

## Features

- Efficiency up to 97%, Non isolated, no need for heatsinks
- SMD Package
- Adjustable Output Voltage
- Wide input range.(4.75V ~ 34V)
- Short circuit protection, Thermal shutdown
- Remote On/Off Control
- UL94V-0 Package Material
- Very Low Shutdown Current
- See Positive-to Negative Converter Application Note for use as a voltage inverter (alternative to LM79xx Linear)

**INNOLINE**  
DC/DC-Converter

# R-78Axx-0.5SMD Series

**0.5 AMP  
SMD  
Single Output**

## Selection Guide

Part Number	Input Range (1) (V)	Output Voltage (V)	Adjust Range (V)	Output Current (A)	Efficiency (%)	
					Min. Vin	Max. Vin
R-78A1.5-0.5SMD	4.75 – 30	1.5	fixed	0.5	73	63
R-78A1.8-0.5SMD	4.75 – 34	1.8	1.5~3.3	0.5	82	71
R-78A2.5-0.5SMD	4.75 – 34	2.5	1.5~4.5	0.5	87	77
R-78A3.3-0.5SMD	4.75 – 34	3.3	1.8~5.5	0.5	91	81
R-78A5.0-0.5SMD	6.5 – 34	5.0	2.5~8.0	0.5	94	86
R-78A6.5-0.5SMD	8.0 – 34	6.5	3.3~11.0	0.5	95	88
R-78A9.0-0.5SMD	11 – 34	9.0	4.5~12.6	0.5	96	92
R-78A12-0.5SMD	15 – 34	12	4.5~12.6	0.5	97	94
R-78A15-0.5SMD	18 – 34	15	fixed	0.5	97	95

Note 1:1.5V Output can be unstable with  $V_{in} > 30VDC$

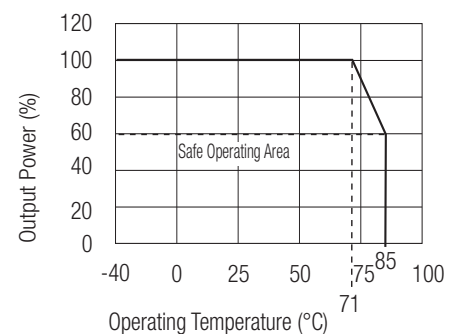
## Description

The R-78Axx-0.5SMD series high efficiency switching regulators are ideally suited to pick-and-place mass production. The efficiency of up to 97% means that very little energy is wasted as heat. The additional features of remote on/off control and adjustable output voltages will find many uses in the Battery-powered, Industrial, Medical and Automotive markets. Low ripple and noise figures and a shutdown input current of typically only 20uA round off the specifications of this versatile SMD converter series.



**RECOM**

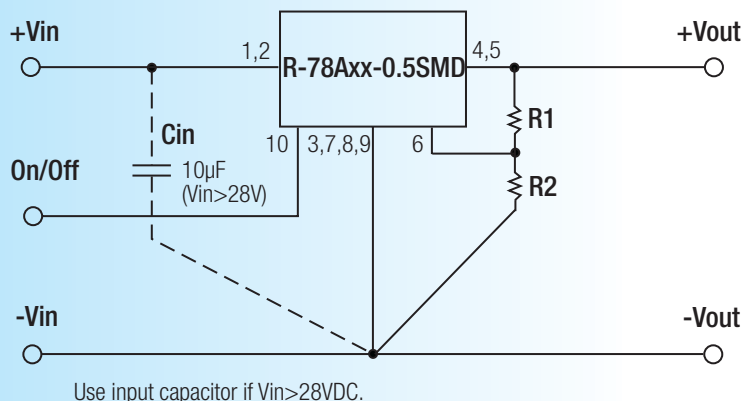
## Derating-Graph (Ambient Temperature)



**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		34.0V
Output Voltage Range	See Table	1.5		15V
Output Current	All Series	0		500mA
Output Current Limit	All Series			2000mA
Short Circuit Input Current	All Series			25mA
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)	1.5V to 6.5V		0.2	0.4%
	9V to 15V		0.1	0.2%
Load Regulation (10 to 100% full load)	1.5V to 6.5V		0.7	1.0%
	9V to 15V		0.25	0.4%
Dynamic Load Stability	100% <-> 50% load		±75V	
	100% <-> 10% load			±100mV
Ripple & Noise (without Output Capacitor)	1.5V to 6.5V		20mVp-p	30mVp-p
	9V to 15.5V		30mVp-p	40mVp-p
Temperature Coefficient	-40°C ~ +85°C ambient			0.015%/°C
Max capacitance Load				220µF
Switching Frequency		280	330	380kHz
Quiescent Current	Vin = min. to max. at 0% load		5	7mA
Shutdown Input Current			20	35µA
Remote On/Off Threshold Voltage		0.8	1.2	1.6V
ON/OFF Remote Control	ON: Open or 1.6<Vr<5V, OFF: GND or 0<Vr<1.6V			Ir=1.8µA typ.
Operating Temperature Range (with derating)		-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		21098 x 10 <sup>3</sup> hours
(+71°C)				4214 x 10 <sup>3</sup> hours

**Standard Application Circuit**

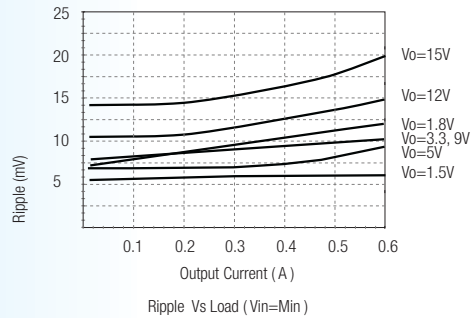
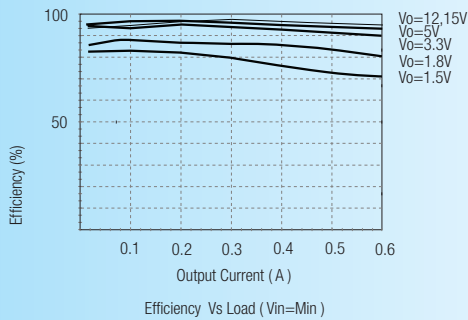
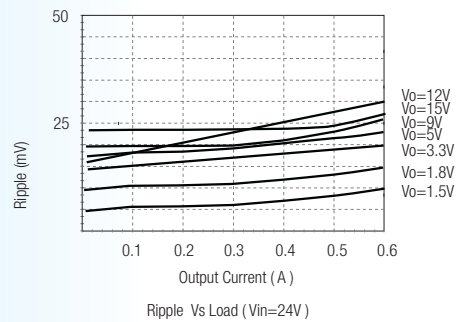
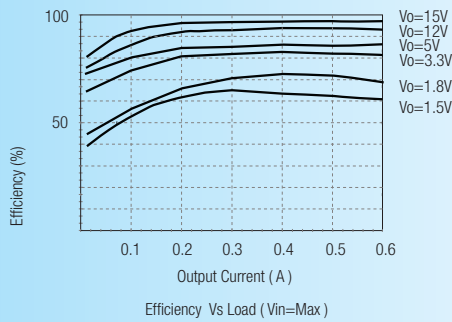
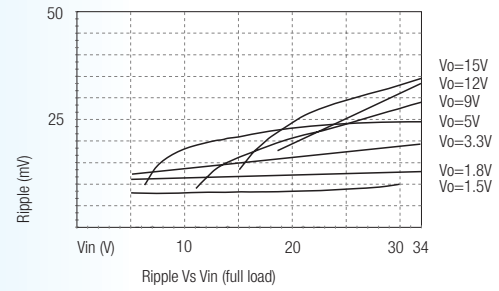
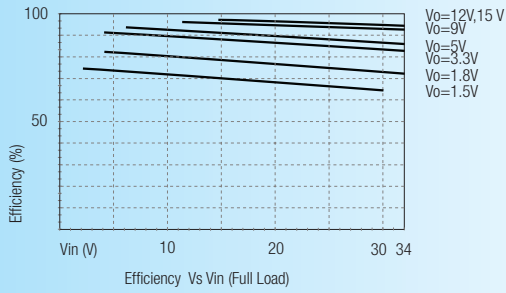


Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter.. See Application Examples for details.

**Characteristics**

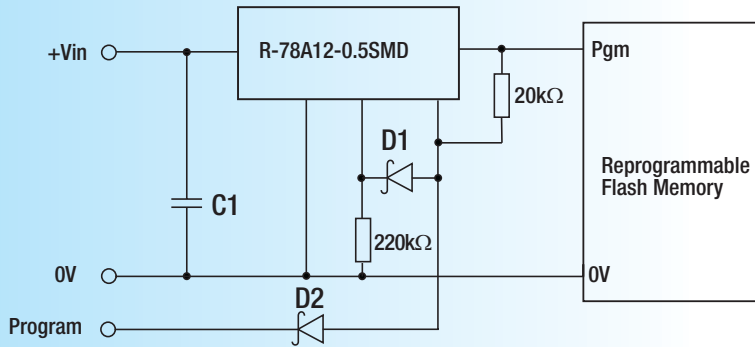
## Efficiency

## Ripple



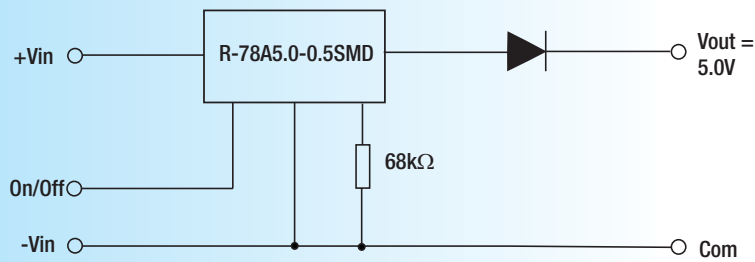
**Application Examples**

### Flash Memory Program Voltage Switcher

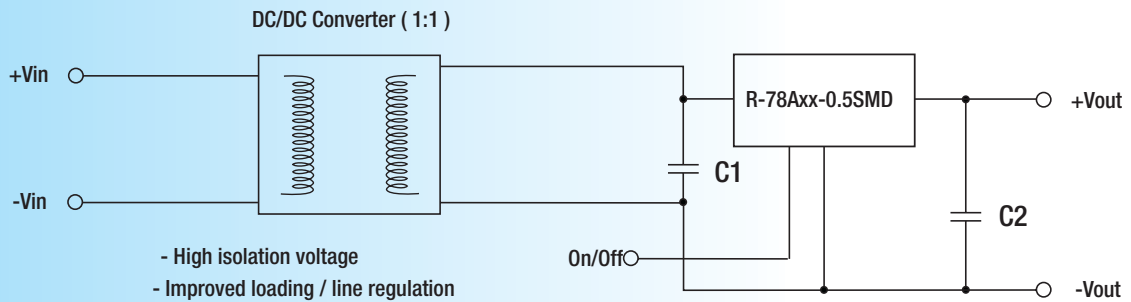


D1, D2: schottky Diode  
 "Program" = 0V, Pgm Pin = +5V  
 "Program" = high, Pgm Pin = +12,6V

### Output protection from external voltage



Converter Output set to 5.7V to compensate for diode drop



- High isolation voltage
- Improved loading / line regulation
- Wide Input Voltage Range
- Point-of-Load Architecture
- Remote On/Off Control

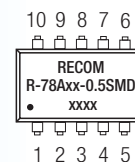
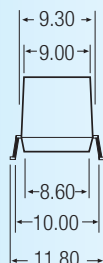
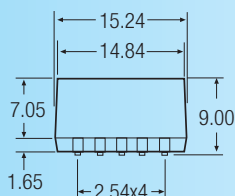
C1: Required (further decoupling filtering may be necessary between the two converters), C2: Optional

**Table 1: Adjustment Resistor Values**

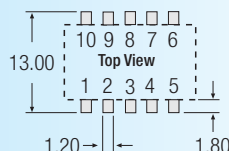
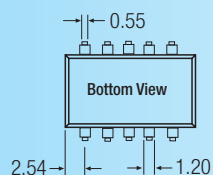
0.5Adc	R-78A1.8		R-78A2.5		R-78A3.3		R-78A5.0		R-78A6.5		R-78A9.0		R-78A12.6	
	-0.5SMD		-0.5SMD		-0.5SMD		-0.5SMD		-0.5SMD		-0.5SMD		-0.5SMD	
Vout (nom.)	1.8Vdc		2.5Vdc		3.3Vdc		5.0Vdc		6.5Vdc		9.0Vdc		12.0Vdc	
Vout (adj)	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
1.5 (V)	3K $\Omega$		200 $\Omega$											
1.8 (V)			12K $\Omega$											
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 $\Omega$		6.7K $\Omega$					
3.6 (V)				19.4K $\Omega$		69K $\Omega$	42K $\Omega$		14K $\Omega$					
3.9 (V)				14k $\Omega$		30.5K $\Omega$	58K $\Omega$		23K $\Omega$					
4.5 (V)				8k $\Omega$		12.1k $\Omega$	180K $\Omega$		49K $\Omega$		26K $\Omega$		17K $\Omega$	
4.9 (V)						7.6k $\Omega$	850K $\Omega$		77k $\Omega$		36K $\Omega$		24K $\Omega$	
5.0 (V)						6.8k $\Omega$			86k $\Omega$		39K $\Omega$		26K $\Omega$	
5.1 (V)						6.2k $\Omega$		540k $\Omega$	97K $\Omega$		42K $\Omega$		28K $\Omega$	
5.5 (V)						4k $\Omega$		71k $\Omega$	160K $\Omega$		56K $\Omega$		36K $\Omega$	
6.5 (V)								20.2k $\Omega$			112K $\Omega$		63K $\Omega$	
8.0 (V)								7.2k $\Omega$		26K $\Omega$	400K $\Omega$		125K $\Omega$	
9.0 (V)										11.3K $\Omega$			200K $\Omega$	
10 (V)										5.2K $\Omega$		59K $\Omega$	345K $\Omega$	
11 (V)										1.8K $\Omega$		18.5K $\Omega$	740K $\Omega$	
12 (V)												5.2K $\Omega$		
12.6 (V)												830K $\Omega$		216K $\Omega$

**Package Style and Pinning (mm)**

**SMD 10Pin Package**



**Recommended Footprint Details**



**Pin Connections**

Pin #	Connection
1,2	+Vin
3,7,8,9	GND
4,5	+Vout
6	V adj
10	Remote On/Off
xx.x	$\pm 0.5\text{mm}$
xx.xx	$\pm 0.25\text{mm}$