Features

Switching Regulator

- Efficiency Up To 96%, No Heatsinks Required
- 2A Continuous Output Current
- Vin Up To 32V
- Vout: 1.2V - 15V
- Wide Operating Temperature -40°C to +70°C at Full Load
- Continuous Short Circuit Protection
- Pin Compatible With TO220 Linear Regulators
- Positive To Negative

RECOM

DC/DC Converter

R-78B-2.0

2.0 Amp SIP3 Single Output

3 YEAR 3 Warranty

Description

The R-78Bxx-2.0 series high efficiency switching regulators are ideally suited to replace 78xx linear regulators and are pin compatible. The efficiency of up to 96% means that very little energy is wasted as heat. Full power is available over a temperature range of -40°C up to 70°C without the need for heatsinks with their additional space and mounting costs. A high input voltage of up to 32VDC and output voltages from 1.2V up to 15V, low ripple and noise figures and a short circuit input current of typically only 50mA round off the specifications of this versatile converter series.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency @ full load @ min Vin [%]	@ max. Vin [%]	Max. Capacitive Load (1) [µF]
R-78B1.2-2.0	4.75 - 32	1.2	2000	72	87	3300
R-78B1.5-2.0	4.75 - 32	1.5	2000	79	90	3300
R-78B1.8-2.0	4.75 - 32	1.8	2000	80	91	3300
R-78B2.5-2.0	4.75 - 32	2.5	2000	84	92	2300
R-78B3.3-2.0	4.75 - 32	3.3	2000	86	92	1800
R-78B5.0-2.0	6.5 - 32	5	2000	90	94	820
R-78B9.0-2.0	11 - 32	9	2000	93	95	620
R-78B12-2.0	15 - 32	12	2000	94	96	470
R-78B15-2.0	18 - 32	15	2000	95	96	470

Notes:

Note1: Max. cap load is tested by nominal input and full resisitive load

IEC/EN62368-1 certified
CB Report
EN55022 Compliant

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

BASIC CHARACTERISTICS					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Input Voltage Range	nom. Vin= 24VDC	1.2Vout - 3.3Vout 5Vout 9Vout 12Vout 15Vout	4.75VDC 6.5VDC 11VDC 15VDC 18VDC	24VDC	32VDC
Maximum Reverse Voltage					0V
Inrush Current				2A	
Quiescent Current	nom. Vin= 24VDC			2mA	
Internal Power Dissipation	Vout= 1.5VDC			0.35W	0.8W
Start-up time				10ms	
Rise Time				50µs	
Internal Operating Frequency	nom. Vin= 24VDC			460kHz	
Minimum Load				0%	
Output Ripple and Noise	20MHz BW	Vout ≤3.3VDC Vout ≥5VDC		50mVp-p 75mVp-p	

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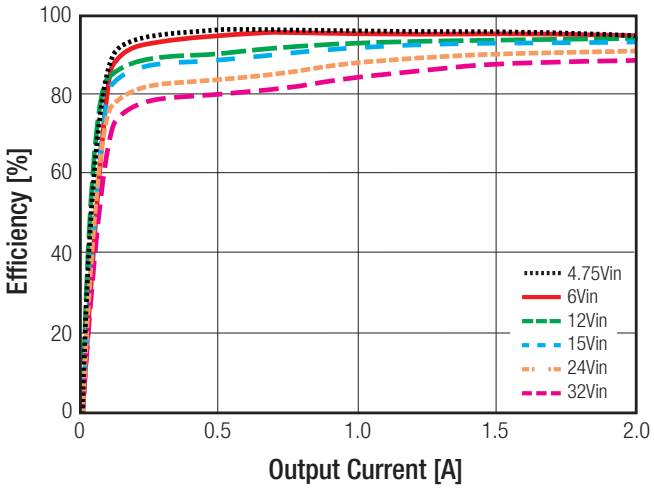
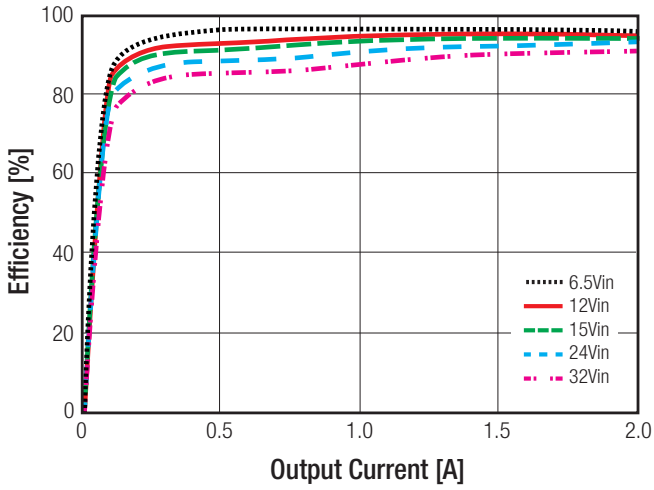
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm up unless otherwise specified)

Efficiency vs. Load

R-78B3.3-2.0

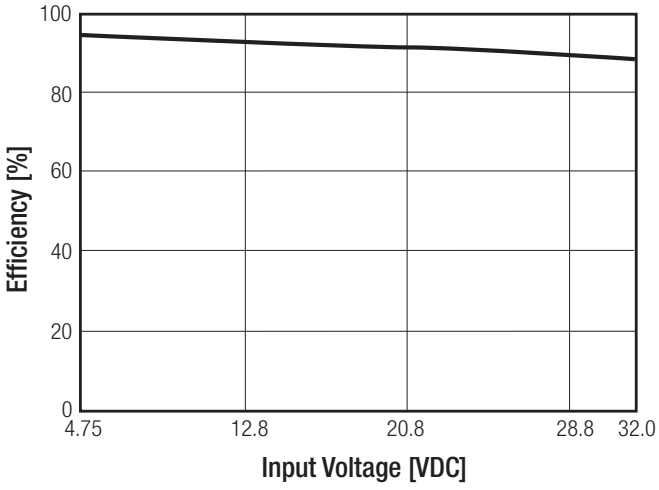


R-78B5.0-2.0

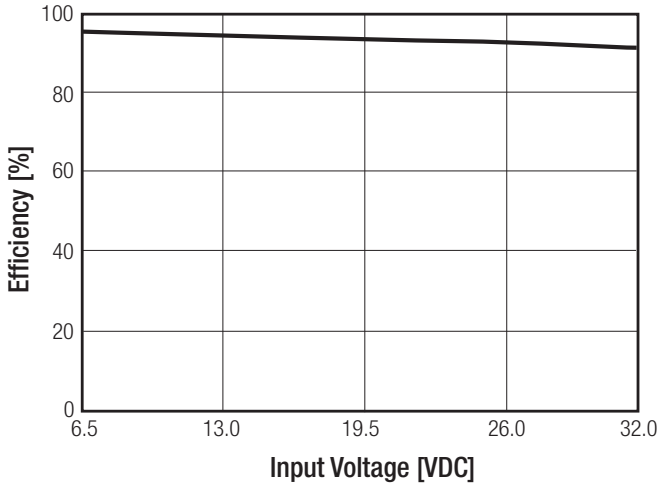


Efficiency vs. Input Voltage

R-78B3.3-2.0



R-78B5.0-2.0



REGULATIONS		
Parameter	**Condition**	**Value**
Output Accuracy		±2.0% typ.
Line Regulation	low line to high line, full load	±0.5% typ.
Load Regulation	0% to 100% load	±1.0% typ.

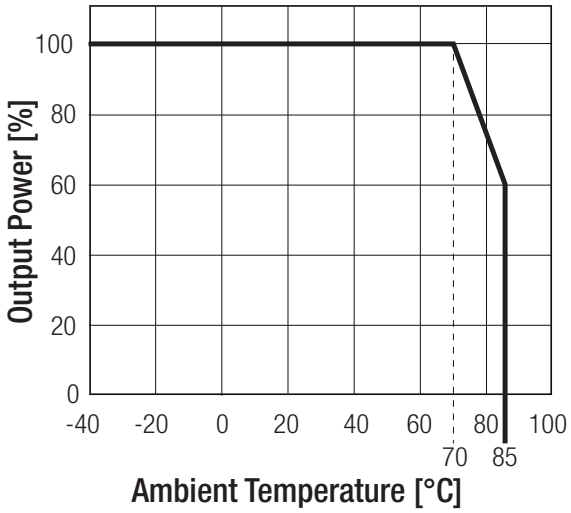
PROTECTIONS			
Parameter	**Condition**		**Value**
Short Circuit Protection (SCP)	below 100mΩ		continuous, automatic recovery
Short Circuit Input Current	nom. Vin= 24VDC	<5Vout ≥5Vout	50mA typ. 75mA typ.

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

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	without derating (see graph)	-40°C to +70°C
Maximum Case Temperature		+105°C
Temperature Coefficient		0.02%/°C typ.
Operating Altitude		5000m
Operating Humidity	non-condensing	95% RH max.
Pollution Degree		PD2
MTBF	according to MIL-HDBK-217F, G.B. +25°C	6349 x 10^3 hours
Vibration		10-55Hz, 2G, 30min along X, Y and Z axis

Derating Graph
(@ Chamber and natural convection 0.1m/s)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Audio/video, information and communication technology equipment Safety requirements (CB Scheme)	L0339m38-B1-L	IEC62368-1, 2nd Edition, 2014 EN62368-1, 2014
RoHs2+		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external components (see filter suggestion below)	EN55022, Class A EN55022, Class B
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024, 2010
Electromagnetic compatibility of multimedia equipment - Emission requirements		EN55032, Class B, 2013
ESD Electrostatic discharge immunity test	Air ±8kV and Contact ± 4kV	IEC61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3 V/m	IEC61000-4-3, Criteria A
Fast Transient and Burst Immunity	±0.5kV	IEC61000-4-4, Criteria A
Surge Immunity	±0.5kV	IEC61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	3V	IEC61000-4-6, Criteria A
Power Magnetic Field Immunity	50Hz/ 1A/m	IEC61000-4-8, Criteria A

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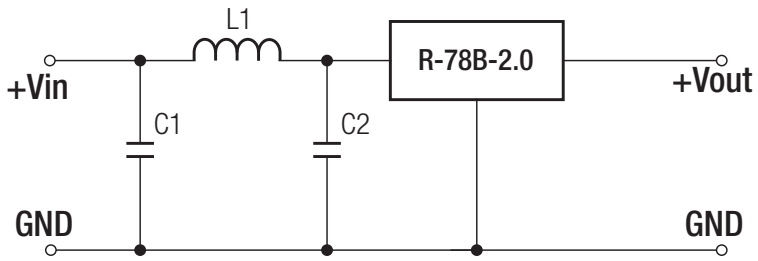
Specifications (measured @ ta= 25°C, nom. Vin, full load and after warm up unless otherwise specified)

EMC Filtering Suggestion according to EN55022

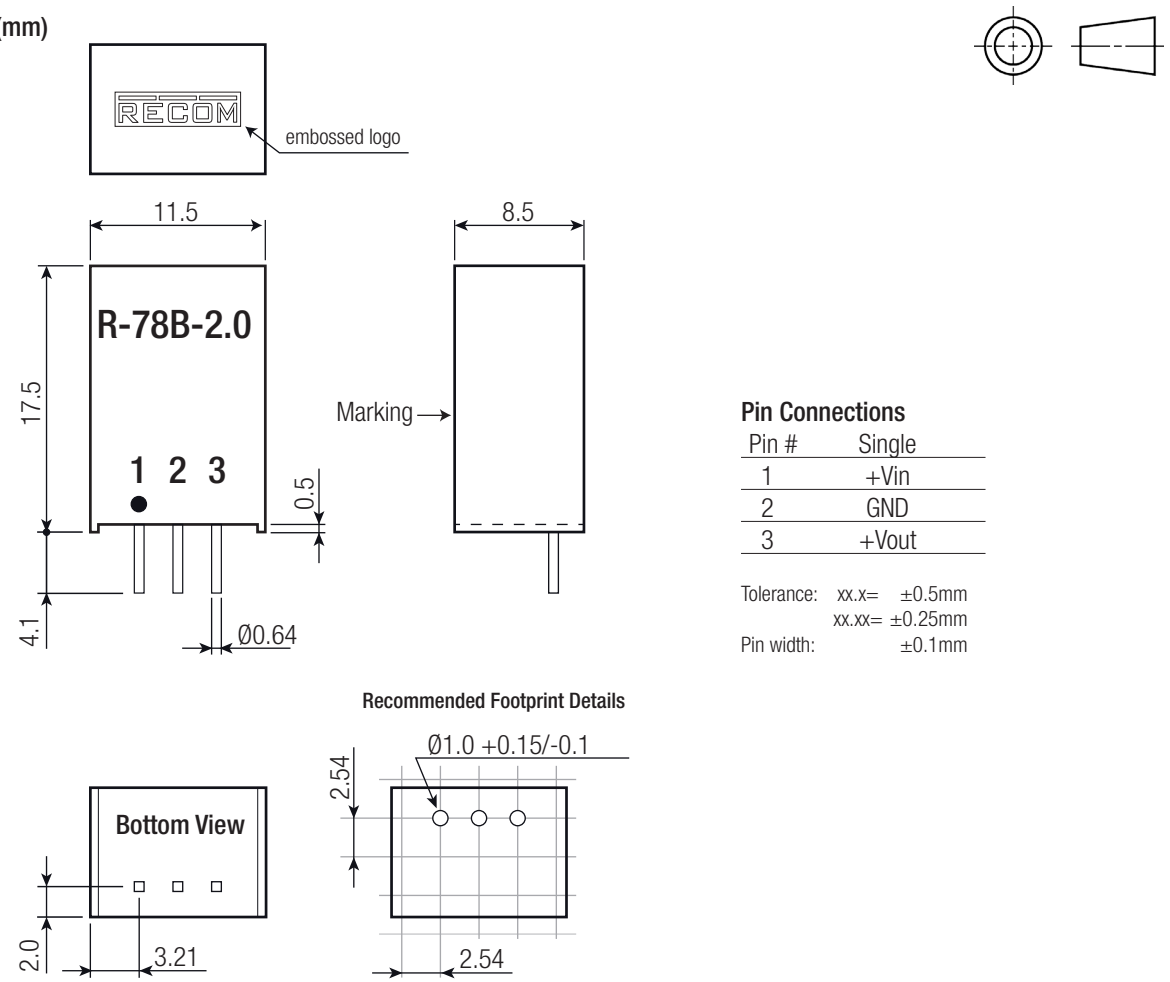


EN55022	C1	C2	L1
Class A	4.7µF 50V MLCC 1206	N/A	3.3µH Choke
Class B	10µF 50V MLCC 1210	4.7µF 50V MLCC 1206	10µH Choke

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	plastic, (UL94 V-0)
	Potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Package Dimension (LxWxH)		11.5 x 8.5 x 17.5mm
Package Weight		4.0g typ.

Dimension Drawing (mm)



Pin Connections

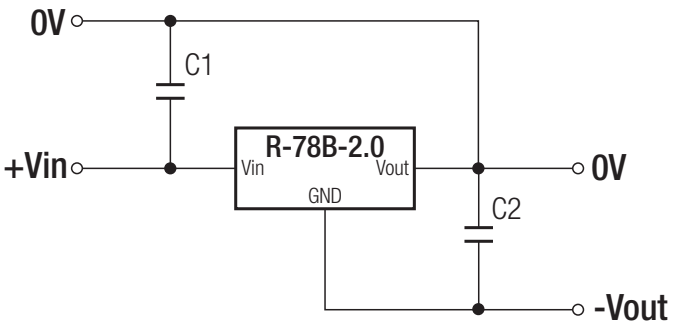
Pin #	Single
1	+Vin
2	GND
3	+Vout

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm
Pin width: ±0.1mm

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

INSTALLATION and APPLICATION

Positive to Negative



Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency @ full load @ min Vin [%]	@ max. Vin [%]	External Capacitor [C1 / C2]
R-78B1.2-2.0	4.75 - 32	-1.2	-1000	86	86	10µF / 10µF
R-78B1.5-2.0	4.75 - 32	-1.5	-1000	74	87	10µF / 10µF
R-78B1.8-2.0	4.75 - 32	-1.8	-1000	76	88	10µF / 10µF
R-78B2.5-2.0	4.75 - 32	-2.5	-1000	79	89	10µF / 10µF
R-78B3.3-2.0	4.75 - 32	-3.3	-1000	83	89	10µF / 10µF
R-78B5.0-2.0	6.5 - 32	-5	-1000	86	90	10µF / 10µF
R-78B9.0-2.0	11 - 32	-9	-1000	90	91	10µF / 10µF
R-78B12-2.0	15 - 32	-12	-1000	91	92	10µF / 10µF
R-78B15-2.0	18 - 32	-15	-1000	92	93	10µF / 10µF

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 25.1 x 10.6mm
Packaging Quantity		42pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.