

# POWERLINE - DC/DC-Converter

# RECOM

E-Series, 20W, 1.6 kV Isolation, 2:1 Wide Input Range (Single, Dual & Triple Output)

## Features

- 20 Watts Output Power
- 2:1 Wide Input Voltage Range
- International Safety Standard Approvals
- Six-Sided Continuous Shield
- High Efficiency up to 86%
- Standard 50.8 x 40.6 x 10.2mm Package
- Fixed Switching Frequency
- UL 1950 Component Recognised



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

| Part Number    | Input Voltage | Output Voltage | Output Current   | Input Current (see note 7) | Efficiency (see note 8) | Capacitive Load max. $\mu$ F |
|----------------|---------------|----------------|------------------|----------------------------|-------------------------|------------------------------|
|                | VDC           | VDC            | mA               | mA                         | %                       |                              |
| RP20-123.3SE   | 9-18          | 3.3            | 4000             | 1507                       | 77                      | 13000                        |
| RP20-1205SE    | 9-18          | 5              | 4000             | 2193                       | 80                      | 6800                         |
| RP20-1212SE    | 9-18          | 12             | 1670             | 2136                       | 82                      | 2200                         |
| RP20-1215SE    | 9-18          | 15             | 1330             | 2136                       | 82                      | 755                          |
| RP20-1205DE    | 9-18          | $\pm$ 5        | $\pm$ 2000       | 2193                       | 80                      | $\pm$ 3400                   |
| RP20-1212DE    | 9-18          | $\pm$ 12       | $\pm$ 833        | 2136                       | 82                      | $\pm$ 680                    |
| RP20-1215DE    | 9-18          | $\pm$ 15       | $\pm$ 666        | 2136                       | 82                      | $\pm$ 450                    |
| RP20-123.312TE | 9-18          | 3.3 / $\pm$ 12 | 3000 / $\pm$ 300 | 1926                       | 78                      | 4700 / $\pm$ 220             |
| RP20-123.315TE | 9-18          | 3.3 / $\pm$ 15 | 3000 / $\pm$ 250 | 1959                       | 78                      | 4700 / $\pm$ 220             |
| RP20-120512TE  | 9-18          | 5 / $\pm$ 12   | 2000 / $\pm$ 300 | 1885                       | 80                      | 4700 / $\pm$ 220             |
| RP20-120515TE  | 9-18          | 5 / $\pm$ 15   | 2000 / $\pm$ 250 | 1919                       | 80                      | 4700 / $\pm$ 220             |
| RP20-243.3SE   | 18-36         | 3.3            | 4000             | 743                        | 78                      | 13000                        |
| RP20-2405SE    | 18-36         | 5              | 4000             | 1082                       | 81                      | 6800                         |
| RP20-2412SE    | 18-36         | 12             | 1670             | 1054                       | 83                      | 2200                         |
| RP20-2415SE    | 18-36         | 15             | 1330             | 1054                       | 83                      | 755                          |
| RP20-2405DE    | 18-36         | $\pm$ 5        | $\pm$ 2000       | 1082                       | 81                      | $\pm$ 3400                   |
| RP20-2412DE    | 18-36         | $\pm$ 12       | $\pm$ 833        | 1054                       | 83                      | $\pm$ 680                    |
| RP20-2415DE    | 18-36         | $\pm$ 15       | $\pm$ 666        | 1041                       | 84                      | $\pm$ 450                    |
| RP20-243.312TE | 18-36         | 3.3 / $\pm$ 12 | 3000 / $\pm$ 300 | 950                        | 79                      | 4700 / $\pm$ 220             |
| RP20-243.315TE | 18-36         | 3.3 / $\pm$ 15 | 3000 / $\pm$ 250 | 967                        | 79                      | 4700 / $\pm$ 220             |
| RP20-240512TE  | 18-36         | 5 / $\pm$ 12   | 2000 / $\pm$ 300 | 931                        | 81                      | 4700 / $\pm$ 220             |
| RP20-240515TE  | 18-36         | 5 / $\pm$ 15   | 2000 / $\pm$ 250 | 947                        | 81                      | 4700 / $\pm$ 220             |
| RP20-483.3SE   | 36-75         | 3.3            | 4000             | 367                        | 79                      | 13000                        |
| RP20-4805SE    | 36-75         | 5              | 4000             | 543                        | 82                      | 6800                         |
| RP20-4812SE    | 36-75         | 12             | 1670             | 527                        | 83                      | 2200                         |
| RP20-4815SE    | 36-75         | 15             | 1330             | 527                        | 83                      | 755                          |
| RP20-4805DE    | 36-75         | $\pm$ 5        | $\pm$ 2000       | 541                        | 81                      | $\pm$ 3400                   |
| RP20-4812DE    | 36-75         | $\pm$ 12       | $\pm$ 833        | 514                        | 85                      | $\pm$ 680                    |
| RP20-4815DE    | 36-75         | $\pm$ 15       | $\pm$ 666        | 508                        | 86                      | $\pm$ 450                    |
| RP20-483.312TE | 36-75         | 3.3 / $\pm$ 12 | 3000 / $\pm$ 300 | 468                        | 80                      | 4700 / $\pm$ 220             |
| RP20-483.315TE | 36-75         | 3.3 / $\pm$ 15 | 3000 / $\pm$ 250 | 477                        | 80                      | 4700 / $\pm$ 220             |
| RP20-480512TE  | 36-75         | 5 / $\pm$ 12   | 2000 / $\pm$ 300 | 459                        | 82                      | 4700 / $\pm$ 220             |
| RP20-480515TE  | 36-75         | 5 / $\pm$ 15   | 2000 / $\pm$ 250 | 467                        | 82                      | 4700 / $\pm$ 220             |

RP20-243.305DE  
RP20-483.305DE, output 3.3V(3A)/5V(2A), for detailed spec. contact Recom

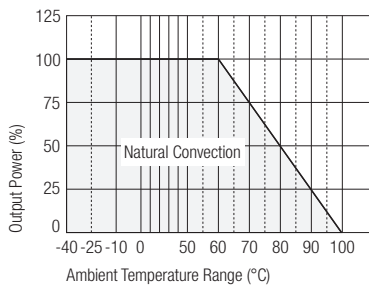
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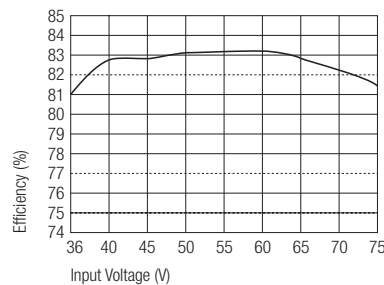
E-Series, 20W, 1.6 kV Isolation, 2:1 Wide Input Range (Single, Dual & Triple Output)

## RP20-4805SE: Derating & Efficiency Curves

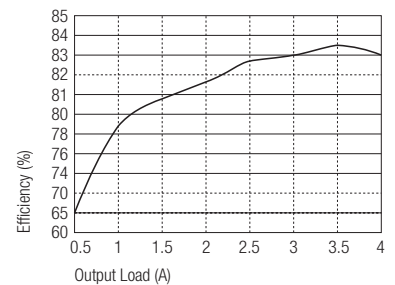
RP20-4805SE Derating Curve



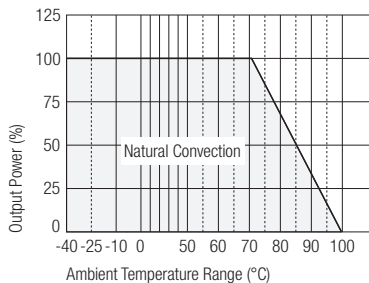
RP20-4805SE Efficiency vs Input Voltage



RP20-4805SE Efficiency vs Output Load



RP20-4805SE Derating Curve with Heat Sink (see note 3)



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

|   |                  |                            |
|---|------------------|----------------------------|
| Output Power  |                  | 20W max.                   |
| Voltage Accuracy (full Load and nominal Vin)            | Single & Dual    | ±2%                        |
|   | Triple 3.3V / 5V | ±2%                        |
|   | Auxiliary        | ±5%                        |
| Voltage Adjustability                                   |                  | ±10%                       |
| Minimum Load (see note 1)                               |                  | 10% of FL                  |
| Line Regulation (LL-HL at FL)                           | Single & Dual    | ±0.2%                      |
|   | Triple 3.3V / 5V | ±1%                        |
|   | Auxiliary        | ±5%                        |
| Load Regulation (10% to 100% FL)                        | Single           | ±0.5%                      |
|   | Dual             | ±3%                        |
|   | Triple 3.3V / 5V | ±2%                        |
|   | Auxiliary        | ±5%                        |
| Cross Regulation (see note 2)                           | Dual             | ±5%                        |
|   | Triple 3.3V / 5V | ±2%                        |
|   | Auxiliary        | ±5%                        |
| Ripple and Noise (20MHz BW)                             | Single           | 75mVp-p                    |
|   | Dual             | 100mVp-p                   |
|   | Triple 3.3V / 5V | 50mVp-p                    |
|   | Auxiliary        | 1% of Vout                 |
| Temperature Coefficient                                 |                  | ±0.02% / °C max.           |
| Transient Response Recovery Time (25% load step change) |                  | 500µsec                    |
| Over Voltage (zener diode clamp)                        | 3.3V output      | 3.9V                       |
|   | 5V output        | 6.2V                       |
|   | 12V output       | 15V                        |
|   | 15V output       | 18V                        |
| Short Circuit Protection                                |                  | Hiccup, automatic recovery |

continued on next page

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

|  |   |  |
|--|---|--|
| Input Voltage Range                                    | 12V types nominal input<br>24V types nominal input<br>48V types nominal input | 9-18VDC<br>18-36VDC<br>36-75VDC                                  |
| Input Filter   |   | Pi Type  |
| Input Surge Voltage (100 ms max.)                      | 12V input<br>24V input<br>48V input   | 36VDC<br>50VDC<br>100VDC   |
| Input Reflected Ripple (see note 3)                    | Nominal Vin and full load   | 25mA <sub>p-p</sub>  |
| Start Up Time (nominal Vin and constant resistor load) |   | 20ms typ.  |
| Remote ON/OFF (see note 4)                             | DC-DC ON<br>DC-DC OFF<br>Remote off input current                             | Open or $3.5V < V_r < 12V$<br>Short or $0V < V_r < 1.2V$<br>20mA |
| Efficiency   |   | See „Selection Guide“ table                                      |
| Isolation Voltage                                      |   | 1600VDC  |
| Isolation Resistance                                   |   | $10^9 \Omega$  |
| Isolation Capacitance                                  |   | 300pF max.   |
| Switching Frequency                                    |   | 300kHz typ.  |
| Approved to Safety Standards                           |   | UL 1950, EN60950   |
| Case Material  |   | Nickel-coated copper   |
| Base Material  |   | Non-conducted black plastic                                      |
| Potting Material                                       |   | Epoxy (UL94-V0)  |
| Weight   |   | 48g  |
| Dimensions   |   | 50.8 x 40.6 x 10.2 mm  |
| MTBF (see note 5)                                      |   | $1.928 \times 10^6$ Hours  |
| Operating Temperature Range                            |   | -40°C to +85°C (with derating)                                   |
| Maximum Case Temperature                               |   | +100°C   |
| Storage Temperature Range                              |   | -55°C to +105°C  |
| Thermal Impedance (see note 6)                         | Natural convection  | 10°C/Watt  |
| Thermal Shock  |   | MIL-STD-810D   |
| Vibration  |   | 10-55Hz, 2G, 30 Min. along X, Y and Z                            |
| Relative Humidity                                      |   | 5% to 95% RH   |
| Conducted Emissions                                    | EN55022   | Level A  |
| Radiated Emissions                                     | EN55022   | Level A  |
| Conducted Immunity                                     | EN61000-4-6   | Perf. Criteria 2   |
| Radiated Immunity                                      | EN61000-4-3   | Perf. Criteria 2   |
| Surge  | EN61000-4-5   | Perf. Criteria 2   |
| Fast Transient   | EN61000-4-4   | Perf. Criteria 2   |
| ESD  | EN61000-4-2   | Perf. Criteria 2   |

### Notes:

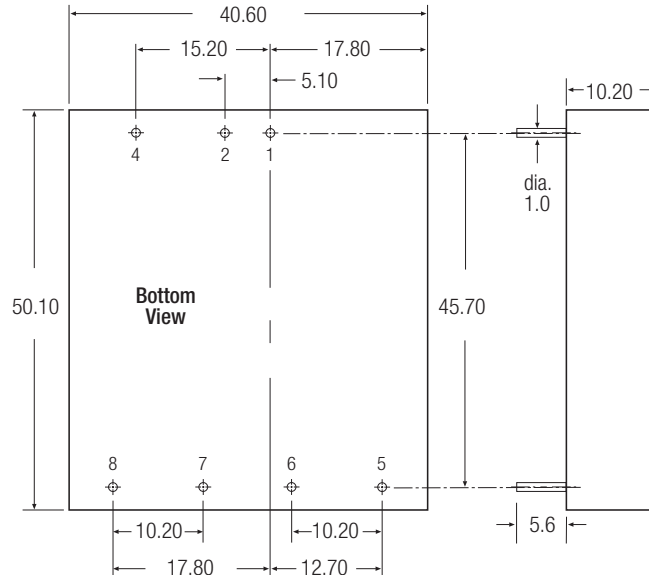
1. The RP20 series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
2. Cross regulation: Dual output – Asymmetrical load 25% to 100% full load.  
Triple output – 3.3V/ 5V 100% load and one of auxiliary 100% load, other auxiliary load change from 25% to 100% load.
3. Simulated source impedance of 12uH. 12uH inductor in series with +Vin.
4. The ON/OFF control pin voltage is referenced to negative input.
5. BELLCORE TR-NWT-00332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment).
6. Heat sink is optional and P/N: 7G-0011A. Operation temperature range please see curve.
7. Maximum value at nominal input voltage and full load.
8. Typical value at nominal input voltage and full load.
9. The RP20-243.305DE and RP20-483.305DE are safety approval pending.

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## Package Style and Pinning (mm)



### Pin Connections

| Pin # | Single | Dual   | Triple      |
|-------|--------|--------|-------------|
| 1     | +Vin   | +Vin   | +Vin        |
| 2     | -Vin   | -Vin   | -Vin        |
| 4     | Ctrl   | Ctrl   | Ctrl        |
| 5     | No Pin | +Vout  | +Aux        |
| 6     | +Vout  | Common | +3.3V / +5V |
| 7     | -Vout  | -Vout  | Common      |
| 8     | Trim   | Trim   | -Aux        |

Pin Pitch Tolerance  $\pm 0.35$  mm

## External Output Trimming

| Single | Dual |
|--------|------|
| 7      | 7    |
| 8      | 8    |
| 6      | 5    |

