

R-78K-1.0 series ◇ Switching Regulator

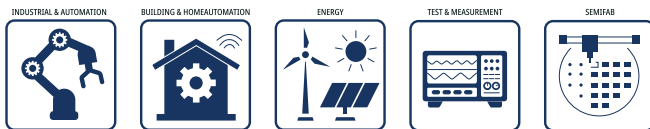
1.0Amp ◇ Single Output ◇ SIP3

FEATURES

- Efficiency up to 96%, no need for heat-sinks
- 4.5-36VDC wide input voltage
- -40°C to +90°C ambient operation without derating
- Pin compatible with 78 series regulators
- Non isolated DC/DC converter
- Undervoltage and short circuit protection
- 3 year warranty



Dimensions (LxWxH): 11.5 x 7.55 x 10.2mm (0.45 x 0.30 x 0.40 inch)
1.7g (0.038 lbs)

APPLICATIONS**SAFETY & EMC****DESCRIPTION**

The R-78K-1.0 series is a switching regulator module that has been designed to offer all the advantages of a switching regulator (high efficiency, wide input range, accurate output voltage regulation) but with a low cost for production quantities. Due to the R-78K-1.0's high efficiency of up to 95% no heat-sink is required, and operation from -40 to 90°C is possible with slight derating. The compact TO-220 compatible SIP3 package measures only 11.5 x 7.55 x 10.2mm, so it saves precious board space.

SELECTION GUIDE

Part Number	Input Voltage Range [VDC]	Output Voltage nom. [VDC]	Output Current max. [mA]	Efficiency	
				@ min. Vin [%]	@ max. Vin [%]
R-78K1.8-1.0	4.5-36	1.8	1000	83	71
R-78K2.5-1.0	4.5-36	2.5	1000	85	75
R-78K3.3-1.0	4.5-36	3.3	1000	88	79
R-78K5.0-1.0	6.5-36	5	1000	92	85
R-78K9.0-1.0	12-36	9	1000	93	89
R-78K12-1.0	15-36	12	1000	95	91
R-78K15-1.0	18-36	15	1000	94	91

R-78K-1.0 series ◇ Switching Regulator**1.0Amp ◇ Single Output ◇ SIP3****MODEL NUMBERING**

R-78K -1.0

Output Voltage _____ Output Current _____

ABSOLUTE MAX. RATINGS (exceeding these ratings may damage the device)

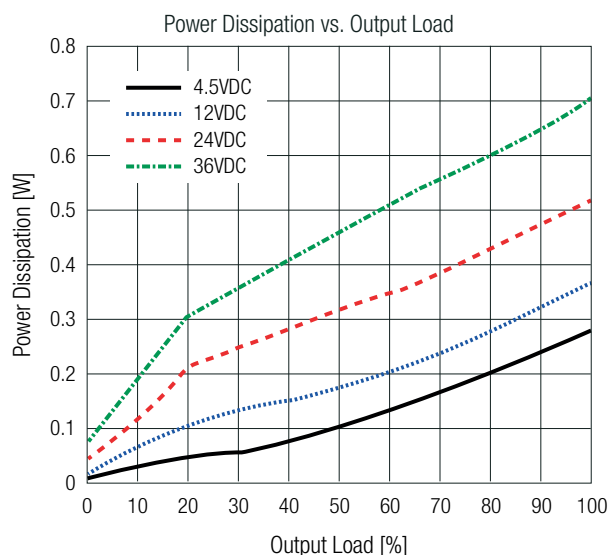
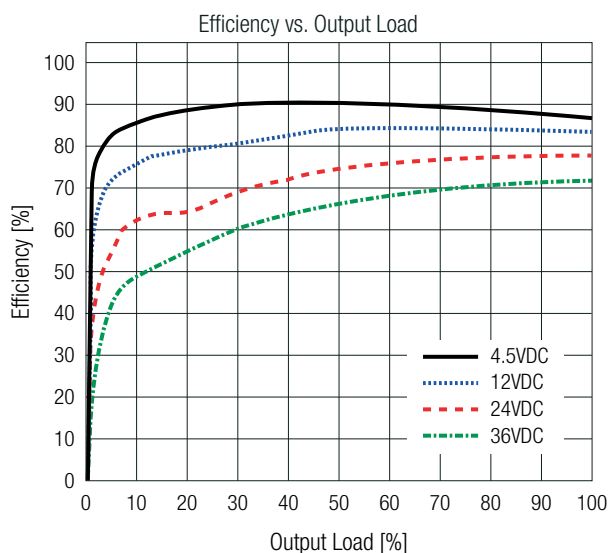
Parameters	Condition	Min.	Typ.	Max.
Maximum Input Voltage Slew Rate ⁽¹⁾	+V _{IN} to GND			10VDC/μs
Case Temperature		-40°C		110°C
Storage Temperature		-50°C		125°C

Note1: At higher slew rates or hard plugging, add 27μF E-Cap between +V_{IN} and GND, especially when V_{IN} is >18VDC

BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition		Min.	Typ.	Max.
Input Under Voltage Lockout (UVLO)	R-78K1.8-1.0, R-78K2.5-1.0, R-78K3.3-1.0	DC-DC ON	3.75VDC		4.05VDC
		DC-DC OFF	3.6VDC		3.8VDC
	R-78K5.0-1.0	DC-DC ON	5VDC		5.25VDC
		DC-DC OFF	4.6VDC		4.9VDC
	R-78K9.0-1.0	DC-DC ON	9.5VDC		10.5VDC
		DC-DC OFF	9.1VDC		9.7VDC
	R-78K12-1.0	DC-DC ON	13.0VDC		13.5VDC
		DC-DC OFF	12.5VDC		13.1VDC
	R-78K15-1.0	DC-DC ON	16.9VDC		17.5VDC
		DC-DC OFF	15.6VDC		16.6VDC
Quiescent Current					1mA
Internal Operating Frequency				400kHz	
Minimum Load			0%		
Output Ripple and Noise ⁽²⁾	20MHz BW	R-78K1.8-1.0 - R-78K5.0-1.0		50mVp-p	
		R-78K9.0-1.0		60mVp-p	
		R-78K12-1.0		75mVp-p	
		R-78K15-1.0		100mVp-p	

Note2: The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

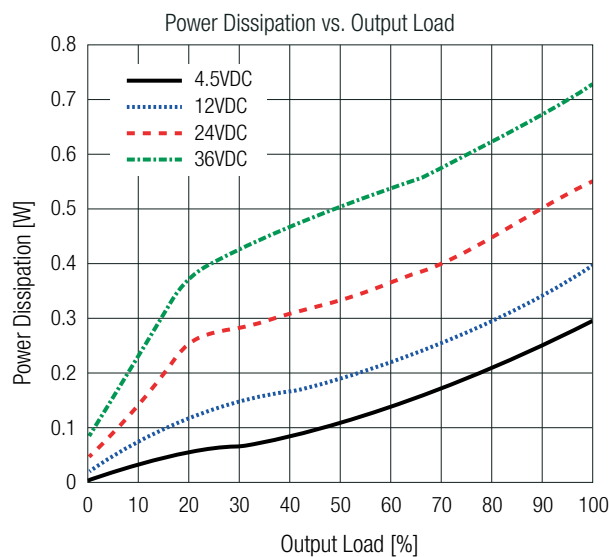
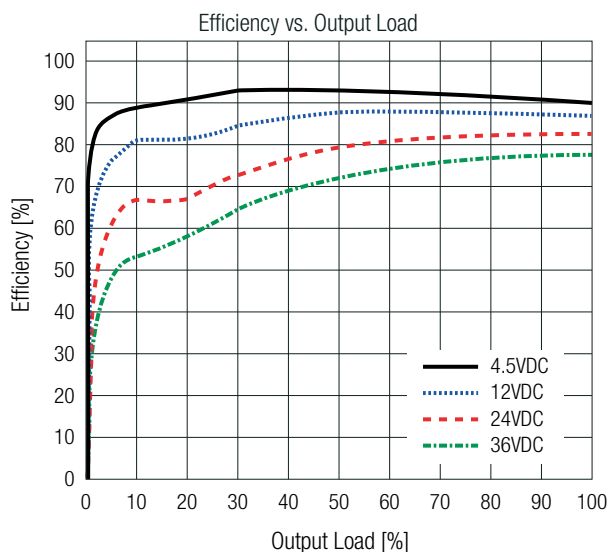
R-78K1.8-1.0

R-78K-1.0 series $\diamond$ Switching Regulator

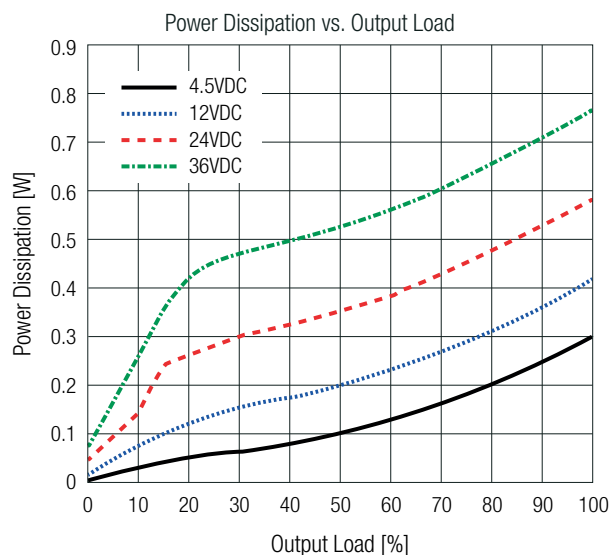
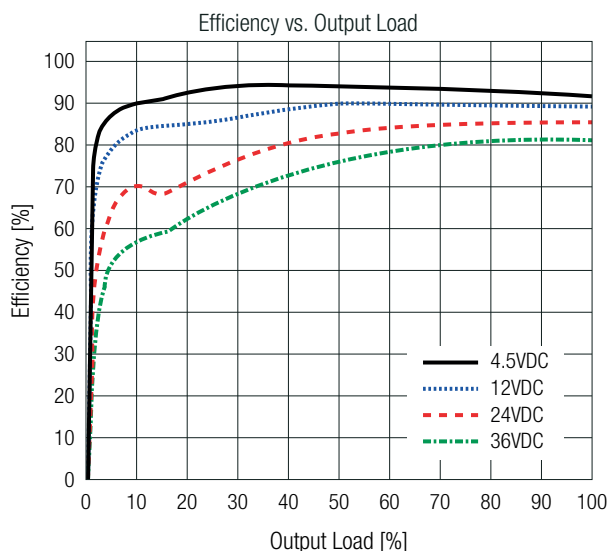
1.0Amp $\diamond$ Single Output $\diamond$ SIP3

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

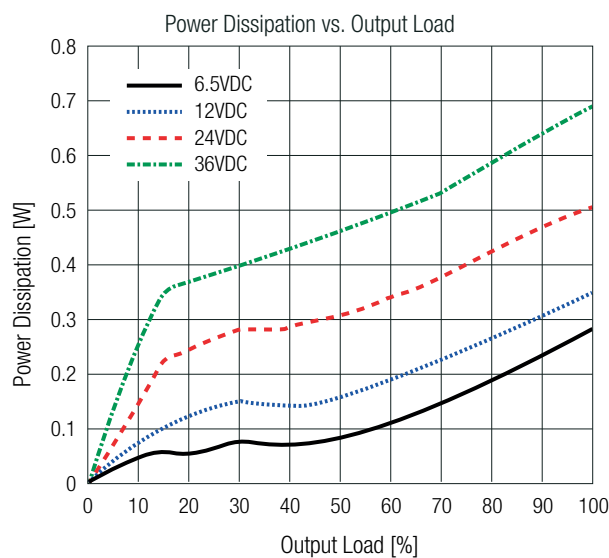
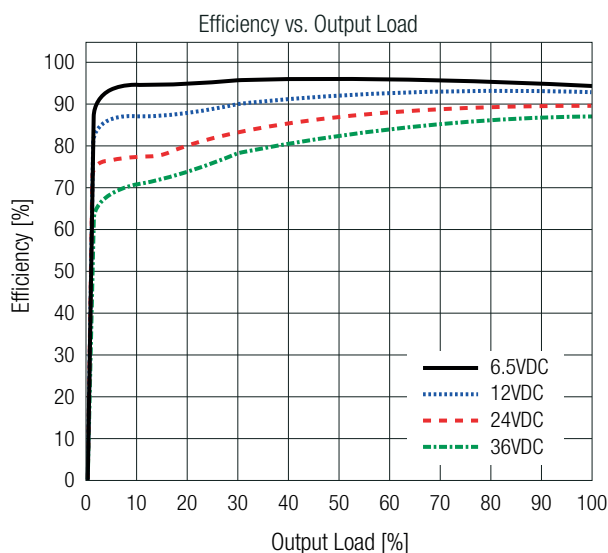
R-78K2.5-1.0



R-78K3.3-1.0



R-78K5.0-1.0

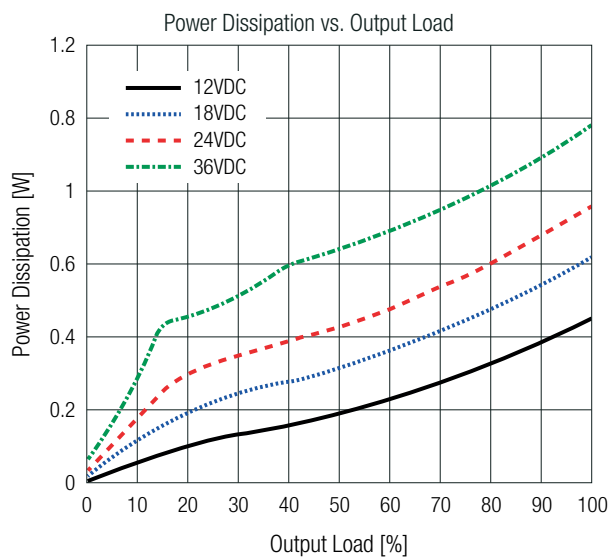
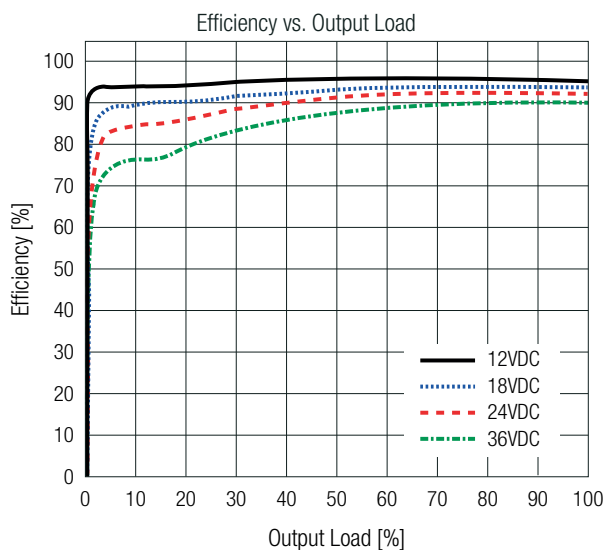


R-78K-1.0 series $\diamond$ Switching Regulator

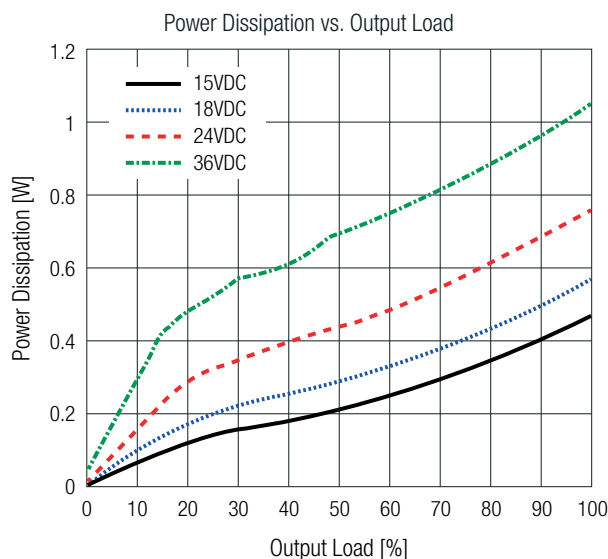
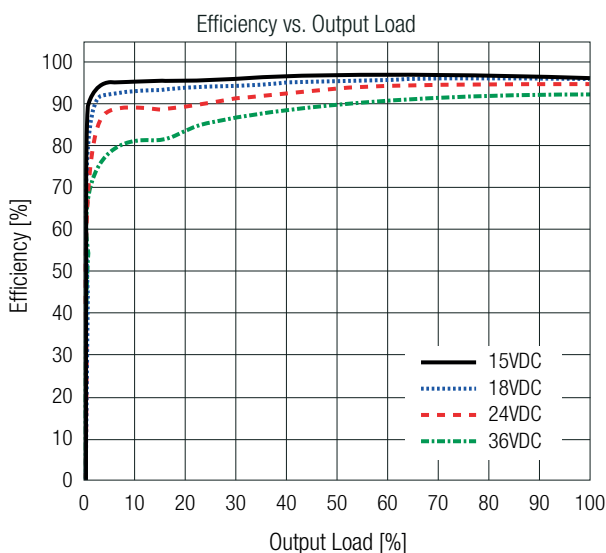
1.0Amp $\diamond$ Single Output $\diamond$ SIP3

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

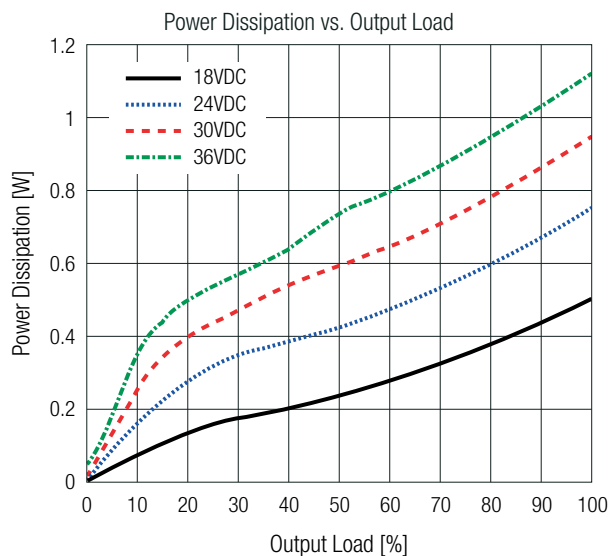
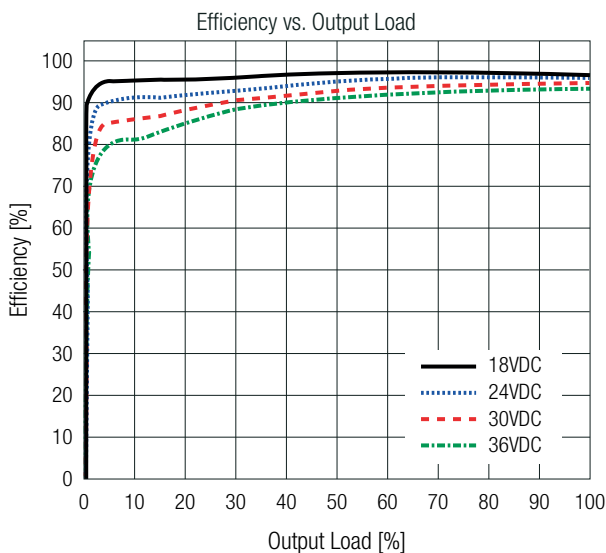
R-78K9.0-1.0



R-78K12-1.0



R-78K15-1.0



R-78K-1.0 series ◇ Switching Regulator**1.0Amp ◇ Single Output ◇ SIP3****REGULATIONS**

Parameter	Condition	Value
Output Accuracy		$\pm 2.0\%$ typ. / $\pm 3.5\%$ max.
Line Regulation	low line to high line, full load	$\pm 0.5\%$ max.
Load Regulation	0% to 100%	2.0% typ. / 3.5% max.

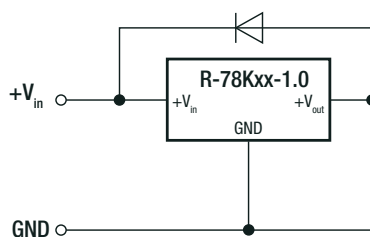
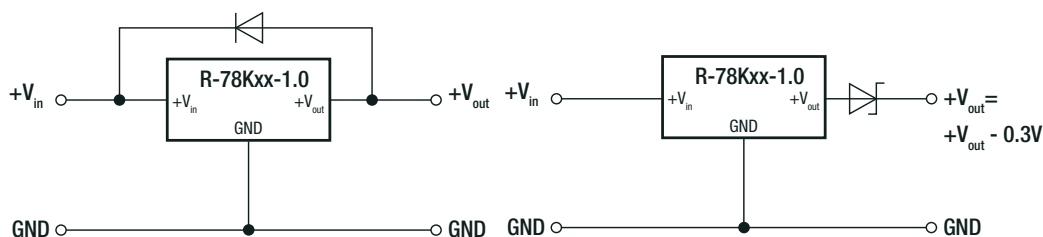
PROTECTIONS

Parameter	Condition	Value
Short Circuit Protection (SCP)		continuous, automatic recovery
Short Circuit Input Current		50mA max.

Optional Diode Protection Circuit

Add a blocking diode to V_{out} if current can flow backwards into the output, as this can damage the converter when it is powered down.

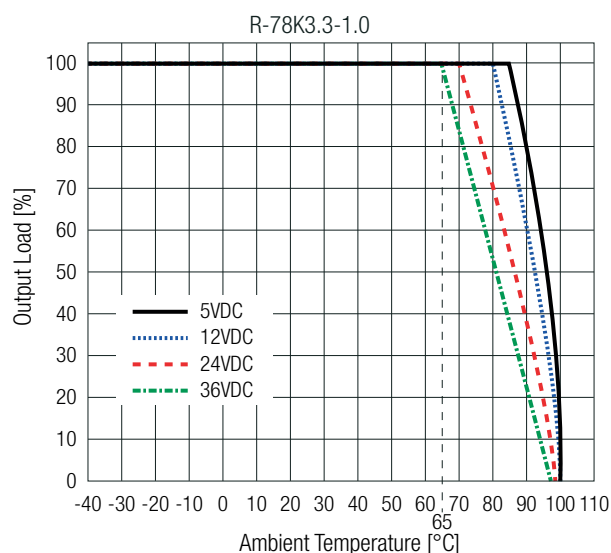
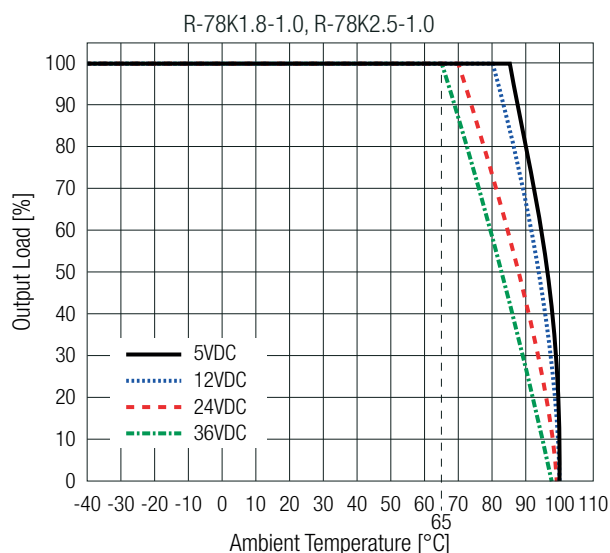
The diode can either be fitted across the device if the source is low impedance or fitted in series with the output (recommended).

Optional Protection 1:**Optional Protection 2:****ENVIRONMENTAL**

Parameter	Condition	Value
Operating Temperature Range	refer to "Derating Graph"	-40°C to +90°C
Maximum Case Temperature		+110°C
Temperature Coefficient		0.01%/K
Operating Humidity	non-condensing	95% RH max.
Vibration		10-55Hz, 2G, 30min along X,Y and Z axis
MTBF	according to MIL-HDBK-217F, G.B., +25°C	R-78K1.8-1.0
		R-78K2.5-1.0
		R-78K3.3-1.0
		R-78K5.0-1.0
		R-78K9.0-1.0
		R-78K12-1.0
		R-78K15-1.0

Derating Graph

(@ Chamber and natural convection 0.1m/s)



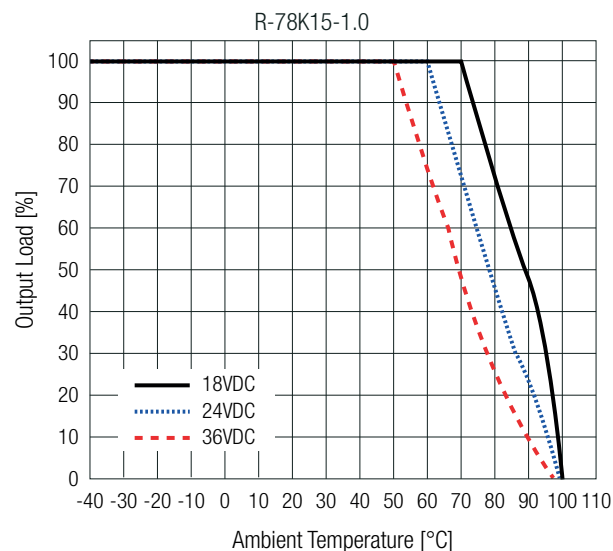
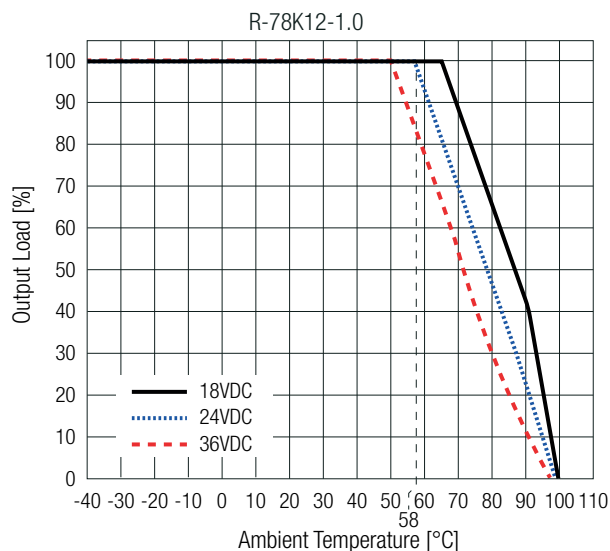
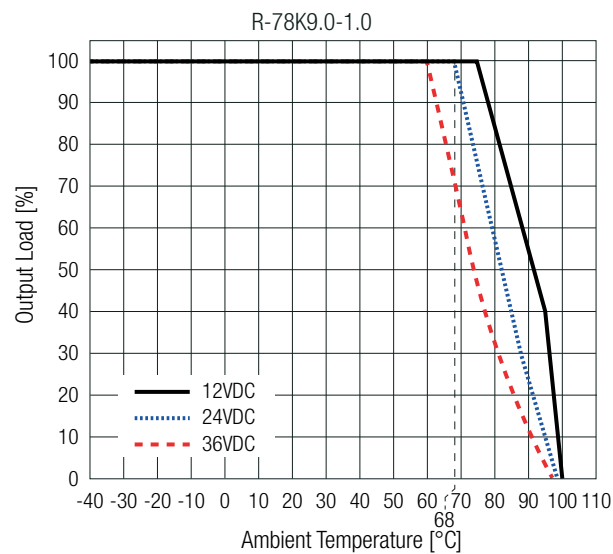
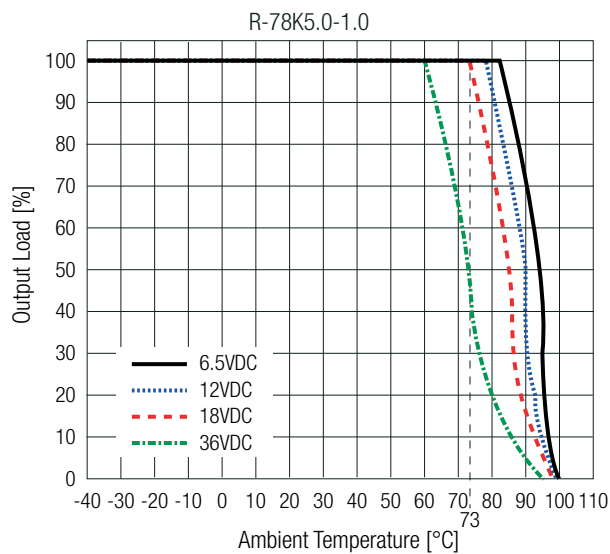
R-78K-1.0 series ◇ Switching Regulator

1.0Amp ◇ Single Output ◇ SIP3

ENVIRONMENTAL

Derating Graph

(@ Chamber and natural convection 0.1m/s)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)

Audio/Video, information and communication technology equipment - Part 1: Safety requirements (CB Scheme)

Audio/Video, information and communication technology equipment - Part 1: Safety requirements

RoHS2

Report Number

085-210593601-100

Standard

IEC62368-1:2018 3rd Edition

EN IEC 62368-1:2020+A11:2020

RoHS 2011/65/EU + AM2015/863

EMC Compliance

Electromagnetic compatibility of multimedia equipment - Emission requirements

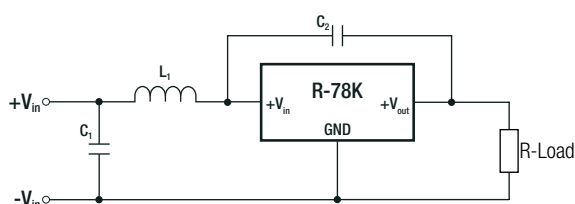
Condition

with external filter

Standard /Criterion

EN55032, Class B

EMC Filtering Suggestions according to EN55032



Component List Class B for 1.8V, 2.5V, 3.3V version

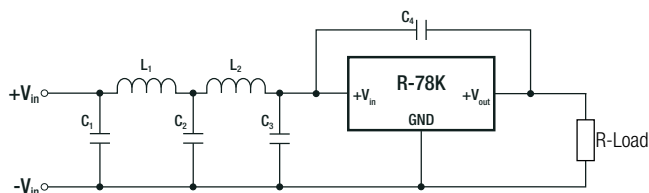
C1	L1	C2
10μF	RLS-186	1nF

R-78K-1.0 series ◇ Switching Regulator

1.0Amp ◇ Single Output ◇ SIP3

SAFETY AND CERTIFICATIONS

EMC Filtering Suggestions according to EN55032



Component List Class B for 5V, 12V & 15V version

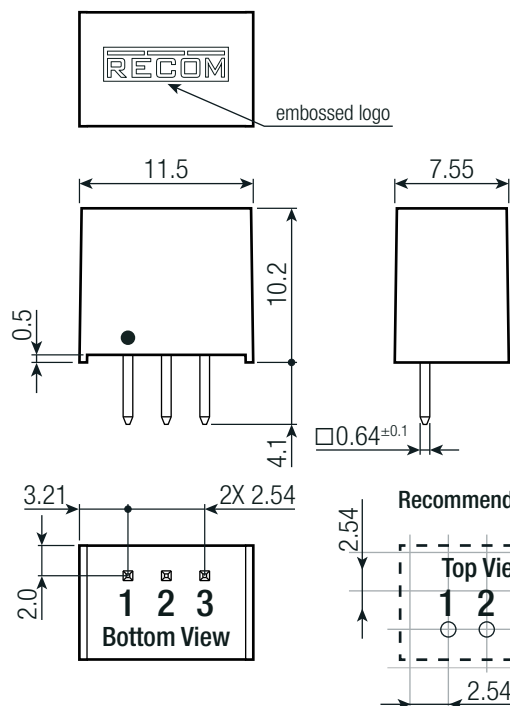
C1/C2	L1	C3	C4	L2
10μF	RLS-397	22μF	1nF	RLS-186

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case	black plastic, (UL94 V-0)
	potting	PU, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		11.5 x 7.55 x 10.2mm
		0.45 x 0.30 x 0.40 inch
Weight		1.7g typ.
		0.038 lbs

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing



Pinning information

Pin #	Single
1	+V _{IN}
2	GND
3	+V _{OUT}

Tolerances:
x.x= ±0.5mm
x.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 9.2 x 19.0mm
Packaging Quantity		43pcs
Storage Temperature Range		-50°C to +125°C
Storage Humidity	non-condensing	95% RH max.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.