

# MD-3W Series



3W 2:1 Regulated Single & Dual output

## Features

- Wide 2:1 Input Range
- Full SMD Technology
- 1500 VDC Isolation, Up to 3000 VDC
- Continuous Short Circuit Protection
- Efficiency up to 81%
- -40°C ~ 85°C Operation Temperature Range
- EMC filter meets EN55022 Class A without adding external components
- Non-conductive Black Plastic DIL24-pin case



The MD series is a family of cost effective 3W single & dual output DC-DC converters. These converters combine Plastic case in a 24-pin DIL package with high performance features such as 1500 VDC ~ 3000VDC input/output isolation voltage, continuous short circuit protection with automatic restart and high line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages are 12Vdc, 24Vdc and 48Vdc with output voltages of 3.3, 5, 12, 15, 24, ±3.3, ±5, ±12, ±15 and ±24 Vdc. Featuring high efficiency operation up to 81% and output voltage accuracy of ±2% maximum. Also, no additional components adding required to comply with EN55022 Class A.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS	
Output Voltage Accuracy	±2%
Output Voltage Blance(Dual Output)	±2%
Maximum Output Current	See table
Line Regulation	±0.5%, max.
Load Regulation( 0% to 100% )	±1.2%, max.
Cross Regulation (Dual Output) (1)	±5%
Ripple&Noise (20MHz Bandwidth)(2)	80mVpk-pk, max. Dual Output 24V:100mVpk-pk, max.
Over Load Protection	160% of Iout, typ.
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load (3)	See table
Transient Recovery Time (4)	300us, typ.
Transient Response Deviation (4)	±3%, max. Single Output 3.3V:±5%, max.

INPUT SPECIFICATIONS	
Input Voltage Range	See table
Under Voltage Lockout	
12V Models	Module ON / OFF      8.5 Vdc / 7.0Vdc, typ.
24V Models	Module ON / OFF      16.5Vdc / 14.5Vdc, typ.
48V Models	Module ON / OFF      34.5Vdc / 30.0Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)	20mS, typ.
Input Filter	Pi Type
Input Current ( No-Load )	See table, max.
Input Current ( Full-Load )	See table, typ.
Input Reflected Ripple Current (5)	20mApk-pk, typ.

EMC SPECIFICATIONS		
Radiated Emissions	EN55022	CLASS A
Conducted Emissions	EN55022	CLASS A
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT	IEC 61000-4-4	Perf. Criteria A
Surge(6)	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage(60 sec) Input/Output	1500~3000Vdc
I/O Isolation Capacitance	1000 pF, typ.
I/O Isolation Resistance	1000M Ohm
Switching Frequency	330kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>800 Khrs
Safety Standard	UL/cUL 60950-1 , IEC/EN 60950-1
Safety Approvals	UL/cUL 60950-1 , IEC/EN 60950-1

PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	Φ0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	13g
Dimensions	1.25"x0.8"x0.4"

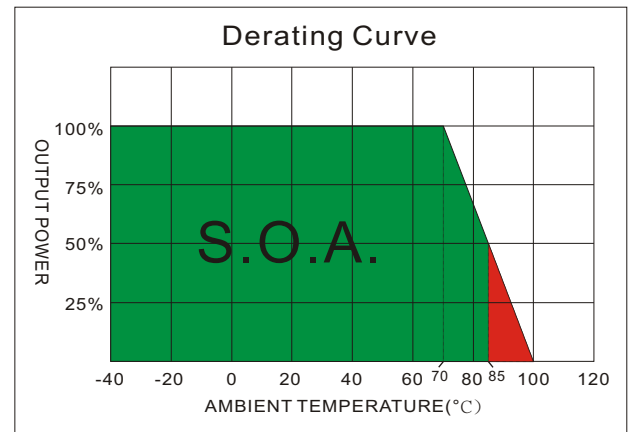
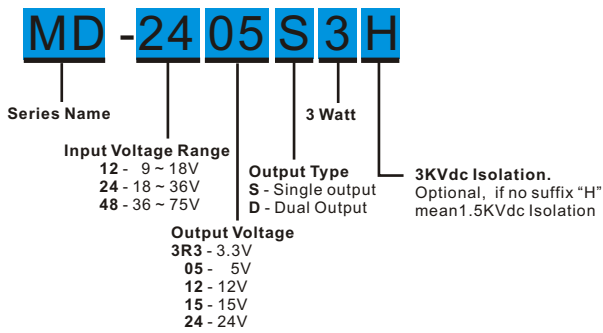
ENVIRONMENT SPECIFICATIONS	
Operating Temperature	-40°C~85°C(See Derating Curve) -40°C ~ +70°C (For 100% load)
Maximum Case Temperature	100°C
Storage Temperature	-55°C~125°C
Cooling	Nature Convection

ABSOLUTE MAXIMUM RATINGS(7)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage(100mS)	
12 Models	25 Vdc, max.
24 Models	50 Vdc, max.
48 Models	100 Vdc, max.
Soldering Temperature (1.5mm from case 10 sec. max.)	260C, max.

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## MD - 3W 2:1 Regulated Single & Dual output

### PART NUMBER STRUCTURE



### MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL(%)	Capa citor Load(uF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
MD-123R3S3	9-18	7	339	3.3	0	900	74	470
MD-1205S3	9-18	7	325	5	0	600	78	470
MD-1212S3	9-18	10	313	12	0	250	81	100
MD-1215S3	9-18	10	313	15	0	200	81	100
MD-1224S3	9-18	20	316	24	0	125	80	47
MD-123R3D3	9-18	10	339	±3.3	0	±450	74	±220
MD-1205D3	9-18	10	325	±5	0	±300	78	±220
MD-1212D3	9-18	15	313	±12	0	±125	81	±100
MD-1215D3	9-18	20	313	±15	0	±100	81	±100
MD-1224D3	9-18	35	319	±24	0	±63	80	±47
MD-243R3S3	18-36	7	172	3.3	0	900	73	470
MD-2405S3	18-36	7	164	5	0	600	77	470
MD-2412S3	18-36	7	156	12	0	250	81	100
MD-2415S3	18-36	7	156	15	0	200	81	100
MD-2424S3	18-36	10	156	24	0	125	81	47
MD-243R3D3	18-36	7	167	±3.3	0	±450	75	±220
MD-2405D3	18-36	7	160	±5	0	±300	79	±220
MD-2412D3	18-36	10	156	±12	0	±125	81	±100
MD-2415D3	18-36	15	156	±15	0	±100	81	±100
MD-2424D3	18-36	20	158	±24	0	±63	81	±47
MD-483R3S3	36-75	7	84	3.3	0	900	75	470
MD-4805S3	36-75	7	80	5	0	600	79	470
MD-4812S3	36-75	7	78	12	0	250	81	100
MD-4815S3	36-75	7	78	15	0	200	81	100
MD-4824S3	36-75	7	78	24	0	125	81	47
MD-483R3D3	36-75	7	81	±3.3	0	±450	77	±220
MD-4805D3	36-75	7	78	±5	0	±300	81	±220
MD-4812D3	36-75	7	78	±12	0	±125	81	±100
MD-4815D3	36-75	7	78	±15	0	±100	81	±100
MD-4824D3	36-75	15	81	±24	0	±63	79	±47

Suffix "H" means 3000Vdc isolation

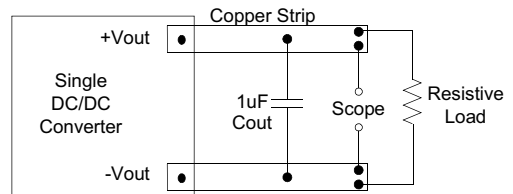
**NOTE**

1. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within  $\pm 5\%$ .
2. Ripple/Noise measured with a 1uF ceramic capacitor.
3. Tested by minimal  $V_{in}$  and constant resistive load.
4. Tested by normal  $V_{in}$  and 25% load step change ( 75%-50%-25% of  $I_o$  ).
5. Measured Input reflected ripple current with a simulated source inductance of 12uH and a source capacitor  $C_{in}$ (47uF, ESR<1.0Ω at 100KHz).
6. An external filter capacitor is required if the module has to meet IEC61000-4-5.  
The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
7. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

**TEST CONFIGURATIONS**

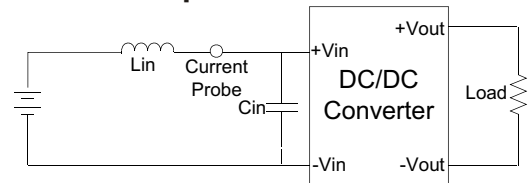
**Output Ripple & Noise Measurement Test**

Use a capacitor  $C_{out}$ (1.0uF) measurement.  
The Scope measurement bandwidth is 0-20MHz.

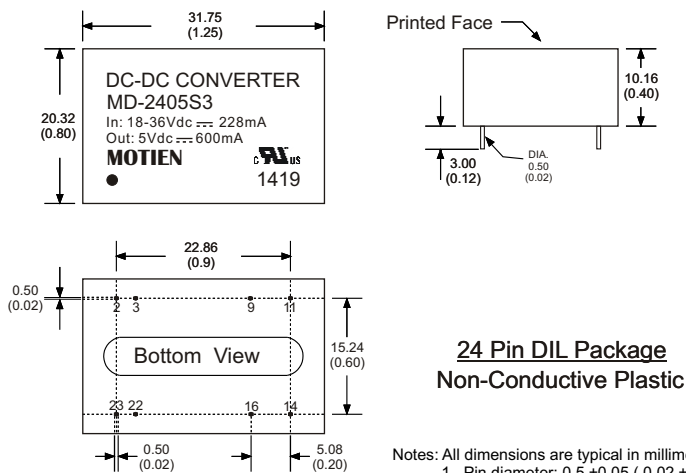


**Input Reflected Ripple Current Test Step**

Input reflected ripple current is measured through a source inductor  $L_{in}$ (12uH) and a source capacitor  $C_{in}$ (47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



**MECHANICAL SPECIFICATIONS**



PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
2	-V Input	-V Input
3	-V Input	-V Input
9	N.P.	Common
11	N.C.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

(The Pin Connection of high isolation one is the same with normal one.)