

## MPR1348FP series front-end

Input: 100-120/200-240V<sub>AC</sub>; Output: 48V<sub>DC</sub> @ 1350W



### Applications

- 48V<sub>DC</sub> distributed power architectures
- Datacom and Telecom applications
- Mid to high-end Servers
- Enterprise Networking
- Network Attached Storage
- Telecom Access Nodes
- Routers/Switches
- ATE Equipment

### Description

The MPR1348FP front end provides efficient isolated power from world-wide commercial AC mains. Offered in the industry standard compact 1U form factor, this front end provides comprehensive solutions for systems connected to commercial ac mains.

### Features

- Universal input with PFC
- Remote ON/OFF control of the 48V<sub>DC</sub> output
- Remote sense of the 48V<sub>DC</sub> output
- Isolated 48V<sub>DC</sub> output configurable as +48 or -48V<sub>DC</sub>
- No minimum load requirements
- Active current sharing
- Upward directed airflow
- Efficiency: typically 92% @ 220V<sub>AC</sub> & full load
- 20ms of holdup time
- Auto recoverable OC & OT protection
- Operating temperature: 0 - 50°C
- Radiated and Conducted EMI – exceeds CISPR22 (EN55022) Class A requirements
- Safety approvals: CSA† C22.2 No.60950-1, IEC 60950-1, CE§ Mark available
- Compliant to RoHS EU Directive 2014/35/EU
- ISO\*\* 9001 and ISO 14001 certified manufacturing facilities
- Meets EN6100 immunity and transient standards

\* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of Canadian Standards Association.

‡ VDE is a trademark of Verband Deutscher Elektrotechniker e.V.

§ Intended for integration into end-user equipment. All the required procedures for CE marking of end-user equipment should be followed. (The CE mark is placed on selected products.)

\*\* ISO is a registered trademark of the International Organization of Standards.

+ PMBus name and logo are registered trademarks of the System Management Interface Forum (SMIF)

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## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the Technical Requirement. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage: Continuous	V <sub>IN</sub>	0	264	V <sub>AC</sub>
Operating Ambient Temperature	T <sub>A</sub>	-10	50	°C
Storage Temperature	T <sub>stg</sub>	-40	85	°C
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			1500	V <sub>AC</sub>

## Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, load, and temperature conditions.

INPUT						
Parameter	Symbol	Min	Typ	Max	Unit	
Operational Range	V <sub>IN</sub>	high line	180	230	264	V <sub>AC</sub>
		Low line	90	110	140	
Frequency Range	F <sub>IN</sub>	47	50/60	63	Hz	
Main Output	V <sub>IN</sub>	Turn_OFF <sup>1</sup>	55		70	V <sub>AC</sub>
		Turn ON	75		90	V <sub>AC</sub>
Maximum Input Current (V <sub>OUT</sub> = 48V <sub>DC</sub> )	I <sub>IN</sub>	V <sub>IN</sub> = 100V <sub>AC</sub> , P <sub>OUT</sub> = 1000W			12	A <sub>AC</sub>
		V <sub>IN</sub> = 200V <sub>AC</sub> , P <sub>OUT</sub> = 1350W			8	
Cold Start Inrush Current <sup>2</sup> (Excluding x-caps, 25°C)	I <sub>IN</sub>				35	A <sub>PEAK</sub> cycle
		duration				
Efficiency (T <sub>AMB</sub> = 25°C, V <sub>OUT</sub> = 48V <sub>DC</sub> )	η	input	100 / 220			V <sub>AC</sub>
		100% load		88 / 92		%
		75% load		88 / 91		
		50% load		87 / 90		
		20% load		80 / 84		
Power Factor (V <sub>IN</sub> = 90 - 264V <sub>AC</sub> , P <sub>OUT</sub> = 1000W)	PF		0.99			
Holdup time (V <sub>IN</sub> = 90V <sub>AC</sub> , T <sub>AMB</sub> 25°C, V <sub>OUT</sub> = 48V <sub>DC</sub> , I <sub>OUT</sub> = 20.8A)	T	20			ms	
Ride through (output ≥ 46V <sub>DC</sub> )			½		cycle	
Leakage Current (V <sub>IN</sub> = 264V <sub>AC</sub> , F <sub>IN</sub> = 60Hz)	I <sub>IN</sub>			3.5	mA	
Isolation	V <sub>AC</sub>	Input/Output	3000			V <sub>AC</sub>
		Input/Frame	1500			V <sub>AC</sub>
	Main output or main_rtn <sup>3</sup> /Frame	V <sub>DC</sub>	-250		250	V <sub>DC</sub>

<sup>1</sup> The input fuse cannot clear for any input voltage levels below 90V<sub>AC</sub>

<sup>2</sup> 5 minutes OFF time, measured at 25°C, 220V @ 50Hz

<sup>3</sup> Either output terminal of the power supply may be tied to frame\_ground

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48V <sub>DC</sub> MAIN OUTPUT						
Parameter	Symbol	Min	Typ	Max	Unit	
Output Power	W	0	-	1350 1000	W	
Regulation	V <sub>OUT</sub>	47.52	48.00	48.48	V <sub>DC</sub>	
Set point (V <sub>IN</sub> = 220V <sub>AC</sub> , T <sub>AMB</sub> 25°C, I <sub>OUT</sub> = 13.5A)				0.01	% / °C	
Temperature drift		-2		+2	%	
Overall regulation (line, load, temperature)				0.5	V <sub>DC</sub>	
Ripple and noise <sup>4</sup>	V <sub>OUT</sub>			600 100	mV <sub>P-P</sub> mV <sub>RMS</sub>	
20MHz bandwidth						
Turn-ON or turn-OFF overshoot				+0	%	
Remote ON/OFF delay time	T			40	ms	
Turn-ON	C			300	ms	
monotonic rise time (10 – 90% of V <sub>OUT</sub> )						
External Load capacitance	R	0.02		25,000	μF	
esr					Ω	
Transient response	V <sub>OUT</sub>	-1		1	V <sub>DC</sub>	
25% step [10%-35%, 100% - 75%]		46.5		50	V <sub>DC</sub>	
0 – 95%, 95 – 0% load step				500	μs	
recovery to within 2% of V <sub>NOMINAL</sub>						
Overvoltage protection, latched				59	V <sub>DC</sub>	
(recovery by cycling OFF/ON via hardware or software)						
Output current	I <sub>OUT</sub>	27.9	28.1	28.4	A <sub>DC</sub>	
high line						
Low line		20.6	20.8	21		
Overcurrent protection threshold		31.8		36.6		
high line						
Low line	23.6		27.0			
Current share	I <sub>OUT</sub>	-5		5	% of FL	

General Specifications

Parameter	Min	Typ	Max	Units	Notes
Reliability		300,000 100,000		hrs	Full load, 25°C per Bellcore RPP Full load, 50°C per Bellcore RPP
Service Life		10		Yrs	Full load, excluding fans
Weight			2 (4.4)	Kgs (Lbs)	

Feature Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. All signals are referenced to Signal\_Return unless otherwise noted. See Feature Descriptions for additional information. ( I<sub>OL</sub> < 5mA, I<sub>OH</sub> < 20μA )

Parameter	Symbol	Min	Typ	Max	Unit
Remote ON/OFF (open collector)	V <sub>I</sub>	0.7V <sub>DD</sub>	—	3.3	V <sub>DC</sub>
Logic HI – normal (or left open)		0		0.4	
Logic – LO – output OFF					
AC Range (opto isolated open collector signal)	V <sub>I</sub>	0.7V <sub>DD</sub>	—	3.3	V <sub>DC</sub>
Low range - Logic HI <sup>5</sup>		0	—	0.4	V <sub>DC</sub>
High range – Logic LO					

<sup>4</sup> Measured across a 10μf electrolytic and a 0.1μf ceramic capacitors in parallel. 20MHz bandwidth

<sup>5</sup> With a 1.5kΩ pull up to a 3.3V<sub>DC</sub> source, a logic level HI is equivalent to > 2.4V<sub>DC</sub>

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Environmental Specifications

Parameter	Min	Typ	Max	Units	Notes
Ambient Temperature	-5		50	°C	0 – 1,000m
Storage Temperature	-40		70	°C	
Operating Altitude			4,600/15,000	m/ft	
Non-operating Altitude			15240/50k	m / ft	
Power derating with temperature			2.5	% / °C	To 60°C
Temperature derating with Altitude			3.0	°C/1000 m °C/3280 ft	
Acoustic noise			55	dba	25°C and Full load
OT	Protection above NTC turn OFF point NTC turn ON point Hysteresis	65	100.3 74.7 25.6	°C ambient °C °C	Auto-recoverable
Humidity	Operating Storage	5 5	95 95	%	Relative humidity, non-condensing
Vibration			0.2	G	IEC 68-2-6, 5-500Hz; IEC 68-2-64
Shock			10	G	IEC 68-2-27, 10ms intervals 3 shocks per axis; IEC 68-2-31

EMC Compliance

Parameter	Criteria	Standard	Level	Test
AC input	Conducted emissions	FCC and CISPR (EN55022A, VCCI-2)	A +6dB	0.15 – 30MHz
Radiated emissions		EN55022	A +6dB	30 – 10000MHz
Harmonic current	Emissions	EN-61000-3-2	Table 1	
Voltage	Fluctuations & Flicker	En-61000-3-3		
AC Input immunity	Voltage dips	EN61000-4-11	A	-30%, 10ms
			B	-60%, 100ms
			B	-100%, 5sec
	Low energy transients	EN61000-4-12 IEEE C62.41 100kHz ring wave		2kV differential 4kV common mode
High energy transients	EN61000-4-5	A	1kV, 1.2 x 50µs, common mode 500V, 8 x 20µs, differential mode	
Fast transients	EN61000-4-4	B	±1kV on power lines, 5kHz rate	
Enclosure immunity	Conducted RF fields	EN61000-4-6	A	130dBµV, 0.15-80MHz, 80% AM
	Radiated RF fields	EN61000-4-3	A	3V/m, 80-1000MHz, 80% AM
		ENV 50140	A	
ESD	EN61000-4-2	B	±4kV contact, ±8kV air	

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Characteristic Curves

The following figures provide typical characteristics at 25°C.

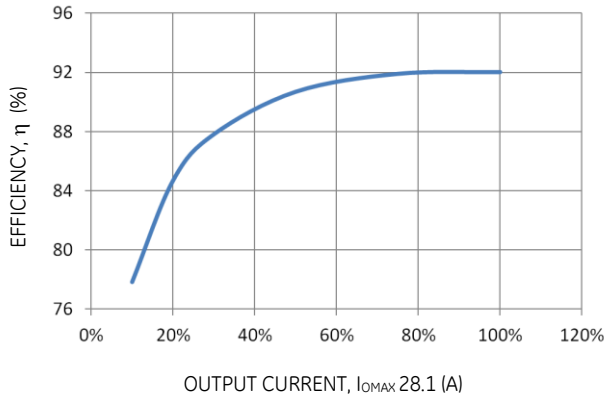


Figure 1. Efficiency V<sub>IN</sub>: 220V, Freq: 50Hz, T: 25°C

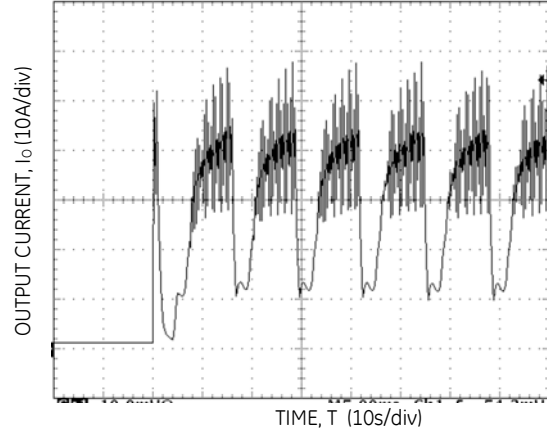


Figure 2. Short circuit Performance, V<sub>IN</sub> 230 V<sub>AC</sub>, T 25°C (reading: Max short circuit current – 57.8A, RMS – 23.1A)

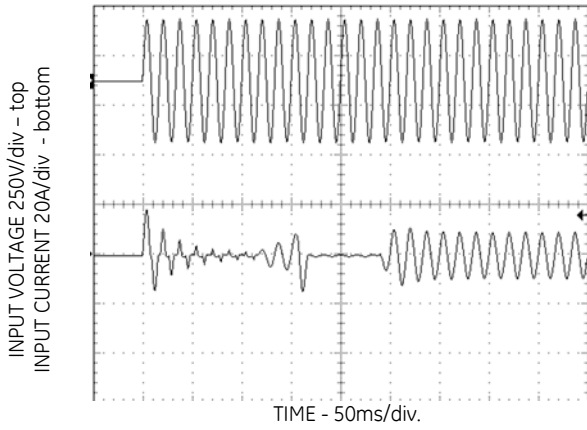


Figure 3. Cold Inrush, V<sub>IN</sub> 220 V<sub>AC</sub> (read 17.6A)

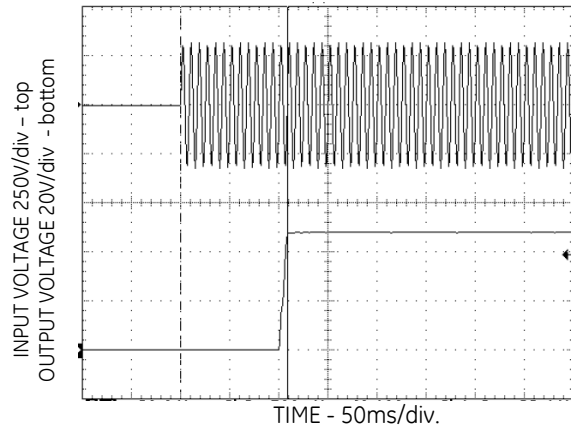


Figure 4. Turn ON delay, V<sub>IN</sub> 230 V<sub>AC</sub> (read 218ms)

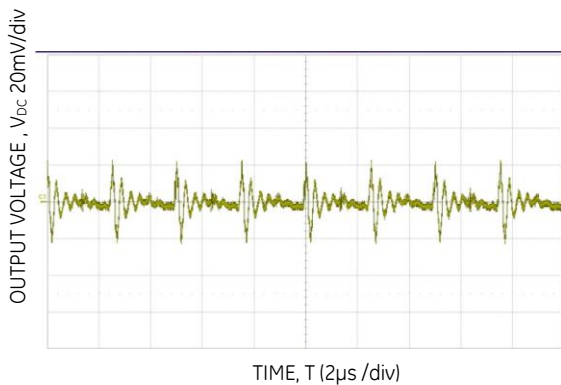


Figure 5. 48V<sub>DC</sub> output PARD, full load, V<sub>IN</sub> = 230V<sub>AC</sub>.

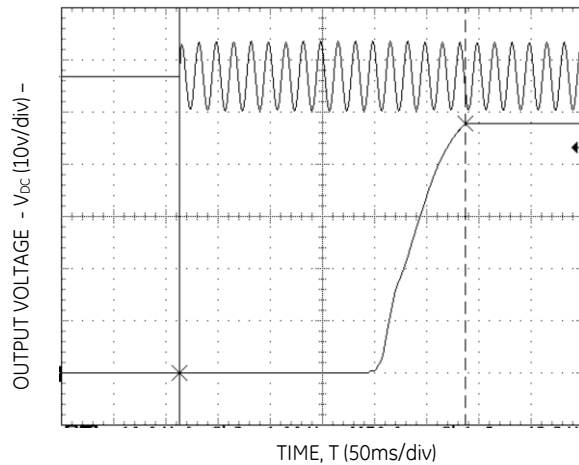


Figure 6. Start up V<sub>IN</sub> 230 V<sub>AC</sub>, C<sub>OUT</sub> 25,600 μF

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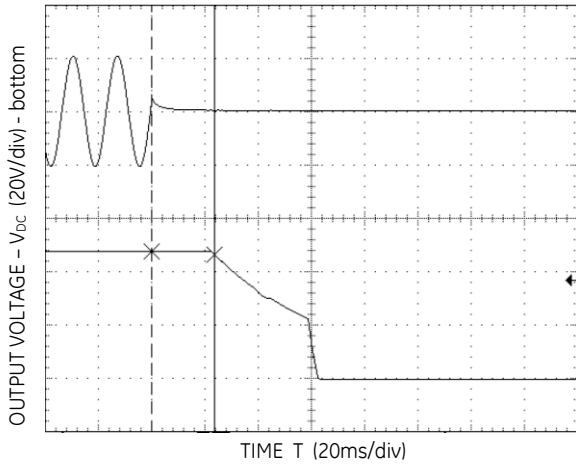


Figure 7. Holdup  $V_{IN} = 180V_{AC}$ , FL (23.6ms)

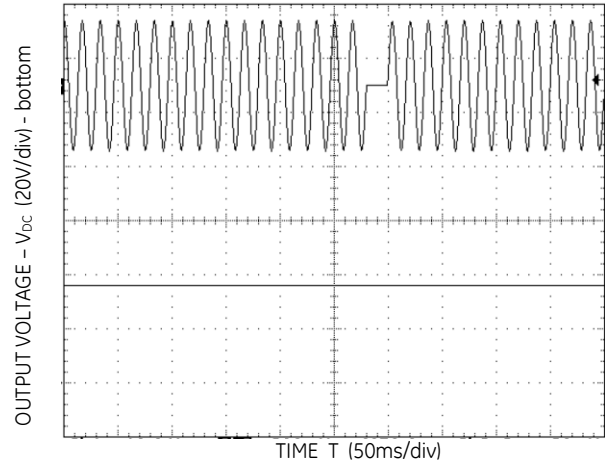


Figure 8. 1/2 cycle ride-through  $V_{IN} = 240 V_{AC}$

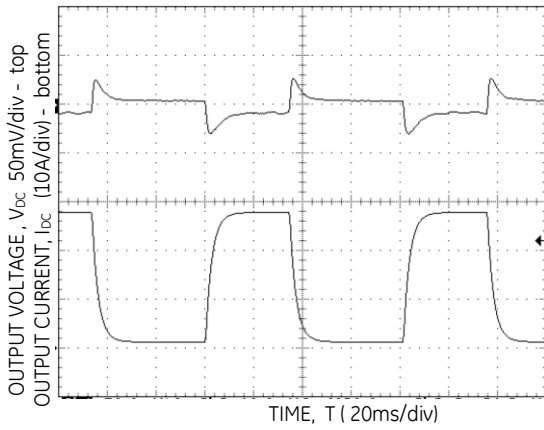


Figure 9. 230V<sub>AC</sub>; Transient response 5 - 100% load step

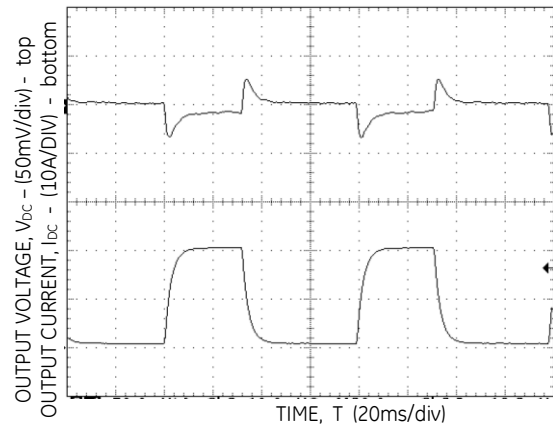


Figure 10. 115V<sub>AC</sub>; Transient response 5 - 100% load step

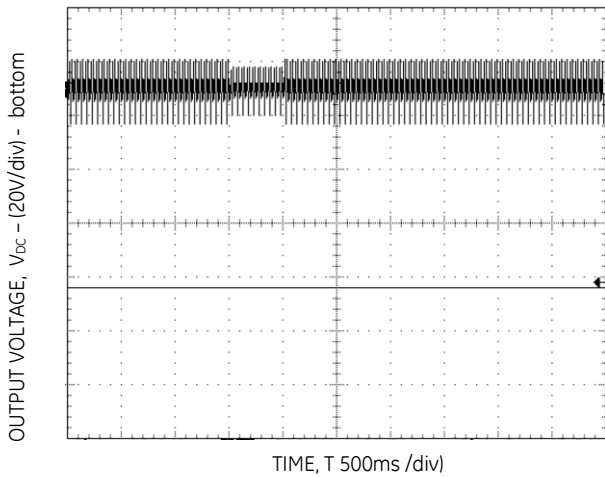


Figure 11. 30% dip ride-through  $V_{IN} = 240 V_{AC}$

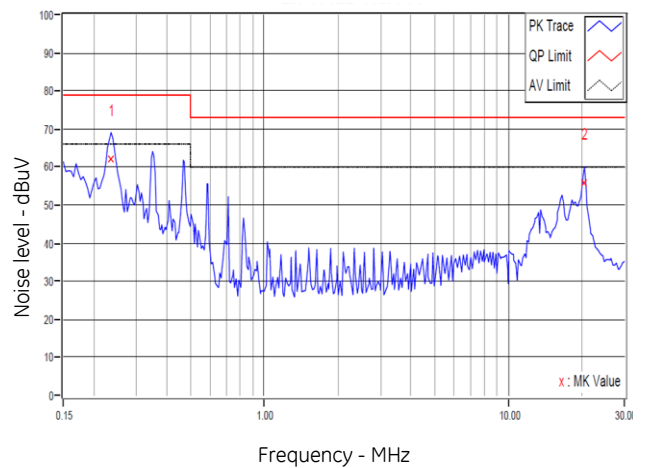
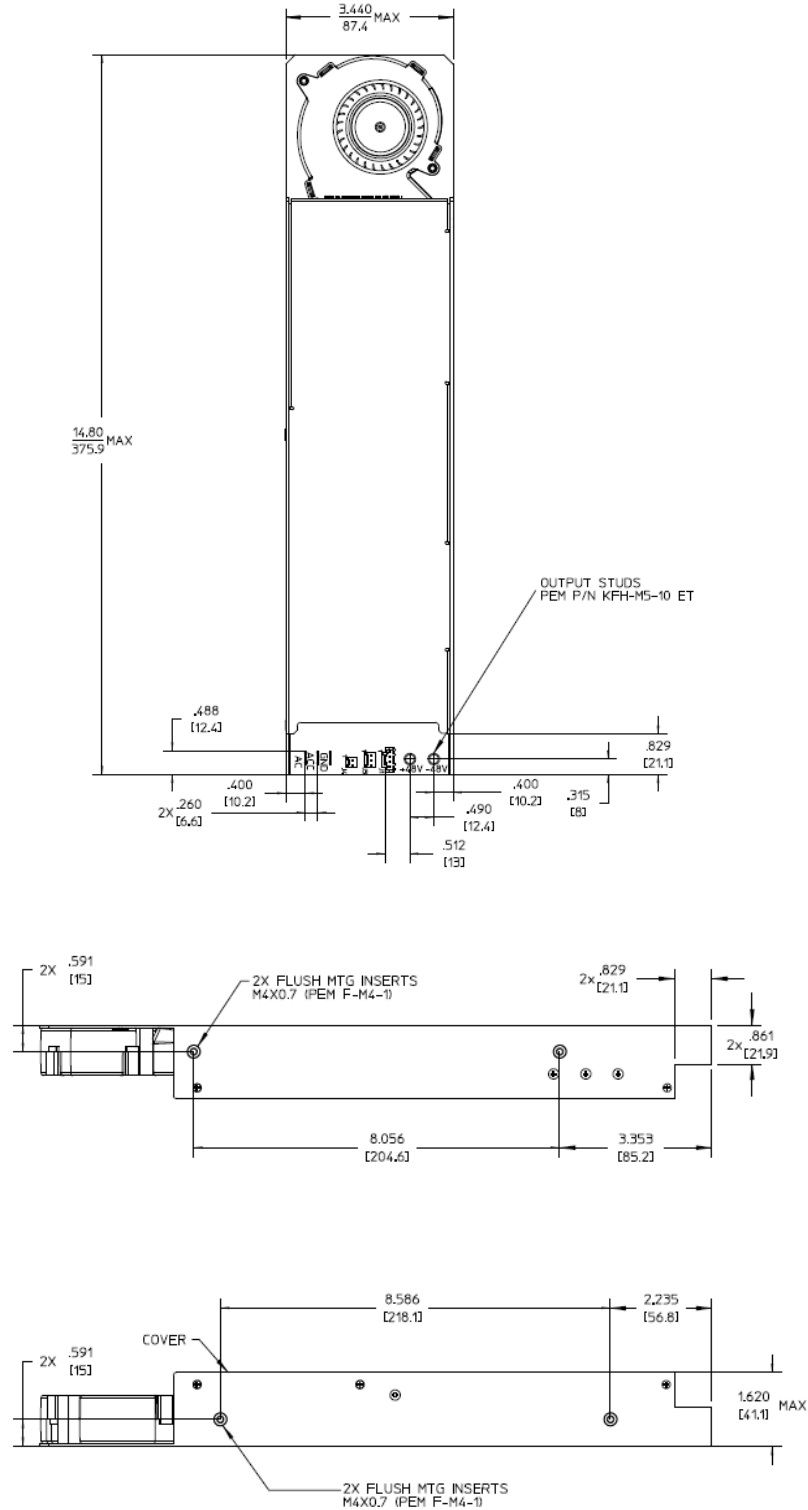


Figure 12. Conducted Emissions

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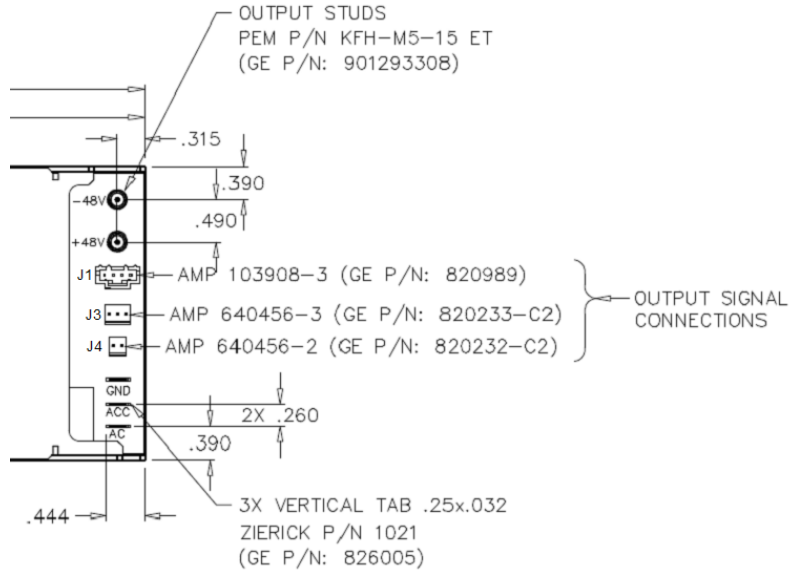
Outline Drawing



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Connectors and Pin Assignments



Power Circuits		
Mate	Function	Operation
Stud	-48V	When + side tied to GRD
Stud	+48V	When - side tied to GRD
FastON	GND	Protective input safety
FastON	ACC	Return side of AC input
FastON	AC	Hi - fused side - of AC input

Signal Circuits					
J1		J3		J4	
Pin	Function	Pin	Function	Pin	Function
1	+ Sense	1	Ishare	1	AC range
2	- Sense	2	Ishare rtn (-48)	2	AC range rtn <sup>6</sup>
3	Remote	3	n/a		
4	Remote rtn (-)				

<sup>6</sup> Digital common is isolated from input circuitry or main output power



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## Ordering Information

Please contact your GE Sales Representative for pricing, availability and optional features.

PRODUCT	DESCRIPTION	PART NUMBER
1350W Rectifier	Configurable 48V <sub>OUT</sub> , as either +48V or -48V	MPR1348FPXXXZ01A

## Contact Us

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