RM20S Series

2.0A, Non-isolated SIP Package Switching Regulators

Features

- Rated current: 2A Max
- Non-isolated, step-down switching regulators
- Input range: 4.5~36VDC
- 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
- 3 year warranty

Overview

The RM20S series are 2A 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}	
RM20S-018	24	4.5	28	1.8	2000	83	79	2000
RM20S-025	24	4.5	36	2.5	2000	89	83	2000
RM20S-033	24	6	36	3.3	2000	89	85	1800
RM20S-050	24	8	36	5.0	2000	92	89	1000
RM20S-065	24	10	36	6.5	2000	92	89	1000
RM20S-090	24	13	36	9.0	2000	95	92	680
RM20S-120	24	16	36	12	2000	96	94	470
RM20S-150	24	18	36	15	2000	96	94	470

* 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. RM20S-033L

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.	-	0.2	1.0	mA	
Output voltage accuracy	V_{OUT} = 1.8 ... 3.3V Others	-	±2 ±2	±4 ±3	%	
Line regulation	V_{IN} = Min. to Max.	-	±0.4	±0.8	%	
Load regulation	I_{OUT} = 10%~100%	-	±0.5	±1.5	%	
Temperature coefficiency	-40°C~+85°C	-	-	0.03	%/°C	
Output ripple and noise*	20MHz bandwidth	-	30	75	mVp-p	
Dynamic load response I_{OUT} = 25%~50%~25% or 50%~75%~50% step of $I_{OUT, rated}$	Peak deviation Peak deviation Recovery time	-	±80 ±50 0.2	±150 ±150 1	mV mV mS	V_{OUT}=1.8, 2.5V V_{OUT}=Others
Output short circuit protection		Continuous, automatic recovery				

* Ripple and noise is higher at low load, 180mVp-p max while I_{OUT} = 0~20%, and 100mVp-p max while I_{OUT} = 20~100%

General Specifications

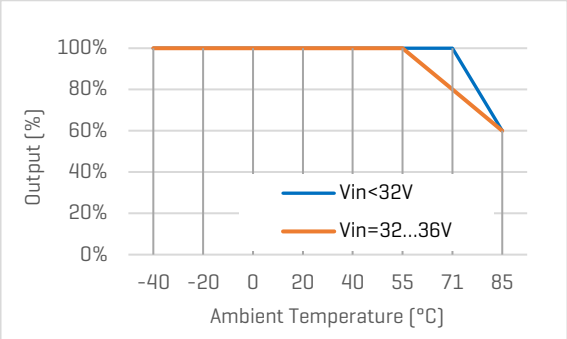
Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Operating temperature		-40	-	+85	°C	
Storage temperature		-55	-	+125	°C	
Storage humidity	Non-condensing	5	-	95	%RH	
Switching frequency	Full load	-	400	-	KHz	
Pin soldering resistance 1.5mm away from case for 10 sec		-	-	260	°C	
Cooling method		Free air 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	11.5 x 9.0 x 17.5 mm, 4g 17.5 x 11.5 x 9.0 mm, 4g				

Characteristic Curves

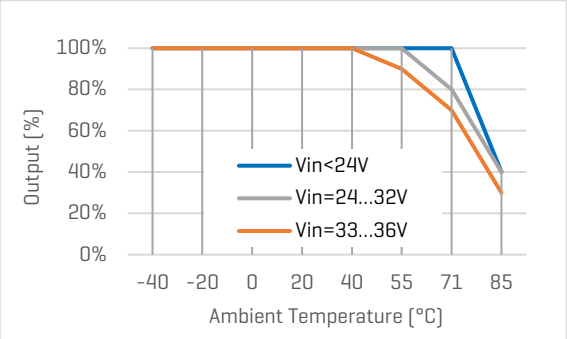
Derating Curve

Output vs Ambient Temperature

V_{OUT} = 1.8 ... 5V

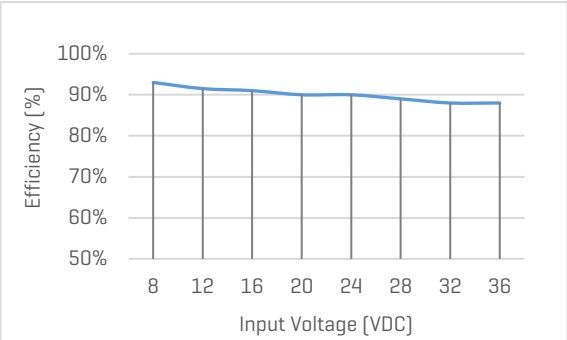


V_{OUT} = 6.5 ... 15V

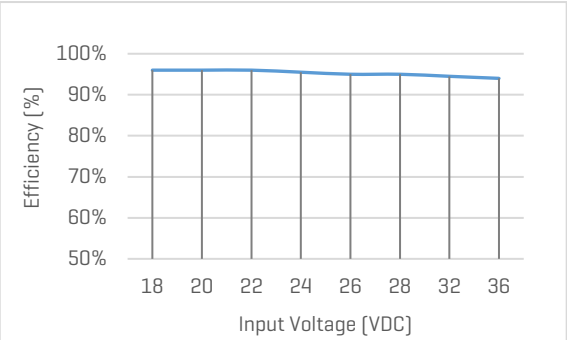


Efficiency vs Input Voltage

RM20S-050, full load

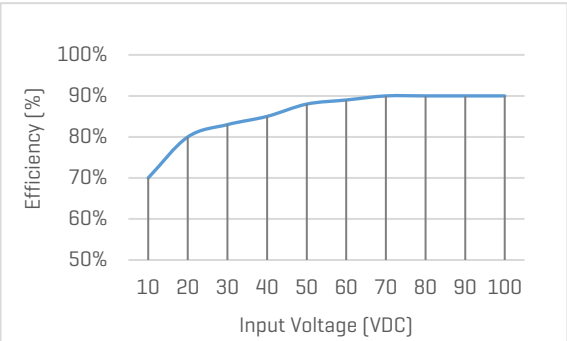


RM20S-150, full load

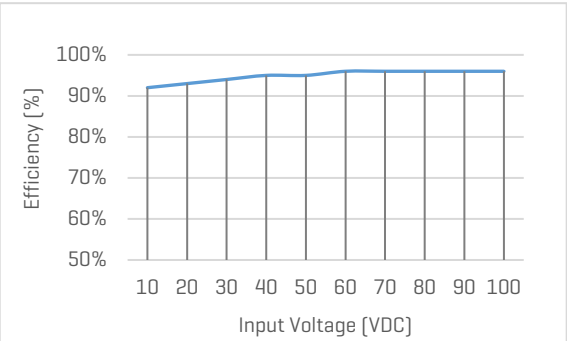


Efficiency vs Load

RM20S-050, V_{IN}=24V



RM20S-150, V_{IN}=24V



Recommended External Circuit

Typical Application Circuit

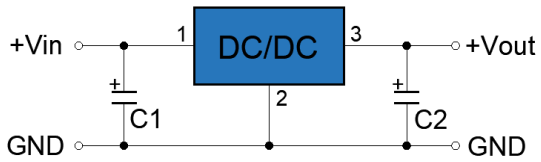


Figure 1: Typical application circuit

Notes

1. C1, C2 are ceramic capacitors. They are mandatory for the operating of the converter. 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.
2. These converters are not allowed to use in parallel or hot plug without support from properly designed external circuits.

[Table 1] Recommended component specifications

Models	C1	C2
V_{OUT}=1.8 ... 6.5V	22uF, 50V	22uF, 10V
V_{OUT}=9V	22uF, 50V	22uF, 16V
V_{OUT}=12, 15V	22uF, 50V	22uF, 25V

Circuit for EMC Enhancement

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

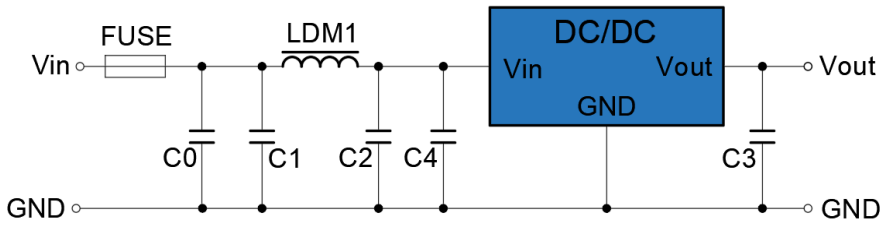


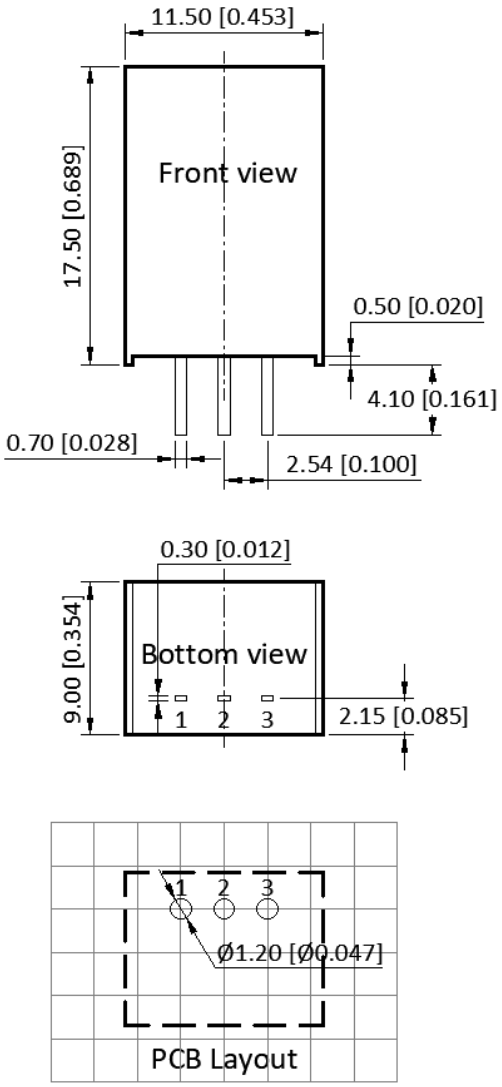
Figure 2. Recommended circuit diagram

[Table 2] Recommended component spec

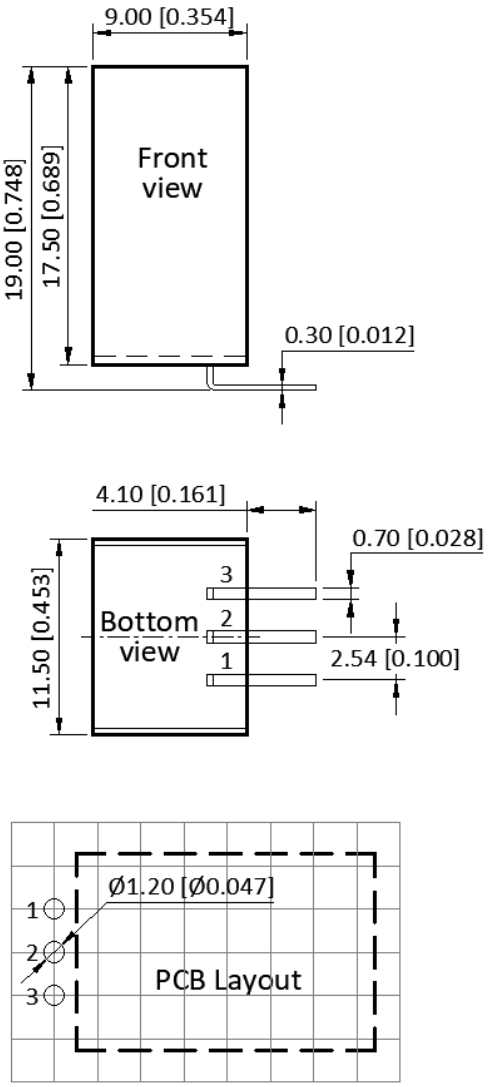
Items	LDM1	C0	C1, C2	C3	C4
Spec	22uH	100uF, 100V	10uF, 50V	22uF, 25V	680uF, 50V

Mechanical Specifications

Default Package



Suffix "L" Package



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 #	Single Out
1	$+V_{IN}$
2	GND
3	$+V_{OUT}$

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