

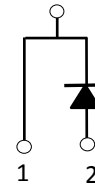
Description

United Silicon Carbide, Inc. offers the xR series of high performance SiC Schottky diodes. With zero reverse recovery charge and 175°C maximum junction temperature, USCi's diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

CASE



CASE



| Part Number | Package | Marking |
|-------------|-----------|------------|
| UJD06504TS | TO-220-2L | UJD06504TS |

Features

- ◆ Positive temperature coefficient for safe operation and ease of paralleling
- ◆ 175°C maximum operating junction temperature
- ◆ Extremely fast switching not dependent on temperature
- ◆ Essentially no reverse or forward recovery
- ◆ Enhanced surge capability
- ◆ RoHS compliant

Typical Applications

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

Maximum Ratings

| Parameter | Symbol | Test Conditions | Value | Units |
|----------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------|------------|------------------|
| DC blocking voltage | V_R | | 650 | V |
| Repetitive peak reverse voltage, $T_j=25^\circ\text{C}$ | V_{RRM} | | 650 | V |
| Surge peak reverse voltage | V_{RSM} | | 650 | V |
| Maximum DC forward current | I_F | $T_C = 156^\circ\text{C}$ | 4 | A |
| Non-repetitive forward surge current sine halfwave | I_{FSM} | $T_C = 25^\circ\text{C}, t_p = 10\text{ms}$ | 30 | A |
| | | $T_C = 110^\circ\text{C}, t_p = 10\text{ms}$ | 24 | |
| Repetitive forward surge current sine halfwave, $D=0.1$ | I_{FRM} | $T_C = 25^\circ\text{C}, t_p = 10\text{ms}$ | 21.5 | A |
| | | $T_C = 110^\circ\text{C}, t_p = 10\text{ms}$ | 12.4 | |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$ | 235 | A |
| | | $T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$ | 212 | |
| Non-repetitive avalanche energy | E_{AS} | $T_j = 25^\circ\text{C}, L = 5\text{mH}, I_{pk}=3.55\text{A}, V_{DD}=100\text{V}$ | 33 | mJ |
| Power dissipation | P_{Tot} | $T_C = 25^\circ\text{C}$ | 71 | W |
| | | $T_C = 156^\circ\text{C}$ | 9 | |
| 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} | 1.6mm from case for 10s | 260 | $^\circ\text{C}$ |

Electrical Characteristics

$T_J = +25^\circ\text{C}$ unless otherwise specified

| Parameter | Symbol | Test Conditions | Value | | | Units |
|----------------------------------------|--------|----------------------------------------------|-------|-----|------|---------------|
| | | | Min | Typ | Max | |
| Forward voltage | V_F | $I_F = 4\text{A}, T_J = 25^\circ\text{C}$ | - | 1.5 | 1.7 | V |
| | | $I_F = 4\text{A}, T_J = 150^\circ\text{C}$ | - | 1.8 | 2.1 | |
| | | $I_F = 4\text{A}, T_J = 175^\circ\text{C}$ | - | 2 | 2.25 | |
| Reverse current | I_R | $V_R = 650\text{V}, T_J = 25^\circ\text{C}$ | - | 10 | 170 | μA |
| | | $V_R = 650\text{V}, T_J = 175^\circ\text{C}$ | - | 20 | 550 | |
| Total capacitive charge ⁽¹⁾ | Q_C | $V_R = 400\text{V}$ | | 9.3 | | nC |
| Total capacitance | C | $V_R = 1\text{V}, f = 1\text{MHz}$ | | 125 | | pF |
| | | $V_R = 300\text{V}, f = 1\text{MHz}$ | | 16 | | |
| | | $V_R = 600\text{V}, f = 1\text{MHz}$ | | 13 | | |
| Capacitance stored energy | E_C | $V_R = 400\text{V}$ | | 1.3 | | μJ |

(1) See Figure 8, Q_C is independent on T_J , di_F/dt , and I_F as shown in the application note USCi_AN0011.

Thermal characteristics

| Parameter | symbol | Test Conditions | Value | | | Units |
|--------------------|-----------------|-----------------|-------|------|-----|---------------------------|
| | | | Min | Typ | Max | |
| Thermal resistance | $R_{\theta JC}$ | | | 1.57 | 2.1 | $^\circ\text{C}/\text{W}$ |

Typical Performance

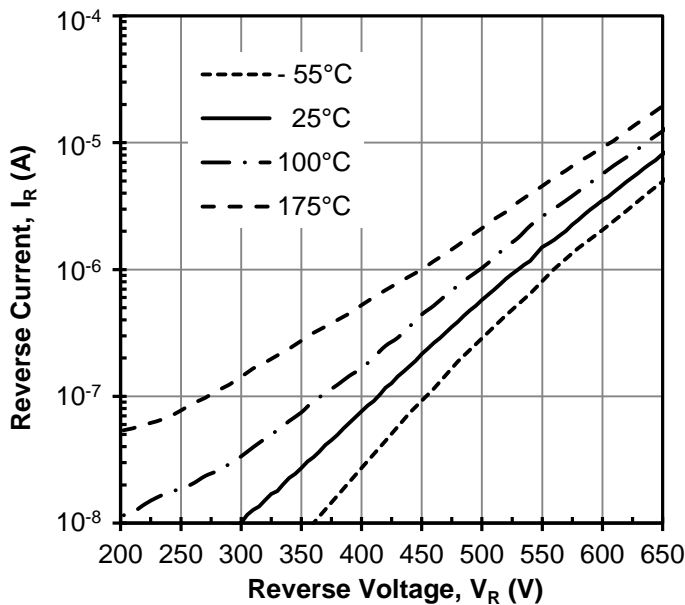


Figure 1 Typical reverse characteristics

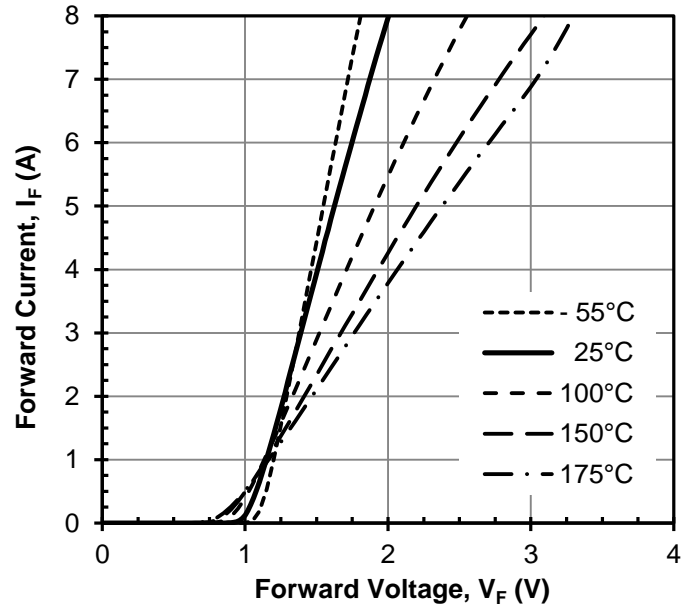


Figure 2 Typical forward characteristics

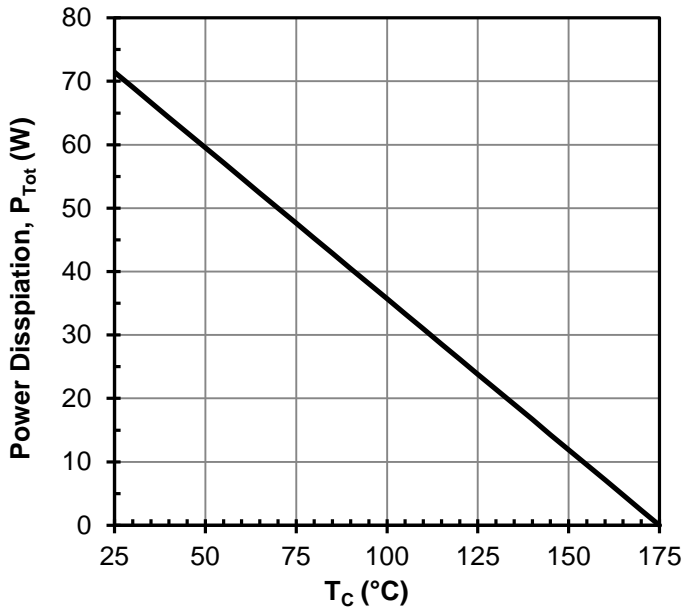


Figure 3 Power dissipation

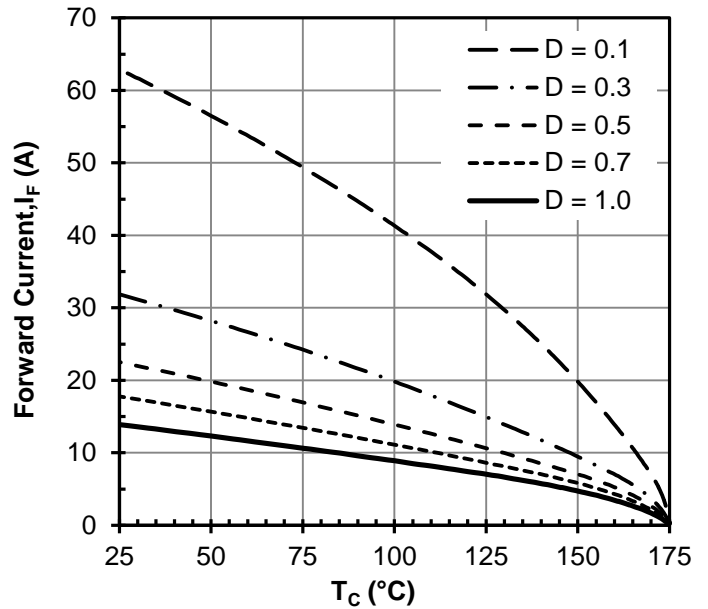


Figure 4 Diode forward current

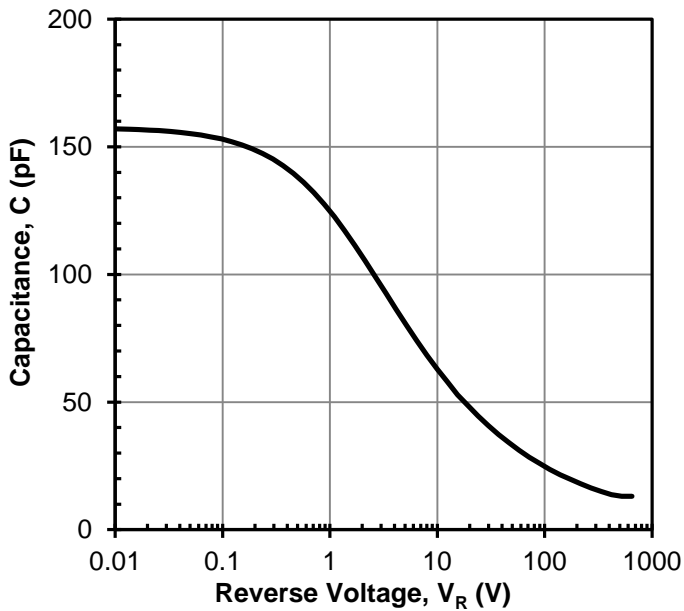


Figure 5 Capacitance vs. reverse voltage

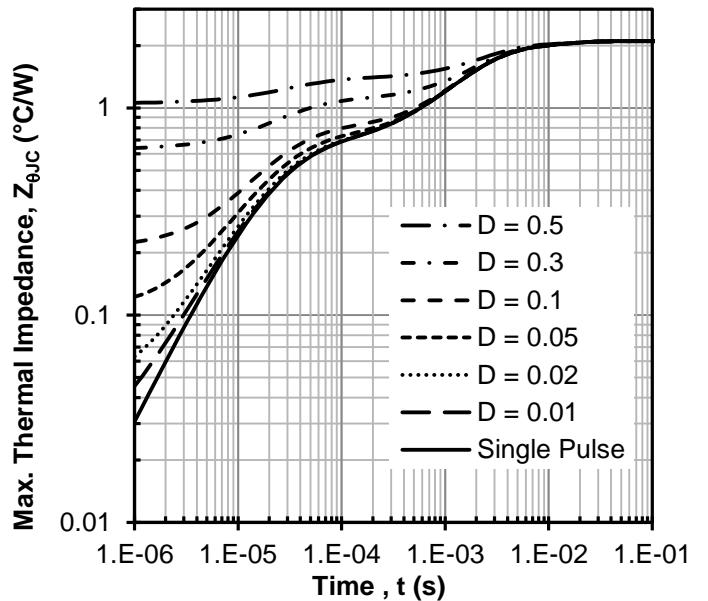


Figure 6 Maximum transient thermal impedance

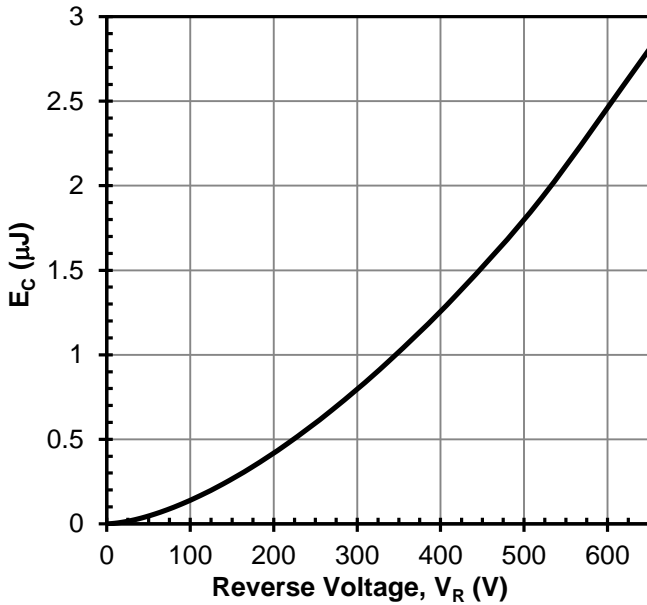


Figure 7 Typical capacitance stored energy vs. reverse voltage

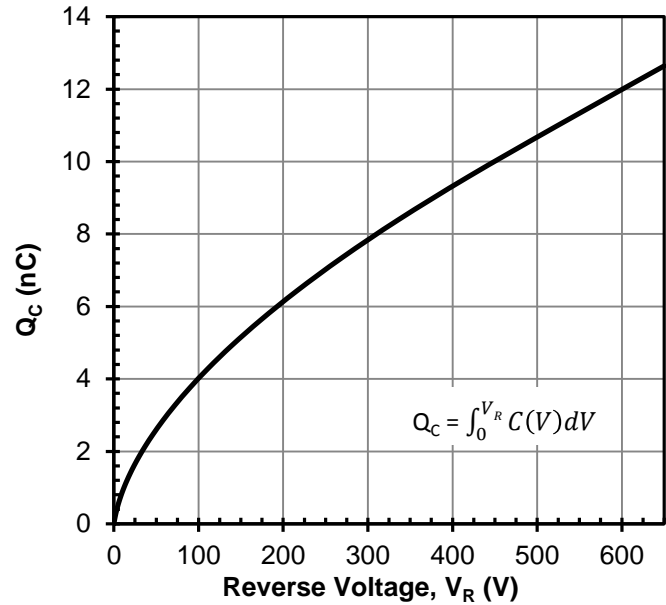


Figure 8 Typical capacitive charge vs. reverse voltage

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