

ME1TN Series

1W, Unregulated, 1.5KV Isolation, SMD Package DC/DC Converters



Features

- Rated power: 1W max
- Input voltage range $\pm 10\%$
- Unregulated single output
- High efficiency up to 88%
- Isolation voltage 1.5KVDC
- Small no load input current
- Operating temperature range: $-40 \sim +105^{\circ}\text{C}$ ambient
- RoHS compliant
- Industrial standard SMD package
- Continuous short circuit protection
- Designed to meet UL/EN/IEC 62368-1
- 3 year warranty



Overview

The ME1TN series are unregulated DC/DC converters offered in compact SMD package with 1.5KVDC isolation. These converters feature high efficiency, low ripple and noise, continuous short circuit protection, and wide operating temperature range $-40 \sim +105^{\circ}\text{C}$. 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] $\pm 10\%$	Output Voltage [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
			Max.	Min.		
ME1TN-0303	3.3	3.3	303	0	80	3000
ME1TN-0305	3.3	5	200	0	82	3000
ME1TN-0309	3.3	9	111	0	83	1200
ME1TN-0312	3.3	12	84	0	84	820
ME1TN-0503	5	3.3	303	0	82	3000
ME1TN-0505	5	5	200	0	85	3000
ME1TN-0509	5	9	111	0	86	1200
ME1TN-0512	5	12	84	0	86	820
ME1TN-0515	5	15	67	0	86	680
ME1TN-0524	5	24	42	0	87	330
ME1TN-1203	12	3.3	303	0	82	3000
ME1TN-1205	12	5	200	0	85	3000
ME1TN-1209	12	9	111	0	86	1200
ME1TN-1212	12	12	84	0	86	820
ME1TN-1215	12	15	67	0	86	680
ME1TN-1224	12	24	42	0	88	330

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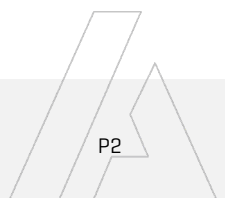


Model Numbers [continued]

Model Number	Input Voltage [VDC] $\pm 10\%$	Output Voltage [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
			Max.	Min.		
ME1TN-1505	15	5	200	0	86	3000
ME1TN-1512	15	12	84	0	87	820
ME1TN-1515	15	15	67	0	88	680
ME1TN-2403	24	3.3	303	0	82	3000
ME1TN-2405	24	5	200	0	85	3000
ME1TN-2409	24	9	111	0	86	1200
ME1TN-2412	24	12	84	0	87	820
ME1TN-2415	24	15	67	0	87	680
ME1TN-2424	24	24	42	0	88	330

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

* 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.



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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	Note
Input current Full load	$V_{IN}=3.3\text{V}$ $V_{IN}=5\text{V}$ $V_{IN}=12, 15\text{V}$ $V_{IN}=24\text{V}$	-	370 230 99 51	-	mA	
Input current No load		-	3	-	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	-	-	± 1.5 ± 1.2	%	
Load regulation $I_{OUT}=10\%$ to 100% of $I_{OUT, rated}$	$V_{OUT}=3.3\text{V}$ $V_{OUT}=5\text{V}$ $V_{OUT}=9\text{V}$ $V_{OUT}=12\text{V}$ $V_{OUT}=15\text{V}$ $V_{OUT}=24\text{V}$	-	14 10 9 8 7 6	-	%	
Temperature coefficient	Full load	-	± 0.02	-	%/ $^{\circ}\text{C}$	
Output ripple and noise	20MHz bandwidth	-	60	150	mVp-p	
Output short circuit protection		Continuous, automatic recovery				
Input filter		Capacitor				
Hot plug		None				

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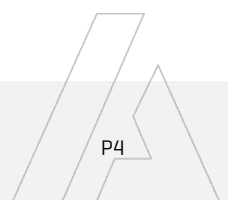
1W, Unregulated, 1.5KV Isolation, SMD Package DC/DC Converters



General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current <1mA	Input to Output	1500	-	-	VDC	
Isolation resistance Tested at 500VDC	Input to Output	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	Input to Output	-	20	-	pF	
Operating temperature	See "Derating Curve"	-40	-	+105	°C	
Storage temperature		-55	-	+125	°C	
Temperature rise at case	Full load	-	25	-	°C	
Storage humidity	Non-condensing	5	-	95	%RH	
Switching frequency	Full load	-	220	-	KHz	
Reflow soldering temperature		Peak temp. 217 - 245°C, maximum duration 60s				
Vibration		10-150Hz, 5G, 0.75mm along X, Y and Z				
Cooling method		Free air convection				
Design based on standards		UL/EN/IEC 62368-1				
Safety certifications		EN/IEC 62368-1				
EMC	Emissions Immunity	CISPR32, EN55032 Class B* IEC/EN61000-4-2				
MTBF	MIL-HDBK-217F	>3,500,000 Hours, T _A =25°C				
Moisture sensitivity level [MSL]		IPC/JEDEC J-STD-020D.1 Level 1				
Size		13.7 x 11 x 7.2 mm				
Weight		1.6g Typ.				

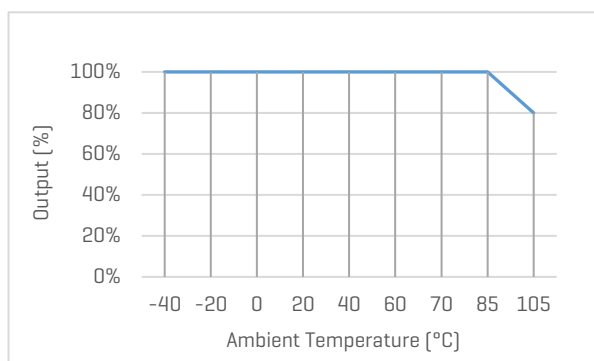
*External circuit is required in order to meet Class B, refer to Figure 2 in Recommended External Circuit



Characteristic Curves

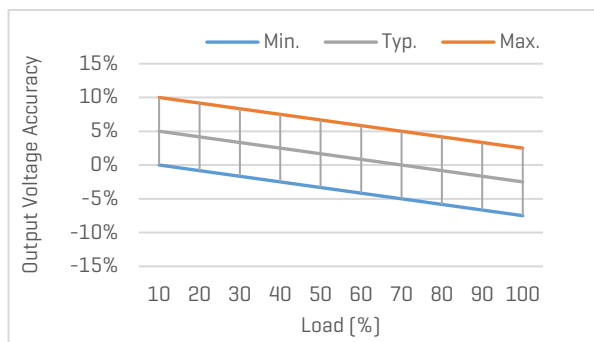
Derating Curve

Output vs Ambient Temperature

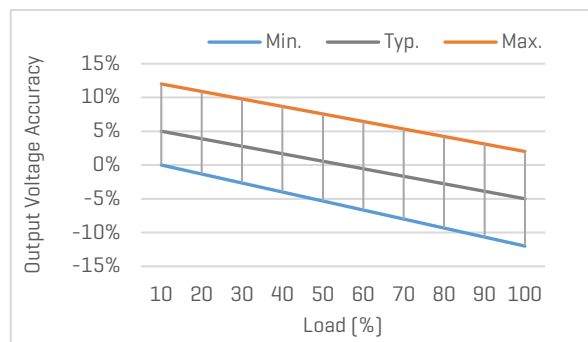


Output Voltage Accuracy vs Load

None 3.3V output models

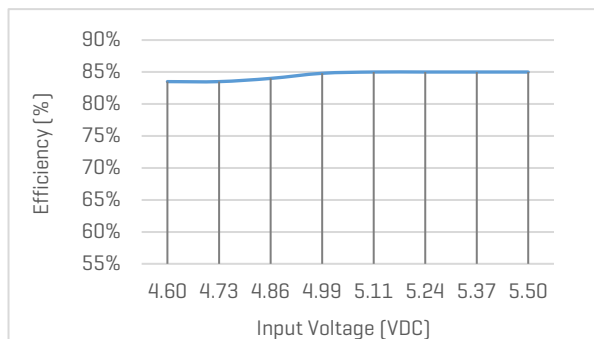


3.3V output models



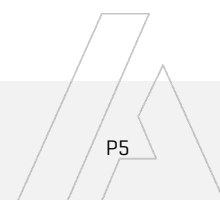
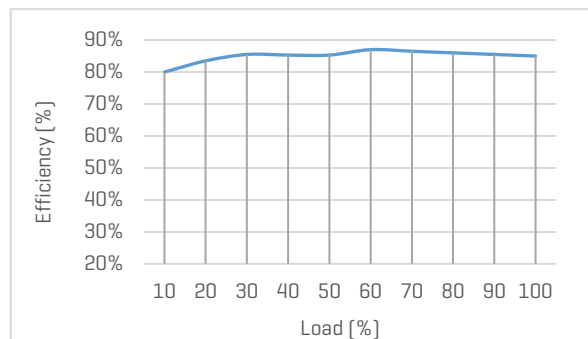
Efficiency vs Input Voltage

ME1TN-0505, with full Load



Efficiency vs Load

ME1TN-0505, 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 required for general use.

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

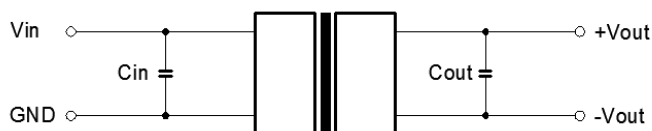


Figure 1. Typical external circuit

[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

Circuit for EMC Enhancement

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

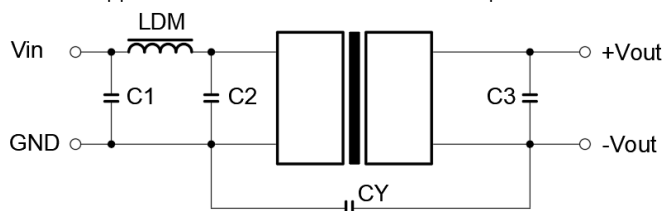


Figure 2. Circuit for EMC enhancement

[Table 3] Recommended component spec

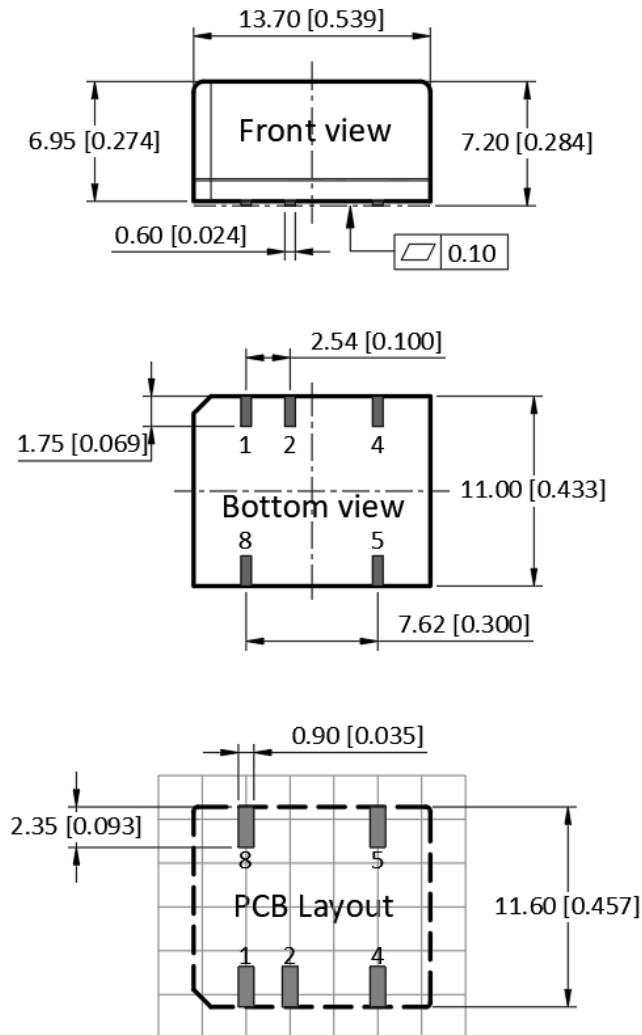
Component	LDM	C1, C2	CY	C3
C _{OUT}	6.8uH	4.7uF, 50V	270pF, 2KV	Refer to C _{OUT} in [Table 2]

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Mechanical Specifications



Pin Definition

Pin #	Single Out
1	GND
2	V _{IN}
4	0V
5	+V _{OUT}
8	No connection

* 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