

## Features

- Efficiency up to 94%, Non isolated, no need for heatsinks
- SMD Package (UL94V-0 Material)
- Adjustable Output Voltage
- Wide input range.(4.75V ~ 18V)
- Short circuit protection, Thermal shutdown
- Remote On/Off Control
- Very Low Shutdown Current

## Selection Guide

| Part Number     | Input Range (1) (V) | Output Voltage (V) | Adjust Range (V) | Output Current (A) | Efficiency   |              |
|-----------------|---------------------|--------------------|------------------|--------------------|--------------|--------------|
|                 |                     |                    |                  |                    | Min. Vin (%) | Max. Vin (%) |
| R-78A1.8-1.0SMD | 4.75 – 18           | 1.8                | 1.5~3.3          | 1.0                | 82           | 71           |
| R-78A2.5-1.0SMD | 4.75 – 18           | 2.5                | 1.5~4.5          | 1.0                | 87           | 77           |
| R-78A3.3-1.0SMD | 4.75 – 18           | 3.3                | 1.8~5.5          | 1.0                | 91           | 81           |
| R-78A5.0-1.0SMD | 6.5 – 18            | 5.0                | 2.5~5.5          | 1.0                | 94           | 86           |

## Description

The R-78Axx-1.0SMD series high efficiency switching regulators are ideally suited to pick-and-place mass production. The efficiency of up to 94% means that very little energy is wasted as heat. remote on/off control and adjustable output voltage are useful additional features of this versatile SMD converter series.

## Specifications ( typical at 25°C, 10% minimum load, unless otherwise specified )

| Characteristics   | Conditions  | Min.                | Typ.                           | Max.                          |
|---|---|---------------------|--------------------------------|-------------------------------|
| Input Voltage Range (Note 1)                            | See Table   | 4.75                |                                | 18.0V                         |
| Output Voltage Range                                    | See Table   | 1.5                 |                                | 5.5V                          |
| Output Current  | All Series  | 0                   |                                | 1000mA                        |
| Output Current Limit                                    | All Series  |                     |                                | 3000mA                        |
| Short Circuit Input Current                             | All Series  |                     |                                | 30mA                          |
| Internal Power Dissipation                              |   |                     |                                | 0.4W                          |
| Short Circuit Protection                                |   |                     | Continuous, automatic recovery |                               |
| Output Voltage Accuracy (At 100% Load)                  | All Series  |                     | ±2                             | ±3%                           |
| Adjustable Voltage Range                                | See Table 1   |                     |                                | ±50%                          |
| Line Voltage Regulation (Vin = min to max at full load) |   |                     | 0.2                            | 0.4%                          |
| Load Regulation (10% to 100% full load)                 |   |                     | 0.7                            | 1.0%                          |
| Dynamic Load Stability                                  | 100% <-> 50% load   |                     | ±85mV                          | ±100mV                        |
| Ripple & Noise (20MHz BW)                               |   |                     | 20mVp-p                        | 30mVp-p                       |
| Temperature Coefficient                                 | -40°C~+85°C ambient   |                     |                                | 0.015%/°C                     |
| Max capacitance Load                                    |   |                     |                                | 220µF                         |
| Switching Frequency                                     |   | 280                 | 350                            | 430kHz                        |
| Quiescent Current                                       | Vin = min. to max. at 0% load                               |                     | 5                              | 7mA                           |
| Shutdown Current  |   |                     | 20                             | 35µA                          |
| Remote On/Off Threshold Voltage                         |   | 2.4                 | 2.6                            | 2.6V                          |
| ON/OFF Remote Control                                   | ON: Open or 1.6<Vr<5V, OFF: GND or 0<Vr<1.6V                |                     | Ir=1.8uA typ.                  |                               |
| Operating Temperature Range                             |   | -40°C               |                                | +85°C                         |
| Switch On/Off Time                                      | (using Remote On/Off Control)                               |                     |                                | 50ms                          |
| Operating Case Temperature                              |   |                     |                                | +100°C                        |
| Storage Temperature Range                               |   | -55°C               |                                | +125°C                        |
| Case Thermal Impedance                                  |   |                     |                                | 70°C / W                      |
| Thermal Shutdown  | Internal IC junction  |                     | +160°C                         |                               |
| Package Weight  |   |                     |                                | 2.7g                          |
| MTBF (+25°C)  | } Detailed Information see Application Notes chapter "MTBF" | using MIL-HDBK 217F |                                | 13338 x 10 <sup>3</sup> hours |
| (+71°C)   |   | using MIL-HDBK 217F |                                | 3880 x 10 <sup>3</sup> hours  |

## INNOLINE DC/DC-Converter

# R-78Axx-1.0SMD Series

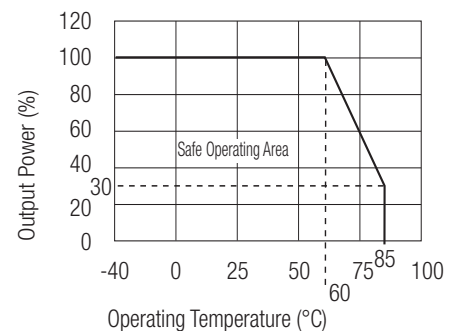
## 1.0 AMP SMD Single Output



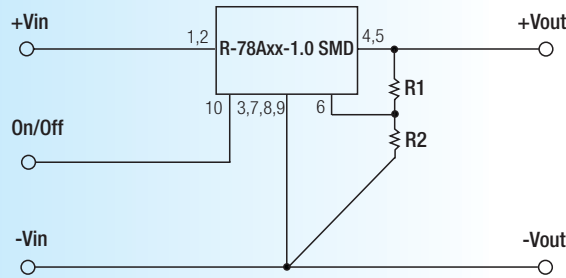
\* add suffix -R for tape&reel packing e.g. R-78A5.0-1.0-R. For more details and dimensions of the tapes and reels see page 334 to 336.



## Derating-Graph (Ambient Temperature)



**Standard Application Circuit**

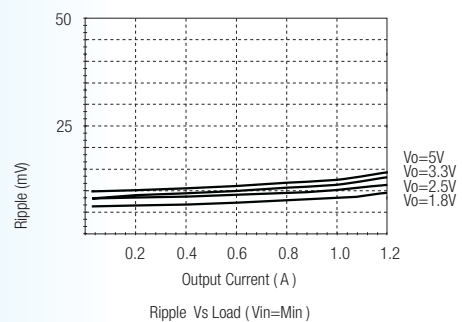
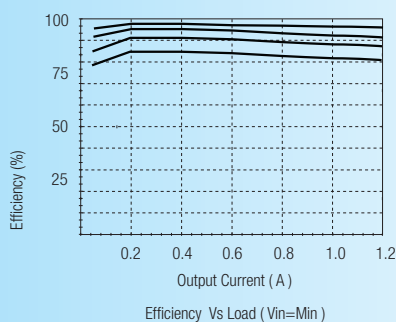
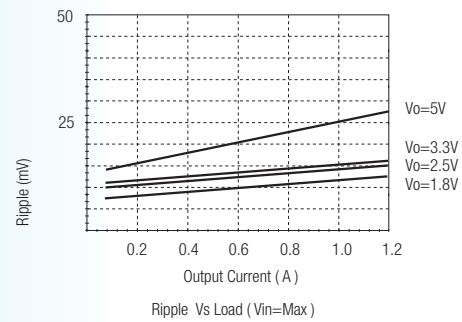
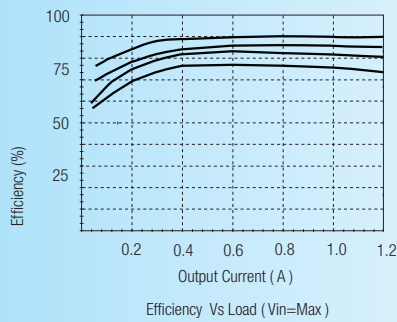
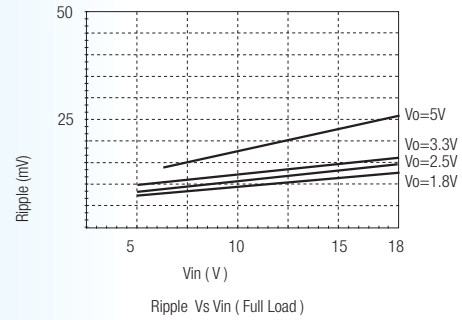
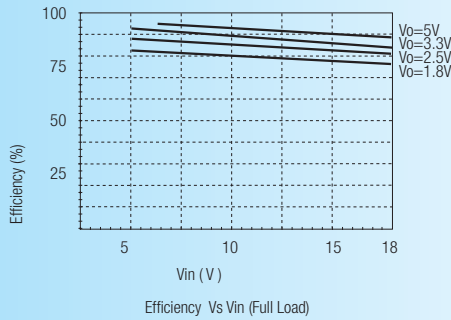


Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter.  
See Application Examples for details.

**Characteristics**

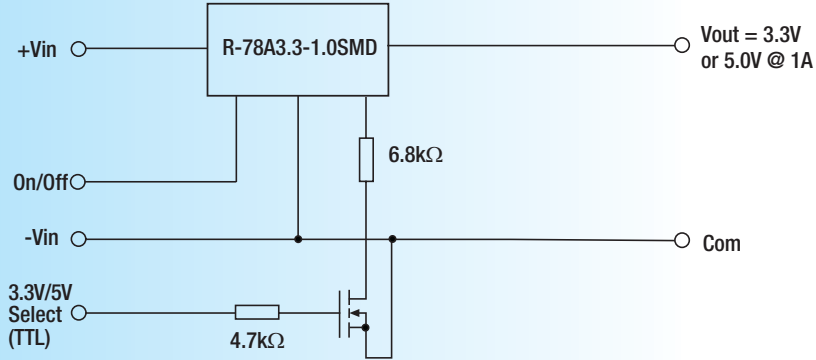
## Efficiency

## Ripple

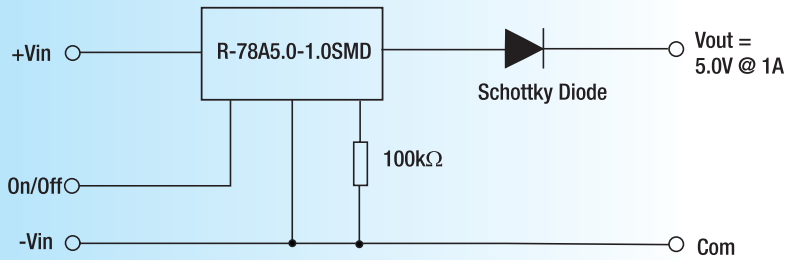


Application Examples

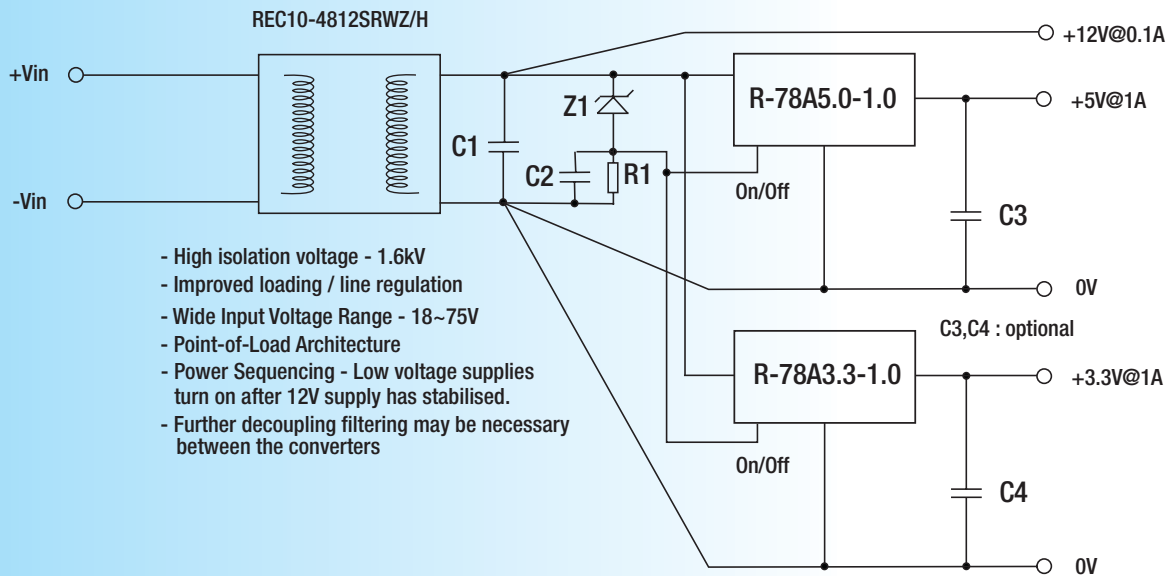
3.3V/5V Selectable 1A Power Supply



Output protection from external voltage



Converter output voltage set to 5.4V to compensate for Schottky diode drop



- High isolation voltage - 1.6kV
- Improved loading / line regulation
- Wide Input Voltage Range - 18~75V
- Point-of-Load Architecture
- Power Sequencing - Low voltage supplies turn on after 12V supply has stabilised.
- Further decoupling filtering may be necessary between the converters

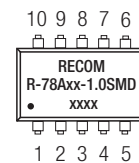
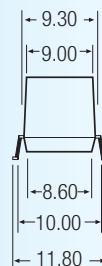
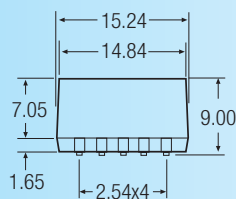
**Table 1: Adjustment Resistor Values**

| 1.0A <sub>dc</sub>      | R-78A1.8-1.0SMD    |               | R-78A2.5-1.0SMD    |                | R-78A3.3-1.0SMD    |                | R-78A5.0-1.0SMD    |               |
|-------------------------|--------------------|---------------|--------------------|----------------|--------------------|----------------|--------------------|---------------|
| V <sub>out</sub> (nom.) | 1.8V <sub>dc</sub> |               | 2.5V <sub>dc</sub> |                | 3.3V <sub>dc</sub> |                | 5.0V <sub>dc</sub> |               |
| V <sub>out</sub> (adj)  | R1                 | R2            | R1                 | R2             | R1                 | R2             | R1                 | R2            |
| 1.5 (V)                 | 3K $\Omega$        |               | 200 $\Omega$       |                |                    |                |                    |               |
| 1.8 (V)                 |                    |               | 12K $\Omega$       |                | 770 $\Omega$       |                |                    |               |
| 2.5 (V)                 |                    | 12K $\Omega$  |                    |                | 21K $\Omega$       |                | 5.6K $\Omega$      |               |
| 3.0 (V)                 |                    | 4.7K $\Omega$ |                    | 50K $\Omega$   | 88.4K $\Omega$     |                | 17K $\Omega$       |               |
| 3.3 (V)                 |                    | 2.7K $\Omega$ |                    | 29K $\Omega$   |                    |                | 27K $\Omega$       |               |
| 3.6 (V)                 |                    |               |                    | 19.4K $\Omega$ |                    | 69K $\Omega$   | 42K $\Omega$       |               |
| 3.9 (V)                 |                    |               |                    | 14k $\Omega$   |                    | 30.5K $\Omega$ | 58K $\Omega$       |               |
| 4.5 (V)                 |                    |               |                    | 8k $\Omega$    |                    | 12.1k $\Omega$ | 180K $\Omega$      |               |
| 4.9 (V)                 |                    |               |                    |                |                    | 7.k6 $\Omega$  | 850K $\Omega$      |               |
| 5.0 (V)                 |                    |               |                    |                |                    | 6.8k $\Omega$  |                    |               |
| 5.1 (V)                 |                    |               |                    |                |                    | 6.2k $\Omega$  |                    | 540k $\Omega$ |
| 5.5 (V)                 |                    |               |                    |                |                    | 4k $\Omega$    |                    | 71k $\Omega$  |

**Package Style and Pinning (mm)**



**SMD 10Pin Package**



**Pin Connections**

| Pin #   | Connection    |
|---------|---------------|
| 1,2     | +Vin          |
| 3,7,8,9 | GND           |
| 4,5     | +Vout         |
| 6       | V adj         |
| 10      | Remote On/Off |

xx.x ±0.5mm  
xx.xx ±0.25mm

**Recommended Footprint Details**

