#### **Features**

**Regulated** 

**Converter** 

- Input Range: 80-264VAC or 80-305VAC
- Temperature rang: -40 to +85°C with derating
- Over voltage category OVC III
- 2MOPP medical certified B and BF compliant
- Class B EMC filter built-in
- 4000/5000m (medical/ITE) operating altitude

#### Description

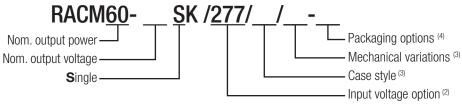
The multi-purpose, industrial + household + medical grade AC/DC converter series RACM60-K/OF delivers 60 Watts of output power from -40°C to +55°C with natural air convection only, and up to +85°C with derating or forced cooling. With a clear focus on extended thermal performance for systems where space is limited, these 2" x 3" compact modules are designed to gain highest overall efficiency levels over the full output load range from universal AC inputs. The RACM60-K/OF has ANSI/AAMI/IEC 60601-1 medical safety and EN 60601-1-2 medical EMC certifications and offers 4kVAC/1 min isolation, 2MOPP and designed to meet B and BF requirements. It is additionally certified to IEC/EN62368-1(CB Report) and IEC61558-1/-2-16 for industrial applications and IEC/EN60335-1 for household appliances. The robust built-in Class B EMC filter has sufficient margin to allow both Installation Class II or Class I PELV with grounded output. A range of mechanical fixing options makes the RACM60 suitable for many different mounting conditions: the standard chassis mount part mates with Molex connectors and the /PCB option permits direct installation in printed circuit boards. Additionally, a 2" x 4" footprint for backwards-compatibility with legacy designs is available on request.

<b>Selection Guide</b>					
Part Number	Input Voltage Range [VAC]	Output Voltage [VDC]	Output Current [mA]	Output Power [W]	Efficiency typ. <sup>(1)</sup> [%]
RACM60-05SK (2, 3, 4)	80-264/ 80-305	5	8000	40	89
RACM60-12SK (2, 3, 4)	80-264/ 80-305	12	5000	60	90
RACM60-15SK (2, 3, 4)	80-264/ 80-305	15	4000	60	90
RACM60-24SK (2, 3, 4)	80-264/ 80-305	24	2500	60	90
RACM60-36SK (2, 3)	80-264	36	1667	60	90
RACM60-48SK (2, 3, 4)	80-264/ 80-305	48	1250	60	90

#### Notes:

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

#### Model Numbering



#### Notes:

- Note2: Add suffix "/277/OF" for wider input voltage range (80-305VAC) Without suffix= standard input range (80-264VAC), check "Model Matrix <sup>(4)</sup>"
  - For more information, refer to "Input Voltage Range (5,6)"
- Note3: "/OF" = standard 2"x3" open frame version with standard connectors
  - "/OF/PCB =  $2^{"}x3^{"}$  open frame with PCB mounting pins
  - "/OF/2x4" =  $2^{"x4"}$  open frame version with standard connectors

```
"/ENC/2x4" = 2"x4" version with metal enclosure and standard connectors (coming soon)
Note4: for packaging details refer to last page "PACKAGING INFORMATION"
```

Model Matrix (4)					
Model	/0F	/277/0F	/OF/PCB	/0F/2x4	/ENC/2x4
RACM60-05SK	х	х	х	on request	on request
RACM60-12SK	х	х	х	х	Х
RACM60-15SK	х	х	on request	on request	on request
RACM60-24SK	Х	Х	Х	Х	Х
RACM60-36SK	х	on request	on request	on request	on request
RACM60-48SK	Х	х	on request	on request	on request
$\mathbf{x} = \text{standard portfolic}$	/ on request = N	10Q may apply on	project base / N/A	= not available	



#### RACM60-K

60 Watt Open Frame 2"x3" & 2"x4" Enclosed 2"x4"



IEC/EN62368-1 certified UL1310 pending, NEC Class 2 (12/24SK/OF) ANSI/AAMI ES60601-1 Ed. 3.1 certified CSA/CAN-C22.2 No. 60601-1:14 certified IEC/EN60335-1 certified IEC/EN61558-1 certified IEC/EN61558-2-16 certified EN60601-1-2 compliant EN55032 compliant EN55035 compliant CB Report

# RACM60-K Series

#### Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Parameter	Condition		Min.	Тур.	Max.
Internal Input Filter					Pi Typ
Nominal Input Voltage	50/60Hz	standard version "/277" version	100VAC		240VAC 277VAC
	standard version	47-63Hz DC	80VAC 120VDC		264VAC 370VDC
Input Voltage Range (5,6)	"/277" version	47-63Hz DC	80VAC 120VDC		305VAC 430VDC
Input Current	2	115VAC 230VAC 277VAC			1400mA 600mA 500mA
Inrush Current	cold start	115VAC 230VAC 277VAC			30A 60A 70A
ErP Standby Mode Conformity (Output Load Capability)	115/230/277VAC	Input Power: 0.5W 1.0W		0.3W 0.7W	
No load Power Consumption		230VAC 277VAC		100mW 120mW	
Input Frequency Range	A	C Input	47Hz		63Hz
Minimum Load					
Power Factor	2	115VAC 230VAC 277VAC			
Start-up Time				150ms	
Rise Time				100ms	
Hold-up Time	2	115VAC 230VAC 277VAC			
Internal Operating Frequency	100% loa	d at nominal Vin		100kHz	
Output Ripple and Noise (7)	20MHz BW 5Vout others				200mVp-p 1% of Vout

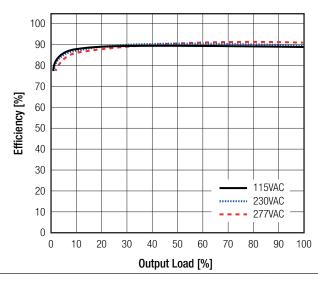
#### Notes:

Note5: The products were submitted for safety files at AC-Input operation (90-264VAC)

Note6: Output power derating for Line-input of less than 90VAC (derate linearly from 100% at 90VAC to 80% at 80VAC)

Note7: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)

#### Efficiency vs. Load



## RACM60-K Series

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REGULATIONS				
Parameter	Condition			Value
	standa	ard version	100% load	±2.0% typ.
Output Accuracy	"/07"	7" version	5Vout	±3.0% typ.
	/21		others	±1.0% typ.
	standa	ard version	low line to high line	±0.05% typ.
Line Regulation	"/27	7" version	5Vout	±0.5% typ.
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Voluion	others	±0.05% typ.
	standard version		5VDC	±1.5% typ.
		10% to 100% load	12VDC, 15VDC	±0.5% typ.
Load Regulation (8)			24VDC, 36VDC, 48VDC	±0.1% typ.
	"/277" version	10% to 100% load	5VDC 12VDC, 15VDC	±3.0% typ.
	/2// VEISIUIT	10% to 100% todu	24VDC, 36VDC, 48VDC	±0.8% typ. ±0.2% typ.
		25% load ste		3.0% max.
Transient Response	25% load step change recovery time			500µs max.
<u>Not</u> Deviation vs. Load			converter, but specifications may not be met	
		Output Load [%	]	

PROTECTIONS		
Parameter	Туре	Value
Input Fuse	internal	T3.15A, slow blow type
Short Circuit Protection (SCP)		hiccup, auto recovery
Over Voltage Protection (OVP)		105 - 120%, auto recovery
Output Reverse Voltage Protection		107 - 145%, auto recovery
Over Voltage Category (OVC) <sup>(9)</sup>	according to 62368-1, 61558-2-16 & 60335-1	OVC II
	according to 61558-2-16	OVC III (up to 2000m)
Over Current Protection (OCP)		130% - 180%, hiccup mode
Thermal Shutdown	TC point IC 101	+130°C, restart after cool down
Notes:	9: RACM60-xxK/277/0F models were submitted to safety agency for C	VC III rating.

# RACM60-K Series

#### **Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Parameter	Туре		Value
Class of Equipment			Class II
Isolation Voltage (safety certified) (10)	1 minute	I/P to O/P; according to 61558-2-16, 60601-1	4.2kVAC
Isolation Resistance	I/P to O/P, $V_{ISO}$ = 500VDC		1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V		100pF max.
Insulation Grade			reinforced
Means of Protection		319VAC working voltage	2MOPP
N	l <b>otes:</b> Note10: For repeat H	li-Pot testing, reduce the time and/or the test voltage	

ENVIRONMENTAL				
Parameter	Condition		Value	
Operating Temperature Range	@ natural convection 0.1m/s	refer to graphs below	-40°C to +85°C	
Temperature Coefficient			±0.02%/K	
Operating Altitude (11)	according to 62368-1, 61	558-2-16 & 60335-1	5000m	
Operating Altitude (11)	according to 60601-		4000m	
Operating Humidity	non-condensing		95% max.	
Pollution Degree			PD2	
Vibration	according to MIL-STD-202G		10-500Hz, 2G 10min./1cycle, period 60min. along x,y,z axes	
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	>900 x 10 <sup>3</sup> hours	
		+40°C	>726 x 10 <sup>3</sup> hours	
Design Lifetime	nom. Vin= 230VAC	+40°C	>42 x 10 <sup>3</sup> hours	

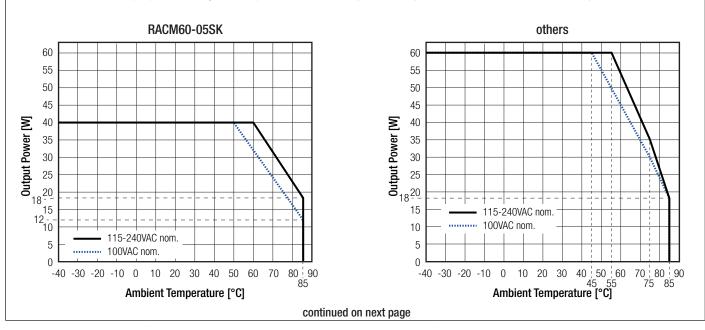
#### Notes:

Note11: Recognized by safety agency for safe operation up to 4000/5000m. High altitude operation may impact the performance and lifetime Please contact RECOM tech support for advice

#### Derating Graph non-/277/OF Versions

(@ Chamber and natural convection 0.1m/s)

Output power derating for line-input of less than 90VAC (derate linearly from 100% at 90VAC to 80% at 80VAC)

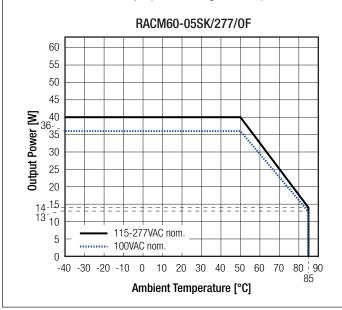


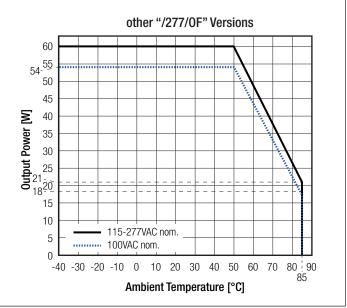
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Derating Graph "/277/OF" Version

(@ Chamber and natural convection 0.1m/s)

Output power derating for Line-input of less than 90VAC (derate linearly from 100% at 90VAC to 80% at 80VAC)





SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report Number	Standard
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	E511305-D1000-1/A1/C0-UL	CAN/CSA-C22.2 No. 60601-1:14, 3rd Ed ANSI/AAMI ES60601-1:2005 + A2:2010/R2012
Audio/Video, information and communication technology equipment - Safety requirements (CB Scheme)	CN21PMDW-001	IEC62368-1:2014 2nd Editior
Audio/Video, information and communication technology equipment - Safety requirements (LVD)	50355749 001	EN62368-1:2014 + A11:2017
Household and similar electrical appliances – Safety – Part 1: General requirements (LVD)	4384104.50	IEC60335-1:2010 5th Edition + A2:2016 EN60335-1:2012 + A15:2021
Standard for Class 2 Power Units (TÜV)	pending (RACM60-12SK/OF, RACM60-24SK/OF only)	UL1310:2018 + R:2020-06
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to $1100 \; V \; (\text{CB Scheme})$	50355750 001	IEC61558-1:2005 2nd Edition + A1:2009
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements (CB Scheme)	(except /277/OF & /ENC/2x4)	IEC61558-2-16:2009 1st Edition + A1:2013
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to $1100 \mbox{V}$	50355751 001	EN61558-1:2005 + A1:2009
Safety of power transformers, power supplies, reactors & similar products for supply voltages up to 1100 V Part 2: Particular requirements	(except /277/OF & /ENC/2x4)	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)	085-210569701-000	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)	(OVCIII)	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	64.210.21.05697.01	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	(OVCIII)	EN61558-2-16:2009 + A1:2013

# RACM60-K

#### **Series**

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

EMC Compliance (EN60601-1-2)	Condition	Standard / Criterion
Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests	LCS220321054BE	EN60601-1-2:2015+A1:2021 Class B, Group 1
ESD Electrostatic discharge immunity test	Air: ±2, 4, 8, 15kV Contact: ±2, 4, 8kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	9V/m (704-787MHz) 9V/m (5100-5800MHz) 10V/m (80-2700MHz) 27V/m (380-390MHz) 28V/m (430-470MHz) 28V/m (800-960MHz) 28V/m (1700-1990MHz) 28V/m (2400-2570MHz)	EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N 2kV	EN61000-4-4:2012, Criteria B
Surge Immunity	L-N: 1kV L (N)-PE: 2kV	EN61000-4-5:2014, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 3Vrms: (0.15-80MHz) 6Vrms: (ISM and amateur radio bands according to table 9)	EN61000-4-6:2014, Criteria A
Power Magnetic Field Immunity	30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Dips: 100% (0.5P 1.0P) 30% Interruptions: 100%	EN61000-4-11:2004, Criteria B
Limits of Voltage Fluctuations & Flicker	LCS220321054BE	EN61000-3-3:2013
EMC Compliance (EN55032)	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements		EN55032:2015+A1:2020, Class B
Electromagnetic compatibility of multimedia equipment - Immunity requirements	LCS220321053BE	EN55035:2017+A11:2020
ESD Electrostatic discharge immunity test	Air: $\pm 2$ , 4, 8kV Contact: $\pm 2$ , 4kV	EN61000-4-2:2009, Criteria B
Radiated, radio-frequency, electromagnetic field immunity test	3 V/m (80-5000MHz)	EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N 1kV	EN61000-4-4:2004+A1:2010, Criteria B
Surge Immunity	L-N: 1kV L (N)-PE: 2kV	EN61000-4-5:2014 + A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 3Vrms (0.15-10MHz) 3-1Vrms (10-30MHz) 1Vrms (30-80MHz)	EN61000-4-6:2014+A1:2015, Criteria A
Power Magnetic Field Immunity	1A/m	EN61000-4-8:2010, Criteria A
	Dips: 100%	EN61000-4-11:2004+A1:2017, Criteria B
Voltage Dips and Interruptions	30%	EN61000-4-11:2004+A1:2017, Criteria C
	Interruptions:100%	EN61000-4-11:2004+A1:2017, Criteria C
Limits of Voltage Fluctuations & Flicker	LCS220321053BE	EN61000-3-3:2013
EMC Compliance (EN61204-3)	Condition	Standard / Criterion
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)	LCS220321055BE	EN/IEC61204-3:2018, Class B

### RACM60-K Series

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

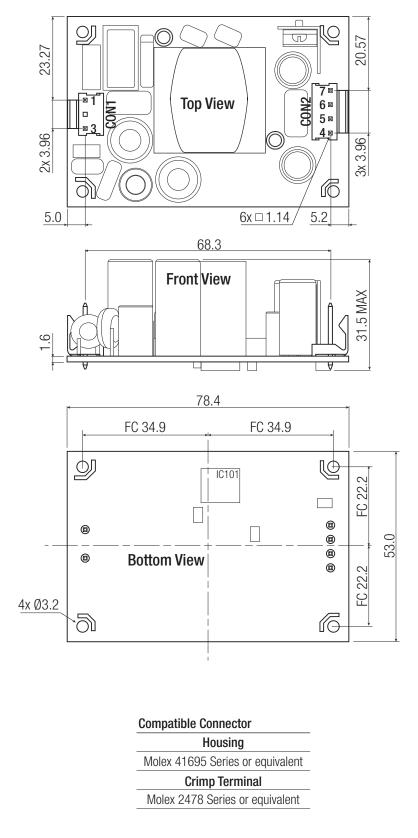
EMC Compliance (EN61204-3)	Condition	Standard / Criterion
Radiated, radio-frequency, electromagnetic field immunity test	10V/m (80-1000MHz) 3V/m (1400-2000MHz) 1V/m (2000-2700MHz)	EN61000-4-3:2006+A2:2010, Criteria A
Fast Transient and Burst Immunity	AC Port: L-N 2kV	EN61000-4-4:2012, Criteria B
Surge Immunity	L-N: 1kV L (N)-PE: 2kV	EN61000-4-5:2014 + A1:2017, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	AC Port: 10Vrms (0.15-80MHz)	EN61000-4-6:2014+A1:2015, Criteria A
Power Magnetic Field Immunity	30A/m	EN61000-4-8:2010, Criteria A
Voltage Dips and Interruptions	Dips: 100% (0.5P, 1.0P) 30% or 20% Interruptions:100%	EN61000-4-11:2004 +A1:2017, Criteria B EN61000-4-11:2004 +A1:2017, Criteria B EN61000-4-11:2004 +A1:2017, Criteria C
Limits of Voltage Fluctuations & Flicker	LCS220321055BE	EN61000-3-3:2013+A2:2021
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices	WTD22D04060199E	FCC 47 CFR Part 15:2020 Subpart B
Limitations on the amount of electromagnetic interference allowed from digital and electronic devices, industrial, scientific, and medical equipment	WTD22D04060215E	FCC 47 CFR Part 18:2020

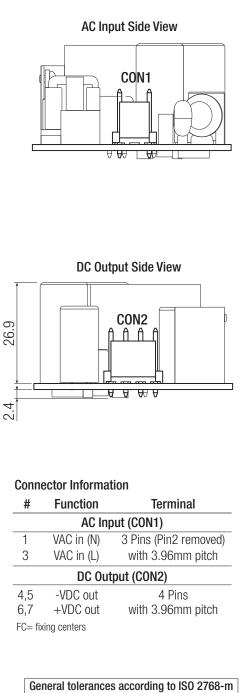
Parameter	Туре	Value
Material	РСВ	FR4 (UL94-V0)
	"/OF" and type	78.4 x 53.0 x 31.5mm
	"/277/0F" type	76.2 x 50.8 x 32.0mm
Dimension (LxWxH)	"/OF/PCB" type	78.4 x 53.0 x 35.4mm
	"/OF/2x4" type	101.6 x 53.0 x 31.5mm
	"/ENC/2x4" type	118.3 x 62.7 x 38.7mm
Weight	"/OF"; "/277/OF" and "/OF/PCB" types	111g typ
	"/OF/2x4" type	120g typ
	"/ENC/2x4" type	167g typ



Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

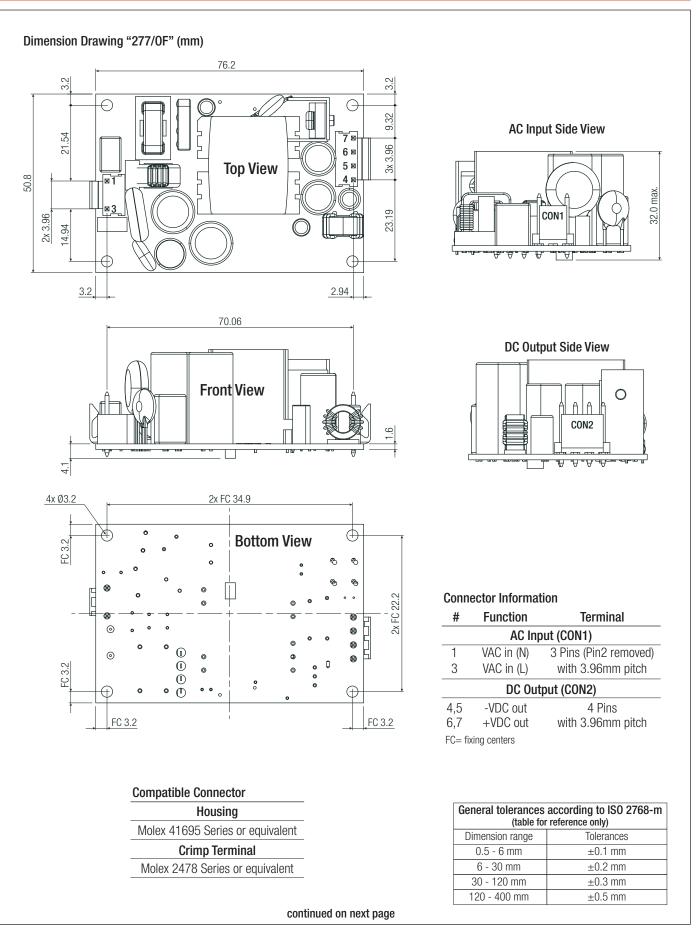
Dimension Drawing "/OF" (mm)



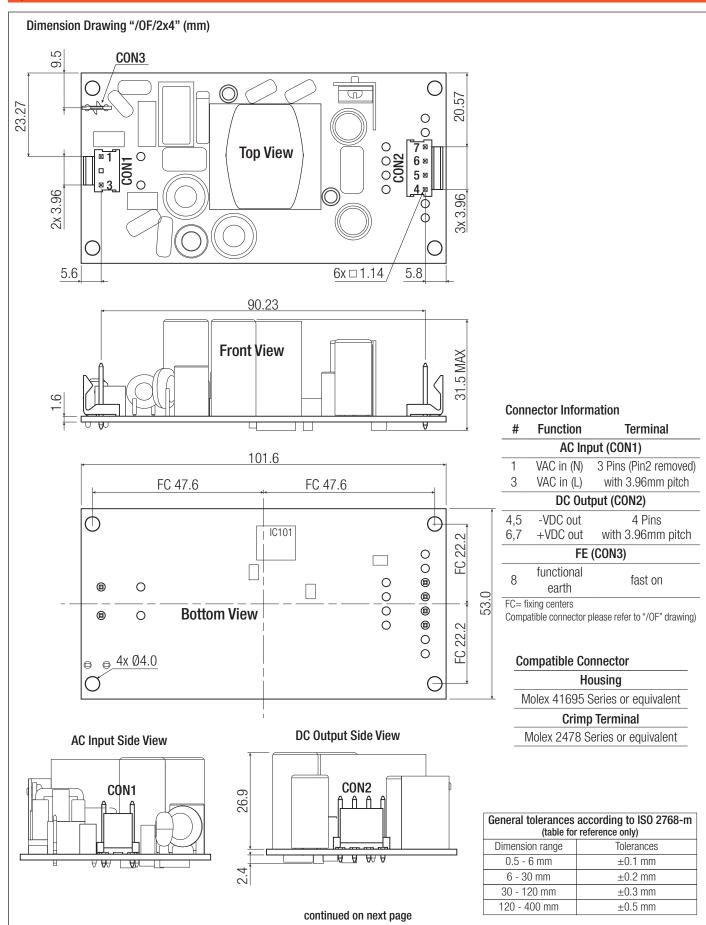


General tolerances according to ISO 2768-m (table for reference only)			
Dimension range Tolerances			
0.5 - 6 mm	±0.1 mm		
6 - 30 mm	±0.2 mm		
30 - 120 mm	±0.3 mm		
120 - 400 mm	±0.5 mm		

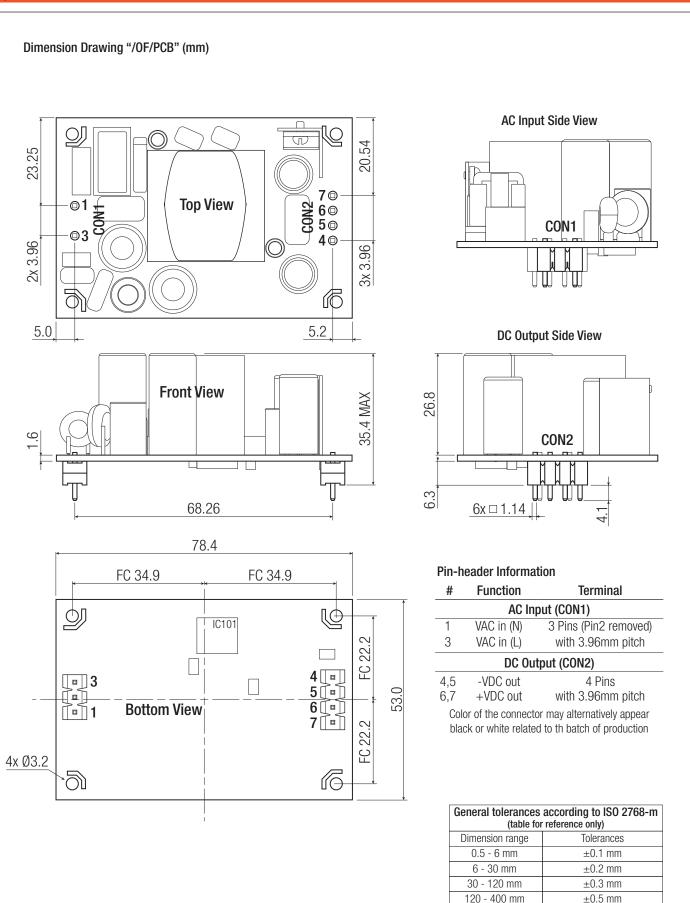
### RACM60-K Series



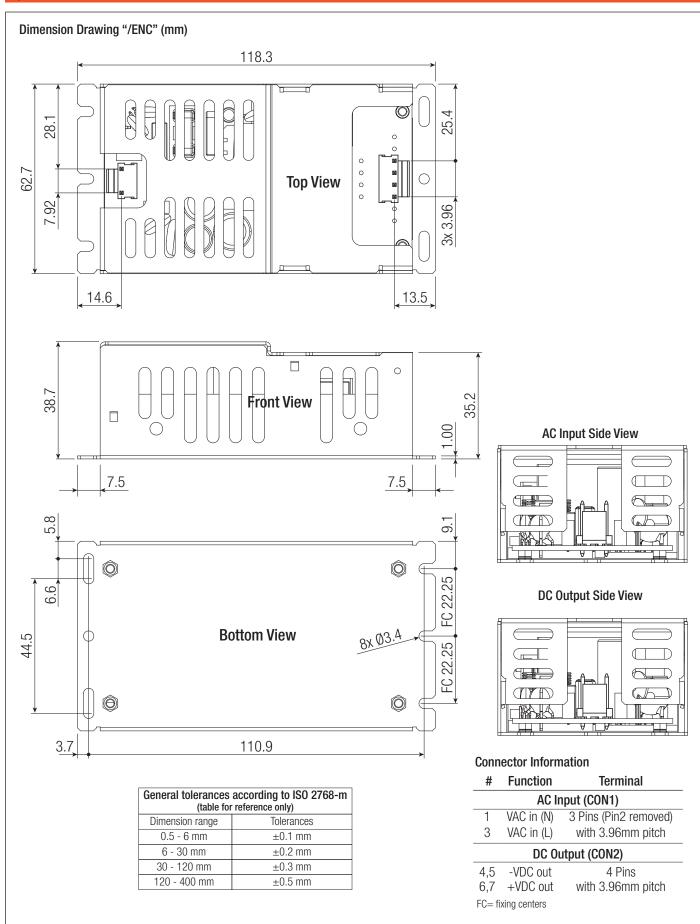
### RACM60-K Series



# RACM60-K Series



### RACM60-K Series

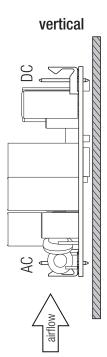




Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

#### **APPLICATION AND INSTALLATION**

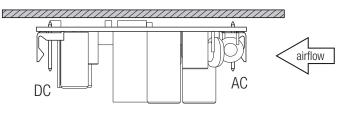




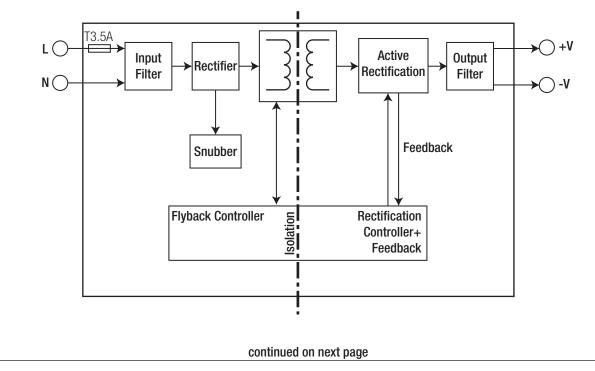
horizontal (standard)

If module is mounted vertical or upside-down with natural convection cooling, the power must be derated  $\ge 10\%$ .

upside-down



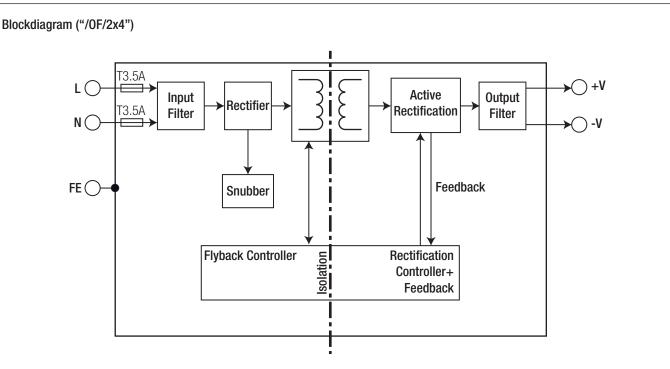
Blockdiagram ("/OF", "/277/OF" and "/OF/PCB")



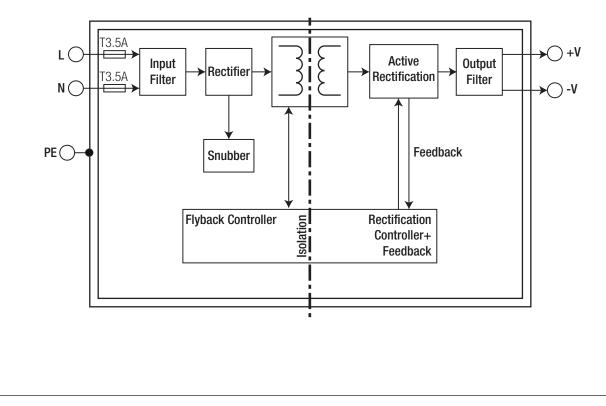


Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

#### APPLICATION AND INSTALLATION



Blockdiagram ("/ENC/2x4")



# RACM60-K Series

#### **Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

#### PACKAGING INFORMATION

Parameter		Value	
Packaging Dimension (LxWxH)	"/OF" type	aardbaard bay (aingla paal)	65.0 x 55.0 x 95.0mm
	"/OF/2x4" type	cardboard box (single pack)	65.0 x 50.0 x 110.0mm
	"/277/0F-T" type		215.0 x 365.0 x 62.0mm
	"/OF/PCB-T" type	single tray (carton)	365.0 x 210.0 x 56.0mm
	"/ENC/2x4" type		405.0 x 360.0 x 85.0mm
	"/OF-CTN" type	tray in carton (project pack)	375.0 x 220.0 x 245.0mm
Package Unit	"/OF" type a	1pcs	
	"/277/0F-T" al	12pcs	
	"/ENC	18pcs	
	"/OF-CTN" typ	48pcs	
Storage Temperature Range			-40°C to +90°C
Storage Humidity	non-c	95% max.	

Model-number	Output Voltage	Input Range	Size	Туре	Connection	Quantity	Packaging Type
RACM60-05SK/0F	5Vout	80-264VAC	2" x 3"	open frame	standard connector	1pc	cardboard box
RACM60-24SK/0F/PCB-T	24Vout	80-264VAC	2" x 3"	open frame	PCB mounting pins	12pcs	tray
RACM60-12SK/0F/2x4	12Vout	80-264VAC	2" x 4"	open frame	standard connector	1pc	cardboard box
RACM60-05SK/277/0F-T	5Vout	80-305VAC	2" x 3"	open frame	standard connector	12pcs	tray
RACM60-24SK/ENC/2x4	24Vout	80-264VAC	2" x 4"	enclosed	standard connector	18pcs	tray
RACM60-12SK/OF-CTN	12Vout	80-264VAC	2" x 4"	open frame	standard connector	48pcs (MOQ= 1152pcs)	carton

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.

#### **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Switching Power Supplies category:

Click to view products by RECOM POWER manufacturer:

Other Similar products are found below :

 70841011
 73-551-0005
 73-551-0048
 EVS57-5R3/A
 AAD600S-4-OP
 MS924
 HWS50A-5/RA
 KD0204
 LDIN100150
 FP80
 FRV7000G

 22929
 PS3E-F12F
 CQM1IA121
 VI-PU22-EXX
 LDIN5075
 432703037161
 09-160CFG
 LPM000-BBAR-08
 LPM000-BBAR-07
 08-30466 

 1055G
 DMB-EWG
 CQM1IPS01
 SP-300-5
 CQM1-IPS02
 VI-MUL-ES
 22829
 08-30466-0028G
 09-250CFG
 CA400 H47251
 96PSR 

 A460WOTH-2
 VP-E2935648E
 G08-L
 G06-Q01
 GHA300F-12-SNF
 MTA040009A
 FSA150024A
 VI-RUR22-EWXX
 VI-PU03-EYW

 PM1-03B-48-2
 VI-LUF-EW
 VI-QCWB3-CSV
 HLS30ZE-NT8
 UT1404-7
 ERP-350-12
 S8FSG01512C
 S8FSG03012C
 VI-PU22-EYY

 XPFM201A+
 S8FS-G15015C
 S8FSG15015C
 S8FSG15015C
 S8FSG15015C
 S8FSG15015C