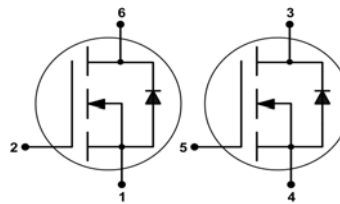
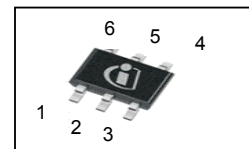


**OptiMOS™2 Small-Signal-Transistor**
**Features**

- Dual 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          |
| $R_{DS(on),max}$ | $V_{GS}=2.5\text{ V}$ | 400  | m $\Omega$ |
|                  | $V_{GS}=1.8\text{ V}$ | 560  |            |
| $I_D$            |                       | 0.88 | A          |


**PG-SOT-363**


| Type    | Package    | Tape and Reel Information | Marking | Lead Free | Packing |
|---------|------------|---------------------------|---------|-----------|---------|
| BSD840N | PG-SOT-363 | H6327: 3000 pcs/ reel     | XBs     | Yes       | Non dry |

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

| Parameter <sup>1)</sup>             | Symbol            | Conditions  | Value                | Unit              |
|-------------------------------------|-------------------|---|----------------------|-------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ }^\circ\text{C}$  | 0.88                 | A                 |
|                                     |                   | $T_A=70\text{ }^\circ\text{C}$  | 0.71                 |                   |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ }^\circ\text{C}$  | 3.5                  |                   |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=0.88\text{ A}$ , $R_{GS}=16\text{ }\Omega$   | 1.6                  | mJ                |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=0.88\text{ A}$ , $V_{DS}=16\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ }^\circ\text{C}$ | 6                    | kV/ $\mu\text{s}$ |
| Gate source voltage                 | $V_{GS}$          |   | $\pm 8$              | V                 |
| Power dissipation <sup>2)</sup>     | $P_{tot}$         | $T_A=25\text{ }^\circ\text{C}$  | 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            |                   |

<sup>1)</sup> Remark: only one of both transistors in operation.

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

**Thermal characteristics**

|  |            |                                 |   |   |     |     |
|--|------------|---------------------------------|---|---|-----|-----|
| Thermal resistance, junction - ambient | $R_{thJA}$ | minimal footprint <sup>2)</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           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=1.6\text{ }\mu\text{A}$                | 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 | $R_{DS(on)}$  | $V_{GS}=1.8\text{ V}, I_D=0.19\text{ A}$                   | -   | 373  | 560  | $\text{m}\Omega$ |
|                                  |               | $V_{GS}=2.5\text{ V}, I_D=0.88\text{ A}$                   | -   | 270  | 400  |                  |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=0.71\text{ A}$          |     | 2.5  | -    | S                |

<sup>2)</sup> Performed on 40 mm<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>$f=1\text{ MHz}$                     | - | 55  | 78 | pF |
| Output capacitance           | $C_{oss}$    |  | - | 25  | 36 |    |
| Reverse transfer capacitance | $C_{rss}$    |  | - | 3.5 | -  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=10\text{ V}, V_{GS}=2.5\text{ V},$<br>$I_D=0.88\text{ A}, R_G=6\ \Omega$ | - | 1.9 | -  | ns |
| Rise time                    | $t_r$        |  | - | 2.2 | -  |    |
| Turn-off delay time          | $t_{d(off)}$ |  | - | 7.8 | -  |    |
| Fall time                    | $t_f$        |  | - | 0.9 | -  |    |

**Gate Charge Characteristics**

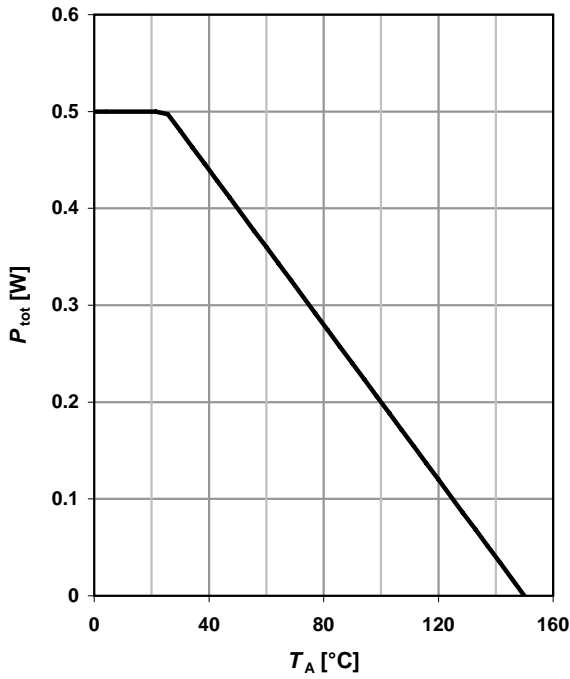
|                       |               |   |   |      |   |    |
|-----------------------|---------------|---|---|------|---|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=10\text{ V}, I_D=0.88\text{ A},$<br>$V_{GS}=0\text{ to }2.5\text{ V}$ | - | 0.10 | - | nC |
| Gate to drain charge  | $Q_{gd}$      |   | - | 0.10 | - |    |
| Gate charge total     | $Q_g$         |   | - | 0.26 | - |    |
| Gate plateau voltage  | $V_{plateau}$ |   | - | 1.7  | - | V  |

**Reverse Diode**

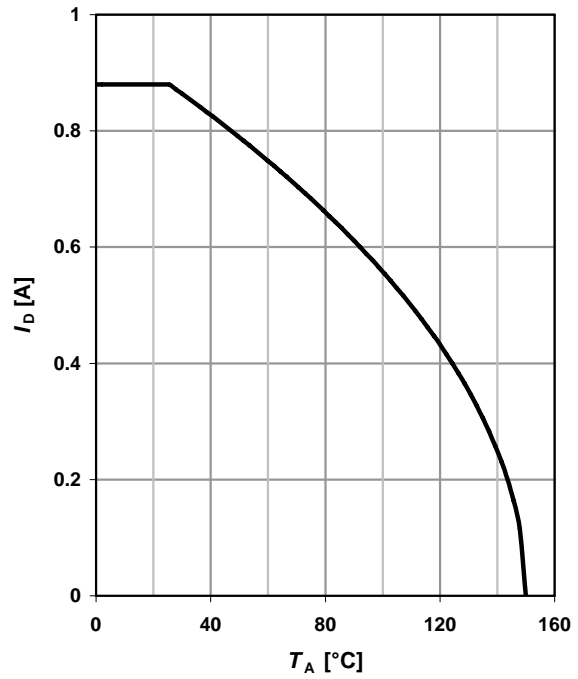
|                                  |               |   |   |      |     |    |
|----------------------------------|---------------|---|---|------|-----|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$  | - | -    | 0.5 | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -    | 3.5 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=0.88\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$   | - | 0.94 | 1.1 | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=10\text{ V}, I_F=0.88\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 5.3  | -   | ns |
| Reverse recovery charge          | $Q_{rr}$      |   | - | 0.82 | -   |    |

**1 Power dissipation**

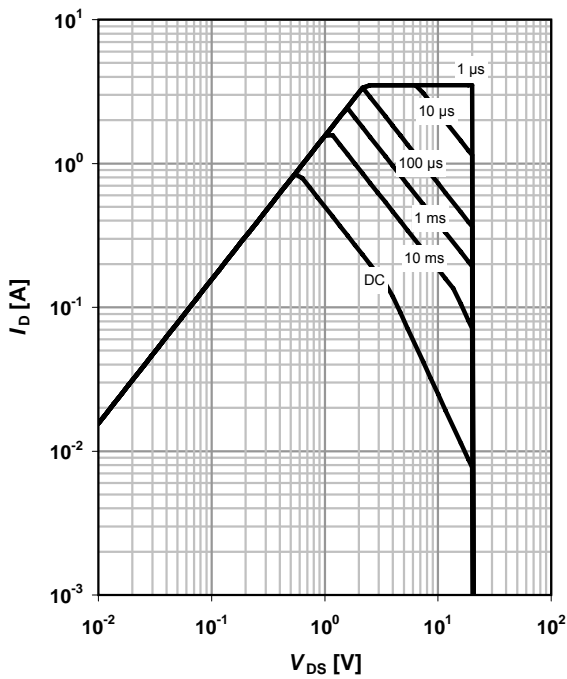
$$P_{\text{tot}} = f(T_A)$$


**2 Drain current**

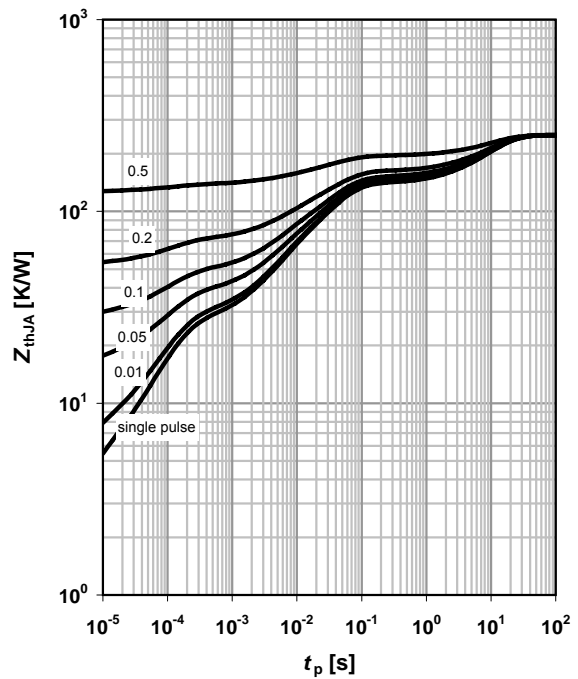
$$I_D = f(T_A); V_{\text{GS}} \geq 2.5 \text{ V}$$


**3 Safe operating area**

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

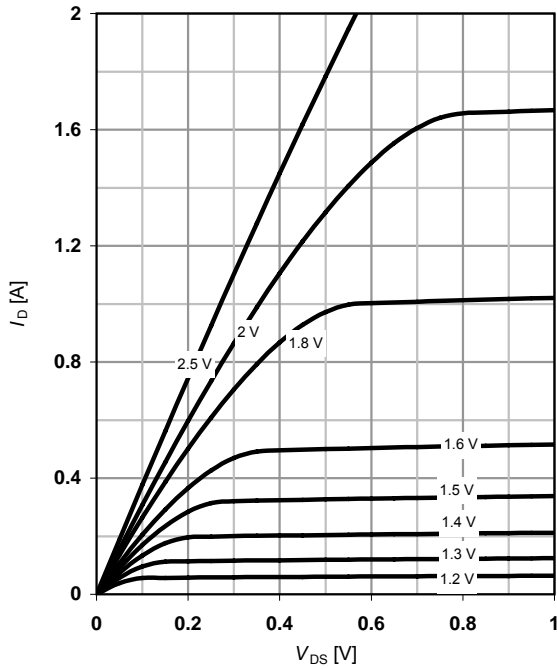
 parameter:  $t_p$ 

**4 Max. transient thermal impedance**

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

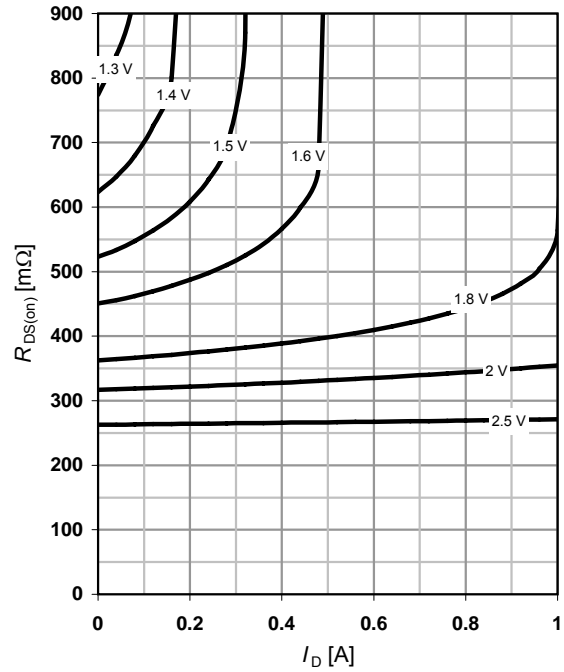
 parameter:  $D = t_p / T$ 


**5 Typ. output characteristics**

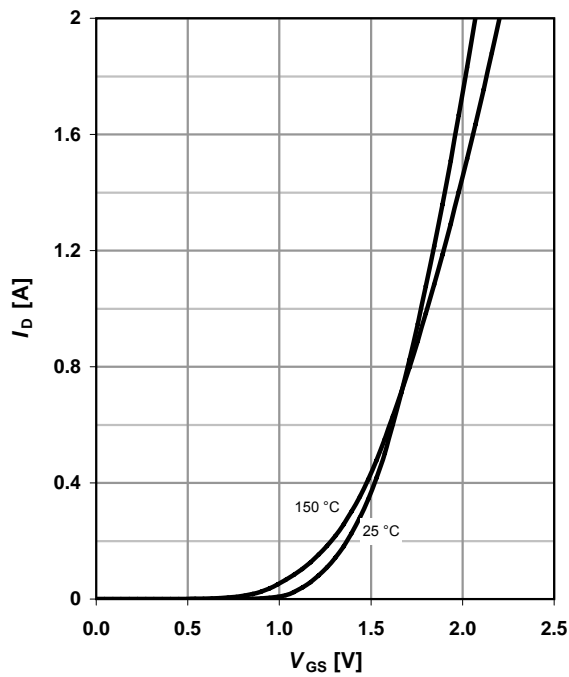
$$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$$

 parameter:  $V_{GS}$ 

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

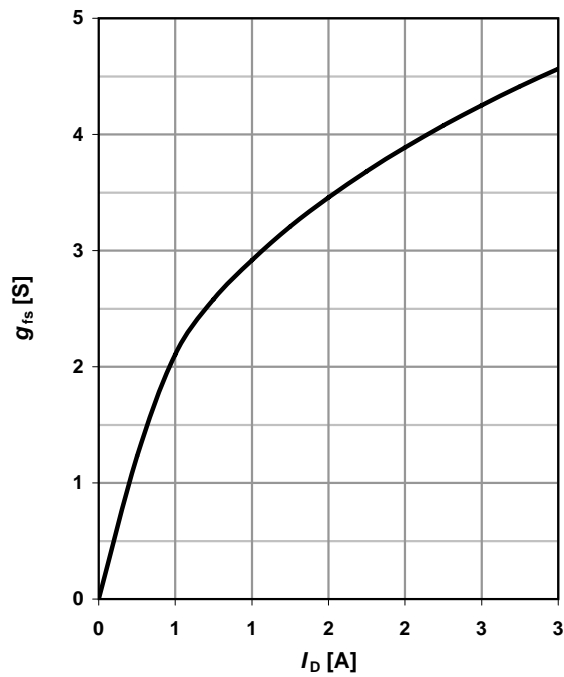
$$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$

 parameter:  $V_{GS}$ 

**7 Typ. transfer characteristics**

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

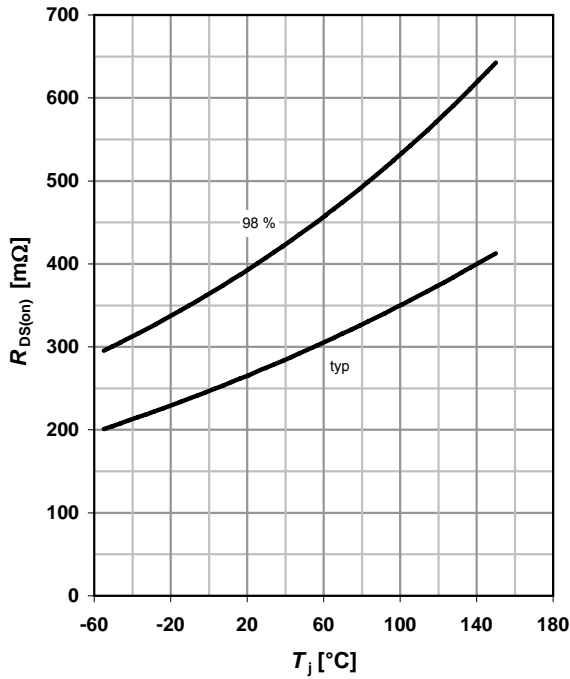

**8 Typ. forward transconductance**

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



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

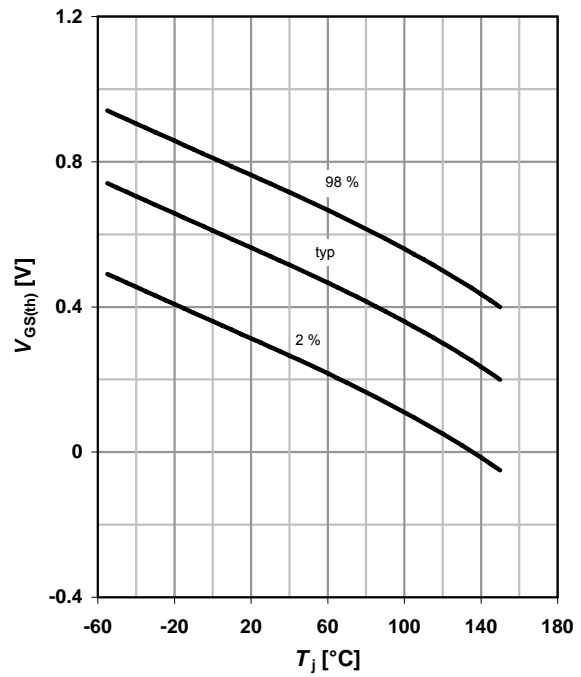
$R_{DS(on)} = f(T_j); I_D = 0.88 \text{ A}; V_{GS} = 2.5 \text{ V}$



**10 Typ. gate threshold voltage**

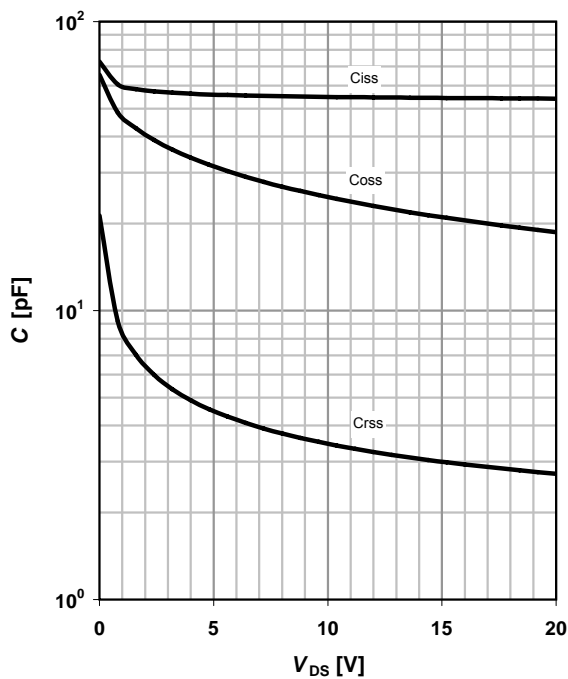
$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 1.6 \mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

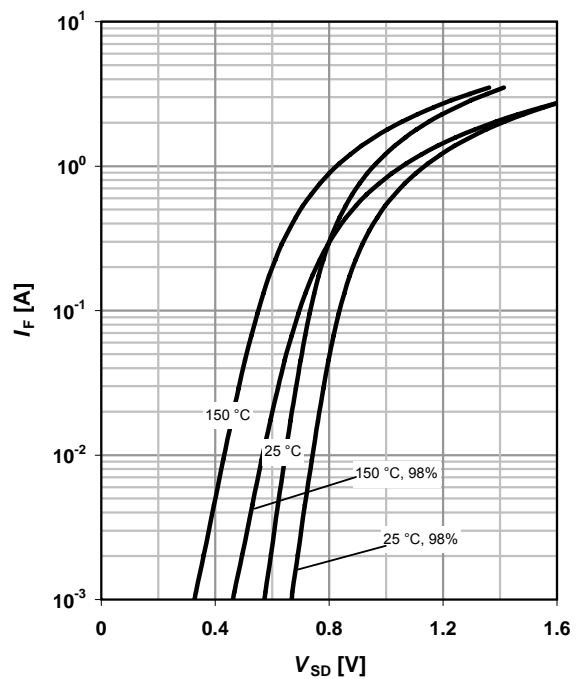
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

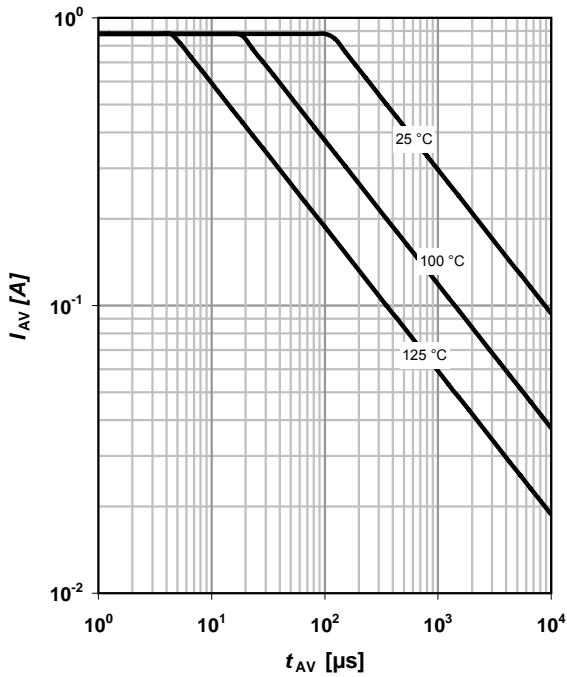
parameter:  $T_j$



**13 Avalanche characteristics**

$I_{AS}=f(t_{AV}); R_{GS}=16 \Omega$

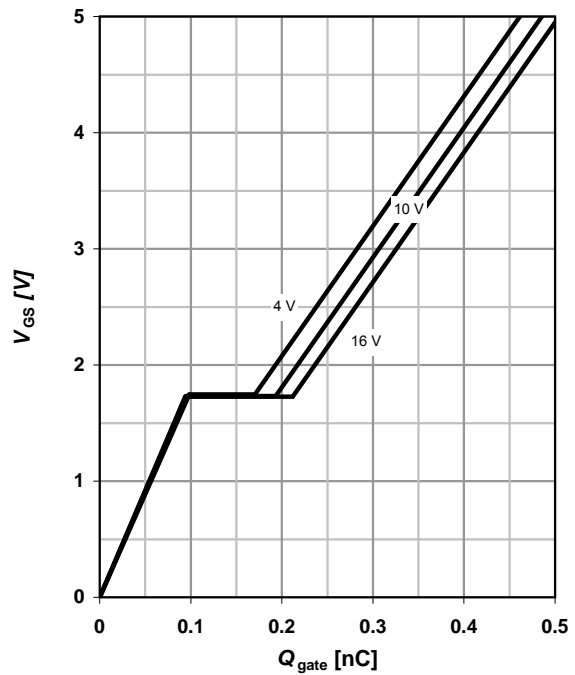
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

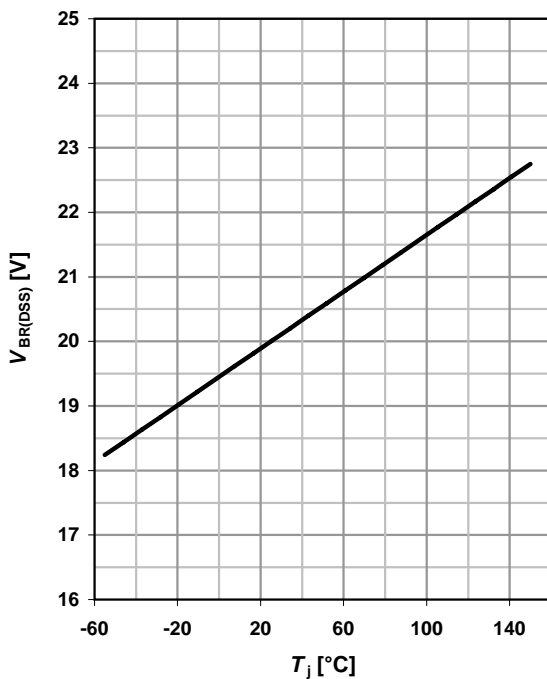
$V_{GS}=f(Q_{gate}); I_D=0.88 \text{ A pulsed}$

parameter:  $V_{DD}$

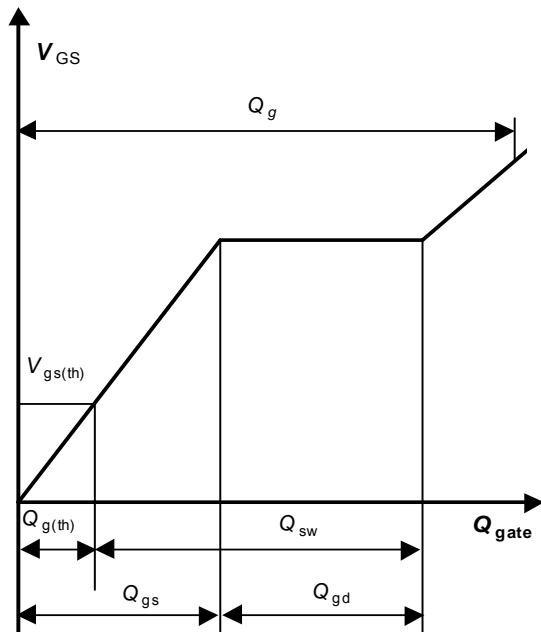


**15 Drain-source breakdown voltage**

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

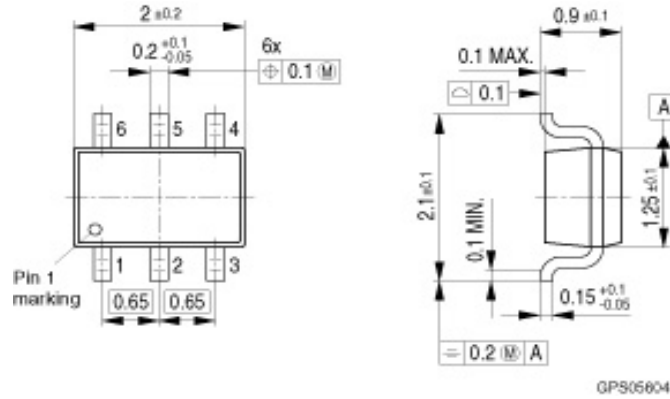


**16 Gate charge waveforms**

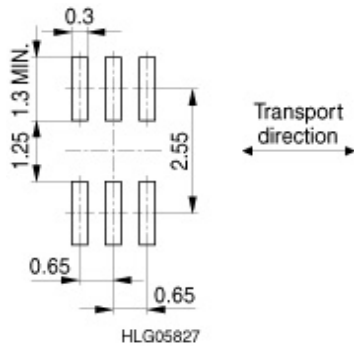


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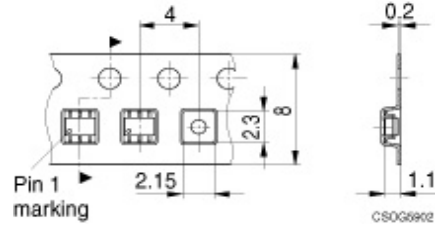
Package Outline:



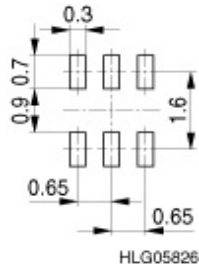
Footprint:



Packing:



Reflow soldering:



Dimensions in mm

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