



AC Input Front End Module

Features

- AC input: 102 – 264 V
- Wide input frequency range: 47 – 440 Hz
- Output power: Up to 1400 W
- Input transient protection
- Power factor corrected
- Rugged construction



Product Highlights

The MIL-COTS PFC Front End from Granite Power Technologies can accept a wide 102-264 Vac input range, frequencies from 47 to 440 Hz and deliver up to 1400 W of output power. The MIL-COTS PFC Front End is compliant to select OV transients of MIL-STD-704F as detailed herein. It also complies, as noted herein, to the conducted emissions and susceptibility portions of MIL-STD-461 when used with the specified external filter. The MIL-COTS PFC Front End has a very low profile and robust brick construction, compliant to many environments in MIL-STD-810, including shock and vibration.

The MIL-COTS PFC Front End provides customers with a highly reliable, easily customizable, and low risk solution suitable for defense and aerospace environments.

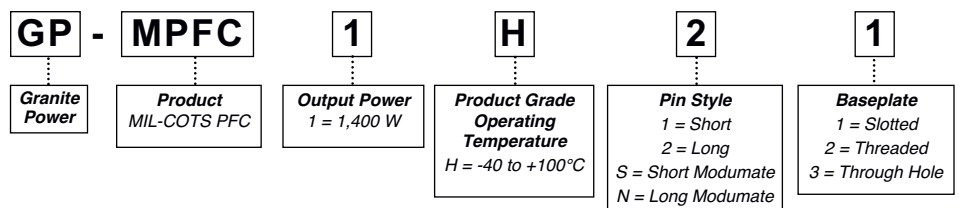
Granite Power Technologies, a division of the Vicor Corporation, specializes in the design, development, and manufacture of rapid response custom switching power supplies and power systems for the defense industry.

Absolute Maximum Ratings

Parameter	Rating	Unit	Notes
L to N voltage	264	V _{RMS}	Continuous
+Out to -Out voltage	385	V _{dc}	
Mounting torque	4 – 6 (0.45 – 0.68)	in-lbs (N-m)	8 each 4-40 screw
Operating temperature	-40 to +100	°C	H-Grade
Storage temperature	-55 to +125	°C	H-Grade
Pin soldering temperature	500 (260)	°F (°C)	<5 sec; wave solder
	750 (390)	°F (°C)	<7 sec; hand solder
Output current	4.0	Amps	Absolute max.
Baseplate temperature	100	°C	
MOD Enable to -OUT voltage	30	V _{dc}	

Part Numbering

MIL-COTS PFC Front End



ELECTRICAL CHARACTERISTICS

Electrical characteristics apply over the full operating range of input voltage, output power and baseplate temperature, unless otherwise specified. All temperatures refer to the operating temperature at the center of the baseplate.

■ INPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Operating input voltage	102		264	Vac	Operation to 85 Vac with additional power derating - consult Applications Engineering
Input undervoltage			<65	Vac	Shutdown
AC line frequency	47		440	Hz	
Power factor	0.85	0.95	0.99		102-264 Vac
Inrush current			20	Amps	264 Vac line voltage
Input Power Transients					As specified below per MIL-HDBK-704, no other compliance expressed or implied
1 phase 60 Hz 115 V					
Table SXF109-II Test Conditions for Normal Voltage Transients for single phase 60 Hz utilization equipment compliant to test conditions A,B,C,D					
Table SXF110-II Test Conditions for Normal Frequency Transients for single phase 60 Hz utilization equipment compliant to test conditions A,B,C,D,E					
Table SXF302-II Test Conditions for Abnormal Voltage Transients for single phase 60 Hz utilization equipment compliant to test conditions A,B,C,D,E					
Table SXF303-II Test Conditions for Abnormal Frequency Transients for single phase 60 Hz utilization equipment compliant to test conditions A,B,C,D,E					
1 phase 400 Hz 115 V					
Table SAC109-II Test Conditions for MIL-STD-704A Normal Voltage Transients compliant to test conditions A,B,C,D,E,F,G					
Table SAC109-III Test Conditions for MIL-STD-704B,C,D,E,F Normal Voltage compliant to test conditions AA,BB,CC,DD,EE,FF,GG					
Table SAC110-II Test Conditions for MIL-STD-704A Normal Frequency Transients compliant to test conditions A,B,C,D,E,F,G,H,I					
Table SAC110-III Test Conditions for MIL-STD-704B,C,D,E,F Normal Frequency Transients compliant to test conditions AA,BB,CC,DD,EE,FF,GG,HH,II					
Table SAC302-II Test Conditions for MIL-STD-704A Abnormal Voltage Transients compliant to test conditions A,B,C,D,E,F,G					
Table SAC302-III Test Conditions for MIL-STD-704B,C,D,E,F Abnormal Voltage compliant to test conditions AA,BB,CC,DD,EE,FF,GG,OO					
Table SAC303-II Test Conditions for MIL-STD-704A Abnormal Frequency Transients compliant to test conditions A,B,C,D,E					
Table SAC303-III Test Conditions for MIL-STD-704B,C,D,E,F Abnormal Frequency Transients compliant to test conditions AA,BB,CC,DD,EE					

■ OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output power	0		1,400	Watts	See Figure 1
Efficiency					
@ 115 Vac	92	95		%	Full load
@ 230 Vac	92	95		%	Full load
Output voltage	375	385	395	Vdc	
External hold-up capacitance	1500	2000	3000	μF	
Turn-on time		<3		seconds	After application of AC input.
Ripple		10	15	Vp-p	2000uF external capacitance.

ELECTRICAL CHARACTERISTICS (CONT.)

Electrical characteristics apply over the full operating range of input voltage, output power and baseplate temperature, unless otherwise specified. All temperatures refer to the operating temperature at the center of the baseplate.

■ CONTROL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
MOD EN (open drain output)		>500		mS	After PFC output in regulation. See Figure 2 for required protection components.
Low State Voltage		0.1		V	Isink = 50mA

■ EMI

Parameter	Standard	Notes
MIL-STD-461F Conducted Emissions	CE102	Compliant when used with Vicor V375 family DC-DC converters and external filter supplied by JMK filters, Inc. (www.jmkfilters.com) Part # FF-2137B-13
Conducted Susceptibility	CS101, CS114, CS115, CS116	

■ SAFETY SPECIFICATIONS (with baseplate earthed and quick acting line fuse.)

Parameter	Min	Typ	Max	Unit	Notes
Isolation (in to out)		None			Isolation provided by DC-DC converter(s)
Dielectric withstand (I/O to baseplate)	1,500 / 2,121			Vac / Vdc	Baseplate earthed
Leakage current					None (No internal electrical connection to the baseplate, leakage current will be dependent on external filtering.)
Fuse (External)			15A		Bussman ABC-15 UL-listed

■ AGENCY APPROVALS

Safety Standards	Agency Markings	Notes-1
EN60950-1, UL60950-1, CSA 60950-1	CE Marked	Low voltage directive

■ GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Weight		9.6 (272)		Ounces (grams)	
Size		6.40 x 2.70 x 0.5		Inches	
		162,2 x 68,6 x 12,7		mm	
MTBF		2,010,528		Hours	25°C, Ground Benign MIL HDBK 217F

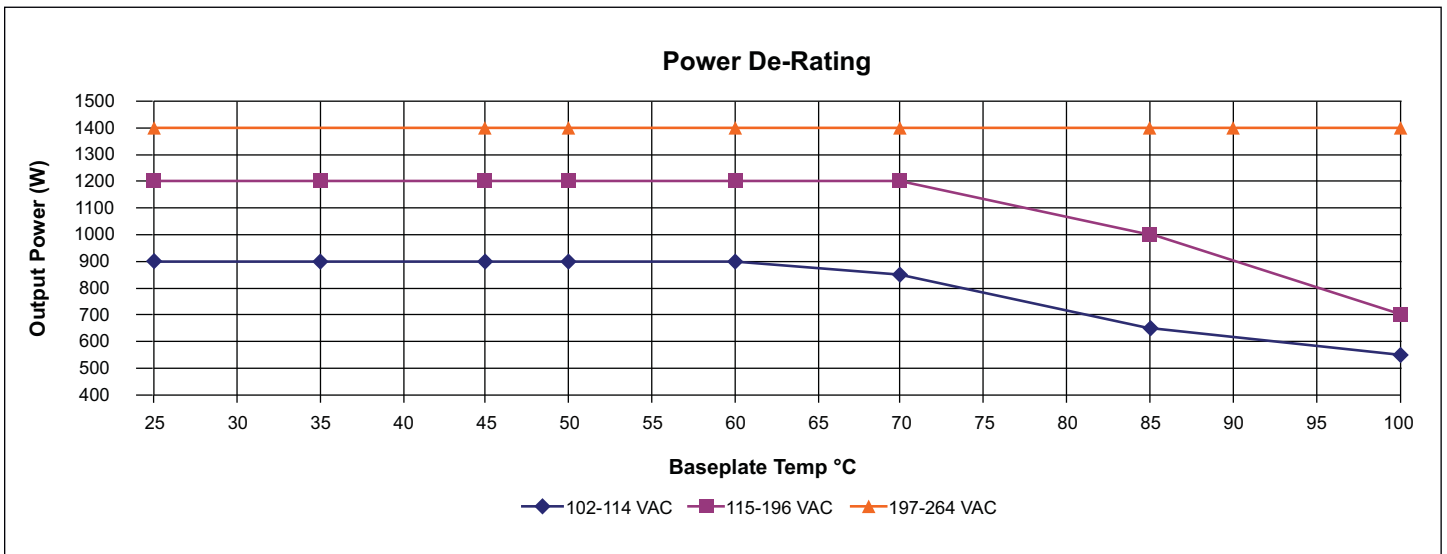


Figure 1 – Module power de-rating for input voltage at baseplate temperature

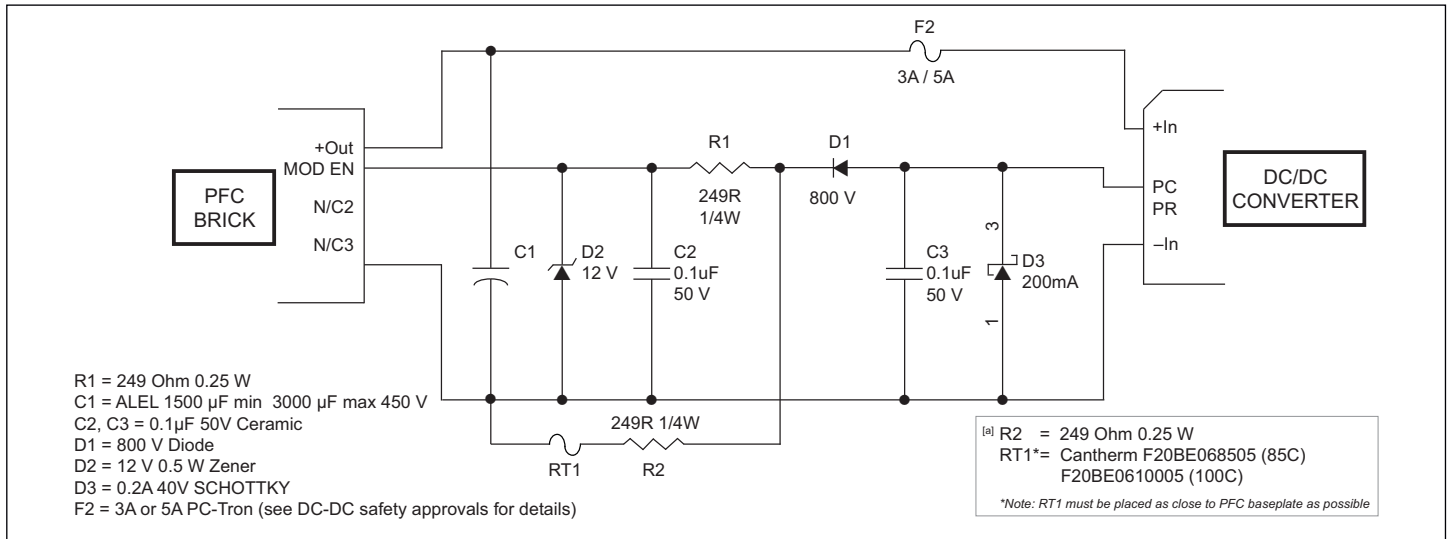


Figure 2 – Mod EN protection circuit and Optional Thermal Safety Ckt

[a] Optional, not required

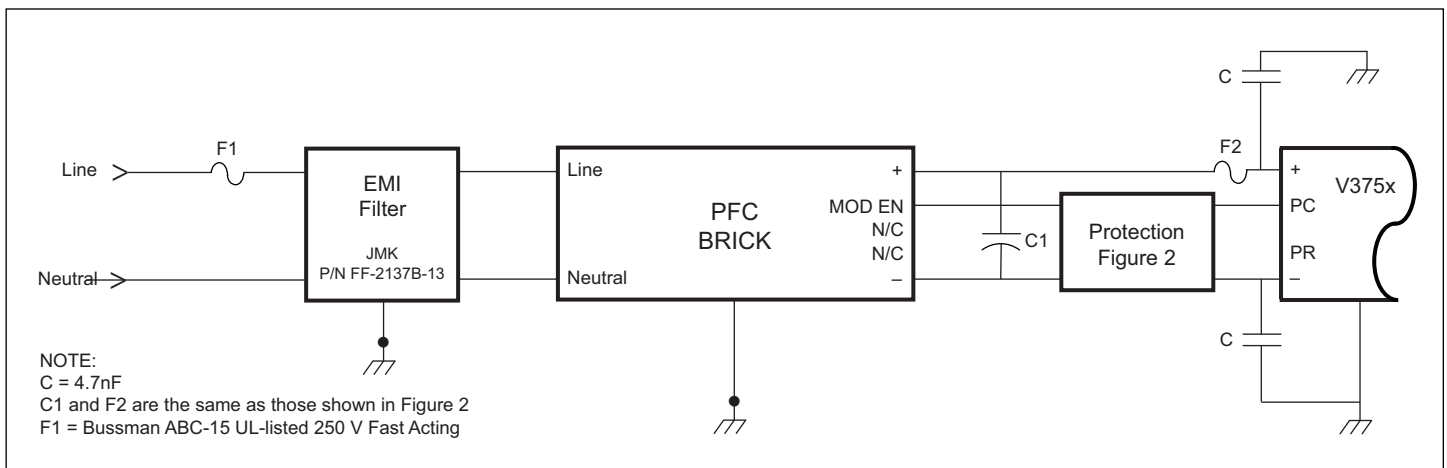


Figure 3– Typical Connection diagram

TEST DATA

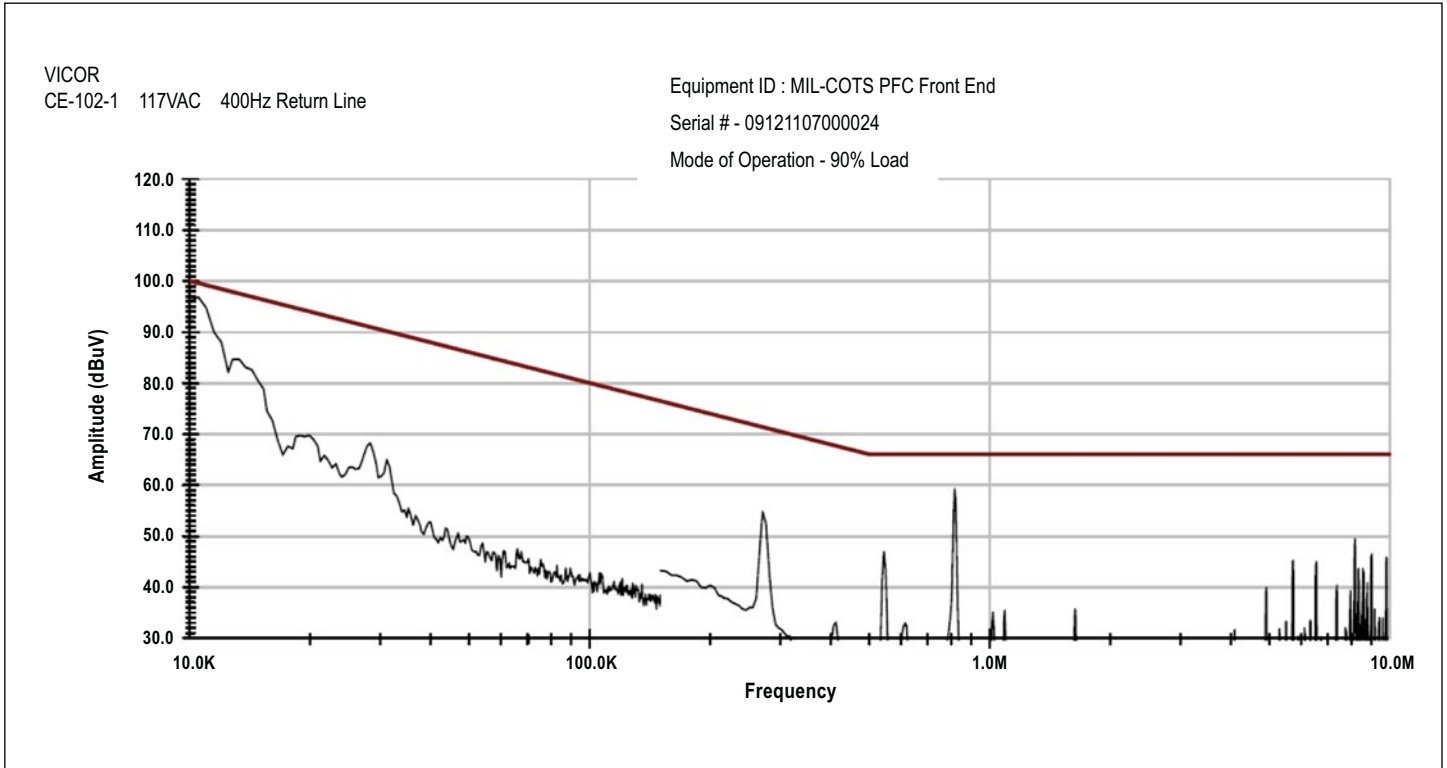


Figure 4— 400Hz Return Line

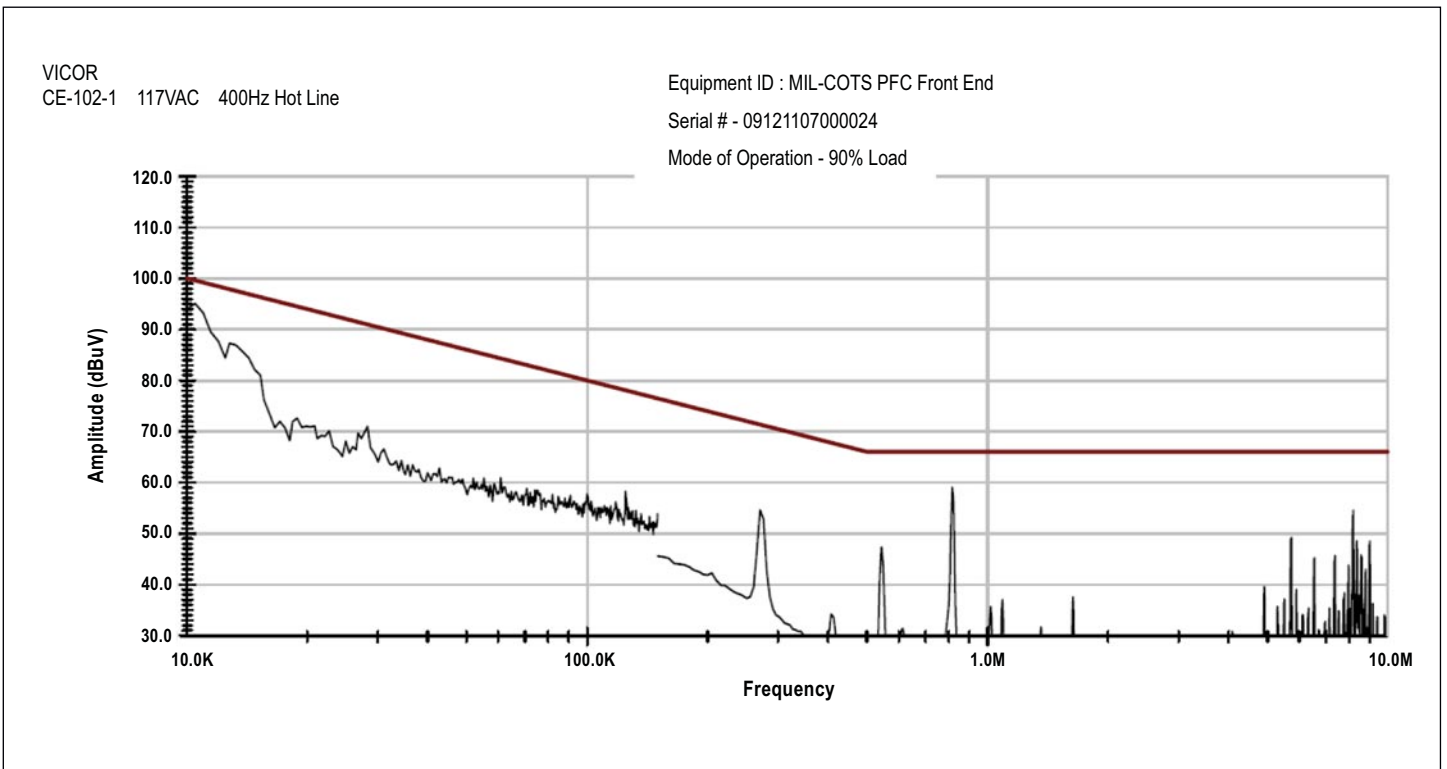


Figure 5— 400Hz Hot Line

TEST DATA (CONT.)

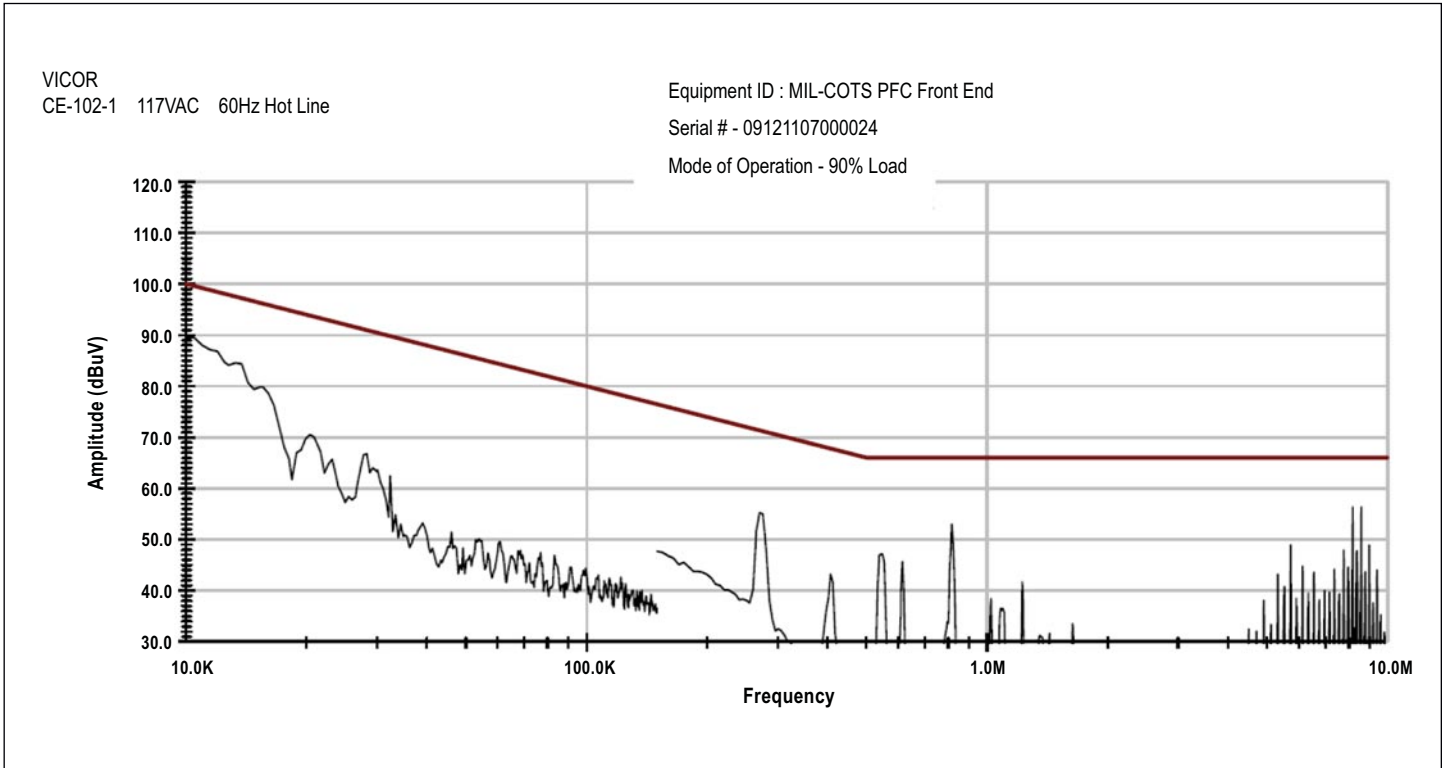


Figure 6— 60Hz Hot Line

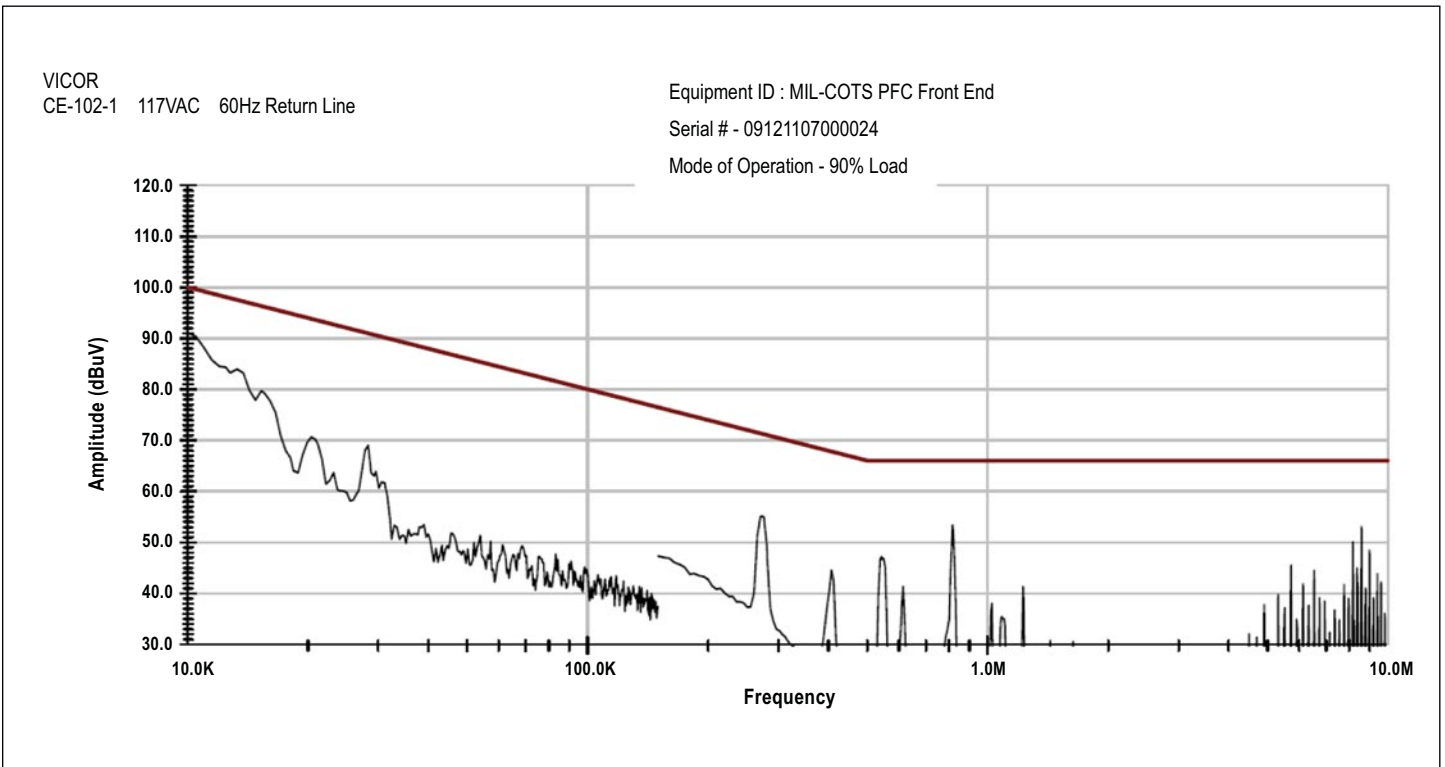


Figure 7— 60Hz Return Line

DESCRIPTION

PFC Brick

Pin function/description

LINE/NEUTRAL (Pins 1 & 4)

Connect single phase AC mains from appropriate EMI filter to these pins via a 15 Amp 250V fuse. Connect the output of the filter to the LINE and NEUTRAL pins of the PFC Brick. To meet MIL-STD-461E/F requirements, an EMI filter between the AC input and PFC Brick similar to that shown in Fig. 4 is required.

N/C (Pins 2, 3, 6, 7)

No Connect. Do not connect to these pins.

MOD ENABLE (Pin 8)

Connect this pin to the down stream Vicor DC/DC converter(s) PC pin as shown in Figure 2. The external circuitry between the MOD ENABLE pin and PC pin shown in the figure must be used to ensure proper operation. During power up, the MOD ENABLE pin is held low until the PFC output is up and regulating. Any fault with the PFC output will cause this pin to go low and held low until the fault is cleared. If an external load is connected directly to the output of the PFC Brick, do not apply the load until the holdup capacitors are fully charged.

+/- OUTPUTS (+ Pin 9, - Pin 5)

Connect the +OUT pin to the +IN of the respected Vicor DC/DC converter. Connect the -OUT pin to the -IN of the respected Vicor DC/DC converter. In addition, external hold-up capacitor of 1500uF with a minimum voltage rating of 450VDC is required across the +OUT and -OUT pins. This capacitor must be in close proximity of the PFC Brick. Do not exceed 3000uF of total output capacitance.

Safety Features:

Over Temperature Shut Down:

The PFC Brick is designed to shut down if the baseplate temperature (measured in the center of the baseplate) exceeds 100°C. Certain line and load conditions dictate lower maximum temperatures as indicated in Figure 1.

Exceeding the power/temperature limits shown in Figure 1 or the maximum 100°C limit may result in permanent module failure. We do not guarantee module survival if the temperature limits are exceeded.

The addition of the thermal safety components shown in Figure 2 should be used if the application requires operation at input voltage and output power where a lower baseplate temperature is required.

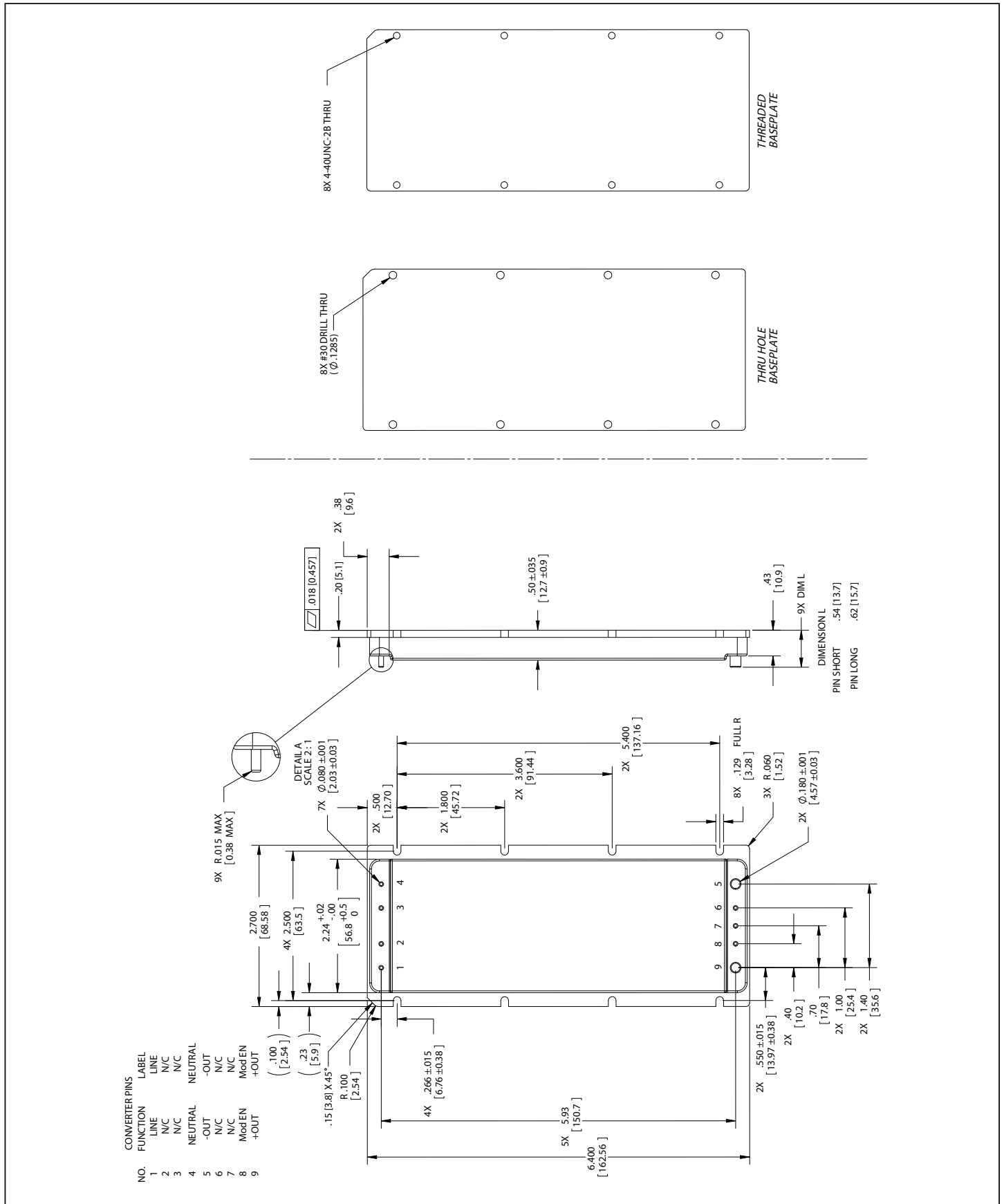
Output Over Voltage Protection:

In the event the PFC output exceeds approximately 415VDC, the boost converter will momentarily shut down to keep the PFC output below 415VDC. The MOD Enable pin will go low and stay low until the PFC output returns to its normal operating range.

Safety Notes:

The PFC Brick is not isolated from the AC mains. An isolation transformer must be used when making scope measurements. The PFC Brick does not provide input to output isolation. Differential probes should be used to avoid destructive ground loops.

MECHANICAL DRAWINGS



Vicor's comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.

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