

Features

- Efficiency up to 97%, Non isolated, no need for heatsinks
- SMD Package
- Adjustable Output Voltage
- Wide input range.(4.75V ~ 32V)
- Short circuit protection, Thermal shutdown
- Remote On/Off Control
- UL94V-0 Package Material
- Very Low Shutdown Current
- See Innoline Application Notes for use as an inverter (alternative to LM79xx Linear)

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.

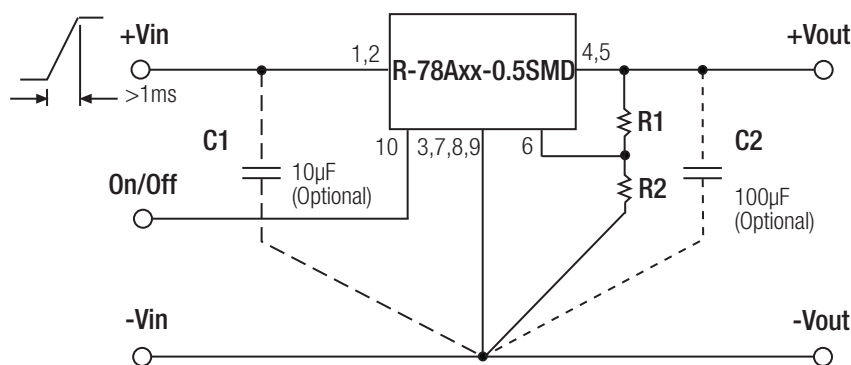
Selection Guide

Part Number SMD	Input Range (1) (V)	Output Voltage (V)	Adjust Range (V)	Output Current (A)	Efficiency Min. Vin (%)	Max. Vin (%)
R-78A1.5-0.5SMD	4.75 – 30	1.5	fixed	0.5	73	63
R-78A1.8-0.5SMD	4.75 – 32	1.8	1.5~3.3	0.5	82	71
R-78A2.5-0.5SMD	4.75 – 32	2.5	1.5~4.5	0.5	87	77
R-78A3.3-0.5SMD	4.75 – 32	3.3	1.8~5.5	0.5	91	81
R-78A5.0-0.5SMD	6.5 – 32	5.0	2.5~8.0	0.5	94	86
R-78A6.5-0.5SMD	8.0 – 32	6.5	3.3~11.0	0.5	95	88
R-78A9.0-0.5SMD	11 – 32	9.0	4.5~12.6	0.5	96	92
R-78A12-0.5SMD	15 – 32	12	4.5~12.6	0.5	97	94
R-78A15-0.5SMD	18 – 32	15	fixed	0.5	97	95

Note 1:1.5V Output can be unstable with Vin>30VDC

* add suffix **-R** for tape&reel packing e.g. R-78A5.0-0.5-R. For more details see Application Notes.

Standard Application Circuit



To protect the converter from high inrush currents, use soft start Vin and C1=10µF

INNOLINE
DC/DC-Converter

RECOM

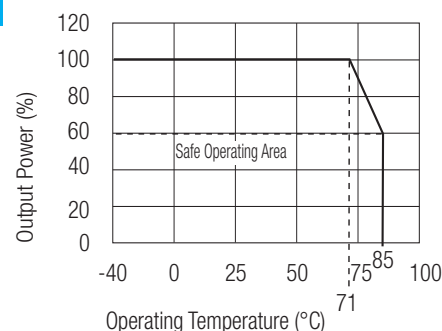
0.5 AMP
SMD
Single Output



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

R-78A-0.5

Derating-Graph (Ambient Temperature)



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

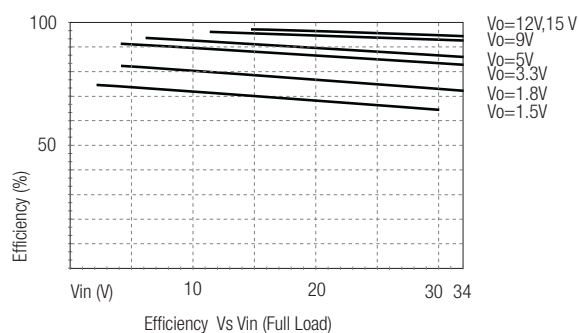
Characteristics	Conditions	Min.	Typ.	Max.
Input Voltage Range	See Table	4.75	32V	34V abs. max.
Output Voltage Range	See Table	1.5		15V
Output Current (see Note)	All Series	0*		500mA
Output Current Limit	All Series			2000mA
Short Circuit Input Current (Vin = 24V)	All Series			60mA
Internal Power Dissipation				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% <-> 10% load	100% <-> 50% load		±75V	
			±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
ON/OFF Remote Control Pin Drive Current			Ir=1.8µA typ	
Converter Input Current (valid for Vr < 1.6V)			20	30µA
Remote On/Off Threshold Voltage (Vr rising)		2.4	2.6	2.8V
Remote On/Off Voltage Hysteresis			250mV	
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
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
Safety Certification	EN 60950-1			
Package Weight			2.7g	
Packing Quantity				33pcs per Tube
				250pcs per Reel
MTBF (+25°C) (+71°C)	Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F		21098 x 10 ³ hours
				4214 x 10 ³ hours

*Note: Operation under no load will not damage these devices, however they may not meet all specifications. A minimum load of 6mA is recommended

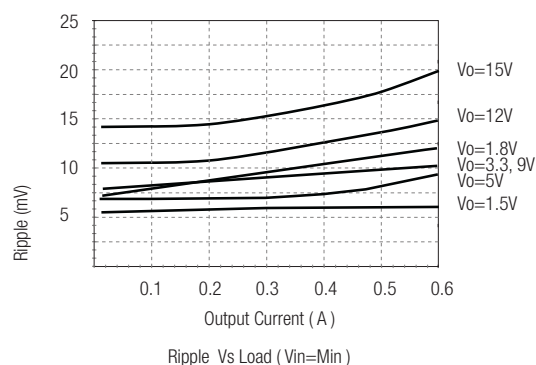
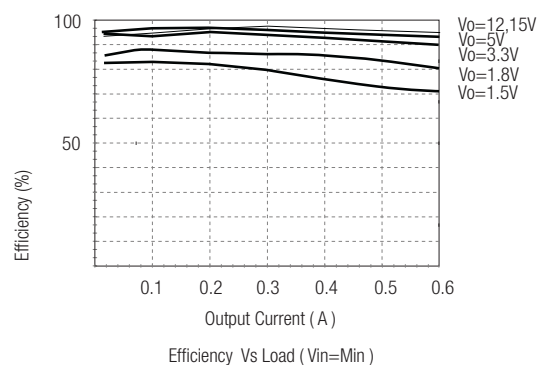
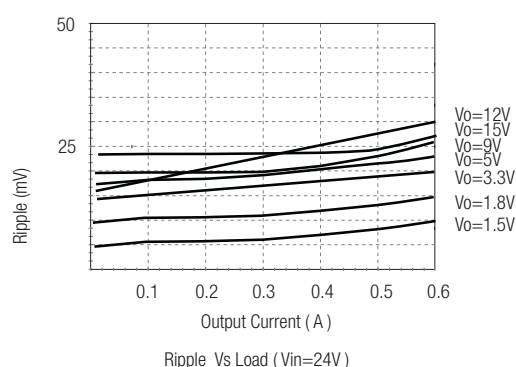
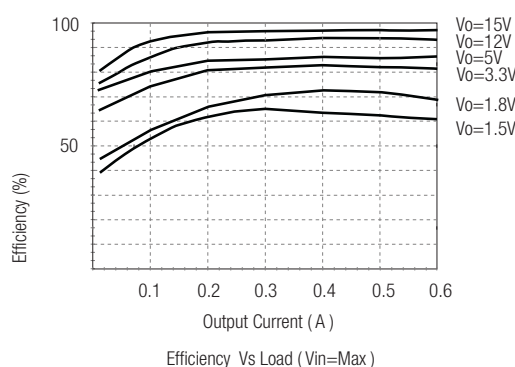
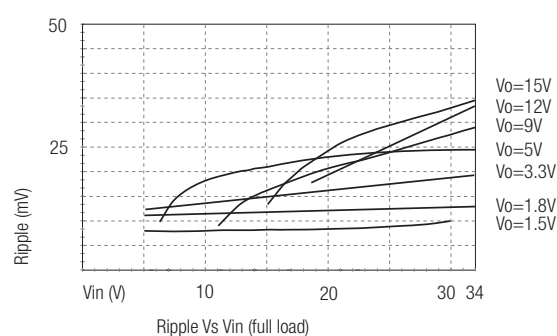
IMPORTANT INFORMATION: The R-78Ax.x-x.SMD series are not suitable to be soldered using vapour phase soldering, they are only guaranteed to be safe in IR or convection reflow ovens and by hand soldering. Reflow conditions should not exceed the limits of the Jedec STD-020C profile. The alternative series-R-78AAxx-SMD does not have this restriction. For more details regarding this matter please contact info@recom-development.at.

Characteristics

Efficiency

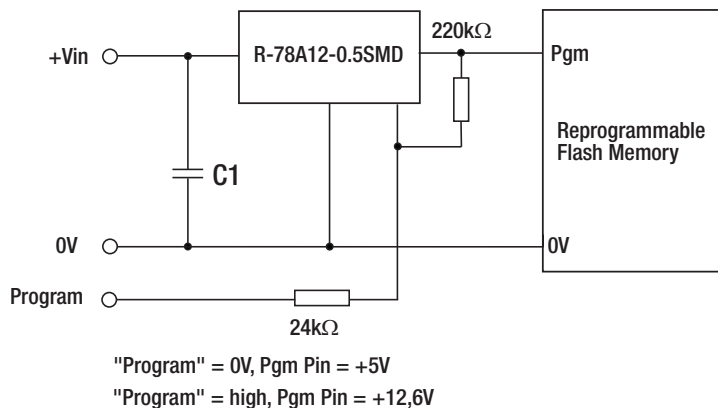


Ripple

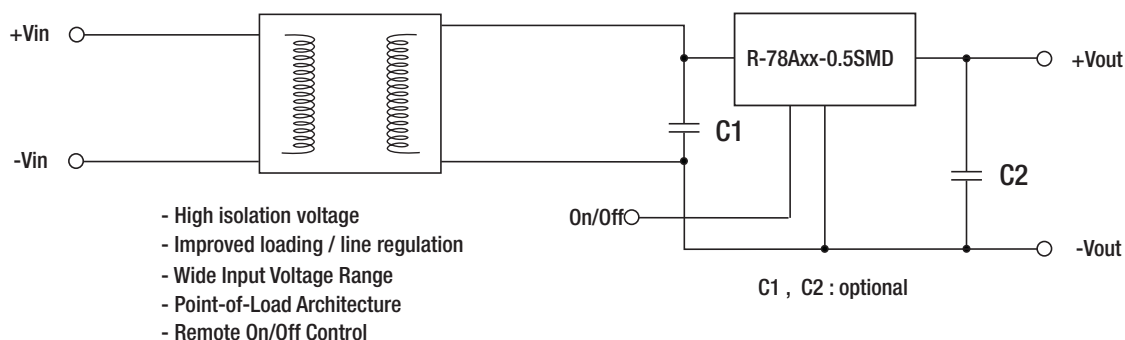


Application Examples

Flash Memory Program Voltage Switcher



DC/DC Converter (1:1)



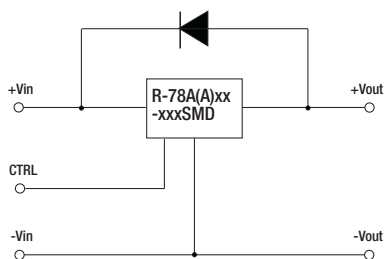
R-78-0.5

Optional Protection Circuit

Optional Protection 1:

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.

The diode can either be fitted across the device if the source is low impedance or fitted in series with the output (recommended).



Optional Protection 2:

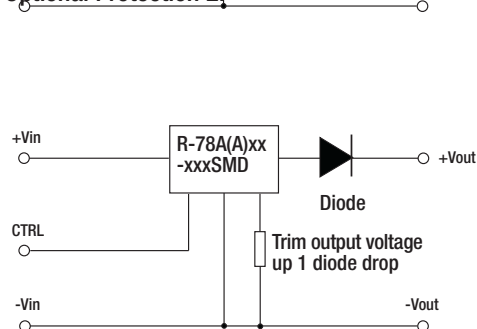


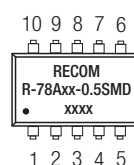
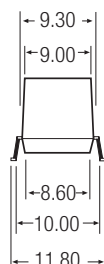
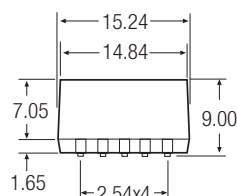
Table 1: Adjustment Resistor Values

0.5Adc	R-78A1.8 -0.5SMD		R-78A2.5 -0.5SMD		R-78A3.3 -0.5SMD		R-78A5.0 -0.5SMD		R-78A6.5 -0.5SMD		R-78A9.0 -0.5SMD		R-78A12 -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 Ω		200 Ω											
1.8 (V)			12K Ω											
2.5 (V)		11.8K Ω												
3.0 (V)		4.64K Ω		44.2K Ω	88.4K Ω		17K Ω							
3.3 (V)							27K Ω		6.7K Ω					
3.6 (V)						60.4K Ω	42K Ω		14K Ω					
3.9 (V)						28K Ω	58K Ω		23K Ω					
4.5 (V)						11.3k Ω	180K Ω		49K Ω		26K Ω		17K Ω	
4.9 (V)						7.15k Ω	850K Ω		77k Ω		36K Ω		24K Ω	
5.0 (V)						6.34k Ω			86k Ω		39K Ω		26K Ω	
5.1 (V)						5.9k Ω		231K Ω	97K Ω		42K Ω		28K Ω	
5.5 (V)						3.9k Ω		56.2k Ω	160K Ω		56K Ω		36K Ω	
6.5 (V)								14k Ω			112K Ω		63K Ω	
8.0 (V)								2.32k Ω		24.6K Ω	400K Ω		125K Ω	
9.0 (V)										10.7K Ω			200K Ω	
10 (V)										4.75K Ω		54.9K Ω	345K Ω	
11 (V)										1.65K Ω		16.5K Ω	740K Ω	
12 (V)												3.6K Ω		
12.6 (V)												0 Ω		180K Ω

R-78-0.5

Package Style and Pinning (mm)

SMD 10Pin Package



Pin Connections

Pin #	
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	$\pm 0.25\text{mm}$

Recommended Footprint Details

