

Fast Switching Diode

Features

- 600V diode technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Qualified according to JEDEC for target applications

Product Summary

| | | |
|------------|-----|----|
| V_{RRM} | 600 | V |
| I_F | 23 | A |
| V_F | 1.5 | V |
| T_{jmax} | 175 | °C |



| Type | Package | Ordering Code | Marking | Pin 1 | PIN 2 | PIN 3 |
|----------|------------|---------------|---------|-------|-------|-------|
| IDP23E60 | PG-TO220-2 | - | D23E60 | C | A | - |

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

| Parameter | Symbol | Value | Unit |
|---|-----------|------------|------|
| Repetitive peak reverse voltage | V_{RRM} | 600 | V |
| Continuous forward current $T_C = 25\text{ °C}$ $T_C = 90\text{ °C}$ | I_F | 41 28 | A |
| Surge non repetitive forward current $T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$, sine halfwave | I_{FSM} | 89 | A |
| Maximum repetitive forward current $T_C = 25\text{ °C}$, t_p limited by $t_{j,max}$, $D = 0.5$ | I_{FRM} | 65 | A |
| Power dissipation $T_C = 25\text{ °C}$ $T_C = 90\text{ °C}$ | P_{tot} | 115 65 | W |
| Operating junction temperature | T_j | -40...+175 | °C |
| Storage temperature | T_{stg} | -55...+150 | |
| Soldering temperature 1.6mm (0.063 in.) from case for 10 s | T_S | 260 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|--|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 1.3 | K/W |
| SMD version, device on PCB: | R_{thJA} | - | - | 75 | |
| @ min. footprint @ 6 cm ² cooling area ¹⁾ | | - | - | 50 | |

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

| Parameter | Symbol | Values | | | Unit |
|--|--------|--------|------------|------------|---------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Reverse leakage current $V_R=600\text{V}$, $T_j=25\text{ }^\circ\text{C}$ $V_R=600\text{V}$, $T_j=150\text{ }^\circ\text{C}$ | I_R | - | - | 50 1900 | μA |
| Forward voltage drop $I_F=23\text{A}$, $T_j=25\text{ }^\circ\text{C}$ $I_F=23\text{A}$, $T_j=150\text{ }^\circ\text{C}$ | V_F | - | 1.5 1.5 | 2 - | |

⁰J-STD20 and JESD22

¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

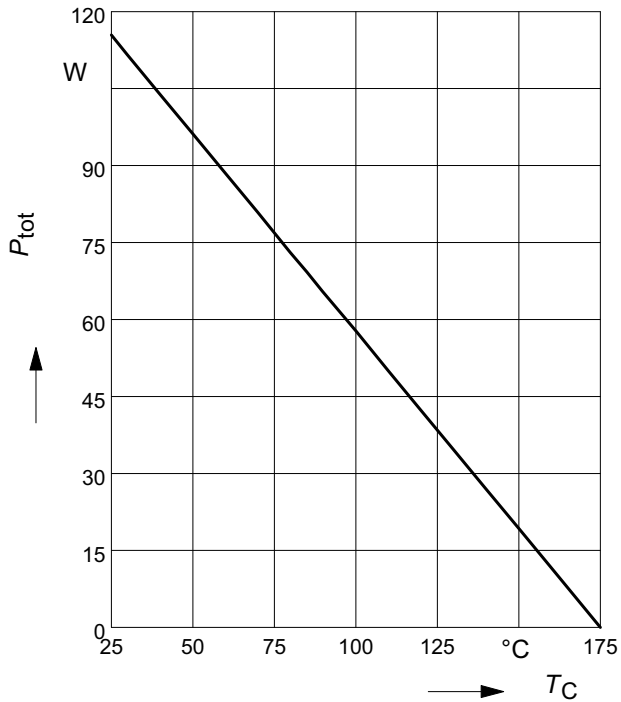
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|-----------|--------|------|------|------|
| | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | |
| Reverse recovery time $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | t_{rr} | - | 120 | - | ns |
| Peak reverse current $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | I_{rrm} | - | 17 | - | A |
| Reverse recovery charge $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | Q_{rr} | - | 970 | - | nC |
| Reverse recovery softness factor $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | S | - | 4.4 | - | |

1 Power dissipation

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

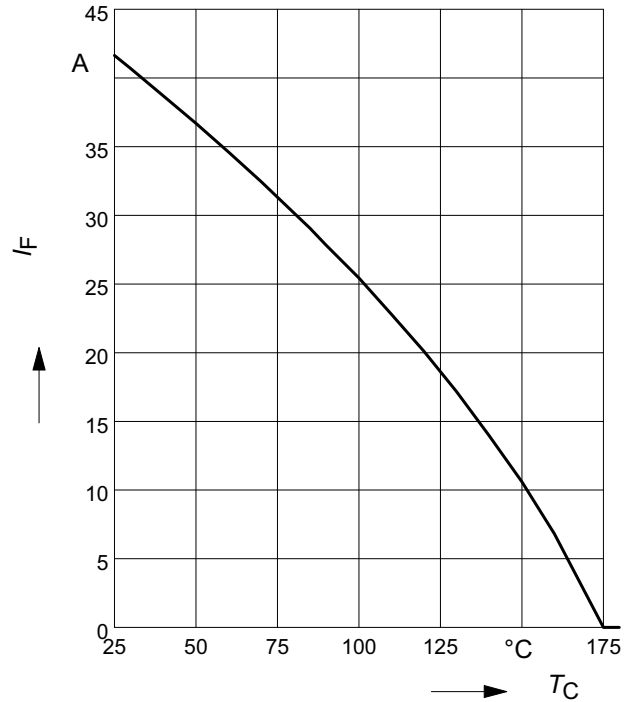
parameter: $T_j \leq 175^\circ\text{C}$



2 Diode forward current

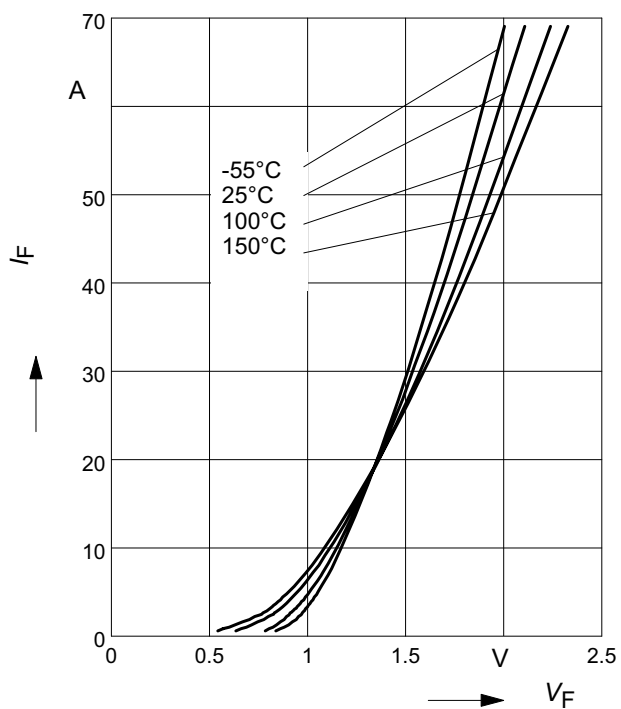
$$I_F = f(T_C)$$

parameter: $T_j \leq 175^\circ\text{C}$



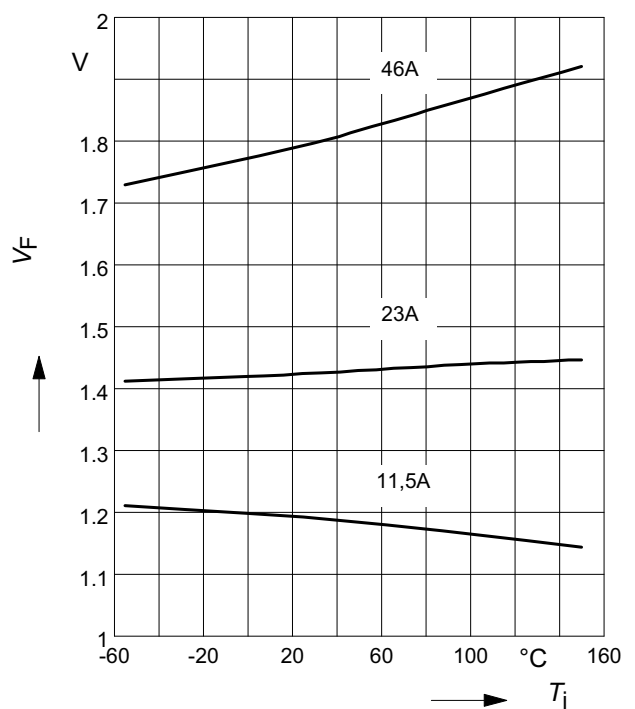
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

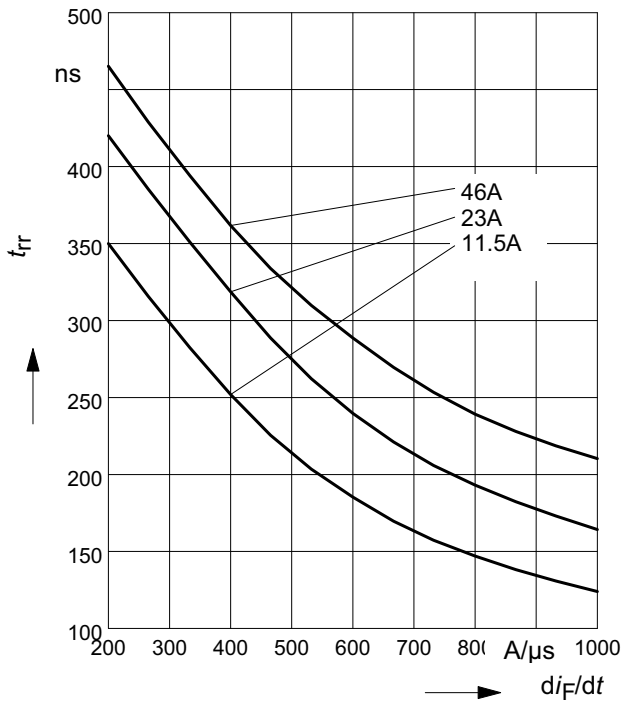
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

$$t_{rr} = f(di_F/dt)$$

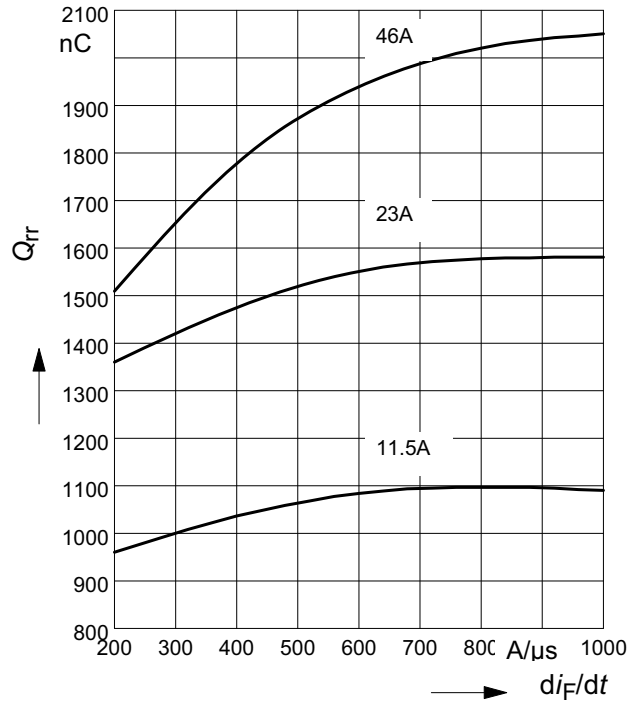
parameter: $V_R = 400V, T_j = 125^\circ C$



6 Typ. reverse recovery charge

$$Q_{rr} = f(di_F/dt)$$

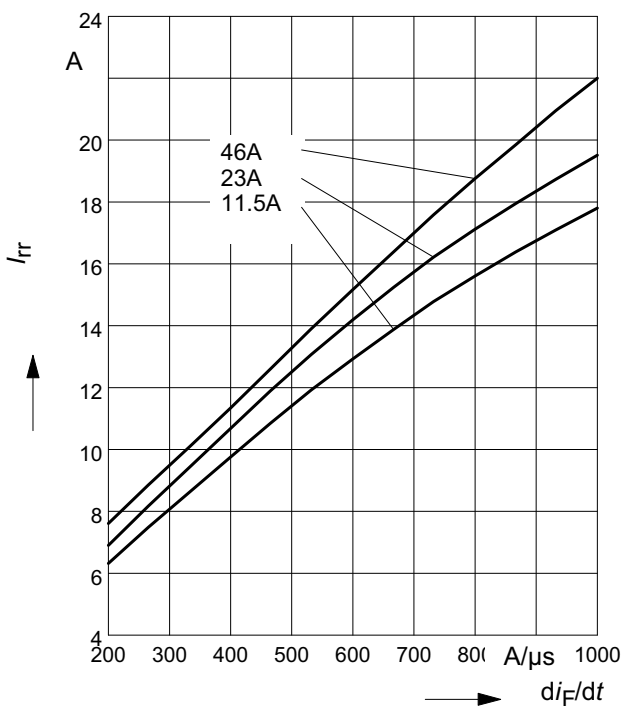
parameter: $V_R = 400V, T_j = 125^\circ C$



7 Typ. reverse recovery current

$$I_{rr} = f(di_F/dt)$$

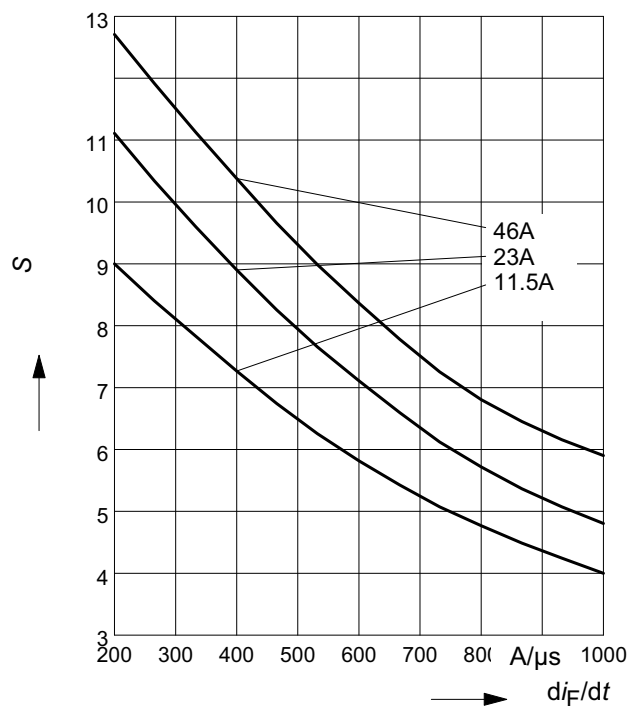
parameter: $V_R = 400V, T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

$$S = f(di_F/dt)$$

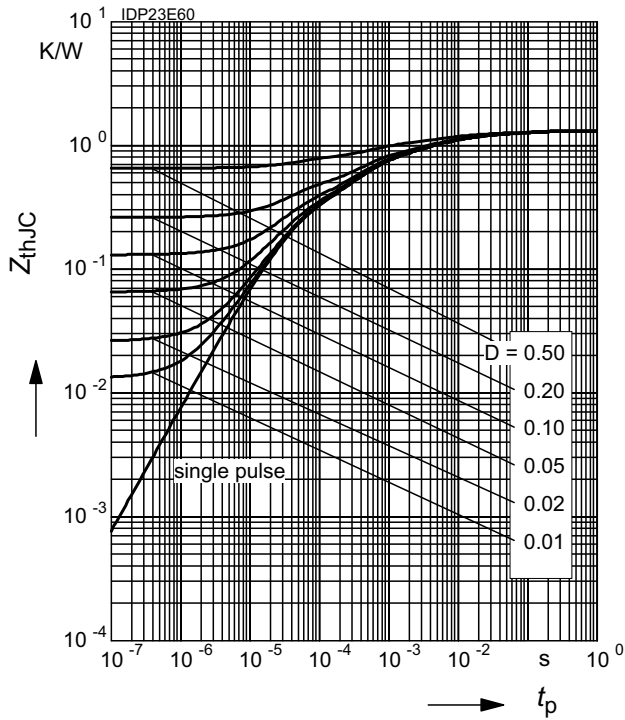
parameter: $V_R = 400V, T_j = 125^\circ C$



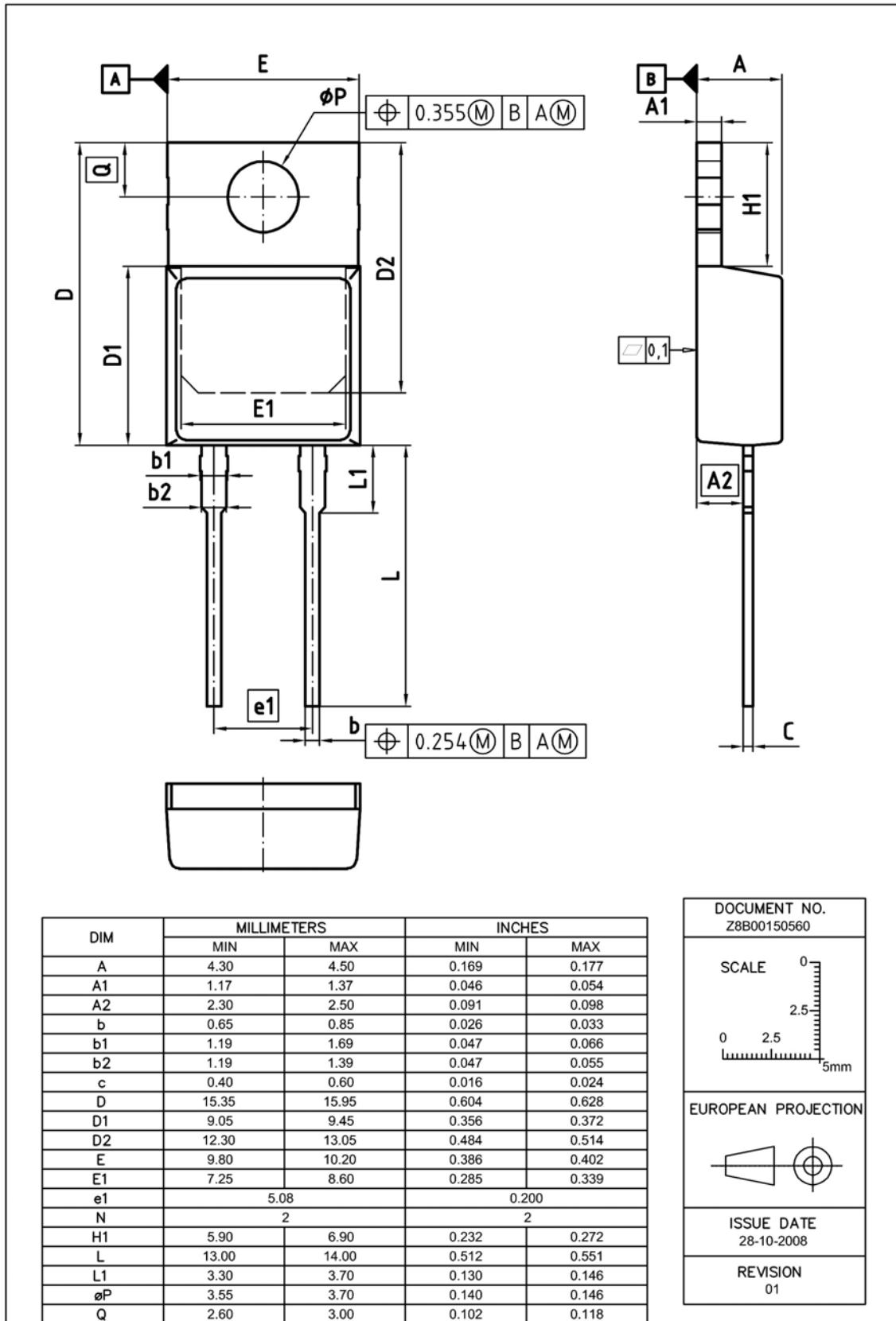
9 Max. transient thermal impedance

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

parameter : $D = t_p/T$



Outline drawing: TO220-2



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