

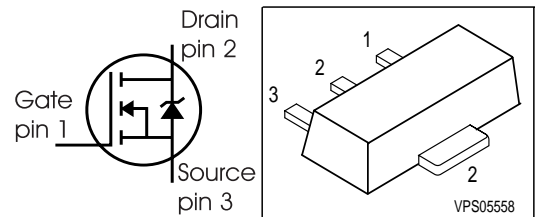
SIPMOS[®] Small-Signal-Transistor

Feature

- N-Channel
- Enhancement mode, Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC 61249-2-21

Product Summary

| | | |
|--------------|------|----------|
| V_{DS} | 240 | V |
| $R_{DS(on)}$ | 6 | Ω |
| I_D | 0.26 | A |



| Type | Package | Pb-free | Tape and Reel Information | Marking |
|-------|-------------|---------|---------------------------|---------|
| BSS87 | P-SOT89-4-2 | Yes | H6327: 1000 pcs/reel | KA |

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

| Parameter | Symbol | Value | Unit |
|---|---------------------|-------------------|-------------------|
| Continuous drain current $T_A=25\text{ }^\circ\text{C}$ $T_A=70\text{ }^\circ\text{C}$ | I_D | 0.26 0.21 | A |
| Pulsed drain current $T_A=25\text{ }^\circ\text{C}$ | $I_{D\text{ puls}}$ | 1.04 | |
| Reverse diode dv/dt $I_S=0.26\text{A}$, $V_{DS}=192\text{V}$, $di/dt=200\text{A}/\mu\text{s}$, $T_{jmax}=150\text{ }^\circ\text{C}$ | dv/dt | 6 | kV/ μs |
| Gate source voltage | V_{GS} | ± 20 | V |
| ESD class (JESD22-A114-HBM) | | 1A (>250V, <500V) | |
| Power dissipation, related to min. footprint $T_A=25\text{ }^\circ\text{C}$ | P_{tot} | 1 | W |
| Operating and storage temperature | T_j, T_{stg} | -55... +150 | $^\circ\text{C}$ |
| IEC climatic category; DIN IEC 68-1 | | 55/150/56 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|------------|--------|------|-----------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case (Pin 2) | R_{thJC} | - | - | 10 | K/W |
| SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾ | R_{thJA} | - | - | 125 70 | |

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

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|------|------------|---------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Drain-source breakdown voltage $V_{GS}=0, I_D=250\mu\text{A}$ | $V_{(BR)DSS}$ | 240 | - | - | V |
| Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=108\mu\text{A}$ | $V_{GS(th)}$ | 0.8 | 1.2 | 1.8 | |
| Zero gate voltage drain current $V_{DS}=240\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$ $V_{DS}=240\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$ | I_{DSS} | - | - | 0.1 100 | μA |
| Gate-source leakage current $V_{GS}=20\text{V}, V_{DS}=0$ | I_{GSS} | - | - | 10 | |
| Drain-source on-state resistance $V_{GS}=4.5\text{V}, I_D=0.24\text{A}$ | $R_{DS(on)}$ | - | 4.6 | 7.5 | Ω |
| Drain-source on-state resistance $V_{GS}=10\text{V}, I_D=0.26\text{A}$ | $R_{DS(on)}$ | - | 3.9 | 6 | |

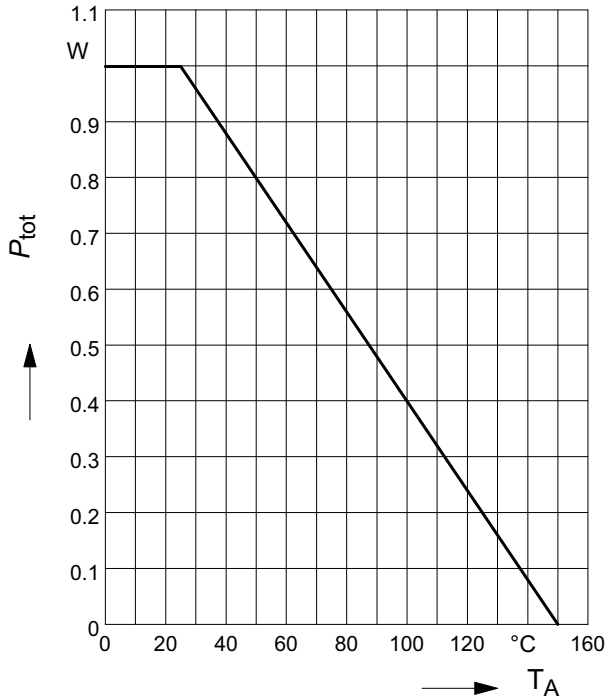
¹⁾Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

| Parameter | Symbol | Conditions | Values | | | Unit |
|--|-----------------|---|--------|------|------|------|
| | | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | | |
| Transconductance | g_{fs} | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 0.21\text{A}$ | 0.16 | 0.33 | - | S |
| Input capacitance | C_{iss} | $V_{GS} = 0$, $V_{DS} = 25\text{V}$, | - | 77.5 | 97 | pF |
| Output capacitance | C_{oss} | $f = 1\text{MHz}$ | - | 11.2 | 14 | |
| Reverse transfer capacitance | C_{rss} | | - | 5.8 | 7.3 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 120\text{V}$, $V_{GS} = 10\text{V}$, | - | 3.7 | 5.5 | ns |
| Rise time | t_r | $I_D = 0.28\text{A}$, $R_G = 6\Omega$ | - | 3.5 | 5.2 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 17.6 | 26.4 | |
| Fall time | t_f | | - | 27.3 | 41 | |
| Gate Charge Characteristics | | | | | | |
| Gate to source charge | Q_{gs} | $V_{DD} = 192\text{V}$, $I_D = 0.26\text{A}$ | - | 0.14 | 0.21 | nC |
| Gate to drain charge | Q_{gd} | | - | 1.7 | 2.5 | |
| Gate charge total | Q_g | $V_{DD} = 192\text{V}$, $I_D = 0.26\text{A}$, $V_{GS} = 0$ to 10V | - | 3.7 | 5.5 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD} = 192\text{V}$, $I_D = 0.26\text{A}$ | - | 2.7 | - | V |
| Reverse Diode | | | | | | |
| Inverse diode continuous forward current | I_S | $T_A = 25\text{ }^\circ\text{C}$ | - | - | 0.26 | A |
| Inv. diode direct current, pulsed | I_{SM} | | - | - | 1.04 | |
| Inverse diode forward voltage | V_{SD} | $V_{GS} = 0$, $I_F = I_S$ | - | 0.82 | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R = 120\text{V}$, $I_F = I_S$, | - | 53.6 | 80.4 | ns |
| Reverse recovery charge | Q_{rr} | $di_F/dt = 100\text{A}/\mu\text{s}$ | - | 101 | 152 | |

1 Power dissipation

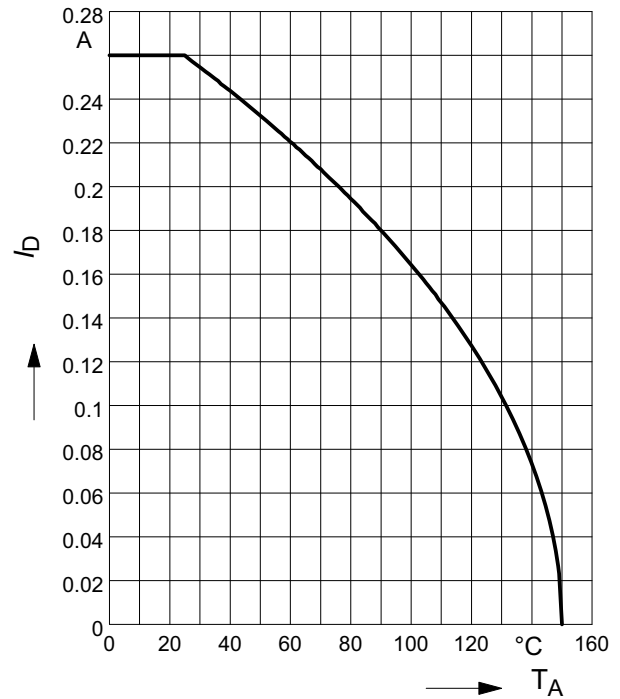
$$P_{tot} = f(T_A)$$



2 Drain current

$$I_D = f(T_A)$$

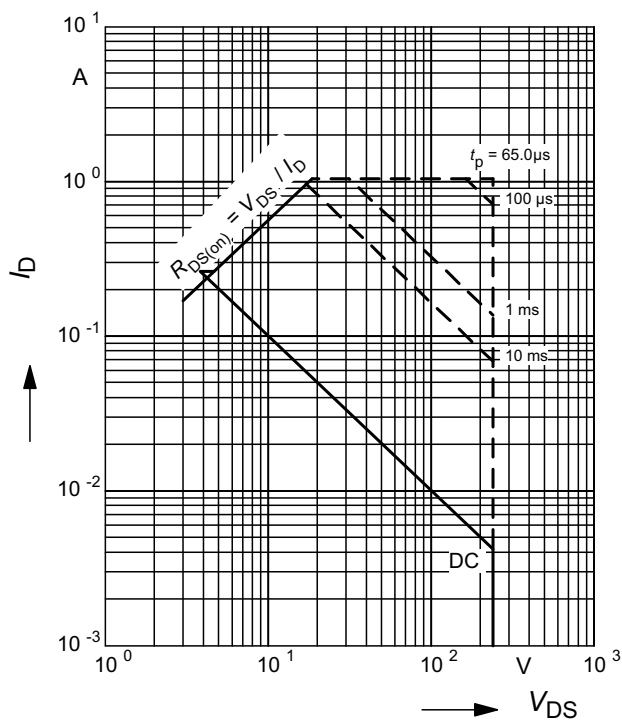
parameter: $V_{GS} \geq 10\text{ V}$



3 Safe operating area

$$I_D = f(V_{DS})$$

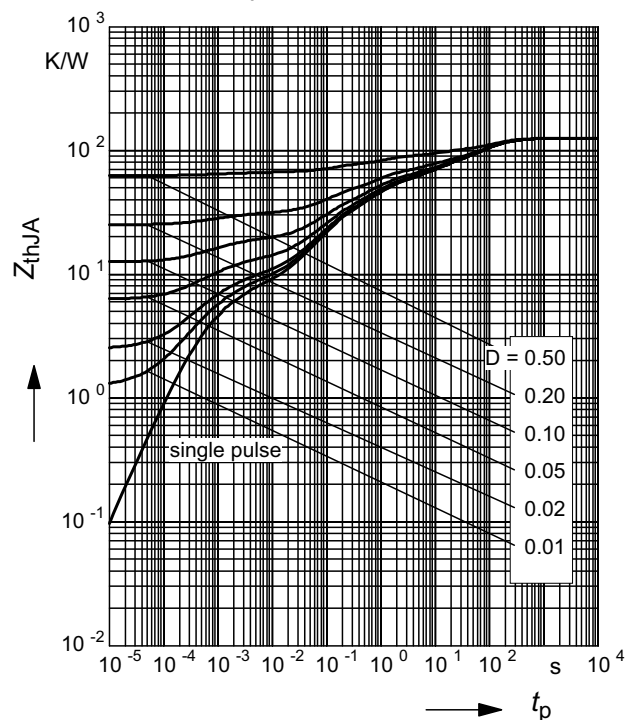
parameter: $D = 0$, $T_A = 25\text{ °C}$



4 Transient thermal impedance

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

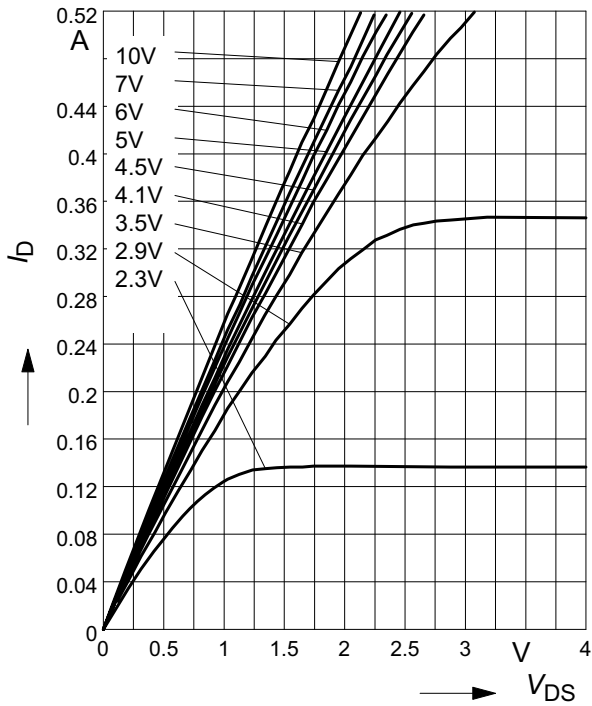
parameter: $D = t_p/T$



5 Typ. output characteristic

$$I_D = f(V_{DS})$$

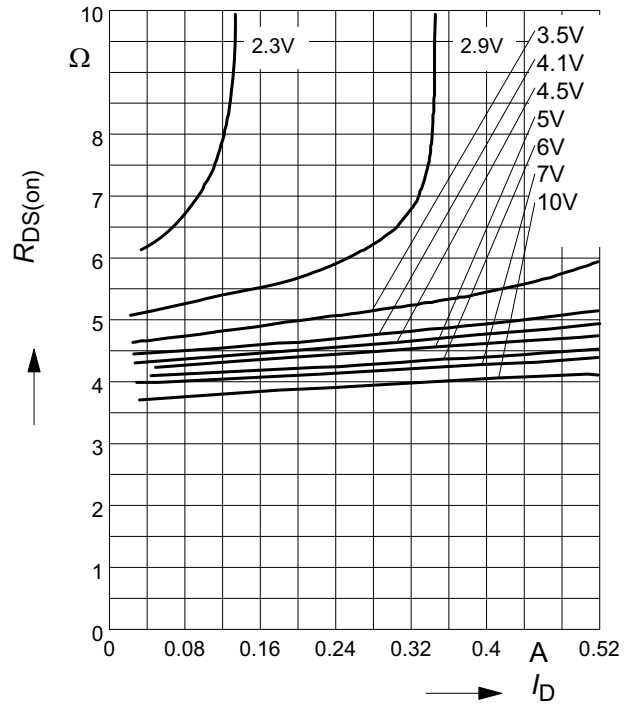
parameter: $T_j = 25\text{ }^\circ\text{C}$, V_{GS}



6 Typ. drain-source on resistance

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

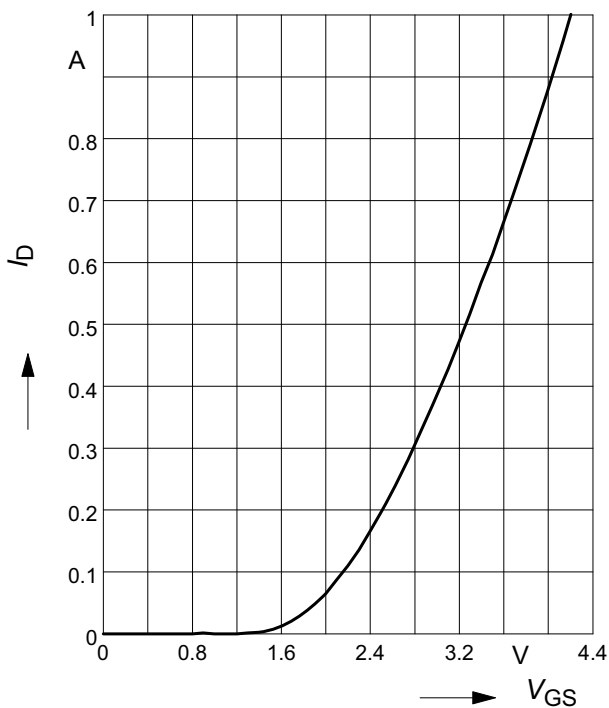
parameter: $T_j = 25\text{ }^\circ\text{C}$, V_{GS}



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$

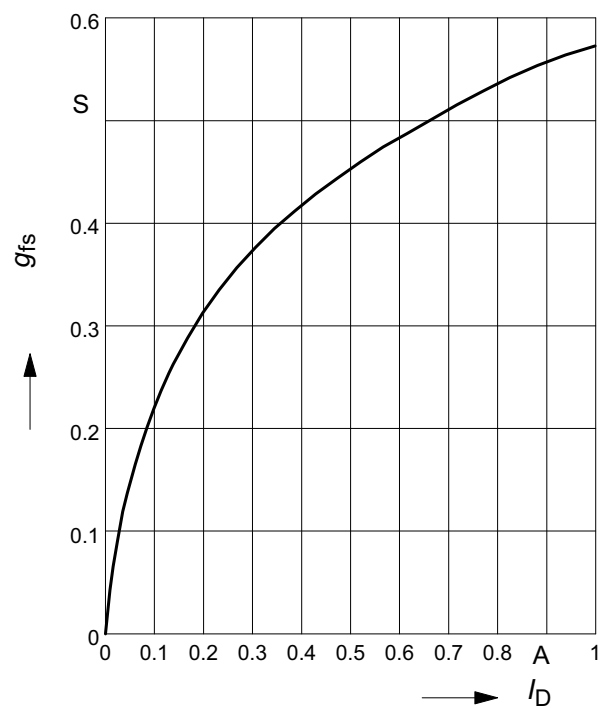
parameter: $T_j = 25\text{ }^\circ\text{C}$



8 Typ. forward transconductance

$$g_{fs} = f(I_D)$$

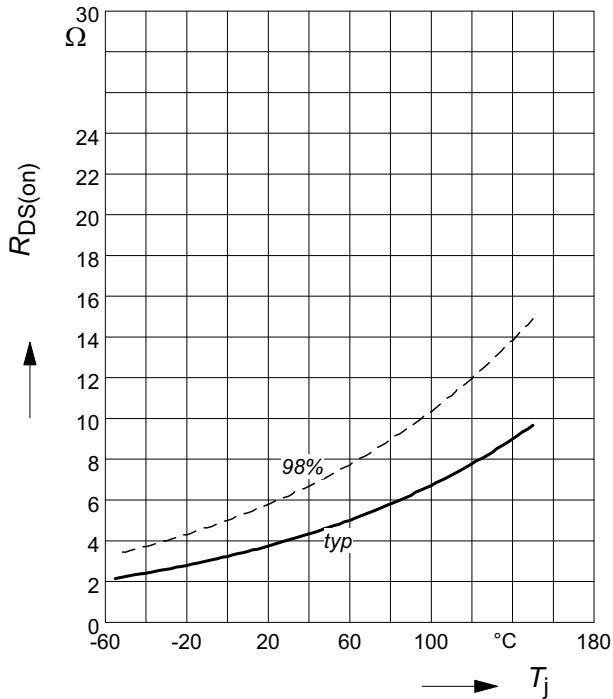
parameter: $T_j = 25\text{ }^\circ\text{C}$



9 Drain-source on-state resistance

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

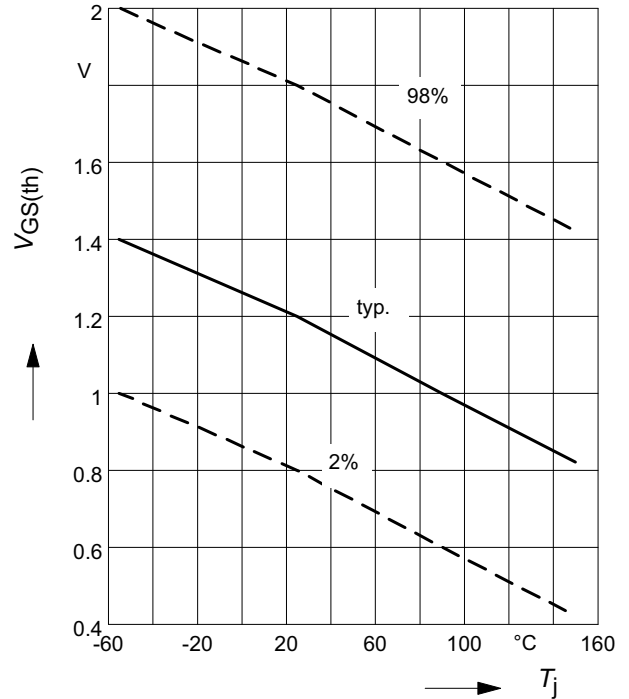
parameter : $I_D = 0.26 \text{ A}$, $V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

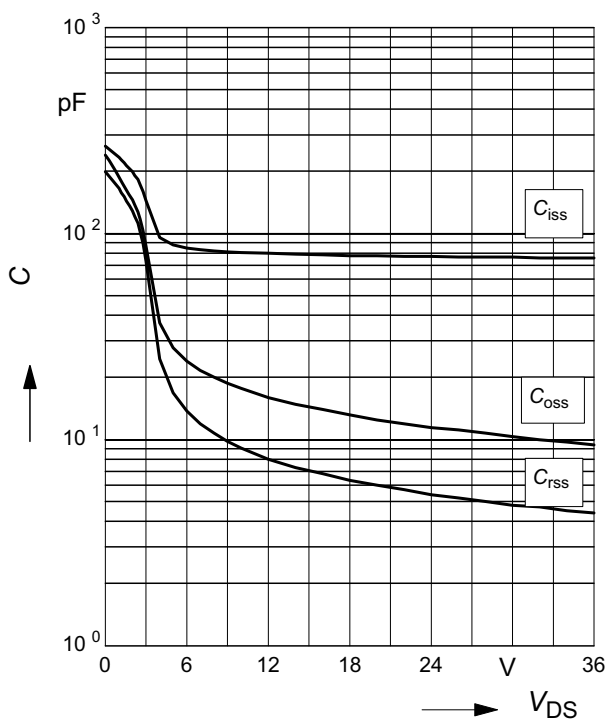
parameter: $V_{GS} = V_{DS}$; $I_D = 108 \mu\text{A}$



11 Typ. capacitances

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

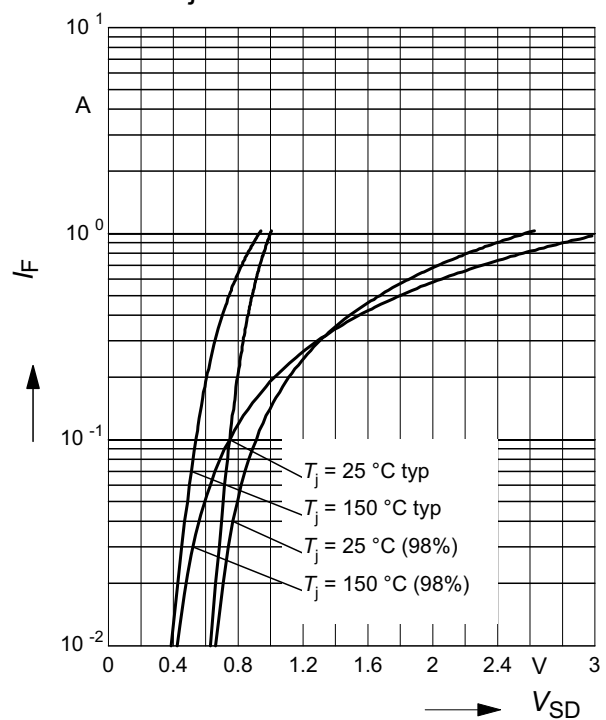
parameter: $V_{GS}=0$, $f=1 \text{ MHz}$, $T_j = 25 \text{ }^\circ\text{C}$



12 Forward character. of reverse diode

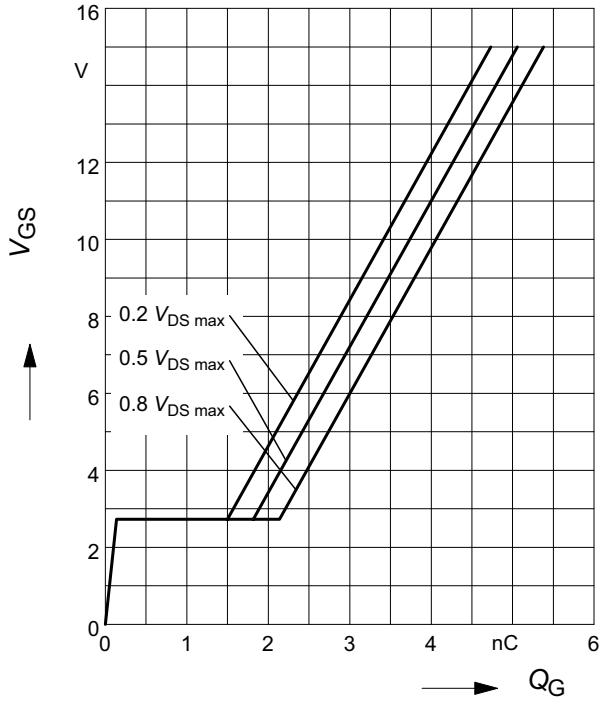
$$I_F = f(V_{SD})$$

parameter: T_j



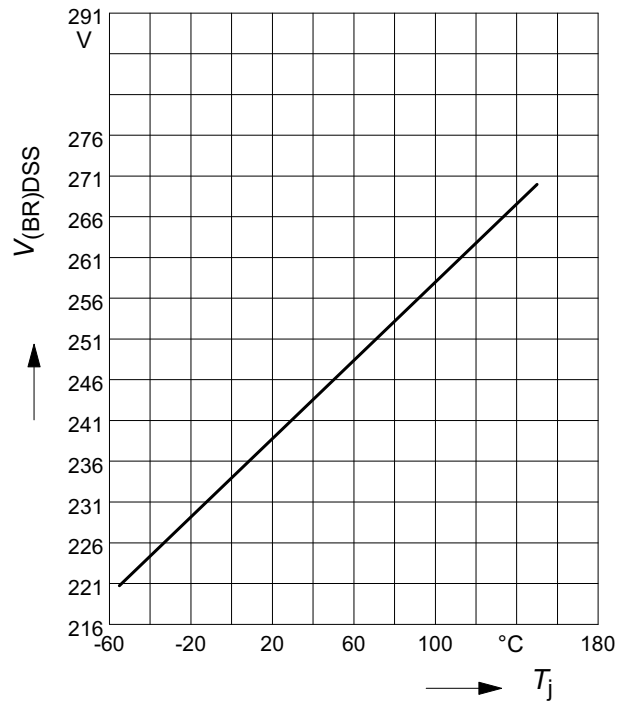
13 Typ. gate charge

$V_{GS} = f(Q_G)$; parameter: V_{DS} ,
 $I_D = 0.26 \text{ A pulsed}$, $T_j = 25 \text{ °C}$

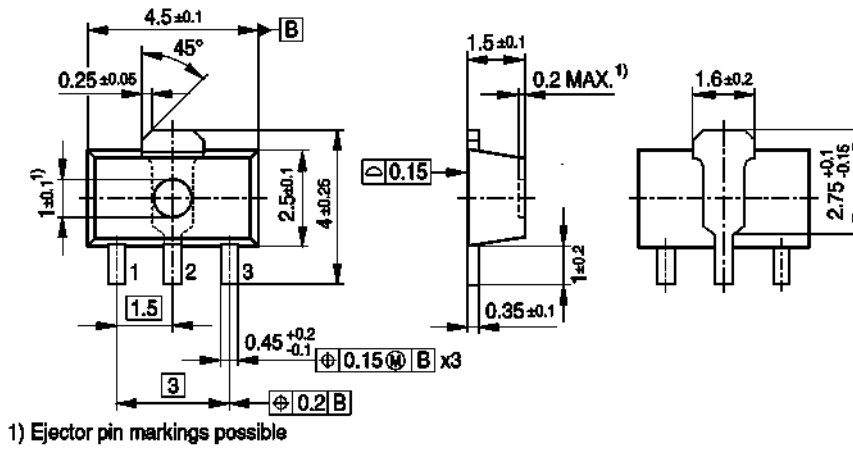


14 Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$

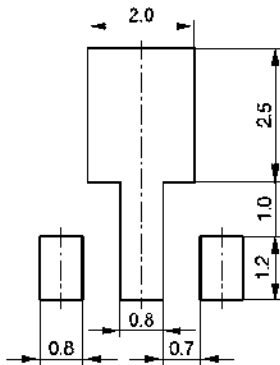


Package Outline SOT-89



Footprint

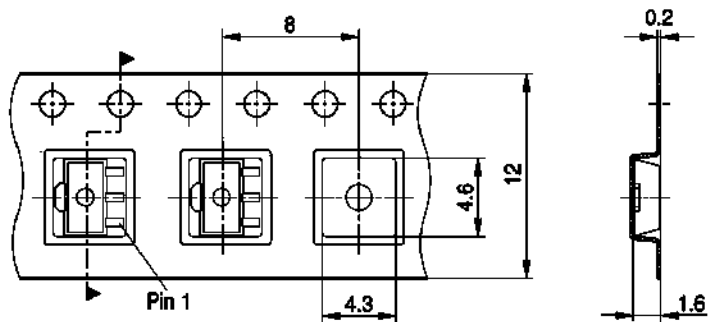
Soldering type: Reflow soldering



Tape and Reel

Reel ø180 mm: 1.000 Pieces/Reel
 Reels/Box: 1 x 1.000 = 1.000

Reel ø330 mm: 4.000 Pieces/Reel
 Reels/Box: 1 x 4.000 = 4.000



Dimensions in mm

Revision History

BSS87

Revision: 2016-06-09, Rev. 2.0

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|--|
| 2.0 | 2016-06-09 | Release of final version |

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