Product Typical Features

- Wide Input Voltage Range(4:1), Output power 20W
- Transfer Efficiency up to 89%
- Output fast start up
- Continuous Short Circuit protection, Self-recovery
- Input under voltage, output over voltage, short circuit, over current protection
- Maximum working insulation voltage 1500 VDC
- Switching Frequency 280KHz
- Isolation Voltage 5000VDC
- Operating temperature: -40°C~+85°C
- Creepage distance of potting device is 3.7mm, electrical distance is 5mm
- CTI Level III
- Good EMC performance
- International standard pin-out

Application Field

PFD20-XXSXXB2C5 *is a newly designed DIP 2X1 packed, 20W output power, ultra wide input range 4:1, low stand-by power consumption， isolated regulated output DC-DC converter， could be widely used for industrial control, instrument, communication, power electricity, internet and etc. When the product is used in a harsh electromagnetic compatibility environment, please refer to the application circuit provided by our company.*

Typical Product List

Certificate	Part NO	Input Voltage Range (VDC)		Output Voltage/ Current(Vo/Io)		Input Current(mA) @Nominal Voltage		Max Capacitive Load	Ripple & Noise (mVp-p)		Efficiency @ output full load(%)	
		Nominal	Range	Voltage (VDC)	Current (mA) Max./Min.	Full Load Typ.	No Load Typ.	uF	Typ.	Max.	Min.	Typ.
-	*PFD20-18S3V3B2(C)5	24	9-36	3.3	5000/0	799	33	10000	50	100	84	86
-	PFD20-18S05B2(C)5	24	9-36	5	4000/0	936	33	10000	50	100	87	89
-	*PFD20-18S09B2(C)5	24	9-36	9	2222/0	947	33	2000	50	100	86	88
-	*PFD20-18S12B2(C)5	24	9-36	12	1667/0	936	6	1600	50	100	87	89
-	PFD20-18S15B2(C)5	24	9-36	15	1333/0	936	6	1000	50	100	87	89
-	PFD20-18S24B2(C)5	24	9-36	24	800/0	936	6	500	50	100	87	89
-	*PFD20-36S3V3B2(C)5	48	18-75	3.3	4000/0	404	33	10000	50	100	83	85
-	PFD20-36S05B2(C)5	48	18-75	5	4000/0	473	33	10000	50	100	86	88
-	*PFD20-36S09B2(C)5	48	18-75	9	2222/0	473	33	2000	50	100	86	88
-	*PFD20-36S12B2(C)5	48	18-75	12	1667/0	473	3	1600	50	100	86	88
-	*PFD20-36S15B2(C)5	48	18-75	15	1333/0	468	3	1000	50	100	87	89

-	PFD20-36S24B2(C)5	48	18-75	24	833/0	468	3	500	50	100	87	89

Note:

1: "*" indicates the model under development;

2: Model description: C with remote control pin, T with output voltage adjustment pin, R with remote control pin and output voltage adjustment pin, N without remote control pin and output voltage adjustment pin;

3: The above efficiency is measured by nominal input voltage and output rated load;

4: The maximum capacitive load refers to the maximum capacity allowed by the external output capacitor when the power supply is started at rated load. If the capacity is exceeded, the power supply may not start;

5: In order to reduce no-load power consumption and improve light-load efficiency, the IC will reduce the frequency when it is no-load and light-load.

6: The above is only a partial product list. If you need products outside the list, please contact our sales department.

Input Specification

Items	Test Conditions	Min.	Typ.	Max.	Unit
Stand-by Consumption	Input voltage range	/	0.1	/	W
Input Surge Voltage (1Sec.max.)	24V nominal input	-0.7	/	50	VDC
	48V nominal input	-0.7	/	100	
Start-up Voltage	24V nominal input	/	/	9	
	48V nominal input	/	/	18	
Input Under-Voltage Protection	24V nominal input	6.5	7	/	
	48V nominal input	12	14	/	
Hot Plug	/	N/A			
Input Filter	/	Pi filter			
Control Pin(Ctrl)	The power module turn on	Suspend or connect to high level (3.5V-12VDC)			
	The power module turn off	Connect to -Vin or low level (0-1.2VDC)			
	Turn off input current	3mA(Typ)			

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

Output Specification

Items	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full voltage range, nominal load		/	±1	±3	%
Voltage Regulation	Nominal load, full voltage range		/	±0.2	±0.5	%
Load Regulation	5%-100% rated load		/	±0.5	±1	%
Ripple & Noise	0%-100% load, 20MHz bandwidth		/	50	100	mVp-p
Transient Recovery Time	25% nominal load step, nominal input voltage		/	300	500	us
Transient Response Deviation		3.3V, 5V output	/	±5	±8	%
		Other output	/	±3	±5	%
Turn on Delay Time	Nominal input voltage		/	20	/	ms
Output voltage adjustable (Trim)	Input voltage range		90	/	110	%Vo
O/P Over voltage protection			110	160	200	%Vo
O/P Over current protection			110	150	250	%Io
Short Circuit Protection			Hicup, continuous, self-recovery			

Note： * Ripple & Noise is tested under the Twisted Pair test method, please refer to “Ripple& Noise Test” at back.

General Specification

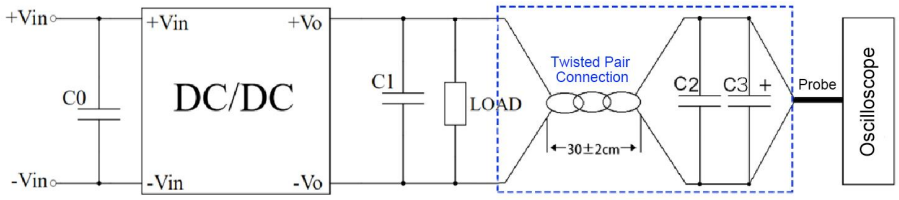
Items	Test Conditions	Min.	Typ.	Max.	Unit

Switching Frequency	Operating Mode(PWM)	/	280	/	KHz
Operating Temperature	Refer to Temperature Derating Curve	-40	/	+85	℃
Storage Temperature		-55	/	+125	
Pin Withstand Soldering Temperature	Distance to shell is 1.5mm,10seconds	/	/	300	
Relative Humidity	No condensing	5	/	95	%RH
Isolation Voltage	Input to output, test 1min, leakage current<1mA	5000	/	/	VDC
Isolation Capacitance	Input to output, 100KHz/0.1V	/	1000	/	pF
Insulation Resistance	Input to output , voltage 500VDC	1000	/	/	MΩ
MTBF	MIL-HDBK-217F@25℃	1000		/	K hours
Cooling Method	Free air convection				
Case Material	Black flame-retardant heat-resistant Plastic(UL94 V-0)				
Weight/ Dimension	Part No.	Weight Typ.	L x W x H		
	PFD20-XXSXXB2(C)5	24g	50.8X25.4X15.6 mm	2.0X1.0X0.614inch	

EMC Compatible Characteristics

Total Item		Sub Item	Test Standard	Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (EMC Recommended Circuit)
		RE	CISPR32/EN55032	CLASS B (EMC Recommended Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria A
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria A
		ESD	IEC/EN61000-4-2	Contact / ±4KV Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf.Criteria B (EMC Recommended Circuit)
		EFT	IEC/EN61000-4-4	±2KV Perf.Criteria B (EMC Recommended Circuit)

Ripple& Noise Test: (Twisted Pair Method 20MHZ bandwidth)

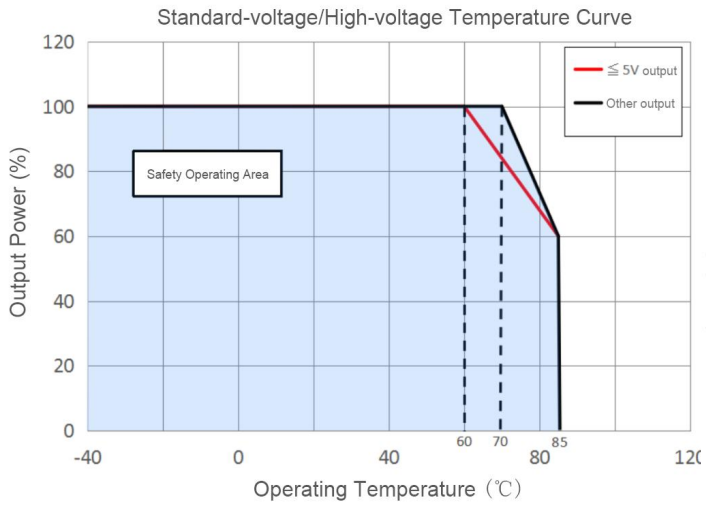


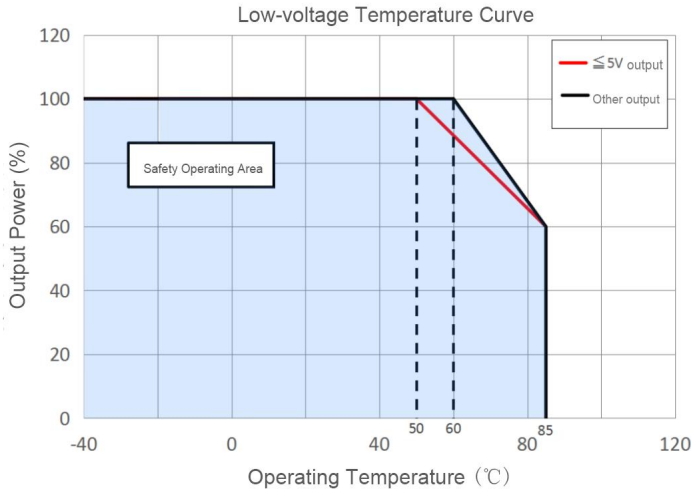
Test conditions:

1. Ripple noise is connected using 12# twisted pair cable, the oscilloscope is sampled using the sampling mode, the oscilloscope bandwidth is set to 20MHz, a 100M bandwidth probe is used, and the probe cap and ground clip are removed; and C2 (0.1uF) polypropylene capacitor and C3 (10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel at the probe end of the twisted pair cable, and the capacitance values of C0 and C1 refer to the design application circuit data;

2. Ripple noise test: The module input end (INPUT) is connected to the input power supply, and the power supply output is connected to the electronic load (LOAD) through the power line. The test is sampled from the power output port using a 30±2 cm twisted pair cable alone, and connected to the oscilloscope probe according to the polarity.

Product Characteristic Curve



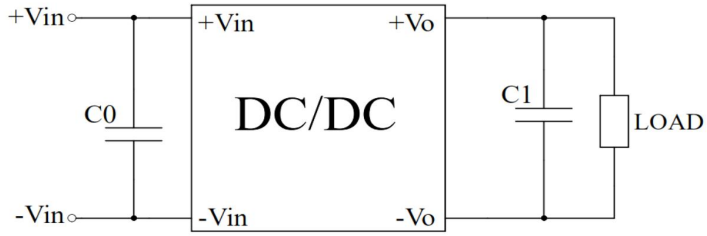


Design Application Circuit

Recommended circuit

1. DC/DC test circuit:

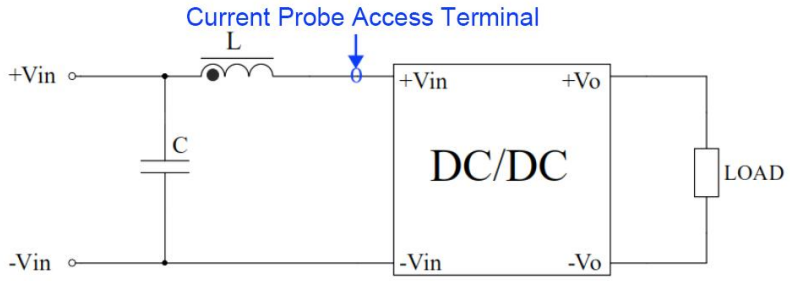
Generally recommended capacitors: C0: 47-100uF; C1; 10-22uF;



Component	Parameter
C0	100uF/100V
C1	100uF/50V

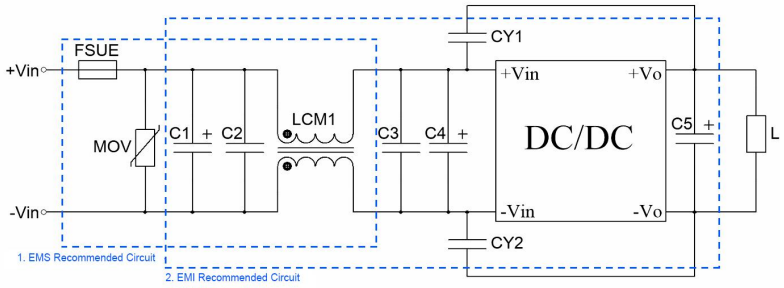
2. Input reflected ripple current test circuit:

Capacitor C needs to be a low ESR type capacitor, and the withstand voltage value should be greater than the maximum input voltage of the product;



Component	Parameter
C	220uF/100V
L	4.7uH

3. Recommended EMC peripheral circuits:

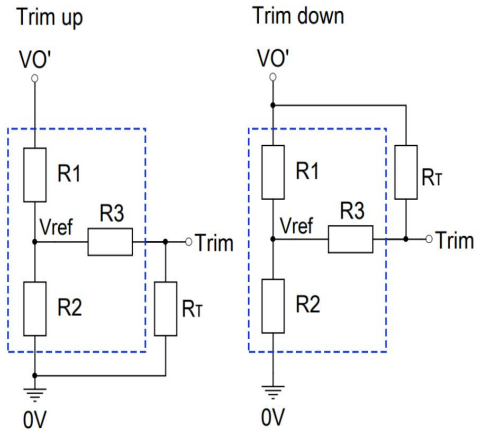


EMC Recommended Circuit

Component	Vin:24VDC	Vin:48VDC
FUSE	Choose according to customer needs	
MOV1	14D470K	14D101K
C1,C4	330uF/50V	330uF/100V
LCM1	5mH	5mH
C2,C3	10uF/50V	10uF/100V
C5	100uF/ 50V	100uF/ 50V
CY1,CY2	2.2nF / 400VAC	

Note: Part 1 in the figure is for EMS testing, and part 2 in the figure is for EMI filtering, which can be adjusted according to the situation.

4. Use of Trim resistor and calculation of Trim resistor:



Note: Trim uses circuits, and the dotted box area is the interior of the product.

Trim resistance calculation formula:

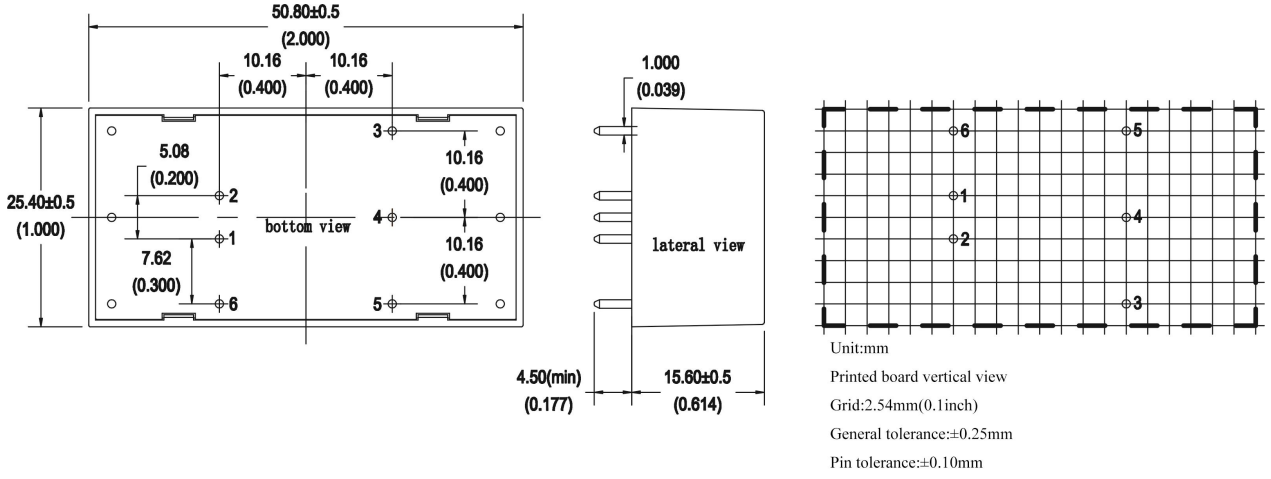
$$up{:}R_T=\frac{aR2}{R2-a}-R3 \qquad a=\frac{Vref}{Vo'-Vref}\cdot R1$$

$$down{:}R_T=\frac{aR1}{R1-a}-R3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R1$$

RT is the Trim resistor, a is a custom parameter, and Vo' is the actual required up or down voltage

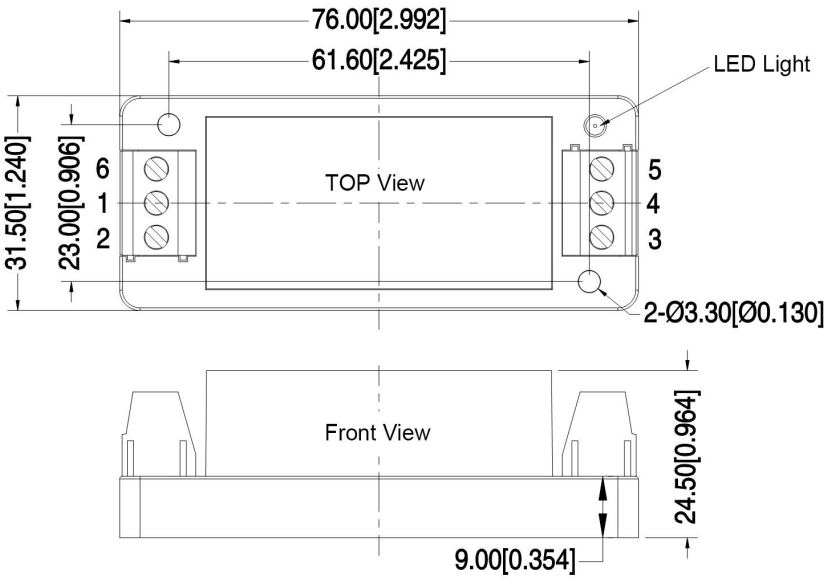
Output Voltage	Trim uses internal circuit parameters			
Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	24	14.53	68	1.25
5	18	18	68	2.5
9	25.5	9.79	30	2.5
12	18	4.7	30	2.5
15	25.5	5.1	30	2.5
24	25.5	2.95	18	2.5

B2 Packing Dimension



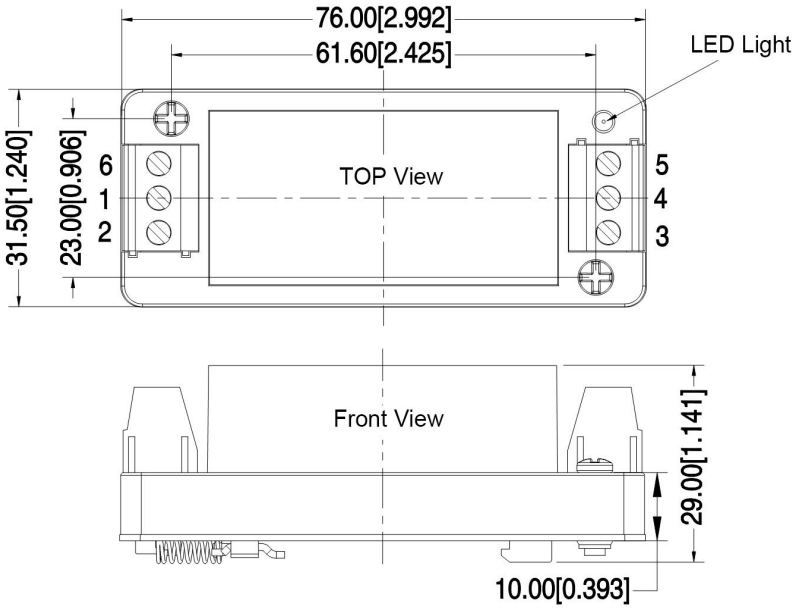
Single(S)	1	2	3	4	5	6
	-Vin	+Vin	+Vo	NP	GND	Ctrl

B2-T Packing Dimension



Single(S)	1	2	3	4	5	6
	-Vin	+Vin	+Vo	NP	GND	Ctrl

B2-TS Packing Dimension



Single(S)	1	2	3	4	5	6
	-Vin	+Vin	+Vo	NP	GND	Ctrl

Pin Definition

Pin	1	2	3	4	5	6
PFD20-XXSXXB2T5	-Vin	+Vin	+Vo	Trim	GND	NP
PFD20-XXSXXB2R5	-Vin	+Vin	+Vo	Trim	GND	Ctrl
PFD20-XXSXXB2N5	-Vin	+Vin	+Vo	NP	GND	NP

Note:

1. The product should be used within the specification range, otherwise it will cause permanent damage to the product;
2. If the product works below the minimum required load, it cannot be guaranteed that the product performance meets all the performance indicators in this manual;
3. If the product works beyond the product load range, it cannot be guaranteed that the product performance meets all the performance indicators in this manual;
4. Unless otherwise specified, the above data are measured at Ta=25℃, humidity<75%, input nominal voltage and output rated load (pure resistance load);
5. All the above index test methods are based on our company's standards;
6. The above are the performance indicators of the product models listed in this manual. Some indicators of non-standard model products will exceed the above requirements. For specific circumstances, please contact our technical personnel directly;
7. Our company can provide product customization;
8. Product specifications are subject to change without prior notice. Please pay attention to the latest manual published on our official website.

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