

## Features

- 2:1 Wide Input Voltage Range
- 20 Watts Output Power
- 1.6kVDC Isolation
- UL Certified
- Fixed Operating Frequency
- Six-Sided Continuous Shield
- Standard 50.8 x25.4x10.2mm Package
- Efficiency to 89%

## Description

The RP20-F series DC/DC converters are certified to UL 60950-1 and to 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.

## 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. |
|--------------|-----------------|--------------------|-------------------|---------------------------------|-----------------------------|-------------------------------------|
| RP20-123.3SF | 9-18            | 3.3                | 5000              | 1719                            | 84                          | 13000µF                             |
| RP20-1205SF  | 9-18            | 5                  | 4000              | 2008                            | 87                          | 6800µF                              |
| RP20-1212SF  | 9-18            | 12                 | 1670              | 2062                            | 85                          | 2200µF                              |
| RP20-1215SF  | 9-18            | 15                 | 1330              | 2052                            | 85                          | 755µF                               |
| RP20-243.3SF | 18-36           | 3.3                | 5000              | 838                             | 86                          | 13000µF                             |
| RP20-2405SF  | 18-36           | 5                  | 4000              | 980                             | 89                          | 6800µF                              |
| RP20-2412SF  | 18-36           | 12                 | 1670              | 1006                            | 87                          | 2200µF                              |
| RP20-2415SF  | 18-36           | 15                 | 1330              | 1002                            | 87                          | 755µF                               |
| RP20-483.3SF | 36-75           | 3.3                | 5000              | 414                             | 87                          | 13000µF                             |
| RP20-4805SF  | 36-75           | 5                  | 4000              | 490                             | 89                          | 6800µF                              |
| RP20-4812SF  | 36-75           | 12                 | 1670              | 497                             | 88                          | 2200µF                              |
| RP20-4815SF  | 36-75           | 15                 | 1330              | 500                             | 87                          | 755µF                               |
| RP20-1212DF  | 9-18            | ±12                | ±833              | 2032                            | 86                          | ±680µF                              |
| RP20-1215DF  | 9-18            | ±15                | ±667              | 2034                            | 86                          | ±450µF                              |
| RP20-2412DF  | 18-36           | ±12                | ±833              | 1004                            | 87                          | ±680µF                              |
| RP20-2415DF  | 18-36           | ±15                | ±667              | 1005                            | 87                          | ±450µF                              |
| RP20-4812DF  | 36-75           | ±12                | ±833              | 496                             | 88                          | ±680µF                              |
| RP20-4815DF  | 36-75           | ±15                | ±667              | 502                             | 87                          | ±450µF                              |

\* no suffix for CTRL function with Positive Logic (1=ON, 0=OFF), this is standard

\* add /N for CTRL function with Negative Logic (0=ON, 1=OFF)

\* add suffix -HC for premounted heatsink and clips

## Ordering Examples

RP20-2405SF = 24V Input, 5V Output, Positive Logic CTRL pin fitted

RP20-4812DF/N-HC = 48V Input, ±12V Output, Negative Logic CTRL pin fitted, Heatsink fitted

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)

## POWERLINE

DC/DC-Converter

with 3 year Warranty

RECOM

20 Watt

2" x 1"

Single &

Dual Output

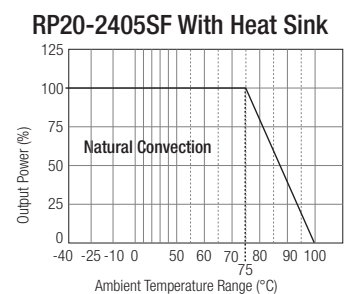
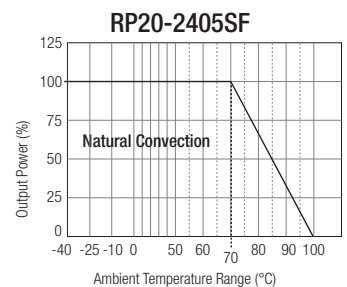


**UL-60950-1 Certified**  
**E196683**

**RP20-F**

## Derating-Graph

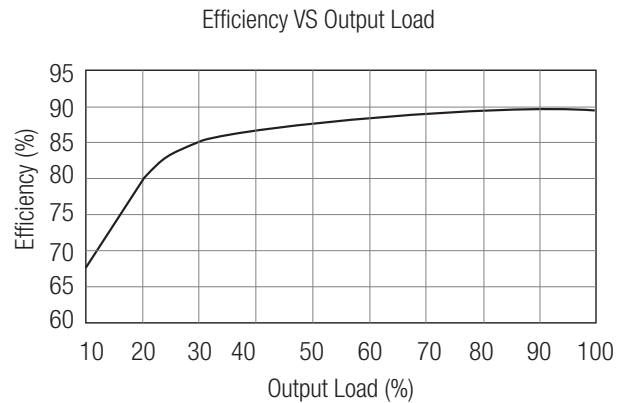
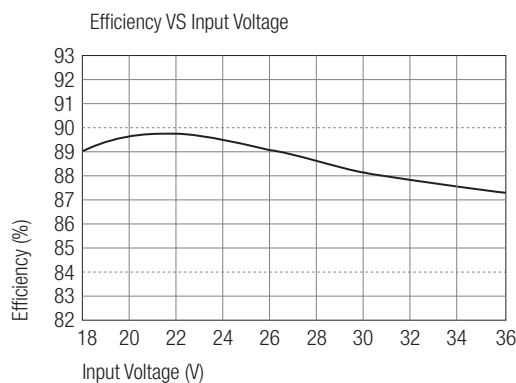
(Ambient Temperature)



**Refer to Application Notes**

## Typical Characteristics

### RP20-2405SF



## 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 <sup>(9)</sup>                                                                      | L-C Type                            |                         |
| Input Voltage Variation dv/dt                                                                    | (Complies with ETS300 132 part 4.4) | 5V/ms max               |
| 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>                                | 20mA <sub>p-p</sub>                 |                         |
| Start Up Time (nominal Vin and constant resistor load)                                           | 10ms typ.                           |                         |
| Remote ON/OFF <sup>(7)</sup>                                                                     | DC-DC ON                            | Open or 3.0V < Vr < 12V |
|                                                                                                  | DC-DC OFF                           | Short or 0V < Vr < 1.2V |
| Remote OFF input current                                                                         | Nominal input                       | 2.5mA                   |
| Output Power                                                                                     | 20W max.                            |                         |
| Output Voltage Accuracy (full Load and nominal Vin)                                              | ±1%                                 |                         |
| Voltage Adjustability                                                                            | ±10%                                |                         |
| Minimum Load <sup>(1)</sup>                                                                      | Single                              | 0%                      |
|                                                                                                  | Dual                                | 10% of full load        |
| Line Regulation (low line, high line at full load)                                               | ±0.2%                               |                         |
| Load Regulation (25% to 100% full load)                                                          | ±0.5%                               |                         |
| Cross Regulation (asymmetrical 25% <-> 100% load)                                                | Dual                                | ±5%                     |
| Ripple and Noise (20MHz bandwidth, with 1µF MLCC on output)<br>(Measured with a 1004pF/50V MLCC) | Single 1.5, 1.8, 2.5, 3.3V          | 60mV <sub>p-p</sub>     |
|                                                                                                  | Single 5, 12, 15V                   | 75mV <sub>p-p</sub>     |
|                                                                                                  | Dual 5, 12, 15V                     | 100mV <sub>p-p</sub>    |

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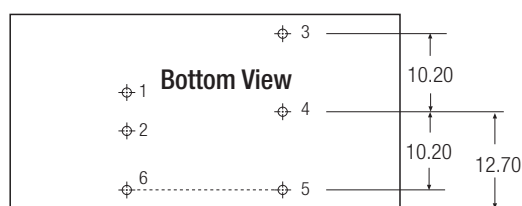
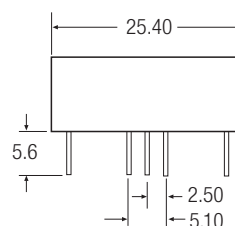
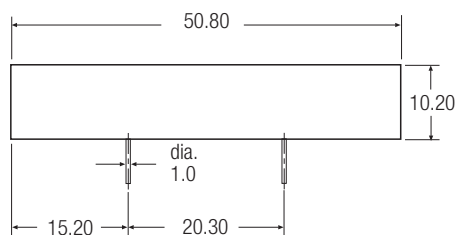
**Specifications** (typical at nominal input and 25°C unless otherwise noted)

|                                                      |                                        |                                        |
|------------------------------------------------------|----------------------------------------|----------------------------------------|
| Temperature Coefficient                              |                                        | ±0.02%/°C max.                         |
| Transient Response (25% load step change)            |                                        | 500µs                                  |
| Over Voltage Protection                              | 1.5, 1.8, 2.5, 3.3V                    | 3.9V                                   |
| Zener diode clamp (only single)                      | 5V                                     | 6.2V                                   |
|                                                      | 12V                                    | 15V                                    |
|                                                      | 15V                                    | 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                                    | Input to Output                        | 1600VDC                                |
| (rated for one minute)                               | Input (Output) to case                 | 1600VDC                                |
| Isolation Resistance                                 |                                        | 1 GΩ min.                              |
| Isolation Capacitance                                |                                        | 1000pF max.                            |
| Operating Frequency                                  |                                        | 500kHz typ.                            |
| Operating Temperature Range                          |                                        | -40°C to +85°C(with derating)          |
| Maximum Case Temperature                             |                                        | +100°C                                 |
| Storage Temperature Range                            |                                        | -55°C to +125°C                        |
| 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>(9, 10)</sup>               | EN55022                                | Class A                                |
| Radiated Emissions                                   | EN55022                                | Class 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>                                  |                                        | 1791 x 10 <sup>3</sup> hours           |

## Notes :

1. The RP20-S\_DF 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. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).
3. Simulated source impedance of 12μH. 12μH inductor in series with +Vin.
4. Maximum value at nominal input voltage and full load of standard type.
5. Typical value at nominal input voltage and full load.
6. Test by minimum Vin and constant resistor load.
7. 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. RP20-2405SF)  
Negative logic ON/OFF is marked with suffix-N (Ex. RP20-2405SF/N).
8. Heat sink is optional and P/N: 7G-0020-C. Powerline DC/DC Converters can be ordered with pre-mounted heatsinks including antivibration fixing clips (add suffix -HC). See Application Notes for heatsink details.
9. An external filter capacitor is required for normal operation. The capacitor should be capable of handling 1A ripple current for 48V/24V models.  
RECOM suggest: Nippon chemi-con KY series, 220μF/100V, ESR 90m Ω.
10. See application notes for Class B common mode filter suggestion.

## 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

Output can be externally trimmed by using the method shown below. See Application Notes for details.

