

## OptiMOS™ 2 Small-Signal-Transistor

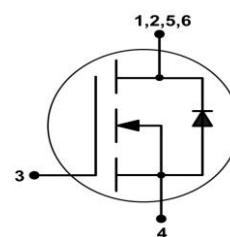
### Features

- 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

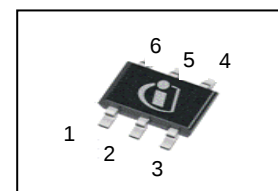


### Product Summary

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



PG-SOT363



| Type     | Package | Tape and Reel Information | Marking | Lead Free | Packing |
|----------|---------|---------------------------|---------|-----------|---------|
| BSD214SN | PG-SOT- | H6327: 3000 pcs/ reel     | X5s     | Yes       | Non dry |

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

| Parameter                           | Symbol            | Conditions                                                                                                     | Value       | Unit              |
|-------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|-------------|-------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$                                                                                             | 1.5         | A                 |
|                                     |                   | $T_A=70\text{ °C}$                                                                                             | 1.2         |                   |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$                                                                                             | 6           |                   |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=1.5\text{ A}$ , $R_{GS}=25\text{ }\Omega$                                                                 | 3.7         | mJ                |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=1.5\text{ A}$ , $V_{DS}=16\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ °C}$ | 6           | kV/ $\mu\text{s}$ |
| Gate source voltage                 | $V_{GS}$          |                                                                                                                | $\pm 12$    | 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,<br>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           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=3.7\text{ }\mu\text{A}$                | 0.7 | 0.95 | 1.2 |                  |
| 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      | $I_{GSS}$     | $V_{GS}=12\text{ V}, V_{DS}=0\text{ V}$                    | -   | -    | 100 | nA               |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=2.5\text{ V}, I_D=0.7\text{ A}$                    | -   | 176  | 250 | $\text{m}\Omega$ |
|                                  |               | $V_{GS}=4.5\text{ V}, I_D=1.5\text{ A}$                    | -   | 111  | 140 |                  |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=1.2\text{ A}$           |     | 4    | -   | 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>$f=1\text{ MHz}$                                | - | 107 | 143 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                             | - | 46  | 62  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                             | - | 6   | 9   |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=10\text{ V}, V_{GS}=4.5\text{ V},$<br>$I_D=1.5\text{ A}, R_{G,ext}=6\text{ }\Omega$ | - | 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**

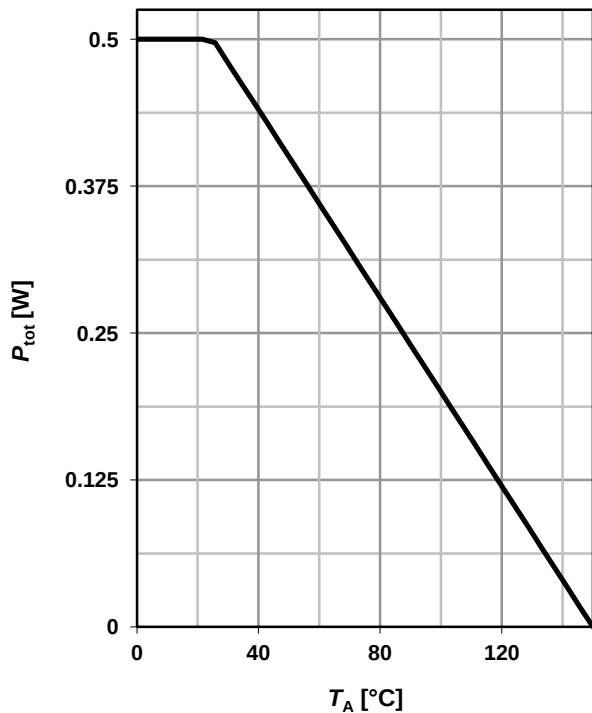
|                       |               |                                                                            |   |      |   |    |
|-----------------------|---------------|----------------------------------------------------------------------------|---|------|---|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=10\text{ V}, I_D=1.5\text{ A},$<br>$V_{GS}=0\text{ to }5\text{ V}$ | - | 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 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            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=1.5\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$   | - | 0.8 | 1.1 | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=10\text{ V}, I_F=1.5\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 8.4 | -   | ns |
| Reverse recovery charge          | $Q_{rr}$      |                                                                            | - | 1.7 | -   | nC |

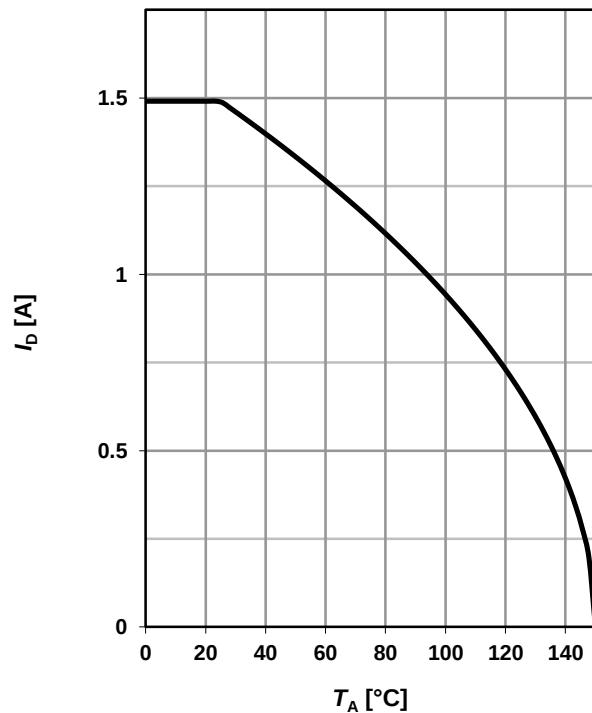
### 1 Power dissipation

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



### 2 Drain current

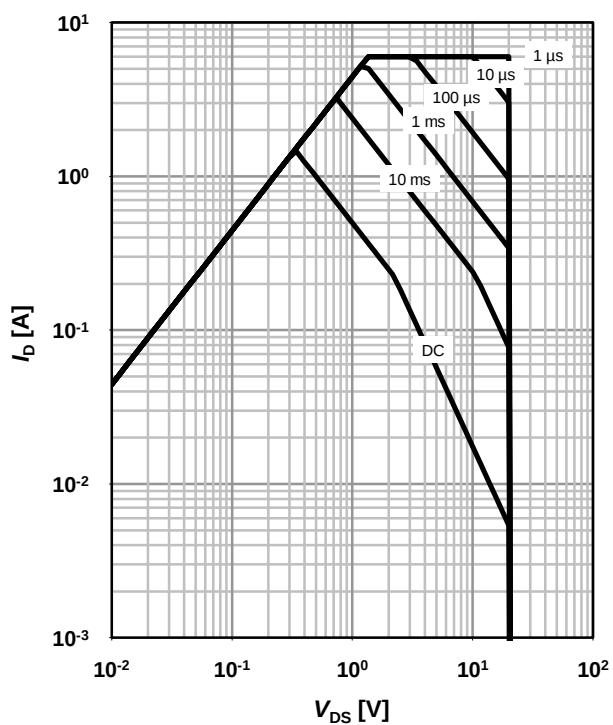
$$I_D = f(T_A); V_{GS} \geq 4.5 \text{ V}$$



### 3 Safe operating area

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

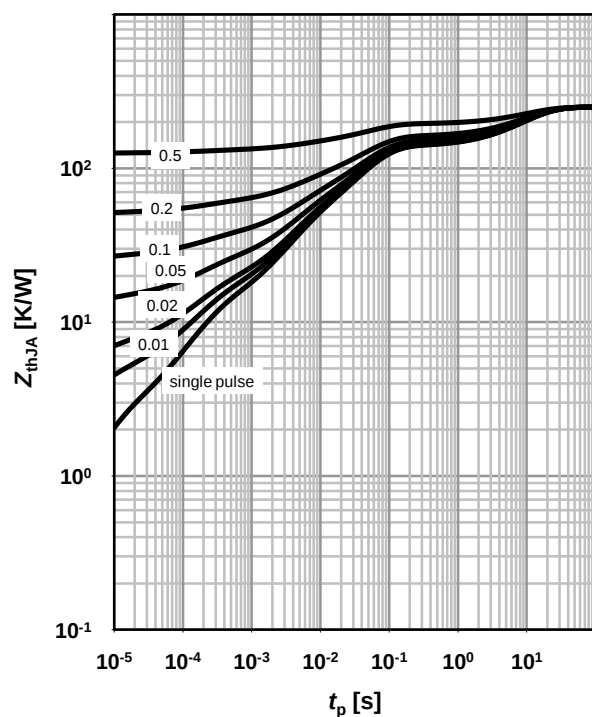
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

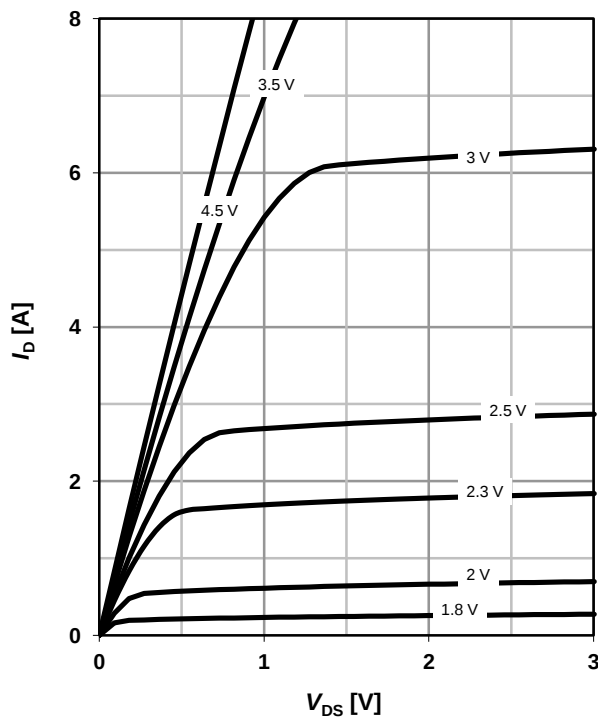
parameter:  $D = t_p/T$



### 5 Typ. output characteristics

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

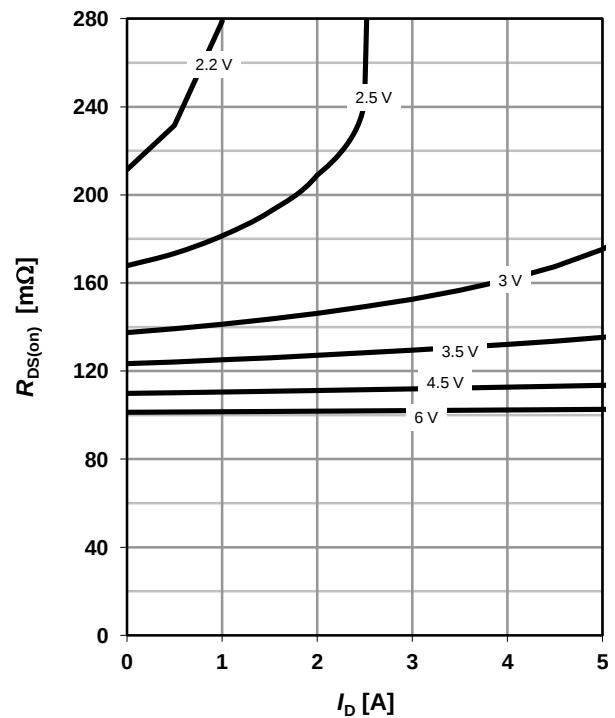
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

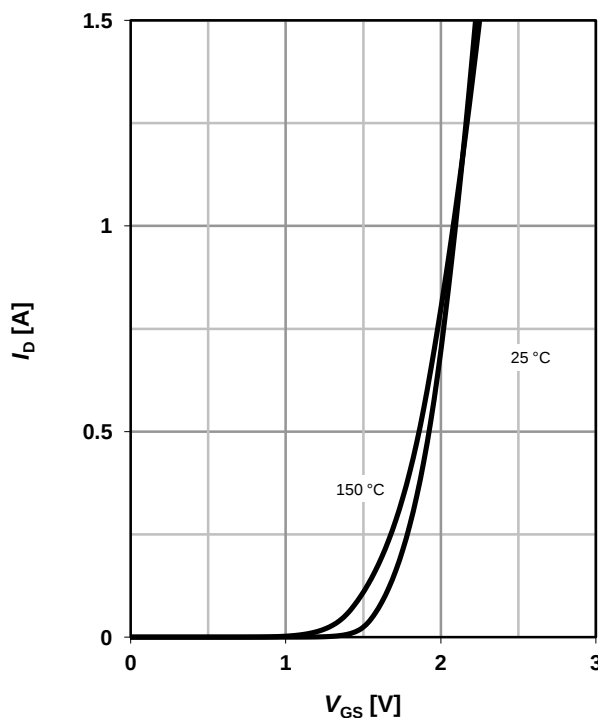
$R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter:  $V_{GS}$



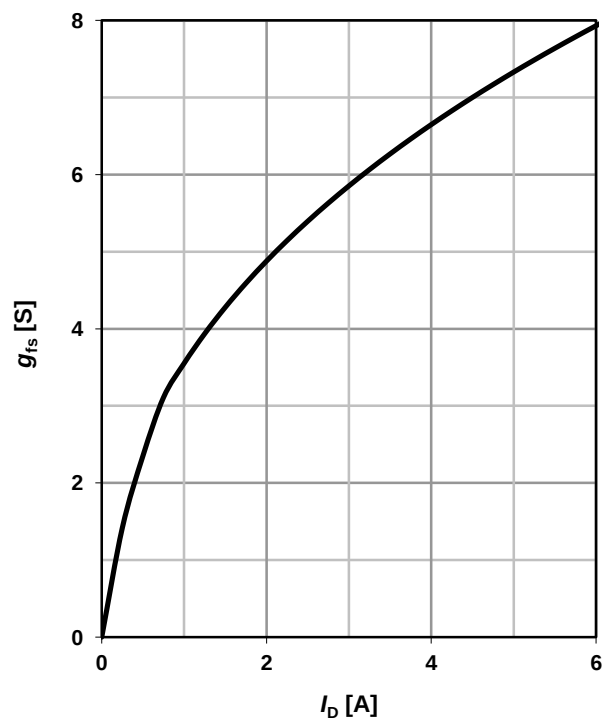
### 7 Typ. transfer characteristics

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



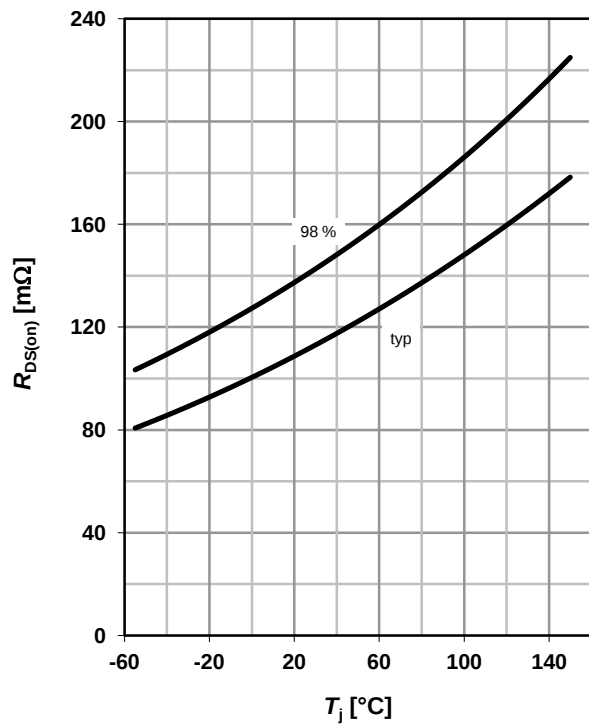
### 8 Typ. forward transconductance

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



### 9 Drain-source on-state resistance

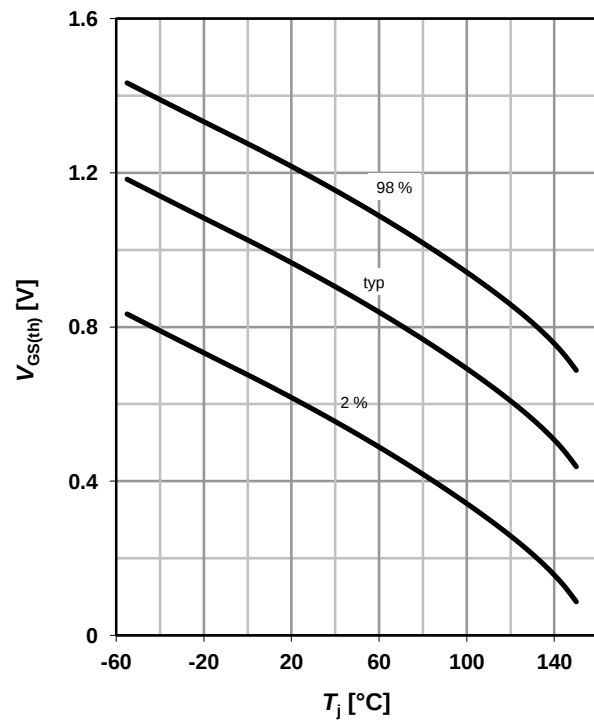
$R_{DS(on)} = f(T_j)$ ;  $I_D = 1.5 \text{ A}$ ;  $V_{GS} = 4.5 \text{ V}$



### 10 Typ. gate threshold voltage

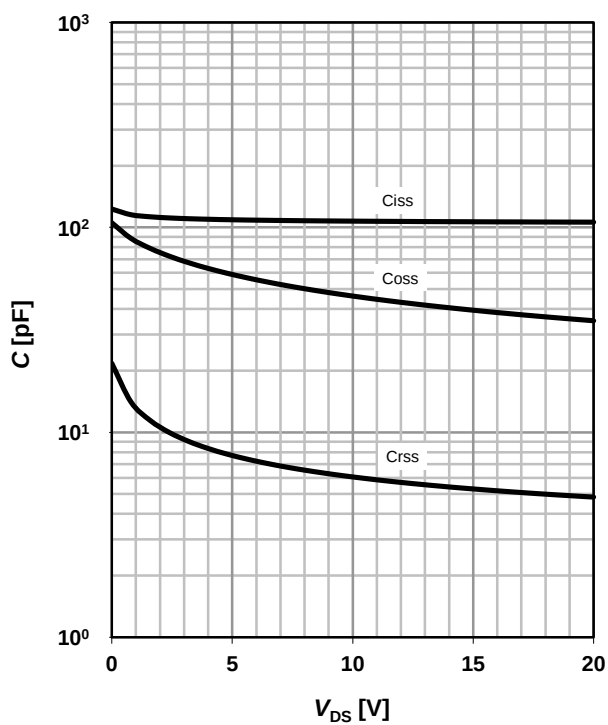
$V_{GS(th)} = f(T_j)$ ;  $V_{DS} = V_{GS}$ ;  $I_D = 3.7 \mu\text{A}$

parameter:  $I_D$



### 11 Typ. capacitances

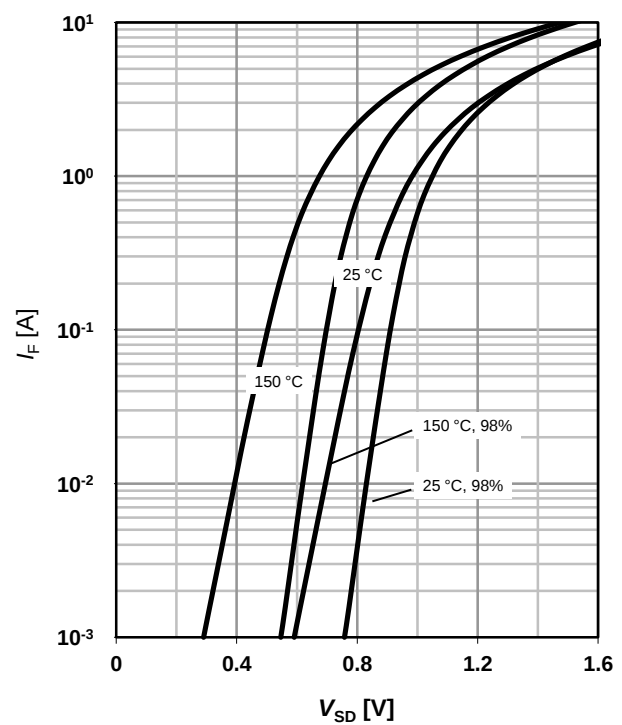
$C = f(V_{DS})$ ;  $V_{GS} = 0 \text{ V}$ ;  $f = 1 \text{ MHz}$ ;  $T_j = 25^\circ\text{C}$



### 12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

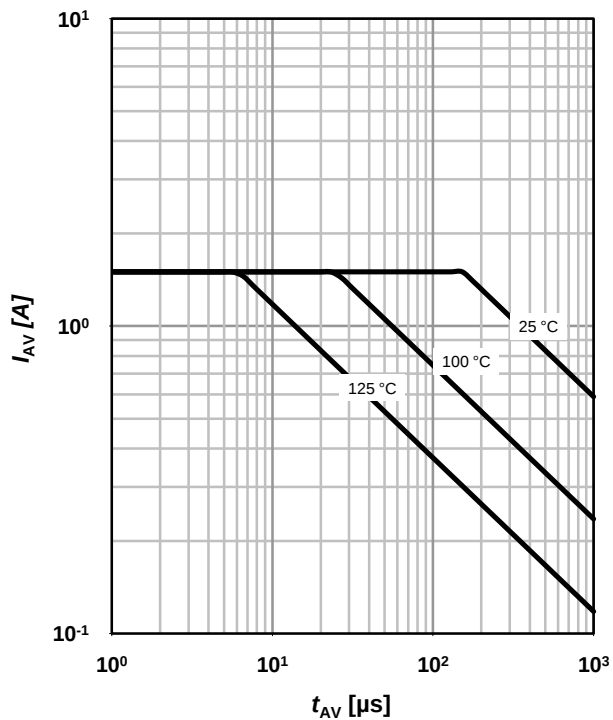
parameter:  $T_j$



### 13 Avalanche characteristics

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

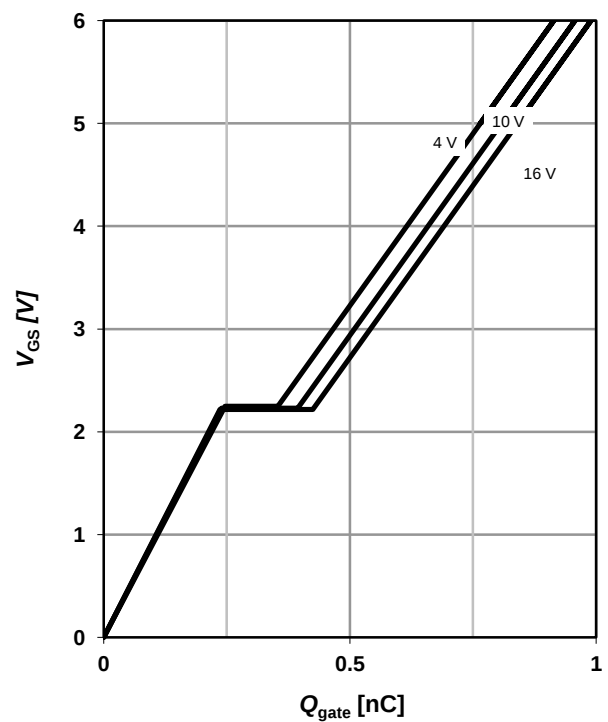
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

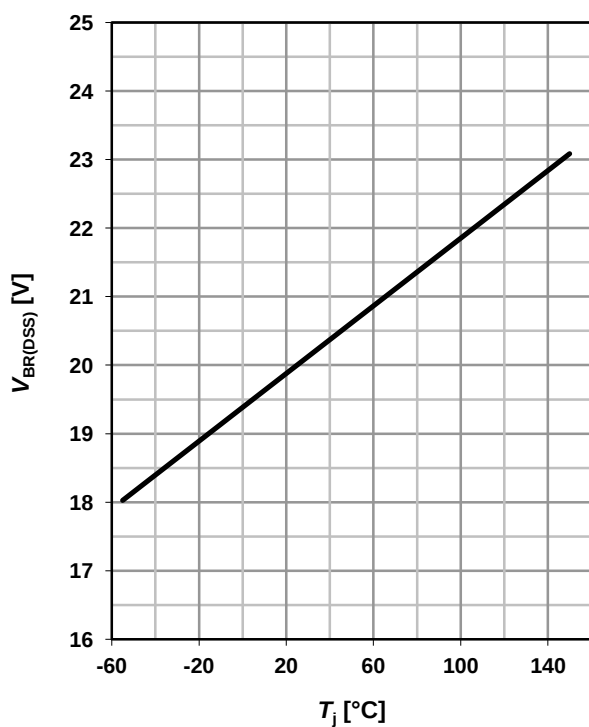
$V_{GS}=f(Q_{\text{gate}})$ ;  $I_D=1.5\text{ A}$  pulsed

parameter:  $V_{DD}$



### 15 Drain-source breakdown voltage

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

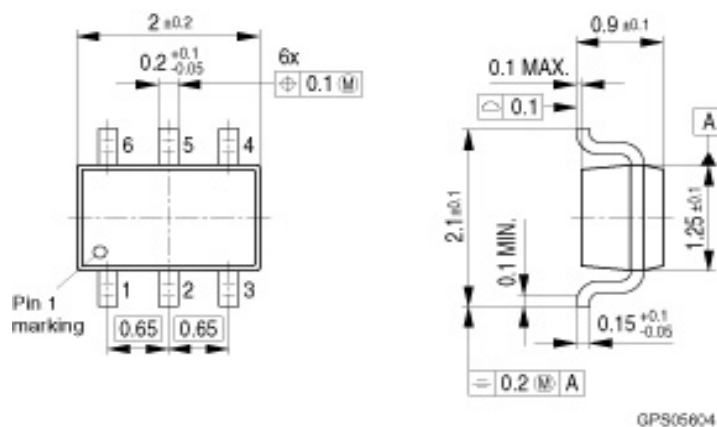


### 16 Gate charge waveforms



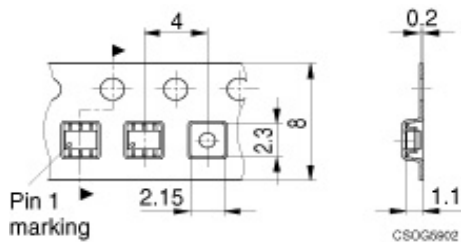
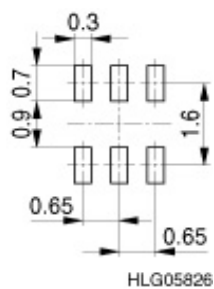
# SOT-363

## Package Outline:



## Reflow soldering:

## Packing:



Dimensions in mm

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