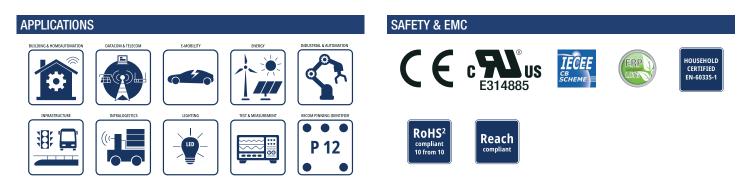


FEATURES

- Wide input range 85-264VAC / 85-305VAC
- Standby mode optimized PSU (ENER Lot 6)
- Operating Altitude up to 5000m
- Operating temperature range: -40°C to +85°C
- Class II installations (without FG)
- · EMC compliant without external components
- No load power consumption 40mW typ.
- Wired connection variants
- 3 year warranty



THT= $2.0 \times 1.0 \times 0.9$ inch Wired= $2.0 \times 1.0 \times 0.9$ inch



DESCRIPTION

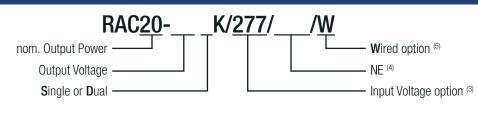
The RAC20-K series are highly efficient PCB-mount power conversion modules with ultra-low energy losses especially in light load conditions, making them a benchmark for always-on and standby mode operations, which are typically coming along with IoT and smart applications. The power supply units cover worldwide mains input range of 85VAC up to 305VAC and come with international safety certifications for industrial, AV and ITE as well as household standards. These AC/DC modules operate in a temperature range of -40°C to +85°C with up to 5000m operating altitude and offer fully protected single or dual outputs as well as EMC class B compliance without the need of any external components in floating connections. Wired connected "/NE" Versions are OVC III approved.

SELECTION GUIDE							
Part Number	•	age Range AC]	Output Voltage	Output Current nom.	Efficiency ⁽¹⁾ typ.	Max. Capacitive Load ⁽²⁾	Output Power continuous
	Basic	Extended	[VDC]	[mA]	[%]	[µF]	[W]
RAC20-05SK (3, 5)	85-264	85-305	5	4000	84	10000	20
RAC20-07SK (5)	85-264	-	7	2860	85	15000	20
RAC20-12SK (3, 4, 5)	85-264	85-305	12	1670	86	8000	20
RAC20-15SK (3, 5)	85-264	85-305	15	1333	86	1500	20
RAC20-24SK (3, 4, 5)	85-264	85-305	24	830	85	1000	20
RAC20-48SK (5)	85-264	-	48	410	85	330	20
RAC20-12DK (3)	85-264	85-305	±12	±833	84	±1200	20
RAC20-15DK (3)	85-264	85-305	±15	±670	84	±1000	20

Note1: Efficiency is tested at 230VAC input and constant resistive load at +25°C ambient Note2: Max Cap Load is tested at nominal input and full resistive load



Model Numbering



Note3: Add suffix "/277" for extended input voltage range (85-305VAC) without suffix= Basic input range 85-264VAC For detail information refer to **"Nominal Input Voltage"**

Note4: use suffix "/NE/W" for wired items with OVC III rating and enhanced EMI filtering

Note5: Add suffix "/W" for wired version (single output only, combination of "/W" with "/277", only available as "/277/NE/W" for 12V and 24V output) without suffix= standard THT version

ORDERING INFORM	NATION							
Model	Output		Package Type Suffix					
MOUEI	Voltage	Basic (no suffix)	"/277"	"/W"	"/277/NE/W"			
RAC20-05SK	5VDC	У	У	У	N/A			
RAC20-07SK	7VDC	у	N/A	on request	N/A			
RAC20-12SK	12VDC	У	У	use "/NE/W" for new designs	У			
RAC20-15SK	15VDC	У	У	у	N/A			
RAC20-24SK	24VDC	У	У	use "/NE/W" for new designs	У			
RAC20-48SK	48VDC	У	N/A	У	N/A			
RAC20-12DK	±12VDC	У	У	N/A	N/A			
RAC20-15DK	±15VDC	у	У	N/A	N/A			

y= standard portfolio; on request= MOQ may apply on project base; N/A= not available

Parameter	Condition		Min.	Тур.	Max.
Naminal Innut Valtaga	F0/0011-	basic version	100\/AC		240VAC
Nominal Input Voltage	50/60Hz	"/277" versions	100VAC		277VA0
	atopdard varaiop	47-63Hz	85VAC		264VA0
Operating Dange (6)	standard version	DC	120VDC		370VD0
Operating Range ⁽⁶⁾	/277 versions	47-63Hz	85VAC		305VA0
		DC	120VDC		430VD0
	115	VAC		450mA	
nput Current	230	VAC		400mA	
	277	VAC			300m/
		115VAC			20A
nrush Current	cold start at +25°C	230VAC			40A
		277VAC			50A
No Load Power Consumption	230VAC			40mW	100mV
	$P_{IN} = 0.5W$				0.3W
Ecodesign Standby Mode Use	$P_{IN} =$	1.0W			0.7W
(Available output power for stated input power) -	$P_{IN} =$	2.0W			1.6W



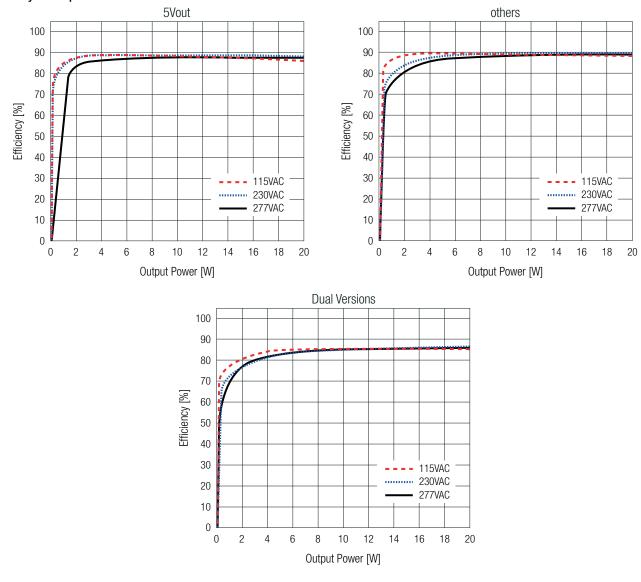
Parameter	Condition		Min.	Тур.	Max.
Input Frequency Range	AC Input		47Hz		63Hz
Minimum Lood	sir	ngle	0%		
Minimum Load	dual (required for regu	lation on both outputs)		10%	
	115	SVAC	0.6		
Power Factor	230	0.5			
	277	0.45			
Start-up Time				150ms	
Rise Time				40ms	
	115		12ms		
Hold-up Time	230		60ms		
	277		90ms		
Internal Operating Frequency					150kHz
Output Dipple and Naiza		5Vout		100mVp-p	
Output Ripple and Noise (7)	20MHz BW	others			1% of Vol

Note6: The products were submitted for safety files at AC-Input operation (90-305VAC).

Note7: Measurements are made with a 1.0µF MLCC 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.)

Efficiency vs Output Power

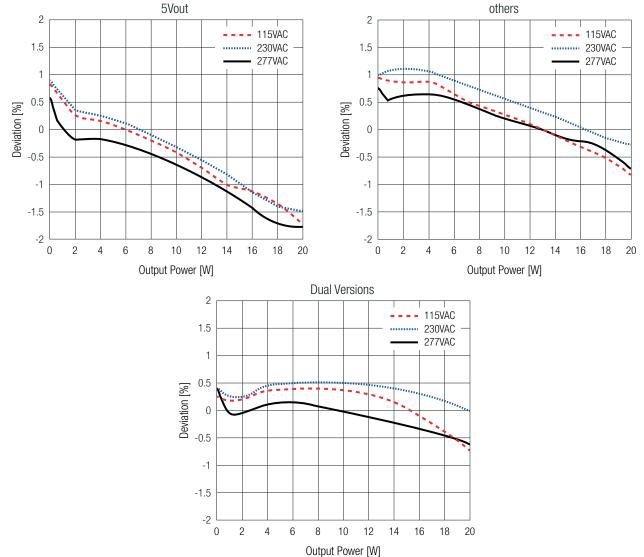




REGULATIONS (measured @ T _{AMB} = 25°C, nom. V _{IN} , full load and after warm-up unless otherwise stated)					
Parameter	(Value			
Output Accuracy			±2.0% typ.		
Line Degulation	others	low line to high line, full load	±0.5% typ.		
Line Regulation	"/277/NE/W"	low line to high line, full load	±1.0% typ.		
Load Regulation (8)	10%	2.0% typ.			
Cross Regulation	dua	dual output only			
Transiant Doppopo	25% lo	ad step change	4.0% max.		
Transient Response	rec	covery time	500µs typ.		

Note8: Operation below 10% load will not harm the converter, but specifications may not be met

Deviation vs. Output Power



PROTECTIONS (measured @ T _{AMB} = 25°C, nom. V _{IN} , full load and after warm-up unless otherwise stated)					
Parameter	Туре		Value		
		standard version	T3.15A, slow blow type		
Input Fuse (9)	internal	"/NE/W"	T2A, slow blow type		
		"/277" version	non, refer to "Protection Circuit"		
Short Circuit Protection (SCP)	below 100mΩ		hiccup, auto recovery		
Over Voltage Protection (OVP)	others		150%-195%, latch off mode		
Over voltage Flotection (OVF)	"/NE/W"		120%-180%, latch off mode		
Quer Queront Destaction (QCD)	others		110%-130%, hiccup mode		
Over Current Protection (OCP)	"/	NE/W"	120%-150%, hiccup mode		

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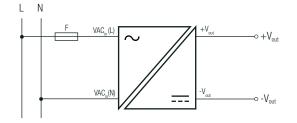
PROTECTIONS (measured @ T _{AMB}	= 25°C, nom. V _№ , full loa	ld and after warm-up un	less otherwise stated	1)
Parameter		Туре	Value	
Over Voltage Category (10)		others		OVC II (5000m)
Over vollage Galegory	"/NE/W"	according to 62368-1, 60	0335-1, 61558, 61347	OVC III (5000m)
Class of Equipment				Class II
Isolation Voltage (11)	I/P to O/P	tested for 1 minute	others	3kVAC
Isolation voltage (1)	1/F 10 0/F		"/NE/W"	4kVAC
Isolation Resistance		I/P to O/P , $V_{\mbox{\tiny ISO}}=500\mbox{VD0}$	1GΩ min.	
Isolation Capacitance				
Insulation Grade				reinforced

Note9: Refer to local safety regulations if input over-current protection is also required

Note10: For OVC III requirements please use "/NE/W" variants or refer to RAC20NE-K.pdf

Note11: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Protection Circuit for RAC20-xxK/277 only:



		• •••	-)
Parameter	Condition				Value
	@ natural convection (0.1m/c)	full load		others	-40°C to +55°C
Operating Ambient Temperature Range	@ natural convection (0.1m/s) refer to "Derating Graph"	i i i i i i i i i i i i i i i i i i i		"/NE/W"	-40°C to +60°C
	Belating draph	with derati	ing	all	-40°C to +85°C
Maximum Case Temperature		·	·		+95°C
Temperature Coefficient					±0.05%/K
		all models			5000m (OVC II)
Operating Altitude ⁽¹²⁾	only "/NE/W" versions	according to 62368-1, 60335-1, 61558, 61347			5000m (OVC III)
Operating Humidity					20% - 90% RH max.
IP Rating					IP20
Pollution Degree					PD2
	10-500Hz, 2G 10min./1cycle, period 60min. along x,y,z axes				according to MIL-STD-202G
) (besting	3 axis, 4	according to IEC 60068-2-27			
Vibration	5-500Hz,	according to IEC 60068-2-65			
	10-500F	according to IEC 60068-2-64			
MTBF		047.00	T _{AM}	_{ив} = +25°С	>1196 x 10 ³ hours
	according to MIL-HDBK-	217, G.B.	7, G.B.		>955 x 10 ³ hours
	6.01		TAN	_{ив} = +25°С	130 x 10 ³ hours
Design Lifetime	full load		$T_{AMB} = +55^{\circ}C$		16 x 10 ³ hours

Note12: 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

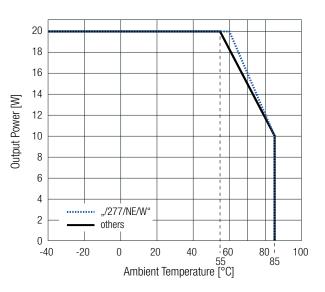


ENVIRONMENTAL (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

Derating Graph

(@ Chamber and natural convection 0.1m/s

Note13: Output power derating for Line-input of less than 90VAC (de-rate linearly from 100% at 90VAC to 90% at 85VAC)



SAFETY & CERTIFICATIONS (COVERING ALL VERSIONS EXCEPT "/NE/W")		
Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Safety requirements	E224736	UL62368-1, 2nd Edition, 2014 CAN/CSA C22.2 Nr. 62368-1-14, 2nd Ed. 2014
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)	E491408-A6008-CB-1	IEC62368-1:2014 2nd Edition
Audio/Video, information and communication technology equipment - Safety requirements (LVD)		EN62368-1:2014 + A11:2017
Household and similar electrical appliances – Safety – Part 1: General requirements (CB Scheme)	4392216.50 4397422.50	IEC60335-1:2010 5th Edition + AM1:2013
Household and similar electrical appliances – Safety – Part 1: General requirements	LCS180508046AS	IEC60335-1:2010 + AMD2:2016 + COR1:2016 EN60335-1:2012 + A11:2014 + A13:2017
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V (CB Scheme)	- 50198090 001	IEC61558-1:2005 2nd Edition + A1:2009
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V	30130030 001	EN61558-1:2005 + A1:2009
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)	- 50198090 001	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 Part 2: Particular requirements	50198090 001	EN61558-2-16:2009 + A1:2013
Safety requirements for power electronic converter systems and equipment - Part 1: General (CB Scheme)	- CN21R4QC001	IEC62477-1:2012 + A1:2016, 1st Edition
Safety requirements for power electronic converter systems and equipment - Part 1: General (LVD)	- UNZ 1K4QUUU I	EN62477-1:2012 + A11:2014 + A1:2017
EAC	RU-AT.03.67361	TP TC 004/2011
RoHS2		RoHS-2011/65/EU + AM-2015/863
EMC Compliance	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		IEC/EN61204-3:2018, Class B
Electromagnetic compatibility of multimedia equipment - Emission requirements	without external filter	EN55032:2015, Class B
Electromagnetic compatibility of household appliances, electric tools and similar apparatus - Emission Requirements		EN55014-1:2006 + A2:2011
Information technology equipment - Immunity characters - Limits and methods of measurement		EN55024:2010 + A1:2015
Electromagnetic compatibility of household appliances, electric tools and similar apparatus - Immunity Requirements		EN55014-2:2015



EMC Compliance	Condition	Standard / Criterion
ESD Electrostatic discharge immunity test	Air ±8kV, Contact ±4kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	80MHz - 6GHz: 10V/m 1.4GHz - 2GHz: 3V/m 2.0GHz - 2.7GHz: 1V/m	EN61000-4-3:2006 + A1:2008, Criteria A
Fast Transient and Burst Immunity	AC Port: ±2.0kV DC Port: ±2.0kV	EN61000-4-4:2012, Criteria B
Surge Immunity	AC Port: L-N ±1.0kV DC Port: ±0.5kV	EN61000-4-5:2014 + A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 10V DC Port: 10V	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	50Hz, 30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Voltage Dips 20% Voltage Dips 30% Voltage Dips 60% Voltage Dips 100% Voltage Interruptions > 95%	EN61000-4-11:2004 + A1:2017, Criteria C EN61000-4-11:2004 + A1:2017, Criteria C EN61000-4-11:2004 + A1:2017, Criteria C EN61000-4-11:2004 + A1:2017, Criteria B EN61000-4-11:2004 + A1:2017, Criteria C
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
American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		ANSI C63.4-2014, Class B

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1:	E491408-A6034-UL	UL62368-1:2019 3rd Edition
Safety requirements 3rd Edition	L491400-A0034-0L	CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - Part1:	240408022	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	240400022	EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1:	085-240223001-000	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	003 240223001 000	EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1:	085-240223401-000	IEC62368-1:2018 3rd Edition
Safety requirements 3rd Edition	000-240220401-000	EN IEC 62368-1:2020+A11:2020
Household and similar electrical appliances – Safety – Part 1: General	64.110.24.02233.01	IEC60335-1:2010 + C1:2016 5th Edition
requirements		EN60335-1:2012 + A15:2021
Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	64.110.24.02233.01	EN62233:2008
Safety of power transformers, power supplies, reactors and similar products for		IEC61558-1:2017 3rd Edition
supply voltages up to 1100 V 3rd Edition		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	085-240223101-000	IEC61558-2-16:2009+A1:2013 1st Edition
requirements		EN61558-2-16:2009+A1:2013
Lamp control ager Dart 1. Constal and cafety requirements		IEC61347-1:2015+A1:2017 3rd Edition
Lamp controlgear Part 1: General and safety requirements		EN61347-1:2015+A1:2021
Lamp controlgear Part 2-13: Particular requirements for d.c. or a.c. supplied	085-240223201-000	IEC61347-2-13:2014+A1:2016 2nd Edition
electronic controlgear for LED modules		EN61347-2-13:2014+A1:2017

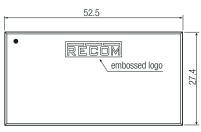


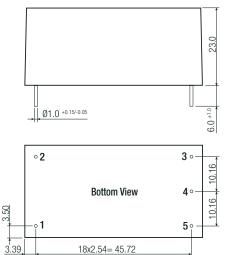
SAFETY & CERTIFICATIONS (COVERING "/NE/W" ONLY)		
EMC Compliance according to EN IEC61204-3	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8kV Contact: ±4kV, ±6kV	IEC61000-4-2:2008, Criteria A 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)	IEC/EN61000-4-3:2006 + A2:2010 Criteria A
	L, N, L-N ±2kV for 24Vout	IEC/EN61000-4-4:2012, Criteria A
Fast Transient and Burst Immunity	L, N, L-N ±2kV for 12Vout	
	L, N, L-N ±4kV for all versions	– IEC/EN61000-4-4:2012, Criteria B
Curra Immunity	L-N: 0.5, 1kV; for all versions	IEC/EN61000-4-5:2014 + A1:2017, Criteria A
Surge Immunity	L-PE, N-PE: 1, 2kV; for all versions	IEC/EN61000-4-5:2014 + A1:2017, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	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 / EN61000-4-8:2010
Voltage Dips and Interruptions	Dips: 100% (0.5P, 1.0P), 60%, 30%, 20%	IEC/EN61000-4-11:2004+A1:2017, Criteria A
	Interruption: 100%	IEC/EN61000-4-11:2004+A1:2017, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013+A1:2019
EMC Compliance according to EN55032	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	floating and earth referenced output	EN55032:2015+A11:2020

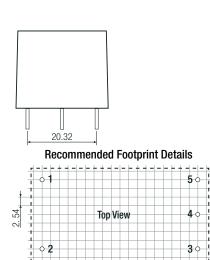
Parameter	Туре	Value
	case/baseplate	black plastic, (UL94 V-0)
Materials	potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)	all models	52.5 x 27.4 x 23.0mm
	ali models	2.0 x 1.0 x 0.9 inch
Weight	THT versions	60.0g typ.
		0.13 lbs
	wired and "/NF (A/" variance	65.0g typ.
	wired and "/NE/W" versions	0.14 lbs

DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing THT Version(mm)







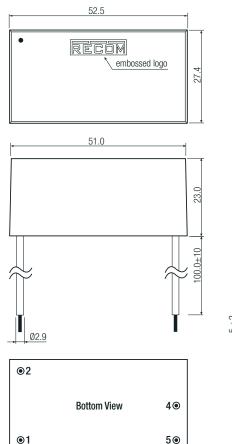
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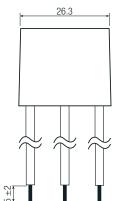
AC/DC Converter

Pinning information [P12]

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

Dimension Drawing wired Versions (mm)





2.54

Wire information

#	Function	Wire color	Туре	AWG
1	VAC in (N)	blue	UL-1015	18
2	VAC in (L)	brown	UL-1015	18
4	-Vout	black	UL-1015	18
5	+Vout	red	UL-1015	18

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



PACKAGING INFORMATION					
Parameter	Ту	De	Value		
Packaging Dimension (LxWxH)	THT versions	tube	490.0 x 56.0 x 40.0mm		
	Wired versions	tray	488.0 x 202.0 x 47.0mm		
	"/NE/W" versions	tray	468.0 x 198.0 x 46.0mm		
Packaging Quantity	THT ve	rsions	15pcs		
	Wired v	ersions	20pcs		
	"/NE/W"	versions	20pcs		
Storage Temperature Range			-40°C to +85°C		
Storage Humidity	non-con	densing	20% to 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 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.

Mouser Electronics

Authorized Distributor

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RECOM:

 RAC20-05SK/W
 RAC20-05SK
 RAC20-15SK/W
 RAC20-24SK/W
 RAC20-24SK
 RAC20-15DK
 RAC20-15SK

 RAC20-12SK/W
 RAC20-12SK
 RAC20-12SK
 RAC20-12SK
 RAC20-15SK/277
 RAC20-05SK/277

 RAC20-12DK/277
 RAC20-12SK/277
 RAC20-15DK/277
 RAC20-15DK/277
 RAC20-24SK/277
 RAC20-24SK/277

 RAC20-12SK/277
 RAC20-15DK/277
 RAC20-24SK/277
 RAC20-07SK
 RAC20-24SK/277/NE/W