

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°C to +85°C
- 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 | %/°C |
| 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

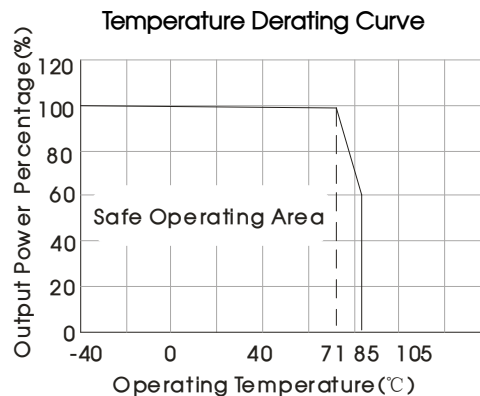
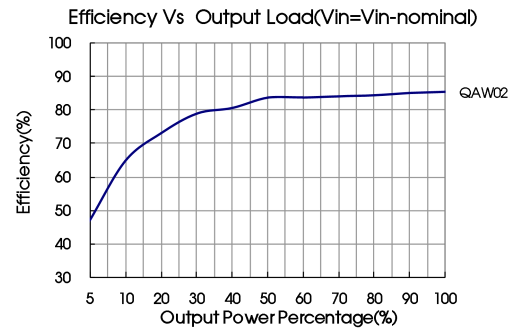
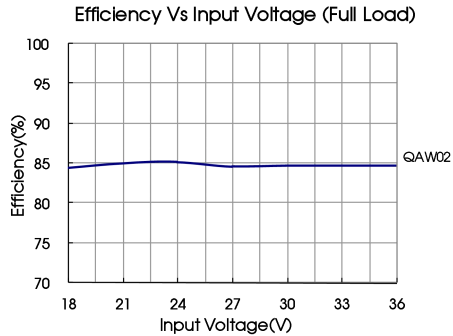
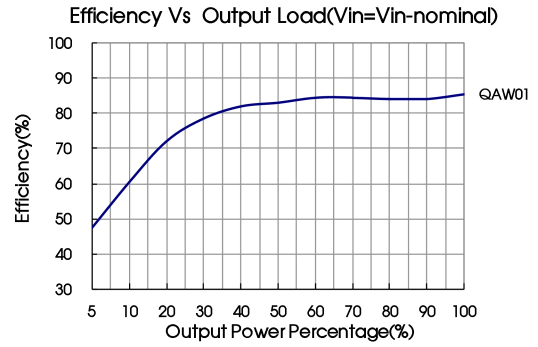
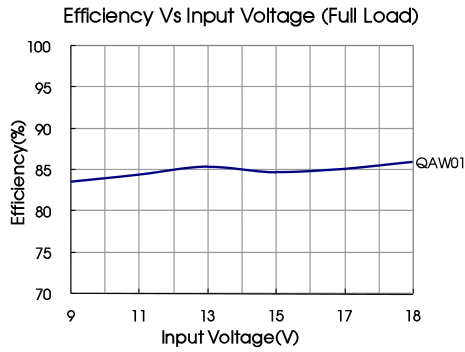


Fig. 1



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 C_{in} and C_{out} 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

| | |
|-----------|-------------|
| V_{in} | 12V/24V |
| C_{in} | 100 μ F |
| C_{out} | 100 μ F |

2. Typical application

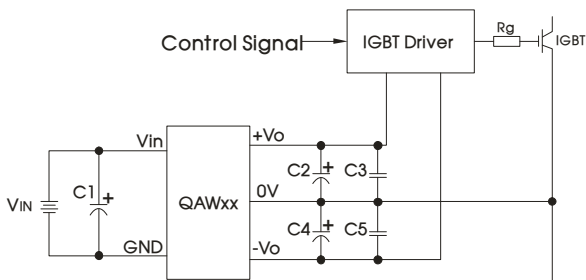


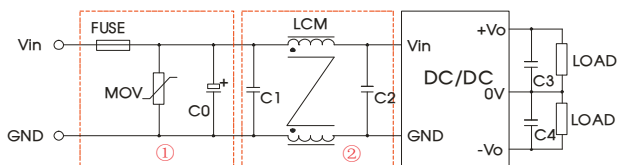
Fig. 3

| | |
|---------|--|
| C1 | 100 μ F/63V (Electrolytic capacitor) |
| C2 / C4 | 100 μ F/35V (Electrolytic capacitor) |
| C3 / C5 | 10 μ F/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)

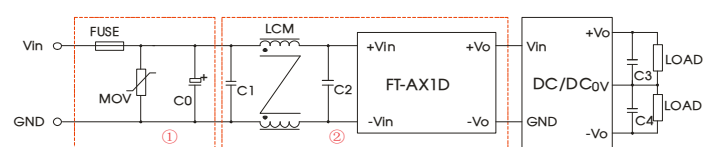


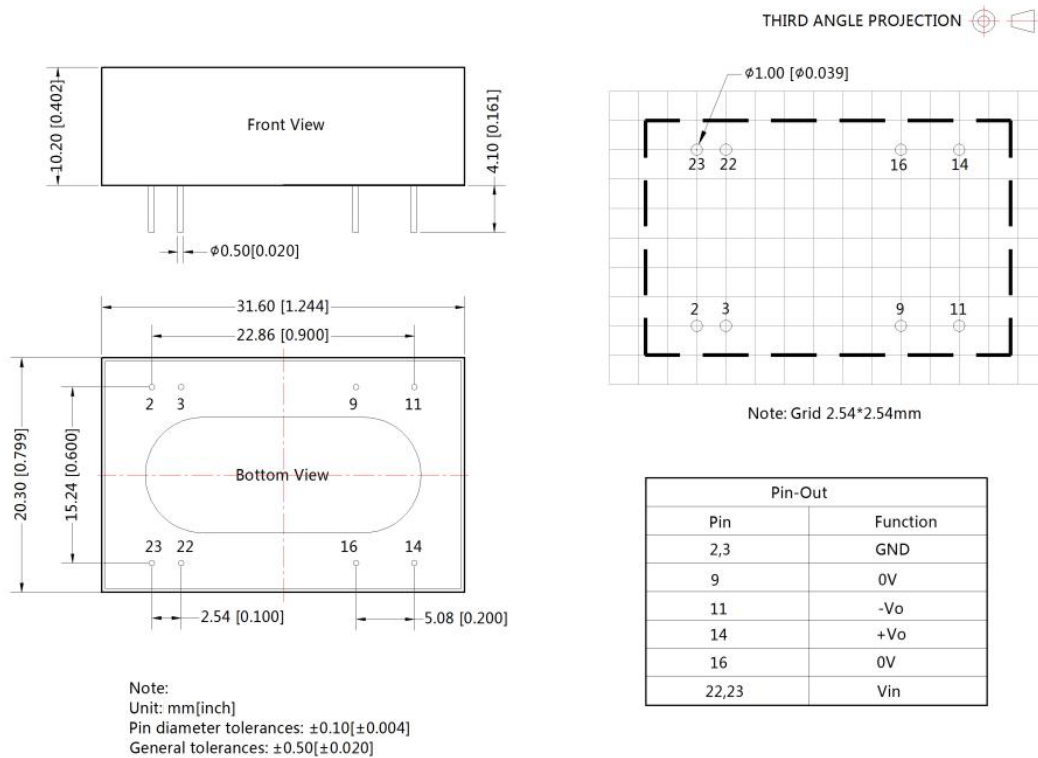
Fig. 4

| | | |
|--------|---|-----------------|
| Model | QAW01 | QAW02 |
| FUSE | Choose according to practical input current | |
| MOV | 14D390K | 14D560K |
| C0 | 680 μ F/25V | 330 μ F/50V |
| C1, C2 | 4.7 μ F/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



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 $T_a=25^{\circ}\text{C}$, 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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