

Power Solutions

Interpoint™ DC/DC Converters
and EMI Filters

SPACE Catalog



Crane Aerospace & Electronics
Power Solutions
Interpoint DC/DC Converters and EMI Filters
Space Catalog

The space DC/DC converters in this catalog are ITAR controlled products. The information in this document is a derivative of documents cleared by the US Department of Defense (DoD) Office of Security Review (OSR) for public release. OSR case number 10-S-0615 dated January 26, 2010 and case number 09-S-1960 dated June 22, 2009. The Space DC/DC converters in this document require an export license.

With the exception of the SFCS28-461 EMI filter, the space EMI filters in this catalog are classified as EAR99 products, no license required (NLR) for export. The information in this catalog related to the space EMI filters is within the purview of the Export Administration Regulations (EAR), 15 CFR 730-774. The SFCS28-461 EMI filter data is cleared by the OSR for public release, case number 11-S-3519, dated September 26, 2011. The SFCS28-461 EMI filter requires an export license.

Crane Aerospace & Electronics
Power Solutions - Interpoint Products
Space Catalog Rev F 2012.01.25
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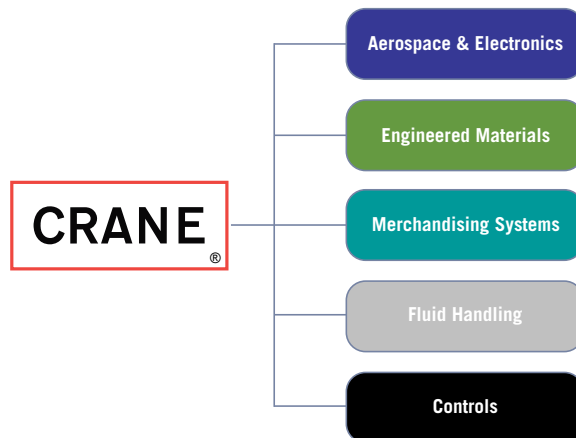
All technical information is believed to be accurate, but no responsibility is assumed for errors or omissions.
Crane Electronics, Inc. reserves the right to make changes in products or specifications without notice.

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Crane Co.




Crane Co. is a diversified manufacturer of engineered industrial products. Founded in 1855, Crane provides products and solutions to customers in the aerospace, defense, medical, electronics, hydrocarbon processing, petrochemical, chemical, power generation, automated merchandising, transportation and other markets. The Company has five business segments: Aerospace & Electronics, Fluid Handling, Engineered Materials, Merchandising Systems and Controls. Crane has approximately 11,000 employees in North America, South America, Europe, Asia and Australia. Crane Co. is traded on the New York Stock Exchange (NYSE:CR). For more information, please visit www.craneco.com.



AEROSPACE

- Cabin 
- Fluid Management 
- Landing Systems 
- Sensing & Utility Systems 

ELECTRONICS

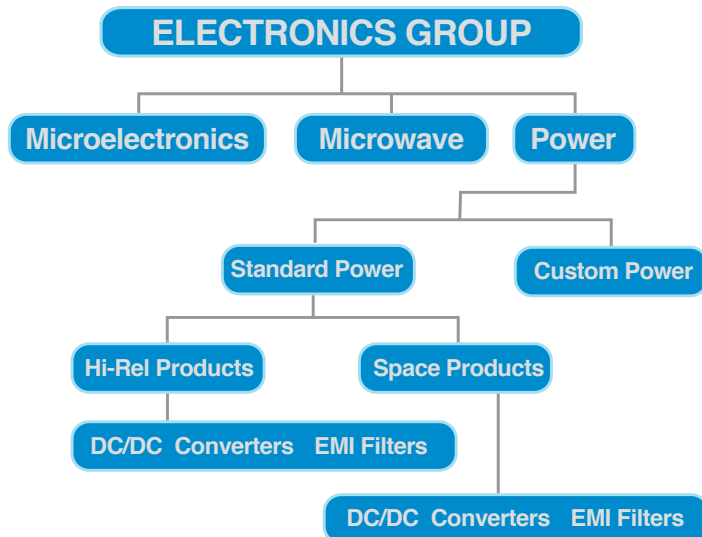
- Power 
- Microwave Systems 
- Microelectronics 

Crane Aerospace & Electronics

Crane Aerospace & Electronics is a major supplier of systems and components for critical aerospace and defense applications. These systems and components are designed for some of the toughest environments — from engines to landing gear; satellites to medical implants; and missiles to unmanned aerial systems (UAS). Product and service offerings are organized in solution sets, and include Cabin Systems, Fluid Management, Landing Systems, Microelectronics, Microwave, Power, and Sensing & Utility Systems. Products are manufactured under the brand names ELDEC, Hydro-Aire, Interpoint, Keltec, Lear Romec, Merrimac, P.L. Porter and Signal Technology. For more information on Crane Aerospace & Electronics, visit www.craneae.com.

Crane Electronics Group

Crane Electronics of Crane Aerospace & Electronics designs and manufactures high-density, high-reliability electronics for aerospace, space, military, medical and commercial applications. Each Solution is ISO 9001 and AS9100 certified and committed to Operational Excellence and world-class processes. From the Mars Science Lab to commercial aircraft; from implantable devices to missiles and fighter aircraft, our products have proven their ability to operate in the most demanding environments. Our brands include Eldec, Interpoint, Keltec, Merrimac and Signal Technology. For more information on Crane Electronics, please visit www.craneae.com/electronics.



Power Solutions

Power Solutions offers ELDEC, Interpoint and Keltec brand power conversion, power distribution and battery systems for the commercial aerospace, defense and space for use in avionics, ATA Chapter 24 Power Systems, communications, electronic countermeasures, missiles, radar, navigation, guidance and utility systems. Our power products, which are well known for high performance and high reliability, have proven performance in military/defense, aerospace, space and industrial applications. From standard power supplies to custom-designed power sub-systems, we can deliver what you need.

Our range of power offerings include custom, semi-custom or off-the-shelf products. Our quality systems ensure reliable, repeatable, processes and performance.

DC/DC Converters and EMI Filters

Interpoint DC/DC converter and EMI filter modules have proven performance in extreme environments where high reliability is required and failure is not an option. They are ideal for aerospace, military/defense, space, medical and industrial applications.

We offer a standard line of high reliability DC to DC power converters fully qualified up to Class K , QML of MIL-PRF-38534. To meet demanding time and cost targets, choose a product from the standard converters and filters. Over 1000 off-the-shelf high-reliability DC/DC power conversion products are available. For more information please visit www.craneae.com/interpoint.

Space Qualified DC/DC Converters and EMI Filters

Our Interpoint space qualified DC/DC converters and EMI filters are in the power systems of the Mars Rovers, Mars Science Laboratory, Phoenix Lander, Hubble Space Telescope, Cassini/Huygens and other out-of-this-world applications.

The converters are available as Class H or K of MIL-PRF-38534 on Standard Microcircuit Drawings (SMD) with Radiation Hardness Assurance (RHA) levels of O (prototypes with no RHA level), 30 krad(Si) or 100 krad(Si). An RHA of 300 krad(Si) is available for select models.

Our EMI Filters are designed exclusively with passive components providing maximum tolerance for space environment requirements. They are available with RHA level O (no RHA) or RHA level H, 1000 krad(Si).





Custom Power:

Low Voltage/High Power

Featuring high efficiency (to 98%) and high power quality, our stackable, high power (typically 2 kW to 66 kW) products are ideal for solid-state radar, regulated power distribution applications, and other avionic, vetronic, and shipboard applications.

Low Voltage/Low Power

AC/DC and DC/DC low voltage (typically 10 W to 2 kW) power supplies are the ultimate in power conversion reliability for your commercial or military display, avionic or vetronic applications

High Voltage/Low Power

Our high reliability, high voltage power supplies are designed for both military and commercial aerospace applications, and have output voltages up to 33 kV.

Battery Systems

Our battery chargers and battery controllers are the optimal high reliability components of a battery system. We offer a complete range of proven solutions for APU start and standby requirements.

Power Management & Distribution Systems

We integrate standard power components into custom power system solutions that save volume, weight and costs, while increasing reliability.

Transformer Rectifier Units (TRUs)

Sized from 20 to 400 amps, regulated and unregulated, our TRUs can be customized to meet the specific output voltage and current you need.

Auto-Transformer Rectifier Units (ATRU)

Sized from 1 to 200 kW, our auto-transformer rectifier units are affordable, efficient, light weight and reliable converters that meet today's new stringent power quality requirements.

For more information visit www.craneae.com/power.

Interpoint Products

Our space and high reliability DC/DC converter and EMI filter modules have proven performance in space, aerospace, communications, military, space, medical and industrial applications. Over 1000 off-the-shelf high-reliability DC/DC power conversion products are available. Our manufacturing facilities in Redmond and Kaohsiung are ISO 9001:2008/AS9100-B certified. Our international offices in France and the UK are ISO 9001:2008 certified.

Redmond Operations

All space products are built in Redmond

Redmond, Washington, USA

Facility: 81,000 square feet

Founded: 1969

Quality Certifications:

- ISO 9001:2008/AS9100-B
- Defense Logistics Agency's (DLA, formerly DSCC) MIL-PRF-38534 Qualified Manufacturers List (QML)
- NASA's Preferred Parts List (PPL)
- Products qualified to Class H and Class K, QML

The Redmond site was one of the first manufacturers to certify to class K, QML, per MIL-PRF-38534, and to qualify a Class K, QML, hybrid DC/DC converter to a Standard Microcircuit Drawing. This followed in the tradition of being one of the first manufacturers to certify to Class H per MIL-STD-1772.

Our DC/DC converters and EMI filters are well known for their reliable performance in military/aerospace applications and in the far reaches of space.



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Fax: +1.425.882.1990
Email: power@crane-eg.com
URL: www.craneae.com/interpoint

Kaohsiung Operations

Kaohsiung, Taiwan

Facility: 20,000 square feet

Founded: 1983

Quality Certifications:

- ISO 9001:2008/AS9100-B
- DLA's MIL-PRF-38534 Qualified Manufacturers List (QML)
- Products qualified to Class H, QML

The Kaohsiung site is the high volume manufacturing operation for Interpoint products.



Kaohsiung, Taiwan

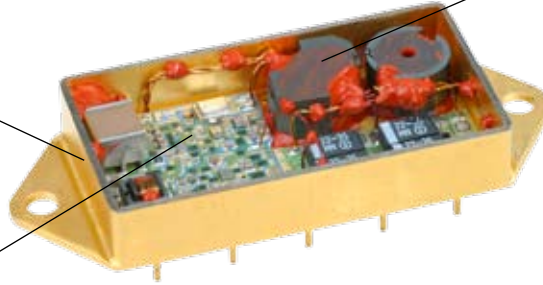
Interpoint Product Overview

High Temperature Operation

High temperature ceramic capacitors and all-metal thermally-conductive cases provide full power operation over DLA's Class H and K temperature range of -55° to +125°C.

Constant Frequency Design

Our proprietary pulse-width-modulated forward converter design produces constant frequency operation and excellent transient response.



Advanced Performance

Advanced magnetics and our patented Asymmetrical Power Transfer provides high power density, high efficiency, and low height.

Standard Military Drawings

DC/DC Converters are available on Standard Microcircuit Drawings (SMD) and EMI filters are available on DLA Drawings.

Full Hermeticity

Hermetically sealed cases provide optimum protection for all components ensuring high reliability operation in harsh environments.

Innovative Solutions

With over forty years of experience, we are your first source for power conversion products for high reliability applications. We have provided innovative power solutions for space aerospace, military/defense, and industrial applications where size, weight and reliability are critical to program success. Our high reliability products and our Space filters (with one exception) are classified as EAR99, no license required for export. Our space DC/DC converters (and the SFCS EMI filter) are ITAR controlled and require a license for export. For highest reliability, all of our space products are available as Class H or K, QML. The information in this catalog has been approved for public release (see title page for more information).

Standard Power Conversion

We offer a standard line of DC to DC power converters fully qualified up to MIL-PRF-38534 Class H or K, QML. To meet demanding time and cost targets, choose a product from the standard converters and filters. We offer over 1000 power conversion products.

Output Voltage Options

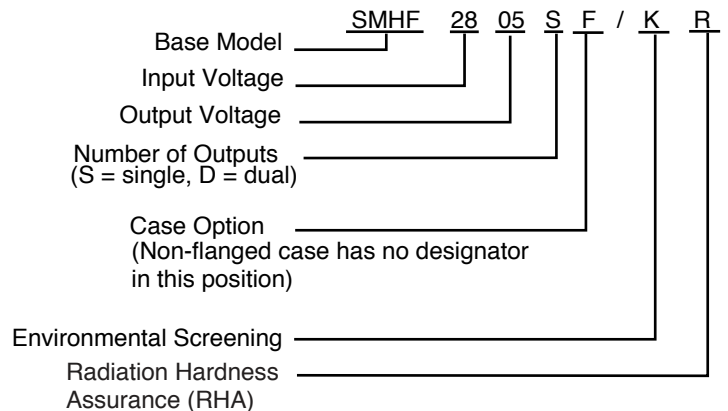
Interpoint converters are capable of providing other output voltage options in addition to those characterized in this catalog. Contact your sales representative to discuss other output voltage options, www.interpoint.com/contacts.

Semi-Custom Power Conversion

To fulfill specialized system requirements, we provide custom or semi-custom power solutions. Our experienced design engineers will design a custom power product to match your exact specifications and deliver it on time and on budget.

Part Numbering

Our part numbering indicates the series (family), input voltage, output voltage, number of outputs, package configuration, screening and radiation hardness assurance (RHA) level.



Technical Support

Applications Engineers are to provide technical support by phone, email or fax. Call +1.425.882.3100, option 7; email powerapps@crane-eg.com. For the fastest response to a voice message, email or fax please include your name, company name, a phone number, the model number and a brief statement of the problem.

QUALITY SYSTEM OVERVIEW - Redmond and Kaohsiung

- The quality management system of Crane Electronics, Inc., Standard Power Redmond and Kaohsiung has been certified to ISO9001 and AS9100B, file numbers 1623564, 1623565 and 1623567. The quality management system of Crane Electronics, Inc., Standard Power in Saint Gratien, France and Yateley, UK has been certified to ISO9001, file numbers 1623563 and 1623562. The quality management system is certified by QMI-SAI Global. Visit www.qmi-saiglobal.com for more information. Our certification is listed at www.qmi-saiglobal.com/qmi_companies. We are listed under Crane Electronics (Redmond and Kaohsiung) and Interpoint (France and UK).
- Our Redmond and Kaohsiung sites are on the DLA's Qualified Manufacturers List (QML) of hybrid microcircuits with products compliant up to Class H (Redmond and Kaohsiung) and Class K (Redmond) of MIL-PRF-38534. Our manufacturing sites are audited by a US government organization with customer participation.
- Standard Microcircuit Drawings (SMD) DC/DC converters are available to Class H and K of MIL-PRF-38534. DLA Drawing EMI filters are available to Class H and K of MIL-PRF-38534. The government documents may be viewed at <http://www.landandmaritime.dla.mil/Programs/MiISpec/DocSearch.aspx>
- Components and materials used in product assembly are purchased against published revision controlled Source Control Drawings (SCD). Characteristics and allowed suppliers are controlled by specific SCD. A system is in place to review components and materials prior to stocking. Instruments such as the X-ray fluorescence (XRF) are used to ensure that supplier certifications accurately describe the material. Our high reliability QML products comply to MIL-PRF-38534 specifications which do not allow the use of pure tin. Our other products may have pure tin. Refer to our "Lead and Other RoHS Materials" letter for more information. www.interpoint.com/011.
- Documented revision controlled procedures/work instructions are in use for all operations that affect quality.
- Radiation Hardness Assurance (RHA) levels, referenced to MIL-PRF-38534, are available for select products. Our Redmond site has a DLA approved RHA plan for Interpoint power products. Our SMD products with RHA "P," "R," "F" and "H" level meet DLA requirements
- Travelers are used to sequence and control operations at in-process, final and special inspection situations.
- Quality documents are specifically identified and retained as specified in our Document Control procedure. The standard retention period for critical documents is 15 years.
- Quality manual QA-040 (www.interpoint.com/012) is the controlling document for the Interpoint quality system. Procedure matrix QA-093 (www.interpoint.com/014) is the cross reference between qualifying documents (e.g. MIL-PRF-38534, AS9100) and our quality system.
- Personnel performing quality functions are given the responsibility, authority and organizational freedom to identify and evaluate quality concerns as well as to initiate corrective action.
- Contracts are reviewed to identify and make timely provisions for special or unusual circumstances.
- As a minimum, self audits of the quality system are completed annually.



ISO 9001
AS 9100
 QMI-SAI Global
 1623564
 1623565



CERTIFICATIONS, QUALIFICATIONS AND STANDARDS - Redmond and Kaohsiung

- ANSI/ESD S20.20—Electrostatic Discharge Control Program. We use a multi-level ESD damage prevention approach including operator training, continuously monitoring wrist grounding-straps, static dissipative smocks for personnel, static dissipative work surfaces and floors, air ionizers at work stations, and faraday cages for parts movement.
- ANSI/IPC-A-600—Acceptability of Printed Boards
- ANSI/IPC-A-610—Acceptability of Electronic Assemblies. The Interpoint facility in Redmond has IPC-610 certified operators.
- ANSI-Z540—Calibration Laboratories and Measuring and Test Equipment—General Requirements
- ASQC-Z1.4—Procedures, Sampling and Tables for Inspection by Attributes
- ISO 9001:2008/AS9100-B—Quality Systems. Model for quality assurance in design, development, production, installation, and servicing. Redmond and Kaohsiung facilities are registered with QMI-SAI Global for ISO 9001:2008/AS9100-B.
- ISO 14644—Cleanrooms and Controlled Environments. Particle count monitoring, laminar flow benches and contamination preventing smocks for personnel all contribute to maintaining the required levels of cleanliness.
- MIL-STD-883—Test Method Standard for Microcircuits
- MIL-PRF-38534—Hybrid Microcircuits, General Specifications for
- Interpoint Quality Certification—Employees who work with products are individually certified in the required skills. Training and certification are documented and records are maintained. Inspectors are tested for color vision and visual acuity.
- QML-38534—Qualified Manufacturer’s List of Products Qualified under Performance Specification MIL-PRF-38534 Hybrid Microcircuits, General Requirements for
- Restriction of Hazardous Substances (RoHS), Waste Electrical and Electronic Equipment (WEEE) and Registration, Evaluation, and Authorization of Chemicals (REACH) are addressed in “Lead and Other RoHS Materials” available at www.interpoint.com/011



RADIATION TOLERANCE: RADIATION HARDNESS ASSURANCE (RHA)

Radiation hardness assurance (RHA) refers to the levels specified in MIL-PRF-38534, appendix G and indicates the levels of radiation products or components will withstand. Our Redmond site has a DLA approved RHA plan.

Our model numbers use an “O” in the RHA designator position to indicate the “-” (dash) RHA level of MIL-PRF-38534, which is defined as “no RHA.”

The RHA levels offered are:

RHA LEVEL	TOTAL IONIZING DOSE (TID) rad(Si)
O	(NA)
P	30 k
R	100 k
F	300 k
H	1,000 k

INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

MODEL (SERIES)	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	MAX. OUTPUT POWER (W)	EFFICIENCY UP TO (%)	OPERATING TEMPERATURE	SCREENING TABLE	EMI FILTER
SMFLHP	19 - 40	3.3, 5, 12, 15 ±5, ±12, ±15	100	87	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	SFME28-461
SMFL	16 - 40	3.3, 5, 12, 15 ±5, ±12, ±15	60	85	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	SFME28-461
SMRT28	19 - 56	3.3, 5, 8.7, 12, 15 ±5, ±12, ±15	35	75	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	Built in filter
		3.3 & ±12, 3.3 & ±15, 5 & ±7, 5 & ±12, 5 & ±15					
SMTR	16 - 40	1.5, 2.5, 3.3, 5, 12, 15 ±5, ±12, ±15	30	84	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	SFMC28-461
		5 & ±12, 5 & ±15	30	73			
MFP	3 - 6	0.64 to 3.5	16.5	92	-55° to +125°C WT -70 to +150°C	Tables 2 and 5 MFP Screening Tables	NA
SMHF	16 - 40	2.5, 3.3, 5, 12, 15 ±5, ±12, ±15	15	82	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	SFMC28-461
SMSA	16 - 40	3.3, 5, 5.2, 12, 15 ±5, ±12, ±15	5	74	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	STF28-461 SFMC28-461
SLH	16 - 40	5, 12, 15 ±5, ±12, ±15	1.5	77	-55° to +125°C	Tables 1 and 4 Space Prototype (O), Class H-QML, Class K-QML	STF28-461

SCREENING: CLASS H AND CLASS K, QML, AND RADIATION HARDNESS ASSURANCE (RHA)

Our Redmond facility is certified to MIL-PRF-38534 Class H and Class K (Space), Qualified Manufacturers List (QML). Our space converters and filters are available qualified to Class H, QML, or Class K, QML.

All space-level converters and filters are functionally comparable regardless of screening level. Converters built to Radiation Hardness Assurance (RHA) level P, R, or F incorporate radiation tested components from controlled lots. Our Redmond site has a DLA approved RHA plan for Interpoint power products. Our EMI filters are 100% passive devices. Use our "OO" level products for your prototypes then upgrade to the desired Class and RHA level products for your final system without the danger of performance compromises. All converters and filters operate over the full space and military temperature range of -55° to +125°C.



Example: SLH2805SKR DC/DC converter with KR screening. The SMD number is marked on the converter as well as the QML designation.

INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

SMFLHP SERIES™ CONVERTERS—100 WATT

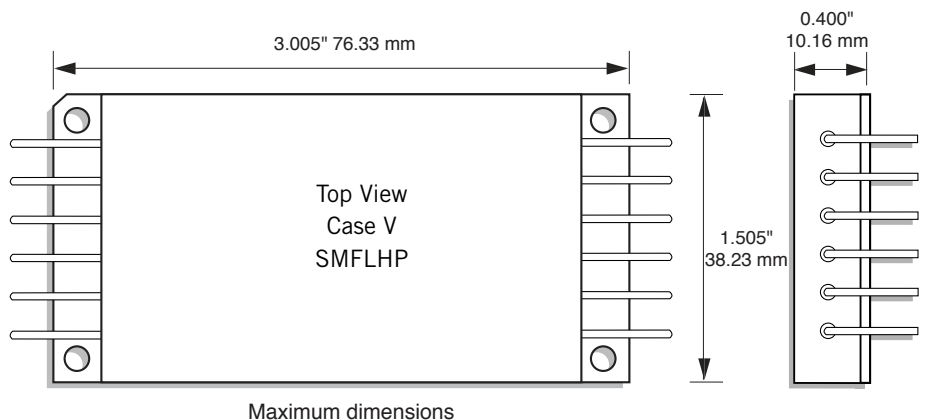
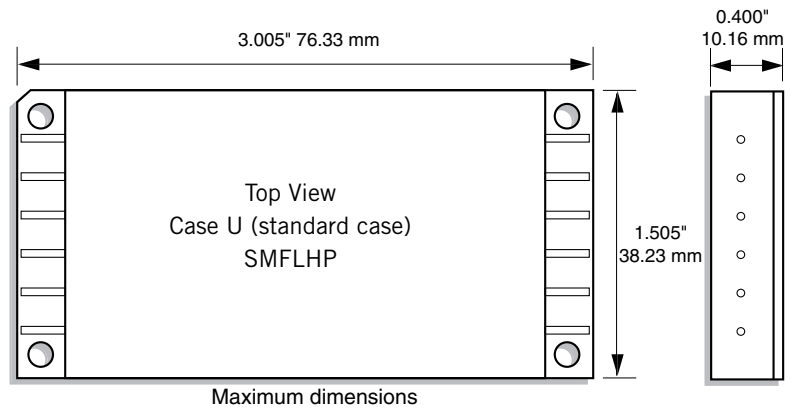
Parallel operation with current share, up to 3 units (285 watts)

- Operating temperature -55° to $+125^{\circ}\text{C}$
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 19 to 40 VDC
- Transient protection 80 V for 50 ms
- Fully isolated, magnetic feedback
- Fixed high frequency switching
- Remote sense / output trim on single output models

The SMFLHP Series uses a unique dual loop feedback technique that controls output current with an inner feedback loop and output voltage with a cascaded voltage mode feedback loop. The additional secondary current mode feedback loop improves transient response in a manner similar to primary current mode control and allows for ease of paralleling. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "R", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMFLHP datasheet at www.interpoint.com/S01.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SMFLHP283R3S	19 to 40	3.3	16.00	53	72
SMFLHP2805S	19 to 40	5	16.00	80	80
SMFLHP2812S	19 to 40	12	7.50	90	86
SMFLHP2815S	19 to 40	15	6.67	100	87
SMFLHP2805D	19 to 40	± 5	16.00 ¹	80 ¹	80
SMFLHP2812D	19 to 40	± 12	7.50 ¹	90 ¹	86
SMFLHP2815D	19 to 40	± 15	6.67 ¹	100 ¹	87

1. Up to 70% of the total power is available from either output providing the opposite output is carrying at least 30% of the power in use. The spec shown is the maximum total current/power.



INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

SMFL SERIES™ CONVERTERS—65 WATT

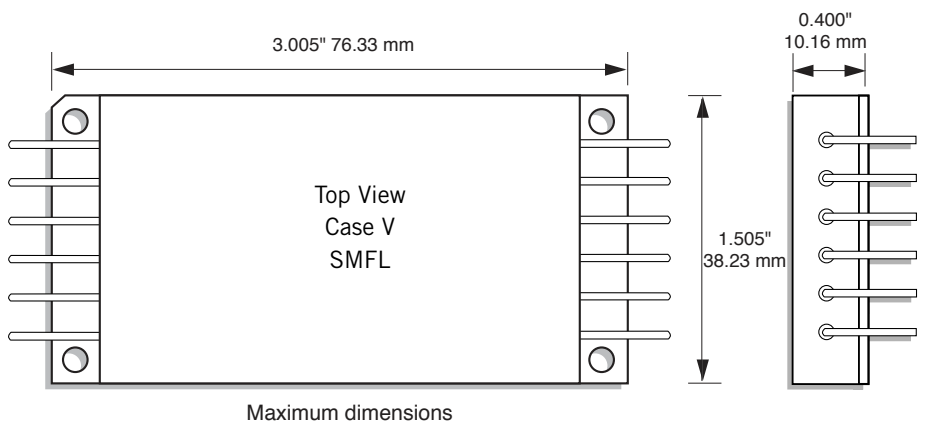
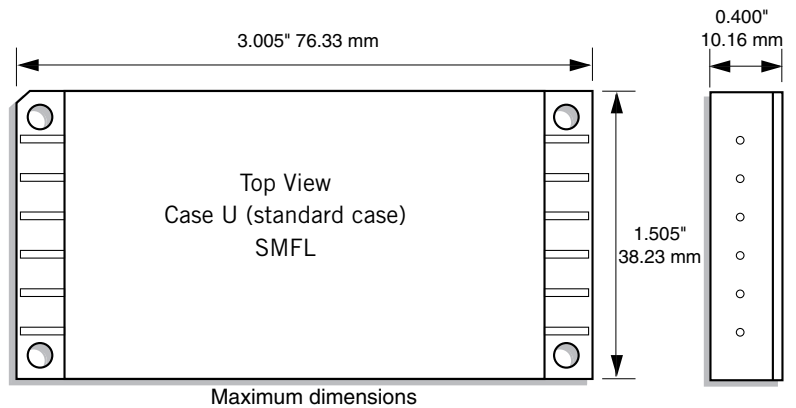
Parallel operation with current share, up to 3 units (185 watts)

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 16 to 40 VDC
- Transient protection 80 V for 50 ms
- Fully isolated, magnetic feedback
- Fixed high frequency switching
- Remote sense and output trim on single output models

The SMFL Series converters have two inhibit terminals (INH1—primary side and INH2—secondary side) that can be used to disable power conversion, resulting in a very low quiescent input current and no generation of switching noise. The SMFL uses a unique dual loop feedback technique that controls output current with an inner feedback loop and an output voltage with a cascaded voltage mode feedback loop. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "R", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMFL datasheet at www.interpoint.com/S02.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SMFL283R3S	16 to 40	3.3	12.12	40	72
SMFL2805S	16 to 40	5	10.00	50	78
SMFL2812S	16 to 40	12	5.00	60	84
SMFL2815S	16 to 40	15	4.33	65	85
SMFL2805D	16 to 40	±5	10.00 ¹	50 ¹	78
SMFL2812D	16 to 40	±12	5.00 ¹	60 ¹	84
SMFL2815D	16 to 40	±15	4.33 ¹	65 ¹	85

1. Up to 70% of the total current/power is available from either output providing the opposite output is carrying at least 30% of the power in use. The spec shown is the maximum total current/power.



INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

SMRT28 SERIES™ CONVERTERS—35 WATT SINGLE, DUAL OR TRIPLE

Built in MIL-STD-461 EMI filter

Output trim from 51% to 124% of nominal ³

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level F 300 krad(Si)
- Input voltage range 19 to 56 VDC
- Transient protection 80 V for 100 ms
- Fully isolated, 5 port isolation
- Dual magnetic feedback
- Fixed high frequency switching
- Remote sense
- Inhibit function
- Synchronization input
- Indefinite short circuit protection
- Radiation tolerant to
 - » 1×10^{12} protons/cm² neutron or proton fluence
 - » 10^{11} rad(Si)/sec dose rate
 - » 3×10^5 rad(Si) total dose
 - » SEE LET to 80 MeV cm²/mg
- Meets MIL-STD-704A transient standards

Two independent feedback loops are used to regulate the dual and triple outputs, one feedback loop regulates the two-phased single output. Each set of outputs is electrically isolated from the other and from the input. This product configuration eliminates cross regulation effects between output sets.

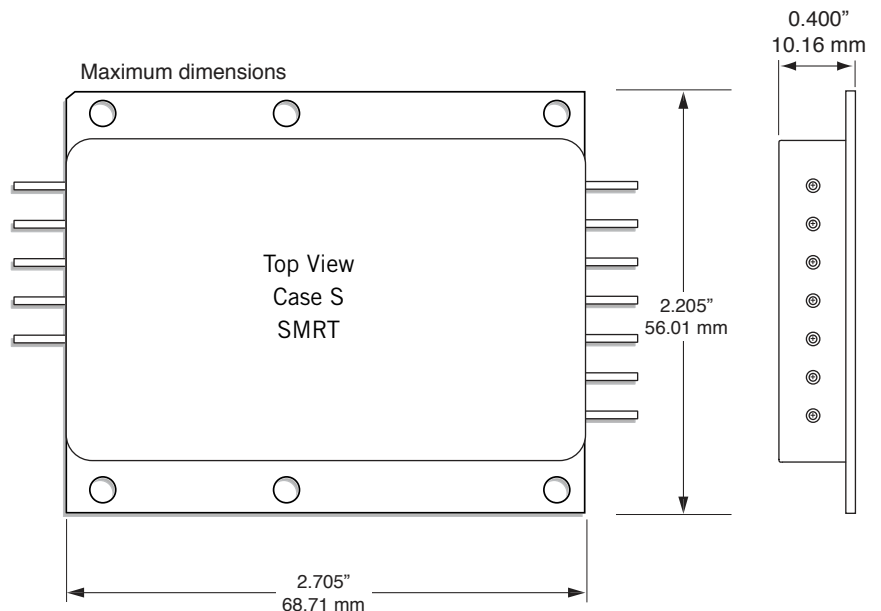
Configurations:

- Single Output: One two-phase single output
- Dual Output: Two single-phase single outputs
- Triple Output: One single-phase independent main output and one single-phase dual output. (± auxiliary output)

The output voltage of each set can be trimmed upward or downward by as much as 20% of nominal. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "F", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMRT28 datasheet at www.interpoint.com/S03.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (%)
SMRT283R3S	19 to 56	3.3	6.97	23	60 (min.)
SMRT2805S	19 to 56	5	6.00	30	66 (min.)
SMRT288R7S	19 to 56	8.7	4.00	35	72 (min)
SMRT2812S	19 to 56	12	2.92	35	75 (min)
SMRT2815S	19 to 56	15	2.33	35	75 (min.)
SMRT2805D	19 to 56	±5	±3.00 ¹	30	66 (min.)
SMRT2812D	19 to 56	±12	±1.46 ¹	35	75 (min.)
SMRT2815D	19 to 56	±15	±1.17 ¹	35	75 (min)
SMRT283R312T	19 to 56	3.3 & ±12	4.50 1.00 ²	30	68 (min.)
SMRT283R315T	19 to 56	3.3 & ±15	4.50 0.750 ²	30	68 (min)
SMRT28507T	19 to 56	5 & ±7	3.00 1.20 ²	29	68 (min)
SMRT28512T	19 to 56	5 & ±12	3.00 1.00 ²	30	68 (min.)
SMRT28515T	19 to 56	5 & ±15	3.00 0.750 ²	30	70 (min)

1. The specified maximum current is available from each output.
2. Up to the maximum specified auxiliary output current is available from either auxiliary output provided the total auxiliary output power does not exceed 15 W.
3. Trim range is model specific. Refer to the full datasheet for trim ranges for each model at www.interpoint.com/S03



INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

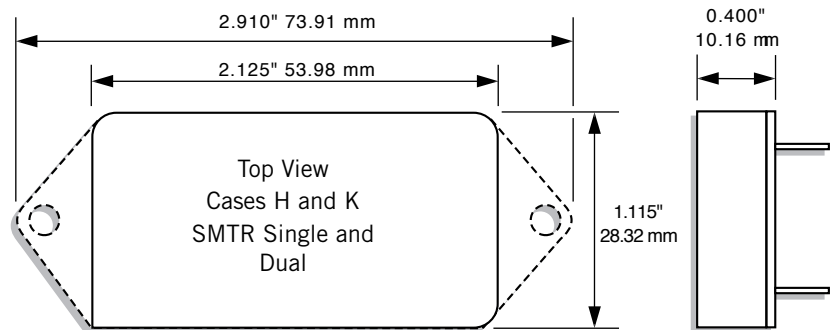
SMTR SERIES™ CONVERTERS—30 WATT SINGLE, DUAL OR TRIPLE

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 16 to 40 VDC
- Transient protection 50 V for 50 ms
- Fully isolated, magnetic feedback
- Fixed high frequency switching, 600 kHz
- Trim function or remote sense on single output models
- Inhibit function
- Synchronization function
- Indefinite short circuit protection

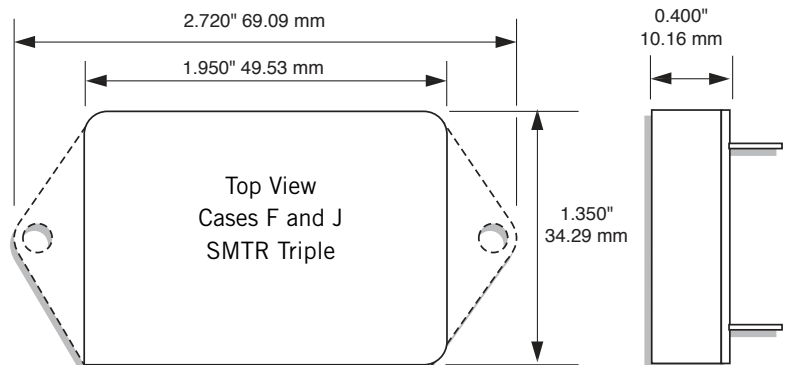
The SMTR Series™ of 28 volt DC/DC converters offers up to 30 watts of output power from single, dual or triple output configuration. They operate over the full military temperature range of -55° to +125°C with up to 84% efficiency (up to 73% efficiency triple models). Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "R", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMTR datasheet at www.interpoint.com/S04.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SMTR281R5S ¹	16 to 40	1.5	8.00	12	60
SMTR282R5S ¹	16 to 40	2.5	8.00	20	70
SMTR283R3S ¹	16 to 40	3.3	6.06	20	73
SMTR2805S	16 to 40	5	5.00	25	78
SMTR2812S	16 to 40	12	2.50	30	83
SMTR2815S	16 to 40	15	2.00	30	84
SMTR2805D	16 to 40	±5	5.00 ²	25 ²	76
SMTR2812D	16 to 40	±12	2.50 ²	30 ²	80
SMTR2815D	16 to 40	±15	2.00 ²	30 ²	81
SMTR28512T	16 to 40	+5 & ±12	4.00 0.834 ³	30 ³	73
SMTR28515T	16 to 40	+5 & ±15	4.00 0.50 ³	30 ³	73

1. Preliminary data on the NEW output voltages 1.5 V, 2.5 V and the improved 3.3 V output.
2. Up to 90% of the total current/power is available from either dual output, providing the opposite output is carrying at least 10% of the power in use. The spec shown is the maximum total current/power.
3. The maximum load per auxiliary is 7.5 W. The total power from the auxiliaries not to exceed 10 W. The spec shown is the maximum total current/power.



Maximum dimensions



Maximum dimensions

MFP SERIES™ POINT OF LOAD CONVERTER

No external components required

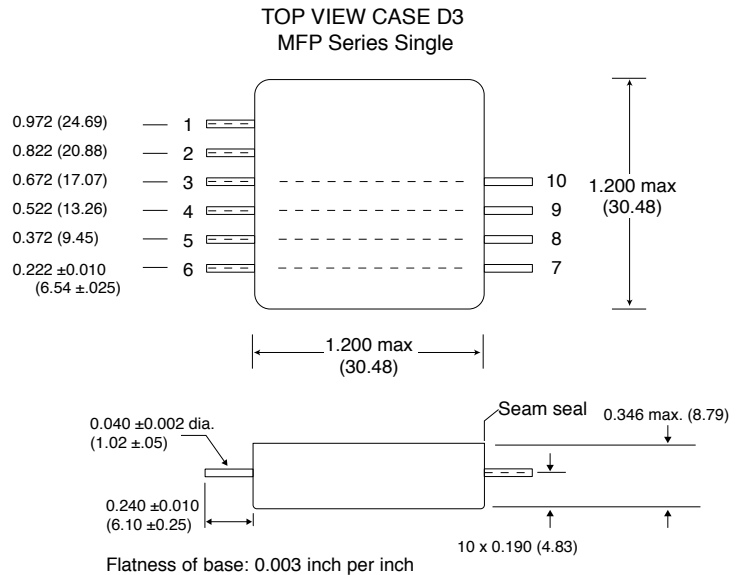
- Operating temperature -70° to +150°C
- Up to 92% efficiency, flat down to 30% load
- Qualified up to MIL-PRF-38534 Class H
- Input voltage range 3.0 to 6.0 VDC
- Input transient for up to 15 V_{IN} for up to 1 sec.
- Inhibit and sync functions
- Current monitoring
- Current sharing pin for parallel operation
- Five pin-selectable, preset voltages:
 - 0.64, 0.8, 1.6, 2.5 and 3.3
- Output voltage continuously adjustable from 0.8 to 3.5 V with resistors
- Indefinite output short circuit protection
- Adjustable start-up sequencing
- Remote sense and voltage margining

The MFP Series™ of DC/DC converters do not require any external components to achieve all specified performance levels. They are a high-reliability, high-efficiency point of load converter for use with a 3.3 VDC input bus or a 5 VDC input bus. The MFP0507S model has the flexibility to be set for any output voltage from 0.64 VDC to 3.5 VDC. The converter operates from an input of 3.0 to 6.0 V_{IN} with an undervoltage shutdown below 3 volts and an overvoltage shutdown above 6 volts. The converter can withstand up to a 15 V transient for up to 1 second.

The non-isolated, feature-rich MFP uses a Buck converter design with synchronous rectification. The design allows the unit to operate synchronously to no output load, ensuring high efficiency at the lightest loads without switching off the synchronous devices. Important features include a solid state switch, inrush current limiting, synchronization with an external system clock and the ability to current share allowing multiple devices to supply a common load. See Screening Tables 2 and 5. For the most current specifications refer to the MFP datasheet at www.interpoint.com/mfp.

MODEL	INPUT (VDC) ^{1, 2}	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.) ³
MFP0507S	3.0 min. to 6.0 max	0.8	7	5.6	73
	3.0 min. to 6.0 max	1.6	6.4	10.2	84
	3.3 min to 6.0 max.	2.5	5.0	12.5	89
	4.5 min to 6.0 max.	3.3	5.0	16.5	92

1. 0.64 VDC is an additional pin selectable voltage.
2. Continuously adjustable from 0.8 to 3.5 VDC.
3. Efficiency at 25°C.



INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

SMHF SERIES™ CONVERTERS—15 WATTS

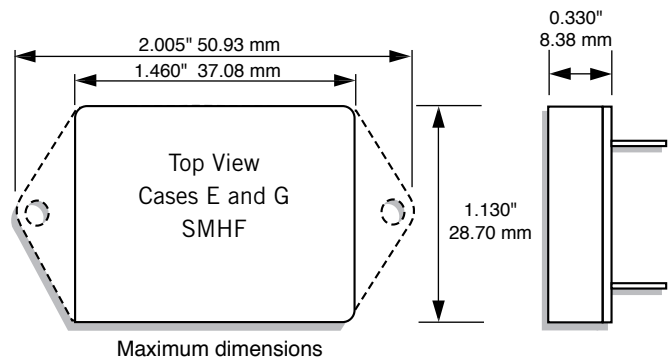
Small footprint 1.65 in² (10.6 cm²)

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 16 to 40 VDC
- Transient protection 50 V for 50 ms
- Fully isolated
- Fixed high frequency switching
- Inhibit function
- Synchronization input and output
- Indefinite short circuit protection
- High power density, 82% efficiency

The SMHF Series' synchronization feature allows the user to match the switching frequency of the converter to the frequency of the system clock. This allows the user to adjust the nominal 550 kHz operating frequency to any frequency within the range of 500 kHz to 600 kHz by applying a compatible input of the desired frequency to pin 5. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to R, per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMHF datasheet at www.interpoint.com/SO5.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SMHF282R5S	16 to 40	2.5	2.40	6	67
SMHF283R3S	16 to 40	3.3	2.40	8	73
SMHF2805S	16 to 40	5	2.40	12	75
SMHF2812S	16 to 40	12	1.25	15	79
SMHF2815S	16 to 40	15	1.00	15	80
SMHF2805D	16 to 40	±5	2.40 ¹	12 ¹	77
SMHF2812D	16 to 40	±12	1.25 ¹	15 ¹	81
SMHF2815D	16 to 40	±15	1.00 ¹	15 ¹	82

1. Up to 90% of the total current/power is available from either dual output, providing the opposite output is carrying at least 10% of the power in use. The spec shown is the maximum total current/power.



INTERPOINT SPACE QUALIFIED DC/DC CONVERTERS

SMSA SERIES™ CONVERTERS—5 WATT

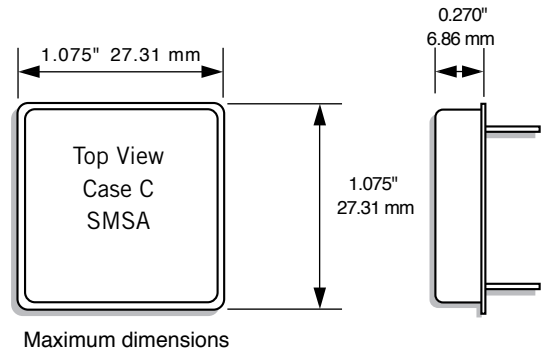
Small size, 1.16 in² (7.5 cm²)

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 16 to 40 VDC
- Transient protection 50 V for 50 ms
- Fixed high frequency switching
- Inhibit function
- Indefinite short circuit protection

The SMSA feed-forward compensation system provides excellent dynamic response and noise rejection. Audio rejection is typically 50 dB. The minimum to maximum step line transient response is typically less than 1%. SMSA converters provide an inhibit feature that can be used to disable internal switching and inhibit the unit's output. Inhibiting in this manner results in low standby current, and no generation of switching noise. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "R", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SMSA datasheet at www.interpoint.com/S06.

MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SMSA283R3S	16 to 40	3.3	1.20	4	65
SMSA2805S	16 to 40	5	1.00	5	69
SMSA285R2S	16 to 40	5.2	0.962	5	74
SMSA2812S	16 to 40	12	0.417	5	74
SMSA2815S	16 to 40	15	0.333	5	74
SMSA2805D	16 to 40	±5	1.00 ¹	5 ¹	70
SMSA2812D	16 to 40	±12	0.417 ¹	5 ¹	73
SMSA2815D	16 to 40	±15	0.333 ¹	5 ¹	73

1. Up to 80% of the total current/power is available from either dual output, providing the opposite output is carrying at least 20% of the power in use. The spec shown is the maximum total current/power.



SLH SERIES™ CONVERTERS—1.5 WATT

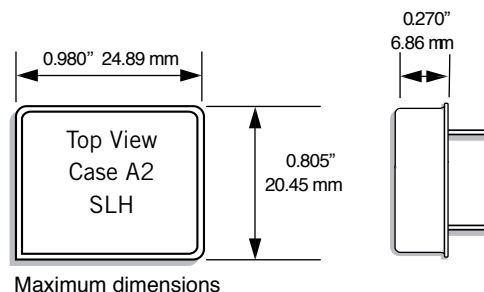
Small size, 0.79 in² (5.1 cm²)

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Radiation hardness assurance (RHA) to level R 100 krad(Si)
- Input voltage range 16 to 40 VDC
- Fully isolated, magnetic feedback
- Inhibit function

With a miniature footprint of just 0.79 square inches, the SLH Series™ of 28 V DC/DC converters delivers 1.5 watts of output power while saving significant board area. The wide input voltage range of 16 to 40 VDC accepts the varying voltages of space, military, or aerospace bus power and tightly regulates output voltages to protect downstream components. The dual models can be used as a single output voltage by connecting the load between positive and negative outputs, leaving the common unconnected resulting in double the output voltage. (e.g. SLH2805D can be used as a 10 VDC output.) Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. Radiation tolerant, with a Radiation Hardness Assurance (RHA) level available up to RHA "R", per MIL-PRF-38534. See Screening Tables 1 and 4. For the most current specifications refer to the SLH datasheet at www.interpoint.com/S07.

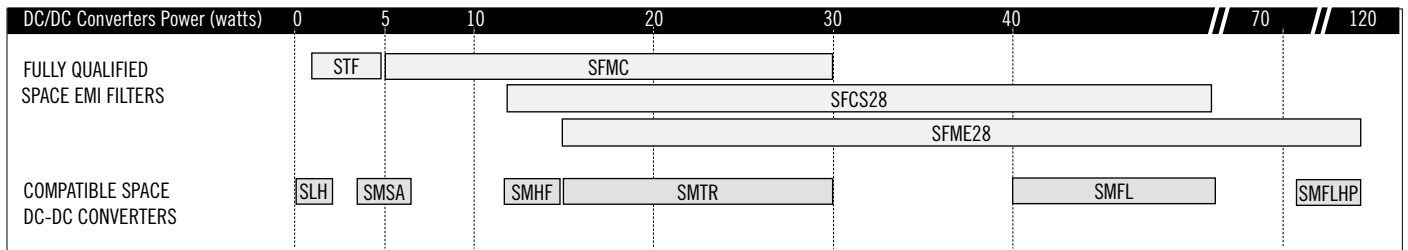
MODEL	INPUT (VDC)	OUTPUT AT FULL LOAD			
		OUTPUT (VDC)	CURRENT (A)	POWER MAX. (W)	EFF (% typ.)
SLH2805S	16 to 40	5	0.300	1.5	75
SLH2812S	16 to 40	12	0.125	1.5	77
SLH2815S	16 to 40	15	0.100	1.5	77
SLH2805D	16 to 40	±5	0.300 ¹	1.5 ¹	75
SLH2812D	16 to 40	±12	0.125 ¹	1.5 ¹	75
SLH2815D	16 to 40	±15	0.100 ¹	1.5 ¹	74

1. Up to 80% of the total current/power is available from either dual output, providing the opposite output is carrying at least 20% of the power in use. The spec shown is the maximum total current/power.



INTERPOINT SPACE QUALIFIED EMI FILTERS

EMI FILTER GUIDE



All filters may be used with multiple converters up to the rated current of the filter.

MODEL	INPUT VOLTAGE (VDC)	CURRENT (MAX. A)	MINIMUM ATTENUATION (dB) @ 500 kHz	AVAILABLE SCREENING	COMPATIBLE CONVERTER
SFME28-461	0 - 50	10.00	60	Tables 2 and 4 Space Prototype (O), Class H-QML, Class K-QML	SMFLHP, SMFL, SMTR, SMHF, SMSA, SLH
SFCS28-461	0 - 50	5.00	60	Tables 2 and 4 Space Prototype (O), Class H-QML, Class K-QML	SMFL, SMTR, SMHF, SMSA, SLH
SFMC28-461	0 - 50	2.70	50	Tables 2 and 4 Space Prototype (O), Class H-QML, Class K-QML	SMTR, SMHF, SMSA, SLH
STF28-461	0 - 50	0.80	50	Tables 2 and 4 Space Prototype (O), Class H-QML, Class K-QML	SMSA, SLH

INTERPOINT SPACE QUALIFIED EMI FILTERS

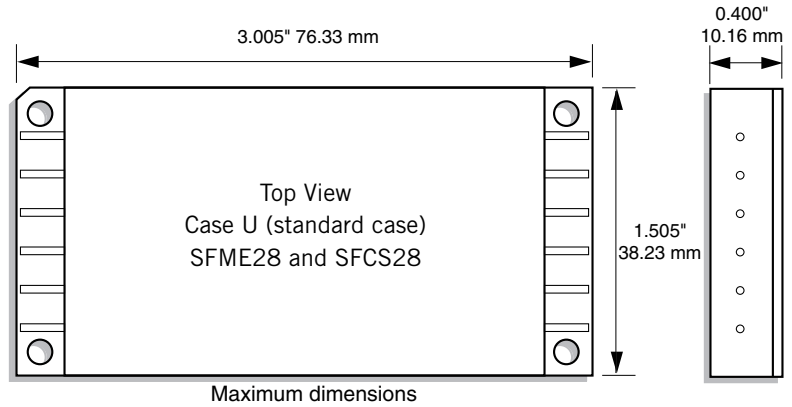
SFME28-461 EMI FILTER—10 AMPS

Attenuation 60 dB minimum at 500 kHz

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Passive components used for maximum tolerance in space environments
- Nominal 28 V input, 0 V to 50 V operation
- Up to 10 A throughput current
- Compliant to MIL-STD-461C CE-03
- Compatible with MIL-STD-704 A-E 28 VDC power bus

The SFME28-461™ EMI filter modules are specifically designed to reduce the reflected input ripple current of high frequency DC/DC converters. SFME28-461 filters minimize electromagnetic interference (EMI) for Interpoint's space applications converters. These filters are intended for use in 28 volt applications which must meet MIL-STD-461 levels of conducted emissions. One filter can be used with multiple converters up to the rated throughput current of the filter. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. See Screening Tables 2 and 4. For the most current specifications refer to the SFME28-461 datasheet at www.interpoint.com/SF1.

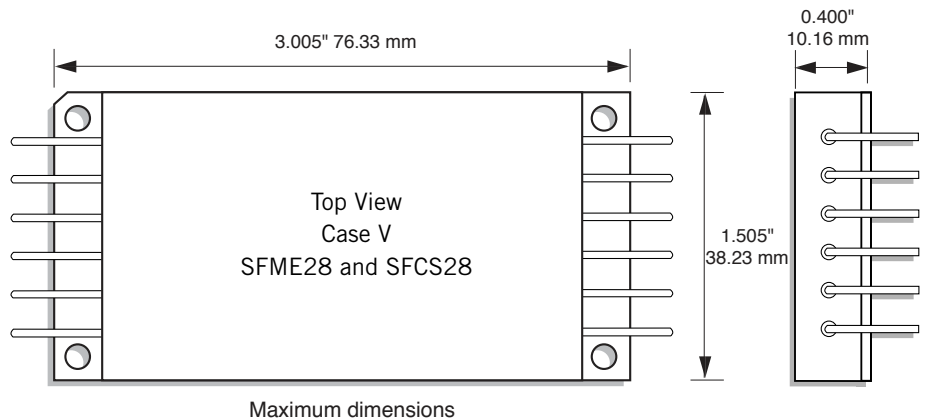
MODEL	VDC INPUT	MAXIMUM CURRENT (A)	MINIMUM ATTENUATION	COMPATIBLE CONVERTERS
SFME28-461	0 to 50	10.00	60 dB @ 500 kHz and 1 MHz	SMFLHP, SMFL, SMTR



SFCS28-461 EMI FILTER – 5 AMPS

- Up to 5 amps throughput current
- Minimum 60 dB attenuation at 0.5 MHz, 1 MHz, and 5 MHz
- -55°C to +125°C operation
- Compliant to MIL-STD-461C, CE03
- Compatible with MIL-STD-704E DC power bus

All SFCS28-461 Series filters are rated for full power operation from -55°C to +125°C case temperature. Current is derated linearly to zero at +135°C case temperature. The maximum DC insertion loss at full load and nominal input voltage represents a power loss of less than 4%. SFCS28-461 filters are sealed in metal hermetic side-leaded packages. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. See Screening Tables 2 and 4. For the most current specifications refer to the SFCS28-461 datasheet at www.interpoint.com/SF2.



MODEL	VDC INPUT	MAXIMUM CURRENT (A)	MINIMUM ATTENUATION	COMPATIBLE CONVERTERS
SFCS28-461	0 to 50	5	50 dB @ 400 kHz to 50 MHz	SMFL, SMTR, SMHF, SMSA

INTERPOINT SPACE QUALIFIED EMI FILTERS

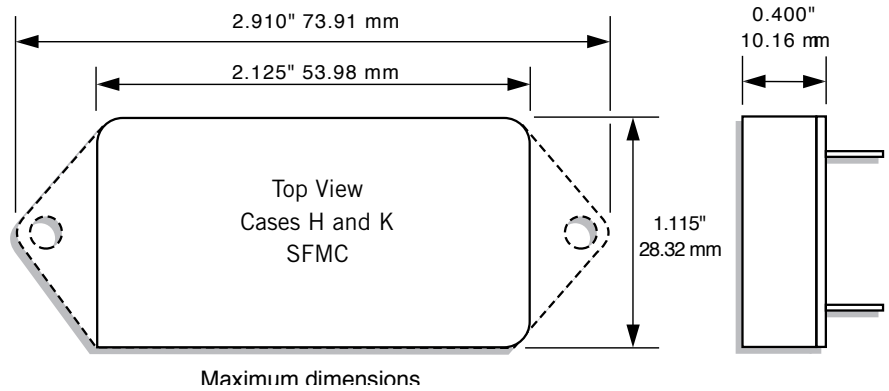
SFMC28-461 EMI FILTER—2.7 AMPS

Attenuation 50 dB minimum at 500 kHz

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Passive components used for maximum tolerance in space environments
- Nominal 28 V input, 0 V to 50 V operation
- Up to 2.7 A throughput current
- Compliant to MIL-STD-461C CE-03
- Compatible with MIL-STD-704 A-E 28 VDC power bus

All SFMC28-461™ filters are built to the same assembly drawing regardless of environmental screening or radiation tolerance level. Filters designated level O, indicating standard environmental screening, are electrically comparable to filters designated level K, the highest environmental screening level. This ensures consistency between your prototype or test system using level OO filters and your flight system using filters with higher levels of environmental screening and radiation tolerance. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. See Screening Tables 2 and 4. For the most current specifications refer to the SFMC28-461 datasheet at www.interpoint.com/SF3.

MODEL	VDC INPUT	MAXIMUM CURRENT (A)	MINIMUM ATTENUATION	COMPATIBLE CONVERTERS
SFMC28-461	0 to 50	2.70	50 dB @ 500 kHz 60 dB @ 1 and 5 MHz	SMTR, SMHF, SMSA



STF28-461 EMI FILTER—0.8 AMPS

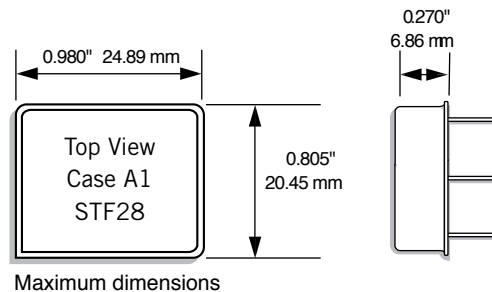
Attenuation 55 dB minimum at 500 kHz

Small size, 0.79 in² (5.1 cm²)

- Operating temperature -55° to +125°C
- Qualified to MIL-PRF-38534 Class H and K
- Passive components used for maximum tolerance in space environments
- Nominal 28 V input, 0 V to 50 V operation
- Up to 0.8 A throughput current
- Compliant to MIL-STD-461C CE-03
- Compatible with MIL-STD-704 A-E 28 VDC power bus

The STF28-461™ EMI filter module has been designed as a companion for Interpoint's SMSA flyback power converters. Multiple SMSA power converters can be operated from a single filter provided the total power line current does not exceed the filter maximum rating. The STF filter will reduce the SMSA's power line reflected ripple current to within the limit of MIL-STD-461C, Method CE-03. The STF filter is fabricated using thick film hybrid technology and is sealed in a metal package for space, military, aerospace and other applications requiring EMI suppression. Available with Space Prototype (non-QML), Class H-QML and Class K-QML Quality Assurance screening. See Screening Tables 2 and 4. For the most current specifications refer to the STF28-461 datasheet at www.interpoint.com/SF4.

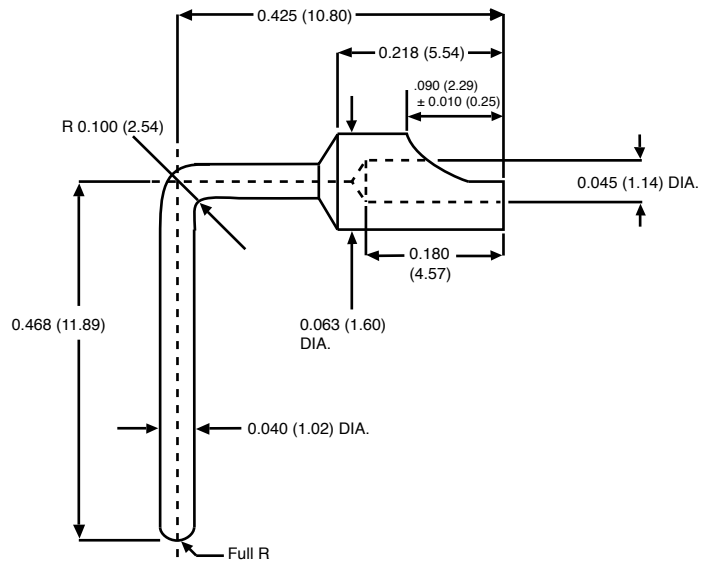
MODEL	VDC INPUT	MAXIMUM CURRENT (A)	MINIMUM ATTENUATION	COMPATIBLE CONVERTERS
STF28-461	0 to 50	0.80	50 dB @ 500 kHz and 1 MHz	SMSA, SLH



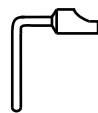
PIN TERMINAL ADAPTOR

- Adapts Interpoint flanged, side-leaded cases to up-leaded or down-leaded configurations
- Compatible with many families of Interpoint products for use in high reliability applications
- Low resistance
- Copper alloy with solder plating over nickel

Our side-leaded packages can be adapted with PIN terminal adapters to fit a variety of configurations. These versatile adapters slide over the ends of side-leaded package terminals and are intended to be soldered to the leads to provide an up-leaded or down-leaded configuration. For the most current specifications refer to the PIN datasheet at www.interpoint.com/PIN.



Drawing enlarged to show detail



Actual size

DC/DC CONVERTERS PROTOTYPE, CLASS H AND CLASS K, MIL-PRF-38534 ELEMENT EVALUATION

COMPONENT-LEVEL TEST PERFORMED	NON-QML ¹	QML			
	PROTOTYPE	CLASS H		CLASS K	
	/O	/H		/K	
	M/S ²	M/S ²	P ³	M/S ²	P ³
Element Electrical	■	■	■	■	■
Visual		■	■	■	■
Internal Visual		■		■	
Temperature Cycling				■	■
Constant Acceleration				■	■
Interim Electrical				■	
Burn-in				■	
Post Burn-in Electrical				■	
Steady State Life				■	
Voltage Conditioning Aging					■
Visual Inspection					■
Final Electrical		■	■	■	■
Wire Bond Evaluation		■	■	■	■
SEM				■	

Notes:

1. Non-QML products may not meet all of the requirements of MIL-PRF-38534.
2. M/S = Active components (Microcircuit and Semiconductor Die)
3. P = Passive components, Class H and K element evaluation. Not applicable to Space Prototype ("O") element evaluation.

Definitions:

Element Evaluation: Component testing/screening per MIL-STD-883 as determined by MIL-PRF-38534
SEM: Scanning Electron Microscopy

SCREENING TABLE 1: ELEMENT EVALUATION—DC/DC CONVERTERS PROTOTYPE, CLASS H AND CLASS K

MFP STANDARD, CLASS H AND CLASS K, MIL-PRF-38534 ELEMENT EVALUATION

COMPONENT-LEVEL TEST PERFORMED	/ST NON-QML ¹	/H CLASS H QML		/K CLASS K QML	
	M/S ^{2,3}	M/S ²	P ³	M/S ²	P ³
Element Electrical	■	■	■	■	■
Visual		■	■	■	■
Internal Visual		■		■	
Temperature Cycling				■	■
Constant Acceleration				■	■
Interim Electrical				■	
Burn-in				■	
Post Burn-in Electrical				■	
Steady State Life				■	
Voltage Conditioning Aging					■
Visual Inspection					■
Final Electrical		■	■	■	■
Wire Bond Evaluation		■	■	■	■
SEM				■	
C-SAM: Input capacitors only ⁴			■		■

Notes:

1. Non-QML products may not meet all of the requirements of MIL-PRF-38534.
2. M/S = Active components (Microcircuit and Semiconductor Die)
3. P = Passive components, Class H and K element evaluation. Not applicable to /ST or /WT element evaluation.
4. Additional test not required by H or K.

Definitions:

Element Evaluation: Component testing/screening per MIL-STD-883 as determined by MIL-PRF-38534
SEM: Scanning Electron Microscopy
C-SAM: C - Mode Scanning Acoustic Microscopy

SCREENING TABLE 2: ELEMENT EVALUATION—MFP STANDARD (/STD), CLASS H AND CLASS K

EMI FILTERS PROTOTYPE, CLASS H AND CLASS K, MIL-PRF-38534 ELEMENT EVALUATION

COMPONENT-LEVEL TEST PERFORMED	NON-QML ¹	QML	
	PROTOTYPE	CLASS H	CLASS K
	/O	/H	/K
		P ²	P ²
Element Electrical		■	■
Visual		■	■
Temperature Cycling			■
Constant Acceleration			■
Voltage Conditioning Aging			■
Visual Inspection			■
Final Electrical		■	■

Notes:

1. Non-QML products may not meet all of the requirements of MIL-PRF-38534. No element evaluation is performed on Space Prototype.
2. P = Passive components, Class H and K element evaluation.

Definitions:

Element Evaluation: Component testing/screening per MIL-STD-883 as determined by MIL-PRF-38534

SCREENING TABLE 3: ELEMENT EVALUATION—EMI FILTERS PROTOTYPE, CLASS H AND CLASS K

Table is for reference only. See individual Series datasheets for specific screening.

DC/DC CONVERTERS PROTOTYPE, CLASS H AND CLASS K MIL-PRF-38534 ENVIRONMENTAL SCREENING AND RHA¹ P, R OR F

TEST PERFORMED	NON-QML ²	QML ^{3,4}				
	PROTOTYPE	CLASS H		CLASS K		
	/OO	/HP	/HR	/KP	/KR	/KF ³
Non-destruct wire bond pull, Method 2023		■ ⁵	■ ⁵	■	■	■
Pre-cap Inspection, Method 2017, 2032	■	■	■	■	■	■
Temperature Cycle (10 times) Method 1010, Cond. C, -65°C to +150°C, ambient	■	■	■	■	■	■
Constant Acceleration Method 2001, 3000 g (Qual 5000 g)	■	■	■	■	■	■
PIND, Test Method 2020, Cond. A		■ ⁵	■ ⁵	■	■	■
Pre burn-in test, Group A, Subgroups 1 and 4	■	■ ⁵	■ ⁵	■	■	■
Burn-in Method 1015, +125°C case, typical ⁶						
96 hours	■					
160 hours		■	■			
2 x 160 hours (includes mid-BI test)				■	■	■
Final Electrical Test, MIL-PRF-38534, Group A,						
Subgroups 1 and 4: +25°C case	■					
Subgroups 1 through 6, -55°C, +25°C, +125°C case		■	■	■	■	■
Hermeticity Test						
Gross Leak, Method 1014	■	■	■	■	■	■
Fine Leak, Method 1014	■	■	■	■	■	■
Radiography, Method 2012				■	■	■
Post Radiography Electrical Test, +25°C case				■ ⁵	■ ⁵	■ ⁵
Final visual inspection, Method 2009	■	■	■	■	■	■
RHA P: 30 krad(Si) total dose		■		■		
RHA R: 100 krad(Si) total dose			■		■	
RHA F ³ : 300 krad(Si) total dose						■
SEE LET						
40 MeV-cm ² /mg		■	■	■	■	■
80 MeV-cm ² /mg - SMRT only		■	■	■	■	■

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

Notes:

- Our Redmond site has a DLA approved RHA plan for Interpoint power products. Our SMD products with RHA "P", "R" or "F" level meet DLA requirements.
- "OO" prototypes are non-QML products and may not meet all of the requirements of MIL-PRF-38534. "O" in the RHA designator position in Interpoint model numbers indicates DLA RHA "-" defined as no RHA.
- RHA "F" is only available in select models.
- All processes are QML qualified and performed by certified operators.
- Not required by DLA but performed to assure product quality.
- Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.

SCREENING TABLE 4: ENVIRONMENTAL SCREENING AND RHA—DC/DC CONVERTERS PROTOTYPE, CLASS H AND CLASS K

MFP STANDARD, CLASS H AND CLASS K, MIL-PRF-38534 ENVIRONMENTAL SCREENING AND RHA¹

TEST PERFORMED	NON-QML ²				
	/ST	CLASS H		CLASS K	
		/HP	/HR	/KP	/KR
Non-destruct bond pull, Method 2023		■ ⁴	■ ⁴	■	■
Pre-cap Inspection, Method 2017, 2032	■	■	■	■	■
Temperature Cycle (10 times) Method 1010, Cond. C, -65°C to +150°C, ambient		■	■	■	■
Constant Acceleration Method 2001, 3000 g (Qual 5000 g)		■	■	■	■
PIND, Test Method 2020, Cond. A		■ ⁴	■ ⁴	■	■
Pre burn-in test, Group A, Subgroups 1 and 4		■	■	■	■
Burn-in Method 1015, +125°C case, typical ⁵ 96 hours					
160 hours		■	■		
2 x 160 hours (includes mid-BI test)				■	■
Final Electrical Test, MIL-PRF-38534, Group A, Subgroups 1 and 4: +25°C case	■				
Subgroups 1 through 6, -70°C, +25°C, +150°C case					
Subgroups 1 through 6, -55°C, +25°C, +125°C case		■	■	■	■
Hermeticity Test Gross Leak, Dip	■				
Gross Leak, Method 1014, Cond. C		■	■	■	■
Fine Leak, Method 1014, Cond. A		■	■	■	■
Radiography, Method 2012				■	■
Post Radiography Electrical Test, +25°C case				■ ⁴	■ ⁴
Final visual inspection, Method 2009	■	■	■	■	■
RHA P: 30 krad(Si) total dose ⁶		■		■	
RHA R: 100 krad(Si) total dose			■		■
SEE LET 85 MeV-cm ² /mg		■	■	■	■

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

Notes:

1. Redmond site has a DLA approved Radiation Hardness Assurance plan for Interpoint power products. Interpoint SMD products with RHA “P”, “R” or “F” code meet DLA requirements.
2. /ST (standard) and /WT (wide temperature) are non-QML products and may not meet all of the requirements of MIL-PRF-38534.
3. All processes are QML qualified and performed by certified operators.
4. Not required by DLA but performed to assure product quality.
5. Burn-in temperature designed to bring the case temperature to +125°C minimum.
6. Includes low dose rate to the rated total dose (TID).

Formal classification and jurisdiction are pending.

SCREENING TABLE 5: ENVIRONMENTAL SCREENING AND RHA—MFP STANDARD (/ST), CLASS H AND CLASS K

EMI FILTERS PROTOTYPE, CLASS H AND CLASS K, MIL-PRF-38534 ENVIRONMENTAL SCREENING AND RHA¹

TEST PERFORMED	NON-QML ²	QML ³	
	/OO	CLASS H /HH ⁴	CLASS K /KH ⁴
Pre-cap Inspection, Method 2017, 2032	■	■	■
Temperature Cycle (10 times) Method 1010, Cond. C, -65°C to +150°C, ambient	■	■	■
Constant Acceleration Method 2001, 3000 g (Qual 5000 g)	■	■	■
PIND, Test Method 2020, Cond. A		■ ⁵	■
Pre burn-in test, Group A, Subgroups 1 and 4	■	■	■
Burn-in Method 1015, +125°C case, typical⁶			
96 hours	■		
160 hours		■	
2 x 160 hours (includes mid-BI test)			■
Final Electrical Test, MIL-PRF-38534, Group A,			
Subgroups 1 and 4: +25°C case	■		
Subgroups 1 through 6, -55°C, +25°C, +125°C case		■	■
Hermeticity Test			
Gross Leak, Method 1014	■	■	■
Fine Leak, Method 1014	■	■	■
Radiography, Method 2012			■
Post Radiography Electrical Test, +25°C case			■ ⁵
Final visual inspection, Method 2009	■	■	■
Radiation tolerant— Tested lots up to 1,000 krad(Si) total dose, applies to EMI filters only		■	■

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

Notes:

- Our Redmond site has a DLA approved RHA plan for Interpoint power products.
- "OO" prototypes are non-QML products and may not meet all of the requirements of MIL-PRF-38534. "O" in the RHA designator position in Interpoint model numbers indicates DLA RHA "-" defined as no RHA.
- All processes are QML qualified and performed by certified operators.
- Our EMI filters are designed exclusively with passive components providing maximum tolerance for space environment requirements.
- Not required by DLA but performed to assure product quality.
- Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.

SCREENING TABLE 6: ENVIRONMENTAL SCREENING AND RHA—EMI FILTERS PROTOTYPE, CLASS H AND CLASS K

Some of the major programs which use our products:

Space

ACE
Aquarius
Cassini/Huygens
GLONAS
GONETS

Hubble Space Telescope
INTEGRAL
Mars Exploration Rovers - MER
Mars Reconnaissance Orbiter
- MRO

Mars Science Lab (MSL)
Phoenix
ROCSAT
Space Shuttle and Space Station

Aircraft

Advanced Light Helicopter - ALH
Airbus A319 - A380
Airbus A400M
AH-64 Apache
ARJ21
CX/PI
EH101
F-16
B-1B Lancer
B-2 Stealth Bomber
B-52 Stratofortress
Boeing 737 through 787
E-2C Hawkeye
F-2 Attack Fighter
F-15 Eagle
F-22 Raptor
F-35 Joint Strike Fighter
F/A-18 Hornet
GRIPEN
Hermes UAV
Jaguar
K8 Trainer
Light Combat Aircraft - LCA
Lynx Helicopters
MI-8 Helicopters
MIG Upgrades
NH90 Helicopters
Nimrod 2000
OH1
RC-135 Rivet Joint
RQ-4A Global Hawk
Typhoon - Eurofighter
U-2 Falcon Hawk
UH60J

V-22 Osprey
Watchkeeper UAV - UK
X-45
X-47 - UAV
Z9 - Z10 Helicopters

C4ISR

AEGIS (radar)
Firefinder/Sentinel
Border Security Camera System
JTIDS/MIDS
MILSTAR
JSTAR

Commercial/Industrial

Oil Rig - down hole instrumentation
Oil platform system controls
Oil and gas pipeline monitoring

Land Systems

Challenger
Leopard
M1A1 Abrams
Multiple Launch Rocket System - MLRS

Naval Platforms

CVN-68 - Nimitz Class
DDG-51 - Arleigh Burke Class
DD(X)
LHD & LHA Amphibious Assault Ship
- Wasp and Tarawa Class
SSN-774 Virginia-Class
- New Attack Submarine - NSSN
Trident Class Fleet
- Ballistic Missile Submarine

Precision Munitions

AGM-88 HARM
AMRAAM Patriot
BAMSE
Dual Mode Guided Bomb - DMGB
Evolved Sea Sparrow Missile - ESSM
IRIS-T
Taurus
Harpoon
Joint Air-to-Surface Standoff Missile
- JASSM
Longbow
PAC-3
Tomahawk
SeaRam
Small Diameter Bomb - SDB
Standard Missile II
Wind Corrected Munition Dispenser
- WCMD

Radar/Electronic Warfare

Airborne Self-Protection Integrated Suites
- ASPIS
AN/AAR-57 Common Missile Warning
System - CMWS
APG-63
APG-81
AWACS
Directional Infrared Counter Measure
- DIRCM
ERIEYE
Giraffe Agile Multi Beam Radar
SLQ-32

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