

# MORNSUN®

## QA Series

### Application Design For IGBT Driver DC-DC Converter



Patent Protected RoHS



Continuous Short  
Circuit Protection

#### FEATURES

- Efficiency up to 80%
- Miniature SIP package
- Good performance at high and low temperature
- 3000VAC isolation
- Ultra-miniature isolation capacitor
- Operating temperature: -40°C ~ +105°C
- Using without load

#### APPLICATIONS

QA series is an application-designed power supply for the IGBT driver which needs two outputs isolate from the input. With two outputs, it can drive IGBT more effective. The module also provides functions of short-circuit protection and auto-recovery capability. The general application is:

- General-purpose inverter
- AC servo systems
- Welding machines
- Uninterrupted power supplies(UPS)

#### SELECTION GUIDE

Approval	Model	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)		Output Current (mA)		Input Current (mA,Typ.)		Max. Capacitive Load(μF)	Efficiency(%) @Max. Load	
			+Vo	-Vo	+Io	-Io	@Max. Load	@No Load		Min.	Typ.
UL	QA01	15 (14.5~15.5)	+15	-8.7	+80	-40	130	20	220	78	80
	QA01-09		+9.0	--	+111	--	84			78	80
	QA01-A09		+9.0	-9.0	+55	-55	84			78	80
	QA01-17		+17	-8.7	+80	-40	143			78	80
	QA02	12 (11.6~12.4)	+15	-8.7	+80	-40	162			78	80
	QA03	24 (23.3~24.7)	+15	-8.7	+80	-40	81			78	80
	QA04	12 (9~15)	+15	-8.0	+100	-80	223			78	80

#### INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Input Voltage	QA01*	DC	-0.7	--	16	V
	QA02	DC	-0.7	--	13	
	QA03	DC	-0.7	--	26	
	QA04	DC	-0.7	--	15	
Input Filter	Capacitor					
Note: QA01* is for models with the beginning of QA01.						

#### OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit		
Output Voltage	QA01	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+80mA	14	15	16	VDC
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-40mA	-7	-8.7	-10	
	QA01-09	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+111mA	8	9	10	
		-Vo	--	--	--	--	
	QA01-A09	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+55mA	8	9	10	
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-55mA	-8	-9	-10	
	QA01-17	+Vo	Vin=15VDC, Pin6 & Pin7 +Io=+80mA	16.5	17	18	
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io=-40mA	-7	-8.7	-10	

Output Voltage	QA02	+Vo	Vin=12VDC, Pin6 & Pin7 +Io=+80mA	14	15	16	VDC
		-Vo	Vin=12VDC, Pin5& Pin6 -Io=-40mA	-7	-8.7	-10	
	QA03	+Vo	Vin=24VDC, Pin6 & Pin7 +Io=+80mA	14	15	16	
		-Vo	Vin=24VDC, Pin5 & Pin6 -Io=-40mA	-7	-8.7	-10	
	QA04	+Vo	Vin=12VDC, Pin6 & Pin7 +Io=+100mA	14	15	16	
		-Vo	Vin=12VDC, Pin5 & Pin6 -Io=-80mA	-7	-8	-9	
Line Regulation		Vin Range		--	±1.2	±1.5	%
Temperature coefficient		100% load		--	--	±0.03	%/°C
Ripple & Noise*		20MHz Bandwidth			100	200	mVp-p
Short Circuit Protection		Continuous, automatic recovery					

Note:\* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at *DC-DC Application Notes*.

## COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, tested for 1 minute and leakage current less than 1 mA	3000	--	--	VAC
Isolation Resistance	Input-Output, test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	6.6	--	pF
Switching Frequency	Full load ,nominal input	--	100	300	KHz
MTBF	MIL-HDFK-217F@25°C	3500	--	--	K hours
Case Material		Plastic(UL94-V0)			
Weight		--	4.3	--	g

## ENVIRONMENTAL SPECIFICATIONS

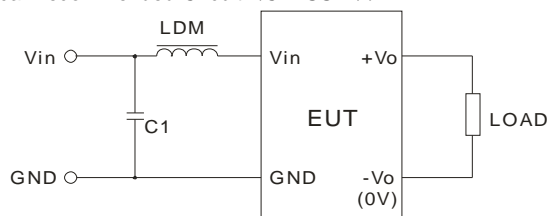
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (≥85°C, see Figure 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temperature rise	Ta=25°C	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

## EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS B (Recommended Circuit Refer to Figure1)
	RE	CISPR22/EN55022	CLASS B (Recommended Circuit Refer to Figure1)
EMS	ESD	IEC/EN61000-4-2	Contact ±8KV perf. Criteria B

## EMC RECOMMENDED CIRCUIT

EMI Typical Recommended Circuit (CLASS B):

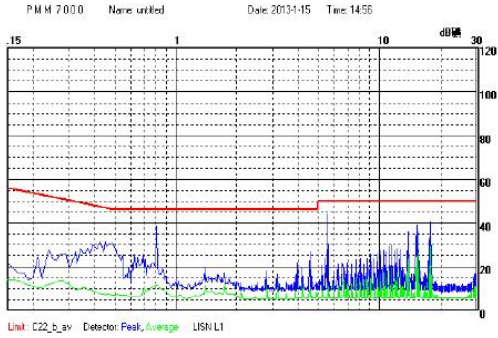


(Figure1)

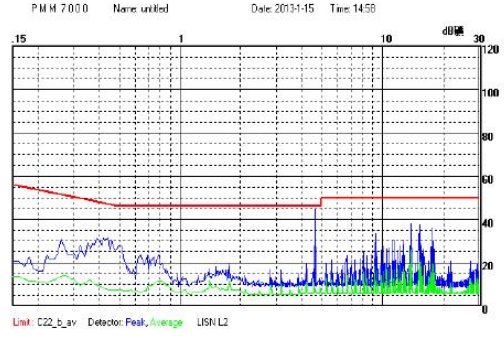
Recommended typical circuit parameters:

		Vin(V)	12/15/24
EMI	C1		4.7μF /50V
	LDM		12μH

## EMC TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1)



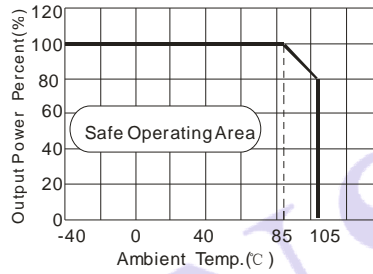
QA01 CE(Class B, Positive line)



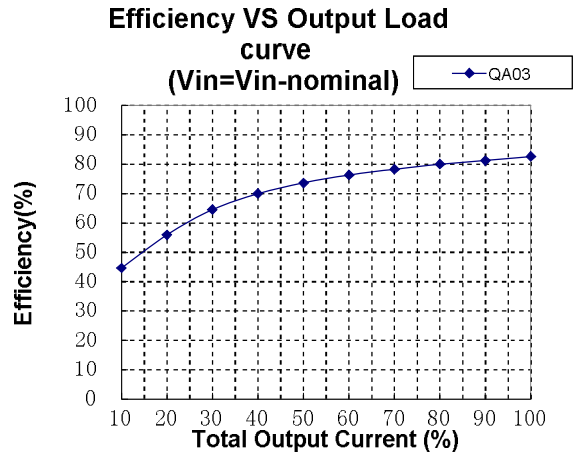
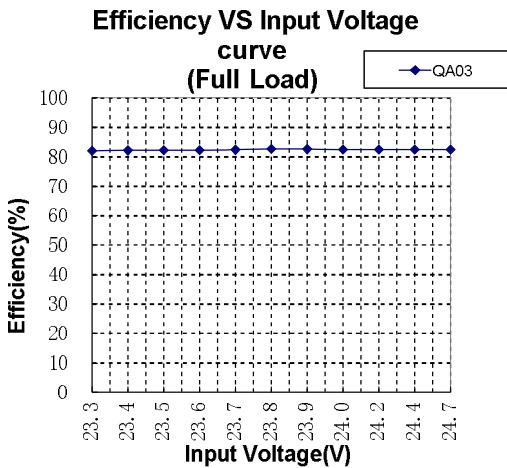
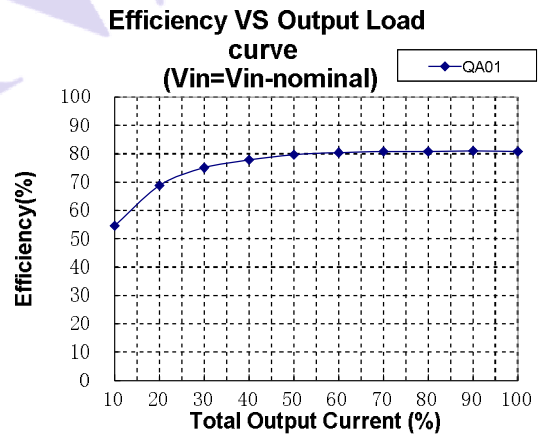
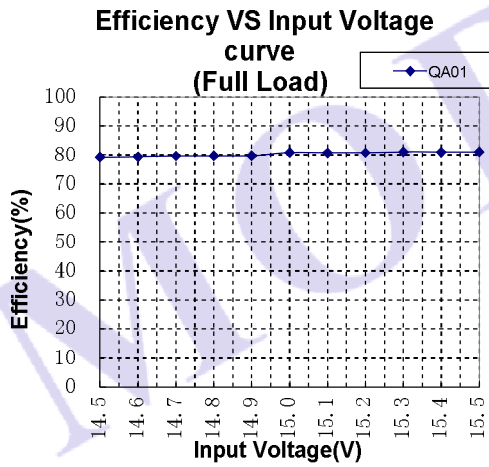
QA01 CE(Class B, Negative line)

## PRODUCT TYPICAL CURVE

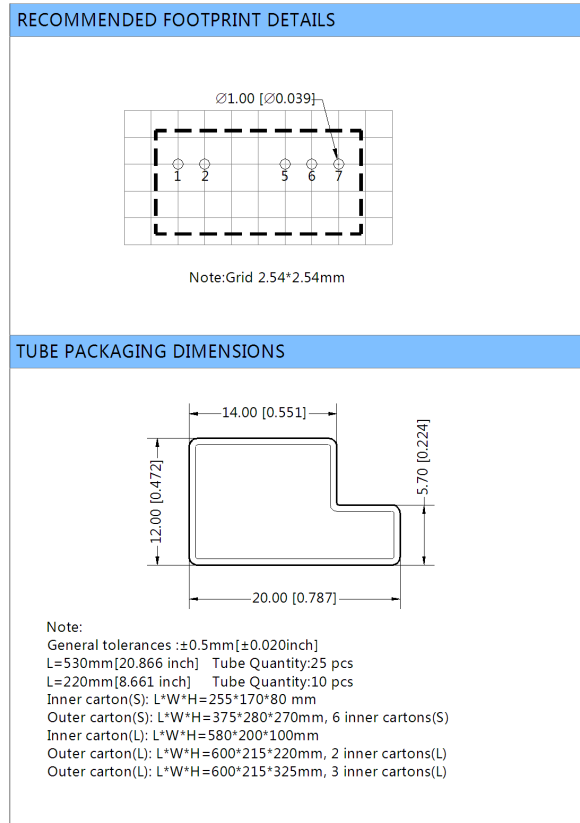
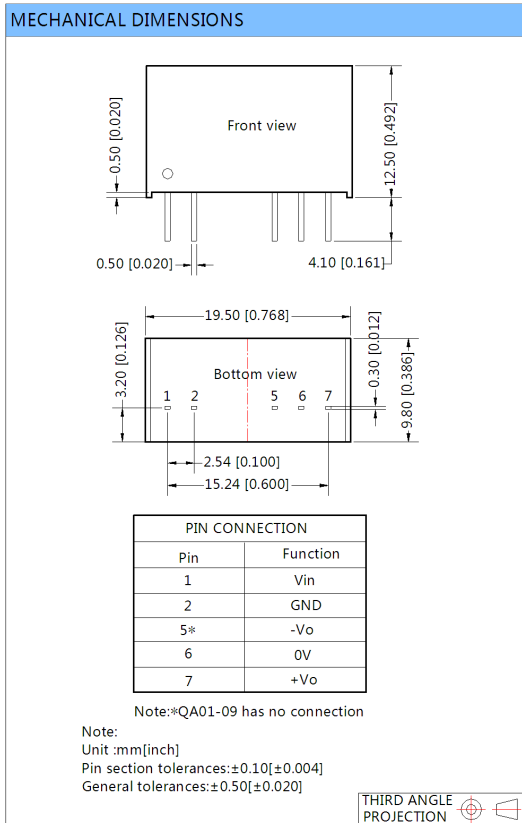
Temperature Derating Graph



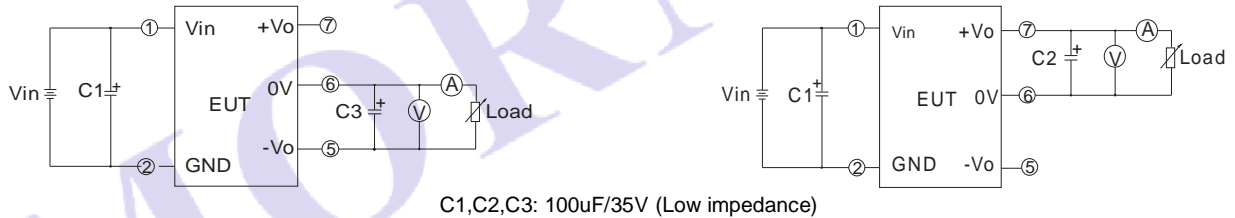
(Figure2)



## DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING



## TEST CONFIGURATIONS

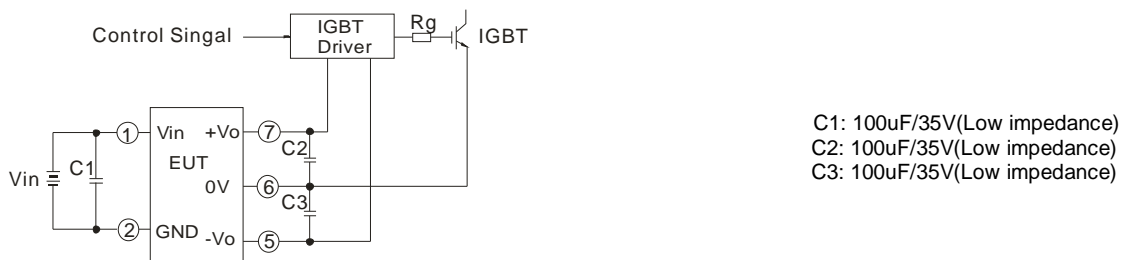


## DESIGN CONSIDERATIONS

### 1) Overload Protection

In normal operating conditions, the circuit of these products have no overload protection. Protect with a breaker is a simple way to make overload protection.

### 2) Recommended circuit



**3) It is not recommended to increase the output power capability by connecting two or more converters in parallel. The product is not hot-swappable**

Note:

1. The wire between the converter and IGBT driver should be as short as possible.
2. External filter capacitors should be placed as close as possible to the converter and the IGBT driver.
3. The average power of the IGBT driver should be less than the output power of DC-DC module.
4. For the application of shocking, recommend to glue the module by glue.
5. Max. Capacitive Load is tested at nominal input voltage and full load.
6. Unless otherwise noted, All specifications are measured at  $T_a=25^{\circ}\text{C}$ , humidity<75%, nominal input voltage and rated output load.
7. In this datasheet, all test methods are based on our corporate standards.
8. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more detail.
9. Please contact our technical support for any specific requirement.
10. Specifications of this product are subject to changes without prior notice.

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