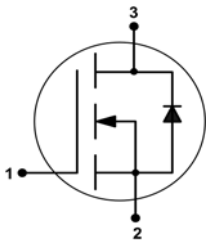
## OptiMOS™2 Small-Signal-Transistor

### Features

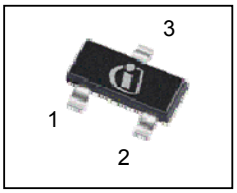
- N-channel
- Enhancement mode
- Super Logic level (2.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to IEC61249-2-21

### Product Summary

| | | | |
|---|---|---|---|
| $V_{DS}$ | | 20 | V |
| $R_{DS(on),max}$ | $V_{GS}$=4.5 V | 140 | mΩ |
| | $V_{GS}$=2.5 V | 250 | |
| $I_D$ | | 1.5 | A |




PG-SOT23




| Type | Package | Tape and Reel Information | Marking | Lead Free | Packing |
|---|---|---|---|---|---|
| BSS214N | PG-SOT23 | H6327: 3000 pcs/ reel | SVs | Yes | Non dry |

**Maximum ratings,** at $T_j$=25 °C, unless otherwise specified

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous drain current | $I_D$ | $T_A$=25 °C | 1.5 | A |
| | | $T_A$=70 °C | 1.2 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A$=25 °C | 6 | |
| Avalanche energy, single pulse | $E_{AS}$ | $I_D$=1.5 A, $R_{GS}$=25 Ω | 3.7 | mJ |
| Reverse diode d$v$/d$t$ | d$v$/d$t$ | $I_D$=1.5 A, $V_{DS}$=16 V, d$i$/d$t$=200 A/µs, $T_{j,max}$=150 °C | 6 | kV/µs |
| Gate source voltage | $V_{GS}$ | | ±12 | V |
| Power dissipation | $P_{tot}$ | $T_A$=25 °C | 0.5 | W |
| Operating and storage temperature | $T_j$, $T_{stg}$ | | -55 ... 150 | °C |
| ESD Class | | JESD22-A114 -HBM | 0 (<250V) | |
| Soldering Temperature | | | 260 °C | |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | |

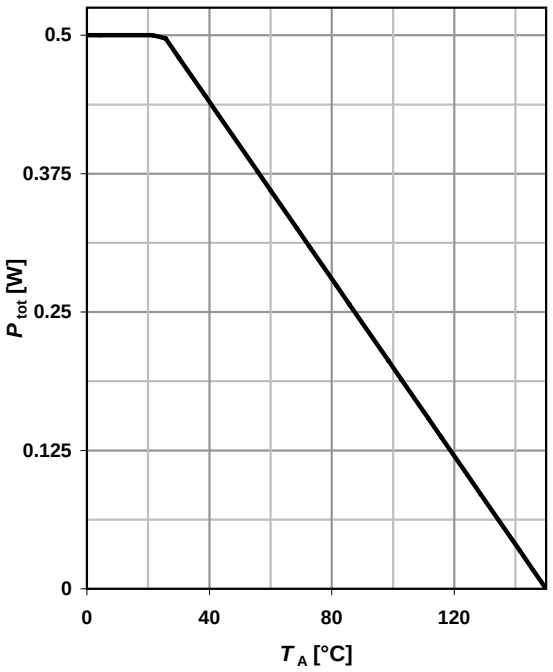
| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Thermal characteristics** | | | | | | |
| Thermal resistance, junction - ambient | $R_{thJA}$ | minimal footprint [1] | - | - | 250 | K/W |
| **Electrical characteristics,** at $T_j$=25 °C, unless otherwise specified | | | | | | |
| **Static characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$= 0 V, $I_D$= 250 µA | 20 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=3.7 µA | 0.7 | 0.95 | 1.2 | |
| Drain-source leakage current | $I_{DSS}$ | $V_{DS}$=20 V, $V_{GS}$=0 V, $T_j$=25 °C | - | - | 1 | µA |
| | | $V_{DS}$=20 V, $V_{GS}$=0 V, $T_j$=150 °C | - | - | 100 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=12 V, $V_{DS}$=0 V | - | - | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=2.5 V, $I_D$=0.7 A | - | 175 | 250 | mΩ |
| | | $V_{GS}$=4.5 V, $I_D$=1.5 A | - | 106 | 140 | |
| Transconductance | $g_{fs}$ | $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, $I_D$=1.2 A | - | 4 | - | S |

[1] Performed on 40mm$^2$ FR4 PCB. The traces are 1mm wide, 70µm thick and 20mm long; they are present on both sides of the PCB.

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=10 V, $f$=1 MHz | - | 107 | 143 | pF |
| Output capacitance | $C_{oss}$ | | - | 46 | 62 | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 6 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=10 V, $V_{GS}$=4.5 V, $I_D$=1.5 A, $R_G$=6 Ω | - | 4.1 | - | ns |
| Rise time | $t_r$ | | - | 7.8 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 6.8 | - | |
| Fall time | $t_f$ | | - | 1.4 | - | |
| Gate Charge Characteristics | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=10 V, $I_D$=1.5 A, $V_{GS}$=0 to 5 V | - | 0.24 | - | nC |
| Gate to drain charge | $Q_{gd}$ | | - | 0.2 | - | |
| Gate charge total | $Q_g$ | | - | 0.8 | - | |
| Gate plateau voltage | $V_{plateau}$ | | - | 2.2 | - | V |
| **Reverse Diode** | | | | | | |
| Diode continous forward current | $I_S$ | $T_A$=25 °C | - | - | 0.5 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 6 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=1.5 A, $T_j$=25 °C | - | 0.8 | 1.1 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=10 V, $I_F$=1.5 A, $di_F/dt$=100 A/µs | - | 8.4 | - | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 1.7 | - | nC |

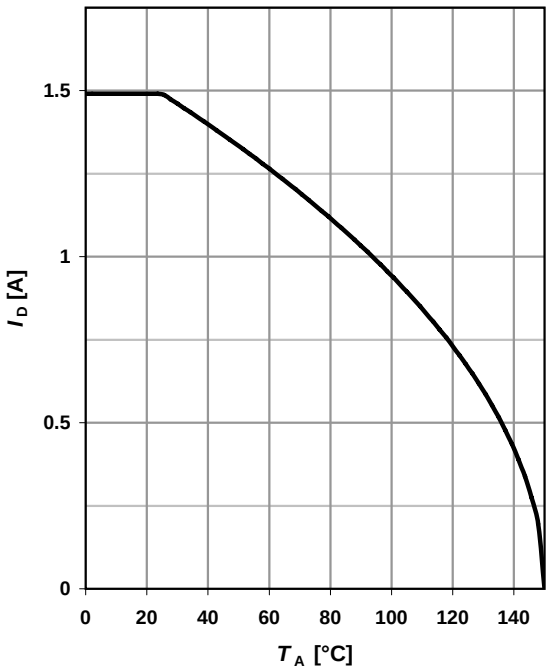
## 1 Power dissipation

$P_{tot}=f(T_A)$




## 2 Drain current

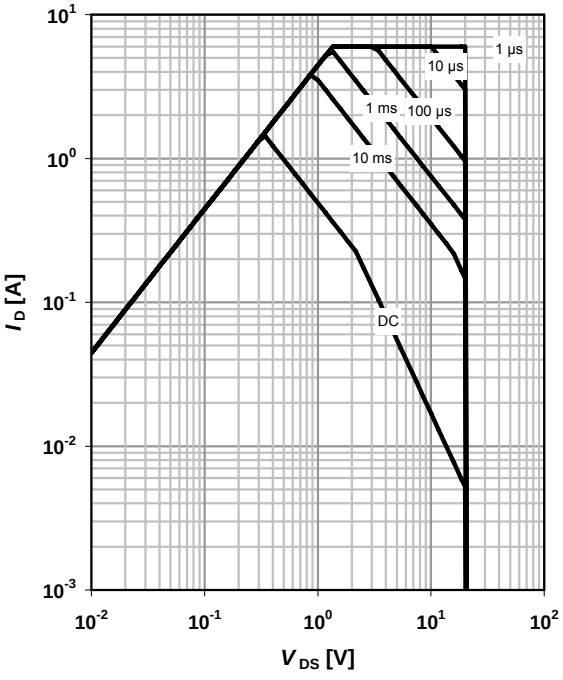
$I_D=f(T_A)$; $V_{GS}\geq 4.5$ V




## 3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C; $D=0$

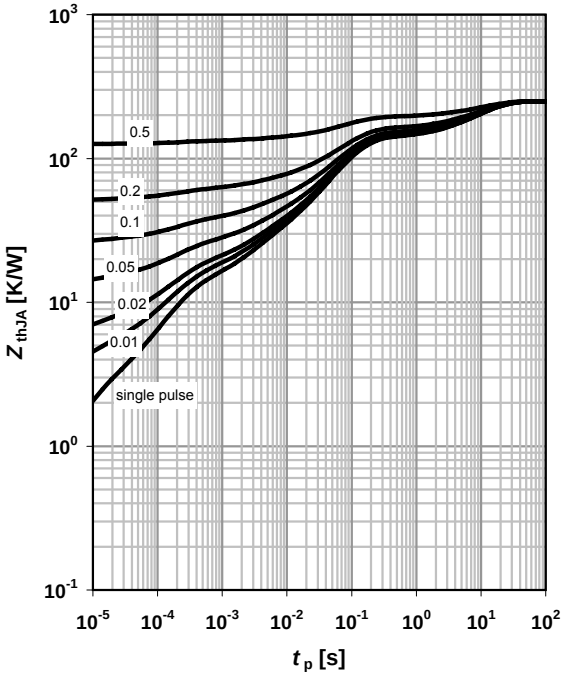
parameter: $t_p$




## 4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)$

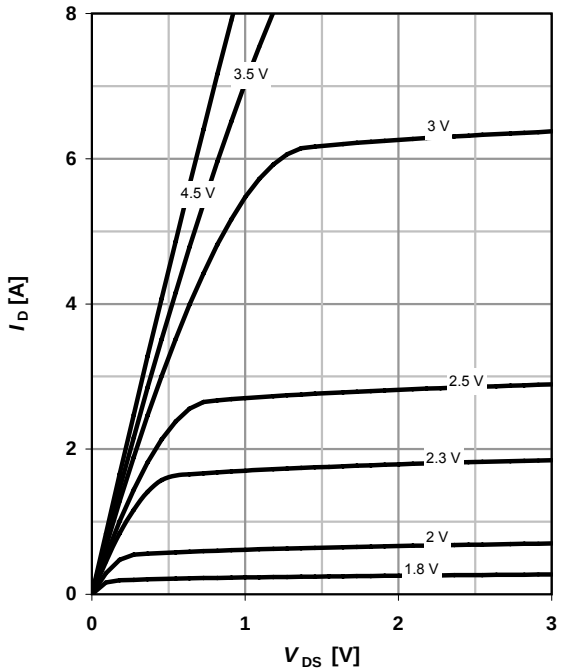
parameter: $D=t_p/T$



## 5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C

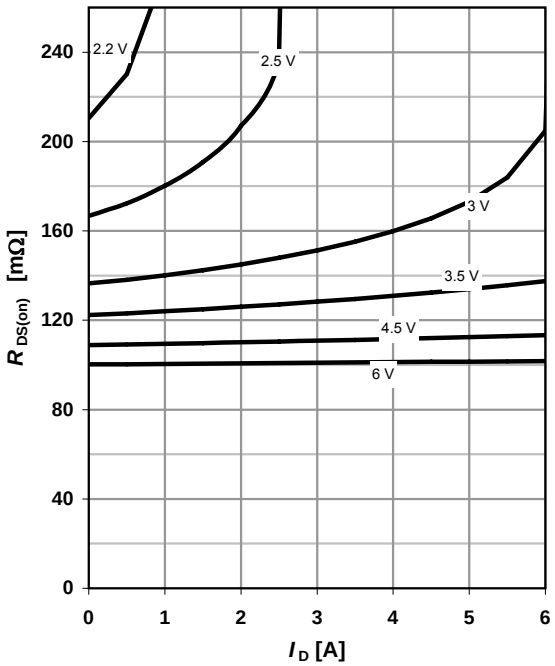
parameter: $V_{GS}$




## 6 Typ. drain-source on resistance

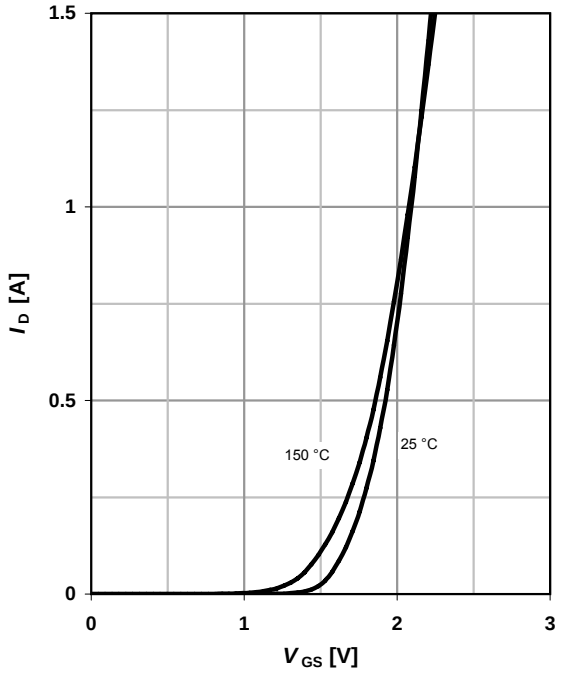
$R_{DS(on)}=f(I_D)$; $T_j=25$ °C

parameter: $V_{GS}$



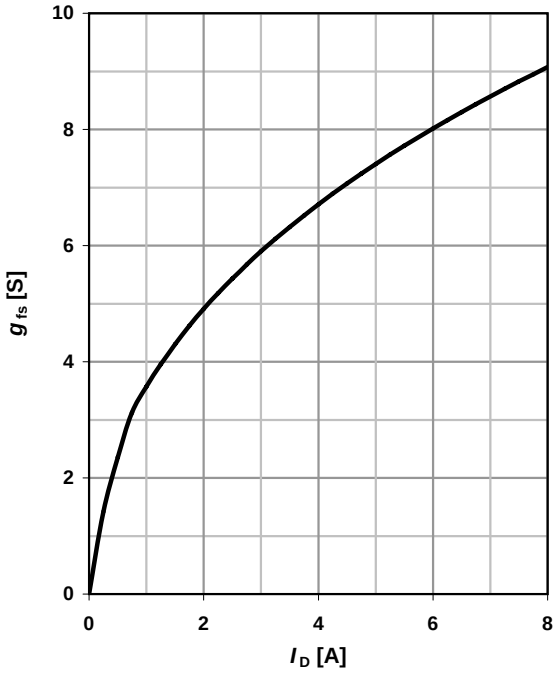

## 7 Typ. transfer characteristics

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



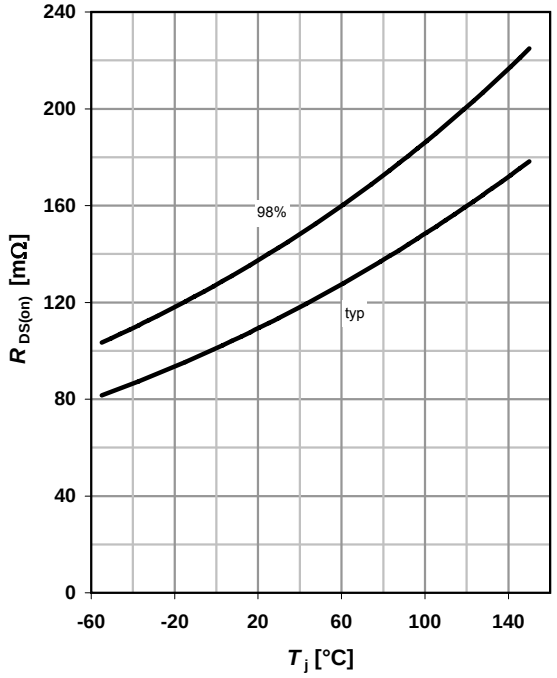

## 8 Typ. forward transconductance

$g_{fs}=f(I_D)$; $T_j=25$ °C



### 9 Drain-source on-state resistance

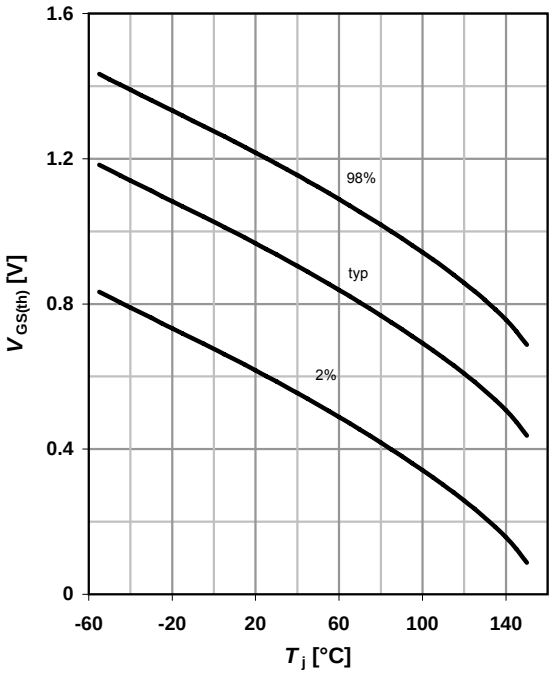
$R_{DS(on)}$=f($T_j$); $I_D$=1.5 A; $V_{GS}$=4.5 V




### 10 Typ. gate threshold voltage

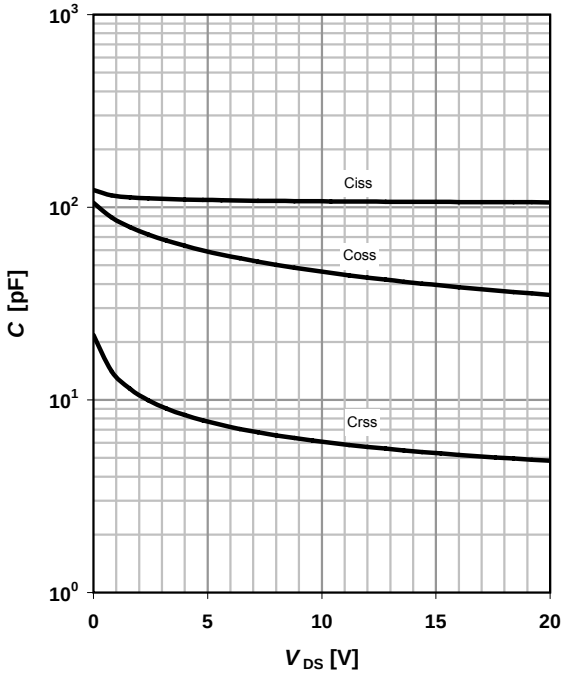
$V_{GS(th)}$=f($T_j$); $V_{DS}$=$V_{GS}$; $I_D$=3.7 µA

parameter: $I_D$




### 11 Typ. capacitances

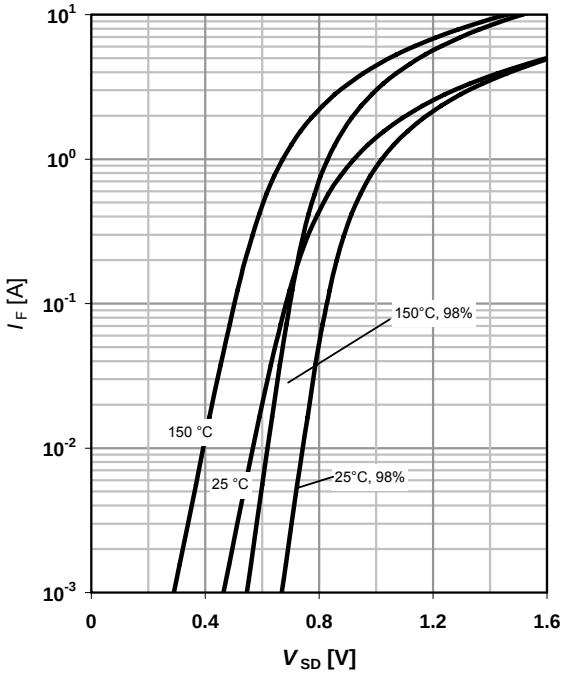
$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz; $T_j$=25°C




### 12 Forward characteristics of reverse diode

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

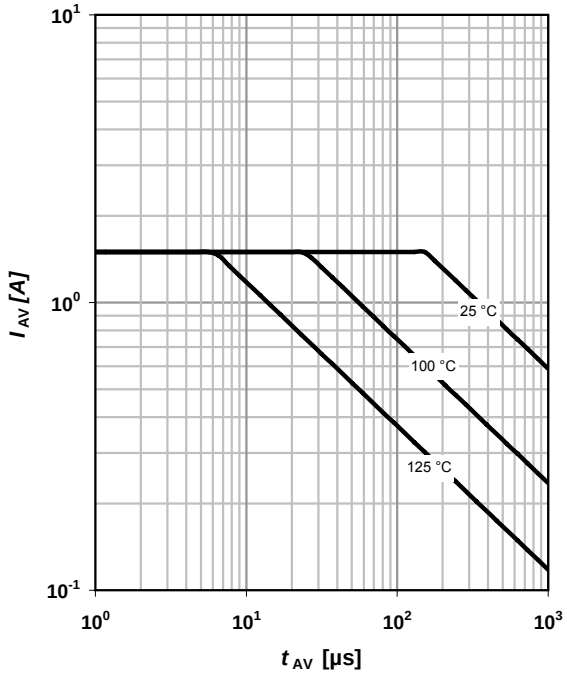
parameter: $T_j$



## 13 Avalanche characteristics

$I_{AS}=f(t_{AV})$; $R_{GS}=25$ W

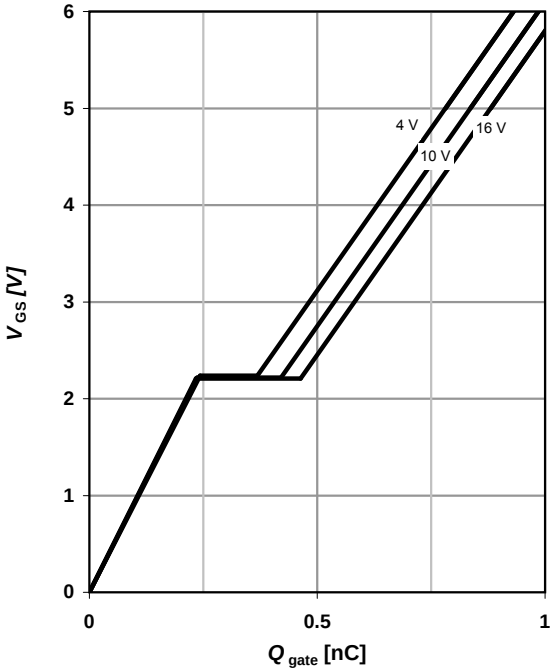
parameter: $T_{j(start)}$




## 14 Typ. gate charge

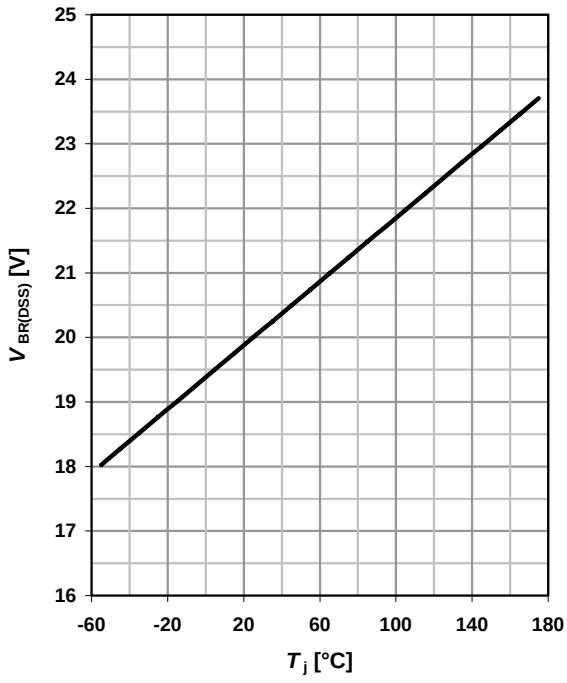
$V_{GS}=f(Q_{gate})$; $I_D=6$A pulsed

parameter: $V_{DD}$

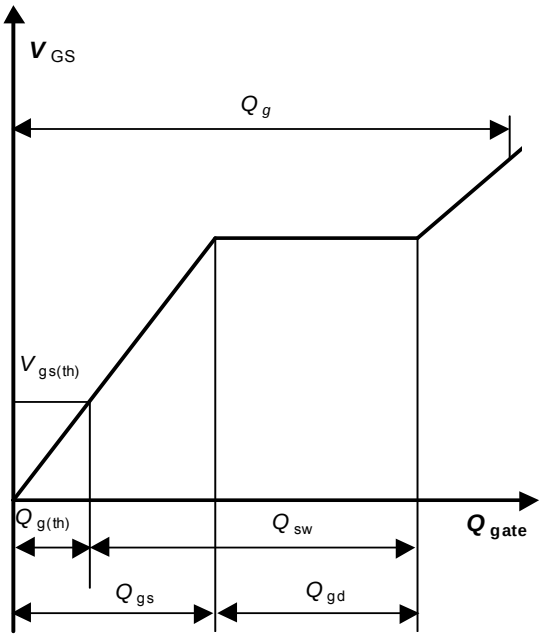



## 15 Drain-source breakdown voltage

$V_{BR(DSS)}=f(T_j)$; $I_D=250$ µA

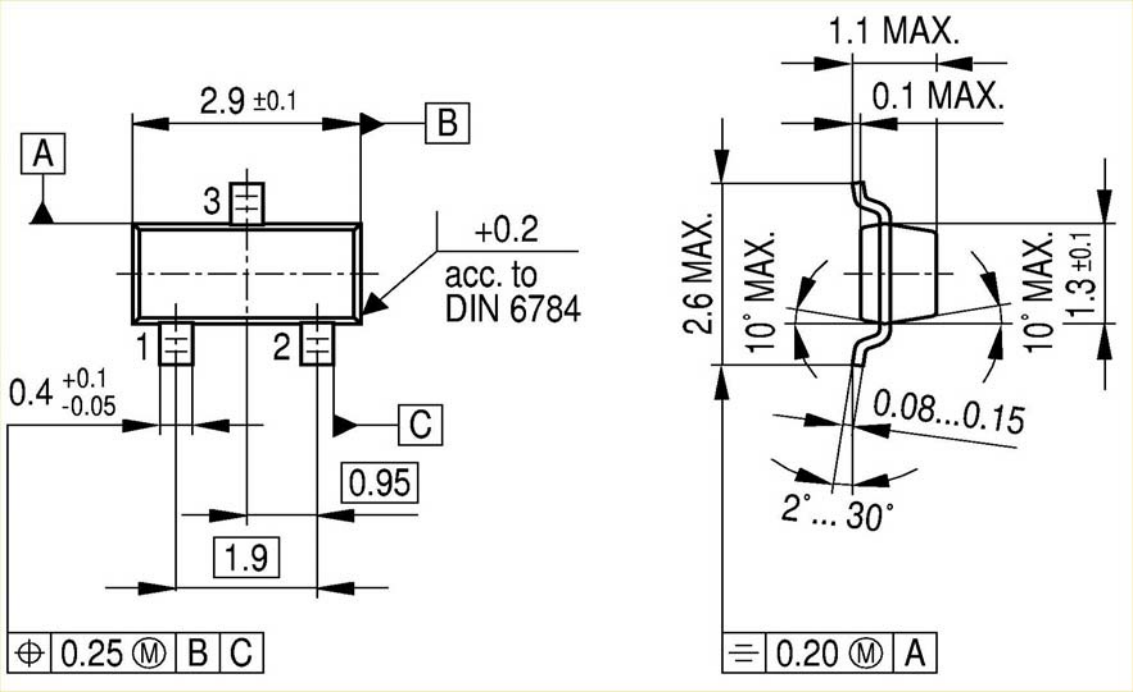



## 16 Gate charge waveforms

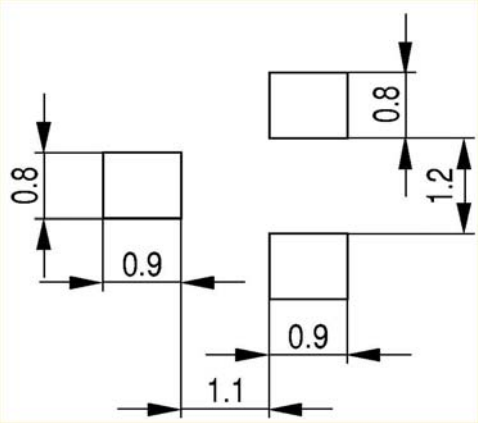


**SOT23**

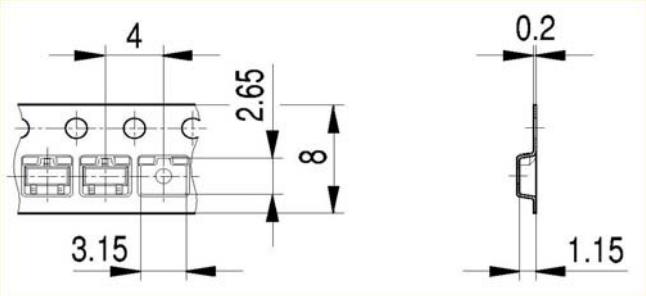
**Package Outline:**




**Footprint:**




**Packaging:**




Dimensions in mm

**Published by**
**Infineon Technologies AG**
**81726 Munich, Germany**
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