# Diode

Silicon Carbide Schottky Diode

# IDH16G120C5

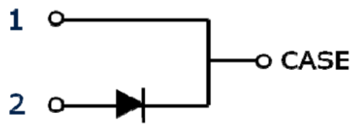
5th Generation thinQ!™ 1200 V SiC Schottky Diode

## Final Datasheet

Rev. 2.0 2015-09-03

Industrial Power Control

# thinQ!TM SiC Schottky Diode




### Features:

- Revolutionary semiconductor material - Silicon Carbide
- No reverse recovery current / No forward recovery
- Temperature independent switching behavior
- Low forward voltage even at high operating temperature
- Tight forward voltage distribution
- Excellent thermal performance
- Extended surge current capability
- Specified dv/dt ruggedness
- Qualified according to JEDEC[1)] for target applications
- Pb-free lead plating; RoHS compliant


### Benefits

- System efficiency improvement over Si diodes
- Enabling higher frequency / increased power density solutions
- System size / cost savings due to reduced heatsink requirements and smaller magnetics
- Reduced EMI
- Highest efficiency across the entire load range
- Robust diode operation during surge events
- High reliability
- RelatedLinks: www.infineon.com/sic

### Applications

- Solar inverters
- Uninterruptable power supplies
- Motor drives
- Power Factor Correction

### Package pin definitions

- Pin 1 and backside – cathode
- Pin 2 – anode

**Key Performance and Package Parameters**

| Type | $V_{DC}$ | $I_F$ | $Q_C$ | $T_{j,max}$ | Marking | Package |
|---|---|---|---|---|---|---|
| IDH16G120C5 | 1200V | 16A | 57nC | 175°C | D1612C5 | PG-TO220-2-1 |

1) J-STD20 and JESD22

**Table of Contents**

### Maximum ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | 1200 | V |
| Continues forward current for $R_{th(j-c,max)}$<br>$T_C$ = 145°C, D=1<br>$T_C$ = 135°C, D=1<br>$T_C$ = 25°C, D=1 | $I_F$ | 16<br>19<br>40 | A |
| Surge non-repetitive forward current, sine halfwave<br>$T_C$=25°C, $t_p$=10ms<br>$T_C$=150°C, $t_p$=10ms | $I_{F,SM}$ | 140<br>120 | A |
| Non-repetitive peak forward current<br>$T_C$ = 25°C, $t_p$=10 µs | $I_{F,max}$ | 850 | A |
| i²t value<br>$T_C$ = 25°C, $t_p$=10 ms<br>$T_C$ = 150°C, $t_p$=10 ms | $\int i^2dt$ | 99<br>71 | A²s |
| Diode d*v*/d*t* ruggedness<br>$V_R$=0…960V | d*v*/d*t* | 80 | V/ns |
| Power dissipation<br>$T_C$ = 25°C | $P_{tot}$ | 250 | W |
| Operating and storage temperature | $T_j$;$T_{stg}$ | -55…175 | °C |
| Soldering temperature, wavesoldering only allowed at leads, 1.6mm (0.063 in.) from case for 10 s | $T_{sold}$ | 260 | °C |
| Mounting torque<br>M3 and M4 screws | *M* | 0.7 | Nm |

### Thermal Resistances

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Characteristic** | | | | | | |
| Diode thermal resistance, junction – case | $R_{th(j-c)}$ | | - | 0.46 | 0.60 | K/W |
| Thermal resistance, junction – ambient | $R_{th(j-a)}$ | leaded | - | - | 62 | K/W |

## Electrical Characteristics

### Static Characteristics, at $T_j$=25°C, unless otherwise specified

| Parameter | Symbol | Conditions | Value min. | Value typ. | Value max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristic** | | | | | | |
| DC blocking voltage | $V_{DC}$ | $T_j$ = 25°C | 1200 | - | - | V |
| Diode forward voltage | $V_F$ | $I_F$= 16A, $T_j$=25°C<br>$I_F$= 16A, $T_j$=150°C | -<br>- | 1.65<br>2.25 | 1.95<br>2.85 | V |
| Reverse current | $I_R$ | $V_R$=1200V, $T_j$=25°C<br>$V_R$=1200V, $T_j$=150°C | | 5.5<br>28 | 80<br>410 | µA |

### Dynamic Characteristics, at $T_j$=25°C, unless otherwise specified

| Parameter | Symbol | Conditions | Value min. | Value typ. | Value max. | Unit |
|---|---|---|---|---|---|---|
| **Dynamic Characteristics** | | | | | | |
| Total capacitive charge | $Q_C$ | $V_R$=800V, $T_j$=150°C<br>$Q_C = \int_0^{V_R} C(V)dV$ | - | 57 | - | nC |
| Total Capacitance | $C$ | $V_R$=1 V, $f$=1 MHz<br>$V_R$=400 V, $f$=1 MHz<br>$V_R$=800 V, $f$=1 MHz | -<br>-<br>- | 730<br>52<br>40 | -<br>-<br>- | pF |

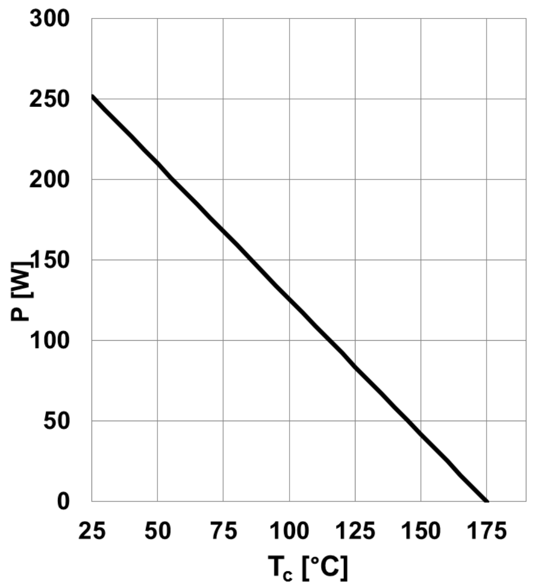



Figure 1. **Power dissipation as a function of case temperature,** $P_{tot}$=f($T_C$, $R_{th(j-c),max}$)

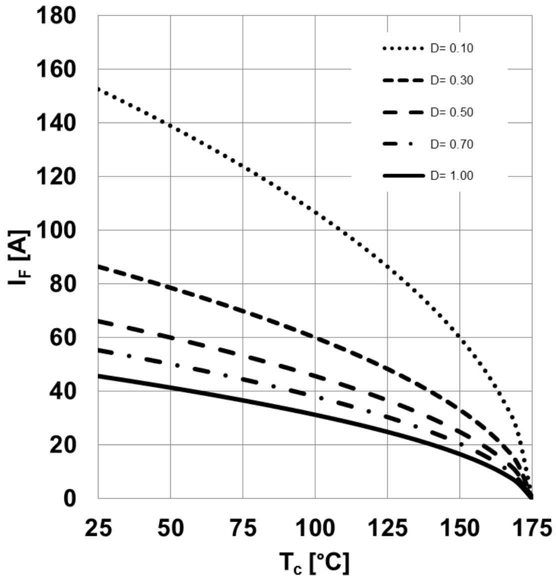



Figure 2. **Diode forward current as function of temperature,** $T_j$≤175°C, $R_{th(j-c),max}$, parameter $D$=duty cycle, $V_{th}$, $R_{diff}$ @ $T_j$=175°C

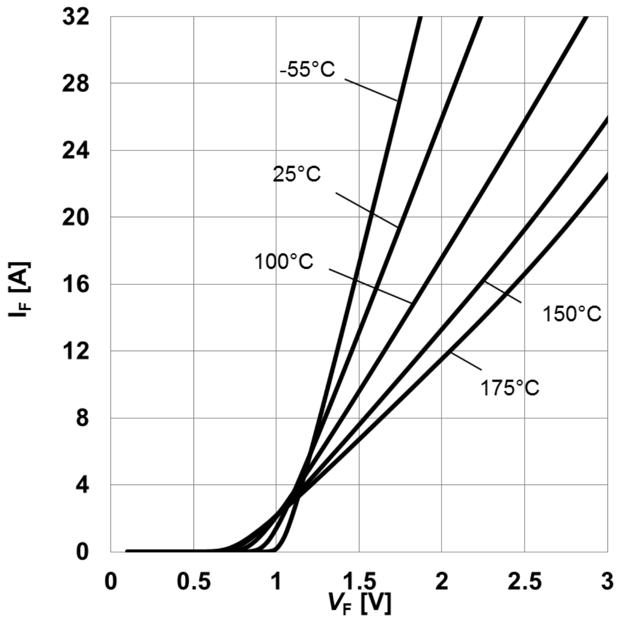



Figure 3. **Typical forward characteristics,** $I_F$=f($V_F$), $t_p$= 10 µs, parameter: $T_j$

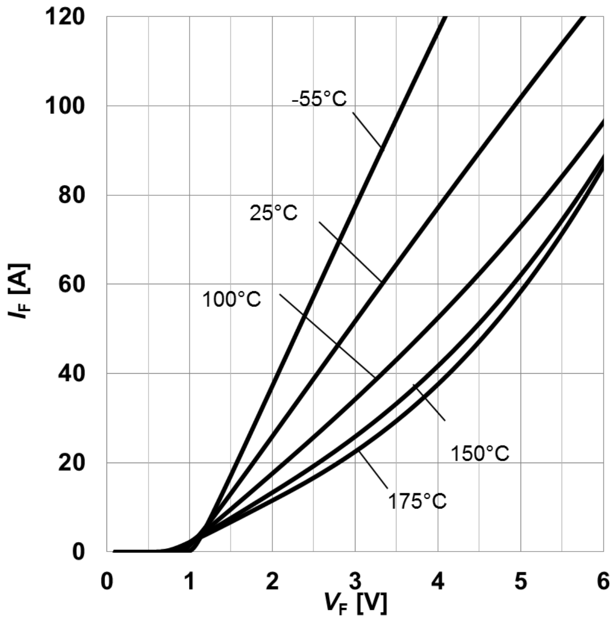



Figure 4. **Typical forward characteristics in surge current,** $I_F$=f($V_F$), $t_p$= 10 µs, parameter: $T_j$

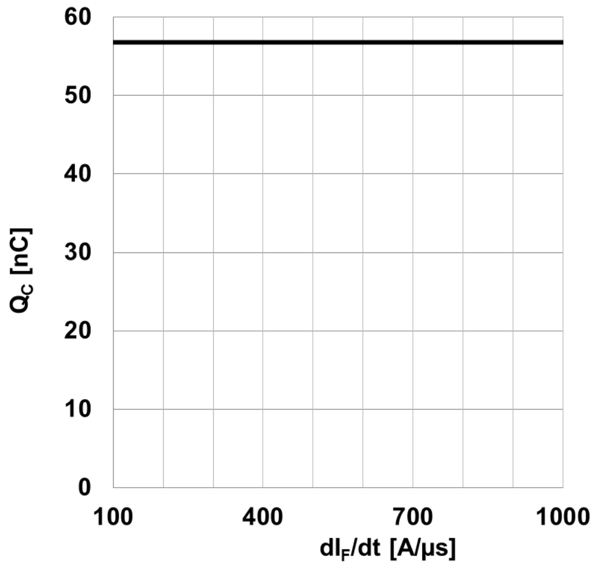



Figure 5. **Typical capacitive charge as function of current slope**[1]**,** $Q_C$=f($dI_F/dt$), $T_j$=150°C

1) Only capacitive charge, guaranteed by design.

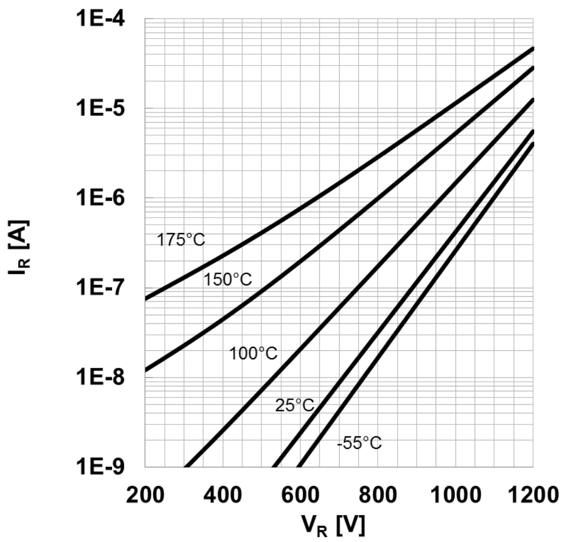



Figure 6. **Typical reverse current as function of reverse voltage,** $I_R$=f($V_R$), parameter: $T_j$

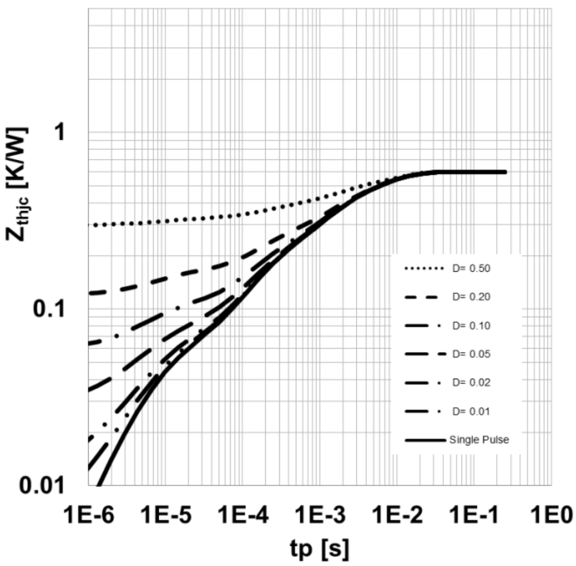



Figure 7. **Max. transient thermal impedance,** $Z_{th,jc}$=f($t_P$), parameter: D=$t_P/T$

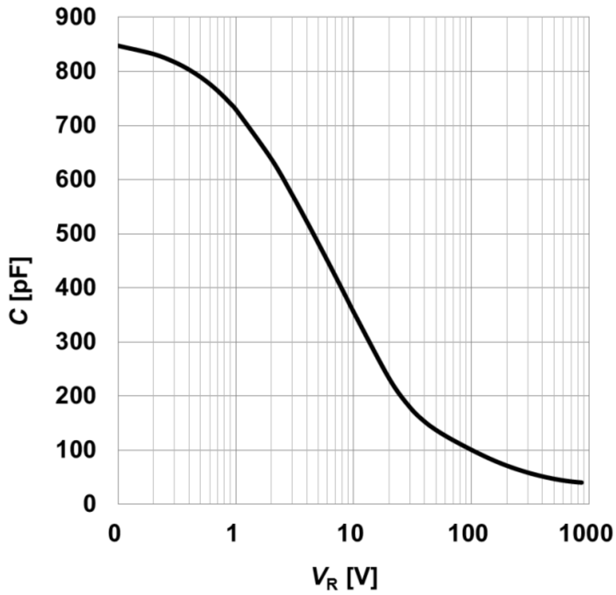



Figure 8. **Typical capacitance as function of reverse voltage**, $C$=f($V_R$); $T_j$=25°C; $f$=1 MHz

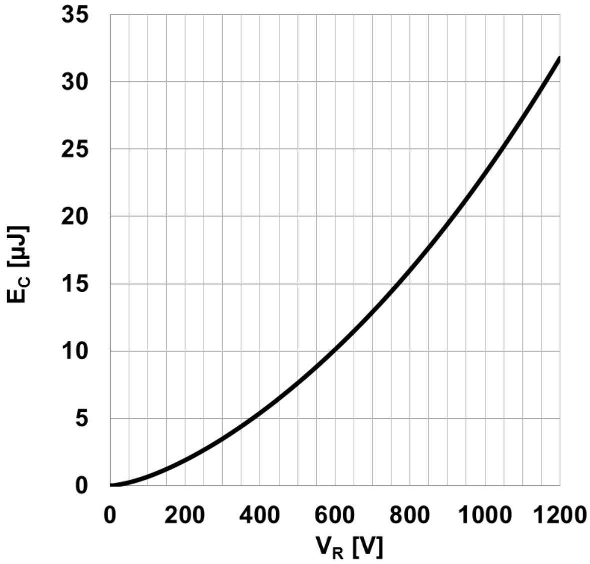
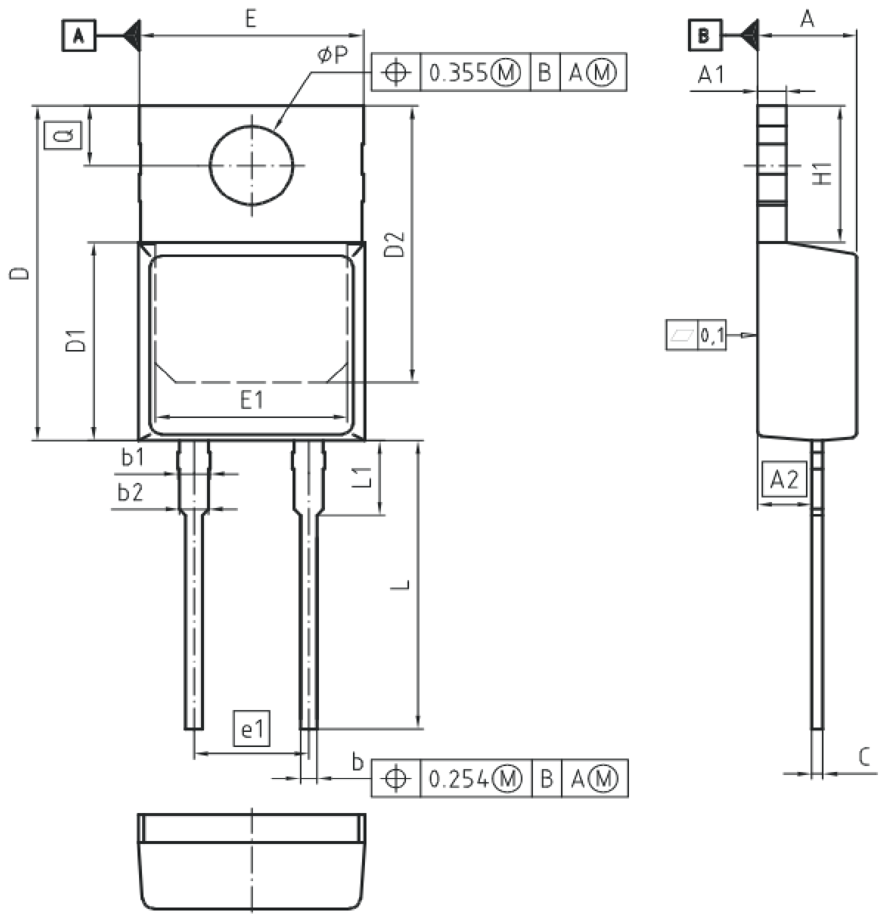



Figure 9. **Typical capacitively stored energy as function of reverse voltage,**

$$E_C = \int_0^{V_R} C(V)VdV$$

## PG-TO220-2-1




| DIM | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 4.30 | 4.50 | 0.169 | 0.177 |
| A1 | 1.17 | 1.37 | 0.046 | 0.054 |
| A2 | 2.30 | 2.50 | 0.091 | 0.098 |
| b | 0.65 | 0.85 | 0.026 | 0.033 |
| b1 | 1.19 | 1.69 | 0.047 | 0.066 |
| b2 | 1.19 | 1.39 | 0.047 | 0.055 |
| c | 0.40 | 0.60 | 0.016 | 0.024 |
| D | 15.35 | 15.95 | 0.604 | 0.628 |
| D1 | 9.05 | 9.45 | 0.356 | 0.372 |
| D2 | 12.30 | 13.05 | 0.484 | 0.514 |
| E | 9.80 | 10.20 | 0.386 | 0.402 |
| E1 | 7.25 | 8.60 | 0.285 | 0.339 |
| e1 | 5.08 | | 0.200 | |
| N | 2 | | 2 | |
| H1 | 5.90 | 6.90 | 0.232 | 0.272 |
| L | 13.00 | 14.00 | 0.512 | 0.551 |
| L1 | 3.30 | 3.70 | 0.130 | 0.146 |
| øP | 3.55 | 3.70 | 0.140 | 0.146 |
| Q | 2.60 | 3.00 | 0.102 | 0.118 |

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01

## Revision History

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**Revision: 2015-09-03, Rev. 2.0**

Previous Revision:

| Revision | Date | Subjects (major changes since last version) |
|---|---|---|
| 2.0 | - | Final data sheet |

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