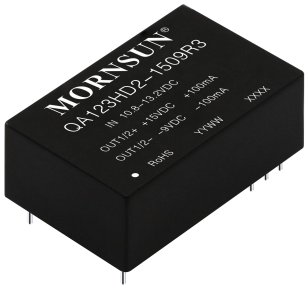
DC/DC Converter for IGBT Driver

QAxx3HD2-R3 Series

MORNSUN®

IGBT MOSFET driver power supply



RoHS

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℃ to +105℃
- 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

4. Uninterruptible power supply (UPS)

Selection Guide

Part No.	Input		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μF)
	Voltage(VDC) (Range)	Current(mA, Typ.) Full Load/No Load	Voltage (VDC) +Vo/-Vo	Current (mA) +Io/-Io		
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.	Typ.	Max.	Unit
Input Voltage (1sec. max.)	Vin=12VDC	DC	-0.7	--	18	VDC
	Vin=15VDC	DC	-0.7	--	21	
	Vin=24VDC	DC	-0.7	--	30	
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			

Output Specifications

Item			Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage	QA123HD2-1509R3	+Vo1/2	Vin=12VDC, Pin11/14 & Pin12/13 +Io=+100mA		14.25	15.00	15.75	VDC
		-Vo1/2	Vin=12VDC, Pin10/15 & Pin11/14 +Io=-100mA		-8.64	-9.09	-9.54	
	QA153HD2-1509R3	+Vo1/2	Vin=15VDC, Pin11/14 & Pin12/13 +Io=+100mA		14.70	15.45	16.20	
		-Vo1/2	Vin=15VDC, Pin10/15 & Pin11/14 +Io=-100mA		-8.28	-8.73	-9.18	
	QA243HD2-1509R3	+Vo1/2	Vin=24VDC, Pin11/14 & Pin12/13 +Io=+100mA		13.80	14.55	15.30	
		-Vo1/2	Vin=24VDC, Pin10/15 & Pin11/14 +Io=-100mA		-8.64	-9.09	-9.54	
Voltage Accuracy			10% - 100% load		See output regulation curve (Fig. 2- Fig. 7)			%
Linear Regulation			Full voltage input range	+Vo1/2	--	±1.1	±1.5	--
				-Vo1/2	--	±1.1	±1.5	

Load Regulation	10% - 100% load	+Vo1/2	--	10	20	%
		-Vo1/2	--	10	20	
Temperature Coefficient	Full load		--	±0.04	±0.1	%/℃
Ripple & Noise*	20MHz bandwidth		--	50	100	mVp-p
Short-circuit Protection	Continuous, self-recovery					
Note:* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.						

General Specifications

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

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

Typical Characteristic Curves

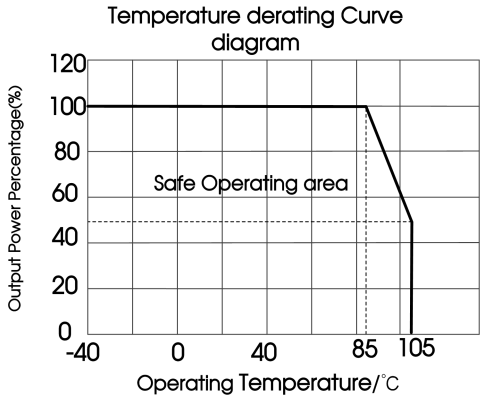


Fig. 1

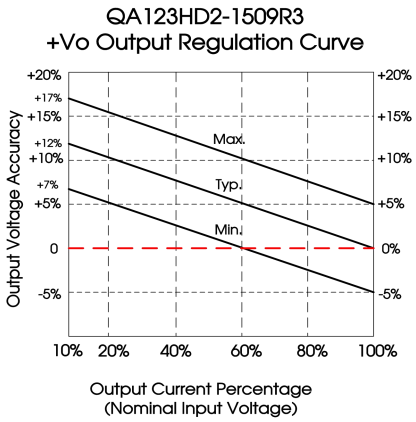


Fig. 2

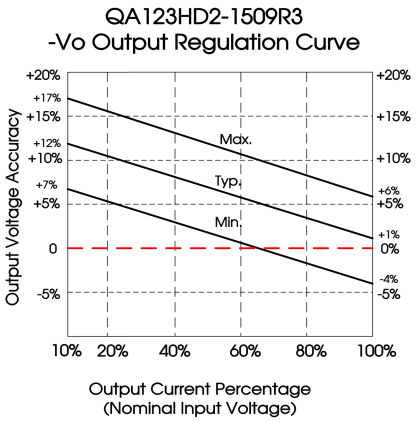


Fig. 3

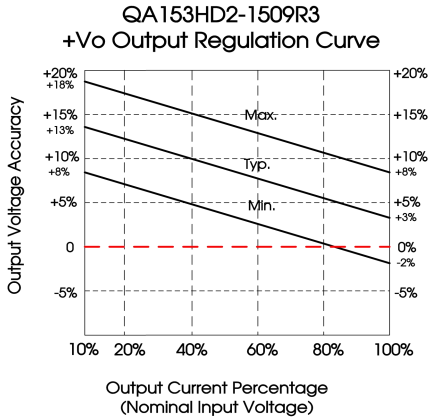


Fig. 4

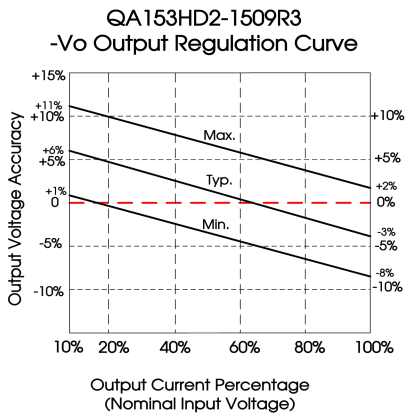


Fig. 5

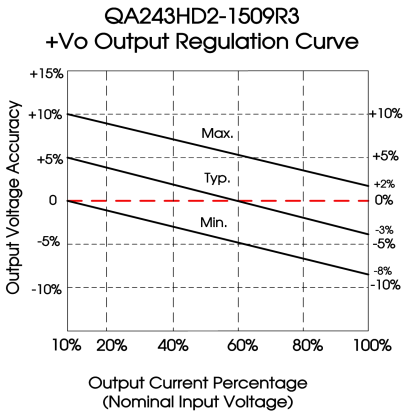


Fig. 6

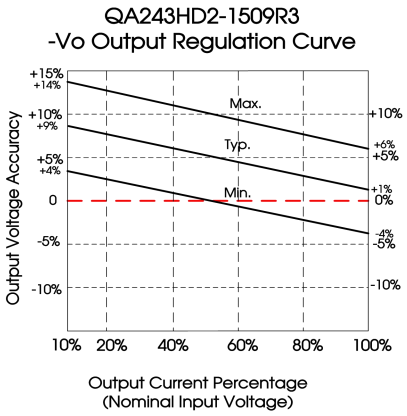


Fig. 7

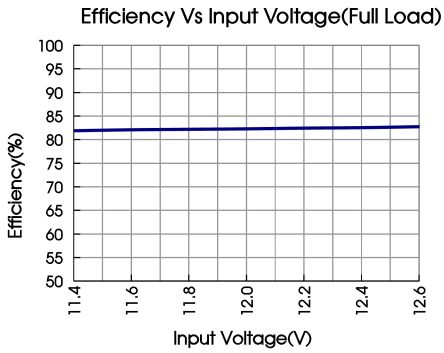


Fig. 8

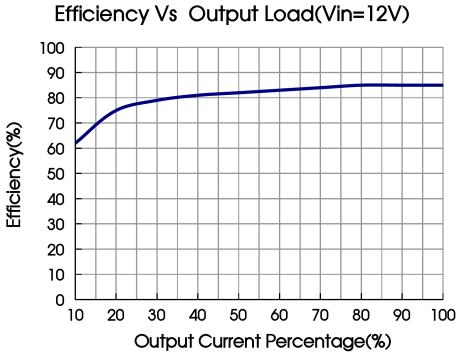


Fig. 9

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

Design Reference

1.Test configurations

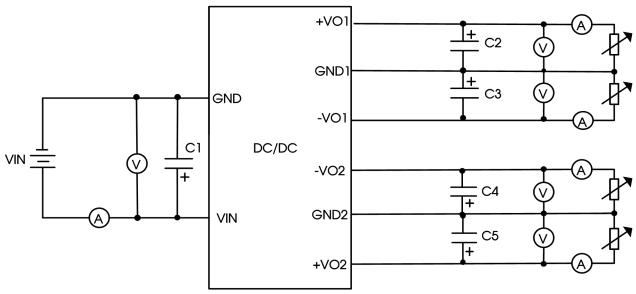


Fig. 10

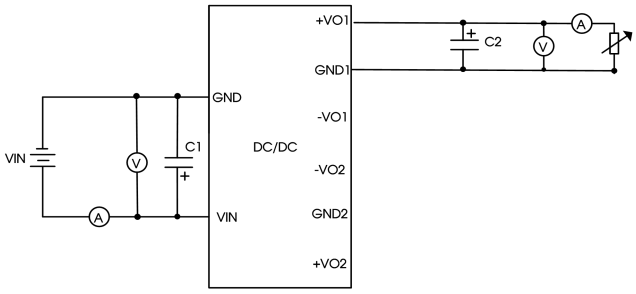
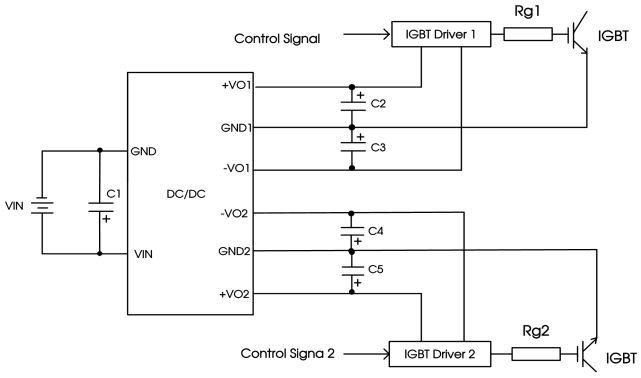


Fig.11

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

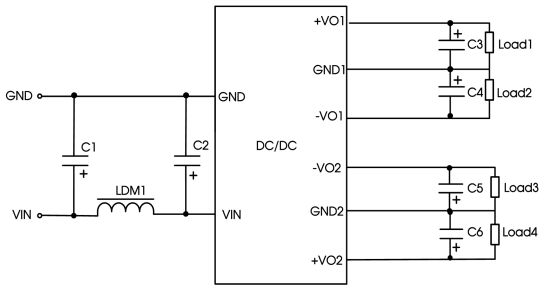
2. Typical application



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

Fig. 12

3. EMC typical recommended circuit (CLASS A)



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

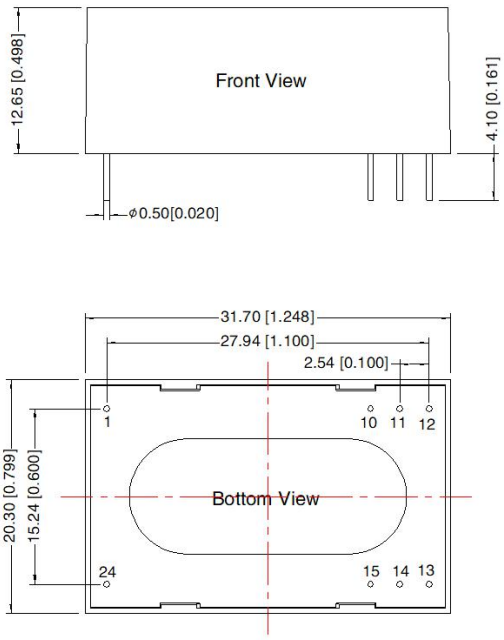
Fig. 13

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 www.mornsun-power.com

Dimensions and Recommended Layout



Note: Grid 2.54*2.54mm

Pin-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: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 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℃, 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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