DC/DC Converter for IGBT Driver

QA Series

MORNSUN®

DC/DC Converter for IGBT driver



Continuous Short Circuit Protection

3 years Warranty

Patent Protection

CE Report EN62368-1 | CB IEC60950-1 | RoHS

FEATURES

- High efficiency up to 80%
- Ultra-Compact SIP package
- Excellent thermal characteristic
- I/O isolation test voltage 3000 VAC
- Ultra-low isolation capacitance
- Operating ambient temperature range: -40℃ to +105℃
- No load operation is available

QA series are DC-DC converters for IGBT drivers. The ultra low isolation capacitance can improve the capability of anti-interference. The built-in common-ground mode of the unique asymmetric voltage output mode reduces the driver loss of IGBT driver. It features short-circuit protection, auto-recovery and can be widely used in:

1. General inverter

2. AC servo drive system

3. Electric welding machine

4. Uninterruptible power supply (UPS)

Selection Guide

Certification	Part No.	Input		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
		Voltage(VDC) Nominal(Range)	Current(mA) Typ. full load/no-load	Voltage(VDC) +Vo/-Vo	Current(mA) +Io/-Io		
EN/IEC	QA01	15 (14.5-15.5)	130/20	+15/-8.7	+80/-40	77/80	220
	QA01-09		84/20	+9.0/--	+111/--		
	QA01-A09		84/20	+9.0/-9.0	+55/-55		
	QA01-17		143/20	+17/-8.7	+80/-40		
	QA02	12 (11.6-12.4)	162/20	+15/-8.7	+80/-40		
	QA03	24 (23.3-24.7)	81/20	+15/-8.7	+80/-40		
	QA04	12 (9-15)	223/20	+15/-8.0	+100/-80		

Input Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage	QA01*	DC	-0.7	--	16	VDC
	QA02	DC	-0.7	--	13	
	QA03	DC	-0.7	--	26	
	QA04	DC	-0.7	--	15	
Input Filter			Capacitance filter			
Hot Plug			Unavailable			

Note: QA01* refers to all models begin with QA01.

Output Specifications

Item			Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage	QA01	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+80mA	14.25	15	15.75	VDC
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-40mA	-8.00	-8.7	-9.40	
	QA01-09	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+111mA	8.46	9	9.54	
		-Vo	--	--	--	--	
	QA01-A09	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+55mA	8.55	9	9.45	
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-55mA	-8.28	-9	-9.72	

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Output Voltage	QA01-17	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+80mA	16.15	17	17.85	VDC
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-40mA	-8.00	-8.7	-9.40	
	QA02	+Vo	Vin=12VDC, Pin6 & Pin7 +Io=+80mA	14.25	15	15.75	
		-Vo	Vin=12VDC, Pin5 & Pin6 -Io=-40mA	-8.00	-8.7	-9.40	
	QA03	+Vo	Vin=24VDC, Pin6 & Pin7 +Io=+80mA	14.25	15	15.75	
		-Vo	Vin=24VDC, Pin5 & Pin6 -Io=-40mA	-8.00	-8.7	-9.40	
	QA04	+Vo	Vin=12VDC, Pin6 & Pin7 +Io=+100mA	14.25	15	15.75	
		-Vo	Vin=12VDC, Pin5 & Pin6 -Io=-80mA	-7.36	-8	-8.64	
Voltage Accuracy			QA01-09	--	±4	±6	%
			Other models	See output regulation curve (Fig. 1)			
Linear Regulation			Input voltage range	--	±1.2	±1.5	--
Load Regulation		10%-100% load	QA01-09	--	12	26	%
			Other models: Positive output	--	8	15	
			Other models: Negative output	--	10	15	
Temperature Coefficient			Full load	--	--	±0.03	%/℃
Ripple & Noise*			20MHz bandwidth	--	100	200	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 Voltage	Input-output Electric strength test for 1 minute with a leakage current of 1mA max.	3000	--	--	VAC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	6.6	--	pF
Operating Temperature	Derating when operating temperature up to 85℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Case Temperature Rise	Ta=25℃, nominal input, full load output	--	25	--	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	100	300	kHz
Safety Class		CLASS III			
MTBF	MIL-HDBk-217F@25℃	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.50 x 9.80 x 12.50 mm
Weight	4.3g (Typ.)
Cooling Method	Free air convection

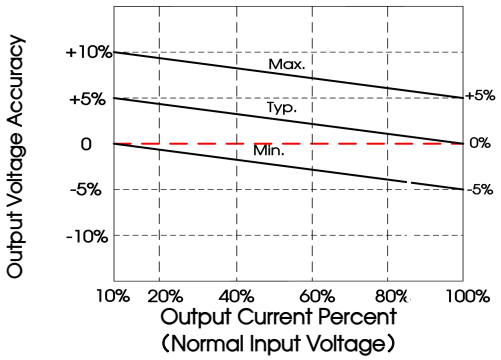
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact ±8kV perf. Criteria B

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Typical Characteristic Curves

+Vo Output Regulation Curve



-Vo Output Regulation Curve

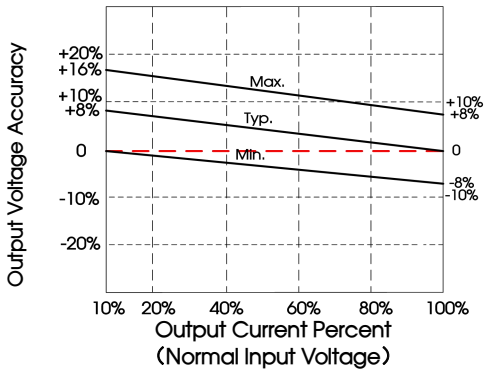


Fig. 1
(Excluding QA01-09 model)

Temperature Derating curve

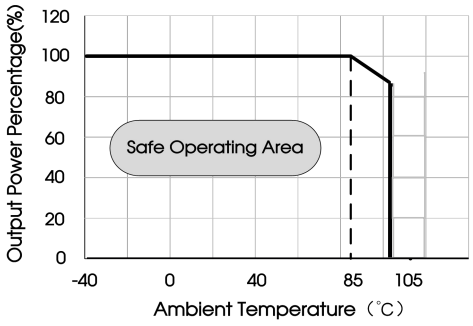
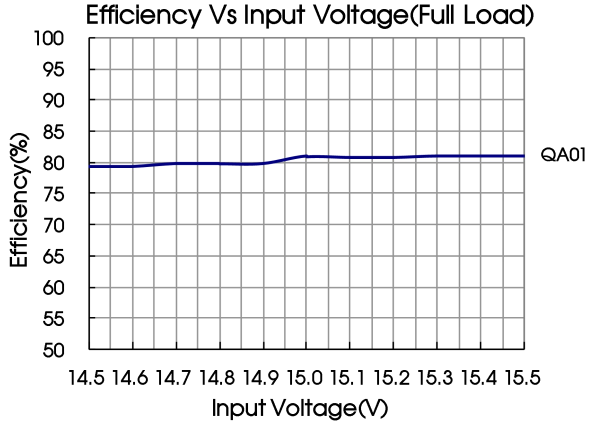
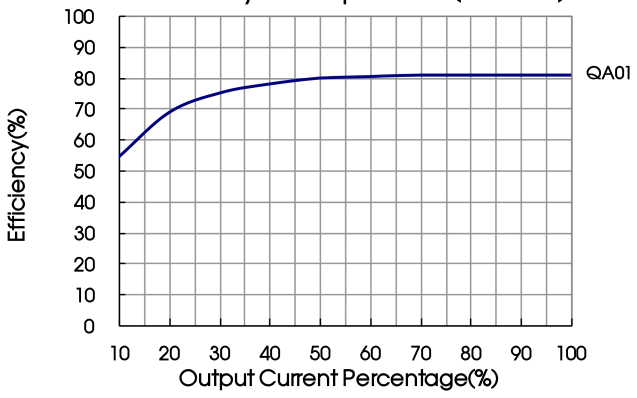


Fig. 2

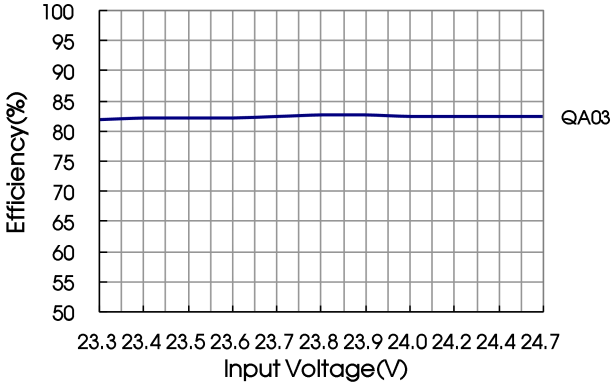
Efficiency Vs Input Voltage(Full Load)



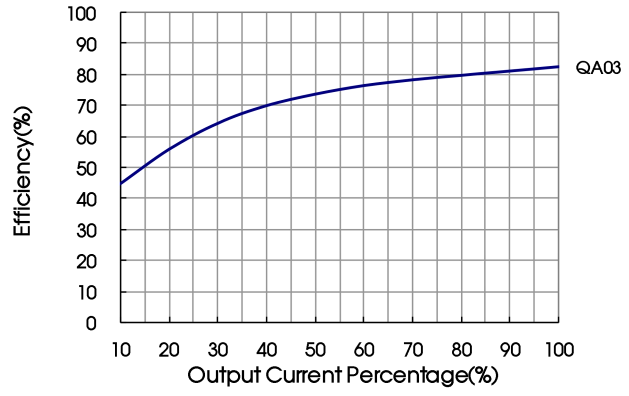
Efficiency Vs Output Load(Vin=15V)



Efficiency Vs Input Voltage(Full Load)



Efficiency Vs Output Load(Vin=24V)



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Design Reference

1. Typical application

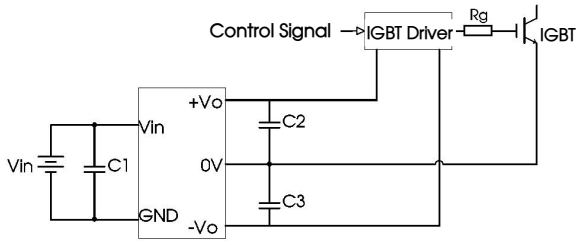


Fig. 3

C1/ C2 /C3
100uF/35V (Low internal resistance capacitance)

Note: A ceramic capacitor (1uF-10uF) can be connected in parallel to both ends of the C2 and C3 to reduce ripple and noise.

2. EMC (CLASS B) compliance circuit

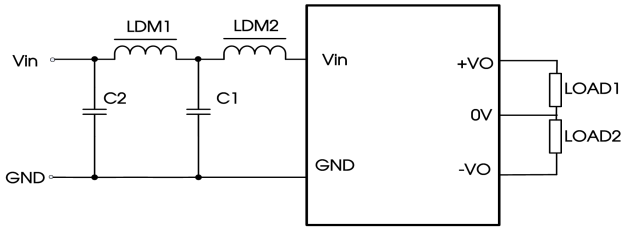


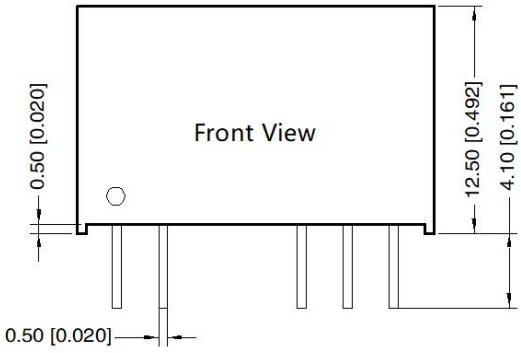
Fig. 4

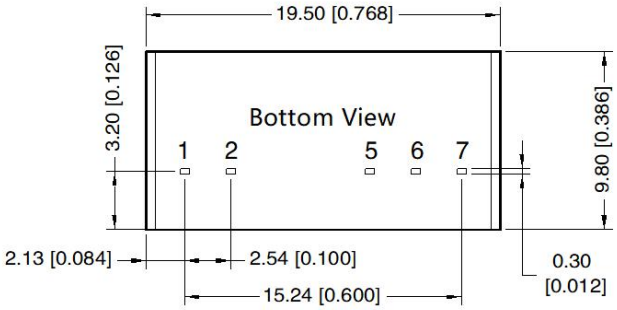
Input Voltage		12/15/24VDC
EMI	C1、C2	4.7μF /50V
	LDM1	12μH
	LDM2	47μH

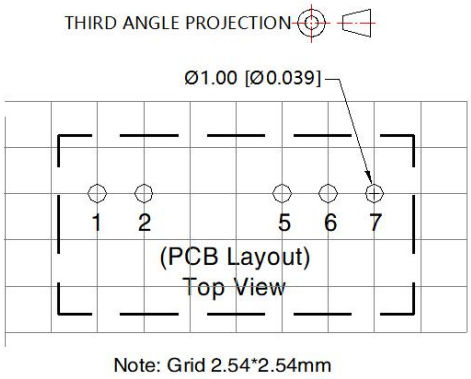
3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout







Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	Vin
2	GND
5	–Vo
6	0V
7	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50 [0.020]

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Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200013;
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 dedicated power supply 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 max. capacitive load should be tested within the input voltage range and under full load conditions;
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. We can provide product customization service, please contact our technicians directly for specific information;
11. Products are related to laws and regulations: see "Features" and "EMC";
12. 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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