

MPR1348FP series front-end

Input: 100-120/200-240V_{AC}; Output: 48V_{DC} @ 1350W



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.

Application

- 48V_{DC} distributed power architectures
- Datacom and Telecom applications
- Mid to high-end Servers
- Enterprise Networking
- Network Attached Storage
- Telecom Access Nodes
- Routers/Switches
- ATE Equipment

Features

- Universal input with PFC
- Remote ON/OFF control of the 48V_{DC} output
- Remote sense of the 48V_{DC} output
- Isolated 48V_{DC} output configurable as +48 or -48V_{DC}
- No minimum load requirements
- Active current sharing
- Upward directed airflow
- Efficiency: typically 92% @ 220V_{AC} & full load
- 20ms of holdup time
- Auto recoverable OC & OT protection
- Operating temperature: 0 - 50°C
- Radiated and Conducted EMI – exceeds CISPR22 (EN55032) Class A requirements
- Safety approvals: CSA[†] C22.2 No.62368-1, IEC 62368-1, 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

FOOTNOTES

* 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)

Technical Specifications (continued)

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_{IN}	0	264	V_{AC}
Operating Ambient Temperature	T_A	-10	50	$^{\circ}C$
Storage Temperature	Tstg	-40	85	$^{\circ}C$
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			1500	V_{AC}

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 high line Low Line	V_{IN}	180 90	230 110	264 140	V_{AC}
Frequency Range	F_{IN}	47	50/60	63	Hz
Main Output Turn_OFF ¹ Turn ON	V_{IN} V_{IN}	55 75		70 90	V_{AC} V_{AC}
Maximum Input Current ($V_{OUT} = 48V_{DC}$)	I_{IN}	$V_{IN} = 100V_{AC}, P_{OUT} = 1000W$ $V_{IN} = 200V_{AC}, P_{OUT} = 1350W$		12 8	A_{AC}
Cold Start Inrush Current ² (Excluding x-caps, 25 $^{\circ}C$) duration	I_{IN}			35 $\frac{1}{2}$	A_{PEAK} cycle
Efficiency ($T_{AMB} = 25^{\circ}C, V_{OUT} = 48V_{DC}$) input 100% load 75% load 50% load 20% load	V_{IN} η		100/220 88/92 88/91 87/90 80/84		V_{AC} %
Power Factor ($V_{IN} = 90 - 264V_{AC}, P_{OUT} = 1000W$)	PF		0.99		
Holdup time ($V_{IN} = 90V_{AC}, T_{AMB} 25^{\circ}C, V_{OUT} = 48V_{DC}, I_{OUT} = 20.8A$)	T	20			ms
Ride through (output $\geq 46V_{DC}$)			$\frac{1}{2}$		cycle
Leakage Current ($V_{IN} = 264V_{AC}, F_{IN} = 60Hz$)	I_{IN}			3.5	mA
Isolation Input/Output Input/Frame Main output or main_rtn ³ /Frame	V_{AC} V_{AC} V_{DC}	3000 1500 -250			V_{AC} V_{AC} V_{DC}

¹The input fuse cannot clear for any input voltage levels below 90 V_{AC}

² 5 minutes OFF time, measured at 25 $^{\circ}C, 220V @ 50Hz$

³ Either output terminal of the power supply may be tied to frame ground

Technical Specifications (continued)

48V_{DC} MAIN OUTPUT

Parameter	Symbol	Min	Typ	Max	Unit
Output Power High Line Low Line	W	0	-	1350 1000	W
Regulation Set point ($V_{IN} = 220V_{AC}$, $T_{AMB} = 25^{\circ}C$, $I_{OUT} = 13.5A$) Temperature drift Overall regulation (line, load, temperature) Maximum remote sense voltage drop	V_{OUT}	47.52	48.00	48.48	V_{DC} %/°C % V_{DC}
Ripple and noise ⁴ 20MHz bandwidth	V_{OUT}			600 100	mV _{P-P} mV _{RMS}
Turn-ON or turn-OFF overshoot				+0	%
Remote ON/OFF delay time	T			40	ms
Turn-ON monotonic rise time (10 – 90% of V_{OUT})				300	ms
External Load capacitance esr	C R	0.02		25,000	μF Ω
Transient response 25% step [10%-35%, 100% - 75%] $di/dt - 1A/\mu s$ 0 – 95%, 95 – 0% load step Recovery to within 2% of $V_{nominal}$	V_{OUT}	-1 46.5		1 50 500	V_{DC} V_{DC} μs
Overvoltage protection, latched (recovery by cycling OFF/ON via hardware or software)				59	V_{DC}
Output current High line Low line	I_{OUT}	27.9 20.6	28.1 20.8	28.4 21	A_{DC}
Overcurrent protection threshold High line Low line		31.8 23.6		36.6 27.0	
Current share	I_{OUT}	-5		5	% of FL

General Specification

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. ($I_{OL} < 5mA$, $I_{OH} < 20\mu A$)

Parameter	Symbol	Min	Typ	Max	Unit
Remote ON/OFF (open collector) Logic HI – normal (or left open) Logic – LO – output OFF	V_I	0.7VDD 0	-	3.3 0.4	V_{DC}
AC Range (opto isolated open collector signal) Low range - Logic HI ⁵ High range – Logic LO	V_I V_I	0.7VDD 0	- -	3.3 0.4	V_{DC} V_{DC}

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

⁵ With a 1.5k Ω pull up to a 3.3V_{DC} source, a logic level HI is equivalent to > 2.4V_{DC}

Technical Specifications (continued)

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	65			°C ambient	Auto-recoverable
Protection above NTC			100.3	°C	
Turn OFF point NTC turn			74.7	°C	
ON point Hysteresis			25.6	°C	
Humidity Operating	5		95	%	Relative humidity, non-condensing
Storage	5		95	%	
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 (EN55032A, VCCI-2)	A +6dB	0.15 – 30MHz
Radiated emissions		EN55032	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
A			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	

Technical Specifications (continued)

Characteristic Curves

The following figures provide typical characteristics at 25°C.

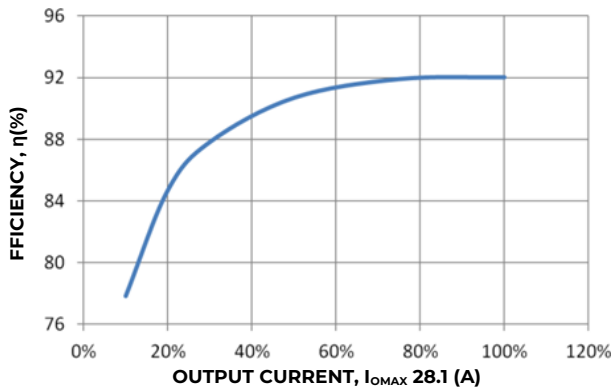


Figure 1. Efficiency V_{IN} : 220V, Freq: 50Hz, T: 25°C

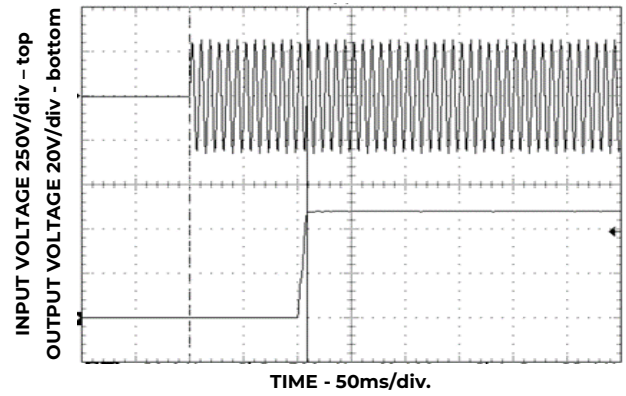


Figure 4. Turn ON delay, V_{IN} 230 V_{AC} (read 218ms)

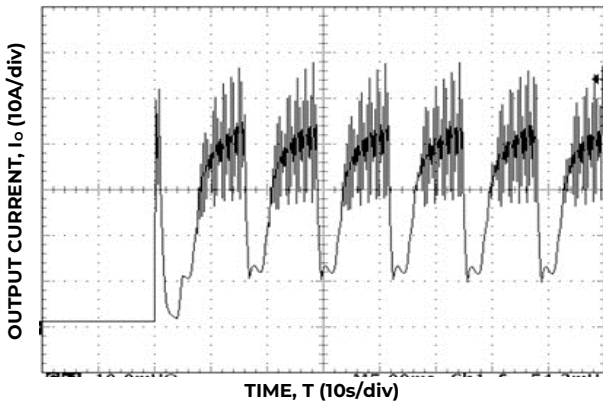


Figure 2. Short circuit Performance, V_{IN} 230 V_{AC}, T 25°C (reading: Max short circuit current – 57.8A, RMS – 23.1A)

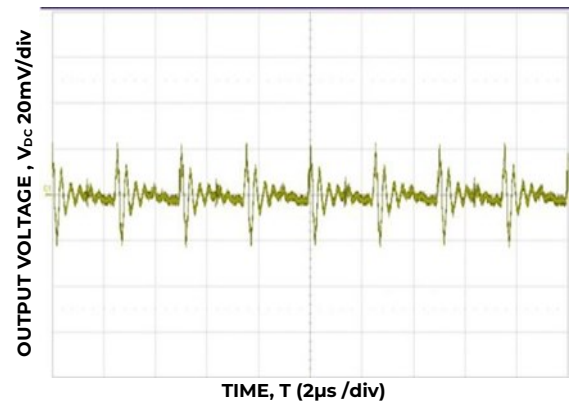


Figure 5. 48V_{DC} output PARD, full load, V_{IN} = 230V_{AC}.

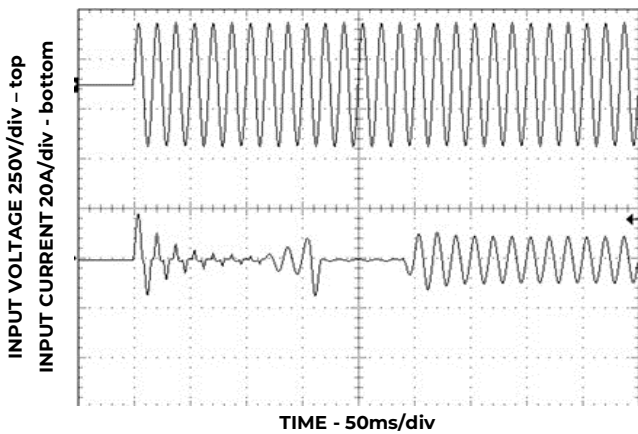


Figure 3. Cold Inrush, V_{IN} 220 V_{AC} (read 17.6A)

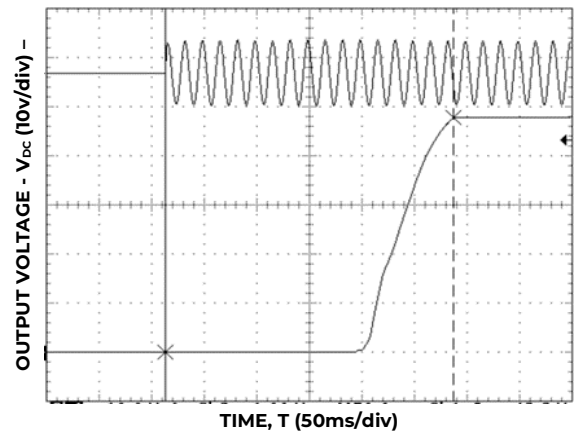


Figure 6. Start up V_{IN} 230 V_{AC}, C_{OUT} 25,600 µF

Technical Specifications (continued)

Characteristic Curves (continued)

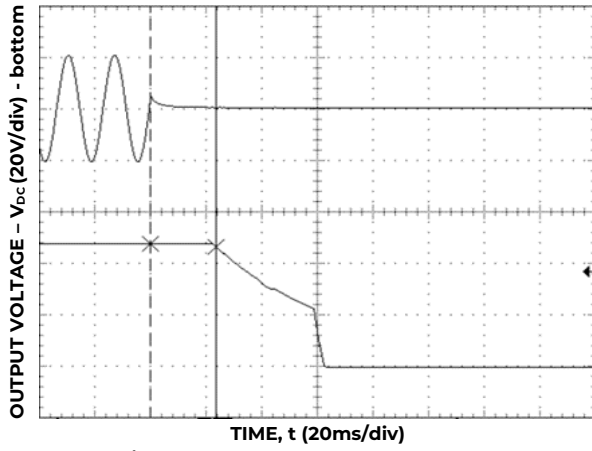


Figure 7. Holdup $V_{IN} - 180V_{AC}$, FL (23.6ms)

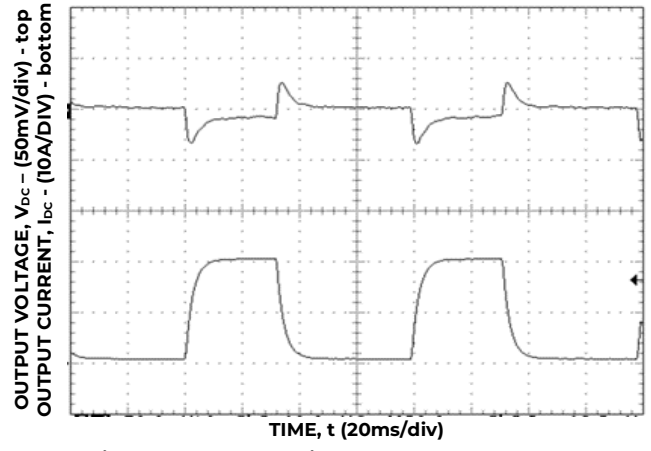


Figure 10. 115V_{AC}; Transient response 5 - 100% load step

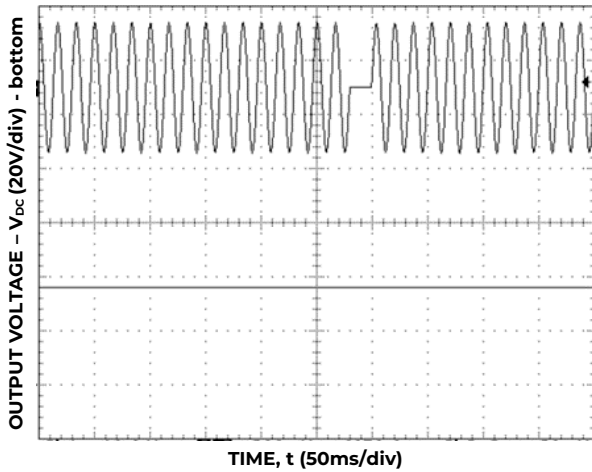


Figure 8. 1/2 cycle ride-through $V_{IN} 240 V_{AC}$

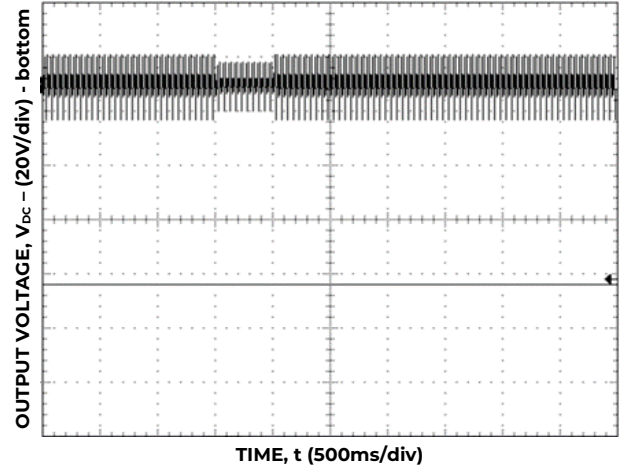


Figure 11. 30% dip ride-through $V_{IN} 240 V_{AC}$

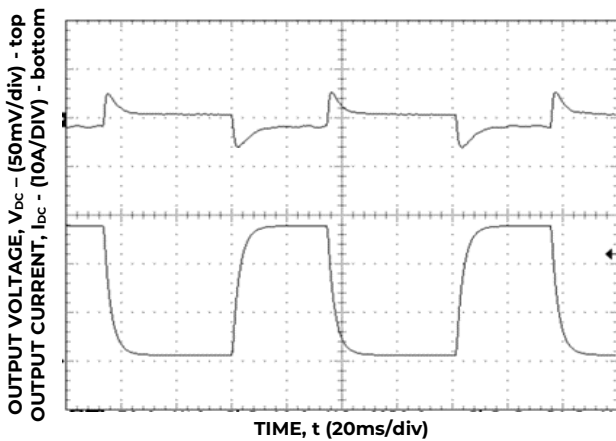


Figure 9. 230V_{AC}; Transient response 5 - 100% load step

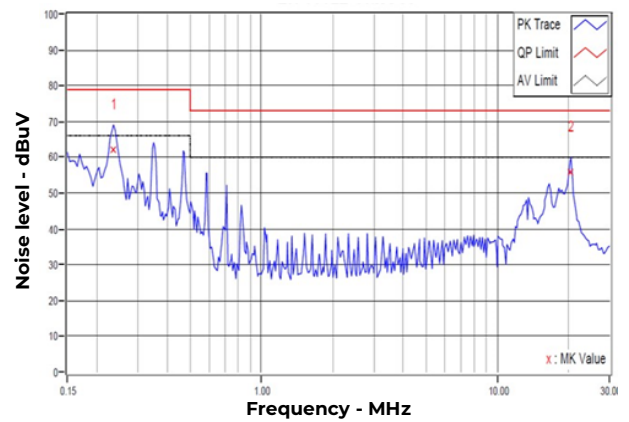
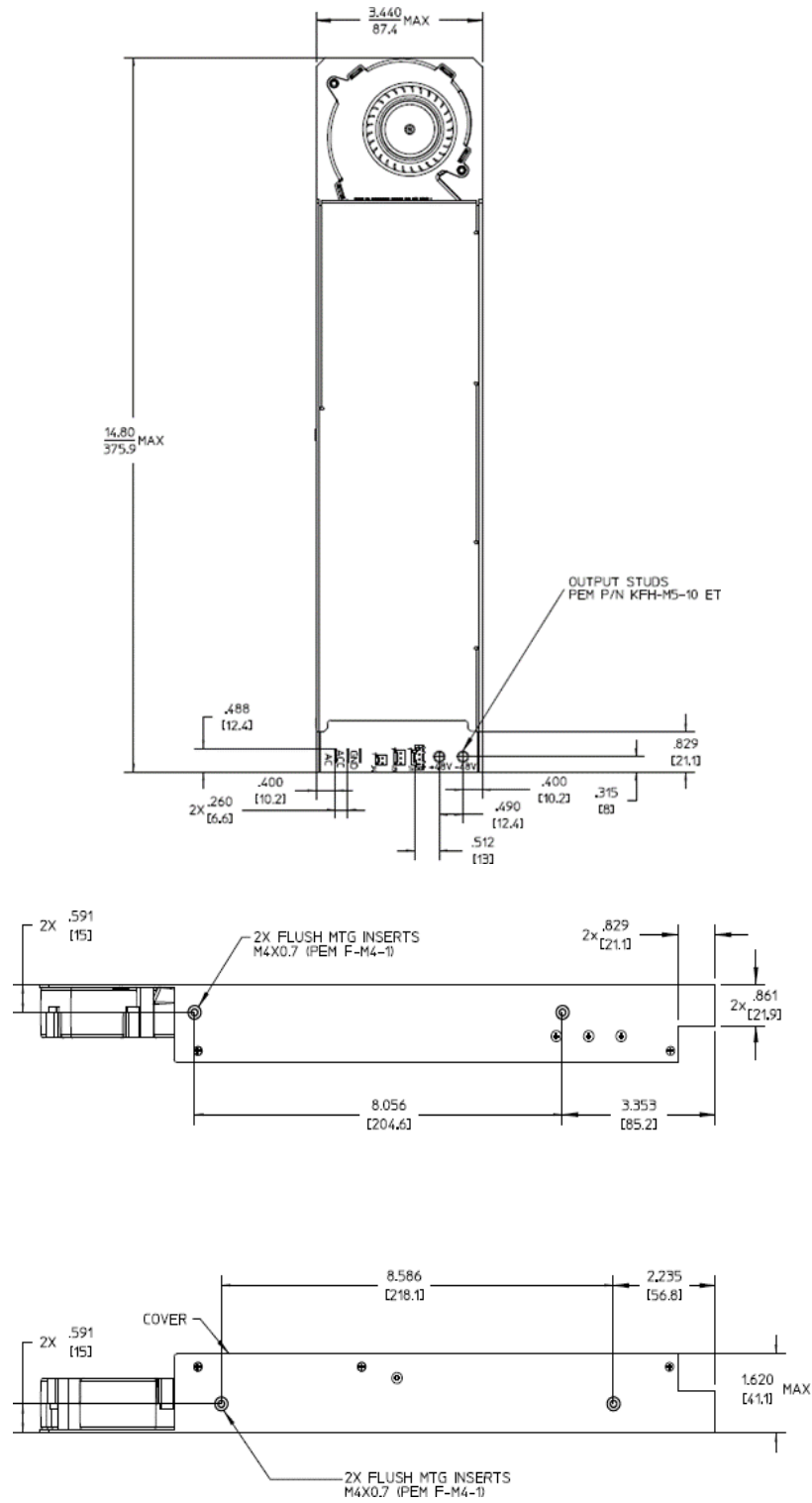


Figure 12. Conducted Emissions

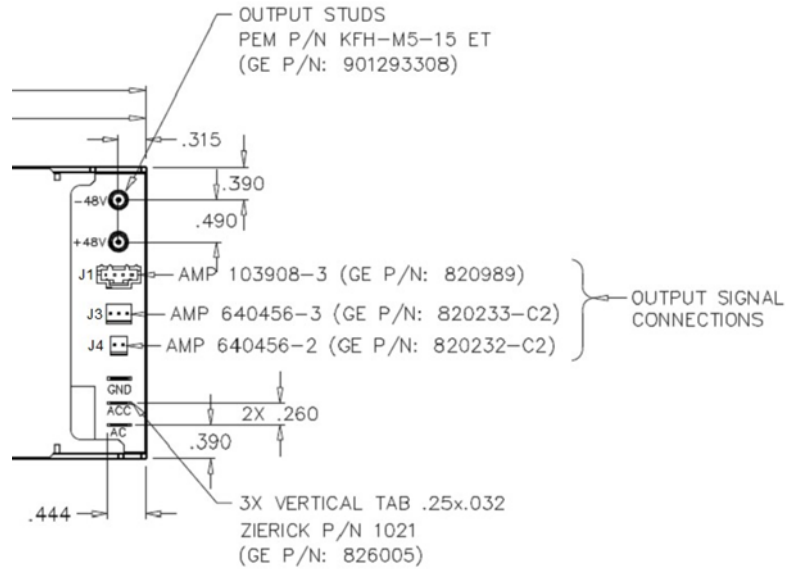
Technical Specifications (continued)

Outline Drawing



Technical Specifications (continued)

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 ⁶
3	Remote	3	n/a		
4	Remote rtn (-)				

Technical Specifications (continued)

Ordering Information

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

PRODUCT	DESCRIPTION	PART NUMBER
1350W Rectifier	Configurable 48V _{OUT} , as either +48V or -48V	MPR1348FPXXXZ01A

Contact Us

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Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
2.3	12/11/2021	Updated as per template
2.4	06/23/2023	Text alignment corrected in Technical specifications Table, Part Number and Version no added in Footer
2.5	10/26/2023	Updated as per OmniOn template

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