

SynQor®

VPX-3U-AC
3-Phase Input
VPX-3U-AC115-3-C-001

MILITARY COTS

VITA 62.1 3-PHASE INPUT POWER SUPPLY

100 - 140 Vrms L-N Continuous Input Voltage	EMI Filter Built-In	1.5% I _{in} THD	28 Vdc @ 27 A Isolated Output	91.5% Full-Load Efficiency
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Operation: -40 °C to 85 °C (at Card Edge)



No Leading Power Factor above 200 W
Buck PFC Controls Inrush Current
Built-in EMI Filter Passes MIL-STD-461
Input Spike/Surge Protection

VPX Features

▶ Outputs:

V Out: +28 V @ 27 A
(AUX) +3.3V_{AUX} @ 150 mA

- ▶ Built-In EMI Filtering and Transient Suppression
- ▶ -40 °C to 85 °C Operating Temperature
- ▶ Current Sharing on Main Output
- ▶ Over-current, Over-voltage and Over-temperature Protection
- ▶ Unity Input Power Factor above 200 W Load
- ▶ Input Voltage Range: 100 - 140 Vrms L-N
- ▶ Input Frequency Range: 47 - 800 Hz
- ▶ Internal Components Conformally Coated
- ▶ Standard VITA 62.1 Controls
- ▶ Standard I²C Function
 - Supports IPMI/PMBus/VITA 46.11

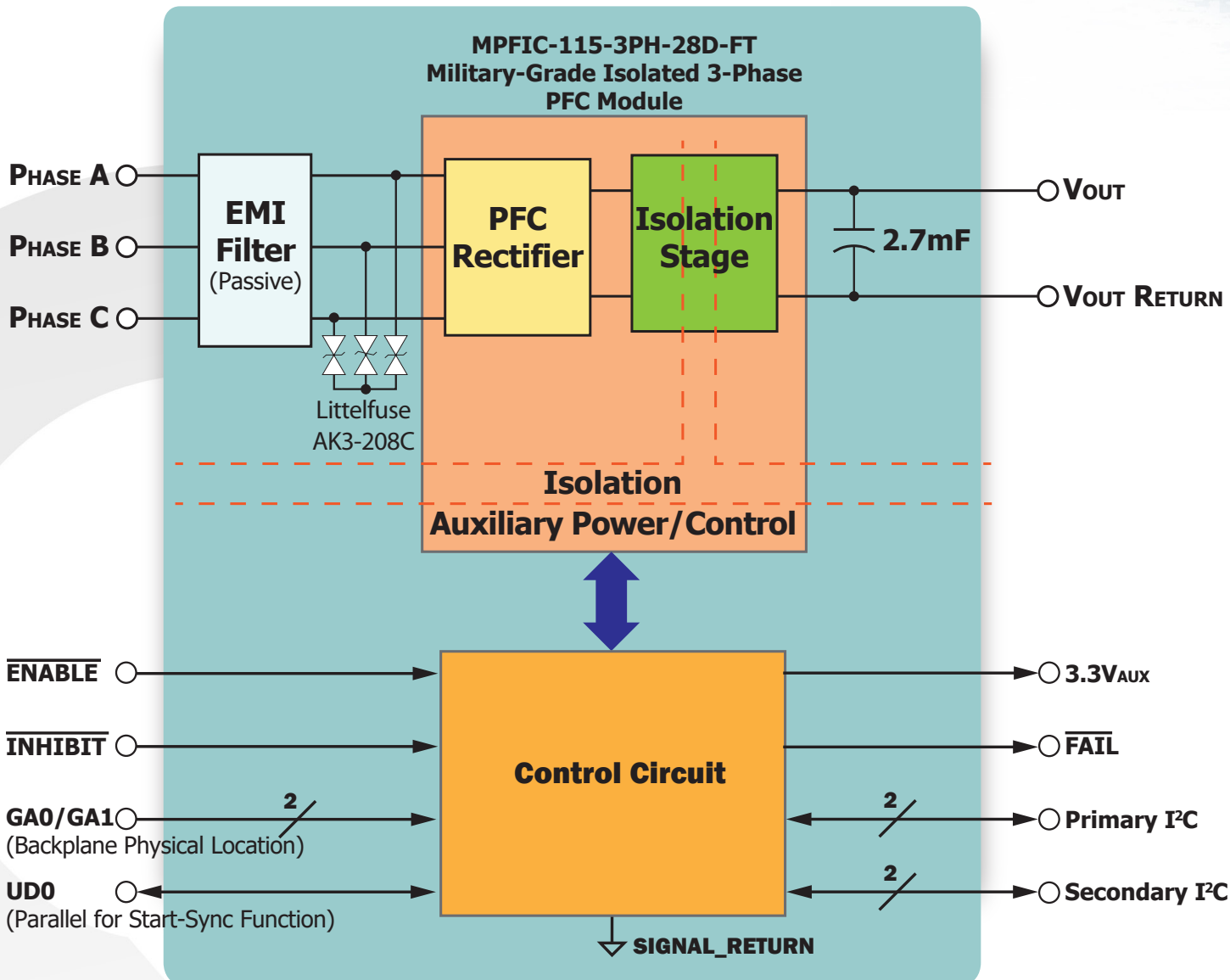
▶ Compliance:

- VITA 62.1
- MIL-STD-461F
 - CE101 ▪ CE102 ▪ CS101 ▪ CS106
 - CS114 ▪ CS115 ▪ CS116
- VITA 47 / MIL-STD-810G
 - ESD Protection
 - Shock
 - Vibration
 - Rapid Decompression
 - Corrosion Resistance
 - Fungus Resistance
 - Altitude
 - Humidity
- ▶ Designed to be compliant with:
 - MIL-STD-704 (B-F)



Made in USA

BLOCK DIAGRAM FOR VPX-3U-AC115-3-C-001





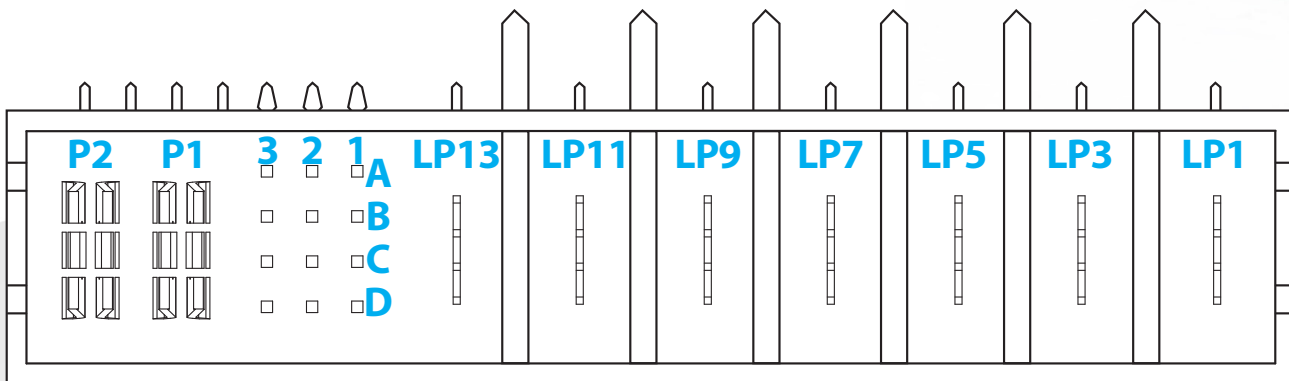
VPX-3U-AC 3-Phase Input VPX-3U-AC115-3-C-001

VPX-3U-AC115-3-C-001 Input Characteristics

Parameter	Min.	Typ.	Max.	Units	Notes & Conditions
ABSOLUTE MAXIMUM RATINGS					
Input Voltage					
Repetitive / Continuous			442	Vpk L-L	To prevent internal TVS devices from clamping
Transient (< 25 J & < 3 kA)			575	Vpk L-L	At internal TVS devices while clamping
Isolation Voltage					
			2250	Vdc	Input to Output/Ctrl and Input/Output/Ctrl to Case
			500	Vdc	Output to Ctrl
Operating Temperature	-40		85	°C	Card edge temperature (no derating)
Storage Temperature	-40		105	°C	
INPUT ELECTRICAL CHARACTERISTICS (For further information see MPFIC-115-3PH-28D-FT PFC module datasheet)					
Operating Input Voltage Range					
3-Phase AC Input Continuous	100		140	Vrms L-N	
3-Phase AC Input ≤ 1 s Transient	60		180	Vrms L-N	Available output power reduced when < 100 Vrms L-N
Operating Input Frequency	47		800	Hz	Very fast frequency transients are supported
THD of AC Input Current		1.5	2.5	%	Full load
Enabled AC Input Power (no-load)		15		W	Nominal 115 Vrms L-N 400 Hz input, sum of all phases
Disabled AC Input Power		6		W	Nominal 115 Vrms L-N 400 Hz input, sum of all phases
Reactive Power (per phase)					
400 Hz, Zero load or Disabled		35		VAR	Leading (due to input EMI filter capacitance)
400 Hz, Pout > 200 W		0		VAR	Complete active cancellation above 200 W
Source Inductance (per phase)			2	mH	
Inrush of AC Input Current			1	Apk	Buck PFC blocks inrush into large output capacitance
ISOLATED OUTPUT CHARACTERISTICS (For further information see MPFIC-115-3PH-28D-FT PFC module datasheet)					
Output Steady-State Voltage	27.5	28	28.5	V	Zero Load
Output Voltage Droop		-2		V	Full Load (allows units to share when in parallel)
Output Current Range	0		27	A	No minimum load
Output Current Limit		35		A	
Output Steady-State Voltage Ripple			70	mVrms	With balanced line
Recommended Output Capacitance	0		47	mF	External, in addition to internal 2.7 mF output cap
Startup Time (to 24 V)					
From initial application of input voltage		730		ms	With INHIBIT* not pulled low
From deassertion of INHIBIT* high		430		ms	With steady-state input voltage
FEATURE CHARACTERISTICS					
FAIL*/SYSRESET* Signal					
Pull-up resistance	100			Ω	Pull-up to 3.3V on backplane, compliant to VITA 46.0
Sinking current			40	mA	Pull-up to 3.3V on backplane, compliant to VITA 46.0
VITA 62 ON/OFF Control					
ENABLE* high-state Voltage	2		3.6	V	Control signals referenced to SIGNAL_RETURN
ENABLE* low-state Voltage			0.8	V	ENABLE* regards a no-connect as a high
INHIBIT* high-state Voltage	2		3.6	V	INHIBIT* regards a no-connect as a high
INHIBIT* low-state Voltage			0.8	V	
AUXILIARY BIAS SUPPLY CHARACTERISTICS (Separate circuit from 3.3V AUX pin on PFC Module)					
Output Steady-State Voltage	3.20	3.30	3.40	V	Over line, load, temp, and life
Source Current	0		150	mA	
Startup Time					
From initial application of input voltage		200		ms	With ENABLE* pulled low
From assertion of ENABLE* low		2		ms	With steady-state input voltage
RELIABILITY CHARACTERISTICS					
Calculated MTBF (MIL-217) MIL-HDBK-217F		1900		kHrs	Ground Benign, T _A = 25°C
Calculated MTBF (MIL-217) MIL-HDBK-217F		230		kHrs	Ground Mobile, T _A = 25°C



PIN DESCRIPTIONS



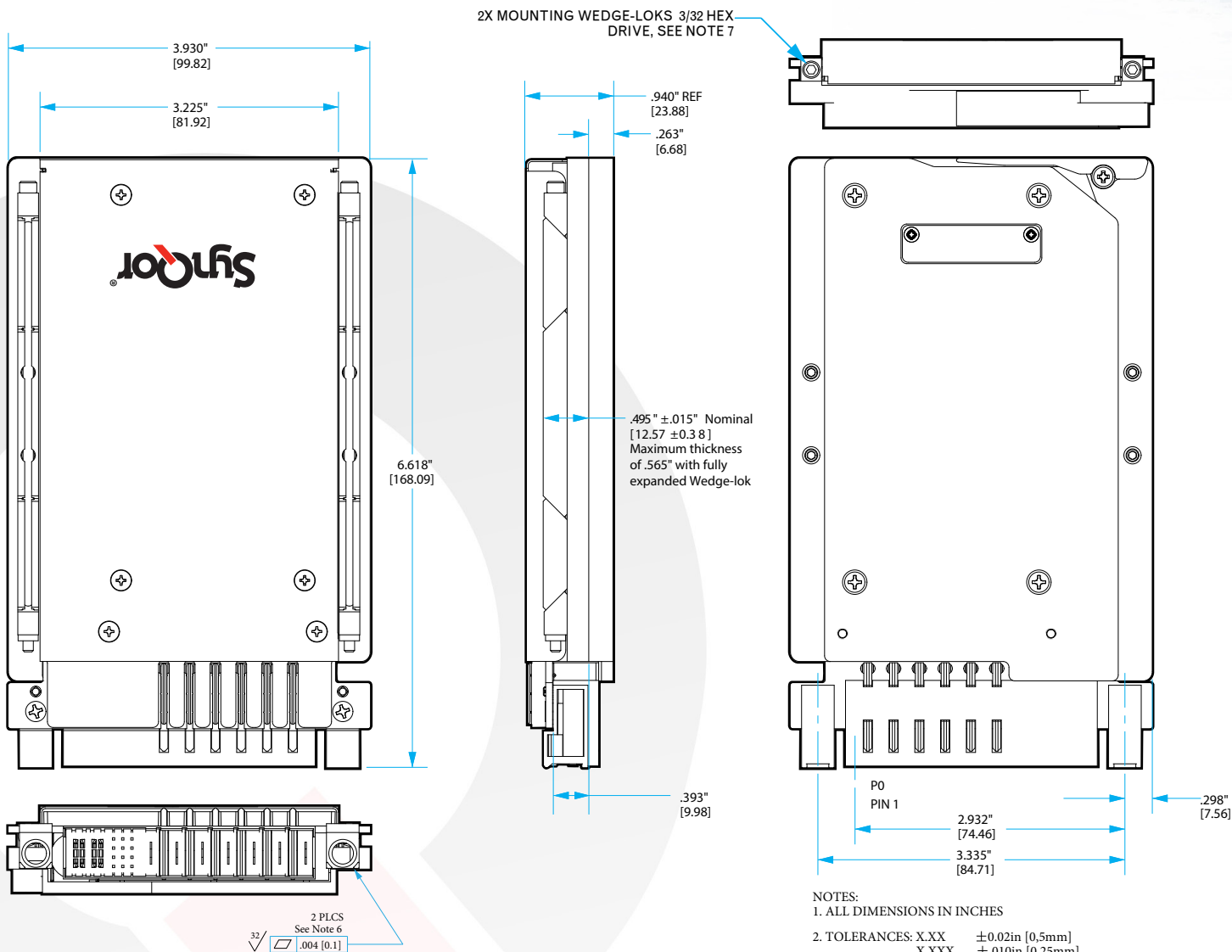
3U 62.1 P0 Connector

PIN	Function	DESCRIPTION
LP1	Phase A	Input voltage Phase A
LP3	Phase B	Input voltage Phase B
LP5	Phase C	Input voltage Phase C
LP7	No Connection	Power input is in a delta configuration, so the neutral line is not used.
LP9	No Connection	Holdup is provided on a separate 28 V plug-in card.
LP11	No Connection	Holdup is provided on a separate 28 V plug-in card.
LP13	Chassis	Protective earth ground, connected to the plug-in module chassis.
A1	GA0*	Geographical Address (See Note 1).
A2	GA1*	Geographical Address (See Note 1).
A3	UD0	Connect this signal line to additional modules with outputs connected in parallel to enable startup-synchronization.
B1	SM0	Primary I2C Clock Line (See Note 1).
B2	SM1	Primary I2C Data Line (See Note 1).
B3	SM2	Redundant I2C Clock Line (See Note 1).
C1	SM3	Redundant I2C Data Line (See Note 1).
C2	Inhibit*	When this input signal is pulled low, the main output is turned off. This signal does not control the 3.3V_Aux output.
C3	Fail*	This output signal is driven low when either the main or auxiliary output is out of specification.
D1	Signal_Return	Ground return for all control signals and for 3.3V_Aux output. Isolated from main output.
D2	Enable*	When this input signal is pulled low, the 3.3V_Aux output is enabled.
D3	3.3V_Aux	3.3 V auxiliary output voltage, rated for up to 150 mA. Referenced to Signal_Return; Isolated from main output.
P1	V Out	Isolated 28 V semi-regulated main output.
P2	V Out Return	Isolated main output return.

Note 1: Refer to SynQor "VPX 3U I²C Operator's Guide" for details regarding the I²C interface.



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 2332793-1
P0 - TE CONNECTIVITY 2313445-1
 4. WEIGHT: SEE TABLE
 5. SEE TABLE FOR KEYWAY POSITION AND ANGLE.
 6. FLATNESS AND SURFACE FINISH REQUIREMENT APPLIES TO BOTH RAILS
 7. RECOMMENDED TORQUE PER EACH MOUNTING WEDGE-LOK: 7 IN-LBS [80 N-CM].

VPX-3U-AC115-3-C-001		
Weight		1.70 lbs (770 g)
Key Position	Alignment Angle	TE Connectivity Part Number
1	0°	1-1469492-1
2	90°	1-1469492-3



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Application Notes

Control Features

ENABLE*	Standard VITA 62.1 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 62.1 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 100 ms prior to when the other outputs are powered up.
FAIL*	Standard VITA 62.1 control signal. 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 3.3 V. A typical resistor value is 4.7 kΩ.
UD0 (Start-Sync)	Custom control signal used for paralleling multiple modules. The UD (User Defined) pin is reserved for the START SYNC feature described in the MPFIC-115-3PH-28D-FT datasheet. This signal synchronizes startup after a fault condition between multiple modules, allowing them to support a heavy startup load together that would otherwise cause an individual module to enter current limit. Connect this pin on the backplane between all units with outputs connected in parallel. For a single module without paralleling, this pin should be left open.

VITA 62.1 Control States

ENABLE*	INHIBIT*	+3.3V_AUX	V Out
HIGH	HIGH	OFF	OFF
LOW	HIGH	ON	ON
HIGH	LOW	OFF	OFF
LOW	LOW	ON	OFF

Parallel Operation

Main Output (V Out)	Passive current sharing is supported on the main output utilizing approximately 2 V of droop between zero and full load. To implement a startup synchronization function, where multiple paralleled modules will start up simultaneously, the UD0* pin should be connected together between all paralleled modules.
Aux Output (3.3V_Aux)	Current sharing is not supported on the auxiliary output. The 3.3V_Aux line may be connected in parallel, but the total rated load remains 150 mA.



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 3; 8kV Air Discharge

Mil-COTS Converter and Filter 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-3U-AC
3-Phase Input
VPX-3U-AC115-3-C-001

Ordering Information / Part Numbering

Series	Package Size (U)	Input Voltage	Number of Phases	Mil Std Filtering	Output Voltage Combination Code	Packaging Options
VPX	3U	AC115	3	C	001	Y1Y2Y3
VPX	3U	AC115: 200 Vrms L-L Δ (115 Vrms L-N)	3: 3-Phase	C: Clamped Passive Filter	001: 001	Y1: Internal Module Screening S - S-Grade M - M-Grade Y2: Conformal Coating (Standard) C - Conformal Coating Y3: I ² C Function (Standard) 2 - I ² C Management Interface

Examples: VPX-3U-AC115-3-C-001-SC2

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

Contact SynQor for further information and to order:
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WARRANTY
 SynQor offers a one (1) year limited warranty. Complete warranty information is listed on our website or is available upon request from SynQor.

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