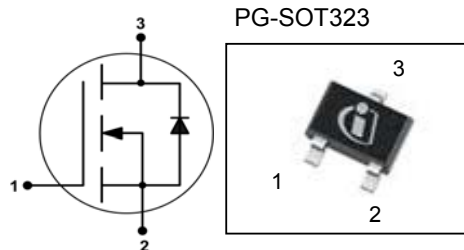


**OptiMOS™2 Small-Signal-Transistor**
**Features**

- N-channel
- Enhancement mode
- Ultra Logic level (1.8V 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         |
| $R_{DS(on),max}$ | $V_{GS}=2.5\text{ V}$ | 160 | $m\Omega$ |
|                  | $V_{GS}=1.8\text{ V}$ | 240 |           |
| $I_D$            |                       | 1.4 | A         |



| Type     | Package   | Tape and Reel Information | Marking | Lead Free | Packing |
|----------|-----------|---------------------------|---------|-----------|---------|
| BSS816NW | PG-SOT323 | H6327: 3000 pcs/ reel     | XCs     | Yes       | Non dry |

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

| Parameter                           | Symbol            | Conditions                                                                                                     | Value                  | Unit               |
|-------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$                                                                                             | 1.4                    | A                  |
|                                     |                   | $T_A=70\text{ °C}$                                                                                             | 1.1                    |                    |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$                                                                                             | 5.6                    |                    |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=1.4\text{ A}$ , $R_{GS}=25\text{ }\Omega$                                                                 | 3.7                    | mJ                 |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=1.4\text{ A}$ , $V_{DS}=16\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ °C}$ | 6                      | kV/ $\mu\text{s}$  |
| Gate source voltage                 | $V_{GS}$          |                                                                                                                | $\pm 8$                | 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            | $^{\circ}\text{C}$ |
| ESD Class                           |                   | JESD22-A114 -HBM                                                                                               | 0 (<250V)              |                    |
| Soldering Temperature               |                   |                                                                                                                | 260 $^{\circ}\text{C}$ |                    |
| IEC climatic category; DIN IEC 68-1 |                   |                                                                                                                | 55/150/56              |                    |

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

#### Thermal characteristics

|                                        |            |                                 |   |   |     |     |
|----------------------------------------|------------|---------------------------------|---|---|-----|-----|
| Thermal resistance, junction - 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   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$               | 20  | -    | -    | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=0\text{ V}$ , $I_D=3.7\text{ }\mu\text{A}$               | 0.3 | 0.55 | 0.75 |               |
| Drain-source leakage current     | $I_{DSS}$     | $V_{DS}=20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$  | -   | -    | 1    | $\mu\text{A}$ |
|                                  |               | $V_{DS}=20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=150\text{ °C}$ | -   | -    | 100  |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=8\text{ V}$ , $V_{DS}=0\text{ V}$                        | -   | -    | 100  | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=1.8\text{ V}$ , $I_D=0.44\text{ A}$                      | -   | 153  | 240  | m $\Omega$    |
|                                  |               | $V_{GS}=2.5\text{ V}$ , $I_D=1.4\text{ A}$                       | -   | 107  | 160  |               |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=1.1\text{ A}$              |     | 4.9  | -    | 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            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=10\text{ V},$<br>$f=1\text{ MHz}$                          | - | 126 | 180 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                       | - | 47  | 67  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                       | - | 7   | 10  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=10\text{ V}, V_{GS}=2.5\text{ V},$<br>$I_D=1.4\text{ A}, R_G=6\text{ }\Omega$ | - | 5.3 | -   | ns |
| Rise time                    | $t_r$        |                                                                                       | - | 9.0 | -   |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                       | - | 11  | -   |    |
| Fall time                    | $t_f$        |                                                                                       | - | 2.2 | -   |    |

#### Gate Charge Characteristics

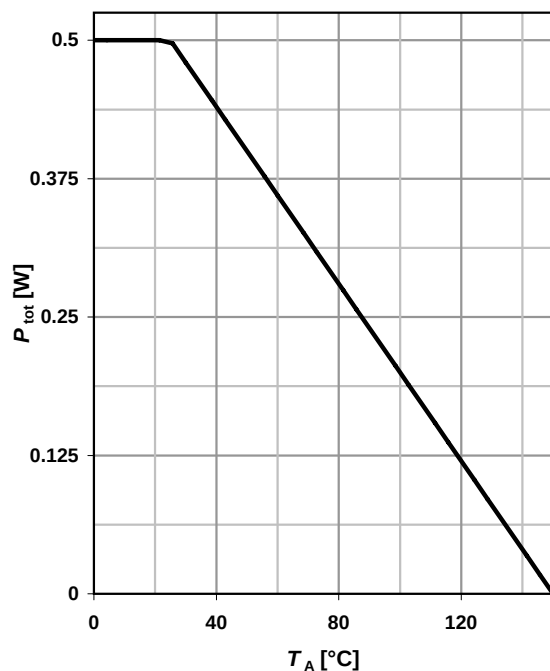
|                       |               |                                                                              |   |     |   |    |
|-----------------------|---------------|------------------------------------------------------------------------------|---|-----|---|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=10\text{ V}, I_D=1.4\text{ A},$<br>$V_{GS}=0\text{ to }2.5\text{ V}$ | - | 0.2 | - | nC |
| Gate to drain charge  | $Q_{gd}$      |                                                                              | - | 0.2 | - |    |
| Gate charge total     | $Q_g$         |                                                                              | - | 0.6 | - |    |
| Gate plateau voltage  | $V_{plateau}$ |                                                                              | - | 1.6 | - | V  |

#### Reverse Diode

|                                  |               |                                                                            |   |      |     |    |
|----------------------------------|---------------|----------------------------------------------------------------------------|---|------|-----|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$                                             | - | -    | 0.5 | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                            | - | -    | 6   |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=1.4\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$   | - | 0.87 | 1.1 | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=10\text{ V}, I_F=1.4\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 8.1  | -   | ns |
| Reverse recovery charge          | $Q_{rr}$      |                                                                            | - | 1.4  | -   | nC |

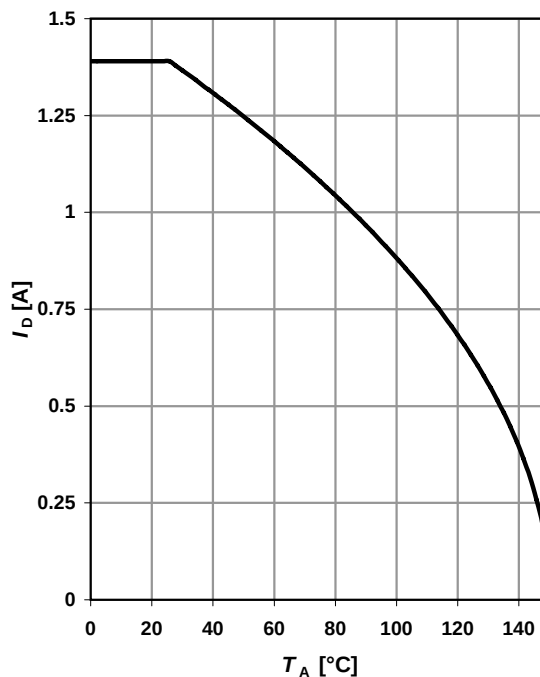
### 1 Power dissipation

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



### 2 Drain current

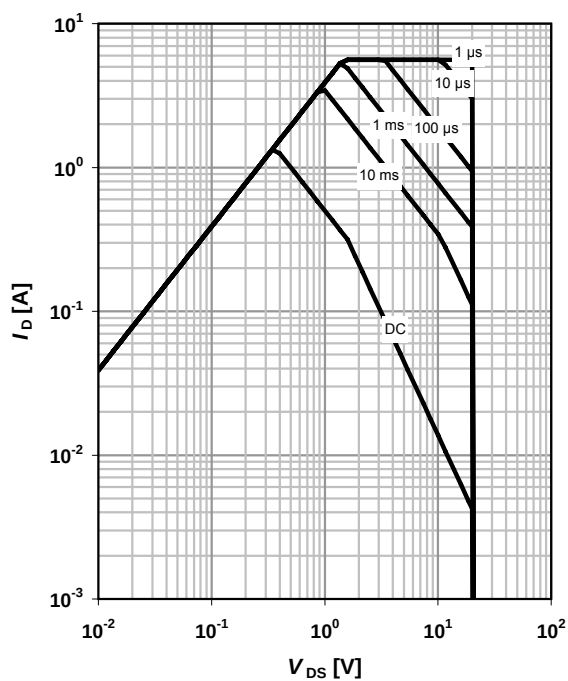
$$I_D = f(T_A); V_{GS} \geq 2.5 \text{ V}$$



### 3 Safe operating area

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

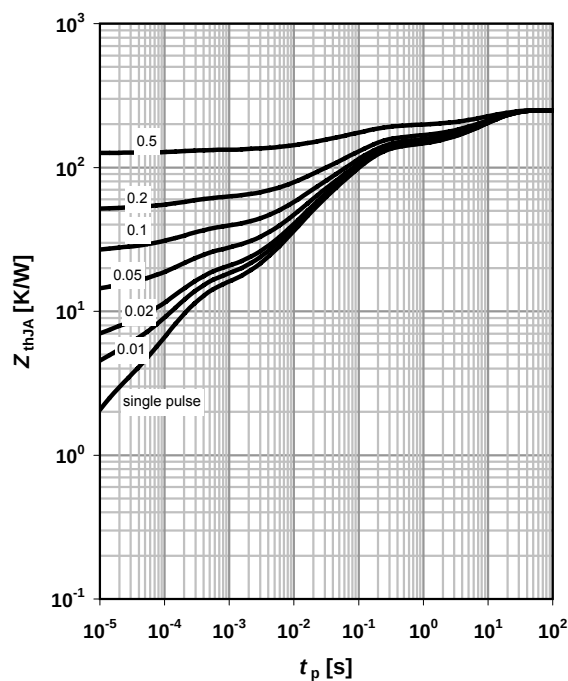
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

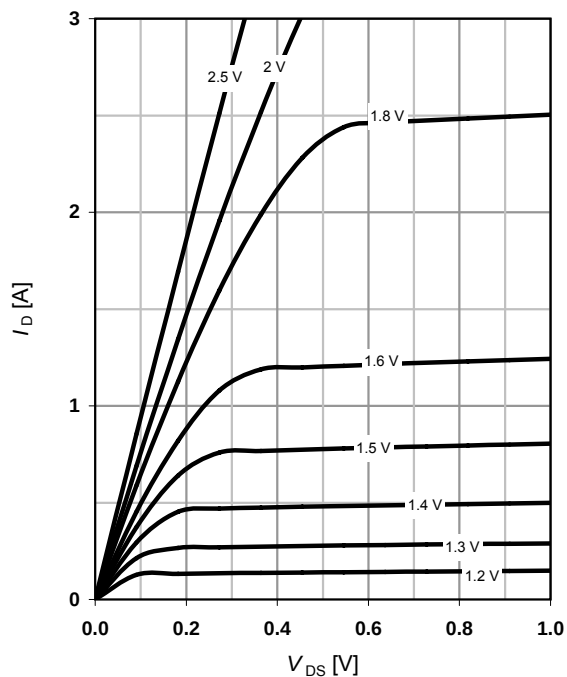
parameter:  $D = t_p/T$



### 5 Typ. output characteristics

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

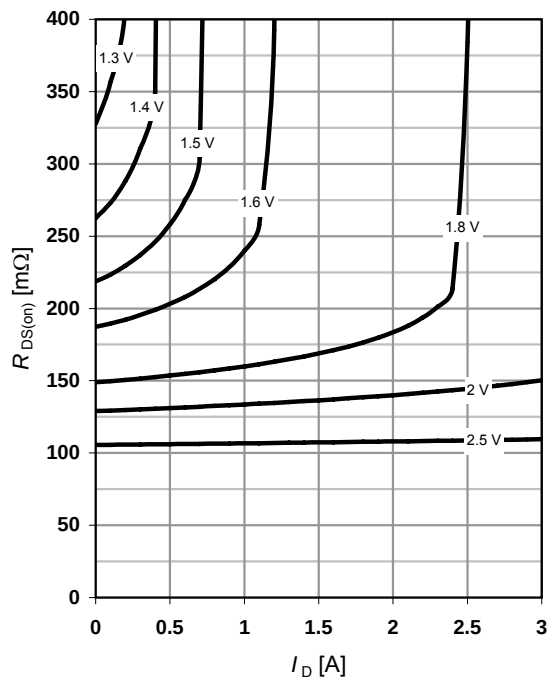
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

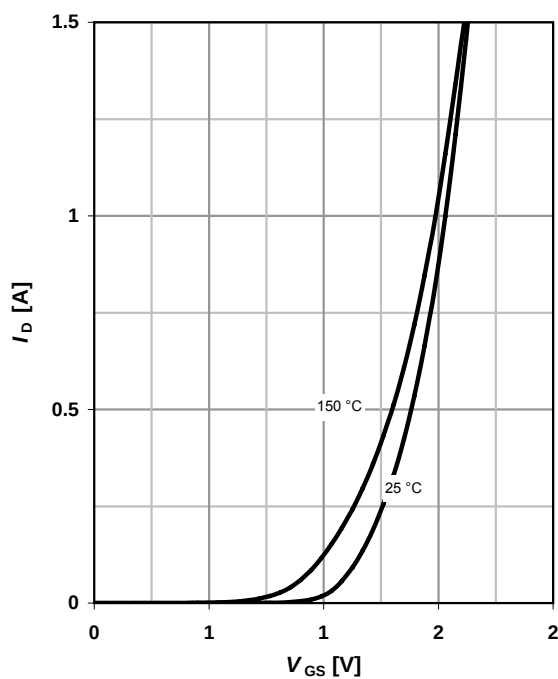
$$R_{DS(on)} = f(I_D); T_J = 25^\circ\text{C}$$

parameter:  $V_{GS}$



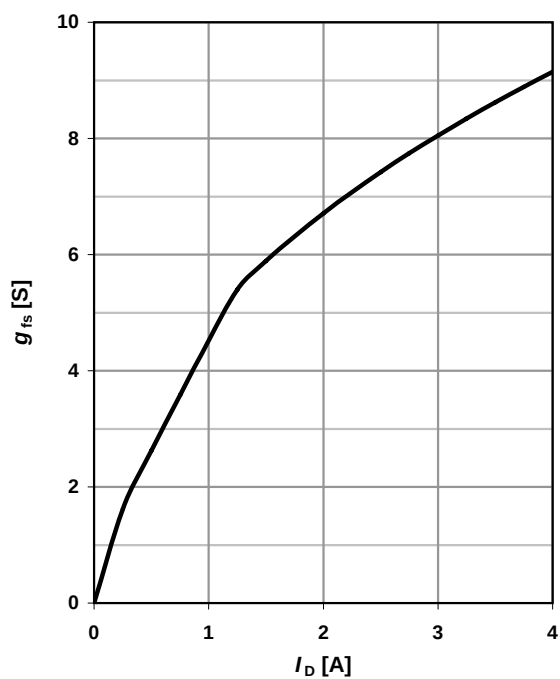
### 7 Typ. transfer characteristics

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



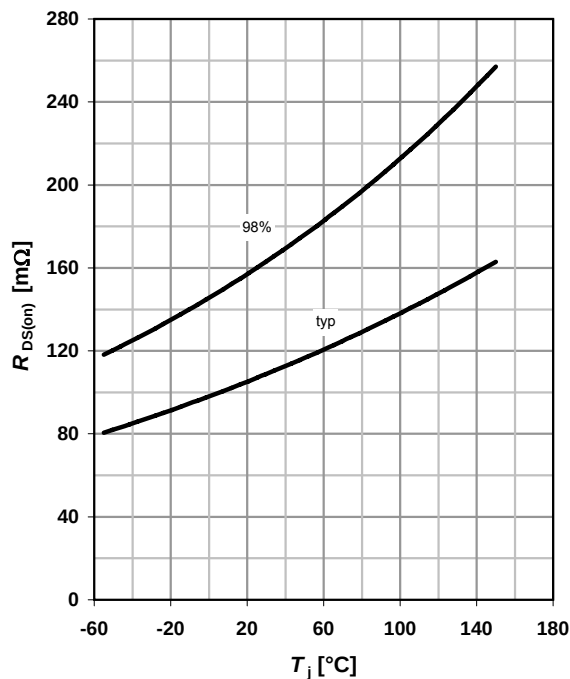
### 8 Typ. forward transconductance

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



### 9 Drain-source on-state resistance

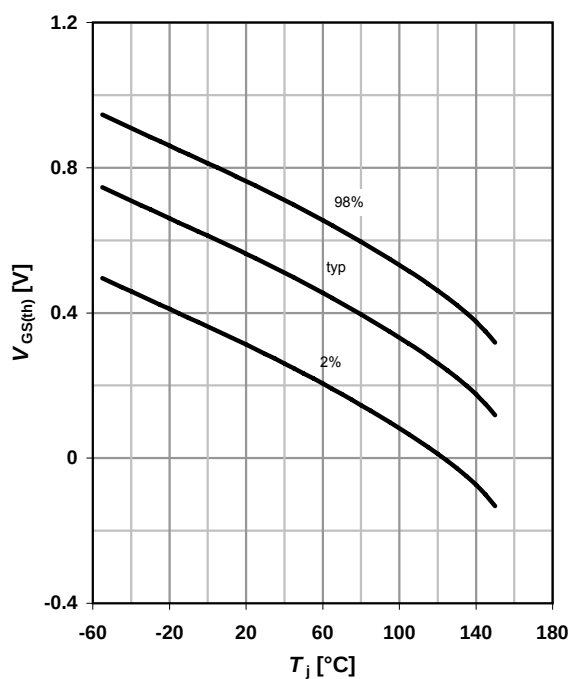
$$R_{DS(on)} = f(T_j); I_D = 1.4 \text{ A}; V_{GS} = 2.5 \text{ V}$$



### 10 Typ. gate threshold voltage

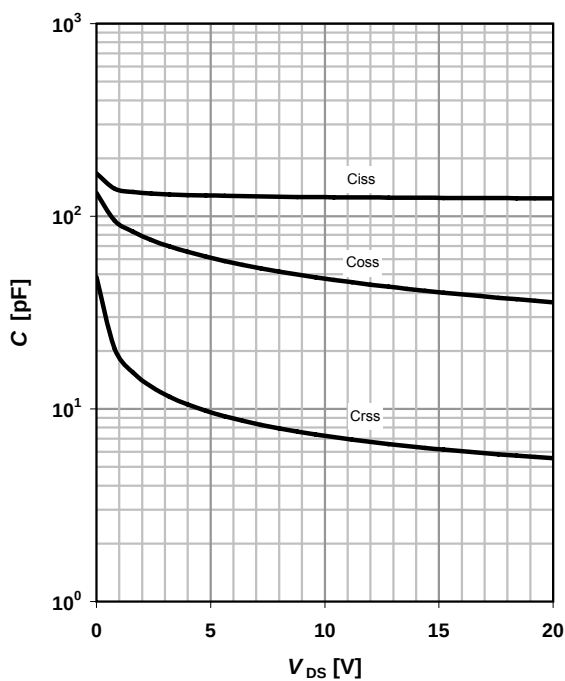
$$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 3.7 \text{ μA}$$

parameter:  $I_D$



### 11 Typ. capacitances

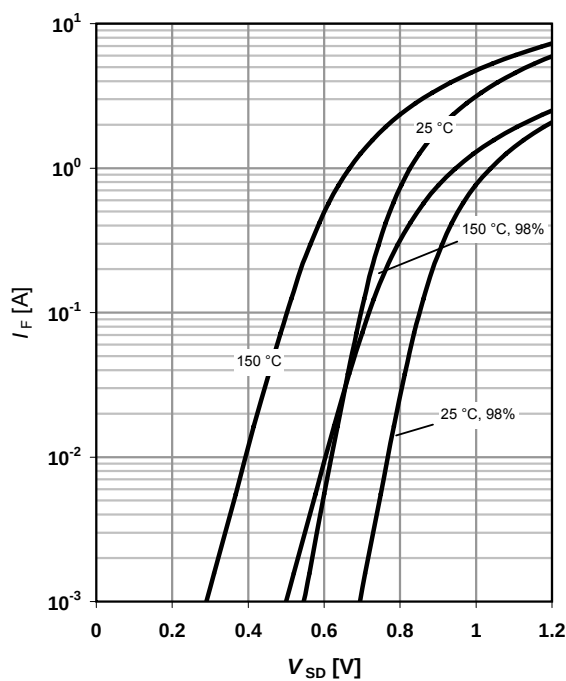
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$$



### 12 Forward characteristics of reverse diode

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

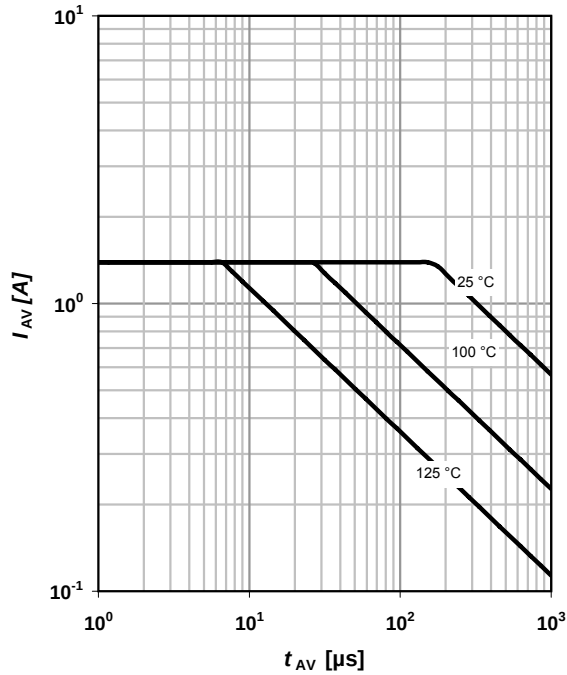
parameter:  $T_j$



### 13 Avalanche characteristics

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

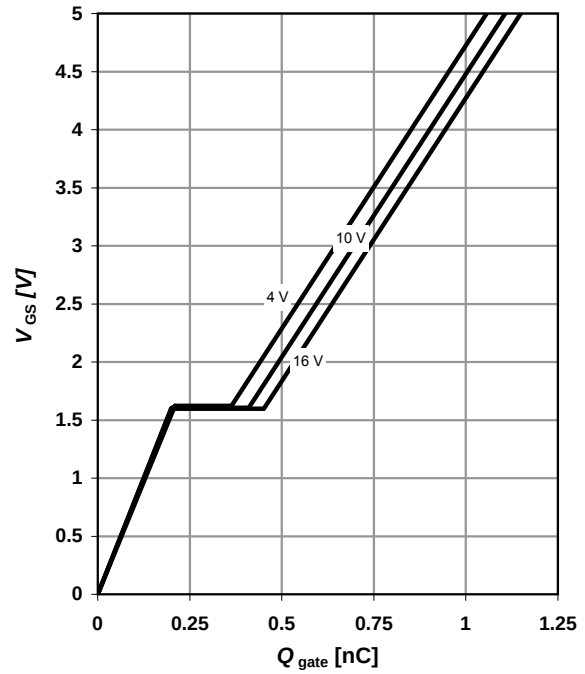
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

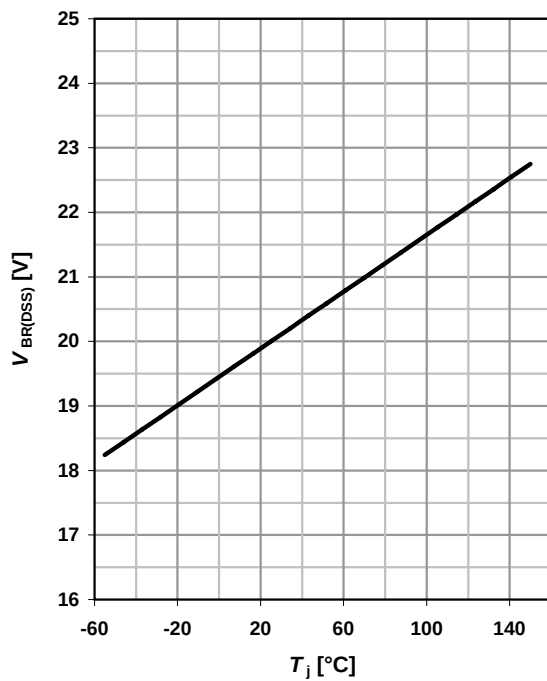
$$V_{GS}=f(Q_{\text{gate}}); I_D=1.4\ \text{A pulsed}$$

parameter:  $V_{DD}$

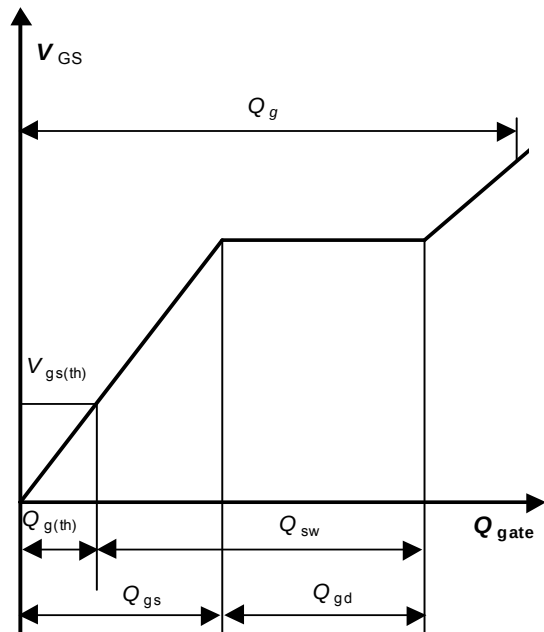


### 15 Drain-source breakdown voltage

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

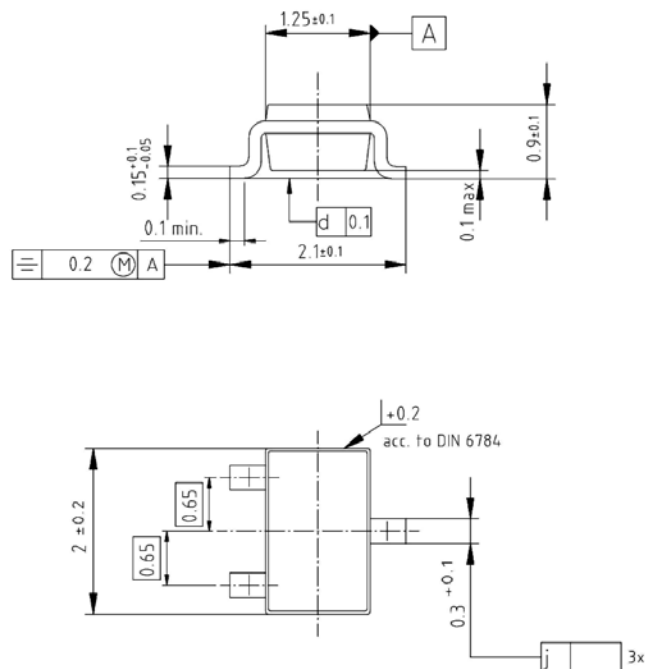


### 16 Gate charge waveforms



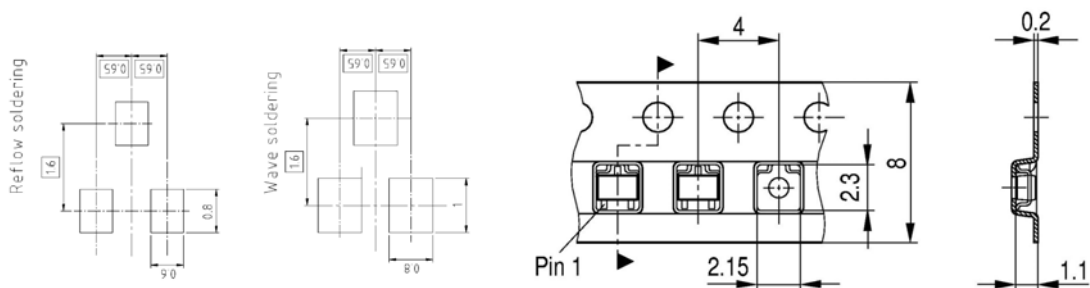
# SOT323

## Package Outline:



## Footprint:

## Packaging:



Dimensions in mm



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