








**FEATURES**

- ▶ Fully encapsulated Plastic Case
- ▶ Single-, Dual- and Triple Output Models
- ▶ 3 Mounting Versions:
  - PCB Mounting with Solder Pins
  - Chassis Mounting with Screw Terminals
  - DIN-Rail Mounting
- ▶ Universal Input 85-264 VAC, 47- 440 Hz
- ▶ Protection Class II
- ▶ Safety Approval to cUL/UL/IEC/EN 60950-1
- ▶ UL508 Approval (Option)
- ▶ Over Load and Over Voltage Protection
- ▶ 3 Year Product Warranty


**PRODUCT OVERVIEW**

The MINMAX AKF-15 series is a new range of fully encapsulated AC/DC power supply modules. The product features EMI-filter to EN55022, class B and EMS compliance to EN 61000-4 standard. Universal input voltage 85-264VAC and International safety approvals qualifies these power modules for applications in products with worldwide markets. For industrial applications, the models for chassis mounting can also be supplied as option with UL508 approval. The AKF-15 series provide a cost effective solution for many space critical applications in commercial 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 115VAC, 60Hz		Max. capacitive Load uF	Efficiency (typ.) @Max. Load %
			@Max. Load mA(typ.)	@No Load mA(typ.)		
AKF-15S05	 5	3000	290	30	3900	75
AKF-15S12	 12	1250	275	30	2200	79
AKF-15S15	 15	1000	275	30	2200	79
AKF-15S24	 24	625	275	30	1000	79
AKF-15S48	 48	310	273	30	680	79
AKF-15D12	 ±12	±650	275	30	#1500	79
AKF-15D15	 ±15	±500	275	30	#1500	79
AKF-15D512	5	1500	302	30	2000	72
	*12	625			1500	
AKF-15T512	5	2000	290	30	2200	74
	*12	200			1500	
	*-12	-200			1500	
AKF-15T515	*5	2000	284	30	2200	74
	*15	150			1500	
	*-15	-150			1500	

\* Output voltage accuracy 4% max.

# 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
Inrush Current (Cold Start at 25°C)	115VAC	---	---	15	A
	230VAC	---	---	30	A

**Output Specifications**

Parameter		Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy			---	±1.0	±2.0	%
Line Regulation		Vin=Min. to Max.	---	±0.5	±1.0	%
Load Regulation		Iout=Min. to Max.	Single Output Models		±1.0	%
			Dual/ Triple Output Models		±2.5	±5.0
Cross Regulation- Dual Positives / Triple Output	Vo1	Measured output Io = 20% to 100% of rated load Other output(s) set at 50% of rated load	---	±1.0	---	%
	Vo2		---	±2.5	---	%
	Vo3		---	±2.5	---	%
Ripple & Noise (20MHz)		5VDC Output Models	---	1.5	1.8	%V <sub>PP</sub> of Vo
		Other Output Models	---	0.8	1.0	%V <sub>PP</sub> of Vo
Minimum Load			---	10	---	%Inom.
Over Voltage Protection		Zener diode clamp	---	120	---	% of Vo
Temperature Coefficient			---	±0.01	±0.02	%/°C
Overshoot			---	---	5	% Vout
Current Limitation		Foldback, auto-recovery (long term overload condition may cause damage)	105	---	---	%Inom.
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	---	---	VACrms
I/O Isolation Resistance	500 VDC	100	---	---	MΩ
Switching Frequency		---	100	---	KHz
Hold-up Time		---	20	---	ms
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	280,000	---	---	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	1.2/50uS(8/20uS) AC dif. ±1KV DC ±0.5KV			B
	EN61000-4-6	0.15~80MHz, 10Vrms (functional earth ports included) 80% AM, 1KHz modulation			B
	EN61000-4-8	50Hz/60Hz, 30A/m			A
	EN61000-4-11	30%, 10ms 60%, 100ms, 95%, 5000ms			B C
Protection Class II		According IEC/EN 60536			
Safety Approvals		cUL/UL 60950-1, IEC/EN 60950-1 (UL508 for models with order code suffix ICE only)			

**Input Fuse**

All Models	
Built-in Fuse	2A / 250VAC
External Fuse (Recommended)	1.5A Slow – Blow Type

**Environmental Specifications**

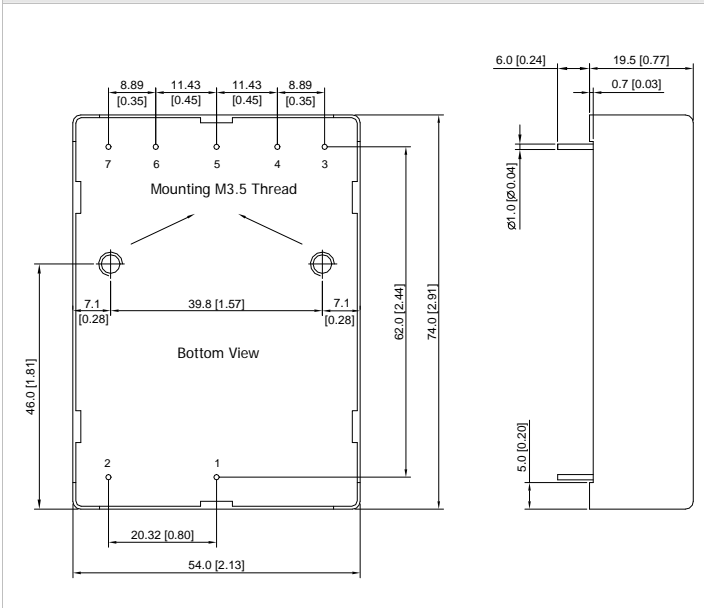
Parameter	Conditions		
Temperature Range (operational)	Ambient	-25°C	+70°C
Power Derating	+50°C to +70°C		0.563W / °C
Storage Temperature Range		-40°C	+85°C
Over Temperature Protection		at 90°C (automatic recovery at 67°C)	
Cooling		Free-Air convection	
Humidity (non condensing)		---	95 % rel. H

**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 Other input and output voltage may be available, please contact factory.
- 5 To order the module with chassis mount package, please add a **suffix C** (e.g. AKF-15S05C).
- 6 To order the module with UL508 safety, please add a **suffix ICE** (e.g. AKF-15S05ICE).
- 7 Part number for DIN-Rail mounting bracket: **AC-DIN-01**
- 8 Specifications subject to change without notice

**Package Specifications PCB Mounting**

**Mechanical Dimensions**



**Pin Connections**

Pin	Single	Dual (D12,D15)	Dual (D512)	Triple
1		AC(N) – AC Neutral		
2		AC(L) – AC Line		
3		No Pin		-Vout3
4	-Vout	-Vout	-Vout2	Common
5	No Pin	Common	+Vout2	+Vout2
6	+Vout	+Vout	-Vout1	-Vout1
7	No Pin		+Vout1	+Vout1

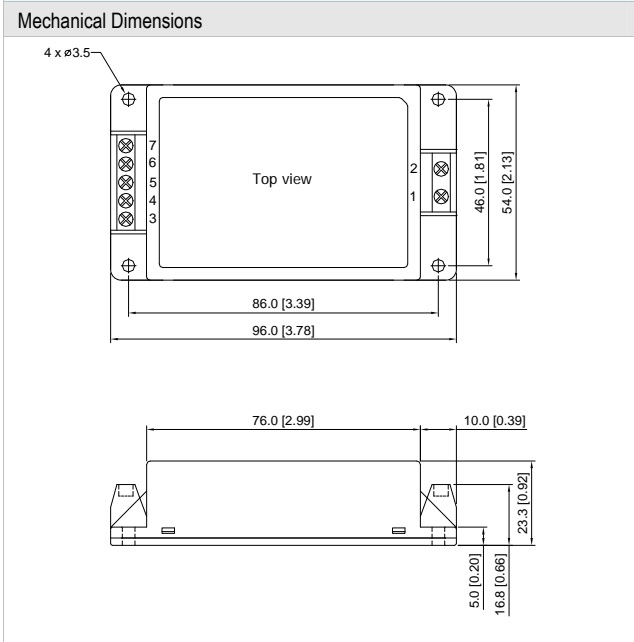
NC: No Connection

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

**Physical Characteristics**

Case Size	: 74.0x54.0x19.5mm (2.91x2.13x0.77 Inches)
Case Material	: Plastic resin + Fiberglass (flammability to UL 94V-0 rated)
Weight	: 174g

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



**Connections**

Terminal	Single	Dual (D12,D15)	Dual (D512)	Triple
1	AC(N) – AC Neutral			
2	AC(L) – AC Line			
3	NC			-Vout3
4	-Vout	-Vout	-Vout2	Common
5	NC	Common	+Vout2	+Vout2
6	+Vout	+Vout	-Vout1	-Vout1
7	NC		+Vout1	+Vout1

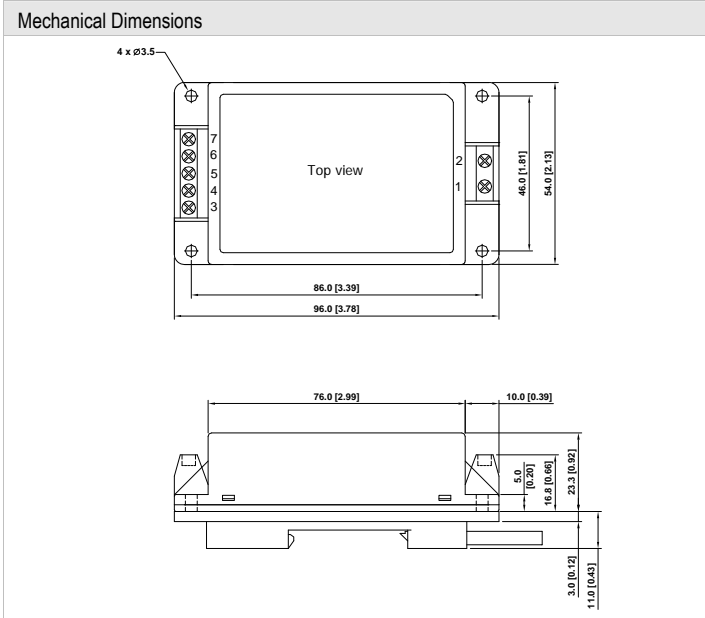
NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.5 (X.XX±0.02)  
X.XX±0.25 (X.XXX±0.01)
- ▶ Pin pitch tolerance: ±0.25 (0.01)

**Physical Characteristics**

Case Size	: 96.0x54.0x23.3mm (3.78x2.13x0.92 Inches)
Case Material	: Plastic resin + Fiberglass (flammability to UL 94V-0 rated)
Weight	: 162g

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



**Physical Characteristics**

Case Size	: 96.0x54.0x23.3mm (3.78x2.13x0.92 Inches)
Case Material	: Plastic resin + Fiberglass (flammability to UL 94V-0 rated)
Weight	: 216g

**DIN-Rail Mounting Kit**

