

# Features

# Switching Regulator

- Efficiency up to 94%, no need for heatsinks
- High reflow temperature SMD package
- Adjustable output voltage buck converter
- Short circuit protection, thermal shutdown
- Remote on/off control
- Very low shutdown current



## R-78AA-1.0

1.0 Amp  
SMD  
Single Output



### Description

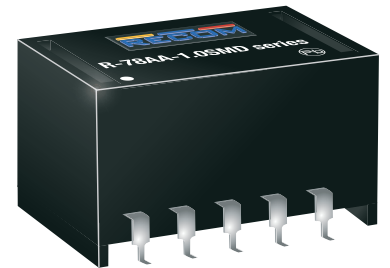
The R-78AAxx-1.0SMD series are adjustable output non-isolated buck converters that meet the requirements for RoHS 10/10 as well as the reflow soldering temperatures associated with vapor phase soldering, making these high efficiency switching regulators ideally suited to modern pick-and-place mass production. The efficiency of up to 97% means that very little energy is wasted as heat. The additional features of remote on/off control, continuous short circuit protection and adjustable output voltages will find many uses in the battery-powered, industrial, medical and automotive markets.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Vout Adjust Range [VDC]	Output Current [A]	Efficiency @ min Vin [%]	Efficiency @ max. Vin [%]
R-78AA1.5-1.0SMD	4.75 - 18	1.5	fixed	1.0	77	73
R-78AA1.8-1.0SMD	4.75 - 18	1.8	1.5 - 3.0	1.0	82	76
R-78AA2.5-1.0SMD	4.75 - 18	2.5	1.5 - 3.0	1.0	87	81
R-78AA3.3-1.0SMD	4.75 - 18	3.3	3.0 - 5.5	1.0	90	84
R-78AA5.0-1.0SMD	6.5 - 18	5.0	3.0 - 5.5	1.0	94	89

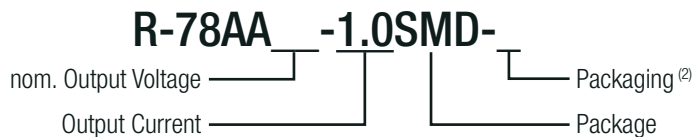
#### Notes:

Note1: Input voltage ranges valid for nominal output voltages  
Vin must be higher than Vout including adjust range and dropout voltage



EN60950-1 certified  
IEC60950-1 certified

### Model Numbering



#### Notes:

Note2: add suffix -R for tape & reel packaging

#### Ordering Examples:

R-78AA5.0-1.0SMD-R = 5.0VDC Output Voltage, 1.0A, SMD, tape and reel packaging  
R-78AA2.5-1.0SMD = 2.5VDC Output Voltage, 1.0A, SMD, tube

Specifications (measured @ Ta= 25°C, 10% minimum load, unless otherwise stated)

### BASIC CHARACTERISTICS

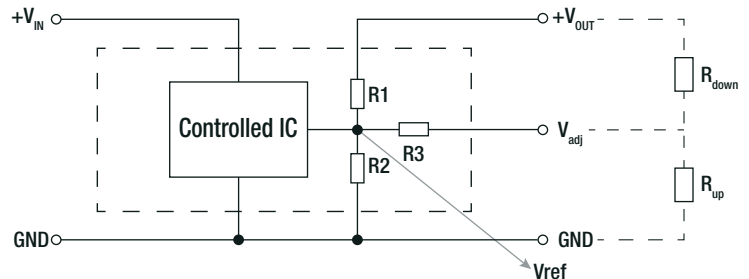
Parameter	Condition	Min.	Typ.	Max.
Quiescent Current	Vin= min. to max.		5mA	7mA
Internal Power Dissipation				0.4W
Output Voltage Adjustability				see calculation
Minimum Load <sup>(2)</sup>		0%		
Start-up time	ON/OFF CTRL		50ms	
ON/OFF CTRL	DC-DC ON DC-DC OFF		Open or 2.8VDC < Vr < 5VDC GND or OVDC < Vr < 0.8VDC	
Input Current of CTRL Pin	DC-DC OFF		1.8µA	
Standby Current			20µA	35µA
CTRL Thershold Voltage		2.4VDC	2.6VDC	2.8VDC
CTRL Voltage Hysteresis			250mV	
Internal Operating Frequency		335kHz	385kHz	435kHz
Output Ripple and Noise	20MHz BW		20mVp-p	30mVp-p
Maximum Capacitive Load	with normal start-up time, no external components			470µF
	with <1 second start-up time + diode protection circuit			6800µF

#### Notes:

Note3: Operation under no load will not harm the converter, but specifications may not be met.  
A minimum load of 10mA is recommended

#### Output Voltage Adjustability Adjustment Resistor Values

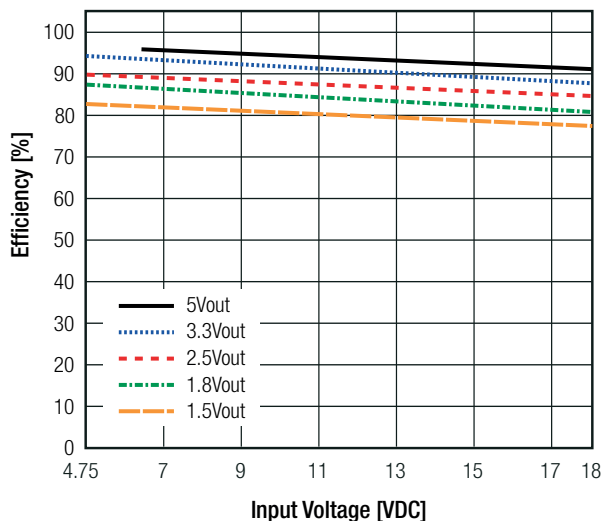
	R1	R2	R3	Vref(V)
1.8V	10KΩ	21KΩ	5.6KΩ	1.23
2.5V	22KΩ	21KΩ	5.6KΩ	1.23
3.3V	16.9KΩ	10KΩ	5.6KΩ	1.23
5.0V	30.9KΩ	10KΩ	10KΩ	1.23



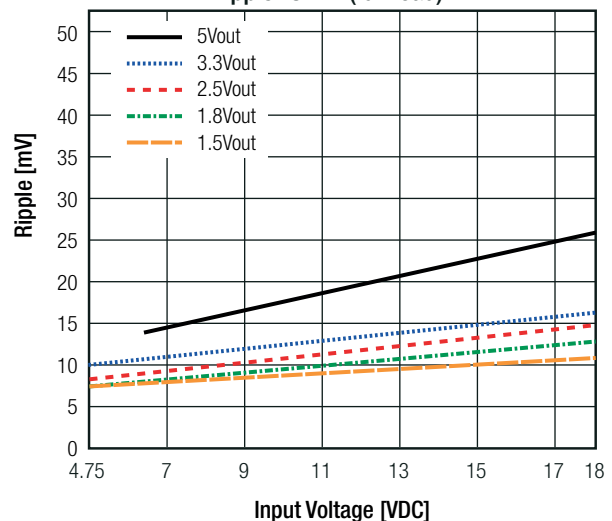
$$\text{Trim down } R_{\text{down}} = \frac{R2(R1 + R3) \times (V_{\text{ref}} - V_o) + V_{\text{ref}} \times R1R3}{R2V_o - V_{\text{ref}}(R1 + R2)}$$

$$\text{Trim up } R_{\text{up}} = \frac{R2R3(V_{\text{ref}} - V_o) + V_{\text{ref}}R1(R2 + R3)}{R2(V_o - V_{\text{ref}}) - V_{\text{ref}}R1}$$

Efficiency vs. Vin (full load)



Ripple vs. Vin (full load)



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