

- Ultra-wide 4:1 input voltage range
- High efficiency up to 93%
- I/O isolation test voltage: 2.25k VDC
- Operating ambient temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit, over-current, over-voltage, over-temperature protection
- Five-sided metal shielded package
- Industry standard ¼-Brick package and pin-out

DUF75-48XXQB



RoHS



3-Year Warranty

Description

DUF75-48XXQB series are isolated 75W DC-DC products with a 4:1 input voltage. They feature efficiency up to 93%, 2250VDC input to output isolation, operating ambient temperature of -40°C to +85°C, input under-voltage, output short circuit, over-current, over-voltage, over-temperature protection. The products meet CLASS B of CISPR32/EN55032 EMI standards by adding the recommended external components, and they are widely used in applications such as battery powered systems, industrial controls, electricity, instrumentation, railway, communication and intelligent robotic.

Selection Guide

Certificati on	Part No.	Input Voltage (Vdc) Nominal (Range)	Input Voltage (Vdc) Nominal (Range) Max.	Output Voltage (Vdc)	Output Current (mA) (Max.)	Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
	DUF75-4805QB	48 (18-75)	80	5	15	89/91	6000
	DUF75-4812QB			12	6.25	90/92	2000
	DUF75-4815QB			15	5	91/93	2000
	DUF75-4824QB			24	3.13	90/92	1000
	DUF75-4848QB			48	1.56	90/92	470

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	Nominal input voltage		--	1698/50	1756/80	mA
Reflected Ripple Current			--	30	--	
Surge Voltage (1sec. max.)			-0.7	--	90	VDC
Start-up Voltage			--	--	18	
Input Under-voltage Protection	5VDC, 15VDC output		16	16.5	--	
	Others		15	15.5	--	
Input Filter		Pi filter				
Hot Plug		Unavailable				
Ctrl①	Module on	Ctrl pin open or pulled high TTL (3.5-12VDC)				
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)				
	Input current when off		--	2	10	mA

Note: ①The Ctrl pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation	0%-100% load		--	±0.5	±0.75	
Transient Recovery Time	25% load step change		--	200	500	μs
Transient Response Deviation	25% load step change	5VDC output	--	±3	±7.5	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise①	20MHz bandwidth	12VDC, 15VDC output	--	100	200	mVp-p
		Others	--	150	250	

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Trim②		95	--	110	%Vo
Sense②		--	--	105	
Over-temperature Protection	Max. Case Temperature	--	115	120	°C
Output Over-voltage Protection	Input voltage range	110	130	160	%Vo
Output Over-current Protection		110	140	190	%Io
Short-circuit Protection		Hiccup, continuous, self-recovery			

Note:

- ①The “parallel cable” method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information;
 ②For URF4805QB-75W(F/H)R3 and URF4815QB-75W(F/H)R3, Vin needs to be higher than 20VDC, if use Trim function to adjust output to 10% or the Sense function to adjust output to 5%.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Electric Strength Test for 1 minute with a leakage current of 5mA max	Input-output	2250	--	--	VDC
		Input-case	1500	--	--	
		Output-case	500	--	--	
Insulation Resistance	Input-output insulation Voltage 500VDC		100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		--	2200	--	pF
Operating Temperature			-40	--	+85	°C
Storage Temperature			-55	--	+125	
Storage Humidity	Non-condensing		5	--	95	%RH
Pin Soldering Resistance Temperature	Wave-soldering, 10 seconds		--	--	260	°C
	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
Shock And Vibration			IEC/EN61373 - Category 1, Grade B			
Switching Frequency	PWM mode		--	250	--	KHz
MTBF	MIL-HDBK-217F@25°C		500	--	--	K hours

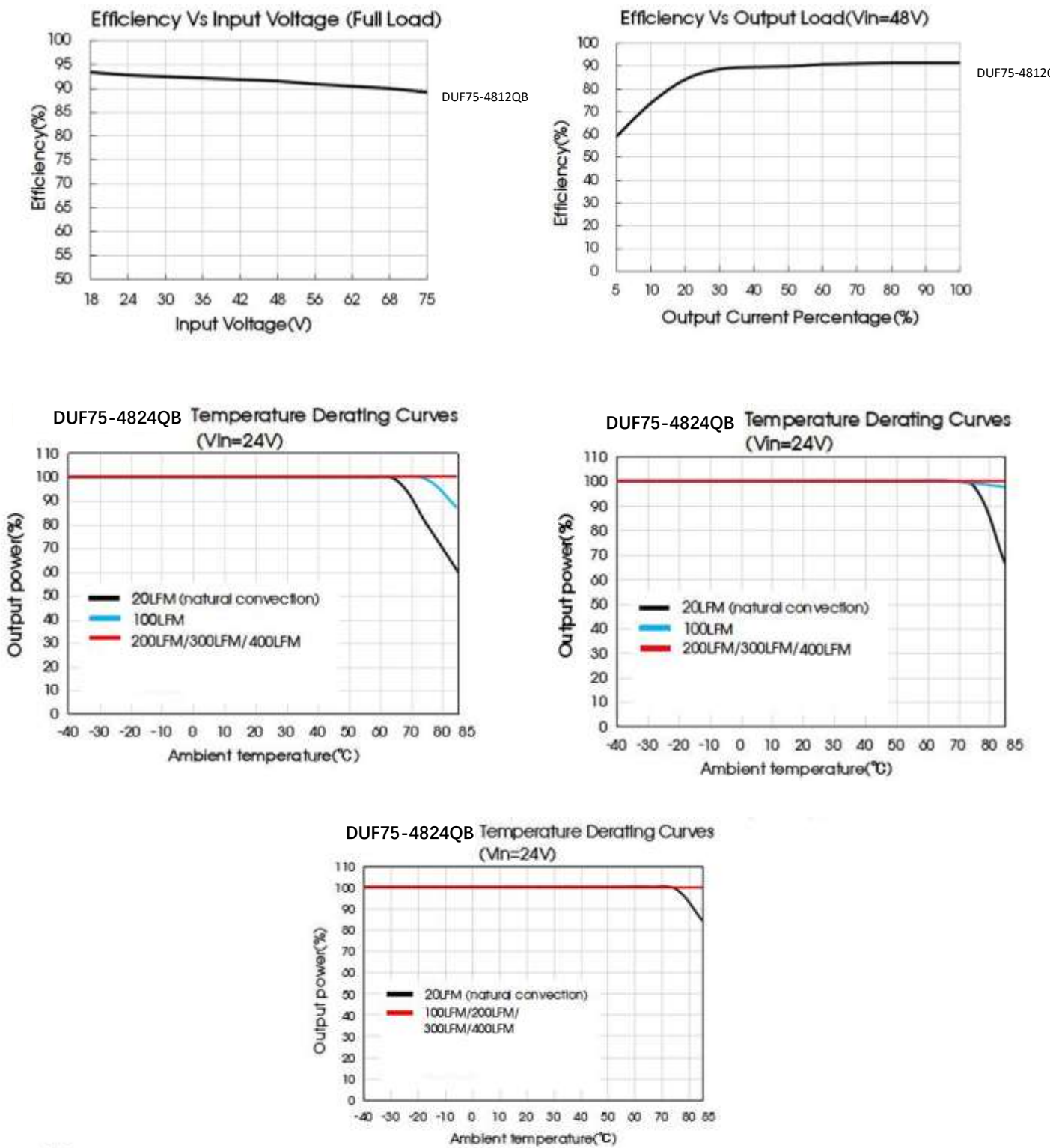
Mechanical Specifications

Case Material	Aluminum alloy case, black plastic bottom, flame-retardant and heat-resistant (UL94 V-0)	
Dimension	DUF75-4805QB	61.8 × 40.2 × 12.7 mm
Weight	DUF75-4805QB	90.0g(Typ.)
Cooling Method	Free air convection (20LFM)	

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS A and CLASS B (see Fig. 3 for recommended circuit)
	RE	CISPR32/EN55032 CLASS A and CLASS B (see Fig. 3 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2, EN50121-3-2 Contact ±6KV Air ±8KV perf.Criteria B
	RS	IEC/EN61000-4-3, EN50121-3-2 10V/m perf.Criteria A
	EFT	IEC/EN61000-4-4, EN50121-3-2 ±2KV (see Fig. 2 for recommended circuit) perf.Criteria A
	Surge	EN50121-3-2 differential mode ±1KV, 1.2/50us, source impedance 42Ω (see Fig.2 for recommended circuit) perf.Criteria B
	CS	IEC/EN61000-4-6, EN50121-3-2 10 Vr.m.s perf.Criteria A

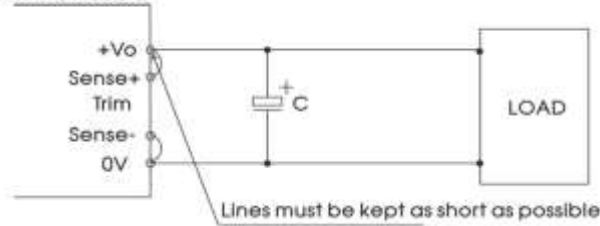
Typical Characteristic Curves



Notes:
1) Product application thermal design should be referred to the recommended PCB layout and recommended heat dissipation structure, please see DC-DC Converter Application Notes for specific information.

Remote Sense Application

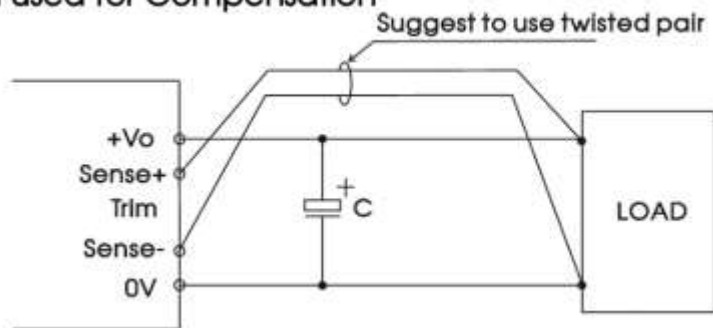
1. Remote Sense Connection if not used



Notes:

- (1) If the sense function is not used for remote regulation the user must connect the +Sense to +Vo and -Sense to 0V.
- (2) The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

2. Remote Sense Connection used for Compensation



Notes:

- (1) Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
- (2) PCB-tracks or cables/wires for Remote Sense must be kept as short as possible. Twisted pair or shielded wires are suggested for remote compensation and must be kept as short as possible.
- (3) We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range.
- (4) Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

Design Reference

1. Typical application

- (1) We recommended using the recommended circuit shown in Fig.1 during product testing and application, otherwise please ensure that at least a 220 μ F electrolytic capacitors is connected at the input in order to ensure adequate voltage surge suppression and protection.
- (2) We recommended increasing the value of C_{in} and pay attention to the unstable input voltage if the product input side is paralleled with motor drive circuit and/or larger energy transient circuits, to ensure the stability of input terminal and avoid repeatedly start-up problems due to input voltage lower than under-voltage protection point.
- (3) We recommended increasing the output capacitance with limited to the capacitive load specification and/or increasing the voltage clamping circuit(such as TVS) if the output terminal is inductive device such as relay or a motor, to ensure adequate voltage surge suppression and protection.
- (4) Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Design Reference

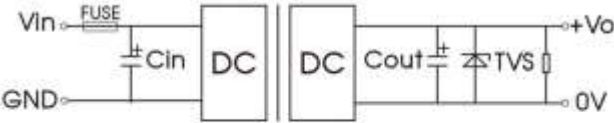


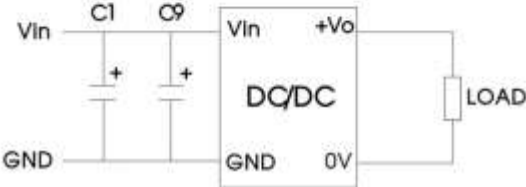
Fig.1

Vout(VDC)	Fuse	Cin ^①	Cout	TVS
5	10A, slow blow	220μF	470μF	SMDJ6.0A
12			220μF	SMDJ14A
15				SMDJ17A
24			100μF	SMDJ28A
48				SMDJ54A

Note:
①Please pay attention to the ambient temperature of the product when using an external capacitor, increase the electrolytic capacitor values to at least 1.5 times the original parameter if the ambient temperature is low(such as -25℃).

2. EMC solution-recommended circuit

We suggest to use the recommended circuit shown in Fig.2 or Fig.3 during product EMC testing and application.



Capacitor	Recommended Value	Function
C1	150μF electrolytic	Meets EFT and surge
C9	47μF electrolytic	

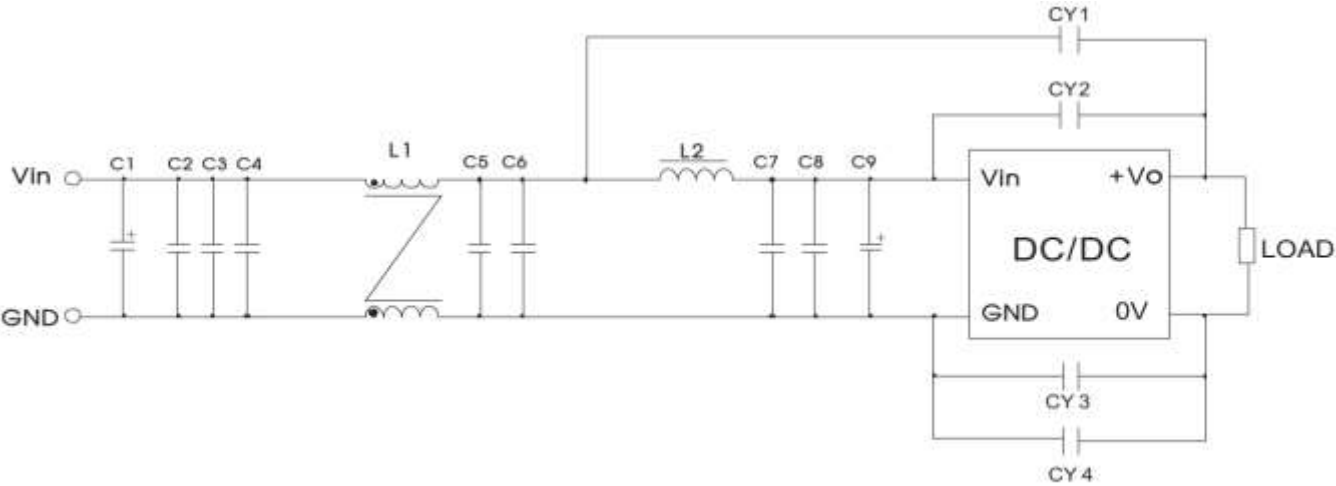
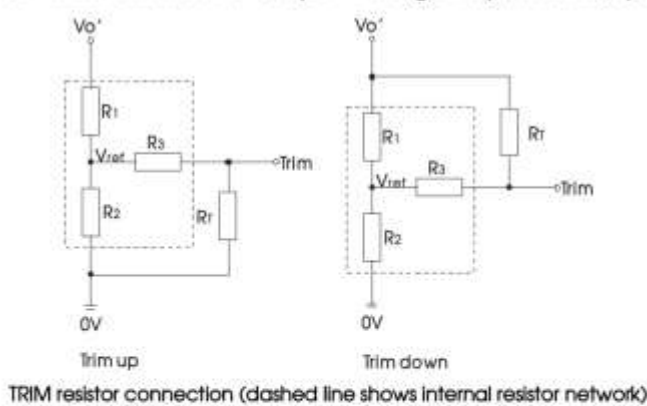


Fig. 3

Class A Components	Class B Components	Recommended Component Value	Function
	C1	150μF electrolytic capacitor	Meets conducted emission and radiated emission
	C9	47μF electrolytic capacitor	
	C1	150μF electrolytic capacitor	
	C9	47μF electrolytic capacitor	
	C2, C3, C4, C5, C6, C7, C8	2.2μF ceramic capacitor	
	L1	1.0mH common mode inductor	
	L2	1.5μH Inductance	
CY3	CY1, CY2, CY3, CY4	1nF Y1 safety capacitor	

Design Reference

3. Trim Function for Output Voltage Adjustment (open if unused)



Calculation formula of Trim resistance:

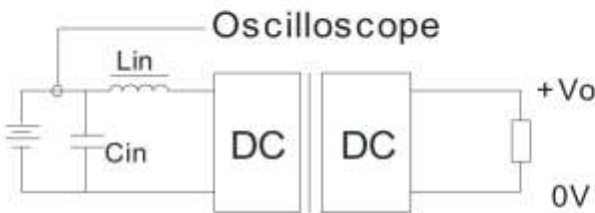
up: $R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3$ $\alpha = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$
down: $R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3$ $\alpha = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$

Note:
Value for R1, R2, R3, and Vref refer to the above table
RT: Resistance of Trim
 α : User-defined parameter, no actual meanings
 V_o' = desired output voltage ($\pm 10\%$ max.)

Vout(VDC)	R1(K Ω)	R2(K Ω)	R3(K Ω)	Vref(V)
5	3.036	3	10	2.5
12	11.00	2.87	15	2.5
15	14.03	2.8	15	2.5
24	24.872	2.87	15	2.5
48	53.017	2.913	15	2.5

Note: When using the Trim down function, If RT resistor value is too low, or the Trim pin is shorted with +Vo, then the output voltage Vo' would be lower than 0.9Vo, which may cause permanent damage to the product.

4. Reflected ripple current–test circuit

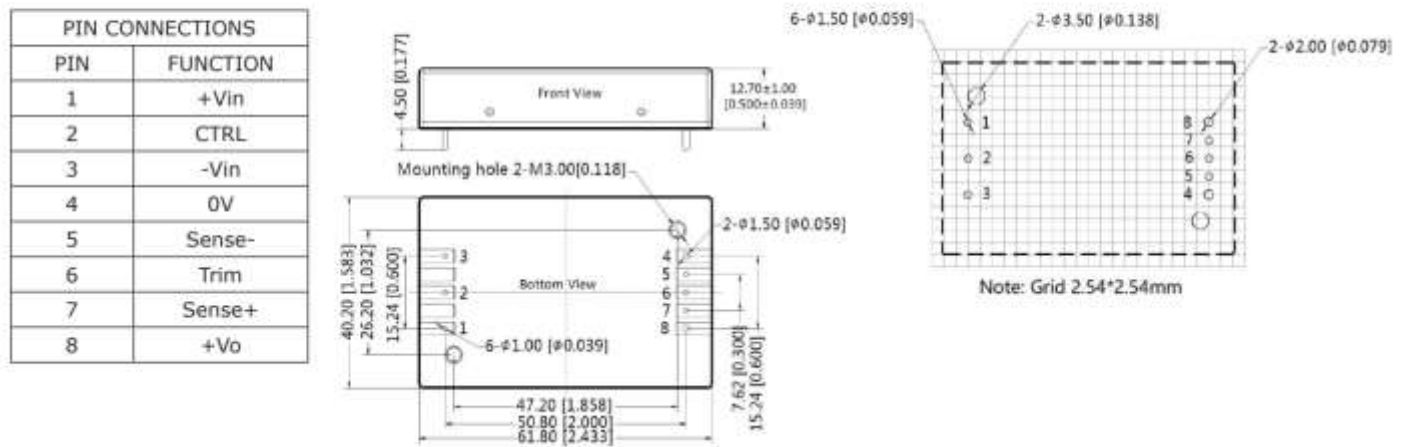


Note: Lin(4.7 μ H), Cin (220 μ F, ESR < 1.0 Ω at 100 KHz)

- 5. The products do not support parallel connection of their output.
- 6. The product test process shall ensure that the current of the input terminal meets the requirements of the starting current to ensure that the power supply of the product does not suffer from under-power.

Dimensions and Recommended Layout

units: mm [inches]
pin 1,2,3,5,6,7's diameter: 1.00 [0.039]
pin 4,8's diameter: 1.50 [0.059]
pin diameter tolerance: ± 0.10 [± 0.004]
general tolerance: ± 0.50 [± 0.020]
mounting hole screwing torque: Max 0.4 N·m



- Note:
1. The maximum capacitive load offered were tested at input voltage range and full load;
 2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
 3. The recommended unbalance degree of the dual output module load is $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
 4. All index testing methods in this datasheet are based on our company corporate standards;
 5. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
 6. We can provide product customization service;
 7. Products are related to laws and regulations: see "Features" and "EMC";