

# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter



## Product Typical Features

- ◆ Wide input voltage range (4:1) Output Power 30W
- ◆ Ultrathin Package: 13mm
- ◆ Transfer Efficiency up to 90%
- ◆ Stand-by Power Consumption as low as 2W
- ◆ Output super-fast start up as low as 10ms
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ Input under voltage, output over voltage, short circuit, over current protection
- ◆ Switching Frequency 300KHz
- ◆ Isolation Voltage 3000VDC/1500VAC
- ◆ Operating Temperature: -40°C~+85°C
- ◆ Good EMI performance
- ◆ International standard pin-out



CFD30-XXSXXB3(C) is a new designed 30W output DC DC Converter with wide input voltage range(4:1), super-fast start up, isolated&regulated output, DIP/chassis mounting/DIN-Rail mounting, single output, isolation(3000VDC/1500VAC) function. It features the protection function of under-voltage, output over current, output short circuit, and output over voltage. It is widely used in the 72V, 96V, 110V of industrial control, electrical power, communication, engine, industrial robot, etc.

## Input Specification

|                               |                                        |                                                    |
|-------------------------------|----------------------------------------|----------------------------------------------------|
| Input Surge Voltage<br>(1Sec) | 110Vdc Input                           | 160Vdc (Max)                                       |
| Under-Voltage Turn-off        | 36VDC                                  |                                                    |
| Start-up Time                 | 10ms (Typ)                             |                                                    |
| Input Filter                  | Pi filter                              |                                                    |
| CTRL                          | Module turn-on                         | Suspended or connect to High level (3.5V-12VDC)    |
|                               | Module turn-off                        | Connect to -Vin or connect to low level (0-1.2VDC) |
|                               | Input current when switched off        | 1mA(Typ)                                           |
| Reflected Ripple Current      | Input full range,connect to test tools | 100mA                                              |

Note: \*The voltage of CTRL pin is relative to -Vin pin.

## Output Specification

|                         |                        |    |              |
|-------------------------|------------------------|----|--------------|
| Output Voltage Accuracy | Full voltage full load | Vo | ≤±2.0% (Max) |
|-------------------------|------------------------|----|--------------|

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## DC/DC Converter



|                                 |                                  |                             |                                            |
|---------------------------------|----------------------------------|-----------------------------|--------------------------------------------|
| Line Voltage Regulation         | Nominal load, full voltage range | Vo                          | ≤±1.0%                                     |
| Load Regulation                 | 10% ~ 100% nominal load          | Vo                          | ≤±1.0%                                     |
| Ripple & Noise                  | Nominal load, nominal voltage    | ≤200mVp-p （20MHz bandwidth） |                                            |
| Output Over-voltage Protection  | 110%~190%Vo                      |                             |                                            |
| Output Voltage Adjustment       | Trim-pin function                |                             | ±10%（Typ）                                  |
| Output Short circuit Protection | Hiccup, continuous,self-recovery |                             |                                            |
| Output Over-current protection  | 110%~200%Io                      |                             |                                            |
| Dynamic Response                | 25% nominal load step change     | △Vo/△t                      | ≤±5.0%/500μs;(3V3,5.0V Series≤±8.0%/500μs) |

### General Specification

|                          |                                     |                        |
|--------------------------|-------------------------------------|------------------------|
| Switching Frequency      | Typical                             | 300KHz                 |
| Isolation Capacitor      | Typical                             | 2000pF                 |
| Operating Temperature    | Refer to Temperature Derating Curve | -40℃ ~ +85℃            |
| Storage Temperature      | -                                   | -55℃ ~ +125℃           |
| Max Case Temperature     | Within Operating Curve              | +105℃                  |
| Relative Humidity        | No condensing                       | 5%~95%                 |
| Case Material            | -                                   | Aluminum Metal Case    |
| Isolation Voltage        | Input to Output                     | 3000Vdc ≤ 0.5mA / 1min |
| Meantime Between Failure | MIL-HDBK-217F@25℃                   | 2X10 <sup>5</sup> Hrs  |
| Product Weight           | Average                             | 30g                    |

### Typical Product List

| Part No           | Input Voltage Range (VDC) |        | Output Voltage/Current (Vo/Io) |             | Input Current (mA) (Nominal Voltage) |              | Max. Capacitive Load | Ripple & Noise 20MHz (MAX) | Efficiency (%) |     |
|-------------------|---------------------------|--------|--------------------------------|-------------|--------------------------------------|--------------|----------------------|----------------------------|----------------|-----|
|                   | Nominal                   | Range  | Voltage (V)                    | Current (A) | Full load (mA)                       | No Load (mA) | u F                  | mVp-p (mV)                 | Min            | Typ |
| CFD30-110S3V3B3C3 | 110                       | 40-160 | 3.3                            | 8           | 276                                  | 25           | 8000                 | 100                        | 85             | 88  |
| CFD30-110S05B3C3  |                           |        | 5                              | 6           | 313                                  | 25           | 6800                 | 100                        | 86             | 89  |
| *CFD30-110S12B3C3 |                           |        | 12                             | 2.5         | 313                                  | 2            | 2200                 | 200                        | 87             | 89  |
| *CFD30-110S15B3C3 |                           |        | 15                             | 2           | 313                                  | 2            | 1000                 | 200                        | 87             | 89  |
| *CFD30-110S24B3C3 |                           |        | 24                             | 1.25        | 313                                  | 2            | 680                  | 200                        | 87             | 89  |
| *CFD30-110S48B3C3 |                           |        | 48                             | 0.625       | 313                                  | 2            | 470                  | 200                        | 87             | 89  |

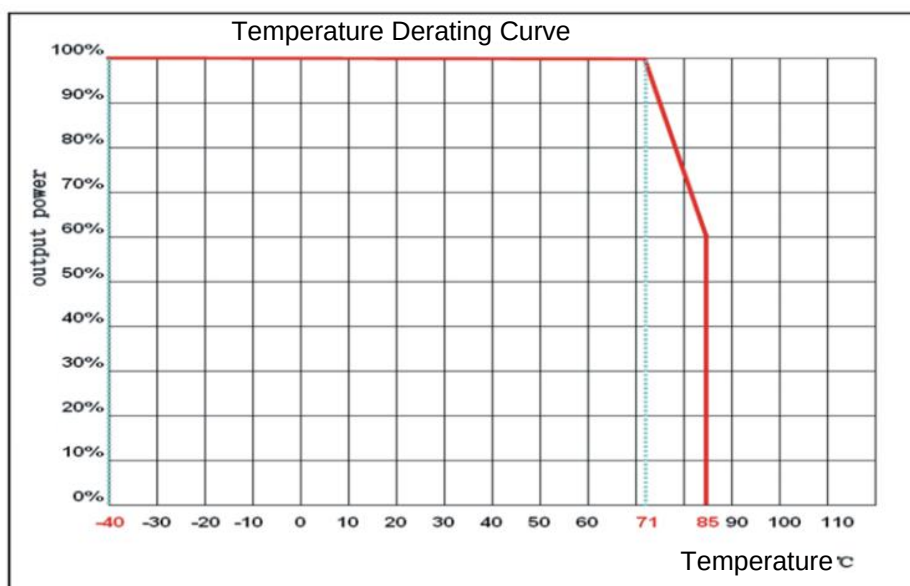
# CFD30-XXSXXB3C3(-T)(-TS) Series

## DC/DC Converter



1. “\*” are models being developing; Suffix “C” is with CTRL function;
2. “-H” suffix is with heat sink, “-T(H)” suffix for chassis mounting(with heat sink);“-TS(H)” suffix for DIN-Rail mounting(with heat sink), DIN-Rail width is: 35mm;
3. Max capacitive load is, when the power supply is fully loaded, the max capacity could be connected to output, if exceed, the power supply cannot start-up;
4. To reduce no load power consumption and improve efficiency of light-load, IC will be flitter frequency under no-load and light-load operating,
5. Output cannot be no load, at least with 5% load or above 470uF high frequency low resistance electrolytic capacitor, otherwise the output ripple will rise;

### Temperature Derating Curve



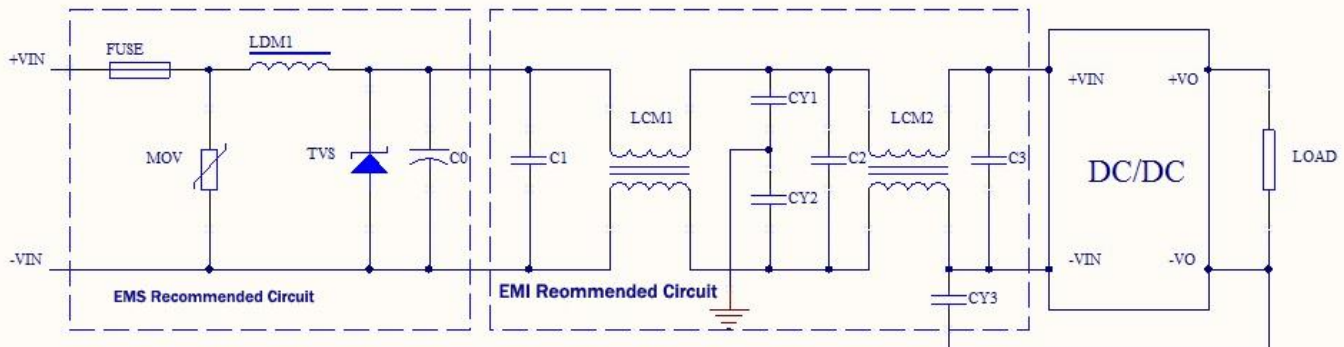
### EMC Characteristics

|     |                                                                   |                                                     |                 |
|-----|-------------------------------------------------------------------|-----------------------------------------------------|-----------------|
| EMI | CE                                                                | CISPR22/EN55032 CLASSB (external circuit is needed) |                 |
|     | RE                                                                | CISPR22/EN55032 CLASSB (external circuit is needed) |                 |
| EMS | ESD                                                               | IEC/EN61000-4-2 Contact ±4KV                        | perf.Criteria B |
|     | RS                                                                | IEC/EN61000-4-3 10V/m                               | perf.Criteria A |
|     | EFT                                                               | IEC/EN61000-4-4 ±2KV (external circuit is needed)   | perf.Criteria B |
|     | CS                                                                | IEC/EN61000-4-6 3Vr.m.s                             | perf.Criteria A |
|     | Voltage dips, short interruptions and voltage variations immunity | IEC/EN61000-4-29 0%-70%                             | perf.Criteria B |

# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter



## EMC External Recommended Circuit



### Recommended Parameter:.

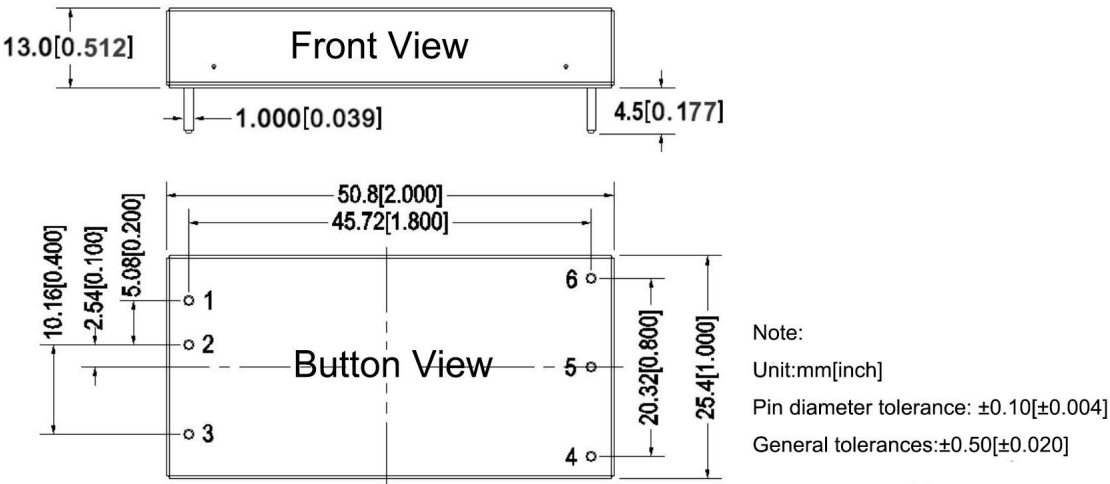
| Component   | 110V Input                      |
|-------------|---------------------------------|
| FUSE        | According to customer's request |
| MOV         | 14D201K                         |
| LDM1        | 56uH                            |
| TVS         | SMCJ170A                        |
| C0          | 560uF/200V                      |
| C1,C2,C3    | 4.7uF/200V                      |
| LCM1        | 15mH                            |
| LCM2        | 56uH                            |
| CY1,CY2,CY3 | 1nF/3KV                         |

CFD30-XXSXXB3C3(-T)(-TS) Series

DC/DC Converter



B3 Package(without Heat Sink) Dimension and Pin Function



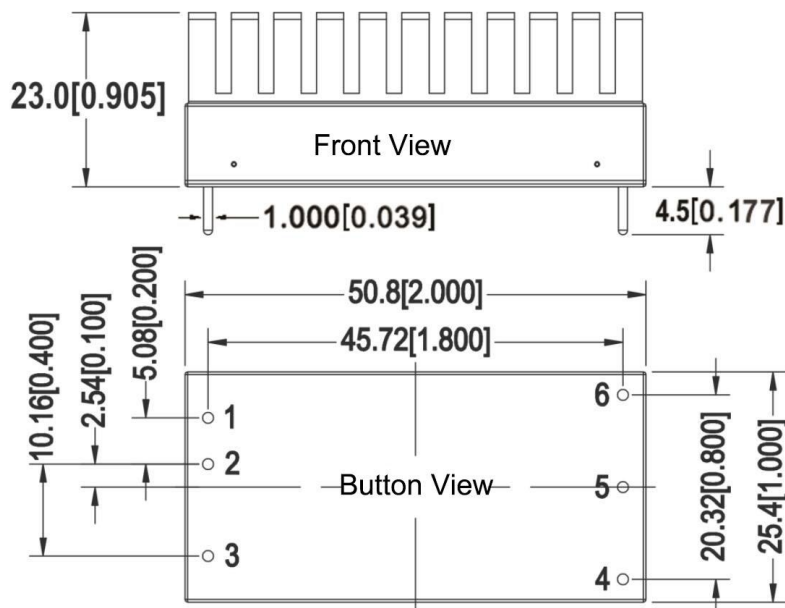
| Single (S) | 1    | 2    | 3    | 4    | 5   | 6   |
|------------|------|------|------|------|-----|-----|
|            | +Vin | -Vin | CTRL | Trim | -Vo | +Vo |

Note: If the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter

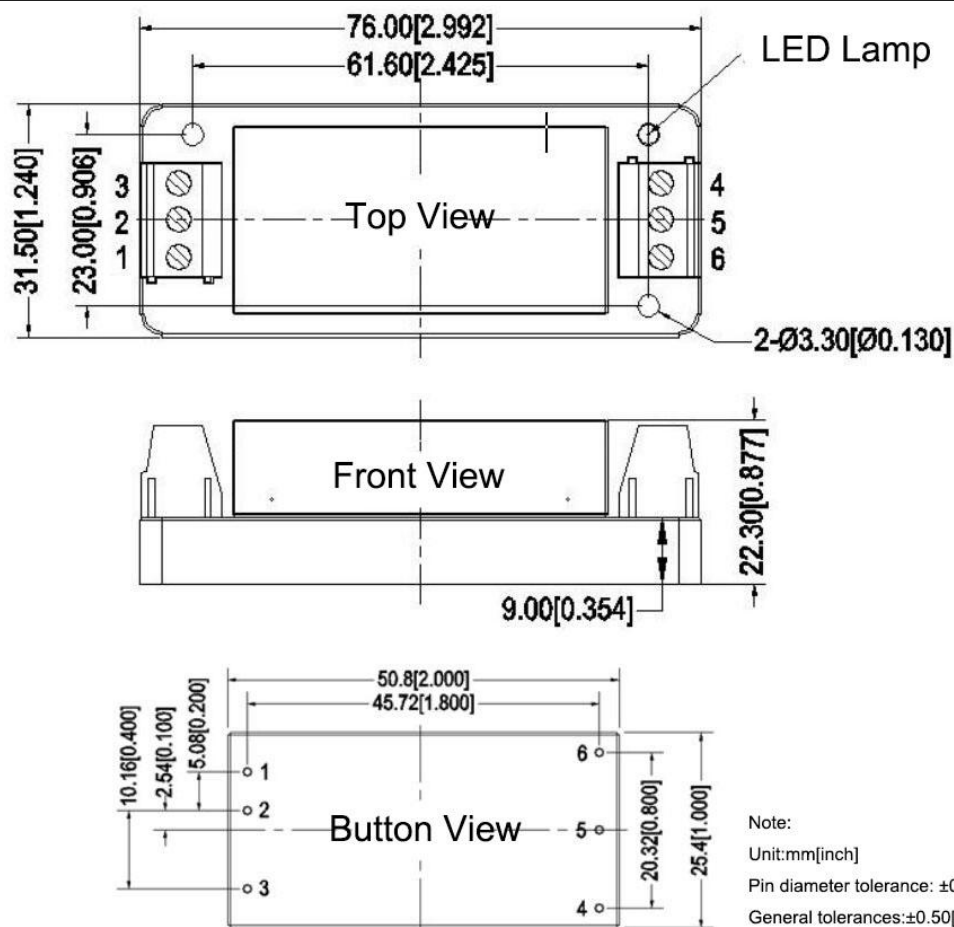


## B3-H Package (with Heat Sink) Dimension and Pin Function



Note:  
Unit:mm[inch]  
Pin diameter tolerance:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

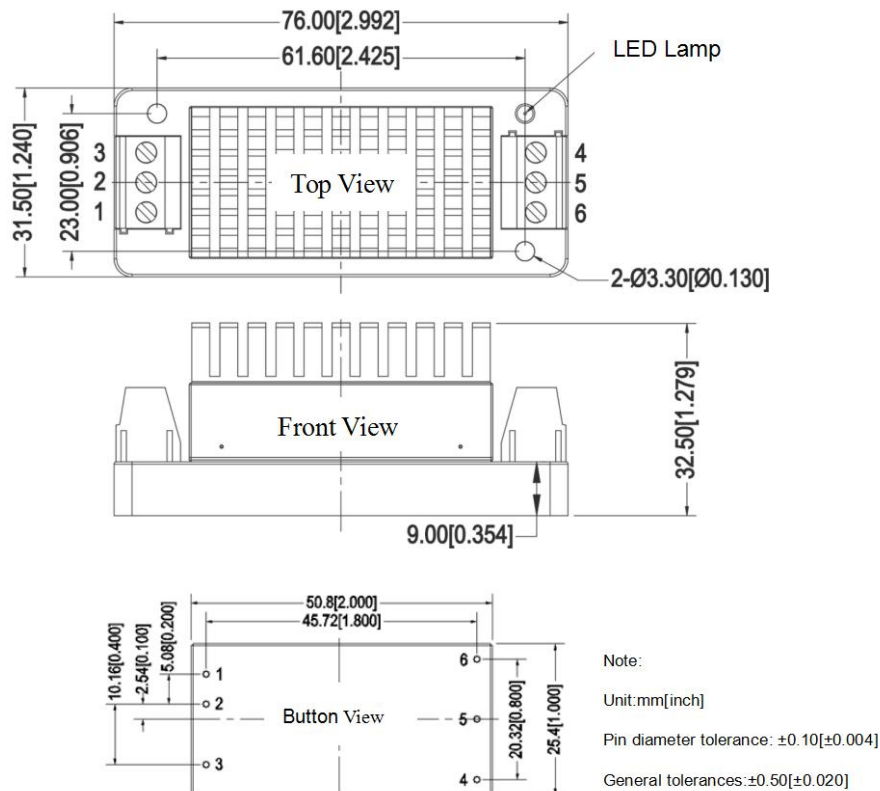
## B3-T Package(without Heat Sink) Dimension



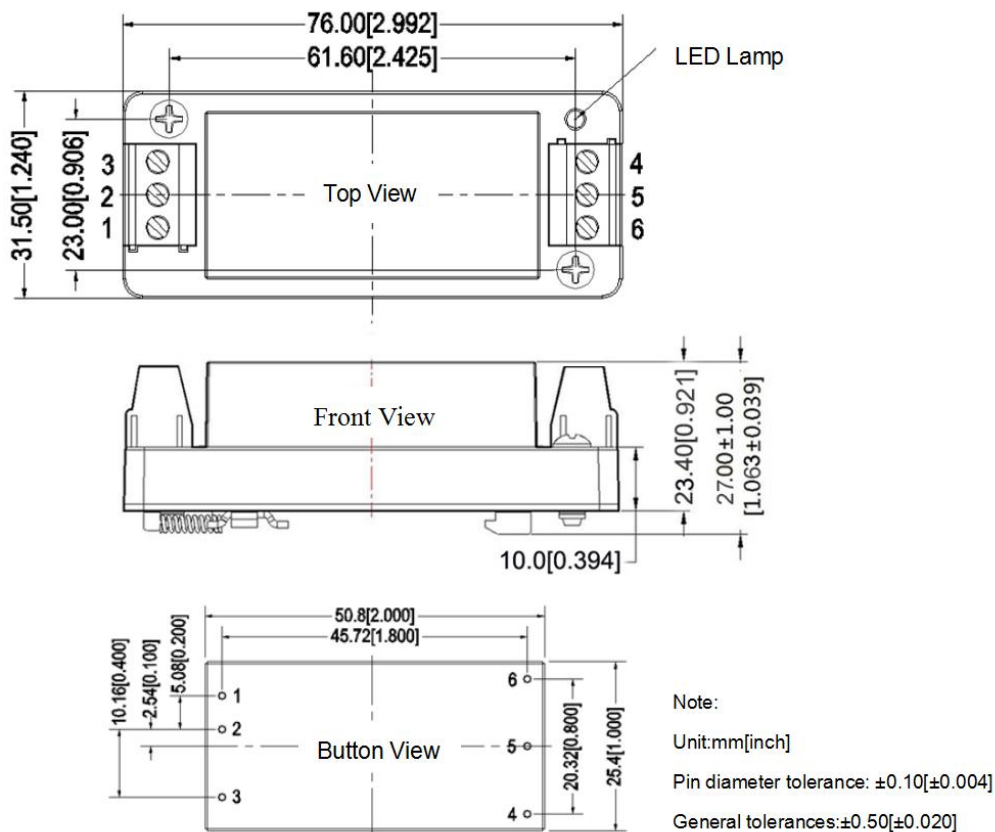
Note:  
Unit:mm[inch]  
Pin diameter tolerance:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter

## B3-T Package(with Heat Sink) Dimension



## B3-TS Package(without Heat Sink) Dimension

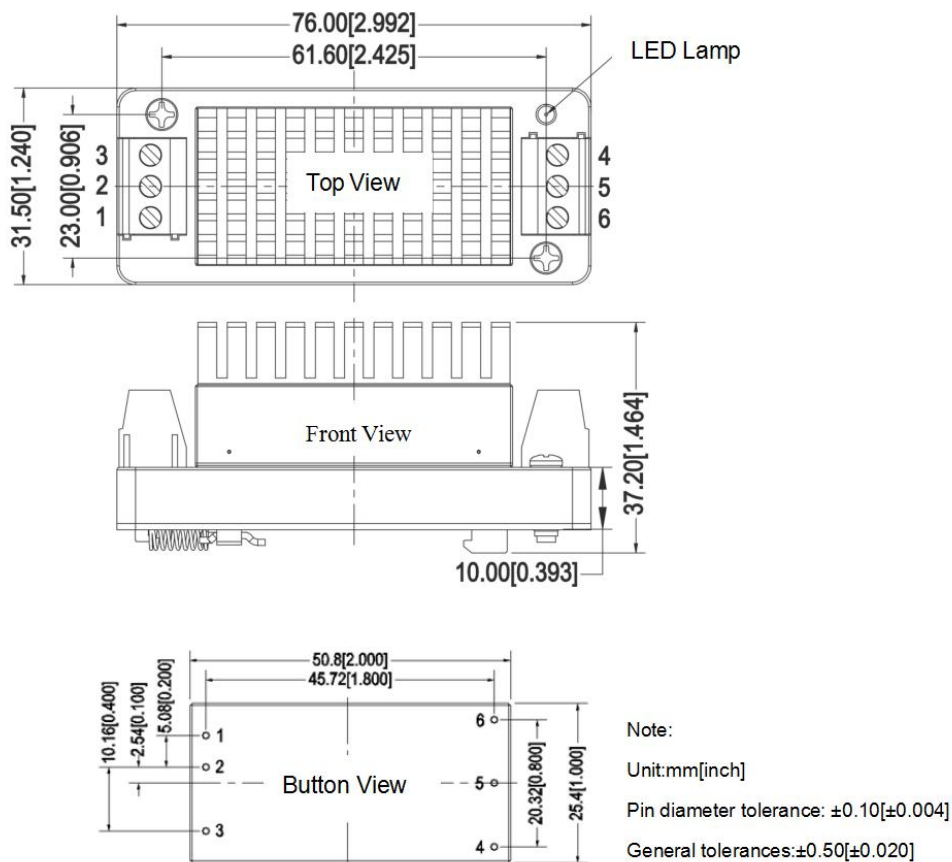




# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter



## B3-TS Package(with Heat Sink) Dimension



## Package Description

| Packing Code              | L x W x H        |                       |
|---------------------------|------------------|-----------------------|
| B3 (without Heat Sink)    | 50.80X25.40X13mm | 2.000X1.000X0.511inch |
| B3-H (with Heat Sink)     | 50.80X25.40X23mm | 2.000X1.000X0.905inch |
| B3-T (without Heat Sink)  | 76X31.5X22.3mm   | 2.99X1.24X0.877inch   |
| B3-TH (with Heat Sink)    | 76X31.5X32.5mm   | 2.99X1.24X1.279inch   |
| B3-TS (without Heat Sink) | 76X31.5X27mm     | 2.99X1.24X1.063inch   |
| B3-TSH (with Heat Sink)   | 76X31.5X37.2mm   | 2.99X1.24X1.464inch   |

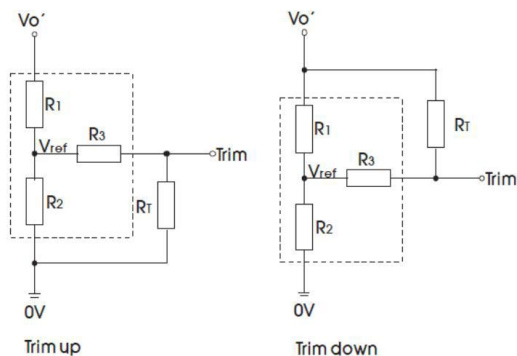
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# CFD30-XXSXXB3C3(-T)(-TS) Series DC/DC Converter



## The usage of Trim and Calculating Trim resistor values



Calculating Trim resistor values:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

$R_T$  = Trim Resistor value;  
 $\alpha$  = self-defined parameter, no actual meaning;  
 $V_{o'}$  is the actual voltage to increase or decrease;

The usage circuit of the Trim circuit(dashed line shows internal resistor network)

| Vout(VDC) | R1(KΩ) | R2(KΩ) | R3(KΩ) | Vref(V) |
|-----------|--------|--------|--------|---------|
| 3.3       | 24     | 14.53  | 68     | 1.25    |
| 5         | 24     | 24     | 68     | 2.5     |
| 9         | 12.1   | 4.62   | 30     | 2.5     |
| 12        | 18     | 4.7    | 30     | 2.5     |
| 15        | 24     | 4.78   | 30     | 2.5     |
| 24        | 25.5   | 2.955  | 18     | 2.5     |

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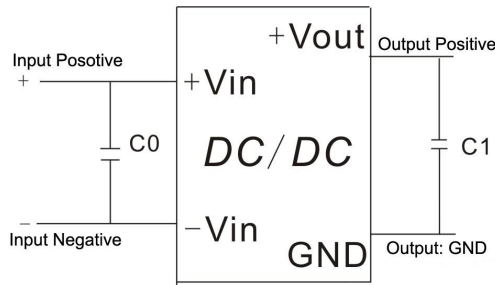
## Design and Application Reference

### Recommended circuit

1. DC/DC test circuit:

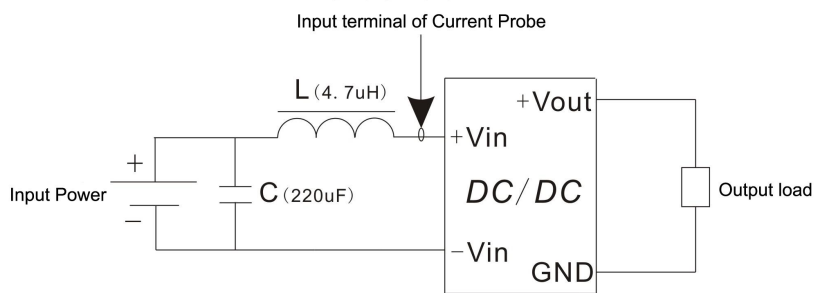
Normal recommended capacitors:

C0: 47-100uF; C1: 10-22uF.



2. Input reflecting ripple current test circuit:

Capacitor C choose low ESR ones, withstand voltage value should be bigger than max input voltage;

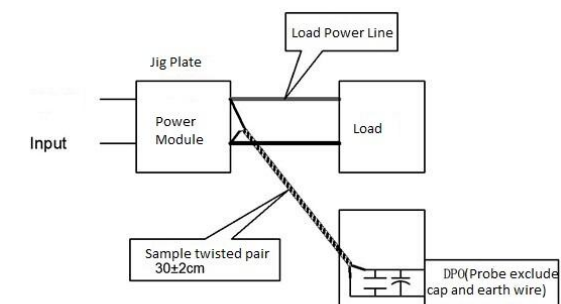


### Ripple & Noise Test:

1. 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

2. Output Ripple & Noise Test Method:

Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



### Application Reference:

1. The recommended minimum load is 10% or high frequency low resistance electrolytic capacitor above 470uF, or output ripple will rise;
2. Recommend the unbalance loads of dual output to be  $\leq \pm 5\%$ ;
3. The maximum capacitive load is tested under pure resistance and full load condition;
4. Our company could provide whole power supply solution, or customized made items;
5. Due to space limitation, please contact our team for more information;
6. If no special specified, all parameters tested under nominal input voltage, pure resistance rated load and  $T_a = 25^\circ\text{C}$  conditions.