

## HMC15N65T2

### Silicon Carbide Schottky Diode

|  |   |      |    |
|--|---|------|----|
| $V_{RRM}$                              | = | 1200 | V  |
| $I_F$ ( $T_C \leq 135^\circ\text{C}$ ) | = | 17.5 | A  |
| $Q_C$                                  | = | 43   | nC |

#### Features

- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on  $V_F$
- Temperature-independent Switching
- $175^\circ\text{C}$  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



| Part Number | Package  | Marking    |
|-------------|----------|------------|
| HMC15N65T2  | TO-247-2 | HMC15N65T2 |

#### Maximum Ratings

| Symbol         | Parameter                                  | Value            | Unit             | Test Conditions   | Note  |
|----------------|--|------------------|------------------|---|-------|
| $V_{RRM}$      | Repetitive Peak Reverse Voltage            | 1200             | V                | $T_C = 25^\circ\text{C}$  |       |
| $V_{RSM}$      | Surge Peak Reverse Voltage                 | 1200             | V                | $T_C = 25^\circ\text{C}$  |       |
| $V_R$          | DC Blocking Voltage                        | 1200             | V                | $T_C = 25^\circ\text{C}$  |       |
| $I_F$          | Forward Current                            | 37<br>17.5<br>15 | A                | $T_C \leq 25^\circ\text{C}$<br>$T_C \leq 135^\circ\text{C}$<br>$T_C \leq 144^\circ\text{C}$ |       |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current       | 135              | A                | $T_C = 25^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , Half Sine Wave                            |       |
| $P_{tot}$      | Power Dissipation                          | 183              | W                | $T_C = 25^\circ\text{C}$  | Fig.3 |
| $T_C$          | Maximum Case Temperature                   | 144              | $^\circ\text{C}$ |   |       |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature | -55 to 175       | $^\circ\text{C}$ |   |       |
|                | TO-247 Mounting Torque                     | 1                | Nm               | M3 Screw  |       |

## Electrical Characteristics

| Symbol | Parameter               | Typ.            | Max.       | Unit    | Test Conditions   | Note  |
|--------|-------------------------|-----------------|------------|---------|---|-------|
| $V_F$  | Forward Voltage         | 1.55<br>2.2     | 1.8<br>2.5 | V       | $I_F = 15A, T_J = 25^{\circ}C$<br>$I_F = 15A, T_J = 175^{\circ}C$   | Fig.1 |
| $I_R$  | Reverse Current         | 5<br>20         | 20<br>200  | $\mu A$ | $V_R = 1200V, T_J = 25^{\circ}C$<br>$V_R = 1200V, T_J = 175^{\circ}C$   | Fig.2 |
| C      | Total Capacitance       | 940<br>70<br>57 | /          | pF      | $V_R = 0V, T_J = 25^{\circ}C, f = 1MHz$<br>$V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$<br>$V_R = 800V, T_J = 25^{\circ}C, f = 1MHz$ | Fig.5 |
| $Q_C$  | Total Capacitive Charge | 43              | /          | nC      | $V_R = 800V, I_F = 15A$<br>$di/dt = 200A/\mu s, T_J = 25^{\circ}C$  | Fig.4 |

## Thermal Characteristics

| Symbol          | Parameter                                   | Typ. | Unit          | Note  |
|-----------------|---|------|---------------|-------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case    | 0.82 | $^{\circ}C/W$ | Fig.6 |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 80   | $^{\circ}C/W$ |       |
| $T_{sold}$      | Soldering Temperature                       | 260  | $^{\circ}C$   |       |

## Typical Performance

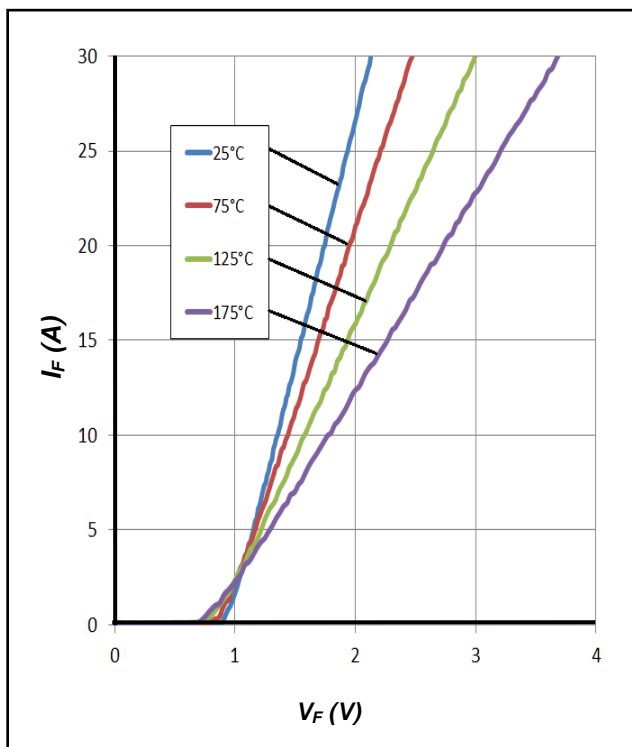


Figure 1. Forward Characteristics

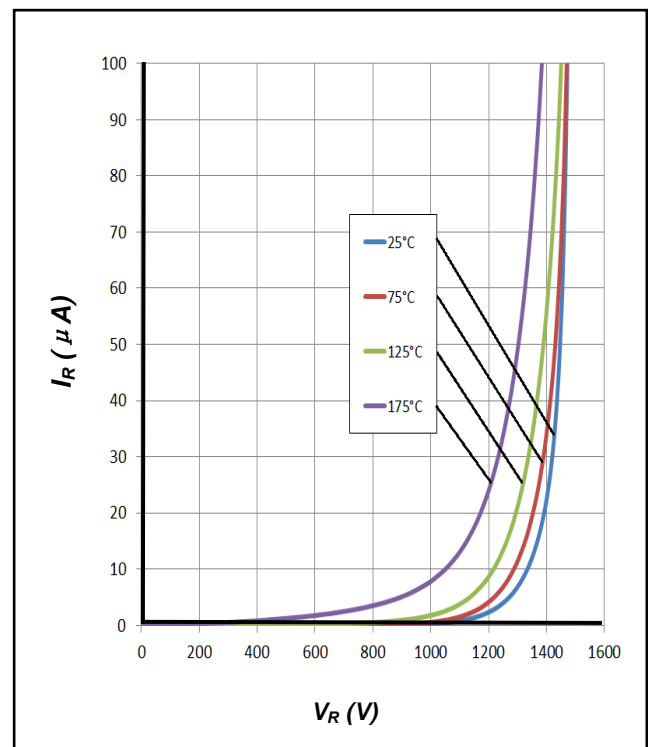


Figure 2. Reverse Characteristics

## Typical Performance

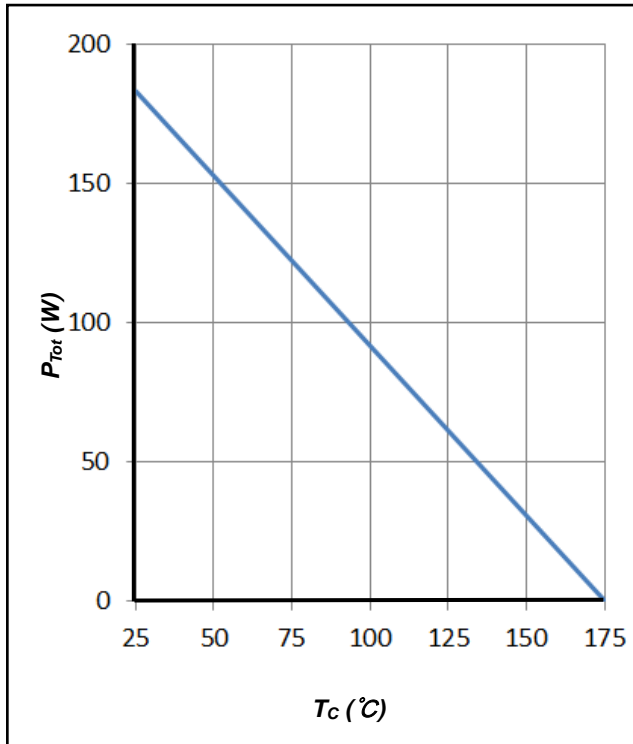


Figure 3. Power Derating

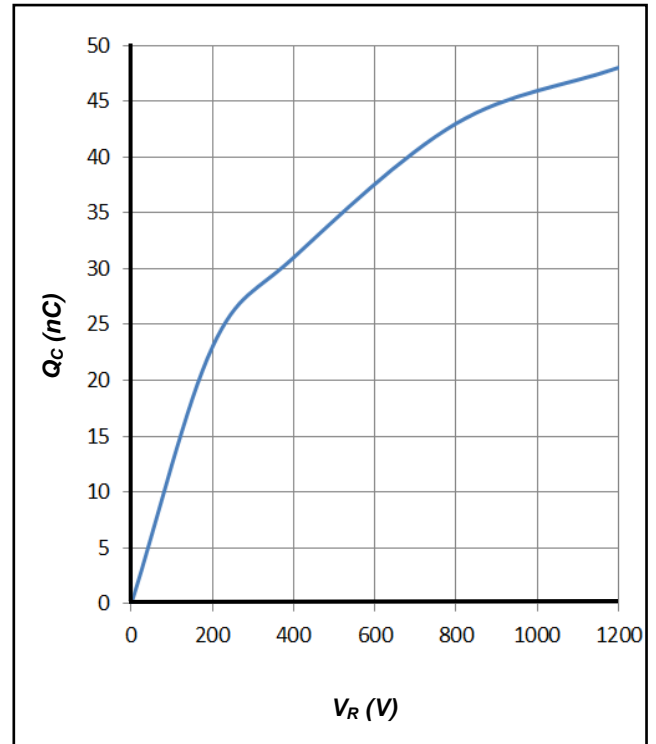


Figure 4. Total Capacitive Charge vs. Reverse Voltage

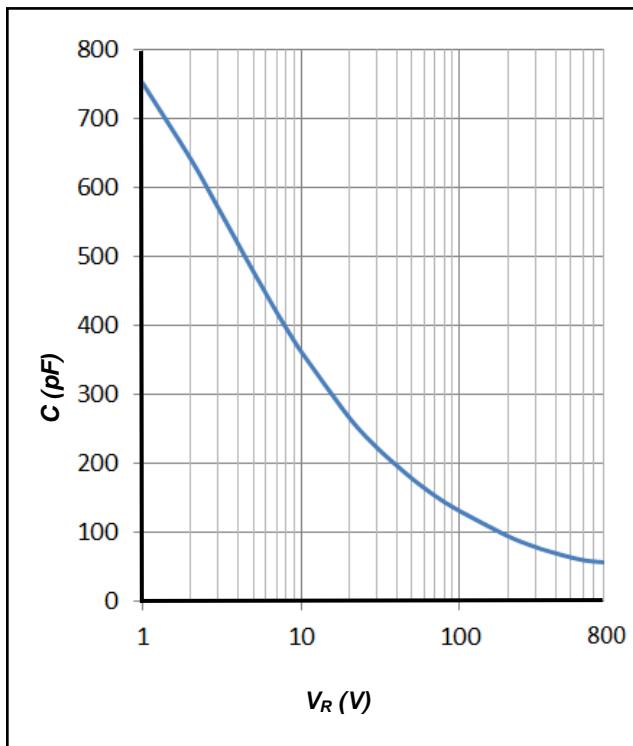


Figure 5. Total Capacitance vs. Reverse Voltage

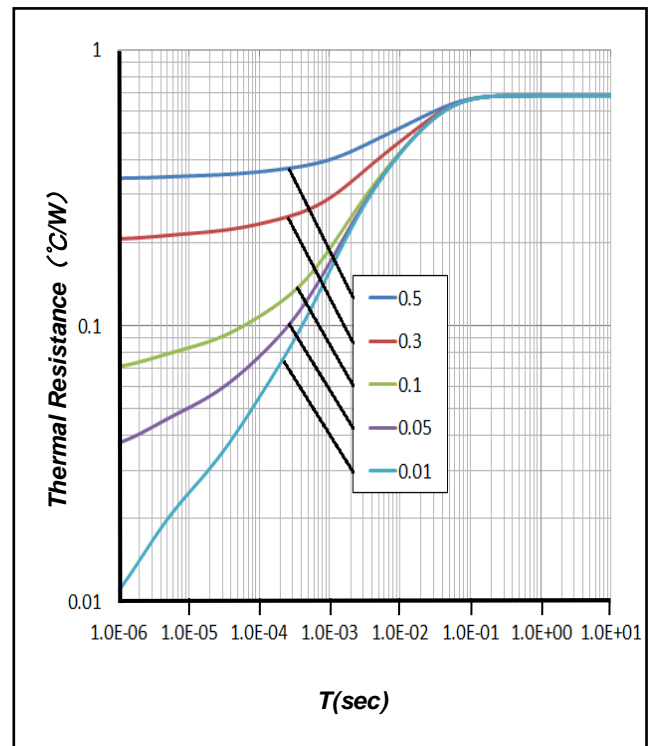
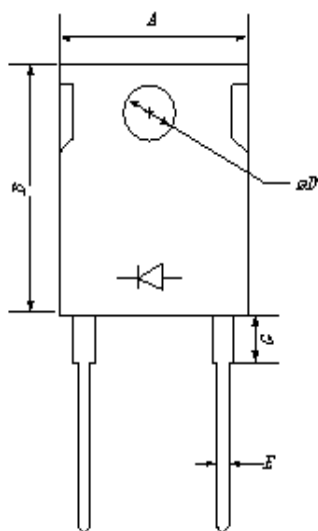


Figure 6. Transient Thermal Impedance

## Package Dimensions

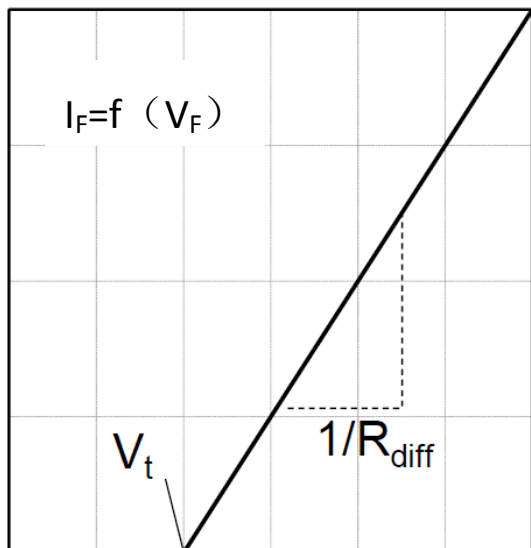
Package TO-247-2



| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|--------|-----------|-----------|-----------|
| A      | 14.18     | 15.75     | 17.33     |
| B      | 18.45     | 20.5      | 22.55     |
| C      | 4.50      | 5.00      | 5.50      |
| D      | 3.15      | 3.50      | 3.85      |
| E      | 1.08      | 1.20      | 1.32      |
| F      | 18.27     | 20.30     | 22.33     |

## Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.001 \times T_j + 0.9836 \text{ [V]}$$

$$R_{diff} = 1 \times 10^{-6} \times T_j^2 + 1 \times 10^{-4} \times T_j + 0.0347 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 30A