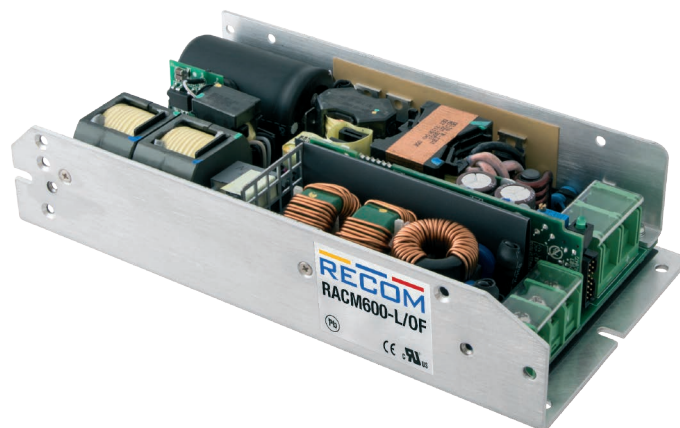


RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

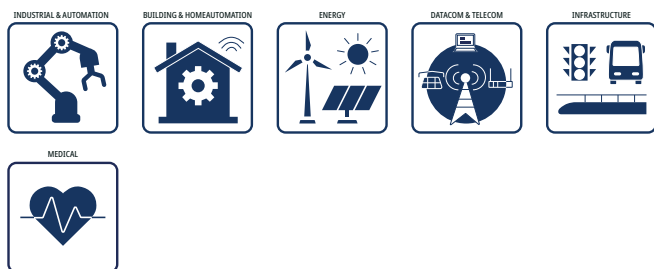
FEATURES

- Up to 450 Watt convection cooled output
- Up to 800 Watt dynamic load supply
- 5VSB output (always on)
- Remote sensing, CTRL ON/OFF, PMBus™
- Redundant operation, active current sharing
- IEC60601 MOPP insulation system, BF ready
- 3 years warranty



Dimensions (HxWxD): 196.8 x 101.6 x 40.6mm (7.75 x 4 x 1.6 inch)
 1000g (2.2 lbs)

APPLICATIONS



SAFETY & EMC



DESCRIPTION

RACM600-L/OF Series AC/DC power supply units are designed to support operation in natural convection where conduction cooling is not an option for up to 450W continuous and peak power of up to 600W or 800W. Safety approvals to Medical IEC 60601-1-2, to IT and to industrial IEC 62368 standards and operations with worldwide input voltage conditions from 80 to 275VAC in altitudes of up to 5.000m makes these chassis mount units ideal for global use in various automation processes. For enhanced reliability requirements of applications, redundant operation is supported with active current sharing. An additional 5V "always on" Stand by output powers housekeeping circuitry to control remote on/off and monitoring functions, which are available via the PMBus I²C interface. EN55032 class B coverage is given without any external components, which underlines the versatility of these power supplies.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Adjustability [VDC]	Output Current max. ⁽¹⁾ [A]	Efficiency typ. ⁽²⁾ [%]	Peak Power max. ⁽¹⁾ [W]
RACM600-12SL/OF	80-275	12	9.6-14.4	66.67	92	800
RACM600-24SL/OF	80-275	24	19.2-28.8	25	93	600
RACM600-48SL/OF	80-275	48	38.4-56	16.67	93	800

Note1: Refer to „Peak Load Capability“

Note2: Efficiency is tested at nominal input (230VAC) and full load at +25°C ambient

RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

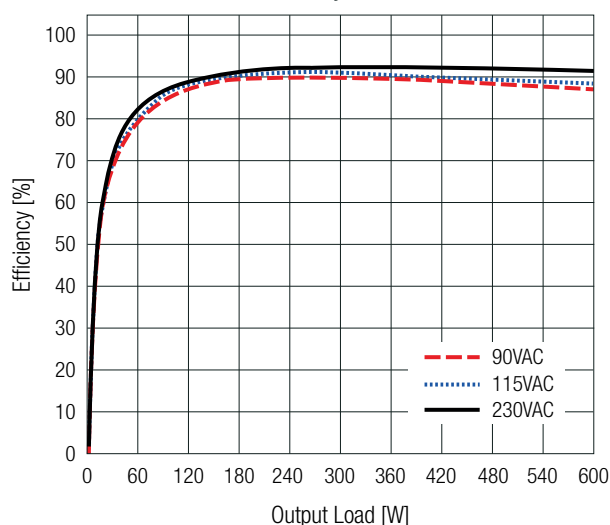
Parameter	Condition	Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz	100VAC		240VAC
Operating Range ^(3, 4)	47-63Hz	80VAC		275VAC
	DC	120VDC		300VDC
Input Current	RACM600-24SL/OF	80VAC		9A
		120VDC		5.7A
	RACM600-12SL/OF; RACM600-48SL/OF	80VAC		11.4A
		120VDC		7.6A
Inrush Current	cold start, $+25^{\circ}\text{C}$			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			2.5s
	CRTL ON			150ms
Rise time				150ms
Hold-up time			20ms	
Periodic and Random Deviation PARD	20MHz BW, 10 μF Tan. and 1 μF MLCC			1%p-p

Note3: The products were submitted for safety files at AC-Input operation.

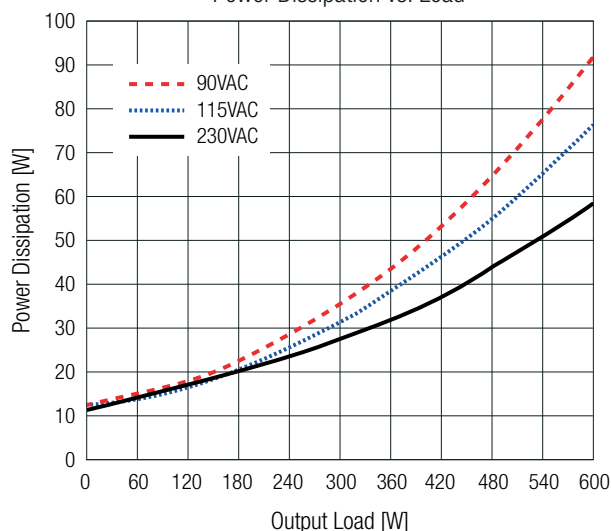
Note4: Refer to „Rating Graphs of continuous operation“

RACM600-12SL/OF

Efficiency vs. Load

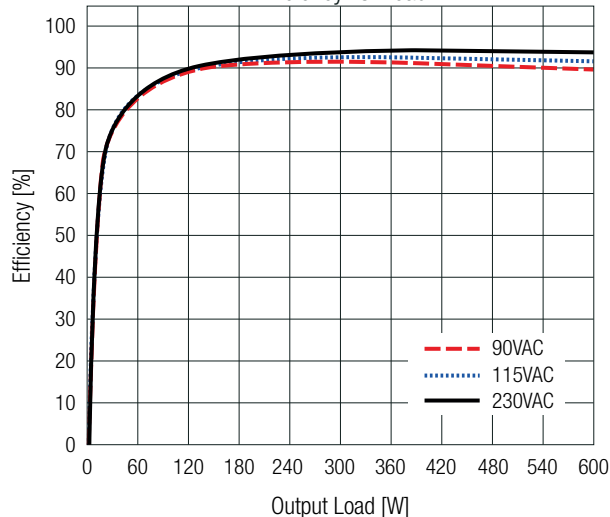


Power Dissipation vs. Load

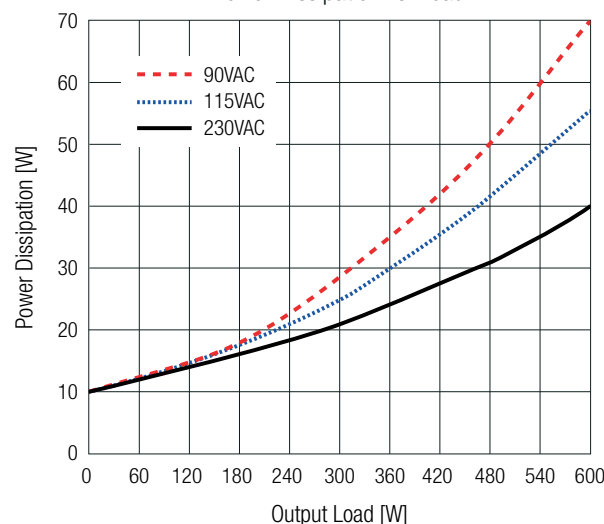


RACM600-24SL/OF

Efficiency vs. Load



Power Dissipation vs. Load

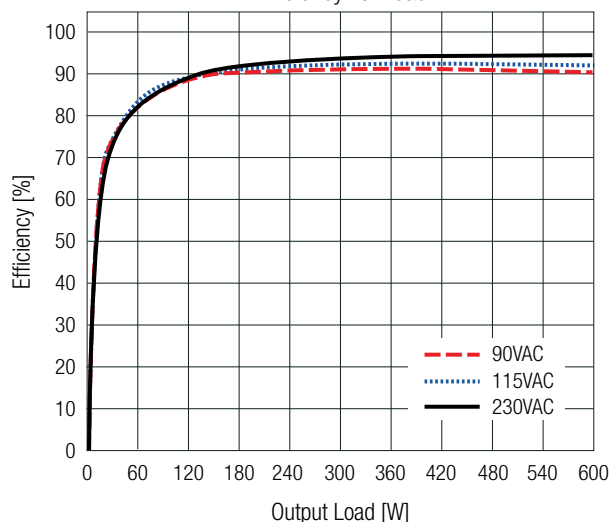


RACM600-L/OF Series / AC-DC Power Supply

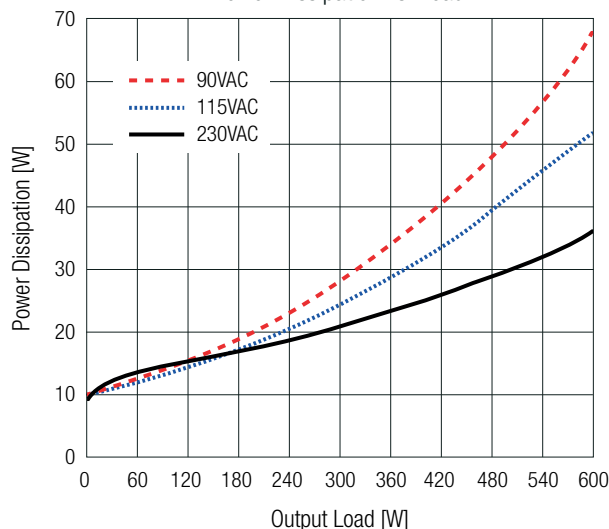
600W / Universal Input 100V - 240VAC

BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)**RACM600-48SL/OF**

Efficiency vs. Load



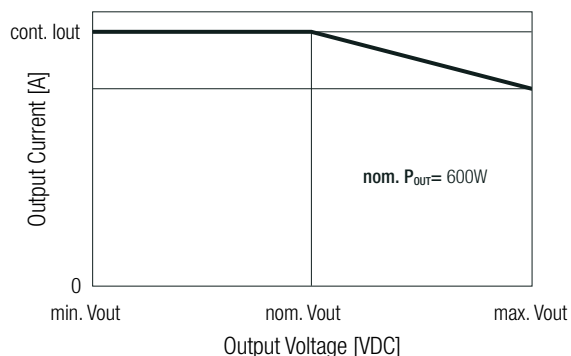
Power Dissipation vs. Load

ADDITIONAL FEATURES (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

Parameter	Condition	Min.	Typ.	Max.
ON/OFF CTRL (logic can be switched with PMBus™)	CON3	MAIN output ON on MAIN output OFF CTRL (pin10) shorted to 5VSB_RTN (pin3,4,7)		
Output Voltage Adjustability ⁽⁵⁾	on-board poti, refer to „Output Current vs. Output Voltage“	RACM600-12SL/OF	9.6VDC	14.4VDC
		RACM600-24SL/OF	19.2VDC	28.8VDC
		RACM600-48SL/OF	38.4VDC	56VDC
Remote Sense ⁽⁶⁾	total voltage drop compensation for +Sense and -Sense connection			200mV
Power OK Led	LED = green	turn ON as soon as PSU_GOOD Signal is set to high		

Note5: Make sure that the maximum rated output power will not be exceeded when trimming up as well.

Note6: Do not short or reversely connect +Sense to -Sense, this can cause damage to the supply.

Output Current vs. Output Voltage

Model	min. Vout	nom. Vout	max Vout	max. cont. Iout
RACM600-12SL/OF	9.6VDC	12VDC	14.4VDC	50A
RACM600-24SL/OF	19.2VDC	24VDC	28.8VDC	25A
RACM600-48SL/OF	38.4VDC	48VDC	56VDC	12.5A

5VSB OUTPUT ⁽⁷⁾ (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

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

Note7: There is no galvanic isolation between AUX GND and Main Output GND. Regulations for 5VSB Output are stated under „Regulations“

RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

REGULATIONS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy (MAIN and 5VSB output)		$\pm 2.25\%$ max.
Line Regulation (MAIN and 5VSB output)	low line to high line, full load	$\pm 0.25\%$ 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 10 μF Tan. and 1 μF MLCC	5.0% max.

PROTECTIONS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

Parameter	Type		Value
Internal Input Fuse	DC input compliant, dual-fusing	RACM600-24SL/OF	2x T10A
		RACM600-12SL/OF; RACM600-48SL/OF	2x F12.5A
Short Circuit Protection (SCP)			hiccup mode, auto recovery
Over Voltage Protection (OVP)		RACM600-12SL/OF	15VDC - 17.5VDC, latch off
		RACM600-24SL/OF	30VDC - 35VDC, latch off
		RACM600-48SL/OF	58.5VDC - 63VDC, latch off
Over Voltage Category (OVC)			OVCII
Over Current Protection (OCP)		RACM600-24SL/OF	108-140%, auto recovery
		RACM600-12SL/OF; RACM600-48SL/OF	105-120%, auto recovery
Over Temperature Protection (OTP)			auto recovery
Isolation Voltage (safety certified) ⁽⁸⁾	1 minute	I/P to O/P (reinforced)	4kVAC (2MOPP)
		I/P and O/P to Case (basic)	1.5kVAC (1MOPP)
Insulation Grade			reinforced
Leakage Current Input to Earth GND	low line= 132VAC , 63Hz	Normal condition	150 μA max.
		Single Fault	250 μA max.
	high line= 264VAC , 60Hz	Normal condition	300 μA max.
		Single Fault	500 μA max.
Leakage Current Output to Earth GND	264VAC , 63Hz	Normal condition	60 μA max.
		Single Fault (neutral open)	80 μA max.
		Single Fault (ground open)	150 μA max.
		AC Back-drive Fault	550 μA max.
Class of Equipment			Class I with PE connection
Medical Device Classification		according to IEC 60601-1	designed to support type BF applied part

Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage

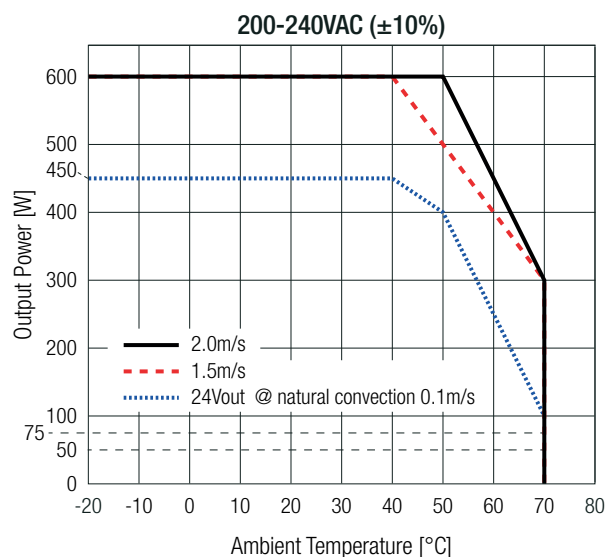
ENVIRONMENTAL (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

Parameter	Condition		Value
Operating Ambient Temperature Range	refer to „Rating Graphs of continuous operation“	T_{BASE} temperature	-20°C to $+70^{\circ}\text{C}$
Operating Altitude ⁽⁹⁾	according to 62368-1		5000m
	according to 60601-1		3000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
Vibration (non-operating)	2.09Gr.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 Telcordia SR-332, Issue 3, 25°C ambient, 90% confidence level		500×10^3 hours
Design Lifetime (capacitor)	nom. V_{IN} , 80% load, 45°C ambient		87.6×10^3 hours

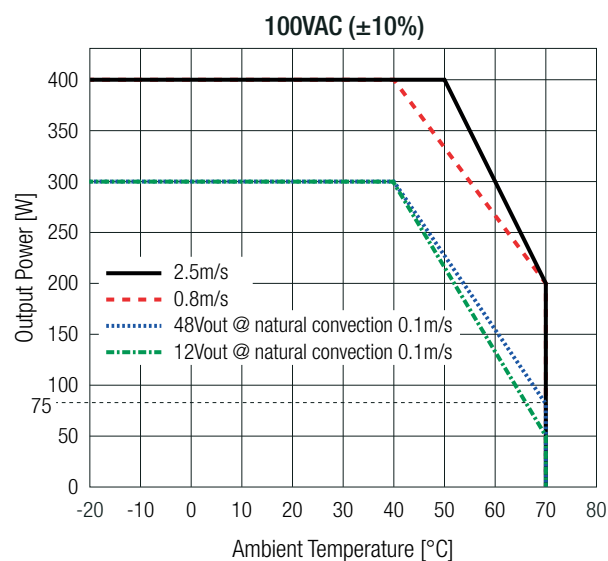
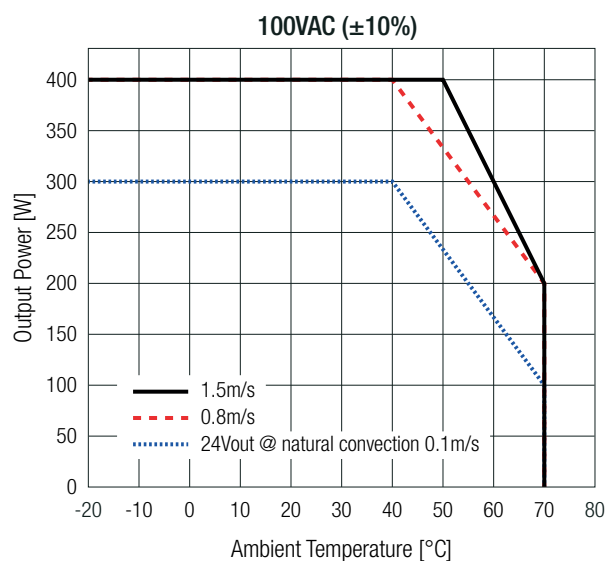
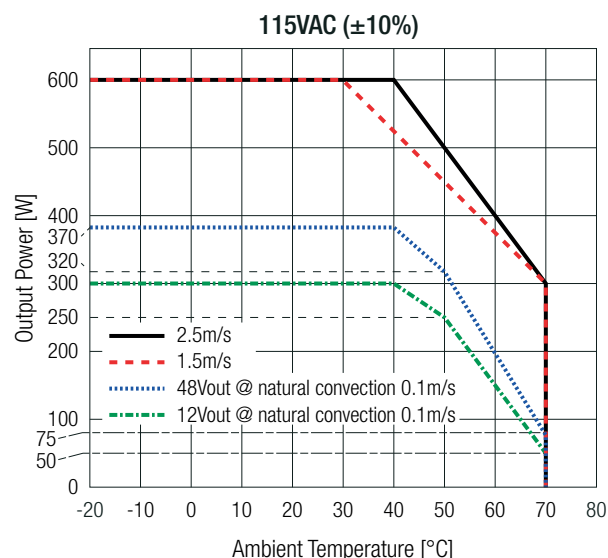
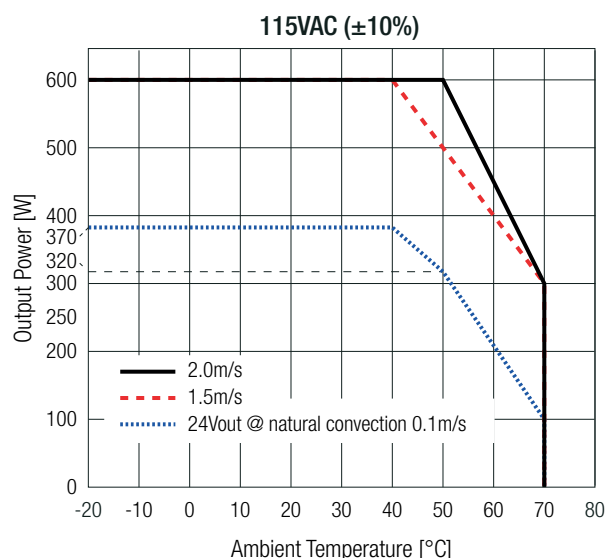
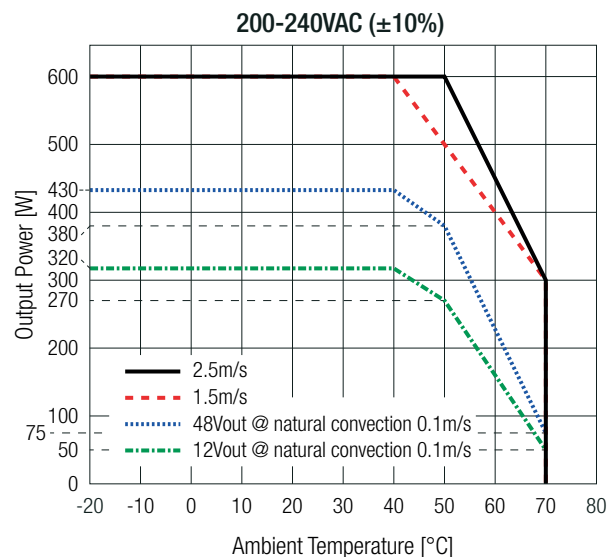
Note9: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime
Ambient temperature decreases by 1°C per 305m altitude increase

RATING GRAPHS OF CONTINUOUS OPERATION

RACM600-24SL/OF (600W max. Peak Power)



RACM600-12SL/OF & RACM600-48SL/OF (800W max. Peak Power)



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

RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

PEAK LOAD CAPABILITY

Guideline for sporadically occurring peak loads (RACM600-12(48)SL/OF):

800 Watt max. @ 40°C ambient with a maximum duty cycle of:

0.5% .. for still air convection

4% ... at 1.5m/s provided system airflow

Calculation Guideline for recurrent dynamic load cycles:

Peak Load calculation for recurrent dynamic loading		Peak Load calculation for still air convection			Peak Load Capability with 1.5m/s airflow
Parameters	Units	RACM600-12SL/OF	RACM600-48SL/OF	RACM600-24SL/OF	RACM600-12(48)SL/OF
P_{nom} = rated output power	[W]	refer to „Rating Graphs of continuous operation“			
P_p = peak output power	[W]	≤800	≤800	≤600	≤800
P_r = recovery output power	[W]	use calculation below			
t_1 = peak time set	[s]	≤5s	≤5s	≤5s	≤10s
t_2 = recovery time	[s]	min. 10 x t_1	min. 8 x t_1	min. 8 x t_1	min. 6 x t_1
k = heat dissipation factor	[]	2	2	2	1.2

$$\text{Calculation: } P_r = \frac{P_{nom} \times (t_1 + t_2) - (P_p \times t_1)}{t_2 \times k}$$

Practical Example (RACM600-48SL/OF for still air convection):

Take the RACM600-48SL/OF at 230VAC input Voltage and full load at $T_{AMB} = 50^\circ\text{C}$, with still air convection.

$$P_p = 720\text{W}$$

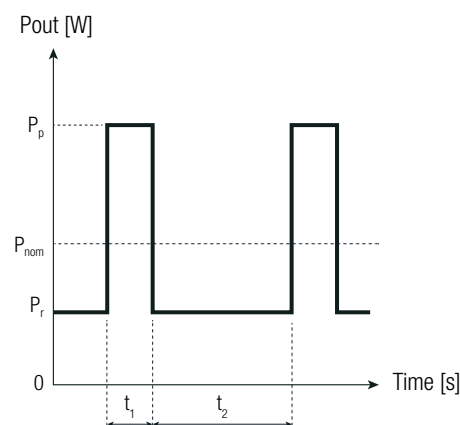
$$P_{nom} = 380\text{W}$$

$$t_1 = 4\text{s}$$

$$t_2 = 32\text{s}$$

$$k = 2$$

$$P_r = \frac{380 \times (4 + 32) - (720 \times 4)}{32 \times 2} = 169\text{W}$$



SAFETY & CERTIFICATIONS

Certificate Type (Safety) (12Vout pending)	Report Number	Standard
Audio/video, information and communication technology equipment - Safety requirements (CB)	T223-0662-21	IEC62368-1, 2nd Edition 2014
Audio/video, information and communication technology equipment - Safety requirements (LVD)		EN62368-1:2014 + A11:2017
Audio/Video, information and communication technology equipment - Part1: Safety requirements	E224736-A6026-UL	UL62368-1:2014 CAN/CSA-C22.2 No. 62368-1:2014
Medical Electric Equipment, General Requirements for Safety and Essential Performance	E314885-D1009-1/A0/C0-UL	ANSI/AAMI ES60601-1:2005A2:2010/(R)2012 CAN/CSA-C22.2 No. 60601-1:14, 3rd Edition
Medical electrical equipment Part 1: General requirements for basic safety and essential performance (CB Scheme)	T223-0661-21	IEC60601-1:2005, 3rd Edition + AM1:2012
Medical electrical equipment Part 1: General requirements for basic safety and essential performance		EN60601-1:2006 + A1:2013
RoHS2		RoHS-2011/65/EU + AM-2015/863

EMC Compliance according to EN 6060-1-2 (12Vout & 48Vout pending)	Condition	Standard / Criterion
Medical electrical equipment Part 1-2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests		EN60601-1-2:2015
ESD Electrostatic Discharge Immunity Test	Contact: ±8kV	IEC61000-4-2:2008 EN61000-4-2:2009
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test	10V/m, 12V/m (80-2700MHz); 27V/m (385MHz); 28V/m (450, 810, 870, 930, 1720, 1845, 1970, 2450MHz); 9V/m (710, 745, 780, 5240, 500, 5785MHz)	IEC/EN61000-4-3:2006+A2:2010

RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

SAFETY & CERTIFICATIONS

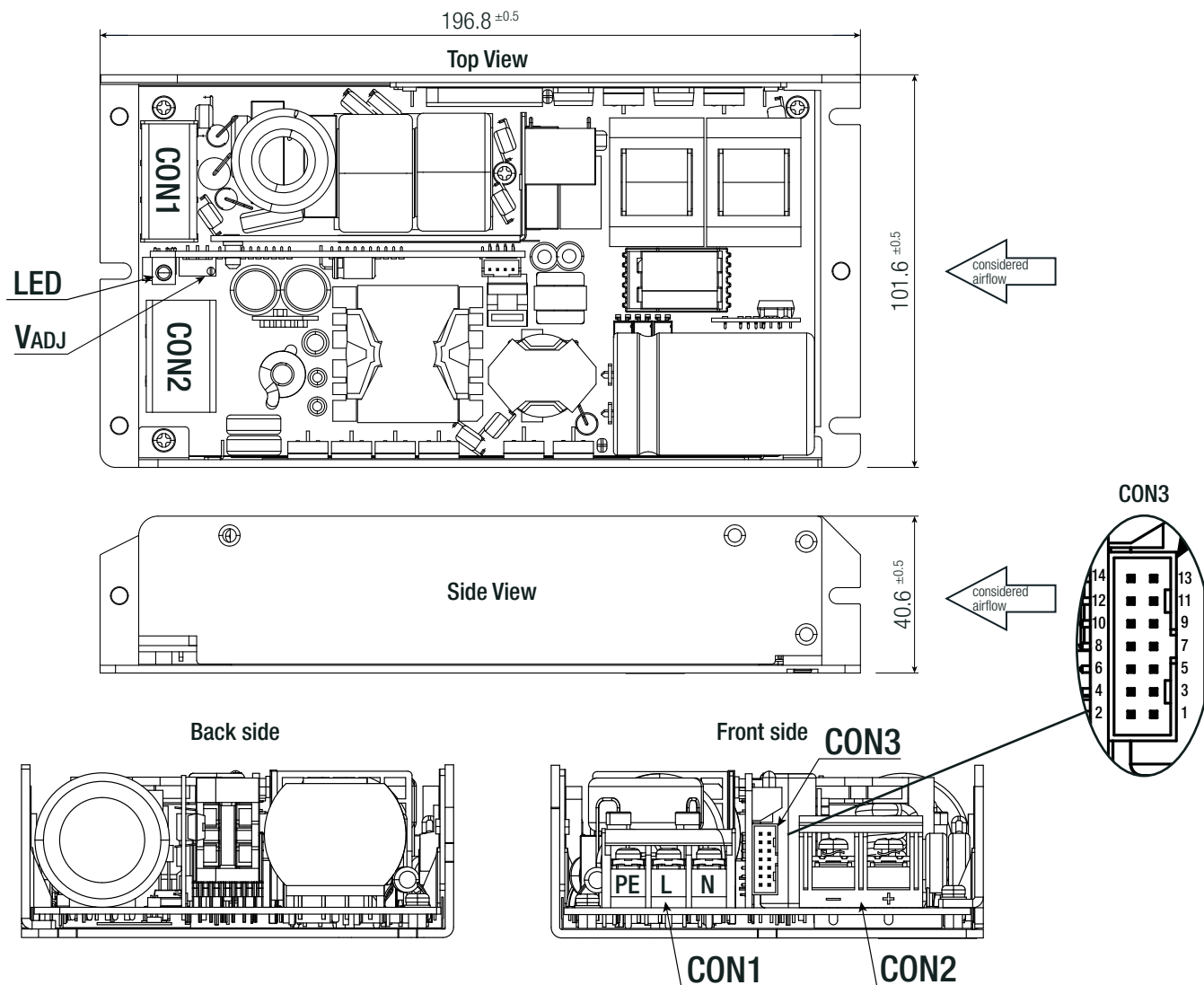
EMC Compliance according to EN 6060-1-2 (12Vout & 48Vout pending)	Condition	Standard / Criterion
Fast Transient and Burst Immunity	AC Power Port: L, N, PE $\pm 2k$	IEC/EN61000-4-4:2012
Surge Immunity	AC Power Port: L-N $\pm 0.5, 1kV$; L-PE, N-PE $\pm 0.5, 1, 2kV$	IEC/EN61000-4-5:2014+A1:2017
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields	AC Power Port 3, 10Vrms (0.15-80MHz); 6, 10Vrms (ISM bands)	IEC61000-4-6:2013 EN61000-4-6:2014
Power Magnetic Field Immunity	30A/m	IEC61000-4-8:2009 EN61000-4-8:2010
Voltage Dips	100V/50Hz, 240VAC/50Hz: 100% (0.5P, 1P); 60% (5P); 30% (0.5P); 30% (25P)	IEC/EN61000-4-11:2004+A1:2017
Voltage Interruptions	100V/50Hz, 240VAC/50Hz: 100% (25P, 250P)	IEC/EN61000-4-11:2004+A1:2017
Limits of Harmonic Current Emissions		EN IEC 61000-3-2:2019
Voltage Fluctuations and Flicker in Public Low-Voltage Systems		EN61000-3-3:2013+A1:2019
EMC Compliance according to EN 55032/35 (12Vout & 48Vout pending)	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2015+A11:2020, Class B
Electromagnetic compatibility of multimedia equipment – Immunity requirements		EN55035:2017+A11:2020, Class B
ESD Electrostatic Discharge Immunity Test	Contact: $\pm 2, 4kV$	IEC61000-4-2:2008 EN61000-4-2:2009
Radiated, radio-frequency, electromagnetic field immunity test	3, 12V/m (80-1000 MHz); 3, 12V/m (1800, 260, 3500, 5000MHz)	IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: L, N, PE $\pm 1, 2kV$ DC Power Port: Positive, Negative, Ground: $\pm 0.5, 2kV$	IEC/EN61000-4-4:2012, Criteria A
Surge Immunity	AC Power Port: L-N $\pm 1kV$; L-PE, N-PE $\pm 2kV$ DC Power Port: Positive-Negative $\pm 0.5, 1kV$; Positive-Ground $\pm 0.5, 2kV$; Negative-Ground $\pm 0.5, 2kV$	IEC/EN61000-4-5:2014+A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port & DC Power Port: 10 Vrms (0.15-80MHz); 3Vrms (0.15-10MHz); 3-1Vrms (10-30MHz); 1Vrms (30-80MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	1, 10A/m	IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips	100V/50Hz, 240VAC/50Hz: 100% (0.5P, 1P); 30% (0.5P); 30% (25P) 100V/50Hz: 60% (5P)	IEC/EN61000-4-11:2004+A1:2017, Criteria A IEC/EN61000-4-11:2004+A1:2017, Criteria B
Voltage Interruptions	100V/50Hz, 240VAC/50Hz: 100% (25P, 250P)	IEC/EN61000-4-11:2004+A1:2017, Criteria B
Limits of Harmonic Current Emissions		EN IEC 61000-3-2:2019
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013+A1:2019

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	chassis	aluminum
Dimension (HxWxD)		196.8 x 101.6 x 40.6mm 7.75 x 4 x 1.6 inch
Weight	with mounting clip	1000g 2.2 lbs

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)



Signal CON3

(Molex PCB Header 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

Compatible Connector CON3

Housing

Molex 51110 Series or equivalent

Crimp Terminal

Molex 50394 Series or equivalent

Input 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 CON2 for 24Vout & 48Vout ⁽⁹⁾

(M4 screws)

Dinkle: DT-7C-B01W-0137-02

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

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

Output CON2 for 12Vout ⁽⁹⁾

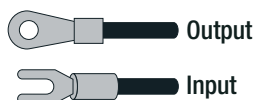
(M5 screws)

Dinkle: 0166-80-S1531802C

Function	AWG
-VOUT	4-6
+VOUT	4-6

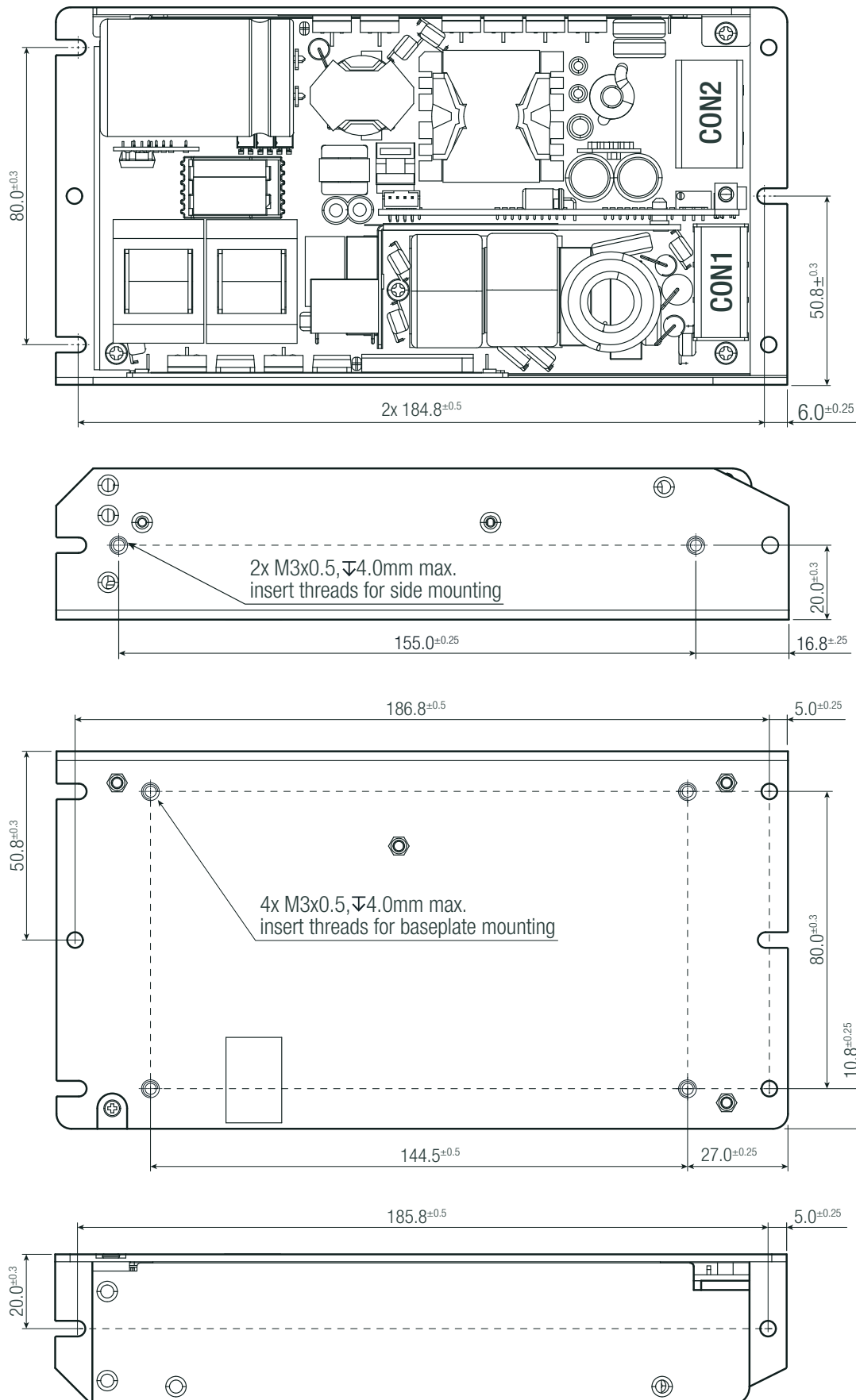
wire stripping length: 14-15mm
recommended tightening torque 2.4Nm

Note9: Use flexible cable with below lugs:



INSTALLATION & APPLICATION

Mounting Dimensions



INSTALLATION & APPLICATION

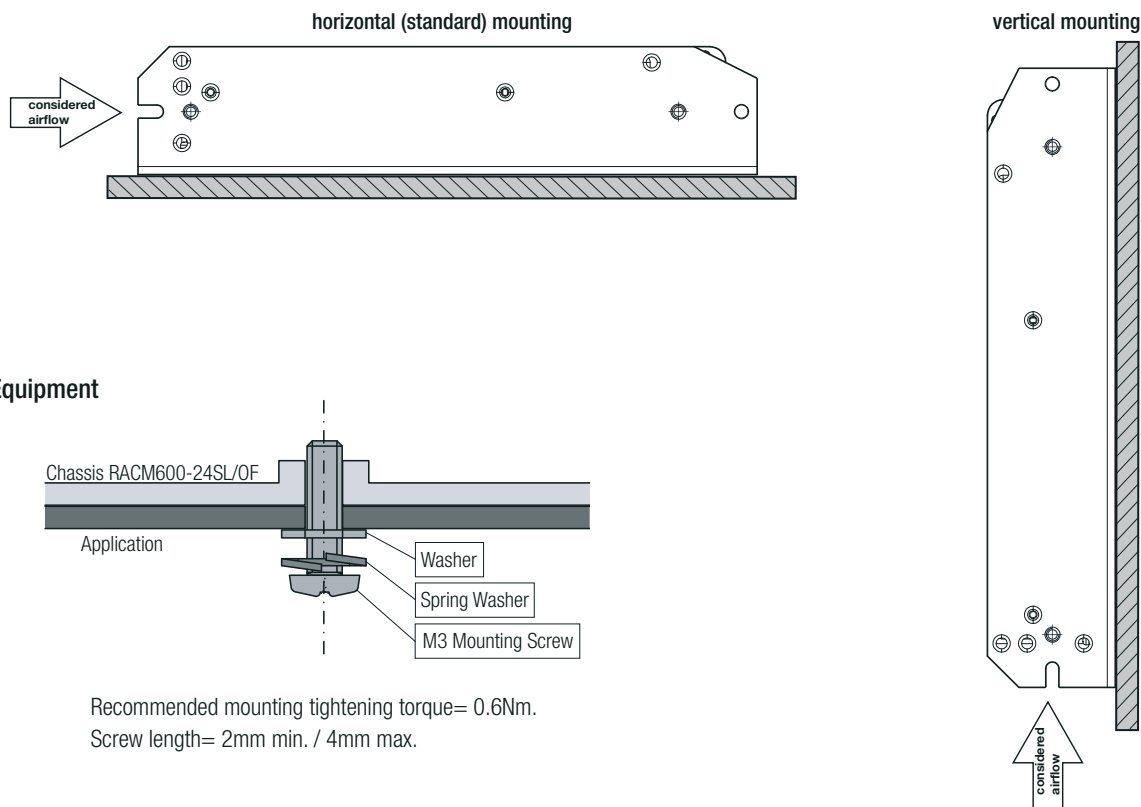
Mounting Orientations

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

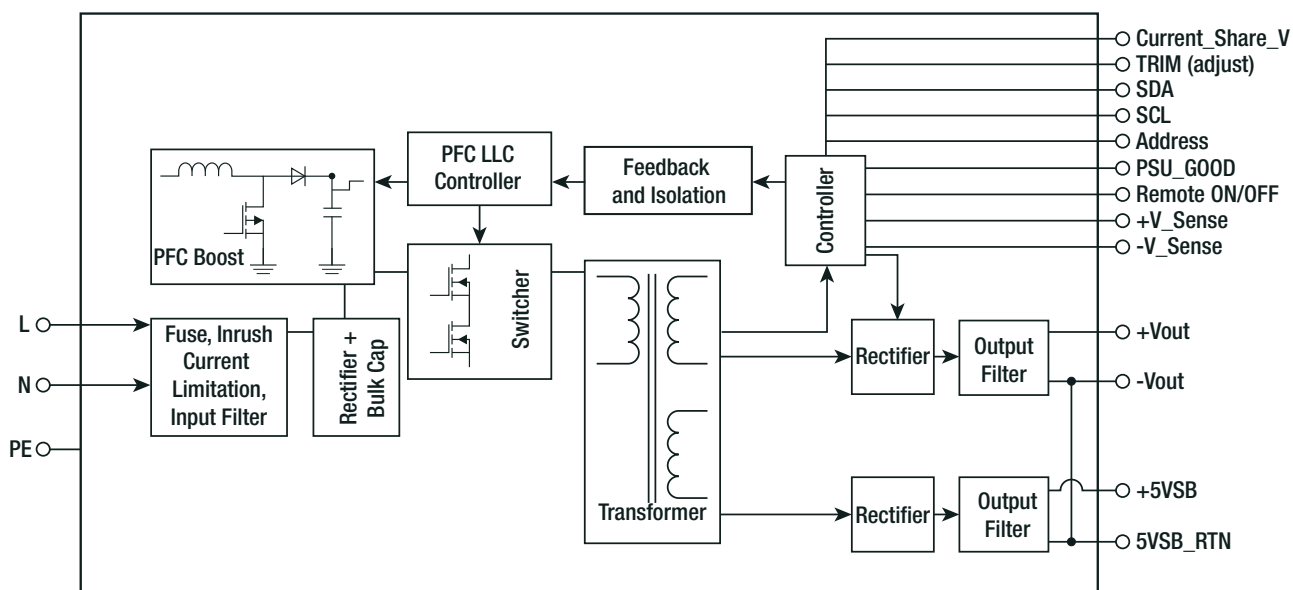
Forced air conditions as specified are valid for indicated airflow direction only (back side).

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.



BLOCK DIAGRAM



RACM600-L/OF Series / AC-DC Power Supply

600W / Universal Input 100V - 240VAC

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	cardboard box	400.0 x 318.0 x 150.0mm
Packaging Quantity		7pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	95% RH max.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.