

Silicon Carbide (SiC) Diode – EliteSiC, TO247-2, 10 A, 1200 V SiC Merged PiN-Schottky (MPS) Diode UJ3D1210K2

Description

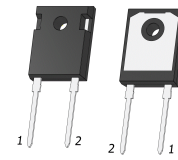
onsemi offers the 3rd generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175 °C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

Features

- Maximum Operating Temperature of 175 °C
- Easy Paralleling
- Extremely Fast Switching not Dependent on Temperature
- No Reverse or Forward Recovery
- Enhanced Surge Current Capability, MPS Structure
- 100% UIS Tested
- This Device is Halogen Free and RoHS Compliant with Exemption 7a, Pb-Free 2LI (on second level interconnection)

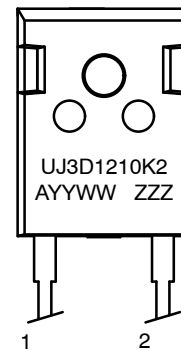
Typical Applications

- Power Converters
- Industrial Motor Drives
- Switch Mode Power Supplies
- Power Factor Correction Modules



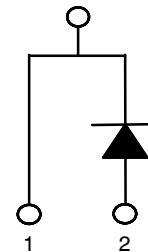
TO247-2
CASE 340CY

MARKING DIAGRAM



| | |
|------------|------------------------|
| UJ3D1210K2 | = Specific Device Code |
| A | = Assembly Location |
| YY | = Year |
| WW | = Work Week |
| ZZZ | = Lot ID |

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

UJ3D1210K2

MAXIMUM RATINGS

| Parameter | Symbol | Test Conditions | Value | Unit |
|---|-----------------------------|---|------------|----------------------|
| DC Blocking Voltage | V_R | | 1200 | V |
| Repetitive Peak Reverse Voltage, $T_J = 25\text{ }^{\circ}\text{C}$ | V_{RRM} | | 1200 | V |
| Surge Peak Reverse Voltage | V_{RSM} | | 1200 | V |
| Maximum DC Forward Current | I_F | $T_C = 146\text{ }^{\circ}\text{C}$ | 10 | A |
| Non-repetitive Forward Surge Current Sine Halfwave | I_{FSM} | $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 120 | A |
| | | $T_C = 110\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 110 | |
| Repetitive Forward Surge Current Sine Halfwave, $D = 0.1$ | I_{FRM} | $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 39.4 | A |
| | | $T_C = 110\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 24 | |
| Non-repetitive Peak Forward Current | $I_{F, \max}$ | $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$ | 720 | A |
| | | $T_C = 110\text{ }^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$ | 720 | |
| i^2t Value | $\int i^2 dt$ | $T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 72 | A^2s |
| | | $T_C = 110\text{ }^{\circ}\text{C}$, $t_p = 10\text{ ms}$ | 60 | |
| Power Dissipation | P_{tot} | $T_C = 25\text{ }^{\circ}\text{C}$ | 136.4 | W |
| | | $T_C = 146\text{ }^{\circ}\text{C}$ | 26.4 | |
| Maximum Junction Temperature | $T_{J, \max}$ | | 175 | $^{\circ}\text{C}$ |
| Operating and Storage Temperature | T_J , T_{STG} | | -55 to 175 | $^{\circ}\text{C}$ |
| Soldering Temperatures, Wavesoldering only Allowed at Leads | T_{sold} | 1.6 mm from case for 10 s | 260 | $^{\circ}\text{C}$ |

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.

THERMAL CHARACTERISTICS

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--------------------------------------|-----------------|-----------------|-----|------|-----|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | | – | 0.83 | 1.1 | $^{\circ}\text{C/W}$ |

ELECTRICAL CHARACTERISTICS ($T_J = +25\text{ }^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|----------------------------------|--------|---|-----|------|-----|---------------|
| Forward Voltage | V_F | $I_F = 10\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$ | – | 1.4 | 1.6 | V |
| | | $I_F = 10\text{ A}$, $T_J = 150\text{ }^{\circ}\text{C}$ | – | 1.85 | 2.3 | |
| | | $I_F = 10\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$ | – | 2 | 2.6 | |
| Reverse Current | I_R | $V_R = 1200\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$ | – | 10 | 110 | μA |
| | | $V_R = 1200\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$ | – | 450 | – | |
| Total Capacitive Charge (Note 1) | Q_C | $V_R = 800\text{ V}$ | – | 51 | – | nC |
| Total Capacitance | C | $V_R = 1\text{ V}$, $f = 1\text{ MHz}$ | – | 510 | – | pF |
| | | $V_R = 400\text{ V}$, $f = 1\text{ MHz}$ | – | 48 | – | |
| | | $V_R = 800\text{ V}$, $f = 1\text{ MHz}$ | – | 41 | – | |
| Capacitance Stored Energy | E_C | $V_R = 800\text{ V}$ | – | 15 | – | μJ |

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.

1. Q_C is independent on T_J , di_F/dt , and I_F as shown in the application note [AND90316/D](#)

TYPICAL PERFORMANCE DIAGRAMS

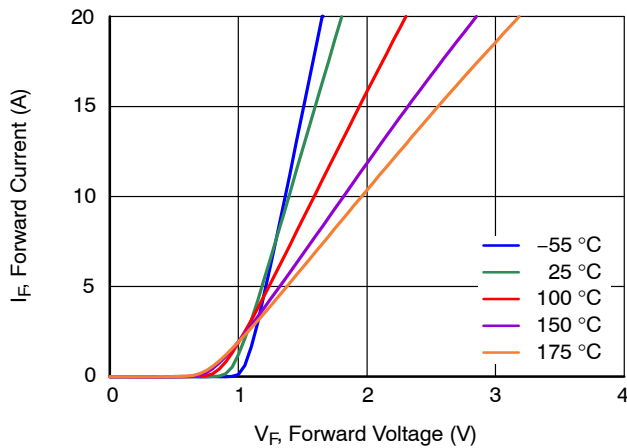


Figure 1. Typical Forward Characteristics

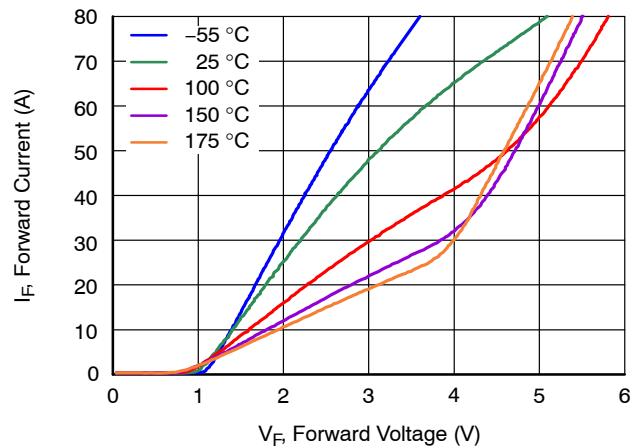


Figure 2. Typical Forward Characteristics in Surge Current

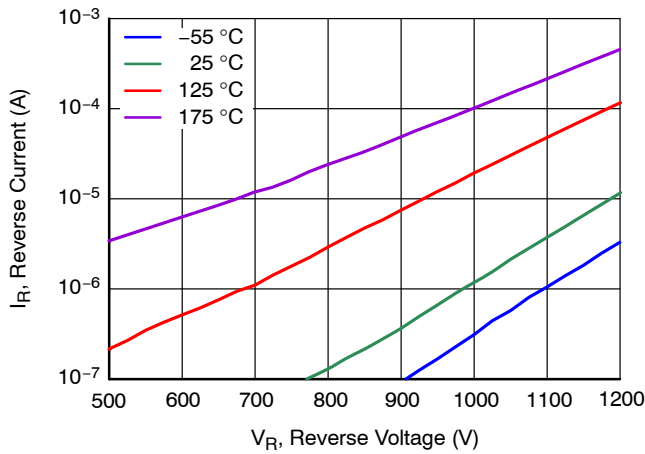


Figure 3. Typical Reverse Characteristics

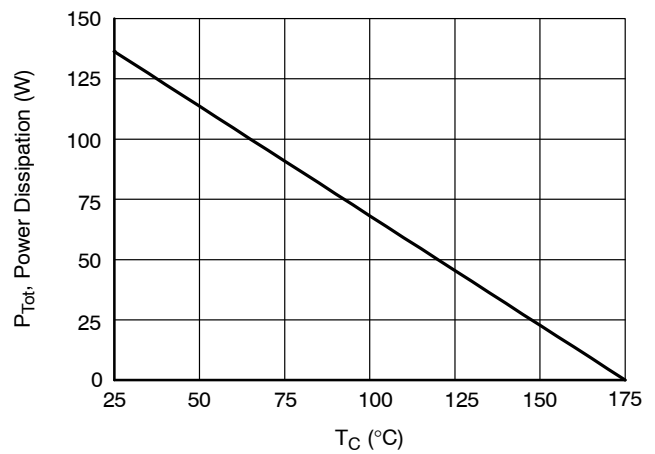


Figure 4. Power Dissipation

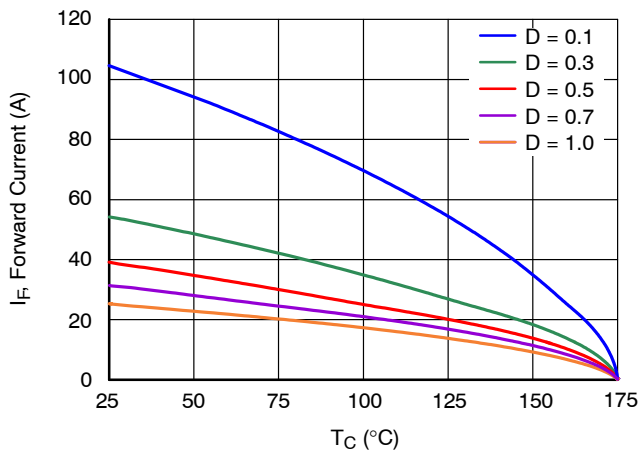


Figure 5. Diode Forward Current

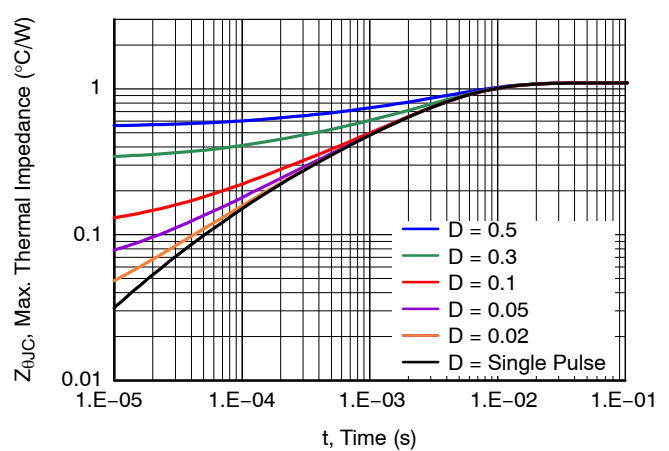


Figure 6. Maximum Transient Thermal Impedance

UJ3D1210K2

TYPICAL PERFORMANCE DIAGRAMS (continued)

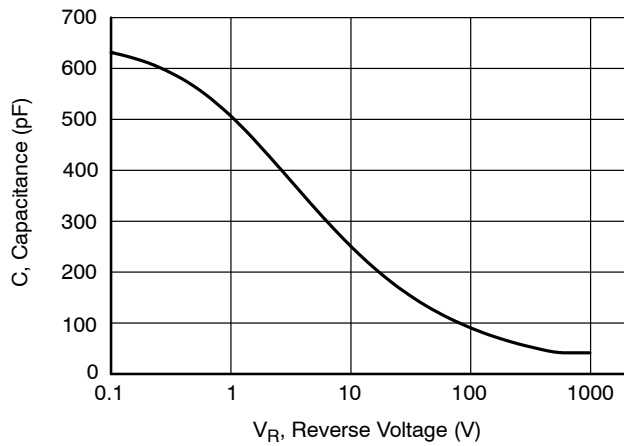


Figure 7. Capacitance vs. Reverse Voltage at 1 MHz

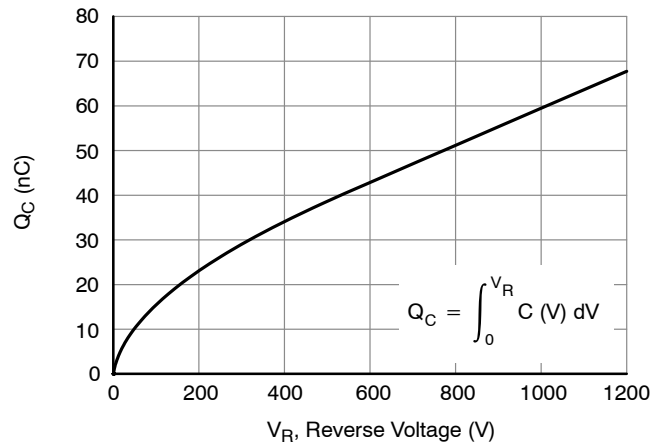


Figure 8. Typical Capacitive Charge vs. Reverse Voltage

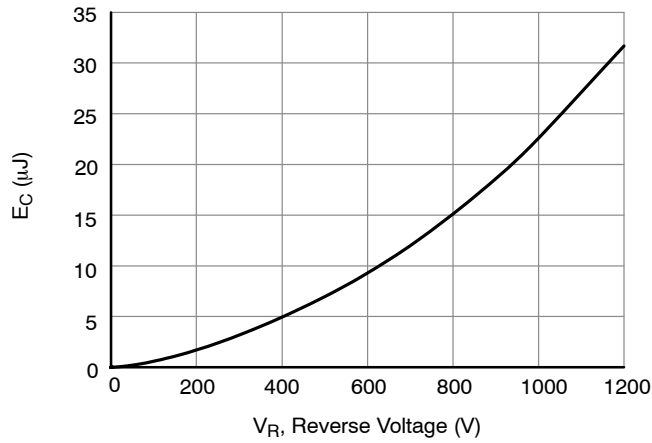


Figure 9. Typical Capacitance Stored Energy vs. Reverse Voltage

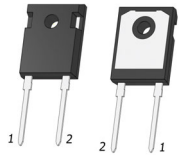
ORDERING INFORMATION

| Part Number | Marking | Package | Shipping |
|-------------|------------|------------------------------------|------------------|
| UJ3D1210K2 | UJ3D1210K2 | TO247-2 (Pb-Free, Halogen Free) | 600 Units / Tube |

UJ3D1210K2

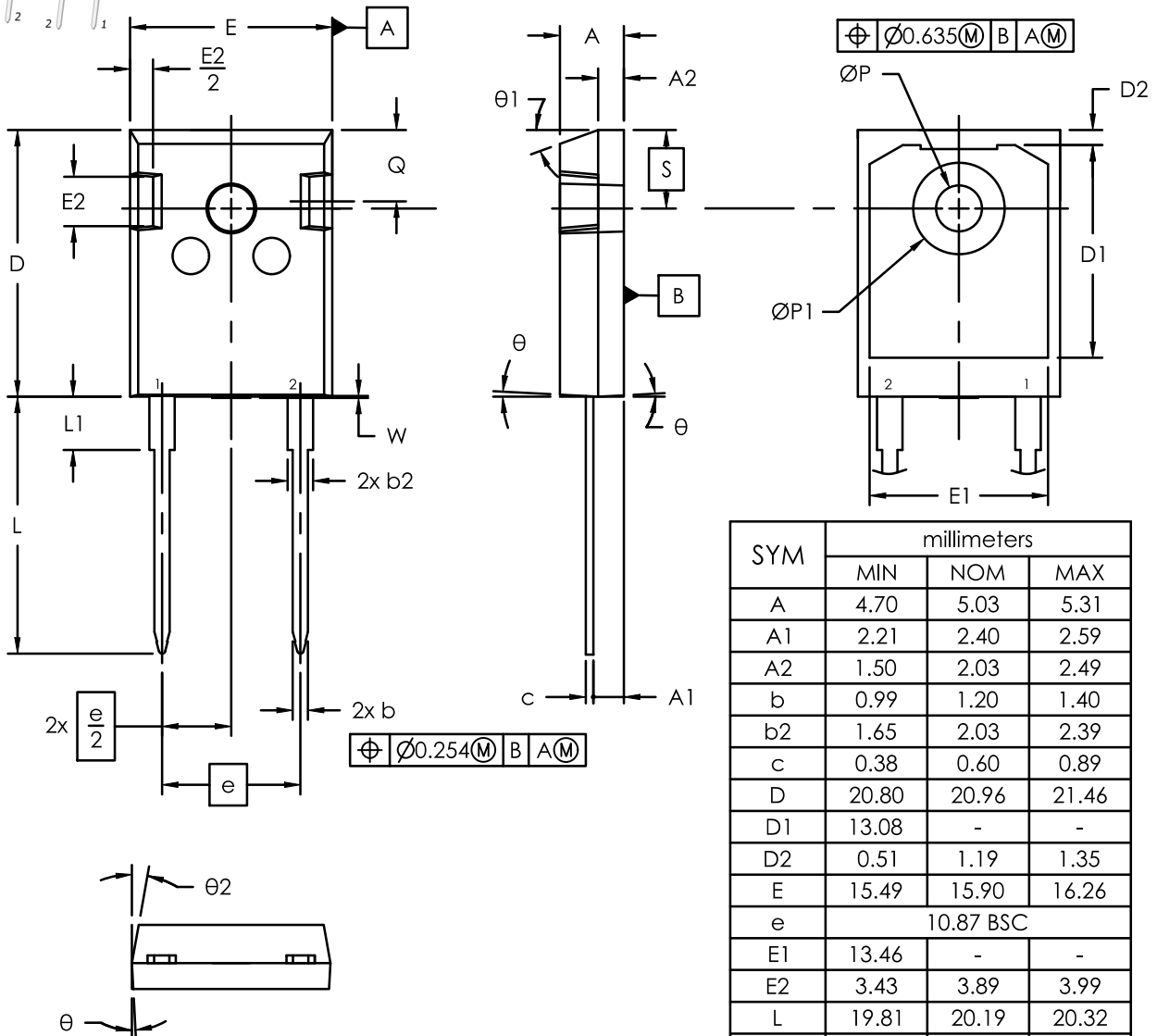
REVISION HISTORY

| Revision | Description of Changes | Date |
|----------|---|-----------|
| C | Acquired the original Qorvo JFET Division Data Sheet and updated the main document title to comply with onsemi standards for SiC products. | 1/15/2025 |
| 3 | Converted the Data Sheet to onsemi format. | 5/13/2025 |



TO247-2 15.90x20.96x5.03, 5.44P
CASE 340CY
ISSUE B

DATE 16 APR 2025



NOTE:

1. Dimensioning and tolerancing as per ASME Y14.5 - 2018
2. Controlling dimension : millimeters
3. Dimension "W" = max. allowable plastic protrusion.
4. Package Outline in compliance with JEDEC standard var. AD.
5. Dimensions D & E does not include mold flash.
6. ØP to have max draft angle of 1.7° to the top with max. hole diameter of 3.91mm.

| SYM | millimeters | | |
|-----|-------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.70 | 5.03 | 5.31 |
| A1 | 2.21 | 2.40 | 2.59 |
| A2 | 1.50 | 2.03 | 2.49 |
| b | 0.99 | 1.20 | 1.40 |
| b2 | 1.65 | 2.03 | 2.39 |
| c | 0.38 | 0.60 | 0.89 |
| D | 20.80 | 20.96 | 21.46 |
| D1 | 13.08 | - | - |
| D2 | 0.51 | 1.19 | 1.35 |
| E | 15.49 | 15.90 | 16.26 |
| e | 10.87 BSC | | |
| E1 | 13.46 | - | - |
| E2 | 3.43 | 3.89 | 3.99 |
| L | 19.81 | 20.19 | 20.32 |
| L1 | - | - | 4.50 |
| ØP | 3.56 | 3.60 | 3.66 |
| ØP1 | 7.06 | 7.19 | 7.39 |
| Q | 5.38 | 5.62 | 6.20 |
| S | 6.17 BSC | | |
| W | - | - | 0.15 |
| θ | 3° | | |
| θ1 | 20° | | |
| θ2 | 10° | | |

| | | |
|-------------------------|--|---|
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| DESCRIPTION: | TO247-2 15.90x20.96x5.03, 5.44P | PAGE 1 OF 1 |

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