Quality Assurance and Certification

APPLICATION NOTE

The application note is an overview of the Crane quality system for Interpoint® products. It includes a list of certifications and qualifications, an explanation of our model numbering system and tables of the screening levels offered.

QUALITY SYSTEM OVERVIEW–REDMOND AND KAOHSIUNG

- The quality management system of Crane Electronics, Inc., Redmond and Crane Electronics Corporation, Kaohsiung have been certified to ISO 9001:2015 and AS9100D on certificates 1655 and 1657 by the International Standards Authority, Inc. (www.isaregistrar.com).
- Our Redmond and Kaohsiung facilities are on the Defense Logistics Agency's (DLA) 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 facilities are audited by a US government organization with customer participation. The certificate number for Kaohsiung Class H is VQH-18-032974, for Redmond Class H and K it is VQH-10-019519.
- Standard Microcircuit Drawings (SMD) of our 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 https://landandmaritimeapps.dla.mil/programs/smcr/.
- 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 with 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 and work instructions are in use for all operations that affect quality.
- Radiation hardness assurance (RHA) levels available referenced to MIL-PRF-38534. Our Redmond facility has a DLA approved RHA plan for Interpoint power products. Our SMD products with RHA "P," "L", "R" and "H" level meet DLA RHA 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.
- 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.


Certificate of Registration

This is to certify that the Quality Management System of

Crane Electronics, Inc.
(Campus Structure)

(Additional Sites Listed on the Attachment)

has been assessed for conformance with the provisions set forth by

ISO 9001:2015
AS9100D

Scope of Registration

Design, Manufacture, and Sales of Hybrid DC/DC Converters, Electromagnetic Interference Filters, And Custom Microelectronics.

The assessment was performed in accordance with the requirements of the latest version of AS9104/1:2012-01
ISA is accredited under the ICQF Scheme.

Certificate No. 1655
Issue Date: 06/30/2018
Expiration Date: 06/29/2021
Certified since June 15, 2016

The conditions for maintaining this certificate of registration are set forth in ISA's Registration Policies 5.1. This registration is granted subject to the organization maintaining compliance to the noted standard. The validity of this certificate is dependent upon ongoing surveillance audits.

President

International Standards Authority, Inc.
www.isaregistrar.com
1611 Commerce Dr.
Corona, CA 92879, USA
Tel: 951-736-0035


Certificate of Registration

This is to certify that the Quality Management System of

Crane Electronics Inc.
Crane Electronics Corporation - Power Solution
No. 198 Xinsheng Rd., Qianzhen District, Kaohsiung City, R.O.C., 80672 Taiwan
(Single Site Structure)

has been assessed for conformance with the provisions set forth by

ISO 9001:2015
AS9100D

Scope of Registration

Manufacture of Hybrids, DC/DC Converters, EMI Filters, Microelectronics, Magnetics Transformer Rectifier Units and Custom Power Products for Aircraft, Aerospace and Defense Systems.

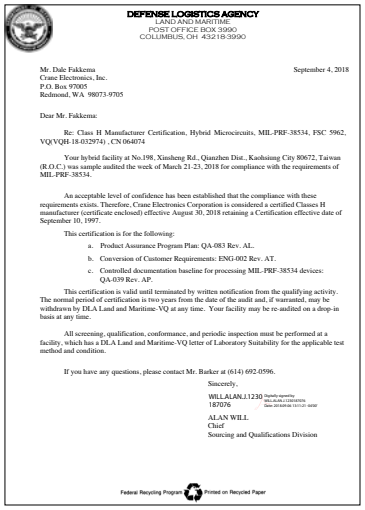
The assessment was performed in accordance with the requirements of the latest version of AS9104/1:2012-01
ISA is accredited under the ICQF Scheme.

Certificate No. 1657
Issue Date: 07/20/2018
Expiration Date: 07/19/2021
Certified since June 15, 2016

The conditions for maintaining this certificate of registration are set forth in ISA's Registration Policies 5.1. This registration is granted subject to the organization maintaining compliance to the noted standard. The validity of this certificate is dependent upon ongoing surveillance audits.

President

International Standards Authority, Inc.
www.isaregistrar.com
1611 Commerce Dr.
Corona, CA 92879, USA
Tel: 951-736-0035


DEFENSE LOGISTICS AGENCY
LAND AND MARITIME
POST OFFICE BOX 3990
COLUMBUS, OH 43218-3990

Mr. Dale Fakkema
Crane Electronics, Inc.
P.O. Box 97005
Redmond, WA 98073-9705

September 4, 2018

Dear Mr. Fakkema:

Re: Class H Manufacturer Certification, Hybrid Microcircuits, MIL-PRF-38534, FSC 5962, VQ/VQH-18-032974) , CN 064074

Your hybrid facility at No.198, Xinsheng Rd., Qianzhen Dist., Kaohsiung City 80672, Taiwan (R.O.C.) was sample audited the week of March 21-23, 2018 for compliance with the requirements of MIL-PRF-38534.

An acceptable level of confidence has been established that the compliance with these requirements exists. Therefore, Crane Electronics Corporation is considered a certified Classes H manufacturer (certificate enclosed) effective August 30, 2018 retaining a Certification effective date of September 10, 1997.

This certification is for the following:

a. Product Assurance Program Plan: QA-083 Rev. AL.
b. Conversion of Customer Requirements: ENG-002 Rev. AT.
c. Controlled documentation baseline for processing MIL-PRF-38534 devices: QA-039 Rev. AP.

This certification is valid until terminated by written notification from the qualifying activity. The normal period of certification is two years from the date of the audit and, if warranted, may be withdrawn by DLA Land and Maritime-VQ at any time. Your facility may be re-audited on a drop-in basis at any time.

All screening, qualification, conformance, and periodic inspection must be performed at a facility, which has a DLA Land and Maritime-VQ letter of Laboratory Suitability for the applicable test method and condition.

If you have any questions, please contact Mr. Barker at (614) 692-0596.

Sincerely,

WILLALAN.1230 Digitally signed by WILLALAN.1230787076 Date: 2018.09.04 10:13:21 -04'00'
187076

ALAN WILL
Chief
Sourcing and Qualifications Division

Federal Recycling Program Printed on Recycled Paper


MIL-PRF-38534
HYBRID MICROCIRCUIT CERTIFICATION
FOR
CLASSES H and K
IS HEREBY AWARDED TO

INTERPOINT CORPORATION
10301 Willows Road
Redmond, WA 98052

THIS CERTIFICATION IS VALID UNTIL TERMINATED BY WRITTEN NOTIFICATION FROM DSCC.
REFERENCE DSCC LETTER VQ/VQH-10-019519 FOR DETAILS PERTAINING TO THIS CERTIFICATION.


MIL-PRF-38534
HYBRID MICROCIRCUIT CERTIFICATION
FOR
CLASS H
IS HEREBY AWARDED TO

INTERPOINT TAIWAN CORPORATION
5 South 6th Road Box 26-143, K.E.P.Z.
Kaohsiung, Taiwan

THIS CERTIFICATION IS VALID UNTIL TERMINATED BY WRITTEN NOTIFICATION FROM DSCC.
REFERENCE DSCC LETTER VQ/VQH-10-(23432) FOR DETAILS PERTAINING TO THIS CERTIFICATION.

Quality Assurance and Certification

APPLICATION NOTE

QUALITY ASSURANCE CERTIFICATIONS 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 Redmond facility 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/AS9100C—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/AS9100C.
- 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
- 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

IPC
ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES®

Quality Assurance and Certification

APPLICATION NOTE

PART NUMBERING

Our part numbering indicates the series (family), input voltage, output voltage, number of outputs, package configuration and screening level. The screening and RHA levels found in this Quality Assurance document appear at the right end of the part number. Products with standard screening do not have a screening level in the part number: e.g. MTR2812D is the MTR Series™ 28 volt input (nominal), ±12 volt outputs, flanged package and standard screening. Refer to individual datasheets to determine what screening options are available for a particular product. Screening methods are referenced to MIL-STD-883 per MIL-PRF-38534.

The example shows an MTR, 28 Vin, ±12 Vout, flanged case with /883 (Class H) screening. MTR2812D/883 is a model in the MTR Series™.

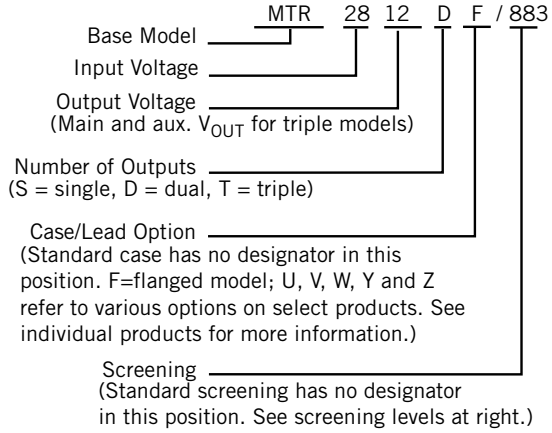
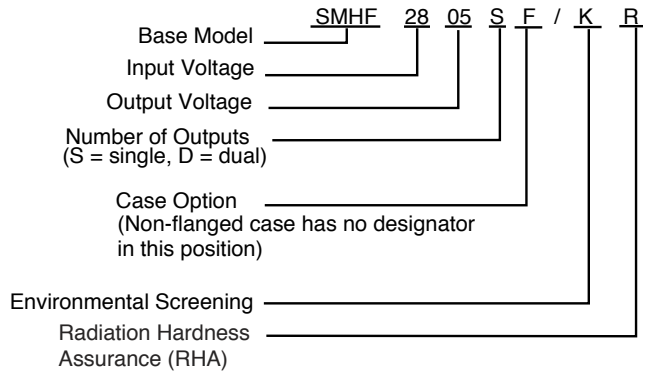


Table 1: Screening Levels (non Space)	
Level	Description of Levels
883	Class H, QML, has an SMD number, marked with "QML"
883	Class H, QML, does not have an SMD number, marked with "CH".
883 [1]	MIL-STD-883 screening, non QML, marked with "SX"
ES [1]	Extended screening, per the product's datasheet
Standard [1]	Standard screening, per the product's datasheet
1. Non-compliant products may not meet all of the requirements of MIL-PRF-38534.	

If ordering by model number add a "-Q" to request solder dipped leads (e. g. MTR-2812DF/883-Q). Available only for Class H.

The example below shows an SMHF, 28 Vin, +5 Vout, flanged case, Class K screening and RHA level R. SMHF2805SF/KR is a model in the SMHF Series™.



If ordering by model number add a "-Q" to request solder dipped leads (e. g. SMHF2805SF/KR-Q). Available only for Class H, E and K.

Notes Table 2
1. RHA "H" applies to filters only. Our EMI filters are designed with passive components providing maximum tolerance for space environment requirements. RHA "H" is defined as radiation tolerant up to 1000 krad(Si) total dose.
2. Non-QML products "A", "B" and "O" may not meet all of the requirements of MIL-PRF-38534.

Table 2: Screening and RHA Levels, Space Products	
Level	Description of Levels
KR	Class K, QML, RHA level R, 100 krad(Si)
KL	Class K, QML, RHA level L, 50 krad(Si)
KP	Class K, QML, RHA level P, 30 krad(Si)
ER	Class E, QML, RHA level R, 100 krad(Si)
EL	Class E, QML, RHA level L, 50 krad(Si)
EP	Class E, QML, RHA level P, 30 krad(Si)
HR	Class H, QML, RHA level R, 100 krad(Si)
HL	Class H, QML, RHA level L, 50 krad(Si)
HP	Class H, QML, RHA level P, 30 krad(Si)
KH	Class K, QML, filters only RHA level H [1]
HH	Class H, QML, filters only RHA level H [1]
BR	Class K screening, non-QML[2], RHA level R, 100 krad(Si)
BL	Class K screening, non-QML[2], RHA level L, 50 krad(Si)
BP	Class K screening, non-QML[2], RHA level P, 30 krad(Si)
AR	Class H screening, non-QML[2], RHA level R, 100 krad(Si)
AL	Class H screening, non-QML[2], RHA level L, 50 krad(Si)
AP	Class H screening, non-QML[2], RHA level P, 30 krad(Si)
OO	Space prototype, screening (non-QML[2]) per the product's datasheet. "O" in the RHA designator position in Interpoint model numbers indicates DLA RHA "-" defined as no RHA.

Quality Assurance and Certification

APPLICATION NOTE

SCREENING TABLES **PAGE**

Quality Assurance and Certification

APPLICATION NOTE

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

ELEMENT EVALUATION SPACE DC-DC CONVERTERS PROTOTYPE, CLASS H, E AND K

	NON-QML [1]	QML					
	PROTOTYPE	CLASS H		CLASS E		CLASS K	
	/O	/H		/E [2]		/K	
COMPONENT-LEVEL TEST PERFORMED	M/S [3]	M/S [3]	P [4]	M/S [3]	P [4]	M/S [3]	P [4]
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 [5]			■		■		■

Notes
1. Non-QML products may not meet all of the requirements of MIL-PRF-38534.
2, Class E is based on Class K requirements of MIL-PRF-38534 with the exception that Constant Acceleration is limited to 3000 g maximum including qualification testing.
3. M/S = Active components (microcircuit and semiconductor die)
4. P = Passive components, Class H, E and K element evaluation. Not applicable to space prototype (“O”) element evaluation.
5. Additional test not required by H, E 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

TABLE 3: ELEMENT EVALUATION SPACE DC-DC CONVERTERS PROTOTYPE, CLASS H, E AND K

Quality Assurance and Certification

APPLICATION NOTE

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

Environmental Screening Space DC-DC Converters Prototype, Class H, E and K, RHA P, L and R

	NON-QML [1]	QML [2, 3]								
	PROTOTYPE	CLASS H			CLASS E [4]			CLASS K		
TEST PERFORMED	/OO [5]	/HP	/HL	/HR	/EKP	/EKL	/EKR	/KP	/KL	/KR
Non-destruct wire bond pull, Method 2023		■ [6]	■ [6]	■ [6]	■	■	■	■	■	■
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	■	■	■	■	■	■	■	■	■	■
PIND, Test Method 2020, Cond. A		■ [6]	■ [6]	■ [6]	■	■	■	■	■	■
Pre burn-in test, Group A, Subgroups 1 and 4	■	■ [6]	■ [6]	■ [6]	■	■	■	■	■	■
Burn-in Method 1015, +125°C case, typical [7]										
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, Method 1014										
Gross Leak, Cond. B_2, Kr85					■	■	■	■	■	■
Gross Leak, Cond. C_1, fluorocarbon	■	■	■	■						
Fine Leak, Cond. B_1, Kr85					■	■	■	■	■	■
Fine Leak, Cond. A_2, helium	■	■	■	■						
Radiography, Method 2012					■	■	■	■	■	■
Post Radiography Electrical Test, +25°C case					■ [6]	■ [6]	■ [6]	■ [6]	■ [6]	■ [6]
Final visual inspection, Method 2009	■	■	■	■	■	■	■	■	■	■

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

Notes
1. Non-QML prototype products may not meet all of the requirements of MIL-PRF-38534.
2. All processes are QML qualified and performed by certified operators.
3. Class H or K QML products that have no SMD number are marked “CHP, CHL, CHR, CKP, CKL or CKR” per MIL-STD-38534, Table III instead of “QML”.
4. Class E is based on Class K requirements of MIL-PRF-38534 with the exception that Constant Acceleration is limited to 3000 g maximum including qualification testing.
5. “O” in the RHA designator position in Interpoint model numbers indicates DLA RHA “-” defined as no RHA.
6. Not required by DLA but performed to assure product quality.
7. Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.

TABLE 4: ENVIRONMENTAL SCREENING SPACE DC-DC CONVERTERS PROTOTYPE, CLASS H, E AND K

Quality Assurance and Certification

APPLICATION NOTE

Table is general information and is for reference only. See individual Series' datasheets for specific screening.

Space Radiation Hardness Assurance Screening
DC-DC Converters Class H, E and K, RHA [1] P, L and R

	non-QML [2]	QML [3]								
	Prototype	Class H			Class E [4]			Class K		
Qualification Per MIL-STD	/OO [5]	/HP	/HL	/HR	/EKP	/EKL	/EKR	/KP	/KL	/KR
RHA P: 30 krad(Si) total dose [1, 6, 7]		■			■			■		
RHA L: 50 krad(Si) total dose [1, 6, 7]			■			■			■	
RHA R: 100 krad(Si) total dose [1, 6, 7]				■			■			■
SEE, LET 86 MeV cm^2/mg [1, 8]		■	■	■	■	■	■	■	■	■

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

Notes
1. Our Redmond facility has a DLA approved RHA plan for Interpoint power products. Our SMD products with RHA “P”, “L” or “R” code meet DLA requirements.
2. Non-QML prototype products may not meet all of the requirements of MIL-PRF-38534.
3. Class H or K QML products that have no SMD number are marked “CHP, CHL, CHR, CKP, CKL or CKR” per MIL-STD-38534, Table III instead of “QML”.
4. Class E is based on Class K requirements of MIL-PRF-38534 with the exception that Constant Acceleration is limited to 3000 g maximum including qualification testing.
5. “O” in the RHA designator position in Interpoint model numbers indicates DLA RHA “-” defined as no RHA.
6. Radiation sensitive components internal to the devices are procured with radiation guarantees or undergo radiation lot acceptance testing (RLAT) performed per condition A, method 1019 of MIL-STD-883.
7. Representative devices were initially High Dose Rate (HDR) tested using condition A of method 1019 of MIL-STD 883 to ensure RHA designator levels. Representative devices have also been Low Dose Rate (LDR) tested using condition D of method 1019 of MIL-STD-883 to the RHA designator levels. Representative devices will also be re-tested after design or process changes that can affect RHA response of this device.
8. Single event testing was performed on a converter to 86 MeV-cm^2/mg using 15 MeV/nucleon gold ions with no latch-up, burn-out, functional interrupts, or gate ruptures exhibited. Single event upsets (output voltage transients) may be present up to 86 MeV-cm^2/mg.

Table 5: Space Radiation Hardness Assurance DC-DC Converters Class H, E and K with RHA P, L and R

Quality Assurance and Certification

APPLICATION NOTE

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

Environmental Screening Space DC-DC Converters Prototype, A and B

	NON-QML [1, 2]						
	Prototype	A			B		
Test Performed	**/OO [3]**	**/AP**	**/AL**	**/AR**	**/BP**	**/BL**	**/BR**
Non-destruct wire bond pull, Method 2023		■ [4]	■ [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	■	■	■	■	■	■	■
PIND, Test Method 2020, Cond. A		■ [4]	■ [4]	■ [4]	■	■	■
Pre burn-in test, Group A, Subgroups 1 and 4	■	■ [4]	■ [4]	■ [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, -55°C, +25°C, +125°C case		■	■	■	■	■	■
Hermeticity Test, Method 1014							
Gross Leak, Cond. B_2, Kr85					■	■	■
Gross Leak, Cond. C_1, fluorocarbon	■	■	■	■			
Fine Leak, Cond. B_1, Kr85					■	■	■
Fine Leak, Cond. A_2, helium	■	■	■	■			
Radiography, Method 2012					■	■	■
Post Radiography Electrical Test, +25°C case					■ [4]	■ [4]	■ [4]
Final visual inspection, Method 2009	■	■	■	■	■	■	■

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

Notes
1. Non-QML prototype products may not meet all of the requirements of MIL-PRF-38534.
2. All processes are QML qualified and performed by certified operators. A and B are only available on select models.
3. "O" in the RHA designator position in Interpoint model numbers indicates DLA RHA "-" defined as no RHA.
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. Burn-in is a powered test.

TABLE 6: ENVIRONMENTAL SCREENING SPACE DC-DC CONVERTERS PROTOTYPE, A AND B, NON-QML

Quality Assurance and Certification

APPLICATION NOTE

Table is general information and is for reference only. See individual Series' datasheets for specific screening.

Space Radiation Hardness Assurance Screening
DC-DC Converters A and B, RHA [1] P, L and R

	non-QML [2]						
	Prototype	A			B		
Qualification Per MIL-STD	**/OO [3]**	**/AP**	**/AL**	**/AR**	**/BP**	**/BL**	**/BR**
RHA P: 30 krad(Si) total dose [1, 4, 5]		■			■		
RHA L: 50 krad(Si) total dose [1, 4, 5]			■			■	
RHA R: 100 krad(Si) total dose [1, 4, 5]				■			■
SEE, LET 86 MeV cm^2/mg [1, 6]		■	■	■	■	■	■

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

Notes
1. Our Redmond facility has a DLA approved RHA plan for Interpoint power products. Our SMD products with RHA “P”, “L” or “R” code meet DLA requirements.
2. Non-QML prototype products may not meet all of the requirements of MIL-PRF-38534. A and B are only available on select models.
3. “O” in the RHA designator position in Interpoint model numbers indicates DLA RHA “-” defined as no RHA.
4. Radiation sensitive components internal to the devices are procured with radiation guarantees or undergo radiation lot acceptance testing (RLAT) performed per condition A, method 1019 of MIL-STD-883.
5. A representative converter was high dose rate (HDR) tested using condition A of method 1019 of MIL-STD-883 to 150 krads(Si) to ensure RHA designator level “R” (100 krad(Si)). A representative converter was also low dose rate (LDR) tested using condition D of Method 1019 of MIL-STD-883 to 100 krad(Si).
6. Single event testing was performed on a converter to 86 MeV-cm^2/mg using 15 MeV/nucleon gold ions with no latch-up, burn-out, functional interrupts, or gate ruptures exhibited. Single event upsets (output voltage transients) may be present up to 86 MeV-cm^2/mg.

Table 7: Space Radiation Hardness Assurance DC-DC Converters A and B non-QML with RHA P, L and R

Quality Assurance and Certification

APPLICATION NOTE

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

ELEMENT EVALUATION SPACE EMI FILTERS PROTOTYPE, CLASS H AND K

	NON-QML [1]	QML	
	PROTOTYPE	CLASS H	CLASS K
	/O	/H	/K
COMPONENT-LEVEL TEST PERFORMED		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.
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

TABLE 8: ELEMENT EVALUATION SPACE EMI FILTERS PROTOTYPE, CLASS H AND K

Quality Assurance and Certification

APPLICATION NOTE

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

Environmental Screening Space EMI Filters Prototype, Class H and K, RHA[1] H

Test Performed	Non-QML [2] Prototype [5] /OO [6]	QML [3, 4] Class H /HH [6]	QML [3, 4] Class K /KH [6]
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	■	■	■
PIND, Test Method 2020, Cond. A		■ [7]	■
Pre burn-in test, Group A, Subgroups 1 and 4	■	■	■
Burn-in Method 1015, +125°C case, typical [8]			
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, Method 1014			
Gross Leak, Cond. B_2, Kr85			■
Gross Leak, Cond. C_1, fluorocarbon	■	■	
Fine Leak, Cond. B_1, Kr85			■
Fine Leak, Cond. A_2, helium	■	■	
Radiography, Method 2012			■
Post Radiography Electrical Test, +25°C case			■ [7]
Final visual inspection, Method 2009	■	■	■
Radiation tolerance [1, 9]			
Passive components, radiation tolerant		■	■

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

Notes
1. Our Redmond facility has a DLA approved RHA plan for Interpoint power products.
2. Non-QML products, prototype (OO), may not meet all of the requirements of MIL-PRF-38534.
3. All processes are QML qualified and performed by certified operators.
4. Class H or K QML products that have no SMD number are marked “CHH, CKH” per MIL-STD-38534, Table III instead of “QML”.
5. “O” in the RHA designator position in Interpoint model numbers indicates DLA RHA “-” defined as no RHA.
6. Our EMI filters are designed exclusively with passive components providing maximum tolerance for space environment requirements.
7. Not required by DLA but performed to assure product quality.
8. Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.
9. Interpoint EMI filters are designed exclusively with passive components providing maximum tolerance for space environment requirements. RHA level H is guaranteed to 1000 krad(Si).

Table 9: Environmental Screening Space EMI Filters Prototype, Class H and K, with RHA H

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APPLICATION NOTE

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

Element Evaluation [1] High Reliability DC-DC Converters and EMI Filters /883 (Class H)

	QML	
	Class H /883	
Component-Level Test Performed	M/S [2]	P [3]
Element Electrical	■	■
Visual	■	■
Internal Visual	■	
Final Electrical	■	■
Wire Bond Evaluation	■	■

Notes
1. Element evaluation does not apply to standard and /ES product.
2. M/S = Active components (microcircuit and semiconductor die).
3. P = Passive components, Class H element evaluation. Not applicable to standard and /ES element evaluation.

Table 10: Element Evaluation High Reliability DC-DC Converters and EMI Filters /883 (Class H)

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APPLICATION NOTE

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

Environmental Screening High Reliability DC-DC Converters and EMI Filters Standard, /ES and /883 (Class H)

Test Performed	non-QML [1]			Class H QML [2]	
	Standard	/ES	/883 SX [3]	/883 CH [4]	/883 QML [5]
Pre-cap Inspection, Method 2017, 2032	■	■	■	■	■
Temperature Cycle (10 times)					
Method 1010, Cond. C, -65°C to +150°C, ambient			■	■	■
Method 1010, Cond. B, -55°C to +125°C, ambient		■			
Constant Acceleration					
Method 2001, 3000 g			■	■	■
Method 2001, 500 g		■			
PIND, Test Method 2020, Cond. A			■	■ [6]	■ [6]
Burn-in Method 1015, +125°C case, typical [7]					
96 hours		■			
160 hours			■	■	■
Final Electrical Test, MIL-PRF-38534, Group A,					
Subgroups 1 through 6, -55°C, +25°C, +125°C case			■	■	■
Subgroups 1 and 4, +25°C case	■	■			
Hermeticity Test					
Gross Leak, Cond. C_1, fluorocarbon		■	■	■	■
Fine Leak, Cond. A_2, helium		■	■	■	■
Gross Leak, Dip	■				
Final visual inspection, Method 2009	■	■	■	■	■

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

Notes
1. Non-QML products may not meet all of the requirements of MIL-PRF-38534.
2. All processes are QML qualified and performed by certified operators.
3. SX screening is available on select models.
4. Class H QML products with no SMD number are marked “CH” per MIL-STD-38534 Rev J, 3.9.5.8.3, Table III.
5. Class H QML products have an SMD number
6. Not required by DLA but performed to assure product quality.
7. Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.

Table 11: Environmental Screening High Reliability DC-DC Converters and EMI Filters Standard, /ES and /883 (Class H)

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APPLICATION NOTE

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

Environmental Screening DC-DC Converters and EMI Filters Standard and /ES, non-QML[1]

Test Performed	Standard	/ES
Pre-cap Inspection Method 2017, 2032	■	■
Temperature Cycle (10 times) Method 1010, Cond. B, -55°C to +125°C, ambient		■
Constant Acceleration Method 2001, 500 g		■
Burn-in Method 1015 [2] 96 hours		■
Final Electrical Test MIL-PRF-38534, Group A Subgroups 1 and 4: +25°C case	■	■
Hermeticity Test		
Gross Leak, Cond. C_1, fluorocarbon		■
Fine Leak, Cond. A_2, helium		■
Gross Leak, Dip	■	
Final visual inspection Method 2009	■	■

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

Notes
1. Standard and /ES, non-QML products, may not meet all of the requirements of MIL-PRF-38534.
2. Burn-in temperature designed to bring the case temperature to the maximum case temperature of the product. Refer to the specific product information for the maximum case temperature. Burn-in is a powered test.

Table 12: Environmental Screening DC-DC Converters and EMI Filters Standard and /ES, Non-QML

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APPLICATION NOTE

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

ENVIRONMENTAL SCREENING INDUSTRIAL DC-DC CONVERTERS AND EMI FILTERS STANDARD, NON-QML[1]

TEST PERFORMED	INDUSTRIAL STANDARD
Pre-cap Inspection	
Method 2017, 2032	■
Final Electrical Test MIL-PRF-38534, Group A	
Subgroups 1 and 4: +25°C case	■
Hermeticity Test	
Gross Leak, Dip	■
Final visual inspection	
Method 2009	■

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

Notes
1. Industrial, standard, non-QML products, may not meet all of the requirements of MIL-PRF-38534.

TABLE 13: ENVIRONMENTAL SCREENING INDUSTRIAL DC-DC CONVERTERS AND EMI FILTERS STANDARD, NON-QML