Custom Power Supplies

85W Radiation-Hardened Redundant Power Supply

Space-Grade Custom Power Supplies

Microchip's highly experienced staff of electrical, mechanical, radiation and reliability engineers have been supplying custom, space grade, radiation-hardened DC-to-DC converters to virtually all major US satellite manufacturers for over 25 years. Our extensive space heritage, proven reliability record and experienced staff will allow a custom SMPS design to be completed on budget and on time.

Full custom design and production capability—95% of custom designs are for space applications.

Parts selection to customer specifications:
1. Standard Level 1 parts as described in EEE-INST-002
2. Standard Level 2 parts as described in EEE-INST-002
3. Vendor Catalog S-level (where applicable)
4. MIL-STD-883B parts as approved by the PCB
5. SCD

Features

Isolated high-efficiency switched mode power supply designed and built to customer specs

- Designed for 15-year life in space
- 100 krad TID
- Nominal input voltage—50V
- $V_{OUT}1$ = 5V at 3.8A to 15.2A
- $V_{OUT}2$ = –5V at 100 mA
- $V_{OUT}3$ = 15V at 600 mA
- Inrush current limited
- –30°C to 75°C
- Remote "on/off" latched power control
- Remote telemetry
- Allows side-by-side redundancy
- Complete mechanical, thermal and radiation design and analysis
- Made in USA

Applications

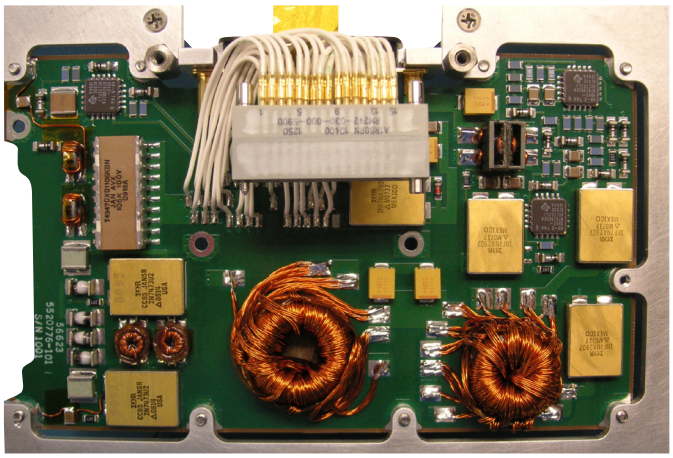
Microchip is a world leader in Space applications that offers standard or custom DC-to-DC converters and EMI filters to space-grade qualification.

Microchip products have been successfully launched and used in space from low earth orbit (LEO) to extended trips to Mars and Jupiter since 1957.

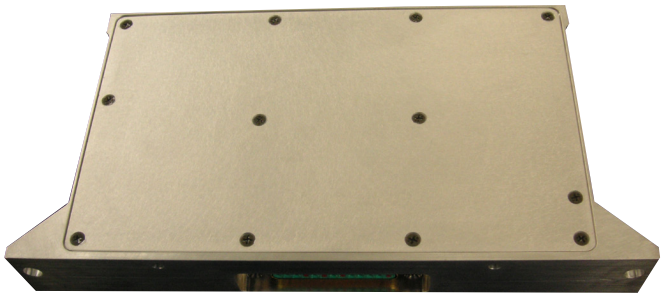
Microchip also offers Military and extended temperature relays, contactors, and pressure sensors, some of which are suitable for the rigors of down-hole applications.

85W, Radiation-hardened, Redundant Power Supply

Front View



Back View



Device Qualifications

Typical Qualification Tests

Test Type	Test Method/Condition	Custom Qualification Method	Reference
External visual	Yes per O&M—dimensions and mass or std 883 2009	Inspection	Test report
Electrical	Read and record (–55°C, 25°C, 85°C)	Test	Test report
Shock, non-operating	MIL-STD-202, method 213B, test condition F, 1500 gpk, 0.5 msec 1/2 sine pulse. Three pulses in each direction of each axis, 18 pulses total.	Similarity	QTR996 Appendix B
Vibration, operating	MIL-STD-202, method 214A, cond. II-F, 24.06 g random vibration, 50 Hz–2,000 Hz, 3 minutes/axis, 9 minutes total. Outputs monitored.	Similarity	QTR996 Appendix C
Thermal vacuum	MIL-STD-883, method 1001, condition G, 3 cycles with base plate temperature of –55°C to 85°C. Outputs monitored during TVAC cycles, record at temperatures noted under ????	Similarity	QTR996 Appendix D*
Temperature cycling	100 cycles form base plate temperature, MIL-STD-883, method 1010.8, cond A, –55°C to 90°C, 10°C–15°C/min, 10 minute dwell at temperature limits. Ouptus monitured during ????	Similarity	QTR996 Appendix D
EMI	CE101, 103, CS101, CS103, CS116, RE101, RE102, RS103, radiated susceptibility magnetic field 10 nT magnetic moment.	Test	CE101, CE103, CS101, CS103 only
External	No damage	Similarity	QTR996
Visual inspection		Similarity	QTR996
Electrical	Read and record at 25°C	Similarity	QTR996
Steady state life test	1,000 hours at TC = 105°C	Similarity	QTR996
Endpoint electricals	Read and record (–55°C, 25°C, 85°C)	Similarity	QTR996
Total dose	100 krad, MIL-STD-883, method 1019, operating bias applied during exposure, full rated load, V_{IN} = 120V	Similarity	RPT603
SEE (analysis)	82 MeV•cm2/mg, heavy ions (LET) Operating bias applied during exposure, full rated load, V_{IN} = 120V	Similarity	RPT603
ELDRS (analysis)	40 krad, MIL-STD-883, Method 1019, Condition DD of MIL-STD-883 Method 1019	Similarity	RPT603
Neutron fluence (analysis)	8E12 minimum to 1E13 typical MIL-STD-883, Method 1017	Similarity	RPT603
Dose rate (gamma dot) (analysis) temporary saturation	MIL-STD-883, Method 1023 Operating bias applied during exposure, full rated load, V_{IN} = 120V	Similarity	RPT603

***Electrical tests at 25°C shall be performed unless otherwise specified after each environmental test are performed.**

Typical Analyses and Reports

- Structural analysis
- Stress analysis
- Thermal analysis
- Radiation analysis
- Worst-case analysis
- Reliability analysis
  - FEMA
- First Article Qualification Test Report
- EMI test report

Heritage

Program	Inputs (V)	Radiation-Hardened
A2100	28/70	Yes
A2100 OBC	28	Yes
ABI GOES	28	Yes
Advanced Extreme High Frequency (AEHF)	28	Yes
Aries	28	Yes
Defense Support Program (DSP)	28	Yes
E115	28	Yes
EOS AM Earth Observation Satellite	28	Yes
EOS CHEM Earth Observation Chemistry Mission	28	Yes
EOS PM Earth Observation PM Mission	28/120	Yes
Radiation Experimental Satellite	28	Yes
GeoEye II	28	Yes
GMI	28	Yes
GPS II	28	Yes
Health management computer (HMC)	28	Yes
INDOSTAR Indonesian Satellite	28	Yes
Inertial Upper Stage (IUS)	28	Yes
Korean Multi-Purpose Satellite (KOMPSAT)	28	Yes
Mars Lander	28	Yes
MILSTAR Military Communications	28	Yes
Miniature Inertial Measurement Unit (MIMU)	28/50/100	Yes
MUOS	28	Yes
Near Earth Asteroid Rendezvous (NEAR)	28	Yes
Next View	28	Yes
NPOESS ATMS	28	Yes
NPOESS Payload	28	Yes
NPOESS VIIRS	28	Yes
Special Programs 1	28	Yes
Special Programs 2	28	Yes
Special Programs 3	28	Yes
Special Programs CTCU	28	Yes
PAC-3 Patriot Advanced Capability	28	No
RIMU Trident	28	No
Republic of China Satellite (ROCSAT)	28	Yes
Space Based Interceptor (SBI)	28	Yes
SBIRS High Space Based Infrared System	28	Yes
SE2	28	Yes
Space and Missile Tracking System (SMIS)	28	Yes
THAAD Mission Computer	28	Yes
TKE Thermal Knife	28	Yes
TRIFOG 3 Axis Fiber Optic Gyro	28	Yes
Vibe Sensor	28	Yes