

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 | |
| AQF-30T512A | -12 | -600 | 900 | 572 | 60 | 1500 | 76 |
| | *5 | 3000 | 4500 | | | 2200 | |
| AQF-30T512A | 12 | 1000 | 1500 | 572 | 60 | 1500 | 76 |
| | -12 | -250 | 500 | | | 1500 | |
| AQF-30T515 | *5 | 3000 | 4500 | 572 | 60 | 2200 | 76 |
| | 15 | 500 | 750 | | | 1500 | |
| AQF-30T515 | -15 | -500 | 750 | 572 | 60 | 1500 | 76 |
| | *5 | 4500 | 6000 | | | 2200 | |
| AQF-30T5312P | +3.3 | 1000 | 1500 | 588 | 60 | 2200 | 71 |
| | +12 | 250 | 500 | | | 1500 | |
| AQF-30T3512P | *3.3 | 4000 | 5300 | 483 | 60 | 2200 | 71 |
| | +5 | 1500 | 2000 | | | 2200 | |
| AQF-30T3512P | +12 | 250 | 500 | 483 | 60 | 1500 | 71 |

* 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 | %V _{PP} of Vo | |
| | | Other Output Models | --- | 1.0 | 1.3 | %V _{PP} 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 | Foldback, auto-recovery | | 105 | --- | --- | % Inom. | |
| | (long term overload condition may cause damage) | | | | | | |
| Short Circuit Protection | Hiccup mode, 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 | | | --- | 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 | | | | | |

| 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 |

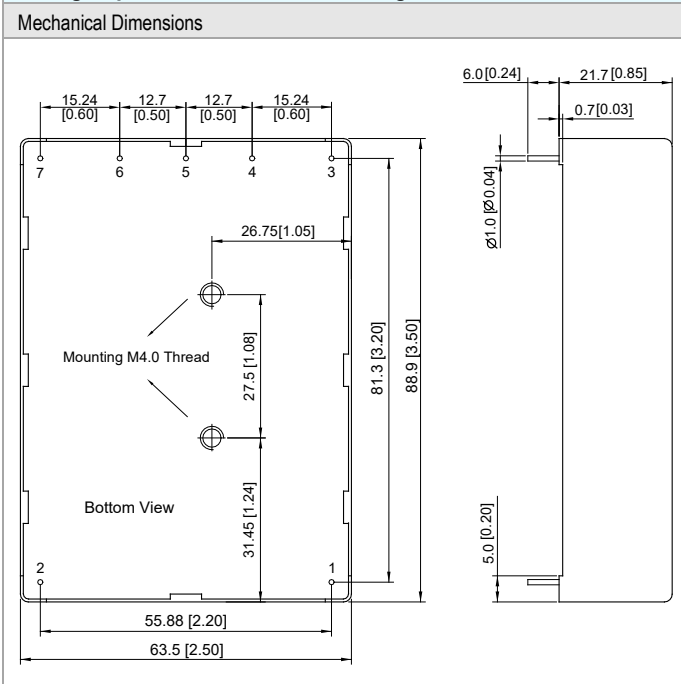
EMC Specifications

| Parameter | Standards & Level | | | Performance |
|-----------|--------------------------------------|---|-----------------------------|-------------|
| EMI | Conduction | EN 55011, EN 55032, EN 61000-6-4, | Without external components | Class B |
| | Radiation | EN 61000-6-3 | | |
| EMS | EN 55024, EN 61000-6-2, EN 61000-6-1 | | | |
| | ESD | EN 61000-4-2 air \pm 8kV, Contact \pm 4kV | | B |
| | Radiated immunity | EN 61000-4-3 10V/m | | A |
| | Fast transient | EN 61000-4-4 \pm 2kV | | B |
| | Surge | EN 61000-4-5 \pm 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 |

Notes

- All specifications typical at Ta=+25°C, resistive load, 115VAC, 60Hz input voltage and after warm-up time rated output current unless otherwise noted.
- We recommend to protect the converter by a slow blow fuse in the input supply line.
- 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.
- Other input and output voltage may be available, please contact MINMAX.
- Peak current can't be drawn from all output at the same time.
- Floating (or isolated) output of a power supply that is not connected to any other output.
- Specifications are subject to change without notice.

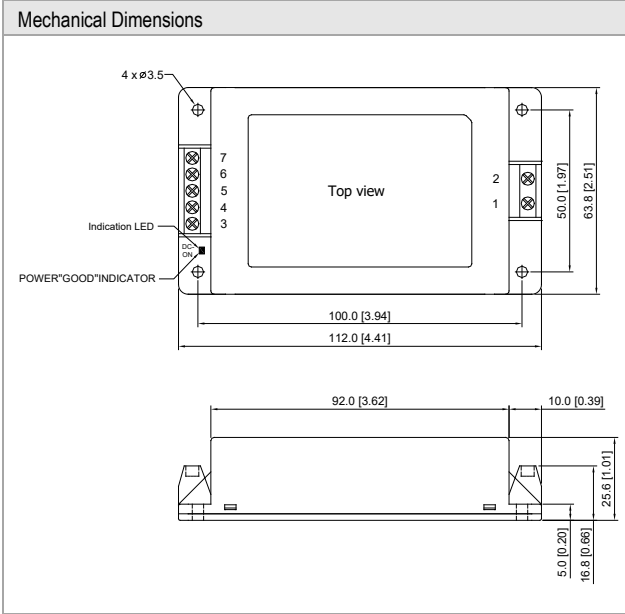
Package Specifications PCB Mounting

| Mechanical Dimensions | | Pin Connections | | | | | |
|--|----|-----------------|--------------------|----------------|-------------|----------|------------------------|
|  | | Pin | Single | Dual (D12,D15) | Dual (D512) | Triple | Triple (T5312P,T3512P) |
| | | 1 | AC(N) – AC Neutral | | | | |
| | | 2 | AC(L) – AC Line | | | | |
| | | 3 | +Vout | +Vout | +Vout2 | +Vout2 | +Vout2 |
| | | 4 | No Pin | +Vout1 | +Vout1 | +Vout1 | +Vout1 |
| | | 5 | -Vout | Common | -Vout2 | Com. 2/3 | Com. 2/3 |
| | | 6 | No Pin | -Vout1 | -Vout1 | -Vout1 | -Vout1 |
| 7 | NC | -Vout | NC | -Vout3 | +Vout3 | | |
| NC: No Connection | | | | | | | |
| <p> ▶ All dimensions in mm (inches) ▶ Tolerance: ± 0.5 (± 0.02) ▶ Pin pitch tolerance: ± 0.25 (± 0.01) ▶ Pin diameter $\varnothing 1.0 \pm 0.1$ (0.04 ± 0.004) </p> | | | | | | | |

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 with Tin Plate Over Nickel Subplate |
| Weight | : 211g |

Package Specifications Chassis Mounting (order code suffix C)



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 |

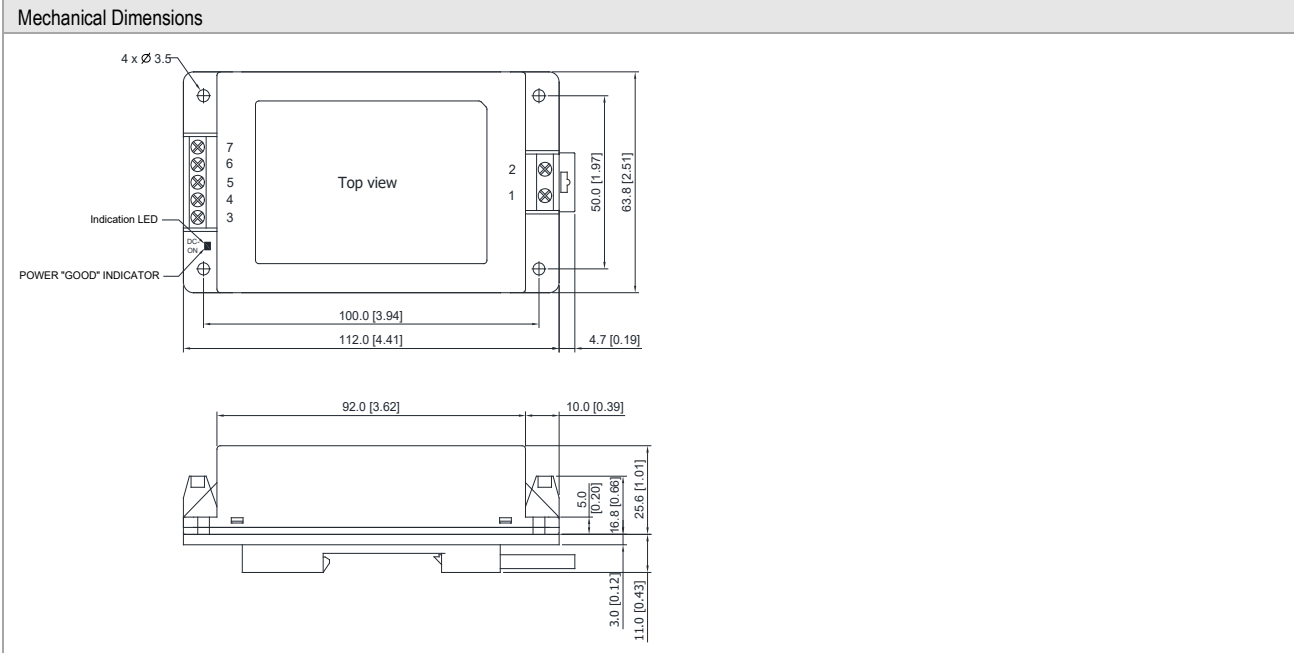
NC: No Connection

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

Physical Characteristics

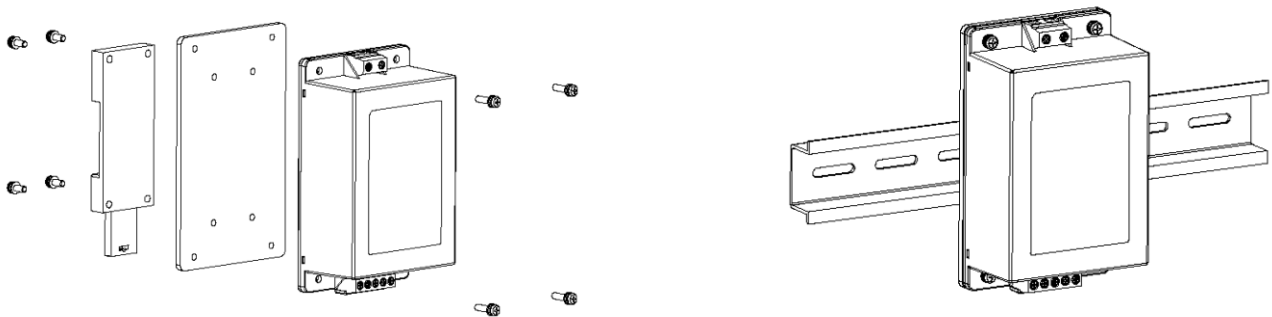
| | |
|---------------|--|
| Case Size | : 112.0x63.8x25.6mm (4.41x2.51x1.01 inches) |
| Case Material | : Plastic resin (flammability to UL 94V-0 rated) |
| Weight | : 208g |

Package Specifications with DIN Rail Mounting Bracket (order code AC-DIN-02)



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 |

DIN-Rail Mounting Kit

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 | --- | --- |