

# Features

## Regulated Converter

- Universal input 90-264VAC
- Efficiency 91%
- Short circuit and over voltage protected
- Active PFC function, PF>0.95
- Power indicator LED
- UL, CE marked (CB report)
- Conformal coated product
- RECOM connector set available

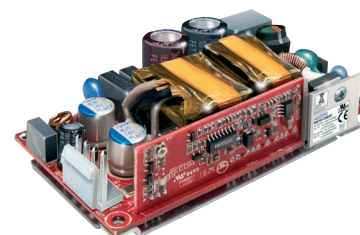
**RECOM**  
AC/DC Converter

## RAC150-G

150 Watt

4" x 2"

Open Frame or  
Enclosed Case



UL62368-1 certified  
CAN/CSA C22.2 No. 62368-1-14 certified  
UL60950 certified  
CAN/CSA C22.2 N.60950-1-07 certified  
IEC/EN60950-1 certified  
EN55032/55024  
FCC Part 15  
CB Report

## Description

The RAC150 series are cost-efficient 150 Watt AC/DC power supplies in a standard 2"x4" footprint with a universal input range of 90-264VAC for worldwide usage. They are built to deliver up to 125 Watt with natural air convection for use in tight, space-critical housings with low available airflow. UL and CE marks with CB-reports include the new 62368 safety standard as well as the usual 60950 safety standard. The RAC150 series offers tightly regulated 12V, 24V and 48VDC outputs with 3kVAC isolation and Class B EMC certifications and come with a three year warranty.

## Selection Guide

| Part Number                | Input Voltage Range [VAC] | Output Voltage [VDC] | max. Output Current <sup>(1)</sup> [mA] | Efficiency typ <sup>(2)</sup> [%] | Max. Capacitive Load <sup>(3)</sup> [μF] |
|----------------------------|---------------------------|----------------------|-----------------------------------------|-----------------------------------|------------------------------------------|
| RAC150-12SG <sup>(4)</sup> | 90-264                    | 12                   | 12500                                   | 91                                | 2000                                     |
| RAC150-24SG <sup>(4)</sup> | 90-264                    | 24                   | 6250                                    | 91                                | 1000                                     |
| RAC150-48SG <sup>(4)</sup> | 90-264                    | 48                   | 3125                                    | 91                                | 500                                      |

### Notes:

Note1: With forced air cooling, refer to derating graph

Note2: Typ. efficiency is tested @ 230VAC and full load

Note3: Max. cap load is tested @ 90-264VAC and full resistive load

## Model Numbering



### Notes:

Note4: add suffix "OF" for open frame version  
add suffix "ENC" for enclosed version

### Ordering Examples:

RAC150-24SG/OF 24Vout Single open frame version  
RAC150-12SG/ENC 12Vout Single enclosed version

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

| BASIC CHARACTERISTICS  |                     |           |                                         |        |        |
|------------------------|---------------------|-----------|-----------------------------------------|--------|--------|
| Parameter              | Condition           |           | Min.                                    | Typ.   | Max.   |
| Output Power           | with forced cooling | 90-264VAC |                                         |        | 150W   |
|                        | natural convection  | 230VAC    |                                         |        | 125W   |
|                        |                     | 115VAC    |                                         |        | 120W   |
|                        | 90-115VAC           |           | refer to <i><b>“Derating Graph”</b></i> |        |        |
| Internal Input Filter  |                     |           | Pi type                                 |        |        |
| Input Voltage Range    |                     |           | 90VAC                                   | 230VAC | 264VAC |
| Input Current          |                     |           |                                         |        | 2A     |
| Inrush Current         | cold start at 25°C  | 115VAC    |                                         |        | 40A    |
|                        |                     | 230VAC    |                                         |        | 60A    |
| continued on next page |                     |           |                                         |        |        |

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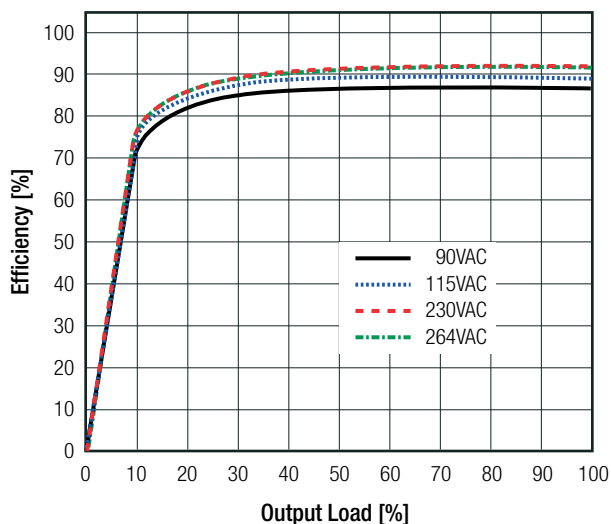
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

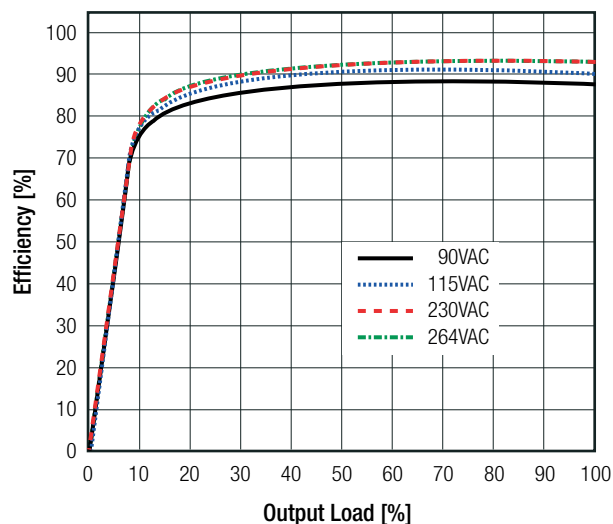
| Parameter                    | Condition        |                            | Min.         | Typ.   | Max.                             |
|------------------------------|------------------|----------------------------|--------------|--------|----------------------------------|
| Input Frequency Range        |                  |                            | 47Hz         |        | 63Hz                             |
| Minimum Load                 |                  |                            | 0%           |        |                                  |
| Power Factor                 | 115VAC<br>230VAC |                            | 0.98<br>0.95 |        |                                  |
| Rise Time                    | 115VAC/230VAC    |                            |              |        | 50ms                             |
| Hold-up Time                 | 115VAC<br>230VAC | 100% load<br>50% load      | 6ms          | 20ms   |                                  |
| Internal Operating Frequency |                  |                            |              | 132kHz |                                  |
| Output Ripple and Noise      | +70°C            | 12Vout<br>24Vout<br>48Vout |              |        | 150mVp-p<br>240mVp-p<br>360mVp-p |
|                              | -30°C            | 12Vout<br>24Vout<br>48Vout |              |        | 300mVp-p<br>480mVp-p<br>720mVp-p |

### Efficiency vs. Load

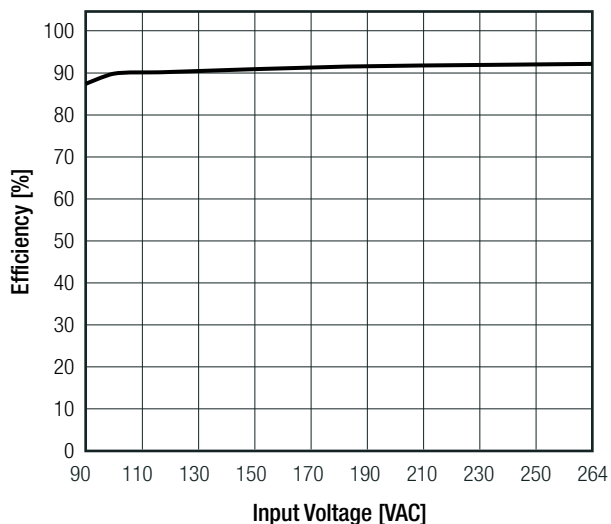
RAC150-12SG



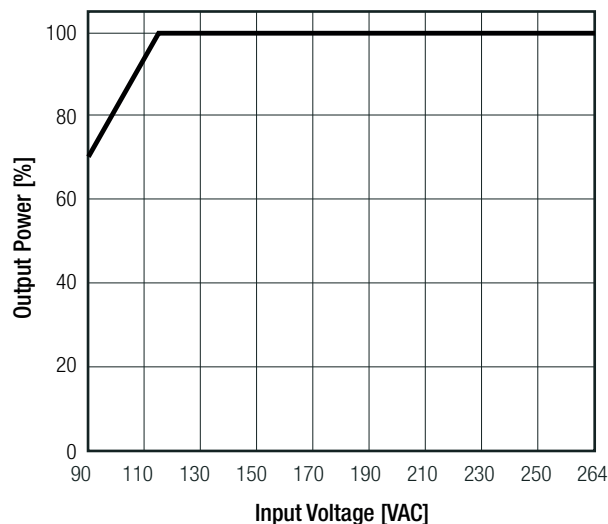
RAC150-24SG



### Efficiency vs. Input Voltage (@ full load)



### Recommended Line Derating <115VAC

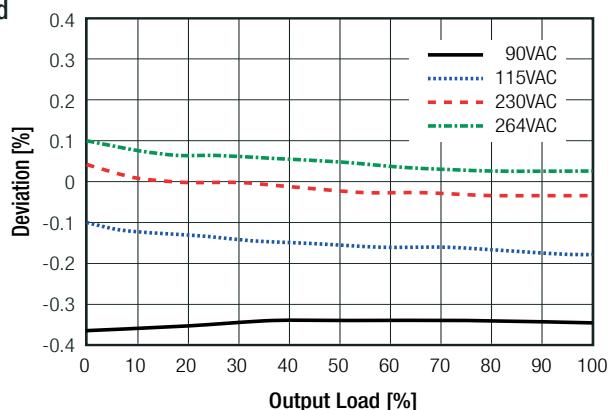


**Specifications** (measured @ Ta= 25°C, nom. Vin and full load unless otherwise stated)

### REGULATIONS

| Parameter          | Condition      |                                    | Value                         |
|--------------------|----------------|------------------------------------|-------------------------------|
| Output Accuracy    | -30°C to +70°C |                                    | ±2.0% max.                    |
| Line Regulation    | -30°C to +70°C |                                    | ±0.1% typ.                    |
| Load Regulation    | -30°C to +70°C | 0%-100% load                       | 0.2 % typ.                    |
| Transient Response | -30°C to +70°C | 25% load step change recovery time | ±5.0% Vout max.<br>200µs max. |

### Normalized Output Deviation vs. Load



### PROTECTIONS

| Parameter                        | Type                             |                                      | Value                                  |
|----------------------------------|----------------------------------|--------------------------------------|----------------------------------------|
| Input fuse <sup>(5)</sup>        | internal                         |                                      | T3.15A                                 |
| Short Circuit Protection (SCP)   | below 100mΩ                      |                                      | continuous, Hiccup Mode, auto recovery |
| Over Voltage Protection (OVP)    | 105%-150% of Vout nominal        |                                      | Latch OFF                              |
| Over Voltage Category            |                                  |                                      | OVCII                                  |
| Class of Equipment               |                                  |                                      | Class I                                |
| Isolation Voltage <sup>(6)</sup> | tested for 1 minute              | I/P to O/P<br>I/P to FG<br>O/P to FG | 3kVAC<br>1.5kVAC<br>0.5kVDC            |
| Isolation Resistance             | I/P to O/P; I/P to FG; O/P to FG |                                      | 10MΩ min.                              |
| Isolation Capacitance            |                                  |                                      | 3300pF max.                            |
| Insulation Grade                 |                                  |                                      | reinforced                             |
| Leakage Current                  | 240VAC, 63Hz                     |                                      | 0.25mA max.                            |

**Notes:**

Note5: Refer to local safety regulations if input over-current protection is also required

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

### ENVIRONMENTAL

| Parameter                         | Condition                                 |                                                    | Value                                                      |
|-----------------------------------|-------------------------------------------|----------------------------------------------------|------------------------------------------------------------|
| Operating Temperature Range       | refer to derating graph                   |                                                    | -30°C to +70°C                                             |
| Temperature Coefficient           |                                           |                                                    | 0.02%/K                                                    |
| Operating Altitude <sup>(7)</sup> |                                           |                                                    | 5000m                                                      |
| Operating Humidity                | non-condensing                            |                                                    | 20% - 90% RH max.                                          |
| Pollution Degree                  |                                           |                                                    | PD2                                                        |
| Conformal Coating                 |                                           |                                                    | conformal coated product                                   |
| Shock                             |                                           |                                                    | 20G, 11ms, 3 times for X,Y,Z axis                          |
| Vibration                         |                                           |                                                    | 10-500Hz, 3G, 10min. for each, 6cycles for each X,Y,Z      |
| MTBF                              | according to MIL-HDBK-217F, G.B.<br>+25°C | natural convection (125W)<br>forced cooling (150W) | 100 x 10 <sup>3</sup> hours<br>200 x 10 <sup>3</sup> hours |

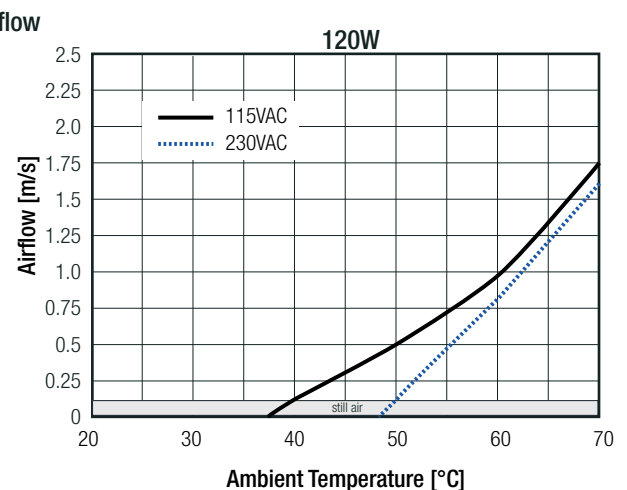
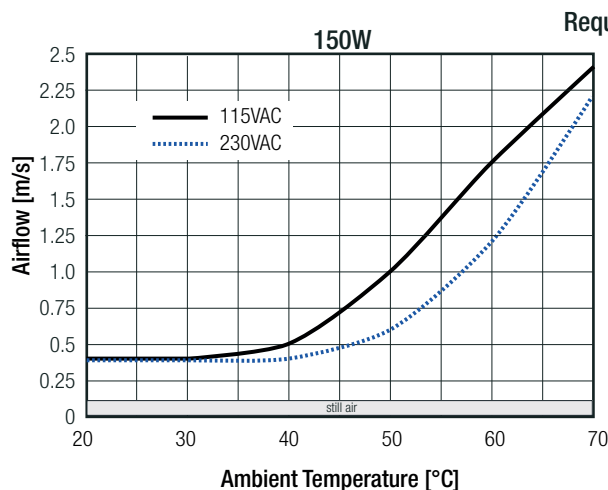
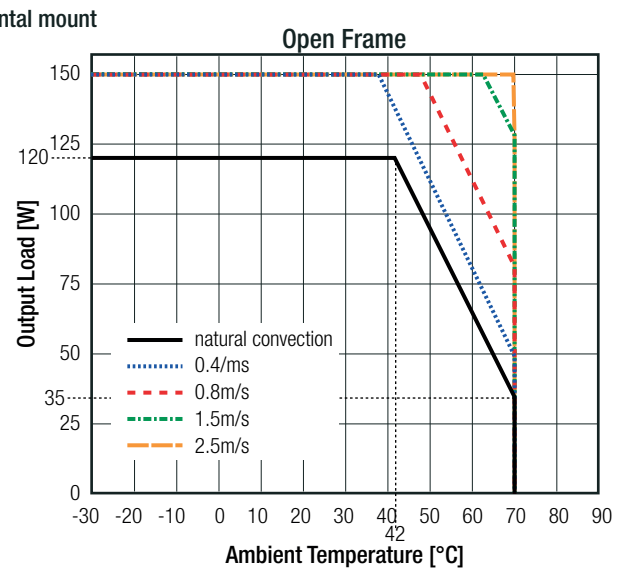
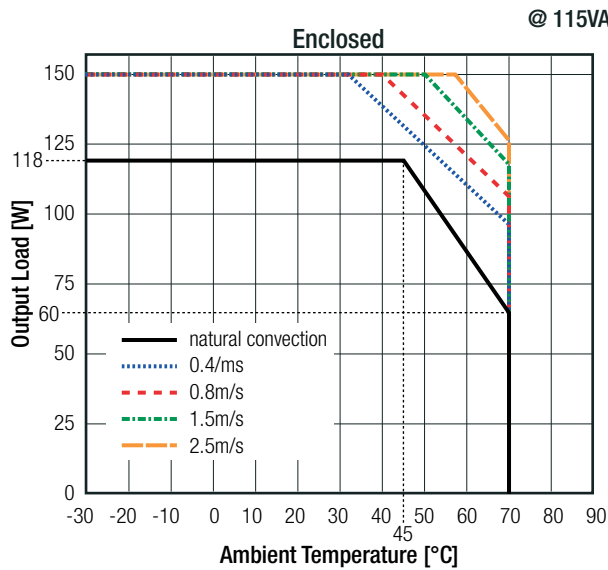
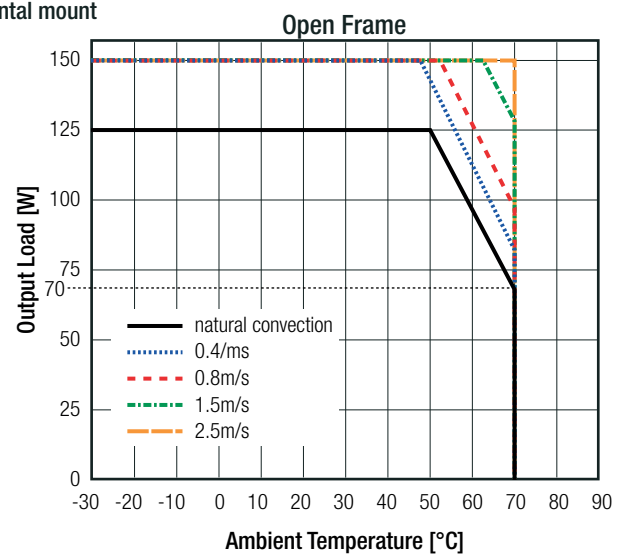
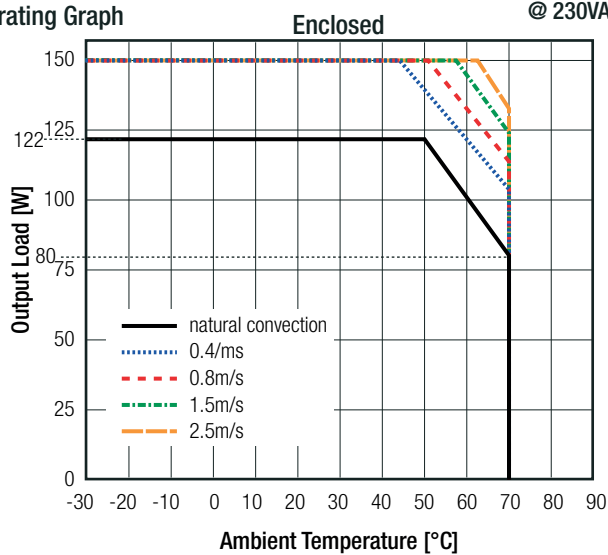
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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$  and full load unless otherwise stated)

**Notes:**

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

**Derating Graph**



<0.1m/s = still air  
0.1 - 0.2m/s = natural convection

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

#### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety)                                                                                | Report / File Number | Standard                                                                        |
|----------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|
| Information Technology Equipment, General Requirements for Safety                                        | E196683 A2           | CAN/CSA-C22.2 No. 62368-1-14<br>UL62368-1, 2nd Edition, 2014                    |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements             |                      | CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2014<br>UL60950-1, 2nd Edition, 2014 |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme) | 16BAS07018 11        | IEC60950-1:2005 2nd Edition + Am2:2013<br>EN60950-1:2006 + A2:2013              |
|                                                                                                          | 16BCS07018 21        | IEC62368-1:2014 2nd Edition<br>EN62368-1:2014                                   |
| EAC Safety of Low Voltage Equipment                                                                      | RU-AT.49.09571       | TP TC 004/2011                                                                  |
| RoHS 2                                                                                                   |                      | RoHS 2011/65/EU + AM2015/863                                                    |

| EMC Compliance                                                                                        | Condition                                                               | Standard / Criterion                   |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------|
| Electromagnetic compatibility of multimedia equipment – Emission Requirements                         | 16EAS07018 11                                                           | EN55032:2010 + AC:2011, Class B        |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement       |                                                                         | EN55024:2010+A1:2015                   |
| Limitations on the amount of electromagnetic interference allowed from digital and electronic devices |                                                                         | 47 CFR FCC Part 15 Subpart B: 2016     |
| ESD Electrostatic Discharge Immunity Test                                                             | air $\pm 8.0\text{kV}$ , contact $\pm 4.0\text{kV}$                     | EN61000-4-2:2009, Criteria B           |
| Radiated, Radio-Frequency, Electromagnetic Field Immunity Test                                        | 3.0V/m                                                                  | EN61000-4-3:2006 + A2:2010, Criteria A |
| Fast Transient and Burst Immunity                                                                     | AC Power Port: $\pm 1.0\text{kV}$                                       | EN61000-4-4:2012, Criteria B           |
| Surge Immunity                                                                                        | AC Power Port: L-N $\pm 1.0\text{kV}$ ,<br>L-PE+N-PE $\pm 2.0\text{kV}$ | EN61000-4-5:2014, Criteria B           |
| Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields                                 | AC Power Port 3.0V                                                      | EN61000-4-6:2014, Criteria A           |
| Voltage Dips and Interruption                                                                         | Voltage Dips >95%                                                       | EN61000-4-11:2004, Criteria B          |
|                                                                                                       | Voltage Dips 30%                                                        | EN61000-4-11:2004, Criteria C          |
|                                                                                                       | Voltage Interruptions > 95%                                             | EN61000-4-11:2004, Criteria C          |
| Limits of Harmonic Current Emissions                                                                  |                                                                         | EN61000-3-2:2014, Criteria A           |
| Limits of Voltage Fluctuations & Flicker                                                              |                                                                         | EN61000-3-3:2013                       |

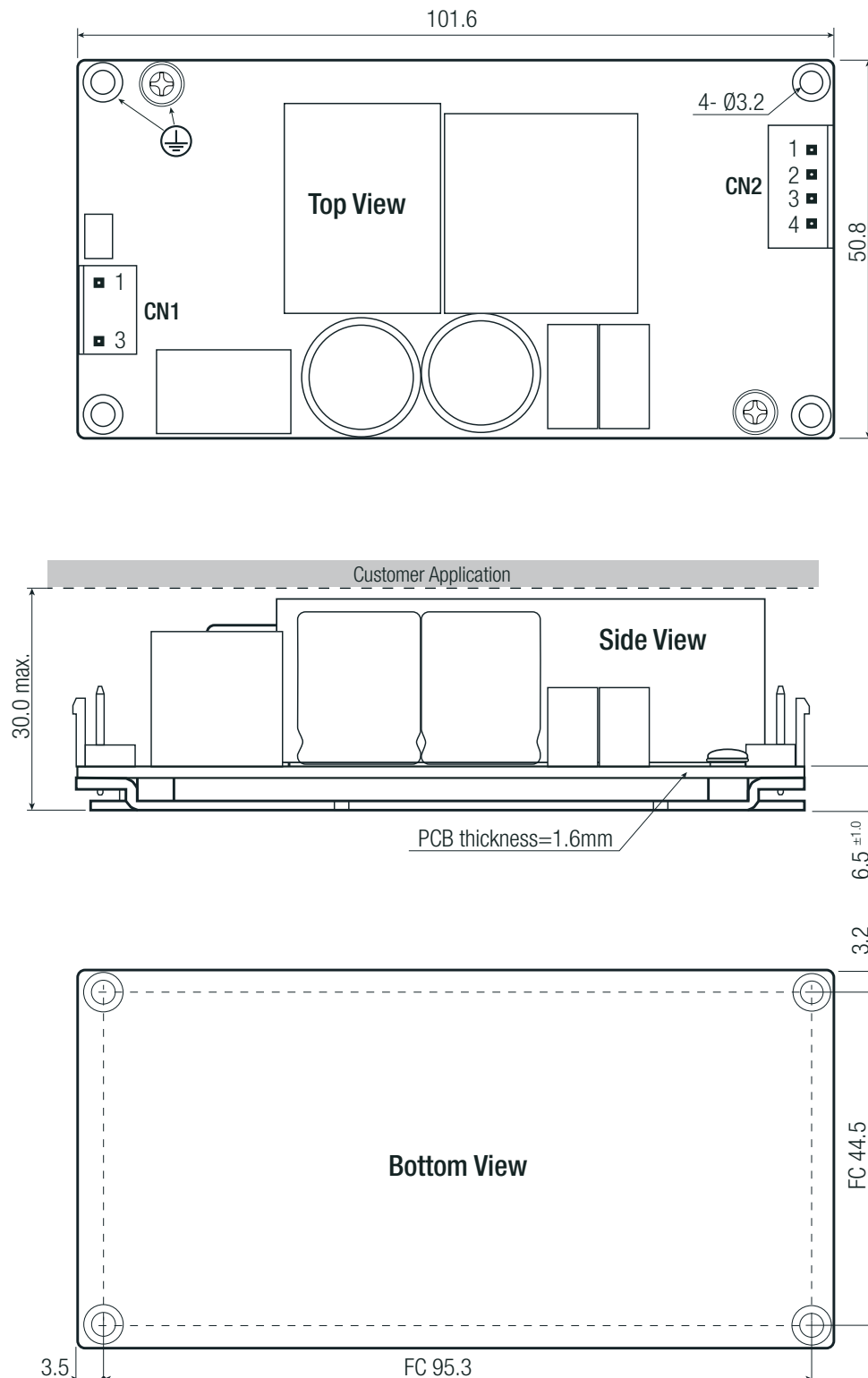
#### DIMENSIONS and PHYSICAL CHARACTERISTICS

| Parameter         | Type                  | Value                      |
|-------------------|-----------------------|----------------------------|
| Material          | PCB<br>case/baseplate | FR4 (UL94-V0)<br>aluminium |
| Dimension (LxWxH) | OF -version           | 101.6 x 50.8 x 30.0mm      |
|                   | ENC-version           | 105.0 x 62.0 x 35.0mm      |
| Weight            | OF -version           | 200.0g                     |
|                   | ENC-version           | 265.0g                     |

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

Dimension Drawing Open Frame (mm)



### Connections

#### AC Input (CN1)

| Pin #  | Terminal                                |
|--------|-----------------------------------------|
| 1 AC/L | 3 Pins (Pin2 removed) with 3.96mm pitch |
| 3 AC/N | 3.96mm pitch                            |

#### DC Output Connector (CN2)

| Pin #  | Terminal                 |
|--------|--------------------------|
| 1,2 V- | 4 Pins with 3.96mm pitch |
| 3,4 V+ | 3.96mm pitch             |

FC= fixing centers

Crimp Terminal AWG Range: 18-22AWG

Tolerance: xx.x= ±1.0mm

xx.xx= ±0.5mm

### Compatible Connectors

#### Housing

Landwin 3960S Series

JST VHR

Molex 51144 Series

#### Crimp Terminal

Landwin 3963T011R

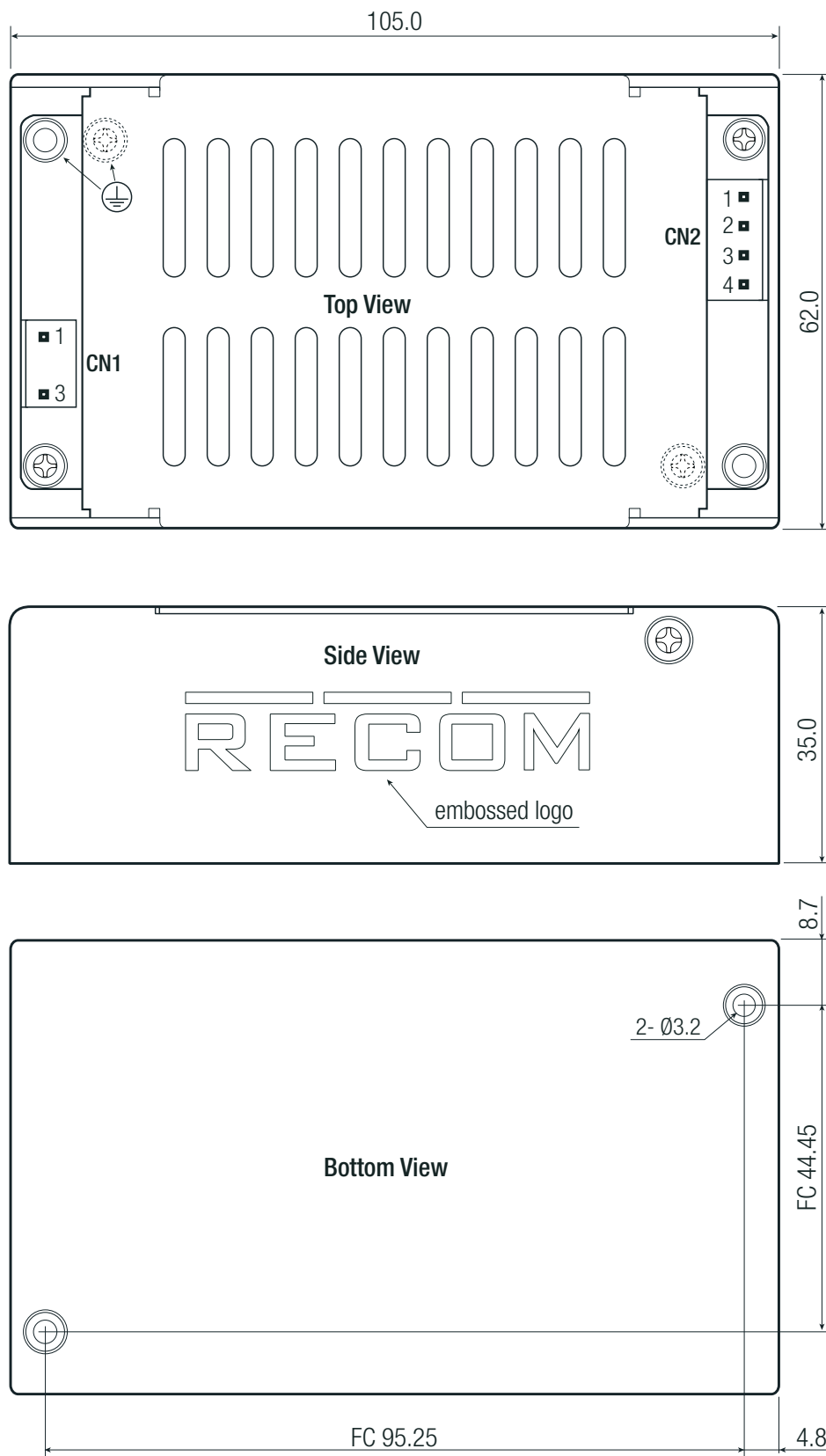
JST SVH-21T-P1.1

Molex 50539

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

Dimension Drawing Enclosed Case (mm)



### Connections

#### AC Input (CN1)

| Pin #  | Terminal                                   |
|--------|--------------------------------------------|
| 1 AC/L | 3 Pins (Pin2 removed) with<br>3.96mm pitch |
| 3 AC/N |                                            |

#### DC Output Connector (CN2)

| Pin #  | Terminal                    |
|--------|-----------------------------|
| 1,2 V- | 4 Pins with<br>3.96mm pitch |
| 3,4 V+ |                             |

FC= fixing centers  
Crimp Terminal AWG Range: 18-22AWG  
Tolerance: xx.x= ±1.0mm  
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#### Crimp Terminal

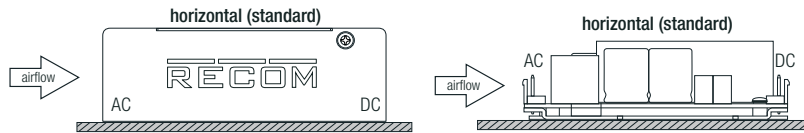
Landwin 3963T011R  
JST SVH-21T-P1.1  
Molex 50539

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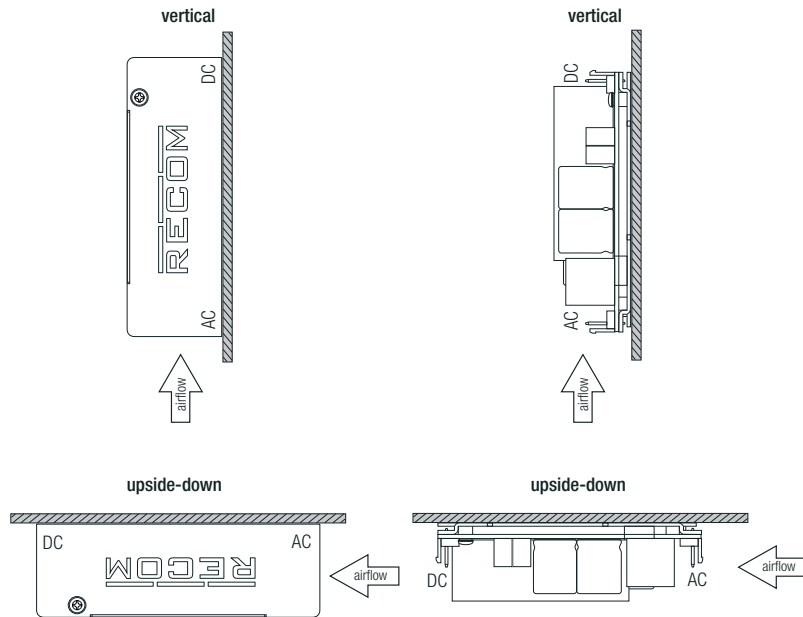
**Specifications** (measured @ Ta= 25°C, nom. Vin and full load unless otherwise stated)

### APPLICATION and INSTALLATION

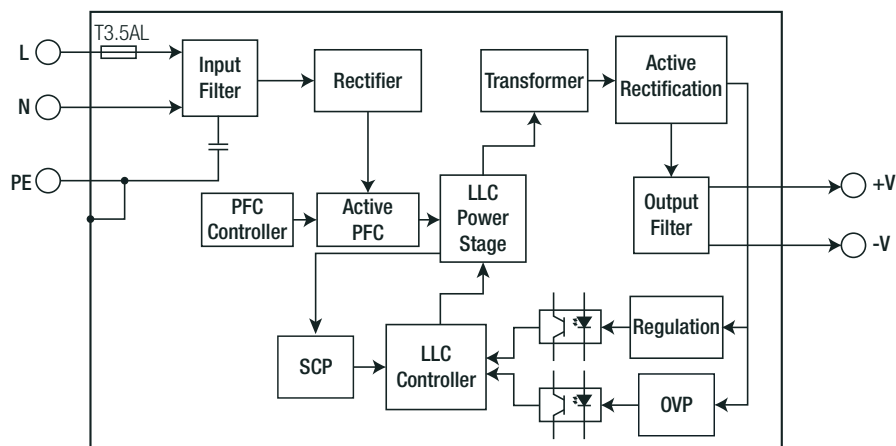
#### Mounting



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



#### Block Diagram



### PACKAGING INFORMATION

| Parameter                   | Type           | Value                 |
|-----------------------------|----------------|-----------------------|
| Packaging Dimension (LxWxH) | cardboard box  | 112.0 x 80.0 x 50.0mm |
| Packaging Quantity          |                | 1pcs                  |
| Storage Temperature Range   |                | -40°C to +85°C        |
| Storage Humidity            | non-condensing | 10% - 95% RH          |

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.

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