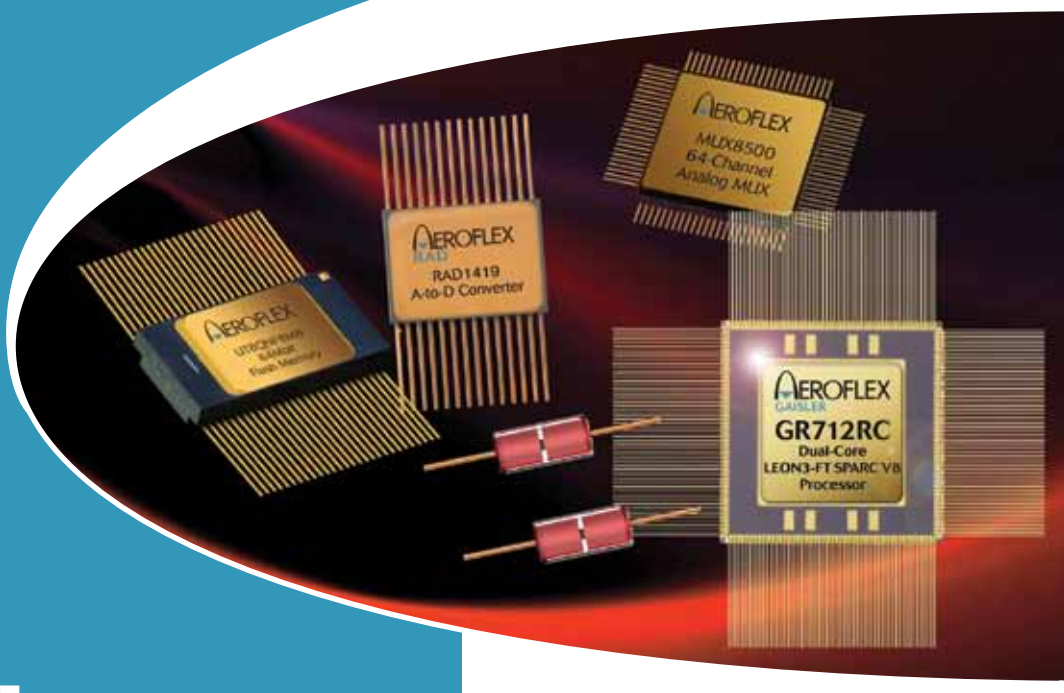
AEROFLEX

A passion for performance.

Aeroflex Microelectronic Solutions

Digital,
Analog,
Power,
RFMW,
Motion…Solutions

for HiRel Applications



Product Short Form

January 2012

Aeroflex Microelectronic Solutions Product Short Form

Aeroflex Microelectronic Solutions is comprised of ten divisions – Colorado Springs, Gaisler, Motion Control, Plainview, RAD, RFMW (ACC, Inmet, Metelics, Nanjing, Weinschel) – offering digital, analog, power, RFMW and Motion Solutions for HiRel Applications with their standard and custom ASIC integrated circuits, Circuit Card Assembly, IP and Radiation Effects Testing.

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Standard Products for HiRel Applications

1553 Databus

aeroflex.com/databus
aeroflex.com/avionics

	MIL-STD-1553B	MIL-STD-1773	Multi-Protocol	±15V*	+12V*	+5V	Int. Transceiver	Bus Controller	Remote Terminal	Monitor	Dual Redundant	8-bit I/O	16-bit I/O	Internal RAM	Flatpack	Pin Grid Array	LCC	Application Options	QML Q & V	SMD #
UT69151 SμMMIT™ E	■	■				■		■	■	■	■		■		132	84		HR1, AV	Q,V	5962-92118
UT69151 SμMMIT™ LXE	■			■	■		■	■	■	■	■		■		100	96		HR2, AV	Q,V	5962-94663
UT69151 SμMMIT™ DXE	■					■	■	■	■	■	■		■		100	96		HR1, AV	Q,V	5962-94663
UT69151 SμMMIT™ XTE	■			■	■	■	■	■	■	■	■	■	■	■	140	139		AV	Q	5962-94758
UT69151 SμMMIT™ RTE	■					■	■		■		■	■	■	■	132, 140	139		AV	Q	5962-98587
UT1553B BCRT	■	■				■		■	■		■		■		132	84	84	AV	Q,V	5962-88628
UT1553B BCRTM	■	■				■		■	■	■	■		■		84	84	84	AV	Q,V	5962-89577
UT1553 BCRTMP	■	■	■			■		■	■		■		■		132	144		AV	Q	5962-89501
UT1553B RTI	■	■				■			■		■		■		84			AV		M38510/55501
UT1553 RTMP	■	■	■			■			■		■		■		84	84	84	AV	Q	5962-88645
UT1553B RTR	■	■				■			■		■		■	■		68		AV	Q	5962-89576
UT1760A RTS	■	■				■			■		■		■	■		68		AV	Q	5962-89575

* End of Life (EOL) for +15V and +12V.

1553/RS485 Transceivers

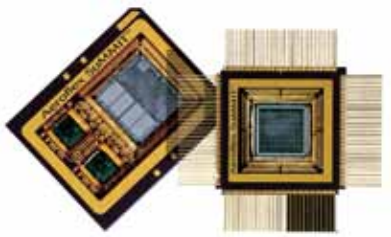
aeroflex.com/transceivers
aeroflex.com/avionics

	RS-485	MIL-STD-1553B	±15V*	+5V	+3V	Dual Redundant	Total Dose krads(Si)	Package	Application Options	QML Q & V	SMD #
UT63M147 Bus Transceiver		■		■		■	100	24 FP	HR3	Q,V	5962-93226
UT63M1XX Bus Transceiver*		■ 1553A	■	■		■	100	36 FP	AV	Q,V	5962-88644
UT63M143 Bus Transceiver		■			■	■	100	24 FP	HR3	Q,V	5962-07242
ACT4453 Dual Transceiver				■			100	36 FP		H,K	5962-89522
DRS4485 RS485/422 Dual Transceiver	■			■		■	100	18 FP		K	5962-09226

* End of Life (EOL) for UT63M1XX Bus Transceiver.

Application Options

	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per bit	Latch-Up Immune MeV - cm^2/mg
HR1	300*	42	1.5E-4	>128
HR2	100*	42	1.5E-4	>128
HR3	1000*	**	**	>111
AV	N/A	N/A	N/A	N/A



* Maximum tolerance for product. Reduced tolerance products may be available.
** Device has no memory storage elements to upset.

Standard Products for HiRel Applications

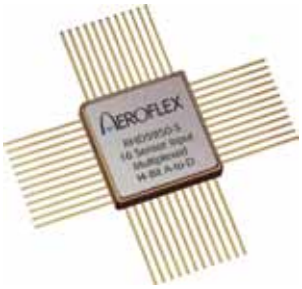
Analog-to-Digital Converters
aeroflex.com/AtoD

	Description	Total Dose krads(Si)	Latch-Up Immune MeV - cm²/mg	Voltage (V)	Package	Class S	QML Q & V	SMD #
RAD1419	800ksps, 14-bit sampling analog-to-digital converter	100	55	±5V	28 FP	S	N/A	
UT14AD20P	14-bit, 20-MSps pipeline analog-to-digital converter	300	120	1.8/3.3V	100 CQFP		Q,V*	TBD
UT16AD40P †	16-bit, 40-MSps pipeline analog-to-digital converter	300	120	1.8/3.3V	100 CQFP		Q,V*	TBD
UT16AD40DC †	16-bit, 40-MSps pipeline analog-to-digital converter for DC Inputs	300	120	1.8/3.3V	100 CQFP		Q,V*	TBD
UT16AD80P †	16-bit, 80-MSps pipeline analog-to-digital converter	300	120	1.8/3.3V	100 CQFP		Q,V*	TBD

† Product in development. Please call 800-645-8862 for more information or visit the web site aeroflex.com/HiRel.
* QML V pending.

Multiplexed Analog-to-Digital Converters
aeroflex.com/AtoD

	Description	Package	SMD #
	Single power supply operation: 3.3V to 5V Radiation performance: CMOS ELDRS Immune Total dose > 1 Mrad(Si) SEL Immune > 100 MeV-cm²/mg Displacement Damage > 10^{14} neutrons/cm²		
RHD5950	The RHD5950 takes 16 analog sensor signals and using 4 address inputs and an enable input, selects one of the 16 analog inputs and converts the signal to 14 digital output bits. The 14-bit digital output has a tri-state control allowing the connection of multiple RHD5950s. This provides very high level of telemetry integration interfacing many sensor voltage readings to the digital processor data bus.	48 CQFP	5962-1220301KXC



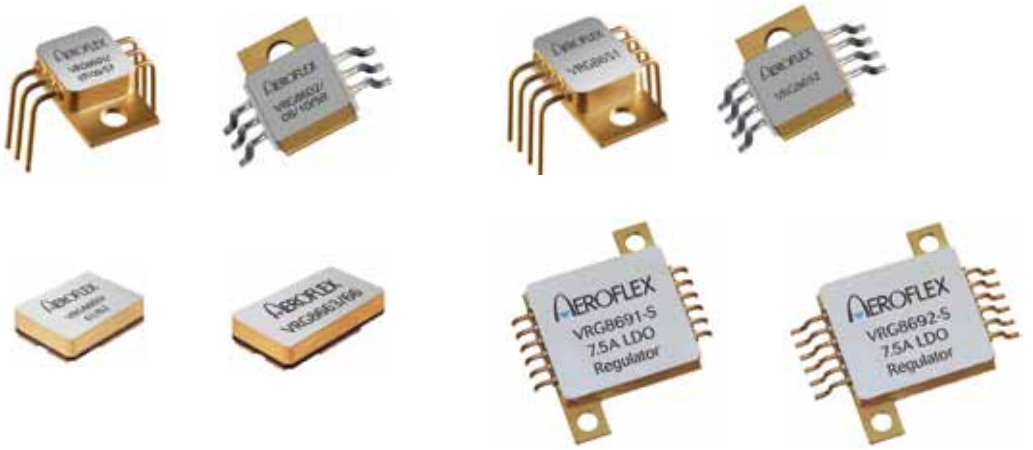
Digital-to-Analog Converters
aeroflex.com/AtoD

	Description	Package	SMD #
	Single power supply operation: 3.3V to 5V Radiation performance: CMOS ELDRS Immune Total dose > 1 Mrad(Si) SEL Immune > 100 MeV-cm²/mg Displacement Damage > 10^{14} neutrons/cm²		
RHD5930	Digital to Analog Converter, 11-bit, ladder output	16 SOIC	5962-1120801KXC
RHD5931	Digital to Analog Converter, 11-bit, buffered output	16 SOIC	5962-1120802KXC

Adjustable Voltage Regulators

aeroflex.com/VoltReg

	Total # Regulators	LDO Regulator Dropout Voltage	# Positive Regulators	Positive Voltage Range (V)	# Negative Regulators	Negative Voltage Range (V)	Positive Output Current (A)	Negative Output Current (A)	Total Dose krads(Si)	Package	Package Size L x W x H (inches)	Thru-Hole	Surface Mount	# Leads	SMD #
VRG8601	2		1	1.2 to 37	1	-1.2 to -27	1.5	1.5	100	TO-257	0.65x0.42x0.220	■		6	5962-0521901KXC
VRG8602	2		1	1.2 to 37	1	-1.2 to -27	1.5	1.5	100	TO-257	0.65x0.42x0.220		■	6	5962-0521901KYC
VRG8607	2		2	1.2 to 37			1.5	1.5	100	TO-257	0.65x0.42x0.220	■		6	5962-0521903KXC
VRG8608	2		2	1.2 to 37			1.5	1.5	100	TO-257	0.65x0.42x 0.220		■	6	5962-0521903KYC
VRG8609	2				2	-1.2 to -27	1.5	1.5	100	TO-257	0.65x0.42x0.220	■		6	5962-0521904KXC
VRG8610	2				2	-1.2 to -27	1.5	1.5	100	TO-257	0.65x0.42x 0.220		■	6	5962-0521904KYC
VRG8651	2	1.30	1	1.3 to 23	1	-2.5 to -25	1.0	3.0	100	TO-257	0.75x0.42x0.220	■		8	5962-0920101KUC
VRG8652	2	1.30	1	1.3 to 23	1	-2.5 to -25	1.0	3.0	100	TO-257	0.75x0.42x0.220		■	8	5962-0920101KZC
VRG8653	2	1.60	1	1.3 to 30	1	-2.5 to -25	3.0	3.0	100	TO-257	0.75x0.42x0.220	■		8	5962-1021301KUC
VRG8654	2	1.60	1	1.3 to 30	1	-2.5 to -25	3.0	3.0	100	TO-257	0.75x0.42x0.220		■	8	5962-1021301KZC
VRG8657	2	1.30	2	1.3 to 23			1.0		100	TO-257	0.65x0.42x0.220	■		6	5962-0920102KXC
VRG8658	2	1.30	2	1.3 to 23			1.0		100	TO-257	0.65x0.42x0.220		■	6	5962-0920102KYC
VRG8660	1		1	1.2 to 37			1.5		100	SMD-0.5	0.40x0.30x0.130		■	3	5962-0920601KXC
VRG8661	1				1	-1.2 to -27		1.5	100	SMD-0.5	0.40x0.30x0.130		■	3	5962-0920602KXC
VRG8662	1	1.30	1	1.3 to 23			1.0		100	SMD-0.5	0.40x0.30x0.130		■	3	5962-0920701KXC
VRG8663	1	1.05			1	-2.5 to -25		3.0	100	SMD	0.55x0.30x0.130		■	5	5962-0920702KYC
VRG8666	1	0.50	1	0.1 to 34			1.0		100	SMD	0.55x0.30x0.130		■	5	5962-1120502KXC
VRG8684	1	1.60	1	1.3 to 30			3.0		100	SMD-0.5	0.40x0.30x0.130		■	3	5962-0924501KXC
VRG8687	2	1.60	2	1.3 to 30			3.0		100	TO-257	0.75x0.42x0.220	■		8	5962-1021302KUC
VRG8688	2	1.60	2	1.3 to 30			3.0		100	TO-257	0.75x0.42x0.220		■	8	5962-1021302KZC
VRG8691	1	0.50	1	1.0 to 3.3			7.5		100	Power	0.90x1.00x0.220	■		12	5962-0923701KXC
VRG8692	1	0.50	1	1.0 to 3.3			7.5		100	Power	0.90x1.00x0.220		■	12	5962-0923701KYC



Standard Products for HiRel Applications

Analog Multiplexer Modules

aeroflex.com/Mux

	Total Channels	Common	Kelvin Measurement	Transorb Input ESD Protection	# Address Busses	# Enable Lines	V+	V-	V_{DIG}	RDSon (Ω Typical)	Access Time (ns Typical)	Input Range Min(V)	Input Range Max(V)	Total Dose krads(Si)	SEL: LET_{TH} MeV - cm^2/mg	Package	SMD #
RHD5928 *	8	8			1	1	+5V	GND	N/A	<750	150	0V	+5V	1000	100	16 SOIC	Pending
MUX8520	16	16		■	1	1	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	56 CQFP	5962-0922901KXC
MUX8530	16	16		■	1	1	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	56 CQFP	5962-0923001KXC
MUX8560 *	16	16			1	1	+5V	GND	+5V	<2000	<500			300	90	56 CQFP	5962-1021001KXC
RHD5920 *	16	16			1	1	+5V	GND	N/A	<750	150	0V	+5V	1000	100	24 SOIC	5962-1024301KXC
RHD5921 * Buffered	16	16			1	1	+5V	GND	N/A	N/A	<2000	0V	+5V	1000	100	24 SOIC	5962-1024302KXC
RHD5922 * Sample/Hold	16	16			1	1	+5V	GND	N/A	N/A	<5000	0V	+5V	1000	100	24 SOIC	5962-1024303KXC
MUX8521	16		16	■	1	1	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	56 CQFP	5962-0922902KXC
MUX8531	16		16	■	1	1	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	56 CQFP	5962-0923002KXC
MUX8561 *	16		16		1	1	+5V	GND	+5V	<2000	<500			300	90	56 CQFP	5962-1021002KXC
MUX8522	32	32			2	2	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	56 CQFP	5962-0922903KXC
MUX8523	32	32		■	2	2	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	56 CQFP	5962-0922904KXC
MUX8532	32	32			2	2	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	56 CQFP	5962-0923003KXC
MUX8533	32	32		■	2	2	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	56 CQFP	5962-0923004KXC
MUX8562 *	32	32			2	2	+5V	GND	+5V	<2000	<500			300	90	56 CQFP	5962-1020901KXC
RHD8544 *	32	32			2	2	+5V	GND	N/A	<750	150	0V	+5V	1000	100	56 CQFP	Pending
MUX8503	48	48		■	1	3	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-0323403KXC
MUX8513	48	48		■	1	3	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	96 CQFP	5962-0920302KXC
RHD8543 *	48	48			1	3	+5V	GND	N/A	<750	150	0V	+5V	1000	100	96 CQFP	Pending
MUX8502	48		48	■	1	3	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-0323401KXC
MUX8506	48		48		1	3	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-0323402KXC
MUX8512	48		48	■	1	3	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	96 CQFP	5962-0920301KXC
MUX8500	64	32	32	■	2	4	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-0050201KXC
MUX8507	64	32	32		2	4	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-1021201KXC
MUX8510	64	32	32	■	2	4	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	96 CQFP	5962-0920201KXC
MUX8501	64	64		■	2	4	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-0050202KXC
MUX8509	64	64			2	4	+15V	-15V	+5V	<2000	<1500	-5V	+15V	300	120	96 CQFP	5962-1021202KXC
MUX8511	64	64		■	2	4	+15V	-15V	+5V	<1200	<600	-5V	+15V	150	90	96 CQFP	5962-0920202KXC
RHD8541 *	64	64			2	4	+5V	GND	N/A	<750	150	0V	+5V	1000	100	96 CQFP	Pending

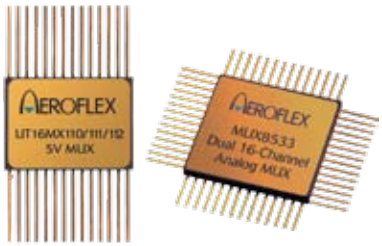
* Power Supply requirements: Only +5V and ground.

Analog Mux
Low-Voltage
LVCMOS Interface

aeroflex.com/Mux

	Asynchronous LVCMOS Interface	Synchronous LVCMOS Interface	LVCMOS SPI™ Interface	CMOS	Digital I/O Supply	Total Dose krads(Si)	LET ONSET MeV - cm²/mg	Latch-Up Immune MeV - cm²/mg	Analog Supply Voltage (V)	Package	QML Q & V	SMD #
UT16MX110	■				*	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10233
UT16MX111		■			*	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10233
UT16MX112			■		*	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10233
UT16MX113	■				3.0 to 3.6	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10236
UT16MX114		■			3.0 to 3.6	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10236
UT16MX115			■		3.0 to 3.6	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10236
UT16MX116	■			■	3.0 to 5.5	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10237
UT16MX117			■		3.0 to 5.5	300	62.3	110	4.5 to 5.5V	28 CFP	Q,V**	5962-10237

* Generated on chip.
** QML V pending.



Standard Products for HiRel Applications

Analog Function Series RadHard-by-Design *aeroflex.com/rhdseries*	Description	Package	SMD #
	Single power supply operation: 3.3V to 5V Radiation performance: CMOS ELDRS Immune Total dose > 1 Mrad(Si) SEL Immune > 100 MeV-cm^2/mg Displacement Damage > 10^{14} neutrons/cm^2		
Quad Op Amps			
RHD5900	Quad Operational Amplifier with rail-to-rail input and outputs for general purpose operational amplifier applications.	16 SOIC	5962-1024101KXC
RHD5901	Quad Operational Amplifier configured with enable/disable control. Pairs of amplifiers are put in a power-down condition with their outputs in a high-impedance state.	16 SOIC	5962-1024102KXC
RHD5902	Higher-speed version of RHD5901 providing wider bandwidth and faster slew rate.	16 SOIC	5962-1024103KXC
RHD5903 †	Differential output operational amplifier. Outputs are centered at VDD/2.	20 SOIC	Pending
Quad Instrumentation Amps			
RHD5904 †	Quad version of the standard instrumentation configuration. Gain 1, output centered at VDD/2.	16 SOIC	Pending
RHD5905 †	Differential output version of RHD5904.	20 SOIC	Pending
Quad Comparators			
RHD5910	Quad Comparator, High Speed, for operation with dynamic signals on either or both inputs. Comparison is continuous as the circuit functions as high gain open loop amplifier with a digital output.	16 SOIC	5962-1024201KXC
RHD5911	Quad Comparator with clocked comparator pairs to access & hold data until needed.	16 SOIC	5962-1024202KXC
RHD5912 †	Quad Comparator with open drain outputs.	16 SOIC	5962-1024203KXC
Analog Multiplexers			
RHD5920	16:1 analog multiplexer. Channel selection is controlled by 4-bit binary addressing and an active low enable.	24 SOIC	5962-1024301KXC
RHD5921	16:1 buffered output voltage multiplexer. Channel selection is controlled by 4-bit binary addressing and an active low enable. Multiplexed voltages are buffered by a unity gain rail-to-rail amplifier.	24 SOIC	5962-1024302KXC
RHD5922	16:1 sample-and-hold multiplexer. Channel selection is controlled by a 4-bit address bus. Signal aquisition is controlled by internal low leakage sample-and-hold circuitry buffered by a unity gain rail-to-rail amplifier.	24 SOIC	5962-1024303KXC
RHD5928	8 channel CMOS multiplexer. Channel selection is controlled by 3 bit binary addressing and an active low enable. All inputs and outputs are diode protected.	16 SOIC	Pending
RHD8541	64 channels provided by four 16:1 multiplexers. Two address busses A(3:0) and B(3:0) and four enable lines afford flexible organization.	96 CQFP	Pending
RHD8543 *	48 channels. Triple 16:1, common address inputs A0:A3, separate enable and output.	96 CQFP	Pending
RHD8544 *	32 channels. Dual 16:1, separate address inputs A0:A3 and B0:B3, separate enable and output.	56 CQFP	Pending
Digital-to-Analog Converters			
RHD5930	Digital to Analog Converter, 11-bit, ladder output.	16 SOIC	5962-1120801KXC
RHD5931	Digital to Analog Converter, 11-bit, buffered output.	16 SOIC	5962-1120802KXC
Multiplexed Analog-to-Digital Converters			
RHD5950	The RHD5950 takes 16 analog sensor signals and using 4 address inputs and an enable input, selects one of the 16 analog inputs and converts the signal to 14 digital output bits. The 14-bit digital output has a tri-state control allowing the connection of multiple RHD5950s. This provides very high level of telemetry integration interfacing many sensor voltage readings to the digital processor data bus.	48 CQFP	5962-1220301KXC

† Product in development.
* Power Supply requirements: Only +5V and ground.

Clock Solutions
aeroflex.com/clocks

	Frequency	# of Clocks	Crystal Capable	LVDS Ref	LVCMOS Outputs	LVDS Outputs	Total Dose krads(Si)	LET_{ONSET} MeV - cm²/mg	Saturated Cross Section (cm²/per bit	Latch-Up Immune MeV - cm²/mg	V_{DD} Core	V_{DD} I/O	Package	QML Q & V	SMD #
UT7R995	6 to 200 MHz	8			■		100	109	*	>109	3.3V	2.25 to 3.6V	48 CFP	Q,V	5962-05214
UT7R995C	6 to 200 MHz	8	■		■		100	109	*	>109	3.3V	2.25 to 3.6V	48 CFP	Q,V	5962-05214
UT54ALVC2525		8			■		100-1000	109	*	>111	2.0V thru 3.6V	2.0V thru 3.6V	14 CFP	Q,V	5962-06233
UT7R2XLR816 †	2 to 200 MHz	16	■	■	■	■	100	109	*	>109	3.3V	2.25 to 3.6V	168 CLGA 168 CBGA 168 CCGA	Q,V	5962-08243
UT7R995C-EVB	Includes user selected crystal or digital interface, flexible feedback selection series, thevenin termination options for output clocks, and independent core and output power supplies. Includes all cabling accessories needed for quick set up.														

† Product in development.
* The device memory storage elements do not upset.

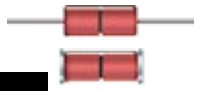
Comparators
aeroflex.com/opamp

	Description	Package	SMD #
	Single power supply operation: 3.3V to 5V Radiation performance: CMOS ELDRS Immune Total dose > 1 Mrad(Si) SEL Immune > 100 MeV-cm²/mg Displacement Damage > 10^{14} neutrons/cm²		
RHD5910 Quad Comparator	Quad Comparator, High Speed, for operation with dynamic signals on either or both inputs. Comparison is continuous as the circuit functions as high gain open loop amplifier with a digital output.	16 SOIC	5962-1024201KXC
RHD5911 Quad Comparator	Quad Comparator with clocked comparator pairs to access & hold data until needed.	16 SOIC	5962-1024202KXC
RHD5912 Quad Comparator †	Quad Comparator with open drain outputs.	16 SOIC	5962-1024203KXC

† Product in development.

Zener Diodes

Available in JAN, JANTX and JANTXV levels to MIL-PRF-19500 slash sheets /117, /127, /435, and /437 in both axial leaded and MELF packages. Other features include metallurgically bonded, hermetically sealed, double plug construction and designs with low noise characteristics. All models are also available in MELF packaging.

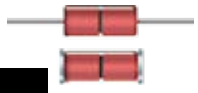


Zener Diodes
1N4099-1 to 1N4135-1, 1N4614-1 to 1N4627-1
aeroflex.com/ metelics-hirelcomponents

Types (Note 1)	Nominal Zener Voltage, V_Z Volts	Zener Test Current, I_{ZT} µA	Maximum Zener Impedance, Z_{ZT} Ohms	Maximum Reverse Current, I_R @ V_R µA	Volts	Maximum Noise Density, N_D @ I_{ZT} µV / √Hz	Maximum Zener DC Current, I_{ZM} mA
1N4614	1.8	250	1200	7.5	1	1	120
1N4615	2.0	250	1250	5.0	1	1	110
1N4616	2.2	250	1300	4.0	1	1	100
1N4617	2.4	250	1400	2.0	1	1	95
1N4618	2.7	250	1500	1.0	1	1	90
1N4619	3.0	250	1600	0.8	1	1	87
1N4620	3.3	250	1650	7.5	1.5	1	85
1N4621	3.6	250	1700	7.5	2	1	83
1N4622	3.9	250	1650	5.0	2	1	80
1N4623	4.3	250	1600	4.0	2	1	77
1N4624	4.7	250	1550	10.0	2	1	75
1N4625	5.1	250	1500	10.0	3	2	70
1N4626	5.6	250	1400	10.0	4	4	65
1N4627	6.2	250	1200	10.0	5	5	61
1N4099	6.8	250	200	10.0	5.17	40	56
1N4100	7.5	250	200	10.0	5.70	40	51
1N4101	8.2	250	200	1.0	6.24	40	46
1N4102	8.7	250	200	1.0	6.61	40	44
1N4103	9.1	250	200	1.0	6.92	40	42
1N4104	10	250	200	1.0	7.60	40	38
1N4105	11	250	200	0.05	8.44	40	35
1N4106	12	250	200	0.05	8.12	40	32
1N4107	13	250	200	0.05	9.857	40	29
1N4108	14	250	200	0.05	10.65	40	27
1N4109	15	250	100	0.05	11.40	40	25
1N4110	16	250	100	0.05	12.15	40	24
1N4111	17	250	100	0.05	12.92	40	22
1N4112	18	250	100	0.05	13.67	40	21
1N4113	19	250	150	0.05	14.44	40	20
1N4114	20	250	150	0.01	15.20	40	19
1N4115	22	250	150	0.01	16.72	40	17
1N4116	24	250	150	0.01	18.25	40	16
1N4117	25	250	150	0.01	19.00	40	15
1N4118	27	250	150	0.01	20.45	40	14
1N4119	29	250	200	0.01	21.28	40	14
1N4120	30	250	200	0.01	22.80	40	13
1N4121	33	250	200	0.01	25.08	40	12
1N4122	36	250	200	0.01	27.38	40	11
1N4123	39	250	200	0.01	29.65	40	9.8
1N4124	43	250	250	0.01	32.65	40	8.9
1N4125	47	250	250	0.01	35.75	40	8.1
1N4126	51	250	300	0.01	38.76	40	7.5
1N4127	56	250	300	0.01	42.60	40	6.7
1N4128	60	250	400	0.01	45.60	40	6.4
1N4129	62	250	500	0.01	47.10	40	6.1
1N4130	68	250	700	0.01	51.68	40	5.6
1N4131	75	250	700	0.01	57.00	40	5.1
1N4132	82	250	800	0.01	62.32	40	4.6
1N4133	87	250	1000	0.01	66.12	40	4.4
1N4134	91	250	1200	0.01	69.16	40	4.2
1N4135	100	250	1500	0.01	76.00	40	3.0

Electrical specifications @ T_A = +25°C (unless otherwise specified).

NOTE 1: The JEDEC type numbers shown (B Suffix) have a ±5% tolerance on nominal Zener Voltage. The suffix A is used to identify ±10% tolerance; suffix C is used to identify ±2%: and suffix D is used identify ±1%; no suffix indicates ±20%.



Low Noise Zener Diodes 1N5518B-1 to 1N5546B-1

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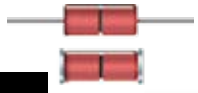
Types (Note 1)	Nominal Zener Voltage, V_Z @ I_{ZT} Volts	Zener Test Current I_{ZT} µA	Maximum Zener Impedance B, C, D Suffix Z_{ZT} @ I_{ZT} Ohms	Maximum Reverse Current, I_R V_R = Volts µA dc	Maximum Reverse Current, I_R V_R = Volts NON & A- Suffix	Maximum Reverse Current, I_R V_R = Volts B- C- D- Suffix	B-, C-, D- Suffix Maximum Zener DC Current, I_{ZM} mA dc	B-, C-, D- Suffix Maximum Noise Density, @ I_{ZT} = 250 mA ND µV / √Hz	Regulation Factor, ΔV_Z Volts	Low V_Z Current, I_{ZL} mA dc
1N5518B	3.3	20	26	5.0	0.90	1.0	115	0.5	0.90	2.0
1N5519B	3.6	20	24	3.0	0.90	1.0	105	0.5	0.90	2.0
1N5520B	3.9	20	22	1.0	0.90	1.0	98	0.5	0.85	2.0
1N5521B	4.3	20	18	3.0	1.0	1.5	88	0.5	0.75	2.0
1N5522B	4.7	10	22	2.0	1.5	2.0	81	0.5	0.60	1.0
1N5523B	5.1	5.0	26	2.0	2.0	2.5	75	0.5	0.65	0.25
1N5524B	5.6	3.0	30	2.0	3.0	3.5	68	1.0	0.30	0.25
1N5525B	6.2	1.0	30	1.0	4.5	5.0	61	1.0	0.20	0.01
1N5526B	6.8	1.0	30	1.0	5.5	6.2	56	1.0	0.10	0.01
1N5527B	7.5	1.0	35	0.5	6.0	6.8	51	2.0	0.05	0.01
1N5528B	8.2	1.0	40	0.5	6.5	7.5	46	4.0	0.05	0.01
1N5529B	9.1	1.0	45	0.1	7.0	8.2	42	4.0	0.05	0.01
1N5530B	10.0	1.0	60	0.05	8.0	9.1	38	4.0	0.10	0.01
1N5531B	11.0	1.0	80	0.05	9.0	9.9	35	5.0	0.20	0.01
1N5532B	12.0	1.0	90	0.05	9.5	0.8	32	10	0.20	0.01
1N5533B	13.0	1.0	90	0.01	10.5	11.7	29	15	0.20	0.01
1N5534B	14.0	1.0	100	0.01	11.5	12.6	27	20	0.20	0.01
1N5535B	15.0	1.0	100	0.01	12.5	13.5	25	20	0.20	0.01
1N5536B	16.0	1.0	100	0.01	13.0	14.4	24	20	0.20	0.01
1N5537B	17.0	1.0	100	0.01	14.0	15.3	22	20	0.20	0.01
1N5538B	18.0	1.0	100	0.01	15.0	16.2	21	20	0.20	0.01
1N5539B	19.0	1.0	100	0.01	16.0	17.1	20	20	0.20	0.01
1N5540B	20.0	1.0	100	0.01	17.0	18.0	19	20	0.20	0.01
1N5541B	22.0	1.0	100	0.01	18.0	19.8	17	20	0.25	0.01
1N5542B	24.0	1.0	100	0.01	20.0	21.6	16	20	0.30	0.01
1N5543B	25.0	1.0	100	0.01	21.0	22.4	15	20	0.35	0.01
1N5544B	28.0	1.0	100	0.01	23.0	25.2	14	20	0.40	0.01
1N5545B	30.0	1.0	100	0.01	24.0	27.0	13	20	0.45	0.01
1N5546B	33.0	1.0	100	0.01	28.0	29.7	12	20	0.50	0.01

Electrical specifications @ T_A = +25°C (unless otherwise specified).

NOTE 1: No Suffix type numbers are ±20% with guaranteed limits for only V_Z, I_R, and V_F. Units with "A" suffix are ±10% with guaranteed limits for V_Z, I_R, and V_F. Units with guaranteed limits for all six parameters are indicated by a "B" suffix for ±5.0% units, "C" suffix for ±2.0% and "D" suffix for ±1.0%.



Zener Diodes 1N746A-1N759, 1N4370A-1N4372A

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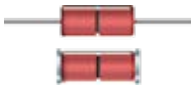
Types (Note 1)	Nominal Zener Voltage, V_Z @ I_{ZT} Volts	Zener Test Current I_{ZT} (Note 2) mA	Maximum Zener Impedance Z_{ZT} @ I_{ZT} (Note 3) Ohms (Ω)	Maximum Reverse Current, I_R @ V_R µA	Maximum Reverse Current, I_R @ V_R Volts	Maximum Zener Current, I_{ZM} Volts
1N4370A, CDLL4370A	2.4	20	30	100	1.0	155
1N4371A, CDLL4371A	2.7	20	30	60	1.0	140
1N4372A, CDLL4372A	3.0	20	29	30	1.0	125
1N746A, CDLL746A	3.3	20	28	5	1.0	120
1N747A, CDLL747A	3.6	20	24	3	1.0	110
1N748A, CDLL748A	3.9	20	23	2	1.0	100
1N749A, CDLL749A	4.3	20	22	2	1.0	90
1N750A, CDLL750A	4.7	20	19	5	1.5	85
1N751A, CDLL751A	5.1	20	17	5	2.0	75
1N752A, CDLL752A	5.6	20	11	5	2.5	70
1N753A, CDLL753A	6.2	20	7	5	3.5	65
1N754A, CDLL754A	6.8	20	5	2	4.0	60
1N755A, CDLL755A	7.5	20	6	2	5.0	55
1N756A, CDLL756A	8.2	20	8	1	6.0	50
1N757A, CDLL757A	9.1	20	10	1	7.0	45
1N758A, CDLL758A	10.0	20	17	1	8.0	40
1N759A, CDLL759A	12.0	20	30	1	9.0	35

Electrical specifications @ T_A = +25°C (unless otherwise specified).

NOTE 1: Zener voltage tolerance on "A" suffix is ±5%. No Suffix denotes ±10% tolerance, "C" suffix denotes ±2% tolerance and "D" suffix denotes ±1% tolerance.
NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of 25°C ± 3°C.
NOTE 3: Zener impedance is derived by superimposing on I_{ZT} A 60 Hz rms a.c. current equal to 10% of I_{ZT}.

Standard Products for HiRel Applications



Zener Diodes
1N957B - 1N992B

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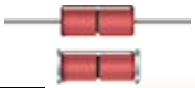
Types (Note 1)	Nominal Zener Voltage, V_Z Volts	Zener Test Current I_{ZT} mA	Maximum Zener Impedance Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} @ I_{ZK} Ohms	mA	Maximum Zener DC Current, I_{ZM} mA	Maximum Surge Leakage, I_{ZSM} mA	Maximum Reverse Current, I_R @ V_R µA	Volts	Maximum Temperature Coefficient, α_{VZ} % / °C
1N957B	6.8	18.5	4.5	700	1.0	55	300	150	5.2	+0.05
1N958B	7.5	16.5	5.5	700	.5	50	275	75	5.7	+0.058
1N959B	8.2	15.0	6.5	700	.5	45	250	50	6.2	+0.065
1N960B	9.1	14.0	7.5	700	.5	41	225	25	6.9	+0.068
1N961B	10	12.5	8.5	700	.25	38	200	10	7.6	+0.075
1N962B	11	11.5	9.5	700	.25	32	175	5	8.4	+0.076
1N963B	12	10.5	11.5	700	.25	31	160	5	9.1	+0.077
1N964B	13	9.5	13	700	.25	28	150	5	9.9	+0.079
1N965B	15	8.5	16	700	.25	25	130	5	11.4	+0.082
1N966B	16	7.8	17	700	.25	24	120	5	12.2	+0.083
1N967B	18	7.0	21	750	.25	20	110	5	13.7	+0.085
1N968B	20	6.2	25	750	.25	18	100	5	15.2	+0.086
1N969B	22	5.6	29	750	.25	16	90	5	16.7	+0.087
1N970B	24	5.2	33	750	.25	15	80	5	18.2	+0.088
1N971B	27	4.6	41	750	.25	13	70	5	20.6	+0.090
1N972B	30	4.2	49	1000	.25	12	65	5	22.8	+0.091
1N973B	33	3.8	58	1000	.25	11	60	5	25.1	+0.092
1N974B	36	3.4	70	1000	.25	10	55	5	27.4	+0.093
1N975B	39	3.2	80	1000	.25	9.5	46	5	29.7	+0.094
1N976B	43	3.0	93	1000	.25	8.8	44	5	32.7	+0.095
1N977B	47	2.7	105	1500	.25	7.9	40	5	35.8	+0.095
1N978B	51	2.5	125	1500	.25	7.4	37	5	38.8	+0.096
1N979B	56	2.2	150	2000	.25	6.8	35	5	42.6	+0.096
1N980B	62	2.0	185	2000	.25	6.0	30	5	47.1	+0.097
1N981B	68	1.8	230	2000	.25	5.5	28	5	51.7	+0.097
1N982B	75	1.7	270	2000	.25	5.0	26	5	56.0	+0.098
1N983B	82	1.5	330	3000	.25	4.6	23	5	62.2	+0.098
1N984B	91	1.4	400	3000	.25	4.1	21	5	69.2	+0.099
1N985B	100	1.3	500	3000	.25	3.7	18	5	76.0	+0.11
1N986B	110	1.1	750	4000	.25	3.3	16	5	83.6	+0.11
1N987B	120	1.0	900	4500	.25	3.1	15	5	91.2	+0.11
1N988B	130	0.95	1100	5000	.25	2.7	13	5	98.8	+0.11
1N989B	150	0.85	1500	6000	.25	2.4	12	5	114.0	+0.11
1N990B	160	0.80	1700	6500	.25	2.2	11	5	121.6	+0.11
1N991B	180	0.68	2200	7100	.25	2.0	10	5	136.8	+0.11
1N992B	200	0.65	2500	8000	.25	1.8	9	5	152.0	+0.11

Electrical specifications @ T_A = +25°C (unless otherwise specified).

NOTE 1: The JEDEC type numbers shown (B Suffix) have a ±5% tolerance on nominal Zener Voltage. The suffix A is used to identify ±10% tolerance; suffix C is used to identify ±2%: and suffix D is used identify ±1%; no suffix indicates ±20%.

Temperature Compensated (TC) Zener Reference Diodes

Available in JAN, JANTX, JANTXV and JANS levels to MIL-PRF-19500 slash sheets /159 and /452 in both axial leaded and MELF packages. Other features include metallurgically bonded and double plug construction.



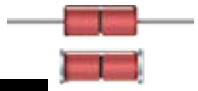
TC Zener Diodes 1N4565-1N4584, -1 *aeroflex.com/ metelics-hirelcomponents*	Zener Test Current I_{ZT}	Effective Temperature Coefficient	Voltage Temperature Stability (ΔV_{ZT}) (Note 1)	Temperature Range	Maximum Dynamic Zener Impedance (Note 2)
Types (Note 1)	mA	% / °C	mV	°C	Ohms (Ω)
1N4565, 1N4565UR	0.5	0.01	48	0 to +75°C	200
1N4565A, 1N4565AUR	0.5	0.01	100	-55 to +100°C	200
1N4566, 1N4566UR	0.5	0.005	24	0 to +75°C	200
1N4566A, 1N4566AUR	0.5	0.005	50	-55 to +100°C	200
1N4567, 1N4567UR	0.5	0.002	10	0 to +75°C	200
1N4567A, 1N4567AUR	0.5	0.002	20	-55 to +100°C	200
1N4568, 1N4568UR	0.5	0.001	5	0 to +75°C	200
1N4568A, 1N4568AUR	0.5	0.001	10	-55 to +100°C	200
1N4569, 1N4569UR	0.5	0.0005	2.5	0 to +75°C	200
1N4569A, 1N4569AUR	0.5	0.0005	5	-55 to +100°C	200
1N4570, 1N4570UR	1.0	0.01	48	0 to +75°C	100
1N4570A, 1N4570AUR	1.0	0.01	100	-55 to +100°C	100
1N4571, 1N4571UR	1.0	0.005	24	0 to +75°C	100
1N4571A, 1N4571AUR	1.0	0.005	50	-55 to +100°C	100
1N4572, 1N4572UR	1.0	0.002	10	0 to +75°C	100
1N4572A, 1N4572AUR	1.0	0.002	20	-55 to +100°C	100
1N4573, 1N4573UR	1.0	0.001	5	0 to +75°C	100
1N4573A, 1N4573AUR	1.0	0.001	10	-55 to +100°C	100
1N4574, 1N4574UR	1.0	0.0005	2.5	0 to +75°C	100
1N4574A, 1N4574AUR	1.0	0.0005	5	-55 to + 100°C	100
1N4575, 1N4575UR	2.0	0.01	48	0 to +75°C	50
1N4575A, 1N4575AUR	2.0	0.01	100	-55 to +100°C	50
1N4576, 1N4576UR	2.0	0.005	24	0 to +75°C	50
1N4576A, 1N4576AUR	2.0	0.005	50	-55 to +100°C	50
1N4577, 1N4577UR	2.0	0.002	10	0 to +75°C	50
1N4577A, 1N4577AUR	2.0	0.002	20	-55 to +100°C	50
1N4578, 1N4578UR	2.0	0.001	5	0 to + 75°C	50
1N4578A, 1N4578AUR	2.0	0.001	10	-55 to +100°C	50
1N4579, 1N4579UR	2.0	0.0005	2.5	0 to +75°C	50
1N4579A, 1N4579AUR	2.0	0.0005	5	-55 to +100°C	50
1N4580, 1N4580UR	4.0	0.01	48	0 to +75°C	25
1N4580A, 1N4580AUR	4.0	0.01	100	-55 to +100°C	25
1N4581, 1N4581UR	4.0	0.005	24	0 to +75°C	25
1N4581A, 1N4581AUR	4.0	0.005	50	-55 to +100°C	25
1N4582, 1N4582UR	4.0	0.002	10	0 to +75°C	25
1N4582A, 1N4582AUR	4.0	0.002	20	-55 to +100°C	25
1N4583, 1N4583UR	4.0	0.001	5	0 to +75°C	25
1N4583A, 1N4583AUR	4.0	0.001	10	-55 to +100°C	25
1N4584, 1N4584UR	4.0	0.0005	2.5	0 to +75°C	25
1N4584A, 1N4584AUR	4.0	0.0005	5	-55 to +100°C	25

Electrical specifications @ +25°C (unless otherwise specified).

NOTE 1: The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV at any discrete temperature between the established limits, per JEDEC standard No. 5.

NOTE 2: Zener impedance is derived by superimposing on I_ZT A 60 Hz rms a.c. current equal to 10% of I_ZT.

Standard Products for HiRel Applications



TC Zener Diodes 1N821 to 1N828, -1 1N821UR-1N828UR, -1

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Types	Zener Voltage V_Z @ I_{ZT}	Zener Test Current I_{ZT}	Maximum Zener Impedance Z_{ZT} (Note 1)	Voltage Temperature Stability, ΔV_{ZT} -55°C to +100°C (Note 2)	Effective Temperature Coefficient
	Volts	mA	Ohms (Ω)	mV	% / °C
1N821, 1N821UR	5.9–6.5	7.5	15	96	0.01
1N821A, 1N821AUR	5.9–6.5	7.5	10	96	0.01
1N822, 1N822UR †	5.9–6.5	7.5	15	96	0.01
1N823, 1N823UR	5.9–6.5	7.5	15	48	0.005
1N823A, 1N823AUR	5.9–6.5	7.5	10	48	0.005
1N824, 1N824UR †	5.9–6.5	7.5	15	48	0.005
1N825, 1N825	5.9–6.5	7.5	15	19	0.002
1N825A, 1N825AUR	5.9–6.5	7.5	10	19	0.002
1N826, 1N826UR	6.2–6.9	7.5	15	20	0.002
1N827, 1N827UR	5.9–6.5	7.5	15	9	0.001
1N827A, 1N827AUR	5.9–6.5	7.5	10	9	0.001
1N828, 1N828UR	6.2–6.9	7.5	15	10	0.001
1N829, 1N829UR	5.9–6.5	7.5	15	5	0.0005
1N829A, 1N829AUR	5.9–6.5	7.5	10	5	0.0005

† Double Anode: Electrical Specifications Apply Under Both Bias Polarities.

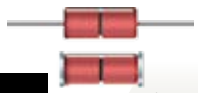
Electrical specifications @ +25°C (unless otherwise specified).

NOTE 1: Zener impedance is derived by superimposing on I_{ZT} A 60 Hz rms a.c. current equal to 10% of I_{ZT}.

NOTE 2: The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV at any discrete temperature between the established limits, per JEDEC standard No. 5.

Silicon Switching Diodes

Available in JAN, JANTX, JANTXV levels to MIL-PRF-19500 slash sheets /116, /144, /231, JAN and JANS /578 & /609 in both axial leaded and MELF packages. Other features include Metallurgically Bonded; Hermetically Sealed and Double Plug Construction.



Switching Diodes 1N3600, 1N4151, -1

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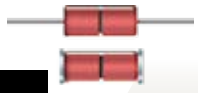
Types	V_{BR} I_R = 10 µA	V_{RWM}	I_{R1} V_R = 50 Vdc T_A = 25°C	I_{R2} V_R = 50 Vdc T_A = 150°C	C I_R = 0; f = 1 MHz AC signal = 50 mV (p-p)	τ_{rr} I_R = 10 - 100 mA I_F = 10 - 100 mA R_L = 100 Ω	V_{f1} I_F = 1 mA dc		V_{f2} I_F = 10 mA dc		V_{f3} I_F = 50 mA dc (pulsed)		V_{f4} I_F = 100 mA dc (pulsed)		V_{f5} I_F = 200 mA dc (pulsed)	
	Volts	V(pk)	µA dc	µA dc	pF	nA	V dc min	V dc max	V dc min	V dc max	V dc min	V dc max	V dc min	V dc max	V dc min	V dc max
1N3600, 1N3600U	75	50	0.1	100	2.5	4.0	0.54	0.62	0.66	0.74	0.76	0.86	0.82	0.92	0.87	1.00
1N4151, 1N4151-1 1N4151U, 1N4151U-1	75	50	0.1	100	2.5	4.0	0.54	0.62	0.66	0.74	0.76	0.86	0.82	0.92	0.87	1.00

Electrical specifications @ +25°C (unless otherwise specified).



Switching Diodes 1N914U & 1N4148U-1

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Types	V_{BR} @ 100 µA	V_{RWM}	I_O	V_{f1} I_F = 10 mA	V_{f2} I_F = 50 mA	τ_{rr} I_R = 10 mA I_F = 10 mA R_L = 100 Ω	I_{R1} @ 20 Vdc	I_{R2} @ 75 Vdc	I_{R3} V_R = 20 V T_A = 150°C	I_{R3} V_R = 20 V T_A = 150°C	Capacitance @ 0 V	Capacitance @ 1.5 V
	Volts	V(pk)	mA	V dc	V dc	nsec	nA	µA	µA	µA	pF	pF
1N914, 1N914U	100	75	75	0.8	1.2	5	25	0.5	35	75	4.0	2.8
1N4148-1, 1N4148U-1	100	75	200	0.8	1.2	5	35	0.5	35	75	4.0	2.8

Electrical specifications @ +25°C (unless otherwise specified).

Switching Diodes 1N6638 Series

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Types	V_{BR} @ I_R	V_{RWM}	V_{FR} / τ_{fr} @ I_F = 200 mA	C_{T1} V_R = 0.0 V	C_{T2} V_R = 1.5 V	τ_{rr} I_R = 10 mA I_F = 10 mA	V_{R1} V_R = V_{RWM}	I_{R2} V_R = 20 V T_A = 150°C	I_{R3} V_R = 20 V T_A = 150°C	I_{R4} V_R = V_{RWM}	V_F @ I_F	V_{F2} @ I_F T_A = -55°C	I_F
	V(pk)	µA	V(pk)	V_{FR} V(pk)	τ_{fr} ns	pF	pF	ns	nA dc	nA dc	µA dc	µA dc	V dc min	V dc max	V dc max	mA pulsed
1N6638	150	100	125	5.0	20	2.5	2.0	4.5	35	500	50	100	–	1.1 0.8	1.2 –	200 10
1N6639	100	10	75	5.0	10	2.5	–	4.0	–	100	–	90	–	1.2	1.3	500
1N6640	75	10	50	5.0	10	2.5	–	4.0	–	100	–	90	0.54 0.76 0.82 0.87	0.62 0.86 0.92 1.0	– – – 1.1	1 50 100 200
1N6641	75	10	50	5.0	10	3.0	–	5.0	–	100	–	90	–	1.1	1.2	200
1N6642	100	100	75	5.0	20	5.0	2.8	5.0	25	500	50	100	–	1.0 1.2	– 1.2	10 100
1N6643	75	100	50	5.0	20	5.0	2.8	6.0	50	500	75	100	–	1.0 1.2	– 1.4	10 100

Electrical specifications @ T_A = +25°C (unless otherwise specified).

Switching Diodes 1N6638U Series

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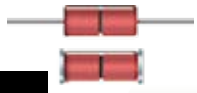
Types	V_{BR} @ I_R	V_{RWM}	V_{FR} / τ_{fr} @ I_F = 200 mA	C_{T1} V_R = 0.0 V	C_{T2} V_R = 1.5 V	τ_{rr} I_R = 10 mA I_F = 10 mA	I_{R1} V_R = V_{RWM}	I_{R2} V_R = 20 V T_A = 150°C	I_{R3} V_R = 20 V T_A = 150°C	I_{R4} V_R = V_{RWM}	V_F @ I_F	V_{F2} @ I_F T_A = -55°C	I_F
	V(pk)	µA	V(pk)	V_{FR} V(pk)	τ_{fr} ns	pF	pF	ns	nA dc	nA dc	µA dc	µA dc	V dc min	V dc max	V dc max	mA pulsed
1N6638U & US	150	100	125	5.0	20	2.5	2.0	4.5	35	500	50	100	–	1.1 0.8	1.2 –	200 10
1N6639U & US	100	10	75	5.0	10	2.5	–	4.0	–	100	–	90	–	1.2	1.3	500
1N6640U & US	75	10	50	5.0	10	2.5	–	4.0	–	100	–	90	0.54 0.76 0.82 0.87	0.62 0.86 0.92 1.0	– – – 1.1	1 50 100 200
1N6641U & US	75	10	50	5.0	10	3.0	–	5.0	–	100	–	90	–	1.1	1.2	200
1N6642U & US	100	100	75	5.0	20	5.0	2.8	5.0	25	500	50	100	–	1.0 1.2	– 1.2	10 100
1N6643U & US	75	100	50	5.0	20	5.0	2.8	6.0	50	500	75	100	–	1.0 1.2	– 1.4	10 100

Electrical specifications @ T_A = +25°C (unless otherwise specified).



Switching Diodes 1N4531

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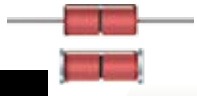
Types	V_F		I_R		V_{BR}			τ_{rr} I_R = 10 mA I_F = 10 mA I_{REC} = 100 Ω	T_{FR} @ I_F = 50 mA	V_{FR} @ IF = 50 mA	Capacitance @ 0 V	Capacitance @ 1.5 V
	Ambient (°C)	I_F mA	V dc max	Ambient (°C)	V dc	A max	Ambient (°C)	I_R µA	V dc max	V dc max	nsec	nsec	V(pk)	pF	pF
1N4531, 1N4531UR	25 25 150 -55	10 100 10 100	0.8 1.2 0.8 1.3	25 25 150 150	20 75 20 75	0.025 0.500 35.0 75.0	25	100	100	25	5	20	5	4	2.8



Switching Diodes 1N4454 & 1N4454-1

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Types	V_{BR} @ 5 µA	V_{RWM}	I_O	V_{f1} I_F = 10 mA	V_{f2} I_F = 10 mA	τ_{rr}	I_{R1} @ 50 Vdc	I_{R2} @ 75 Vdc T_A = 150°C	Capacitance @ 0 V
	Volts	V(pk)	mA	V dc	V dc	nsec	µA	µA	pF
1N4454, 1N4454-1 1N4454UR, 1N4454UR-1	75	50	200	0.8	0.7	4	0.1	100	2.0

Zener Diode Chip Series CD5518B – CD5546B

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Types	Nominal Zener Voltage, V_Z @ I_{ZT} (Note 1)	Zener Test Current, I_{ZT}	Maximum Zener Impedance, Z_{ZT} @ I_{ZT} (Note 2)	Maximum Reverse Leakage Current, I_R	Maximum Reverse Leakage Current, V_R	Regulation Factor V_Z (Note 3)	Low VZ Current, I_{ZL}
	Volts	mAdc	Ohms	mAdc	Volts	Volts	mAdc
CD5518B	3.3	20	26	5.0	1.0	0.90	2.0
CD5519B	3.6	20	24	3.0	1.0	0.90	2.0
CD5520B	3.9	20	22	1.0	1.0	0.90	2.0
CD5521B	4.3	20	18	3.0	1.5	0.75	2.0
CD5522B	4.7	10	22	2.0	2.0	0.60	1.0
CD5523B	5.1	5.0	26	2.0	2.5	0.65	0.25
CD5524B	5.6	3.0	30	2.0	3.5	0.30	0.25
CD55258	6.2	1.0	30	1.0	5.0	0.20	0.01
CD5526B	6.8	1.0	30	1.0	6.2	0.10	0.01
CD5527B	7.5	1.0	35	0.5	6.8	0.05	0.01
CD5528B	8.2	1.0	40	0.5	7.5	0.05	0.01
CD5529B	9.1	1.0	45	0.1	8.2	0.05	0.01
CD55308	10.0	1.0	60	0.05	9.1	0.10	0.01
CD5531B	11.0	1.0	80	0.05	9.9	0.20	0.01
CD5532B	12.0	1.0	90	0.05	10.8	0.20	0.01
CD5533B	13.0	.0	90	0.01	11.7	0.20	0.01
CD5534B	14.0	1.0	100	0.01	12.6	0.20	0.01
CD5535B	15.0	1.0	100	0.01	13.5	0.20	0.01
CD5536B	16.0	1.0	100	0.01	14.4	0.20	0.01
CD5537B	17.0	1.0	100	0.01	15.3	0.20	0.01
CD5538B	18.0	1.0	100	0.01	16.2	0.20	0.01
CD5539B	19.0	1.0	100	0.01	17.1	0.20	0.01
CD5540B	20.0	1.0	100	0.01	18.0	0.20	0.01
CD5541B	22.0	1.0	100	0.01	19.8	0.25	0.01
CD5542B	24.0	1.0	100	0.01	21.6	0.30	0.01
CD5543B	25.0	1.0	100	0.01	22.4	0.35	0.01
CD5544B	28.0	1.0	100	0.01	25.2	0.40	0.01
CD5545B	30.0	1·0	100	0.01	27.0	0.45	0.01
CD5546B	33.0	1.0	100	0.01	29.7	0.50	0.01

Electrical specifications @ +25°C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Suffix "B" voltage range equals nominal Zener voltage. ± 5%. Suffix "A" equals ± 10 %. "C" suffix = ± 2 % and "D" suffix= ± 1 %. No Suffix equals ± 20 %. Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms ac current equal to 10 % of I_{ZT}.

NOTE 3: ΔV_Z is the maximum difference between V_Z-@ I_{ZT} and VZ at I_{ZL} measured with the device junction in thermal equilibnum at an ambient temperature of +25° ± 3°C.

Zener Diode Chip Series CD4614 – CD4627

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Types	Nominal Zener Voltage, V_Z @ I_{ZT} (Note 1)	Zener Test Current, I_{ZT}	Maximum Zener Impedance, Z_{ZT} @ I_{ZT} (Note 2)	Maximum Reverse Leakage Current, I_R @ V_R	
	Volts	A	Ohms	A	Volts
CD4614	1.8	250	1200	7.5	1
CD4615	2.0	250	1250	5.0	1
CD4616	2.2	250	1300	4.0	1
CD4617	2.4	250	1400	2.0	1
CD4618	2.7	250	1500	1.0	1
CD4619	3.0	250	1600	0.8	1
CD4620	3.3	250	1650	7.5	1.5
CD4621	3.6	250	1700	7.5	2
CD4622	3.9	250	1650	5.0	2
CD4623	4.3	250	1600	4.0	2
CD4624	4.7	250	1550	10.0	3
CD4625	5.1	250	1500	10.0	3
CD4626	5.6	250	1400	10.0	4
CD4627	6.2	250	1200	10.0	5

Electrical specifications @ +25°C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Zener voltage range equals nominal Zener voltage ± 5% for no suffix types. Zener voltage is read using a pulse measurement, 10 milliseconds maximum. "C" suffix = ± 2% and "D" suffix = ± 1 %.

NOTE 2: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms AC current equal to 10 % of I_{ZT}.

Zener Diode Chip Series
CD4565 – CD4584A
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Types 6.4 V ±5 %	Zener Test Current, I_{ZT} mA	Effective Temperature Coefficient % / °C	Voltage Temperature Stability, ΔV_{ZT} Max -55° to + 100° (Note 2) Ohms	Temperature Range A	Maximum Zener Impedance Z_{ZT} (Note 1) Ohms
CD4565	0.5	0.01	48	0 to +75 °C	200
CD4565A	0.5	0.01	100	-55 to +100 °C	200
CD4566	0.5	0.005	24	0 to +75 °C	200
CD4566A	0.5	0.005	50	-55 to +100 °C	200
CD4567	0.5	0.002	10	0 to +75 °C	200
CD4567A	0.5	0.002	20	-55 to +100 °C	200
CD4568	0.5	0.001	5	0 to +75 °C	200
CD4568A	0.5	0.001	10	-55 to +100 °C	200
CD4569	0.5	0.0005	2.5	0 to +75 °C	200
CD4569A	0.5	0.0005	5	-55 to +100 °C	200
CD4570	1.0	0.01	48	0 to +75° C	100
CD4570A	1.0	0.01	100	-55 to +100 °C	100
CD4571	1.0	0.005	24	0 to +75°C	100
CD4571A	1.0	0.005	50	-55 to +100°C	100
CD4572	1.0	0.002	10	0 to +75°C	100
CD4572A	1.0	0.002	20	-55 to +100°C	100
CD4573	1.0	0.001	5	0 to +75 °C	100
CD4573A	1.0	0.001	10	-55 to +100 °C	100
CD4574	1.0	0.0005	2.5	0 to +75 °C	100
CD4574A	1.0	0.0005	5	-55 to +100 °C	100
CD4575	2.0	0.01	48	0 to +75°C	50
CD4575A	2.0	0.01	100	-55 to +100 °C	50
CD4576	2.0	0.005	24	0 to +75 °C	50
CD4576A	2.0	0.005	50	-55 to +100 °C	50
CD4577	2.0	0.002	10	0 to +75 °C	50
CD4577A	2.0	0.002	20	-55 to +100 °C	50
CD4578	2.0	0.001	5	0 to +75 °C	50
CD4578A	2.0	0.001	10	-55 to +100 °C	50
CD4579	2.0	0.0005	2.5	0 to +75 °C	50
CD4579A	2.0	0.0005	5	-55 to +100 °C	50
CD4580	4.0	0.01	48	0 to +75 °C	25
CD4580A	4.0	0.01	100	-55 to +100 °C	25
CD4581	4.0	0.005	24	0 to +75 °C	25
CD4581A	4.0	0.005	50	-55 to +100 °C	25
CD4582	4.0	0.002	10	0 to +75 °C	25
CD4582A	4.0	0.002	20	-55 to +100 °C	25
CD4583	4.0	0.001	5	0 to +75 °C	25
CD4583A	4.0	0.001	10	-55 to +100 °C	25
CD4584	4.0	0.0005	2.5	0 to +75° C	25
CD4584A	4.0	0.0005	5	-55 to +100 °C	25

Electrical specifications @ +25 °C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms ac current equal to 10% of I_{ZT}.
NOTE 2: The maximum allowable change observed over the entire temperature range, i.e., the diode voltage will not exceed the specialized mV at any discrete temperature between the established limits, per JEDEC standard No.5.

Zener Diode Chip Series CD4099 – CD4135

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Types	Nominal Zener Voltage, V_Z @ I_{ZT} (Note 1)	Zener Test Current, I_{ZT}	Maximum Zener Impedance, Z_{ZT} @ I_{ZT} (Note 2)	Maximum Reverse Leakage Current, I_R @ V_R	
	Volts	A	Ohms	A	Volts
CD4099	6.8	250	200	10.0	5.17
CD4100	7.5	250	200	10.0	5.70
CD4101	8.2	250	200	1.0	6.24
CD4102	8.7	250	200	1.0	6.61
CD4103	9.1	250	200	1.0	6.92
CD4104	10	250	200	1.0	7.60
CD4105	11	250	200	0.05	8.44
CD4106	12	250	200	0.05	9.12
CD4107	13	250	200	0.05	9.87
CD4108	14	250	200	0.05	10.65
CD4109	15	250	100	0.05	11.40
CD4110	16	250	100	0.05	12.15
CD4111	17	250	100	0.05	12.92
CD4112	18	250	100	0.05	13.67
CD4113	19	250	150	0.05	14.44
CD4114	20	250	150	0.01	15.20
CD4115	22	250	150	0.01	16.72
CD4116	24	250	150	0.01	18.25
CD4117	25	250	150	0.01	19.00
CD4118	27	250	150	0.01	20.46
CD4119	28	250	200	0.01	21.28
CD4120	30	250	200	0.01	22.80
CD4121	33	250	200	0.01	25.08
CD4122	36	250	200	0.01	27.38
CD4123	39	250	200	0.01	29.65
CD4124	43	250	250	0.01	32.56
CD4125	47	250	250	0.01	35.75
CD4126	51	250	300	0.01	38.76
CD4127	56	250	300	0.01	42.60
CD4128	60	250	400	0.01	45.60
CD4129	62	250	500	0.01	47.10
CD4130	68	250	700	0.01	51.68
CD4131	75	250	700	0.01	57.00
CD4132	82	250	800	0.01	62.32
CD4133	87	250	1000	0.01	66.12
CD4134	91	250	1200	0.01	69.16
CD4135	100	250	1500	0.01	76.00

Electrical specifications @ +25°C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Zener voltage range equals nominal Zener voltage ± 5% for no suffix types. Zener voltage is read using a pulse measurement, 10 milliseconds maximum. "C" suffix = ± 2% and "D" suffix = ± 1 %.

NOTE 2: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms AC current equal to 10 % of I_{ZT}.

Zener Diode Chip Series
CD957B – CD986B

aeroflex.com/ metelics-hirelcomponents

Types	Nominal Zener Voltage, V_Z (Note 1)	Zener Test Current, I_{ZT}	Maximum Zener Impedance, Z_{ZT} @ I_{ZT} (Note 2)	Maximum Zener Impedance, Z_{ZK} @ I_{ZK} (Note 2)		Maximum DC Zener Current, I_{ZM}	Maximum Reverse Leakage Current, I_R @ V_R	
	Volts	mA	Ohms	Ohms	mA	mA	A	Volts
CD957B	6.8	18.5	4.5	700	1.0	55	5.0	5.2
CD958B	7.5	16.5	5.5	700	0.5	50	5.0	5.7
CD959B	8.2	15.0	6.5	700	0.5	45	5.0	6.2
CD960B	9.1	14.0	7.5	700	0.5	41	5.0	6.9
CD961B	10	12.5	8.5	700	0.25	38	2.0	7.6
CD962B	11	11.5	9.5	700	0.25	32	1.0	8.4
CD963B	12	10.5	11.5	700	0.25	31	1.0	9.1
CD964B	13	9.5	13	700	0.25	28	0.5	9.9
CD965B	15	8.5	16	700	0.25	25	0.5	11
CD966B	16	7.8	17	700	0.25	24	0.5	12
CD967B	18	7.0	21	750	0.25	20	0.5	14
CD968B	20	6.2	25	750	0.25	18	0.5	15
CD969B	22	5.6	29	750	0.25	16	0.5	17
CD970B	24	5.2	33	750	0.25	15	0.5	18
CD971B	27	4.6	41	750	0.25	13	0.5	21
CD972B	30	4.2	49	1000	0.25	12	0.5	23
CD973B	33	3.8	58	1000	0.25	11	0.5	25
CD974B	36	3.4	70	1000	0.25	10	0.5	27
CD975B	39	3.2	90	1000	0.25	9.5	0.5	30
CD976B	43	3.0	93	1500	0.25	8.8	0.5	33
CD977B	47	2.7	105	1500	0.25	7.9	0.5	36
CD978B	51	2.5	125	1500	0.25	7.4	0.5	39
CD979B	56	2.2	150	2000	0.25	6.8	0.5	43
CD980B	62	2.0	185	2000	0.25	6.0	0.5	47
CD981B	68	1.8	230	2000	0.25	5.5	0.5	52
CD982B	75	1.7	270	2000	0.25	5.0	0.5	56
CD983B	82	1.5	330	3000	0 .25	4.6	0.5	62
CD984B	91	1.4	400	3000	0.25	4.1	0.5	69
CD985B	100	1.3	500	3000	0.25	3.7	0.5	76
CD986B	110	1.1	750	4000	0.25	3.3	0.5	84

Electrical specifications @ +25°C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Zener voltage range equals nominal voltage ± 5% for "B" Suffix. "A" Suffix denotes ± 10%. No Suffix denotes ± 20%. "C" suffix = ± 2% and "D" suffix = ± 1%. Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms a.c. current equal to 10 % of I_{ZT}.

Zener Diode Chip Series
CD746A – CD759A, CD4370A – CD4372A

aeroflex.com/metelics-hirelcomponents

Types	Nominal Zener Voltage, V_Z @ I_{ZT} (Note 1)	Zener Test Current, I_{ZT}	Maximum Zener Impedance, Z_{ZT} @ I_{ZT} (Note 2)	Maximum Reverse I_R @ V_R		Maximum Zener Current, I_{ZM}
	Volts	mA	Ohms	A	Volts	mA
CD4370A	2.4	20	30	100	1.0	155
CD4371A	2.7	20	30	75	1.0	140
C04372A	3.0	20	29	50	1.0	125
CD746A	3.3	20	28	10	1.0	120
CD747A	3.6	20	24	5	1.0	110
CD748A	3.9	20	23	5	1.0	100
C0749A	4.3	20	22	2	1.0	90
CD750A	4.7	20	19	5	1.5	85
C0751A	5.1	20	17	5	2.0	75
C0752A	5.6	20	11	5	2.5	70
C0753A	6.2	20	7	5	3.5	85
CD754A	6.8	20	5	2	4.0	60
CD755A	7.5	20	6	2	5.0	55
CD756A	8.2	20	8	1	6.0	50
CD757A	9.1	20	10	1	7.0	45
CD758A	10.0	20	17	1	8.0	40
C0759A	12.0	20	30	1	9.0	35

Electrical specifications @ +25°C (unless otherwise specified). Available in JANKC and JANHC.

NOTE 1: Zener voltage range equals nominal voltage ± 5% for "A" Suffix. No Suffix denotes ± 10%. "C" suffix = ± 2% and "D" suffix = ± 1%. Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms a.c. current equal to 10 % of I_{ZT}.

Silicon Switching Diode Chips CD914, CD4148, CD4531, CD6642 & CD4454

aeroflex.com/ metelics-hirelcomponents

Types	V_{BR} @ 100 mA Volts (min)	V_{RWM} Volts (pk)	I_O mA	V_{F1} I_F = 10 mA Vdc	V_{F2} I_F = 50 mA Vdc	V_{F3} I_F = 100 mA Vdc	T_{rr} nsec	I_{R1} @ 20 Vdc nA	I_{R2} µA @ V	I_{R3} @ 20 Vdc T_A = 150°C µA	I_{R4} T_A = 150°C µA @ V	Capacitance @ 0 V pF	Capacitance @ 1.5 V pF
CD914	100	75	75	0.8	1.2	N/A	5	25	0.5 @ 75	35	75 @ 75	4.0	2.8
CD4148 CD4531 CD6642	100	75	200	0.8	N/A	1.2	5	35	0.5 @ 75	35	75 @ 75	4.0	2.8
CD4454	75	50	200	1.0	N/A	N/A	4	N/A	0.1 @ 50	N/A	100 @ 50	2.0	N/A

Electrical specifications @ +25°C (unless otherwise specified). CD914, CD4148 and CD4531 available in JANKC and JANHC.

Silicon Switching Diode Chips CD3600, CD4150, CD6640 & CD4153

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Types	V_{BR} I_R = 10 µA* Volts (min)	V_{RWM} Volts (pk)	I_{R1} V_R = 50 Vdc T_A = 150°C µA Vdc	I_{R2} V_R = 50 Vdc T_A = 150°C µA Vdc	Capacitance V_R = 0; f = 1 MHz; ac signals = 50 mV (p-p) pF	T_{rr} nsec
CD3600	75	50	0.10	100	2.5	4
CD4150 CD6640	75	50	0.10	100	2.5	4
CD4153	75*	50	0.05	150	2.0	4

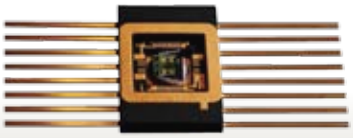
* @ 5 mA for CD4153

Electrical specifications @ +25°C (unless otherwise specified). CD4153 available in JANKC and JANHC.

Standard Products for HiRel Applications

RadTol Eclipse FPGAs
aeroflex.com/FPGA

	SRAM bits	Logic Cells	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per bit	Latch-Up Immune MeV - cm^2/mg	I/O	Package	QML Q & V	SMD #
UT6325	55K	1536	300	>42 logic cell flip flops >64 embedded SRAM	5.0E-7 2.0E-7	>120	99 I/O, 25 input 163 I/O, 25 input 316 I/O, 25 input	208 CQFP 288 CQFP 484 CCGA	Q, V	5962-04229
UT6325 Rapid Prototyping	55K	1536	300	>42 logic cell flip flops >64 embedded SRAM	5.0E-7 2.0E-7	>120	99 I/O, 25 input 163 I/O, 25 input 310 I/O, 25 input	208 PQFP 280 PBGA 484 PBGA	N/A	N/A
UT6325 Factory Programming Flow	Aeroflex provides an in-house solution for FPGA programming, HTOL/LTOL stress and electrical/parametric test. Requires customer input for programming and test vector files. Options exist for program only through full program, stress and test flow.									
UT100SpW02 SpaceWire IP Protocol Handler	The UT100SpW02 SpaceWire Protocol Handler IP is designed specifically for use with Aeroflex's Eclipse FPGA. Dual ECSS-E-50-12A compliant links; data rates from 2 to 100 Mbits/sec; 9 bit transmit and receive FIFO user interface.									



LVDS
aeroflex.com/LVDS

	Description	+3.3V	+5V	Package	Total Dose krads(Si)	QML Q & V	SMD #
UT54LVDS031 Quad Driver	Operates at >155.5 Mbps (77.7 MHz) switching ranges with ultra low power CMOS technology.		■	16 FP	300-1000	Q,V	5962-95833
UT54LVDS032 Quad Receiver	Operates at >155.5 Mbps (77.7 MHz) switching ranges with ultra low power CMOS technology. Receiver fail-safe.		■	16 FP	300-1000	Q,V	5962-95834
UT54LVDSC031 Quad Driver	Operates at >155.5 Mbps (77.7 MHz) switching ranges with ultra low power CMOS technology. Cold spare all LVDS outputs.		■	16 FP	300	Q,V	5962-95833
UT54LVDSC032 Quad Receiver	Operates at >155.5 Mbps (77.7 MHz) switching ranges with ultra low power CMOS technology. Receiver fail-safe. Cold spare all LVDS inputs.		■	16 FP	300	Q,V	5962-95834
UT54LVDS031LV/E Quad Driver	Operates at >400.0 Mbps (200 MHz) switching ranges with ultra low power CMOS technology. Cold spare all pins.	■		16 FP	300-1000	Q,V	5962-98651
UT54LVDS032LV/E Quad Receiver	Operates at >400.0 Mbps (200 MHz) switching ranges with ultra low power CMOS technology. Receiver fail-safe. Cold spare all pins.	■		16 FP	300-1000	Q,V	5962-98652
UT54LVDS217 Serializer	15 to 75 MHz shift clock support, power-down mode <60 µA (max), narrow bus reduces cable size and cost, cold spare all pins.	■		48 FP	300-1000	Q,V	5962-01534
UT54LVDS218 Deserializer	15 to 75 MHz shift clock support, power-down mode <60 µA (max), narrow bus reduces cable size and cost, cold spare all pins.	■		48 FP	300-1000	Q,V	5962-01535
UT54LVDM328 Octal 400 Mbps Bus LVDS Repeater	Operates at >400.0 Mbps (200 MHz) with 10mA LVDS output drivers. Cold spare all pins.	■		48 FP	300-1000	Q,V	5962-01536
UT54LVDM228 Quad 2x2 400 Mbps Crosspoint Switch	Operates at >400.0 Mbps (200 MHz) with 10mA LVDS output drivers. Cold spare all pins. Configurable as quad 2:1 mux, 1:2 demux, repeater or 1:2 signal splitter.	■		64 FP	300-1000	Q,V	5962-01537
UT54LVDS032LVT Low Voltage Quad Receiver with Integrated Termination Resistor	Operates at >400.0 Mbps (200 MHz) switching ranges with ultra low power CMOS technology, nominal 105 ohms integrated termination resistor. Cold spare all pins.	■		16 FP	300-1000	Q,V	5962-04201
UT54LVDM031LV Low Voltage Bus LVDS Quad Driver	Operates at >400.0 Mbps (200 MHz) with 10mA LVDS output drivers. Cold spare all pins.	■		16 FP	300	Q,V	5962-06201
UT54LVDM055LV Dual Driver and Receiver	Operates at >400.0 Mbps (200 MHz) with 10mA LVDS output drivers. Receiver fail-safe. Cold spare all pins.	■		18 FP	300	Q,V	5962-06202

MSI Logic

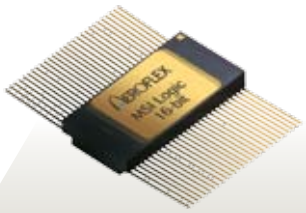
Standard Microcircuit Drawing (SMD) to Aeroflex Colorado Springs Part Number *www.aeroflex.com/Logic*

SMD #	Aeroflex Part #	Description
5962-96512 5962-96513 5962-96513	UT54ACS00 UT54ACTS00 ⋆UT54ACTS00E	Quadruple 2-Input NAND Gates
5962-96514 5962-96514 5962-96515 5962-96515	UT54ACS02 ⋆ UT54ACS02E UT54ACTS02 ⋆ UT54ACTS02E	Quadruple 2-Input NOR Gates
5962-96516 5962-96517 5962-96517	UT54ACS04 UT54ACTS04 ⋆UT54ACTS04E	Hex Inverters
5962-96518 5962-06518 5962-06519 5962-96519	UT54ACS08 ⋆UT54ACS08E UT54ACTS08 ⋆ UT54ACTS08E	Quadruple 2-Input AND Gates
5962-96520 5962-96521	UT54ACS10 UT54ACTS10	Triple 3-Input NAND Gates
5962-96522 5962-96523	UT54ACS11 UT54ACTS11	Triple 3-Input AND Gates
5962-96524 5962-96524 5962-96525 5962-96525	UT54ACS14 ⋆ UT54ACS14E UT54ACTS14 ⋆ UT54ACTS14E	Hex Inverter Schmitt Trigger
5962-96526 5962-96527	UT54ACS20 UT54ACTS20	Dual 4-Input NAND Gates
5962-96528 5962-96529	UT54ACS27 UT54ACTS27	Triple 3-Input NOR Gates
5962-96530 5962-96531	UT54ACS34 UT54ACTS34	Hex Noninverting Buffers
5962-96532 5962-96533	UT54ACS54 UT54ACTS54	4-Wide AND-OR-INVERT Gates
5962-96534 5962-96535 5962-90535	UT54ACS74 UT54ACTS74 ⋆ UT54ACTS74E	Dual D Flip-Flops with Clear & Preset
5962-96536 5962-96537	UT54ACS85 UT54ACTS85	4-Bit Comparators
5962-96538 5962-96539	UT54ACS86 UT54ACTS86	Quadruple 2-Input Exclusive OR Gates
5962-96540 5962-96540 5962-96541	UT54ACS109 ⋆ UT54ACS109E UT54ACTS109	Dual J-K Flip-Flops
5962-96542 5962-96542 5962-96543	UT54ACS132 ⋆ UT54ACS132E UT54ACTS132	Quadruple 2-Input NAND Schmitt Triggers
5962-96544 5962-96544 5962-96545	UT54ACS138 ⋆ UT54ACS138E UT54ACTS138	3-Line to 8-Line Decoders/Demultiplexers
5962-96546 5962-96547	UT54ACS139 UT54ACTS139	Dual 2-Line to 4-Line Decoders/Demultiplexers
5962-96548 5962-96549	UT54ACS151 UT54ACTS151	1 of 8 Data Selectors/Multiplexers
5962-96550 5962-96551 5962-96551	UT54ACS153 UT54ACTS153 ⋆ UT54ACTS153E	Dual 4-Input Multiplexer
5962-96552 5962-96553 5962-96553	UT54ACS157 UT54ACTS157 ⋆ UT54ACTS157E	Quadruple 2 to 1 Multiplexers
5962-96554 5962-96555	UT54ACS163 UT54ACTS163	4-Bit Synchronous Counters
5962-96556 5962-96556 5962-96557 5962-96557	UT54ACS164 ⋆ UT54ACS164E UT54ACTS164 ⋆ UT54ACTS164E	8-Bit Shift Registers
5962-96558 5962-96558 5962-96559	UT54ACS165 ⋆ UT54ACS165E UT54ACTS165	8-Bit Parallel Shift Registers
5962-96560 5962-96561	UT54ACS169 UT54ACTS169	4-Bit Up-Down Binary Counters
5962-96562 5962-96563	UT54ACS190 UT54ACTS190	Synchronous 4-Bit Up-Down BCD Counters
5962-96564 5962-96565	UT54ACS191 UT54ACTS191	Synchronous 4-Bit Up-Down Binary Counters
5962-96566 5962-96567 5962-96567	UT54ACS193 UT54ACTS193 ⋆ UT54ACS193E	Synchronous 4-Bit Up-Down Dual Clock
5962-96753	UT54ACTS220	Clock & Wait-State Generation Circuit
5962-96568 5962-96569	UT54ACS240 UT54ACTS240	Octal Buffers w/Inverted Three-State Outputs
5962-96570 5962-96571	UT54ACS244 UT54ACTS244	Octal Buffers & Line Drivers, Three-State Outputs
5962-96572	UT54ACS245S	Schmitt Trigger Octal Bus Transceivers w/Three-State Outputs
5962-96572 5962-96573 5962-96573	UT54ACS245 UT54ACTS245 ⋆ UT54ACTS245E	Octal Bus Transceivers with Three-State Outputs
5962-96574 5962-96575	UT54ACS253 UT54ACTS253	Dual 4-Input Multiplexers
5962-96576 5962-96577	UT54ACS264 UT54ACTS264	Look-Ahead Carry Generators for Counters
5962-96578 5962-96579	UT54ACS273 UT54ACTS273	Octal D Flip-Flops with Clear
5962-96580 5962-96581	UT54ACS279 UT54ACTS279	Quadruple S-R Latches
5962-96582 5962-96583	UT54ACS280 UT54ACTS280	9-Bit Parity Generators/Checkers
5962-96584 5962-96585 5962-96584	UT54ACS283 ⋆ UT54ACS283E UT54ACTS283	4-Bit Binary Full Adders
5962-06238	⋆ UT54ACS299E	Universal Shift/Storage Register
5962-96586 5962-96587	UT54ACS365 UT54ACTS365	Hex Buffer/Line Driver with Three-State Outputs
5962-96588 5962-96589	UT54ACS373 UT54ACTS373	Octal Transparent Latches with Three-State Outputs
5962-96590 5962-96591	UT54ACS374 UT54ACTS374	Octal D Flip-Flops with Three-State Outputs
5962-96592 5962-96593	UT54ACS540 UT54ACTS540	Octal Driver, with Inverted Three-State Output
5962-96594 5962-96595 5962-96595	UT54ACS541 UT54ACTS541 ⋆ UT54ACTS541E	Octal Driver, with Three-State Output
5962-06239	UT54ACS630	EDAC
5962-96596 5962-96597	UT54ACS4002 UT54ACTS4002	Dual 4-Input NOR Gate
5962-06240	UT54ACTS899	Latchable Transceiver with Parity Generator/Checker
5962-94754	UT22VP10	RadPal One Time Programmable Logic Array

⋆ 3.0V to 5.0V Supply Range

The MSI Logic Family is compatible to ACS and ACTS logic and has high speed, lower power consumption, 3- and 5-volt supply, and SEU threshold 80 MeV - cm^2/mg. We offer 14, 16, and 20 flatpack and 14, 16, and 20 DIP.

Standard Products for HiRel Applications



MSI Logic (16-bit wide)

aeroflex.com/16BitLogic

	Description	Package	Total Dose krads(Si)	QML Q & V	SMD #
UT54ACTQ16244 Buffer/Line Driver	16-bit wide Buffer/Line Driver, 16 non-inverting buffers with three-state outputs. 24mA slew rate limited buffers; low simultaneously switching noise.	48 FP	100	Q,V	5962-06243
UT54ACTQ16245 Transceiver	16-bit Bidirectional Transcever with TTL Inputs, and Three-State Outputs. 24mA slew rate limited buffers; low simultaneously switching noise.	48 FP	100	Q,V	5962-06244
UT54ACS164245S/ UT54ACS164245SE Transceiver	16-bit Wide MultiPurpose Transceiver with Schmitt Trigger Input, Cold Spare I/O, Mixed Supply Operation (5V to 3V Translation), 3V/3V and 5V/5V.	48 FP	100	Q,V	5962-98580
UT54ACS164245SEI Transceiver	16-bit Bidirectional MultiPurpose Transceiver with Schmitt Trigger Input, Cold and Warm Spare I/O, Mixed Supply Operation (5V to 3V translation), 3V/3V and 5V/5V.	48 FP	100	Q,V	5962-98580
UT54ACS162245SLV Transceiver	16-bit Wide MultiPurpose Transceiver with Schmitt Trigger Input, Cold and Warm Spare I/O, Mixed Supply Operation (3.3V to 2.5V Translation), 3.3V/2.5V and 2.5V/3.3V.	48 FP	100	Q,V	5962-02543
UT54ACTQ16374 D Flip-Flop TTL Inputs	16-bit wide D Flip-Flop TTL Inputs with Three-State Outputs. 24mA slew rate limited buffers; low simultaneously switching noise and 100MHz maximum clock.	48 FP	100	Q,V	5962-06245
UT54ACS164646S Transceiver	16-bit Wide MultiPurpose Registered Transceiver with Schmitt Trigger Input, Cold and Warm Spare I/O, Mixed Supply Operation (5V to 3V Translation), 3V/3V and 5V/5V.	56 FP	100	Q,V	5962-06234

HiRel Memories
aeroflex.com/memories

	Configuration	Voltages	Access/Clock	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per bit	Latch-Up Immune MeV - cm^2/mg	CMOS Inputs	Package	QML Q & V	SMD #
UT8R128K32 SRAM	128K x 32	3.3V*	15 ns	300	50	1.7E-7	>100	■	68 FP	Q,V	5962-03236
UT8R512K8 SRAM	512K x 8	3.3V*	15 ns	300	50	1.7E-7	>100	■	36 FP	Q,V	5962-03235
UT8CR512K32 SRAM	512K x 32	3.3V*	17 ns	300	50	1.7E-7	>100	■	68 FP	Q,V	5962-04227
UT8ER512K32 SRAM Monolithic	512K x 32	3.3V*	20 ns	100	N/A**	N/A**	>100	■	68 FP	Q,V	5962-06261
UT8Q512E 4M SRAM	512K x 8	3.3V	20 ns	50	50	2.8E-8	>100	■	36 FP	Q,V	5962-99607
UT8Q512K32E 16M SRAM MCM	512K x 32	3.3V	25 ns	50	50	2.8E-8	>100	■	68 FP	Q,V	5962-01533
UT9Q512E 4M SRAM	512K x 8	5V	20 ns	50	50	2.8E-8	>100	■	36 FP	Q,V	5952-00536
UT9Q512K32E 16M SRAM MCM	512K x 32	5V	25 ns	50	50	2.8E-8	>100	■	68 FP	Q,V	5962-01511
UT8ER1M32 32M SRAM MCM	1M x 32	3.3V*	20 ns	100	N/A**	N/A**	>100	■	132 FP	Q,V	5962-10202
UT8ER2M32 64M SRAM MCM	2M x 32	3.3V*	22 ns	100	N/A**	N/A**	>100	■	132 FP	Q,V***	5962-10203
UT8ER4M32 128M SRAM MCM †	4M x 32	3.3V*	25 ns	100	N/A**	N/A**	>100	■	132 FP	Q,V***	5962-10204
UT8R1M39 40M SRAM MCM	1M x 39	3.3V*	20 ns	100	15	8.0E-8	>100	■	132 FP	Q,V	5962-10205
UT8R2M39 80M SRAM MCM	2M x 39	3.3V*	22 ns	100	15	8.0E-8	>100	■	132 FP	Q,V***	5962-10206
UT8R4M39 160M SRAM MCM †	4M x 39	3.3V*	25 ns	100	15	8.0E-8	>100	■	132 FP	Q,V***	5962-10207
UT8MR2M8 16M MRAM †	2M x 8	3.3V	40 ns	300	N/A****	N/A****	>100	■	40 FP	Q,V***	TBD
UT8MR8M8 64M MRAM †	4 - 2M x 8	3.3V	50 ns	300	N/A****	N/A****	>100	■	64 FP	Q,V***	TBD

† Product in development. Please call 800-645-8862 for more information or visit the web site at aeroflex.com/memories.
* 1.8V core.
** The SEU error rate is driven by particle flux and EDAC scrub rate. The error rate is 6x10-16 errors/bit-day.
*** QML qualification in process.
**** No upsets at LET of 100 MeV - cm^2/mg.

Standard Products for HiRel Applications

QCOTS™ Memories
(Quantified Commercial Off-the-Shelf)
aeroflex.com/memories

	Configuration	Voltages	Access/Clock	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per bit	Latch-Up Immune MeV - cm^2/mg	CMOS Inputs	TTL Inputs	Package	QML Q, T & V	SMD #
UT7Q512 4M SRAM	512K x 8	5V	100 ns	30	5	1.0E-7	>80		■	32 FP	Q,T	5962-99606
UT8Q512 4M SRAM*	512K x 8	3.3V	20 ns	50	10	5.0E-9	>80		■	36 FP	Q,T	5962-99607
UT8Q1024K8 8M SRAM*	1024K x 8	3.3V	25 ns	50	10	5.0E-9	>80		■	44 FP	Q,T	5962-01532
UT8Q512K32 16M SRAM MCM*	512K x 32	3.3V	25 ns	50	10	5.0E-9	>80		■	68 FP	Q,T	5962-01533
UT8SDMQ64M40 2.5Gb SDRAM MCM	64M x 40	3.3V	TBD***	100	21	7.6E-10	>100	■		128 FP	Q,Q+**	5962-10229
UT8SDMQ64M48 3.0Gb SDRAM MCM	64M x 48	3.3V	TBD***	100	21	7.6E-10	>100	■		128 FP	Q,Q+**	5962-10230
UT8QNF8M8 64M NOR Flash	8M x 8 and 4M x 16	3.3V	60 ns	TBD***	TBD***	TBD***	TBD***	■		48 FP	Q,Q+**	5962-12204

* Contact factory for availability.
** QML qualification in process.

Legacy Memories
aeroflex.com/memories

	Configuration	Voltages	Access/Clock	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per bit	Latch-Up Immune MeV - cm^2/mg	CMOS Inputs	TTL Inputs	Package	QML Q, T & V	SMD #
UT7C138/139RH Dual-Port SRAM	4K x 8/9	5V	45 ns	1000	85	3.8E-8	>100	■	■	68 FP and 68 DIP	Q,V	5962-96845
UT28F64 PROM	8K x 8	5V	35 ns	1000	100	1.0E-11	>100		■	28 FP and 28 DIP	Q,V	5962-96873
UT28F64LV PROM	8K x 8	3.3V	55 ns	1000	100	1.0E-11	>100		■	28 FP and 28 DIP	Q,V	5962-01516
UT28F256LVQLE	32K x 8	3.3V	65 ns	100-1000	50	2.5E-6*	>100		■	28 FP	Q,V	5962-01517
UT28F256QLE	32K x 8	5V	45 ns	100-1000	50	9.4E-7*	>100		■	28 FP	Q,V	5962-96891

* Saturated Cross Section (cm^2) per device.

Microcontrollers/ Microprocessors
aeroflex.com/microcontrollers

Description	Total Dose krads(Si)	LET_{TH}(0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per device	Latch-Up Immune MeV - cm^2/mg	Package	QML Q & V	SMD #
UT69RH051 Microcontroller	Fully-compatible with MCS-51 ISA, 256 bytes data RAM, 32 programmable I/O ports, 7 interrupt sources; flexible clock operation 1-20 MHz.	1000	86	1.0E-4	*	40 DIP and 44 FP	Q,V	5962-95638
UT80CRH196KDS Microcontroller	Fully-compatible with MCS-96 ISA, 1K bytes data RAM, 3 programmable I/O ports, enhanced memory interface support and SEU performance, 18 interrupt sources; flexible clock operation 1-20 MHz, FirstPass Core IP.	300	48	6.0E-7	>128	68 FP	Q,V	5962-02523
UT80CRH196KD Microcontroller	Fully-compatible with MCS-96 ISA, 1K bytes data RAM, 3 programmable I/O ports, 18 interrupt sources; flexible clock operation 1-20 MHz, FirstPass Core IP.	100	25	3.1E-7	>128	68 FP	Q,V	5962-98583
UT69R000 Microcontroller	Harvard and Register-oriented architecture, 8 MIPs @ 16 MHz, 15 interrupt levels, 16-bit or 32-bit register configurations, SEU < 7.1E-10 E/B-D.	1000	60	1.2E-7	*	144 CGA/PGA and 132 FP	Q,V	5962-98552
UT1750AR RISC Microprocessor	Operates in RISC or MIL-STD-1750A mode, full 64K word address space, 16-bit and 32-bit registers.	1000	*	*	*	144 CGA/PGA and 132 FP	Q,V	5962-01502

* Contact factory for SEU report.

LEON Microprocessors
aeroflex.com/LEON

Description	Total Dose krads(Si)	LET_{TH}(0.25) MeV - cm^2/mg	Saturated Cross Section (cm^2) per device	Latch-Up Immune MeV - cm^2/mg	Package	QML Q & V	SMD #
GR712RC Dual-Core LEON 3FT SPARC™ V8 32-bit Microprocessor	GR712RC is a dual-core LEON3FT 32-bit processor, with two full SPARC V8 compliant integer units and two high performance fully pipelined IEEE-754 floating point units capable of running at up to 125 MHz, equating to 300 DMIPS and 250 MFLOPS throughput. GR712RC includes a memory controller with BCH and Reed-Solomon EDAC, 192 kByte on-chip memory with EDAC, 6 SpaceWire ports (2 with RMAP), 10/100 Ethernet, redundant Mil-Std-1553B BC/RT/BM interfaces, redundant CAN ports, CCSDS/ECSS TM/TC, SPI, I2C, 6 UARTs, JTAG debug port, etc. Industry standard development tools supported.	300	*	*	> 118	240 FP	**	***
UT699 32-bit Fault-Tolerant SPARC™ V8/LEON 3FT Processor	LEON 3FT 32-bit SPARC™ Microprocessor, full SPARC™ V8 compliant interger unit, capable of running up to a systems clock speed of 66MHz, equating to a 89 DMIPs throughput. Includes a high performance fully pipelined IEEE-754 Floating Point Unit and Multi-functional Memory Controller. Integrated peripherals include 4 SpaceWire ports, 32bit/33MHz PCI, 10/100 Ethernet, 2 CAN ports, and 1 debug port. Industry standard development tools supported. Flight heritage.	300	*	*	>100	352 FP and 484 LGA	Q,V	5962-08228
GR712RC-BOARD Dual-Core LEON 3FT Development Board	The GR712RC-BOARD evaluation board is capable of running at a system clock speed of 100MHz. The board is a double Eurocard form factor used in a standalone bench-top configuration. The board supports MIL-STD-1553B, 10/100 Base-T Ethernet, six SpaceWire ports capable of running up to 200Mbits/s, two CAN ports, on-board FLASH, SRAM, and SDRAM. USB debug port is also available on-board.							
GR-CPCI-UT699 Fault-Tolerant SPARC™ V8 Processor ASIC Evaluation Board	Development board with the UT699 LEON3FT SPARC V8 microprocessor. The board is cPCI form factor and can also be used in a standalone bench-top configuration. The board supports 32-bit/33MHz PCI, Ethernet, 4 SpaceWire ports capable of running up to 200Mbit/s, 2 CAN ports, on-board FLASH, SRAM, SDRAM, and socket for a PROM device. A USB debug port is provided.							
UT699 Single Board Computer	Off-the-shelf 3U cPCI form factor Single Board Computer (SBC) based on the UT699 LEON 3FT 32-bit SPARC™ V8 Microprocessor. The UT699 SBC addresses size (160mm x 100mm), weight (<4 pounds) and power (<5.5W). The UT699 SBC has a path to flight (non-flight and flight variants to be available). The UT699 SBC includes an FPGA, volatile and non-volatile memory, 10 user defined A/D channels, 194-pin mezzanine connectors (2) and the following interfaces: SpW (4), RS-485 (1), cPCI 33MHz/32bit (1), JTAG (2), 10/100 Ethernet (1) for terrestrial use. The non-flight UT699 SBC is also available in the ALExIS (Aeroflex LEON Experimenter's Interface System) development platform.							
ALExIS Development System	Aeroflex LEON Experimenter's Interface System is a ready-to-run development platform for customer applications with flexible architecture supporting quick path-to-flight after development. The ALExIS platform is a 3U cPCI chassis which comes with one non-flight UT699 SBC, a video card, a power card and two cPCI slots for future card expansion. Pre-loaded operating systems and applications drivers are also included with the ALExIS.							

* Contact factory for SEU report.
** Class S screening and qualification.
*** Per Aeroflex procurement specification.

Standard Products for HiRel Applications

MOSFETs *aeroflex.com/MOSFETS*	Breakdown Potential (V)	RDSON (mOhms)	Drain Current (A)	Gate Charge (nC)	Total Dose krads(Si)	SEE *	Die Size	Package	Screening
RAD7110-NCx	100	220	3.5	15	100	Au, Xe	1	Bare Die	Prototype, EM, Space
RAD7110-NFx	100	250	3.5	15	100	Au, Xe	1	TO-39	Prototype, EM, Space
RAD7130-NCx	100	TBD	TBD	50	100	Au, Xe	3	Bare Die	Prototype, EM, Space
RAD7130-NNJx	100	TBD	TBD	50	100	Au, Xe	3	SMD 0.5	Prototype, EM, Space
RAD7130-NYx	100	TBD	TBD	50	100	Au, Xe	3	TO-257AA	Prototype, EM, Space
RAD7160-NCx	100	10	60	150	100	Au, Xe	6	Bare Die	Prototype, EM, Space
RAD7160-NNAx	100	13	45	150	100	Au, Xe	6	SMD 2	Prototype, EM, Space
RAD7160-NMx	100	18	35	150	100	Au, Xe	6	TO-254AA	Prototype, EM, Space
RAD7114-NCx	150	600	2.2	15	100	Au, Xe	1	Bare Die	Prototype, EM, Space
RAD7114-NFP	150	630	2.2	15	100	Au, Xe	1	TO-39	Prototype, EM, Space
RAD7134-NCx	150	TBD	TBD	50	100	Au, Xe	3	Bare Die	Prototype, EM, Space
RAD7134-NNJx	150	TBD	TBD	50	100	Au, Xe	3	SMD 0.5	Prototype, EM, Space
RAD7134-NYx	150	TBD	TBD	50	100	Au, Xe	3	TO-257AA	Prototype, EM, Space
RAD7164-NCx	150	24	35	150	100	Au, Xe	6	Bare Die	Prototype, EM, Space
RAD7164-NNAx	150	27	35	150	100	Au, Xe	6	SMD 2	Prototype, EM, Space
RAD7164-NMx	150	32	35	150	100	Au, Xe	6	TO-254AA	Prototype, EM, Space
RAD7210-NCx	200	700	2.0	15	100	Au, Xe	1	Bare Die	Prototype, EM, Space
RAD7210-NFx	200	730	2.0	15	100	Au, Xe	1	TO-39	Prototype, EM, Space
RAD7230-NCx	200	TBD	TBD	50	100	Au, Xe	3	Bare Die	Prototype, EM, Space
RAD7230-NNJx	200	TBD	TBD	50	100	Au, Xe	3	SMD 0.5	Prototype, EM, Space
RAD7230-NYx	200	TBD	TBD	50	100	Au, Xe	3	TO-257AA	Prototype, EM, Space
RAD7260-NCx	200	34	30	150	100	Au, Xe	6	Bare Die	Prototype, EM, Space
RAD7260-NNAx	200	37	30	150	100	Au, Xe	6	SMD 2	Prototype, EM, Space
RAD7260-NMx	200	42	30	150	100	Au, Xe	6	TO-254AA	Prototype, EM, Space

* SEE (Single Event Effects)

Units exhibit immunity to SEGR and SEB at listed ion when tested at full rated drain potential and in the off-state. The following ion characteristics were used: Xe, 10MeV/n Berkeley beam. Initial LET of approximately 60MeV-cm^2/mg. Au, 1.7MeV/n Brookhaven beam. Initial LET of approximately 84MeV-cm^2/mg. See SEB/SEGR reports for full details.

x = P for prototypes, E for engineering samples, S for Class S.

MOSFETs *aeroflex.com/MOSFETS*	Breakdown Potential (V)	RDSON (mOhms)	Drain Current (A)	Gate Charge (nC)	Total Dose krads(Si)	SEE *	Die Size	Package	Screening
RAD7214-NCx	250	1200	1.5	15	100	Au, Xe	1	Bare Die	Prototype, EM, Space
RAD7214-NFx	250	1200	1.5	15	100	Au, Xe	1	TO-39	Prototype, EM, Space
RAD7234-NCx	250	200	9.0	50	100	Au, Xe	3	Bare Die	Prototype, EM, Space
RAD7234-NNJx	250	200	9.0	50	100	Au, Xe	3	SMD 0.5	Prototype, EM, Space
RAD7234-NYx	250	1200	1.2	15	100	Au, Xe	3	TO-257AA	Prototype, EM, Space
RAD7214-NQx	250	1200	1.2	15	100	Au, Xe	Quad	LCC-28	Prototype, EM, Space
RAD7214-NGx	250	1200	1.2	15	100	Au, Xe	Quad	DIP-14	Prototype, EM, Space
RAD7264-NCx	250	51	28	150	100	Au, Xe	6	Bare Die	Prototype, EM, Space
RAD7264-NNAx	250	54	28	150	100	Au, Xe	6	SMD 2	Prototype, EM, Space
RAD7264-NMx	250	59	28	150	100	Au, Xe	6	TO-254AA	Prototype, EM, Space

* SEE (Single Event Effects)

Units exhibit immunity to SEGR and SEB at listed ion when tested at full rated drain potential and in the off-state. The following ion characteristics were used: Xe, 10MeV/n Berkeley beam. Initial LET of approximately 60MeV-cm^2/mg. Au, 1.7MeV/n Brookhaven beam. Initial LET of approximately 84MeV-cm^2/mg. See SEB/SEGR reports for full details.

x = P for prototypes, E for engineering samples, S for Class S.

Aeroflex RAD MOSFET Numbering

RAD	7	1	1	0	-	N	M	P	X
	TID Level	Breakdown	Die Size	Breakdown Adder		Channel Type	Package	Screening	Technology
	7-100 krad(Si)	1 - 100V 2 - 200V	1 - Size 1 3 - Size 3 6 - Size 6	0 - None 3 - 30V 4 - 50V		N - N Type P - P Type M - Mixed	C - Bare Die F - TO39 NJ - SMD 0.5 M - TO-254AA Q - LCC 28 Pin G - DIP 14 Pin NA - SMD 2 y - TO-257AA	P - Proto E - EM S - Space	Reserved

Standard Products for HiRel Applications

Nuclear Event Detector (NED)

aeroflex.com/HiRel

	Description	Total Dose krads(Si)	LET_{ONSET} MeV - cm^2/mg	Latch-Up Immune MeV - cm^2/mg	Voltage (V)	Package	QML Q & V	SMD #
UTNEDCC301	Dual channel, multi-radiation, nuclear event detector. User-selectable dose rate thresholds from 1E5 to 1E7 rad(Si)/sec using threshold adjust resistor. Response time of < 10 nsec.	1000	100	110	5	14 CFP	N/A	SCD

Op Amps

aeroflex.com/opamp

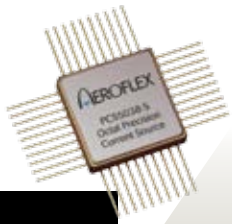
	Description	Package	SMD #
	Single power supply operation: 3.3V to 5V Radiation performance: CMOS ELDRS Immune Total dose > 1 Mrad(Si) SEL Immune > 100 MeV-cm^2/mg Displacement Damage > 10^{14} neutrons/cm^2		
RHD5900 Quad Op Amp	Quad Operational Amplifier with rail-to-rail input and outputs for general purpose operational amplifier applications.	16 SOIC	5962-1024101KXC
RHD5901 Quad Op Amp	Quad Operational Amplifier configured with enable/disable control. Pairs of amplifiers are put in a power-down condition with their outputs in a high-impedance state.	16 SOIC	5962-1024102KXC
RHD5902 Quad Op Amp	Higher-speed version of RHD5901 providing wider bandwidth and faster slew rate.	16 SOIC	5962-1024103KXC
RHD5903 Quad Op Amp †	Differential output operational amplifier. Outputs are centered at VDD/2.	20 SOIC	Pending
RHD5904 Quad Instrumentation Amplifiers †	Quad version of the standard instrumentation configuration. Gain 1, output centered at VDD/2.	16 SOIC	Pending
RHD5905 Quad Instrumentation Amplifiers †	Differential output version of RHD5904.	20 SOIC	Pending

† Product in development. Please call 800-645-8862 for more information or visit the web site aeroflex.com/HiRel.

PWM

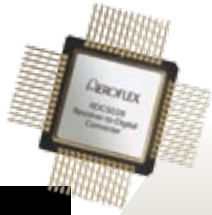
aeroflex.com/PWM

	Description	Total Dose krads(Si)	LET_{ONSET} MeV - cm^2/mg	Latch-Up Immune MeV - cm^2/mg	Package	SMD #
PWM5032 High-Speed PWM Controller	Optimized for power applications: Buck, Boost, Flyback, Forward and Center-Tapped Push-Pull converters. 1V thru 12V @ 1.0A drive capability. Selectable 50%/100% duty cycle. Low power CMOS technology.	1000	20	100	24 SOIC	5962-0625102KXC
PWM5034 High-Speed PWM Controller	Optimized for power applications: Buck, Boost, Flyback, Forward and Center-Tapped Push-Pull converters. 1V thru 12V @ 1.0A drive capability. Selectable 50%/100% duty cycle. Low power CMOS technology with unformed leads.	1000	20	100	24 FP	5962-0625102KYC



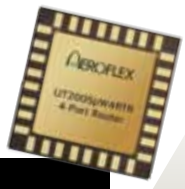
PCS
aeroflex.com/PCS

	Description	Total Dose krads(Si)	Package	SMD #
PCS5035 Quintet Precision Current Source	Monolithic quintet (5) precision current sources (each at 80µA) designed for thermistor current monitor and resistive sensor applications. Built-in comparators and precision internal 2.0VDC reference further simplifies the application design.	100	18 CFP	5962-0923401KXC
PCS5038 Octal Precision Current Source	The PCS5038 was designed to provide the flexibility needed to support a very wide range of resistive sensors. It contains eight precision current sources that can be set to source from 100uA to 2mA each with a single external resistor. Any number of the eight current source outputs can be tied together allowing the PCS5038 to drive multiple current source values.	100	40 CQFP	5962-0923402KYC



RDC
aeroflex.com/RDC

	Description	Total Dose krads(Si)	Latch-Up Immune MeV - cm²/mg	Package	SMD #
RDC5028 Resolver-to-Digital Converter	16-bit with accuracy to 5.3 arc minutes, single +5 volt @ 20mA represents HiRel best in class power consumption, selectable for 16-, 14-, 12- and 10-bit modes with velocity output. -55°C to 125°C operation.	1000	100	52 CQFP	5962-0423503KXC



SpaceWire
aeroflex.com/spacewire

	Links	Data Rates Mbps	Voltages	Total Dose krads(Si)	LET_{TH} (0.25) MeV - cm²/mg	Saturated Cross Section (cm²) per device	Latch-Up Immune MeV - cm²/mg	Package	QML Q & V	SMD #
UT200SpWPHY01 SpaceWire Physical Layer Transceiver	1	200	3.3V	100	109	5.0E-7 2.0E-7	>109	28 FP	Q,V	5962-06232
UT200SpW4RTR SpaceWire 4-port Router	4	200	2.5V, 3.3V	100	100	*	>100	255 CLGA	Q,V	5962-08244
UT200SpW4RTR-EVB 4-port Router Evaluation Board	The UT200SpWRTR-EVB is a 4-Port SpaceWire Router evaluation board designed to allow the system designer access to all the features of the UT200spW4RTR 4-Port Router as defined in the datasheet. The evaluation board can also be plugged into the Aeroflex Gaisler LEON 3-FT evaluation board.									
UT100SpW02 SpaceWire Protocol Handler IP	The UT100SpW02 SpaceWire Protocol Handler IP is designed specifically for use with Aeroflex's RadHard Eclipse FPGA. Dual ECSS-E-ST-50-KC compliant links; data rates from 2 to 100 Mbps; 9 bit transmit and receive FIFO user interface.									

* Contact factory for SEU report

Standard Products for HiRel Applications

Transistors
aeroflex.com/transistors

	Description	MIL-PRF-19500	Package
2N3791, 2N3792 *	PNP Power	/379	TO-3
2N3740, 2N3741 *	PNP Power	/441	TO-66
2N6298, 2N6299	PNP Power	/540	TO-66
2N5153 *	PNP Power	/545	TO-5 & TO-39
2N6193 *	PNP Power	/561	TO-39
2N3418, 19, 20, 21 *	NPN Power	/393	TO-5
2N4150 *	NPN Power	/394	TO-5 & TO-39
2N3055	NPN Power	/407	TO-3
2N3715, 2N3716 *	NPN Power	/408	TO-3
2N6058, 2N6059	NPN Power	/502	TO-3
2N6283, 6284	NPN Power	/504	TO-3
2N6249, 6250, 6251 *	NPN Power	/510	TO-3
2N3766, 2N3767	NPN Power	/518	TO-66
2N6300, 2N6301	NPN Power	/539	TO-66
2N6674, 2N6675	NPN Power	/537	TO-3
2N6676, 2N6678 *	NPN Power	/538	TO-3
2N5152, 2N5154 *	NPN Power	/544	TO-5 & TO-39
2N5339 *	NPN Power	/560	TO-39
2N2323, 24,26,28,29	SCR	/276	TO-5 & TO-39
2N2222A *	NPN Small Signal	/255	TO-18, UA, UB
2N2907A *	PNP Small Signal	/291	TO-18, UA, UB

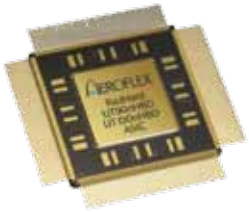
* denotes JANS level

All parts available for sale in die form.

Custom RadHard ASICs for HiRel Applications

RadHard Digital ASIC Products *aeroflex.com/RadHardASIC*	Description
UT0.6µCRH - 0.6µm	> 500K usable gates; clock rates >150 MHz; +5V and +3.3V operation; CMOS processed in commercial fab; RadHard from 100 to 300 krads(Si). QML V & Q.
UT0.25µHBD - 0.25µm	Up to 3.0M usable gates; toggle rates >1 GHz; single +3.3V supply or +3.3V I/O and +2.5V core operation; CMOS processed in commercial fab; RadHard from 100 krads(Si) to 1E6 rads(Si). QML V & Q.
UT130nHBD - 130nm	Ultra-low-power ASICs. Up to 15M usable gates; toggle rates up to 4 GHz; +3.3V/2.5V/1.8V I/O and +1.2V core operation; CMOS processed in commercial fab; RadHard from 100 to 300 krads(Si).
UT90nHBD - 90nm †	HBD performance ASICs. Up to 40M usable gates; toggle rates up to 10 GHz; +2.5V/1.8V I/O and +1.0V core operation; CMOS processed in commercial fab; RadHard from 100 to 300 krads(Si).
ASIC Design System	Supports design signoff in Synopsys and Mentor tools, and tools using VHDL and Verilog languages.
FPGA to ASIC Conversions	Convert RadHard (or non-RadHard) FPGAs (Field Programmable Gate Arrays) to high reliability RadHard ASICs.
Category 1A Trusted	Design, Assembly, and Backend Screening Services

† Product in development. Please call 800-645-8862 for more information or visit the web site aeroflex.com/RadHardASIC.



RadHard Mixed-Signal ASIC Products *aeroflex.com/RadHardASIC*	Description
UT0.6µCRH-0.6µm	High voltage (20V), highly linear custom analog. Example analog IP - PLL, bandgap, op-amps; 5V (±2.5V), 3.3V (±1.65V), 2.5V (±1.25). HV CMOS up to 20V. Up to 500k usable gates; toggle rates up to 215MHz. I/O types include SSTL, LVDS, PCI, CML. RadHard from 100 to 300krads(Si).
UT0.35µCRH-0.35µm	High precision (up to 21 bits), highly integrated custom analog. Example analog IP - ADCs, DACs, PLL, bandgap; 10V (±5V), 5V (±2.5V), 3.3V (±1.65V). Up to 1.5M usable gates; toggle rates up to 375MHz. Non-volatile memory options. I/O types include SSTL, LVDS, USB, RS232/RS485 (±5V), PCI, CML. RadHard from 100 to 300krads(Si).
UT0.18µCRH-0.18µm	Highly integrated (up to 256 data conversion channels), high-precision custom analog. Example analog IP - ADCs, DACs, PLL, op-amps; 5V (±2.5V), 3.3V (±1.65V), 1.8V (±0.9V). Up to 8M usable gates; toggle rates up to 2.4GHz. Non-volatile memory options. I/O types include SSTL, LVDS, USB, PCI, CML. RadHard from 100 to 300krads(Si).
ASIC Design System	Full custom design to customer peformance specification and/or supports design signoff in Synopsys/Mentor tools, and tools using VHDL/Verilog languages.

Aeroflex Trusted Accreditation *aeroflex.com/trusted*

Aeroflex Colorado Springs received Category 1A Trusted Accreditation by the Defense Microelectronics Activity as a Microelectronics Trusted Source for DoD and all other U.S. goverment users. The scope of the accreditation includes:

- Design Services
- Aggregation Services
- Broker Services
- Packaging and Assembly Services
- Test Services

Aeroflex Plainview received Category 1A Trusted Accreditation in 2010. Their scope includes:

- Packaging/Assembly

Circuit Card Assembly Capabilities

Circuit Card Assembly *aeroflex.com/CCA*

The Aeroflex Colorado Springs Circuit Card Assembly (CCA) capability consists of assembly, test and conformal coat in a high-mix/low-to-medium volume operation. Our process equipment and test capabilities provide for state-of-the-art manufacturing and are ISO 9001 and AS-9100 approved. We provide full turnkey or consignment sub-contract assembly services for high-reliability products including J-STD-001 and NASA 8739. We combine best commercial practices of circuit card assembly with our radiation-hardened integrated circuits to provide CCA solutions for the commercial space industry including a long history of installing Column Grid and other unique assembly technologies. Aeroflex works with our customers to develop and qualify unique assembly processes. We utilize 2D real-time X-rays to inspect hidden or critical assembly inspection concerns. Our CCAs are manufactured for space, military, and commercial programs where quality and process control are essential for mission success.

Aerospace Advantages

- High-reliability standards
- Board layout
- Low volume orders
- Supplier and BOM management
- Access to Aeroflex Standard Products and RadHard ASICs
- QML Q, T and V products
- Flown on commercial aircraft and commercial/military satellites

CCA Services

- Quick turn assembly
- Material management
- Flying probe testing
- Board layout
- Dock-to-stock with Aeroflex ICs
- SMT, through-hole, test and coat
- Customer-specific processes

Production Services

- Build to print
- Prototype
- Engineering
- Qualification
- Very low to moderate production
- Quick turn, typically less than 6 weeks from receipt of components and documents

Material Management

- Full turnkey or consigned material acquisition
- Supplier management
- BOM management
- Value-added component screening

IC Screening and Value-Added Capabilities

- PIND, RLAT, DPA, fine and gross leak
- Packaging, electrical testing, tinning, forming, and programming

Medium- and High-Power Amps

aeroflex.com/Microwave

	Description	Features
PA001002-20	Low noise and high linearity	100 to 200 MHz, P0.1dB > 17 dBm, NF < 1.2 dB typical, Space qualified
PA001002-22	High linearity amplifier	100 to 200 MHz, P0.1dB > 19 dBm, 19 dB typical Gain, Space qualified
PA001003-20	Low noise and high linearity	100 to 300 MHz P0.1dB > 17 dBm, NF < 1.1 dB typical, Space qualified
PA00104-27	Medium-power amplifier	0.1 to 4.0 GHz, P1 dB > 27 dBm, 25 dB typical gain, Single power supply +10V to +15V
PA002005-21	High linearity amplifier	200 to 500 MHz, P0.1dB > 18 dBm, 20 dB typical gain, Space qualified
PA010020-33	Medium-power amplifier	1.0 to 2.0 GHz, 2 Watt output power at 1 dB G.C.P., Low noise - less than 4 dB
PA090102-38	High-power amplifier	Dual channel 9.0 to 10.2 GHz, 35 dB typical gain, > 20% power-added efficient, 8 W CW per channel
PA020180-3025-SS	Broadband power amplifier	2 to 18 GHz >30 dBm p1dB up to 18 GHz, 25 dB typical gain, single supply
PA020180-3922	Broadband high power amplifier	2 to 18 GHz >38 dBm Psat output power, 22 dB typical gain, single +28V (1.2A) supply

RF Switches

aeroflex.com/Microwave

	Description	Features
SWSP6T0002020-35	Absorptive RF switch	SP6T, high-isolation >38 dB @ 2 GHz, low insertion loss of 2.0 dB @ 1 GHz, Space qualified
SWSPDT-000030-45	Absorptive RF switch	SPDT, 0.1 to 3 GHz, fast switching speed, <25 ns, low current <200 uA, Space qualified
SWSPDT-000300-55	Absorptive RF Switch	SPDT very high Isolation >55 dB up to 3 GHz, compact size, low insertion loss, Space qualified

Motion Solutions for HiRel Applications

Motion Control Products
aeroflex.com/motion

	Description
	Aeroflex Motion Control Products provides complete and integrated motion solutions for space, military, avionics, and strategic industrial customers such as motors, actuators, controllers, gimbals, slip rings, twist capsules and custom designed products.

Actuators
aeroflex.com/motion

	Description	Operating Torque
	Aeroflex has a significant heritage in actuation. This extensive experience allows us to build-in application-dependent customer design options for: motor selection; gear set; special interfaces; position feedback; pass-through for cabling/RF. We can modify existing designs to fit a specific application, or formulate a complete custom design. These designs can accommodate tough environmental requirements, including extreme temperatures, vacuum, radiation, dust, and corrosive atmospheres.	
16239	16:1 planetary gearhead with 10 MM Ø stepper motor	1.1 in-oz
16356	16:1 planetary gearhead with 10 MM Ø BDC motor	1.3 in-oz
16250	21.8:1 planetary gearhead with stepper motor	13 in-oz
16240	256:1 planetary gearhead with 10 MM Ø stepper motor	13.5 in-oz
16358	256:1 planetary gearhead with 10 MM Ø BDC motor	18.5 in-oz
16229	4:1 planetary gearhead with 1.8 degree hybrid stepper motor	140 in-oz
16243	10:1 planetary gearhead with 1.8 degree hybrid stepper motor	345 in-oz
16401	60:1 Harmonic Drive with 3.75 degree stepper motor	16 in-lb
16434	3954:1 planetary gearhead with BDC motor and integrated electronics	60 in-lb
16379	200:1 planetary gearhead with BDC motor and optional brake	65 in-lb
16283	200:1 planetary gearhead with 45 degree stepper motor	75.2 in-lb
16423	160:1 Harmonic Drive with 1.5 degree stepper motor, large thru hole	190 in-lb
16378	4000:1 planetary gearhead with BDC motor and optional brake	1100 in-lb
16362	200:1 planetary gearhead with BDC motor and optional brake	1600 in-lb
16385	8000:1 planetary gearhead with BDC motor and optional brake	2200 in-lb
16296	320,890:1 planetary gearhead with BDC motor and brake	232 ft-lb

Controllers
aeroflex.com/motion

	Description
	With extensive design and manufacturing capabilities in-house, Aeroflex can handle any aerospace electronic controller requirement. We offer a variety of drive schemes and interfaces, including MIL-STD-1553 and RS422/485. Aeroflex controllers can read a variety of position feedback devices, including resolvers, encoders, potentiometers, and hall sensors. Aeroflex offers a variety of custom and standard controller products featuring a wide selection of characteristics: FPGA based; radiation hardened; variety of external interfaces; BDCM or stepper motor drive schemes; hall, resolver or encoder commutation and position feedback; micro-stepping and closed-loop operation schemes; multiple motor driving capability
Stepper Controller	
Brushless DC Controller	

DC Motors
aeroflex.com/motion

Description

Our portfolio includes a wide range of DC motors specifically designed for HiRel applications. Aeroflex can customize all motors for specific requirements, and supply them as framed or frameless, housed or with custom mounting interfaces.

Brushless DC motors	• 2 or 3 phase • Optional commutation	
Zero cogging motors	• Ideal for precise pointing apps • 1 to 20-inch diameters	
Limited-angle torque motors	• Wide variety of catalog sizes • Cog-free motion in a limited range	
Voice coils	• Standard or custom designs • Linear or rotary motion	
Stepper motors	• Unipolar or bipolar • 1° to 90° step angles	Operating Torque
16225	1.8 degree hybrid housed stepper motor	36 in-oz
16298	1.8 degree hybrid housed stepper motor	27 in-oz
16345	1.8 degree hybrid housed stepper motor	25 in-oz
16262	2.0 degree frameless stepper motor	75 in-oz
16334	3.75 degree frameless stepper motor	75 in-oz
16305	30 degree housed stepper motor - 10 MM Ø	0.6 in-oz
Size 8	90 degree housed stepper motor - Unipolar	1.2 in-oz
Size 11	90 degree housed stepper motor - Bipolar	1.2 in-oz
Size 11	15 degree housed stepper motor - Unipolar	1.4 in-oz
Size 11	90 degree housed stepper motor - Unipolar	1.2 in-oz
Size 13	15 degree housed stepper motor - Bipolar	1.3 in-oz
Size 15	90 degree housed stepper motor - Bipolar	1.2 in-oz
Size 15	90 degree housed stepper motor - Unipolar	1.2 in-oz

Gimbals
aeroflex.com/motion

Description

Precision gimbals for pointing and tracking, stabilized platforms, and pedestals have been a specialty of Aeroflex Motion Control since the early 1940s. We have deep and broad experience in both terrestial and space applications. Whatever the application — intersatellite communications, stabilized shipboard uplinks, remote sensing systems, designators, tracking systems, or a host of others — we have expertise. Over several decades, we have provided thousands of systems and components. Coupled with our electronic motion controllers, we can provide a complete turnkey multi-axis gimbal system built to your requirements.

Motion Solutions for HiRel Applications

Slip Ring Assemblies
aeroflex.com/sliprings

A variety of applications require cable management systems to pass power, signals, video, fluids, and RF through a moving interface. Our slip ring assemblies are an ideal cable management option when the rotation is greater than 360°. We can fully customize our high-reliability slip ring assemblies to fit application requirements – or supply one of our standard products. Our slip rings can include: RF rotary joints; position feedback including resolvers and encoders; fiber optic rotary joints; fluid rotary joints. Aeroflex can also provide separate brush block and ring assemblies for applications that require this level of assembly. In addition, our slip ring products can be joined with one of our DC motor products for a complete solution for your particular application.

Twist Capsules
aeroflex.com/motion

Aeroflex's twist capsule products are designed for limited angle rotation applications. We customize our twist capsules for the number of lines, the range of motion, and the envelope available for each application. Like our slip ring assemblies, our twist capsules can transmit these signals: power; signal; RF; video; high frequency; telemetry.

Custom Designs
aeroflex.com/sliprings

	Description	Slip Rings	Twist Capsules
	Aeroflex can fully customize slip ring and twist capsule assemblies to fit commercial or military application requirements. We can also provide separate brush block and ring assemblies. Our slip rings and twist capsules can include the below signal types and options.		
Power	We have developed long life slip rings for constant rotation applications. We reduce the wear and debris generated in power slip rings through the use of proprietary materials and lengthen the life of the slip ring.	■	■
Analog / RF	We can transmit Analog, RF, HF and UHF signals through our assemblies. We impedance match the signal lines for minimum crosstalk and insertion losses.	■	■
High Speed Data	We can transmit high speed data signals through our assemblies. Below is a partial list of the signal types our slip rings have transmitted.	■	■
	RS-422	■	■
	USB	■	■
	Serial EIA-422	■	■
	Serial EIA-485	■	■
	GPIB/HPIB (IEEE-488.1)	■	■
	10BASE-T / 100BASE-T / 1000BASE-T	■	■
	USB Hi-Speed (USB 2.0)	■	■
	Camera Link	■	■
	Fibre Channel 2GB SCSI	■	■
	eSATA (SATA 300)		■
	FireWire (IEEE1394b)	■	■
	Fibre Channel 4GB SCSI		■
	USB Super Speed (USB 3.0)		■
	Camera Link Full		■
	Thunderbolt		■
Digital Video	We can process high speed digital video signals through our assemblies. Below is a partial list of video signal we can transmit. We continue to develop new designs as video technologies evolve.		
	SD-SDI (SMPTE 259M)	■	■
	HD-SDI (SMPTE 292M)	■	■
	LVDS Display Interface	■	■
	3G-SDI (SMPTE 424M)	■	■
	Single Link DVI	■	■
	HDMI	■	■
	DisplayPort		■
	Dual Link DVI		■
RF	We can integrate DC - 40 GHz non-contacting rotary joints up to 20 KW of power as well as rotating waveguide systems.	■	■
Fiber Optics	We can integrate fiber optic rotary joints into our slip ring assemblies: • Single mode or multi-mode • 1 through 36 fiber channels	■	■
Position feedback	We can sense speed, direction and position by integrating these products: • Resolvers • Encoders • Potentiometers	■	■
Fluid	We can integrate media rotary joints into our slip ring assemblies: • Air • Water • Fluids (Coolant, hydraulics, similar fluids)	■	■

Web Site Available Slip Rings

aeroflex.com/sliprings

	Power	Analog	Digital Data	High Speed Digital Video	High Speed Data	Number of Circuits	Outer Diameter (inches)	Length (inches)	Current Rating per Ring	Voltage Rating (V)	Electrical Noise	Lead Wire	Maximum Speed
1002010-206	■	■	■	■		6	0.440	0.490	2A	210 VDC / 240 VAC	50 mΩ	28 AWG	60 rpm
1002010-212	■	■	■	■		12	0.440	0.640	2A	210 VDC / 240 VAC	50 mΩ	28 AWG	60 rpm
1002010-218	■	■	■	■	■	18	0.440	0.780	2A	210 VDC / 240 VAC	50 mΩ	28 AWG	60 rpm
1002010-224	■	■	■	■	■	24	0.440	0.920	2A	210 VDC / 240 VAC	50 mΩ	28 AWG	60 rpm
1002010-106	■	■	■	■		6	0.870	0.520	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-112	■	■	■	■		12	0.870	0.760	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-118	■	■	■	■	■	18	0.870	1.000	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-124	■	■	■	■	■	24	0.870	1.240	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-136	■	■	■	■	■	36	0.870	1.720	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-140	■	■	■	■	■	40	0.870	1.880	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm
1002010-338	■	■	■	■	■	38	1.000	2.150	2A	210 VDC / 240 VAC	30 mΩ	26 AWG	250 rpm

Standard Slip Rings *

aeroflex.com/sliprings

	Power	Analog	Digital Data	High Speed Digital Video	High Speed Data	Number of Circuits	Outer Diameter (inches)	Length (inches)	Through Bore	Inner Diameter (inches)	Current Rating per Ring	Voltage Rating (V)	Electrical Noise	Lead Wire	Maximum Speed
1001544	■	■	■			12	0.225	0.840			0.5A	150 VAC / VDC	<10 mΩ	30 AWG	390 rpm
1001398	■	■	■	■	■	12	0.372	0.603			1A	150 VAC / VDC	<10 mΩ	30 AWG	1000 rpm
1000604	■	■	■	■		40 Max	0.562	1.665			1A	110 VAC / VDC	<10 mΩ	30 AWG	200 rpm
1000245	■	■	■	■	■	20 Max	0.690	1.700			1A	110 VAC / VDC	<10 mΩ	30 AWG	200 rpm
1001671	■	■	■	■	■	12	0.700	0.750	■	0.196	1A	120 VAC / VDC	<15 mΩ	28 AWG	500 rpm
1001884	■	■	■	■	■	10	1.000	2.150			1A/5A	24 VDC	<20 mΩ	18/20 AWG	500 rpm
1000110	■	■	■			30 Max	1.000	2.560			1A	150 VDC	<5 mΩ	28 AWG	750 rpm
1001847	■	■	■	■	■	18	1.250	1.270	■	0.375	2A	210 VDC	<20 mΩ	26 AWG	500 rpm
1001877	■	■	■	■	■	18	1.250	1.275	■	0.375	2A	110 VAC / VDC	<20 mΩ	26 AWG	1000 rpm
1001808	■	■	■	■	■	36	1.250	3.385	■	0.500	2A/8A	210 VDC	<10 mΩ	18/26 AWG	60 rpm
1000150	■	■	■			48 Max	1.720	4.500			2A	400 VDC	<10 mΩ	28 AWG	750 rpm
	■	■	■			80 Max	1.720	6.600			2A	400 VDC	<10 mΩ	22 AWG	750 rpm
1001666	■	■	■			8	1.800	1.990	■	0.501	5A	150 VAC / VDC	<10 mΩ	24 AWG	900 rpm
1001030	■	■				30 Max	2.500	5.750	■	0.500	5A	250 VDC	<10 mΩ	22 AWG	5000 rpm
1001611	■	■	■			42 Max	2.700	2.710	■	0.312	2A	100 VAC / VDC	<10 mΩ	22/26 AWG	500 rpm
1001675	■	■	■			66 Max	2.700	4.310	■	0.312	2A/5A	100 VAC / VDC	<10 mΩ	22/26 AWG	500 rpm
1001498	■	■	■			80	2.750	4.921	■	0.310	3A	110 VAC / VDC	<10 mΩ	22 AWG	150 rpm
	■	■	■			170	2.750	8.661	■	0.310	3A	110 VAC / VDC	<10 mΩ	22 AWG	150 rpm
	■	■	■			235	2.750	11.500	■	0.310	3A	110 VAC / VDC	<10 mΩ	22 AWG	150 rpm
	■	■	■			280	2.750	13.230	■	0.310	3A	110 VAC / VDC	<10 mΩ	22 AWG	150 rpm
1000490	■	■				100 Max	4.000	10.500	■	1.000	10A	250 VAC / VDC	<10 mΩ	Per request	5000 rpm
1000491	■	■				100 Max	5.000	10.500	■	1.750	10A	250 VAC / VDC	<10 mΩ	Per request	4000 rpm
1000492	■	■				100 Max	6.500	10.500	■	2.750	10A	250 VAC / VDC	<10 mΩ	Per request	3000 rpm
1000493	■	■				100 Max	7.500	10.500	■	3.750	10A	250 VAC / VDC	<10 mΩ	Per request	2500 rpm
1000494	■	■				100 Max	8.500	10.500	■	4.750	10A	250 VAC / VDC	<10 mΩ	Per request	2000 rpm
1001727	■	■	■			178	9.000	28.000	■	6.000	2A/20A	110 VAC / VDC	<10 mΩ	Per request	150 rpm
1000495	■	■				100 Max	9.500	10.500	■	5.750	10A	250 VAC / VDC	<10 mΩ	Per request	1500 rpm
1000496	■	■				100 Max	10.500	10.500	■	6.750	10A	250 VAC / VDC	<10 mΩ	Per request	1500 rpm
1001821	■	■	■	■	■	30	11.250	1.300	■	6.500	2A	110 VAC / VDC	<20 mΩ	24/26 AWG	50 rpm
1000497	■	■				100 Max	11.500	10.500	■	7.750	10A	250 VAC / VDC	<10 mΩ	Per request	1000 rpm
1000498	■	■				100 Max	13.000	10.500	■	8.750	10A	250 VAC / VDC	<10 mΩ	Per request	1000 rpm
1000499	■	■				100 Max	14.000	10.500	■	9.750	10A	250 VAC / VDC	<10 mΩ	Per request	750 rpm

* Product part numbers are listed by outer diameter size.

Power Management Solutions for Battery Electronics

Battery Electronics Units
aeroflex.com/BEU

	Cells	Description	Size
		Aeroflex Plainview's new Battery Electronics Units provide autonomous cell balancing for Lithium-Ion batteries. A series stack of Lithium- Ion cells are accurately charge balanced so the battery can be utilized to its fullest capacity. The cell balancing circuitry uses a set of bi-directional DC-DC converters that tie the cells of the battery to a common share bus. Cell charge is distributed among the multiple cells so that the charge of each cell is brought to the average charge of the other cells. Cell balancing can, therefore, be performed at any state of charge of the battery. Individual cell voltage monitors keep track of cells that may exceed charge limits. Precise voltage telemetry is provided for all cells and the battery. Optional features include reconditioning load control and cell bypass relay drivers.	
BEU8635	8, 12, 24	Balancing for 24-cell battery, with cell voltage monitoring and telemetry	11.50″ L x 2.30″ W x 5.25″ H
BEU8636 †	8, 12, 24	Balancing for 24-cell battery, with cell voltage monitoring and telemetry and cell bypass relay drivers	11.50″L x 3.30″W x 5.25″H
BEU8637	8, 12	Independent balancing for two 12-cell batteries or redundant balancing for a single 12-cell battery, with cell voltage monitoring and telemetry	11.50″ L x 4.00″ W x 5.25″H
BEU8638 †	8, 12	Independent balancing for two 12-cell batteries or redundant balancing for a single 12-cell battery, with cell voltage monitoring and telemetry, reconditioning load control and cell bypass relay drivers	11.50″ L x 5.20″ W x 5.25″ H
BEU8640	24	Dual redundant balancing for up to 24-cell battery, with cell voltage monitoring and telemetry, reconditioning load control and cell bypass relay drivers	11.50″ L x 5.30″ W x 5.25″ H
BEU8642-EVAL	8	Balancing for 8-cell battery, with cell voltage monitoring and telemetry, temperature monitoring, built-in test, RS-232 output for data logging, LCD display for cell voltage, temperature and status	12.00″ L x 9.00″ W x 2.65″ H

† Product in development. Please call 800-645-8862 for more information or visit the web site aeroflex.com/BEU.

Battery Interface Electronic Assembly
aeroflex.com/BEU

	Cells	Description	Size
BIE8678	8 – 32	The Battery Interface Electronic (BIE) assembly provides an interface between a space vehicle electrical power system (EPS) and its' Lithium Ion batteries (comprised of 8 to 32 cells). The BIE provides real time battery status monitoring, telemetry and control, and insures safe battery operation throughout the mission life. It is fully space qualified and is designed to support a wide range of missions including LEO, MEO, GEO, MEO, interplanetary and manned flight. The BIE assembly inludes three primary components: the Voltage/Temperature Monitoring Module (VTM), the Over Charge Protection Module (OCP), and the Battery Isolation Switch.	6.95″ W x 11.71″ L x 4.50″ H

Licensable IP Cores and Processors

aeroflex.com/Gaisler

	Description
LEON3 SPARC V8 Processor Core	The LEON3 is a synthesisable VHDL model of a 32-bit processor compliant with the SPARC V8 architecture. The model is highly configurable, and particularly suitable for system-on-a-chip (SOC) designs. Delivery format is source code.
LEON3FT Fault-tolerant SPARC V8 Processor Core	The LEON3FT is a fault-tolerant version of the standard LEON3 SPARC V8 Processor. It has been designed for operation in the harsh space environment, and includes functionality to detect and correct (SEU) errors in all on-chip RAM memories. Delivery format is netlist.
LEON3FT for Actel RTAX FPGAs	The LEON3FT adapted for optimum performance using the Actel RTAX FPGAs. It has been designed for operation in the harsh space environment, and includes functionality to detect and correct (SEU) errors in all on-chip RAM memories. Delivery format is netlist.
LEON4 SPARC V8 Processor Core	The LEON4 is a synthesisable VHDL model of a 32-bit processor compliant with the SPARC V8 architecture. The LEON4 implements 64/128 bit buses and caches which improves the performance. The model is highly configurable, and particularly suitable for system-on-a-chip (SOC) designs. Delivery format is source code

Licensable IP Cores

aeroflex.com/Gaisler

	Description
GRLIB - Portable IP library	The GRLIB IP Library is an integrated set of about 70 reusable IP cores, designed for system-on-chip (SOC) development. The IP cores are centered around the common on-chip bus, and use a coherent method for simulation and synthesis. A unique plug & play method is used to configure and connect the IP cores without the need to modify any global resources. Delivery format is source code.
GRFPU - IEEE-754 Floating-Point Unit	The GRFPU is an IEEE-754 compliant floating-point unit, supporting both single and double precision operands. The advanced design combines high throughput with low latency, providing up to 250 MFLOPS on a 0.13µm ASIC process. Delivery format is netlist.
GRPCI - Master/Target PCI Bridge	The GRPCI provides a 32-bit master/target interface for AMBA AHB-2.0 systems. It includes parameterizable FIFOs for both master and target operation, and can optionally be provided with an independent DMA engine. Delivery format is source code.
GR1553 - AHB IF for 1553BRM	The GR1553 VHDL Library contains wrappers to interface the Actel 1553 cores to the AMBA-2.0 AHB/APB on-chip buses. Wrappers for the following Actel cores are provided: Core1553BBC, Core1553BRT and Core1553BRM. Delivery format is source code.
GR1553B	The GR1553B core implements the MIL-STD-1553B (Notice 2) data bus protocol, with ability to serve as Bus Controller (BC), Remote Terminal (RT) or -Bus Monitor (BM). The core is connected to the MIL-STD-1553B bus via a dual transceiver interface (txP/N/en, rxP/N/en). On the system side, the core connects to the AMBA bus as an AHB master for DMA transfers and an APB slave for register access. The core uses a separate 20 MHz clock for the MIL-STD-1553B codec, and runs at any AMBA clock frequency from 10 MHz and upwards. Delivery format is source code.
GRSPW2 - SpaceWire Link	The GRSPW2 implements a SpaceWire Codec with RMAP support and AMBA host interface. The core implements the SpaceWire standard with the protocol identification extension (ECSS-E- 50-12 part 2) and RMAP protocol. Receive and transmit data is autonomously transferred between the SpaceWire Codec and the AMBA AHB bus using DMA transfers. Delivery format is netlist.
GRSPWROUTER - SpaceWire Router	The SpaceWire router core implements a SpaceWire router as defined in the ECSS-E-ST-50-12C standard. It supports from 0 to 31 ports (excluding the mandatory configuration port) which can be individually configured to be external SpaceWire links, FIFO ports or AHB ports. The AHB ports are limited to a maximum of 16 in a single router. Delivery format is netlist.
GRETH - 10/100/1000 Mbit Ethernet MAC	The GRETH_GBIT implements a 10/100/1000 Mbit/s Ethernet Media Access Controller (MAC) with AMBA host interface. The core implements the 802.3-2002 Ethernet standard. Receive and transmit data is autonomously transferred between the Ethernet MAC and the AMBA AHB bus using DMA transfers. Delivery format is source code.
GRUSBHC - USB 2.0 Host Controller	The USB 2.0 Host Controller provides a link between the AMBA on-chip bus and the Universal Serial Bus (USB). The host controller supports High- Full- and Low-Speed USB traffic. USB 2.0 High-Speed functionality is supplied by an enhanced host controller implementing the Enhanced Host Controller Interface (EHCI). Full- and Low-Speed functionality (USB 2.0 and USB 1.1) is supplied by one or more companion controllers implementing the Universal Host Controller Interface (UHCI). Delivery format is source code.
GRUSBDC - USB 2.0 Device Controller	The USB 2.0 Device Controller provides an interface between an USB 2.0 bus and an AMBA-AHB bus. The core is used for implementing USB 2.0 functions providing access to the USB through either an AHB slave or an AHB master interface. The master interface is capable of higher bandwidths but is more complex and requires external memory. The slave interface is simpler and does not require external memory but is more bandwidth limited. UTMI, UTMI+ and ULPI PHYs are supported. Delivery format is source code.
GRCAN - CAN 2.0 Controller	The GRCAN provides a CAN 2.0 controller for AMBA AHB-2.0 systems. The CAN controller supports transmission and reception of sets of messages by use of circular buffers located in memory external to the core. Separate transmit and receive buffers are assumed. Reception and transmission of sets of messages can be ongoing simultaneously. Delivery format is source code.
GRI2C - Inter IC Bus Interface	The IC bus is a simple 2-wire serial multi-master bus with collision detection and arbitration. The bus consists of a serial data line (SDA) and a serial clock line (SCL). Both the master and a slave cores are provided. Delivery format is source code.
GRSPI - Serial Peripheral Interface	The core provides a link between the AMBA APB bus and the Serial Peripheral Interface (SPI) bus. Through registers mapped into APB address space, the core can be configured to work either as a master or a slave. Delivery format is source code.
GRAES/GRECC - Crypotography Cores	The GRAES - Advanced Encryption Standard (AES) cryptography and the GRECC - Elliptic Curve Cryptography (ECC) cryptography cores combine high throughput performance with seamless integration with the LEON3 32-bit SPARC processor core. Delivery format is source code.
Spacecraft Data Handling	The Spacecraft Data Handling IP cores represent a collection of cores that have been developed specifically for the space sector. These IP cores implement functions commonly used in spacecraft data handling and management systems. Delivery format is source code.

Processing Solutions for HiRel Applications

Components *aeroflex.com/Gaisler*	Description
GR701A	GR701A is a PCI to SpaceWire and 1553 Bridge. Its fault tolerant design is implemented using the Actel RTAX FPGA technology to enable total immunity to radiation effects.
LEON3FT - RTAX	LEON3FT-RTAX is an implementation of the LEON3FT SPAR V8 processor using the Actel RTAX FPGA technology. The fault tolerant design of the processor in combination with the radiation tolerant FPGA gives total immunity to radiation effects.
RT-SPW-ROUTER	The Radiation-Tolerant SpaceWire Router family is available as standard components using the Actel RTAX and RT ProASIC3 Field Programmable Gate Arrays. The fault tolerant design of the router in combination with the radiation tolerant FPGA makes it ideally suited for space and other high-rel applications.
GR712RC	The GR712RC is an implementation of the dual-core LEON3FT SPARC V8 processor using RadSafe™ technology. The fault tolerant design of the processor in combination with the radiation tolerant technology provides total immunity to radiation effects.

Software Tools *aeroflex.com/Gaisler*	Description
GRMON	GRMON is a hardware debug monitor for LEON processors. It communicates with the LEON Debug Support Unit (DSU) and allows non-intrusive debugging of the complete target system.
TSIM ERC32/LEON Simulator	TSIM is an instruction-level simulator capable of emulating ERC32- and LEON-based computer systems. TSIM is developed for near-real time performance and cycle true behaviour. Using the simulators, it is possible to develop and debug target applications before the real hardware is available, thereby shortening the product development cycle.
TSIM-HW LEON2	TSIM-HW is a high-performance simulator emulating the LEON2 AT697F processor core together with the standard memory controller and external PROM, SRAM and SDRAM memory. It is based on the existing TSIM simulator and extended with a dedicated hardware-acceleration engine to provide better than real-time simulation performance.
GRSIM LEON Multi-Processor Simulator	The GRSIM simulator emulates a multi-processor LEON3 system, and has an accurate modelling of the on-chip IP cores and AMBA buses. It is time-based rather than instruction-based (as TSIM) and can be attached to other simulation frameworks such as System-C.

Compilers and Operating Systems *aeroflex.com/Gaisler*	Description
Bare-C Cross-Compiler System (BCC)	BCC is open source and royalty-free. It includes: GNU C/C++ Compiler with binutils, Simple bare-C runtime with interrupt support, optional Pthreads support, GNU gdb debugger with DDD front-end.
RTEMS Cross-Compiler System (RCC)	RCC is open source and royalty-free. It includes: GNU C/C++ Compiler with binutils, RTEMS real-time kernel 4.8.0 or 4.6.5, Network and file system support, GNU gdb debugger with DDD front-end.
eCOS Real-Time O/S for LEON	eCos is an open source, royalty-free, real-time operating system intended for embedded applications. The highly configurable nature of eCos allows the operating system to be customised to precise application requirements, delivering the best possible run-time performance and an optimised hardware resource footprint.
SnapGear Embedded LINUX for LEON	LINUX is open source and royalty-free. SnapGear Linux is a full source package, containing kernel, libraries and application code for rapid development of embedded Linux systems. The LEON port of SnapGear supports both MMU and non-MMU LEON configurations, as well as the optional V8 mul/div instructions and Floating-Point Unit (FPU). The port includes Symmetric Multi-Processing (SMP) support for LEON3 systems with multiple processors.
VxWorks 6.X port and BSP for LEON	The VxWorks-6.X-LEON is a port of Wind River VxWorks 6.X operating system to the LEON processor. A BSP and drivers for all standard on-chip peripherals are included. Development can be done on Linux or Windows hosts. The port and BSP are provided in full source code with example projects supplied.
Nucleus port and BSP for LEON	The Nucleus-LEON is a port of the Mentor Graphics Nucleus operating system. A BSP and drivers for all standard on-chip peripherals are included. Development can be done on Linux or Windows hosts. The port and BSP are provided in full source code.
ThreadX port and BSP for LEON	The ThreadX-LEON is a port of the Express Logic ThreadX operating system. A BSP and drivers for Ethernet and UARTS are included. Development can be done on Linux or Windows hosts. The port and BSP are provided in full source code.
LynxOS port and BSP	The LynxOS-LEON is a port of the LynuxWorks LynxOS operating system. A BSP and drivers for Ethernet and UARTS are included. Development can be done on Linux or Windows hosts. The port and BSP are provided in full source code.

Boards
aeroflex.com/Gaisler

	Description
GR-CPCI-UT699	Development board with the UT699 LEON3FT SPARC V8 microprocessor is capable of running at a system clock speed of 66MHz. The board is cPCI form factor and can also be used in a standalone bench-top configuration. The board supports 32-bit/33MHz PCI, Ethernet, 4 SpaceWire ports capable of running up to 200Mbit/s, 2 CAN ports, on-board FLASH, SRAM, SDRAM, and socket for a PROM device. A USB debug port is provided.
GR-CPCI-AT697	Development board with the AT697 LEON2FT SPARC V8 microprocessor capable of running at a system clock speed of 80MHz. The board is cPCI form factor. The board supports 32-bit/33MHz PCI, Ethernet, on-board FLASH, SRAM, SDRAM. An serial debug port is provided.
GR-PCI-XC5V	Xilinx Virtex 5, XC5VLX50 FPGA PCI format plug in board, especially developed for LEON development, with on-board SO-DIMM, SRAM, FLASH, GBit Ethernet, USB 2.0, DSU UART, user and memory expansion connectors .
GR-CPCI-XC4V	Xilinx Virtex 4, XC4VLX100 FPGA cPCI format plug in board, especially developed for LEON development, with on-board SO-DIMM, SRAM, FLASH, DSU UART, user and memory expansion connectors. The board is capable of operating stand-alone, as a Compact-PCI plug-in card, and as a Compact-PCI system controller.
GR-CPCI-AX	The board supports the early development and fast prototyping of LEON3/RTAX designs. The board incorporates a socket for an Actel AX2000/ RTAX2000 FPGA, with on-board SO-DIMM, SRAM, FLASH, DSU UART, user and memory expansion connectors. The board is capable of operating stand-alone, as a Compact-PCI plug-in card, and as a Compact-PCI system controller.
GR-LEON4-ITX	Low cost, dual core LEON4 development board. The board provides USB, Ethernet, PCI, Video, PS2, I2C, SPI, DDR2 SDRAM, FLASH, DSU UART, user and memory expansion connectors.
GR-MCC-C	Actel ProASIC3L / RT ProASIC3 FPGA board, especially developed for LEON3 / LEON3-FT development, with on-board SRAM, Flash PROM, ADC devices, LVDS and CAN transceivers, user I/O expansion connectors, etc.
GR712RC-BOARD	The GR712RC-BOARD evaluation board is capable of running at a system clock speed of 100MHz. The board is a double Eurocard form factor used in a standalone bench-top configuration. The board supports MIL-STD-1553B, 10/100 Base-T Ethernet, six SpaceWire ports capable of running up to 200Mbits/s, two CAN ports, on-board FLASH, SRAM, and SDRAM. USB debug port is also available on-board.
GR-XC6S-LX75	Xilinx Spartan6, XC6SLX75 FPGA stand alone FPGA development board, especially developed for LEON development, with on-board DDR2 RAM, FLASH, Ethernet, DVI/Video DAC, USB, 2x PS/2, 2x UART, PIO and user expansion connectors.

Development Platforms
aeroflex.com/Gaisler

	Description
GR-RASTA Spacecraft Avionics Development Platform	LEON3FT based avionics development platform in standalone, bench-top configuration. Supports 32-bit/33MHz PCI, Ethernet, CAN, 1553, CCSDS TM/TC, SpaceWire links capable of running up to 200Mbit/s. The platform is configurable and built to customer needs.
SpaceWire-RTC Development Suite	A system to support the development of hardware and software for the SpaceWire-RTC (AT7913) ASIC.

Test Equipment
aeroflex.com/Gaisler

	Description
GRESB SpaceWire/Ethernet Bridge	The GRESB bridge facilitates rapid development and testing of equipment with SpaceWire interfaces. It provides three bi-directional SpaceWire links with a maximum bit rate of 100 Mbit/s and six "virtual" links that are interfaced through TCP sockets. Each SpaceWire link can be individually configured with respect of transmission bit rate.
Telemetry and Telecommand EGSE	The CCSDS / ECSS Telemetry and Telecommand EGSE (Electrical Ground Support Equipment) provides the necessary means for communicating with the on-board space segment. It has been designed to support satellite integration and test activities, on-board space segment development, ground segment applications, etc.

Radiation Effects Testing Capabilities

MIL-STD Radiation Effects Test Services

aeroflex.com/RAD

- Total Ionizing Dose (TID) RLAT (50 to 300 rads/sec)
  — MIL-STD-883 TM 1019, Cond. A
- TID ELDRS (10 to 100 mrads/sec)
  — MIL-STD-883 TM 1019, Cond. D, ESA/SCC22900
- Prompt dose
  — MIL-STD-883 TM 1020 and 1021
- Neutron SEE
- Heavy ion SEE (SEL, SEU and SET)
  — EIA/JESD 57, ASTM F1192
- Proton: Heavy Ion SEE
- Cryogenic FPA testing (25 K)

Aeroflex RAD's 14Mev Neutron Irradiator

Device Preparation for Single Event Effects Testing

aeroflex.com/RAD

Preparation for Single Event Effects (SEE) Testing can be quite demanding. Aeroflex RAD can significantly lessen these demands by using Aeroflex RAD proprietary processes and techniques that simplify this task.

Backside thinning to 35µm allows for SEE testing at TAMU or Berkeley without repackaging of ICs.

Finished Package Backside Thinning

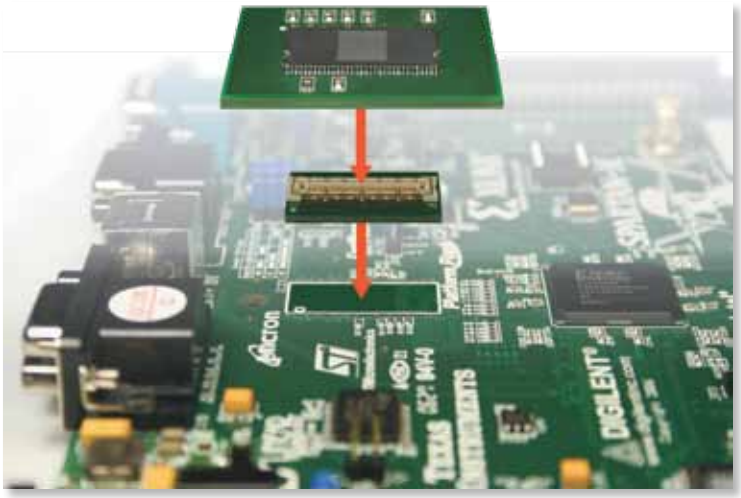
- Package backside thinning to 35µm ±5µm
- Custom PC board design in preparation for SEE Testing
- Custom DUT Socket Solutions for SEE Testing of multiple interchangeable ICs for at-speed testing on a test board

Die Thinning

- Die thinning is available as required to any thickness (±5µm)

Die Extraction / Repackaging

- When package backside thinning is not a solution, we routinely perform die extraction and repackaging in preparation for SEE Testing
- Custom PC board design for SEE testing is available



Device Screening and Element Evaluation

aeroflex.com/RAD

Aeroflex RAD offers comprehensive screening services for your flight devices, lot conformance, and individual die element evaluation.

Screening Test Method Capabilities

	MIL-STD Test Methods	
Test Description	883	750
Adhesion of Lead Finish	2025	n/a
Bond Strength	2011	2037
Burn-in	1015	1039
Constant Acceleration	2001	2006
Die Shear	2019	2017
External Visual	2009	2071
Hermiticity	1014	1071
Internal Visual	2010	2072
Internal Water Vapor	1018	1018
Lead Integrity	2004	2036
Lid Torque	2024	n/a
Mechanical Shock	2002	2016
Moisture Resistance	1004	1021
Physical Dimensions	2016	2066
PIND	2020	2052
Radiography X-ray	2012	2076
Resistance to Solvents	2015	1022
Salt Atmosphere	1009	1041
Solderability	2003	2026
Steady State Life	1005	1026
Temperature Cycling	1010	1051
Thermal Shock	1011	1056
Vibration Variable Frequency	2007	2056

Quick-Turn Prototype IC Assembly

aeroflex.com/RAD

Aeroflex RAD offers the following services: Quick-Turn Prototype IC Assembly in ceramic, etched out plastic, COB and flip chip.

Quick-Turn Prototype IC Assembly Capabilities

- Dicing, Die Visual and Die Attach
  - Wafer Dicing (up to 12inch wafers)
  - Visual Inspection (50-500X)
  - Conductive and non-conductive epoxy die attach
  - Silver Glass and Eutectic die attach
  - Flip Chip
- Wirebond, Encapsulation and Marking
  - Gold and Aluminum Wirebond (to 35µm pitch)
  - Epoxy, Solder, and Glass Frit Lid Seal
  - Dam and Fill (Plastic Encapsulation)
    - Plastic Equivalent Devices
    - COB Glob Top
  - Package Ink Marking or Laser Marking
- Package Options
  - Multi-chip / Stacked Modules, Chip-On-Board (COB), and Custom Substrates
  - Ceramic Packages Including: BGA, PGA, J-Lead, Flat Pack, QFP, Sidebraze, Cerdip and others
  - Etched Cavity Plastic Packages Including: J-Lead, QFP, SOIC, TSSOP, QFN /MLF and others

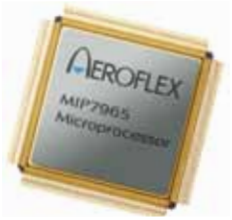
Cryogenic Dewar Test Chamber

Standard Products for Avionic Applications

MIPS RISC 64Bit Microprocessors
aeroflex.com/MIPS

	Description	CPU Speed (MHz)	Package
ACT-7000ASC-300F17(X)	64 bit SysAD bus interface in a cavity-up hermetic CQFP.	300	208 CQFP (1.12"sq)
ACT-7000ASC-300F24(X)	64 bit SysAD bus interface in a cavity-down hermetic CQFP.	300	208 CQFP (1.12"sq)
MIP7365-450B1(X)	64 bit SysAD bus interface in a TBGA.	450	Plastic 256 TBGA (26mm sq)
MIP7965-668F17(X)	64 bit SysAD bus interface in a cavity-up hermetic CQFP with EJTAG debug port.	668	208 CQFP (1.12"sq)
MIP7965-668F24(X)	64 bit SysAD bus interface in a cavity-down hermetic CQFP with EJTAG debug port.	668	208 CQFP (1.12"sq)
MIP7965-750B1(X)	64 bit SysAD bus interface in a TBGA with EJTAG debug port.	750	Plastic 256 TBGA (26mm sq)

(X) = Temperature range and screening code (see data sheet).



Memory Modules
aeroflex.com/avionics

	Description	Access Speed (ns)	Package
	High-Speed, low-noise, low-voltage TTL (LVTTL) compatible outputs. 3.3V operation with separate logic and output driver power pins. All inputs and outputs are synchronized with the CLK input to simplify system design and enhance use with high-speed microprocessors. Internal pipelined operation; column address can be changed every clock cycle. CAS latency (CL) programmable to 2 cycles from column-address entry. Cycle-by-cycle DQ-bus write mask capability with upper and lower byte control. Chip select and clock enable for enhanced-system interfacing. Auto-Refresh.		
Model: ACT-D1M96S-020F20X Ordering Part Number: 3369-BF20-M01C	6 low power 1M x 16 banks of SDRAM die packaged into a single SDRAM MCM organized as 2 independent 512K x 48 x 2 banks. Programmable burst lengths: 4 or 8. Serial Burst Sequence. 2 banks for on-chip interleaving (gapless accesses). 4K refresh (Total for Both Banks) Operates from 3.3V Power Supply +/-10%.	20	200 CQFP (1.45" sq)
Model: ACT-D16M96S-020F20X Ordering Part Number: 3370-BF20-M21C-1	6 low power 4M x 16 x 4 banks of SDRAM die packaged into a single SDRAM MCM organized as 2 independent 4M x 48 x 4 banks. LVTTL compatible outputs. 3.3V operation with separate logic and output driver power pins. Internal pipelined operation; column address can be changed every clock cycle. Programmable burst lengths: 1, 2, 4, 8, or full page. 64ms, 8,192-cycle refresh. Auto precharge, includes concurrent auto precharge, and auto refresh modes. Operates from 3.3V power supply ±5%.	20	200 CQFP (1.45" sq)

Motor Drivers
aeroflex.com/power

	Description	Package
ACT5101-1 Three Phase Brushless DC Motor Driver	High-voltage three phase motor driver features a 500 VDS rating, 50A continuous current (up to 85°C) with 4 quadrant control, 6-step trapezoidal drive cap, isolated upper and lower gate drivers.	26 Plug-in package 3.0" x 2.1"

MIL-STD-1553 Encoder-Decoder

aeroflex.com/avionics

	Description	SMD #
CT1820 Series	56-pin plug-in 2.2" x 1.2"; terminal bit processor; +5V; also available in a 1.0" x 1.7" 60-lead flatpack.	5962-90636

MIL-STD-1553 Integrated Terminals

aeroflex.com/avionics

	Description	SMD #
CT2512 / CT2512-FP	78-pin quad plug-in 1.9" x 2.1" or 82-lead flatpack; dual redundant remote terminal with dual transceivers; +5V, ±15V; 16-bit bus; 12 MHz; direct replacement for BUS65112.	5962-8753503
CT2512-PCB / CT2512-FP-PCB	Same as CT2512 except antifuse FPGA based implementation, COTS PCB construction dual surface mount transceivers and on board regulator; available in flatpack.	N/A
CT2542 / CT2542-FP	78-pin quad plug-in 1.9" x 2.1" or 82-lead flatpack; dual redundant remote terminal with dual transceivers; +5V, -15V; 16-bit bus; 16 MHz; direct replacement for BUS65142.	5962-8979803
CT2553 / CT2553-FP	78-pin quad plug-in 1.9" x 2.1" or 82-lead flatpack; dual redundant BC/RT/MT protocol unit with dual transceivers; 8K x 16 Ram; +5V, -15V; direct replacement for BUS61553.	5962-8869201
CT2553-PCB / CT2553-FP-PCB	Same as CT2553 except antifuse FPGA based implementation, COTS PCB construction dual surface mount transceivers and on board regulator; available in flatpack.	N/A
CT2554 / CT2554-FP	Same as CT2553 except +5V, -12V; direct replacement for BUS61554.	5962-8869202
CT2554-PCB / CT2554-FP-PCB	Same as CT2554 except antifuse FPGA based implementation, COTS PCB construction dual surface mount transceivers and on board regulator; available in flatpack.	N/A
CT2555 / CT2555-FP	Same as CT2553 except +5V only; direct replacement for BUS61555.	5962-8869203
CT2555-PCB / CT2555-FP-PCB	Same as CT2555 except antifuse FPGA based implementation, COTS PCB construction dual surface mount transceiver, 8k x 16 SRAM and regulator.	N/A
CT2577-P119*	16 MHz, 119-pin CPGA 1.3" sq.; BC/RT protocol unit with dual MIL-STD-1553/1760 transceivers; 3K x 16 Ram; 8 or 16-bit VME/Multibus processor interface; optional 1760 checksum; 1760 header word identification; latched RT address; store release signal; +5V.	N/A
CT2578-P119	119-pin CPGA 1.3" sq.; Simple RT protocol unit with dual MIL-STD-1553 A/B transceivers; DMA handshake; +5V.	N/A
CT2578-F84	Similar to CT2578-P119 except 84-lead CQFP 1.16" sq.	N/A
CT2579-P119*	16 MHz, 119-pin CPGA 1.3" sq.; BC/RT protocol unit with dual MIL-STD-1553 A/B / MacAir transceivers; 3K x 16 Ram; 8 or 16-bit VME/Multibus processor interface; optional 1760 checksum; 1760 header word identification; latched RT address; store release signal; +5V.	N/A
ACT3492	100-pin CPGA 1.1" sq.; BC/RT/MT with Status Word Control and Dual Low Power Monolithic Transceivers; +5V; 250 mw typical power consumption. 6 MHz clock.	N/A
ACT7005	90-pin Ceramic plug-in 1.1" x 2.2"; dual redundant BC/RT protocol unit with dual transceivers; 2K x 16 Ram; 8 or 16-bit processor interface; +5V.	N/A
ACT7006	Same as ACT7005 except with external SSF status bit control.	N/A

N/A = not actively pursuing an SMD.
* Contact Aeroflex at 800-645-8862; these are not in full production.

Standard Products for Avionic Applications

Data Bus Transceivers Single Channel

aeroflex.com/avionics

	1553/1760	MacAir	Size	Package Type	Leads	Idle RCVR Outputs	Power Supplies	Turns Ratio	Transformer Center Tap Ground	SMD #
ACT4402	■		0.62″ x 1.25″	Plug-in	24	Low	+5V, ±15V	1.4:1	■	TBD
ACT4402I	■		0.62″ x 1.25″	Plug-in	24	High	+5V, ±15V	1.4:1	■	TBD
ACT4404N** (replaces CT3232M)	■	■	1.27″ x 1.27″	Plug-in or Flatpack	24	High	+5V, ±12V to ±15V	1:1	Open	5962-91749
ACT4438-1, ACT4438-3	■		8 mm x 8 mm	BCC++	56	Low	+5V	2.5:1	■	TBD
ACT4444 (see ACT4462D)	■	■	9 mm x 9 mm	BCC++	64	Low/High	+5V, ±12V to ±15V	1:1	Open	TBD
ACT4445 (see ACT4487D)	■		9 mm x 9 mm	BCC++	64	Low/High	+5V, ±12V to ±15V	1.4:1	■	TBD
ACT4455	■		0.445″ x 0.445″	LCC	28	Low	+5V	2.5:1	■	5962-96741
ACT4459	■		0.445″ x 0.445″	LCC	28	High	+5V	2.5:1	■	5962-96741
ACT4406N (replaces ARX3404)	■	■	1.27″ x 1.27″	Plug-in or Flatpack	24	High	+5V, ±12V to ±15V	1:1	Open	5962-89592
ACT4407N (replaces CT3231M)	■		1.27″ x 1.27″	Plug-in or Flatpack	24	High	+5V, ±12V to ±15V	1:1	Open	5962-91749
ACT4417N	■		1.27″ x 1.27″	Plug-in or Flatpack	24	High	+5V, ±12V to ±15V	1:1	Open	TBD
ACT4418N*	■	■	1.27″ x 1.27″	Plug-in or Flatpack	24	Low	+5V, ±12V to ±15V	1:1	Open	5962-92085
ACT4435N (replaces CT1816 and CT1641)		H009	1.27″ x 1.27″	Plug-in or Flatpack	24	High	+5V, ±12V to ±15V	1:1	Open	TBD
ACT4487 (equiv BUS8553) (replaces CT1487 and CT1487M)	■		0.805″ x 1.385″ 0.735″ x 1.315″	Plug-in and Flatpack	24	High	±5V, ±15V	1.4:1	■	TBD

* Variable Amplitude Transceiver (similar to ARX4418) - contact factory for information.
** Has external threshold control.

Data Bus Transceivers Dual Channel*

aeroflex.com/avionics

	1553/1760	MacAir	Size	Package Type	Leads	Variable Amplitude Transmitter	Power Supplies	Turns Ratio	Transformer Center Tap Ground	SMD #
ACT4419D	■		0.3" x 1.2"	Plug-in	20	■	+5V	2.5:1	■	TBD
ACT4419DF	■		0.3" x 1.2"	Flatpack	20	■	+5V	2.5:1	■	TBD
ACT4453	■		0.775" x 1.9"	Plug-in or Flatpack	36		+5V	2.12:1	■	5962-89522
ACT4458	■		0.6" x 0.8"	Flatpack	24		+5V	2.5:1	■	5962-92061
ACT4464	■		0.6" x 0.8"	Flatpack	24		+5V	2.5:1	■	5962-92061
ACT4461DF	■		0.6" x 0.8"	Flatpack	24		+5V	2.5:1	■	TBD
ACT4468D (equiv NHI-1567)	■		0.3" x 1.0"	Plug-in	20		+5V	2.5:1	■	TBD
ACT4468DF	■		0.3" x 1.0"	Flatpack	20		+5V	2.5:1	■	TBD
ACT4462D (pin selectable H009 transmitter)	■	■ H009	0.62" x 1.25"	Plug-in	24	■	+5V, ±12V to 15V	1:1	Open	TBD
ACT4469D		H009	0.62" x 1.25"	Plug-in	24	■	+5V, ±15V	1:1	■	TBD
ACT4479D		H009	0.775" x 1.5"	Plug-in	28		+5V, ±15V	1:1	■	TBD
ACT4479DF		H009	0.775" x 1.5"	Flatpack	28		+5V, ±15V	1:1	■	TBD
ACT4489D	■		0.775" x 1.9"	Plug-in	36		+5V, ±12V	1:1	■	TBD
ACT4489DF	■		0.775" x 1.9"	Flatpack	36		+5V, ±12V	1:1	■	TBD
ACT4433D	■		0.775" x 1.5"	Plug-in	28		+5V, ±12V	1:1	■	TBD
ACT4433DF	■		0.775" x 1.5"	Flatpack	28		+5V, ±12V	1:1	■	TBD
ACT4487D (replaces CT1487D)	■		0.775" x 1.9"	Plug-in	36		+5V, ±15V	1.4:1	■	5962-87579
ACT4487DI (replaces CT1487DI)	■		0.775" x 1.9"	Plug-in	36		+5V, ±15V	1.4:1	■	5962-89447
ACT4487DF (replaces CT1487DFP)	■		0.775" x 1.9"	Flatpack	36		+5V, ±15V	1.4:1	■	5962-87579
ACT4487DFI (replaces CT1487DIFP)	■		0.775" x 1.9"	Flatpack	36		+5V, ±15V	1.4:1	■	5962-89447
ACT4436D	■		0.775" x 1.5"	Plug-in	28		+5V, ±15V	1.4:1	■	TBD
ACT4436DI	■		0.775" x 1.5"	Plug-in	28		+5V, ±15V	1.4:1	■	5962-89447
ACT4436DF	■		0.775" x 1.5"	Flatpack	28		+5V, ±15V	1.4:1	■	TBD
ACT4436DFI	■		0.775" x 1.5"	Flatpack	28		+5V, ±15V	1.4:1	■	5962-89447
ACT4808N-D	■	■	0.775" x 1.9"	Plug-in	36		+5V, ±12V to ±15V	1:1	Open	TBD
ACT4808N-DF	■	■	0.775" x 1.9"	Flatpack	36		+5V, ±12V to ±15V	1:1	Open	TBD

* See individual data sheets for receiver output idle low/high.

Notes

AEROFLEX MICROELECTRONIC SOLUTIONS

DIVISIONS

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Circuit Card Assembly

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Gain Equalizers
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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

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