

## Features

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

Rev.0

## 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.

## Selection Guide

Part Number SMD	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

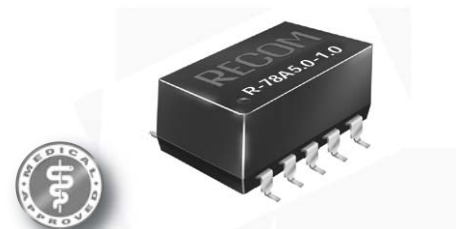
## Specifications ( typical at 25°C, 10% minimum load, unless otherwise specified )

Characteristics	Conditions	Min.	Typ.	Max.
Input Voltage Range	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 (Vin = 12V)	All Series			100mA
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
ON/OFF Remote Control Pin	ON: Open or 1.6<Vr<5V, OFF: GND or 0<Vr<1.6V			Ir=1.8µA typ
Shutdown Input Current			20	35µA
Remote On/Off Shutdown Threshold Voltage		0.8	1.2	1.6V
Undervolt Lockout Voltage		2.4	2.6	2.8V
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

**INNOLINE**  
DC/DC-Converter

# R-78Axx-1.0 SMD Series

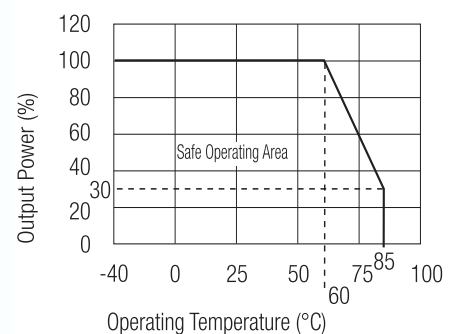
## 1.0 AMP SMD Single Output



**EN-55022 Certified**  
**EN-55024 Certified**  
**EN-60601-1-2 Certified**  
**EN-60950-1 Certified**

**RECOM**

## Derating-Graph (Ambient Temperature)



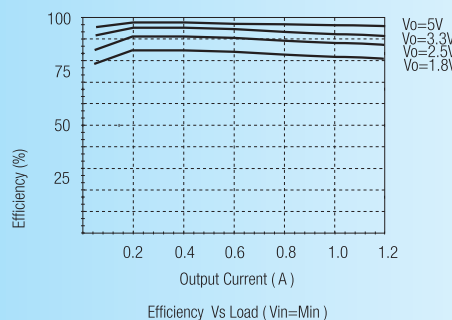
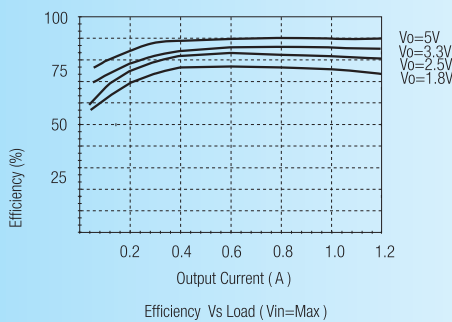
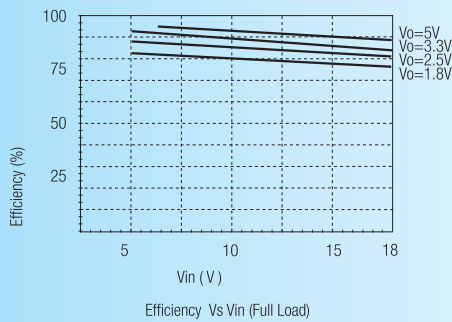
## Standard Application Circuit

Conducted Emissions	EN55022	Class B
Radiated Emissions	EN55022	Class B
ESD	EN61000-4-2	Class A
Radiated Immunity	EN61000-4-3	Class A
Fast Transient	EN61000-4-4	Class A
Conducted Immunity	EN61000-4-6	Class A
Magnetic Field Immunity	EN61000-4-8	Class A
CE Certified		EN-60950-1
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)		3880 x 10 <sup>3</sup> hours

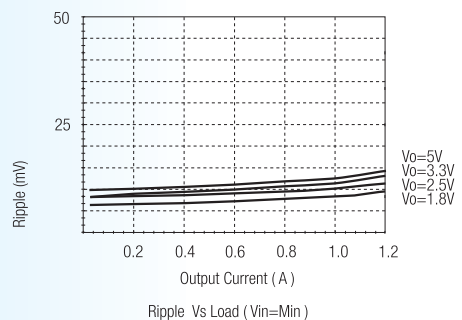
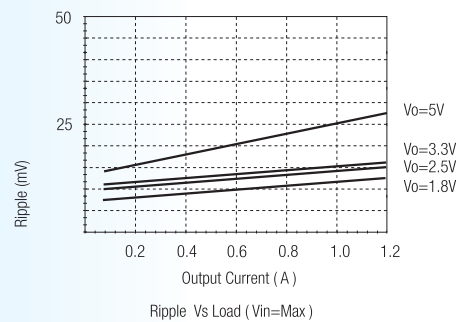
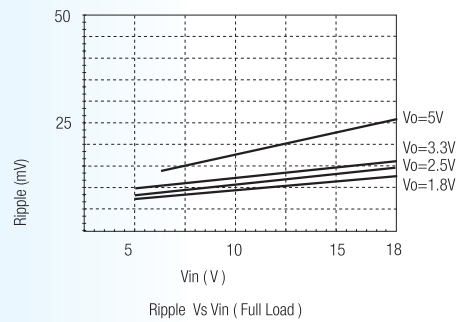
\*Note: Operation under no load will not damage these devices, however they may not meet all specifications. A minimum load of 10mA is recommended

## Characteristics

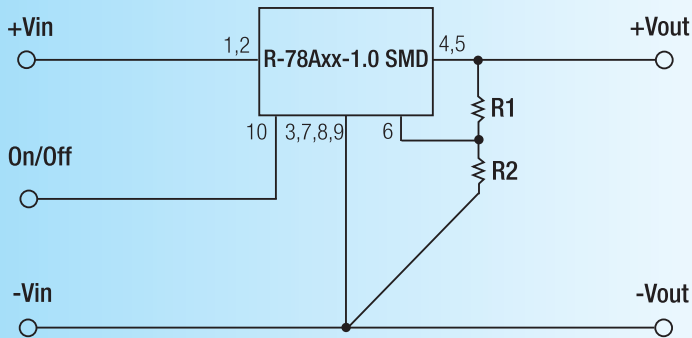
### Efficiency



### Ripple



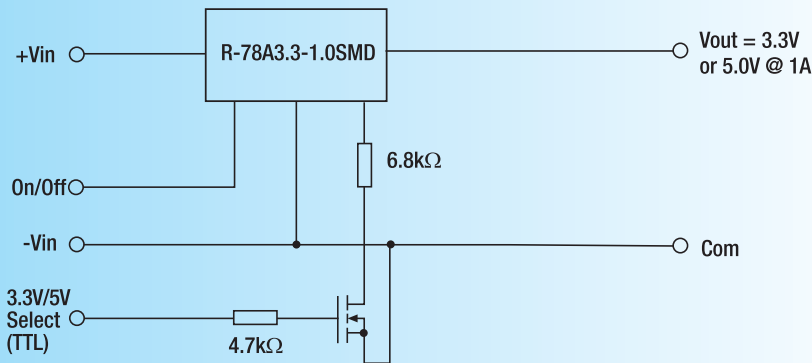
## Standard Application Circuit



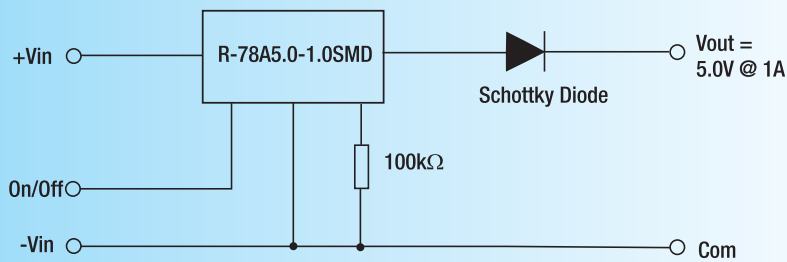
Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter. when it is powered down.  
See Application Examples for details.

## 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

# R-78Axx-1.0 SMD Series

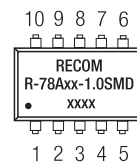
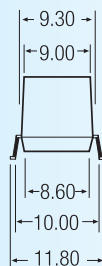
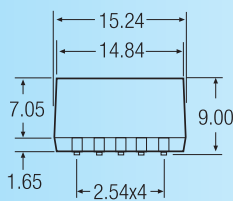
**Table 1: Adjustment Resistor Values**

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 $\Omega$					
2.5 (V)		11.8K $\Omega$						
3.0 (V)		4.64K $\Omega$		44.2K $\Omega$	88.4K $\Omega$		17K $\Omega$	
3.3 (V)							27K $\Omega$	
3.6 (V)						60.4K $\Omega$	42K $\Omega$	
3.9 (V)						28K $\Omega$	58K $\Omega$	
4.5 (V)						11.3K $\Omega$	180K $\Omega$	
4.9 (V)						7.15K $\Omega$	850K $\Omega$	
5.0 (V)						6.34K $\Omega$		
5.1 (V)						5.9K $\Omega$		231K $\Omega$
5.5 (V)						3.9k $\Omega$		56.2K $\Omega$

## Package Style and Pinning (mm)



### SMD 10Pin Package

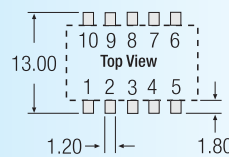
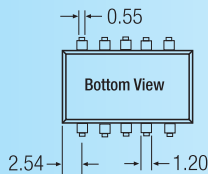


#### Pin Connections

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

xx.x  $\pm$ 0.5mm  
xx.xx  $\pm$ 0.25mm

#### Recommended Footprint Details



\* add suffix -R for tape & reel packing e.g. R-78A5.0-1.0-R. For more details see Application Notes