Silicon Carbide (SiC) Schottky Diode – EliteSiC, 8 A, 650 V, D1, DPAK

FFSD0865A

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 49 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

MARKING DIAGRAM
AYWWZZ
FFS
D0865A

A = Assembly Plant Code
YWW = Date Code (Year & Week)
ZZ = Lot Code
FFSD0865A = Specific Device Code

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>FFSD0865A</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>49</td>
<td>mJ</td>
</tr>
<tr>
<td>(I_F)</td>
<td>Continuous Rectified Forward Current @ (T_C &lt; 159^\circ C)</td>
<td>8</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F,Max})</td>
<td>Non–Repetitive Peak Forward Surge Current (T_C = 25^\circ C, 10\ \mu s)</td>
<td>750</td>
<td>A</td>
</tr>
<tr>
<td>(T_C = 150^\circ C, 10\ \mu s)</td>
<td>730</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>(I_{F,SM})</td>
<td>Non–Repetitive Forward Surge Current (\text{Half–Sine Pulse, } t_p = 8.3\ \text{ms})</td>
<td>49</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F,RM})</td>
<td>Repetitive Forward Surge Current (\text{Half–Sine Pulse, } t_p = 8.3\ \text{ms})</td>
<td>28</td>
<td>A</td>
</tr>
<tr>
<td>(P_{tot})</td>
<td>Power Dissipation (T_C = 25^\circ C)</td>
<td>125</td>
<td>W</td>
</tr>
<tr>
<td>(T_C = 150^\circ C)</td>
<td>21</td>
<td>W</td>
<td></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 49 mJ is based on starting \(T_J = 25^\circ C, L = 0.5\ \text{mH, } I_{AS} = 14\ \text{A, } V = 50\ \text{V.}\)

### 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>1.2</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>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_F)</td>
<td>Forward Voltage</td>
<td>(I_F = 8\ \text{A, } T_C = 25^\circ C)</td>
<td>–</td>
<td>1.50</td>
<td>1.75</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 8\ \text{A, } T_C = 125^\circ C)</td>
<td>–</td>
<td>1.6</td>
<td>2.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 8\ \text{A, } T_C = 175^\circ C)</td>
<td>–</td>
<td>1.72</td>
<td>2.4</td>
<td>V</td>
</tr>
<tr>
<td>(I_R)</td>
<td>Reverse Current</td>
<td>(V_R = 650\ \text{V, } T_C = 25^\circ C)</td>
<td>–</td>
<td>–</td>
<td>200</td>
<td>(\mu A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 650\ \text{V, } T_C = 125^\circ C)</td>
<td>–</td>
<td>–</td>
<td>400</td>
<td>(\mu A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 650\ \text{V, } T_C = 175^\circ C)</td>
<td>–</td>
<td>–</td>
<td>600</td>
<td>(\mu A)</td>
</tr>
<tr>
<td>(Q_C)</td>
<td>Total Capacitive Charge</td>
<td>(V = 400\ \text{V})</td>
<td>–</td>
<td>27</td>
<td>–</td>
<td>nC</td>
</tr>
<tr>
<td>(C)</td>
<td>Total Capacitance</td>
<td>(V_R = 1\ \text{V, } f = 100\ \text{kHz})</td>
<td>–</td>
<td>463</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 200\ \text{V, } f = 100\ \text{kHz})</td>
<td>–</td>
<td>48</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 400\ \text{V, } f = 100\ \text{kHz})</td>
<td>–</td>
<td>38</td>
<td>–</td>
<td>pF</td>
</tr>
</tbody>
</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†</th>
<th>Tape Width</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFSD0865A</td>
<td>FFSD0865A</td>
<td>DPAK</td>
<td>N/A</td>
<td>13”</td>
<td>N/A</td>
<td>2500 units</td>
</tr>
</tbody>
</table>

†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)] /
VDD
Q1 = IGBT (BVCES > DUT VR(AVL))

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform
**MECHANICAL CASE OUTLINE**

**PACKAGE DIMENSIONS**

**DPAK3 6.10x6.54x2.29, 4.57P**

CASE 369AS

ISSUE B

DATE 20 DEC 2023

**NOTES:** UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.

D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OF EDGE PROTRUSION.

E) FOR IODE PRODUCTS, L4 IS 0.25MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.

F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD T028P991X239-3N.

**GENERIC MARKING DIAGRAM**

**LAND PATTERN RECOMMENDATION**

-MODIFIED ADDITIONAL INFORMATION IN OUR Pb-FREE STRATEGY AND SOLIDING DETAILS. PLEASE IDIICALIZE THE ON SEMICONDUCTOR SOLIDING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLIDRM/B.

**DOCUMENT NUMBER:** 98A013810G

**DESCRIPTION:** DPAK3 6.10x6.54x2.29, 4.57P

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**Pb-Free indicator, "G" or microdot "/", may or may not be present. Some products may not follow the Generic Marking.**

**XXXX = Specific Device Code**

**A = Assembly Location**

**Y = Year**

**WW = Work Week**

**ZZ = Assembly Lot Code**

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