DC/DC Converter for IGBT Driver

QAW Series

MORNSUN®

4.8W, Wide input, isolated & regulated
dual output, IGBT dedicated DC-DC converter

Patent Protection RoHS

FEATURES

- Wide 2:1 input voltage range
- High efficiency up to 85%
- I/O isolation test voltage 3000VDC
- Short circuit protection
- Output over-voltage protection
- Operating ambient temperature range:-40℃ to +85℃
- Industry standard pin-out
- IGBT dedicated regulated DC-DC converter

QAW series are designed for the IGBT driver, offer 4.8W of output, with output over- voltage protection and short-circuit protection. 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		Efficiency at Full Load (%) Min./Typ	Capacitive Load (μF) Max.
	Voltage (VDC)	Current (mA) Typ. at full/no-load	Voltage(VDC) +Vo/-Vo	Current (mA) +Io/-Io		
QAW01	12(9-18)	471/16	+15/-9	±200/±10	85	1000
QAW02	24(18-36)	235/8	+15/-9	±200/±10		

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Surge Voltage	12VDC input	-0.7	--	25	VDC
	24VDC input	-0.7	--	50	
Start-up Voltage	12VDC input	--	--	9	
	24VDC input	--	--	18	
Input Filter		PI filter			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Power		0.24	--	4.8	W
Voltage Accuracy	Main output(+15V output)	--	±1	±2	%
	Supplement output(-9V output)	--	±3	±5	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation	5% to 100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	100% load	--	--	±0.03	%/℃
Ripple & Noise*	20MHz bandwidth	--	100	200	mVp-p
Over-voltage Protection	Input voltage range	110	120	140	% Vo
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	--	--	VDC
Isolation Resistance	Input-output insulation at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	100	--	pF
Operating Temperature	Power derating≥71℃, (see Fig. 1)	-40	--	85	℃
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℃	--	30	40	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching frequency	100% load, nominal input voltage	--	300	--	kHz
MTBF	MIL-HDFK-217F@25℃	1000	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant（UL94 V-0）
Dimensions	31.60 × 20.30 × 10.20 mm
Weight	14.0g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS A (see Fig. 4-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (see Fig. 4-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±4kV	perf. Criteria B
	RI	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2kV (see Fig. 4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 ±2kV (see Fig. 4-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0%-70%	perf. Criteria B

Typical Characteristic Curves

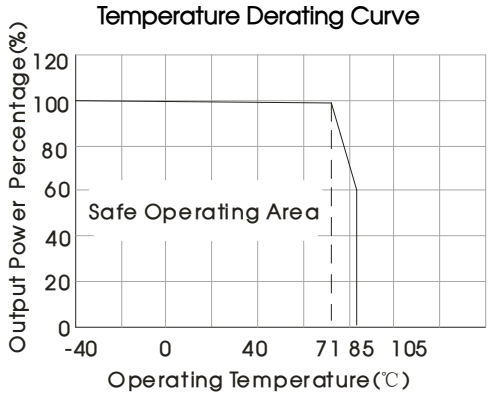
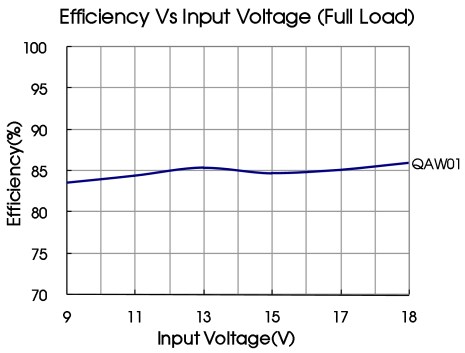
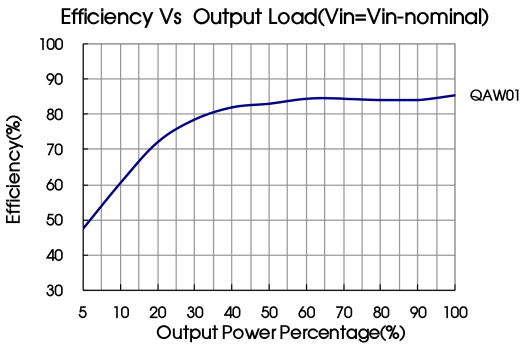
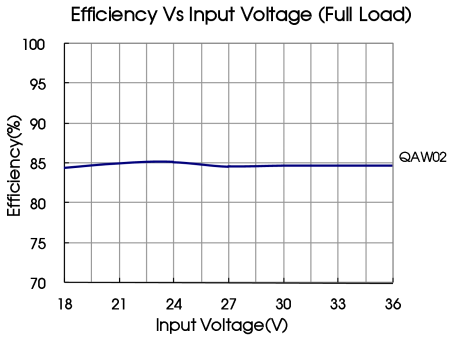
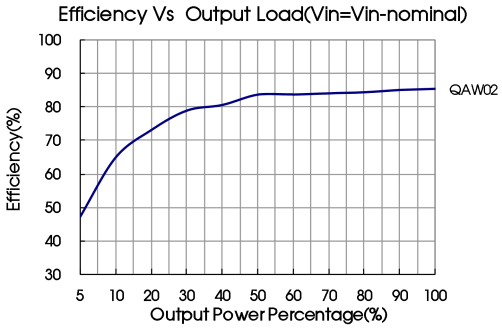


Fig. 1









Design Reference

1. Typical application

All the IGBT converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.
Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Fig. 2

Vin	12V/24V
Cin	100μF
Cout	100μF

2. Typical application

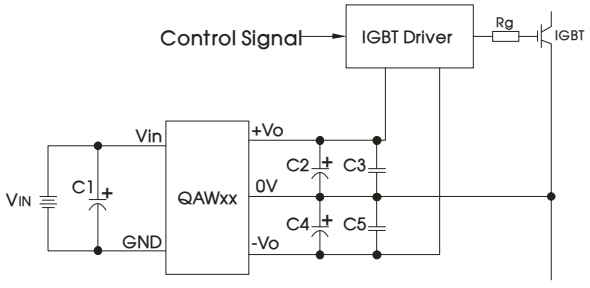


Fig. 3

C1	100uF/63V(Electrolytic capacitor)
C2 /C4	100uF/35V(Electrolytic capacitor)
C3/C5	10uF/25V(Ceramic capacitor)

Application Notes
1. The wire between the converter and IGBT driver must as short as possible.
2. External filter capacitors should be connected as close as possible to the IGBT driver.
3. The peak gate drive current of the IGBT driver is high, so electrolytic capacitors are recommended for the output filter. Use in conjunction with ceramic capacitors to reduce internal resistance.
4. The output average power of the IGBT driver should be less than the output power of DC-DC module.

3. EMC solution-recommended circuit(QAW01)

EMC solution-recommended circuit(QAW02)

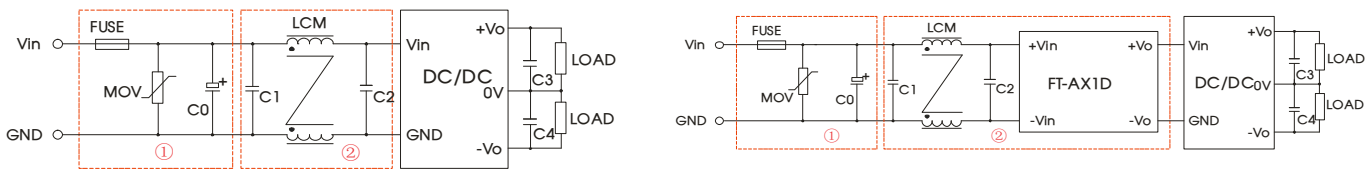
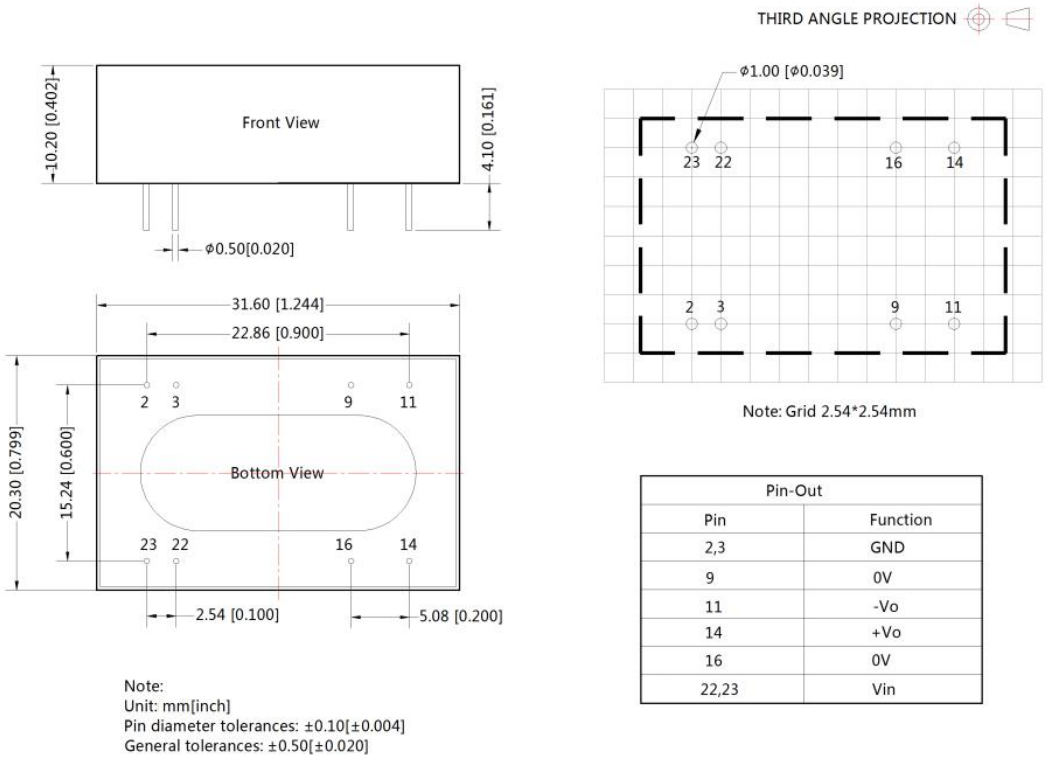


Fig. 4

Model	QAW01	QAW02
FUSE	Choose according to practical input current	
MOV	14D390K	14D560K
C0	680μF/25V	330μF/50V
C1, C2	4.7μF/50V	
C3, C4	Refer to the Cout in Fig.2	
LCM	1mH	3.3mH
Module	--	FT-AX1D

4. The products do not support parallel connection of their output for power expansion purpose or hot-plug.
5. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Pin-Out	
Pin	Function
2,3	GND
9	0V
11	-Vo
14	+Vo
16	0V
22,23	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: 58210008;
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. Low ESR electrolytic capacitors are recommended for output filtering (IGBT gate drives have high peak current);
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 our 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. Specifications of this product are subject to changes without prior notice.

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