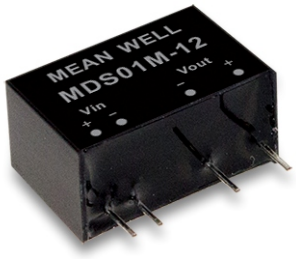
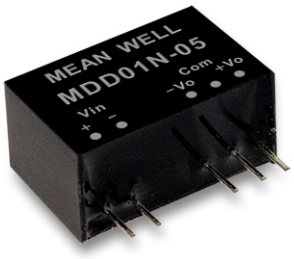
# 1W SIP Package DC-DC Medical Grade Unregulated Converter MDS01 & MDD01 series




ANSI/AAMI ES60601-1

Medical

## Features

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

## Applications

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

## GTIN CODE

MW Search: https://www.meanwell.com/serviceGTIN.aspx

## Description

MDS01 and MDD01 series are 1W isolated and unregulated module type medical grade DC-DC converter with SIP7 package. It features international standard pins, a high efficiency up to 83%, wide working temperature range -40~+85℃, 6KVDC or 4.2KVAC I/P-O/P hight isolation voltage, short circuit protection, etc. The models account for different input voltage 5V/12V/24V±10%, and various output voltage, 3.3V/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 01 L – 12**

- 12 → Output voltage (3.3/5/12/15Vdc，±5/±9/±12/±15Vdc)
- L → Input voltage (L: 4.5 ~ 5.5Vdc，M: 10.8 ~ 13.2Vdc，N: 21.6 ~ 26.4Vdc)
- 01 → Rated wattage
- S → Series name { S:Single output / D:Dual output

## MODEL SELECTION TABLE

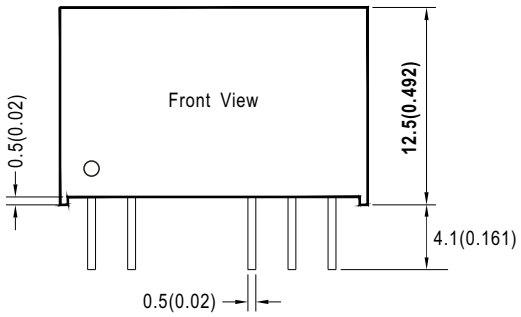
| ORDER NO. | INPUT | | | OUTPUT | | EFFICIENCY (TYP.) | CAPACITOR LOAD (MAX.) |
|---|---|---|---|---|---|---|---|
| | INPUT VOLTAGE (RANGE) | INPUT CURRENT | | OUTPUT VOLTAGE | OUTPUT CURRENT | | |
| | | NO LOAD | FULL LOAD | | | | |
| MDS01L-03 | Normal 5V (4.5 ~ 5.5V) | 25mA | 260mA | 3.3V | 31 ~ 303mA | 73% | 1000μF |
| MDS01L-05 | | 25mA | 260mA | 5V | 20 ~ 200mA | 78% | 1000μF |
| MDS01L-12 | | 40mA | 260mA | 12V | 9 ~ 84mA | 77% | 470μF |
| MDS01L-15 | | 45mA | 265mA | 15V | 7 ~ 67mA | 75% | 470μF |
| MDD01L-05 | | 25mA | 260mA | ±5V | ±10 ~ 100mA | 79% | *470μF |
| MDD01L-09 | | 35mA | 260mA | ±9V | ±6 ~ 56mA | 81% | *470μF |
| MDD01L-12 | | 40mA | 265mA | ±12V | ±5 ~ 42mA | 77% | *220μF |
| MDD01L-15 | | 45mA | 275mA | ±15V | ±4 ~ 34mA | 77% | *220μF |
| MDS01M-05 | Normal 12V (10.8 ~ 13.2V) | 15mA | 105mA | 5V | 20 ~ 200mA | 78% | 1000μF |
| MDS01M-12 | | 15mA | 105mA | 12V | 9 ~ 84mA | 82% | 470μF |
| MDS01M-15 | | 15mA | 105mA | 15V | 7 ~ 67mA | 83% | 470μF |
| MDD01M-05 | | 14mA | 105mA | ±5V | ±10 ~ 100mA | 78% | *470μF |
| MDD01M-09 | | 14mA | 105mA | ±9V | ±6 ~ 56mA | 82% | *470μF |
| MDD01M-12 | | 22mA | 114mA | ±12V | ±5 ~ 42mA | 75% | *220μF |
| MDD01M-15 | | 22mA | 114mA | ±15V | ±4 ~ 34mA | 76% | *220μF |
| MDS01N-05 | Normal 24V (21.6 ~ 26.4V) | 9mA | 55mA | 5V | 20 ~ 200mA | 77% | 1000μF |
| MDS01N-12 | | 9mA | 55mA | 12V | 9 ~ 84mA | 79% | 470μF |
| MDS01N-15 | | 9mA | 55mA | 15V | 7 ~ 67mA | 79% | 470μF |
| MDD01N-05 | | 9mA | 55mA | ±5V | ±10 ~ 100mA | 77% | *470μF |
| MDD01N-09 | | 9mA | 55mA | ±9V | ±6 ~ 56mA | 79% | *470μF |
| MDD01N-12 | | 10mA | 56mA | ±12V | ±5 ~ 42mA | 77% | *220μF |
| MDD01N-15 | | 11mA | 57mA | ±15V | ±4 ~ 34mA | 77% | *220μF |

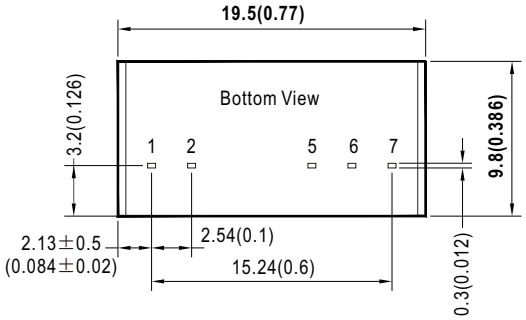
* For each output

| SPECIFICATION | | | | |
|---|---|---|---|---|
| INPUT | VOLTAGE RANGE | L: 4.5 ~ 5.5Vdc<br>M: 10.8 ~ 13.2Vdc<br>N: 21.6 ~ 26.4Vdc | | |
| | SURGE VOLTAGE (100ms max.) | 5Vin models : 9Vdc<br>12Vin models : 18Vdc<br>24Vin models : 30Vdc | | |
| | FILTER | Internal capacitor | | |
| | PROTECTION | Fuse recommended. 500mA Slow-Blow Type for all models | | |
| OUTPUT | VOLTAGE ACCURACY | ±5.0% | | |
| | RATED POWER | 1W | | |
| | 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℃ (Refer to "Derating Curve") | | |
| | WORKING HUMIDITY | 20% ~ 90% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -55 ~ +125℃, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | 0.02% / ℃ (0 ~ 85℃) | | |
| | SOLDERING TEMPERATURE | 1.5mm from case of 1 ~ 3sec./260℃ max. | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes | | |
| SAFETY & EMC ( Note.6) | SAFETY STANDARDS | UL60601-1, EAC TP TC 020/2011 approved | | |
| | WITHSTAND VOLTAGE | I/P-O/P:6KVDC or 4.2KVAC | | |
| | ISOLATION RESISTANCE | I/P-O/P:100M Ohms / 500VDC / 25℃/ 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 | BS EN/EN55011(CISPR11) | Class B |
| | | Radiated | BS EN/EN55011(CISPR11) | Class B |
| | EMC IMMUNITY | **Parameter** | **Standard** | **Test Level / Note** |
| | | ESD | BS EN/EN61000-4-2 | Level 2, ±8KV contact |
| OTHERS | MTBF | 3500Khrs MIL-HDBK-217F(25℃) | | |
| | 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 ; 25pcs/per tube, 3000pcs/120 tube/per carton | | |
| NOTE | 1.All parameters are specified at normal input(L:5Vdc, M:12Vdc, N:24Vdc), rated load, 25℃ 70% RH ambient.<br>2.Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1μf & 47μf capacitor.<br>3.Line regulation is measured from low line to high line at rated load.<br>4.Load regulation is measured from 10% to 100% rated load.<br>5.Patient leakage current(2μA max.) and reinforced isolation is based on a 250VAC, 50/60Hz system input voltage.<br>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)<br>※ Product Liability Disclaimer ： For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx | | | |

## ■ Mechanical Specification

- All dimensions in mm(inch)
- Tolerance:x.x±0.25mm(x.xx±0.01")
  x.xx±0.10mm(x.xxx±0.004")
- Pin pitch tolerance:±0.05mm (±0.002")



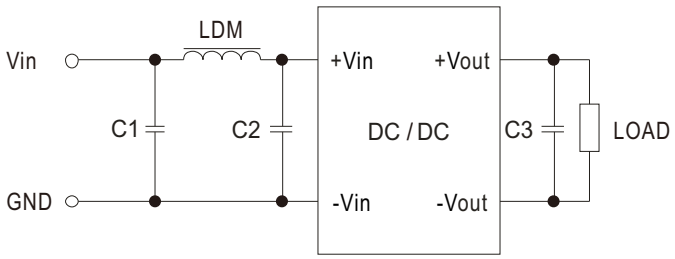




## ■ Plug Assignment

| Pin-Out | | |
|---|---|---|
| Pin No. | MDS01 (Single output) | MDD01 (Dual output) |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 5 | -Vout | -Vout |
| 6 | No pin | Common |
| 7 | +Vout | +Vout |

## ■ EMC Suggestion

EMC typical recommended circuit (Class B)




Recommended typical circuit parameters:

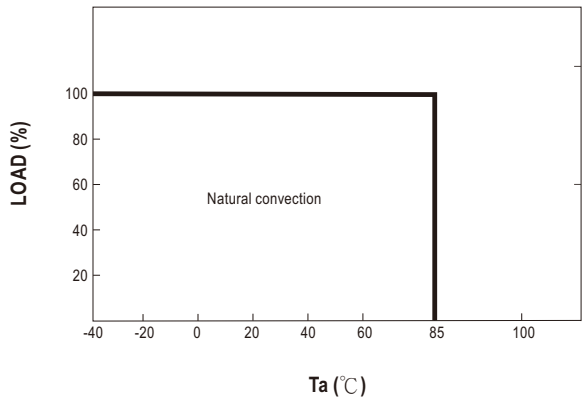
| Input voltage (V) | | 3.3/5/12/15/24 |
|---|---|---|
| EMI | C1,C2 | 4.7μF/50V |
| | C3 | See table 2 |
| | LDM | 6.8μH |

Table 1

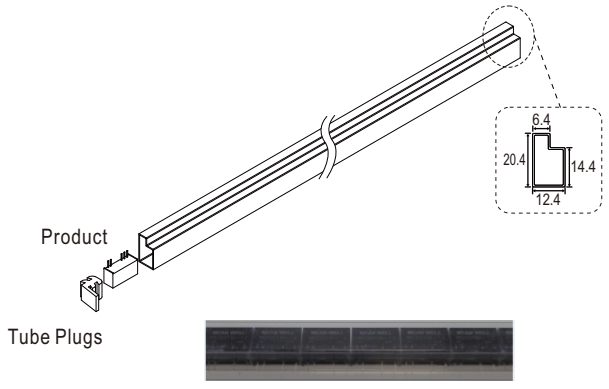
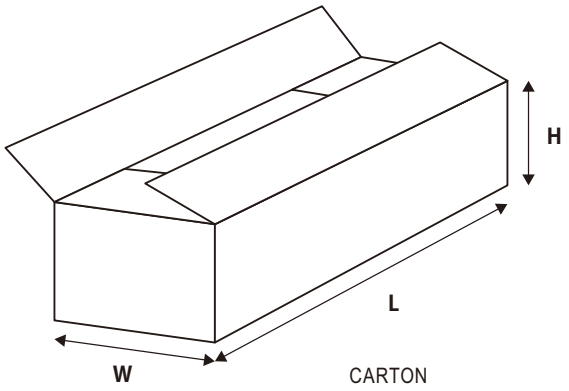
| Single Vout | C3(μF) | Dual Vout | C3(μF) |
|---|---|---|---|
| 3.3/5V | 10μF | ±5V | 4.7μF |
| 12V | 2.2μF | ±9V | 2.2μF |
| 15V | 1μF | ±12V/15V | 1μF |

Table 2

## ■ Derating Curve




## ■ Packing

| Standard Tube Packing | MPQ Per Tube (PCS) | One Tube G.W. | Max. Q'TY/ Carton(PCS) | One Carton G.W. |
|---|---|---|---|---|
| Unit : mm<br>  <br><br><br>Tube pattern<br>  <br><br>CARTON<br>L600 x W285 x H225 | 25 | 136g | 3000 | 18.5Kg |

## ■ Installation Manual

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