

# Features

# Switching Regulator

- Efficiency up to 91%, no need for heatsinks!
- Pin-out compatible with LM78XX Linear Regs.
- 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 [mA] | Efficiency typ @ min Vin. [%] | Max. Capacitive Load [µF] |
|--------------|---------------------------|----------------------|---------------------|-------------------------------|---------------------------|
| R-78E3.3-1.0 | 7 - 28                    | 3.3                  | 1000                | 87                            | 220                       |
| R-78E5.0-1.0 | 8 - 28                    | 5.0                  | 1000                | 91                            | 220                       |



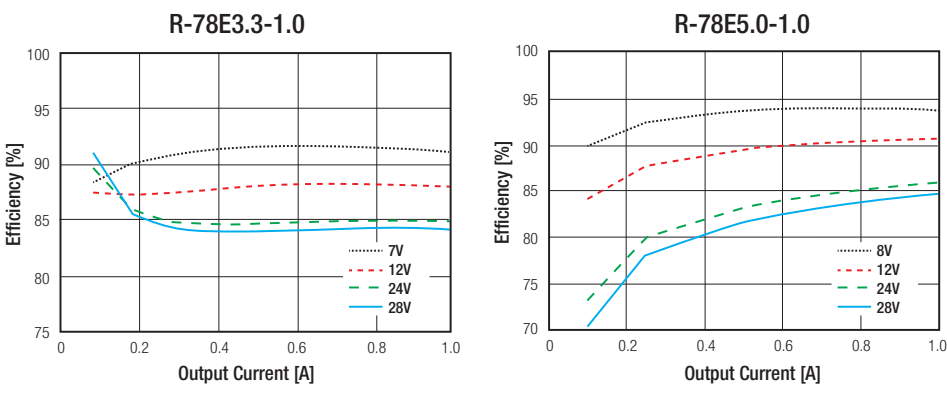
### Specifications (measured at ta= 25°C, full load, nominal input voltage and after warm-up)

| BASIC CHARACTERISTICS   |  |       |        |        |          |
|-------------------------|--|-------|--------|--------|----------|
| Parameter               | Condition                                | Min.  | Typ.   | Max.   |          |
| Input Voltage Range     | 3.3V                                     | 7VDC  | 24VDC  | 28VDC  |          |
|                         | 5.0V                                     | 8VDC  |        |        |          |
| Input Current           | min. Vin                                 | 1.5mA |        | 1000mA |          |
| No Load Input Current   | typ. Vin                                 |       | 1.5mA  |        |          |
| Operating Frequency     | Vin= 12VDC                               |       | 330kHz |        |          |
| Output Ripple and Noise | typ. Vin, full load and 20MHz BW limited |       |        |        | 120mVp-p |



IEC60950-1 Certified  
EN60950-1 Certified

### Efficiency vs. Load



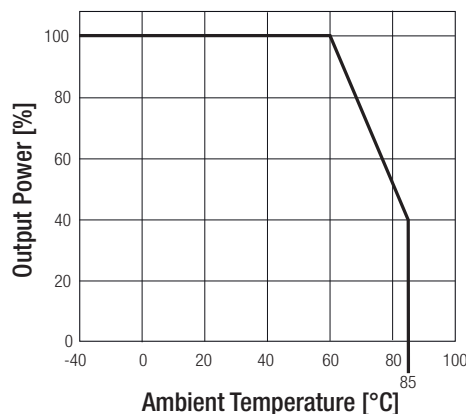
Specifications (measured at  $t_a = 25^\circ\text{C}$ , full load, nominal input voltage and after warm-up)

| REGULATIONS             |                                     |                                 |
|-------------------------|-------------------------------------|---------------------------------|
| Parameter               | Condition                           | Value                           |
| Output Voltage Accuracy |                                     | $\pm 3\%$ typ. / $\pm 5\%$ max. |
| Line Voltage Regulation | low line to high line, full load    | $\pm 1\%$ max.                  |
| Load Voltage Regulation | typ $V_{in}$ . and 10% to 100% load | $\pm 1.5\%$ 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) | $-40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| Humidity                    | non-condensing                                   | 95%, RH max.                               |
| MTBF                        | MIL-HDBK 217F, $+25^\circ\text{C}$               | $3875 \times 10^3$ hours                   |

Derating Graph

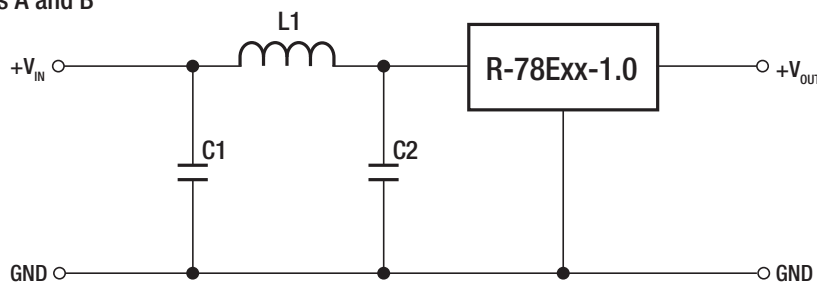


### SAFETY AND CERTIFICATIONS

| 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

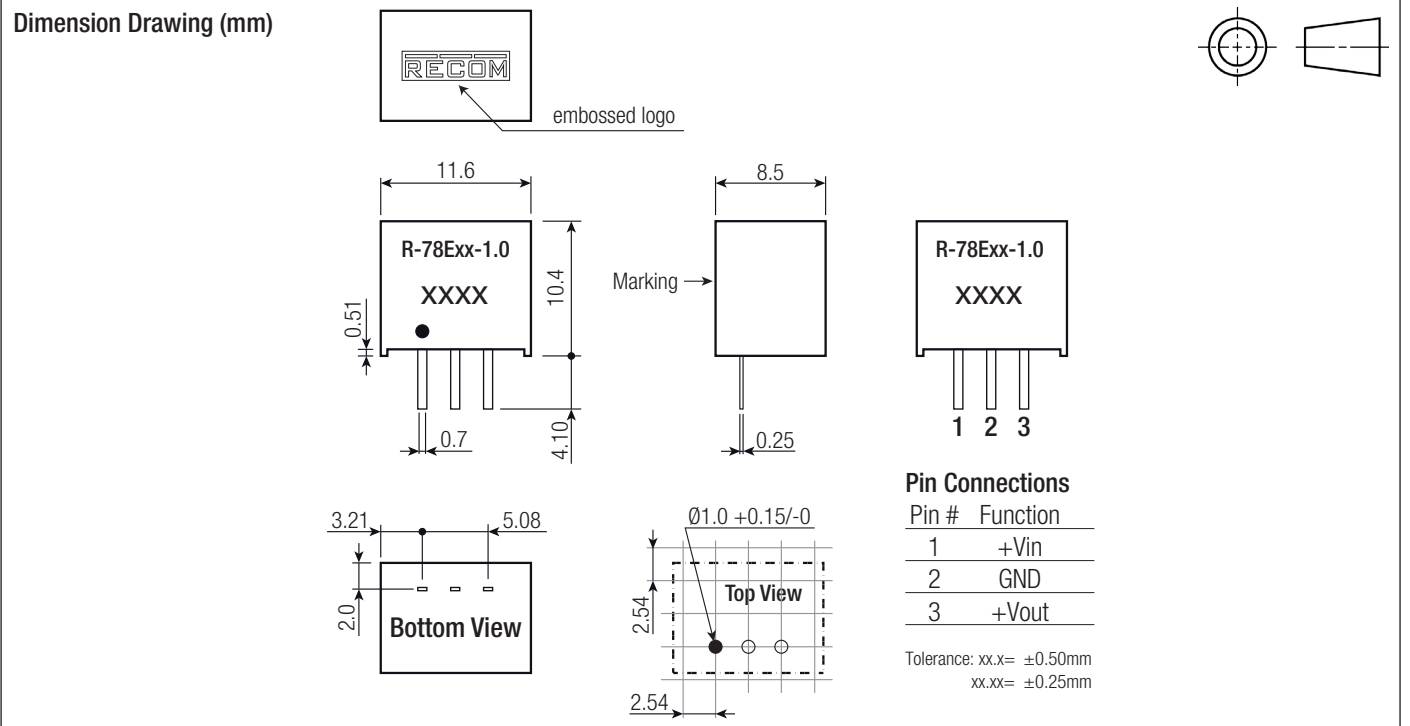


| MODEL   | C1/C2                            | L1               |
|---------|----------------------------------|------------------|
| Class A | 1210 10 $\mu\text{F}$ , 50V MLCC | 10 $\mu\text{H}$ |
| Class B |                                  | 33 $\mu\text{H}$ |

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

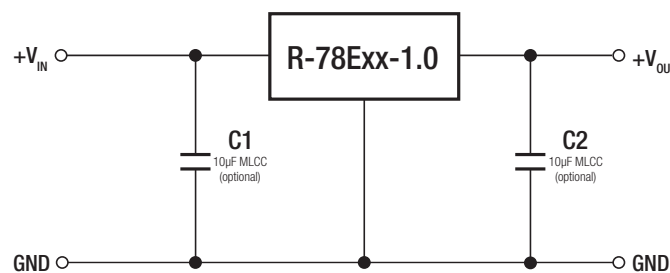
**DIMENSION and PHYSICAL CHARACTERISTICS**

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



**INSTALLATION AND APPLICATION**

**Standard Application:**



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

**Notes:**

Note1: The R-78Exx-1.0 can't 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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