

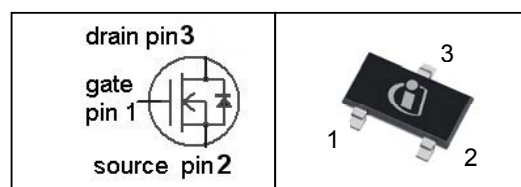
**OptiMOS® 2 Small-Signal-Transistor**
**Features**

- N-channel
- Enhancement mode
- Logic level (4.5V)
- Avalanche rated
- Footprint compatible to SOT23
- $dv/dt$  rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101


**Product Summary**

|                  |                       |     |           |
|------------------|-----------------------|-----|-----------|
| $V_{DS}$         |                       | 30  | V         |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$  | 23  | $m\Omega$ |
|                  | $V_{GS}=4.5\text{ V}$ | 36  |           |
| $I_D$            |                       | 3.7 | A         |

PG-SC-59



| Type    | Package  | Tape and Reel Information | Marking | Lead Free | Packing |
|---------|----------|---------------------------|---------|-----------|---------|
| BSR302N | PG-SC-59 | L6327 = 3000 pcs. / reel  | LEs     | Yes       | Non dry |

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

| Parameter                           | Symbol            | Conditions                                                                                                     | Value                  | Unit               |
|-------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$                                                                                             | 3.7                    | A                  |
|                                     |                   | $T_A=70\text{ °C}$                                                                                             | 2.9                    |                    |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$                                                                                             | 14.7                   |                    |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=3.7\text{ A}$ , $R_{GS}=25\text{ }\Omega$                                                                 | 30                     | mJ                 |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=3.7\text{ A}$ , $V_{DS}=16\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ °C}$ | 6                      | kV/ $\mu\text{s}$  |
| Gate source voltage                 | $V_{GS}$          |                                                                                                                | $\pm 20$               | V                  |
| Power dissipation                   | $P_{tot}$         | $T_A=25\text{ °C}$                                                                                             | 0.5                    | W                  |
| Operating and storage temperature   | $T_j$ , $T_{stg}$ |                                                                                                                | -55 ... 150            | $^{\circ}\text{C}$ |
| ESD Class                           |                   | JESD22-A114-HMB                                                                                                | 0 (0V to 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,<br>junction - minimal footprint | $R_{thJA}$ |  | - | - | 250 | K/W |
|-----------------------------------------------------|------------|--|---|---|-----|-----|

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

|                                  |               |                                                            |     |     |     |                  |
|----------------------------------|---------------|------------------------------------------------------------|-----|-----|-----|------------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$            | 30  | -   | -   | V                |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=30\text{ }\mu\text{A}$                 | 1.2 | 1.7 | 2   |                  |
| Drain-source leakage current     | $I_{DSS}$     | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$  | -   | -   | 1   | $\mu\text{A}$    |
|                                  |               | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$ | -   | -   | 100 |                  |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                    | -   | -   | 100 | nA               |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=4.5\text{ V}, I_D=2.9\text{ A}$                    | -   | 26  | 36  | $\text{m}\Omega$ |
|                                  |               | $V_{GS}=10\text{ V}, I_D=3.7\text{ A}$                     | -   | 18  | 23  |                  |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=3.7\text{ A}$           |     | 12  | -   | S                |

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

**Dynamic characteristics**

|                              |              |                                                                                  |   |      |     |    |
|------------------------------|--------------|----------------------------------------------------------------------------------|---|------|-----|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$<br>$f=1\text{ MHz}$                     | - | 564  | 750 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                  | - | 202  | 269 |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                  | - | 28   | 43  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=3.7\text{ A}, R_G=2.7\ \Omega$ | - | 6.8  | -   | ns |
| Rise time                    | $t_r$        |                                                                                  | - | 3.2  | -   |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                  | - | 16.2 | -   |    |
| Fall time                    | $t_f$        |                                                                                  | - | 2.2  | -   |    |

**Gate Charge Characteristics**

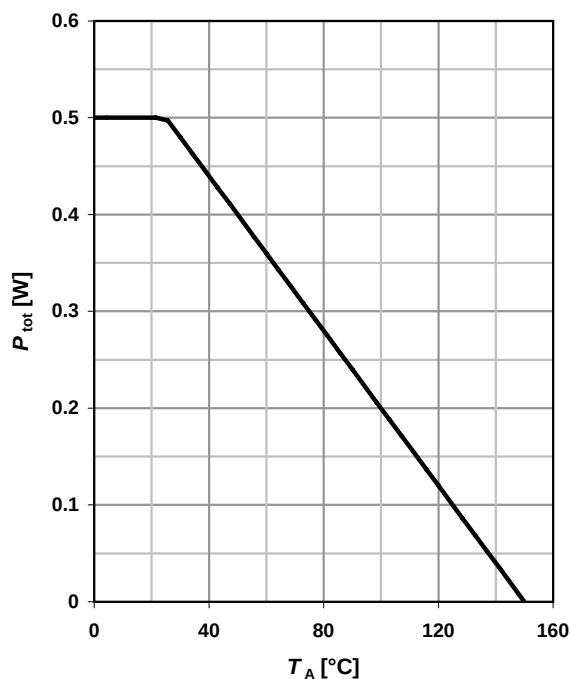
|                       |               |                                                                            |   |     |     |    |
|-----------------------|---------------|----------------------------------------------------------------------------|---|-----|-----|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=15\text{ V}, I_D=3.7\text{ A},$<br>$V_{GS}=0\text{ to }5\text{ V}$ | - | 1.6 | 2.2 | nC |
| Gate to drain charge  | $Q_{gd}$      |                                                                            | - | 1.1 | 1.7 |    |
| Gate charge total     | $Q_g$         |                                                                            | - | 4.4 | 6.6 |    |
| Gate plateau voltage  | $V_{plateau}$ |                                                                            | - | 2.9 | -   | V  |

**Reverse Diode**

|                                  |               |                                                                            |   |      |      |    |
|----------------------------------|---------------|----------------------------------------------------------------------------|---|------|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ °C}$                                                         | - | -    | 0.8  | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                            | - | -    | 14.7 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=3.7\text{ A},$<br>$T_j=25\text{ °C}$               | - | 0.8  | 1.2  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=15\text{ V}, I_F=3.7\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 13.5 | -    | ns |
| Reverse recovery charge          | $Q_{rr}$      |                                                                            | - | 5.0  | -    | nC |

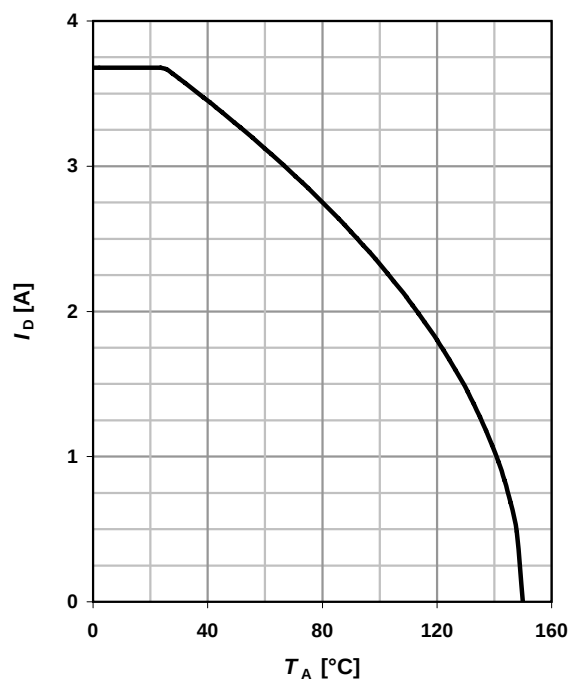
### 1 Power dissipation

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



### 2 Drain current

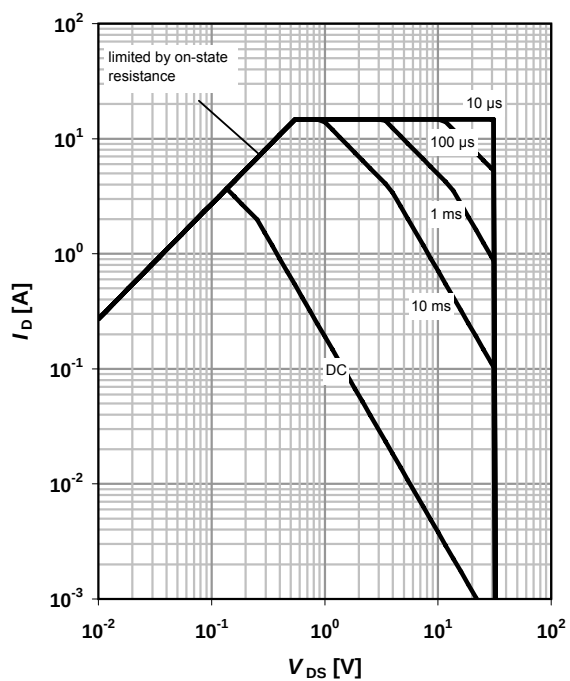
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



### 3 Safe operating area

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

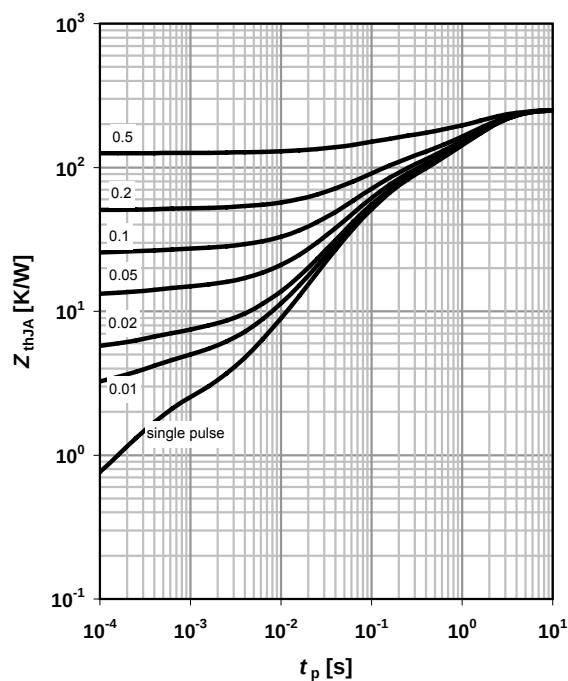
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

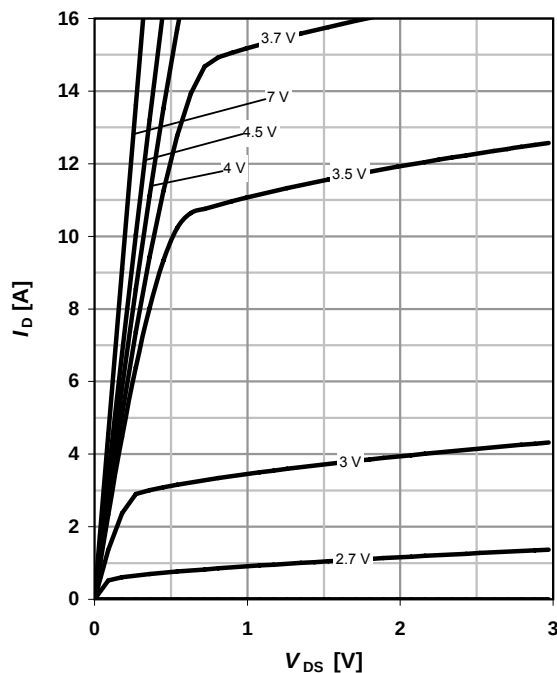
parameter:  $D = t_p/T$



### 5 Typ. output characteristics

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

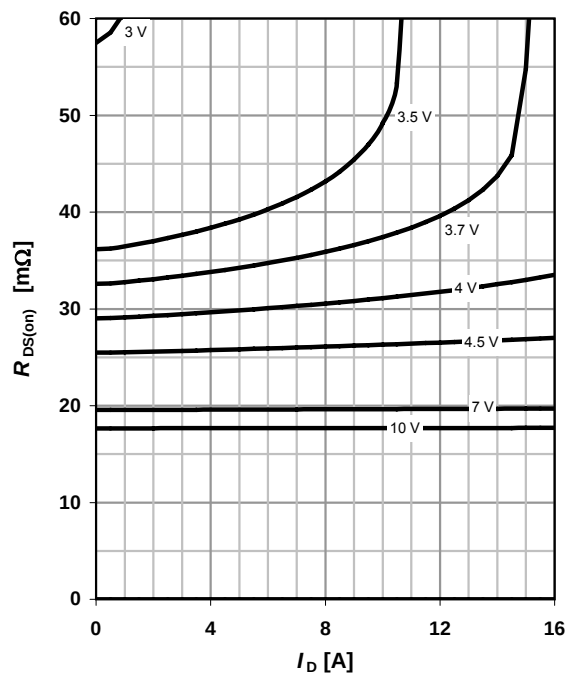
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

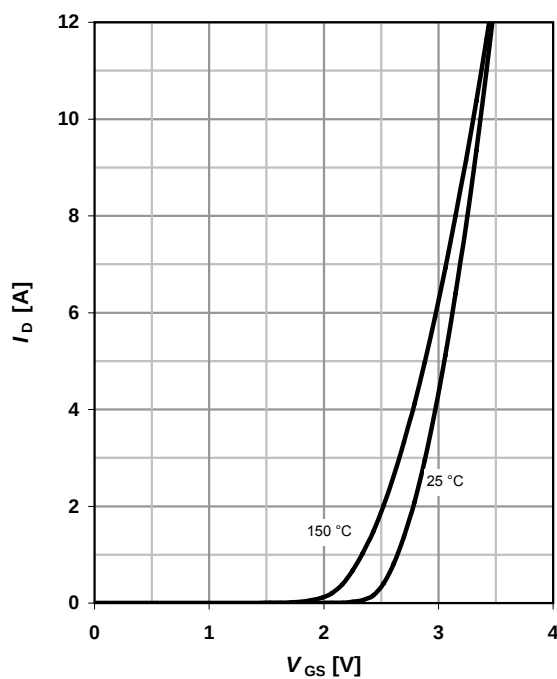
$$R_{DS(on)} = f(I_D); T_J = 25^\circ\text{C}$$

parameter:  $V_{GS}$



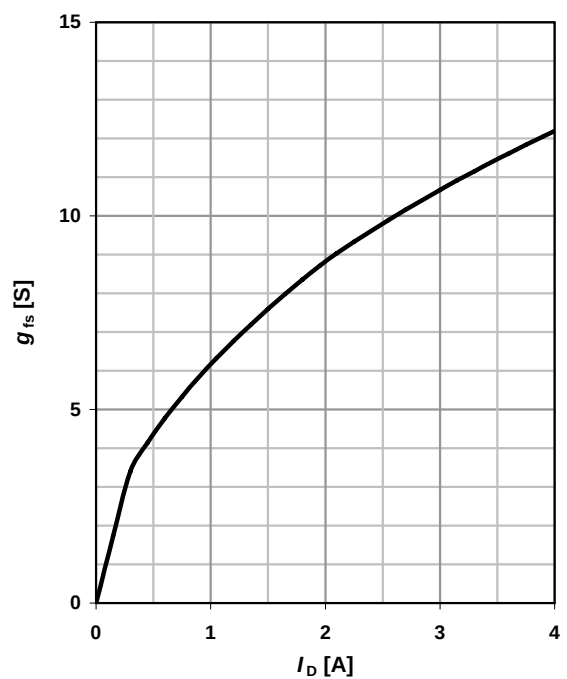
### 7 Typ. transfer characteristics

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



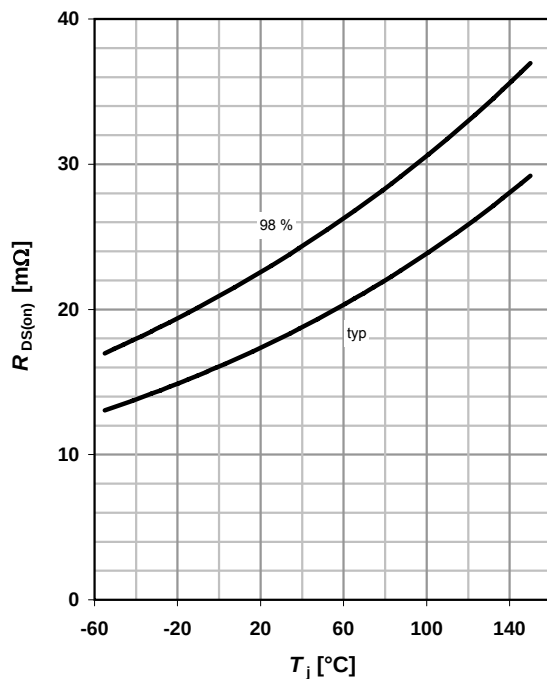
### 8 Typ. forward transconductance

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



### 9 Drain-source on-state resistance

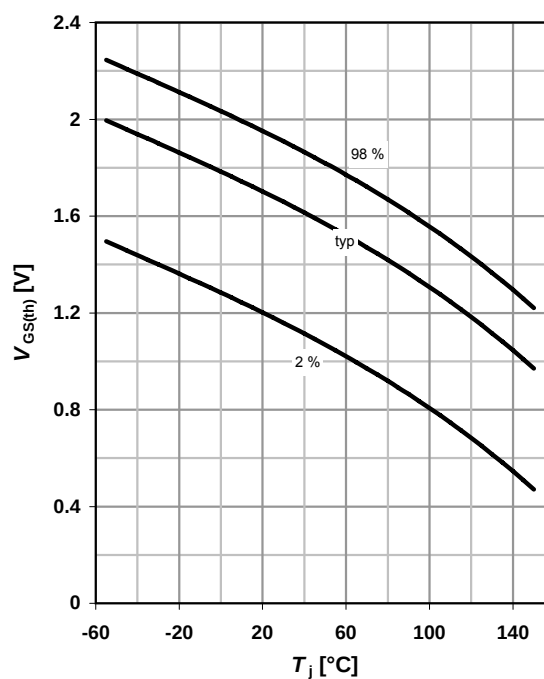
$$R_{DS(on)} = f(T_j); I_D = 3.7 \text{ A}; V_{GS} = 10 \text{ V}$$



### 10 Typ. gate threshold voltage

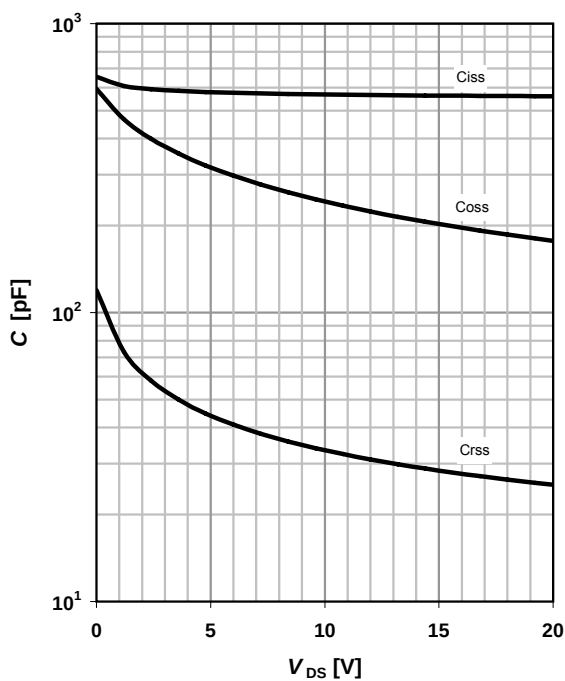
$$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 30 \mu\text{A}$$

parameter:  $I_D$



### 11 Typ. capacitances

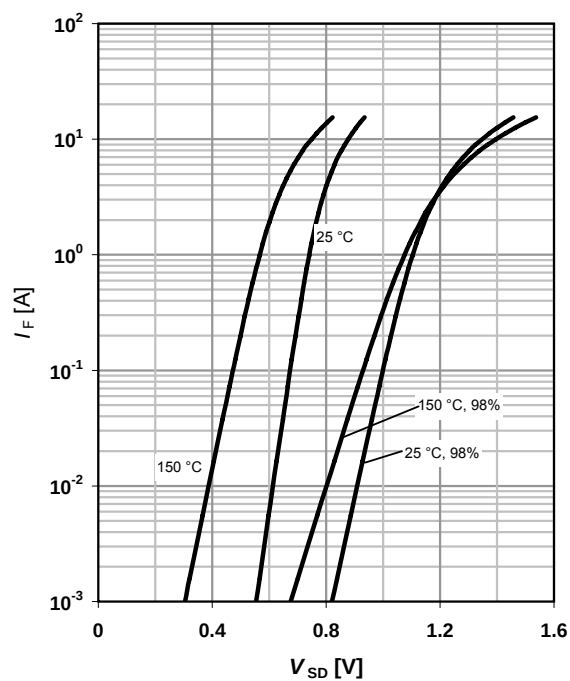
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$$



### 12 Forward characteristics of reverse diode

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

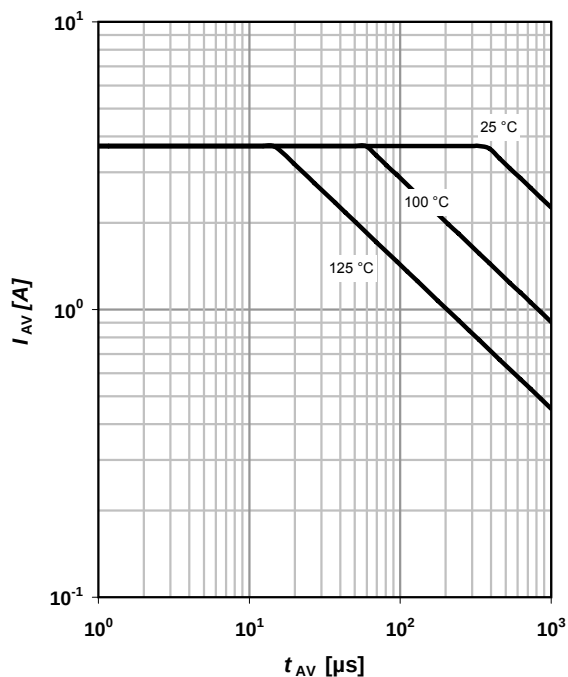
parameter:  $T_j$



### 13 Avalanche characteristics

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

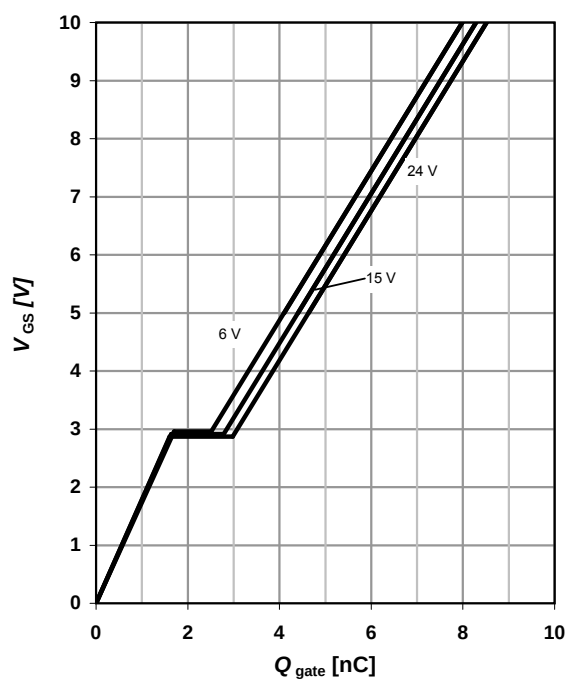
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

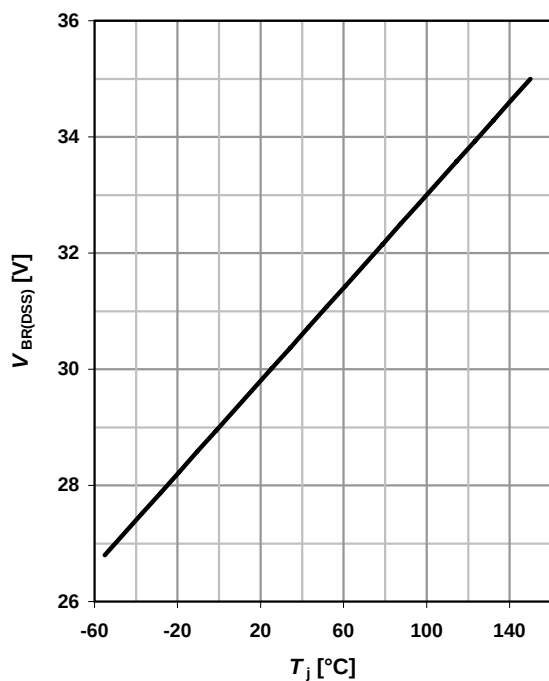
$$V_{GS}=f(Q_{\text{gate}}); I_D=3.7\ \text{A pulsed}$$

parameter:  $V_{DD}$

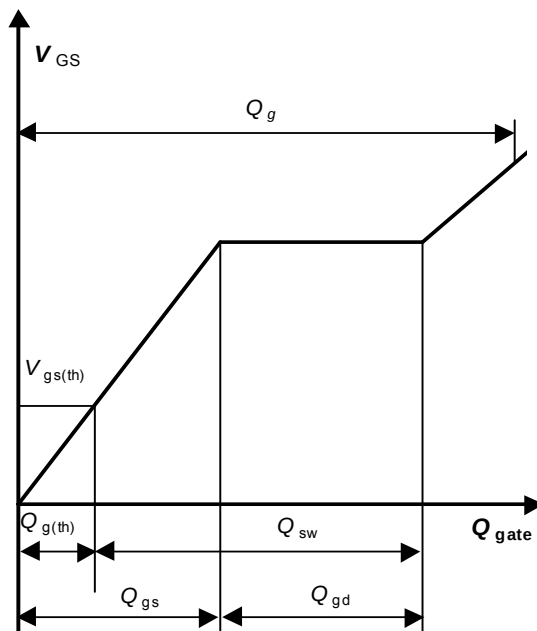


### 15 Drain-source breakdown voltage

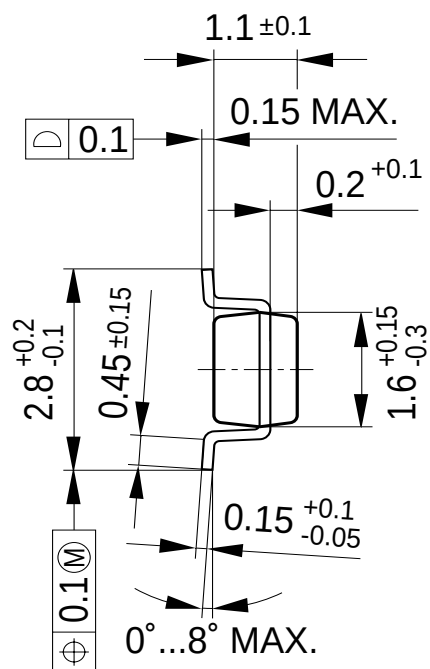
$$V_{BR(DSS)}=f(T_j); I_D=250\ \mu\text{A}$$



### 16 Gate charge waveforms



### Package Outline:

**PG-SC59**

GPS09473

**Footprint:**



Dimensions in mm



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