



Product Specification

Industrial & Medical

XLM 240 series

240W AC-DC

Power Supplies

Document No. 703592 Rev 07-01-19

Notices

N2Power[™] and the *N2Power* logo are registered trademarks of Qualstar Corporation.

Copyright© 2018 by Qualstar Corporation — All Rights Reserved

For warranty information refer to www.qualstar.com

Information contained in this document is copyrighted by Qualstar Corporation and is intended for use by customers and prospective customers to evaluate and integrate our power supplies. Customers and prospective customers may reproduce this document as needed for these purposes. Reproduction in whole or in part for any other purpose or by any other party is prohibited without prior written permission from Qualstar Corporation.

Every effort has been made to keep the information contained in this document current and accurate as of the date of publication or revision. However, no guarantee is given or implied that the document is error-free or that it is accurate with regard to any specification. *Qualstar* reserves the right to modify the design or specification without notice.

This specification may not be construed as a contractual obligation except as specifically agreed to by *Qualstar* in writing at the time of order.

For information about this product specification, please write or call *N2Power* at:

N2Power

A subsidiary of Qualstar Corporation

1267 Flynn Road
Camarillo, CA 93012

FAX: (805) 978-5212
Phone: (805) 583-7744

E-Mail: sales@n2power.com
www.n2power.com

Table of Contents

1.	Introduction	1-1
1.1	Introduction.....	1-1
1.2	Agency Compliance.....	1-2
2.	AC Input	2-1
2.1	Input Line Requirements.....	2-1
2.2	Input Over Current Protection.....	2-1
2.3	Inrush Current Limiting.....	2-1
2.4	Low Input Voltage.....	2-1
2.5	Leakage Current.....	2-1
3.	DC Outputs	3-1
3.1	Output Voltage Regulation.....	3-1
3.2	No Load Operation.....	3-1
3.3	Output Current/Power.....	3-1
3.4	Cooling.....	3-2
3.5	Output Ripple/Noise.....	3-3
3.6	Output Protection.....	3-4
3.7	Output Rise Time.....	3-5
3.8	Overshoot at Turn On/Turn Off.....	3-5
4.	General Specifications	4-1
4.1	Environmental.....	4-1
4.2	Mean Time Between Failures.....	4-1
4.3	Labeling/Marking.....	4-1
4.4	Net Weight.....	4-2
4.5	Mounting and Physical Dimensions.....	4-2
4.6	Mating Connectors.....	4-5
4.7	Output Grounding.....	4-6
4.8	Pin Definitions.....	4-6
5.	Efficiency	5-1
6.	Timing and Control	6-1
6.1	Power Supply Timing.....	6-1
6.2	Voltage Hold-Up Time.....	6-1
7.	Ordering Information	7-1

1.

Introduction

1.1 Introduction

This specification defines the XLM 240 series of universal input, single output, power factor corrected 240W switch mode power supplies. It includes information regarding the mechanical details, cooling requirements, electrical and signal specifications and environmental ranges for storage and operation of the power supply. These power supplies achieve very high packaging densities. All of the XLM 240 family models are listed in Table 3-1.

All models of the XLM 240 series can be used as standalone power supplies and have different chassis options - XLMO240 for **O**pen frame, XLMU240 for **U** Chassis, and XLME240 for **E**nclosure.



XLMO240



XLMU240



XLME240

Figure 1-1 XLM 240 Series

1.2 Agency Compliance

All of the XLMO240, XLMU240 and XLME240 models comply with the following international agency standards:






Safety	Complies with Standard	Remarks
United States	UL 60950-1 2 nd Ed + A1:2009 + A2:2013 (Information Technology equipment) UL 60601-1 3.1 Ed + C1:09 + A2:10 (Medical)	I/P-O/P: 4000VAC; I/P-GND: 2000VAC 2MOPP
Canada	CSA 22.2 60950-1 CSA 22.2 60601-1	
International	IEC/EN 60950-1 Second Edition IEC/EN 60601-1 3.1 Edition	
EU Council	2014/35/EU	Low Voltage Directive
EMC	Complies with Standard	Remarks
International	EN60601-1-2 : 2015 (4 TH Edition) EN61204-3 : 2000 (refer to the following) EN55011: 2009+A1 Class B Group 1 EN55024: 1998 + A1: 2001_ A2:2003 EN61000-3-2:Class D EN61000-3-3 EN61000-4-3 Ed 3.2 EN61000-4-4 Ed 3.0 EN61000-4-5 Ed 3.0 EN61000-4-6 Ed 4.0 EN61000-4-11 Ed 2.0	Medical electrical equipment Low voltage power supplies – DC output Conducted Emission Standard Immunity Standard Harmonic Current Emissions (PFC) Voltage Fluctuations & Flicker Radio frequency immunity Electrical fast transient burst immunity Power line surge immunity RF Common mode immunity Voltage dips and short interruptions immunity
Reduction of Hazardous Substances (RoHS)	Complies with Standard	Remarks
EU Council	2011/65/EU	RoHS 2 Directive
Marks of Conformance		
United States & Canada	 Underwriters Laboratories File E468416(Medical), E211115 (Industrial)	
EU Council		
RoHS	 	

Table 1-1 Agency Compliance

2.1 Input Line Requirements

The following table defines the voltage and frequency requirements for the AC line inputs to the XLM 240 models which are capable of supplying full rated power in continuous operation throughout the specified ranges of voltages and frequencies. The power supply will automatically recover from AC power loss and is capable of starting under maximum load at the minimum AC input voltage described below.

Parameter	Minimum	Nominal	Maximum
RMS Input Voltage	90VAC	100–240VAC	264VAC
RMS Input Current	-	-	3.0A / 115VAC 1.5A / 230VAC
Input Frequency	47Hz	50/60Hz	63Hz

Table 2-1 XLM 240 Series Input Parameters

2.2 Input Over Current Protection

The XLM 240 series incorporate a primary AC line fuse for input over current protection to prevent damage to the power supply and meet product safety requirements as outlined in Section 1.2.

2.3 Inrush Current Limiting

The cold-start (25°C) inrush current at 90° input phase angle (i.e. AC switch is closed at the peak of the AC sine wave input) is limited to less than 90 Amps peak for 230 VAC and 45 Amps peak for 115VAC.

Repetitive ON-OFF cycling of the AC input voltage should not damage the power supply or cause the input fuse to open.

2.4 Low Input Voltage

The application of an input voltage below the minimums specified in Table 2-1 shall not cause damage to the power supply.

2.5 Leakage Current

The leakage current from AC line or AC Neutral inputs to Earth Ground is <0.1mA/240Vac.

3.

DC Outputs

3.1 Output Voltage Regulation

The DC output voltages shall remain within the Minimum and Maximum limits of Table 3-1 when measured at the power supply connector under all specified line, load and environmental conditions contained herein.

Model	Output	Rated Voltage	Regulation	Minimum (VDC)	Nominal (VDC)	Maximum (VDC)
XLM#240-12	VOUT	12	±4%	11.52	12	12.48
XLM#240-15	VOUT	15	±4%	14.47	15	15.53
XLM#240-24	VOUT	24	±4%	23.04	24	24.96
XLM#240-48	VOUT	48	±4%	46.08	48	49.92
XLM#240-12, XLM#240-24, XLM#240-48	FAN SUPPLY	12	±5%	11.4	12	12.6
XLM#240-15		10.15	±8.5%	9.3	10.15	11

Table 3-1 Output Voltage Specifications

3.2 No Load Operation

The power supply will operate under a no load condition and will not result in damage to the supply. The power supply will remain stable and operate normally after application of loads.

3.3 Output Current/Power

The maximum available output power is always a function of the input voltage, cooling airflow and temperature. The output currents listed in Table 3-2 are with the Forced Air internal fan included inside the power supply at no more than 50°C.

Model	Rated Output	Minimum Load	Maximum Load
XLM#240-12	12V	0 A	20.0 A
XLM#240-15	15V	0 A	16.0 A
XLM#240-24	24V	0 A	10.0 A
XLM#240-48	48V	0 A	5.0 A
All : FAN SUPPLY	12V (10.15V for XLM#240-15)	0 A	0.5 A (for fan supply usage only)

Table 3-2 Max Load Currents

3.3.1 Input Voltage Derating

The XLM 240 series can be operated at the minimum input voltage of 90VAC with the maximum load of 80% of the total maximum output power. From 90VAC to 115VAC, the output load can be increased by 0.8%/VAC.

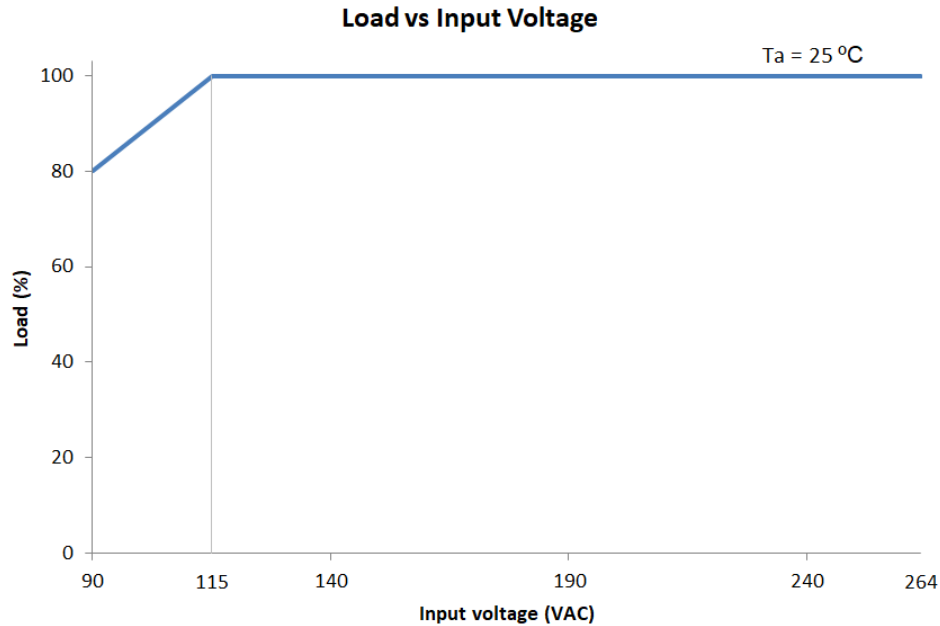


Figure 3-1 Load vs. Input Voltage

3.4 Cooling

Required cooling is always dependent on output power needed and available space for cooling air flow with recommended internal testing for temperature rating after the power supply is mounted in the OEM product. Typically, the XLM 240 can operate in a convection cooling mode at 50°C with the maximum output power of 160 watts. If more than 160 watts load is required at convection cooling mode with ambient temperature less than 50°C, the OEM will have to do internal testing to make sure what the maximum power is available. For optimum cooling, it is recommended that the power supply is mounted open side up with 10-CFM of forced-air cooling impinging downward in the center of the open topside. With proper cooling, the XLM 240 can deliver 240 watts of power at a maximum internal temperature rating of 50°C.

3.4.1 High Temperature Derating

The XLM 240 series can be operated at elevated temperatures by derating the total maximum output power (or current) by 2.1%/°C from 50°C to 70°C.

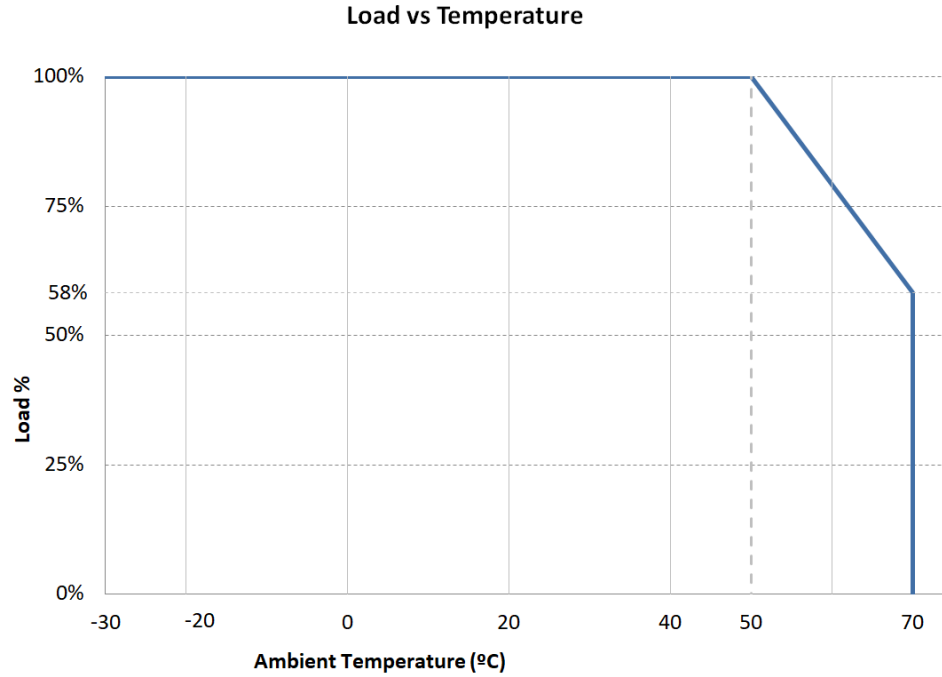


Figure 3-2 Temperature Derating Curve

(For convection usage, "100% available power" is 160 watts @ 50°C.
With 10CFM Airflow, "100% available power" is 240 watts @ 50°C.)

3.5 Output Ripple/Noise

Output ripple voltage and noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with 0.1 μ F & 47 μ F in parallel. The ripple noise is measured from the output pin connectors (VOUT and RTN).

3.5.1 Ripple/Noise Limits

The ripple voltage of the outputs is measured at the pins of the mating connector. Ripple and noise shall not exceed the limits specified in Table 3-3 under any condition of line voltage and frequency specified in Section 2.1 and DC loading specified in Section 3-1.

Model	Output	Voltage	Maximum Ripple+Noise (peak-to-peak)
XLM#240-12	VOUT	12V	120mV
XLM#240-15	VOUT	15V	150mV
XLM#240-24	VOUT	24V	240mV
XLM#240-48	VOUT	48V	480mV

Table 3-3 Ripple Voltage

3.5.2 Ripple/Noise Test Setup

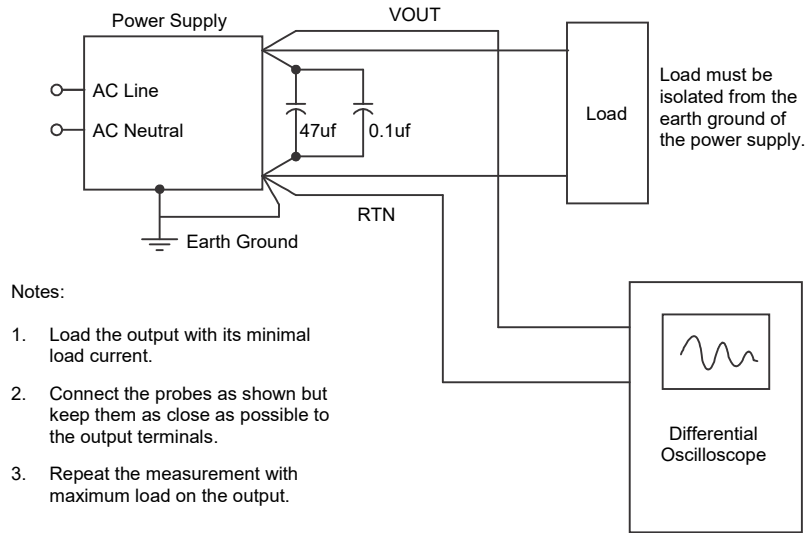


Figure 3-3 Ripple Noise Measurement Setup

3.6 Output Protection

There are three different output protection schemes designed to protect the load and the XLM 240 series from component failures and extraordinary circumstances.

3.6.1 Over Temperature Protection (OTP)

If the XLM 240 models are operated without adequate cooling they will sense an over-temperature condition by detecting primary and secondary heat and shut themselves down. The power supplies will recover automatically after the temperature goes down to below its maximum operating temperature.

3.6.2 Over Voltage Protection (OVP)

No single fault is able to cause a sustained over voltage condition on any output. When an over-voltage condition occurs, the power supply will shut down and recover automatically after the fault causing over voltage condition is removed.

Model	Minimum	Nominal	Maximum
XLM#240-12	12.6 V	14.4 V	16.2 V
XLM#240-15	15.8 V	18.0 V	20.3 V
XLM#240-24	25.2 V	28.8 V	32.4 V
XLM#240-48	50.4 V	57.6 V	64.8 V

Table 3-4 Over Voltage Protection Limits

3.6.3 Over Current Protection (OCP)

An excessive load on the VOUT output will induce constant-current limiting which will cause the output voltage to droop. The constant-current limiter has a threshold of with the range of 105~175% of the rated output current. Overload current applied to the output will cause the output to shut down. The power supply will periodically attempt to restart until the over-current condition is removed.

3.6.4 Short Circuit Protection

A short circuit is defined as an impedance of less than 0.1 ohms placed between RTN and any output. A short circuit will cause no damage to the power supply, but will cause it to shut down. The power supply will periodically attempt a restart until the short circuit condition is removed. After successfully restarting, the power supply will operate normally.

3.7 Output Rise Time

All output voltages shall rise from 10% to 90% of nominal output voltage within 20ms. The output voltages waveform must be a monotonic ramp from 10% to 90% of final set point within the regulation band under any loading conditions specified in the respective load current tables in Table 3-2.

For the purposes of this specification, a monotonic ramp is defined as always having a positive slope from zero to $10 \times V_{OUT}$ volts/millisecond. During any 5-millisecond portion of the ramp, its slope must be greater than 5% of its rated voltage per millisecond.

3.8 Overshoot at Turn On/Turn Off

The output voltage overshoot upon the application or removal of the input mains voltage is less than 5% for all XLM 240 models above the nominal voltage. No opposite polarity voltage will be present on any output during turn on or turn off.

4.

General Specifications

4.1 Environmental

The XLM 240 series meets or exceeds the following environmental specifications:

Parameter	Conditions	Specification	Remarks
	Operating	-30°C to 70°C*	
	Non-Operating	-30°C to 85°C*	
Relative Humidity	Operating	20-90% Maximum	Non-Condensing
	Non-Operating	95% Maximum	Non-Condensing
Altitude	Operating	16404 feet MSL Max.	5,000 meters
Vibration	No damage	2.0 G RMS Maximum	10-500Hz, 10-min/1cycle, 60 min each along x, y, z axis. Mounting: Compliance to IEC60068-2-6 and IEC60068-2-64
		2.0 G RMS Maximum	

Table 4-1 Environmental Specifications

Note on (*): Refer to **Figure 3-2** for derating at different temperatures.

4.2 Mean Time Between Failures

The calculated MTBF of all models is equal to or greater than 250,000 hours of continuous operation at maximum output loading and worst-case input line voltage with convection cooling at 25°C. N2Power does not warrant the MTBF to be representative of any particular unit. The MTBF of the power supply is calculated in accordance with (MIL-HDBK-217F). Actual failure rates vary from unit to unit.

4.3 Labeling/Marking

The power supply is marked and labeled with the N2Power logo and part number, model number, input and output specifications, production code, appropriate safety agency logos and CE mark. A typical label is pictured below.

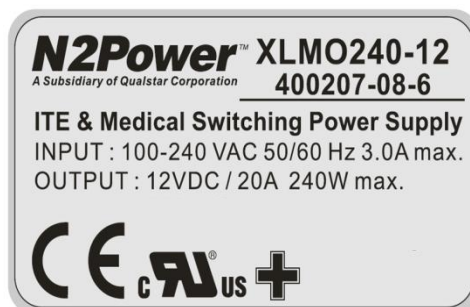


Figure 4-1 Sample XLM 240 series Labels

4.4 Net Weight

Model	Pound	Ounces	Kilograms
XLMO240	0.52	8.25	0.23
XLMO240	0.65	10.48	0.30
XLME240	0.72	11.57	0.33

Table 4-2 Net Weights

4.5 Mounting and Physical Dimensions

The XLM 240 power supplies may be mounted with the following screws.

Model	Bottom Mounting	Side Mounting
XLMO240	(open frame)	(open frame)
XLMO240	M3, length 2.5	M3, length 2.5
XLME240	M3, length 2.5	M3, length 2.5

Table 4-3 Mounting Screw Sizes

The power supplies may be mounted on their bottom surface or their sides. See mechanical drawings for mounting hole locations and the dimensions of the power supplies. All the units are in “mm[in]” format.

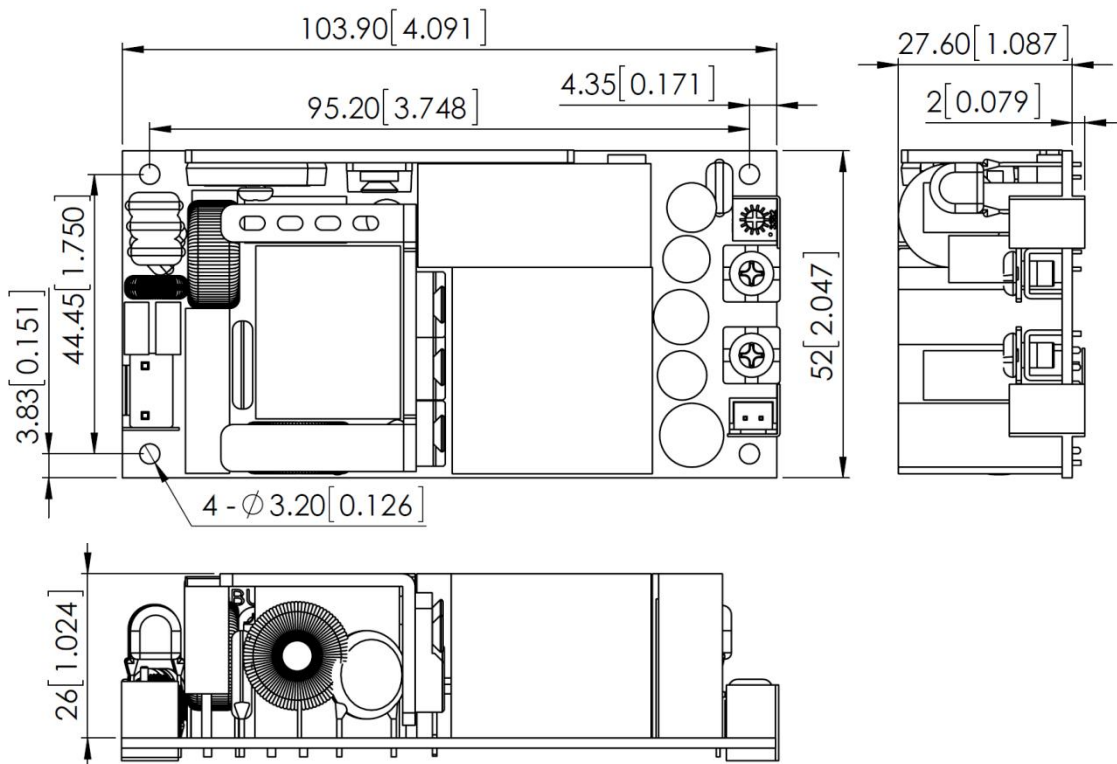


Figure 4-2 XLMO240 Mounting Hole Locations and Dimensions

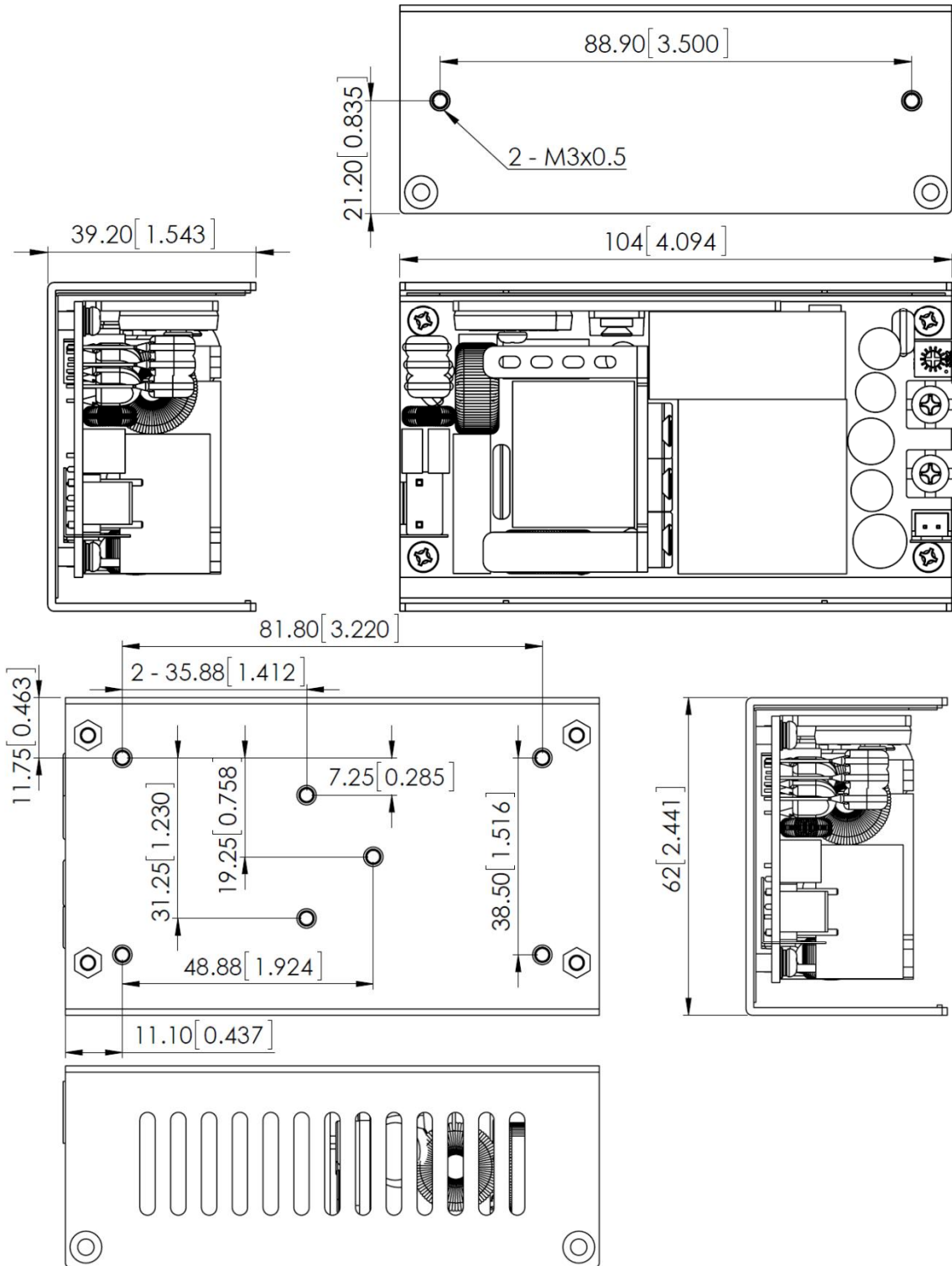


Figure 4-3 XMLU240 Mounting Hole Locations and Dimensions

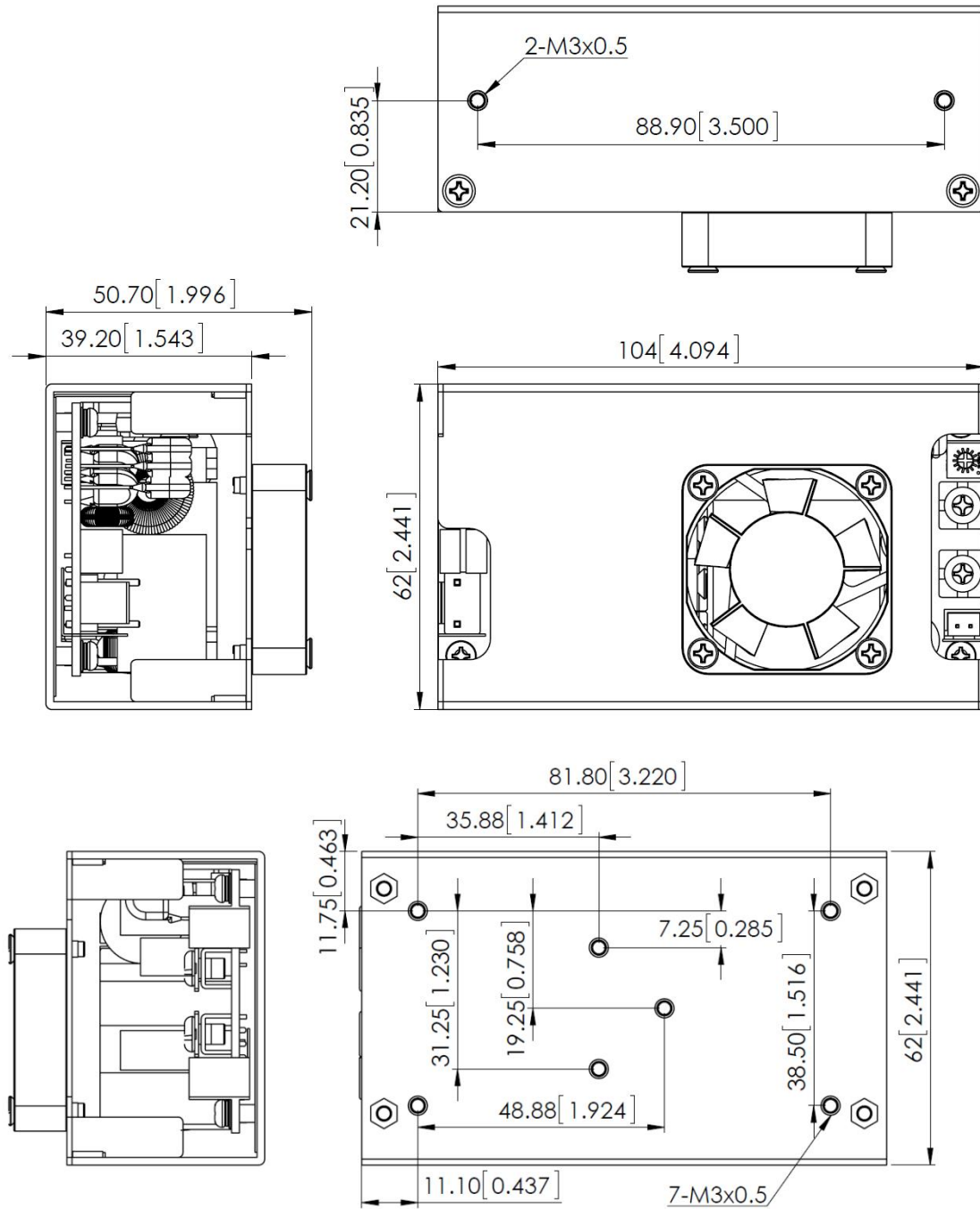


Figure 4-4 XMLE240 Mounting Hole Locations and Dimensions

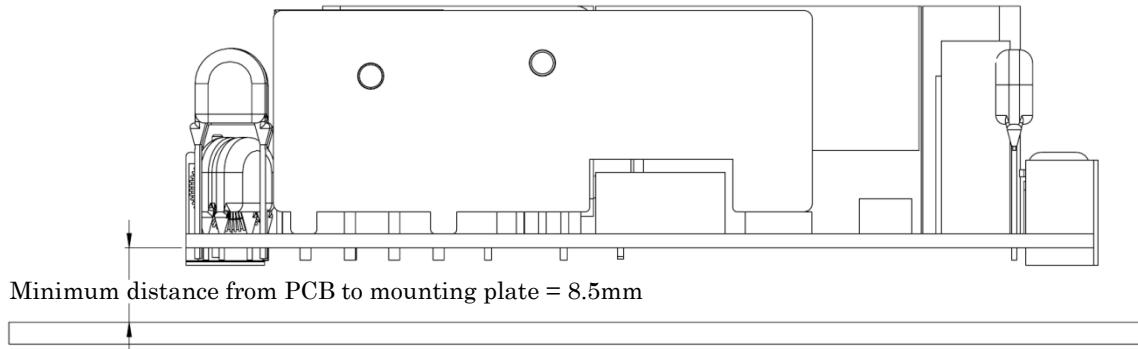


Figure 4-5 XMLO240 minimum distance requirement from mounting plate

The distance from the mounting plate (FG Plane) to the PCB must be at least 8.5mm.

A standoff less than 8.5mm high is acceptable when a thin insulator, 0.4mm thick (polyester, fish paper or equivalent UL rated 94V-2 minimum) is placed between the power supply and the mounting chassis (refer to applicable UL standard for clearance requirements).

4.6 Mating Connectors

The user must furnish all mating connectors. The mating connectors must meet the requirements of all applicable safety agencies (UL and/or TUV).

Model	Designator	Connector	Mating Housing	Terminal
ALL	AC INPUT	B3P-VH	VHR-3N	SVH-21T-P1.1
XLM#240	+/-VOUT (DC Output) (Standard)	M4 Pan Head Screw		Ring-lug
	+/-VOUT (DC Output) (A Type)	B6P-VH	VHR-6N	SVH-21T-P1.1
	FAN (DC Output)	B2B-XH-A	XHP-2	SXH-001T-P0.6, SXH-002T-P0.6

Table 4-4 Mounting Screw Sizes

4.7 Output Grounding

The RTN signal may be connected to the power supply chassis ground (safety earth) screw terminals on the power supplies as shown in Figure 4-6.

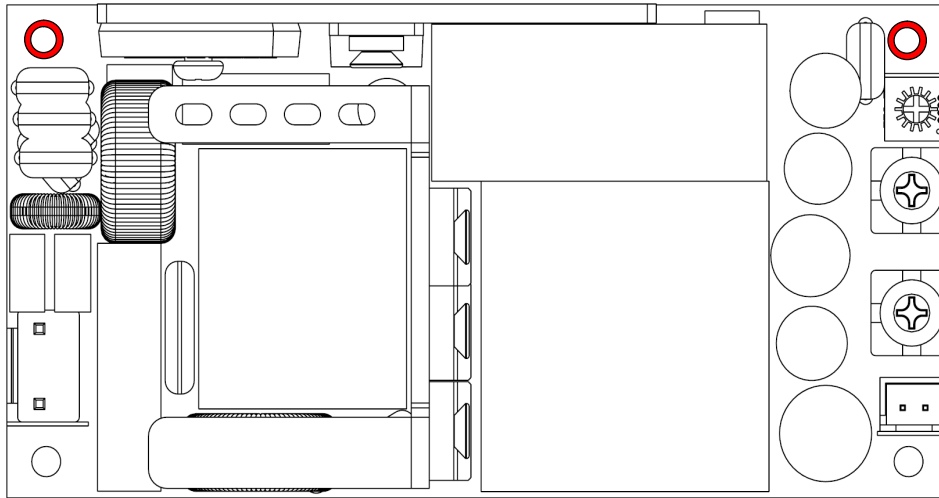


Figure 4-6 XLM 240 Grounding Location

4.8 Pin Definitions

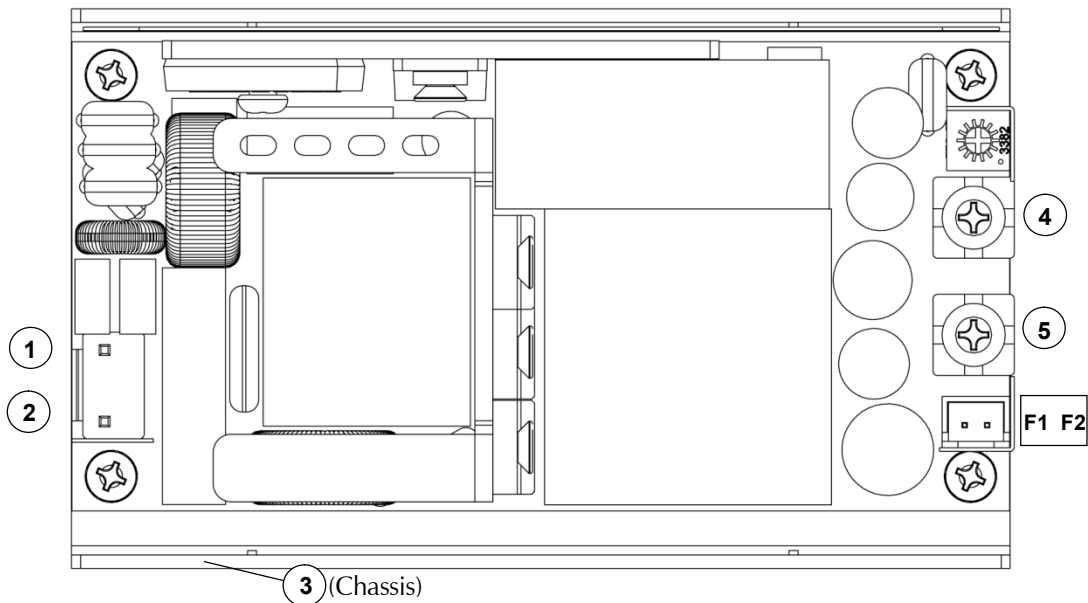


Figure 4-7 XLMU240 Pin Definitions

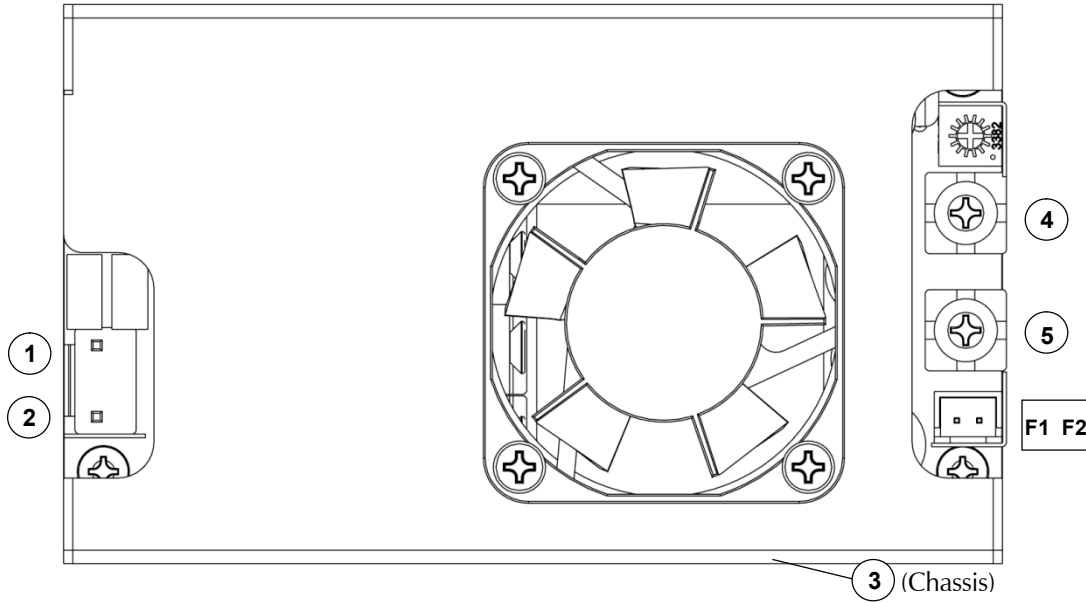


Figure 4-8 XLME240 Pin Definitions

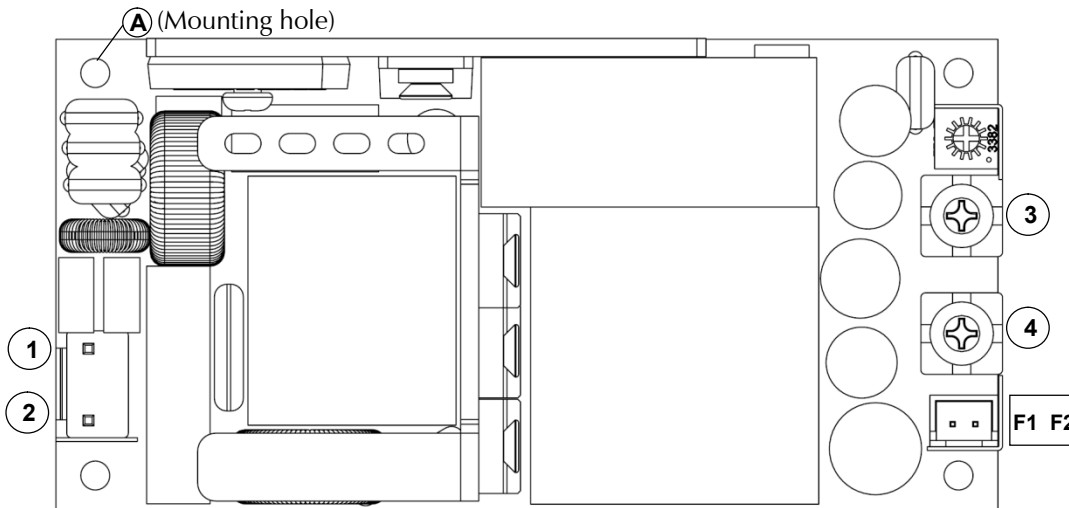


Figure 4-9 XLMO240 Pin Definitions

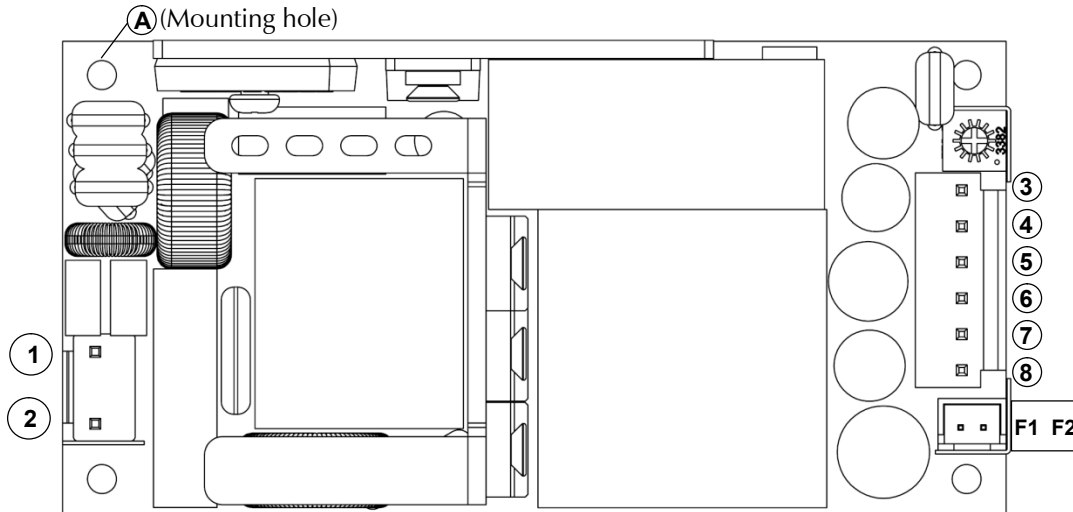


Figure 4-10 XLMO240 (Type A) Pin Definitions

Model	Connector	Pin No.	Assignment
XLMU240 & XLME240	AC Input Terminal	1	AC NEUTRAL
		2	AC LINE
		3	FG
	Main Output	4	VOUT (+Output)
		5	RTN (Main Output Return)
	Connector (FAN)	F1	+12V (+12V fan supply)
F2		RTN (Return)	
XLMO240	AC Input Terminal	A	FG
		1	AC NEUTRAL
		2	AC LINE
	Main Output	3	VOUT (+Output)
		4	RTN (Main Output Return)
	Connector (FAN)	F1	+12V (+12V fan supply)
F2		RTN (Return)	
XLM#240 (Type A Models)	AC Input Terminal	A	FG
		1	AC NEUTRAL
		2	AC LINE
	Main Output	3	VOUT (+Output)
		4	VOUT (+Output)
		5	VOUT (+Output)
		6	RTN (Main Output Return)
		7	RTN (Main Output Return)
	Connector (FAN)	8	RTN (Main Output Return)
		F1	+12Vfan supply
	F2	RTN (Return)	

Table 4-5 Pin Definitions

5.

Efficiency

The efficiencies for the XLM 240 power supply models are listed below. They were measured at full load, 25 °C, at 230AC.

Model:	Output	Load	AC	Efficiency
XLM#240	12V	20.0A	230VAC	92.5%
XLM#240	15V	16.0A	230VAC	92.5%
XLM#240	24V	10.0A	230VAC	93.0%
XLM#240	48V	5.0A	230VAC	94.0%

Table 5-1 Output Currents at Rated Efficiency

6.

Timing and Control

6.1 Power Supply Timing

The maximum duration for the output to rise up to regulated output voltage (99% of nominal voltage) from the start of AC input voltage is 1 second.

6.2 Voltage Hold-Up Time

The power supply will maintain output regulation per Table 3-1 despite a loss of input power at 100VAC/50Hz and 230VAC/50Hz at maximum rated continuous output for a minimum of 8ms.

7.

Ordering Information

The following table provides the N2Power part numbers that should appear on your purchase order and will appear on any N2Power correspondence:

Model Number	VOUT	N2Power Part Number
XLMO240-12	12V	400207-05-2
XLMO240-15	15V	400207-14-3
XLMO240-24	24V	400207-06-0
XLMO240-48	48V	400207-07-8
XLMU240-12	12V	400207-08-6
XLMU240-15	15V	400207-15-1
XLMU240-24	24V	400207-09-4
XLMU240-48	48V	400207-10-2
XLME240-12	12V	400207-11-0
XLME240-15	15V	400207-16-9
XLME240-24	24V	400207-12-8
XLME240-48	48V	400207-13-6

Table 7-1 XLM 240 Part Numbers

There are “type A” option models with different output connector. (Refer to Figure 4-10)

All XLM power supplies are RoHS compliant. For warranty information, refer to www.n2power.com. Direct all questions, orders or requests for quotation as follows:

N2Power Order Desk: orders@n2power.com 805-583-7744 x112
Fax (Attention N2Power): 805-978-5212
Sales: sales@n2power.com 805-583-7744 x122
Technical Support: techsupport@n2power.com 805-583-7744 x119
Address: 1267 Flynn Road
Camarillo, CA 93012