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Silicon Carbide Schottky Diode

1200 V, 50 A

NVDSH50120C

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 380 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery
- NV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Halogen Free/BFR Free and are RoHS Compliant

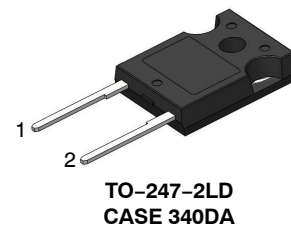
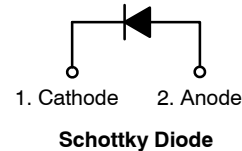
Applications

- Automotive HEV-EV Onboard Chargers
- Automotive HEV-EV DC-DC Converters

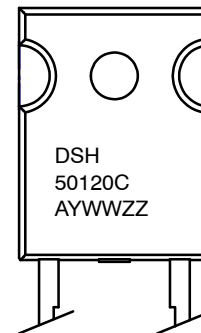


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MARKING DIAGRAM



| | |
|-----------|---------------------------|
| DSH50120C | = Specific Device Code |
| A | = Assembly Plant Code |
| YWW | = Date Code (Year & Week) |
| ZZ | = Lot Code |

ORDERING INFORMATION

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

NVDSH50120C

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

| Symbol | Parameter | | Value | Unit |
|-----------------------------------|---|--|-------------|------|
| V _{RRM} | Peak Repetitive Reverse Voltage | | 1200 | V |
| E _{AS} | Single Pulse Avalanche Energy (Note 1) | | 380 | mJ |
| I _F | Continuous Rectified Forward Current @ T _C < 139°C | | 50 | A |
| | Continuous Rectified Forward Current @ T _C < 135°C | | 53 | |
| I _{F, Max} | Non-Repetitive Peak Forward Surge Current | T _C = 25°C, 10 μs | 1568 | A |
| | | T _C = 150°C, 10 μs | 1414 | A |
| I _{F, SM} | Non-Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 231 | A |
| I _{F, RM} | Repetitive Forward Surge Current | Half-Sine Pulse, t _p = 8.3 ms | 84 | A |
| P _{tot} | Power Dissipation | T _C = 25°C | 375 | W |
| | | T _C = 150°C | 62.5 | 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 380 mJ is based on starting T_J = 25°C, L = 0.5 mH, I_{AS} = 39 A, V = 50 V.

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|------------------|--|-------|------|
| R _{θJC} | Thermal Resistance, Junction to Case, Max | 0.4 | °C/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient, Max | 40 | °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 _J = 25°C | – | 1.4 | 1.75 | V |
| | | I _F = 50 A, T _J = 125°C | – | 1.63 | – | |
| | | I _F = 50 A, T _J = 175°C | – | 1.84 | – | |
| I _R | Reverse Current | V _R = 1200 V, T _J = 25°C | – | 12.2 | 200 | μA |
| | | V _R = 1200 V, T _J = 125°C | – | 30 | 200 | |
| | | V _R = 1200 V, T _J = 175°C | – | 61.5 | 200 | |
| Q _C | Total Capacitive Charge | V = 800 V | – | 246 | – | nC |
| C | Total Capacitance | V _R = 1 V, f = 100 kHz | – | 3691 | – | pF |
| | | V _R = 400 V, f = 100 kHz | – | 198 | – | |
| | | V _R = 800 V, f = 100 kHz | – | 143 | – | |

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.

ORDERING INFORMATION

| Part Number | Top Marking | Package | Shipping |
|-------------|-------------|--|-----------------|
| NVDSH50120C | DSH50120C | TO-247-2LD (Pb-Free / Halogen Free) | 30 Units / Tube |

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

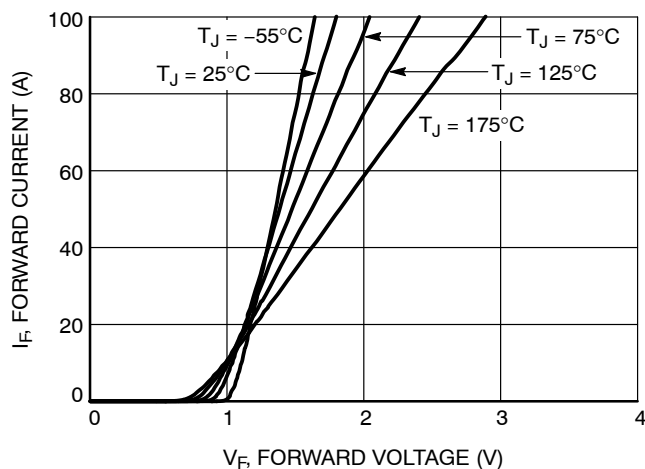


Figure 1. Forward Characteristics

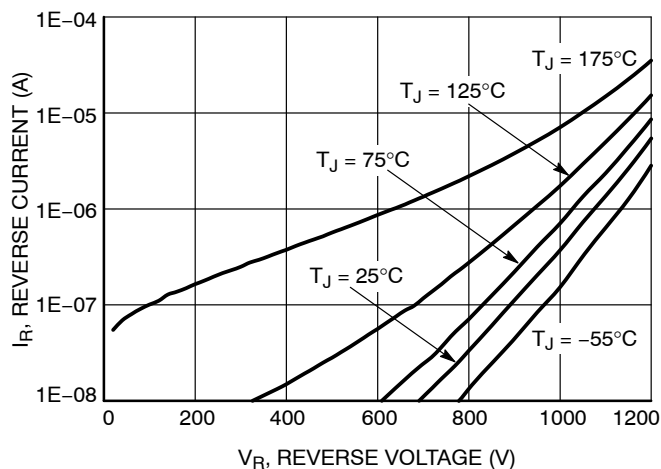


Figure 2. Reverse Characteristics

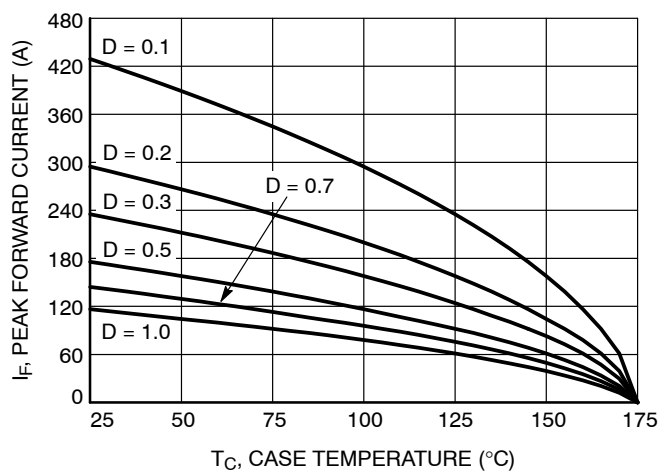


Figure 3. Current Derating

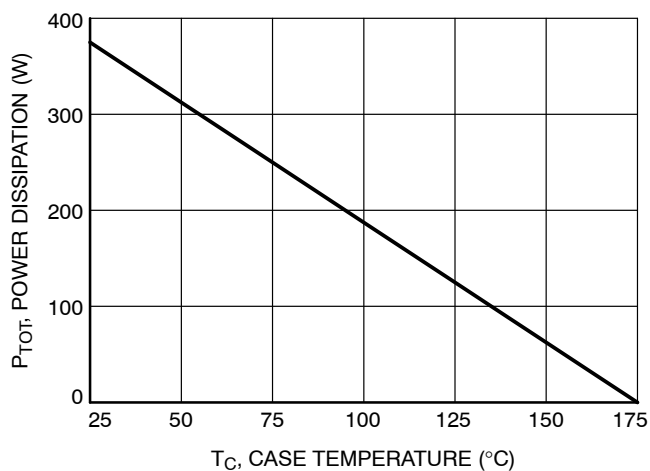


Figure 4. Power Derating

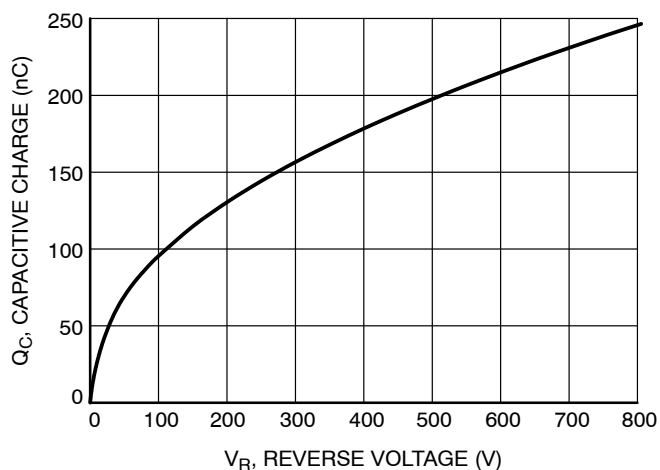


Figure 5. Capacitive Charge vs. Reverse Voltage

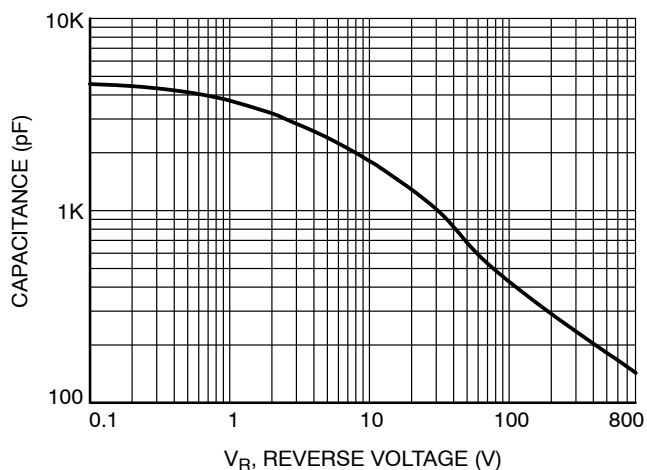


Figure 6. Capacitive vs. Reverse Voltage

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

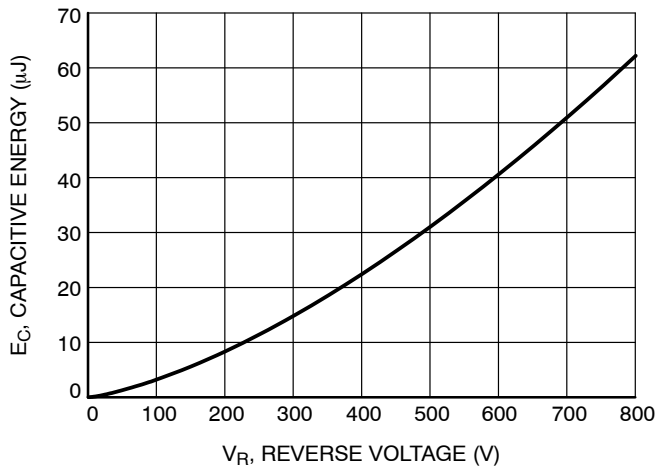


Figure 7. Capacitance Stored Energy

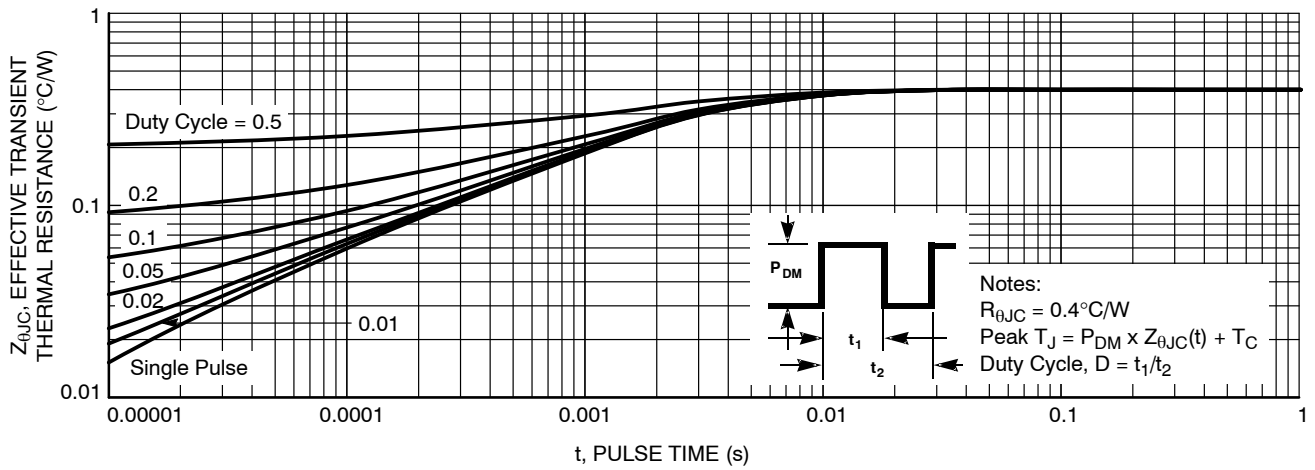
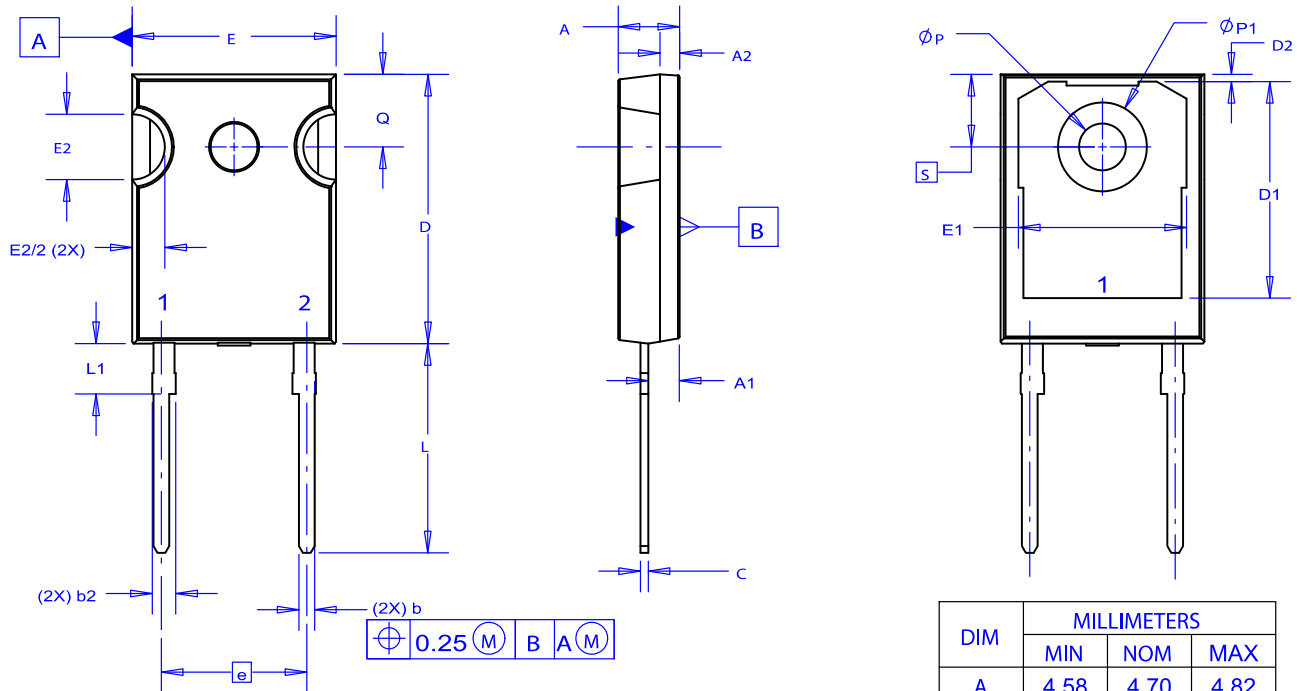


Figure 8. Junction-to-Case Transient Thermal Response Curve

NVDSH50120C


PACKAGE DIMENSIONS

TO-247-2LD
CASE 340DA
ISSUE A



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.

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