

# MEK1T Series

1W, Unregulated, 3KV Isolation, DC/DC Converters

## Features

- ▶ Rated power: 1W max
- ▶ Input voltage range  $\pm 10\%$
- ▶ Unregulated output
- ▶ High efficiency up to 88%
- ▶ Isolation voltage 3KVDC
- ▶ Small no load input current
- ▶ Operating temp. range: -40 ~ +105°C ambient
- ▶ RoHS compliant
- ▶ Compact SMD package
- ▶ Continuous short circuit protection
- ▶ Meet UL/EN/IEC 62368-1 EN 55032 Class B
- ▶ 5 year warranty



## Overview

The MEK1T series are unregulated DC/DC converters offered in compact SMD package with 3KVDC isolation. These converters feature high efficiency, low ripple and noise, continuous short circuit protection, and wide operating temperature range -40 ~ +105°C. 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]	Output Voltage [VDC]	Output Current [mA] Max.	Efficiency [%] Typ.	Capacitive Load [ $\mu$ F] Max.
MEK1T-0303	3.3 [2.97~3.63]	3.3	303	80	3000
MEK1T-0305		5	200	82	3000
MEK1T-0309		9	111	83	1200
MEK1T-0312		12	84	84	820
MEK1T-0315		15	67	84	680
MEK1T-0324		24	42	84	330
MEK1T-0503	5 [4.5~5.5]	3.3	303	82	3000
MEK1T-0505 <sup>[1]</sup>		5	200	85	3000
MEK1T-0509		9	111	86	1200
MEK1T-0512 <sup>[1]</sup>		12	84	86	820
MEK1T-0515		15	67	86	680
MEK1T-0524		24	42	87	330
MEK1T-1203	12 [10.8~13.2]	3.3	303	82	3000
MEK1T-1205		5	200	85	3000
MEK1T-1209		9	111	86	1200
MEK1T-1212		12	84	86	820
MEK1T-1215		15	67	86	680
MEK1T-1224		24	42	88	330

## Model Numbers

Model Number	Input Voltage [VDC]	Output Voltage [VDC]	Output Current [mA] Max.	Efficiency [%] Typ.	Capacitive Load [ $\mu$ F] Max.
MEK1T-1505	15 [13.5~16.5]	5	200	86	3000
MEK1T-1512		12	84	87	820
MEK1T-1515		15	67	88	680
MEK1T-2403	24 [21.6~26.4]	3.3	303	82	3000
MEK1T-2405		5	200	85	3000
MEK1T-2409		9	111	86	1200
MEK1T-2412		12	84	87	820
MEK1T-2415		15	67	87	680
MEK1T-2424		24	42	88	330

Note [1]: Models that are certified to UL62368-1.

## Electrical Specifications

Unless otherwise indicated, specifications are measured at  $T_A=25^\circ\text{C}$ , nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit
Input current Full load	$V_{IN}=3.3\text{V}$ $V_{IN}=5\text{V}$ $V_{IN}=12\text{V}$ $V_{IN}=15\text{V}$ $V_{IN}=24\text{V}$	-	370 230 99 80 51	-	mA
Input current No load		-	10	-	mA
Reflected Ripple Current		-	15	-	mA
Surge voltage 1 second max	$V_{IN}=3.3\text{V}$ $V_{IN}=5\text{V}$ $V_{IN}=12\text{V}$ $V_{IN}=15\text{V}$ $V_{IN}=24\text{V}$	-0.7 -0.7 -0.7 -0.7 -0.7	-	5 9 18 21 30	VDC
Output voltage accuracy	All models	Refer to graphic in "Characteristic Curves" section			
Line regulation For $V_{IN}$ change of $\pm 1\%$	$V_{OUT}=3.3\text{V}$ All others	-	-	$\pm 1.5$ $\pm 1.2$	%
Load regulation [2] $I_{OUT}=10\%$ to $100\%$ of $I_{OUT, rated}$	$V_{OUT}=3.3\text{V}$ $V_{OUT}=5\text{V}$ $V_{OUT}=9\text{V}$ $V_{OUT}=12\text{V}$ $V_{OUT}=15\text{V}$ $V_{OUT}=24\text{V}$	-	15 10 9 8 7 6	20 15 10 10 10 10	%

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Unless otherwise indicated, specifications are measured at  $T_A=25^{\circ}\text{C}$ , nominal input voltage, full load after warm up.

Parameters	Conditions	Min.	Typ.	Max.	Unit
Temperature coefficient	Full load	-	$\pm 0.02$	-	%/ $^{\circ}\text{C}$
Output ripple and noise	20MHz bandwidth	-	60	120	mVp-p
Output short circuit protection		Continuous, automatic recovery			
Input filter		Capacitor			
Hot plug		None			

Note [2]: 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
Isolation voltage 1 minute, leakage current <1mA	Input to Output	3000	-	-	VDC
Isolation resistance Tested at 500VDC	Input to Output	1000	-	-	M ohm
Isolation capacitance 100KHz, 0.1V	Input to Output	-	20	-	pF
Switching frequency	Full load	-	220	-	KHz
Operating temperature	See "Derating Curve"	-40	-	+105	$^{\circ}\text{C}$
Storage temperature		-55	-	+125	$^{\circ}\text{C}$
Temperature rise at case	Full load	-	25	-	$^{\circ}\text{C}$
Storage humidity	Non-condensing	5	-	95	%RH
Reflow soldering temperature		Peak temp. 217 - 245 $^{\circ}\text{C}$ , maximum duration 60s			
Case material		Black plastic UL94-V0			
Cooling method		Free air convection			
Vibration		10-150Hz, 5G, 0.75mm along X, Y and Z			
Moisture sensitivity level [MSL]		IPC/JEDEC J-STD-020D.1 Level 1			
MTBF	MIL-HDBK-217F	>3,500,000 Hours, $T_A=25^{\circ}\text{C}$			
Safety standards		UL/EN/IEC 62368-1			
EMC standards	CISPR32, EN55032	Class B with "External Circuit"			
ESD	IEC/EN61000-4-2	Contact $\pm 4\text{kV}$ , Air $\pm 8\text{kV}$ , perf. Criteria B			
Size & Weight		13.5x11x7.25mm, 1.2g Typ.			

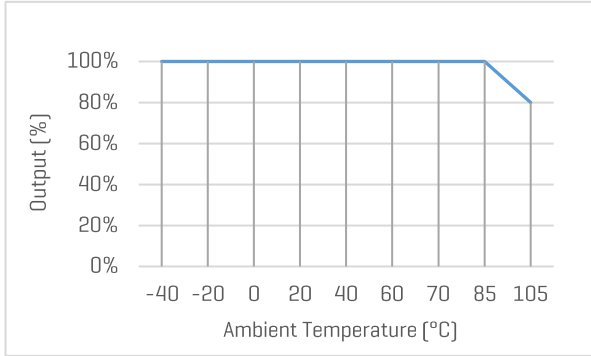
# MEK1T Series

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## Characteristic Curves

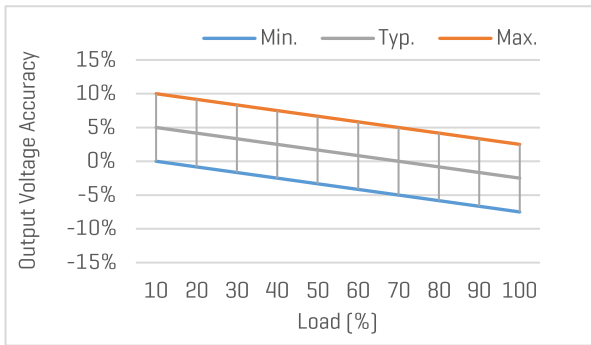
### Output vs Ambient Temperature

All models

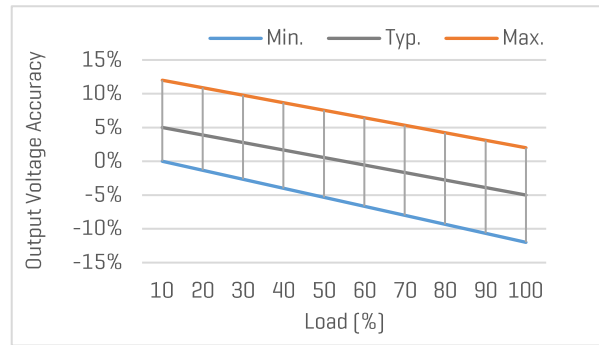


### Output Voltage Accuracy vs Load

None 3.3V output models

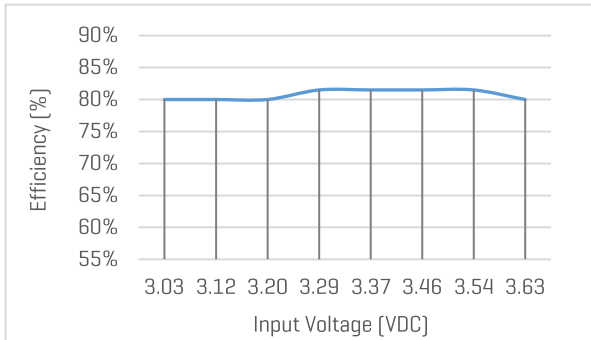


3.3V output models



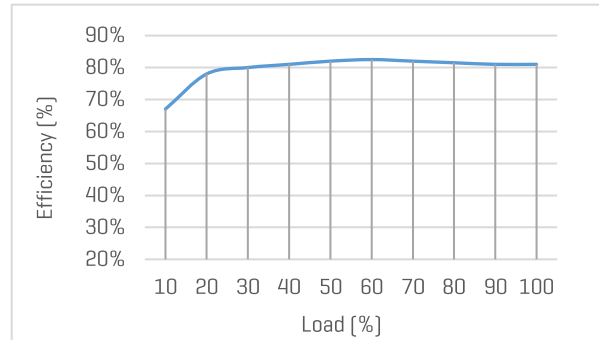
### Efficiency vs Input Voltage

MEK1T-0305, with full Load



### Efficiency vs Load

MEK1T-0305, with nominal input voltage



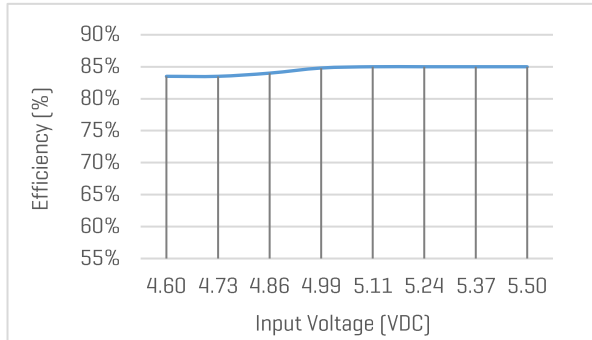
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## Characteristic Curves

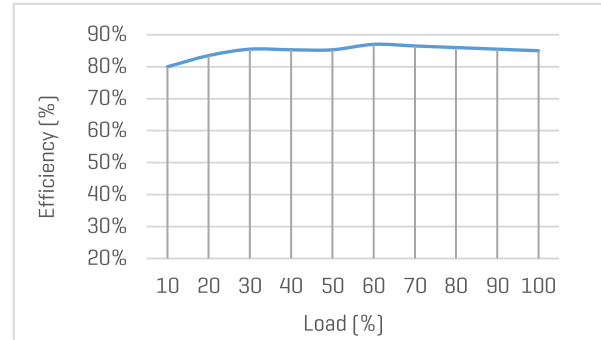
### Efficiency vs Input Voltage

MEK1T-0505, with full Load



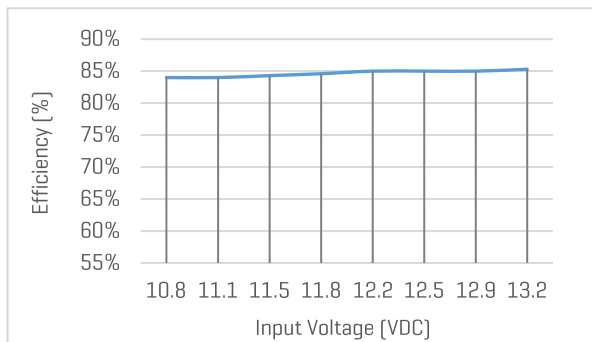
### Efficiency vs Load

MEK1T-0505, with nominal input voltage



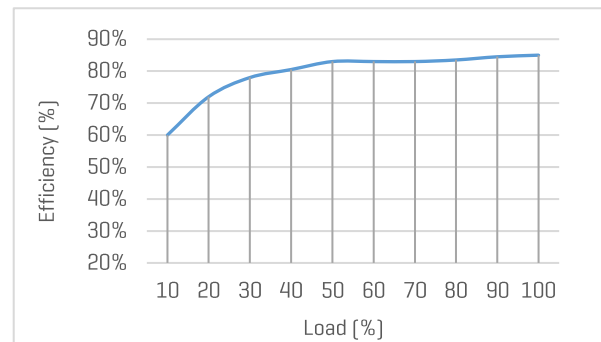
### Efficiency vs Input Voltage

MEK1T-1205, with full Load



### Efficiency vs Load

MEK1T-1205, with nominal input voltage



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## Recommended External Circuit

### Typical Application Circuit

\*Typical application circuit is to further lower the input and output ripple. It is not mandatory.



Figure 1. Typical external circuit

[Table 1] Recommended component spec

Input voltage	3.3, 5V	12V	15V	24V
$C_{IN}$	4.7 $\mu$ F, 16V	2.2 $\mu$ F, 25V	2.2 $\mu$ F, 25V	1 $\mu$ F, 50V

[Table 2] Recommended component spec

Output voltage	3.3, 5V	9V	12V	15V	24V
$C_{OUT}$	10 $\mu$ F, 16V	4.7 $\mu$ F, 16V	2.2 $\mu$ F, 25V	1 $\mu$ F, 25V	0.47 $\mu$ F, 50V

### EMC Enhancement for EN55032 Class B

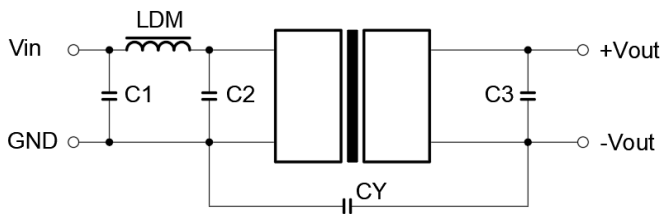


Figure 2. Circuit for EMC enhancement

[Table 3] Recommended component spec

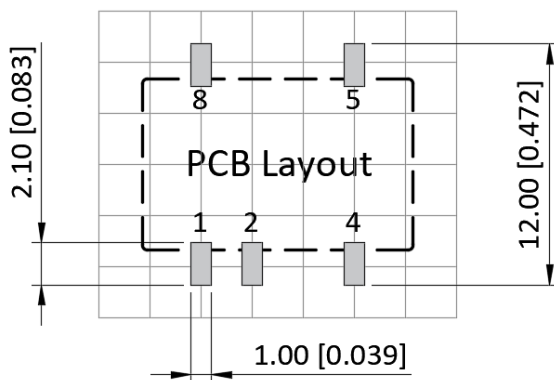
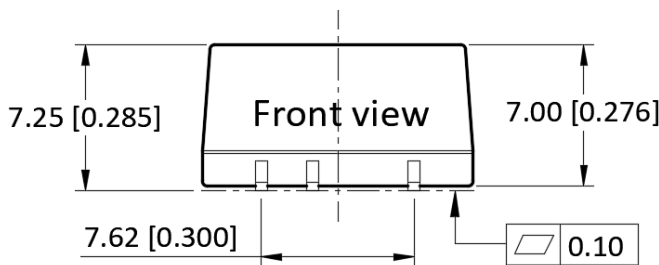
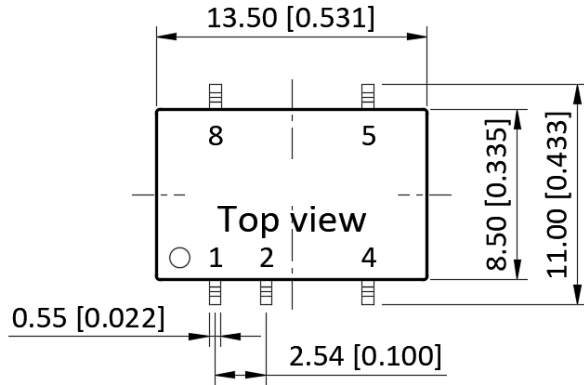
Component	LDM	C1, C2	CY
$C_{OUT}$	6.8 $\mu$ H	4.7 $\mu$ F, 50V	270pF, 4KV

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

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## Mechanical Specifications



### Pin Definition

Pin #	Single Out
1	-V <sub>IN</sub>
2	+V <sub>IN</sub>
4	-V <sub>OUT</sub>
5	+V <sub>OUT</sub>
8	NC

\* Unless otherwise specified unit: mm [inch]

\* General tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]

\* Pin thickness:  $\pm 0.10$  [ $\pm 0.004$ ]

\* Footprint grid 2.54 x 2.54 mm

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