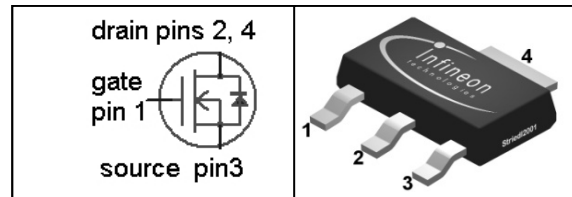


**SIPMOS<sup>®</sup> Small-Signal-Transistor**
**Features**

- N-channel
- Depletion mode
- $dv/dt$  rated
- Available with  $V_{GS(th)}$  indicator on reel
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21


**Product Summary**

|                  |      |          |
|------------------|------|----------|
| $V_{DS}$         | 200  | V        |
| $R_{DS(on),max}$ | 3.5  | $\Omega$ |
| $I_{DSS,min}$    | 0.14 | A        |

**PG-SOT223**


| Type   | Package   | Tape and Reel Information                           | Marking | Packaging |
|--------|-----------|---|---------|-----------|
| BSP149 | PG-SOT223 | H6327: 1000 pcs/reel                                | BSP149  | Non dry   |
| BSP149 | PG-SOT223 | H6906: 1000 pcs/reel sorted in $V_{GS(th)}$ bands1) | BSP149  | Non dry   |

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

| Parameter                           | Symbol         | Conditions  | Value           | Unit               |
|-------------------------------------|----------------|---|-----------------|--------------------|
| Continuous drain current            | $I_D$          | $T_A=25\text{ °C}$  | 0.66            | A                  |
|                                     |                | $T_A=70\text{ °C}$  | 0.53            |                    |
| Pulsed drain current                | $I_{D,pulse}$  | $T_A=25\text{ °C}$  | 2.6             |                    |
| Reverse diode $dv/dt$               | $dv/dt$        | $I_D=0.66\text{ A}$ ,<br>$V_{DS}=160\text{ V}$ ,<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<br>(JESD22-A114-HBM)      |                |   | 1B (>500, <600) |                    |
| Power dissipation                   | $P_{tot}$      | $T_A=25\text{ °C}$  | 1.8             | 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. |      |
| <b>Thermal characteristics</b>                         |            |  |        |      |      |      |
| Thermal resistance, junction - soldering point (pin 4) | $R_{thJS}$ |  | -      | -    | 25   | K/W  |
| SMD version, device on PCB                             | $R_{thJA}$ | minimal footprint                            | -      | -    | 115  |      |
|  |            | 6 cm <sup>2</sup> cooling area <sup>1)</sup> | -      | -    | 70   |      |

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

**Static characteristics**

|                                  |               |  |      |      |     |               |
|----------------------------------|---------------|--|------|------|-----|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=-3\text{ V}, I_D=250\text{ }\mu\text{A}$             | 200  | -    | -   | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=3\text{ V}, I_D=400\text{ }\mu\text{A}$              | -2.1 | -1.4 | -1  |               |
| Drain-source cutoff current      | $I_{D(off)}$  | $V_{DS}=200\text{ V}, V_{GS}=-3\text{ V}, T_j=25\text{ °C}$  | -    | -    | 0.1 | $\mu\text{A}$ |
|                                  |               | $V_{DS}=200\text{ V}, V_{GS}=-3\text{ V}, T_j=125\text{ °C}$ | -    | -    | 5   |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                      | -    | -    | 10  | nA            |
| On-state drain current           | $I_{DSS}$     | $V_{GS}=0\text{ V}, V_{DS}=10\text{ V}$                      | 140  | -    | -   | mA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=0\text{ V}, I_D=70\text{ mA}$                        | -    | 1.7  | 3.5 | $\Omega$      |
|                                  |               | $V_{GS}=10\text{ V}, I_D=660\text{ mA}$                      | -    | 1.0  | 1.8 |               |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=0.48\text{ A}$            | 0.4  | 0.8  | -   | S             |

**Threshold voltage  $V_{GS(th)}$  sorted in bands<sup>3)</sup>**

|   |              |   |       |   |       |   |
|---|--------------|---|-------|---|-------|---|
| J | $V_{GS(th)}$ | $V_{DS}=3\text{ V}, I_D=400\text{ }\mu\text{A}$ | -1.2  | - | -1    | V |
| K |              |   | -1.35 | - | -1.15 |   |
| L |              |   | -1.5  | - | -1.3  |   |
| M |              |   | -1.65 | - | -1.45 |   |
| N |              |   | -1.8  | - | -1.6  |   |

<sup>2)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (single layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air.

<sup>3)</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            | $C_{iss}$    | $V_{GS}=-3\text{ V}, V_{DS}=25\text{ V},$<br>$f=1\text{ MHz}$                                | - | 326 | 430 | pF |
| Output capacitance           | $C_{oss}$    |  | - | 41  | 55  |    |
| Reverse transfer capacitance | $C_{rss}$    |  | - | 17  | 25  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=100\text{ V},$<br>$V_{GS}=-2\dots 7\text{ V},$<br>$I_D=0.50\text{ A}, R_G=6\ \Omega$ | - | 5.1 | 7.7 | ns |
| Rise time                    | $t_r$        |  | - | 3.4 | 5.1 |    |
| Turn-off delay time          | $t_{d(off)}$ |  | - | 45  | 68  |    |
| Fall time                    | $t_f$        |  | - | 21  | 31  |    |

**Gate Charge Characteristics**

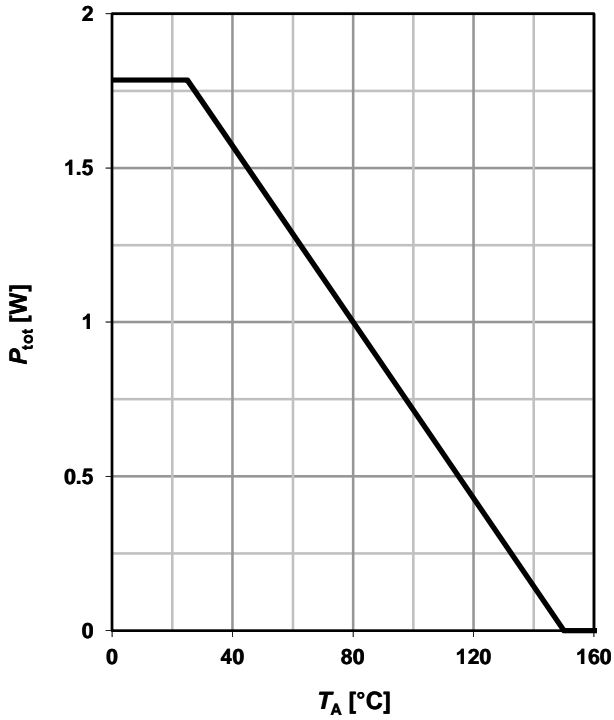
|                       |               |  |   |      |     |    |
|-----------------------|---------------|--|---|------|-----|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=160\text{ V},$<br>$I_D=0.05\text{ A},$<br>$V_{GS}=-3\text{ to }5\text{ V}$ | - | 0.74 | 1.0 | nC |
| Gate to drain charge  | $Q_{gd}$      |  | - | 5.6  | 8.4 |    |
| Gate charge total     | $Q_g$         |  | - | 11   | 14  |    |
| Gate plateau voltage  | $V_{plateau}$ |  | - | 0.16 | -   | V  |

**Reverse Diode**

|                                  |               |   |   |     |      |    |
|----------------------------------|---------------|---|---|-----|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$  | - | -   | 0.66 | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -   | 2.6  |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=-3\text{ V}, I_F=0.66\text{ A},$<br>$T_J=25\text{ }^\circ\text{C}$  | - | 0.9 | 1.2  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=100\text{ V}, I_F=0.5\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 42  | 65   | ns |
| Reverse recovery charge          | $Q_{rr}$      |   | - | 60  | 90   | nC |

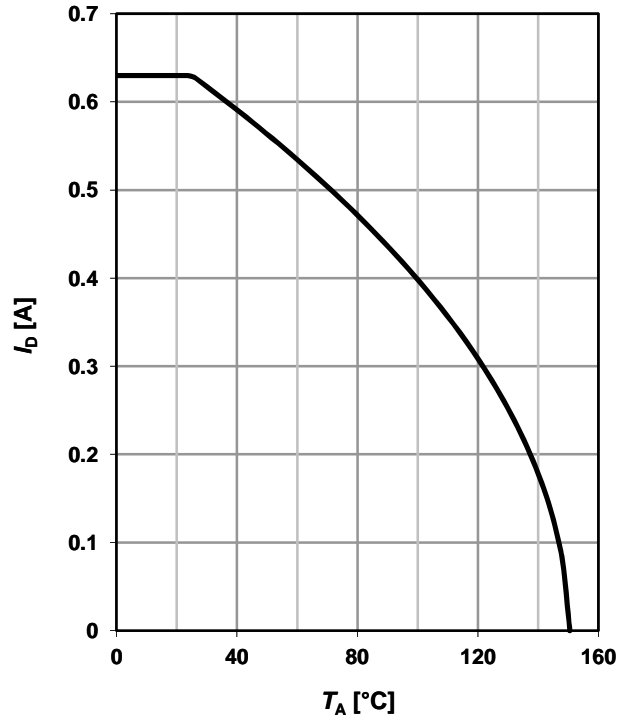
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

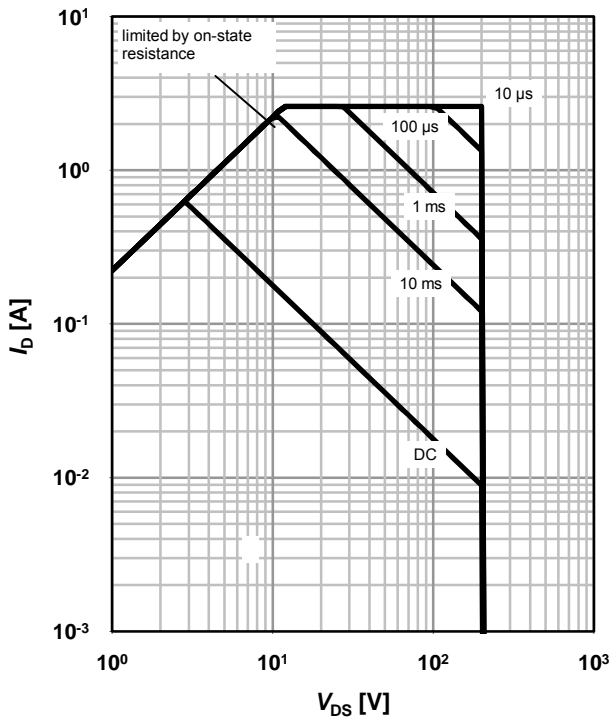
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

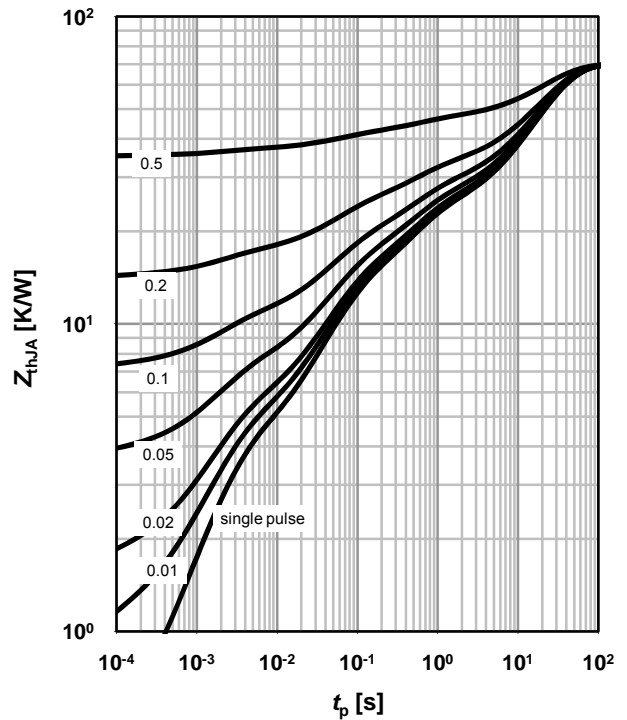
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

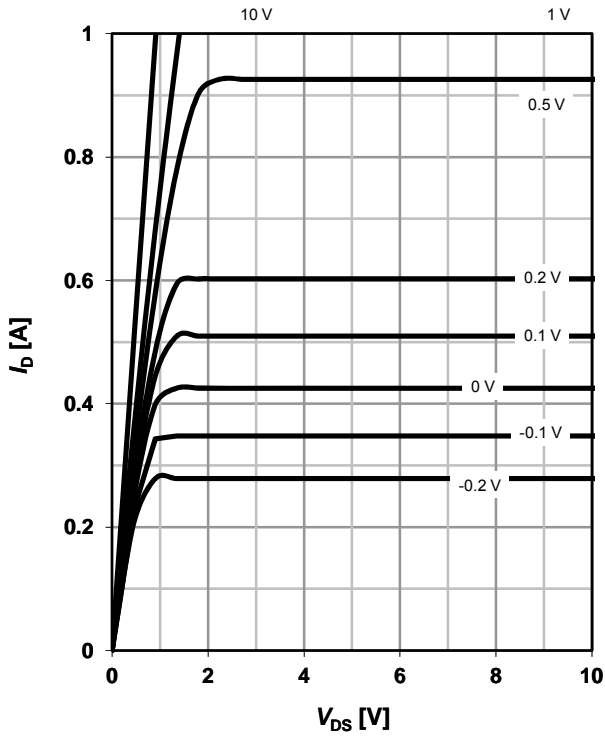
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

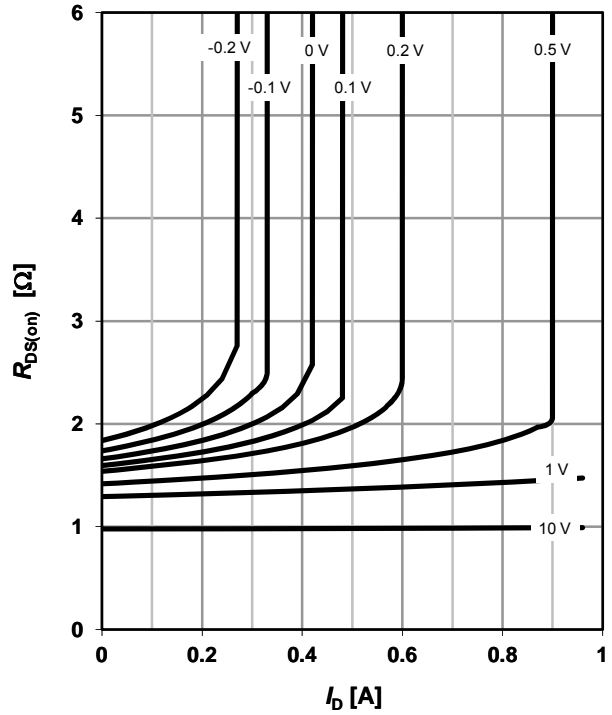
parameter:  $V_{GS}$



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

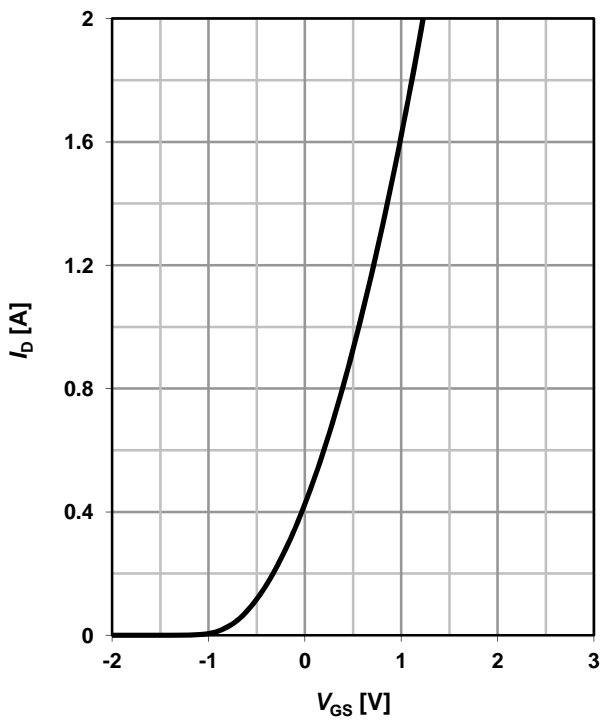
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



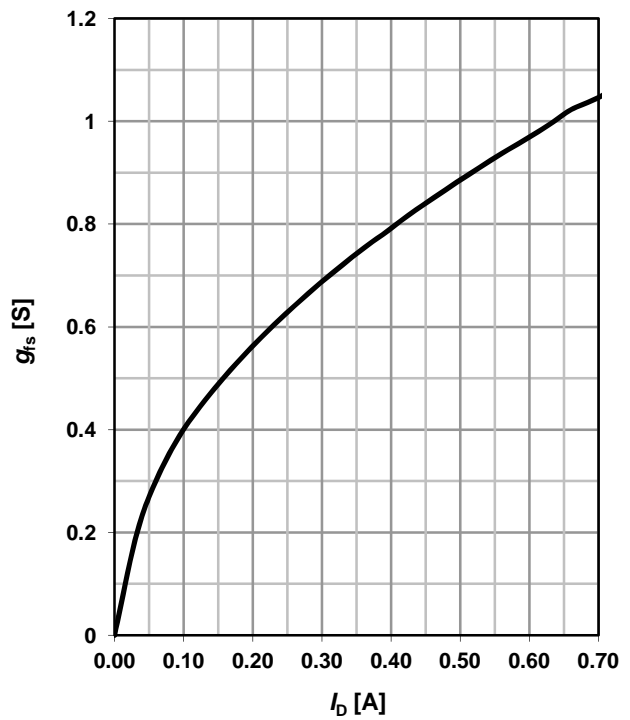
**7 Typ. transfer characteristics**

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



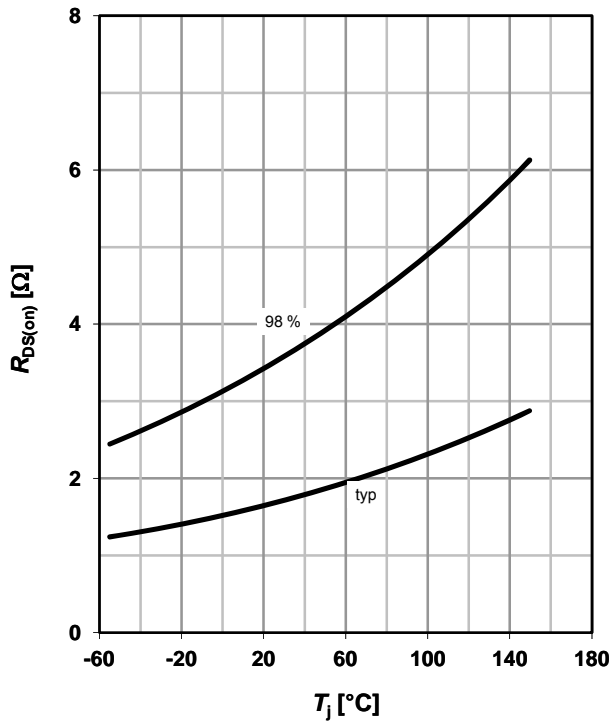
**8 Typ. forward transconductance**

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



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

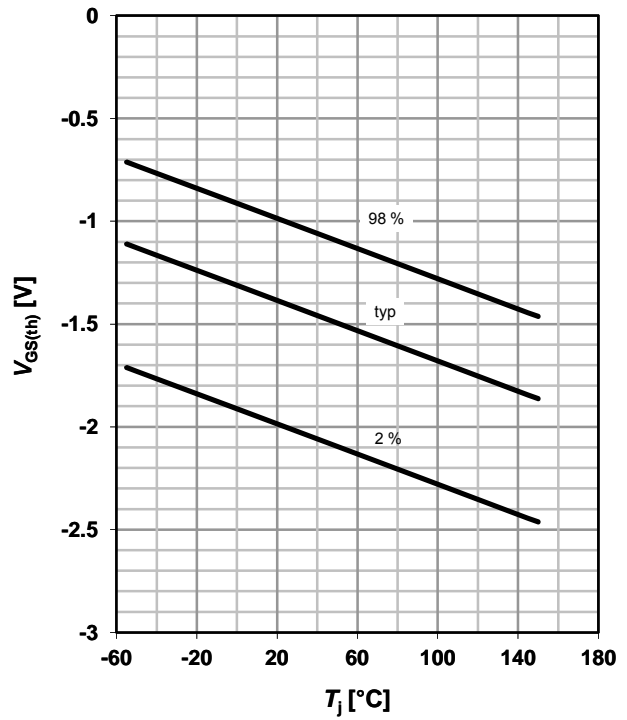
$R_{DS(on)}=f(T_j); I_D=0.07\text{ A}; V_{GS}=0\text{ V}$



**10 Typ. gate threshold voltage**

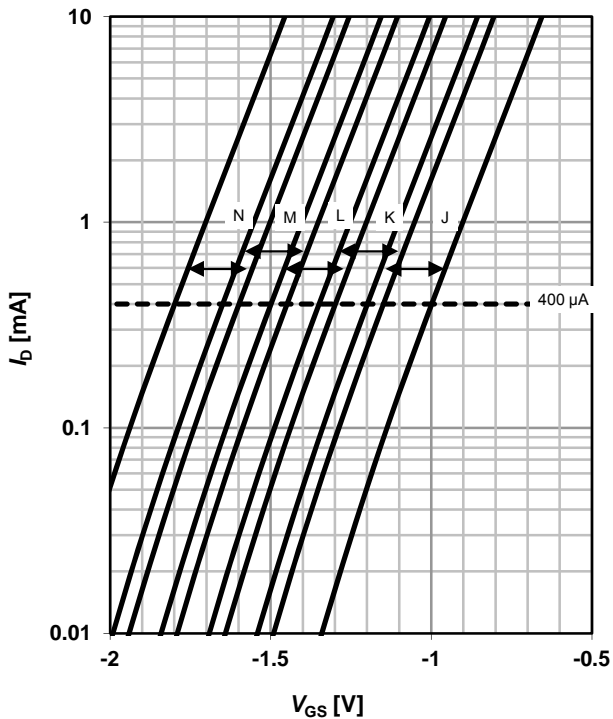
$V_{GS(th)}=f(T_j); V_{DS}=3\text{ V}; I_D=400\text{ }\mu\text{A}$

parameter:  $I_D$



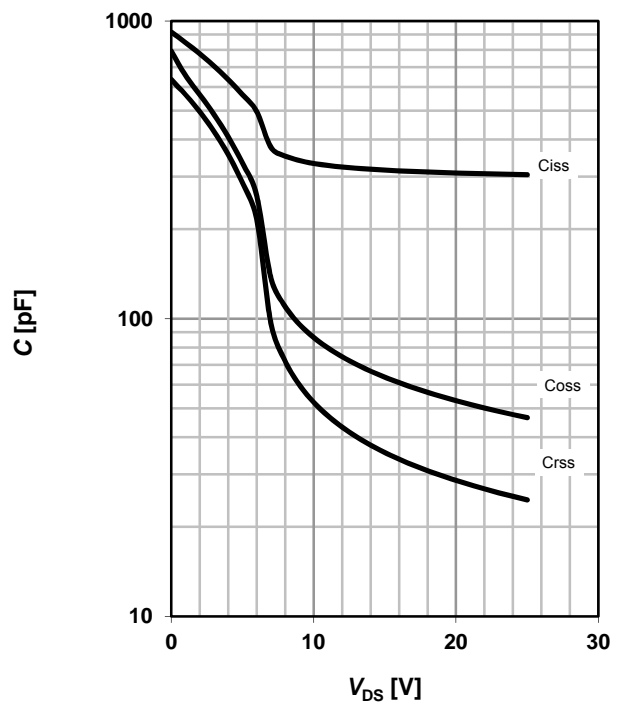
**11 Threshold voltage bands**

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



**12 Typ. capacitances**

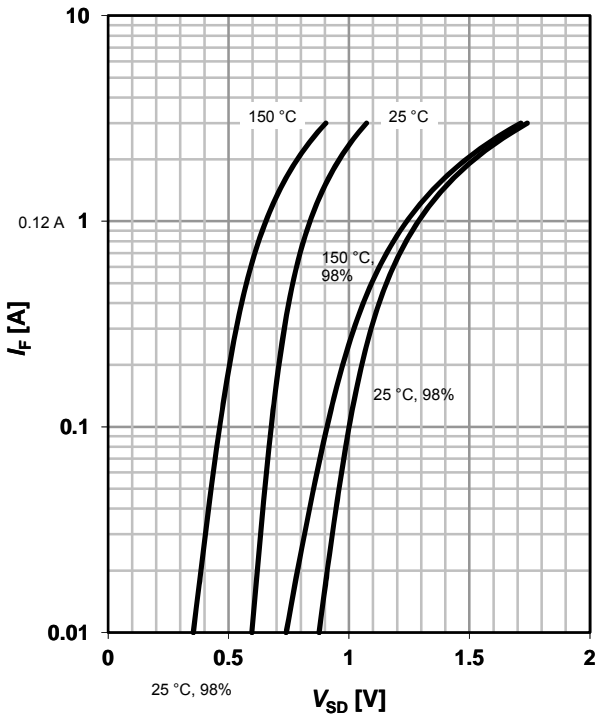
$C=f(V_{DS}); V_{GS}=-3\text{ V}; f=1\text{ MHz}$



**13 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

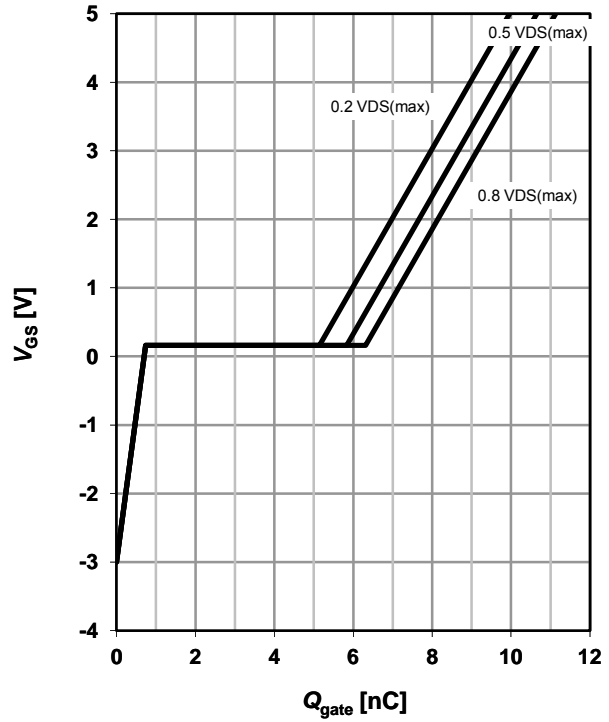
parameter:  $T_j$



**15 Typ. gate charge**

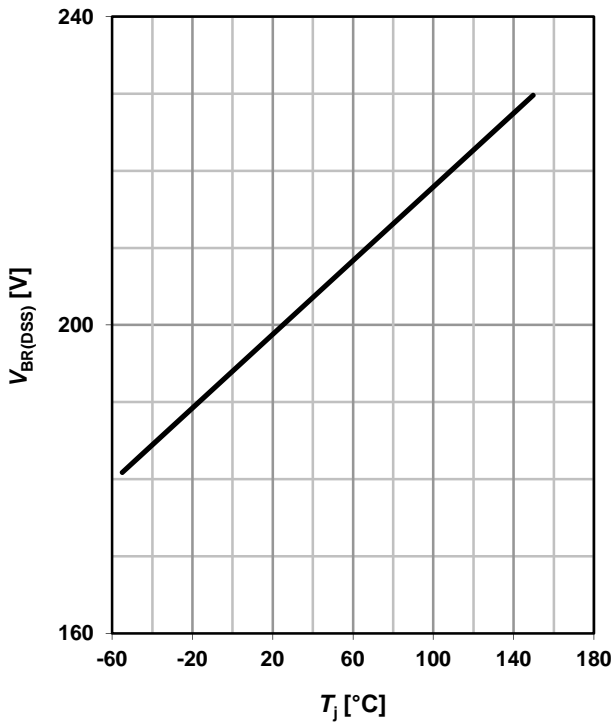
$V_{GS} = f(Q_{gate}); I_D = 0.5 \text{ A pulsed}$

parameter:  $V_{DD}$

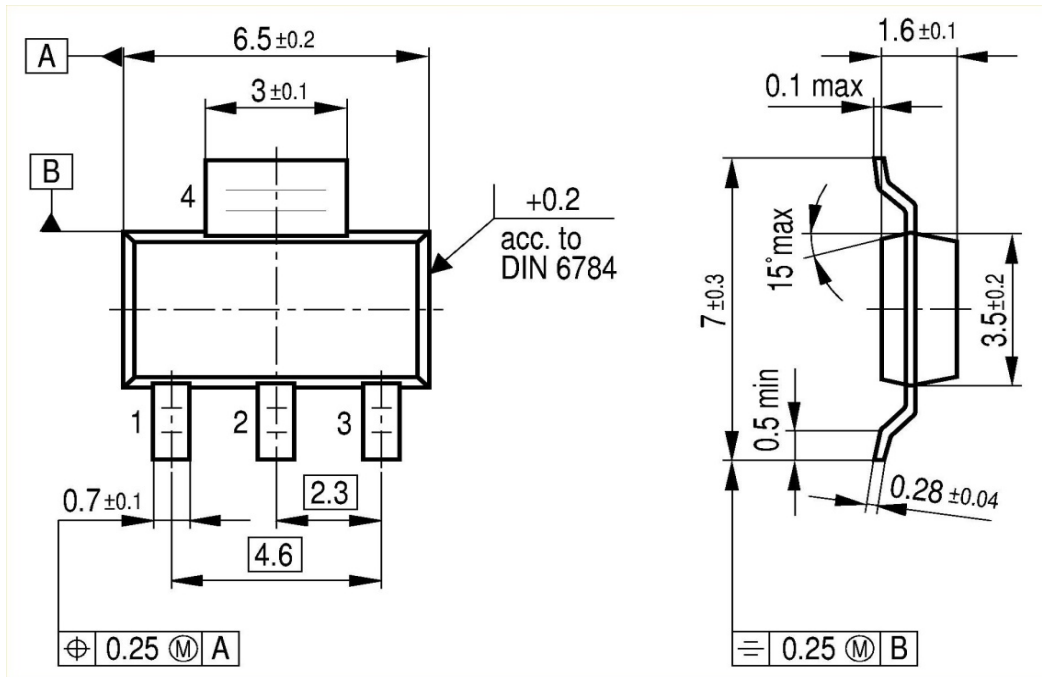


**16 Drain-source breakdown voltage**

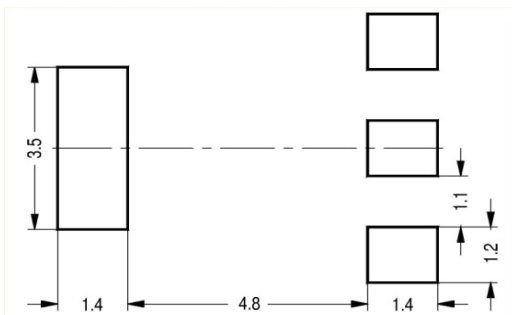
$V_{BR(DSS)} = f(T_j); I_D = 250 \mu\text{A}$



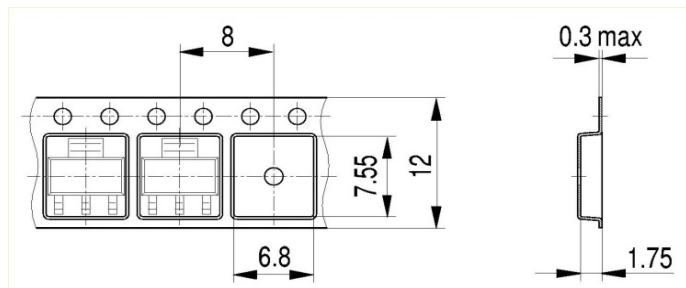
Package Outline:



Footprint:



Packaging:



Dimensions in mm



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