

# Features

## Switching Regulator

- Efficiency up to 91%, no need for heatsinks
- Pin-out compatible with LM78XX linears
- Low profile (LxWxH=11.6 x 8.5 x 10.4mm)
- Wide input range (7V - 28V)
- Short circuit protection
- IEC/EN60950-1 + AM2 certified

**RECOM**  
DC/DC Converter

## R-78E-1.0

**1.0 Amp  
SIP3  
Single Output**



IEC60950-1 certified  
EN60950-1 certified

## Description

The R-78E 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-78E's high efficiency of up to 91% at an output voltage of 5V/1A at the output, no heat sink is required. The compact TO-220 compatible SIP3 package measures only 11.6 x 8.5 x 10.4 mm, so it saves precious board space. The warranty is 3 years.

## Selection Guide

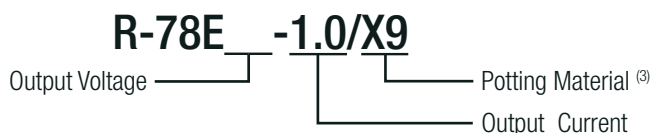
Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [A]	Efficiency <sup>(1)</sup>		max. Capacitive Load <sup>(2)</sup> [μF]
				@ min. Vin [%]	@ max. Vin [%]	
R-78E3.3-1.0	7-28	3.3	1.0	91	84	220
R-78E5.0-1.0	8-28	5.0	1.0	93	85	220
R-78E12-1.0/X9	15-27	12	1.0	97	93	100

### Notes:

Note1: Efficiency is tested at full load at +25°C ambient

Note2: Max. Cap Load is tested by nominal input and full resistive load

## Model Numbering



### Notes:

Note3: R-78E12-1.0/X9 is available with epoxy potting only.

For more information refer to "**Material**"

## Specifications (measured at Ta= 25°C, full load, Vin= 24VDC and after warm-up)

### BASIC CHARACTERISTICS

Parameter	Condition	Min.	Typ.	Max.
Input Current	min. Vin			1000mA
Quiescent Current			1.5mA	
Internal Operating Frequency	3.3 & 5Vout		330kHz	
	12Vout		570kHz	
Minimum Load	only R-78E12-1.0/X9		2%	
Output Ripple and Noise <sup>(4)</sup>	20MHz BW			120mVp-p

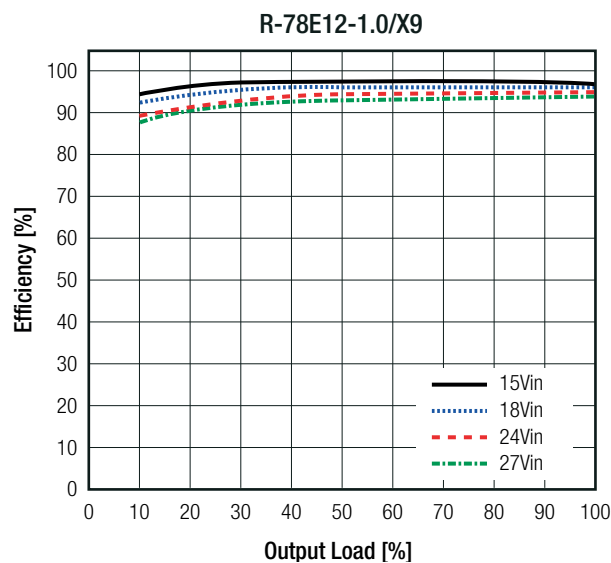
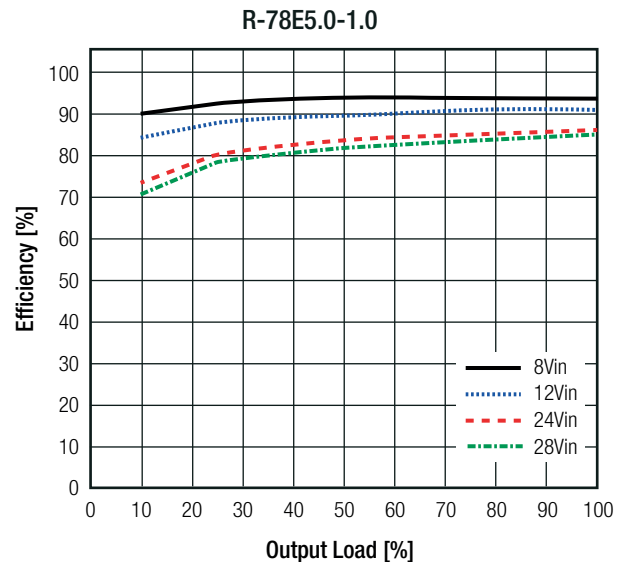
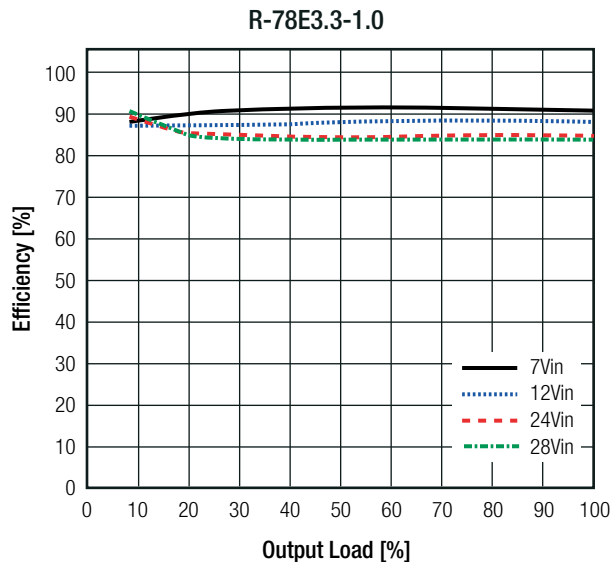
### Notes:

Note4: Measurements are made with a 100nF MLCC across output (low ESR)

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Specifications (measured at Ta= 25°C, full load, Vin= 24VDC and after warm-up)

### Efficiency vs. Load



### REGULATIONS

Parameter	Condition	Value
Output Accuracy		±3.0% typ. / ±5.0% max.
Line Regulation	low line to high line, full load	±1.0% max.
Load Regulation	typ Vin. and 10% to 100% load	±1.5% max.

### PROTECTIONS

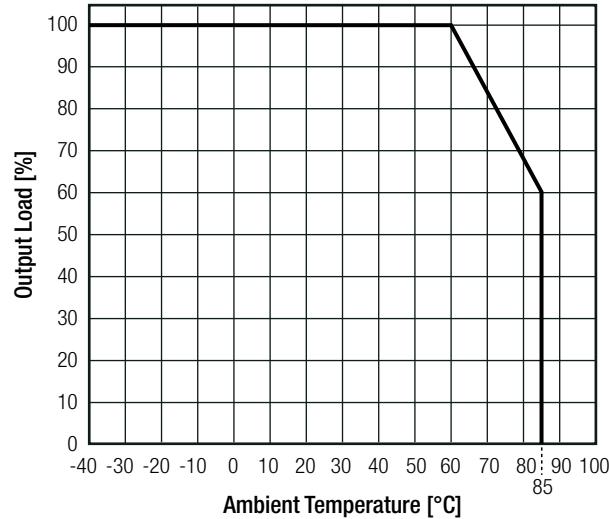
Parameter	Condition	Value
Short Circuit Protection (SCP)		Continuous, automatic recovery

Specifications (measured at Ta= 25°C, full load, Vin= 24VDC and after warm-up)

### ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	natural convection and with derating (see graph)	-40°C to +85°C
Humidity	non-condensing	95%, RH max.
MTBF	according to MIL-HDBK-217F, G.B.	+25°C
		+60°C
		3875 x 10 <sup>3</sup> hours
		2088 x 10 <sup>3</sup> hours

### Derating Graph

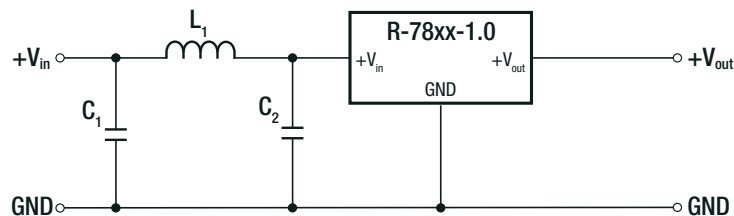


### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	1603123	IEC60950-1:2005, 2nd Edition + AM 2:2013 EN60950-1:2006 + AM2:2013
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter (see filter suggestion below)	EN55032, Class A and B

### EMC Filter Suggestion according to EN55032



### Component List Class A

MODEL	C1	C2	L1
R-78E3.3-1.0	10µF	10µF	<a href="#">12µH choke</a>
R-78E5.0-1.0	100V MLCC	100V MLCC	<a href="#">RLS-126</a>
R-78E12-1.0/X9	10µF	10µF	5.6µH choke
	50V MLCC	50V MLCC	<a href="#">RLS-567</a>

### Component List Class B

MODEL	C1	C2	L1
R-78E3.3-1.0	10µF	2.2µF	68µH choke
R-78E5.0-1.0	100V MLCC	100V MLCC	<a href="#">RLS-686</a>
R-78E12-1.0	10µF	10µF	100µH choke
	50V MLCC	50V MLCC	<a href="#">RLS-105</a>

### Notes:

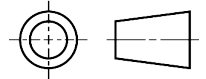
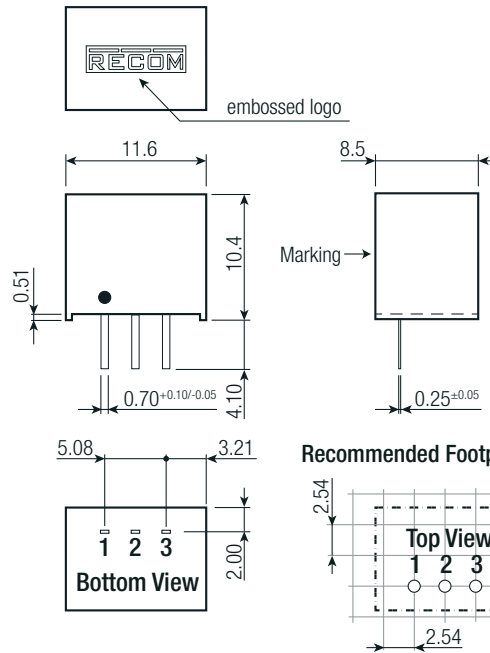
Note5: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

Specifications (measured at Ta= 25°C, full load, Vin= 24VDC and after warm-up)

### DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Condition		Value
Material	case		non-conductive black plastic, (UL94 V-0)
	potting	3.3, 5Vout 12Vout	silicone, (UL94 V-0) epoxy, (UL94 V-0)
Package Dimension (LxWxH)			11.6 x 8.5 x 10.4mm
Package Weight			2g typ.

#### Dimension Drawing (mm)

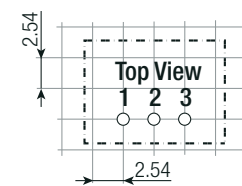


#### Pin Connections

Pin #	Function
1	+Vin
2	GND
3	+Vout

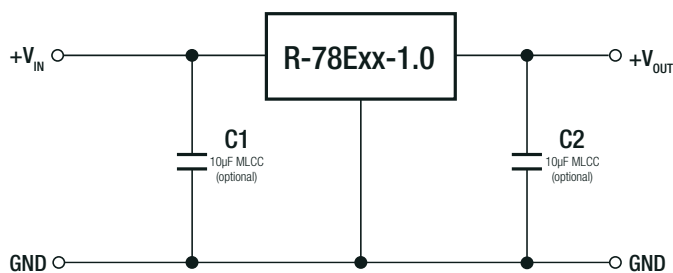
Tolerance: xx.x= ±0.50mm  
xx.xx= ±0.25mm

#### Recommended Footprint Details



### INSTALLATION AND APPLICATION

#### Standard Application



#### Notes:

Note6: The R-78Exx-1.0 can not be used as positive to negative converter

To protect the converter during power-up, use soft start power supply.

### PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 11.2 x 18.2mm
Packaging Quantity		42pcs
Storage Temperature Range		-55°C to +125°C

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