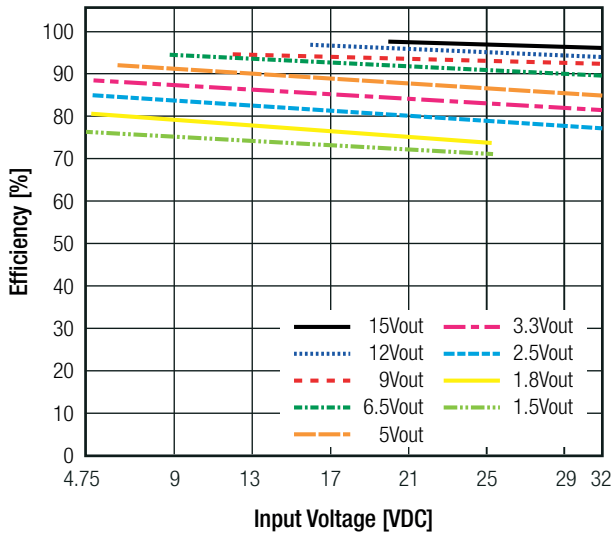


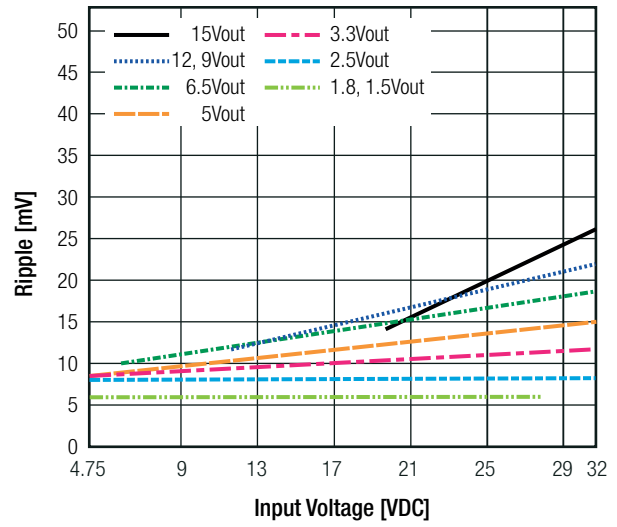


Specifications (measured @ Ta= 25°C, 10% minimum load, unless otherwise stated)

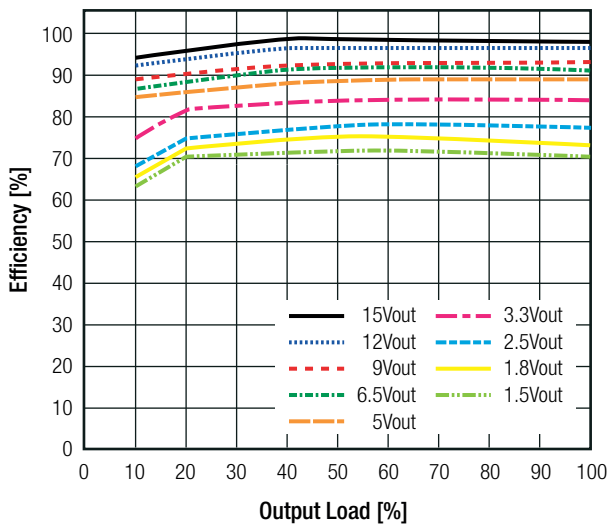
Efficiency vs. Vin (full load)



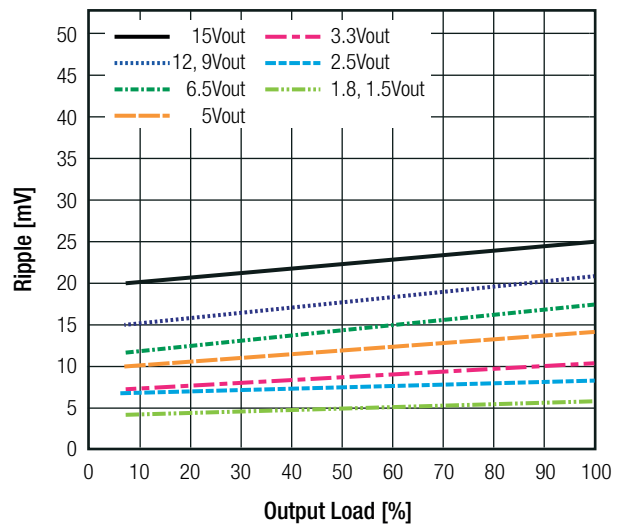
Ripple vs. Vin (full load)



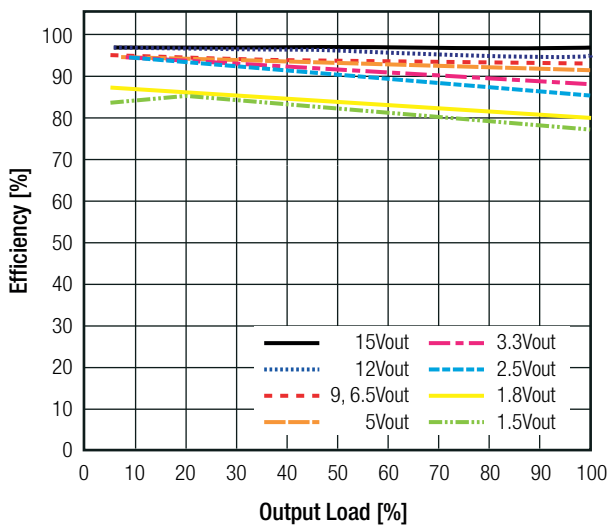
Efficiency vs. Load (max. Vin)



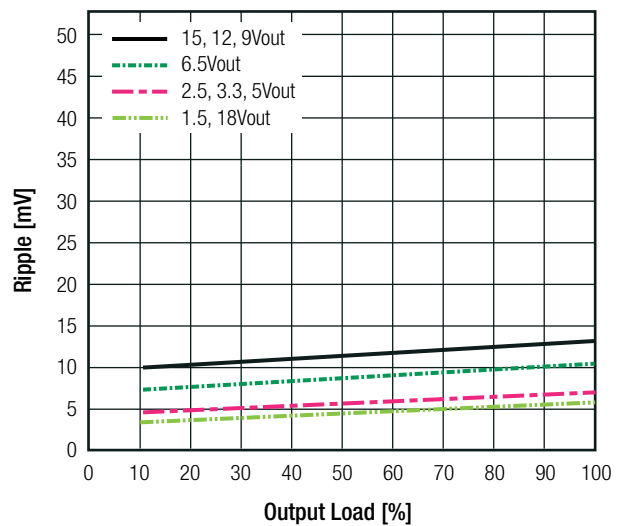
Ripple vs. Load (max. Vin)



Efficiency vs. Load (min. Vin)



Ripple vs. Load (min. Vin)



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

REGULATIONS			
Parameter	Condition		Value
Output Accuracy	100% load		±2.0% typ / ±3.0% max.
Line Regulation	low line to high line, 100% load	1.5Vout to 6.5Vout	±0.2% typ. / ±0.4% max.
		9Vout to 15Vout	±0.1% typ. / ±0.2% max.
Load Regulation	10% to 100% load	1.5Vout to 6.5Vout	±0.4% typ. / ±0.6% max.
		9Vout to 15Vout	±0.25% typ. / ±0.4% max.
Transient Response	100% <-> 50% load		±100mV typ. / ±150mV max.
	Recovery Time		1.0ms typ. / 1.5ms max.

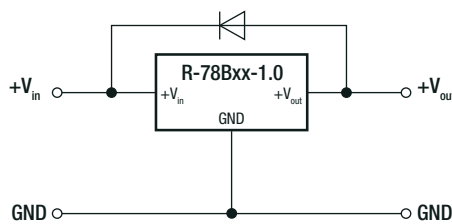
PROTECTIONS			
Parameter	Condition		Value
Short Circuit Protection (SCP)	below 100mΩ		continuous, automatic recovery
Short Circuit Input Current	nom. Vin= 24VDC		60mA max.

**Optional Diode Protection Circuit**

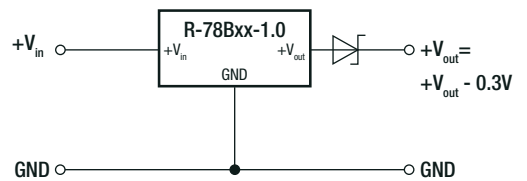
Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter when it is powered down.

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

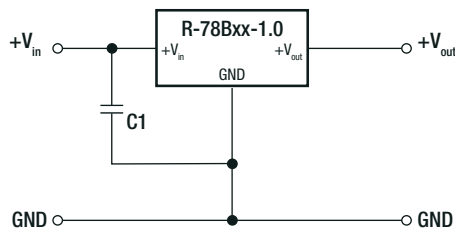
**Optional Protection 1:**



**Optional Protection 2:**



**Protection Circuit**



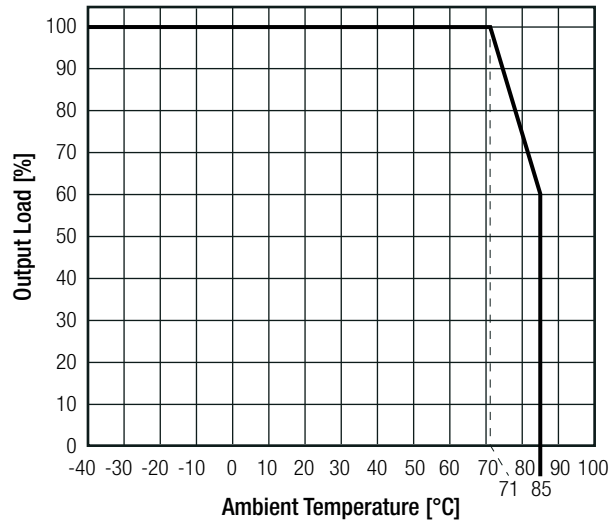
To protect the converter during power-up, use C1=22µF if Vin>30V

ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range	with derating (see graph)		-40°C to +85°C
Maximum Case Temperature			+100°C
Temperature Coefficient			±0.015%/K
Thermal Impedance	0.1m/s, vertical		60K/W
Operating Altitude			2000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	8593 x 10 <sup>3</sup> hours

continued on next page

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

Derating Graph

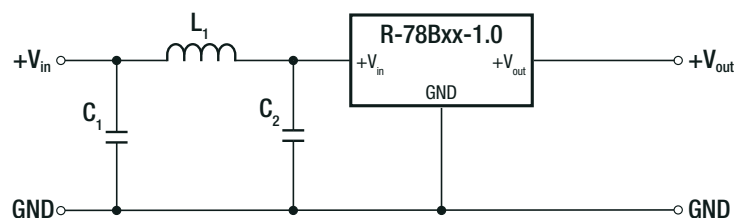


### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	1603123	IEC60950-1:2005, 2nd Edition + AM 2:2013 EN60950-1:2006 + AM 2:2013
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS 2+		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter (see filter suggestion below)	EN55032, Class A and B
ESD Electrostatic discharge immunity test	Air ±8kV, Contact ±4kV	EN61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m	EN61000-4-3, Criteria A

### EMC Filter Suggestion according to EN55032



#### Component List Class A

MODEL	C1	C2	L1
R-78B5.0-1.0(L)	10µF 100V MLCC	4.7µF 50V MLCC	3.9µH choke RLS-397
R-78B12-1.0(L)			
R-78B15-1.0(L)			

#### Component List Class B

MODEL	C1	C2	L1
R-78B5.0-1.0(L)	10µF 100V MLCC	10µF 100V MLCC	12µH choke RLS-126
R-78B12-1.0(L)			
R-78B15-1.0(L)			

**Notes:**

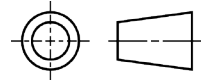
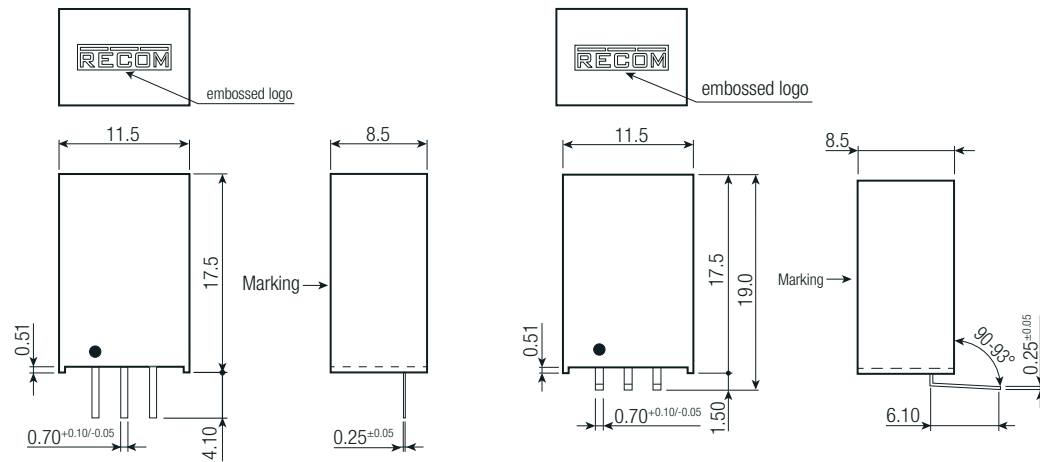
Note4: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

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

### DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting	non-conductive black plastic, (UL94 V-0) silicone, (UL94 V-0)
Package Dimension (LxWxH)		11.5 x 8.5 x 17.5mm
Package Weight		4g typ.

#### Dimension Drawing (mm)

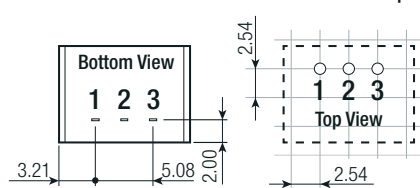


#### Pin Connections

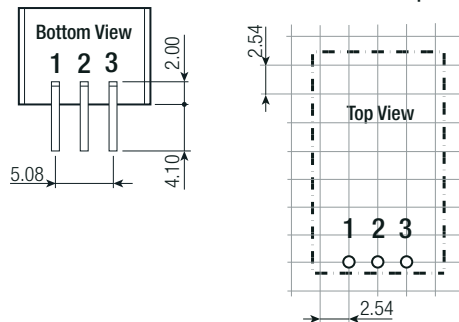
Pin #	Single
1	+Vin
2	GND
3	+Vout

Tolerance: xx.x= ±0.5mm  
xx.xx= ±0.25mm

#### Recommended Footprint Details

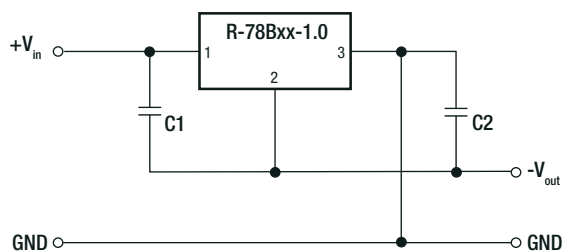


#### Recommended Footprint Details



### INSTALLATION AND APPLICATION

#### Positive to Negative Converter

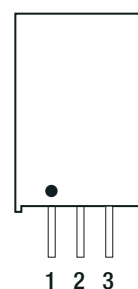


C1 and C2 are required and should be fitted close to the converter pins.

Maximum capacitive load including C2 is 220µF

#### Pin Connections

Pin #	Negative	Positive
1	+Vin	+Vin
2	-Vout	GND
3	GND	+Vout



continued on next page

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

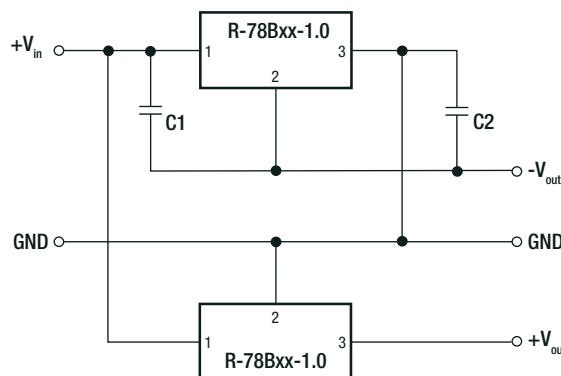
### Selection Guide - Negative Output

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [A]	Efficiency		External Capacitor	
				@ min Vin [%]	@ max. Vin [%]	C1	C2 <sup>(5)</sup>
R-78B1.5-1.0	4.75 - 28	-1.5	-0.6	70	68	10µF/50V	22µF/6.3V
R-78B1.8-1.0	4.75 - 28	-1.8	-0.6	72	72	10µF/50V	22µF/6.3V
R-78B2.5-1.0	4.75 - 28	-2.5	-0.6	75	77	10µF/50V	22µF/6.3V
R-78B3.3-1.0	4.75 - 28	-3.3	-0.6	77	80	10µF/50V	22µF/6.3V
R-78B5.0-1.0	6.5 - 28	-5.0	-0.6	83	85	10µF/50V	22µF/10V
R-78B6.5-1.0	8.0 - 26	-6.5	-0.4	84	87	10µF/50V	10µF/10V
R-78B9.0-1.0	8.0 - 18	-9.0	-0.4	88	89	10µF/25V	10µF/25V
R-78B12-1.0	8.0 - 18	-12	-0.3	89	90	10µF/25V	10µF/25V
R-78B15-1.0	8.0 - 18	-15	-0.3	89	91	10µF/25V	10µF/25V

**Notes:**

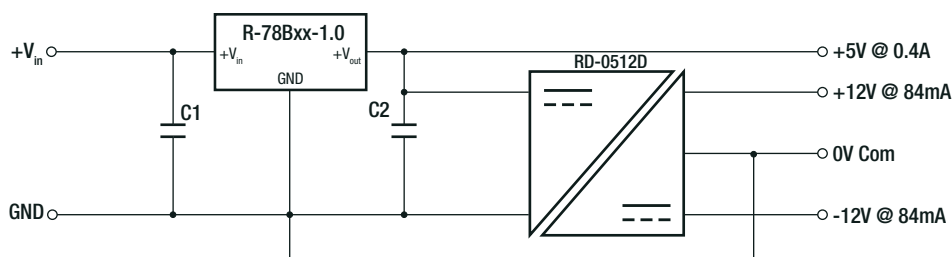
Note5: Maximum Capacitive Load including C2 is 220µF

### Dual Output (two Converters) with Negative Output



### Application Examples

#### High Efficiency Multiple Output



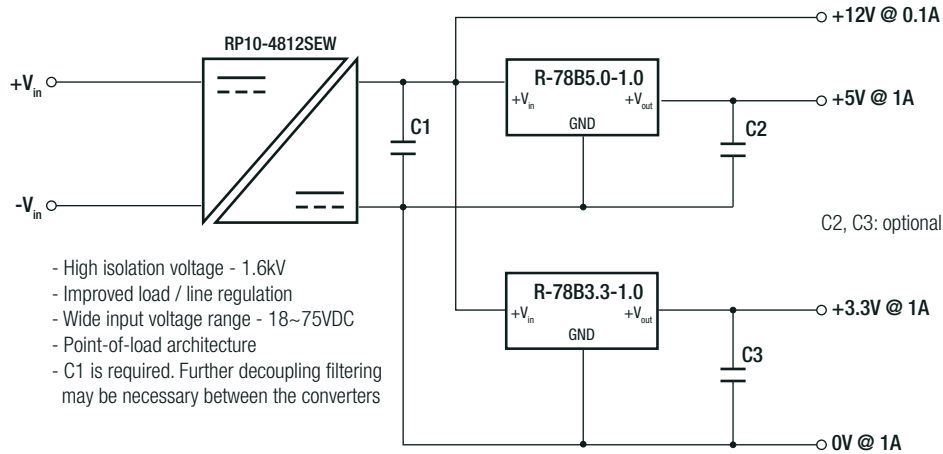
C1 optional;  
C2 required (further decoupling filtering may be necessary between the two converters)

- Wide input range 4.75V to 34V
- ±12V outputs for analogue circuits, e.g. instrumentation amplifier
- +5V output for digital circuits

continued on next page

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

**Isolated, Wide Input Range, Distributed Power Architecture (Point-of-Load)**



**PACKAGING INFORMATION**

Parameter	Type		Value
Packaging Dimension (LxWxH)	tube	without suffix with suffix "L"	520.0 x 25.1 x 10.6mm 520.0 x 26.1 x 15.8mm
Packaging Quantity	tube		42pcs
Storage Temperature Range			-55°C to +125°C
Storage Humidity			95% RH max.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.