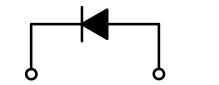
# Silicon Carbide Schottky Diode

## 650 V, 4 A

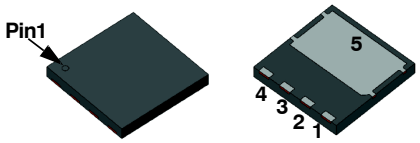
# FFSM0465A

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**Schottky Diode**




**PQFN 8×8, 2P**
**CASE 483AP**

### 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 23 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




| | |
|---|---|
| $Y | = ON Semiconductor Logo |
| &Z | = Assembly Plant Code |
| &3 | = Numeric Date Code |
| &K | = Lot Code |
| FFSM0465A | = Specific Device Code |

### ORDERING INFORMATION

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

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## 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) | | 23 | mJ |
| $I_F$ | Continuous Rectified Forward Current @ $T_C$ < 152°C | | 4 | A |
| | Continuous Rectified Forward Current @ $T_C$ < 135°C | | 5.7 | |
| $I_{F, Max}$ | Non-Repetitive Peak Forward Surge Current | $T_C$ = 25°C, 10 μs | 320 | A |
| | | $T_C$ = 150°C, 10 μs | 310 | A |
| $I_{F,SM}$ | Non-Repetitive Forward Surge Current | Half-Sine Pulse, $t_p$ = 8.3 ms | 21 | A |
| $I_{F,RM}$ | Repetitive Forward Surge Current | Half-Sine Pulse, $t_p$ = 8.3 ms | 15 | A |
| Ptot | Power Dissipation | $T_C$ = 25°C | 43 | W |
| | | $T_C$ = 150°C | 7.2 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | −55 to +175 | °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 23 mJ is based on starting $T_J$ = 25°C, L = 1 mH, $I_{AS}$ = 6.8 A, V = 50 V.

## THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max | 3.5 | °C/W |

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | $I_F$ = 4 A, $T_C$ = 25°C | – | 1.50 | 1.75 | V |
| | | $I_F$ = 4 A, $T_C$ = 125°C | – | 1.6 | 2.0 | |
| | | $I_F$ = 4 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 | – | 15 | – | nC |
| C | Total Capacitance | $V_R$ = 1 V, f = 100 kHz | – | 247 | – | pF |
| | | $V_R$ = 200 V, f = 100 kHz | – | 29 | – | |
| | | $V_R$ = 400 V, f = 100 kHz | – | 22 | – | |

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.

## PACKAGE MARKING AND ORDERING INFORMATION

| Part Number | Top Marking | Package | Shipping† |
|---|---|---|---|
| FFSM0465A | FFSM0465A | PQFN 8x8, 2P<br>(Pb−Free/Halogen Free) | 3000Units / Tape & Reel |

†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 ($T_J$ = 25°C unless otherwise noted)

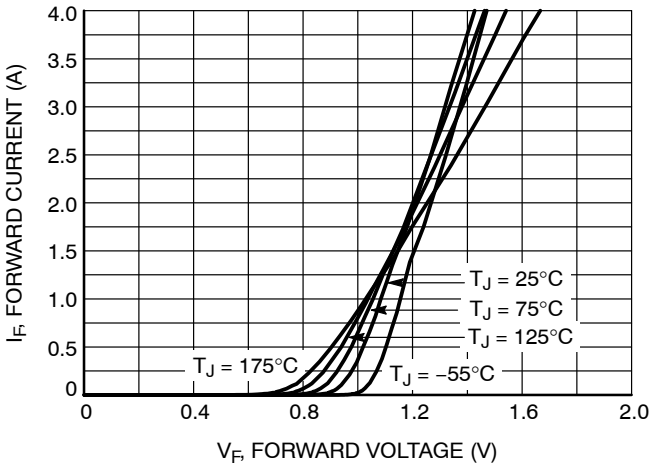



**Figure 1. Forward Characteristics**

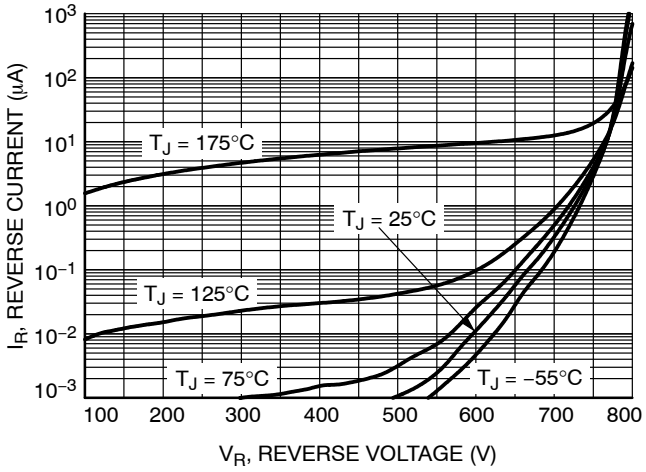



**Figure 2. Reverse Characteristics**

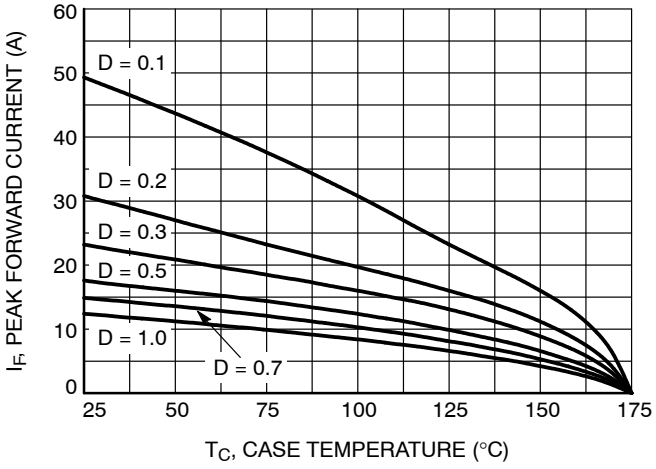



**Figure 3. Current Derating**

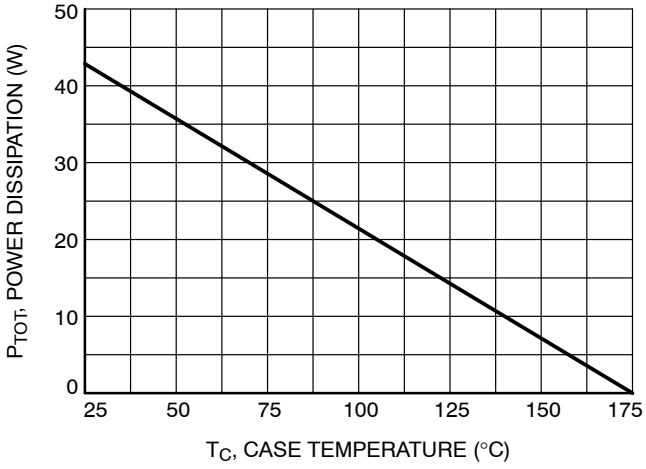



**Figure 4. Power Derating**

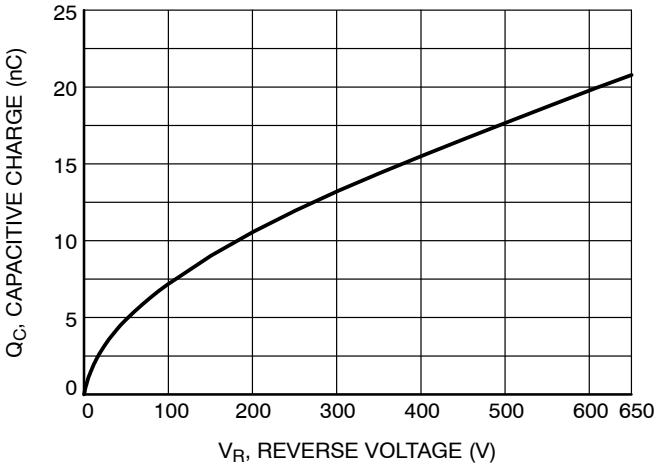



**Figure 5. Capacitive Charge vs. Reverse Voltage**

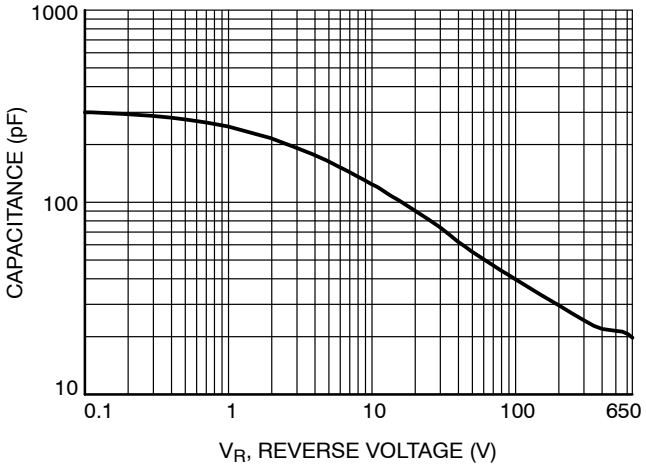



**Figure 6. Capacitance vs. Reverse Voltage**

## TYPICAL CHARACTERISTICS ($T_J$ = 25°C unless otherwise noted)

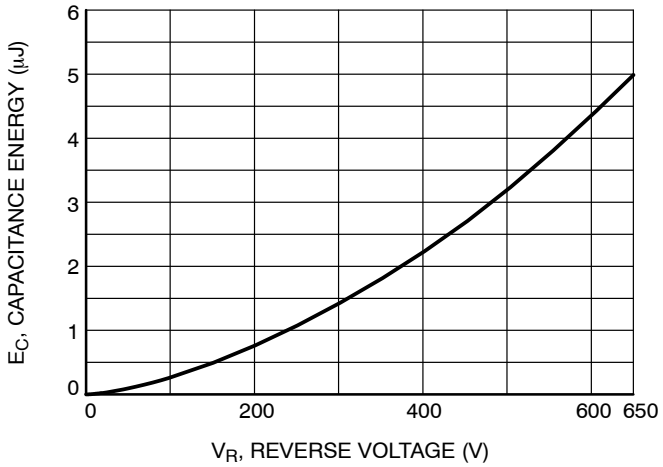



**Figure 7. Capacitance Stored Energy**

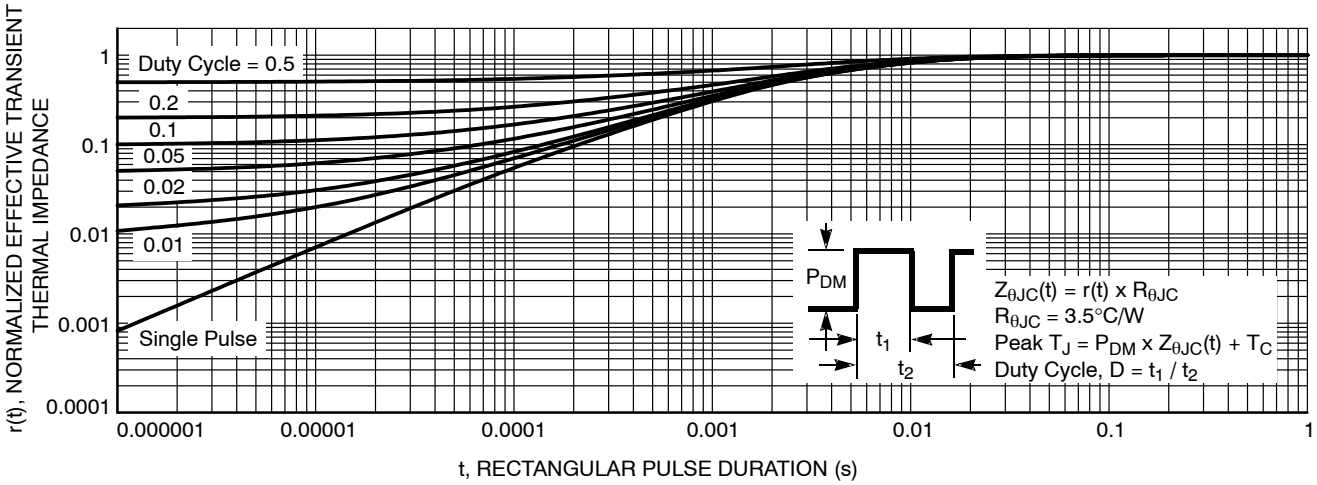



**Figure 8. Junction−to−Case Transient Thermal Response Curve**

## TEST CIRCUIT AND WAVEFORMS

L = 1 mH
R < 0.1 Ω
$V_{DD}$ = 50 V
EAVL = 1/2LI2 [$V_{R(AVL)}$ / ($V_{R(AVL)}$ − $V_{DD}$)]
Q1 = IGBT ($BV_{CES}$ > DUT $V_{R(AVL)}$)

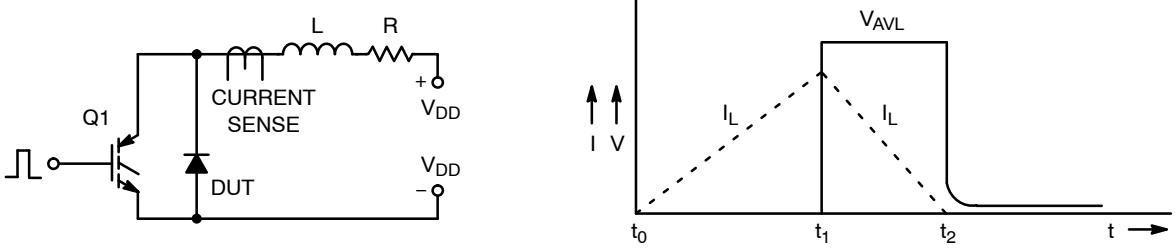
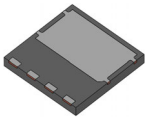



**Figure 9. Unclamped Inductive Switching Test Circuit & Waveform**

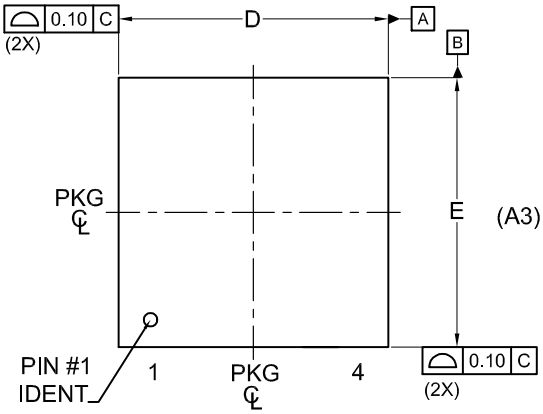
# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

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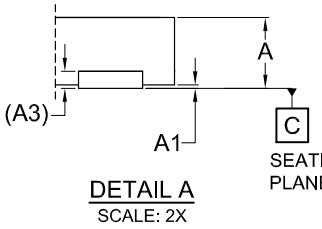


**PQFN4 8X8, 2P**
CASE 483AP
ISSUE A

DATE 06 JUL 2021



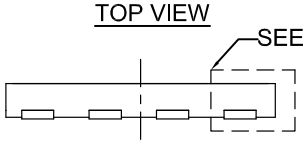

TOP VIEW



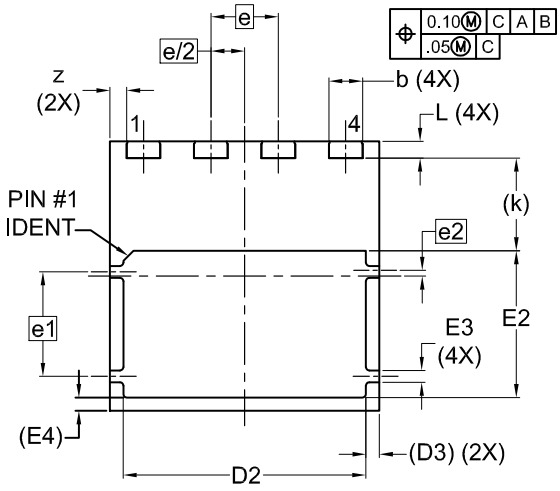

DETAIL A
SCALE: 2X

NOTES:

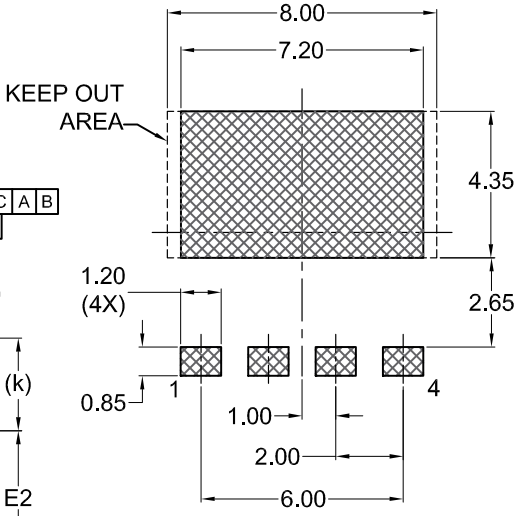
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.




FRONT VIEW




BOTTOM VIEW




LAND PATTERN
RECOMMENDATION

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

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | - | 0.05 |
| A3 | | 0.20 REF | |
| b | 0.90 | 1.00 | 1.10 |
| D | 7.90 | 8.00 | 8.10 |
| D2 | 7.10 | 7.20 | 7.30 |
| D3 | | 0.40 REF | |
| E | 7.90 | 8.00 | 8.10 |
| E2 | 4.25 | 4.35 | 4.45 |
| E3 | 0.25 | 0.35 | 0.45 |
| E4 | | 0.40 REF | |
| e | | 2.00 BSC | |
| e/2 | | 1.00 BSC | |
| e1 | | 3.10 BSC | |
| e2 | | 0.17 BSC | |
| k | | 2.75 REF | |
| L | 0.40 | 0.50 | 0.60 |

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