Features

Regulated Converter

- 60 Watt PCB mount package
- Universal input voltage range
- 4kVAC isolation
- Low output ripple and noise
- Short circuit protected
- Output trim
- UL certified, CE marked

RECOM
AC/DC Converter

RAC60-B

60 Watt Single Output

Description

Power module for PCB mounting. This switching converter has a universal input voltage range with single outputs which are trimmable to compensate for any voltage drops on the output connections. Threaded inserts ensure mechanical fixing.

Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. [1] [%]	Max. Capacitive Load [µF]	Output Power max. [W]
RAC60-05SB	85 - 265	5	10000	82	80000	50
RAC60-09SB	85 - 265	9	6600	84	28000	60
RAC60-12SB	85 - 265	12	5000	86	14000	60
RAC60-15SB	85 - 265	15	4000	86	12000	60
RAC60-24SB	85 - 265	24	2500	86	4000	60
RAC60-48SB	85 - 265	48	1250	86	950	60

NOT RECOMMENDED FOR NEW DESIGNS

Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

UL60950-1 certified
EN60950-1 certified
CAN/CSA-C22.2 No. 60950-1 certified
EN55032 compliant
EN55024 compliant

Model Numbering

RAC60-___B

nom. Output Power ⎯⎯⎯

Output Voltage ⎯⎯⎯

Single

Ordering Examples:

RAC60-05SB	60 Watt	5Vout	Single Output
RAC60-24SB	60 Watt	24Vout	Single Output

RECOM
AC/DC Converter

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range [2]	nom. Vin = 230VAC		85VAC 100VDC	230VAC	265VAC 370VDC
Input Current	115VAC 230VAC				2A 1A
Inrush Current	2ms max., cold start	115VAC 230VAC			30A 50A
No load Power Consumption	115VAC/230VAC				520mW
Input Frequency Range	AC Input		47Hz		63Hz
Output Voltage Trimming	please refer to Trim table		-10%		+10%
Minimum Load			1%		
Hold-up Time	115VAC/230VAC		10ms		
Internal Operating Frequency				100kHz	
Output Ripple and Noise [3]	20MHz limited				<0.5% Vout + 50mVp-p <0.2% Vout + 40mVp-p

Notes:
Note2: The products were submitted for safety files at AC-Input operation
Note3: Measurements are made with a 0.1µF and 47µF MLCC in parallel across output (low ESR)

Output Voltage Trimming

It allows the user to increase or decrease the output voltage of the module. This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins. With an external resistor between the Trim and -Vout pin, the output voltage increases. With an external resistor between the Trim and +Vout pin, the output voltage decreases. The values for trim resistors shown in trim tables below, the specified percentage may slightly vary.

	5Vout		9Vout		12Vout		15Vout		24Vout		48Vout		
Trim up	+10	100	+10	100	+10	100	+10	100	+10	100	+10	100	[%]
R_{up} =	500	1M	6k	1M	4k	1M	5k	1M	12k	1M	12k	1M	[Ω]

	5Vout		9Vout		12Vout		15Vout		24Vout		48Vout		
Trim down	100	-10	100	-10	100	-10	100	-10	100	-10	100	-10	[%]
R_{down} =	1M	500	1M	20k	1M	40k	1M	60k	1M	110k	10M	290k	[Ω]

REGULATIONS

Parameter	Condition	Value
Output Accuracy		±2.0% max.
Line Regulation	low line to high line, full load	±1.0% typ.
Load Regulation [4]	5% to 100% load	1.0% typ.

Notes:
Note4: Operation below 5% load will not harm the converter, but specifications may not be met

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PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, hiccup, auto recovery
Over Voltage Protection (OVP)			zener diode clamp
Over Current Protection (OCP)			auto recovery
Over Voltage Category			OVCII
Isolation Voltage	I/P to O/P	tested for 1 minute	4kVAC
Isolation Resistance			100MΩ max.
Leakage Current			0.5mA max.

Notes:

Note5:   Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note6:   An external MOV is recommended. The varistor should comply with IEC-61051-2. e.g. 14S471K series

Protection Circuit
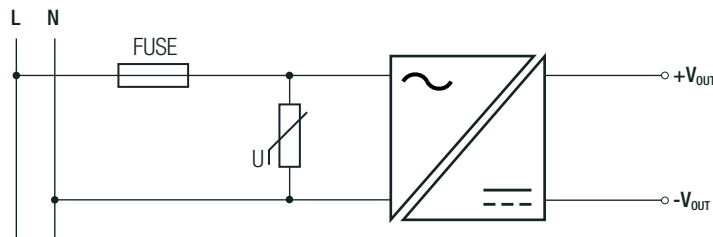
ENVIRONMENTAL

Parameter	Condition			Value
Operating Temperature Range	@ natural convection 0.1m/s	full load	5, 9Vout	-30°C to +45°C
			12, 15Vout	-30°C to +50°C
			24, 48Vout	-30°C to +55°C
		refer to derating graph		-40°C to +70°C
Temperature Coefficient				0.02%/K typ.
Operating Altitude				2000m
Pollution Degree				PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C		>300 x 10^3 hours

Derating Graph

(@ Chamber and natural convection 0.1m/s)
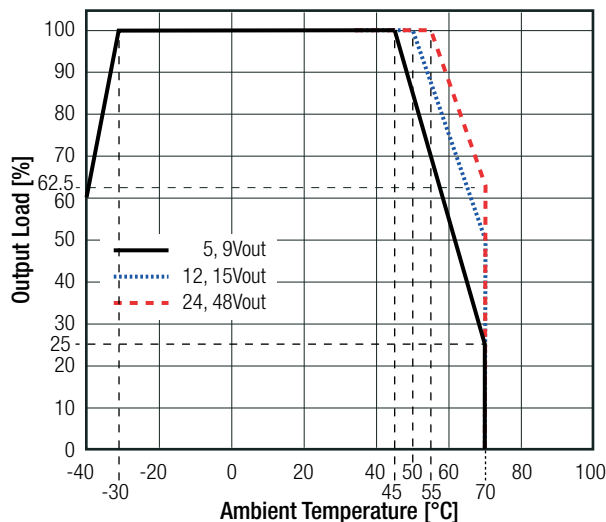
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1, 2nd Edition, 2007 CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2007
Information Technology Equipment, General Requirements for Safety		EN60950-1:2006 + A2:2013
EAC Safety of Low Voltage Equipment	RU-AT.49.09571	TP TC 004/2011
RoHS2+		RoHS-2011/65/EU + AM-2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2015
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015
Limitation of voltage fluctuations/flicker in low-voltage systems		EN61000-3-3: 2013

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case	epoxy with fibreglas, (UL94V-0)
Dimension (LxWxH)		109.0 x 58.5 x 30.0mm
Weight		310g typ.

Dimension Drawing (mm)

Pinning information

Pin #	Single	Dia. (mm)
1	FG	1.2
2	VAC in (L)	1.8
3	VAC in (N)	1.8
4	Trim	1.2
5	-VDC out	1.8
6	+VDC out	1.8

FC = Fixing Centers
Tolerance: xx.x ± 0.5mm
xx.xx ± 0.25mm

Recommended Footprint Details

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PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	cardboard box	120.0 x 65.0 x 55.0mm
Packaging Quantity		1pcs
Storage Temperature Range		-50°C to +85°C
Storage Humidity	non-condensing	95% RH max.