DC/DC Converter

URF48_QB-75W(F/H)R3 Series

MORNSUN®

75W, wide input voltage, isolated & regulated single output DC-DC converter

Patent Protection RoHS

3 years Warranty

FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 93%
- Isolation voltage: 2.25K VDC
- Input under-voltage protection, Output short circuit, over-current, over–voltage, over-temperature protection
- Operating temperature range: -40℃ to +85℃
- Five-sided metal shielding package
- International standard pin-out: 1/4 brick

URF48_QB-75W(F/H)R3 series are isolated 75W DC-DC products with 4:1 input voltage. They feature efficiency up to 93%, 2250VDC isolation, operating temperature of -40℃ to +85℃, Input under-voltage protection, output short circuit protection, over-current protection, over–voltage protection, over-temperature protection and EMI meets CISPR32/EN55032 CLASS B by add module recommended circuit, which make them widely applied in battery power supplies, industrial control, electricity, instruments, railway, communication, intelligence robot fields.

Selection Guide

Part No.①	Input Voltage (VDC)		Output		Efficiency (%,Min./Typ.) @ Full Load	Max. Capacitive Load(μF)
	Nominal (Range)	Max.②	Output Voltage(VDC)	Output Current (A)(Max.)		
URF4805QB-75W(F/H) R3	48 (18-75)	80	5	15	89/91	6000
URF4812QB-75W(F/H) R3			12	6.25	90/92	2000
URF4815QB-75W(F/H) R3			15	5	91/93	2000
URF4824QB-75W(F/H) R3			24	3.13	90/92	1000
URF4848QB-75W(F/H) R3			48	1.56	90/92	470

Note:①"F" means product with aluminium bottom case;Series with suffix "H" are heat sink mounting; If the application has a higher requirement for heat dissipation, you can choose modules with heat sink;
②Exceeding the maximum input voltage may cause permanent damage.

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	Nominal input voltage	--	30	--	
Surge Voltage (1sec. max.)		-0.7	--	90	VDC
Start-up Threshold Voltage		--	--	18	
Input Under-voltage Protection	5VDC/15VDC output	16	16.5	--	
	Others	15	15.5	--	
Input Filter		Pi filter			
Ctrl*	Module switch on	Ctrl open circuit or connected to TTL high level (3.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	2	10	mA
Hot Plug		Unavailable			

Note: * The voltage of Ctrl pin is relative to input pin GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
Line Regulation	Full load, the input voltage is from low to high		--	±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 & Noise*	20MHz bandwidth	12VDC/15VDC output	--	100	200	mVp-p
		Others	--	150	250	
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: *Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output	With the test time of 1 minute and the leak current less than 5mA	2250	--	--	VDC
	Input-case		1500	--	--	
	Output-case		500	--	--	
Insulation Resistance	Input-output, insulation voltage 500VDC		100	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		--	2200	--	pF
Trim*			95	--	110	%Vo
Sense			--	--	105	
Operating Temperature			-40	--	+85	℃
Storage Temperature			-55	--	+125	
Over-temperature Protection			--	105	--	
Pin Welding Resistance Temperature	Wave-soldering, 10 seconds		--	--	260	
	Welding spot is 1.5mm away from the casing, 10 seconds		--	--	300	
Storage Humidity	Non-condensing		5	--	95	%RH
Vibration			IEC/EN61373 car body 1 B mold			
Switching Frequency	PWM mode		--	250	--	KHz
MTBF	MIL-HDBK-217F@25℃		500	--	--	K hours

Note: *The URF4805QB-75W (F/H)R3 and URF4815QB-75W (F/H)R3, Trim function meet output up to 10% or Sense function meet output up to 5%, Vin need exceed 20VDC.

Physical Specifications

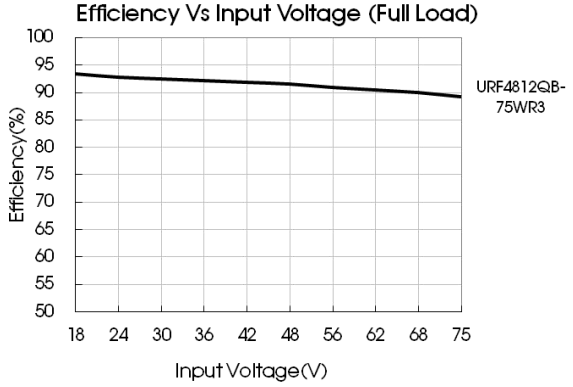
Casing Material	Aluminum alloy case, Black flame-retardant and heat-resistant plastic bottom case (UL94 V-0)	
Dimension	URF48xxQB-75WR3	61.8*40.2*12.7 mm
	URF48xxQB-75WFR3	62.0*56.0*14.6 mm
	URF48xxQB-75WHR3	61.8*40.2*27.7 mm
Weight	URF48xxQB-75WR3	83g(Typ.)
	URF48xxQB-75WFR3	103g(Typ.)
	URF48xxQB-75WHR3	114g(Typ.)
Cooling method	Natural convection (20FLM)	

EMC Specifications

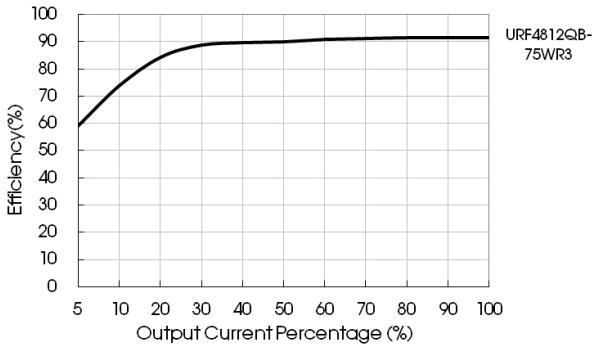
EMI	CE	CISPR32/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2, EN50121-3-2	Contact ±6KV Air ±8KV	perf.Criteria B
	RS	IEC/EN61000-4-3, EN50121-3-2	10V/m	perf.Criteria A
	EFT	IEC/EN61000-4-4,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

Product Characteristic Curve

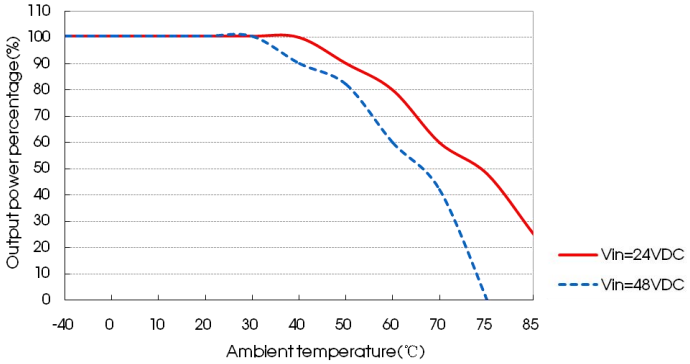
Efficiency Vs Input Voltage (Full Load)



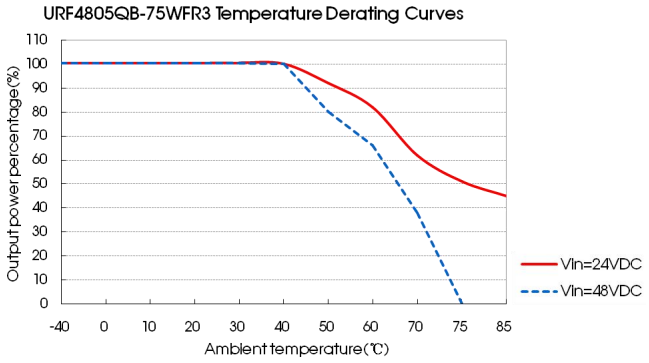
Efficiency Vs Output Load(Vin=48V)



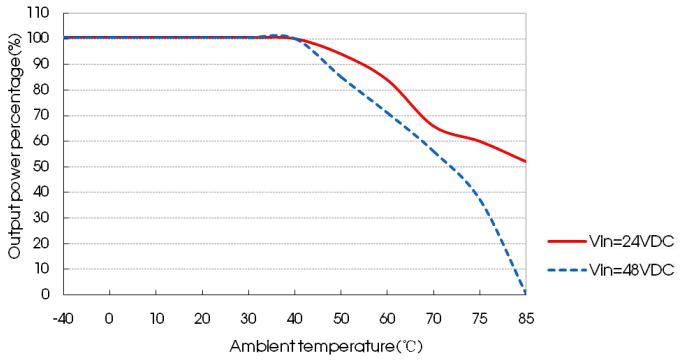
URF4805QB-75WR3 Temperature Derating Curves



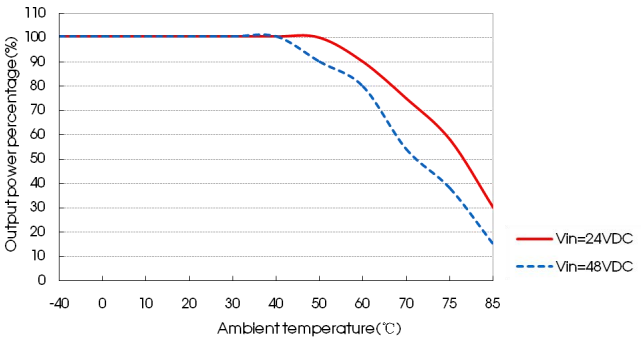
URF4805QB-75WFR3 Temperature Derating Curves



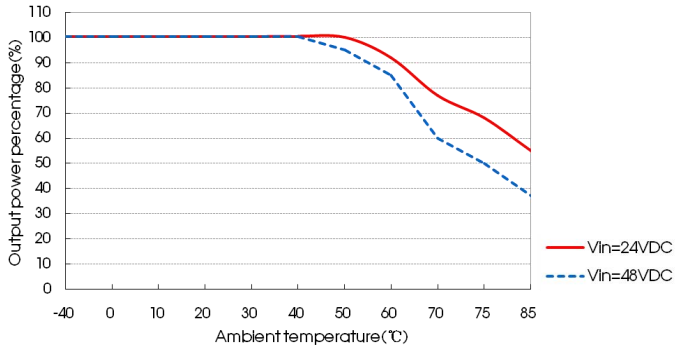
URF4805QB-75WHR3 Temperature Derating Curves



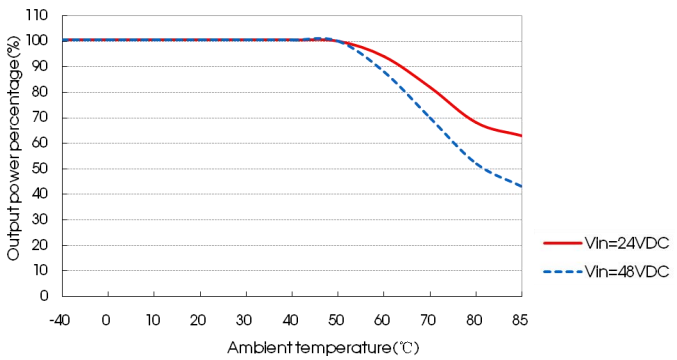
URF4812/15/24/48QB-75WR3 Temperature Derating Curves



URF4812/15/24/48QB-75WFR3 Temperature Derating Curves



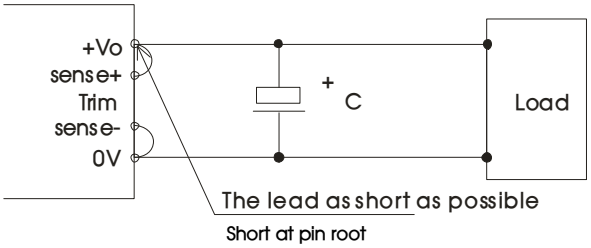
URF4812/15/24/48QB-75WHR3 Temperature Derating Curves



Note: Temperature Derating Curves were tested at natural convection (20FLM).

Sense of application and precautions

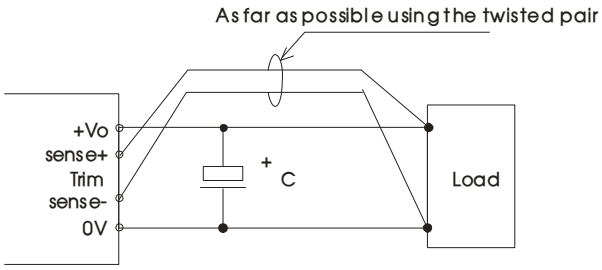
1. When not using remote sense



Notes:

1) When not using remote sense, make sure + Vo and Sense + are shorted, and that 0V and Sense- are shorted as well;
2) Keep the tracks between + Vo and Sense +, 0V and Sense- as short as possible. and close to the terminal. Avoid a looping track. If noise interferes the loop, the operation of the power module will become unstable.

2. When Remote Sense is used



Notes:

1. Using remote sense with long wires may cause output voltage to become unstable. Consult us if long sensing wiring is necessary.
2. Sense tracks or wires should be as short as possible. If using wires, it should not use twisted-pair or shielded wires.
3. Please use wide PCB tracks or a thick wires between the power supply module and the load, the line voltage drop should be kept less than 0.3V. Make sure the power supply module's output voltage remains within the specified range.
4. The impedance of wires may cause the output voltage oscillation or a greater ripple, please take adequate assessments before using.

Design Reference

1. Typical application

If not using Momsun's recommended cicuit, please ensure an 220 μ F electrolytic capacitors in parallel with the input, which used to suppress the surge voltage come from the iuput terminal.
All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 1) before delivery.
If it is required to further reduce input&output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance,provided that the capacitance is no larger than the max. capacitive load of the product.

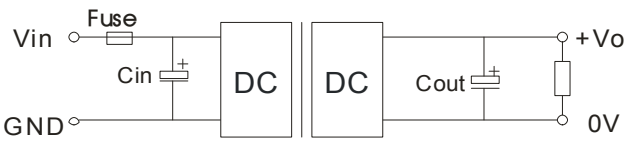


Fig.1

Vout(VDC)	Fuse	Cin	Cout
5	10A, slow blow	220μF	470μF
12/15			220μF
24			100μF
48			100μF

2. EMC solution-module recommended circuit

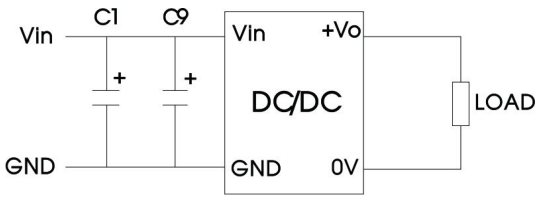


Fig. 2

device number	Device parameter	Device function
C1	150μF electrolytic caoacitor	Meet puise group and surge
C9	47μF electrolytic caoacitor	

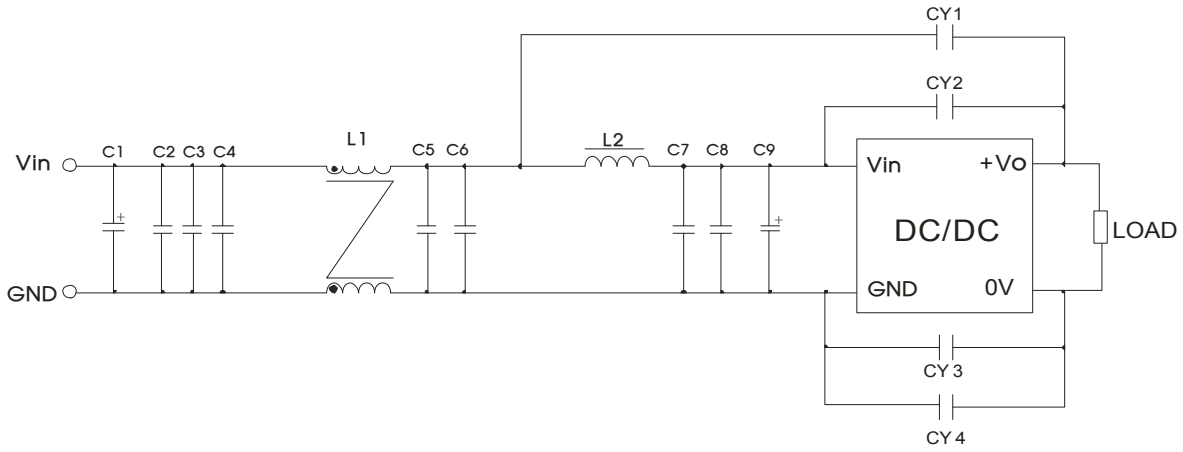
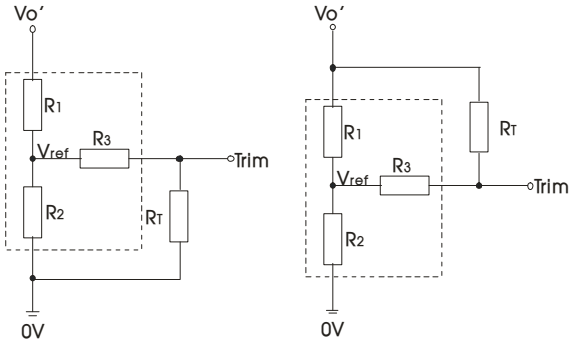


Fig. 3

device number	Device parameter	Device function
C1	150μF electrolytic caoacitor	Meet conducted emission and radiated emission
C9	47μF electrolytic caoacitor	
C2、C3、C4、C5、C6、C7、C8	2.2μF ceramic caoacitor	
L1	1.0mH common mode inductor	
L2	1.5μH inductance	
CY1、CY2、CY3、CY4	1nF Y1safety caoacitor	

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

$$up:\ R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{Vref}{Vo'-Vref}\cdot R_1$$

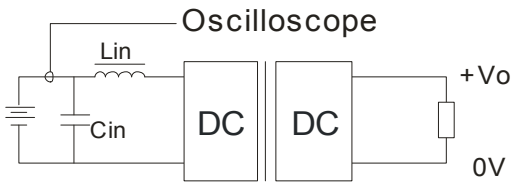
$$down:\ R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R_2$$

R_T is Trim resistance ,a is a self-defined parameter, with no real meaning. Vo' for the actual needs of the up or down regulated voltage

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	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

When the Trim function with down regulated is used, If the RT resistor is too low or "Trim" is short with "+Vo", the output voltage Vo' would be lower than 0.9Vo, which may cause the product to be irreversibly damaged.

4. Reflected ripple current--test circuit

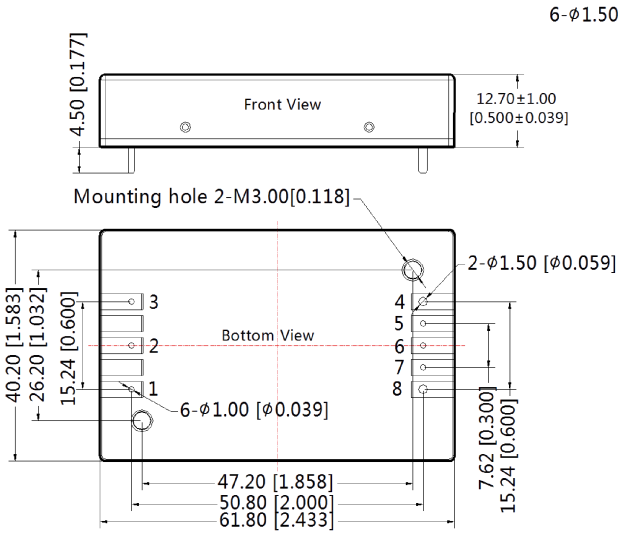


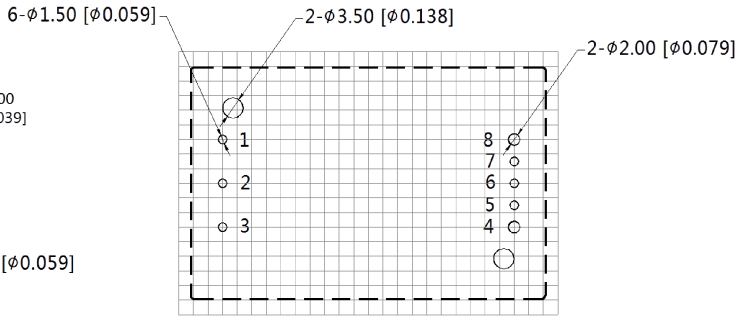
Note:Lin(4.7μH) ， Cin(220μF, ESR < 1.0Ω at 100 KHz)

5. It is not allowed to connect modules output in parallel to enlarge the power
6. For more information please find the application notes on www.mornsun-power.com

URF48xxQB-75WR3 Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



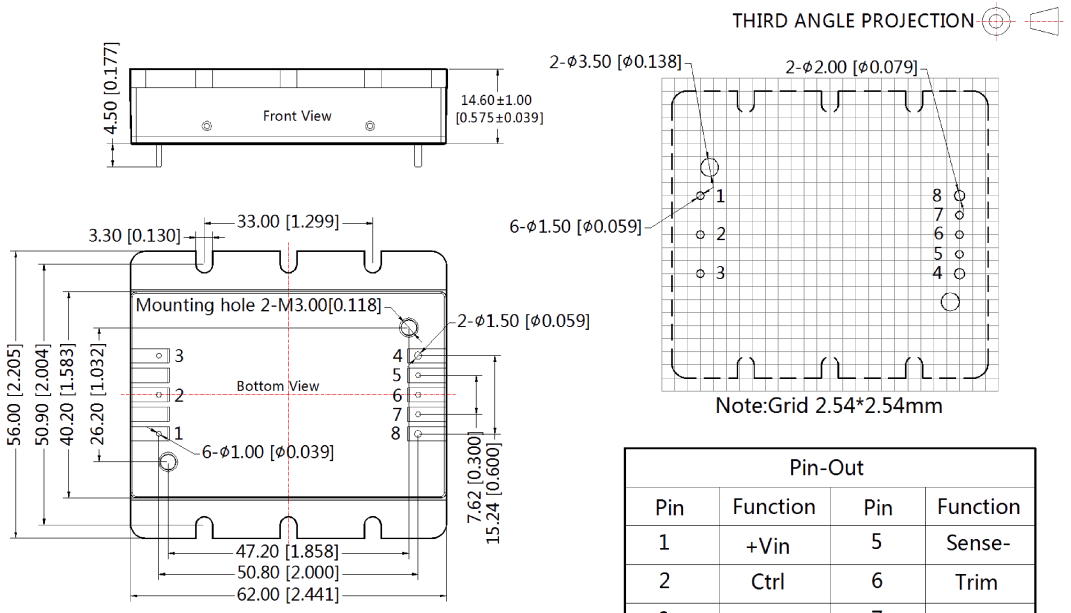


Note:Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
Mounting hole screwing torque: Max 0.4 N·m

Pin-Out			
Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	-Vin	7	Sense+
4	0V	8	+Vo

URF48xxQB-75WFR3 Dimensions and Recommended Layout



Pin-Out			
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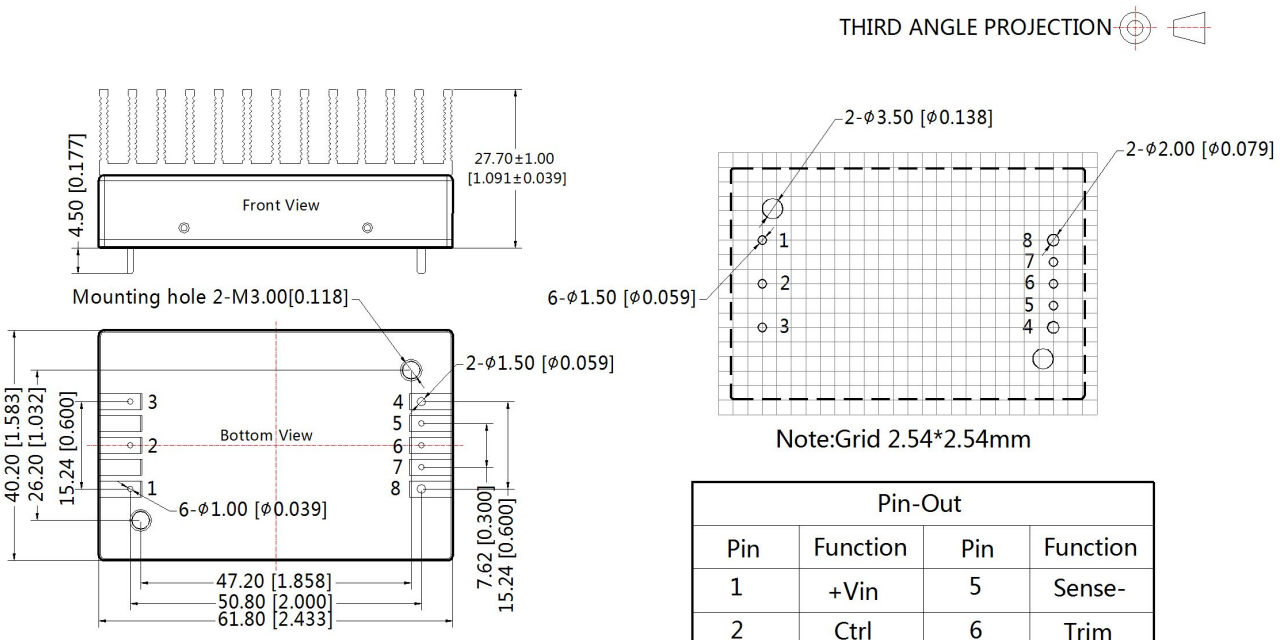

Pin-Out			
Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
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4	0V	8	+Vo

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
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Mounting hole screwing torque: Max 0.4 N·m

Note:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58010113(URF48xxQB-75WR3), 58200069(URF48xxQB-75WFR3), 58220017(URF48xxQB-75WHR3);
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, humidity<75%RH when inputting nominal voltage and outputting rated load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. We can provide product customization service and match filter module;
6. Specifications of this product are subject to chang es without prior notice.

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