INTERPOINT SPACE CAPABILITIES
DC/DC Converters, EMI Filters, Custom Power

CRANE
AEROSPACE &
ELECTRONICS
Electronics Group

INTERPOINT
DC/DC Converters and EMI Filters for Space

DC/DC Converters

	Model	Input Voltage (VDC)	Output Voltage (VDC)	Output Power (Total W)	Efficiency (typ.) (%)	Features
	SMFLHP	19 - 40	3.3, 5, 12, 15, ±12, ±15	100 (-55 to +100°C)	50 - 87	Parallel for up to 270 watts
	SMHP120	80 - 160	5, 12, 15, 28 ±12, ±15	65	78 - 87	Parallel for up to 120 watts
	SMFL	16 - 40	3.3, 5, 8, 9, 12, 15 ±5, ±12, ±15	65	80 - 87	Parallel for up to 180 watts
NEW	SMRT dual	19 - 56	3.3, 5, 28 ±5, ±12, ±15	35 - 50	67 - 80	Magnetic feedback Rad Hard
	triple	3.3 & ±12, 5 & ±12, 5 & ±15				
	quad	±5 & ±12, ±5 & ±15				
	SMTR	16 - 40	3.3, 5, 12, 15 ±5, ±12, ±15	30	63 - 87	Up to 50 dB audio rejection
NEW	SMTR Triple	16 - 40	5 & ±12, 5 & ±15	30	73	Magnetic feedback
	SMHF	16 - 40	2.5, 3.3, 5, 5.2, 12, 15 ±5, ±7, ±12, ±15	15	78 - 84	Low noise
	SMSA	16 - 40	5, 12, 15 ±12, ±15	5	69 - 80	Small footprint 1.15"^{2} (746 mm2)
	SLH	12 - 50	5, 12, 15 ±5, ±12, ±15	1.5	77 - 84	Small footprint 0.80"^{2} (503 mm2)

DC/DC EMI Filters

Model	Input Voltage (VDC)	Current (Max. A)	Minimum Attenuation (dB)	Compatible Converter(s)
SFME120-461	0 - 160	2.1	60 dB 400 kHz to 50 MHz	SMHP120
SFME28-461	0 - 40	10	45 dB at 1MHz	SMFLHP, SMFL SMTR, SMTR Triple, SMRT
SFCS28-461	0 - 50	5	50 dB 400 kHz to 50 MHz	SMHF, SMSA
SFMC28-46	0 - 40	2.7	50 dB 400 kHz to 50 MHz	SMHF, SMSA
STF28-461	0 - 40	0.8	60 dB 500 kHz to 50 MHz	SMSA, SLH

DSCC Qualified

Interpoint is qualified to provide products compliant to the highest US government standards. Interpoint is on the Defense Supply Center, Columbus (DSCC) Qualified Manufacturer List (QML) -38534, and Interpoint space products Class H and K are available on DSCC's Standard Microcircuit Drawings (SMDs) for DC/DC converters or DSCC Drawings for EMI filters.

Dedicated Space Team

From early product development through product implementation, Interpoint's Space Products Team delivers specialized customer support exclusively for your space program. The team includes a project manager, quality assurance engineer, design engineer, and process engineer plus dedicated procurement and production control personnel. The project manager will serve as your central point of contact and provide you with project progress reports at regular intervals.

INTERPOINT
Screening: Element Evaluation

Level "00" for Prototyping

All space-level converters and filters are functionally comparable regardless of screening level. Use "00" level products (see Radiation Screening next page) for your prototypes then upgrade to level "KR" or "KH" products for your final system without the danger of performance compromises. Products built to radiation screening level "R" or "H" incorporate radiation tested components from controlled lots. All marking inks meet NASA's Total Mass Loss (TML) and Collected Volatile Condensable Materials (CVCM) requirements. All converters and filters operate over the full space and military temperature range of –55°C to +125°C.

Table 1

Definitions

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

SEM: Scanning Electron Microscopy

SLAM™: Scanning Laser Acoustic Microscopy

C-SAM: C - Mode Scanning Acoustic Microscopy

Key

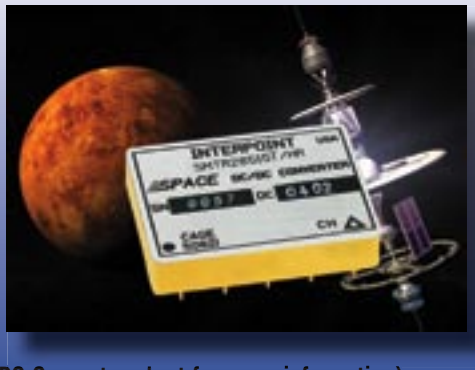
M/S: Active components (Microcircuit and Semiconductor Die)

P: Passive components

*: Not applicable to EMI filters that have no wirebonds

Table 1: Element Evaluation

Element Evaluation Test Performed (component level)	Prototype (0)		Class H		Class K	
	M/S	P	M/S	P	M/S	P
Element Electrical	yes	no	yes	yes	yes	yes
Element Visual	no	no	yes	yes	yes	yes
Internal Visual	no	no	yes	no	yes	no
Temperature Cycling	no	no	no	no	yes	yes
Constant Acceleration	no	no	no	no	yes	yes
Interim Electrical	no	no	no	no	yes	no
Burn-in	no	no	no	no	yes	no
Post Burn-in Electrical	no	no	no	no	yes	no
Steady State Life	no	no	no	no	yes	no
Voltage Conditioning/Aging	no	no	no	no	no	yes
Visual Inspection	no	no	no	no	no	yes
Final Electrical	no	no	yes	yes	yes	yes
Wire Bond Evaluation*	no	no	yes	yes	yes	yes
SEM	no	no	no	no	yes	no
SLAM™/C-SAM: input capacitors only (Add'l test, not req. by H or K)	no	no	no	yes	no	yes



New Products: SMTR Triple and SMRT (see DC/DC Converter chart for more information)

Interpoint's EMI filters are designed exclusively with passive components providing maximum tolerance for space environment requirements.

INTERPOINT
Screening: Environmental and Radiation

Table 2: Environmental Screening

Environmental Screening Test Performed (end item level)	Prototype (0)	Class H	Class K
Non-destruct bond pull*			
Method 2023	no	yes	yes
Pre-cap inspection			
Method 2017, 2032	yes	yes	yes
Temperature cycle			
Method 1010, Cond. C	yes	yes	yes
Constant acceleration			
Method 2001, 3000 g	yes	yes	yes
PIND Test			
Method 2020, Cond. B	no	yes	yes
Radiography			
Method 2012	no	no	yes
Pre burn-in test	yes	yes	yes
Burn-in, Method 1015, 125°C			
96 hours	yes	no	no
160 hours	no	yes	no
2 x 160 hour (includes mid BI test)	no	no	yes
Final electrical test			
MIL-PRF-38534, Group A	yes	yes	yes
Hermeticity test			
Fine Leak,			
Method 1014, Cond. A	yes	yes	yes
Gross Leak,			
Method 1014, Cond. C	yes	yes	yes
Final visual inspection			
Method 2009	yes	yes	yes

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.
Note: * Not applicable to EMI filters that have no wirebonds.

Table 3: Radiation Hardness Levels for DC/DC Converters

Product Level Availability / Radiation Hardness Levels	Environmental Screening Levels: Prototype (0)	Class H	Class K
0: Standard, no radiation guarantee For system evaluation, electrically and mechanically comparable to H and K level.	00	HO	Not available
R:-Radiation hardened – Tested lots Up to 100 k Rads (Si) total dose SEU guarantee up to 40 MeV	Not available	HR	KR

Radiation Hardness

Radiation hardness (RHA) efers to the specified levels of radiation products or components will withstand. Radiation Hardness Assurance (RHA) levels refers to the levels specified in MIL-PRF-38534, appendix G. Level R will withstand up to 100 krad (Si) total dose at die level and will survive a 40 MeV SEU.

Reports

1. Radiation Susceptibility Analysis
2. Electrical/Thermal Stress Analysis and Derating
3. MTBF
4. FMEA

The reports are available subject to a non-disclosure agreement (NDA) and to US International Traffic in Arms (ITAR) regulations.

Your Power Partner

With many years of experience and numerous successful space programs already launched, we at Interpoint welcome the opportunity to share our expertise with you.

Contact your regional sales office today and discover how our power products and our team can help you meet your most demanding specifications.

INTERPOINT
Power: Standard, Custom, and EMS

Interpoint on Board

- ACE
- CASSINI/HUYGENS
- CERES
- CIRS
- COLUMBUS
- COMSAT
- DAMA
- DESTINY MODULE
- EOS
- ERS 1
- EUROPEAN ROBOTIC ARM (ERA)
- GENESIS
- H2A LAUNCH ROCKET
- HUBBLE TELESCOPE
- INTEGRAL
- INTELSAT
- INTERFACE
- INT'L SPACE STATION
- JET-X
- KIT SAT A
- M-STAR
- MAP
- MARS EXPLORER ROVER
  - OPPORTUNITY
  - SPIRIT
- METEOSAT
- MISTY II
- NEAR
- NEAT
- NICMOS
- ODIN
- ORBITAL
- POLDER
- S.D.I.
- SEDSAT 1
- SETAR
- SIR C
- SMART
- SPACE SHUTTLE
- SPOT
- STAR TRACKER
- STIS
- STRV 1

The above is a partial list of the many space projects using Interpoint products.

Innovative Solutions

With over thirty years of experience, Interpoint is your first source for power conversion products for space and other hi-rel applications. Interpoint has provided innovative power solutions for space applications where size, weight and reliability are critical to mission success. Interpoint is a part of the Electronics Group of Crane Aerospace & Electronics.

Standard Power Conversion

Interpoint offers a standard line of radiation hardened DC to DC power converters fully compliant to MIL-PRF-38534 Class K and radiation hardened to Level R with EMI filters compliant to Class K. To meet demanding time and cost targets, choose a product from the standard space-level converters and filters. Short lead times ensure you meet your launch date. Products manufactured and screened to Class K requirements ensure ultimate reliability and performance in the harsh environments of space. This plus the benefit of standard product pricing means mission success at the lowest cost. Interpoint also offers over 800 non-space power conversion products.

Custom Power Conversion

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

Electronics Manufacturing Solutions (EMS)

General Technology Corporation (GTC), also part of the Crane Aerospace & Electronics, Electronics Group, General Technology Corporation provides high quality and quick-response electronic assembly services. As a turnkey MIL-SPEC and commercial assembly facility, GTC conforms to all relevant standards. GTC offers full surface mount technology (SMT) and provides customers with virtually all types of printed wiring board assembly technologies including:

- Contract manufacturing
- Surface mount technology
- Cable and harness assembly
- Automated testing
- Technical support
- IPC certified operators

SMT technology with Interpoint converters

Electronics Group

The Electronics Group is comprised of Advanced Integrated Systems Division (AISD), ELDEC, General Technology, Interpoint, Keltec, and STC Microwave Systems (formerly Signal Technology Corporation). The Electronics Group designs and manufactures high-density, high-reliability electronics for aerospace, space, military, medical, industrial, and commercial applications.

Crane Aerospace & Electronics

Crane Aerospace & Electronics, a segment of Crane Co., in addition to the Electronics Group, also includes Hydro-Aire, Lear Romec, P.L. Porter, and Resistoflex-Aerospace, all suppliers of critical aircraft systems and components.

Crane Co.

Crane Co., is a diversified manufacturer of engineered industrial products. Crane Co. is traded on the New York Stock Exchange (NYSE:CR).

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