# SIPMOS® Small-Signal-Transistor

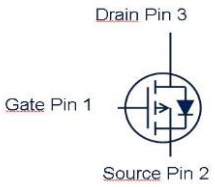
## Features

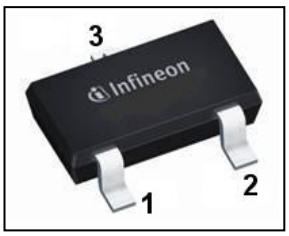
- P-Channel
- Enhancement mode / Logic level
- Avalanche rated
- Pb-free lead plating; RoHS compliant
- Footprint compatible to SOT23
- Qualified according to AEC Q101
- Halogen free according to IEC61249-2-21

## Product Summary

| | | |
|---|---|---|
| $V_{DS}$ | -250 | V |
| $R_{DS(on),max}$ | 11 | Ω |
| $I_D$ | -0.14 | A |

PG-SC59




| Type | Package | Tape and Reel Information | Marking | Halogen-free | Packing |
|---|---|---|---|---|---|
| BSR92P | PG-SC59 | H6327 = 3000 pcs. / reel | LDs | Yes | Non dry |

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

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| | | | steady state | |
| Continuous drain current | $I_D$ | $T_A$=25 °C | -0.14 | A |
| | | $T_A$=70 °C | -0.11 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A$=25 °C | -0.56 | |
| Avalanche energy, single pulse | $E_{AS}$ | $I_D$=-0.14 A, $R_{GS}$=25 Ω | 24 | mJ |
| Gate source voltage | $V_{GS}$ | | ±20 | V |
| Power dissipation | $P_{tot}$ | $T_C$=25 °C | 0.5 | W |
| Operating and storage temperature | $T_j$, $T_{stg}$ | | -55 ... 150 | °C |
| ESD class | | JESD22-A114 (HBM) | 1A (250V to 500V) | |
| Soldering temperature | | | 260 °C | |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | |

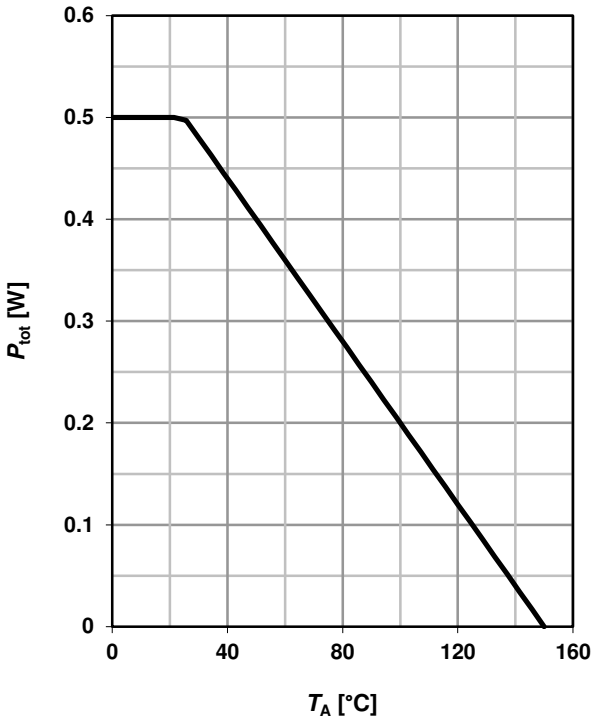
| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Thermal characteristics** | | | | | | |
| Thermal resistance, junction - ambient | $R_{thJA}$ | minimal footprint, steady state | - | - | 250 | K/W |
| **Electrical characteristics,** 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 | -250 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-130 µA | -2 | -1.5 | -1 | |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=-250 V, $V_{GS}$=0 V, $T_j$=25 °C | - | -0.1 | -1 | µA |
| | | $V_{DS}$=-250 V, $V_{GS}$=0 V, $T_j$=150 °C | - | -10 | -100 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=-20 V, $V_{DS}$=0 V | - | -10 | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=-2.8 V, $I_D$=-0.025 A | - | 11 | 20 | Ω |
| | | $V_{GS}$=-4.5 V, $I_D$=-0.13 A | - | 9 | 13 | |
| | | $V_{GS}$=-10 V, $I_D$=-0.14 A | - | 8 | 11 | |
| Transconductance | $g_{fs}$ | $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, $I_D$=-0.11 A | 0.1 | 0.3 | - | S |

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic characteristics**[3] | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=-25 V, $f$=1 MHz | - | 82 | 109 | pF |
| Output capacitance | $C_{oss}$ | | - | 12 | 16 | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 5 | 8 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-125 V, $V_{GS}$=-10 V, $I_D$=-0.14 A, $R_{G,ext}$=6 Ω | - | 6.4 | 9.0 | ns |
| Rise time | $t_r$ | | - | 6.3 | 9.0 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 75.0 | 112 | |
| Fall time | $t_f$ | | - | 71.0 | 163 | |
| Gate Charge Characteristics[2), 3)] | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=-200 V, $I_D$=-0.14 A, $V_{GS}$=0 to -10 V | - | -0.2 | -0.3 | nC |
| Gate to drain charge | $Q_{gd}$ | | - | -1.2 | -1.8 | |
| Gate charge total | $Q_g$ | | - | -3.6 | -4.8 | |
| Gate plateau voltage | $V_{plateau}$ | | - | -2.7 | - | V |
| **Reverse Diode** | | | | | | |
| Diode continuous forward current | $I_S$ | $T_C$=25 °C | - | - | -0.14 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | -0.56 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=0.14 A, $T_j$=25 °C | - | -0.8 | -1.2 | V |
| Reverse recovery time[3] | $t_{rr}$ | $V_R$=125 V, $I_F$=$\|I_S\|$, d$i_F$/d$t$=100 A/µs | - | 66 | - | ns |
| Reverse recovery charge[3] | $Q_{rr}$ | | - | 125 | - | nC |

[2] See figure 16 for gate charge parameter definition
[3] Defined by design. Not subjected to production test

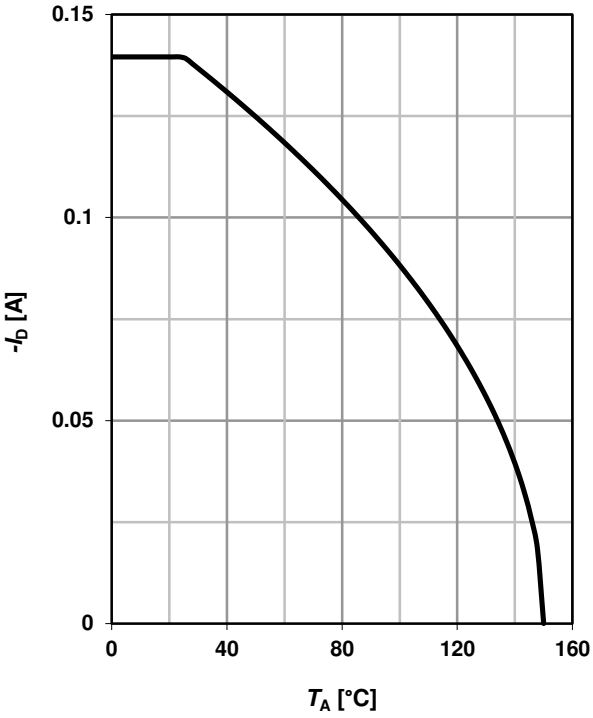
## 1 Power dissipation

$P_{tot}=f(T_C)$




## 2 Drain current

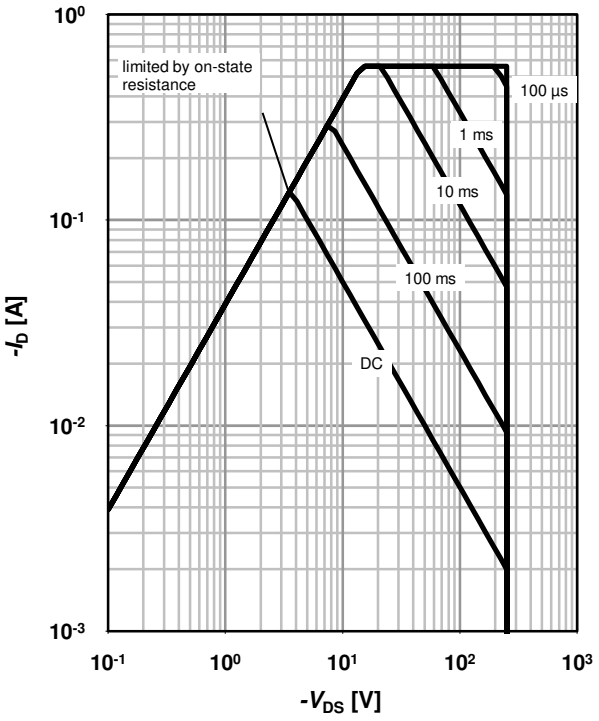
$I_D=f(T_C)$; $|V_{GS}|\geq 10$ V




## 3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

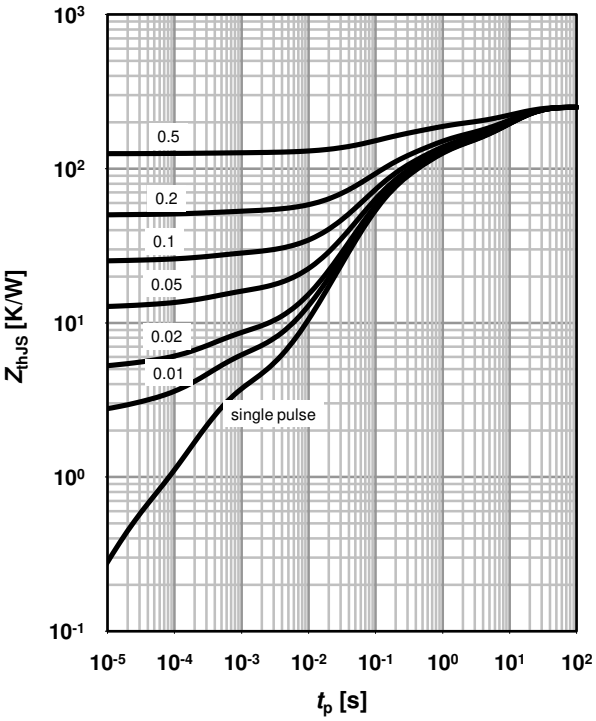
parameter: $t_p$




## 4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

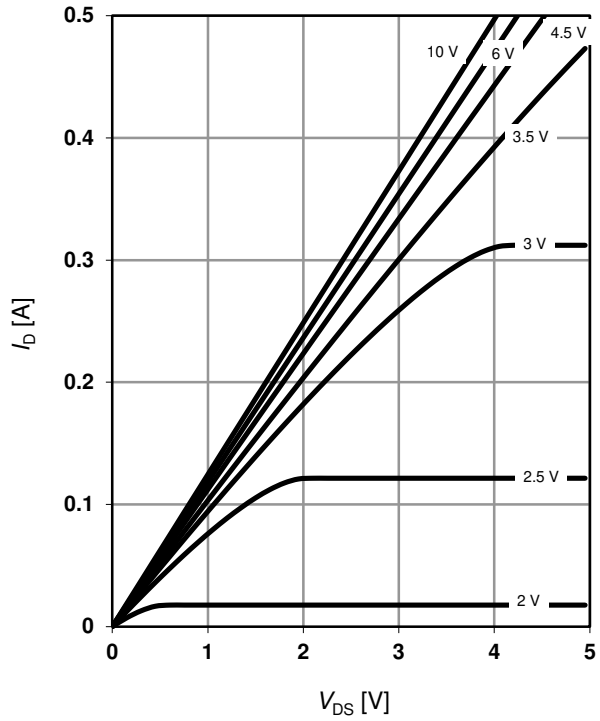
parameter: $D=t_p/T$



## 5 Typ. output characteristics

$I_D$=f($V_{DS}$); $T_j$=25 °C

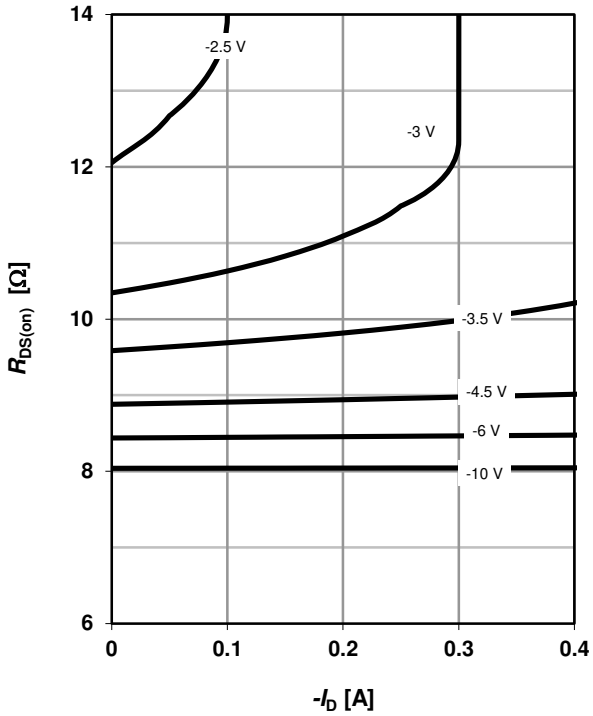
parameter: $V_{GS}$




## 6 Typ. drain-source on resistance

$R_{DS(on)}$=f($I_D$); $T_j$=25 °C

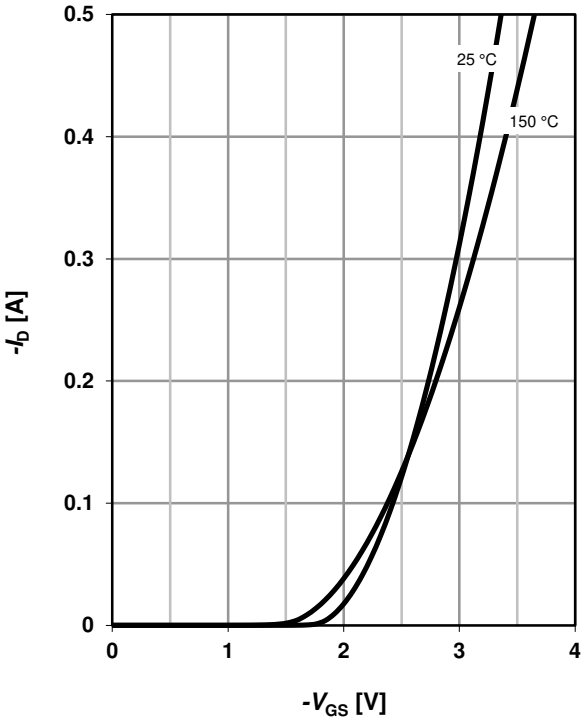
parameter: $V_{GS}$




## 7 Typ. transfer characteristics

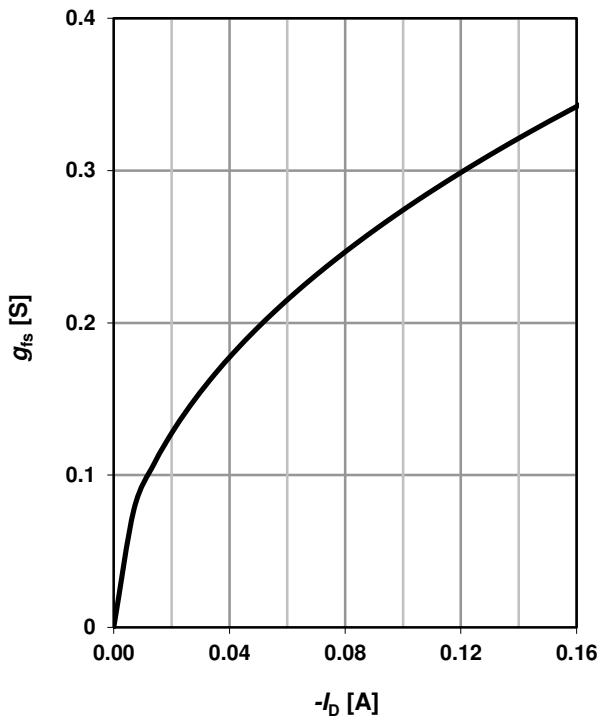
$I_D$=f($V_{GS}$); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: $T_j$



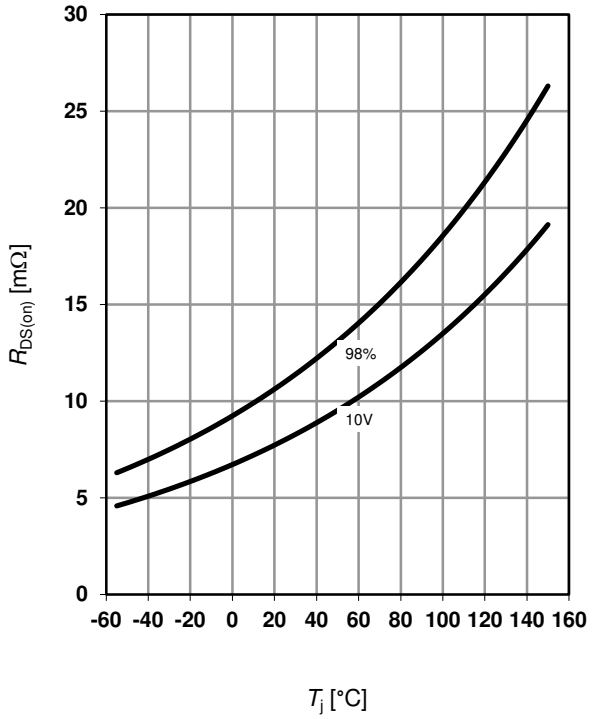

## 8 Typ. forward transconductance

$g_{fs}$=f($I_D$); $T_j$=25 °C



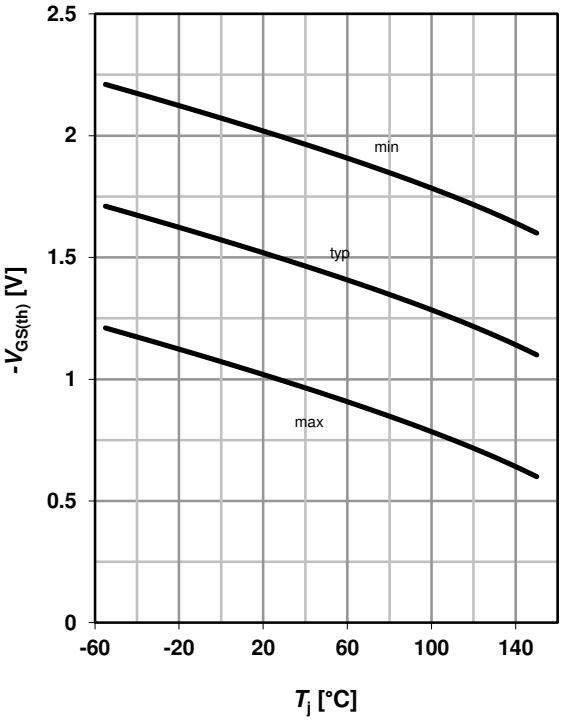
### 9 Drain-source on-state resistance

$R_{DS(on)}$=f($T_j$); $I_D$=-0.14 A; $V_{GS}$=-10 V



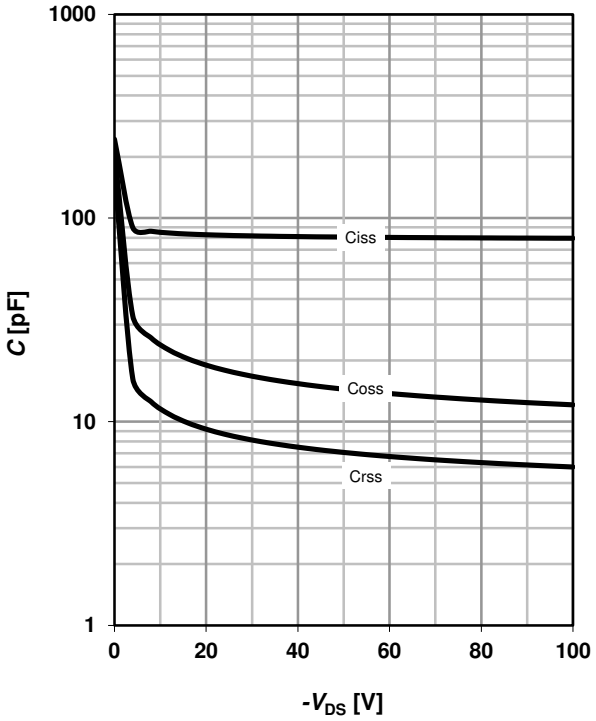

### 10 Typ. gate threshold voltage

$V_{GS(th)}$=f($T_j$); $V_{GS}$=$V_{DS}$; $I_D$=-130 µA




### 11 Typ. capacitances

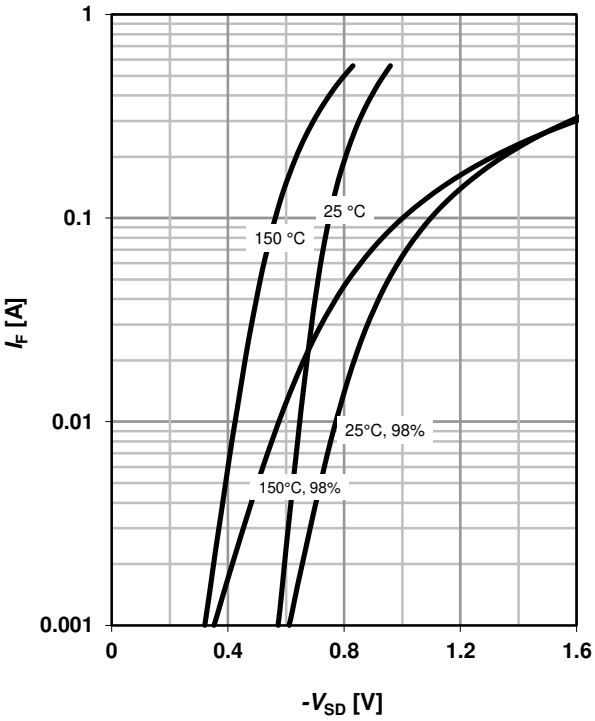
$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz




### 12 Forward characteristics of reverse diode

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

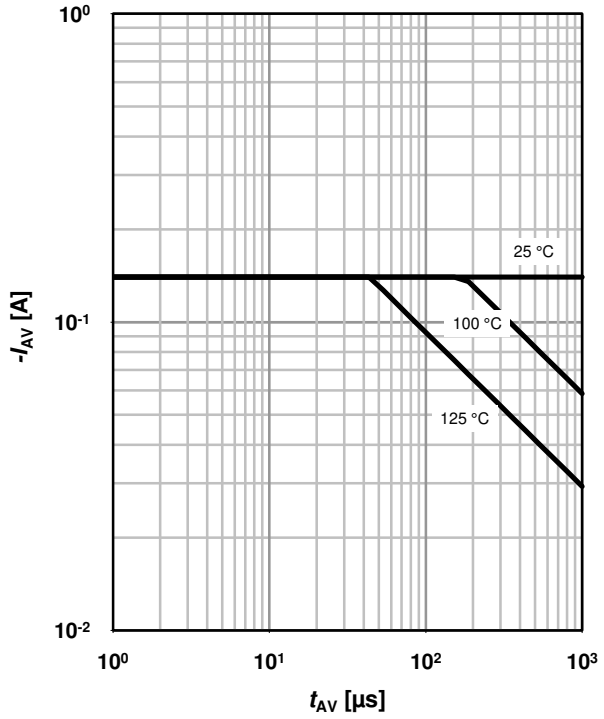
parameter: $T_j$



## 13 Avalanche characteristics

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω

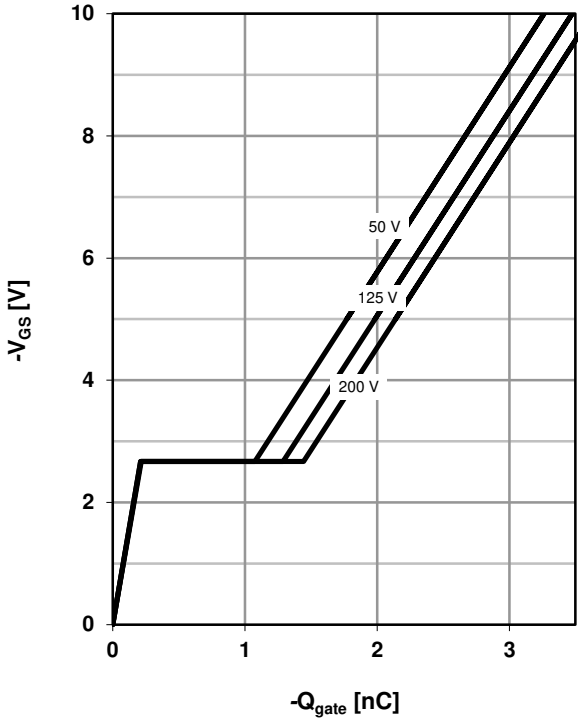
parameter: $T_{j(start)}$




## 14 Typ. gate charge

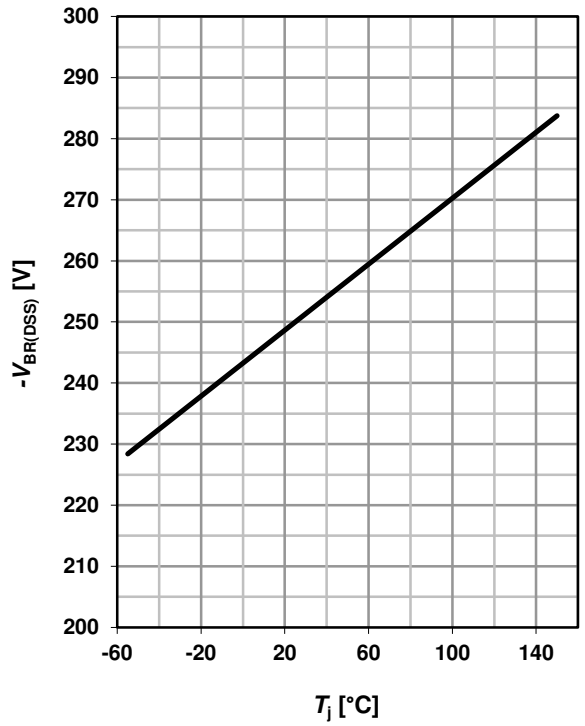
$V_{GS}$=f($Q_{gate}$); $I_D$=-0.14 A pulsed

parameter: $V_{DD}$

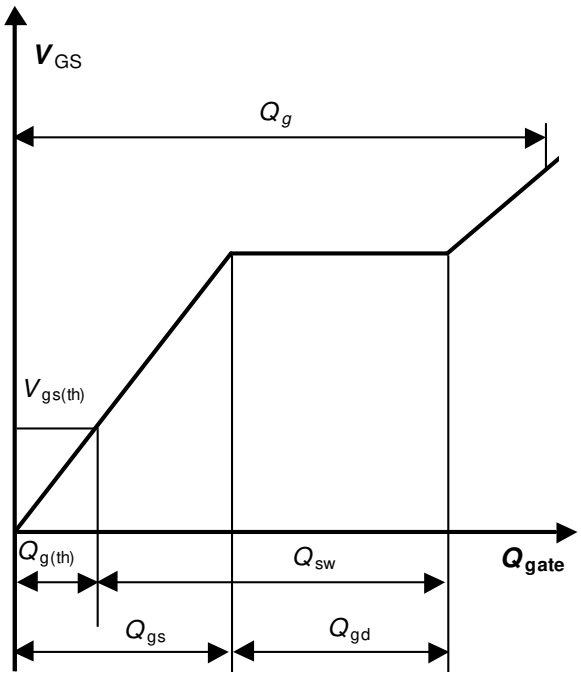



## 15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f($T_j$); $I_D$=-250 µA

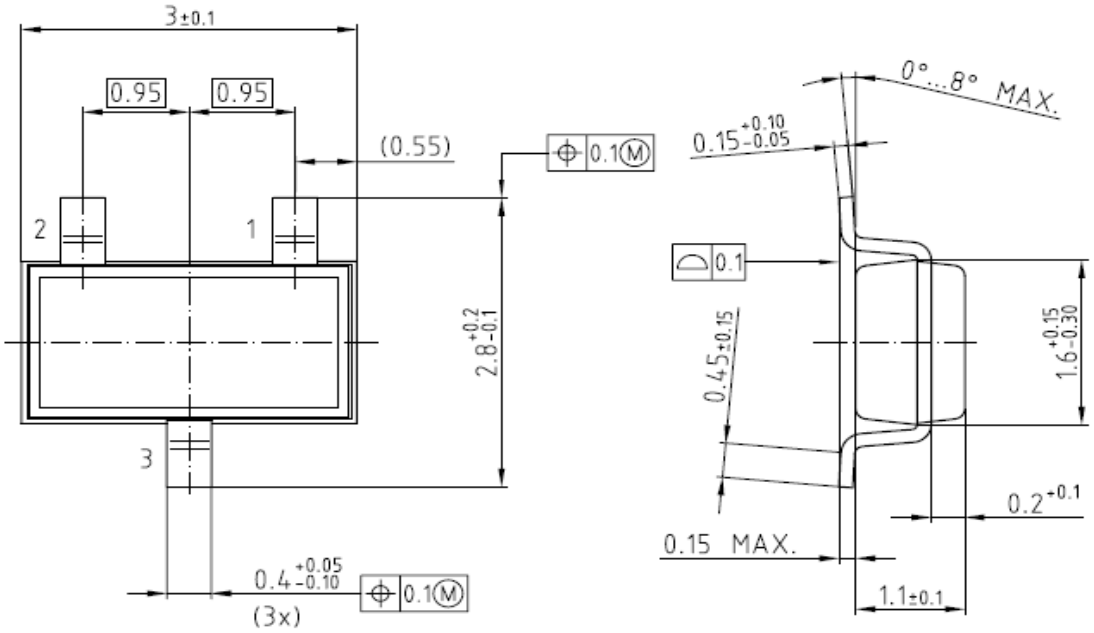



## 16 Gate charge waveforms

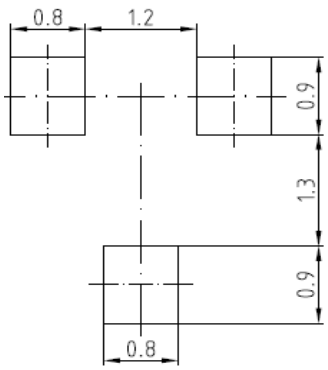


## Package Outline

### SC-59: Outline

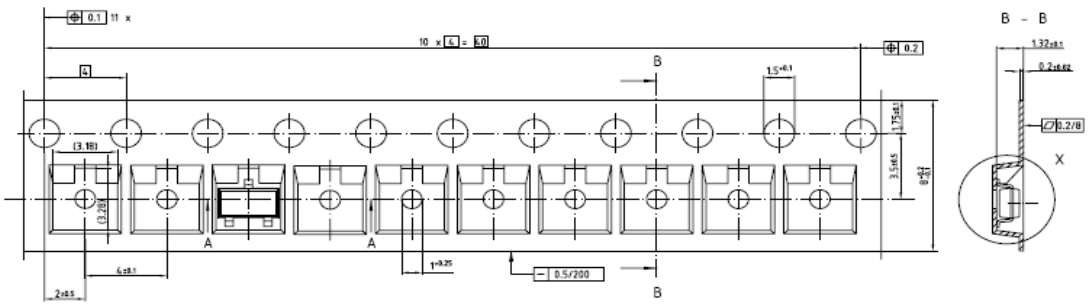



### Footprint




### Packaging

**Tape**




Dimensions in mm

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