Features

Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.5kVDC / 1 min. Isolation
- UL/IEC/EN60950 Certified & EN50155 Compliant
- Efficiency up to 93.3%
- OVP, OCP & OTP
- +105°C max Case Temperature

RECOM

DC/DC Converter

RPA60-FW

60 Watt 2“x1“ Single Output

3 YEAR Warranty

Description

The RPA60-FW series are high power density, wide input voltage range 60W DC/DC converters in an industry standard 2”x1” case size. Despite their small size, the RPA60-FW converters are fully specified devices with output currents up to 12Amps, up to 93% efficiency, no minimum load, UVLO, 1500VDC / 1 minute isolation, tight regulation and low ripple/noise figures. The trimmable outputs are also fully protected against over-temperature, short circuits, overcurrent and overvoltage. The converters are UL/IEC/EN60950 certified and EN50155 compliant and will find many uses in railway 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 [µF]
RPA60-2405SFW[2,3]	9-36	05	12000	2700	92.4	20000
RPA60-2412SFW[2,3]	9-36	12	5000	2695	92.8	6000
RPA60-2415SFW[2,3]	9-36	15	4000	2680	93.3	4000
RPA60-2424SFW[2,3]	9-36	24	2500	2688	93	2000

Notes:

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



E224736

UL60950-1 Certified
IEC/EN60950 Certified
EN50155 Compliant

Model Numbering

RPA60-_ _ SFW/_ _

- Input Voltage
- Output Voltage
- Single
- Package[3]
- CTRL Logic[2]

Ordering Examples

RPA60-2405SFW = 24V Input, 5V Output, Single, no CTRL pin
RPA60-2405SFW/P = 24V Input, 5V Output, Single, Pos. CTRL function
RPA60-2415SFW/N-HC = 24V Input, 15V Output, Single, Neg. CTRL function, Heat-sink assembled

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
Note3: add suffix “-HC” for glued Heat-sink (compatible with all other suffixes)

RPA60-FW Series

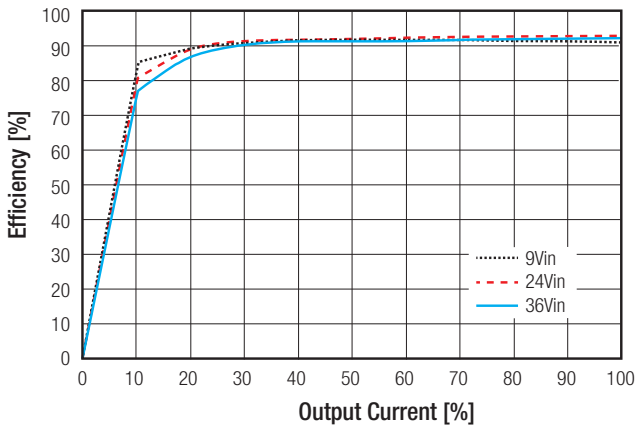
Specifications measured @ta = 25°C, resistive load, nominal Vin and rated Iout unless otherwise noted

BASIC CHARACTERISTICS

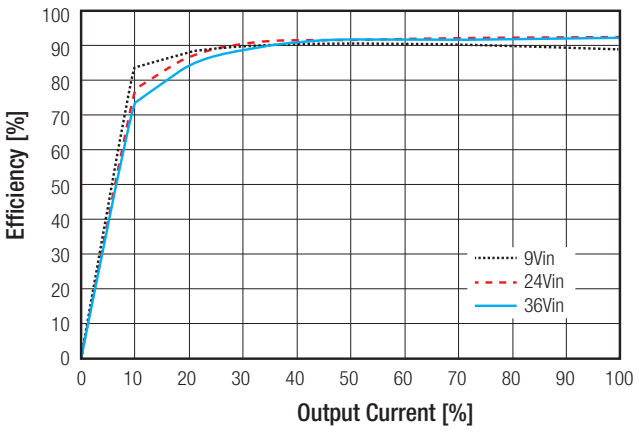
Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter					LC Filter
Input Voltage Range			9VDC	24VDC	36VDC
Input Surge Voltage	100ms				50VDC
Quiescent Current	5Vout 12Vout & 15 Vout 24Vout			70mA 60mA 40mA	
Start-up time	Power up Remote ON/OFF			60ms 60ms	
Internal Operating Frequency				330kHz	
Minimum Load			0%		
Ripple and Noise	20MHz bw, 10µF tantalum capacitor and 1µF ceramic capacitor			100mVp-p	
Under Voltage Lockout (UVLO)	DC-DC ON DC-DC OFF		8VDC 7VDC	8.5VDC 7.5VDC	9VDC 8VDC
ON/OFF Control[2]	Positive Logic	DC-DC ON DC-DC OFF			Open or 2.4 < Vr < 10VDC Short or 0 < Vr < 0.8VDC
	Negative Logic	DC-DC ON DC-DC OFF			Short or 0 < Vr < 0.8VDC Open or 2.4 < Vr < 10VDC
Input current of CTRL pin	DC-DC OFF			10mA	
Output Voltage Trimming			-10%		+10%

Efficiency vs. Output Current

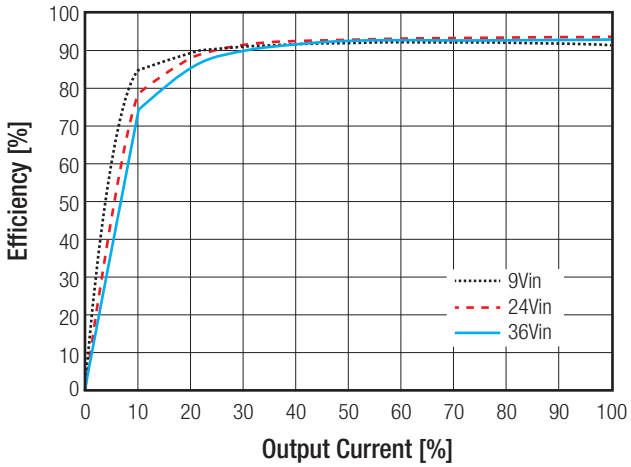
RPA60-2405SFW



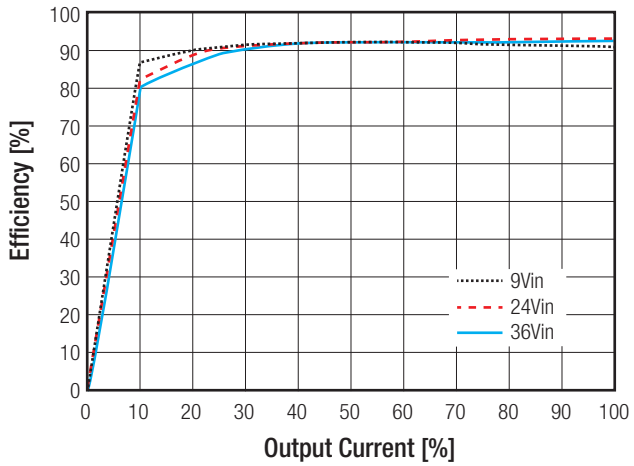
RPA60-2412SFW



RPA60-2415SFW



RPA60-2424SFW



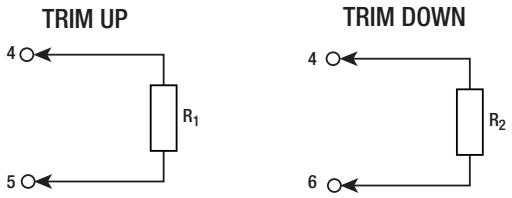
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Specifications measured @ta = 25°C, resistive load, nominal Vin and rated Iout unless otherwise noted

OUTPUT TRIM

Output Voltage Trimming

RPA60-FW 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.



RPA60-2405SFW

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	5.40	5.45	5.50	Volts
R_1 =	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	%
Vout =	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	Volts
R_2 =	604	301	169	115	80.6	56.2	40.2	28	15	8.06	KOhms

RPA60-2412SFW

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_1 =	604	255	154	105	75	49.9	38.3	24.9	18.2	10	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_2 =	698	301	187	121	84.5	60.4	45.3	30.1	20	10	KOhms

RPA60-2415SFW

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_1 =	750	309	191	124	71.5	59	40.2	28	15	8.06	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_2 =	698	374	226	150	105	71.5	59	32.4	20	8.06	KOhms

RPA60-2424SFW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4	Volts
R_1 =	1000	511	324	221	162	121	90.9	68.1	48.7	34.8	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	23.76	23.52	23.38	23.04	22.8	22.56	22.32	22.08	21.84	21.6	Volts
R_2 =	1500	909	499	324	232	169	124	93.1	64.9	45.3	KOhms

Specifications measured @ta = 25°C, resistive load, nominal Vin and rated Iout unless otherwise noted

REGULATION

Parameter	Condition		Value
Output Accuracy			±1% max.
Line Regulation	low line to high line		±0.2% max.
Load Regulation			±0.5%
Transient Response	5Vout others	50%-75% full	±5% Vout typ. ±2.5% Vout typ.
	25% load step change		250µs typ.

PROTECTION

Parameter	Condition	Value
Short Circuit Protection (SCP)	below 100mΩ	continuous, auto recovery
Over Voltage Protection (OVP)		115%-140% Output Voltage
Over Current Protection (OCP)	Output Voltage 10% low	110%-150% Output Current, Hiccup
Over Temperature Protection (OTP)		115°C ±5°C
Isolation Voltage	I/P to O/P	1.5kVDC/1 minute
Isolation Resistance		10MΩ min.
Isolation Capacitance		2200pF typ.

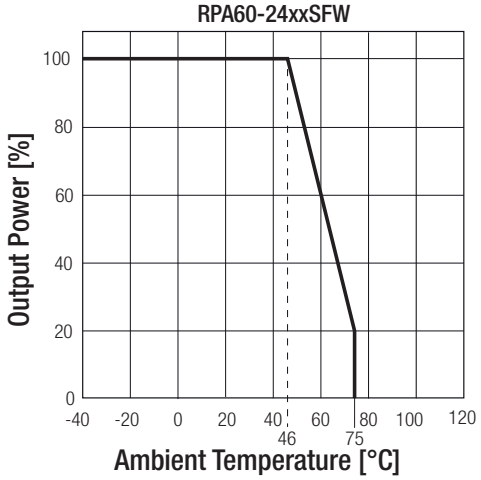
Notes:

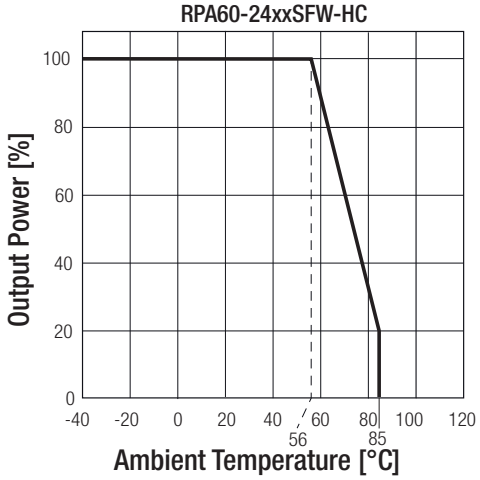
Note4: An input fuse is required if the mains supply is not over-current protected. Recommended fuse: 10A slow blow type.

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range (5)		refer to derating graph
Maximum Case Temperature		+105°C
Temperature Coefficient		0.02%/°C
Thermal Impedance	vertical direction by natural convection (0.1m/s) without Heat-sink vertical direction by natural convection (0.1m/s) with Heat-sink	12°C/W 10°C/W
Operating Altitude		4500m
Operating Humidity		95% RH
MTBF	according to MIL-HDBK-217F standard, 25°C	5997 x 10^3h

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

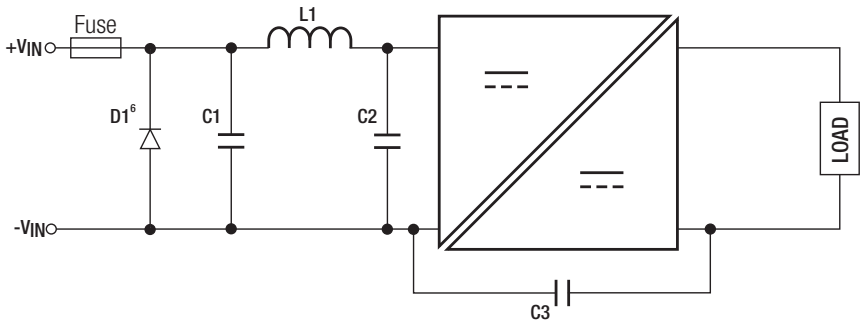
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SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E224736	UL60950-1, 2nd Edition, 2014 CSA C22.2 No. 60950, 2nd Edition, 2014
IEC/EN Information Technology Equipment - General Requirments for Safety (CB Scheme)	E224736-A42+A43	IEC60950-1, 2nd Edition, 2005 + AM2, 2013 EN60950-1, 1st Edition, 2006 + AM2, 2013
Railway Applications - Electrical Equipment used on rolling stock	compliant	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 according to EN50121-3-2 (EN50155) and EN55022 Class A

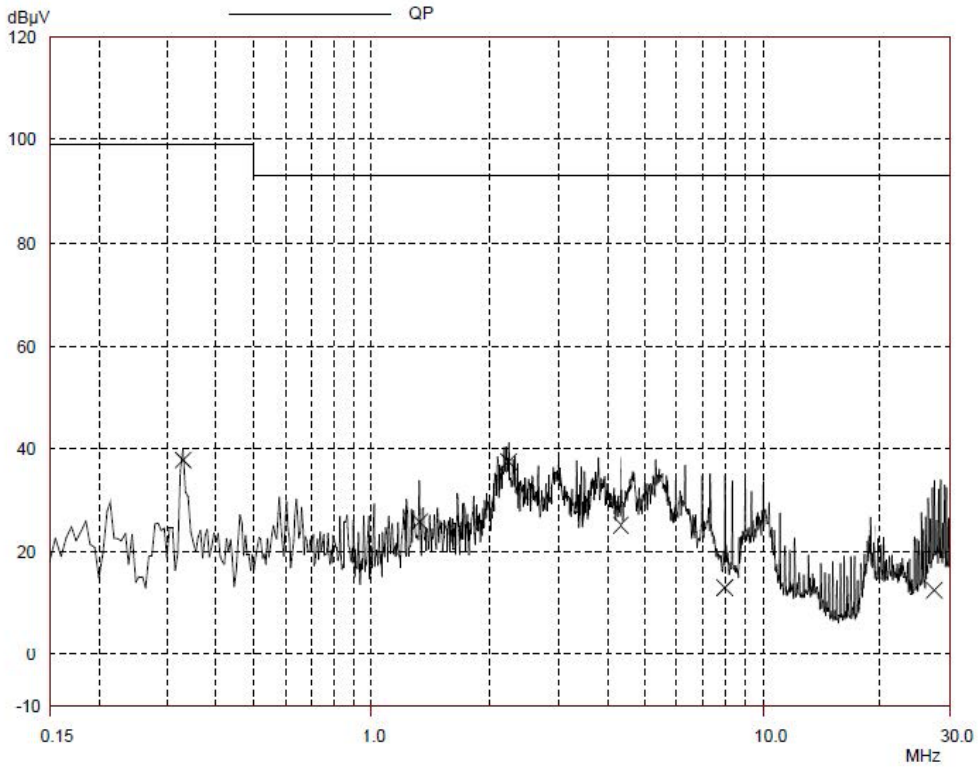


C1	C2	L1	C3
100µF/50V electrolytic	6.8µF/50V MLCC	4.7µH SMD Inductor	6.8nF/2kV MLCC

Notes:

Note6: Diode is only needed for EN50155.

Conducted Emissions according to EN50121-3-2 (EN50155)

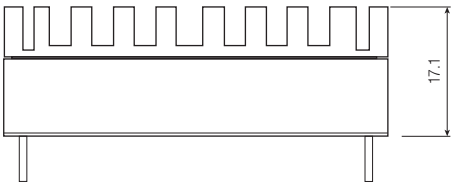


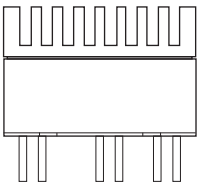
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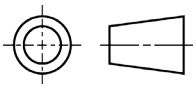
DIMENSIONS and PHYSICAL CHARACTERISTICS

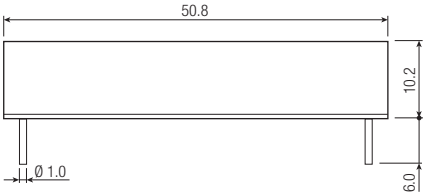
Parameter	Type	Value
Material	Case Baseplate Potting	Al Alloy, anodize black non-conductive FR4 Silicone (UL94-0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	50.8 x 25.4 x 10.2mm 50.8 x 25.4 x 16.8mm
Package Weight	without Heat-sink with Heat-sink	35g 46g

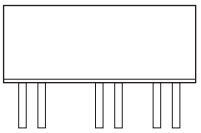
Dimension Drawing (mm)







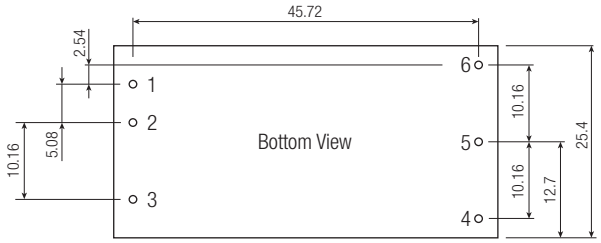


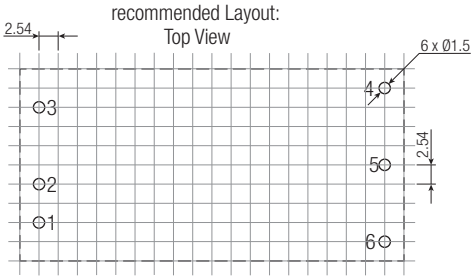


Pin Connections

Pin #	Single
1	+Vin
2	-Vin
3	CTRL[2]
4	Trim
5	-Vout
6	+Vout

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





PACKAGING INFORMATION

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

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