



**THE DATASHEET OF
RP15-2415DFW**



Features

- Wide 4:1 input voltage range
- 1.6kVDC isolation
- UL certified
- Efficiency up to 88%
- Six-sided continuous shield
- No minimum load required

Regulated Converter



RP15-FW

15 Watt
2" x 1"
Single and Dual Output



Description

The RP15-FW series wide range input 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

| Part Number | Input Voltage Range (VDC) | Output Voltage (VDC) | Output Current (mA) | Input ⁽¹⁾ Current (mA) | Efficiency ⁽¹⁾ typ. (%) | Max. Capacitive Load ⁽²⁾ (µF) |
|--------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|--|
| RP15-243.3SFW ^(3,4) | 9-36 | 3.3 | 4500 | 719 | 86 | 14700 |
| RP15-2405SFW ^(3,4) | 9-36 | 5 | 3000 | 718 | 87 | 7200 |
| RP15-2412SFW ^(3,4) | 9-36 | 12 | 1250 | 718 | 87 | 1250 |
| RP15-2415SFW ^(3,4) | 9-36 | 15 | 1000 | 718 | 87 | 800 |
| RP15-483.3SFW ^(3,4) | 18-75 | 3.3 | 4500 | 360 | 86 | 14700 |
| RP15-4805SFW ^(3,4) | 18-75 | 5 | 3000 | 355 | 88 | 7200 |
| RP15-4812SFW ^(3,4) | 18-75 | 12 | 1250 | 360 | 87 | 1250 |
| RP15-4815SFW ^(3,4) | 18-75 | 15 | 1000 | 360 | 87 | 800 |
| RP15-2405DFW ^(3,4) | 9-36 | ±5 | ±1500 | 718 | 87 | ±3600 |
| RP15-2412DFW ^(3,4) | 9-36 | ±12 | ±625 | 710 | 88 | ±625 |
| RP15-2415DFW ^(3,4) | 9-36 | ±15 | ±500 | 710 | 88 | ±400 |
| RP15-4805DFW ^(3,4) | 18-75 | ±5 | ±1500 | 355 | 88 | ±3600 |
| RP15-4812DFW ^(3,4) | 18-75 | ±12 | ±625 | 355 | 88 | ±625 |
| RP15-4815DFW ^(3,4) | 18-75 | ±15 | ±500 | 355 | 88 | ±400 |

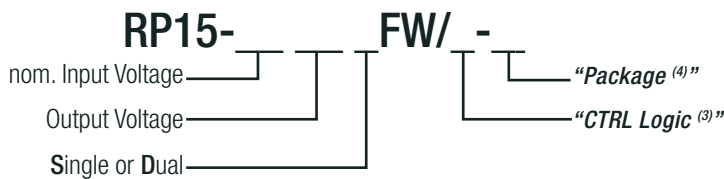


UL60950-1 certified

Notes:

- Note1: Maximum values at nominal input voltage and full load
 Note2: Max. Cap load is tested at minimum input and constant resistive load

Model Numbering



Notes:

- Note3: no suffix for standard part without CTRL pin
 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)
 Note4: add suffix "-HC" for premounted Heat-sink with clips

Ordering Examples

RP20-2405SFW/P = 24V input, 5V output, single, positive logic CTRL pin
 RP20-4812DFW/N-HC = 48V input, ±12V output, dual, negative logic CTRL pin, Heat-sink premounted

Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

BASIC CHARACTERISTICS

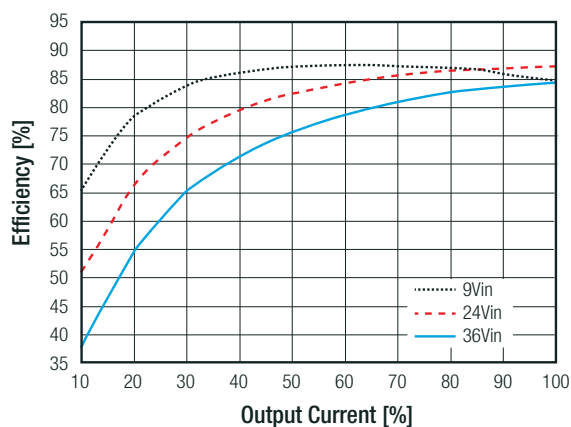
| Parameter | Condition | | Min. | Typ. | Max. |
|--------------------------------|---|--|--|--|-----------------|
| Input Filter | | | Pi-Type | | |
| Input Voltage Range | nom. Vin = 24VDC nom. Vin = 48VDC | | 9VDC 18VDC | 24VDC 48VDC | 36VDC 75VDC |
| Input Surge Voltage | 100ms max. | nom. Vin = 24VDC nom. Vin = 48VDC | | | 50VDC 100VDC |
| Under Voltage Lockout (UVLO) | nom. Vin = 24VDC | DC-DC ON DC-DC OFF | | 7.5VDC | 9VDC |
| | nom. Vin = 48VDC | DC-DC ON DC-DC OFF | | 15VDC | 18VDC |
| Input Reflected Ripple Current | | | | 20mA _{p-p} | |
| Minimum Load | | | 0% | | |
| Start-up Time | Power up | | | 20ms | |
| ON/OFF CTRL ⁽⁵⁾ | Positive Logic | DC-DC ON DC-DC OFF | Open or 3.0VDC < V _{CTRL} < 12VDC Short or 0VDC < V _{CTRL} < 1.2VDC | | |
| | Negative Logic | DC-DC ON DC-DC OFF | Short or 0VDC < V _{CTRL} < 1.2VDC Open or 3.0VDC < V _{CTRL} < 12VDC | | |
| Input Current of CTRL pin | DC-DC ON | | -0.5mA | | +0.5mA |
| Standby Current | DC-DC OFF | | | 2.5mA | |
| Internal Operating Frequency | | | 360kHz | 400kHz | 440kHz |
| Ripple and Noise | measured at 20MHz BW with a 0.1µF/50V MLCC | 3.3V _{out} , 5V _{out} 12V _{out} , 15V _{out} | | 50mV _{p-p} 75mV _{p-p} | |
| | | ±5V _{out} , ±12V _{out} , ±15V _{out} | | 75mV _{p-p} | |

Notes:

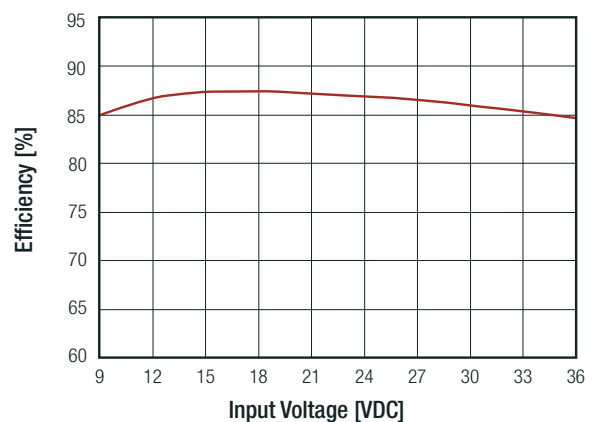
Note5: If no suffix is specified, the control pin will be omitted. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

RP15-2405SFW

Efficiency vs. Output Current



Efficiency vs. Input Voltage full load

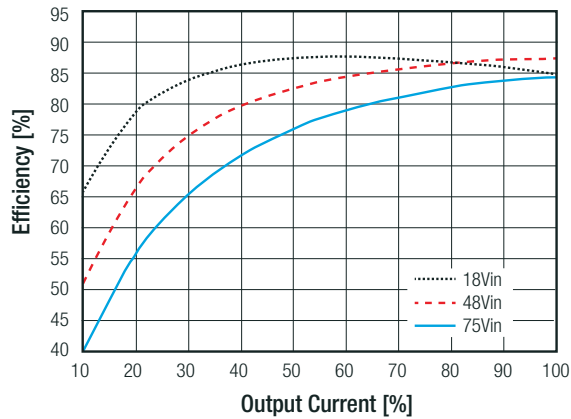


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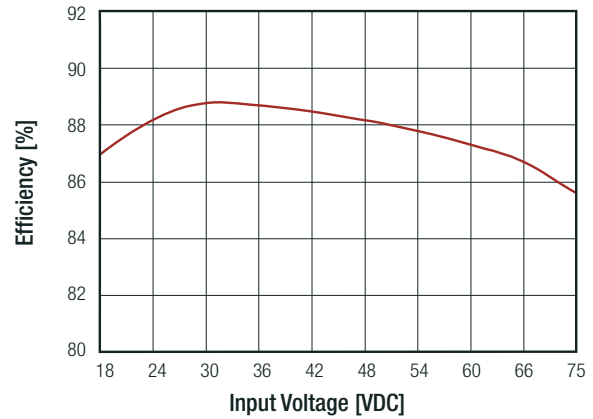
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

RP20-4805FW

Efficiency vs. Output Current



Efficiency vs. Input Voltage full load



REGULATIONS

| Parameter | Condition | | Value |
|----------------------------------|-------------------------------------|--------|------------|
| Output Accuracy | | | ±1.0% |
| Line Regulation | low line to high line, full load | Single | ±0.2% |
| | | Dual | ±0.5% |
| Load Regulation | 0% to 100% load | Single | ±0.5% |
| | | Dual | ±1.0% |
| Cross Regulation | asymmetrical 25%<>100% load | | ±5.0% |
| Transient Response Recovery Time | 25% load step change | | 250µs typ. |

PROTECTIONS

| Parameter | Condition | | Value |
|----------------------------------|--------------------------|---------------------|--------------------------------|
| Short Circuit Protection (SCP) | | | continuous, automatic recovery |
| Over Voltage Protection (OVP) | zener diode clamp | 3.3V _{out} | 3.9VDC |
| | | 5V _{out} | 6.2VDC |
| | | 12V _{out} | 15VDC |
| | | 15V _{out} | 18VDC |
| Over Load Protection (OLP) | % I _{out} rated | | 150% typ. |
| Isolation Voltage ⁽⁶⁾ | I/P to O/P | | 1.6kVDC/ 1 minute |
| | I/P to O/P to case | | 1.6kVDC/ 1 minute |
| Isolation Resistance | Viso= 500VDC | | 1GΩ min. |
| Isolation Capacitance | | | 1500pF max. |

Notes:

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

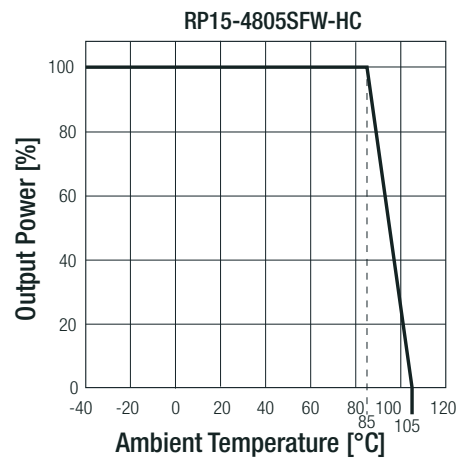
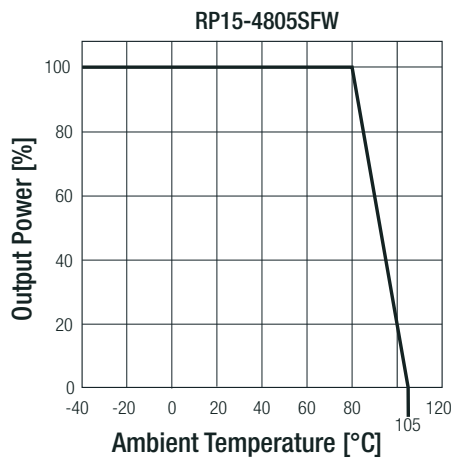
Note7: This power module is not internally fused. An input line fuse must always be used

Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

ENVIRONMENTAL

| Parameter | Condition | | Value |
|-----------------------------|---------------------------------------|-------------------|------------------------------|
| Operating Temperature Range | without derating | | -40°C to +80°C |
| | with derating | | -40°C to +105°C |
| Maximum Case Temperature | | | +105°C |
| Temperature Coefficient | | | ±0.02%/K max. |
| Thermal Impedance | @ natural convection | without heat-sink | 12K/W |
| | 0.1m/s | with heat-sink | 10K/W |
| Operating Humidity | non-condensing | | 5% - 95% RH |
| Operating Altitude | | | 2000m |
| Thermal Shock | | | according to MIL-STD-810F |
| Vibration | | | according to MIL-STD-810F |
| MTBF | MIL-HDBK-217F, G.B. | | 2430 x 10 ³ hours |
| | Bellcore TR-NWT-000332 ⁽⁸⁾ | | 2350 x 10 ³ hours |

Derating Graph ⁽⁹⁾



Notes:

- Note8: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment)
 Note9: 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 RECOM Techsupport for detailed information

SAFETY AND CERTIFICATIONS

| Certificate Type (Safety) | Condition | Standard |
|---|----------------|---|
| Information Technology Equipment, General Requirements for Safety | E196683 | UL60950-1, 2nd Edition, 2011 CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2011 |
| EAC | RU-AT.49.09571 | TP TC 004/2011 |
| RoHS2 | | RoHS-2011/65/EU + AM-2015/863 |

| EMC Compliance | Condition | Standard / Criterion |
|---|---|-------------------------|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter (see filter suggestion below) | EN55032, Class A and B |
| ESD Electrostatic discharge immunity test | Air ±8kV and Contact ±6kV | EN61000-4-2, Criteria B |
| Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m | EN61000-4-3, Criteria A |
| Fast Transient and Burst Immunity ⁽¹⁰⁾ | ±2kV | EN61000-4-4, Criteria B |
| Surge Immunity ⁽¹⁰⁾ | ±1kV | EN61000-4-5, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields | 10 Vr.m.s | EN61000-4-6, Criteria A |
| Power Magnetic Field Immunity | 100A/m continuous; 1000A/m 1s | EN61000-4-8, Criteria A |

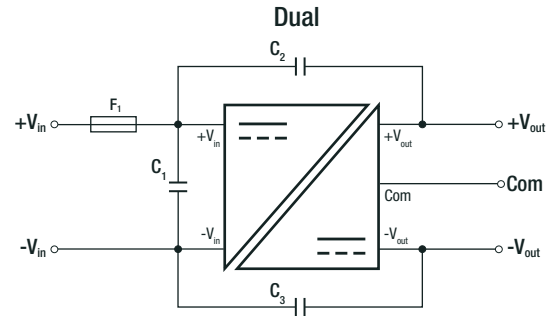
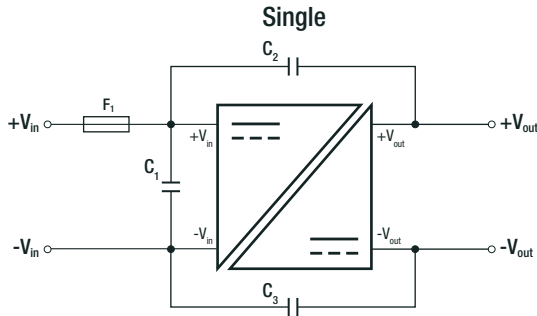
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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Notes:

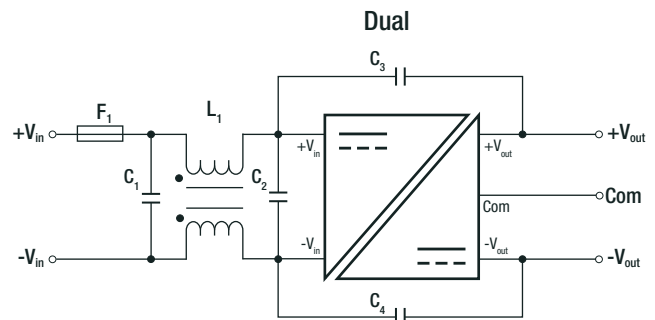
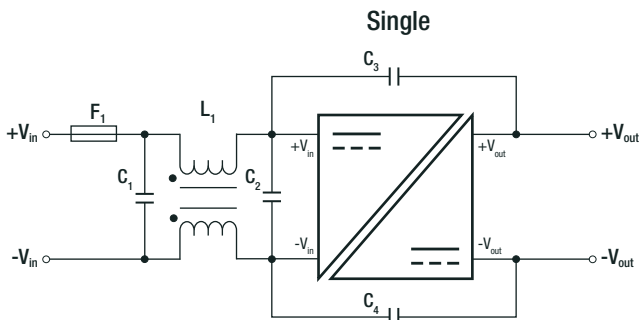
Note10 :An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5
 Recom suggests Nippon chemi-con KY series 220µF/100V

EMC Filtering Suggestions according to EN55032



Component List Class A

| MODEL | C1 | C2 | C3 |
|--------------|-----------|------------|------------|
| RP15-24xxSFW | N/A | 1000pF/2kV | 1000pF/2kV |
| RP15-24xxDFW | N/A | 1206 MLCC | 1206 MLCC |
| RP15-48xxSFW | 1µF/100V | 1000pF/2kV | 1000pF/2kV |
| RP15-48xxDFW | 1210 MLCC | 1206 MLCC | 1206 MLCC |



Component List Class B

| MODEL | C1 | C2 | C3/C4 | L1 |
|--------------|-----------|-----------|------------|----------------------------------|
| RP15-24xxSFW | 2.2µF/50V | N/A | 1000pF/2kV | CMC: 450µH |
| RP15-24xxDFW | 1812 MLCC | N/A | 1206 MLCC | ref.: WE 7448227005 ref.: CMC-05 |
| RP15-48xxSFW | 2.2µF/50V | 2.2µF/50V | 1000pF/2kV | CMC: 325µH |
| RP15-48xxDFW | 1812 MLCC | 1812 MLCC | 1206 MLCC | ref.: WE 744290321 ref.: CMC-06 |

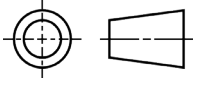
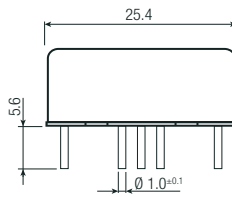
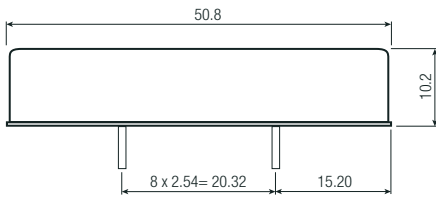
DIMENSIONS and PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|--------------------|-------------------|----------------------|
| Material | case | nickel coated copper |
| | base | FR4 PCB |
| | potting | epoxy (UL94V-0) |
| Dimensions (LxWxH) | without Heat-sink | 50.8 x 25.4 x 10.2mm |
| | with Heat-sink | 56.8 x 25.4 x 16.8mm |
| Weight | without Heat-sink | 27g |
| | with Heat-sink | 37.89g |

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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

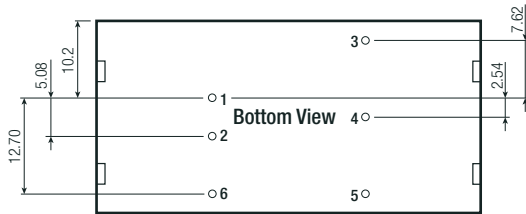
Dimension Drawing (mm)



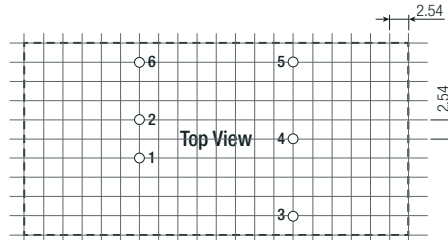
Pinning Information

| Pin # | Single | Dual |
|-------|---------------------|---------------------|
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | +Vout | +Vout |
| 4 | no Pin | Com |
| 5 | -Vout | -Vout |
| 6 | CTRL ⁽³⁾ | CTRL ⁽³⁾ |

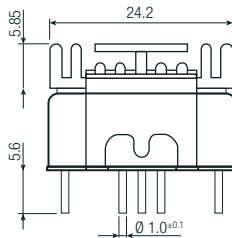
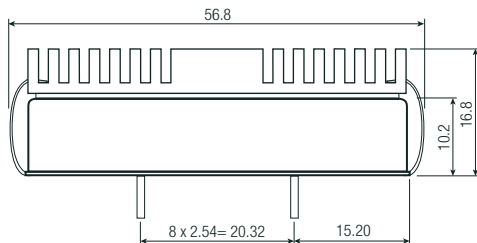
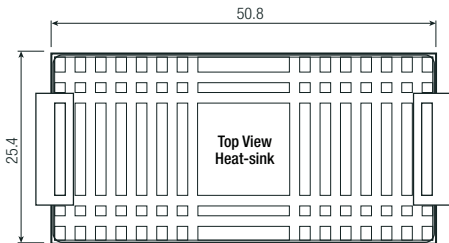
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm



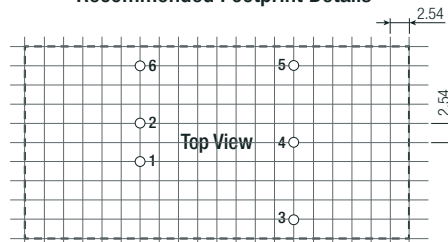
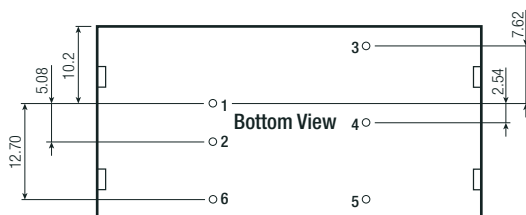
Recommended Footprint Details



Dimension Drawing with Heat-sink (mm)



Recommended Footprint Details





Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

| PACKAGING INFORMATION | | | |
|-----------------------------|----------------|-------------------|------------------------|
| Parameter | Type | | Value |
| Packaging Dimension (LxWxH) | tube | without heat-sink | 255.0 x 54.0 x 22.0mm |
| | tray | with heat-sink | 302.5 x 222.0 x 20.0mm |
| Packaging Quantity | tube | without heat-sink | 9pcs |
| | tray | with heat-sink | 20pcs |
| Storage Temperature Range | | | -55°C to +125°C |
| Storage Humidity | non-condensing | | 5% - 95% RH |

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