

### 3<sup>rd</sup> Generation thinQ!<sup>TM</sup> SiC Schottky Diode

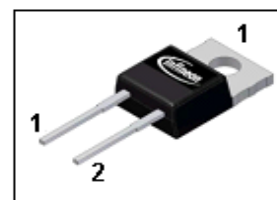
#### Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery / No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>(1)</sup> for target applications
- Breakdown voltage tested at 20mA<sup>(2)</sup>
- Optimized for high temperature operation
- Lowest Figure of Merit  $Q_C/I_F$

#### Product Summary

|                            |     |    |
|----------------------------|-----|----|
| $V_{DC}$                   | 600 | V  |
| $Q_C$                      | 6   | nC |
| $I_F; T_C < 130\text{ °C}$ | 5   | A  |

#### PG-T0220-2



#### thinQ! 3G Diode designed for fast switching applications like:

- SMPS e.g.; CCM PFC
- Motor Drives; Solar Applications; UPS

| Type       | Package    | Marking | Pin 1 | Pin 2 |
|------------|------------|---------|-------|-------|
| IDH05SG60C | PG-T0220-2 | D05G60C | C     | A     |

#### Maximum ratings

| Parameter  | Symbol         | Conditions  | Value       | Unit             |
|--|----------------|---|-------------|------------------|
| Continuous forward current                                 | $I_F$          | $T_C < 130\text{ °C}$                             | 5           | A                |
| Surge non-repetitive forward current, sine halfwave        | $I_{F,SM}$     | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$          | 26          |                  |
|  |                | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$         | 18          |                  |
| Non-repetitive peak forward current                        | $I_{F,max}$    | $T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$ | 150         |                  |
| $i^2t$ value   | $\int i^2 dt$  | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$          | 3.2         | A <sup>2</sup> s |
|  |                | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$         | 2           |                  |
| Repetitive peak reverse voltage                            | $V_{RRM}$      | $T_j = 25\text{ °C}$                              | 600         | V                |
| Diode dv/dt ruggedness                                     | dv/dt          | $V_R = 0 \dots 480\text{ V}$                      | 50          | V/ns             |
| Power dissipation  | $P_{tot}$      | $T_C = 25\text{ °C}$                              | 56          | W                |
| Operating and storage temperature                          | $T_j, T_{stg}$ |   | -55 ... 175 | °C               |
| Soldering temperature, wavesoldering only allowed at leads | $T_{sold}$     | 1.6mm (0.063 in.) from case for 10s               | 260         |                  |
| Mounting torque  |                | M3 and M3.5 screws                                | 60          | Ncm              |

| Parameter | Symbol | Conditions | Values |      |      | Unit |
|-----------|--------|------------|--------|------|------|------|
|           |        |            | min.   | typ. | max. |      |

**Thermal characteristics**

|  |            |   |   |   |     |     |
|--|------------|---|---|---|-----|-----|
| Thermal resistance, junction - case    | $R_{thJC}$ |   | - | - | 2.7 | K/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | Thermal resistance, junction- ambient, leaded | - | - | 62  |     |

**Electrical characteristics**, at  $T_j=25\text{ }^\circ\text{C}$ , unless otherwise specified

**Static characteristics**

|                       |          |   |     |     |     |               |
|-----------------------|----------|---|-----|-----|-----|---------------|
| DC blocking voltage   | $V_{DC}$ | $I_R=0.05\text{ mA}$ , $T_j=25\text{ }^\circ\text{C}$ | 600 | -   | -   | V             |
| Diode forward voltage | $V_F$    | $I_F=5\text{ A}$ , $T_j=25\text{ }^\circ\text{C}$     | -   | 2.1 | 2.3 |               |
|                       |          | $I_F=5\text{ A}$ , $T_j=150\text{ }^\circ\text{C}$    | -   | 2.8 | -   |               |
| Reverse current       | $I_R$    | $V_R=600\text{ V}$ , $T_j=25\text{ }^\circ\text{C}$   | -   | 0.4 | 30  | $\mu\text{A}$ |
|                       |          | $V_R=600\text{ V}$ , $T_j=150\text{ }^\circ\text{C}$  | -   | 1.5 | 350 |               |

**AC characteristics**

|                              |       |   |   |     |     |    |
|------------------------------|-------|---|---|-----|-----|----|
| Total capacitive charge      | $Q_c$ | $V_R=400\text{ V}$ , $I_F \leq I_{F,max}$ ,<br>$di_F/dt=200\text{ A}/\mu\text{s}$ , | - | 6   | -   | nC |
| Switching time <sup>3)</sup> | $t_c$ | $T_j=150\text{ }^\circ\text{C}$   | - | -   | <10 |    |
| Total capacitance            | C     | $V_R=1\text{ V}$ , $f=1\text{ MHz}$   | - | 110 | -   | pF |
|                              |       | $V_R=300\text{ V}$ , $f=1\text{ MHz}$   | - | 15  | -   |    |
|                              |       | $V_R=600\text{ V}$ , $f=1\text{ MHz}$   | - | 15  | -   |    |

<sup>1)</sup> J-STD20 and JESD22

<sup>2)</sup> All devices tested under avalanche conditions, for a time periode of 10ms, at 20mA.

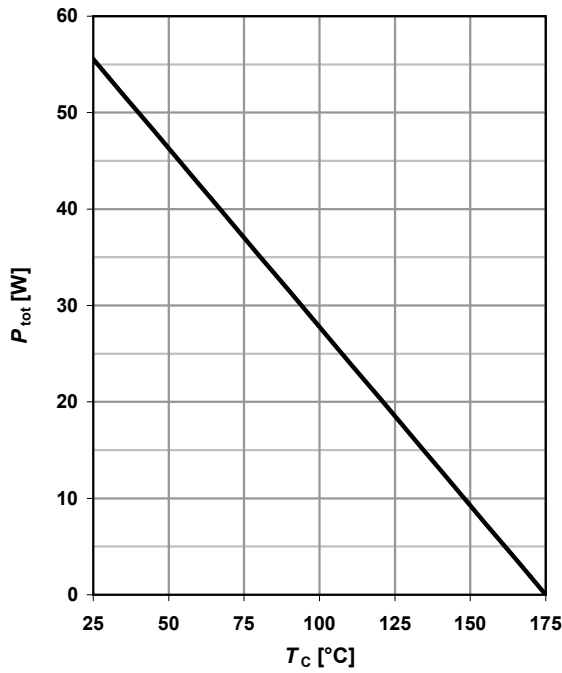
<sup>3)</sup>  $t_c$  is the time constant for the capacitive displacement current waveform (independent from  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ ), different from  $t_{rr}$  which is dependent on  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ . No reverse recovery time constant  $t_{rr}$  due to absence of minority carrier injection.

<sup>4)</sup> Under worst case  $Z_{th}$  conditions.

<sup>5)</sup> Only capacitive charge occurring, guaranteed by design.

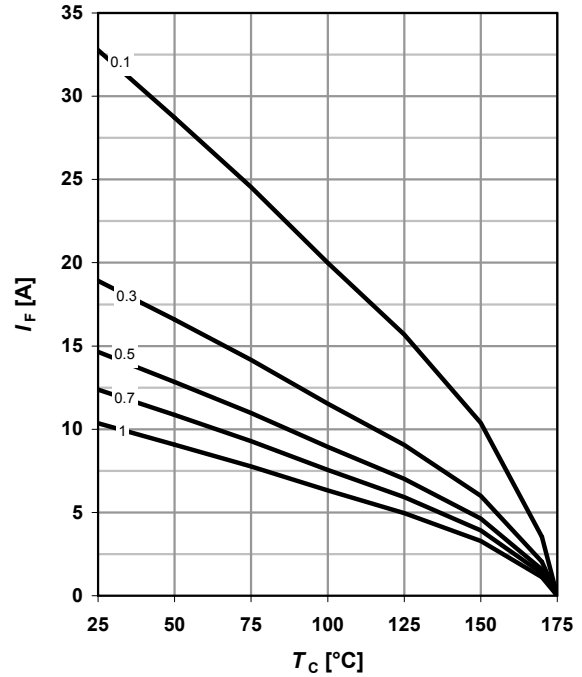
**1 Power dissipation**

$P_{tot}=f(T_C)$ ; parameter:  $R_{thJC(max)}$



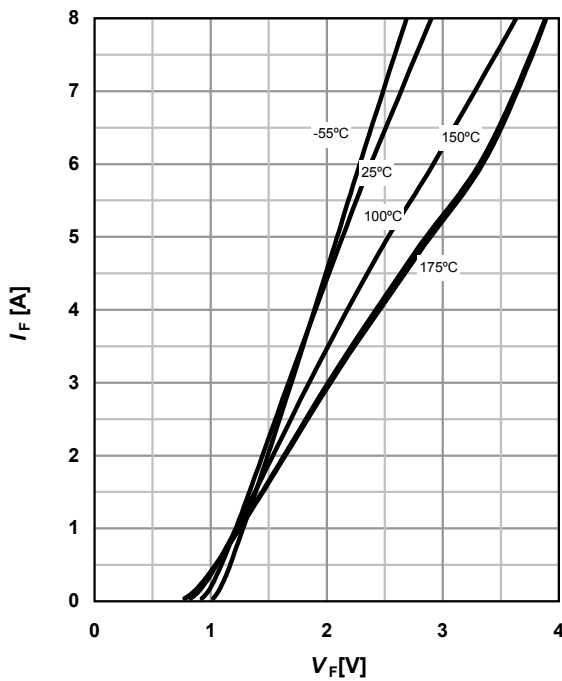
**2 Diode forward current**

$I_F=f(T_C)^4$ ;  $T_j \leq 175\text{ °C}$ ; parameter:  $D = t_p/T$



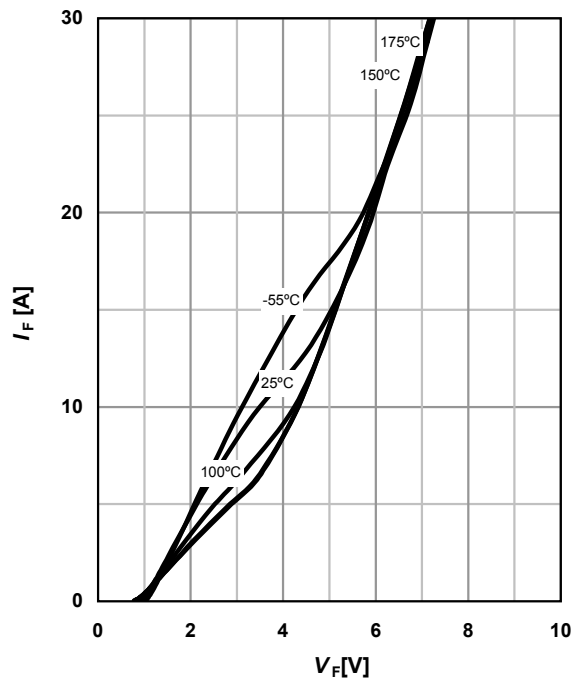
**3 Typ. forward characteristic**

$I_F=f(V_F)$ ;  $t_p=400\text{ }\mu\text{s}$ ; parameter:  $T_j$



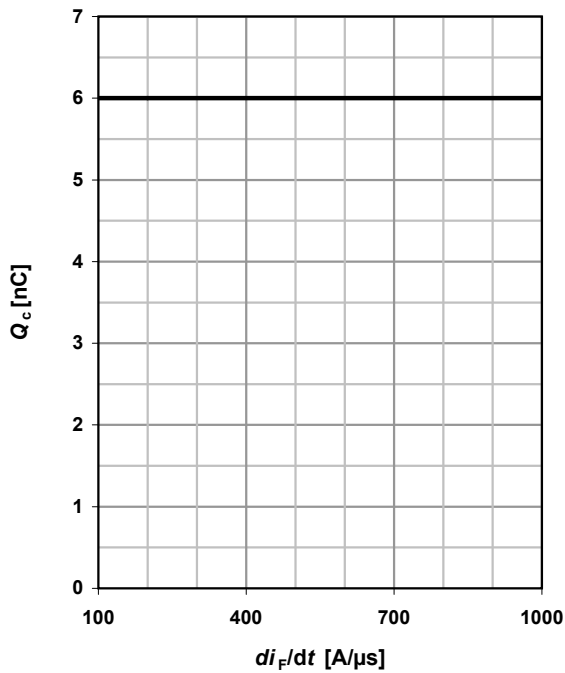
**4 Typ. forward characteristic in surge current mode**

$I_F=f(V_F)$ ;  $t_p=400\text{ }\mu\text{s}$ ; parameter:  $T_j$



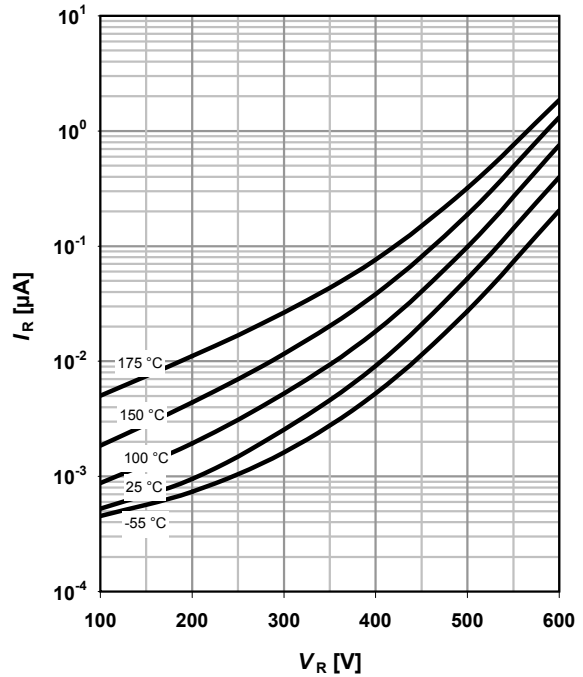
**5 Typ. capacitance charge vs. current slope**

$$Q_C = f(di_F/dt)^5; I_F \leq I_{F,max}$$



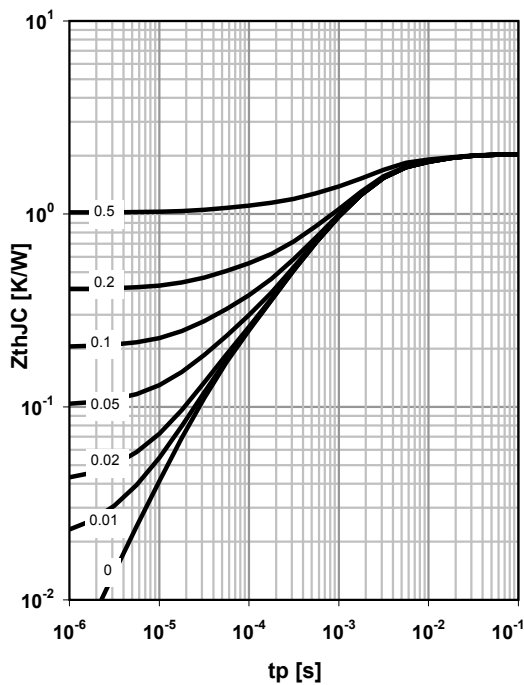
**6 Typ. reverse current vs. reverse voltage**

$$I_R = f(V_R); \text{parameter: } T_j$$



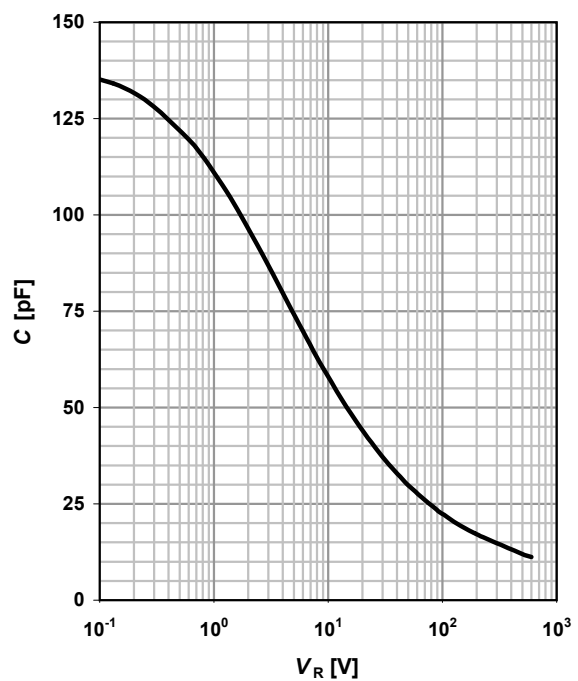
**7 Transient thermal impedance**

$$Z_{thJC} = f(t_p); \text{parameter: } D = t_p/T$$



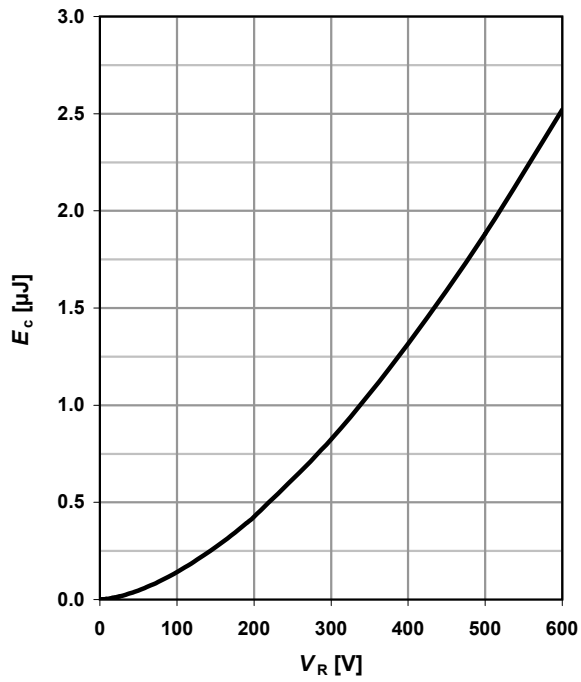
**8 Typ. capacitance vs. reverse voltage**

$$C = f(V_R); T_C = 25 \text{ °C}, f = 1 \text{ MHz}$$

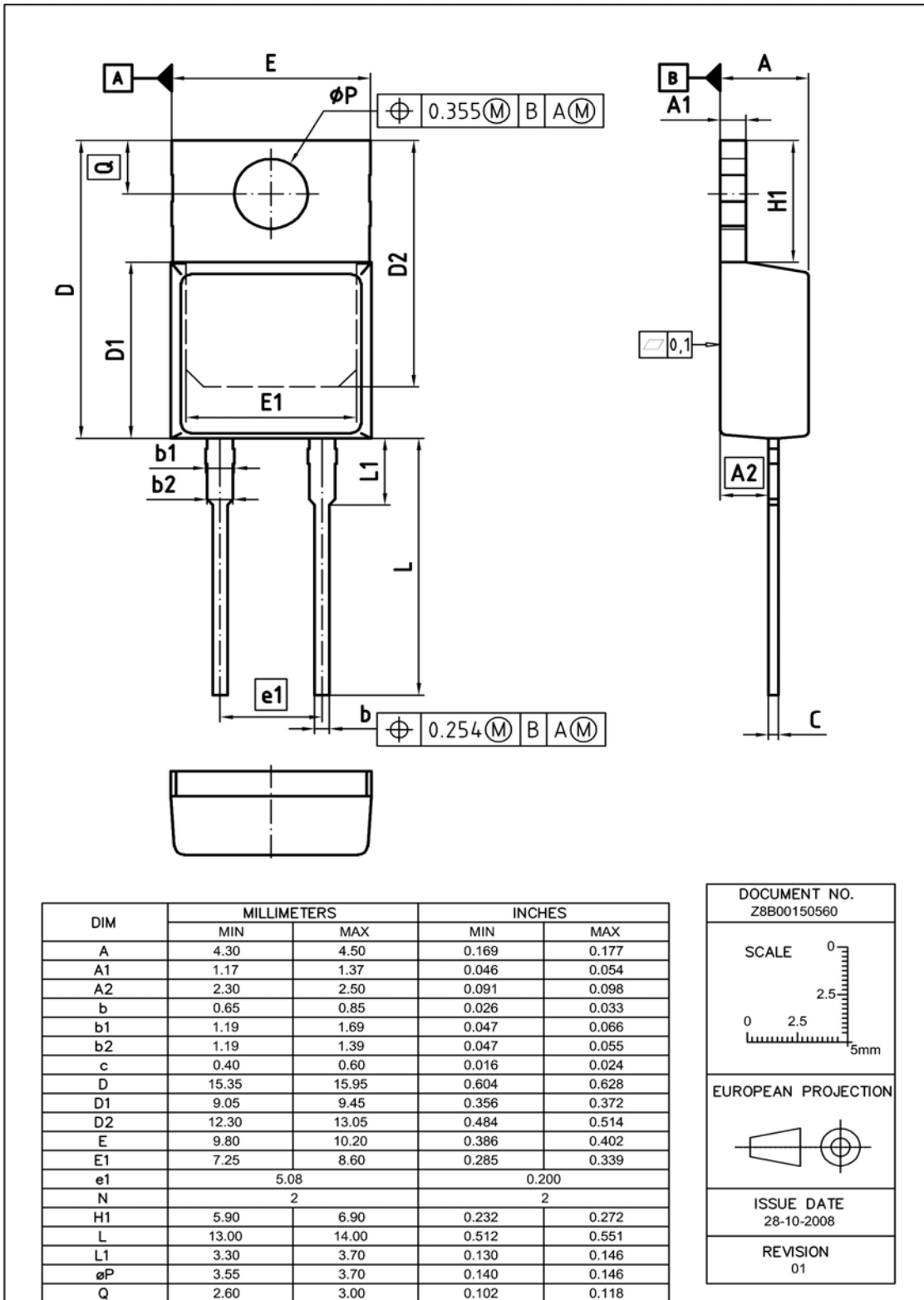


**9 Typ. C stored energy**

$$E_C = f(V_R)$$



PG-TO220-2: Outline



Dimensions in mm/inches

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