

## FEATURES

- ▶ Ultra-compact Dimensions:  
36.5x27x17.1 mm (1.44x1.06x0.67")
- ▶ Fully encapsulated Module with  
Solder Pins for PCB Mounting
- ▶ Universal Input 85-264 VAC, 47-440 Hz
- ▶ Eco Design, compliant to Energy Star specification and ErP  
Directive 2009/125/EC
- ▶ Single- and Dual Output Models
- ▶ Protection Class II
- ▶ Safety Approval to cUL/UL/IEC/EN 60950-1
- ▶ Over Load and Over Voltage Protection
- ▶ 3 Year Product Warranty

**NEW**

 cUL US  
UL 60950-1

 CB  
Scheme


## PRODUCT OVERVIEW

The MINMAX ABF-04 series is a new range of fully encapsulated AC/DC power supply modules. They are designed for direct PCB mounting with solder pins. The product features EMI-filter to EN55022, class B and EMS compliance to the EN 61000-4 standard.

Universal input voltage 85-264VAC and International safety approvals qualifies these power modules for applications in products with worldwide markets.

The ABF-04 series provide a cost effective solution for many space critical applications in commercial and industrial electronic equipment.

### Model Selection Guide

Model Number	Output Voltage VDC	Output Current	Input Current	Max. capacitive Load μF	Efficiency (typ.)
		Max. mA	@Max. Load mA(typ.)		@Max. Load %
ABF-04S03	3.3	1200	82	1200	70
ABF-04S05	5	800	82	800	72
ABF-04S09	9	444	77	440	75
ABF-04S12	12	333	76	330	76
ABF-04S15	15	267	76	260	76
ABF-04S24	24	167	76	160	77
ABF-04D53	+5	600	72	5600	72
	+3.3	150		4700	
ABF-04D125	+12	250	72	330	75
	+5	120		4700	
ABF-04D12	±12	±166	76	# 330	77
ABF-04D15	±15	±133	76	# 260	77

# For each output

### Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Voltage Range	All Models	85	---	264	VAC
Input Frequency Range		47	---	440	Hz
Input Voltage Range		120	---	370	VDC
No-Load Power Consumption		---	---	0.3	W
Inrush Current (Cold Start at 25°C)	115VAC	---	---	15	A
	230VAC	---	---	25	A

**Output Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Single and Dual Output Models	---	±1.0	±2.0	%	
	ABF-04D53 & ABF-04D125	---	±2.0	±5.0	%	
Line Regulation	Single and Dual Output Models	---	±0.5	±1.0	%	
	ABF-04D53 & ABF-04D125	Vo1	---	±0.5	±1.0	%
		Vo2	---	±1.0	±3.0	%
Load Regulation	3.3VDC Output Model	---	±1.0	±1.5	%	
	5~24VDC and Dual Output Models	---	±0.5	±1.0	%	
	ABF-04D53 & ABF-04D125	Vo1	---	±0.5	±1.0	%
		Vo2	---	±2.5	±5.0	%
Ripple & Noise (20MHz)	3.3V & 5VDC Output Models	---	100	150	mV <sub>P-P</sub>	
	Other Output Models	---	0.8	1.0	%V <sub>PP</sub> of Vo	
Minimum Load	Single Output and Dual +/- Output Models	No min. Load required	---	---	%I <sub>nom.</sub>	
	Dual +/- Output Models	---	25	---	%I <sub>nom.</sub>	
Over Voltage Protection	Zener diode clamp	---	120	---	% of Vo	
Temperature Coefficient		---	±0.01	±0.02	%/°C	
Overshoot		---	---	5	%V <sub>out</sub>	
Current Limitation	Foldback, 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	Input to Output, 60 Seconds	3000	---	---	VAC
I/O Isolation Resistance	500 VDC	100	---	---	MΩ
Switching Frequency		---	130	---	KHz
Hold-up Time		---	20	---	ms
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	330,000	---	---	Hours
EMC Emission	Conducted and radiated	EN 55011 class B, EN 55022 class B, FCC part 15 class B			
EMC Immunity according EN61000-6-1	Standard	Specification Requirement			Performance Criteria
	EN61000-4-2	Air ±8KV Cont. ±4KV			B
	EN61000-4-3	80~1000MHz, 10V/m 80% AM, 1KHz modulation			A
	EN61000-4-4	AC port ±2KV DC, SL, TL ±2KV not less than 1 min.			B
	EN61000-4-5	1.2/50µS(8/20µS) AC dif. ±1KV DC ±0.5KV			B
	EN61000-4-6	0.15~80MHz, 10Vrms (functional earth ports included)			B
		80% AM, 1KHz modulation			
	EN61000-4-8	50Hz/60Hz, 30A/m			A
EN61000-4-11	30%, 10ms			B	
Protection Class II		60%, 100ms, 95%, 5000ms			C
Safety Approvals		According IEC/EN 60536 cUL/UL 60950-1, IEC/EN 60950-1			

**Input Fuse**

All Models	
External Fuse (Recommended)	1A Slow – Blow Type

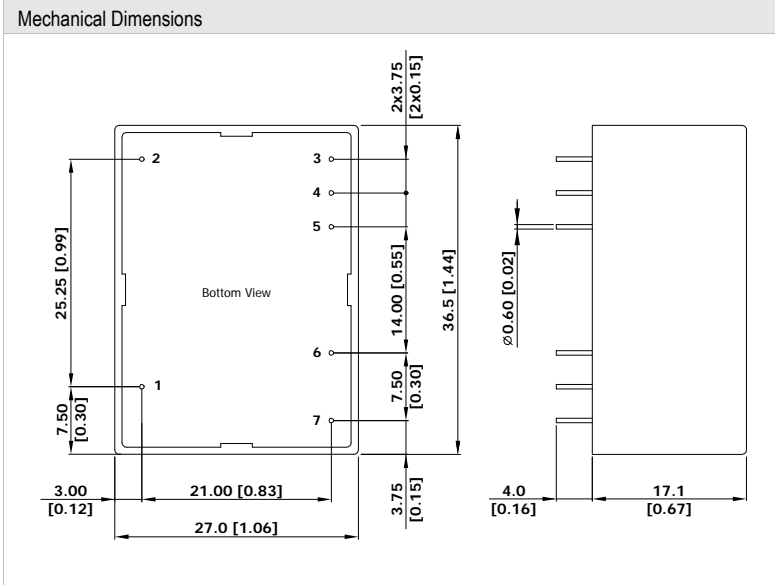
**Environmental Specifications**

Parameter	Conditions
Temperature Range (operational)	Ambient -25°C to +60°C
Power Derating	+50°C to +60°C 0.3W / °C
Storage Temperature Range	-40°C to +85°C
Over Temperature Protection	at 90°C (automatic recovery at 67°C)
Cooling	Free-Air convection
Humidity (non condensing)	--- 95 % rel. H

**Notes**

- 1 All specifications typical at Ta=+25°C, resistive load, 115VAC, 60Hz input voltage and after warm-up time rated output current unless otherwise noted.
- 2 Ripple & Noise measurement bandwidth is 0~20 MHz
- 3 These power modules require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage the power supplies however they may not meet all listed specifications.
- 4 All AC/DC modules should be externally fused at the front end for protection.
- 5 Other input and output voltage may be available, please contact factory
- 6 Specifications subject to change without notice

**Package Specifications**



Pin Connections

Pin	Single Output	D12/D15	D53/D125
1		NC	
2		NC	
3	+Vout	+Vout	+Vout1
4	-Vout	Common	Common
5	NP	-Vout	+Vout2
6		AC(N)	
7		AC(L)	

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: ±0.5 (±0.01)
- ▶ Pin diameter  $\varnothing 0.6 \pm 0.1$  (0.02±0.004)

**Physical Characteristics**

Case Size	: 36.5x27.0x17.1mm (1.44x1.06x0.67 inches)
Case Material	: Plastic resin + Fiberglass (flammability to UL 94V-0 rated)
Weight	: 26g