MR1TC Series

1W, Regulated, 1.5KV Isolation, DC/DC Converters

Features

- Rated power: 1W max
- Input voltage range ±5%
- Tightly regulated output
- High efficiency up to 73%
- Isolation voltage 1.5KVDC
- Operating temp. range: -40 ~ +85°C ambient
- RoHS compliant
- Compact SMD package
- Continuous short circuit protection
- Meet UL/EN/IEC 62368-1 EN 55032 Class B
- 5 year warranty

RoHS CE

Overview

The MR1TC series are SMD package DC/DC converters with tightly regulated single output, and 1.5KVDC isolation. These converters feature high efficiency, low ripple and noise, 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]	Output Voltage [VDC]	Output Current [mA] Max.	Efficiency [%] Typ.	Capacitive Load [uF] Max.
MR1TC-0503	5 [4.75~5.25]	3.3	250	67	2400
MR1TC-0505		5	200	70	2400
MR1TC-0509		9	111	71	1000
MR1TC-0512		12	84	72	560
MR1TC-0515		15	67	73	220
MR1TC-0524		24	41	72	100
MR1TC-1203	12 [11.4~12.6]	3.3	250	67	2400
MR1TC-1205		5	200	70	2400
MR1TC-1212		12	84	72	560
MR1TC-1215		15	67	73	220
MR1TC-2403	24 [22.8~25.2]	3.3	250	67	2400
MR1TC-2405		5	200	72	2400
MR1TC-2412		12	84	73	560
MR1TC-2415		15	67	73	220

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}=5V V_{IN}=12V V_{IN}=24V	-	286 115 59	-	mA
Input current No load		-	8	-	mA
Reflected Ripple Current		-	15	-	mA
Surge voltage 1 second max	V_{IN}=5V V_{IN}=12V V_{IN}=24V	-0.7 -0.7 -0.7	-	9 18 30	VDC
Output voltage accuracy		-	-	±3	%
Line regulation For V_{IN} change of ±1%		-	-	±0.25	%
Load regulation [1] I_{OUT}=10% to 100% of $I_{OUT, rated}$	V_{OUT}=3.3V Others	-	-	±3 ±2	%
Temperature coefficiency	Full load	-	±0.02	-	%/°C
Output ripple and noise 20MHz bandwidth	V_{OUT}=24V Others	-	50 30	120 80	mVp-p
Output short circuit protection		Continuous, automatic recovery			
Input filter		Capacitor			
Hot plug		None			

Note [1]: 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.

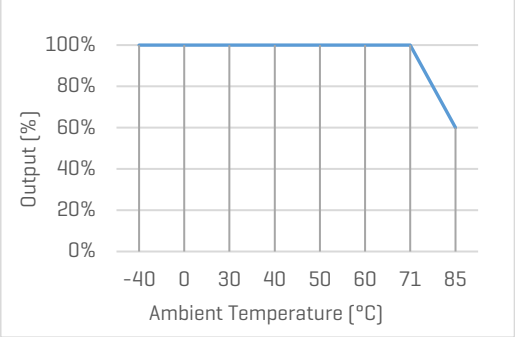
General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage 1 minute, leakage current <1mA	Input to Output	1500	-	-	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	-	25	-	°C
Operating temperature	See "Derating Curve"	-40	-	+85	°C
Storage temperature		-55	-	+125	°C
Storage humidity	Non-condensing	5	-	95	%RH
Reflow soldering temperature		Peak temp. 217 - 245°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°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		16.24x11.4x7.25mm, 1.3g Typ.			

Characteristic Curves

Derating Curve

Output vs Ambient Temperature



Recommended External Circuit

Typical Application Circuit

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

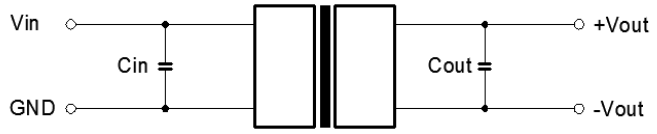


Figure 1. Typical external circuit

[Table 1] Recommended component spec

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

[Table 2] Recommended component spec

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

EMC Enhancement for EN55032 Class B

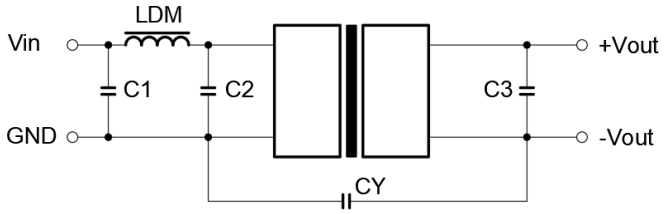


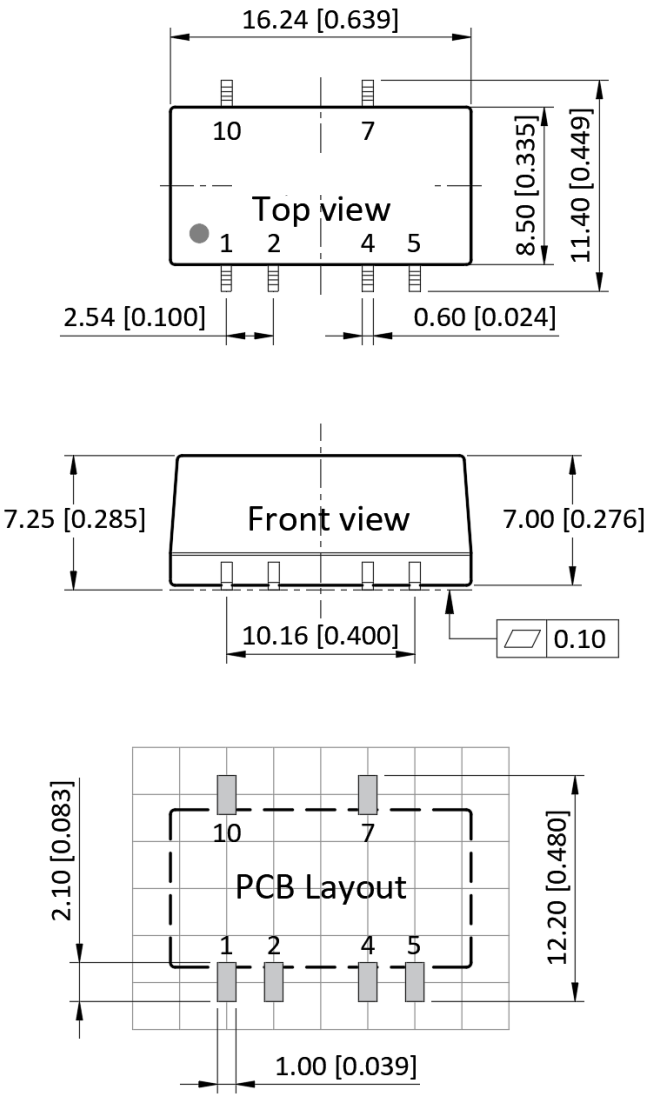
Figure 2. Circuit for EMC enhancement

[Table 3] Recommended component spec

Component	LDM	C1, C2	CY
Spec	6.8uH	4.7uF, 50V	1nF, 4KV

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

Mechanical Specifications



Pin Definition

Pin #	Dual Out
1	$-V_{IN}$
2	$+V_{IN}$
4	$-V_{OUT}$
5	$-V_{OUT}$
7	$+V_{OUT}$
10	N/C

* 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