



Product Specification

Industrial & Medical

XLM 240 series

240W AC-DC

Power Supplies

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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 XML0240, XMLU240 and XMLE240 models comply with the following international agency standards:

| Safety | Complies with Standard | Remarks |
|---|---|--|
| United States | UL 60950-1 UL 60601-1 UL 62368-1 | I/P-O/P: 4000VAC; I/P-GND: 2000VAC 2MOPP |
| Canada | CAN/CSA-C22.2 No. 60950-1 CAN/CSA-C22.2 No. 60601-1 CAN/CSA-C22.2 No. 62368-1 | |
| EU Council | EN 60950-1 EN 60601-1 EN 62368-1 | |
| International | IEC 60950-1 IEC 60601-1 IEC 62368-1 | |
| EMC | Complies with Standard | Remarks |
| Emission | EN55032 EN55011 EN 60601-1-2 IEC 61000-3-2 IEC 61000-3-3 | Conducted Emission: Class B Radiated Emission: Class I-Class B/ Class II Class A Harmonic Current Emissions Voltage Fluctuations & Flicker |
| Immunity | EN 60601-1-2 EN 61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 EN61000-4-11 | Electrostatic Discharge Radiated Susceptibility Fast Transient/Burst Immunity Power Mains Surge Immunity Conducted Susceptibility Power Frequency Magnetic Field Voltage Dips, Short interruptions |
| Reduction of Hazardous Substances (RoHS) | | Remarks |
| EU Council | 2002/95/EC 2011/65/EU 2015/863/EU | RoHS Directive RoHS 2 Directive Amending Annex II to Directive |
| Marks of Conformance | | |
| United States & Canada |  Underwriters Laboratories File E469416 (Medical), E211115 (Industrial) |  |
| EU Council |  | |
| RoHS |   | |

Table 1-1 Agency Compliance

2.

AC Input

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.

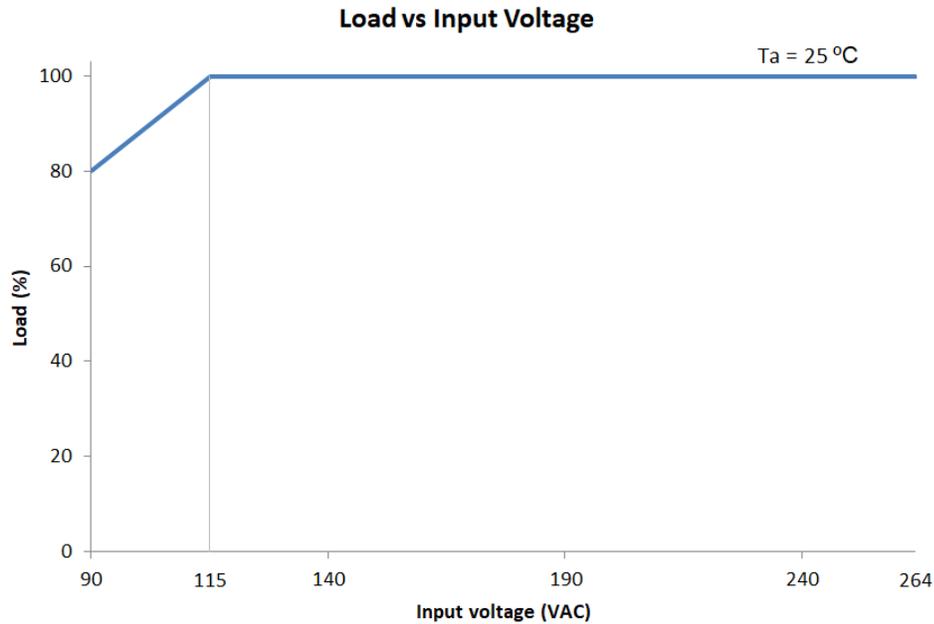


Figure 3-1 Load vs. Input Voltage

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.

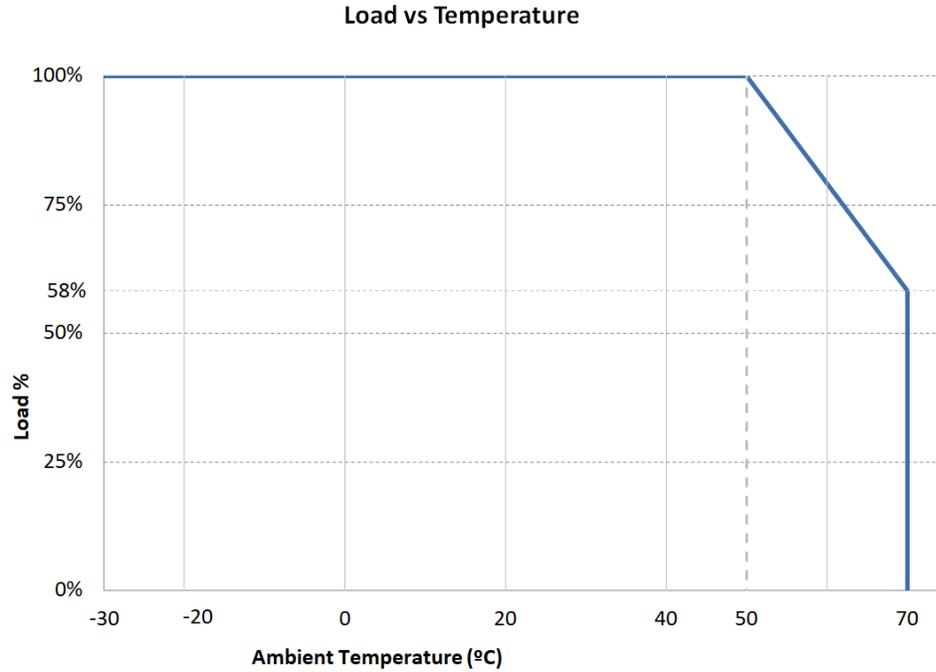


Figure 3-2 Temperature Derating Curve

(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

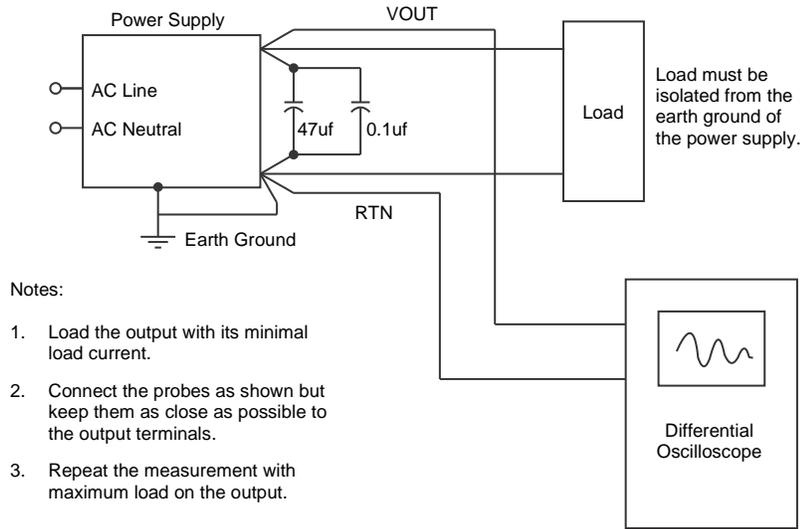


Figure 3-3 Ripple Noise Measurement Setup

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.

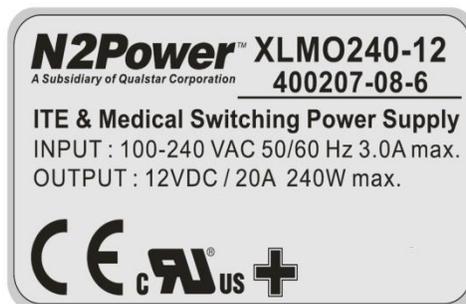


Figure 4-1 Sample XLM 240 series Labels

4.4 Net Weight

| Model | Pound | Ounces | Kilograms |
|---------|-------|--------|-----------|
| XLMO240 | 0.52 | 8.25 | 0.23 |
| XLMU240 | 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) |
| XLMU240 | 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.

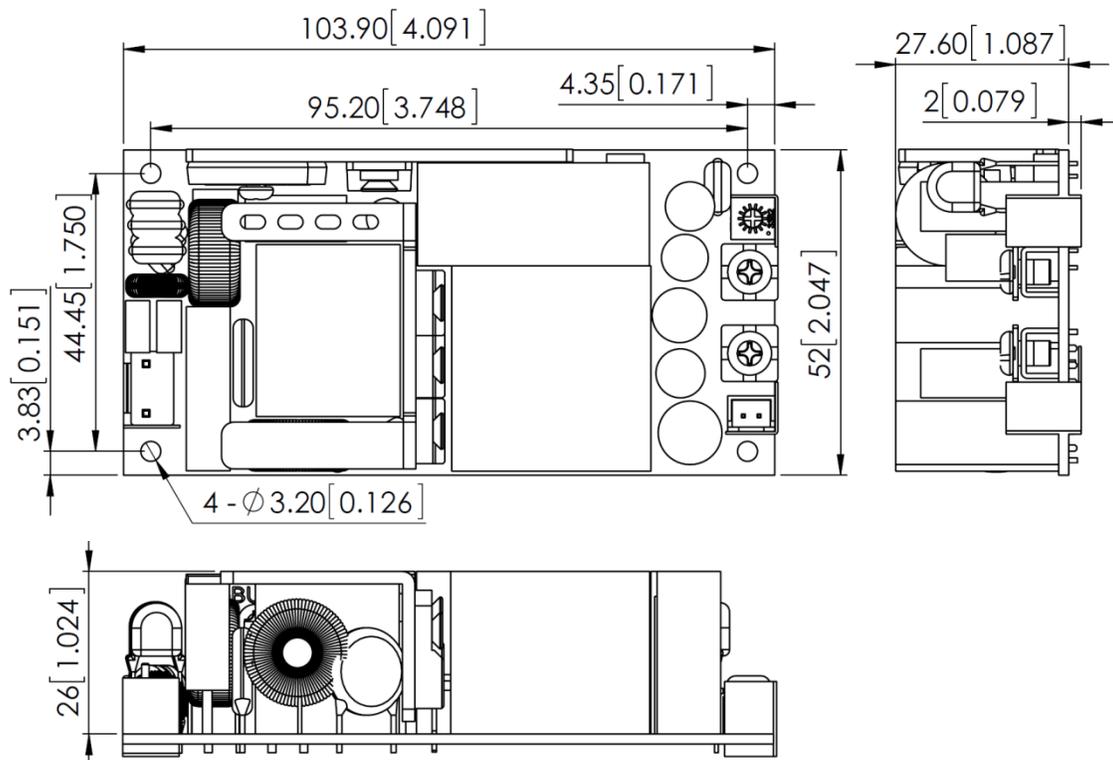


Figure 4-2 XLMO240 Mounting Hole Locations and Dimensions

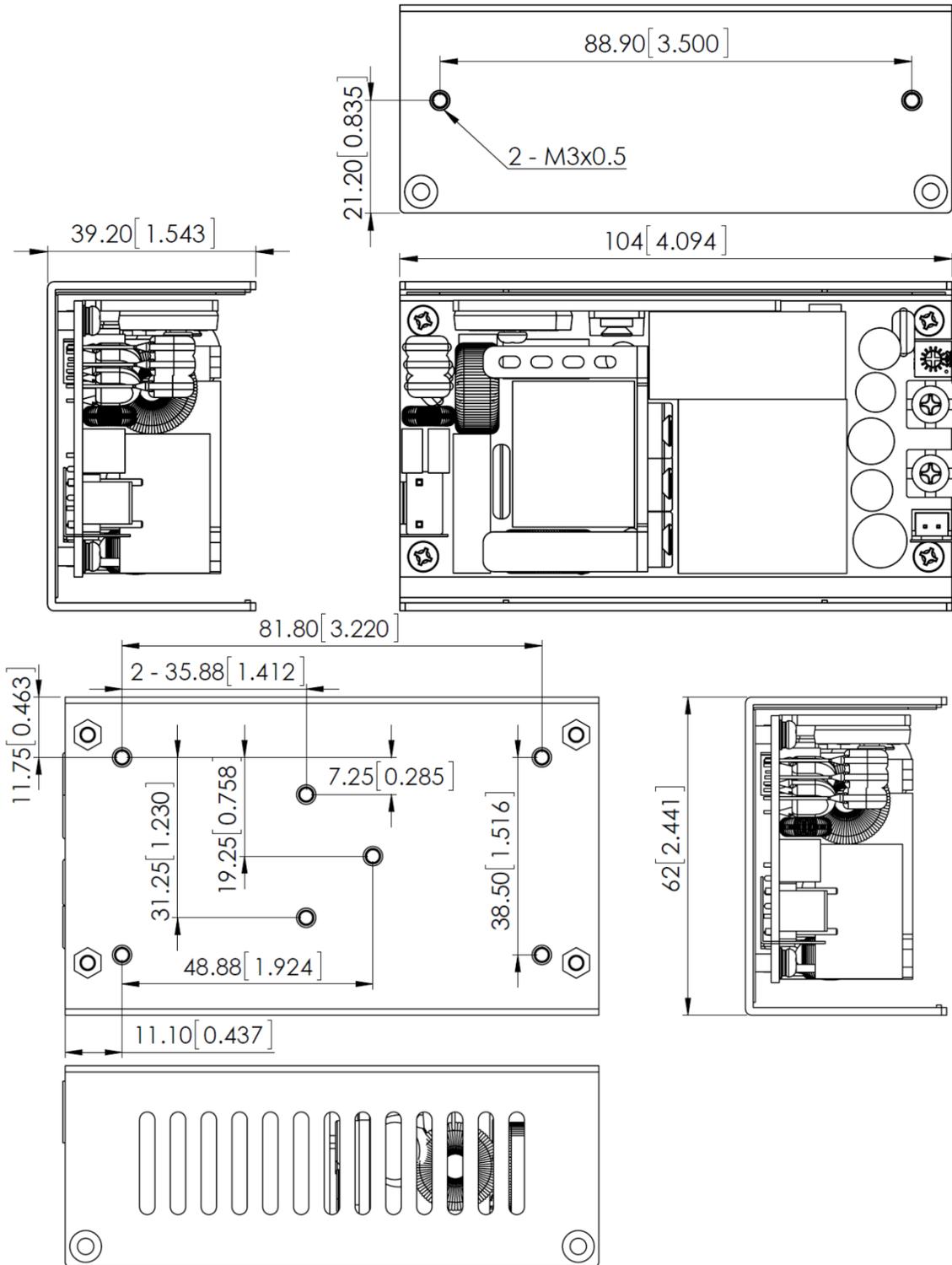


Figure 4-3 XMLU240 Mounting Hole Locations and Dimensions

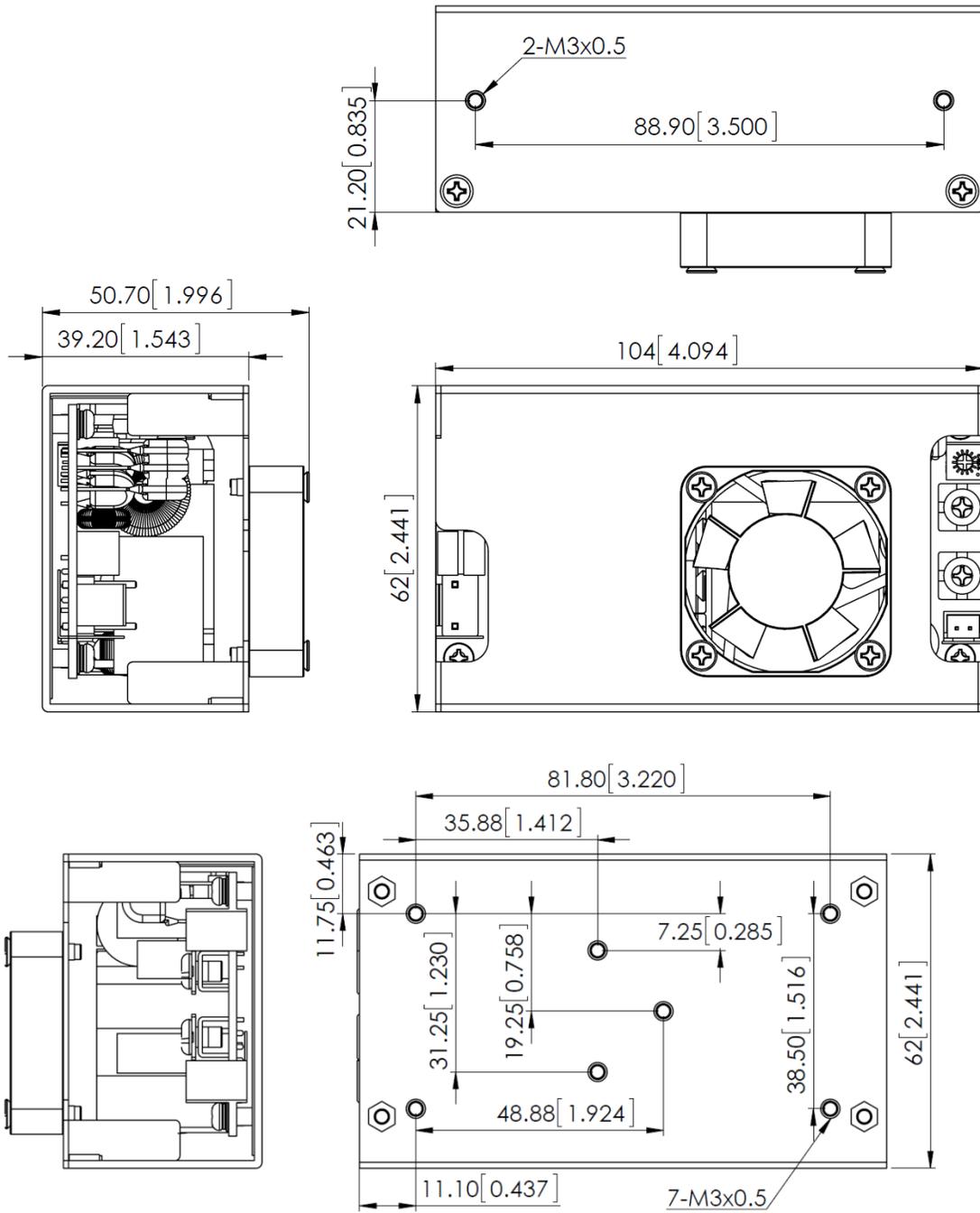


Figure 4-4 XMLE240 Mounting Hole Locations and Dimensions

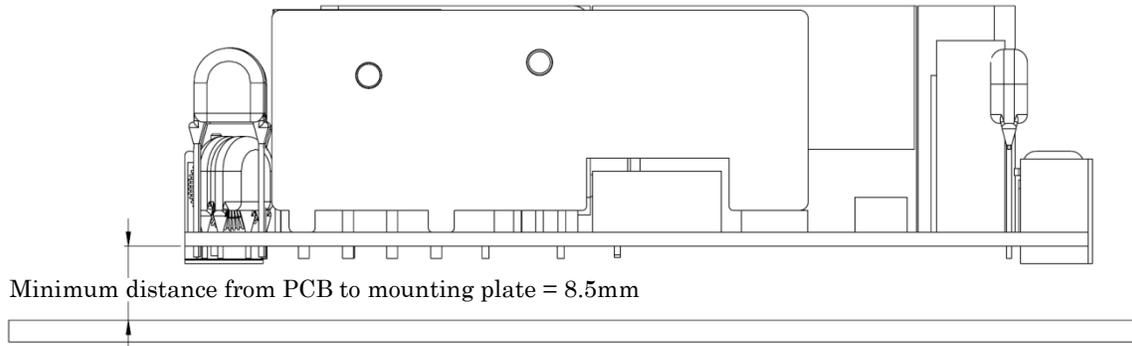


Figure 4-5 XML0240 minimum distance requirement from mounting plate

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.

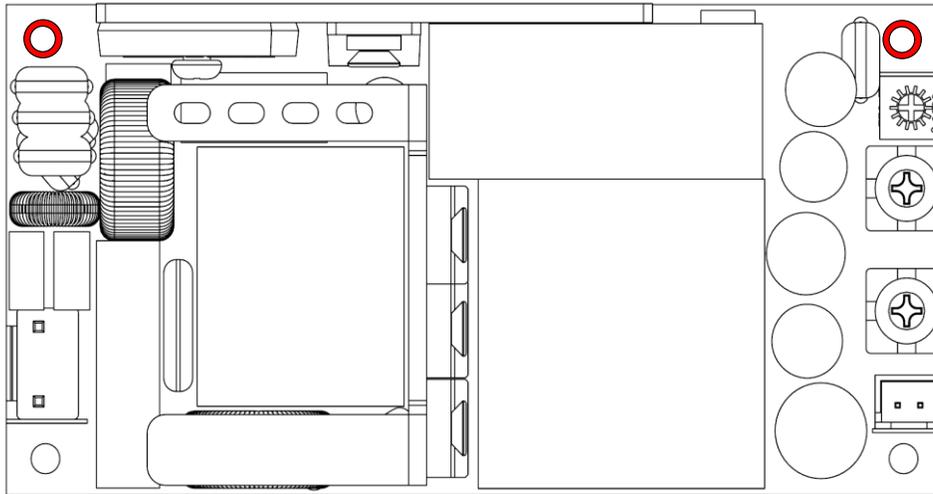


Figure 4-6 XLM 240 Grounding Location

4.8 Pin Definitions

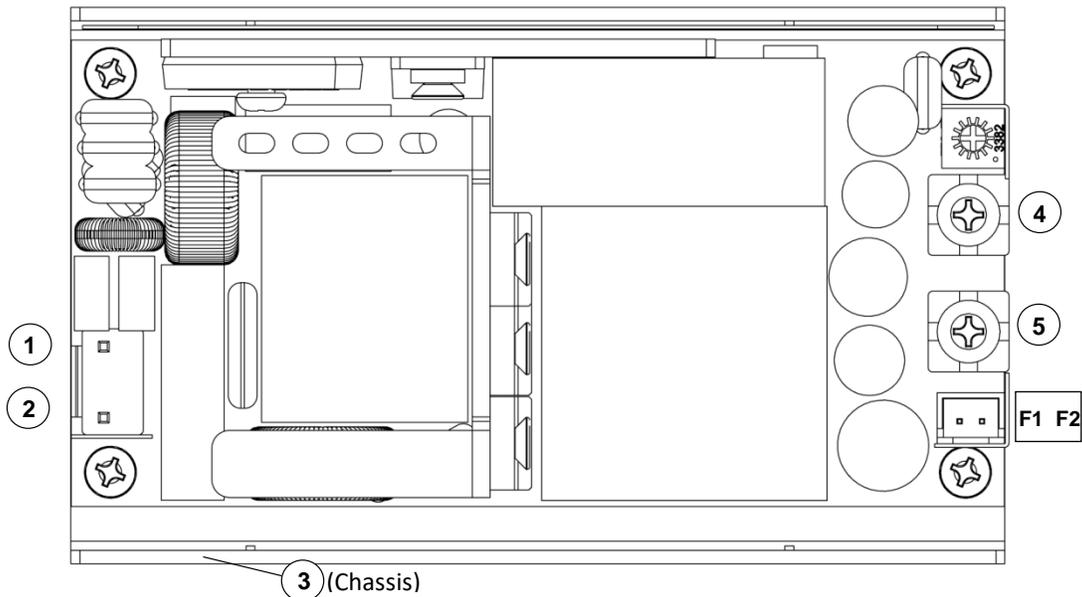


Figure 4-7 XLMU240 Pin Definitions

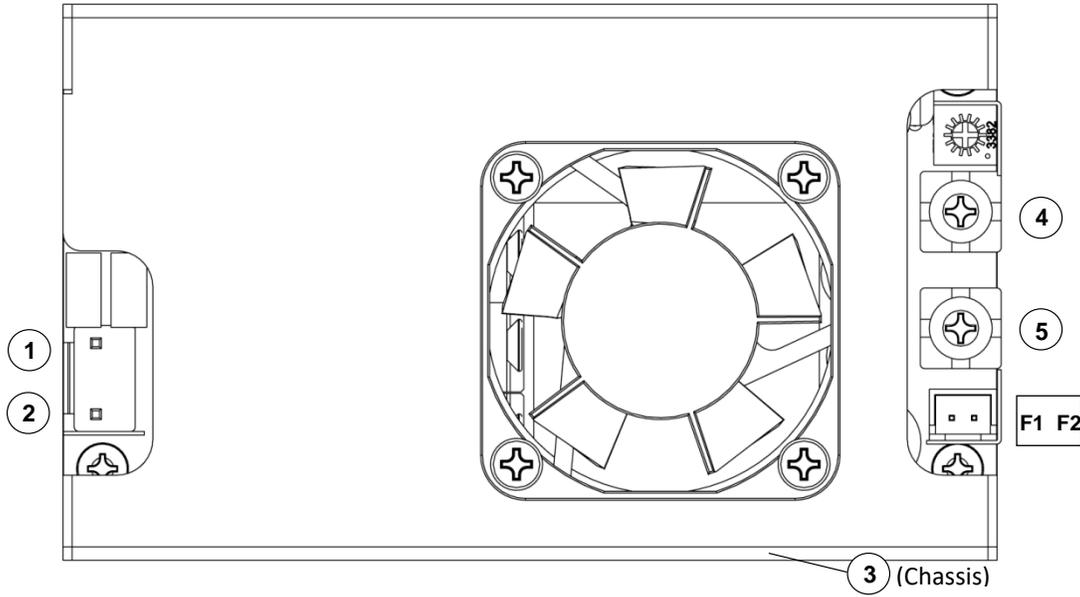


Figure 4-8 XLME240 Pin Definitions

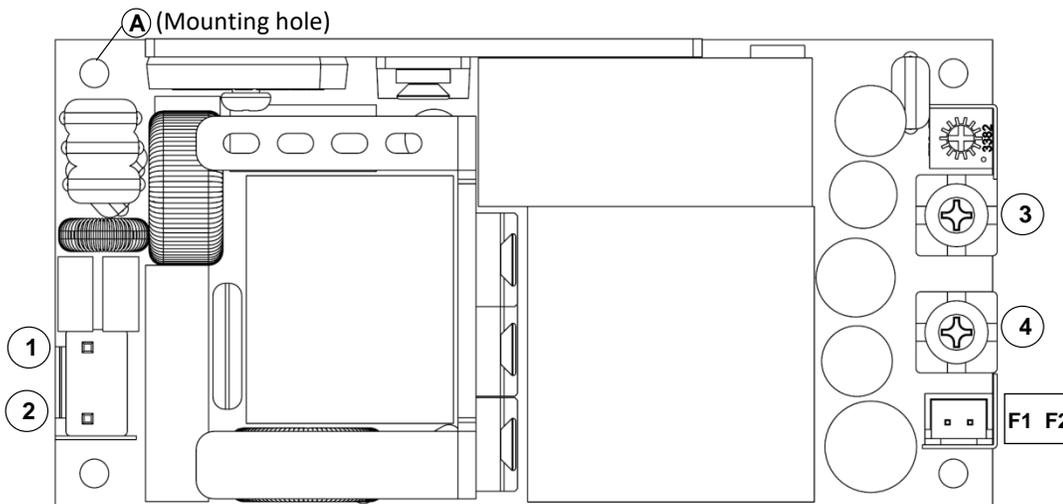


Figure 4-9 XLMO240 Pin Definitions

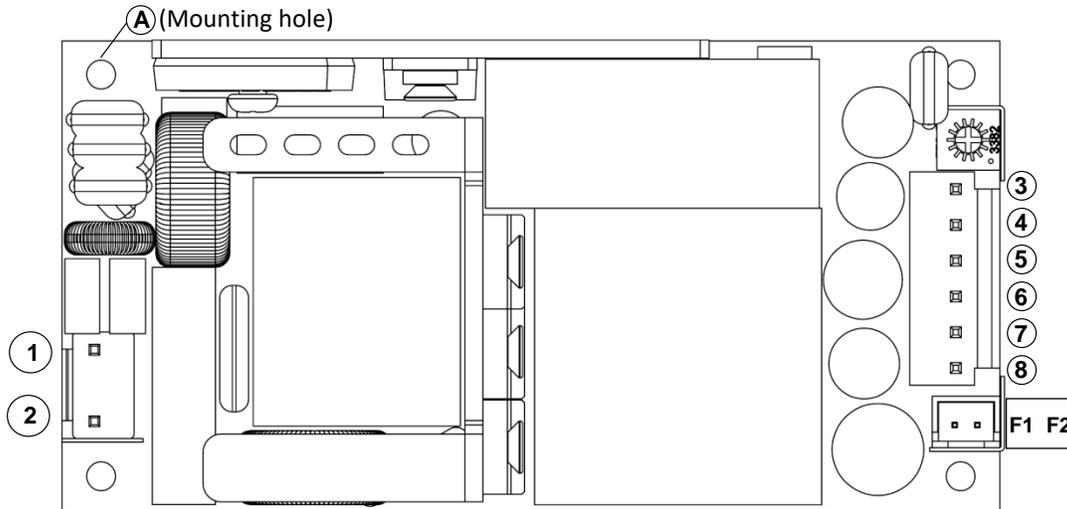


Figure 4-10 XLMO240 (Type A) Pin Definitions

| 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:

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