



# FFSH4065ADN-F155

## Silicon Carbide Schottky Diode

### 650 V, 40 A

#### Features

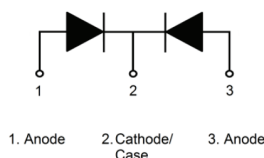
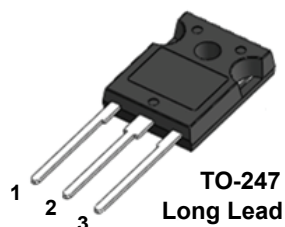
- Max Junction Temperature 175 °C
- Avalanche Rated 95 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

#### Applications

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

#### 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.



#### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

| Symbol         | Parameter                                                        | FFSH4065ADN-F155                          | Unit             |
|----------------|------------------------------------------------------------------|-------------------------------------------|------------------|
| $V_{RRM}$      | Peak Repetitive Reverse Voltage                                  | 650                                       | V                |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 1)                           | 95                                        | mJ               |
| $I_F$          | Continuous Rectified Forward Current @ $T_C < 140^\circ\text{C}$ | 20*40**                                   | A                |
|                | Continuous Rectified Forward Current @ $T_C < 135^\circ\text{C}$ | 22*/44*                                   |                  |
| $I_{F, Max}$   | Non-Repetitive Peak Forward Surge Current                        | $T_C = 25^\circ\text{C}, 10 \mu\text{s}$  | A                |
|                |                                                                  | $T_C = 150^\circ\text{C}, 10 \mu\text{s}$ | A                |
| $I_{F, SM}$    | Non-Repetitive Forward Surge Current                             | Half-Sine Pulse, $t_p = 8.3 \text{ ms}$   | A                |
| $I_{F, RM}$    | Repetitive Forward Surge Current                                 | Half-Sine Pulse, $t_p = 8.3 \text{ ms}$   | A                |
| $P_{tot}$      | Power Dissipation                                                | $T_C = 25^\circ\text{C}$                  | 150              |
|                |                                                                  | $T_C = 150^\circ\text{C}$                 | 25               |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                          | -55 to +175                               | $^\circ\text{C}$ |
|                | TO247 Mounting Torque, M3 Screw                                  | 60                                        | Ncm              |

#### Thermal Characteristics

| Symbol          | Parameter                                           | Rating     | Unit               |
|-----------------|-----------------------------------------------------|------------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. (Note 1) | 1.0*/0.5** | $^\circ\text{C/W}$ |

\* Per leg, \*\* Per Device

## Package Marking and Ordering Information

| Part Number      | Top Mark    | Package          | Packing Method | Reel Size | Tape Width | Quantity |
|------------------|-------------|------------------|----------------|-----------|------------|----------|
| FFSH4065ADN-F155 | FFSH4065ADN | TO-247 Long Lead | Tube           | N/A       | N/A        | 30 units |

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter               | Test Conditions                               | Min. | Typ. | Max. | Unit          |
|--------|-------------------------|-----------------------------------------------|------|------|------|---------------|
| $V_F$  | Forward Voltage         | $I_F = 20\text{ A}, T_C = 25^\circ\text{C}$   | -    | 1.5  | 1.75 | V             |
|        |                         | $I_F = 20\text{ A}, T_C = 125^\circ\text{C}$  | -    | 1.6  | 2.0  |               |
|        |                         | $I_F = 20\text{ A}, T_C = 175^\circ\text{C}$  | -    | 1.72 | 2.4  |               |
| $I_R$  | Reverse Current         | $V_R = 650\text{ V}, T_C = 25^\circ\text{C}$  | -    | -    | 200  | $\mu\text{A}$ |
|        |                         | $V_R = 650\text{ V}, T_C = 125^\circ\text{C}$ | -    | -    | 400  |               |
|        |                         | $V_R = 650\text{ V}, T_C = 175^\circ\text{C}$ | -    | -    | 600  |               |
| $Q_C$  | Total Capacitive Charge | $V = 400\text{ V}$                            | -    | 64   | -    | nC            |
| C      | Total Capacitance       | $V_R = 1\text{ V}, f = 100\text{ kHz}$        | -    | 1085 | -    | pF            |
|        |                         | $V_R = 200\text{ V}, f = 100\text{ kHz}$      | -    | 117  | -    |               |
|        |                         | $V_R = 400\text{ V}, f = 100\text{ kHz}$      | -    | 88   | -    |               |

### Notes:

1.  $E_{AS}$  of 95 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.5\text{ mH}$ ,  $I_{AS} = 19.5\text{ A}$ ,  $V = 50\text{ V}$ .

## Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Figure 1. Forward Characteristics

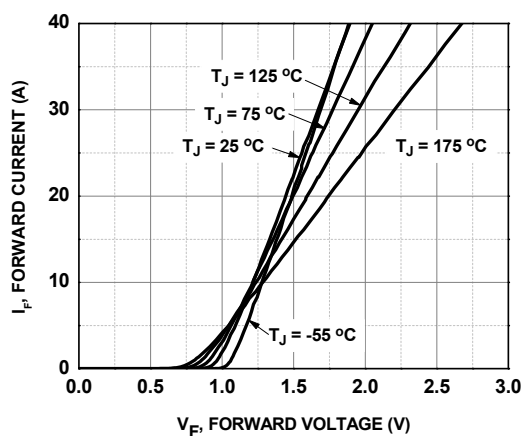


Figure 2. Reverse Characteristics

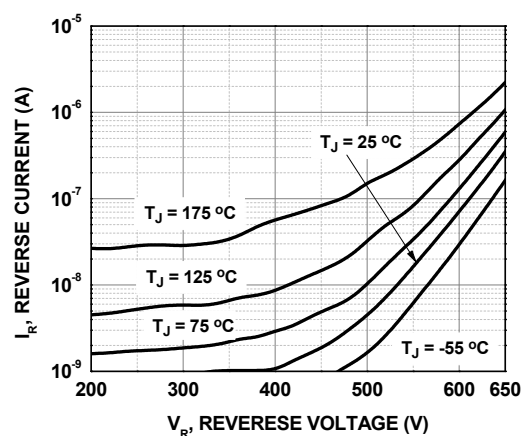


Figure 3. Current Derating

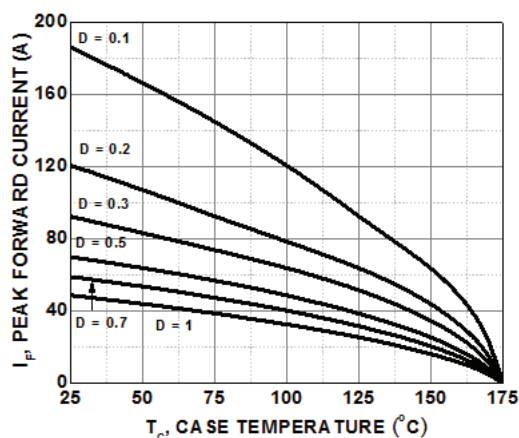
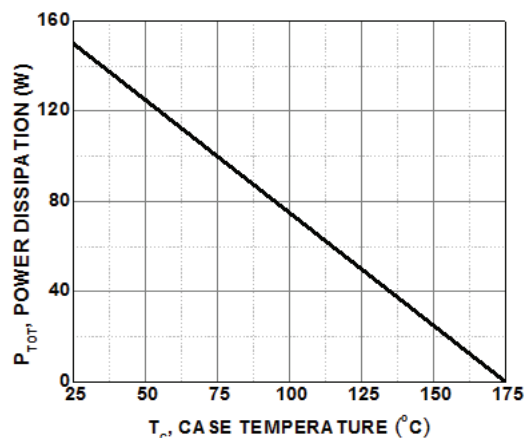


Figure 4. Power Derating



# Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Figure 5. Capacitive Charge vs. Reverse Voltage

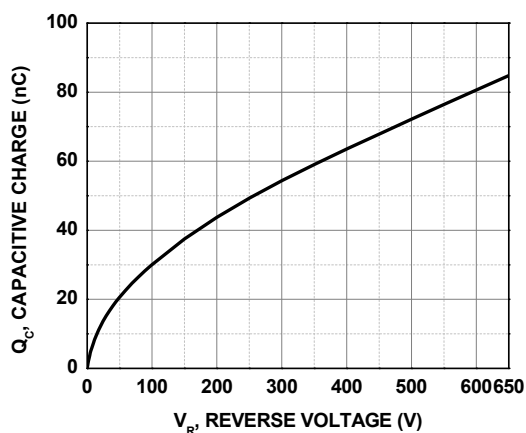


Figure 6. Capacitance vs. Reverse Voltage

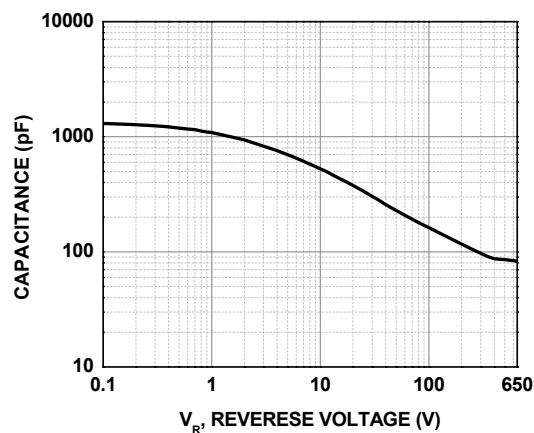


Figure 7. Capacitance Stored Energy

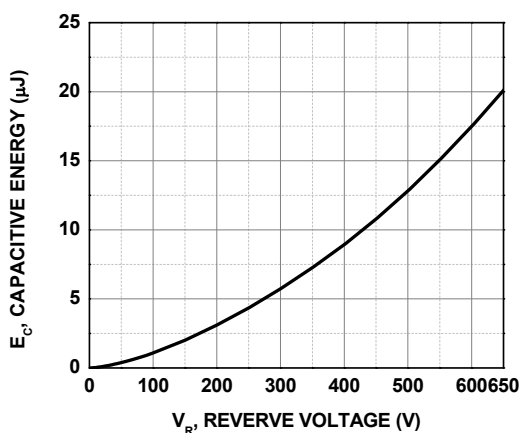
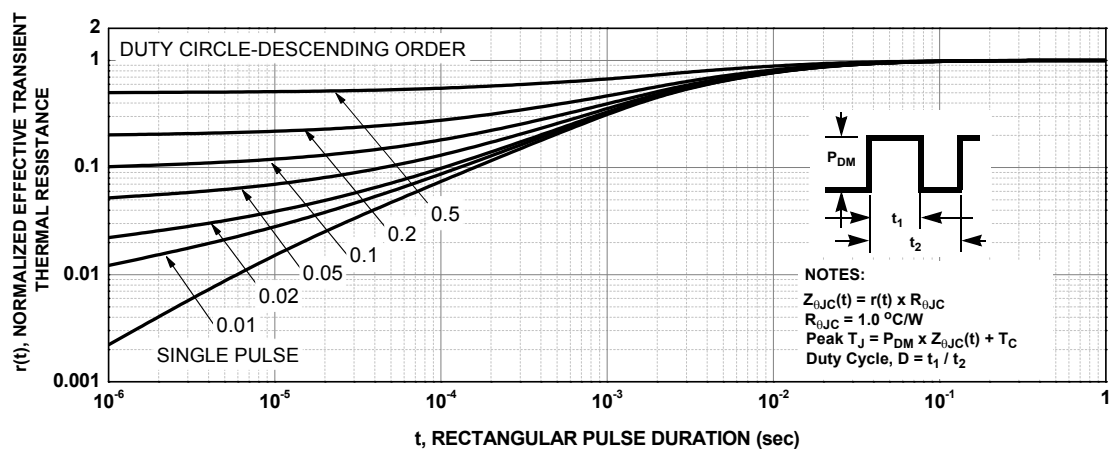


Figure 8. Junction-to-Case Transient Thermal Response Curve



## Test Circuit and Waveforms

Figure 9. Unclamped Inductive Switching Test Circuit & Waveform

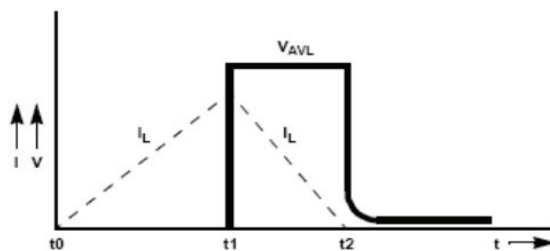
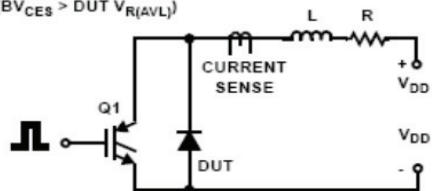
$L = 0.5\text{mH}$

$R < 0.1\Omega$

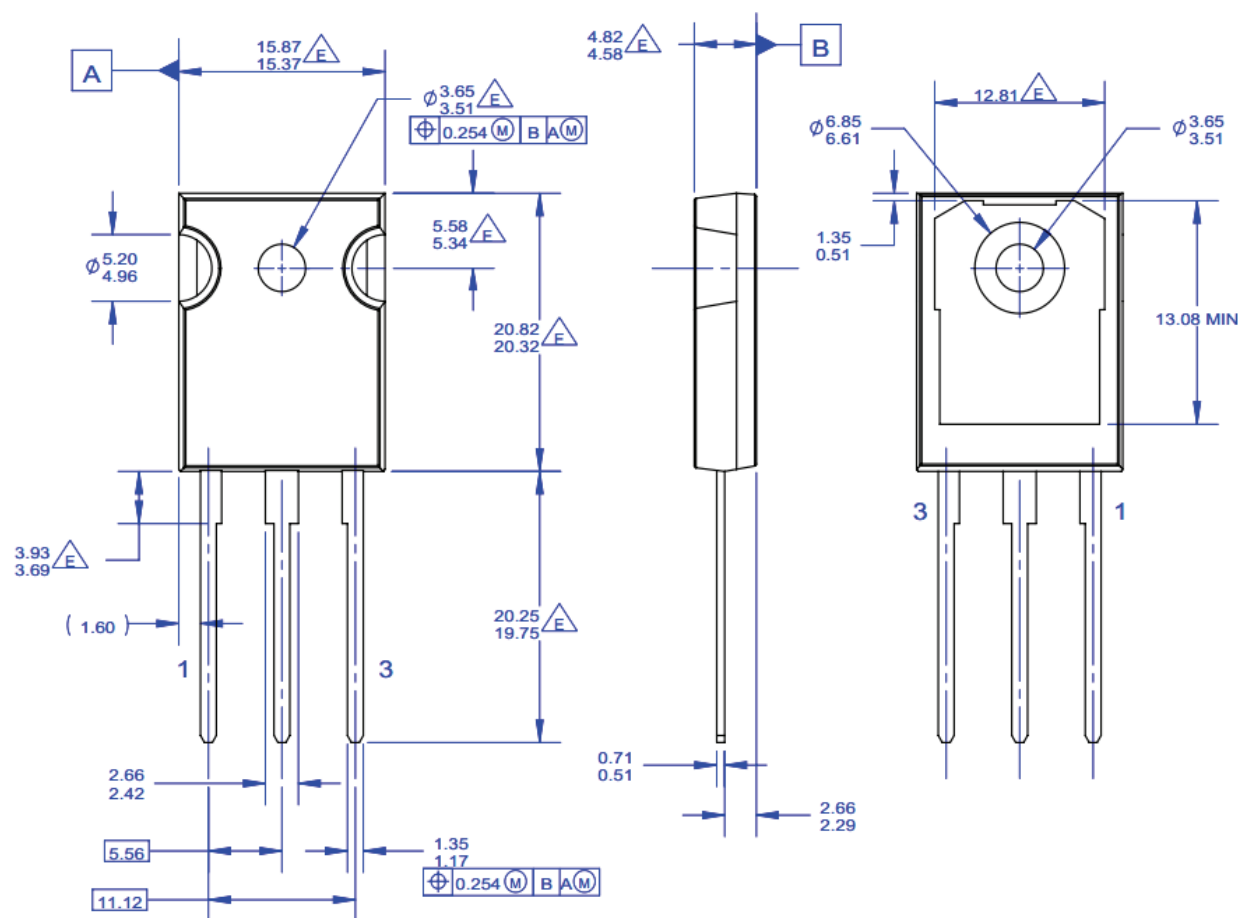
$V_{DD} = 50\text{V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$

$Q1 = \text{IGBT (}BV_{CES} > DUT V_{R(AVL)}\text{)}$



## Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
- 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 - 1994

E. DOES NOT COMPLY JEDEC STANDARD VALUE  
F. DRAWING FILENAME: MKT-TO247G03\_REV01

**Figure 10. TO-247, Molded, 3 Lead, Jedec AB Long Leads**

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