

### Typical Features

- ◆ Wide input voltage range 4:1, Output Power 50W
- ◆ Ultra thin Package:11.8mm
- ◆ Transfer Efficiency up to 91%
- ◆ Stand-by Power Consumption as low as 0.3W
- ◆ Output super-fast start up as low as 20ms
- ◆ Continuous Short Circuit protection, Self-recovery
- ◆ Protection: Input under voltage, output over voltage, short circuit, over current
- ◆ Switching Frequency 350KHZ
- ◆ Isolation Voltage 1500VDC
- ◆ Operating Temperature: -40°C~+85°C
- ◆ Good EMI performance
- ◆ International standard pin-out



FD50-XXSXXB3(C) is a new designed 50W 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 1500VDC. It features the protection function of input under-voltage, output over current, short circuit, over voltage. It is widely used in the industrial control, electrical power, communication, railway engine, industrial robot, etc.

### Typical Product List

Part No	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) (Nominal Voltage)		Max. Capacitive Load u F	Ripple & Noise 20MHz (MAX) mVp-p (mV)	Efficiency (%)	
	Nominal	Range	Voltage (V)	Current (A)	Full load(mA)	No Load (mA)			Min	Typ.
*FD50-18S05B3R2	24	9-36	5	10	-	-	6000	150	89	91
FD50-18S12B3R2			12	4.167	2280	3	2000	150	89	91
FD50-18S24B3R2			24	2.083	2290	5	1000	150	89	91
*FD50-36S3V3B3R2	48	18-75	3.3	15.152	-	-	6000	150	89	91
*FD50-36S05B3R2			5	10	-	-	6000	150	89	91
*FD50-36S09B3R2			9	5.555	-	-	5000	150	89	91
*FD50-36S12B3R2			12	4.167	-	-	4000	150	89	91
*FD50-36S15B3R2			15	3.333	-	-	2000	150	89	91
*FD50-36S24B3R2			24	2.083	-	-	1000	150	89	91

1. "\*" are models being developing; Product with CTRL control pin and Trim voltage set function.
2. Suffix "-H" is with heatsink, "-T(H)" for chassis mounting(with heatsink), "-TS(H)" suffix for DIN-Rail mounting(with heatsink), 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, output cannot be no load, at least with 10% load or above 470uF high frequency low resistance electrolytic capacitor, otherwise the output ripple will rise.

### Input Specification

Input Surge Voltage (1Sec)	24Vdc Input	50Vdc (Max)
	48Vdc input	100Vdc (Max)
Under-Voltage Turn-off	8VDC (24Vdc Input) /17VDC (48Vdc Input)	
Start-up Time	20ms (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	150mA

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

### Output Specification

Output Voltage Accuracy	Full voltage full load	Vo	$\leq \pm 2.0\%$ (Max)
Line Regulation	Nominal load, full voltage range	Vo	$\leq \pm 0.5\%$ (Max)
Load Regulation	10%~100% nominal load	Vo	$\leq \pm 1.0\%$ (Max)
Ripple & Noise	Nominal load, nominal voltage	$\leq 150\text{mVp-p}$ (20MHz bandwidth)	
Output Over-voltage Protection	110%~160%Vo		
Output Voltage Adjustment	Trim-pin function	$\pm 10\%$ (Typ.)	
Output Short circuit Protection	Hiccup, continuous, self-recovery		
Output Over-current protection	110%~200%Io (150%Io (Typ.))		
Dynamic Response	25% nominal load step change $\Delta V_o / \Delta t$	3.3V&5V	7.5%(Max)
		Others	$\leq \pm 5.0\% / 500\mu\text{s}; (24\text{V Input } 16\text{-}36\text{VDC})$ (48V Input 36-75VDC) $\leq \pm 7.0\% / 500\mu\text{s}; (24\text{V Input } 9\text{-}16\text{VDC})$ (48V Input 18-36VDC)

### General Specification

Switching Frequency	Typical	350KHZ
Isolation Capacitor	Typical	2000pF
Operating Temperature	Refer to Temperature Derating Curve	-40°C ~ +85°C

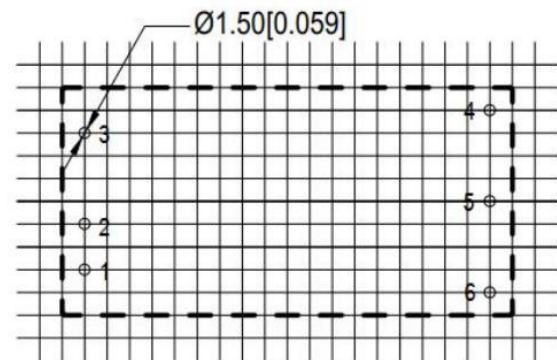
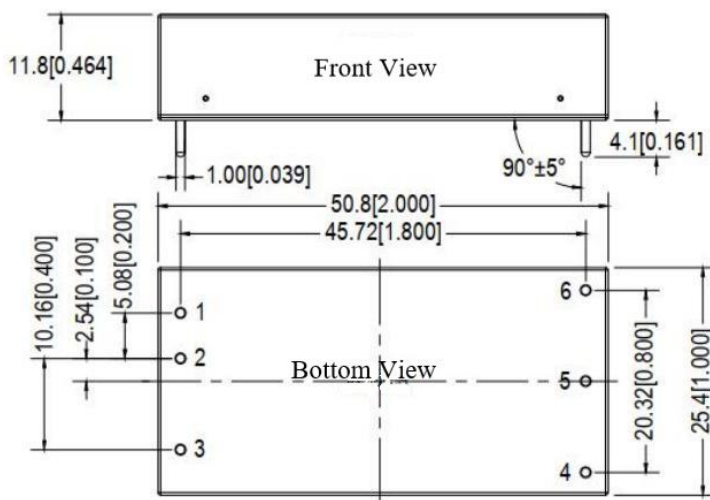
Storage Temperature	-	-55°C ~ +125°C
Max Case Temperature	Within Operating Curve	+105°C
Relative Humidity	No condensing	5%~95%
Case Material	-	Aluminum Metal Case
Isolation Voltage	Input to Output	1500Vdc ≤ 0.5mA / 1min
MTBF	MIL-HDBK-217F@25°C	2X10 <sup>5</sup> Hrs
Product Weight	Average	45g

**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 perf.Criteria B (external circuit is needed)
	Surge	IEC/EN61000-4-5 ±2KV perf.Criteria B (external circuit is needed)
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-6 3V/r.m.s perf.Criteria A

**B3R2 Package(without Heat Sink) Dimension and Pin Function**

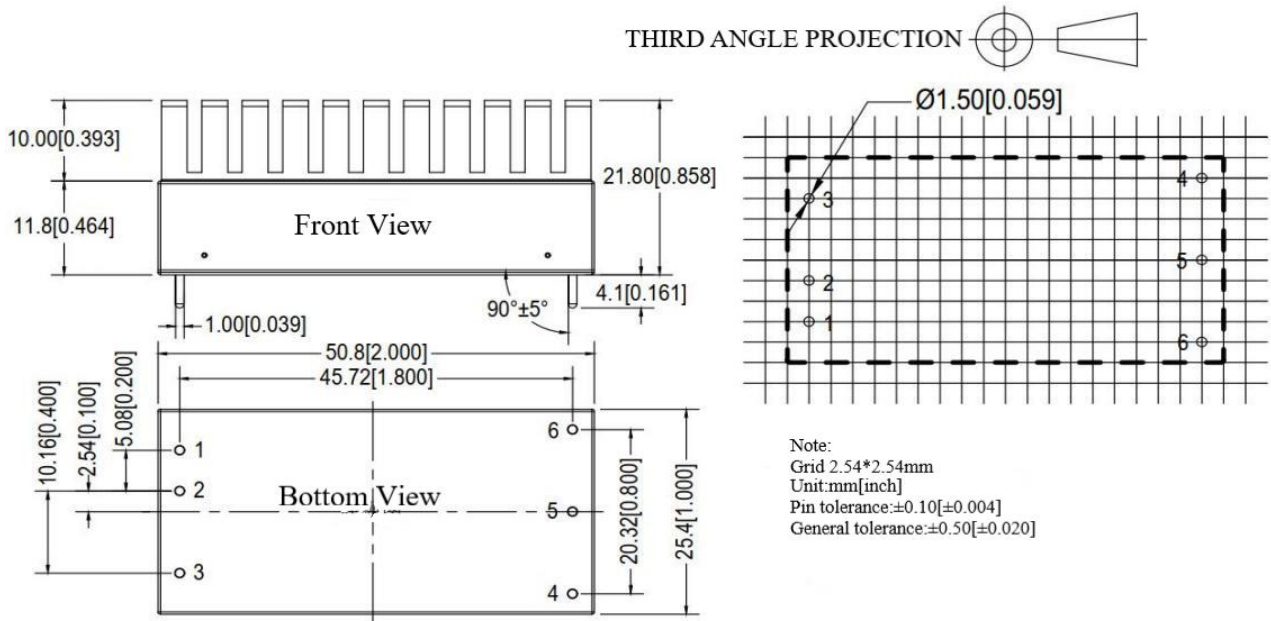
THIRD ANGLE PROJECTION



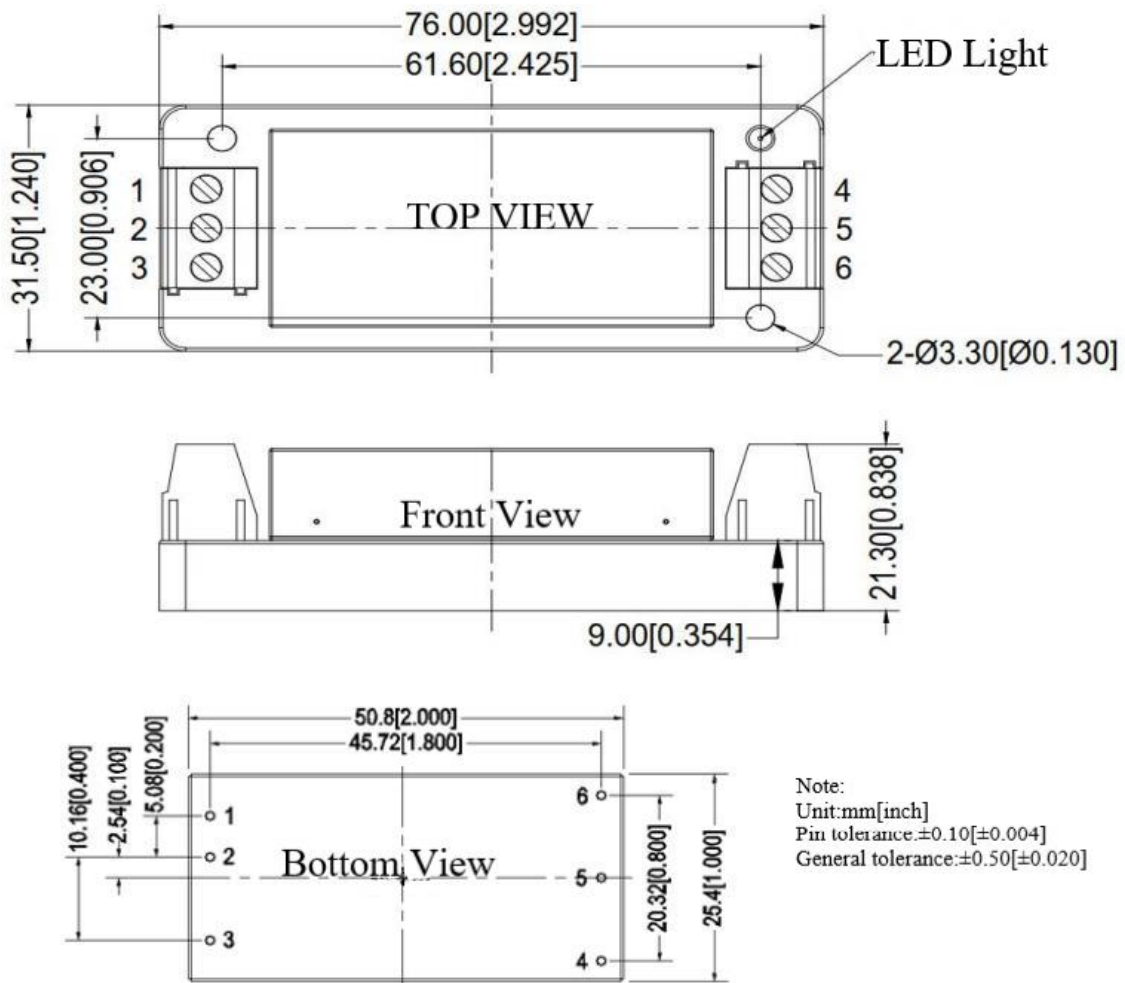
Note:  
Grid 2.54\*2.54mm  
Unit:mm[inch]  
Pin tolerance:±1.0[±0.004]  
General tolerance:±0.50[±0.020]



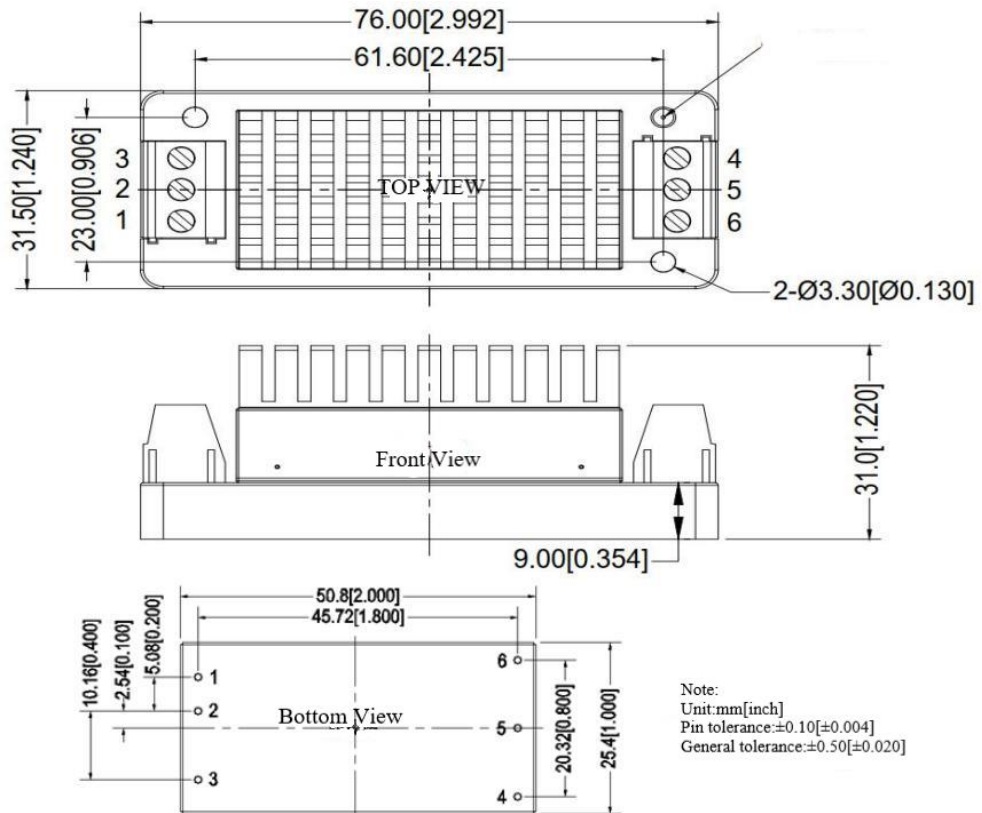
**B3R2 Package(with Heat Sink) Dimension and Pin Function**



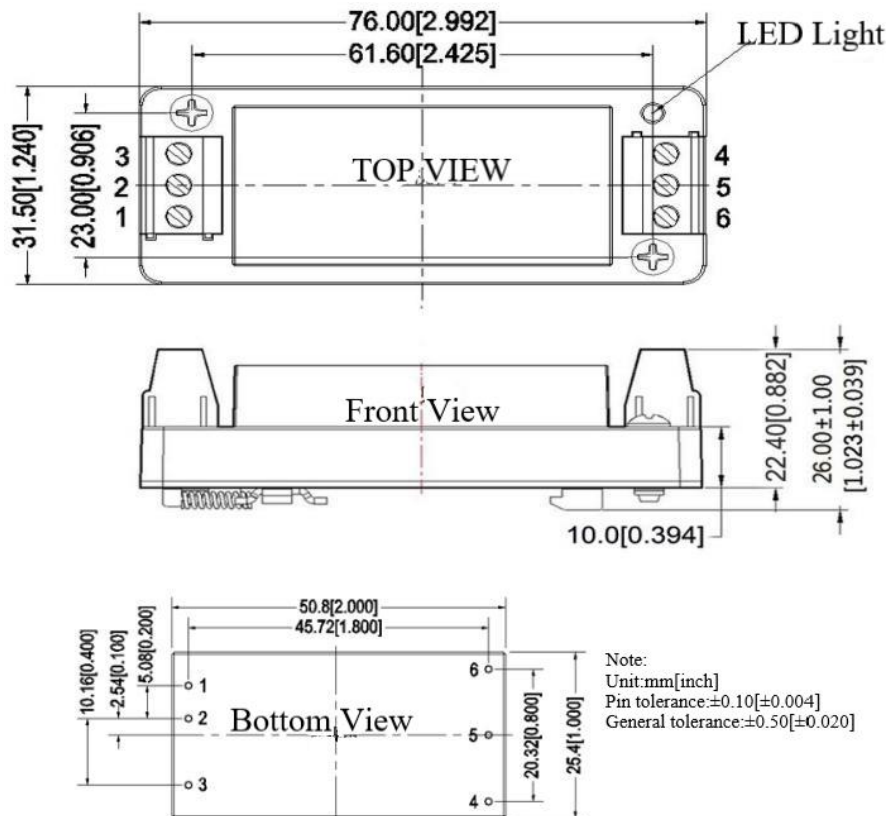
**B3R2-T Package(without Heat Sink) Dimension**



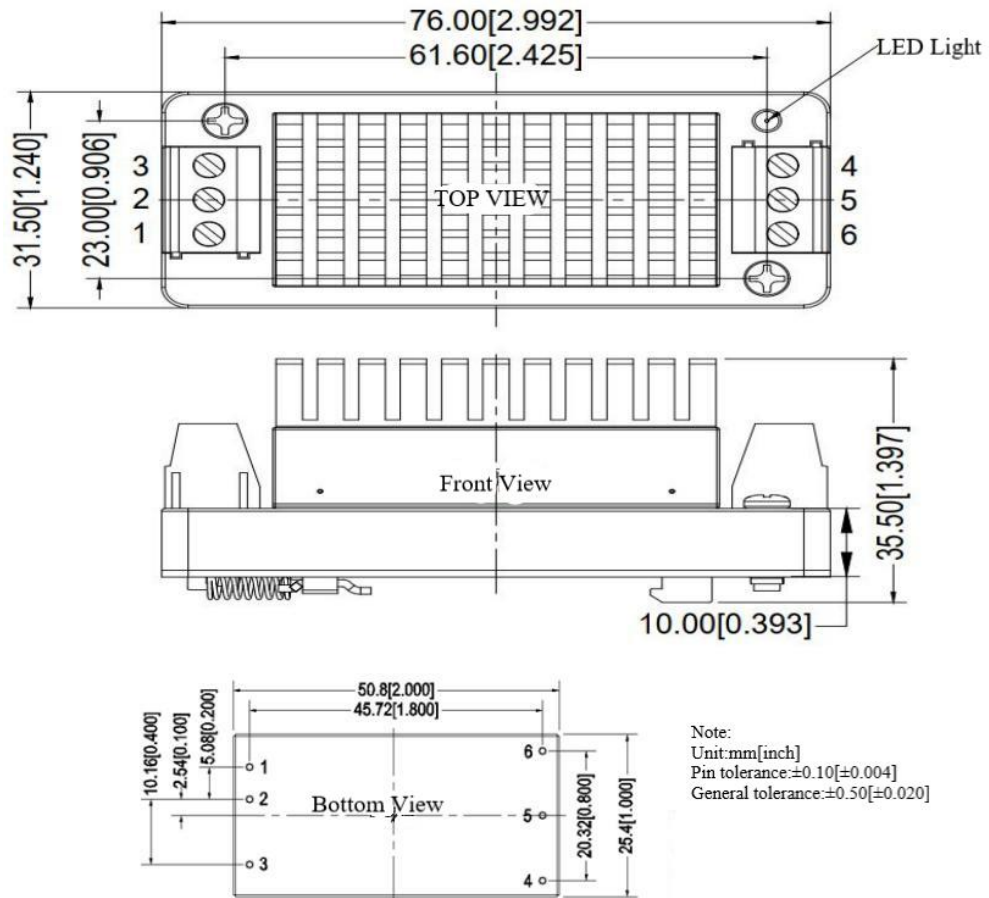
**B3R2-TH Package(with Heat Sink) Dimension**



**B3R2-TS Package(without Heat Sink) Dimension**



**B3R2-TSH Package(with Heat Sink) Dimension**



**Package Description**

Packing Code	L x W x H	
B3R2(without Heat Sink)	50.80X25.40X11.8mm	2.000X1.000X0.464inch
B3R2-H(with Heat Sink)	50.80X25.40X21.8mm	2.000X1.000X0.858inch
B3R2-T(without Heat Sink)	76X31.5X21.3mm	2.99X1.24X0.838inch
B3R2-TH(with Heat Sink)	76X31.5X31.0mm	2.99X1.24X1.1220inch
B3R2-TS(without Heat Sink)	76X31.5X26.0mm	2.99X1.24X1.023inch
B3R2-TSH(with Heat Sink)	76X31.5X35.5mm	2.99X1.24X1.397inch

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

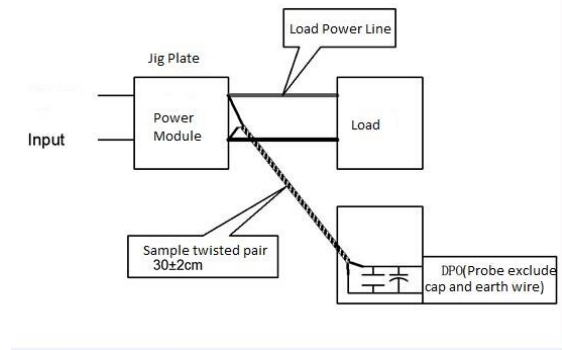
Note: If the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

**Ripple & Noise Test (Twisted Pair Method 20MHz Bandwidth)**

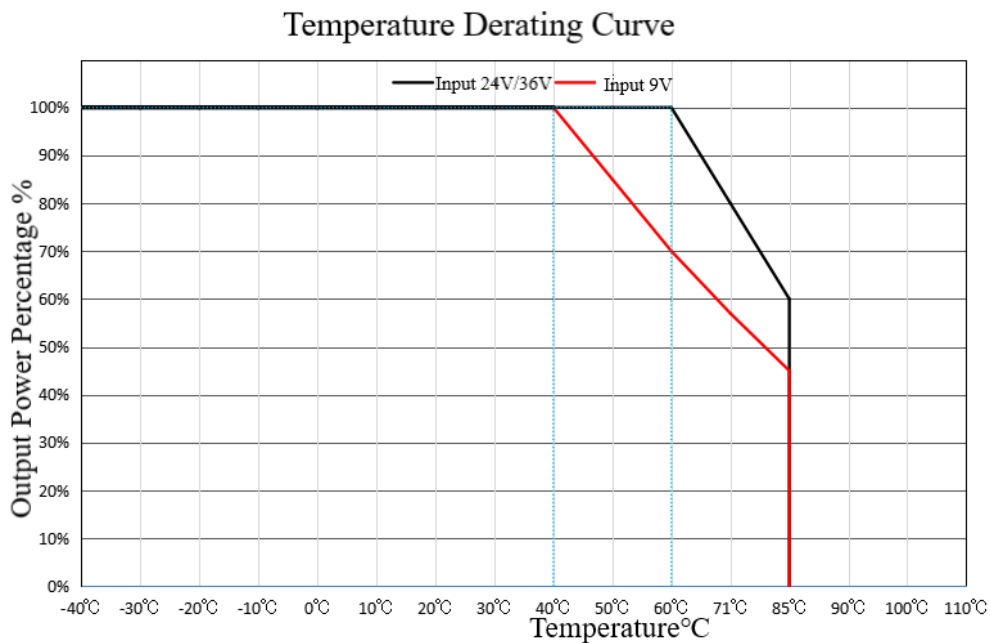
1.12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

**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.

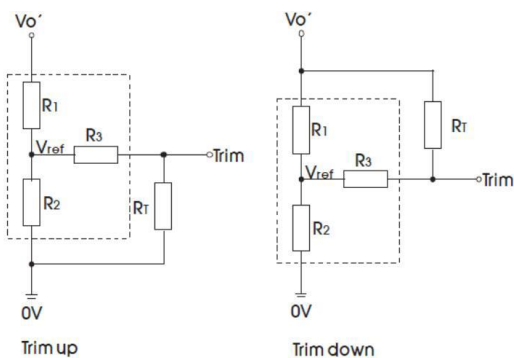


**Temperature Derating Curve**



Note: The temperature derating curve is based on the product with heatsink and no wind environment.

**The usage of Trim and Calculating Trim resistor values**



Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad \alpha = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

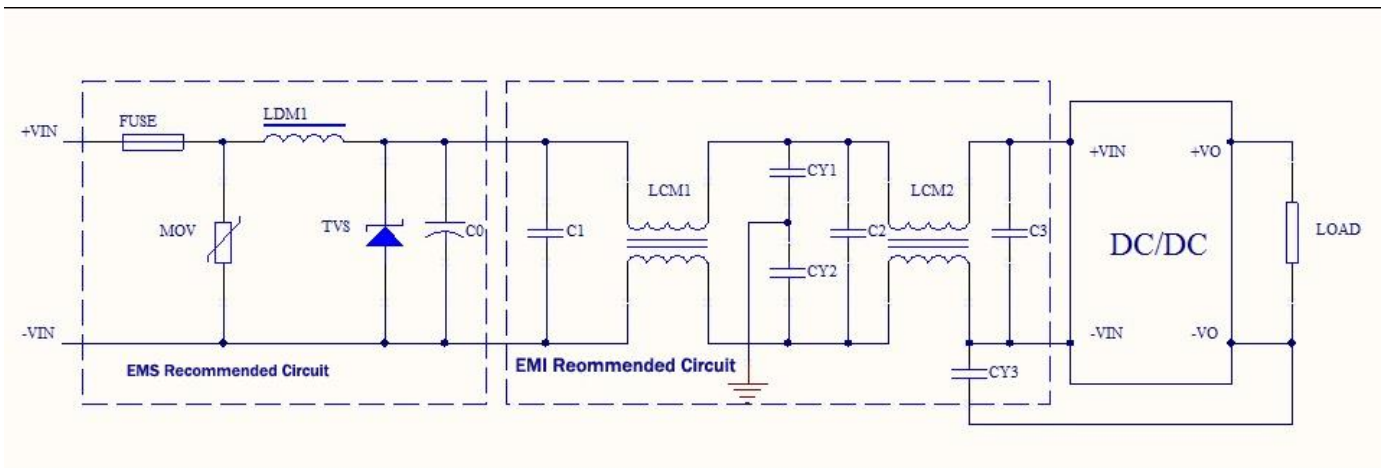
$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad \alpha = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

RT= Trim Resistor value;  
a= self-defined parameter, no actual meaning;  
Vo' is the actula voltage to increas or desearse;

The usage circuit of the Trim circuit (dashed line shows inside of product)

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

**EMC External Recommended Circuit**



**Recommended Parameter::**

Component	18V Input	36V Input
FUSE	According to customer's request	
MOV	14D101K	14D470K
LDM1	56uH	
TVS	SMCJ80A	SMCJ40A
C0	560uF/100V	680uF/100V
C1,C2,C3	4.7uF/100V	4.7uF/100V
LCM1	15mH	
LCM2	56uH	
CY1,CY2,CY3	1nF/2KV	





**Design and Application Reference**

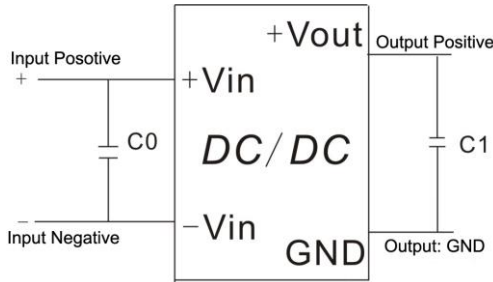
**Recommended circuit**

1. DC/DC test circuit:

Normal recommended capacitors:

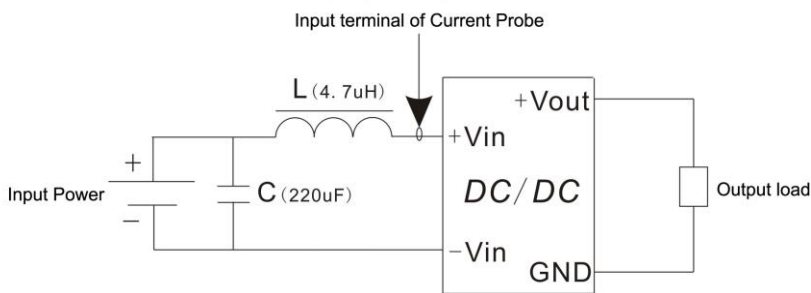
C0:47-100uF; (Input 24VDC use 50V, Input 48VDC use 100V)

C1:100uF/50V.



2. Input reflecting ripple current test circuit:

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



**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.