

Features

Regulated Converters

- 1W power in SMD package
- 4:1 Input voltage range
- Efficiency up to 81%
- 1.6kVDC/1min isolation
- Regulated output
- -40°C to +90°C at full load
- Continuous short circuit protected



R1M

1 Watt SMD Single & Dual Output



Description

The R1M is an isolated 1W DC/DC converter in a compact SMD package available with 4:1 inputs covering 5, 12, 24, and 48V rails providing single or dual regulated, short-circuit protected outputs. There is no minimum load requirement. Isolation is 1.6kVDC/1min, and the operating temperature is from -40°C up to +90°C without derating. Class A and Class B EMC conformity requires only a few external components. Standard packaging is tube.

Selection Guide

Part Number	Input Voltage Range ⁽¹⁾ [VDC]	nom. Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽²⁾ [%]	max. Capacitive Load ⁽³⁾ [μF]
R1M-xx3.3S/SMD	4.5-18, 9-36, 18-75	3.3	300	75-77	1680
R1M-xx05S/SMD	4.5-18, 9-36, 18-75	5	200	78-79	820
R1M-xx09S/SMD	4.5-18, 9-36, 18-75	9	112	79	630
R1M-xx12S/SMD	4.5-18, 9-36, 18-75	12	90	81	470
R1M-xx15S/SMD	4.5-18, 9-36, 18-75	15	70	81	330
R1M-xx24S/SMD	4.5-18, 9-36, 18-75	24	45	80	160
R1M-xx05D/SMD	4.5-18, 9-36, 18-75	±5	±100	77	±470
R1M-xx12D/SMD	4.5-18, 9-36, 18-75	±12	±45	80	±330
R1M-xx15D/SMD	4.5-18, 9-36, 18-75	±15	±35	81	±220

Notes:

Note1: Refer to "Input Voltage Range"

Note2: Efficiency is tested at nominal input and full load at +25°C ambient

Note3: Max Cap Load is tested at nominal input and full resistive load

Model Numbering



Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS					
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	nom. V _{IN} = 12VDC		4.5VDC	12VDC	18VDC
	nom. V _{IN} = 24VDC		9VDC	24VDC	36VDC
	nom. V _{IN} = 48VDC		18VDC	48VDC	75VDC
Input Surge Voltage	1 second max.	nom. V _{IN} = 12VDC			25VDC
		nom. V _{IN} = 24VDC			50VDC
		nom. V _{IN} = 48VDC			100VDC
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Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

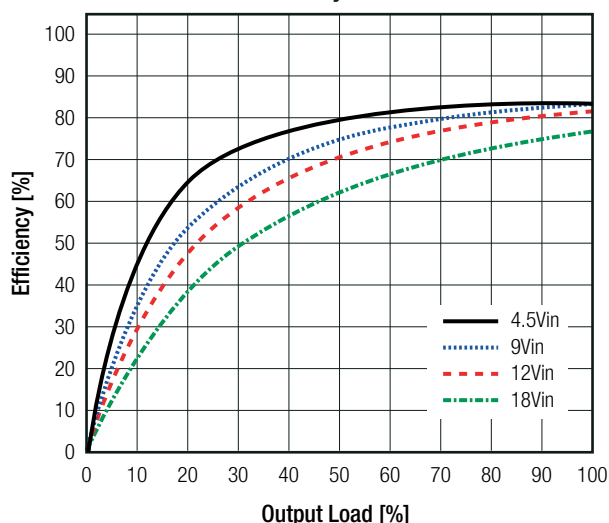
Parameter	Condition	Min.	Typ.	Max.
Quiescent Current	nom. $V_{in} = 12\text{VDC}$		20mA	
	nom. $V_{in} = 24\text{VDC}$		10mA	
	nom. $V_{in} = 48\text{VDC}$		5mA	
Start-up time	power up, CTRL ON/OFF		10ms	20ms
ON/OFF CTRL ⁽⁴⁾	DC-DC ON	open or high impedance		
	DC-DC OFF	2mA	3mA	4mA
Standby Current	DC-DC OFF		2.5mA	
Internal Operating Frequency		100kHz		
Output Ripple and Noise	20MHz BW		30mVp-p	
Reflected Back Ripple Current	with external components	nom. $V_{in} = 12\text{VDC}$	15mA _{p-p}	
		nom. $V_{in} = 24\text{VDC}$	10mA _{p-p}	
		nom. $V_{in} = 48\text{VDC}$	5mA _{p-p}	

Notes:

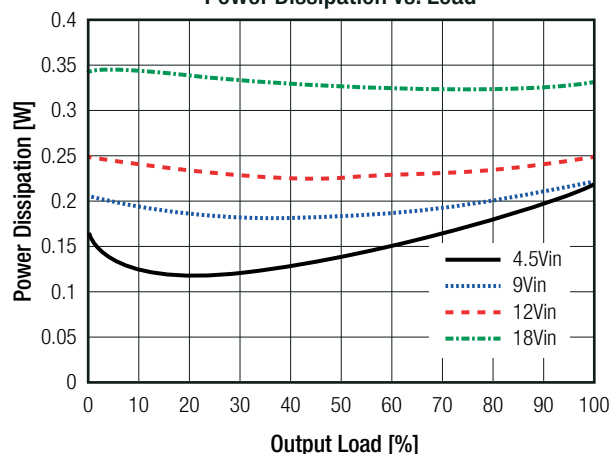
Note4: Refer to "ON/OFF CTRL"

R1M-1212S/SMD

Efficiency vs. Load

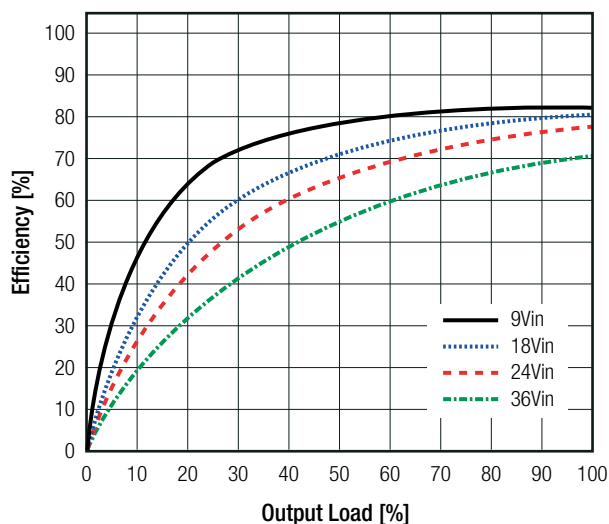


Power Dissipation vs. Load

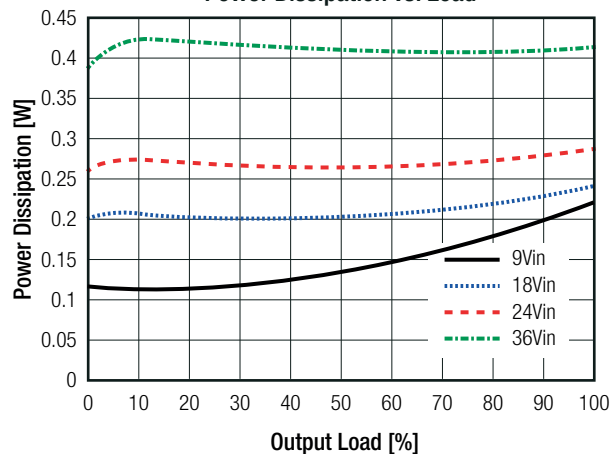


R1M-2405S/SMD

Efficiency vs. Load



Power Dissipation vs. Load

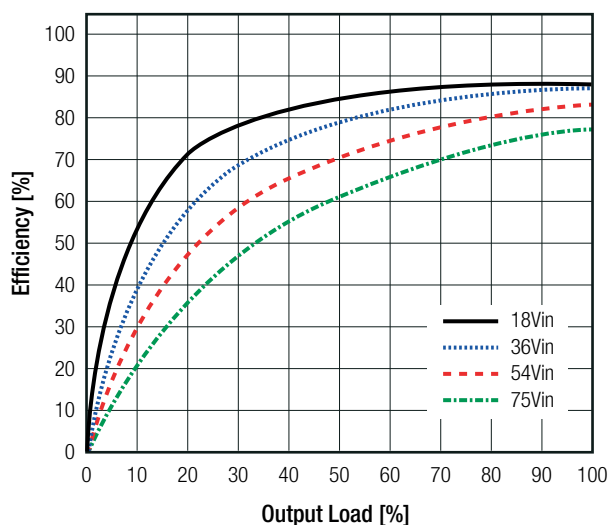


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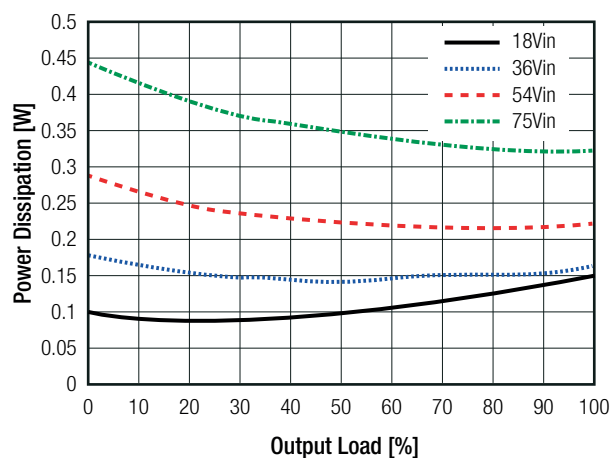
Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

R1M-4812S/SMD

Efficiency vs. Load

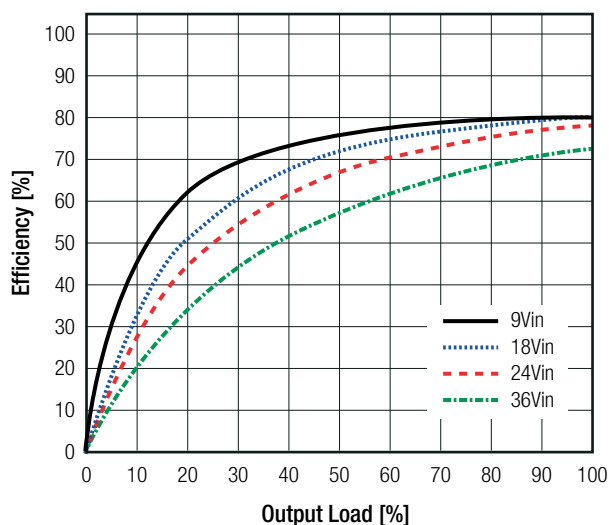


Power Dissipation vs. Load

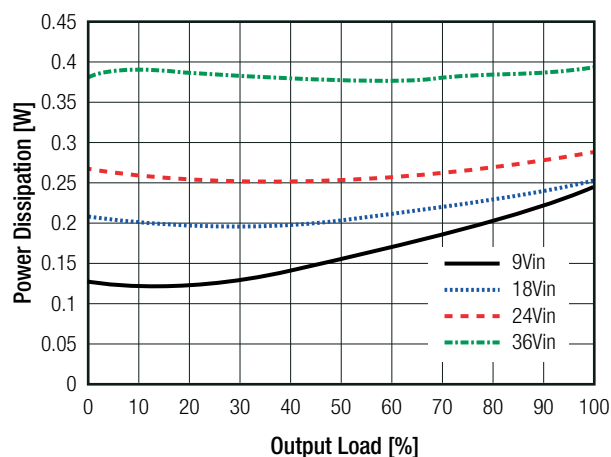


R1M-2405D/SMD

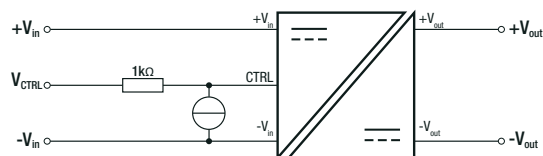
Efficiency vs. Load



Power Dissipation vs. Load



ON/OFF CTRL



DC-DC ON	Open or high impedance
DC-DC OFF	2.0mA to 4.0mA max.

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS

Parameter	Condition		Value
Output Accuracy			±1.0% max.
Line Regulation	low line to high line, full load		±0.2% max.
Load Regulation	0% to 100% load	single	1% max.
		dual	1% max.
	10% to 100% load	single	0.5% max.
		dual	0.8% max.
Cross Regulation	asymmetrical 25% / 100% load		±5% max.
Transient Response Recovery Time	25% load step change		±500µs typ.

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Isolation Voltage ⁽⁵⁾	I/P to O/P	1 minute	1.6kVDC
Isolation Resistance	I/P to O/P, V _{ISO} = 500VDC		1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V		50pF typ.

Notes:

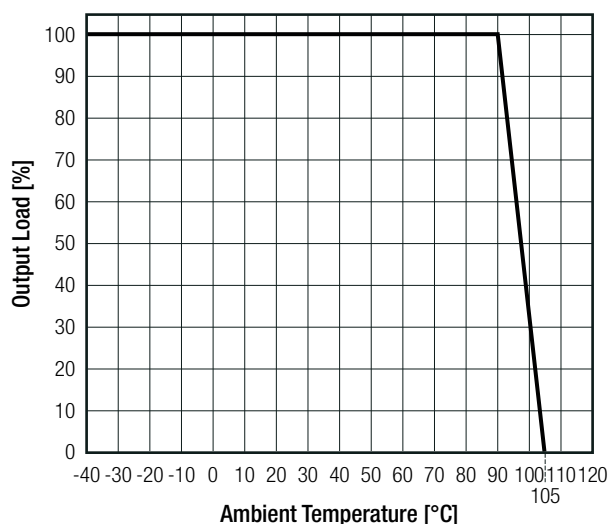
Note5: This power module is not internally fused. An input line fuse must always be used
 Recom suggests: 12Vin=T0.5A; 24Vin=T0.315A; 48Vin=T0.16A slow blow

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	with derating		-40°C to +105°C
	without derating		-40°C to +90°C
Maximum Case Temperature	measured at "tc point"		+105°C
Operating Humidity	non-condensing		5% - 95% RH max.
Thermal Shock			according to MIL-STD-810F
Vibration			according to MIL-STD-810F
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	8534 x 10 ³ hours

Derating Graph

(@ Chamber and natural convection 0.1m/s)

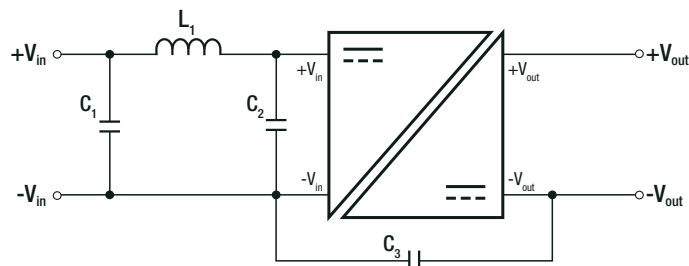


Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	File Number	Standard
RoHS2		RoHS-2011/65/EU + AM-2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	with external filter refer to "EMC Filtering"	EN55032, Class A and B

EMC Filtering Suggestions according to EN55032



Class A Component List

Model	C1	C2	C3	L1
R1M-12xxS	10μF	N/A	N/A	4.7μH
R1M-24xxS	4.7μF	N/A	N/A	22μH
R1M-48xxS	2.2μF	N/A	150pF	39μH

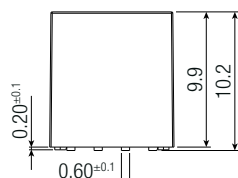
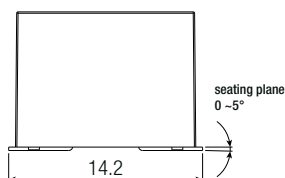
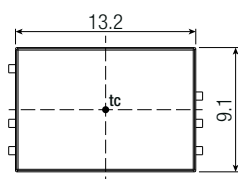
Class B Component List

Model	C1, C2	C3	L1
R1M-12xxS	10μF	100pF	4.7μH
R1M-24xxS	4.7μF	150pF	22μH
R1M-48xxS	2.2μF	150pF	39μH

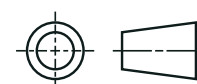
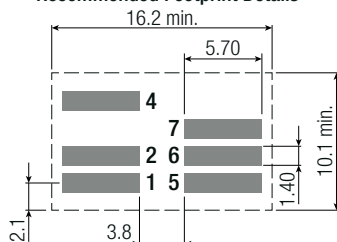
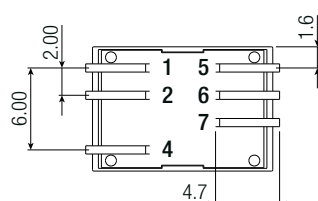
DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	baseplate/case	black plastic, (UL94 V-0)
	potting	silicone (UL94 V-0)
Dimension (LxWxH)		14.2 x 9.1 x 10.2mm
Weight		2.7g typ.

Dimension Drawing (mm)



Recommended Footprint Details



Pinning Information

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	CTRL	CTRL
5	NC	-Vout
6	-Vout	COM
7	+Vout	+Vout

NC= no connection

Tolerance:

xx.x = ±0.5mm
xx.xx = ±0.25mm

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	218.0 x 17.2 x 19.9mm
Packaging Quantity		20pcs
Storage Temperature Range	non-condensing	-55°C to +125°C
Storage Humidity		5% to 95% RH max.
Moisture Sensitive Level	MSL peak temp. ⁽⁶⁾	Level 2

Notes:

Note6: The Moisture Sensitivity Level rating is according to the JEDEC industry standard classifications and peak solder temperature