SynQor®

MultiQor™ Plate
MTQ-Px-AC115-1

Military COTS
Configurable Multi-Output Single Phase AC-DC Power Supply

1 to 2 Outputs	85 - 180 Vrms	47 - 63 Hz / 360 - 800 Hz	Up to 650 W
Standard Configurations	Input Voltage	Input Frequency	Total Output Power

The MultiQor Plate format of input-filtered single phase AC-DC power supplies provides up to two customer defined output voltages that are isolated from the input, each other and the cold plate. Using SynQor's Mil-COTS line of high efficiency, high reliability, fixed switching frequency DC-DC converters, PFC and EMI filters, this supply is designed to comply with MIL-STD-704, and MIL-STD-1399. The complete assembly is designed to withstand the harsh environments of the Military and Aerospace industries and is compliant with MIL-STD-810G requirements.

MultiQor™ Plate
Single Phase AC-DC Power Supply

Operational Features
- Input voltage range: 85 - 180 Vrms
- Universal input frequency range: 47 - 63 Hz / 360 - 800 Hz
- Up to 650 W output power
- ≥ 0.99 Power Factor (50/60 Hz)
- Internal inrush current limit
- Hold-Up Capacitors (with available external connection)

Protection Features
- Input current limit and auto-recovery short circuit protection
- Auto-recovery input under/over-voltage protection
- Auto-recovery output over-voltage protection
- Auto-recovery thermal shutdown

Mechanical Features
- Size: 6.70" x 9.12" x 1.23" (170.2 x 231.6 x 31.3 mm)
- Refer to mechanical diagrams for weight
- Cold plate with mounting holes for connection to heat removal system

Control Features
- PFC Enable (isolated)
- Individual output voltage Enable control (isolated)
- AC Power Good Signal (isolated)

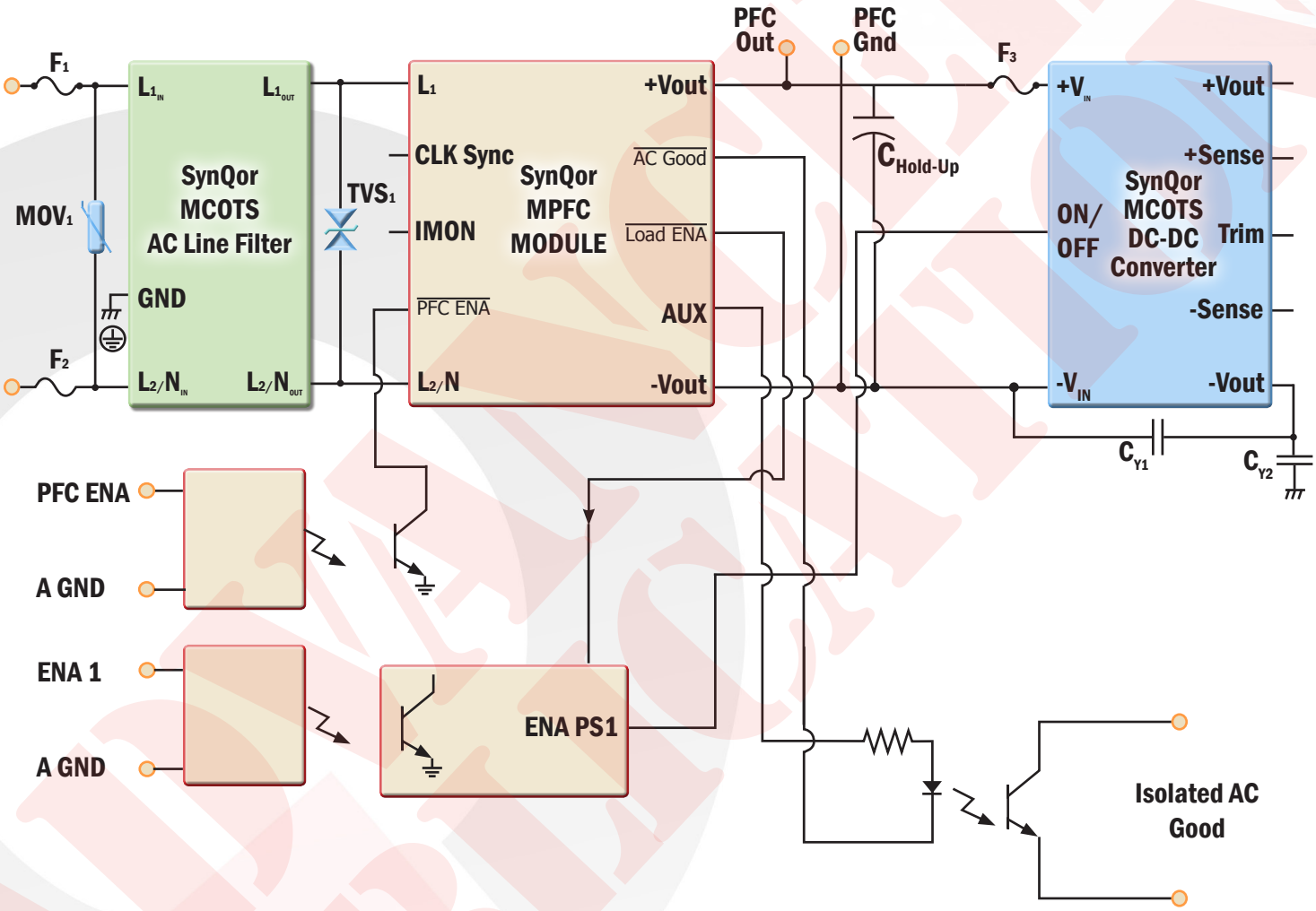
Safety Features
- Input/Output to baseplate isolation 2150 Vdc
- Internal input fuses

Compliance Features
Designed to meet these standards:

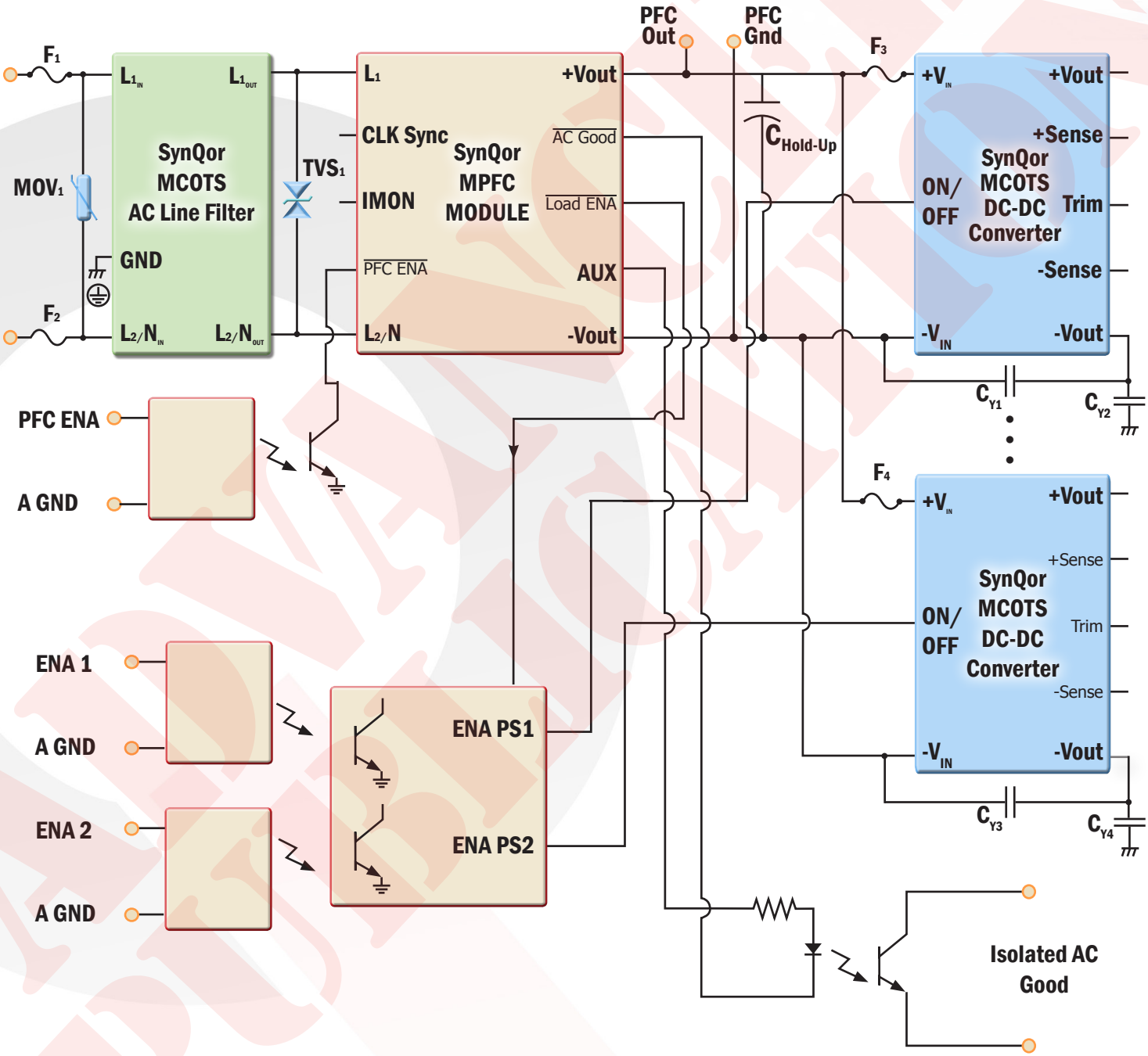
PENDING
- MIL-STD-1399
- MIL-STD-704-2, -704-4, & -704-6* (see 704 app section)

Contents

Typical Connection of the MTQ-P1-AC115-1



Typical Connection of the MTQ-P2-AC115-1



Technical Specification

MTQ-Px-AC115-1 Family Input Characteristics

Parameter	Min.	Typ.	Max.	Units	Notes & Conditions
ABSOLUTE MAXIMUM RATINGS					
Input Voltage					
Continuous			450	Vpk	
Non-operating 100ms Transient			575	Vpk	
Isolation Voltage			2150	V	Input/Output to Plate
Operating Temperature	-55		100	°C	Plate Temperature
Storage Temperature	-65		125	°C	
ELECTRICAL CHARACTERISTICS					
Operating Input Voltage Range					
AC Input Continuous	85		180	Vrms	
AC Input 100ms Transient	40		180	Vrms	See Note 1
Operating Input Frequency	47		63	Hz	50/60 Hz range
	360		800	Hz	400 Hz range
Power Factor of AC Input Current		0.99			50/60 Hz range
		0.97			400 Hz range, min 400 W output
Total Harmonic Distortion of AC Input Current		3		%	At full output power
Inrush of AC Input Current			10	Apk	50/60 Hz range
			10	Apk	400 Hz range
Maximum Input Power			775	W	
Maximum Input Current			9.5	Arms	85 VAC in
Turn-On Input Voltage Threshold		30		Vrms	>1s Duration, See Note 1
FEATURE CHARACTERISTICS					
PFC Enable Control					Pin 2 of J1, referenced to AGND
PFC Off-State Voltage	-5		0.7	V	Pin can also be left open
PFC On-State Voltage	2.5		40	V	
Enable Control					Pins 6-7 of J1, referenced to AGND
Converter Off-State Voltage	-5		0.7	V	Pin can also be left open
Converter On-State Voltage	2.5		40	V	

Note 1: Available output power reduced when <85 Vrms, see Figure 1

See individual DC-DC Converter and Filter Datasheets for more information regarding performance specifications, (MACF-xxx-230-HT, MPFC-115-270-HP, MCOTS-C-270-xx-FT, MCOTS-C-270-xx-HT).

Technical Specification

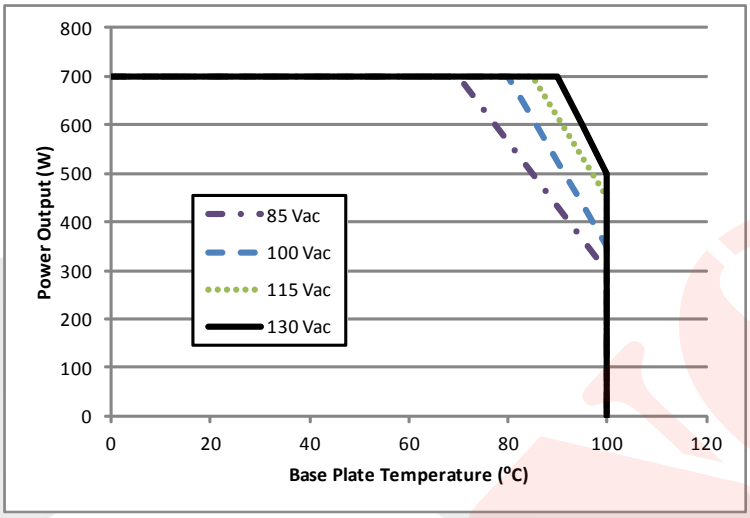
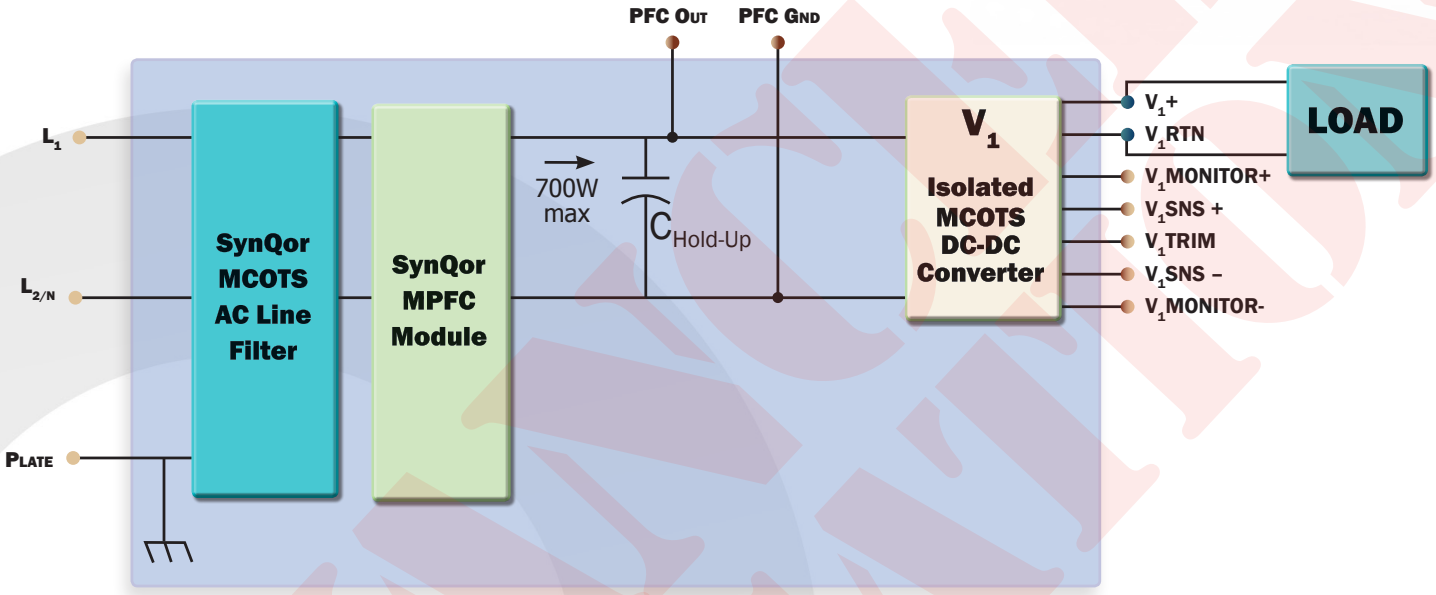
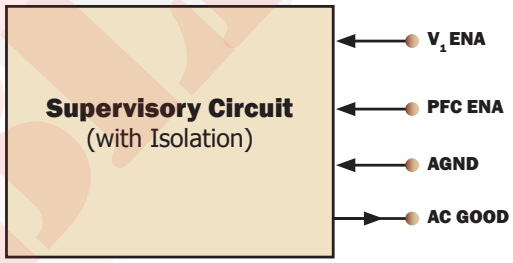


***Figure 1**: Output power vs. baseplate temperature derating curve of the MPFC-115-270-HP*

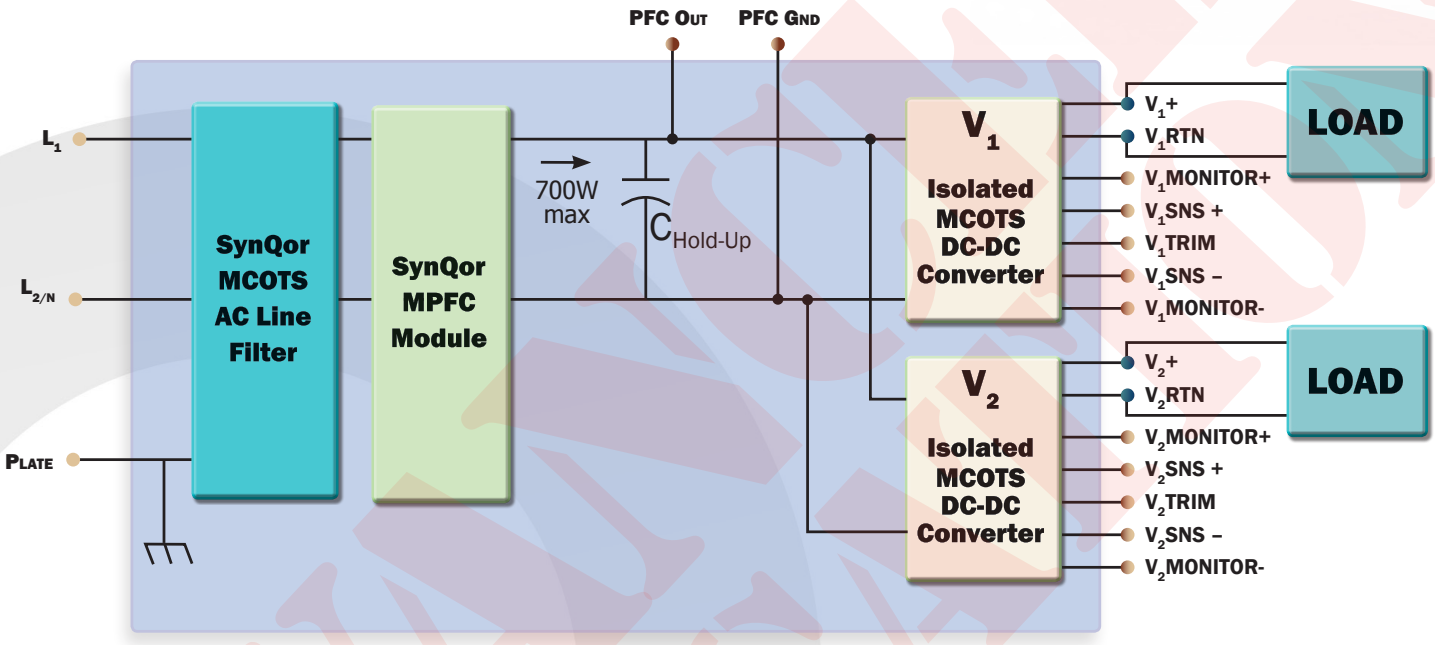
BLOCK DIAGRAM FOR P1



Note: Maximum total output power must be limited such that the power drawn from the PFC is typically ≤700W. The efficiency of each converter should be considered in this calculation.



BLOCK DIAGRAM FOR P2



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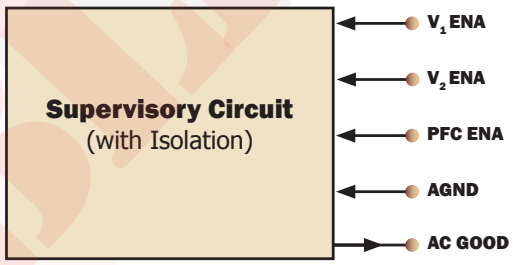


Converters Listed by Vout

Available MCOTS-C-270 DC-DC Converters

Half-Brick Tera Series (MCOTS-C-270-xx-HT)								
Vout	**3.3**	**5.0**		**12.0**	**15.0**	**24.0**	**28.0**	**48.0**
Power	198 W	250 W		300 W	300 W	300 W	300 W	302 W
Output Current	60 A	50 A		25 A	20 A	12.5 A	10.7 A	6.3 A
Efficiency @28Vin (Full Load)	0.86	0.87		0.87	0.88	0.90	0.90	0.89
Ripple & Noise (pk to pk)	120 mV	100 mV		72 mV	151 mV	120 mV	190 mV	350 mV
Output OVP Setpoint No Load	4.1 V	6.18 V		15.0 V	18.88 V	30.0 V	35.0 V	60.0 V
Input Current	50 mA	43 mA		44 mA	48 mA	37 mA	49 mA	49 mA

Full-Brick Tera Series (MCOTS-C-270-xx-FT)								
Vout	**3.3**	**5.0**	**6.0**	**12.0**	**15.0**	**24.0**	**28.0**	**48.0**
Power		400 W		600 W	600 W	600 W	599 W	600 W
Output Current		80 A		50 A	40 A	25 A	21.4 A	12.5 A
Efficiency @28Vin (Full Load)		0.88		0.91	0.91	0.91	0.91	0.91
Ripple & Noise (pk to pk)		200 mV		136 mV	150 mV	300 mV	220 mV	540 mV
Output OVP Setpoint No Load		6.3 V		15.0 V	18.8 V	30.0 V	35.0 V	60.0 V
Input Current		30 mA		35 mA	30 mA	49 mA	35 mA	30 mA
Full power operation at –55 °C to +100 °C, designed for Mil-COTS applications.								

Standards & Qualification Testing

Parameter	Notes & Conditions
STANDARDS COMPLIANCE	**Pending**
Input/Output to baseplate isolation 2150 Vdc	Basic Insulation to Baseplate
UL 60950-1:2007/A2:2014	
CAN/CSA C22.2 No.60950-1:2007/A2:2014	
EN 60950-1:2006/A2:2013	

Note: An external input fuse must always be used to meet these safety requirements. Contact SynQor for official safety certificates on new releases or download from the SynQor website.

Mil-COTS Qualification

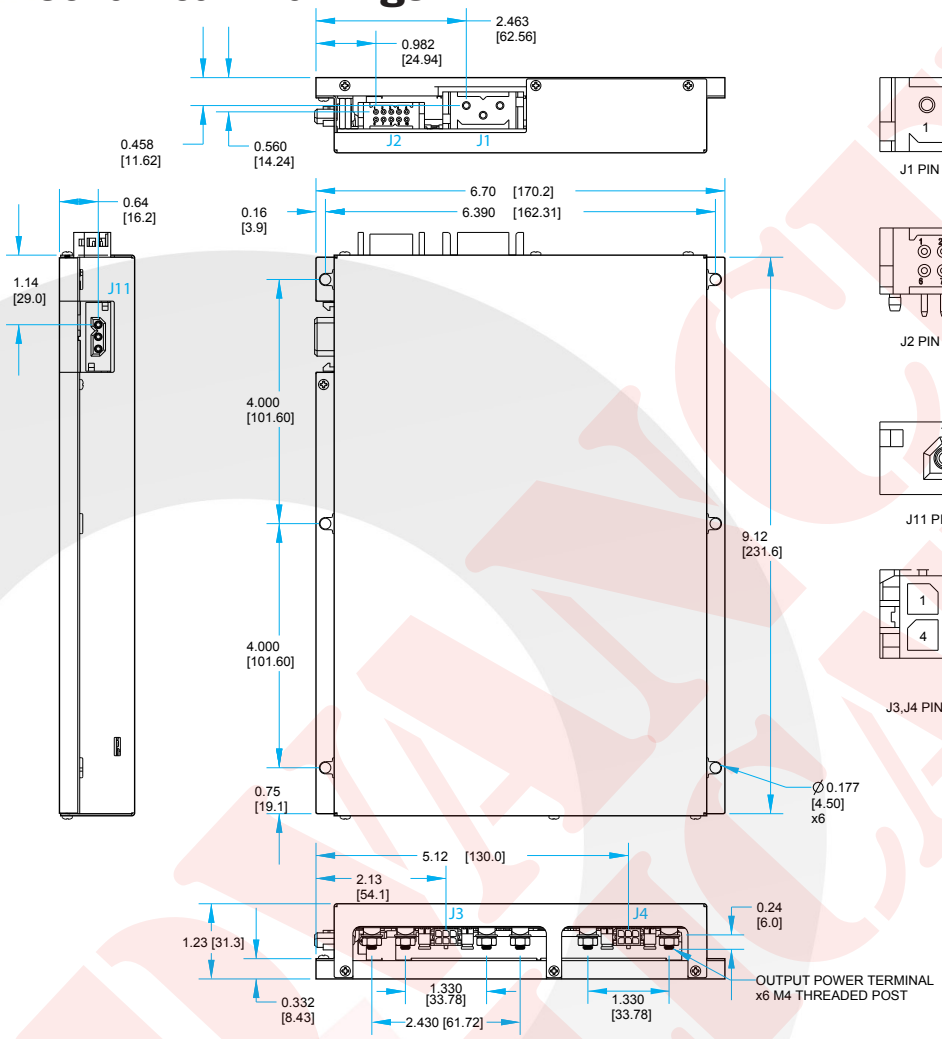
Test Name	Details	# Tested (# Failed)	Consistent with MIL-STD-883F Method
Life Testing	Visual, mechanical and electrical testing before, during and after 1000 hour burn-in @ full load	15 (0)	Method 1005.8
Shock-Vibration	Visual, mechanical and electrical testing before, during and after shock and vibration tests	5 (0)	MIL-STD-202, Methods 201A & 213B
Humidity	+85°C, 95% RH, 1000 hours, 2 minutes on / 6 hours off	8 (0)	Method 1004.7
Temperature Cycling	500 cycles of -55°C to +100°C (30 minute dwell at each temperature)	10 (0)	Method 1010.8, Condition A
Solderability	15 pins	15 (0)	Method 2003
DMT	-65°C to +110°C across full line and load specifications in 5°C steps	7 (0)	
Altitude	70,000 feet (21 km), see Note	2 (0)	

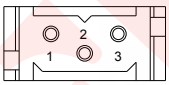
Note: A conductive cooling design is generally needed for high altitude applications because of naturally poor convective cooling at rare atmospheres.

Mil-COTS MIL-STD-810G Qualification Testing

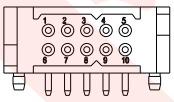
MIL-STD-810G Test	Method	Description
Fungus	508.6	Table 508.6-I
Altitude	500.5 - Procedure I	Storage: 70,000 ft / 2 hr duration
	500.5 - Procedure II	Operating: 70,000 ft / 2 hr duration; Ambient Temperature
Rapid Decompression	500.5 - Procedure III	Storage: 8,000 ft to 40,000 ft
Acceleration	513.6 - Procedure II	Operating: 15 g
Salt Fog	509.5	Storage
High Temperature	501.5 - Procedure I	Storage: 135°C / 3 hrs
	501.5 - Procedure II	Operating: 100°C / 3 hrs
Low Temperature	502.5 - Procedure I	Storage: -65°C / 4 hrs
	502.5 - Procedure II	Operating: -55°C / 3 hrs
Temperature Shock	503.5 - Procedure I - C	Storage: -65°C to 135°C; 12 cycles
Rain	506.5 - Procedure I	Wind Blown Rain
Immersion	512.5 - Procedure I	Non-Operating
Humidity	507.5 - Procedure II	Aggravated cycle @ 95% RH (Figure 507.5-7 aggravated temp - humidity cycle, 15 cycles)
Random Vibration	514.6 - Procedure I	10 - 2000 Hz, PSD level of 1.5 g^2/Hz (54.6 grms), duration = 1 hr/axis
Shock	516.6 - Procedure I	20 g peak, 11 ms, Functional Shock (Operating no load) (saw tooth)
	516.6 - Procedure VI	Bench Handling Shock
Sinusoidal vibration	514.6 - Category 14	Rotary wing aircraft - helicopter, 4 hrs/axis, 20 g (sine sweep from 10 - 500 Hz)
Sand and Dust	510.5 - Procedure I	Blowing Dust
	510.5 - Procedure II	Blowing Sand

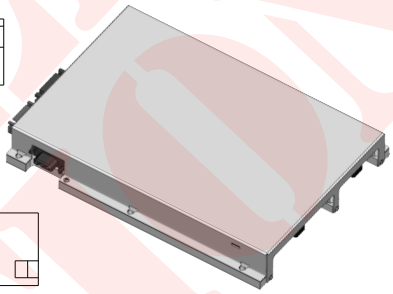
Mechanical Drawings P1

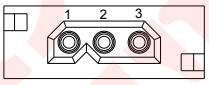




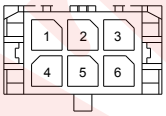
J1 PIN LOCATIONS


J2 PIN LOCATIONS





J11 PIN LOCATIONS



J3,J4 PIN LOCATIONS

Hold-Up Connector (J11)

Pin	Name	Function
1	PFC OUT	Positive Output of PFC
2	NC	Not Connected
3	PFC GND	Negative Output of PFC

Input Connector (J1)

Pin	Name	Function
1	COM IN	Chassis
2	L2/N	AC Line 2 / Neutral
3	L1	AC Line 1

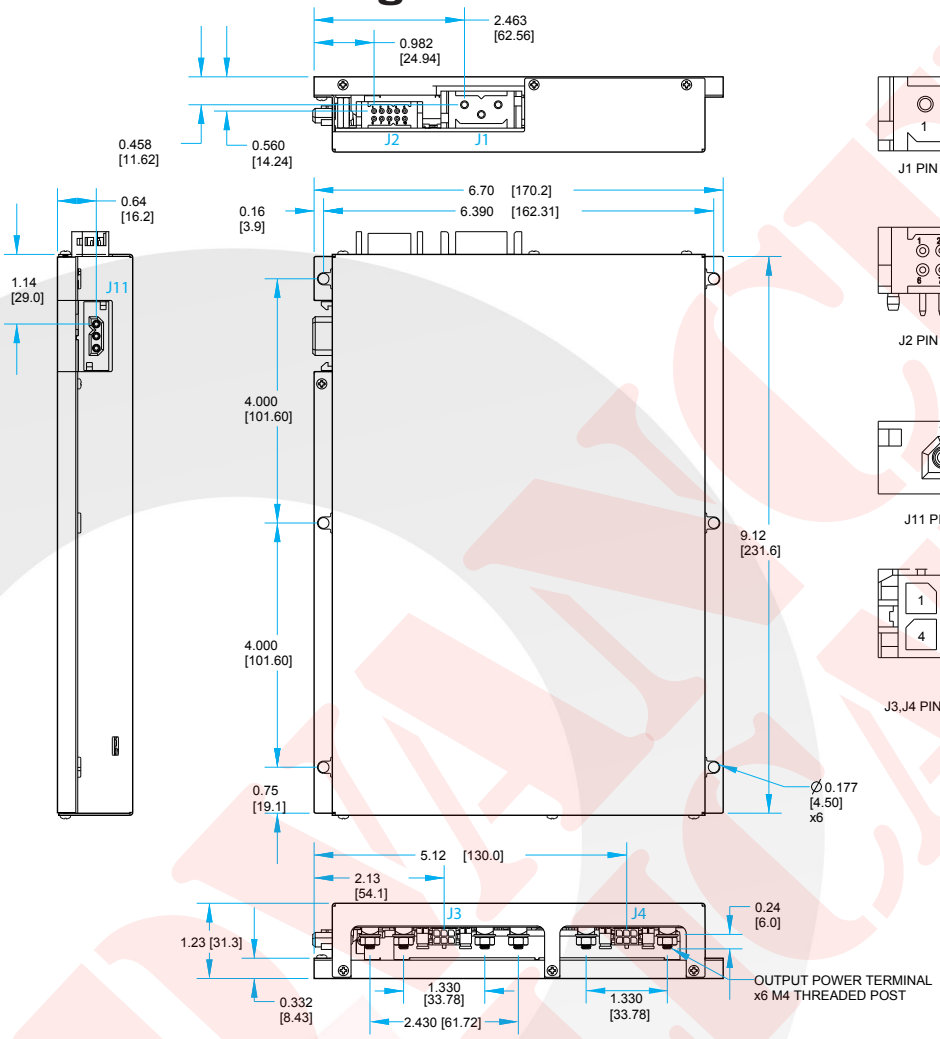
Output Connector (J3)

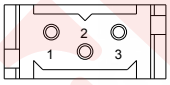
Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

Input Signal Connector (J2)

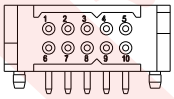
Pin	Name	Function
1	AGND	Analog Ground
2	AUX IN	Aux Power In [Ref to AGND]
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	PFC ENA	PFC Enable [Ref to AGND]
7	AC GOOD	Ref to AGND
8	ENA_1	Enable 1 [Ref to AGND]
9	NC	Not Connected
10	NC	Not Connected

Mechanical Drawings P2

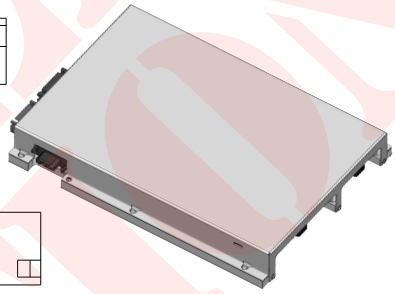


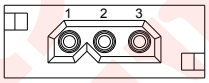


J1 PIN LOCATIONS

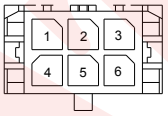


J2 PIN LOCATIONS





J11 PIN LOCATIONS



J3,J4 PIN LOCATIONS

Hold-Up Connector (J11)

Pin	Name	Function
1	PFC OUT	Positive Output of PFC
2	NC	Not Connected
3	PFC GND	Negative Output of PFC

Input Connector (J1)

Pin	Name	Function
1	COM IN	Chassis
2	L2/N	AC Line 2 / Neutral
3	L1	AC Line 1

Output Connector (J3, J4)

Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

Input Signal Connector (J2)

Pin	Name	Function
1	AGND	Analog Ground
2	AUX IN	Aux Power In [Ref to AGND]
3	ENA_2	Enable 2 [Ref to AGND]
4	NC	Not Connected
5	NC	Not Connected
6	PFC ENA	PFC Enable [Ref to AGND]
7	AC GOOD	Ref to AGND
8	ENA_1	Enable 1 [Ref to AGND]
9	NC	Not Connected
10	NC	Not Connected

Ordering Information

MTQ	- P1	- AC115	- 1	- XXXXXX	- S	V
Family	Plate Format (# of Outputs)	MIL-STD Compliance	Phase	6 Digit Application Identification Number	Screening	Optional Character
MTQ	**P1:** 1 output **P2:** 2 output	PENDING **AC115:** MIL-STD-704 (A-F) MIL-STD-1399	**1:** Single Phase	6 Digit Application Identification Number	**S:** S-Grade **M:** M-Grade	**V:** Cover

Not all combinations make valid part numbers, please contact SynQor to order a configured solution.

Example: MTQ-P1-AC115-1-XXXXXX-SV

PART NUMBERING SYSTEM

The part numbering system for SynQor's ac-dc converters follows the format shown in the example.

APPLICATION NOTES

A variety of application notes and technical white papers can be downloaded in pdf format from our website.

PATENTS

SynQor holds numerous U.S. patents, one or more of which apply to most of its power converter 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:

5,999,417	6,222,742	6,545,890	6,594,159	6,731,520	6,894,468
6,896,526	6,927,987	7,050,309	7,072,190	7,085,146	7,119,524
7,269,034	7,272,021	7,272,023	7,558,083	7,564,702	7,765,687
7,787,261	8,023,290	8,149,597	8,493,751	8,644,027	9,143,042

Contact SynQor for further information and to order:

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WARRANTY

SynQor offers a two (2) year limited warranty. Complete warranty information is listed on our website or is available upon request from SynQor.