

Features

Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL, IEC/EN & EN50155 Pending
- Efficiency up to 88%
- OVP, OCP & OTP
- +105°C max Case Temperature



RPA20-AW

20 Watt

1"x1"

Single & Dual Output



Description

The RPA20-AW series are high power density, wide input voltage range 20W DC/DC converters in an industry standard 1"x1" case size. Despite their small size, the RPA20-AW converters are fully specified devices with output currents up to 6Amps, up to 88% efficiency, no minimum load, 1600VDC isolation, tight regulation and low ripple/noise figures. The outputs are also fully protected against over-temperature, short circuits, overcurrent and overvoltage and the single output version offers a $\pm 10\%$ trim range. A heatsink option is available to extend the operating temperature range. The converters are UL and EN50155 pending and will find many uses irailway and industrial applications where board space 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 [μ F]
RPA20-243.3SAW ^(2,3)	9-36	3.3	6000	960	87	10000
RPA20-2405SAW ^(2,3)	9-36	5	4000	960	88	10000
RPA20-2412SAW ^(2,3)	9-36	12	1670	960	88	1000
RPA20-2415SAW ^(2,3)	9-36	15	1330	960	88	1000
RPA20-2412DAW ^(2,3)	9-36	± 12	± 830	960	88	± 1000
RPA20-2415DAW ^(2,3)	9-36	± 15	± 670	960	88	± 680

Notes:

Note1: Efficiency is tested by nominal Vin, full load and at 25°C.



Model Numbering



Ordering Examples

- RPA20-243.3SAW = 24V Input, 3.3V Output, Single, no CTRL pin
- RPA20-2405DAW/P = 24V Input, 5V Output, Dual, Pos. CTRL function
- RPA20-2415SAW-HC = 24V Input, 15V Output, Single, no CTRL pin, glued Heat-sink
- RPA20-2415DAW/N-HC = 24V Input, 15V Output, Dual, Neg. CTRL function, glued Heat-sink

Notes:

- Note2: part without suffixes is without CTRL pin, trim pin fitted
 add suffix "P" for positive CTRL function (1=ON, 0=OFF), trim pin fitted
 add suffix "N" for negative CTRL function (0=ON, 1=OFF), trim pin fitted
 trim pin is only available for single outputs
- Note3: add suffix "-HC" for glued Heat-sink (compatible with all other suffixes)

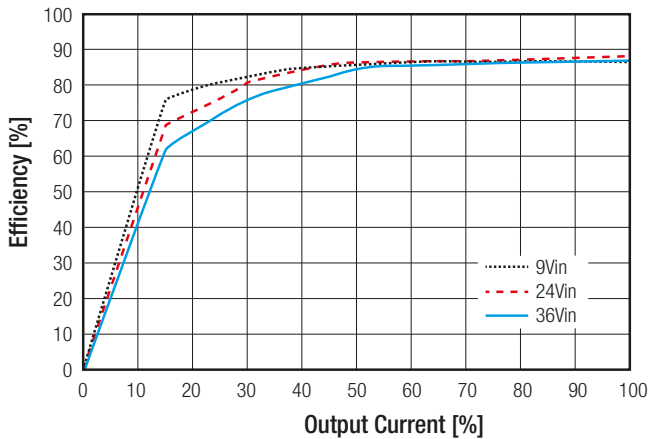
UL60950-1 Pending
 IEC/EN60950 Pending
 EN50155 Pending

Specifications measured @ $t_a = 25^\circ\text{C}$, resistive load, nominal V_{in} and rated I_{out} unless otherwise noted

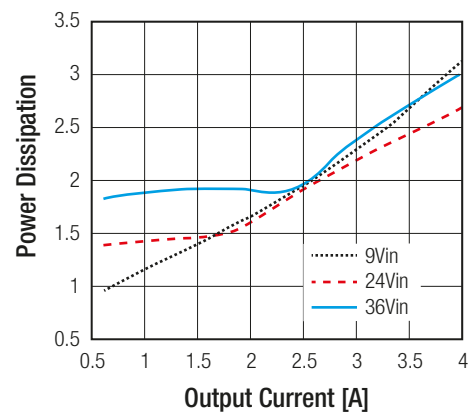
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi-Type
Input Voltage Range		9VDC	24VDC	36VDC
Input Surge Voltage	100ms			50VDC
Quiescent Current		20mA		55mA
Start-up time	Power up CTRL ON/OFF		8ms	16ms
Internal Operating Frequency			550kHz	
Minimum Load		0%		
Ripple and Noise	20MHz BW, 10 μF tantalum capacitor and 1 μF ceramic capacitor		50mVp-p	
Under Voltage Lockout (UVLO)	DC-DC ON	8VDC	8.5VDC	9VDC
	DC-DC OFF	7VDC	7.5VDC	8VDC
ON/OFF Control	Positive Logic DC-DC ON DC-DC OFF	2.4VDC -0.7VDC		10VDC 0.8VDC
	Negative Logic DC-DC ON DC-DC OFF	-0.7VDC 2.4VDC		0.8VDC 10VDC
Input current of CTRL pin			6mA	
Output Trim	Single Outputs	-10%		+10%

RPA20-2405SAW

Efficiency vs. Output Current

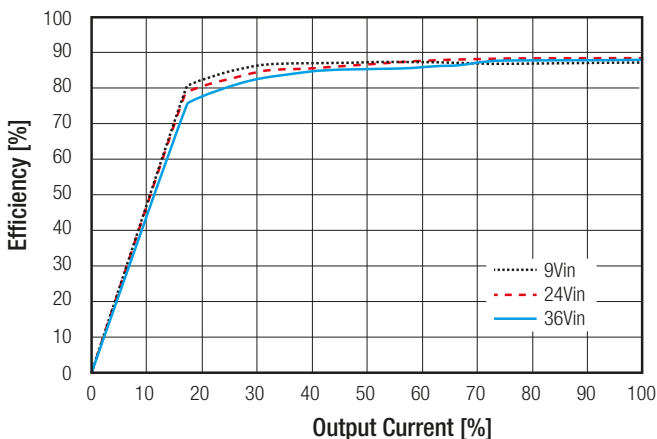


Power Dissipation vs Output Current

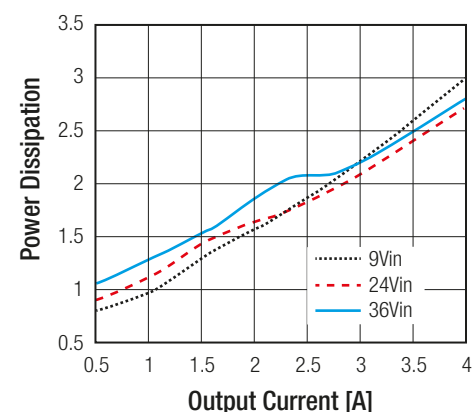


RPA20-2412SAW

Efficiency vs. Output Current



Power Dissipation vs Output Current



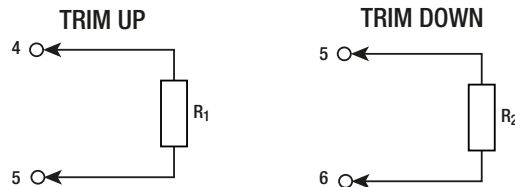
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Specifications measured @ $t_a = 25^\circ\text{C}$, resistive load, nominal V_{in} and rated I_{out} unless otherwise noted

OUTPUT TRIM

Output Voltage Trimming

RPA20-AW converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. The values for trim resistors shown in trim tables below are according to standard E96 values; therefore, the specified voltage may slightly vary.



RPA20-243.3SAW

Trim up	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	3.33	3.36	3.39	3.43	3.46	3.49	3.53	3.56	3.59	3.63	Volts
$R_U =$	402	169	100	75	47.5	34.8	26.1	17.8	12.1	8.06	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	3.27	3.23	3.20	3.17	3.14	3.10	3.07	3.04	3.0	2.97	Volts
$R_D =$	402	191	113	75	52.3	39.2	26.7	20	12.1	8.06	KOhms

RPA20-2405SAW

Trim up	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50	Volts
$R_U =$	604	243	147	95.3	68.1	39.2	34.8	22.1	15	8.06	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	Volts
$R_D =$	604	287	169	124	105	78.7	54.9	39.2	15	0.5	KOhms

RPA20-2412SAW

Trim up	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.20	Volts
$R_U =$	604	267	162	105	75	499	40.2	24.9	18.2	10	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.80	Volts
$R_D =$	750	309	200	124	90.9	64.9	45.3	32.4	20	12.1	KOhms

RPA20-2415SAW

Trim up	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
$R_U =$	1000	243	200	130	90.9	61.9	40.2	30.1	24.9	10	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	14.85	14.70	14.55	14.40	14.25	14.10	13.95	13.80	13.65	13.50	Volts
$R_D =$	1000	348	210	140	95.3	68.1	45.3	30.1	18.2	8.06	KOhms

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REGULATION			
Parameter	Condition	Value	
Output Accuracy	Single & Dual	$\pm 0.1\%$ typ., $\pm 2.0\%$ max.	
Line Regulation	low line to high line	Single	$\pm 0.1\%$ typ., $\pm 0.2\%$ max.
		Dual	$\pm 0.1\%$ typ., $\pm 0.5\%$ max.
Load Regulation	3.3Vout	$\pm 0.3\%$	
	5Vout	$\pm 0.2\%$	
	12Vout, 15Vout	$\pm 0.1\%$	
	$\pm 12\text{Vout}$, $\pm 15\text{Vout}$	$\pm 1.0\%$	
Cross Regulation	asymmetrical 25% \leftrightarrow 100% load	$\pm 2.0\%$ typ., $\pm 3.0\%$ max.	
Transient Response	50-75%, full load, 0.1A/ μs	$\pm 3.0\%$ typ.	
	25% load step change	250 μs typ.	

PROTECTION		
Parameter	Condition	Value
Short Circuit Protection (SCP)	below 100m Ω	continuous, auto recovery
Over Voltage Protection (OVP)		115%-150% Output Voltage, Hiccup, auto recovery
Over Current Protection (OCP)	Output Voltage 10% low	110%-160% Output Current, Hiccup
Over Temperature Protection (OTP)		115 $^\circ\text{C} \pm 5^\circ\text{C}$
Isolation Voltage	I/P to O/P	1.6kVDC/1 minute
Isolation Resistance		10M Ω min.
Isolation Capacitance		1100pF typ.

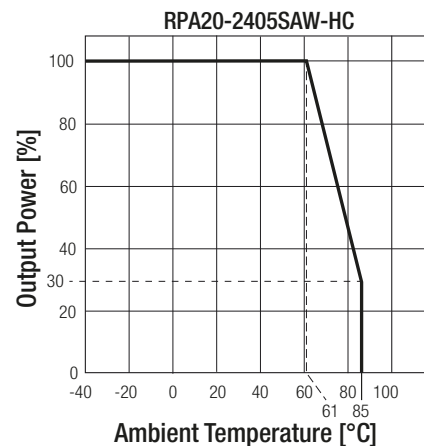
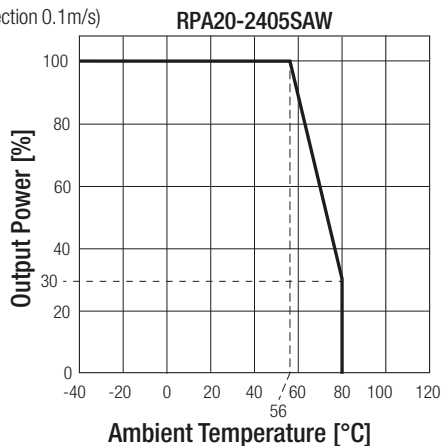
Notes:

Note4: An input fuse is required if the mains supply is not over-current protected. Recommended fuse: 3A slow blow type.

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range ⁽⁵⁾		refer to derating graph
Maximum Case Temperature		+105 $^\circ\text{C}$
Temperature Coefficient		0.02%/ $^\circ\text{C}$
Thermal Impedance	vertical direction by natural convection without Heat-sink	18 $^\circ\text{C}/\text{W}$
	vertical direction by natural convection with Heat-sink	16 $^\circ\text{C}/\text{W}$
Operating Altitude		2134m
Operating Humidity		95% RH

Derating Graph ⁽⁵⁾

(@ Chamber and natural convection 0.1m/s)



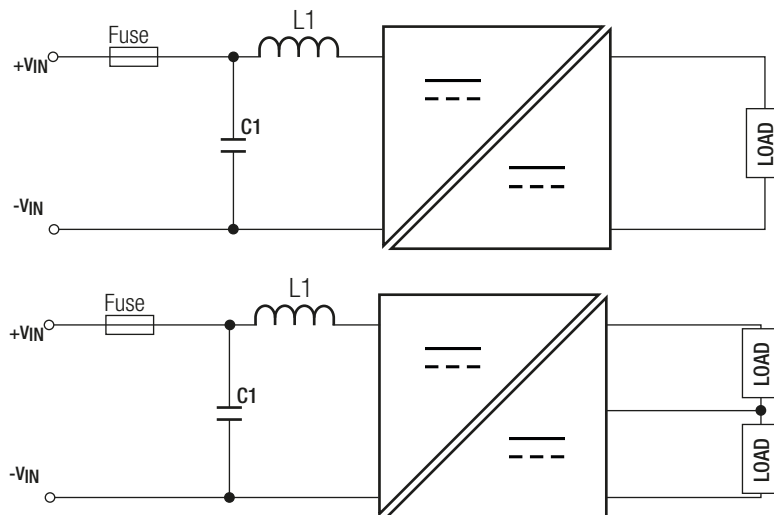
Notes:

Note5: 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 team at techsupportAT@recom-power.com

Specifications measured @ $t_a = 25^\circ\text{C}$, resistive load, nominal V_{in} and rated I_{out} unless otherwise noted

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E224736 pending	UL60950-1, 2nd Edition, 2014 CSA C22.2 No. 60950, 2nd Edition, 2014
IEC/EN Information Technology Equipment - General Requirements for Safety (CB Scheme)	E224736-A42+A43 pending	IEC60950-1, 2nd Edition, 2005 EN60950-1, 1st Edition, 2005
EN Information Technology Equipment - General Requirements for Safety (LVD Directive)	pending	EN60950-1, 1st Edition, 2006
Railway Applications - Electrical Equipment used on rolling stock	pending	EN50155, 1st Edition, 2007
EMC Compliance (designed to meet)		
Condition	Standard / Criterion	
Information technology equipment - Radio disturbance characteristics Limits and methods of measurement	with external filter	EN55022, Class A, 2010

EMI Filtering EN55022 Class A



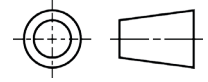
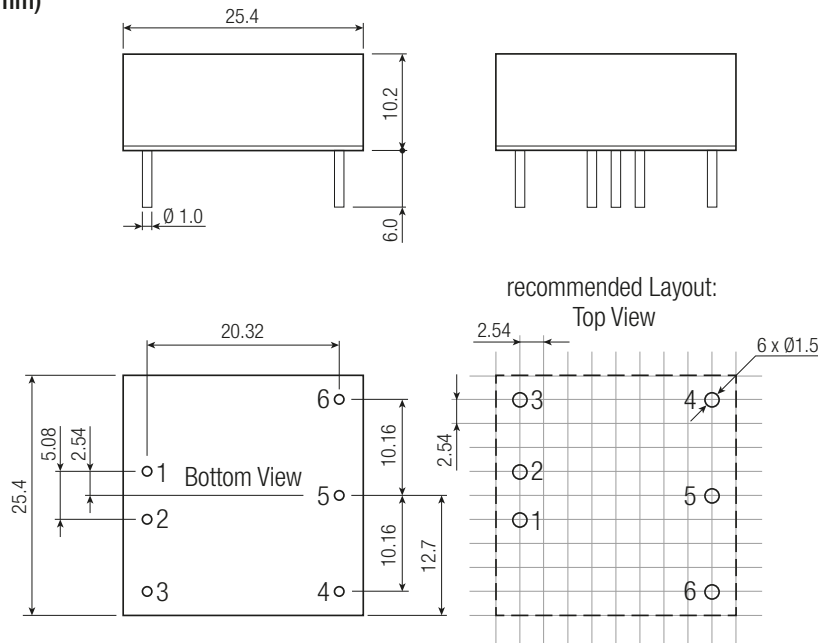
MODEL	C1	L1
RPA20-xyyS_DAW	47 μF /50V electrolyt capacitor	1 μH

DIMENSIONS and PHYSICAL CHARACTERISTICS		
Parameter	Type	Value
Material	Case	Al Alloy, anodize black
	Baseplate	non-conductive FR4
	Potting	Silicone (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink	25.4 x 25.4 x 10.2mm
	with Heat-sink	25.4 x 25.4 x 16.8mm
Package Weight	without Heat-sink	17g
	with Heat-sink	21g

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Dimension Drawing (mm)



Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL ⁽²⁾	CTRL ⁽²⁾
4	-Vout	-Vout
5	Trim	Com
6	+Vout	+Vout

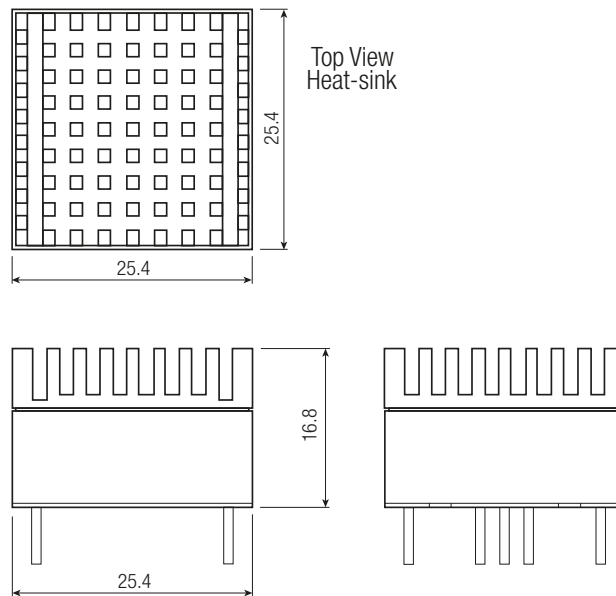
Pin Pitch Tolerance $\pm 0.25\text{mm}$

Pin dimension tolerance $\pm 0.1\text{mm}$

XX.X $\pm 0.5\text{mm}$

XX.XX $\pm 0.25\text{mm}$

Heat-sink Dimension Drawing (mm)



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimensions (LxWxH)	without Heat-sink	285.0 x 27.6 x 19.0mm
	with Heat-sink	285.0 x 27.6 x 25.8mm
Packaging Quantity		10pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH

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