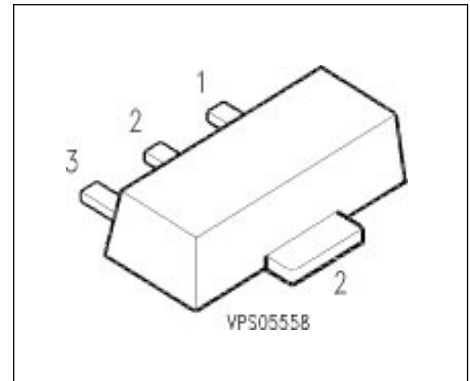## SIPMOS ® Small-Signal Transistor

• N channel

• Enhancement mode

• Logic Level

• $V_{GS(th)} = 0.8...2.0V$

| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|-------|-------|-------|-------|
| G | D | S | D |

| Type | $V_{DS}$ | $I_D$ | $R_{DS(on)}$ | Package | Marking |
|------|----------|-------|--------------|---------|---------|
| BSS 87 | 240 V | 0.29 A | 6 Ω | SOT-89 | KA |

| Type | Ordering Code | Tape and Reel Information |
|------|---------------|--------------------------|
| BSS 87 | Q67000-S506 | E6327 |

### Maximum Ratings

| Parameter | Symbol | Values | Unit |
|-----------|--------|--------|------|
| Drain source voltage | $V_{DS}$ | 240 | V |
| Drain-gate voltage $R_{GS} = 20\ k\Omega$ | $V_{DGR}$ | 240 | |
| Gate source voltage | $V_{GS}$ | ± 14 | |
| Gate-source peak voltage, aperiodic | $V_{gs}$ | ± 20 | |
| Continuous drain current $T_A = 23\ °C$ | $I_D$ | 0.29 | A |
| DC drain current, pulsed $T_A = 25\ °C$ | $I_{Dpuls}$ | 1.16 | |
| Power dissipation $T_A = 25\ °C$ | $P_{tot}$ | 1 | W |

## Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Chip or operating temperature | $T_j$ | -55 ... + 150 | °C |
| Storage temperature | $T_{stg}$ | -55 ... + 150 | |
| Thermal resistance, chip to ambient air | $R_{thJA}$ | $\leq 125$ | K/W |
| DIN humidity category, DIN 40 040 | | E | |
| IEC climatic category, DIN IEC 68-1 | | 55 / 150 / 56 | |

**Electrical Characteristics,** at $T_j = 25°C$, unless otherwise specified

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

### Static Characteristics

| Parameter | Symbol | min. | typ. | max. | Unit |
|---|---|---|---|---|---|
| Drain- source breakdown voltage $V_{GS} = 0$ V, $I_D = 0.25$ mA, $T_j = 25$ °C | $V_{(BR)DSS}$ | 240 | - | - | V |
| Gate threshold voltage $V_{GS} = V_{DS}$, $I_D = 1$ mA | $V_{GS(th)}$ | 0.8 | 1.5 | 2 | |
| Zero gate voltage drain current | $I_{DSS}$ | | | | µA |
| $V_{DS} = 240$ V, $V_{GS} = 0$ V, $T_j = 25$ °C | | - | 0.1 | 1 | |
| $V_{DS} = 240$ V, $V_{GS} = 0$ V, $T_j = 125$ °C | | - | 10 | 100 | |
| $V_{DS} = 60$ V, $V_{GS} = 0$ V, $T_j = 25$ °C | | - | - | 0.2 | |
| Gate-source leakage current | $I_{GSS}$ | | | | nA |
| $V_{GS} = 20$ V, $V_{DS} = 0$ V | | - | 1 | 10 | |
| Drain-Source on-state resistance | $R_{DS(on)}$ | | | | Ω |
| $V_{GS} = 10$ V, $I_D = 0.29$ A | | - | 3 | 6 | |
| $V_{GS} = 4.5$ V, $I_D = 0.29$ A | | - | 4 | 10 | |

**Electrical Characteristics,** at $T_j = 25°C$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Dynamic Characteristics** | | | | | |
| Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}, I_D = 0.29 \text{ A}$ | $g_{fs}$ | 0.14 | 0.33 | - | S |
| Input capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$ | $C_{iss}$ | - | 115 | 155 | pF |
| Output capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$ | $C_{oss}$ | - | 15 | 25 | |
| Reverse transfer capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$ | $C_{rss}$ | - | 8 | 12 | |
| Turn-on delay time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.28 \text{ A}$ $R_{GS} = 50 \, \Omega$ | $t_{d(on)}$ | - | 6 | 9 | ns |
| Rise time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.28 \text{ A}$ $R_{GS} = 50 \, \Omega$ | $t_r$ | - | 10 | 15 | |
| Turn-off delay time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.28 \text{ A}$ $R_{GS} = 50 \, \Omega$ | $t_{d(off)}$ | - | 33 | 45 | |
| Fall time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.28 \text{ A}$ $R_{GS} = 50 \, \Omega$ | $t_f$ | - | 22 | 30 | |

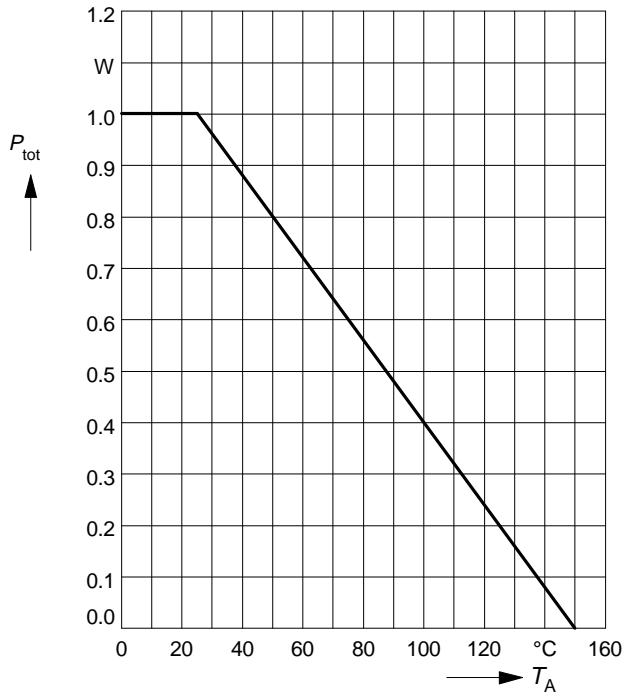**Electrical Characteristics,** at $T_j = 25°C$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Reverse Diode** | | | | | |
| Inverse diode continuous forward current $T_A = 25 °C$ | $I_S$ | - | - | 0.29 | A |
| Inverse diode direct current,pulsed $T_A = 25 °C$ | $I_{SM}$ | - | - | 1.16 | |
| Inverse diode forward voltage $V_{GS} = 0$ V, $I_F = 0.58$ A, $T_j = 25 °C$ | $V_{SD}$ | - | 0.85 | 1.4 | V |

## Power dissipation

$P_{tot} = f(T_A)$



## Drain current

$I_D = f(T_A)$
parameter: $V_{GS} \geq 10$ V
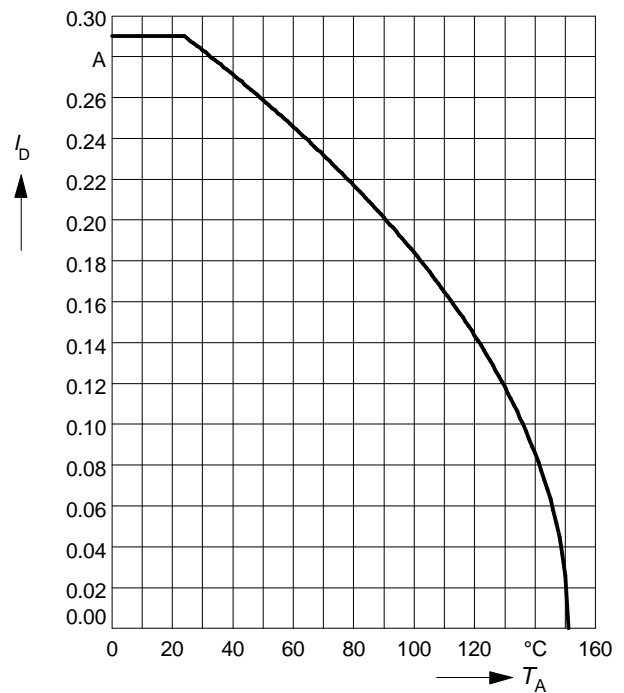


## Safe operating area $I_D = f(V_{DS})$

parameter : $D = 0.01$, $T_C = 25°C$
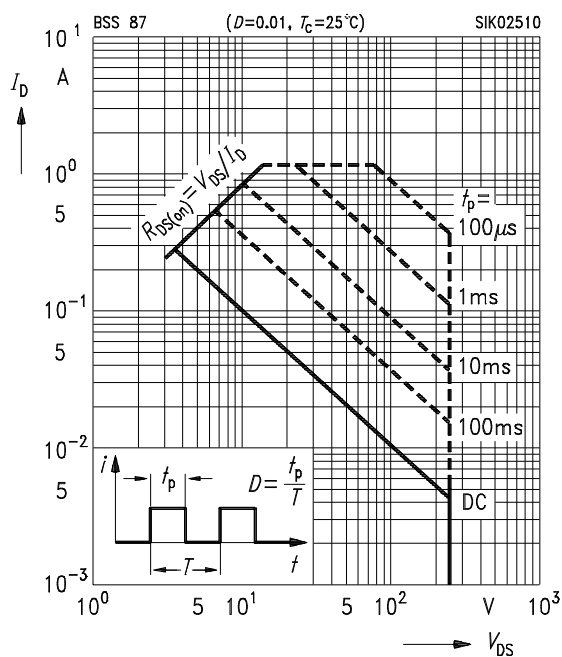


## Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$
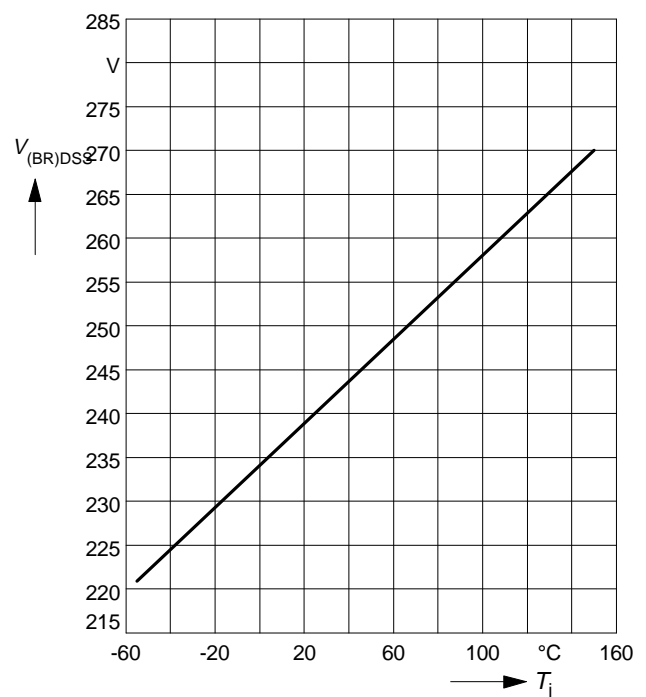
## Typ. output characteristics

$I_D = f(V_{DS})$

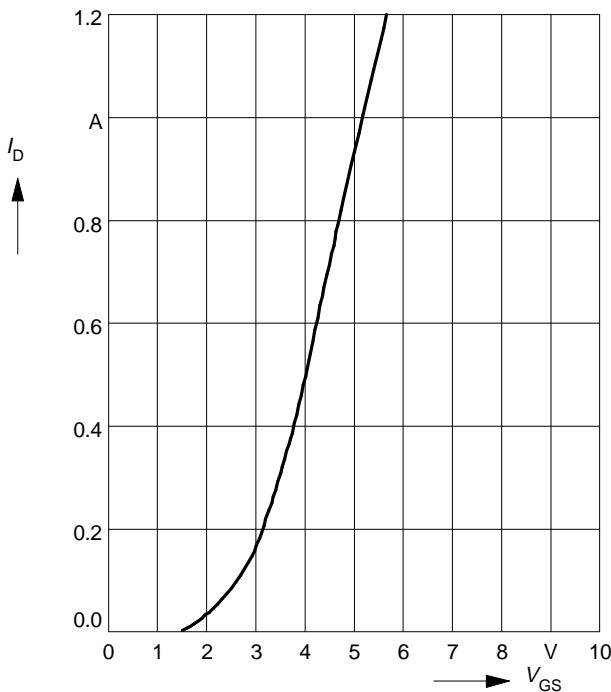parameter: $t_p = 80$ µs , $T_j = 25$ °C
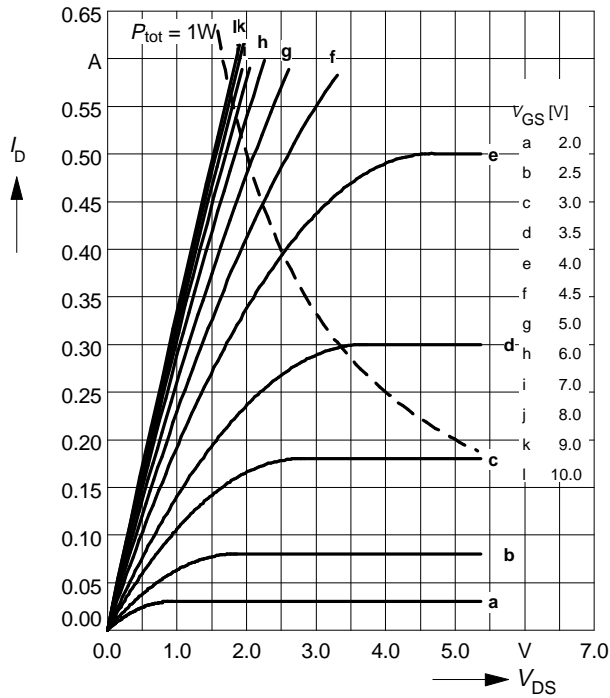


## Typ. drain-source on-resistance

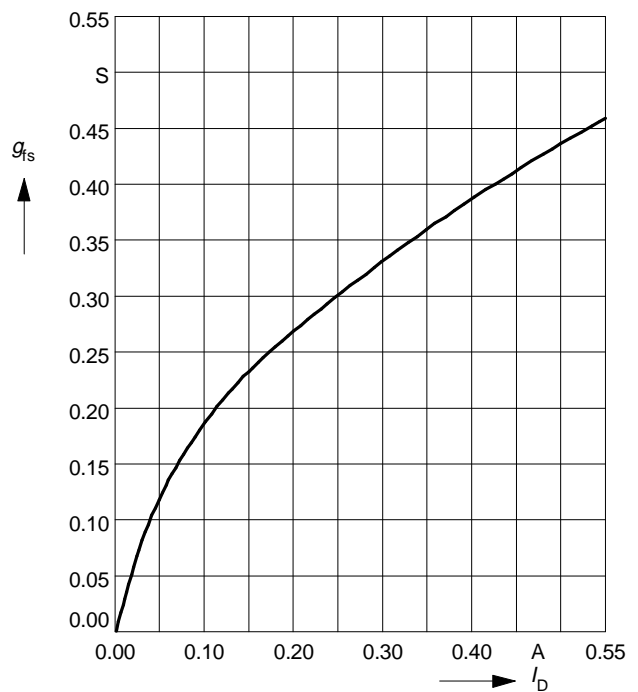$R_{DS (on)} = f(I_D)$

parameter: $t_p = 80$ µs, $T_j = 25$ °C
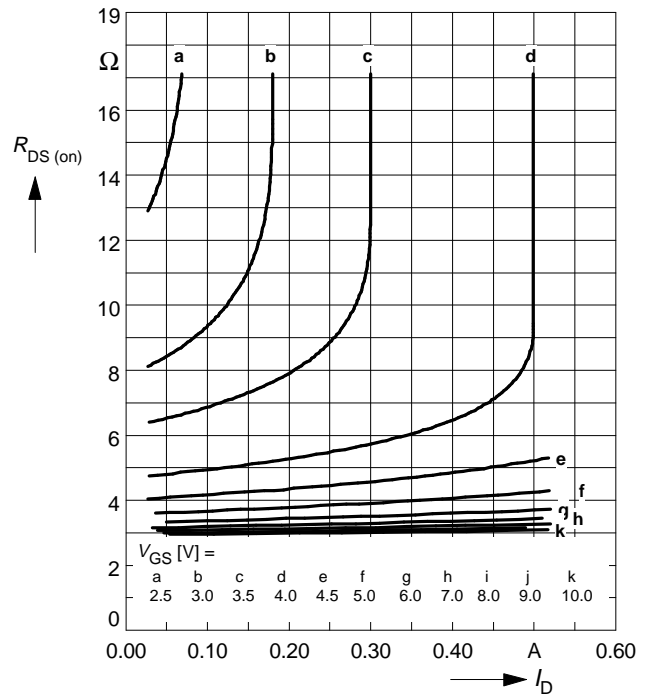


Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs



Typ. forward transconductance $g_{fs} = f(I_D)$
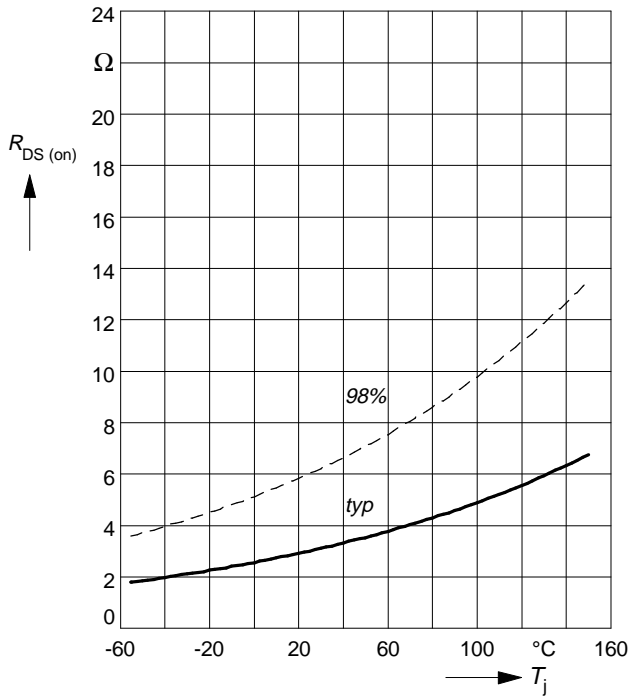parameter: $t_p = 80$ µs,

## Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
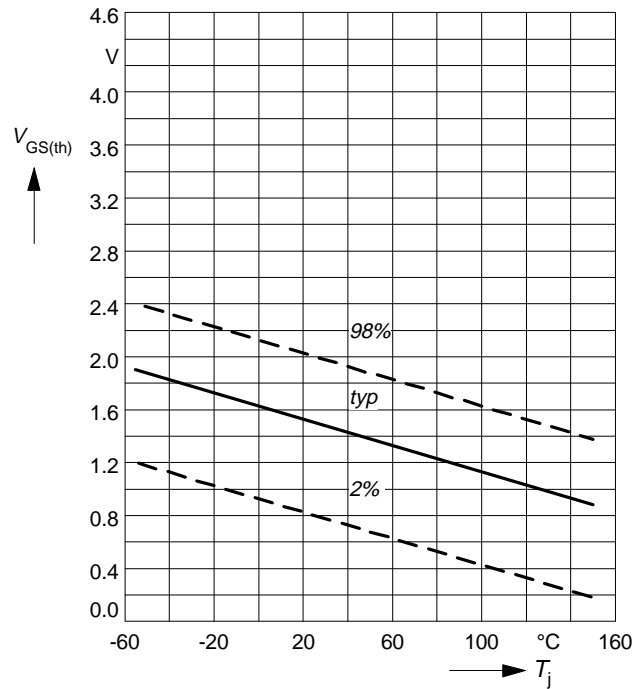parameter: $I_D = 0.29$ A, $V_{GS} = 10$ V
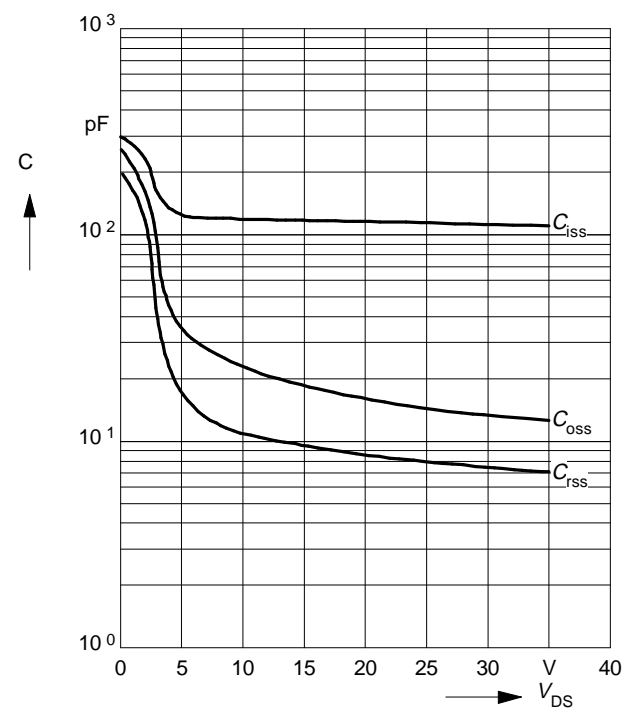


## Gate threshold voltage

$V_{GS\,(th)} = f(T_j)$
parameter: $V_{GS} = V_{DS}$, $I_D = 1$ mA
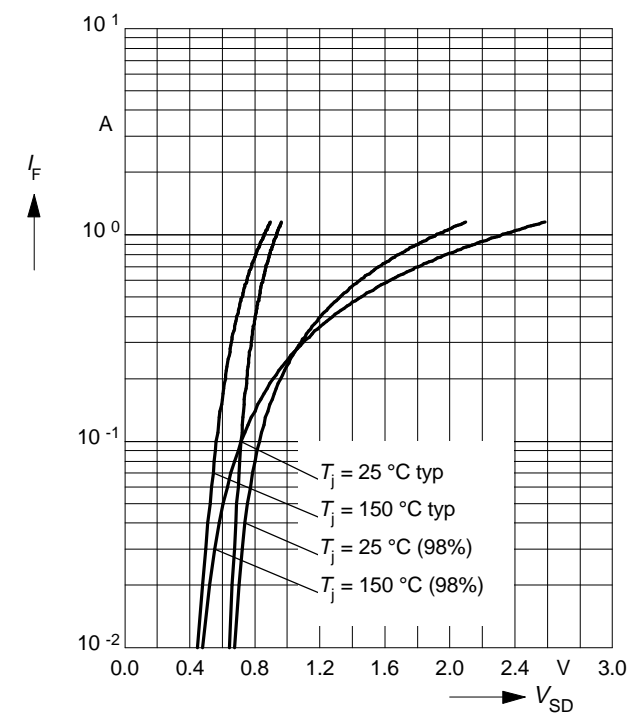


## Typ. capacitances

$C = f(V_{DS})$
parameter: $V_{GS} = 0$V, $f = 1$ MHz



## Forward characteristics of reverse diode

$I_F = f(V_{SD})$
parameter: $T_j$, $t_p = 80$ µs

**Package outlines**

SOT-89

Dimensions in mm



GPS05558