MEK1S Series

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

Features

- Rated power: 1W max
- Input voltage range ±10%
- Unregulated output
- High efficiency up to 89%
- Isolation voltage 3KVDC
- Small no load input current
- Operating temp. range: -40 ~ +105°C ambient
- RoHS compliant
- Compact SIP7 package
- Continuous short circuit protection
- Meet UL/EN/IEC 62368-1 EN 55032 Class B
- 3 year warranty

Overview

The MEK1S series are unregulated SIP7 package DC/DC converters with single or dual outputs, 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] Max.	Efficiency [%] Typ.	Capacitive Load [uF] Max.
MEK1S-0303	3.3	3.3	303	82	4000
MEK1S-0305	3.3	5	200	83	4000
MEK1S-0309	3.3	9	111	84	2000
MEK1S-0312	3.3	12	84	85	1000
MEK1S-0315	3.3	15	67	85	680
MEK1S-0324	3.3	24	42	84	560
MEK1S-0503	5	3.3	303	83	4000
MEK1S-0505 [1]	5	5	200	86	4000
MEK1S-0509	5	9	111	86	2000
MEK1S-0512 [1]	5	12	84	88	1000
MEK1S-0515	5	15	67	88	680
MEK1S-0524	5	24	42	89	560
MEK1S-0503D	5	±3.3	±152	76	±2000
MEK1S-0505D	5	±5	±100	86	±2000
MEK1S-0509D	5	±9	±56	86	±1000
MEK1S-0512D	5	±12	±42	88	±560
MEK1S-0515D	5	±15	±34	88	±220
MEK1S-0524D	5	±24	±21	88	±100

Model Numbers

Model Number	Input Voltage [VDC]	Output Voltage [VDC]	Output Current [mA] Max.	Efficiency [%] Typ.	Capacitive Load [uF] Max.
MEK1S-1203	12	3.3	303	84	4000
MEK1S-1205	12	5	200	86	4000
MEK1S-1209	12	9	111	87	2000
MEK1S-1212	12	12	84	87	1000
MEK1S-1215	12	15	67	88	680
MEK1S-1224	12	24	42	89	560
MEK1S-1203D	12	±3.3	±152	84	±2000
MEK1S-1205D	12	±5	±100	86	±2000
MEK1S-1209D	12	±9	±56	87	±1000
MEK1S-1212D	12	±12	±42	87	±560
MEK1S-1215D	12	±15	±34	88	±220
MEK1S-1224D	12	±24	±21	84	±100
MEK1S-1505	15	5	200	86	4000
MEK1S-1509	15	9	111	87	2000
MEK1S-1512	15	12	84	87	1000
MEK1S-1515	15	15	67	88	680
MEK1S-1524	15	24	42	84	560
MEK1S-1505D	15	±5	±100	86	±2000
MEK1S-1512D	15	±12	±42	87	±560
MEK1S-1515D	15	±15	±34	88	±220
MEK1S-1524D	15	±24	±21	84	±100
MEK1S-2403	24	3.3	303	84	4000
MEK1S-2405	24	5	200	87	4000
MEK1S-2409	24	9	111	88	2000
MEK1S-2412	24	12	84	88	1000
MEK1S-2415	24	15	67	88	680
MEK1S-2424	24	24	42	89	560
MEK1S-2405D	24	±5	±100	87	±2000
MEK1S-2409D	24	±9	±56	88	±1000
MEK1S-2412D	24	±12	±42	88	±560
MEK1S-2415D	24	±15	±34	88	±220
MEK1S-2424D	24	±24	±21	84	±100

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

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
Input current Full load	V_{IN}=3.3V V_{IN}=5V V_{IN}=12V V_{IN}=15V V_{IN}=24V	-	370 230 99 78 50	390 260 105 85 55	mA
Input current No load		-	3	15	mA
Reflected Ripple Current		-	15	-	mA
Surge voltage 1 second max	V_{IN}=3.3V V_{IN}=5V V_{IN}=12V V_{IN}=15V V_{IN}=24V	-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 ±1%	V_{OUT}=3.3V All others	-	-	±1.5 ±1.2	%
Load regulation [2] I_{OUT}=10% to 100% of $I_{OUT, rated}$	V_{OUT}=3.3V Others	-	10 8	20 15	%
Temperature coefficiency	Full load	-	±0.03	-	%/°C
Output ripple and noise	20MHz bandwidth	-	45	100	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. Dual output models need to operate with balanced load. The load difference between two outputs over 10% may cause unstable operating of the converter.

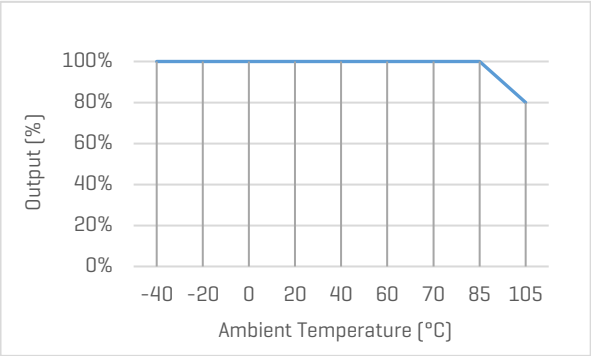
General Specifications

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
Temperature rise at case	Full load	-	15	-	°C
Operating temperature	See "Derating Curve"	-40	-	+105	°C
Storage temperature		-55	-	+125	°C
Storage humidity	Non-condensing	5	-	95	%RH
Pin soldering resistance 1.5mm away from case for 10 sec		-	-	300	°C
Case material		Black plastic UL94-V0			
Cooling method		Free air convection			
Vibration		10-150Hz, 5G, 0.75mm along X, Y and Z			
MTBF	MIL-HDBK-217F	>3,500,000 Hours, T_A=25°C			
Safety standards		UL/EN/IEC 62368-1			
EMC standards	CISPR32, EN55032	Class B with "External Circuit"			
ESD	IEC/EN61000-4-2	Contact ±4kV, Air ±8kV, perf. Criteria B			
Size & Weight		19.65x6x10.16mm, 2.1g Typ.			

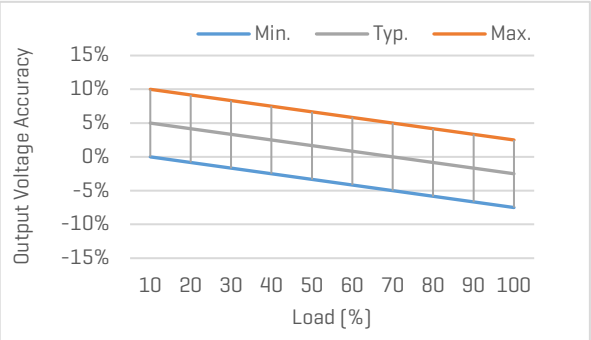
Characteristic Curves

Output vs Ambient Temperature

All models

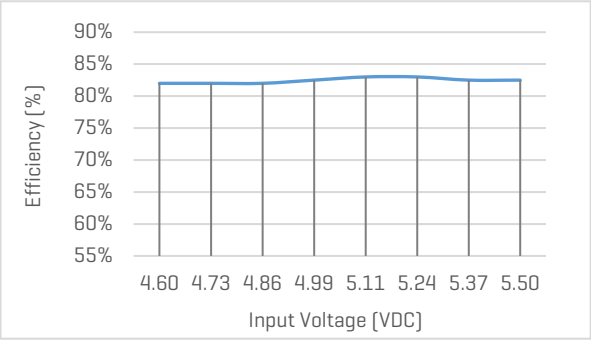


Output Voltage Accuracy vs Load



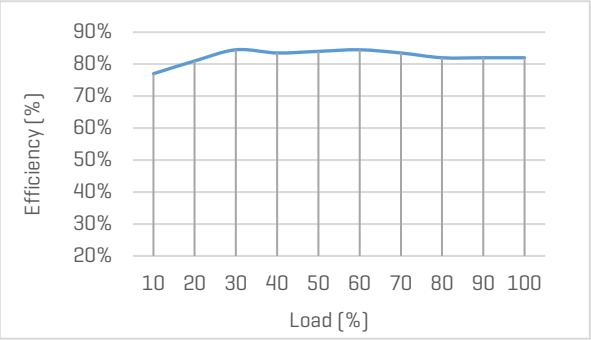
Efficiency vs Input Voltage

MEK1S-0505, with full Load



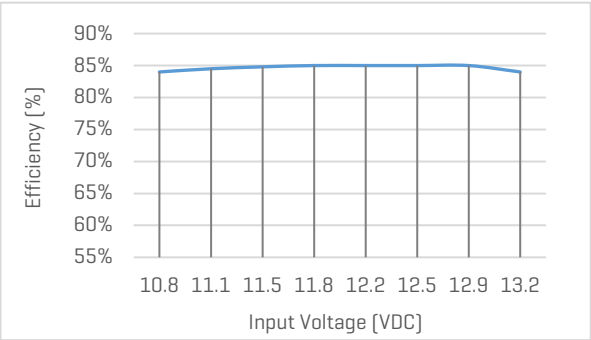
Efficiency vs Load

MEK1S-0505, with nominal input voltage



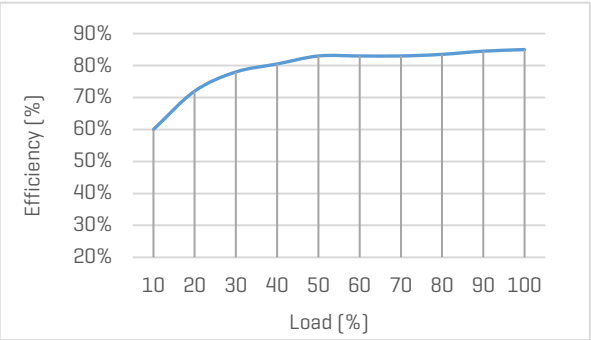
Efficiency vs Input Voltage

MEK1S-1205, with full Load



Efficiency vs Load

MEK1S-1205, with nominal input voltage



Recommended External Circuit

Typical Application Circuit

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

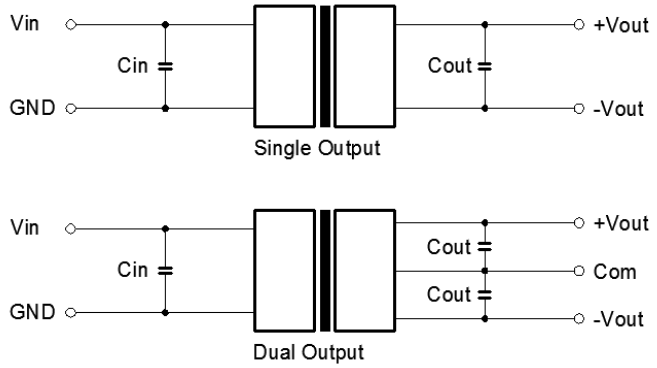


Figure 1. Typical external circuit

[Table 1] Recommended component spec

Input voltage	3.3, 5V	12V	15V	24V
C_{IN}	4.7uF, 16V	2.2uF, 25V	2.2uF, 25V	1uF, 50V

[Table 2] Recommended component spec

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

EMC Enhancement for EN55032 Class B

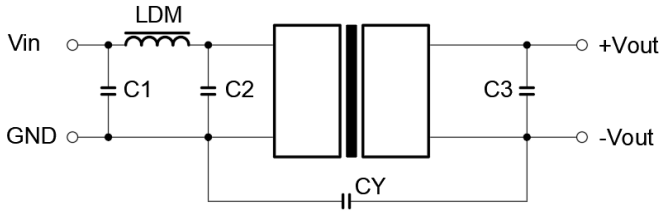


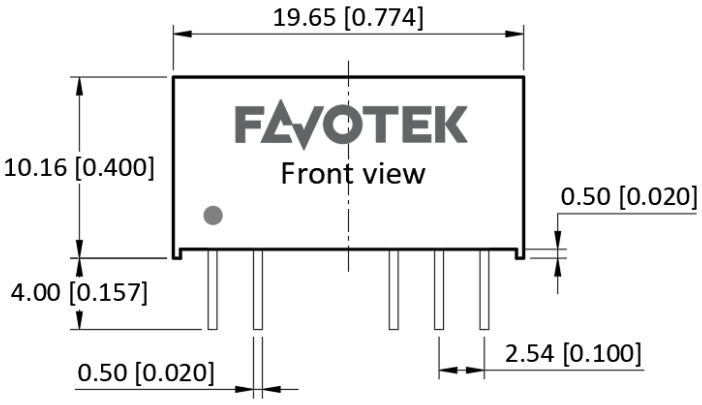
Figure 2. Circuit for EMC enhancement

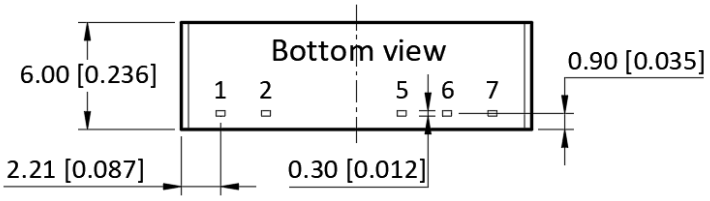
[Table 3] Recommended component spec

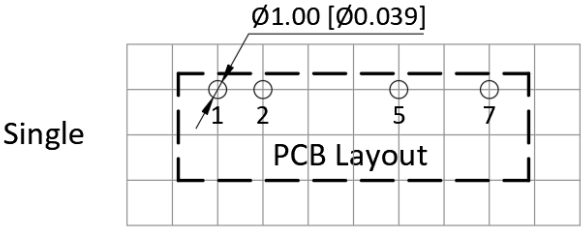
Component	LDM	C1, C2	CY
C_{OUT}	6.8uH	4.7uF, 50V	1nF, 4KV

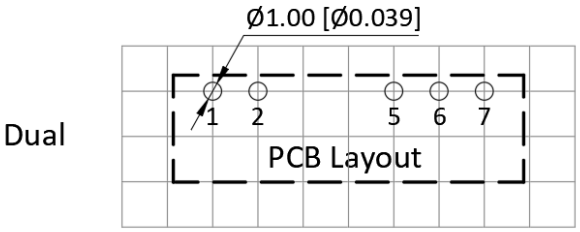
*"C3" refer to C_{OUT} in [Table 2]

Mechanical Specifications









Pin Definition

Pin #	Single Out	Dual Out
1	$+V_{IN}$	$+V_{IN}$
2	$-V_{IN}$	$-V_{IN}$
5	$-V_{OUT}$	$-V_{OUT}$
6	No Pin	COM
7	$+V_{OUT}$	$+V_{OUT}$

* Unless otherwise specified unit: mm [inch]
* General tolerance: ±0.50 [±0.020]
* Pin thickness: ±0.10 [±0.004]
* Footprint grid 2.54 x 2.54 mm