

# Features

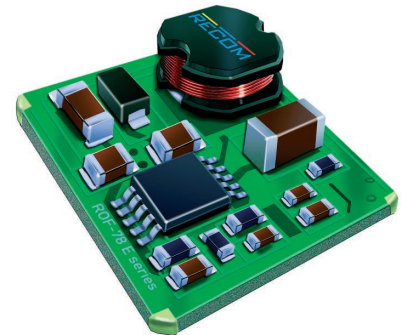
# Switching Regulator

- Low profile 4.5mm
- Low cost
- Wide input range (5V - 36V)
- Short circuit protection
- Castellated connections



## ROF-78E-0.5SMD

**0.5 Amp**  
**Non Isolated**  
**Power Module**



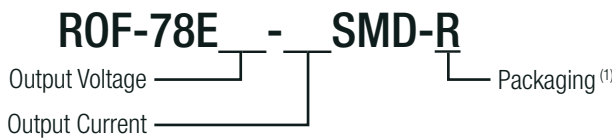
### Description

The ROF-78E is a switching regulator with a wide input voltage range, high efficiency and a low profile, pin-less SMD package. Three low-ripple output voltages are available as standard: 3.3V, 5V or 12V with 500mA continuous output current rating over the full operating temperature range of -40°C to +75°C without derating. An enable connection allows power sequencing or very low standby consumption (3.5µA) for battery powered applications. These modules can be SMD reflow soldered. The connection pads have corner half-vias to enable optical inspection of the joints after soldering.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. [%]
ROF-78E3.3-0.5SMD-R	5 - 36	3.3	500	73 - 84
ROF-78E5.0-0.5SMD-R	9 - 36	5.0	500	79 - 87
ROF-78E12-0.5SMD-R	15 - 36	12	500	87 - 92

### Model Numbering



**Notes:**

Note1: suffix -R for tape&reel packaging (refer to **"PACKAGING INFORMATION"**)

**Ordering Examples:**

ROF-78E3.3-0.5SMD-R = 3.3Vout, 0.5A Output Current, SMD, tape and reel packaging

### Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

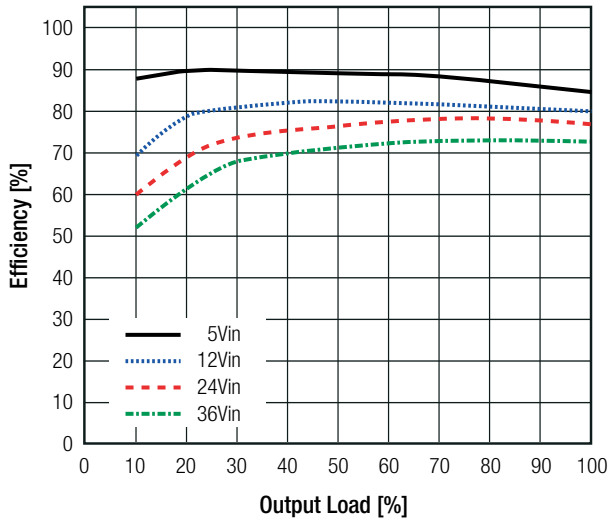
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. Vin= 12VDC and 24VDC	5VDC		36VDC
Input Current				500mA
Quiescent Current				5mA
Minimum Load <sup>(2)</sup>		10%		
ON/OFF CTRL	max. Vin= 5VDC	DC-DC ON DC-DC OFF		Open or >1.75VDC GND or <0.7VDC
Standby Current	DC-DC OFF		3.5µA	6.5µA
Internal Operating Frequency			650kHz	
Output Ripple and Noise	20MHz BW			100mVp-p

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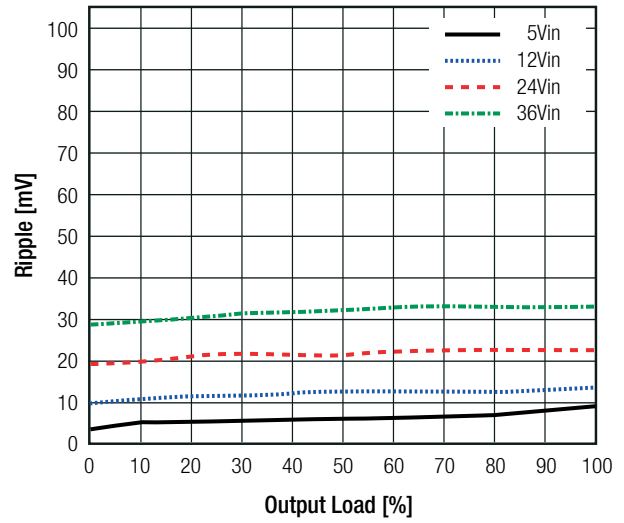
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

ROF-78E3.3-0.5SMD

Efficiency vs. Load

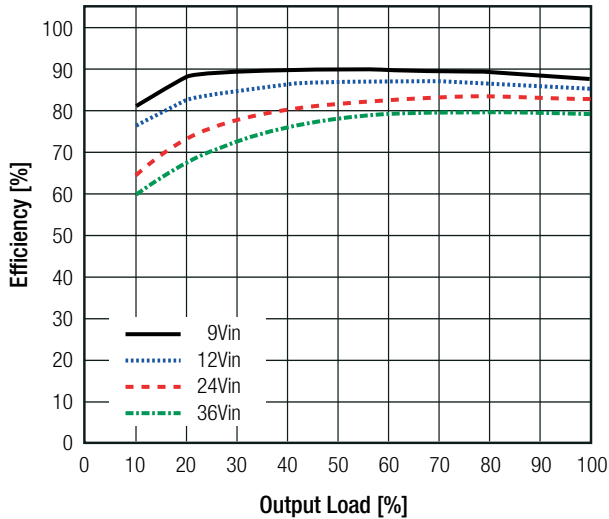


Ripple vs. Load

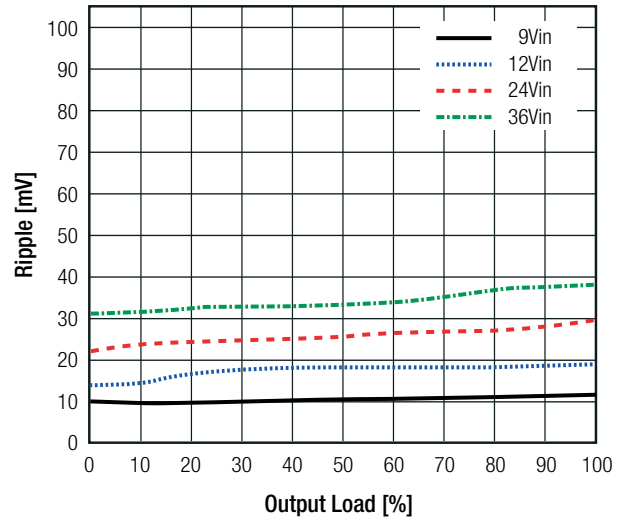


ROF-78E5.0-0.5SMD

Efficiency vs. Load

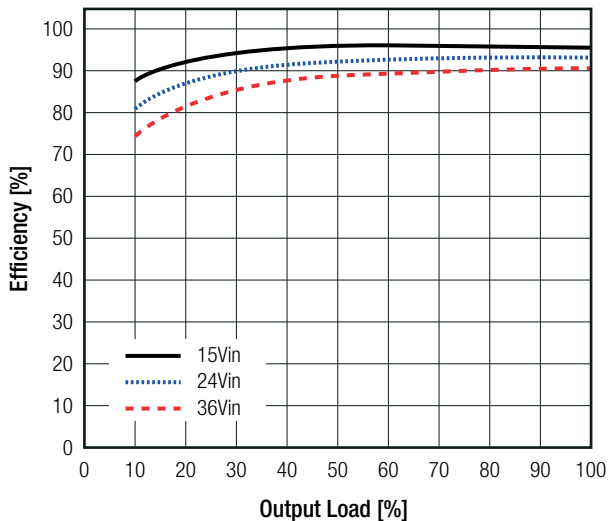


Ripple vs. Load

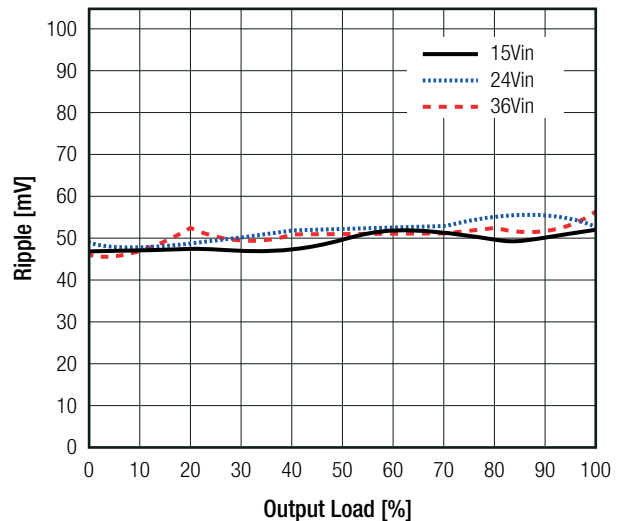


ROF-78E12-0.5SMD

Efficiency vs. Load



Ripple vs. Load



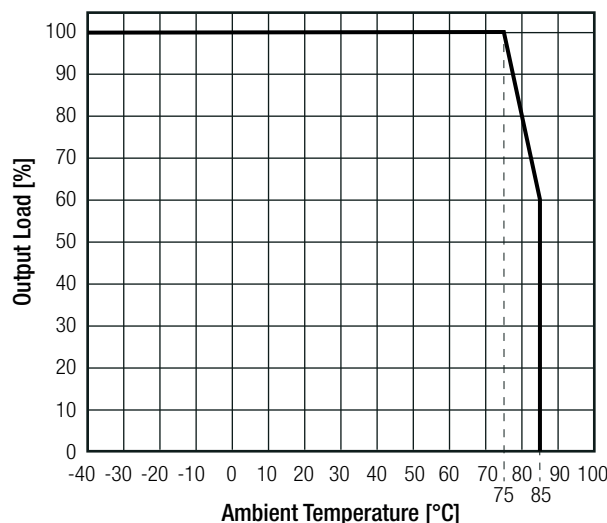
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS		
Parameter	Condition	Value
Output Accuracy		±5.0% max.
Line Regulation	low line to high line	±1.0% max.
Load Regulation <sup>(2)</sup>	10% to 100% load	± 3.0% typ.
Transient Response	100% to 50% load	±100mV
	100% to 10% load	±200mV
<b>Notes:</b>		
Note2: Operation below 10% load will not harm the converter, but specifications may not be met		

PROTECTIONS		
Parameter	Condition	Value
Short Circuit Protection (SCP)		automatic recovery
Short Circuit Input Current		200mA max.
Over Current Protection (OCP)		>950mA typ. Hiccup mode
<b>Optional Diode Protection Circuit</b>		
<p><b>Optional Protection 1:</b></p> <p>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.</p> <p>The diode can either be fitted across the device if the source is low impedance or fitted in series with the output (recommended).</p>		

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	with derating @ free air convection (see graph)	-40°C to +85°C
Operating Humidity	non-condensing	5% - 95% RH max.
MTBF	according to MIL-HDBK-217F, G.B.	+25°C 3500 x 10 <sup>3</sup> hours

**Derating Graph**  
(@ free air convection)



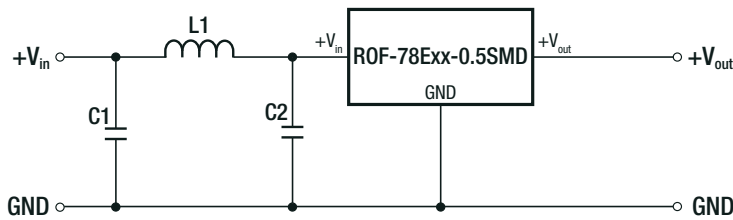
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
RoHS 2+		RoHS-2011/65/EU + AM-2015/863
EAC	RU-AT.49.09571	TP TC 004/2011

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter	EN55032, Class B

**EMC Filtering Suggestion according to EN55032 Class A and Class B**



**Component List Class A and B**

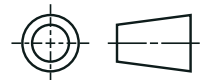
C1	C2	L1
1µF	1µF	33µH

The capacitors used are ceramic capacitors, rated voltage 50V

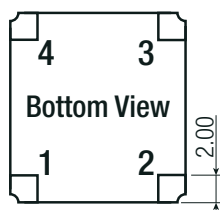
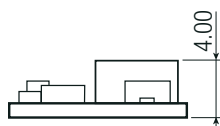
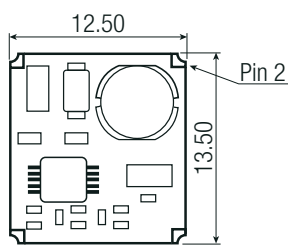
**DIMENSION AND PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	PCB	FR4, (UL94 V-0)
Package Dimension (LxWxH)	3.3, 5Vout 12Vout	12.5 x 13.5 x 4.0mm 12.5 x 13.5 x 4.5mm
Package Weight		1g typ.

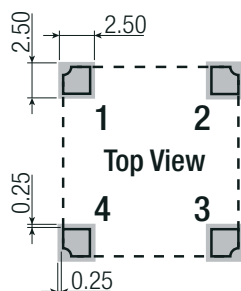
**Dimension Drawing (mm)**



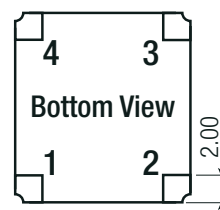
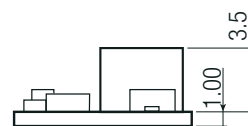
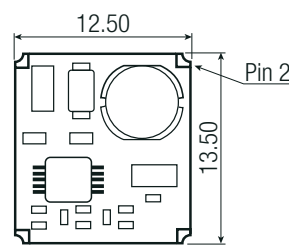
**3.3Vout & 5Vout**



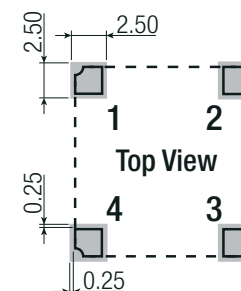
**Recommended Footprint Details**



**12Vout**



**Recommended Footprint Details**



**Pin Connections**

Pin #	Single
1	+Vin
2	GND
3	+Vout
4	CTRL

Tolerance: x.x= ±0.50mm  
x.xx= ±0.25mm

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

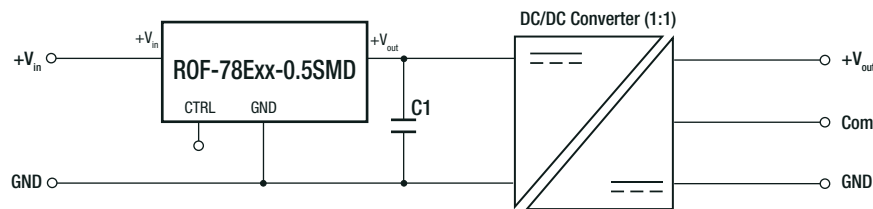
**INSTALLATION AND APPLICATION**

**Standard Application Circuit**



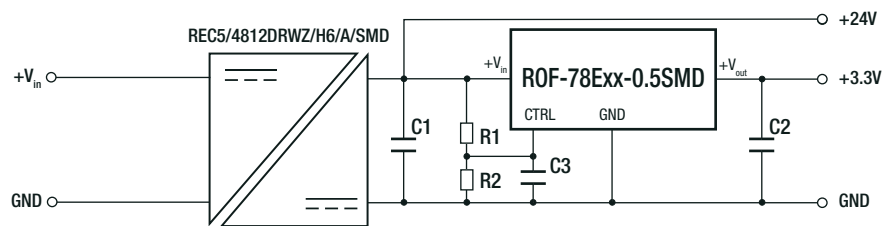
**Application Examples**

**High Efficiency, Isolated, Dual Unregulated Output**

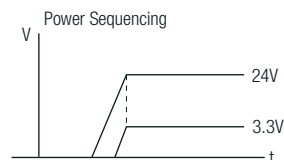


- Isolated dual output
- Wide Input Range

**Isolated (up to 6kVDC), Wide Input Range Regulated Output**



- High isolation voltage
- Improved loading / line regulation
- Wide input voltage range
- Point-of-load architecture



**PACKAGING INFORMATION**

Parameter	Type	Value
Packaging Dimension (LxWxH)	tape and reel (carton)	355.0 x 342.0 x 36.0mm
Packaging Quantity	tape and reel	500pcs
Tape Width		24mm
Storage Temperature Range		-55°C to +125°C
Storage Humidity		95% RH max.

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