Technical Data Sheet

RAC20E-K/277 Series ◊ AC/DC Power Supply

20W ◊ Input: 100-277VAC

RECOM AC/DC Converter

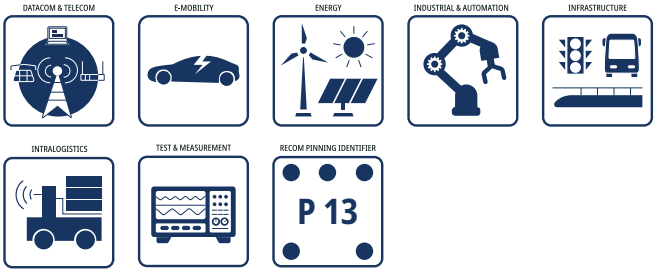
FEATURES

- Wide input range 85-305VAC
- 5000m operating altitude
- OVC III over voltage category up to 2000m
- Operating temperature ratings: -40°C to +90°C
- 4.2kVAC isolation
- EN55032 class B compliant floating and GND ref.
- No load power consumption <200mW
- Industry standard footprint and pinning [P13]
- 3 year warranty



Dimensions (LxWxH): 52.7 x 27.6 x 23.0mm (2.07 x 1.08 x 0.91 inch)
60g (0.13 lbs)

APPLICATIONS



SAFETY & EMC

CE cULus E224736 IECEE CB SCHEME RoHS² compliant 10 from 10 Reach compliant

DESCRIPTION

RAC20E-K/277, the economy "E-K" series of compact 20 Watt AC/DC modules, is designed to meet general purpose requirements for a wide variety of equipment for the IoT, ITE and industrial markets. These encapsulated power supplies feature 4.2kVac isolation and over voltage category OVC III, as well as 100-277VAC nominal input voltages. At OVC II usage, the operating altitude is rated for up to 5000m. EMC compatibility to EN55032 class "B" is met in floating and ground referenced installations. The outputs are protected against over current and short circuits and input protection by internal fuse is provided. All these features make the product one of the easiest integrated modular power solutions for lowest total cost of ownership in the industry.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current max. [mA]	Efficiency typ. (1) [%]
RAC20E-05SK/277	85-305	5	4000	80
RAC20E-12SK/277	85-305	12	1667	83
RAC20E-24SK/277	85-305	24	833	84

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

MODEL NUMBERING

RAC20 E- SK/277

- RAC20 — nom. Output Power
- E — Economic series
- S — Single
- K/277 — nom. Output Voltage

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RAC20E-K/277 Series ◊ AC/DC Power Supply

20W ◊ Input: 100-277VAC

RECOM AC/DC Converter

ACCESSIBLE PART		
Part Number	Description	Datasheet Link
RAC-ADAPT-ST1	adapter board with screw terminal connection	RAC-ADAPT-ST1.pdf

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

Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz		100VAC		277VAC
Operating Range (2, 3)	47/63Hz		85VAC	277VAC	305VAC
	DC		120VDC		430VDC
Input Current	V_{IN}= 115VAC				400mA
	V_{IN}= 230VAC				300mA
	V_{IN}= 277VAC				250mA
Inrush Current	cold start at 25°C	V_{IN}= 115VAC			20A
		V_{IN}= 230/277VAC			40A
No Load Power Consumption					200mW
Ecodesign Standby Mode Use (Available output power for stated input power)	P_{IN}= 0.5W				0.25W
	P_{IN}= 1.0W				0.6W
	P_{IN}= 2.0W				1.4W
Input Frequency Range			47Hz		63Hz
Minimum Load			0%		
Power Factor	V_{IN}= 115VAC			0.6	
	V_{IN}= 230VAC			0.5	
	V_{IN}= 277VAC			0.45	
Start-up time					150ms
Rise time					25ms
Hold-up time	V_{IN}= 115VAC			10ms	
	V_{IN}= 230VAC		25ms	40ms	
	V_{IN}= 277VAC			60ms	
Internal Operating Frequency	100% load at nominal V_{IN}			120kHz	
Output Ripple and Noise (4)	20MHz BW	5Vout			150mVp-p
		others			1% of nom Vout

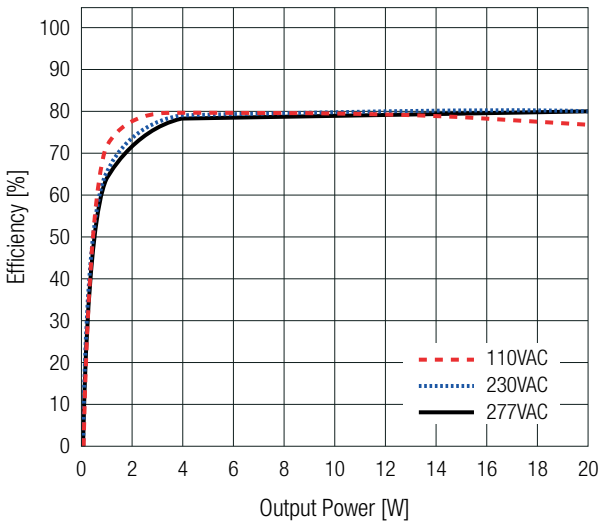
Note2: The products were submitted for safety files at AC-Input operation. (90-305VAC)

Note3: Refer to **„Derating Graph“**

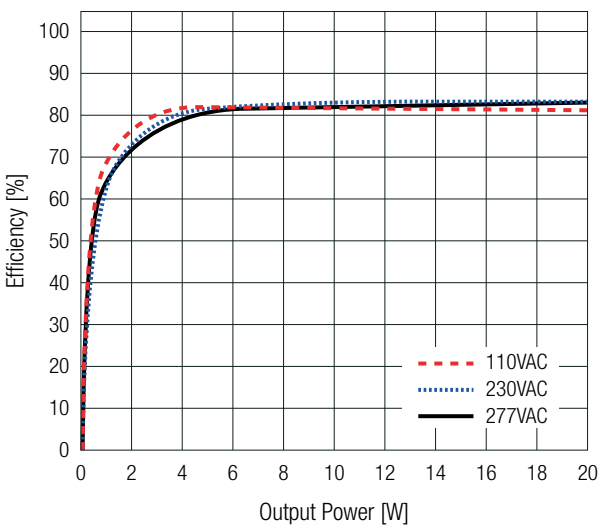
Note4: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

RAC20E-05SK/277



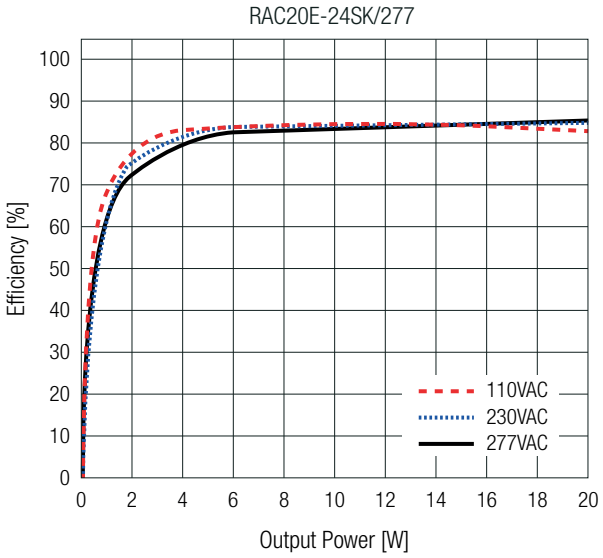
RAC20E-12SK/277



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

Efficiency vs. Load

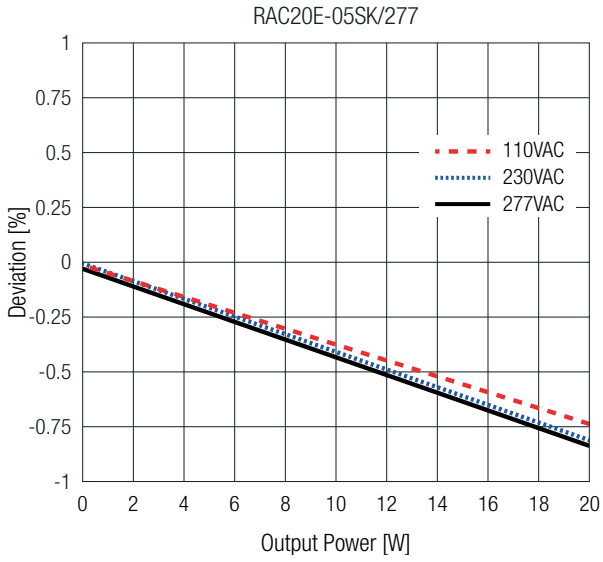


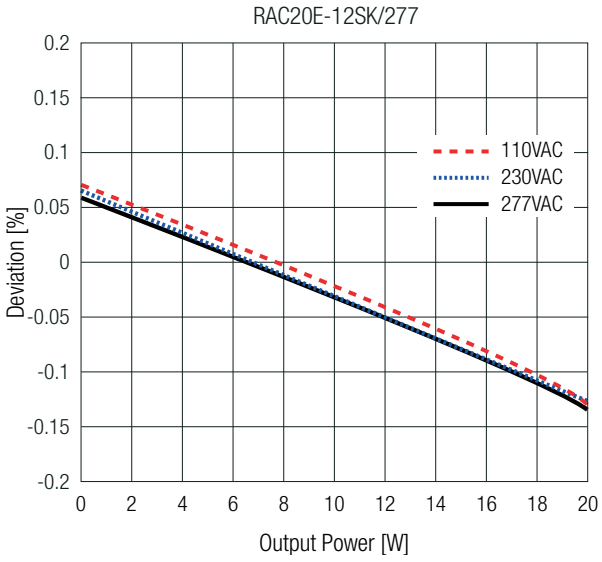
REGULATIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy		±2.0% typ.
Line Regulation	low line to high line	±0.5% typ.
Load Regulation [5]	10% to 100% load	1.0% typ.
Transient Response	25% load step change	3.0% max.
	recovery time	500µs max.

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Load

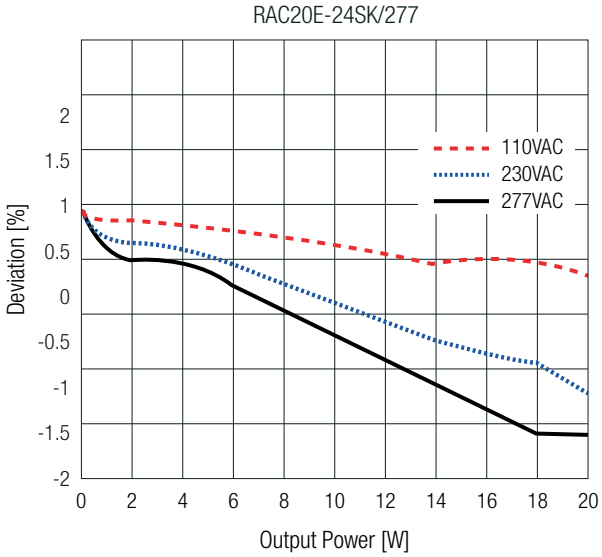




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REGULATIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Deviation vs. Load



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

Parameter	Type			Value
Input Fuse	internal			slow blow type
Short Circuit Protection (SCP)				hiccup mode, automatic restart
Over Voltage Protection (OVP)				105-120%, clamping, automatic restart
Over Load Protection (OLP)				150-195%, hiccup mode
Over Voltage Category (OVC)	according to 61558			OVC III (2000m)
	according to 62368-1			OVC II (5000m)
Isolation Voltage [6]	I/P to O/P	according to 61558	1 minute	4.2kVAC
Isolation Resistance		V_{ISO} = 500VDC		1GΩ min.
Isolation Capacitance		I/P to O/P, 100kHz/0.1VDC		100pF max.
Insulation Grade	I/P to O/P			reinforced
Leakage Current	V_{IN}= 277VAC			0.25mA max.

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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

Parameter	Condition	Value
Operating Ambient Temperature Range	@ natural convection (0.1m/s), refer to **„Derating Graph“**	-40°C to +90°C
Maximum Case Temperature		+95°C
Temperature Coefficient		±0.02%/K
Operating Altitude	according to 62368-1	5000m (OVC II)
	according to 61558	2000m (OVC III)
Operating Humidity	non-condensing	20-90% RH max.
Pollution Degree		PD2
Vibration	according to MIL-STD-202G	10-500Hz, 2G 10min./1cycle, period 60min. each along x,y,z axes
	according to IEC 60068-2-27	3 axis, 40 g half sine, 11 ms shock
	according to IEC 60068-2-65	5-500Hz, 20m/s², 1 Oct/min, 15min
	according to IEC 60068-2-64	10-500Hz; RMS 23,4m/s² ; 15min

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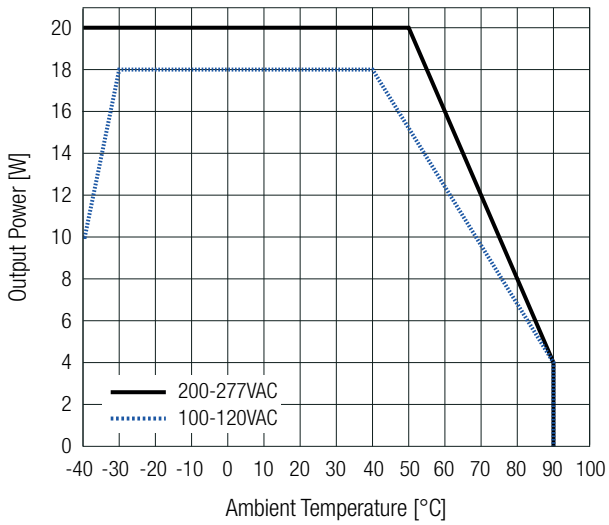
ENVIRONMENTAL (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition			Value
MTBF	according to MIL-HDBK-217F, G.B.		T_{AMB}= +25°C	830 x 10³ hours
			T_{AMB}= +40°C	700 x 10³ hours
Design Lifetime	V_{IN}= 230VAC/60Hz and full load	T_{AMB}= +25°C	5Vout	89 x 10³ hours
			12Vout	115 x 10³ hours
			24Vout	132 x 10³ hours
		T_{AMB}= +40°C	5Vout	34 x 10³ hours
			12Vout	44 x 10³ hours
			24Vout	53 x 10³ hours

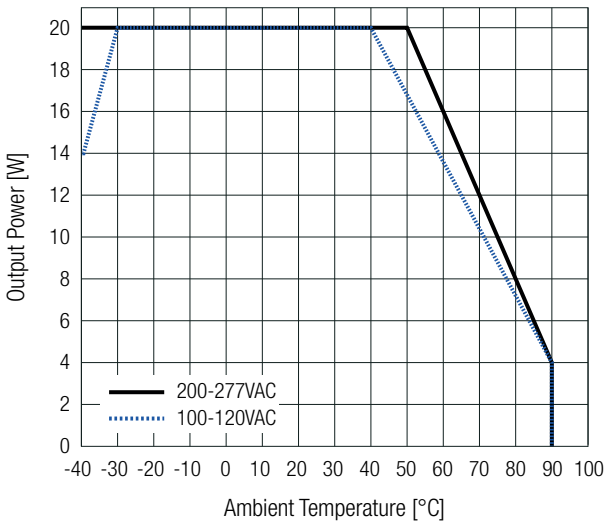
Derating Graph

(@ Chamber and natural convection 0.1m/s)

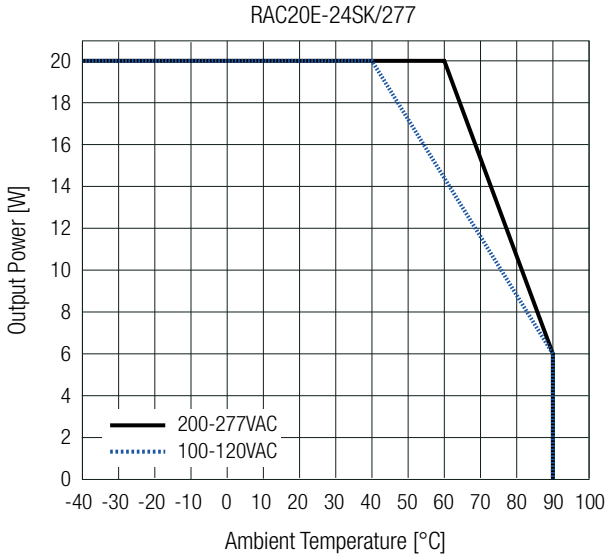
RAC20E-05SK/277



RAC20E-12SK/277



RAC20E-24SK/277



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SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Safety requirements	E491408-A6018 -UL	UL62368-1 3rd Edition
		CAN/CSA-C22.2 No. 62368-1 3rd Edition
Audio/Video, information and communication technology equipment - Safety requirements (LVD)	210615003	EN62368-1:2014 + A11:2017
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)		IEC62368-1:2014 2nd Edition
Audio/Video, information and communication technology equipment - Safety requirements (LVD)	210615002	EN IEC 62368-1:2020 + A11:2020
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)		IEC62368-1:2018 3rd Edition
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V	CN21POA0 001 (OVC II)	EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V Part 2: Particular requirements		EN61558-2-16:2009 + A1:2013
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V (CB Scheme)	CN21NHMJ 001 (OVC II)	IEC61558-1:2017
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V Part 2: Particular requirements (CB Scheme)		IEC61558-2-16:2009 1st Edition + A1:2013
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V	CN2199UU 001 (OVC III)	EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V Part 2: Particular requirements		EN61558-2-16:2009 + A1:2013
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V (CB Scheme)	CN21AR9N 001 (OVC III)	IEC61558-1:2017
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100V Part 2: Particular requirements (CB Scheme)		IEC61558-2-16:2009 1st Edition + A1:2013
RoHS2		RoHS-2011/65/EU + AM-2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	refer to **„Note 7"** for GND ref. use	EN55032:2015+A11:2020, Class B
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018, Class B
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact ±4kV	EN61000-4-2:2008, Criteria A IEC61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz); 3V/m (1400-2000MHz); 1V/m (2000-2700MHz)	IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: ±2kV	IEC/EN61000-4-4:2012, Criteria A
Surge Immunity	AC Port: ±1kV	IEC/EN61000-4-5:2014+A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 10Vrms (0.15-80MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/m	IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips	100% (0.5P, 1.0P); 30%; 20%	IEC/EN61000-4-11:2004, Criteria A
Voltage Interruptions	100%	IEC/EN61000-4-11:2004, Criteria B
Limits of Harmonic Current Emissions		EN61000-3-2:2014
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices		FCC 47 CFR Part 15 Subpart B, Class B

Note7: For 12V model in GND or earth referenced output configuration, an X-cap of 0.15uF parallel connected to the input is recommended

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RAC20E-K/277 Series ◊ AC/DC Power Supply

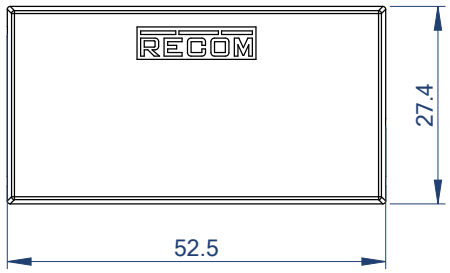
20W ◊ Input: 100-277VAC

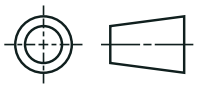
RECOM AC/DC Converter

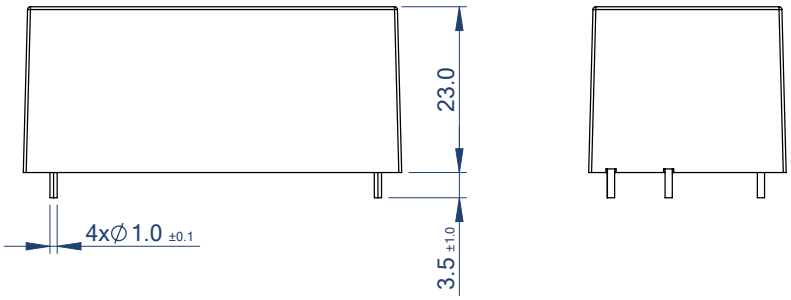
DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case/baseplate	black plastic, (UL94-V0)
	potting	silicone, (UL94-V0)
	PCB	FR4, (UL94-V0)
Dimension (LxWxH)		52.7 x 27.6 x 23.0mm 2.07 x 1.08 x 0.91 inch
Weight		60g typ. 0.13 lbs

Dimension Drawing (mm)

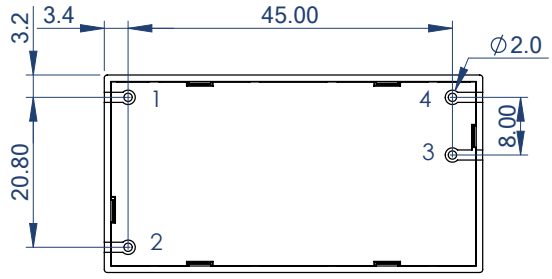




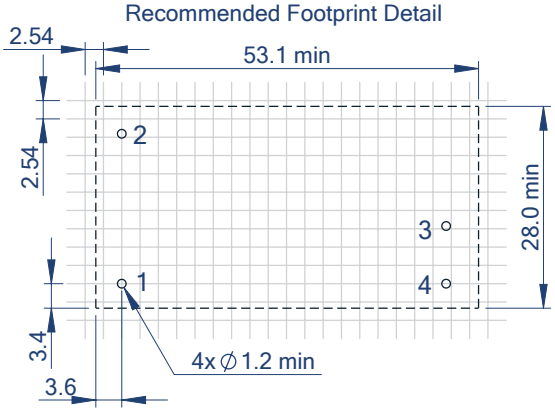


Pinning Information

Pin #	Function
1	VAC in (N)
2	VAC in (L)
3	+Vout
4	-Vout



Recommended Footprint Detail



Tolerance: x.x= ±0.5mm
x.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 56.0 x 40.0mm
Packaging Quantity		15pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	20-90% 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.

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