

# Features

## Regulated Converter

- 2:1 input voltage range
- 1.6kVDC isolation
- UL60950-1 certified
- Efficiency up to 87%
- Fixed operation frequency
- Six-sided continuous shield

**RECOM**  
DC/DC Converter

## RP10-E

10 Watt

2" x 1"

Single and Dual Output



**UL**  
E196683



UL60950-1 certified  
EN55032 compliant

## Description

The RP10-E series DC/DC converters are certified to UL 60950-1 and cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The industry standard 2" x 1" package meets military standards for thermal shock and vibration tolerance and is available with an optional remote on/off control pin. This series is also available with the /M1 and /M2 option which is particularly suitable for extended temperature range applications.

## 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] |
|-------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|------------------------------------------|
| RP10-123.3SE <sup>(3,4)</sup> | 9-18                      | 3.3                  | 2000                | 688                               | 80                                 | 6800                                     |
| RP10-1205SE <sup>(3,4)</sup>  | 9-18                      | 5                    | 2000                | 1029                              | 81                                 | 4700                                     |
| RP10-1212SE <sup>(3,4)</sup>  | 9-18                      | 12                   | 830                 | 988                               | 84                                 | 690                                      |
| RP10-1215SE <sup>(3,4)</sup>  | 9-18                      | 15                   | 670                 | 997                               | 84                                 | 470                                      |
| RP10-243.3SE <sup>(3,4)</sup> | 18-36                     | 3.3                  | 2000                | 344                               | 80                                 | 6800                                     |
| RP10-2405SE <sup>(3,4)</sup>  | 18-36                     | 5                    | 2000                | 508                               | 82                                 | 4700                                     |
| RP10-2412SE <sup>(3,4)</sup>  | 18-36                     | 12                   | 830                 | 494                               | 84                                 | 690                                      |
| RP10-2415SE <sup>(3,4)</sup>  | 18-36                     | 15                   | 670                 | 499                               | 84                                 | 470                                      |
| RP10-483.3SE <sup>(3,4)</sup> | 36-75                     | 3.3                  | 2000                | 172                               | 80                                 | 6800                                     |
| RP10-4805SE <sup>(3,4)</sup>  | 36-75                     | 5                    | 2000                | 248                               | 84                                 | 4700                                     |
| RP10-4812SE <sup>(3,4)</sup>  | 36-75                     | 12                   | 830                 | 241                               | 86                                 | 690                                      |
| RP10-4815SE <sup>(3,4)</sup>  | 36-75                     | 15                   | 670                 | 241                               | 87                                 | 470                                      |
| RP10-1205DE <sup>(3,4)</sup>  | 9-18                      | ±5                   | ±1000               | 992                               | 84                                 | ±680                                     |
| RP10-1212DE <sup>(3,4)</sup>  | 9-18                      | ±12                  | ±416                | 1002                              | 83                                 | ±330                                     |
| RP10-1215DE <sup>(3,4)</sup>  | 9-18                      | ±15                  | ±333                | 991                               | 84                                 | ±110                                     |
| RP10-2405DE <sup>(3,4)</sup>  | 18-36                     | ±5                   | ±1000               | 502                               | 83                                 | ±680                                     |
| RP10-2412DE <sup>(3,4)</sup>  | 18-36                     | ±12                  | ±416                | 489                               | 85                                 | ±330                                     |
| RP10-2415DE <sup>(3,4)</sup>  | 18-36                     | ±15                  | ±333                | 496                               | 84                                 | ±110                                     |
| RP10-4805DE <sup>(3,4)</sup>  | 36-75                     | ±5                   | ±1000               | 248                               | 84                                 | ±680                                     |
| RP10-4812DE <sup>(3,4)</sup>  | 36-75                     | ±12                  | ±416                | 242                               | 86                                 | ±330                                     |
| RP10-4815DE <sup>(3,4)</sup>  | 36-75                     | ±15                  | ±333                | 245                               | 85                                 | ±110                                     |

### 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



### Notes:

- Note3: no suffix for standard part without CTRL pin  
add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF)  
add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF)  
Note4: add suffix "/M1" for higher efficiencies and extended temperature range  
Note5: add suffix "-HC" for premounted Heat-sink with clips

### Ordering Examples

RP10-1205SE/P = 12V input, 5V output, single, positive logic CTRL pin  
RP10-4805DE/M1 -HC = 48V input, ±5V output, dual, extended temp. range, 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                           | 100ms max.                                               | nom. Vin = 12VDC<br>nom. Vin = 24VDC<br>nom. Vin = 48VDC |                                                                                          |                                            | 36VDC<br>50VDC<br>100VDC |
| Input Reflected Ripple Current <sup>(6)</sup> |                                                          |                                                          |                                                                                          | 30mA <sub>p-p</sub>                        |                          |
| Minimum Load <sup>(7)</sup>                   |                                                          |                                                          | 10%                                                                                      |                                            |                          |
| Start-up Time                                 | Power up                                                 |                                                          |                                                                                          | 20ms                                       |                          |
| ON/OFF CTRL <sup>(8)</sup>                    | Positive Logic                                           | DC-DC ON<br>DC-DC OFF                                    | Open or 3.5VDC < V <sub>CTRL</sub> < 12VDC<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 3.5VDC < V <sub>CTRL</sub> < 12VDC |                                            |                          |
| Input Current of CTRL pin                     | DC-DC ON                                                 |                                                          | -0.5mA                                                                                   |                                            | +1.0mA                   |
| Standby Current                               | DC-DC OFF                                                |                                                          |                                                                                          | 20mA                                       |                          |
| Internal Operating Frequency                  |                                                          |                                                          | 270kHz                                                                                   | 300kHz                                     | 330kHz                   |
| Ripple and Noise                              | 20MHz BW                                                 | Single<br>Dual                                           |                                                                                          | 50mV <sub>p-p</sub><br>75mV <sub>p-p</sub> |                          |

**Notes:**

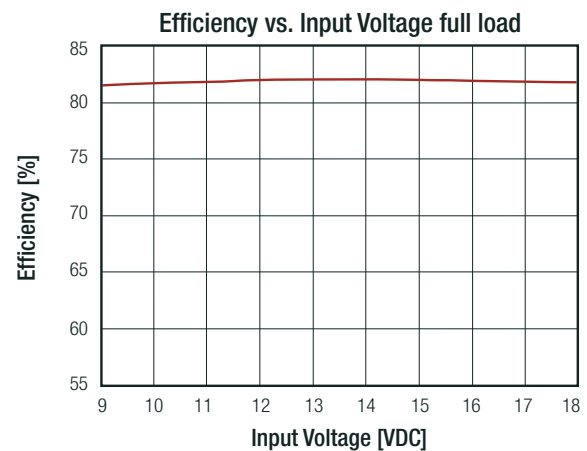
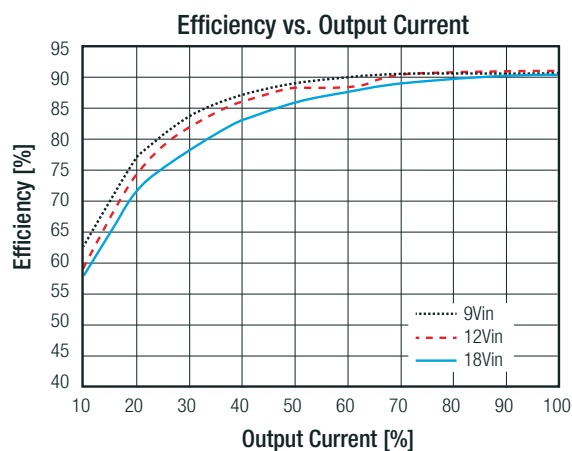
Note6: Simulated source impedance of 12μH. 12μH inductor in series with +Vin

Note7: The RP10-E series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification

Note8: If no suffix is specified, pin6 will be absent.

If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

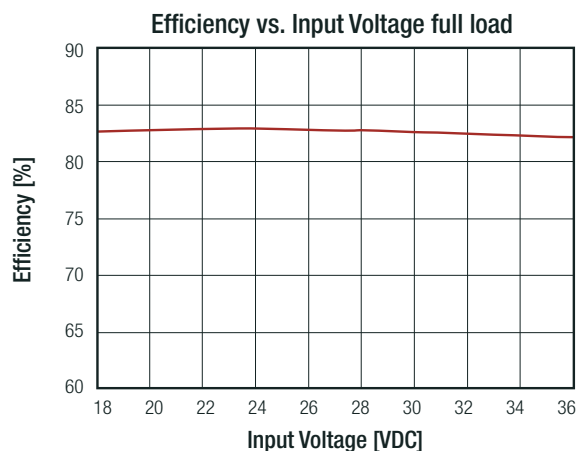
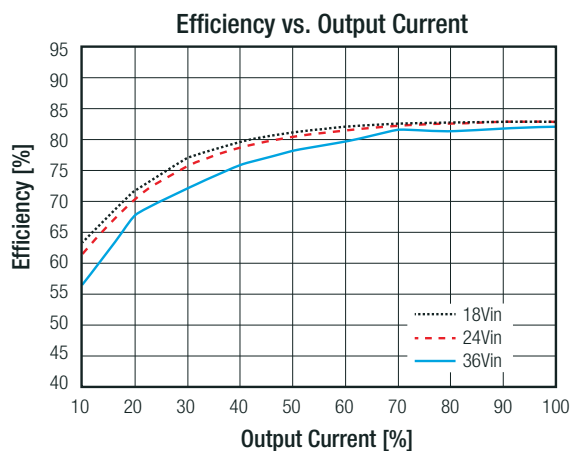
**RP10-1205SE**



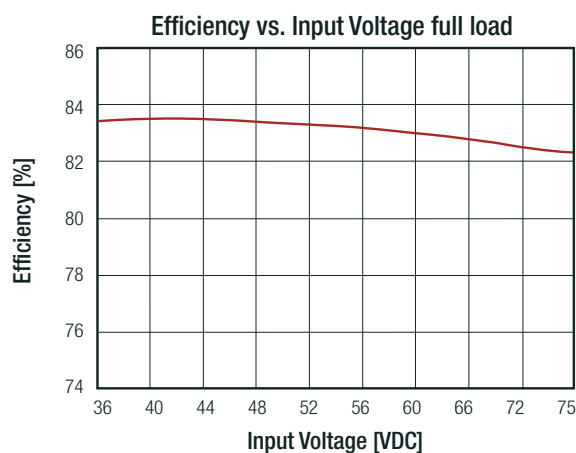
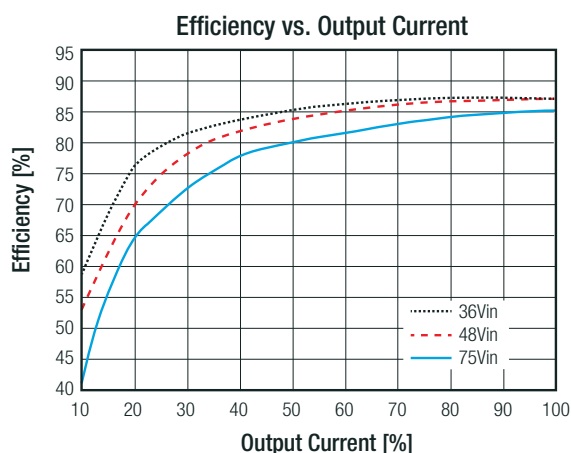
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

### RP10-2405SE



### RP10-4805SE



### 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                  | Single | ±0.5%      |
|                                  |                                  | Dual   | ±1.0%      |
| Cross Regulation                 | asymmetrical 25%<>100% load      |        | ±5.0%      |
| Transient Response Recovery Time | 25% load step change             |        | 250µs typ. |

### PROTECTIONS

| Parameter                      | Condition         |         | Value                          |
|--------------------------------|-------------------|---------|--------------------------------|
| Short Circuit Protection (SCP) |                   |         | continuous, automatic recovery |
| Over Voltage Protection (OVP)  | zener diode clamp | 3.3Vout | 3.9VDC typ.                    |
|                                |                   | 5Vout   | 6.2VDC typ.                    |
|                                |                   | 12Vout  | 15VDC typ.                     |
|                                |                   | 15Vout  | 18VDC typ.                     |
| Over Load Protection (OLP)     | % of lout rated   |         | 150% typ.                      |

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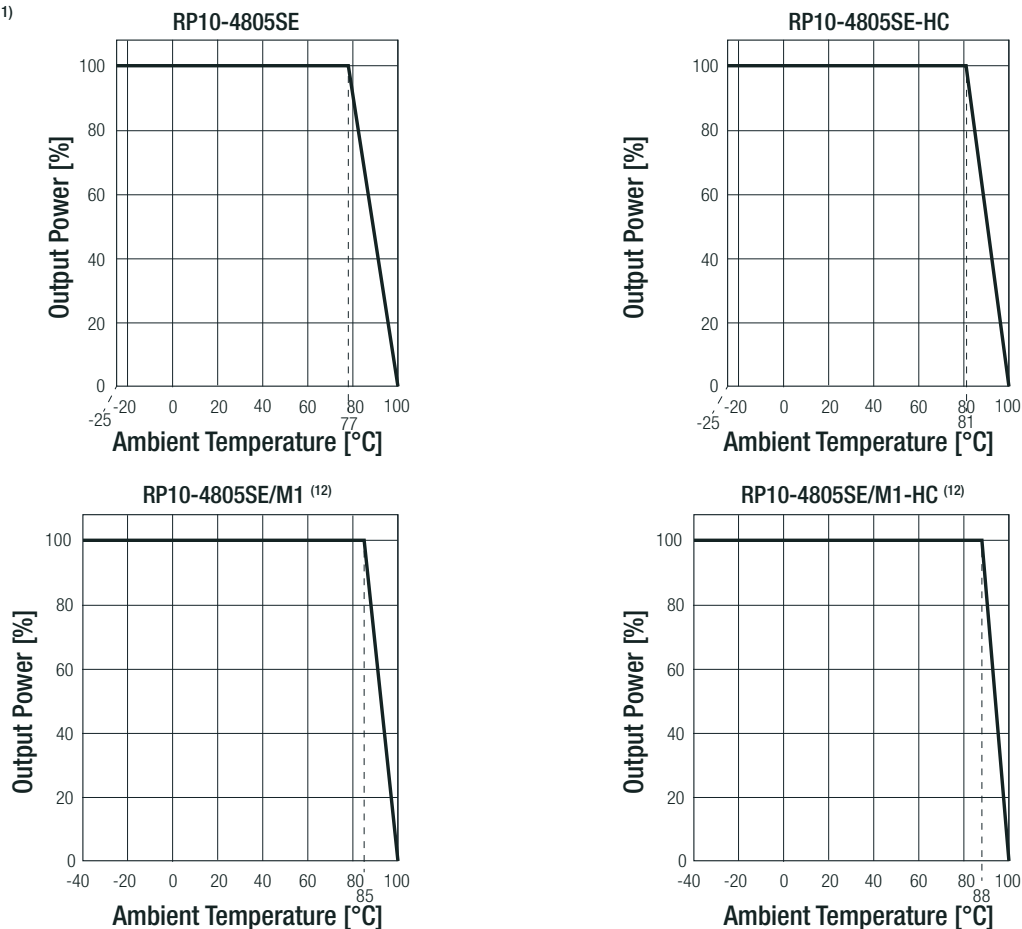
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

| Parameter                                                                                                                                                                               | Condition          | Value             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|
| Isolation Voltage <sup>(9)</sup>                                                                                                                                                        | I/P to O/P         | 1.6kVDC/ 1 minute |
|                                                                                                                                                                                         | I/P to O/P to case | 1.6kVDC/ 1 minute |
| Isolation Resistance                                                                                                                                                                    | Viso= 500VDC       | 1GΩ min.          |
| Isolation Capacitance                                                                                                                                                                   |                    | 300pF max.        |
| <b>Notes:</b><br>Note9: For repeat Hi-Pot testing, reduce the time and/or the test voltage<br>Note10: This power module is not internally fused. An input line fuse must always be used |                    |                   |

**ENVIRONMENTAL**

| Parameter                   | Condition                                       |                   | Value                        |
|-----------------------------|-------------------------------------------------|-------------------|------------------------------|
| Operating Temperature Range | with derating                                   | Standard          | -25°C to +100°C              |
|                             |                                                 | with suffix "M1"  | -40°C to +100°C              |
| Maximum Case Temperature    |                                                 |                   | +105°C                       |
| Temperature Coefficient     |                                                 |                   | ±0.02%/K max.                |
| Thermal Impedance           | @ natural convection 0.1m/s, vertical direction | without heat-sink | 12K/W                        |
|                             |                                                 | with heat-sink    | 10K/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.                             |                   | 3342 x 10 <sup>3</sup> hours |

**Derating Graph<sup>(11)</sup>**



**Notes:**

Note11: 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

Note12: "/M1" version is more efficient and can therefore operate in a more extensive temperature range than standard version

**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, 2nd Edition, 2011<br>CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2011 |
| EAC                                                               | RU-AT.49.09571 | TP TC 004/2011                                                                  |
| RoHS2                                                             |                | RoHS-2011/65/EU + AM-2015/863                                                   |

### EMC Compliance

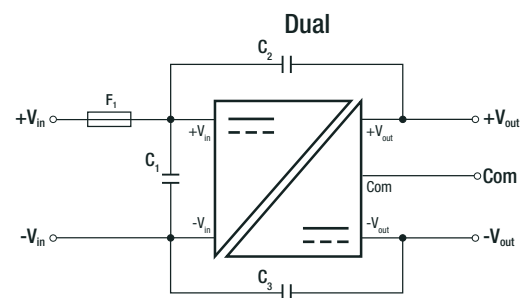
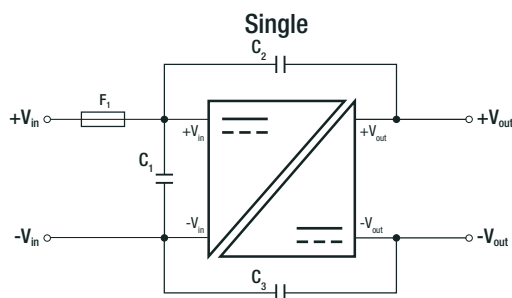
| Condition                                                                     | Standard / Criterion    |
|-------------------------------------------------------------------------------|-------------------------|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | EN55032, Class A and B  |
| ESD Electrostatic discharge immunity test                                     | EN61000-4-2, Criteria B |
| Radiated, radio-frequency, electromagnetic field immunity test                | EN61000-4-3, Criteria A |
| Fast Transient and Burst Immunity <sup>(13)</sup>                             | EN61000-4-4, Criteria B |
| Surge Immunity <sup>(13)</sup>                                                | EN61000-4-5, Criteria B |
| Immunity to conducted disturbances, induced by radio-frequency fields         | EN61000-4-6, Criteria A |
| Power Magnetic Field Immunity                                                 | EN61000-4-8, Criteria A |

**Notes:**

Note13: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5

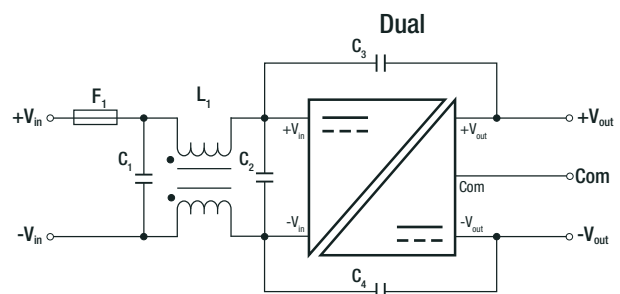
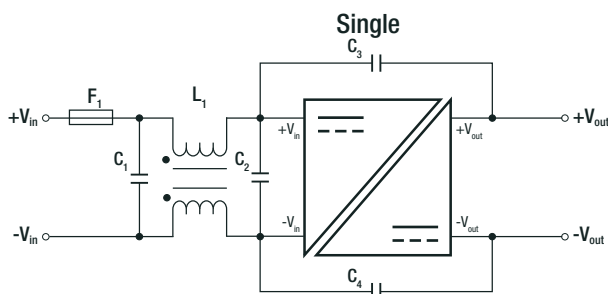
Recom suggests Nippon chemi-con KY series 220µF/100V

### EMC Filtering Suggestions according to EN55032



#### Component List Class A

| MODEL                    | C1                   | C2                    | C3                    |
|--------------------------|----------------------|-----------------------|-----------------------|
| RP10-12xxSE, RP10-12xxDE | 2.2µF/25V, 1206 MLCC | 1000pF/2kV, 1808 MLCC | 1000pF/2kV, 1808 MLCC |
| RP10-24xxSE, RP10-24xxDE | N/A                  | 1000pF/2kV, 1808 MLCC | 1000pF/2kV, 1808 MLCC |
| RP10-48xxSE, RP10-48xxDE | N/A                  | 1000pF/2kV, 1808 MLCC | 1000pF/2kV, 1808 MLCC |



#### Component List Class B

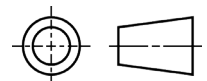
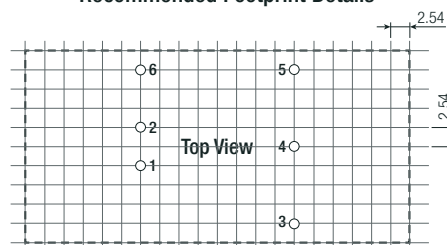
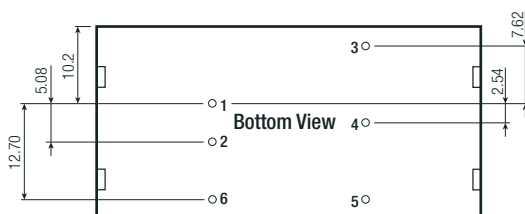
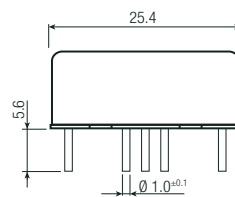
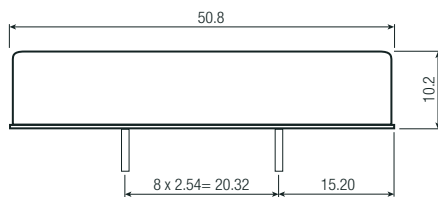
| MODEL                      | C1                      | C2                      | C3/C4                   | L1                                           |
|----------------------------|-------------------------|-------------------------|-------------------------|----------------------------------------------|
| RP10-12xxSE<br>RP10-12xxDE | 3.3µF/50V<br>1812 MLCC  | N/A                     | 1000pF/2kV<br>1808 MLCC | CMC: 325µH<br>ref: WE 744290321 ref.: CMC-06 |
| RP10-24xxSE<br>RP10-24xxDE | 2.2µF/50V<br>1812 MLCC  | N/A                     | 1000pF/2kV<br>1808 MLCC | CMC: 325µH<br>ref: WE 744290321 ref.: CMC-06 |
| RP10-48xxSE<br>RP10-48xxDE | 2.2µF/100V<br>1812 MLCC | 2.2µF/100V<br>1812 MLCC | 1000pF/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>non-conductive black plastic<br>epoxy (UL94 V-0) |
| Dimensions (LxWxH) | without Heat-sink<br>with Heat-sink | 50.8 x 25.4 x 10.2mm<br>56.8 x 25.4 x 16.8mm                             |
| Weight             | without Heat-sink<br>with Heat-sink | 27g<br>37.89g                                                            |

#### Dimension Drawing (mm)



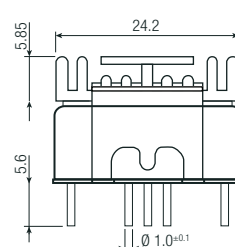
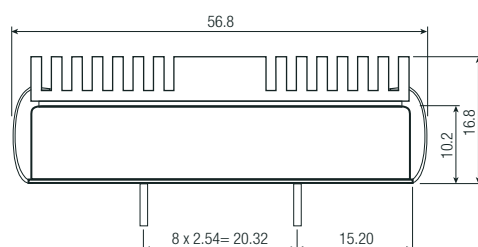
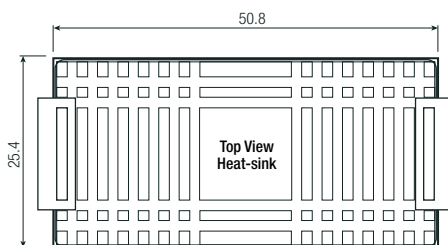
#### Pinning Information

| Pin # | Single              | Dual                |
|-------|---------------------|---------------------|
| 1     | +Vin                | +Vin                |
| 2     | -Vin                | -Vin                |
| 3     | +Vout               | +Vout               |
| 4     | no Pin              | Com                 |
| 5     | -Vout               | -Vout               |
| 6     | CTRL <sup>(3)</sup> | CTRL <sup>(3)</sup> |

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

#### Recommended Footprint Details

#### 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           | without heat-sink | 255.0 x 54.0 x 22.0mm  |
|                             | tray           | with heat-sink    | 302.5 x 222.0 x 20.0mm |
| Packaging Quantity          | tube           | without heat-sink | 9pcs                   |
|                             | tray           | with heat-sink    | 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 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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