

# Features

- 4:1 wide input voltage range
- 2.25kVDC isolation
- UL certified
- Efficiency up to 87%
- Ultraminiature open frame SMD
- No minimum load required

# Regulated Converter



## RP15-OFW

**15 Watt  
SMD  
Open Frame  
Single Output**

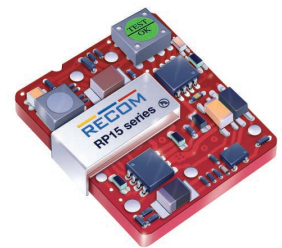


### Description

The RP15-OFW series are SMD open frame ultraminiature power DC/DC converters in a case half the size of industry standard 15W converters. The converters use solder ball pins to enable SMD mounting and can be reflow soldered. Despite their small size, the RP15-OFW converters are fully specified devices with output currents up to 4 Amps, no minimum load, 2250VDC isolation and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The RP15-OFW series will find many uses in telecommunications and other demanding applications where price, board space or board height is at a premium.

### Selection Guide

| Part Number                   | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Input <sup>(1)</sup> Current [mA] | Efficiency <sup>(1)</sup> typ. [%] | Max. Capacitive Load <sup>(2)</sup> [μF] |
|-------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|--|
| RP15-243.3SOFW <sup>(3)</sup> | 9-36                      | 3.3                  | 4000                | 647                               | 85                                 | 12000                                    |
| RP15-2405SOFW <sup>(3)</sup>  | 9-36                      | 5                    | 3000                | 718                               | 87                                 | 6000                                     |
| RP15-2412SOFW <sup>(3)</sup>  | 9-36                      | 12                   | 1300                | 756                               | 86                                 | 1000                                     |
| RP15-2415SOFW <sup>(3)</sup>  | 9-36                      | 15                   | 1000                | 727                               | 86                                 | 660                                      |
| RP15-483.3SOFW <sup>(3)</sup> | 18-75                     | 3.3                  | 4000                | 324                               | 85                                 | 12000                                    |
| RP15-4805SOFW <sup>(3)</sup>  | 18-75                     | 5                    | 3000                | 359                               | 87                                 | 6000                                     |
| RP15-4812SOFW <sup>(3)</sup>  | 18-75                     | 12                   | 1300                | 378                               | 86                                 | 1000                                     |
| RP15-4815SOFW <sup>(3)</sup>  | 18-75                     | 15                   | 1000                | 363                               | 86                                 | 660                                      |



UL60950-1 certified

#### Notes:

- Note1: Maximum values at nominal input and full load at +25°C ambient  
 Note2: Max. Cap Load is tested at nominal input and constant resistive load

### Model Numbering



#### Notes:

- Note3: no suffix for standard part without Trim or CTRL pin  
 add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF) and Trim pin  
 add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF) and Trim pin

#### Ordering Examples

- RP15-4805SOFW = 48V 4:1 input, 5V output, single, without Trim and CTRL pin  
 RP15-4805SOFW/P = 48V 4:1 input, 5V output, single, positive logic CTRL pin and Trim pin fitted  
 RP15-243.3SOFW/N = 24V 4:1 input, 3.3V output, single, negative logic CTRL pin and Trim pin fitted

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

**BASIC CHARACTERISTICS**

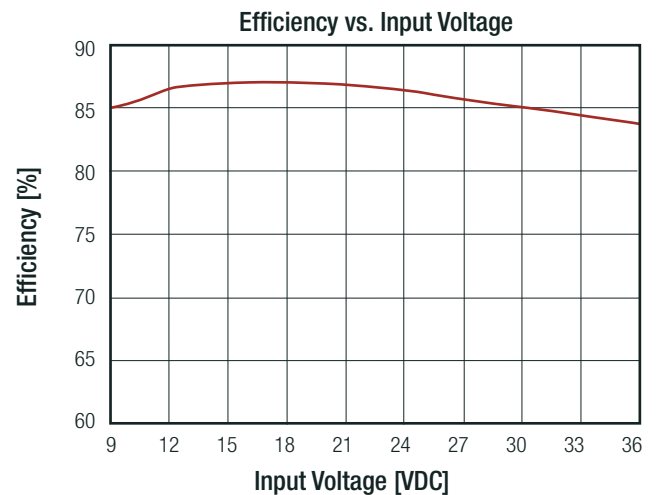
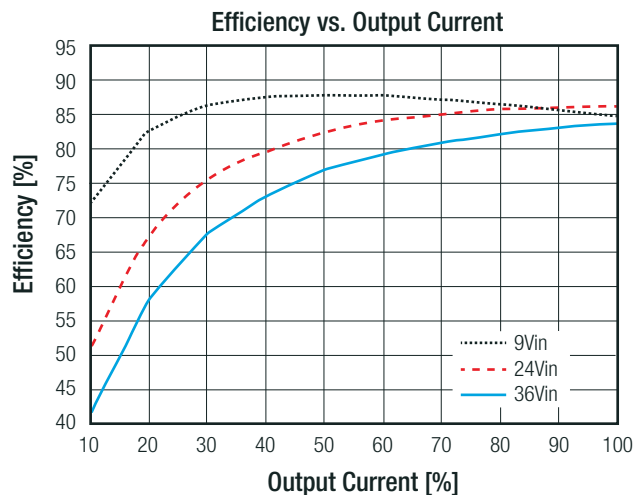
| Parameter                             | Condition  | Min.                  | Typ.                 | Max.   |
|---------------------------------------|--|-----------------------|----------------------|--|
| Input Filter                          |  |                       |                      | Pi-Type  |
| Input Voltage Range                   | nom. Vin = 24VDC<br>nom. Vin = 48VDC   | 9DC<br>18VDC          | 24VDC<br>48VDC       | 36VDC<br>75VDC   |
| Input Surge Voltage                   | 100ms max.   |                       |                      | 50VDC<br>100VDC  |
| Under Voltage Lockout (UVLO)          | nom. Vin = 24VDC   |                       | 8VDC                 | 9VDC   |
|                                       | nom. Vin = 48VDC   |                       | 16VDC                | 18VDC  |
| Output Voltage Trimming               | refer to „ <b>OUTPUT VOLTAGE TRIMMING</b> “  | -10%                  |                      | +10%   |
| Input Reflected Ripple <sup>(4)</sup> | nominal Vin and full load  |                       | 30mA <sub>p-p</sub>  |  |
| Minimum Load                          |  | 0%                    |                      |  |
| Start-up time                         | Power up<br>Remote ON/OFF  |                       |                      | 30ms<br>30ms   |
| ON/OFF CTRL <sup>(5)</sup>            | Positive Logic   | DC-DC ON<br>DC-DC OFF |                      | Open or 3.0VDC < V <sub>CTRL</sub> < 15VDC<br>Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC |
|                                       | Negative Logic   | DC-DC ON<br>DC-DC OFF |                      | Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC<br>Open or 3.0VDC < V <sub>CTRL</sub> < 15VDC |
| Input Current of CTRL pin             | DC-DC ON   | -0.5mA                |                      | +1.0mA   |
| Standby Current                       | DC-DC OFF  |                       | 2.5mA                |  |
| Internal Operating Frequency          | 3.3V <sub>out</sub> , 5V <sub>out</sub><br>12V <sub>out</sub> , 15V <sub>out</sub> | 315kHz<br>360kHz      | 350kHz<br>400kHz     | 385kHz<br>440kHz   |
| Ripple and Noise                      | measured at 20MHz BW with a 1µF M/C X7R and 10µF T/C                               |                       | 100mV <sub>p-p</sub> |  |

**Notes:**

Note4: Simulated source impedance of 12µH. 12µH inductor in series with +Vin.

Note5: If no suffix is specified, the control pin will be omitted. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin

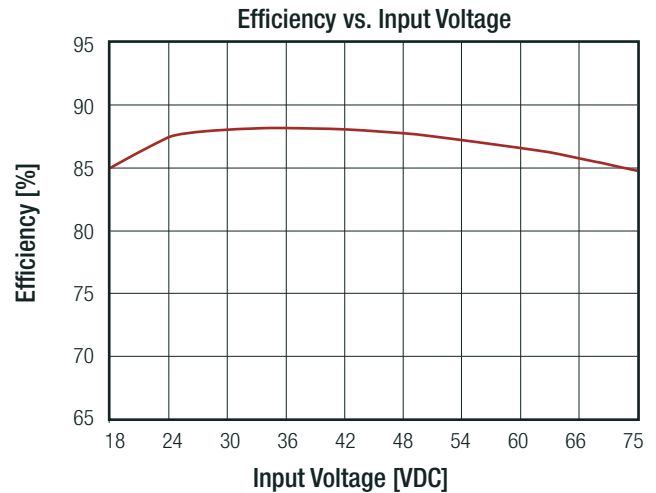
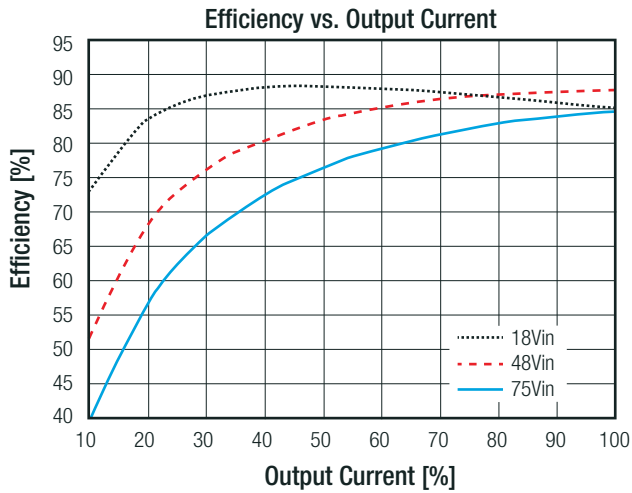
**RP15-2405S0FW**



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

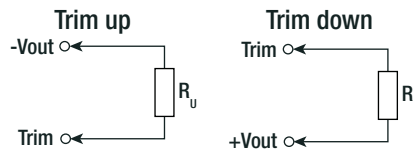
**RP15-4805S0FW**



**OUTPUT VOLTAGE TRIMMING**

**Output Voltage Trimming**

Single output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for choosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



**RP15-xx3.3S0FW**

|                  |        |        |        |       |       |       |       |       |       |       |       |
|------------------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| Trim up          | 1      | 2      | 3      | 4     | 5     | 6     | 7     | 8     | 9     | 10    | [%]   |
| Vout =           | 3.333  | 3.366  | 3.399  | 3.432 | 3.465 | 3.498 | 3.531 | 3.564 | 3.597 | 3.63  | [VDC] |
| R <sub>u</sub> = | 385.07 | 191.51 | 126.99 | 94.73 | 75.37 | 62.47 | 53.25 | 46.34 | 40.96 | 36.66 | [kΩ]  |

|                  |        |       |       |       |       |       |       |       |       |      |       |
|------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Trim down        | 1      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10   | [%]   |
| Vout =           | 3.267  | 3.234 | 3.201 | 3.168 | 3.135 | 3.102 | 3.069 | 3.036 | 3.003 | 2.97 | [VDC] |
| R <sub>d</sub> = | 116.72 | 54.78 | 34.13 | 23.81 | 17.62 | 13.49 | 10.54 | 8.32  | 6.60  | 5.23 | [kΩ]  |

**RP15-xx05S0FW**

|                  |        |        |       |       |       |       |       |       |       |       |       |
|------------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Trim up          | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | [%]   |
| Vout =           | 5.05   | 5.10   | 5.15  | 5.20  | 5.25  | 5.30  | 5.35  | 5.4   | 5.45  | 5.50  | [VDC] |
| R <sub>u</sub> = | 253.45 | 125.70 | 83.12 | 61.82 | 49.05 | 40.53 | 34.45 | 29.89 | 26.34 | 23.50 | [kΩ]  |

|                  |        |        |       |       |       |       |       |       |       |       |       |
|------------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Trim down        | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | [%]   |
| Vout =           | 4.95   | 4.90   | 4.85  | 4.80  | 4.75  | 4.70  | 4.65  | 4.60  | 4.55  | 4.50  | [VDC] |
| R <sub>d</sub> = | 248.34 | 120.59 | 78.01 | 56.71 | 43.94 | 35.42 | 29.34 | 24.78 | 21.23 | 18.39 | [kΩ]  |

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

| RP15-xx12S0FW    |        |        |        |        |        |        |        |       |       |       |       |
|------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|
| Trim up          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    | [%]   |
| Vout =           | 12.12  | 12.24  | 12.36  | 12.48  | 12.60  | 12.72  | 12.84  | 12.96 | 13.08 | 13.20 | [VDC] |
| R <sub>u</sub> = | 203.22 | 99.06  | 64.33  | 46.97  | 36.56  | 29.61  | 24.65  | 20.93 | 18.04 | 15.72 | [kΩ]  |
| RP15-xx15S0FW    |        |        |        |        |        |        |        |       |       |       |       |
| Trim down        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    | [%]   |
| Vout =           | 11.88  | 11.76  | 11.64  | 11.52  | 11.40  | 11.28  | 11.16  | 11.04 | 10.92 | 10.8  | [VDC] |
| R <sub>u</sub> = | 776.56 | 380.72 | 248.78 | 182.81 | 143.22 | 116.83 | 97.98  | 83.85 | 72.85 | 64.06 | [kΩ]  |
| Trim down        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    | [%]   |
| Vout =           | 14.85  | 14.70  | 14.55  | 14.40  | 14.25  | 14.10  | 13.95  | 13.80 | 13.65 | 13.50 | [VDC] |
| R <sub>u</sub> = | 818.22 | 401.56 | 262.67 | 193.22 | 151.56 | 123.78 | 103.94 | 89.06 | 77.48 | 68.22 | [kΩ]  |

| REGULATIONS                      |                                  |       |
|----------------------------------|----------------------------------|-------|
| Parameter                        | Condition                        | Value |
| Output Accuracy                  |                                  | ±1.0% |
| Line Regulation                  | low line to high line, full load | ±0.2% |
| Load Regulation                  | 0% to 100% load                  | ±0.2% |
| Transient Response Recovery Time | 25% load step change             | 250µs |

| PROTECTIONS                      |                   |  |
|----------------------------------|-------------------|--|
| Parameter                        | Condition         | Value  |
| Short Circuit Protection (SCP)   |                   | continuous, automatic recovery   |
| Over Voltage Protection (OVP)    | zener diode clamp | 3.3Vout<br>5Vout<br>12Vout<br>15Vout<br>3.7 - 5.4VDC<br>5.6 - 7.0VDC<br>13.8 - 17.5VDC<br>16.8 - 20.5VDC |
| Over Load Protection (OLP)       | % of Iout rated   | 150% typ., Hiccup mode   |
| Isolation Voltage <sup>(6)</sup> | I/P to O/P        | 2.25kVDC/1 minute  |
| Isolation Resistance             | Viso= 500VDC      | 1GΩ min.   |
| Isolation Capacitance            |                   | 1500pF typ.  |

**Notes:**

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

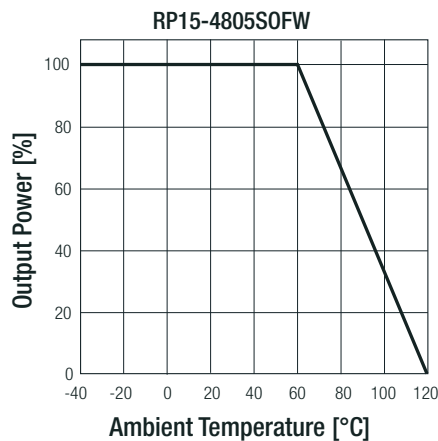
Note7: This power module is not internally fused. An input line fuse must always be used

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

**ENVIRONMENTAL**

| Parameter                        | Condition   | Value  |
|----------------------------------|---|--|
| Lead-free reflow solder process  |   | IPC J-STD-020D   |
| Moisture sensitivity level (MSL) |   | IPC J-STD-03B level 2a                                       |
| Operating Temperature Range      | without derating<br>with derating   | -40°C to +70°C<br>-40°C to +120°C                            |
| Temperature Coefficient          |   | ±0.02%/K max.  |
| Thermal Impedance                |   | 18.2K/W  |
| Operating Humidity               | non-condensing  | 5% - 95% RH  |
| Thermal Shock                    |   | according to MIL-STD-810F                                    |
| Vibration                        |   | according to MIL-STD-810F                                    |
| MTBF                             | MIL-HDBK-217F, G.B. <sup>(8)</sup><br>Bellcore TR-NWT-000332 <sup>(8)</sup> | 2444 x 10 <sup>3</sup> hours<br>1322 x 10 <sup>3</sup> hours |

**Derating Graph <sup>(9)</sup>**



**Notes:**

- Note8: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C  
MIL-HDBK 217F Notice 2. Ta = 25°C, full load, (Ground, Benign, controlled environment)
- Note9: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact RECOM Techsupport for detailed information

**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)   | Condition      | Standard  |
|---|----------------|---|
| Information Technology Equipment, General Requirements for Safety | E196683        | UL60950-1, 1st Edition, 2007<br>CAN/CSA-C22.2 No. 60950-1-03, 1st Edition, 2006 |
| EAC   | RU-AT.49.09571 | TP TC 004/2011  |
| RoHS 2  |                | RoHS-2011/65/EU + AM-2015/863   |

| EMC Compliance  | Condition   | Standard / Criterion    |
|---|---|-------------------------|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter<br>(see filter suggestion below) | EN55032, Class A and B  |
| Radiated, radio-frequency, electromagnetic field immunity test                | 10 V/m  | EN61000-4-3, Criteria A |
| Fast Transient and Burst Immunity <sup>(10)</sup>                             | ±2kV  | EN61000-4-4, Criteria B |
| Surge Immunity <sup>(10)</sup>  | ±1kV  | EN61000-4-5, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields         | 10 Vr.m.s   | EN61000-4-6, Criteria A |
| Power Magnetic Field Immunity   | 100A/m continuous; 1000A/m 1s                         | EN61000-4-8, Criteria A |

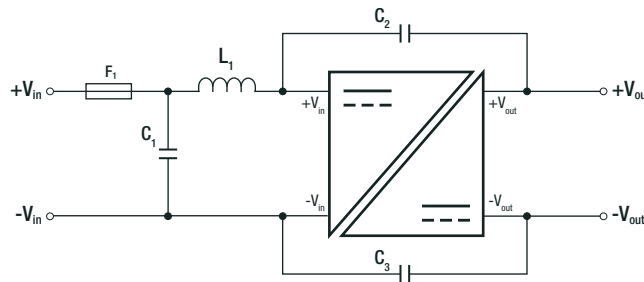
**Notes:**

- Note10: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5  
Recom suggests Nippon chemi-con KY series 220µF/100V

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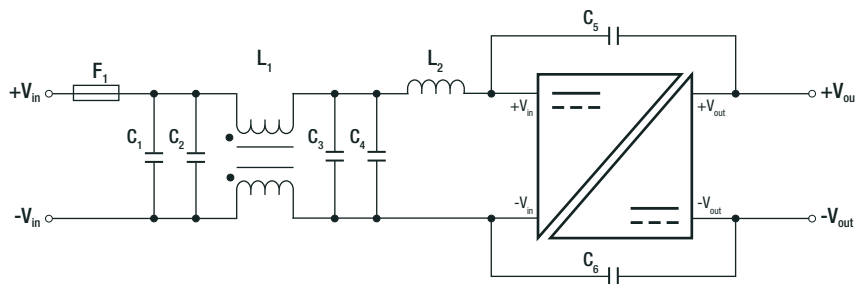
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

**EMC Filtering Suggestions according to EN55032**



**Component List Class A**

| MODEL         | C1                    | C2/C3                | L1  |
|---------------|-----------------------|----------------------|---|
| RP15-24xxSOFW | 6.8µF/50V, 1812 MLCC  | 470pF/3kV, 1808 MLCC | 10µH 2.6A 0.04Ω 0705 SMD Inductor<br>ref.: WE 744787330 |
| RP15-48xxSOFW | 2.2µF/100V, 1812 MLCC | 470pF/3kV, 1808 MLCC | 18µH 1.6A 0.1Ω 0705 SMD Inductor<br>ref.: WE 744053180  |



**Component List Class B**

| MODEL         | C1                      | C2                      | C3/C4                   | C5/C6                  | L1  | L2   |
|---------------|-------------------------|-------------------------|-------------------------|------------------------|---|--|
| RP15-24xxSOFW | N/A                     | 6.8µF/50V<br>1812 MLCC  | 6.8µF/50V<br>1812 MLCC  | 470pF/3kV<br>1808 MLCC | CMC: 145µH<br>ref.: WE 7482210002<br>ref.: CMC-07 | 10µH 2.6A 0.04Ω<br>0705 SMD Inductor ref.: WE<br>744787330 |
| RP15-48xxSOFW | 2.2µF/100V<br>1812 MLCC | 2.2µF/100V<br>1812 MLCC | 2.2µF/100V<br>1812 MLCC | 470pF/3kV<br>1808 MLCC | CMC: 325µH<br>ref.: WE 744290321<br>ref.: CMC-06  | 33µH 1.2A 0.13Ω<br>0504 SMD Inductor ref.: WE<br>744787100 |

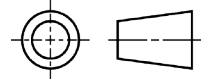
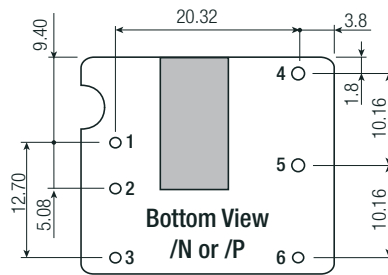
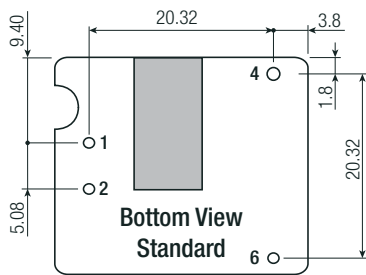
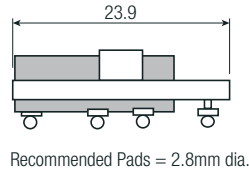
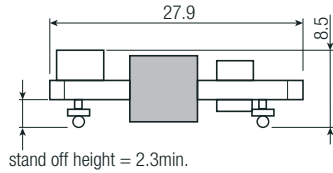
**DIMENSION AND PHYSICAL CHARACTERISTICS**

| Parameter          | Type | Value               |
|--------------------|------|---------------------|
| Material           | base | FR4 PCB             |
| Dimensions (LxWxH) |      | 27.9 x 23.9 x 8.5mm |
| Weight             |      | 10.5g               |

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

**Dimension Drawing (mm)**



**Pinning Information**

| Pin # | Standard | with Suffix /P or /N |
|-------|----------|----------------------|
| 1     | +Vin     | +Vin                 |
| 2     | -Vin     | -Vin                 |
| 3     | no Pin   | CTRL                 |
| 4     | +Vout    | +Vout                |
| 5     | no Pin   | Trim                 |
| 6     | -Vout    | -Vout                |

PCB Tolerance ±0.5mm  
SMD Pin Pitch Tolerance ±0.25mm

**PACKAGING INFORMATION**

| Parameter                   | Type           | Value                 |
|-----------------------------|----------------|-----------------------|
| Packaging Dimension (LxWxH) | tube           | 255.0 x 29.0 x 12.0mm |
| Packaging Quantity          |                | 20pcs                 |
| Storage Temperature Range   |                | -55°C to +125°C       |
| Storage Humidity            | non-condensing | 5% - 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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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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