

Features

Regulated Converters

- Wide input range 85-305Vac
- Full load temperature range: -40°C to +65°C
- Ultra-high efficiency over entire load range
- No external components necessary
- International EMC compliant
- Lowest total cost of ownership
- 140% Peak load capability



RAC10-K/277

10 Watt
2" x 1"
Single and Dual Output



Description

The RAC10-K/277 series are highly efficient PCB-Mount power conversion modules with ultra-low energy losses even in light load conditions. Built for worldwide usage, the AC/DC units cover an enhanced mains input range of 85Vac up to 305Vac and come with international safety certifications for both industrial and household standards. These AC/DC modules offer fully protected single or dual outputs as well as EMC class B compliance without the need of any external components. The 150% peak power capability makes the RAC10-K/277 series suitable for inductive, high start-up current or nonlinear loads. With a full load temperature range of -40°C to +65°C, they are ideal for always-on and standby mode operations in process automation, IoT and smart building applications.



Selection Guide

Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽¹⁾ [%]	Max. Capacitive Load [µF]
RAC10-3.3SK/277	85-305	3.3	2500	79	10000
RAC10-05SK/277	85-305	5	2000	82	8000
RAC10-12SK/277	85-305	12	840	84	1500
RAC10-15SK/277	85-305	15	670	85	1000
RAC10-24SK/277	85-305	24	420	84	330
RAC10-12DK/277	85-305	±12	±420	82	±1200
RAC10-15DK/277	85-305	±15	±340	83	±1000

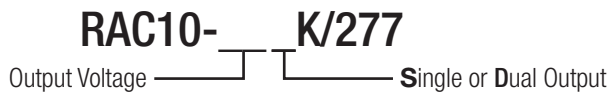
Notes:

Note1: Efficiency is tested at 25°C with constant resistive mode at full load and 230VAC



UL/IEC/EN62368-1 (pending)
 UL60950-1 certified
 IEC/EN60950-1 (pending)
 IEC/EN60335-1 certified
 CSA C22.2 No. 60950-1-07 certified
 CSA C22.2 No. 62368-1-14 (pending)
 EN62233 certified
 EN61204-3 certified

Model Numbering



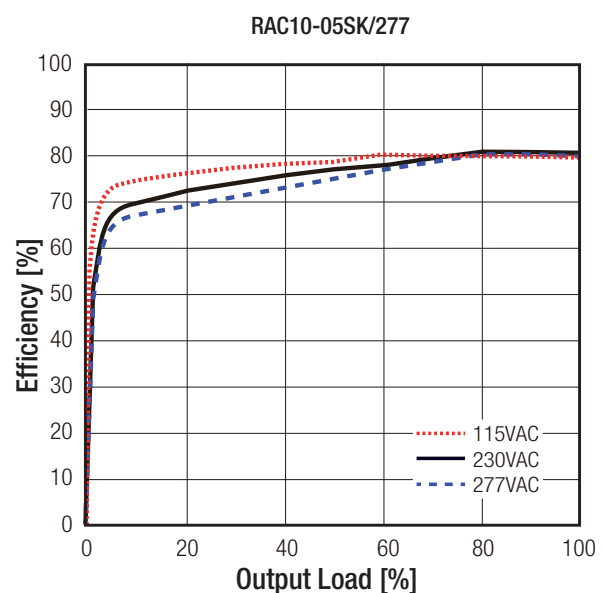
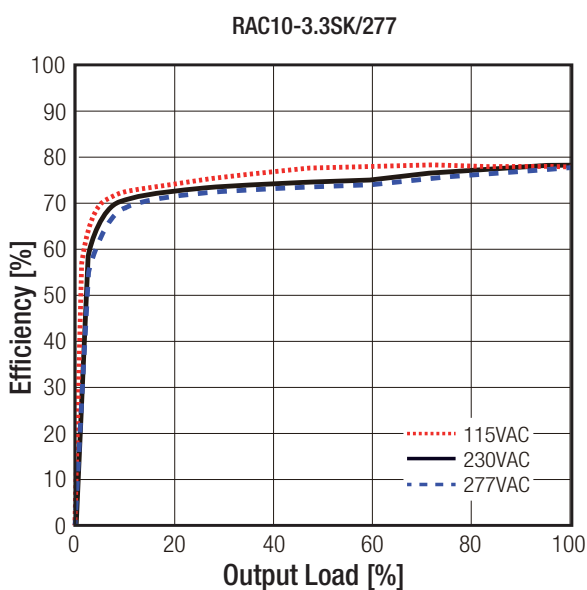
Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

BASIC CHARACTERISTICS					
Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter					Pi Type
Input Voltage Range ⁽²⁾	(refer to line derating graph on PA-5)		85VAC 120VDC		305VAC 430VDC
Input Current	115VAC 230VAC				0.25A 0.21A
Inrush Current	230VAC				0.06A ² s
No load Power Consumption				150mW	250mW
ErP Standby Mode Conformity (Output Load Capability)	Input Power=	0.5W 1.0W 2.0W			0.3W 0.7W 1.4W
Input Frequency Range			47Hz		63Hz
Overload Capability	peak duty cycle: 10%; $T_{AMB} + 50^\circ\text{C}$ max.				140%/10s
Start-up Time				30ms	
Rise Time					25ms
Hold-up time	115VAC 230VAC			15ms 90ms	
Minimum Load			0%		
Internal Operating Frequency					100kHz
Output Ripple and Noise	20MHz BW	3.3V _{out} , 5V _{out} others		60mVp-p	1% of V _{out}
Power Factor	115VAC 230VAC		0.6 0.5		

Notes:

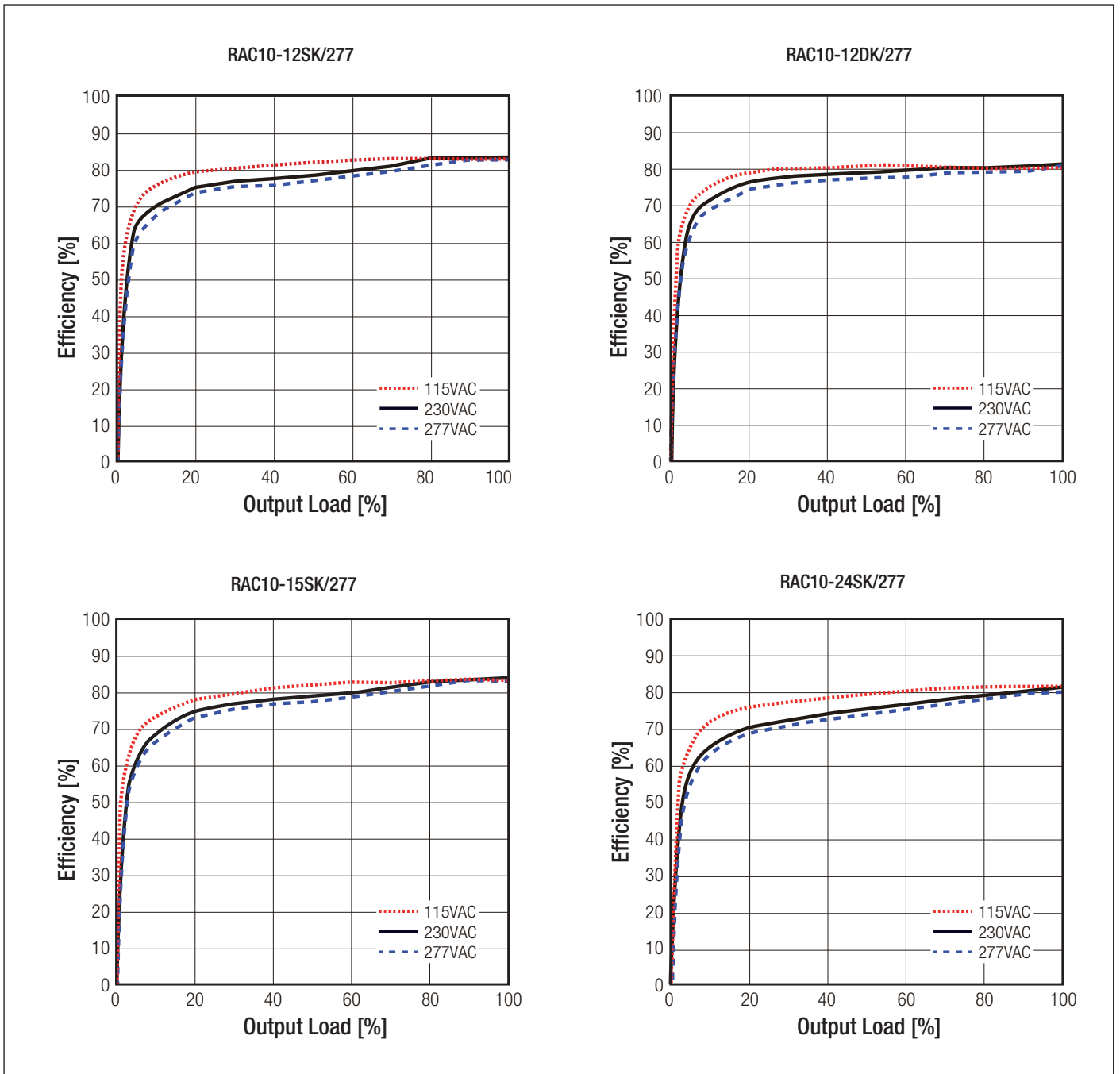
Note2: The products were submitted for safety files at AC-Input operation

Efficiency vs. Load



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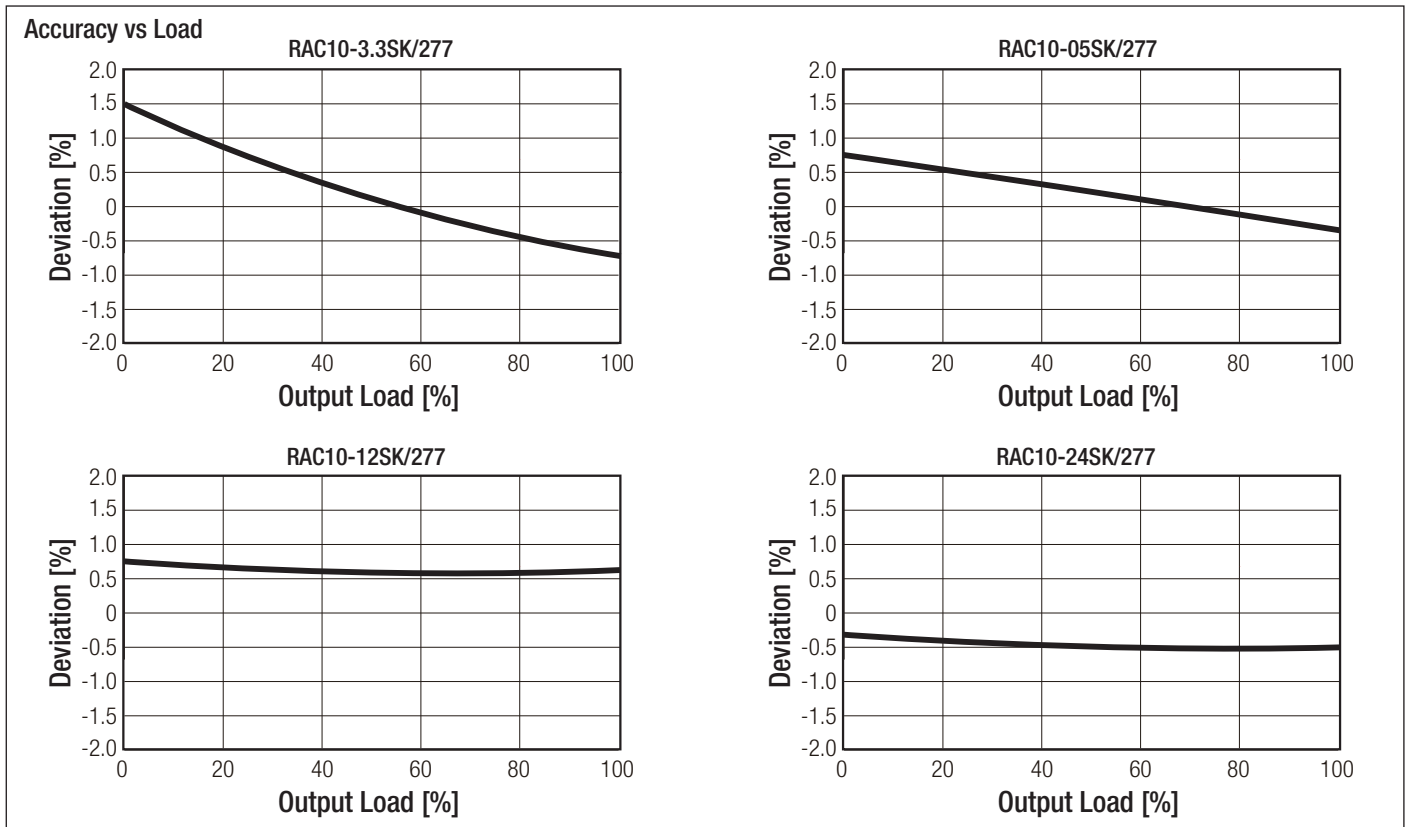
Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)



REGULATIONS			
Parameter	Condition		Value
Output Accuracy			±1.0% typ.
Line Regulation	low line to high line		±0.5% typ.
Load Regulation	0-100% load	3.3, 5 Vout	±1.5% typ.
		others	±1.0% typ.
Transient Response	25% load step change recovery time		4.0% max. 500µs

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Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)



PROTECTIONS

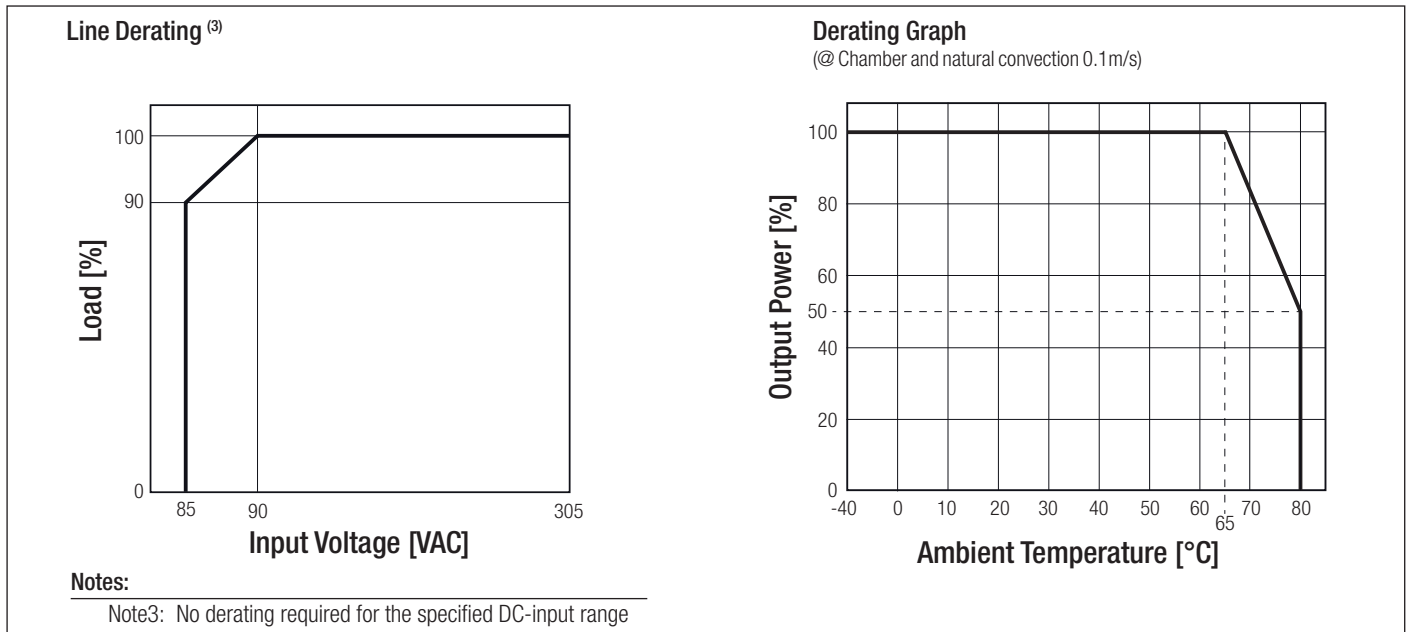
Parameter	Type	Value
Internal Input Fuse		T2A, slow blow
Short Circuit Protection (SCP)		Hiccup, automatic restart
Over Voltage Protection (OVP)		150% - 195%, Hiccup Mode
Over Load Protection (OLP)		150% - 195%, Hiccup Mode
Over Voltage Category (OVC)		OVC II
Isolation Voltage	tested for 1 minute	4kVAC
Isolation Resistance	I/P to O/P, Isolation Voltage 500VDC	1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V	100pF max.
Insulation Grade		reinforced
Leakage Current		0.25mA max.

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	with derating (see graph)	-40°C to +80°C
Maximum Case Temperature		+100°C
Temperature Coefficient		±0.05%/°C
Operating Altitude		3000m
Operating Humidity	non-condensing	20% to 90% RH
Design Lifetime	115VAC/60Hz and full load at +25°C	>10 x 10 ³ hours
MTBF	according to MIL-HDBK-217F, G.B.	
	+25°C	>450 x 10 ³ hours
	+65°C	>28 x 10 ³ hours
Pollution Degree		PD2
Vibration		10-500Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes

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Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E491408-A3	UL60950-1, 2nd Edition, 2014 CAN/CSA C22.2 No. 60950-1-07, 2nd Ed. 2014
Audio/Video, information and communication technology equipment - Safety requirements	pending	UL62368-1, 2nd Edition, 2014 CAN/CSA C22.2 Nr. 62368-1-14, 2nd Ed. 2014
Information Technology Equipment, General Requirements for Safety (CB)	E491408-A4-CB-1	IEC60950-1:2005, 2nd Edition + A2:2013
Household and similar electrical appliances - Safety - Part 1: General requirements	LCS170821028CS	IEC60335-1:2010 + A2:2016 + C1:2016, 5th Edition EN60335-1:2012 + A11:2014
Information Technology Equipment, General Requirements for Safety (LVD)	pending	EN60950-1:2006 + A2:2013
Audio/Video, information and communication technology equipment - Safety requirements (CB)	16BECS10045 11	IEC62368-1:2014, 2nd Edition EN62368-1:2014 + A11:2017
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	LCS170821028CS	EN62233:2008
RoHS2	pending	RoHS 2011/65/EU + AM2015/863

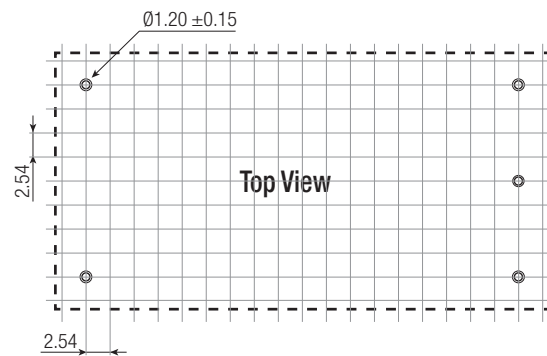
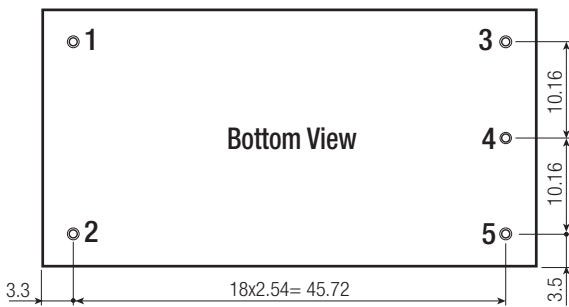
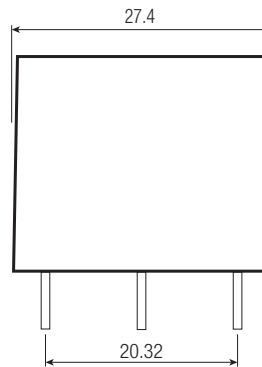
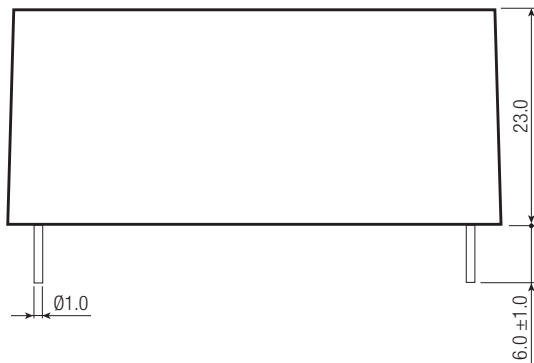
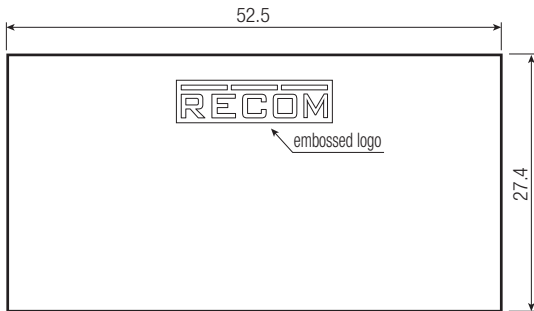
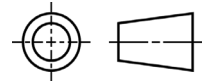
EMC Compliance	Conditions	Standard / Criterion
Low-voltage power supplies DC output - Part 3: Electromagnetic compatibility		EN61204-3:2000, Class B
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	pending	AS/NZS CSPR 22:2009 + A1:2010, Class B
ESD Electrostatic discharge immunity test	$\pm 8\text{kV}$ Air; $\pm 4\text{kV}$ Contact	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	10V/m 80-1000MHz	EN61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC In Port: $\pm 2.0\text{kV}$ DC Out Port: $\pm 2.0\text{kV}$	EN61000-4-4:2012, Criteria B
Surge Immunity	AC In Port: $\pm 1.0\text{kV}$ L-PE, N-PE $\pm 2.0\text{kV}$ DC Out Port: $\pm 0.5\text{kV}$	EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz, 1A/m	EN61000-4-8:2010, Criteria A
Voltage Dips	Voltage Dips 30% Voltage Dips 60%	EN61000-4-11:2004, Criteria B EN61000-4-11:2004, Criteria C
Voltage Interruptions	>95%	EN61000-4-11:2004, Criteria C
Voltage Fluctuations and Flicker in Public Low-Voltage Systems $\leq 16\text{A}$ per phase		EN61000-3-3:2013

Specifications (measured @ $t_a = 25^\circ\text{C}$, nominal input voltage (115/230VAC), full load and after warm-up)

DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	black plastic (UL94V-0)
	Potting	silicone (UL94V-0)
	PCB	FR4 (UL94V-0)
	Baseplate	plastic (UL94V-0)
Package Dimension (LxWxH)		52.5 x 27.4 x 23.0mm
Package Weight		65g typ.

Dimension Drawing (mm)



Pin Connections

Pin #	Single	Dual
1	VAC in (N)	VAC in (N)
2	VAC in (L)	VAC in (L)
3	No Pin	-Vout
4	-Vout	COM
5	+Vout	+Vout

Tolerance: xx.x= $\pm 0.5\text{mm}$
xx.xx= $\pm 0.25\text{mm}$

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 56.0 x 40.0mm
Packaging Quantity		15pcs
Storage Temperature Range	non-condensing	-40°C to $+85^\circ\text{C}$
Storage Humidity		20% to 90% RH

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