

■ Embedded Power for  
*Business-Critical Continuity™*

## ***Embedded Power AC-DC and DC-DC Power Conversion Solutions***





# Contents

## AC–DC Power Supplies

### Low Power 2-500 W

|                                   |    |
|-----------------------------------|----|
| ■ Open frame/enclosed 1-4 outputs | 8  |
| ■ Convection/conduction mounting  | 13 |
| ■ External power adapters         | 15 |

### Healthcare Power Up to 4920 W

|                |    |
|----------------|----|
| ■ 1-24 outputs | 18 |
|----------------|----|

### LED Drivers Up to 100 W

|                        |    |
|------------------------|----|
| ■ LED lighting drivers | 22 |
|------------------------|----|

### Micro Medium Power (μMP) Up to 1200 W

|                    |    |
|--------------------|----|
| ■ Up to 12 outputs | 23 |
|--------------------|----|

### Medium Power (MP) Up to 1200 W

|                                              |    |
|----------------------------------------------|----|
| ■ 1-10 outputs standard (up to 21 available) | 25 |
|----------------------------------------------|----|

### Intelligent Medium Power (iMP) Up to 1500 W

|                    |    |
|--------------------|----|
| ■ Up to 21 outputs | 27 |
|--------------------|----|

### Intelligent High Power (iVS) Up to 4920 W

|                    |    |
|--------------------|----|
| ■ Up to 24 outputs | 30 |
|--------------------|----|

### Bulk Power 350-12000 W

|                                    |    |
|------------------------------------|----|
| ■ Bulk front end                   | 33 |
| ■ Distributed power bulk front end | 35 |

### Distributed Power (DS) 450-2900 W

|                           |    |
|---------------------------|----|
| ■ Available 1U, 2U and 3U | 38 |
|---------------------------|----|

### DIN Rail (ADN) 24 V 120-480 W

|                    |    |
|--------------------|----|
| ■ Single & 3-phase | 43 |
|--------------------|----|

## DC–DC Converters

### Industry Standard Isolated

|                   |    |
|-------------------|----|
| ■ Sixteenth-Brick | 47 |
| ■ Eighth-Brick    | 48 |
| ■ Quarter-Brick   | 49 |
| ■ Half-Brick      | 51 |
| ■ RF Power Brick  | 52 |

### Industry Standard Non-Isolated

|                       |    |
|-----------------------|----|
| ■ C-Class             | 53 |
| ■ E-Class             | 56 |
| ■ F-Class             | 57 |
| ■ POLA Products       | 58 |
| ■ VRM Processor Power | 60 |

### High Power 300 V Input

|                                 |    |
|---------------------------------|----|
| ■ Power Factor Correction (PFC) | 62 |
| ■ 300 V Full-Brick              | 62 |
| ■ 300 V Half-Brick              | 62 |
| ■ 300 V Quarter-Brick           | 62 |

### Low Power Industrial

|                                |    |
|--------------------------------|----|
| ■ Industrial Standard Products | 63 |
|--------------------------------|----|

|                      |    |
|----------------------|----|
| Terms and Conditions | 65 |
| Index                | 67 |

For additional information go to  
[www.Emerson.com/EmbeddedPower](http://www.Emerson.com/EmbeddedPower)



The Embedded Power business of Emerson Network Power offers thousands of standard, modified standards and custom power supply products. Every standard product in our extensive portfolio is designed to help speed time-to-market more cost effectively and with less risk – with an outstanding level of support.

Our research, development, sales and support teams throughout the world are dedicated to meeting your needs today and in the future with innovative power solutions. We have invested in state-of-the-art manufacturing facilities and advanced global distribution systems to quickly manufacture and deliver the power products you need. We can quickly respond to your changing demands and have the ability to support you locally or worldwide.

Uniting the well-known Astec and Artesyn brands, the combined strength and experience of these companies, fused with pedigrees of quality, innovation and a deep understanding of our customers' needs, positions Emerson Network Power for continued growth and leadership in the embedded power markets.

This catalog lists key performance data for all standard ac-dc power supplies and dc-dc converters from the Embedded Power business of Emerson Network Power. It is designed to provide you with a fast, easy-to-use means of identifying the ideal power source for your application.

After selecting the product that you need from this catalog, we recommend that you visit our website to obtain more detailed information. You will find that you can quickly download product datasheets and safety certificates, check stock levels at our extensive global distribution network, and request evaluation samples. You can even ask one of our experts for technical advice, or register for the 'MyPower' community portal to gain access to tools, a knowledge base and support to help guide you to the best power solution for your needs.

## Local Support

*Our regional sales offices are ready to provide expert local applications and sales support. In addition, an extensive network of manufacturers' representatives and distributors bring our products to you. Please call for locations of sales offices near you or visit our website at [Emerson.com/EmbeddedPower](http://Emerson.com/EmbeddedPower).*

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For additional information go to  
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## Accelerate, Improve & Enhance the Capabilities of Your Next System Design

*At Emerson Network Power, our engineers have been designing and developing power supply products for over 35 years. Our products have helped pave the way for advancements in numerous applications in the communications, industrial, computing, data storage and healthcare markets.*

When developing products, time is money. Every step in the process that you can eliminate, speed up, or make more effective accelerates your time-to-market and lowers your R&D costs. Major advantages of partnering with Emerson Network Power include:

- Broadest power supply product lines
- Highly versatile power supplies
- Modified standards and value-add services
- Low energy consumption
- Eco-friendly products
- Space-efficient power
- Reliability & quality
- Worldwide distributor network
- Vast knowledge, experience & expertise

### Innovation for the Next Generation

Many of our products incorporate powerful programming, monitoring and self-testing software providing system engineers with critical data to manage power consumption. High efficiency, green design and manufacturing technologies, and innovative demand and supply replenishment systems collectively deliver key business efficiencies and new design capabilities. Emerson Network Power can help take your new product design or redevelopment efforts to the next level with a shorter time-to-profit, higher reliability and greater scalability. Emerson benefits include:

- **Shorter Time-to-Market** – our latest programmable power solutions and our modular, medium/high power  $\mu$ MP and iMP series provide you with shorter time-to-market and offer faster test and qualification than traditional analog power solutions. Our modified standards and value-add services also provide turn-key solutions for the best application match to help accelerate time-to-market without compromising quality.
- **Higher Reliability** – moving from inflexible fixed-output analog power supplies to programmable power solutions enables our engineers to more extensively test and document our products to ensure they meet or exceed your reliability requirements. And we provide a wide range of on-line environmental, EMC compliance and safety certification to help speed your product design process.
- **Greater Scalability** – many of our latest power solutions are scalable, programmable and plug-compatible with our earlier-generation products, enabling you to quickly address changes or enhancements to your systems. You can now satisfy most changes in power requirements simply by reprogramming the power supply – and if your needs change radically, you can easily swap to a more capable solution. This inherent scalability eliminates redesign costs, reduces testing time and provides you with greater design flexibility.



## Power Supply Design Controls

*Emerson utilizes the following design methodologies and techniques to ensure that our power supplies meet the rigorous quality & reliability requirements of the communications, industrial, computing, data storage and healthcare markets.*

### Reliability Models and Predictions

- A prediction of design reliability in terms of Mean Time Between Failures (MTBF) using Telecordia, Bellcore or MIL-HDBK-217F
- Not intended as a measure of expected field performance, but for design trade-off analysis and review of part stress derating performance

### Failure Modes and Effect Analysis

- An analytical technique to identify and review failure modes, their causes, mechanisms and effects
- Provides a formal risk assessment to reduce field failures at the customer site

### Component Selection

- Database warehouse of all component information
- Design engineers can only select components rigorously approved from suppliers that have undergone strict qualification and auditing process

### Derating Analysis

- Intended to reduce the failure rate of components

### Design for Manufacturability

- Design rules regarding manufacturability

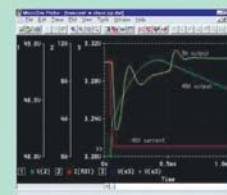
### Simulation Analysis – Computer-Aided Engineering Tools

- Thermal Simulation
- Circuit Simulation
- EMI Field Simulation
- Detailed Mechanical Design
- PCB Layout and Tracking
- Structural Simulation

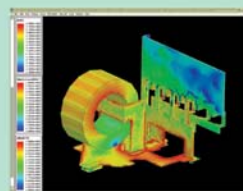
#### Emerson Computer-Aided Engineering Tools



Thermal Simulation



Circuit Simulation



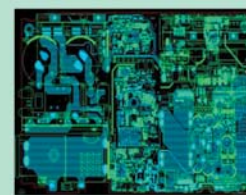
EMI Field Simulation



Detailed Mechanical Design



PCB Layout and Tracking



Structural Simulation



## MyPower Community Portal

**Discover. Communicate. Collaborate.**

MyPower is a free community portal that provides a variety of tools and resources including:



### Community

Utilizing the tools and resources provided will increase your standard knowledge base of our industry. Resources include:

- Industry Links
- What's New
- Trade Shows
- Tools & Calculators



### Knowledge Base

Familiarize yourself with our products and services. This section is designed to help build your industry knowledge.

- Product Videos
- White Papers
- Industry Books
- Educational Product Videos

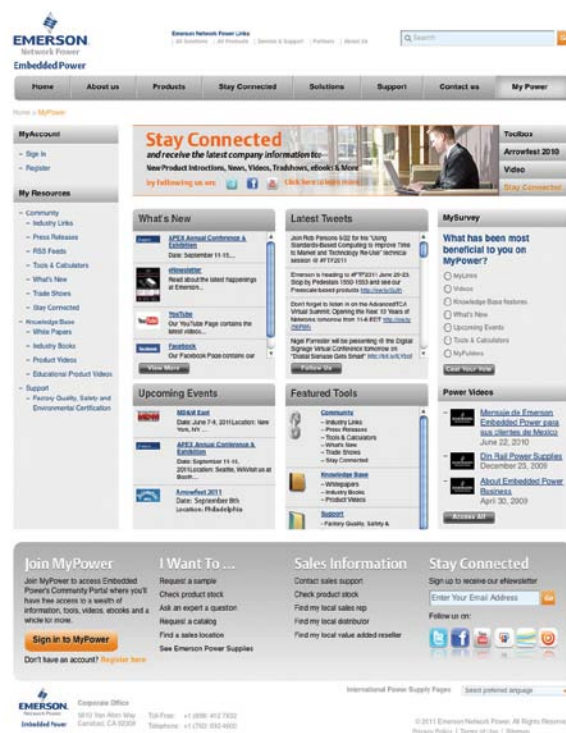


### Support

Emerson Network Power strives to support your needs. In this section you will find:

- Factory Quality, Safety and Environmental Certifications

To sign up for a free MyPower account go to [www.Emerson.com/MyPower](http://www.Emerson.com/MyPower)



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### Stay Connected.

The latest happenings are being posted on Twitter, Facebook and YouTube! Sign up for one or all of the sites below and stay connected with Emerson Network Power!

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[www.facebook.com/EmersonPowerSupplies](http://www.facebook.com/EmersonPowerSupplies)

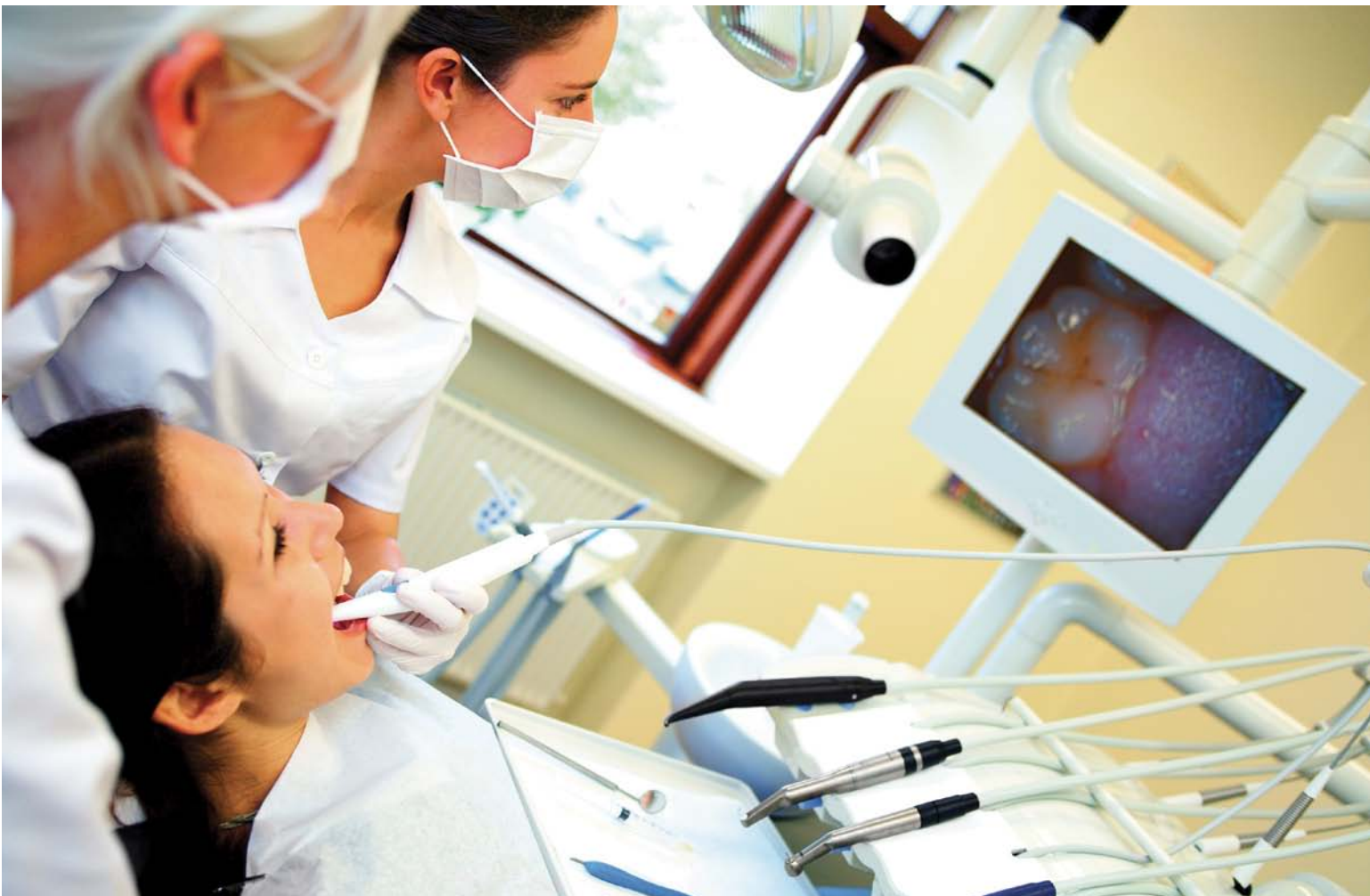
[www.youtube.com/EmersonNetworkPower](http://www.youtube.com/EmersonNetworkPower)





## AC-DC Power Supplies

*Emerson Network Power is widely acknowledged as an industry leader and produces an exceptionally wide range of AC-DC power conversion products.*



# Low Power

Open frame/enclosed 1-4 outputs

20-500 Watts

## Special Features

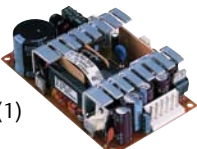
### All models feature:

- Industry standard footprints
- Wide-range AC input
- Full power to 50 °C
- High demonstrated MTBF
- Overvoltage protection
- Overload protection
- Built-in EMI filtering
- Extensive safety approvals
- Derated operation to 70 °C

### Many models feature:

- EN61000-3-2 compliance
- Supervisory outputs (5 V/12 V)
- Wide-adjust floating 4<sup>th</sup> output
- Single wire current share
- Medical approvals
- Remote sense
- Adjustable outputs
- Power fail
- Wide-adjust on single output models
- Derated operation to 80 °C



| Output Power                                                                                                |                 | Output                 |                      |                       |    | Size W x L x H (mm)                         | Model         |
|-------------------------------------------------------------------------------------------------------------|-----------------|------------------------|----------------------|-----------------------|----|---------------------------------------------|---------------|
| [Forced Air]                                                                                                | Free Air        | V1                     | V2                   | V3                    | V4 |                                             |               |
| <b>[20 W]</b><br>          | <b>20 W</b>     | <b>NLP25 Series</b>    |                      |                       |    |                                             |               |
|                                                                                                             |                 | 5 V @ 2 A              | 12 V @ 0.8 A         |                       |    | 2.07" x 4" x 0.91"                          | NLP25-7629J   |
|                                                                                                             |                 | 5 V @ 2 A              | 12 V @ 0.8 A         | -5 V @ 0.1 A          |    | (52.57 x 101.6 x 23.2)                      | NLP25-7607J   |
|                                                                                                             |                 | 5 V @ 2 A              | 12 V @ 0.8 A         | -12 V @ 0.1 A         |    |                                             | NLP25-7608J   |
| <b>[40 W]</b><br><br>(1)  | <b>25 W</b>     | <b>LP20 Series</b>     |                      |                       |    |                                             |               |
|                                                                                                             |                 | 5 V @ 5 A [8 A]*       |                      |                       |    | 3" x 5" x 1.2"                              | LPS22         |
|                                                                                                             |                 | 12 V @ 2.1 A [3.3 A]*  |                      |                       |    | (76.2 x 127 x 30.5)                         | LPS23         |
|                                                                                                             |                 | 15 V @ 1.7 A [2.7]*    |                      |                       |    |                                             | LPS24         |
|                                                                                                             |                 | 24 V @ 1.1 A [1.8 A]*  |                      |                       |    |                                             | LPS25         |
|                                                                                                             |                 | 5 V @ 3 A [4 A]        | 12 V @ 1.5 A [2 A]   | -12 V @ 0.5 A [0.7 A] |    |                                             | LPT22         |
|                                                                                                             |                 | 5 V @ 4 A [5 A]        | 12 V @ 0.5 A [0.7 A] | -12 V @ 0.5 A [0.7 A] |    |                                             | LPT23         |
|                                                                                                             |                 | 5 V @ 3 A [4 A]        | 12 V @ 1.5 A [2 A]   | -5 V @ 0.5 A [0.7 A]  |    |                                             | LPT24         |
|                                                                                                             |                 | 5 V @ 3 A [4 A]        | 15 V @ 1.5 A [2 A]   | -15 V @ 0.5 A [0.7 A] |    |                                             | LPT25         |
|                                                                                                             |                 |                        |                      |                       |    |                                             |               |
| <b>[40 W]</b><br><br>(1) | <b>25 W</b>     | <b>NPS20-M Series</b>  |                      |                       |    |                                             |               |
|                                                                                                             |                 | 5 V @ 5 A [8 A]*       |                      |                       |    | 2" x 4" x 1"                                | NPS22-M       |
|                                                                                                             |                 | 12 V @ 2.1 A [3.3 A]*  |                      |                       |    | (50.8 x 101.6 x 25.4)                       | NPS23-M       |
|                                                                                                             |                 | 15 V @ 1.7 A [2.7]*    |                      |                       |    |                                             | NPS24-M       |
|                                                                                                             |                 | 24 V @ 1 A [1.8 A]*    |                      |                       |    |                                             | NPS25-M       |
|                                                                                                             |                 | 48 V @ 0.5 A [0.84 A]* |                      |                       |    |                                             | NPS28-M       |
| <b>[47 W]</b><br>        | <b>Enclosed</b> | <b>LCT43-E</b>         |                      |                       |    |                                             |               |
|                                                                                                             |                 | 5 V @ 4 A [7 A]        | 12 V @ 1 A [1.2 A]   | -12 V @ 0.5 A [0.5 A] |    | 3.2" x 6.2" x 1.5"<br>(81.3 x 157.5 x 38.1) | LCT43-E       |
| <b>[50 W]</b><br><br>(1) | <b>40 W</b>     | <b>NLP40 Series</b>    |                      |                       |    |                                             |               |
|                                                                                                             |                 | 3.3 V @ 9 A*           |                      |                       |    | 2.5" x 4.25" x 1.15"                        | NLP40-7653J   |
|                                                                                                             |                 | 12 V @ 4 A*            |                      |                       |    | (63.5 x 108 x 29.2)                         | NLP40-7612J   |
|                                                                                                             |                 | 5 V @ 9 A*             |                      |                       |    |                                             | NLP40-7605J   |
|                                                                                                             |                 | 12 V @ 4 A*            |                      |                       |    |                                             | NLP40-7612J   |
|                                                                                                             |                 | 15 V @ 3.3 A*          |                      |                       |    |                                             | NLP40-7615J   |
|                                                                                                             |                 | 24 V @ 2 A*            |                      |                       |    |                                             | NLP40-7624J   |
|                                                                                                             |                 | 48 V @ 1 A*            |                      |                       |    |                                             | NLP40-7617J   |
|                                                                                                             |                 | 5 V @ 4.5 A            | 12 V @ 3 A           |                       |    |                                             | NLP40-7629J   |
|                                                                                                             |                 | 12 V @ 2.1 A           | -12 V @ 2.1 A        |                       |    |                                             | NLP40-7627J   |
|                                                                                                             |                 | 3.3 V @ 4.5 A          | 12 V @ 3 A           | -12 V @ 0.5 A         |    |                                             | NLP40-76T366J |
|                                                                                                             |                 | 5 V @ 4.5 A            | 12 V @ 3 A           | -12 V @ 0.5 A         |    |                                             | NLP40-7608J   |
|                                                                                                             |                 | 5 V @ 4.5 A            | 15 V @ 2 A           | -15 V @ 0.5 A         |    |                                             | NLP40-7610J   |
|                                                                                                             |                 |                        |                      |                       |    |                                             |               |

Options:  
 [ ] Rating with 30 CFM of air  
 (1) Optional cover/enclosure  
 \* Floating output



| Output Power                                                                                                                                            |          | Output                |    |                    |    | Size W x L x H (mm)   | Model |                     |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------|----|--------------------|----|-----------------------|-------|---------------------|-------|
| [Forced Air]                                                                                                                                            | Free Air | V1                    | V2 | V3                 | V4 |                       |       |                     |       |
| <div><div>[55 W]</div><div><div>(1)</div></div></div>                  | 40 W     | LP40 Series           |    |                    |    |                       |       |                     |       |
|                                                                                                                                                         |          | 3.3 V@8 A [11 A]*     |    |                    |    | 3" x 5" x 1.2"        |       | LPS41               |       |
|                                                                                                                                                         |          | 5 V@8 A [11 A]*       |    |                    |    | (76.2 x 127 x 30.5)   |       | LPS42               |       |
|                                                                                                                                                         |          | 12 V@3.3 A [4.5]*     |    |                    |    |                       |       | LPS43               |       |
|                                                                                                                                                         |          | 15 V@2.6 A [3.6 A]*   |    |                    |    |                       |       | LPS44               |       |
|                                                                                                                                                         |          | 24 V@1.6 A [2.3 A]*   |    |                    |    |                       |       | LPS45               |       |
|                                                                                                                                                         |          | 48 V@0.9 A [1.2 A]*   |    |                    |    |                       |       | LPS48               |       |
|                                                                                                                                                         |          | 3.3 V@4 A [7 A]       |    | 5 V@1.5 A [2 A]    |    | +12 V@0.5 A [0.7 A]   |       | LPT41               |       |
|                                                                                                                                                         |          | 5 V@4 A [5 A]         |    | 12 V@2 A [2.5 A]   |    | -12 V@0.5 A [0.7 A]   |       | LPT42               |       |
|                                                                                                                                                         |          | 5 V@6 A [8 A]         |    | 12 V@0.5 A [0.7 A] |    | -12 V@0.5 A [0.7 A]   |       | LPT43               |       |
|                                                                                                                                                         |          | 5 V@4 A [5 A]         |    | 12 V@2 A [2.5 A]   |    | -5 V@0.5 A [0.7 A]    |       | LPT44               |       |
|                                                                                                                                                         |          | 5 V@4 A [5 A]         |    | 15 V@2 A [2.5 A]   |    | -15 V@0.5 A [0.7 A]   |       | LPT45               |       |
|                                                                                                                                                         |          | 5 V@4 A [5 A]         |    | 24 V@1 A [1.5 A]   |    | +12 V@0.5 A [0.7 A]   |       | LPT46               |       |
| <div><div>[60 W]</div><div><div>(1)</div></div></div>                  | 45 W     | NPS40-M Series        |    |                    |    |                       |       |                     |       |
|                                                                                                                                                         |          | 5 V@8 A [11 A]*       |    |                    |    | 2" x 4" x 1"          |       | NPS42-M             |       |
|                                                                                                                                                         |          | 12 V@3.75 A [5 A]*    |    |                    |    | (50.8 x 101.6 x 25.4) |       | NPS43-M             |       |
|                                                                                                                                                         |          | 15 V@3 A [4 A]*       |    |                    |    |                       |       | NPS44-M             |       |
|                                                                                                                                                         |          | 24 V@1.9 A [2.5 A]*   |    |                    |    |                       |       | NPS45-M             |       |
|                                                                                                                                                         |          | 48 V@0.94 A [1.25 A]* |    |                    |    |                       |       | NPS48-M             |       |
| <div><div>[55 W]</div><div><div>(1)</div></div></div>                  | 55 W     | LP50 Series           |    |                    |    |                       |       |                     |       |
|                                                                                                                                                         |          | 3.3 V@8 A             |    | 5 V@3 A            |    | 12 V@0.5 A            |       | 2" x 4" x 1.3"      | LPT51 |
|                                                                                                                                                         |          | 5 V@8 A               |    | 12 V@3 A           |    | -12 V@0.5 A           |       | (50.8 x 101.6 x 33) | LPT52 |
|                                                                                                                                                         |          | 5 V@8 A               |    | 15 V@2.4 A         |    | -15 V@0.5 A           |       |                     | LPT53 |
|                                                                                                                                                         |          | 5 V@8 A               |    | 24 V@1.5 A         |    | 12 V@0.5 A            |       |                     | LPT54 |
| <div><div>[60 W]</div><div><div>(1)</div></div></div>                | 60 W     | 5 V@11 A*             |    |                    |    |                       |       | LPS52               |       |
|                                                                                                                                                         |          | 5 V@11 A*             |    |                    |    |                       |       | LPS52 (-I)          |       |
|                                                                                                                                                         |          | 12 V@5 A*             |    |                    |    |                       |       | LPS53               |       |
|                                                                                                                                                         |          | 12 V@5 A*             |    |                    |    |                       |       | LPS53 (-I)          |       |
|                                                                                                                                                         |          | 15 V@4 A*             |    |                    |    |                       |       | LPS54               |       |
|                                                                                                                                                         |          | 24 V@2.5 A*           |    |                    |    |                       |       | LPS55               |       |
|                                                                                                                                                         |          | 48 V@1.25 A*          |    |                    |    |                       |       | LPS58               |       |
| <div><div>[60 W]</div><div><div>NEW!</div><div>(1)</div></div></div> | 60 W     | NPS60-M Series        |    |                    |    |                       |       |                     |       |
|                                                                                                                                                         |          | 5 V@11 A*             |    |                    |    | 2" x 4" x 1"          |       | NPS62-M             |       |
|                                                                                                                                                         |          | 12 V@5 A*             |    |                    |    | (50.8 x 101.6 x 25.6) |       | NPS63-M             |       |
|                                                                                                                                                         |          | 24 V@2.5 A*           |    |                    |    |                       |       | NPS65-M             |       |

## Options:

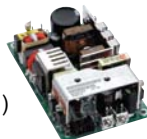
[ ] Rating with 30 CFM of air

(1) Optional cover/enclosure

\* Floating output

(-I) Industrial version -40 °C up to 80 °C (derated)



| Output Power                                                                                      |            | Output                                                                                            |                    |                   |                             | Size W x L x H (mm)    | Model                           |                     |              |
|---------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------|--------------------|-------------------|-----------------------------|------------------------|---------------------------------|---------------------|--------------|
| [Forced Air]                                                                                      | Free Air   | V1                                                                                                | V2                 | V3                | V4                          |                        |                                 |                     |              |
|                                                                                                   |            |                                                                                                   |                    |                   |                             |                        |                                 |                     |              |
| <div>(1)</div>   | 65 W       | NLP65 Series                                                                                      |                    |                   |                             |                        |                                 |                     |              |
|                                                                                                   |            | 5 V@12 A*                                                                                         |                    |                   |                             | 3" x 5" x 1.26"        | NLP65-7605J                     |                     |              |
|                                                                                                   |            | 5 V@12 A*                                                                                         |                    |                   |                             | (76.2 x 127 x 32)      | NLP65-9605J <sup>(5)(G)</sup>   |                     |              |
|                                                                                                   |            | 12 V@6.5 A*                                                                                       |                    |                   |                             |                        | NLP65-7612J <sup>(G)</sup>      |                     |              |
|                                                                                                   |            | 12 V@6.5 A*                                                                                       |                    |                   |                             |                        | NLP65-9612J <sup>(5)(G)</sup>   |                     |              |
|                                                                                                   |            | 24 V@3.5 A*                                                                                       |                    |                   |                             |                        | NLP65-7624J <sup>(G)</sup>      |                     |              |
|                                                                                                   |            | 24 V@3.5 A*                                                                                       |                    |                   |                             |                        | NLP65-9624J <sup>(5)(G)</sup>   |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 12 V@3 A           |                   |                             |                        | NLP65-7629J                     |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 12 V@3 A           |                   |                             |                        | NLP65-9629J <sup>(5)(G)</sup>   |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 24 V@2 A           | +12 V@1.0 A       |                             |                        | NLP65-3322J                     |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 12 V@3 A           | -12 V@0.8 A       |                             |                        | NLP65-7608J <sup>(G)</sup>      |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 12 V@3 A           | -12 V@0.8 A       |                             |                        | NLP65-9608J <sup>(5)(E,G)</sup> |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 15 V@2.5 A         | -15 V@0.8 A       |                             |                        | NLP65-7610GJ                    |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 15 V@2.5 A         | -15 V@0.8 A       |                             |                        | NLP65-9610J <sup>(5)(G)</sup>   |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 24 V@2 A           |                   |                             |                        | NLP65-7620J                     |                     |              |
|                                                                                                   |            | 5 V@8 A                                                                                           | 24 V@2 A           |                   |                             |                        | NLP65-9620J <sup>(5)(G)</sup>   |                     |              |
| <div>(1)</div>   | 60 W       | LP60 Series                                                                                       |                    |                   |                             |                        |                                 |                     |              |
|                                                                                                   |            | 3.3 V@12 A [16 A]*                                                                                |                    |                   |                             | 3" x 5" x 1.65"        | LPS61                           |                     |              |
|                                                                                                   |            | 5 V@12 A [16 A]*                                                                                  |                    |                   |                             | (76.2 x 127 x 41.9)    | LPS62                           |                     |              |
|                                                                                                   |            | 12 V@5 A [6.7 A]*                                                                                 |                    |                   |                             |                        | LPS63                           |                     |              |
|                                                                                                   |            | 15 V@4 A [5.3 A]*                                                                                 |                    |                   |                             |                        | LPS64                           |                     |              |
|                                                                                                   |            | 24 V@2.5 A [3.3 A]*                                                                               |                    |                   |                             |                        | LPS65                           |                     |              |
|                                                                                                   |            | 48 V@1.3 A [1.7 A]*                                                                               |                    |                   |                             |                        | LPS68                           |                     |              |
|                                                                                                   |            | 3.3 V@5 A [8.5 A]                                                                                 | 5 V@2.5 A [3 A]    | +12 V@0.5 A [1 A] |                             |                        | LPT61                           |                     |              |
|                                                                                                   |            | 5 V@7 A [8 A]                                                                                     | 12 V@3 A [3.5 A]   | -12 V@0.7 A [1 A] |                             |                        | LPT62                           |                     |              |
|                                                                                                   |            | 5 V@7 A [8 A]                                                                                     | 15 V@2.8 A [3.3 A] | -15 V@0.7 A [1 A] |                             |                        | LPT63                           |                     |              |
|                                                                                                   |            | 5 V@7 A [8 A]                                                                                     | 12 V@3 A [3.5 A]   | -5 V@0.7 A [1 A]  |                             |                        | LPT64                           |                     |              |
|                                                                                                   |            | 5 V@7 A [8 A]                                                                                     | 24 V@1.5 A [2 A]   | +12 V@0.7 A [1 A] |                             |                        | LPT65                           |                     |              |
|                                                                                                   |            | <div>(1)</div> | 80 W               | NLP110 Series     |                             |                        |                                 |                     |              |
|                                                                                                   |            |                                                                                                   |                    | 5 V@22 A*         |                             |                        |                                 | 3" x 6.5" x 1.26"   | NLP110-9605J |
|                                                                                                   |            |                                                                                                   |                    | 12 V@9.2 A*       |                             |                        |                                 | (76.2 x 165.1 x 32) | NLP110-9612J |
|                                                                                                   |            |                                                                                                   |                    | 24 V@4.6 A*       |                             |                        |                                 |                     | NLP110-9624J |
| 48 V@2.3 A*                                                                                       |            |                                                                                                   |                    |                   | NLP110-9617J                |                        |                                 |                     |              |
| 5 V@18 A                                                                                          | 3.3 V@20 A |                                                                                                   |                    | 12 V@1 A          |                             |                        | NLP110-9693J                    |                     |              |
| 12 V@8.5 A                                                                                        | 5 V@18 A   | -12 V@1 A                                                                                         |                    |                   | NLP110-9608J <sup>(5)</sup> |                        |                                 |                     |              |
| <div>(1)</div> | 70 W       | NTQ120 Series                                                                                     |                    |                   |                             |                        |                                 |                     |              |
|                                                                                                   |            | 3.3 V@14 A [25 A]                                                                                 | 5 V@12.5 A [24 A]  | +12 V@1 A [2 A]   | -12 V@0.5 A [1 A]           | 4" x 7" x 1.5"         | NTQ123                          |                     |              |
|                                                                                                   |            | 3.3 V@14 A [25 A]                                                                                 | 5 V@12.5 A [24 A]  | +12 V@1 A [2 A]   | -12 V@0.5 A [1 A]           | (101.6 x 177.8 x 38.1) | NTQ123-DC                       |                     |              |
| <div>(1)</div> | 80 W       | LP120 Series                                                                                      |                    |                   |                             |                        |                                 |                     |              |
|                                                                                                   |            | 3.3 V@16 A [26 A]*                                                                                |                    |                   |                             | 3" x 5" x 1.29"        | LPS121                          |                     |              |
|                                                                                                   |            | 5 V@16 A [26 A]*                                                                                  |                    |                   |                             | (101.6 x 177.8 x 38.1) | LPS122                          |                     |              |
|                                                                                                   |            | 12 V@6.6 A [10.8 A]*                                                                              |                    |                   |                             |                        | LPS123                          |                     |              |
|                                                                                                   |            | 15 V@5.3 A [8.6 A]*                                                                               |                    |                   |                             |                        | LPS124                          |                     |              |
|                                                                                                   |            | 24 V@3.4 A [5.4 A]*                                                                               |                    |                   |                             |                        | LPS125                          |                     |              |
|                                                                                                   |            | 48 V@1.7 A [2.7 A]*                                                                               |                    |                   |                             |                        | LPS128                          |                     |              |

## Options:

- (E) To order an enclosed version of the NLP65-9608J, add suffix 'EJ' to the end of the model number, e.g., NLP65-9608EJ. The enclosed version includes: IEC connector, on/off switch, wire harness output connector and fitted cover.
- (G) A safety earth ground pin and ground choke are available as an option. To order, please add the suffix 'GJ' to the end of the model number e.g. NLP65-9612GJ.

[ ] Rating with 30 CFM of air

(1) Optional cover/enclosure

\* Floating output

(5) These modules feature harmonic current correction to EN6100-3-2

| Output Power                                                                                                                 |                        | Output                             |                                    |                                   |                                 | Size W x L x H (mm)                         | Model                         |
|------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------|------------------------------------|-----------------------------------|---------------------------------|---------------------------------------------|-------------------------------|
| [Forced Air]                                                                                                                 | Free Air               | V1                                 | V2                                 | V3                                | V4                              |                                             |                               |
| <b>[130 W]</b><br><b>80 W</b><br><br>(1)    | <b>LPT100-M Series</b> | 3.3 V @ 13 A [18 A]                | 5 V @ 5 A [9 A]                    | 12 V @ 1 A [2.3 A]                |                                 | 2" x 4" x 1.28"                             | LPT101-M                      |
|                                                                                                                              |                        | 5 V @ 13 A [18 A]                  | 12 V @ 5 A [9 A]                   | -12 V @ 1 A [2 A]                 |                                 | (50.8 x 101.6 x 32.7)                       | LPT102-M                      |
|                                                                                                                              |                        | 5 V @ 13 A [18 A]                  | 15 V @ 4 A [7.2 A]                 | -15 V @ 1 A [1.5 A]               |                                 |                                             | LPT103-M                      |
|                                                                                                                              |                        | 5 V @ 13 A [18 A]                  | 24 V @ 1.5 A [3 A]                 | 12 V @ 1 A [2.3 A]                |                                 |                                             | LPT104-M                      |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |
| <b>[145 W]</b><br><b>80 W</b><br><br>(1)    | <b>LP140 Series</b>    | 5 V @ 12 A [25 A]<br>(3.3-5 V)     | 12 V @ 5 A [6 A]                   | -12 V @ 1 A [1.5 A]<br>(-12-15 V) | ±3.3-25 V @<br>1.5 A [4.5 A]*   | 4" x 7" x 1.5"<br>(101.6 x 177.8 x 38.1)    | LPQ142                        |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |
| <b>[150 W]</b><br><b>100 W</b><br><br>(1)   | <b>TLP150 Series</b>   | 12 V @ 12.5 A*                     |                                    |                                   |                                 | 3" x 5" x 1.25"                             | TLP150R-96S12J <sup>(f)</sup> |
|                                                                                                                              |                        | 24 V @ 6.3 A*                      |                                    |                                   |                                 | (76.2 x 127 x 31.75)                        | TLP150R-96S24J <sup>(f)</sup> |
|                                                                                                                              |                        | 36 V @ 4.2 A*                      |                                    |                                   |                                 |                                             | TLP150R-96S36J                |
|                                                                                                                              |                        | 48 V @ 3.2 A*                      |                                    |                                   |                                 |                                             | TLP150R-96S48J <sup>(f)</sup> |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |
| <b>[150 W]</b><br><b>100 W</b><br><br>(1)   | <b>LPS100-M Series</b> | 5 V @ 16 A [24 A]*                 |                                    |                                   |                                 | 2" x 4" x 1.29"                             | LPS102-M                      |
|                                                                                                                              |                        | 12 V @ 8.3 A [12.5 A]*             |                                    |                                   |                                 | (50.8 x 101.6 x 33)                         | LPS103-M                      |
|                                                                                                                              |                        | 15 V @ 6.7 A [10 A]*               |                                    |                                   |                                 |                                             | LPS104-M                      |
|                                                                                                                              |                        | 24 V @ 4.2 A [6.3 A]*              |                                    |                                   |                                 |                                             | LPS105-M                      |
|                                                                                                                              |                        | 48 V @ 2.1 A [3.1 A]*              |                                    |                                   |                                 |                                             | LPS108-M                      |
| <b>[165 W]</b><br><b>50 W</b><br><br>(1)   | <b>NTQ160 Series</b>   | 3.3 V @ 15 A [30 A]<br>(1.8-3.5 V) | 5 V @ 10 A [20 A]<br>(3-5.5 V)     | 12 V @ 2 A [4.5 A]*               | 12 V @ 2 A [4.5 A]*             | 4.25" x 8.5" x 1.5"<br>(108 x 215.9 x 38.1) | NTQ162                        |
|                                                                                                                              |                        | 5 V @ 15 A [30 A]<br>(3.3-5 V)     | 3.3 V @ 10 A [20 A]                | 12 V @ 2 A [4.5 A]*               | 12 V @ 2 A [4.5 A]*             |                                             | NTQ163                        |
|                                                                                                                              |                        | 3.3 V @ 15 A [30 A]<br>(3.3-5 V)   | 2.5 V @ 10 A [20 A]<br>(1.8-3.5 V) | 5 V @ 2 A [4 A]*                  | 12 V @ 2 A [4 A]*               |                                             | NTQ165                        |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |
| <b>[175 W]</b><br><b>110 W</b><br><br>(1) | <b>LP170 Series</b>    | 5 V @ 22 A [35 A]*<br>(2.5-6 V)    |                                    |                                   |                                 | 4.25" x 8.5" x 1.5"<br>(108 x 215.9 x 38.1) | LPS172                        |
|                                                                                                                              |                        | 12 V @ 9.1 A [15 A]*<br>(6-12 V)   |                                    |                                   |                                 |                                             | LPS173                        |
|                                                                                                                              |                        | 15 V @ 7.3 A [12 A]*<br>(12-24 V)  |                                    |                                   |                                 |                                             | LPS174                        |
|                                                                                                                              |                        | 24 V @ 4.5 A [7.5]*<br>(24-54 V)   |                                    |                                   |                                 |                                             | LPS175                        |
|                                                                                                                              |                        | 5 V @ 15 A [30 A]<br>(3.3-5.5 V)   | 12 V @ 6 A [8 A]                   | -12 V @ 0.2 A [3 A]<br>(-12-15 V) | ±3.3-25 V @<br>2 A [5 A]*       |                                             | LPQ172                        |
|                                                                                                                              |                        | 5 V @ 10 A [24 A]<br>(3.3-5.5 V)   | 12 V @ 6 A [8 A]                   | -12 V @ 1.2 A [3 A]<br>(-12-15 V) | 5 V @ 10 A [24 A]*<br>(3.3-5 V) |                                             | LPQ173                        |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |
| <b>[200 W]</b><br><b>100 W</b><br><br>(1) | <b>LPQ200-M Series</b> | 3.3 V @ 13 A [18 A]                | 5 V @ 13 A [18 A]                  | 12 V @ 5 A [9 A]                  | -12 V @ 1 A [2 A]               | 3" x 5" x 1.32"                             | LPQ201-M                      |
|                                                                                                                              |                        | 5 V @ 13 A [18 A]                  | 12 V @ 5 A [9 A]                   | 24 V @ 1.5 A [3 A]                | -12 V @ 1 A [2 A]               | (76.2 x 127 x 33.6)                         | LPQ202-M                      |
|                                                                                                                              |                        |                                    |                                    |                                   |                                 |                                             |                               |

Options:

[ ] Rating with 30 CFM of air

(1) Optional cover/enclosure

\* Floating output



| Output Power                                                                                    |          | Output                      |               |               |                    | Size W x L x H (mm)                      | Model          |
|-------------------------------------------------------------------------------------------------|----------|-----------------------------|---------------|---------------|--------------------|------------------------------------------|----------------|
| [Forced Air]                                                                                    | Free Air | V1                          | V2            | V3            | V4                 |                                          |                |
| [250 W]                                                                                         | 125 W    | LPS200-M Series             |               |               |                    |                                          |                |
| <br>(1)        |          | 5 V @ 20 A [40 A]*          |               |               |                    | 3" x 5" x 1.32"                          | LPS202-M       |
|                                                                                                 |          | 12 V @ 10.3 A [20.8 A]*     |               |               |                    | (76.2 x 127 x 33.6)                      | LPS203-M       |
|                                                                                                 |          | 15 V @ 8.3 A [16.6 A]*      |               |               |                    |                                          | LPS204-M       |
|                                                                                                 |          | 24 V @ 5.2 A [10.4 A]*      |               |               |                    |                                          | LPS205-M       |
|                                                                                                 |          | 48 V @ 2.6 A [5.2 A]*       |               |               |                    |                                          | LPS208-M       |
| [250 W]                                                                                         | 175 W    | NLP250 Series               |               |               |                    |                                          |                |
| <br>(1)        |          | 12 V @ 21 A*                |               |               |                    | 4" x 7" x 1.5"                           | NLP250R-96S12J |
|                                                                                                 |          | 24 V @ 10.5 A*              |               |               |                    | (101.6 x 177.8 x 38.1)                   | NLP250R-96S24J |
|                                                                                                 |          | 48 V @ 5.3 A*               |               |               |                    |                                          | NLP250R-96S48J |
|                                                                                                 |          | NLP250 – DC (-48 Vdc Input) |               |               |                    |                                          |                |
|                                                                                                 |          | 12 V @ 14.6 A [21 A]        |               |               |                    | 4" x 7" x 1.5"<br>(101.6 x 177.8 x 38.1) | NLP250N-48S12J |
| [250 W]                                                                                         |          | LP250 Series                |               |               |                    |                                          |                |
| <br>(3), (4)    |          | 5 V (3-6 V) @ [50 A]*       |               |               |                    | 5" x 9" x 2"                             | LPS252-C       |
|                                                                                                 |          | 12 V (6-12 V) @ [21 A]*     |               |               |                    | (127 x 228.6 x 50.8)                     | LPS253-C       |
|                                                                                                 |          | 15 V (12-24 V) @ [16.7 A]*  |               |               |                    |                                          | LPS254-C       |
|                                                                                                 |          | 24 V (24-48 V) @ [10.4 A]*  |               |               |                    |                                          | LPS255-C       |
|                                                                                                 |          | 5 V @ [35 A]                | 12 V @ [10 A] | -12 V @ [6 A] | ±5-25 V @ [6 A]*   |                                          | LPQ252-C       |
|                                                                                                 |          | 5 V @ [35 A]                | 15 V @ [10 A] | -15 V @ [6 A] | ±5-25 V @ [6 A]*   |                                          | LPQ253-C       |
| [350 W]                                                                                         |          | LP350 Series                |               |               |                    |                                          |                |
| <br>(3), (4) |          | 5 V (3-6 V) @ [70 A]*       |               |               |                    | 5" x 9" x 2.5"                           | LPS352-C       |
|                                                                                                 |          | 12 V (6-12 V) @ [29.2 A]*   |               |               |                    | (127 x 228.6 x 63.5)                     | LPS353-C       |
|                                                                                                 |          | 15 V (12-24 V) @ [23.3 A]*  |               |               |                    |                                          | LPS354-C       |
|                                                                                                 |          | 24 V (24-48 V) @ [14.6 A]*  |               |               |                    |                                          | LPS355-C       |
|                                                                                                 |          | 5 V @ [50 A]                | 12 V @ [12 A] | -12 V @ [6 A] | ±3.3-24 V @ [6 A]* |                                          | LPQ352-C       |
|                                                                                                 |          | 5 V @ [50 A]                | 15 V @ [12 A] | -15 V @ [6 A] | ±3.3-24 V @ [6 A]* |                                          | LPQ353-C       |
| [350 W]                                                                                         | 200 W    | NTS350 Series               |               |               |                    |                                          |                |
| <br>(3), (4) |          | 12 V @ 16.6 A [29.2 A]*     |               |               |                    | 4" x 7" x 1.5"                           | NTS353         |
|                                                                                                 |          | 24 V @ 8.3 A [14.6 A]*      |               |               |                    | (101.6 x 177.8 x 38)                     | NTS355         |
|                                                                                                 |          | 48 V @ 4.2 A [7.3 A]*       |               |               |                    |                                          | NTS358         |
|                                                                                                 |          | 54 V @ 3.7 A [6.5 A]*       |               |               |                    |                                          | NTS359         |
| [500 W]                                                                                         | 200 W    | NTS500 Series               |               |               |                    |                                          |                |
| <br>(3), (4) |          | 12 V @ 16.6 A [41.7 A]*     |               |               |                    | 4" x 7" x 1.5"                           | NTS503         |
|                                                                                                 |          | 24 V @ 8.3 A [20.8 A]*      |               |               |                    | (101.6 x 177.8 x 38)                     | NTS505         |
|                                                                                                 |          | 18 V @ 11.1 A [27.7 A]*     |               |               |                    |                                          | NTS506         |
|                                                                                                 |          | 48 V @ 4.2 A [10.4 A]*      |               |               |                    |                                          | NTS508         |

## Options:

[ ] Rating with 30 CFM of air

(1) Optional cover/enclosure

(3) Optional top fan cover (see datasheet for increased dimensions)

(4) Optional end fan cover (see datasheet for increased dimensions)

\* Floating output

# LCC250

Convection/conduction  
mounting

250 Watts

Total Power: 250 Watts  
# of Outputs: Single  
Output: 12 V, 24 V



## Special Features

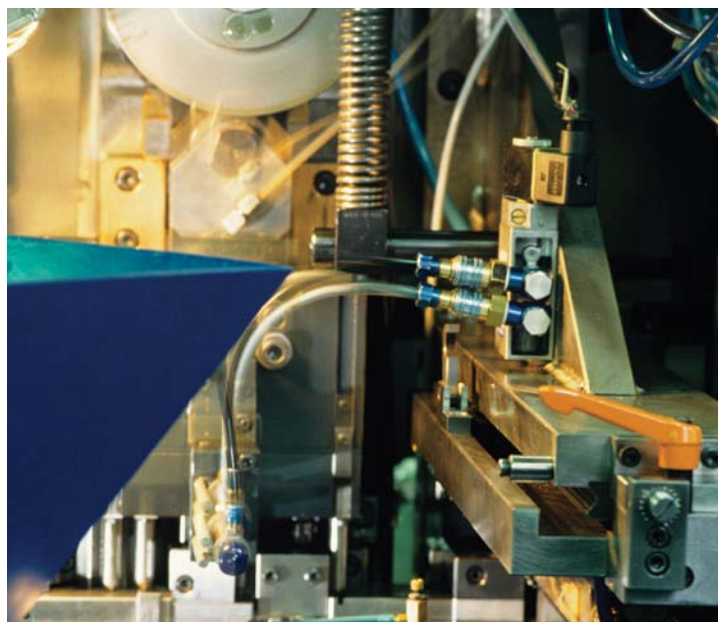
- Wide operating temperature range suited for both outdoor and indoor applications
- 250 W fanless power supply with zero derating up to 85 °C
- IP64 rated
- Conduction or convection mounting
- Differential remote sense
- Output adjust
- Output On/Off (Positive or negative logic user selectable)

## Electrical Specifications

| Input           |                                                                |
|-----------------|----------------------------------------------------------------|
| Input range     | 90-264 Vac (Operating)<br>115/230 Vac (Nominal)                |
| Frequency       | 47-63 Hz                                                       |
| Input fusing    | Internal fuse on both L and N lines                            |
| Inrush current  | 50 A                                                           |
| Power factor    | >0.92 full load                                                |
| Harmonics       | Meets IEN 61000-3-2 Class C                                    |
| Input current   | 3.4 A @ 90 Vac full load                                       |
| Hold up time    | 16 ms minimum at 115 Vac; 100% load                            |
| Efficiency      | 230 Vac; 100% load<br>12 V - 89% typical<br>24 V - 91% typical |
| Leakage current | <275 µA at 230 Vac                                             |

## Environmental Specifications

|                       |                                                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature | Suffix 4P (conduction): -40 °C to +85 °C<br>baseplate temperature<br>Suffix 7P (convection): -40 °C to +85 °C<br>ambient temperature |
| Storage temperature   | -40 °C to 85 °C                                                                                                                      |
| Humidity              | 10% to 100% (condensing & non-condensing)                                                                                            |
| Altitude              | Operating: 13,000 feet<br>Non-operating: 50,000 feet                                                                                 |
| Shock                 | IEC 68-2-27                                                                                                                          |
| Vibration             | IEC 68-2-6 / IEC 721-3-2                                                                                                             |
| Ingress protection    | IP64 rated                                                                                                                           |
| MTBF (calculated)     | >780,000 hours at 100% load; Low line;<br>Telcordia SR332                                                                            |



## Compliance

EMI Class B  
EN61000 Immunity

## Safety

|           |                                     |
|-----------|-------------------------------------|
| UL + CSA  | 60950-1<br>60601-1                  |
| TÜV       | 60950-1<br>60601-1<br>61347-1; 2-13 |
| China     | CCC                                 |
| CB Scheme | IEC 60950-1<br>IEC 61347-1; 2-13    |

## Electrical Specifications

| Output                                   |                                                                                                                                          |                                                                                                                                     |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Output rating                            | 12 V @ 20.83 A<br>24 V @ 10.4 A                                                                                                          | —                                                                                                                                   |
| Set point                                | ±0.2%                                                                                                                                    | Factory set point                                                                                                                   |
| Total regulation range                   | ±2%                                                                                                                                      | Line/load/temperature                                                                                                               |
| Rated load                               | 250 W maximum                                                                                                                            | —                                                                                                                                   |
| Minimum load                             | 0 A Load                                                                                                                                 | No loss of regulation                                                                                                               |
| Capacitive load                          | 0-330 µF/amp                                                                                                                             | —                                                                                                                                   |
| Constant output voltage adjustment range | 12 V: +10/-10%<br>24 V: +14.6/-15%                                                                                                       | Adjust via VR2                                                                                                                      |
| Constant output current adjustment range | +0/-50%                                                                                                                                  | Adjust via VR1<br>CC mode supported from Vo nominal down to 80% Vo                                                                  |
| Output ripple and noise                  | 1%                                                                                                                                       | See Note 1                                                                                                                          |
| Transient response                       | ±5% Vo max transient;<br>recovery <500 µs max                                                                                            | 50% load step @ 1 A/µs<br>Step load verified at: 50% to 100% load; 90-264 Vac input;<br>capacitive load from 0 to 2X 3300 µF (25 V) |
| Remote sense                             | Capable of stable offset of ±0.5 Vdc at<br>output cable termination                                                                      | +SENSE (red wire); -SENSE (black wire)                                                                                              |
| Output On/Off                            | Remote on/off referenced to secondary side.<br>Positive or negative logic user selectable via<br>CN2. Factory default is positive logic. | On/off (orange wire); on/off return (white wire)                                                                                    |
| Overload protection (OCP)                | 150% Io                                                                                                                                  | Autorecovery                                                                                                                        |
| Overvoltage protection (OVP)             | 110% to 125% Vo                                                                                                                          | Latching mode; requires input AC recycle                                                                                            |
| Overtemp protection (OTP)                | —                                                                                                                                        | Autorecovery; hiccup mode                                                                                                           |
| Output isolation                         | 4000 Vac Input to Output<br>1500 Vac Input to Ground<br>500 Vac Output to Ground                                                         | —                                                                                                                                   |

## Ordering Information

| Model Number   | Output | Adjustment Range | Output Current |        | Output Ripple P/P <sup>1</sup> | Combined Line/ Load Regulation | Safety Approval <sup>4</sup> |
|----------------|--------|------------------|----------------|--------|--------------------------------|--------------------------------|------------------------------|
|                |        |                  | Min            | Max    |                                |                                |                              |
| LCC250-12U-4P  | 12 V   | ±10%             | 0 A            | 20.8 A | 1% <sup>2</sup>                | ±2%                            | A, B, E                      |
| LCC250-12U-4PE | 12 V   | ±10%             | 0 A            | 20.8 A | 1% <sup>2</sup>                | ±2%                            | C, D, E                      |
| LCC250-12U-7P  | 12 V   | ±10%             | 0 A            | 20.8 A | 1% <sup>2</sup>                | ±2%                            | A, B, E                      |
| LCC250-12U-7PE | 12 V   | ±10%             | 0 A            | 20.8 A | 1% <sup>2</sup>                | ±2%                            | C, D, E                      |
| LCC250-24U-4P  | 24 V   | +14.6/-15%       | 0 A            | 10.4 A | 1% <sup>3</sup>                | ±2%                            | A, B, E                      |
| LCC250-24U-4PE | 24 V   | +14.6/-15%       | 0 A            | 10.4 A | 1% <sup>3</sup>                | ±2%                            | C, D, E                      |
| LCC250-24U-7P  | 24 V   | +14.6/-15%       | 0 A            | 10.4 A | 1% <sup>3</sup>                | ±2%                            | A, B, E                      |
| LCC250-24U-7PE | 24 V   | +14.6/-15%       | 0 A            | 10.4 A | 1% <sup>3</sup>                | ±2%                            | C, D, E                      |

Mechanical dimensions: 4Px = 4" x 7" x 1.1" (101.6 mm x 177.8 mm x 28 mm)  
7Px = 4" x 7" x 1.5" (101.6 mm x 177.8 mm x 38.1 mm)

- Output ripple measured at the end of the output cable terminated with 10 µF tantalum cap in parallel with 0.1 µF ceramic cap.
- 1% limit is achieved with 2X 820 µF/16 V external cap (e.g., PLG1C821MD01 from Nichicon or equivalent). Otherwise, maximum limits are 1.5% at Ta ≥ 0 °C and 2.0% max at Ta < 0 °C.
- 1% limit is achieved with 2X 820 µF/35 V external cap (e.g., UPM1V821MHD1TO from Nichicon or equivalent). Otherwise, maximum limits are 1.5% at Ta ≥ -10 °C 2.0% max ripple at Ta < -10 °C is met with below external capacitance.

|                                      |      |      |      |       |       |
|--------------------------------------|------|------|------|-------|-------|
| Ambient Temperature (°C)             | -20  | -25  | -30  | -35   | -40   |
| Recommended External Capacitors (µF) | 1000 | 2200 | 3300 | 12000 | 22000 |

4. Safety Approvals:  
(A) UL+CSA 60950-1 2nd Edition (B) UL+CSA 60601-1 2nd Edition (C) TÜV 60950-1 2nd Edition (different input cable) (D) TÜV 60601-1 2nd Edition (different input cable) (E) TÜV 61347-1; 2-23 / China CCC / CB

# Low Power

## External power adapters

### 2-100 Watts

### Special Features

#### All models feature:

- Wide-range AC input
- High demonstrated MTBF
- Overload protection
- Extensive safety approvals

#### Many models feature:

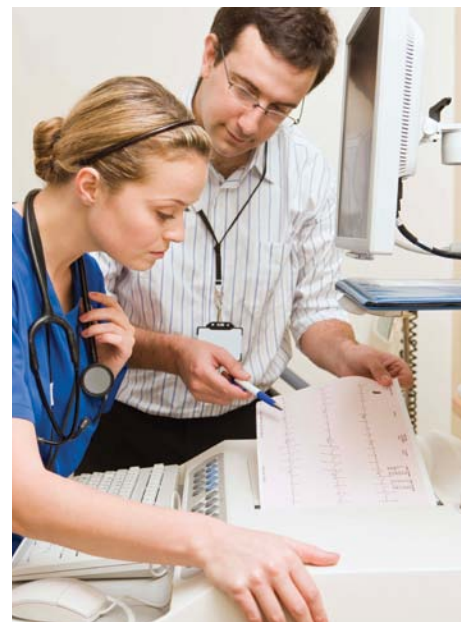
- EN61000-3-2 compliance
- Medical approvals
- Thermal protection
- Energy Star/ErP

#### AC Input:

- Wallmount
  - U.S. – 2-prong
  - China – 2-prong
  - Europe – 2-prong
  - United Kingdom – 3-prong
  - Australia – 2-prong
  - Interchangeable
- Freestanding
  - IEC320 2-pin (C14) & (C6)
  - IEC320 2-pin (C8)

#### DC Output:

- Single output
  - 2.5 mm barrel plug
  - 2.1 mm right angle plug
- Triple output
  - 5-pin DIN



#### Output Power

#### 3 W



NEW!

#### DCH3 Series – USB

| V1           | V2 | V3 | Size W x L x H (mm)                         | Model                              |
|--------------|----|----|---------------------------------------------|------------------------------------|
| 5 V @ 0.55 A |    |    | 1.03" x 2.28" x 1.81"<br>(26.1 x 58 x 46)   | DCH3-050US-0001<br>DCH3-050US-0002 |
| 5 V @ 0.55 A |    |    | 1.03" x 2.28" x 1.80"<br>(26.1 x 58 x 45.8) | DCH3-050EU-0005<br>DCH3-050EU-0006 |
| 5 V @ 0.55 A |    |    | 2.02" x 2.28" x 0.91"<br>(51.2 x 57.8 x 23) | DCH3-050UK-0005<br>DCH3-050UK-0006 |
| 5 V @ 0.55 A |    |    | 1.07" x 2.66" x 1.81"<br>(27.2 x 67.2 x 46) | DCH3-050US-0004                    |
| 5 V @ 0.55 A |    |    | 1.07" x 2.66" x 1.81"<br>(27.2 x 67.2 x 46) | DCH3-050US-0005                    |
| 5 V @ 0.55 A |    |    | 2.02" x 2.64" x 0.97"<br>(51.2 x 67 x 24.5) | DCH3-050US-0006                    |

#### 8 W



#### DA4 US Series

|                 |                       |           |
|-----------------|-----------------------|-----------|
| 5.5 V @ 0.75 V  | 1.02" x 2.36" x 1.80" | DA4-050US |
| 11 V @ 0.30 A   | (26 x 60 x 45.8)      | DA4-110US |
| 16.5 V @ 0.30 A |                       | DA4-165US |
| 18 V @ 0.30 A   |                       | DA4-180US |
| 21.5 V @ 0.30 A |                       | DA4-215US |
| 23 V @ 0.30 A   | 1.10" x 2.36" x 1.99" | DA4-230US |
| 26.5 V @ 0.30 A | (28 x 60 x 50.6)      | DA4-265US |

#### 12 W

#### 60 W



NEW!

#### DCH5 Series

|           |                                                 |            |
|-----------|-------------------------------------------------|------------|
| 5 V @ 1 A | 1" x 1.4" x 1.88"<br>(25.5 x 35.5 x 47.9)       | DCH5-050US |
| 5 V @ 1 A | 1" x 1.4" x 1.88"<br>(25.5 x 35.5 x 47.9)       | DCH5-050EU |
| 5 V @ 1 A | 1.74" x 1.95" x 2.19"<br>(44.2 x 49.53 x 55.62) | DCH5-050UK |
| 5 V @ 1 A | 1" x 1.4" x 1.88"<br>(25.5 x 35.5 x 47.9)       | DCH5-050AU |



| Output Power                                                                                              | V1                   | V2 | V3 | Size W x L x H (mm)                         | Model                          |
|-----------------------------------------------------------------------------------------------------------|----------------------|----|----|---------------------------------------------|--------------------------------|
| <b>12 W</b><br>          | <b>DA12-M Series</b> |    |    |                                             |                                |
|                                                                                                           | 5 V @ 2 A            |    |    | 1.10" x 2.36" x 2.14"<br>(28 x 60 x 54.3)   | DA12-050AU-M                   |
|                                                                                                           | 12 V @ 1 A           |    |    |                                             | DA12-120AU-M                   |
|                                                                                                           | 5 V @ 2 A            |    |    | 1.10" x 2.36" x 2.48"<br>(28 x 60 x 63.1)   | DA12-050EU-M                   |
|                                                                                                           | 12 V @ 1 A           |    |    |                                             | DA12-120EU-M                   |
|                                                                                                           | 5 V @ 2 A            |    |    | 1.98" x 2.36" x 1.90"<br>(50.2 x 60 x 48.3) | DA12-050UK-M                   |
|                                                                                                           | 12 V @ 1 A           |    |    |                                             | DA12-120UK-M                   |
|                                                                                                           | 5 V @ 2 A            |    |    | 1.10" x 2.36" x 1.99"<br>(28 x 60 x 50.6)   | DA12-050US-M                   |
|                                                                                                           | 12 V @ 1 A           |    |    |                                             | DA12-120US-M                   |
|                                                                                                           | 5 V @ 2 A            |    |    | 1.1" x 2.36" x 2.06"<br>(28 x 60 x 52.3)    | DA12-050MP-M <sup>(1)</sup>    |
|                                                                                                           | 5 V @ 2 A            |    |    |                                             | DA12-050MP-M2.1 <sup>(2)</sup> |
|                                                                                                           | 12 V @ 1 A           |    |    | 1.10" x 2.36" x 2.14"<br>(28 x 60 x 54.3)   | DA12-120MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1 A           |    |    |                                             | DA12-120MP-M2.1 <sup>(2)</sup> |
| <b>18 W</b><br><br>NEW! | <b>DA18-M Series</b> |    |    |                                             |                                |
|                                                                                                           | 12 V @ 1.5 A         |    |    | 1.1" x 2.36" x 2.14"<br>(28 x 60 x 54.3)    | DA18-120AU-M                   |
|                                                                                                           | 15 V @ 1.2 A         |    |    |                                             | DA18-150AU-M                   |
|                                                                                                           | 12 V @ 1.5 A         |    |    | 1.1" x 2.36" x 2.48"<br>(28 x 60 x 63.1)    | DA18-120EU-M                   |
|                                                                                                           | 15 V @ 1.2 A         |    |    |                                             | DA18-150EU-M                   |
|                                                                                                           | 12 V @ 1.5 A         |    |    | 1.98" x 2.36" x 1.90"<br>(50.2 x 60 x 48.3) | DA18-120UK-M                   |
|                                                                                                           | 15 V @ 1.2 A         |    |    |                                             | DA18-150UK-M                   |
|                                                                                                           | 12 V @ 1.5 A         |    |    | 1.1" x 2.36" x 1.99"<br>(28 x 60 x 50.6)    | DA18-120US-M                   |
|                                                                                                           | 15 V @ 1.2 A         |    |    |                                             | DA18-150US-M                   |
|                                                                                                           | 12 V @ 1.5 A         |    |    | 1.1" x 2.36" x 2.06"<br>(28 x 60 x 52.3)    | DA18-120MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1.5 A         |    |    |                                             | DA18-120MP-M2.1 <sup>(2)</sup> |
|                                                                                                           | 15 V @ 1.2 A         |    |    |                                             | DA18-150MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1.2 A         |    |    |                                             | DA18-150MP-M2.1 <sup>(2)</sup> |
| <b>24 W</b><br>        | <b>AD24</b>          |    |    |                                             |                                |
|                                                                                                           | 12 V @ 2 A           |    |    | 1.89" x 4.13" x 1.3"<br>(48 x 105 x 33)     | AD2412N3L                      |
| <b>40 W</b><br>        | <b>DP40 Series</b>   |    |    |                                             |                                |
|                                                                                                           | 9 V @ 4.4 A          |    |    | 2.4" x 4.88" x 1.55"                        | DP4009N2M                      |
|                                                                                                           | 9 V @ 4.4 A          |    |    | (61 x 124 x 39.5)                           | DP4009N3M                      |
|                                                                                                           | 12 V @ 3.33 A        |    |    |                                             | DP4012N2M                      |
|                                                                                                           | 12 V @ 3.33 A        |    |    |                                             | DP4012N3M                      |
|                                                                                                           | 15 V @ 2.67 A        |    |    |                                             | DP4015N2M                      |
|                                                                                                           | 15 V @ 2.67 A        |    |    |                                             | DP4015N3M                      |
|                                                                                                           | 18 V @ 2.22 A        |    |    |                                             | DP4018N2M                      |
|                                                                                                           | 18 V @ 2.22 A        |    |    |                                             | DP4018N3M                      |
|                                                                                                           | 24 V @ 1.67 A        |    |    |                                             | DP4024N2M                      |
|                                                                                                           | 24 V @ 1.67 A        |    |    |                                             | DP4024N3M                      |
|                                                                                                           | 48 V @ 0.84 A        |    |    |                                             | DP4048N2M                      |
|                                                                                                           | 48 V @ 0.84 A        |    |    |                                             | DP4048N3M                      |

Options:

(1) Interchangeable AC plug - must be purchased separately.

(2) 2.1 mm x 5.5 mm barrel plug

| Output Power                                                                                        | V1                  | V2       | V3        | Size W x L x H (mm)                        | Model          |
|-----------------------------------------------------------------------------------------------------|---------------------|----------|-----------|--------------------------------------------|----------------|
| <b>50 W</b><br>    | <b>DPT50 Series</b> |          |           |                                            |                |
|                                                                                                     | 3.3V@9A             | 5V@3A    | -12V@0.5A | 2.39" x 5.24" x 1.62"                      | DPT51          |
|                                                                                                     | 5V@8A               | 12V@3A   | -12V@0.5A | (60.7 x 133 x 41.15)                       | DPT52          |
|                                                                                                     | 5V@8A               | 15V@2.4A | -15V@0.5A |                                            | DPT53          |
| <b>50 W</b><br>    | <b>AD50 Series</b>  |          |           |                                            |                |
|                                                                                                     | 12V@4.16A           |          |           | 2.56" x 4.72" x 1.61"                      | AD5012N2L      |
|                                                                                                     | 12V@4.16A           |          |           | (65 x 120 x 41)                            | AD5012N3L      |
| <b>60 W</b><br>    | <b>DPS50 Series</b> |          |           |                                            |                |
|                                                                                                     | 5V@6A               |          |           | 2.39" x 5.24" x 1.62"                      | DPS52          |
|                                                                                                     | 12V@5A              |          |           | (60.7 x 133 x 41.15)                       | DPS53          |
|                                                                                                     | 15V@4A              |          |           |                                            | DPS54          |
|                                                                                                     | 24V@2.5A            |          |           |                                            | DPS55          |
| <b>72 W</b><br>    | <b>AD72</b>         |          |           |                                            |                |
|                                                                                                     | 16V@4.5A            |          |           | 2.0" x 4.54" x 1.10"<br>(51 x 115.4 x 28)  | AD7216N2L      |
| <b>78 W</b><br>  | <b>AD80</b>         |          |           |                                            |                |
|                                                                                                     | 24V@3.25A           |          |           | 3.13" x 5.87" x 1.76"<br>(79.6 x 149 x 44) | AD8024N3L-001  |
| <b>100 W</b><br> | <b>AD100</b>        |          |           |                                            |                |
|                                                                                                     | 48V@2.08A           |          |           | 2.56" x 3.03" x 1.44"<br>(65 x 156 x 37.2) | AD10048P3L-001 |



# Healthcare AC–DC Power Supplies

## Up to 4920 Watts

Emerson Network Power produces a wide range of AC–DC power supplies certified for use in medical equipment requiring lower safety ground leakage and higher isolation. The power supplies listed below are designed for use in non-patient critical applications: bio-life science, medical, dental, imaging and laboratory applications such as immunoassay and in-vitro diagnostics machines, ultrasound and mass analyzers. All these power supplies are high efficiency switch-mode designs, and feature medical safety approval to EN60601-1.

## Special Features

### All models feature:

- Industry standard footprints
- Wide-range AC input
- Remote sense
- Adjustable outputs
- Power fail
- Full power to 50 °C
- High demonstrated MTBF
- Overvoltage protection
- Overload protection
- Built-in EMI filtering
- Medical approvals
- Extensive safety approvals
- Derated operation to 70 °C

### Many models feature:

- EN61000-3-2 compliance
- Supervisory outputs (5 V/12 V)
- Wide-adjust floating 4<sup>th</sup> output
- Single wire current share
- Wide-adjust on single output models
- Voltage monitor/data logging
- Real-time parametric adjustment & control

| Output Power                                                                                                                                                                                                                     |                                                                                                                                                                                                         | Output      |                    |                       |                       | Control               |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|-----------------------|-----------------------|-----------------------|---------|
| Forced Air                                                                                                                                                                                                                       | Free Air                                                                                                                                                                                                | V1          | V2                 | V3                    | V4                    | Size W x L x H (mm)   | Model   |
| <div><div>[40 W]</div><div><div><div>NEW!</div><div></div><div>(1)</div></div></div></div> <div><div>25 W</div><div>NPS20-M Series</div></div> |                                                                                                                                                                                                         |             |                    |                       |                       |                       |         |
|                                                                                                                                                                                                                                  | 5 V @ 5 A [8 A]*                                                                                                                                                                                        |             |                    |                       |                       | 2" x 4" x 1"          | NPS22-M |
|                                                                                                                                                                                                                                  | 12 V @ 2.1 A [3.3 A]*                                                                                                                                                                                   |             |                    |                       |                       | (50.8 x 101.6 x 25.4) | NPS23-M |
|                                                                                                                                                                                                                                  | 15 V @ 1.7 A [2.7 A]*                                                                                                                                                                                   |             |                    |                       |                       |                       | NPS24-M |
|                                                                                                                                                                                                                                  | 24 V @ 1 A [1.8 A]*                                                                                                                                                                                     |             |                    |                       |                       |                       | NPS25-M |
|                                                                                                                                                                                                                                  | 48 V @ 0.52 A [0.84 A]*                                                                                                                                                                                 |             |                    |                       |                       |                       | NPS28-M |
| <div><div>[55 W]</div><div><div></div><div>(1)</div></div></div> <div><div>40 W</div><div>LP40-M Series</div></div>                           |                                                                                                                                                                                                         |             |                    |                       |                       |                       |         |
|                                                                                                                                                                                                                                  | 5 V @ 8 A [11 A]*                                                                                                                                                                                       |             |                    |                       |                       | 3" x 5" x 1.2"        | LPS42-M |
|                                                                                                                                                                                                                                  | 12 V @ 3.3 A [4.5]*                                                                                                                                                                                     |             |                    |                       |                       | (76.2 x 127 x 30.5)   | LPS43-M |
|                                                                                                                                                                                                                                  | 15 V @ 2.6 A [3.6 A]*                                                                                                                                                                                   |             |                    |                       |                       |                       | LPS44-M |
|                                                                                                                                                                                                                                  | 24 V @ 1.6 A [2.3 A]*                                                                                                                                                                                   |             |                    |                       |                       |                       | LPS45-M |
|                                                                                                                                                                                                                                  | 5 V @ 4 A [5 A]                                                                                                                                                                                         |             | 12 V @ 2 A [2.5 A] | -12 V @ 0.5 A [0.7 A] |                       |                       | LPT42-M |
|                                                                                                                                                                                                                                  | 5 V @ 4 A [5 A]                                                                                                                                                                                         |             | 15 V @ 2 A [2.5 A] | -15 V @ 0.5 A [0.7 A] |                       |                       | LPT45-M |
|                                                                                                                                                                                                                                  | <div><div>[60 W]</div><div><div></div><div>(1)</div></div></div> <div><div>45 W</div><div>NPS40-M Series</div></div> |             |                    |                       |                       |                       |         |
| 5 V @ 8 A [11 A]*                                                                                                                                                                                                                |                                                                                                                                                                                                         |             |                    |                       | 2" x 4" x 1"          | NPS42-M               |         |
| 12 V @ 3.75 A [5 A]*                                                                                                                                                                                                             |                                                                                                                                                                                                         |             |                    |                       | (50.8 x 101.6 x 25.4) | NPS43-M               |         |
| 15 V @ 3 A [4 A]*                                                                                                                                                                                                                |                                                                                                                                                                                                         |             |                    |                       |                       | NPS44-M               |         |
| 24 V @ 1.9 A [2.5 A]*                                                                                                                                                                                                            |                                                                                                                                                                                                         |             |                    |                       |                       | NPS45-M               |         |
| 48 V @ 0.94 A [1.25 A]*                                                                                                                                                                                                          |                                                                                                                                                                                                         |             |                    |                       |                       | NPS48-M               |         |
| <div><div>[55 W]</div><div><div></div><div>(1)</div></div></div> <div><div>55 W</div><div>LP50-M Series</div></div>                           |                                                                                                                                                                                                         |             |                    |                       |                       |                       |         |
|                                                                                                                                                                                                                                  | 3.3 V @ 8 A                                                                                                                                                                                             |             | 5 V @ 3 A          | 12 V @ 0.5 A          |                       | 2" x 4" x 1.3"        | LPT51-M |
|                                                                                                                                                                                                                                  | 5 V @ 8 A                                                                                                                                                                                               |             | 12 V @ 3 A         | -12 V @ 0.5 A         |                       | (50.8 x 101.6 x 33)   | LPT52-M |
|                                                                                                                                                                                                                                  | 5 V @ 8 A                                                                                                                                                                                               |             | 15 V @ 2.4 A       | -15 V @ 0.5 A         |                       |                       | LPT53-M |
|                                                                                                                                                                                                                                  | 5 V @ 8 A                                                                                                                                                                                               |             | 24 V @ 1.5 A       | 12 V @ 0.5 A          |                       |                       | LPT54-M |
|                                                                                                                                                                                                                                  | <div><div>[60 W]</div><div><div></div><div>(1)</div></div></div> <div><div>60 W</div></div>                          | 5 V @ 11 A* |                    |                       |                       |                       | LPS52-M |
| 12 V @ 5 A*                                                                                                                                                                                                                      |                                                                                                                                                                                                         |             |                    |                       | LPS53-M               |                       |         |
| 15 V @ 4 A*                                                                                                                                                                                                                      |                                                                                                                                                                                                         |             |                    |                       | LPS54-M               |                       |         |
| 24 V @ 2.5 A*                                                                                                                                                                                                                    |                                                                                                                                                                                                         |             |                    |                       | LPS55-M               |                       |         |
| 48 V @ 1.25 A*                                                                                                                                                                                                                   |                                                                                                                                                                                                         |             |                    |                       | LPS58-M               |                       |         |

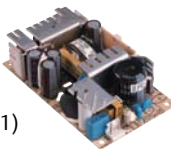
Options:

[ ] Rating with 30 CFM of air

(1) Optional cover/enclosure

\* Floating output



| Output Power                                                                                                                                    |                         | Output                 |                     |    |    | Size W x L x H (mm)     | Model                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------|---------------------|----|----|-------------------------|----------------------------|
| [Forced Air]                                                                                                                                    | Free Air                | V1                     | V2                  | V3 | V4 |                         |                            |
|                                                                                                                                                 |                         |                        |                     |    |    |                         |                            |
| <div><div><div>NEW!</div></div><div></div><div>(1)</div></div> | <b>60 W</b>             | <b>NPS60-M Series</b>  |                     |    |    |                         |                            |
|                                                                                                                                                 | 5 V @ 11 A *            |                        |                     |    |    | 2" x 4" x 1"            | NPS62-M                    |
|                                                                                                                                                 | 12 V @ 5 A *            |                        |                     |    |    | (50.8 x 101.6 x 25.6)   | NPS63-M                    |
|                                                                                                                                                 | 24 V @ 2.5 A *          |                        |                     |    |    |                         | NPS65-M                    |
| <div><div><div></div></div><div></div><div>(1)</div></div>     | <b>65 W</b>             | <b>NLP65 Series</b>    |                     |    |    |                         |                            |
|                                                                                                                                                 | 12 V @ 6.5 A *          |                        |                     |    |    | 3" x 5" x 1.26"         | NLP65-9912J <sup>(5)</sup> |
|                                                                                                                                                 | 15 V @ 5.3 A *          |                        |                     |    |    | (76.2 x 27 x 32)        | NLP65-9915J <sup>(5)</sup> |
|                                                                                                                                                 | 24 V @ 3.5 A *          |                        |                     |    |    |                         | NLP65-9924J <sup>(5)</sup> |
|                                                                                                                                                 | 5 V @ 8 A               | 12 V @ 3 A             |                     |    |    |                         | NLP65-9929J <sup>(5)</sup> |
|                                                                                                                                                 | 5 V @ 8 A               | 24 V @ 2 A             |                     |    |    |                         | NLP65-9920J <sup>(5)</sup> |
|                                                                                                                                                 | 5 V @ 8 A               | 12 V @ 3 A             | -12 V @ 1 A         |    |    |                         | NLP65-9908J <sup>(5)</sup> |
| <div><div><div></div></div><div></div><div>(1)</div></div>     | <b>60 W</b>             | <b>LP60-M Series</b>   |                     |    |    |                         |                            |
|                                                                                                                                                 | 12 V @ 5 A [6.7 A] *    |                        |                     |    |    | 3" x 5" x 1.65"         | LPS63-M                    |
|                                                                                                                                                 | 15 V @ 4 A [5.3 A] *    |                        |                     |    |    | (76.2 x 127 x 41.9)     | LPS64-M                    |
|                                                                                                                                                 | 24 V @ 2.5 A [3.3 A] *  |                        |                     |    |    |                         | LPS65-M                    |
|                                                                                                                                                 | 5 V @ 7 A [8 A]         | 12 V @ 3 A [3.5 A]     | -12 V @ 0.7 A [1 A] |    |    |                         | LPT62-M                    |
|                                                                                                                                                 | 5 V @ 7 A [8 A]         | 15 V @ 2.8 A [3.3 A]   | -15 V @ 0.7 A [1 A] |    |    |                         | LPT63-M                    |
| <div><div><div></div></div><div></div><div>(1)</div></div>    | <b>80 W</b>             | <b>NLP110 Series</b>   |                     |    |    |                         |                            |
|                                                                                                                                                 | 5 V @ 22 A *            |                        |                     |    |    | 3" x 6.5" x 1.26"       | NLP110-9905J               |
|                                                                                                                                                 | 12 V @ 9.2 A *          |                        |                     |    |    | (76.2 x 165.1 x 45.72)  | NLP110-9912J               |
|                                                                                                                                                 | 24 V @ 4.6 A *          |                        |                     |    |    |                         | NLP110-9924J               |
|                                                                                                                                                 | 48 V @ 2.3 A *          |                        |                     |    |    |                         | NLP110-9917J               |
|                                                                                                                                                 | 3.3 V @ 20 A            | 2.5 V @ 20 A           | 12 V @ 1 A          |    |    |                         | NLP110-9994J               |
|                                                                                                                                                 | 5 V @ 18 A              | 3.3 V @ 20 A           | 12 V @ 1 A          |    |    |                         | NLP110-9993J               |
|                                                                                                                                                 | 12 V @ 8.5 A            | 3.3 V @ 20 A           | -12 V @ 1 A         |    |    |                         | NLP110-9995J               |
|                                                                                                                                                 | 12 V @ 8.5 A            | 5 V @ 18 A             | -12 V @ 1 A         |    |    |                         | NLP110-9908J               |
| <div><div><div></div></div><div></div><div>(1)</div></div>   | <b>80 W</b>             | <b>LPT100-M Series</b> |                     |    |    |                         |                            |
|                                                                                                                                                 | 3.3 V @ 13 A [18 A]     | 5 V @ 5 A [9 A]        | 12 V @ 1 A [2.3 A]  |    |    | 2" x 4" x 1.28"         | LPT101-M                   |
|                                                                                                                                                 | 5 V @ 13 A [18 A]       | 12 V @ 5 A [9 A]       | -12 V @ 1 A [2 A]   |    |    | (50.8 x 101.6 x 32.7)   | LPT102-M                   |
|                                                                                                                                                 | 5 V @ 13 A [18 A]       | 15 V @ 4 A [7.2 A]     | -15 V @ 1 A [1.5 A] |    |    |                         | LPT103-M                   |
|                                                                                                                                                 | 5 V @ 13 A [18 A]       | 24 V @ 1.5 A [3 A]     | 12 V @ 1 A [2.3 A]  |    |    |                         | LPT104-M                   |
| <div><div><div></div></div><div></div><div>(1)</div></div>   | <b>100 W</b>            | <b>LPS100-M Series</b> |                     |    |    |                         |                            |
|                                                                                                                                                 | 5 V @ 16 A [24 A] *     |                        |                     |    |    | 2" x 4" x 1.29"         | LPS102-M                   |
|                                                                                                                                                 | 12 V @ 8.3 A [12.5 A] * |                        |                     |    |    | (50.8 x 101.6 x 33)     | LPS103-M                   |
|                                                                                                                                                 | 15 V @ 6.7 A [10 A] *   |                        |                     |    |    |                         | LPS104-M                   |
|                                                                                                                                                 | 24 V @ 4.2 A [6.3 A] *  |                        |                     |    |    |                         | LPS105-M                   |
|                                                                                                                                                 | 48 V @ 2.1 A [3.1 A] *  |                        |                     |    |    |                         | LPS108-M                   |
| <div><div><div></div></div><div></div><div>(1)</div></div>   | <b>100 W</b>            | <b>TLP150 Series</b>   |                     |    |    |                         |                            |
|                                                                                                                                                 | 12 V @ 12.5 A *         |                        |                     |    |    | 3" x 5" x 1.25"         | TLP150N-99S12J F           |
|                                                                                                                                                 | 24 V @ 6.3 A *          |                        |                     |    |    | (177.8 x 101.6 x 31.75) | TLP150N-99S24J F           |

## Options:

- F Replace the 'J' at the end of the model number with 'FJ' when the optional standby output and/or remote ON/OFF control is required e.g., TLP150N-99S12FJ
- [ ] Rating with 30 CFM of air

- (1) Optional cover/enclosure (see datasheet for increased dimensions)
- (5) These models feature harmonic current correction to EN61000-3-2
- \* Floating output



| Output Power                                                                                       |          | Output                               |                   |                                    |                   | Size W x L x H (mm)                          | Model              |
|----------------------------------------------------------------------------------------------------|----------|--------------------------------------|-------------------|------------------------------------|-------------------|----------------------------------------------|--------------------|
| Forced Air                                                                                         | Free Air | V1                                   | V2                | V3                                 | V4                |                                              |                    |
| [175 W]                                                                                            | 110 W    | LP170-M Series                       |                   |                                    |                   |                                              |                    |
| <br>(1)           |          | 5 V @ 22 A [35 A]* (2.5-6 V)         |                   |                                    |                   | 4.25" x 8.5" x 1.5"                          | LPS172-M           |
|                                                                                                    |          | 12 V @ 9.1 A [15 A]* (6-12 V)        |                   |                                    |                   | (108 x 215.9 x 38.1)                         | LPS173-M           |
|                                                                                                    |          | 15 V @ 7.3 A [12 A]* (12-24 V)       |                   |                                    |                   |                                              | LPS174-M           |
|                                                                                                    |          | 24 V @ 4.5 A [7.5]* (24-54 V)        |                   |                                    |                   |                                              | LPS175-M           |
| [200 W]                                                                                            | 100 W    | LPQ200-M Series                      |                   |                                    |                   |                                              |                    |
| <br>(1)           |          | 3.3 V @ 13 A [18 A]                  | 5 V @ 13 A [18 A] | 12 V @ 5 A [9 A]                   | -12 V @ 1 A [2 A] | 3" x 5" x 1.32"                              | LPQ201-M           |
|                                                                                                    |          | 5 V @ 13 A [18 A]                    | 12 V @ 5 A [9 A]  | 24 V @ 1.5 A [3 A]                 | -12 V @ 1 A [2 A] | (76.2 x 127 x 33.6)                          | LPQ202-M           |
| [250 W]                                                                                            | 125 W    | LPS200-M Series                      |                   |                                    |                   |                                              |                    |
| <br>(1)           |          | 5 V @ 20 A [40 A]*                   |                   |                                    |                   | 3" x 5" x 1.32"                              | LPS202-M           |
|                                                                                                    |          | 12 V @ 10.3 A [20.8 A]*              |                   |                                    |                   | (76.2 x 127 x 33.6)                          | LPS203-M           |
|                                                                                                    |          | 15 V @ 8.3A [16.6 A]*                |                   |                                    |                   |                                              | LPS204-M           |
|                                                                                                    |          | 24 V @ 5.2 A [10.4 A]*               |                   |                                    |                   |                                              | LPS205-M           |
|                                                                                                    |          | 48 V @ 2.6 A [5.2 A]*                |                   |                                    |                   |                                              | LPS208-M           |
| [250 W]                                                                                            | 175 W    | NLP250 Series                        |                   |                                    |                   |                                              |                    |
| <br>(1)           |          | 12 V @ 21 A*                         |                   |                                    |                   | 4" x 7" x 1.5"                               | NLP250N-99S12J     |
|                                                                                                    |          | 24 V @ 10.5 A*                       |                   |                                    |                   | (101.6 x 177.8 x 38.1)                       | NLP250N-99S24J     |
| [250 W]                                                                                            | 250 W    | LCC250 Series                        |                   |                                    |                   |                                              |                    |
| <br><b>NEW!</b>  |          | 12 V @ 20.8 A                        |                   |                                    |                   | 4" x 7" x 1.1"                               | See LCC250 section |
|                                                                                                    |          | 24 V @ 10.4 V                        |                   |                                    |                   | (101.6 x 177.8 x 28)                         |                    |
| [500 W]                                                                                            | 200 W    | NTS500-M Series                      |                   |                                    |                   |                                              |                    |
| <br>(4), (5)    |          | 12 V @ 16.6 A [41.7 A]*              |                   |                                    |                   | 4" x 7" x 1.5"                               | NTS503-M           |
|                                                                                                    |          | 24 V @ 8.3 A [20.8 A]*               |                   |                                    |                   | (101.6 x 177.8 x 38)                         | NTS505-M           |
|                                                                                                    |          | 48 V @ 4.2 A [10.4 A]*               |                   |                                    |                   |                                              | NTS508-M           |
| [600 W]                                                                                            |          | LCM600 Bulk Front End                |                   |                                    |                   |                                              |                    |
| <br><b>NEW!</b> |          | 3.3-60 V                             | Single outputs    |                                    |                   | 4.5" x 7.5" x 2.4"<br>(114.3 x 190.5 x 62)   | See LCM600 section |
|                                                                                                    |          |                                      |                   |                                    |                   |                                              |                    |
| Up to 1200 W                                                                                       |          | µMP Medium Power Series              |                   |                                    |                   |                                              |                    |
| <br><b>NEW!</b> |          | 0.9-60 V                             | 1-12 outputs      | Fully configurable                 |                   | 3.5" x 10.11" x 1.57"<br>(88.9 x 256.9 x 40) | See µMP section    |
|                                                                                                    |          |                                      |                   |                                    |                   |                                              |                    |
| Up to 1500 W                                                                                       |          | iMP Intelligent Medium Power Series  |                   |                                    |                   |                                              |                    |
|                 |          | 2-60 V                               | 1-21 outputs      | Fully configurable and intelligent |                   | 5" x 10" x 2.5"<br>(127 x 254 x 63.5)        | See iMP section    |
|                                                                                                    |          |                                      |                   |                                    |                   |                                              |                    |
| 1500-4920 W                                                                                        |          | iVS Intelligent VS High Power Series |                   |                                    |                   |                                              |                    |
|                 |          | 2-60 V                               | 1-24 outputs      | Fully configurable and intelligent |                   | 5" x 11" x 5"<br>(127 x 279.4 x 127)         | See iVS section    |
|                                                                                                    |          |                                      |                   |                                    |                   |                                              |                    |

Options:

(1) Optional cover/enclosure

(4) Optional top fan covers (see datasheet for increased dimensions)

\* Floating output

(5) Optional end fan cover (see datasheet for increased dimensions)

| Output Power                                                                                              | V1                     | V2           | V3            | Size W x L x H (mm)                         | Model                          |
|-----------------------------------------------------------------------------------------------------------|------------------------|--------------|---------------|---------------------------------------------|--------------------------------|
| <b>12 W</b><br>          | <b>DA12-M Series</b>   |              |               |                                             |                                |
|                                                                                                           | 5 V @ 2 A              |              |               | 1.10" x 2.36" x 2.14"<br>(28 x 60 x 54.3)   | DA12-050AU-M                   |
|                                                                                                           | 12 V @ 1 A             |              |               |                                             | DA12-120AU-M                   |
|                                                                                                           | 5 V @ 2 A              |              |               | 1.10" x 2.36" x 2.48"<br>(28 x 60 x 63.1)   | DA12-050EU-M                   |
|                                                                                                           | 12 V @ 1 A             |              |               |                                             | DA12-120EU-M                   |
|                                                                                                           | 5 V @ 2 A              |              |               | 1.98" x 2.36" x 1.90"<br>(50.2 x 60 x 48.3) | DA12-050UK-M                   |
|                                                                                                           | 12 V @ 1 A             |              |               |                                             | DA12-120UK-M                   |
|                                                                                                           | 5 V @ 2 A              |              |               | 1.10" x 2.36" x 1.99"<br>(28 x 60 x 50.6)   | DA12-050US-M                   |
|                                                                                                           | 12 V @ 1 A             |              |               |                                             | DA12-120US-M                   |
|                                                                                                           | 5 V @ 2 A              |              |               | 1.1" x 2.36" x 2.06"<br>(28 x 60 x 52.3)    | DA12-050MP-M <sup>(1)</sup>    |
|                                                                                                           | 5 V @ 2 A              |              |               |                                             | DA12-050MP-M2.1 <sup>(2)</sup> |
|                                                                                                           | 12 V @ 1 A             |              |               | 1.10" x 2.36" x 2.14"<br>(28 x 60 x 54.3)   | DA12-120MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1 A             |              |               |                                             | DA12-120MP-M2.1 <sup>(2)</sup> |
| <b>18 W</b><br><br>NEW! | <b>DA18-M Series</b>   |              |               |                                             |                                |
|                                                                                                           | 12 V @ 1.5 A           |              |               | 1.1" x 2.36" x 2.14"<br>(28 x 60 x 54.3)    | DA18-120AU-M                   |
|                                                                                                           | 15 V @ 1.2 A           |              |               |                                             | DA18-150AU-M                   |
|                                                                                                           | 12 V @ 1.5 A           |              |               | 1.1" x 2.36" x 2.48"<br>(28 x 60 x 63.1)    | DA18-120EU-M                   |
|                                                                                                           | 15 V @ 1.2 A           |              |               |                                             | DA18-150EU-M                   |
|                                                                                                           | 12 V @ 1.5 A           |              |               | 1.98" x 2.36" x 1.90"<br>(50.2 x 60 x 48.3) | DA18-120UK-M                   |
|                                                                                                           | 15 V @ 1.2 A           |              |               |                                             | DA18-150UK-M                   |
|                                                                                                           | 12 V @ 1.5 A           |              |               | 1.1" x 2.36" x 1.99"<br>(28 x 60 x 50.6)    | DA18-120US-M                   |
|                                                                                                           | 15 V @ 1.2 A           |              |               |                                             | DA18-150US-M                   |
|                                                                                                           | 12 V @ 1.5 A           |              |               | 1.1" x 2.36" x 2.06"<br>(28 x 60 x 52.3)    | DA18-120MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1.5 A           |              |               |                                             | DA18-120MP-M2.1 <sup>(2)</sup> |
|                                                                                                           | 15 V @ 1.2 A           |              |               |                                             | DA18-150MP-M <sup>(1)</sup>    |
|                                                                                                           | 12 V @ 1.2 A           |              |               |                                             | DA18-150MP-M2.1 <sup>(2)</sup> |
| <b>50 W</b><br>        | <b>DPT50-M Medical</b> |              |               |                                             |                                |
|                                                                                                           | 3.3 V @ 9 A            | 5 V @ 3 A    | -12 V @ 0.5 A | 2.39" x 5.24" x 1.62"                       | DPT51-M                        |
|                                                                                                           | 5 V @ 8 A              | 12 V @ 3 A   | -12 V @ 0.5 A | (60.7 x 133 x 41.15)                        | DPT52-M                        |
|                                                                                                           | 5 V @ 8 A              | 15 V @ 2.4 A | -15 V @ 0.5 A |                                             | DPT53-M                        |
|                                                                                                           | 5 V @ 8 A              | 24 V @ 1.5 A | 12 V @ 0.5 A  |                                             | DPT54-M                        |
| <b>50 W</b><br>        | <b>AD50 Medical</b>    |              |               |                                             |                                |
|                                                                                                           | 12 V @ 4.16 A          |              |               | 2.56" x 4.72" x 1.61"                       | AD5012N2LM                     |
|                                                                                                           | 12 V @ 4.16 A          |              |               | (65 x 120 x 41)                             | AD5012N3LM                     |
| <b>60 W</b><br>        | <b>DPS50-M Medical</b> |              |               |                                             |                                |
|                                                                                                           | 5 V @ 6 A              |              |               | 2.39" x 5.24" x 1.62"                       | DPS52-M                        |
|                                                                                                           | 12 V @ 5 A             |              |               | (60.7 x 133 x 41.15)                        | DPS53-M                        |
|                                                                                                           | 15 V @ 4 A             |              |               |                                             | DPS54-M                        |
|                                                                                                           | 24 V @ 2.5 A           |              |               |                                             | DPS55-M                        |
|                                                                                                           | 48 V @ 1.25 A          |              |               |                                             | DPS58-M                        |

Options:

(1) Interchangeable AC plug - must be purchased separately.

(2) 2.1 mm x 5.5 mm barrel plug

# LED Lighting Drivers

Up to 100 Watts



NEW!

## Special Features

- Constant current and constant voltage operation
- Flexible dimming options
- Free-air rated—no forced air necessary for cooling

## Compliance

- Includes Class 2 outputs
- Includes IP20, IP64 and IP67 water protection
- CISPR 15/FCC Part 15 EMI performance
- Class C harmonics
- >0.9 power factor

## Safety

|     |                 |
|-----|-----------------|
| EN  | 61347-2-13      |
| UL  | 8750            |
| CSA | C22.2 No. 107.1 |
| CE  | Mark (LVD)      |

## Electrical Specifications

### Input

|                 |                                              |
|-----------------|----------------------------------------------|
| Input range     | 90-264 Vac (U models); 90-305 Vac (H models) |
| Input frequency | 47-63 Hz                                     |
| Input fusing    | Internally fused                             |

### Output

|                  |                                                                                                                     |
|------------------|---------------------------------------------------------------------------------------------------------------------|
| Constant current | Capable of operating in constant current mode to directly drive LEDs and have optional programmable current levels* |
| Constant voltage | Designed to operate in constant voltage mode over a specified range to power external LED drivers*                  |

### Control and Protection

|               |                                           |
|---------------|-------------------------------------------|
| Current limit | Programmable*                             |
| Protection    | Short Circuit/Overvoltage/Overtemperature |

\* Refer to data sheet for detailed information.

## Ordering Information

| Model Number  | Input Voltage Range | Rated Output Voltage | Rated Output Current | Dimming Interface    | IP Rating  |
|---------------|---------------------|----------------------|----------------------|----------------------|------------|
| LDS25-36-H03U | 90-305 Vac          | 36 Vdc               | 700 mA dc            | 0-10 V               | IP20       |
| LDS25-36-H03F | 90-305 Vac          | 36 Vdc               | 700 mA dc            | 0-10 V               | Open-frame |
| LDS70-12-U00  | 90-264 Vac          | 12 Vdc               | 5.0 Adc              | None                 | IP67       |
| LDS70-12-H03  | 90-305 Vac          | 12 Vdc               | 5.0 Adc              | 0-10 V               | IP67       |
| LDS70-58-U00  | 90-264 Vac          | 58 Vdc               | 1.2 Adc              | None                 | IP67       |
| LDS70-58-U01  | 90-264 Vac          | 58 Vdc               | 1.2 Adc              | 2-level & DIP switch | IP64       |
| LDS70-58-H03  | 90-305 Vac          | 58 Vdc               | 1.2 Adc              | 0-10 V               | IP67       |
| LDS100-24-U00 | 90-264 Vac          | 24 Vdc               | 4.1 Adc              | None                 | IP67       |
| LDS100-24-H00 | 90-305 Vac          | 24 Vdc               | 4.1 Adc              | None                 | IP67       |
| LDS100-24-H03 | 90-305 Vac          | 24 Vdc               | 4.1 Adc              | 0-10 V               | IP67       |



# MicroMP Series

Cost-efficient, configurable power supply with market-leading density and efficiency

## Up to 1200 Watts

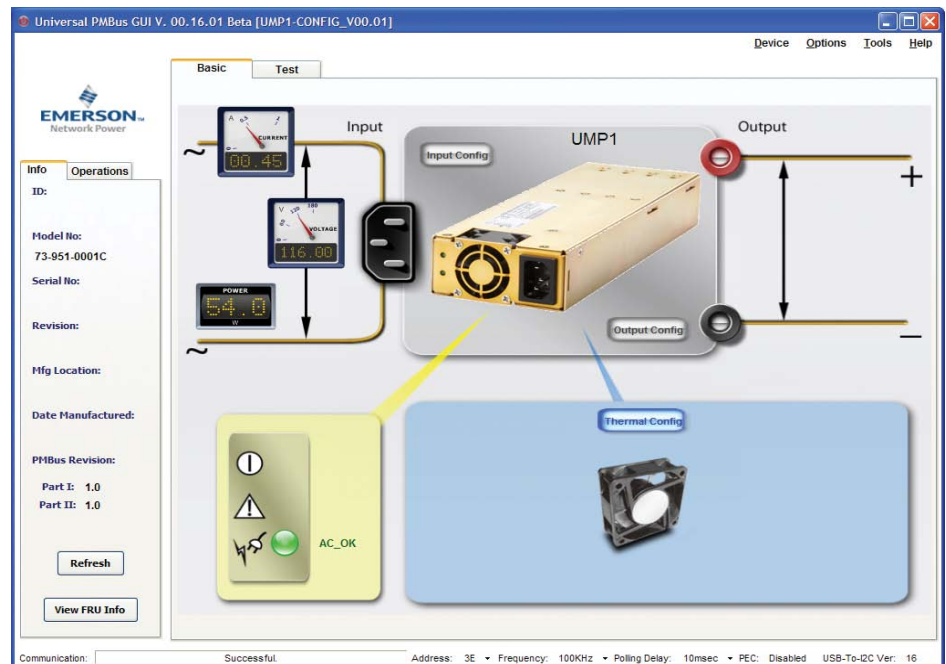
Total Power: Up to 1200 Watts  
 Input Voltage: 85-264 Vac  
 120-300 Vdc  
 # of Outputs: Up to 12

NEW!



## Special Features

- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- Industrial shock/vibration (>50 G's)
- Low cost
- Low leakage (< 300 µA)
- PMBus
- High efficiency
- Low profile 1U size
- Multi output
- Current limit modification (foldback or constant current)
- High power density
  - µMP4: 10.8 W/cu-in
  - µMP1: 15.1 W/cu-in
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- µP controlled PFC input with active inrush protection
- No preload required
- IEC or terminal block input



## Electrical Specifications

| Input           |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| Input range     | 85-264 Vac<br>120-350 Vdc (limited to 250 Vac/300Vdc in medical apps)    |
| Frequency       | 47-440 Hz                                                                |
| Inrush current  | 40 A peak max. (soft start)                                              |
| Efficiency      | Up to 91% @ full case load                                               |
| Power factor    | 0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz)                               |
| Turn-on time    | AC on 2 sec for µMP1 and 1.5 sec for µMP4, inhibit/enable 250 ms typical |
| EMI filter      | CISPR 22/EN55022 Level "B"                                               |
| Leakage current | 300 µA max. @ 240 Vac for µMP1 and 500 µA max. for µMP4; 47-63 Hz        |
| Radiated EMI    | CISPR 22/EN55022 Level "B"                                               |
| Warranty        | Two years                                                                |





## Electrical Specifications

| Output                     |                                                                                                                       |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Factory set point accuracy | ±1%                                                                                                                   |
| Margining                  | ±3-7% nominal analog (single output module only)                                                                      |
| Overall regulation         | 0.4% or 30 mV whichever is greater                                                                                    |
| Ripple                     | RMS: 0.1% or 10 mV, whichever is greater<br>Pk-Pk: 1.0% or 50 mV, whichever is greater<br>Bandwidth limited to 20 MHz |
| Dynamic response           | <±5% or 250 mV, with 50% step load                                                                                    |
| Recovery time              | To within 1% in <300 µs                                                                                               |
| Reverse voltage protection | 100% of rated output current                                                                                          |
| Thermal protection (OTP)   | All outputs disabled when internal temp exceeds safe operating range.                                                 |
| Remote sense               | Up to 0.5 V total drop (not available on triple output module)                                                        |
| Single wire parallel       | Current share to within 5% of total rated current                                                                     |
| DC OK                      | ±5% of nominal                                                                                                        |
| Minimum load               | Not required                                                                                                          |
| Housekeeping standby       | 5 Vdc @ 1.0 A max. present whenever AC input is applied                                                               |
| Module inhibit             | Logic - output on with low or open. Different logic options available                                                 |
| Output/Output isolation    | >1 Megohm, 500 V                                                                                                      |

## Environmental Specifications Safety

|                                |                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature          | -40 °C to 70 °C ambient.<br>Derate each output 2.5% per degree from 50 °C to 70 °C.<br>(-20 °C start up) Meets full spec after 1/2 load. 10 min warm-up |
| Storage temperature            | -40 °C to 85 °C                                                                                                                                         |
| Electromagnetic susceptibility | Designed to meet EN61000-4; -3, -6, -11 Level 3, Level 4 for -2, -4, -5                                                                                 |
| Humidity                       | Operating; non-condensing<br>10% to 95% RH                                                                                                              |
| Vibration                      | MIL-STD-810E                                                                                                                                            |
| MTBF demonstrated              | >350,000 hours at full load, one µMP4 case + two modules, Telcordia SR-332 calculated MTBF                                                              |
| Altitude:                      | Up to 10k feet; derate linear to 50% from 10k-30k feet                                                                                                  |

|      |                                      |
|------|--------------------------------------|
| UL   | UL60950/UL60601-1                    |
| CSA  | CSA22.2 No. 234 Level 5              |
| VDE  | EN60950/EN60601-1                    |
| BABT | Compliance to EN60950/EN60601 BS7002 |
| CB   | Certificate and report               |
| CE   | Mark to LVD                          |
| CCC  | Approved                             |

## Voltage Codes

| Standard Output Ratings    |                                  |                                                    |                |      |
|----------------------------|----------------------------------|----------------------------------------------------|----------------|------|
| Module Output Voltage Code | Single Output ONE SLOT 240 W Max | Dual Output ONE SLOT 192 W Max                     |                |      |
| Module Identification      | S2                               | D = Dual Common Ground<br>I = Dual Isolated Ground |                |      |
| Output Module Line-Up      |                                  |                                                    |                |      |
| Code                       | Volts                            | Output Current V1                                  | Output Current |      |
|                            |                                  |                                                    | V1             | V2   |
| A                          | 2.0                              | 40.0                                               | N/A            |      |
| B                          | 2.2                              | 40.0                                               | N/A            |      |
| C                          | 3.0                              | 40.0                                               | N/A            |      |
| D                          | 3.3                              | 40.0                                               | 4.0*           | 4.0* |
| E                          | 5.0                              | 36.0                                               | 4.0            | 4.0  |
| F                          | 5.2                              | 34.0                                               | 4.0            | 4.0  |
| G                          | 5.5                              | 32.0                                               | 4.0            | 4.0  |
| H                          | 6.0                              | 30.0                                               | 4.0            | 4.0  |
| I                          | 8.0                              | 25.0                                               | 4.0            | 4.0  |
| J                          | 10.0                             | 24.0                                               | 4.0            | 4.0  |
| K                          | 11.0                             | 22.0                                               | 4.0            | 4.0  |
| L                          | 12.0                             | 20.0                                               | 4.0            | 4.0  |
| M                          | 14.0                             | 17.0                                               | 4.0            | 4.0  |
| N                          | 15.0                             | 16.0                                               | 4.0            | 4.0  |
| O                          | 18.0                             | 13.0                                               | 4.0            | 4.0  |
| P                          | 20.0                             | 12.0                                               | 4.0            | 4.0  |
| Q                          | 24.0                             | 10.0                                               | 4.0            | 4.0  |
| R                          | 28.0                             | 8.6                                                | 3.4            | 3.4  |
| S                          | 30.0                             | 8.0                                                | N/A            |      |
| T                          | 33.0                             | 7.0                                                | N/A            |      |
| U                          | 36.0                             | 6.7                                                | N/A            |      |
| V                          | 42.0                             | 5.7                                                | N/A            |      |
| W                          | 48.0                             | 5.0                                                | N/A            |      |
| X                          | 54.0                             | 4.4                                                | N/A            |      |
| Y                          | 60.0                             | 4.0                                                | N/A            |      |

\* For "I" codes only

| Parallel Codes |                   |      |                   |      |                       |
|----------------|-------------------|------|-------------------|------|-----------------------|
| Code           | Slots in Parallel | Code | Slots in Parallel | Code | Slots in Parallel     |
| 1              | 1&2               | 6    | 1&2&3             | B    | 1,2&3; 4&5            |
| 2              | 2&3               | 7    | 1,2,3&4           | C    | 1,2,3&4; 5&6          |
| 3              | 3&4               | 8    | 1,2,3,4&5         | D    | 1&2; 3&4; 5&6         |
| 4              | 4&5               | 9    | 1,2,3,4,5&6       | E    | 1,2&3; 4,5&6          |
| 5              | 5&6               | A    | 1&2; 3&4          | 0    | no module in parallel |

## Ordering Information

| Case Size                                                                                                                                                                                                                                                       | Module/Voltage/Option Codes                                                                                                                                                                                      | Case Option Codes                                                                                                                                                   | Software Code                           | Hardware Code                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| µMPXY                                                                                                                                                                                                                                                           | First - Module Code<br>Second - Voltage Code<br>Third - Option Code                                                                                                                                              |                                                                                                                                                                     |                                         |                                         |
|                                                                                                                                                                                                                                                                 | <b>S2E - DER - DLL</b>                                                                                                                                                                                           | <b>00</b>                                                                                                                                                           | <b>A</b>                                | <b>###</b>                              |
| <b>Case Size (mm)</b><br>Single-Phase Input where X =<br>4 = 1.57" x 3.5" x 10"; 400 W - 600 W, 4 slots<br>1 = 1.57" x 5" x 10"; 1000 W - 1200 W, 6 slots<br><br>Input Type where Y =<br>T = Terminal Block<br>C = IEC Connector, C14<br>B = IEC Connector, C16 | <b>Module Codes</b><br>S2 = 200 W Single O/P (1 slot)<br>D = 96 W/96 W Dual O/P Common Ground (1 slot)<br>I = 96 W/96 W Dual O/P Isolated Ground (1 slot)<br><br><b>Voltage Codes:</b><br>See Voltage Code Table | <b>Case Option Codes</b><br>First digit<br>0 - E = Parallel Code<br><br>Second digit<br>0 = No Options<br>1 = Reverse Air<br>3 = Global Enable<br>5 = Opt 1 + Opt 3 | Factory assigned for modified standards | Factory assigned for modified standards |

## MP Series

Modular power supply for optimum flexibility

Up to 1200 Watts

Total Power: Up to 1200 Watts  
 Input Voltage: 85-264 Vac  
 120-350 Vdc  
 # of Outputs: Up to 21



### Special Features

- Low cost
- Current share on all outputs with ratings of 10 A or greater
- Remote sense on all outputs with ratings greater than 2 A
- Overload protection on all outputs
- Voltage adjustment on all outputs
- Margining on all single output modules
- Input OK signal and status indicator LED
- Global DC OK signal and status indicator LED
- Global and individual module inhibits/enable
- Forced air cooling or customer provided air option
- Isolated 1 A 5 V bias voltage
- Power factor correction
- EN61000-3-2 harmonic distortion compliance
- CISPR 22, EN55022 Curve B conducted/radiated EMI
- European CE Mark requirements
- Optional VME timing and system DC OK module
- Low leakage option
- EN61000 immunity standards
- Standard modification flexibility (see datasheet on [Emerson.com/EmbeddedPower](http://Emerson.com/EmbeddedPower))

### Special Purpose Modules

- Battery charger module
- Extended hold-up module
- High voltage module (non-isolated)
- OR-ing diode module



### Electrical Specifications

| Input                                |                                                                                            |
|--------------------------------------|--------------------------------------------------------------------------------------------|
| Input voltage                        | 85-264 Vac<br>120-350 Vdc                                                                  |
| Frequency                            | 47-440 Hz                                                                                  |
| Inrush current                       | 40 A peak maximum (soft start)                                                             |
| Efficiency                           | 70-80% typ. @ full case load                                                               |
| Power factor                         | 0.99 typ. meets EN61000-3-2 (N/A @ 440 Hz)                                                 |
| Turn-on time                         | AC on 1.5 second typical<br>Inhibit/enable 150 ms typical                                  |
| EMI filter standard                  | CISPR 22<br>EN55022 Level "B"                                                              |
| EMI filter (low leakage option)      | CISPR 22<br>EN55022 Level "A"                                                              |
| Leakage current standard             | 2.0 mA maximum @ 240 Vac                                                                   |
| Leakage current (low leakage option) | 300 $\mu$ A maximum @ 240 Vac                                                              |
| Radiated EMI                         | CISPR 22<br>EN55022 Level "B"                                                              |
| Holdover storage                     | 20 ms minimum (independent of input Vac)                                                   |
| AC OK                                | >5 ms early warning minimum before outputs lose regulation<br>Full cycle ride thru (50 Hz) |
| Harmonic distortion                  | Meets EN61000-3-2                                                                          |
| Isolation                            | Meets EN60950                                                                              |
| Global inhibit/enable                | TTL, Logic "1" and Logic "0"; configurable                                                 |
| Input fuse (internal)                | MP4: 10 A; MP6: 15 A; MP8: 20 A; MP1: 20 A                                                 |
| Warranty                             | Two years                                                                                  |

| Output                                                |                                                                                                                     |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Adjustment range                                      | ±10% minimum all outputs                                                                                            |
| Margining                                             | ±4-6% nominal <sup>1</sup>                                                                                          |
| Overall regulation                                    | 0.4% or 20 mV maximum<br>(36 W modules 4% maximum)                                                                  |
| Ripple                                                | RMS: 0.1% or 10 mV, whichever is greater; Pk-Pk: 1.0% or 50 mV, whichever is greater; bandwidth limited to 20 MHz   |
| Dynamic response                                      | <2% or 100 mV, with 25% load step                                                                                   |
| Recovery time                                         | To within 1% in <300 µs second                                                                                      |
| Overcurrent protection                                | Single, main of dual output module 105-120% of rated output current                                                 |
| Short-circuit protection                              | Protected for continuous short-circuit<br>Recovery is automatic upon removal of short                               |
| Overvoltage protection (measured at sense connection) | Single output modules                                                                                               |
| Reverse voltage protection                            | 100% of rated output current                                                                                        |
| Thermal protection                                    | All outputs disabled when internal temp exceeds safe operating range. > 5 ms warning (AC OK signal) before shutdown |
| Remote sense                                          | Up to 0.5 V total drop (not available on triple output module)                                                      |
| Single wire parallel                                  | Current share to within 2% of total rated current <sup>2</sup>                                                      |
| DC OK                                                 | -2% to -8% of nominal for any monitored output <sup>2</sup>                                                         |
| Minimum load                                          | Not required on single or triple output modules.<br>10% required on main of dual output modules <sup>3</sup>        |
| Housekeeping standby                                  | 5 Vdc @1.0 A mA maximum present whenever AC input is applied (optional 2.0 A available)                             |
| Module inhibit                                        | TTL, isolated, singles and dual (both outputs) only                                                                 |
| Switching frequency                                   | 250 kHz                                                                                                             |
| Output/output isolation                               | >1 Megohm                                                                                                           |
| VME signal option board                               | POR signal & quad external DC OK                                                                                    |

## Environmental Specifications

|                         |                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Operating temperature   | -20 °C to 50 °C (start @ 0 °C)<br>(derate each output linearly to 50% at 70 °C) (-20 °C to 40 °C max. with rear air option) |
| Storage/vibration       | MIL-HDBK 810E                                                                                                               |
| Humidity                | 95% non-condensing                                                                                                          |
| Storage temperature     | -40 °C to 85 °C                                                                                                             |
| Temperature coefficient | 0.02% per °C                                                                                                                |
| Cooling:                | Internal DC fan or customer provided air (option)                                                                           |

## Safety

|      |                                 |
|------|---------------------------------|
| UL   | UL1950                          |
| CSA  | CSA22.2 No. 234 Level 5         |
| IEC  | IEC950, Class 1                 |
| VDE  | EN60950-1                       |
| BABT | Compliance to EN 60950, BS 7002 |
| CB   | Certificate and report          |
| CE   | Mark                            |

### Notes:

1. Single output modules only
2. Single and main of dual output modules only
3. Contact factory for optional preload if required

## Ordering Information

Sample below is 1200 W case with 12 V @ 50 A; 5 V @ 60 A; 24 V @ 8.5 A; 12 V @ 10 A; 12 V @ 4 A; extended hold-up with no options.

| Case Size                                                                                                                                                                                                                                                                                                        | Module/Voltage(s)<br>First - Module Code<br>Second - Voltage Code                                                                                                                                                                                                                                                                        | Add-on Modules<br>Requires 1 slot each                                                   | Case Option Codes                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Hardware Code                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>MP1</b>                                                                                                                                                                                                                                                                                                       | <b>3L - 2E - 1Q - 4LL</b>                                                                                                                                                                                                                                                                                                                | <b>HUP</b>                                                                               | <b>00</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>###</b>                            |
| <b>Case Size (mm)</b><br>4 = 2.5" x 5" x 10";<br>400-600 W, 5 Slots<br>(63.5 x 127 x 254)<br>6 = 2.5" x 5" x 11";<br>600-800 W, 5 Slots<br>(63.5 x 127 x 279.4)<br>8 = 2.5" x 7" x 10";<br>800-1000 W, 6 Slots<br>(63.5 x 177.8 x 254)<br>1 = 2.5" x 8" x 11";<br>1000-1200 W, 7 Slots<br>(63.5 x 203.2 x 279.4) | <b>Module Codes</b><br>Module/Voltage/Option Codes<br>Module Codes:<br>(None) = 36 W Triple O/P (1 slot)<br>1 = 210 W Single O/P (1 slot)<br>2 = 360 W Single O/P (2 slot)<br>3 = 750 W Single O/P (3 slot)<br>4 = 144 W Dual O/P (1 slot)<br>5 - 9 = Future<br><br><b>Voltage Codes:</b><br>See Output Module Voltage/<br>Current table | <b>Add-on Modules</b><br>HUP = Hold up module<br>VME = VME POR signal<br>and isolated DC | <b>Case Option Codes</b><br><br><b>First Digit</b><br>0 - 9 = parallel code<br>(See MP parallel codes table on<br>following page)<br><br><b>Second Digit</b><br>Standard Options<br><b>0</b> = no options<br><b>1</b> = rear air exhaust<br><b>3</b> = global enable<br><b>5</b> = option package<br>(options 1 & 3)<br><b>M</b> = low leakage<br><b>N</b> = low leakage plus option 1<br><b>P</b> = low leakage plus option 3<br><b>R</b> = low leakage plus option 5 | Factory assigned<br>for modifications |

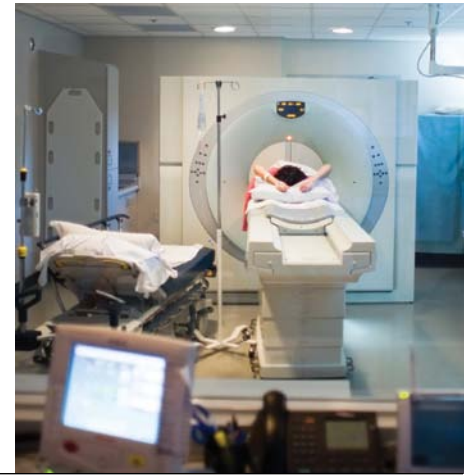
# Intelligent MP Series

*Intelligent modular power supply  
for optimum flexibility*

**Up to 1500 Watts**

Total Power: Up to 1500 Watts  
Input Voltage: 85-264 Vac  
120-300 Vdc  
# of Outputs: Up to 21

**iMP®**



## Special Features

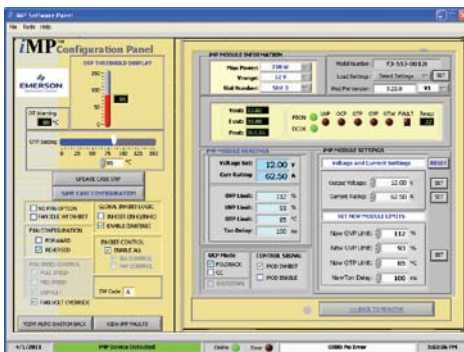
- **Medical EN60601-1 approval**
- Intelligent I<sup>2</sup>C control
- Voltage adjustment on all outputs (Manual or I<sup>2</sup>C)
- Configurable input and output (case and module) OK signals and indicators
- Configurable inhibit/enable
- Configurable output UP/DOWN sequencing
- Configurable current limit (foldback or constant current)
- High power density (8.8 W/cu-in)
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- Customer provided air option
- $\mu$ P controlled PFC input with active inrush protection
- I<sup>2</sup>C monitor of voltage, current and temp
- Programmable voltage, current limit, inhibit/enable through I<sup>2</sup>C
- Optional extended hold-up module (SEMI F47 compliance)
- CAN BUS and RS-485 interface option
- Low leakage (<300  $\mu$ A)
- Increased power density to 50% over standard MP
- Backward compatibility with standard MP
- External switching frequency sync input
- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- No preload required
- Industrial shock/vibration (>50 G's)



## Electrical Specifications

### Input

|                       |                                                                                                                                 |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Input range           | 85-264 Vac 120-350 Vdc<br>(limited to 300 Vdc in medical applications)                                                          |
| Frequency             | 47-440 Hz                                                                                                                       |
| Inrush current        | 40 A peak max. (soft start)                                                                                                     |
| Efficiency            | Up to 85% @ full case load                                                                                                      |
| Power factor          | 0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz)                                                                                      |
| Turn-on time          | AC on 2 sec typ., inhibit/enable 150 ms typical<br>Programmable delay; 50 ms internal turn-on delay (Dual Output only)          |
| EMI filter            | CISPR 22/EN55022 Level "B"                                                                                                      |
| Leakage current       | 300 $\mu$ A max. @ 240 Vac; 47-63 Hz                                                                                            |
| Radiated EMI          | CISPR 22/EN55022 Level "B"                                                                                                      |
| Holdover storage      | 20 ms minimum (independent of input Vac) additional<br>34 ms holdover storage with optional HUP module<br>(SEMI F47 compatible) |
| AC OK                 | >5 ms early warning min. before outputs lose regulation<br>Full cycle ride thru (50 Hz) (N/A on iMP4 > 750 W @ 90 Vac)          |
| Harmonic distortion   | Meets EN61000-3-2                                                                                                               |
| Isolation             | Meets EN60950 and EN60601                                                                                                       |
| Global Inhibit/Enable | TTL, Logic "1" and Logic "0"; configurable                                                                                      |
| Input fuse (internal) | iMP4: 16 A; iMP8: 20 A; iMP1: 25 A (both lines fused)                                                                           |
| Warranty              | Two years                                                                                                                       |



The iMP software is designed to make the iMP Power Supply Unit (PSU) accessible to the user. It is intended to provide information gathered from the PSU and interactive controls to the basic capabilities of iMP power supply. To download go to: [www.PowerConversion.com/impssoftware](http://www.PowerConversion.com/impssoftware)



| Output                            |                                                                                                                                                                                                                                  |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adjustment range*                 | ±10% minimum all outputs (manual)<br>(full module adjustment range using I <sup>2</sup> C)                                                                                                                                       |
| Margining                         | ±4-6% nominal analog (single output module only)                                                                                                                                                                                 |
| Overall regulation                | 0.4% or 20 mV max. (1500 W modules 1% max. 36 W modules 4% max.)                                                                                                                                                                 |
| Ripple                            | RMS: 0.1% or 10 mV, whichever is greater<br>Pk-Pk: 1.0% or 50 mV, whichever is greater<br>Bandwidth limited to 20 MHz                                                                                                            |
| Dynamic response                  | <2% or 100 mV, with 25% load step                                                                                                                                                                                                |
| Recovery time                     | To within 1% in <300 µs                                                                                                                                                                                                          |
| Overcurrent protection**          | Configurable through I <sup>2</sup> C (calibration required). Single output module and main output of the dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current |
| Short-circuit protection          | Protected for continuous short-circuit<br>Recovery is automatic upon removal of short                                                                                                                                            |
| Overvoltage protection*           | Configurable through I <sup>2</sup> C<br>- Single output module 2-5.5 V 122-134%; 6-60 V 110-120%<br>- Dual output module 2-6 V 122-134%; 8-28 V 110-120%<br>- Triple output module                                              |
| Reverse voltage protection        | 100% of rated output current                                                                                                                                                                                                     |
| Thermal protection* (OTP and OTW) | Configurable through I <sup>2</sup> C<br>All outputs disabled when internal temp exceeds safe operating range. > 5 ms warning (AC OK signal) before shutdown                                                                     |
| Remote sense                      | Up to 0.5 V total drop (not available on triple output module)                                                                                                                                                                   |
| Single wire parallel              | Current share to within 2% of total rated current                                                                                                                                                                                |
| DC OK*                            | ±5% of nominal. Configurable through I <sup>2</sup> C                                                                                                                                                                            |
| Minimum load                      | Not required                                                                                                                                                                                                                     |
| Housekeeping standby              | 5 Vdc @ 1.0 A max. present whenever AC input is applied (Optional 2.0 A available)                                                                                                                                               |
| Module inhibit*                   | Configured and controlled through I <sup>2</sup> C                                                                                                                                                                               |
| Switching frequency               | 250 kHz accepts external sync signal                                                                                                                                                                                             |
| Output/Output isolation           | >1 Megohm, 500 V                                                                                                                                                                                                                 |

\* Can be controlled via I<sup>2</sup>C

\*\* Controlled via I<sup>2</sup>C but requires load calibration

## Environmental Specifications

|                                |                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------|
| Operating temperature          | -40 °C to 70 °C ambient.<br>Derate each output 2.5% per degree from 50 °C to 70 °C.<br>(-20 °C start up) |
| Storage temperature            | -40 °C to 85 °C                                                                                          |
| Electromagnetic susceptibility | Designed to meet EN61000-4;<br>-2, -3, -4, -5, -6, -8, -11 Level 3                                       |
| Humidity                       | Operating; non-condensing<br>10% to 95% RH                                                               |
| Vibration                      | IEC68-2-6 to the levels of<br>IEC721-3-2                                                                 |
| MTBF demonstrated              | >550,000 hours at full load,<br>220 Vac and 25 °C ambient conditions                                     |

## Safety

|      |                                          |
|------|------------------------------------------|
| UL   | UL60950/UL2601                           |
| CSA  | CSA22.2 No. 234 Level 5                  |
| VDE  | EN60950/EN60601-1                        |
| BABT | Compliance to EN60950/<br>EN60601 BS7002 |
| CB   | Certificate and report                   |
| CE   | Mark to LVD                              |

## Output Module Line-up

| Module Code                               | 1      | 2      | 3      | 4                                                                      | 5                                                                      |
|-------------------------------------------|--------|--------|--------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Module Type                               | Single | Single | Single | Dual                                                                   | Triple                                                                 |
| Max output power                          | 210 W  | 360 W  | 750 W  | 144 W                                                                  | 36 W                                                                   |
| Max output current                        | 35 A   | 60 A   | 150 A  | 10 A                                                                   | 2 A                                                                    |
| Output voltages available*                | 2-60 V | 2-60 V | 2-60 V | 6-15, 24-28; 6-15, 6-15; 6-15, 2-6; 2-6, 2-6; 24-28, 24-28; 24-28; 2-6 | 8-15, 8-15, 2-6; 8-15, 8-15, 8-15; 8-15, 8-15, 18-28; 8-15, 18-28, 2-6 |
| Standard voltage increments               | 25     | 25     | 25     | 16                                                                     | 18                                                                     |
| Remote sense                              | Yes    | Yes    | Yes    | Yes                                                                    | No                                                                     |
| Remote margin                             | Yes    | Yes    | Yes    | No                                                                     | No                                                                     |
| V-Program - I <sup>2</sup> C control      | Yes    | Yes    | Yes    | Yes                                                                    | No                                                                     |
| Active current share                      | Yes    | Yes    | Yes    | Yes                                                                    | No                                                                     |
| Module Inhibit - I <sup>2</sup> C control | Yes    | Yes    | Yes    | Yes                                                                    | Yes                                                                    |
| Module Inhibit - analog                   | Yes    | Yes    | Yes    | Yes                                                                    | No                                                                     |
| Overvoltage/overcurrent protection        | Yes    | Yes    | Yes    | Yes                                                                    | Yes                                                                    |
| Minimum load required                     | No     | No     | No     | No                                                                     | No                                                                     |
| Slots occupied in any iMP case            | 1      | 2      | 3      | 1                                                                      | 1                                                                      |

\* Programmable

## Output Module Voltage/Current

| Voltage         | Voltage Code | Single Output Module Code |        |        |         | Dual Output** |       | Triple Output |       |       | I <sup>2</sup> C Adjustment Ranges*** |
|-----------------|--------------|---------------------------|--------|--------|---------|---------------|-------|---------------|-------|-------|---------------------------------------|
|                 |              | 1                         | 2      | 3      | 5+      | V1            | V2    | —             | —     | —     |                                       |
| 2 V             | A            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 1.8-2.2                               |
| 2.2 V           | B            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 2.0-2.4                               |
| 3 V             | C            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 2.7-3.3                               |
| 3.3 V           | D            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 3.0-3.6                               |
| 5 V             | E            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 4.5-5.5                               |
| 5.2 V           | F            | 35 A                      | 60 A   | 144 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 4.7-5.7                               |
| 5.5 V           | G            | 34 A                      | 58 A   | 136 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 5.0-6.1                               |
| 6 V             | H            | 23 A                      | 42 A   | 97.5 A | 140 A   | 10 A*         | 10 A* | —             | —     | 2 A   | 5.4-6.6                               |
| 8 V             | I            | 20 A                      | 36 A   | 84.4 A | 140 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 7.2-8.8                               |
| 10 V            | J            | 18 A                      | 32 A   | 75 A   | 140 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 9.0-11.0                              |
| 11 V            | K            | 17 A                      | 31 A   | 68 A   | 136.3 A | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 9.9-12.1                              |
| 12 V            | L            | 17 A                      | 30 A   | 62.5 A | 125 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 10.8-13.2                             |
| 14 V            | M            | 14 A                      | 21 A   | 53.5 A | 107 A   | 9 A           | 4 A   | 1 A           | 1 A   | 1 A   | 12.6-15.4                             |
| 15 V            | N            | 14 A                      | 20 A   | 50 A   | 100 A   | 8 A           | 4 A   | 1 A           | 1 A   | 1 A   | 13.5-16.5                             |
| 18 V            | O            | 11 A                      | 19 A   | 41.6 A | 83.3 A  | —             | —     | —             | 0.5 A | 0.5 A | 16.2-19.8                             |
| 20 V            | P            | 10.5 A                    | 18 A   | 37.5 A | 75 A    | —             | —     | —             | 0.5 A | 0.5 A | 18.0-22.0                             |
| 24 V            | Q            | 8.5 A                     | 15 A   | 30 A   | 62.5 A  | 4 A           | 2 A   | —             | 0.5 A | 0.5 A | 21.6-26.4                             |
| 28 V            | R            | 6.7 A                     | 11 A   | 26.8 A | 53.5 A  | 3 A           | 2 A   | —             | 0.5 A | 0.5 A | 25.2-30.8                             |
| 30 V            | S            | 6.5 A                     | 11 A   | 25 A   | 50 A    | —             | —     | —             | —     | —     | 27.0-33.0                             |
| 33 V            | T            | 6.2 A                     | 10.9 A | 22.7 A | 35.8 A  | —             | —     | —             | —     | —     | 29.7-36.3                             |
| 36 V            | U            | 5.8 A                     | 10 A   | 20.8 A | 35.8 A  | —             | —     | —             | —     | —     | 32.4-39.6                             |
| 42 V            | V            | 4.2 A                     | 7.5 A  | 16 A   | 35.7 A  | —             | —     | —             | —     | —     | 37.8-46.2                             |
| 48 V            | W            | 4 A                       | 7.5 A  | 15.6 A | 31.2 A  | —             | —     | —             | —     | —     | 43.2-52.8                             |
| 54 V            | X            | 3.7 A                     | 6 A    | 13.9 A | 27.7 A  | —             | —     | —             | —     | —     | 48.6-59.4                             |
| 60 V            | Y            | 3.5 A                     | 6 A    | 12.5 A | 25 A    | —             | —     | —             | —     | —     | 54.0-66.0                             |
| Consult Factory |              |                           |        |        |         |               |       |               |       |       |                                       |
| Special         | Z            | 35 A                      | 60 A   | 150 A  | —       | —             | 10 A  | —             | —     | —     | 2.3-2.6                               |
| Special         | Z            | 35 A                      | 60 A   | 150 A  | —       | —             | 10 A  | —             | —     | —     | 3.7-4.4                               |
| Special         | Z            | 20 A                      | 36 A   | 80 A   | 140 A   | —             | 8 A   | —             | —     | —     | 6.7-7.1                               |

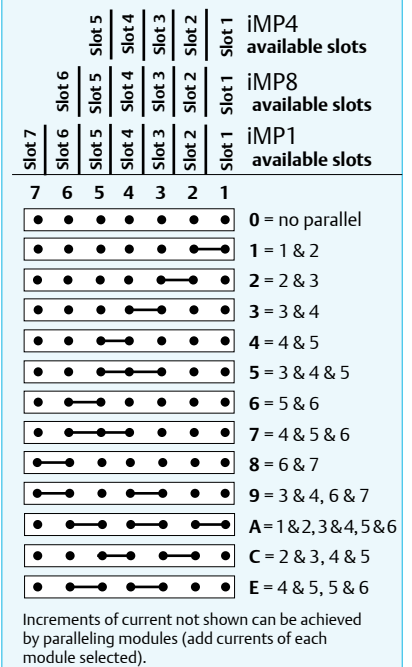
\* Note: Contact factory for extended range down to 6 V.

\*\* Total output power on dual module must not exceed 144 W.

\*\*\* For single output modules only.

+ Applicable for iMP1 only.

### Parallel Codes



## Ordering Information

Sample below is 1500 W case with 12 V @ 62.5 A; 5 V @ 60 A; 24 V @ 8.5 A; 12 V @ 10 A; 12 V @ 4 A; with no options.

| Case Size                                                                                                                                                                                                                                                                                                                           | Module/Voltage/Option Codes<br>First - Module Code<br>Second - Voltage Code<br>Third - Option Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Case Option Codes                                                                                                                                                                                                                                                                                                                                        | Software Code                                                | Hardware Code                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------|
| <b>iMP1*</b>                                                                                                                                                                                                                                                                                                                        | <b>3L0 - 2E2 - 1Q1 - 4LL0</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>00</b>                                                                                                                                                                                                                                                                                                                                                | <b>A</b>                                                     | <b>###</b>                                       |
| <b>Case Size (mm)</b><br>4 = 2.5" x 5" x 10"; 750-1100 W, 5 slots (63.5 x 127 x 254)<br>8 = 2.5" x 7" x 10"; 1000-1200 W, 6 slots (63.5 x 177.8 x 254)<br>1 = 2.5" x 8" x 11"; 1200-1500 W, 7 slots (63.5 x 203.2 x 279.4)<br><br>*Note: Add "E" after iMP4 to denote IEC input option. e.g., iMP4E (Not available on iMP8 or iMP1) | <b>Module Codes</b><br>Module/voltage/option codes<br>Module codes:<br>(None) = 36 W triple O/P (1 slot)<br>1 = 210 W single O/P (1 slot)<br>2 = 360 W single O/P (2 slot)<br>3 = 750 W single O/P (3 slot)<br>4 = 144 W dual O/P (1 slot)<br>5 = 1500 W single O/P (4 slot)<br>6 - 9 = Future<br><br><b>Voltage Codes:</b><br>See Output Module Voltage/Current table above<br><br><b>Option Codes:</b><br>0 = Standard<br>1 = Module enable<br>2 = Constant current<br>3 = 1 & 2 combined<br>4 = Set for use in standard (non-intelligent case)<br>5 = Shutdown mode for 1500 W<br>6 = 1 & 5 combined<br>7 - 9 = Future | <b>Case Option Codes</b><br><br>First digit<br>0 - 9 = parallel code (See Parallel Codes table above)<br><br>Second digit<br>0 = No options<br>1 = Reverse air<br>3 = Global enable<br>4 = Fan idle w/inhibit<br>5 = Opt 1 + Opt 3<br>6 = Opt 1 + Opt 4<br>7 = Opt 3 + Opt 4<br>8 = Opt 1 + 3 + 4<br>9 = CAN BUS/RS-485 73-544-002<br>B = USB 73-546-002 | Software code used for configuration change. "A" is standard | Factory assembled for hardware of firmware mods. |

#### Ordering Note:

- The cases and modules of both MP and iMP series can be interchanged to allow more flexibility. If intelligent modules are used with non-intelligent cases, a numeric code "4" is placed at the end of the module code (e.g., 4LL0 becomes 4LL4).
- USB to I<sup>2</sup>C module order code 73-769-001

# Intelligent VS Series

*Intelligent modular power supply  
for optimum flexibility*

**Up to 4920 Watts**

Total Power: Up to 4920 Watts  
Input Voltage: 85-264 Vdc  
120-300 Vdc  
# of Outputs: Up to 24

**iVS™**



## Special Features

- **Medical EN60601-1 approval**
- Intelligent I<sup>2</sup>C control
- Voltage adjustment on all outputs (manual or I<sup>2</sup>C)
- Configurable input and output OK signals and indicators
- Configurable inhibit/enable
- Configurable output UP/DOWN sequencing
- High power density (12 W/cu-in)
- Intelligent fan (speed control/fault status)
- $\mu$ P controlled PFC input with active Inrush protection
- I<sup>2</sup>C monitor of voltage, current and temp
- Programmable voltage, current limit, inhibit/enable through I<sup>2</sup>C
- CAN BUS and RS-485 interface option
- Optional extended hold-up module (SEMI F47 compliance)
- Increased power density to 150%
- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- Uses standard iMP modules
- Field upgradeable firmware
- RoHS compliant

## Electrical Specifications

### Input

#### Input range

|              |                            |
|--------------|----------------------------|
| iVS1 & iVS3: | 90-264 Vac 1Ø; 120-300 Vdc |
| iVS6 & iVS8: | 170-264 Vac 3Ø             |

#### Frequency

47-440 Hz

#### Inrush current

40 A peak maximum (soft start)

#### Efficiency

Up to 85% @ full case load

#### Power factor

0.99 typ. meets EN61000-3-2

#### Turn-on time

AC on 1.5 sec typical, inhibit/enable 150 ms typical. Programmable

#### EMI Filter

CISPR 22/EN55022 Level "B"

#### Leakage current

300  $\mu$ A max. @ 240 Vac; 47-63 Hz

#### Radiated EMI

CISPR 22/EN55022 Level "B"

#### Holdover storage

10 ms minimum (independent of input Vac) additional 20 ms holdover storage with optional HUP module (SEMI F47 compatible)

#### AC OK

>5 ms early warning minutes before outputs lose regulation. Full cycle ride thru (50 Hz). Programmable

#### Harmonic distortion

Meets EN61000-3-2

#### Isolation

Meets EN60950 and EN60601

#### Global inhibit/enable

TTL, Logic "1" and Logic "0"/configurable

#### Warranty

Three years



210 W



360 W



750 W



1500 W

### Single



144 W

### Dual



36 W

### Triple

| Output                    |                                                                                                                                                                                                                                                                                                               |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adjustment range*         | ±10% minimum all outputs (manual)<br>(full module adjustment range using I <sup>2</sup> C)                                                                                                                                                                                                                    |
| Margining                 | ±4-6% nominal analog (single output module only)                                                                                                                                                                                                                                                              |
| Overall regulation        | 0.4% or 20 mV max. (1500 W modules 1% max.)                                                                                                                                                                                                                                                                   |
| Ripple                    | RMS: 0.1% or 10 mV, whichever is greater<br>Pk-Pk: 1.0% or 50 mV, whichever is greater<br>Bandwidth limited to 20 MHz                                                                                                                                                                                         |
| Dynamic response          | <2% or 100 mV, with 25% load step                                                                                                                                                                                                                                                                             |
| Recovery time             | To within 1% in <300 µs                                                                                                                                                                                                                                                                                       |
| Overcurrent protection**  | Configurable through I <sup>2</sup> C. single output module and main output of the dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current. Special programmable OCP delay on 1500 W module from 100 ms to 25.5 seconds with shutdown features |
| Short-circuit protection  | Protected for continuous short-circuit<br>Recovery is automatic upon removal of short<br>(Shutdown mode on 1500 W module)                                                                                                                                                                                     |
| Overvoltage protection*   | Configurable through I <sup>2</sup> C<br>– Single output module 2-5.5 V 122-134%; 6-60 V 110-120%<br>– Dual output module 2-6 V 122-134%; 8-28 V 110-120%<br>– Triple output module No overvoltage protection provided                                                                                        |
| Thermal protection*       | Configurable through I <sup>2</sup> C<br>All outputs disabled when internal temp exceeds safe operating range. > 5 ms warning (AC OK signal) before shutdown                                                                                                                                                  |
| Remote sense              | Up to 0.5 V total drop (not available on triple output module)                                                                                                                                                                                                                                                |
| Single wire parallel      | Current share to within 2% of total rated current                                                                                                                                                                                                                                                             |
| DC OK*                    | ±5% of nominal. Configurable through I <sup>2</sup> C                                                                                                                                                                                                                                                         |
| Minimum load              | Not required                                                                                                                                                                                                                                                                                                  |
| Housekeeping bias voltage | 5 Vdc @1.0 A max. present whenever AC input is applied                                                                                                                                                                                                                                                        |
| Module inhibit*           | Configured and controlled through I <sup>2</sup> C                                                                                                                                                                                                                                                            |
| Output/Output isolation   | >1 Megohm, 500 V                                                                                                                                                                                                                                                                                              |

\* Can be controlled via I<sup>2</sup>C\*\* Controlled via I<sup>2</sup>C but requires load calibration

## Environmental Specifications

|                                |                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------|
| Operating temperature          | -40 °C to 70 °C ambient.<br>Derate each output 2.5% per degree from 50 °C to 70 °C.<br>(-20 °C start up) |
| Storage temperature            | -40 °C to 85 °C                                                                                          |
| Electromagnetic susceptibility | Designed to meet EN61000-4;<br>-2, -3, -4, -5, -6, -8, -11 Level 3                                       |
| Humidity                       | Operating; non-condensing<br>10% to 95% RH                                                               |
| Vibration                      | IEC68-2-6 to the levels of IEC721-3-2                                                                    |
| MTBF demonstrated              | >550,000 hours at full load, 220 Vac and 25 °C ambient conditions                                        |

## Safety

|      |                                          |
|------|------------------------------------------|
| UL   | UL60950/UL2601                           |
| CSA  | CSA22.2 No. 234 Level 5                  |
| VDE  | EN60950/EN60601-1                        |
| BABT | Compliance to EN60950/<br>EN60601 BS7002 |
| CB   | Certificate and report                   |
| CE   | Mark to LVD                              |

## Output Module Line-up

| Module Code                                | 1      | 2      | 3      | 5      | 4                                                                            |                                                                              |
|--------------------------------------------|--------|--------|--------|--------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Module Type                                | Single | Single | Single | Single | Dual                                                                         | Triple                                                                       |
| Max output power                           | 210 W  | 360 W  | 750 W  | 1500 W | 144 W                                                                        | 36 W                                                                         |
| Max output current                         | 35 A   | 60 A   | 150 A  | 140 A  | 10 A                                                                         | 2 A                                                                          |
| Output voltages available*                 | 2-60 V | 2-60 V | 2-60 V | 6-60 V | 6-15, 24-28; 6-15; 6-15; 6-15;<br>2-6; 2-6, 2-6; 24-28, 24-28;<br>24-28; 2-6 | 8-15, 8-15, 2-6; 8-15, 8-15,<br>8-15; 8-15, 8-15, 18-28; 8-15,<br>18-28, 2-6 |
| Standard voltage increments                | 25     | 25     | 25     | 18     | 16                                                                           | 18                                                                           |
| Remote sense                               | Yes    | Yes    | Yes    | Yes    | Yes                                                                          | Yes                                                                          |
| Remote margin*                             | Yes    | Yes    | Yes    | Yes    | No                                                                           | No                                                                           |
| V-Program - I <sup>2</sup> C Control*      | Yes    | Yes    | Yes    | Yes    | Yes                                                                          | Yes                                                                          |
| Active Current Share                       | Yes    | Yes    | Yes    | Yes    | Yes                                                                          | No                                                                           |
| Module Inhibit - I <sup>2</sup> C Control* | Yes    | Yes    | Yes    | Yes    | Yes                                                                          | Yes                                                                          |
| Module Inhibit - Analog                    | Yes    | Yes    | Yes    | Yes    | No                                                                           | No                                                                           |
| Overvoltage/Overcurrent protection*        | Yes    | Yes    | Yes    | Yes    | Yes                                                                          | Yes                                                                          |
| Minimum load required                      | No     | No     | No     | No     | No                                                                           | No                                                                           |
| Slots occupied in any iMP case             | 1      | 2      | 3      | 4      | 1                                                                            | 1                                                                            |

\* Programmable





## Output Module Voltage/Current

| Voltage         | Voltage Code | Single Output Module Code |        |        |         | Dual Output** |       | Triple Output |       |       | I <sup>2</sup> C Adjustment Ranges*** |
|-----------------|--------------|---------------------------|--------|--------|---------|---------------|-------|---------------|-------|-------|---------------------------------------|
|                 |              | 1                         | 2      | 3      | 5       | V1            | V2    |               |       |       |                                       |
| 2 V             | A            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 1.8-2.2                               |
| 2.2 V           | B            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 2.0-2.4                               |
| 3 V             | C            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 2.7-3.3                               |
| 3.3 V           | D            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 3.0-3.6                               |
| 5 V             | E            | 35 A                      | 60 A   | 150 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 4.5-5.5                               |
| 5.2 V           | F            | 35 A                      | 60 A   | 144 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 4.7-5.7                               |
| 5.5 V           | G            | 34 A                      | 58 A   | 136 A  | —       | 10 A          | 10 A  | —             | —     | 2 A   | 5.0-6.1                               |
| 6 V             | H            | 23 A                      | 42 A   | 97.5 A | 140 A   | 10 A*         | 10 A* | —             | —     | 2 A   | 5.4-6.6                               |
| 8 V             | I            | 20 A                      | 36 A   | 84.4 A | 140 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 7.2-8.8                               |
| 10 V            | J            | 18 A                      | 32 A   | 75 A   | 140 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 9.0-11.0                              |
| 11 V            | K            | 17 A                      | 31 A   | 68 A   | 136.3 A | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 9.9-12.1                              |
| 12 V            | L            | 17 A                      | 30 A   | 62.5 A | 125 A   | 10 A          | 4 A   | 1 A           | 1 A   | 1 A   | 10.8-13.2                             |
| 14 V            | M            | 14 A                      | 21 A   | 53.5 A | 107 A   | 9 A           | 4 A   | 1 A           | 1 A   | 1 A   | 12.6-15.4                             |
| 15 V            | N            | 14 A                      | 20 A   | 50 A   | 100 A   | 8 A           | 4 A   | 1 A           | 1 A   | 1 A   | 13.5-16.5                             |
| 18 V            | O            | 11 A                      | 19 A   | 41.6 A | 83.3 A  | —             | —     | —             | 0.5 A | 0.5 A | 16.2-19.8                             |
| 20 V            | P            | 10.5 A                    | 18 A   | 37.5 A | 75 A    | —             | —     | —             | 0.5 A | 0.5 A | 18.0-22.0                             |
| 24 V            | Q            | 8.5 A                     | 15 A   | 30 A   | 62.5 A  | 4 A           | 2 A   | —             | 0.5 A | 0.5 A | 21.6-26.4                             |
| 28 V            | R            | 6.7 A                     | 11 A   | 26.8 A | 53.5 A  | 3 A           | 2 A   | —             | 0.5 A | 0.5 A | 25.2-30.8                             |
| 30 V            | S            | 6.5 A                     | 11 A   | 25 A   | 50 A    | —             | —     | —             | —     | —     | 27.0-33.0                             |
| 33 V            | T            | 6.2 A                     | 10.9 A | 22.7 A | 35.8    | —             | —     | —             | —     | —     | 29.7-36.3                             |
| 36 V            | U            | 5.8 A                     | 10 A   | 20.8 A | 35.8    | —             | —     | —             | —     | —     | 32.4-39.6                             |
| 42 V            | V            | 4.2 A                     | 7.5 A  | 16 A   | 35.7    | —             | —     | —             | —     | —     | 37.8-46.2                             |
| 48 V            | W            | 4 A                       | 7.5 A  | 15.6 A | 31.2    | —             | —     | —             | —     | —     | 43.2-52.8                             |
| 54 V            | X            | 3.7 A                     | 6 A    | 13.9 A | 27.7    | —             | —     | —             | —     | —     | 48.6-59.4                             |
| 60 V            | Y            | 3.5 A                     | 6 A    | 12.5 A | 25      | —             | —     | —             | —     | —     | 54.0-66.0                             |
| Consult Factory |              |                           |        |        |         |               |       |               |       |       |                                       |
| Special         | Z            | 35 A                      | 60 A   | 150 A  | —       | —             | 10 A  | —             | —     | —     | 2.3-2.6                               |
| Special         | Z            | 35 A                      | 60 A   | 150 A  | —       | —             | 10 A  | —             | —     | —     | 3.7-4.4                               |
| Special         | Z            | 20 A                      | 36 A   | 80 A   | 140 A   | —             | 8 A   | —             | —     | —     | 6.7-7.1                               |

\* Note: Consult factory for extended range down to 6V.

\*\* Total output power on dual model must not exceed 144 W.

\*\*\* For single output modules only.

## Ordering Information

Sample below is 3210 W case with 12 V @ 125 A; 24 V @ 8.5 A; 5 V @ 60 A; 12 V @ 10 A and 12 V @ 4 A; with no options.

| Case Size                                                                                                                                                                                                                                                                                                                                                                                         | Module/Voltage/Option Codes<br>First - Module Code<br>Second - Voltage Code<br>Third - Option Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Case Option Codes                                                                                                                                                                                                                                                                                                                                                                                                                     | Software Code                                                                                                                                        | Hardware Code                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>iVS1</b>                                                                                                                                                                                                                                                                                                                                                                                       | <b>5L1 - 1Q1 - 2EO - 4LL0</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>00</b>                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>A</b>                                                                                                                                             | <b>###</b>                                       |
| <b>Case Size (mm)</b><br><b>1-Phase Input</b><br>1 = 5" x 5" x 11"; 1500-3210 W, 9 slots<br>(127 x 127 x 279.4)<br>3 = 5" x 8" x 11"; 1800-4920 W, 15 slots<br>(127 x 203.2 x 279.4)<br><b>3-Phase Input*</b><br>6 = 5" x 5" x 11"; 3120 W, 9 slots<br>(127 x 127 x 279.4)<br>8 = 5" x 8" x 11"; 4920 W, 15 slots<br>(127 x 203.2 x 279.4)<br><br><i>*3-phase versions not medically approved</i> | <b>Module Codes</b><br>Module/voltage/option codes<br>Module Codes:<br>(None) = 36 W triple O/P (1 slot)<br>1 = 210 W single O/P (1 slot)<br>2 = 360 W single O/P (2 slot)<br>3 = 750 W single O/P (3 slot)<br>5 = 1500 W single O/P (slot 4)<br>4 = 144 W dual O/P (1 slot)<br>HUP = Extra 30mS hold-up (1 slot)<br><br><b>Voltage Codes:</b><br>See Output Module Voltage/Current table above<br><br><b>Option Codes:</b><br>0 = Standard<br>1 = Module enable<br>2 = Constant current<br>3 = 1 & 2 combined<br>4 = Set for use in standard (non-intelligent case)<br>5 = Shutdown mode for 1500 W<br>6 = 1 & 5 combined<br>7-9 = Future | <b>Case Option Codes</b><br>First Digit<br>0 - 9 = Parallel code (See parallel codes table in datasheet)<br><br>Second Digit<br>0 = No options<br>1 = Reverse air<br>2 = Not used<br>3 = Global enable<br>4 = Fan idle w/inhibit<br>5 = Opt 1 + Opt 3<br>6 = Opt 1 + Opt 4<br>7 = Opt 3 + Opt 4<br>8 = Opt 1 + 3 + 4<br>9 = CAN BUS/RS-485 73-544-001<br>B = USB 73-546-001<br>M = Medical<br>N = M + 1<br>P = M + 3<br>R = M + 1 + 3 | Software code used for configuration change. "A" is standard<br><br><b>Ordering Note:</b><br>1. USB to I <sup>2</sup> C module order code 73-769-001 | Factory assembled for hardware of firmware mods. |

# LCM600

*Bulk front end*

**600 Watts**

Total Power: 600 Watts  
# of Outputs: Single  
Output: 3.3-60 V  
Optional 5.0 V standby

**NEW!**



## Special Features

- 600 W output power
- Low cost
- 2.4" x 4.5" x 7.5"
- 7.41 W/cu-in
- 5 V SELV standby (housekeeping)
- Industrial/Medical safety
- -40 °C to 70 °C with derating
- 5 V housekeeping
- High efficiency: 89% typical
- Variable speed "Smart Fans"
- DSP controlled front end
- Conformal coat option
- ±20% adjustment range
- Margin programming
- OR-ing FET option
- Terminal block input option

## Electrical Specifications

| Input                |                                                                                      |
|----------------------|--------------------------------------------------------------------------------------|
| Input range          | 85-264 Vac (Operating)<br>115/230 Vac (Nominal) Input through standard IEC connector |
| Frequency            | 47-440 Hz, Nominal 50/60                                                             |
| Input fusing         | Internal 10 A fuses, both lines fused                                                |
| Inrush current       | ≤25 A peak, either hot or cold start                                                 |
| Power factor         | 0.99 typical, meets EN61000-3-2                                                      |
| Harmonics            | Meets IEC 1000-3-2 requirements                                                      |
| Input current        | 8 A RMS max input current, at 100 Vac                                                |
| Hold up time         | 20 ms minimum for Main O/P, at full rated load                                       |
| Efficiency           | >88% at full load                                                                    |
| Leakage current      | <0.3 mA at 264 Vac                                                                   |
| ON/OFF power switch  | N/A                                                                                  |
| Power line transient | MOV directly after the fuse                                                          |



## Environmental Specifications

|                       |                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------|
| Operating temperature | -40 °C to +70 °C, linear derating to 50% from 50 °C to 70 °C                               |
| Storage temperature   | -40 °C to 85 °C                                                                            |
| Humidity              | 20 to 90%, non-condensing. Operating. Conformal coat option available                      |
| Fan noise             | <45 dBA, 80% load at 30 °C                                                                 |
| Altitude              | Operating: Up to 15,000 feet above sea level<br>Storage: Up to 30,000 feet above sea level |
| Shock                 | MIL-STD-810F 516.5, Procedure I, VI. Storage                                               |
| Vibration             | MIL-STD-810F 514.5, Cat. 4, 10. Storage                                                    |

## Safety

|           |                                     |
|-----------|-------------------------------------|
| UL        | 60950-1<br>508/1598/1433<br>60601-1 |
| CSA       | 60950-1                             |
| VDE       | 60950-1<br>60601                    |
| China     | CCC                                 |
| CB Scheme | Report/Cert                         |

## Electrical Specifications

| Output                       |                                      |                                                                                                                                                 |
|------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Output rating                | See ordering information table below | 85-264 Vac                                                                                                                                      |
| Set point                    | ±0.5%                                | 85-264 Vac                                                                                                                                      |
| Total regulation range       | Main output ±2%<br>5 Vsb ±1%         | Combined line/load/transient when measured at output terminal                                                                                   |
| Rated load                   | 600 W maximum                        | Derate linear to 50% from 50 °C to 70 °C                                                                                                        |
| Minimum load                 | Main output @ 0.0 A<br>5 Vsb @ 0.0 A | No loss of regulation                                                                                                                           |
| Output noise (PARD)          | 1% max p-p<br>50 mV max p-p          | Main output<br>5 Vsb output<br>Measured with a 0.1 µF ceramic and 10 µF tantalum capacitor on any output, 20 MHz                                |
| Output voltage overshoot     | —                                    | No overshoot/undershoot outside the regulation band during on or off cycle                                                                      |
| Transient response           | <300 µs                              | 50% load step @ 1 A/µs<br>Step load valid between 10% to 100% of output rating<br>Recovery time to within 1% of set point at onset of transient |
| Max units in parallel        | —                                    | Up to 10                                                                                                                                        |
| Short circuit protection     | Protected, no damage to occur        | Bounce mode                                                                                                                                     |
| Remote sense                 | —                                    | Compensation up to 500 mV                                                                                                                       |
| Output isolation             | —                                    | Standard per safety requirements                                                                                                                |
| Forced load sharing          | To within 10% of all shared outputs  | Analog sharing control                                                                                                                          |
| Overload protection (OCP)    | 105% to 125%<br>120% to 170%         | Main output<br>5 Vsb output                                                                                                                     |
| Overvoltage protection (OVP) | 125% to 145%<br>110% to 125%         | 12 V output<br>5 Vsb output                                                                                                                     |
| Overtemp protection          | 10-15 °C above safe operating area   | Both PFC and output converter monitored                                                                                                         |

## Ordering Information

| Model Number* | Output | Nominal Output Voltage Set Point | Set Point Tolerance | Adjustment Range | Current Min | Current Max | Output Ripple P/P | Combined Line/ Load Regulation | Status      |
|---------------|--------|----------------------------------|---------------------|------------------|-------------|-------------|-------------------|--------------------------------|-------------|
| LCM600C       | 3 V    | 3 V                              | ±0.5%               | 2.0–4.0 V        | 0 A         | 150 A       | 50 mV             | 2%                             | Coming Soon |
| LCM600E       | 5 V    | 5 V                              | ±0.5%               | 4.0–6.0 V        | 0 A         | 120 A       | 50 mV             | 2%                             | Coming Soon |
| LCM600L       | 12 V   | 12 V                             | ±0.5%               | 9.6–14.4 V       | 0 A         | 54 A        | 120 mV            | 2%                             | Released    |
| LCM600N       | 15 V   | 15 V                             | ±0.5%               | 12.0–19.5 V      | 0 A         | 44 A        | 150 mV            | 2%                             | Released    |
| LCM600Q       | 24 V   | 24 V                             | ±0.5%               | 19.2–28.8 V      | 0 A         | 27 A        | 240 mV            | 2%                             | Released    |
| LCM600U       | 36 V   | 36 V                             | ±0.5%               | 28.8–43.2 V      | 0 A         | 16.7 A      | 240 mV            | 2%                             | Released    |
| LCM600W       | 48 V   | 48 V                             | ±0.5%               | 38.4–57.6 V      | 0 A         | 14 A        | 280 mV            | 2%                             | Released    |

\* Add "-T" for terminal block instead of IEC input.

# HPS & UFE

*Distributed power bulk front end*

*350-12000 Watts*

## Special Features

- EN61000-3-2 harmonic compliance
- Built-in EMI filter
- Low output ripple
- +5 V standby output
- Built-in cooling fans
- Hot swap/N + 1 redundant
- Overcurrent protection
- Overvoltage protection
- Overtemperature protection
- Built-in OR-ing diodes
- Active power factor correction

## Voltage Availability

| Model                                                        | HPS3000                   | HPS35      | UFE                 |
|--------------------------------------------------------------|---------------------------|------------|---------------------|
| Wattage                                                      | 3000 W <sup>3</sup>       | 350 W      | 2000 W <sup>4</sup> |
| Input Voltage                                                | 90-140 Vac<br>180-264 Vac | 90-264 Vac | 90-265 Vac          |
| Available Standard Output Voltages (order code) <sup>1</sup> |                           |            |                     |
| 12 (L)                                                       |                           | •          |                     |
| 24 (Q)                                                       |                           | •          | •                   |
| 28 (R)                                                       |                           |            | •                   |
| 30 (S)                                                       |                           |            |                     |
| 48 (W)                                                       | •                         | •          | •                   |
| 54 (X)                                                       |                           | •          | •                   |
| 60 (Y)                                                       |                           |            |                     |
| Available Options                                            | See Note 1                | See Note 1 |                     |
| Corresponding Rack                                           | See Note 2                | HPR1-00    | UFR6000J            |

Notes: 1 = Consult factory for other output voltages and options  
 2 = Comes with optional I<sup>2</sup>C interface  
 3 = 3000 W @ 180-264 Vac; 1500 W @ 90-140 Vac  
 4 = 2000 W @ 48 V; 1300 W @ 24 V

## Environmental Specifications

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <b>HPS35</b>    |                                                                                                 |
| Operating temp. | -10 °C to 50 °C ambient (derate output @ 2.5% per degree from 50 °C to 70 °C)                   |
| <b>HPS3000</b>  |                                                                                                 |
| Operating temp. | -10 °C to 40 °C                                                                                 |
| Storage temp.   | -40 °C to 85 °C                                                                                 |
| Cooling         | External fans with Fan Fail and Fan Speed control                                               |
| Humidity        | Operating/Storage: 5-95% non-condensing                                                         |
| Altitude        | Operating: Up to 10,000 feet above sea level<br>Storage: Up to 30,000 feet above sea level      |
| Vibration/Shock | Non-operational 5G Sine sweep from 5-500 Hz, dwelling at resonant frequencies for one hour each |
| RoHS compliant  | Yes                                                                                             |

## Safety

|       |                         |
|-------|-------------------------|
| UL    | UL60950 (UL recognized) |
| NEMKO | EN60950                 |
| TÜV   | EN60950                 |
| CE    | Mark                    |
| CB    | Report                  |



HPS3000

## HPS3000 Electrical Specifications

|                              |                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Input</b>                 |                                                                                                                                                                  |
| Input range (operating)      | 180-264 Vac<br>90-140 Vac                                                                                                                                        |
| Input range (nominal)        | 200 Vac<br>110 Vac                                                                                                                                               |
| Frequency                    | 43-63 Hz                                                                                                                                                         |
| Input fusing                 | Internal 25 A fuses (both lines fused)                                                                                                                           |
| Inrush current               | ≤40 A peak (either hot or cold start)                                                                                                                            |
| Power factor                 | 0.97 typical (Meets EN61000-3-2)                                                                                                                                 |
| Harmonics                    | Meets IEC 1000-3-2 requirements @ 50% load                                                                                                                       |
| Input current                | 19 A max input current                                                                                                                                           |
| Holdup time                  | 10 ms min @ full rated load                                                                                                                                      |
| Leakage current              | 1.4 mA @ 240 Vac                                                                                                                                                 |
| Power line transient         | MOV directly after the fuse                                                                                                                                      |
| <b>Output</b>                |                                                                                                                                                                  |
| Output rating                | 48 V @ 62.0 A (180-264 Vac)<br>5 Vsb @ 3.0 A<br>48 V @ 29.4 A (90-140 Vac)<br>5 V @ 3 A                                                                          |
| Set point                    | -4% to +17% through I <sup>2</sup> C                                                                                                                             |
| Total regulation range       | 48 V ±10%; 5 Vsb ±4% (line/load/transient when measured at output connection)                                                                                    |
| Rated load                   | 3000 W maximum @ 200 Vac Input<br>1500 W maximum @ 110 Vac Input<br>(no derating over operating temperature range)                                               |
| Minimum load                 | 48 V @ 0.0 A 5; Vsb @ 0.0 A with no loss of regulation                                                                                                           |
| Output noise                 | 480 mV max P-P for 48 V output<br>100 mV max P-P for 5 Vsb output<br>Measured with a 0.1 µF Ceramic and 10 µF Tantalum capacitor on any input                    |
| Output voltage overshoot     | ±5% maximum of nominal voltage setting                                                                                                                           |
| Transient response           | 5% maximum deviation (50% load step @ 1 A/us. Step load valid between 10-100% of output rating)                                                                  |
| Max units in parallel        | Up to 4 (total power in 1U 19" rack is 12 KW)                                                                                                                    |
| Short circuit protection     | 120-130% of rated output (output to return)                                                                                                                      |
| Output isolation             | Per POE specs (>2000 Vac)                                                                                                                                        |
| Forced load sharing          | Within 10% of all shared outputs (digital sharing control)                                                                                                       |
| Overcurrent protection (OCP) | 120-130% for 48 V output<br>100-125% for 5 Vsb output                                                                                                            |
| Overvoltage protection (OVP) | 110-120% for 48 V output<br>110-125% for 5 Vsb output                                                                                                            |
| Overtemperature protection   | 10 °C to 15 °C above safe operating area.<br>(Both PFC and output converter monitored. 5 Vsb will operate under overtemperature condition. Built-in hysteresis.) |



## HPS35 Electrical Specifications

### Input

|                          |                                                           |
|--------------------------|-----------------------------------------------------------|
| Input voltage            | 90-264 Vac typical                                        |
| Frequency                | 47-440 Hz                                                 |
| Inrush current           | 40 A peak max. @ 25 °C                                    |
| Efficiency               | 80% typical @ full load, 230 Vac                          |
| Power factor             | 0.99 typical @ 115 Vac, full load                         |
| Turn-on time             | AC on 2 sec; inhibit/enable 160 ms typical                |
| EMI filter standard      | CISPR 22; EN55022 Level "B"                               |
| Leakage current standard | <0.5 mA max @ 230 Vac @ 60 Hz per module                  |
| Radiated EMI             | CISPR 22; EN55022 Level "B"                               |
| Holdover time            | 20 ms minimum (independent of input Vac)                  |
| AC OK                    | 5 ms early warning minutes before outputs lose regulation |
| Harmonic distortion      | Meets EN61000-3-2                                         |
| Isolation                | Meets EN60950                                             |

### Output

|                            |                                                                              |
|----------------------------|------------------------------------------------------------------------------|
| Adjustability              | ±5% of nominal output voltage                                                |
| Overall regulation         | ±2%                                                                          |
| Ripple                     | 1% of Vout Pk-Pk (20 MHz bandwidth)                                          |
| Dynamic response           | 4% with 25% load step                                                        |
| Recovery time              | To within 1% in <300 µs                                                      |
| Overcurrent protection     | 115-130% of rated output current                                             |
| Short-circuit protection   | Protected for continuous short-circuit<br>Auto recovery                      |
| Overvoltage protection     | 120-140%. AC Reset                                                           |
| Reverse voltage protection | 100% of rated output current                                                 |
| Thermal protection         | Main and Aux disabled when internal temperature exceeds safe operating range |
| Remote sense               | Up to 0.5 V total drop                                                       |
| Single wire parallel       | Current share to within 10% of total rated current on main output            |
| DC OK                      | ±5% of nominal                                                               |
| Minimum load*              | Not required (when used as stand-alone module)                               |
| Standby voltage            | 5 Vdc @ 2 A maximum present whenever AC input is applied                     |
| Global inhibit             | Logic "0"                                                                    |

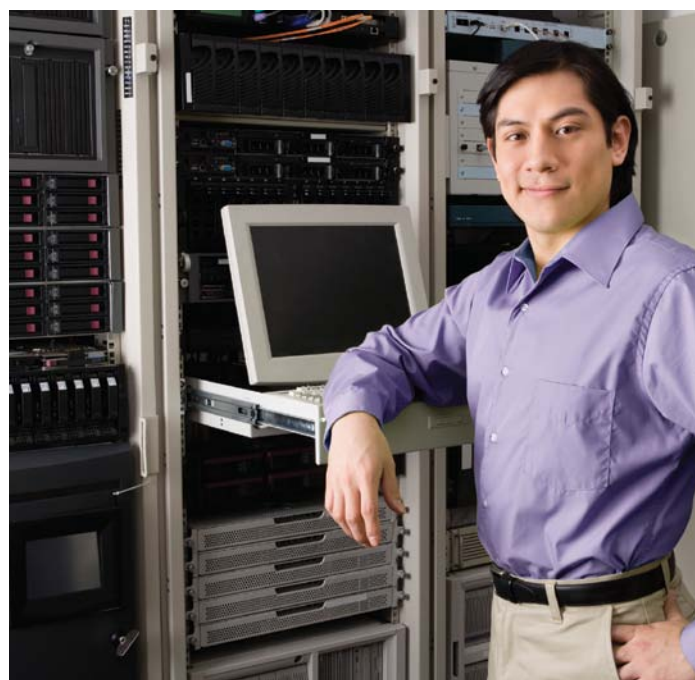
\*3 A minimum for current share operation



HPR12K



HPS35



## Rack Ordering Information

| Module      | UFE1300/2000 | HPS3000 | HPS35     |
|-------------|--------------|---------|-----------|
| Rack #      | UFR6000      | HPR12K  | HPR1-00** |
| # of Slots  | 3            | 4       | 4         |
| Total Power | 6000 W       | 12000 W | 1400 W    |

\*\*See website for option codes on HPR racks.

## Ordering Information

|         |                |
|---------|----------------|
| HPS35   | HPS35x-NNR-yyy |
| HPS3000 | HPS3000-9      |

x = Voltage code (L-Y)

yyy = Standard option codes (000-256)

## UFE1300/2000 Electrical Specifications

| Input                             |                                                            |
|-----------------------------------|------------------------------------------------------------|
| Input range (operating)           | 88-264 Vac<br>176-264 Vac                                  |
| Input range (nominal)             | 120 Vac<br>240 Vac                                         |
| Frequency                         | 47-63 Hz                                                   |
| Input fusing                      | 30 A (both lines fused)                                    |
| Power factor                      | 0.98 (50-100% load)                                        |
| Input current                     | 15 A max.                                                  |
| Leakage current                   | 2 mA max.                                                  |
| Undervoltage lockout (power up)   | 176 Vac max. (high line range)<br>88 Vac max. (wide range) |
| Undervoltage lockout (power down) | 162 Vac min. (high line range)<br>76 Vac min. (wide range) |

| Output                                 |                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------|
| Output rating - Main output            | 48 V 2000 W (high line range)<br>48 V 1300 W (wide range)<br>24 V 1300 W (all ranges) |
| Output rating - Auxiliary output       | 11 V $\pm$ 15%, 2.875 W                                                               |
| Line regulation                        | $\pm$ 0.15% max.                                                                      |
| Load regulation                        | $\pm$ 0.15% max.                                                                      |
| Turn-on delay                          | 5.0 seconds max.                                                                      |
| Ambient temp. coefficient              | $\pm$ 0.005%/°C                                                                       |
| Voltage adjustability (via PMBus)      | 48 V 42-57 Vdc<br>24 V 21-28.5 Vdc                                                    |
| Output setpoint accuracy               | $\pm$ 0.5%                                                                            |
| Default output voltage (@ 25 °C)       | 48 V $\pm$ 0.5% @ 41 A<br>27 V $\pm$ 0.5% @ 48 A                                      |
| Total error band                       | $\pm$ 1.0% max.                                                                       |
| Overshoot/undershoot                   | 0%                                                                                    |
| Ripple and noise (20 MHz)              | 500 mV pk-pk, 150 mV rms                                                              |
| Dynamic regulation (except droop mode) | 2.5% max., recovery in 1 ms max.                                                      |
| Current sharing                        | 15% max.                                                                              |
| Electrical insulation                  | 4242 Vdc input/output                                                                 |
| Switching frequency                    | 450 kHz fixed                                                                         |
| Power limit                            | 115%                                                                                  |
| Current limit                          | 108% typical                                                                          |
| Short-circuit                          | 200 ms on; 1/8 second off                                                             |
| Overvoltage                            | 60 V/32 V                                                                             |
| Overtemperature                        | Non-latching                                                                          |

UFE Power Shelf



UFE2000

## Ordering Information

| Rated Output Power | Output Voltage Vout |        | Output Current (Min) | Power Limit + 15% / -0% Vout (min) | Line Range at Turn On (Auto Ranging) | Operating Line Range | Current Limit (Vout) < Vout (min) | Model Numbers     | Order Number |
|--------------------|---------------------|--------|----------------------|------------------------------------|--------------------------------------|----------------------|-----------------------------------|-------------------|--------------|
|                    | Min                 | Max    |                      |                                    |                                      |                      |                                   |                   |              |
| 24 Vout Models     |                     |        |                      |                                    |                                      |                      |                                   |                   |              |
| 1300 W             | 21 V                | 28.5 V | 0 A                  | 1300 W                             | 90-264 Vac                           | 65 A                 | 65 A                              | UFE1300-96S24PJ   | UFE1300-5    |
| 48 Vout Models     |                     |        |                      |                                    |                                      |                      |                                   |                   |              |
| 1300 W             | 42 V                | 57 V   | 0 A                  | 1300 W                             | 90-264 Vac                           | 33 A                 | 33 A                              | UFE2000-96S48PJ   | UFE2000-9    |
| 2000 W             | 42 V                | 57 V   | 0 A                  | 2000 W                             | 180-264 Vac                          | 52 A                 | 52 A                              |                   |              |
| 1300 W             | 42 V                | 57 V   | 0 A                  | 1300 W                             | 90-264 Vac                           | 33 A                 | 33 A                              | UFE2000-96S48PDJ  | UFE2000-9-HD |
| 2000 W             | 42 V                | 57 V   | 0 A                  | 2000 W                             | 180-264 Vac                          | 52 A                 | 52 A                              |                   |              |
| 1300 W             | 42 V                | 57 V   | 0 A                  | 1300 W                             | 90-264 Vac                           | 33 A                 | 33 A                              | UFE2000-96S48PHDJ | UFE2000-9-D  |
| 2000 W             | 42 V                | 57 V   | 0 A                  | 2000 W                             | 180-264 Vac                          | 52 A                 | 52 A                              |                   |              |

| Product Family            | Rated Output Power                     | Input Range                  | Standard Compliance      | Type of Output | Output Voltage         | Communications Type             | Option Code                                                            | Special Modification | RoHS Compliance                  |
|---------------------------|----------------------------------------|------------------------------|--------------------------|----------------|------------------------|---------------------------------|------------------------------------------------------------------------|----------------------|----------------------------------|
| <b>UFE</b>                | <b>2000</b>                            | <b>9</b>                     | <b>6</b>                 | <b>S</b>       | <b>48</b>              | <b>P</b>                        | <b>D</b>                                                               | <b>xx</b>            | <b>J</b>                         |
| UFE = Universal Front-End | 1300 = 1300 Watts<br>2000 = 2000 Watts | 9 = Universal Input with PFC | 6 = UL/CSA/VDE Class A/B | S = Single     | 48 = 48 V<br>24 = 24 V | P = PMBus serial communications | None = Active IsShare<br>D = Droop IsShare<br>HD = PS Enable H/I/Droop |                      | J = Pb free (RoHS 6/6 compliant) |

# Distributed Power Systems (DS)

AC and DC inputs available

450-2900 Watts



DS450DC/DS2900



## Special Features

- Active power factor correction
- EN61000-3-2 harmonic compliance
- Active AC inrush control
- High density
- Outputs +12 Vdc with some +48 Vdc models available
- 3.3 Vdc standby
- Options for 5 V standby voltage
- No minimum load required
- Hot plug operation
- N+1 redundant
- Internal OR-ing FETs
- Active current sharing
- Built-in cooling fans
- I<sup>2</sup>C Interface with EEPROM for FRU data
- Internal fan speed control with fan fail signal
- DC Input
- DSR1 rack for DS650/850. Ordering part number is 73-762-002. Standard 19" 1U fits up to 5 modules (4250 Watts)
- Gold efficiency standards on some models
- Options for reverse airflow
- Options for 5 V standby
- Platinum Plus efficiency on some models

## Voltage Availability

| Model      | 12 V | 24 V | 48 V | PMBus |
|------------|------|------|------|-------|
|            | (-3) | (-5) | (-9) |       |
| DS450 (HE) | •    |      |      |       |
| DS450DC    | •    |      |      |       |
| DS460S     | •    |      |      | •     |
| DS460SDC   | •    |      |      | •     |
| DS550 (HE) | •    |      |      |       |
| DS550DC    | •    |      |      |       |
| DS650      | •    | •    | •    |       |
| DS650DC    | •    |      |      |       |
| DS760SL    | •    |      |      |       |
| DS800SL    | •    |      |      | •     |
| DS850      | •    | •    | •    |       |
| DS850DC    | •    |      |      |       |
| DS1050     | •    |      |      | •     |
| DS1200     | •    |      |      | •     |
| DS1200DC   | •    |      |      | •     |
| DS1500     | •    |      |      |       |
| DS2000     | •    |      |      | •     |
| DS2900     | •    |      |      | •     |

Notes: • Available

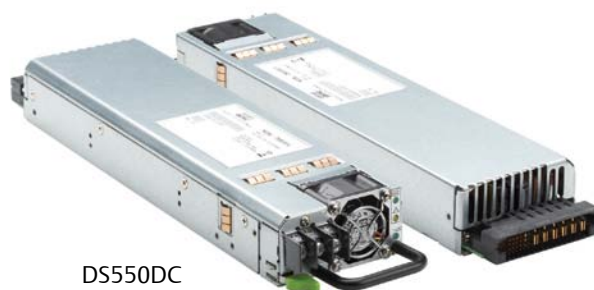
## Safety

|       |                         |
|-------|-------------------------|
| UL    | UL60950 (UL recognized) |
| NEMKO | EN60950                 |
| TÜV   | EN60950                 |
| CE    | Mark                    |
| CB    | Report                  |





DS460



DS550DC

## Electrical Specifications

|                            | DS450-3             | DS450DC-3           | DS460S-3          | DS460SDC          | DS550-3             | DS550DC-3           |
|----------------------------|---------------------|---------------------|-------------------|-------------------|---------------------|---------------------|
| <b>Input</b>               |                     |                     |                   |                   |                     |                     |
| Input Range                | 90-264 Vac          | 40-72 Vdc           | 90-264 Vac        | 40-72Vdc          | 90-264 Vac          | 40-72 Vdc           |
| Frequency                  | 47-63 Hz            | DC                  | 47-63 Hz          | DC                | 47-63 Hz            | DC                  |
| Efficiency                 | 80% Typ             | 80% Typ             | 92% Typ           | 92% Typ           | 80% Typ             | 80% Typ             |
| EMI/RFI                    | Class B             | N/A                 | Class B           | N/A               | Class B             | N/A                 |
| Leakage Current            | 1.4 mA @ 240 V      | N/A                 | 1.0 mA @ 240 V    | N/A               | 1.4 mA @ 240 V      | N/A                 |
| <b>Outputs</b>             |                     |                     |                   |                   |                     |                     |
| Output Main                | 12 V / 37 A         | 12 V / 37 A         | 12 V / 38.2 A     | 12 V / 38.2 A     | 12 V / 45 A         | 12 V / 45 A         |
| Output Stand-By            | 3.3 Vsb / 3 A       | 3.3 Vsb / 3 A       | 12 Vsb / 2.5 A    | 12 Vsb / 2.5 A    | 3.3 Vsb / 3 A       | 3.3 Vsb / 3 A       |
| OCP/OVP/OTP                | YES                 | YES                 | YES               | YES               | YES                 | YES                 |
| I <sup>2</sup> C Control   | YES                 | YES                 | YES               | YES               | YES                 | YES                 |
| <b>Environmental</b>       |                     |                     |                   |                   |                     |                     |
| Operating Temp             | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C   | -10 °C to 50 °C   | -10 °C to 50 °C     | -10 °C to 50 °C     |
| Derating                   | N/A                 | N/A                 | N/A               | N/A               | N/A                 | N/A                 |
| Storage                    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C  | -40 °C to +85 °C  | -40 °C to +85 °C    | -40 °C to +85 °C    |
| RoHS Compliant             | YES                 | YES                 | YES               | YES               | YES                 | YES                 |
| MTBF                       | 300K Hours          | 500K Hours          | 500K Hours        | 500K Hours        | 300K Hours          | 500K Hours          |
| <b>Other:</b>              |                     |                     |                   |                   |                     |                     |
| Size (inch)                | 1.57 x 3.07 x 11.05 | 1.57 x 3.07 x 11.05 | 1.57 x 3.4 x 7.75 | 1.57 x 3.4 x 7.75 | 1.57 x 3.07 x 11.05 | 1.57 x 3.07 x 11.05 |
| Size (mm)                  | 40 x 78 x 280       | 40 x 78 x 280       | 40 x 86.4 x 197   | 40 x 86.4 x 197   | 40 x 78 x 280       | 40 x 78 x 280       |
| Power Density              | 8.42                | 8.42                | 11.12             | 11.12             | 10.30               | 10.30               |
| Cubic Inches               | 53.42               | 53.42               | 41.37             | 41.37             | 53.42               | 53.42               |
| Pro-E Files                | NO                  | YES                 | YES               | YES               | NO                  | YES                 |
| Thermal Data               | YES                 | YES                 | YES               | YES               | YES                 | YES                 |
| PQ Airflow Curves          | YES                 | YES                 | YES               | YES               | YES                 | YES                 |
| Warranty                   | Two Year            | Two Year            | Two Year          | Two Year          | Two Year            | Two Year            |
| <b>Ordering Codes</b>      |                     |                     |                   |                   |                     |                     |
| Standard                   | DS450-3             | DS450DC-3           | DS460S-3-002      | DS460SDC-3        | DS550-3             | DS550DC-3           |
| ALT Standby                | DS450-3-001         | DS450DC-3-004       |                   |                   | DS550-3-001         | DS550DC-3-004       |
| Reverse Air                | DS450-3-002         | DS450DC-3-002       | DS460S-3-003      | DS460SDC-3-001    | DS550-3-002         | DS550DC-3-003       |
| ALT Standby & Reverse Air  | DS450-3-004         | DS450DC-3-005       |                   |                   | DS550-3-004         | DS550DC-3-005       |
| Fan Off with inhibit       |                     |                     |                   |                   |                     |                     |
| Disable External Fan Drive | DS450-3-003         |                     |                   |                   |                     |                     |





|                            | DS650-3             | DS650-5             | DS650-9             | DS650DC-3           | DS760SL-3           |
|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Input</b>               |                     |                     |                     |                     |                     |
| Input Range                | 90-264 Vac          | 90-264 Vac          | 90-264 Vac          | 40-72 Vdc           | 90-264 Vac          |
| Frequency                  | 47-63 Hz            | 47-63 Hz            | 47-63 Hz            | DC                  | 47-63 Hz            |
| Efficiency                 | 80% Typ             | 80% Typ             | 82% Typ             | 80% Typ             | 90% Typ             |
| EMI/RFI                    | Class B             | Class B             | Class B             | N/A                 | Class A             |
| Leakage Current            | 1.4 mA @ 240 V      | 1.4 mA @ 240 V      | 1.4 mA @ 240 V      | N/A                 | 0.8 mA @ 240 V      |
| <b>Outputs</b>             |                     |                     |                     |                     |                     |
| Output Main                | 12 V / 52.5 A       | 24 V / 26.3 A       | 48 V / 13.1 A       | 12 V / 52.5 A       | 12 V / 62.3 A       |
| Output Stand-By            | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 5.0 Vsb / 3.6 A     |
| OCP/OVP/OTP                | YES                 | YES                 | YES                 | YES                 | YES                 |
| I <sup>2</sup> C Control   | YES                 | YES                 | YES                 | YES                 | YES                 |
| <b>Environmental</b>       |                     |                     |                     |                     |                     |
| Operating Temp             | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C     | 0 °C to 50 °C       |
| Derating                   | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C        | N/A                 |
| Storage                    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    |
| RoHS Compliant             | YES                 | YES                 | YES                 | YES                 | YES                 |
| MTBF                       | 500K Hours          | 500K Hours          | 500K Hours          | 500K Hours          | 300K Hours          |
| <b>Other:</b>              |                     |                     |                     |                     |                     |
| Size (inch)                | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 2.15 x 12.68 |
| Size (mm)                  | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 54.5 x 322     |
| Power Density              | 11.76               | 11.76               | 11.76               | 11.76               | 17.76               |
| Cubic Inches               | 55.44               | 55.44               | 55.44               | 55.44               | 42.8                |
| Pro-E Files                | YES                 | YES                 | YES                 | YES                 | YES                 |
| Thermal Data               | YES                 | YES                 | YES                 | YES                 | YES                 |
| PQ Airflow Curves          | YES                 | YES                 | YES                 | YES                 | YES                 |
| Warranty                   | Two Year            | Two Year            | Two Year            | Two Year            | Two Year            |
| <b>Ordering Codes</b>      |                     |                     |                     |                     |                     |
| Standard                   | DS650-3             | DS650-5             | DS650-9             | DS650DC-3           | DS760SL-3           |
| ALT Standby                | DS650-3-002         | DS650-5-001         | DS650-9-002         | DS650DC-3-002       |                     |
| Reverse Air                | DS650-3-007         | DS650-5-002         | DS650-9-004         | DS650DC-3-003       | DS760SL-3-001       |
| ALT Standby & Reverse Air  | DS650-3-008         | DS650-5-003         | DS650-9-005         | DS650DC-3-004       |                     |
| Fan Off with inhibit       |                     |                     |                     |                     |                     |
| Disable External Fan Drive |                     | DS650DC-3-001       |                     | DS850DC-3-001       |                     |



DS850



DS850DC

|                            | DS800SL-3           | DS850-3             | DS850-5             | DS850-9             | DS850DC-3           |
|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Input:</b>              |                     |                     |                     |                     |                     |
| Input Range                | 90-264 Vac          | 90-264 Vac          | 90-264 Vac          | 90-264 Vac          | 40-72 Vdc           |
| Frequency                  | 47-63 Hz            | 47-63 Hz            | 47-63 Hz            | 47-63 Hz            | DC                  |
| Efficiency                 | 92% Typ GLD         | 82% Typ             | 82% Typ             | 83% Typ             | 80% Typ             |
| EMI/RFI                    | Class A             | Class B             | Class B             | Class B             | N/A                 |
| Leakage Current            | 0.8 mA @240 V       | 1.4 mA @ 240 V      | 1.4 mA @ 240 V      | 1.4 mA @ 240 V      | N/A                 |
| <b>Outputs:</b>            |                     |                     |                     |                     |                     |
| Output Main                | 12 V / 66.7 A       | 12 V / 70 A         | 24 V / 35 A         | 48 V / 17.5 A       | 12 V / 70 A         |
| Output Stand-By            | 5.0 Vsb / 4 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       |
| OCP/OVP/OTP                | YES                 | YES                 | YES                 | YES                 | YES                 |
| I <sup>2</sup> C Control   | YES                 | YES                 | YES                 | YES                 | YES                 |
| <b>Environmental</b>       |                     |                     |                     |                     |                     |
| Operating Temp             | 0 °C to 50 °C       | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C     |
| Derating                   | N/A                 | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C        |
| Storage                    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    |
| RoHS Compliant             | YES                 | YES                 | YES                 | YES                 | YES                 |
| MTBF                       | 500K Hours          | 500K Hours          | 500K Hours          | 500K Hours          | 500K Hours          |
| <b>Other:</b>              |                     |                     |                     |                     |                     |
| Size (inch)                | 1.57 x 2.15 x 12.68 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 |
| Size (mm)                  | 40 x 54.5 x 322     | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   |
| Power Density              | 18.69               | 15.38               | 15.38               | 15.38               | 15.38               |
| Cubic Inches               | 42.8                | 55.44               | 55.44               | 55.44               | 55.44               |
| Pro-E Files                | YES                 | YES                 | YES                 | YES                 | YES                 |
| Thermal Data               | YES                 | YES                 | YES                 | YES                 | YES                 |
| PQ Airflow Curves          | YES                 | YES                 | YES                 | YES                 | YES                 |
| Warranty                   | Two Year            | Two Year            | Two Year            | Two Year            | Two Year            |
| <b>Ordering Codes</b>      |                     |                     |                     |                     |                     |
| Standard                   | DS800SL-3           | DS850-3             | DS850-5             | DS850-9             | DS850DC-3           |
| ALT Standby                |                     | DS850-3-002         | DS850-5-001         | DS850-9-002         | DS850DC-3-003       |
| Reverse Air                |                     | DS850-3-006         | DS850-5-002         | DS850-9-003         | DS850DC-3-004       |
| ALT Standby & Reverse Air  |                     | DS850-3-008         | DS850-5-003         | DS850-9-004         | DS850DC-3-005       |
| Fan Off with inhibit       |                     | DS850-3-004         |                     |                     |                     |
| Disable External Fan Drive |                     |                     |                     |                     |                     |



|                            | DS1050-3            | DS1200-3            | DS1200DC-3          | DS1500-3             | DS2000-3           | DS2900            |
|----------------------------|---------------------|---------------------|---------------------|----------------------|--------------------|-------------------|
| <b>Input:</b>              |                     |                     |                     |                      |                    |                   |
| Input Range                | 90-264 Vac          | 90-264 Vac          | 40-72 Vdc           | 90-264 Vac           | 90-264 Vac         | 180-264 Vac       |
| Frequency                  | 47-63 Hz            | 47-63 Hz            | DC                  | 47-63 Hz             | 47-63 Hz           | 47-63 Hz          |
| Efficiency                 | 92% Typ GLD         | 90% Typ             | 91% Typ             | 80% Typ              | 87% Typ            | 90% Typ           |
| EMI/RFI                    | Class B             | Class B             | N/A                 | Class B              | Class B            | Class B           |
| Leakage Current            | 1.4 mA @ 240 V      | 1.4 mA @ 240 V      | N/A                 | 1.4 mA @ 240 V       | 1.4 mA @ 240 V     | 1.4 mA @ 240 V    |
| <b>Outputs:</b>            |                     |                     |                     |                      |                    |                   |
| Output Main                | 12 V / 85.5 A       | 12 V / 98 A         | 12 V / 98 A         | 12 V / 123 A         | 12 V / 165 A       | 12 V / 240 A      |
| Output Stand-By            | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 6 A       | 3.3 Vsb / 7 A        | 3.3 Vsb / 9 A      | 3.3 Vsb / 3 A     |
| OCP/OVP/OTP                | YES                 | YES                 | YES                 | YES                  | YES                | YES               |
| I <sup>2</sup> C Control   | YES                 | YES                 | YES                 | NO                   | YES                | YES               |
| <b>Environmental</b>       |                     |                     |                     |                      |                    |                   |
| Operating Temp             | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C     | -10 °C to 50 °C      | -10 °C to 50 °C    | 0 °C to 50 °C     |
| Derating                   | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C        | 50% at 70 °C         | N/A                | N/A               |
| Storage                    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C    | -40 °C to +85 °C     | -40 °C to +85 °C   | -40 °C to +85 °C  |
| RoHS Compliant             | YES                 | YES                 | YES                 | YES                  | YES                | YES               |
| MTBF                       | 500K Hours          | 500K Hours          | 500K Hours          | 500K Hours           | 500K Hours         | 500K Hours        |
| <b>Other:</b>              |                     |                     |                     |                      |                    |                   |
| Size (inch)                | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 1.57 x 3.20 x 11.00 | 2.8 x 4.9 x 7.5      | 1.57 x 4.2 x 11.6  | 3.07 x 4.17 x 8.5 |
| Size (mm)                  | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 40 x 81.3 x 279.4   | 71.1 x 124.5 x 190.5 | 40 x 106.7 x 295.7 | 78 x 106 x 217    |
| Power Density              | 18.95               | 21.71               | 21.71               | 12.63                | 26.2               | 26.7              |
| Cubic Inches               | 55.44               | 55.44               | 55.44               | 102.9                | 76.5               | 108.8             |
| Pro-E Files                | YES                 | YES                 | YES                 | YES                  | YES                | YES               |
| Thermal Data               | YES                 | YES                 | YES                 | YES                  | YES                | YES               |
| PQ Airflow Curves          | YES                 | YES                 | YES                 | YES                  | YES                | YES               |
| Warranty                   | Two Year            | Two Year            | Two Year            | Two Year             | Two Year           | Two Year          |
| <b>Ordering Codes</b>      |                     |                     |                     |                      |                    |                   |
| Standard                   | DS1050-3            | DS1200-3            | DS1200DC-3          | DS1500-3             | DS2000-3           | DS2900-3          |
| ALT Standby                | DS1050-3-002        | DS1200-3-002        | DS1200DC-3-002      |                      | DS2000-3-002       | DS2900-3-002      |
| Reverse Air                | DS1050-3-001        | DS1200-3-003        | DS1200DC-3-001      | DS1500-3-001         | DS2000-3-001       | DS2900-3-001      |
| ALT Standby & Reverse Air  | DS1050-3-003        | DS1200-3-004        | DS1200DC-3-003      |                      |                    | DS2900-3-003      |
| Fan Off with inhibit       |                     |                     |                     |                      |                    |                   |
| Disable External Fan Drive |                     |                     |                     |                      |                    |                   |

# ADN-C Series Single Phase

120-480 Watts

## Special Features

- Slim form factor
- Five year warranty
- High efficiency > 90% typical
- Full power at 60 °C
- PowerBoost™ technology
- Industrial grade design
  - Metal mounting clip
  - Metal case
- MTBF > 450,000h demonstrated at 40 °C
- Active PFC > 0.92
- Adjustable output
- Overvoltage protection with auto recovery
- Continuous short-circuit and overload protection
- SEMI F47 Sag Immunity
- New visual diagnostic LED
- Three Status LEDs
  - Input, Output, Alarm
- DC OK Relay
- Parallel operation capability
- Screw terminal connections
- RoHS compliant
- No tools required for mounting



## Electrical Specifications

| Input          |                                                                           |
|----------------|---------------------------------------------------------------------------|
| AC Input range | Nominal: 115-230 Vac<br>85-264 Vac                                        |
| DC Input range | 90-375 Vdc                                                                |
| Frequency      | 47-67 Hz, 400 Hz                                                          |
| Efficiency     | > 90%                                                                     |
| Inrush current | ADN5-24-1PM-C: < 15 A<br>ADN10-24-1PM-C: < 30 A<br>ADN20-24-1PM-C: < 40 A |
| PFC            | Active, better than 0.92                                                  |

| Output                     |                                                                                                                                                   |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal voltage            | ADN5-24-1PM-C & ADN10-24-1PM-C: 24 Vdc (22.5-28.5 Vdc Adj)<br>ADN20-24-1PM-C: 24 Vdc (24-28 Vdc Adj)                                              |
| Initial voltage setting    | 24.5 V ±1%                                                                                                                                        |
| Hold-up time               | > 20 ms at full load (100 Vac Input @ Tamb = +25 °C)                                                                                              |
| Voltage regulation         | < ±2% (combination line, load, time and temperature related changes)                                                                              |
| Ripple                     | ADN5-24-1PM-C & ADN10-24-1PM-C: < 50 mVpp<br>ADN20-24-1PM-C: < 100 mVpp                                                                           |
| Back EMF immunity          | < 35 Vdc                                                                                                                                          |
| PowerBoost™                | 1.5x nominal current for 4 seconds                                                                                                                |
| Short-circuit current      | 1.5x nominal current at near zero volts at short-circuit condition                                                                                |
| Parallel operation         | Switch selectable single unit or parallel unit operation. Units will not be damaged by parallel operation (regardless of switch position setting) |
| Output noise suppression   | Radiated EMI values below EN61000-6-2                                                                                                             |
| Overvoltage protection     | > 30.5 Vdc but < 33 Vdc, auto recovery                                                                                                            |
| Line and load regulation   | < 0.5%                                                                                                                                            |
| Time and temperature drift | < 1%                                                                                                                                              |



| Power        | Voltage                  | Current | Size L x W x H (mm)                       | Model Number   |
|--------------|--------------------------|---------|-------------------------------------------|----------------|
| <b>120 W</b> | 85-264 Vac<br>90-375 Vdc | 5 A     | 4.85" x 1.97" x 4.37"<br>(123 x 50 x 111) | ADN5-24-1PM-C  |
| <b>240 W</b> | 85-264 Vac<br>90-375 Vdc | 10 A    | 4.85" x 2.36" x 4.37"<br>(123 x 60 x 111) | ADN10-24-1PM-C |
| <b>480 W</b> | 85-264 Vac<br>90-375 Vdc | 20 A    | 4.85" x 3.42" x 4.96"<br>(123 x 87 x 126) | ADN20-24-1PM-C |



# ADN-C Series 3-Phase

480-960 Watts

NEW!



## Special Features

- Slim form factor
- Five year warranty
- High efficiency > 93% typical
- Full power at 60 °C
- PowerBoost™ technology
- Industrial grade design – metal cases
- MTBF > 450,000h demonstrated at 40 °C
- Active PFC
- Adjustable output
- Overvoltage protection with auto recovery
- Continuous short-circuit and overload protection
- Three Status LEDs – Input, Output, Alarm
- DC OK Relay
- Parallel operation capability
- Screw terminal connections
- RoHS compliant
- No tools required for mounting

## Electrical Specifications

| Input                  |                                                                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal voltage        | 380-480 Vac                                                                                                                                                |
| AC Input range         | 320-540 Vac                                                                                                                                                |
| DC Input range         | 450-720 Vdc for ADN20                                                                                                                                      |
| Frequency              | 50-60 Hz                                                                                                                                                   |
| Efficiency             | 93% for ADN20; 94% for ADN40                                                                                                                               |
| PFC                    | Active power factor correction                                                                                                                             |
| Two phase input        | Derate to 75% and 50% for ADN20 and ADN40 respectively under loss of 1 phase. Units will shut down if thermal threshold is exceeded under this condition   |
| Output                 |                                                                                                                                                            |
| Nominal voltage        | 24 V (24.0-28.0 Vdc Adj.)                                                                                                                                  |
| Hold-up time           | > 20 ms for ADN20; > 15 ms for ADN40                                                                                                                       |
| Voltage regulation     | < ±2% overall                                                                                                                                              |
| Ripple                 | < 100 mVpp                                                                                                                                                 |
| PowerBoost™            | 1.5x nominal current for 4 seconds                                                                                                                         |
| Peak current           | 1.5x nominal current for 4 seconds minimum while holding voltage > 20 Vdc                                                                                  |
| Parallel operation     | Single or parallel operation selectable via front switch. For redundant operation use of external diode module is preferred; ADN40 uses active paralleling |
| Power back immunity    | > 35 V                                                                                                                                                     |
| Overvoltage protection | > 30.5 Vdc but < 33 Vdc, auto recovery                                                                                                                     |



| Power        | Voltage                    | Current       | Size L x W x H (mm)                        | Model Number   |
|--------------|----------------------------|---------------|--------------------------------------------|----------------|
| <b>480 W</b> | 320-540 Vac<br>450-760 Vdc | 20 A @ 24 Vdc | 4.68" x 3.34" x 4.85"<br>(119 x 85 x 123)  | ADN20-24-3PM-C |
| <b>960 W</b> | 320-540 Vac                | 40 A @ 24 Vdc | 4.85" x 7.09" x 4.85"<br>(123 x 180 x 123) | ADN40-24-3PM-C |



## DC-DC Converters

*Emerson Network Power is widely acknowledged as an industry leader in distributed power applications and produces an exceptionally wide range of DC-DC conversion products.*

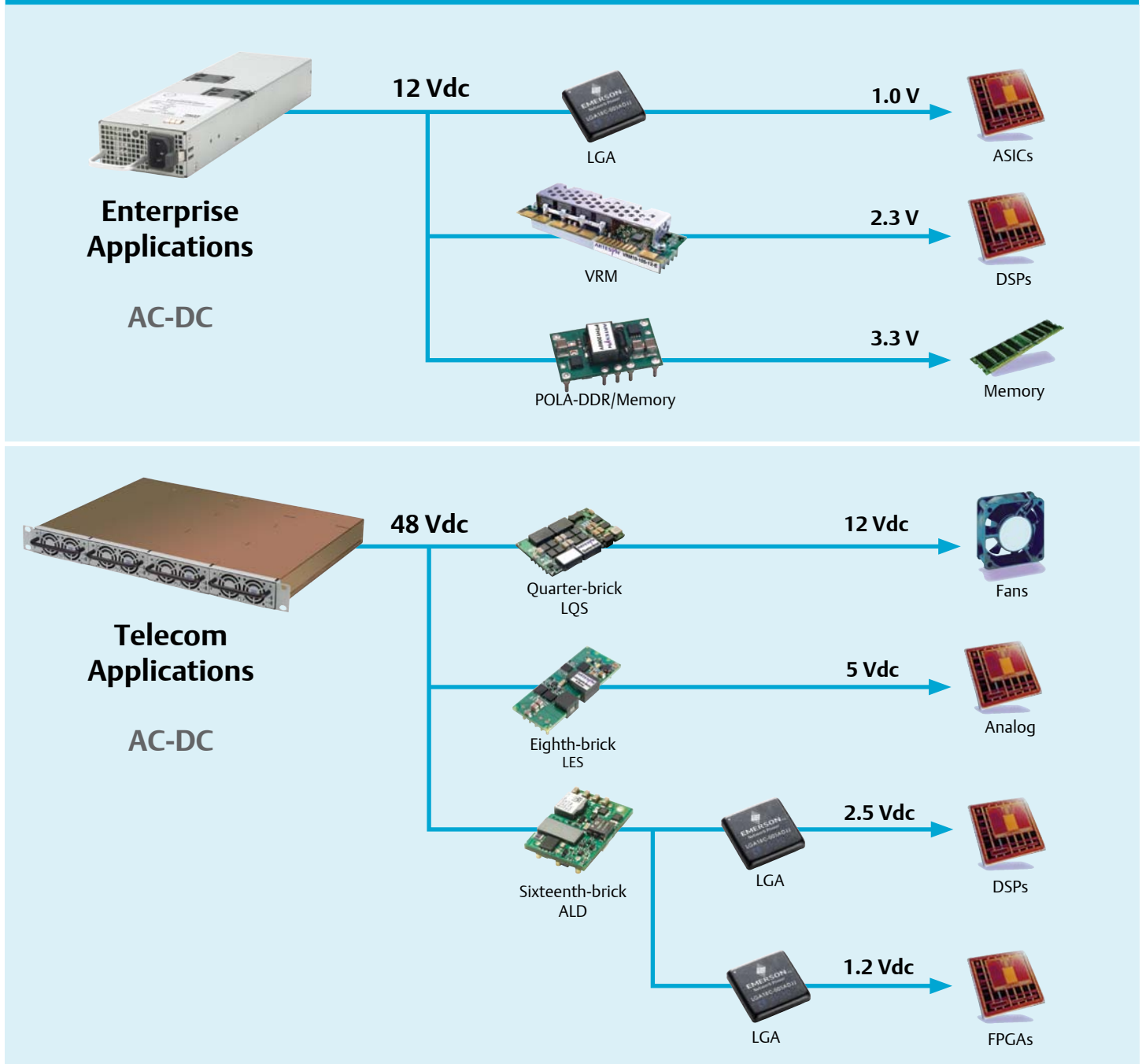


# Distributed Power Architecture

Emerson Network Power understands the needs and nuances of developing power systems using Distributed Power Architecture. We know it is your job to create the most efficient, cost-effective, quality system, and deliver it in a timely fashion.

From full-system power to board-level components, high-power isolated front ends to a full line of isolated and non-isolated DC-DC modules, Emerson Network Power is the source for today's power systems.

## Distributed Power Architecture DC-DC Conversion





# Sixteenth-Brick



ALD10



ALD25Y48

## Special Features

- Industry leading sixteenth-brick standard package and feature sets
- Scalable offering: 35 W and 60 W platforms
- Mechanical options for optimum mounting flexibility: Through-hole (default) or surface mount (suffix “-S”) termination; 5 mm (default) or 3.7 mm through-hole pin length option
- Meets basic insulation
- Power densities as high as 146.5 W per cubic inch
- International safety standards approvals – UL, CSA, TÜV

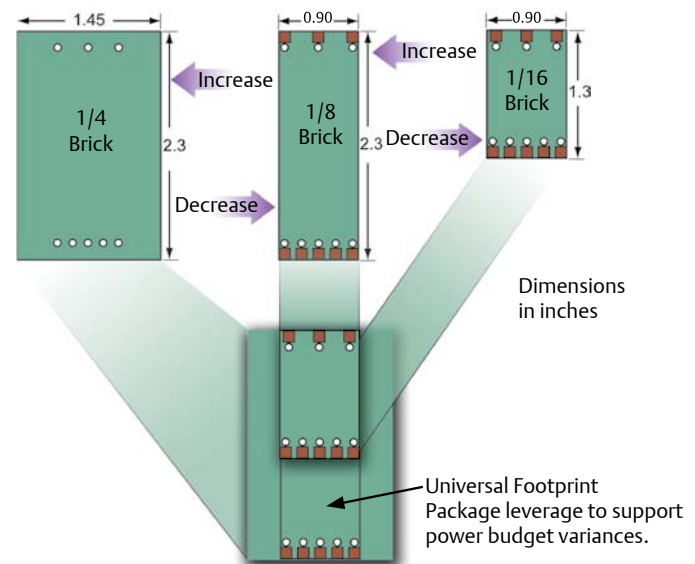
| Vout  | Iout              | Input Voltage  | Package L x W x H (mm)                  | Efficiency | Model Number |
|-------|-------------------|----------------|-----------------------------------------|------------|--------------|
| 1.2 V | <b>Open-frame</b> |                |                                         |            |              |
|       | 15 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 84%        | ALD15K48N-L  |
|       | 25 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 84%        | ALD25K48N-L  |
| 1.5 V | <b>Open-frame</b> |                |                                         |            |              |
|       | 15 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 85%        | ALD15M48N-L  |
|       | 25 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 85%        | ALD25M48N-L  |
| 1.8 V | <b>Open-frame</b> |                |                                         |            |              |
|       | 13 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 87%        | ALD13Y48N-L  |
|       | 25 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 88%        | ALD25Y48N-L  |
| 2.5 V | <b>Open-frame</b> |                |                                         |            |              |
|       | 11 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 89%        | ALD11G48N-L  |
|       | 20 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 89%        | ALD20G48N-L  |
| 3.3 V | <b>Open-frame</b> |                |                                         |            |              |
|       | 10 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 90%        | ALD10F48N-L  |
|       | 18 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 90%        | ALD18F48N-L  |
| 5 V   | <b>Open-frame</b> |                |                                         |            |              |
|       | 7 A               | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 91%        | ALD07A48N-L  |
|       | 12 A              | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 91%        | ALD12A48N-L  |
| 12 V  | <b>Open-frame</b> |                |                                         |            |              |
|       | 2.75 A            | 48 V (36-75 V) | 1.3" x 0.9" x 0.35" (33 x 22.86 x 8.89) | 92%        | ALD03B48N-L  |

## Footprint/Package Leverage

### Common Features

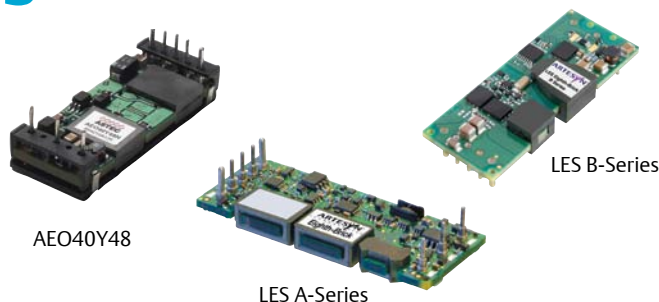
- Open-frame or baseplate
- Through-hole or SMT
- 3.7 mm or 5 mm pin length
- Negative or Positive enable

Designing multiple footprints maximizes product availability (supply) and creates greatest cost/price leverage





# Eighth-Brick

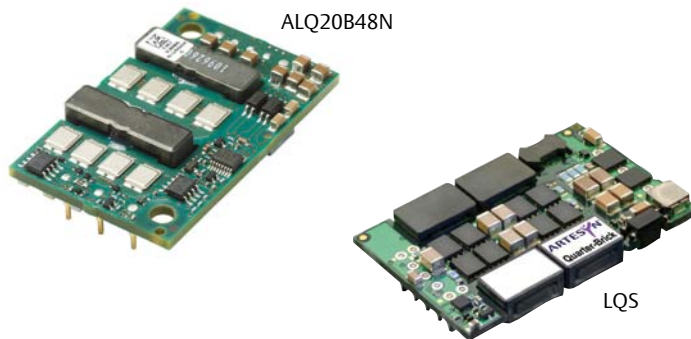


## Special Features

- Industry leading eighth-brick standard package and feature sets
- Scalable output power offering: Low power 80 W series or up to 120 W high power series
- Mechanical options for optimum mounting flexibility: Open-frame (ALO or LES) or baseplate (AEO) construction; Through-hole (default) or surface mount (suffix “-S”) termination; 5 mm (default) or 3.7 mm through-hole pin length option
- Meets basic insulation
- Power densities as high as 181 W per cubic inch
- Wide operating temperature range
- International safety standards approvals – UL, CSA, TÜV

| Vout  | Iout              | Input Voltage      | Package L x W x H (mm)                      | Efficiency | Model Number     |
|-------|-------------------|--------------------|---------------------------------------------|------------|------------------|
| 1.0 V | <b>Open-frame</b> |                    |                                             |            |                  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 85%        | LES25B48-1V0REJ  |
| 1.2 V | <b>Open-frame</b> |                    |                                             |            |                  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 86%        | LES25B48-1V2REJ  |
|       | 50 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.34" (58.42 x 22.86 x 8.64)  | 86%        | LES50A48-1V2REJ  |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
| 1.5 V | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 85%        | AEO25K48N-L      |
|       | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 86%        | AEO40K48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 88%        | LES25B48-1V5REJ  |
| 1.8 V | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 88%        | ALO40M48N-L      |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 86%        | AEO25M48N-L      |
|       | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 88%        | AEO40M48N-L      |
| 2.5 V | <b>Open-frame</b> |                    |                                             |            |                  |
|       | 20 A              | 24 V (18-36 V)     | 2.3" x 0.9" x 0.34" (58.42 x 22.86 x 8.64)  | 91%        | LES20A24-1V8REJ  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 89%        | LES25B48-1V8REJ  |
|       | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 90%        | ALO40Y48N-L      |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 25 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 87%        | AEO25Y48N-L      |
|       | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 90%        | AEO40Y48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
| 3.3 V | 22 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42" x 22.86 x 9.14) | 91%        | LES22B48-2V5REJ  |
|       | 40 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.34" (58.42" x 22.86 x 8.64) | 91%        | LES40A48-2V5REJ  |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 20 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 90%        | AEO20G48N-L      |
|       | 35 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 90%        | AEO35G48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
| 5 V   | 20 A              | 24 V (18-36 V)     | 2.3" x 0.9" x 0.34" (58.42 x 22.86 x 8.64)  | 90%        | LES20A24-3V3REJ  |
|       | 20 A              | 24V/48 V (19-60 V) | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 91%        | ALO20F36N-L      |
|       | 20 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 91%        | LES20B48-3V3REJ  |
|       | 30 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 91%        | ALO30F48N-L      |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 20 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 91%        | AEO20F48N-L      |
|       | 30 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 91%        | AEO30F48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
| 12 V  | 13 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 92%        | LES13B48-5V0REJ  |
|       | 20 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 93%        | ALO20A48N-L      |
|       | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 12 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 93%        | AEO12A48N-L      |
| 15 V  | 20 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 92%        | AEO20A48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
|       | 6.7 A             | 48 V (36-75 V)     | 2.3" x 0.9" x 0.36" (58.42 x 22.86 x 9.14)  | 93%        | LES06B48-12V0REJ |
|       | 10 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.32" (58.42 x 22.86 x 8.13)  | 92%        | ALO10B48N-L      |
| 15 V  | <b>Baseplate</b>  |                    |                                             |            |                  |
|       | 4 A               | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 93%        | AEO04B48N-L      |
|       | 10 A              | 48 V (36-75 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 92%        | AEO10B48N-L      |
|       | <b>Open-frame</b> |                    |                                             |            |                  |
| 15 V  | 5 A               | 24 V (18-36 V)     | 2.3" x 0.9" x 0.4" (58.42 x 22.86 x 10.16)  | 91%        | LES05B24-15V0J   |

# Quarter-Brick

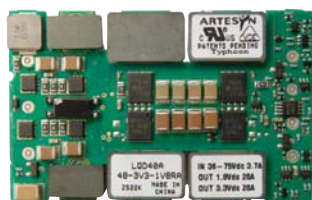


## Special Features

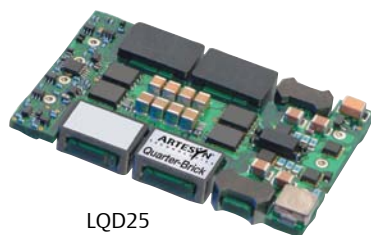
- Industry leading quarter-brick standard package and feature sets
- Up to 100 A offering
- Wide operating temperature range
- Meets basic insulation
- Exceptional dynamic response and reactive loading capability
- Monotonic start-up characteristic
- International safety standards approvals – UL, CSA, TÜV

| Vout        | Iout              | Input Voltage  | Package L x W x H (mm)                       | Efficiency | Model Number     |
|-------------|-------------------|----------------|----------------------------------------------|------------|------------------|
| 1.2 V       | <b>Open-frame</b> |                |                                              |            |                  |
|             | 50 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 89%        | LQS50A48-1V2REJ  |
|             | 100 A             | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 86%        | LQS100A48-1V2REJ |
| 1.5 V       | <b>Open-frame</b> |                |                                              |            |                  |
|             | 50 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 89%        | LQS50A48-1V5REJ  |
|             | 80 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 89%        | LQS80A48-1V5REJ  |
|             | 100 A             | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 89%        | LQS100A48-1V5REJ |
| 1.8 V       | <b>Open-frame</b> |                |                                              |            |                  |
|             | 30 A              | 24 V (18-36 V) | 2.3" x 1.45" x 0.34" (57.42 x 36.83 x 8.64)  | 91%        | LQS30A24-1V8REJ  |
|             | 50 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (57.42 x 36.83 x 8.64)  | 90%        | LQS50A48-1V8REJ  |
|             | 80 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (57.42 x 36.83 x 8.64)  | 90%        | LQS80A48-1V8REJ  |
|             | 100 A             | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (57.42 x 36.83 x 8.64)  | 90%        | LQS100A48-1V8REJ |
|             | <b>Baseplate</b>  |                |                                              |            |                  |
|             | 75 A              | 48 V (36-75 V) | 2.3" x 1.48" x 0.44" (58.42 x 37.59 x 11.18) | 89%        | AEQ75Y48N-3L     |
| 2.5 V       | <b>Open-frame</b> |                |                                              |            |                  |
|             | 50 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 90%        | LQS50A48-2V5REJ  |
|             | 80 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 91%        | LQS80A48-2V5REJ  |
| 3.3 V       | <b>Open-frame</b> |                |                                              |            |                  |
|             | 30 A              | 24 V (18-36 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 90%        | LQS30A24-3V3REJ  |
|             | 50 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 91%        | LQS50A48-3V3REJ  |
|             | 60 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 91%        | LQS60A48-3V3REJ  |
| 5 V         | <b>Open-frame</b> |                |                                              |            |                  |
|             | 40 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64)  | 92%        | LQS40A48-5V0REJ  |
| 12 V        | <b>Open-frame</b> |                |                                              |            |                  |
|             | 20 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.36" (58.42 x 36.83 x 9.14)  | 93%        | ALQ20B48N-L      |
|             | <b>Baseplate</b>  |                |                                              |            |                  |
|             | 20 A              | 48 V (36-75 V) | 2.3" x 1.45" x 0.42" (58.42 x 36.83 x 10.67) | 93%        | AEQ20B48N-L      |
| <b>NEW!</b> | 33 A              | 48 V (36-75 V) | 2.28" x 1.45" x 0.50" (57.9 x 36.83 x 12.7)  | 93%        | AVQ400-48S12B-4L |

# Quarter-Brick Dual



LQD40



LQD25

## Special Features

- Industry leading quarter-brick standard package and feature sets
- Wide operating temperature range
- Independent control loop eliminates cross regulation
- Tightly regulated individual output channels
- Clean, fast transient load response
- International safety standards approvals – UL, CSA, TÜV

| Vout        | Iout              | Input Voltage  | Package L x W x H (mm)                      | Efficiency | Model Number       |
|-------------|-------------------|----------------|---------------------------------------------|------------|--------------------|
| 3.3 V/1.2 V | <b>Open-frame</b> |                |                                             |            |                    |
|             | 15/15 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 90%        | LQD30A48-3V31V2REJ |
|             | 20/20 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 90%        | LQD40A48-3V31V2REJ |
| 3.3 V/1.5 V | <b>Open-frame</b> |                |                                             |            |                    |
|             | 15/15 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD30A48-3V31V5REJ |
|             | 20/20 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD40A48-3V31V5REJ |
| 3.3 V/1.8 V | <b>Open-frame</b> |                |                                             |            |                    |
|             | 15/15 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD30A48-3V31V8REJ |
|             | 20/20 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD40A48-3V31V8REJ |
| 3.3 V/2.5 V | <b>Open-frame</b> |                |                                             |            |                    |
|             | 15/15 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD30A48-3V32V5REJ |
|             | 20/20 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD40A48-3V32V5REJ |
|             | <b>Baseplate</b>  |                |                                             |            |                    |
|             | 12/16 A           | 48 V (36-75 V) | 2.3" x 1.5" x 0.5" (58.42 x 38.10 x 12.7)   | 91%        | EXQ60-48D3V3-2V5RJ |
| 5 V/3.3 V   | <b>Open-frame</b> |                |                                             |            |                    |
|             | 10/15 A           | 48 V (36-75 V) | 2.3" x 1.45" x 0.34" (58.42 x 36.83 x 8.64) | 91%        | LQD25A48-5V03V3REJ |



# Half-Brick



EXB250



AEH80

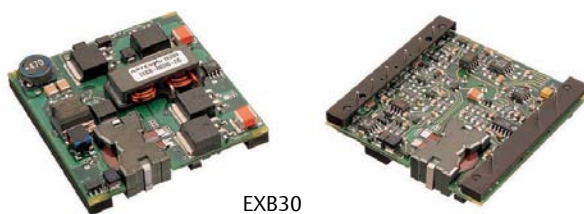
## Special Features

- Industry standard half-brick available up to 80 A
- Open-frame and baseplate construction
- Open-frame has heat sink adapter for conductive cooling applications
- Highest efficiencies available
- Optimum transient load performance and reactive loading capacity
- Wide operating temperature range
- International safety standards approvals – UL, CSA, TÜV

| Vout  | Iout       | Input Voltage  | Package L x W x H (mm)                       | Efficiency | Model Number      |
|-------|------------|----------------|----------------------------------------------|------------|-------------------|
| 1.2 V | Baseplate  |                |                                              |            |                   |
|       | 60 A       | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 85%        | EXB250-48S1V2-RJ  |
| 1.5 V | Baseplate  |                |                                              |            |                   |
|       | 60 A       | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.89 x 57.91 x 12.7)   | 86%        | EXB250-48S1V5-RJ  |
| 1.8 V | Baseplate  |                |                                              |            |                   |
|       | 60 A       | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 87%        | EXB250-48S1V8-R   |
| 2.5 V | Baseplate  |                |                                              |            |                   |
|       | 60 A       | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 88%        | EXB250-48S2V5-RJ  |
| 3.3 V | Open-frame |                |                                              |            |                   |
|       | 8 A        | 48 V (36-75 V) | 2.4" x 2.28" x 0.43" (60.96 x 57.91 x 10.92) | 90%        | EXB30-48S3V3J     |
|       | 10 A       | 48 V (36-75 V) | 2.4" x 2.28" x 0.43" (60.96 x 57.91 x 10.92) | 90%        | EXB50-48S3V3J     |
|       | 30 A       | 48 V (36-75 V) | 2.4" x 2.28" x 0.39" (60.96 x 57.91 x 9.91)  | 91%        | EXB100-48S3V3-RJ  |
|       | Baseplate  |                |                                              |            |                   |
|       | 30 A       | 24 V (18-36 V) | 2.4" x 2.3" x 0.5" (60.96 x 57.91 x 12.7)    | 77%        | BXB150-24S3V3FLTJ |
| 5 V   | Open-frame |                |                                              |            |                   |
|       | 10 A       | 48 V (36-75 V) | 2.4" x 2.28" x 0.43" (60.96 x 57.91 x 10.92) | 91%        | EXB50-48S05-RJ    |
|       | 20 A       | 48 V (36-75 V) | 2.4" x 2.28" x 0.39" (60.96 x 57.91 x 9.91)  | 92%        | EXB100-48S05-RJ   |
|       | Baseplate  |                |                                              |            |                   |
|       | 33 A       | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 92%        | EXB250-48S05-RJ   |
|       | Baseplate  |                |                                              |            |                   |
| 12 V  | Open-frame |                |                                              |            |                   |
|       | 2.5 A      | 48 V (36-75 V) | 2.4" x 2.28" x 0.43" (60.96 x 57.91 x 10.92) | 90%        | EXB30-48S12J      |
|       | 4.2 A      | 48 V (36-75 V) | 2.4" x 2.28" x 0.43" (60.96 x 57.91 x 10.92) | 90%        | EXB50-48S12J      |
|       | Baseplate  |                |                                              |            |                   |
|       | 8.33 A     | 24 V (18-36 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 85%        | BXB100-24S12FLTJ  |
|       | 13.75 A    | 48 V (33-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 92%        | EXB250-48S12-RJ   |
| 15 V  | Baseplate  |                |                                              |            |                   |
|       | 3.33 A     | 24 V (18-36 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)   | 83%        | BXB50-24S15FLTJ   |



# Half-Brick Dual



EXB30

|           | Current           | Input Voltage  | Package L x W x H (mm)                      | Efficiency | Model Number       |
|-----------|-------------------|----------------|---------------------------------------------|------------|--------------------|
| 1.8/3.3 V | <b>Open-frame</b> |                |                                             |            |                    |
|           | 8.5/8.5 A         | 48 V (36-75 V) | 2.4" x 2.28" x 0.39" (60.96 x 57.91 x 9.91) | 86%        | EXB50-48D3V3-1V8J  |
| 3.3/5 V   | <b>Open-frame</b> |                |                                             |            |                    |
|           | 6/6 A             | 24 V (18-36 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.7)  | 87%        | EXB30-24D05-3V3J   |
|           | 6/6 A             | 48 V (36-75 V) | 2.4" x 2.28" x 0.5" (60.96 x 57.91 x 12.)   | 88%        | EXB30-48D05-3V3J   |
|           | 7.5/7.5 A         | 48 V (36-75 V) | 2.4" x 2.28" x 0.39" (60.96 x 57.91 x 9.91) | 89%        | EXB50-48D05-3V3-RJ |

## RF Power Bricks



RFF700



RFB300

### Special Features

- Specialized high power bricks for RF applications such as base station power amplifiers
- Offered in 24 V and 48 V input voltages
- Wide output voltage adjustability
- -40 °C to 100 °C baseplate temperature with no derating at rated power
- International safety standard approvals – UL, CSA, VDE, CB Report

### Half-Brick

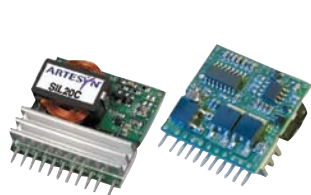
| Vout        | Iout             | Input Voltage  | Package L x W x H (mm)                     | Efficiency | Model Number     |
|-------------|------------------|----------------|--------------------------------------------|------------|------------------|
| 7.2-13.2 V  | <b>Baseplate</b> |                |                                            |            |                  |
|             | 25 A             | 24 V (18-36 V) | 2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7) | 86%        | RFB300-24S12-R5Y |
|             | 29.2 A           | 48 V (36-75 V) | 2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7) | 86%        | RFB350-48S12-R5J |
| 16.8-29.4 V | <b>Baseplate</b> |                |                                            |            |                  |
|             | 11 A             | 24 V (18-36 V) | 2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7) | 90%        | RFB300-24S28-R5Y |
|             | 11 A             | 48 V (36-75 V) | 2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7) | 91%        | RFB300-48S28-R5J |
|             | 12.5 A           | 48 V (36-75 V) | 2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7) | 91%        | RFB350-48S28-R5Y |

### Full-Brick

| Vout        | Iout             | Input Voltage  | Package L x W x H (mm)                     | Efficiency | Model Number    |
|-------------|------------------|----------------|--------------------------------------------|------------|-----------------|
| 16.8-29.4 V | <b>Baseplate</b> |                |                                            |            |                 |
|             | 17.9 A           | 24 V (18-36 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | RFF500-24S28-5Y |
|             | 17.9 A           | 48 V (36-75 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 91%        | RFF500-48S28-5Y |
|             | 21.4 A           | 24 V (18-36 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | RFF600-24S28-5Y |
|             | 21.4 A           | 48 V (36-75 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 91%        | RFF600-48S28-5Y |
|             | 25 A             | 48 V (36-75 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 91%        | RFF700-48S28-5Y |

# C-Class – Economy

The 1<sup>st</sup> generation C-Class non-isolated DC–DC converters are designed to provide good efficiency and performance.



SIL20C



SMT30C



SMT40C



SMT06C

## Special Features

- Input voltage ranges: 4.5-5.5 V or 10.2-13.8 V
- Wide output voltage trim/adjustability: 0.9 to 5 Vdc
- Output current: 6-40 A
- High efficiency up to 92%
- Remote on/off
- Power good
- Parallel operation/current share (SIL30C and SIL40C)
- Remote sense (SIL30C and SIL40C)
- Excellent transient response
- Operating temperature range for SIL20C2 and SIL40C2: 0 °C to 70 °C
- Protection: overcurrent/short-circuit
- Cost-optimized design – industry leading value
- Compact footprint, vertical, horizontal and horizontal SMT options
- International safety standard approvals – UL, CSA, TÜV & CB Report

## General-Purpose C-Class Non-Isolated DC–DC Converters

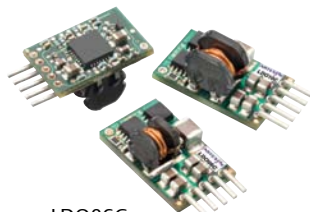
| Output Current                               | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                        | Model Number     |
|----------------------------------------------|---------------|----------------|------------|-----------------------------------------------|------------------|
| <b>Single-In-Line, Through-Hole Mounting</b> |               |                |            |                                               |                  |
| <b>6 A</b>                                   | 4.5-5.5 Vdc   | 0.9-3.3 V      | 89%        | 1.2" x 0.45" x 0.61" (30.48 x 11.43 x 15.49)  | SIL06C-05SADJ-VJ |
| <b>6 A</b>                                   | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 0.45" x 0.61" (30.48 x 11.43 x 15.49)  | SIL06C-12SADJ-VJ |
| <b>15 A</b>                                  | 4.5-5.5 Vdc   | 0.9-3.3 V      | 89%        | 1.2" x 0.4" x 1.1" (30.48 x 10.16 x 27.94)    | SIL15C-05SADJ-VJ |
| <b>15 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 0.4" x 1.1" (30.48 x 10.16 x 27.94)    | SIL15C-12SADJ-VJ |
| <b>20 A</b>                                  | 4.5-5.5 Vdc   | 0.9-3.3 V      | 87%        | 1.2" x 0.45" x 1.1" (30.48 x 10.16 x 27.94)   | SIL20C-05SADJ-VJ |
| <b>20 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 0.45" x 1.1" (30.48 x 10.16 x 27.94)   | SIL20C-12SADJ-VJ |
| <b>25 A</b>                                  | 10.2-13.8 Vdc | -4.5-(-5.5 V)  | 90%        | 2.4" x 0.52" x 1.25" (60.96 x 13.21 x 31.75)  | SIL25C-12SNEG-VJ |
| <b>30 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 2.4" x 0.52" x 1.25" (60.96 x 13.21 x 31.75)  | SIL30C-12SADJ-VJ |
| <b>40 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 92%        | 2.4" x 0.52" x 1.25" (60.96 x 13.21 x 31.75)  | SIL40C-12SADJ-VJ |
| <b>Surface-Mounting</b>                      |               |                |            |                                               |                  |
| <b>6 A</b>                                   | 4.5-5.5 Vdc   | 0.9-3.3 V      | 89%        | 1.2" x 0.53" x 0.47" (30.48 x 13.46 x 11.94)  | SMT06C-05SADJJ   |
| <b>6 A</b>                                   | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 0.53" x 0.47" (30.48 x 13.46 x 11.94)  | SMT06C-12SADJJ   |
| <b>15 A</b>                                  | 4.5-5.5 Vdc   | 0.9-3.3 V      | 89%        | 1.2" x 1.1" x 0.46" (30.48 x 27.94 x 11.68)   | SMT15C-05SADJJ   |
| <b>15 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 1.1" x 0.46" (30.48 x 27.94 x 11.68)   | SMT15C-12SADJJ   |
| <b>20 A</b>                                  | 4.5-5.5 Vdc   | 0.9-3.3 V      | 87%        | 1.2" x 1.14" x 0.46" (30.48 x 28.96 x 11.68)  | SMT20C-05SADJJ   |
| <b>20 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 1.2" x 1.14" x 0.46" (30.48 x 28.96 x 11.68)  | SMT20C-12SADJJ   |
| <b>30 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 91%        | 2.28" x 1.45" x 0.43" (57.91 x 36.83 x 10.92) | SMT30C-12SADJJ   |
| <b>40 A</b>                                  | 10.2-13.8 Vdc | 0.9-5.0 V      | 92%        | 2.28" x 1.45" x 0.43" (57.91 x 36.83 x 10.92) | SMT40C-12SADJJ   |

## C-Class – High Density

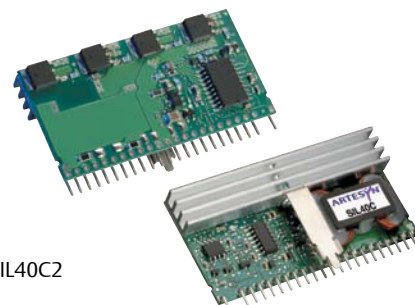
The 2<sup>nd</sup> generation C-Class non-isolated DC–DC converters are designed to provide good efficiency and performance, a smaller footprint, and integrated input and output capacitors.



LDO03C



LDO06C



SIL40C2

### Special Features

- Wide input voltage ranges: 3-13.8 V or 4.5-13.8 V
- Wide output voltage trim/adjustability: 0.59-5.1 V
- Output current: 3-40 A
- High efficiency up to 94%
- Remote on/off
- Power good
- Remote sense (Sxx20C2, Sxx40C2 and Sxx60C2)
- Excellent transient response
- Current sink capability for termination applications
- Operating temperature range for LDO03, LDO06 and LDO10: -40 °C to 70 °C
- Operating temperature range: 0 °C to 70 °C
- Protection: over current/short-circuit
- No added input or output capacitors needed for ripple current capability or stability
- Cost-optimized design – industry leading value
- Compact footprint, vertical, horizontal and horizontal SMT options
- International safety standard approvals – UL, CSA, TÜV & CB Report

### General-Purpose C-Class Non-Isolated DC–DC Converters

| Output Current                               | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                        | Model Number       |
|----------------------------------------------|---------------|----------------|------------|-----------------------------------------------|--------------------|
| <b>Single-In-Line, Through-Hole Mounting</b> |               |                |            |                                               |                    |
| 3 A                                          | 3.0-13.8 Vdc  | 0.59-5.1 V     | 90%        | 0.37" x 0.21" x 0.61" (9.4 x 5.33 x 15.49)    | LDO03C-005W05-VJ   |
| 6 A                                          | 3.0-13.8 Vdc  | 0.59-5.1 V     | 92%        | 0.41" x 0.37" x 0.65" (10.41 x 9.4 x 16.51)   | LDO06C-005W05-VJ   |
| 10 A                                         | 3.0-13.8 Vdc  | 0.59-5.1 V     | 94%        | 0.41" x 0.45" x 0.65" (10.41 x 11.43 x 16.51) | LDO10C-005W05-VJ   |
| 20 A                                         | 4.5-13.8 Vdc  | 0.59-5.1 V     | 93%        | 1.2" x 0.46" x 0.61" (30.48 x 11.68 x 15.49)  | SIL20C2-00SADJ-VJ  |
| 40 A                                         | 4.5-13.8 Vdc  | 0.6-5.0 V      | 94%        | 1.2" x 0.43" x 1.1" (30.48 x 10.92 x 27.94)   | SIL40C2-00SADJ-VJ  |
| <b>NEW!</b> 60 A                             | 10.8-13.2 Vdc | 1.2-4.0V       | 89%        | 1.98" x 0.54" x 0.78" (50.29 x 13.72 x 19.81) | SIL60C2-00SADJ-VDJ |
| <b>NEW!</b> 80 A                             | 4.7-13.8 Vdc  | 0.84-5.0 V     | 93%        | 2.4" x 0.7" x 1.25" (60.96 x 17.78 x 31.75)   | SIL80C2-00SADJ-VJ  |
| <b>Surface-Mounting</b>                      |               |                |            |                                               |                    |
| 3 A                                          | 3.0-13.8 Vdc  | 0.59-5.1 V     | 90%        | 0.61" x 0.37" x 0.29" (15.49 x 9.4 x 7.37)    | LDO03C-005W05-SJ   |
| 6 A                                          | 3.0-13.8 Vdc  | 0.59-5.1 V     | 92%        | 0.65" x 0.41" x 0.44" (16.51 x 10.41 x 11.18) | LDO06C-005W05-SJ   |
| 10 A                                         | 3.0-13.8 Vdc  | 0.59-5.1 V     | 94%        | 0.65" x 0.41" x 0.52" (16.51 x 10.41 x 13.21) | LDO10C-005W05-SJ   |
| 20 A                                         | 4.5-13.8 Vdc  | 0.59-5.1 V     | 93%        | 1.2" x 0.61" x 0.48" (30.48 x 15.49 x 12.19)  | SMT20C2-00SADJJ    |
| 40 A                                         | 4.5-13.8 Vdc  | 0.6-5.0 V      | 94%        | 1.2" x 1.1" x 0.44" (30.48 x 27.94 x 11.18)   | SMT40C2-00SADJJ    |
| <b>NEW!</b> 80 A                             | 4.5-13.8 Vdc  | 0.84-5.1V      | 88%        | 2.4" x 1.25" x 0.7" (60.96 x 31.75 x 18.03)   | SMT80C2-00SADJ-J   |

# C-Class – High Density LGA C Series

The latest addition to the C-Class non-isolated DC-DC converter offering packaged in an ultra-compact, low-profile Land Grid Array with current densities up to 225 A/in<sup>3</sup>.



## Special Features

- High density, ultra low profile surface mount module in Land Grid Array (LGA) package
- Available in 4 different output current levels: 3, 6, 10 and 20 Amps
- Wide input voltage range: 3.0-14.0 V
- Adjustable output voltage: 0.59-5.1 V via external resistor
- High efficiency ~92% typical
- Wide ambient operating temperature range: -40 °C to 85 °C
- Input UVLO; Remote On/Off; Output Adjust; Margin; PGood signal, Differential sense
- Current sink capability for voltage termination applications
- Integrated input and output capacitors resulting in minimal external capacitance required for stable operation

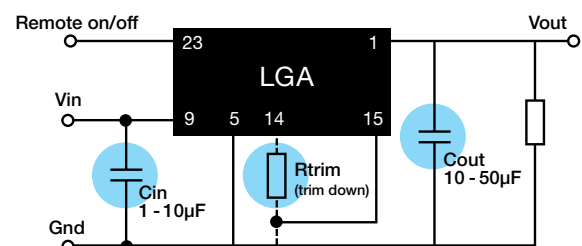
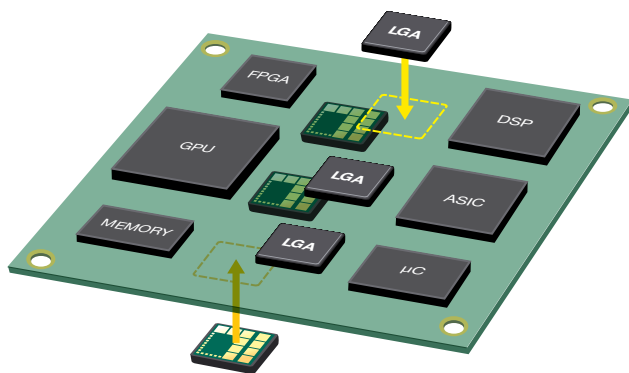
## LGA C Series Non-Isolated DC-DC Converters

| Output Current          | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                        | Model Number   |
|-------------------------|---------------|----------------|------------|-----------------------------------------------|----------------|
| <b>Surface-Mounting</b> |               |                |            |                                               |                |
| <b>3 A</b>              | 3.0-14 Vdc    | 0.59-5.1 V     | 92%        | 0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27) | LGA03C-00SADJJ |
| <b>6 A</b>              | 3.0-14 Vdc    | 0.59-5.1 V     | 92%        | 0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27) | LGA06C-00SADJJ |
| <b>10 A</b>             | 3.0-14 Vdc    | 0.59-5.1 V     | 92%        | 0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27) | LGA10C-00SADJJ |
| <b>20 A</b>             | 4.5-14 Vdc    | 0.59-5.1 V     | 91%        | 0.65" x 0.65" x 0.210" (16.51 x 16.51 x 5.33) | LGA20C-01SADJJ |

Note: Optional heatsink kits are available. Ordering part number is LGA-HTSK-KIT-XXX

XXX = Total height of the LGA20C-01SADJJ with heatsink attached: 045 = 0.45"; 048 = 0.48"; 050 = 0.50"

## A Paradigm Shift in Converter Packaging

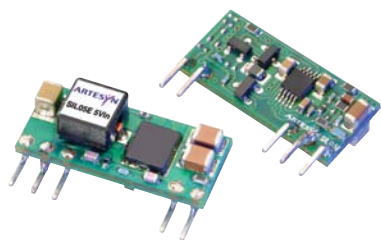


- Compact LGA package - significant improvement in current density, saves board space
- Allows for bilateral thermal management not easily provided by "down" solutions or typical modules (e.g., uniform height for coldplate cooling)
- Scalable solution, one footprint design for 3, 6, 10 and 20 A offering
- Fully operational DC-DC solution with 3 external components

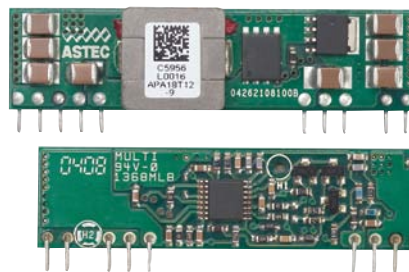


# E-Class – Performance

Efficiencies as high as 96% and current densities up to 140 A/in<sup>3</sup>.



SIL05E



APA18

## Special Features

Efficiencies as high as 96% and current densities up to 140 A/in<sup>3</sup>.

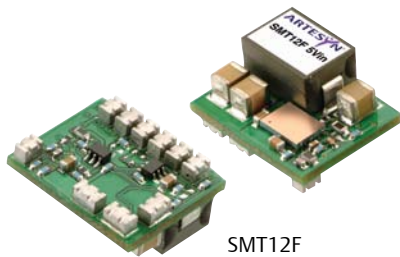
- Input voltage ranges: 3-5.5 V, 4.5-5.5 V, 8-14 V, 10-14 V
- Wide output voltage trim ranges: 0.8-3.63 V and 0.75-5.5 V
- Output current: 5-30 A
- Remote on/off
- Remote sense
- Industry standard footprint—vertical and horizontal mounting (low profile SMT/SIP—through-hole)
- Operating temperature range: -40 °C to 85 °C
- Built-in I<sup>2</sup>C bus interface feature for precision setting of both output voltage and voltage margining product series (SIL15E-12M)
- Protection: overcurrent/short-circuit
- International safety standard approvals –UL, CSA, TÜV & CB Report

## General-Purpose E-Class Non-Isolated DC–DC Converters

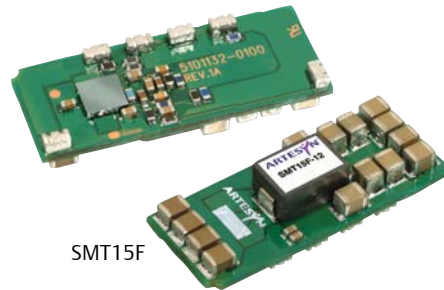
| Output Current                               | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                      | Model Number     |
|----------------------------------------------|---------------|----------------|------------|---------------------------------------------|------------------|
| <b>Single-In-Line, Through-hole Mounting</b> |               |                |            |                                             |                  |
| 5 A                                          | 3.0-5.5 Vdc   | 0.75-3.63 V    | 94%        | 0.9" x 0.28" x 0.4" (22.86 x 7.11 x 10.16)  | SIL05E-05W3V3-VJ |
| 10 A                                         | 4.5-5.5 Vdc   | 0.8-3.63 V     | 95%        | 2" x 0.31" x 0.5" (50.8 x 7.87 x 12.7)      | SIL10E-05W3V3-VJ |
| 10 A                                         | 10-14 Vdc     | 0.8-3.63 V     | 94%        | 2" x 0.31" x 0.5" (50.8 x 7.87 x 12.7)      | SIL10E-12W3V3-VJ |
| 15 A                                         | 3.0-5.5 Vdc   | 0.8-3.63 V     | 94%        | 2" x 0.31" x 0.5" (50.8 x 7.87 x 12.7)      | SIL15E-05W3V3-VJ |
| 15 A                                         | 10-14 Vdc     | 0.8-3.63 V     | 94%        | 2" x 0.31" x 0.5" (50.8 x 7.87 x 12.7)      | SIL15E-12W3V3-VJ |
| 18 A                                         | 3.0-5.5 Vdc   | 0.75-3.6 V     | 92%        | 2" x 0.39" x 0.5" (50.8 x 9.91 x 12.7)      | APA18T04-9L      |
| 18 A                                         | 10-14 Vdc     | 0.75-3.6 V     | 92%        | 2" x 0.39" x 0.5" (50.8 x 9.91 x 12.7)      | APA18T12-9L      |
| 30 A                                         | 8.0-14 Vdc    | 0.8-3.63 V     | 93%        | 2" x 0.31" x 0.5" (50.8 x 7.87 x 12.7)      | SIL30E-12W3V3-VJ |
| <b>Surface-Mounting</b>                      |               |                |            |                                             |                  |
| 5 A                                          | 3.0-5.5 Vdc   | 0.75-3.63 V    | 94%        | 0.8" x 0.45" x 0.26" (20.32 x 11.43 x 6.6)  | SMT05E-05W3V3J   |
| 5 A                                          | 10-14 Vdc     | 0.8-3.63 V     | 91%        | 0.8" x 0.45" x 0.24" (20.32 x 11.43 x 6.1)  | SMT05E-12W3V3J   |
| 10 A                                         | 3.0-5.5 Vdc   | 0.8-3.63 V     | 96%        | 1.3" x 0.53" x 0.32" (33.02 x 13.46 x 8.13) | SMT10E-05W3V3J   |
| 10 A                                         | 10-14 Vdc     | 0.8-3.63 V     | 94%        | 1.3" x 0.53" x 0.32" (33.02 x 13.46 x 8.13) | SMT10E-12W3V3J   |
| 15 A                                         | 3.0-5.5 Vdc   | 0.8-3.63 V     | 95%        | 1.3" x 0.53" x 0.32" (33.02 x 13.46 x 8.13) | SMT15E-05W3V3J   |
| 15 A                                         | 10-14 Vdc     | 0.8-3.63 V     | 94%        | 1.3" x 0.53" x 0.32" (33.02 x 13.46 x 8.13) | SMT15E-12W3V3J   |
| 18 A                                         | 3.0-5.5 Vdc   | 0.75-3.63 V    | 92%        | 1.3" x 0.53" x 0.34 (33.02 x 13.46 x 8.64)  | APC18T04-9L      |
| 18 A                                         | 10-14 Vdc     | 0.75-5.5 V     | 92%        | 1.3" x 0.53" x 0.34 (33.02 x 13.46 x 8.64)  | APC18T12-9L      |
| 30 A                                         | 8.0-14 Vdc    | 0.8-3.63 V     | 91%        | 1.3" x 0.53" x 0.32" (33.02 x 13.46 x 8.13) | SMT30E-12W3V3J   |

# F-Class – Fast Transient Response

Highly integrated non-isolated DC–DC modules, combining transient response up to 300 A/ $\mu$ s. Expressly designed to minimize the number of external capacitors needed.



SMT12F



SMT15F

## Special Features

- Input voltage ranges: 3-5.5 Vdc, 10.8-13.2 Vdc
- Wide output voltage trim range: 0.9-3.3 V (SMT12F)
- Output current: 12-15 A
- High efficiency: 95% @ 5 V in 3.3 Vdc output/full load
- Remote on/off
- Differential remote sense
- Power good
- Separate digital inputs for +5% and -5% output voltage margining
- Industry standard surface-mount footprint (SMT15F)
- Current densities in excess of 72 A/in<sup>3</sup>
- Operating temperature range: -40 °C to 85 °C
- Protection: overcurrent/short-circuit (non-latching) and overtemperature
- International safety standard approvals – UL, CSA, TÜV & CB Report

## General-Purpose F-Class Non-Isolated DC–DC Converters

| Output Current          | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                     | Model Number   |
|-------------------------|---------------|----------------|------------|--------------------------------------------|----------------|
| <b>Surface-Mounting</b> |               |                |            |                                            |                |
| 12 A                    | 3-5.5 Vdc     | 0.9-3.3 V      | 95%        | 0.63" x 0.52" x 0.31" (16 x 13.21 x 7.87)  | SMT12F-05W3V3J |
| 15 A                    | 10.8-13.2 Vdc | 1.0 V          | 85%        | 1.3" x 0.53" x 0.3" (33.02 x 13.46 x 7.62) | SMT15F-12S1V0J |
| 15 A                    | 10.8-13.2 Vdc | 1.2 V          | 86%        | 1.3" x 0.53" x 0.3" (33.02 x 13.46 x 7.62) | SMT15F-12S1V2J |
| 15 A                    | 10.8-13.2 Vdc | 1.5 V          | 87%        | 1.3" x 0.53" x 0.3" (33.02 x 13.46 x 7.62) | SMT15F-12S1V5J |
| 15 A                    | 10.8-13.2 Vdc | 1.8 V          | 88%        | 1.3" x 0.53" x 0.3" (33.02 x 13.46 x 7.62) | SMT15F-12S1V8J |



# POLA-DDR/Memory

Choose POLA modules for multi-sourced and interoperable parts.



PTH12060Y



PTH12010Y



PTH05050Y

## Special Features

- Input voltage ranges: 2.95-3.65 V, 4.5-5.5 V, 10.8-13.2 V
- Wide VTT output voltage trim/adjustability: 0.55-1.8 V
- Output current: 6-15 A
- High efficiency up to 88%
- VTT bus termination output (output the system VREF)
- Current sink capability for termination applications
- DDR and QDR compatible
- Pre-bias start-up capability
- Remote on/off
- Remote sense
- Undervoltage lockout
- POLA compatible
- True multi-sourcing flexibility (form, fit and function)
- Operating temperature range: -40 °C to 85 °C
- Protection: overcurrent/short-circuit
- Through-hole or surface-mount
- International safety standard approvals – UL, CSA, TÜV & CB Report

## POLA Non-Isolated DDR/QDR Memory Bus Termination Modules

| Output Current | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                          | Model Number * |
|----------------|---------------|----------------|------------|-------------------------------------------------|----------------|
| 6 A            | 2.95-3.65 Vdc | 0.55-1.8 V     | 88%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH03050YAD    |
| 6 A            | 4.5-5.5 Vdc   | 0.55-1.8 V     | 87%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH05050YAD    |
| 6 A            | 10.8-13.2 Vdc | 0.55-1.8 V     | 84%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH12050YAD    |
| 10 A           | 2.95-3.65 Vdc | 0.55-1.8 V     | 86%        | 0.995" x 0.620" x 0.354" (25.27 x 15.75 x 8.99) | PTH03060YAD    |
| 10 A           | 4.5-5.5 Vdc   | 0.55-1.8 V     | 86%        | 0.995" x 0.620" x 0.354" (25.27 x 15.75 x 8.99) | PTH05060YAD    |
| 10 A           | 10.8-13.2 Vdc | 0.55-1.8 V     | 83%        | 0.995" x 0.620" x 0.354" (25.27 x 15.75 x 8.99) | PTH12060YAD    |
| 15 A           | 10.8-13.2 Vdc | 0.55-1.8 V     | 85%        | 1.37" x 0.620" x 0.354" (34.80 x 15.75 x 8.99)  | PTH12010YAD    |
| 15 A           | 2.95-3.65 Vdc | 0.55-1.8 V     | 88%        | 1.37" x 0.620" x 0.354" (34.80 x 15.75 x 8.99)  | PTH03010YAD    |
| 15 A           | 4.5-5.5 Vdc   | 0.55-1.8 V     | 88%        | 1.37" x 0.620" x 0.354" (34.80 x 15.75 x 8.99)  | PTH05010YAD    |

\*Mounting Option Suffix:

D Horizontal through-hole (RoHS 6/6)

H Horizontal through-hole (RoHS 5/6)

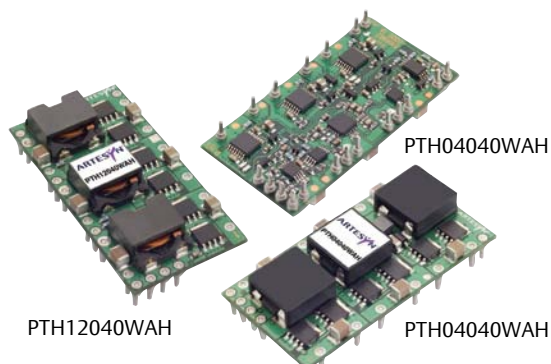
S Surface-mount solder ball (RoHS 5/6)

Z Surface-mount solder ball (RoHS 6/6)



# POLA – General Purpose

Choose POLA modules for multi-sourced and interoperable parts.



## Special Features

- Input voltage ranges: 2.95-3.65 V, 4.5-5.5 V, 10.8-13.2 V
- Wide output voltage trim and adjustability: 0.8-5.5 V
- Output current: 6-60 A
- High efficiency up to 96%
- Auto-Track™ Sequencing
- Margin up/down controls
- Pre-bias start up capability
- Remote on/off
- Remote sense
- POLA compatible
- True multi-sourcing flexibility (form, fit and function)
- Operating temperature range: -40 °C to 85 °C
- Protection: overcurrent/short-circuit
- Through-hole or surface-mount
- International safety standard approvals – UL, CSA, TÜV & CB Report

## General Purpose POLA Non-Isolated DC-DC Converters

| Output Current | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                          | Model Number* |
|----------------|---------------|----------------|------------|-------------------------------------------------|---------------|
| 6 A            | 2.95-3.65 Vdc | 0.8-2.5 V      | 94%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH03050WAD   |
| 6 A            | 4.5-5.5 Vdc   | 0.8-3.6 V      | 95%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH05050WAD   |
| 6 A            | 10.8-13.2 Vdc | 0.8-1.8 V      | 88%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH12050LAD   |
| 6 A            | 10.8-13.2 Vdc | 1.2-5.5 V      | 93%        | 0.87" x 0.495" x 0.335" (22.01 x 12.57 x 8.51)  | PTH12050WAD   |
| 8 A            | 2.95-3.65 Vdc | 0.8-2.5 V      | 93%        | 0.9" x 0.33" x 0.4" (22.86 x 8.38 x 10.16)      | PTV03010WAD   |
| 8 A            | 4.5-5.5 Vdc   | 0.8-3.6 V      | 95%        | 0.9" x 0.33" x 0.4" (22.86 x 8.38 x 10.16)      | PTV05010WAD   |
| 8 A            | 10.8-13.2 Vdc | 0.8-1.8 V      | 87%        | 0.9" x 0.33" x 0.4" (22.86 x 8.38 x 10.16)      | PTV12010LAD   |
| 8 A            | 10.8-3.2 Vdc  | 1.2-5.5 V      | 92%        | 0.9" x 0.33" x 0.4" (22.86 x 8.38 x 10.16)      | PTV12010WAD   |
| 10 A           | 2.95-3.65 Vdc | 0.8-2.5 V      | 93%        | 0.995" x 0.62" x 0.354" (25.27 x 15.75 x 8.99)  | PTH03060WAD   |
| 10 A           | 4.5-5.5 Vdc   | 0.8-3.6 V      | 94%        | 0.995" x 0.62" x 0.354" (25.27 x 15.75 x 8.99)  | PTH05060WAD   |
| 10 A           | 10.8-13.2 Vdc | 0.8-1.8 V      | 88%        | 0.995" x 0.62" x 0.354" (25.27 x 15.75 x 8.99)  | PTH12060LAD   |
| 10 A           | 10.8-3.2 Vdc  | 1.2-5.5 V      | 94%        | 0.995" x 0.62" x 0.354" (25.27 x 15.75 x 8.99)  | PTH12060WAD   |
| 12 A           | 10.8-13.2 Vdc | 0.8-1.8 V      | 89%        | 1.370" x 0.62" x 0.354" (34.80 x 15.75 x 8.99)  | PTH12010LAD   |
| 12 A           | 10.8-13.2 Vdc | 1.2-5.5 V      | 94%        | 1.370" x 0.62" x 0.354" (34.80 x 15.75 x 8.99)  | PTH12010WAD   |
| 15 A           | 2.95-3.65 Vdc | 0.8-2.5 V      | 93%        | 1.370" x 0.62" x 0.354" (34.80 x 15.75 x 8.99)  | PTH03010WAD   |
| 15 A           | 4.5-5.5 Vdc   | 0.8-3.6 V      | 95%        | 1.370" x 0.62" x 0.354" (34.80 x 15.75 x 8.99)  | PTH05010WAD   |
| 16 A           | 10.8-13.2 Vdc | 0.8-1.8 V      | 87%        | 1.750" x 0.37" x 0.500" (44.45 x 9.4 x 12.7)    | PTV12020LAD   |
| 16 A           | 10.8-13.2 Vdc | 1.2-5.5 V      | 93%        | 1.750" x 0.37" x 0.500" (44.45 x 9.4 x 12.7)    | PTV12020WAD   |
| 18 A           | 2.95-3.6 Vdc  | 0.8-2.5 V      | 95%        | 1.750" x 0.37" x 0.500" (44.45 x 9.4 x 12.7)    | PTV03020WAD   |
| 18 A           | 4.5-5.5 Vdc   | 0.8-3.6 V      | 94%        | 1.750" x 0.37" x 0.500" (44.45 x 9.4 x 12.7)    | PTV05020WAD   |
| 18 A           | 10.8-13.2 Vdc | 0.8-1.8 V      | 89%        | 1.495" x 0.87" x 0.354" (37.97 x 22.01 x 8.99)  | PTH12020LAD   |
| 18 A           | 10.8-13.2 Vdc | 1.2-5.5 V      | 95%        | 1.495" x 0.87" x 0.354" (37.97 x 22.01 x 8.99)  | PTH12020WAD   |
| 22 A           | 2.95-3.65 Vdc | 0.8-2.5 V      | 95%        | 1.495" x 0.87" x 0.354" (37.97 x 22.01 x 8.99)  | PTH03020WAD   |
| 22 A           | 4.5-5.5 Vdc   | 0.8-3.6 V      | 96%        | 1.495" x 0.87" x 0.354" (37.97 x 22.01 x 8.99)  | PTH05020WAD   |
| 26 A           | 10.2-13.8 Vdc | 0.8-1.8 V      | 89%        | 1.37" x 1.12" x 0.354" (34.80 x 28.45 x 8.99)   | PTH12030LAD   |
| 26 A           | 10.2-13.8 Vdc | 1.2-5.5 V      | 95%        | 1.37" x 1.12" x 0.354" (34.80 x 28.45 x 8.99)   | PTH12030WAD   |
| 30 A           | 2.95-3.65 Vdc | 0.8-2.5 V      | 93%        | 1.37" x 1.12" x 0.354" (34.80 x 28.45 x 8.99)   | PTH03030WAD   |
| 30 A           | 4.5-5.5 Vdc   | 0.8-3.6 V      | 94%        | 1.37" x 1.12" x 0.354" (34.80 x 28.45 x 8.99)   | PTH05030WAD   |
| 50 A           | 8.0-14 Vdc    | 0.8-5.5 V      | 96%        | 2.045" x 1.045" x 0.357" (51.94 x 26.54 x 9.07) | PTH12040WAD   |
| 60 A           | 2.95-2.5 Vdc  | 0.8-2.5 V      | 96%        | 2.045" x 1.045" x 0.357" (51.94 x 26.54 x 9.07) | PTH04040WAD   |

\*Mounting Option Suffix:

D Horizontal through-hole (RoHS 6/6)

H Horizontal through-hole (RoHS 5/6)

S Surface-mount solder ball (RoHS 5/6)

Z Surface-mount solder ball (RoHS 6/6)





## Voltage Regulator Modules (VRM)

Emerson Network Power closely tracks leading semiconductor manufacturers' (Intel® and AMD) roadmaps and offer processor power converters designed specifically to match demands.

### Special Features

- Voltage regulator modules (VRMs) for both Intel and AMD64 microprocessors
- Input voltage ranges: 10.8-13.2 V , 11-12.6 V and 11-13.2 V
- Output currents up to 105 A
- Output voltage adjustability
- 5-bit and 6-bit VID inputs
- Allows dynamic VID code changes
- High efficiency up to 87%
- Exceptionally fast transient response in excess of 900 A/μs
- Remote on/off
- Differential remote sense
- Low profile to meet 1U applications
- Current sharing – no need for master/slave configurations
- Protection: overcurrent/short-circuit/overvoltage (with on-board fuse)
- International safety standard approvals – VDE



VRM10



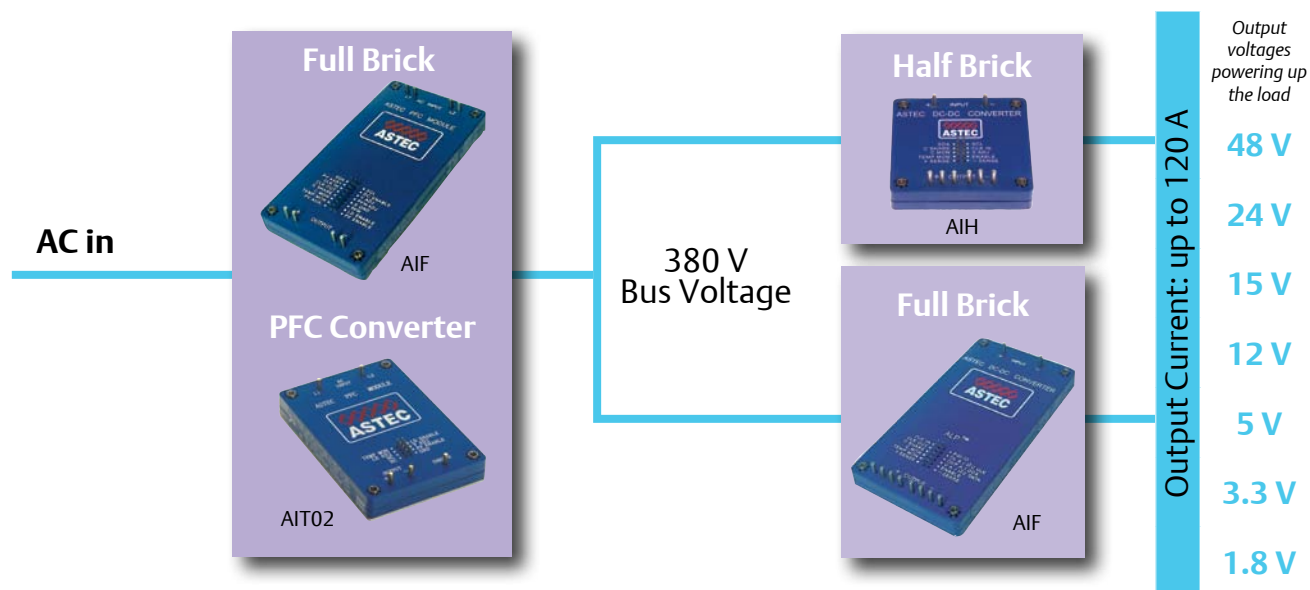
VRM64

### VRM Processor Non-Isolated DC-DC Converters

| VRM Specifications | Output Current | Input Voltage | Output Voltage | Efficiency | Package L x W x H (mm)                        | Model Number    |
|--------------------|----------------|---------------|----------------|------------|-----------------------------------------------|-----------------|
| AMD64              | <b>80 A</b>    | 10.8-13.2 Vdc | 0.8-1.55 V     | 84%        | 3.68" x 0.75 x 1.25" (93.47 x 19.05 x 31.75)  | VRM64-80-12-UY  |
| VRM10.0, VRM10.1   | <b>105 A</b>   | 11-12.6 Vdc   | 0.8375-1.60 V  | 84%        | 3.68" x 1.00" x 1.25" (93.35 x 25.4 x 31.75)  | VRM10-105-12-EJ |
| VRM10.0, VRM10.1   | <b>80 A</b>    | 11-12.6 Vdc   | 0.8375-1.60 V  | 85%        | 3.19" x 0.77" x 1.24" (81.03 x 19.78 x 31.75) | VRM10-80-12-PJ  |
| VRM10.0, VRM10.1   | <b>85 A</b>    | 11-12.6 Vdc   | 0.8375-1.60 V  | 85%        | 3.19" x 0.77" x 1.24" (81.03 x 19.78 x 31.75) | VRM10-85-12-UJ  |

# On-board AC-DC Distributed Architecture

- High power and high density AC-DC building blocks for quick-turn and modular power solutions
- Alternative power solutions vs. custom development approach
- No fans and high reliability (1M hours MTBF)
- Suitable for harsh temperature conditions (-40 °C startup/-20 °C to 100 °C operating temperature)



# Power Factor Correction (PFC)



## Special Features

- 1600 W/720 W/75 W
- Unity power factor
- Universal input and frequency range
- Positive and negative enable
- Paralleling with current share
- IEC 1000-3.2 compliance
- 100 °C baseplate
- Clock synch (in/out)
- Current monitoring
- Vout adjust
- On/off enable
- Remote sense
- 95% efficiency
- Fast transient response

| Vout                          | Iout   | Input Voltage | Package L x W x H (mm)                     | Efficiency | Model Number   |
|-------------------------------|--------|---------------|--------------------------------------------|------------|----------------|
| <b>PFC Module - Baseplate</b> |        |               |                                            |            |                |
| 380 V                         | 4.2 A  | 85-264 Vac    | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 95%        | AIF04ZPFC-01L  |
| 380 V                         | 4.2 A  | 85-264 Vac    | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 95%        | AIF04ZPFC-02L  |
| <b>NEW!</b> 393 V             | 0.25 A | 100-122 Vac   | 2.3" x 1.45" x 0.5" (57.91 x 36.83 x 12.7) | 90%        | AIQ00ZPFC-01NL |
| 393 V                         | 2.08 A | 85-264 Vac    | 3.5" x 2.4" x 0.5" (88.9 x 60.96 x 12.7)   | 93%        | AIT02ZPFC-01NL |
| <b>NEW!</b> 393 V             | 0.35 A | 100-122 Vac   | 3.5" x 2.4" x 0.5" (88.9 x 60.96 x 12.7)   | 91%        | AIT00ZPFC-01NL |

# High Power 300 Vin



300 V input 65-600 W output

## Special Features

- 300 V input (250-420 V PFC-ready)
- 2nd generation product
- Standard through-hole termination
- Power density >100 W/in<sup>3</sup>
- 100 °C max baseplate operating temperature
- Embedded controls on secondary side (Full- and Half-brick):
  - Temp monitor
  - Current sharing
  - Power good signal
  - Current limit & OVP adjust

|                    | Vout                                   | Iout        | Input Voltage     | Package L x W x H (mm)                     | Efficiency | Model Number |
|--------------------|----------------------------------------|-------------|-------------------|--------------------------------------------|------------|--------------|
| <b>AIF 300 Vin</b> | <b>Full-Brick – Baseplate</b>          |             |                   |                                            |            |              |
|                    | 1.8 V                                  | 120 A       | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 80%        | AIF120Y300-L |
|                    | 3.3 V                                  | 120 A       | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 87%        | AIF120F300-L |
|                    | 5 V                                    | 80 A        | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | AIF80A300-L  |
|                    | 12 V                                   | 50 A        | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | AIF50B300-L  |
|                    | 15 V                                   | 40 A        | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | AIF40C300-L  |
|                    | 24 V                                   | 25 A        | 300 V (250-420 V) | 4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7) | 90%        | AIF25H300-L  |
| <b>AIT 300 Vin</b> | <b>Three-Quarter-Brick – Baseplate</b> |             |                   |                                            |            |              |
|                    | <b>NEW!</b> 28 V/3.3 V                 | 3.9 A/4.5 A | 390 V (375-410 V) | 3.6" x 2.4" x 0.5" (91.44 x 60.96 x 12.7)  | 87%        | AIT04RF300-L |
| <b>AIH 300 Vin</b> | <b>Half-Brick – Baseplate</b>          |             |                   |                                            |            |              |
|                    | 1.8 V                                  | 50 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 80%        | AIH50Y300-L  |
|                    | 3.3 V                                  | 50 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 85%        | AIH50F300-L  |
|                    | 5 V                                    | 40 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 88%        | AIH40A300-L  |
|                    | 12 V                                   | 20 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 90%        | AIH20B300-L  |
|                    | 15 V                                   | 16 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 90%        | AIH16C300-L  |
|                    | 24 V                                   | 10 A        | 300 V (250-420 V) | 2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)  | 90%        | AIH10H300-L  |
| <b>AIQ 300 Vin</b> | <b>Quarter-Brick – Baseplate</b>       |             |                   |                                            |            |              |
|                    | <b>NEW!</b> 28 V                       | 2.32 A      | 300 V (250-420 V) | 2.3" x 1.45" x 0.5" (57.91 x 36.83 x 12.7) | 89%        | AIQ02R300L   |

## BXA Low Power



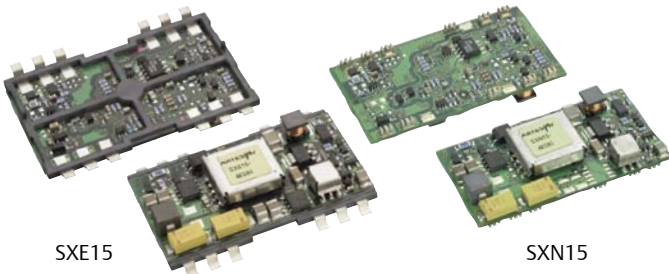
BXA30

### Special Features

- Input voltages, 18-36 V, 36-75 V
- Single and dual outputs
- Power 3-40 W
- Regulated outputs
- Operating temperature -40 °C to 105 °C (ambient with derating)
- Protection: overcurrent/short-circuit
- 500-1500 Vdc isolation
- Enclosed and baseplate models
- UL, CSA and VDE safety approvals

|             | Input Voltage    | Output Voltage | Package L x W x H (mm)                        | I/O Isolation | Efficiency | Model Number    |
|-------------|------------------|----------------|-----------------------------------------------|---------------|------------|-----------------|
| <b>3 W</b>  | <b>Enclosed</b>  |                |                                               |               |            |                 |
|             | 18-36 V          | 5 V @ 0.5 A    | 1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)   | 500 V         | 76%        | BXA3-24S05J     |
|             | 36-75 V          | 5 V @ 0.5 A    | 1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)   | 500 V         | 76%        | BXA3-48S05J     |
|             | 36-75 V          | 15 V @ 0.2 A   | 1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)   | 500 V         | 76%        | BXA3-48S15J     |
| <b>25 W</b> | <b>Baseplate</b> |                |                                               |               |            |                 |
|             | 36-75 V          | 5 V @ 5 A      | 3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21) | 1500 V        | 80%        | BXA30-48S05J    |
| <b>30 W</b> | <b>Baseplate</b> |                |                                               |               |            |                 |
|             | 36-75 V          | 15 V @ 2 A     | 3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21) | 1500 V        | 87%        | BXA30-48S15J    |
|             | 36-75 V          | 5 V @ ±2.5 A   | 3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21) | 1500 V        | 80%        | BXA30-48D05-FJ  |
|             | 36-75 V          | 12 V @ ±1.25 A | 3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21) | 1500 V        | 84%        | BXA30-48D12J    |
|             | 36-75 V          | 15 V @ ±1.0 A  | 3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21) | 1500 V        | 86%        | BXA30-48D15J    |
| <b>40 W</b> | <b>Baseplate</b> |                |                                               |               |            |                 |
|             | 18-36 V          | 3.3 V @ 7 A    | 2.20" x 2.2" x 0.5" (55.88 x 55.88 x 12.70)   | 1500 V        | 75%        | BXA40-24S3V3-MJ |
|             | 36-75 V          | 12 V @ 3.3 A   | 2.20" x 2.2" x 0.5" (55.88 x 55.88 x 12.70)   | 1500 V        | 87%        | BXA40-48S12-MJ  |

## SXE & SXN Low Power



SXE15

SXN15

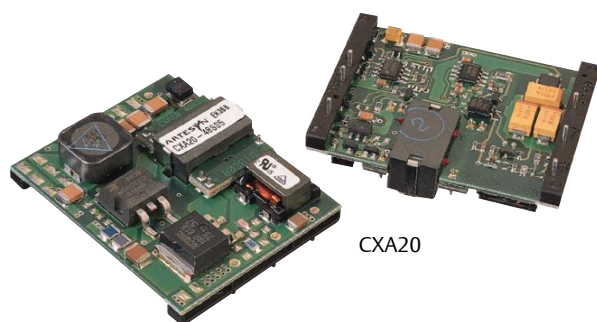
### Special Features

- Input voltages 33-75 Vdc
- Single and dual outputs
- Power 10.8-15 W
- Regulated outputs
- High efficiency topology – 87% @ 5 Vdc
- Remote on/off
- ±10% output voltage trim
- Operating temperature -40 °C to 70 °C (ambient)
- Protection: overcurrent/short-circuit/overvoltage
- 1500 Vdc isolation
- UL, CSA & VDE safety approvals
- Surface-mount

|             | Input Voltage                      | Output Voltage                | Package L x W x H (mm)                      | I/O Isolation | Efficiency | Model Number       |
|-------------|------------------------------------|-------------------------------|---------------------------------------------|---------------|------------|--------------------|
| <b>15 W</b> | <b>Open-frame Surface-mounting</b> |                               |                                             |               |            |                    |
|             | 33-75 V                            | 5 V @ 3 A                     | 1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64) | 1500 V        | 87%        | SXE15-48S05-RJ     |
|             | 33-75 V                            | 12 V @ 1.25 A                 | 1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64) | 1500 V        | 85%        | SXE15-48S12-RJ     |
|             | 33-75 V                            | 1.8 V @ 6 A                   | 1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64) | 1500 V        | 83%        | SXE15-48S1V8-RJ    |
|             | 33-75 V                            | 2.5 V @ 6 A                   | 1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64) | 1500 V        | 85%        | SXE15-48S2V5-RJ    |
|             | 33-75 V                            | 3.3 V @ 4.5 A                 | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 86%        | SXE15-48S3V3-RJ    |
|             | 33-75 V                            | 5 V @ 3 A                     | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 87%        | SXN15-48S05-RJ     |
|             | 33-75 V                            | 1.8 V @ 6 A                   | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 85%        | SXN15-48S1V8-RJ    |
|             | 33-75 V                            | 2.5 V @ 6 A                   | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 85%        | SXN15-48S2V5-RJ    |
|             | 33-75 V                            | 3.3 V @ 4.5 A                 | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 86%        | SXN15-48S3V3-RJ    |
|             | 33-75 V                            | 5 V @ 3 A & 3.3 V @ 4.5 A     | 1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64) | 1500 V        | 86%        | SXE15-48D05-3V3-RJ |
|             | 33-75 V                            | 3.3 V @ 3.5 A & 2.5 V @ 4.5 A | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 85%        | SXN15-48D3V3-2V5RJ |
|             | 33-75 V                            | 5 V @ 3 A & 3.3 V @ 4.5 A     | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 86%        | SXN15-48D05-3V3-RJ |
|             | 33-75 V                            | 3.3 V @ 3.5 A & 2.5 V @ 4.5 A | 1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64) | 1500 V        | 85%        | SXN15-48D3V3-2V5RJ |



# CXA Low Power



CXA20

## Special Features

- 4:1 input voltage range, 18-75 V
- Single and dual outputs
- Power 20 W
- Regulated outputs
- Remote on/off
- $\pm 10\%$  output voltage trim
- Operating temperature  $-40^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  (ambient)
- Protection: overcurrent/short-circuit/overvoltage
- Basic insulation, 1500 Vdc
- UL, CSA & VDE safety approvals

|             | Input Voltage     | Output Voltage      | Package L x W x H (mm)                    | I/O Isolation | Efficiency | Model Number  |
|-------------|-------------------|---------------------|-------------------------------------------|---------------|------------|---------------|
| <b>10 W</b> | <b>Open-frame</b> |                     |                                           |               |            |               |
|             | 18-75 V           | 5 V @ 2 A           | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 81%        | CXA10-48S05J  |
|             | 18-75 V           | 12 V @ 0.83 A       | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 83%        | CXA10-48S12J  |
|             | 18-75 V           | 3.3 V @ 2.4 A       | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 78%        | CXA10-48S3V3J |
|             | 18-75 V           | 5 V @ $\pm 1.0$ A   | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 81%        | CXA10-48D05J  |
|             | 18-75 V           | 12 V @ $\pm 0.41$ A | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 83%        | CXA10-48D12J  |
| <b>20 W</b> | 18-75 V           | 15 V @ $\pm 0.33$ A | 2" x 1" x 0.39" (50.80 x 25.40 x 10.00)   | 1500 V        | 81%        | CXA10-48D15J  |
|             | <b>Open-frame</b> |                     |                                           |               |            |               |
|             | 18-75 V           | 5 V @ 4 A           | 2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41) | 1500 V        | 83%        | CXA20-48S05J  |
|             | 18-75 V           | 12 V @ 1.66 A       | 2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41) | 1500 V        | 83%        | CXA20-48S12J  |
|             | 18-75 V           | 3.3 V @ 6 A         | 2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41) | 1500 V        | 80%        | CXA20-48S3V3J |
|             | 18-75 V           | 5 V @ $\pm 2.0$ A   | 2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41) | 1500 V        | 84%        | CXA20-48D05J  |
|             | 18-75 V           | 12 V @ $\pm 0.83$ A | 2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41) | 1500 V        | 84%        | CXA20-48D12J  |



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**SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS OR SOFTWARE PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.** The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use, revenue, reputation and data, costs incurred, including without limitation, for capital, fuel, power and loss or damage to property or equipment.

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**7. PATENTS AND COPYRIGHTS:** Subject to the limitations of the second paragraph of Section 6, Seller warrants that the Goods sold, except as are made specifically for Buyer according to Buyer's specifications, do not infringe any valid U.S. patent or copyright in existence as of the date of shipment. This warranty is given upon the condition that Buyer promptly notifies Seller of any claim or suit involving Buyer in which such infringement is alleged and cooperates fully with Seller and permits Seller to control completely the defense, settlement or compromise of any such allegation of infringement. Seller's warranty as to utility patents only applies to infringement arising solely out of the inherent operation according to Seller's specifications and instructions of such Goods. In the event such Goods are held to infringe such a U.S. patent or copyright in such suit, and the use of such Goods is enjoined, or in the case of a compromise or settlement by Seller, Seller shall have the right, at its option

# Terms and Conditions

and expense, to procure for Buyer the right to continue using such Goods, or replace them with non-infringing Goods, or modify same to become non-infringing, or grant Buyer a credit for the depreciated value of such Goods and accept return of them. In the event of the foregoing, Seller may also, at its option, cancel the agreement as to future deliveries of such Goods, without liability.

**8. EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to acts of God; acts of Buyer; war; fire; flood; weather; sabotage; epidemics; strikes or labor disputes; civil disturbances or riots; governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances or any events or causes beyond Seller's reasonable control. Deliveries or other performance may be suspended for an appropriate period of time or canceled by Seller upon notice to Buyer in the event of any of the foregoing, but the balance of the agreement shall otherwise remain unaffected as a result of the foregoing.

If Seller determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth in the preceding paragraph, Seller may allocate its available supply of the Goods or such material (without obligation to acquire other supplies of any such Goods or material) among its purchasers on such basis as Seller determines to be equitable without liability for any failure of performance which may result therefrom.

**9. RESCHEDULE/CANCELLATION:** Unless otherwise agreed in writing by Seller, orders under this agreement may not be rescheduled or canceled by Buyer for any reason.

**10. CHANGES:** Buyer may request changes or additions to the Goods and/or Software consistent with Seller's specifications and criteria. In the event such changes or additions are accepted by Seller, Seller may revise the price, license fees and dates of delivery.

Seller reserves the right to change designs and specifications for the Goods and/or Software without prior notice to Buyer, except with respect to Goods and/or Software being made to order for Buyer. Seller shall have no obligation to install or make such change in any Goods and/or Software manufactured prior to the date of such change.

**11. NUCLEAR/MEDICAL: GOODS AND SOFTWARE SOLD HEREUNDER ARE NOT FOR USE IN CONNECTION WITH ANY NUCLEAR, MEDICAL, LIFE-SUPPORT AND OTHER HIGH RISK APPLICATIONS WHERE GOODS OR SOFTWARE FAILURE COULD LEAD TO LOSS OF LIFE OR CATASTROPHIC PROPERTY DAMAGE.** Buyer accepts Goods and Software with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchasers or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

**12. ASSIGNMENT:** Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of Seller, and any such assignment, without such consent, shall be void.

**13. SOFTWARE:** Notwithstanding any other provision herein to the contrary, Seller or applicable third party licensor to Seller shall retain all rights of ownership and title in its respective Software, including without limitation all rights of ownership and title in its respective copies of such Software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, non-transferable royalty free license to use the Software incorporated into the Goods solely for purposes of Buyer properly utilizing such Goods purchased from Seller. All other Software shall be furnished to, and used by, Buyer only after execution of Seller's (or the licensor's) applicable standard license agreement, the terms of which are incorporated herein by reference. The Software is Seller's own or Seller's supplier's proprietary information, and Buyer and its employees and agents shall not disclose the Software to others without Seller's prior written consent.

**14. TOOLING:** Tool, die, and pattern charges, if any, are in addition to the price of the Goods and are due and payable upon completion of the tooling. All such tools, dies and patterns shall be and remain the property of Seller. Charges for tools, dies, and patterns do not convey to Buyer, title, ownership interest in, or rights to possession or removal, or prevent their use by Seller for other purchasers, except as otherwise expressly provided by Seller and Buyer in writing with reference to this provision.

**15. INTELLECTUAL PROPERTY:** Seller's intellectual property, including without limitation, all patents, copyrights, trade secrets, trade-dress and any other intellectual property of any kind (including without limitation, that which exists in the underlying technology), furnished by Seller to Buyer in connection with this agreement is the property of Seller and Seller retains all rights, including without limitation, exclusive rights of use, licensing, and sale. Possession of Goods, pre-production units, specifications, prints or drawings, or any other materials does not convey to Buyer any rights or license thereto.

**16. BUYER'S COMPLIANCE WITH LAWS:** In connection with the transactions contemplated by this agreement, Buyer is familiar with and shall fully comply with all applicable laws, regulations, rules and other requirements of the United States and of any applicable state, foreign and local governmental body in connection with the purchase, license, receipt, use, transfer and disposal of the Goods and/or Software.

**17. EXPORT/IMPORT:** Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which Goods and/or Software may be supplied, will apply to their receipt and use. In no event shall Buyer use, transfer, release, import, export, Goods and/or Software in violation of such applicable laws, regulations, orders or requirements.

**18. GOVERNMENT CONTRACT CONDITIONS:** In the event Buyer supplies Goods or Software to the U.S. Government or to a prime contractor selling to the U.S. Government, the following Federal Acquisition Regulation (FAR) clauses are accepted by Seller and are made part of this agreement applicable to such supply: 52.222-21 Prohibition of Segregated Facilities; 52.222-26 Equal Opportunity; 52.222-35 Equal Opportunity For Special Disabled Veterans, Veterans of Vietnam Era, and Other Eligible Veterans; 52.222-36 Affirmative Action For Workers with Disabilities; and 52.219-8 Utilization of Small Business Concerns. No additional FAR or FAR Supplement clauses are accepted by Seller. In the event Buyer elects to sell Goods or Software to the U.S. Government or any national, state, provincial or local non-U.S. governmental entity or to a prime contractor selling to such entities, Buyer does so solely at its own option and risk, and agrees not to obligate Seller as a sub-contractor or otherwise to the U.S. Government or other governmental entity except as described in this Section 18. Buyer remains solely and exclusively responsible for compliance with all statutes and regulations governing sales to the U.S. Government or any national, state, provincial or local non-U.S. governmental entity. Seller makes no representations, certifications or warranties whatsoever with respect to the ability of its Goods, Software, or prices to satisfy any such statutes and regulations.

**19. GENERAL PROVISIONS:** These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter of these terms and conditions. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon the Seller unless made in writing and signed on its behalf by a duly authorized representative of Seller. No conditions, usage of trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification or additional terms shall be applicable to this agreement by Seller's receipt, acknowledgment, or acceptance of purchase orders, shipping instruction forms, or other documentation containing terms at variance with or in addition to those set forth herein. Any such modifications or additional terms are specifically rejected and deemed a material alteration hereof. If this document shall be deemed an acceptance of a prior offer by Buyer, such acceptance is expressly conditional upon Buyer's assent to any additional or different terms set forth herein. No waiver by either party with respect to any breach or default or of any right or remedy, and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. All typographical or clerical errors made by Seller in any quotation, acknowledgment or publication are subject to correction. In the event that any provision or portion thereof contained in the Contract is held to be unenforceable, the Contract shall be construed without such provision or portion thereof.

(A) If Seller is a U.S. incorporated entity: This Agreement shall be governed by the laws of the State of Delaware, U.S.A., without reference to its choice or conflict of laws principles. The parties agree to submit to the exclusive jurisdiction of the courts of the State of Delaware for all actions arising in connection herewith.

(B) If Seller is a European incorporated entity: This Agreement shall be governed by the laws of England. Any dispute arising out of or in connection with this Agreement that cannot be resolved through friendly consultation shall be referred to and finally resolved by arbitration in London, England before the London Court of International Arbitration in accordance with its arbitration rules. The arbitral award shall be final and binding on the parties.

(C) If Seller is an entity incorporated in the Asia Pacific region: This Agreement shall be governed by the laws of the Hong Kong Special Administrative Region of the People's Republic of China. Any dispute arising out of or in connection with this Agreement that cannot be resolved through friendly consultation shall be referred to and finally resolved by arbitration in Hong Kong before the Hong Kong International Arbitration Centre in accordance with its arbitration rules. The arbitral award shall be final and binding on the parties.

(D) No action, regardless of form, arising out of transactions relating to this agreement, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

Revised July 8, 2010



## Technology Index

| Section               | Page             | Section                           | Page               | Section                               | Page           |
|-----------------------|------------------|-----------------------------------|--------------------|---------------------------------------|----------------|
| <b>Low Power</b>      |                  | <b>Micro Medium Power</b>         |                    | <b>Industry Standard Non-Isolated</b> |                |
| LCC                   | 13, 14           | μMP                               | 23, 24             | APA                                   | 56             |
| LCT                   | 8                | <b>Medium Power</b>               |                    | APC                                   | 56             |
| LPQ                   | 11, 12           | MP                                | 25, 26             | LDO                                   | 54             |
| LPS                   | 8, 9, 10, 11, 12 | <b>Intelligent Medium Power</b>   |                    | LGA                                   | 55             |
| LPT                   | 8, 9, 10, 11     | iMP                               | 27, 28, 29         | PTH                                   | 58, 59         |
| NLP                   | 8, 10, 12        | <b>Intelligent High Power</b>     |                    | PTV                                   | 59             |
| NPS                   | 8, 9             | iVS                               | 30, 31, 32         | SIL                                   | 53, 54, 56     |
| NTQ                   | 10, 11           | <b>Bulk Power</b>                 |                    | SMT                                   | 53, 54, 56, 57 |
| NTS                   | 12               | HPR                               | 36                 | VRM                                   | 60             |
| TLP                   | 11               | HPS                               | 35, 36             | <b>High Power</b>                     |                |
| <b>External Power</b> |                  | LCM                               | 33, 34             | AIF                                   | 62             |
| AD                    | 16, 17           | UFE                               | 35, 36, 37         | AIH                                   | 62             |
| DA                    | 15, 16           | <b>Distributed Power</b>          |                    | AIQ                                   | 62             |
| DCH                   | 15               | DS                                | 38, 39, 40, 41, 42 | AIT                                   | 62             |
| DP                    | 16               | <b>Din Rail</b>                   |                    | BXA                                   | 63             |
| DPS                   | 17               | ADN                               | 43, 44             | CXA                                   | 64             |
| DPT                   | 17               | <b>Industry Standard Isolated</b> |                    | SXE                                   | 63             |
| <b>Medical Power</b>  |                  | AEO                               | 48                 | SXN                                   | 63             |
| AD                    | 21               | AEQ                               | 49                 |                                       |                |
| DA                    | 21               | ALD                               | 47                 |                                       |                |
| DPS                   | 21               | ALO                               | 48                 |                                       |                |
| DPT                   | 21               | ALQ                               | 49                 |                                       |                |
| iMP                   | 20               | AVQ                               | 49                 |                                       |                |
| iVS                   | 20               | BXB                               | 51                 |                                       |                |
| LCC                   | 20               | EXB                               | 51, 52             |                                       |                |
| LCM                   | 20               | EXQ                               | 50                 |                                       |                |
| μMP                   | 20               | LES                               | 48                 |                                       |                |
| LPQ                   | 20               | LQD                               | 50                 |                                       |                |
| LPS                   | 18, 19, 20       | LQS                               | 49                 |                                       |                |
| LPT                   | 18, 19           | RFB                               | 52                 |                                       |                |
| NLP                   | 19, 20           | RFF                               | 52                 |                                       |                |
| NPS                   | 18, 19           |                                   |                    |                                       |                |
| NTS                   | 20               |                                   |                    |                                       |                |
| TLP                   | 19               |                                   |                    |                                       |                |
| <b>LED Drivers</b>    |                  |                                   |                    |                                       |                |
| LDS                   | 22               |                                   |                    |                                       |                |



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