

# Features

## Evaluation Module

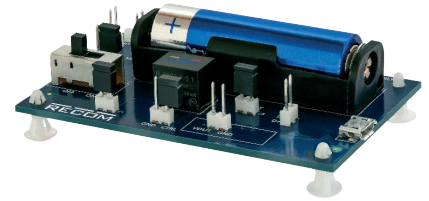
- 3.3V from a single AA battery or from an external source (boost converter)
- Efficiency 93%, >80% at 10% load
- Input voltage range down to 0.65V
- Input and output power measurement capability
- Micro-USB type B or 0.100" (2.54mm) pin output

**RECOM**  
Evaluation Module

**R-78S3.3-0.1-EVM-1**

### Description

The R-78S3.3-0.1-EVM-1 Evaluation Module generates 3.3V from a single AA battery or from an external source. By using the external input source, any voltage source (other types of batteries, energy harvesters, etc.) in the range from 0.65V to 3.15V can be used. The evaluation module contains a AA battery holder, power switch, R-78S3.3-0.1 boost converter and a micro-USB connector. Jumper headers are provided to allow various test measurements to be made. An enable pin puts the R-78S into sleep mode where it draws only 7uA from the battery.



### Selection Guide

| Part Number  | Input Voltage Range <sup>(3)</sup> [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency <sup>(1)</sup> |                | Max. Capacitive Load <sup>(2)</sup> [μF] |
|--------------|------------------------------------------|----------------------|---------------------|---------------------------|----------------|------------------------------------------|
|              |                                          |                      |                     | @ min Vin [%]             | @ typ. Vin [%] |                                          |
| R-78S3.3-0.1 | 0.65-3.15                                | 3.3                  | 100                 | 92                        | 93             | 470                                      |

### Specifications (measured @ ta= 25°C, 1.5Vin, full load after warm up unless otherwise stated)

#### BASIC CHARACTERISTICS

| Parameter                          | Condition             |  | Min.                                                       | Typ.      | Max. |
|------------------------------------|-----------------------|--|------------------------------------------------------------|-----------|------|
| Under Voltage Lockout              | DC-DC OFF             |  |                                                            | 0.4VDC    |      |
| Overload Capability <sup>(3)</sup> | peak duty cycle 10%   |  |                                                            | 150%, 10s |      |
| Quiescent Current                  |                       |  |                                                            | 160μA     |      |
| Start-up Time                      |                       |  |                                                            | 2ms       |      |
| Rise Time                          |                       |  |                                                            | 800μs     |      |
| Internal Operating Frequency       |                       |  |                                                            | 1200kHz   |      |
| Minimum Load                       |                       |  | 0%                                                         |           |      |
| Dropout Voltage                    |                       |  |                                                            | 150mV     |      |
| Output Ripple and Noise            |                       |  |                                                            | 100mVp-p  |      |
| ON/OFF CTRL                        | DC-DC ON<br>DC-DC OFF |  | Open or 0.7V ≤ VCTRL < Vin<br>Short to GND or VCTRL < 0.1V |           |      |
| Input Current of CTRL Pin          |                       |  |                                                            | 5μA       |      |
| Standby Current                    |                       |  |                                                            | 7μA       |      |

#### Notes:

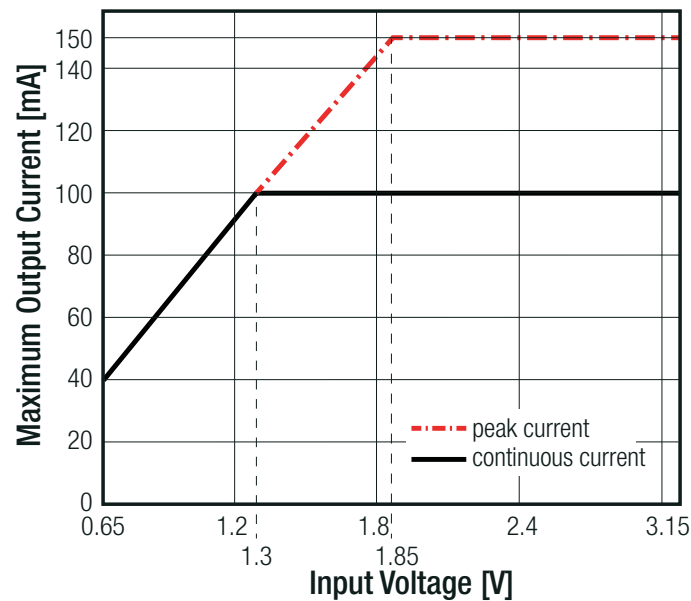
Note1: Efficiency is tested at full load. Typ. Vin = 1.5V

Note2: Max. capacitive load is tested at nominal input and full resistive load

Note3: For more information, please refer to "Overload Capability Graph" on page P-2

Specifications (measured @  $t_a = 25^\circ\text{C}$ , 1.5Vin, full load after warm up unless otherwise stated)

Overload Capability Graph



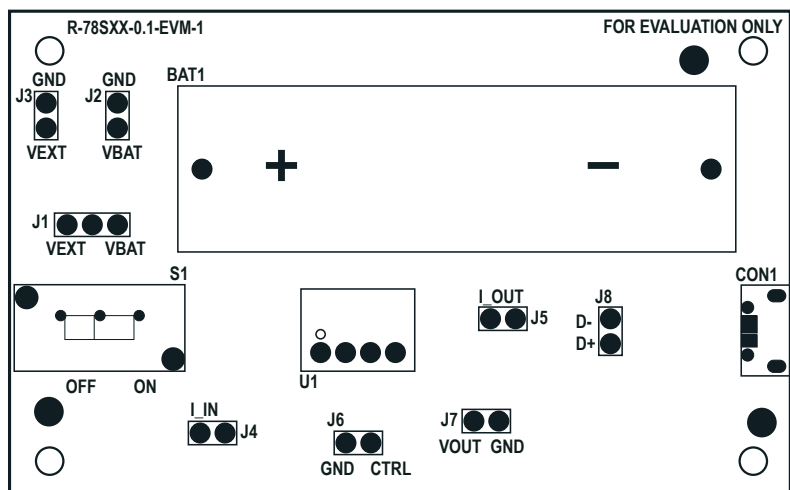
## Quick Start Guide

- Insert the AA battery into the battery holder (only one way possible).
- If powering USB-powered demonstrators: plug in the micro-USB cable.
- Turn on and off using the slide switch.

Note: to reduce the power consumption, no indicator LED is fitted. Remember to switch off to conserve the battery.

- The output voltage is accessed via J7 or the USB port.
- To measure the input and output current of the R-78S, remove the jumpers on J4 and J5. J4 and J5 are standard 0.100" (2.54mm) pin headers to allow current measurement device connections (ampere meter, scope probe).
- When an external voltage source (no on-board battery) is used on J3, change the jumper position on J1 to pin 1 and pin 2 (VEXT).
- When the on-board AA battery is used, change the jumper position on J1 to pin 2 and pin 3 (VBAT).
- To set the R-78S into sleep mode, apply the provided jumper on both pins of J6 (CTRL to GND).

## Component Placement



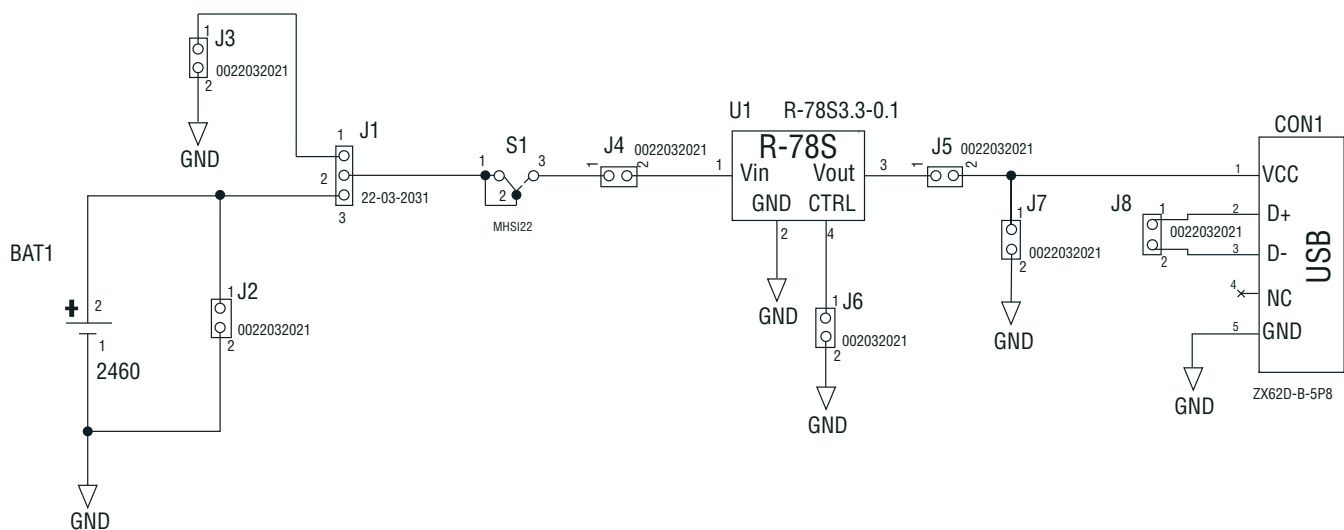
Specifications (measured @  $t_a = 25^\circ\text{C}$ , 1.5Vin, full load after warm up unless otherwise stated)

| Component List |                                                        |                                 |
|----------------|--------------------------------------------------------|---------------------------------|
| Part           | Description                                            | Setting                         |
| BAT1           | AA battery holder                                      |                                 |
| J1             | 3 pin 0.100" (2.54mm) header for VEXT and VBAT         | Factory set to on-board battery |
| J2*            | 2 pin 0.100" (2.54mm) header for VBAT and GND          | Leave open if not used          |
| J3             | 2 pin 0.100" (2.54mm) header for VEXT and GND          | Leave open if not used          |
| J4             | 2 pin 0.100" (2.54mm) header for input current         | Leave closed if not used        |
| J5             | 2 pin 0.100" (2.54mm) header for output current        | Leave closed if not used        |
| J6             | 2 pin 0.100" (2.54mm) header for CTRL (enable) and GND | Leave open if not used          |
| J7             | 2 pin 0.100" (2.54mm) header for VOUT and GND          | Leave open if not used          |
| J8             | 2 pin 0.100" (2.54mm) header for USB D+ and D-         | Leave open if not used          |
| S1             | Slide switch                                           | Factory set OFF                 |
| CON1           | USB micro B connector                                  |                                 |
| U1             | R-78S3.3-0.1 boost converter                           |                                 |

**\*Caution:**

DO NOT PLACE A JUMPER ON J2. DOING SO WILL CAUSE THE BATTERY TO SHORT CIRCUIT AND CREATE THE RISK OF FIRE.

## Schematic

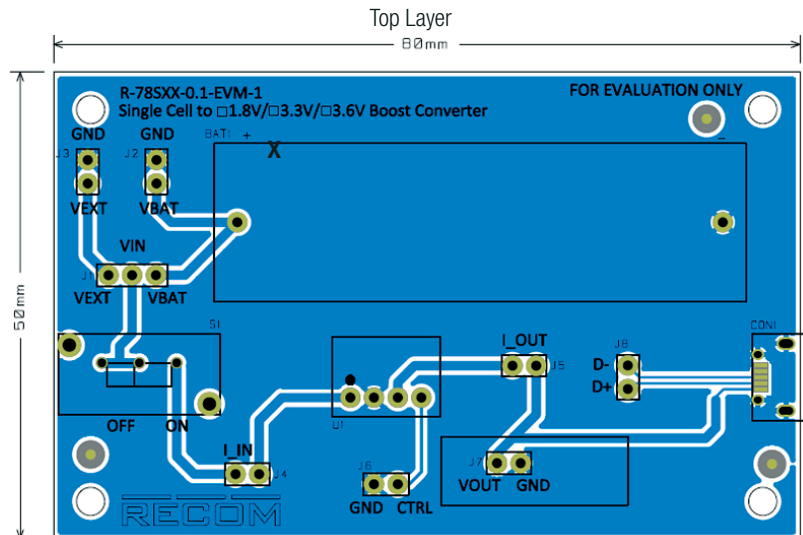


Specifications (measured @ ta= 25°C, 1.5Vin, full load after warm up unless otherwise stated)

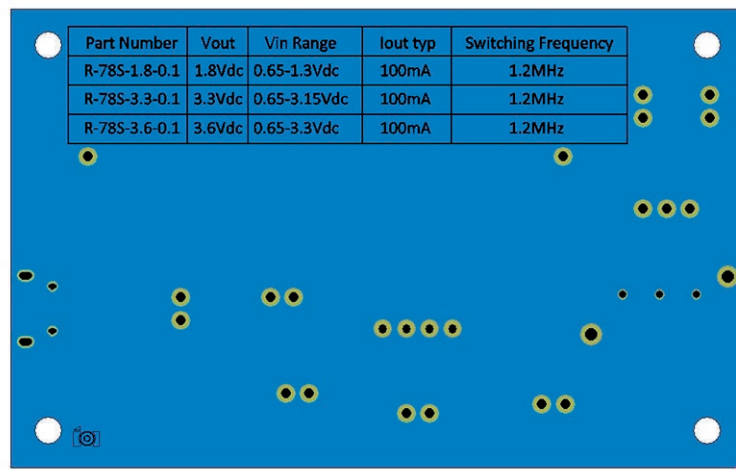
## DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter         | Type | Value                |
|-------------------|------|----------------------|
| Dimension (LxWxH) |      | 80.0 x 50.0 x 23.0mm |
| Weight            |      | 26g typ.             |

## Layout



## Bottom Layer



## BOM

| Part Name/Number  | Description                                                   | Manufacturer Part Number | Manufacturer           | Qty. | Comps.               |
|-------------------|---------------------------------------------------------------|--------------------------|------------------------|------|----------------------|
| Battery_Holder_AA | Holder Battery 1Cell AA PCB MNT                               | 2460                     | Keystone Electronics   | 1    | BAT1                 |
| JUMPER_2PINS      | 2 Positions Header Connector 0.100" (2.54mm) Through Hole Tin | 0022032021               | Molex                  | 7    | J2 J3 J4 J5 J6 J7 J8 |
| JUMPER_3PINS      | Conn Header 3POS .100 Vert Tin                                | 22-03-2031               | Molex                  | 1    | J1                   |
| MHS122            | Switch Slide SPDT 300mA 30V                                   | MHS122                   | APEM Inc               | 1    | S1                   |
| R-78S3.3-0.1      | DC DC Converter 3.3V                                          | R-78S3.3-0.1             | RECOM                  | 1    | U1                   |
| ZX62D-B-5P8       | Conn RCPT USB Micro B SMD                                     | ZX62D-B-5P8              | Hirose Electric Co Ltd | 1    | CON1                 |

**Specifications** (measured @  $t_a = 25^\circ\text{C}$ , 1.5Vin, full load after warm up unless otherwise stated)

**PACKAGING INFORMATION**

| Parameter                   | Type   | Value                  |
|-----------------------------|--------|------------------------|
| Packaging Dimension (LxWxH) | carton | 200.0 x 135.0 x 68.0mm |
| Packaging Quantity          |        | 1pcs                   |

**Contents**

- R-78S3.3-0.1-EVM-1 Evaluation Module PBA
- Micro-USB Type B to Micro-USB Type B Cable
- Terms and Conditions Letter

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