Features

Regulated Converters

- Wide 4:1 Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 90%
- Six-Sided Continuous Shield
- No Minimum Load

RECOM

DC/DC Converter

RP20-AW

20 Watt Single & Dual Output

3 YEAR Warranty

Description

The RP20-AW series are ultraminiature wide input voltage range power DC/DC converters in a case half the size of industry standard 20W converters. Despite their small size, the RP20-AW converters are fully specified devices with output currents up to 4.5 Amps, up to 90% efficiency, no minimum load, 1600VDC isolation, a built-in Class A EMC filter and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The no load input current is particularly low (only 4mA/6mA). The RP20-AW series will find many uses in applications where board space and/or board height is at a premium or in battery-powered systems where standby current is important.

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]
RP20-243.3SAW[3,4]	9-36	3.3	4500	695	89	7000
RP20-2405SAW[3,4]	9-36	5	4000	936	89	5000
RP20-2412SAW[3,4]	9-36	12	1670	938	89	850
RP20-2415SAW[3,4]	9-36	15	1330	934	89	700
RP20-483.3SAW[3,4]	18-75	3.3	4500	356	87	7000
RP20-4805SAW[3,4]	18-75	5	4000	468	89	5000
RP20-4812SAW[3,4]	18-75	12	1670	469	89	850
RP20-4815SAW[3,4]	18-75	15	1330	462	90	700
RP20-2412DAW[3,4]	9-36	±12	±833	936	89	±500
RP20-2415DAW[3,4]	9-36	±15	±667	926	90	±350
RP20-4812DAW[3,4]	18-75	±12	±833	468	89	±500
RP20-4815DAW[3,4]	18-75	±15	±667	463	90	±350

Notes:

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

UL60950-1 Certified

Model Numbering

RP20-__ __ __AW/__ __

- Input Voltage
- Output Voltage
- Single or Dual
- Package[5]
- Control Logic[4]

Ordering Examples

RP20-2405SAW/P = 24V 4:1 Input, 5V Output, Positive Logic CTRL pin and Trim pin fitted.
RP20-483.3SAW-HC = 48V 4:1 Input, 3.3V Output, Premounted Heat-sink, no Trim or CTRL pins. (no trim pin available with dual output)

Notes:

Note3: no suffix is standard part without trim pin and CTRL function fitted.
add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF), including trim pin
add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF), including trim pin
Note4: add suffix -HC for premounted Heat-sink and clips

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		9VDC 18VDc	24VDC 48VDC	36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		 8VDC	9VDC
	Vin = 48V	DC-DC ON DC-DC OFF		 16VDC	18VDC
Input Filter					Pi-Type
Input Reflected Ripple Current[5]	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	3.3Vout, 5Vout Others		248kHz 297kHz	275kHz 330kHz	303kHz 363kHz
Minimum Load			0%		
Optional Output Trim[6]					±10%
Ripple and Noise	measured by 20Mhz bandwidth with 1µF M/C X7R and a 10µF T/C	Single		75mVp-p	
	measured by 20Mhz bandwidth with 1µF M/C X7R and 10µF T/C for each output	Dual		100mVp-p	
Remote ON/OFF[6]	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		2mA	
		DC-DC ON	-0.5mA		1mA

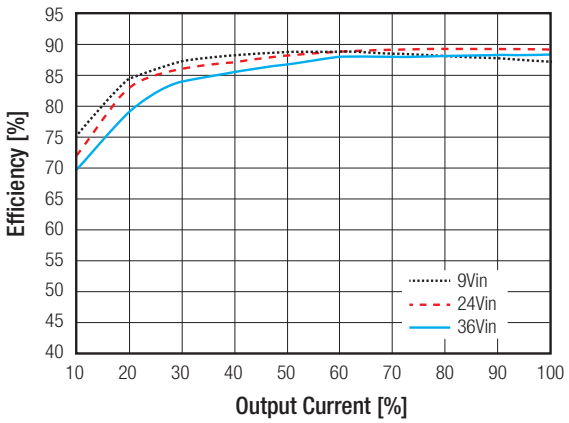
Notes:

Note5: Simulated source impedance of 12µH. 12µH inductor in series with +Vin.

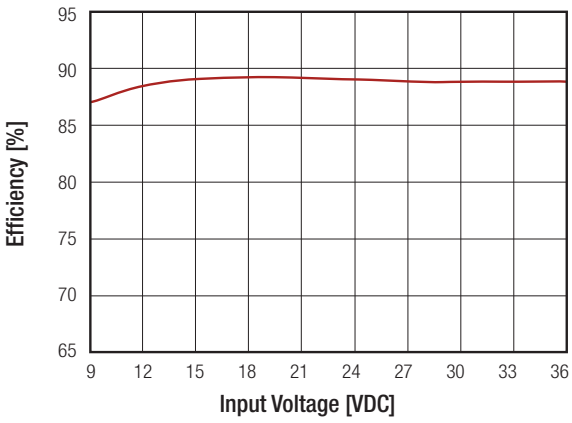
Note6: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin. If no suffix is specified, the control pin will be omitted.

RP20-2405SAW

Efficiency vs. Output Current



Efficiency vs. Input Voltage

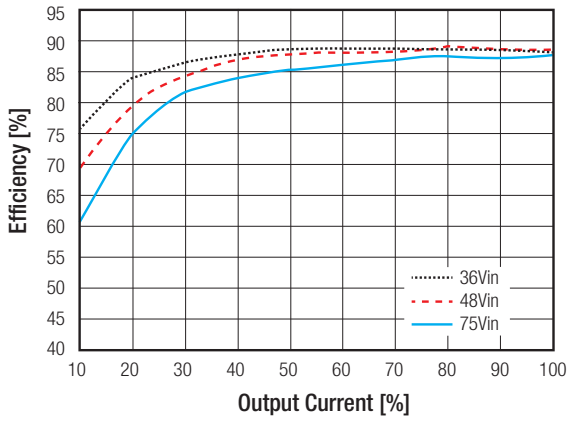


continued on next page

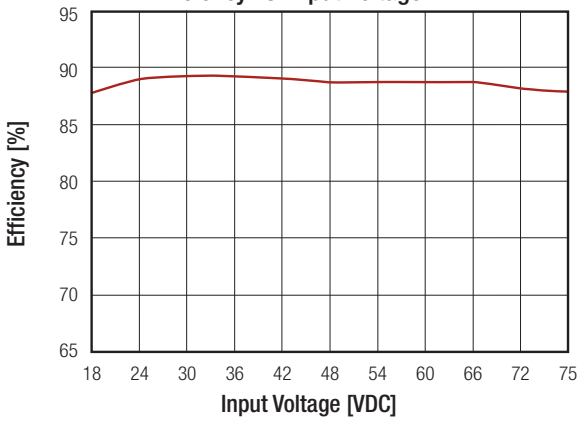
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP20-4805SAW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



REGULATIONS

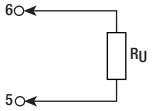
Parameter	Condition		Value
Output Voltage Accuracy			±1%
Voltage Adjustability	Single		±10%
Line Voltage Regulation	Single Dual		±0.2% ±0.5%
Load Voltage Regulation	0% load to 100% load	Single Dual	±0.2% ±1.0%
	10% load to 100% load	Single Dual	±0.1% ±0.8%
Cross Regulation	asymmetrical 25%<>100% load		±5%
Transient Response recovery time	25% load step change		250µs typ.

External Output Trimming

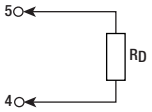
Output Voltage Trimming

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 resis tor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.

Trim up



Trim down



RP20-xx3.3SAW

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 =	57.93	26.16	15.58	10.28	7.11	4.99	3.48	2.34	1.46	0.75	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 =	69.47	31.23	18.49	12.12	8.29	5.74	3.92	2.56	1.50	0.65	KOhms

continued on next page

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

RP20-xx05SAW

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 =	36.57	16.58	9.92	6.58	4.59	3.25	2.30	1.59	1.03	0.59	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 =	45.53	20.61	12.31	8.15	5.66	4.00	2.81	1.92	1.23	0.68	KOhms

RP20-xx12SAW

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 =	367.91	165.95	98.64	64.98	44.78	31.32	21.70	14.49	8.88	4.39	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 =	460.99	207.95	123.60	81.42	56.12	39.25	27.20	18.16	11.13	5.51	KOhms

RP20-xx15SAW

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 =	404.18	180.59	106.06	68.80	46.44	31.53	20.88	12.90	6.69	1.72	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 =	499.82	223.41	131.27	85.20	57.56	39.14	25.97	16.10	8.42	2.282	KOhms

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout 5Vout 12Vout 15Vout	3.7VDC - 5.4VDC 5.6VDC - 7.0VDC 13.5VDC - 19.6VDC 16.8VDC - 20.5VDC
Over Load Protection (OLP)	% of Iout rated; Hiccup mode		150% typ
Isolation Voltage	I/P to O/P I/P to O/P to case		1.6kVDC/1 minute 1.0kVDC/1 minute
Isolation Resistance	500 VDC		1GΩ min
Isolation Capacitance			1500pF max.

Notes:

Note7: This power module is not internally fused. An input line fuse must always be used.

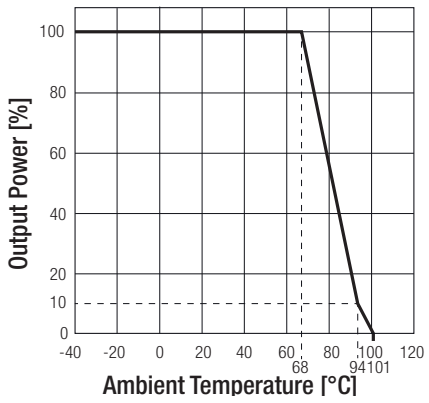
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

ENVIRONMENTAL

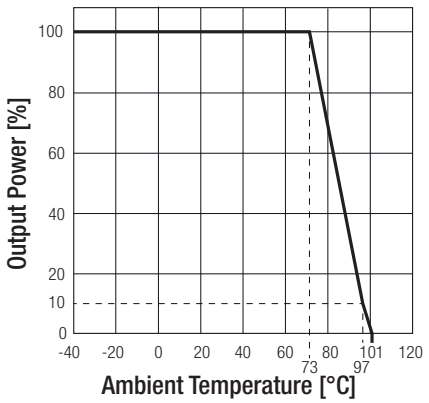
Parameter	Condition	Value
Operating Temperature Range	without derating with derating	-40°C to +68°C -40°C to +101°C
Maximum Case Temperature		+105°C
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance	Natural convection Natural convection with Heat Sink	17.6°C/Watt 14.8°C/Watt
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF[8]	Bellcore TR-NWT-000332 MIL-HDBK-217F	1766 x 10^3 hours 1469 x 10^3 hours

Derating Graph[9]

RP20-4815SAW



RP20-4815SAW with Heat-sink



Notes:

Note8: 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).

Note9: 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)	Condition	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

EMC Compliance	Condition	Standard / Criterion
EMI Standard[10]	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ±6kC	EN61000-4-2, Criteria A
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient[11]	±2kV	EN61000-4-4, Criteria A
Surge[11]	±2kV	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

Notes:

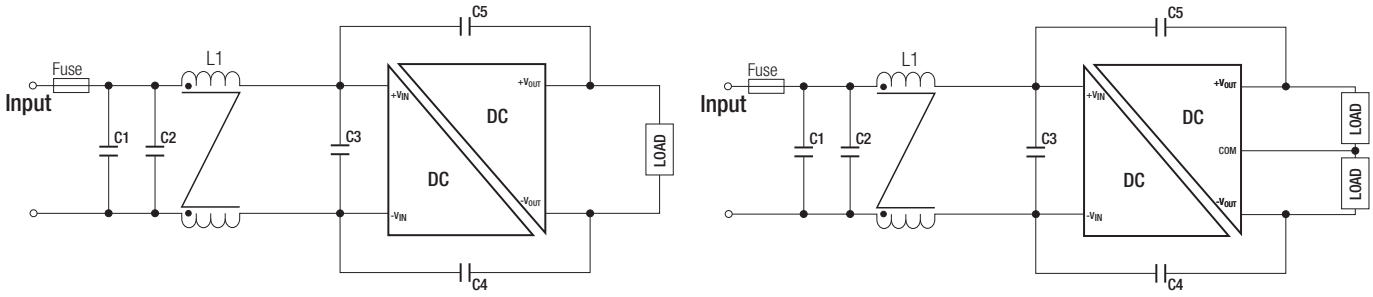
Note10: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

Note11: 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.

continued on next page

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

EMI Filtering Class B

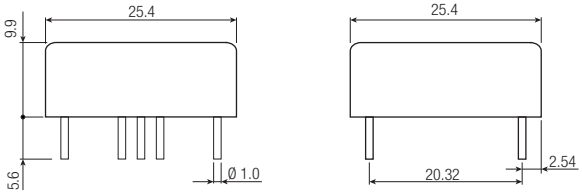


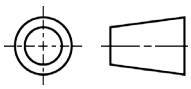
MODEL	C1	C2	C3	C4/C5	L1
RP20-24xxSAW RP20-24xxDAW	4.7µF/25V 1812 MLCC	N/A	N/A	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06
RP20-48xxSAW RP20-48xxDAW	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06

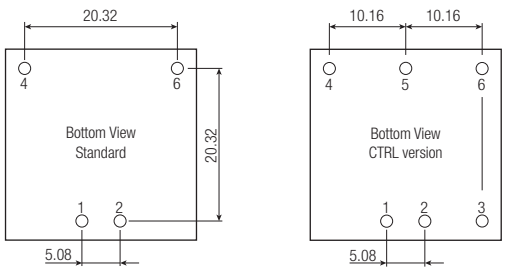
DIMENSIONS and PHYSICAL CHARACTERISTICS

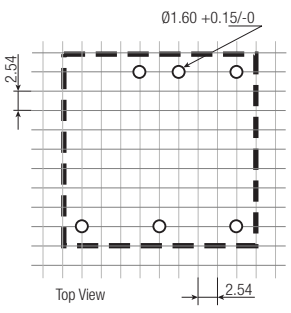
Parameter	Type	Value
Material	Case Base Potting	Nickel coated copper FR4 PCB Silicone (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	25.4 x 25.4 x 9.9mm 31.4 x 25.4x 16.5mm
Package Weight	without Heat-sink with Heat-sink	15g 21.44g

Dimension Drawing (mm)









Pin Connections

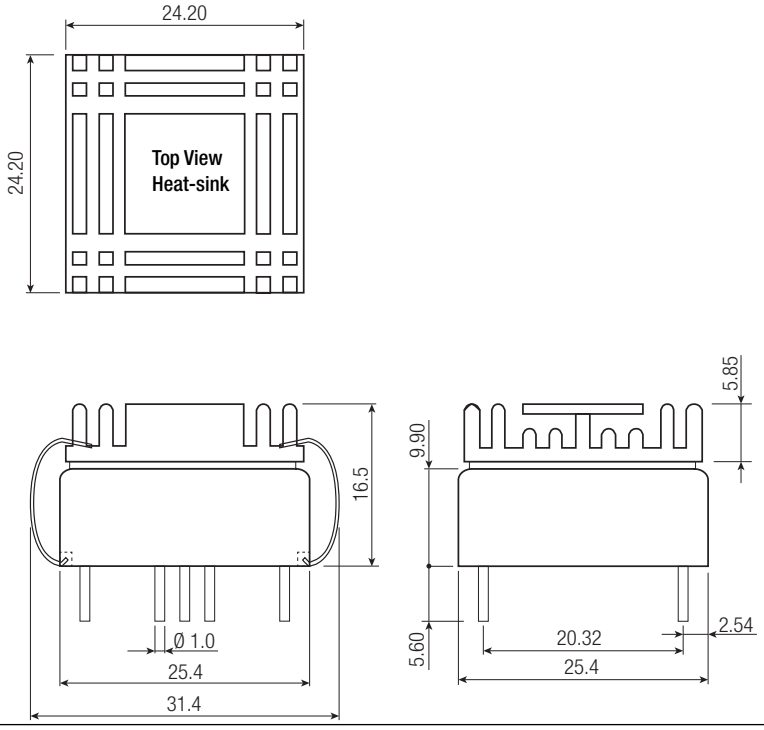
Pin #	Single	Single /P or /N	Dual	Dual /P or /N
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
3	CTRL	CTRL	CTRL	CTRL
4	+Vout	+Vout	+Vout	+Vout
5	Trim	Trim	Com	Com
6	-Vout	-Vout	-Vout	-Vout

Pin Pitch Tolerance ±0.25mm
Pin dimension tolerance ±0.1mm
XX.X ± 0.5mm
XX.XX ± 0.25mm

continued on next page

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

Dimension Drawing (mm) with Heat-sink



PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Quantity	without Heat-sink | Tube with Heat-sink | Tray	8pcs. 20pcs.
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH