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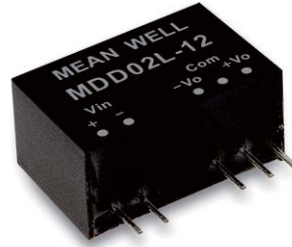
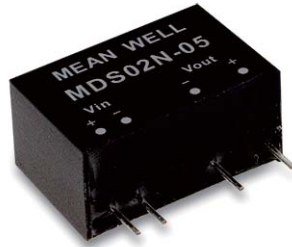
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■ Features

- SIP7 package with international standard pinout
- Operating temperature range -40 ~ +85°C
- Medical safety approved (1xMOPP/2xMOOP) according to ANSI/AAMI ES60601-1
- Low patient leakage current <2μA
- Protection: Short circuit(3 second max.)
- 6KVDC or 4.2VAC high I/O isolation (Reinforced isolation)
- Low cost
- 3 years warranty

■ Applications

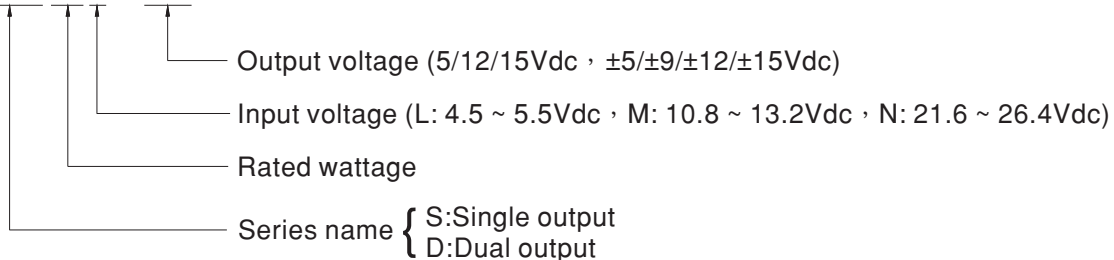
- Medical devices
- Medical oxygen monitor
- CT scanning
- Medical carts
- Oral care equipment

■ Description

MDS02 and MDD02 series are 2W isolated and unregulated module type medical grade DC-DC converter with SIP7 package. It features international standard pins, a high efficiency up to 85%, wide working temperature range -40~+85°C, 6KVDC or 4.2KVAC I/P-O/P high isolation voltage, short circuit protection, etc. The models account for different input voltage 5V/12V/24V±10%, and various output voltage, 5V/12V/15V for single output and ±5V/±9V/±12V/±15V for dual outputs, which are suitable for medical systems, ultra low leakage current.

■ Model Encoding

MD**S****02****L** - **12**





| MODEL SELECTION TABLE | | | | | | | |
|-----------------------|------------------------------|---------------|-----------|----------------|----------------|-------------------|-----------------------|
| ORDER NO. | INPUT | | | OUTPUT | | EFFICIENCY (TYP.) | CAPACITOR LOAD (MAX.) |
| | INPUT VOLTAGE (RANGE) | INPUT CURRENT | | OUTPUT VOLTAGE | OUTPUT CURRENT | | |
| | | NO LOAD | FULL LOAD | | | | |
| MDS02L-05 | Normal 5V (4.5 ~ 5.5V) | 35mA | 510mA | 5V | 40 ~ 400mA | 77% | 1000μF |
| MDS02L-12 | | 47mA | 510mA | 12V | 17 ~ 167mA | 80% | 470μF |
| MDS02L-15 | | 65mA | 510mA | 15V | 13 ~ 133mA | 79% | 470μF |
| MDD02L-05 | | 35mA | 500mA | ±5V | ±20 ~ 200mA | 78% | *470μF |
| MDD02L-09 | | 47mA | 500mA | ±9V | ±12 ~ 111mA | 81% | *470μF |
| MDD02L-12 | | 60mA | 510mA | ±12V | ±9 ~ 83mA | 78% | *220μF |
| MDD02L-15 | | 65mA | 510mA | ±15V | ±7 ~ 67mA | 79% | *220μF |
| MDS02M-05 | Normal 12V (10.8 ~ 13.2V) | 15mA | 215mA | 5V | 40 ~ 400mA | 75% | 1000μF |
| MDS02M-12 | | 16mA | 205mA | 12V | 17 ~ 167mA | 83% | 470μF |
| MDS02M-15 | | 17mA | 200mA | 15V | 13 ~ 133mA | 84% | 470μF |
| MDD02M-05 | | 17mA | 210mA | ±5V | ±20 ~ 200mA | 78% | *470μF |
| MDD02M-09 | | 21mA | 205mA | ±9V | ±12 ~ 111mA | 83% | *470μF |
| MDD02M-12 | | 18mA | 205mA | ±12V | ±9 ~ 83mA | 83% | *220μF |
| MDD02M-15 | | 24mA | 205mA | ±15V | ±7 ~ 67mA | 82% | *220μF |
| MDS02N-05 | Normal 24V (21.6 ~ 26.4V) | 8mA | 106mA | 5V | 40 ~ 400mA | 80% | 1000μF |
| MDS02N-12 | | 9mA | 103mA | 12V | 17 ~ 167mA | 83% | 470μF |
| MDS02N-15 | | 9mA | 100mA | 15V | 13 ~ 133mA | 85% | 470μF |
| MDD02N-05 | | 11mA | 106mA | ±5V | ±20 ~ 200mA | 77% | *470μF |
| MDD02N-09 | | 11mA | 103mA | ±9V | ±12 ~ 111mA | 83% | *470μF |
| MDD02N-12 | | 11mA | 103mA | ±12V | ±9 ~ 83mA | 82% | *220μF |
| MDD02N-15 | | 12mA | 103mA | ±15V | ±7 ~ 67mA | 82% | *220μF |

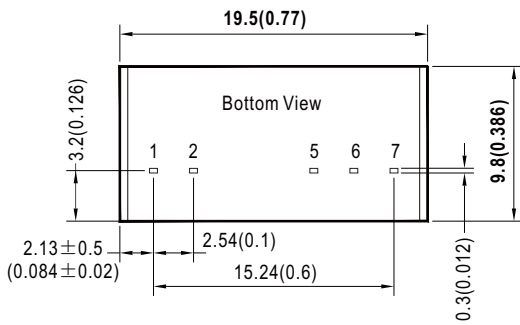
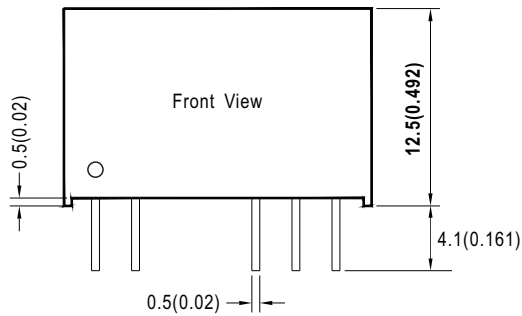
* For each output



| SPECIFICATION | | | | |
|-----------------------|---|--|-----------------------|-------------------|
| INPUT | VOLTAGE RANGE | L: 4.5 ~ 5.5Vdc M: 10.8 ~ 13.2Vdc N: 21.6 ~ 26.4Vdc | | |
| | SURGE VOLTAGE (100ms max.) | 5Vin models : 9Vdc 12Vin models : 18Vdc 24Vin models : 30Vdc | | |
| | FILTER | Internal capacitor | | |
| | PROTECTION | Fuse recommended. 500mA Slow-Blow Type for all models | | |
| OUTPUT | VOLTAGE ACCURACY | ±5.0% | | |
| | RATED POWER | 2W | | |
| | RIPPLE & NOISE Note.2 | 75mVp-p | | |
| | LINE REGULATION Note.3 | 1.2% for 1% input variation | | |
| | LOAD REGULATION Note.4 | ±10% | | |
| | SWITCHING FREQUENCY (Typ.) | 100KHz | | |
| PROTECTION | SHORT CIRCUIT | 3 second max. | | |
| ENVIRONMENT | COOLING | Free-air convection | | |
| | WORKING TEMP. | -40 ~ +85°C (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20% ~ 90% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -55 ~ +125°C, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | 0.02% / °C (0 ~ 85°C) | | |
| | SOLDERING TEMPERATURE | 1.5mm from case of 1 ~ 3sec./260°C max. | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes | | |
| SAFETY & EMC (Note.6) | WITHSTAND VOLTAGE | I/P-O/P:6KVDC or 4.2KVAC | | |
| | ISOLATION RESISTANCE | I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH | | |
| | ISOLATION LEVEL | Primary-secondary: 1xMOPP / 2xMOOP when system input voltage is with 250VAC, 50/60Hz | | |
| | ISOLATION CAPACITANCE (Typ.) | 5pF | | |
| | EMC EMISSION | Parameter | Standard | Test Level / Note |
| | | Conducted | EN55011(CISPR11) | Class B |
| | | Radiated | EN55011(CISPR11) | Class B |
| | EMC IMMUNITY | Parameter | Standard | Test Level / Note |
| ESD | | EN61000-4-2 | Level 2, ±8KV contact | |
| OTHERS | MTBF | 3500Khrs MIL-HDBK-217F(25°C) | | |
| | DIMENSION (L*W*H) | 19.5*9.8*12.5mm (0.77*0.386*0.492 inch) | | |
| | CASE MATERIAL | Non-Conductive black plastic (UL 94V-0 rated) | | |
| | PACKING | 4.2g | | |
| NOTE | <p>1.All parameters are specified at normal input(L:5Vdc, M:12Vdc, N:24Vdc), rated load, 25°C 70% RH ambient.</p> <p>2.Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1µf & 47µf capacitor.</p> <p>3.Line regulation is measured from low line to high line at rated load.</p> <p>4.Load regulation is measured from 10% to 100% rated load.</p> <p>5.Patient leakage current(2µf max.) and reinforced isolation is based on a 250VAC, 50/60Hz system input voltage.</p> <p>6.The final equipment must be re-confirm that it still meet EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies."(as available on http://www.meanwell.com)</p> | | | |

Mechanical Specification

- All dimensions in mm (inch)
- Tolerance: $x.x \pm 0.25\text{mm}$ ($x.xx \pm 0.01"$)
 $x.xx \pm 0.10\text{mm}$ ($x.xxx \pm 0.004"$)
- Pin pitch tolerance: $\pm 0.05\text{mm}$ ($\pm 0.002"$)

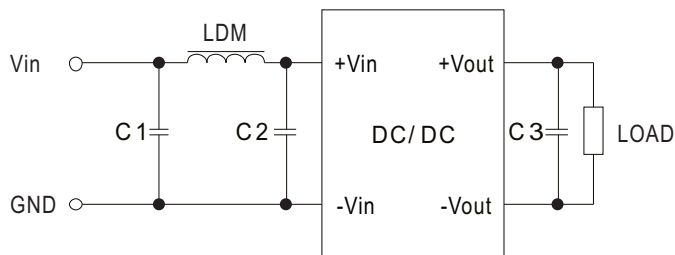


Plug Assignment

| Pin-Out | | |
|---------|-----------------------|---------------------|
| Pin No. | MDS02 (Single output) | MDD02 (Dual output) |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 5 | -Vout | -Vout |
| 7 | No pin | Common |
| 6 | +Vout | +Vout |

EMC Suggestion

EMC typical recommended circuit (Class B)



Recommended typical circuit parameters:

| Input voltage (V) | | 3.3/5/12/15/24 |
|-------------------|--------|----------------|
| EMI | C1, C2 | 4.7μF/50V |
| | C3 | See table 2 |
| | LDM | 6.8μF |

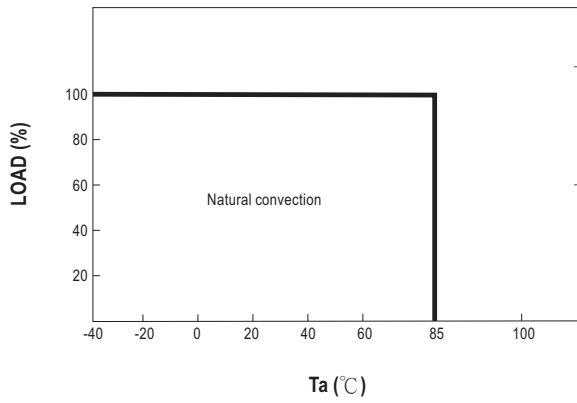
Table 1

| Single Vout | C3(μF) | Dual Vout | C3(μF) |
|-------------|--------|------------|--------|
| 3.3/5V | 10μF | ±5V | 4.7μF |
| 12V | 2.2μF | ±9V | 2.2μF |
| 15V | 1μF | ±12V / 15V | 1μF |

Table 2



■ Derating Curve



■ Installation Manual

Please refer to : <http://www.meanwell.com/manual.html>