

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

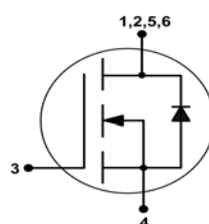
Features

- 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

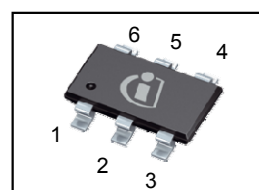


Product Summary

V_{DS}	100	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	460
	$V_{GS}=4.5\text{ V}$	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}	$I_D=1.4\text{ A}$, $R_{GS}=25\text{ }\Omega$	15.0	mJ
Reverse diode dv/dt	dv/dt	$I_D=1.4\text{ A}$, $V_{DS}=50\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$	6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
Power dissipation ¹⁾	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 ² cooling area ¹⁾	-	-	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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=100\text{ }\mu\text{A}$	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	μA
		$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^{\circ}\text{C}$	-	-	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	m Ω
		$V_{GS}=10\text{ V}, I_D=1.26\text{ A}$	-	314	460	
Transconductance	g_{fs}	$ V_{DS} > 2 I_D R_{DS(on)max}, I_D=1.1\text{ A}$		3.04	-	S

¹⁾ Device on 40mm x 40mm x 1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air. (t < 5 sec.)

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics²⁾

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	$t_{d(on)}$	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V},$ $I_D=1.4\text{ A}, R_{G,ext}=6\text{ }\Omega$	-	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 Characteristics²⁾

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

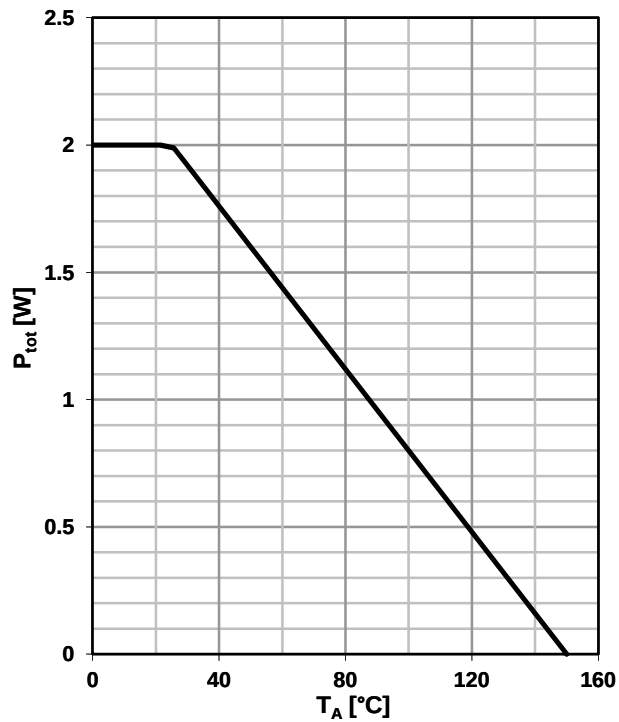
Reverse Diode

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 ²⁾	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 ²⁾	Q_{rr}		-	37	55	nC

²⁾ Defined by design. Not subjected to production test

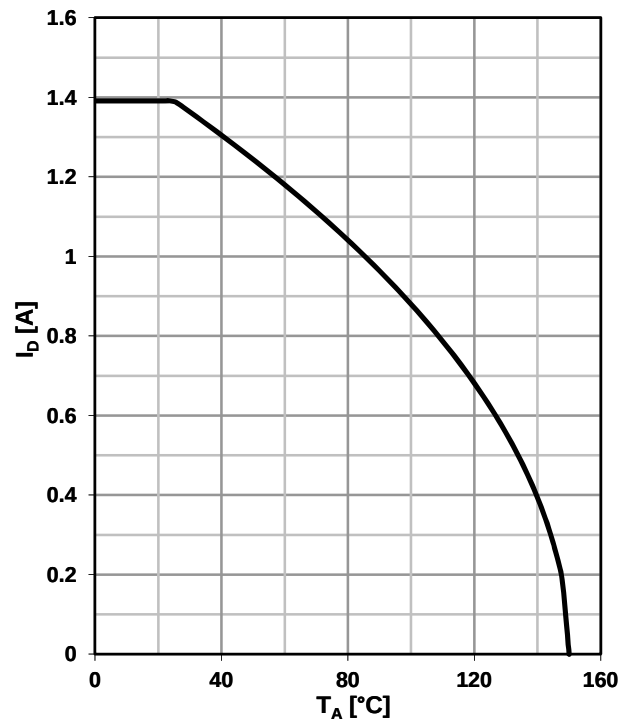
1 Power dissipation

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



2 Drain current

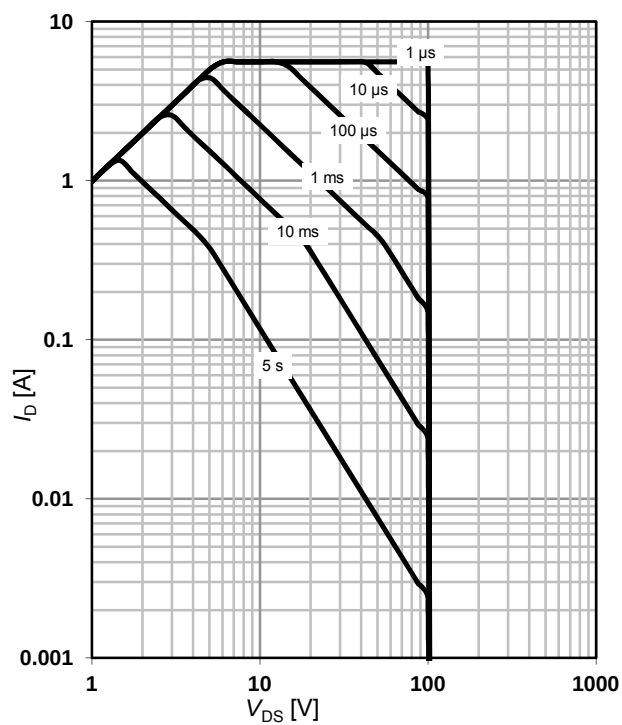
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

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

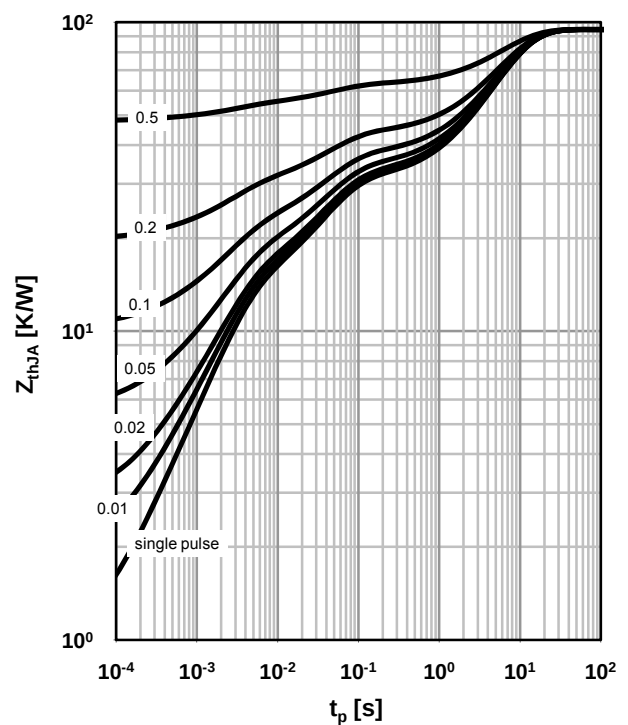
parameter: t_p



4 Max. transient thermal impedance

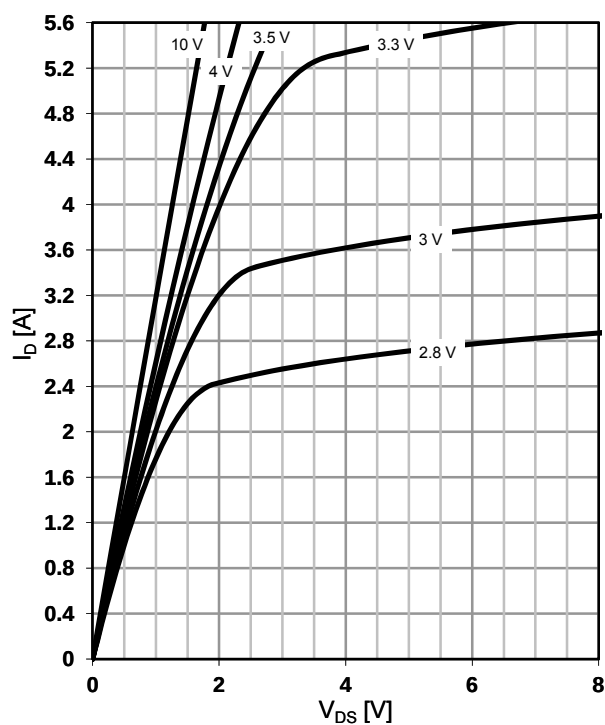
$$Z_{\text{thJA}} = f(t_p)$$

parameter: $D = t_p/T$



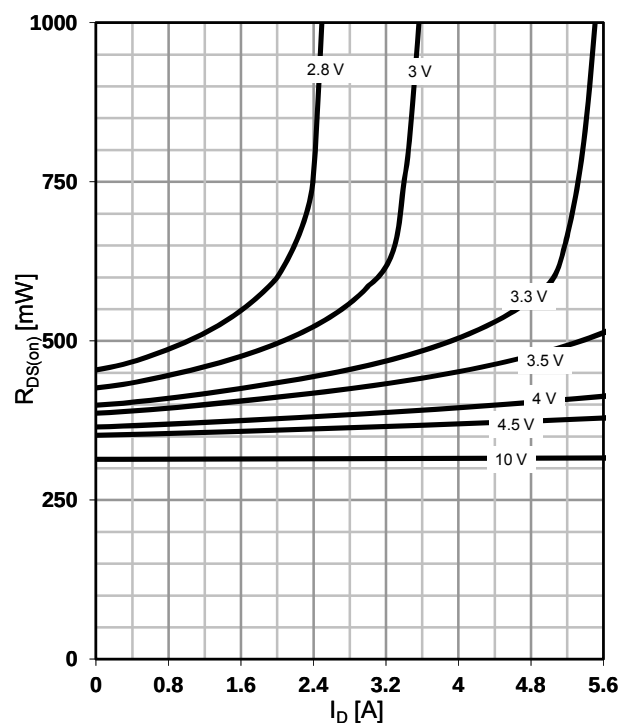
5 Typ. output characteristics

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

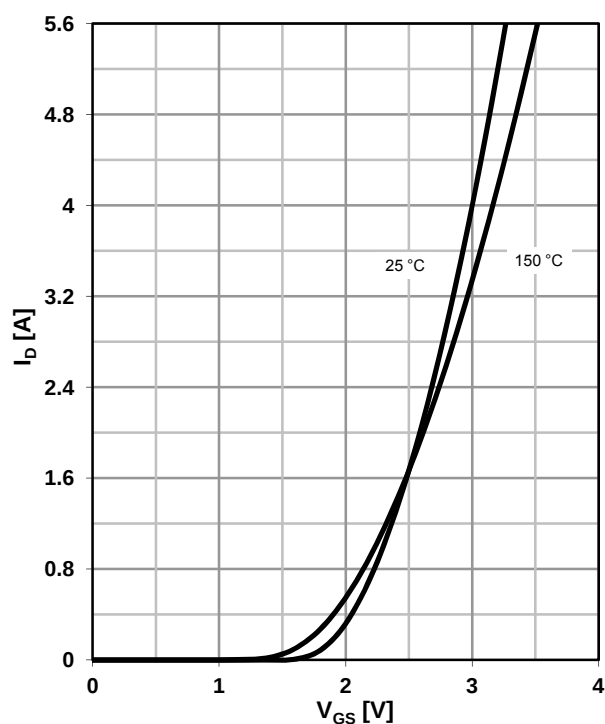
parameter: V_{GS}


6 Typ. drain-source on resistance

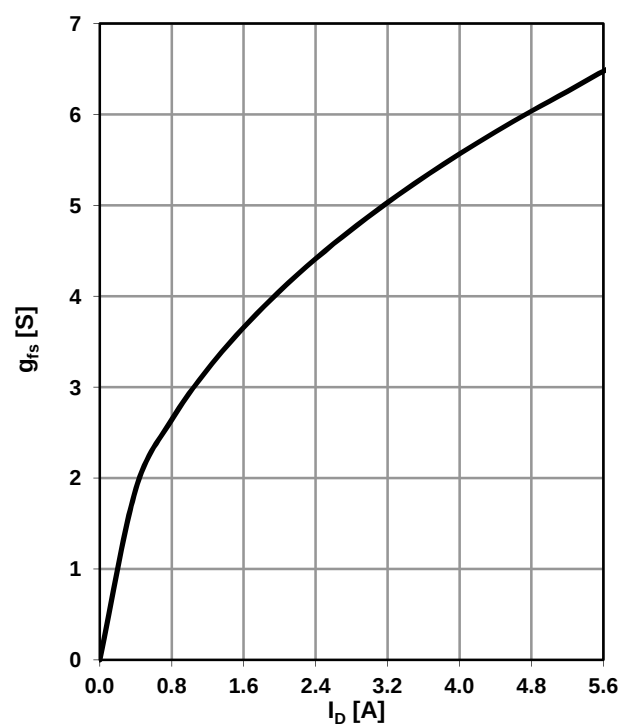
 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter: V_{GS}


7 Typ. transfer characteristics

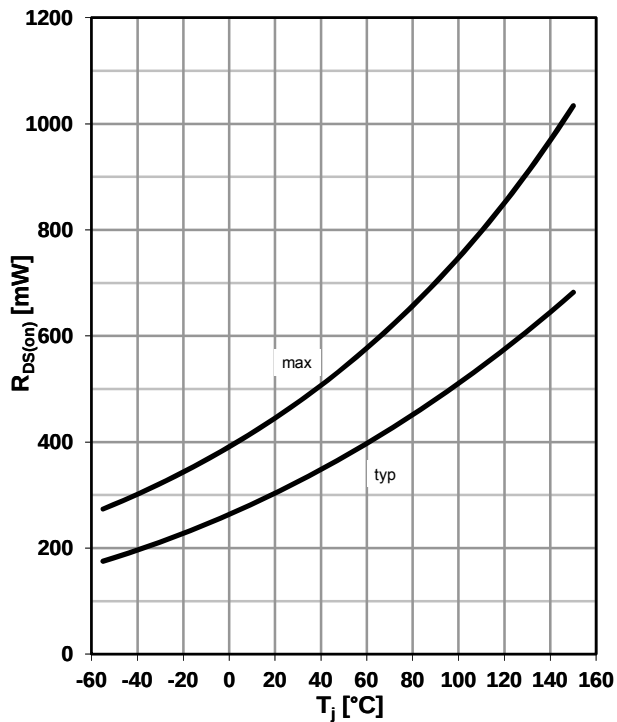
 $I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$


8 Typ. forward transconductance

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


9 Drain-source on-state resistance

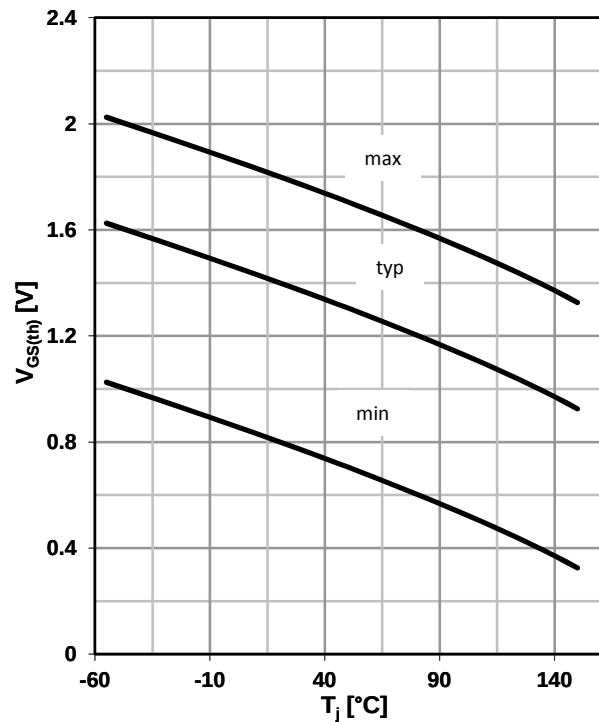
$R_{DS(on)} = f(T_j)$; $I_D = 1.4 \text{ A}$; $V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

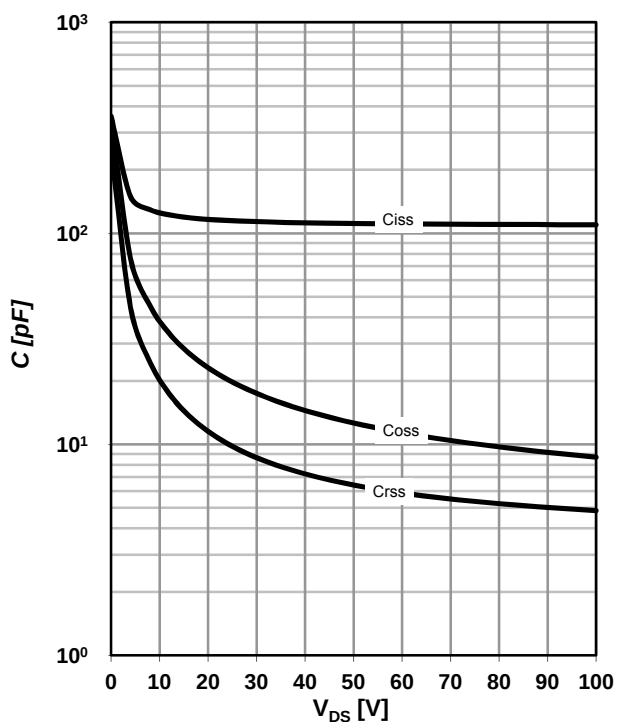
$V_{GS(th)} = f(T_j)$; $V_{DS} = V_{GS}$; $I_D = 100 \mu\text{A}$

parameter: I_D



11 Typ. capacitances

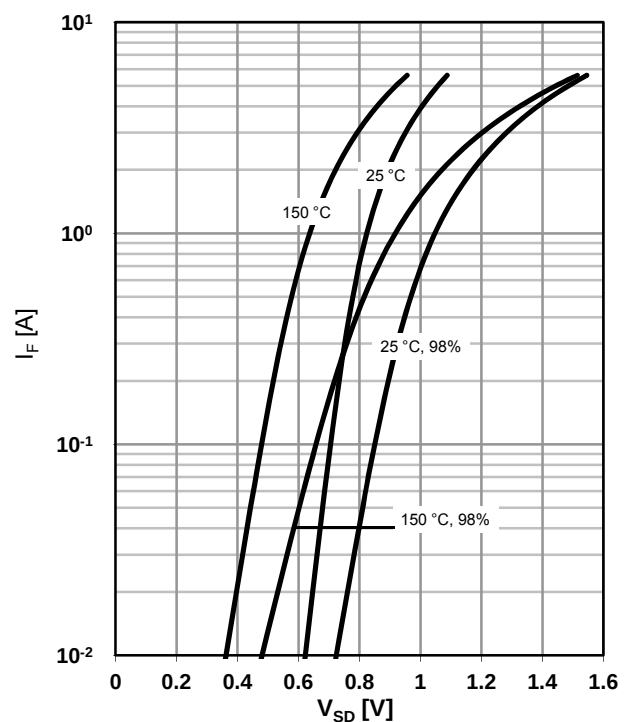
$C = f(V_{DS})$; $V_{GS} = 0 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25^\circ\text{C}$



12 Forward characteristics of reverse diode

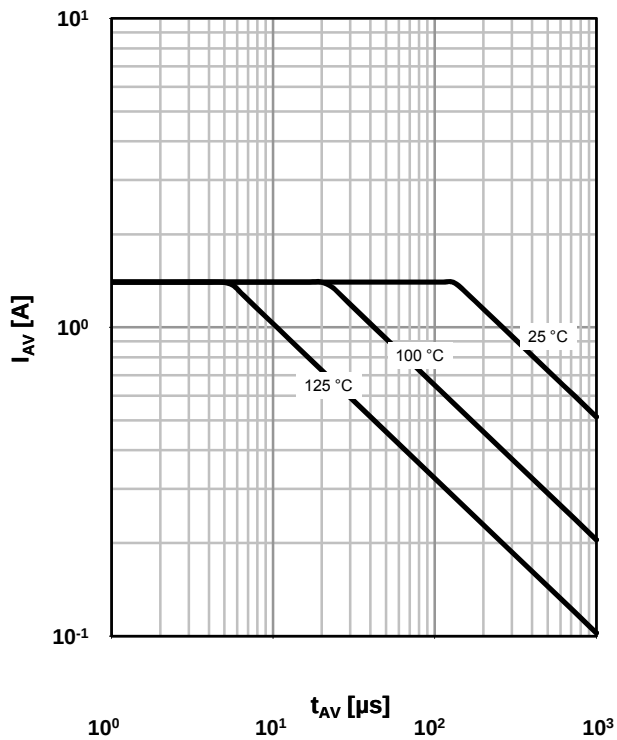
$I_F = f(V_{SD})$

parameter: T_j

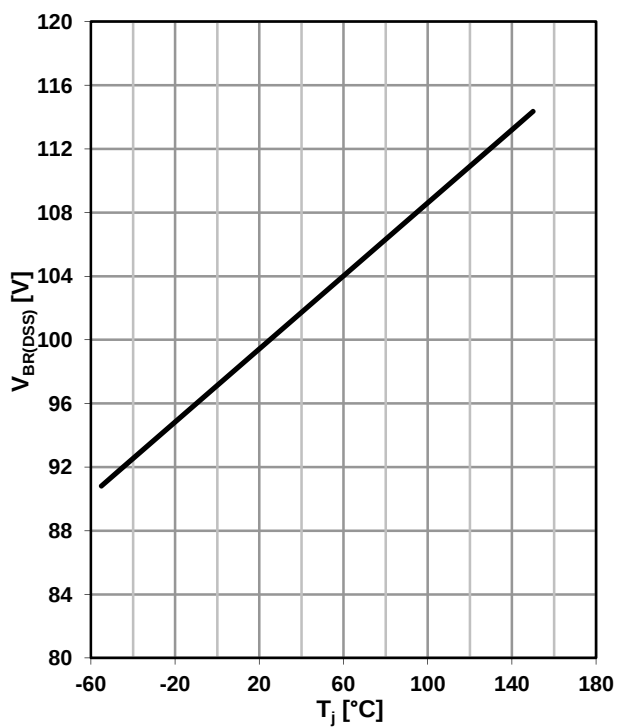


13 Avalanche characteristics

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

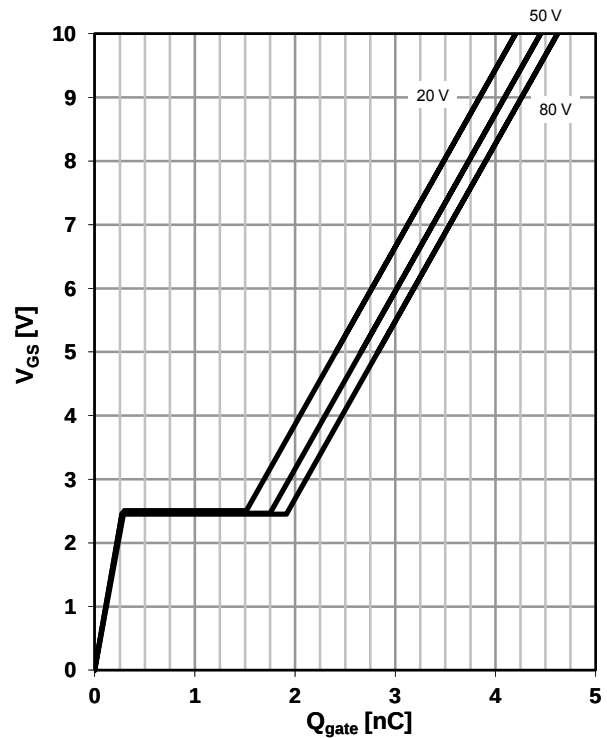
parameter: $T_{j(start)}$


15 Drain-source breakdown voltage

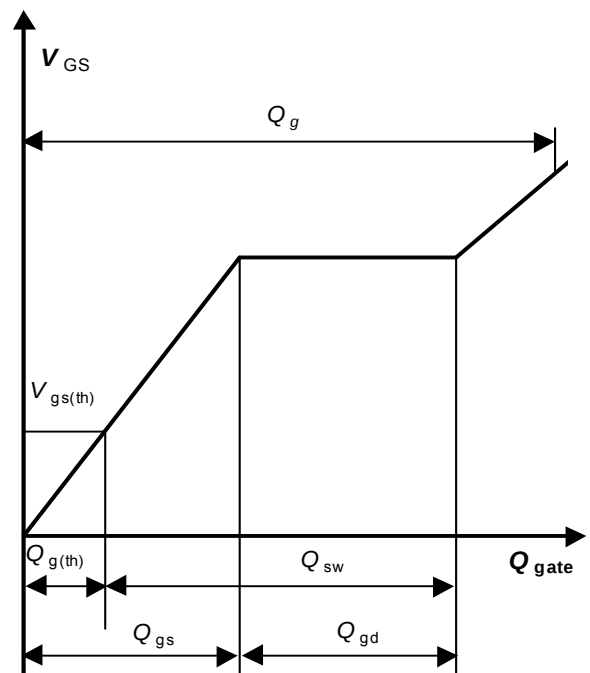
 $V_{BR(DSS)}=f(T_j); I_D=250\ \mu A$


14 Typ. gate charge

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

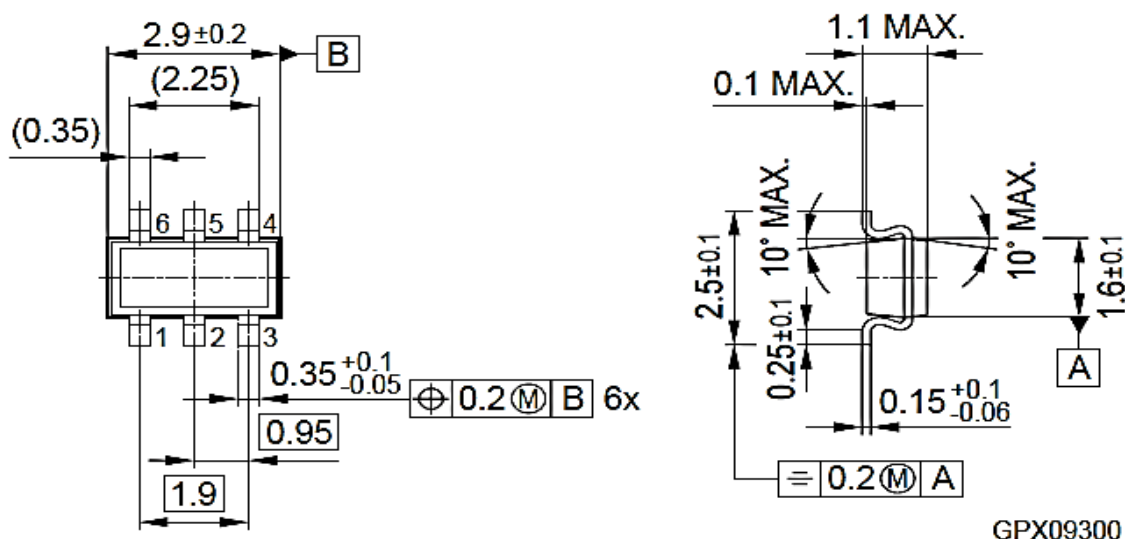
parameter: V_{DD}


16 Gate charge waveforms

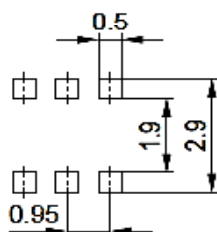


TSOP6

Package Outline:

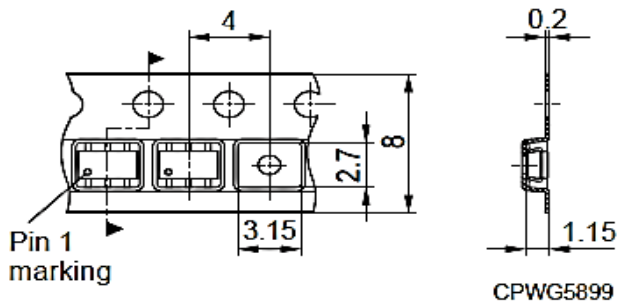


Footprint:



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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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9