

Features

Switching Regulator

- Efficiency up to 95%, no need for heatsinks
- High reflow temperature SMD package
- Adjustable output voltage buck converter
- Wide input range (4.74V - 32V)
- Short circuit protection, thermal shutdown
- Remote on/off control
- Very low shutdown current



R-78AA-0.5

0.5 Amp
SMD
Single Output

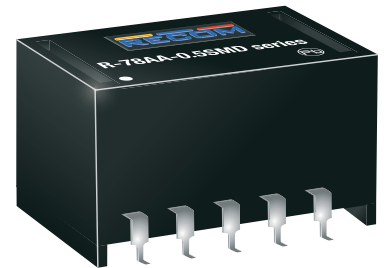


Description

The R-78AAx-0.5SMD 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] ⁽¹⁾ | Output Voltage [VDC] | Vout Adjust Range [VDC] | Output Current [mA] | Efficiency @ min Vin [%] | Efficiency @ max. Vin [%] |
|------------------|--|----------------------|-------------------------|---------------------|--------------------------|---------------------------|
| R-78AA1.5-0.5SMD | 4.75 - 30 | 1.5 | fixed | 0.5 | 73 | 63 |
| R-78AA1.8-0.5SMD | 4.75 - 32 | 1.8 | 1.5 - 3.0 | 0.5 | 82 | 71 |
| R-78AA2.5-0.5SMD | 4.75 - 32 | 2.5 | 1.5 - 3.0 | 0.5 | 87 | 77 |
| R-78AA3.3-0.5SMD | 4.75 - 32 | 3.3 | 3.0 - 5.5 | 0.5 | 91 | 81 |
| R-78AA5.0-0.5SMD | 6.5 - 32 | 5.0 | 3.0 - 8.0 | 0.5 | 94 | 86 |
| R-78AA6.5-0.5SMD | 8.0 - 32 | 6.5 | 3.3 - 11.0 | 0.5 | 95 | 88 |
| R-78AA9.0-0.5SMD | 11 - 32 | 9.0 | 4.5 - 12.6 | 0.5 | 96 | 92 |
| R-78AA12-0.5SMD | 15 - 32 | 12 | 4.5 - 12.6 | 0.5 | 97 | 94 |
| R-78AA15-0.5SMD | 18 - 32 | 15 | fixed | 0.5 | 97 | 95 |

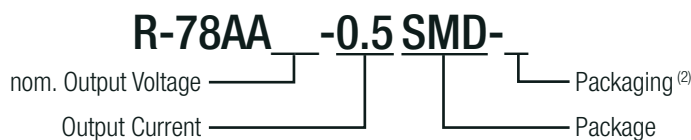


Notes:

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-78AA5.0-0.5SMD-R = 5.0VDC Output Voltage, 0.5A, SMD, tape and reel packaging
R-78AA2.5-0.5SMD = 2.5VDC Output Voltage, 0.5A, SMD, tube

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

BASIC CHARACTERISTICS

| Parameter | Condition | | Min. | Typ. | Max. |
|--------------------------------|---|-----------------------------------|---|--------------------|--------------------|
| Absolute Maximum Input Voltage | | | | | 34VDC |
| Quiescent Current | Vin= min. to max. | | | 5mA | 7mA |
| Internal Power Dissipation | | | | | 0.4W |
| Output Voltage Adjustability | | | see calculation | | |
| Minimum Load ⁽³⁾ | | | 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 0VDC < Vr < 0.8VDC | | |
| Input Current of CTRL Pin | DC-DC OFF | | | 1.8µA | |
| Standby Current | | | | 20µA | 30µA |
| CTRL Thershold Voltage | | | 2.4VDC | 2.6VDC | 2.8VDC |
| CTRL Voltage Hysteresis | | | | 250mV | |
| Internal Operating Frequency | | | 280kHz | 330kHz | 380kHz |
| Output Ripple and Noise | 20MHz BW | 1.5VDC tp 6.5VDC 9VDC to 15VDC | | 20mVp-p 30mVp-p | 30mVp-p 40mVp-p |
| Maximum Capacitive Load | with normal start-up time, no external components | | | | 470µF |
| | with <1 second start-up time + diode protection circuit | | | | 6800µF |

Notes:

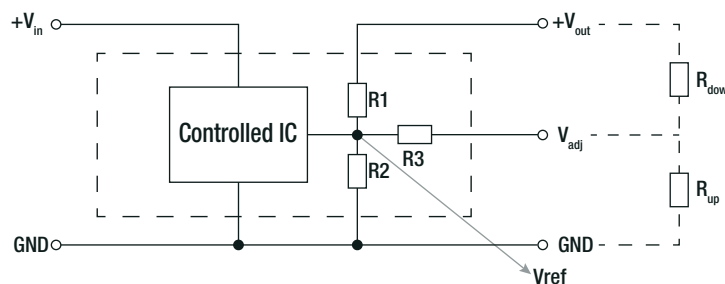
Note3: Operation under no load will not harm the converter, but specifications may not be met.
A minimum load of 6mA is recommended

Output Voltage Adjustability
Adjustment Resistor Values

| V0 | 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 |
| 6.5V | 43kΩ | 10kΩ | 10kΩ | 1.23 |
| 9V | 63.4kΩ | 10kΩ | 22.1kΩ | 1.23 |
| 12V | 88.7kΩ | 10kΩ | 22.1kΩ | 1.23 |

$$R_{down} = \frac{R2(R1 + R3) \times (Vref - Vo) + Vref \times R1R3}{R2Vo - Vref (R1 + R2)}$$

$$R_{up} = \frac{R2R3 (Vref - Vo) + Vref R1 (R2 + R3)}{R2 (Vo - Vref) - Vref R1}$$



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