100W isolated DC-DC converter
Ultra-wide input and regulated single output

CE   Patent Protection RoHS   3 years Warranty

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 94%
- I/O isolation test voltage: 2250VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output over–voltage, over-current, short circuit, over-temperature protection
- Five-sided metal shielding package
- Industry standard ¼-Brick package and pin-out
- EN62368 approved

URF48_QB -100W(F/H)R3 series are isolated 100W DC-DC products with 4:1 input voltage. They feature efficiency up to 94%, 2250VDC input to output isolation, operating temperature of -40℃ to +85℃, input under-voltage, output over–voltage, over-current, short circuit, over-temperature protection. EN62368 approved and they are widely used in applications such as battery powered systems, industrial controls, electricity, instrumentation, railway, communication and intelligent robotics.

Selection Guide

Certification	Part No.[1]	Input Voltage (VDC)		Output		Full Load Efficiency(%) Min./Typ.		Max. Capacitive Load (µF)
		Nominal (Range)	Max.[2]	Voltage(VDC)	Current (A) (Max.)	Vin=24V	Vin=48V	
--	URF4803QB-100W(F/H) R3	48 (18-75)	80	3.3	22.7	87/89	86/88	10000
CE	URF4805QB-100W(F/H) R3			5	20	91/93	89/91	6000
	URF4812QB-100W(F/H) R3			12	8.3	91/93	90/92	2000
	URF4815QB-100W(F/H) R3			15	6.7	92/94	91/93	2000
	URF4824QB-100W(F/H) R3			24	4.2	91/93	90/92	1000
	URF4848QB-100W(F/H) R3			48	2.1	91/93	90/92	470

Note:
①Use"F"suffix is for added aluminum baseplate and "H" suffix for heat sink mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
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	3.3V output	--	1776/50	1812/80	mA
		Others	--	2265/50	2341/80	
Reflected Ripple Current	Nominal input voltage		--	30	--	
Surge Voltage (1sec. max.)			-0.7	--	90	VDC
Start-up Threshold Voltage			--	--	18	
Input Under-voltage Protection	URF4805QB-100W(F/H)R3, URF4815QB-100W(F/H) R3		16	16.5	--	
	Others		15	15.5	--	
Input Filter			Pi filter			
Ctrl①	Module on		Ctrl open circuit or connected to TTL high level (3.5-12VDC)			
	Module off		Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when off		--	2	10	mA

Hot Plug		Unavailable

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			--	±1	±3	
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	%
Load Regulation	5%-100% load		--	±0.5	±0.75	
Transient Recovery Time	25% load step change		--	200	500	μs
Transient Response Deviation	25% load step change	3.3V, 5V output	--	±3	±7.5	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise①	20MHz bandwidth	12V, 15V output	--	100	200	mVp-p
		Others	--	130	250	
Output Over-voltage Protection	Input voltage range		110	125	160	%Vo
Output Over-current Protection			110	125	190	%Io
Short-circuit Protection			Hiccup, continuous, self-recovery			

Note: ①The "parallel cable" method is used for ripple and noise test, please see DC-DC Converter Application Notes for specific operation.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Insulation 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		1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		--	2200	--	pF
Trim①			95	--	110	%Vo
Sense			--	--	105	
Operating Temperature			-40	--	+85	℃
Storage Temperature			-55	--	+125	
Over-temperature Protection	Max. Casing Temperature		+95	+105	+115	
Lead Temperature	Wave-soldering, 10 seconds		--	--	+260	
	1.5mm away from the casing, 10 seconds		--	--	+300	
Storage Humidity	Non-condensing		5	--	95	%RH
Vibration			IEC/EN61373 train 1B category			
Switching Frequency	PFM mode		--	250	--	KHz
MTBF	MIL-HDBK-217F@25℃		500	--	--	K hours

Note: ①For URF4803QB-100W (F/H)R3, URF4805QB-100W (F/H)R3 and URF4815QB-100W (F/H)R3, when the Trim function satisfies the output up to 10% or the Sense function satisfies the output up to 5%, Vin needs to be higher than 20VDC.

Mechanical Specifications

Case Material	Aluminum alloy case, black flame-retardant and heat-resistant plastic bottom case (UL94 V-0)	
Dimension	URF48xxQB-100WR3	61.8 x 40.2 x 12.7 mm
	URF48xxQB-100WFR3	62.0 x 56.0 x 14.6 mm
	URF48xxQB-100WHR3	61.8 x 40.2 x 27.7 mm
Weight	URF48xxQB-100WR3	89g(Typ.)
	URF48xxQB-100WFR3	109g(Typ.)
	URF48xxQB-100WHR3	120g(Typ.)
Cooling method	Natural convection or forced air convection	

MORNSUN®

MORNSUN Guangzhou Science & Technology Co., Ltd.

MORNSUN Guangzhou Science & Technology Co., Ltd. reserves the copyright and right of final interpretation

Electromagnetic Compatibility (EMC)

|				
Emissions	CE	CISPR32/EN55032, EN50121-3-2	CLASS A and CLASS B (see Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032, EN50121-3-2	CLASS A and CLASS B (see Fig. 2 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 Performance Curves

URF4824QB-100WR3 Temperature Derating Curves (Vin=24V)
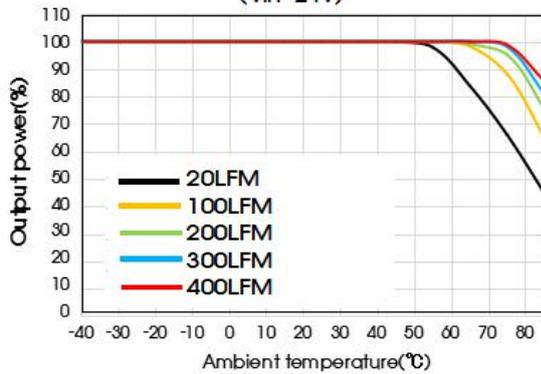
URF4824QB-100WFR3 Temperature Derating Curves (Vin=24V)
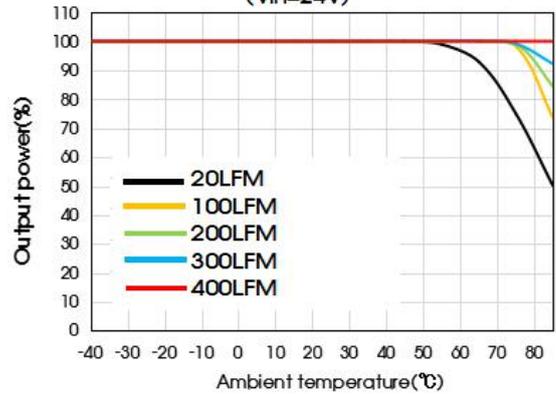
URF4824QB-100WHR3 Temperature Derating Curves (Vin=24V)
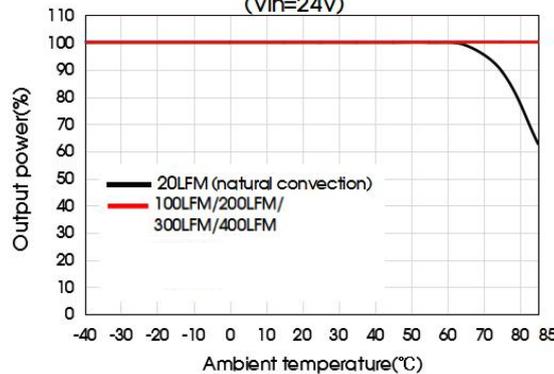
Notes：
1. Product application thermal design should be referred to the recommended PCB layout and recommended heat dissipation structure, please see DC-DC Converter Application Notes for specific operation.
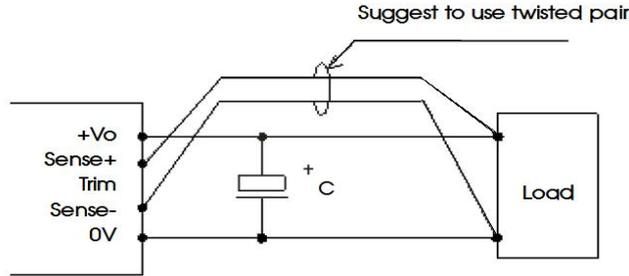
Remote Sense Application

1. Remote Sense Connection if not used

+Vo
Sense+
Trim
Sense-
0V

C

LOAD

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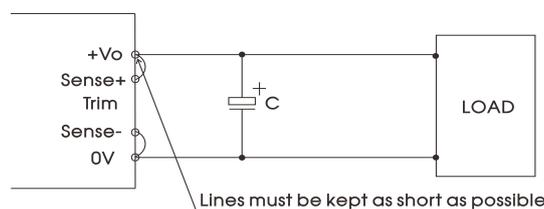
(1) If the sense function is not used for remote regulation the user must connect the +Sense to +Vo and -Sense to 0V at the DC-DC converter pins and will compensate for voltage drop across pins only.
(2) The connections between Sense lines and their respective power lines must be kept as short as possible,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

2.Remote Sense Connection used for Compensation

(1) PCB-tracks or cables/wires for Remote Sense must be kept as short as possible.
(2) In cables and discrete wiring applications, twisted pair or other techniques should be implemented.
(3) Using remote sense with long wires may cause unstable operation. 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.
(4) 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.

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 220μF electrolytic capacitors is connected at the input in order to ensure adequate voltage surge suppression and protection.
(2) We recommended increasing the value of Cin 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 capactive 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 Cin and Cout 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.

Fig.1

Vout(VDC)	Fuse	Cin[①]	Cout	TVS
3.3			680μF	SMDJ6.0A
5			470μF	SMDJ6.0A
12	10A, slow blow	220μF	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 recommended using the recommended circuit shown in Fig.2 during product EMC testing and application.
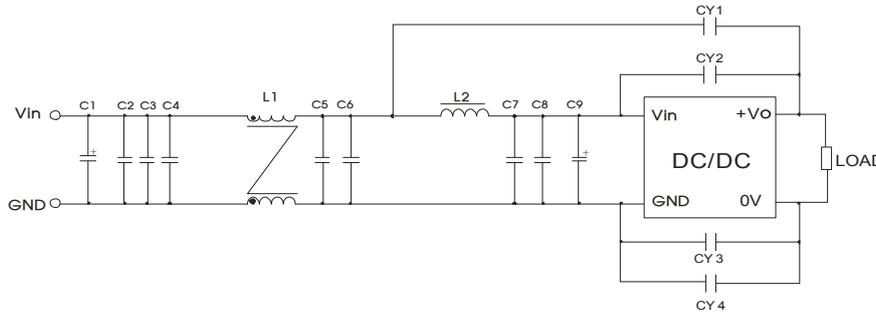
Fig. 2

CLASS A Components	CLASS B Components	Recommended Component value of 3.3V	Recommended Component value of 05-48V	Function
C1		150μ Felectrolytic capacitor	150μF electrolytic capacitor	Meet EFT and surge
C9		470μ Felectrolytic capacitor	47μF electrolytic capacitor	
C1		150μ Felectrolytic capacitor	150μF electrolytic capacitor	Meet conducted emission and radiated emission
C9		470μ Felectrolytic capacitor	47μF electrolytic capacitor	
C2、C3、C4、C5、C6、C7、C8		4.7μ Fceramic capacitor	2.2μF ceramic capacitor	
L1		2mH, recommended to use MORNSUN P/N: FL2D-A2-202(C)	2mH, recommended to use MORNSUN P/N: FL2D-A2-202(C)	
L2		1.5μ Hinductance	1.5μH inductance	
CY1、CY2		1nF Y1 safety capacitor	1nF Y1 safety capacitor	
CY3	CY3、CY4	2.2nF Y1 safety capacitor	1nF Y1 safety capacitor	

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

Trim up   Trim down

TRIM resistor connection (dashed line shows internal resistor network)
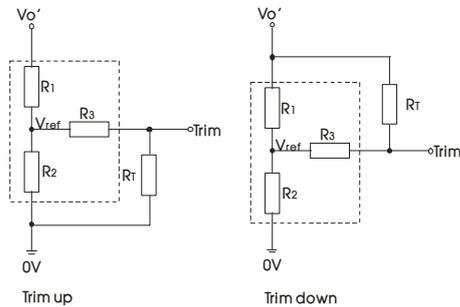
Calculation formula of Trim resistance:

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

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

Note:
R_T = Trim Resistor value;
a = self-defined parameter;
V_o' = desired output voltage (±10% max.)

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	5	3	10	1.24
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 make sure that the RT resistor value is calculated correctly. If the Trim pin is shorted with +Vo, or its value is too low, then the output voltage Vo' would be lower than 0.9Vo, which may cause the product to fail.

4. Reflected ripple current--test circuit
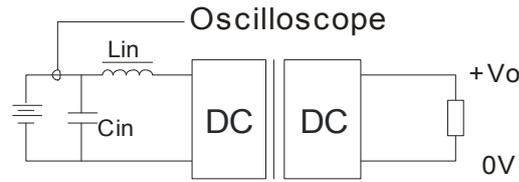
Note: Lin(4.7μH), Cin(220μF, ESR < 1.0Ω at 100 KHz)

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.

7. For additional information please refer to DC-DC converter application notes on

www.mornsun-power.com

Dimensions and Recommended Layout (URF48xxQB-100WR3)

THIRD ANGLE PROJECTION
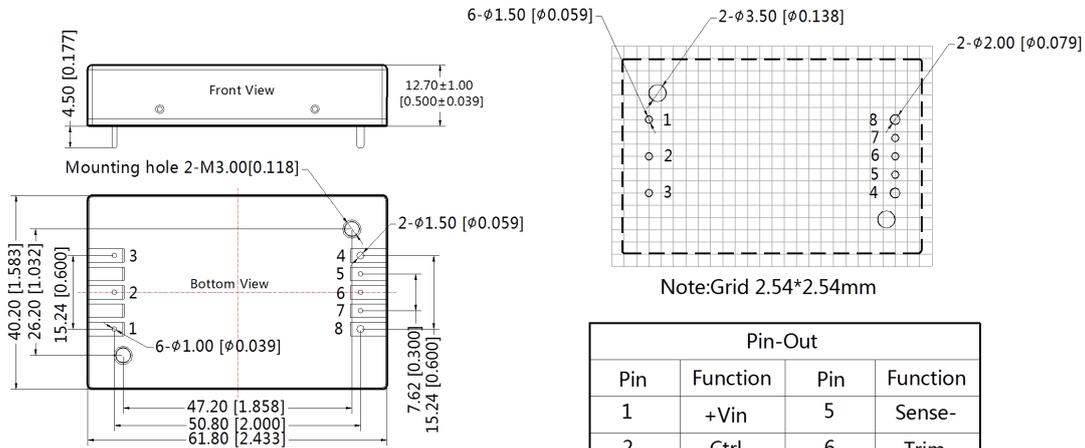
Note:Grid 2.54*2.54mm

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

Dimensions and Recommended Layout(URF48xxQB-100WFR3)

THIRD ANGLE PROJECTION

4.50 [0.177]

Front View

14.60±1.00 [0.575±0.039]

2-φ3.50 [φ0.138]
2-φ2.00 [φ0.079]
6-φ1.50 [φ0.059]

Note:Grid 2.54*2.54mm

3.30 [0.130]
33.00 [1.299]

Mounting hole 2-M3.00[0.118]
2-φ1.50 [φ0.059]

56.00 [2.205]
50.90 [2.004]
40.20 [1.583]
26.20 [1.032]

Bottom View

7.62 [0.300]
15.24 [0.600]

6-φ1.00 [φ0.039]

47.20 [1.858]
50.80 [2.000]
62.00 [2.441]

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-100WHR3 Dimensions and Recommended Layout

THIRD ANGLE PROJECTION

4.50 [0.177]

Front View

27.70±1.00 [1.091±0.039]

2-φ3.50 [φ0.138]
2-φ2.00 [φ0.079]
6-φ1.50 [φ0.059]

Note:Grid 2.54*2.54mm

Mounting hole 2-M3.00[0.118]
2-φ1.50 [φ0.059]

40.20 [1.583]
26.20 [1.032]
15.24 [0.600]

Bottom View

7.62 [0.300]
15.24 [0.600]

6-φ1.00 [φ0.039]

47.20 [1.858]
50.80 [2.000]
61.80 [2.433]

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

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packing bag number: 58010113(URF48xxQB-100WR3), 58200069(URF48xxQB-100WFR3), 58220017(URF48xxQB-100WHR3);
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.