Features

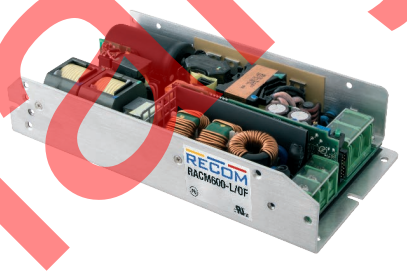
Regulated Converter

- 400/450 Watt convection cooled (115/230VAC)
- 600 Watt forced air or peak power
- 5VSB Output
- Redundant operation; active current sharing
- Remote sensing, CTRL ON/OFF, PMBus™
- IEC60601 2x MOPP insulation system, BF-ready

RECOM
AC/DC Converter

RACM600-L

600 Watt 7.7" x 4" Open Frame Single Output



Description

RACM600-L/OF Series AC/DC power supply units are designed for operation in natural convection and in systems with certain airflow ventilation to deliver 400 to 600Watt output power. Safety approvals to Medical IEC 60601-1-2 and to IT and industrial IEC 62368 standards and operation with worldwide input voltage conditions from 80 to 275Vac in altitudes up to 5.000m make these chassis mount units ideal for global use in medical, industrial or IT related automation processes. For enhanced reliability requirements of applications redundant operation is supported with active current sharing. An additional 5V Standby output powers housekeeping circuitry to control remote on/off and monitoring functions which are available via PMBus™ I²C interface. EN55032 class "B" EMC compliance is achieved without any external components which underlines the versatility of these power supplies.

Selection Guide

Part Number	Input Voltage Range [VAC]	Nom. Output Voltage [VDC]	Max. Output Current [A]	Max. Output Power [W]	Efficiency typ. (1) [%]
RACM600-24SL/OF	80-275	24	25	600	93

Notes:

Note1: Efficiency is tested at 230VAC and full load at +25°C ambient

Model Numbering

RACM600-24 SL/OF

- 24 — max. Output Power / nom. Output Voltage
- SL — **S**ingle
- OF — Open frame package

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

BASIC CHARACTERISTICS				
Parameter	**Condition**	**Min.**	**Typ.**	**Max.**
Nominal Input Voltage	50/60Hz	100VAC		240VAC
Operating Range (2, 3)	47-63Hz DC	80VAC 120VDC		275VAC 300VDC
Input Current	80VAC 120VDC			9A 5.7A
Inrush Current	cold start at 25°C			20A
Input Frequency Range	AC Input	47Hz		63Hz
Minimum Load		0%		
Power Factor	EN61000-3-2, Class A compliant		0.9	
Start-up Time	MAIN ON CTRL ON			2.5s 150ms
Rise Time				150ms
Hold-up Time			20ms	
Periodic and Random Deviation (PARD)	20MHz BW, 10µF Tan. and 1µF MLCC			1%p-p

Notes:

Note2: The products were submitted for safety files at AC and DC-Input operation.

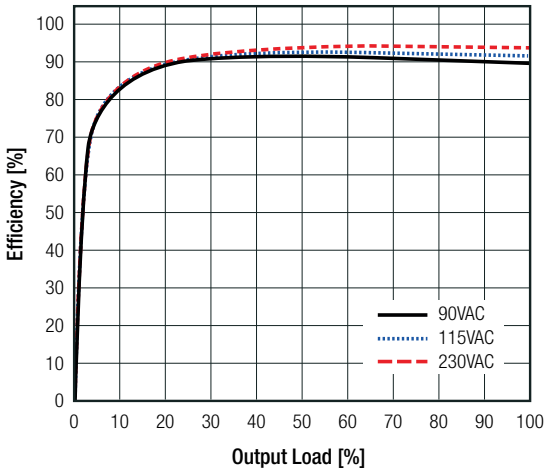
Note3: Refer to ***"Derating Graph"***

continued on next page

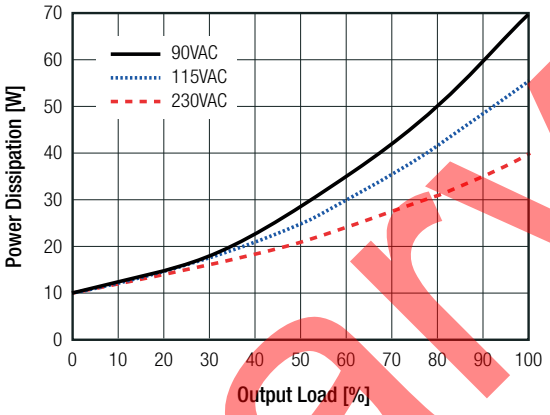
IEC62368-1 pending
UL/CSA/CAN 60950-1 pending
IEC/EN60601-1 pending
ANSI/AAMI ES60601-1 pending
CAN/CSA C22.2 No. 60601-1 pending

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

Efficiency vs. Load



Power Dissipation vs. Load



ADDITIONAL FEATURES

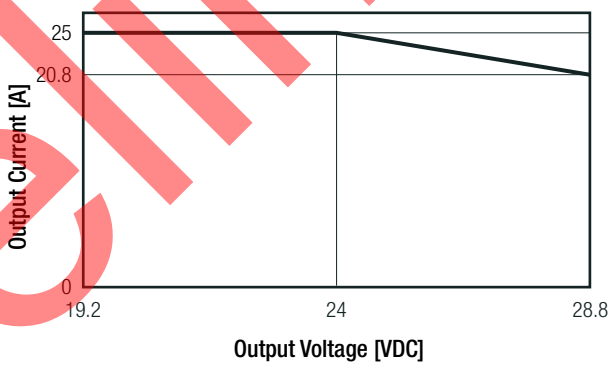
Parameter	Condition		Min.	Typ.	Max.
ON/OFF CTRL *(logic can be switched with PMBus)*	CON3	MAIN OUTPUT ON MAIN OUTPUT OFF	CTRL (pin10) shorted to 5VSB_RTN (pin3,4,7)		open
Output Voltage Adjustability (4)	on-board poti, refer to ***"Output Current vs. Output Voltage"***		19.2VDC		28.8VDC
Remote Sense (5)	total voltage drop compensation for +Sense and -Sense connection				200mV
Power OK LED	LED = green		will turn ON as soon as PSU_GOOD Signal is set to high		

Notes:

Note4: By trimming up, decrease output power. By trimming down, do not exceed maximum continuous output current

Note5: Do not short or reversely connect +Sense to -Sense, this can cause damage to the supply

Output Current vs. Output Voltage



5VSB OUTPUT (6)

Parameter	Condition	Min.	Typ.	Max.
Nominal Output Voltage				5VDC
Max. Output Current				500mA
Max. Output Power				2.5W
Max. Capacitive Load				1000µF
Over Voltage Protection (OVP)				5.5-6VDC, latch off
Over Current Protection (OCP)	of rated I_{OUT}			1-1.3A, auto recovery
Short Circuit Protection (SCP)				auto recovery
Over Temperature Protection (OTP)				auto recovery

Notes:

Note6: There is no galvanic isolation between AUX GND and Main Output GND. Regulations for 5VSB Output are stated under ***"REGULATIONS"***

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

REGULATIONS

Parameter	Condition	Value
Output Accuracy (MAIN and 5VSB output)		±2.25% max.
Line Regulation (MAIN and 5VSB output)	low line to high line, full load	±0.25% typ.
Load Regulation (MAIN and 5VSB output)	0% to 100% load	1.0% typ.
Dynamic Load Regulation	50% step from 5% load (1A/µs), tested with 10µF Tan. and 1µF MLCC	5.0% max.

PROTECTIONS

Parameter	Type		Value
Internal Input Fuse	DC input compliant, dual-fusing		2x T10A
Short Circuit Protection (SCP)			hiccup, auto recovery
Over Voltage Protection (OVP)			30VDC - 35VDC, latch off
Over Voltage Category (OVC)			OVC II
Over Current Protection (OCP)	of rated I_{OUT}		108-140%, auto recovery
Over Temperature Protection (OTP)			auto recovery
Isolation Voltage (safety certified) (7)	I/P to O/P (reinforced) I/P and O/P to Case (basic)	1 minute	4kVAC (2MOPP) 1.5kVAC (1MOPP)
Insulation Grade			reinforced
Leakage Current Input to Earth GND	low line 132VAC , 63Hz	Normal condition	150µA max.
		Single Fault	250µA max.
	high line 264VAC , 60Hz	Normal condition	300µA max.
		Single Fault	500µA max.
Leakage Current Output to Earth GND	264VAC , 63Hz	Normal condition	60µA max.
		Single Fault (neutral open)	80µA max.
		Single Fault (ground open)	150µA max.
		AC Back-drive Fault	550µA max.
Class of Equipment			Class I
Medical Device Classification	according to IEC60601-1		designed to support Type BF applied part

Notes:

Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	refer to *"Derating Graph"*	T_{BASE} temperature	-20°C to +70°C
Operating Altitude (8)	according to 62368-1 according to 60601-1		5000m 3000m
Operating Humidity	non-condensing		95% max.
Pollution Degree			PD2
Vibration (non-operating)	2.09G r.m.s., 5Hz to 500Hz, 20 minutes per side (3 planes)		according to IEC 60068-2-6
Shock (non-operating)	50G, 11ms, 3 shocks for each direction		according to IEC 60068-2-27
MTBF	according to Telecordia SR-332, Issue 3, 25°C ambient, 90% confidence level		500 x 10^3 hours
Design Lifetime (capacitor)	nom. Vin, 80% load, 45°C ambient		87.6 x 10^3 hours

Notes:

Note8: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime
Ambient temperature decreases by 1°C per 305m altitude increase

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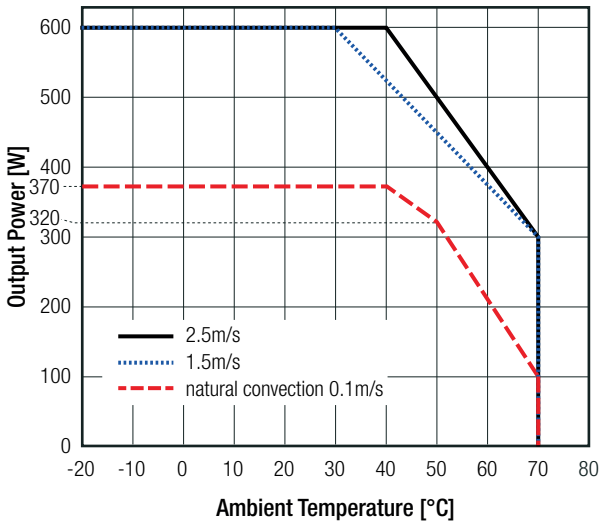
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

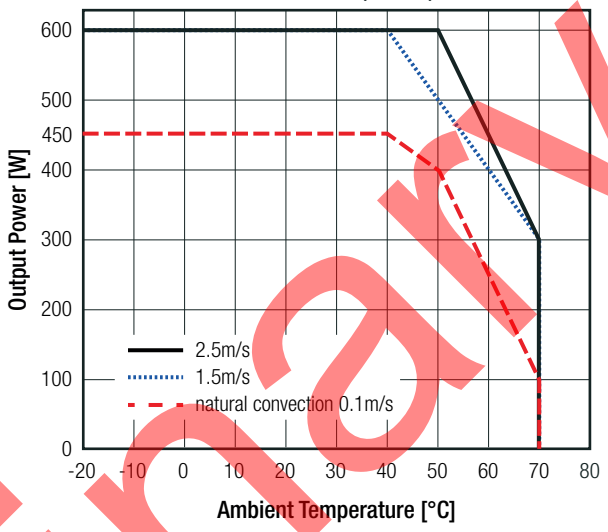
Derating Graph

(@ Chamber, refer to ***"Mounting Orientations"*** for airflow direction)

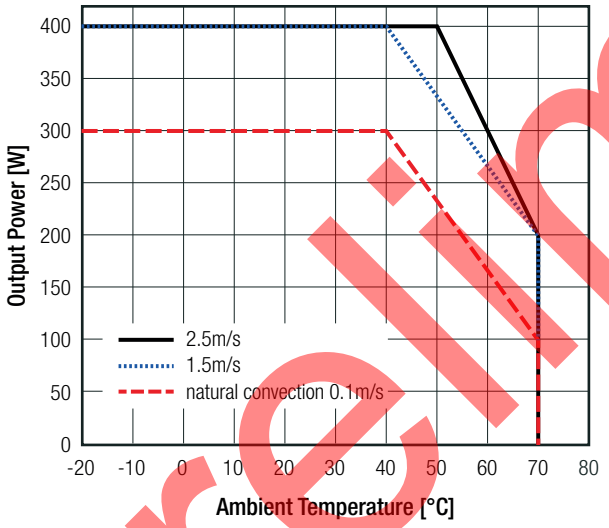
115VAC (±10%)



200-240VAC (±10%)



100VAC (±10%)



Output power derating for Line-input of less than 90VAC. Derate linearly from 100% at 90VAC to 80% at 80VAC to given thermal ratings

SAFETY AND CERTIFICATIONS (DESIGNED TO MEET)		
Certificate Type (Safety)	**Report Number**	**Standard**
Audio/video, information and communication technology equipment. Safety requirements	pending	IEC62368-1, 2nd Edition 2014
Information Technology Equipment, General Requirements for Safety	pending	UL60950-1, 2nd Edition CSA/CAN 22.2 No. 60950-1, 2nd Edition
Medical Electric Equipment, General Requirements for Safety and Essential Performance	pending	IEC60601-1:2005, 3rd Edition EN60601-1:2006
Medical Electric Equipment, General Requirements for Safety and Essential Performance	pending	ANSI/AAMI ES 6060-1:2005 CAN/CSA C22.2 No. 60601-1:2005
Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests	pending	IEC60601-1-2:2014
RoHS2		RoHS 2011/65/EU

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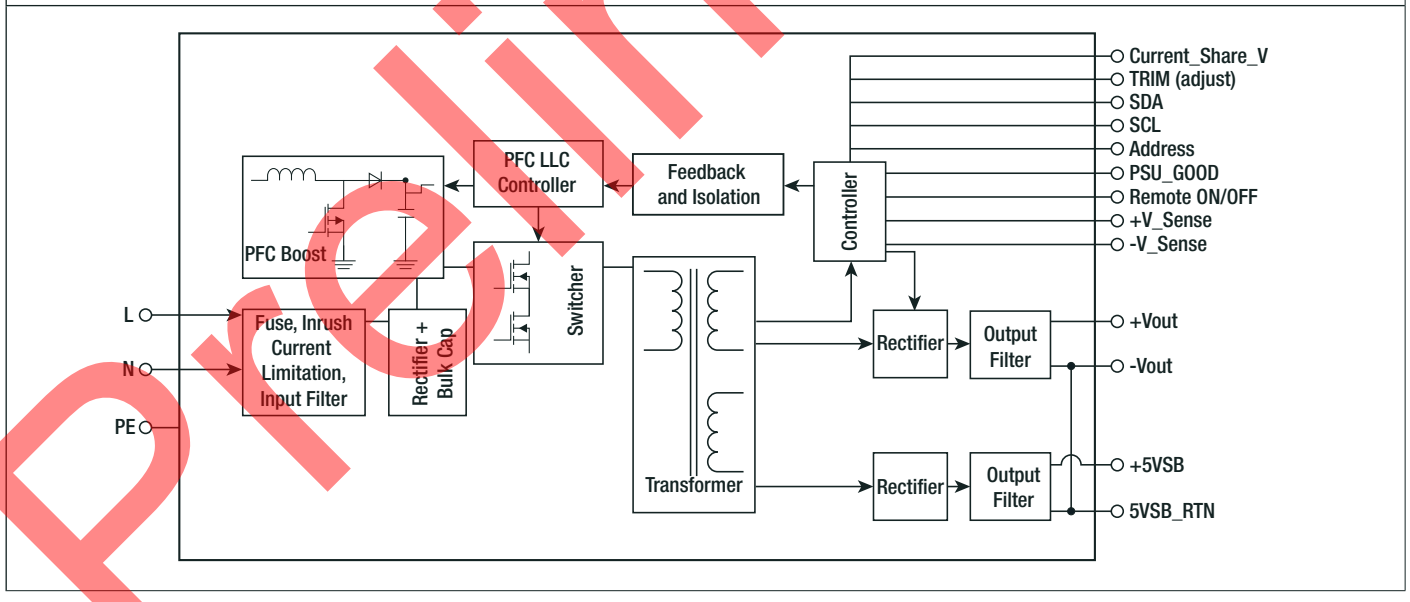
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement		EN55022, Class B
Industrial, Scientific and Medical Equipment - Radio Frequency Disturbance Characteristics - Limits and Methods of Measurement		EN55011, Class B
ESD Electrostatic Discharge Immunity Test	Air: ±15kV Contact: ±4,8kV	EN61000-4-2, Criteria A
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test	level 3= 10V/m	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity	level 4= ±4kV	EN61000-4-4, Criteria A
Surge Immunity	level 4= ±2kV DM, ±4kV CM	EN61000-4-5, Criteria A
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields	level= 3, 6Vrms in ISM band	EN61000-4-6, Criteria A
Power Magnetic Field Immunity	30A/m	EN61000-4-8, Criteria A
Voltage Dips	30%, 500ms 60%, 100ms 100%, 20ms	EN61000-4-11, Criteria A EN61000-4-11, Criteria B EN61000-4-11, Criteria A
Voltage Interruptions	30%, 500ms 60%, 100ms 100%, 20ms 100%, 5000ms	EN61000-4-11, Criteria A EN61000-4-11, Criteria B EN61000-4-11, Criteria A EN61000-4-11, Criteria B
Ring wave immunity test	level 3= 1kV DM, 2kV CM	EN61000-4-12, Class A
Voltage fluctuation immunity test for equipment with input current <16 A per phase	class 3	EN61000-4-14, Class A
Limits of Harmonic Current Emissions		EN61000-3-2, Class A
Voltage Fluctuations and Flicker in Public Low-Voltage Systems		EN61000-3-3

BLOCK DIAGRAM



DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case/baseplate PCB	aluminum FR4
Dimension (LxWxH)		196.8 x 101.6 x 40.6mm
Weight		1000g typ.

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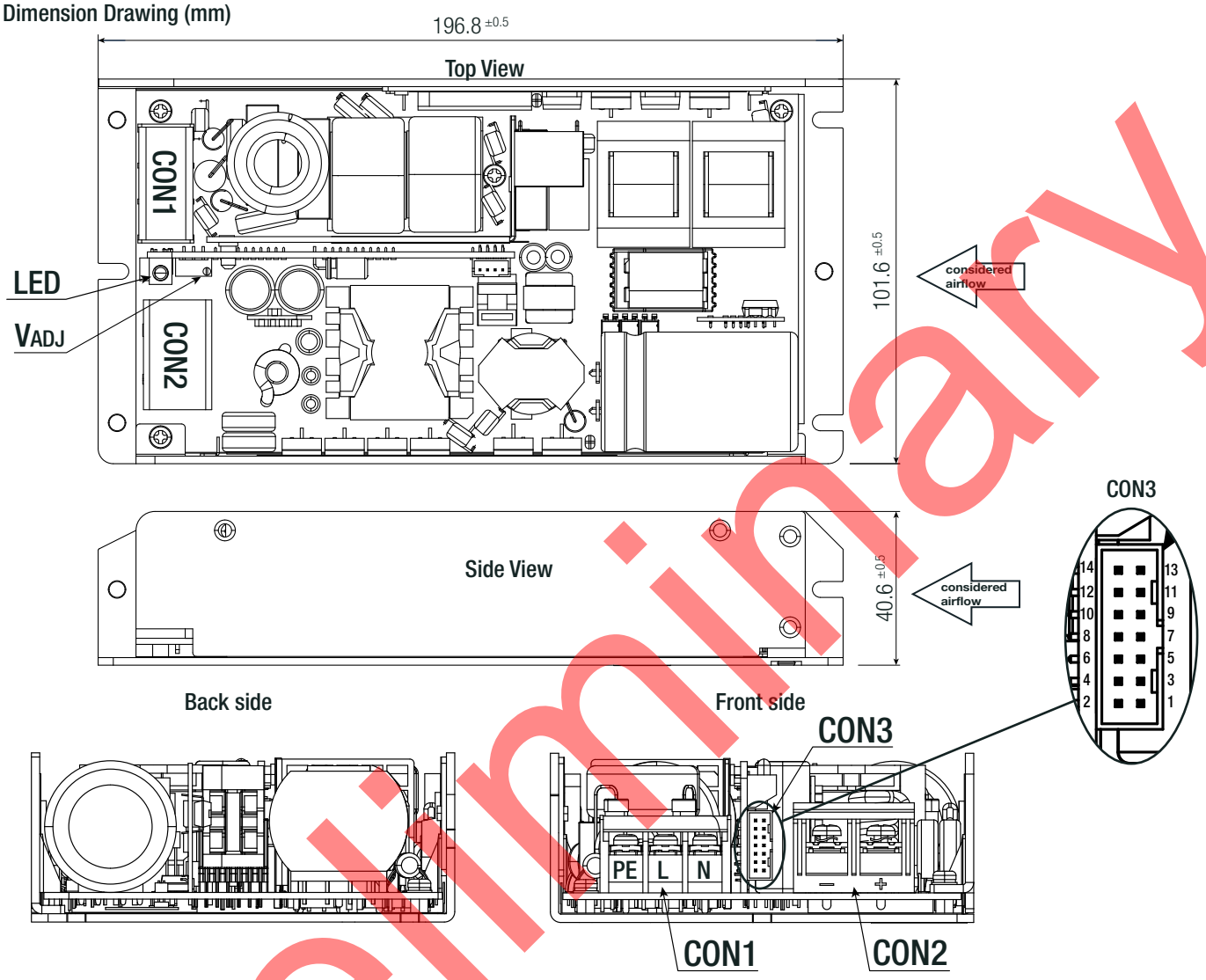
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing (mm)



Signal CON3
(Molex 87833-1420)

#	Function	#	Function
14	-Sense	13	+Sense
12	address	11	Current_share_V
10	Remote ON/OFF	9	PSU_GOOD
8	+5VSB	7	5VSB_RTN
6	SDA	5	SCL
4	5VSB_RTN	3	5VSB_RTN
2	+5VSB	1	+5VSB

Input Terminal Block CON1 (9)
(M3.5 screws)
Dinkle: DT-4C-B01W-03-GN)

Function	AWG
PE	12-18
L (line)	12-18
N (neutral)	12-18

wire stripping length: 7-8mm
recommended tightening torque : 1.3Nm

Output Terminal Block CON2 (9)
(M4 screws)
Dinkle: DT-7C-B01W-02-GN

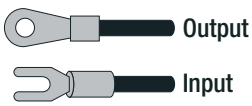
Function	AWG
-VOUT	8-12
+VOUT	8-12

wire stripping length: 10-11mm
recommended tightening torque 1.5Nm

Compatible Connector CON3
Housing
Molex 51110 Series or equivalent
Crimp Terminal
Molex 50394 Series or equivalent

Notes:

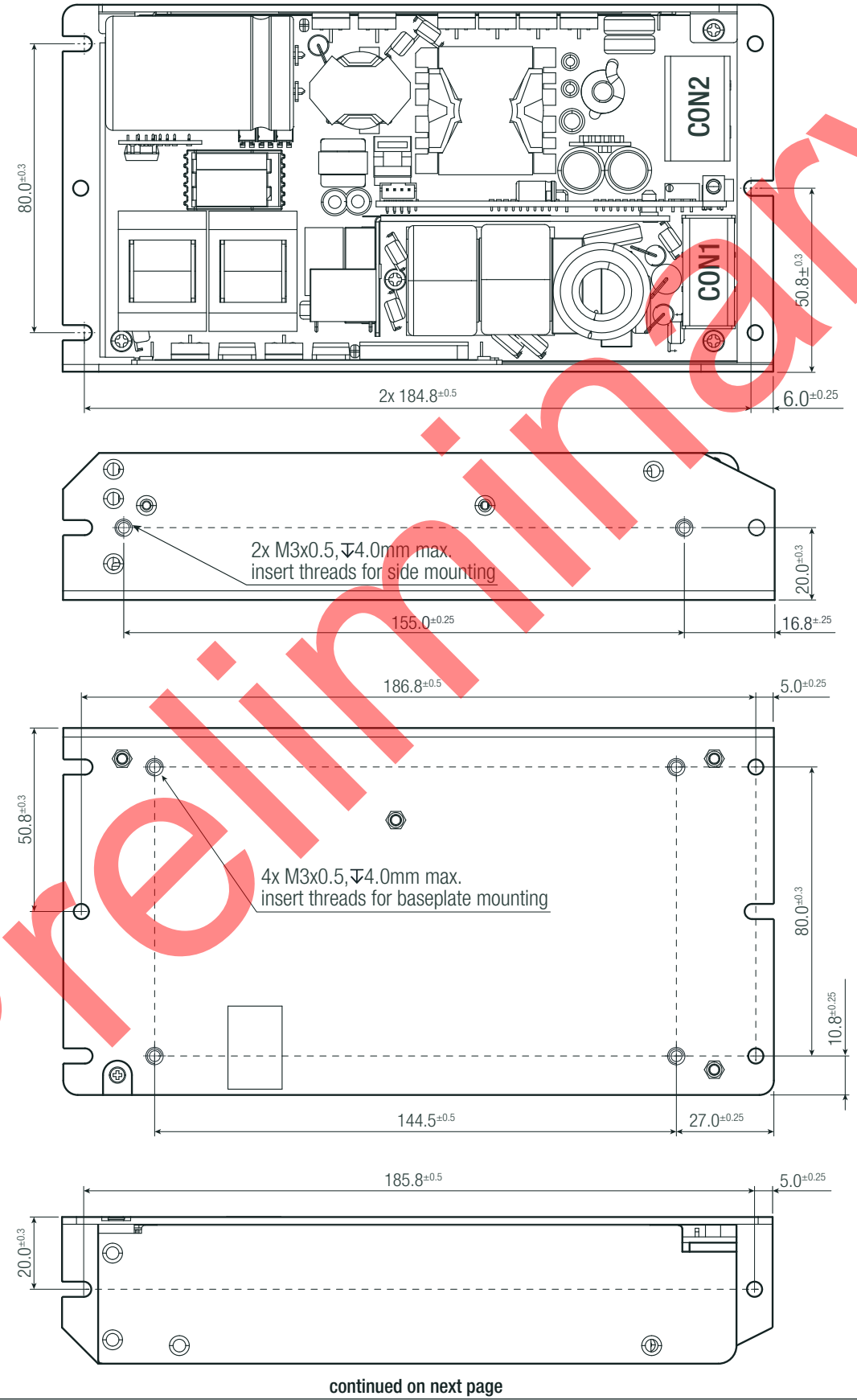
Note9: Use flexible cable with below lugs:



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

MOUNTING INSTRUCTIONS

Mounting Dimensions



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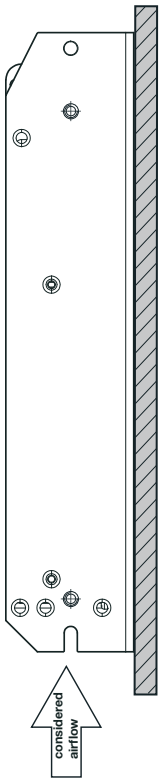
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

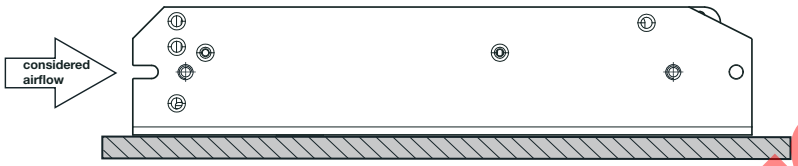
MOUNTING INSTRUCTIONS

Mounting Orientations

vertical mounting



horizontal (standard) mounting



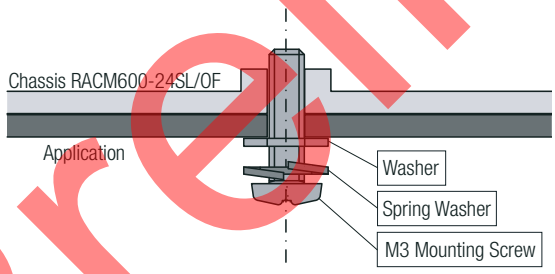
With forced air cooling, mounting orientation has no impact on output power. Upside down mounting is not recommended.

Forced air conditions as specified are valid for indicated airflow direction only (back side).

The PSU should be placed on a metal surface. It should not be placed on isolating and low thermal conductive surfaces.

Take care that no objects can fall into the PSU.

Mounting Equipment



Recommended mounting tightening torque= 0.6Nm.
Screw length= min. 2mm / max. 4mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	cardboard box	400.0 x 318.0 x 150mm
Packaging Quantity		7pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	95% RH max.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

RECOM:
RACM600-24SL/OF