Technical Data Sheet

RACM06E-K/277 Series ◊ AC-DC Power Supply

6W ◊ Input: 100V-277VAC

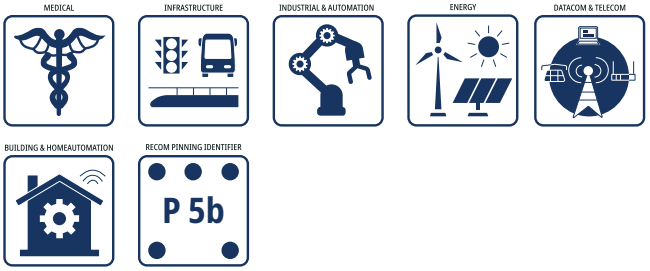
RECOM
AC/DC Converter

FEATURES

- 6 Watt output up to 60°C
- 1”x1” footprint; 17mm low profile
- 100-277VAC nominal operating range
- -40°C to +90°C operating temperature ratings
- OVC III rated up to 5000m altitude
- 2MOPP rating
- EN55032 class “B” compliant @ floating load
- 3 year warranty

Dimensions (LxWxH): 25.4 x 25.4 x 16.7mm (1.0 x 1.0 x 0.6 inch)
20g (0.04 lbs)

APPLICATIONS



SAFETY & EMC

E314885

HOUSEHOLD CERTIFIED EN-60335-1

RoHS² compliant 10 from 10

Reach compliant

DESCRIPTION

The industry’s most compact integrated 6-watt AC/DC power supply series RACM06E is based on a 1”x1” footprint and fits into a low profile of just 17mm. Multiple international safety certifications to industrial, medical, and household standards ease implementation into a wide range of applications for direct connections to worldwide mains input voltage conditions to OVC III and without limitation to operating altitudes of up to 5000m. Even though it is a cost-efficient construction the thermally optimized design has safety rating for full load output power from -40°C up to 60°C with some derating continuing up 90°C. Internal EMI Filter supports compliance to EN55032 class “B” in floating output configurations without any need for additional filter components.

SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current max. [mA]	Efficiency (1) typ. [%]	Output Power max. [W]
RACM06E-3.3SK/277	80-305	3.3	1818	73	6
RACM06E-05SK/277	80-305	5	1200	77	6
RACM06E-12SK/277	80-305	12	500	82	6
RACM06E-15SK/277	80-305	15	400	83	6
RACM06E-18SK/277	80-305	18	333	82	6
RACM06E-24SK/277	80-305	24	250	83	6

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

RACM06E-K/277 Series ◊ AC-DC Power Supply

6W ◊ Input: 100V-277VAC

RECOM AC/DC Converter

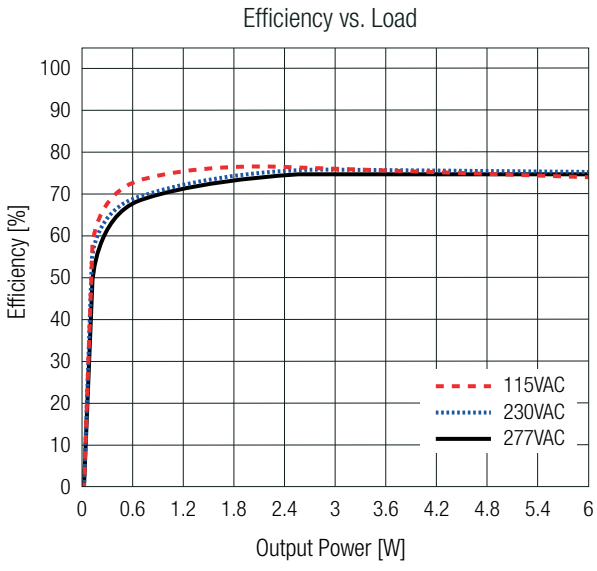
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

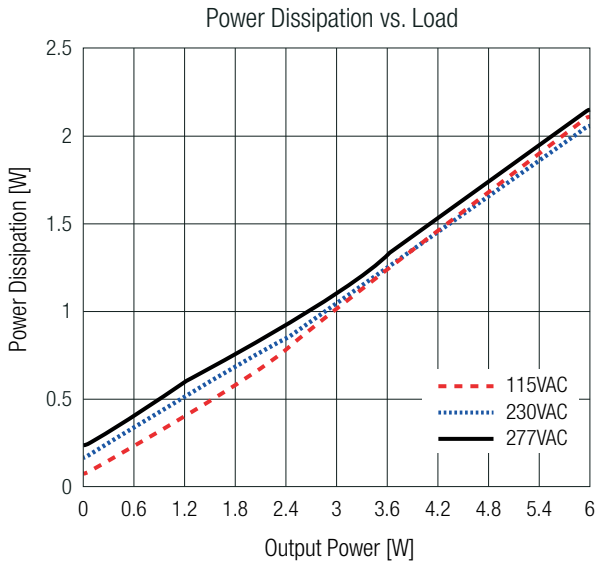
Parameter	Condition		Min.	Typ.	Max.
Nominal Input Voltage	50/60Hz		100VAC		277VAC
Operating Range [2]	47-63Hz		80VAC		305VAC
	DC		120VDC		430VDC
Input Current	115/230/277VAC				150mA
Inrush Current	cold start at 25°C	115VAC			15A
		230VAC			30A
		277VAC			36A
No Load Power Consumption	RACM06E-3.3SK/277; RACM06E-24SK/277				110mW
	others				120mW
Input Frequency Range			47Hz		63Hz
Minimum Load			0%		
Power Factor	115VAC			0.6	
	230VAC			0.5	
	277VAC			0.48	
Start-up time	RACM06E-24SK/277				25ms
	others				20ms
Rise time	RACM06E-15SK/277				15ms
	RACM06E-24SK/277				22ms
	others				10ms
Hold-up time	115VAC	RACM06E-3.3SK/277; RACM06E-05SK/277, RACM06E-18SK/277	8ms		
		others	13ms		
	230VAC	RACM06E-3.3SK/277; RACM06E-05SK/277, RACM06E-18SK/277	50ms		
		others	60ms		
Internal Operating Frequency					130kHz
Output Ripple and Noise [3]	20MHz BW	RACM06E-3.3SK/277			120mVp-p
		RACM06E-05SK/277			100mVp-p
		others			1% Vout

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)
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

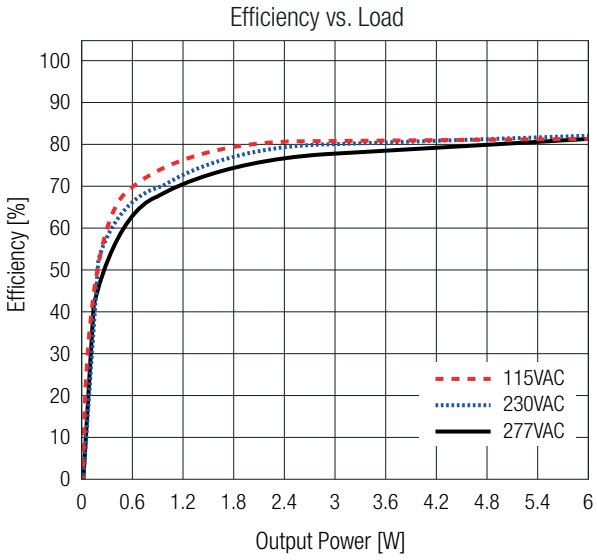
RACM06E-3.3SK/277; RACM06E-05SK/277

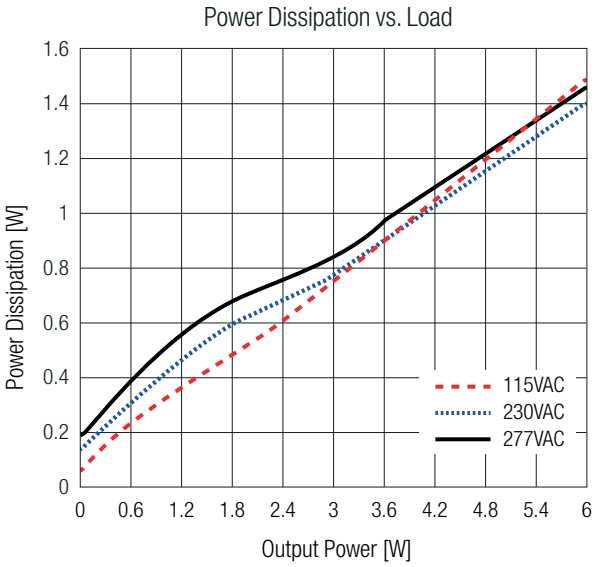




BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

others



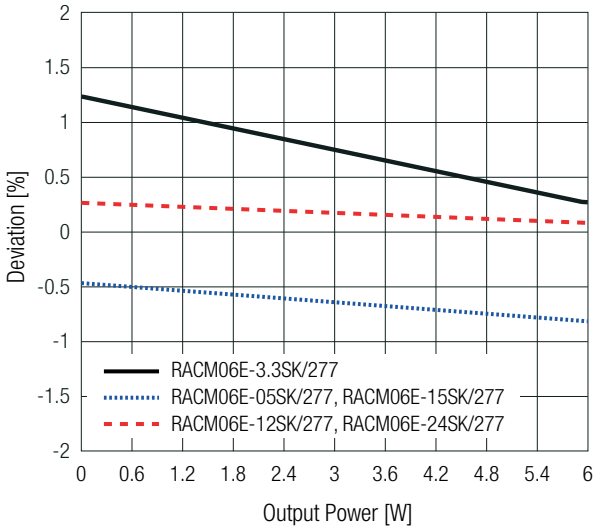


REGULATIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy		±2.0% max.
Line Regulation	low line to high line, full load	±0.3% max.
Load Regulation [4]	10% to 100% load	1.0% max.
Transient Response	25% load step change	4.0% max.
	recovery time	500µs typ.

Note4: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Load



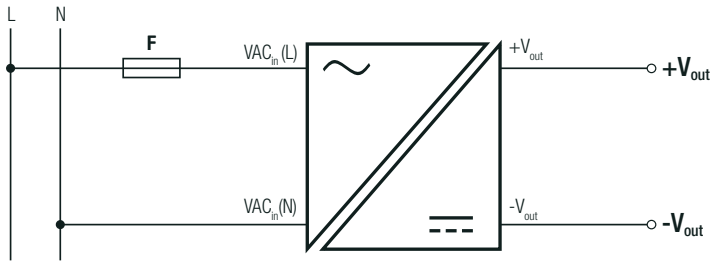
PROTECTIONS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Parameter	Type		Value
Input Fuse [6]	refer to **"Protection Circuit"**		external fuse required
Limited Power Source (LPS)			yes
Short Circuit Protection (SCP)	below 100mΩ		hiccup mode
Over Voltage Protection (OVP)			125-195%, hiccup mode
Over Voltage Category (OVC)	according to 60601-1, 60335-1		OVC II
	according to 62368-1, 61558		OVC III
Over Temperature Protection (OTP)			not protective against overload, hiccup mode
Class of Equipment			Class II
Isolation Voltage [5]	I/P to O/P; 1 minute	according to 61558	4.2kVAC
		according to 62368-1	6kVDC
Insulation Grade	I/P to O/P		reinforced
Means of Protection	according to 60601-1		2MOPP
Medical Device Classification	built-in power supply		designed to support type BF applications
Touch Current	264VAC/63Hz	normal condition	<100µA
		single fault	<500µA

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note6: Safety agency tested fuses: T1A, 420VAC or T1A, 600VAC. For system integration with DC operation, consider a suitable DC fuse in front of the input.

Protection Circuit [6]



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); with derating		-40°C to +90°C
Maximum Case Temperature			+110°C
Temperature Coefficient			±0.05%/K
Operating Altitude [7]	according to 62368-1, 60601-1, 61558		5000m
Operating Humidity	non-condensing		90% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217, G.B.	T_{AMB}= +25°C	1936 x 10^3 hours
		T_{AMB}= +40°C	1653 x 10^3 hours
Design Lifetime	T_{AMB}= +50°C		43 x 10^3 hours

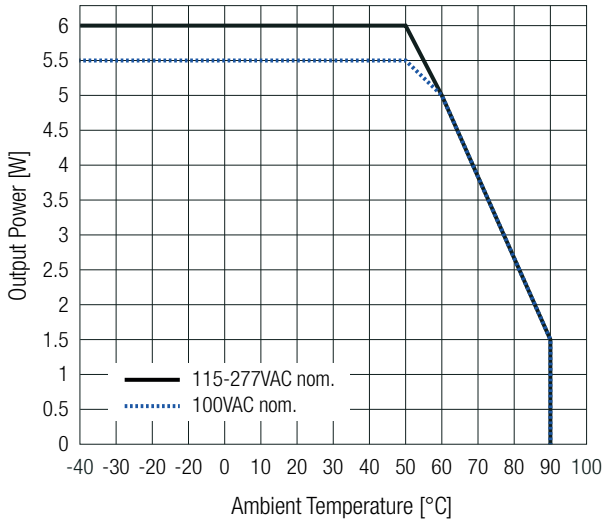
Note7: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime. Please contact RECOM tech support for advice

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

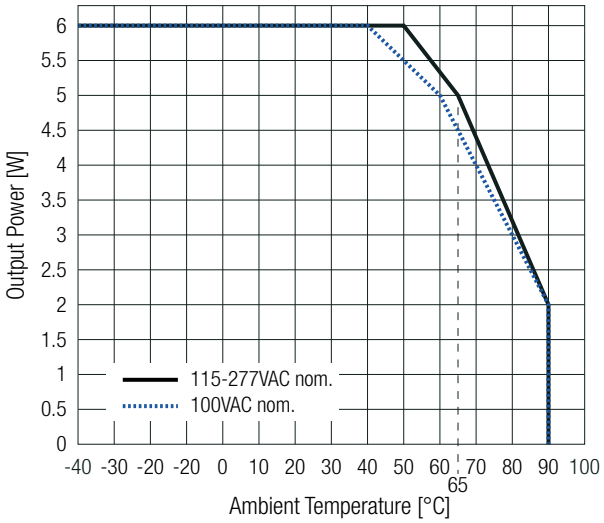
Derating Graph

(@ Chamber and natural convection 0.1m/s)

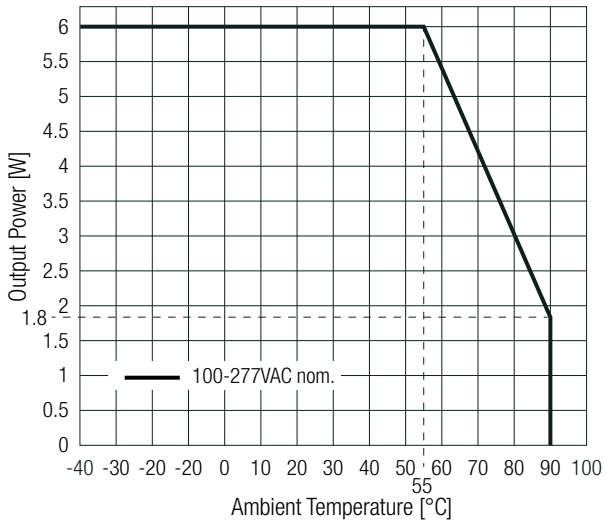
RACM06E-3.3SK/277



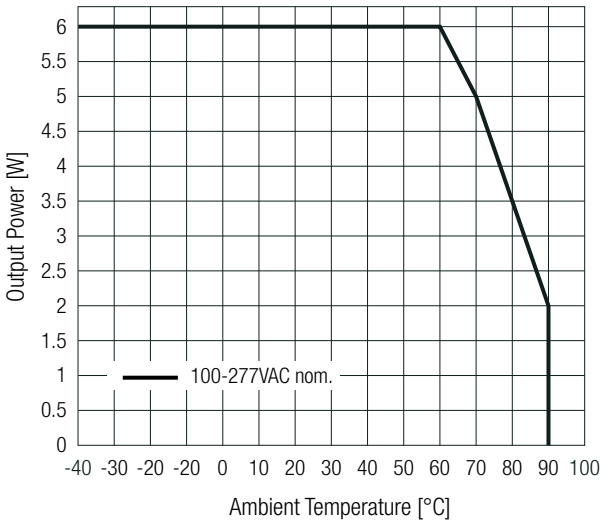
RACM06E-05SK/277



RACM06E-18SK/277



others



SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 2nd Edition (LVD)	64.210.22.05225.02	EN62368-1:2014+A11:2017
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition (CB)	085-220522401-100	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition		EN IEC 62368-1:2020+A11:2020
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	E314885 (except RACM06E-18SK/277)	ANSI/AAMI ES60601-1:2005 + A2:2010 CAN/CSA-C22.2 No. 60601-1:14 3rd Edition
Medical electrical equipment Part 1: General requirements for basic safety and essential performance (CB)	22SBDS12050-00721 (except RACM06E-18SK/277)	IEC60601-1:2005 + AM1:2012 3rd Edition
Medical electrical equipment Part 1: General requirements for basic safety and essential performance		EN60601-1:2006 + A12:2014
Household and similar electrical appliances – Safety – Part 1: General requirements	64.260.22.05227.01 (except RACM06E-18SK/277)	IEC60335-1:2010 + C1:2016 5th Edition EN60335-1:2012 + A15:2021
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure		EN62233:2008+AC:2008

SAFETY & CERTIFICATIONS

Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V 3rd Edition (CB)	085-220522601-100	IEC61558-1:2017 3rd Edition
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V 3rd Edition (LVD)	64.250.22.05226.02	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 (CB)	085-220522601-100	IEC61558-2-16:2009 + A1:2013 1st Edition
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (LVD)	64.250.22.05226.02	EN61558-2-16:2009+A1:2013
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance (EN60601-1-2)	**Condition**	**Standard / Criterion**
Medical electrical equipment Part 1-2: General requirements for basic safety and essential performance		EN60601-1-2:2015 + A1:2021
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8, 15kV Contact: ±8kV	EN61000-4-2:2009
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-2700MHZ); 27V/m (385MHz); 28V/m (450MHz); 9V/m (710, 745, 780MHz); 28V/m (810, 870, 930MHz); 28V/m (1720, 1845, 1970MHz); 28V/m (2450MHz); 9V/m (5240, 5500, 5785MHz)	EN61000-4-3:2006 + A2:2010
Fast Transient and Burst Immunity	AC Port: L-N: 2kV	EN61000-4-4:2012
Surge Immunity	AC Port: L-N: 0.5, 1kV	EN61000-4-5:2014 + A1:2017
	AC Port: L-N: 2kV, with external filter refer to **"External filter"**	
Immunity to conducted disturbances, induced by radio-frequency fields	3.6Vrms (0.15-80MHz)	EN61000-4-6:2014
Power Magnetic Field Immunity	30A/m	EN61000-4-8:2010
Voltage Dips and Interruptions	Dips: 100% (0.5P, 1.0P), 30% Interruptions: 100%	EN61000-4-11:2004 + A1:2017
Limits of Voltage Fluctuations & Flicker	JYTA-R01-2200312	EN61000-3-3:2013 + A1:2019

EMC Compliance (EN61204-3)	**Condition**	**Standard / Criterion**
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility		EN IEC 61204-3:2018
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±4kV	EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz) 3V/m (1400-2000MHz) 1V/m (2000-2700MHz)	EN61000-4-3:2006 + A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N: 2kV	EN61000-4-4:2012, Criteria A
Surge Immunity	AC Port: L-N: 1kV	EN61000-4-5:2014 + A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vrms (0.15-80MHz)	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips	100% (0.5P; 1.0P), 20%, 30%	EN61000-4-11:2004 + A1:2017, Criteria A
	60%	EN61000-4-11:2004 + A1:2017, Criteria B
Voltage Interruptions	100%	IEC/EN61000-4-11:2004 + A1:2017, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013 + A1:2019

EMC Compliance (EN55032)	**Condition**	**Standard / Criterion**
Electromagnetic compatibility of multimedia equipment - Emission Requirements	O/P connected to GND: refer to: **„PELV installation"** and floating output; without external filter	EN55032:2015 + A11:2020, Class B
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices		FCC 47 CFR Part 15 Subpart B, Class B

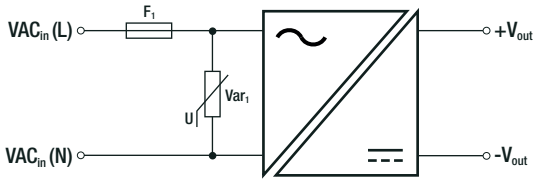
RACM06E-K/277 Series ◊ AC-DC Power Supply

6W ◊ Input: 100V-277VAC

AC/DC Converter

SAFETY & CERTIFICATIONS

Suggested external circuit for 2kV surge rating

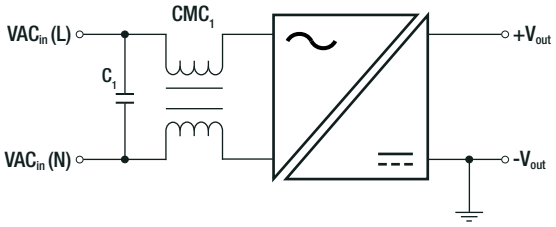


Component List

F_1	Var_1
20Ω, 2W	TVR1; 350VAC

Suggested external filter for PELV installation

refer to "EMC Compliance (EN55032)"



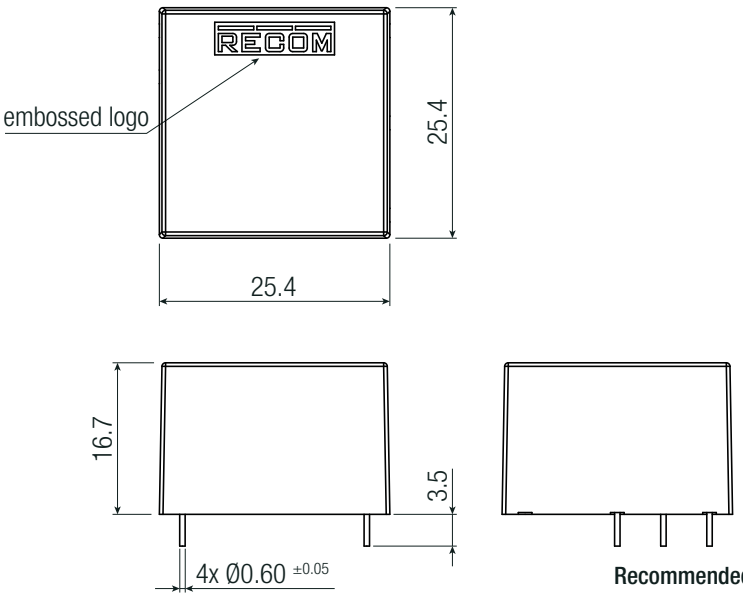
Component List

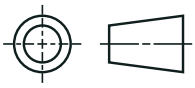
C_1	CMC_1
100nF	60mH: RACMC60-500/UF9.8 (coming soon)

DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case/baseplate	plastic, (UL94 V-0)
	potting	PU, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		25.4 x 25.4 x 16.7mm 1.0 x 1.0 x 0.6 inch
Weight		20g typ. 0.04 lbs

Dimension Drawing (mm)

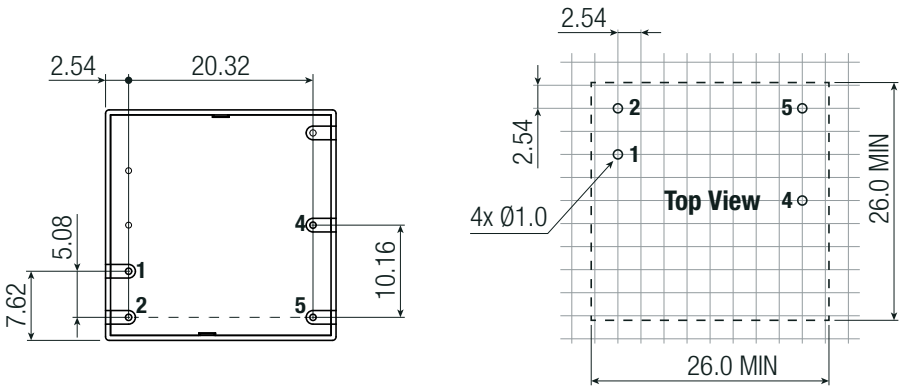




Pinning Information [P5b]

Pin #	Single
1	VAC in (L)
2	VAC in (N)
4	-Vout
5	+Vout

Recommended Footprint Details



Tolerance:
x.x= ±0.5mm
x.xx= ±0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	530.0 x 27.5 x 25.6mm
Packaging Quantity		18pcs
Storage Temperature Range		-40°C to +90°C
Storage Humidity	non-condensing	95% RH max.