Technical Data Sheet

RAC10E-K/277 Series ◊ AC/DC Power Supply

10W ◊ Input: 100-277VAC

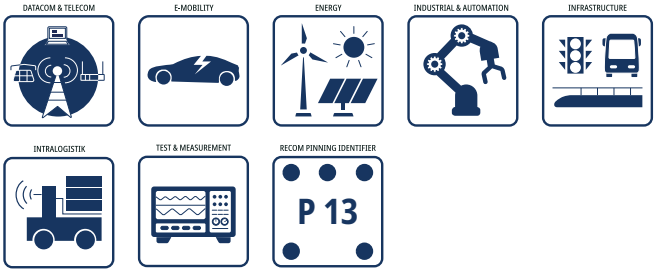
RECOM
AC/DC Converter

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
- 4kVAC isolation
- EN55032 class B compliant
- No load power consumption <100mW
- Industry standard footprint and pinning [P13]

Dimensions (LxWxH): 45.7 x 25.4 x 21.5mm (1.8 x 1.0 x 0.85 inch)
52g (0.11 lbs)

APPLICATIONS



SAFETY & EMC

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

DESCRIPTION

The economy itemized RAC10E-K series are extra compact 1.8”x1” encapsulated PCB-mount AC/DC modules with a wide input operating range of 85 to 305Vac and come with international safety certifications for industrial, AV and ITE as well as household standards. These Power Supply modules with certifications to overvoltage category OVC III environments operate in a temperature range of -40°C to +90°C with up to 5000m operating altitude and offer fully protected single outputs as well as EMC class B compliance without the need of any external components.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current max. [mA]	Efficiency typ. (1) [%]
RAC10E-3.3SK/277	85-305	3.3	2500	76
RAC10E-05SK/277	85-305	5	2000	80
RAC10E-12SK/277	85-305	12	833	83
RAC10E-15SK/277	85-305	15	666	83
RAC10E-24SK/277	85-305	24	416	84

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

MODEL NUMBERING

RAC10 E- SK/277

- RAC10: nom. Output Power
- E: Economic series
- S: Single
- K/277: nom. Output Voltage

RAC10E-K/277 Series ◊ AC/DC Power Supply

10W ◊ 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

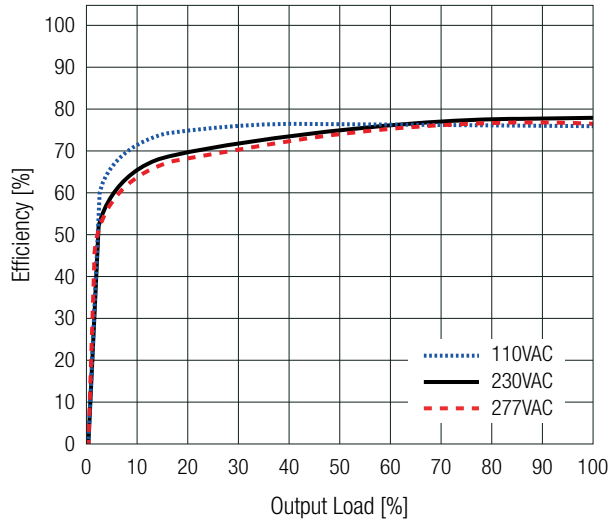
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Nominal Input Voltage	50/60Hz		100VAC		277VAC
Operating Range (2)	47/63Hz		85VAC	277VAC	305VAC
	DC		120VDC		430VDC
Input Current	V_{IN}= 115VAC				200mA
	V_{IN}= 230VAC				100mA
	V_{IN}= 277VAC				80mA
Inrush Current	cold start at 25°C	V_{IN}= 115VAC			20A
		V_{IN}= 230/277VAC			40A
No Load Power Consumption				75mW	100mW
Ecodesign Standby Mode Use (Available output power for stated input power)	P_{IN}= 0.5W			0.3W	
	P_{IN}= 1.0W			0.7W	
Input Frequency Range			47Hz		63Hz
Minimum Load			0%		
Power Factor	V_{IN}= 115VAC			0.6	
	V_{IN}= 230VAC			0.5	
Start-up time					50ms
Rise time					40ms
Hold-up time	V_{IN}= 115VAC		5ms		
	V_{IN}= 230VAC		30ms		
	V_{IN}= 277VAC		50ms		
Internal Operating Frequency	100% load at nominal V_{IN}			80kHz	
Output Ripple and Noise (3)	20MHz BW				150mVp-p

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

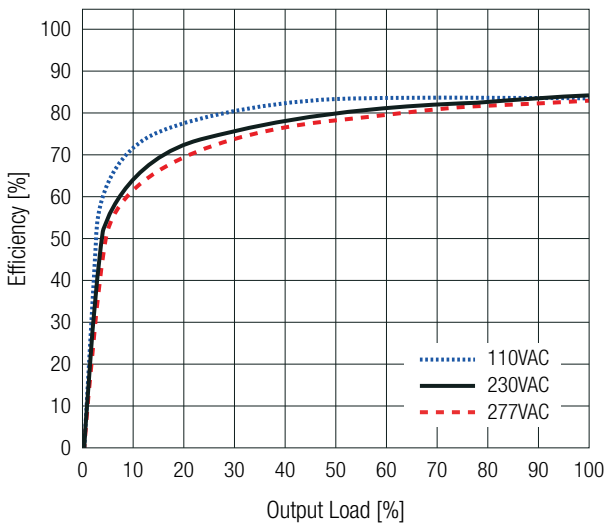
Note3: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

Efficiency vs. Load

RAC10E-3.3SK/277
RAC10E-05SK/277



others

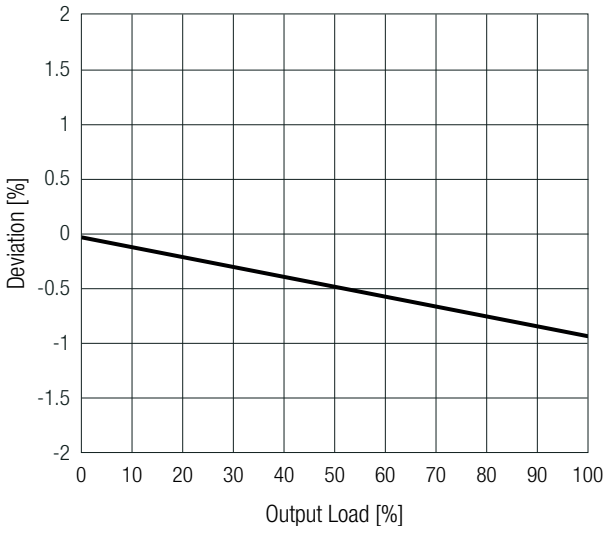


REGULATIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition		Value
Output Accuracy			±2.0% typ.
Line Regulation	low line to high line		±0.5% typ.
Load Regulation	0% to 100% load	RAC10E-3.3SK/277	1.5% typ.
		others	0.5% typ.
Transient Response	25% load step change		3.0% max.
	recovery time		500µs max.

Deviation vs. Load

RAC10E-3.3SK/277
RAC10E-05SK/277



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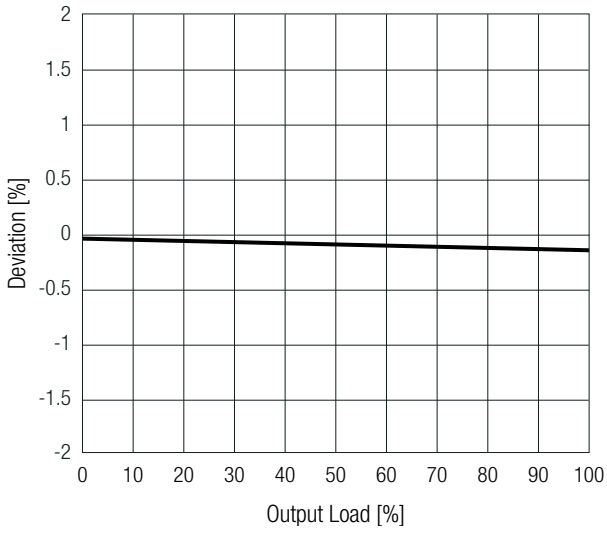


PROTECTIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Type		Value
Input Fuse	internal		T2A, slow blow type
Short Circuit Protection (SCP)	below 100mΩ		hiccup mode, automatic restart
Over Voltage Protection (OVP)			105-120%, clamping, automatic restart
Over Current Protection (OCP)			128-155%, hiccup mode
Over Voltage Category (OVC)	according to 61558		OVC III (2000m)
	according to 62368-1		OVC II (5000m)
Isolation Voltage (4)	I/P to O/P	1 minute	4kVAC
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		0.05mA max.

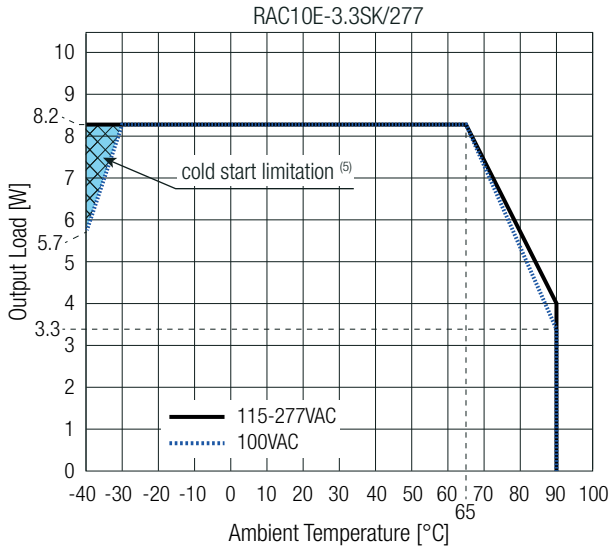
Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage

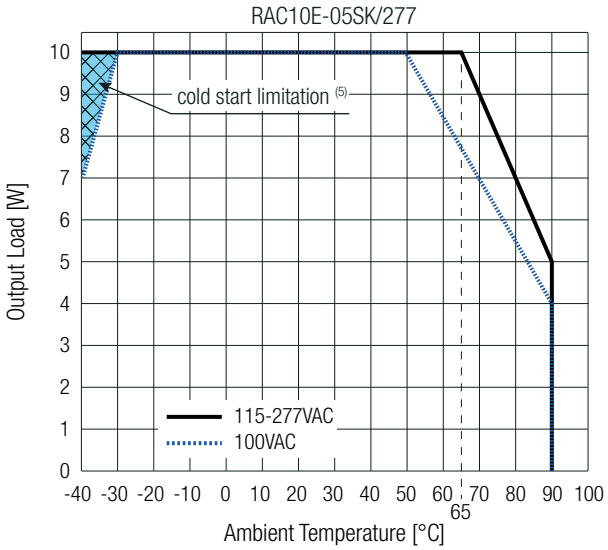
ENVIRONMENTAL (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

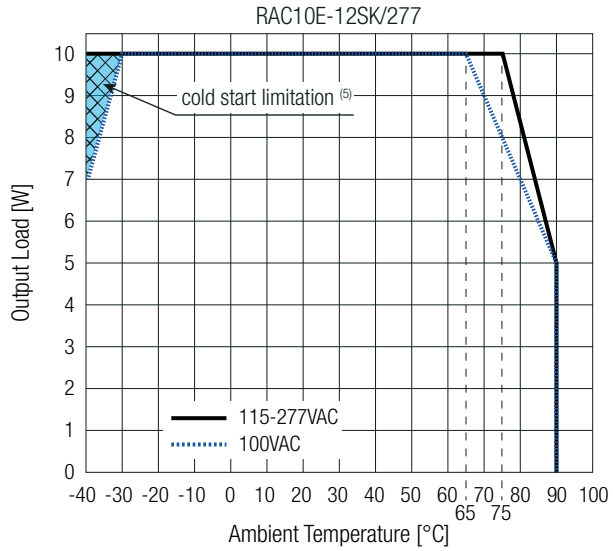
Parameter	Condition		Value
Operating Ambient Temperature Range	@ natural convection (0.1m/s), refer to **„Derating Graph“**		-40°C to +90°C
Maximum Case Temperature			+110°C
Temperature Coefficient			±0.02%/K
Operating Altitude	according to 62368-1		5000m (OVC II)
	according to 61558		2000m (OVC III)
Operating Humidity	non-condensing		95% 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
MTBF	according to MIL-HDBK-217F, G.B.	T_{AMB}= +25°C	1710 x 10³ hours
		T_{AMB}= +40°C	1460 x 10³ hours
Design Lifetime	V_{IN}= 230VAC/60Hz and full load	T_{AMB}= +55°C	>35 x 10³ hours

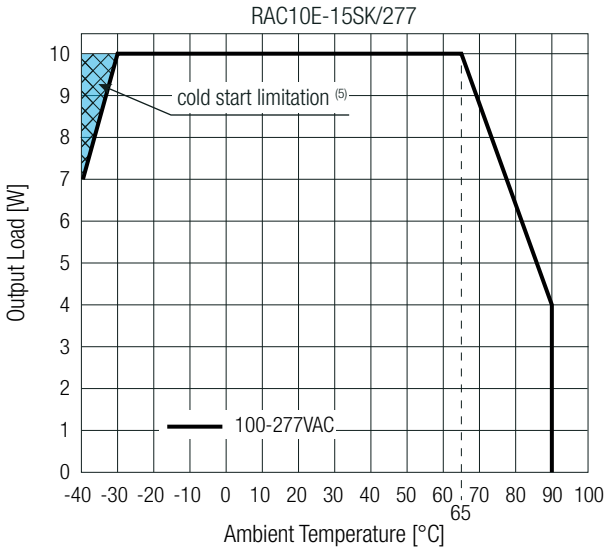
Derating Graph

(@ Chamber and natural convection 0.1m/s)







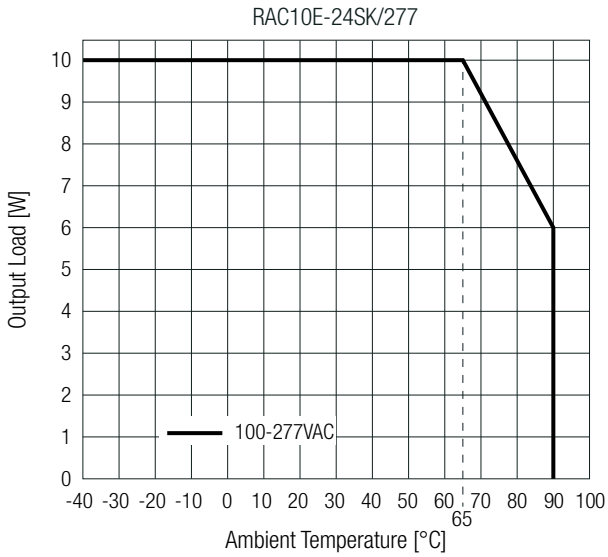


Note5: Cold start is limited to reduced output Power for 15V in general and for 3.3 to 12V versions at use in low line conditions

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

Derating Graph

(@ Chamber and natural convection 0.1m/s)



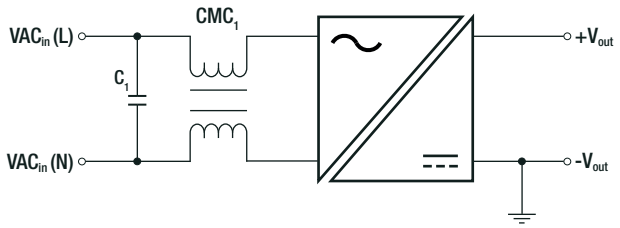
SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Safety requirements	E491408-A6019-UL	UL62368-1:2019 3rd Ed. CAN/CSA-C22.2 No. 62368-1:2019 3rd Ed.
Audio/video, information and communication technology equipment. Safety requirements (CB Scheme)	210824013	IEC62368-1:2018 3rd Ed.
Audio/video, information and communication technology equipment. Safety requirements (LVD)	210824013	EN IEC 62368-1:2020 + A11:2020
Audio/video, information and communication technology equipment. Safety requirements (CB Scheme)	210824014	IEC62368-1:2014 2nd Ed.
Audio/video, information and communication technology equipment. Safety requirements (LVD)		EN62368-1:2014 + A11:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	CN21F0GR-001 (OVC II)	IEC61558-1:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)		IEC61558-2-16:2009 1st Edition + A1:2013
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (LVD)	CN21N7KP-001 (OVC II)	EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (LVD)		EN61558-2-16:2009 + A1:2013
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	CN21LEIF-001 (OVC III)	IEC61558-1:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)		IEC61558-2-16:2009 1st Edition + A1:2013
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	CN21V98T-001 (OVC III)	EN IEC 61558-1:2019
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements		EN61558-2-16:2009 + A1:2013
RoHS2		RoHS-2011/65/EU + AM-2015/863

SAFETY & CERTIFICATIONS

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements (6)	O/P connected to GND: refer to: **„PELV installation“** and floating output; without external filter	EN55032:2017, Class B
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018, Class B
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices, industrial, scientific, and medical equipment		FCC 47 CFR Part 18
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±4kV	IEC61000-4-2:2008, Criteria A EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10 V/m (80-1000 MHz) 3 V/m (1400-2000MHz) 1 V/m (2000-2700MHz)	IEC/EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Power Port: L, N: ±2kV	IEC/EN61000-4-4:2012, Criteria A
	AC Power Port: L-N: ±2kV	IEC/EN61000-4-4:2012, Criteria B
Surge Immunity	AC Power Port: L-N 1.0kV	IEC/EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Power Port: 10 Vrms (0.15-80MHz)	IEC61000-4-6:2013, Criteria A EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30 A/m	IEC61000-4-8:2009, Criteria A EN61000-4-8:2010, Criteria A
Voltage Dips	100% (0.5P, 1.0P) 20, 30, 60%	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

Suggested external filter for PELV installation



Component List

C_1 (7)	CMC_1
100nF	45mH: RACMC45-500/UF9.8 (coming soon)

Note6: For PE or earth referenced output connections, it is suggested to add a 45mH CMC to the AC-Inlet, to meet EN55032 class “B”requirements
Note7: For usage with longer cables it is recommended to add an additional 100nF

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case/baseplate	black plastic, (UL94-V0)
	potting	silicone, (UL94-V0)
	PCB	FR4, (UL94-V0)
Dimension (LxWxH)		45.7 x 25.4 x 21.5mm 1.8 x 1.0 x 0.85 inch
Weight		52g typ. 0.11 lbs

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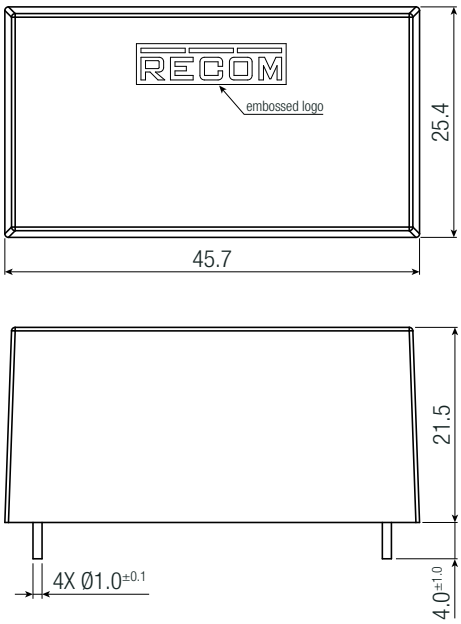
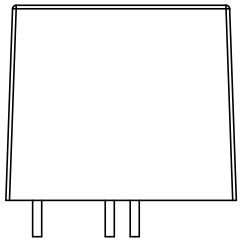
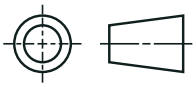
10W ◊ Input: 100-277VAC

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)



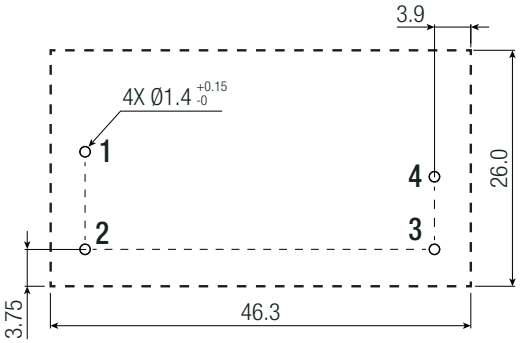




Pinning Information

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

Recommended Footprint Details



Tolerance: x.x= ±0.5mm
x.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	490.0 x 56.0 x 36.0mm
Packaging Quantity		17pcs
Storage Temperature Range		-40°C to +85°C
Storage Humidity	non-condensing	20-90% RH max.