

## HMC15N65

### Silicon Carbide Schottky Diode

|   |   |       |
|---|---|-------|
| $V_{RRM}$                               | = | 650 V |
| $I_F (T_C=149\text{ }^{\circ}\text{C})$ | = | 15 A  |
| $Q_C$                                   | = | 47 nC |

### Features

- 650 V Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching

### Benefits

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- High Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

### Applications

- Switching Mode Power Supply
- Boost Diodes in PFC
- DC/DC Converters
- AC/DC Converters
- Free Wheeling Diodes in Inverter

### Package



| Part Number | Package  | Marking  |
|-------------|----------|----------|
| HMC15N65    | TO-220-2 | HMC15N65 |

### Maximum Ratings $(T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

| Symbol    | Parameter                            | Value            | Unit               | Test Conditions  | Note   |
|-----------|--------------------------------------|------------------|--------------------|--|--------|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage      | 650              | V                  |  |        |
| $V_{RSM}$ | Surge Peak Reverse Voltage           | 650              | V                  |  |        |
| $V_R$     | DC Peak Reverse Voltage              | 650              | V                  |  |        |
| $I_F$     | Continuous Forward Current           | 43<br>19.5<br>15 | A                  | $T_C = 25\text{ }^{\circ}\text{C}$<br>$T_C = 135\text{ }^{\circ}\text{C}$<br>$T_C = 149\text{ }^{\circ}\text{C}$ | Fig. 3 |
| $I_{FSM}$ | Non-Repetitive Forward Surge Current | 120              | A                  | $T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$ , Half Sine Pulse                                      |        |
| $P_{tot}$ | Power Dissipation                    | 150<br>65        | W                  | $T_C = 25\text{ }^{\circ}\text{C}$<br>$T_C = 110\text{ }^{\circ}\text{C}$  | Fig. 4 |
| $T_J$     | Operating Junction Range             | -55 to +175      | $^{\circ}\text{C}$ |  |        |
| $T_{stg}$ | Storage Temperature Range            | -55 to +175      | $^{\circ}\text{C}$ |  |        |

## Electrical Characteristics

| Symbol | Parameter                 | Typ.            | Max.       | Unit          | Test Conditions  | Note   |
|--------|---------------------------|-----------------|------------|---------------|--|--------|
| $V_F$  | Forward Voltage           | 1.42<br>1.7     | 1.7<br>2.5 | V             | $I_F = 15\text{ A}$ , $T_J = 25\text{ }^\circ\text{C}$<br>$I_F = 15\text{ A}$ , $T_J = 175\text{ }^\circ\text{C}$  | Fig. 1 |
| $I_R$  | Reverse Current           | 3<br>20         | 100<br>250 | $\mu\text{A}$ | $V_R = 650\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$<br>$V_R = 650\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$  | Fig. 2 |
| $Q_C$  | Total Capacitive Charge   | 47              |            | nC            | $V_R = 400\text{ V}$ , $I_F = 15\text{ A}$ ,<br>$T_J = 25\text{ }^\circ\text{C}$   | Fig. 6 |
| $C$    | Total Capacitance         | 836<br>91<br>69 |            | pF            | $V_R = 0\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 200\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$ , $f = 1\text{ MHz}$<br>$V_R = 400\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$ , $f = 1\text{ MHz}$ | Fig. 5 |
| $E_C$  | Capacitance Stored Energy | 5.9             |            | $\mu\text{J}$ | $V_R = 400\text{ V}$   | Fig. 7 |

Note: This is a majority carrier diode, so there is no reverse recovery charge.

## Thermal Characteristics

| Symbol          | Parameter                                | Min. | Typ. | Max. | Unit               | Note  |
|-----------------|--|------|------|------|--------------------|-------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case |      | 1.0  |      | $^\circ\text{C/W}$ | Fig.8 |

## Typical Performance

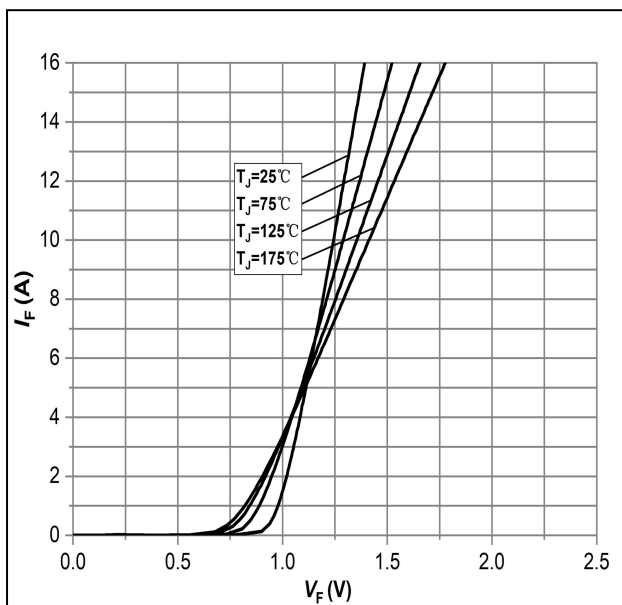


Figure 1: Forward Characteristics

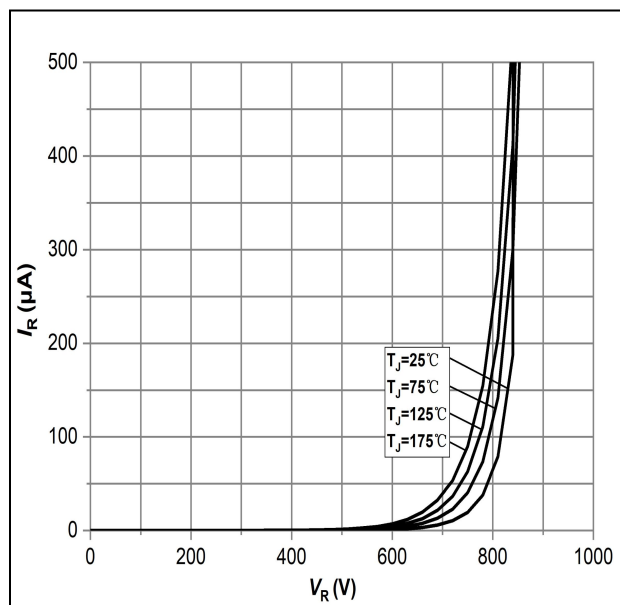


Figure 2: Reverse Characteristics

## Typical Performance

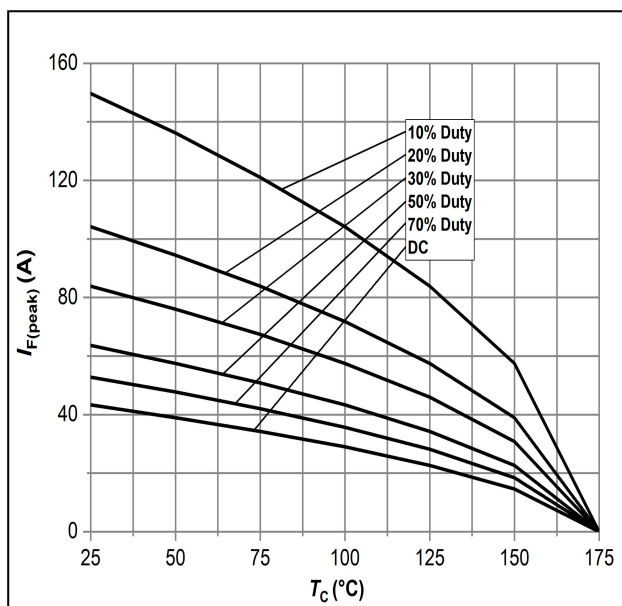


Figure 3: Current Derating

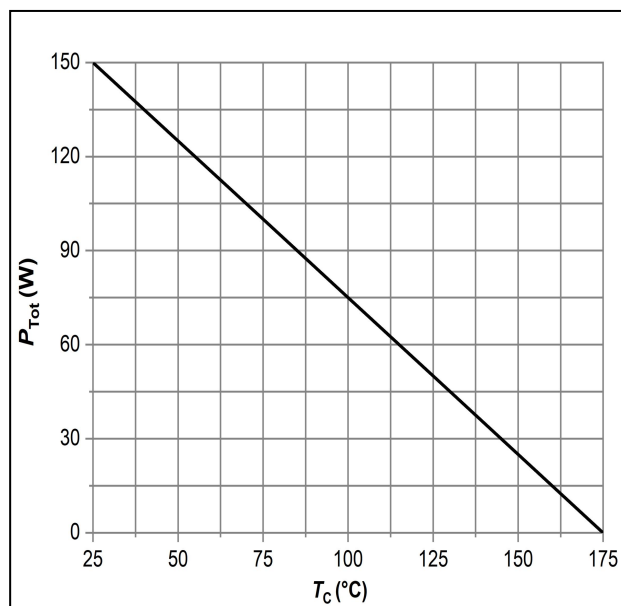


Figure 4: Power Derating

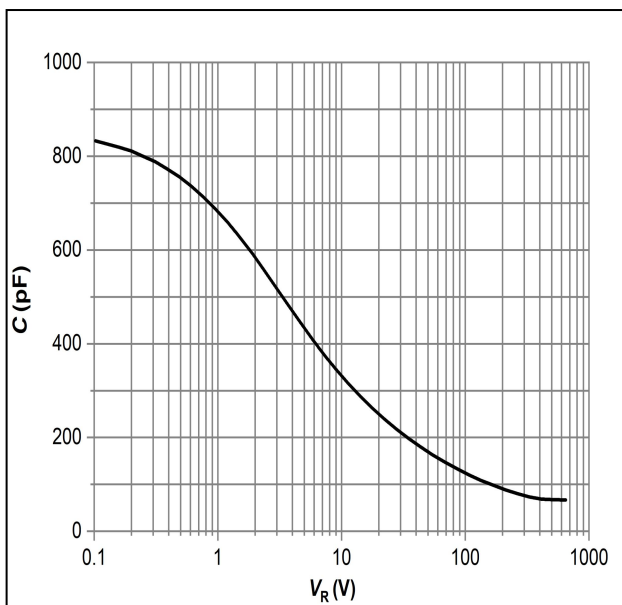


Figure 5: Capacitance vs. Reverse Voltage

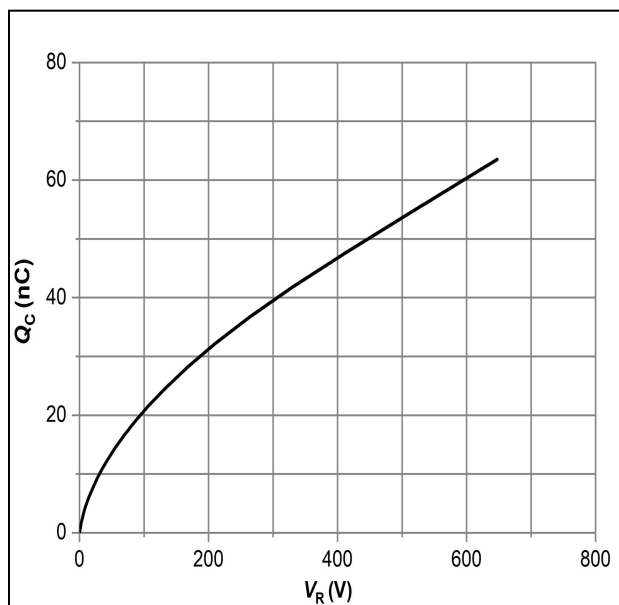


Figure 6: Total Capacitance Charge vs. Reverse Voltage

## Typical Performance

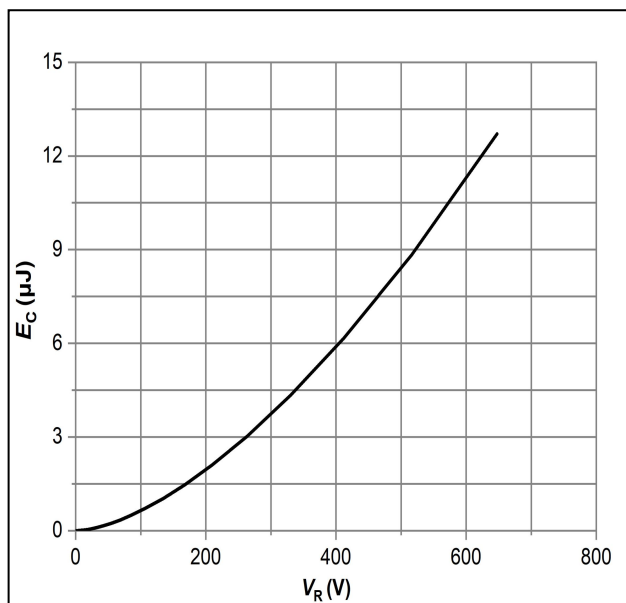


Figure 7: Typical Capacitance Stored Energy

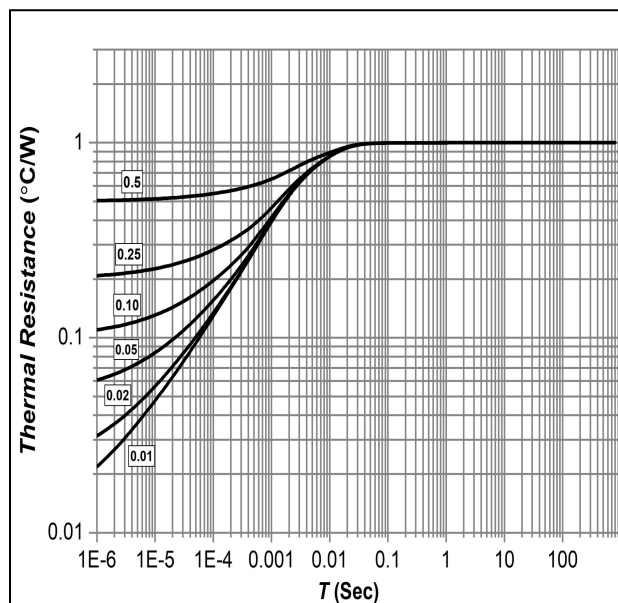
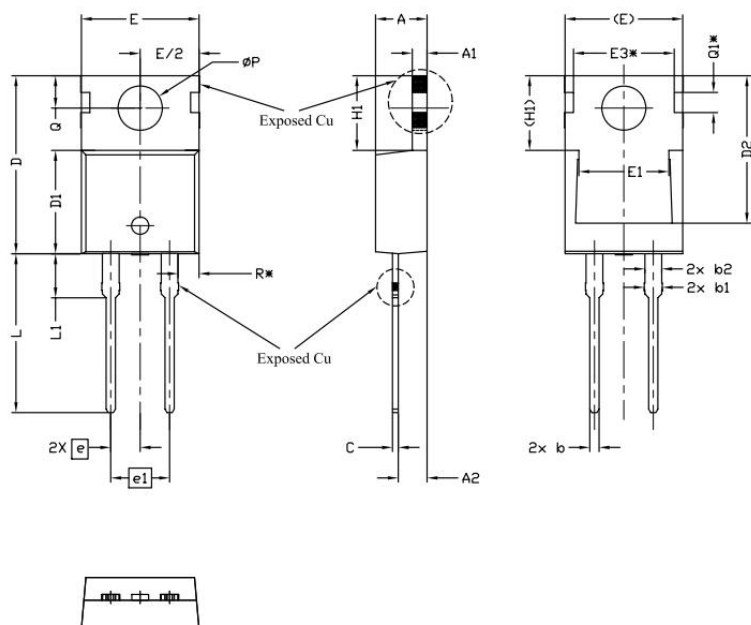


Figure 8: Transient Thermal Impedance

## Package Dimensions

Package: TO-220-2



| SYMBOL | DIMENSIONS |       |       | NOTES |
|--------|------------|-------|-------|-------|
|        | Min.       | NOM   | Max.  |       |
| A      | 4.24       | 4.44  | 4.64  |       |
| A1     | 1.15       | 1.27  | 1.40  |       |
| A2     | 2.30       | 2.48  | 2.70  |       |
| b      | 0.70       | 0.80  | 0.90  |       |
| b1     | 1.20       | 1.55  | 1.75  |       |
| b2     | 1.20       | 1.45  | 1.70  |       |
| c      | 0.40       | 0.50  | 0.60  |       |
| D      | 14.70      | 15.37 | 16.00 | 4     |
| D1     | 8.82       | 8.92  | 9.02  |       |
| D2     | 12.43      | 12.73 | 12.83 | 5     |
| E      | 9.96       | 10.16 | 10.36 | 4.5   |
| E1     | 6.86       | 7.77  | 8.89  | 5     |
| E3*    | 8.70 REF   |       |       |       |
| e      | 2.54 BSC   |       |       |       |
| e1     | 5.08 BSC   |       |       |       |
| H1     | 6.30       | 6.45  | 6.60  | 5.6   |
| L      | 13.47      | 13.72 | 13.97 |       |
| L1     | 3.60       | 3.80  | 4.00  |       |
| ØP     | 3.75       | 3.84  | 3.93  |       |
| Q      | 2.60       | 2.80  | 3.00  |       |
| Q1*    | 1.73 REF   |       |       |       |
| R*     | 1.82 REF   |       |       |       |

OTE : Dimension L, M, W apply for Solder Dip Finish