# MEK1N Series

1W, Unregulated Single Output, 3KV Isolation, DIP8 Package DC/DC Converters

## Features

- Rated power: 1W Max.
- Input voltage range ±10%
- Unregulated single output
- High efficiency, up to 85%
- Small no load input current
- Isolation voltage 3KVDC
- Operating temperature range: -40 ~ +105°C ambient
- RoHS compliant
- Industrial standard DIP8 package
- Continuous short circuit protection
- Meet UL/EN/IEC 62368-1
- 5 year warranty

## Overview

The MEK1N series are DIP8 package DC/DC converters with unregulated single output, and 3KVdc isolation. These converters feature high efficiency, low ripple and noise, continuous short circuit protection, and wide operating temperature range. They are widely used in distributed power system in industrial applications where isolation and voltage converting is needed.

## Model Numbers

| Model Number | Input Voltage [VDC] ±10% | Output Voltage [VDC] | Output Current [mA] | | Efficiency [%] Typ. | Capacitive Load [uF] Max. |
|---|---|---|---|---|---|---|
| | | | Max. | Min. | | |
| **MEK1N-0303** | 3.3 | 3.3 | 303 | 30 | 75 | 2400 |
| **MEK1N-0305** | 3.3 | 5 | 200 | 20 | 79 | 2400 |
| **MEK1N-0503** | 5 | 3.3 | 303 | 30 | 74 | 2400 |
| **MEK1N-0505** | 5 | 5 | 200 | 20 | 82 | 2400 |
| **MEK1N-0509** | 5 | 9 | 111 | 12 | 83 | 1000 |
| **MEK1N-0512** | 5 | 12 | 84 | 9 | 83 | 560 |
| **MEK1N-0515** | 5 | 15 | 67 | 7 | 83 | 560 |
| **MEK1N-0524** | 5 | 24 | 42 | 4 | 85 | 220 |
| **MEK1N-0905** | 9 | 5 | 200 | 20 | 86 | 2400 |
| **MEK1N-0909** | 9 | 9 | 111 | 12 | 87 | 1000 |
| **MEK1N-0912** | 9 | 12 | 84 | 9 | 87 | 560 |
| **MEK1N-0915** | 9 | 15 | 67 | 7 | 88 | 560 |
| **MEK1N-0924** | 9 | 24 | 42 | 4 | 89 | 220 |
| **MEK1N-1203** | 12 | 3.3 | 303 | 30 | 75 | 2400 |
| **MEK1N-1205** | 12 | 5 | 200 | 20 | 80 | 2400 |
| **MEK1N-1209** | 12 | 9 | 111 | 12 | 78 | 1200 |
| **MEK1N-1212** | 12 | 12 | 83 | 9 | 80 | 560 |
| **MEK1N-1215** | 12 | 15 | 67 | 7 | 81 | 560 |

## Model Numbers (continued)

| Model Number | Input Voltage [VDC] ±10% | Output Voltage [VDC] | Output Current [mA] | | Efficiency [%] Typ. | Capacitive Load [uF] Max. |
|---|---|---|---|---|---|---|
| | | | Max. | Min. | | |
| **MEK1N-1505** | 15 | 5 | 200 | 20 | 80 | 2400 |
| **MEK1N-1509** | 15 | 9 | 111 | 12 | 80 | 1200 |
| **MEK1N-1515** | 15 | 15 | 67 | 7 | 81 | 560 |
| **MEK1N-2403** | 24 | 3.3 | 303 | 30 | 75 | 2400 |
| **MEK1N-2405** | 24 | 5 | 200 | 20 | 79 | 2400 |
| **MEK1N-2409** | 24 | 9 | 111 | 12 | 80 | 1200 |
| **MEK1N-2412** | 24 | 12 | 83 | 9 | 81 | 560 |
| **MEK1N-2415** | 24 | 15 | 67 | 7 | 81 | 560 |
| **MEK1N-2424** | 24 | 24 | 42 | 5 | 81 | 220 |

* Only typical models are listed. Other models may be available upon request.

* See ME1N series for 1.5KVDC isolation models.

## Electrical Specifications

Unless otherwise indicated, specifications are measured at $T_A$=25°C, nominal input voltage, full load after warm up.

| Parameters | Conditions | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Input current**<br>Full load | $V_{IN}$=3.3V<br>$V_{IN}$=5, 9V<br>$V_{IN}$=12V<br>$V_{IN}$=15V<br>$V_{IN}$=24V | - | 406<br>235<br>98<br>79<br>50 | - | mA | |
| **Input current**<br>No load | $V_{IN}$=3.3V<br>$V_{IN}$=5V<br>$V_{IN}$=9 ... 15V<br>$V_{IN}$=24V | - | 15<br>5<br>3<br>2 | 20<br>11<br>7<br>5 | mA | |
| **Reflected Ripple Current** | | - | 30 | - | mA | |
| **Surge voltage**<br>1 second max | $V_{IN}$=3.3, 5V<br>$V_{IN}$=9V<br>$V_{IN}$=12, 15V<br>$V_{IN}$=24V | -0.7<br>-0.7<br>-0.7<br>-0.7 | - | 9<br>12<br>20<br>30 | VDC | |
| **Output voltage accuracy** | All models | Refer to graphic in "Characteristic Curves" section | | | | |
| **Line regulation**<br>For $V_{IN}$ change of ±1% | $V_{OUT}$=3.3V<br>All others | - | - | ±1.5<br>±1.2 | % | |
| **Load regulation**<br>$I_{OUT}$=10% to 100% of $I_{OUT, rated}$ | $V_{OUT}$=3.3V<br>$V_{OUT}$=5V<br>Others | - | 8<br>5<br>3 | 20<br>15<br>10 | % | |
| **Temperature coefficiency** | Full load | - | ±0.02 | - | %/°C | |
| **Output ripple and noise**<br>20MHz bandwidth | | - | 30 | 75 | mVp-p | |
| **Output short circuit protection** | | Continuous, automatic recovery | | | | |
| **Input filter** | | Capacitor | | | | |
| **Hot plug** | | None | | | | |

* Operating with less than 10% of rated load will not cause permanent damage to the converters, but the performances data may not fall into the specifications, and reliable operating is not assured.

## General Specifications

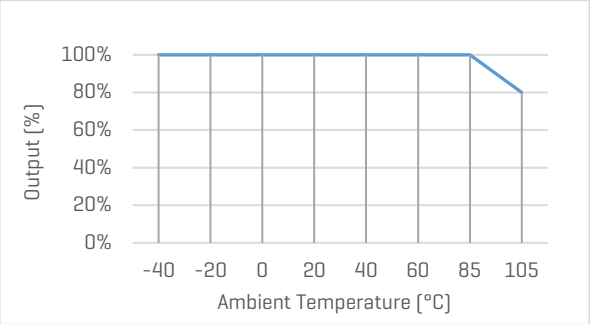
| Parameters | Conditions | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| **Isolation voltage**<br>1 minute, leakage current 1mA max | I/P to O/P | 3000 | - | - | VDC | |
| **Isolation resistance**<br>Tested at 500VDC | I/P to O/P | 1000 | - | - | M ohm | |
| **Isolation capacitance**<br>100KHz, 0.1V | I/P to O/P | - | 20 | - | pF | |
| **Operating temperature** | See "Derating Curve" | -40 | - | +105 | °C | |
| **Storage temperature** | | -55 | - | +125 | °C | |
| **Temperature rise at case**<br>Full load | $V_{OUT}$=3.3V<br>All others | - | 25<br>15 | - | °C | |
| **Storage humidity** | Non-condensing | 5 | - | 95 | %RH | |
| **Switching frequency**<br>Full load | | - | 450 | - | KHz | |
| **Pin soldering resistance**<br>1.5mm away from case for 10 sec | | - | - | 300 | °C | |
| **Vibration** | | 10-150Hz, 5G, 0.75mm along X, Y and Z | | | | |
| **Case material** | | Black plastic UL94-V0 | | | | |
| **Cooling method** | | Free air convection | | | | |
| **Design based on standards** | | UL/EN/IEC 62368-1 | | | | |
| **Safety certifications** | | EN/IEC 62368-1 | | | | |
| **EMC** | Emissions<br>Immunity | CISPR32, EN55032 Class B*<br>IEC/EN61000-4-2 | | | | |
| **MTBF** | MIL-HDBK-217F | >3,500,000 Hours, $T_A$=25°C | | | | |
| **Size** | | 12.9 x 10.7 x 8.2 mm | | | | |
| **Weight** | | 1.8g Typ. | | | | |

*External circuit is required in order to meet Class B, refer to Figure 2 in Recommended External Circuit

## Characteristic Curves

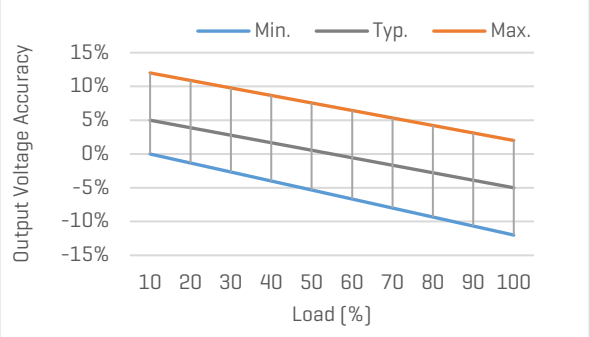
### Derating Curve

**Output vs Ambient Temperature**

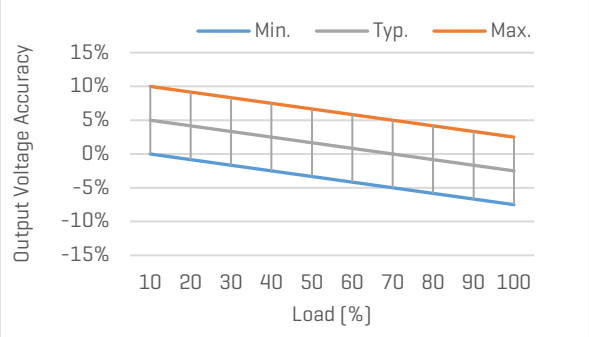



**Output Voltage Accuracy vs Load**

$V_{OUT}$=3.3V



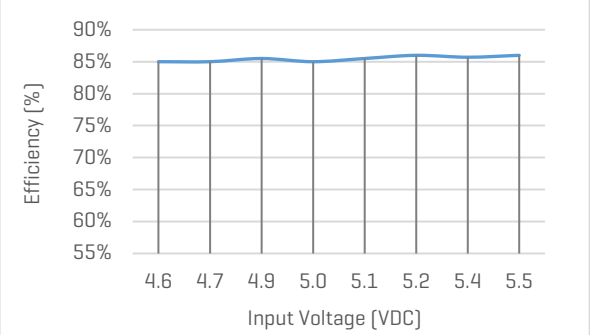

None 3.3V output models




### Efficiency Curves

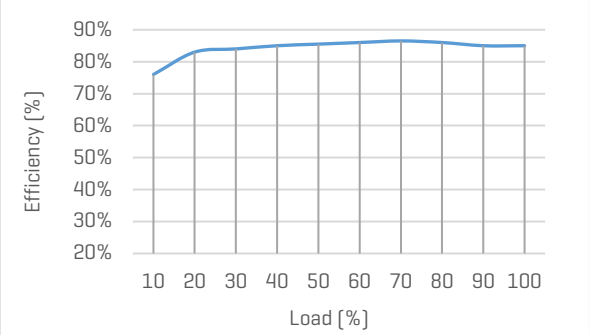
**Efficiency vs Input Voltage**

MEK1N-0505, with full Load




**Efficiency vs Load**

MEK1N-0505, with nominal input voltage



## Recommended External Circuit

### Typical Application Circuit

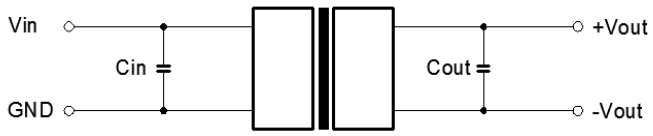



Figure 1. Typical external circuit

*Typical application circuit is to further lower the input and output ripple. It is not required for general use.

*Recommended component specifications are typical values. Excessive external capacitive load may cause startup problem.

**[Table 1] Recommended component spec**

| Input voltage | 5V | 12V | 15V | 24V |
|---|---|---|---|---|
| $C_{IN}$ | 4.7uF, 16V | 2.2uF, 25V | 2.2uF, 25V | 1uF, 50V |

**[Table 2] Recommended component spec**

| Output voltage | 3.3, 5V | 9V | 12V | 15, 24V |
|---|---|---|---|---|
| $C_{OUT}$ | 10uF, 16V | 4.7uF, 25V | 2.2uF, 25V | 1uF, 50V |

### EMC Enhancement for EN55032 Class B

*Use this application circuit to meet Class B EMC performance.

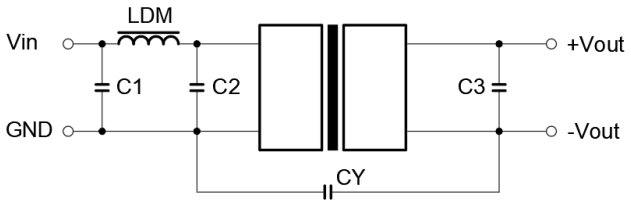


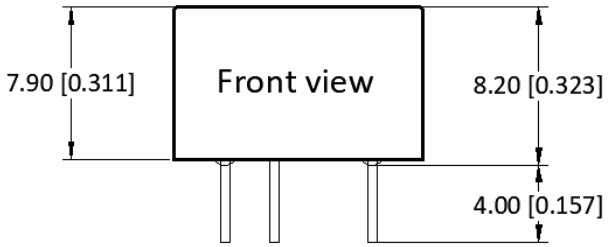

Figure 2. Circuit for EMC enhancement

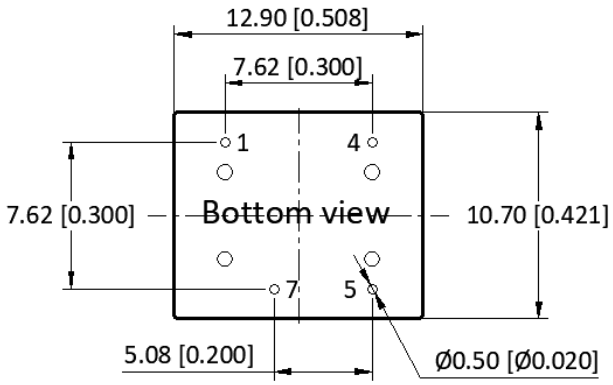
**[Table 3] Recommended component spec**

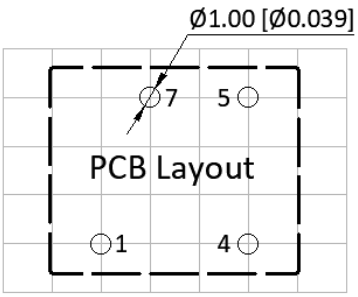
| Item | LDM | C1, C2 | CY |
|---|---|---|---|
| Spec | 6.8uH | 4.7uF, 50V | 270pF, 4KV |

***C3** refer to $C_{OUT}$ in [Table 2]

## Mechanical Specifications




**Pin Definition**

| Pin # | Single Out |
|---|---|
| 1 | GND |
| 4 | $V_{IN}$ |
| 5 | $+V_{OUT}$ |
| 7 | 0V |

* Unless otherwise specified unit: mm [inch]
* General tolerance: ±0.25 [±0.010]
* Pin thickness: ±0.10 [±0.004]
* Footprint grid 2.54 x 2.54 mm