

**MAD150** Series  
AC/DC Power Supplies



Medical



Industrial



**Highly Reliable Medical  
AC/DC Power Supplies  
That Help to Rescue Lives**

Medical Certificated 15-450W AC/DC Power Supplies

**Compact Medical AC/DC Power Supplies**

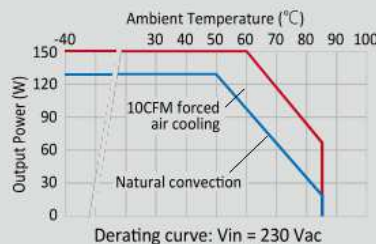
New Medical Grade 3"x2" 150W AC/DC Power supplies  
High Reliability . Versatile . Compact Design

P-DUKE has launched the MAD150, a new medical-grade AC/DC power supply series capable of delivering up to 150W of continuous output power and 200W peak power for 5 seconds. This compact 3"x2" package is available in open frame, enclosed, and DIN-rail options, with connection types including JST connectors, Molex connectors, and screw terminals.

The series features a universal input range from 85 to 264 Vac and supports DC input voltages from 88 to 370 Vdc, making it suitable for most industries worldwide. The MAD150 series provides single output options for medical devices at 12, 15, 18, 24, 28, 36, 48, and 54 Vdc, with up to 7% output adjustability. With conversion efficiency reaching up to 94%, it reduces thermal generation and expands operating temperature ranges. Designed for medical applications, it offers less than 100µA patient leakage current, 2xMOPP (Means of Patient Protection), and 4000 Vac input-to-output isolation, suitable for type BF applied parts.

| Output Power                       | Input Voltage                | Output Voltage                        | Insulation        | Leakage Current | EMI                                 |
|------------------------------------|------------------------------|---------------------------------------|-------------------|-----------------|-------------------------------------|
| 150W Continuous<br>200W for 5 sec. | 85 - 264 Vac<br>88 - 370 Vdc | 12, 15, 18, 24,<br>28, 36, 48, 54 Vdc | 2xMOPP<br>4000Vac | < 100µA         | EN 55032<br>CE Class B<br>RE Cass B |

The MAD150 is certified to IEC/EN/ANSI/AAMI ES 60601-1 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance) and IEC/EN/UL 62368-1 (Audio/video, information and communication technology equipment - Part 1: Safety requirements). It operates at altitudes up to 5000m, with an ambient temperature range of -40 to +85°C, and includes versatile protection features to ensure system safety. This makes it ideal for harsh environments and demanding medical applications such as portable medical devices, diagnostic equipment, monitoring equipment, hospital beds, and medical carts.



**Features**

- Up to 94% Conversion Efficiency
- Up to 200W Peak Load for 5 seconds
- 4000Vac reinforced 2xMOPP insulation
- Low leakage current < 100µA
- Comply with EN55032 radiated & conducted EMI Class B
- Medical certification IEC/EN/ANSI/AAMI 60601-1
- Compact 3" x 2" Package
- Operating Altitude up to 5000 m
- Operating Temperature Range -40°C to +85°C
- 5 Years Product Warranty

**Applications**

- Portable medical devices
- Diagnostic equipment
- Monitoring equipment
- Hospital beds
- Medical carts

【お問い合わせ先】

**JEMCO** 株式会社ジェムコ

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 E-Mail : [inf@jemc.co.jp](mailto:inf@jemc.co.jp)



# P-DUKE POWER

## MAD150 Series

2 x 3 Inch AC-DC POWER SUPPLIES  
Up to 150 Watts

**5**  
YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT

+85°C  
-40°C  
AMBIENT TEMP.



Medical



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



PV



Railway



|                       |  |                                  |                                       |                                  |                                |   |            |            |            |            |
|-----------------------|--|----------------------------------|---------------------------------------|----------------------------------|--------------------------------|---|------------|------------|------------|------------|
| <b>2</b><br>x<br>MOPP | <b>4000</b><br>VAC<br>Reinforced<br>Insulation | <b>ADJ.</b><br>Output<br>Voltage | Internal<br>EN55032<br>Class <b>B</b> | <b>LOW</b><br>Leakage<br>Current | <b>LOW</b><br>Standby<br>Power | Operating<br>Altitude<br><b>5000</b><br>meter | <b>OCP</b> | <b>OVP</b> | <b>SCP</b> | <b>OTP</b> |
|-----------------------|--|----------------------------------|---------------------------------------|----------------------------------|--------------------------------|---|------------|------------|------------|------------|

### PART NUMBER STRUCTURE

| MAD150      | U                     | S               | 12   | A               | - | M                                       |  |
|-------------|-----------------------|-----------------|--|-----------------|---|---|--|
| Series Name | Universal Input (VAC) | Output Quantity | Output Voltage (VDC)   | Protection Type |   | Connector Options                       | Package Options  |
|             | 85~264                | Single          | 12:12V<br>15:15V<br>18:18V<br>24:24V<br>28:28V<br>36:36V<br>48:48V<br>54:54V | A: CLASS I      |   | M: Molex<br>J: JST<br>T: Terminal Block | <input type="checkbox"/> : Open type<br>E1: Enclosed type<br>D1: Din rail type |

**TECHNICAL SPECIFICATION** All specifications are typical at 230VAC input, full load and 25°C unless otherwise noted

| Model Number | Input Range | Output Voltage | Output Current     |                                | Input Power @ No Load | Efficiency | Maximum Capacitor Load |
|--------------|-------------|----------------|--------------------|--------------------------------|-----------------------|------------|------------------------|
|              |             |                | Natural Convection | Forced Air Cooling With 10 CFM |                       |            |                        |
|              | VAC         | VDC            | A                  | A                              | W                     | %          | μF                     |
| MAD150US12A  | 85 ~ 264    | 12             | 10.84              | 12.5                           | 0.2                   | 92         | 8600                   |
| MAD150US15A  | 85 ~ 264    | 15             | 8.67               | 10                             | 0.2                   | 92         | 5400                   |
| MAD150US18A  | 85 ~ 264    | 18             | 7.23               | 8.34                           | 0.2                   | 92         | 4000                   |
| MAD150US24A  | 85 ~ 264    | 24             | 5.42               | 6.25                           | 0.2                   | 93         | 2200                   |
| MAD150US28A  | 85 ~ 264    | 28             | 4.65               | 5.36                           | 0.2                   | 93         | 1500                   |
| MAD150US36A  | 85 ~ 264    | 36             | 3.62               | 4.17                           | 0.2                   | 93         | 1000                   |
| MAD150US48A  | 85 ~ 264    | 48             | 2.71               | 3.13                           | 0.2                   | 94         | 560                    |
| MAD150US54A  | 85 ~ 264    | 54             | 2.42               | 2.79                           | 0.2                   | 94         | 470                    |

**INPUT SPECIFICATIONS**

| Parameter                     | Conditions                   | Min. | Typ. | Max.         | Unit  |
|-------------------------------|------------------------------|------|------|--------------|-------|
| Operating input voltage range | AC input                     | 85   |      | 264          | VAC   |
|                               | DC input                     | 88   |      | 370          | VDC   |
| Input frequency               | AC input                     | 47   |      | 63           | Hz    |
| Input current                 | 100VAC and at 150W Full Load |      |      | 3            | A     |
|                               | 240VAC and at 150W Full Load |      |      | 1.5          |       |
| No load input power           | 230VAC                       |      | 0.2  |              | Watts |
| Leakage current               | 264VAC                       |      |      | 100          | μA    |
| Power factor                  |                              | 0.95 |      |              |       |
| Start up time                 |                              |      |      | 1500         | ms    |
| Rise time                     |                              |      | 15   |              | ms    |
| Hold up time                  | 115VAC and 130W              | 10   |      |              | ms    |
| Input inrush current          | 230VAC Cold start at 25°C    |      | 80   |              | A     |
| Input protection              | Internal fuse                |      |      | T4.0A/250VAC |       |

**OUTPUT SPECIFICATIONS**

| Parameter                    | Conditions   | Min.                            | Typ.                                   | Max.         | Unit                    |
|------------------------------|--|---------------------------------|--|--------------|-------------------------|
| Output power                 | Forced air cooling with 10CFM<br>Natural convection<br><br>* Please refer to the derating curve for detailed rating.<br>* For further information, please contact with P-DUKE.   |                                 |  | 150<br>130   | Watts                   |
| Output peak power            | Peak power<br>Peak power time<br>Peak power duty<br>Average operation power ( % of Full Load)<br><br>* Please refer to the Definition of peak power rating.<br>* For further information, please contact with P-DUKE.        |                                 | 5<br>20<br>50                          | 200          | Watts<br>s<br>%<br>%    |
| Initial set voltage accuracy | 230VAC and Full Load   | -1.0                            |  | +1.0         | %                       |
| Line regulation              | Low Line to High Line at Full Load   | -0.2                            |  | +0.2         | %                       |
| Load regulation              | No Load to Full Load<br>10% Load to 90% Load   | -0.5<br>-0.4                    |  | +0.5<br>+0.4 | %                       |
| Voltage adjustability        | No Peak Power<br>Peak Power Up to 200W   | -7<br>-7                        |  | +7<br>+2     | %                       |
| Minimum load                 | No minimum load required   |                                 | 0                                      |              | %                       |
| Ripple and noise             | Measured by 20MHz bandwidth<br>With a 1 $\mu$ F/25V 1206 X7R MLCC<br>12Vout<br>15Vout<br>18Vout<br>With a 1 $\mu$ F/50V 1206 X7R MLCC<br>24Vout<br>28Vout<br>With a 0.1 $\mu$ F/100V 1206 X7R MLCC<br>36Vout, 48Vout, 54Vout |                                 | 120<br>150<br>180<br>240<br>280<br>360 |              | mVp-p<br>mVp-p<br>mVp-p |
| Temperature coefficient      |  | -0.02                           |  | +0.02        | %/°C                    |
| Transient response           | Load step from 75 ~ 50% change at 2.5A/ $\mu$ s<br>Peak deviation<br>Recovery time   |                                 | 3<br>600                               |              | % Vout<br>$\mu$ s       |
| Over voltage protection      | % of Vout(nom); Latch mode   | 110                             |  | 135          | %                       |
| Over load protection         | % of Iout rated; Hiccup mode   |                                 | 160                                    |              | %                       |
| Short circuit protection     | Output short circuit is defined to be a short circuit load of less than 0.1 ohm  | Continuous, automatics recovery |  |              |                         |

**GENERAL SPECIFICATIONS**

| Parameter                 | Conditions   | Min.   | Typ. | Max.  | Unit       |
|---------------------------|--|--|------|---|------------|
| Isolation voltage         | 1 minute (2MOPP insulation)<br>Input to Output<br>Input (Output) to F.G. | 4000<br>2500   |      |   | VAC        |
| Isolation resistance      | 500VDC   | 0.1  |      |   | G $\Omega$ |
| Switching frequency       | 230VAC, Full load  |  | 100  |   | kHz        |
| Safety approvals(Pending) |  | IEC/ EN/ ANSI/AAMI ES 60601-1<br>IEC/ EN/ UL 62368-1 |      |   |            |
| Weight                    | Open type<br>Enclosed type<br>Din rail type                              |  |      | 134g (4.70oz)<br>190g (6.70oz)<br>212g (7.48oz) |            |
| MTBF                      | MIL-HDBK-217F Ta=25°C, Full load   |  |      | 7.245 x 10 <sup>5</sup>                         | hrs        |



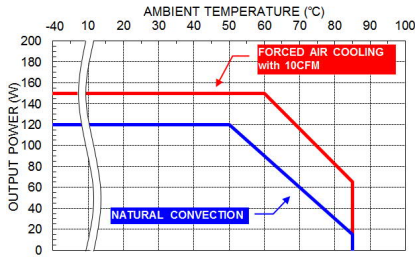
**ENVIRONMENTAL SPECIFICATIONS**

| Parameter                     | Conditions                       | Min. | Typ. | Max.          | Unit |
|-------------------------------|----------------------------------|------|------|---------------|------|
| Operating ambient temperature | With derating                    |      |      | +85           | °C   |
| Storage temperature range     |                                  | -40  |      | +85           | °C   |
| Over temperature protection   | Internal thermistor; Hiccup mode |      | 125  |               | °C   |
| Operating altitude            |                                  |      |      | 5000          | m    |
| Thermal shock                 |                                  |      |      | MIL-STD-810F  |      |
| Shock                         |                                  |      |      | IEC60068-2-27 |      |
| Vibration                     |                                  |      |      | IEC60068-2-6  |      |
| Relative humidity             | Non-condensing                   |      |      | 5% to 95% RH  |      |

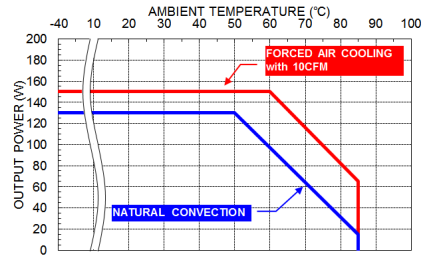
**EMC SPECIFICATIONS**

| Parameter                      | Conditions  | Level            |         |
|--------------------------------|---|------------------|---------|
| EMI                            | EN55011, EN55032, EN60601-1-2, and FCC Part 18 / 15 | Conducted        | Class B |
|                                |   | Radiated         | Class B |
|                                |   | Class I          | Class A |
|                                |   | Class II         | Class A |
| Harmonic currents              | EN61000-3-2 Full Load                               | Class D          |         |
| Voltage flicker                | EN61000-3-3   |                  |         |
| EMS                            | EN55035 and EN60601-1-2                             |                  |         |
| ESD                            | EN61000-4-2   | Perf. Criteria A |         |
| Radiated immunity              | EN61000-4-3 20 V/m                                  | Perf. Criteria A |         |
| Fast transient                 | EN61000-4-4 ± 2kV                                   | Perf. Criteria A |         |
| Surge                          | EN61000-4-5 DM ± 1kV and CM ± 2kV                   | Perf. Criteria A |         |
| Conducted immunity             | EN61000-4-6 20 Vr.m.s                               | Perf. Criteria A |         |
| Power frequency magnetic field | EN61000-4-8 30 A/m                                  | Perf. Criteria A |         |
| Dip and interruptions          | EN61000-4-11  |                  |         |

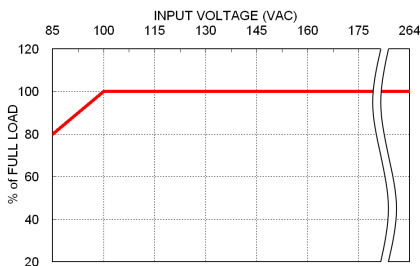
**CHARACTERISTIC CURVE**



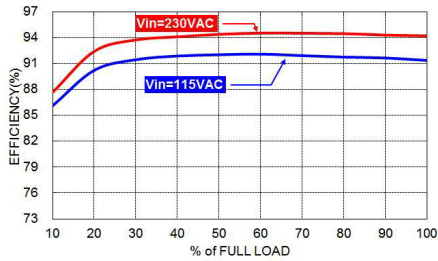
Derating Curve vs. Ambient Temperature  
Vin=115VAC Open type



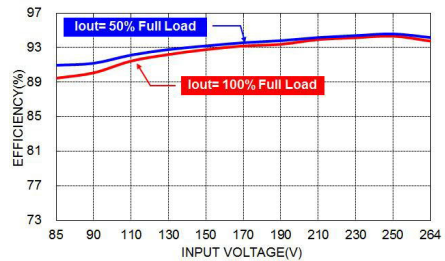
Derating Curve vs. Ambient Temperature  
Vin=230VAC Open type



Derating Curve vs. Input Voltage  
MAD150



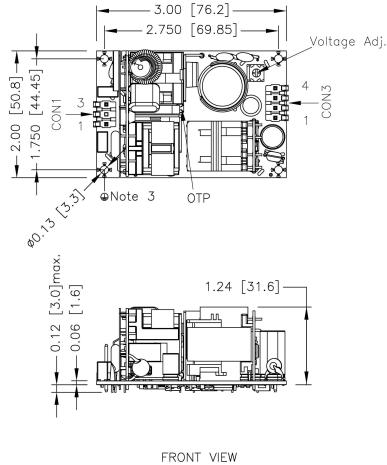
Efficiency vs. Output Load  
MAD150US24 with Forced air cooling



Efficiency vs. Input Voltage  
MAD150US24 with Forced air cooling

**MECHANICAL DRAWING**

Open type



**CONNECTORS CONNECTIONS**

**CON1 – Input Connector**

|       |         |
|-------|---------|
| Pin 3 | Line    |
| Pin 1 | Neutral |

Mates with  
Molex housing : **09-93-0300**  
Molex crimp terminals : **2478**

**CON3 – Output Connector**

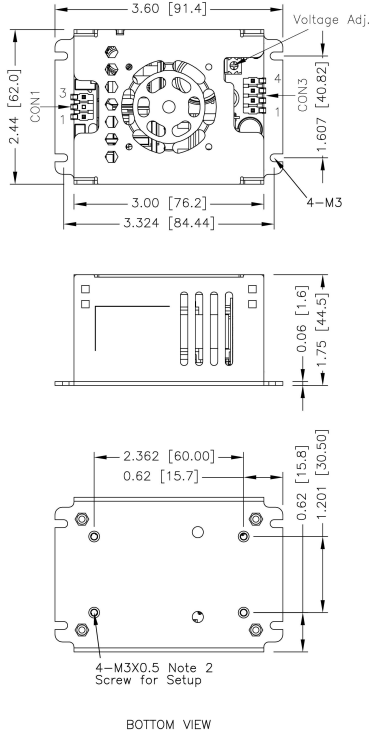
|         |       |
|---------|-------|
| Pin 1,2 | +Vout |
| Pin 3,4 | -Vout |

Mates with  
Molex housing : **09-93-0400**  
Molex crimp terminals : **2478**

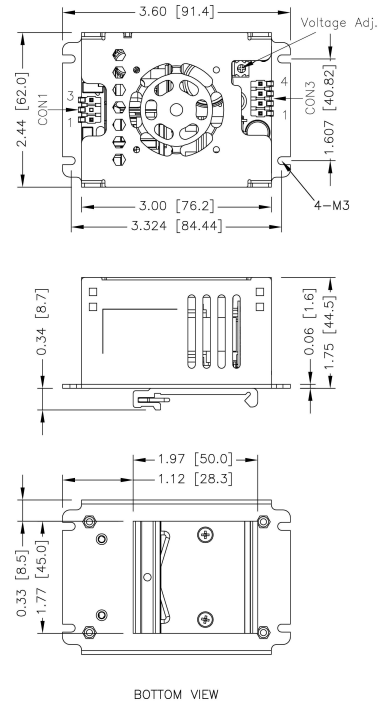
- All dimensions in inch [mm]  
Tolerance : x.xx±0.02 [x.x±0.5]  
x.xxx±0.010 [x.xx±0.25]
- The screw locked torque: MAX 3.4kgf-cm/0.33N-m
- The screws holes can be considered as PE connection for CLASS I application.
- Unnecessary to connect with safety earth for CLASS II application.

## MECHANICAL DRAWING(CONTINUED)

### Enclosed type



### Din rail type



1. All dimensions in inch [mm]

Tolerance : x.xx±0.02 [x.x±0.5]

x.xxx±0.010 [x.xx±0.25]

2.The screw locked torque: MAX 4.2Kgf-cm/0.41N-m

1. All dimensions in inch [mm]

Tolerance : x.xx±0.02 [x.x±0.5]

x.xxx±0.010[x.xx±0.25]

### CONNECTORS CONNECTIONS

#### CON1 – Input Connector

|       |         |
|-------|---------|
| Pin 3 | Line    |
| Pin 1 | Neutral |

#### CON3 – Output Connector

|         |       |
|---------|-------|
| Pin 1,2 | +Vout |
| Pin 3,4 | -Vout |

### CONNECTOR OPTIONS

#### - J JST Type



Mates with housing  
CON1: VHR-3N  
CON2: VHR-4N

Crimp terminals  
CON1: SVH-21T-P1.1  
CON2: SVH-21T-P1.1

#### - M Molex Type



Mates with housing  
CON1: 09-93-0300  
CON2: 09-93-0400

Crimp terminals  
CON1: 2478  
CON2: 2478

#### - T Terminal Block



Screw locked torque  
MAX 2Kgf.cm/0.2N.m

Wire dimension range  
26 ~ 16AWG