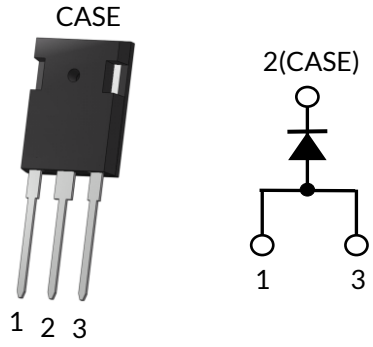
DATASHEET

# UJ3D1250K

## 50A -1200V SiC Schottky Diode

Rev. C, February 2020




| Part Number | Package | Marking |
|---|---|---|
| UJ3D1250K | TO-247-3L | UJ3D1250K |

## Description

UnitedSiC 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
- AEC-Q101 qualified

## Typical applications

- Power converters
- Industrial motor drives
- Switch mode power supplies
- Power factor correction modules

## Maximum Ratings

| Parameter | Symbol | Test Conditions | Value | Units |
|---|---|---|---|---|
| DC blocking voltage | $V_R$ | | 1200 | V |
| Repetitive peak reverse voltage, $T_J$=25°C | $V_{RRM}$ | | 1200 | V |
| Surge peak reverse voltage | $V_{RSM}$ | | 1200 | V |
| Maximum DC forward current | $I_F$ | $T_C$ = 112°C | 50 | A |
| Non-repetitive forward surge current sine halfwave | $I_{FSM}$ | $T_C$ = 25°C, $t_p$ = 10ms | 275 | A |
| Repetitive forward surge current sine halfwave, D=0.1 | $I_{FRM}$ | $T_C$ = 25°C, $t_p$ = 10ms | 163.5 | A |
| | | $T_C$ = 110°C, $t_p$ = 10ms | 99.6 | |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C$ = 25°C, $t_p$ = 10µs | 2400 | A |
| | | $T_C$ = 110°C, $t_p$ = 10µs | 2400 | |
| $i^2t$ value | $\int i^2dt$ | $T_C$ = 25°C, $t_p$ = 10ms | 378 | $A^2s$ |
| Power dissipation | $P_{tot}$ | $T_C$ = 25°C | 319 | W |
| | | $T_C$ = 112°C | 134 | |
| Maximum junction temperature | $T_{J,max}$ | | 175 | °C |
| Operating and storage temperature | $T_J$, $T_{STG}$ | | -55 to 175 | °C |
| Soldering temperatures, wavesoldering only allowed at leads | $T_{sold}$ | 1.6mm from case for 10s | 260 | °C |

## Thermal Characteristics

| Parameter | Symbol | Test Conditions | Value | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Thermal resistance, junction-to-case | $R_{\theta JC}$ | | | 0.36 | 0.47 | °C/W |

## Electrical Characteristics ($T_J$ = +25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | Value | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Forward voltage | $V_F$ | $I_F$ = 50A, $T_J$=25°C | - | 1.5 | 1.7 | V |
| | | $I_F$ = 50A, $T_J$=150°C | - | 1.95 | 2.4 | |
| | | $I_F$ = 50A, $T_J$=175°C | - | 2.2 | 2.7 | |
| Reverse current | $I_R$ | $V_R$=1200V, $T_J$=25°C | - | 52 | 400 | µA |
| | | $V_R$=1200V, $T_J$=175°C | - | 900 | | |
| Total capacitive charge (1) | $Q_C$ | $V_R$=800V | | 240 | | nC |
| Total capacitance | C | $V_R$=1V, f = 1MHz | | 2340 | | pF |
| | | $V_R$=400V, f = 1MHz | | 224 | | |
| | | $V_R$=800V, f = 1MHz | | 198 | | |
| Capacitance stored energy | $E_C$ | $V_R$=800V | | 72 | | µJ |

(1) $Q_c$ is independent on $T_J$, $di_F/dt$, and $I_F$ as shown in the application note USCi_AN0011.

## Typical Performance Diagrams

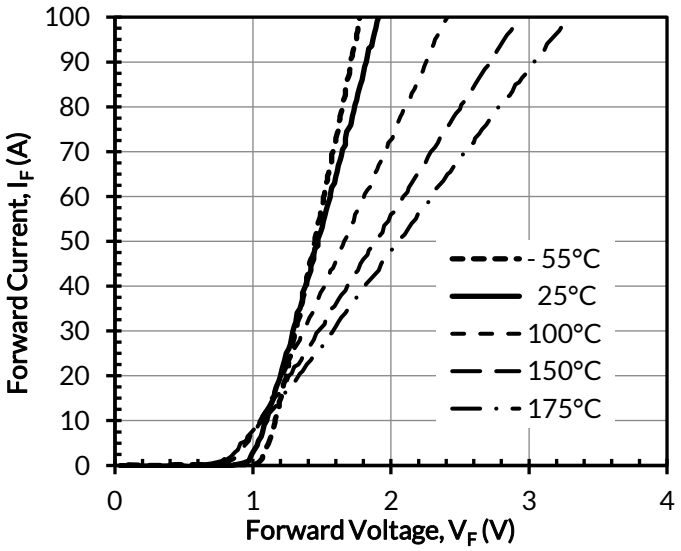



Figure 1. Typical forward characteristics

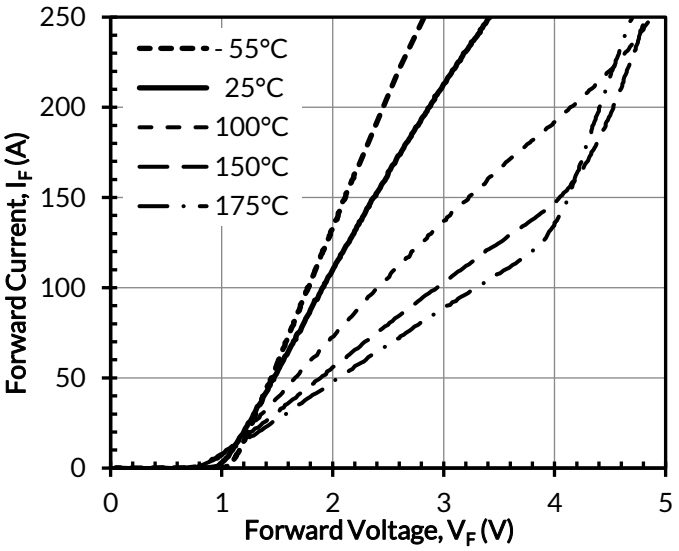



Figure 2. Typical forward characteristics in surge current

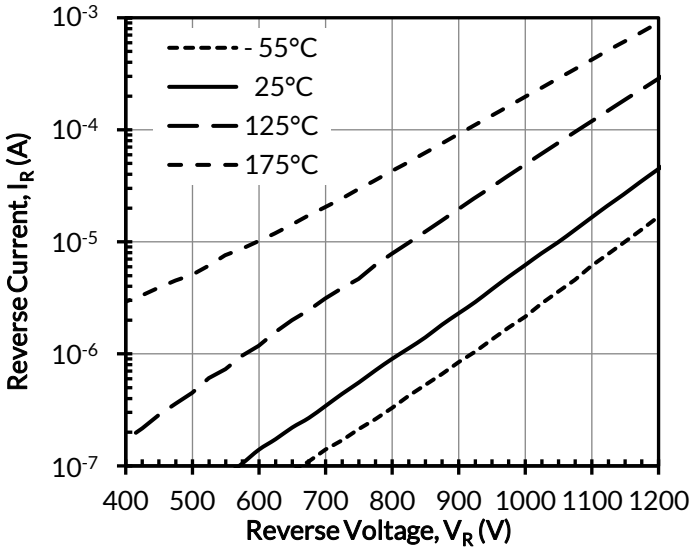



Figure 3. Typical reverse characteristics

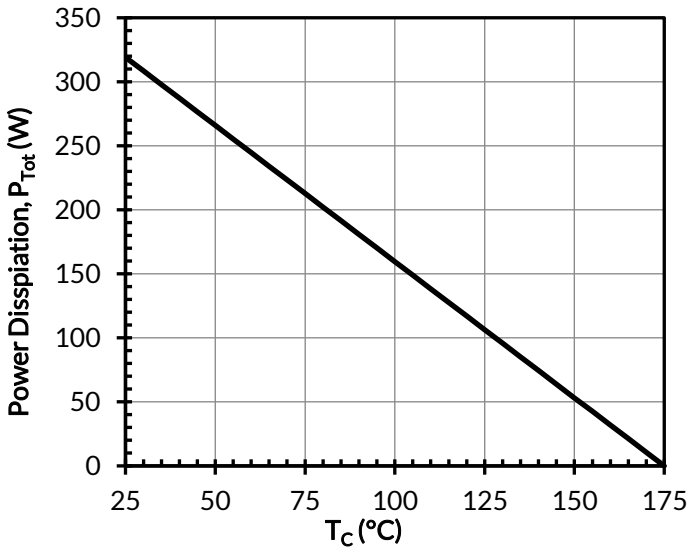



Figure 4. Power dissipation

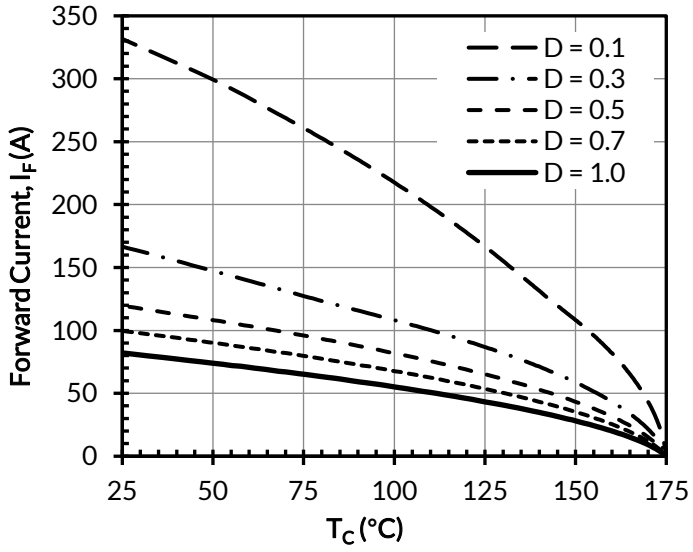



Figure 5. Diode forward current

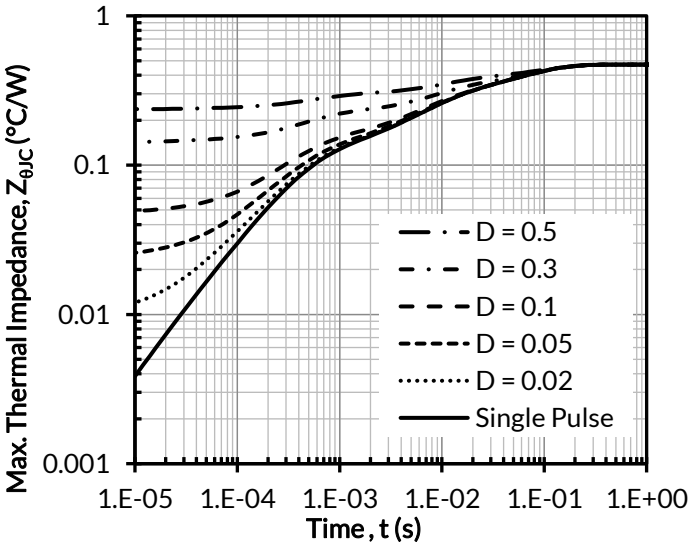



Figure 6. Maximum transient thermal impedance

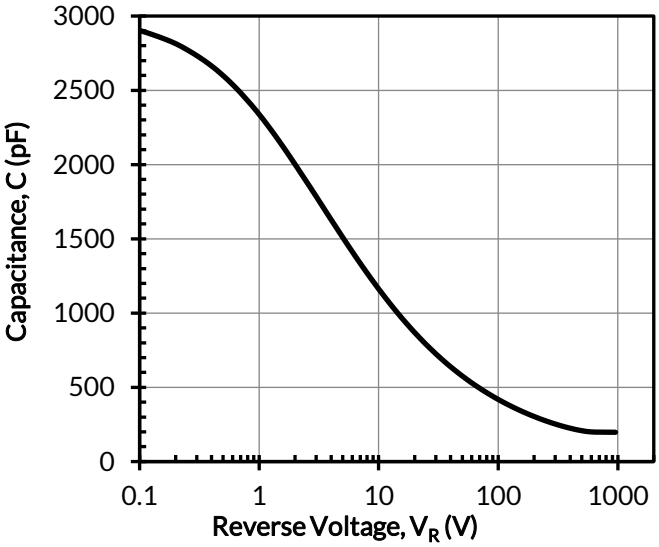



Figure 7. Capacitance vs. reverse voltage at 1MHz

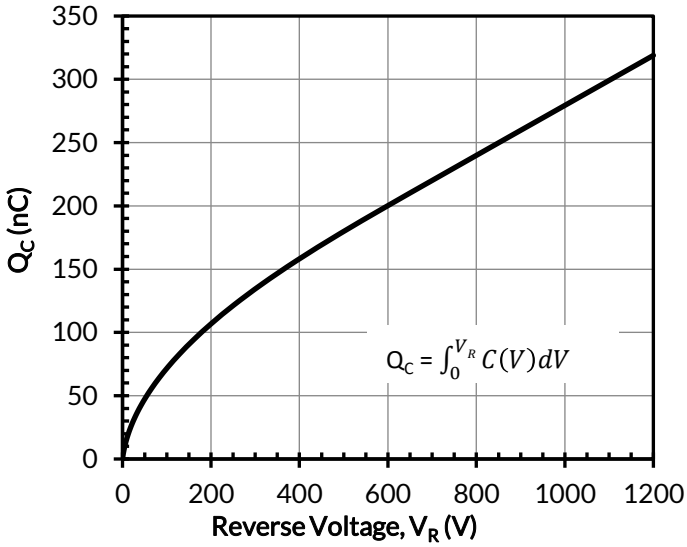



Figure 8. Typical capacitive charge vs. reverse voltage

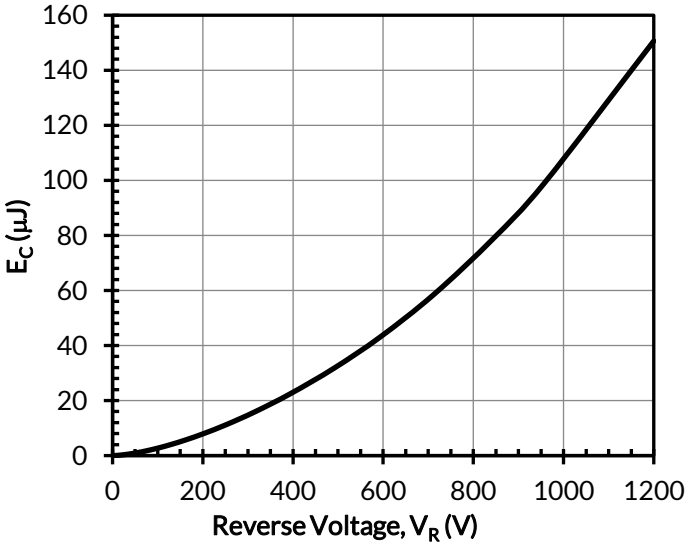



Figure 9. Typical capacitance stored energy vs. reverse voltage

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