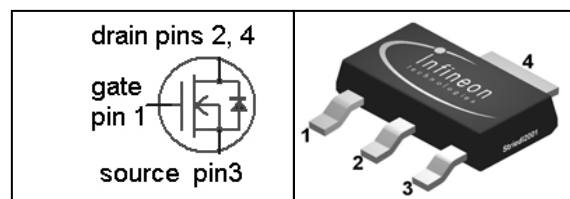


SIPMOS® Small-Signal-Transistor
Features

- N-channel
- Depletion mode
- dv/dt rated

Product Summary

| | | |
|------------------|------|----------|
| V_{DS} | 600 | V |
| $R_{DS(on),max}$ | 60 | Ω |
| $I_{DSS,min}$ | 0.02 | A |

SOT-223


| Type | Package | Ordering Code | Tape and Reel Information | Marking |
|--------|---------|---------------|---------------------------|---------|
| BSP135 | SOT-223 | Q62702-S655 | E6327: 1000 pcs/reel | BSP135 |

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

| Parameter | Symbol | Conditions | Value | Unit |
|--|----------------|---|-------------|--------------------|
| Continuous drain current | I_D | $T_A=25\text{ °C}$ | 0.12 | A |
| | | $T_A=70\text{ °C}$ | 0.10 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A=25\text{ °C}$ | 0.48 | |
| Reverse diode dv/dt | dv/dt | $I_D=0.12\text{ A}$, $V_{DS}=20\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$ | 6 | kV/ μs |
| Gate source voltage | V_{GS} | | ± 20 | V |
| ESD sensitivity (HBM) as per MIL-STD 883 | | | Class 1 | |
| 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 | |

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

Thermal characteristics

| | | | | | | |
|--|------------|--|---|---|-----|-----|
| Thermal resistance, junction - soldering point (pin 4) | R_{thJS} | | - | - | 25 | K/W |
| SMD version, device on PCB | R_{thJA} | minimal footprint | - | - | 115 | |
| | | 6 cm ² cooling area ¹⁾ | - | - | 70 | |

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

| | | | | | | |
|----------------------------------|---------------|--|------|------|-----|---------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=-3\text{ V}, I_D=250\text{ }\mu\text{A}$ | 600 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=3\text{ V}, I_D=94\text{ }\mu\text{A}$ | -2.1 | -1.4 | -1 | |
| Drain-source cutoff current | $I_{D(off)}$ | $V_{DS}=600\text{ V}, V_{GS}=-3\text{ V}, T_j=25\text{ }^\circ\text{C}$ | - | - | 0.1 | μA |
| | | $V_{DS}=600\text{ V}, V_{GS}=-3\text{ V}, T_j=125\text{ }^\circ\text{C}$ | - | - | 10 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$ | - | - | 100 | nA |
| On-state drain current | I_{DSS} | $V_{GS}=0\text{ V}, V_{DS}=10\text{ V}$ | 20 | - | - | mA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=0\text{ V}, I_D=0.01\text{ A}$ | - | 30 | 60 | Ω |
| | | $V_{GS}=10\text{ V}, I_D=0.12\text{ A}$ | - | 25 | 45 | |
| Transconductance | g_{fs} | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=0.1\text{ A}$ | 0.08 | 0.16 | - | S |

¹⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (single layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

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

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|---|---|-----|-----|----|
| Input capacitance | C_{iss} | $V_{GS}=-3\text{ V}, V_{DS}=25\text{ V}, f=1\text{ MHz}$ | - | 98 | 146 | pF |
| Output capacitance | C_{oss} | | - | 8.5 | 13 | |
| Reverse transfer capacitance | C_{rss} | | - | 3.4 | 5.1 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=300\text{ V}, V_{GS}=-3\dots 5\text{ V}, I_D=0.1\text{ A}, R_G=6\ \Omega$ | - | 5.4 | 8.1 | ns |
| Rise time | t_r | | - | 5.6 | 8.4 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 28 | 42 | |
| Fall time | t_f | | - | 182 | 273 | |

Gate Charge Characteristics

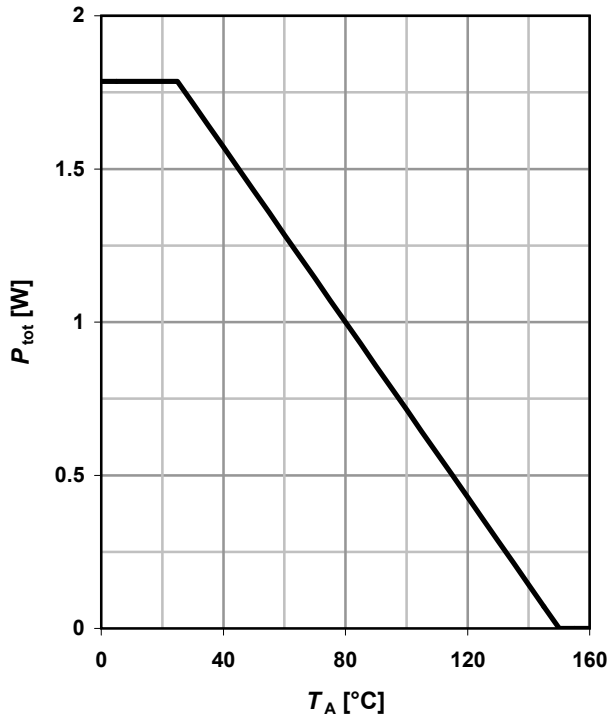
| | | | | | | |
|-----------------------|---------------|---|---|------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD}=400\text{ V}, I_D=0.1\text{ A}, V_{GS}=-3\text{ to }5\text{ V}$ | - | 0.24 | 0.36 | nC |
| Gate to drain charge | Q_{gd} | | - | 2.0 | 3.0 | |
| Gate charge total | Q_g | | - | 3.7 | 4.9 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 0.20 | - | V |

Reverse Diode

| | | | | | | |
|----------------------------------|---------------|--|---|------|------|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | 0.12 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 0.48 | |
| Diode forward voltage | V_{SD} | $V_{GS}=-3\text{ V}, I_F=0.12\text{ A}, T_J=25\text{ }^\circ\text{C}$ | - | 0.78 | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R=300\text{ V}, I_F=0.1\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$ | - | 87 | 130 | ns |
| Reverse recovery charge | Q_{rr} | | - | 70 | 104 | nC |

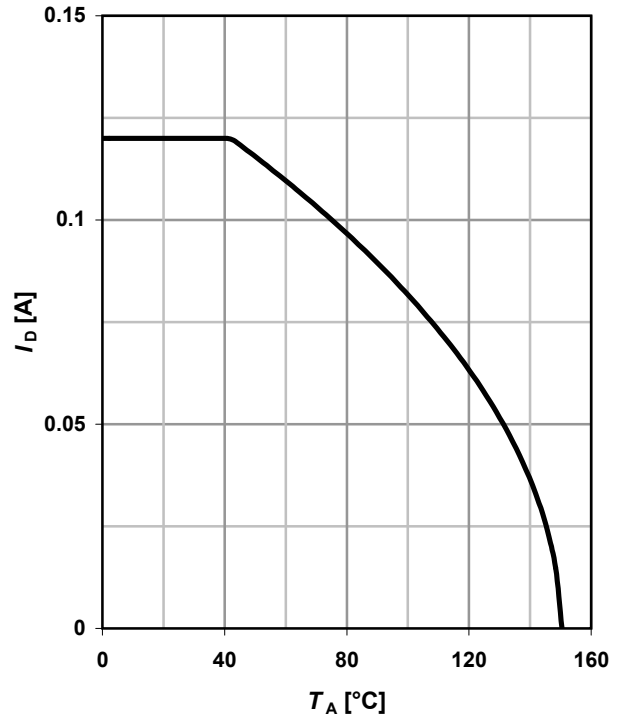
1 Power dissipation

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



2 Drain current

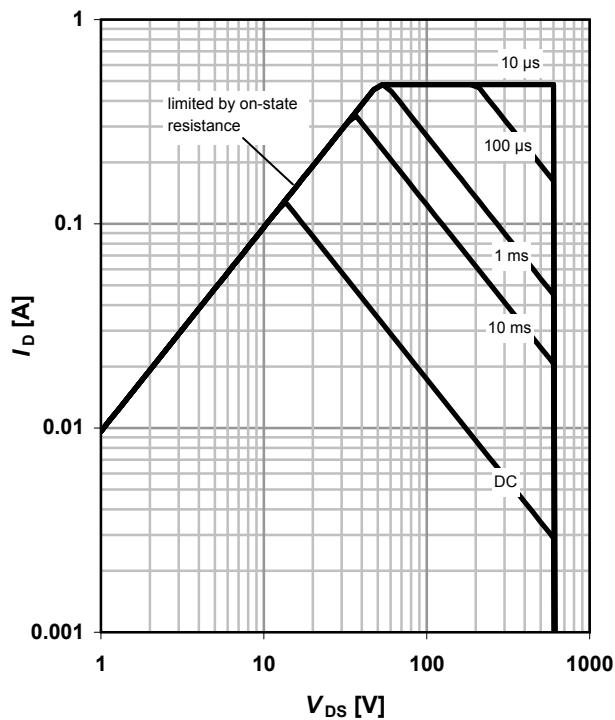
$$I_D=f(T_A); V_{GS} \geq 10 \text{ V}$$



3 Safe operation area

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

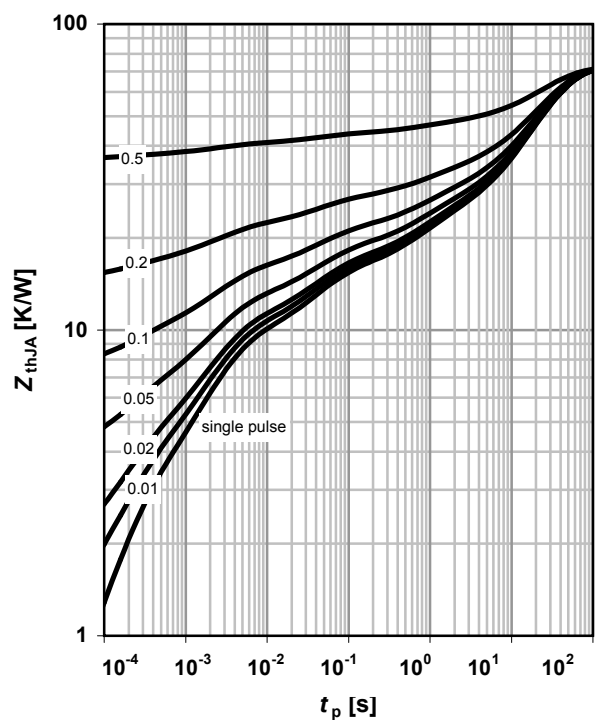
parameter: t_p



4 Max. transient thermal impedance

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

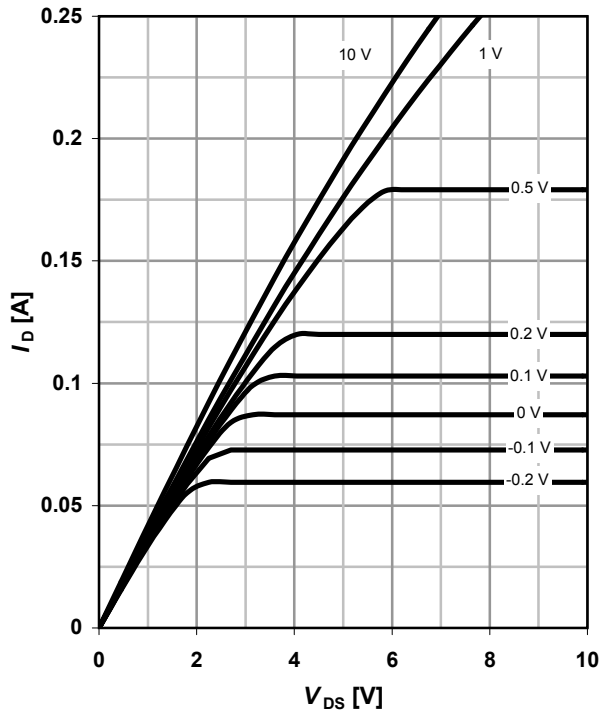
parameter: $D=t_p/T$



5 Typ. output characteristics

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

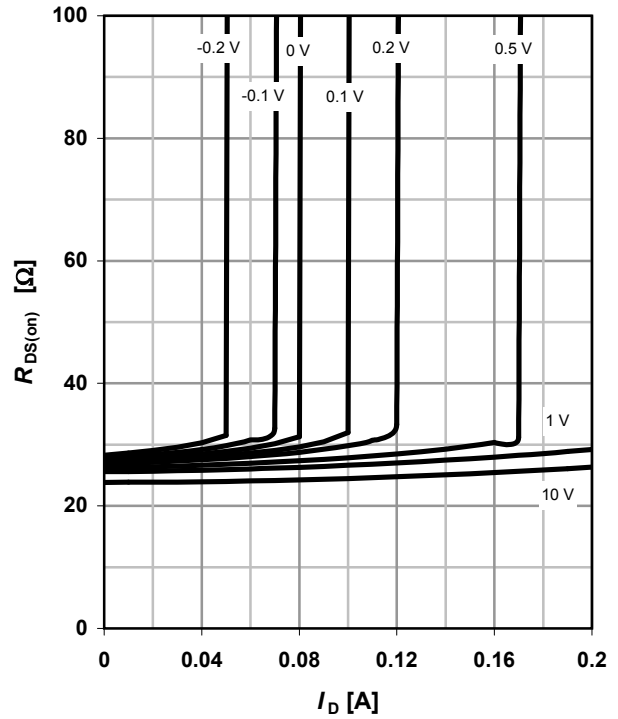
parameter: V_{GS}



6 Typ. drain-source on resistance

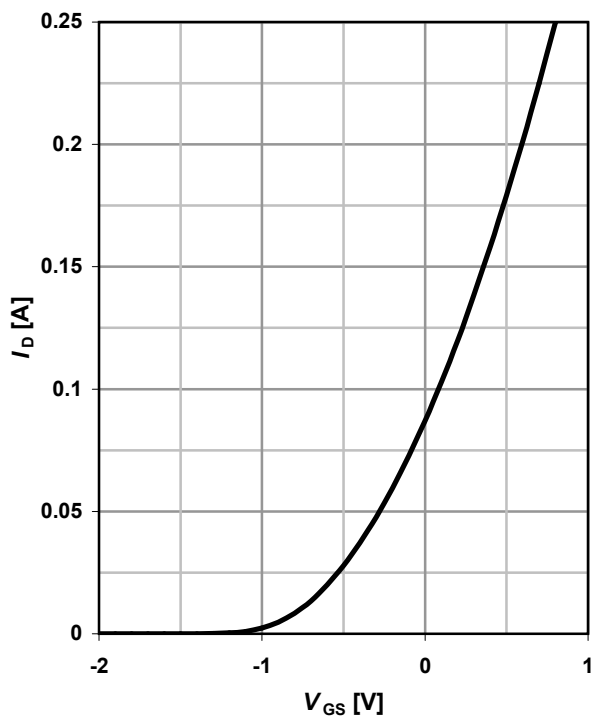
$$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$

parameter: V_{GS}



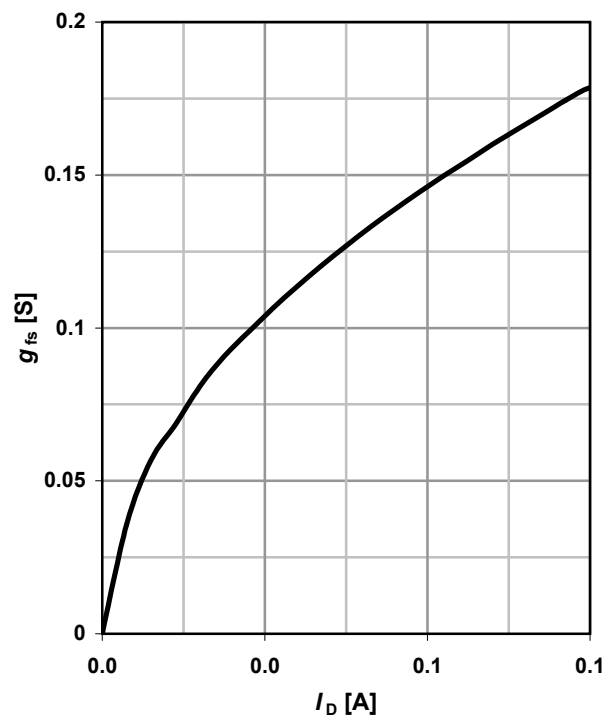
7 Typ. transfer characteristics

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



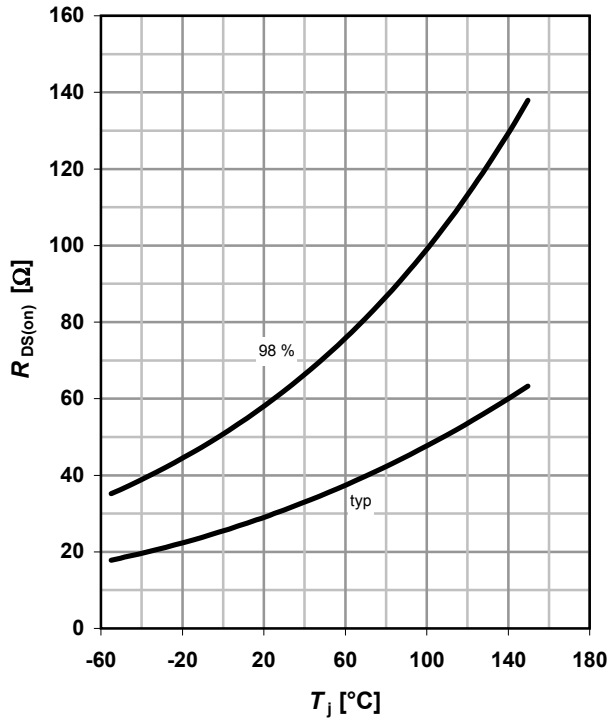
8 Typ. forward transconductance

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



9 Drain-source on-state resistance

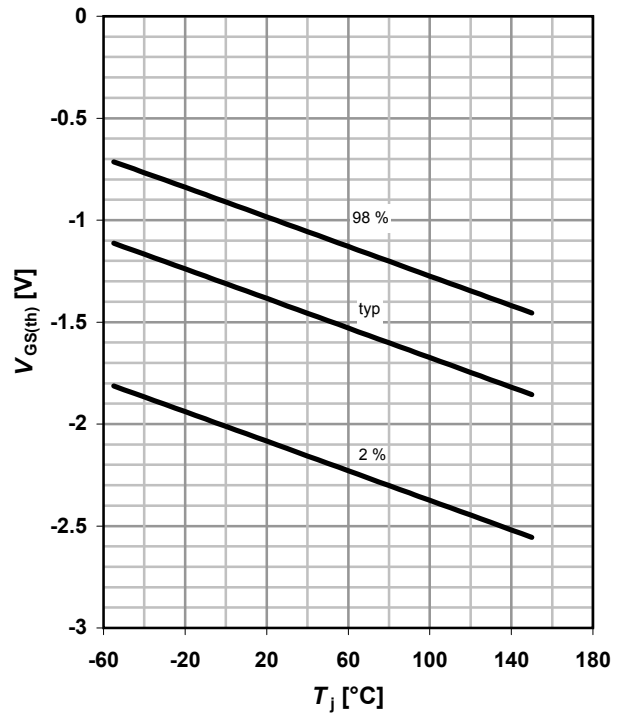
$R_{DS(on)} = f(T_j); I_D = 0.01 \text{ A}; V_{GS} = 0 \text{ V}$



10 Typ. gate threshold voltage

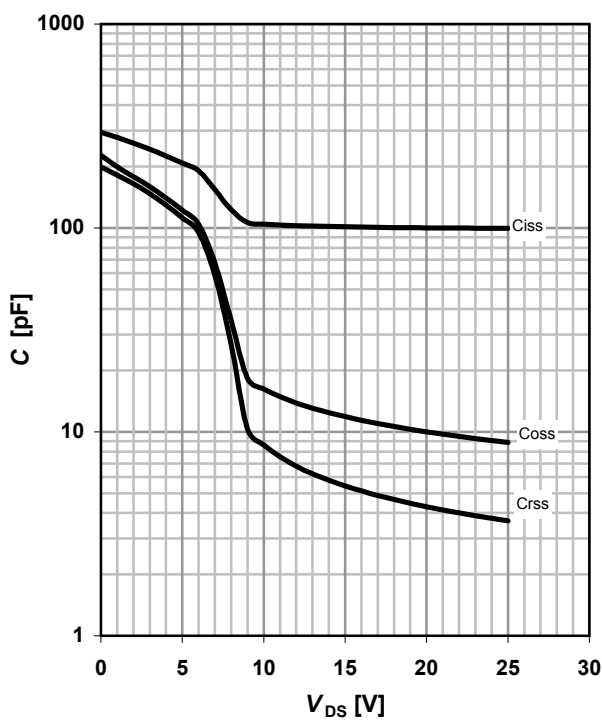
$V_{GS(th)} = f(T_j); V_{DS} = 3 \text{ V}; I_D = 94 \mu\text{A}$

parameter: I_D



11 Typ. Capacitances

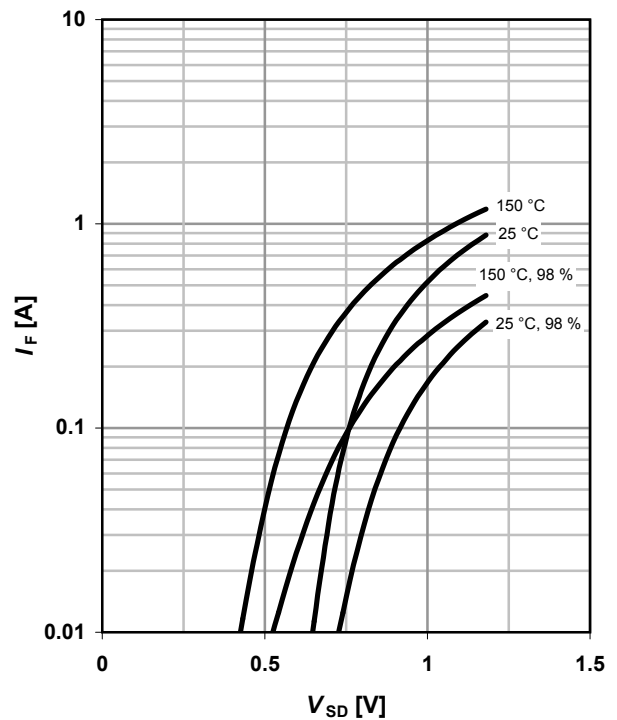
$C = f(V_{DS}); V_{GS} = -3 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

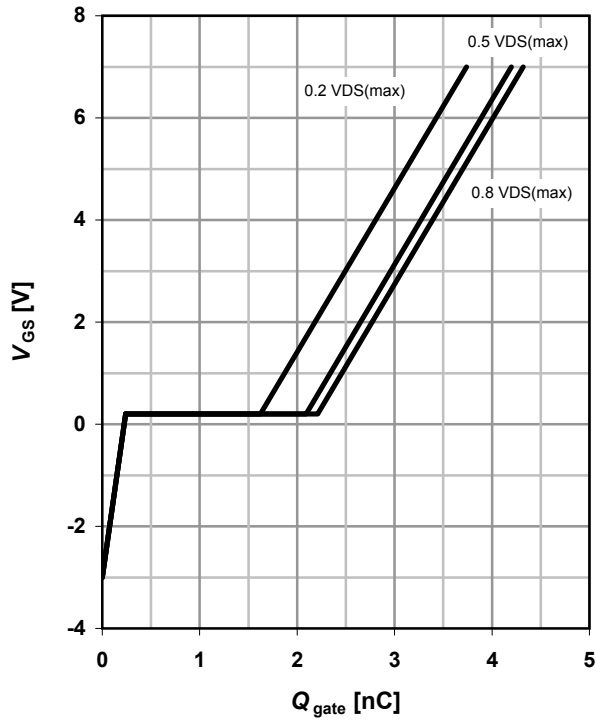
parameter: T_j



14 Typ. gate charge

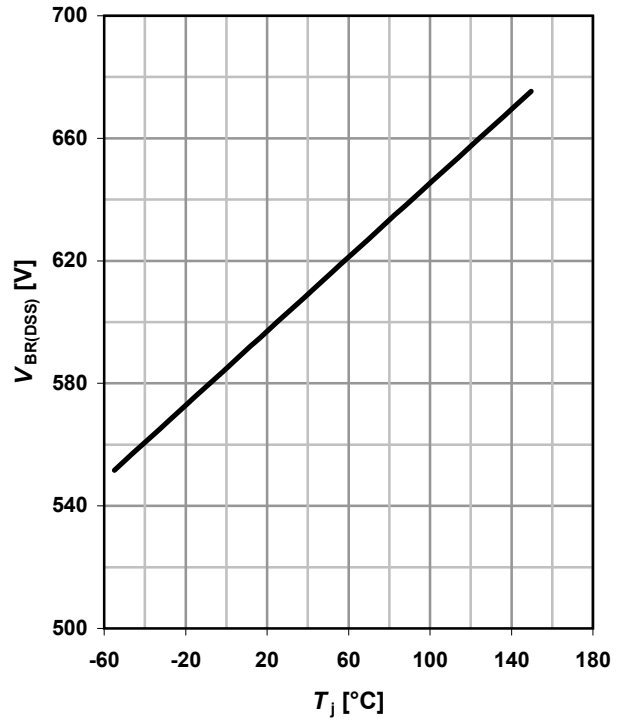
$V_{GS}=f(Q_{gate}); I_D=0.1 \text{ A pulsed}$

parameter: V_{DD}

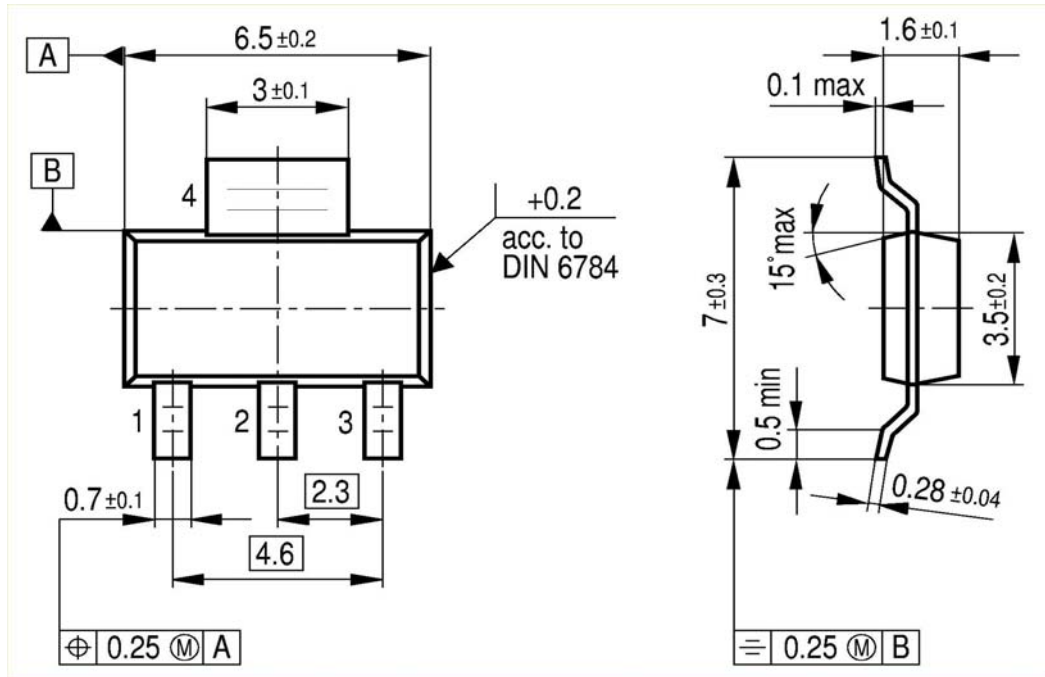


15 Drain-source breakdown voltage

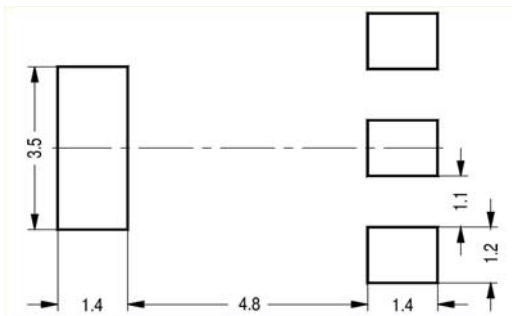
$V_{BR(DSS)}=f(T_j); I_D=250 \mu\text{A}$



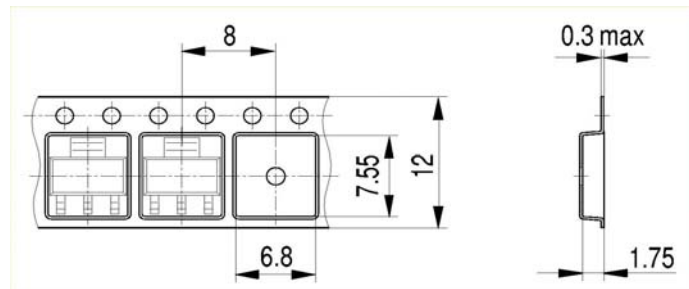
Package Outline:



Footprint:



Packaging:



Dimensions in mm

Published by
Infineon Technologies AG
Bereich Kommunikation
St.-Martin-Straße 53
D-81541 München
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