



Product Specification

# **XS125 series**

**125 W AC-DC**

**Power Supplies**

Document No. 702701 Rev. 09-09-22

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# 1.

# Introduction

## 1.1 Introduction

This specification defines the XS125 series of universal input, single output 125W switchmode power supplies. It includes information regarding the mechanical details, electrical and environmental ranges for storage and operation of the power supply. These power supplies achieve very high packaging densities. All of the XS125 family models are listed in Table 3-1.

All models of the XS125 series can be used as standalone power supplies and have different chassis options – XSO125 for Open frame, XSU125 for U Chassis, XSE125 for Enclosure and XSD125 for Din rail.



XSO125



XSU125



XSE125



XSD125

Figure 1-1 XS125 Series

## 1.2 Agency Compliance

All of the XS125 models comply with the following international agency

Safety	Complies with Standard	Remarks
United States	UL 62368-1  (Information and Communications Technology) and AV (Audio/Video) equipment)	I/P-O/P: 3000VAC; I/P-GND: 1500VAC
Canada	CSA 22.2 62368-1	
EU Council	2014/35/EU	Low Voltage Directive
International	IEC/EN 62368-1	
United States	FCC Part 15, Subpart B	Conducted (Class B)* Radiated (Class A)
EU Council	2014/30/EU	EMC Directive
<b>EMC</b>	<b>Complies with Standard</b>	<b>Remarks</b>
International	EN55032: 2015+AC: 2016  EN61000-3-2 EN61000-3-3  EN55024: 2010 + A1: 2015  EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 EN61000-4-11	Conducted (Class B)* Radiated (Class A)  Harmonic Current Emissions Voltage Fluctuations & Flicker  Immunity Standard  Electrostatic discharge immunity Radio frequency immunity Electrical fast transient burst immunity Power line surge immunity RF Common mode immunity Power frequency magnetic field immunity Voltage dips and short interruptions immunity

\*External components may be required for Class I application

Reduction of Hazardous Substances (RoHS)	Complies with Standard	Remarks
EU Council	2002/95/EC 2011/65/EU 2015/863/EU	RoHS Directive RoHS 2 Directive Amending Annex II to Directive 2011/65/EU

### Marks of Conformance

United States & Canada



Underwriters Laboratories File 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 XS125 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	85VAC	100–240VAC	264VAC
RMS Input Current	-	-	1.8 A / 100 VAC 0.7 A / 240 VAC
Input Frequency	47Hz	50/60Hz	63Hz

Table 2-1 XL65 Series Input Parameters

### 2.2 Input Over Current Protection

The XS125 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 100 Amps peak for 230 VAC.

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 less than 300 uA at 264 VAC.

# 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	Rated Voltage (VDC)	Load Regulation	Minimum (VDC)	Nominal (VDC)	Maximum (VDC)
XS#125-12	12V	±1.0%	11.88	12	12.12
XS#125-15	15V	±1.0%	13.85	15	15.15
XS#125-18	18V	±1.0%	17.82	18	18.18
XS#125-24	24V	±1.0%	23.76	24	24.24
XS#125-28	28V	±1.0%	27.72	28	28.28
XS#125-36	36V	±1.0%	35.64	36	36.36
XS#125-48	48V	±1.0%	47.52	48	48.48

**Table 3-1 Output Voltage Specifications**

Note: “#” denotes the type of chassis, which can be  
O =Open frame, U=U Chassis, E=Enclosure, D=Din Rail

## 3.2 No Load Operation

The power supply will operate under 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

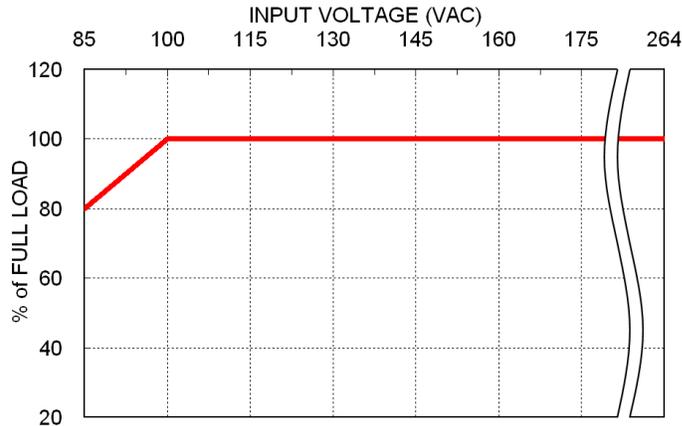
The maximum available output power is always a function of the input voltage and ambient temperature. The maximum output currents of all models of XS125 are listed in Table 3-2. Refer to Section 3.3.1 and 3.4.1 for input voltage range and ambient temperature at which XS125 can deliver these maximum output powers.

MODEL	VOLTAGE	MAXIMUM CURRENT (A) with 400LFM	MAXIMUM CURRENT (A) Convection
XS#125-12	12V	10.42	8.34
XS#125-15	15V	8.34	6.67
XS#125-18	18V	6.95	5.56
XS#125-24	24V	5.21	4.17
XS#125-28	28V	4.47	3.58
XS#125-36	36V	3.48	2.78
XS#126-48	48V	2.61	2.09

**Table 3-2 Max Load Currents**

#### 3.3.1 Input Voltage Derating

The XS125 series can be operated at the minimum input voltage of 85VAC with the maximum load of 80% of the total maximum output power. From 85VAC to 90VAC, the output load can be increased by 4%/VAC and from 90VAC onwards, the output load can be 100%.



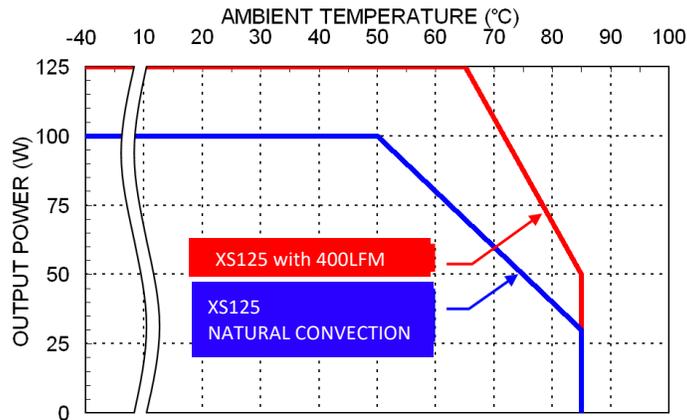
**Figure 3-1**  
**XS125 Derating Curve vs. Input Voltage**  
**Forced air cooling with 400LFM**

### 3.4 Cooling

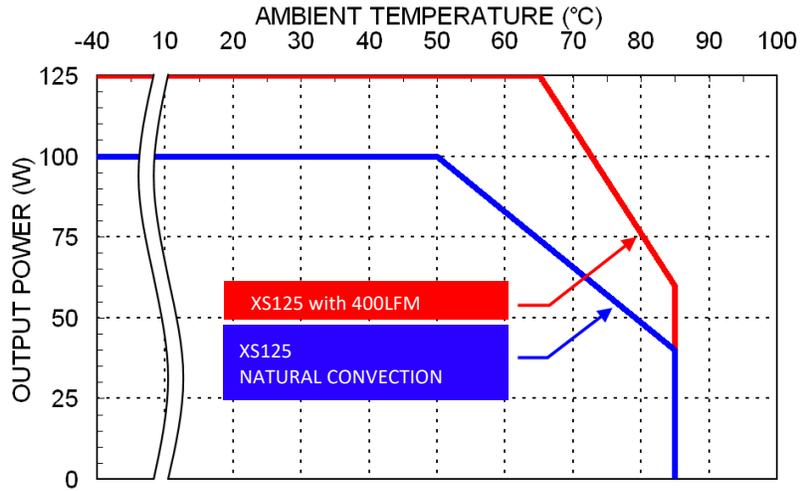
XS125 can deliver maximum output power with unrestricted convection cooling at 50 C. “Unrestricted” means there are no nearby obstructions that would impede the convection cooling process.

#### 3.4.1 High Temperature Derating

The XS125 series can be operated at elevated temperatures by derating the total maximum output power (or current). Refer to below graphs to get the maximum output power at a specific ambient temperature.



**Figure 3-2**  
**XS125 with 400 LFM & XS125 with Natural Convection**



**Figure 3-3**  
**XS125 with 400 LFM & XS125 with Natural Convection**

### **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 a ceramic capacitor (MLCC) in parallel. The capacitance value of this MLCCs are 10µF for 12V, 15V output models, 1µF for 24V, 28V, 36V output models or 0.1µF for 48V and 53V output models. The ripple noise is measured from the output pin connectors.

#### **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 3-2.

<b>MODEL</b>	<b>VOLTAGE</b>	<b>Ripple Noise ( P-P)</b>
XS#125-12	12V	140 mV
XS#125-15	15V	150 mV
XS#125-18	18V	150 mV
XS#125-24	24V	160 mV
XS#125-28	28V	180 mV
XS#125-36	36V	190 mV
XS#125-48	48V	340 mV

**Table 3-3 Ripple Voltage of XS125**

### 3.5.2 Ripple/Noise Test Setup

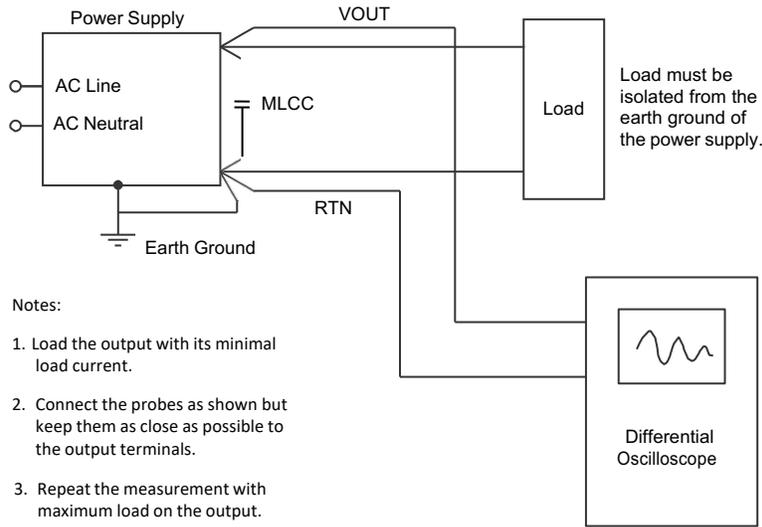


Figure 3-5 Ripple Noise Measurement Setup

## 3.6 Output Protection

There are output protection schemes designed to protect the load and the XS125 series from component failures and extraordinary circumstances.

### 3.6.1 Over Voltage Protection (OVP)

No single fault is able to cause a sustained over voltage condition on the output. When an over-voltage condition occurs at output, the power supply will shut down. Following an OVP event, the XS125 will not restart until AC power is turned off and back on.

Model	Output (VDC)	Minimum (VDC)	OVP Voltage	
			Nominal (VDC)	Maximum (VDC)
XS#125-12	12	13.8	15	16.2
XS#125-15	15	17.25	18.75	20.25
XS#125-18	18	20.7	22.5	24.3
XS#125-24	24	27.6	26.45	32.5
XS#125-28	28	32.2	30.8	37.8
XS#125-36	36	41.4	39.6	48.6
XS#125-48	48	55.2	57.6	64.8

Table 3-4 Over Voltage Protection Limits

### **3.6.2 Over Current Protection (OCP)**

An excessive load will cause the output to shut down. The maximum output power before the power supply shuts down is about 160% (typical) of the rated output power. The power supply will periodically attempt to restart until the over-current condition is removed.

### **3.6.3 Short Circuit Protection**

A short circuit is defined as an impedance of less than 0.1 ohms placed between RTN and 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**

Output voltage shall rise from 10% to 90% of nominal output voltage within 20ms. The output voltage 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  $10 \cdot V_{OUT}$  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 XS125 models above the nominal voltage. No opposite polarity voltage will be present on any output during turn on or turn off.

### 3.9 Voltage Trim

A potentiometer (see picture below) is provided to allow the user to adjust the output up or down by up to 10%. The ability of the output to maintain its specified regulation accuracy under severe load or line conditions could be diminished by trimming the output to a higher than nominal voltage. The load current and power should not exceed the maximum limits described in Section 3.3.

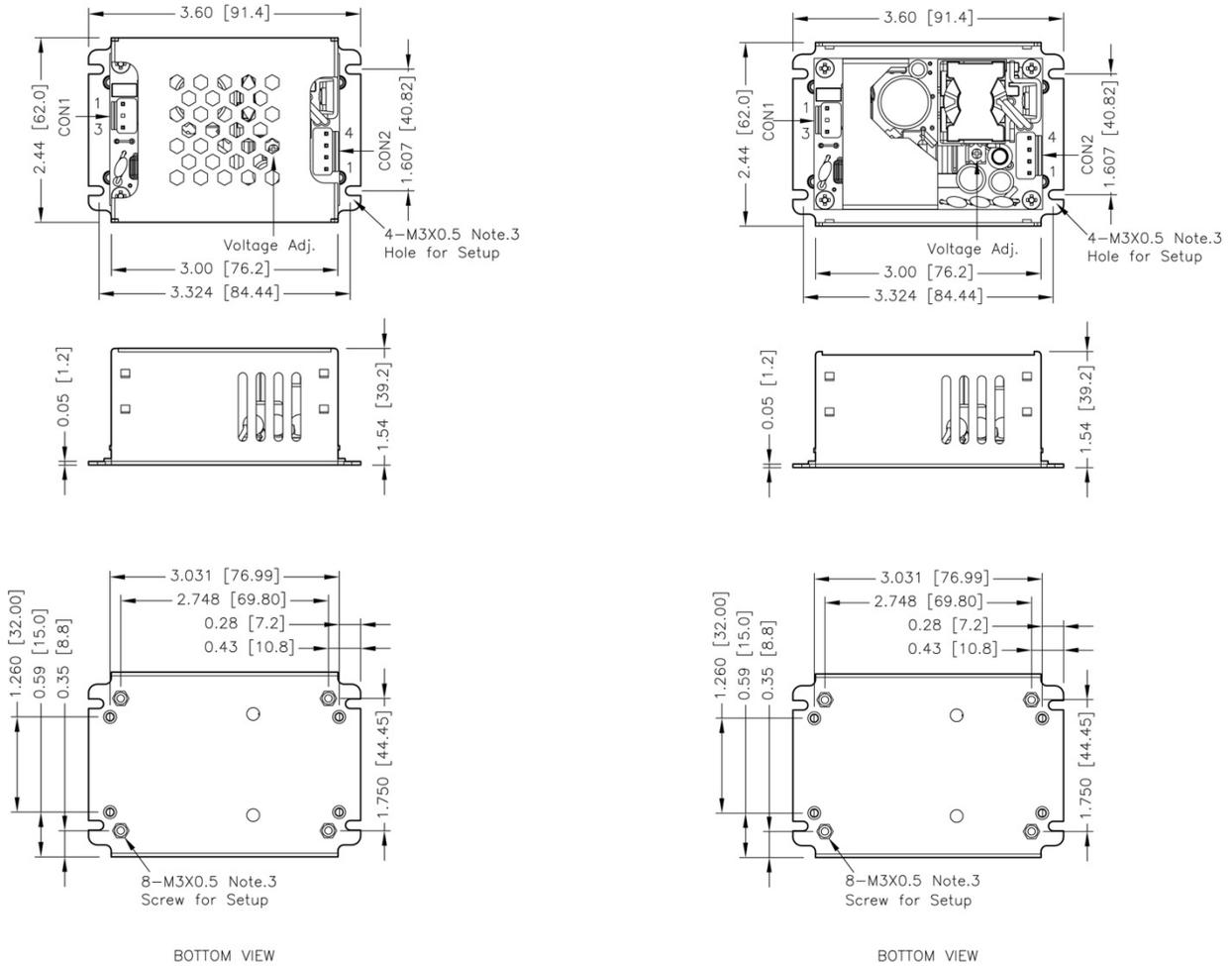


Figure 3-6 Potentiometer to adjust output

# 4.

# General Specifications

## 4.1 Environmental

The XS125 series meets or exceeds the following environmental specifications:

Parameter	Conditions	Specification	Remarks
Relative Humidity	Operating	-40°C to 85°C*	
	Non-Operating	-40°C to 85°C*	
	Operating	5-95% 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 2.0 G RMS Maximum	10-500Hz, 10-min/1cycle, 60 min each along x, y, z axis. Mounting: Compliance to IEC60068-2-6

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  $1.059 \times 10^6$  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 XS125 series Label

#### 4.4 Net Weight

Model	Pound	Ounces	Grams
XSO125	0.343	5.5	156
XSU125	0.425	6.84	194
XSE125	0.463	7.41	210
XSD125	0.511	8.18	232

**Table 4-2 Net Weights**

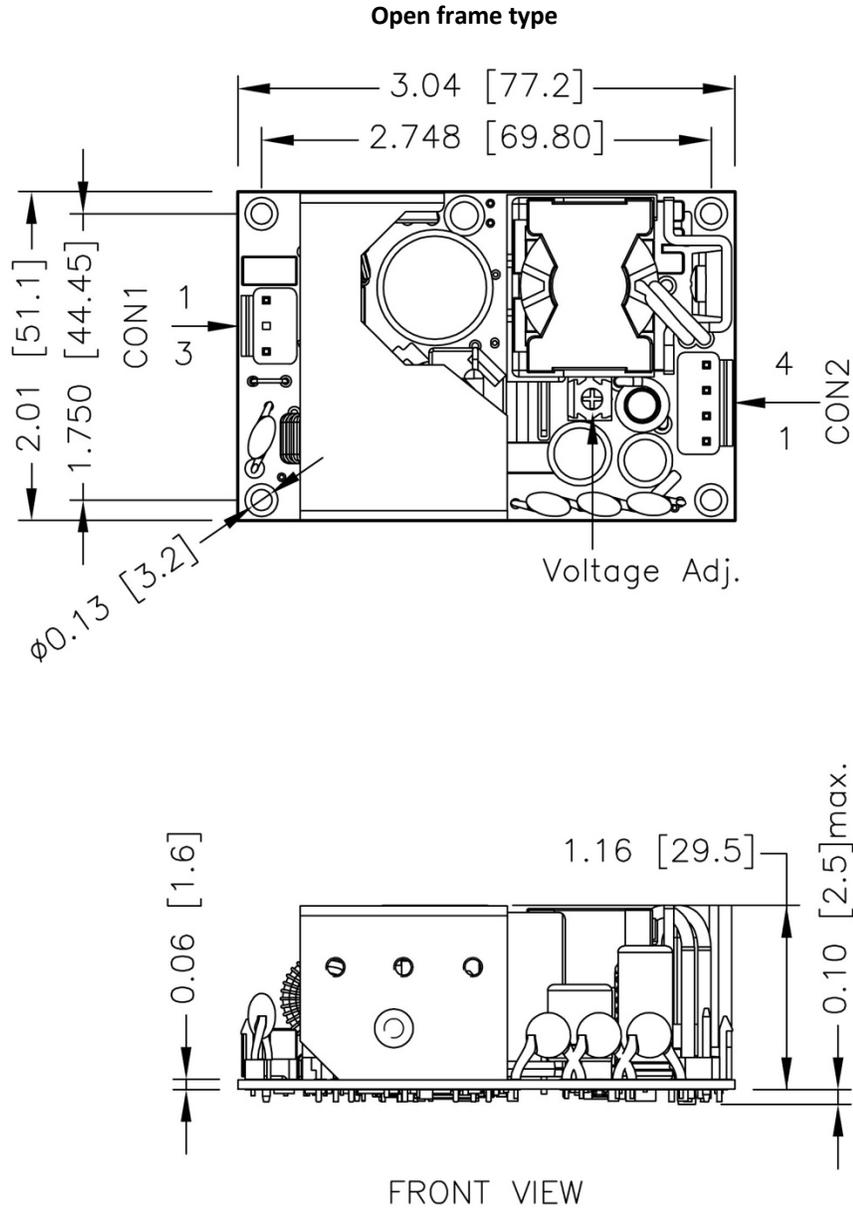
#### 4.5 Mounting and Physical Dimensions

All XL65 models are provided with four mounting holes of the following size.

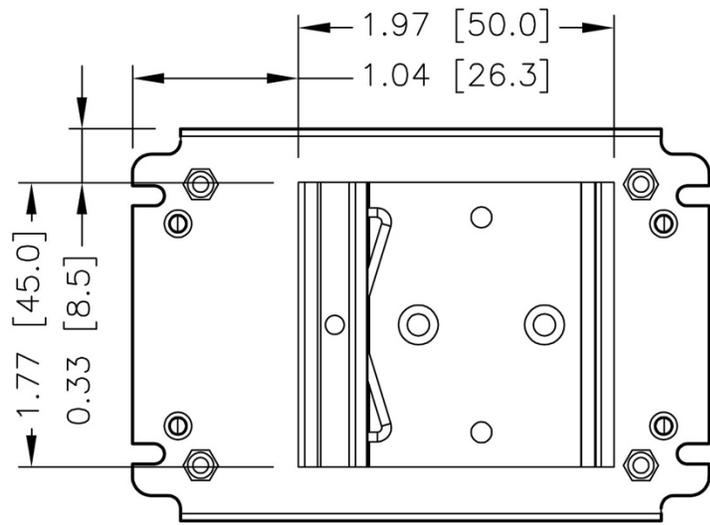
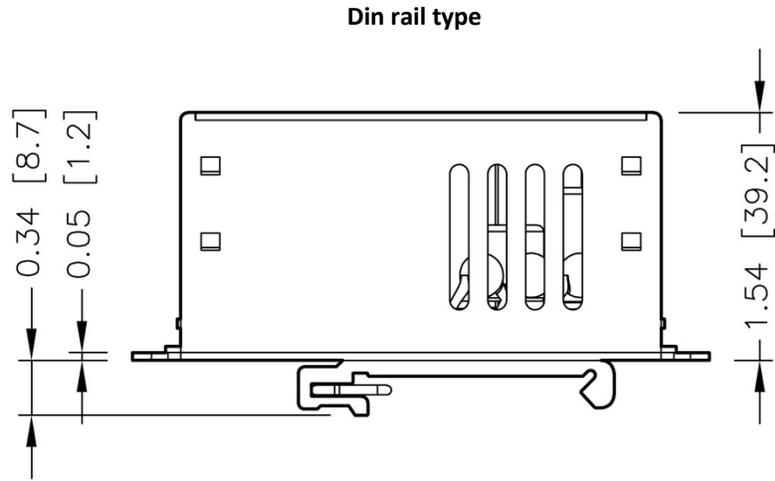
Model	Millimeter (mm)	Inch (in)
XS125	3.2	0.130

**Table 4-3 Mounting Screw Sizes**

See mechanical drawings for mounting hole locations and the dimensions of the power supplies. All the units are in “mm [in]” format with the tolerance of  $x.xx \pm 0.5$  [ $x.xxx \pm 0.02$ ].

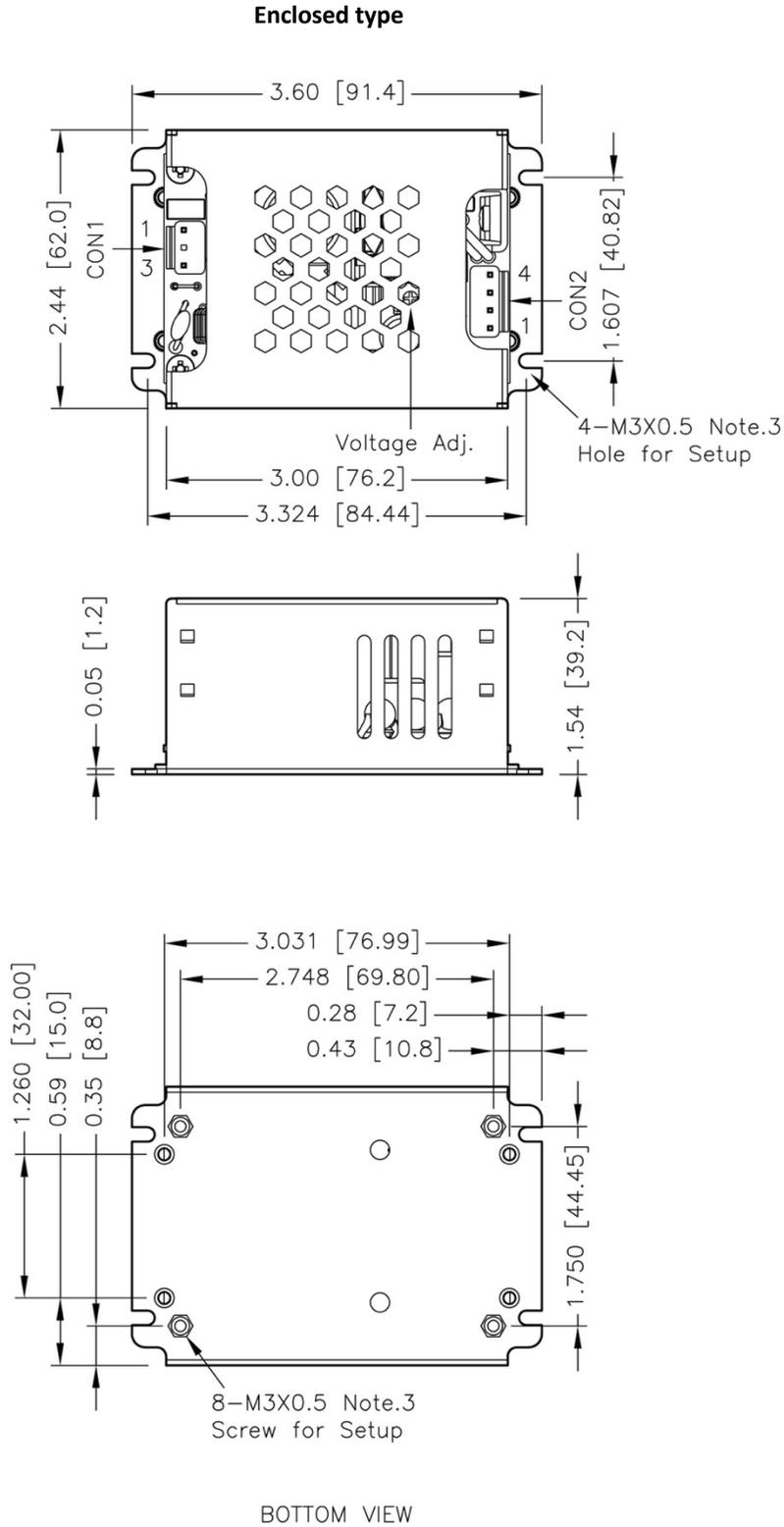


**Figure 4-2 XS125 models: Mounting Hole Locations and Dimensions**



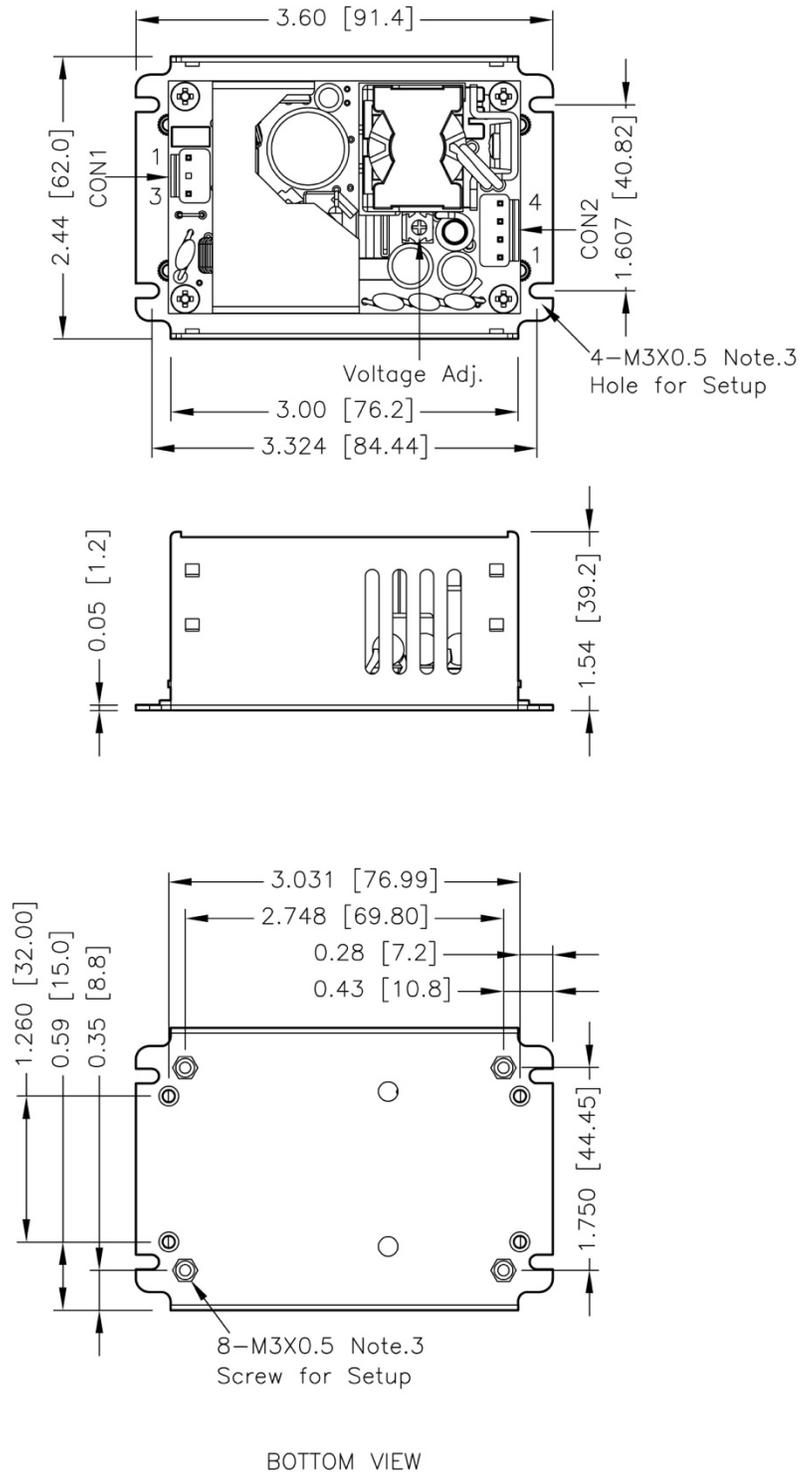
BOTTOM VIEW

**Figure 4-3 XS125 models: Mounting Hole Locations and Dimensions**

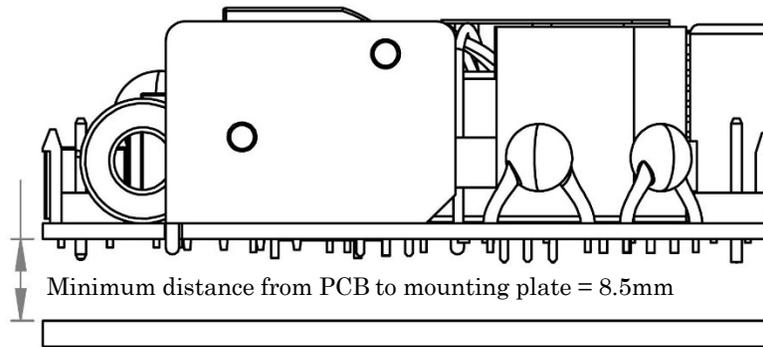


**Figure 4-4 XS125 models: Mounting Hole Locations and Dimensions**

**U-Channel Type**



**Figure 4-5 XS125 models: Mounting Hole Locations and Dimensions**



**Figure 4-6 XS125 minimum distance requirement from mounting**

When XS125 models are mounted on the FG mounting plate, the distance from the mounting plate 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	Mating Housing	Terminal	
Mains input Options		AC INPUT	VHR-3N	SVH-21T-P1.1	
		+/-VOUT (DC Output)	VHR-4N	SVH-21T-P1.1	
		AC INPUT	09-50-8031	SD-2478	
		+/-VOUT (DC Output)	09-50-8061	SD-2478	
		Terminal Block	AC INPUT +/-VOUT (DC Output)	Screw locked torque- max 2Kgf.cm/0.2N.m	Wire dimension range 26 ~ 16AWG

**Table 4-4 Mating connectors**

## 4.7 Output Grounding

For CLASS I protection type power supplies, the RTN signal may be connected to the power supply chassis ground (safety earth) screw terminals on the power supplies as shown in Figure 4-7.

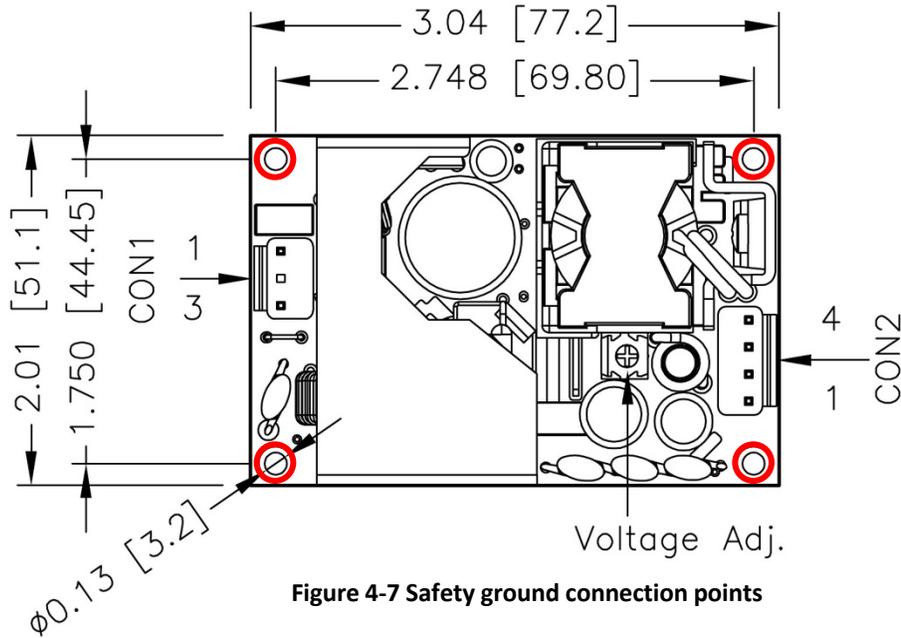


Figure 4-7 Safety ground connection points

## 4.8 Pin Definitions

Model	Con 1 AC Input Connector	Pin No.
	AC Line	Pin 1
ALL	AC Neutral	Pin 3
	Con 2 DC Output Connector	Pin No.
	-Vout	Pin 1,2
ALL	+Vout	Pin 3,4

Table 4-5 Pin Definitions

## 5.

# Efficiency

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The efficiencies for the XS125 power supply models are listed below.  
They were measured at full load, 25 °C at 230 AC.

Model	Ouput Voltage	Total Load	Efficiency	Maximum Capcaitor Load
XS#125-12	12V	125 W	91%	8700 uF
XS#125-15	15V	125 W	92%	5600 uF
XS#125-18	18V	125 W	92%	3900 uF
XS#125-24	24V	125 W	92%	2200 uF
XS#125-28	28V	125 W	92%	1600 uF
XS#125-36	36V	125 W	91%	1000 uF
XS#125-48	48V	125 W	91%	550 uF

**Table 5-1 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 115VAC/60Hz and 230VAC/50Hz at maximum rated continuous output for a minimum of 18ms.

# 7.

## Ordering Information

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

MODEL	OUTPUT VOLTAGE	N2POWER PART NUMBER
XSO125-12	12V	400580-01-5
XSO125-15	15V	400580-02-3
XSO125-18	18V	400580-03-1
XSO125-24	24V	400580-04-9
XSO125-28	28V	400580-05-6
XSO125-36	36V	400580-06-4
XSO125-48	48V	400580-07-2
XSO125-12B	12V	400580-11-4
XSO125-15B	15V	400580-12-2
XSO125-18B	18V	400580-13-0
XSO125-24B	24V	400580-14-8
XSO125-28B	28V	400580-15-5
XSO125-36B	36V	400580-16-3
XSO125-48B	48V	400580-17-1
XSU125-12	12V	400581-01-3
XSU125-15	15V	400581-02-1
XSU125-18	18V	400581-03-9
XSU125-24	24V	400581-04-7
XSU125-28	28V	400581-05-4
XSU125-36	36V	400581-06-2
XSU125-48	48V	400581-07-0
XSU125-12B	12V	400581-11-2
XSU125-15B	15V	400581-12-0
XSU125-18B	18V	400581-13-8
XSU125-24B	24V	400581-14-6
XSU125-28B	28V	400581-15-3
XSU125-36B	36V	400581-16-1
XSU125-48B	48V	400581-17-9
XSE125-12	12V	400582-01-1
XSE125-15	15V	400582-02-9

Continued...

...Continued from previous page

<b>MODEL</b>	<b>OUTPUT VOLTAGE</b>	<b>N2POWER PART NUMBER</b>
XSE125-18	18V	400582-03-7
XSE125-24	24V	400582-04-5
XSE125-28	28V	400582-05-2
XSE125-36	36V	400582-06-0
XSE125-48	48V	400582-07-8
XSE125-12B	12V	400582-11-0
XSE125-15B	15V	400582-12-8
XSE125-18B	18V	400582-13-6
XSE125-24B	24V	400582-14-4
XSE125-28B	28V	400582-15-1
XSE125-36B	36V	400582-16-9
XSE125-48B	48V	400582-17-7
XSD125-12	12V	400583-01-9
XSD125-15	15V	400583-02-7
XSD125-18	18V	400583-03-5
XSD125-24	24V	400583-04-3
XSD125-28	28V	400583-05-0
XSD125-36	36V	400583-06-8
XSD125-48	48V	400583-07-6
XSD125-12B	12V	400583-11-8
XSD125-15B	15V	400583-12-6
XSD125-18B	18V	400583-13-4
XSD125-24B	24V	400583-14-2
XSD125-28B	28V	400583-15-9
XSD125-36B	36V	400583-16-7
XSD125-48B	48V	400583-17-5

The model names in the above table are for CLASS II B protection type. XS125s for CLASS I protection are also available.

All XS125 power supplies are RoHS compliant. For warranty information, refer to [www.n2power.com](http://www.n2power.com). Direct all questions, orders or requests for quotation as follows:

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