

## Features

- 2:1 Wide Input Voltage Range
- 30 Watts Output Power
- 1.6kVDC Isolation
- UL Pending
- Fixed Operating Frequency
- Six-Sided Continuous Shield
- Standard 50.8 x 25.4 x 10.2mm Package
- Efficiency to 91%

## Description

The RP30-F series DC/DC converters are designed to meet 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 | Output Voltage | Output Current | Input Current <sup>(4)</sup> |           | Efficiency <sup>(5)</sup> | Capacitive <sup>(6)</sup> |
|--------------|-------------|----------------|----------------|------------------------------|-----------|---------------------------|---------------------------|
|              | VDC         | VDC            | mA             | No Load                      | Full Load | %                         | Load max.                 |
| RP30-123.3SF | 9-18        | 3.3            | 8000           | 90                           | 2716      | 85                        | 20000µF                   |
| RP30-1205SF  | 9-18        | 5              | 6000           | 130                          | 3012      | 87                        | 14400µF                   |
| RP30-1212SF  | 9-18        | 12             | 2500           | 90                           | 2941      | 89                        | 3000µF                    |
| RP30-1215SF  | 9-18        | 15             | 2000           | 80                           | 2941      | 89                        | 2000µF                    |
| RP30-243.3SF | 18-36       | 3.3            | 8000           | 50                           | 1325      | 87                        | 20000µF                   |
| RP30-2405SF  | 18-36       | 5              | 6000           | 75                           | 1453      | 90                        | 14400µF                   |
| RP30-2412SF  | 18-36       | 12             | 2500           | 40                           | 1437      | 91                        | 3000µF                    |
| RP30-2415SF  | 18-36       | 15             | 2000           | 30                           | 1437      | 91                        | 2000µF                    |
| RP30-483.3SF | 36-75       | 3.3            | 8000           | 30                           | 663       | 87                        | 20000µF                   |
| RP30-4805SF  | 36-75       | 5              | 6000           | 45                           | 727       | 90                        | 14400µF                   |
| RP30-4812SF  | 36-75       | 12             | 2500           | 40                           | 718       | 91                        | 3000µF                    |
| RP30-4815SF  | 36-75       | 15             | 2000           | 40                           | 718       | 91                        | 2000µF                    |
| RP30-1205DF  | 9-18        | ±5             | ±3000          | 90                           | 3012      | 87                        | ±3000µF                   |
| RP30-1212DF  | 9-18        | ±12            | ±1250          | 50                           | 3012      | 87                        | ±2000µF                   |
| RP30-1215DF  | 9-18        | ±15            | ±1000          | 40                           | 3012      | 87                        | ±1300µF                   |
| RP30-2405DF  | 18-36       | ±5             | ±3000          | 70                           | 1453      | 90                        | ±3000µF                   |
| RP30-2412DF  | 18-36       | ±12            | ±1250          | 30                           | 1471      | 89                        | ±2000µF                   |
| RP30-2415DF  | 18-36       | ±15            | ±1000          | 30                           | 1453      | 90                        | ±1300µF                   |
| RP30-4805DF  | 36-75       | ±5             | ±3000          | 35                           | 727       | 90                        | ±3000µF                   |
| RP30-4812DF  | 36-75       | ±12            | ±1250          | 30                           | 744       | 88                        | ±2000µF                   |
| RP30-4815DF  | 36-75       | ±15            | ±1000          | 20                           | 735       | 89                        | ±1300µF                   |

\* 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

RP30-2405SF = 24V Input, 5V Output, Positive Logic CTRL pin fitted

RP30-4812DF/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

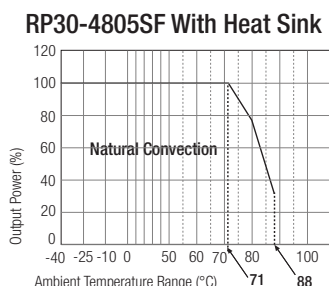
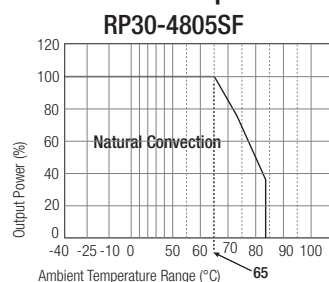
## 30 Watt 2" x 1" Package Single & Dual Output



**UL-60950-1 Certified  
E196683**

## RP30-F

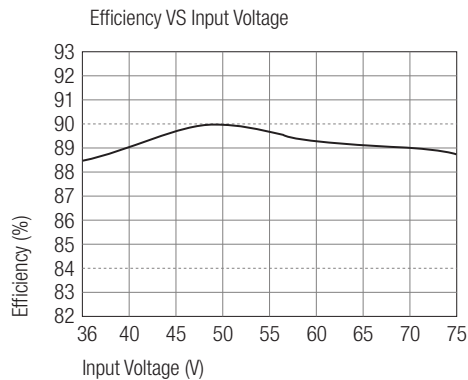
## Derating-Graph (Ambient Temperature)



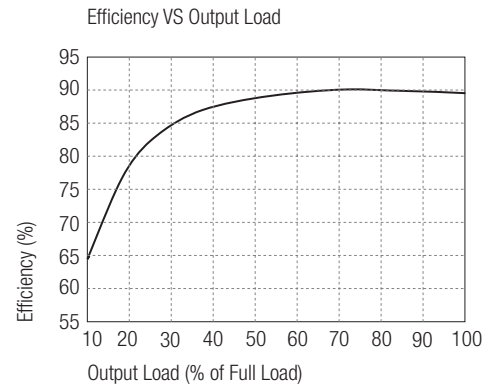
**Refer to Application Notes**

## Typical Characteristics

### RP30-4805SF



### RP30-4805SF



## 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           | 25VDC                   |
|                                                                   | 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)            | Power up            | 30ms typ.               |
|                                                                   | Remote ON/OFF       | 30ms typ.               |
| Start-up voltage                                                  | 12V Input           | 9VDC                    |
|                                                                   | 24V Input           | 18VDC                   |
|                                                                   | 48V Input           | 36VDC                   |
| Shutdown voltage                                                  | 12V Input           | 8VDC                    |
|                                                                   | 24V Input           | 16VDC                   |
|                                                                   | 48V Input           | 32VDC                   |
| Remote ON/OFF <sup>(7)</sup>                                      |                     |                         |
| (Positive logic)(Standard)                                        | DC-DC ON            | Open or 3V < Vr < 12V   |
|                                                                   | DC-DC OFF           | Short or 0V < Vr < 1.2V |
| (Negative logic)(Option)                                          | DC-DC ON            | Short or 0V < Vr < 1.2V |
|                                                                   | DC-DC OFF           | Open or 3V < Vr < 12V   |
| Input current of Remote control pin                               | Nominal input       | -0.5mA ~ +0.5mA         |
| Remote OFF state input current                                    | Nominal input       | 3mA                     |
| Output Power                                                      | 30W max.            |                         |
| Output Voltage Accuracy (full Load and nominal Vin)               | ±1%                 |                         |
| Voltage Adjustability                                             | ±10%                |                         |
| Minimum Load                                                      | 0%                  |                         |
| Line Regulation (low line, high line at full load)                | ±0.2%               |                         |

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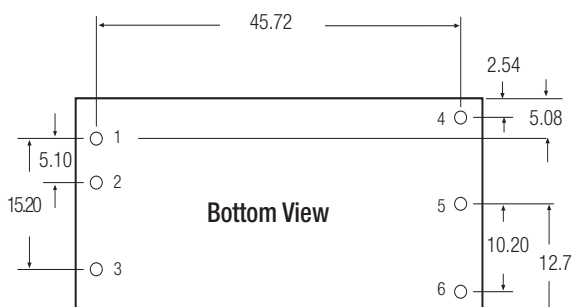
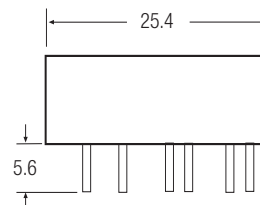
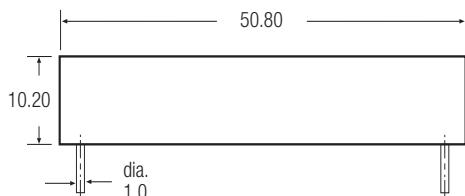
**Specifications** (typical at nominal input and 25°C unless otherwise noted)

|                                                                                               |                                                         |                                                                   |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------|
| Load Regulation (No load to full load)                                                        | Single<br>Dual                                          | ±0.5%<br>±1%                                                      |
| Cross Regulation (asymmetrical 25% <> 100% load)                                              | Dual                                                    | ±5%                                                               |
| Ripple and Noise (20MHz bandwidth, with 1µF MLCC on output)<br>(Measured with a 1µF/50V MLCC) | 3.3, 5V<br>12, 15V                                      | 100mVp-p<br>150mVp-p                                              |
| Temperature Coefficient                                                                       |                                                         | ±0.02%/°C max.                                                    |
| Transient Response (25% load step change)                                                     |                                                         | 250µs                                                             |
| Over Voltage Protection                                                                       | 3.3V                                                    | 3.9V                                                              |
| Zener diode clamp (only single)                                                               | 5V, ±5V<br>12V, ±12V<br>15V, ±15V                       | 6.2V<br>15V<br>18V                                                |
| Over Load Protection (% of full load at nominal Vin)                                          |                                                         | 150% typ                                                          |
| Short Circuit Protection                                                                      |                                                         | Hiccup, automatic recovery                                        |
| Efficiency                                                                                    |                                                         | see „Selection Guide“ table                                       |
| Isolation Voltage<br>(rated for one minute)                                                   | Input to Output<br>Input (Output) to case               | 1600VDC<br>1600VDC                                                |
| Isolation Resistance                                                                          |                                                         | 1GΩ min.                                                          |
| Isolation Capacitance                                                                         |                                                         | 1500pF max.                                                       |
| Operating Frequency                                                                           |                                                         | 430kHz typ.                                                       |
| Operating Temperature Range                                                                   |                                                         | -40°C to +50°C(without derating)<br>-40°C to +85°C(with derating) |
| Maximum Case Temperature                                                                      |                                                         | +105°C                                                            |
| Storage Temperature Range                                                                     |                                                         | -55°C to +125°C                                                   |
| Over Temperature Protection                                                                   |                                                         | +115°C typ.                                                       |
| Thermal Impedance <sup>(8)</sup>                                                              | Natural convection<br>Natural convection with Heat Sink | 12°C/Watt<br>10°C/Watt                                            |
| Thermal Shock                                                                                 |                                                         | MIL-STD-810F                                                      |
| Vibration                                                                                     |                                                         | MIL-STD-810F                                                      |
| Relative Humidity                                                                             |                                                         | 5% to 95% RH                                                      |
| Case Material                                                                                 |                                                         | Nickel plated copper                                              |
| Base Material                                                                                 |                                                         | FR4 PCB                                                           |
| Potting Material                                                                              |                                                         | Epoxy (UL94-V0)                                                   |
| Conducted Emissions <sup>(10)</sup>                                                           | EN55022                                                 | Class A                                                           |
| Radiated Emissions                                                                            | EN55022                                                 | Class B                                                           |
| ESD                                                                                           | EN61000-4-2                                             | Air ±8KV Perf. Criteria A                                         |
|                                                                                               | EN61000-4-2                                             | Contact ±6KV Perf. Criteria A                                     |
| Radiated Immunity                                                                             | EN61000-4-3                                             | 10V/m Perf. Criteria A                                            |
| Fast Transient <sup>(9)</sup>                                                                 | EN61000-4-4                                             | ±2KV Perf. Criteria A                                             |
| Surge <sup>(9)</sup>                                                                          | EN61000-4-5                                             | ±1KV Perf. Criteria A                                             |
| Conducted Immunity                                                                            | EN61000-4-6                                             | 10 Vr.m.s Perf. Criteria A                                        |
| Weight                                                                                        |                                                         | 30.5g                                                             |
| 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>                                                                           | Belcore-TR-NWT-000332<br>MIL-HDBK-217F                  | 3.173 x 10 <sup>6</sup> hours<br>5.548 x 10 <sup>5</sup> hours    |

## Notes :

1. The RP30-S\_DF series does not require any minimum load.
2. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment)  
MIL-HDBK-217F Notice2 @ TA= 25°C, Full load (Ground, Benign, controlled environment)
3. Simulated source impedance of 12μH. 12μH inductor in series with +Vin.
4. Typical value at nominal input voltage and no load of standard type  
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. RP30-2405SF)  
Negative logic ON/OFF is marked with suffix-N (Ex. R320-2405SF/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 if the module has to meet EN61000-4-4,EN61000-4-5.  
The filter capacitor RECOM suggest: 12Vin & 24Vin : Nippon chemi-con KY series, 330μF/50V, ESR 55mΩ.  
48Vin : Nippon chemi-con KY series, 220μF/100V, ESR 48mΩ.
10. Meets class A with external components shown below. See application notes for Class B common mode filter suggestion

## Package Style and Pinning (mm)

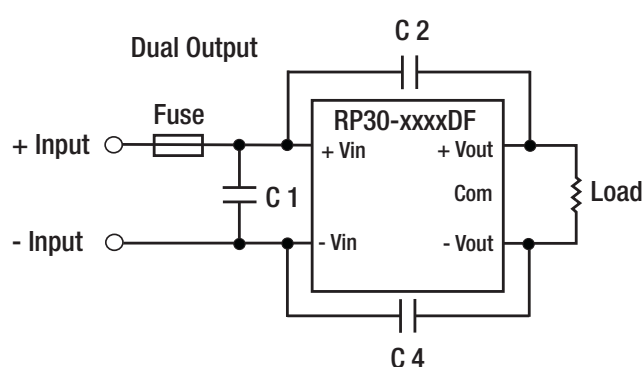
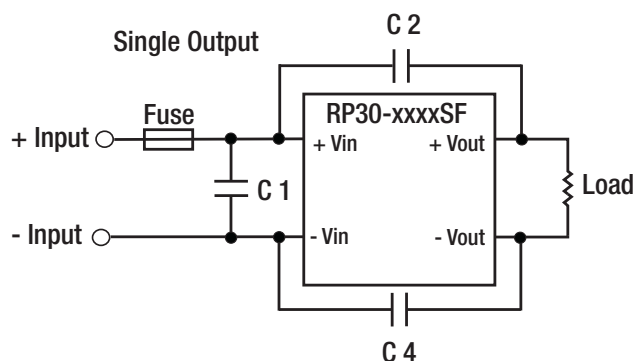


### Pin Connections

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

Pin Pitch Tolerance  $\pm 0.25$  mm

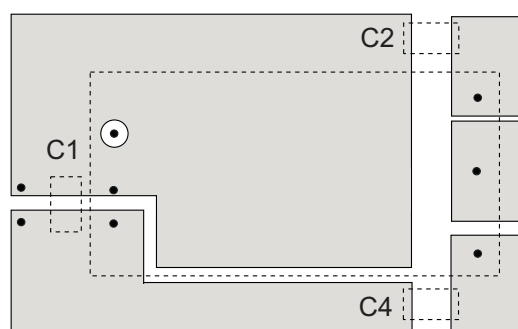
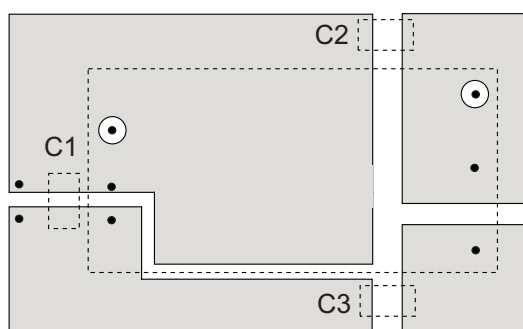
EMC Filtering - For Class A filter suggestion, see Application Notes



| Single Output | C1                         | C2 & C3              |
|---------------|----------------------------|----------------------|
| RP30-12xxSF   | 10 $\mu$ F/25V 1812 MLCC   | 1000pF/2KV 1808 MLCC |
| RP30-24xxSF   | 6.8 $\mu$ F/50V 1812 MLCC  | 1000pF/2KV 1808 MLCC |
| RP30-48xxSF   | 2.2 $\mu$ F/100V 1812 MLCC | 1000pF/2KV 1808 MLCC |

| Dual Output | C1                         | C2 & C4              |
|-------------|----------------------------|----------------------|
| RP30-12xxDF | 10 $\mu$ F/25V 1812 MLCC   | 1000pF/2KV 1808 MLCC |
| RP30-24xxDF | 6.8 $\mu$ F/50V 1812 MLCC  | 1000pF/2KV 1808 MLCC |
| RP30-48xxDF | 2.2 $\mu$ F/100V 1812 MLCC | 1000pF/2KV 1808 MLCC |

## Recommended EN55022 Class A Filter Circuit Layouts



## External Output Trimming

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

