# 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


CE

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 SIP 7 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 |

### EMC SPECIFICATIONS

| | | |
|---|---|---|
| Radiated Emissions | EN55032 | CLASS B |
| Conducted Emissions (3) | EN55032 | CLASS B |
| ESD | IEC 61000-4-2 | Perf. Criteria A |
| RS | IEC 61000-4-3 | Perf. Criteria A |
| EFT(4) | IEC 61000-4-4 | Perf. Criteria A |
| CS | IEC 61000-4-6 | Perf. Criteria A |
| PFMF | IEC 61000-4-8 | Perf. Criteria A |

### 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 |
| | 12V | 25mA pk-pk |

### 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" |

### GENERAL SPECIFICATIONS

| | |
|---|---|
| Efficiency | See table |
| I/O Isolation Voltage(60 sec) | |
| Input/Output | 1000~3000Vdc |
| 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 |

### ENVIRONMENT SPECIFICATIONS

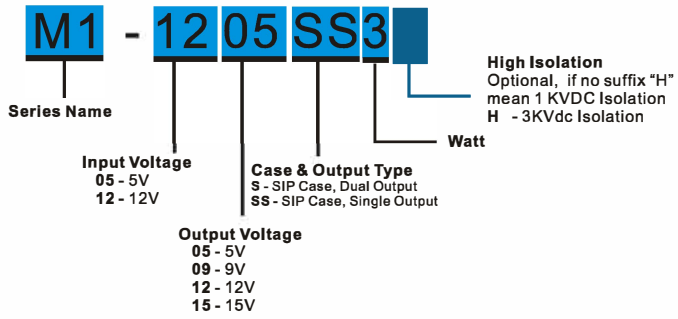
| | |
|---|---|
| Operating Temperature | -40°C~85°C(See Derating Curve) |
| Maximum Case Temperature | 100°C |
| Storage Temperature | -40°C~125°C |
| Cooling | Nature Convection |

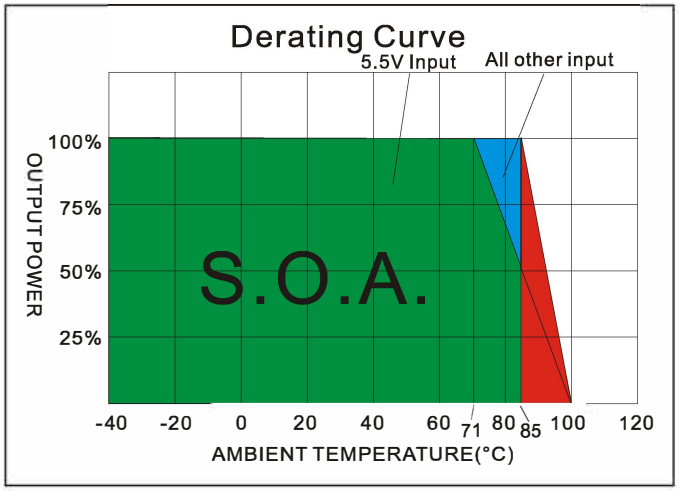
### ABSOLUTE MAXIMUM RATINGS(5)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

| | |
|---|---|
| Input Surge Voltage(100mS) | |
| 5 Models | 9 Vdc, max. |
| 12 Models | 18 Vdc, max. |
| Soldering Temperature (1.5mm from case 10sec max.) | 260°C |

## PART NUMBER STRUCTURE




# MODEL SELECTION GUIDE

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

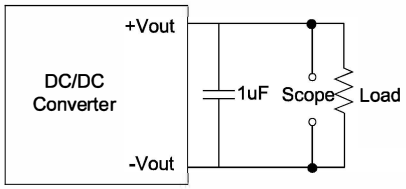
## NOTE

1. Ripple/Noise measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
2. Tested by minimal Vin and constant resistive full load.
3. 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.
4. An external filter capacitor is required if the module has to meet IEC61000-4-4
   The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
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

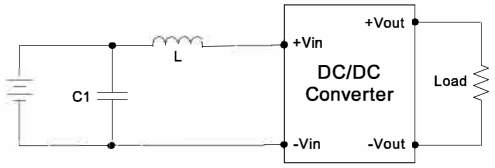
### Output Ripple & Noise Measurement Test

Use a capacitor Cout(1.0uF) measurement.
The Scope measurement bandwidth is 0-20MHz.



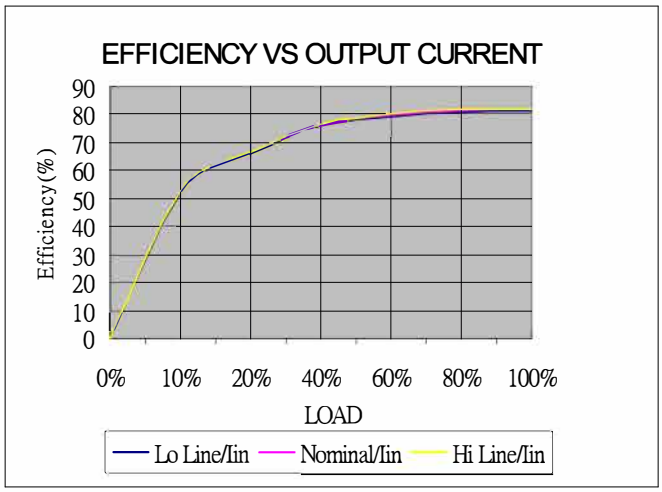

### EMI Filter

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.

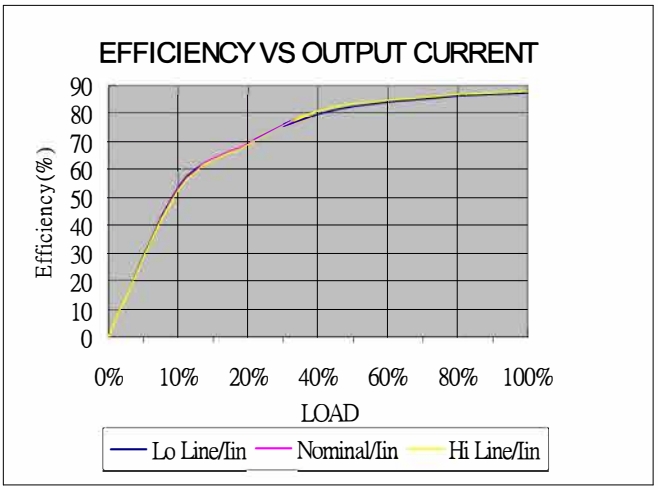



| | C1 | L |
|---|---|---|
| M1-05XXXXX | 1210, 2.2uF/100V | 18uH |
| M1-12XXXXX | 1210, 2.2uF/100V | 18uH |

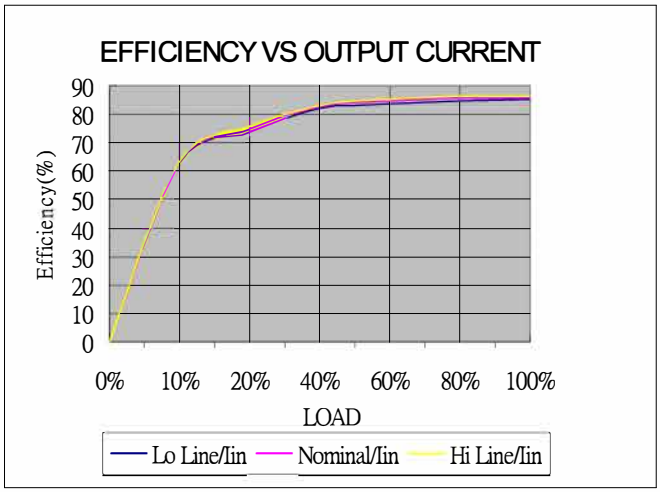
## ELECTRICAL CHARACTERISTIC CURVES



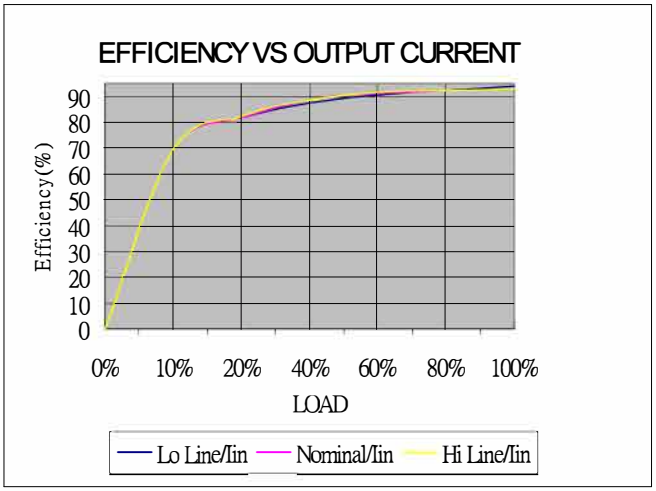

M1-0505SS3




M1-0515S3

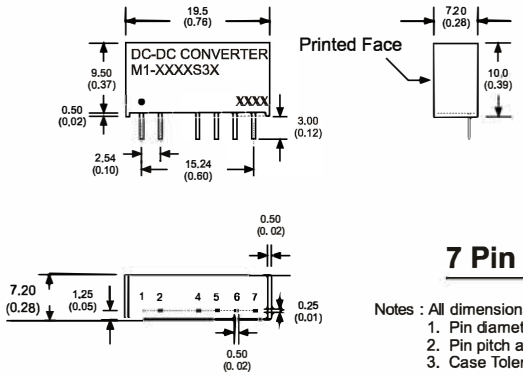



M1-1205SS3




M1-1215S3

## MECHANICAL SPECIFICATIONS




### 7 Pin SIL Package

Notes : All dimensions are typical in millimeters ( inches ).
1. Pin diameter: 0.5±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 | 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 |

ALL PSU LTD, Unit D6 Laser Quay, Culpeper Close
Medway City Estate, Rochester, Kent, ME2 4HU
Tel: 01634 725527, Email: sales@allpsu.co.uk, Web: www.allpsu.co.uk

DRAWING: APPROVED:

Last Update : 15.JUN.2017