

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)

Rev.0

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.

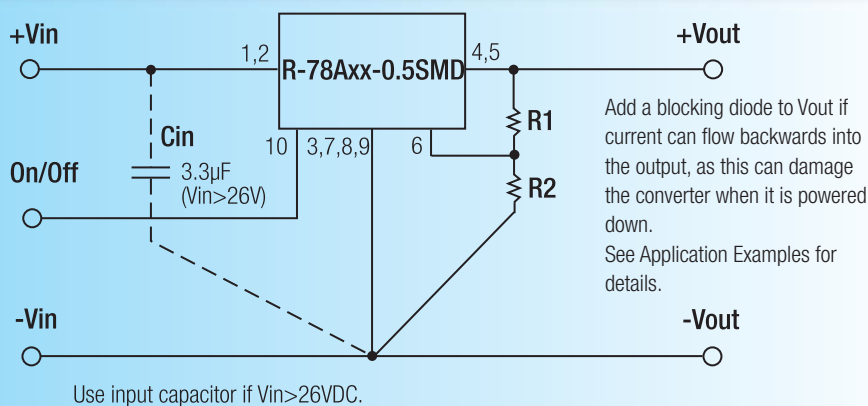
Selection Guide

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 – 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 $V_{in} > 30VDC$

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

Standard Application Circuit

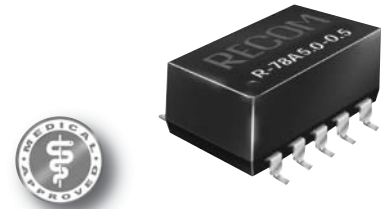


Add a blocking diode to V_{out} if current can flow backwards into the output, as this can damage the converter when it is powered down. See Application Examples for details.

INNOVATIVE
DC/DC-Converter

R-78Axx-0.5SMD Series

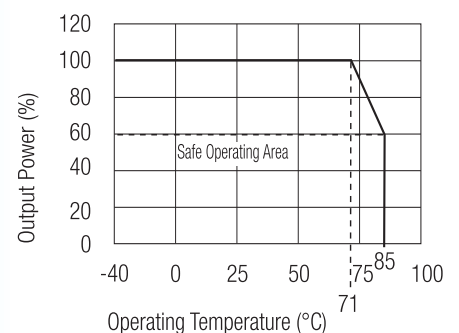
0.5 AMP SMD Single Output



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

RECOM

Derating-Graph (Ambient Temperature)



R-78Axx-0.5 SMD Series

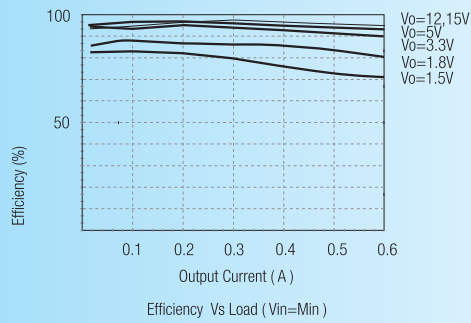
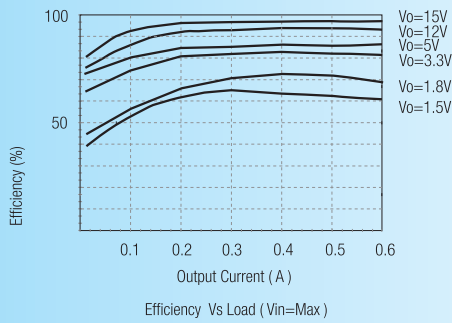
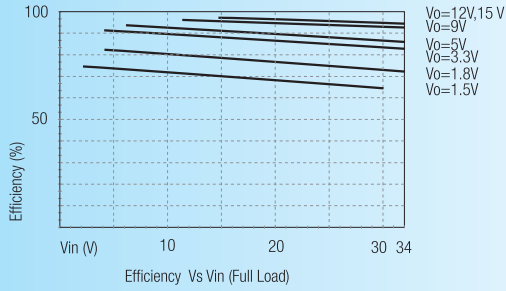
Specifications (typical at 25°C, 10% minimum load, unless otherwise specified)

Characteristics	Conditions	Min.	Typ.	Max.
Input Voltage Range	See Table	4.75		34.0V
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% <-> 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
ON/OFF Remote Control Pin Current	ON: Open or 1.6<Vr<5V, OFF: GND or 0<Vr<1.6V			Ir=1.8uA typ.
Shutdown Input Current			20	35uA
Remote On/Off Shutdown Threshold Voltage		0.8	1.2	1.6V
Undervolt Lockout Voltage		2.4	2.6	2.8V
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
Soldering Temperature	RoHS Conform			265°C max./10 sec.
Vapour Phase Process	(see Application Notes for details)			240°C max./60 sec.
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 Certification				EN 60950-1
Package Weight				2.7g
MTBF (+25°C)	} Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F		21098 x 10 ³ hours
(+71°C)				4214 x 10 ³ hours

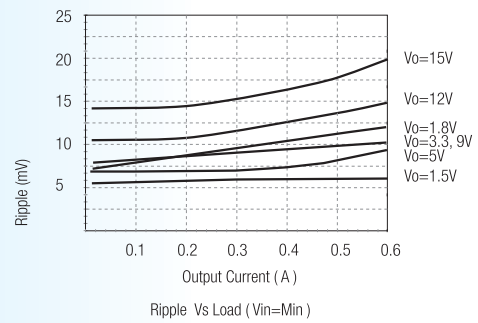
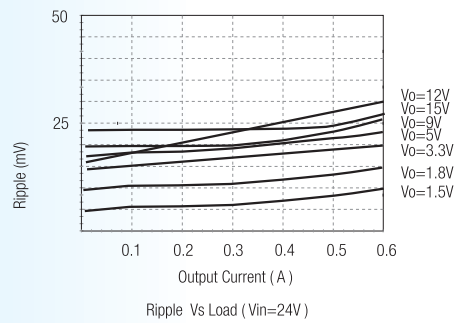
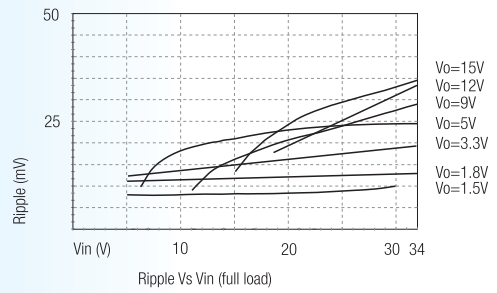
*Note: Operation under no load will not damage these devices, however they may not meet all specifications. A minimum load of 6mA is recommended

Characteristics

Efficiency

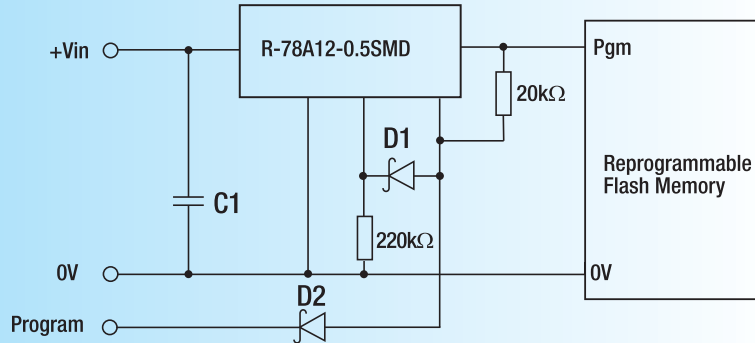


Ripple



Application Examples

Flash Memory Program Voltage Switcher

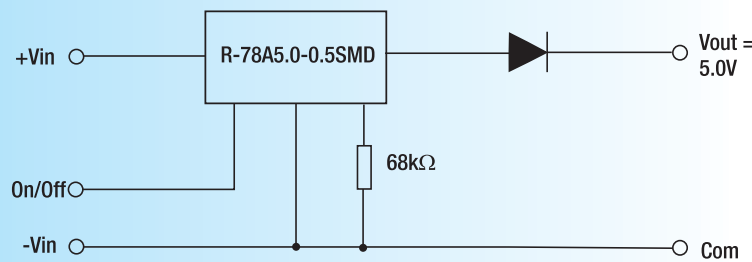


D1, D2: schottky Diode

"Program" = 0V, Pgm Pin = +5V

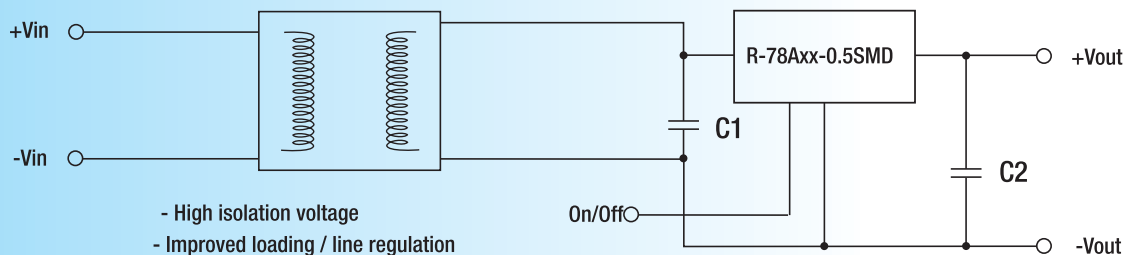
"Program" = high, Pgm Pin = +12,6V

Output protection from external voltage



Converter Output set to 5.7V to compensate for diode drop

DC/DC Converter (1:1)



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

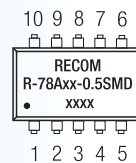
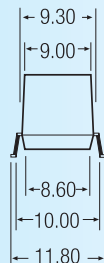
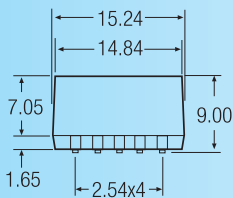
C1: Required (further decoupling filtering may be necessary between the two converters), C2: Optional

Table 1: Adjustment Resistor Values

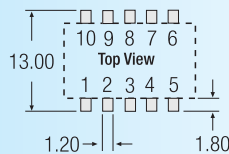
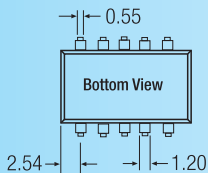
0.5A _{dc}	R-78A1.8 -0.5SMD		R-78A2.5 -0.5SMD		R-78A3.3 -0.5SMD		R-78A5.0 -0.5SMD		R-78A6.5 -0.5SMD		R-78A9.0 -0.5SMD		R-78A12 -0.5SMD	
V _{out} (nom.)	1.8V _{dc}		2.5V _{dc}		3.3V _{dc}		5.0V _{dc}		6.5V _{dc}		9.0V _{dc}		12.0V _{dc}	
V _{out} (adj)	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
1.5 (V)	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

Package Style and Pinning (mm)

SMD 10Pin Package



Recommended Footprint Details



Pin Connections

Pin #	Function
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