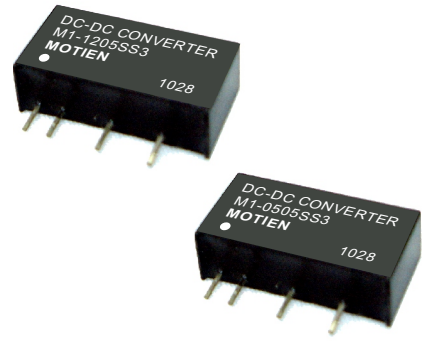


# M1 Series

## 3W Semi-regulated Single & Dual output

### Features

- 7 Pin SIL Package
- Semi-regulated output
- 1000 VDC Isolation
- Up to 3000 VDC Isolation
- Low Ripple and Noise
- Efficiency up to 90%
- -40 ~ 85°C Operation Temperature Range
- Non-Conductive Black Plastic Case



The M1 series is a family of cost effective 3W single & dual output DC-DC converters. These converters achieve low cost, high efficiency, semi-regulated and ultra-miniature SIP7 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 5, 12Vdc with output voltage of 5, 9, 12, 15, ±5, ±9, ±12, ±15 Vdc. High efficiency operation and output voltage accuracy of +2%~-4% maximum. Standard features include an input range of ±10% tolerance and low output noise and ripple.

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

| OUTPUT SPECIFICATIONS                  |                           |
|----------------------------------------|---------------------------|
| Voltage accuracy                       | +2~-4%                    |
| Line regulation                        | ±1.2% / Per 1% Vin Change |
| Load regulation(From 10% to 100% Load) | See table                 |
| Ripple & noise(20 MHz bandwidth)(1)    | 50mV pk-pk                |
| Temperature coefficient                | ±0.02%/°C                 |
| Capacitor load(2)                      | See table                 |

| INPUT SPECIFICATIONS           |                                 |
|--------------------------------|---------------------------------|
| Voltage Range                  | ±10%                            |
| Max. Input Current             | See table                       |
| No-Load Input Current          | See table                       |
| Input Filter                   | Capacitors                      |
| Input Reflected Ripple Current | 5V 25mA pk-pk<br>12V 25mA pk-pk |

| GENERAL SPECIFICATIONS                       |                |
|----------------------------------------------|----------------|
| Efficiency                                   | See table      |
| I/O Isolation Voltage(3 sec)<br>Input/Output | 10000~3000Vdc  |
| I/O Isolation Capacitance                    | 60 pF Typ.     |
| I/O Isolation Resistance                     | 1G Ohm         |
| Switching Frequency                          | Variable 70kHz |
| Humidity                                     | 95% rel H      |
| Reliability Calculated MTBF(MIL-HDBK-217 F)  | >1.8 Mhrs      |
| Safety Standard : (designed to meet)         | IEC 60950-1    |

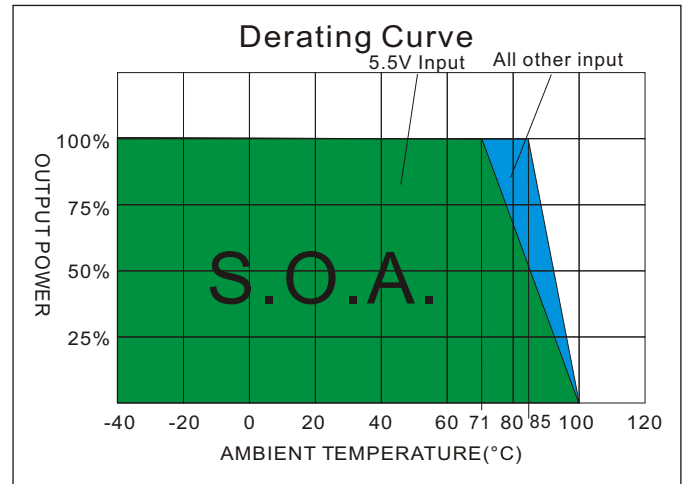
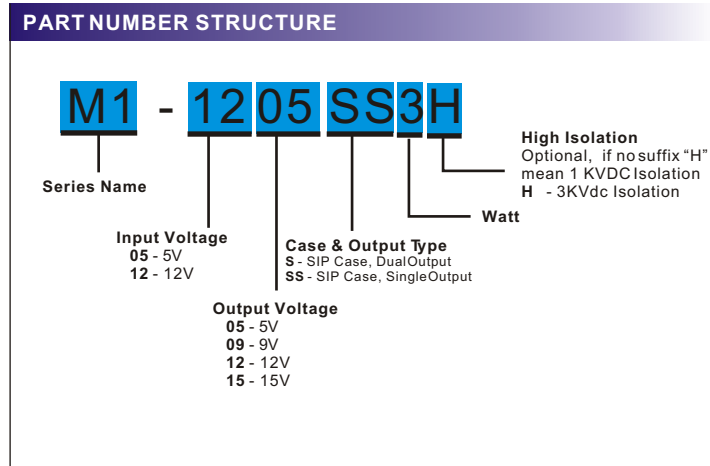
| PHYSICAL SPECIFICATIONS |                                             |
|-------------------------|---------------------------------------------|
| Case Material           | Non-conductive Black Plastic(UL94V-0 rated) |
| Pin Material            | C5191R-H Solder-coated                      |
| Potting Material        | Epoxy (UL94V-0 rated)                       |
| Weight                  | 2.8g, Typ                                   |
| Dimensions              | SIP Case 0.76"x0.28"x0.39"                  |

| ENVIRONMENT SPECIFICATIONS |                                |
|----------------------------|--------------------------------|
| Operating Temperature      | -40°C~85°C(See Derating Curve) |
| Maximum Case Temperature   | 100°C                          |
| Storage Temperature        | -40°C~125°C                    |
| Cooling                    | Nature Convection              |

| ABSOLUTE MAXIMUM RATINGS(3)                                                                                          |        |
|----------------------------------------------------------------------------------------------------------------------|--------|
| These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. |        |
| Input Voltage(100mS)<br>5 Modes                                                                                      | 9 Vdc  |
| 12 Modes                                                                                                             | 18 Vdc |
| Soldering Temperature<br>(1.5mm from case 10sec.)                                                                    | 260°C  |

| EMC CHARACTERISTICS    |             |                  |
|------------------------|-------------|------------------|
| Radiated Emissions     | EN55022     | CLASS B          |
| Conducted Emissions(4) | EN55022     | CLASS B          |
| ESD                    | EN61000-4-2 | Perf. Criteria A |
| RS                     | EN61000-4-3 | Perf. Criteria A |
| EFT(5)                 | EN61000-4-4 | Perf. Criteria A |
| CS                     | EN61000-4-6 | Perf. Criteria A |
| PFMF                   | EN61000-4-8 | Perf. Criteria A |

# M1 - 3W Semi-regulated Single & Dual output



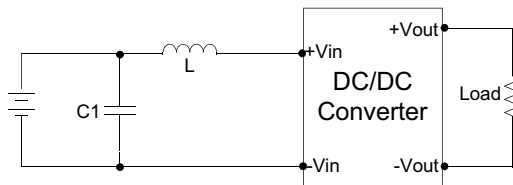
| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current |                | OUTPUT Voltage (Vdc) | OUTPUT Current Full load (mA) | LOAD Regulation % | EFFICIENCY @FL(%) | Capacitor Load(uF) |
|--------------|---------------------------|---------------|----------------|----------------------|-------------------------------|-------------------|-------------------|--------------------|
|              |                           | No-Load (mA)  | Full Load (mA) |                      |                               |                   |                   |                    |
| M1-0505S3    | 5                         | 80            | 741            | ±5                   | ±300                          | 7                 | 81                | ±100               |
| M1-0509S3    | 5                         | 70            | 706            | ±9                   | ±166.67                       | 6                 | 85                | ±100               |
| M1-0512S3    | 5                         | 70            | 706            | ±12                  | ±125                          | 6                 | 85                | ±47                |
| M1-0515S3    | 5                         | 80            | 714            | ±15                  | ±100                          | 5                 | 84                | ±47                |
| M1-1205S3    | 12                        | 25            | 294            | ±5                   | ±300                          | 5                 | 85                | ±100               |
| M1-1209S3    | 12                        | 25            | 284            | ±9                   | ±166.67                       | 4                 | 88                | ±100               |
| M1-1212S3    | 12                        | 25            | 281            | ±12                  | ±125                          | 3                 | 89                | ±47                |
| M1-1215S3    | 12                        | 20            | 278            | ±15                  | ±100                          | 3                 | 90                | ±47                |
| M1-0505SS3   | 5                         | 80            | 769            | 5                    | 600                           | 8                 | 78                | 220                |
| M1-0509SS3   | 5                         | 70            | 714            | 9                    | 333.33                        | 7                 | 84                | 220                |
| M1-0512SS3   | 5                         | 80            | 714            | 12                   | 250                           | 6                 | 84                | 100                |
| M1-0515SS3   | 5                         | 80            | 714            | 15                   | 200                           | 6                 | 84                | 100                |
| M1-1205SS3   | 12                        | 25            | 298            | 5                    | 600                           | 6                 | 84                | 220                |
| M1-1209SS3   | 12                        | 25            | 287            | 9                    | 333.33                        | 4                 | 87                | 220                |
| M1-1212SS3   | 12                        | 25            | 284            | 12                   | 250                           | 4                 | 88                | 100                |
| M1-1215SS3   | 12                        | 20            | 278            | 15                   | 200                           | 3                 | 90                | 100                |

Suffix "H" means 3 KVdc isolation

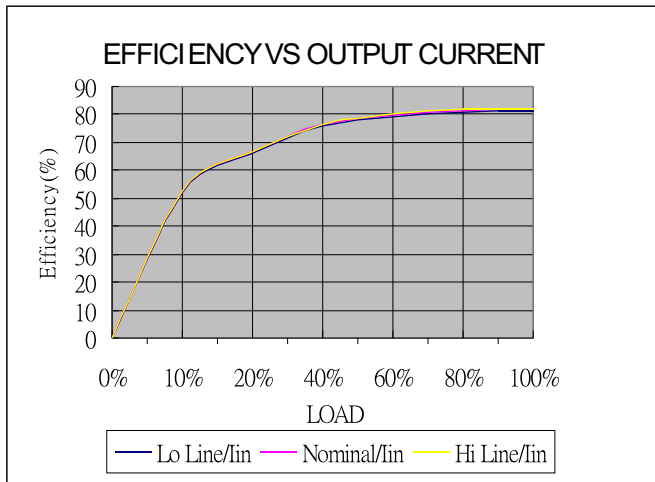
# M1 - 3W Semi-regulated Single & Dual output

## NOTE

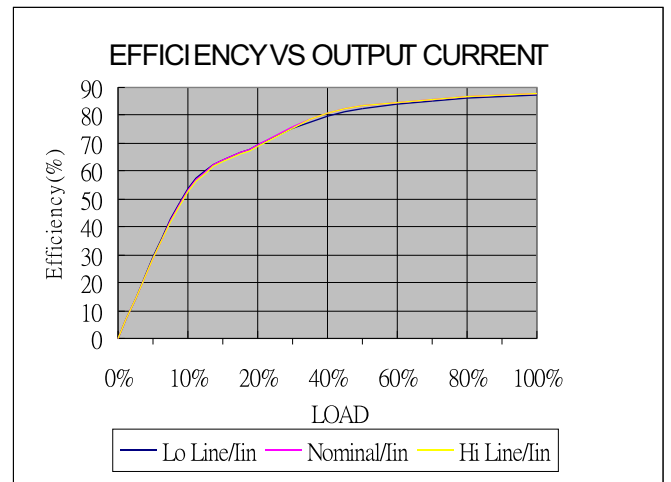
1. Ripple/Noise measured with a 1uF ceramic capacitor.
2. Tested by minimal Vin and constant resistive full load.
3. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
4. Input filter components (C1, L) are used to help meet conducted emissions 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.
5. An external filter capacitor is required if the module has to meet EN61000-4-4  
The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
6. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.



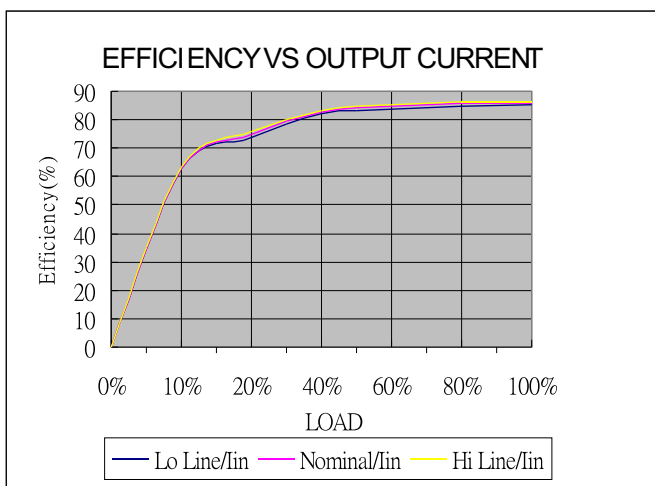
|            | C1               | L    |
|------------|------------------|------|
| M1-05XXXXX | 1210, 2.2uF/100V | 18uH |
| M1-12XXXXX | 1210, 2.2uF/100V | 18uH |



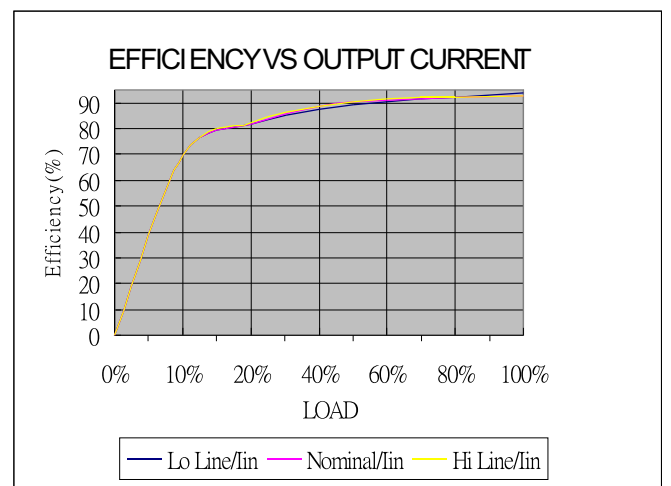
M1-0505SS3



M1-0515S3

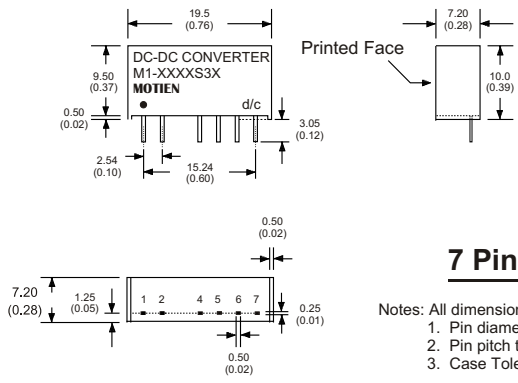


M1-1205SS3



M1-1215S3

**MECHANICAL SPECIFICATIONS**



**7 Pin SIL Package**

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

**PIN CONNECTIONS**

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