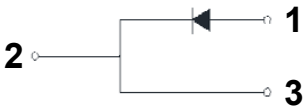
# HSTPSC5H12D

Silicon Carbide Schottky Diode

## Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching
- Positive Temperature Coefficient on $V_F$


TO-220C-2L




## Benefits

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

## Applications

- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

| Part Number | Package | Qty(PCS) |
|---|---|---|
| HSTPSC5H12D | TO-220C-2L | 50 |

## Maximum Ratings ($T_C$=25°C unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V | | |
| $V_{RSM}$ | Surge Peak Reverse Voltage | 1300 | V | | |
| $V_R$ | DC Peak Reverse Voltage | 1200 | V | | |
| $I_F$ | Continuous Forward Current | 19<br>9.5<br>5 | A | $T_C$=25˚C<br>$T_C$=135˚C<br>$T_C$=161˚C | Fig. 3 |
| $I_{FRM}$ | Repetitive Peak Forward Surge Current | 26<br>18 | A | $T_C$=25˚C, $t_P$=10 ms, Half Sine Pulse<br>$T_C$=110˚C, $t_P$=10 ms, Half Sine Pulse | |
| $I_{FSM}$ | Non-Repetitive Forward Surge Current | 46<br>36 | A | $T_C$=25˚C, $t_P$=10 ms, Half Sine Pulse<br>$T_C$=110˚C, $t_P$=10 ms, Half Sine Pulse | Fig. 8 |
| $I_{F,Max}$ | Non-Repetitive Peak Forward Current | 400<br>320 | A | $T_C$=25˚C, $t_P$=10 ms, Pulse<br>$T_C$=110˚C, $t_P$=10 ms, Pulse | Fig. 8 |
| $P_{tot}$ | Power Dissipation | 100<br>43 | W | $T_C$=25˚C<br>$T_C$=110˚C | Fig. 4 |
| dV/dt | Diode dV/dt ruggedness | 200 | V/ns | $V_R$=0-650V | |
| $\int i^2dt$ | $i^2t$ value | 10.6<br>6.5 | $A^2s$ | $T_C$=25˚C, $t_P$=10 ms<br>$T_C$=110˚C, $t_P$=10 ms | |
| $T_J$ | Operating Junction Range | -55 to +175 | ˚C | | |
| $T_{stg}$ | Storage Temperature Range | -55 to +135 | ˚C | | |
| | TO220-2L Mounting Torque | 1<br>8.8 | Nm<br>lbf-in | M3 Screw<br>6-32 Screw | |

## Electrical Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | 1.4<br>1.9 | 1.8<br>3 | V | $I_F$ = 5 A $T_J$=25°C<br>$I_F$ = 5 A $T_J$=175°C | Fig. 1 |
| $I_R$ | Reverse Current | 20<br>40 | 150<br>300 | μA | $V_R$ = 1200 V $T_J$=25°C<br>$V_R$ = 1200 V $T_J$=175°C | Fig. 2 |
| $Q_C$ | Total Capacitive Charge | 27 | | nC | $V_R$ = 800 V, $I_F$ = 5A<br>$di/dt$ = 200 A/μs<br>$T_J$ = 25°C | Fig. 5 |
| C | Total Capacitance | 390<br>27<br>20 | | pF | $V_R$ = 0 V, $T_J$ = 25°C, f = 1 MHz<br>$V_R$ = 400 V, $T_J$ = 25°C, f = 1 MHz<br>$V_R$ = 800 V, $T_J$ = 25°C, f = 1 MHz | Fig. 6 |
| $E_C$ | Capacitance Stored Energy | 8.0 | | μJ | $V_R$ = 800 V | Fig. 7 |

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

## Thermal Characteristics

| Symbol | Parameter | Typ. | Unit | Note |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 1.5 | °C/W | Fig. 9 |

## Typical Performance

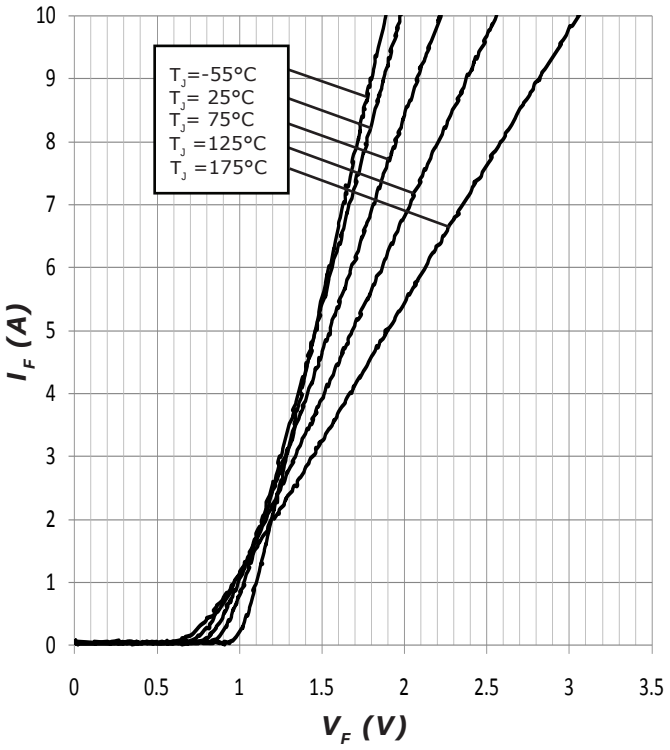



Figure 1. Forward Characteristics

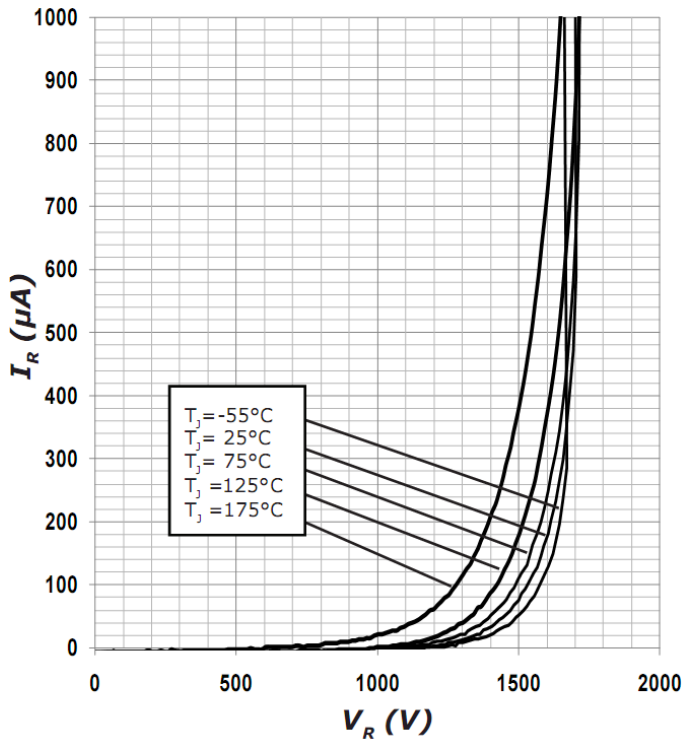



Figure 2. Reverse Characteristics

## Typical Performance

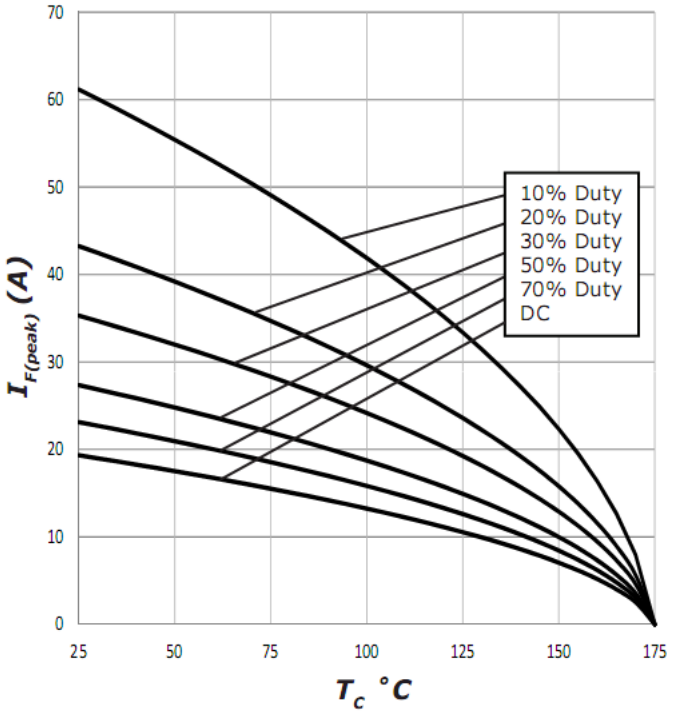



Figure 3. Current Derating

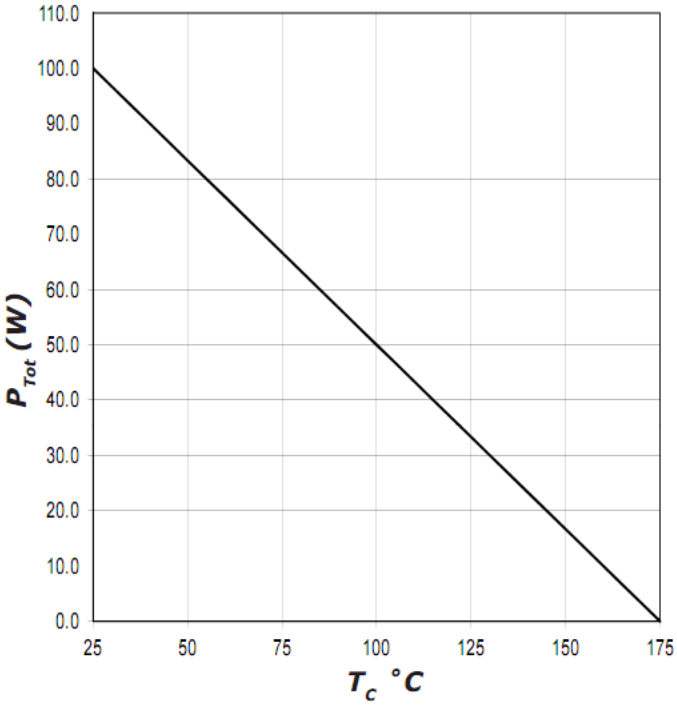



Figure 4. Power Derating

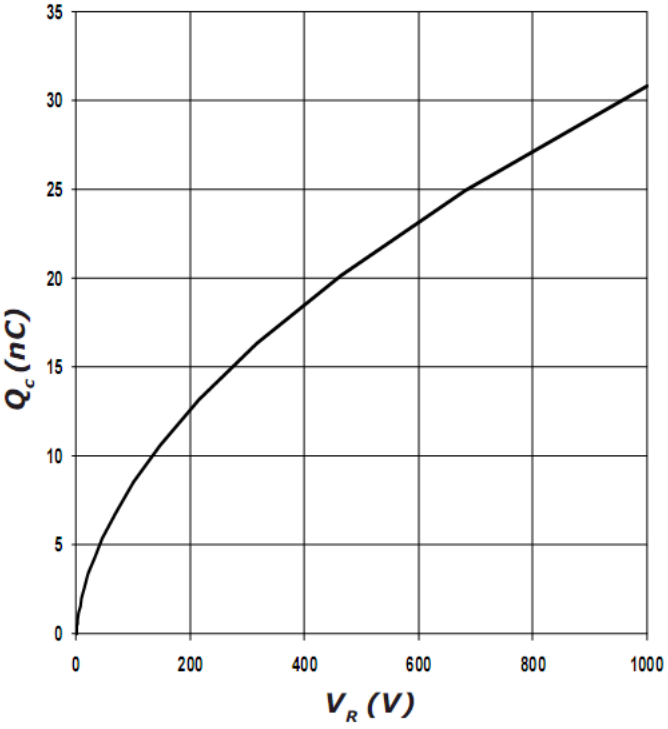



Figure 5. Recovery Charge vs. Reverse Voltage

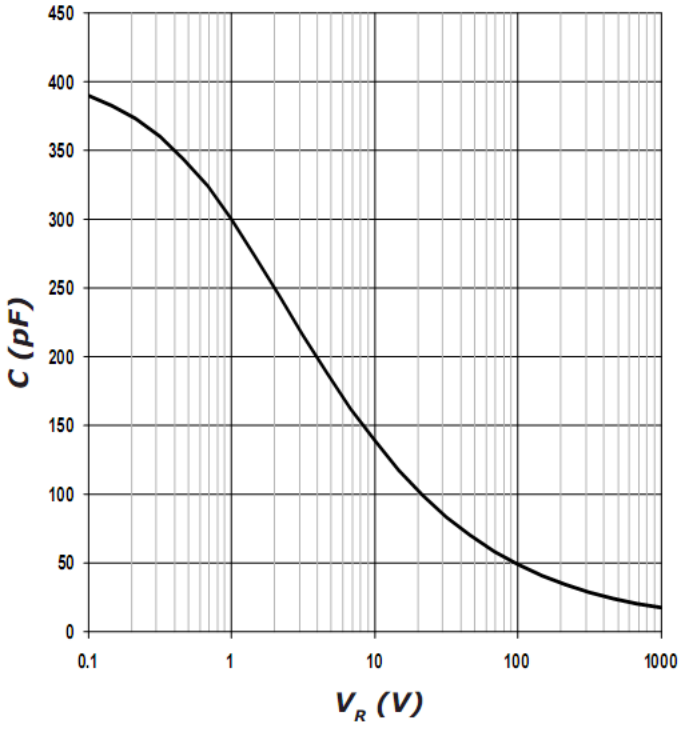
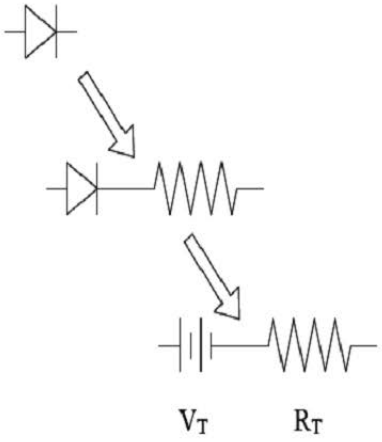



Figure 6. Capacitance vs. Reverse Voltage

**Diode Model**



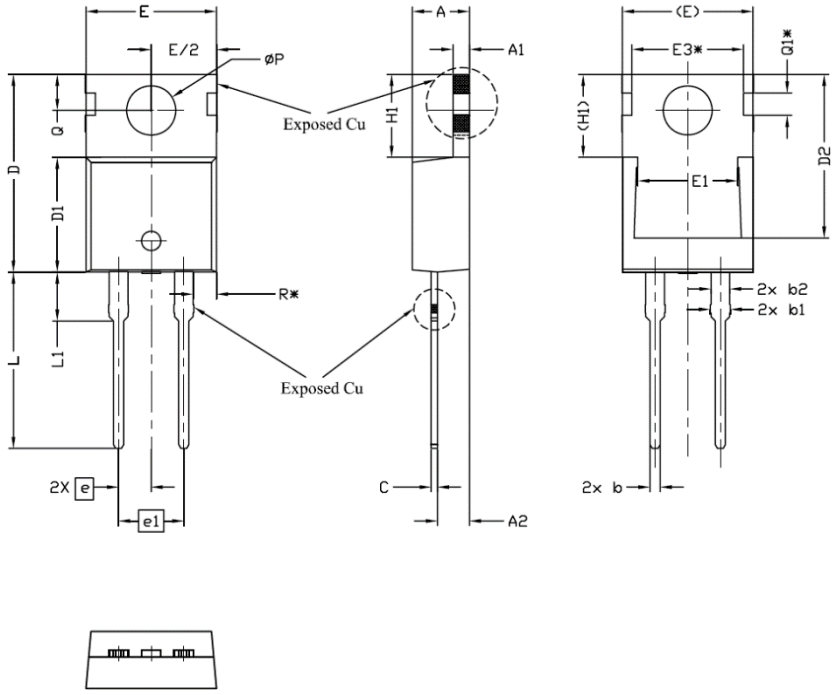

$$Vf_T = V_T + If * R_T$$

$$\mathbf{V_T = 0.96 + (T_j * -1.22*10^{-3})}$$

$$\mathbf{R_T = 0.08 + (T_j * 8.5*10^{-4})}$$

**Note: $T_j$ is diode junction temperature in degrees Celsius**

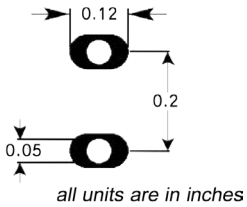
## Package Information
## TO-220C-2L






| 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* | 8.70REF. | | | |
| e | 2.54BSC | | | |
| e1 | 5.08BSC | | | |
| 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* | 1.73REF. | | | |
| R* | 1.82REF. | | | |

### Recommended Solder Pad Layout




*all units are in inches*

TO-220C-2L

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