

SynQor®

VPX-6U
VPX-6U-DC28P-001

MILITARY COTS VITA 62 COMPLIANT POWER SUPPLY

| | | | | |
|--|----------------------------|---------------------|--------------------------------------|----------------------------------|
| 18V - 40V Continuous Input Voltage | Input EMI Filtering | 5 Outputs | 1000W Maximum Output Power | 91% Typical Efficiency |
|--|----------------------------|---------------------|--------------------------------------|----------------------------------|

Operation: -40 °C to 85 °C (at Card Edge)



VPX Features

► Outputs:

| | | |
|--------------------------------|----------------------|--------------|
| VS1: | } +12V | @ 80A = 960W |
| VS2: | | |
| VS3 (standard): | +5.0V | @ 30A = 150W |
| VS3 (I ² C option): | +5.0V | @ 60A = 300W |
| (AUX) | +3.3V _{AUX} | @ 15A = 50W |
| (AUX) | +12V _{AUX} | @ 1A = 12W |
| (AUX) | -12V _{AUX} | @ 1A = 12W |

- Maximum Total Output Power: 1000W
- Input EMI Filtering
- -40 °C to 85 °C Operating Temperature (at Card Edge)
- Over-current, over-voltage and over-temperature protection
- Current Sharing on +12V and +5.0V
- Standard VITA 62 Controls
- Optional I²C Function
 - Supports IPMI/PMBus/VITA 46.11
 - Input Reverse Polarity Protection

► Compliance:

(Full Load Operation Down to 18Vin)

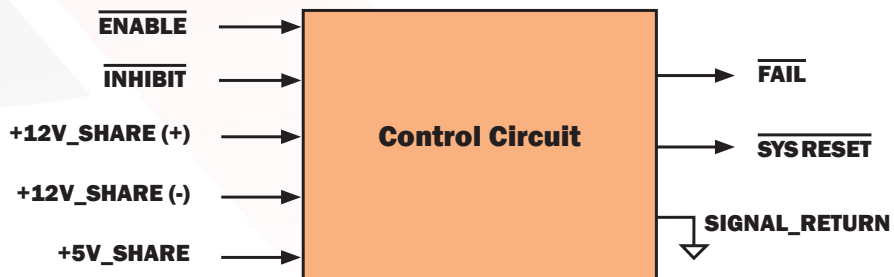
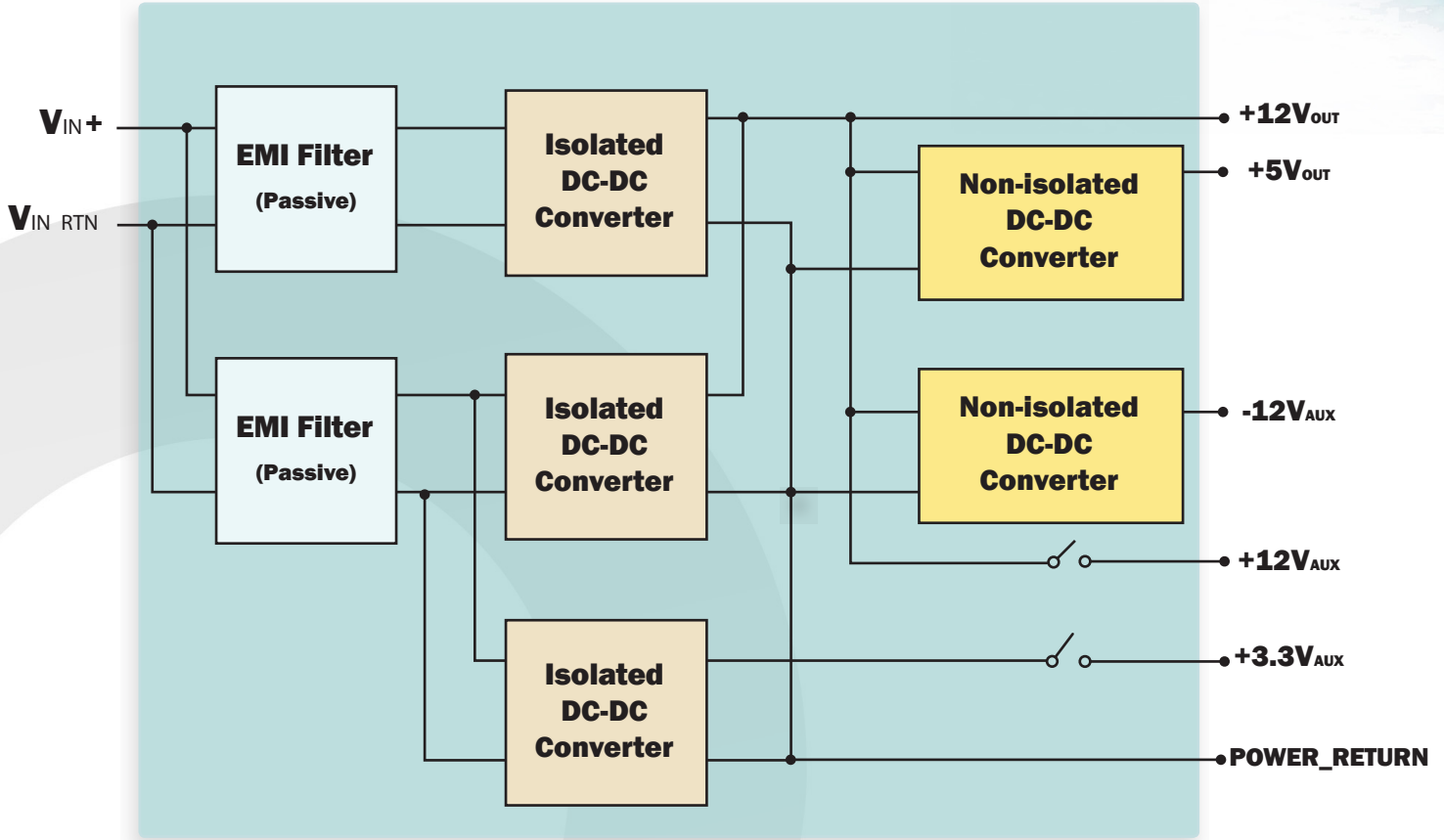
- VITA 62
- MIL-STD-704 (B-F)
- MIL-STD-461
 - CE102 ▪ CS101 ▪ CS114
 - CS115 ▪ CS116
- VITA 47 / MIL-STD-810G
 - ESD Protection
 - Shock
 - Vibration
 - Rapid Decompression
 - Corrosion Resistance
 - Fungus Resistance
 - Altitude
 - Humidity



Made in USA



Block Diagram for VPX-6U-DC28P-001





VPX-6U
VPX-6U-DC28P-001

VPX-6U-DC28P-001 Input Characteristics

| Parameter | Min. | Typ. | Max. | Units | Notes & Conditions |
|---|------|------|------|-------|---|
| ABSOLUTE MAXIMUM RATINGS | | | | | |
| Input Voltage | | | | | |
| Non-Operating | -1 | | 60 | V | Continuous |
| Operating | | | 40 | V | Continuous |
| Operating Transient Protection | | | 50 | V | 1s transient, square wave |
| Isolation Voltage | | | 1500 | V | Input to Output and Input/Output to Case |
| Operating Temperature | -40 | | 85 | °C | Card edge temperature |
| Storage Temperature | -55 | | 105 | °C | |
| ELECTRICAL CHARACTERISTICS | | | | | |
| Input Voltage | | | | | |
| Continuous | 18 | | 40 | V | |
| Transient | 18 | | 50 | V | 50V Transient for 1s |
| Under-Voltage Lockout | | | | | |
| Turn-On Input Voltage Threshold | 15 | 15.5 | 16 | V | |
| FEATURE CHARACTERISTICS | | | | | |
| VITA 62 ON/OFF Control | | | | | |
| ENABLE* high-state Voltage | 2 | | 3.6 | V | Control signals referenced to SIGNAL_RETURN ENABLE* regards a no-connect as a high |
| ENABLE* low-state Voltage | | | 0.8 | V | |
| INHIBIT* high-state Voltage | 2 | | 3.6 | V | INHIBIT* regards a no-connect as a high |
| INHIBIT* low-state Voltage | | | 0.8 | V | |
| RELIABILITY CHARACTERISTICS | | | | | |
| Calculated MTBF (MIL-217) MIL-HDBK-217F | | 2170 | | kHrs | Ground Benign, T _A = 25°C |
| Calculated MTBF (MIL-217) MIL-HDBK-217F | | 230 | | kHrs | Ground Mobile, T _A = 25°C |

Input Voltage Spike

| INPUT VOLTAGE SPIKE SUPPRESSION | |
|---|------------------------------------|
| Module Operates through these Spikes | |
| Input Voltage Spike (Centered on Vin) | |
| ±250V, 100µs, Emax = 15mJ | MIL-STD-1275D |
| ±200V, 10µs, Rs ≤ 0.5Ω | MIL-STD-461C (CS06); DEF-STAN 61-5 |
| ±400V, 5µs, Rs ≤ 0.5Ω | MIL-STD-461C (CS06) |
| ±600V, 10µs, Rs = 50Ω | RTCA/DO-160E |

VPX-6U-DC28P-001 Output Characteristics

| Parameter | +12V | +5V | +3.3VAUX | +12VAUX | -12VAUX |
|--|-------------------------|---|--------------------------|-------------------------|--------------------------|
| OUTPUT CHARACTERISTICS | | | | | |
| Output Voltage Set Point See Note 1 | 12V (+/-1.5%) | 5V (+/-1.5%) | 3.3V (+/-1.5%) | 12V (+/-1.5%) | -12V (+/-1.5%) |
| Total Output Voltage Range See Note 2 | 12V (+/-4%) | 5V (+/-3%) | 3.3V (+/-2%) | 12V (+/-4%) | -12V (+/-3%) |
| Output Voltage Ripple (pk-pk) See Note 3 | 80mV | 50mV | 80mV | 80mV | 50mV |
| Operating Current Range Maximum Total Output Power = 1000W | 0-80A | 30A (std) 60A (I²C) | 0-15A | 0-1A | 0-1A |
| Over-Voltage Protection | 14.8V | 6.0V | 4.0V | 14.8V | NA |
| Current-Limit Inception | 100.8A | 40A | 18A | 2A | 1.8A |
| Maximum Output Capacitance | 10mF | 10mF | 10mF | 1mF | 10mF |
| MAXIMUM TOTAL OUTPUT POWER | | | 1000W | | |

Note 1: 28Vin, 50% load

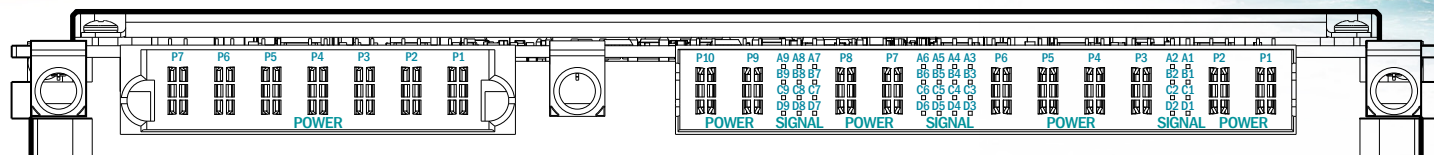
Note 2: Over line, load, temperature

Note 3: Full Load, measured with 1 μ F capacitor and 10uF tantalum capacitor

Maximum Total Output Power
 = **1000W (At 70°C Card Edge Temperature)**
 = **800W (At 85°C Card Edge Temperature)**

Temperature specifications are relative to the temperature at the thermal interface, on the flange opposite the wedge locks.

PIN DESCRIPTIONS



6U P0 Connector

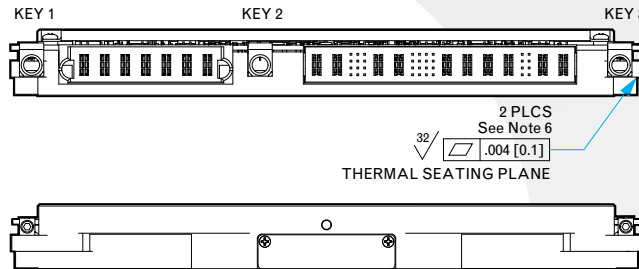
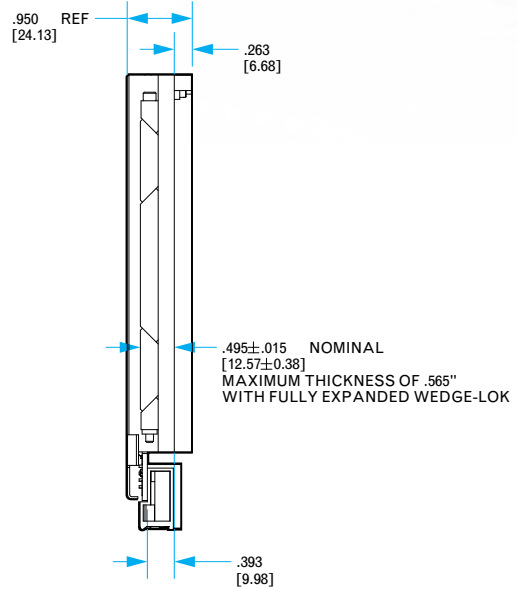
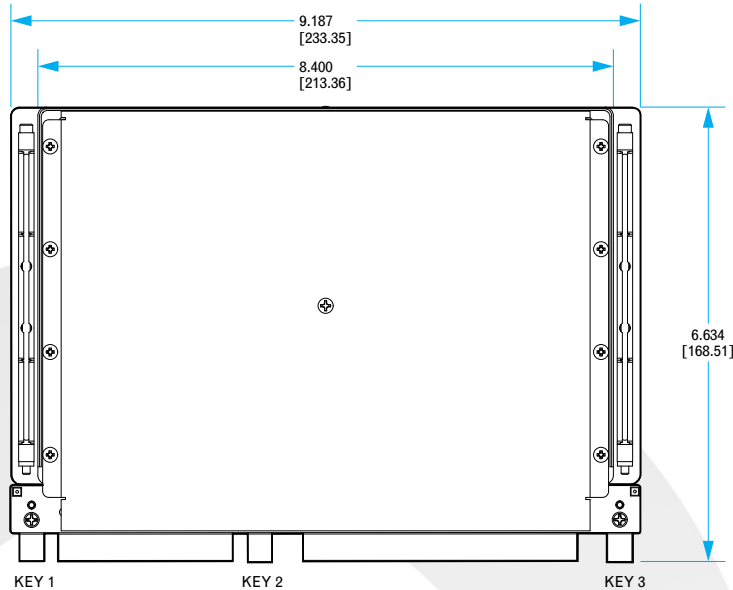
6U P1 Connector

| PIN | Function | DESCRIPTION |
|-----|---------------|-------------|
| P7 | +DC_IN | Vin+ |
| P6 | +DC_IN | Vin+ |
| P5 | -DC_IN | Vin- |
| P4 | -DC_IN | Vin- |
| P3 | No Connection | |
| P2 | No Connection | |
| P1 | CHASSIS | Chassis |

| PIN | Function | DESCRIPTION |
|-----|---------------|--|
| P10 | +12V_MAIN | +12V main output voltage, 80A rated |
| P9 | +12V_MAIN | |
| A9 | +12V_SENSE(+) | Should be connected to +12V_MAIN either remotely or at the connector |
| B9 | +12V_SENSE(+) | |
| C9 | +5V_SENSE(+) | Should be connected to +5V_MAIN either remotely or at the connector |
| D9 | LED_DISABLE | Internally pulled up to 3.3V, connect to SIGNAL_RETURN to disable LED |
| A8 | +12V_SENSE(-) | Should be connected to POWER_RETURN either remotely or at the connector |
| B8 | +12V_SENSE(-) | |
| C8 | +5V_SENSE(-) | Should be connected to POWER_RETURN (available on I ² C option only) |
| D8 | STARTUP_SYNC | Startup synchronization for +5V_MAIN |
| A7 | +12V_SHARE(+) | Active current share differential pair for +12V_MAIN |
| B7 | +12V_SHARE(-) | |
| C7 | +5V_SHARE | Active current share for +5V_MAIN |
| D7 | SIGNAL_RETURN | Ground pin for control signals |
| P8 | POWER_RETURN | Common output voltage return pin, 40A rated per pin |
| P7 | POWER_RETURN | |
| A6 | SM2 | Redundant I ² C Clock Line, See Note 1 |
| B6 | SM3 | Redundant I ² C Data Line, See Note 1 |
| C6 | -12V_AUX | -12V auxiliary output voltage, 1A rated |
| D6 | SYSRESET* | System Reset is actively low. It will float when all outputs are within specification |
| A5 | GAP* | Geographical Address, See Note 1 |
| B5 | GA4* | Geographical Address, See Note 1 |
| C5 | SM0 | Primary I ² C Clock Line, See Note 1 |
| D5 | SM1 | Primary I ² C Data Line, See Note 1 |
| A4 | GA3* | Geographical Address, See Note 1 |
| B4 | GA2* | Geographical Address, See Note 1 |
| C4 | GA1* | Geographical Address, See Note 1 |
| D4 | GA0* | Geographical Address, See Note 1 |
| A3 | No Connection | |
| B3 | +12V_AUX | +12V auxiliary output voltage, 1A rated |
| C3 | No Connection | |
| D3 | No Connection | |
| P6 | +5V_MAIN | +5V main output voltage, 30A rated for standard option and 60A for I ² C option |
| P5 | +5V_MAIN | |
| P4 | POWER_RETURN | Common output voltage return pin, 40A rated per pin |
| P3 | POWER_RETURN | |
| A2 | No Connection | |
| B2 | FAIL* | When any of the output is not within specification, FAIL* signal will be driven low |
| C2 | INHIBIT* | Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN |
| D2 | ENABLE* | Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN |
| A1 | No Connection | |
| B1 | No Connection | |
| C1 | No Connection | |
| D1 | No Connection | |
| P2 | +3.3V_AUX | +3.3V auxiliary output voltage, 15A rated |
| P1 | POWER_RETURN | Common output voltage return pin, 40A rated per pin |

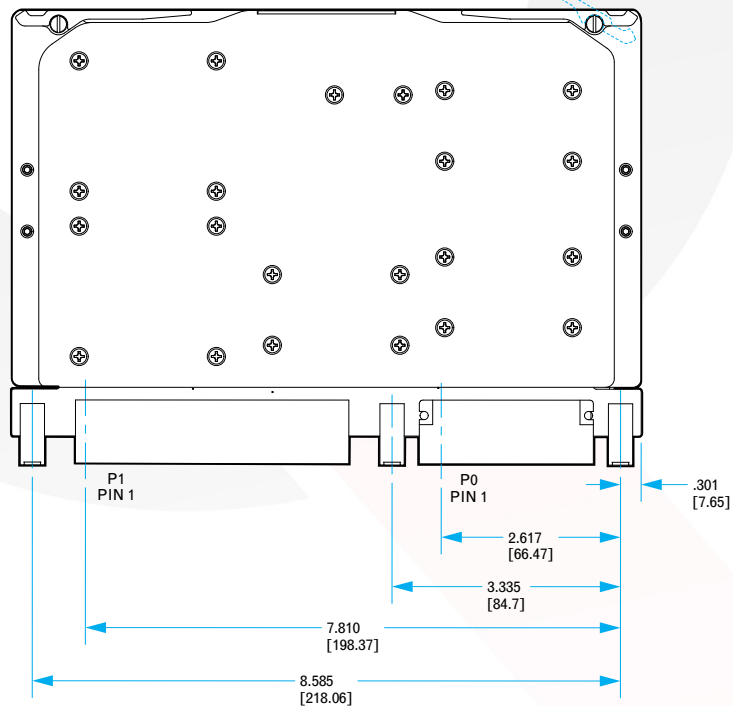
Note 1: Refer to SynQor "VPX 6U I²C Operator's Guide" for details regarding the I²C interface. No connection on standard option.

Mechanical Diagram



NOTES:

1. ALL DIMENSIONS IN INCHES
2. TOLERANCES: X.XX ±0.02in [0,5mm]
X.XXX ±.010in [0,25mm]
3. CONNECTOR PART NUMBERS:
P0 - TE CONNECTIVITY 6450843-6
P0 - FOXCONN HM811J3-B84F
P1 - TE CONNECTIVITY 6450849-6
P1 - FOXCONN HM811L3-B84F
4. WEIGHT: SEE TABLE
5. SEE TABLE FOR KEYWAY POSITION AND ANGLE.
6. FLATNESS AND SURFACE FINISH REQUIREMENT APPLIES TO BOTH RAILS



| VPX-6U-DC28P-001 | | |
|------------------|-----------------|-----------------------------|
| Weight | | 3.6lbs (1.6kg) |
| Key Position | Alignment Angle | TE Connectivity Part Number |
| 1 | 0° | 1-1469492-1 |
| 2 | 0° | 1-1469492-1 |
| 3 | 0° | 1-1469492-1 |



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Application Notes

Control Features

| | |
|------------------|---|
| ENABLE* | Standard VITA 62 control signal. It is used to turn off all of the output voltages when it is high, including +3.3V_AUX. When it is pulled low to SIGNAL_RETURN, +3.3V_AUX will be turned on and the status of the other outputs will be dependent on the state of INHIBIT*. ENABLE* signal regards a no-connect as a high. |
| INHIBIT* | Standard VITA 62 control signal. It is used to turn off all the output voltages except +3.3V_AUX. When it is pulled low to SIGNAL_RETURN, VS1, VS2, VS3, +12V_AUX and -12V_AUX will be turned off. INHIBIT* signal regards a no-connect as a high. At power-on, if ENABLE* and INHIBIT* are configured to turn all outputs on, +3.3V_AUX will be powered up 100ms prior to when the other outputs are powered up. |
| FAIL* | FAIL* signal is used to indicate a failure has occurred. It will be pulled low when any of the outputs are outside the voltage specification. FAIL* is an active low open-drain signal. It is expected there will be a pull-up resistor on the backplane to 3.3V. A typical resistor value is 4.7kΩ. |
| SYSRESET* | SYSRESET* signal is an output generated from the module. It is used to indicate that startup has completed. At power-on, SYSRESET* is pulled low. It will be high impedance when all outputs are within voltage specification. It will be pulled low if any failure has occurred or if the outputs are disabled by the user during operation. SYSRESET* signal is an active low open-drain signal. It is expected there will be a pull-up resistor on the backplane to 3.3V. A typical resistor value is 4.7kΩ. |

VITA 62 Control States

| ENABLE* | INHIBIT* | +3.3V_AUX | VS1, VS2, VS3, +12V_AUX, -12V_AUX |
|---------|----------|-----------|-----------------------------------|
| HIGH | HIGH | OFF | OFF |
| LOW | HIGH | ON | ON |
| HIGH | LOW | OFF | OFF |
| LOW | LOW | ON | OFF |

Parallel Operation

| | |
|---|--|
| +12V_MAIN | Active current sharing on +12V_MAIN is supported. To implement the current sharing function, +12V_SHARE(+) and +12V_SHARE(-) pins should be routed between all paralleled modules as a differential pair. ENABLE* and INHIBIT* should be connected together. High speed data communication is transmitted on these two lines. Control state is transmitted between the master unit and slave units on a cycle-by-cycle basis. Adding capacitance to these share lines must be avoided. |
| +5V_MAIN | Active current sharing on +5V_MAIN is also supported, but with an analog sharing scheme that is different than the digital sharing scheme for the +12V_MAIN. To implement the current sharing function, +5V_SHARE, ENABLE*, INHIBIT* and STARTUP_SYNC should be connected together between all paralleled modules. These SHARE pins are referenced to POWER_RETURN. A clean ground plane is important, and ground drop between each module should be minimized. |
| +3.3V_AUX, +12V_AUX & -12V_AUX | Active current sharing is not supported on auxiliary outputs. However, all these auxiliary rails have OR'ing MOSFETs or OR'ing diodes implemented, so that they can still be operated in parallel. Total output current on these rails should not exceed the current rating of a single module. |



VPX Module Qualification (VITA 47 Compliant)

| Test Name | Method |
|----------------------|---|
| Random Vibration | MIL-STD-810, 514.6 - Procedure I, Class V3 |
| Shock | MIL-STD-810, 516.6 - Procedure I, VI, Class OS2 |
| Altitude | MIL-STD-810, 500.5 - Procedure I, II, III |
| Fungus Resistance | MIL-STD-810, 508.6 |
| Corrosion Resistance | ASTM G85, Annex A4 |
| Humidity | MIL-STD-810, 507.5 - Procedure II |
| High Temperature | MIL-STD-810, 501.5 - Procedure I, II |
| Low Temperature | MIL-STD-810, 502.5 - Procedure I, II |
| Temperature Cycling | MIL-STD-202, 107 - Class C4 |
| ESD | EN61000-4-2, Level 4; 15kV Air Discharge |

Internal Mil-COTS Converter and Filter Module Screening

| Screening | Process Description | S-Grade | M-Grade |
|---------------------------------|---|-------------------|-------------------------|
| Baseplate Operating Temperature | | -55 °C to +100 °C | -55 °C to +100 °C |
| Storage Temperature | | -65 °C to +135 °C | -65 °C to +135 °C |
| Pre-Cap Inspection | IPC-A-610, Class III | • | • |
| Temperature Cycling | MIL-STD-883F, Method 1010, Condition B, 10 Cycles | | • |
| Burn-In | 100 °C Baseplate | 12 Hours | 96 Hours |
| Final Electrical Test | 100% | 25 °C | -55 °C, +25 °C, +100 °C |
| Final Visual Inspection | MIL-STD-883F, Method 2009 | • | • |



VPX-6U
VPX-6U-DC28P-001

Ordering Information / Part Numbering

| Series | Package Size (U) | Input Range | Mil Std Filtering | Output Voltage Combination Code | Packaging Options |
|------------|------------------|-------------|-------------------|---------------------------------|--|
| VPX | 6U | DC28 | P | 001 | Y1Y2Y3 |
| VPX | 6U | DC28: 28V | P: Passive Filter | 001: 001 | Y1: Internal Module Screening S - Standard (MCOTS) M - Military (MCOTS) Y2: Conformal Coating N - No Conformal Coating C - Conformal Coating Y3: I ² C Function [] - No I ² C 2 - I ² C |

Examples:

VPX-6U-DC28P-001-SN
 VPX-6U-DC28P-001-MC2

Not all combinations make valid part numbers, please contact SynQor for availability.

Contact SynQor for further information and to order:

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PATENTS

SynQor holds numerous U.S. patents, one or more of which apply to most of its power conversion products. Any that apply to the product(s) listed in this document are identified by markings on the product(s) or on internal components of the product(s) in accordance with U.S. patent laws. SynQor's patents include the following:

7,050,309 7,765,687 7,787,261
 8,149,597 8,644,027

WARRANTY

SynQor offers a one (1) year limited warranty. Complete warranty information is listed on our website or is available upon request from SynQor.