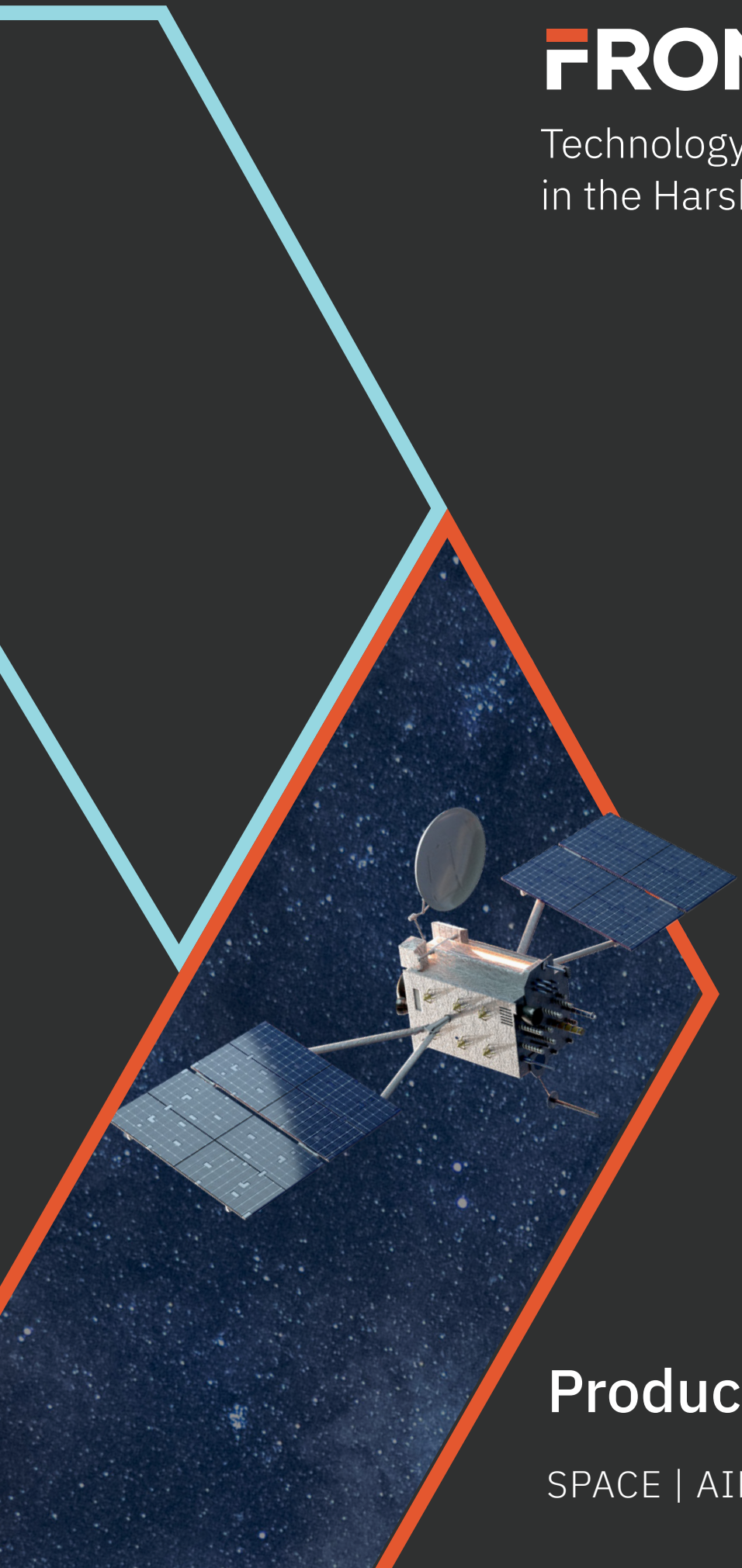
FRONTGRADE

Technology Engineered to Perform in the Harshest Conditions



Product Catalog

SPACE | AIR | LAND | SEA | MEDICAL

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About Frontgrade

Who We Are

Unwavering support for the world's most important missions for 60+ years and counting

For more than six decades, the skilled thinkers, makers, and doers at Frontgrade have embraced our mission to solve complex technology challenges across the U.S. and around the globe. As the largest provider of analog and radiation-hardened electronics for the aerospace, defense, and medical industries, we offer a broad portfolio of off-the-shelf and customizable radiofrequency, microwave, and high-reliability microelectronic products and subsystems — as well as complete solutions across the signal chain, from aperture to digital conversion.

From inception and development engineering to full-rate production and sustainment, we stay in lockstep with you throughout your program lifecycle.

At Frontgrade, we don't succeed unless your mission succeeds.

INNOVATION

Enabling the Future, One Tech-Forward Solution at a Time

Our advanced engineering and manufacturing solutions expand frontiers in space exploration, avionics, defense, medicine and more.

RELIABILITY

Technology Partners You Can Trust

Our trusted senior leaders carry out activities to help promote good ethical culture and act as impartial sounding boards.

Ethics

Frontgrade is committed to establishing and maintaining high ethical standards in all aspects of our business.

We do this by empowering people to act correctly and to do the right thing in the right way. Ethical behavior is an asset that we value, encourage and reward. To that end we have a rigorous Ethics and Compliance Program. Every employee — from the C-suite to the newest hire — is trained and retrained in determining if something is wrong and what to do about it. They are encouraged to always be aware and curious and ask questions.

In addition to raising concerns with a supervisor, manager, the Ethics and Compliance Officer, or Human Resources, Frontgrade provides an anonymous helpline — hosted by an independent third party, which can be accessed by phone or online. We have also created Ethics Champions for each of our locations. These are trusted senior leaders who carry out a range of compliance activities to help promote a good ethical culture, including acting as a "sounding board," to whom business unit employees can bring questions or raise concerns in confidence. As such they also provide another channel for the raising of ethical concerns and other issues.

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Single Board Computers

SBC Gen 8

Our latest Single Board Computer — SBC Gen 8 — seamlessly integrates high-performance processing with flexible interfaces. Its SWaP-C optimized design is ideal for space processing and Command and Data Handling (C&DH). Our newest SBC design is based on our rad-hard and TRL-9 GR740 Quad Core LEON4FT SPARC V8 processor. This SBC can deliver up to 1700 DMIPS of processing power in a compact 3U SpaceVPX design, targeted at spacecraft C&DH or payload processing applications. For I/O expansion, the SBC8 supports an XMC+ mezzanine daughter card, making the modules a powerful solution for (C&DH) applications.

Did You Know?

Frontgrade solutions have supported every manned space flight since **Apollo 11 in 1969.**

SBC Gen 8

Reconfigurable Mission Processing

RPM-PS

The Reconfigurable Processing Module (RPM) is a high-performance, 3U SpaceVPX (-PS) form factor, data processing module, built around the AMD/Xilinx® XQR-Grade Versal VC1902 System-on-Chip (SoC) FPGA. The RPM-PS boasts dual A72 ARM™processors up to 1.7 GHz and dual ARM Cortex®-R5 cores running up to 750 MHz. On-board memory includes 16 GB PC4-19200 DDR4, 8 GB of Dual QSPI MRAM and up to 1 TB NAND flash. For I/O expansion, the RPM-PS supports an XMC+ mezzanine daughter card, making the modules a powerful solution for Payload and Sensor data processing.

RPS-PS

The Reconfigurable Processing System (RPS) is a 3U box level solution containing the RPM-PS and its XMC+ I/O Mezzanine Card combined with a local power supply module providing a fully integrated, high-performance, payload data processing instrument. Refer to the RPM-PS and IOM specifications for additional performance and capability details on our **website**.

RPS-9X-PS

The 9-slot eXtensible Reconfigurable Processing System (RPS-9X) is an extension of the 2-slot RPS,providing a broad range of subsystem configurations by mixing/combining up to three Frontgrade RPMs, System Ethernet I/F Module (SEIM), System RF Module (SRFM), System Power Supply Modules (SPSM), and other building blocks such as Solid State Mass Memory Units. Through its flexibility and available building blocks, the RPS-9X can be purpose built to fit a broad range of applications such as software defined radios, Ethernet switches, high throughput data and signal processing instruments, among others.

RPM-PS

RFM

RPS-9X-PS

RF Solutions

SOLID STATE POWER AMPLIFIERS

Product Name	Part Number	Environment
Gallium Nitride Broadband Amplifier	SSPA 0.001-6.000-5	Ground/Air
GaN Broadband Power Amplifier	SSPA 0.020-0.520-125	Ground/Air
High Power, Broadband, GaN SSPA for Space Applications	SSPA 0.020-1.000-200	Space
GaN Broadband Power Amplifier	SSPA 0.020-1.000-100	Ground/Air
High Power, Super Broadband, SSPA	SSPA 0.020-1.000-350	Ground/Air
GaN Broadband Power Amplifier, Solid State RF Amplifier	SSPA 0.020-6.000-10	Ground/Air
GaN Broadband Power Amplifier	SSPA 0.020-6.000-35	Ground/Air
High Power, Super Broadband, GaN SSPA	SSPA 0.020-6.000-70	Ground/Air
Ka Band GaN SSPA	SSPA 16.75-20.25-40	Ground/Air
Ultra-Broadband High Power, SSPA	SSPA 2.0-6.0-100	Ground/Air
Ultra-Broadband High Power, SSPA	SSPA 2.0-6.0-250	Ground/Air
GaN Broadband Power Amplifier	SSPA 2.5-6.0-50	Ground/Air
GaN Broadband Power Amplifier	SSPA 20.0-24.0-20	Ground/Air
Super Broadband, 20 W, 20-40 GHz, GaN	SSPA 20.0-40.0-20	Ground/Air
Ka Band GaN SSPA	SSPA 27.0-31.0-20	Ground/Air
High Powered, Broadband, SSPA	SSPA 6.0-12.0-100	Ground/Air
High Powered, Broadband, GaN SSPA	SSPA 6.0-18.0-30	Ground/Air
X Band, GaN, 1000 W, LEO SSPA	SSPA 7.5-10.0-1000	Space
Medium Power, X Band, Broadband SSPA	SSPA 8.025-8.500-4	Space
X Band, GaN, Space Qualified, Lunar SSPA	SSPA 8.4-8.6-30	Space
X Band, GaN, 500 W, LEO SSPA	SSPA 9.35-9.85-500	Space

RACK MOUNT AMPLIFIERS

Product Name	Part Number	Environment
High Power, Rack Mounted, GaN RF Amplifier	SSPA 0.001-1.000-500-RM	Ground/Air
High Power, Rack Mounted, GaN RF Amplifier	SSPA 0.020-6.000-35-RM	Ground/Air
L Band Radar, Pulsed Power Amplifier	SSPA 1.2-1.4-800-RM	Ground/Air

AETHERCOMM PRODUCT DATA — AMPLIFIERS

Min/Max Frequency (GHz)	Typical Power Out (W)	VDC Input	Operating Temp (°C)	Size - Inches (L x W x H)	Typical Enable/Disable (µs)
0.001-6.0	5	28 VDC	-40 to +85	6.4 x 2.5 x 1	20
0.020-0.520	125	28 VDC	-40 to +85	6.4 x 3.4 x 1	15
0.020-1.0	200	28 VDC	-40 to +85	4.5 x 19 x .75	10
0.020-1.0	100	28 VDC	-40 to +85	6.4 x 3.4 x 1	15
0.020-1.0	350	58 VDC	-40 to +75	12.8 x 6.3 x 1.8	10
0.020-6.0	10	28 VDC	-40 to +85	6.4 x 2.5 x 1	20
0.020-6.0	35	28 VDC	-40 to +85	7.7 x 2.5 x 1.4	25
0.020-6.0	70	28 VDC	-20 to +70	6.5 x 5.5 x 2	25
16.75-20.25	40	28 VDC	-40 to +70	5 x 4 x 2	10
2.0-6.0	100	28 VDC	-40 to +85	6.9 x 3.4 x 1.5	10
2.0-6.0	250	28 VDC	-40 to +85	13.5 x 8 x 2.37	10
2.5-6.0	50	28 VDC	-40 to +85	6.4 x 2.5 x 1	8
20.0-24.0	20	28 VDC	-40 to +60	5 x 4 x 2	10
20.0-40.0	20	28 VDC	-20 to +65	7 x 5 x 1.5	10
27.1-31.0	20	28 VDC	-40 to +70	5 x 4 x 2	10
6.0-12.0	100	28 VDC	-40 to +85	9 x 5 x 2	10
6.0-18.0	30	28 VDC	-40 to +70	3.25 x 5.5 x 1.5	20
7.5-10.0	1000	28 VDC	-40 to +85	10.9 x 4.6 x 2	2
8.025-8.500	4	28 VDC	-24 to +61	5.1 x 5.1 x 2	10
8.4-8.6	30	28 VDC	N/A	2 x 5 x 1	N/A
9.35-9.85	500	28 VDC	-40 to +85	10 x 14 x 6	2

AETHERCOMM PRODUCT DATA — RACKMOUNT AMPLIFIERS

Min/Max Frequency (GHz)	Typical Power Out (W)	VDC Input	Size - Inches (L x W x H x D)	Typical Gain (dB)
0.001-1.0	500	208 VAC	31.5 x 22.5 x 42.6	57
0.020-6.0	35	28 VDC	22 x 19 x 22 x 7	50
1.2-1.4	800	120 VAC	7.7 x 2.5 x 7.7 x 1.4	50

Microprocessors

GR765

The GR765 rad-hard, octa-core microprocessor with 20800 DMIPS is a major performance leap for space-grade computing. A boot option selects between SPARC LEON5FT or 64-bit RISC-V NOEL-V processor cores. Its wide range of interfaces, including gigabit Ethernet switch and PCIe — as well as cybersecurity and fault tolerance features — ensures adaptability and reliability for critical missions

GR740 Plastic & Ceramic

The GR740 rad-hard, quad-core SPARC LEON4FT microprocessor features a wide range of spacecraft interfaces. QML-V qualified, it also exists in a space-resilient plastic package, perfect for constellations and LEO applications. The GR740 has an excellent performance-to-watt ratio with 1700 DMIPS at less than 3 W.

LEON (SPARC)

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
GR740 Quad-Core LEON4FT SPARC V8 Processor	GR740	5962-21204	QML-Q & QML-V	> 125
GR740 Plastic Quad-Core LEON4FT SPARC V8 Processor	GR740-AS GR740-IS	N/A	ECSS-Q-ST-60-13C Class 2	> 125
GR712C Dual-Core SPARC V8 Processor	GR712RC	N/A	Space Grade	> 118
UT700 Single-Core LEON3FT SPARC V Processor	UT700	5962-13238	QML-Q & QML-V	> 110
UT699 LEON3FT SPARC V Processor	UT699	5962-08228	QML-Q & QML-V	> 108
UT699E Single-Core LEON3FT SPARC V Processor	UT699E	5962-13237	QML-Q & QML-V	> 110

RISC-V

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
GR765 Octa-Core RV64 RISC-V & LEON5FT SPARC V8 Processor	GR765	N/A	Space Grade (ECSS9030)	> 60

MICROPROCESSOR — LEON (SPARC)				
TID krad(Si)	Processor Core	Max Speed MHz	Performance	Package
300	Quad-Core LEON4FT	250	425 DMIPS/Core	CLGA625 CCGA625
300	Quad-Core LEON4FT	250	425 DMIPS/Core	PBGA625
300	Dual-Core LEON3FT	100	140 DMIPS/Core	240-lead FP
100	Dual-Core LEON3FT	166	240 DMIPS/Core	CLGA484 CCGA484
100	Single-Core LEON3FT	66	92 DMIPS/Core	352-lead FP
100	Single-Core LEON3FT	100	140 DMIPS/Core	CLGA484 CCGA484

MICROPROCESSOR — RISC-V				
TID krad(Si)	Processor Core	Max Speed MHz	Performance	Package
50	Octa-Core NOEL-V RV64GCH RISC-V & Octa-Core LEON5FT SPARC V8	800	2600 DMIPS/Core	FF1932

Microcontrollers

Arm M0+ Plastic

For space missions demanding the highest reliability and radiation-tolerant products, Frontgrade offers the UT32M0R500 32-bit Arm® Cortex® M0+ microcontroller in two package types — ceramic and a lightweight plastic. Both are comprised of the same internal components. Our plastic Arm microcontrollers are screened to the NASA PEM-INST-001 Level 2 standard for greater affordability while maintaining high reliability. These rad-tolerant devices include a complete front-end analog signal chain with a wide range of digital and communication support.

GR716B Ceramic

The GR716B is a rad-hard mixed-signal microcontroller. Compared to the GR716A, it doubles the performance, introduces Real Time Accelerator cores, and widens the range of interfaces to include Ethernet. Its versatility enables distributed control nodes, bus bridging, DC-DC and motor control, and FPGA supervision.

ARM®

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
32-Bit Arm® Cortex® M0+ Microcontroller	UT32M0R500	5962-17212	QML-Q & QML-Q+	≤ 80
32-Bit Arm® Cortex® Microcontroller	UT32M0R500LBNA	NA	PEM INST-001 Level 2	≤ 80

MICROCONTROLLERS

Product Name	Part Number	Flight Grade	LET (MeV-cm²/mg)
GR716A RadHard LEON3FT Microcontroller	GR716A	Space Grade	> 118
GR716B RadHard LEON3FT Microcontroller	GR716B	Prototype	> 118 (TBC)

MICROCONTROLLER — ARM®				
TID krad (Si)	Processor Core	MHz	Performance	Package
50	32-Bit Arm® Cortex® M0+	50	N/A	143-CLGA 143-CCGA
50	32-Bit Arm® Cortex®-M0+	50	N/A	143-PBGA with 1mm pitch

MICROCONTROLLERS				
TID krad (Si)	Processor Core	MHz	Performance	Package
100	LEON3FT	50	70 DMIPS/Core	132-lead CQFP
100 (TBC)	LEON3FT + 2x RTAs	100	140 DMIPS/Core	132-lead CQFP

FPGAs

CertusPro™-NX-RT

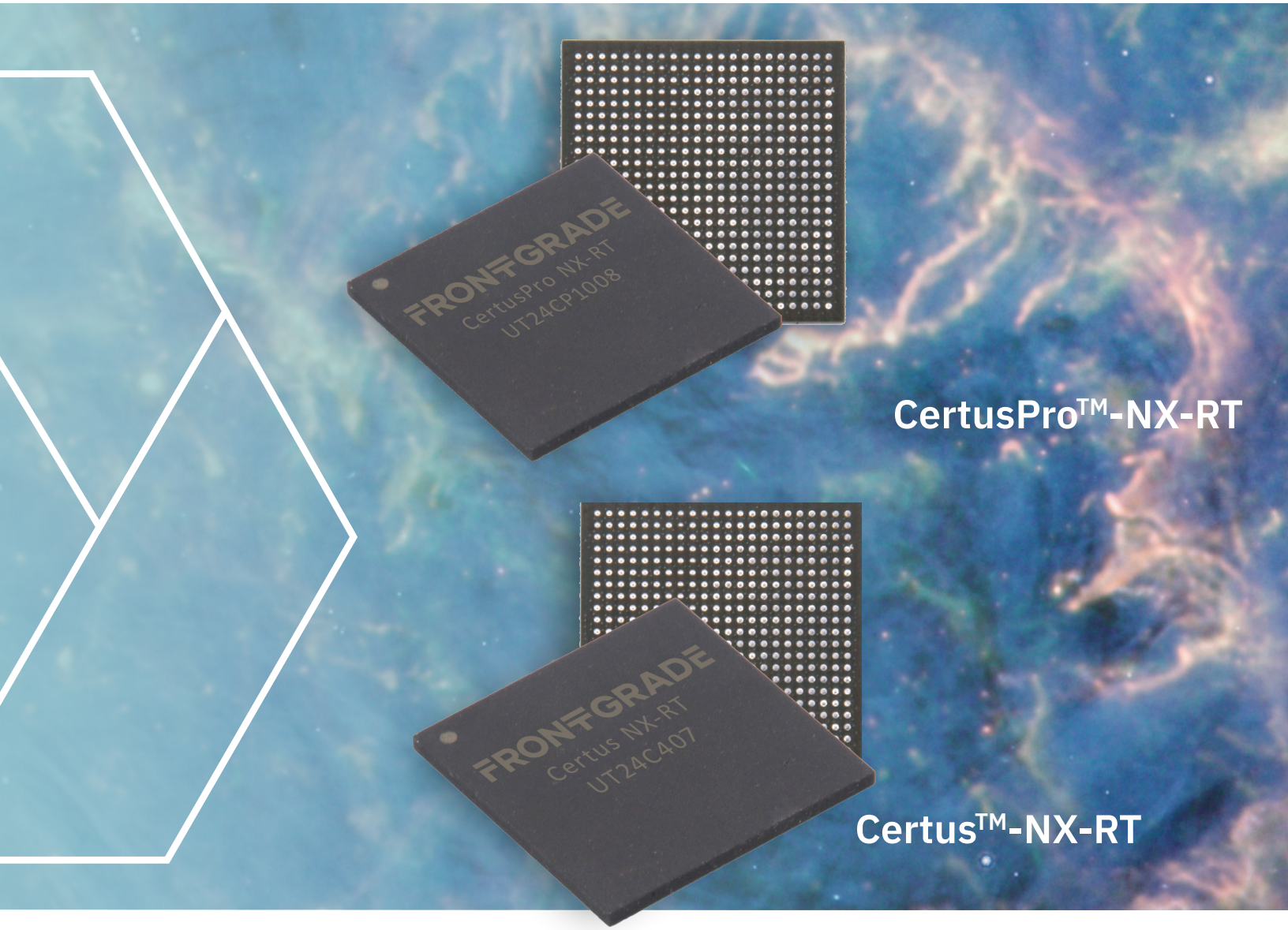
The CertusPro™-NX-RT FPGA is built on the Lattice Nexus™ 28nm radiation-tolerant, fully-depleted, silicon-on-insulator (FD-SOI) platform to deliver class-leading system bandwidth and power efficiency. Its small footprint includes tin-lead (SnPb) balls and supports 1.5 Gbps differential I/O and 305 I/O, including 167 wide range up to 3.3 V. Eight lanes of flexible SerDes support 10 G Ethernet, SRIO, SpaceFibre, and more. The CertusPro™-NX-RT will soon be available in a wider variety of screening levels to optimize cost and reliability.

Certus™-NX-RT

The Certus™-NX-RT FPGA is built on the Lattice Nexus™ 28nm radiation-tolerant, fully-depleted, silicon-on-insulator (FD-SOI) platform and delivers class-leading system bandwidth and power efficiency. Its small footprint includes tin-lead (SnPb) balls and supports PCI express, 1.5 Gbps differential I/O, and 192 I/O. This FPGA includes 118 wide range up to 3.3 V as well as 2 analog-digital converters.

FPGAS

Product Name	Part Number	Flight Grade	LET (MeV-cm²/mg)
UT24C407 Certus™-NX-RT	UT24C407	Space PEM QD	≤ 80
UT24CP1008 CertusPro™-NX-RT	UT24CP1008	Space PEM L1 , L2, QD	≤ 80



TID krad(Si)	Logic Cells	I/O Count	Embedded SRAM Memory	Package
100	39,000	192	2.5 Mb	256-lead PBGA
100	96,000	305	7.3 Mb	484-lead PBGA

Non-Volatile Memory

MRAM 1/2/4/8 Gb DQSPI

UT8MRQRHxG is a Spin-transfer torque, Magneto-resistive random-access memory (STT-MRAM). Frontgrade offers this product in density ranging from 1 Gbit to 8 Gbit. MRAM technology is analogous to Flash technology with SRAM-compatible read/write timings (Persistent SRAM, P-SRAM). Data is always non-volatile with 10^{16} write cycles endurance and greater than 20-year retention at 85°C. UT8MRQRHxG connects two Quad SPI devices with dual-chip select numbers, providing an 8-bit I/O data path. Each device can be configured and operate independently with its own register sets, managed by a separate chip select. UT8MRQRHxG is available in a 224-ball FBGA package.

MRAM 4 Gb Parallel

UT8MRQ4G32 is a 4 Gb Spin-transfer torque, Magneto-resistive random-access memory (STT-MRAM). MRAM technology is analogous to Flash technology with SRAM compatible 45ns/45ns read/write timings. This makes Frontgrade's MRAM a very reliable and fast non-volatile memory solution. Data is always non-volatile with 10^{16} write cycles endurance and greater than 20-year retention at 85°C. MRAM is a true random-access memory, allowing both reads and writes to occur randomly in memory. UT8MRQ4G32 is available in a 142-ball FBGA package.

4Gb Parallel MRAM

NAND Flash

The UT81NDQ512G8T 4 Tb NAND flash, based on the Triple-Level Cell (TLC) NAND technology, delivers 32 times the density of the closest competing device available in a single industry standard JEDEC 132 BGA package. The UT81NDQ512G8T is compliant with Open NAND Flash Interface (ONFI) 4.0 and supports up to 667 MT/s throughput (read/write) per pin. With access to unparalleled storage capacity, designers can significantly increase sensor and digital signal processing throughput.

Non-Volatile Memory

NAND

Product Name	Part Number	Flight Grade	LET (MeV-cm²/mg)	TID krad(Si)
4 Tb NAND Flash	UT81NDQ512G8T	PEM INST-001 Level 2	≤ 60	50

MRAM 16/64 MB PARALLEL

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
16 Mb MRAM Memory	UT8MR2M8	5962-12227	QML-Q, QML-Q+ & QML-V	≤ 112
64 Mb MRAM Memory	UT8MR8M8	5962-13207	QML-Q, QML-Q+ & QML-V	≤ 112
UT8MRQ4G32B 4 Gb Parallel MRAM	UT8MRQ4G32B	N/A	PEM INST-001 Level 2	≤ 83
UT8MRQ2GB 2 Gb DQSPI MRAM	UT8MRQ2GB	N/A	PEM INST-001 Level 2	≤ 37
UT8MRQRHxG 1/2/4/8Gb DQSPI RadHard MRAM	UT8MRQRHxG	N/A	PEM INST-001 Level 1	≤ 78

NOR FLASH

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
64 Mb QCOTS NOR Flash	UT8QNF8M8	5962-12204	QML-Q & QML-Q+	≤ 80

PROM

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
3 V 256K PROM	UT28F256LVQLE	5962-01517	QML-Q & QML-V	≤ 110
5 V 256K PROM	UT28F256QLE	5962-96891	QML-Q & QML-V	≤ 110

NON-VOLATILE MEMORY — NAND

Density	Configuration	Endurance	Supply Voltage	Package
4 Tb TLC 1.33 Tb SLC	512 x 8	40K Program/Erase Cycles (SLC Mode) 3K Program/Erase Cycles (TLC Mode)	3.3 V	132-lead PBGA

NON-VOLATILE MEMORY — MRAM

TID krad(Si)	Density	Configuration	Access Time	Supply Voltage	Package
1000	16 Mb	2 M x 8	45 ns	3.3 V	40-lead FP 50 mil 40-lead FP 25 mil
1000	64 Mb	8 M x 8	45 ns	3.3 V	64-lead FP
100	4 Gb	128 M x 32 Parallel	45 ns	+2.5 V to +3.6 V	142-PBGA 1 mm Pitch
100	2 Gb	Dual-QSPI	54 MHz SDR40 MHz DDR	2.7 V - 3.6 V	96-PBGA 1 mm Pitch
100	1/2/4/8 Gb	Dual-QSPI	108 MHz SDR54 MHz DDR	+2.5 V to +3.6 V	224-PBGA 1 mm Pitch

NON-VOLATILE MEMORY — NOR FLASH

TID krad(Si)	Density	Configuration	Access Time	Supply Voltage	Package
50	64 Mb	8 M x 8	65 ns	3.3 V	48-lead FP

NON-VOLATILE MEMORY — PROM

TID krad(Si)	Density	Configuration	Access Time	Supply Voltage	Package
1000	256 K	32 K x 8	65 ns	3.3 V	28-lead FP
1000	256 K	32 K x 8	45 ns	5 V	28-lead FP

Volatile Memory

DDR4 18 GB

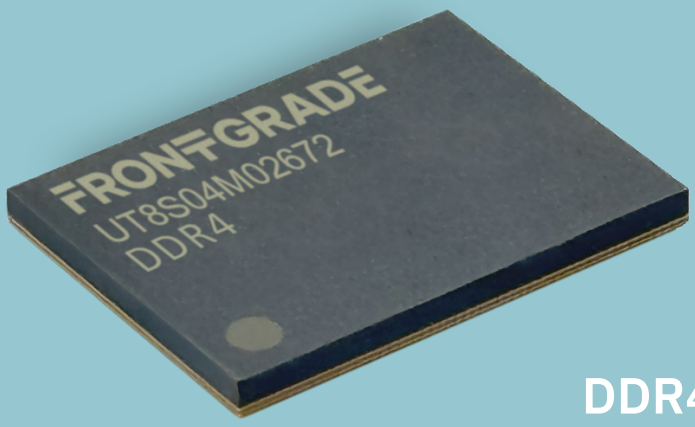
The 18 GB DDR4 provides 2G, addressing depth with a 72-bit bus divided into 64-bits of data plus 8-bits of ECC. The DDR4 is capable of 2400 MT/s data throughput in a small 20 mm x 15 mm footprint. It supports Single Error Correction and Double Error Detection (SECDED) ECC protection or a 48-bit data bus plus 24-bit Reed-Solomon EDAC configuration. To further enable SEFI recovery techniques, this memory component provides dedicated RESET for each die, thus allowing the system controller to reset/recover SEFI die while holding the remaining die in a self-refreshing, standby mode.

DDR4

Part Number	Flight Grade	TID krad(Si)	Event Rate
UT8SD4MQ2G72	PEM INST-001 Level 2	100	40,000 yrs MTTF GEO (Adams 90%, 100 mil Al)

SRAM

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
4 Mb QCOTS SRAM	UT8Q512E	5962-99607	QML-Q & QML-V	≤ 110
4 Mb QCOTS SRAM	UT9Q512E	5962-00536	QML-Q & QML-V	≤ 110
4 Mb Asynchronous SRAM	UT8R512KE	5962-03235	QML-Q & QML-V	≤ 100
4 Mb SRAM	UT8R128K32	5962-03236	QML-Q & QML-V	≤ 100
16 Mb Asychronous Monolithic SRAM	UT8ER512K32	5962-06261	QML-Q & QML-V	≤ 111
16 Mb Asychronous SRAM Module	UT8CR512K32	5962-04227	QML-Q & QML-V	≤ 100
16 Mb QCOTS SRAM	UT8Q512K32	5962-01533	QML-Q & QML-V	≤ 100
16 Mb QCOTS SRAM	UT9Q512K32	5962-01511	QML-Q & QML-V	≤ 100
32 Mb SRAM Module	UT8ER1M32	5962-10202	QML-Q & QML-V	≤ 110
64 Mb SRAM Module	UT8ER2M32	5962-10203	QML-Q & QML-V	≤ 110
128 Mb SRAM Module	UT8ER4M32	5962-10204	QML-Q & QML-Q+	≤ 110
40 Mb SRAM Module	UT8ER1M39	5962-10205	QML-Q & QML-V	≤ 110
80 Mb SRAM Module	UT8ER2M39	5962-10206	QML-Q & QML-V	≤ 110
160 Mb SRAM Module	UT8ER4M39	5962-10207	QML-Q & QML-Q+	≤ 110



DDR4 18 GByte

Density	Configuration	Speed	Supply Voltage	Package
16 GB + 2 GB ECC	2G x 72	2400 MT/s @CL 18-18-18	1.2 pV	266-PBGA 1 mm Pitch

VOLATILE MEMORY — SRAM

TID krad(Si)	Access Time	Configuration	Density	Supply Voltage	Package
100	20 ns	512 K x 8	4 Mb	3.3 V	36-lead FP
100	20 ns	512 K x 8	4 Mb	5 V	36-lead FP
100	15 ns	512 K x 8	4 Mb	3.3 V	36-lead FP
100	15 ns	128 K x 32	4 Mb	3.3 V	68-lead FP
100	20 ns	512 K x 32	16 Mb	3.3 V	68-lead FP
100	17 ns	512 K x 32	16 Mb	3.3 V	68-lead FP
100	25 ns	512 K x 32	16 Mb	3.3 V	68-lead FP
100	25 ns	512 K x 32	16 Mb	5 V	68-lead FP
100	20 ns	1 M x 32	32 Mb	2.5 V	132-lead FP
100	22 ns	2 M x 32	64 Mb	2.5 V	132-lead FP
100	25 ns	4 M x 32	128 Mb	2.5 V	132-lead FP
100	20 ns	1 M x 39	40 Mb	2.5 V	132-lead FP
100	22 ns	2 M x 39	80 Mb	2.5 V	132-lead FP
100	25 ns	4 M x 39	160 Mb	2.5 V	132-lead FP

Clock, Interconnects, LVDS & Logic
Clock & Timing

RADCLOCK

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
UT7R995 Rad Clock	UT7R995	5962-05124	QML-Q & QML-V	≤ 109
UT7R995C Rad Clock	UT7R995C	5962-05124	QML-Q & QML-V	≤ 109

CLOCKDRIVER

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
UT54ALVC2525 Clock Driver	UT54ALVC2525	5962-06233	QML-Q & QML-V	≤ 111

CLOCK NETWORK MANAGER

Product Name	Part Number	SMD Part Number	Flight Grade	LET (MeV-cm²/mg)
UT7R995 Rad Clock	UT7R995	5962-05124	QML-Q & QML-V	≤ 109
UT7R995C Rad Clock	UT7R995C	5962-05124	QML-Q & QML-V	≤ 109

LVDS

Product Name	Part Number	SMD Part Number	Flight Grade
3 V Quad CMOS Differential Line Driver	UT54LVDS031LV/E	5962-98651	QML-Q & QML-V
3 V Quad CMOS Differential Line Receiver	UT54LVDS032LV/E	5962-98652	QML-Q & QML-V
Serializer	UT54LVDS217	5962-01534	QML-Q & QML-V
Deserializer	UT54LVDS218	5962-01535	QML-Q & QML-V
1.25 Gbps LVDS Dual Transceiver/Quad Repeater	UT54LVDS454	5962-21211	QML-Q & QML-V
Low Voltage Differential Signaling (LVDS) Octal Repeater	UT54LVDS328	5962-20219	QML-Q & QML-V
Low Voltage Differential Signaling (LVDS) Octal Bus Repeater	UT54LVDM328	5962-01536	QML-Q & QML-V
Dual Driver/Dual Receiver	UT54LVDM031LV	5962-06201	QML-Q & QML-V
Dual Driver/Dual Receiver	UT54LVDM055LV	5962-06202	QML-Q & QML-V
5 V Quad CMOS Differential Line Driver	UT54LVDS031	5962-95833	QML-Q & QML-V
5 V Quad CMOS Differential Line Receiver	UT54LVDS032	5962-95834	QML-Q & QML-V
Quad CMOS Differential Line Receiver with Integrated 100 Ohm Termination Resistors	UT54LVDS032LVT	5962-04201	QML-Q & QML-V

CLOCK & TIMING — RADCLOCK

TID krad(Si)	# of Clocks	Frequency	Supply Voltage	Package
100	8	6 to 200 MHz	2.25 to 3.6 V	48-lead FP
100	8	6 to 200 MHz	2.25 to 3.6 V	48-lead FP

CLOCK & TIMING — CLOCKDRIVER

TID krad(Si)	# of Clocks	Frequency	Supply Voltage	Package
1000	Distributes 1 to 8	> 200 MHz	2 V to 3.6V	14-lead FP

CLOCK & TIMING — CLOCK NETWORK MANAGER

TID krad(Si)	# of Clocks	Frequency	Supply Voltage	Package
100	8	6 to 200 MHz	2.25 to 3.6 V	48-lead FP
100	8	6 to 200 MHz	2.25 to 3.6 V	48-lead FP

LVDS

LET (MeV-cm^2/mg)	TID krad(Si)	Throughput	Supply Voltage	Package
≤ 100	1000	400 Mbps	3.3 V	16-lead FP
≤ 100	1000	400 Mbps	3.3 V	16-lead FP
≤ 100	1000	1.575 GBps	3.3 V	48-lead FP
≤ 100	1000	1.575 GBps	3.3 V	48-lead FP
≤ 100	100	1.25 GBps	2.5 V	71-lead CLGA 71-lead CCGA
≤ 100	1000	400 Mbps	3.3 V	48-lead FP
≤ 100	1000	400 Mbps	3.3 V	48-lead FP
≤ 100	300	400 Mbps	3.3 V	16-lead FP
≤ 100	300	400 Mbps	3.3 V	16-lead FP
≤ 100	1000	155.5 Mbps	5 V	16-lead FP
≤ 100	1000	155.5 Mbps	5 V	16-lead FP
≤ 100	1000	400 Mbps	3.3 V	16-lead FP

Clock, Interconnects, LVDS & Logic
Switches & Transceivers

CROSSPOINT SWITCHES

Product Name	Part Number	SMD Part Number	Flight Grade
UT54LVDM228 Quad 2x2 400 Mbps Crosspoint Switch	UT54LVDM228	5962-01537	QML-Q & QML-V
UT65CML8x8FD VPX Crosspoint Switch	UT65CML8X8FD	5962-17213	QML-Q & QML-V

CAN TRANSCEIVER

Product Name	Part Number	SMD Part Number	Flight Grade
CAN Transceiver	UT64CAN3330	5962-15232	QML-Q & QML-V
CAN Transceiver	UT64CAN3331	5962-15232	QML-Q & QML-V
CAN Transceiver	UT64CAN3332	5962-15232	QML-Q & QML-V

TRANSCEIVER

Product Name	Part Number	SMD Part Number	Flight Grade
3 V 1553 Transceiver	UT63M143	5962-07242	QML-Q & QML-V
5 V 1553 Transceiver	UT63M147	5962-93226	QML-Q & QML-V
1553 Transceiver	UT63M1X5C	N/A	HiRel

CLOCK & TIMING — CROSSPOINT SWITCHES

LET (MeV-cm²/mg)	TID krad(Si)	Channels	Data Rate	I/O Type	Package
≤ 100	300	2 x 2	400 Mbps	LVDS	64-lead FP
< 100	100	8 x 8 4 x 4 1 x 1	3.125 GBps	CML	143-pin CLGA 143-pin CCGA

CLOCK & TIMING — CAN TRANSCEIVER

LET (MeV-cm²/mg)	TID krad(Si)	Voltage	Transceiver Options	Package
≤ 141	100	3.3 V	Sleep mode	8-lead FP
≤ 141	100	3.3 V	Diagnostic loopback	8-lead FP
≤ 141	100	3.3 V	Loopback for auto-baud	8-lead FP

CLOCK & TIMING — TRANSCEIVER

LET (MeV-cm²/mg)	TID krad(Si)	Voltage	Package
111	1000	3.3 V	24-lead FP 36-lead pin DIP
111	1000	5 V	24-lead FP 36-lead pin DIP
N/A	N/A	15 V	24-pin ceramic DIP 36-pin ceramic DIP 36-lead FP

Clock, Interconnects, LVDS & Logic
MIL-STD-1553

DUAL TRANCEIVERS

Product Name	Part Number	Flight Grade	Protocol
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - Commerical	4485-7	Commercial	RS485 & RS422 Interface
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - Class K	4485-S	Class K	RS485 & RS422 Interface
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - QML-K, Gold-Plated	4485-201-1S	QML-K	RS485 & RS422 Interface
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - QML-K, Solder-Dipped	4485-201-2S	QML-K	RS485 & RS422 Interface
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - QML-K, Gold-Plated	4485-901-1S	QML-K	RS485 & RS422 Interface
DRS4485 Dual RS585 Interface Transceiver Radiation Tolerant - QML-K, Solder-Dipped	4485-901-2S	QML-K	RS485 & RS422 Interface

SµMMIT

Product Name	Part Number	SMD Part Number	Flight Grade
SµMMIT E	UT69151	5962-92118	QML-Q & QML-V
SµMMIT RTE	UT69151	5962-98587	QML-Q
SµMMIT XTE	UT69151	5962-94758	QML-Q
SµMMIT DXE	UT69151	5962-94663	QML-Q & QML-V

BUS CONTROLLER

Product Name	Part Number	SMD Part Number
1553 Bus Controller, Remote Terminal & Monitor	UT1553B/BCRTM	5962-89577
1553 Bus Controller, Remote Terminal	UT1553B/BCRT	5962-88628

MIL-STD-1553 — DUAL TRANCEIVERS

Supply Voltage (Vcc)	Driver Output Voltage	Serial Data Rate	Total Dose krad(Si)	Package
12 V	+/-5 V	500 kHz	≥ 100	18-lead hermetic FP
12 V	+/-5 V	500 kHz	≥ 100	18-lead hermetic FP
12 V	+/-5 V	500 kHz	≥ 100	18-lead, gold-plated, hermetic FP
12 V	+/-5 V	500 kHz	≥ 100	18-lead, solder-dipped, hermetic FP
12 V	+/-5 V	500 kHz	≥ 100	18-lead, gold-plated, hermetic FP
12 V	+/-5 V	500 kHz	≥ 100	18-lead, solder-dipped, hermetic FP

MIL-STD-1553 — SμMMIT

LET (MeV-cm^2/mg)	TID krad(Si)	Voltage	Function	Integrated Transceiver	Package
≤ 128	300	5 V	Remote terminal, bus controller, and monitor	N/A	132-lead FP 84-pin PGA
N/A	N/A	5 V	Remote terminal, 8-bit internal RAM	Yes	132-lead CFP 140-lead CFP 139-pin CPGA
N/A	N/A	5 V	Remote terminal, bus controller, and monitor 8-bit internal RAM	Yes	140-lead CFP 139-pin CPGA
≤ 128	300	5 V	Bus controller, monitor, remote terminal	Yes	132-lead CFP 140-lead CFP 139-pin CPGA

MIL-STD-1553 — BUS CONTROLLER

Flight Grade	Voltage	Package
QML-Q	5 V	84-lead FP 84-pin PGA
QML-Q	5 V	84-lead FP 84-pin PGA

Clock, Interconnects, LVDS & Logic
MIL-STD-1553

SPACEWIRE

Product Name	Part Number	SMD Part Number	Flight Grade
GR718B 18-port SpaceWire Router	GR718B	NA	Space Grade
UT200SpW4RTR 4-Port SpaceWire Router	UT200SpW4RTR	5962-08244	QML-Q & QML-V
UT200SpWPHY01 Physical Layer Transceiver	UT200SpWPHY01	5962-06232	QML-Q & QML-V

8-BIT MSI LOGIC

Product Name	Part Number	SMD Part Number
UT54ACS00E Quadruple 2-Input NAND Gates	UT54ACS00E	5962-96512
UT54ACTS00E Quadruple 2-Input NAND Gates	UT54ACTS00E	5962-96513
UT54ACS02 Quadruple 2-Input NOR Gates	UT54ACS02E	5962-96514
UT54ACTS02 Quadruple 2-Input NOR Gates	UT54ACTS02E	5962-96515
UT54ACS04 Hex Inverters	UT54ACS04E	5962-96516
UT54ACTS04 Hex Inverters	UT54ACTS04E	5962-96517
UT54ACS08E Quadruple 2-Input AND Gates	UT54ACS08E	5962-96518
UT54ACTS08E Quadruple 2-Input AND Gates	UT54ACTS08E	5962-96519
UT54ACS14 Hex Inverting Schmitt Trigger	UT54ACS14E	5962-96524
UT54ACTS14 Hex Inverting Schmitt Trigger	UT54ACTS14E	5962-96525
UT54ACS74 FLIP-FLOPs Dual D with Clear and Preset	UT54ACS74	5962-96534
UT54ACTS74 FLIP-FLOPs Dual D with Clear and Preset	UT54ACTS74E	5962-96535
UT54ACS85 Comparators 4-Bit	UT54ACS85	5962-96536
UT54ACTS85 Comparators 4-Bit	UT54ACTS85	5962-96537
UT54ACS86 Quadruple 2-Input XOR Gates	UT54ACS86E	5962-96538
UT54ACTS86 Quadruple 2-Input XOR Gates	UT54ACTS86	5962-96539
UT54ACS132 Logic Quadruple 2-Input NAND with Schmitt Triggers	UT54ACS132E	5962-96542
UT54ACTS132E Quadruple 2-Input NAND with Schmitt Triggers	UT54ACTS132	5962-96543
UT54ACS138 Decoders/Demultiplexers 3-Line to 8-Line	UT54ACS138E	5962-96544

MIL-STD-1553 — SPACEWIRE					
LET (MeV-cm²/mg)	TID krad(Si)	Data Rate Mbps	Ports	Supply Voltage	Package
> 118	300	200	18	1.8 V and 3.3 V	256-lead CQFP
> 100	100	200	4	3.3 V	255-lead CLGA 255-lead CCGA
> 109	100	200	N/A	3.3 V	28-lead FP

MIL-STD-1553 — 8-BIT MSI LOGIC					
Flight Grade	SEL LET (MeV-cm²/mg)	TID krad(Si)	Input Buffer	Supply Voltage	Package
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	Schmitt TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	500	CMOS	5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	16-lead FP 16-pin DIP
QML-Q & QML-V	≤ 120	1000	TTL	5 V	16-lead FP 16-pin DIP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	5 V	14-lead FP 14-pin DIP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP 14-pin DIP
QML-Q & QML-V	≤ 120	500	Schmitt TTL	5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	16-lead FP 16-pin DIP

Clock, Interconnects, LVDS & Logic
MIL-STD-1553

8-BIT MSI LOGIC		
Product Name	Part Number	SMD Part Number
UT54ACTS138 Decoders/Demultiplexers 3-Line to 8-Line	UT54ACTS138	5962-96545
UT54ACS157 Multiplexers Quadruple 2 to 1	UT54ACS157	5962-96552
UT54ACTS157E Multiplexers Quadruple 2 to 1	UT54ACTS157E	5962-96553
UT54ACS163 Counters 4-Bit Synchronous	UT54ACS163	5962-96554
UT54ACTS163 Counters 4-Bit Synchronous	UT54ACTS163	5962-96555
UT54ACS164E Registers 8-Bit Shift	UT54ACS164E	5962-96556
UT54ACTS164E Registers 8-Bit Shift	UT54ACTS164E	5962-96557
Counters Up-Down Binary Synchronous 4-Bit	UT54ACS191E	5962-96564
UT54ACS193E Clocks Up-Down Synchronous 4-Bit	UT54ACS193E	5962-96566
UT54ACTS193 Clocks Up-Down Synchronous 4-Bit	UT54ACTS193	5962-96567
UT54ACTS240E Buffers Octal with Inverted 3-State Outputs	UT54ACTS240E	5962-96569
UT54ACS244E Buffers/Line Drivers Octal with 3-State Outputs	UT54ACS244E	5962-96570
UT54ACTS244E Buffers/Line Drivers Octal with 3-State Outputs	UT54ACTS244	5962-96571
UT54ACS245 Transceivers Octal Bus with 3-State Outputs	UT54ACS245	5962-96572
UT54ACS245S Transceivers Octal Bus Schmitt Trigger with 3-State Outputs	UT54ACS245S	5962-96572
UT54ACTS245E Transceivers Octal Bus with 3-State Outputs	UT54ACTS245E	5962-96573
UT54ACS273E Flip-Flops Octal D with Clear	UT54ACS273E	5962-96578
UT54ACS373 Latches Octal Transparent with 3-State Outputs	UT54ACS373	5962-96588
UT54ACTS373 Latches Octal Transparent with 3-State Outputs	UT54ACTS373	5962-96589
UT54ACS541 Octal Buffers and Line Drivers with 3-State Outputs	UT54ACS541	5962-96594
Octal Buffers and Line Drivers with 3-State Outputs	UT54ACTS541	5962-96595

MIL-STD-1553 — 8-BIT MSI LOGIC					
Flight Grade	SEL LET (MeV-cm^2/mg)	TID krad(Si)	Input Buffer	Supply Voltage	Package
QML-Q & QML-V	≤ 120	1000	TTL	5 V	16-lead FP 16-pin DIP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	16-lead FP 16-pin DIP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	16-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	16-lead FP 16-pin DIP
QML-Q & QML-V	≤ 120	1000	TTL	5 V	16-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	14-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	16-lead FP
QML-Q & QML-V	≤ 120	500	TTL	5 V	16-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	20-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	20-lead FP
QML-Q & QML-V	≤ 120	500	TTL	5 V	20-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	20-lead FP 20-pin DIP
QML-Q	≤ 120	1000	CMOS	5 V	20-lead FP 20-pin DIP
QML-Q & QML-V	≤ 120	1000	TTL	3.3 V or 5 V	20-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	3.3 V or 5 V	20-lead FP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	20-lead FP
QML-Q & QML-V	≤ 120	1000	TTL	5 V	20-lead FP 20-pin DIP
QML-Q & QML-V	≤ 120	1000	CMOS	5 V	20-lead FP 20-pin DIP
QML-Q	≤ 120	500	TTL	5 V	20-lead FP

Clock, Interconnects, LVDS & Logic
MIL-STD-1553

8-BIT MSI LOGIC

Product Name	Part Number	SMD Part Number
Octal Buffers and Line Drivers with 3-State Outputs	UT54ACTS541E	5962-96595
Clock and Wait-State Generation Circuit	UT54ACTS220	5962-96753
EDACs	UT54ACS630	5962-06239
Pin-Configurable Logic Solution	UT54ACS2S99S	5962-15239
Pin-Configurable Logic Solution	UT54ACS3G99S	5962-15238

16-BIT LOGIC

Product Name	Part Number	SMD Part Number	Flight Grade
UT54ACS164245SEI 16-Bit Multipurpose Transceiver	UT54ACS164245SEI	5962-98580	QML-Q & QML-V
UT54ACS164245S/SE 16-Bit Multipurpose Transceiver	UT54ACS164245S/SE	5962-98580	QML-Q & QML-V
UT54ACTQ164646 Schmitt CMOS 16-Bit Bidirectional Multipurpose Transceiver	UT54ACTQ164646	5962-06234	QML-Q & QML-V
UT54ACTQ16244 16-Bit Buffer/Line Driver	UT54ACTQ16244	5962-06234	QML-Q & QML-V
UT54ACTQ16245 16-Bit Bidirectional Tranceiver with Three-State Outputs	UT54ACTQ16245	5962-06244	QML-Q & QML-V
UT54ACTQ16374 16-Bit D Flip-Flop	UT54ACTQ16374	5962-06245	QML-Q & QML-V

BUS SWITCH

Product Name	Part Number	SMD Part Number	Flight Grade
Matrix-A Bus Switch	UT64BS1X433	5962-15242	QML-Q & QML-V
Matrix-D Bus Switch	UT32BS1X833	5962-15243	QML-Q & QML-V
32 x 1:1 Bus Switch	UT54BS32245	5962-15241	QML-Q & QML-V
20 x 1:1 Bus Switch	UT54BS16210	5962-15245	QML-Q & QML-V
16 x 1:1 Digital Bus Switch	UT54BS16245	5962-15240	QML-Q & QML-V
8 x 1:1 Bus Switch	UT54BS3245	5962-15244	QML-Q & QML-V

MIL-STD-1553 — 8-BIT MSI LOGIC

Flight Grade	SEL LET (MeV-cm²/mg)	TID krad(Si)	Input Buffer	Supply Voltage	Package
QML-Q	≤ 120	1000	TTL	3.3 V or 5 V	20-lead FP
QML-Q	≤ 120	1000	TTL	5 V	20-lead FP
QML-Q	≤ 108	100	TTL	5 V	20-lead FP
QML-Q	≤ 100	1000	CMOS	3.3 V or 5 V	20-lead FP
QML-Q & QML-V	≤ 100	1000	CMOS	3.3 V or 5 V	20-lead FP

MIL-STD-1553 — 16-BIT LOGIC

LET (MeV-cm²/mg)	TID krad(Si)	Supply Voltage	Type	Package
≤ 114	1000	3.3 to 5 V	Warm and cold sparing	48-lead FP
≤ 114	1000	3.3 to 5 V	Cold sparing	48-lead FP
≤ 110	1000	5 V	16-bit transceiver	56-lead FP
≤ 108	1000	5 V	16-bit buffer	48-lead FP
≤ 108	1000	5 V	16-bit transceiver	48-lead FP
≤ 110	1000	5 V	16-bit D flip-flop	48-lead FP

BUS SWITCH

Package	LET (MeV-cm²/mg)	TID krad(Si)	Supply Voltage	Impedance
400-lead CLGA 400-lead CCGA	≤ 100	100	5 V	5Ω
400-lead CLGA 400-lead CCGA	≤ 100	100	5 V	5Ω
99-lead CLGA 99-lead CCGA	≤ 100	100	3.3 V or 5 V	11Ω, 5Ω
48-lead FP	≤ 100	100	3.3 V or 5 V	11Ω, 5Ω
48-lead FP	≤ 100	100	3.3 V or 5 V	11Ω, 5Ω
48-lead FP	≤ 100	100	3.3 V or 5 V	11Ω, 5Ω

Analog Components
Operational Amplifiers & Comparators

ANALOG TO DIGITAL CONVERTERS (ADCs & DACs)

Product Name	Part Number	Flight Grade
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-7	Commercial
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-S	Class K
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-201-1S	QML-K
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-201-2S	QML-K
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-901-1S	QML-K
RHD 5950 16-Channel Multiplexed 14-Bit Analog-to-Digital Converter	5950-901-2S	QML-K
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-7	Commercial
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-S	Class K
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-201-1S	QML-K
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-201-2S	QML-K
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-901-1S	QML-K
RHD 5958 8-Channel Multiplexed, 14-Bit, Analog-to-Digital Converter	5958-901-2S	QML-K

DIGITAL TO ANALOG CONVERTERS (DACs)

Product Name	Part Number	Flight Grade
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-7	Commercial
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-S	Class K
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-201-1S	QML-K
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-201-2S	QML-K
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-901-1S	QML-K
RHD 5930 Digital-to-Analog Converter, 11-Bit, Ladder Output	5930-901-2S	QML-K
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-7	Commercial
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-S	Class K
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-201-1S	QML-K
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-201-2S	QML-K
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-901-1S	QML-K
RHD 5931 Digital-to-Analog Converter, 11 Bit, Buffered Output	5931-901-2S	QML-K
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-7	Commercial
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-S	Class K

ANALOG TO DIGITAL CONVERTERS (ADCs & DACs)

Channels	Resolution	Sampling Rate	Interface	SEL Immune MeV-cm²/mg	Package
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, ceramic QFP
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, ceramic QFP
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, gold-plated, ceramic QFP
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, solder-dipped, ceramic QFP
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, gold-plated, ceramic QFP
16	14 bit	20 µs	5.0 or 3.3 V logic	> 100	48-lead, solder-dipped, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, gold-plated, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, solder-dipped, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, gold-plated, ceramic QFP
8	14 bit	20 µs	5.0 or 3.3 V logic	> 100	40-lead, solder-dipped, ceramic QFP

DIGITAL TO ANALOG CONVERTERS (DACs)

Resolution	Settling Time	Power Consumption	Weight	SEL Immune MeV-cm²/mg	Package
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, ceramic SOIC
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, ceramic SOIC
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, gold-plated, ceramic SOIC
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, solder-dipped, ceramic SOIC
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, gold-plated, ceramic SOIC
11 bit	2.75 µs	20 MW	0.8 g	> 100	16-lead, solder-dipped, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, gold-plated, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, solder-dipped, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, gold-plated, ceramic SOIC
11 bit	5 µs	50 MW	0.8 g	> 100	16-lead, solder-dipped, ceramic SOIC
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, ceramic SOIC
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, ceramic SOIC

Analog Components

DIGITAL TO ANALOG CONVERTERS (DACs)

Product Name	Part Number	Flight Grade
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-201-1S	QML-K
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-201-2S	QML-K
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-901-1S	QML-K
RHD 5932 Digital-to-Analog Converter, 14-Bit, Latched, Buffered Output	5932-901-2S	QML-K

OPERATIONAL AMPLIFIERS & COMPARATORS

Product Name	Part Number	Flight Grade
RHD 5900 Quad Op-Amp - Commercial	5900-7	Commercial
RHD 5900 Quad Op-Amp - Class K	5900-S	Class K
RHD 5900 Quad Op-Amp - QML-K, Gold-Plated	5900-201-1S	QML-K
RHD 5900 Quad Op-Amp - QML-K, Solder-Dipped	5900-201-2S	QML-K
RHD 5900 Quad Op-Amp - QML-K, Gold-Plated	5900-901-1S	QML-K
RHD 5900 Quad Op-Amp - QML-K, Solder-Dipped	5900-901-2S	QML-K
RHD 5901 Quad Op-Amp with Hi-Z Control - Commercial	5901-7	Commercial
RHD 5901 Quad Op-Amp with Hi-Z Control - Class K	5901-S	Class K
RHD 5901 Quad Op-Amp with Hi-Z Control - QML-K, Gold-Plated	5901-201-1S	QML-K
RHD 5901 Quad Op-Amp with Hi-Z Control - QML-K, Solder-Dipped	5901-201-2S	QML-K
RHD 5901 Quad Op-Amp with Hi-Z Control - QML-K, Gold-Plated	5901-901-1S	QML-K
RHD 5901 Quad Op-Amp with Hi-Z Control - QML-K, Solder-Dipped	5901-901-2S	QML-K
RHD 5902 Quad Op-Amp, High Speed - Commercial	5902-7	Commercial
RHD 5902 Quad Op-Amp, High Speed - Class K	5902-S	Class K
RHD 5902 Quad Op-Amp, High Speed - QML-K, Gold-Plated	5902-201-1S	QML-K
RHD 5902 Quad Op-Amp, High Speed - QML-K, Solder-Dipped	5902-201-2S	QML-K
RHD 5902 Quad Op-Amp, High Speed - QML-K, Gold-Plated	5902-901-1S	QML-K
RHD 5902 Quad Op-Amp, High Speed - QML-K, Solder-Dipped	5902-901-2S	QML-K

DIGITAL TO ANALOG CONVERTERS (DACs)

Resolution	Settling Time	Power Consumption	Weight	SEL Immune MeV-cm²/mg	Package
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, gold-plated, ceramic SOIC
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, solder-dipped, ceramic SOIC
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, gold-plated, ceramic SOIC
14 bit	5 µs	60 MW	1.0 g	> 100	20-lead, solder-dipped, ceramic SOIC

ANALOG COMPONENTS — OPERATIONAL AMPLIFIERS & COMPARATORS

Supply Voltage	Input Offset Voltage	PSSR	CMRR	SEL Immune MeV-cm²/mg	Package
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin ceramic SOIC
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin ceramic SOIC
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin, gold-plated, ceramic SOIC
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin, solder-dipped, ceramic SOIC
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin, gold-plated, ceramic SOIC
3.3 V	-2.2 to 2.8 mV	90 dB	60 dB	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-3 to 3 mV	90 dB	90 dB	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-4 to 4 mV	70 dB	60 dB	> 100	16-pin, solder-dipped, ceramic SOIC

Analog Components

COMPARATORS

Product Name	Part Number	Flight Grade/ Screening
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-7	Commercial
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-S	Class K
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-201-1S	QML-K
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-201-2S	QML-K
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-901-1S	QML-K
RHD 5910 Quad Comparator High Speed RadHard-by-Design	5910-901-2S	QML-K
RHD 5912 Quad Comparator, Open Drain Outputs	5912-7	Commercial
RHD 5912 Quad Comparator, Open Drain Outputs	5912-S	Class K
RHD 5912 Quad Comparator, Open Drain Outputs	5912-201-1S	QML-K
RHD 5912 Quad Comparator, Open Drain Outputs	5912-201-2S	QML-K
RHD 5912 Quad Comparator, Open Drain Outputs	5912-901-1S	QML-K
RHD 5912 Quad Comparator, Open Drain Outputs	5912-901-2S	QML-K

MULTIPLEXER

Product Name	Part Number	Flight Grade	Power Supply
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-7	Commercial	+5 V
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-S	Class K	+5 V
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-201-1S	QML-K	+5 V
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-201-2S	QML-K	+5 V
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-901-1S	QML-K	+5 V
RHD 5920 16-Channel Analog Multiplexer RadHard-by-Design	5920-901-2S	QML-K	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-7	Commercial	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-S	Class K	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-201-1S	QML-K	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-201-2S	QML-K	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-901-1S	QML-K	+5 V
RHD 5921 16-Channel Buffered Output Analog Multiplexer	5921-901-2S	QML-K	+5 V
RHD 5928 8-Channel Analog Multiplexer	5928-7	Commercial	+5 V
RHD 5928 8-Channel Analog Multiplexer	5928-S	Class K	+5 V
RHD 5928 8-Channel Analog Multiplexer	5928-201-1S	QML-K	+5 V

ANALOG COMPONENTS — COMPARATORS

Supply Voltage	Input Offset Voltage	Outplay Delay	Output Type	SEL Immune MeV-cm^2/mg	Package
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, ceramic SOIC
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, ceramic SOIC
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-60 to 60 mV	200 ns	Digital	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, solder-dipped, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, gold-plated, ceramic SOIC
5.0 V	-20 to 20 mV	300 ns	Digital	> 100	16-pin, solder-dipped, ceramic SOIC

ANALOG — MULTIPLEXERS

Channels	Access Time	Power Consumption	Radiation Performance	Package
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, ceramic SOIC
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, ceramic SOIC
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, gold-plated, ceramic SOIC
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, solder-dipped, ceramic SOIC
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, gold-plated, ceramic SOIC
16	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	24-pin, solder-dipped, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, gold-plated, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, solder-dipped, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, gold-plated, ceramic SOIC
16	< 2000 ns	< 20 mW	SEL Immune > 100 MeV-cm2/mg	24-lead, solder-dipped, ceramic SOIC
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	16-pin, ceramic SOIC
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	16-pin, ceramic SOIC
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm2/mg	16-pin, gold-plated, ceramic SOIC

Analog Components

MULTIPLEXER Product Name	Part Number	Flight Grade	Power Supply
RHD 5928 8-Channel Analog Multiplexer	5928-201-2S	QML-K	+5 V
RHD 5928 8-Channel Analog Multiplexer	5928-901-1S	QML-K	+5 V
RHD 5928 8-Channel Analog Multiplexer	5928-901-2S	QML-K	+5 V
RHD 8540 64-Channel Analog Multiplexer, 32-Channel Kelvin	8540-7	Commercial	+5 V
RHD 8540 64-Channel Analog Multiplexer, 32-Channel Kelvin	8540-S	Class K	+5 V
RHD 8540 64-Channel Analog Multiplexer, 32-Channel Kelvin	8540-201-1S	QML-K	+5 V
RHD 8540 64-Channel Analog Multiplexer, 32-Channel Kelvin	8540-901-1S	QML-K	+5 V
RHD 8541 64-Channel Analog Multiplexer	8541-7	Commercial	+5 V
RHD 8541 64-Channel Analog Multiplexer	8541-S	Class K	+5 V
RHD 8541 64-Channel Analog Multiplexer	8541-201-1S	QML-K	+5 V
RHD 8541 64-Channel Analog Multiplexer	8541-901-1S	QML-K	+5 V
RHD 8542 48-Channel Analog Multiplexer, Kelvin	8542-7	Commercial	+5 V
RHD 8542 48-Channel Analog Multiplexer, Kelvin	8542-S	Class K	+5 V
RHD 8542 48-Channel Analog Multiplexer, Kelvin	8542-201-1S	QML-K	+5 V
RHD 8542 48-Channel Analog Multiplexer, Kelvin	8542-901-1S	QML-K	+5 V
RHD 8543 48-Channel Analog Multiplexer	8543-7	Commercial	+5 V
RHD 8543 48-Channel Analog Multiplexer	8543-S	Class K	+5 V
RHD 8543 48-Channel Analog Multiplexer	8543-201-1S	QML-K	+5 V
RHD 8543 48-Channel Analog Multiplexer	8543-901-1S	QML-K	+5 V
RHD 8544 Dual 16-Channel Analog Multiplexer	8544-7	Commercial	+5 V
RHD 8544 Dual 16-Channel Analog Multiplexer	8544-S	Class K	+5 V
RHD 8544 Dual 16-Channel Analog Multiplexer	8544-201-1S	QML-K	+5 V
RHD 8544 Dual 16-Channel Analog Multiplexer	8544-901-1S	QML-K	+5 V
RHD 8545 Dual 16-Channel Analog Buffered Multiplexer Module	8545-7	Commercial	+5 V
RHD 8545 Dual 16-Channel Analog Buffered Multiplexer Module	8545-S	Class K	+5 V
RHD 8545 Dual 16-Channel Analog Buffered Multiplexer Module	8545-201-1S	QML-K	+5 V
RHD 8545 Dual 16-Channel Analog Buffered Multiplexer Module	8545-901-1S	QML-K	+5 V
ACT 8500 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8500-7	Commercial	+15 V
ACT 8500 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8500-S	QML-K	+15 V

Channels	Access Time	Power Consumption	Radiation Performance	Package
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm^2/mg	16-pin, solder-dipped, ceramic SOIC
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm^2/mg	16-pin, gold-plated, ceramic SOIC
8	< 150 ns	< 4.0 mW	SEL Immune > 100 MeV-cm^2/mg	16-pin, solder-dipped, ceramic SOIC
64	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
64	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
64	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
64	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
64	< 150 ns	< 22.4 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, hermetic, ceramic QFP 1.320” Sq x 0.200” Ht
64	< 150 ns	< 22.4 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
64	< 150 ns	< 22.4 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
64	< 150 ns	< 22.4 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
48	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
48	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead ceramic QFP
48	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
48	< 150 ns	< 33.6 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
48	< 150 ns	< 16.8 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
48	< 150 ns	< 16.8 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, ceramic QFP
48	< 150 ns	< 16.8 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
48	< 150 ns	< 16.8 mW	SEL Immune > 100 MeV-cm^2/mg	96-lead, gold-plated, ceramic QFP
32	< 150 ns	< 11.2 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, ceramic QFP
32	< 150 ns	< 11.2 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, ceramic QFP
32	< 150 ns	< 11.2 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, gold-plated, ceramic QFP
32	< 150 ns	< 11.2 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, gold-plated, ceramic QFP
32	< 2000 ns	< 70 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, ceramic QFP
32	< 2000 ns	< 70 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, ceramic QFP
32	< 2000 ns	< 70 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, gold-plated, ceramic QFP
32	< 2000 ns	< 70 mW	SEL Immune > 100 MeV-cm^2/mg	56-lead, gold-plated, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP

Analog Components

MULTIPLEXER Product Name	Part Number	Flight Grade	Power Supply
ACT 8500 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8500-901-1S	QML-K	+15 V
ACT 8501 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8501-7	Commercial	+15 V
ACT 8501 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8501-S	QML-K	+15 V
ACT 8501 64-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8501-901-1S	QML-K	+15 V
ACT 8502 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8502-7	Commercial	+15 V
ACT 8502 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8502-S	QML-K	+15 V
ACT 8502 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8502-901-1S	QML-K	+15 V
ACT 8503 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8503-7	Commercial	+15 V
ACT 8503 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8503-S	QML-K	+15 V
ACT 8503 48-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8503-901-1S	QML-K	+15 V
ACT 8506 48-Channel Analog Multiplexer Module Radiation Tolerant	8506-7	Commercial	+15 V
ACT 8506 48-Channel Analog Multiplexer Module Radiation Tolerant	8506-S	QML-K	+15 V
ACT 8506 48-Channel Analog Multiplexer Module Radiation Tolerant	8506-901-1S	QML-K	+15 V
MUX 8507 64-Channel Analog Multiplexer Module Radiation Tolerant	8507-7	Commercial	+15 V
MUX 8507 64-Channel Analog Multiplexer Module Radiation Tolerant	8507-S	QML-K	+15 V
MUX 8507 64-Channel Analog Multiplexer Module Radiation Tolerant	8507-201-1S	QML-K	+15 V
MUX 8507 64-Channel Analog Multiplexer Module Radiation Tolerant	8507-901-1S	QML-K	+15 V
ACT 8508 32-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8508-7	Commercial	+15 V
ACT 8508 32-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8508-S	QML-K	+15 V
ACT 8508 32-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8508-901-1S	QML-K	+15 V
MUX 8509 64-Channel Analog Multiplexer Module Radiation Tolerant	8509-7	Commercial	+15 V
MUX 8509 64-Channel Analog Multiplexer Module Radiation Tolerant	8509-S	Class K	+15 V
MUX 8509 64-Channel Analog Multiplexer Module Radiation Tolerant	8509-201-1S	QML-K	+15 V

Channels	Access Time	Power Consumption	Radiation Performance	Package
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
64	< 500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
48	< 1500 ns	< 45 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 45 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 45mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
48	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
64	< 1500 ns	< 90 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
64	< 1500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 1500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, ceramic QFP
64	< 1500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP

Analog Components

MULTIPLEXER Product Name	Part Number	Flight Grade	Power Supply
MUX 8509 64-Channel Analog Multiplexer Module Radiation Tolerant	8509-901-1S	QML-K	+15 V
MUX 8520 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8520-7	Commercial	+15 V
MUX 8520 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8520-S	Class K	+15 V
MUX 8520 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8520-201-1S	QML-K	+15 V
MUX 8520 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8520-901-1S	QML-K	+15 V
MUX 8521 16-Channel Analog Multiplexer Module Radition Tolerant & ESD Protected Kelvin Measurement Configured	8521-7	Commercial	+15 V
MUX 8521 16-Channel Analog Multiplexer Module Radition Tolerant & ESD Protected Kelvin Measurement Configured	8521-S	Class K	+15 V
MUX 8521 16-Channel Analog Multiplexer Module Radition Tolerant & ESD Protected Kelvin Measurement Configured	8521-201-1S	QML-K	+15 V
MUX 8521 16-Channel Analog Multiplexer Module Radition Tolerant & ESD Protected Kelvin Measurement Configured	8521-901-1S	QML-K	+15 V
MUX 8522 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant	8522-7	Commercial	+15 V
MUX 8522 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant	8522-S	Class K	+15 V
MUX 8522 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant	8522-201-1S	QML-K	+15 V
MUX 8522 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant	8522-901-1S	QML-K	+15 V
MUX 8523 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8523-7	Commercial	+15 V
MUX 8523 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8523-S	Class K	+15 V
MUX 8523 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8523-201-1S	QML-K	15 V
MUX 8523 Dual 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected	8523-901-1S	QML-K	15 V
MUX 8561 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant Kelvin Measurement Configured	8561-7	Commercial	5 V
MUX 8561 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant Kelvin Measurement Configured	8561-S	Class K	5 V

Channels	Access Time	Power Consumption	Radiation Performance	Package
64	< 1500 ns	< 60 mW	Total Dose > 300 krad(Si)	96-lead, gold-plated, ceramic QFP
16	< 1500 ns	< 15 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
16	< 1500 ns	< 15 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
16	< 1500 ns	< 15 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
16	< 1500 ns	< 15 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
16	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
16	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
16	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
16	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
32	< 1500 ns	< 30 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
16	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
16	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP

Analog Components

MULTIPLEXER

Product Name	Part Number	Flight Grade	Power Supply
MUX 8561 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant Kelvin Measurement Configured	8561-201-1S	QML-K	5 V
MUX 8562 Dual 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant	8562-7	Commercial	5 V
MUX 8562 Dual 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant	8562-S	Class K	5 V
MUX 8562 Dual 16-Channel Analog Multiplexer Module +5 V, Radiation Tolerant	8562-201-1S	QML-K	5 V

MULTIPLEXER

Product Name	Part Number	SMD Part Number	Flight Grade
16:1 Multiplexer Asynchronous	UT16MX110	5962-10233	QML-Q & QML-V
16:1 Multiplexer Synchronous	UT16MX111	5962-10233	QML-Q & QML-V
16:1 Multiplexer Serial Interface	UT16MX112	5962-10233	QML-Q & QML-V
16:1 Multiplexer Asynchronous	UT16MX113	5962-10236	QML-Q & QML-V
16:1 Multiplexer Synchronous	UT16MX114	5962-10236	QML-Q & QML-V
16:1 Multiplexer Serial Interface	UT16MX115	5962-10236	QML-Q & QML-V
16:1 Multiplexer Asynchronous	UT16MX116	5962-10237	QML-Q & QML-V
16:1 Multiplexer Synchronous	UT16MX117	5962-10237	QML-Q & QML-V

VOLTAGE TRANSLATOR

Product Name	Part Number	Flight Grade	Drive Capabilities
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - Commercial FG	5980-7	Commercial	12 mA
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - Class K FG	5980-S	Class K	12 mA
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - QML-K, Gold-Plated	5980-201-1S	QML-K	12 mA
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - QML-K, Solder-Dipped	5980-201-2S	QML-K	12 mA
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - QML-K, Gold-Plated	5980-901-1S	QML-K	12 mA
RHD 5980 Octal Bus Transcever, Bidirectional Voltage Level Shifter - QML-K, Solder-Dipped	5980-901-2S	QML-K	12 mA

ANALOG — MULTIPLEXERS

Channels	Access Time	Power Consumption	Radiation Performance	Package
16	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP
32	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, ceramic QFP
32	< 500 ns	< 5 mW	Total Dose > 300 krad(Si)	56-lead, gold-plated, ceramic QFP

ANALOG COMPONENT — MULTIPLEXER

LET (MeV-cm²/mg)	TID krad(Si)	# of Channels	Analog Supply Voltage (V)	Package
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP
≤ 110	300	16	4.5 to 5.5 V	28-lead FP

ANALOG COMPONENT — VOLTAGE TRANSLATORS

Level Shift	Prop Delay	Power	SEL IMMUNE MeV-cm²/mg	Package
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin ceramic SOIC
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin ceramic SOIC
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin, gold-plated, ceramic SOIC
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin, solder-dipped, ceramic SOIC
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin, gold-plated, ceramic SOIC
5.0 to 3.3 V or 3.3 to 5.0 V	30 ns	100 mW	> 100	24-pin, solder-dipped, ceramic SOIC

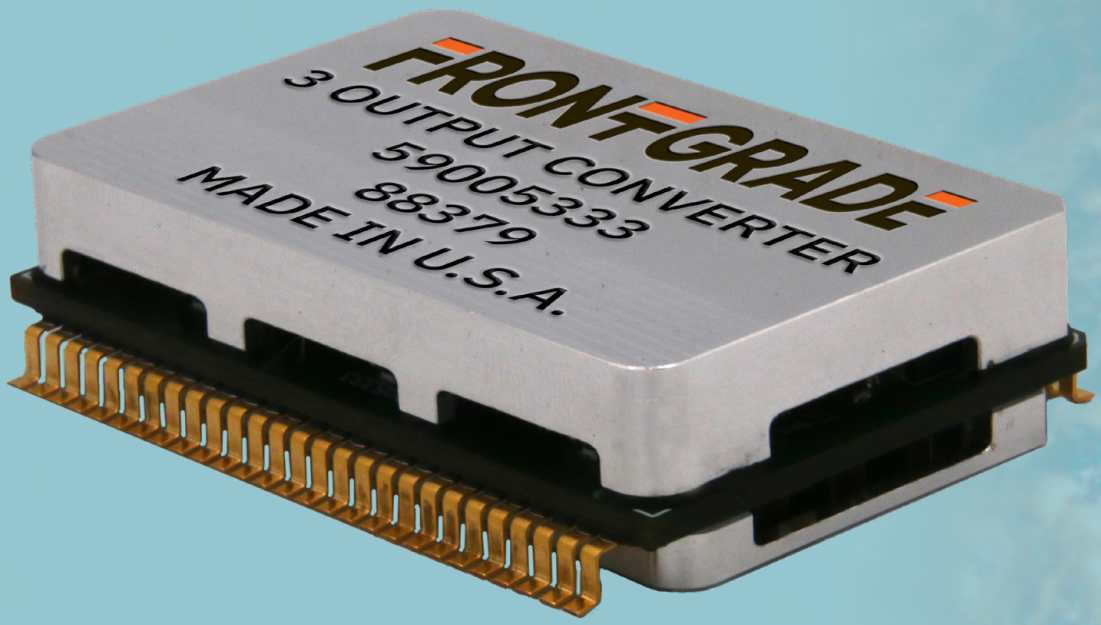
Power Management

Single Stage GaN DC-DC Converter

The 51028XXX series is a Single-Stage Isolated GaN DC-DC Converter designed for space applications. It operates from a 28 VDC input and provides a regulated, isolated output of 0.8 VDC to 12.0 VDC. With a 433 kHz switching frequency, it delivers industry-leading efficiency of 90% and above, achieving high power density in a compact, small package. The package combines a metal cover with a plastic base and features a gull-winged lead design for reliable surface-mount installation in demanding environments. Built-in protection includes input overvoltage/undervoltage shutdown, short-circuit protection, and remote output sensing.

Non-Isolated Point of Load

A Three-Output NiPOL DC-DC converter, the 59005333 NiPOL integrates three independent converters in one high-density package and operates with an input voltage range of 4.5 VDC to 5.5 VDC. This Three-Output Converter delivers output voltages from 0.8 VDC to 3.3 VDC, which can be independently set for each converter using external programming resistors. Each converter provides currents up to 6A and features individual voltage sense inputs and enables inputs plus power-good outputs – all based on a buck topology with a 1 MHz switching frequency. Its compact package has a metal cover and plastic base, operates from -40°C to +125°C, and includes overvoltage/undervoltage, overcurrent, and short-circuit protection.



EMI Filter

The 5402801 high-density EMI filter is designed for high-reliability space systems and provides attenuation to limit conducted emissions, helping meet the requirements of MIL-STD 461G CS101. Supporting input voltages from 0 to 50 VDC and a maximum current of 6A, the module offers both differential and common-mode low-pass filtering. Optimized and compatible with Frontgrade converters, it ensures system reliability and performance in demanding environments.

Power Management
New Products

CONVERTERS & SPSCs

Product Name	Part Number	Flight Grade	Voltage In
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series (28 V/50 W Output)	51028080-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028100-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028120-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028180-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028330-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Serie	51028250-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028500-S	Flight	21 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028700-S	Flight	20 to 38 VDC
28-Volt Single Stage Isolated DC-DC Converter 51028XXX Series	51028121-S	Flight	20 to 38 VDC
100-Volt Single Stage Isolated DC-DC Converter 51100XXX Series	51100100-S	Flight	93 to 107 VDC
100-Volt Single Stage Isolated DC-DC Converter 51100XXX Series	51100281-S	Flight	93 to 107 VDC

EMI

Product Name	Part Number	Flight Grade
28-Volt EMI Filter Module for Single Stage Isolated Converters	5402801-S	Flight

THREE-OUTPUT CONVERTERS

Product Name	Part Number	Flight Grade	Voltage In
Three-Output NiPOL DC-DC Converter Module 5 V in, 0.8 to 3.3 V out at up to 6A	59005333-S	Flight	4.5 to 5.5 VDC

POWER MANAGEMENT — CONVERTERS & SPSCs

Voltage Out	Switching Frequency	Full-Load Efficiency	SEL Immune MeV-cm²/mg	Package
0.8 VDC	425 kHz	89%	60	62-lead PCB Module
1 VDC	425 kHz	91%	60	62-lead PCB Module
1.2 VDC	425 kHz	91%	60	62-lead PCB Module
1.8 VDC	425 kHz	91%	60	62-lead PCB Module
3.3 VDC	425 kHz	92%	60	62-lead PCB Module
2.5 VDC	433 kHz	89%	60	62-lead PCB Module
5 VDC	425 kHz	92%	60	62-lead PCB Module
7 VDC	425 kHz	93%	60	62-lead PCB Module
12 VDC	425 kHz	93%	60	62-lead PCB Module
1 VDC	433 kHz	90%	60	62-lead PCB Module
28 VDC	433 kHz	93%	60	62-lead PCB Module

POWER MANAGEMENT — EMI

Voltage In	Voltage Out	SEL Immune MeV-cm²/mg	Package
0 to 50 VDC	0 to 50 VDC	Radiation Immune	38-lead PCB Module

POWER MANAGEMENT — THREE-OUTPUT CONVERTERS

Voltage Out	Switching Frequency	Efficiency	SEL Immune MeV-cm²/mg	Package
0.8 to 3.3 VDC	1 MHz	95%	43	54-lead PCB Module

Power Management

RESOLVER TO DIGITAL CONVERTER

Product Name	Part Number	Flight Grade	Supply Voltage	Digital Interface Logic Voltage
RDC5028C16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-3-1-7	Commercial	+5 VDC	3.3 to 5V
RDC5028C 16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-3-1-S	Class K	+5 VDC	3.3 to 5V
RDC 5028C 16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-301-1S	QML-K	5 VDC	3.3 to 5 V
RDC 5028C 16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-301-2S	QML-K	5 VDC	3.3 to 5 V
RDC 5028C 16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-931-1S	QML-K	5 VDC	3.3 to 5 V
RDC 5028C 16-Bit Monolithic Tracking Resolver-to-Digital Converter	5028-931-2S	QML-K	5 VDC	3.3 to 5 V
ACT 5028 Resolver-to-Digital Converter (RDC) Evaluation Board	5028-EVAL	N/A	5 VDC	3.3 to 5 V

SMART POWER SWITCH CONTROLLER

Product Name	Part Number	SMD Part Number	Flight Grade
Smart Power Switch Controller - 36 V	UT36PFD103	5962-20206	QML-Q & QML-V
Smart Power Switch Controller - 5 V	UT05PFD103	N/A	QML-Q & QML-V

POWER MANAGEMENT — RESOLVER TO DIGITAL CONVERTER			
Resolution	Accuracy	SEL Immune MeV-cm²/mg	Package
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, gold-plated, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, solder-dipped, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, gold-plated, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	52-pin, solder-dipped, ceramic QFP
16-, 14-, 12- & 10-bit modes	5.3 arcmin with INL Table or 10.0 arcmin	> 100	PCB

POWER MANAGEMENT — SMART POWER SWITCH CONTROLLER			
LET (MeV-cm²/mg)	TID krad(Si)	Voltage (V)	Package
≤ 100	300	8 to 36 V	47-lead FP
≤ 100	300	4.5 to 5.5 V	47-lead FP

Power Management
Voltage Supervisors & Regulators

VOLTAGE SUPERVISOR

Product Name	Part Number	SMD Part Number	Flight Grade
Voltage Supervisor - 1.25 V	UT01VS50L	5962-11213	QML-Q & QML-V
Voltage Supervisor - 1.25 V	UT01VS50D	5962-11213	QML-Q & QML-V
Voltage Supervisor - 0.6 V	UT01VS33L	5962-11213	QML-Q & QML-V
Voltage Supervisor - 0.6 V	UT01VS33D	5962-11213	QML-Q & QML-V
Voltage Supervisor - 1.0 to +3.3 V	UT04VS50P	5962-13206	QML-Q & QML-V
Voltage Supervisor - 1.0 to +3.3 V	UT04VS33P	5962-13206	QML-Q & QML-V

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-7	Commercial	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-S	Class K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-201-1S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-201-2S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-901-1S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V

POWER MANAGEMENT — VOLTAGE SUPERVISOR

LET (MeV-cm²/mg)	TID krad(Si)	# of Channels	Fixed Voltage Thresholds	Package
≤ 110	300	1	1.25 V	8-lead FP
≤ 110	300	1	1.25 V	8-lead FP
≤ 110	300	1	0.6 V	8-lead FP
≤ 110	300	1	0.6 V	8-lead FP
≤ 110	300	4	1.0 to +3.3 V	28-lead FP
≤ 110	300	4	1.0 to +3.3 V	28-lead FP

POWER MANAGEMENT — VOLTAGE REGULATORS

Load Regulation	Line Regulation	Protection Feature	Package
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8601-901-2S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-7	Commercial	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-S	Class K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-201-1S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-201-2S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-901-1S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive/ Negative Voltage Regulators	8602-901-2S	QML-K	Positive: +1.25 to 37 V Negative: -1.25 to -27 V	1.5 A	Positive: +2.5 V Negative: -2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-7	Commercial	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-S	Class K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-201-1S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-201-2S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V

Load Regulation	Line Regulation	Protection Feature	Package
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Current Limiting Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
Positive: +1.9% max Negative: -1.0% typ	Positive: 0.06% max Negative: 0.05% typ	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-901-1S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8607-901-2S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-7	Commercial	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-S	Class K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-201-1S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-201-2S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-901-1S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Positive Voltage Regulators	8608-901-2S	QML-K	+1.25 to 37 V	1.5 A	+2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-7	Commercial	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-S	Class K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-201-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-201-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-901-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8609-901-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-7	Commercial	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-S	Class K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-201-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-201-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V

Load Regulation	Line Regulation	Protection Feature	Package
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.2% max	0.06%/V max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, hermetic, solder-dipped metal, surface mount power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-901-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual 1.5 A Adjustable Negative Voltage Regulators VRG8609/10	8610-901-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-7	Commercial	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-S	Class K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-201-1S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-201-2S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-901-1S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8651-901-2S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-7	Commercial	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-S	Class K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-201-1S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V

Load Regulation	Line Regulation	Protection Feature	Package
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
1.0% max	0.05%/V max	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, surface mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, surface mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, gold-plated, surface mount, hermetic metal power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-201-2S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-901-1S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual LDO Adjustable Positive/ Negative Voltage Regulators VRG8651/52	8652-901-2S	QML-K	Positive: +1.25 to 23 V Negative: -2.37 to -25 V	Positive: +1.0 A Negative: -3.0 A	Positive: +1.3 V Negative: -1.05 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-7	Commercial	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-S	Class K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-201-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-201-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-901-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8657-901-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-7	Commercial	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-S	Class K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-201-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-201-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-901-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Dual 1A LDO Adjustable Positive Voltage Regulators	8658-901-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
Adjustable Positive Voltage Regulators VRG8660	8660-7	Commercial	1.25 to 37 V	1.5 A	2.5 V

Load Regulation	Line Regulation	Protection Feature	Package
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, solder-dipped, surface mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, gold-plated, surface mount, hermetic metal power pkg
Positive: +0.3% max Negative: -0.8% max	Positive: 0.25%/V max Negative: 0.02%/V max	Thermal Shutdown	8-lead, solder-dipped, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, gold-plated, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, gold-plated, surface mount, hermetic metal power pkg
0.3% max	0.25% max	Thermal Shutdown	6-lead, solder-dipped, surface mount, hermetic metal power pkg
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, surface mount, ceramic power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Adjustable Positive Voltage Regulator VRG8660	8660-S	Class K	1.25 to 37 V	1.5 A	2.5 V
Adjustable Positive Voltage Regulator VRG8660	8660-201-1S	QML-K	1.25 to 37 V	1.5 A	2.5 V
Adjustable Positive Voltage Regulator VRG8660	8660-201-2S	QML-K	1.25 to 37 V	1.5 A	2.5 V
Adjustable Positive Voltage Regulator VRG8660	8660-901-1S	QML-K	1.25 to 37 V	1.5 A	2.5 V
Adjustable Positive Voltage Regulator VRG8660	8660-901-2S	QML-K	1.25 to 37 V	1.5 A	2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-7	Commercial	-1.25 to -27 V	1.5 A	-2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-S	Class K	-1.25 to -27 V	1.5 A	-2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-201-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-201-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-901-1S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
Adjustable Negative Voltage Regulator VRG8661	8661-901-2S	QML-K	-1.25 to -27 V	1.5 A	-2.5 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-7	Commercial	1.25 to 23 V	1.0 A	1.3 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-S	Class K	1.25 to 23 V	1.0 A	1.3 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-201-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-201-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-901-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
1A LDO Adjustable Positive Voltage Regulator VRG8662	8662-901-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
3A LDO Adjustable Negative Voltage Regulator	8663-7	Commercial	-2.37 to -25 V	3.0 A	-1.05 V
3A LDO Adjustable Negative Voltage Regulator	8663-S	Class K	-2.37 to -25 V	3.0 A	-1.05 V

POWER MANAGEMENT — VOLTAGE REGULATORS			
Load Regulation	Line Regulation	Protection Feature	Package
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, surface mount, ceramic power pkg
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
1.9% max	0.06%/V max	Thermal Shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
1.0% max	0.05% max	Thermal Shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
0.8% max	0.02% max	Thermal shutdown	5-pad, surface mount, ceramic power pkg
0.8% max	0.02% max	Thermal shutdown	5-pad, surface mount, ceramic power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
3A LDO Adjustable Negative Voltage Regulator	8663-201-1S	QML-K	-2.37 to -25 V	3.0 A	-1.05 V
3A LDO Adjustable Negative Voltage Regulator	8663-201-2S	QML-K	-2.37 to -25 V	3.0 A	-1.05 V
3A LDO Adjustable Negative Voltage Regulator	8663-901-1S	QML-K	-2.37 to -25 V	3.0 A	-1.05 V
3A LDO Adjustable Negative Voltage Regulator	8663-901-2S	QML-K	-2.37 to -25 V	3.0 A	-1.05 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-7	Commercial	0 to 35 V	1.0 A	0.60 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-S	Class K	0 to 35 V	1.0 A	0.60 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-201-1S	QML-K	0 to 35 V	1.0 A	0.60 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-201-2S	QML-K	0 to 35 V	1.0 A	0.60 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-901-1S	QML-K	0 to 35 V	1.0 A	0.60 V
1A ULDO Adjustable Positive Voltage Regulator VRG8666	8666-901-2S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-7	Commercial	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-S	Class K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-201-1S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-201-2S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-901-1S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8667-901-2S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-7	Commercial	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-S	Class K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-201-1S	QML-K	0 to 35 V	1.0 A	0.60 V

POWER MANAGEMENT — VOLTAGE REGULATORS			
Load Regulation	Line Regulation	Protection Feature	Package
0.8% max	0.02% max	Thermal shutdown	5-pad, gold-plated, surface mount, ceramic power pkg
0.8% max	0.02% max	Thermal shutdown	5-pad, solder-dipped, surface mount, ceramic power pkg
0.8% max	0.02% max	Thermal shutdown	5-pad, gold-plated, surface mount, ceramic power pkg
0.8% max	0.02% max	Thermal shutdown	5-pad, solder-dipped, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, gold-plated, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, solder-dipped, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, gold-plated, surface mount, ceramic power pkg
1.5% max	0.15% max	Thermal shutdown	5-pad, solder-dipped, surface mount, ceramic power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, surface mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, surface mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, gold-plated, surface mount, hermetic metal power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-201-2S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-901-1S	QML-K	0 to 35 V	1.0 A	0.60 V
Dual A1 ULDO Adjustable Positive Voltage Regulators	8668-901-2S	QML-K	0 to 35 V	1.0 A	0.60 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-7	Commercial	0 to 18 V	2.5 A	0.75 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-S	Class K	0 to 18 V	2.5 A	0.75 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-201-1S	QML-K	0 to 18 V	2.5 A	0.75 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-201-2S	QML-K	0 to 18 V	2.5 A	0.75 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-901-1S	QML-K	0 to 18 V	2.5 A	0.75 V
2.5 A ULDO Adjustable Positive Voltage Regulator VRG8669	8669-901-2S	QML-K	0 to 18 V	2.5 A	0.75 V
VRG8682 1A LDO Adjustable Positive Voltage Regulator	8682-901-1S	QML-K	1.25 to 23 V	1.0 A	1.3 V
VRG8682 1A LDO Adjustable Positive Voltage Regulator	8682-901-2S	QML-K	1.25 to 23 V	1.0 A	1.3 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-7	Commercial	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-S	Class K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-201-1S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-201-2S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-901-1S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8691	8691-901-2S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-7	Commercial	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-S	Class K	1.0 to 3.3 V	7.5 A	0.5 V

Load Regulation	Line Regulation	Protection Feature	Package
1.5% max	0.15% max	Over-temperature protection	8-lead, solder-dipped, surface mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, gold-plated, surface mount, hermetic metal power pkg
1.5% max	0.15% max	Over-temperature protection	8-lead, solder-dipped, surface mount, hermetic metal power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, surface mount, ceramic power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, surface mount, ceramic power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, gold-plated, surface mount, ceramic power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, solder-dipped, surface mount, ceramic power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, gold-plated, surface mount, ceramic power pkg
10 mV	0.08 mV/V	Over-temperature protection	5-pad, solder-dipped, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, gold-plated, surface mount, ceramic power pkg
0.3% max	0.25% max	Thermal shutdown	3-pad, solder-dipped, surface mount, ceramic power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, gold-plated, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, gold-plated, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, surface mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, surface mount, hermetic metal power pkg

Power Management

VOLTAGE REGULATORS

Product Name	Part Number	Flight Grade	Output Voltage	Output Current	Dropout Voltage
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-201-1S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-201-2S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-901-1S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
7.5 Amp LDO Adjustable Positive Voltage Regulators VRG8692	8692-901-2S	QML-K	1.0 to 3.3 V	7.5 A	0.5 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-7	Commercial	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-S	Class K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-201-1S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-201-2S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-901-1S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8697-901-2S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-7	Commercial	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-S	Class K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-201-1S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-201-2S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-901-1S	QML-K	0 to 22 V	2.5 A	0.75 V
Dual 2.5 A ULDO Adjustable Positive Voltage Regulators VRG8697/98	8698-901-2S	QML-K	0 to 22 V	2.5 A	0.75 V

Load Regulation	Line Regulation	Protection Feature	Package
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, gold-plated, surface mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, solder-dipped, surface mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, gold-plated, surface mount, hermetic metal power pkg
0.5% max	0.2% max	Internal current limiting blowout-proof	12-lead, solder-dipped, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, gold-plated, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, solder-dipped, thru-hole mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, gold-plated, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, solder-dipped, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, gold-plated, surface mount, hermetic metal power pkg
10 mV	0.07 mV/V	Over-temperature protection	8-lead, solder-dipped, surface mount, hermetic metal power pkg

Power Management

PRECISION VOLTAGE REFERENCE			
Product Name	Part Number	Flight Grade	Operating Voltage Range
RHD 5961 2.00 Volt Precision Voltage Reference	5961-7	Commercial	3 to 5 V
RHD 5961 2.00 Volt Precision Voltage Reference	5961-S	Class K	3 to 5 V
RHD 5961 2.00 Volt Precision Voltage Reference	5961-201-1S	QML-K	3 to 5 V
RHD 5961 2.00 Volt Precision Voltage Reference	5961-201-2S	QML-K	3 to 5 V
RHD 5961 2.00 V Precision Voltage Reference	5961-901-1S	QML-K	3 to 5 V
RHD 5961 2.00 V Precision Voltage Reference	5961-901-2S	QML-K	3 to 5 V
RHD 5962 Buffered Thermometer	5962-7	Commercial	3 to 6 V
RHD 5962 Buffered Thermometer	5962-S	Class K	3 to 6 V
RHD 5962 Buffered Thermometer	5962-201-1S	QML-K	3 to 6 V
RHD 5962 Buffered Thermometer	5962-201-2S	QML-K	3 to 6 V
RHD 5962 Buffered Thermometer	5962-901-1S	QML-K	3 to 6 V
RHD 5962 Buffered Thermometer	5962-901-2S	QML-K	3 to 6 V
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-7	Commercial	3 to 5 V
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-S	Class K	3 to 5 V
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-201-1S	QML-K	3 to 5 V
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-201-2S	QML-K	3 to 5 V
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-901-1S	QML-K	3 to 5 V

POWER MANAGEMENT — PRECISION VOLTAGE REFERENCE			
Accuracy	Power Consumption	SEL Immune MeV-cm²/mg	Package (L x W x H)
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, surface mount
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, SMD-0.5, surface mount .400” x .296” x .120”
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, gold-plated, surface mount
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, solder-dipped, SMD-0.5, surface mount .400” x .296” x .120”
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, gold-plated, SMD-0.5, surface mount .400” x .296” x .120”
V REF ±0.02% at 2.0 V	7.5 mW	> 100	3-pad, solder-dipped, SMD-0.5, surface mount .400” x .296” x .120”
V REF ±0.04% at 2.0 V Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, SMD-0.5, surface mount .405” x .301” x .127”
V REF ±0.04% at 2.0 V Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, SMD-0.5, surface mount .405” x .301” x .127”
V REF ±0.04% at 2.0 V Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, gold-plated, SMD-0.5, surface mount .405” x .301” x .127”
V REF ±0.04% at 2.0 V Extra Spaces Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, solder-dipped, SMD-0.5, surface mount.405” x .301” x .127”
V REF ±0.04% at 2.0 V Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, gold-plated, SMD-0.5, surface mount.405” x .301” x .127”
V REF ±0.04% at 2.0 V Max Temp Coef 35 ppm/°C	7.5 mW	> 100	3-pad, solder-dipped, SMD-0.5, surface mount .405” x .301” x .127”
V REF ±0.05% at 1.0 V Max Temp Coef 10 mV/°C	5 mW	> 100	5-pad, surface mount, hermetic power pkg .545” x .296” x .120”
V REF ±0.05% at 1.0 V Max Temp Coef 10 mV/°C	5 mW	> 100	5-pad, surface mount, hermetic power pkg .545” x .296” x .120”
V REF ±0.05% at 1.0 V Extra Spaces Max Temp Coef 10 m/°C	5 mW	> 100	5-pad, gold-plated, surface mount, hermetic power pkg .545” x .296” x .120”
V REF ±0.05% at 1.0 V Max Temp Coef 10 mV/°C	5 mW	> 100	5-pad, solder-dipped, surface mount, hermetic power pkg .545” x .296” x .120”
V REF ±0.05% at 1.0 V Max Temp Coef 10 mV/°C	5 mW	> 100	5-pad, gold-plated, surface mount, hermetic power pkg .545” x .296” x .120”

Power Management

PRECISION VOLTAGE REFERENCE

Product Name	Part Number	Flight Grade	Operating Voltage Range
RHD 5963 2.00 V Precision Voltage Reference and Buffered Thermometer	5963-901-2S	QML-K	3 to 5 V

PWM CONTROLLER

Product Name	Part Number	Flight Grade	Duty Cycle
High Speed PWM Controller PWM 5031/5032/5034	5032-7	Commercial	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5035	5032-S	Class K	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5036	5032-001-1S	QML-K	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5037	5032-001-2S	QML-K	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5038	5034-7	QML-K	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5039	5034-S	Class K	Selectable 50%/100%
High Speed PWM Controller PWM 5031/5032/5040	5034-001-1S	QML-K	Selectable 50%/100%
High Speed Pulse Width Modulator Controller Evaluation Board	5032-EVAL	N/A	Selectable 50%/100%

BATTERY ELECTRONIC UNITS

Product Name	Product Number	Flight Grade/ Screening	Battery Configuration
Balancing for 8-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-08	Commercial	8 Lithium-Ion battery cells
Balancing for 8-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-08-S	High Reliability Space Grade	8 Lithium-Ion battery cells
SCD8635-12 Balancing for 12-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-12	Commercial	12 Lithium-Ion battery cells
SCD8635-12 Balancing for 12-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-12-S	High Reliability Space Grade	12 Lithium-Ion battery cells

POWER MANAGEMENT — PRECISION VOLTAGE REFERENCE

Accuracy	Power Consumption	SEL Immune MeV-cm²/mg	Package (L x W x H)
V REF ±0.05% at 1.0 V Max Temp Coef 10 mV/°C	5 mW	> 100	5-pad, solder-dipped, surface mount, hermetic power pkg .545” x .296” x .120”

PWM CONTROLLER

Drive Capabilities	Frequency Range	SEL Immune MeV-cm²/mg	Package
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, gull wing, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, gull wing, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, gold-plated, gull wing, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, solder-dipped, gull wing, ceramic FP
1 V thru 12 V @ 1.0 A	1 Mhz	> 100	24-lead, straight, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, straight, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	24-lead, gold-plated, straight, ceramic FP
1 V thru 12 V @ 1.0 A	1 MHz	> 100	8’’ x 11’’ x 3.25’’ H

BATTERY ELECTRONIC UNITS

Power Dissipation	Cell Balancing	Voltage Monitoring Accuracy	Battery Drain Current	Size (LxWxH)
6.6W (30V Supply), 0.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
6.6W (30V Supply), 0.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.1W (30V Supply), 0.75W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.1W (30V Supply), 0.75W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”

Power Management

BATTERY ELECTRONIC UNITS

Product Name	Product Number	Flight Grade/ Screening	Battery Configuration
SCD8635-12 Balancing for 24-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-24	Commercial	24 Lithium-Ion battery cells
SCD8635-12 Balancing for 24-Cell Battery Cell Voltage Monitoring and Telemetry	BEU8635-24-S	High Reliability Space Grade	24 Lithium-Ion battery cells
Balancing for 8-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-08	Commercial	8 Lithium-Ion battery cells
Balancing for 8-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-08-S	High Reliability Space Grade	8 Lithium-Ion battery cells
Balancing for 12-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-12	Commercial	12 Lithium-Ion battery cells
Balancing for 12-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-12-S	High Reliability Space Grade	12 Lithium-Ion battery cells
SCD8636-24 Balancing For 12-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-24	Commercial	24 Lithium-Ion battery cells
SCD8636-24 Balancing For 12-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8636-24-S	High Reliability Space Grade	24 Lithium-Ion battery cells
SCD8637-08 Independent Balancing for Two 8-Cell Batteries Cell Voltage Monitoring and Telemetry	BEU8637-08	Commercial	8 Lithium-Ion battery cells
SCD8637-08 Independent Balancing for Two 8-Cell Batteries Cell Voltage Monitoring and Telemetry	BEU8637-08-S	High Reliability Space Grade	8 Lithium-Ion battery cells
SCD8637-12 Independent Balancing for Two 12-Cell Batteries Cell Voltage Monitoring and Telemetry	BEU8637-12	Commercial	12 Lithium-Ion battery cells
SCD8637-12 Independent Balancing for Two 12-Cell Batteries Cell Voltage Monitoring and Telemetry	BEU8637-12-S	High Reliability Space Grade	12 Lithium-Ion battery cells
SCD8638-08 Independent Balancing for Two 8-Cell Batteries Cell Voltage Monitoring and Telemetry Cell Bypass Relay Drivers	BEU8638-08	Commercial	8 Lithium-Ion battery cells
SCD8638-08 Independent Balancing for Two 8-Cell Batteries Cell Voltage Monitoring and Telemetry Cell Bypass Relay Drivers	BEU8638-08-S	High Reliability Space Grade	8 Lithium-Ion battery cells

BATTERY ELECTRONIC UNITS				
Power Dissipation	Cell Balancing	Voltage Monitoring Accuracy	Battery Drain Current	Size (LxWxH)
9.0W (30V Supply), 1.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
9.0W (30V Supply), 1.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.0W (30V Supply), 0.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.0W (30V Supply), 0.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.65W (30V Supply), 0.75W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
7.65W (30V Supply), 0.75W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
9.5W (30V Supply), 1.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
9.5W (30V Supply), 1.5W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
11.08W (30V Supply), 0.96W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
11.08W (30V Supply), 0.96W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
11.6W (30V Supply), 1.44W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
11.6W (30V Supply), 1.44W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
13W (30V Supply), 1.0W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
13W (30V Supply), 1.0W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”

Power Management

BATTERY ELECTRONIC UNITS Product Name	Product Number	Flight Grade/ Screening	Battery Configuration
SCD8638-12 Independent Balancing for Two 12-Cell Batteries Cell Voltage Monitoring and Telemetry Cell Bypass Relay Drivers	BEU8638-12	Commercial	12 Lithium-Ion battery cells
SCD8638-12 Independent Balancing for Two 12-Cell Batteries Cell Voltage Monitoring and Telemetry Cell Bypass Relay Drivers	BEU8638-12-S	High Reliability Space Grade	12 Lithium-Ion battery cells
Dual Redundant Balancing for 24-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8640-24	Commercial	24 Lithium-Ion battery cells
Dual Redundant Balancing for 24-Cell Battery Cell Voltage Monitoring and Telemetry Reconditioning Load Control Cell Bypass Relay Drivers	BEU8640-24-S	High Reliability Space Grade	24 Lithium-Ion battery cells
Balancing for 8-Cell Battery Cell Voltage Monitoring Temperature Monitoring	BEU8642-EVAL	N/A	8 Lithium-Ion battery cells

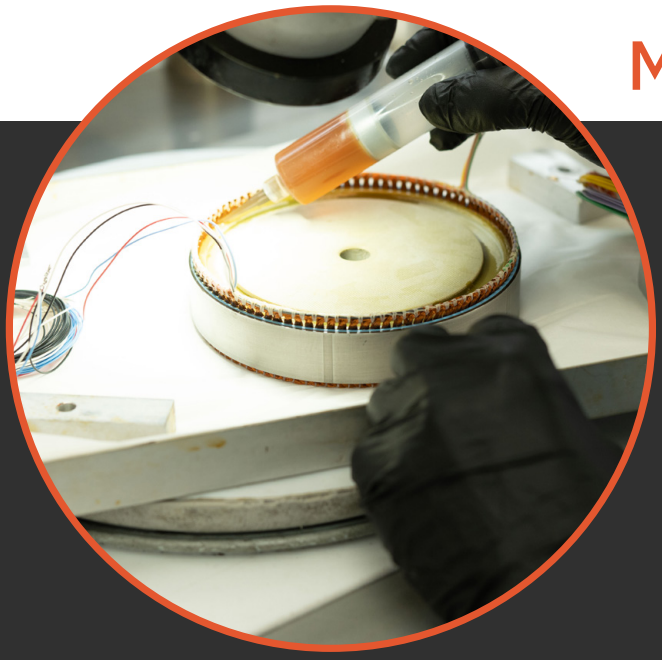
Commitment to Ethics

OUR GUIDING PRINCIPLES

We maintain high ethical standards across every business touchpoint — and we empower team members and provide them with the infrastructure to always do the right thing in the right way.

EXPLORE OUR LEADERSHIP TEAM

BATTERY ELECTRONIC UNITS				
Power Dissipation	Cell Balancing	Voltage Monitoring Accuracy	Battery Drain Current	Size (LxWxH)
14 W (30 V Supply), 1.5 W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
14 W (30 V Supply), 1.5 W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
30 W (30 V Supply), 3.0 W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
30 W (30 V Supply), 3.0 W (Battery)	±5 mV	±10 mV (±20 mV for Space Missions)	15 mA	11.50” x 2.30” x 5.25”
	±10 mV	± 10 mV		12.00” x 9.00” x 2.65”



Manufacturing Excellence

QUALITY & RELIABILITY

Our heritage of creating trusted, assured solutions that simply cannot fail has made us a recognized leader in our industry.

LEARN MORE ABOUT OUR PRODUCTS

22nm ASICs

Frontgrade is leveraging the high-volume commercial Global Foundries 22FDX node for space applications. We offer many engagement models and can act as a storefront, gathering the best IP the industry has to offer. Our experts can handle design, physical design, custom package development, assembly, and all the steps through QML qualification.

90nm ASICs

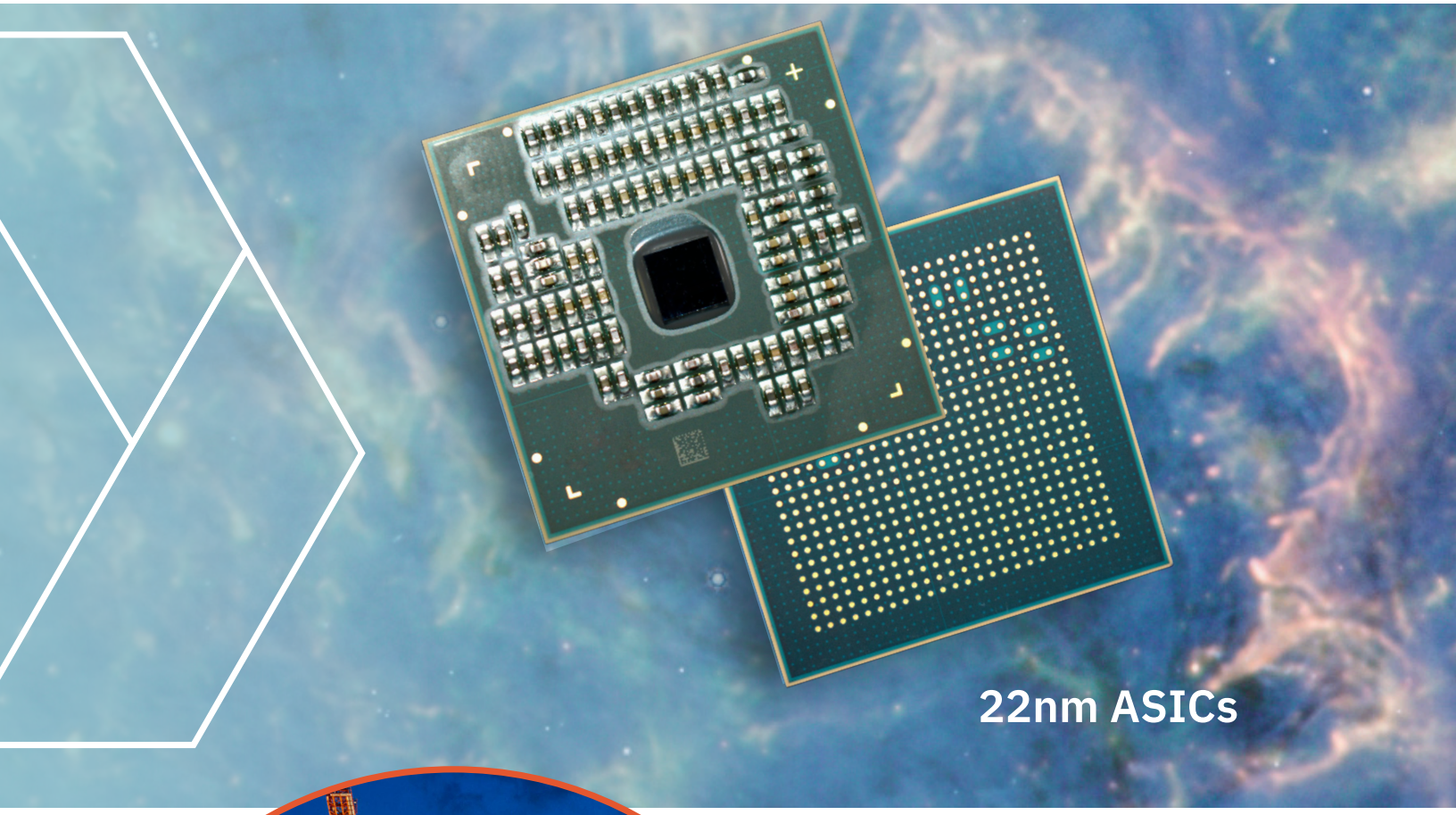
Frontgrade is partnered with SkyWater Technology on the RH90 development. We offer many engagement models and have years of experience in IP and chip development on RH90. Our experts can handle design, physical design, custom package development, assembly, and all the steps through QML qualification.

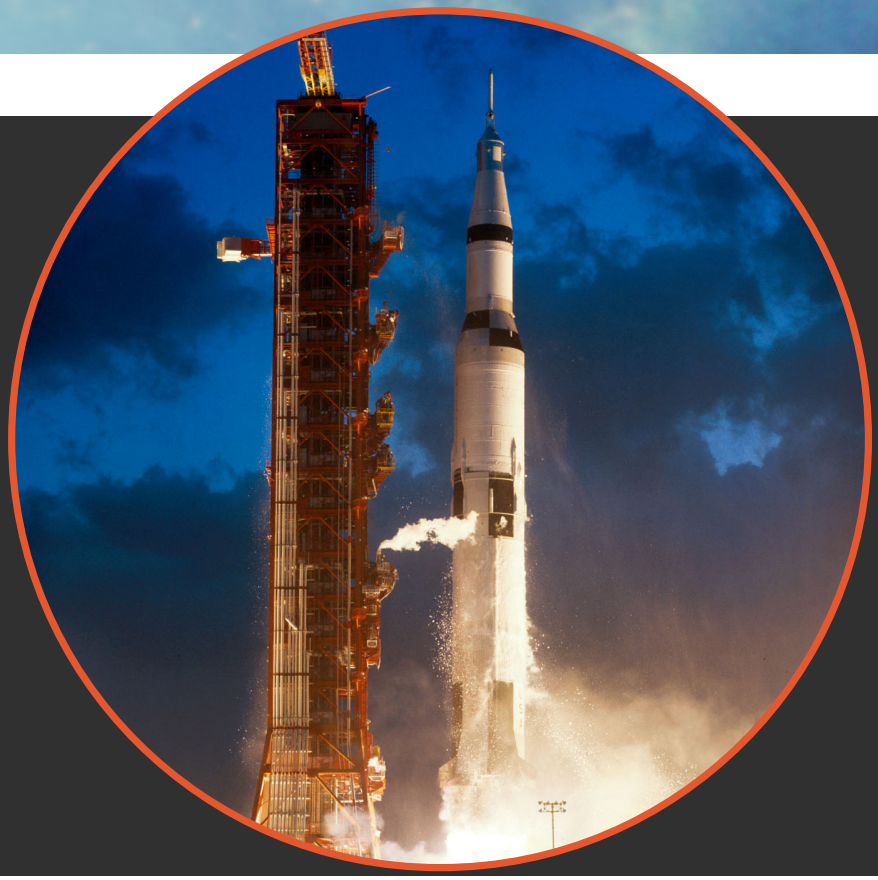
Innovation

ENABLING THE FUTURE, ONE TECH-FORWARD SOLUTION AT AT TIME

Our advanced engineering and manufacturing solutions expand frontiers in space exploration, avionics, defense, medicine and more.

COMPANY OVERVIEW





Solutions for Space

FRONTGRADE'S DEFENSE TECHNOLOGY and security systems supports our customers' needs and accelerates time to flight — with mission-matched reliability and assurance.

IP, Software & Tools

SPARC LEON and RISC-V Processors

Our fault tolerant processors' IP cores offer flexibility across a wide range of design options, balancing power, area, and performance. The RISC-V NOEL-V is configurable and offers scalable performance, from low-power embedded systems to high-performance computing. Several versions of the LEON processor have been developed. The LEON5 primarily targets high-end FPGAs and deep-submicron ASIC technologies. When less performance is required, or a smaller area footprint is needed, the LEON3 processor is the recommended choice that we continue to maintain”

Software Ecosystem

Frontgrade maintains a software ecosystem for the **LEON SPARC V8** and **NOEL RISC-V** processor families. The software elements support Frontgrade devices and custom designs, making it possible to select different operating systems and tools when starting a new project. The operating systems support extends to **VxWorks**, **RTEMS**, **Linux**, **Zephyr RTOS** and bare-metal. Furthermore, **GRBOOT** is our flight-assured bootloader, providing initialization, self-test and application loading functionality to payload and onboard computers.

Learn more at Frontgrade.com/Gaisler. Read the NOEL-V Software Overview.

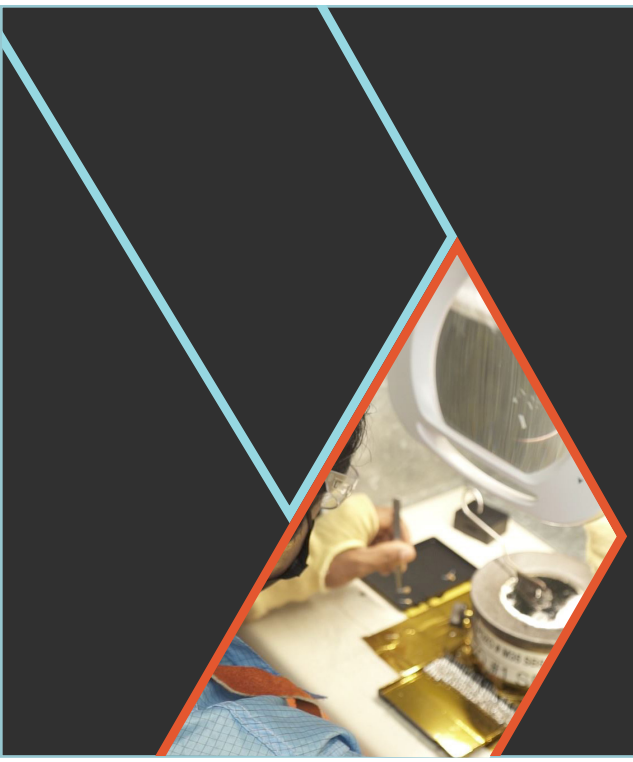
GRLIB VHDL IP Library

The **GRLIB IP** Library is a complete System-on-Chip **(SoC)** design environment which includes a collection of reusable VHDL IP cores targeting **FPGA** and **ASIC** designs. All microprocessor IPs and most peripherals are proven in both **FPGA** and **ASIC** implementations and include features such as error-correcting codes and redundancy, ensuring high reliability.

The library is designed to be used in digital system designs independently of the target technology vendor. It also includes specialized support for various **FPGA** technologies (e.g., AMD/Xilinx, Intel/Altera, Lattice, Microchip, and NanoXplore) as well as a straightforward way for end-users to add specialized support for additional technologies.

GRLIB offers an efficient and cost-effective solution for digital system design, reducing development time and expenses. It contains template designs for several **FPGA** boards.

A list of supported boards is available in the GRLIB IP Library User's Manual.



Manufacturing Excellence

QUALITY & RELIABILITY, ABOVE ALL ELSE

Our heritage of creating trusted, assured solutions that simply cannot fail has made us a recognized leader in our industry.

LEARN MORE ABOUT OUR PRODUCTS

Learn more at Frontgrade.com/Gaisler. Read the NOEL-V Software Overview.

IP, Software & Tools

TSIM3 Simulators

TSIM3 is an instruction-level simulator capable of emulating single- and multi-core processor systems based on the **LEON2/3/4** processors with high simulation accuracy. It is highly user-extensible, includes functionalities such as a scriptable Tcl frontend, **GDB** support, and using **TSIM** as a library. **TSIM3** also includes features such as non-intrusive debugging, profiling, tracing and code coverage. **TSIM3** is developed for accurate behavior and timing in terms of simulation time. Using **TSIM3**, it is possible to develop and debug target applications before the real hardware is available, thereby shortening the product development cycle.

We currently offer several **TSIM3** simulators:

- **TSIM3-LEON4:** simulates quad-core GR740
- **TSIM3-LEON3:** simulates dual-core GR712RC, GR716A, GR716B, UT699, UT699E, UT700 and a generic configurable LEON3
- **TSIM3-GR716:** simulates the GR716A and GR716B
- **TSIM3-LEON2:** simulates AT697E and a generic configurable **LEON2**

TSIM can operate in three modes: standalone, used as a library, and attached to **GDB**. A number of commands are available to drive, investigate and interact with the simulation in the three operating modes.

GRMON 4 Debugger

GRMON4 is a debug tool optimized for **SPARC/LEON** and **RISC-V/NOEL-V** systems, providing a non-intrusive debug environment. It enables embedded system developers to debug applications in a fast and efficient manner, improving productivity.

The target system can be monitored and controlled by the graphical user interface with scripting support. A large number of debug link interfaces are supported. GRMON includes the following functions:

- Read/write access to all system registers and memory
- Built-in disassembler and trace buffer management
- Downloading and execution of software applications
- Breakpoint and watchpoint management
- Remote connection to **GNU** debugger **(GDB)**
- Support for **USB, JTAG, UART, Ethernet and SpaceWire** debug links
- Tcl interface (scripts, procedures, variables, loops, etc.)
- Graphical user interface

Learn more at Frontgrade.com/Gaisler. Read the NOEL-V Software Overview.

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