APPLICATION NOTE

Product and Quality Assurance Overview for VPT Hi-Rel COTS DC-DC Converters and Accessory Products

DC-DC CONVERTERS AND ACCESSORIES

Sales Information: (phone) 425-353-3010 • (fax) 425-353-4030 • vptsales@vptpower.com • www.vptpower.com

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Introduction

VPT, Inc., a HEICO company, is dedicated to the highest level of quality. With expert, experienced personnel, state-of-the-art technology, and strict quality procedures, VPT produces reliable power supply products for the demanding environments of avionics, military, and space environments.

VPT products are designed and produced at ISO9001 registered sites. VPT's R&D and manufacturing headquarters are in Blacksburg, VA, portions of manufacturing are at ISO9001 registered subcontractors, and sales and marketing facilities are in Bothell, WA.

VPT employs a comprehensive Quality Assurance System to ensure that all products are designed, developed, manufactured, tested, stored, and delivered in compliance with all government, customer specified, and contractual requirements. The System includes detailed policies, objectives, plans, and methods to ensure that requirements are effectively implemented and to provide defect-free products through concurrent engineering and process controls.

The VPT Quality Assurance System utilizes a proactive approach to ensure the design quality of products prior to manufacturing. VPT's System manages design and process quality rather than product defects. This is achieved through a complete set of quality procedures, which include process capability, quality management methodology, supplier quality control, component and raw material standardization and minimization, process control and capability studies, and design assurance. The System provides for the early detection of actual and potential deficiencies, system incompatibilities, marginal quality, trends, and any other conditions which could result in reduced performance. Finally, VPT's System enables VPT to provide effective and timely action to correct any such conditions.

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VPT's Quality Assurance Manual (QA1-001) and System includes more than 300 specific quality and process procedures. These procedures detail VPT's configuration and documentation/software/record control, responsibilities and authorities, contract review, self-auditing, calibration, cleanroom and facility control, ESD control, testing, processes, manufacturing, qualification, training, and all other aspects of each requirement and function performed. When pertaining to quality, every requirement and procedure is documented and every action is recorded. This document highlights a few key aspects of VPT's Quality Assurance System, certifications, and policies. VPT welcomes customer inquiries into any areas not specifically covered in this document. Please contact your sales representative or the VPT Sales Department for more information.

Quality Certifications

- ISO 9001:2008 Certification: All sites share a joint quality systems certification and registration to ISO 9001:2008 (Quality management systems — Requirements) from Kiwa International Cert GmbH, certificate number H1205007. VPT manufacturing subcontractors maintain site specific quality systems certification and registration to ISO 9001:2008.

- VPT's certificates, listings, certifications, and letters are available at http://www.vptpower.com/.

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Product Part Numbering

Standard VPT Series DC-DC Converters (Single and Dual Outputs):

VPT100(±)	28	12	D	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage(s)	Number of Outputs	Additional Screening Code (if required)
		1	2	3

Notes:

1. Used for single output; i.e., +12V. Used for ± dual outputs; i.e., ±12V. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. Outputs values with single digits use a preceding zero; i.e., 5 = 05. See specific product datasheet for values available.

2. S = Single, D = Dual.

3. Contact Sales for customer specific additional screening codes.

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Standard VPT Series DC-DC Converters (Triple Outputs):

VPT30-	28	5	1212	T	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage (Main)	Output Voltage (Auxiliary)	Number of Outputs	Additional Screening Code (if required)
		1	2	3	4

Notes:

1. Main positive output. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. See specific product datasheet for values available.

2. Auxiliary positive outputs. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. See specific product datasheet for values available.

3. T = Triple.

4. Contact Sales for customer specific additional screening codes.

Standard VPT Series Accessory Products (EMI Filter and Transient Protection Modules):

VPTF10-	28	-yyy
Product Series	Input Voltage (Nominal)	Additional Package Option (if available)
1		2

Notes:

1. Following the product series, "F" represents "filter". The number following "F" indicates the max current (Amp); 2 = 2 Amp, 10 = 10 Amp, etc. See specific EMI filter datasheets for various available current options.

2. If applicable, letters following the input voltage indicate additional package information (i.e., "W" for the V-SHIELD® packaging, "M" for mounting holes). See specific EMI filter datasheets for packaging options.

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Standard VPT Series Accessory Products (Preconditioning Modules):

VPTPCM-	12	-yyy
Product Series	Input Voltage (Nominal)	Additional Package Option (if available)
	1	2

Notes:

1. See specific product datasheet for available voltages.

2. A letter following the input voltage represents the product packaging. For example, "W" indicates the V-SHIELD® epoxy encapsulated package.

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Standard VPT Series Accessory Products (Regulated Bus Converters):

VPTHVM-	270	-yyy
Product Series	Input Voltage (Nominal)	Additional Package Option (if available)
	1	2

Notes:

1. See specific product datasheet for values available.

2. A letter following the input voltage represents the product packaging. For example, "W" indicates the V-SHIELD® epoxy encapsulated package.

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Standard VHR Series DC-DC Converters (Single and Dual Outputs):

VHR100(±)	28	12	D	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage(s)	Number of Outputs	Additional Screening Code (if required)
		1	2	3

Notes:

1. Used for single output; i.e., +12V. Used for ± dual outputs; i.e., ±12V. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. Outputs values with single digits use a preceding zero; i.e., 5 = 05. See specific product datasheet for values available.

2. S = Single, D = Dual.

3. Contact Sales for customer specific additional screening codes.

Standard VHR Series DC-DC Converters (Triple Outputs):

VHR30-	28	5	1212	T	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage (Main)	Output Voltage (Auxiliary)	Number of Outputs	Additional Screening Code (if required)
		1	2	3	4

Notes:

1. Main positive output. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. See specific product datasheet for values available.

2. Auxiliary positive outputs. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. See specific product datasheet for values available.

3. T = Triple.

4. Contact Sales for customer specific additional screening codes.

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Standard VHR Series Accessory Products (EMI Filter and Transient Protection Modules):

VHRF10-	28	-yyy
Product Series	Input Voltage (Nominal)	Additional Package Option (if available)
1		1

Notes:

1. Following the product series, "F" represents "filter". The number following "F" indicates the max current (Amp) 2 = 2 Amp, 10 = 10 Amp, etc. See specific EMI filter datasheets for various available current options.

2. A letter following the input voltage represents the product packaging. For example, "W" indicates the V-SHIELD® epoxy encapsulated package.

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Standard VXR Series DC-DC Converters (Single Outputs):

VXR100(+)	28	12	S	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage(s)	Number of Outputs	Additional Screening Code (if required)
		1	2	3

Notes:

1. Used for single output; i.e., +12V. Outputs with decimal points (3.3V, 5V, 12V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3. Outputs values with single digits use a preceding zero; i.e., 5 = 05. See specific product datasheet for values available.

2. S = Single.

3. Contact Sales for customer specific additional screening codes.

Standard VXR Series Accessory Products (EMI Filter and Transient Protection Modules):

VXRF10-	28	-yyy
Product Series	Input Voltage (Nominal)	Additional Package Option (if available)
1		1

Notes:

1. Following the product series, "F" represents "filter". The number following "F" indicates the max current (Amp) 2 = 2 Amp, 10 = 10 Amp, etc. See specific EMI filter datasheets for various available current options.

2. A letter following the input voltage represents the product packaging. For example, "M" indicates mounting holes.

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Standard Potted Module Series DC-DC Converters (Single and Dual Outputs)

DV200-	28	12	D	/ML	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage(s)	Number of Outputs	Screening Code	Additional Screening Code (if required)
	1	2	3	4	5

Notes:

1. See specific product datasheet for values available.
2. Used for single output; i.e., +12V. Used for ± dual outputs; i.e., ±12V. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. Outputs values with single digits use
3. a preceding zero; i.e., 5 = 05. See specific product datasheet for values available.
4. S = Single, D = Dual.
5. See environmental screening tables herein for options available.
6. Contact Sales for customer specific additional screening codes.

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Standard Potted Module Series DC-DC Converters (Triple Outputs):

DVST	28	5	1212	T	/ML	-yyy
Product Series	Input Voltage (Nominal)	Output Voltage (Main)	Output Voltages (Auxiliary)	Number of Outputs	Screening Code	Additional Screening Code (if required)
		1	2	3	4	5

Notes:

1. Main positive output. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5, etc. See specific product datasheet for values available.
2. Auxiliary positive outputs. Outputs with decimal points (3.3V, 5.2V, 9.5V, etc.) are represented by an "R" in the decimal point location; i.e., 3.3 = 3R3, 5.2 = 5R2, 9.5 = 9R5,
3. etc. See specific product datasheet for values available.
4. T = Triple.
5. See environmental screening tables herein for options available.
6. Contact Sales for customer specific additional screening codes.

Standard Potted Module Series Accessory Products (EMI Filters):

DVMN	28	/ML	-yyy
Product Series	Input Voltage (Nominal)	Screening Code	Additional Screening Code (if required)
		1	2

Notes:

1. See environmental screening tables herein for options available.
2. Contact Sales for customer specific additional screening codes.

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Product Environmental Screening (100% Tested)

Test	Specification, Test Method, Condition	VPT Series	VHR Series	VXR Series	Potted Module Series No Suffix (Standard)	Potted Module Series /ML (Military)
Internal Visual	IPC-A-610, Class 2				•	•
	IPC-A-610, Class 3	•	•	•		
Stabilization Bake	MIL-STD-883, TM1008, Condition B, 125°C, 24 hours	•	•	•		
Temperature Cycling	MIL-STD-883, TM1010, Condition B, -55°C to 125°C, Ambient, 10 Cycles	•	•	•		
	Internal Procedure, -55°C to 100°C, Ambient, 10 Cycles					•
Burn-In	Internal Procedure, 96 hours, 100°C, Case Typ	•	•			•
	Internal Procedure, 96 hours, 105°C, Case Typ			•	•	
	Internal Procedure, 12 hours, 100°C, Case Typ				•	
Final Electrical	Internal Procedure, -55°C, 25°C, 100°C ③					•
	Internal Procedure, 25°C	•	•	•	•	
External Visual	Internal Procedure	•	•	•	•	•

Notes:

1. Contact Sales for more information concerning additional environmental screening and testing options desired.
2. VPT Inc. reserves the right to ship higher screened products to meet lower screened orders at our sole discretion unless specifically forbidden by customer contract.
3. 100% R&R testing with all test data included in product shipment.

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Specialty Metals

VPT hybrid products comply with FARS 252.225-7014, Preference for Domestic Specialty Metals, Alternate I (Deviation) clause which exempts “Commercially Available Electronic Components With De Minimis Specialty Metal Content”.

Counterfeit Electronic Parts Control Program

VPT implements an extensive Counterfeit Electronics Parts Control procedure, QC1-016, which documents and describes the methods used to identify and control counterfeit electronic parts in order prevent them from entering VPT inventory and VPT products. This program is modeled after the requirements of SAE AS5553. Please contact your sales representative or the VPT Inc. Sales Department to request further information about the VPT counterfeit electronics parts control program.

Contamination Control, FOE, and FOC Program

VPT implements, controls, and assures cleanliness and performs contamination and FOC (Foreign Object Control) and FOE (Foreign Object Elimination) in accordance with qualified processes as listed in procedures GNL-003 and QA2-001. Please contact your sales representative or the VPT Inc. Sales Department to request further information about the VPT contamination control, FOE, and FOC program.

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Technology and ITAR Control Program

VPT's technology and ITAR (International Traffic in Arms Regulations) control program, ITR-001, delineates the policies and internal controls of VPT to ensure that no transfer of defense-related technology or assistance subject to control under U.S. export control laws and regulations takes place beyond what is authorized and approved by the U.S. Government. VPT is committed to compliance with all aspects of U.S. laws and regulations governing the export of ITAR-controlled Defense Articles, Defense Services and Technical Data. Please contact your sales representative or the VPT Inc. Sales Department to request further information about the VPT technology and ITAR control program.

Prohibited Materials (Pure Tin, Lead, RoHS, WEEE, REACH, and SVHC)

- Prohibited Material Restrictions: Most readily available and qualified solderable non-pure tin finishes use percentages of lead in the mixture as the alloy material. The majority of space, military, and high-reliability users of VPT products support the position of using lead bearing solderable finishes because of the risk of tin whisker formation caused by pure tin coatings, as outlined in numerous papers published by NASA, The Aerospace Corporation, Boeing, University Researchers, and other experts. This position is, however, in direct conflict with the initiatives set forth by Japan and the European Union directives; Article 95 of the EC Treaty - RoHS (Restriction of Hazardous Substances), and Article 175 of the EC Treaty - WEEE (Waste Electrical and Electronic Equipment). These initiatives restrict the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB's), polybrominated diphenyl ethers (PBDE's), zinc, selenium, beryllium oxide, and alloys of zinc, cadmium and mercury.

- Pure Tin Finishes: VPT uses pure tin finishes internally in COTS products. VPT does not use pure tin finishes externally in COTS products.

- Lead: VPT uses solders and solderable finishes on components internally to COTS products which contain small percentages of lead. VPT does not use lead bearing solders and solderable finishes externally on COTS products unless a customer specifically requests solder dipped leads.

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- RoHs and WEEE: VPT does not use components, materials, or finishes which contain mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB's), polybrominated diphenyl ethers (PBDE's), zinc, selenium, beryllium oxide, or alloys of zinc, cadmium and mercury in or on any COTS products.

- REACH and SVHC: VPT has completed a thorough review of all components and materials used in the construction of hybrid products. VPT has received REACH Certificates of Conformance from all component and material manufacturers willing and able to provide such documentation. Investigation into the components and materials has yielded no traces of Substances of Very High Concern (SVHC's) listed in Article 57 of European Community Regulation 1907/2006, other than lead (Pb) [CAS # 7439-92-1; EC #231-100-4] in concentrations above 0.1%, for reasons stated on page 16 regarding the presence of lead in VPT products. For the most up-to-date REACH compliance statement, please contact VPT. VPT is unaware of any other potential source for the introduction of SVHC's into VPT products from the manufacturing or packaging processes utilized, or from the packaging materials themselves. VPT does not specifically analyze our products for the presence of these substances; therefore cannot guarantee the level of these substances to any specific threshold or value. This information is provided in good faith and believed to be accurate based on the current composition and information provided by our vendors. No warranty is expressed or implied. Liability is expressly disclaimed.

- Conflict Minerals Policy: VPT has either obtained, or is in the process of obtaining, information from our current suppliers concerning the origin of the metals that are used in the manufacture of VPT products. Based upon information provided by our suppliers, VPT does not knowingly use metals derived from the Conflict Region in our products. VPT's suppliers must complete a Conflict Minerals template declaring the usage of gold, tungsten, tantalum, and tin in products provided to VPT and their country of origin. Each supplier must agree to language contained in the source control drawing stating that products supplied to VPT will not knowingly contain metals derived from the Conflict Region without written permission from VPT. To obtain a copy of VPT's latest CMRT, please contact VPT.

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Contact Information

For further information about any of VPT's products, policies, or programs contained herein, or to request a quotation or place orders please contact your sales representative or the VPT Inc. Sales Department at:

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