

## Features

## ICE Technology\*

- Up to 97°C Ambient, no derating
- 120°C Maximum Case Temperature
- -45°C Minimum Operating Temperature
- Built-in FCC/EN55022 Class B Filter
- 4:1 Wide Input Voltage Range
- Six Sided Shielded Enclosure
- Compact 40.6x25.4x11.7mm Package
- Efficiency to >89%
- 2kVDC Isolation
- Fully Protected
- Low Quiescent Current

## POWERLINE+ DC/DC-Converter

**RECOM**

## 20 Watt Single & Dual Output

### Description

The RPP20-W series 4:1 input range DC/DC converters are ideal for high end industrial applications and COTS Military applications where a high ambient operating temperature converter is required.

Although the case size is compact, the converter contains a built-in EN55022 Class B / FCC Level B EMC filter without the need for any external components.

### Selection Guide 24V and 48V 4:1 Input Types

| Part Number   | Input Range VDC | Output Voltage VDC | Output Current mA | Input <sup>(1)</sup> Current mA | Efficiency <sup>(2)</sup> | Max <sup>(3)</sup> Operating Temp |
|---------------|-----------------|--------------------|-------------------|---------------------------------|---------------------------|-----------------------------------|
| RPP20-243.3SW | 9-36            | 3.3                | 6000              | 59/955                          | 87.2%                     | 93°C                              |
| RPP20-2405SW  | 9-36            | 5                  | 4000              | 65/946                          | 88.1%                     | 95°C                              |
| RPP20-2412SW  | 9-36            | 12                 | 1666              | 23/946                          | 88.1%                     | 95°C                              |
| RPP20-2415SW  | 9-36            | 15                 | 1333              | 25/931                          | 89.5%                     | 97°C                              |
| RPP20-483.3SW | 18-75           | 3.3                | 6000              | 28/465                          | 89.6%                     | 97°C                              |
| RPP20-4805SW  | 18-75           | 5                  | 4000              | 33/465                          | 89.6%                     | 97°C                              |
| RPP20-4812SW  | 18-75           | 12                 | 1666              | 13/470                          | 88.6%                     | 96°C                              |
| RPP20-4815SW  | 18-75           | 15                 | 1333              | 12/466                          | 89.3%                     | 97°C                              |
| RPP20-2405DW  | 9-36            | ±5                 | ±2000             | 23/946                          | 88.1%                     | 95°C                              |
| RPP20-2412DW  | 9-36            | ±12                | ±833              | 28/930                          | 89.6%                     | 97°C                              |
| RPP20-2415DW  | 9-36            | ±15                | ±666              | 24/946                          | 88.0%                     | 95°C                              |
| RPP20-4805DW  | 18-75           | ±5                 | ±2000             | 13/470                          | 88.6%                     | 96°C                              |
| RPP20-4812DW  | 18-75           | ±12                | ±833              | 16/472                          | 88.2%                     | 95°C                              |
| RPP20-4815DW  | 18-75           | ±15                | ±666              | 13/466                          | 89.4%                     | 97°C                              |

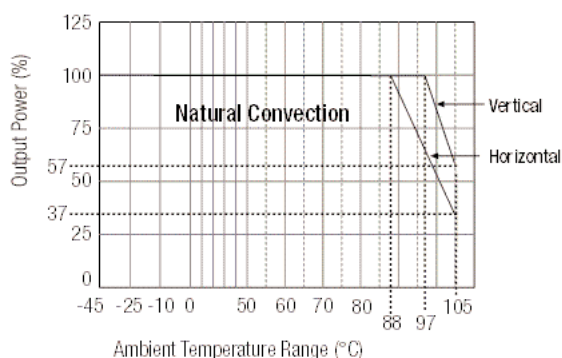


**UL-60950-1 Pending**

# RPP20-W

### Derating Graph (Ambient Temperature)

#### RPP20-2405SW



Derating graphs are valid only for the shown part number. Please contact Technical Support for more information:  
[info@recom-development.at](mailto:info@recom-development.at)

### \* ICE Technology

**ICE (Innovation in Converter Excellence)** uses state-of-the-art techniques to minimise internal power dissipation and to increase the internal temperature limits to extend the ambient operating temperature range to the maximum. Refer to end of section for more details.

Refer to Application Notes

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

|                                                                              |                                                             |                                                                      |
|------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------|
| Input Voltage Range                                                          | 24V nominal input                                           | 9-36VDC                                                              |
|                                                                              | 48V nominal input                                           | 18-75VDC                                                             |
| Under Voltage Lockout                                                        | 24V input                                                   | DC-DC ON (min.) 8.5VDC<br>DC-DC OFF (max.) 8VDC                      |
|                                                                              | 48V input                                                   | DC-DC ON (min.) 17.5VDC<br>DC-DC OFF (max.) 17VDC                    |
| Input Filter                                                                 | Common Mode EMC Filter                                      |                                                                      |
| Input Voltage Variation dv/dt (Complies with ETS300 132 part 4.4)            | 5V/ms max                                                   |                                                                      |
| Input Surge Voltage (100 ms max.)                                            | 24V Input                                                   | 50VDC                                                                |
|                                                                              | 48V Input                                                   | 100VDC                                                               |
| Input Reflected Ripple                                                       | nominal Vin and full load                                   | 20mA <sub>p-p</sub>                                                  |
| Start Up Time                                                                | nominal Vin and constant resistor load                      | 2ms typ., 5ms max.                                                   |
| Remote ON/OFF <sup>(4)</sup>                                                 | DC-DC ON                                                    | Open or 3.0V < Vr < 5.5V                                             |
|                                                                              | DC-DC OFF                                                   | Short or 0V < Vr < 1.2V                                              |
| Remote OFF input current                                                     | Nominal input                                               | 2mA typ.                                                             |
| Output Power                                                                 | 20W max.                                                    |                                                                      |
| Output Voltage Accuracy                                                      | 50% Load and nominal Vin                                    | ±1.5%                                                                |
| Voltage Adjustability                                                        | Single Output only                                          | ±5%                                                                  |
| Minimum Load                                                                 | 0%                                                          |                                                                      |
| Line Regulation                                                              | low line, high line at full load                            | ±0.3%                                                                |
| Load Regulation                                                              | 10% to 100% full load                                       | ±0.5%                                                                |
| Cross Regulation (10% <> 100% Load)                                          | Dual Outputs only                                           | 3% typ. / 5% max.                                                    |
| Ripple and Noise (20MHz bandwidth limited)                                   | 3.3V                                                        | 100mV <sub>p-p</sub> typ.                                            |
| (measured with 1µF capacitor across outputs)                                 | All others                                                  | 40mV-75mV <sub>p-p</sub> typ.                                        |
| Temperature Coefficient                                                      | ±0.04%/°C max.                                              |                                                                      |
| Transient Response                                                           | 25% load step change                                        | 800µs                                                                |
| Over Load Protection                                                         | % of full load at nominal Vin                               | 120% typ.                                                            |
| Short Circuit Protection                                                     | Current limit, automatic recovery                           |                                                                      |
| Output Over Voltage Protection (refer to block diagram in Application Notes) | Converter shutdown if Vout > Vout nominal + 20%             |                                                                      |
| Isolation Voltage                                                            | Rated at 1600VDC/1 minute, Flash tested at 2000VDC/1 second |                                                                      |
| Isolation Resistance                                                         | 10MΩ min.                                                   |                                                                      |
| Isolation Capacitance (refer to block diagram in Application Notes)          | 1500pF max.                                                 |                                                                      |
| Operating Frequency                                                          | 260kHz ± 40kHz                                              |                                                                      |
| Operating Temperature Range                                                  | Ambient, Free Convection                                    | -45°C to +97°C (without derating)<br>-45°C to +105°C (with derating) |
| Maximum Case Temperature                                                     | +120°C                                                      |                                                                      |
| Storage Temperature Range                                                    | -55°C to +125°C                                             |                                                                      |
| Over Temperature Protection (refer to block diagram in Application Notes)    | internal thermistor                                         |                                                                      |
| Thermal Impedance                                                            | Vertical                                                    | 7.5°C/Watt                                                           |
| (Natural convection)                                                         | Horizontal                                                  | 11.5°C/Watt                                                          |
| Relative Humidity                                                            | 5% to 95% RH                                                |                                                                      |
| Case Material <sup>(7)</sup>                                                 | Aluminium                                                   |                                                                      |
| Potting Material                                                             | Silicone (UL94-V0)                                          |                                                                      |
| Weight                                                                       | 26g                                                         |                                                                      |
| Dimensions                                                                   | 1.6" x 1" x 0.48" (40.6 x 25.4 x 11.7mm)                    |                                                                      |

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

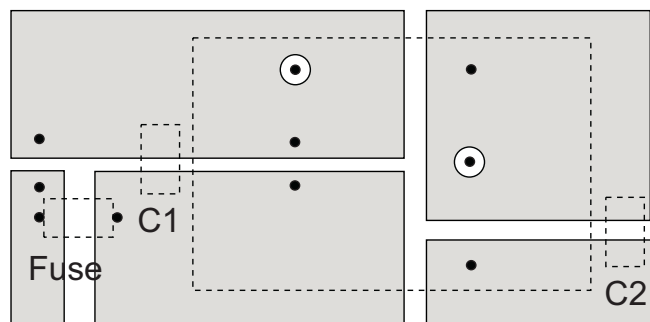
|                                                                    |                                        |                  |
|--------------------------------------------------------------------|----------------------------------------|------------------|
| Safety Standards                                                   | UL-60950-1 Pending                     |                  |
| Thermal Cycling                                                    | complies with MIL-STD-810F             |                  |
| Vibration                                                          | 10-55Hz, 12G, 30 Min. along X, Y and Z |                  |
| Conducted Emissions                                                | EN55022                                | Class B          |
| Radiated Emissions                                                 | EN55022                                | Class B          |
| ESD                                                                | EN61000-4-2                            | Perf. Criteria B |
| Radiated Immunity                                                  | EN61000-4-3                            | Perf. Criteria A |
| Fast Transient <sup>(5)</sup>                                      | EN61000-4-4                            | Perf. Criteria B |
| Surge <sup>(5)</sup>                                               | EN61000-4-5                            | Perf. Criteria B |
| Conducted Immunity                                                 | EN61000-4-6                            | Perf. Criteria A |
| MTBF calculated according to BELLCORE TR-NWT-000332 <sup>(6)</sup> | 2195 x 10 <sup>3</sup> hours           |                  |

**Notes :**

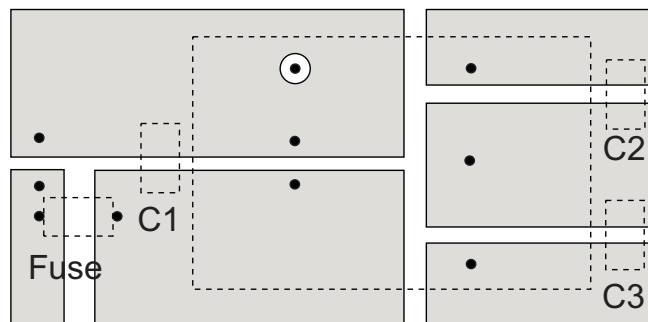
1. Typical values at nominal input voltage and no load/full load.
2. Typical values at nominal input voltage and full load.
3. Typical values at nominal input voltage and full load in vertical orientation and with Eurocard-sized PCB ground planes to assist in heat dissipation.  
For horizontal orientation, reduce the maximum temperatures by 10°C.
4. The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to negative input.  
Positive logic ON/OFF is standard, no suffix (Ex. RPP20-2405SW)  
Negative logic ON/OFF option has suffix /N (Ex. RPP20-2405SW/N)
5. Requires an external 100µF/100V low ESR capacitor to meet EN61000-4-4 and EN61000-4-5
6. Case I: 50% Stress, Temperature at 50°C (Ground Benign).
7. To ensure a good all-round electrical contact, the baseplate is pressed firmly into place within the aluminium housing. The hydraulic press can leave tooling marks and deformations to both the housing and baseplate. The case is anodised aluminium, so there will be natural variations in the case colour and the aluminium is not scratch resistant. Any resultant marks, scratches and colour variations are cosmetic only and do not affect the operation or performance of the converters.

**Recommended PCB Layout**

**Single Output**



**Dual Output**



Input Fuse is recommended, but optional. Recommended fuse rating = double maximum input current, time delay type.

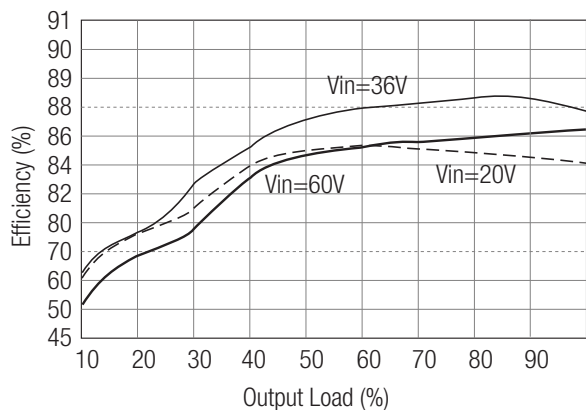
Input Capacitor, C1, is required to meet EN61000 Surge and Fast Transient, otherwise it is not required for normal operation.

Output Capacitors C2/C3 are recommended, but not required for normal operation. Typical capacitor values are 1µF/100V MLCC

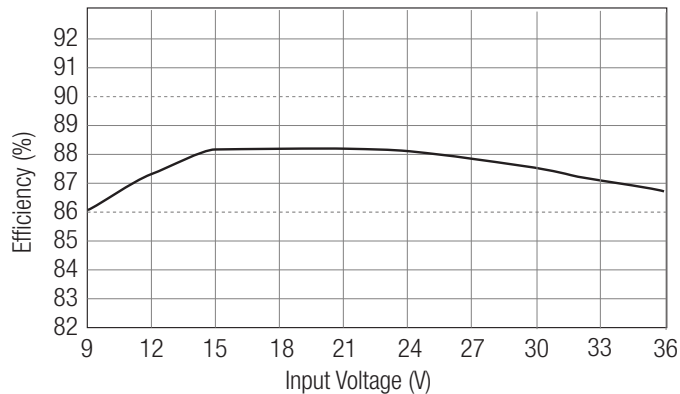
To ensure optimum thermal performance, use large areas of copper on the PCB to assist with heat dissipation and mount the converter vertically.

## RPP20-2405SW

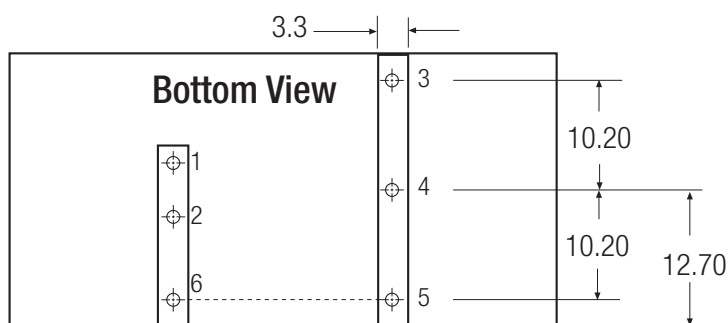
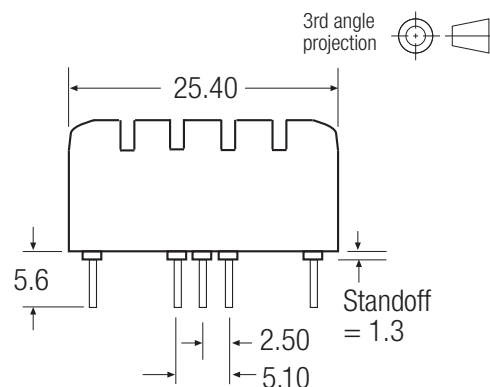
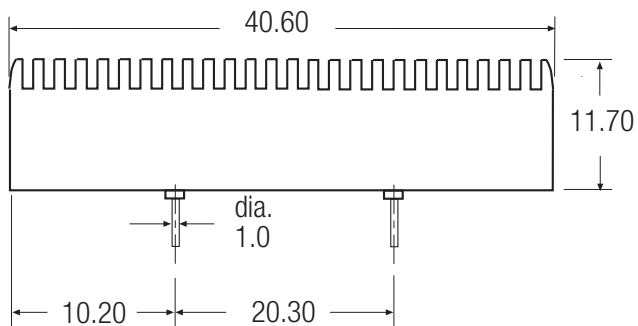
Efficiency VS Output Load



Efficiency VS Input Voltage



## Package Style and Pinning (mm)



Pin Connections

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

Pin Pitch Tolerance  $\pm 0.35$  mm

**External Output Trimming**  
Refer To Application Notes for  
recommended resistor Values

