

Product brief

M3GB DC-DC converter series

120V input, radiation-hardened hybrid products

28V has long been a standard bus voltage in spacecraft power systems. Today's spacecraft are more sophisticated in capabilities and functionality, demanding greater electrical power capacity to drive subsystems. As spacecraft power demands have increased to 15kW and beyond, the industry need for higher bus voltage and increased system efficiencies became clear. Higher spacecraft bus voltages are now common in the industry. For example, NASA's Orion spacecraft, the International Space Station (ISS) and Space Launch System rocket all use a 120V bus, specifically with M3GB DC-DC converters.

Made in the USA, MIL-PRF-38534 Class K SMD compliant

IR HiRel's M3GB series is the industry's first family of high input voltage radiation-hardened (rad hard) DC-DC converters using hybrid technology capable of 120V nominal input voltage, up to 40W of output power, and with models qualified to MIL-PRF-38534 Class K with DLA Standard Microelectronics Drawing (SMD). With a wide DC input voltage range, from 95V to 140V, the M3GB offers the availability of proven, off-the-shelf, fully qualified and fully documented hybrid converters in a compact 3" x 2" x 0.475" package that weighs less than 100g.

Over 20 years of design heritage with thousands of units manufactured

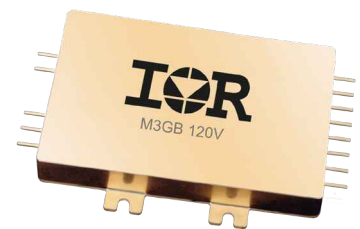
The M3GB series with 120V nominal input voltage builds on the long heritage of the widely used M3GB family, with many available DLA SMD for the 28V nominal input voltage. Used in hundreds of programs, the family also benefits from IR HiRel's integrated design, process and manufacturing know-how to deliver high-reliability hermetic hybrid products.

Fully de-rated, ready for use in a broad range of applications

The M3GB series is fully qualified for radiation environments up to 1.0E13 n/cm² neutron fluence, 300 kRads (Si) Total Ionizing Dose, and SEE-rated at 82 MeV-cm²/mg LET. This rugged DC-DC converter family is compliant to MIL-PRF-38534 Class K SMD and available with radiation hardness components tested in accordance with additional Radiation Lot Acceptance Testing (RLAT) per the DLA MIL-PRF-38534 approved Radiation Hardness Assurance (RHA) plan.

Key features

- > 120V nominal input voltage
- > 95V to 140V input voltage range
- > Total dose (TID) up to 300 kRads (Si)
- > SEE rated at 82 MeV-cm²/mg LET
- > Lightweight at <100g
- > Compact 3" x 2" x 0.475" package
- > Typical efficiency 82% over the temperature range (-55°C to 125°C)
- > EMI filter compliant to MIL-STD-461C
- > DLA-approved Radiation Hardness Assurance (RHA) plan



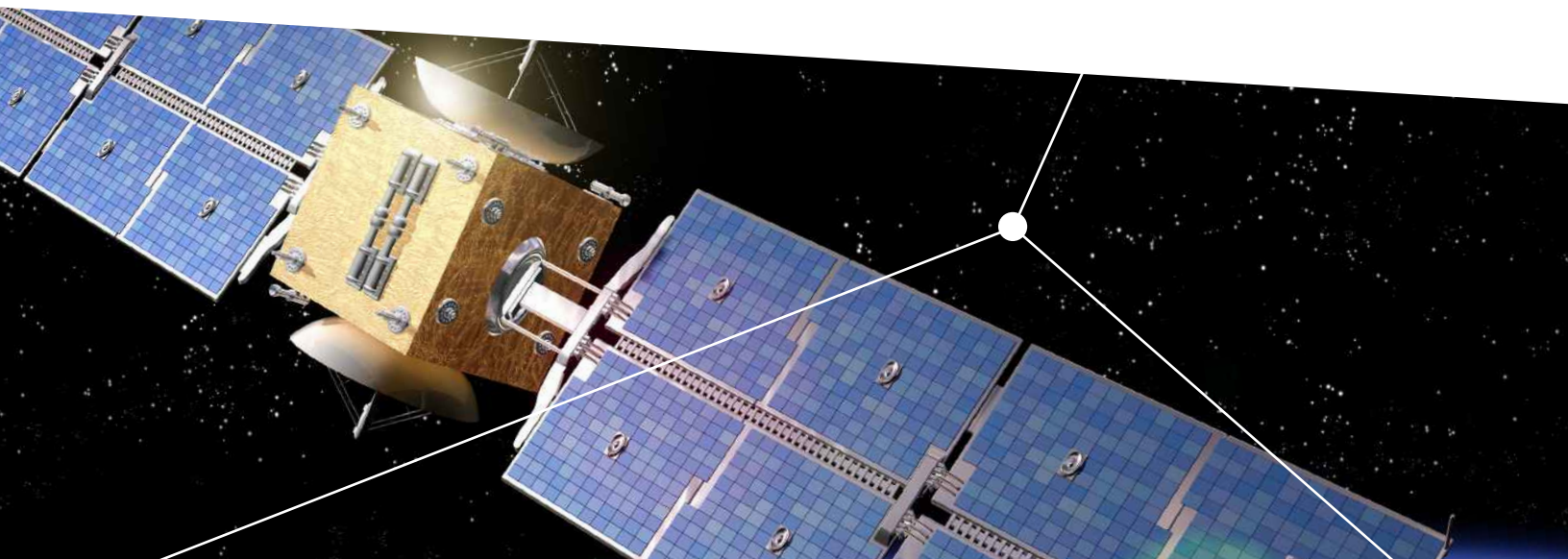
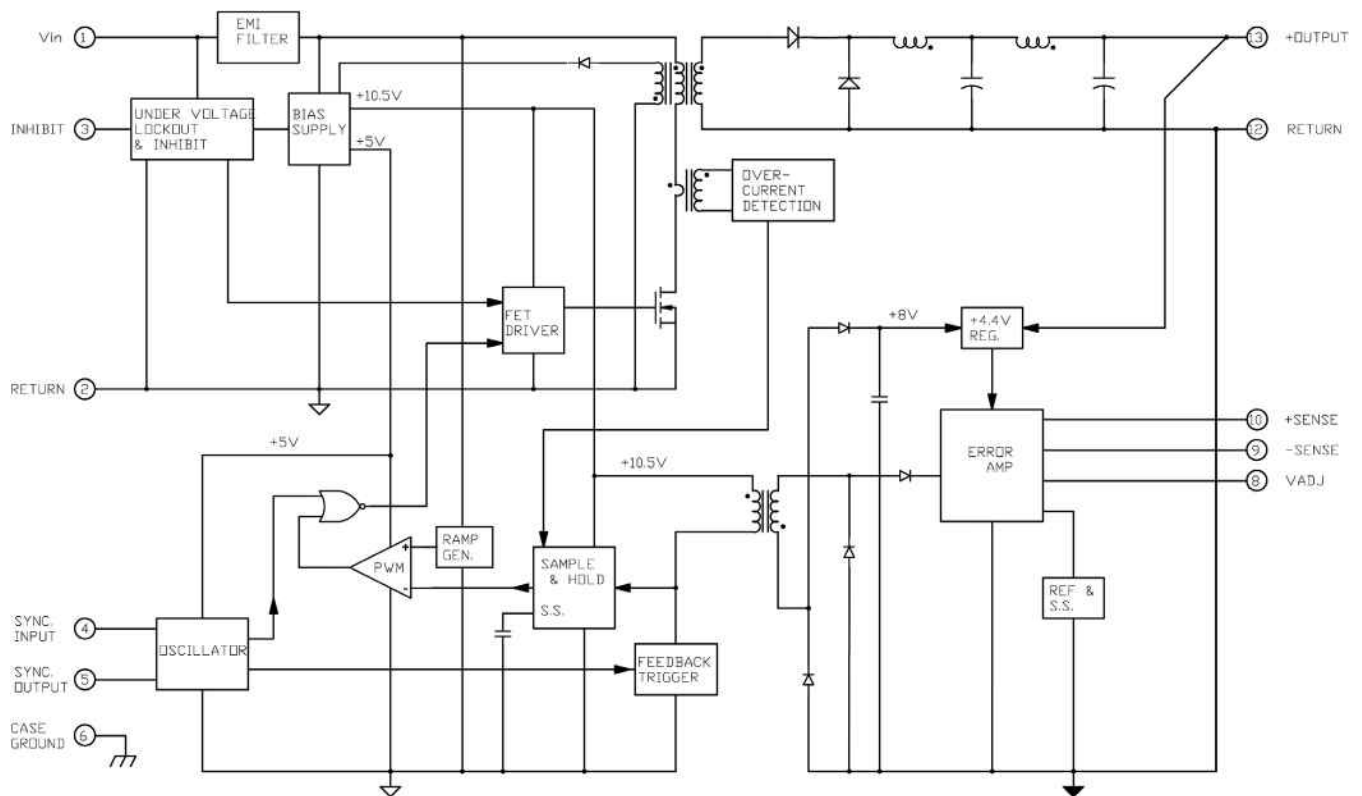
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The M3GB series is supported by thorough design analyses, validated by test data, which are ready for use in next-level system or equipment-level analysis by customers. Our extensive de-rating and design analyses provide a high level of confidence to customers in product performance to datasheet specifications through end-of-life (15 years).

With two available models – 12V output and 15V dual output – the rugged M3GB DC-DC converter series is designed to support a wide range of applications. Other output voltage models with 120V nominal input voltages are available on demand or are in development.

Block diagram, single output



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Radiation hardened by design

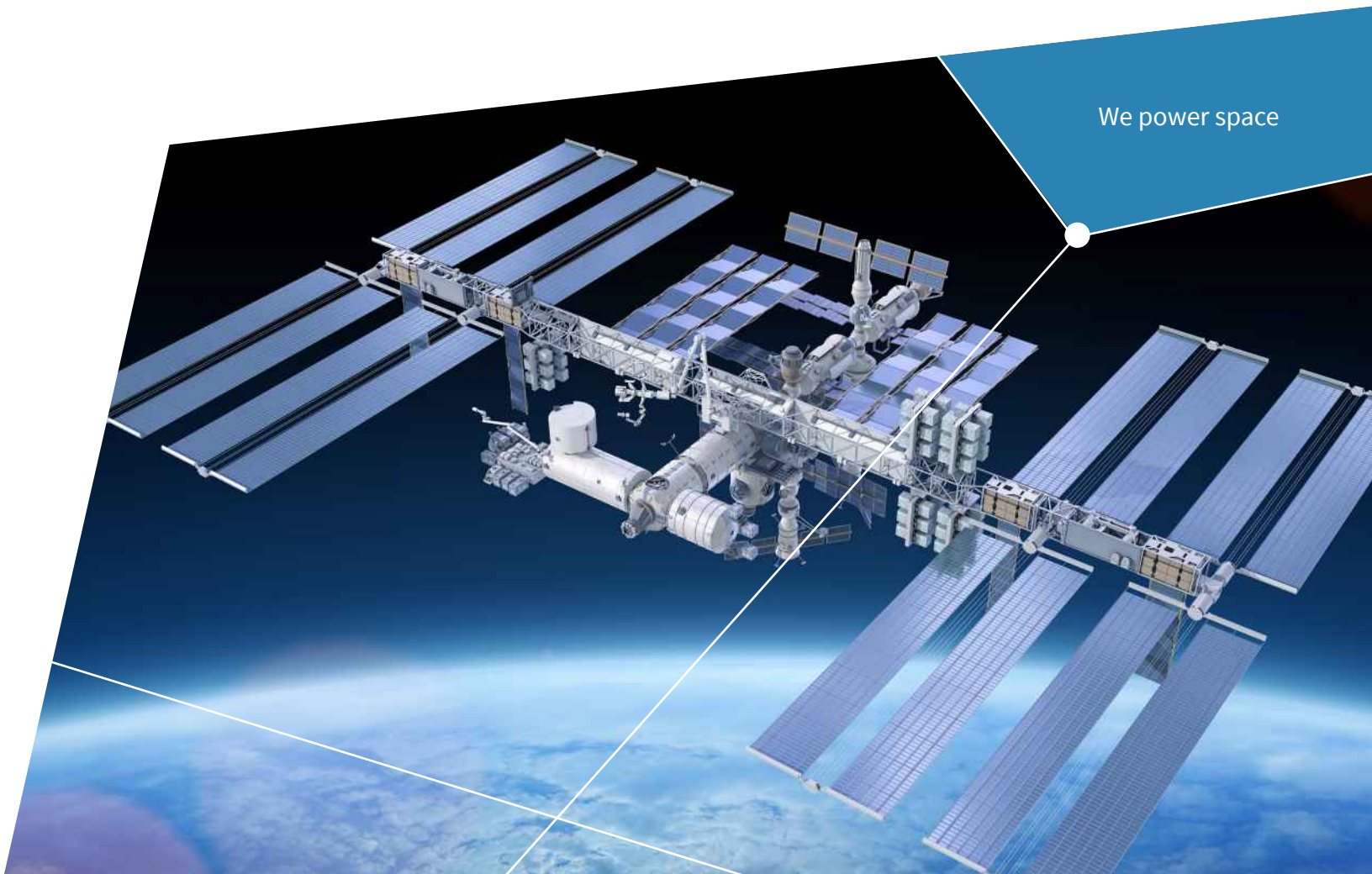
The M3GB DC-DC converter series uses a proven, conservative design methodology that includes:

- › Selecting radiation tolerant and established reliability components
- › Fully de-rating to MIL-STD-1547 and MIL-STD-975 requirements

Heavy de-rating of the rad hard MOSFET virtually eliminates the possibility of single-event gate rupture (SEGR) and single-event burnout (SEB). IR HiRel’s thorough design analyses include Radiation Susceptibility (TREE), Worst Case, Stress, Thermal, Failure Modes and Effects (FMEA), and Reliability (MTBF).

Radiation performance characteristics

Test	Conditions	Min	Typ	Units
Total ionizing dose (Gamma)	MIL-STD-883, Method 1019 Operating bias applied during exposure, full rated load $V_{IN} = 120V$	200	300	kRads (Si)
Dose rate (Gamma dot) Temporary saturation survival	MIL-STD-883, Method 1023 Operating bias applied during exposure, full rated load $V_{IN} = 120V$ (supported by analysis)	1E8 4E10	1E11	Rads (Si)/sec
Neutron fluence	MIL-STD-883, Method 1017 (supported by analysis)	8E12	1E13	Neutrons/cm ²
Single Event Effects SEU, SEL, SEGR, SEB	Heavy ions (LET) Operating bias applied during exposure, full rated load $V_{IN} = 95, 120, 140V$	82		MeV-cm ² /mg



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Product information

Part number	Output voltage single (V)	Output voltage dual (V)	DLA SMD drawing
M3GB12003R3S	+3.3		
M3GB12005S	+5		
M3GB12012S	+12		5962-19202
M3GB12015S	+15		
M3GB12005D		+/-5	
M3GB12012D		+/-12	
M3GB12015D		+/-15	5962-19203

A resource you can count on

IR HiRel is a trusted expert in high-reliability DC-DC converters, with a broad portfolio available in a variety of packages for space, aerospace and defense, and other demanding environments. Our rad tolerant and rad hard DC-DC solutions include:

- › Ruggedized DC-DC converters
- › Rad hard hermetic hybrid DC-DC converters, with DLA-certified MIL-PRF-38534 Class K SMD available for multiple models
- › Rad hard PCB open frame and enclosed power supplies

Backed by IR HiRel's vast space heritage, you can reliably source qualified power supplies that reduce project risk and time to market. Our flight-proven DC-DC converters can be used with confidence in a wide range of applications.

www.infineon.com/irhirel

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