Technical Data Sheet

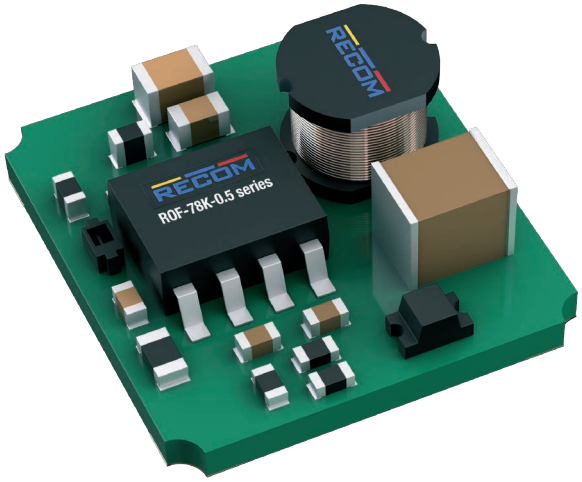
ROF-78K-0.5 Series ◊ Regulated SMD

0.5Amp ◊ Non-isolated Single Output ◊ Input: 4.5V-36VDC

RECOM DC/DC Converter

FEATURES

- Low cost
- Low profile 4.5mm
- Efficiency up to 95%
- -40°C to +105°C operating temperature range
- No derating up to 95°C for all models
- 3 year warranty



Dimensions (LxWxH): 12.5 x 13.5 x 4.5mm (0.49 x 0.53 x 0.18 inch)
0.88g (0.002 lbs)

APPLICATIONS



SAFETY & EMC

RoHS² compliant 10 from 10

Reach compliant

DESCRIPTION

The ROF-78K is a switching regulator with a wide input voltage range, high efficiency and a low profile, pin-less SMD package. Seven output voltages are available as standard: 3.3V, 5V, 6.5V, 9V, 12V, 15V or 24VDC with 500mA continuous output current rating over the full operating temperature range of -40°C to +95°C without derating. No minimum load is required. 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 2:1 INPUT

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. (1) [%]	max. Capacitive Load (2) [µF]
ROF-78K3.3-0.5SMD-R	4.5-36	3.3	500	83	1500
ROF-78K5.0-0.5SMD-R	6.5-36	5	500	85	1500
ROF-78K6.5-0.5SMD-R	8-36	6.5	500	87	1500
ROF-78K9.0-0.5SMD-R	11-36	9	500	89	470
ROF-78K12-0.5SMD-R	15-36	12	500	92	470
ROF-78K15-0.5SMD-R	18-36	15	500	93	270
ROF-78K24-0.5SMD-R	28-36	24	500	95	270

Note1: Efficiency is tested at minimum input and full load at +25°C ambient
Note2: Max Cap Load is tested at nominal input and full resistive load

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ROF-78K-0.5 Series ◊ Regulated SMD

0.5Amp ◊ Non-isolated Single Output ◊ Input: 4.5V-36VDC

RECOM DC/DC Converter

MODEL NUMBERING

ROF-78K__-0.5 SMD-R

- Output Voltage
- Output Current
- Packaging (3)

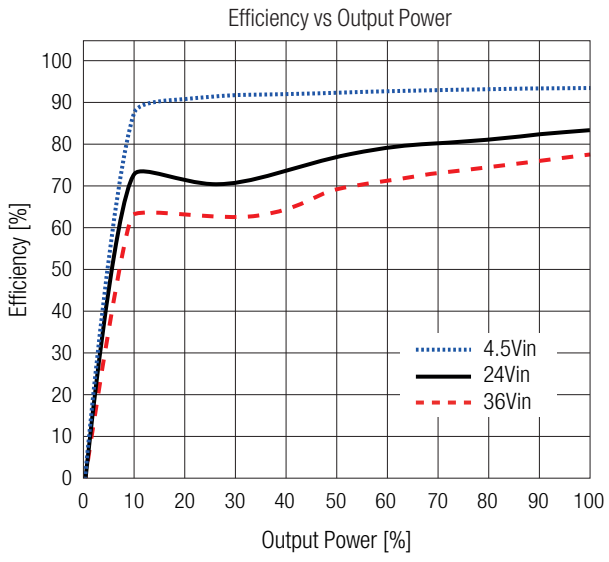
Note3: suffix "-R" for tape&reel packaging (refer to **„Packaging Information“**)

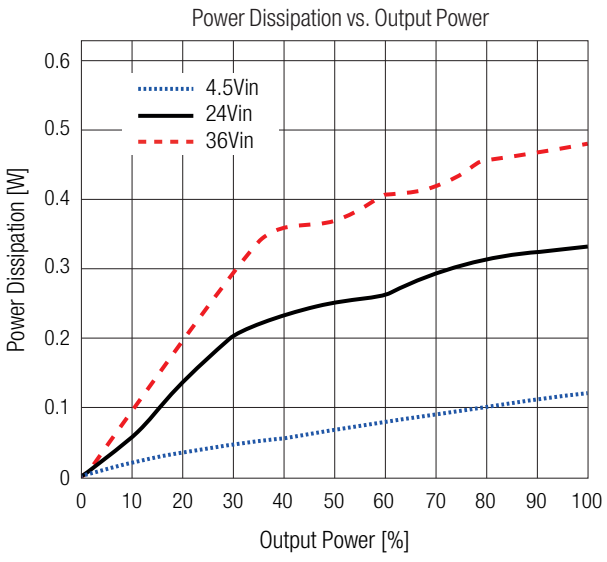
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Conditions		Min.	Typ.	Max.
Input Under Voltage Lockout (UVLO)	ROF-78K3.3-0.5SMD	DC-DC ON	4.1VDC		4.4VDC
		DC-DC OFF	3.8VDC		4VDC
	ROF-78K5.0-0.5SMD	DC-DC ON	5.1VDC		5.7VDC
		DC-DC OFF	4.7VDC		5.1VDC
	ROF-78K6.5-0.5SMD	DC-DC ON	7.1VDC		7.5VDC
		DC-DC OFF	6.5VDC		7.3VDC
	ROF-78K9.0-0.5SMD	DC-DC ON	10VDC		10.8VDC
		DC-DC OFF	9.2VDC		10.1VDC
	ROF-78K12-0.5SMD	DC-DC ON	14VDC		14.2VDC
		DC-DC OFF	13VDC		13.5VDC
	ROF-78K15-0.5SMD	DC-DC ON	17VDC		17.8VDC
		DC-DC OFF	16VDC		16.6VDC
	ROF-78K24-0.5SMD	DC-DC ON	26VDC		27.1VDC
		DC-DC OFF	24VDC		25VDC
Quiescent Current					5mA
Minimum Load			0%		
Start-up Time				25ms	
ON/OFF CTRL	DC-DC ON		Open or 1.75VDC < V_{CTRL} < 30VDC		
	DC-DC OFF		Short to GND or 0 < V_{CTRL} < 0.5VDC		
Standby Current	remote DC-DC OFF	nom. V_{OUT}= 15V, ±24VDC		100µA	
		others		20µA	
Internal Operating Frequency				400kHz	
Output Ripple and Noise (4)	20MHz BW, 25°C	nom. V_{IN}= 24VDC, full load			100mVp-p

Note4: Measurements are made with a 10µF MLCC across and close to output pins.
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

ROF-78K3.3-0.5

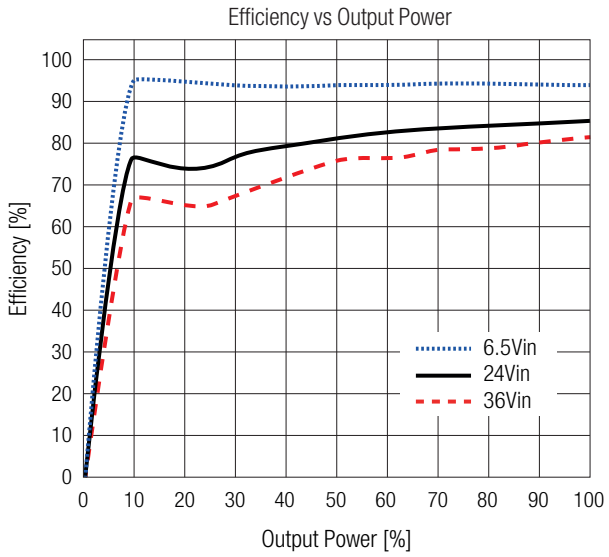


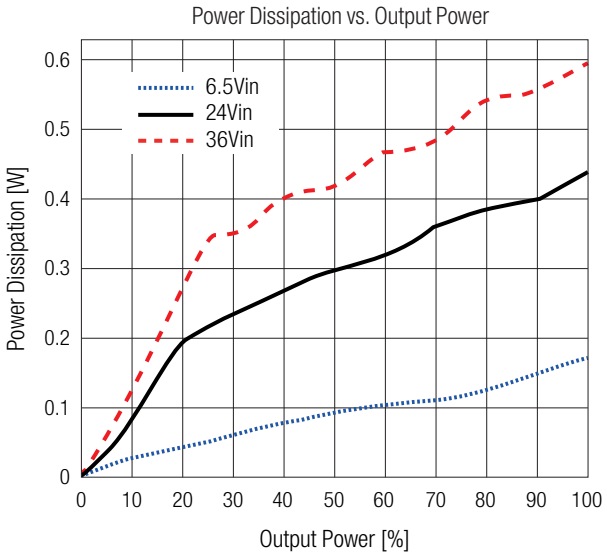


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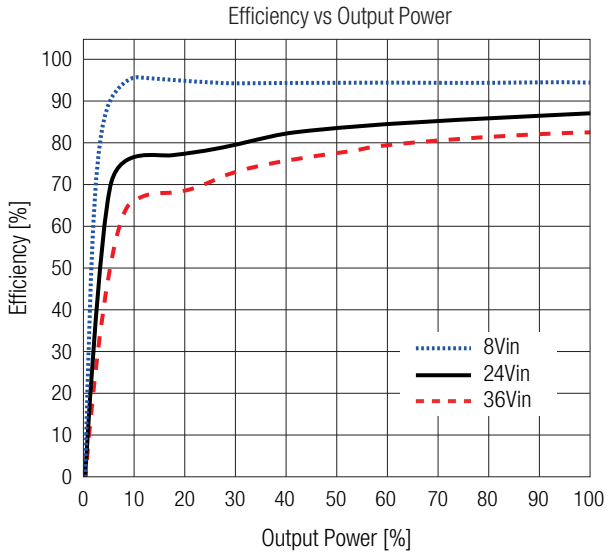
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

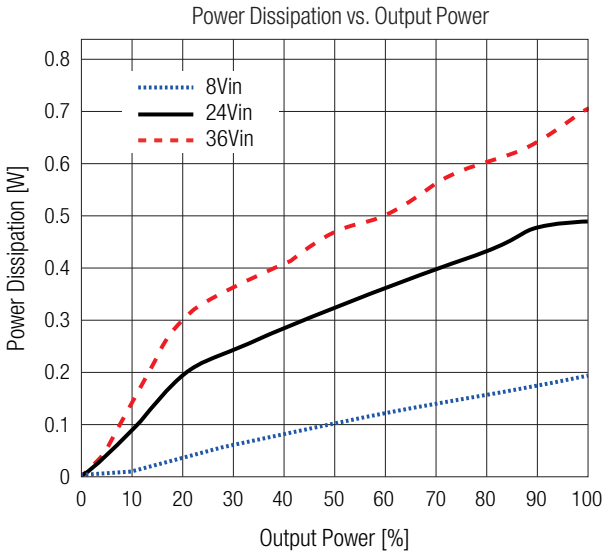
ROF-78K5.0-0.5



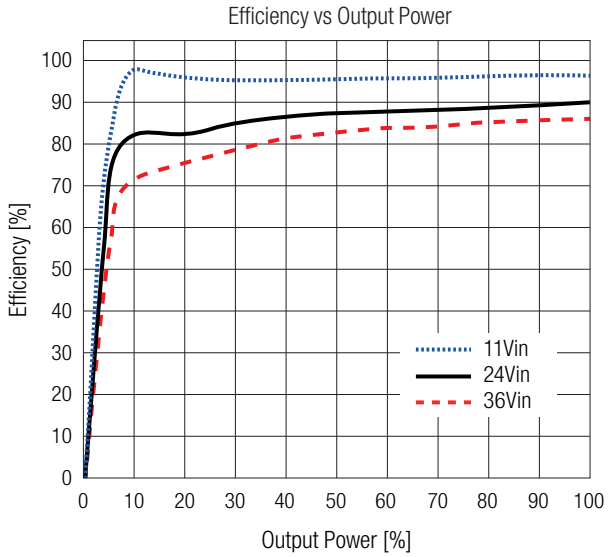


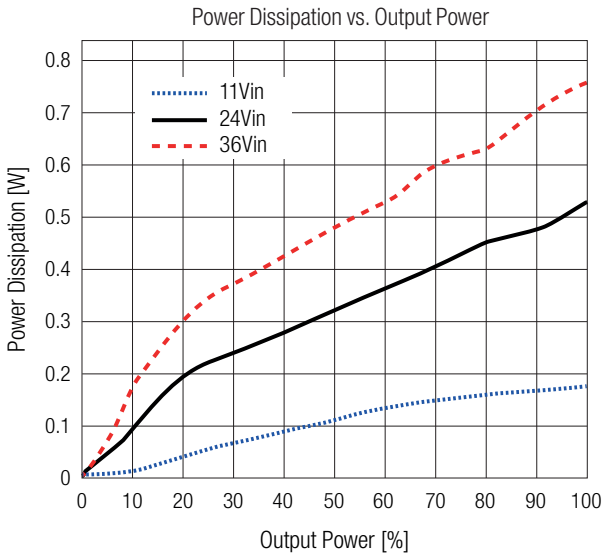
ROF-78K6.5-0.5





ROF-78K9.0-0.5

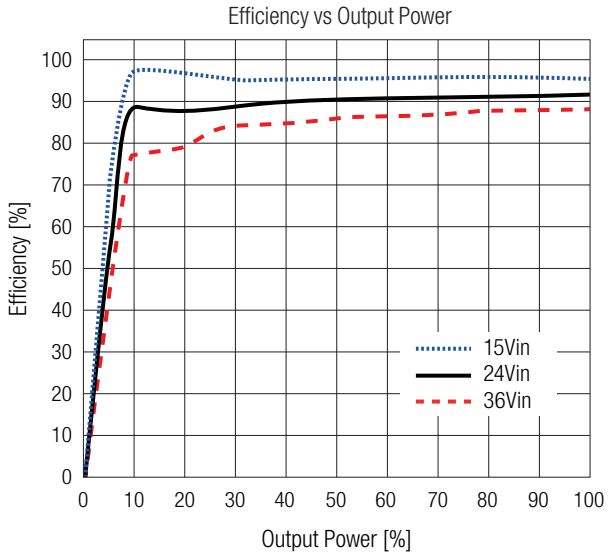


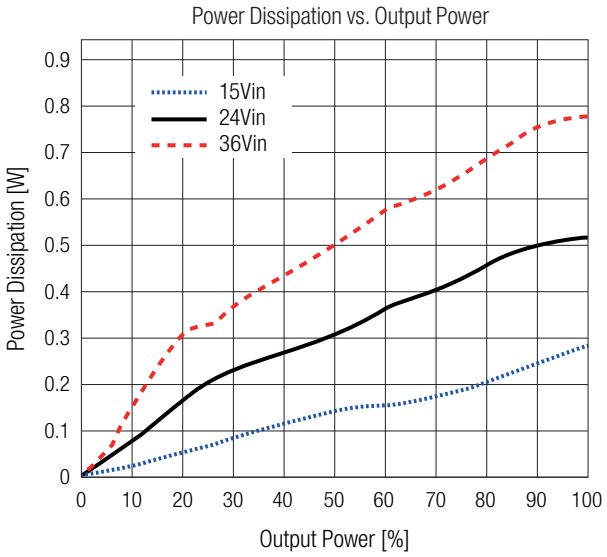


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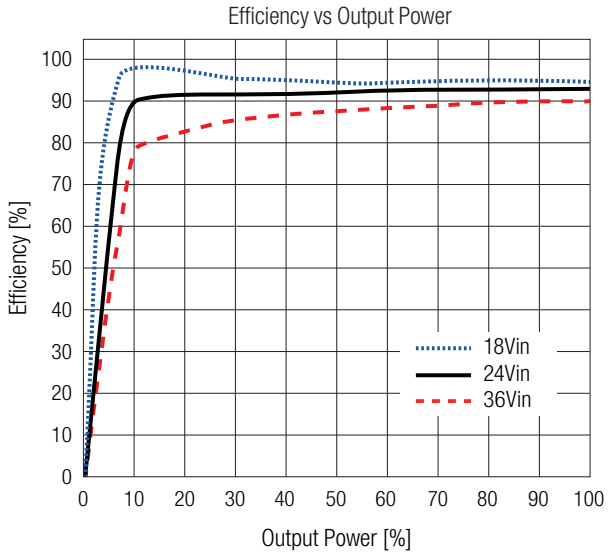
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

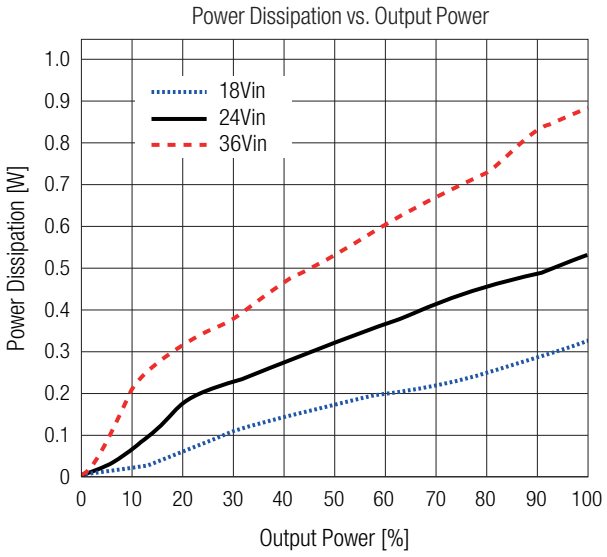
ROF-78K12-0.5



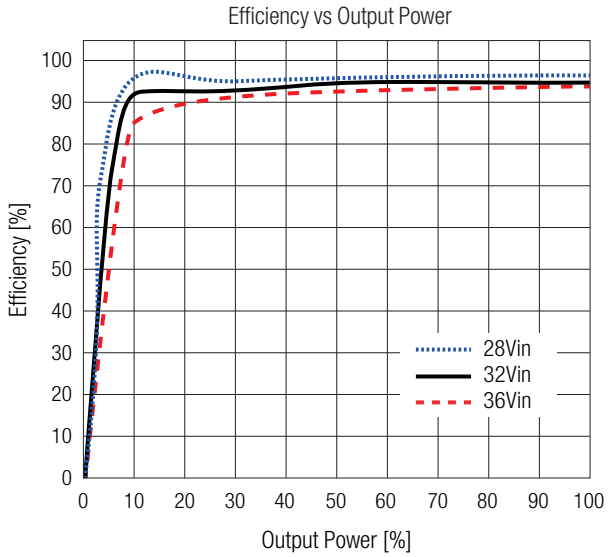


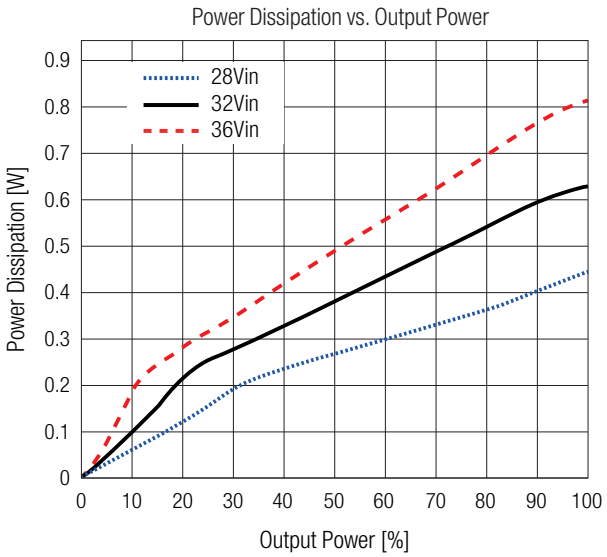
ROF-78K15-0.5





ROF-78K24-0.5





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ROF-78K-0.5 Series ◊ Regulated SMD

0.5Amp ◊ Non-isolated Single Output ◊ Input: 4.5V-36VDC

RECOM DC/DC Converter

REGULATIONS

Parameter	Conditions	Value
Output Accuracy	nom. V_{OUT}= 3.3V, 5.0V, 6.5VDC	±4.0% max.
	others	±3.0% max.
Line Regulation	low line to high line, full load	±1.0% max.
Load Regulation (5)	10%-100% load	±3.0% max.

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

PROTECTIONS

Parameter	Conditions	Value
Short Circuit Protection (SCP)		hiccup mode, auto recovery
Over Current Protection (OCP)	hiccup mode, auto recovery	3000mA max.

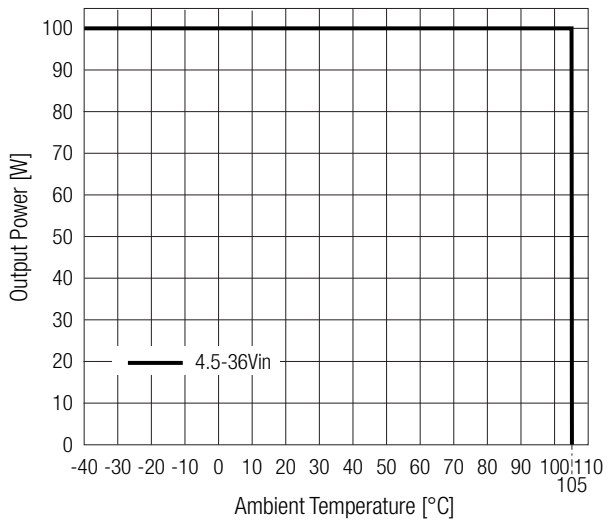
ENVIRONMENTAL

Parameter	Conditions			Value
Operating Temperature Range	@ natural convection 0.1m/s, refer to **„Derating Graph“**	nom. V_{OUT}= 3.3VDC	without derating	-40°C to +105°C
		others	with derating	
Operating Altitude				5000m
Operating Humidity	non-condensing			5-95% RH max.
Pollution Degree				PD2
MTBF	according to MIL-HDBK-217F, G.B.	ROF-78K3.3-0.5	T_{AMB}= +25°C	3098 x 10³ hours
			T_{AMB}= +85°C	1715 x 10³ hours
		ROF-78K5.0-0.5	T_{AMB}= +25°C	3067 x 10³ hours
			T_{AMB}= +85°C	1636 x 10³ hours
		ROF-78K6.5-0.5	T_{AMB}= +25°C	3065 x 10³ hours
			T_{AMB}= +85°C	1679 x 10³ hours
		ROF-78K9.0-0.5	T_{AMB}= +25°C	3083 x 10³ hours
			T_{AMB}= +85°C	1609 x 10³ hours
		ROF-78K12-0.5	T_{AMB}= +25°C	2984 x 10³ hours
			T_{AMB}= +85°C	1586 x 10³ hours
		ROF-78K15-0.5	T_{AMB}= +25°C	3046 x 10³ hours
			T_{AMB}= +85°C	1640 x 10³ hours
		ROF-78K24-0.5	T_{AMB}= +25°C	2376 x 10³ hours
			T_{AMB}= +85°C	1341 x 10³ hours

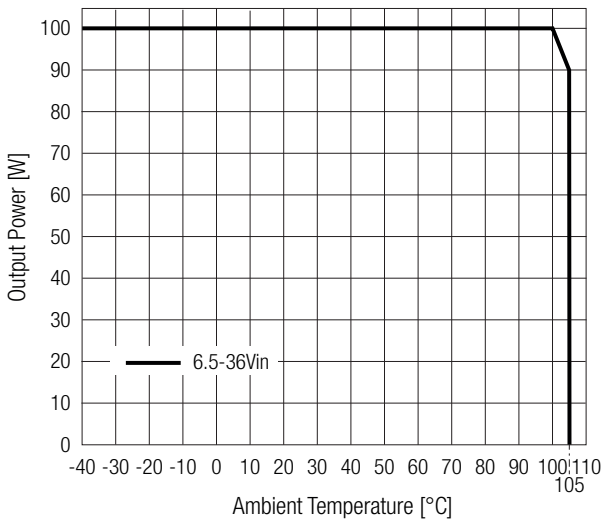
Derating Graph

(@ Chamber and natural convection 0.1m/s)

ROF-78K3.3-0.5



ROF-78K5.0-0.5



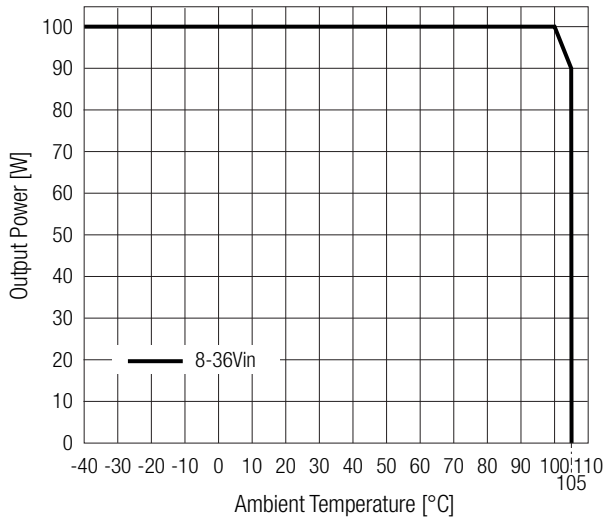
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ENVIRONMENTAL

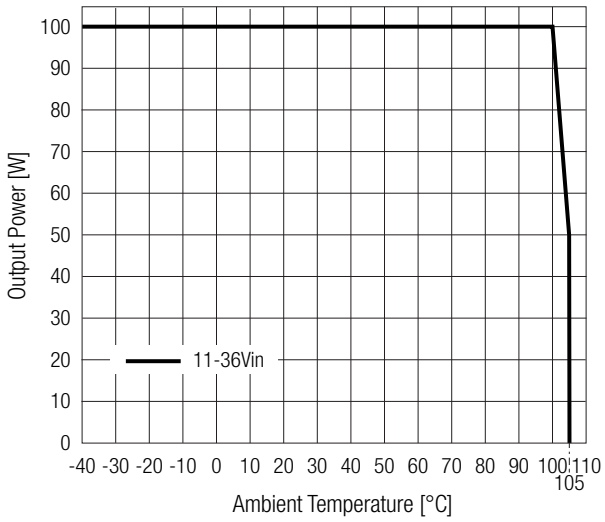
Derating Graph

(@ Chamber and natural convection 0.1m/s)

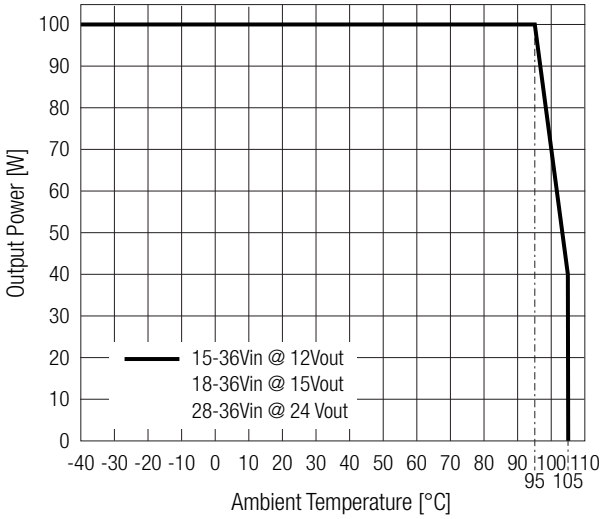
ROF-78K6.5-0.5



ROF-78K9.0-0.5



ROF-78K12-0.5, ROF-78K15-0.5, ROF-78K24-0.5



SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
RoHS2		RoHS 2011/65/EU + AM2015/863
EMC Compliance	**Conditions**	**Standard / Criterion**
Electromagnetic compatibility of multimedia equipment – Emission Requirements	with external filter, refer to below filter suggestion	EN55032, Class B

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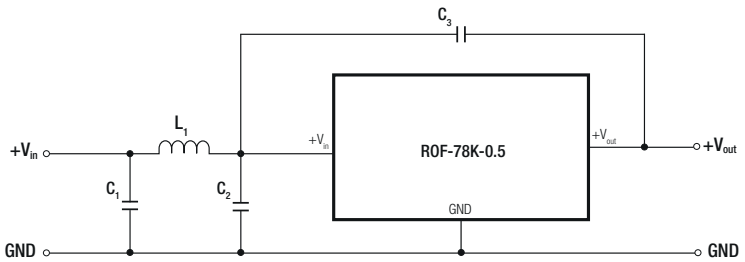
ROF-78K-0.5 Series ◊ Regulated SMD

0.5Amp ◊ Non-isolated Single Output ◊ Input: 4.5V-36VDC

RECOM DC/DC Converter

SAFETY & CERTIFICATIONS

EMC filter suggestion



Component List Class A

nom. V_{OUT} [VDC]	C1	C2	L1	C3
3.3	2.2µF	100nF	22µF/ 650mA RLS-226	/
5				
6.5				
9				
12				
15				
24				

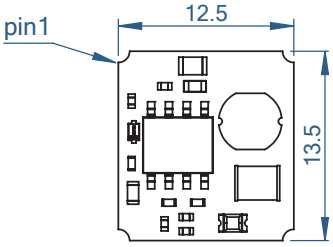
Component List Class B

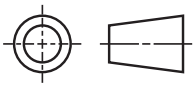
nom. V_{OUT} [VDC]	C1	C2	L1	C3
3.3	10µF	100nF	22µF/ 650mA RLS-226	1nF
5				
6.5				
9				
12				
15				
24	22µF			

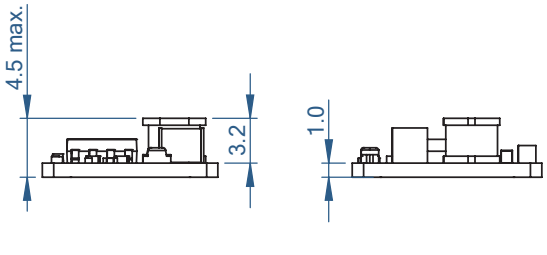
DIMENSION & PHYSICAL CHARACTERISTICS

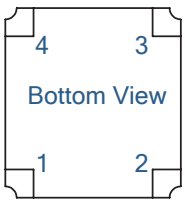
Parameter	Type	Value
Material	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		12.5 x 13.5 x 4.5mm 0.49 x 0.53 x 0.18 inch
Weight		0.88g typ. 0.002 lbs

Dimension Drawing (mm)

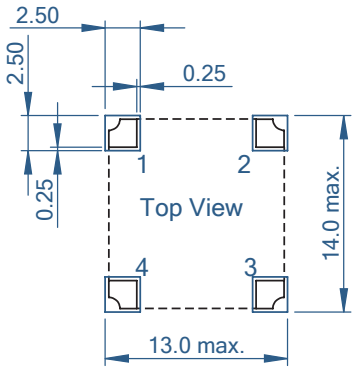








Recommended Footprint Details



Pinning Information

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

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

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PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	Tape & Reel (-R)	365.0 x 365.0 x 55.0mm 14.37 x 14.37 x 2.17inch
Packaging Quantity		600pcs
Tape Width		24mm
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	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.

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