



**THE DATASHEET OF  
BSS169H6327XTSA1**

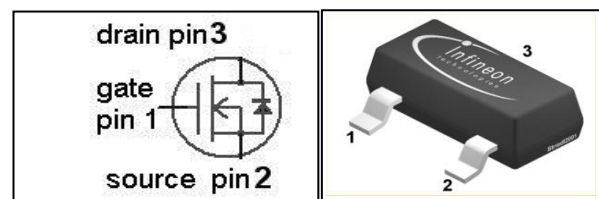


**SIPMOS<sup>®</sup> Small-Signal-Transistor**
**Features**

- N-channel
- Depletion mode
- $dv/dt$  rated
- Available with  $V_{GS(th)}$  indicator on reel
- Pb-free lead-plating; RoHS compliant
- Halogen-free according to AEC61249-2-21
- Qualified according to AEC Q101

**Product Summary**

|                  |      |          |
|------------------|------|----------|
| $V_{DS}$         | 100  | V        |
| $R_{DS(on),max}$ | 12   | $\Omega$ |
| $I_{DSS,min}$    | 0.09 | A        |

**PG-SOT-23**


| Type   | Package   | Pb-free | Tape and Reel Information                                       | Marking |
|--------|-----------|---------|---|---------|
| BSS169 | PG-SOT-23 | Yes     | H6327: 3000 pcs/reel  | SFs     |
| BSS169 | PG-SOT-23 | Yes     | H6906: 3000 pcs/reel sorted in $V_{GS(th)}$ bands <sup>1)</sup> | SFs     |

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

| Parameter                           | Symbol            | Conditions  | Value       | Unit               |
|-------------------------------------|-------------------|---|-------------|--------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$  | 0.17        | A                  |
|                                     |                   | $T_A=70\text{ °C}$  | 0.14        |                    |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$  | 0.68        |                    |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=0.19\text{ A}$ , $V_{DS}=20\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ °C}$ | 6           | kV/ $\mu\text{s}$  |
| Gate source voltage                 | $V_{GS}$          |   | $\pm 20$    | V                  |
| ESD Class                           |                   | JESD22-A114-HBM   | Class 0     |                    |
| Power dissipation                   | $P_{tot}$         | $T_A=25\text{ °C}$  | 0.36        | W                  |
| Operating and storage temperature   | $T_j$ , $T_{stg}$ |   | -55 ... 150 | $^{\circ}\text{C}$ |
| IEC climatic category; DIN IEC 68-1 |                   |   | 55/150/56   |                    |

<sup>1)</sup> see table on next page and diagram 11

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

**Thermal characteristics**

|  |            |                   |   |   |     |     |
|--|------------|-------------------|---|---|-----|-----|
| Thermal resistance, junction - ambient | $R_{thJA}$ | minimal footprint | - | - | 250 | K/W |
|--|------------|-------------------|---|---|-----|-----|

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

|                                  |               |  |      |      |      |               |
|----------------------------------|---------------|--|------|------|------|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=-10\text{ V}, I_D=250\text{ }\mu\text{A}$                              | 100  | -    | -    | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=3\text{ V}, I_D=50\text{ }\mu\text{A}$                                 | -2.9 | -2.2 | -1.8 |               |
| Drain-source cutoff current      | $I_{D(off)}$  | $V_{DS}=100\text{ V},$<br>$V_{GS}=-10\text{ V}, T_j=25\text{ }^\circ\text{C}$  | -    | -    | 0.1  | $\mu\text{A}$ |
|                                  |               | $V_{DS}=100\text{ V},$<br>$V_{GS}=-10\text{ V}, T_j=125\text{ }^\circ\text{C}$ | -    | -    | 10   |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$  | -    | -    | 10   | nA            |
| On-state drain current           | $I_{DSS}$     | $V_{GS}=0\text{ V}, V_{DS}=10\text{ V}$  | 90   | -    | -    | mA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=0\text{ V}, I_D=0.05\text{ A}$   | -    | 5.3  | 12   | $\Omega$      |
|                                  |               | $V_{GS}=10\text{ V}, I_D=0.19\text{ A}$  | -    | 2.9  |      |               |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max},$<br>$I_D=0.15\text{ A}$                         |      | 0.20 | -    | S             |

**Threshold voltage  $V_{GS(th)}$  sorted in bands<sup>2)</sup>**

|   |              |  |       |   |       |   |
|---|--------------|--|-------|---|-------|---|
| J | $V_{GS(th)}$ | $V_{DS}=3\text{ V}, I_D=50\text{ }\mu\text{A}$ | -2    | - | -1.8  | V |
| K |              |  | -2.15 | - | -1.95 |   |
| L |              |  | -2.3  | - | -2.1  |   |
| M |              |  | -2.45 | - | -2.25 |   |
| N |              |  | -2.6  | - | -2.4  |   |

<sup>2)</sup> Each reel contains transistors out of one band whose identifying letter is printed on the reel label. A specific band cannot be ordered separately.

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

**Dynamic characteristics**

|                              |              |   |   |     |     |    |
|------------------------------|--------------|---|---|-----|-----|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=-10\text{ V}, V_{DS}=25\text{ V},$<br>$f=1\text{ MHz}$                                    | - | 51  | 68  | pF |
| Output capacitance           | $C_{oss}$    |   | - | 9   | 13  |    |
| Reverse transfer capacitance | $C_{rss}$    |   | - | 4   | 7   |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=50\text{ V},$<br>$V_{GS}=-3\dots 7\text{ V},$<br>$I_D=0.12\text{ A}, R_{G,ext}=6\ \Omega$ | - | 2.9 | 4.2 | ns |
| Rise time                    | $t_r$        |   | - | 2.7 | 4.0 |    |
| Turn-off delay time          | $t_{d(off)}$ |   | - | 11  | 17  |    |
| Fall time                    | $t_f$        |   | - | 27  | 40  |    |

**Gate Charge Characteristics**

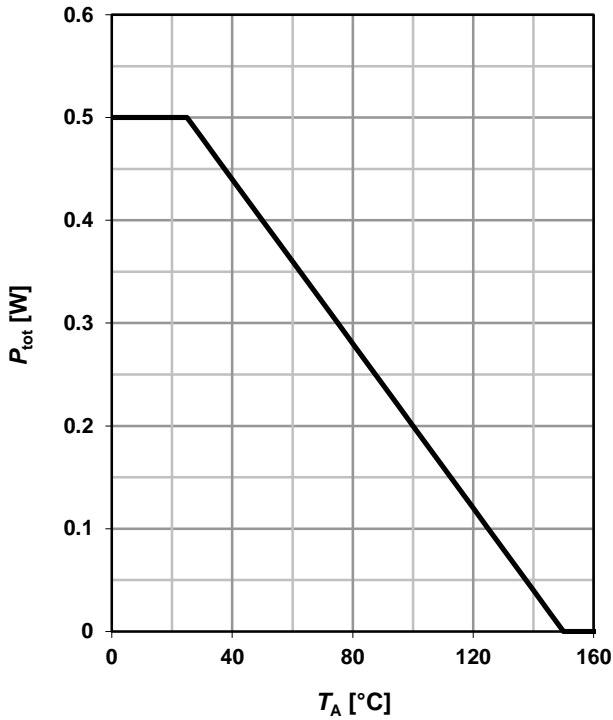
|                       |               |  |   |       |      |    |
|-----------------------|---------------|--|---|-------|------|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=80\text{ V}, I_D=0.12\text{ A},$<br>$V_{GS}=-3\text{ to }7\text{ V}$ | - | 0.12  | 0.16 | nC |
| Gate to drain charge  | $Q_{gd}$      |  | - | 0.9   | 1.4  |    |
| Gate charge total     | $Q_g$         |  | - | 2.1   | 2.8  |    |
| Gate plateau voltage  | $V_{plateau}$ |  | - | -0.43 | -    | V  |

**Reverse Diode**

|                                  |               |   |   |      |      |    |
|----------------------------------|---------------|---|---|------|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$  | - | -    | 0.19 | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -    | 0.76 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=-10\text{ V}, I_F=0.19\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$ | - | 0.82 | 1.2  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=50\text{ V}, I_F=0.12\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 20.5 | 25.6 | ns |
| Reverse recovery charge          | $Q_{rr}$      |   | - | 9.7  | 12.1 | nC |

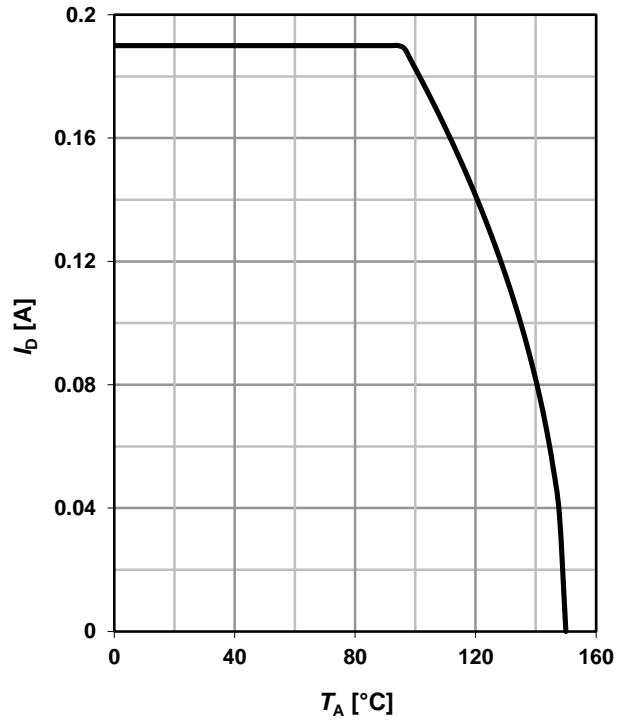
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

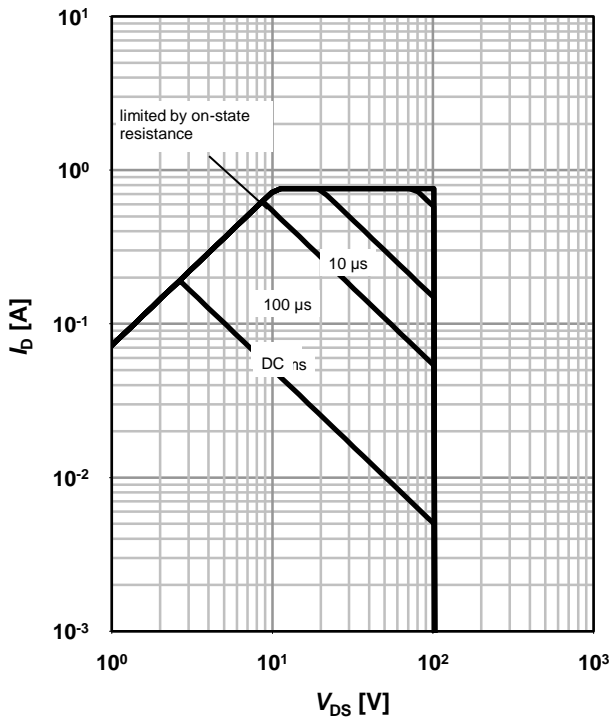
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

$I_D=f(V_{DS}); T_A=25\text{ °C}; D=0$

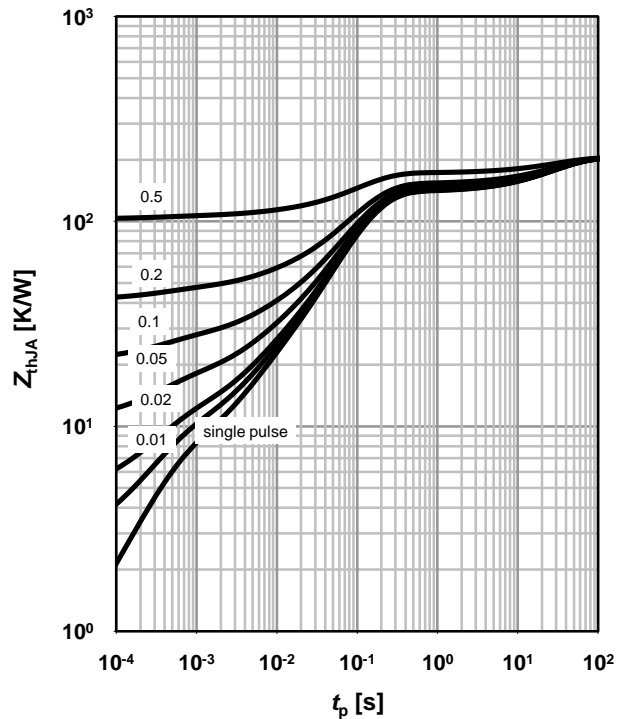
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

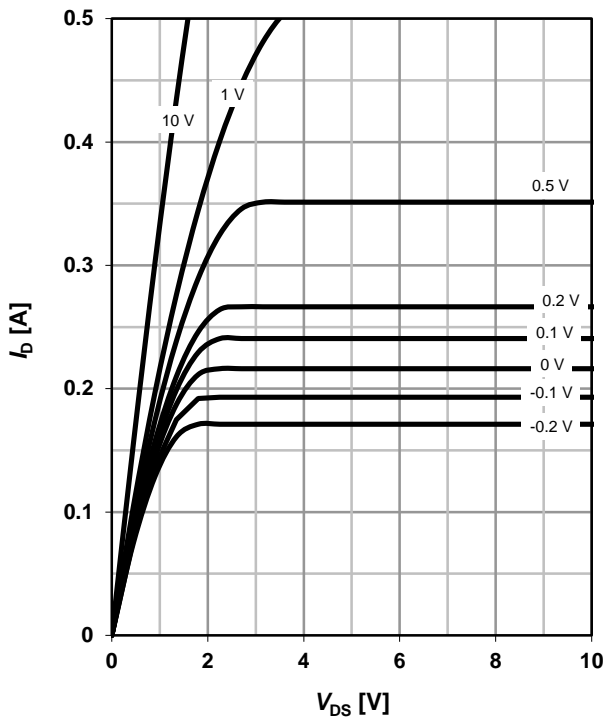
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C}$

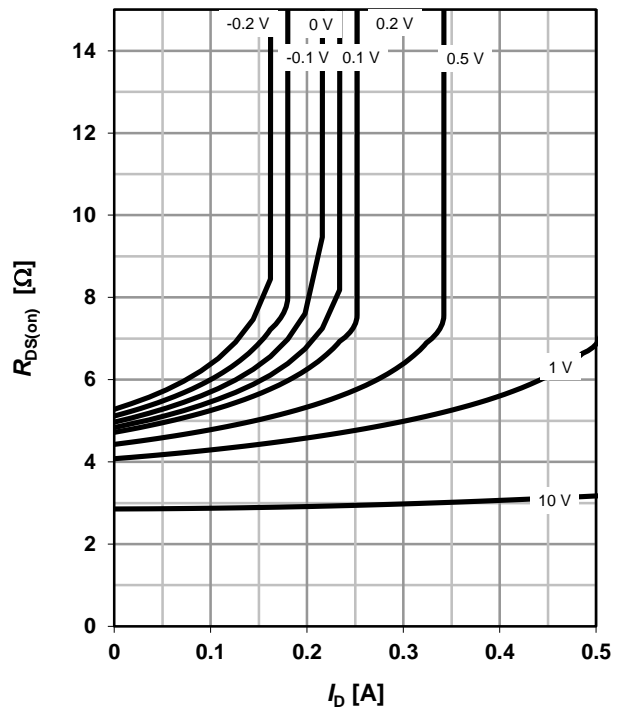
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

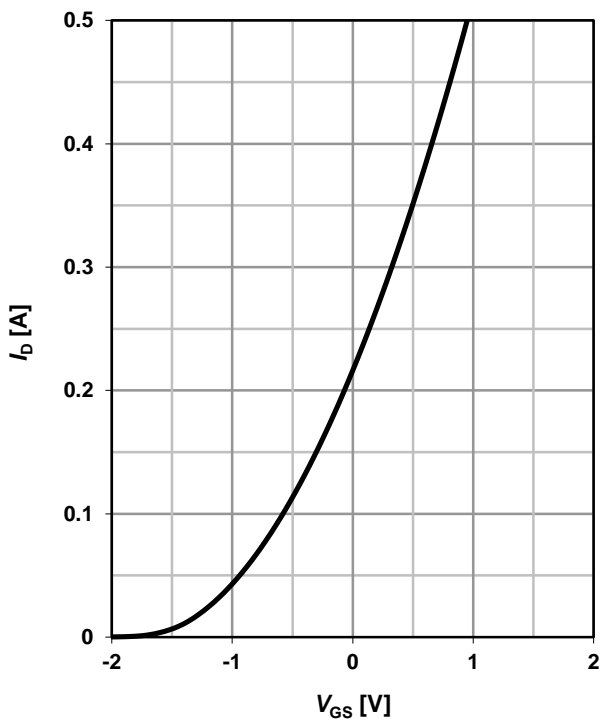
$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



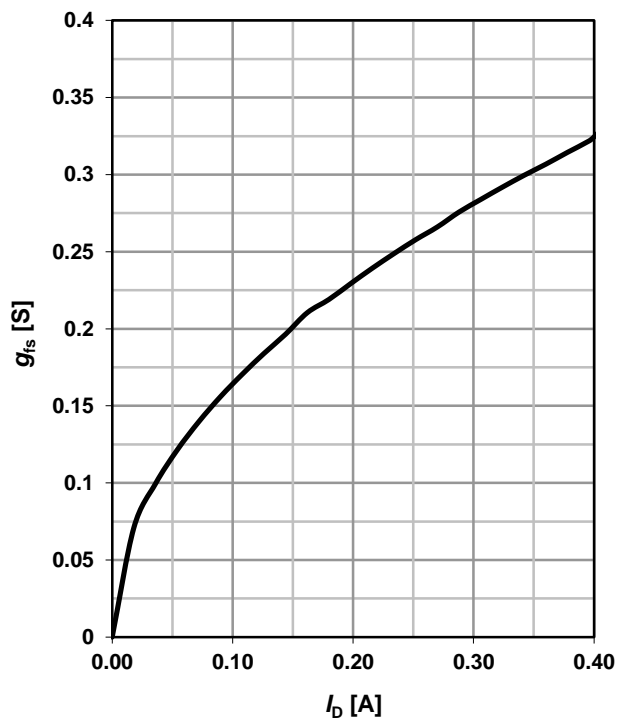
**7 Typ. transfer characteristics**

$I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max}$



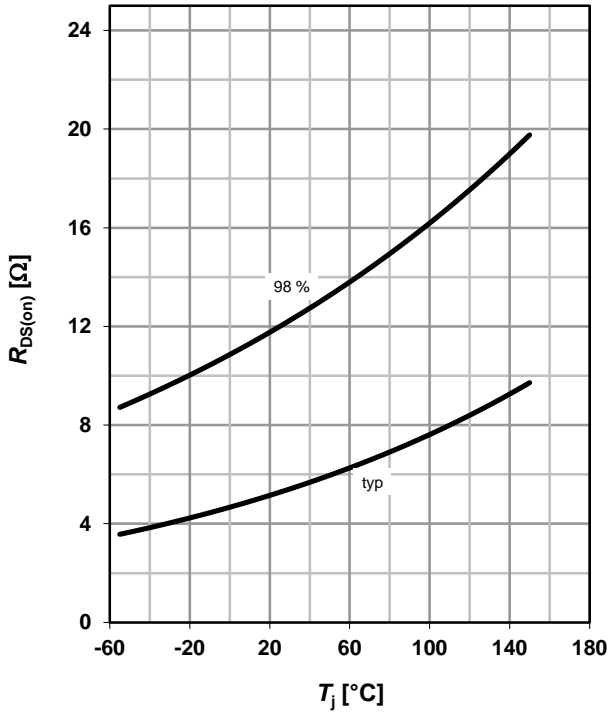
**8 Typ. forward transconductance**

$g_{fs}=f(I_D); T_j=25\text{ }^\circ\text{C}$



**9 Drain-source on-state resistance**

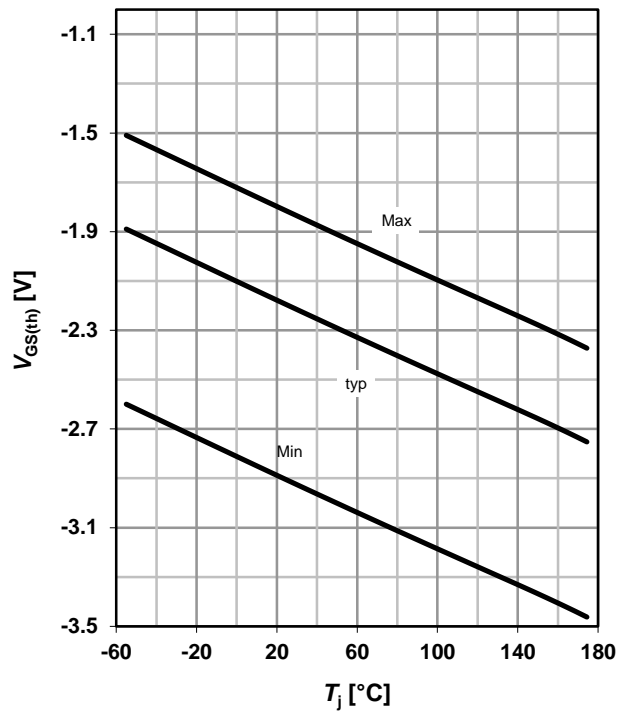
$R_{DS(on)}=f(T_j); I_D=0.05\text{ A}; V_{GS}=0\text{ V}$



**10 Typ. gate threshold voltage**

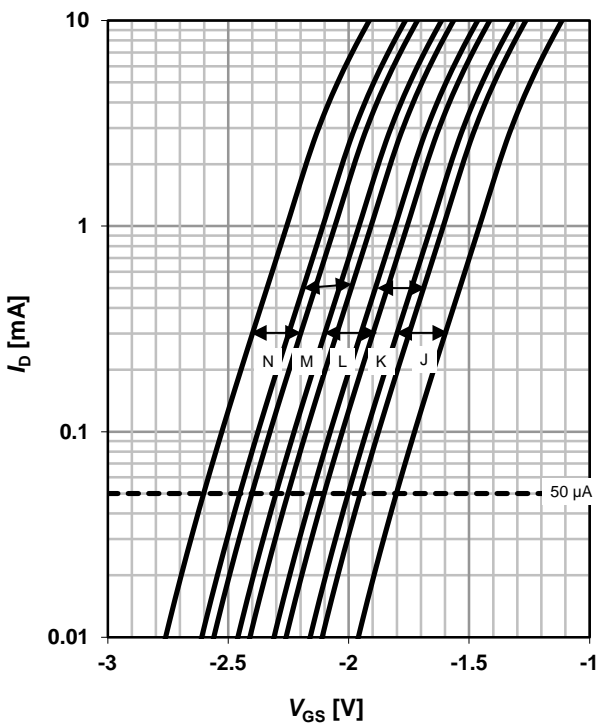
$V_{GS(th)}=f(T_j); V_{DS}=3\text{ V}; I_D=50\text{ }\mu\text{A}$

parameter:  $I_D$



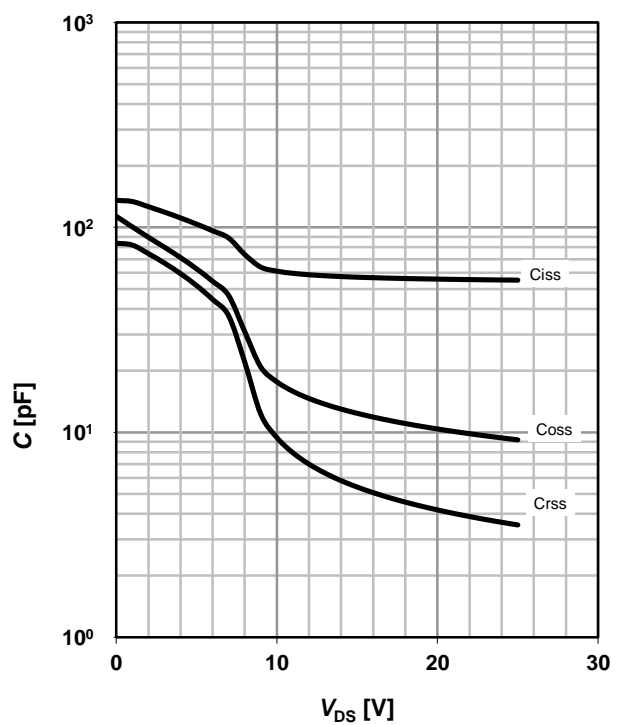
**11 Threshold voltage bands**

$I_D=f(V_{GS}); V_{DS}=3\text{ V}; T_j=25\text{ }^\circ\text{C}$



**12 Typ. capacitances**

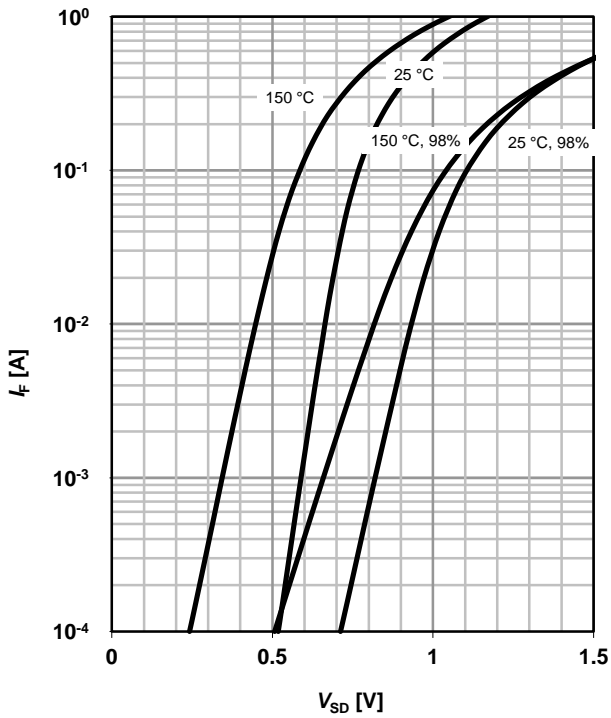
$C=f(V_{DS}); V_{GS}=-10\text{ V}; f=1\text{ MHz}$



**13 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

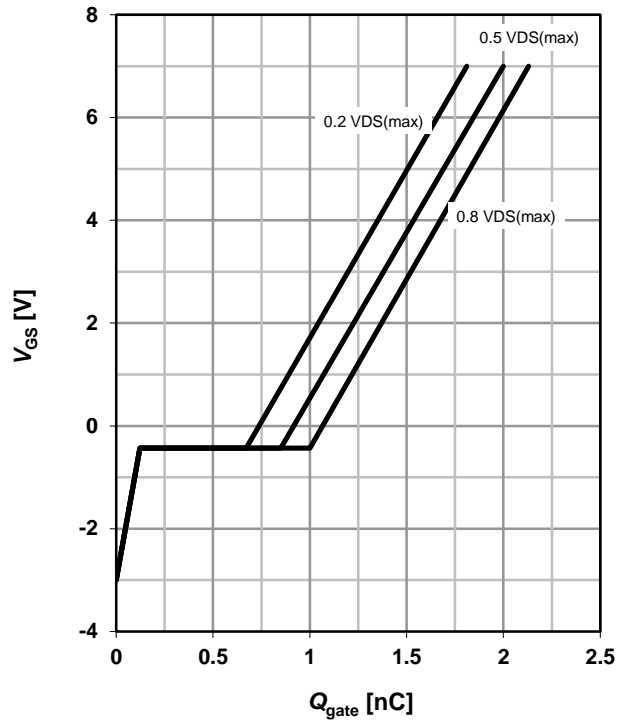
parameter:  $T_j$



**15 Typ. gate charge**

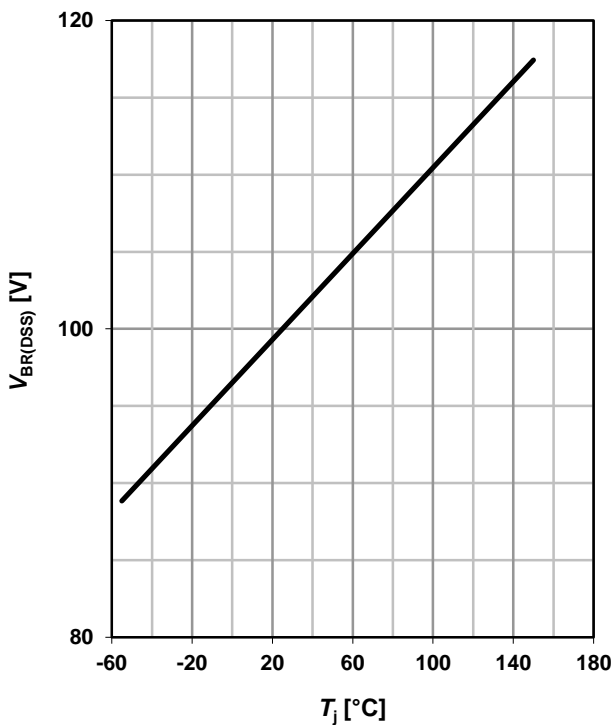
$V_{GS}=f(Q_{gate}); I_D=0.12$  A pulsed

parameter:  $V_{DD}$

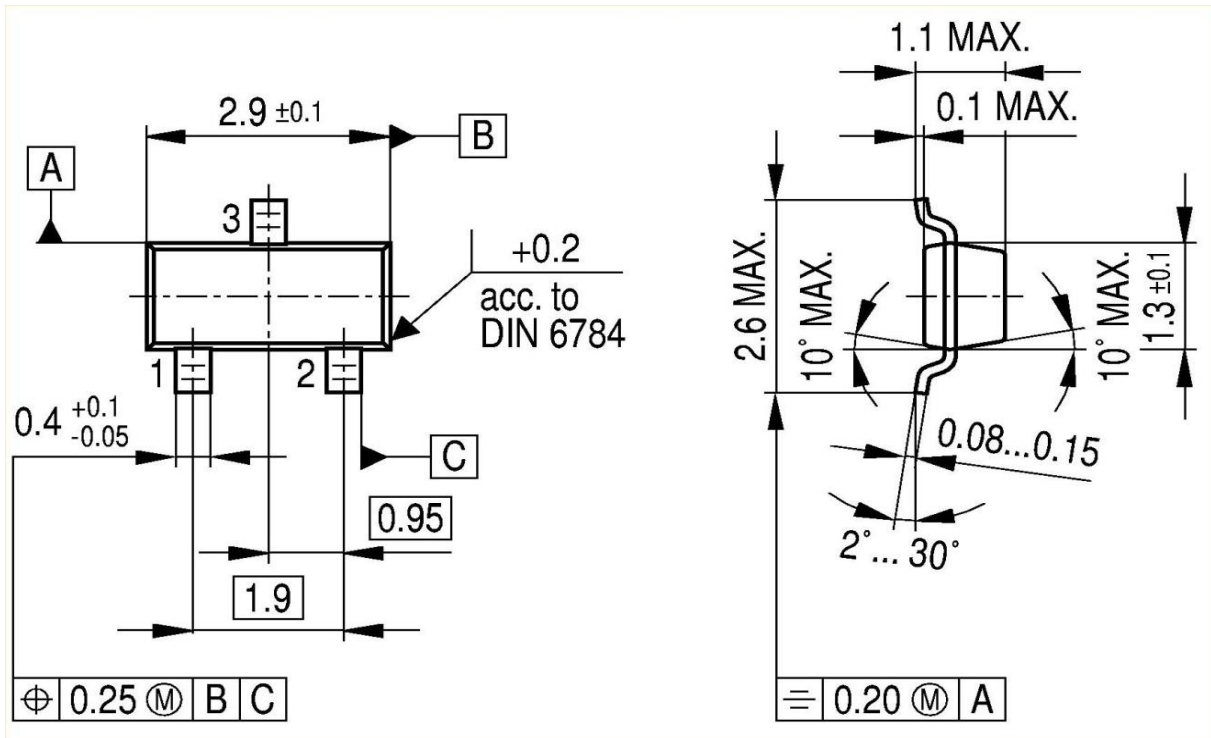


**16 Drain-source breakdown voltage**

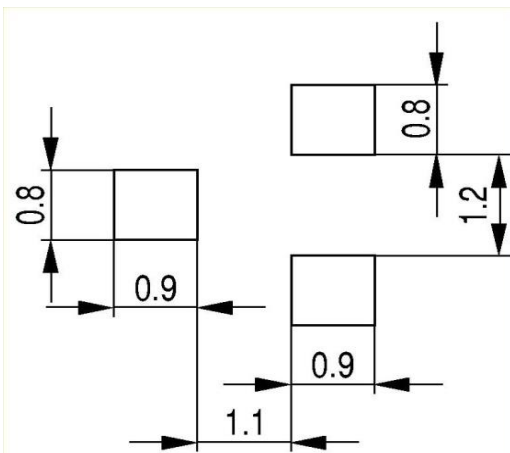
$V_{BR(DSS)}=f(T_j); I_D=250$   $\mu$ A



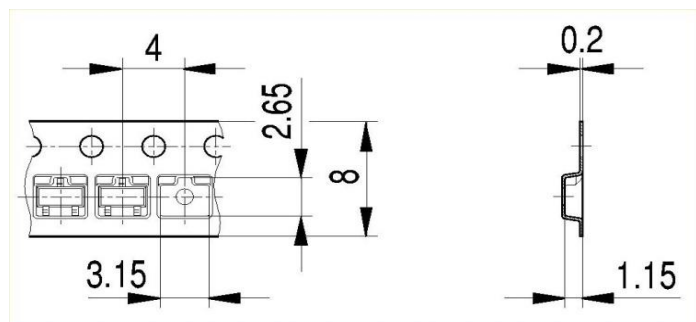
Package Outline:



Footprint:



Packaging:



Dimensions in mm

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