

# Features

## Switching Regulator

- Low cost switching regulator
- High start-up current capability
- Efficiency up to 95%
- Short circuit protection
- Pin compatible with 78 series regulators
- Non isolated DC-DC converter
- IEC/EN60950-1, Am2 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 95% no heat-sink is required. The compact TO-220 compatible SIP3 package measures only 11.6 x 8.5 x 10.4mm, so it saves precious board space.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ <sup>(1)</sup> [%]	Max. Capacitive Load <sup>(2)</sup> [μF]
R-78E3.3-0.5	6-28	3.3	500	75-88	220
R-78E5.0-0.5	7-28	5	500	82-92	220
R-78E9.0-0.5	12-28	9	500	89-94	220
R-78E12-0.5	15-28	12	500	92-95	220
R-78E15-0.5	18-28	15	500	93-95	220

#### Notes:

Note1: test by maximum/minimum input, full load and @25°C.

Note2: test by minimum input and constant resistive load.

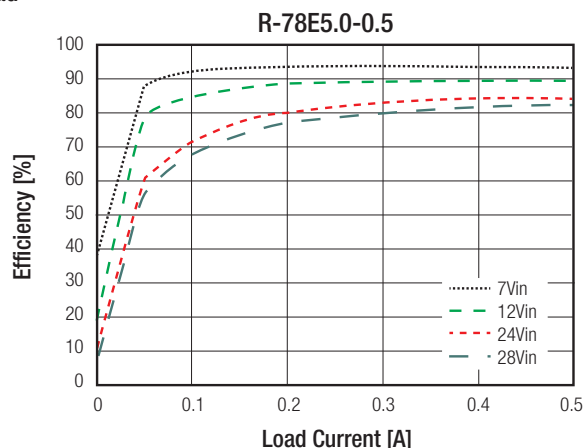
### Specifications (measured @ ta= 25°C, full load, nominal input voltage and after warm-up)

BASIC CHARACTERISTICS					
Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage				24VDC	
Input Current	@ no load			1.5mA	
Minimum Load <sup>(3)</sup>			2%		
Operating Frequency				570kHz	
Output Ripple and Noise	20MHz bandwidth	3.3, 5, 9Vout 12, 15Vout		50mVp-p 70mVp-p	

#### Notes:

Note3: recommend to use with more than 2% load, if not, the ripple of the product may exceeds the specification, but doesn't affect the reliability of the product.

#### Efficiency vs Load



**RECOM**  
DC/DC Converter

**R-78E-0.5**

**500mA**  
**SIP3**  
**Single**  
**Output**



IEC60950-1 certified  
EN60950-1 certified

Specifications (measured @  $t_a = 25^\circ\text{C}$ , full load, nominal input voltage and after warm-up)

### REGULATIONS

Parameter	Condition	Value
Output Voltage Accuracy		$\pm 3.0\%$ typ.
Line Voltage Regulation	low line to high line, full load	$\pm 0.5\%$ typ.
Load Voltage Regulation	10% to 100% load	$\pm 1.0\%$ typ.

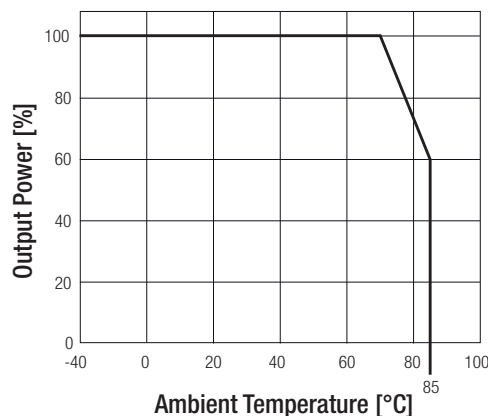
### PROTECTIONS

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

### ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	natural convection and with derating	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Maximum Case Temperature		$100^\circ\text{C}$
Vibration		10-55Hz, 2G, 30min along X,Y,Z
MTBF	MIL-HDBK 217F, $+25^\circ\text{C}$ MIL-HDBK 217F, $+70^\circ\text{C}$	$4185 \times 10^3$ hours $2182 \times 10^3$ hours

#### Derating Graph

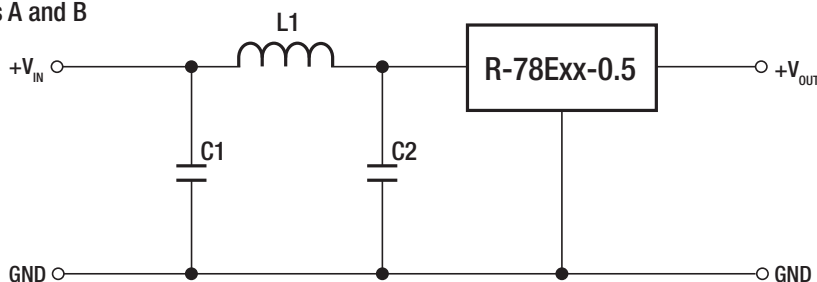


### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (LVD)	LVD1603123	IEC/EN60950-1, 2nd Edition, Am2:2013

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter	EN55022, Class A or B

#### EMI Filter suggestion Class A and B



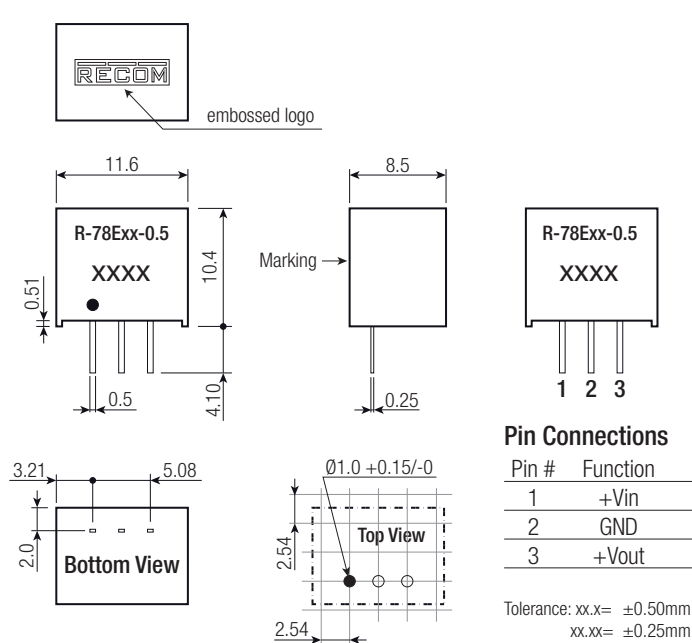
Level	C1	L1	C2
Class A	1206 4.7 $\mu\text{F}$ , 50V MLCC	3.3 $\mu\text{H}$	NA
Class B	1210 10 $\mu\text{F}$ , 50V MLCC	10 $\mu\text{H}$	1206 4.7 $\mu\text{F}$ , 50V MLCC

Specifications (measured @  $t_a = 25^\circ\text{C}$ , full load, nominal input voltage and after warm-up)

### DIMENSIONS and PHYSICAL CHARACTERISTICS

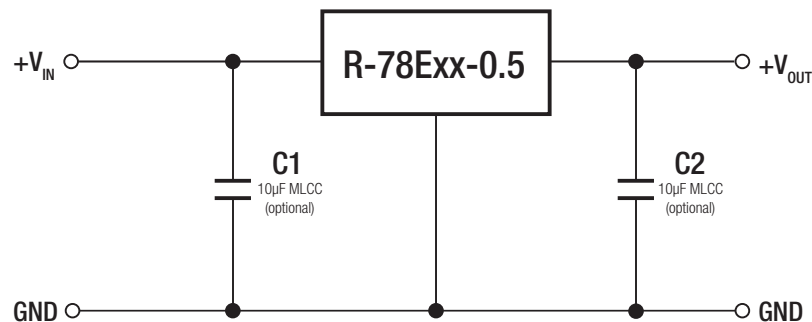
Parameter	Condition	Value
Material	Case Potting	UL94V-0, non-conductive black plastic UL94V-0, Silicone
Package Dimension (LxWxH)		11.6 x 8.5 x 10.4mm
Package Weight		2g typ.

#### Dimension Drawing (mm)



### INSTALLATION AND APPLICATION

#### Standard Application:



#### Notes:

Note4: The R-78Exx-0.5 can't be used as positive to negativ converter.

### 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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