

## Features

- 2:1 Wide Input Voltage Range
- 10 Watts Output Power
- 1.6kVDC Isolation
- UL Certified
- Fixed Operating Frequency
- Six-Sided Continuous Shield
- Standard 50.8 x 25.4 x 10.2mm Package
- Efficiency to 86 %

### 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 option which is particularly suitable for extended temperature range applications.

### Selection Guide 12V, 24V and 48V Input Types

| Part Number | Input Range VDC | Output Voltage VDC | Output Current mA | Input <sup>(4)</sup> Current mA | Efficiency <sup>(5)</sup> % | Capacitive <sup>(6)</sup> Load max. |
|-------------|-----------------|--------------------|-------------------|---------------------------------|-----------------------------|-------------------------------------|
| RP10-1205SE | 9-18            | 5                  | 2000              | 1082                            | 81                          | 4700µF                              |
| RP10-1212SE | 9-18            | 12                 | 830               | 1064                            | 82                          | 690µF                               |
| RP10-1215SE | 9-18            | 15                 | 670               | 1088                            | 81                          | 470µF                               |
| RP10-2405SE | 18-36           | 5                  | 2000              | 534                             | 82                          | 4700µF                              |
| RP10-2412SE | 18-36           | 12                 | 830               | 519                             | 84                          | 690µF                               |
| RP10-2415SE | 18-36           | 15                 | 670               | 523                             | 84                          | 470µF                               |
| RP10-4805SE | 36-75           | 5                  | 2000              | 260                             | 84                          | 4700µF                              |
| RP10-4812SE | 36-75           | 12                 | 830               | 253                             | 86                          | 690µF                               |
| RP10-4815SE | 36-75           | 15                 | 670               | 258                             | 85                          | 470µF                               |
| RP10-1205DE | 9-18            | ±5                 | ±1000             | 1068                            | 82                          | ±680µF                              |
| RP10-1212DE | 9-18            | ±12                | ±416              | 1053                            | 83                          | ±330µF                              |
| RP10-1215DE | 9-18            | ±15                | ±333              | 1041                            | 84                          | ±110µF                              |
| RP10-2405DE | 18-36           | ±5                 | ±1000             | 548                             | 80                          | ±680µF                              |
| RP10-2412DE | 18-36           | ±12                | ±416              | 520                             | 84                          | ±330µF                              |
| RP10-2415DE | 18-36           | ±15                | ±333              | 520                             | 84                          | ±110µF                              |
| RP10-4805DE | 36-75           | ±5                 | ±1000             | 267                             | 82                          | ±680µF                              |
| RP10-4812DE | 36-75           | ±12                | ±416              | 254                             | 86                          | ±330µF                              |
| RP10-4815DE | 36-75           | ±15                | ±333              | 260                             | 84                          | ±110µF                              |

\* add suffix /M1 for higher efficiencies and extended temperature range.

\* 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)

\* add suffix -HC for premounted heatsink and clips

### Ordering Examples

RP10-1205SE/P = 12V Input, 5V Output, Standard Temp. Range, Positive Logic CTRL pin fitted

RP10-4805DE/M1 -HC = 48V Input, ±5V Output, Extended Temp. Range, No CTRL pin, Heatsink fitted

## POWERLINE

### DC/DC-Converter

with 3 year Warranty

RECOM

## 10 Watt 2" x 1" Single & Dual Output



**UL-60950-1 Certified  
E196683**

## RP10-E

Refer to Application Notes

**Derating Graph (Ambient Temperature)**

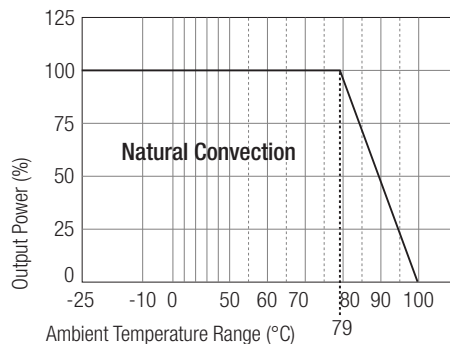
**RP10-2405SE**



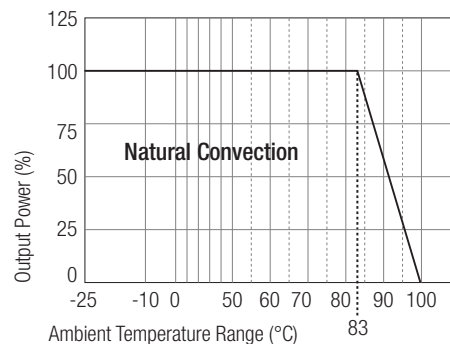
**RP10-2405SE With Heat Sink**



**RP10-2405DE**



**RP10-2405DE With Heat Sink**



**RP10-4805SE**



**RP10-2405SE\_DE/M1**



**RP10-4805SE/M1**



**RP10-2405SE\_DE/M1 With Heat Sink**



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 our technical support service at [info@recom-development.at](mailto:info@recom-development.at)

**Specifications** (typical at nominal input and 25°C unless otherwise noted)

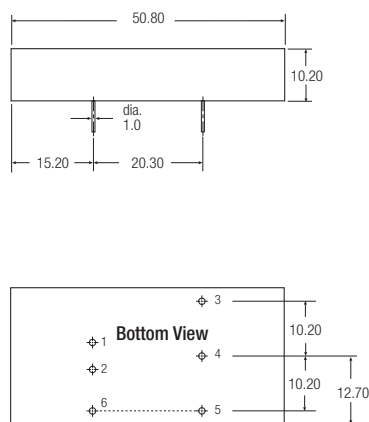
|                                                                           |                   |                                |
|---------------------------------------------------------------------------|-------------------|--------------------------------|
| Input Voltage Range                                                       | 12V nominal input | 9-18VDC                        |
|                                                                           | 24V nominal input | 18-36VDC                       |
|                                                                           | 48V nominal input | 36-75VDC                       |
| Input Filter                                                              |                   | Pi Type                        |
| Input Surge Voltage (100 ms max.)                                         | 12V Input         | 36VDC                          |
|                                                                           | 24V Input         | 50VDC                          |
|                                                                           | 48V Input         | 100VDC                         |
| Input Reflected Ripple (nominal Vin and full load) <sup>(3)</sup>         |                   | 30mA <sub>p-p</sub>            |
| Start Up Time (nominal Vin and constant resistor load)                    |                   | 20ms typ.                      |
| Remote ON/OFF <sup>(7)</sup>                                              |                   |                                |
| (Positive logic)                                                          | DC-DC ON          | Open or 3.5V < Vr < 12V        |
|                                                                           | DC-DC OFF         | Short or 0V < Vr < 1.2V        |
| (Negative logic)                                                          | DC-DC ON          | Short or 0V < Vr < 1.2V        |
|                                                                           | DC-DC OFF         | Open or 3.5V < Vr < 12V        |
| Remote OFF input current                                                  | Nominal input     | 20mA                           |
| Output Power                                                              |                   | 10W max.                       |
| Output Voltage Accuracy (full Load and nominal Vin)                       |                   | ±2%                            |
| Minimum Load <sup>(1)</sup>                                               |                   | 10% of full load               |
| Line Regulation (low line, high line at full load)                        |                   | ±1%                            |
| Load Regulation (25% to 100% full load)                                   | Single            | ±1%                            |
|                                                                           | Dual              | ±2%                            |
| Cross Regulation (asymmetrical 25% <-> 100% load)                         |                   | ±5%                            |
| Ripple and Noise (20MHz bandwidth, with 1µF MLCC on output)               | Single            | 50mV <sub>p-p</sub>            |
|                                                                           | Dual              | 75mV <sub>p-p</sub>            |
| Temperature Coefficient                                                   |                   | ±0.02%/°C max.                 |
| Transient Response (25% load step change)                                 |                   | 500µs                          |
| Over Voltage Protection                                                   | 3.3V output       | 3.9V                           |
| Zener diode clamp                                                         | 5V output         | 6.2V                           |
|                                                                           | 12V output        | 15V                            |
|                                                                           | 15V output        | 18V                            |
| Over Load Protection (% of full load at nominal Vin)                      |                   | 150% typ                       |
| Undervoltage Lockout                                                      |                   | none                           |
| Short Circuit Protection                                                  |                   | Hiccup, automatic recovery     |
| Efficiency                                                                |                   | see „Selection Guide“ table    |
| Isolation Voltage (rated for one minute)                                  |                   | 1600VDC                        |
| Isolation Resistance                                                      |                   | 1 GΩ min.                      |
| Isolation Capacitance                                                     |                   | 300pF max.                     |
| Operating Frequency                                                       |                   | 300kHz typ.                    |
| Approved to Safety Standards <sup>(9)</sup>                               |                   | UL 1950, EN60950               |
| Operating Temperature Range<br>(Reference Derating Curve) <sup>(10)</sup> | Standard          | -25°C to +85°C (with derating) |
|                                                                           | M1                | -40°C to +85°C (non derating)  |
| Maximum Case Temperature                                                  |                   | +100°C                         |
| Storage Temperature Range                                                 |                   | -55°C to +125°C                |

continued on next page

## Specifications (typical at nominal input and 25°C unless otherwise noted)

|                                     |                                        |                                        |
|-------------------------------------|----------------------------------------|----------------------------------------|
| Thermal Impedance <sup>(8)</sup>    | Natural convection                     | 12°C/Watt                              |
|                                     | Natural convection with Heat Sink      | 10°C/Watt                              |
| Thermal Shock                       |                                        | MIL-STD-810D                           |
| Vibration                           |                                        | 10-55Hz, 10G, 30 Min. along X, Y and Z |
| Relative Humidity                   |                                        | 5% to 95% RH                           |
| Case Material                       |                                        | Nickel plated copper                   |
| Base Material                       |                                        | Non-conductive black plastic           |
| Potting Material                    |                                        | Epoxy (UL94-V0)                        |
| Conducted Emissions <sup>(11)</sup> | EN55022                                | Level A                                |
| Radiated Emissions                  | EN55022                                | Level A                                |
| ESD                                 | EN61000-4-2                            | Perf. Criteria B                       |
| Radiated Immunity                   | EN61000-4-3                            | Perf. Criteria B                       |
| Fast Transient                      | EN61000-4-4                            | Perf. Criteria B                       |
| Surge                               | EN61000-4-5                            | Perf. Criteria B                       |
| Conducted Immunity                  | EN61000-4-6                            | Perf. Criteria B                       |
| Weight                              |                                        | 27g                                    |
| Packing Quantity                    | Refer to App Notes for tube dimensions | 9 pcs per Tube                         |
| Dimensions                          |                                        | 50.8 x 25.4 x 10.2mm                   |
| MTBF <sup>(2)</sup>                 |                                        | 1976 x 10 <sup>3</sup> hours           |

## Package Style and Pinning (mm)



### Pin Connections

| Pin # | Single | Dual  |
|-------|--------|-------|
| 1     | +Vin   | +Vin  |
| 2     | -Vin   | -Vin  |
| 3     | +Vout  | +Vout |
| 4     | No Pin | Com   |
| 5     | -Vout  | -Vout |
| 6*    | CTRL*  | CTRL* |

\*Optional. See Note 7.

Pin Pitch Tolerance  $\pm 0.35$  mm

## Notes :

- The RP10 (W) series required a minimum 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.
- BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment).
- Simulated source impedance of 12 $\mu$ H. 12 $\mu$ H inductor in series with +Vin.
- Maximum value at nominal input voltage and full load of standard type.
- Typical value at nominal input voltage and full load.
- Test by minimum Vin and constant resistor load.
- The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to negative input.  
Positive logic ON/OFF is marked with suffix-P (eg. RP10-2405SE/P), Negative logic ON/OFF is marked with suffix-N (eg. RP10-2405SE/N).  
If no suffix is specified, the control pin will be omitted.
- Heat sink is optional and P/N: 7G-0020C. Powerline DC/DC Converters can be ordered with pre-mounted heatsinks including antivibration fixing clips (add suffix -HC). See Application Notes for heatsink details.
- The M1 version (RP10-xxxxSE/M1, RP10-xxxDE/M1) does not carry the UL certification.
- M1 version is more efficient, therefore, it can be operated in a more extensive temperature range than standard version.
- See application notes for EMI-filtering.

The product information and specifications are subject to change without prior notice. RECOM products are not authorized for use in safety-critical applications (such as life support) without RECOM's explicit written consent. A safety-critical application is defined as an application where a failure of a RECOM product may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The buyer 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.