

**FEATURES**

- ▶ Fully encapsulated Plastic Case
- ▶ 3 Mounting Versions:
  - PCB Mounting with Solder Pins
  - Chassis Mounting with Screw Terminals
  - DIN-Rail Mounting
- ▶ Package Dimension 88.9x63.5x30.0 mm (PCB Version)
- ▶ Universal Input 85-264VAC, 47-440 Hz
- ▶ Protection Class II
- ▶ Extended Operating Temp.Range -40°C to +60°C at full Load
- ▶ LED Output Indicator (Chassis Version Models)
- ▶ Industrial Safety to UL/cUL/IEC/EN 60950-1 and UL508
- ▶ Medical Safety Approval to ANSI/AAMI ES60601-1 2XMOPP IEC/EN 60601-1 3<sup>rd</sup> Edition CB Report
- ▶ Over Load and Over Temperature Protection
- ▶ 3 Year Product Warranty



**PRODUCT OVERVIEW**

The new MINMAX APM-40 series is a range of fully encapsulated AC/DC power modules. These high performance products feature an extended operating temperature range of -40°C to +80°C. Universal input voltage 85-264VAC and UL/IEC/EN safety approvals including medical safety and UL508 listing qualify these power supplies modules for applications in products with worldwide markets. EMI-filter meets EN55022, class B and FCC, part15, class B. The APM-40 series power modules provide an economical solution for many space critical applications in commercial, medical and industrial electronic equipment.

**Model Selection Guide**

Model Number PCB Mounting (For model with Chassis Mounting, add suffix C)	Output Voltage VDC	Output Current Max. mA	Input Current		Max. capacitive Load μF	Efficiency (typ.) @Max. Load, 115VAC %
			115VAC, 60Hz	230VAC, 50Hz		
			@Max. Load mA(typ.)			
APM-40S05	5	8000	716	429	8000	81
APM-40S12	12	3330	689	414	3900	84
APM-40S15	15	2660	680	408	3900	85
APM-40S24	24	1660	687	413	680	84
APM-40D12	±12	±1660	687	413	1500#	84
APM-40D15	±15	±1330	680	408	1000#	85

# For each output

**Input Specifications**

Parameter	Model	Min.	Typ.	Max.	Unit
AC Voltage Input Range	All Models	85	---	264	VAC
Input Frequency Range		47	---	440	Hz
DC Voltage Input Range		120	---	370	VDC
No-Load Power Consumption		---	---	0.3	W
Inrush Current (Cold Start at 25°C)	115VAC	---	---	30	A
	230VAC	---	---	60	A

**Output Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		---	±2.0	---	%	
Line Regulation		---	±0.5	---	%	
Load Regulation	Single Output Model	---	±1.0	---	%	
	Dual Output Models	---	±2.0	---	%	
Min.Load	No minimum Load Requirement					
Ripple & Noise	0-20 MHz Bandwidth	5VDC Output Models	---	1.5	1.8	%V <sub>PP</sub> of Vo
		Other Output Models	---	1.0	1.3	%V <sub>PP</sub> of Vo
Over Voltage Protection	Zener diode clamp	---	120	---	% of Vo	
Temperature Coefficient		---	±0.02	---	%/°C	
Overshoot		---	---	5	%	
Current Limitation	85VAC, Hiccup Mode, auto-recovery (long term overload condition may cause damage)	105	---	---	% I <sub>nom</sub> .	
Short Circuit Protection	Hiccup mode, indefinite (automatic recovery)					

**General Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (reinforced)		4000	---	---	VACrms
Leakage Current		---	80	---	μA
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
Switching Frequency		---	130	---	KHz
Hold-up Time	115VAC, 60Hz	---	25	---	ms
	230VAC, 50Hz	---	80	---	ms
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	200,000	---	---	Hours
Protection Class II	According IEC/EN 60536				
Safety Approvals	IEC/EN 60950-1 CB Report, cUL/UL 60950-1, CSA-C22.2 No.60950-1, UL508 listed certificate IEC/EN 60601-1 3 <sup>rd</sup> Edition CB Report, ANSI/AAMI ES60601-1 2XMOPP, CAN/CSA-C22.2 No.60601-1 certificate				

**EMC Specifications**

Parameter	Standards & Level	Performance	
EMI	EN55011, EN55022, EN61000-6-4, EN61000-6-3, FCC part 15	Class B	
EMS	EN60601-1-2, EN55024, EN61000-6-2, EN61000-6-1		
	ESD	EN61000-4-2 air ± 8kV, Contact ± 4kV	A
	Radiated immunity	EN61000-4-3 10V/m	A
	Fast transient	EN61000-4-4 ±2kV	A
	Surge	EN61000-4-5 ±1kV	A
	Conducted immunity	EN61000-4-6 10Vrms	A
	PFMF	EN61000-4-8 30A/M	A
	Dips	EN61000-4-11 30% 10ms	A
Interruptions	EN61000-4-11 >95% 5000ms	B	

**Environmental Specifications**

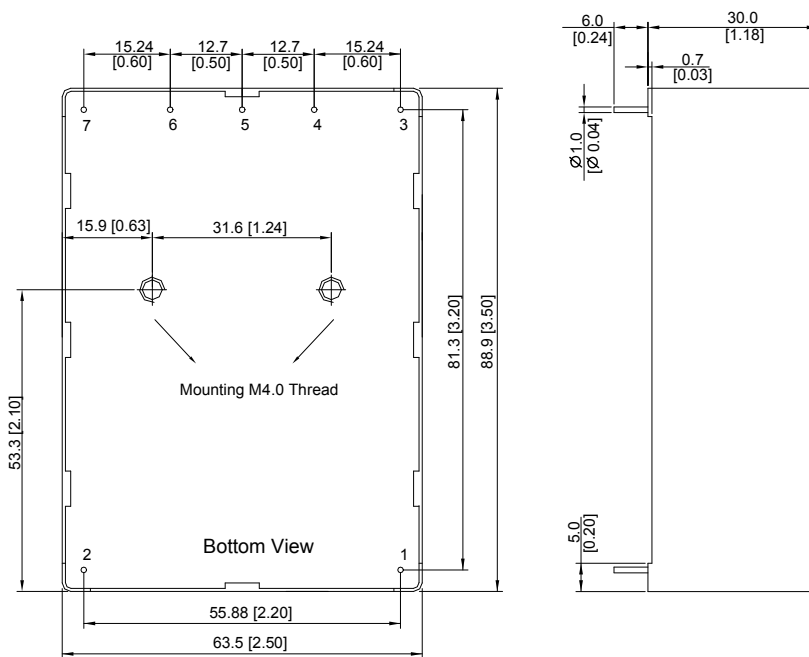
Parameter	Conditions	Min.	Max.
Temperature Range (operational)	Ambient	-40°C	+80°C
Power Derating	Above +60°C		1.5W / °C
Storage Temperature Range		-40°C	+95°C
Over Temperature Protection	Shutdown at 90°C (automatic recovery at approx. 67°C)		
Humidity (non condensing)		---	95% rel. H
Cooling	Free-Air convection		

**Notes**

- 1 **This product is not designed for use in critical life support systems, equipment used in hazardous environment, nuclear control systems or other such applications which necessitate specific safety and regulatory standards other the ones listed in this datasheet.**
- 2 Specifications typical at Ta=+25°C, resistive load, 115VAC, 60Hz input voltage, after warm-up time rated output current unless otherwise noted.
- 3 Ripple & Noise measured with a 0.1µF/50V MLCC and a 1µF/50V Aluminum electrolytic.
- 4 Safety approvals cover frequency 47-63 Hz.
- 5 We recommend to protect the converter by a slow blow fuse in the input supply line.
- 6 Other input and output voltage may be available, please contact factory.
- 7 To order the module with chassis mount package, please add a **suffix C** (e.g. APM-40S05C).
- 8 Part number for DIN-Rail mounting bracket: **AC-DIN-02**
- 9 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
- 10 Specifications are subject to change without notice.

**Package Specifications PCB Mounting**

## Mechanical Dimensions



## Pin Connections

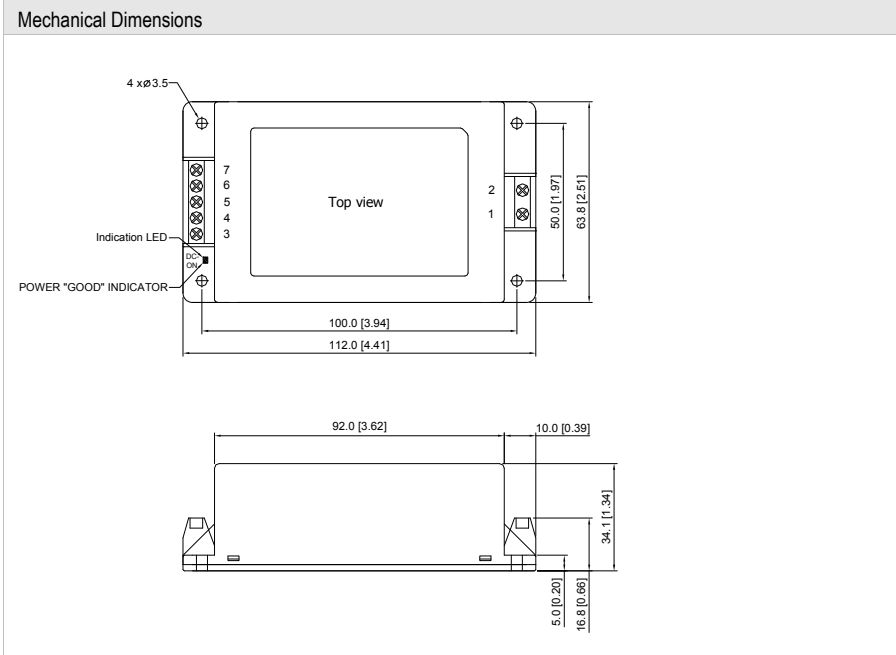
Pin	Single Output	Dual Output
1	AC (N)	AC (N)
2	AC (L)	AC (L)
3	+Vout	+Vout
4	No Pin	No Pin
5	-Vout	Common
6	No Pin	No Pin
7	NC	-Vout

NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance:  $\pm 0.5$  ( $\pm 0.02$ )
- ▶ Pin diameter  $\varnothing 1.0 \pm 0.1$  ( $0.04 \pm 0.004$ )

**Physical Characteristics**

Case Size	: 88.9x63.5x30.0mm (3.50x2.50x1.18 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Pin Material	: Copper Alloy with Gold Plate Over Nickel Subplate
Weight	: 310g

**Package Specifications Chassis Mounting (order code suffix C)**


**Connections**

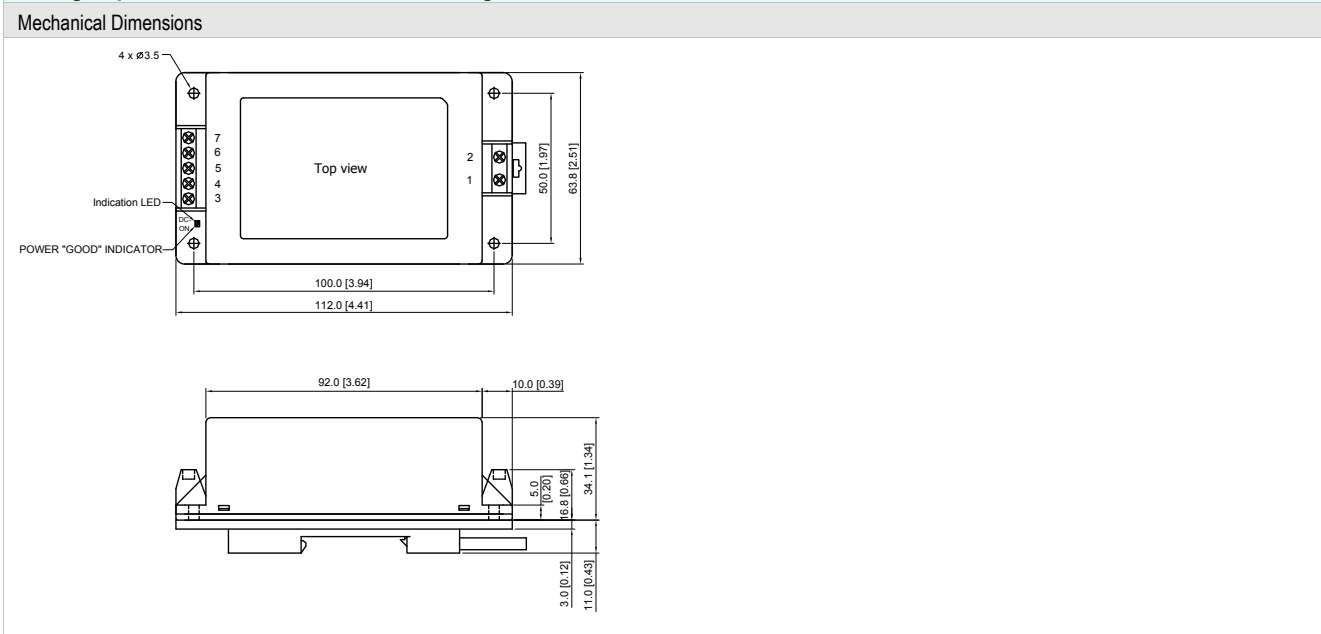
Pin	Single Output	Dual Output
1	AC (N)	AC (N)
2	AC (L)	AC (L)
3	+Vout	+Vout
4	NC	NC
5	-Vout	Common
6	NC	NC
7	NC	-Vout

NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance:  $\pm 0.5$  ( $\pm 0.02$ )

**Physical Characteristics**

Case Size	: 112.0x63.8x34.1mm (4.41x2.51x1.34 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 320g

**Package Specifications with DIN Rail Mounting Bracket**

**Physical Characteristics**

Case Size	: 112.0x63.8x34.1mm (4.41x2.51x1.34 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 374g

**DIN-Rail Mounting Bracket (Order code for Kit : AC-DIN-02)**

