

# MOSFET

Metal Oxide Semiconductor Field Effect Transistor

## OptiMOS™ Small-Signal-Transistor, 100V

BSL296SN

### Data Sheet

Rev. 2.0  
Final

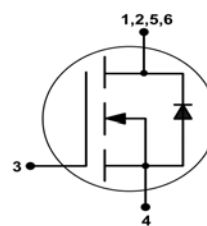
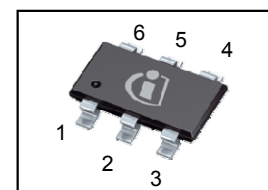
Industrial & Multimarket

**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**

$V_{DS}$		100	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	460	mΩ
	$V_{GS}=4.5\text{ V}$	560	
$I_D$		1.4	A


**PG-TSOP6**


Type	Package	Tape and Reel Info	Marking	Halogen Free	Packing
BSL296SN	TSOP6	H6327: 3000 pcs/ reel	sLZ	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	$E_{AS}$	$I_D=1.4\text{ A}$ , $R_{GS}=25\text{ Ω}$	15.0	mJ
Reverse diode $dv/dt$	$dv/dt$	$I_D=1.4\text{ A}$ , $V_{DS}=50\text{ V}$ , $di/dt=200\text{ A/μs}$ , $T_{j,max}=150\text{ °C}$	6	kV/μs
Gate source voltage	$V_{GS}$		±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	°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, junction - soldering point	$R_{thJS}$		-	-	50	K/W
Thermal resistance 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	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}\text{ V}$ , $I_D=100\text{ }\mu\text{A}$	0.8	1.4	1.8	
Drain-source leakage current	$I_{DSS}$	$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ }^\circ\text{C}$	-	-	0.02	$\mu\text{A}$
		$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=150\text{ }^\circ\text{C}$	-	-	10	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$	-	-	10	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}$ , $I_D=1.4\text{ A}$	-	357	560	$\text{m}\Omega$
		$V_{GS}=10\text{ V}$ , $I_D=1.26\text{ A}$	-	314	460	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=1.1\text{ A}$		3.04	-	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<sup>2)</sup>**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	114.8	152.7	pF
Output capacitance	$C_{oss}$		-	19.7	26.3	
Reverse transfer capacitance	$C_{rss}$		-	9.8	14.7	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V},$ $I_D=1.4\text{ A}, R_{G,ext}=6\ \Omega$	-	3.5	5.6	ns
Rise time	$t_r$		-	3.0	4.5	
Turn-off delay time	$t_{d(off)}$		-	17.1	25.65	
Fall time	$t_f$		-	4.5	8.1	

**Gate Charge Characteristics<sup>2)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=50\text{ V}, I_D=1.4\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	0.27	0.4	nC
Gate to drain charge	$Q_{gd}$		-	1.47	2.2	
Gate charge total	$Q_g$		-	2.7	4.0	
Gate plateau voltage	$V_{plateau}$		-	2.5	-	V

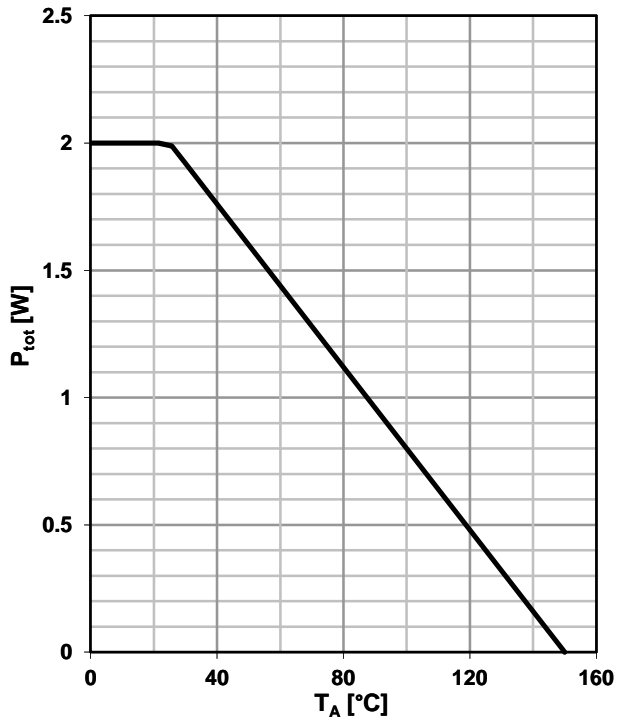
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	1.4	A
Diode pulse current	$I_{S,pulse}$		-	-	5.6	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=1.4\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.8	1.1	V
Reverse recovery time <sup>2)</sup>	$t_{rr}$	$V_R=50\text{ V}, I_F=1.4\text{ A},$ $di_F/dt=200\text{ A}/\mu\text{s}$	-	20	30	ns
Reverse recovery charge <sup>2)</sup>	$Q_{rr}$		-	37	55	nC

<sup>2)</sup> Defined by design. Not subjected to production test

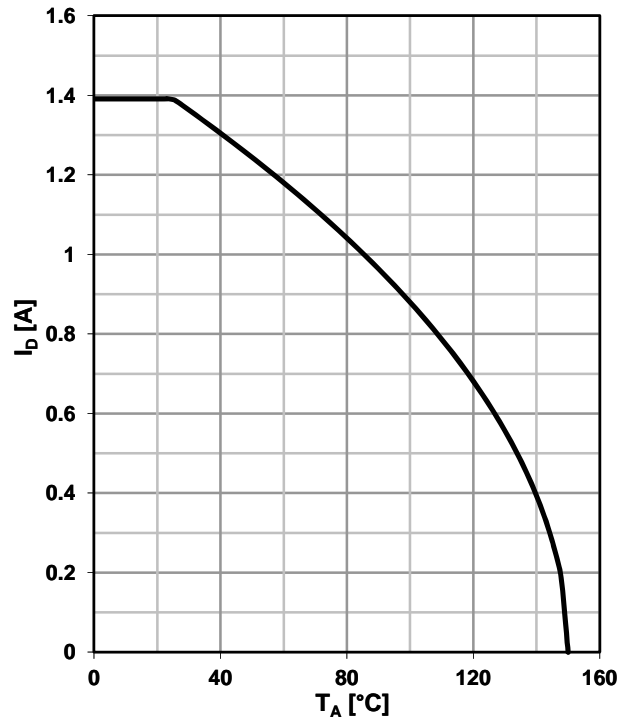
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

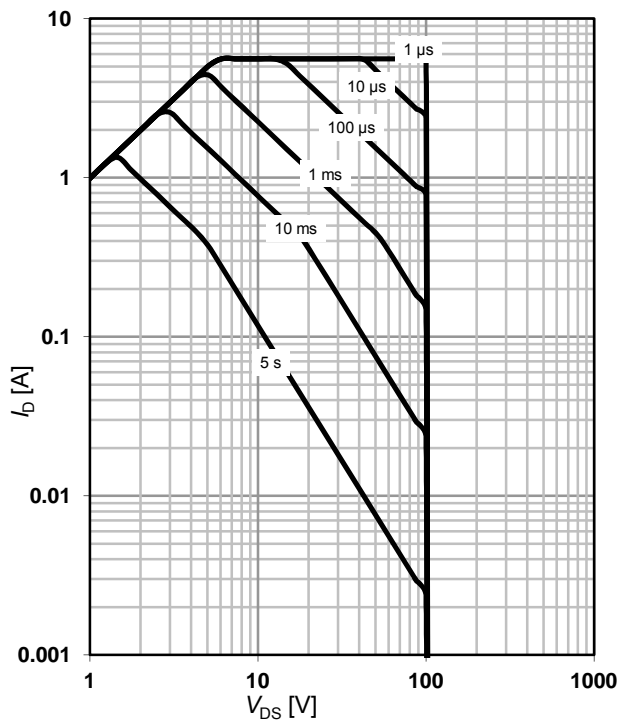
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

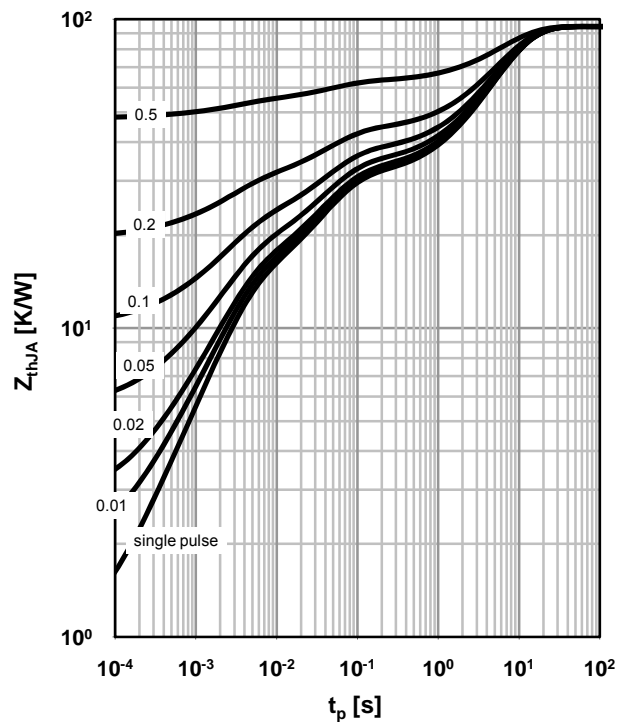
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

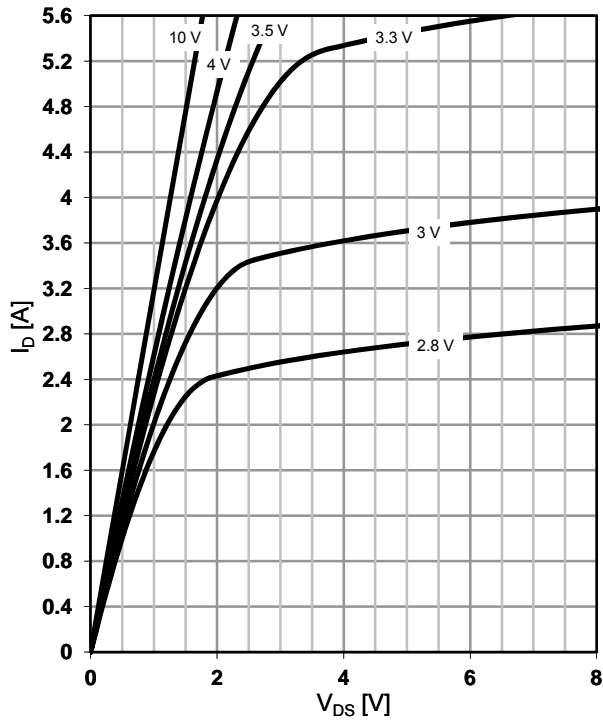
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

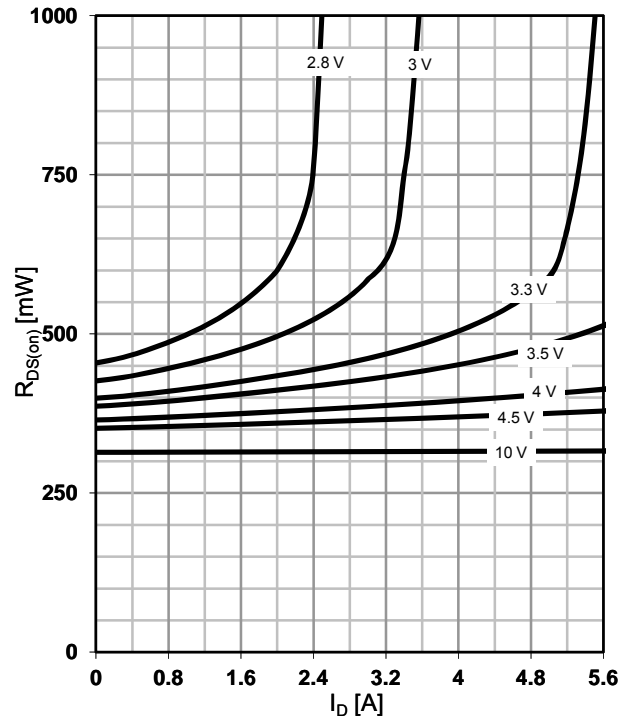
parameter:  $V_{GS}$



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

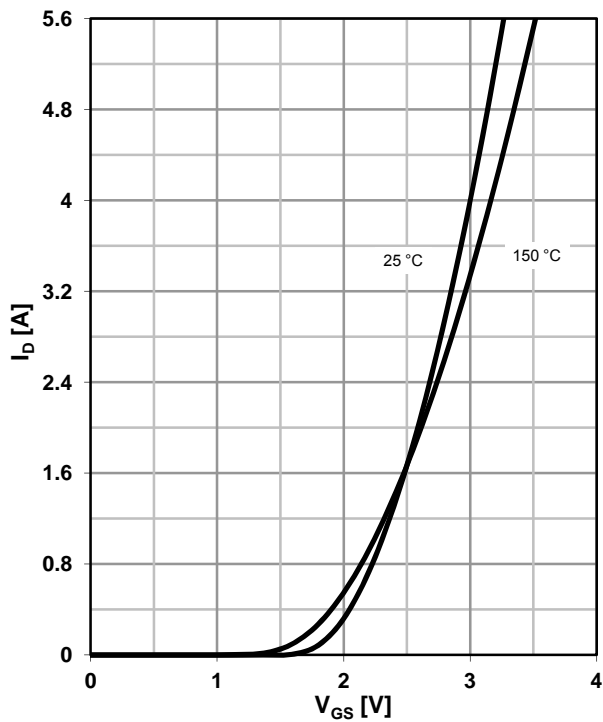
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



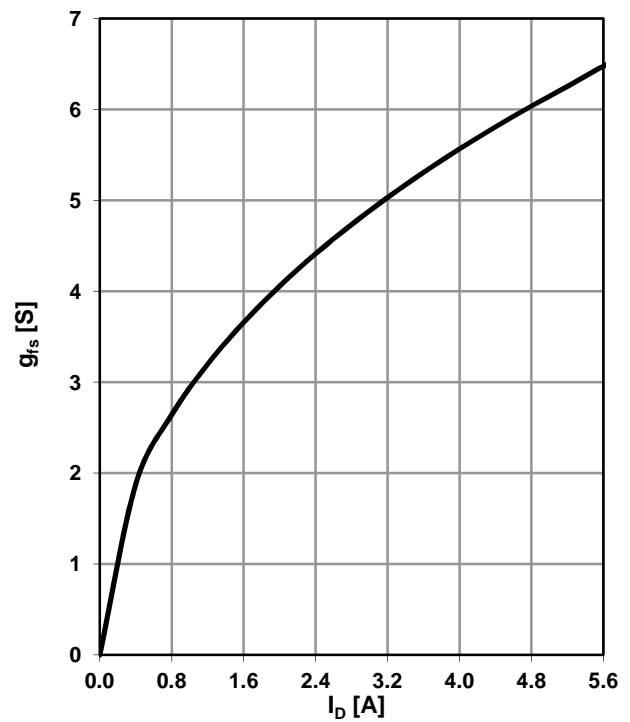
**7 Typ. transfer characteristics**

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



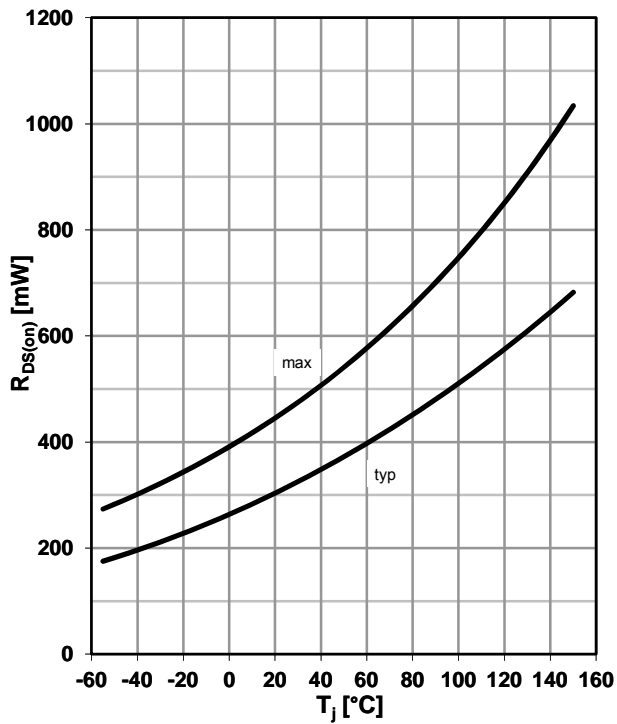
**8 Typ. forward transconductance**

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



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

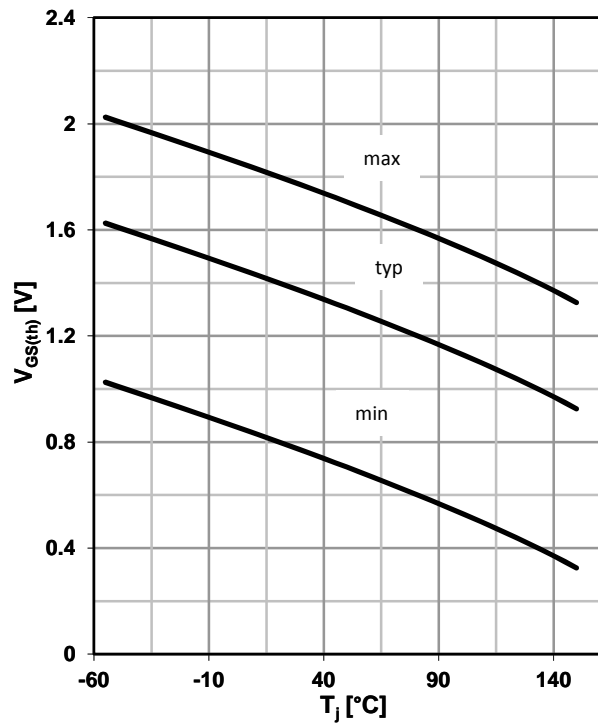
$R_{DS(on)}=f(T_j); I_D=1.4\text{ A}; V_{GS}=10\text{ V}$



**10 Typ. gate threshold voltage**

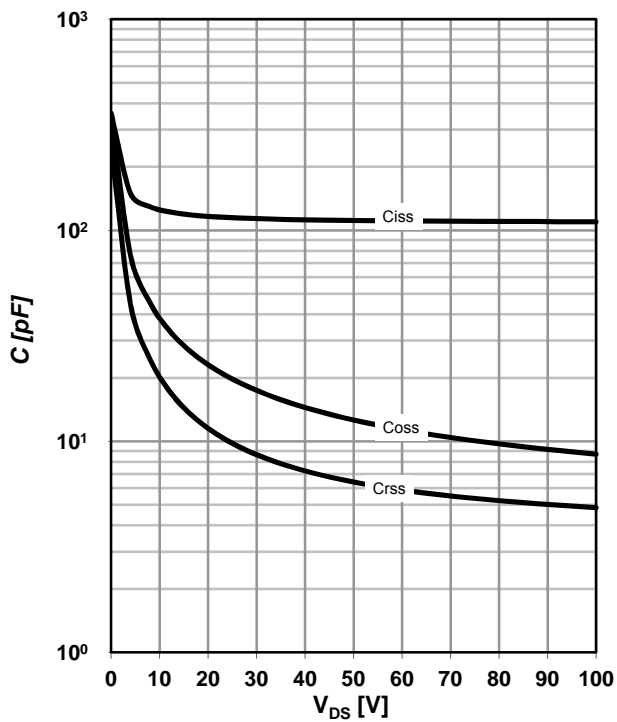
$V_{GS(th)}=f(T_j); V_{DS}=V_{GS}; I_D=100\ \mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

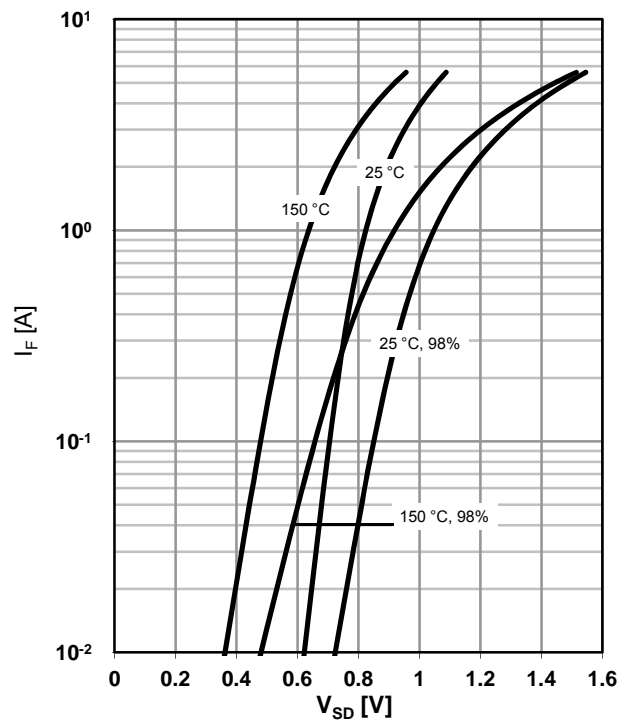
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}; T_j=25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

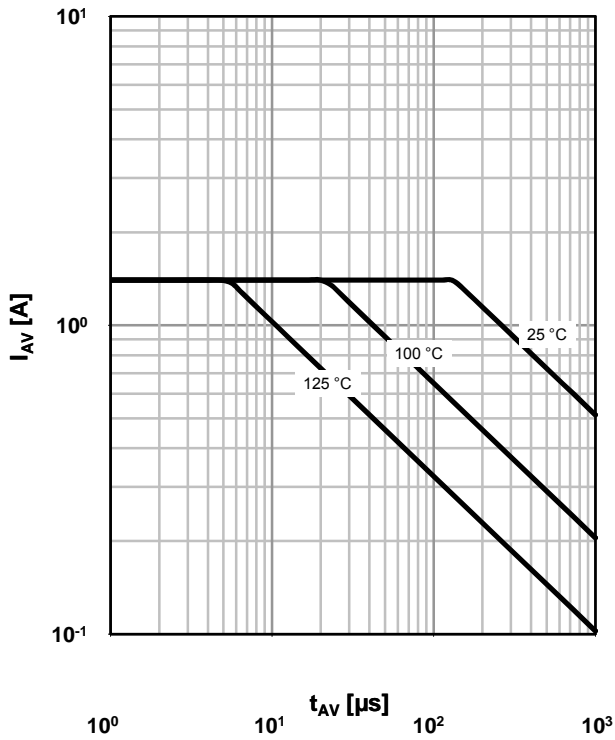
parameter:  $T_j$



**13 Avalanche characteristics**

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

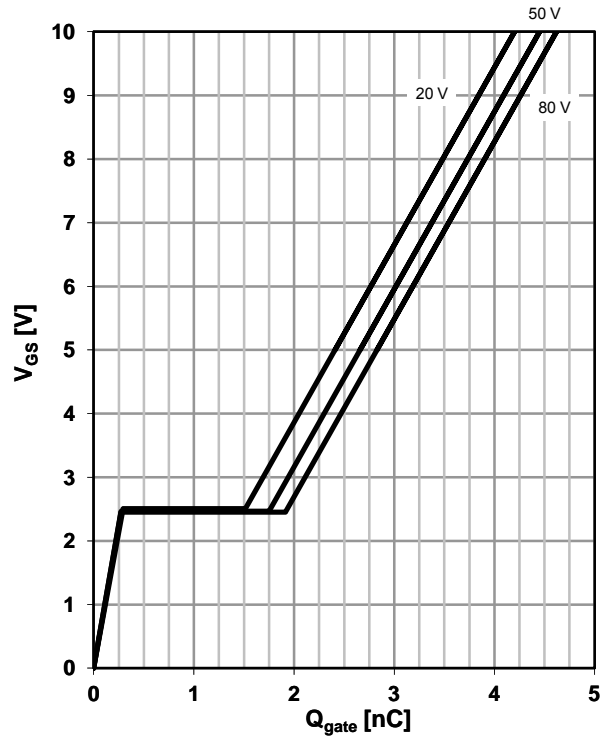
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

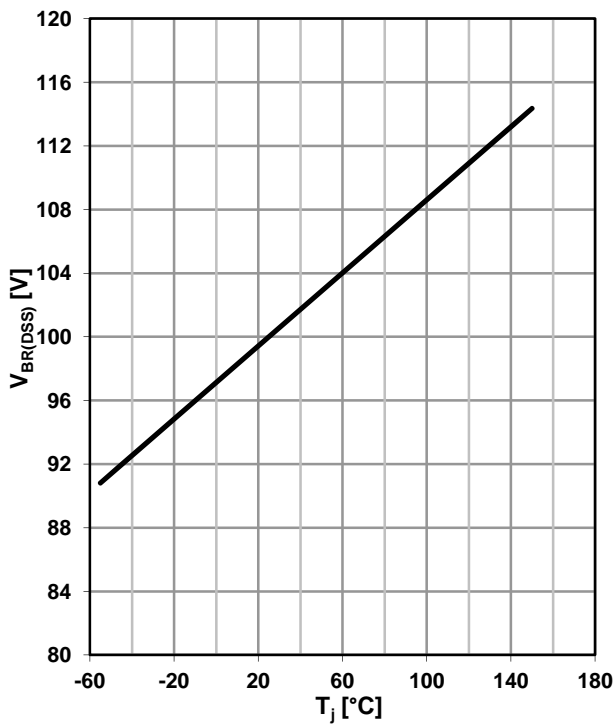
$V_{GS}=f(Q_{gate}); I_D=1.4 \text{ A pulsed}$

parameter:  $V_{DD}$

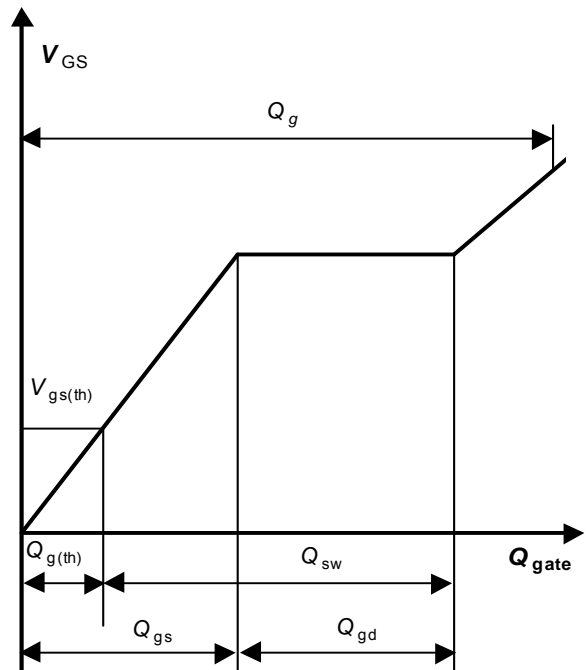


**15 Drain-source breakdown voltage**

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



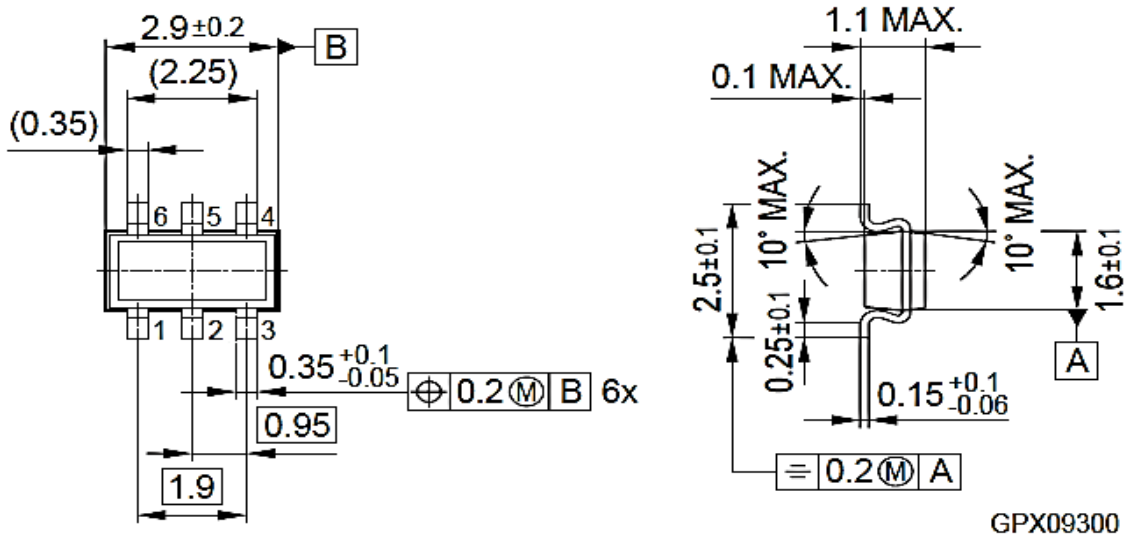
**16 Gate charge waveforms**



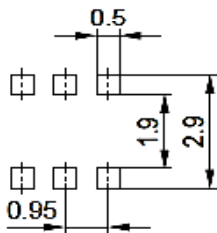


TSOP6

Package Outline:

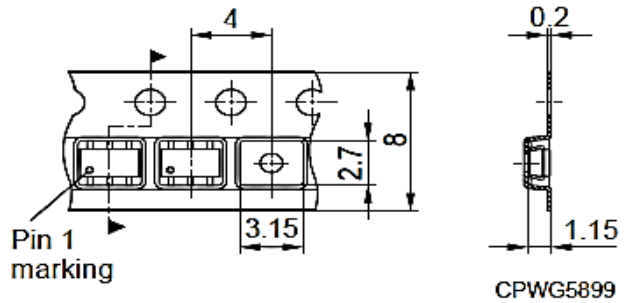


Footprint:



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

BSL296SN

**Revision: 2014-10-22, Rev. 2.0**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2014-10-22	Release of final version

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