

# 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

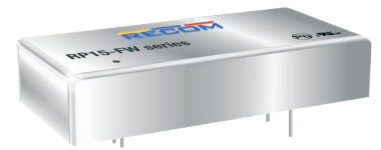


### Description

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

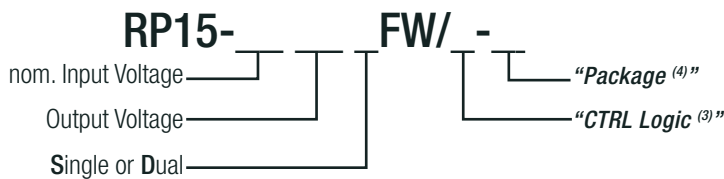


UL60950-1 certified

#### 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)

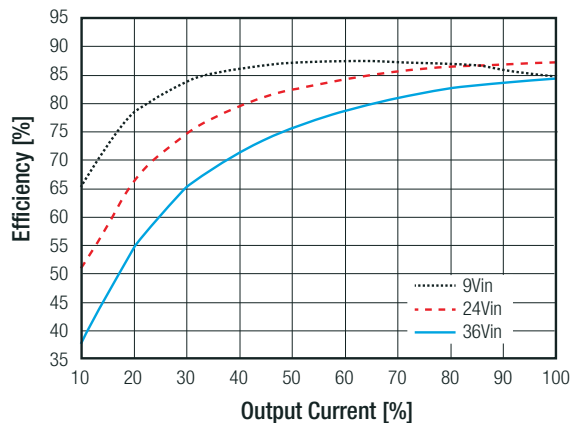
| BASIC CHARACTERISTICS          |   |  |  |  |                 |
|--------------------------------|---|--|--|--|-----------------|
| Parameter                      | Condition                                     |  | Min.   | Typ.                                       | Max.            |
| Input Filter                   |   |  |  |  | Pi-Type         |
| Input Voltage Range            | nom. Vin = 24VDC<br>nom. Vin = 48VDC          |  | 9VDC<br>18VDC  | 24VDC<br>48VDC                             | 36VDC<br>75VDC  |
| Input Surge Voltage            | 100ms max.                                    | nom. Vin = 24VDC<br>nom. Vin = 48VDC   |  |  | 50VDC<br>100VDC |
| Under Voltage Lockout (UVLO)   | nom. Vin = 24VDC                              | DC-DC ON<br>DC-DC OFF  |  | 7.5VDC                                     | 9VDC            |
|                                | nom. Vin = 48VDC                              | DC-DC ON<br>DC-DC OFF  |  | 15VDC                                      | 18VDC           |
| Input Reflected Ripple Current |   |  |  | 20mA <sub>p-p</sub>                        |                 |
| Minimum Load                   |   |  | 0%   |  |                 |
| Start-up Time                  | Power up                                      |  |  | 20ms                                       |                 |
| ON/OFF CTRL <sup>(5)</sup>     | Positive Logic                                | DC-DC ON<br>DC-DC OFF  | Open or 3.0VDC < V <sub>CTRL</sub> < 12VDC<br>Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC |  |                 |
|                                | Negative Logic                                | DC-DC ON<br>DC-DC OFF  | Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC<br>Open or 3.0VDC < V <sub>CTRL</sub> < 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<br>with a 0.1µF/50V MLCC | 3.3V <sub>out</sub> , 5V <sub>out</sub><br>12V <sub>out</sub> , 15V <sub>out</sub> |  | 50mV <sub>p-p</sub><br>75mV <sub>p-p</sub> |                 |
|                                |   | ±5V <sub>out</sub> , ±12V <sub>out</sub> , ±15V <sub>out</sub>                     |  | 75mV <sub>p-p</sub>                        |                 |

**Notes:**

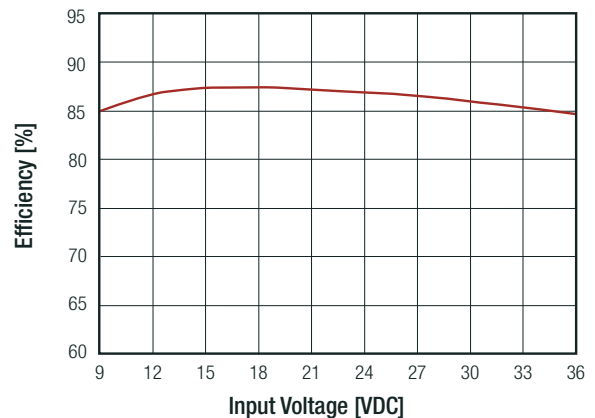
Note5: If no suffix is specified, the control pin will be omitted. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

**RP15-2405SF**

**Efficiency vs. Output Current**



**Efficiency vs. Input Voltage full load**

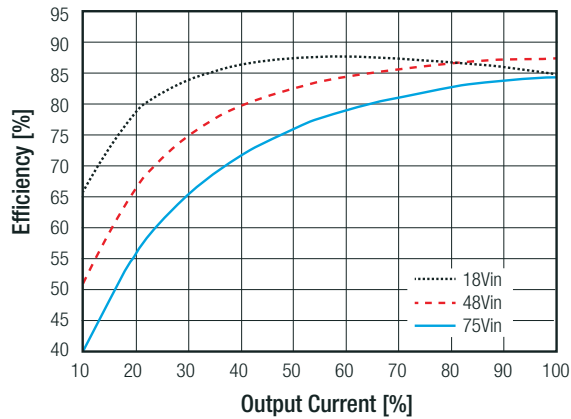


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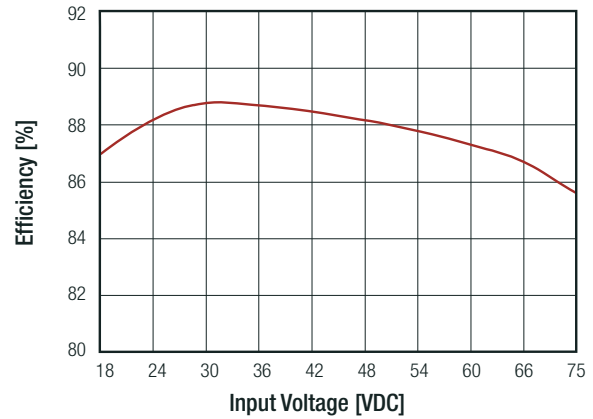
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

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,<br>full load | Single<br>Dual | ±0.2%<br>±0.5% |
| Load Regulation                  | 0% to 100% load                     | Single<br>Dual | ±0.5%<br>±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 <sub>out</sub><br>5V <sub>out</sub><br>12V <sub>out</sub><br>15V <sub>out</sub> | 3.9VDC<br>6.2VDC<br>15VDC<br>18VDC     |
| Over Load Protection (OLP)       | % I <sub>out</sub> rated         |  | 150% typ.                              |
| Isolation Voltage <sup>(6)</sup> | I/P to O/P<br>I/P to O/P to case |  | 1.6kVDC/ 1 minute<br>1.6kVDC/ 1 minute |
| Isolation Resistance             | Viso= 500VDC                     |  | 1GΩ min.                               |
| Isolation Capacitance            |                                  |  | 1500pF max.                            |

**Notes:**

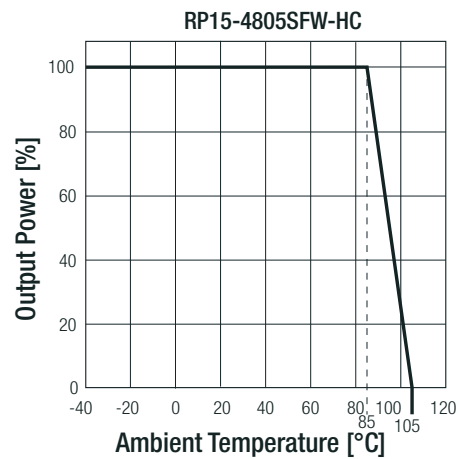
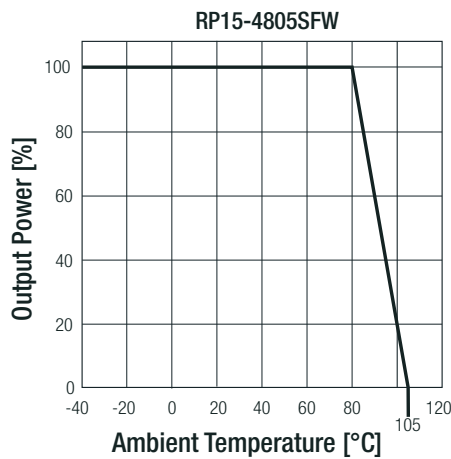
- Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage  
 Note7: This power module is not internally fused. An input line fuse must always be used

**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 <sup>3</sup> hours |
|                             | Bellcore TR-NWT-000332 <sup>(8)</sup> |                   | 2350 x 10 <sup>3</sup> hours |

**Derating Graph <sup>(9)</sup>**



**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<br>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<br>(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 <sup>(10)</sup>                             | ±2kV  | EN61000-4-4, Criteria B |
| Surge Immunity <sup>(10)</sup>  | ±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 |

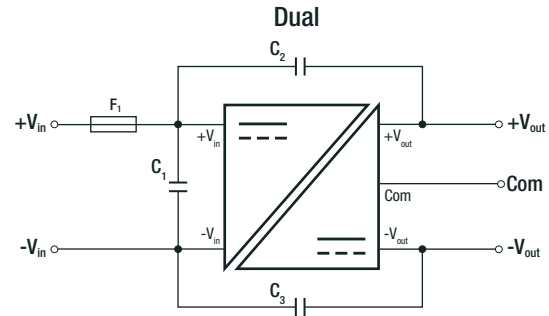
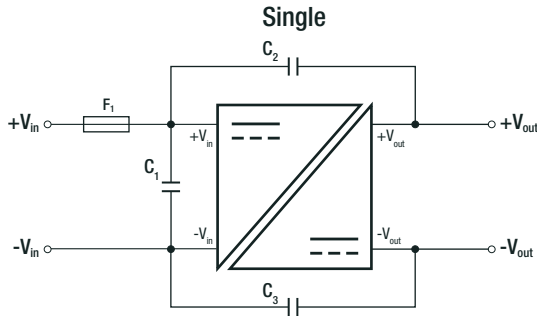
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

**Notes:**

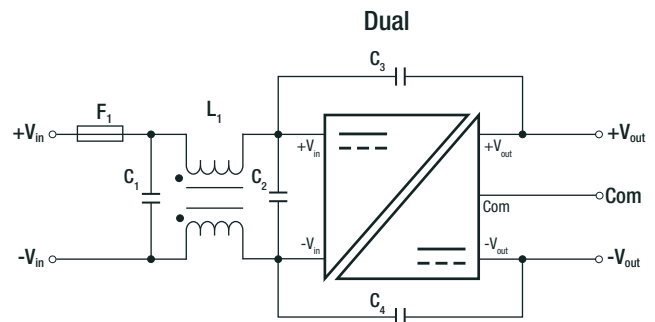
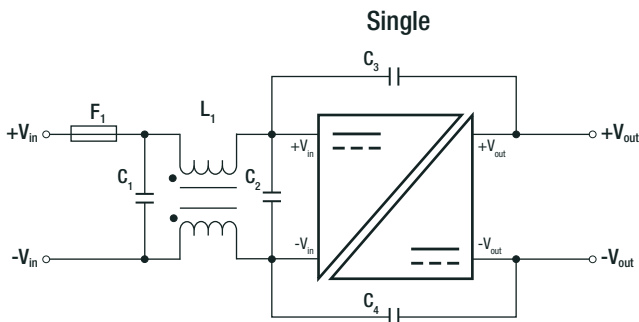
Note10 : An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5  
 Recom suggests Nippon chemi-con KY series 220µF/100V

**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  |

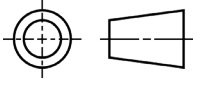
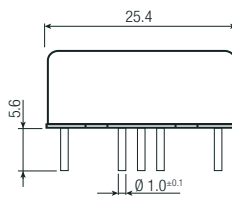
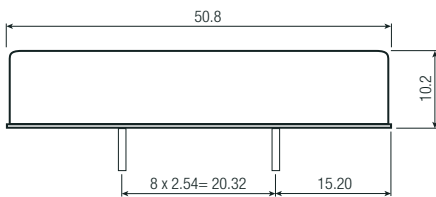
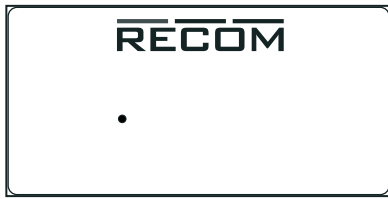
**DIMENSIONS and PHYSICAL CHARACTERISTICS**

| 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)

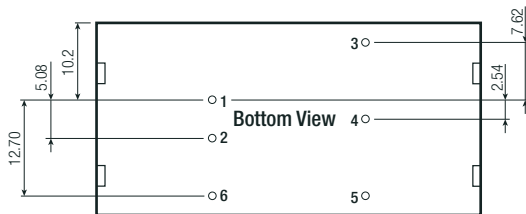
### Dimension Drawing (mm)



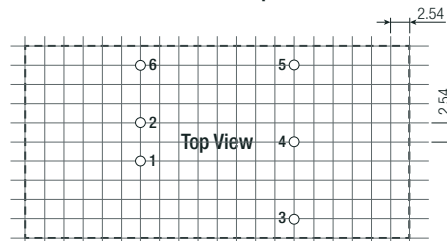
### Pinning Information

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

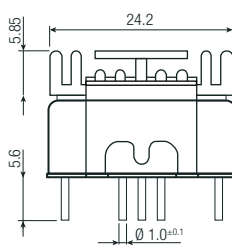
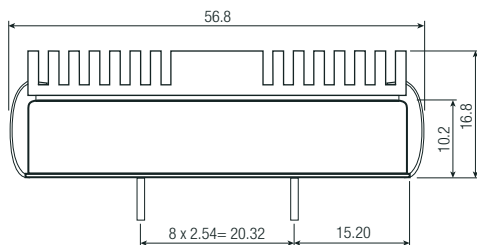
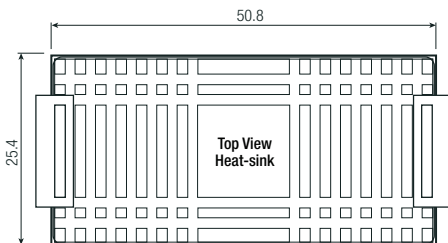
Tolerance: xx.x= ±0.5mm  
xx.xx= ±0.25mm



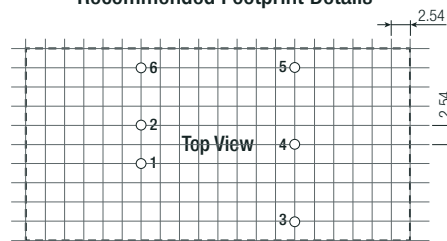
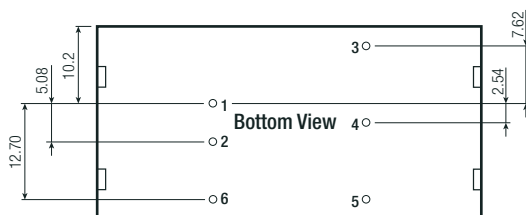
### Recommended Footprint Details



### 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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