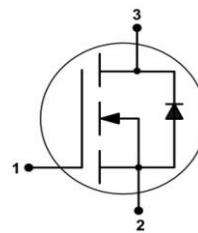
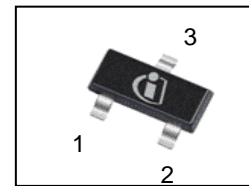


**OptiMOS™ Small-Signal-Transistor**
**Features**

- N-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant, Halogen free


**Product Summary**

|                  |                       |            |
|------------------|-----------------------|------------|
| $V_{DS}$         | 100                   | V          |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$  | 6 $\Omega$ |
|                  | $V_{GS}=4.5\text{ V}$ | 10         |
| $I_D$            | 0.19                  | A          |


**PG-SOT23**


| Type    | Package | Tape and Reel Information | Marking | Halogen Free | Packing |
|---------|---------|---------------------------|---------|--------------|---------|
| BSS123N | SOT23   | H6327: 3000 pcs/ reel     | SAs     | Yes          | Non dry |

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

| Parameter                           | Symbol            | Conditions  | Value       | Unit              |
|-------------------------------------|-------------------|---|-------------|-------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$  | 0.19        | A                 |
|                                     |                   | $T_A=70\text{ °C}$  | 0.15        |                   |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$  | 0.77        |                   |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=0.19\text{ A}$ , $R_{GS}=25\ \Omega$   | 2.0         | mJ                |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=0.19\text{ A}$ , $V_{DS}=80\text{ V}$ ,<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                 |
| Power dissipation <sup>1)</sup>     | $P_{tot}$         | $T_A=25\text{ °C}$  | 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 <sup>1)</sup> | - | - | 250 | K/W |
|--|------------|---------------------------------|---|---|-----|-----|

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

|                                  |               |  |     |      |      |               |
|----------------------------------|---------------|--|-----|------|------|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$                   | 100 | -    | -    | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}\text{ V}$ , $I_D=13\text{ }\mu\text{A}$               | 0.8 | 1.4  | 1.8  |               |
| Drain-source leakage current     | $I_{DSS}$     | $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ ,<br>$T_j=25\text{ °C}$  | -   | -    | 0.01 | $\mu\text{A}$ |
|                                  |               | $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ ,<br>$T_j=150\text{ °C}$ | -   | -    | 5    |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$                           | -   | -    | 10   | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=4.5\text{ V}$ , $I_D=0.15\text{ A}$                          | -   | 2.7  | 10   | $\Omega$      |
|                                  |               | $V_{GS}=10\text{ V}$ , $I_D=0.19\text{ A}$                           | -   | 2.4  | 6    |               |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}$ ,<br>$I_D=0.15\text{ A}$              |     | 0.41 | -    | S             |

<sup>1)</sup> Performed on 40mm<sup>2</sup> FR4 PCB. The traces are 1mm wide, 70 $\mu\text{m}$  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            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$<br>$f=1\text{ MHz}$                          | - | 15.7 | 20.9 | pF |
| Output capacitance           | $C_{oss}$    |   | - | 3.4  | 4.5  |    |
| Reverse transfer capacitance | $C_{rss}$    |   | - | 2.1  | 3.1  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=50\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=0.19\text{ A}, R_{G,ext}=6\ \Omega$ | - | 2.3  | 3.5  | ns |
| Rise time                    | $t_r$        |   | - | 3.2  | 4.6  |    |
| Turn-off delay time          | $t_{d(off)}$ |   | - | 7.4  | 11.1 |    |
| Fall time                    | $t_f$        |   | - | 22   | 33   |    |

**Gate Charge Characteristics**

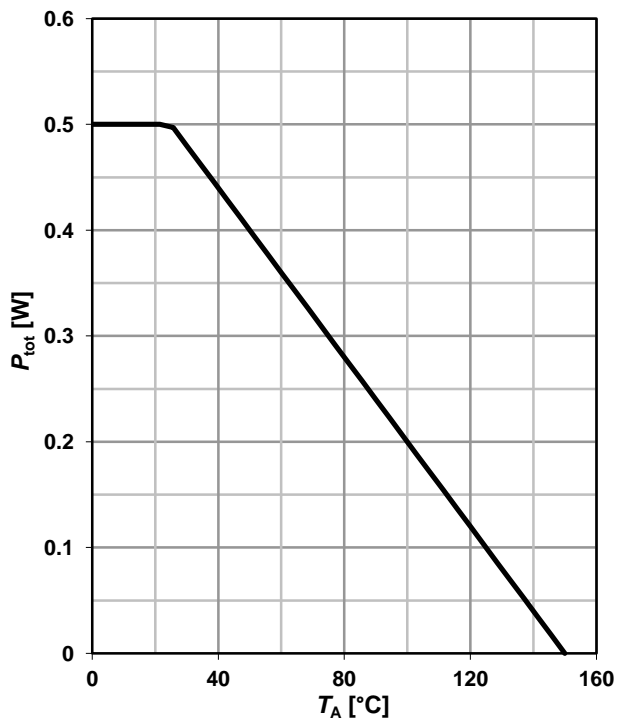
|                       |               |  |   |      |      |    |
|-----------------------|---------------|--|---|------|------|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=50\text{ V}, I_D=0.19\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$ | - | 0.04 | 0.06 | nC |
| Gate to drain charge  | $Q_{gd}$      |  | - | 0.23 | 0.35 |    |
| Gate charge total     | $Q_g$         |  | - | 0.6  | 0.9  |    |
| Gate plateau voltage  | $V_{plateau}$ |  | - | 2.5  | -    | V  |

**Reverse Diode**

|                                  |               |   |   |     |      |    |
|----------------------------------|---------------|---|---|-----|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$  | - | -   | 0.19 | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -   | 0.77 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=0.19\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$   | - | 0.8 | 1.1  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=50\text{ V}, I_F=0.19\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 12  | 18   | ns |
| Reverse recovery charge          | $Q_{rr}$      |   | - | 4.3 | 6.5  | nC |

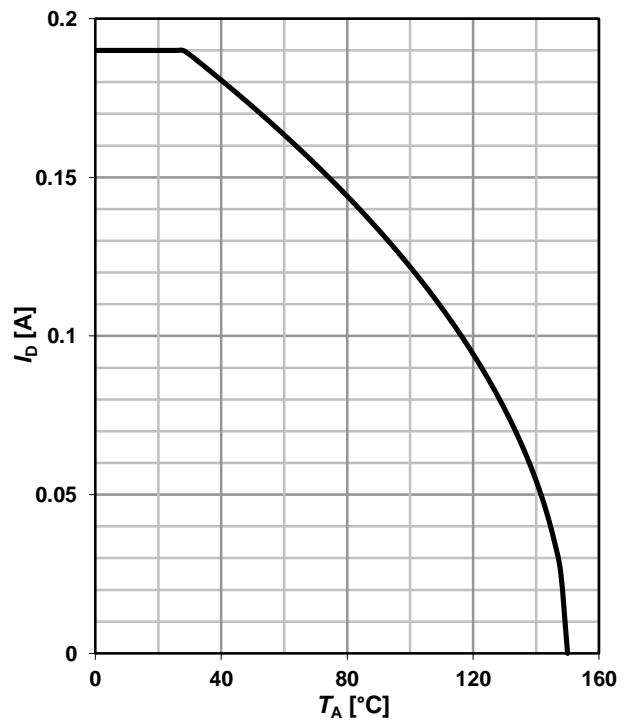
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

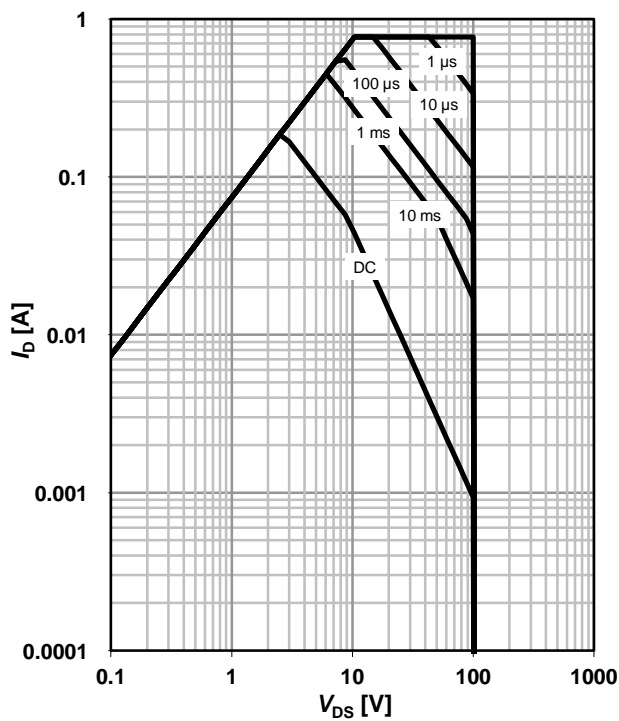
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

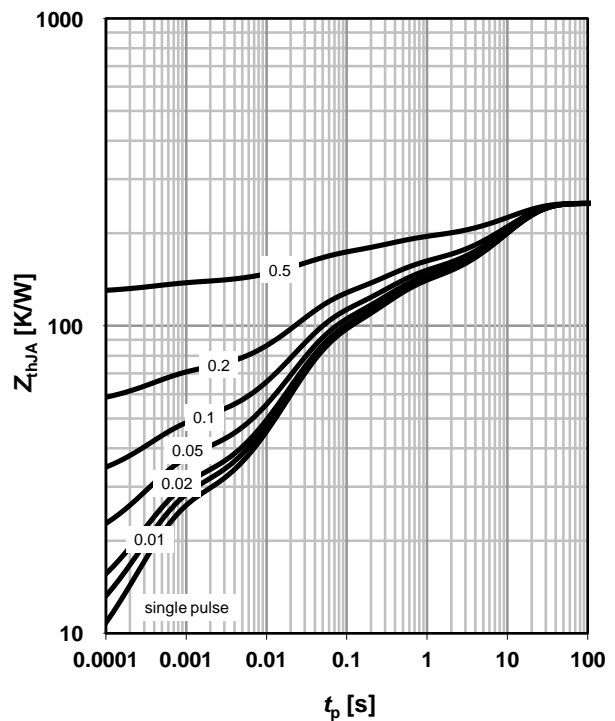
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

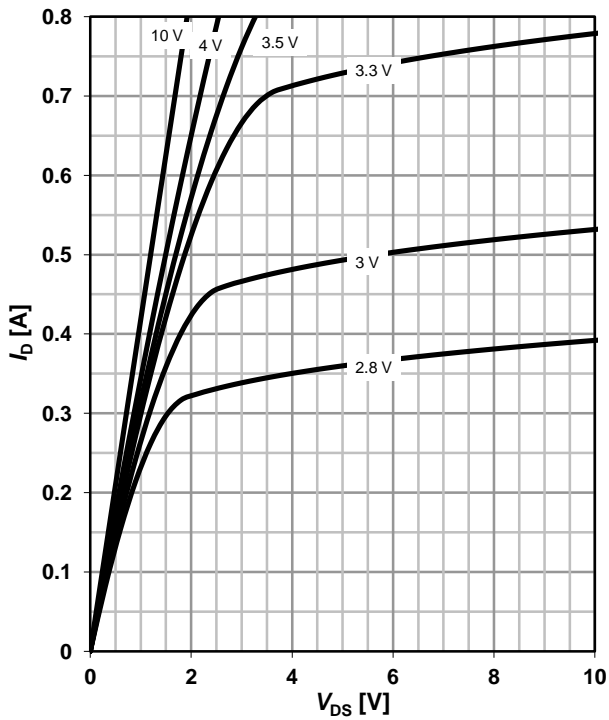
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

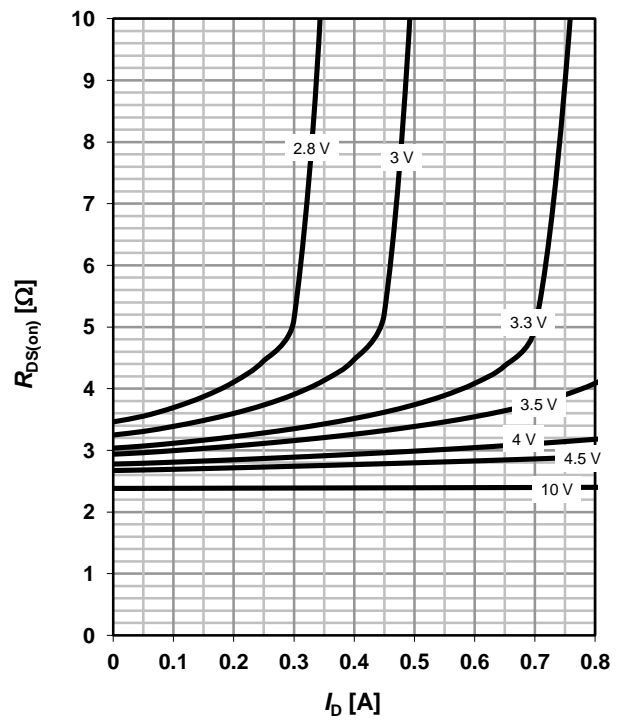
parameter:  $V_{GS}$



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

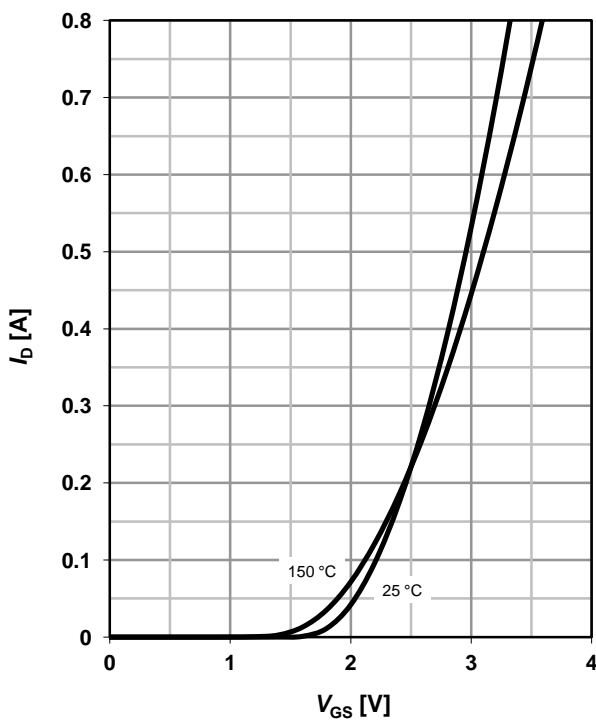
$R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$

parameter:  $V_{GS}$



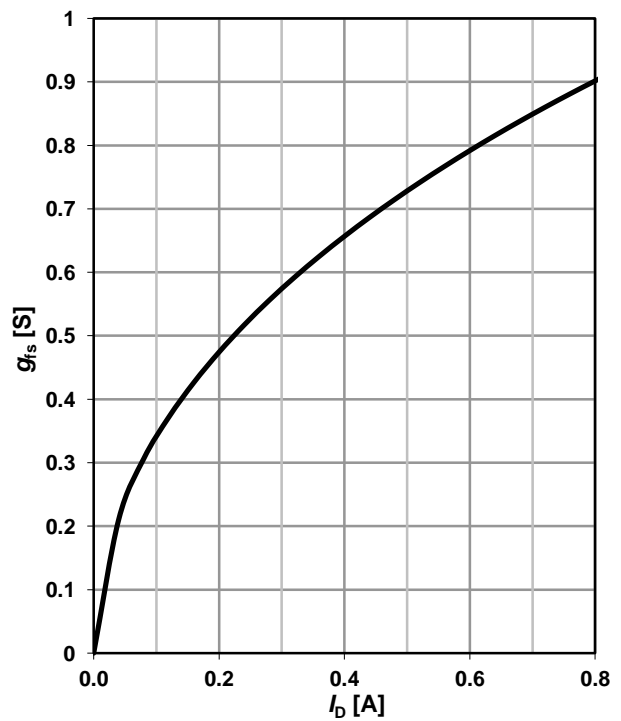
**7 Typ. transfer characteristics**

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



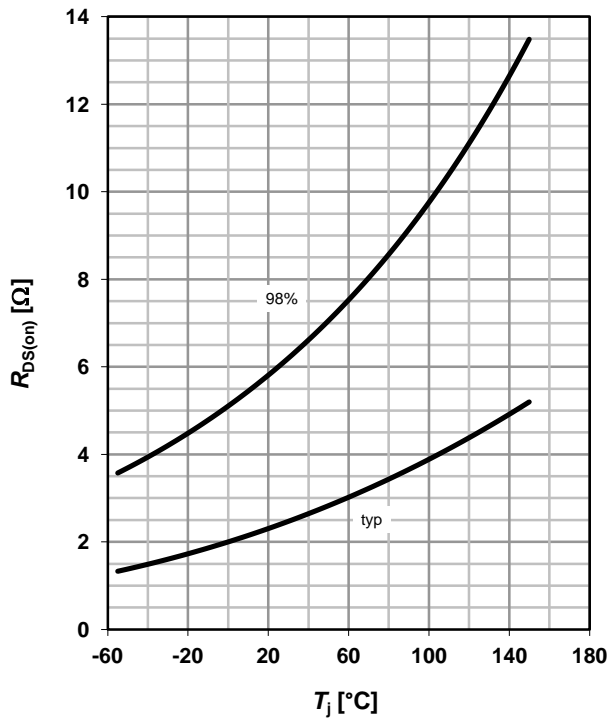
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



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

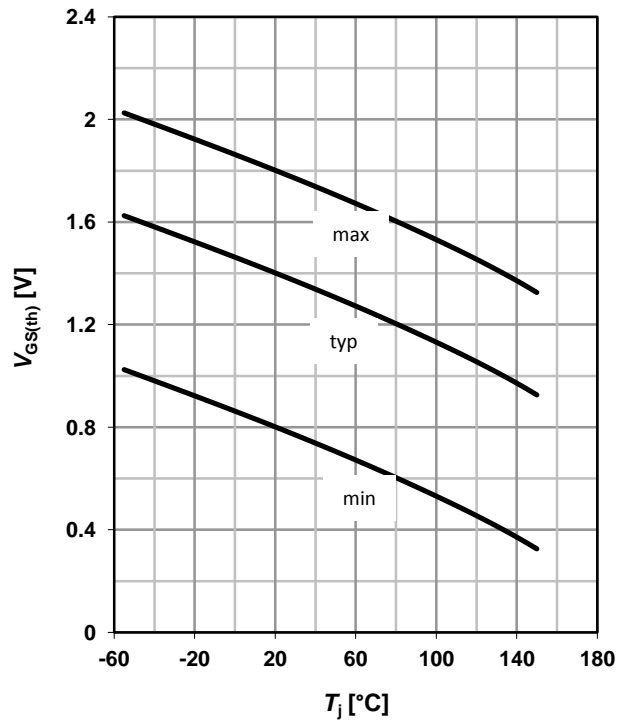
$R_{DS(on)}=f(T_j); I_D=0.19\text{ A}; V_{GS}=10\text{ V}$



**10 Typ. gate threshold voltage**

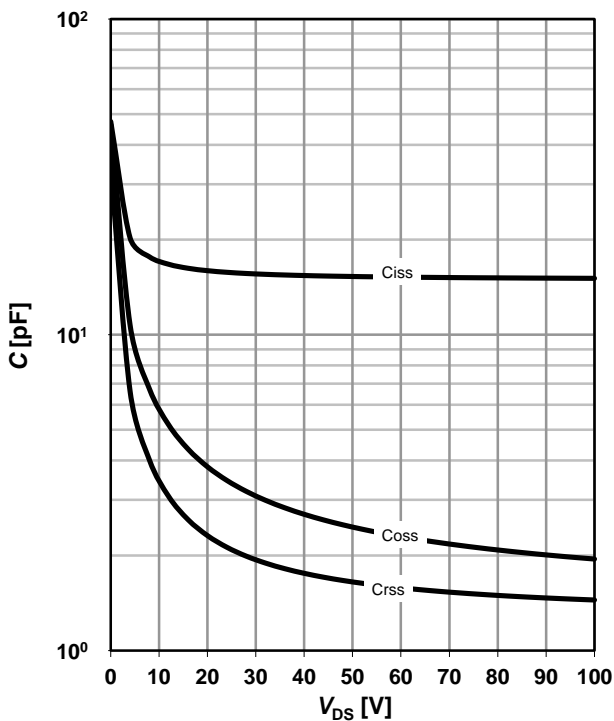
$V_{GS(th)}=f(T_j); V_{DS}=V_{GS}; I_D=13\ \mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

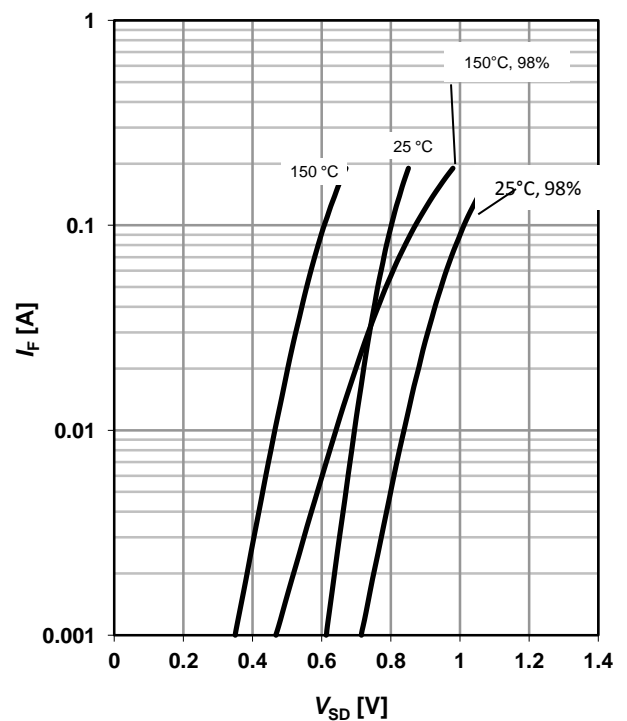
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}; T_j=25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

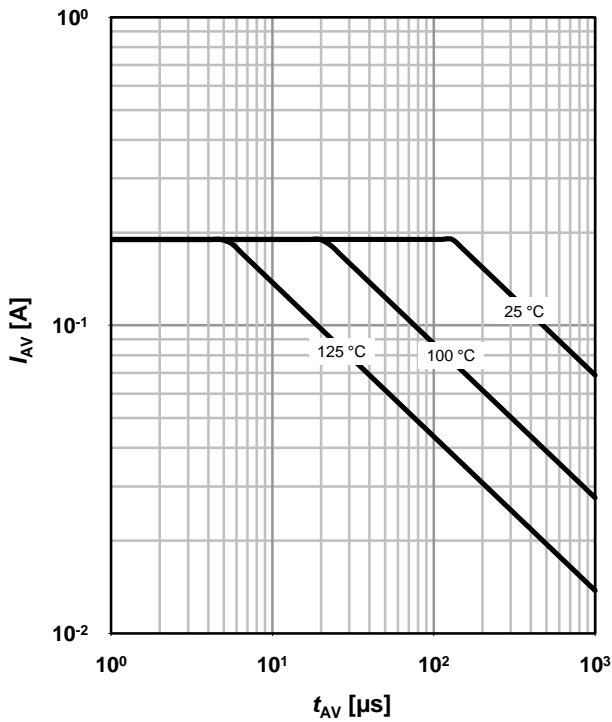
parameter:  $T_j$



**13 Avalanche characteristics**

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

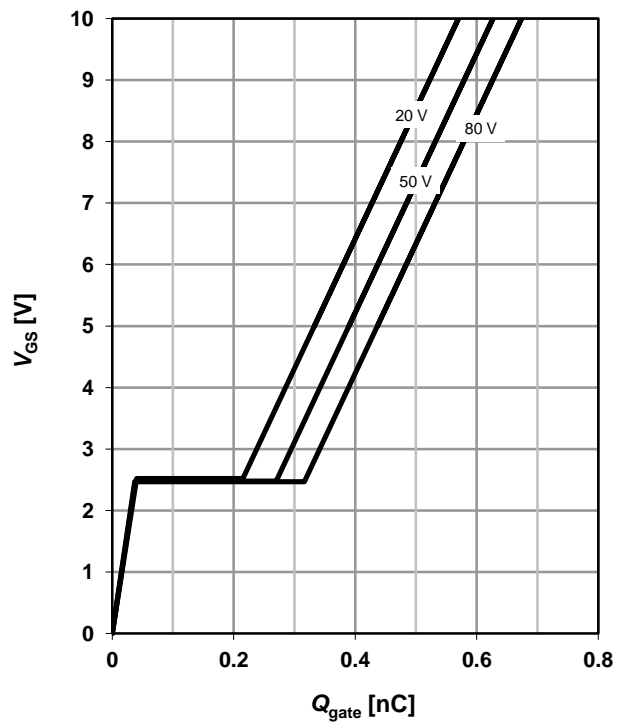
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

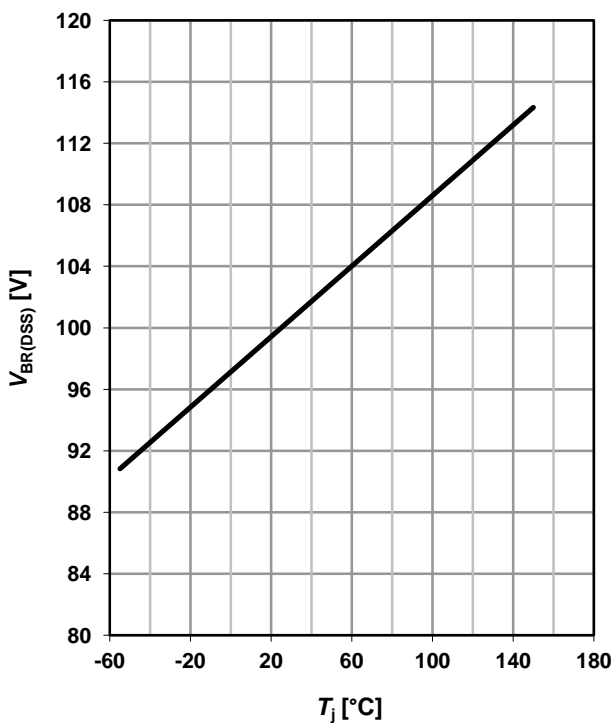
$V_{GS}=f(Q_{\text{gate}}); I_D=0.19 \text{ A pulsed}$

parameter:  $V_{DD}$

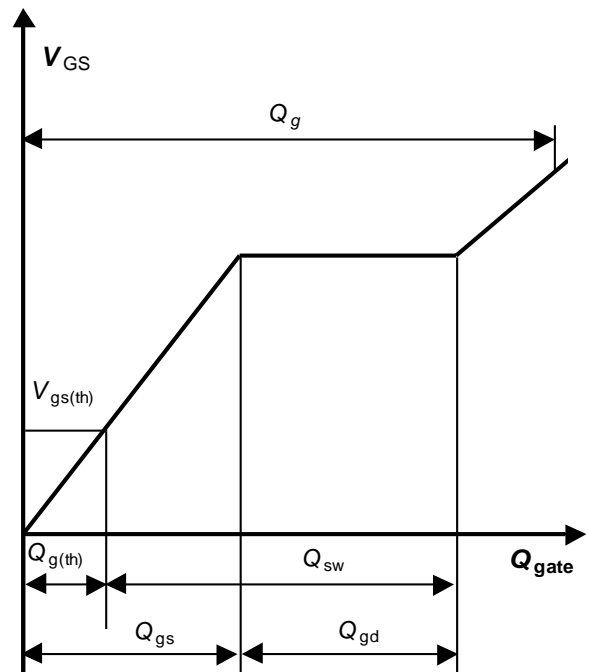


**15 Drain-source breakdown voltage**

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

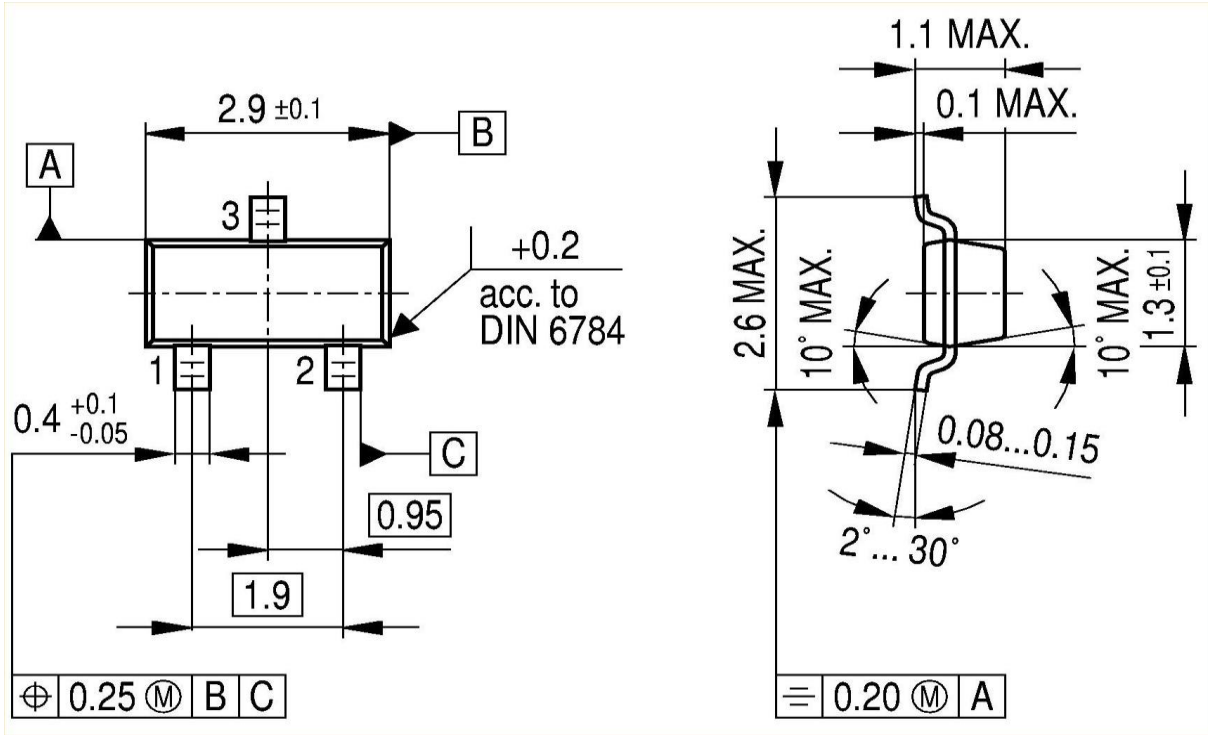


**16 Gate charge waveforms**

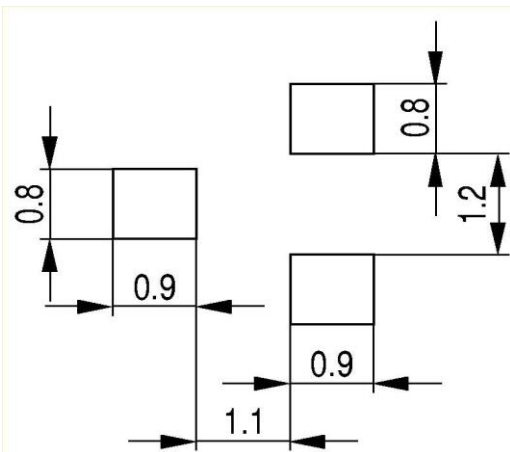


SOT23

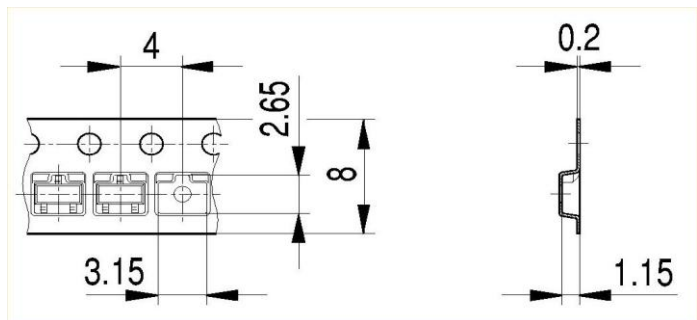
Package Outline:



Footprint:



Packaging:



Dimensions in mm



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