

# RACM65S-K/277/OIB Series $\diamond$ AC/DC Power Supply

65W  $\diamond$  Input: 100V-277VAC

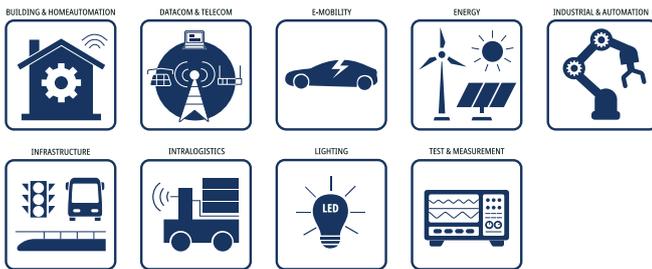
## FEATURES

- Extended input: 90-305VAC
- 65 watts with 11 W/in<sup>3</sup> power density
- OVC III: 3000m altitude; OVC II: 5000m
- Thermally effective basplate on 1.5 x 3 inch footprint
- No-load power <100mW; 90% < efficiency
- Safety ratings up to 90 °C operating temperature
- Integrated EMI Filter to EN55032 “B”
- O/P either floating or coupled with GND, FE or PE
- 3 year warranty



OIB: 79.0 x 40.8 x 31.0mm (3.11 x 1.60 x 1.22 inch)

## APPLICATIONS



## SAFETY & EMC



## DESCRIPTION

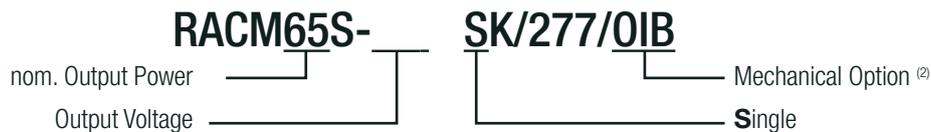
RACM65S-K/277 are the new benchmark in power density for low power AC-DC power supplies with over 90% efficiency over a class of load ranges from 6 to 65 watts, or in an open chassis mount structure with optional cover on a 1.5”x3” footprint with 31 mm overall height. International safety approvals according to medical, household and industrial standards with OVC III rating up to 3000m operating altitude or up to 5000m under OVC II rating ensure worldwide use in ambient temperatures from -40 °C to 90 °C. The integrated EMC filter according to EN55032 Class “B” for floating loads in the solder modules or additionally for grounded load connections in the chassis mount modules simplify system implementation.

## SELECTION GUIDE

Part Number	Input Voltage Range [VAC]	Output Voltage nom. [VDC]	Output Current nom. [A]	Efficiency <sup>(1)</sup> typ. [%]	Output Power continuous [W]
RACM65S-05SK/277 <sup>(2)</sup>	90-305	5	8	88	40
RACM65S-12SK/277 <sup>(2)</sup>	90-305	12	5.42	91	65
RACM65S-15SK/277 <sup>(2)</sup>	90-305	15	4.34	91	65
RACM65S-24SK/277 <sup>(2)</sup>	90-305	24	2.71	90	65
RACM65S-36SK/277 <sup>(2)</sup>	90-305	36	1.81	91	65
RACM65S-48SK/277 <sup>(2)</sup>	90-305	48	1.35	91	65
RACM65S-52SK/277 <sup>(2)</sup>	90-305	52	1.25	91	65

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

### MODEL NUMBERING



Note2: "/OIB" = open frame with integrated base

### BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}C$ , 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 <sup>(3)</sup>	47-63Hz	90VAC		305VAC
Input Current	5Vout			1.2A
	others			1.5A
Inrush Current	cold start at 25°C	115VAC		25A
		230VAC		50A
		277VAC		60A
No Load Power Consumption	5Vout		100mW	200mW
	others		60mW	100mW
Ecodesign Standby Mode Use (Available output power for stated input power)	$P_{IN} = 0.3W$	150mW		
	$P_{IN} = 0.5W$	300mW		
	$P_{IN} = 0.8W$	500mW		
Input Frequency Range	AC Input	47Hz		63Hz
Minimum Load		0%		
Power Factor	115VAC		0.6	
	230/277VAC		0.5	
Start-up time				200ms
Rise time				25ms
Hold-up time	230VAC	5Vout	50ms	
		others	20ms	
Internal Operating Frequency				100kHz
Output Ripple and Noise <sup>(4)</sup>	20MHz BW	5Vout		100mVp-p
		others		1% of Vout

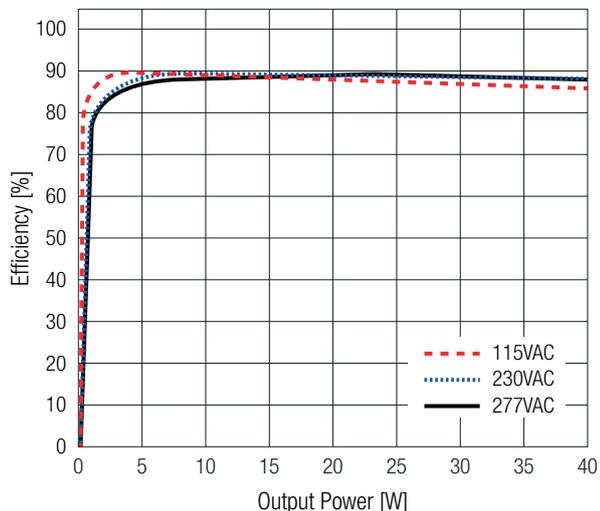
Note3: The products were submitted for safety files at AC-Input operation. (90V-305VAC)

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

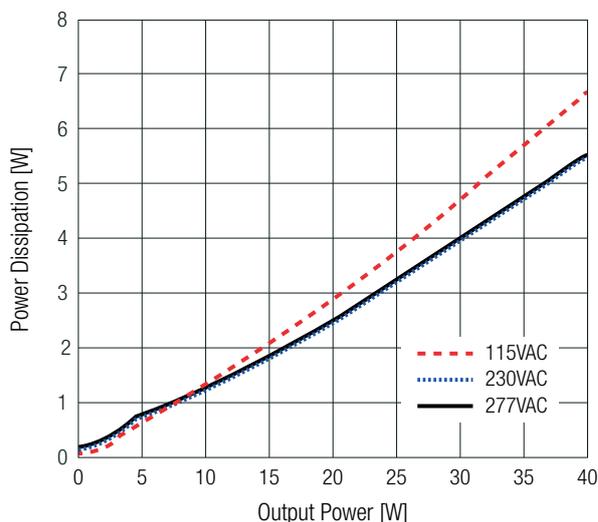
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

5Vout

Efficiency vs. Load



Power Dissipation vs. Load



# RACM65S-K/277/OIB Series $\diamond$ AC/DC Power Supply

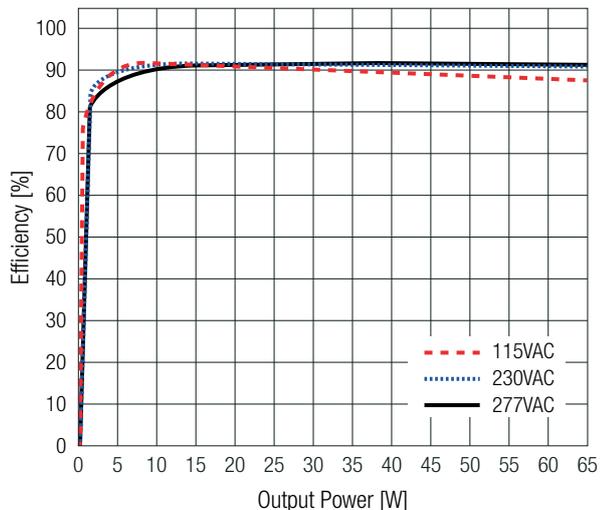
65W  $\diamond$  Input: 100V-277VAC



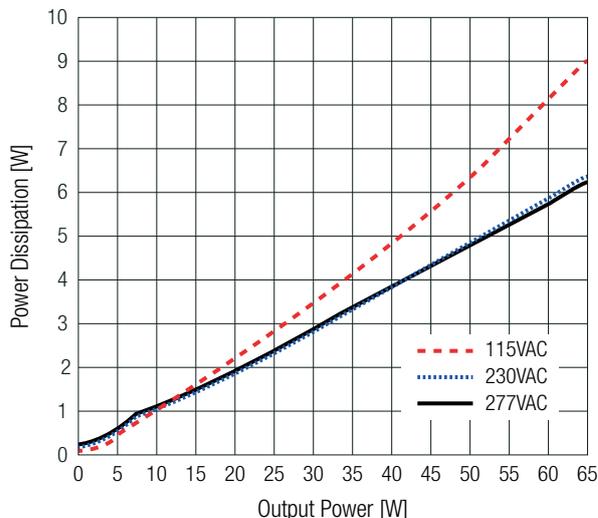
**BASIC CHARACTERISTICS** (measured @  $T_{AMB}= 25^{\circ}\text{C}$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

others

Efficiency vs. Load



Power Dissipation vs. Load



**REGULATIONS** (measured @  $T_{AMB}= 25^{\circ}\text{C}$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

Parameter	Condition	Value
Output Accuracy		$\pm 3.0\%$ max.
Line Regulation	low line to high line	$\pm 1.0\%$ max.
Load Regulation <sup>(5)</sup>	10% to 100% load	2.5% max.
Transient Response	25% load step change	1.0V max.
	recovery time	3ms max.

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

**PROTECTIONS** (measured @  $T_{AMB}= 25^{\circ}\text{C}$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

Parameter	Type		Value
Internal Input Fuse			T3.15A, slow blow type
Short Circuit Protection (SCP)			hiccup mode, auto recovery
Over Voltage Protection (OVP)			105%-150%, hiccup mode
Over Current Protection (OCP)			110%-150%, hiccup mode
Over Voltage Category (OVC)	according to 62368-1, 61558		OVC III (3000m)
			OVC II (5000m)
DC ON LED			green light, output voltage present
Class of Equipment			Class II
Isolation Voltage <sup>(6)</sup>	I/P to O/P	1 minute	4kVAC
Insulation Grade			reinforced
Isolation Resistance			1G $\Omega$ min.
Isolation Capacitance			100pF typ.
Means of Protection			2MOPP
Suitable For Medical Device Classification			designed to support type BF applications

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

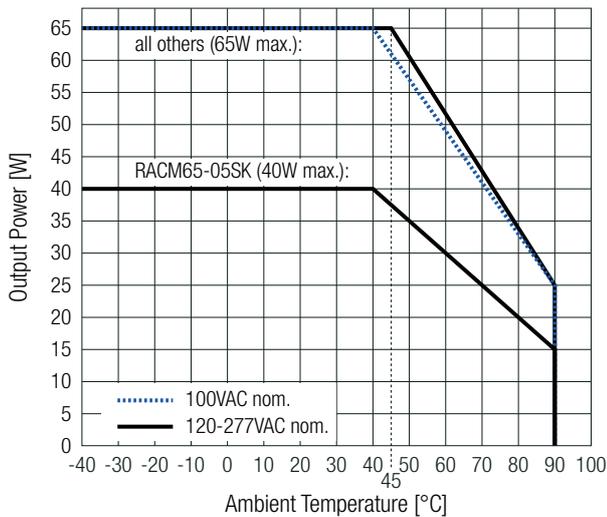
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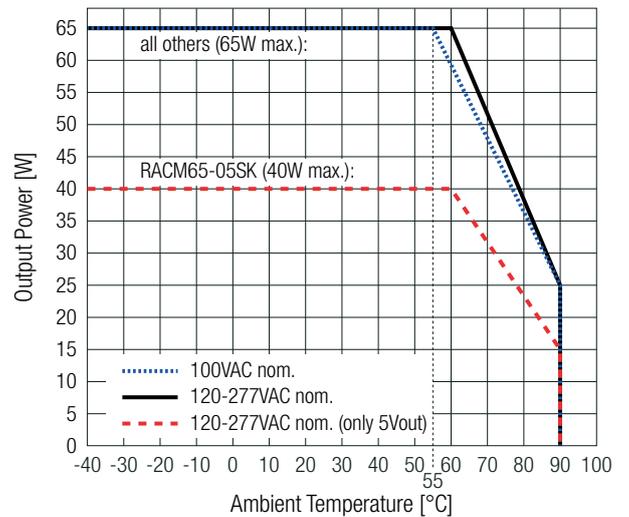
**ENVIRONMENTAL** (measured @  $T_{AMB} = 25^{\circ}\text{C}$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

Parameter	Condition		Value
Operating Ambient Temperature Range			-40°C to +90°C
Maximum Case Temperature			+110°C
Temperature Coefficient			$\pm 0.03\%/K$
Operating Altitude	according to 62368-1, 61558		5000m
Operating Humidity	non-condensing		90% RH max.
Pollution Degree			PD2
Shock			5-500Hz, 20m/s <sup>2</sup> 15 min for each axis
MTBF	according to MIL-HDBK-217, G.B.	$T_{AMB} = +25^{\circ}\text{C}$	450 x 10 <sup>3</sup> hours
Design Lifetime	230VAC and full load	$T_{AMB} = +25^{\circ}\text{C}$	10 x 10 <sup>3</sup> hours

Convection cooled rating @ still air <math>0.1\text{m/s}</math><sup>(7)</sup>



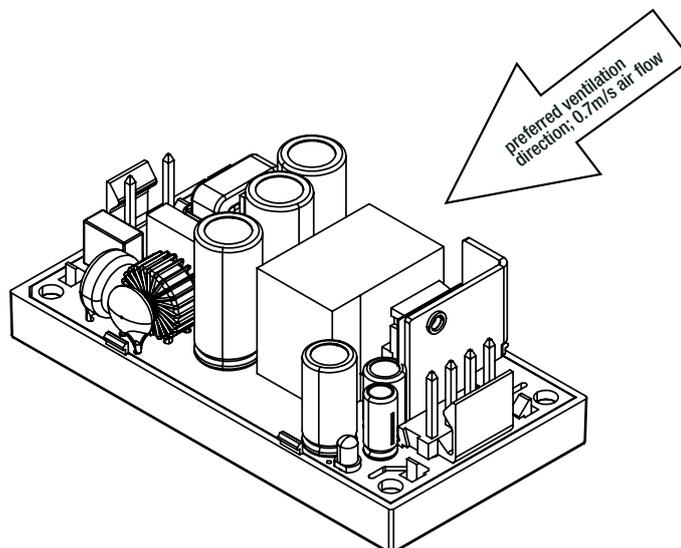
Air flow rating @ <math>0.7\text{m/s}</math><sup>(7)</sup>



Note7: "VAC nom." values include  $\pm 10\%$  tolerance

**ENVIRONMENTAL** (measured @  $T_{AMB} = 25^{\circ}\text{C}$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

Preferred ventilation direction



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## SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	E491408-A6044-UL	UL62368-1:2019 3rd Edition
		CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	241213015	IEC62368-1:2018 3rd Edition
		EN IEC 62368-1:2020+A11:2020
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	241213014	IEC60601-1:2005+AM2:2020 Edition 3.2
Household and similar electrical appliances – Safety – Part 1: General requirements	64.110.24.06952.01	IEC60335-1:2010 + C1:2016 5th Edition
		EN60335-1:2012+ A15:2021
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V 3rd Edition	085-240695101-000	IEC61558-1:2017 3rd Edition
Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements		IEC61558-2-16:2009+A1:2013 1st Edition
RoHS2		RoHS-2011/65/EU + AM-2015/863

EMC Compliance according to EN55032	Condition	Standard
Electromagnetic compatibility of multimedia equipment – Emission Requirements		EN55032:2015+A11:2020

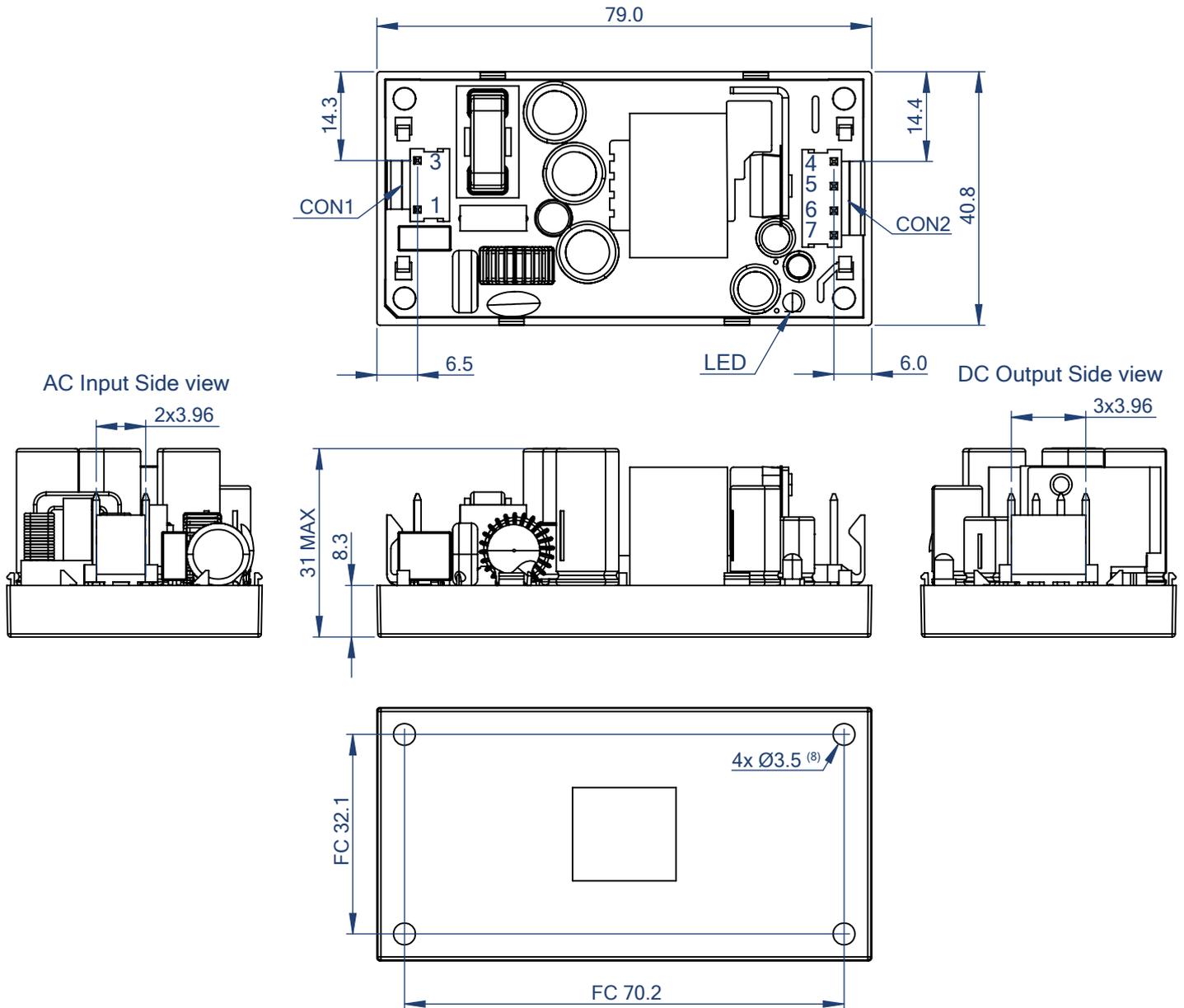
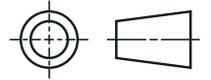
EMC Compliance according to EN61204-3	Condition	Standard
Low voltage power supplies, d.c. output Part 3: Electromagnetic compatibility (EMC)		EN IEC 61204-3:2018
ESD Electrostatic discharge immunity test	Air: $\pm 2, 4, 8kV$ Contact: $\pm 4kV$	IEC61000-4-2:2008, Criteria A
		EN61000-4-2:2009, Criteria 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
Fast Transient and Burst Immunity	AC Port: L, N, L-N: $\pm 2kV$	IEC/EN61000-4-4:2012, Criteria A
Surge Immunity		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, Criteria A
		EN61000-4-8:2010, Criteria A
Voltage Dips	100% (0.5P, 1.0P); 20%, 30%, 60%	EN61000-4-11:2004 + A1:2017, Criteria A
Voltage Interruptions	100%	EN61000-4-11:2004 + A1:2017, Criteria B
Limits of Voltage Fluctuations & Flicker		EN61000-3-3:2013

## DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Materials	case/baseplate (isolated)	plastic, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		79.0 x 40.8 x 31.0mm
		3.11 x 1.60 x 1.22 inch
Weight		81g typ.
		0.18 lbs

### DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing "/OIB" (mm)



Note8: Secure the device to the mounting surface using two M3 screws. Use cylinder head screws only. Countersunk screws are not permitted. Recommended tightening torque= 0.7Nm

#### Connector Information

AC Input (CON1)		
#	Function	Connector
1	VAC in (L)	3 Pins (Pin2 removed)
3	VAC in (N)	with 3.96mm pitch

#### DC Output (CON2)

#	Function	Connector
4, 5	-Vout	4 Pins
6, 7	+Vout	with 3.96mm pitch

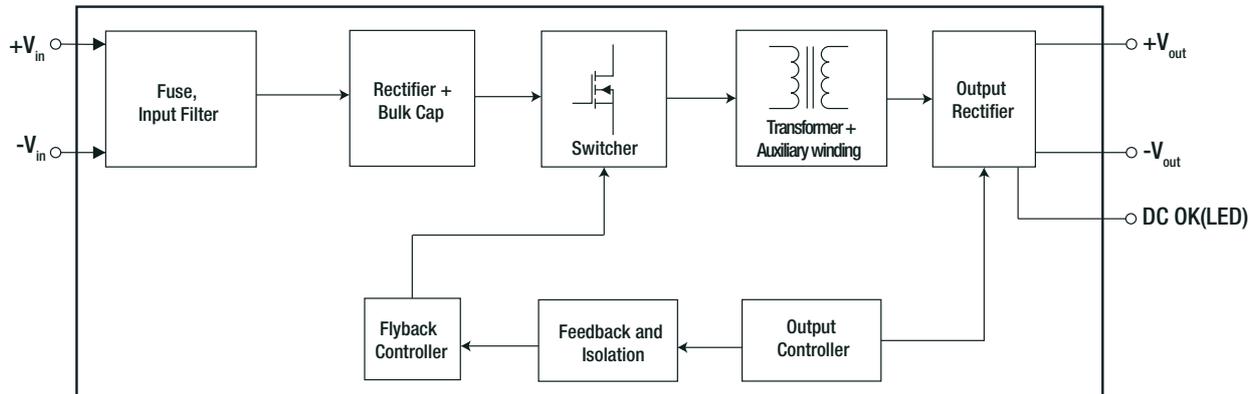
FC= Fixing centers

#### Compatible Connector

Housing	Crimp Terminal
Molex 41695 Series or equivalent	Molex 2478 Series or equivalent

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

### BLOCK DIAGRAMM



### PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tray	365.0 x 210.0 x 56.0mm
Packaging Quantity		12pcs
Storage Temperature Range		-40°C to +90°C
Storage Humidity	non-condensing	90% RH max.

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