

HM4C8N65

Silicon Carbide Schottky Diode

| | | | |
|------------------------------------|---|-----|----|
| V_{RRM} | = | 650 | V |
| $I_F (T_C \leq 135^\circ\text{C})$ | = | 14 | A |
| Q_C | = | 21 | nC |

Features

- New Thin Wafer Technology
- Low Forward Voltage Drop (V_F)
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on V_F
- Temperature-independent Switching

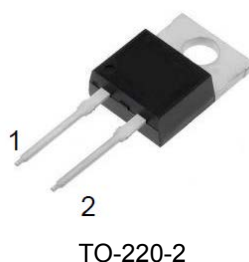
Benefits

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

Applications

- Switch Mode Power Supplies
- Uninterruptible Power Supplies
- Server/Telecom Power Supplies
- Industrial Power Supplies

Package



| Part Number | Package | Marking |
|-------------|----------|----------|
| HM4C8N65 | TO-220-2 | HM4C8N65 |

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 | 31 14 8 | A | $T_C \leq 25^\circ\text{C}$ $T_C \leq 135^\circ\text{C}$ $T_C \leq 156^\circ\text{C}$ | |
| I_{FSM} | Non-Repetitive Forward Surge Current | 70 | 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_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 | 1.27 1.38 | 1.5 1.6 | V | $I_F = 8A, T_J = 25^{\circ}C$ $I_F = 8A, T_J = 175^{\circ}C$ | Fig.1 |
| I_R | Reverse Current | 5 25 | 50 200 | μA | $V_R = 650V, T_J = 25^{\circ}C$ $V_R = 650V, T_J = 175^{\circ}C$ | Fig.2 |
| C | Total Capacitance | 530 54 39 | / | 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 | 21 | / | nC | $V_R = 400V, I_F = 8A$ $di/dt = 200A/\mu s, T_J = 25^{\circ}C$ | 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_{solder} | Soldering Temperature | 260 | $^{\circ}C$ | |

Typical Performance

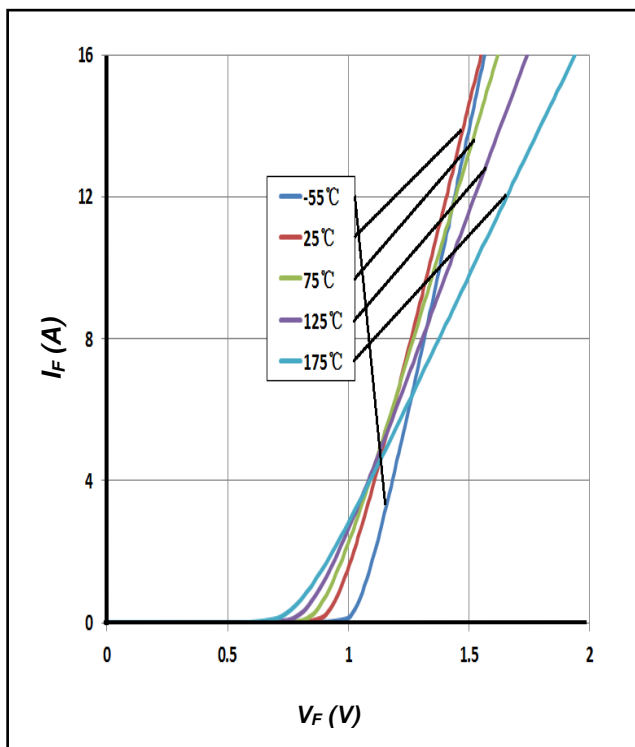


Figure 1. Forward Characteristics

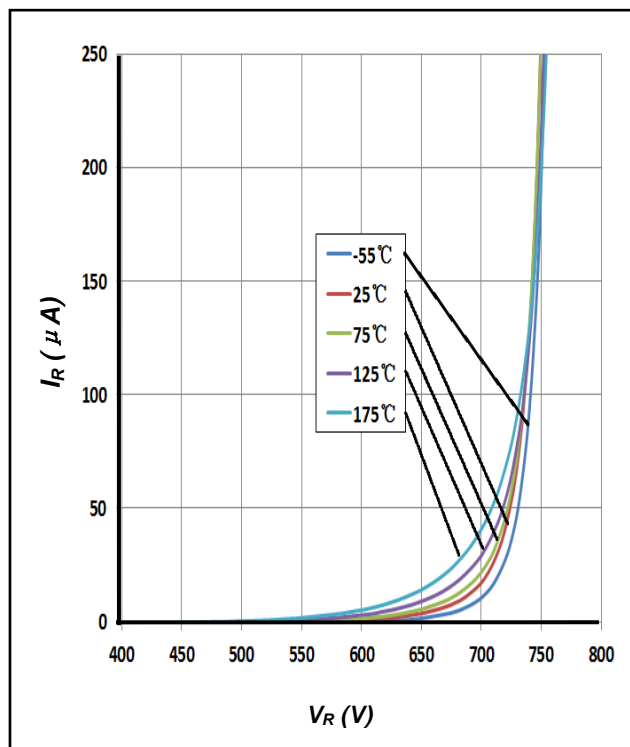


Figure 2. Reverse Characteristics

Typical Performance

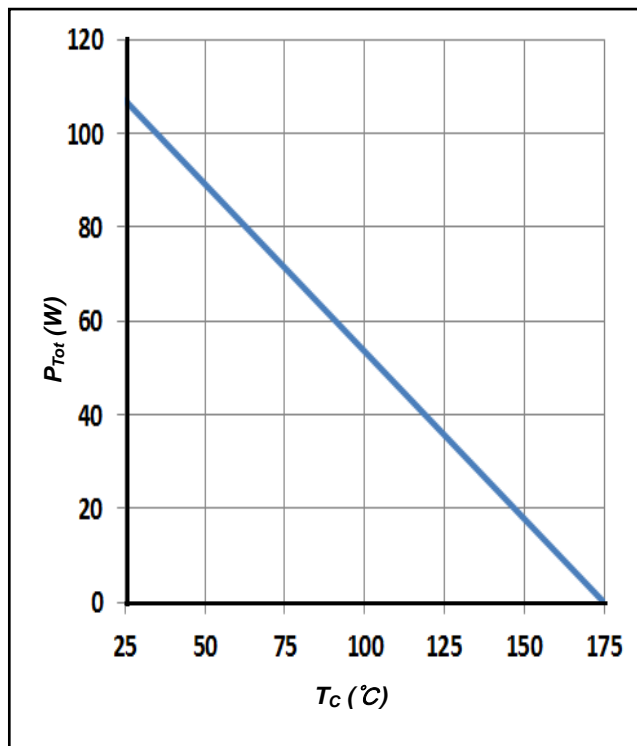


Figure 3. Power Derating

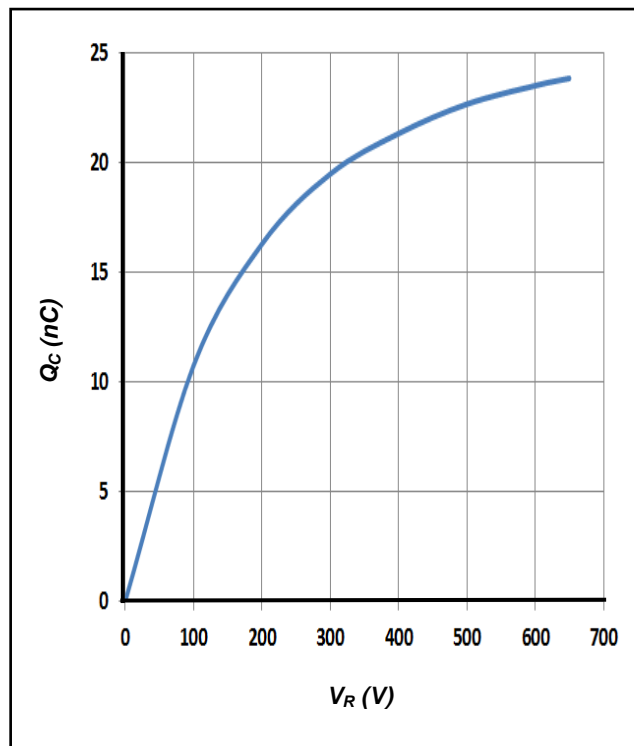


Figure 4. Total Capacitive Charge vs. Reverse Voltage

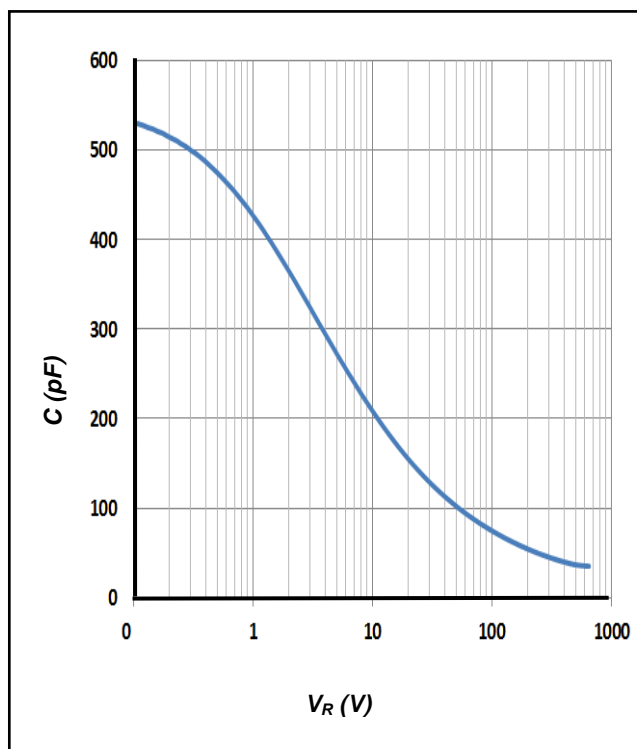


Figure 5. Total Capacitance vs. Reverse Voltage

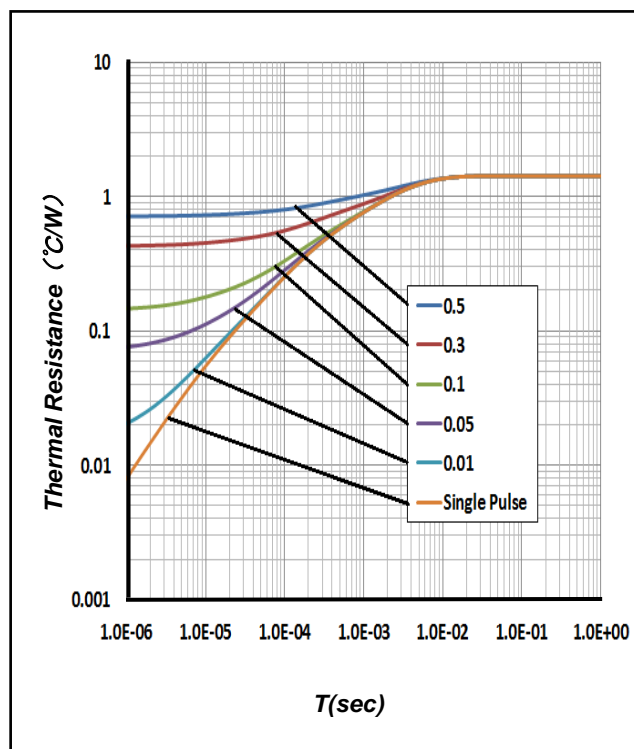
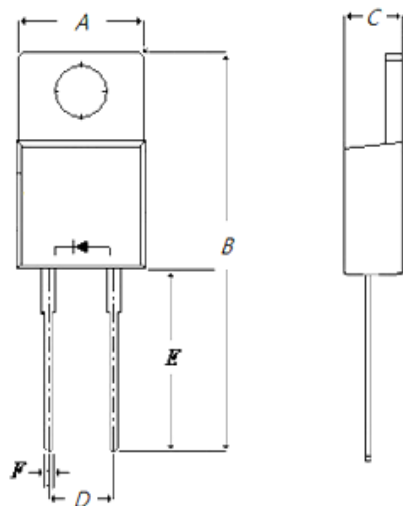


Figure 6. Transient Thermal Impedance

Package Dimensions

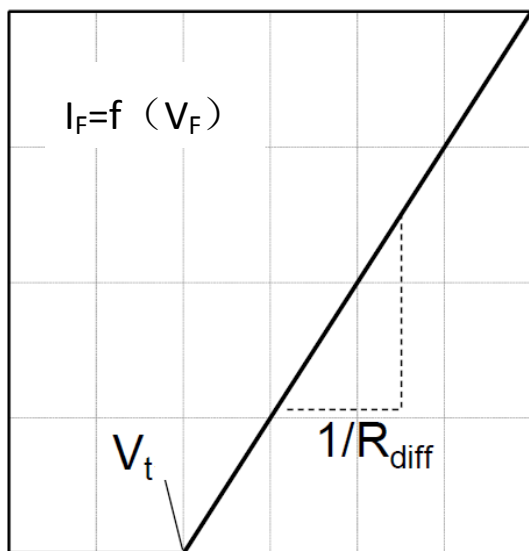
Package TO-220-2



| 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

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

$$V_t = -0.001 \times T_j + 0.99 \text{ [V]}$$

$$R_{diff} = 8.7 \times 10^{-7} \times T_j^2 + 5.4 \times 10^{-5} \times T_j + 0.35 \text{ [\Omega]}$$

Note:

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

I_F = Forward Current

Less than 16A