DC/DC Converter for SiC Driver
QA01C-18

DC-DC module power supply specialized for SiC driver

FEASIBILITY
- Efficiency up to 79%
- SIP package
- I/O isolation test voltage 3.5kVAC/6kVDC
- Ultra low-volume isolation capacitance
- Operating ambient temperature range -40℃ to +105℃
- Continuous short circuit protection
- Industry standard pin-out

QA01C-18 is DC-DC module power supply designed for IGBT driver requiring two set of isolation power supply. The mode of mutual connection after two independent 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**

<table>
<thead>
<tr>
<th>Certification</th>
<th>Part No.</th>
<th>Input Voltage (VDC)</th>
<th>Output</th>
<th>Full Load Efficiency(%)</th>
<th>Capacitive Load (μF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>QA01C-18</td>
<td>Nominal (Range)</td>
<td>Voltage(VDC) +Vo/-Vo</td>
<td>Current(mA) +Io/-Io</td>
<td>Min./Typ. Max.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 (13.5-16.5)</td>
<td>+18/-3</td>
<td>+100/-100</td>
<td>76/79 220</td>
</tr>
</tbody>
</table>

Note:*The capacitive loads of positive and negative outputs are identical.

**Input Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Operating Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current (full load / no-load)</td>
<td></td>
<td>--</td>
<td>177/16</td>
<td>185/30</td>
<td>mA</td>
</tr>
<tr>
<td>Surge Voltage (1sec. max.)</td>
<td></td>
<td>-0.7</td>
<td>--</td>
<td>21</td>
<td>VDC</td>
</tr>
<tr>
<td>Input Filter</td>
<td></td>
<td>Capacitor filter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot Plug</td>
<td></td>
<td>Unavailable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Output Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Operating Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Accuracy</td>
<td>See tolerance envelope graph (Fig. 1, Fig. 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line Regulation</td>
<td>Input voltage change: ±10%</td>
<td>--</td>
<td>±1.1</td>
<td>±1.3</td>
<td>%/%</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>10%-100% load</td>
<td>18VDC output</td>
<td>--</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>-3VDC output</td>
<td>--</td>
<td>12</td>
<td>20</td>
<td>%</td>
</tr>
<tr>
<td>Ripple &amp; Noise*</td>
<td>20MHz bandwidth</td>
<td>Ripple</td>
<td>--</td>
<td>60</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>--</td>
<td>75</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Temperature Drift Coefficient</td>
<td>100% load</td>
<td>--</td>
<td>±0.03</td>
<td>--</td>
<td>%/℃</td>
</tr>
<tr>
<td>Short-circuit Protection</td>
<td>Continuous, self-recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Operating Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation</td>
<td>Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.</td>
<td>3500</td>
<td>--</td>
<td>--</td>
<td>VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6000</td>
<td>--</td>
<td>--</td>
<td>VDC</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Input-output resistance at 500VDC</td>
<td>1000</td>
<td>--</td>
<td>--</td>
<td>MΩ</td>
</tr>
</tbody>
</table>
## DC/DC Converter for SiC Driver

### Isolation Capacitance
<table>
<thead>
<tr>
<th>Application</th>
<th>Input-output capacitance at 100kHz/0.1V</th>
<th>5</th>
<th>pF</th>
</tr>
</thead>
</table>

### Operating Temperature
- Derating when operating temperature up to 85°C (See Fig. 3)
- Temperature: -40°C to 125°C

### Storage Temperature
- Temperature: -55°C to 200°C

### Pin Soldering Resistance Temperature
- Soldering spot is 1.5mm away from case for 10 seconds
- Resistance: 500 Ω

### Case Temperature Rise
- Ta=25°C
- Temperature: 30°C to 40°C

### Storage Humidity
- Non-condensing
- Relative Humidity: 95% RH

### Switching Frequency
- 100% load, nominal input voltage
- Frequency: 95 KHz

### MTBF
- MIL-HDBK-217F @25°C
- MTBF: 3500 K hours

### Mechanical Specifications
- Case Material: Black Epoxy resin; flame-retardant and heat-resistant (UL94 V-0)
- Dimensions: 19.50 x 9.80 x 12.50mm
- Weight: 4.2g (Typ.)
- Cooling Method: Free air convection

### Electromagnetic Compatibility (EMC)

<table>
<thead>
<tr>
<th>Emissions</th>
<th>CE</th>
<th>CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE</td>
<td></td>
<td>CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit)</td>
</tr>
</tbody>
</table>

| Immunity  | ESD | IEC/EN61000-4-2 Contact ±6KV perf. Criteria B |

### Typical Characteristic Curves

**Output Regulation**

- **Output Voltage Accuracy**
  - Output Current Percentage (Nominal Input Voltage)
  - Fig. 1: 18V output

**Output Regulation**

- **Output Voltage Accuracy**
  - Output Current Percentage (Nominal Input Voltage)
  - Fig. 2: -3V output

**Temperature Derating Curve**

- Temperature: -40°C to 105°C
- Safe Operating Area

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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. Test configurations

![Test configurations diagram](image)

Note: C1, C2, C3: 100µF/35V (Low Impedance)

3. Typical application

![Typical application diagram](image)

4. EMC compliance circuit (CLASS B)

![EMC compliance circuit diagram](image)

<table>
<thead>
<tr>
<th>Input voltage (VDC)</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMI</td>
<td></td>
</tr>
<tr>
<td>C1/C2</td>
<td>4.7µF /50V</td>
</tr>
<tr>
<td>C3/C4</td>
<td>100µF /35V (Low internal resistance capacitance)</td>
</tr>
<tr>
<td>LCM1</td>
<td>4.7mH</td>
</tr>
</tbody>
</table>

5. The product does not support output in parallel with power per liter or hot-swappable use

6. The input and the output of the product are recommended to be connected to ceramic capacitor or electrolytic capacitor. Using tantalum capacitor may cause risk of failure

7. For additional information please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)
Notes:
1. Packing information please refer to Product Packaging Information which can be downloaded from www.mornsun-power.com. Packaging bag number: 58200013;
2. The lead connecting the power supply module and SiC 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 SiC driver;
4. 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;
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, data in this datasheet should be tested under the conditions of Ta=25°C, humidity<75%RH when inputting nominal voltage and outputting rated load;
9. All index testing methods in this datasheet are based on our Company’s corporate standards;
10. The performance indexes of the product models listed in this manual are as above, please directly contact our technicians for specific information;
11. We can provide product customization service;
12. Products are related to laws and regulations: see “Features” and “EMC”;
13. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.