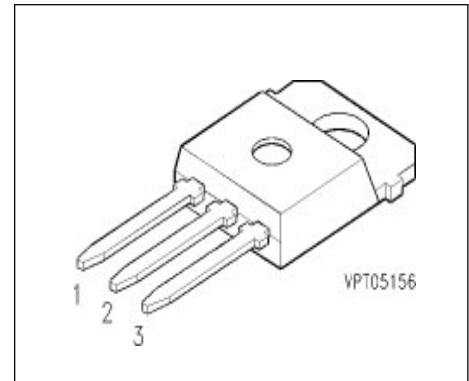


IGBT

Preliminary data

- Low forward voltage drop
- High switching speed
- Low tail current
- Latch-up free
- Avalanche rated



| Pin 1 | Pin 2 | Pin 3 |
|-------|-------|-------|
| G | C | E |

| Type | V_{CE} | I_C | Package | Ordering Code |
|---------|----------|-------|-----------|-----------------|
| BUP 303 | 1000V | 23A | TO-218 AB | Q67078-A4202-A2 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|-------------|---------------|------------------|
| Collector-emitter voltage | V_{CE} | 1000 | V |
| Collector-gate voltage | V_{CGR} | 1000 | |
| $R_{GE} = 20 \text{ k}\Omega$ | | | |
| Gate-emitter voltage | V_{GE} | ± 20 | |
| DC collector current | I_C | | A |
| $T_C = 25 \text{ }^\circ\text{C}$ | | 23 | |
| $T_C = 90 \text{ }^\circ\text{C}$ | | 15 | |
| Pulsed collector current, $t_p = 1 \text{ ms}$ | I_{Cpuls} | | |
| $T_C = 25 \text{ }^\circ\text{C}$ | | 46 | |
| $T_C = 90 \text{ }^\circ\text{C}$ | | 30 | |
| Avalanche energy, single pulse | E_{AS} | | mJ |
| $I_C = 10 \text{ A}$, $V_{CC} = 24 \text{ V}$, $R_{GE} = 25 \text{ }\Omega$ $L = 3 \text{ mH}$, $T_j = 25 \text{ }^\circ\text{C}$ | | 20 | |
| Power dissipation | P_{tot} | | W |
| $T_C = 25 \text{ }^\circ\text{C}$ | | 200 | |
| Chip or operating temperature | T_j | -55 ... + 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 ... + 150 | |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|-------------------------------------|--------|---------------|------|
| DIN humidity category, DIN 40 040 | - | E | - |
| IEC climatic category, DIN IEC 68-1 | - | 55 / 150 / 56 | |

Thermal Resistance

| | | | |
|-------------------------------|------------|-------------|-----|
| Thermal resistance, chip case | R_{thJC} | ≤ 0.63 | K/W |
|-------------------------------|------------|-------------|-----|

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

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

Static Characteristics

| | | | | | |
|---|---------------|-----|-----------------|-------------------|---------------|
| Gate threshold voltage $V_{GE} = V_{CE}, I_C = 0.7\text{ mA}$ | $V_{GE(th)}$ | 4.5 | 5.5 | 6.5 | V |
| Collector-emitter saturation voltage $V_{GE} = 15\text{ V}, I_C = 10\text{ A}, T_j = 25\text{ }^\circ\text{C}$ $V_{GE} = 15\text{ V}, I_C = 10\text{ A}, T_j = 125\text{ }^\circ\text{C}$ $V_{GE} = 15\text{ V}, I_C = 10\text{ A}, T_j = 150\text{ }^\circ\text{C}$ | $V_{CE(sat)}$ | - | 2.8 3.8 4 | 3.3 4.3 4.5 | |
| Zero gate voltage collector current $V_{CE} = 1000\text{ V}, V_{GE} = 0\text{ V}, T_j = 25\text{ }^\circ\text{C}$ $V_{CE} = 1000\text{ V}, V_{GE} = 0\text{ V}, T_j = 125\text{ }^\circ\text{C}$ | I_{CES} | - | - | 150 700 | μA |
| Gate-emitter leakage current $V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$ | I_{GES} | - | 0.1 | 100 | nA |

AC Characteristics

| | | | | | |
|---|-----------|-----|------|------|----|
| Transconductance $V_{CE} = 20\text{ V}, I_C = 10\text{ A}$ | g_{fs} | 3.5 | 5.5 | - | S |
| Input capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$ | C_{iss} | - | 1300 | 1750 | pF |
| Output capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$ | C_{oss} | - | 100 | 150 | |
| Reverse transfer capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$ | C_{rss} | - | 50 | 75 | |

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

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

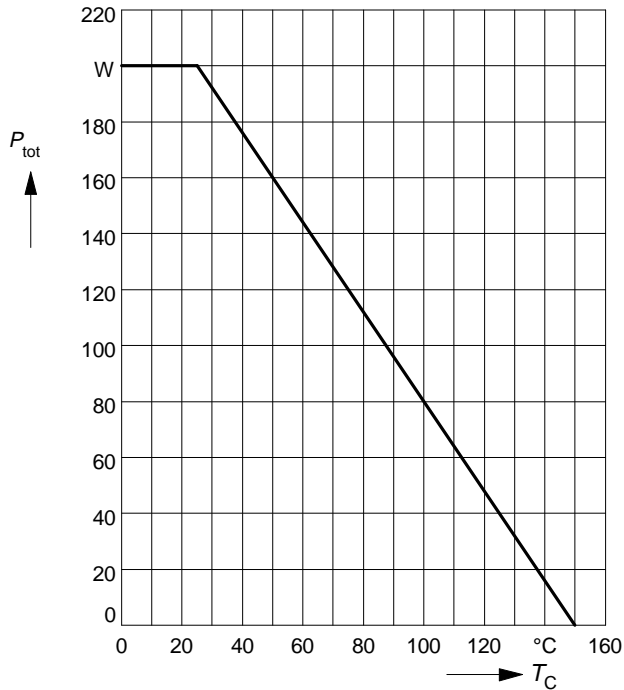
Switching Characteristics, Inductive Load at $T_j = 125\text{ °C}$

| | | | | | |
|--|--------------|---|-----|-----|----|
| Turn-on delay time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 10\text{ A}$ $R_{Gon} = 47\text{ }\Omega$ | $t_{d(on)}$ | - | 40 | 60 | ns |
| Rise time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 10\text{ A}$ $R_{Gon} = 47\text{ }\Omega$ | t_r | - | 30 | 50 | |
| Turn-off delay time $V_{CC} = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $I_C = 10\text{ A}$ $R_{Goff} = 47\text{ }\Omega$ | $t_{d(off)}$ | - | 200 | 300 | |
| Fall time $V_{CC} = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $I_C = 10\text{ A}$ $R_{Goff} = 47\text{ }\Omega$ | t_f | - | 20 | 30 | |
| Total turn-off loss energy $V_{CC} = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $I_C = 10\text{ A}$ $R_{Goff} = 47\text{ }\Omega$ | E_{off} | - | 1.3 | - | |

Power dissipation

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

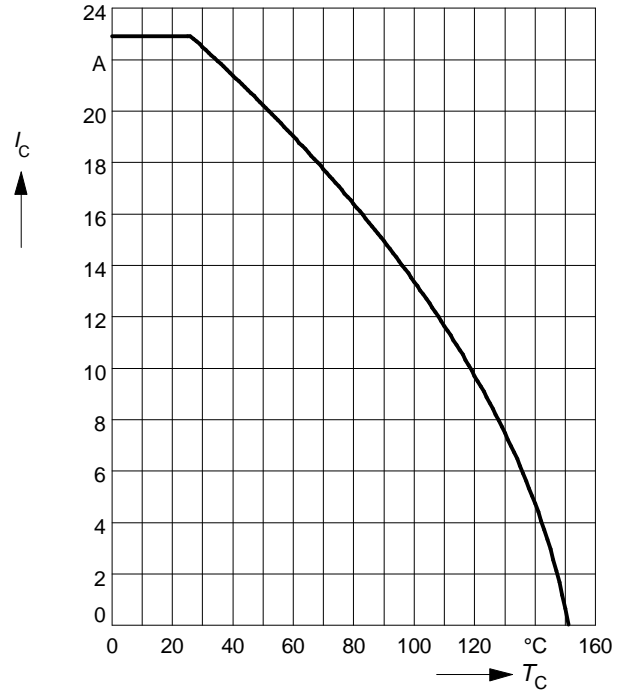
parameter: $T_j \leq 150^\circ\text{C}$



Collector current

$$I_C = f(T_C)$$

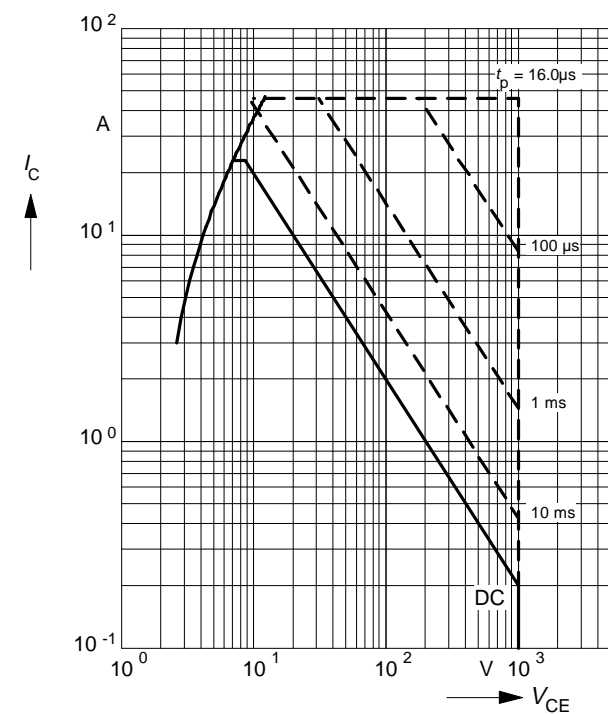
parameter: $V_{GE} \geq 15\text{ V}$, $T_j \leq 150^\circ\text{C}$



Safe operating area

$$I_C = f(V_{CE})$$

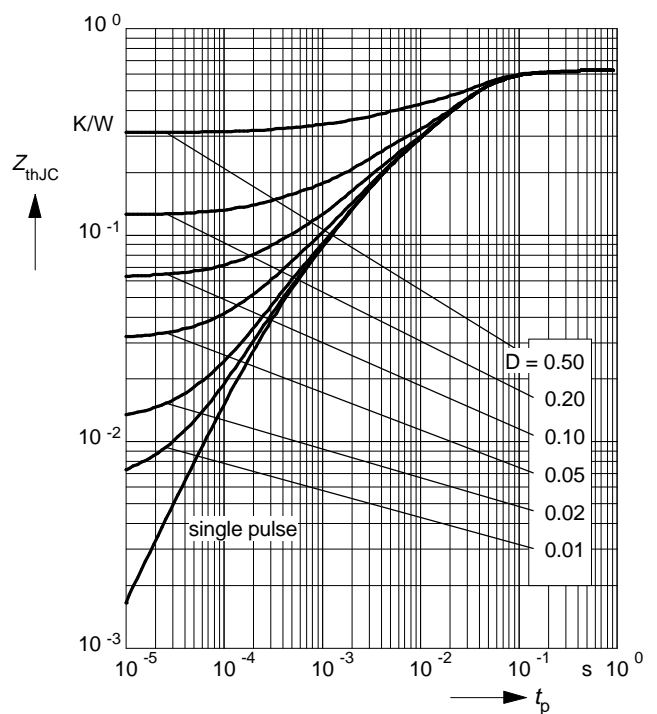
parameter: $D = 0$, $T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$



Transient thermal impedance IGBT

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

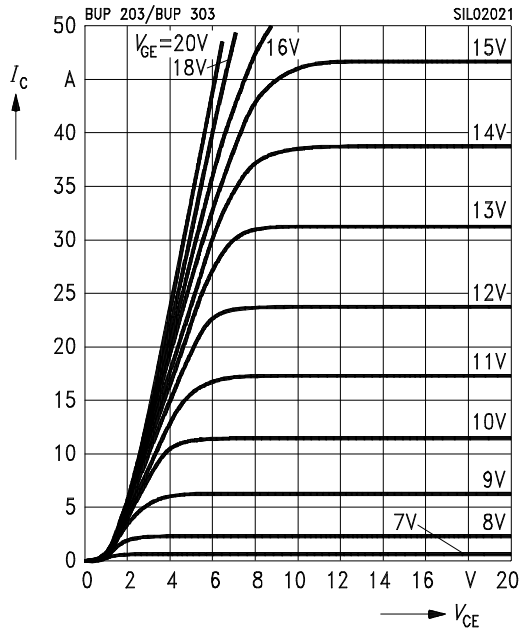
parameter: $D = t_p / T$



Typ. output characteristics

$$I_C = f(V_{CE})$$

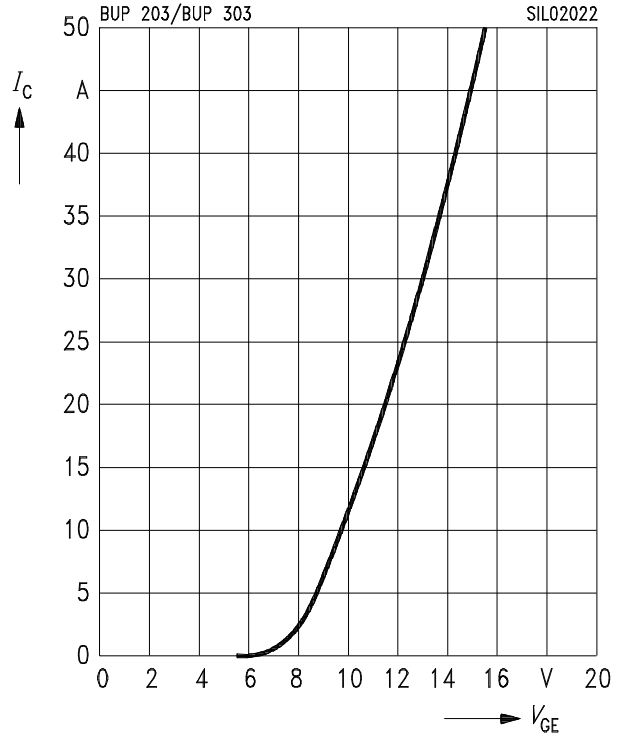
parameter: $t_p = 80 \mu s$, $T_j = 125 \text{ }^\circ\text{C}$



Typ. transfer characteristics

$$I_C = f(V_{GE})$$

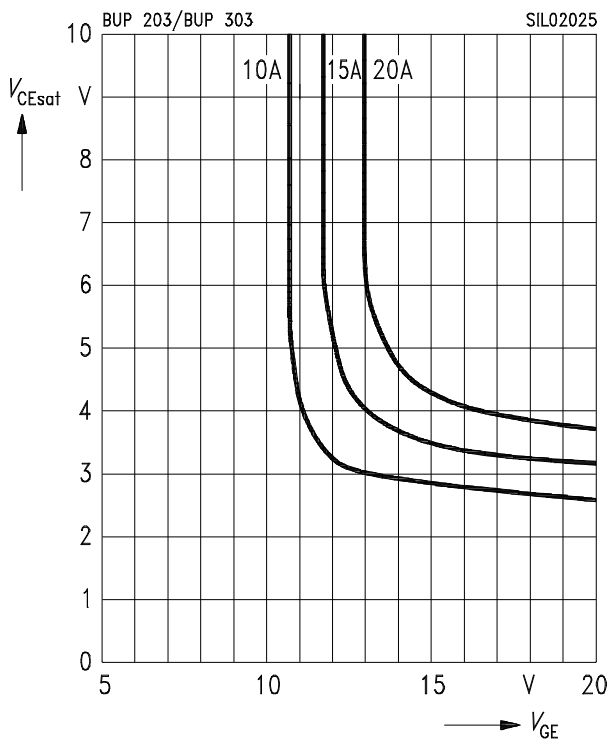
parameter: $t_p = 80 \mu s$, $V_{CE} = 20 \text{ V}$, $T_j = 25 \text{ }^\circ\text{C}$



Typ. saturation characteristics

$$V_{CE(sat)} = f(V_{GE})$$

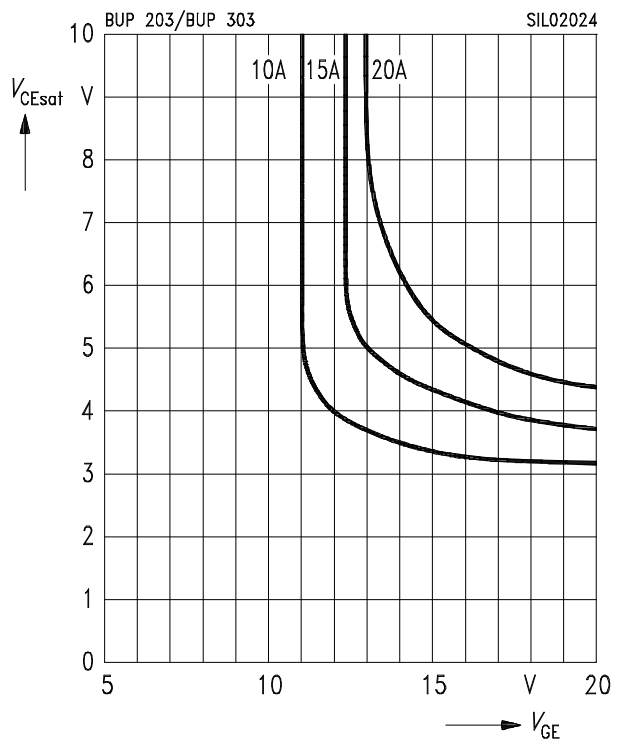
parameter: $T_j = 25 \text{ }^\circ\text{C}$



Typ. saturation characteristics

$$V_{CE(sat)} = f(V_{GE})$$

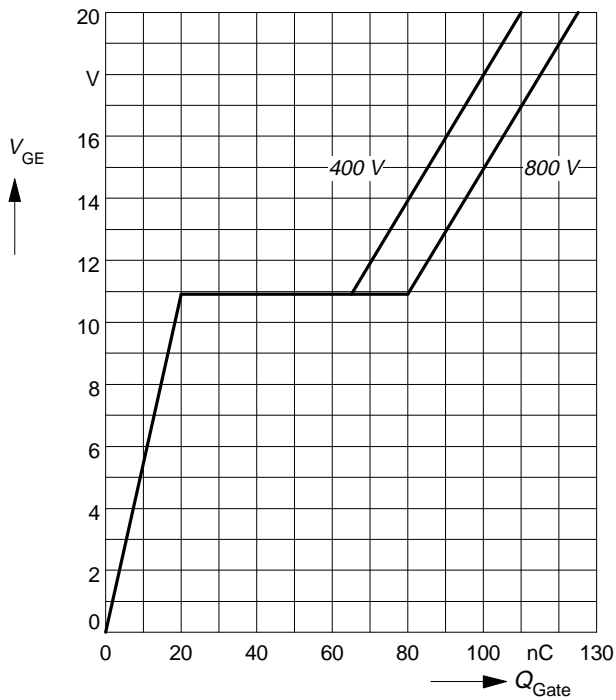
parameter: $T_j = 125 \text{ }^\circ\text{C}$



Typ. gate charge

$$V_{GE} = f(Q_{Gate})$$

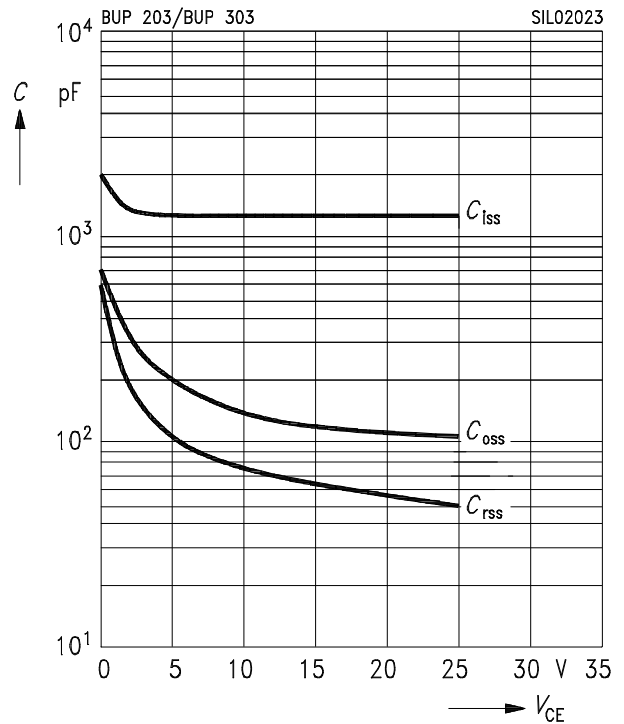
parameter: $I_{C\ puls} = 10\ A$



Typ. capacitances

$$C = f(V_{CE})$$

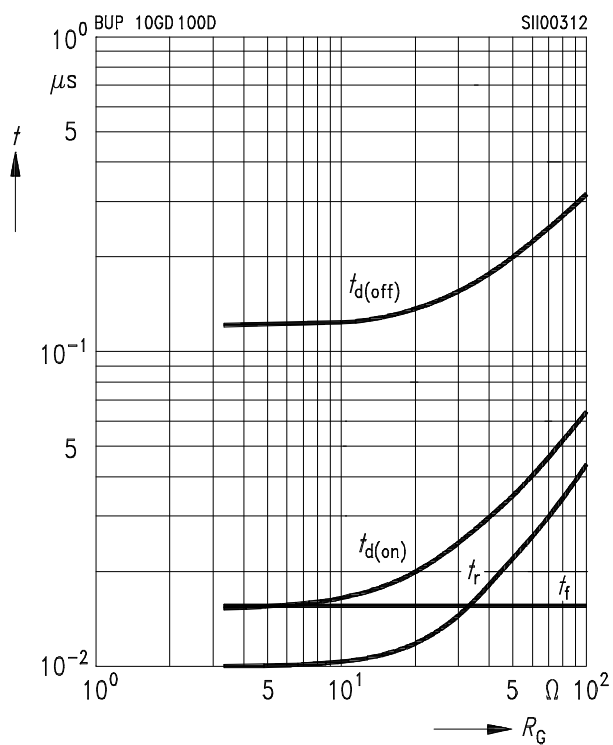
parameter: $V_{GE} = 0\ V, f = 1\ MHz$



Typ. switching time

$t = f(R_G)$, inductive load, $T_j = 125\ ^\circ C$

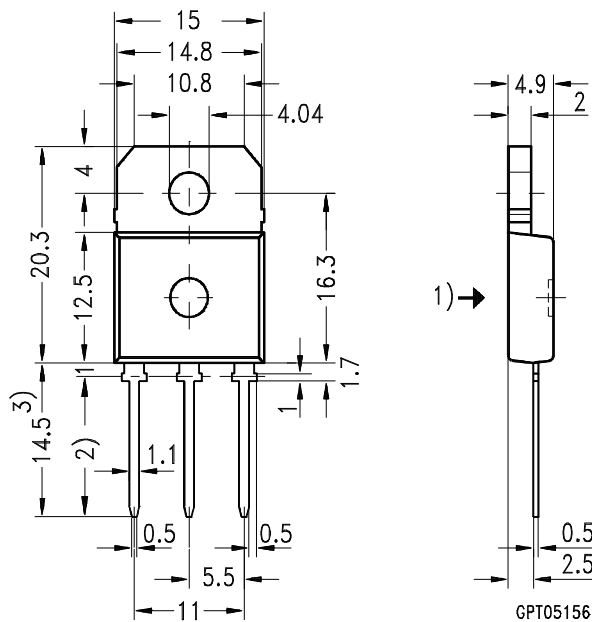
parameter: $V_{CE} = 600\ V, V_{GE} = \pm 15\ V, I_C = 10\ A$



Package Outlines

Dimensions in mm

Weight: 8 g



- 1) punch direction, burr max. 0.04
- 2) dip finning
- 3) max. 15.5 by dip finning press burr max. 0.05