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Silicon Carbide Schottky Diode

1700 V, 10 A

NDC10170A

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 156 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

Applications

- Industrial Motor Loads, Wind Generation Inverter, Solar Inverter, UPS
- Power Switching Circuits

Die Information

- Wafer Diameter: 6 inch
- Die Size: 2660 × 2660 μm (include Scribe Lane)
- Metallization:
 - ◆ Top: Ti/TiN/AlSiCu
 - ◆ Back: Ti/NiV/Ag
- Die Thickness: Typ. 200 μm
- Bonding Pad Size:
 - ◆ Anode: 1985 × 1985 μm
- Recommended Wire Bond (Note 1)
 - ◆ Anode: 15 mil × 2

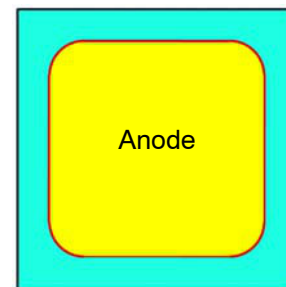
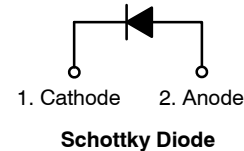
NOTE:

1. Based on TO-247 package

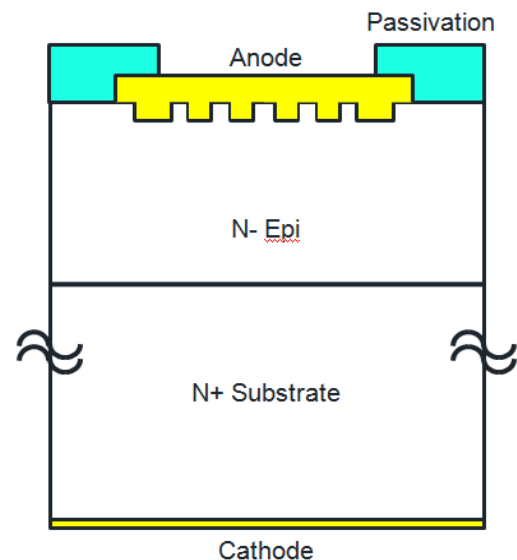


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CROSS SECTION



ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

NDC10170A

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

| Symbol | Parameter | Value | Unit | |
|-----------------------------------|---|--|------|---|
| V _{RRM} | Peak Repetitive Reverse Voltage | 1700 | V | |
| E _{AS} | Single Pulse Avalanche Energy (Notes 2 and 4) | 156 | mJ | |
| I _F | Continuous Rectified Forward Current @ T _C < 157°C | 10 | A | |
| | Continuous Rectified Forward Current @ T _C < 135°C | 16 | | |
| I _{F, Max} | Non-Repetitive Peak Forward Surge Current | T _C = 25°C, 10 μs | 868 | A |
| | | T _C = 150°C, 10 μs | 798 | A |
| I _{F, SM} | Non-Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 105 | A |
| P _{tot} | Power Dissipation | T _C = 25°C | 185 | W |
| | | T _C = 150°C | 31 | 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.

2. E_{AS} of 156 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 25 A, V = 50 V.
3. I_{F, Max}, and I_{F, SM} surge test value are limited by measurement limitation, it's not product capability
4. DC, E_{AS} and Curve test result base on TO247 package

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|------------------|---|-------|------|
| R _{θJC} | Thermal Resistance, Junction to Case, Max | 0.81 | °C/W |

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

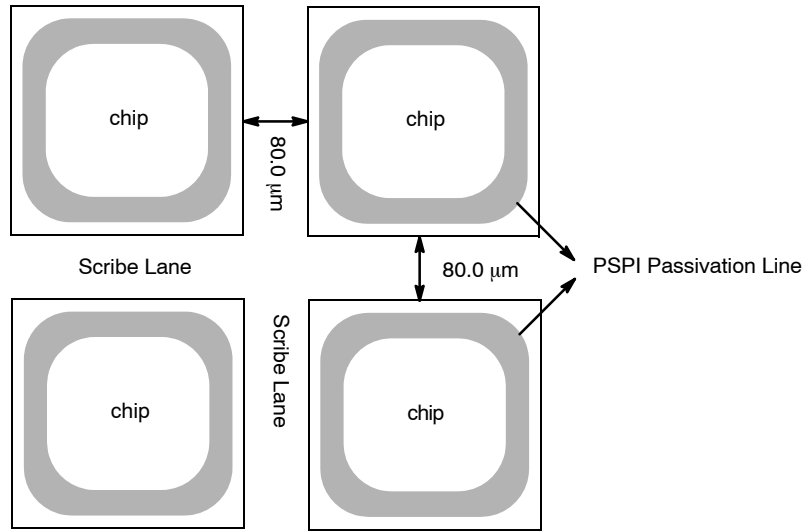
| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|----------------|-------------------------|---|-----|------|-----|------|
| V _F | Forward Voltage | I _F = 10 A, T _J = 25°C | - | 1.5 | - | V |
| | | I _F = 10 A, T _J = 125°C | - | 1.87 | - | |
| | | I _F = 10 A, T _J = 175°C | - | 2.19 | - | |
| I _R | Reverse Current | V _R = 1700 V, T _J = 25°C | - | 0.09 | 40 | μA |
| | | V _R = 1700 V, T _J = 125°C | - | 0.42 | 60 | |
| | | V _R = 1700 V, T _J = 175°C | - | 2.46 | 100 | |
| Q _C | Total Capacitive Charge | V = 800 V | - | 74 | - | nC |
| C | Total Capacitance | V _R = 1 V, f = 100 kHz | - | 856 | - | pF |
| | | V _R = 400 V, f = 100 kHz | - | 69 | - | |
| | | V _R = 800 V, f = 100 kHz | - | 48 | - | |

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.

NDC10170A

The Configuration of Chips

(Based on 6 inch Wafer)



Sawn-on-film frame packing based on tested wafer

ORDERING INFORMATION

| Part Number | Die Size with SL (μm) | Package | Shipping |
|-------------|------------------------------------|---------|-------------|
| NDC10170A | 2660 x 2660 | N/A | Wafer Sales |

NDC10170A

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

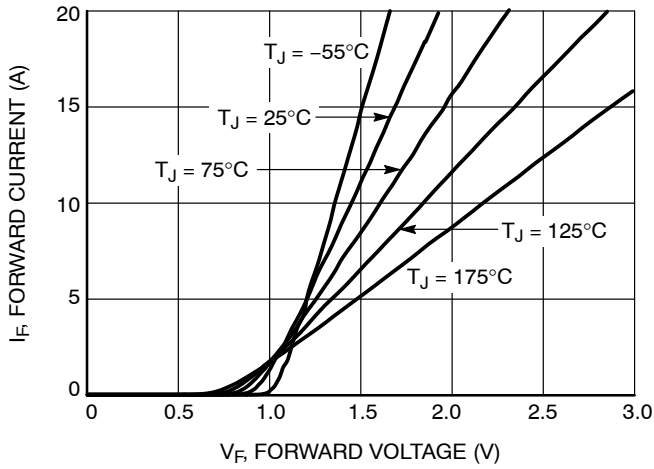


Figure 1. Forward Characteristics

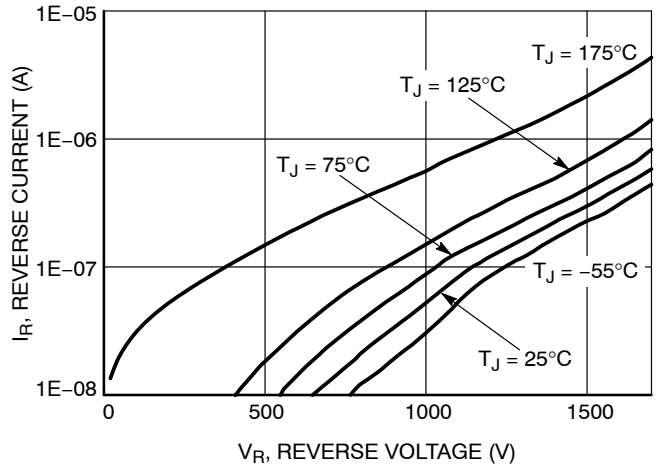


Figure 2. Reverse Characteristics

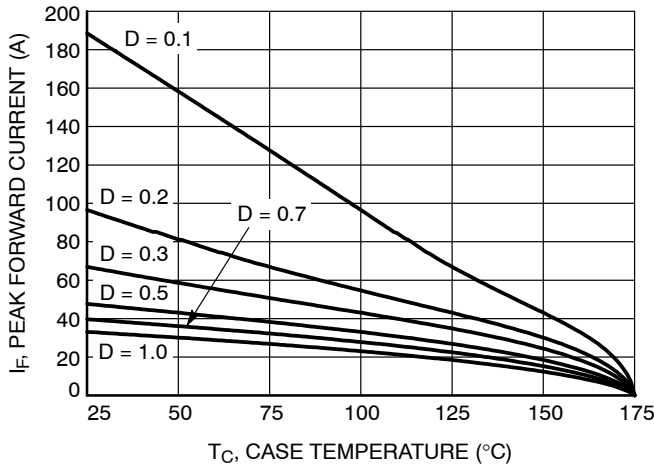


Figure 3. Current Derating

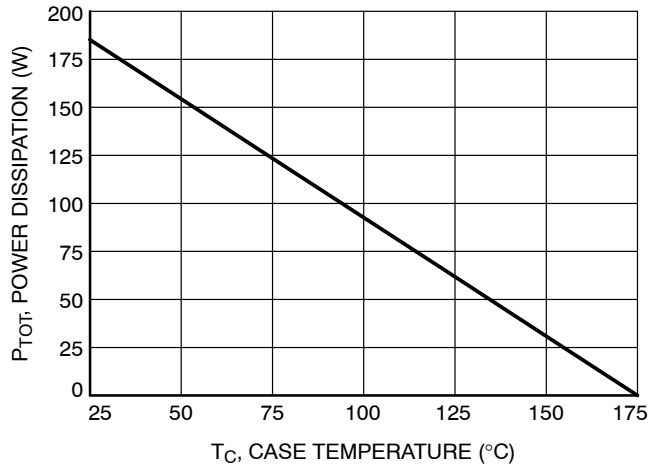


Figure 4. Power Derating

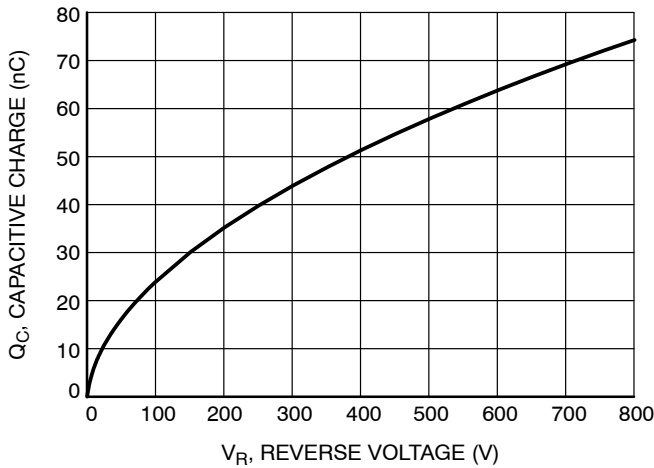


Figure 5. Capacitive Charge vs. Reverse Voltage

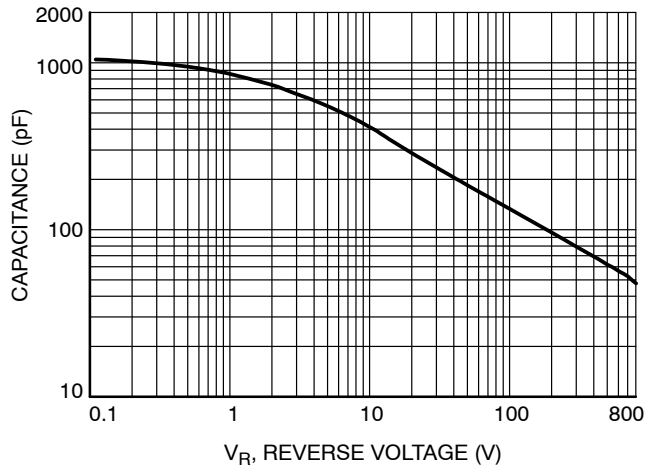


Figure 6. Capacitive vs. Reverse Voltage

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

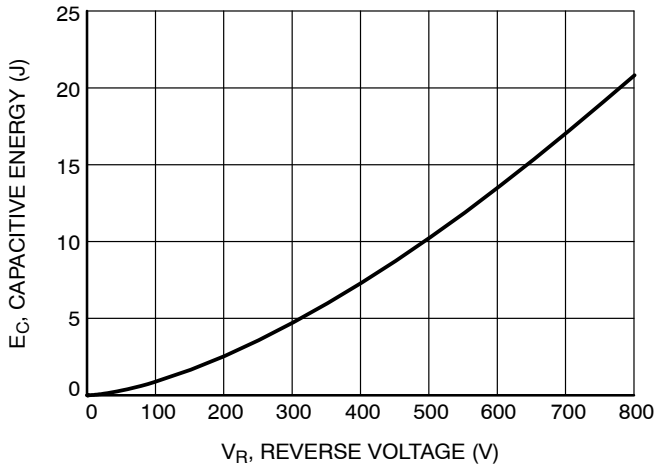


Figure 7. Capacitance Stored Energy

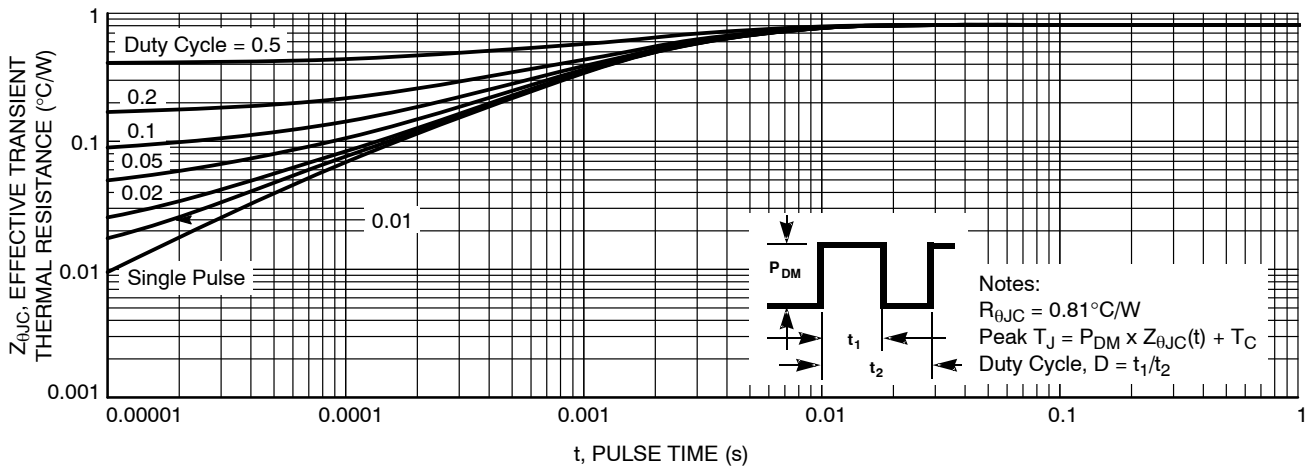


Figure 8. Junction-to-Case Transient Thermal Response Curve

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