# Features

# Regulated Converter

- 2:1 input voltage range
- 1.6kVDC isolation
- UL certified
- Efficiency up to 89%
- Six-sided continuous shield
- No minimum load required

RECOM
DC/DC Converter

# RP15-A

## 15 Watt 1“ x 1“ Single and Dual Output

3 YEAR warranty

UL60950-1 certified

## Description

The RP15-A series are ultraminiature power DC/DC converters in a case half the size of industry standard 15W converters. Despite their small size, the RP15-A converters are fully specified devices with output currents up to 4 Amps, no minimum load, 1600VDC isolation and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The RP15-A series will find many uses in applications where board space and/or board height is at a premium.

## Selection Guide

| Part Number | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Input (1) Current [mA] | Efficiency (1) typ. [%] | Max. Capacitive Load (2) [µF] |
|---|---|---|---|---|---|---|
| RP15-123.3SA (3,4) | 9-18 | 3.3 | 4000 | 1310 | 84 | 12000 |
| RP15-1205SA (3,4) | 9-18 | 5 | 3000 | 1420 | 88 | 6000 |
| RP15-1212SA (3,4) | 9-18 | 12 | 1300 | 1512 | 86 | 1000 |
| RP15-1215SA (3,4) | 9-18 | 15 | 1000 | 1420 | 88 | 660 |
| RP15-243.3SA (3,4) | 18-36 | 3.3 | 4000 | 640 | 86 | 12000 |
| RP15-2405SA (3,4) | 18-36 | 5 | 3000 | 710 | 88 | 6000 |
| RP15-2412SA (3,4) | 18-36 | 12 | 1300 | 747 | 87 | 1000 |
| RP15-2415SA (3,4) | 18-36 | 15 | 1000 | 710 | 88 | 660 |
| RP15-483.3SA (3,4) | 36-75 | 3.3 | 4000 | 320 | 86 | 12000 |
| RP15-4805SA (3,4) | 36-75 | 5 | 3000 | 355 | 88 | 6000 |
| RP15-4812SA (3,4) | 36-75 | 12 | 1300 | 369 | 88 | 1000 |
| RP15-4815SA (3,4) | 36-75 | 15 | 1000 | 355 | 88 | 660 |
| RP15-1205DA (3,4) | 9-18 | ±5 | ±1500 | 1471 | 85 | ±3000 |
| RP15-1212DA (3,4) | 9-18 | ±12 | ±625 | 1437 | 87 | ±520 |
| RP15-1215DA (3,4) | 9-18 | ±15 | ±500 | 1420 | 88 | ±330 |
| RP15-2405DA (3,4) | 18-36 | ±5 | ±1500 | 735 | 85 | ±3000 |
| RP15-2412DA (3,4) | 18-36 | ±12 | ±625 | 710 | 88 | ±520 |
| RP15-2415DA (3,4) | 18-36 | ±15 | ±500 | 710 | 88 | ±330 |
| RP15-4805DA (3,4) | 36-75 | ±5 | ±1500 | 368 | 85 | ±3000 |
| RP15-4812DA (3,4) | 36-75 | ±12 | ±625 | 351 | 89 | ±520 |
| RP15-4815DA (3,4) | 36-75 | ±15 | ±500 | 355 | 88 | ±330 |

**Notes:**

Note1: Maximum values at nominal input voltage and full load

Note2: Max. Cap load is tested at minimum Input and constant resistive load

## Model Numbering

RP15-__ __ A/ __ -__

- nom. Input Voltage
- Output Voltage
- Single or Dual
- *“Package (4)”*
- *“CTRL Logic (3)”*

**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

Note4: add suffix “-HC” for premounted Heat-sink with clamps

**Ordering Examples**

RP15-2405SA/P = 24V input, 5V output, single, positive Logic CTRL pin

RP15-4805DA-HC = 48V input, ±5V output, dual, without CTRL pin, Heat-sink premounted

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

### BASIC CHARACTERISTICS

| Parameter | Condition | | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Input Filter | | | | | Pi-Type |
| Input Voltage Range | nom. Vin = 12VDC<br>nom. Vin = 24VDC<br>nom. Vin = 48VDC | | 9VDC<br>18VDC<br>36VDC | 12VDC<br>24VDC<br>48VDC | 18VDC<br>36VDC<br>75VDC |
| Input Surge Voltage | 100s max. | nom. Vin = 12VDC<br>nom. Vin = 24VDC<br>nom. Vin = 48VDC | | | 36VDC<br>50VDC<br>100VDC |
| Under Voltage Lockout (UVLO) | nom. Vin = 12VDC | DC-DC ON<br>DC-DC OFF | | <br>8VDC | 9VDC |
| | nom. Vin = 24VDC | DC-DC ON<br>DC-DC OFF | | <br>14.5VDC | 18VDC |
| | nom. Vin = 48VDC | DC-DC ON<br>DC-DC OFF | | <br>30.5VDC | 36VDC |
| Input Reflected Ripple Current [5] | | | | 30mAp-p | |
| Output Voltage Trimming | refer to ***"OUTPUT VOLTAGE TRIMMING"*** | | -10% | | +10% |
| Minimum Load | | | 0% | | |
| Start-up Time | Power up<br>ON/OFF CTRL | | | | 30ms<br>30ms |
| ON/OFF CTRL [6] | Positive Logic | DC-DC ON<br>DC-DC OFF | | | Open or 3.0VDC < $V_{CTRL}$ < 15VDC<br>Short or 0VDC < $V_{CTRL}$ < 1.2VDC |
| | Negative Logic | DC-DC ON<br>DC-DC OFF | | | Short or 0VDC < $V_{CTRL}$ < 1.2VDC<br>Open or 3.0VDC < $V_{CTRL}$ < 15VDC |
| Input Current of CTRL pin | DC-DC ON | | -0.5mA | | +1.0mA |
| Standby Current | DC-DC OFF | | | 2.5mA | |
| Internal Operating Frequency | | | 360kHz | 400kHz | 440kHz |
| Ripple and Noise | measured at 20MHz BW,<br>with a 1µF M/C X7R and 10µF T/C | 3.3Vout, 5Vout<br>12Vout, 15Vout | | 75mVp-p<br>100mVp-p | |
| | | ±5Vout, ±12Vout, ±15Vout | | 100mVp-p | |

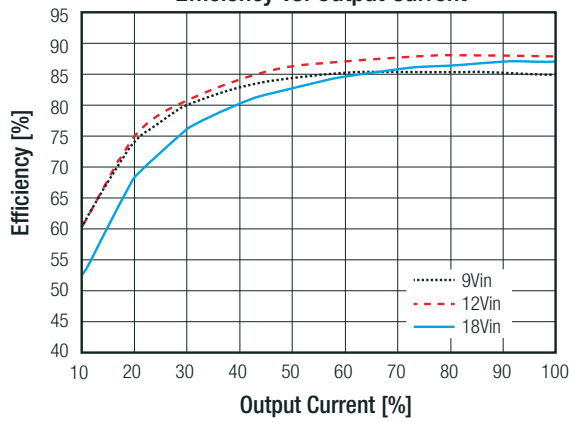
**Notes:**

Note5: Simulated source impedance of 12µH. 12µH inductor in series with +Vin

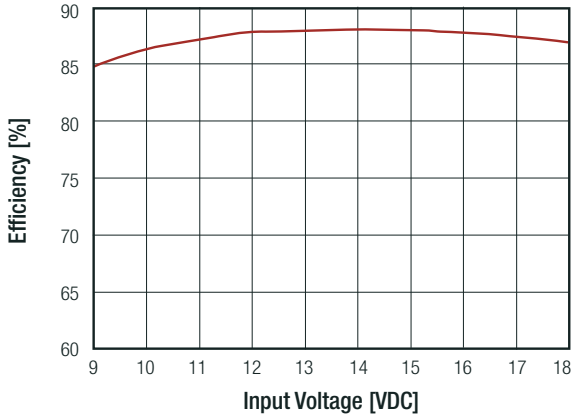
Note6: If no suffix is specified, the control pin will be omitted. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

**RP15-1205SA**

Efficiency vs. Output Current




Efficiency vs. Input Voltage full load

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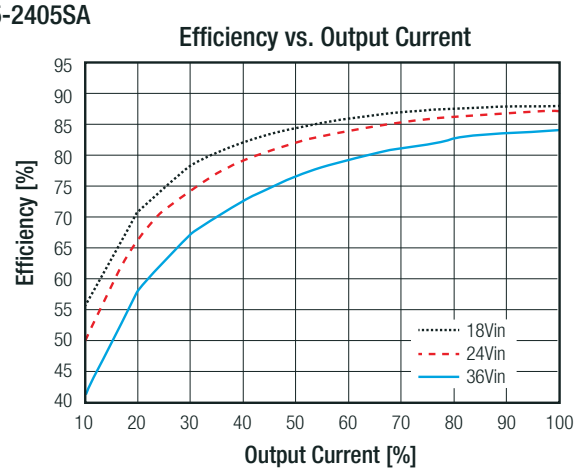
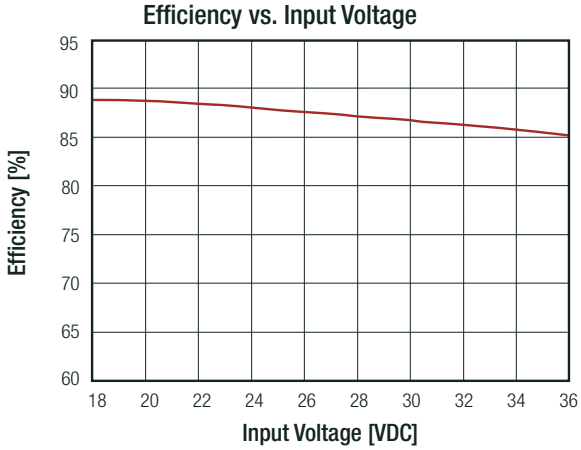
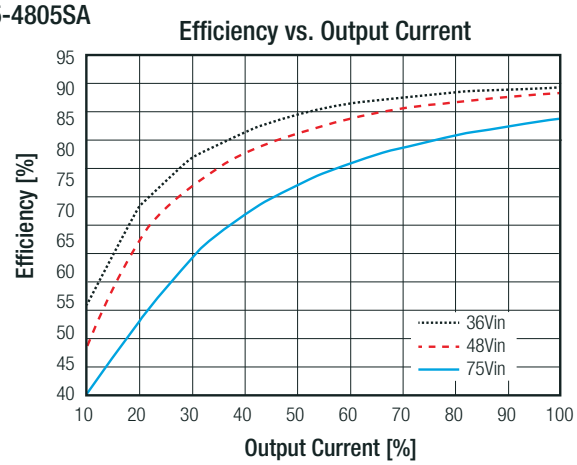
## Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

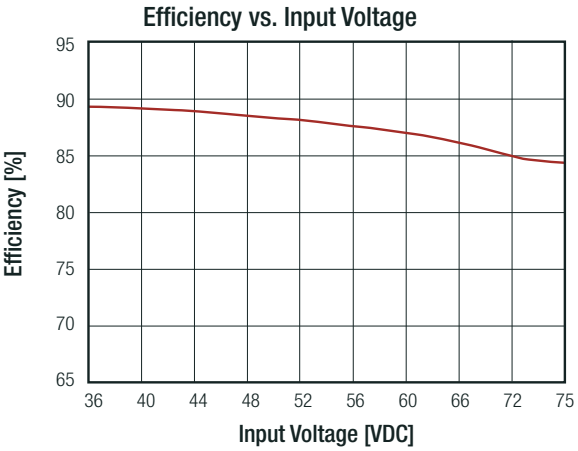
RP15-2405SA




RP15-4805SA

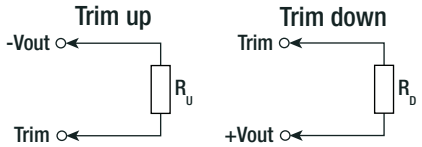



## OUTPUT VOLTAGE TRIMMING

### 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-xx3.3A

| 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] |
| $R_U$ = | 385.071 | 191.511 | 126.990 | 94.730 | 75.374 | 62.470 | 53.253 | 46.340 | 40.963 | 36.662 | [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] |
| $R_D$ = | 116.719 | 54.779 | 34.133 | 23.810 | 17.616 | 13.486 | 10.537 | 8.325 | 6.604 | 5.228 | [kΩ] |

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

### RP15-xx05A

| 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] |
| $R_U$ = | 253.450 | 125.700 | 83.117 | 61.825 | 49.050 | 40.533 | 34.450 | 29.888 | 26.339 | 23.500 | [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] |
| $R_D$ = | 248.340 | 120.590 | 78.007 | 56.715 | 43.940 | 35.423 | 29.340 | 24.778 | 21.229 | 18.390 | [kΩ] |

### RP15-xx12A

| 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] |
| $R_U$ = | 203.223 | 99.057 | 64.334 | 46.973 | 36.557 | 29.612 | 24.652 | 20.932 | 18.038 | 15.723 | [kΩ] |
| | | | | | | | | | | | |
| 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] |
| $R_D$ = | 776.557 | 380.723 | 248.779 | 182.807 | 143.223 | 116.834 | 97.985 | 83.848 | 72.853 | 64.057 | [kΩ] |

### RP15-xx15A

| Trim up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Vout = | 15.15 | 15.3 | 15.45 | 15.60 | 15.75 | 15.90 | 16.05 | 16.20 | 16.35 | 16.50 | [VDC] |
| $R_U$ = | 161.557 | 78.223 | 50.446 | 36.557 | 28.223 | 22.668 | 18.700 | 15.723 | 13.409 | 11.557 | [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] |
| $R_D$ = | 818.223 | 401.557 | 262.668 | 193.223 | 151.557 | 123.779 | 103.938 | 89.057 | 77.483 | 68.223 | [kΩ] |

### REGULATIONS

| Parameter | Condition | | Value |
|---|---|---|---|
| Output Accuracy | | | ±1.0% |
| Line Regulation | low line to high line, full load | Single<br>Dual | ±0.2%<br>±0.5% |
| Load Regulation | 0% to 100% load | Single<br>Dual | ±0.2%<br>±1.0% |
| Cross Regulation | asymmetrical 25%<>100% load | | ±5.0% |
| Transient Response Recovery Time | 25% load step change | | 250µs typ. |

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

### 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 | 3.7 - 5.4VDC<br>5.6 - 7.0VDC<br>13.5 - 19.6VDC<br>16.8 - 20.5VDC |
| Over Load Protection (OLP) | % of Iout rated | | 150% typ., Hiccup mode |
| Isolation Voltage (7) | I/P to O/P<br>I/P to O/P to case | | 1.6kVDC/ 1 minute<br>1.0kVDC/ 1 minute |
| Isolation Resistance | Viso= 500VDC | | 1GΩ min. |
| Isolation Capacitance | | | 1000pF max. |

**Notes:**

Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

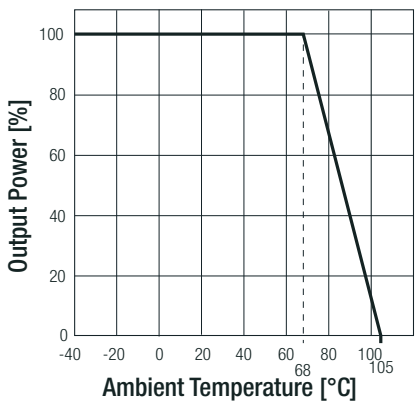
Note8: This power module is not internally fused. An input line fuse must always be used
Recom suggests: 12Vin= T3.15A; 24Vin= T1.6A; 48Vin= T1.25A slow blow types

### ENVIRONMENTAL

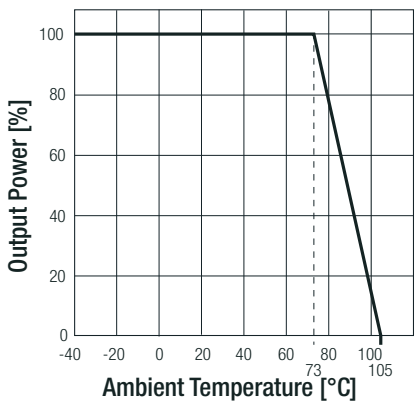
| Parameter | Condition | | Value |
|---|---|---|---|
| Operating Temperature Range | without derating<br>with derating | | -40°C to +68°C<br>-40°C to +105°C |
| Maximum Case Temperature | | | +105°C |
| Temperature Coefficient | | | ±0.02%/K max. |
| Thermal Impedance | @ natural convection<br>0.1m/s | without heat-sink<br>with heat-sink | 18.2K/W<br>15.8K/W |
| Operating Humidity | non-condensing | | 5% - 95% RH |
| Thermal Shock | | | according to MIL-STD-810F |
| Vibration | | | according to MIL-STD-810F |
| MTBF | according to MIL-HDBK-217F, G.B.<br>Bellcore TR-NWT-000332 (9) | +25°C | 1600 x $10^3$ hours<br>1330 x $10^3$ hours |

**Derating Graph (10)**

RP15-1215SA




RP15-1215SA-HC




**Notes:**

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, Ta= 40°C. MIL-HDBK 217F Notice 2. Ta = 25°C, full load, (controlled environment)

Note10: 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

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

| SAFETY AND CERTIFICATIONS | | |
|---|---|---|
| **Certificate Type (Safety)** | **Condition** | **Standard** |
| Information Technology Equipment, General Requirements for Safety | E196683 | UL60950-1, 1st Edition<br>CAN/CSA-C22.2 No. 60950-1-07, 1st Edition |
| RoHS 2 | | RoHS-2011/65/EU + AM-2015/863 |

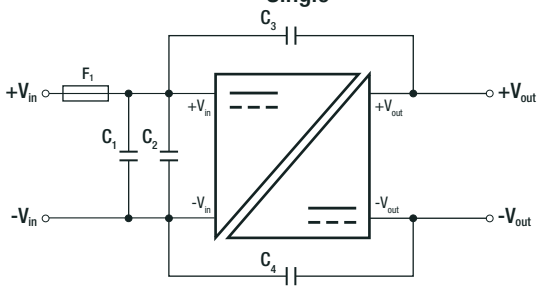
| EMC Compliance | Condition | Standard / Criterion |
|---|---|---|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter<br>(see filter suggestion below) | EN55032, Class A and B |
| ESD Electrostatic discharge immunity test | Air ±8kV and Contact ±6kV | EN61000-4-2, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 10V/m | EN61000-4-3, Criteria A |
| Fast Transient and Burst Immunity (11) | ±2kV | EN61000-4-4, Criteria A |
| Surge Immunity (11) | ±1kV | EN61000-4-5, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields | 3Vr.m.s | EN61000-4-6, Criteria A |
| Power Magnetic Field Immunity | 100A/m continuous; 1000A/m 1s | EN61000-4-8, Criteria A |

**Notes:**

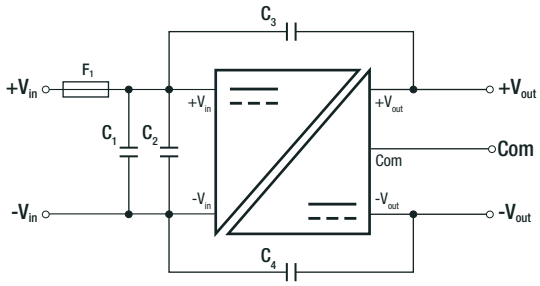
Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5
Recom suggests Nippon chemi-con KY series 220µF/100V

### EMC Filtering Suggestions according to EN55032

**Single**



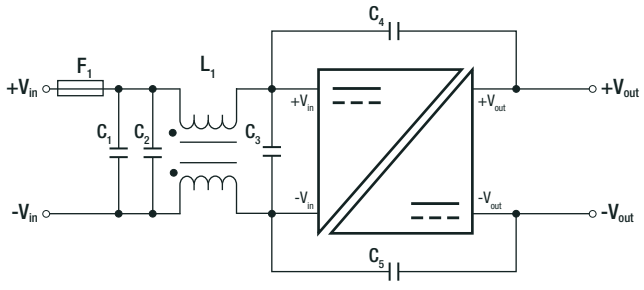

**Dual**



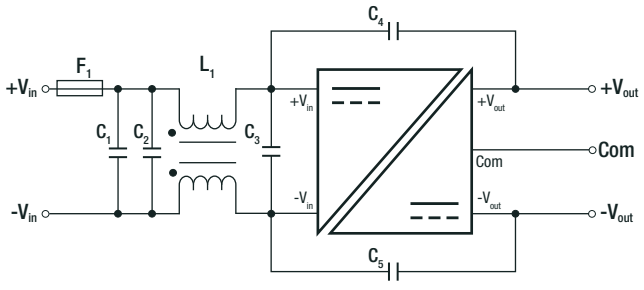

### Component List Class A

| MODEL | C1 | C2 | C3/C4 |
|---|---|---|---|
| RP15-12xxSA, RP15-12xxDA | 10µF/25V, 1812 MLCC | N/A | 470pF/2kV, 1808 MLCC |
| RP15-24xxSA, RP15-24xxDA | 6.8µF/50V, 1812 MLCC | 6.8µF/50V, 1812 MLCC | 470pF/2kV, 1808 MLCC |
| RP15-48xxSA, RP15-48xxDA | 2.2µF/100V, 1812 MLCC | 2.2µF/100V, 1812 MLCC | 470pF/2kV, 1808 MLCC |

**Single**




**Dual**




### Component List Class B

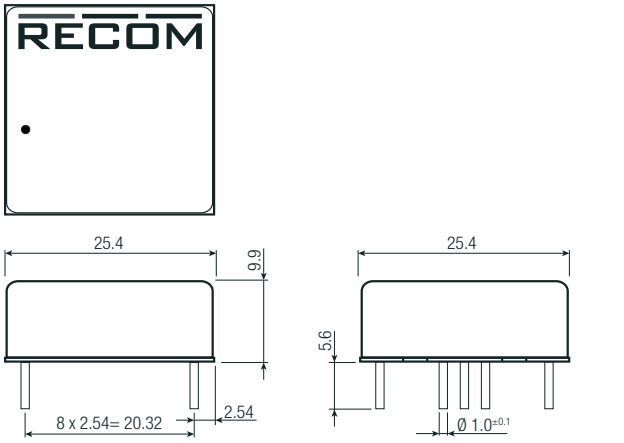
| MODEL | C1 | C2 | C3 | C4/C5 | L1 |
|---|---|---|---|---|---|
| RP15-12xxSA,<br>RP15-12xxDA | 10µF/25V<br>1812 MLCC | N/A | 10µF/25V<br>1812 MLCC | 470pF/2kV<br>1808 MLCC | CMC: 145µH<br>ref: WE 482210002 ref: CMC-07 |
| RP15-24xxSA,<br>RP15-24xxDA | 6.8µF/50V<br>1812 MLCC | N/A | 6.8µF/50V<br>1812 MLCC | 470pF/2kV<br>1808 MLCC | CMC: 325µH<br>ref: WE 744290321 ref: CMC-06 |
| RP15-48xxSA,<br>RP15-48xxDA | 2.2µF/100V<br>1812 MLCC | 2.2µF/100V<br>1812 MLCC | 2.2µF/100V<br>1812 MLCC | 470pF/2kV<br>1808 MLCC | CMC: 325µH<br>ref: WE 744290321 ref: CMC-06 |

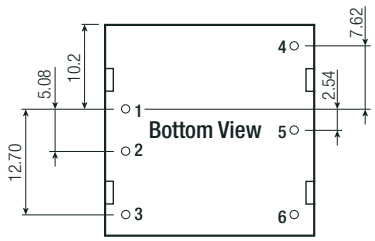
## Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

### DIMENSIONS and PHYSICAL CHARACTERISTICS

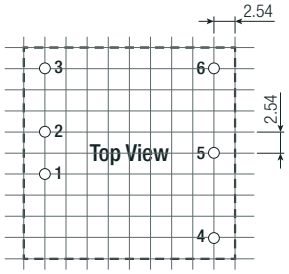
| Parameter | Type | Value |
|---|---|---|
| Material | case<br>base<br>potting | nickel coated copper<br>FR4 PCB<br>epoxy (UL94V-0) |
| Dimensions (LxWxH) | without Heat-sink<br>with Heat-sink | 25.4 x 25.4 x 9.9mm<br>31.4 x 25.4 x 16.5mm |
| Weight | without Heat-sink<br>with Heat-sink | 15g<br>21.5g |

### Dimension Drawing (mm)




Recommended Footprint Details

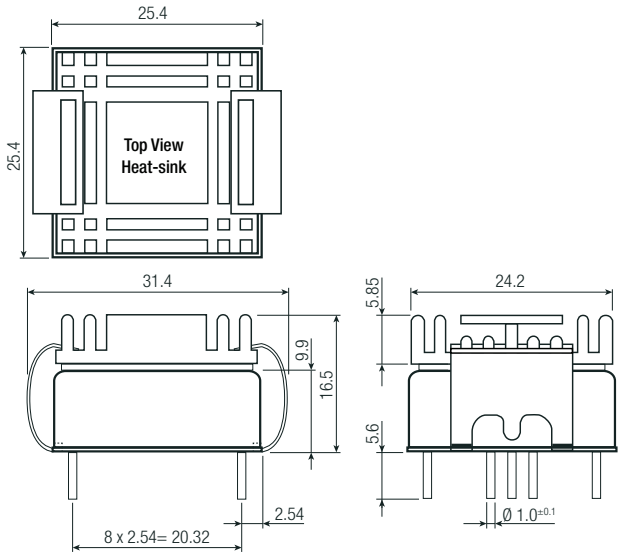



### Pinning Information

| Pin # | Single | Dual |
|---|---|---|
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | CTRL(3) | CTRL(3) |
| 4 | +Vout | +Vout |
| 5 | Trim | Com |
| 6 | -Vout | -Vout |

Pin Pitch Tolerance ±0.25mm
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

### Dimension Drawing with Heat-sink (mm)



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

| PACKAGING INFORMATION | | | |
|---|---|---|---|
| **Parameter** | **Type** | | **Value** |
| Packaging Dimension (LxWxH) | tube<br>tray | without heat-sink<br>with heat-sink | 257.0 x 28.5 x 21.0mm<br>230.0 x 180.0 x 28.0mm |
| Packaging Quantity | tube<br>tray | without heat-sink<br>with heat-sink | 8pcs<br>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.

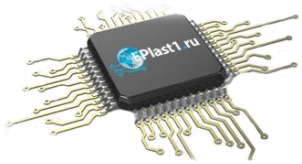
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- 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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