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#### IGBT MOSFET driver power supply

## FEATURES

- Reinforced insulation
- Isolation test: 5000VAC
- Continuous barrier withstand voltage 1700V
- Characterised CMTI>200kV/µs
- Max. Capacitive Load: 2200µF
- Capacitance: 4.2pF (typ.)
- High efficiency up to 85%
- DIP package
- Operating ambient temperature range: -40 $^{\circ}$ C to +105 $^{\circ}$ C
- Continuous short-circuit protection

QAxx3HD2-R3 is DC-DC module power supplie designed for IGBT driver requiring two sets of isolation power supply. The mode of common ground outputs is adopted internally for better energy provision of IGBT turn-on and turn-off. Output short-circuit protection and self-recovery capabilities are also provided. General application includes:

- 1. Universal converter
- 2. AC servo drive system
- 3. Electric welding machine

**RoHS** 

4. Uninterruptible power supply (UPS)

## Selection Guide

Selection Guide						
	Input		Out	Full Load	Max.	
Part No.	Voltage(VDC) (Range)	Current(mA, Typ.) Full Load/No Load	Voltage (VDC) +Vo/-Vo	Current (mA) +lo/-lo	Efficiency (%) Min./Typ.	Capacitive Load(µF)
QA123HD2-1509R3	12 (10.8-13.2)	470/13	+15/-9	+100/-100	80/85	2200
QA153HD2-1509R3	15 (13.5-16.5)	370/12	+15/-9	+100/-100	80/85	2200
QA243HD2-1509R3	24 (21.6-26.4)	250/10	+15/-9	+100/-100	74/80	2200

Note:\*The specified maximum capacitive load for positive and negative output is identical.

Input Specifications						
Item		Operating Conditions	Min.	Тур.	Max.	Unit
	Vin=12VDC	DC	-0.7		18	
(1sec. max.)	Vin=15VDC	DC	-0.7		21	VDC
	Vin=24VDC	DC	-0.7		30	
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			

Output Specifications							
Item			Operating Conditions	Min.	Тур.	Max.	Unit
		+Vo1/2	Vin=12VDC, Pin11/14 & Pin12/13 +lo= +100mA	14.25	15.00	15.75	
QA 123HD2-1309K3	-Vo1/2	Vin=12VDC, Pin10/15 & Pin11/14 +lo= -100mA	-8.64	-9.09	-9.54		
Output Voltage	+Vo1/2	Vin=15VDC, Pin11/14 & Pin12/13 +lo= +100mA	14.70	15.45	16.20	VDC	
	-Vo1/2	Vin=15VDC, Pin10/15 & Pin11/14 +lo= -100mA	-8.28	-8.73	-9.18	VDC	
	+Vo1/2	Vin=24VDC, Pin11/14 & Pin12/13 +lo= +100mA	13.80	14.55	15.30		
Q/2401102-100710		-Vo1/2	Vin=24VDC, Pin10/15 & Pin11/14 +lo= -100mA	-8.64	-9.09	-9.54	
Voltage Accuracy			10% - 100% load	See output regulation curve (Fig. 2- Fig. 7)		%	

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Linear Degulation		+Vo1/2		±1.1	±1.5		
	ruii voirage input range	-Vo1/2		±1.1	±1.5		
Logd Dogulation	10% 100% load	+Vo1/2		10	20	%	
Load Regulation	10% - 100% 1000	-Vo1/2		10	20		
Temperature Coefficient	Full load			±0.04	±0.1	<b>%/</b> ℃	
Ripple & Noise*	20MHz bandwidth			50	100	mVp-p	
Short-circuit Protection		Continue	ous, self-recov	/ery			
Note:* The "parallel cable" method is used for Ric	pole and Noise test, please refer	to DC-DC Convert	er Application N	Notes for specifi	ic information.		

**General Specifications** ltem **Operating Conditions** Min. Typ. Max. Unit Input-output1, Input-output2, test time 1 minute, 5000 VAC -----leakage current less than 1mA Isolation Output1- output2, test time 1 minute, leakage 3750 \_\_\_ \_\_\_ VAC current less than 1mA Continuous barrier withstand v 1700 Input-output1,Input-output2 (According to 61800-5-1) -----voltage CMTI Input-output1, Input-output2  $\pm 200$ ---\_\_\_ kV/µs Insulation Resistance Input-output1, Input-output2, Isolation 500VDC 1000 \_\_\_  $\mathbf{M} \Omega$ Vin=12VDC 4.2 5.0 Input-output1, Input-output2, capacitor at 100kHz/0.1V рF Vin=15VDC 5.0 Isolation capacitor 6.0 ---Vin=24VDC ---5.5 6.5 Derating when operating temperature≥85°C, **Operating Temperature** -40 \_\_\_ 105 (see Fig. 1) 125 -55 Storage Temperature ---°C Pin Soldering Resistance Soldering spot is 1.5mm away from case for 10s ---\_\_\_ 300 Temperature seconds 30 60 Case Temperature Rise Ta=25°C, nominal input voltage, full load ---Storage Humidity Non-condensing 5 ---95 %RH Switching Frequency Full load, nominal input voltage \_\_\_ 200 kHz \_\_\_ MTBF MIL-HDBK-217F@25°C 3500 \_\_\_ k hours ---

Mechanical Specifications			
Case Material	Black plastic; flame-retardant and heat-resistant		
Dimensions	31.70 x 20.30 x 12.65mm		
Weight	14g (Typ.)		
Cooling Method	Free air convection		

Electromagnetic Compatibility (EMC)					
CE			CISPR32/EN55032 CLASS A (see Fig. 13 for recommended circuit)		
Emissions	RE		CISPR32/EN55032 CLASS A(see Fig.13 for recommended circuit)		
Immunity E		Vin=12/15VDC series	IEC/EN61000-4-2 Contact ±6kV perf. Criteria B		
	E9D	Vin=24VDC series	IEC/EN61000-4-2 Contact ±4kV perf. Criteria B		

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## Typical Characteristic Curves









QA153HD2-1509R3 +Vo Output Regulation Curve



Fig. 4



Fig. 3

QA153HD2-1509R3 -Vo Output Regulation Curve



Fig. 5

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Fig. 6

Efficiency Vs Input Voltage(Full Load)



Fig. 7



Fig. 8 Note: Take QA123HD2-1509R3 as an example, other models can be corresponding reference

2.2

2.6

2.4

12.0

Input Voltage(V)

## **Design Reference**

100

95

90

85

80

75 70 65

60

55

50

11.6

Efficiency(%)

1.Test configurations +VO1 + C2 +VO + C GND GND 1+ GND -VO1 -vo CI DC/DC VIN СІ DC/DC Ò -VO2 -VO2 + VIN GND2 GNE VIN Ţ C5 Н +VO2 +VO2 Fig.11 Fig. 10

Note: C1, C2, C3, C4, C5: 100µF/35V(Low internal resistance)



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## 2. Typical application



Fig. 12 3. EMC typical recommended circuit (CLASS A)



Device selection				
EMI C1/0 EMI C3/C4/0 LDM	C1/C2	1.0µF /50V		
	C3/C4/C5/C6	10µF /50V (Low internal resistance)		
	LDM1	33µH		

C1/C2/C3/C4/C5

100µF/35V (Low internal

resistance)

Fig. 13

4. Electrolytic capacitors are recommended for external capacitors at the input or output of the product. Tantalum capacitors are not, otherwise there is a risk of failure.

5. The products do not support parallel connection of their output for power expansion purpose or hot-plug.

6. For more information please find the application notes on <u>www.mornsun-power.com</u>



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#### **Dimensions and Recommended Layout**



THIRD ANGLE PROJECTION

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Pi	in-Out
Pin	Mark
1	GND
10	-Vo1
11	GND1
12	+Vo1
13	+Vo2
14	GND2
15	-Vo2
24	Vin

Note: Unit: mm[inch] Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$ General tolerances:  $\pm 0.50[\pm 0.020]$ 

#### Notes:

- 1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58000150;
- 2. The lead connecting the power supply module and IGBT driver should be as short as possible during use;
- 3. The output filtering capacitor should be as close as possible to the power supply module and IGBT driver;
- 4. The peak of the IGBT driver gate drive current is high, so Low internal resistance electrolytic capacitor is recommended to be used for the power supply module output filter capacitor;
- 5. The average output power of the driver must be lower than that of the power supply module;
- 6. Consider fixing with glue near the module if being used in vibration occasion;
- 7. The maximum capacitive load offered were tested at nominal input voltage and full load;
- 8. 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;
- 9. All index testing methods in this datasheet are based on company corporate standards;
- 10. The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements. For details, please contact our technical staff;
- 11. We can provide product customization service, please contact our technicians directly for specific information;
- 12. Products are related to laws and regulations: see "Features" and "EMC".
- 13. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units

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Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. ChinaTel: 86-20-38601850Fax: 86-20-38601272E-mail: info@mornsun.cnwww.mornsun-power.com

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