

3rd Generation thinQ!TM SiC Schottky Diode

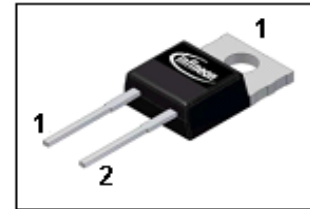
Features

- 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 JEDEC¹⁾ for target applications
- Breakdown voltage tested at 20mA²⁾
- Optimized for high temperature operation
- Lowest Figure of Merit Q_C/I_F

Product Summary

| | | |
|----------------------------|-----|----|
| V_{DC} | 600 | V |
| Q_C | 4.5 | nC |
| $I_F; T_C < 130\text{ °C}$ | 4 | A |

PG-TO220-2



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 |
|------------|------------|---------|-------|-------|
| IDH04SG60C | PG-TO220-2 | D04G60C | C | A |

Maximum ratings

| Parameter | Symbol | Conditions | Value | Unit |
|--|----------------|---|-------------|------------------|
| Continuous forward current | I_F | $T_C < 130\text{ °C}$ | 4 | A |
| Surge non-repetitive forward current, sine halfwave | $I_{F,SM}$ | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$ | 18 | |
| | | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$ | 13.5 | |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$ | 120 | |
| i^2t value | $\int i^2 dt$ | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$ | 1.8 | A ² s |
| | | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$ | 0.93 | |
| 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} | $T_C = 25\text{ °C}$ | 43 | 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} | | - | - | 3.5 | 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 | $I_F=4\text{ A}, T_j=25\text{ }^\circ\text{C}$ | - | 2.1 | 2.3 | |
| | | $I_F=4\text{ A}, T_j=150\text{ }^\circ\text{C}$ | - | 2.8 | - | |
| Reverse current | I_R | $V_R=600\text{ V}, T_j=25\text{ }^\circ\text{C}$ | - | 0.3 | 25 | μA |
| | | $V_R=600\text{ V}, T_j=150\text{ }^\circ\text{C}$ | - | 1.3 | 270 | |

AC characteristics

| | | | | | | |
|------------------------------|-------|---|---|-----|-----|---------------|
| Total capacitive charge | Q_c | $V_R=400\text{ V}, I_F \leq I_{F,max}, di_F/dt=200\text{ A}/\mu\text{s}, T_j=150\text{ }^\circ\text{C}$ | - | 4.5 | - | nC |
| Switching time ³⁾ | t_c | | - | - | <10 | ns |
| Total capacitance | C | $V_R=1\text{ V}, f=1\text{ MHz}$ | - | 80 | - | μF |
| | | $V_R=300\text{ V}, f=1\text{ MHz}$ | - | 10 | - | |
| | | $V_R=600\text{ V}, f=1\text{ MHz}$ | - | 10 | - | |

¹⁾ J-STD20 and JESD22

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

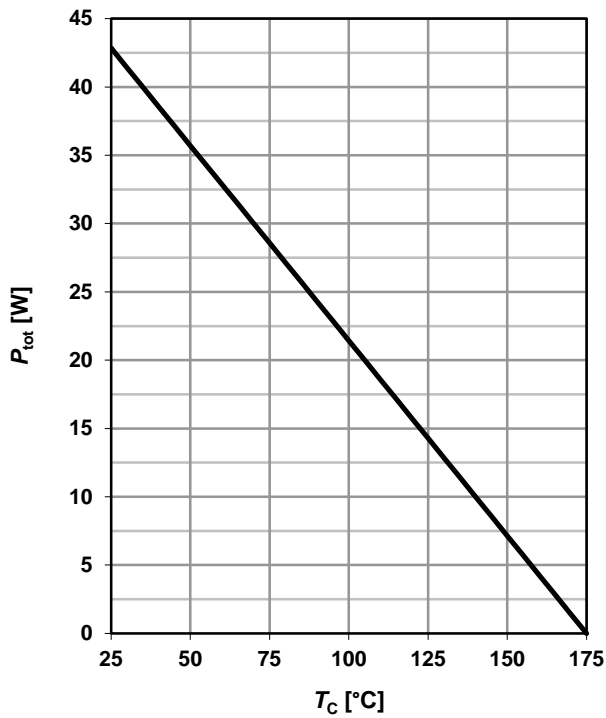
³⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j , I_{LOAD} and di/dt), different from t_{rr} which is dependent on T_j , I_{LOAD} and di/dt . No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

⁴⁾ Under worst case Z_{th} conditions.

⁵⁾ Only capacitive charge occuring, guaranteed by design.

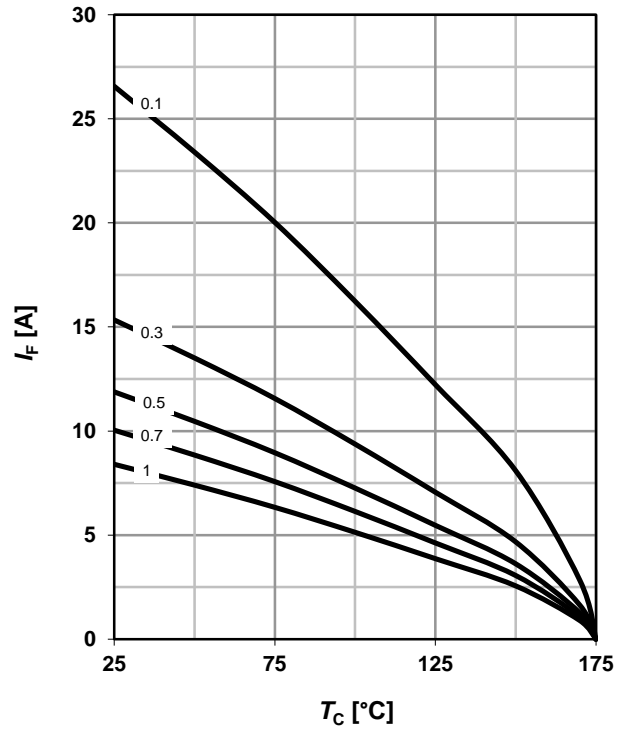
1 Power dissipation

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



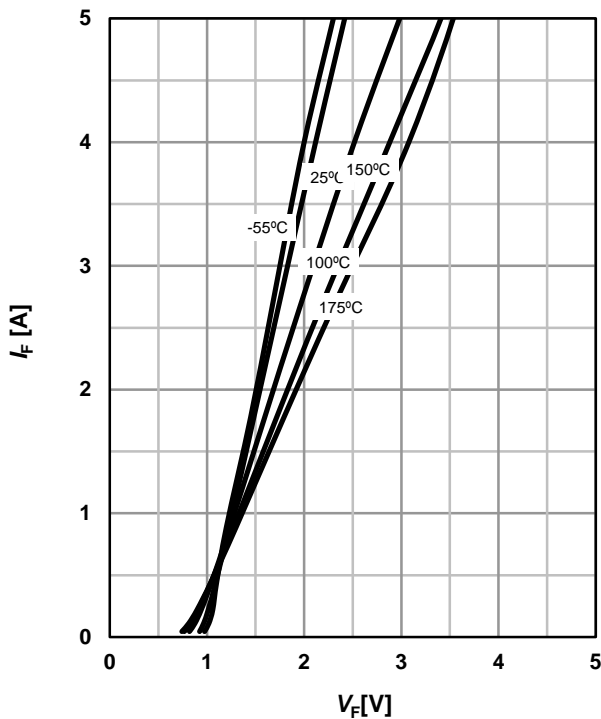
2 Diode forward current

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



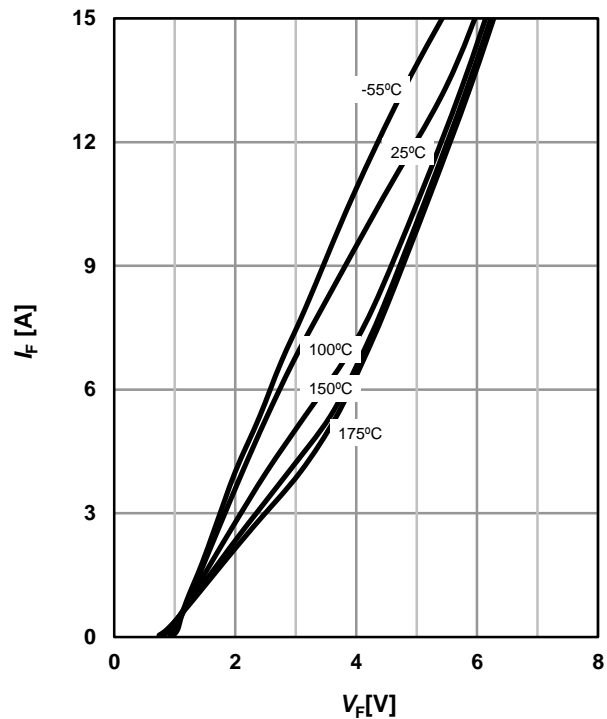
3 Typ. forward characteristic

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



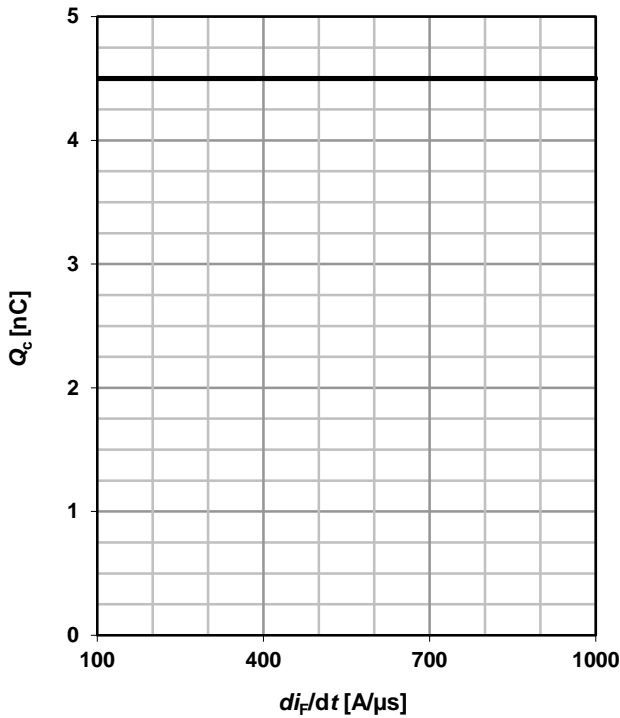
4 Typ. forward characteristic in surge current mode

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



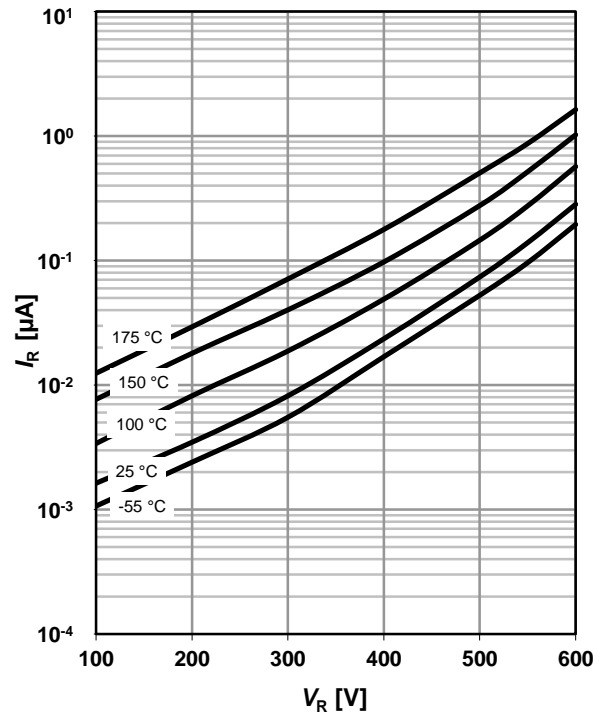
5 Typ. capacitance charge vs. current slope

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



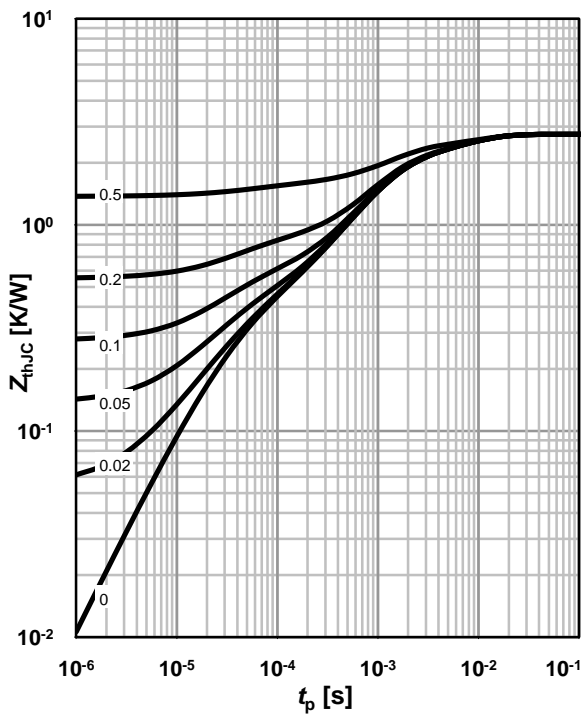
6 Typ. reverse current vs. reverse voltage

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



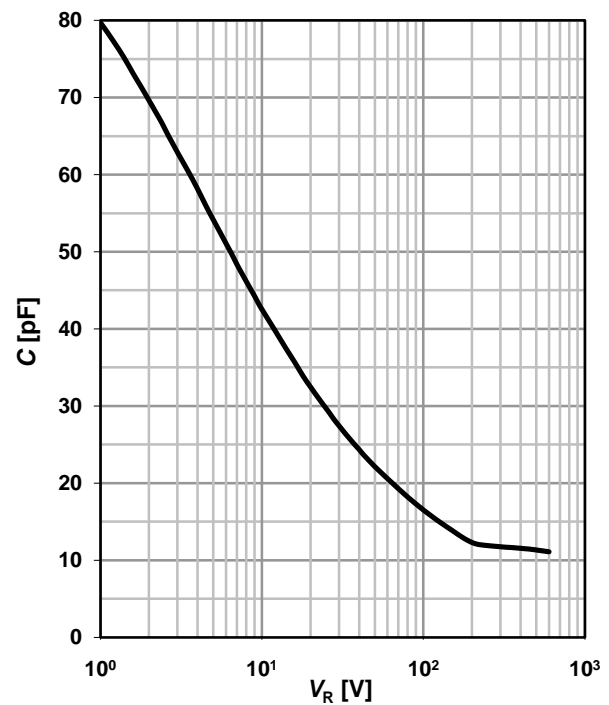
7 Transient thermal impedance

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



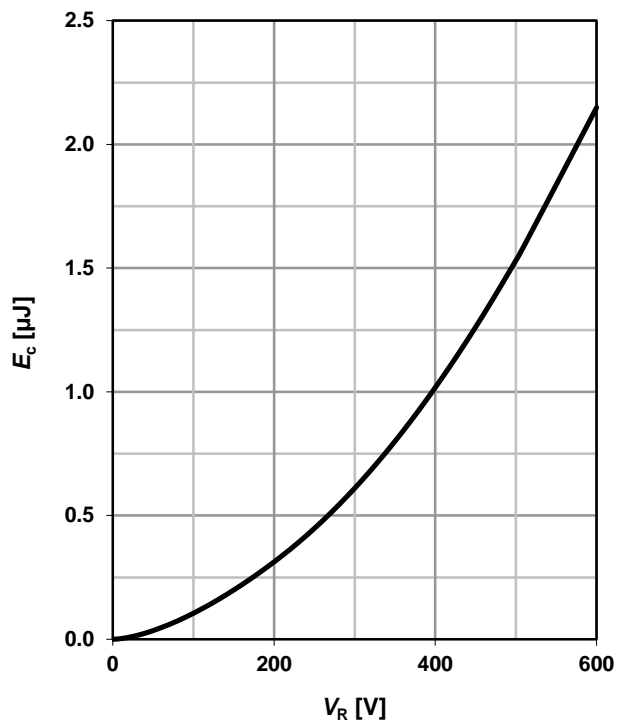
8 Typ. capacitance vs. reverse voltage

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

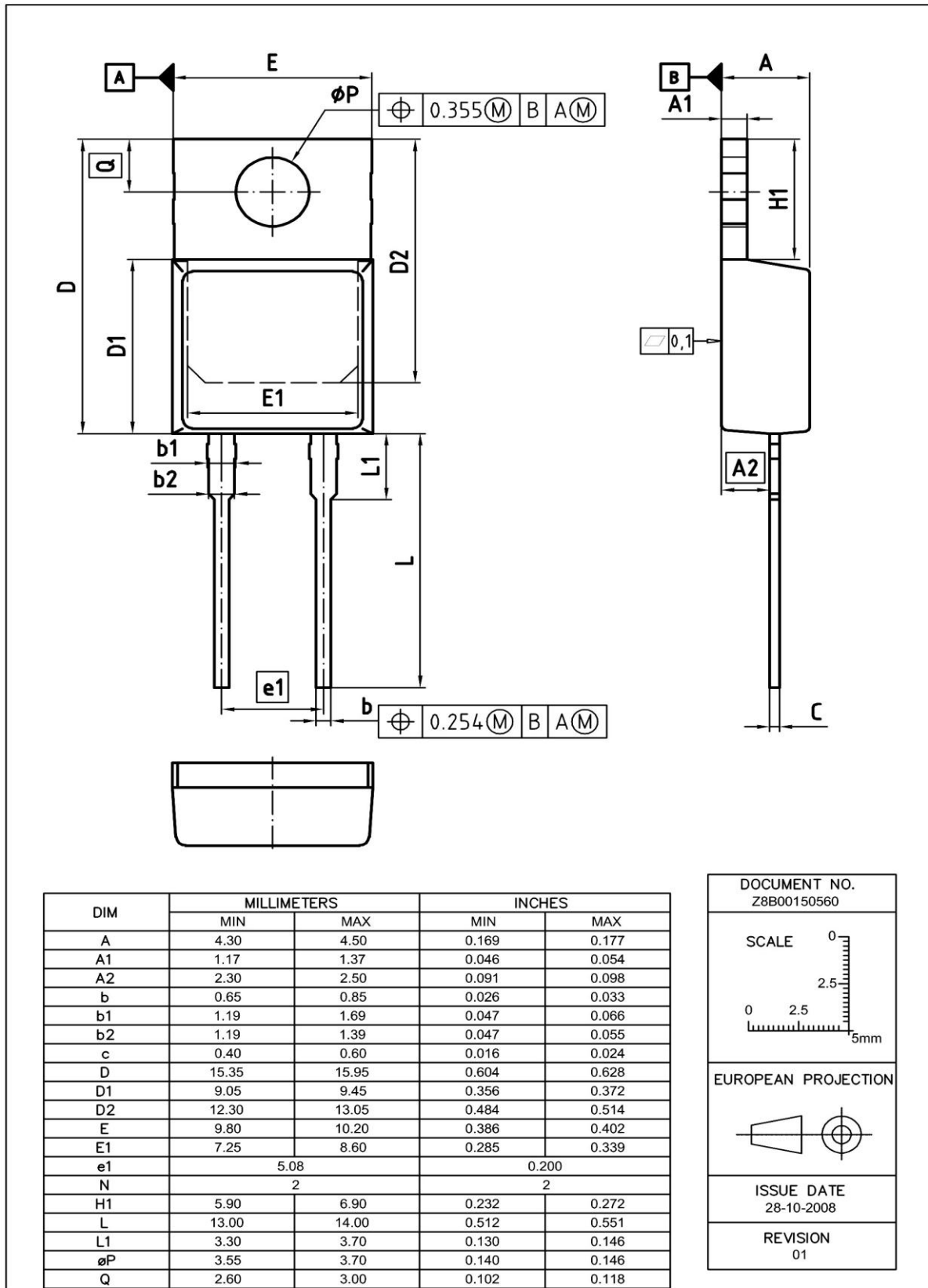


9 Typ. C stored energy

$$E_C = f(V_R)$$



PG-TO220-2: Outline



Dimensions in mm/inches

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