

## Fast Switching Diode

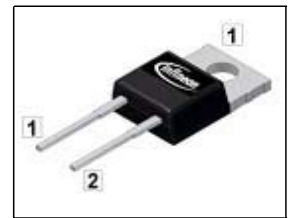
### Features

- 1200 V 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

|            |      |    |
|------------|------|----|
| $V_{RRM}$  | 1200 | V  |
| $I_F$      | 12   | A  |
| $V_F$      | 1.65 | V  |
| $T_{jmax}$ | 150  | °C |

PG-TO220-2



| Type      | Package    | Ordering Code | Marking | Pin 1 | PIN 2 | PIN 3 |
|-----------|------------|---------------|---------|-------|-------|-------|
| IDP12E120 | PG-TO220-2 | -             | D12E120 | C     | A     | -     |

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

| Parameter                                                  | Symbol         | Value      | Unit |
|------------------------------------------------------------|----------------|------------|------|
| Repetitive peak reverse voltage                            | $V_{RRM}$      | 1200       | V    |
| Continuous forward current                                 | $I_F$          | 12         | A    |
| $T_C=25\text{ °C}$                                         |                | 28         |      |
| $T_C=90\text{ °C}$                                         |                | 17         |      |
| Surge non repetitive forward current                       | $I_{FSM}$      | 63         |      |
| $T_C=25\text{ °C}$ , $t_p=10\text{ ms}$ , sine halfwave    |                |            |      |
| Maximum repetitive forward current                         | $I_{FRM}$      | 42.5       |      |
| $T_C=25\text{ °C}$ , $t_p$ limited by $T_{jmax}$ , $D=0.5$ |                |            |      |
| Power dissipation                                          | $P_{tot}$      | 96         | W    |
| $T_C=25\text{ °C}$                                         |                | 46         |      |
| $T_C=90\text{ °C}$                                         |                |            |      |
| Operating and storage temperature                          | $T_j, T_{stg}$ | -55...+150 | °C   |
| Soldering temperature                                      | $T_S$          | 260        | °C   |
| wavesoldering, 1.6mm (0.063 in.) from case for 10s         |                |            |      |

## Thermal Characteristics

| Parameter                                      | Symbol     | Values |      |      | Unit |
|------------------------------------------------|------------|--------|------|------|------|
|                                                |            | min.   | typ. | max. |      |
| Characteristics                                |            |        |      |      |      |
| Thermal resistance, junction - case            | $R_{thJC}$ | -      | -    | 1.3  | K/W  |
| Thermal resistance, junction - ambient, leaded | $R_{thJA}$ | -      | -    | 62   |      |
| SMD version, device on PCB:                    | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                               |            | -      | -    | 62   |      |
| @ 6 cm <sup>2</sup> cooling area <sup>1)</sup> |            | -      | 35   | -    |      |

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

| Parameter                                    | Symbol | Values |      |      | Unit          |
|----------------------------------------------|--------|--------|------|------|---------------|
|                                              |        | min.   | typ. | max. |               |
| Static Characteristics                       |        |        |      |      |               |
| Reverse leakage current                      | $I_R$  |        |      |      | $\mu\text{A}$ |
| $V_R=1200\text{V}$ , $T_j=25^\circ\text{C}$  |        | -      | -    | 100  |               |
| $V_R=1200\text{V}$ , $T_j=150^\circ\text{C}$ |        | -      | -    | 1000 |               |
| Forward voltage drop                         | $V_F$  |        |      |      | V             |
| $I_F=12\text{A}$ , $T_j=25^\circ\text{C}$    |        | -      | 1.65 | 2.15 |               |
| $I_F=12\text{A}$ , $T_j=150^\circ\text{C}$   |        | -      | 1.7  | -    |               |

<sup>0</sup>J-STD20 and JESD22

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

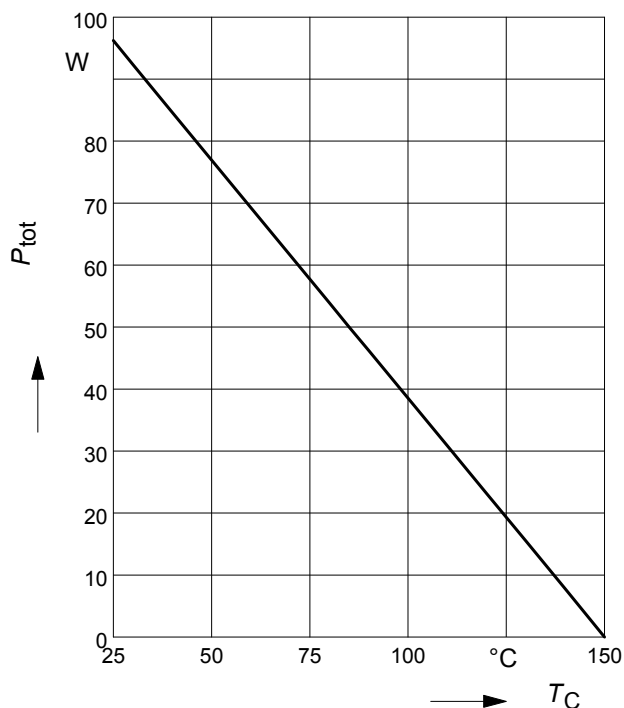
**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                                                                                                                                                                                                                                         | Symbol    | Values      |                      |             | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|----------------------|-------------|------|
|                                                                                                                                                                                                                                                   |           | min.        | typ.                 | max.        |      |
| Dynamic Characteristics                                                                                                                                                                                                                           |           |             |                      |             |      |
| Reverse recovery time<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=25^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=125^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=150^{\circ}C$            | $t_{rr}$  | -<br>-<br>- | 150<br>215<br>225    | -<br>-<br>- | ns   |
| Peak reverse current<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=25^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=125^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=150^{\circ}C$             | $I_{rrm}$ | -<br>-<br>- | 17<br>20.9<br>21.5   | -<br>-<br>- | A    |
| Reverse recovery charge<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=25^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=125^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=150^{\circ}C$          | $Q_{rr}$  | -<br>-<br>- | 1200<br>1840<br>2025 | -<br>-<br>- | nC   |
| Reverse recovery softness factor<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=25^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=125^{\circ}C$<br>$V_R=800V$ , $I_F=12A$ , $di_F/dt=800A/\mu s$ , $T_j=150^{\circ}C$ | S         | -<br>-<br>- | 5<br>5.8<br>5.9      | -<br>-<br>- |      |

### 1 Power dissipation

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

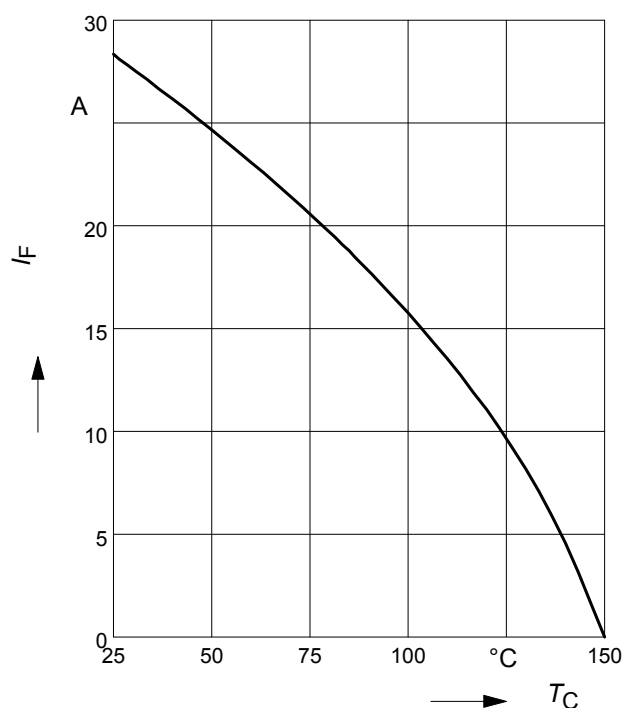
parameter:  $T_j \leq 150^\circ\text{C}$



### 2 Diode forward current

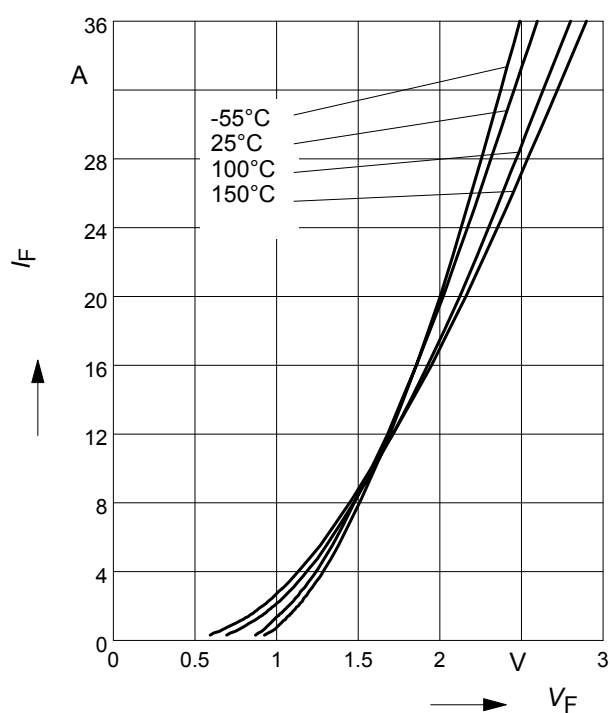
$$I_F = f(T_C)$$

parameter:  $T_j \leq 150^\circ\text{C}$



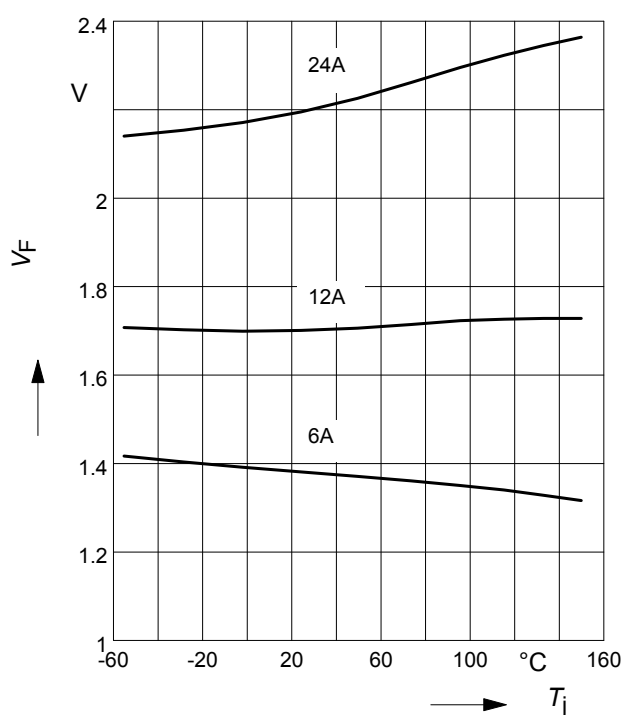
### 3 Typ. diode forward current

$$I_F = f(V_F)$$



### 4 Typ. diode forward voltage

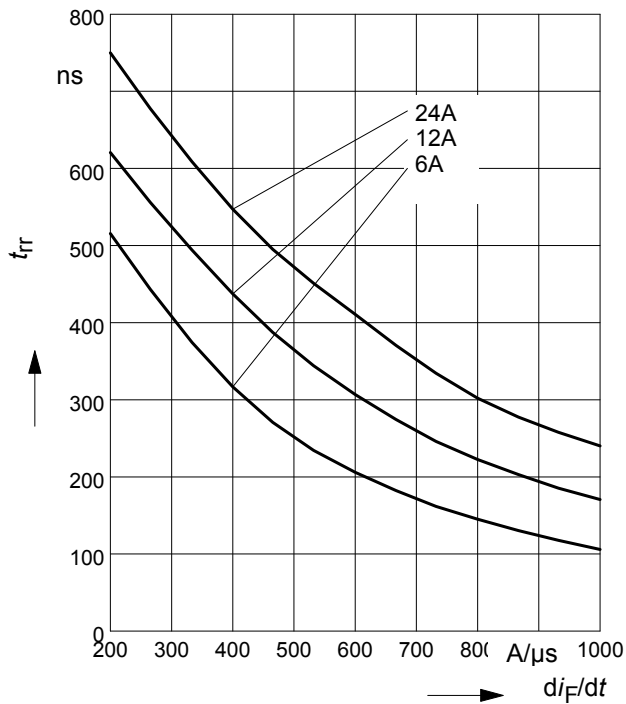
$$V_F = f(T_j)$$



### 5 Typ. reverse recovery time

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

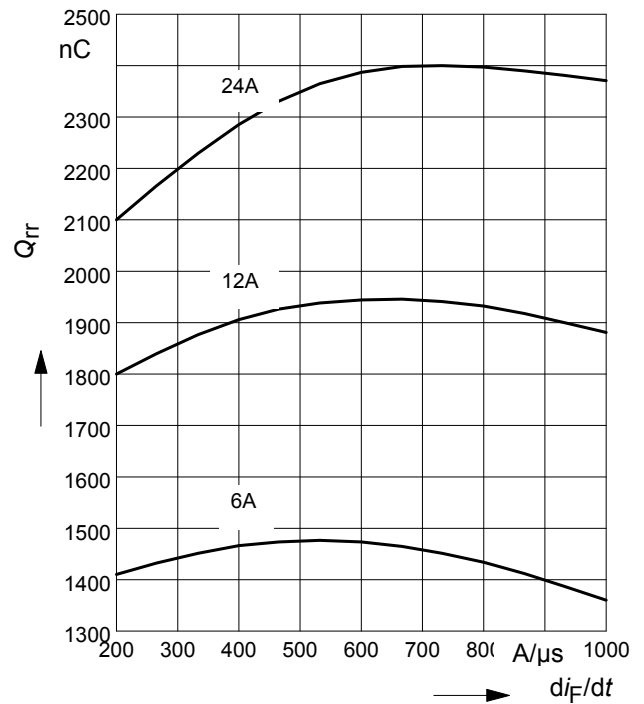
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 6 Typ. reverse recovery charge

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

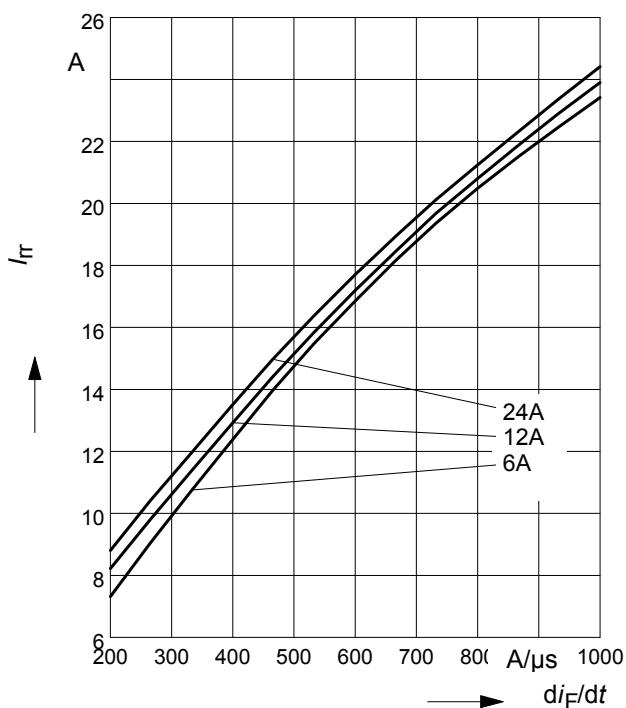
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 7 Typ. reverse recovery current

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

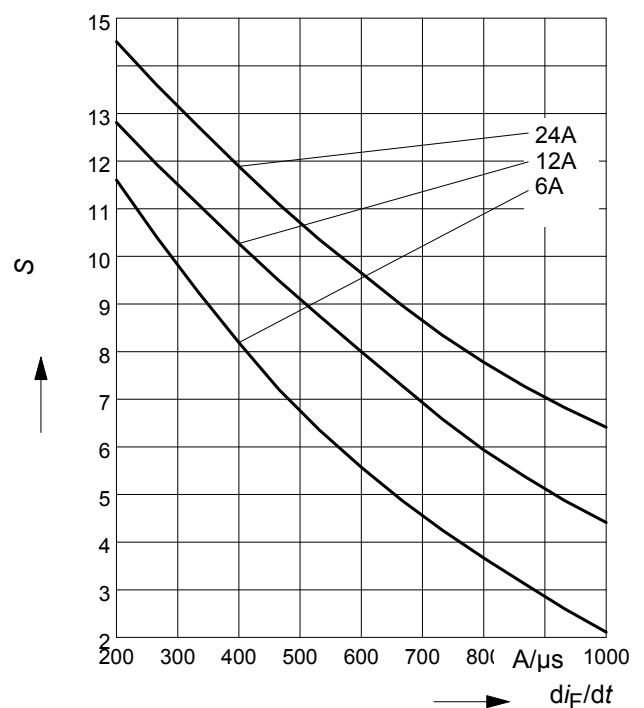
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



### 8 Typ. reverse recovery softness factor

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

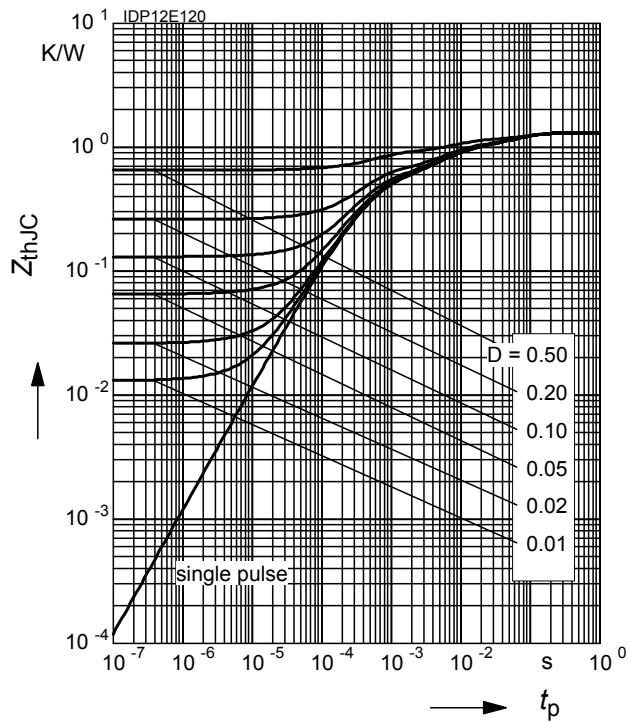
parameter:  $V_R = 800V$ ,  $T_j = 125^\circ C$



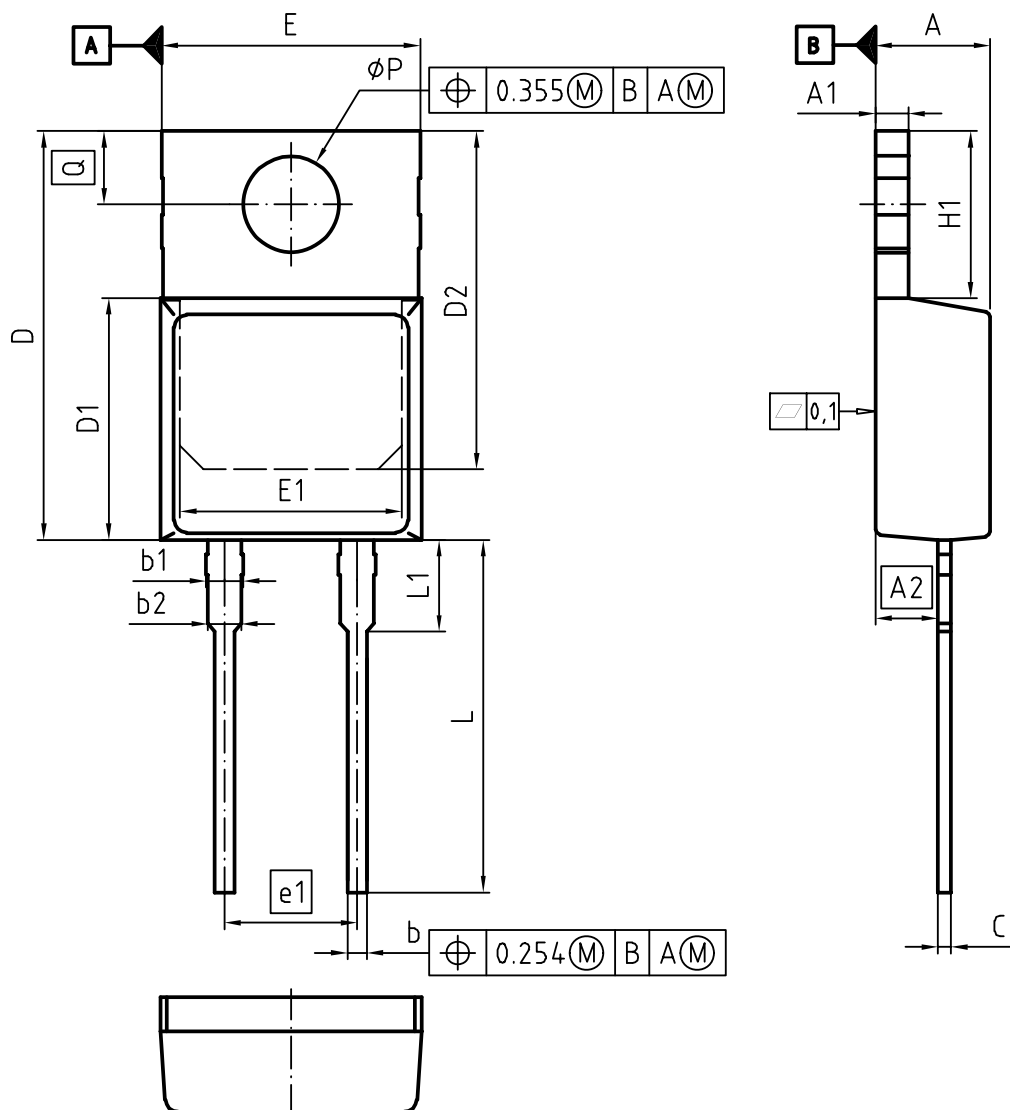
## 9 Max. transient thermal impedance

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

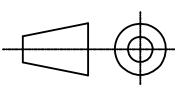
parameter :  $D = t_p/T$



TO-220-2



| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 4.30        | 4.50  | 0.169  | 0.177 |
| A1  | 1.17        | 1.37  | 0.046  | 0.054 |
| A2  | 2.30        | 2.50  | 0.091  | 0.098 |
| b   | 0.65        | 0.85  | 0.026  | 0.033 |
| b1  | 1.19        | 1.69  | 0.047  | 0.066 |
| b2  | 1.19        | 1.39  | 0.047  | 0.055 |
| c   | 0.40        | 0.60  | 0.016  | 0.024 |
| D   | 15.35       | 15.95 | 0.604  | 0.628 |
| D1  | 9.05        | 9.45  | 0.356  | 0.372 |
| D2  | 12.30       | 13.05 | 0.484  | 0.514 |
| E   | 9.80        | 10.20 | 0.386  | 0.402 |
| E1  | 7.25        | 8.60  | 0.285  | 0.339 |
| e1  | 5.08        |       | 0.200  |       |
| N   | 2           |       | 2      |       |
| H1  | 5.90        | 6.90  | 0.232  | 0.272 |
| L   | 13.00       | 14.00 | 0.512  | 0.551 |
| L1  | 3.30        | 3.70  | 0.130  | 0.146 |
| φP  | 3.55        | 3.70  | 0.140  | 0.146 |
| Q   | 2.60        | 3.00  | 0.102  | 0.118 |

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
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