

DC-DC module power supply specialized for SiC driver



UL US CE CB Patent Protection RoHS

FEATURES

- High efficiency up to 82%
- SIP package
- I/O isolation test voltage : 3.5kVAC/6kVDC
- Ultra-low isolation capacitance
- Operating ambient temperature range: -40°C to +105°C
- Continuous short-circuit protection
- Industry standard pin-out
- IEC60950、UL60950 and EN60950 approved

QAxCx is DC-DC module power supply designed for SiC driver requiring two sets of isolation power supply. The mode of common ground outputs is adopted internally for better energy provision of SiC 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

Certification	Part No.	Input Voltage (VDC)	Output		Efficiency at Full Load (%) Min./Typ	Capacitive Load* (μF) Max.
		Nominal (Range)	Voltage (VDC)+Vo/-Vo	Current (mA)+Io/-Io		
UL/CE/CB	QA01C	15 (13.5-16.5)	+20/-4	+100/-100	76/80	220
--	QA01C-18	15 (13.5-16.5)	+18/-3	+100/-100	76/79	220
--	QA051C	5 (4.5-5.5)	+20/-5	+80/-40	75/79	100
--	QA151C	15 (13.5-16.5)	+20/-5	+80/-40	76/78	220
--	QA121C2	12 (10.8-13.2)	+15/-3.5	+111/-111	77/81	220
--	QA151C3	15 (13.5-16.5)	+15/-4	+100/-100	77/82	220
--	QA1201C-20	12 (10.8-13.2)	+20/-4	+100/-100	--/80	220
--	QA2401C-20	24 (21.6-26.4)	+20/-4	+100/-100	75/80	220

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

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	Nominal voltage input	--	QA01C	193/16	--	mA
			QA01C-18	177/16	185/30	
			QA051C	456/53	--	
			QA151C	150/20	160/30	
			QA121C2	210/15	--	
			QA151C3	151/15	--	
			QA1201C-20	--/20	--	
			QA2401C-20	125/13	--	
Surge Voltage (1sec. max.)		-0.7	--	QA01C	21	VDC
				QA01C-18	21	
				QA051C	9	

		QA151C			21	
		QA121C2			18	
		QA151C3			21	
		QA1201C-20			18	
		QA2401C-20			30	
Input Filter		Capacitance filter				
Hot Plug		Unavailable				

Output Specifications

Item	Operating Conditions				Min.	Typ.	Max.	Unit		
Voltage Accuracy	Nominal voltage input (See Fig.1 and Fig.2)	QA01C	Light Load	+Vo	+2	+4	+6	%		
				-Vo	+5	+10	+15			
			Full Load	+Vo	-4	-1.5	+1			
					-Vo	-4	+0.5		+5.5	
		QA01C-18	Light Load	+Vo	0	+4	+9			
						-Vo	+6		+12	+20
			Full Load	+Vo	-7	-3	+2			
					-Vo	-5	0		+7	
		QA051C	Light Load	+Vo	+4	+8	+12			
						-Vo	+6		+12	+18
			Full Load	+Vo	-3	+0.5	+4			
					-Vo	+1	+4		+8	
		QA151C	Light Load	+Vo	-0.5	+1.5	+3.5			
						-Vo	0		+3	+6
			Full Load	+Vo	-5	-3	-1			
					-Vo	-5	-2		1	
		QA121C2	Light Load	+Vo	0	+7	+15			
						-Vo	0		+15	+30
			Full Load	+Vo	-4	0	+5			
					-Vo	-5	+5		+15	
QA151C3	Light Load	+Vo	+2	+6	+10					
				-Vo	0	+10	+18			
	Full Load	+Vo	-2	0	+2					
			-Vo	-5	0	+5				
QA1201C-20	Light Load	+Vo	--	--	--					
				-Vo	--	--	--			
	Full Load	+Vo	-2	--	+2					
			-Vo	-7.5	--	+2.5				
QA2401C-20	Light Load	+Vo	+6.5	+8	+10.5					
				-Vo	+5.5	+13	+20.5			
	Full Load	+Vo	-2.5	0	+2.5					
			-Vo	-7.5	0	+7.5				
Linear Regulation	Input voltage change: ±10%	QA01C				±1.1	±1.3	%/%		
		QA01C-18				±1.1	±1.3			
		QA051C				±1.4	±2			
		QA151C				±1.1	±1.3			
		QA121C2				±1.1	±1.2			
		QA151C3				±1.1	±1.3			
		QA1201C-20				±1.5	±2			
QA2401C-20				±1.1	±1.3					
Load Regulation	10% ~100% load	+Vo	QA01C			7	9	%		
			QA01C-18			6	10			
			QA051C			8	12			
			QA151C			5	8			
			QA121C2			7	--			
			QA151C3			5	8			
			QA1201C-20			--	8			
		QA2401C-20			5	8				
		-Vo	QA01C			10	15			
			QA01C-18			12	20			
			QA051C			10	14			
			QA151C			5	10			

			QA121C2		10	--	
			QA151C3		10	13	
			QA1201C-20		--	13	
			QA2401C-20		10	13	
Ripple & Noise*	20MHz bandwidth	Ripple	QA01C		60		mVp-p
			QA01C-18		60		
			QA051C		40		
			QA151C	--	60	--	
			QA121C2		120		
			QA151C3		80		
			QA1201C-20		60		
			QA2401C-20		60		
Ripple & Noise*	20MHz bandwidth	Noise	QA01C		75		mVp-p
			QA01C-18		75		
			QA051C		75		
			QA151C	--	75	--	
			QA121C2		80		
			QA151C3		100		
			QA1201C-20		100		
			QA2401C-20		75		
Temperature Coefficient	100% load		QA01C	--	±0.03	--	% / °C
			QA01C-18		±0.03		
			QA051C		±0.03		
			QA151C		±0.03		
			QA121C2		±0.02		
			QA151C3		±0.03		
			QA1201C-20		--	±0.03	
			QA2401C-20		--	±0.03	
Output Short Circuit Protection							Continuous, self-recovery

Note: *Ripple and noise tested with "parallel cable" method, please see DC-DC Converter Application Notes for specific operation methods.

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.	QA01C	3500			VAC
			6000			VDC
		QA01C-18	3500			VAC
			5000			VDC
		QA051C	3000			VAC
			5200			VDC
		QA151C	3500	--	--	VAC
			6000			VDC
		QA121C2	3500			VAC
	3500			VAC		
	6000			VDC		
	3500			VAC		
	6000			VDC		
	3500			VAC		
	3500			VAC		
Isolation Resistance	Input-output insulation at 500VDC	1000	--	--	MΩ	
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	3.5	--	pF	
Operating Temperature	Derating when operating temperature up to 85°C, (Except QA051C see Fig. 5, QA051C see Fig. 6)	-40	--	105		
Storage Temperature		QA01C	-55		125	°C
		QA01C-18	-55		125	
		QA051C	-55		125	
		QA151C	-55	--	125	
		QA121C2	-55		125	
		QA151C3	-40		105	
		QA1201C-20	-50		105	
		QA2401C-20	-55		125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from the case, 10 seconds	--	--	300		
Case Temperature Rise	Ta=25°C	--	30	--		
Storage Humidity	Non-condensing	--	--	95	%RH	

Switching Frequency	100% load, nominal input voltage	QA01C	--	95	--	kHz
		QA01C-18		95		
		QA051C		100		
		QA151C		95		
		QA121C2		67		
		QA151C3		100		
		QA1201C-20		100		
QA2401C-20	100					
MTBF	MIL-HDBK-217F@25°C	3500	--	--	k hours	

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Package Dimensions	19.50 × 9.80 × 12.50mm
Weight	4.2g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	Conducted disturbance	CISPR32/EN55032 CLASS B (see Fig. 12 for recommended circuit)
	Radiated emission (Except QA051C)	CISPR32/EN55032 CLASS B (see Fig. 12 for recommended circuit)
Immunity	Electrostatic discharge	IEC/EN61000-4-2 Contact ±6kV perf. Criteria B

Typical Characteristic Curves

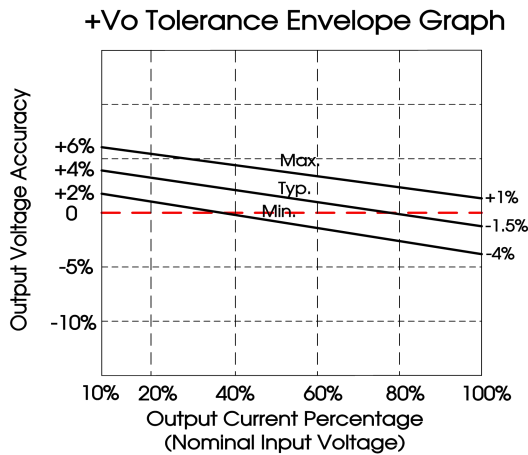


Fig. 1

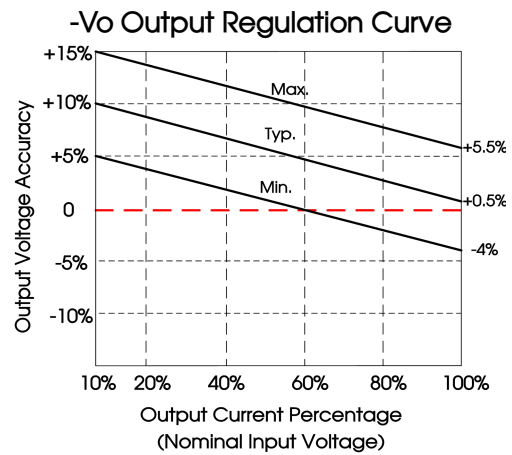


Fig. 2

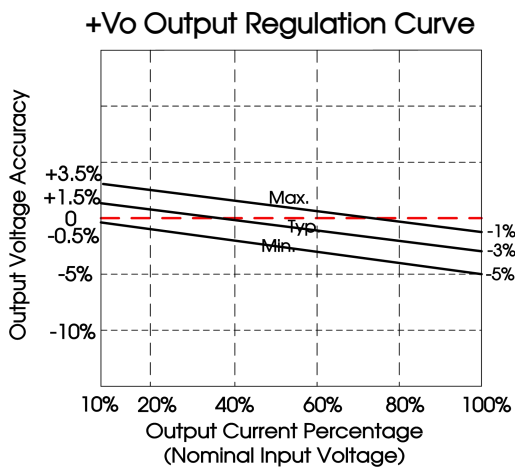


Fig. 3(QA151C)

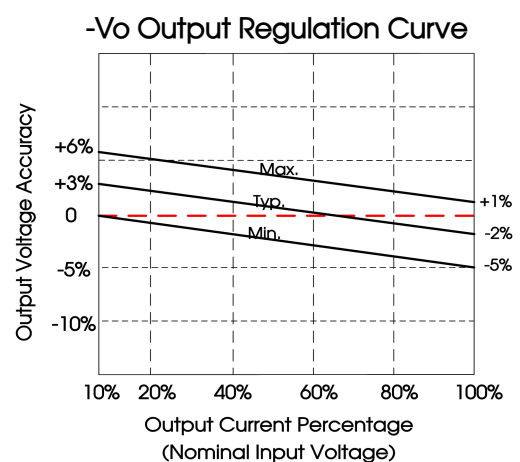


Fig. 4(QA151C)

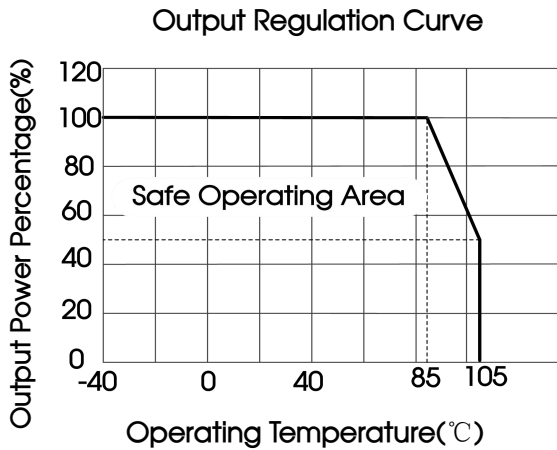


Fig. 5

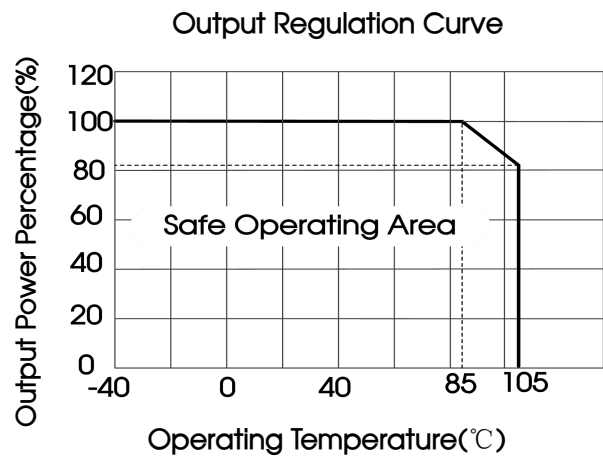


Fig. 6(QA051C)

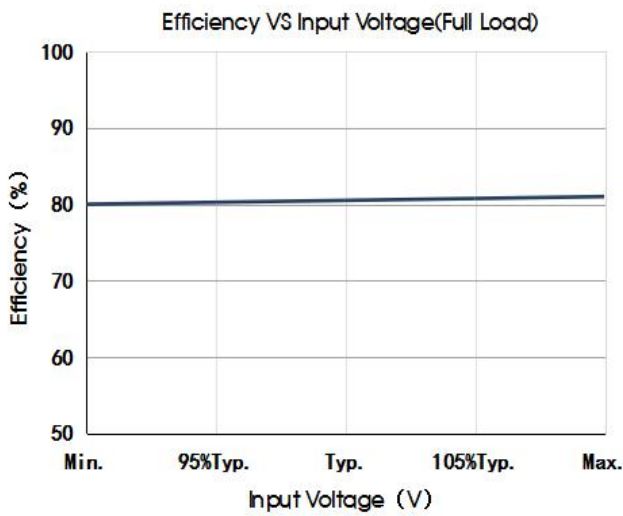


Fig. 7

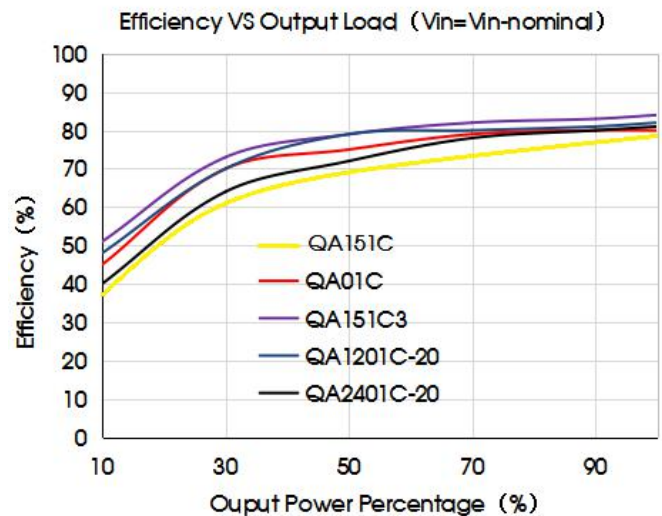


Fig. 8

Design Reference

1. Overload Protection

There is no over-load protection under normal operating conditions, we suggest to add an circuit breaker outside in the circuit.

2. Test configurations

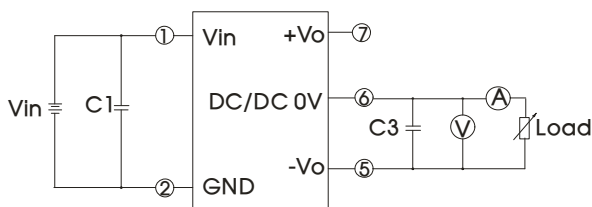


Fig. 9

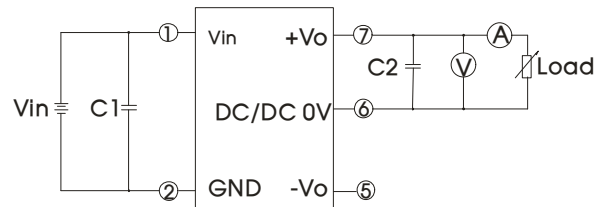
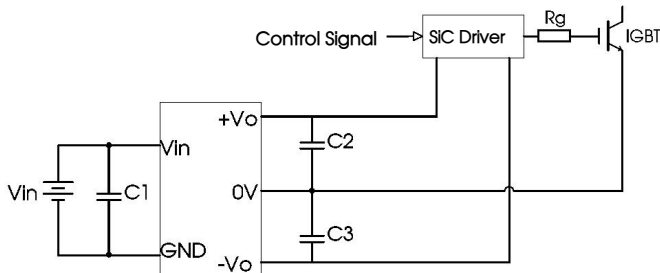


Fig. 10

Note: C1,C2,C3: 100uF/35V (Low impedance)

3. Typical application



(Apply to QA01C, QA01C-18, QA051C, QA121C2, QA151C3, QA151C)

Fig. 11

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

4. EMC typical recommended circuit (CLASS B)

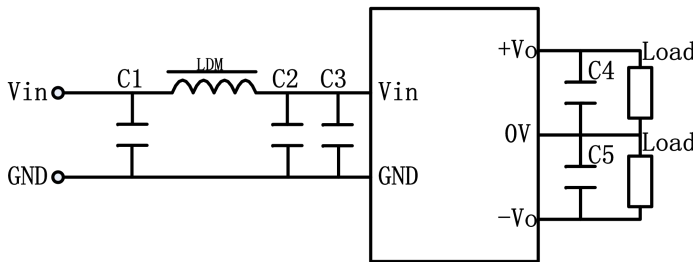


Fig. 12

model		Except QA151C	
EMI	C1/C2	4.7μF /50V	
	C4/C5	100μF /35V (Low internal resistance capacitance)	
	LDM	6.8μH	22μH (QA121C2)

model		QA151C	
EMI	C1/C2	4.7μF /50V	
	C3	100pF /50V	
	C4/C5	100μF /35V (Low internal resistance capacitance)	
	LDM	22μH	

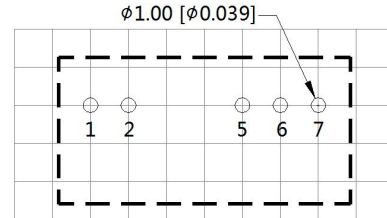
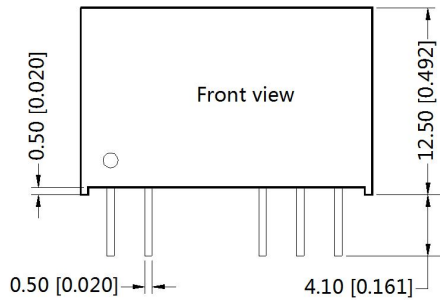
5. The products do not support parallel connection of their output for power expansion purpose or hot-plug.

6. 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.

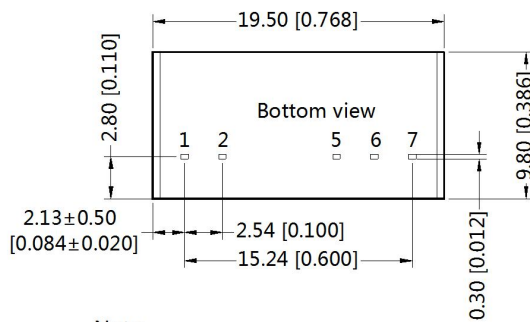
7. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Note: Grid 2.54*2.54mm



Pin-Out	
Pin	Function
1	Vin
2	GND
5	-Vo
6	0V
7	+Vo

Note:
Unit :mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.25[±0.010]

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200013;
- The lead connecting the power supply module and SiC driver should be as short as possible during use;
- The output filtering capacitor should be as close as possible to the power supply module and SiC driver;
- The peak of the SiC 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;
- The average output power of the driver must be lower than that of the power supply module;
- Consider fixing with glue near the module if being used in vibration occasion;
- The maximum capacitive load offered were tested at nominal input voltage and full load;
- 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;
- All index testing methods in this datasheet are based on company corporate standards;
- 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;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC".
- 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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