

FEATURES

- ▶ Fully Encapsulated Plastic Case for PCB, Chassis and DIN-Rail Mounting Version
- ▶ Universal Input 85~264VAC, 47~440Hz
- ▶ Protection Class II as per IEC/EN 60536
- ▶ I/O Isolation 4000VAC with Reinforced Insulation
- ▶ Operating Ambient Temp. Range -40°C to +80°C
- ▶ Overload/Voltage and Short Circuit Protection
- ▶ Designed-in EMI Emission meets EN 55011/32 Class B & FCC Level B
- ▶ Designed-in EMC Immunity meets EN 61000-4-2,3,4,5,6,8,11
- ▶ Medical EMC Standard meets 4th Edition of EMI EN 55011 and EMS EN60601-1-2
- ▶ Medical Safety meets 2xMOPP per 3rd Edition of IEC/EN 60601-1 & ANSI/AAMI ES60601-1
- ▶ UL508 Safety Approval Specifically for Industrial Application
- ▶ UL/cUL/IEC/EN 60950-1 Safety Approval & CE Marking


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 EN 55011/32, class B and FCC, part 15, 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	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
			115VAC, 60Hz	230VAC, 50Hz		
			Max.	@Max. Load		@Max. Load, 115VAC
VDC	mA	mA (typ.)		µF	%	
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	Conditions / 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	115VAC	Cold Start at 25°C	---	---	30	A
	230VAC		---	---	60	A

Output Specifications						
Parameter	Conditions / Model	Min.	Typ.	Max.	Unit	
Output Voltage Setting Accuracy		---	±2.0	---	%Vnom.	
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.5	---	%	
Load Regulation	Io=0% to 100%	Single Output Model	---	±1.0	---	%
		Dual Output Models	---	±2.0	---	%
Minimum Load	No minimum Load Requirement					
Ripple & Noise ₍₃₎	0-20 MHz Bandwidth	5V Output Models	---	1.5	1.8	%V _{PP} of Vo
		Other Output Models	---	1.0	1.3	%V _{PP} of Vo
Over Voltage Protection	Zener diode clamp	---	120	---	% of Vo	
Temperature Coefficient		---	±0.02	---	%/°C	
Overshoot		---	---	5	%	
Over Load Protection	85VAC, Hiccup Mode, auto-recovery (long term overload condition may cause damage)	105	---	---	% Inom.	
Short Circuit Protection	Hiccup mode, Automatic Recovery					

General Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	Reinforced Insulation, Rated For 60 Seconds	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 Standards	UL/cUL 60950-1, CSA C22.2 No 60950-1				
	ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1				
	IEC/EN 60950-1, IEC/EN 60601-1 3 rd Edition 2xMOPP				
	UL508, CSA C22.2 No.107.1-01				
Safety Approvals	UL/cUL 60950-1 recognition (UL certificate), IEC/EN 60950-1 (CB-report), UL/cUL 508 listed certificate				
	ANSI/AAMI ES60601-1 2xMOPP recognition (UL certificate), IEC/EN 60601-1 3 rd Edition (CB-report)				

Environmental Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature Range	Natural Convection	-40	---	+80	°C
Storage Temperature Range		-40	---	+95	°C
Power Derating	Above +60°C	1.5			W / °C
Thermal Shutdown	Shutdown, Internal IC Junction Temperature	---	142	---	°C
	Automatic Recovery, Internal IC Junction Temperature	---	67	---	°C
Humidity (non condensing)		---	---	95	% rel. H
Cooling	Natural Convection				
Lead Temperature (1.5mm from case for 10Sec.)		---	---	260	°C

EMC Specifications

Parameter	Standards & Level			Performance
EMI	Conduction and Radiation	EN 55011, EN55032, EN 61000-6-4, EN 61000-6-3, FCC part 15		Class B
EMS	EN 60601-1-2 4 th , EN 55024, EN 61000-6-2, EN 61000-6-1			
	ESD	EN 61000-4-2 Air \pm 15kV, Contact \pm 8kV		A
	Radiated immunity	EN 61000-4-3 10V/m		A
	Fast transient	EN 61000-4-4 \pm 2kV		A
	Surge	EN 61000-4-5 \pm 1kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 30A/m		A
	Dips & Interruptions	EN 61000-4-11	0% of 230VAC	0.5 cycle
0% of 230VAC			1 cycle	A
70% of 230VAC			25/30 cycle	A
0% of 230VAC			250/300 cycle	B

Notes

- 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.**
- Specifications typical at Ta=+25°C, resistive load, 115VAC, 60Hz input voltage, after warm-up time rated output current unless otherwise noted.
- Ripple & Noise measured with a 0.1 μ F/50V MLCC and a 1 μ F/50V Aluminum electrolytic.
- Safety approvals cover frequency 47-63 Hz.
- We recommend to protect the converter by a slow blow fuse in the input supply line.
- Other input and output voltage may be available, please contact factory.
- That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
- Specifications are subject to change without notice.

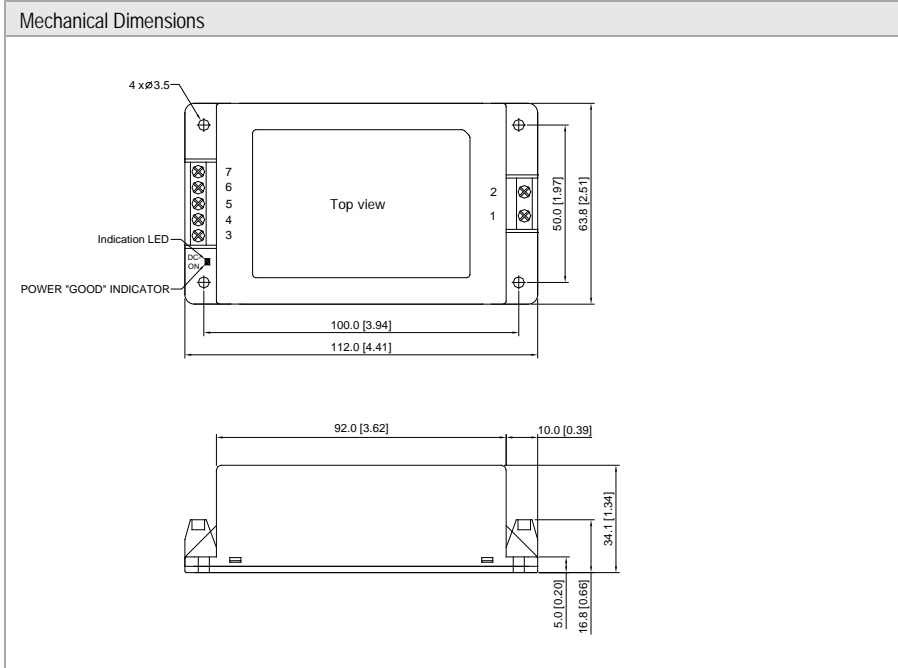
Package Specifications PCB Mounting

Mechanical Dimensions		Pin Connections																									
		<table border="1"> <thead> <tr> <th>Pin</th> <th>Single Output</th> <th>Dual Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>AC (N)</td> <td>AC (N)</td> </tr> <tr> <td>2</td> <td>AC (L)</td> <td>AC (L)</td> </tr> <tr> <td>3</td> <td>+Vout</td> <td>+Vout</td> </tr> <tr> <td>4</td> <td>No Pin</td> <td>No Pin</td> </tr> <tr> <td>5</td> <td>-Vout</td> <td>Common</td> </tr> <tr> <td>6</td> <td>No Pin</td> <td>No Pin</td> </tr> <tr> <td>7</td> <td>NC</td> <td>-Vout</td> </tr> </tbody> </table>		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
Pin	Single Output	Dual Output																									
1	AC (N)	AC (N)																									
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6	No Pin	No Pin																									
7	NC	-Vout																									
		NC: No Connection																									
		<ul style="list-style-type: none"> ▶ All dimensions in mm (inches) ▶ Tolerance: \pm0.5 (\pm0.02) ▶ Pin diameter \varnothing 1.0 \pm0.1 (0.04\pm0.004) 																									

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

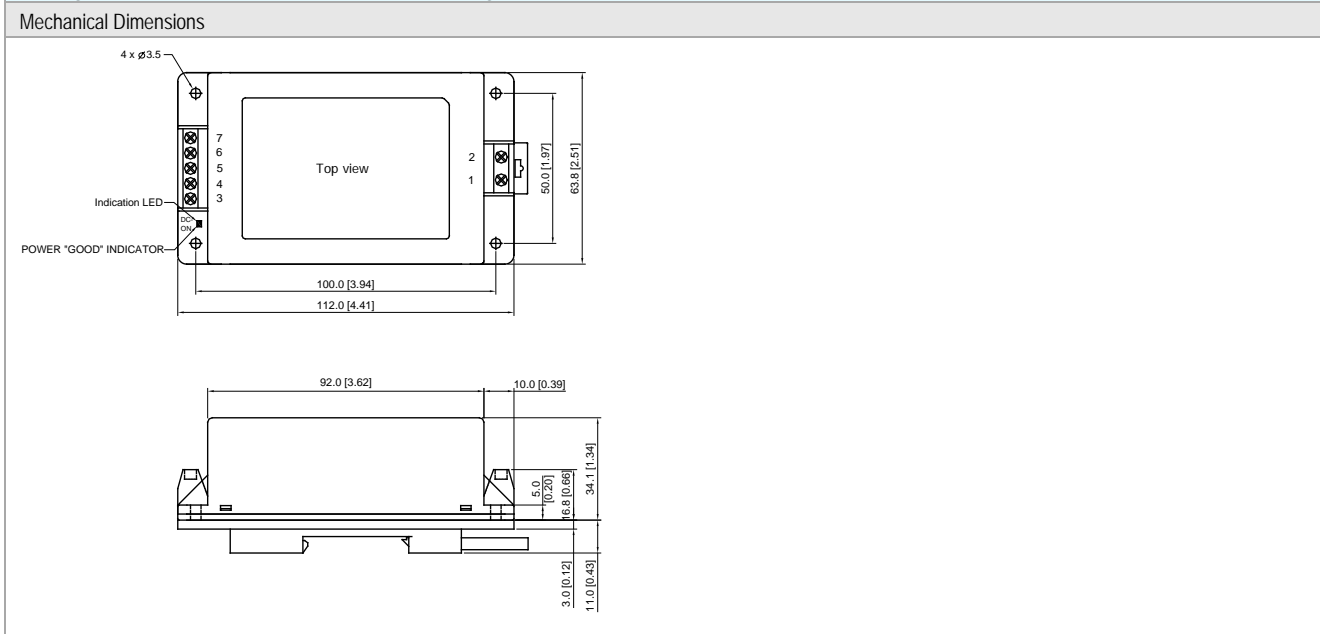
NC: No Connection

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


Order Code Table			
PCB Mounting	Chassis Mounting	With DIN Rail Mounting by two Order Code	
APM-40S05	APM-40S05C	APM-40S05C	AC-DIN-02
APM-40S12	APM-40S12C	APM-40S12C	AC-DIN-02
APM-40S15	APM-40S15C	APM-40S15C	AC-DIN-02
APM-40S24	APM-40S24C	APM-40S24C	AC-DIN-02
APM-40D12	APM-40D12C	APM-40D12C	AC-DIN-02
APM-40D15	APM-40D15C	APM-40D15C	AC-DIN-02