

MD-3W Series

3W 2:1 Regulated Single & Dual output



Features

- Wide 2:1 Input Range
- Full SMD Technology
- 1500VDC Isolation, Up to 3000VDC
- Continuous Short Circuit Protection
- Efficiency up to 81%
- -40°C ~ 85°C Operation Temperature Range
- EMC filter meets EN55032 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 1500VDC ~ 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 $\pm 2\%$ maximum. Also, no additional components adding required to comply with EN55032 Class A.

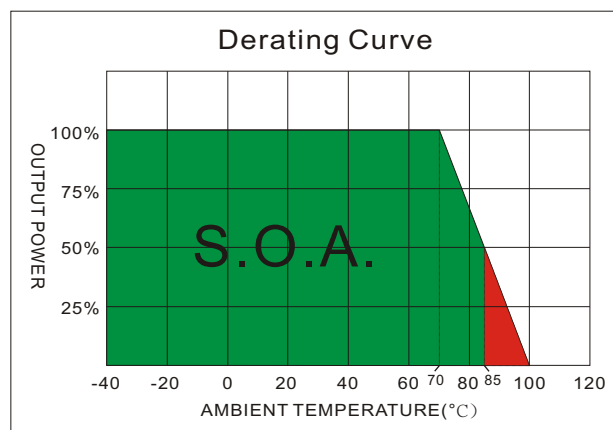
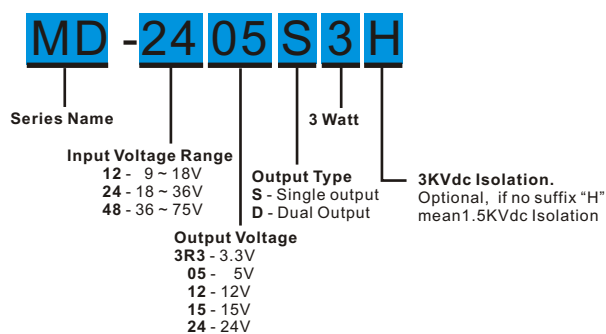
All specifications typical at $T_a = 25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified.

OUTPUT SPECIFICATIONS			
Output Voltage Accuracy		±2%, max.	
Output Voltage Blance (Dual Output)		±2%, max.	
Output Current		See table, max.	
Line Regulation		±0.5%, max.	
Load Regulation (0% to 100%)		±1.2%, max.	
Cross Regulation (Dual Output) (1)		±5%, max.	
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)		300µs, typ.	
Transient Response Deviation (4)		±3%, max.	
		Single Output 3.3V:±5%, max.	
INPUT SPECIFICATIONS			
Input Voltage Range		See table	
Under Voltage Lockout			
12 Models	Module ON / OFF	8.5Vdc / 7.0Vdc, typ.	
24 Models	Module ON / OFF	16.5Vdc / 14.5Vdc, typ.	
48 Models	Module ON / OFF	34.5Vdc / 30.0Vdc, typ.	
Start up Time		20mS, typ.	
(Nominal Vin and constant resistive load)			
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	EN55032	CLASS A	
Conducted Emissions	EN55032	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(60sec)	
Input/Output	1500~3000Vdc
I/O Isolation Capacitance	1000pF, typ.
I/O Isolation Resistance	1000MΩ, min.
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	13.0g
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	25Vdc, max.
24 Models	50Vdc, max.
48 Models	100Vdc, max.
Soldering Temperature	260°C, max.
(1.5mm from case 10sec max.)	

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PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		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

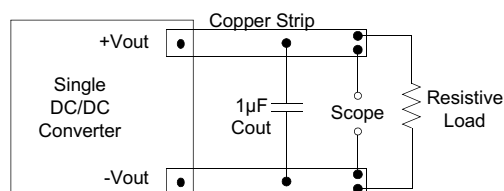
NOTE

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 $1\mu\text{F}$ 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 $12\mu\text{H}$ and a source capacitor $C_{in}(47\mu\text{F}, \text{ESR}<1.0\Omega \text{ at } 100\text{KHz})$.
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, $220\mu\text{F}/100\text{V}$.
7. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

TEST CONFIGURATIONS

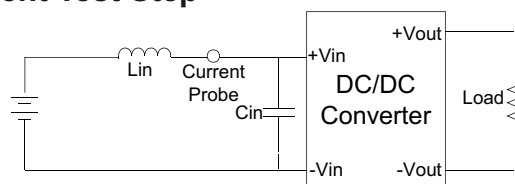
Output Ripple & Noise Measurement Test

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

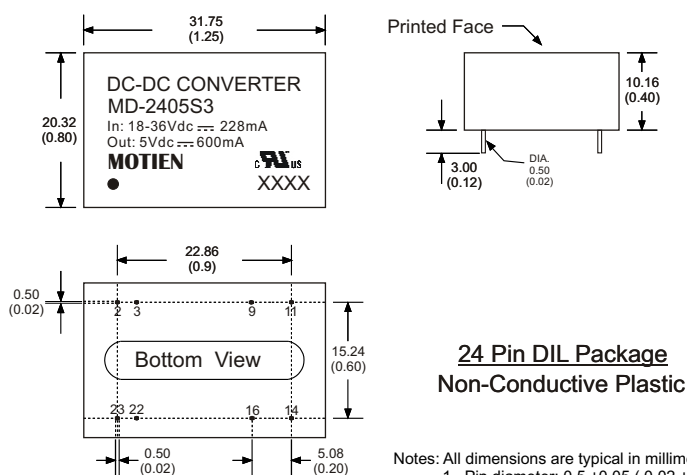


Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor $L_{in}(12\mu\text{H})$ and a source capacitor $C_{in}(47\mu\text{F}, \text{ESR}<1.0\Omega \text{ at } 100\text{KHz})$ 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.)