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FFSH5065A

Silicon Carbide Schottky Diode

650 V, 50 A

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 & cost.

Features

- Max Junction Temperature 175°C
- Avalanche Rated 240 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery/No Forward Recovery
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

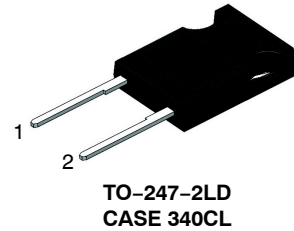
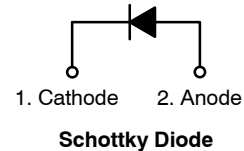
Applications

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

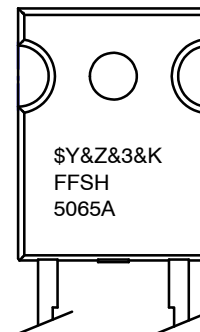


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MARKING DIAGRAM



\$Y = ON Semiconductor Logo
&Z = Assembly Plant Code
&3 = Numeric Date Code
&K = Lot Code
FFSH5065A = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FFSH5065A

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

| Symbol | Parameter | Value | Unit | |
|-----------------------------------|---|--|------|---|
| V _{RRM} | Peak Repetitive Reverse Voltage | 650 | V | |
| E _{AS} | Single Pulse Avalanche Energy (Note 1) | 240 | mJ | |
| I _F | Continuous Rectified Forward Current @ T _C < 144°C | 50 | A | |
| | Continuous Rectified Forward Current @ T _C < 135°C | 60 | | |
| I _{F, Max} | Non-Repetitive Peak Forward Surge Current | T _C = 25°C, 10 μs | 1400 | A |
| | | T _C = 150°C, 10 μs | 1300 | A |
| I _{F, SM} | Non-Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 230 | A |
| I _{F, RM} | Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 120 | A |
| P _{tot} | Power Dissipation | T _C = 25°C | 429 | W |
| | | T _C = 150°C | 72 | W |
| T _J , T _{STG} | Operating and Storage Temperature Range | -55 to +175 | °C | |
| | TO-247 Mounting Torque, M3 Screw | 60 | Ncm | |

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 240 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 31 A, V = 50 V.

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|------------------|---|-------|------|
| R _{θJC} | Thermal Resistance, Junction to Case, Max | 0.35 | °C/W |

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|----------------|-------------------------|--|-----|------|------|------|
| V _F | Forward Voltage | I _F = 50 A, T _C = 25°C | - | 1.51 | 1.75 | V |
| | | I _F = 50 A, T _C = 125°C | - | 1.67 | 2.0 | |
| | | I _F = 50 A, T _C = 175°C | - | 1.82 | 2.4 | |
| I _R | Reverse Current | V _R = 650 V, T _C = 25°C | - | - | 200 | μA |
| | | V _R = 650 V, T _C = 125°C | - | - | 400 | |
| | | V _R = 650 V, T _C = 175°C | - | - | 600 | |
| Q _C | Total Capacitive Charge | V = 400 V | - | 147 | - | nC |
| C | Total Capacitance | V _R = 1 V, f = 100 kHz | - | 2530 | - | pF |
| | | V _R = 200 V, f = 100 kHz | - | 271 | - | |
| | | V _R = 400 V, f = 100 kHz | - | 211 | - | |

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.

2. Pulse: Test Pulse width = 300 μs, Duty Cycle = 2%.

ORDERING INFORMATION

| Part Number | Top Marking | Package | Packing Method | Quantity |
|-------------|-------------|--|----------------|----------|
| FFSH5065A | FFSH5065A | TO-247-2LD (Pb-Free / Halogen Free) | Tube | 30 Units |

FFSH5065A

TYPICAL CHARACTERISTICS

($T_J = 25^\circ\text{C}$ unless otherwise noted)

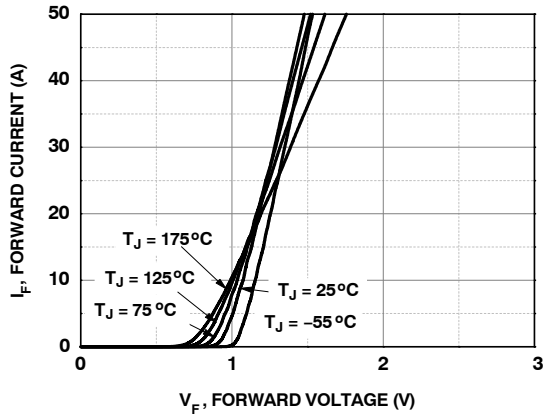


Figure 1. Forward Characteristics

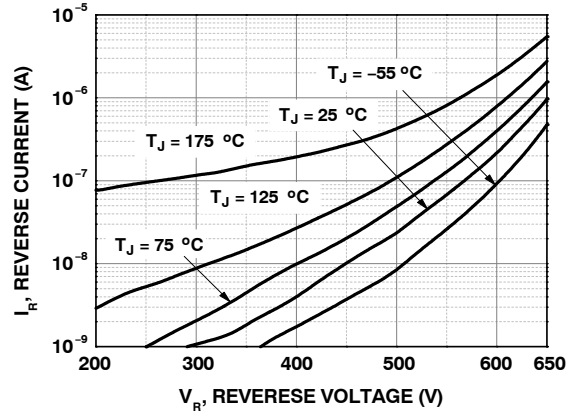


Figure 2. Reverse Characteristics

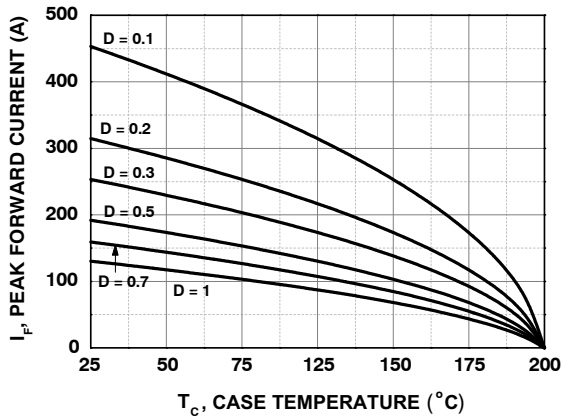


Figure 3. Current Derating

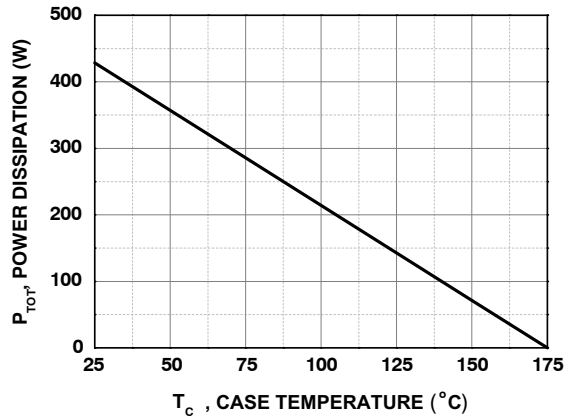


Figure 4. Power Derating

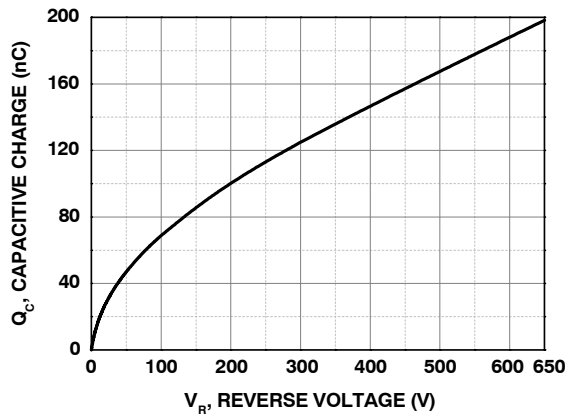


Figure 5. Capacitive Charge vs. Reverse Voltage

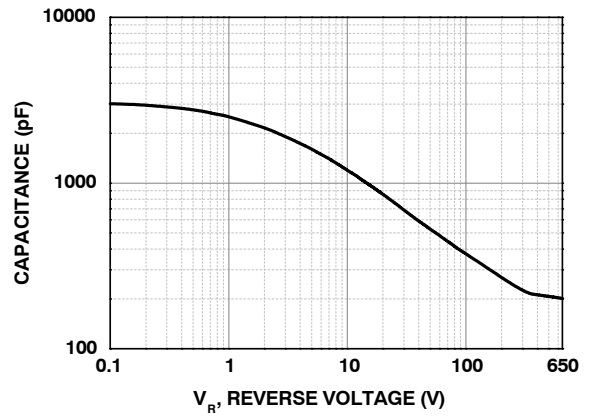


Figure 6. Capacitance vs. Reverse Voltage

FFSH5065A

TYPICAL CHARACTERISTICS

($T_J = 25^\circ\text{C}$ unless otherwise noted)

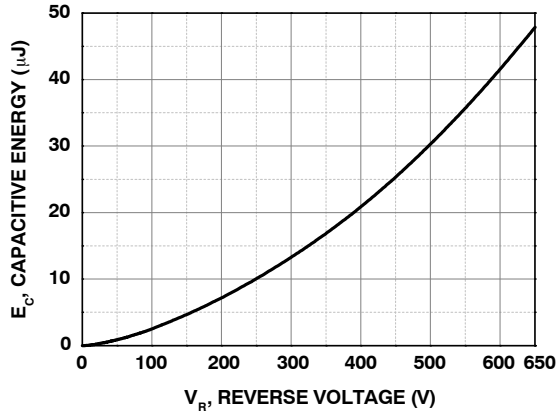


Figure 7. Capacitance Stored Energy

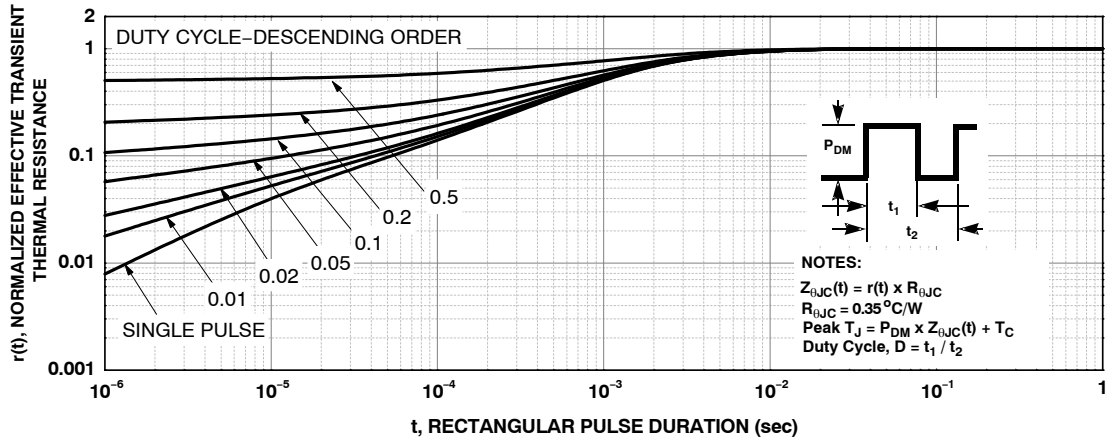


Figure 8. Junction-to-Case Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

$L = 0.5 \text{ mH}$
 $R < 0.1 \ \Omega$
 $V_{DD} = 50 \text{ V}$
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)} / (V_{R(AVL)} - V_{DD})]$
 $Q1 = \text{IGBT (} BV_{CES} > \text{DUT } V_{R(AVL)} \text{)}$

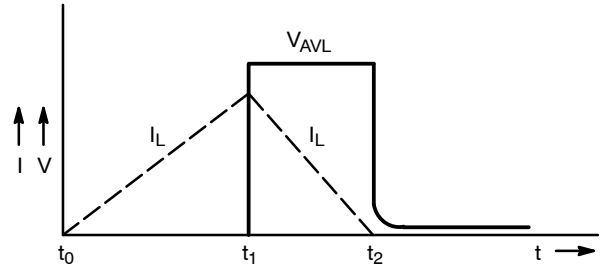
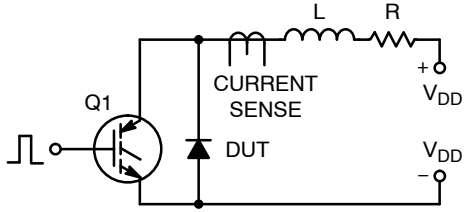
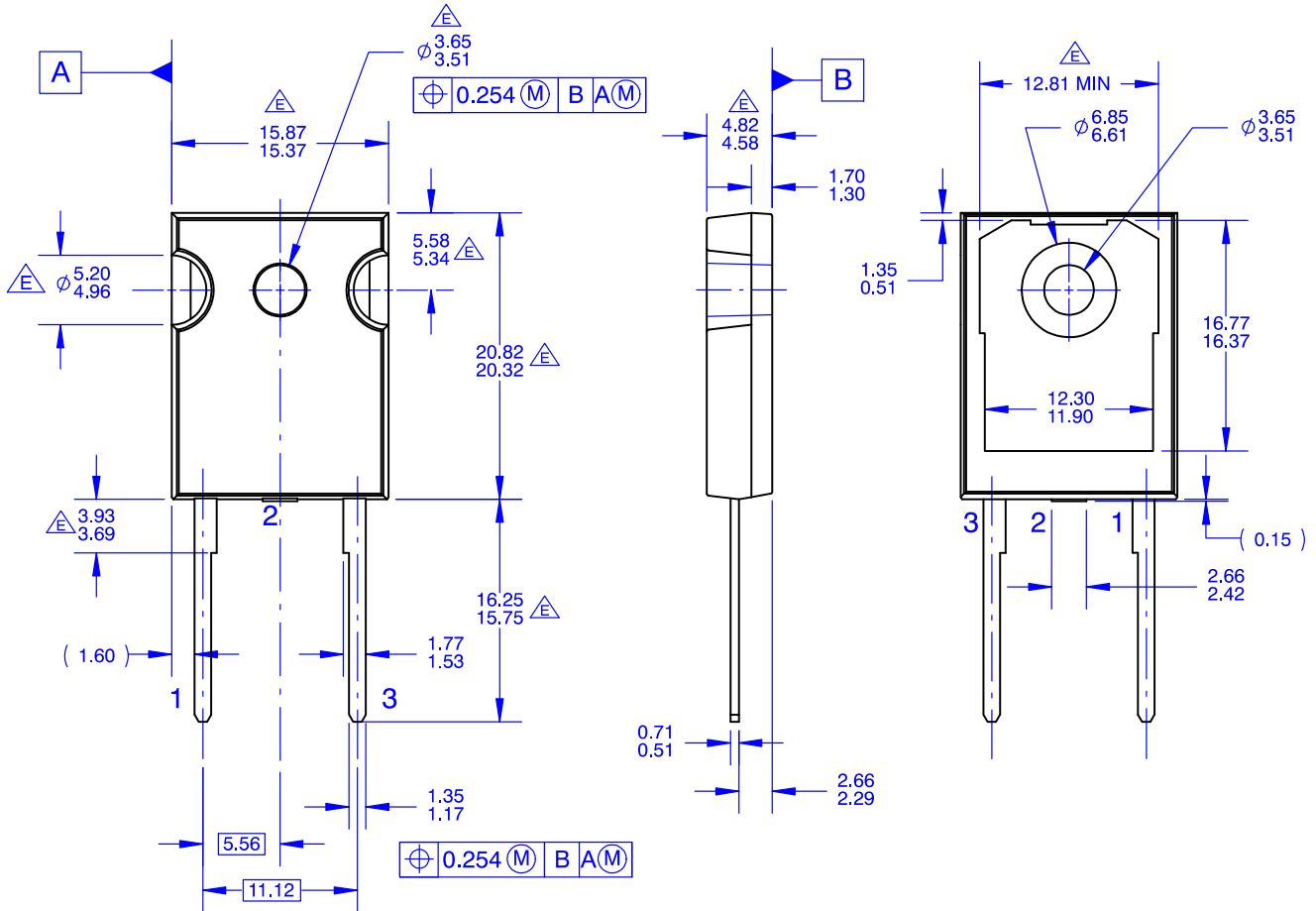


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO-247-2LD
CASE 340CL
ISSUE O

DATE 31 OCT 2016




NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 – 2009.

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