

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

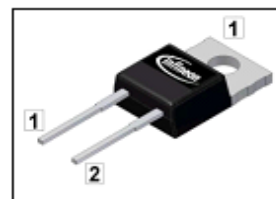
### Features

- 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  |
| $Q_c$    | 24  | nC |
| $I_F$    | 10  | 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 |
|-----------|------------|---------|-------|-------|
| IDH10S60C | PG-TO220-2 | D10S60C | C     | A     |

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

| Parameter                                                  | Symbol            | Conditions                                             | Value       | Unit             |
|------------------------------------------------------------|-------------------|--------------------------------------------------------|-------------|------------------|
| Continuous forward current                                 | $I_F$             | $T_C < 140\text{ °C}$                                  | 10          | A                |
| RMS forward current                                        | $I_{F,RMS}$       | $f=50\text{ Hz}$                                       | 15          |                  |
| Surge non-repetitive forward current, sine halfwave        | $I_{F,SM}$        | $T_C=25\text{ °C}$ , $t_p=10\text{ ms}$                | 84          |                  |
| Repetitive peak forward current                            | $I_{F,RM}$        | $T_j=150\text{ °C}$ ,<br>$T_C=100\text{ °C}$ , $D=0.1$ | 39          |                  |
| Non-repetitive peak forward current                        | $I_{F,max}$       | $T_C=25\text{ °C}$ , $t_p=10\text{ μs}$                | 350         |                  |
| $i^2t$ value                                               | $\int i^2 dt$     | $T_C=25\text{ °C}$ , $t_p=10\text{ ms}$                | 35          | 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                                          | $P_{tot}$         | $T_C=25\text{ °C}$                                     | 100         | 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                                                          | $R_{thJC}$ |                                                                                                                         | -      | -    | 1.5  | K/W           |
| Thermal resistance, junction - ambient                                                       | $R_{thJA}$ | leaded                                                                                                                  | -      | -    | 62   |               |
| Electrical characteristics, at $T_j=25\text{ }^{\circ}\text{C}$ , unless otherwise specified |            |                                                                                                                         |        |      |      |               |
| Static characteristics                                                                       |            |                                                                                                                         |        |      |      |               |
| DC blocking voltage                                                                          | $V_{DC}$   | $I_R=0.14\text{ mA}$                                                                                                    | 600    | -    | -    | V             |
| Diode forward voltage                                                                        | $V_F$      | $I_F=10\text{ A}$ , $T_j=25\text{ }^{\circ}\text{C}$                                                                    | -      | 1.5  | 1.7  |               |
|                                                                                              |            | $I_F=10\text{ A}$ , $T_j=150\text{ }^{\circ}\text{C}$                                                                   | -      | 1.7  | 2.1  |               |
| Reverse current                                                                              | $I_R$      | $V_R=600\text{ V}$ , $T_j=25\text{ }^{\circ}\text{C}$                                                                   | -      | 1.4  | 140  | $\mu\text{A}$ |
|                                                                                              |            | $V_R=600\text{ V}$ , $T_j=150\text{ }^{\circ}\text{C}$                                                                  | -      | 5    | 1400 |               |
| AC characteristics                                                                           |            |                                                                                                                         |        |      |      |               |
| Total capacitive charge                                                                      | $Q_c$      | $V_R=400\text{ V}$ , $I_F\leq I_{F,max}$ ,<br>$di_F/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_j=150\text{ }^{\circ}\text{C}$ | -      | 24   | -    | nC            |
| Switching time <sup>3)</sup>                                                                 | $t_c$      |                                                                                                                         | -      | -    | <10  | ns            |
| Total capacitance                                                                            | C          | $V_R=1\text{ V}$ , $f=1\text{ MHz}$                                                                                     | -      | 480  | -    | pF            |
|                                                                                              |            | $V_R=300\text{ V}$ , $f=1\text{ MHz}$                                                                                   | -      | 60   | -    |               |
|                                                                                              |            | $V_R=600\text{ V}$ , $f=1\text{ MHz}$                                                                                   | -      | 60   | -    |               |

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

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

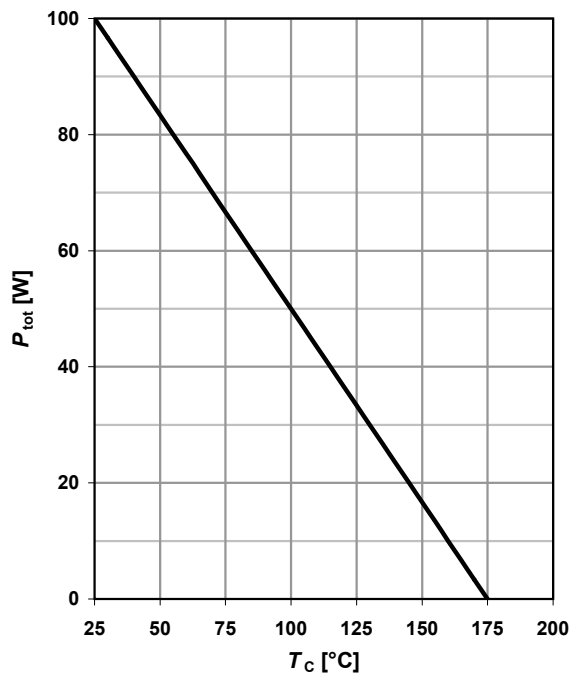
<sup>3)</sup>  $t_c$  is the time constant for the capacitive displacement current waveform (independent from  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ ), different from  $t_{rr}$ , which is dependent on  $T_j$ ,  $I_{LOAD}$ ,  $di/dt$ . No reverse recovery time constant  $t_{rr}$  due to absence of minority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

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

### 1 Power dissipation

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

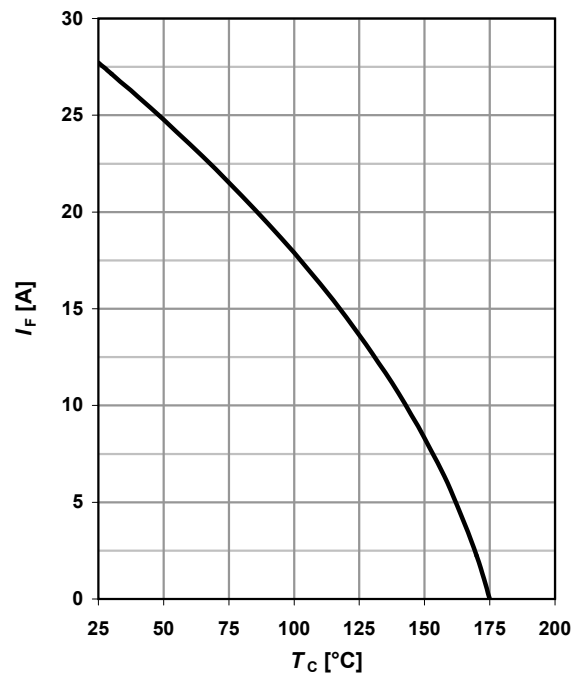
parameter:  $R_{\text{thJC(max)}}$



### 2 Diode forward current

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

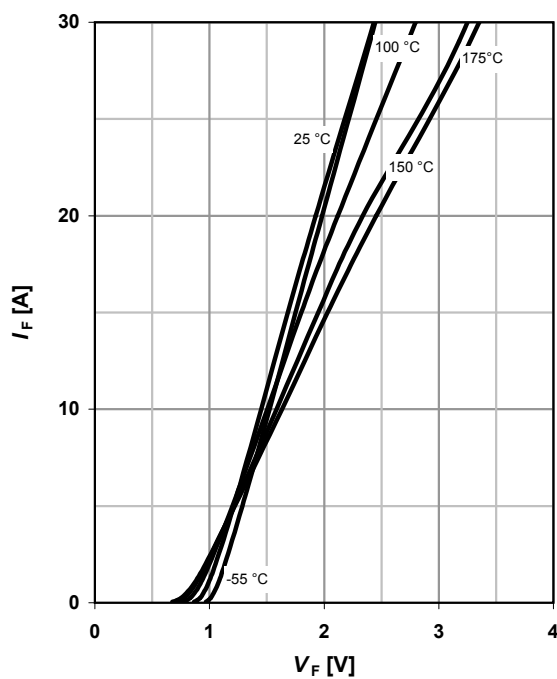
parameter:  $R_{\text{thJC(max)}}$ ;  $V_{F(\text{max})}$



### 3 Typ. forward characteristic

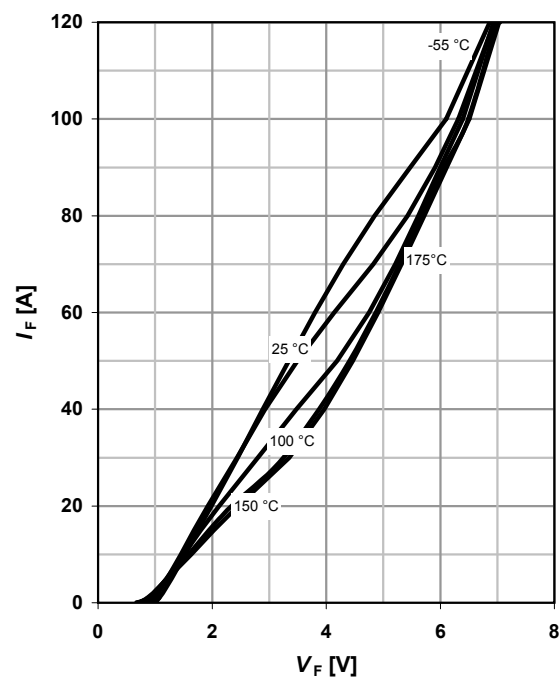
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}$$

parameter:  $T_j$



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

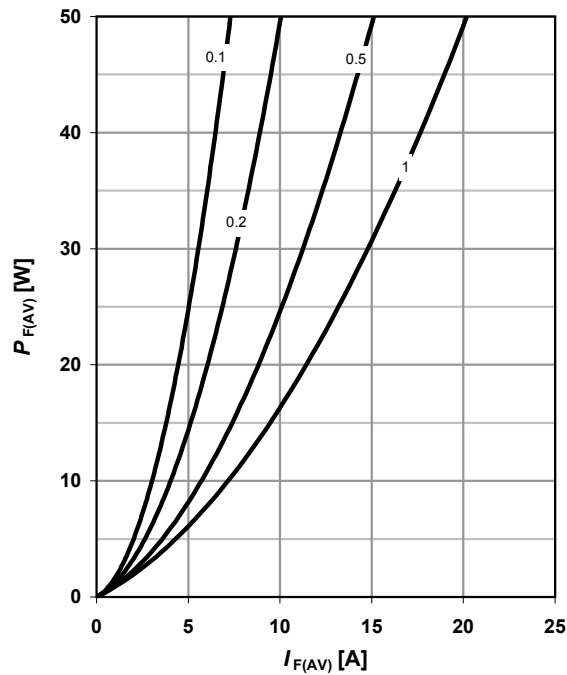
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}; \text{ parameter: } T_j$$



### 5 Typ. forward power dissipation vs.

average forward current

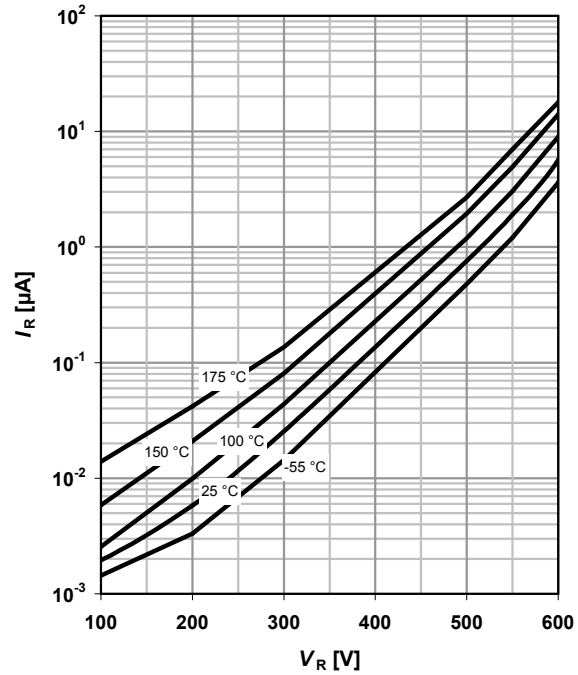
$$P_{F,AV}=f(I_F), T_C=100\text{ }^{\circ}\text{C}, \text{ parameter: } D=t_p/T$$



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

$$I_R=f(V_R)$$

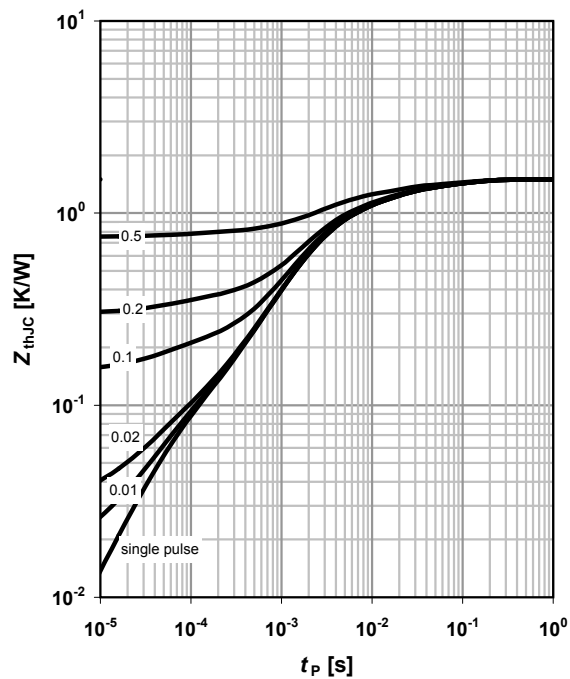
parameter:  $T_j$



### 7 Transient thermal impedance

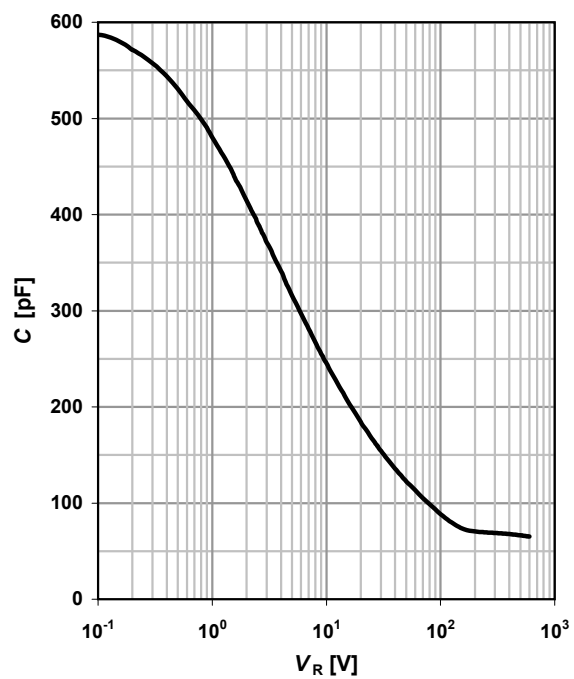
$$Z_{thJC}=f(t_p)$$

parameter:  $D=t_p/T$



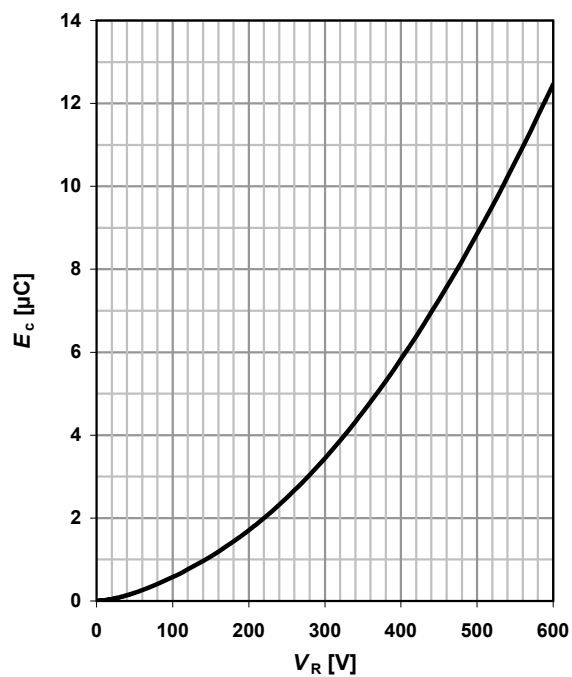
### 8 Typ. capacitance vs. reverse voltage

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



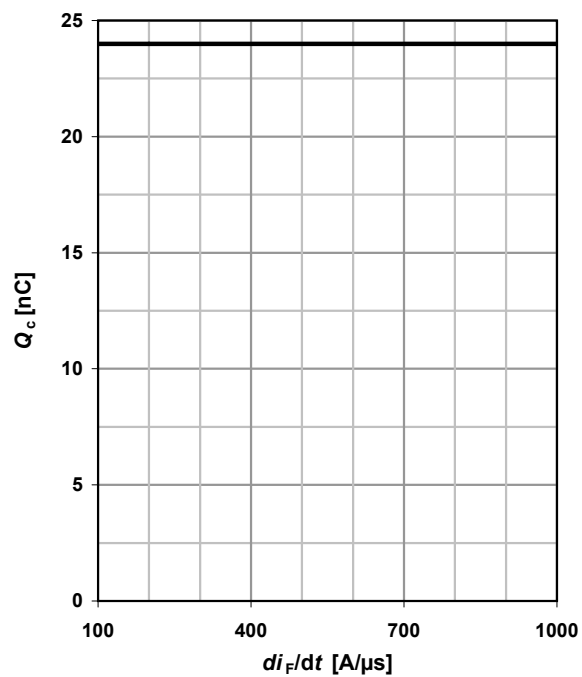
### 9 Typ. C stored energy

$$E_C = f(V_R)$$

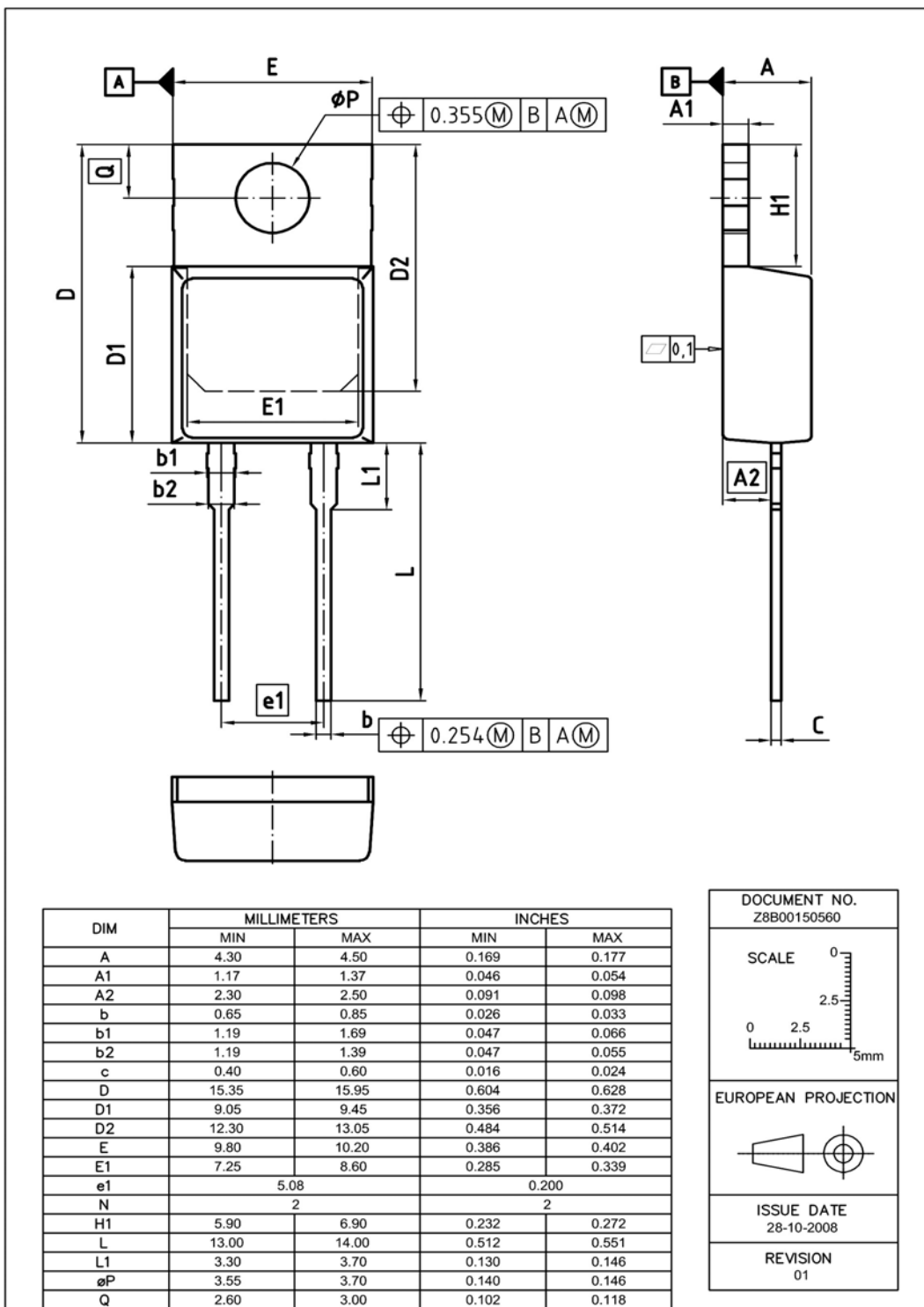


### 10 Typ. Capacitive charge vs. current slope

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



## PG-TO220-2: Outline



Dimensions in mm/inches

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