# HMC15N65D

## Silicon Carbide Schottky Diode

| | | | |
|---|---|---|---|
| $V_{RRM}$ | = | 650 | V |
| $I_F$ ( $T_C$≤135℃) | = | 20 | A |
| $Q_C$ | = | 34.5 | nC |

### Features

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

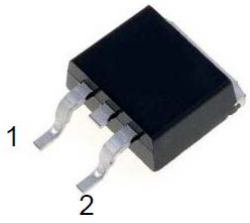
### Benefits

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

### Applications

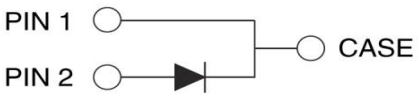
- Switch Mode Power Supplies
- Power Factor Correction
- AC/DC converters

### Package




TO-263-2

RoHS




| Part Number | Package | Marking |
|---|---|---|
| HMC15N65D | TO-263-2 | HMC15N65D |

### Maximum Ratings

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 650 | V | $T_C$ = 25℃ | |
| $V_{RSM}$ | Surge Peak Reverse Voltage | 650 | V | $T_C$ = 25℃ | |
| $V_R$ | DC Blocking Voltage | 650 | V | $T_C$ = 25℃ | |
| $I_F$ | Forward Current | 45<br>20<br>15 | A | $T_C$ ≤ 25℃<br>$T_C$ ≤ 135℃<br>$T_C$ ≤ 151℃ | |
| $I_{FSM}$ | Non-Repetitive Forward Surge Current | 135 | A | $T_C$ = 25℃, $t_p$ = 8.3ms, Half Sine Wave | |
| $P_{tot}$ | Power Dissipation | 153 | W | $T_C$ = 25℃ | Fig.3 |
| $T_C$ | Maximum Case Temperature | 151 | ℃ | | |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature | -55 to 175 | ℃ | | |

## Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | 1.4<br>1.7 | 1.65<br>2.3 | V | $I_F$ = 15A, $T_J$ = 25˚C<br>$I_F$ = 15A, $T_J$ = 175˚C | Fig.1 |
| $I_R$ | Reverse Current | 2<br>10 | 20<br>200 | μA | $V_R$ = 650V, $T_J$ = 25˚C<br>$V_R$ = 650V, $T_J$ = 175˚C | Fig.2 |
| C | Total Capacitance | 865<br>88<br>72 | / | pF | $V_R$ = 0V, $T_J$ = 25˚C, f = 1MHz<br>$V_R$ = 200V, $T_J$ = 25˚C, f = 1MHz<br>$V_R$ = 400V, $T_J$ = 25˚C, f = 1MHz | Fig.5 |
| $Q_C$ | Total Capacitive Charge | 34.5 | / | nC | $V_R$ = 650V, $I_F$ = 15A<br>di/dt = 200A/μs, $T_J$ = 25˚C | Fig.4 |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Unit | Note |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 0.98 | ˚C/W | Fig.6 |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 80 | ˚C/W | |
| $T_{sold}$ | Soldering Temperature | 260 | ˚C | |

## Typical Performance

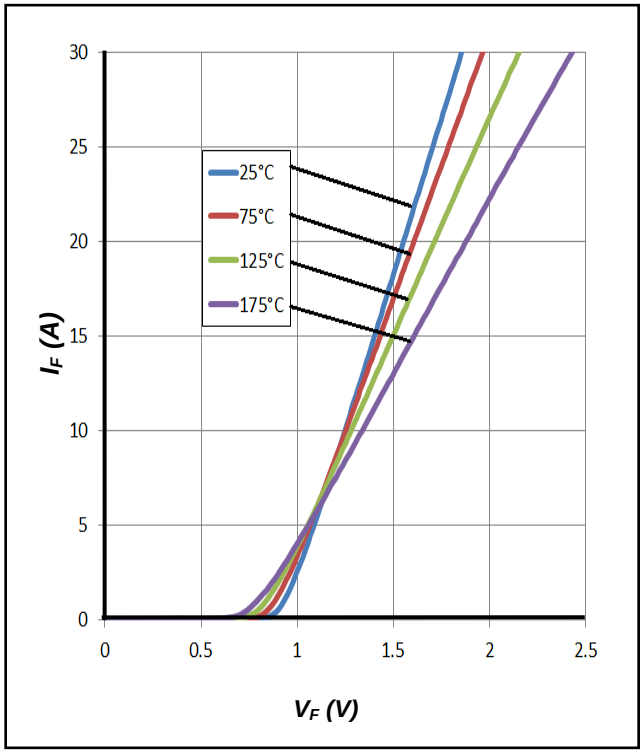



Figure 1. Forward Characteristics

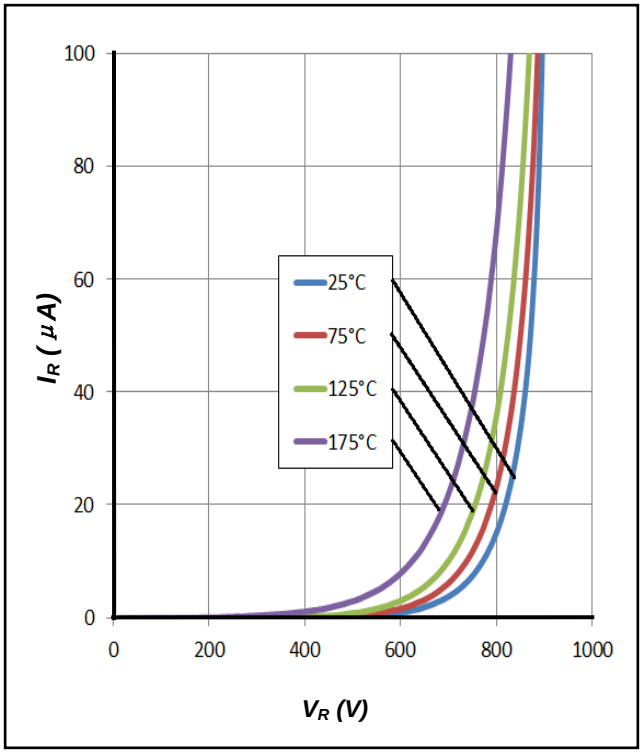



Figure 2. Reverse Characteristics

## Typical Performance

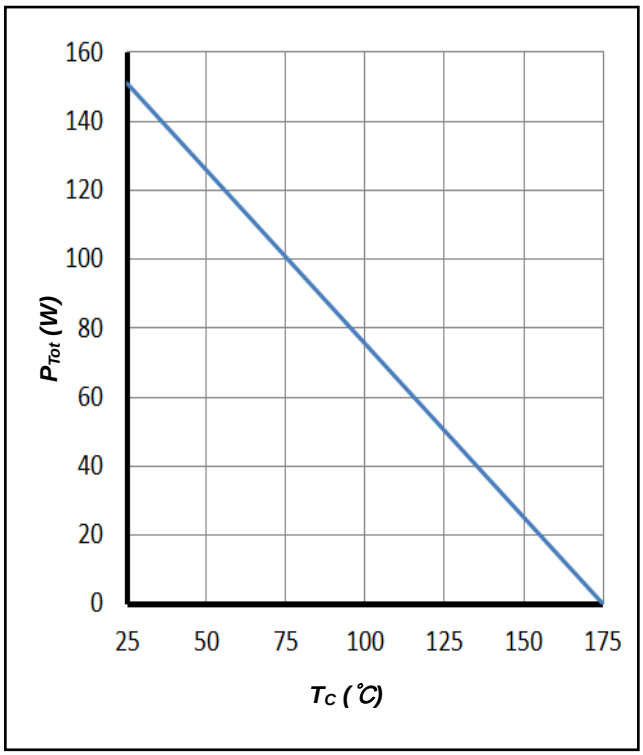



Figure 3. Power Derating

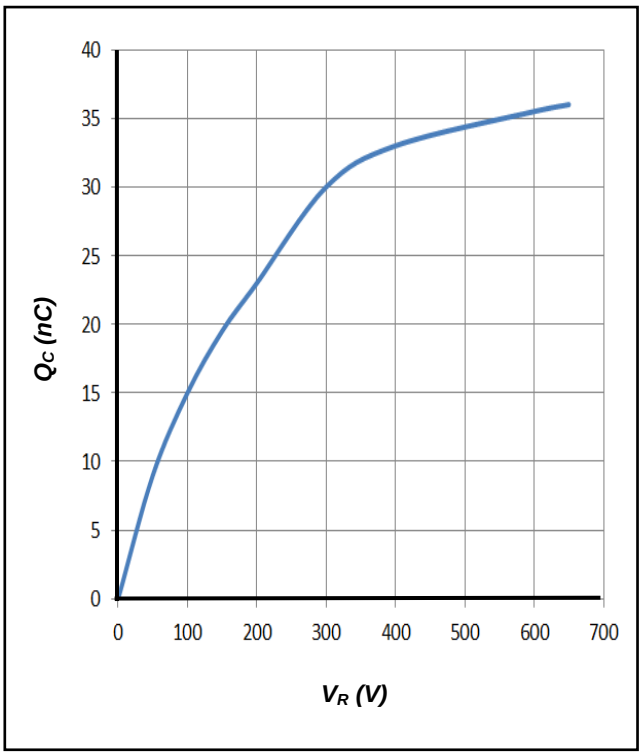



Figure 4. Total Capacitive Charge vs. Reverse Voltage

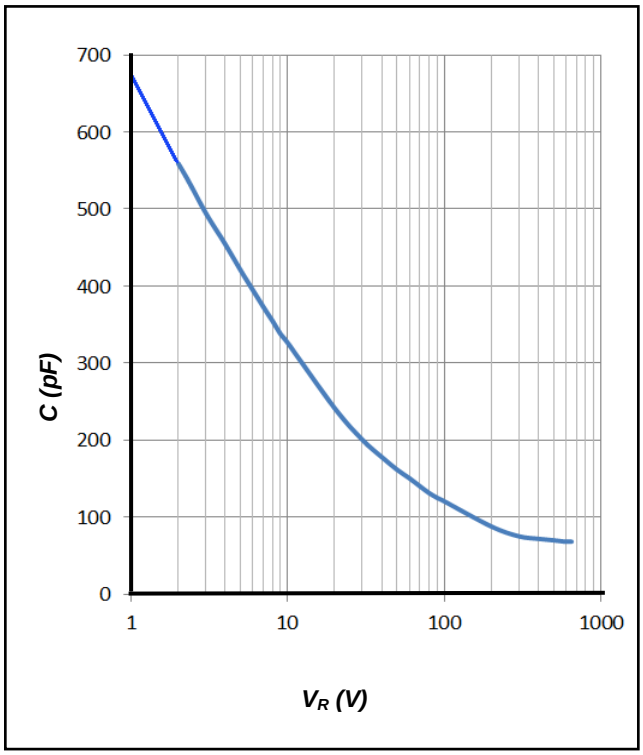



Figure 5. Total Capacitance vs. Reverse Voltage

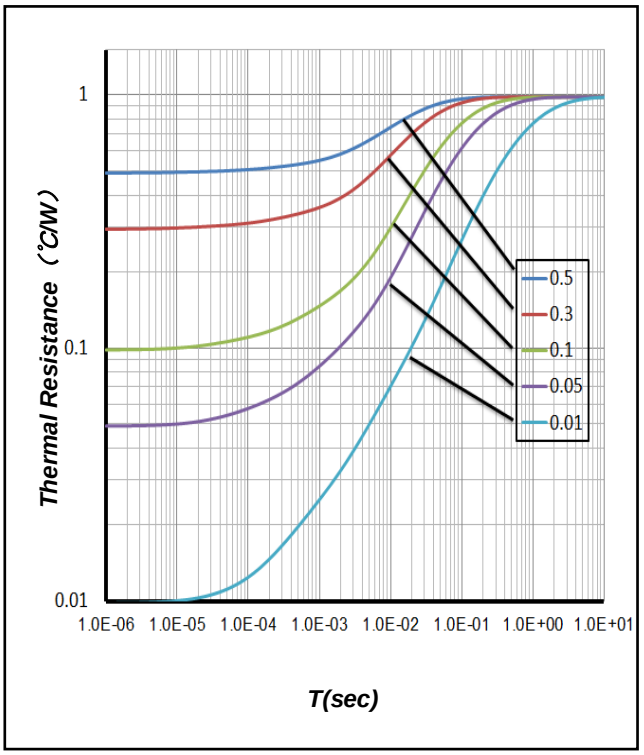
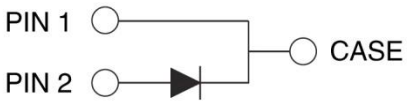
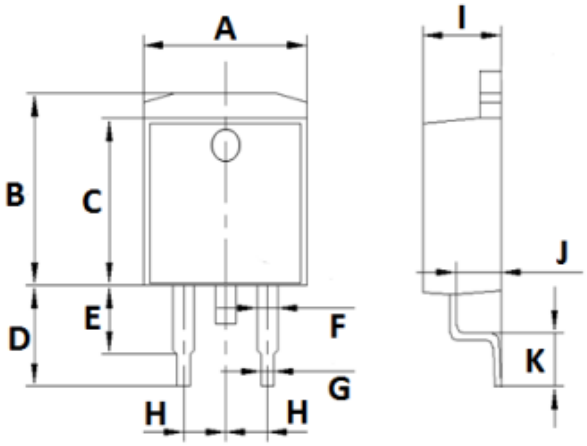



Figure 6. Transient Thermal Impedance

## Package Dimensions

Package TO-263-2

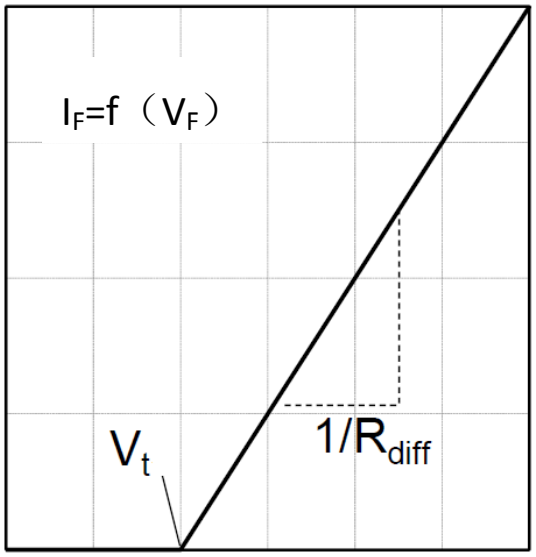



| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|---|---|---|---|
| A | 9.9 | 10.1 | 10.3 |
| B | 9.90 | 10.1 | 10.3 |
| C | 8.50 | 8.7 | 8.90 |
| D | 4.85 | 5.05 | 5.25 |
| E | 3.00 | 3.2 | 3.40 |
| F | 1.05 | 1.25 | 1.45 |
| G | 0.60 | 0.8 | 1.00 |
| H | 2.34 | 2.54 | 2.74 |
| I | 4.40 | 4.6 | 4.80 |
| J | 2.40 | 2.6 | 2.80 |
| K | 2.55 | 1.75 | 2.95 |

## Simplified Diode Model

**Equivalent IV Curve for Model**




**Mathematical Equation**

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

$V_t = -0.00102 \times T_j + 0.968$ [V]

$R_{diff} = 5.61 \times 10^{-7} \times T_j^2 + 4.77 \times 10^{-5} \times T_j + 0.029$ [Ω]

Note:

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

$I_F$= Forward Current

Less than 30A