Features

Regulated Converters

- 2:1 Input Voltage Range
- 2.25kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Ultraminiature Open Frame SMD
- No Minimum Load Required

RECOM

DC/DC Converter

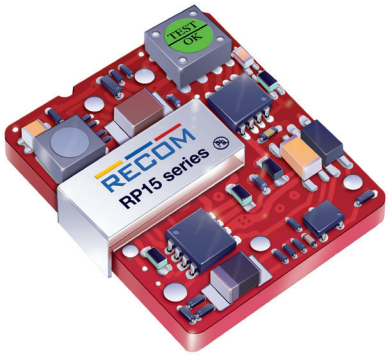
RP15-OF

15 Watt Single Output Open Frame SMD

3 YEAR 3 warranty

Description

The RP15-SOF series, are SMD open frame ultraminiature power DC/DC converters in a case half the size of industry standard 15W converters. The converters use solder ball pins to enable SMD mounting and can be reflow soldered. Despite their small size, these converters are fully specified devices with output currents up to 3.5 Amps, no minimum load, 2250VDC isolation and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The RP15-SOF series will find many uses in telecommunications and other demanding applications where cost, board space or board height is at a premium.



Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input[1] Current [mA]	Efficiency[1] typ. [%]	Max. Capacitive Load[2] [µF]
RP15-243.3SOF[3]	18-36	3.3	3500	560	86	10000
RP15-2405SOF[3]	18-36	5	3000	718	87	6000
RP15-2412SOF[3]	18-36	12	1250	718	87	1000
RP15-2415SOF[3]	18-36	15	1000	710	88	660
RP15-483.3SOF[3]	36-75	3.3	3500	283	85	10000
RP15-4805SOF[3]	36-75	5	3000	359	87	6000
RP15-4812SOF[3]	36-75	12	1250	359	87	1000
RP15-4815SOF[3]	36-75	15	1000	355	88	660

Notes:

Note1: Values at nominal input voltage and no load/full load.
Note2: Test by minimum Vin and constant resistor load.

RoHS 2+ compliant 8 from 8 | REACH compliant | c UL us E196683

UL60950-1 Certified

Model Numbering

RP15-__ __ SOF/_

- Input Voltage
- Output Voltage
- Single
- Control Logic[4]

Ordering Examples

RP15-2405SOF = 24 Input, 5V Output, No CTRL or trim connections
RP15-2412SOF/P = 24V Input, 12V Output, Positive logic. CTRL and trim SMD pins fitted

Notes:

Note3: Standard part is without suffixes and Trim and CTRL pins are not fitted.
add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF) and trim pin for single output
add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF) and trim pin for single output

Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

BASIC CHARACTERISTICS					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Input Voltage Range	nom. Vin = 24V nom. Vin = 48V		18VDC 36VDC	24VDC 48VDC	36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		 14.5VDC	18VDC
	Vin = 48V	DC-DC ON DC-DC OFF		 30.5VDC	36VDC
Input Filter					Pi-Type
Input Reflected Ripple[4]	nominal Vin and full load			30mAp-p	
Input Surge Voltage	Vin = 24V, 100ms max. Vin = 48V, 100ms max.				50VDC 100VDC
Start-up time	Power up Remote ON/OFF				30ms 30ms
Operating Frequency Range	3.3V, 5V Others		243kHz 423kHz	270kHz 470kHz	297kHz 517kHz
Minimum Load			0%		
Optional Output Trim[5]					±10.0%
Ripple and Noise	measured by 20MHz bandwidth with a 1µF M/C X7R and 10µF T/C	3.3Vout, 5Vout 12Vout, 15Vout		75mVp-p 100mVp-p	
Remote ON/OFF[5]	Positive Logic	DC-DC ON DC-DC OFF			Open or 3.0V < Vr < 15V Short or 0V < Vr < 1.2V
	Negative Logic	DC-DC ON DC-DC OFF			Short or 0V < Vr < 1.2V Open or 3.0V < Vr < 15V
Input current of Remote pin (CTRL)		DC-DC OFF			20mA
		DC-DC ON	-0.5mA		+1.0mA

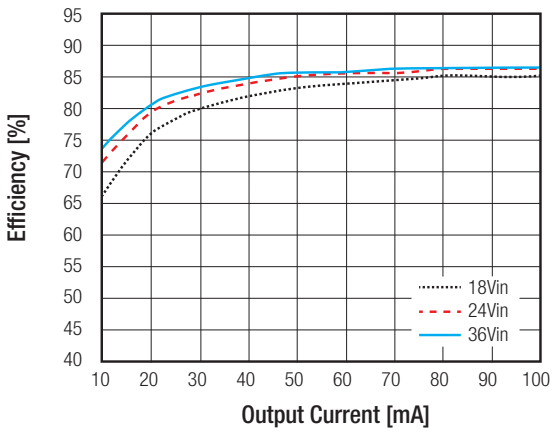
Notes:

Note4: Simulated source impedance of 12µH. 12µH inductor in series with +Vin.

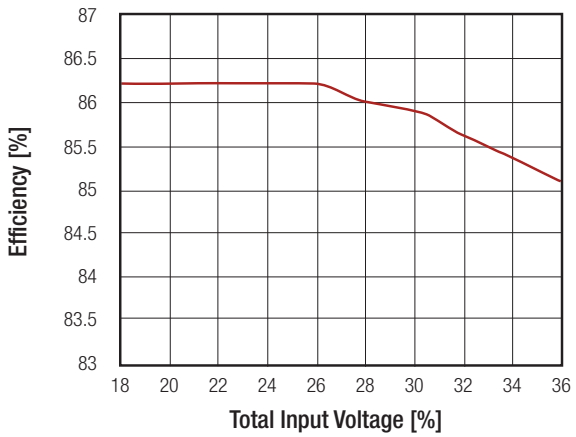
Note5: If no suffix is specified, the control pin will be omitted. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin.

RP15-2405SOF

Efficiency vs. Output Current



Efficiency vs. Input Voltage



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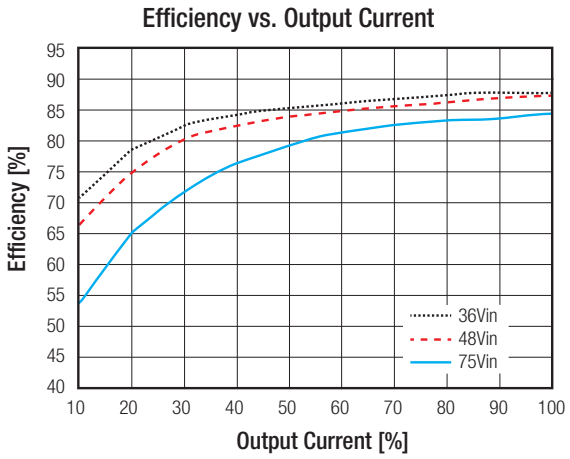
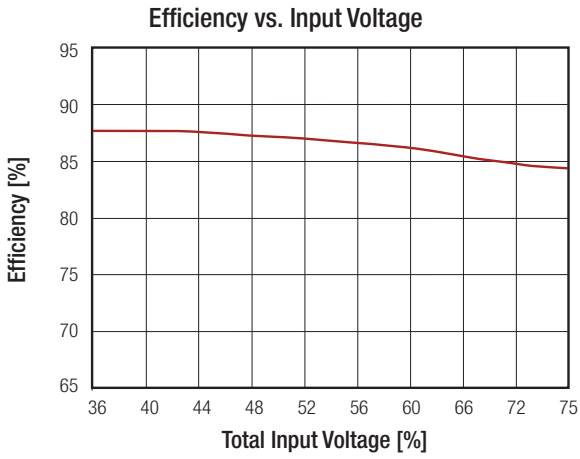
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP15-4805SOF





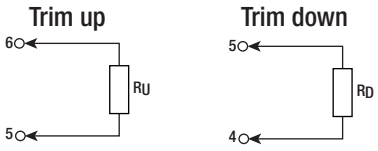
REGULATIONS

Parameter	Condition	Value
Output Voltage Accuracy		±1%
Voltage Adjustable		±10%
Line Voltage Regulation	low line to high line at full load	±0.2%
Output Voltage overshoot		3% typ.
Load Voltage Regulation	0% to 100% load Single	±0.2%
Cross Regulation	asymmetrical 25%<>100% load	±5%
Transient Response recovery time	25% load step change	300µs typ.

External Output Trimming

Output Voltage Trimming

Single output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for chosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



RP15-xx3.3SOF

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Volts
R_U =	385.07	191.51	126.99	94.73	75.37	62.47	53.25	46.34	40.96	36.66	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Volts
R_D =	116.72	54.78	34.13	23.81	17.62	13.49	10.54	8.32	6.60	5.23	kOhms

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Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP15-xx05SOF

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.4	5.45	5.50	Volts
R_U =	253.45	125.70	83.12	61.82	49.05	40.53	34.45	29.89	26.34	23.50	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	Volts
R_D =	248.34	120.59	78.01	56.71	43.94	35.42	29.34	24.78	21.23	18.39	kOhms

RP15-xx12SOF

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	Volts
R_U =	203.22	99.06	64.33	46.97	36.56	29.61	24.65	20.93	18.04	15.72	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.8	Volts
R_D =	776.56	380.72	248.78	182.81	143.22	116.83	97.98	83.85	72.85	64.06	kOhms

RP15-xx15SOF

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	15.15	15.3	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
R_U =	161.56	78.22	50.45	36.56	28.22	22.67	18.70	15.72	13.41	11.56	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	14.85	14.70	14.55	14.40	14.25	14.10	13.95	13.80	13.65	13.50	Volts
R_D =	818.22	401.56	262.67	193.22	151.56	123.78	103.94	89.06	77.48	68.22	kOhms

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.7 - 5.4V
		5Vout	5.6 - 7.0V
		12Vout	13.5 - 19.6V
		15Vout	16.8 - 20.5V
Over Load Protection (OLP)	% of Iout rated, Hiccup mode		150% typ.
Isolation Voltage	I/P to O/P		2.25kVDC/1 minute
Isolation Resistance	500VDC		10MΩ min.
Isolation Capacitance			1000pF typ.

Notes:

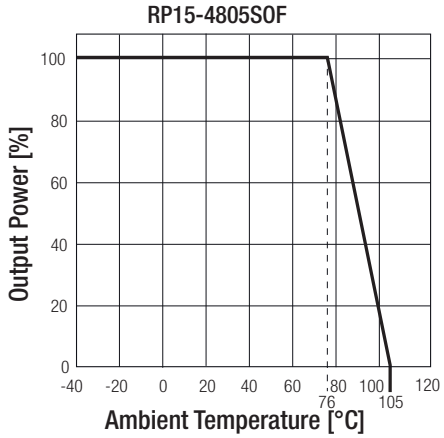
Note6: This power module is not internally fused. An input line fuse must always be used.

Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

ENVIRONMENTAL

Parameter	Condition	Value
Lead-free reflow solder process		IPC J-STD-020D
Moisture sensitivity level (MSL)		IPC J-STD-03B level 2a
Operating Temperature Range	without derating with derating	-40°C to 76°C -40°C to +105°C
Temperature Coefficient		±0.02%/°C max.
Operating Humidity		5% - 95%, RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F Bellcore TR-NWT-000332[7]	3438 x 10^3 hours 2200 x 10^3 hours

Derating Graph[8]



Notes:

Note7: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C.
MIL-HDBK 217F Notice 2. Ta = 25°C, full load, (Ground, Benign, controlled environment).

Note8: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact our technical support service at techsupportAT@recom-power.com.

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

EMC Compliance	Condition	Standard / Criterion
EMI Standard[8]	with external filter	EN55022, Class A or B
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient[9]	±2kV	EN61000-4-4, Criteria B
Surge [9]	±1kV	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

Notes:

Note8: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

Note9: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220µF/100V.

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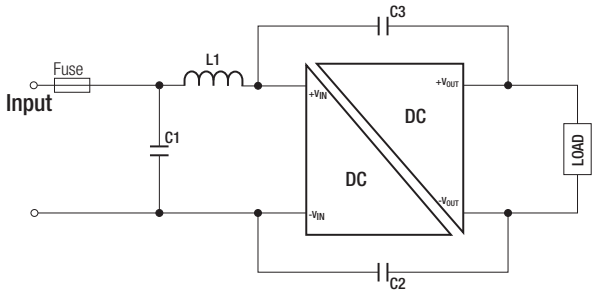
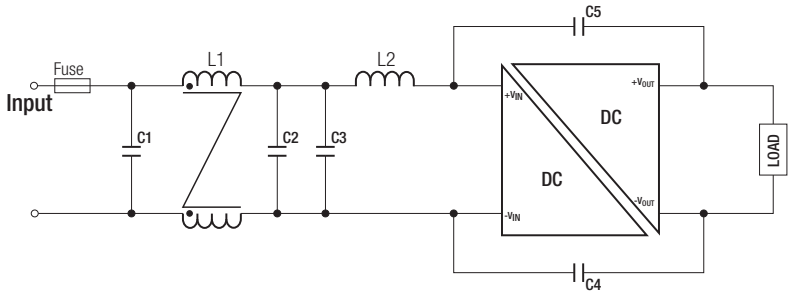
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

EMI Filtering Class A



MODEL	C1	C2/C3	L1
RP15-24xxS_DOF	6.8µF/50V 1812MLCC	470pF/3kV 1808 MLCC	10ìH 1.4A 0.1Ω 0504 SMD Inductor ref.: WE 744787100
RP15-48xxS_DOF	2.2µF/100V 18MLCC	470pF/3kV 1808 MLCC	18ìH 1.2A 0.15Ω 0504 SMD Inductor ref.: WE 744787180

EMI Filtering Class B



MODEL	C1	C2	C3	C4/C5	L1	L2
RP15-24xxS_DOF	6.8µF/50V 1812 MLCC	6.8µF/50V 1812 MLCC	6.8µF/50V 1812 MLCC	470pF/3kV 1808 MLCC	CMC: 145µH ref.: WE 7482210002 ref.: CMC-07	10ìH 1.4A 0.1Ω 0504 SMD Inductor ref.: WE 744787100
RP15-48xxS_DOF	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	470pF/3kV 1808 MLCC	CMC: 145µH ref.: WE 7482210002 ref.: CMC-07	18ìH 1.2A 0.15Ω 0504 SMD Inductor ref.: WE 744787180

DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Base	FR4 PCB
Package Dimensions (LxWxH)		27.9 x 23.9 x 8.5mm
Package Weight		10.5g

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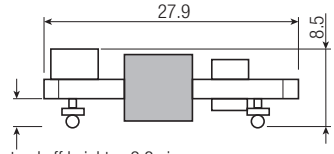
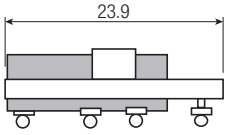
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

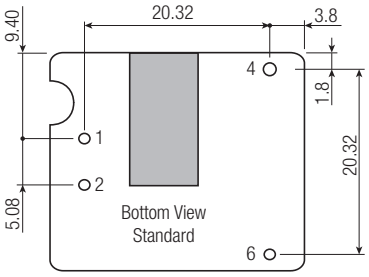
Dimension Drawing (mm)

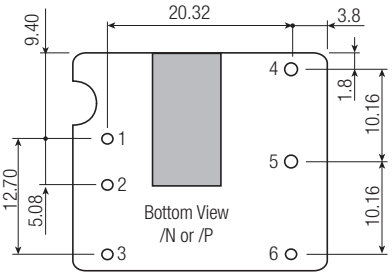


stand off height = 2.3min.



Recommended Pads = 2.8mm dia.





Pin Connections

Pin #	Standard	Suffix /P or /N
1	+Vin	+Vin
2	-Vin	-Vin
3	no Pin	CTRL
4	+Vout	+Vout
5	no Pin	Trim
6	-Vout	-Vout

PCB Tolerance ±0.5mm
SMD Pin Pitch Tolerance ±0.25mm

PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Quantity		20pcs.
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95%, RH