

# Features

# Switching Regulator

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



## R-78E-1.0

1.0 Amp  
SIP3  
Single Output



### 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.

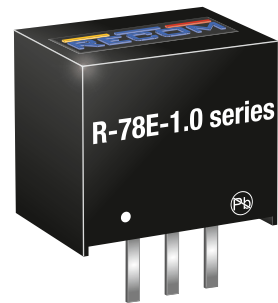
### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [A]	Efficiency <sup>(1)</sup> typ @ min Vin. [%]	Max. Capacitive Load <sup>(2)</sup> [µF]
R-78E3.3-1.0	7 - 28	3.3	1.0	87	220
R-78E5.0-1.0	8 - 28	5.0	1.0	91	220

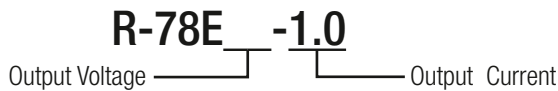
**Notes:**

Note1: Efficiency is tested at nom. input voltage and full load

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



### Model Numbering



IEC60950-1 certified  
EN60950-1 certified

### Specifications (measured at Ta= 25°C, full load, nominal input voltage and after warm-up)

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. Vin = 24VDC	7VDC	24VDC	28VDC
Input Current	min. Vin			1000mA
Quiescent Current			1.5mA	
Internal Operating Frequency	Vin= 12VDC		330kHz	
Output Ripple and Noise <sup>(3)</sup>	20MHz BW			120mVp-p

**Notes:**

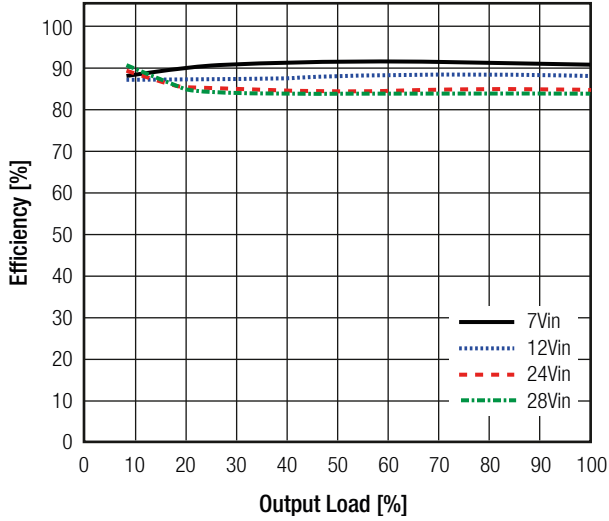
Note3: Measurements are made with a 100nF MLCC across output (low ESR)

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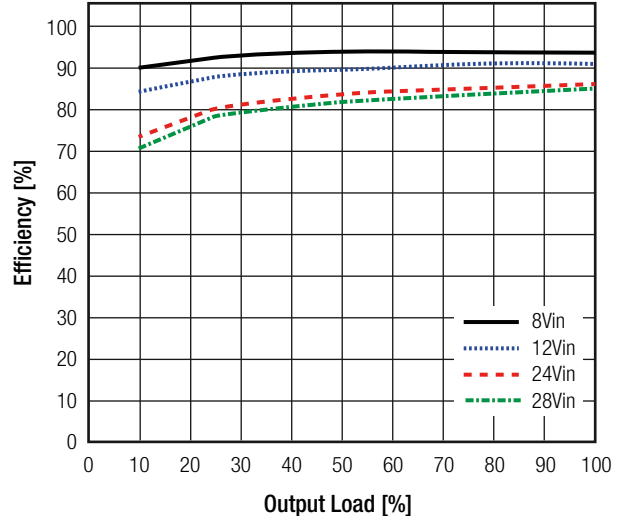
Specifications (measured at Ta= 25°C, full load, nominal input voltage and after warm-up)

Efficiency vs. Load

R-78E3.3-1.0



R-78E5.0-1.0



**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.

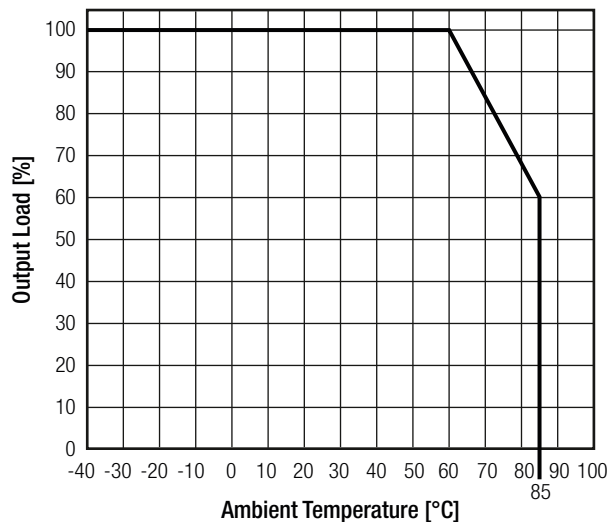
**PROTECTIONS**

Parameter	Condition	Value
Short Circuit Protection (SCP)		automatic recovery
Over Current Protection (OCP)	100% = 1A	200% Load

**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	3875 x 10 <sup>3</sup> hours

Derating Graph



**Specifications** (measured at Ta= 25°C, full load, nominal input voltage and after warm-up)

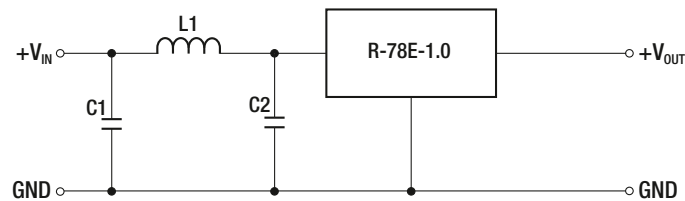
**SAFETY AND CERTIFICATIONS**

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
RoHs 2+		RoHS 2011/65/EU + AM2015/863

**EMC Compliance**

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter	EN55032, Class B

**EMC Filtering Suggestions according to EN55032 Class A and B**

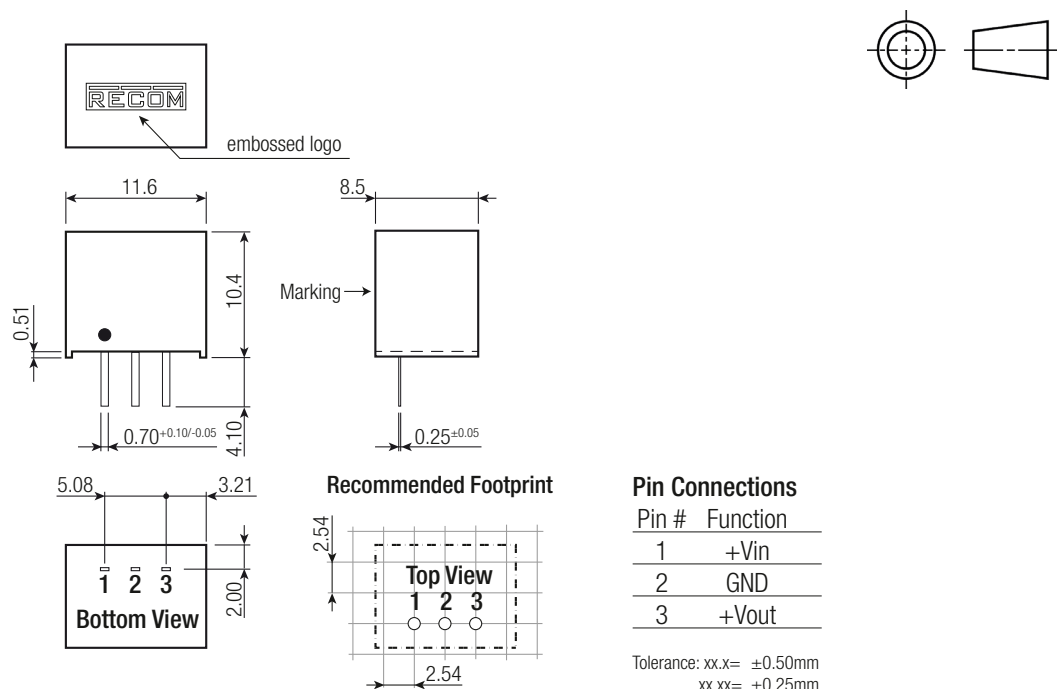


Level	C1	C2	L1
Class A	10µF MLCC	10µF MLCC	12µH
Class B	10µF MLCC	2.2µF MLCC	68µH

**DIMENSION and PHYSICAL CHARACTERISTICS**

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

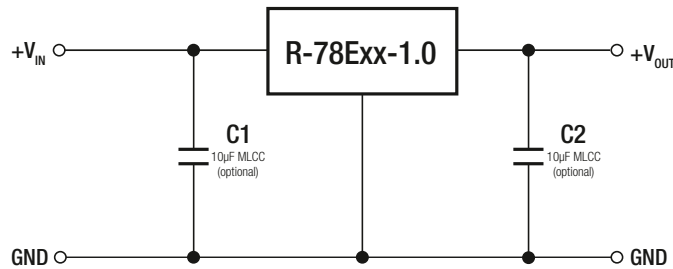
**Dimension Drawing (mm)**



Specifications (measured at Ta= 25°C, full load, nominal input voltage and after warm-up)

**INSTALLATION AND APPLICATION**

**Standard Application**



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

**Notes:**

Note4: The R-78Exx-1.0 can not be used as positive to negativ converter

**PACKAGING INFORMATION**

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520 x 18.2 x 11.2mm
Packaging Quantity		42pcs.
Storage Temperature Range		-55°C to +125°C

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