

Features

- Wide 4:1 input voltage range
- 1.6kVDC isolation
- UL certified
- Efficiency up to 91%
- Six-sided continuous shield
- No minimum load required

Regulated Converter



RP30-FW

30 Watt

2" x 1"

Single and Dual Output



Description

The RP30-FW 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

| Part Number | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Input ⁽¹⁾ Current [mA] | Efficiency ⁽¹⁾ typ. [%] | Max. Capacitive Load ⁽²⁾ [μF] |
|--------------------------------|---------------------------|----------------------|---------------------|-----------------------------------|------------------------------------|--|
| RP30-243.3SFW ^(3,4) | 9-36 | 3.3 | 7500 | 1199 | 86 | 20000 |
| RP30-2405SFW ^(3,4) | 9-36 | 5 | 6000 | 1420 | 88 | 14400 |
| RP30-2412SFW ^(3,4) | 9-36 | 12 | 2500 | 1404 | 89 | 3000 |
| RP30-2415SFW ^(3,4) | 9-36 | 15 | 2000 | 1404 | 89 | 2000 |
| RP30-483.3SFW ^(3,4) | 18-75 | 3.3 | 7500 | 600 | 86 | 20000 |
| RP30-4805SFW ^(3,4) | 18-75 | 5 | 6000 | 710 | 88 | 14400 |
| RP30-4812SFW ^(3,4) | 18-75 | 12 | 2500 | 694 | 90 | 3000 |
| RP30-4815SFW ^(3,4) | 18-75 | 15 | 2000 | 687 | 91 | 2000 |
| RP30-2405DFW ^(3,4) | 9-36 | ±5 | ±3000 | 1420 | 88 | ±3000 |
| RP30-2412DFW ^(3,4) | 9-36 | ±12 | ±1250 | 1437 | 87 | ±2000 |
| RP30-2415DFW ^(3,4) | 9-36 | ±15 | ±1000 | 1437 | 87 | ±1300 |
| RP30-4805DFW ^(3,4) | 18-75 | ±5 | ±3000 | 710 | 88 | ±3000 |
| RP30-4812DFW ^(3,4) | 18-75 | ±12 | ±1250 | 710 | 88 | ±2000 |
| RP30-4815DFW ^(3,4) | 18-75 | ±15 | ±1000 | 710 | 88 | ±1300 |

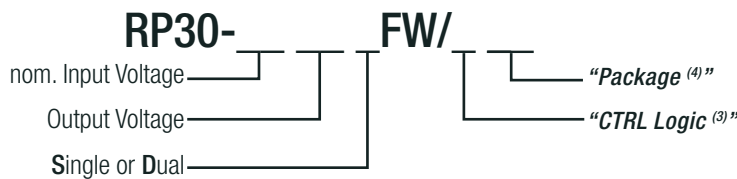


Notes:

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

UL60950-1 certified
 EN55032 compliant

Model Numbering



Notes:

- Note3: no suffix 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

- RP30-2405SFW = 24V input, 5V output, single, positive Logic CTRL pin
 RP30-4812DFW/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

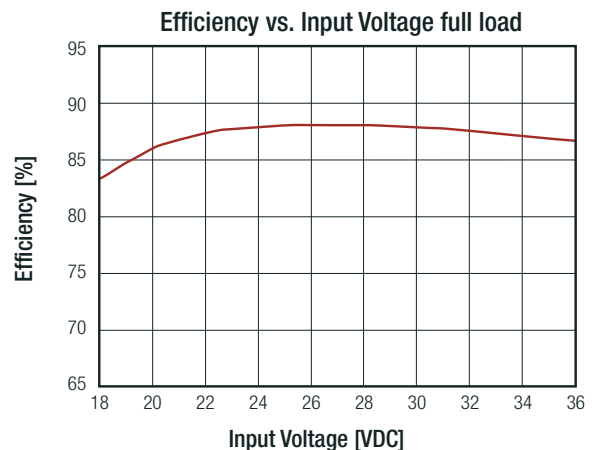
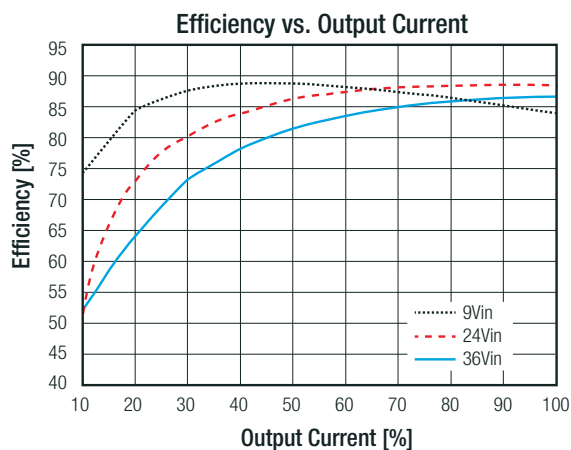
| Parameter | Condition | | Min. | Typ. | Max. |
|---|---|--|--|--|-----------------|
| Input Filter | | | Pi-Type | | |
| Input Voltage Range | nom. Vin = 24VDC nom. Vin = 48VDC | | 9VDC 18VDC | 24VDC 48VDC | 36VDC 75VDC |
| Input Surge Voltage | 100ms max. | nom. Vin = 24VDC nom. Vin = 48VDC | | | 50VDC 100VDC |
| Under Voltage Lockout (UVLO) | nom. Vin = 24VDC | DC-DC ON DC-DC OFF | | 8VDC | 9VDC |
| | nom. Vin = 48VDC | DC-DC ON DC-DC OFF | | 16VDC | 18VDC |
| Output Voltage Trimming | refer to "OUTPUT VOLTAGE TRIMMING" | | -10% | | +10% |
| Input Reflected Ripple Current ⁽⁵⁾ | | | | 20mA _{p-p} | |
| Minimum Load | | | 0% | | |
| Start-up Time | Power up ON/OFF CTRL | | | 30ms 30ms | |
| ON/OFF CTRL ⁽⁶⁾ | 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 | | | 3mA | |
| Internal Operating Frequency | | | 387kHz | 430kHz | 473kHz |
| Ripple and Noise | measured at 20MHz BW with a 1µF/50V MLCC | 3.3V _{out} , 5V _{out} 12V _{out} , 15V _{out} | | 100mV _{p-p} 150mV _{p-p} | |

Notes:

Note5: Simulated source impedance of 12µH. 12µH inductor in series with +Vin

Note6: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin

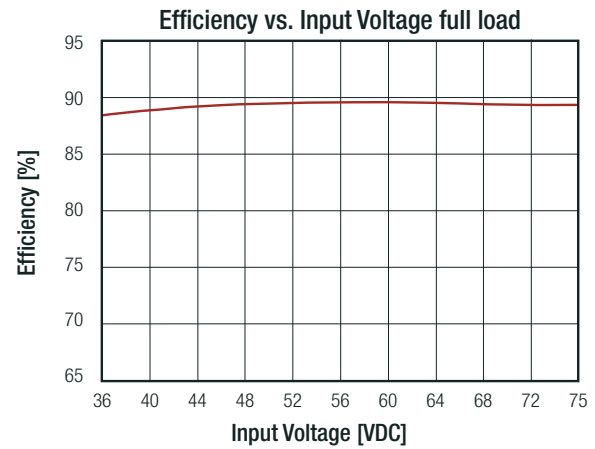
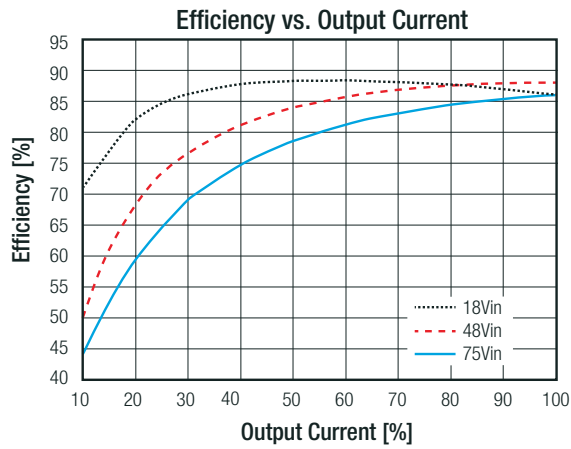
RP30-2405FW



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

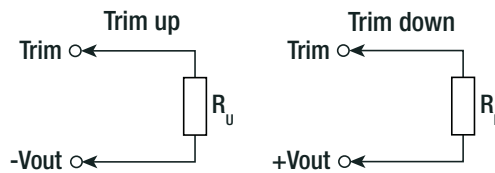
RP30-4805SFW



OUTPUT VOLTAGE TRIMMING

Output Voltage Trimming

Single output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for choosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



RP30-xx3.3SFW

| | | | | | | | | | | | |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Trim up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 3.333 | 3.366 | 3.399 | 3.432 | 3.465 | 3.498 | 3.531 | 3.564 | 3.597 | 3.63 | [VDC] |
| Ru = | 57.93 | 26.16 | 15.58 | 10.28 | 7.11 | 4.99 | 3.48 | 2.34 | 1.46 | 0.75 | [kΩ] |

| | | | | | | | | | | | |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Trim down | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 3.267 | 3.234 | 3.201 | 3.168 | 3.135 | 3.102 | 3.069 | 3.036 | 3.003 | 2.97 | [VDC] |
| Rd = | 69.47 | 31.23 | 18.49 | 12.12 | 8.29 | 5.74 | 3.92 | 2.56 | 1.50 | 0.65 | [kΩ] |

RP30-xx05SFW

| | | | | | | | | | | | |
|---------|-------|-------|------|------|------|------|------|------|------|------|-------|
| Trim up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 5.05 | 5.01 | 5.15 | 5.20 | 5.25 | 5.30 | 5.35 | 5.4 | 5.45 | 5.50 | [VDC] |
| Ru = | 36.57 | 16.58 | 9.92 | 6.58 | 4.59 | 3.25 | 2.30 | 1.59 | 1.03 | 0.59 | [kΩ] |

| | | | | | | | | | | | |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|-------|
| Trim down | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 4.95 | 4.90 | 4.85 | 4.80 | 4.75 | 4.70 | 4.65 | 4.60 | 4.55 | 4.50 | [VDC] |
| Rd = | 45.53 | 20.61 | 12.31 | 8.15 | 5.66 | 4.00 | 2.81 | 1.92 | 1.23 | 0.68 | [kΩ] |

continued on next page

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

| RP30-xx12SFW | | | | | | | | | | | |
|------------------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| Trim up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 12.12 | 12.24 | 12.36 | 12.48 | 12.60 | 12.72 | 12.84 | 12.96 | 13.08 | 13.20 | [VDC] |
| R _u = | 367.91 | 165.95 | 98.64 | 64.98 | 44.78 | 31.32 | 21.70 | 14.49 | 8.88 | 4.39 | [kΩ] |
| RP30-xx15SFW | | | | | | | | | | | |
| Trim up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 15.15 | 15.3 | 15.45 | 15.60 | 15.75 | 15.90 | 16.05 | 16.20 | 16.35 | 16.50 | [VDC] |
| R _u = | 404.18 | 180.59 | 106.06 | 68.80 | 46.44 | 31.53 | 20.88 | 12.90 | 6.69 | 1.72 | [kΩ] |
| Trim down | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | [%] |
| Vout = | 11.88 | 11.76 | 11.64 | 11.52 | 11.40 | 11.28 | 11.16 | 11.04 | 10.92 | 10.8 | [VDC] |
| R _d = | 460.99 | 207.95 | 123.60 | 81.42 | 56.12 | 39.25 | 27.20 | 18.16 | 11.13 | 5.51 | [kΩ] |

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

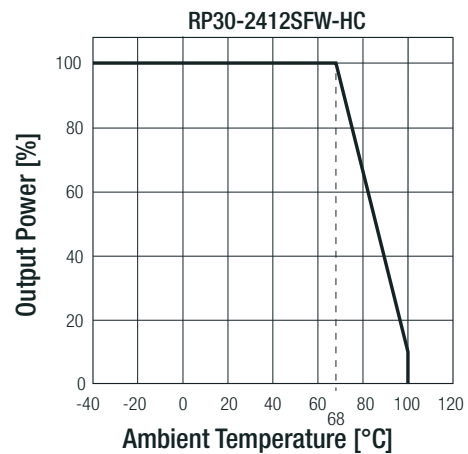
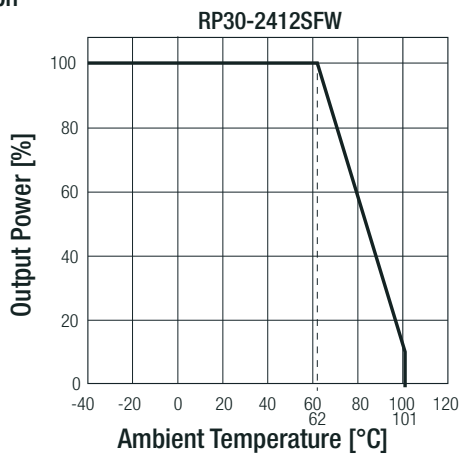
| PROTECTIONS | | |
|--|---|--|
| Parameter | Condition | Value |
| Short Circuit Protection (SCP) | | continuous, automatic recovery |
| Over Voltage Protection (OVP) | zener diode clamp 3.3Vout 5Vout 12Vout 15Vout | 3.9VDC 6.2VDC 15VDC 18VDC |
| Over Load Protection (OLP) | % Iout rated | 150% typ. |
| Over Temperature Protection (OTP) | | 115°C typ. |
| Isolation Voltage ⁽⁷⁾ | I/P to O/P I/P to O/P to case | 1.6kVDC/ 1 minute 1.6kVDC/ 1 minute |
| Isolation Resistance | Viso= 500VDC | 1GΩ min. |
| Isolation Capacitance | | 1500pF max. |
| Notes: | | |
| Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage | | |
| Note8: 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 +62°C |
| | with derating | | -40°C to +101°C |
| Maximum Case Temperature | | | +105°C max. |
| 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 |
| Thermal Shock | | | according to MIL-STD-810F |
| Vibration | | | according to MIL-STD-810F |
| MTBF | MIL-HDBK-217F, G.B. | | 1288 x 10 ³ hours |
| | Bellcore TR-NWT-000332 ⁽⁹⁾ | | 3163 x 10 ³ hours |

Derating Graph ⁽¹⁰⁾



Notes:

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment)
MIL-HDBK-217F, G.B. Notice2 @ TA= 25°C, Full load (Ground, Benign, controlled environment)

Note10: 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, 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 |
| Information technology equipment - Immunity characteristics - Limits and methods of measurement | | EN55024:2010 + A1:2015 |
| ESD Electrostatic discharge immunity test | Air ±8kV and Contact ±6kV | IEC61000-4-2:2008, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m | IEC61000-4-3:2006 + A2:2010, Criteria A |
| Fast Transient and Burst Immunity ⁽¹¹⁾ | ±2kV | IEC61000-4-4:2012, Criteria A |
| Surge Immunity ⁽¹¹⁾ | ±1kV | IEC61000-4-5:2005, Criteria A |
| Immunity to conducted disturbances, induced by radio-frequency fields | 10 Vr.m.s | IEC61000-4-6:2008, Criteria A |

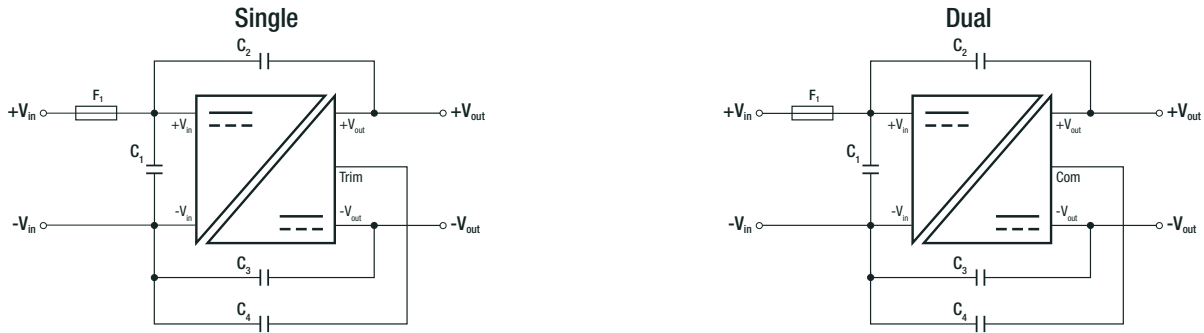
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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Notes:

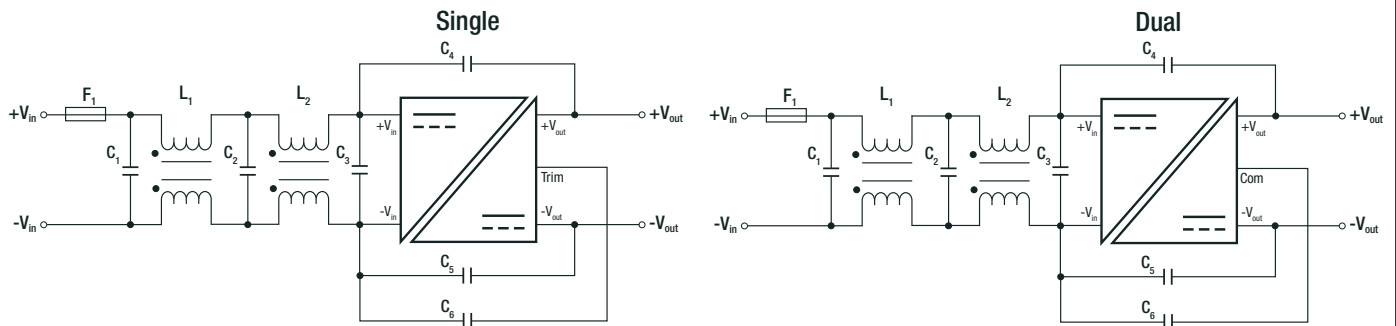
Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5
 Recom suggests Nippon chemi-con KY series 24Vin=330µF/50V or 48Vin=220µF/100V

EMC Filtering Suggestions according to EN55032



Component List Class A

| MODEL | C1 | C2 | C3/C4 |
|--------------|------------|------------|------------|
| RP30-24xxSFW | 4.7µF/50V | 1000pF/2kV | 1000pF/2kV |
| RP30-24xxDFW | 1812 MLCC | 1808 MLCC | 1808 MLCC |
| RP30-48xxSFW | 2.2µF/100V | 1000pF/2kV | 1000pF/2kV |
| RP30-48xxDFW | 1812 MLCC | 1808 MLCC | 1808 MLCC |



Component List Class B

| MODEL | C1/C2/C3 | C4/C5/C6 | L1 | L2 |
|--------------|------------|------------|---------------------------------|---------------------------------|
| RP30-24xxSFW | 4.7µF/50V | 1000pF/2kV | CMC: 33.3µH | CMC: 55µH |
| RP30-24xxDFW | 1812 MLCC | 1808 MLCC | ref.: WE 744842932 ref.: CMC-09 | ref.: WE 744290560 ref.: CMC-10 |
| RP30-48xxSFW | 2.2µF/100V | 1000pF/2kV | CMC: 33.3µH | CMC: 55µH |
| RP30-48xxDFW | 1812 MLCC | 1808 MLCC | ref.: WE 744842932 ref.: CMC-09 | ref.: WE 744290560 ref.: CMC-10 |

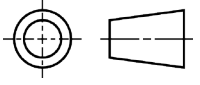
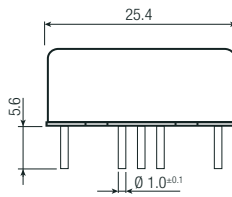
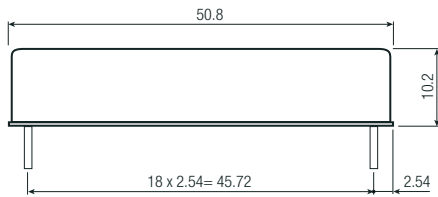
DIMENSIONS and PHYSICAL CHARACTERISTICS

| 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 | 30.5g |
| | with Heat-sink | 41.39g |

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

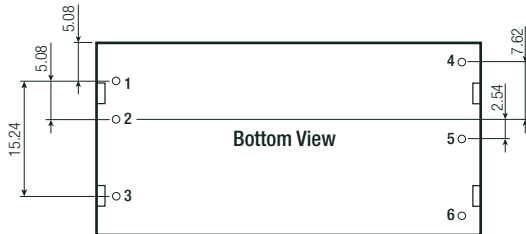
Dimension Drawing (mm)



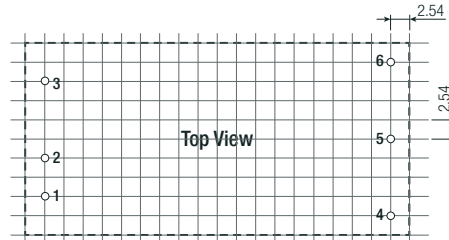
Pinning Information

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

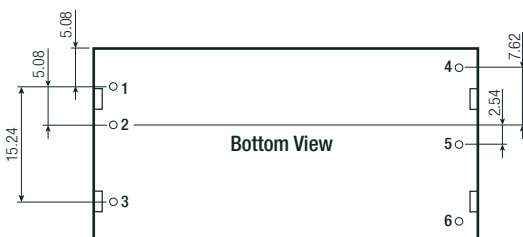
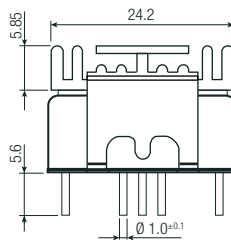
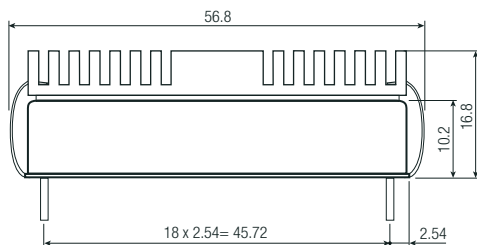
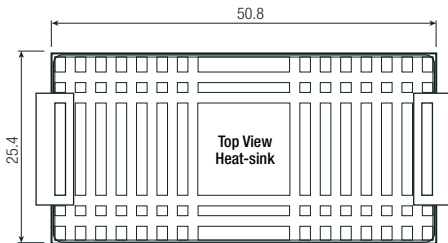
Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm



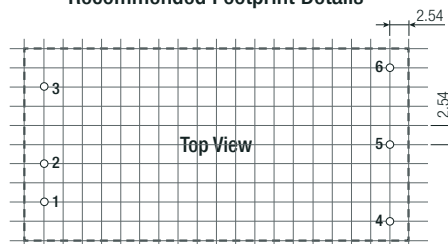
Recommended Footprint Details



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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