

**NEW**
**FEATURES**

- ▶ Ultra Compact Size 2.99x2.13x1.10 "
- ▶ Fully Encapsulated Plastic Case for PCB, Chassis and DIN-Rail Mounting Version
- ▶ Universal Input 85-264VAC, 90-370VDC, 47-440Hz
- ▶ I/O Isolation 3000VAC with Reinforced Insulation
- ▶ No Min. Load Requirement & Low no-load power consumption
- ▶ Operating Ambient Temp. Range -40°C to +70°C
- ▶ Overload/Voltage and Short Circuit Protection
- ▶ EMI Emission EN55014-1/55032 Class B Approved
- ▶ EMC Immunity EN61000-4-2,3,4,5,6,8,11 Approved
- ▶ Safety Approval to UL/cUL/IEC/EN 62368-1, IEC/EN 60335-1 & CE Marking


**PRODUCT OVERVIEW**

The MINMAX AMF-60 series is a new generation of fully encapsulated AC-DC power supply modules with ultra-compact size for higher power density and space saving.

The product features universal AC input 85-264VAC and wider DC input 90-370VDC, regulated output voltages 5.1,12,15,24,48VDC ; I/O Isolation 3000VAC with Reinforced Insulation ; EMI emission EN55014-1/32 Class B and EMS immunity EN 61000-4 standards approved ; no min. load requirement and low no-load power consumption; abnormal protection mechanism with output overload, short circuit and overvoltage protections.

The AMF-60 series equips with PCB, Chassis and DIN-Rail Mounting Version for flexible installation and comply with UL/IEC/EN 62368-1 & IEC/EN 60335-1 for safety usage. It provides a cost effective solution especially for space critical applications in industrial and household electronic equipment.

**Model Selection Guide**

Model Number	Output Voltage	Output Power	Output Current	Input Current	Max. capacitive Load	Efficiency (typ.)
				115VAC, 60Hz		
	VDC	W	Max. A	@Max. Load mA(typ.)	μF	@Max. Load %
<b>AMF-60S051</b>	<b>5.1</b>	<b>51</b>	<b>10</b>	961	12000	87
<b>AMF-60S12</b>	<b>12</b>	<b>60</b>	<b>5</b>	1127	2200	89
<b>AMF-60S15</b>	<b>15</b>	<b>60</b>	<b>4</b>	1127	1500	89
<b>AMF-60S24</b>	<b>24</b>	<b>60</b>	<b>2.5</b>	1127	1000	89
<b>AMF-60S48</b>	<b>48</b>	<b>60</b>	<b>1.25</b>	1127	220	89

**Input Specifications**

Parameter	Conditions / Model		Min.	Typ.	Max.	Unit
AC Input Voltage Range	ALL Models		85	---	264	VAC
AC Input Frequency Range			47	---	440	Hz
DC Input Voltage Range			90	---	370	VDC
No-Load Power Consumption	115VAC	PCB Mounting	---	---	100	mW
	230VAC		---	---	200	mW
	115VAC	Chassis Mounting	---	---	150	mW
	230VAC		---	---	250	mW
Inrush Current	115VAC	Cold Start at 25°C	---	---	45	A
	230VAC		---	---	90	A

**Output Specifications**

Parameter	Conditions / Model	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		---	±1.0	±2.0	%	
Line Regulation	Vin=Min. to Max. @Full Load	---	---	±0.5	%	
Load Regulation	Io=0% to 100%	---	---	±1.0	%	
Ripple & Noise	0-20 MHz Bandwidth	5.1VDC Output Model	---	---	1.8	%V <sub>PP</sub> of Vo
		Other Output Models	---	---	1.0	%V <sub>PP</sub> of Vo
Minimum Load	No minimum Load Requirement					
Over Voltage Protection	Zener diode clamp	---	125	---	% of Vo	
Temperature Coefficient		---	±0.01	±0.02	%/°C	
Overshoot		---	---	5	% Vout	
Over Load Protection	auto-recovery	110	---	---	%Inom.	
	(long term overload condition may cause damage)					
Short Circuit Protection	Hiccup mode, Automatic Recovery					

**General Specifications**

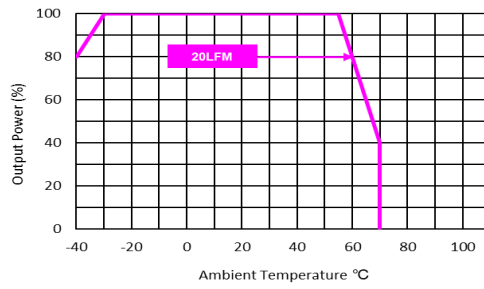
Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	Input to Output, 60 Seconds	3000	---	---	VAC
I/O Isolation Resistance	500 VDC	10	---	---	GΩ
Switching Frequency		---	65	---	kHz
Start-up Time		---	---	1	s
Hold-up Time	115VAC, 60Hz	10	---	---	ms
	230VAC, 50Hz	20	---	---	ms
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	355,000	---	---	Hours
Safety Approvals	UL/cUL 62368-1 recognition(UL certificate), IEC/EN 62368-1(CB-report)				
	IEC/EN 60335-1, 61558-1, 61558-2-16 recognition(CB-report)				

**EMC Specifications**

Parameter	Standards & Level			Performance
General	Compliance with EN 61204-3 Switch mode power supplies			
EMI	Conduction	EN55014-1, EN 55032	Without external components	Class B
	Radiation			
EMS	EN 55014-2, EN 55024, EN 55035			
	ESD	Direct discharge	Indirect discharge HCP & VCP	
		EN61000-4-2 air ± 8kV	Contact ± 6kV	
	Radiated immunity	EN 61000-4-3 10V/m		
	Fast transient	EN 61000-4-4 ±2kV		
	Surge	EN 61000-4-5 ±1kV		
	Conducted immunity	EN 61000-4-6 10Vrms		
	PFMF	EN 61000-4-8 30A/m		
	Dips	EN 61000-4-11 30% 10ms		
Interruptions	EN 61000-4-11 >95% 5000ms			

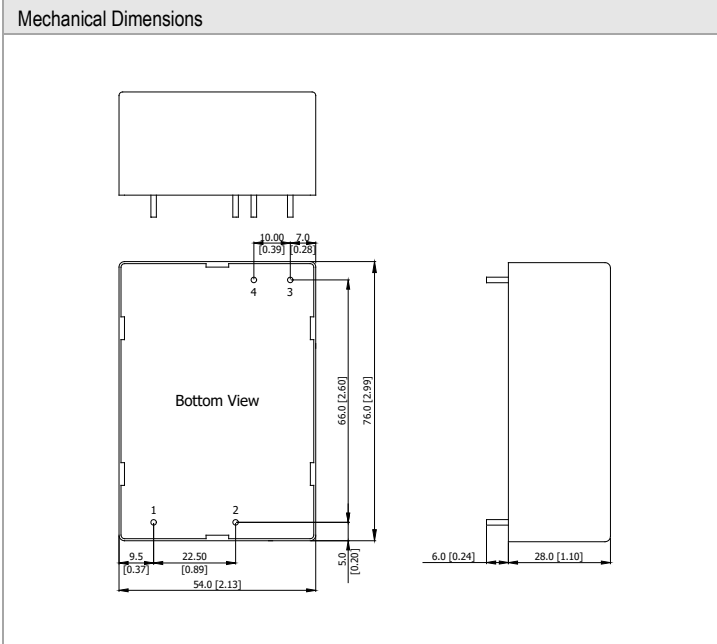
**Environmental Specifications**

Parameter	Min.	Typ.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	-40	---	+70	°C
Storage Temperature Range	-40	---	+85	°C
Humidity (non condensing)	---	---	95	% rel. H
Lead Temperature (1.5mm from case for 10Sec.)	---	---	260	°C

**Power Derating Curve****Notes**

- 1 All Specifications typical at  $T_a=+25^{\circ}\text{C}$ , resistive load, 115VAC, 60Hz input voltage and after warm-up time rated output current unless otherwise noted.
- 2 We recommend to protect the converter by a slow blow fuse in the input supply line.
- 3 Other input and output voltage may be available, please contact MINMAX.
- 4 Specifications are subject to change without notice

**Package Specifications PCB Mounting**



Pin Connections

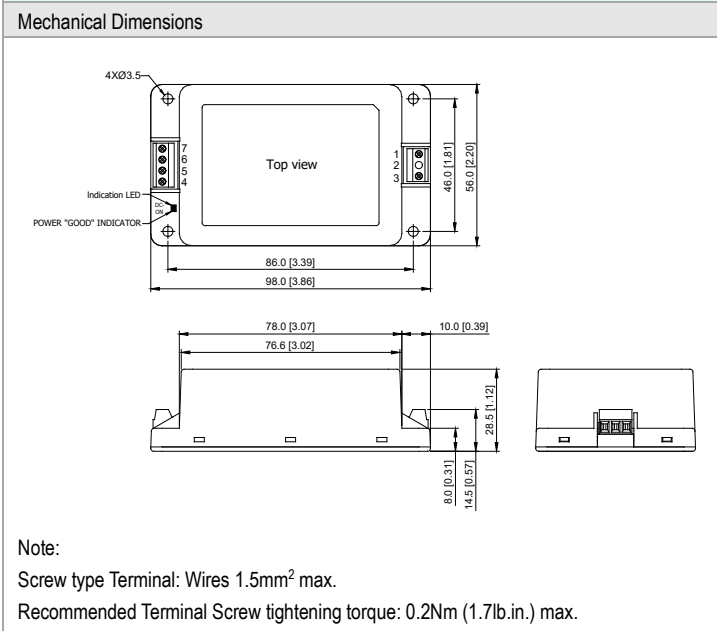
Pin	Function	Diameter mm (inches)
1	AC(L) – AC Line	∅ 1.5 [0.06]
2	AC(N) – AC Neutral	∅ 1.5 [0.06]
3	-Vout	∅ 1.5 [0.06]
4	+Vout	∅ 1.5 [0.06]

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: ±0.5 (±0.02)
- ▶ Pin pitch tolerance: ±0.25 (0.01)
- ▶ Pin diameter ∅ 1.5 ±0.1 (0.06±0.004)

**Physical Characteristics**

Case Size	: 76.0x54.0x28.0mm (2.99x2.13x1.10 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Pin Material	: Copper Alloy
Weight	: 169g

**Package Specifications Chassis Mounting**



Pin Connections

Pin	Function
1	AC(L) – AC Line
2	No Pin
3	AC(N) – AC Neutral
4	-Vout
5	-Vout
6	+Vout
7	+Vout

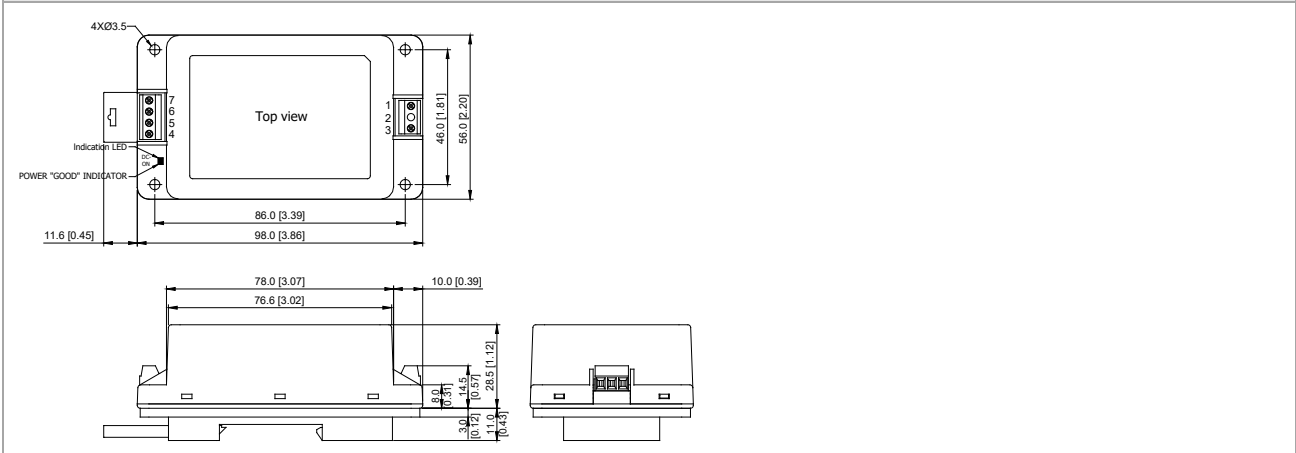
- ▶ All dimensions in mm (inches)
- ▶ Tolerance: ±0.5 (±0.02)

**Physical Characteristics**

Case Size	: 98.0x56.0x28.5mm (3.86x2.20x1.12 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 172g

**Package Specifications with DIN Rail Mounting Bracket (order code AC-DIN-01)**

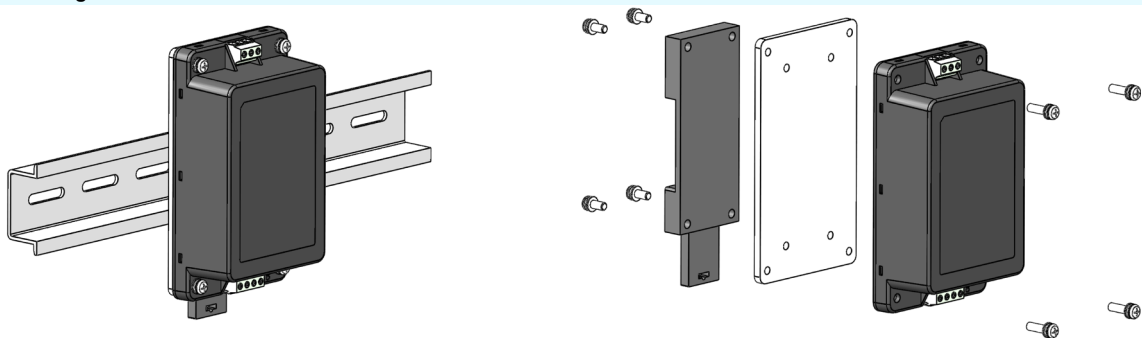
**Mechanical Dimensions**



**Physical Characteristics**

Case Size	: 98.0x56.0x28.5mm (3.86x2.20x1.12 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 226g

**DIN-Rail Mounting Kit**



**Order Code Table**

PCB Mounting	Chassis Mounting	With DIN Rail Mounting by two Order Code	
AMF-60S051	AMF-60S051C	AMF-60S051C	AC-DIN-01
AMF-60S12	AMF-60S12C	AMF-60S12C	AC-DIN-01
AMF-60S15	AMF-60S15C	AMF-60S15C	AC-DIN-01
AMF-60S24	AMF-60S24C	AMF-60S24C	AC-DIN-01
AMF-60S48	AMF-60S48C	AMF-60S48C	AC-DIN-01