RM10SN Series

1.0A, Non-isolated SIP Package Switching Regulators

Features

- Rated output current: 1A
- Non-isolated, step down switching regulators
- Input voltage range: 6.0~36VDC
- Regulated single output with low ripple and noise
- High efficiency up to 96%, no need for heatsink
- Low no load input current, 0.3mA only
- Compatible with LM78 linear regulators RoHS compliant
- Short circuit protection
- Operating temperature range: -40 ~ +85°C ambient
- Meet IEC/EN/UL 62368-1
- 5 year warranty

Overview

The RM10SN series are non-isolated switching regulators, pin to pin compatible with LM78 family linear regulators. Unlike those linear regulators, the RM series switching regulators are high efficiency up to 96%. They do not need for any heatsink because very few energy is wasted as heat. Besides, these converters accept very wide input voltage range 6~36VDC, operate over wide ambient temperature range -40 ~ +85°C, and are short circuit and overheat protected. This particular series has very low no load input current, 0.3mA only. These converters are especially suitable for applications such portable devices, 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}	
RM10SN-033	24	6	36	3.3	1000	90	80	680
RM10SN-050	24	8	36	5	1000	93	85	680
	12	8	27	-5	-500	85	81	330
RM10SN-065	24	10	36	6.5	1000	93	85	680
RM10SN-090	24	13	36	9	1000	94	89	680
RM10SN-120	24	16	36	12	1000	95	92	680
	12	8	20	-12	-300	88	87	330
RM10SN-150	24	20	36	15	1000	96	93	680
	12	8	18	-15	-300	87	88	330

* Only typical models are listed. Contact our sales agent for availability of other models.

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.	Positive Out Negative Out	-	0.3 1.0	1.0 4.0	mA	
Output voltage accuracy Full load	RM10SN-033 Others	-	±2 ±1.5	±4 ±3	%	
Line regulation	V_{IN} = Min. to Max.	-	±0.2	±0.4	%	
Load regulation I_{OUT} = 10%~100%	Positive Out Negative Out	-	±0.4 ±0.4	±0.6 ±0.8	%	
Temperature coefficiency	-40°C~+85°C	-	-	0.03	%/°C	
Output ripple and noise 20MHz bandwidth, peak to peak		-	25	75	mV	
Dynamic load response I_{OUT}=25%~50%~75% of $I_{OUT, rated}$	Peak deviation Recovery time	-	60 0.2	200 1	mV mS	
Output short circuit protection		Continuous, automatic recovery				
Input filter		Capacitor				

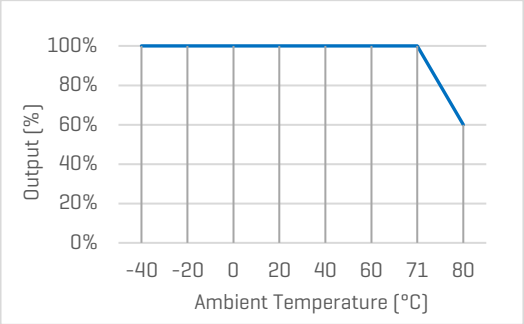
General Specifications

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	-	600	-	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 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		11.60 x 7.55 x 10.16 mm, 1.8g Typ.				

Characteristic Curves

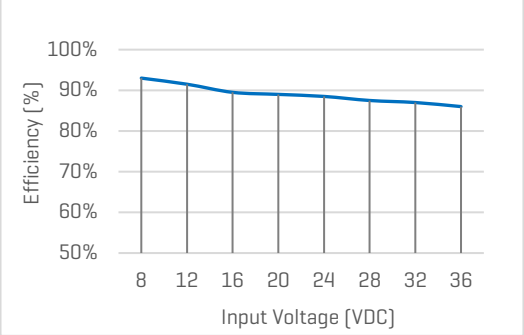
Derating Curve

Output vs Ambient Temperature



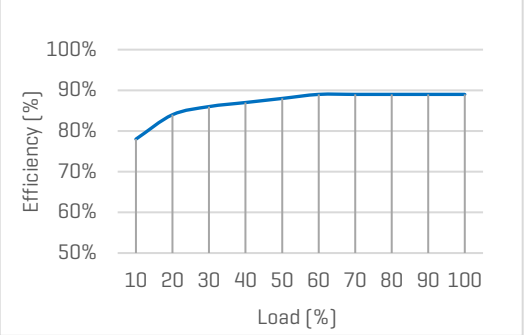
Efficiency vs Input Voltage

Full Load, RM10SN-050



Efficiency vs Load

Nominal input voltage, RM10SN-050



Recommended External Circuit

Typical Application Circuit

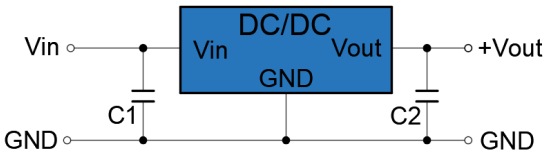


Figure 1: positive output application

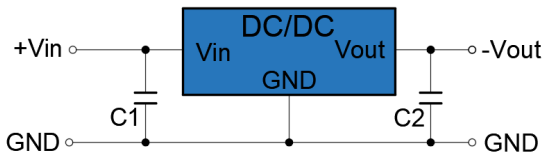


Figure 2: negative output application

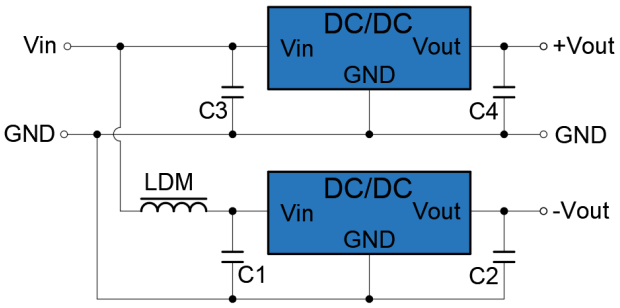


Figure 3: dual output application

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
RM10SN-033	10uF, 50V	22uF, 10V
RM10SN-050	10uF, 50V	22uF, 10V
RM10SN-065	10uF, 50V	22uF, 16V
RM10SN-090	10uF, 50V	22uF, 16V
RM10SN-120	10uF, 50V	22uF, 25V
RM10SN-150	10uF, 50V	22uF, 25V

Circuit for EMC Enhancement

* This application circuit is recommended in order to meet EN55032 Class B

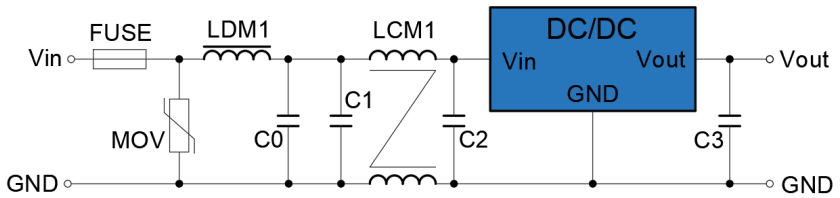


Figure 4: circuit diagram for positive output

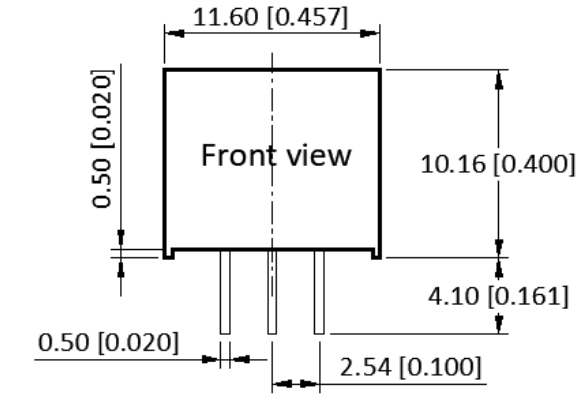
Recommended External Circuit [continued]

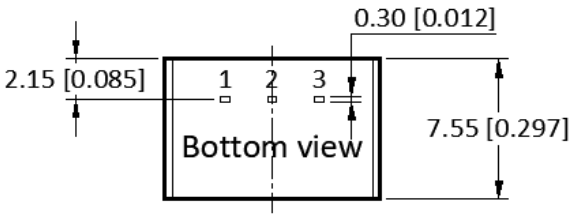
[Table 2] Recommended component spec

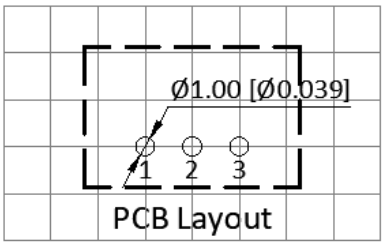
Positive output	
Item	**Recommended spec**
MOV	20D470K
LDM1	82uH
CO	680uF, 50V
LCM1	4.7mH
C1, C2	4.7uF, 50V
C3	Refer to the C2 in "Table 1"

Note: The recommended component values are for reference, can be changed according to design needs.

Mechanical Specifications







Pin Definition

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

* 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