

MD-6W Series

6W 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 85%
- -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 6W 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 85% and output voltage accuracy of $\pm 2\%$ maximum. Also, no additional components adding required to comply with EN55032 Class A.

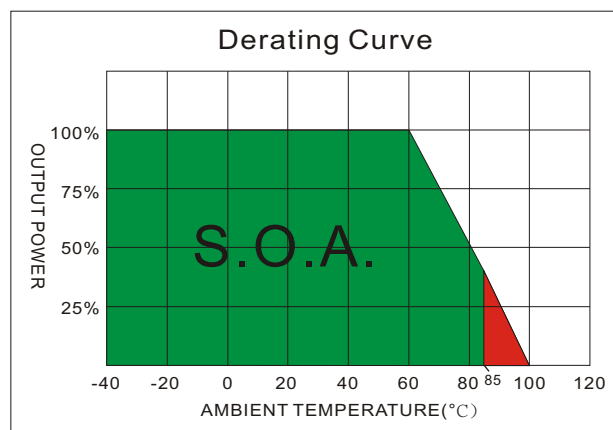
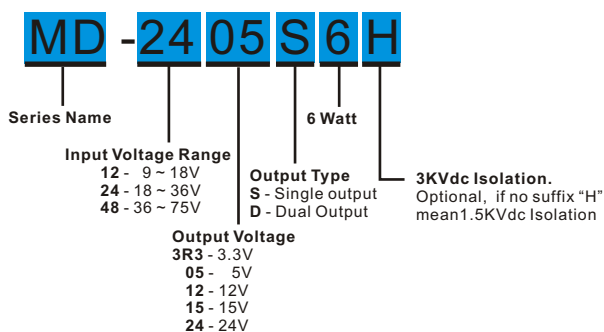
All specifications typical at $T_a=25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified.

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-H	

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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-123R3S6	9-18	7	513	3.3	0	1400	76	470
MD-1205S6	9-18	7	633	5	0	1200	80	470
MD-1212S6	9-18	10	602	12	0	500	84	100
MD-1215S6	9-18	10	595	15	0	400	85	100
MD-1224S6	9-18	20	610	24	0	250	83	47
MD-123R3D6	9-18	10	658	±3.3	0	±909	77	±220
MD-1205D6	9-18	10	625	±5	0	±600	81	±220
MD-1212D6	9-18	15	602	±12	0	±250	84	±100
MD-1215D6	9-18	20	602	±15	0	±200	84	±100
MD-1224D6	9-18	35	625	±24	0	±125	81	±47
MD-243R3S6	18-36	7	260	3.3	0	1400	75	470
MD-2405S6	18-36	7	316	5	0	1200	80	470
MD-2412S6	18-36	7	301	12	0	500	84	100
MD-2415S6	18-36	7	301	15	0	400	84	100
MD-2424S6	18-36	10	305	24	0	250	83	47
MD-243R3D6	18-36	7	329	±3.3	0	±909	77	±220
MD-2405D6	18-36	7	316	±5	0	±600	80	±220
MD-2412D6	18-36	10	305	±12	0	±250	83	±100
MD-2415D6	18-36	15	301	±15	0	±200	84	±100
MD-2424D6	18-36	20	309	±24	0	±125	82	±47
MD-483R3S6	36-75	7	127	3.3	0	1400	77	470
MD-4805S6	36-75	7	152	5	0	1200	83	470
MD-4812S6	36-75	7	149	12	0	500	85	100
MD-4815S6	36-75	7	149	15	0	400	85	100
MD-4824S6	36-75	7	149	24	0	250	85	47
MD-483R3D6	36-75	7	160	±3.3	0	±909	79	±220
MD-4805D6	36-75	7	152	±5	0	±600	83	±220
MD-4812D6	36-75	7	151	±12	0	±250	84	±100
MD-4815D6	36-75	7	151	±15	0	±200	84	±100
MD-4824D6	36-75	15	156	±24	0	±125	81	±47

Suffix "H" means 3000Vdc isolation

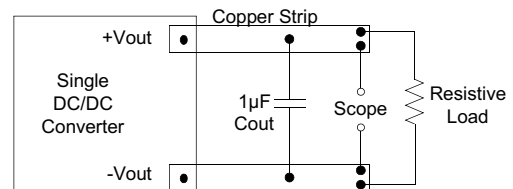
NOTE

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 $C_{in}(47\mu\text{F}$, $\text{ESR} < 1.0\Omega$ 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, $220\mu\text{F}/100\text{V}$.
7. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

TEST CONFIGURATIONS

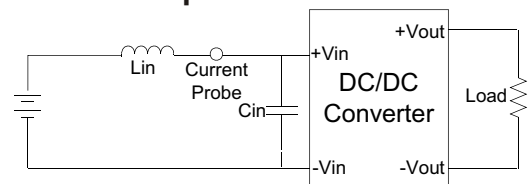
Output Ripple & Noise Measurement Test

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

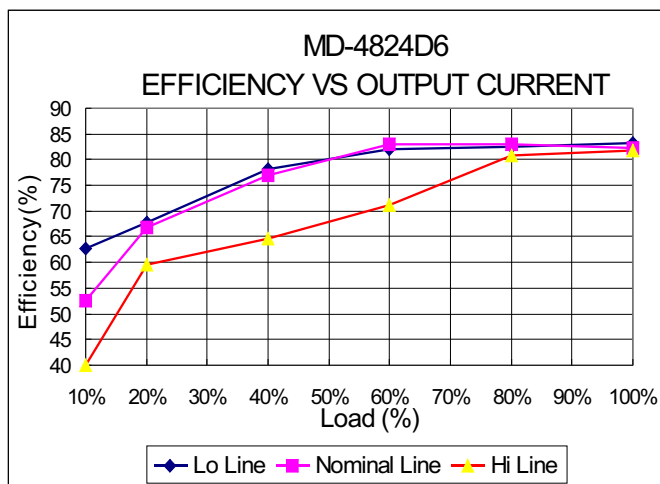
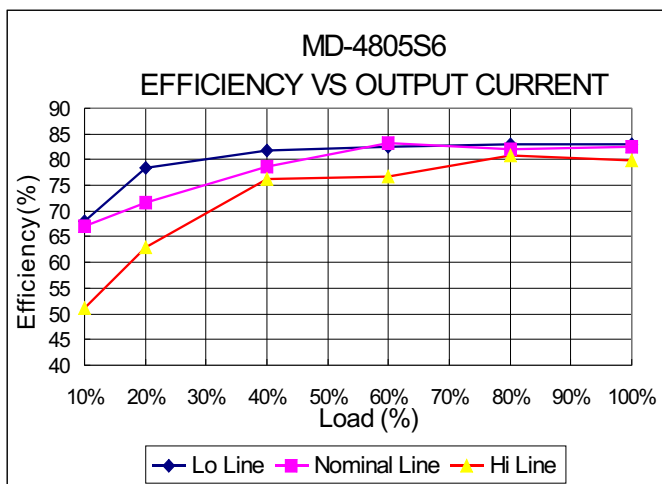
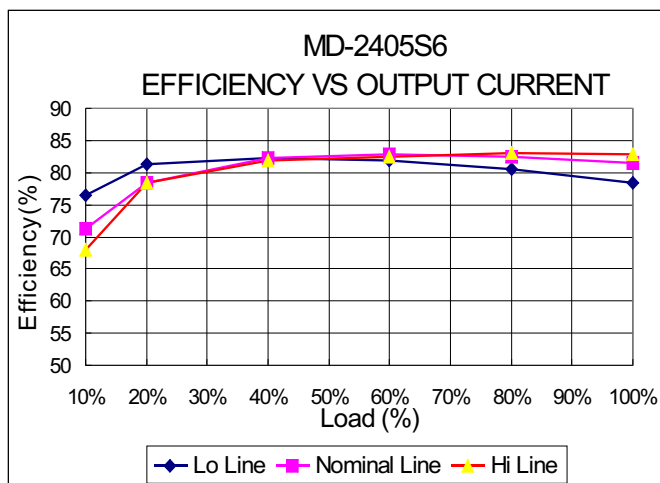
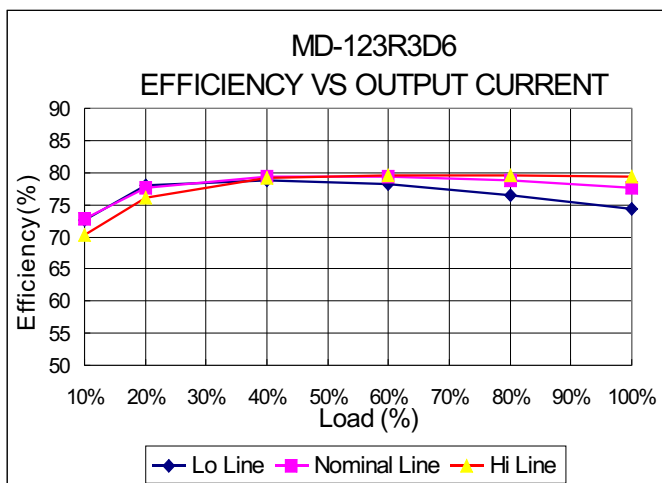


Input Reflected Ripple Current Test Step

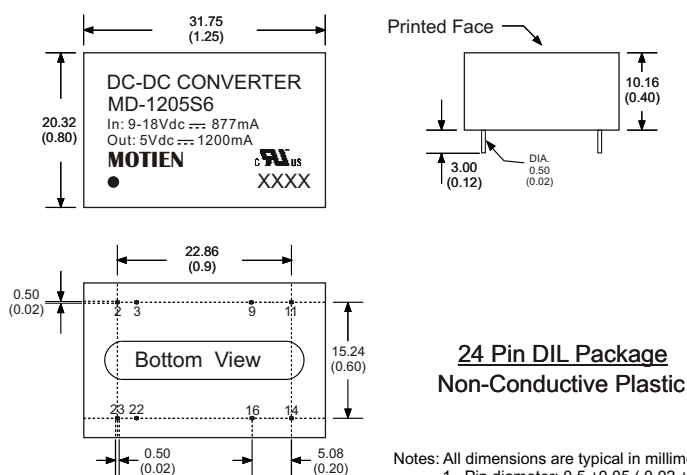
Input reflected ripple current is measured through a source inductor $L_{in}(12\mu\text{H})$ and a source capacitor $C_{in}(47\mu\text{F}$, $\text{ESR} < 1.0\Omega$ at 100KHz) at nominal input and full load.



ELECTRICAL CHARACTERISTIC CURVES



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.)