

WS3A008065A

Silicon Carbide Schottky Diode

| | | | |
|------------------------------------|---|-----|----|
| V_{RRM} | = | 650 | V |
| $I_F (T_C \leq 135^\circ\text{C})$ | = | 11 | A |
| Q_C | = | 22 | nC |

Features

- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on V_F
- Temperature-independent Switching
- 175°C Operating Junction Temperature

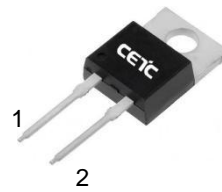
Benefits

- Replace Bipolar with Unipolar Device
- Reduction of Heat Sink Size
- Parallel Devices Without Thermal Runaway
- Essentially No Switching Losses

Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor drive, PV Inverter, Wind Power Station

Package



TO-220-2



| Part Number | Package | Marking |
|-------------|----------|-------------|
| WS3A008065A | TO-220-2 | WS3A008065A |

Maximum Ratings

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|----------------|--|---------------|------------------|---|-------|
| V_{RRM} | Repetitive Peak Reverse Voltage | 650 | V | $T_C = 25^\circ\text{C}$ | |
| V_{RSM} | Surge Peak Reverse Voltage | 650 | V | $T_C = 25^\circ\text{C}$ | |
| V_R | DC Blocking Voltage | 650 | V | $T_C = 25^\circ\text{C}$ | |
| I_F | Forward Current | 24 11 8 | A | $T_C \leq 25^\circ\text{C}$ $T_C \leq 135^\circ\text{C}$ $T_C \leq 153^\circ\text{C}$ | |
| I_{FSM} | Non-Repetitive Forward Surge Current | 72 | A | $T_C = 25^\circ\text{C}$, $t_p = 8.3\text{ms}$, Half Sine Wave | |
| P_{tot} | Power Dissipation | 107 | W | $T_C = 25^\circ\text{C}$ | Fig.3 |
| T_C | Maximum Case Temperature | 153 | $^\circ\text{C}$ | | |
| T_J, T_{STG} | Operating Junction and Storage Temperature | -55 to 175 | $^\circ\text{C}$ | | |
| | TO-220 Mounting Torque | 1 | Nm | M3 Screw | |

Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|--------|-------------------------|-----------------|-------------|---------|--|-------|
| V_F | Forward Voltage | 1.4 1.7 | 1.65 2.3 | V | $I_F = 8A, T_J = 25^\circ C$ $I_F = 8A, T_J = 175^\circ C$ | Fig.1 |
| I_R | Reverse Current | 1 5 | 20 100 | μA | $V_R = 650V, T_J = 25^\circ C$ $V_R = 650V, T_J = 175^\circ C$ | Fig.2 |
| C | Total Capacitance | 520 50 41 | / | pF | $V_R = 0V, T_J = 25^\circ C, f = 1MHz$ $V_R = 200V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$ | Fig.5 |
| Q_C | Total Capacitive Charge | 22 | / | nC | $V_R = 650V, I_F = 8A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$ | Fig.4 |

Thermal Characteristics

| Symbol | Parameter | Typ. | Unit | Note |
|-----------------|---|------|--------------|-------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 1.4 | $^\circ C/W$ | Fig.6 |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 80 | $^\circ C/W$ | |
| T_{sold} | Soldering Temperature | 260 | $^\circ C$ | |

Typical Performance

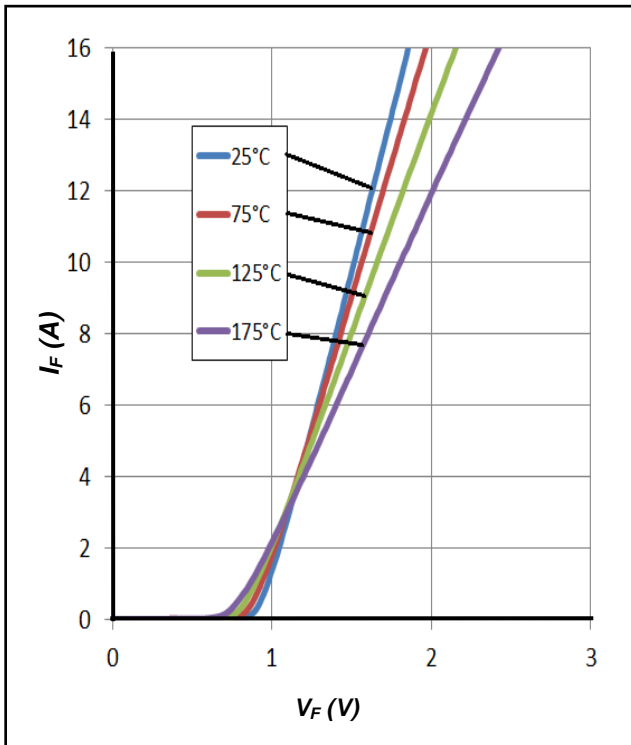


Figure 1. Forward Characteristics

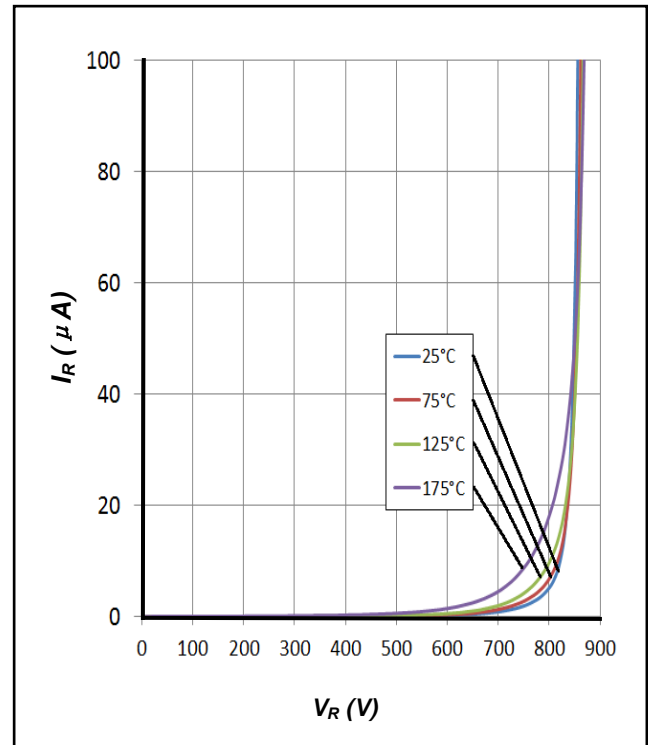


Figure 2. Reverse Characteristics

Typical Performance

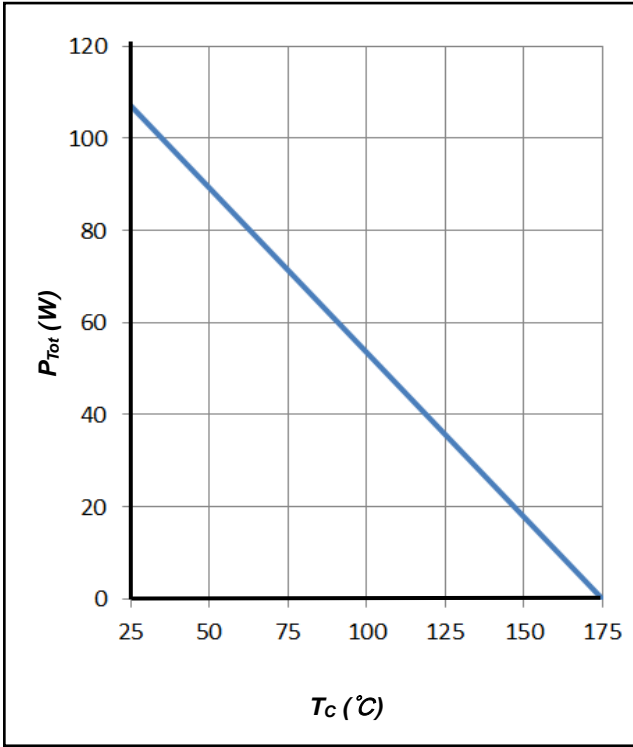


Figure 3. Power Derating

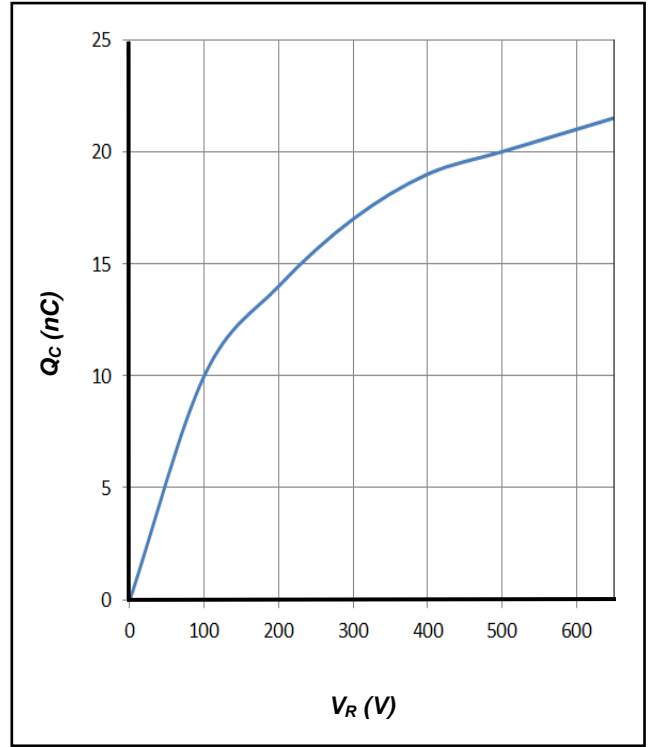


Figure 4. Total Capacitive Charge vs. Reverse Voltage

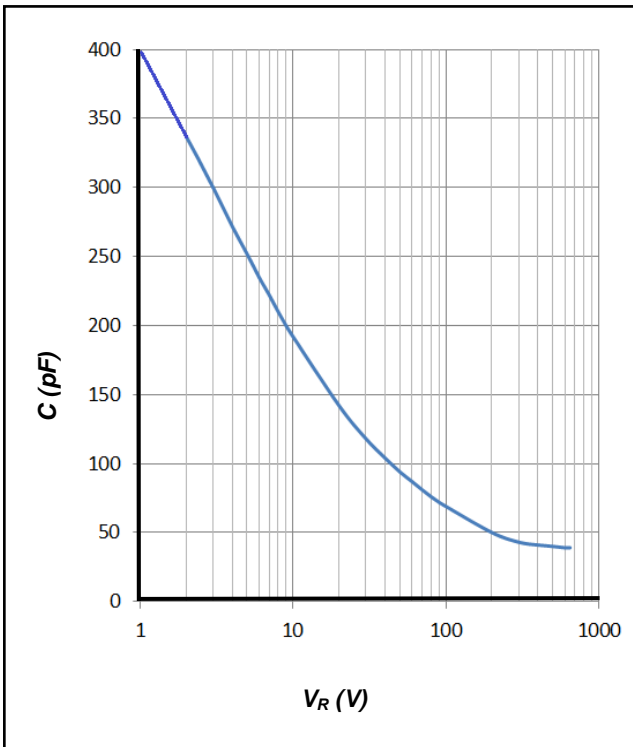


Figure 5. Total Capacitance vs. Reverse Voltage

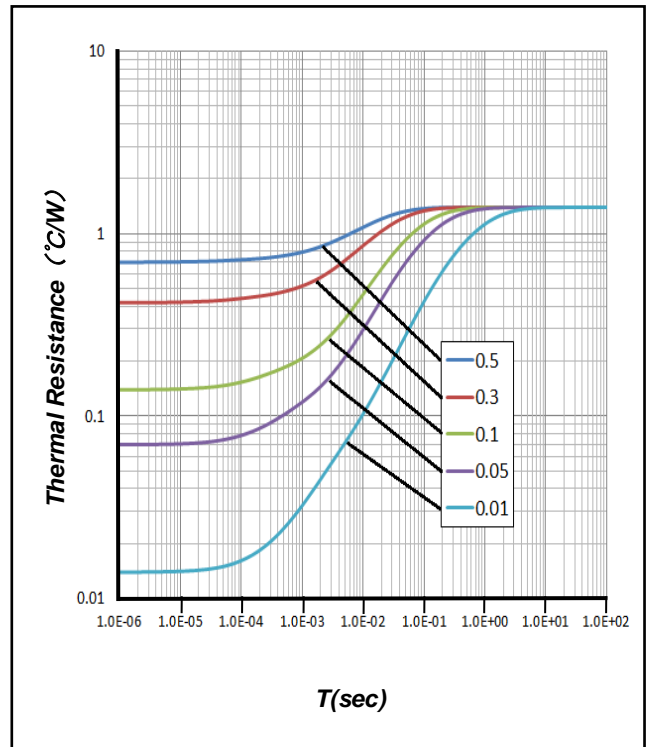
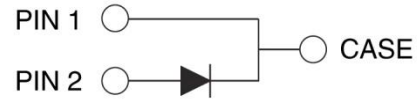
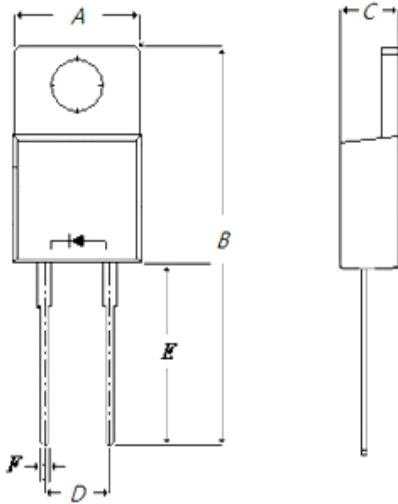


Figure 6. Transient Thermal Impedance

Package Dimensions

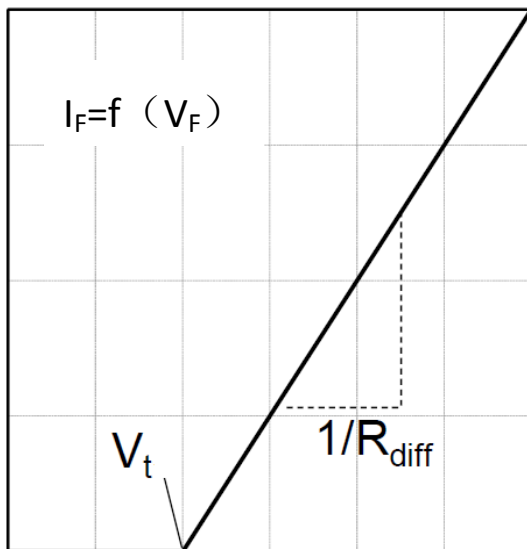
Package TO-220-2



| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|--------|-----------|-----------|-----------|
| A | 9.17 | 10.08 | 10.91 |
| B | 27.00 | 28.58 | 30.00 |
| C | 3.89 | 4.50 | 5.00 |
| D | 4.20 | 5.10 | 5.80 |
| E | 11.70 | 13.30 | 14.97 |
| F | 0.50 | 0.80 | 1.21 |

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

$$V_F = V_t + I_F \times R_{diff}$$

$$V_t = -0.001 \times T_j + 0.9674 \text{ [V]}$$

$$R_{diff} = 1 \times 10^{-6} \times T_j^2 + 1 \times 10^{-4} \times T_j + 0.0543 \text{ [\Omega]}$$

Note:

T_j = Diode Junction Temperature In Degrees Celsius,
valid from 25°C to 175°C

I_F = Forward Current

Less than 16A



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