Silicon Carbide (SiC) Schottky Diode – EliteSiC, 6 A, 650 V, D1, DPAK

FFSD0665A

Description
Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature independent switching characteristics, and excellent thermal performance sets Silicon Carbide as the next generation of power semiconductor. System benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size and cost.

Features
- Max Junction Temperature 175°C
- Avalanche Rated 36 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- This Device is Pb–Free, Halogen Free/BFR Free and RoHS Compliant

Applications
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

ORDERING INFORMATION
See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.
Table 1. ABSOLUTE MAXIMUM RATINGS \((T_C = 25^\circ C \text{ unless otherwise noted})\)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>FFSD0665A</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{RRM})</td>
<td>Peak Repetitive Reverse Voltage</td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>(E_{AS})</td>
<td>Single Pulse Avalanche Energy (Note 1)</td>
<td>36</td>
<td>mJ</td>
</tr>
<tr>
<td>(I_F)</td>
<td>Continuous Rectified Forward Current @ (T_C &lt; 159^\circ C)</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F,\text{Max}})</td>
<td>Non–Repetitive Peak Forward Surge Current (T_C = 25^\circ C), 10 (\mu)s</td>
<td>430</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F,\text{SM}})</td>
<td>Non–Repetitive Forward Surge Current Half–Sine Pulse, (t_p = 8.3) ms</td>
<td>42</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F,\text{RM}})</td>
<td>Repetitive Forward Surge Current Half–Sine Pulse, (t_p = 8.3) ms</td>
<td>24</td>
<td>A</td>
</tr>
<tr>
<td>(P_{\text{tot}})</td>
<td>Power Dissipation (T_C = 25^\circ C)</td>
<td>89</td>
<td>W</td>
</tr>
<tr>
<td>(T_J, T_{STG})</td>
<td>Operating and Storage Temperature Range</td>
<td>−55 to +175</td>
<td>°C</td>
</tr>
</tbody>
</table>

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. \(E_{AS}\) of 36 mJ is based on starting \(T_J = 25^\circ C\), \(L = 0.5\) mH, \(I_{AS} = 12\) A, \(V = 50\) V.

Table 2. THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R_{JUC})</td>
<td>Thermal Resistance, Junction–to–Case, Max.</td>
<td>1.7</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Table 3. OPERATING CHARACTERISTICS \((T_C = 25^\circ C, \text{ unless otherwise noted})\)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_F)</td>
<td>Forward Voltage (I_F = 6) A, (T_C = 25^\circ C)</td>
<td>–</td>
<td>1.50</td>
<td>1.75</td>
<td>V</td>
</tr>
<tr>
<td>(I_F)</td>
<td></td>
<td>(I_F = 6) A, (T_C = 125^\circ C)</td>
<td>–</td>
<td>1.6</td>
<td>2.0</td>
</tr>
<tr>
<td>(I_F)</td>
<td></td>
<td>(I_F = 6) A, (T_C = 175^\circ C)</td>
<td>–</td>
<td>1.72</td>
<td>2.4</td>
</tr>
<tr>
<td>(I_R)</td>
<td>Reverse Current (V_R = 650) V, (T_C = 25^\circ C)</td>
<td>–</td>
<td>–</td>
<td>200</td>
<td>(\mu)A</td>
</tr>
<tr>
<td>(V_R)</td>
<td></td>
<td>(V_R = 650) V, (T_C = 125^\circ C)</td>
<td>–</td>
<td>–</td>
<td>400</td>
</tr>
<tr>
<td>(V_R)</td>
<td></td>
<td>(V_R = 650) V, (T_C = 175^\circ C)</td>
<td>–</td>
<td>–</td>
<td>600</td>
</tr>
<tr>
<td>(Q_C)</td>
<td>Total Capacitive Charge (V = 400) V</td>
<td>–</td>
<td>22</td>
<td>–</td>
<td>nC</td>
</tr>
<tr>
<td>(C)</td>
<td>Total Capacitance (V_R = 1) V, (f = 100) kHz</td>
<td>–</td>
<td>361</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>(V_R)</td>
<td></td>
<td>(V_R = 200) V, (f = 100) kHz</td>
<td>–</td>
<td>41</td>
<td>–</td>
</tr>
<tr>
<td>(V_R)</td>
<td></td>
<td>(V_R = 400) V, (f = 100) kHz</td>
<td>–</td>
<td>32</td>
<td>–</td>
</tr>
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</table>

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

PART MARKING AND ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Top Mark</th>
<th>Package</th>
<th>Packing Method</th>
<th>Reel Size(^1)</th>
<th>Tape Width</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>FFSD0665A</td>
<td>FFSD0665A</td>
<td>DPAK</td>
<td>N/A</td>
<td>13”</td>
<td>N/A</td>
<td>2500 Units</td>
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</tbody>
</table>

\(^1\) For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D
TYPICAL CHARACTERISTICS
(TJ = 25°C UNLESS OTHERWISE NOTED)

Figure 1. Forward Characteristics

Figure 2. Reverse Characteristics

Figure 3. Current Derating

Figure 4. Power Derating

Figure 5. Capacitive Charge vs. Reverse Voltage

Figure 6. Capacitance vs. Reverse Voltage
TYPICAL CHARACTERISTICS (CONTINUED)

(TJ = 25°C UNLESS OTHERWISE NOTED)

Figure 7. Capacitance Stored Energy

Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

L = 0.5 mH
R < 0.1 Ω
VDD = 50 V
EAVL = 1/2LI2 [VR(AVL) / (VR(AVL) − VDD)]
Q1 = IGBT (BV_CES > DUT VR(AVL))
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

DPAK3 (TO-252 3 LD)
CASE 369AS
ISSUE A

DATE 28 SEP 2022

NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO-252,
ISSUE C, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS,
C) DIMENSIONING AND TOLERANCING PER
ASME Y14.5M-2009.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED
CORNERS OR EDGE PROTRUSION.
E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX.
F) DIMENSIONS ARE EXCLUSIVE OF BURRS,
MOLD FLASH AND TIE BAR EXTRUSIONS;
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD
TO220F91X230-3v.

**This information is generic. Please refer to
device data sheet for actual part marking.
Pb-Free indicator, "G" or microdot "G/C0071",
may or may not be present. Some products may
not follow the Generic Marking.

**FOR ADDITIONAL INFORMATION ON OUR
PB-FREE STRATEGY AND SOLDERING
DETAILS, PLEASE DOWNLOAD THE ON
SEMICONDUCTOR SOLDERING AND
MOUNTING TECHNIQUES REFERENCE
MANUAL, SOLDMFM.

<table>
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<tr>
<th>DOCUMENT NUMBER: 98A0113810G</th>
<th>PAGE 1 OF 1</th>
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