

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
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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)

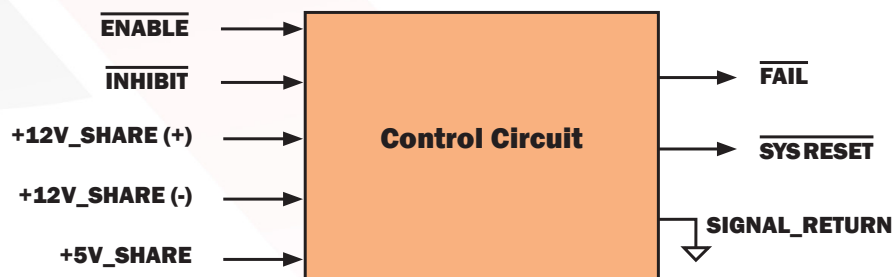
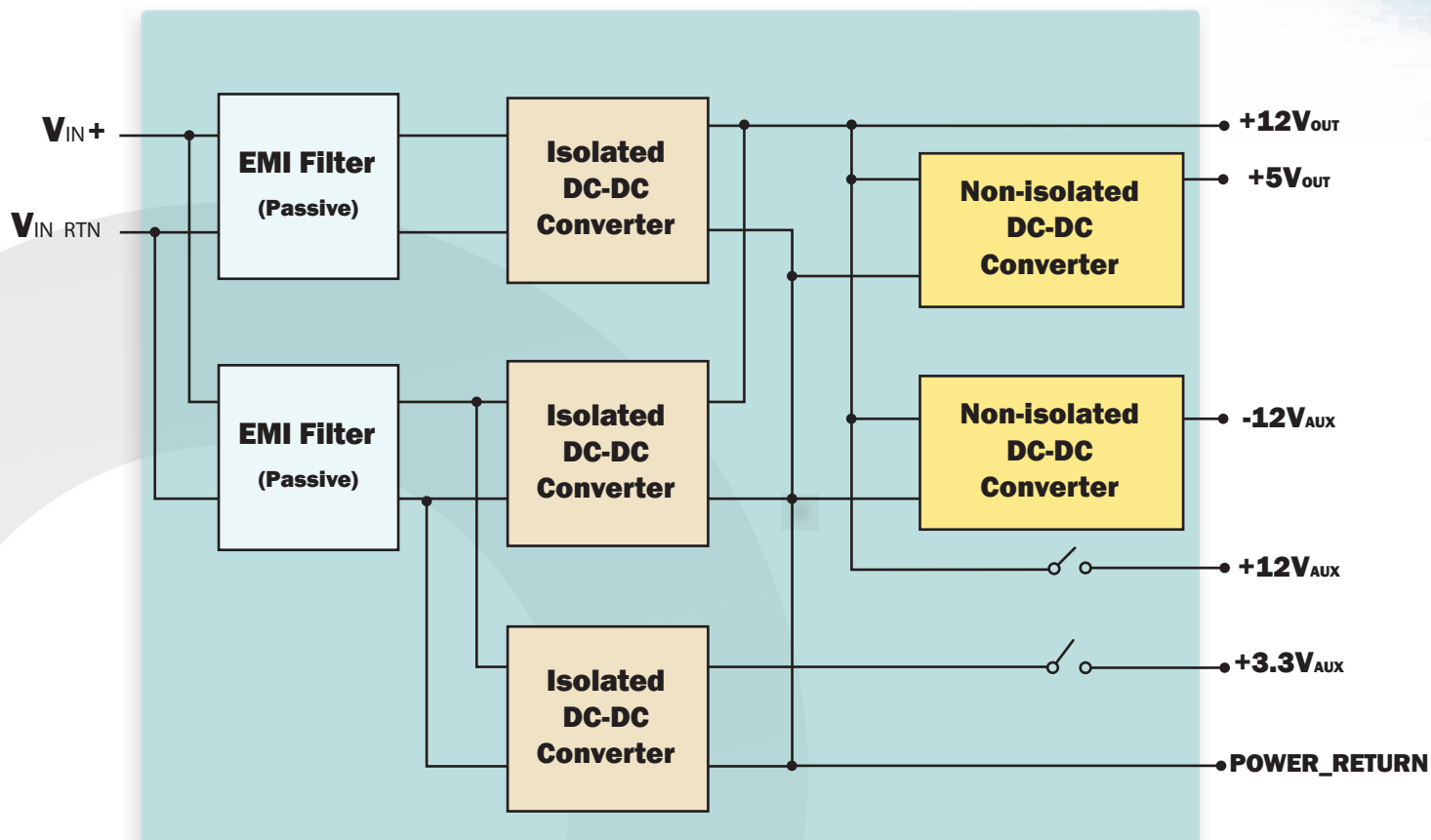
- VITA 62
- MIL-STD-704 (B-F)
- MIL-STD-461
 - CE102 ▪ CS101 ▪ CS114
 - CS115 ▪ CS116
- VITA 47 / MIL-STD-810G
 - ESD Protection
 - Shock
 - Vibration
 - Rapid Decompression
 - Corrosion Resistance
 - Fungus Resistance
 - Altitude
 - Humidity



Made in USA



Block Diagram for VPX-6U-DC28P-001





VPX-6U-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					Control signals referenced to SIGNAL_RETURN
ENABLE* high-state Voltage	2		3.6	V	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 (T_C)	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

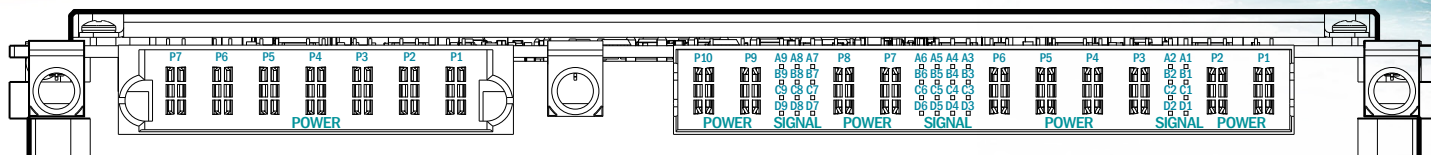
Note 3: Full Load, measured with 1μF capacitor and 10uF tantalum capacitor

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

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

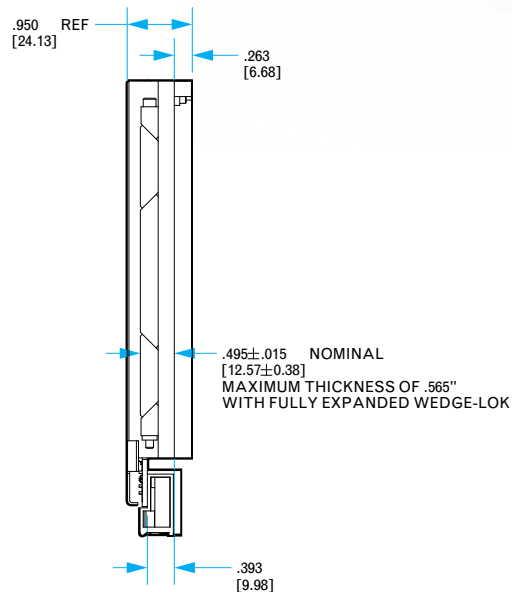
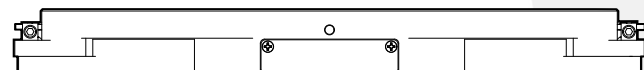
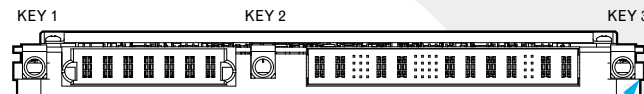
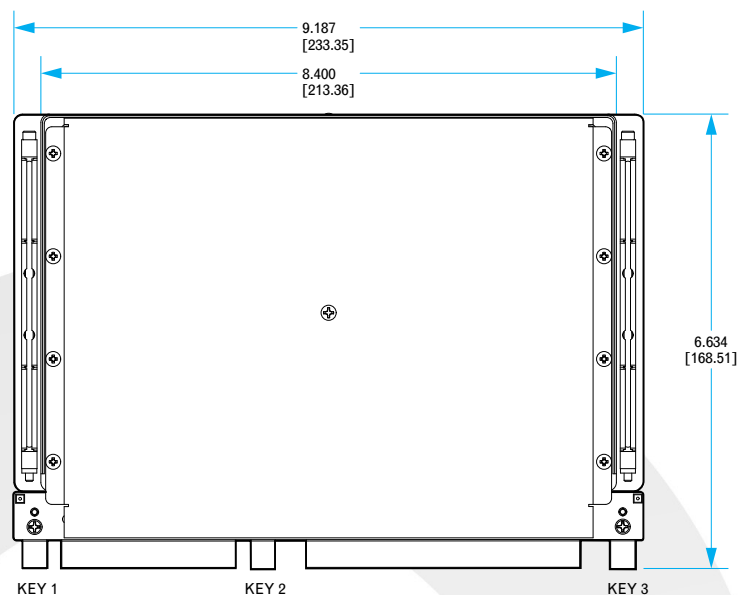
6U P1 Connector

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:

- ALL DIMENSIONS IN INCHES
- TOLERANCES: X.XX $\pm$ 0.02in [0.5mm]
X.XXX $\pm$ 0.010in [0.25mm]
- CONNECTOR PART NUMBERS:
P0 - TE CONNECTIVITY 6450843-6
P0 - FOXCONN HM811J3-B84F
P1 - TE CONNECTIVITY 6450849-6
P1 - FOXCONN HM811L3-B84F
- WEIGHT: SEE TABLE
- SEE TABLE FOR KEYWAY POSITION AND ANGLE.
- 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



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	•	•



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:

Phone: 978-849-0600
Toll Free: 888-567-9596
Fax: 978-849-0602
E-mail: power@synqor.com
Web: www.synqor.com
Address: 155 Swanson Road
 Boxborough, MA 01719
 USA

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:

6,896,526	6,927,987	7,050,309	7,085,146
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.