

M4-1W Series



1W Regulated Single output

Features

- 7 Pin SIL / 14 Pin DIL Package
- 1000 ~ 3000VDC Isolation
- Continue Short Current Protection
- -40 ~ 85°C Operation Temperature Range
- Non-Conductive Black Plastic Case



The M4 series is a family of cost effective 1W single output DC-DC converters. These converters achieve low cost and ultra-miniature SIP 7 pin or DIP 14 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 5, 12, 24 Vdc with output voltage of 3.3, 5, 7.2, 9, 12, 15Vdc. Featuring high efficiency up to 69% (input voltage range $\pm 10\%$) and output short circuit protection.

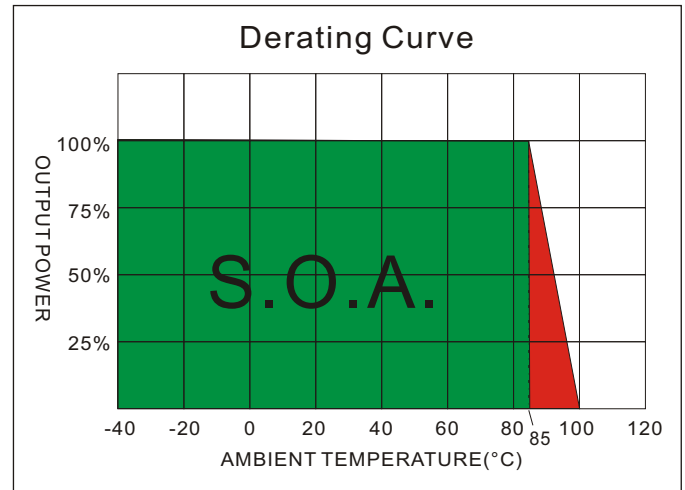
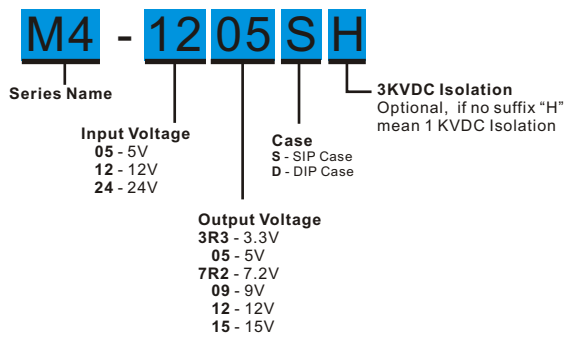
All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

| OUTPUT SPECIFICATIONS | | EMC SPECIFICATIONS(4) | | |
|--------------------------------------|---|--|----------------|------------------|
| Voltage accuracy | $\pm 2\%$ | Radiated Emissions | EN55022 | CLASS B |
| Line regulation | $\pm 0.5\%$ | Conducted Emissions | EN55022 | CLASS B |
| Load regulation | (From 0% to 100% Load) $\pm 0.5\%$ (Output 3.3V Model) $\pm 1.0\%$ | ESD | IEC 61000-4-2 | Perf. Criteria A |
| Ripple & noise (20 MHz bandwidth)(1) | 50mV pk-pk | RS | IEC 61000-4-3 | Perf. Criteria A |
| Temperature coefficient | $\pm 0.02\%/^{\circ}\text{C}$ | EFT | IEC 61000-4-4 | Perf. Criteria A |
| Short Circuit Protection | Continuous | Surge | IEC 61000-4-5 | Perf. Criteria A |
| Capacitor load(2) | See table | CS | IEC 61000-4-6 | Perf. Criteria A |
| | | PFMF | IEC 61000-4-8 | Perf. Criteria A |
| INPUT SPECIFICATIONS | | ABSOLUTE MAXIMUM RATINGS(5) | | |
| Voltage Range | $\pm 10\%$ | These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. | | |
| Max. Input Current | See table | Input Surge Voltage(100ms) | | |
| No-Load Input Current | See table | 5 Models | 7 Vdc ,max. | |
| Input Filter | Capacitors | 12 Models | 15 Vdc ,max. | |
| Input Reflected Ripple Current(3) | 20mA pk-pk | 24 Models | 28 Vdc ,max. | |
| | | Soldering Temperature | 260°C ,max. | |
| | | (1.5mm from case 10 sec. max.) | | |
| ENVIRONMENT SPECIFICATIONS | | GENERAL SPECIFICATIONS | | |
| Operating Temperature | -40°C~85°C(See Derating Curve) | Efficiency | See table | |
| Maximum Case Temperature | 100°C | I/O Isolation Voltage(60 sec) | 1000~3000Vdc | |
| Storage Temperature | -40°C~125°C | Input/Output | | |
| Cooling | Nature Convection | I/O Isolation Capacitance | 60 pF Typ. | |
| | | I/O Isolation Resistance | 1000M Ohm | |
| | | Switching Frequency | Variable 50kHz | |
| PHYSICAL SPECIFICATIONS | | Humidity | 95% rel H | |
| Case Material | Non-conductive Black Plastic(UL94V-0 rated) | Reliability Calculated MTBF(MIL-HDBK-217 F) | >3.5 Mhrs | |
| Pin Material | 0.5mm Alloy42 Solder-coated | Safety Standard : (designed to meet) | IEC 60950-1 | |
| Potting Material | Epoxy (UL94V-0 rated) | | | |
| Weight | (SIP/2.7g) (DIP/2.9g) | | | |
| Dimensions | SIP Case 0.76"x0.28"x0.39" DIP Case 0.80"x0.40"x0.27" | | | |

The information and specifications contained in this data sheet are believed to be correct at time of publication. However, MOTIEN Technologies accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice. No rights under any patent accompany the sale of any such product(s) or information contained herein.

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PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT | INPUT Current | | OUTPUT | OUTPUT Current | EFFICIENCY @FL(%) | Capacitor Load(uF) |
|--------------|---------------------|---------------|----------------|---------------|----------------|-------------------|--------------------|
| | Voltage Range (Vdc) | No-Load (mA) | Full Load (mA) | Voltage (Vdc) | Full load (mA) | | |
| M4-053R3S | 5 | 30 | 363 | 3.3 | 333 | 55 | 220 |
| M4-0505S | 5 | 30 | 312 | 5 | 200 | 64 | 220 |
| M4-057R2S | 5 | 30 | 312 | 7.2 | 138.9 | 64 | 220 |
| M4-0509S | 5 | 35 | 307 | 9 | 111.1 | 65 | 220 |
| M4-0512S | 5 | 35 | 303 | 12 | 83.3 | 66 | 220 |
| M4-0515S | 5 | 35 | 303 | 15 | 66.7 | 66 | 220 |
| M4-123R3S | 12 | 20 | 148 | 3.3 | 333 | 56 | 220 |
| M4-1205S | 12 | 20 | 130 | 5 | 200 | 64 | 220 |
| M4-127R2S | 12 | 20 | 128 | 7.2 | 138.9 | 65 | 220 |
| M4-1209S | 12 | 20 | 126 | 9 | 111.1 | 66 | 220 |
| M4-1212S | 12 | 20 | 126 | 12 | 83.3 | 66 | 220 |
| M4-1215S | 12 | 20 | 122 | 15 | 66.7 | 68 | 220 |
| M4-243R3S | 24 | 10 | 74 | 3.3 | 333 | 56 | 220 |
| M4-2405S | 24 | 10 | 66 | 5 | 200 | 63 | 220 |
| M4-247R2S | 24 | 10 | 64 | 7.2 | 138.9 | 65 | 220 |
| M4-2409S | 24 | 10 | 63 | 9 | 111.1 | 66 | 220 |
| M4-2412S | 24 | 10 | 62 | 12 | 83.3 | 67 | 220 |
| M4-2415S | 24 | 10 | 62 | 15 | 66.7 | 67 | 220 |
| M4-053R3D | 5 | 30 | 363 | 3.3 | 333 | 55 | 220 |
| M4-0505D | 5 | 30 | 312 | 5 | 200 | 64 | 220 |
| M4-057R2D | 5 | 30 | 312 | 7.2 | 138.9 | 64 | 220 |
| M4-0509D | 5 | 35 | 307 | 9 | 111.1 | 65 | 220 |
| M4-0512D | 5 | 35 | 303 | 12 | 83.3 | 66 | 220 |
| M4-0515D | 5 | 35 | 303 | 15 | 66.7 | 66 | 220 |
| M4-123R3D | 12 | 20 | 148 | 3.3 | 333 | 56 | 220 |
| M4-1205D | 12 | 20 | 130 | 5 | 200 | 64 | 220 |
| M4-127R2D | 12 | 20 | 128 | 7.2 | 138.9 | 65 | 220 |
| M4-1209D | 12 | 20 | 126 | 9 | 111.1 | 66 | 220 |
| M4-1212D | 12 | 20 | 126 | 12 | 83.3 | 66 | 220 |
| M4-1215D | 12 | 20 | 122 | 15 | 66.7 | 68 | 220 |
| M4-243R3D | 24 | 10 | 74 | 3.3 | 333 | 56 | 220 |
| M4-2405D | 24 | 10 | 66 | 5 | 200 | 63 | 220 |

Suffix "H" means 3 KVdc isolation

The models listed above is just for standard type. If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : sales@motien.com.tw

M4 - 1W Regulated Single output

| MODEL NUMBER | INPUT | INPUT Current | | OUTPUT | OUTPUT Current | EFFICIENCY @FL(%) | Capacitor Load(μ F) |
|--------------|---------------------|---------------|----------------|---------------|----------------|-------------------|--------------------------|
| | Voltage Range (Vdc) | No-Load (mA) | Full Load (mA) | Voltage (Vdc) | Full load (mA) | | |
| M4-247R2D | 24 | 10 | 64 | 7.2 | 138.9 | 65 | 220 |
| M4-2409D | 24 | 10 | 63 | 9 | 111.1 | 66 | 220 |
| M4-2412D | 24 | 10 | 62 | 12 | 83.3 | 67 | 220 |
| M4-2415D | 24 | 10 | 62 | 15 | 66.7 | 67 | 220 |

Suffix "H" means 3 KVdc isolation

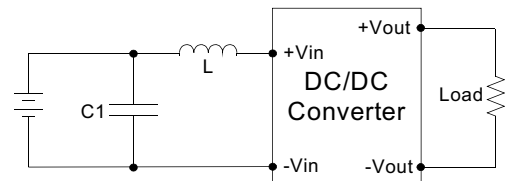
NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal V_{in} and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12 μ H.
4. Input filter components (C1, L) are used to help meet EMC requirement for the module.
These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.
5. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
6. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

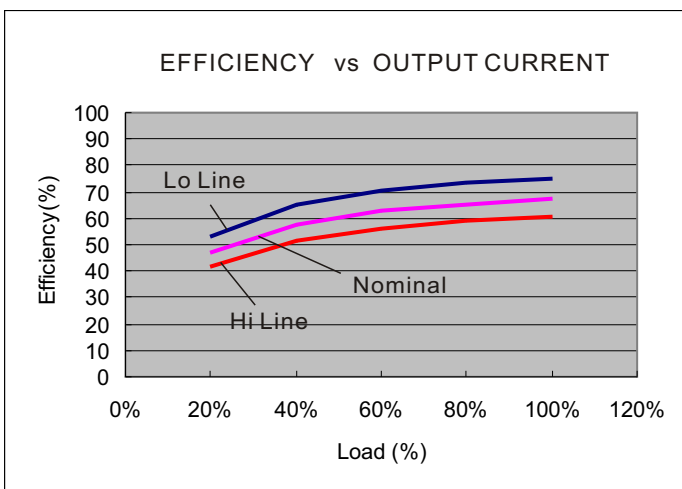
TEST CONFIGURATIONS

EMI Filter

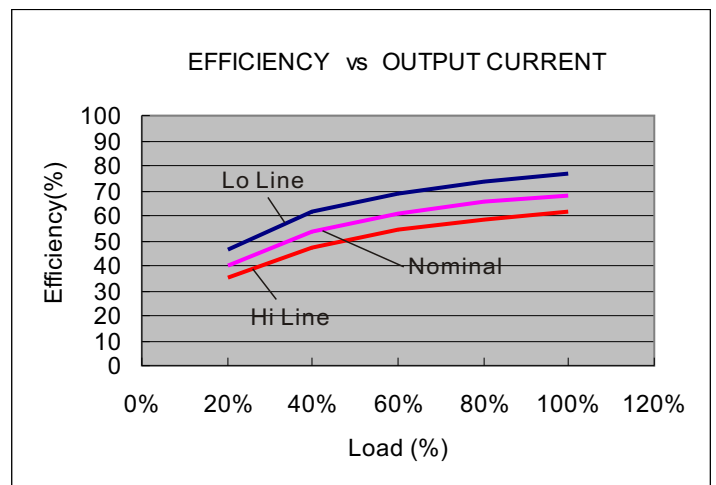
Input filter components (C1, L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



| | C1 | L |
|-----------|------------------|------------|
| M4-05XXXX | 470 μ F/100V | 12 μ H |
| M4-12XXXX | 470 μ F/100V | 12 μ H |
| M4-24XXXX | 470 μ F/100V | 12 μ H |



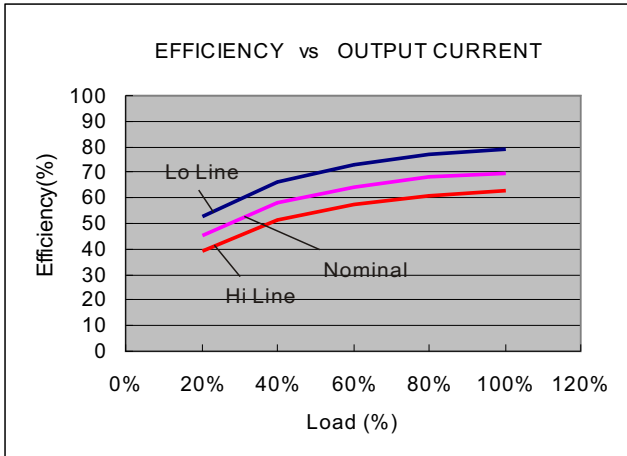
5V Mode



12V Mode

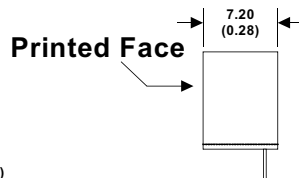
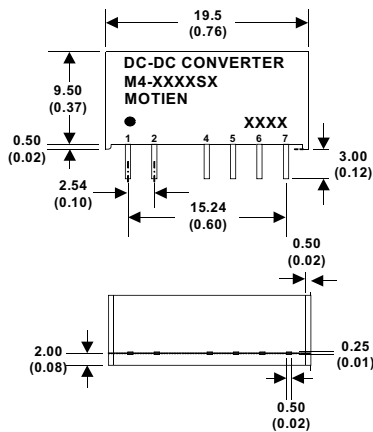
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24V Mode

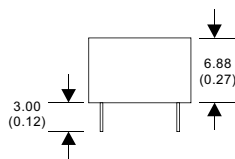
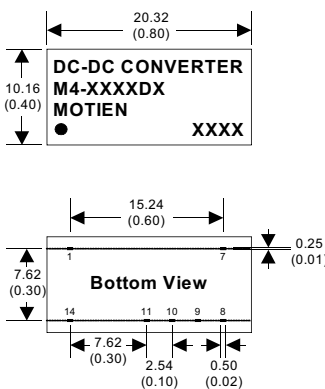
MECHANICAL SPECIFICATIONS



7 Pin SIL Package

- Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Case Tolerance: ± 0.5 (± 0.02)

| PIN CONNECTIONS | | |
|-----------------|-----------|-----------|
| PIN NUMBER | SINGLE | SINGLE-H |
| 1 | +V Input | +V Input |
| 2 | -V Input | -V Input |
| 4 | -V Output | N.P. |
| 5 | N.P. | -V Output |
| 6 | +V Output | N.P. |
| 7 | N.P. | +V Output |



14 Pin DIL Package

- Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Case Tolerance: ± 0.5 (± 0.02)

| PIN CONNECTIONS | | |
|-----------------|-----------|-----------|
| PIN NUMBER | SINGLE | SINGLE-H |
| 1 | -V Input | -V Input |
| 7 | N.C. | N.C. |
| 8 | N.P. | +V Output |
| 9 | +V Output | N.P. |
| 10 | N.P. | -V Output |
| 11 | -V Output | N.P. |
| 14 | +V Input | +V Input |