

FEATURES

- ▶ Fully Encapsulated Plastic Case for PCB, Chassis and DIN-Rail Mounting Version
- ▶ Universal Input 85-264VAC, 47-440Hz
- ▶ Single, Dual and Triple Outputs
- ▶ I/O Isolation 3000VAC with Reinforced Insulation
- ▶ Operating Ambient Temp. Range -25°C to +70°C
- ▶ Overload/Voltage and Short Circuit Protection
- ▶ EMI Emission EN55011/32 Class B Approved
- ▶ EMC Immunity EN 61000-4-2,3,4,5,6,8,11 Approved
- ▶ UL508 Safety Approval (Option) Specifically for Industrial Application
- ▶ UL/cUL/IEC/EN 62368-1(60950-1) Safety Approval & CE Marking



PRODUCT OVERVIEW

The MINMAX AQF-30 series is a range of fully encapsulated AC-DC power supply modules. The product features EMI emission EN 55011/32 Class B approved and EMS compliance to EN 61000-4 standard. This series comply with international standard pinout and input voltage range of 85-264VAC for worldwide markets. For industrial applications, the models for chassis mounting can also be supplied as option with UL508 approval. The AQF-30 series provide a cost effective solution for many space critical applications in commercial and industrial electronic equipment.

Model Selection Guide

Model Number	Output Voltage	Output Current		Input Current		Max. capacitive Load	Efficiency (typ.)
				115VAC, 60Hz			
		Max.	Peak	@Max. Load	@No Load		@Max. Load
	VDC	mA	mA	mA(typ.)	mA(typ.)	μF	%
AQF-30S05	5	6000	---	557	60	8000	78
AQF-30S12	12	2500	---	543	60	3900	80
AQF-30S15	15	2000	---	543	60	3900	80
AQF-30S24	24	1250	---	543	60	1500	80
AQF-30S48	48	625	---	543	60	1000	80
AQF-30D12	±12	±1300	---	565	60	#1500	80
AQF-30D15	±15	±1000	---	543	60	#1500	80
AQF-30D512	*5	3000	4500	572	60	3900	76
	*12	1250	1800			1500	
AQF-30T512	*5	3000	4500	572	60	2200	76
	12	600	900			1500	
	-12	-600	900			1500	
AQF-30T512A	*5	3000	4500	572	60	2200	76
	12	1000	1500			1500	
	-12	-250	500			1500	
AQF-30T515	*5	3000	4500	572	60	2200	76
	15	500	750			1500	
	-15	-500	750			1500	
AQF-30T5312P	*5	4500	6000	588	60	2200	71
	+3.3	1000	1500			2200	
	+12	250	500			1500	
AQF-30T3512P	*3.3	4000	5300	483	60	2200	71
	+5	1500	2000			2200	
	+12	250	500			1500	

* Output floating (note 6)

For each output

Input Specifications

Parameter	Conditions / 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	115VAC	Cold Start at 25°C	---	---	20	A
	230VAC		---	---	40	A

Output Specifications

Parameter		Conditions / Model		Min.	Typ.	Max.	Unit		
Output Voltage Setting Accuracy		Single / Dual Output		---	±1.0	±2.0	%Vnom.		
		Dual Positive / Triple Output		Vo1	---	±1.0	±2.0	%Vnom.	
				Vo2 & Vo3	---	±3.0	---	%Vnom.	
Line Regulation		Vin=Min. to Max. @Full Load		---	±0.2	±1.0	%		
Load Regulation		Iout=Min. to Max.	Single Output Models		---	±0.5	±1.0	%	
			Dual Output Models		---	±2.5	±5.0	%	
			Triple Output Models		Vo1	---	±2.5	±5.0	%
					Vo2 & Vo3	---	±4.0	---	%
Cross Regulation- Dual / Triple Output Models	Vo1	Measured output Io = 20% to 100% of rated load Other output(s) set at 50% of rated load		---	±2.0	---	%		
	Vo2			---	±5.0	---	%		
	Vo3			---	±5.0	---	%		
Ripple & Noise		0-20 MHz Bandwidth	3.3V & 5VDC Output Models		---	1.5	1.8	%VPP of Vo	
			Other Output Models		---	1.0	1.3	%VPP of Vo	
Minimum Load		Single, Dual-Output Models and Main Output Triple Output Models		---	10	---	%Inom.		
		Auxiliary Outputs of Triple Output Models		---	20	---	%Inom.		
Over Voltage Protection		Zener diode clamp		---	120	---	% of Vo		
Temperature Coefficient				---	±0.02	---	%/°C		
Overshoot				---	---	5	% Vout		
Over Load Protection		Hiccup mode, auto-recovery		105	---	---	% Inom.		
		(long term overload condition may cause damage)							
Short Circuit Protection		Hiccup mode, Automatic Recovery							

General Specifications

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		---	100	---	kHz
Hold-up Time		---	20	---	ms
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	200,000			Hours
Safety Approvals	UL/cUL 60950-1 recognition(UL certificate), IEC/EN 60950-1(CB-report)				
	UL/cUL 62368-1 recognition(UL certificate), IEC/EN 62368-1(CB-report)				
	UL/cUL 508 listed certificate				

EMC Specifications

EMI Specifications					
Parameter		Standards & Level			Performance
EMI	Conduction	EN 55011, EN 55032, EN 61000-6-4, EN 61000-6-3		Without external components	Class B
	Radiation				
EMS	EN 55035, EN 61000-6-2, EN 61000-6-1				
	ESD	EN 61000-4-2 air ± 8kV, Contact ± 4kV			B
	Radiated immunity	EN 61000-4-3 10V/m			A
	Fast transient	EN 61000-4-4 ±2kV			B
	Surge	EN 61000-4-5 ±1kV			B
	Conducted immunity	EN 61000-4-6 10Vrms			B
	PFMF	EN 61000-4-8 30A/m			A
	Dips	EN 61000-4-11 30% 10ms			B
	Interruptions	EN 61000-4-11 >95% 5000ms			C

Environmental Specifications

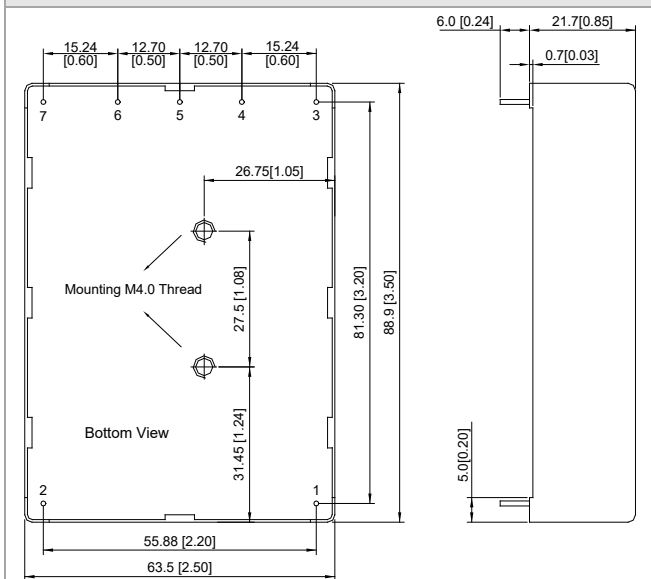
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature Range		-25	---	+70	°C
Power Derating	+50°C to +70°C	1.125			W / °C
Storage Temperature Range		-40	---	+85	°C
Thermal Shutdown	Shutdown, Internal IC Junction Temperature	---	140	---	°C
	Automatic Recovery, Internal IC Junction Temperature	---	65	---	°C
Humidity (non condensing)		---	---	95	% rel. H
Lead Temperature (1.5mm from case for 10Sec.)		---	---	260	°C

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 We recommend to protect the converter by a slow blow fuse in the input supply line.
- 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 MINMAX.
- 5 Peak current can't be drawn from all output at the same time.
- 6 Floating (or isolated) output of a power supply that is not connected to any other output.
- 7 Specifications are subject to change without notice.

Package Specifications PCB Mounting

Mechanical Dimensions



Pin Connections

Pin	Single	Dual (D12, D15)	Dual (D512)	Triple	Triple (T5312P, T3512P)	Diameter mm (inches)
1	AC(N) – AC Neutral					Ø 1.0 [0.04]
2	AC(L) – AC Line					Ø 1.0 [0.04]
3	+Vout	+Vout	+Vout2	+Vout2	+Vout2	Ø 1.0 [0.04]
4	No Pin		+Vout1	+Vout1	+Vout1	Ø 1.0 [0.04]
5	-Vout	Common	-Vout2	Com. 2/3	Com. 2/3	Ø 1.0 [0.04]
6	No Pin		-Vout1	-Vout1	-Vout1	Ø 1.0 [0.04]
7	NC	-Vout	NC	-Vout3	+Vout3	Ø 1.0 [0.04]

NC: No Connection

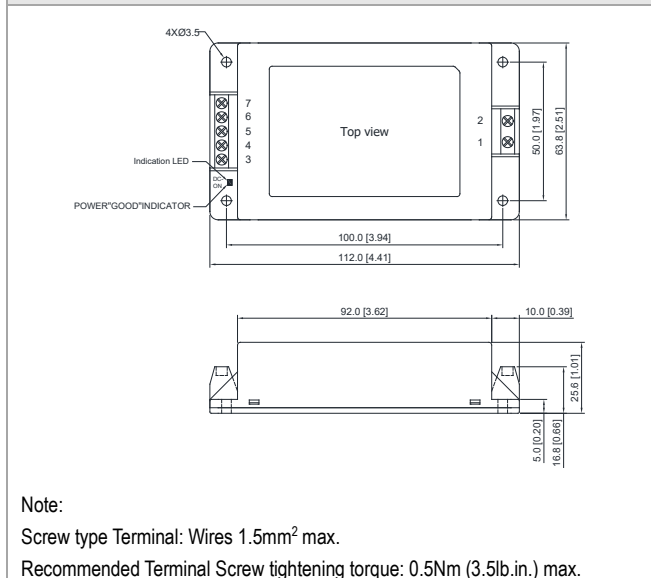
- ▶ All dimensions in mm (inches)
- ▶ Tolerance: ± 0.5 (± 0.02)
- ▶ Pin pitch tolerance: ± 0.25 (± 0.01)
- ▶ Pin diameter tolerance: $X.X \pm 0.1$ ($X.XX \pm 0.004$)

Physical Characteristics

Case Size	:	88.9x63.5x21.7mm (3.50x2.50x0.85 inches)
Case Material	:	Plastic resin (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy
Weight	:	211g

Package Specifications Chassis Mounting with screw terminal (order code suffix C)

Mechanical Dimensions



Connections

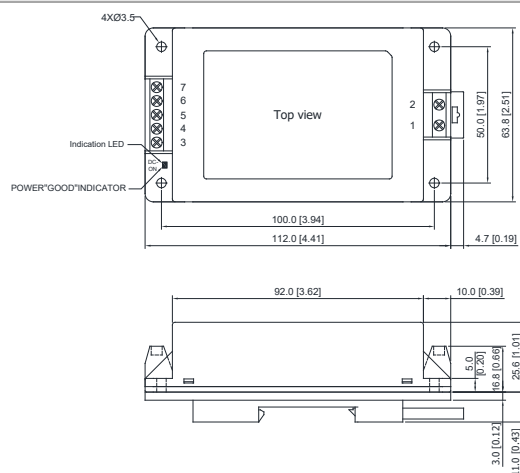
Terminal	Single	Dual (D12, D15)	Dual (D512)	Triple	Triple (T5312P, T3512P)
1	AC(N) – AC Neutral				
2	AC(L) – AC Line				
3	+Vout	+Vout	+Vout2	+Vout2	+Vout2
4	NC		+Vout1	+Vout1	+Vout1
5	-Vout	Common	-Vout2	Com. 2/3	Com. 2/3
6	NC		-Vout1	-Vout1	-Vout1
7	NC	-Vout	NC	-Vout3	+Vout3

NC: No Connection

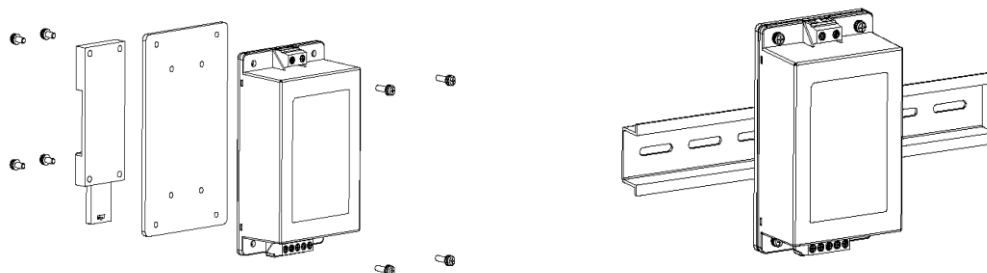
- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.01)

Physical Characteristics

Case Size	: 112.0x63.8x25.6mm (4.41x2.51x1.01 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 208g

Package Specifications for screw terminal with DIN Rail Mounting (order code suffix AC-DIN-02)
Mechanical Dimensions

Physical Characteristics

Case Size	: 112.0x63.8x25.6mm (4.41x2.51x1.01 inches)
Case Material	: Plastic resin (flammability to UL 94V-0 rated)
Weight	: 262g

Screw terminal with DIN Rail Mounting

Order Code Table

PCB Mounting	Chassis Mounting	PCB Mounting With UL508	Chassis Mounting With UL508	With DIN Rail Mounting by two Order Code		Chassis Mounting with UL508 & DIN Rail Mounting by two Order Code	
AQF-30S05	AQF-30S05C	AQF-30S05ICE	AQF-30S05CICE	AQF-30S05C	AC-DIN-02	AQF-30S05CICE	AC-DIN-02
AQF-30S12	AQF-30S12C	AQF-30S12ICE	AQF-30S12CICE	AQF-30S12C	AC-DIN-02	AQF-30S12CICE	AC-DIN-02
AQF-30S15	AQF-30S15C	AQF-30S15ICE	AQF-30S15CICE	AQF-30S15C	AC-DIN-02	AQF-30S15CICE	AC-DIN-02
AQF-30S24	AQF-30S24C	AQF-30S24ICE	AQF-30S24CICE	AQF-30S24C	AC-DIN-02	AQF-30S24CICE	AC-DIN-02
AQF-30S48	AQF-30S48C	AQF-30S48ICE	AQF-30S48CICE	AQF-30S48C	AC-DIN-02	AQF-30S48CICE	AC-DIN-02
AQF-30D12	AQF-30D12C	AQF-30D12ICE	AQF-30D12CICE	AQF-30D12C	AC-DIN-02	AQF-30D12CICE	AC-DIN-02
AQF-30D15	AQF-30D15C	AQF-30D15ICE	AQF-30D15CICE	AQF-30D15C	AC-DIN-02	AQF-30D15CICE	AC-DIN-02
AQF-30D512	AQF-30D512C	---	---	AQF-30D512C	AC-DIN-02	---	---
AQF-30T512	AQF-30T512C	---	---	AQF-30T512C	AC-DIN-02	---	---
AQF-30T512A	AQF-30T512AC	---	---	AQF-30T512AC	AC-DIN-02	---	---
AQF-30T515	AQF-30T515C	---	---	AQF-30T515C	AC-DIN-02	---	---
AQF-30T5312P	AQF-30T5312PC	---	---	AQF-30T5312PC	AC-DIN-02	---	---
AQF-30T3512P	AQF-30T3512PC	---	---	AQF-30T3512PC	AC-DIN-02	---	---