

## 2<sup>nd</sup> Generation thinQ!™ SiC Schottky Diode

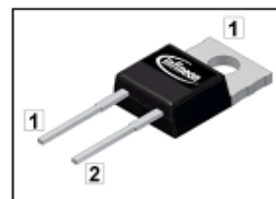
### Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- No temperature influence on the 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 5mA<sup>2)</sup>

### Product Summary

|          |     |    |
|----------|-----|----|
| $V_{DC}$ | 600 | V  |
| $Q_c$    | 19  | nC |
| $I_F$    | 8   | A  |

### PG-TO220-2



thinQ! 2G Diode specially designed for fast switching applications like:

- CCM PFC
- Motor Drives

| Type      | Package    | Marking | Pin 1 | Pin 2 |
|-----------|------------|---------|-------|-------|
| IDH08S60C | PG-TO220-2 | D08S60C | C     | A     |

Maximum ratings, at  $T_j=25\text{ °C}$ , unless otherwise specified

| Parameter                                                  | Symbol            | Conditions                                             | Value       | Unit             |
|------------------------------------------------------------|-------------------|--------------------------------------------------------|-------------|------------------|
| Continuous forward current                                 | $I_F$             | $T_C < 140\text{ °C}$                                  | 8           | A                |
| RMS forward current                                        | $I_{F,RMS}$       | $f=50\text{ Hz}$                                       | 12          |                  |
| Surge non-repetitive forward current, sine halfwave        | $I_{F,SM}$        | $T_C=25\text{ °C}$ , $t_p=10\text{ ms}$                | 59          |                  |
| Repetitive peak forward current                            | $I_{F,RM}$        | $T_j=150\text{ °C}$ ,<br>$T_C=100\text{ °C}$ , $D=0.1$ | 32          |                  |
| Non-repetitive peak forward current                        | $I_{F,max}$       | $T_C=25\text{ °C}$ , $t_p=10\text{ μs}$                | 264         |                  |
| $i^2t$ value                                               | $\int i^2 dt$     | $T_C=25\text{ °C}$ , $t_p=10\text{ ms}$                | 17          | A <sup>2</sup> s |
| Repetitive peak reverse voltage                            | $V_{RRM}$         |                                                        | 600         | V                |
| Diode dv/dt ruggedness                                     | $dv/dt$           | $V_R = 0 \dots 480\text{ V}$                           | 50          | V/ns             |
| Power dissipation                                          | $P_{tot}$         | $T_C=25\text{ °C}$                                     | 75          | W                |
| Operating and storage temperature                          | $T_j$ , $T_{stg}$ |                                                        | -55 ... 175 | °C               |
| Mounting torque                                            |                   | M3 and M3.5 screws                                     | 60          | Mcm              |
| Soldering temperature, wavesoldering only allowed at leads | $T_{sld}$         | 1.6mm (0.063 in.) from case for 10s                    | 260         | °C               |

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

#### Thermal characteristics

|                                        |            |        |   |   |    |     |
|----------------------------------------|------------|--------|---|---|----|-----|
| Thermal resistance, junction - case    | $R_{thJC}$ |        | - | - | 2  | K/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | leaded | - | - | 62 |     |

#### Electrical characteristics, at $T_j=25\text{ °C}$ , unless otherwise specified

#### Static characteristics

|                       |          |                                       |     |     |      |               |
|-----------------------|----------|---------------------------------------|-----|-----|------|---------------|
| DC blocking voltage   | $V_{DC}$ | $I_R=0.1\text{ mA}$                   | 600 | -   | -    | V             |
| Diode forward voltage | $V_F$    | $I_F=8\text{ A}, T_j=25\text{ °C}$    | -   | 1.5 | 1.7  |               |
|                       |          | $I_F=8\text{ A}, T_j=150\text{ °C}$   | -   | 1.7 | 2.1  |               |
| Reverse current       | $I_R$    | $V_R=600\text{ V}, T_j=25\text{ °C}$  | -   | 1   | 100  | $\mu\text{A}$ |
|                       |          | $V_R=600\text{ V}, T_j=150\text{ °C}$ | -   | 4   | 1000 |               |

#### AC characteristics

|                              |       |                                                                                |   |     |     |    |
|------------------------------|-------|--------------------------------------------------------------------------------|---|-----|-----|----|
| Total capacitive charge      | $Q_c$ | $V_R=400\text{ V}, I_F \leq I_{F,max},$<br>$di_F/dt=200\text{ A}/\mu\text{s},$ | - | 19  | -   | nC |
| Switching time <sup>3)</sup> | $t_c$ | $T_j=150\text{ °C}$                                                            | - | -   | <10 |    |
| Total capacitance            | $C$   | $V_R=1\text{ V}, f=1\text{ MHz}$                                               | - | 310 | -   | pF |
|                              |       | $V_R=300\text{ V}, f=1\text{ MHz}$                                             | - | 50  | -   |    |
|                              |       | $V_R=600\text{ V}, f=1\text{ MHz}$                                             | - | 50  | -   |    |

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

<sup>2)</sup> All devices tested under avalanche conditions, for a time periode of 5ms, at 5 mA.

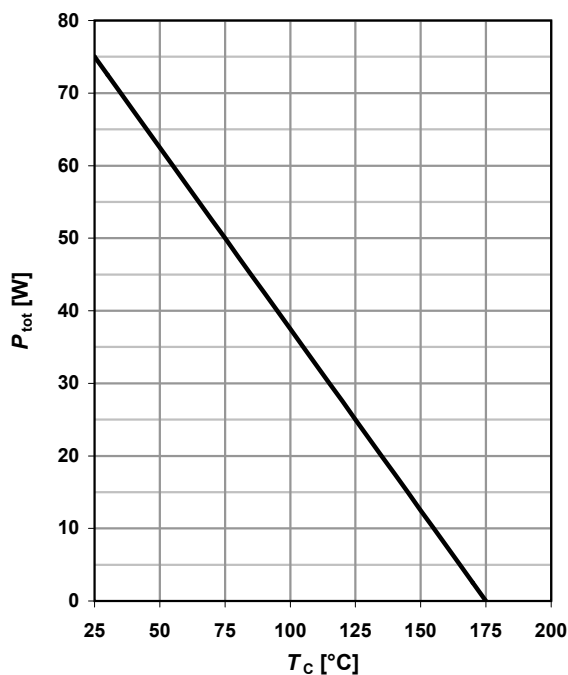
<sup>3)</sup>  $t_c$  is the time constant for the capacitive displacement current waveform (independent from  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ ), different from  $t_{rr}$  which is dependent on  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ . No reverse recovery time constant  $t_{rr}$  due to absence of minority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

<sup>4)</sup> Only capacitive charge occuring, guaranteed by design

### 1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$

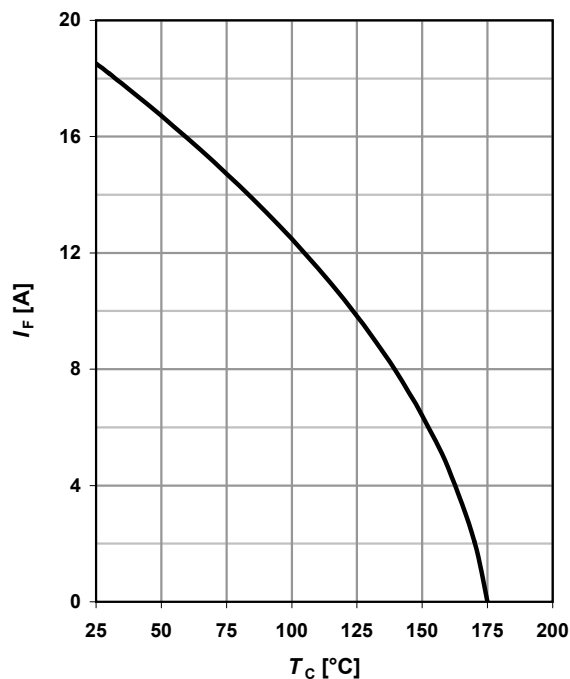
parameter:  $R_{\text{thJC(max)}}$



### 2 Diode forward current

$$I_F = f(T_C); T_j \leq 175 \text{ °C}$$

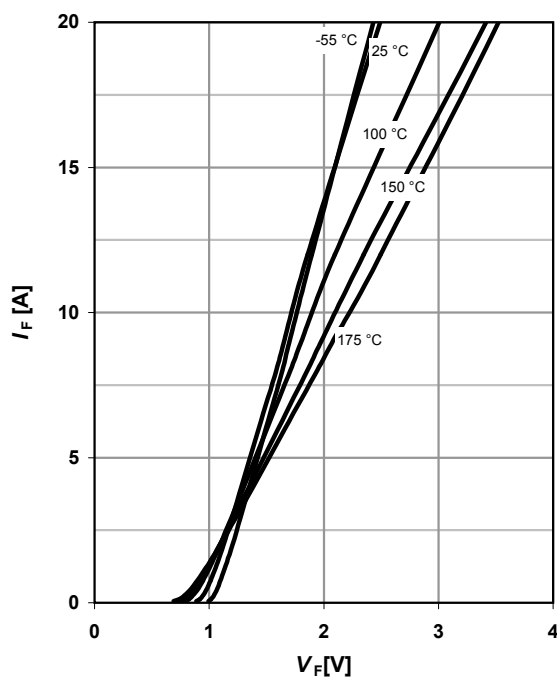
parameter:  $R_{\text{thJC(max)}}$ ;  $V_{F(\text{max})}$



### 3 Typ. forward characteristic

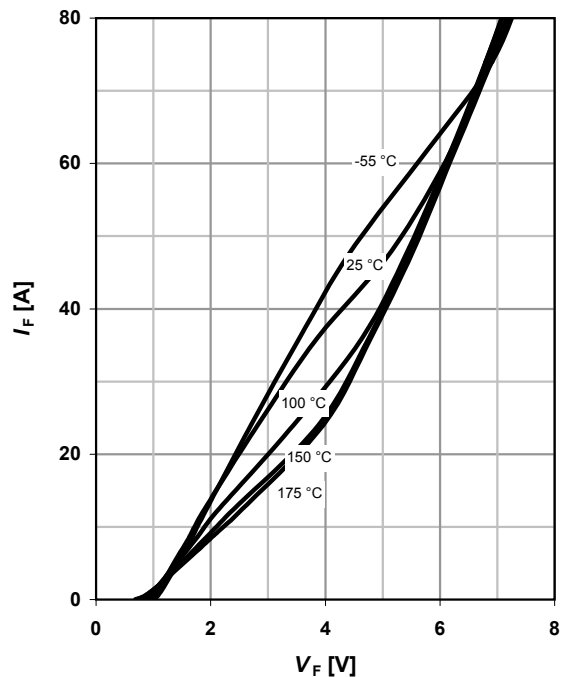
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}$$

parameter:  $T_j$



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

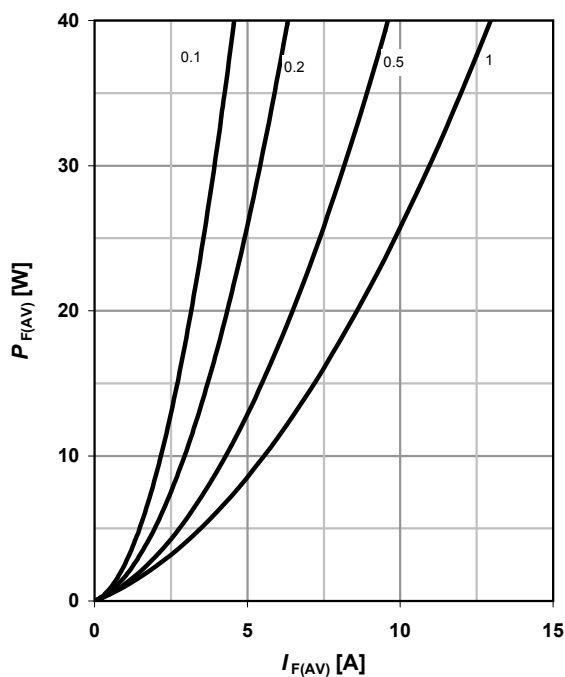
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}; \text{ parameter: } T_j$$



### 5 Typ. forward power dissipation vs.

average forward current

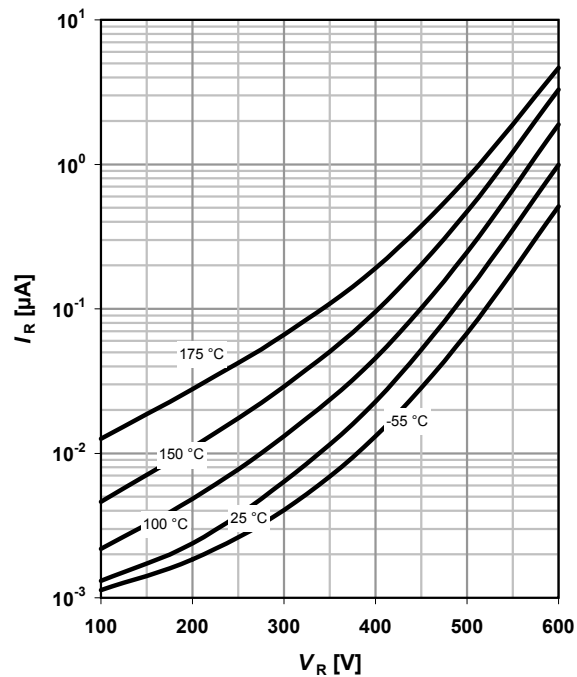
$$P_{F,AV}=f(I_F), T_C=100\text{ }^{\circ}\text{C}, \text{ parameter: } D=t_p/T$$



### 6 Typ. reverse current vs. reverse voltage

$$I_R=f(V_R)$$

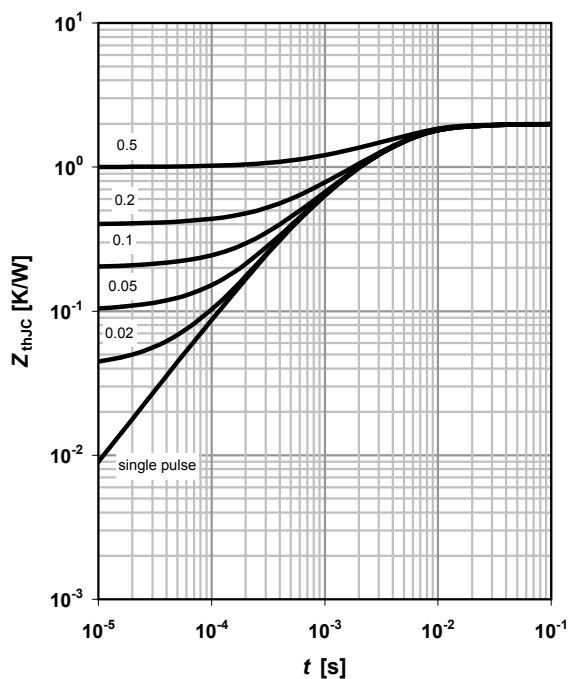
parameter:  $T_j$



### 7 Transient thermal impedance

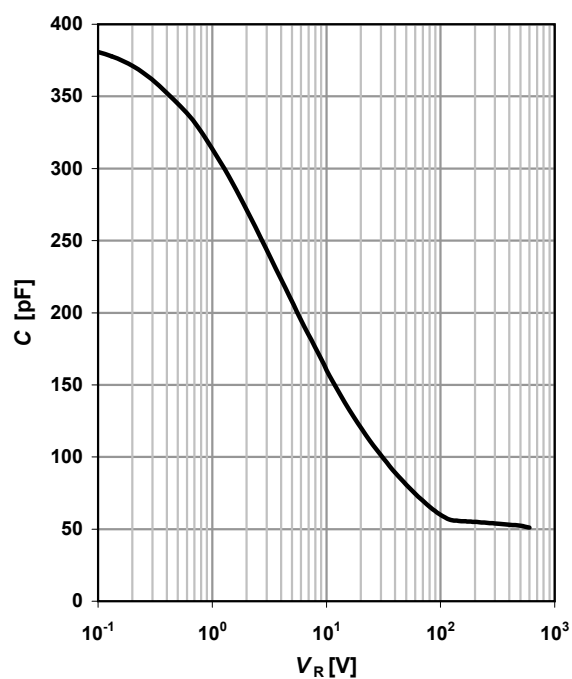
$$Z_{thJC}=f(t_p)$$

parameter:  $D=t_p/T$



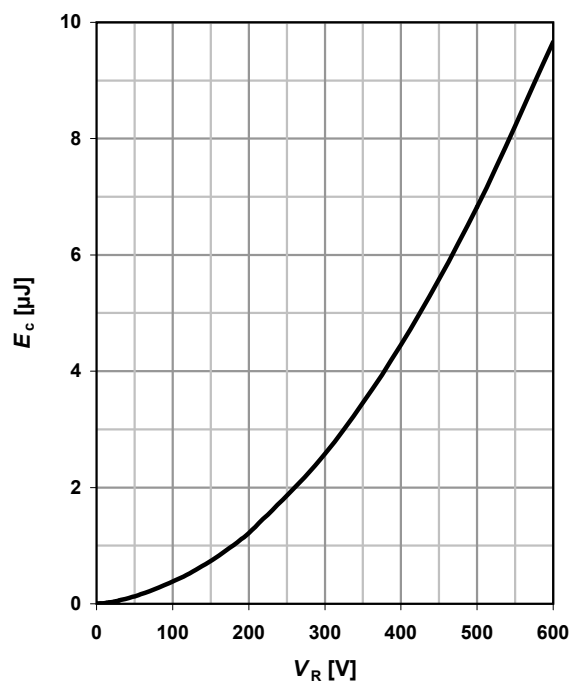
### 8 Typ. capacitance vs. reverse voltage

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



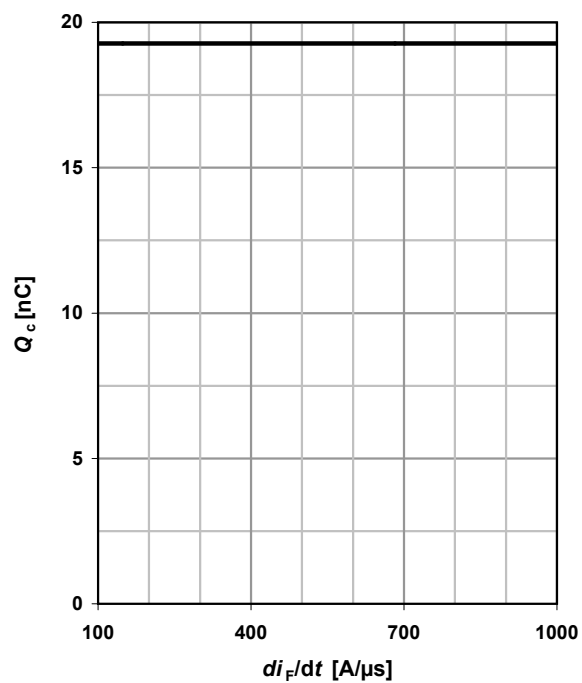
### 9 Typ. C stored energy

$$E_C = f(V_R)$$

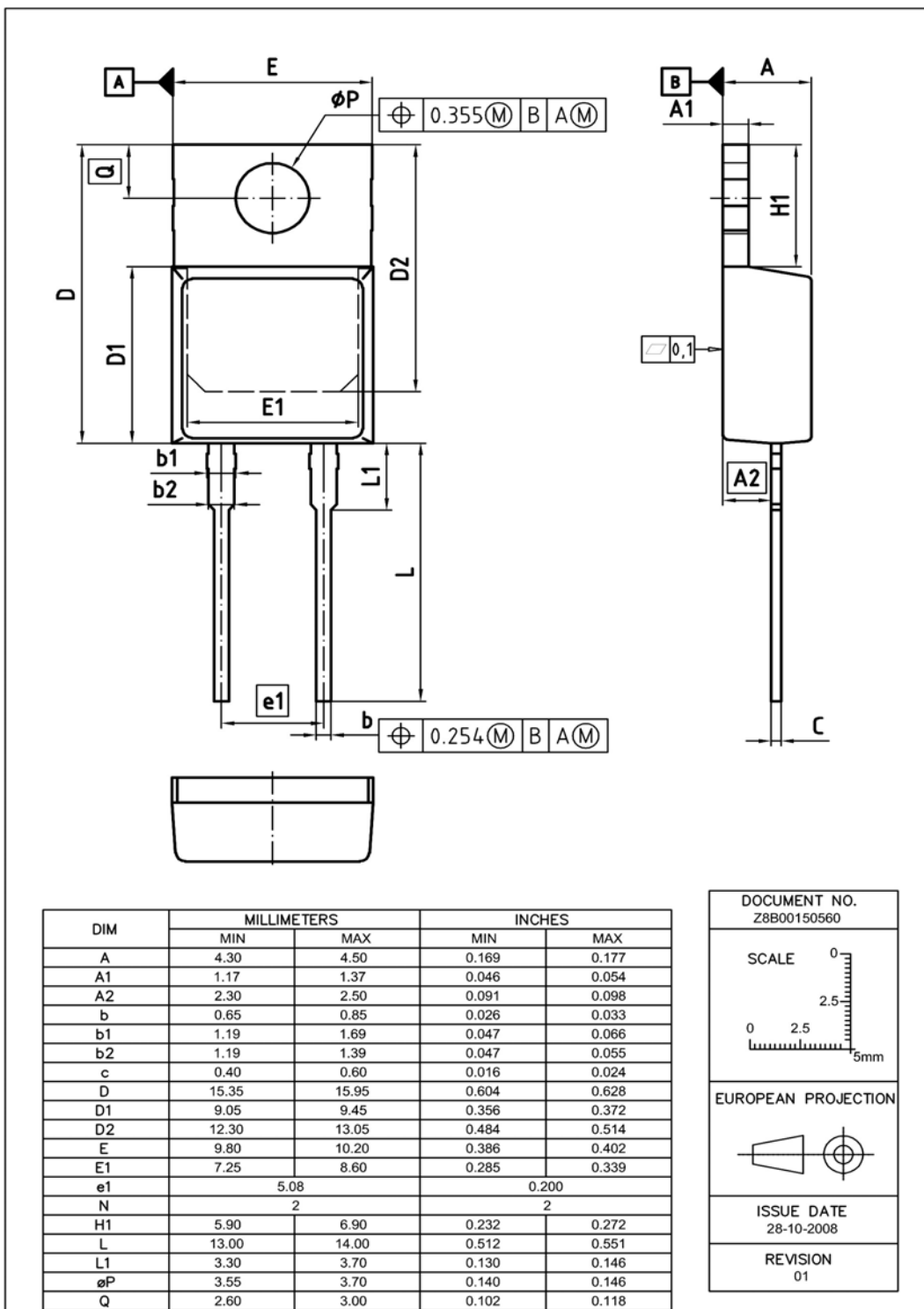


### 10 Typ. capacitance charge vs. current slope

$$Q_C = f(di_F/dt)^4; T_J = 150^\circ\text{C}; I_F \leq I_{F,\text{max}}$$



## PG-TO220-2: Outline



Dimensions in mm/inches

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