MOSFET SiC Driver Dedicated Power Supply

QA151M

MOSFET SiC driver dedicated power supply

FEATURES
- High efficiency up to 80%
- SIP package
- I/O isolation test voltage: 3.5k VAC
- Ultra low isolation capacitor
- Operating ambient temperature range: -40°C ~ +105°C
- Continuous short-circuit protection
- Industry standard pin-out

QA151M is DC-DC module power supply designed for MOSFET SiC 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 systems
3. Electric welding machines
4. Un-interruptible power supplies (UPS)

Selection Guide

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Input Voltage (VDC)</th>
<th>Output</th>
<th>Full Load Efficiency(%)</th>
<th>Max. Capacitive Load(µF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>QA151M</td>
<td>Nominally (Range)</td>
<td>Voltage (VDC)</td>
<td>Current (mA) Min./Typ.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 (13.5-16.5)</td>
<td>+15/-5</td>
<td>+100/-100</td>
<td>76/80</td>
</tr>
</tbody>
</table>

Note:*The specified maximum capacitive load value for positive and negative output is 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>15V Input</td>
<td>-</td>
<td>162/15</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Surge Voltage (1sec. max.)</td>
<td>-0.7</td>
<td>-</td>
<td>21</td>
<td>VDC</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>Output Voltage</td>
<td>Vin=15VDC, Pin6 &amp; Pin7 +Io=+100mA</td>
<td>+Vo</td>
<td>14.4</td>
<td>15</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Vin=15VDC, Pin5 &amp; Pin6 -Io=-100mA</td>
<td>-Vo</td>
<td>-4.75</td>
<td>-5</td>
<td>-5.75</td>
</tr>
<tr>
<td>Voltage Accuracy</td>
<td>Vin=15VDC, Pin6 &amp; Pin7 +Io=+100mA</td>
<td>+Vo</td>
<td>-4%</td>
<td>-6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vin=15VDC, Pin5 &amp; Pin6 -Io=-100mA</td>
<td>-Vo</td>
<td>-5%</td>
<td>+15%</td>
<td></td>
</tr>
</tbody>
</table>

Linear Regulation
Input voltage change: ±1%

Load Regulation
10%-100% load

Ripple & Noise*
20MHz bandwidth

Temperature Coefficient
100% load

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

<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>Insulation Resistance</td>
<td>Input-output resistance at 500VDC</td>
<td>1000</td>
<td>--</td>
<td>--</td>
<td>Ω</td>
</tr>
<tr>
<td>Isolation Capacitance</td>
<td>Input-output capacitance at 100kHz/0.1V</td>
<td>--</td>
<td>3.5</td>
<td>--</td>
<td>pF</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Derating when operating temperature up to 85°C (see Fig. 2)</td>
<td>-40</td>
<td>--</td>
<td>105</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55</td>
<td>--</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin Soldering Resistance Resistance</td>
<td>Soldering spot is 1.5mm away from case for 10 seconds</td>
<td>--</td>
<td>--</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Case Temperature Rise</td>
<td>Ta=25°C</td>
<td>--</td>
<td>30</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Storage Humidity</td>
<td>Non-condensing</td>
<td>--</td>
<td>--</td>
<td>95</td>
<td>%RH</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>100% load, nominal input voltage</td>
<td>--</td>
<td>83</td>
<td>--</td>
<td>KHz</td>
</tr>
<tr>
<td>MTBF</td>
<td>MIL-HDBK-217F@25°C</td>
<td>3500</td>
<td>--</td>
<td>--</td>
<td>K hours</td>
</tr>
</tbody>
</table>

### Mechanical Specifications

- **Case Material**: Black plastic; flame-retardant and heat-resistant
- **Dimensions**: 19.50 x 9.80 x 12.50mm
- **Weight**: 4.2g (Typ.)
- **Cooling Method**: Free air convection

### Electromagnetic Compatibility (EMC)

- **Emissions**
  - CE: CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit)
  - RE: CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit)
- **Immunity**
  - ESD: IEC/EN61000-4-2 Contact ±6KV perf. Criteria B

### Typical Characteristic Curves

- **Output Regulation Curve**
  - Output Voltage Accuracy vs. Output Current Percent (Nominal Input Voltage)
  - +Vo output regulation curve

- **Output Regulation Curve**
  - Output Voltage Accuracy vs. Output Current Percent (Nominal Input Voltage)
  - -Vo output regulation curve
**Design Reference**

1. **Test configurations**

![Test configuration diagram](image1)

Note: C1, C2, C3: 100uF/35V (Low internal resistance capacitor)

2. **Typical application**

![Typical application diagram](image2)

3. **EMC compliance circuit**

![EMC compliance circuit diagram](image3)

4. Electrolytic capacitors with low ESR (equivalent series resistance) are recommended for external capacitors at the input or output of the product.

5. The products do not support parallel connection of their output and hot plug.

6. For additional information please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)
Notes:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200013;
2. The connection between the power supply module and SiC driver should be kept as short as possible;
3. The output filter capacitors should be as close as possible to the power supply module and SiC driver;
4. Low ESR electrolytic capacitors are recommended for output filtering (MOSFET SiC gate drives have high peak current);
5. The average driver output power must be lower than the one of the power supply module;
6. For using parts in high vibration environments, consider gluing techniques for securing the module;
7. The maximum capacitive load is measured under full load condition and over the entire input voltage range;
8. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75% 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 performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly 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.