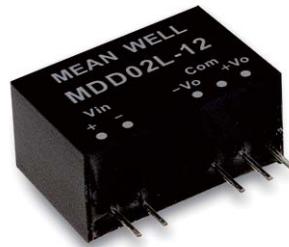
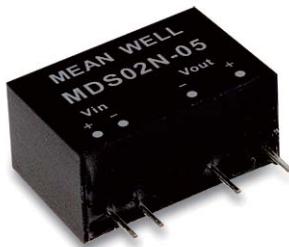




2W SIP Package DC-DC Medical Grade Unregulated Converter

**MDS02 & MDD02 series**

## ■ Features

- SIP7 package with international standard pinout
- Operating temperature range  $-40 \sim +85^\circ\text{C}$
- Medical safety approved (1xMOPP/2xMOOP) according to ANSI/AAMI ES60601-1
- Low patient leakage current  $<2\mu\text{A}$
- Protection: Short circuit(3 second max.)
- 6KVDC or 4.2VAC hight I/O isolation (Reinforced isolation)
- Low cost
- 3 years warranty

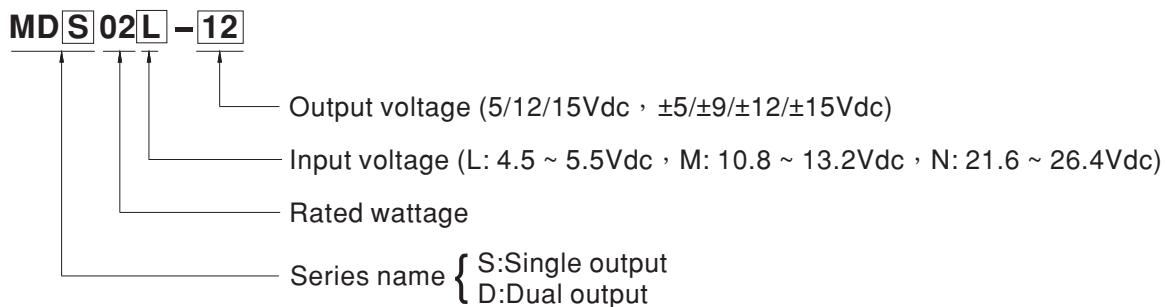
## ■ Applications

- 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  $-40\sim+85^\circ\text{C}$ , 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 $\pm 10\%$ , and various output voltage, 5V/12V/15V for single output and  $\pm 5V/\pm 9V/\pm 12V/\pm 15V$  for dual outputs, which are suitable for medical systems, ultra low leakage current.

## ■ Model Encoding





2W SIP Package DC-DC Medical Grade Unregulated Converter

**MDS02 & MDD02 series****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



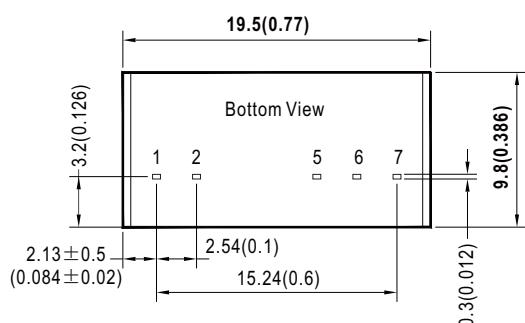
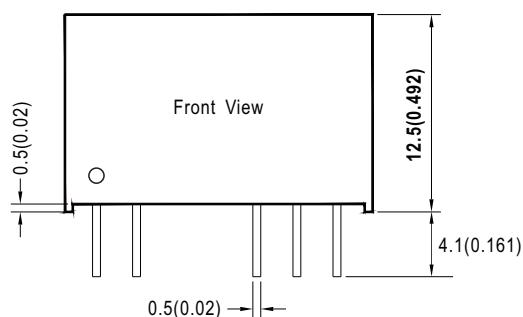
2W SIP Package DC-DC Medical Grade Unregulated Converter

**MDS02 & MDD02 series****SPECIFICATION**

<b>INPUT</b>	<b>VOLTAGE RANGE</b>	L: 4.5 ~ 5.5Vdc M: 10.8 ~ 13.2Vdc N: 21.6 ~ 26.4Vdc		
	<b>SURGE VOLTAGE (100ms max.)</b>	5Vin models : 9Vdc 12Vin models : 18Vdc 24Vin models : 30Vdc		
	<b>FILTER</b>	Internal capacitor		
	<b>PROTECTION</b>	Fuse recommended. 500mA Slow-Blow Type for all models		
<b>OUTPUT</b>	<b>VOLTAGE ACCURACY</b>	±5.0%		
	<b>RATED POWER</b>	2W		
	<b>RIPPLE &amp; NOISE Note.2</b>	75mVp-p		
	<b>LINE REGULATION Note.3</b>	1.2% for 1% input variation		
	<b>LOAD REGULATION Note.4</b>	±10%		
	<b>SWITCHING FREQUENCY (Typ.)</b>	100KHz		
<b>PROTECTION</b>	<b>SHORT CIRCUIT</b>	3 second max.		
<b>ENVIRONMENT</b>	<b>COOLING</b>	Free-air convection		
	<b>WORKING TEMP.</b>	-40 ~ +85°C (Refer to "Derating Curve")		
	<b>WORKING HUMIDITY</b>	20% ~ 90% RH non-condensing		
	<b>STORAGE TEMP., HUMIDITY</b>	-55 ~ +125°C, 10 ~ 95% RH non-condensing		
	<b>TEMP. COEFFICIENT</b>	0.02% / °C (0 ~ 85°C)		
	<b>SOLDERING TEMPERATURE</b>	1.5mm from case of 1 ~ 3sec./260°C max.		
	<b>VIBRATION</b>	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes		
<b>SAFETY &amp; EMC ( Note.6 )</b>	<b>SAFETY STANDARDS</b>	UL60601-1, EAC TP TC 020/2011 approved		
	<b>WITHSTAND VOLTAGE</b>	I/P-O/P:6KVDC or 4.2KVAC		
	<b>ISOLATION RESISTANCE</b>	I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH		
	<b>ISOLATION LEVEL</b>	Primary-secondary: 1xMOPP / 2xMOOP when system input voltage is with 250VAC, 50/60Hz		
	<b>ISOLATION CAPACITANCE (Typ.)</b>	5pF		
	<b>EMC EMISSION</b>	<b>Parameter</b>	<b>Standard</b>	<b>Test Level / Note</b>
		Conducted	BS EN/EN55011(CISPR11)	Class B
	<b>EMC IMMUNITY</b>	Radiated	BS EN/EN55011(CISPR11)	Class B
		<b>Parameter</b>	<b>Standard</b>	<b>Test Level / Note</b>
		ESD	BS EN/EN61000-4-2	Level 2, ±8KV contact
<b>OTHERS</b>	<b>MTBF</b>	3500Khrs MIL-HDBK-217F(25°C)		
	<b>DIMENSION (L*W*H)</b>	19.5*9.8*12.5mm (0.77*0.386*0.492 inch)		
	<b>CASE MATERIAL</b>	Non-Conductive black plastic (UL 94V-0 rated)		
	<b>PACKING</b>	4.2g		
<b>NOTE</b>	1. All parameters are specified at normal input(L:5Vdc, M:12Vdc, N:24Vdc), rated load, 25°C 70% RH ambient. 2. Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1µF & 47µF capacitor. 3. Line regulation is measured from low line to high line at rated load. 4. Load regulation is measured from 10% to 100% rated load. 5. Patient leakage current(2µA max.) and reinforced isolation is based on a 250VAC, 50/60Hz system input voltage. 6. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on <a href="http://www.meanwell.com">http://www.meanwell.com</a> ) ※ Product Liability Disclaimer : For detailed information, please refer to <a href="https://www.meanwell.com/serviceDisclaimer.aspx">https://www.meanwell.com/serviceDisclaimer.aspx</a>			

**■ Mechanical Specification**

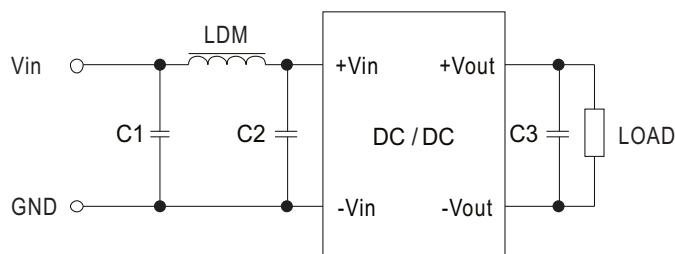
- All dimensions in mm(inch)
- Tolerance:  $x.x \pm 0.25\text{mm}(x.xx \pm 0.01")$   
 $x.xx \pm 0.10\text{mm}(x.xxx \pm 0.004")$
- Pin pitch tolerance:  $\pm 0.05\text{mm} (\pm 0.002")$


**■ Plug Assignment**

Pin-Out		
Pin No.	MDS02 (Single output)	MDD02 (Dual output)
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
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
	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

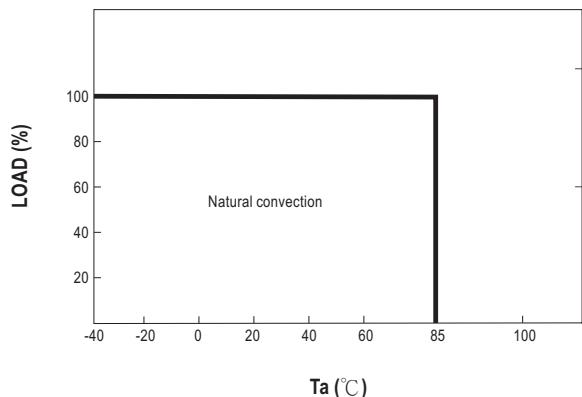
Table 2



2W SIP Package DC-DC Medical Grade Unregulated Converter

**MDS02 & MDD02** series

### ■ Derating Curve



### ■ Installation Manual

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