RM10S Series

1.0A, Non-isolated SIP Package Switching Regulators

WinkEE

Features

- ► Rated current: 1A Max
- ► Non-isolated, step-down switching regulators
- ► Input range: 6.0~36VDC
- ► Regulated single output
- ► High efficiency up to 96%
- ► Low ripple and noise
- ► Low no load input current, 0.2mA only
- ► Operating temperature range: -40 ~ +85°C ambient

- ► RoHS compliant
- ► Compact SIP3 package
- ► Compatible with LM78 linear regulators
- ► Continuous short circuit protection
- ► Designed to meet: UL/IEC/EN 62368-1
- ► 5 year warranty

Overview

The RM10S series are 1A rated non-isolated switching regulators, pin to pin compatible with LM78 family linear regulators. Unlike those linear regulators, the switching regulators are high efficiency. They do not need for any heatsinks because very little energy is wasted as heat. Besides, these converters accept ultra-wide input range, operate over wide ambient temperature range, and are continuous short circuit protected. These converters are especially suitable for applications where energy saving, space saving and high performance are essential.

Model Numbers

Model Number	Input Voltage Range [VDC]			V_{OUT} [VDC]	I_{OUT} [mA] Max.	Efficiency [%] Typ.		Capacitive Load [uF] Max.
	Nominal	Min.	Max.			Min. V_{IN}	Max. V_{IN}	
RM10S-033	24	6	36	3.3	1000	90	81	680
RM10S-050	24	8	36	5	1000	93	86	680
	12	8	27	-5	-500	86	82	330
RM10S-065	24	10	36	6.5	1000	93	87	680
RM10S-090	24	13	36	9	1000	95	90	680
RM10S-120	24	16	36	12	1000	96	93	680
	12	8	20	-12	-300	89	88	330
RM10S-150	24	20	36	15	1000	96	94	680
	12	8	18	-15	-300	89	89	330

* Only typical models are listed. Contact our sales agent for availability of other models.
* Add suffix "L" for pins bended to L shape. See Mechanical Specifications for details. E.g. RM10S-050L, RM10S-150L

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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
No load input current	V_{IN} = Min. to Max.	-	0.1	1.0	mA	
Output voltage accuracy Full load	RM10S-033 Other models	-	±2 ±2	±4 ±3	%	
Line regulation	V_{IN} = Min. to Max.	-	±0.2	±0.4	%	
Load regulation	I_{OUT} = 10%~100%	-	±0.4	±0.6	%	
Temperature coefficiency	-40°C~+85°C	-	-	0.03	%/°C	
Output ripple and noise 20MHz bandwidth, peak to peak		-	20	75	mV	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation Recovery time	-	50 0.2	250 1	mV mS	
Output short circuit protection		Continuous, automatic recovery				
Reversed input		NOT protected				
Input filter		Capacitor				

General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Operating temperature		-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	Non-condensing	5	-	95	%RH	
Switching frequency Full load	V_{OUT} = 3.3, 5, 6.5V Others	420 580	520 680	620 780	KHz	
Pin soldering resistance 1.5mm away from case for 10 sec		-	-	260	°C	
Cooling method		Free air convection				
Case material		Black plastic UL94-V0				
Design based on standards		UL/EN/IEC 62368-1				
Safety certifications		EN/IEC 62368-1				
EMC	Emissions Immunity	CISPR32, EN55032 Class B* (external circuit required) IEC/EN61000-4-2, 3, 4, 6				
MTBF	MIL-HDBK-217F	>2,000,000 Hours, T_A=25°C				
Size & Weight	Standard models Suffix "L" models	11.50 x 9.00 x 17.50 mm, 3.8g Typ. 17.50 x 11.50 x 9.00 mm, 3.8g Typ.				

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Characteristic Curves

Derating Curve
Output vs Ambient Temperature
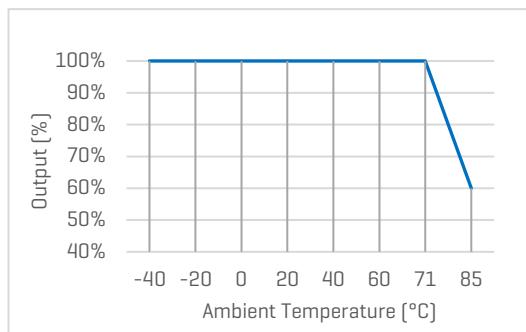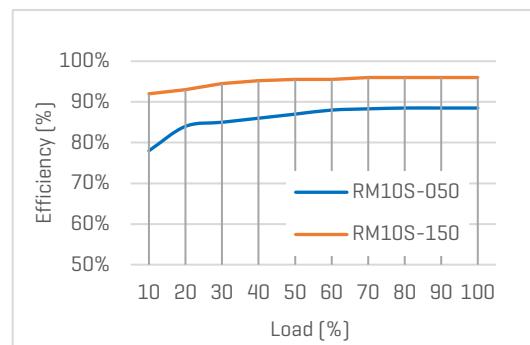
Efficiency vs Input Voltage
Full Load
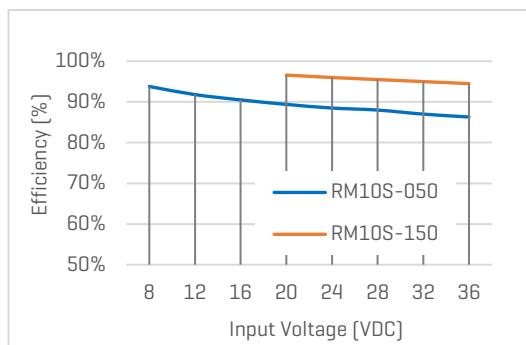
Efficiency vs Load
Nominal input voltage

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Recommended External Circuit

Typical Application Circuit
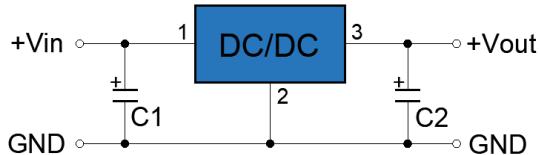
Figure 1: positive output application
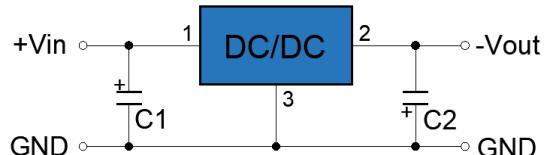
Figure 2: negative output application
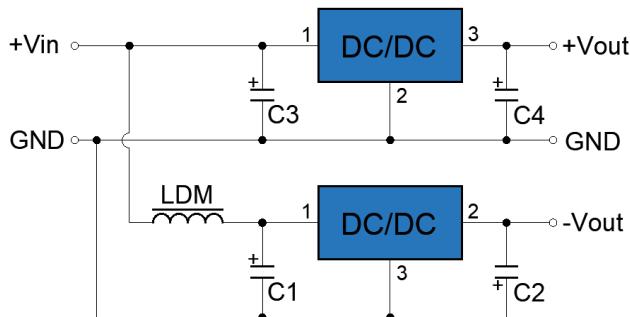
Figure 3: dual output application

Notes

1. C1, C2, C3, C4 are ceramic capacitors, and mandatory for operating of the converters. They can also be tantalum or low ESR electrolytic capacitors. Recommended specs listed in the table on right can be changed according to the needs in the circuits. Recommended LDM is 10uH.

2. The converter can be used both for positive and negative output using the circuit connection shown above.

3. These converters are not allowed to use in parallel or hot plug without support from properly designed external circuits.

[Table 1] Recommended component specifications

Model Number	C1, C3	C2, C4
RM10S-033	10uF, 50V	22uF, 10V
RM10S-050	10uF, 50V	22uF, 10V
RM10S-065	10uF, 50V	22uF, 10V
RM10S-090	10uF, 50V	22uF, 16V
RM10S-120	10uF, 50V	22uF, 25V
RM10S-150	10uF, 50V	22uF, 25V

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Recommended External Circuit (continued)

Output Filtering Circuit

* Connect "LC" filtering circuit as below can further reduce the output ripple. Recommended value for "L" is 10uH~47uH.

Positive output   Negative output
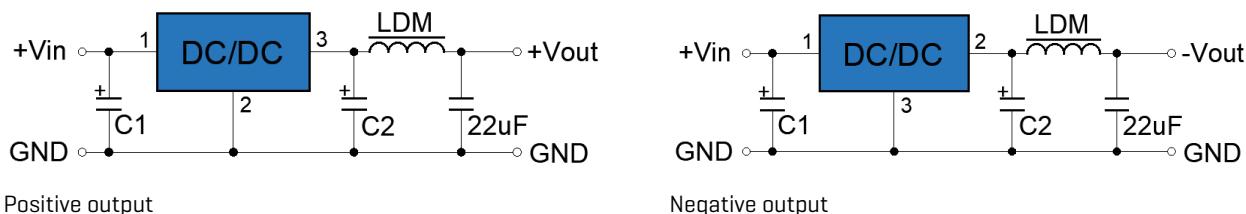
Figure 4, recommended output filtering circuit

Circuit for EMC Enhancement

*Use this application circuit to meet Class B EMC performance.
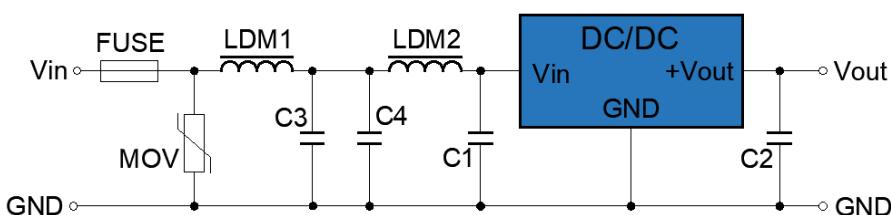
Figure 5: Circuit for EMC Enhancement

[Table 2] Recommended component spec
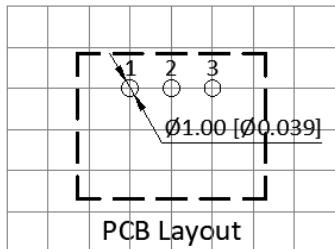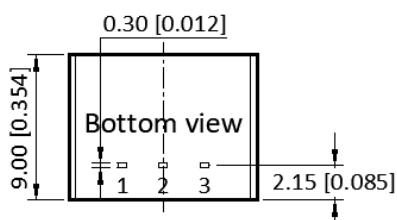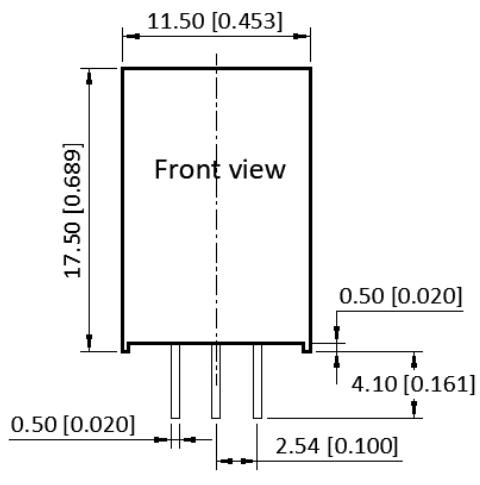
Component	MOV	LDM1	LDM2	C3	C4
Spec	20D470K	82uH	12uH	680uH, 50V	4.7uF, 50V

*C1 & C2 Refer to the same in [Table 1]
*Recommended component values are for reference only. They can be changed according to design needs.
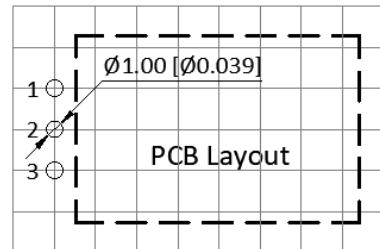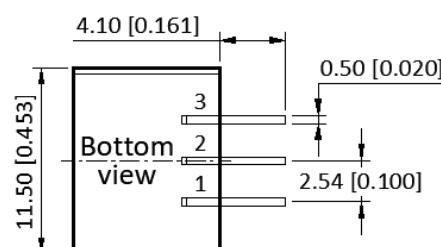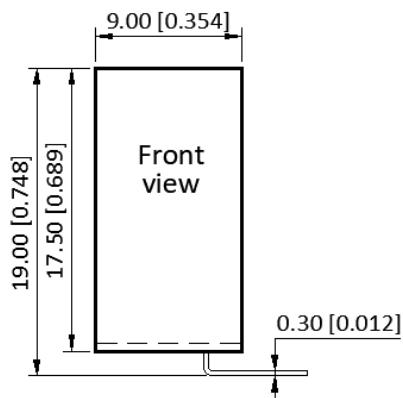
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Mechanical Specifications

Default Package

Front view

11.50 [0.453]
17.50 [0.689]
0.50 [0.020]
4.10 [0.161]
0.50 [0.020]
2.54 [0.100]

Bottom view

0.30 [0.012]
9.00 [0.354]
1 2 3
2.15 [0.085]

PCB Layout

1 2 3
Ø1.00 [Ø0.039]

Suffix "L" Package

Front view

9.00 [0.354]
19.00 [0.748]
17.50 [0.689]
0.30 [0.012]

Bottom view

4.10 [0.161]
0.50 [0.020]
3
2
1
2.54 [0.100]
11.50 [0.453]

PCB Layout

1
2
3
Ø1.00 [Ø0.039]

Note

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

Pin Definition

Pin #	Positive Out	Negative Out
1	$+V_{IN}$	$+V_{IN}$
2	GND	$-V_{OUT}$
3	$+V_{OUT}$	GND