

Silicon Carbide Schottky Diode

650 V, 16 A

FFSH1665A

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 81 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery
- This Device is Pb-Free and is RoHS Compliant

Applications

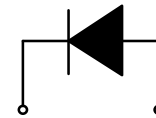
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits



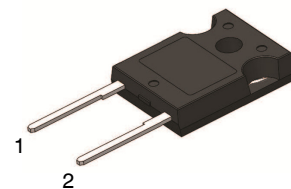
ON Semiconductor®

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| V_{RRM} | I_F |
|-----------|-------|
| 650 V | 16 A |

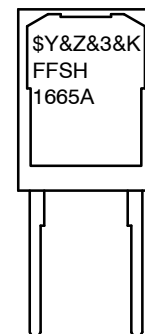


1. Cathode 2. Anode



TO-247-2LD
CASE 340CL

MARKING DIAGRAM



| | |
|-----------|-------------------------|
| \$Y | = ON Semiconductor Logo |
| &Z | = Assembly Plant Code |
| &3 | = Numeric Date Code |
| &K | = Lot Code |
| FFSH1665A | = Specific Device Code |

ORDERING INFORMATION

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

FFSH1665A

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless otherwise specified)

| Symbol | Parameter | FFSH1665A | Unit |
|-----------------------------------|---|--|------|
| V _{RRM} | Peak Repetitive Reverse Voltage | 650 | V |
| E _{AS} | Single Pulse Avalanche Energy (Note 1) | 81 | mJ |
| I _F | Continuous Rectified Forward Current | @ T _C < 152°C | 16 |
| | | @ T _C < 135°C | 23 |
| I _{F, Max} | Non-Repetitive Peak Forward Surge Current | T _C = 25°C, 10 μs | 1000 |
| | | T _C = 150°C, 10 μs | 900 |
| I _{F, SM} | Non-Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 90 |
| I _{F, RM} | Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 50 |
| P _{tot} | Power Dissipation | T _C = 25°C | 161 |
| | | T _C = 150°C | 27 |
| T _J , T _{STG} | Operating and Storage Temperature Range | -55 to +150 | °C |

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 81 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 18 A, V = 50 V.

THERMAL CHARACTERISTICS

| Symbol | Parameter | Rating | Unit |
|------------------|--|--------|------|
| R _{θJC} | Thermal Resistance, Junction to Case, Max. | 0.93 | °C/W |

PACKAGE MARKING AND ORDERING INFORMATION

| Part Number | Top Marking | Package | Packing Method | Reel Size | Tape Width | Quantity |
|-------------|-------------|----------|----------------|-----------|------------|----------|
| FFSH1665A | FFSH1665A | TO247-2L | Tube | N/A | N/A | 30 Units |

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|----------------|-------------------------|--|-----|------|------|------|
| V _F | Forward Voltage | I _F = 16 A, T _C = 25°C | - | 1.50 | 1.75 | V |
| | | I _F = 16 A, T _C = 125°C | - | 1.6 | 2.0 | |
| | | I _F = 16 A, T _C = 175°C | - | 1.72 | 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 | - | 52 | - | nC |
| C | Total Capacitance | V _R = 1 V, f = 100 kHz | - | 887 | - | pF |
| | | V _R = 200 V, f = 100 kHz | - | 95 | - | |
| | | V _R = 400 V, f = 100 kHz | - | 72 | - | |

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.

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TYPICAL CHARACTERISTICS

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

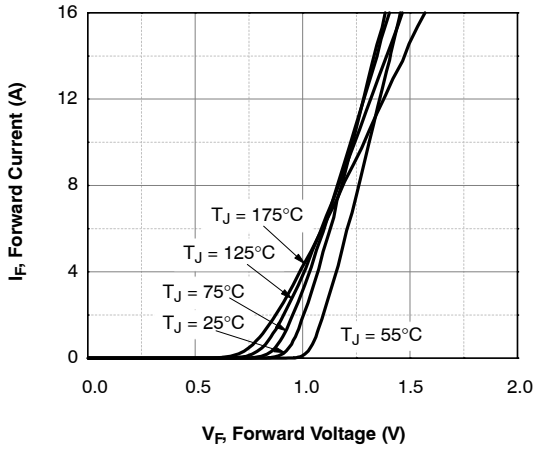


Figure 1. Forward Characteristics

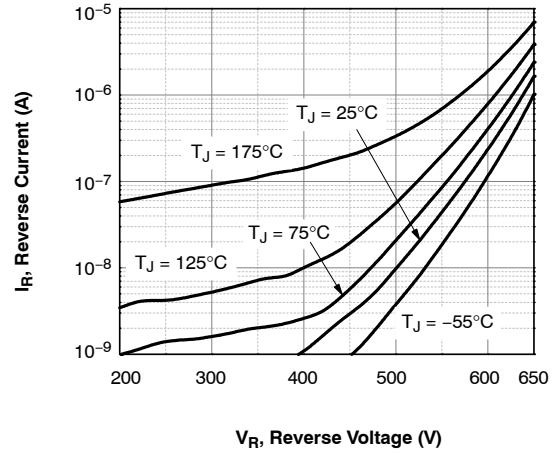


Figure 2. Reverse Characteristics

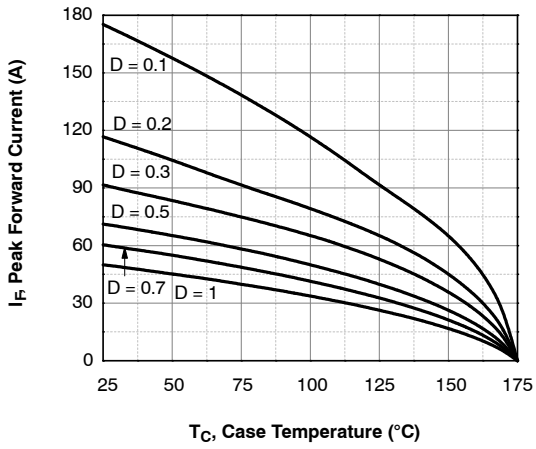


Figure 3. Current Derating

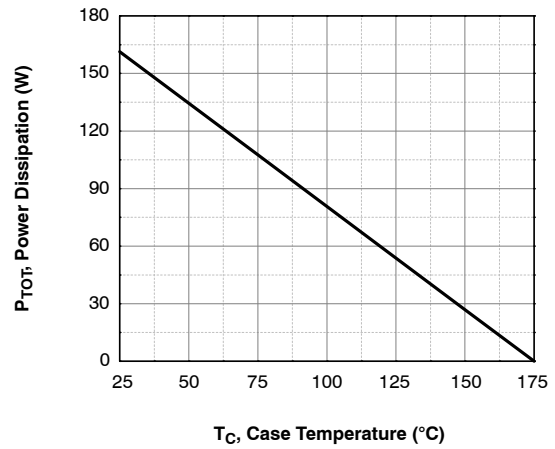


Figure 4. Power Derating

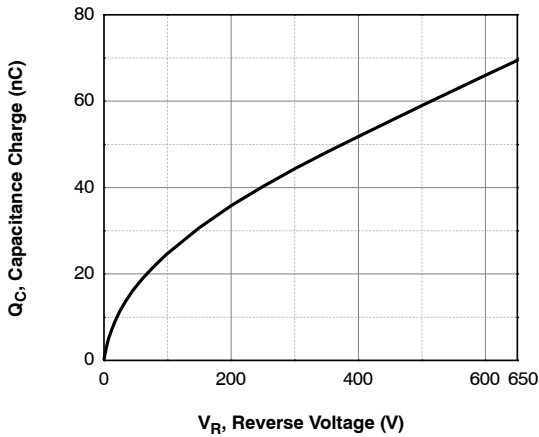


Figure 5. Capacitive Charge vs. Reverse Voltage

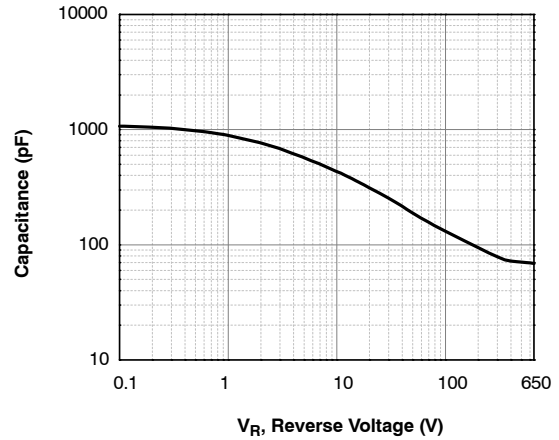


Figure 6. Capacitance vs. Reverse Voltage

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TYPICAL CHARACTERISTICS (Continued)

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

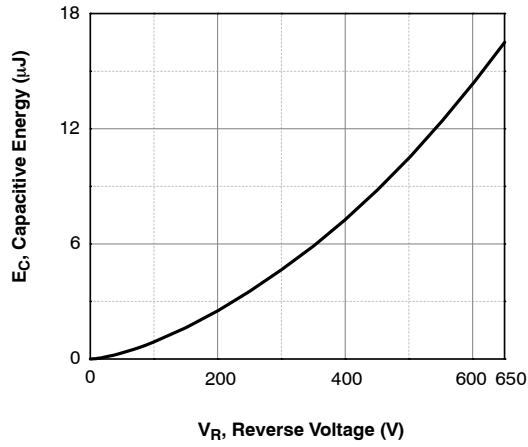


Figure 7. Capacitance Stored Energy

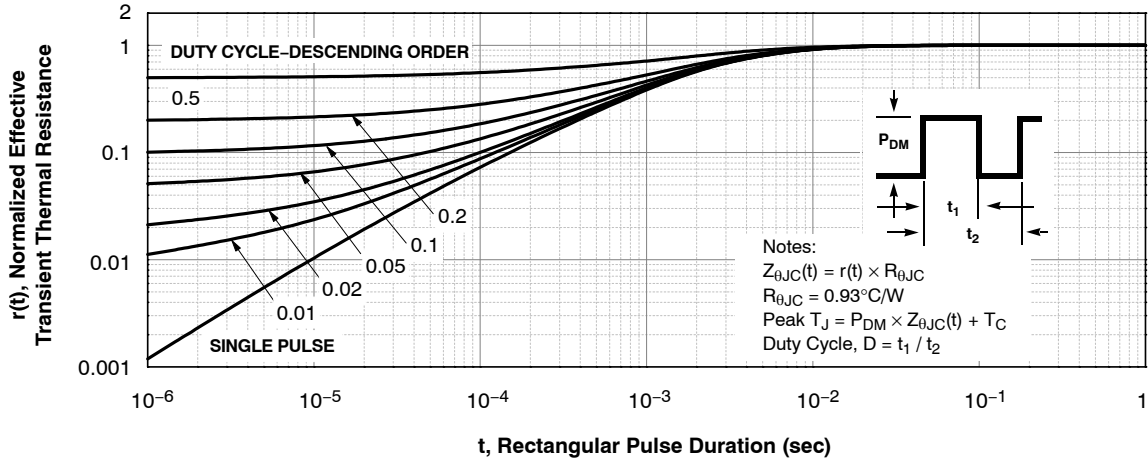


Figure 8. Junction-to-Case Transient Thermal Response Curve

FFSH1665A

TEST CIRCUIT AND WAVEFORMS

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

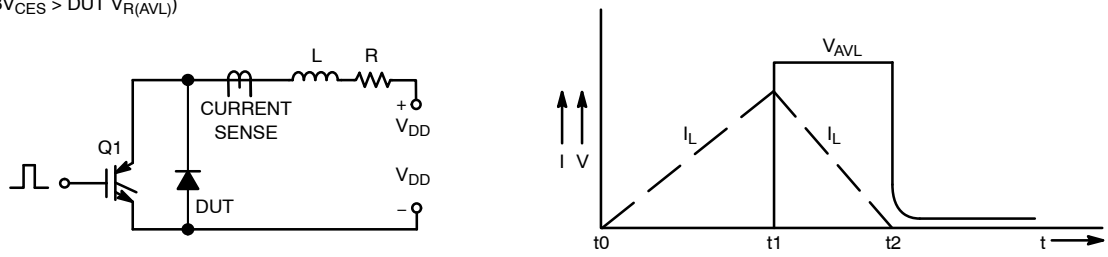


Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



TO-247-2LD
CASE 340CL
ISSUE A

DATE 03 DEC 2019



⊕ 0.25 (M) B A (M)

NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

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

| DIM | MILLIMETERS | | |
|-----|-------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.58 | 4.70 | 4.82 |
| A1 | 2.29 | 2.40 | 2.66 |
| A2 | 1.30 | 1.50 | 1.70 |
| b | 1.17 | 1.26 | 1.35 |
| b2 | 1.53 | 1.65 | 1.77 |
| c | 0.51 | 0.61 | 0.71 |
| D | 20.32 | 20.57 | 20.82 |
| D1 | 16.37 | 16.57 | 16.77 |
| D2 | 0.51 | 0.93 | 1.35 |
| E | 15.37 | 15.62 | 15.87 |
| E1 | 12.81 | ~ | ~ |
| E2 | 4.96 | 5.08 | 5.20 |
| e | ~ | 11.12 | ~ |
| L | 15.75 | 16.00 | 16.25 |
| L1 | 3.69 | 3.81 | 3.93 |
| ∅P | 3.51 | 3.58 | 3.65 |
| ∅P1 | 6.61 | 6.73 | 6.85 |
| Q | 5.34 | 5.46 | 5.58 |
| S | 5.34 | 5.46 | 5.58 |

| | | |
|-------------------------|--------------------|--|
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