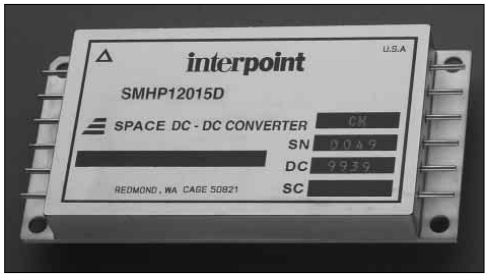
DC/DC CONVERTERS 120 VOLT INPUT

SMHP120 SERIES 65 WATT

FEATURES

- **Fully qualified to Class H**
- **–55° to +125°C operation**
- **80 to 175 VDC input**
- Fully Isolated
- Magnetic feedback
- Fixed frequency, 600 kHz typical
- Topology – Single Ended Forward
- Inhibit input and output side
- Sync in and out
- Indefinite short circuit protection
- Remote sense on single output models
- Up to 85% efficiency
- Parallelable up to 180 watts



MODELS	
VDC OUTPUT	
SINGLE	DUAL
5	±12
12	±15
15	

Size (max.): 3.005 x 1.505 x 0.400 inches (76.33 x 38.23 x 10.16mm)
See Section B8, case U1, for dimensions.
Weight: 100 grams maximum
Screening: Standard or Class H (MIL-PRF-38534)
See Section C2 for screening options, see Section A5 for ordering information.

DESCRIPTION

The SMHP120™ Series DC/DC converters provide up to 65 watts of output power over the full -55° to 125°C temperature range. SMHP120 models operate from a MIL-STD-704 nominal 120 volt DC power bus – from 80 to 175 VDC – continuous operation and provide isolated outputs at 5, 12, 15, and 28 VDC. Parallel operation for all loading conditions is supported without any requirement for external components.

SCREENING

SMHP120 converters offer three screening options – Standard, or Class H. See Section C2, Quality Assurance, pages C2-7 through C2-9, for descriptions.

CONVERTER DESIGN

SMHP120 DC/DC converters are constant frequency, pulse width modulated switching power supplies which use a quasi-square wave, two-switch single-ended forward converter design. Tight load regulation is achieved through a wide-bandwidth magnetic feedback circuit.

SMHP converters meet a wide variety of military/aerospace performance and environmental specifications. Their continuous operation input voltage (80 to 175) meets the normal operating limits of MIL-STD-704D. The units are built as fully hermetic thick film hybrids in Interpoint's MIL-STD-1772 certified facilities.

PARALLEL OPERATION

Up to five single output SMHP converters may be used in parallel to power a single load by simply connecting the share pins of all units. Units in this configuration have a 90% current sharing accuracy over all loading conditions, and provide true n+1 operation.

FEATURES

Synchronization – units may be synchronized to an external clock or to one another by using sync in and sync out pins provided on each unit. The converters have a nominal switching frequency of 600 kHz, but may be synchronized at any frequency from 525 to 675 kHz.

Low voltage lock-out – shuts down when the input line voltage falls below approximately 50 VDC to provide smooth initialization.

Continuous short circuit protection – using foldback current limit set at approximately 125%.

Soft-start – at both turn-on and recovery after load fault conditions.

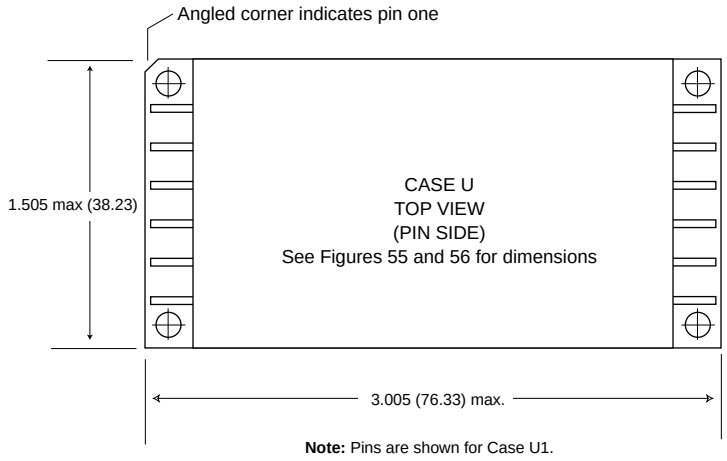
Remote sense – to provide automatic compensation for voltage drops on output lines on single output models.

For more information, contact your Interpoint representative listed in Section A5.

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Note: Pins are shown for Case U1.

Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold compression glass seal

Case dimensions in inches (mm)

Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.2) for two decimal places
unless otherwise specified

CAUTION

Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

FIGURE 54: CASE U MAXIMUM DIMENSIONS

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TOP VIEW CASE U1

MFL Series and MHP Series: Screening – Standard, ES or 883
MFLHP Series, FMD270 EMI Filter, and FMD28-461SL EMI Filters:
Screening – Standard or ES
SMFL, SMFLHP, SMHP, and SSP Series; SFCS, and SFME EMI Filters:
Screening – Standard, Class H or K
HUM70 Module and LCM Module: Screening – Standard or ES

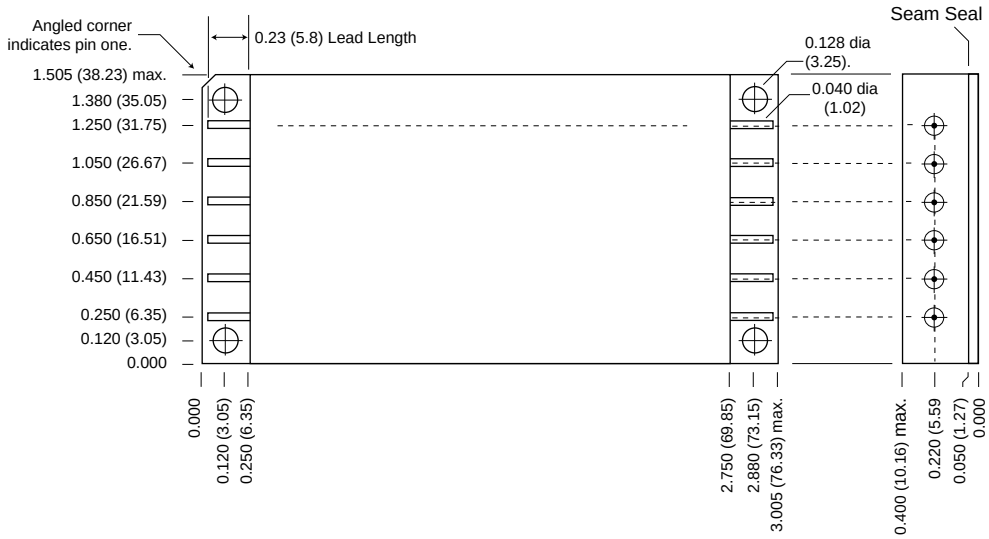


FIGURE 55: CASE U1

SPACE PRODUCTS

ELEMENT EVALUATION TEST PERFORMED (COMPONENT LEVEL)	STANDARD (O)		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

Notes
- M/S Active components (Microcircuit and Semiconductor Die)
- P Passive components
- * Not applicable to EMI filters that have no wirebonds

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

Applies to the following products:

SMFLHP Series
SMFL Series
SMHP Series (O&H only)
SMTR Series
SSP Series
SMHF Series
SMSA Series
SLH Series
SLIM Module
SFME120 EMI Filter
SFME28 EMI Filter
SFCS EMI Filter
SFMC EMI Filter
STF EMI Filter

QA SCREENING
SPACE PRODUCTS

ENVIRONMENTAL SCREENING TEST PERFORMED (END ITEM LEVEL)	STANDARD (O)	CLASS H	CLASS K
Non-destruct bond pull* Method 2023	no	no	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	no	yes
Radiography Method 2012	no	no	yes
Pre burn-in test	yes	yes	yes
Burn-in, Method 1015, 125°C 96 hours 160 hours 2 x 160 hour (includes mid BI test)	 yes no no	 no yes no	 no no yes
Final electrical test MIL-PRF-38534, Group A	yes	yes	yes
Hermeticity test Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C	 yes yes	 yes 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.

Applies to the following products:

SMFLHP Series
SMFL Series
SMHP Series (O&H only)
SMTR Series
SSP Series
SMHF Series
SMSA Series
SLH Series
SLIM Module
SFME120 EMI Filter
SFME28 EMI Filter
SFCS EMI Filter
SFMC EMI Filter
STF EMI Filter

SPACE PRODUCTS

ELEMENT EVALUATION TEST PERFORMED (COMPONENT LEVEL)	STANDARD (O)		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

Notes
- M/S Active components (Microcircuit and Semiconductor Die)
- P Passive components
- * Not applicable to EMI filters that have no wirebonds

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

Applies to the following products:

SMFLHP Series
SMFL Series
SMHP Series (O&H only)
SMTR Series
SSP Series
SMHF Series
SMSA Series
SLH Series
SLIM Module
SFME120 EMI Filter
SFME28 EMI Filter
SFCS EMI Filter
SFMC EMI Filter
STF EMI Filter

QA SCREENING
SPACE PRODUCTS

ENVIRONMENTAL SCREENING TEST PERFORMED (END ITEM LEVEL)	STANDARD (O)	CLASS H	CLASS K
Non-destruct bond pull* Method 2023	no	no	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	no	yes
Radiography Method 2012	no	no	yes
Pre burn-in test	yes	yes	yes
Burn-in, Method 1015, 125°C 96 hours 160 hours 2 x 160 hour (includes mid BI test)	 yes no no	 no yes no	 no no yes
Final electrical test MIL-PRF-38534, Group A	yes	yes	yes
Hermeticity test Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C	 yes yes	 yes 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.

Applies to the following products:

SMFLHP Series
SMFL Series
SMHP Series (O&H only)
SMTR Series
SSP Series
SMHF Series
SMSA Series
SLH Series
SLIM Module
SFME120 EMI Filter
SFME28 EMI Filter
SFCS EMI Filter
SFMC EMI Filter
STF EMI Filter

RADIATION HARDNESS LEVELS
FOR DC/DC CONVERTERS AND LINE INPUT MODULES[1]

PRODUCT LEVEL AVAILABILITY	ENVIRONMENTAL SCREENING LEVELS		
RADIATION HARDNESS LEVELS	STANDARD (O)	CLASS H	CLASS K
O: Standard, no radiation guarantee For system evaluation, electrically and mechanically comparable to H and K level.	OO	HO	Not available
L: Radiation hardened – Tested lots Up to 50 k Rads (Si) total dose No SEU guarantee	Not available	HL	KL
R: Radiation hardened – Tested lots Up to 100 k Rads (Si) total dose SEU guarantee up to 40 MeV	Not available	HR	KR

L and R are referenced to MIL-PRF-38534, appendix G, Radiation Hardness Assurance (RHA) levels.

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

Applies to the following products:

SMFLHP Series (levels O and L only)
SMFL Series (levels O and L only)
SMTR Series
SSP Series
SMHF Series
SMSA Series
SLH Series
SLIM Series Modules

REPORTS: INCLUDED WITH PURCHASE OF PRODUCT HL, KL, HR, or KR
1. Radiation Susceptibility Analysis
2. Electrical/Thermal Stress Analysis and Derating Report
3. MTBF Report
4. FMEA Report

OO option: Select reports available as separate purchases.