Features

Regulated Converter

- 300W baseplate-cooled, fan-less operation
- 550W peak power or forced air rating
- Universal AC input range (80~264VAC)
- Standby power consumption <0.5W
- Operating temperature -40°C to +70°C
- Signals: remote sensing and ON/OFF control

RECOM
AC/DC Converter

RACM550-G

550 Watt 5" x 3" Open Frame or Enclosed Single Output

Description

The RACM550 Series is designed to support up to 300 Watt continuous output power without fan cooling. The compact 5" x 3" baseplate design enables direct heat dissipation through metal housings in the application. Up to 550 watts are available to drive dynamic loads for several seconds of peak power or with forced air for even longer time frames. A smart fan output is on board as standard as well as a 5V/1A VSB output for applications with housekeeping circuits and on/off control. A wide input range of 80 to 264VAC, up to 5000m operating altitude and international safety agency certifications make the series worldwide compliant for medical 2 MOPP, household and industrial ITE applications.

Selection Guide

Part Number	Input Voltage Range [VAC]	Nom. Output Voltage [VDC]	Max. Output Current (1) [A]	Efficiency typ. (2) [%]
RACM550-24SG (3)	80-264	24	22.92	93
RACM550-36SG (3)	80-264	36	15.28	93
RACM550-48SG (3)	80-264	48	11.46	93
RACM550-56SG (3)	80-264	56	9.82	94

Notes:

Note1: With forced air cooling (2.5m/s) + conduction cooling + refer to ***"Line Derating"***

Note2: Efficiency is tested at nominal input and full load at +25°C ambient

Model Numbering

RACM550- SG/

- RACM550- : max. Output Power / nom. Output Voltage
- SG/ : ***"Case Option (3)"***
- SG/ : **S**ingle

Notes:

Note3: add suffix "/OF" for open frame version
add suffix "/ENC" for enclosed version

Ordering Examples:

RACM550-24SG/OF	24Vout	Single	open frame
RACM550-36SG/ENC	24Vout	Single	enclosed

2MOPP

UL62368-1 (TÜV NRTL) certified
CAN/CAS C22.2 No. 62368-1 certified
IEC/EN62368-1 certified
IEC/EN60950-1 (pending)
IEC/EN60335-1 (pending)
IEC/EN60601-1 (pending)
ANSI/AAMI ES60601-1 (pending)
CSA/CAN 22.2 60950-1-14 (pending)
IEC/EN61558-1 (pending)
IEC/EN61558-2-16 (pending)
EN55032 compliant
EN55024 compliant
CB Report

Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

BASIC CHARACTERISTICS

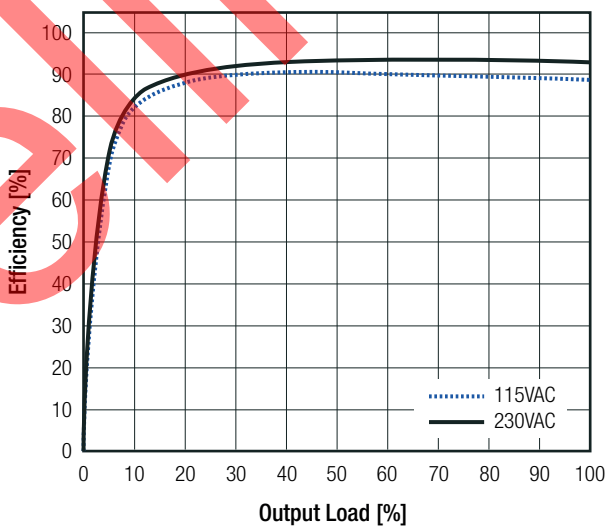
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range [4]	nom. Vin= 230VAC		80VAC 120VDC	230VAC	264VAC 370VDC
Input Current	115VAC 230VAC				6.5A 3.0A
Inrush Current	115VAC 230VAC				40A 60A
No load Power Consumption					2W
Standby Power	main output OFF, VSB Output unloaded				0.5W
Input Frequency Range	AC input		47Hz		63Hz
ErP Lot 6 Standby Mode Conformity (VSB Output Load Capability)	Input Power= 1W (main output= standby mode)				450mW
Minimum Load			0%		
Power Factor	115VAC 230VAC		0.98 0.95	0.99 0.97	
Start-up Time	main output VSB Output	115VAC/230VAC 115VAC/230VAC		400ms 140ms	
Rise Time	main output VSB Output	115VAC/230VAC 115VAC/230VAC		15ms 5ms	
Hold-up Time	main output VSB Output	115VAC/230VAC, 550W 115VAC/230VAC		15ms 130ms	
Output Ripple and Noise [5]	20MHz BW @ 25°C	main output			1% of Vout nom. max.
		VSB Output			120mVp-p

Notes:

Note4: The products were submitted for safety files at AC-input operation. For DC-input make sure that sufficient fuses are used

Note5: Measurements are made with a 12" twisted pair-wire terminated with a 0.1µF and 10µF parallel capacitor

Efficiency vs. Load



REGULATIONS

Parameter	Condition		Value
Output Accuracy	main output VSB output		±3.0% max. ±4.0% max.
Line Regulation	low line to high line, full load	main output / VSB output	±1.0% max.
Load Regulation [6]	10% to 100% load	main output / VSB output	1.0% max.

Notes:

Note6: Operation below 10% load will not harm the converter, but specifications may not be met

Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

ADDITIONAL FEATURES

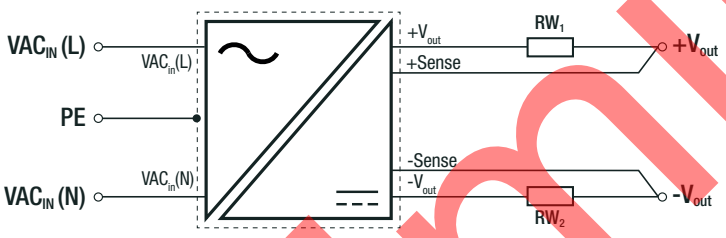
Parameter	Condition		Min.	Typ.	Max.
VSB Output Power	CTRL ON	115VAC/230VAC			5W
	CTRL OFF	230VAC 115VAC			5W 1W
Output Voltage Adjustability (7)	on-board potentiometer				±2VDC
ON/OFF CTRL	CON3, Pin3 (refer to ***"VSB & CTRL (CON3)"***	main + FAN output ON main + FAN output OFF	2.4VDC - 5VDC or open 0VDC - 0.8VDC or shorted to GND		
Fan Output Power	@ +50°C (not protected)	continuous peak (1s)		250mA	 500mA
Remote Sense (8)					2VDC
Power OK LED	LED = green LED = red		working failure		

Notes:

Note7: By trimming up, decrease output current to avoid exceeding rated output power. By trimming down, do not exceed maximum continuous output current

Note8: The output voltage can be adjusted by both ADJ (potentiometer) and Sense. The maximum combined adjustment range is ±2VDC

REMOTE SENSE



RW$_1$ ... wire losses +
RW$_2$ ... wire losses -

PROTECTIONS (Fan output not protected)

Parameter	Type		Value
Input Fuse (9)	internal		2x T6.3A, slow blow type
Over Voltage Category (OVC)			OVCII
Class of Equipment			Class I
Isolation Voltage (safety certified) (10)	I/P to O/P	1 minute	4kVAC
Isolation Resistance			10MΩ min.
Insulation Grade			reinforced
Leakage Current			0.25mA max.
Means of Protection	250VAC working voltage		2MOPP

Notes:

Note9: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

Note10: For repeat Hi-Pot testing, reduce the time and/or the test voltage

PROTECTIONS MAIN OUTPUT

Short Circuit Protection (SCP)	below 100mΩ	P$_{in}$ =10W max.	hiccup mode, auto recovery
Over Voltage Protection (OVP)			110% - 120%, hiccup mode
Over Current Protection (OCP)			105% - 135%, hiccup mode
Over Temperature Protection (OTP)			auto recovery, internal temperature sensors

PROTECTIONS AUX (VSB)

Short Circuit Protection (SCP)	below 100mΩ		hiccup mode, auto recovery
Over Voltage Protection (OVP)			8-9VDC, hiccup mode
Over Current Protection (OCP)			2.5-3.5A, hiccup mode

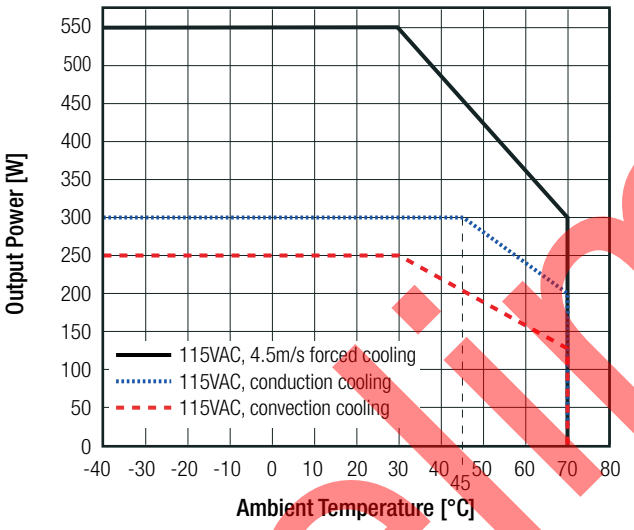
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

ENVIRONMENTAL			
Parameter	**Condition**		**Value**
Operating Temperature Range	refer to derating graphs		-40°C to +70°C
Temperature Coefficient			±0.02%/K
Operating Altitude (11)			5000m
Operating Humidity	non-condensing		20% - 90% RH max.
Pollution Degree			PD2
Shock			250m/s², 6ms; 3 times, each along x, y, z axes
Vibration			90-200Hz, 10m/s²; 3.5min./1cycle, 5 periods, each along x, y, z axes
MTBF	according to MIL-217F Method 2 Components Stress Method	+25°C (forced air cooling) +45°C (forced air cooling)	200 x 10^3 hours 50 x 10^3 hours

Notes:

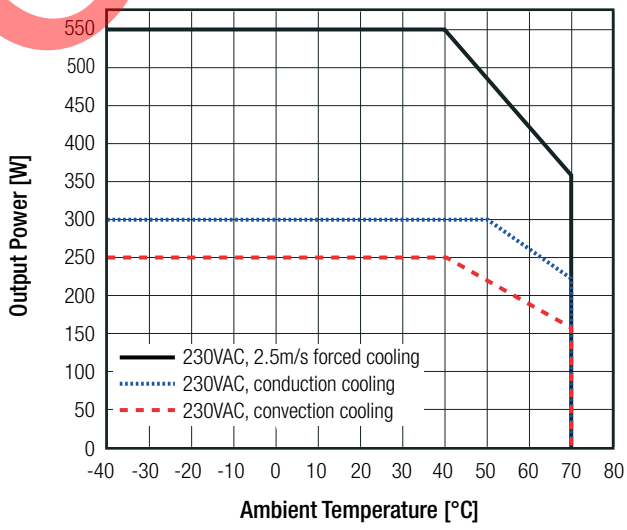
Note11: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime. Please contact RECOM tech support for advice.

Thermal Derating 115VAC



Line Derating (<115VAC)

Thermal Derating 230VAC



<0.1m/s = still air
0.1 - 0.2m/s = natural convection

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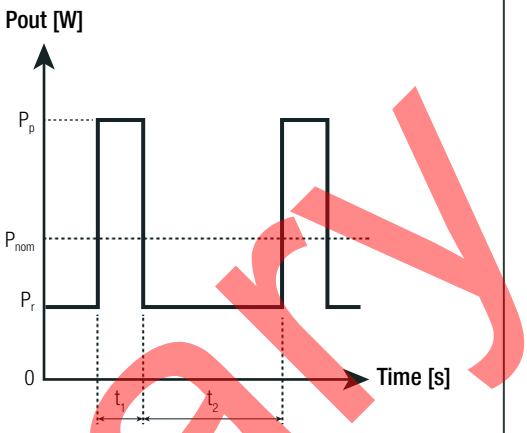
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

Peak Load Capability



Calculation

P_{nom}	= nom. output power	[W]
P_P	= peak output power (≤550W)	[W]
P_r	= recovery output power	[W]
t_1	= peak time set (10s max.)	[s]
t_2	= recovery time (min. 4 x t_1)	[s]
k	= safety factor 1.7	[ ]

$$P_r = \frac{P_{nom} \times (t_{1set} + t_2) - (P_P \times t_{1set})}{t_2 \times k}$$

Practical Example (RACM550-24SG/OF):

Take the RACM550-24SG/OF at 100VAC input voltage and T_{AMB}= 60°C (220W) with conduction cooling.

$P_{nom.}$ = refer to derating graphs= 245W with line derating 220W
P_P = 550W
t_1 = 10s
t_2 = 40s
k = 1.7

$$P_r = \frac{220 \times (10 + 40) - (550 \times 10)}{40 \times 1.7} = \underline{80.9W}$$

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Audio/video, information and communication technology equipment - Safety requirements (CB)	211-700545-000	IEC62368-1:2014 2nd Edition
Audio/video, information and communication technology equipment - Safety requirements		EN62368-1:2014 + A11:2017
Audio/video, information and communication technology equipment - Safety requirements (TÜV NRTL)	65.250.19.032.02	UL62368-1:2014
		CAN/CSA C22.2 No.62368-1:2014
Information Technology Equipment, General Requirements for Safety	pending	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
Household and similar electrical appliances - Safety - Part 1: General requirements	pending	EN60335-1:2012 + A11:2014
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure		EN62233:2008
Medical Electric Equipment, General Requirements for Safety and Essential Performance	pending	ANSI/AAMI ES60601-1:2005 CAN/CSA-C22.2 No. 6060-1:14
Medical Electric Equipment, General Requirements for Safety and Essential Performance (CB)	pending	IEC60601-1:2005, 3rd Edition + AM1:2012
Medical Electric Equipment, General Requirements for Safety and Essential Performance		EN60601-1:2006 + A12:2014
Safety of transformers, reactors, power supply units and combinations thereof Part 1: General requirements and tests	pending	IEC61558-1:2005, 2nd Edition + A1:2009 EN61558-1:2005 + A1:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units (CB)	pending	IEC61558-2-16:2009, 1st Edition + A1:2013
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units (LVD)	pending	EN61558-2-16:2009 + A1:2013
RoHS2		RoHS 2011/65/EU + AM2015/863

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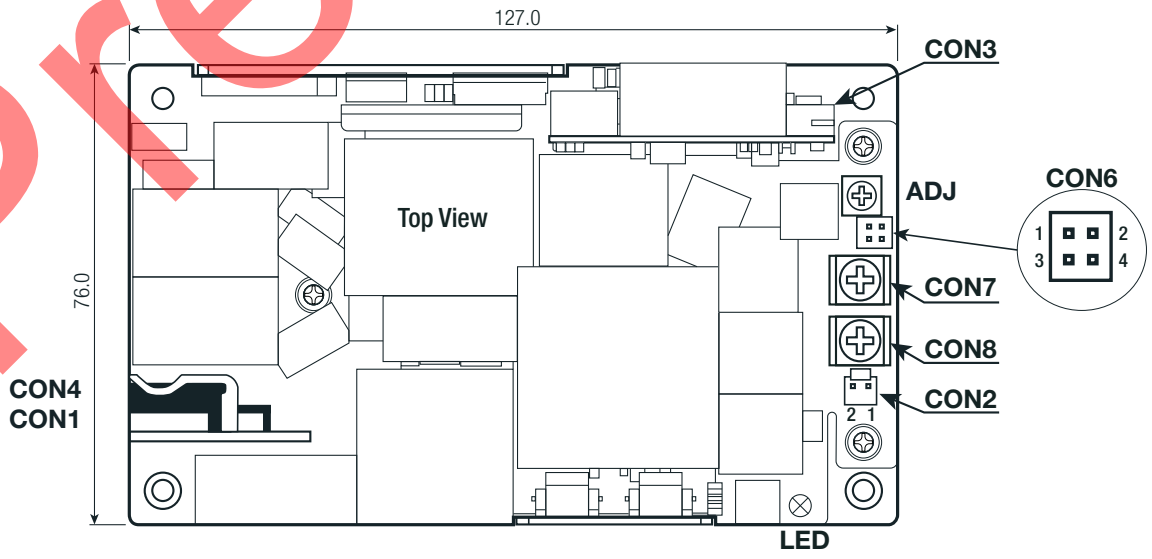
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	without external filter	EN55032:2015, Class B
Electromagnetic compatibility of multimedia equipment - Immunity requirements		EN55035:2017
Information technology equipment - Immunity characteristics - Limits and methods of measurement		EN55024:2010 + A1:2015
ESD Electrostatic discharge immunity test	Air ±8kV, Contact ±4kV	EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	3V/m (80-5000MHz)	EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: ±1kV	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Power Port: L-N ±1kV	EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port: 3V (0.15-10MHz) 3V to 1V (10-30MHz) 1V (30-80MHz)	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz/60Hz, 1A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Voltage Dips 100% at 50/60Hz	EN61000-4-11:2004, Criteria A
Voltage Dips and Interruptions	Voltage Dips 30% at 50Hz	EN61000-4-11:2004, Criteria A
Voltage Dips and Interruptions	Voltage Dips 30% at 60Hz	EN61000-4-11:2004, Criteria B
Voltage Dips and Interruptions	Voltage Interruptions > 95% at 50Hz	EN61000-4-11:2004, Criteria C
Voltage Dips and Interruptions	Voltage Interruptions > 95% at 60Hz	EN61000-4-11:2004, Criteria B
Limits of Harmonic Current Emissions		EN61000-3-2:2014
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	PCB baseplate/case	FR4, (UL94 V-0) aluminium
Dimension (LxWxH)	open frame version enclosed version	127.0 x 76.0 x 38.0mm 150.0 x 87.0 x 45.0mm
Weight	open frame version enclosed version	500g typ. 590g typ.

Dimension Drawing Open Frame (mm)



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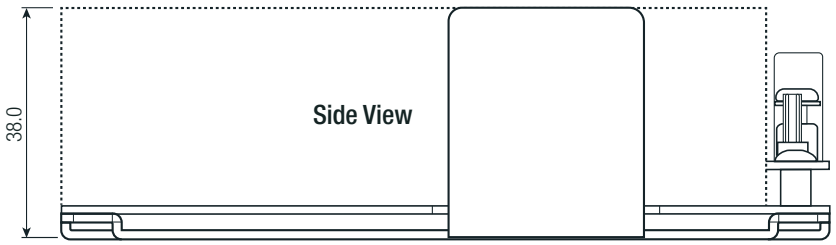
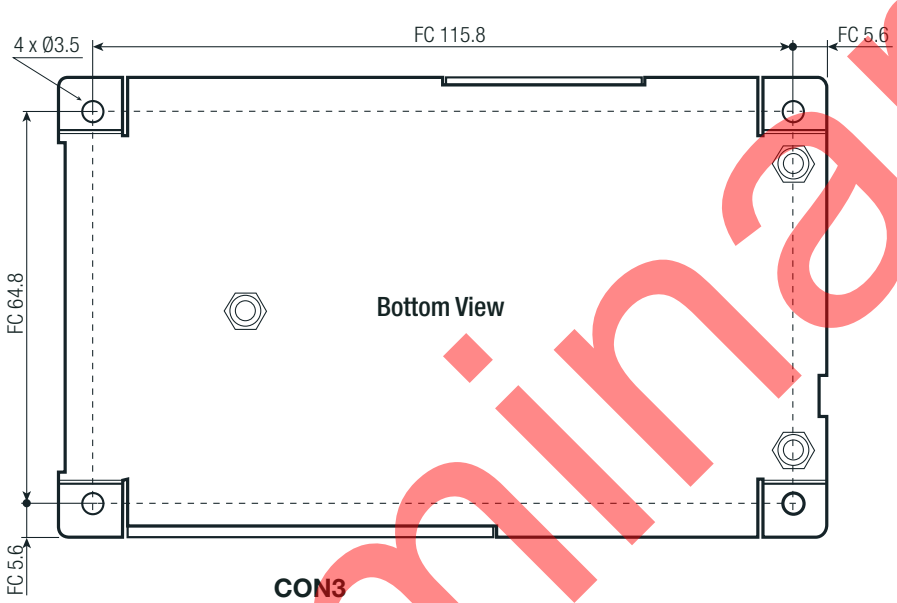
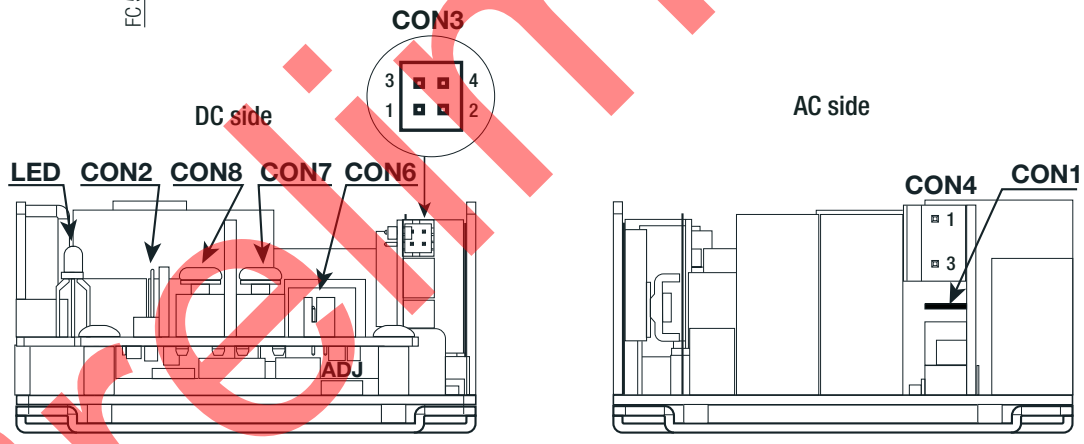
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)





FC = fixing centers
Tolerance: xx.x= ±1.0mm
xx.xx= ±0.5mm



Compatible Connector (valid for open frame and enclosed version)

PE (CON1)			AC Input (CON4)			FAN (CON2)			VSB & CTRL (CON3)			Sense (CON6)		
#	Function	Connector	#	Function	Connector	#	Function	Connector	#	Function	Connector	#	Function	Connector
1	PE	TE Connectivity PIDG series with positive lock .250EX	1 3	AC/N AC/L	Molex 09-50-1031 or similar	1 2	-FAN +FAN	Molex 22-01-1022 or similar	1 2 3 4	+5VSB GND PS ON GND	Molex 51110-0450 or similar	1 2 3 4	-Sense NC +Sense NC	Molex 51110-0450 or similar

NC= No connection

MAIN Output Screw Terminal (CON7/8)		
#	Function	AWG
CON7	-Vout	14-26
CON8	+Vout	14-26
wire stripping length: 5.0mm recommended tightening torque: 0.8Nm		

Maximum tightening torque for mounting: 0.3Nm
FC= fixing centers
Tolerance: xx.x= ±1.0mm
xx.xx= ±0.5mm

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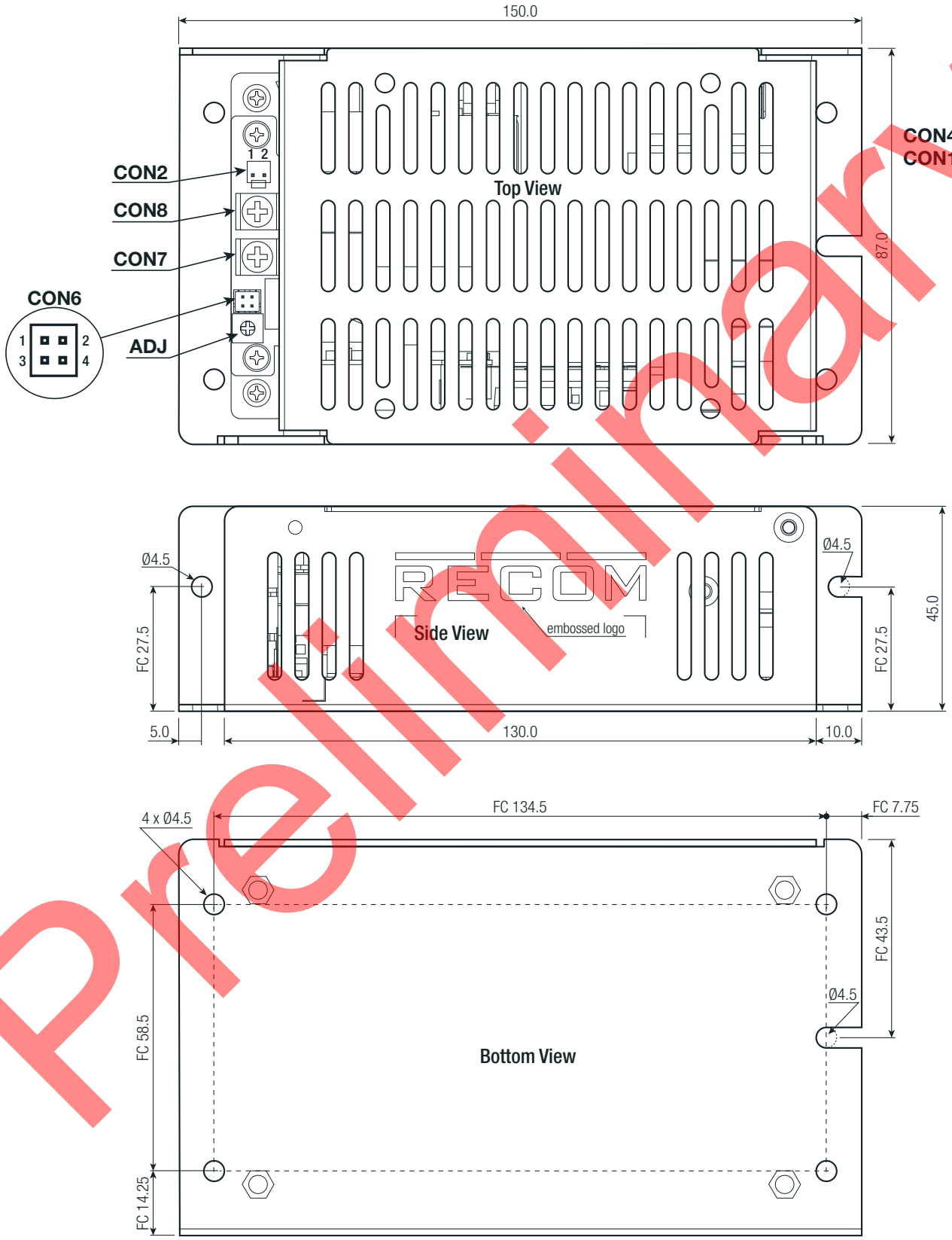
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

Dimension Drawing Enclosed Version (mm)



FC = fixing centers
Tolerance: xx.x= ±1.0mm
xx.xx= ±0.5mm

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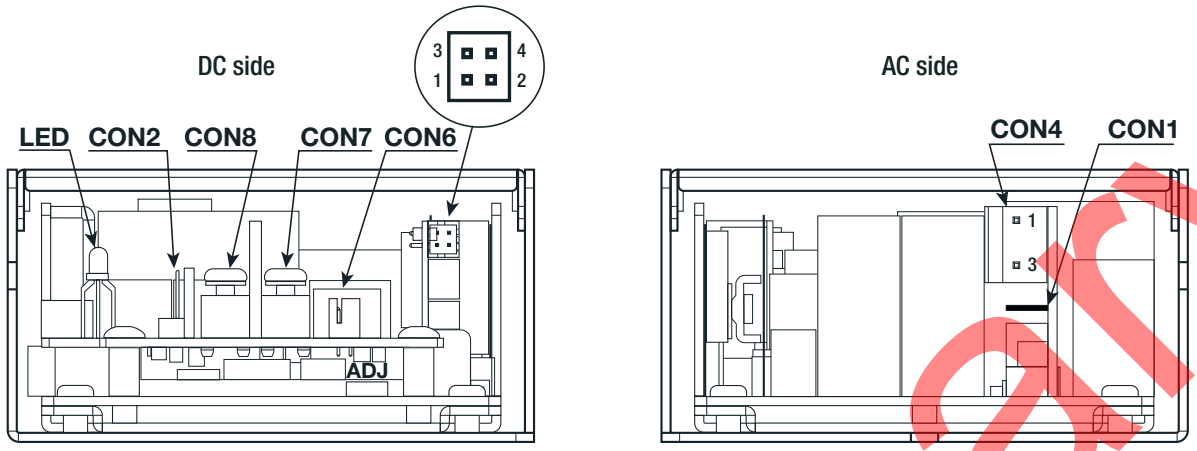
Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

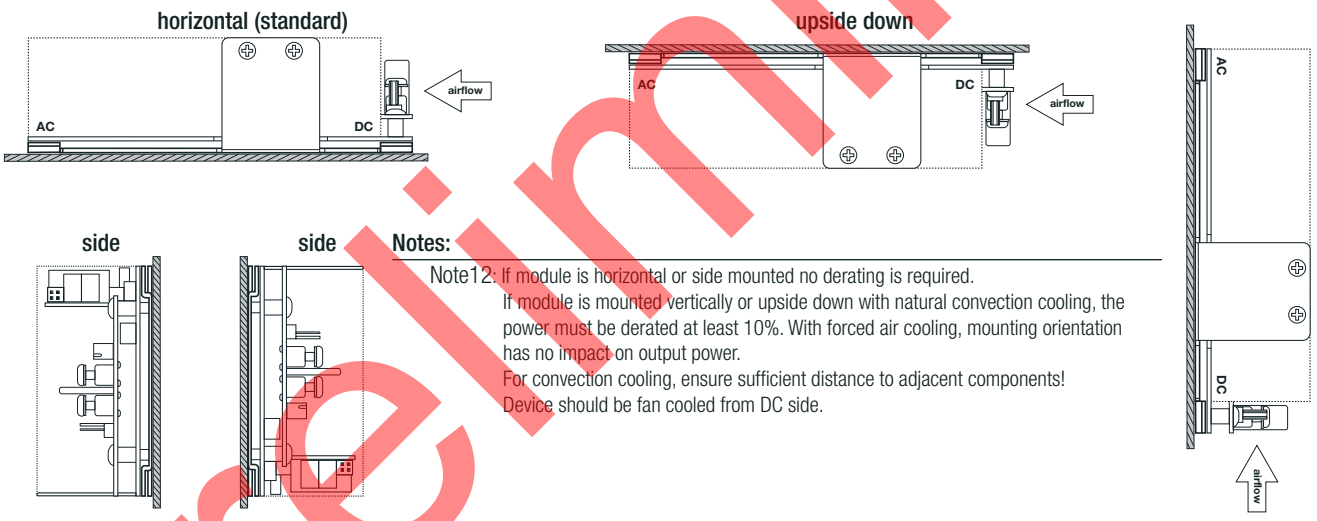
Dimension Drawing Enclosed Version (mm)



INSTALLATION AND APPLICATION

Mounting

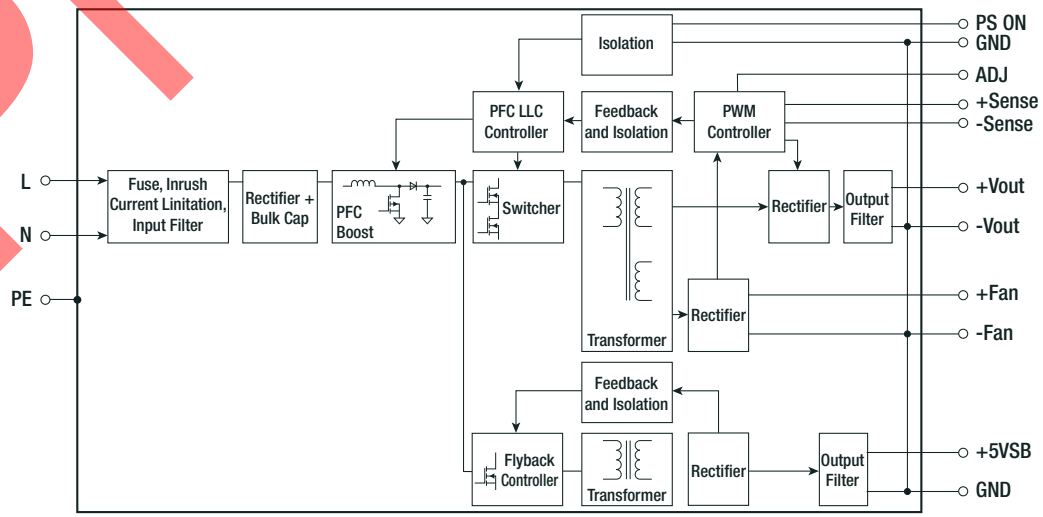
Forced air conditions as specified are valid for indicated airflow direction only!



Notes:

Note12: If module is horizontal or side mounted no derating is required.
If module is mounted vertically or upside down with natural convection cooling, the power must be derated at least 10%. With forced air cooling, mounting orientation has no impact on output power.
For convection cooling, ensure sufficient distance to adjacent components!
Device should be fan cooled from DC side.

Block Diagram



Specifications (measured @ Ta= 25°C, rated input, rated load unless otherwise stated)

PACKAGING INFORMATION			
Parameter	**Type**		**Value**
Packaging Dimension (LxWxH)	cardboard box	open frame version enclosed version	134.0 x 86.0 x 45.0mm 155.0 x 92.0 x 50.0mm
Packaging Quantity			1pcs
Storage Temperature Range			-55°C to +85°C
Storage Humidity	non-condensing		95% RH max.