

# MOSFET

Metal Oxide Semiconductor Field Effect Transistor

## OptiMOS™ Small-Signal-Transistor, 75V

BSL716SN

### Data Sheet

Rev. 2.0  
Final

Industrial & Multimarket

## OptiMOS™ Small-Signal-Transistor

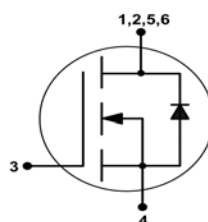
### Features

- N-channel
- Enhancement mode
- Logic Level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- RoHS compliant
- Halogen-free according to IEC61249-2-21

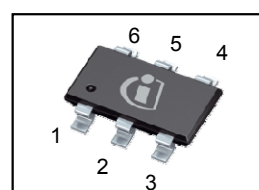


### Product Summary

|                  |                       |      |          |
|------------------|-----------------------|------|----------|
| $V_{DS}$         |                       | 75   | V        |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$  | 0.15 | $\Omega$ |
|                  | $V_{GS}=4.5\text{ V}$ | 0.18 |          |
| $I_D$            |                       | 2.5  | A        |



TSOP6



| Type     | Package | Tape and Reel Info    | Marking | Halogen Free | Packing |
|----------|---------|-----------------------|---------|--------------|---------|
| BSL716SN | TSOP6   | H6327: 3000 pcs/ reel | sPZ     | Yes          | Non dry |

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

| Parameter                           | Symbol            | Conditions                                                                                                     | Value                  | Unit               |
|-------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}$                                                                                             | 2.5                    | A                  |
|                                     |                   | $T_A=70\text{ °C}$                                                                                             | 2.0                    |                    |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}$                                                                                             | 10.0                   |                    |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=2.5\text{ A}$ , $R_{GS}=25\text{ }\Omega$                                                                 | 33                     | mJ                 |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=2.5\text{ A}$ , $V_{DS}=50\text{ V}$ ,<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>     | $P_{tot}$         | $T_A=25\text{ °C}$                                                                                             | 2.0                    | 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<br>junction - soldering point | $R_{thJS}$ |                                              | - | - | 50   | K/W |
| Thermal resistance<br>junction - ambient         | $R_{thJA}$ | minimal footprint                            | - | - | 230  |     |
|                                                  |            | 6 cm <sup>2</sup> cooling area <sup>1)</sup> | - | - | 62.5 |     |

#### Electrical characteristics, at $T_j=25\text{ }^{\circ}\text{C}$ , unless otherwise specified

#### Static characteristics

|                                  |               |                                                                          |     |      |      |               |
|----------------------------------|---------------|--------------------------------------------------------------------------|-----|------|------|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$                          | 75  | -    | -    | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}\text{ V}, I_D=218\text{ }\mu\text{A}$                     | 0.8 | 1.4  | 1.80 |               |
| Drain-source leakage current     | $I_{DSS}$     | $V_{DS}=75\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^{\circ}\text{C}$  | -   | -    | 0.02 | $\mu\text{A}$ |
|                                  |               | $V_{DS}=75\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^{\circ}\text{C}$ | -   | -    | 10   |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                                  | -   | -    | 10   | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=10\text{ V}, I_D=2.5\text{ A}$                                   | -   | 120  | 150  | m $\Omega$    |
|                                  |               | $V_{GS}=4.5\text{ V}, I_D=2.3\text{ A}$                                  | -   | 136  | 180  |               |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=2\text{ A}$                           |     | 6.06 | -    | S             |

<sup>1)</sup> Device on 40mm x 40mm x 1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air. (  $t < 5\text{ sec}$  )

| 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>$f=1\text{ MHz}$                                | - | 237  | 315  | pF |
| Output capacitance           | $C_{oss}$    |                                                                                             | - | 41   | 55   |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                             | - | 19   | 29   |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=37.5\text{ V},$<br>$V_{GS}=10\text{ V}, I_D=2.5\text{ A},$<br>$R_{G,ext}=6\ \Omega$ | - | 4.2  | 6.3  | ns |
| Rise time                    | $t_r$        |                                                                                             | - | 3.4  | 5.1  |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                             | - | 50.3 | 75.5 |    |
| Fall time                    | $t_f$        |                                                                                             | - | 14.3 | 21.5 |    |

#### Gate Charge Characteristics

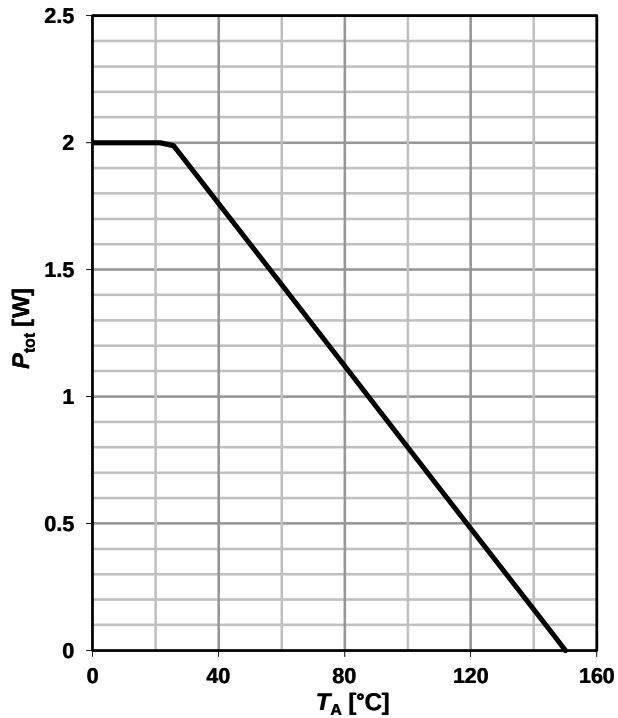
|                       |               |                                                                               |   |     |      |    |
|-----------------------|---------------|-------------------------------------------------------------------------------|---|-----|------|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=37.5\text{ V}, I_D=2.5\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$ | - | 0.6 | 0.8  | nC |
| Gate to drain charge  | $Q_{gd}$      |                                                                               | - | 2.5 | 3.7  |    |
| Gate charge total     | $Q_g$         |                                                                               | - | 8.7 | 13.1 |    |
| Gate plateau voltage  | $V_{plateau}$ |                                                                               | - | 2.4 | -    | V  |

#### Reverse Diode

|                                  |               |                                                                              |   |     |      |    |
|----------------------------------|---------------|------------------------------------------------------------------------------|---|-----|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ °C}$                                                           | - | -   | 2.1  | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                              | - | -   | 10.0 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=2.5\text{ A},$<br>$T_J=25\text{ °C}$                 | - | 0.8 | 1.1  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=37.5\text{ V}, I_F=2.5\text{ A},$<br>$di_F/dt=200\text{ A}/\mu\text{s}$ | - | 29  | 36   | ns |
| Reverse recovery charge          | $Q_{rr}$      |                                                                              | - | 58  | 73   | nC |

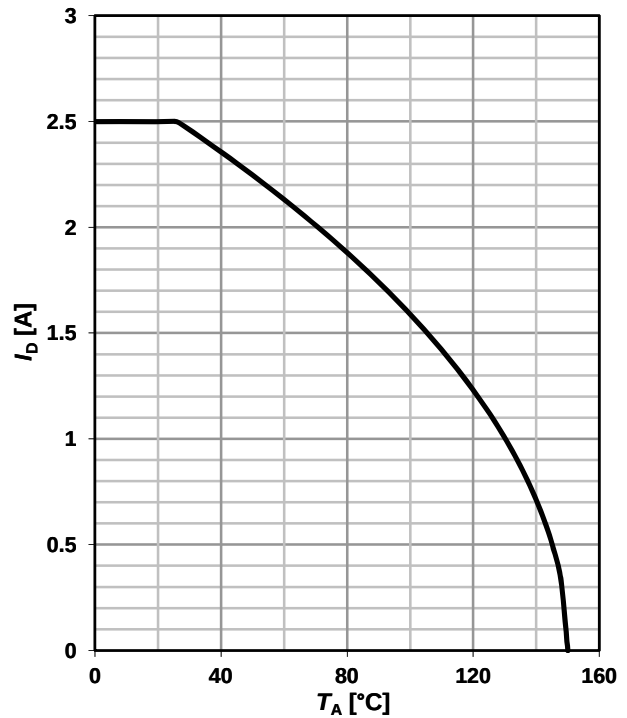
### 1 Power dissipation

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



### 2 Drain current

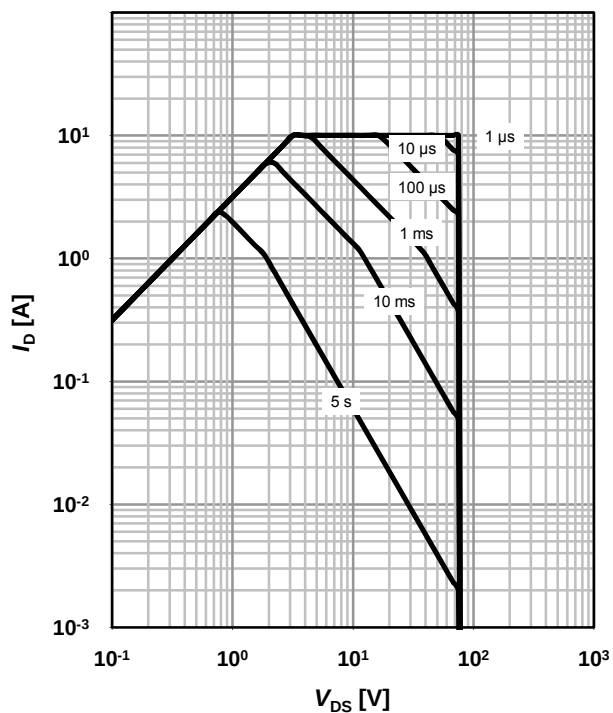
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



### 3 Safe operating area

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

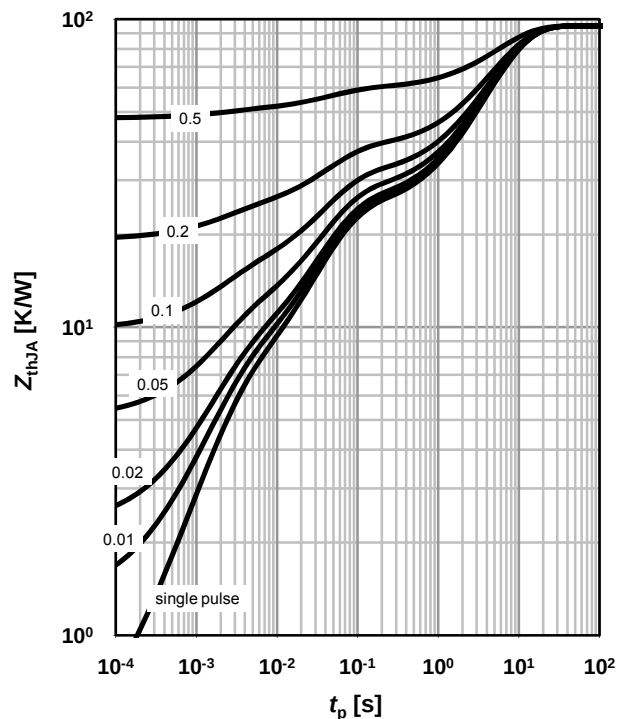
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

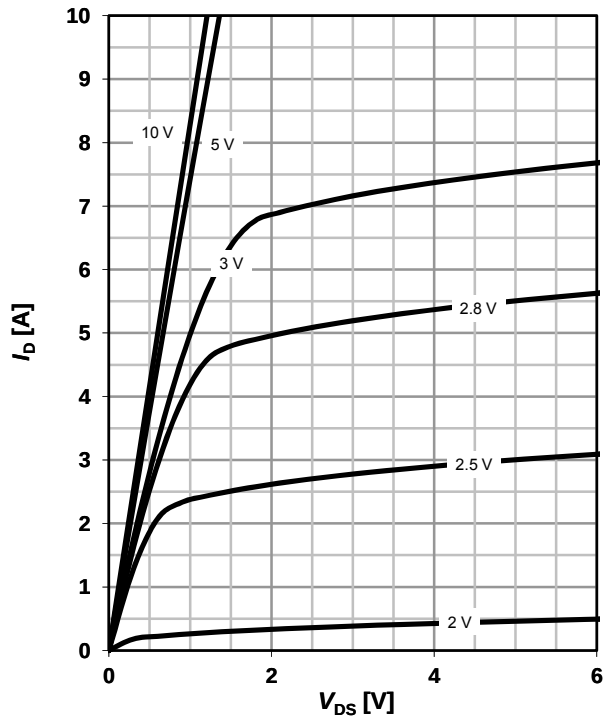
parameter:  $D = t_p/T$



### 5 Typ. output characteristics

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

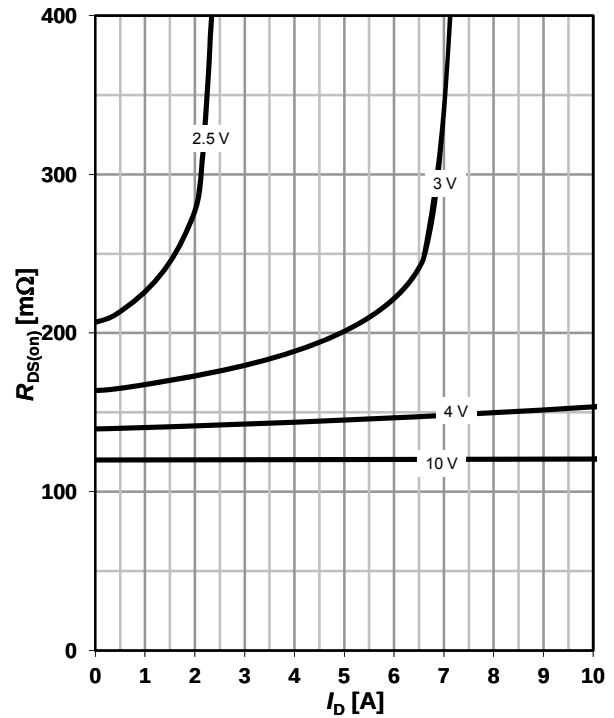
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

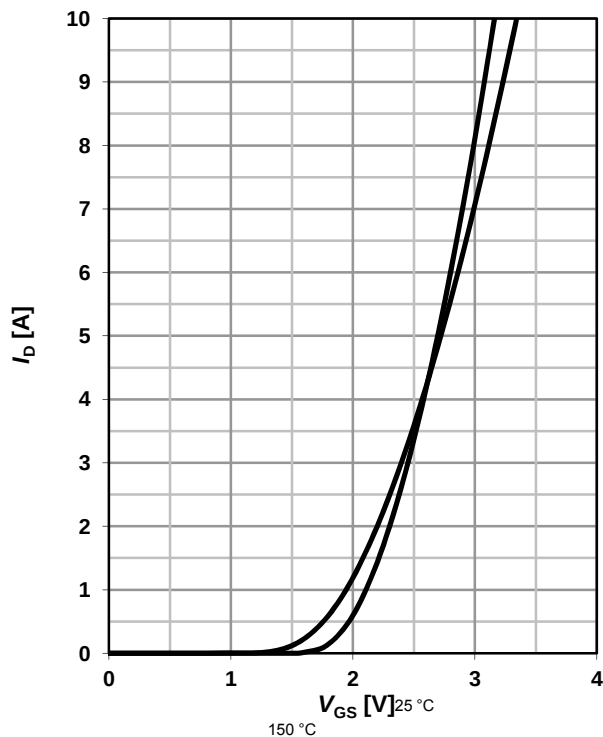
$$R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$$

parameter:  $V_{GS}$



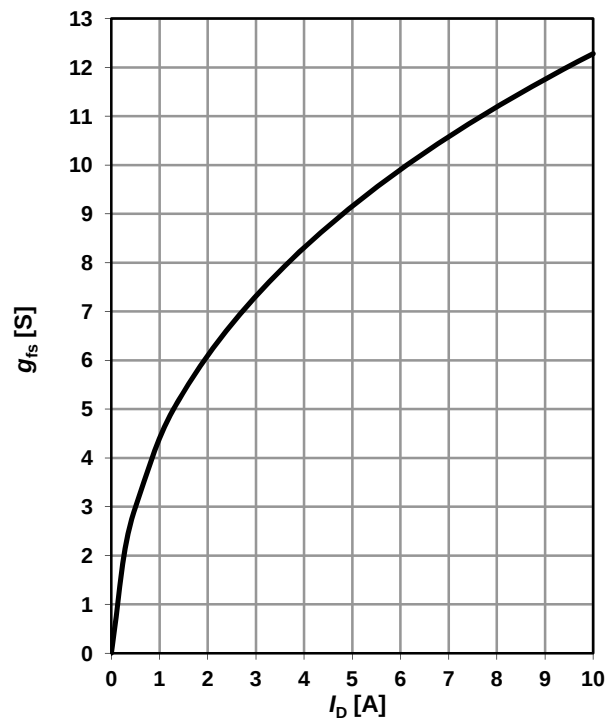
### 7 Typ. transfer characteristics

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

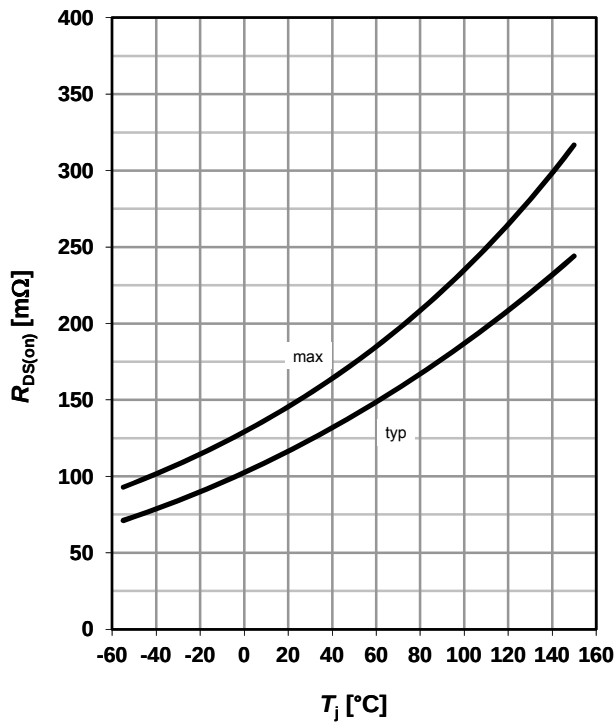


### 8 Typ. forward transconductance

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

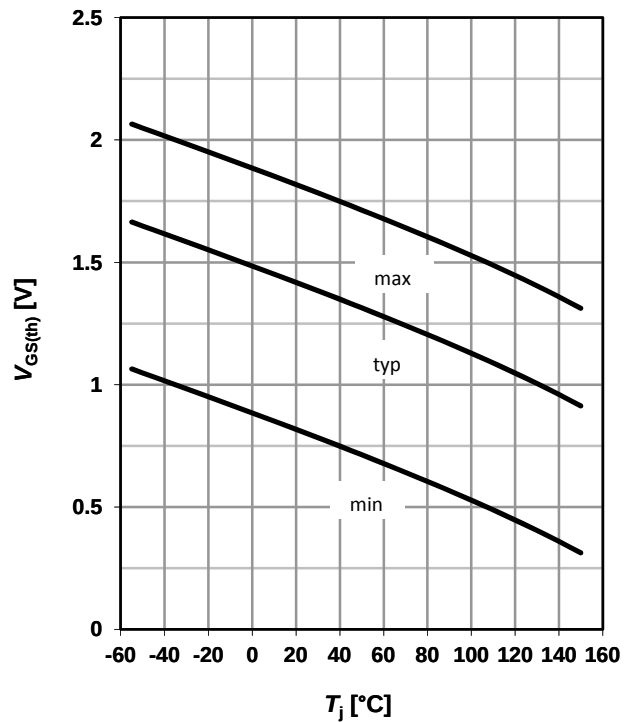


## 9 Drain-source on-state resistance

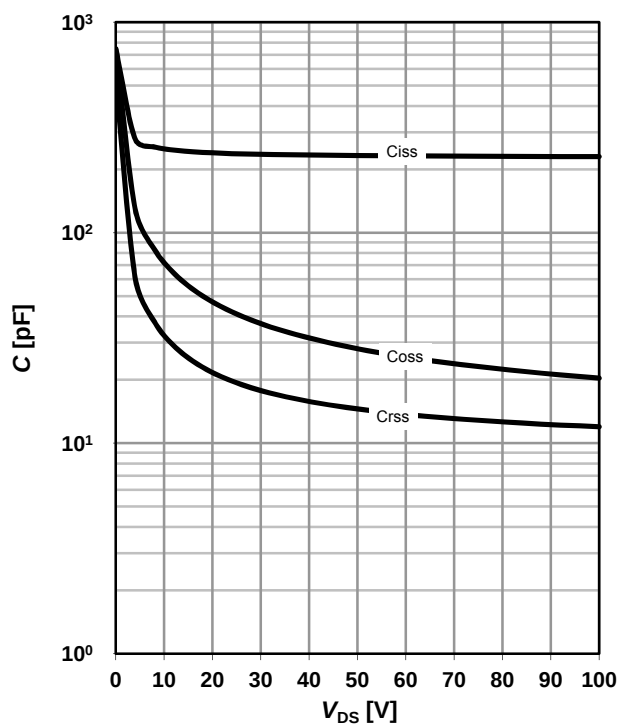
 $R_{DS(on)} = f(T_j); I_D = 2.5 \text{ A}; V_{GS} = 10 \text{ V}$ 


## 10 Typ. gate threshold voltage

 $V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 218 \mu\text{A}$ 

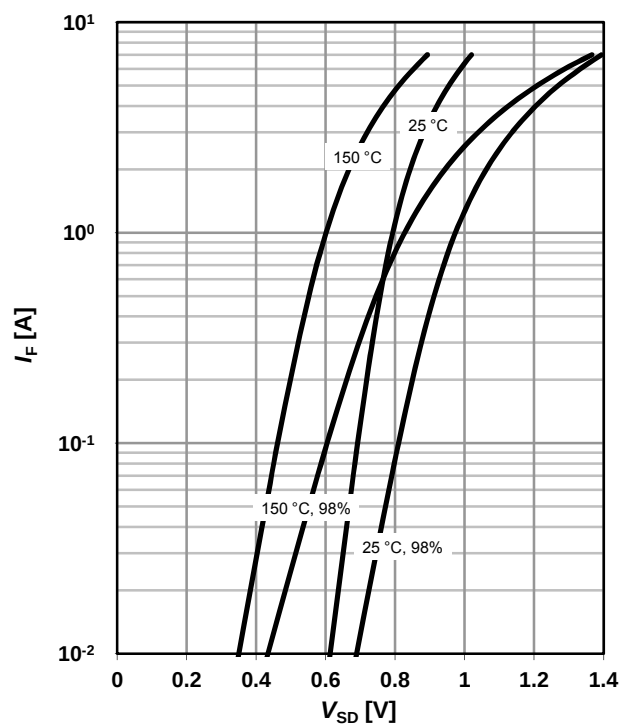
parameter:  $I_D$ 


## 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

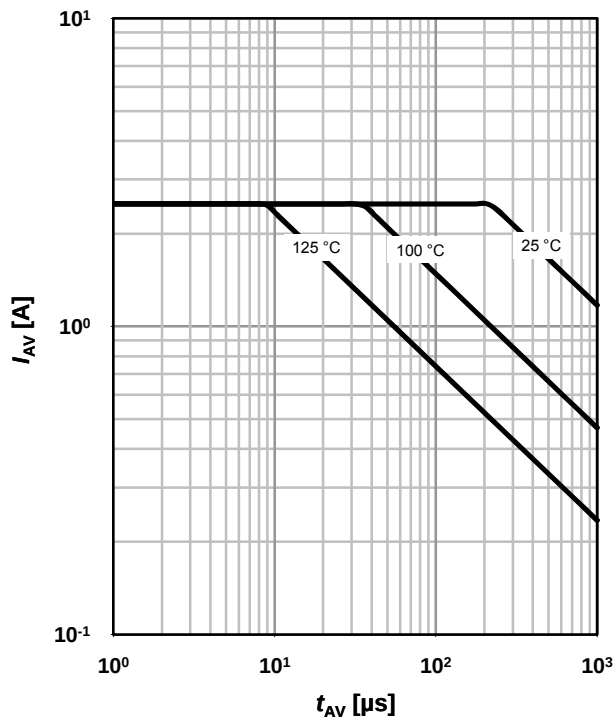
 $I_F = f(V_{SD})$ 

parameter:  $T_j$ 


### 13 Avalanche characteristics

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

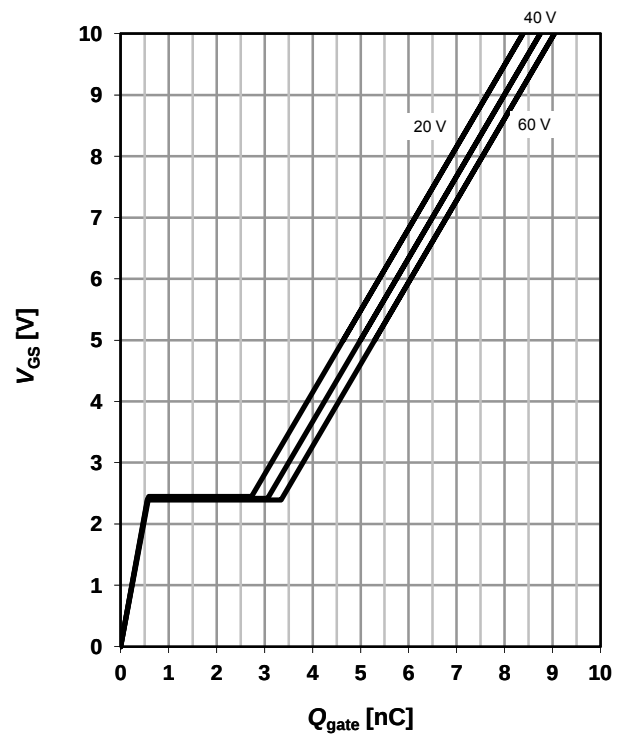
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

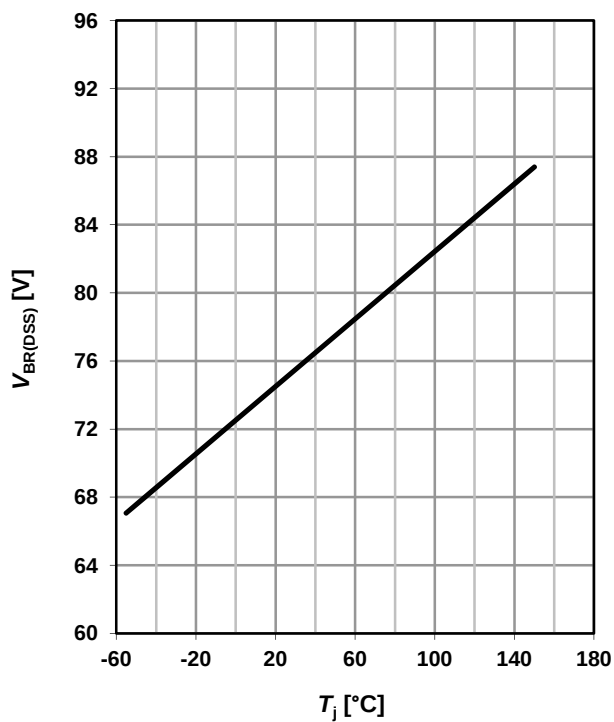
$$V_{GS}=f(Q_{\text{gate}}); I_D=2.5\ \text{A pulsed}$$

parameter:  $V_{DD}$

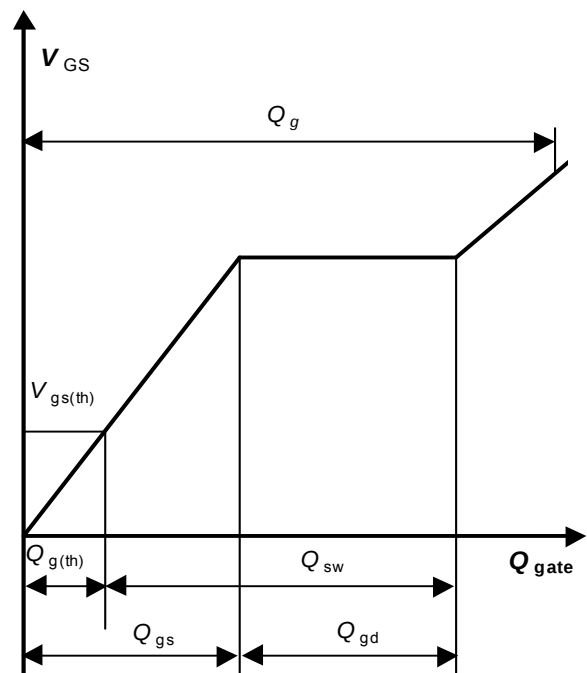


### 15 Drain-source breakdown voltage

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

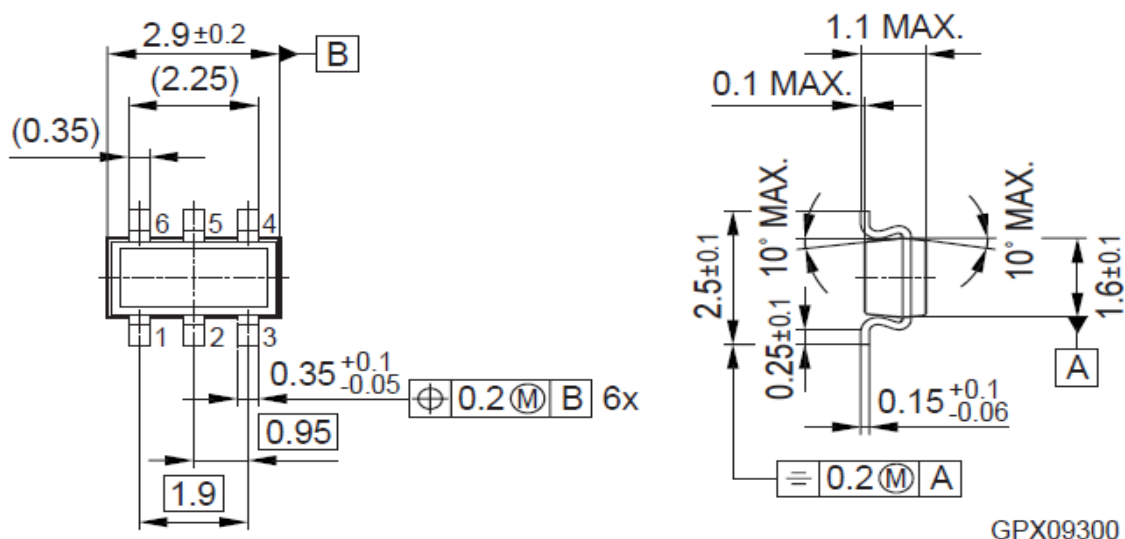


### 16 Gate charge waveforms

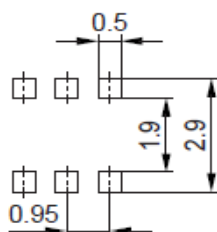


# TSOP6

## Package Outline:

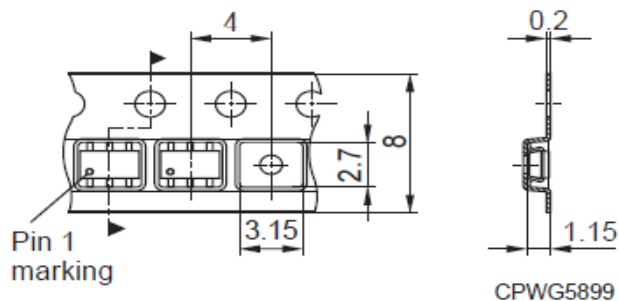


## Footprint:



Remark: Wave soldering possible dep.  
on customers process conditions  
HLG09283

## Packaging:



Dimensions in mm

Note: For symmetric types there is no defined Pin 1 orientation in the reel.

## Revision History

BSL716SN

**Revision: 2014-10-03, Rev. 2.0**

Previous Revision

| Revision | Date       | Subjects (major changes since last revision) |
|----------|------------|----------------------------------------------|
| 2.0      | 2014-10-03 | Release of final version                     |

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