

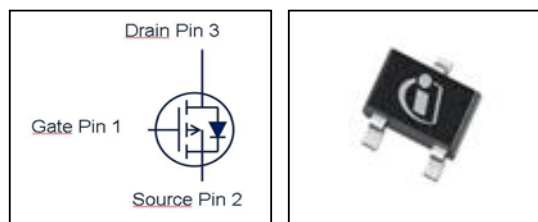
OptiMOS® -P Small-Signal-Transistor
Features

- P-Channel
- Enhancement mode
- Super Logic level (2.5 V rated)
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21


Product Summary

V_{DS}	-20	V
$R_{DS(on),max}$	550	m Ω
I_D	-0.63	A

PG-SOT-323



Type	Package	Tape and Reel Information	Marking	Lead free	Packing
BSS 209PW	SOT-323	H6327: 1000 pcs/reel	X3s	Yes	Non Dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_C=25\text{ }^\circ\text{C}$	-0.63	A
		$T_C=70\text{ }^\circ\text{C}$	-0.5	
Pulsed drain current	$I_{D,pulse}$	$T_C=25\text{ }^\circ\text{C}$	-2.5	
Avalanche energy, single pulse	E_{AS}	$I_D = -0.63\text{ A}$, $R_{GS} = 25\ \Omega$	4.0	mJ
Reverse diode dv/dt	dv/dt	$I_D = -0.63\text{ A}$, $V_{DS} = -16\text{ V}$, $di/dt = -200\text{ A}/\mu\text{s}$, $T_{j,max} = 150\text{ }^\circ\text{C}$	-6	kV/ μs
Gate source voltage	V_{GS}		± 12	V
Power dissipation	P_{tot}	$T_A = 25\text{ }^\circ\text{C}$	0.30	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	$^\circ\text{C}$
ESD class		JESD22-C101 (HBM)	0 (max 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, junction - soldering point	R_{thJS}		-	-	120	K/W
SMD version, device on PCB:	R_{thJA}	minimal footprint	-	-	420	
		6 cm ² cooling area ¹⁾	-	-	350	

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

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=-250\mu\text{A}$	-20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=3.5\mu\text{A}$	-0.6	-0.9	-1.2	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-20\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ }^\circ\text{C}$	-	-0.1	-1	μA
		$V_{DS}=-20\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=150\text{ }^\circ\text{C}$	-	-10	-100	
Gate-source leakage current	I_{GSS}	$V_{GS}=12\text{ V}$, $V_{DS}=0\text{ V}$	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=2.5\text{ V}$, $I_D=0.46\text{ A}$	-	581	900	
		$V_{GS}=4.5\text{ V}$, $I_D=0.63\text{ A}$	-	379	550	
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=0.46\text{ A}$	0.87	1.74	-	S

¹⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air; $\leq 10\text{ sec}$.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=-15\text{ V},$ $f=1\text{ MHz}$	-	87	115	pF
Output capacitance	C_{oss}		-	35	46.7	
Reverse transfer capacitance	C_{rss}		-	30	45	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-10\text{ V}, V_{GS}=-$ $4.5\text{ V}, I_D=0.58\text{ A},$ $R_G=6\ \Omega$	-	2.6	4.0	ns
Rise time	t_r		-	7	11	
Turn-off delay time	$t_{d(off)}$		-	6	9	
Fall time	t_f		-	4.6	6.9	

Gate Charge Characteristics³⁾

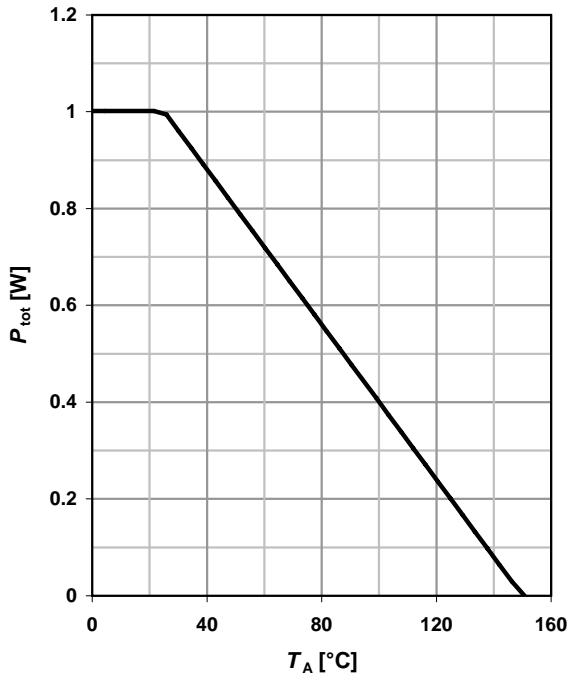
Gate to source charge	Q_{gs}	$V_{DD}=10\text{ V}, I_D=0.58\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	-0.18	-0.24	nC
Gate to drain charge	Q_{gd}		-	-0.46	-0.7	
Gate charge total	Q_g		-	-1.0	-1.3	
Gate plateau voltage	$V_{plateau}$		-	-2.0	-	V

Reverse Diode

Diode continuous forward current	I_S	$T_C=25\text{ }^\circ\text{C}$	-	-	-0.7	A
Diode direct current, pulsed	I_{SM}		-	-	-4.0	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=-0.58\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-0.92	-0.88	V
Reverse recovery time	t_{rr}	$V_R=10\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	9	11.2	ns
Reverse recovery charge	Q_{rr}		-	1.27	1.59	

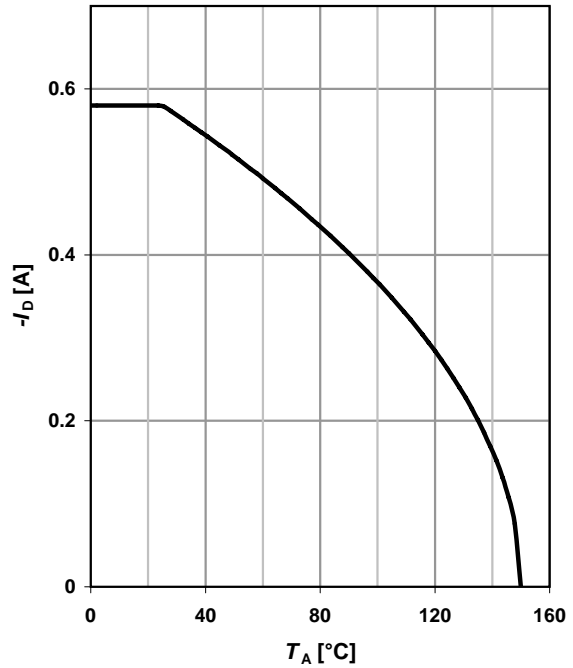
1 Power dissipation

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



2 Drain current

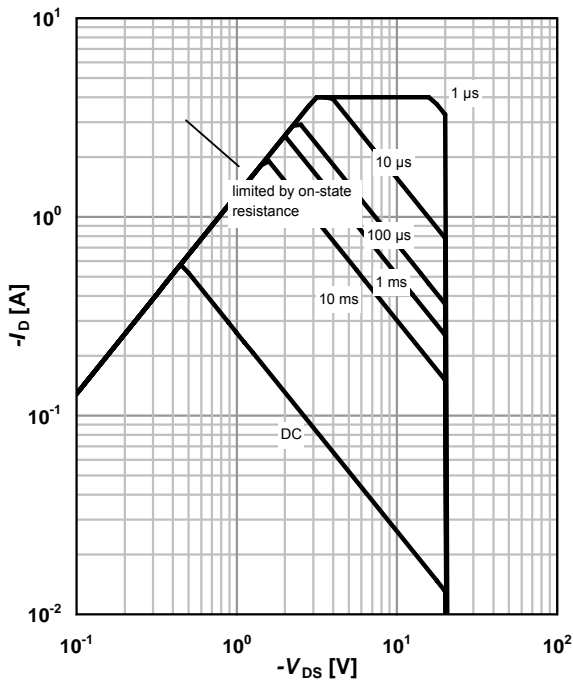
$$I_D = f(T_A); |V_{GS}| \geq 4.5 \text{ V}$$



3 Safe operating area

$$I_D = f(V_{DS}); T_A = 25 \text{ °C}^1; D = 0$$

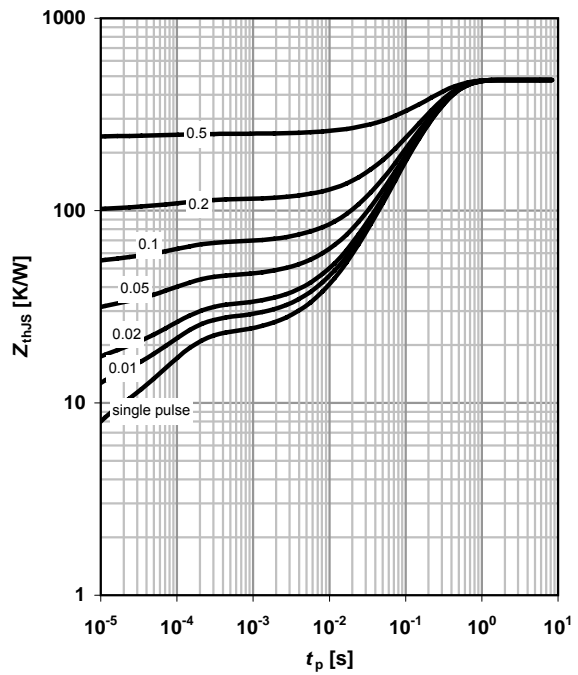
parameter: t_p



4 Max. transient thermal impedance

$$Z_{thJS} = f(t_p)$$

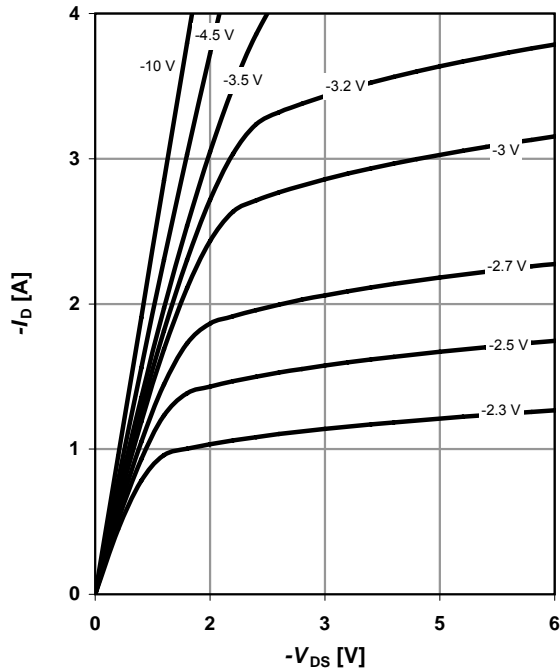
parameter: $D = t_p / T$



5 Typ. output characteristics

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

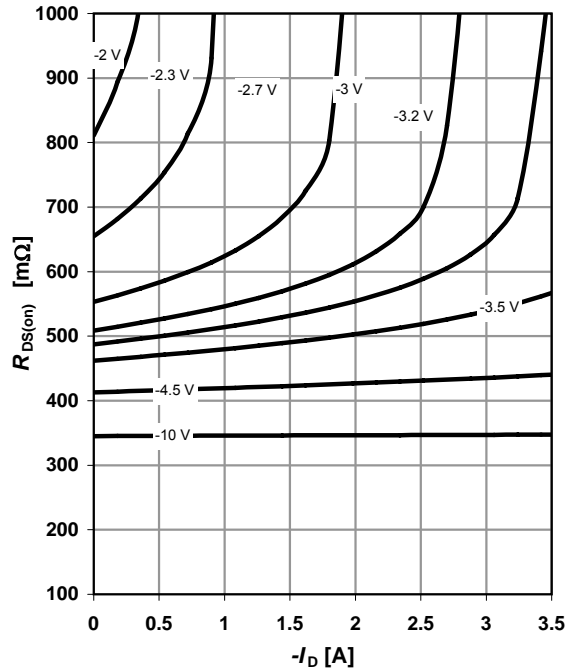
parameter: V_{GS}



6 Typ. drain-source on resistance

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

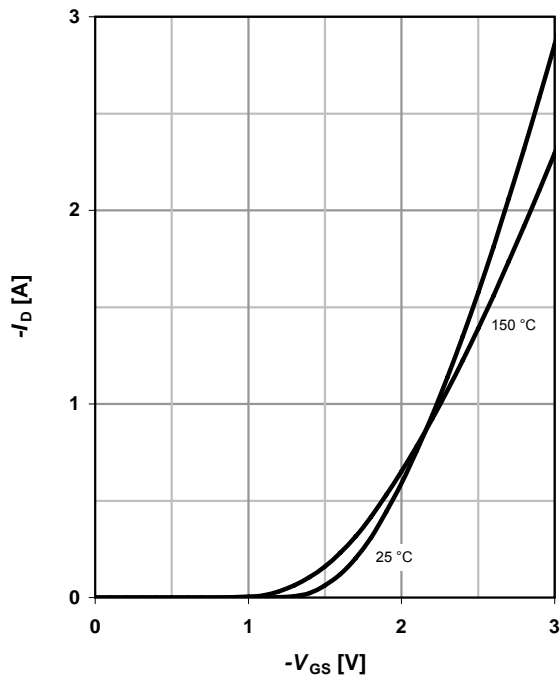
parameter: V_{GS}



7 Typ. transfer characteristics

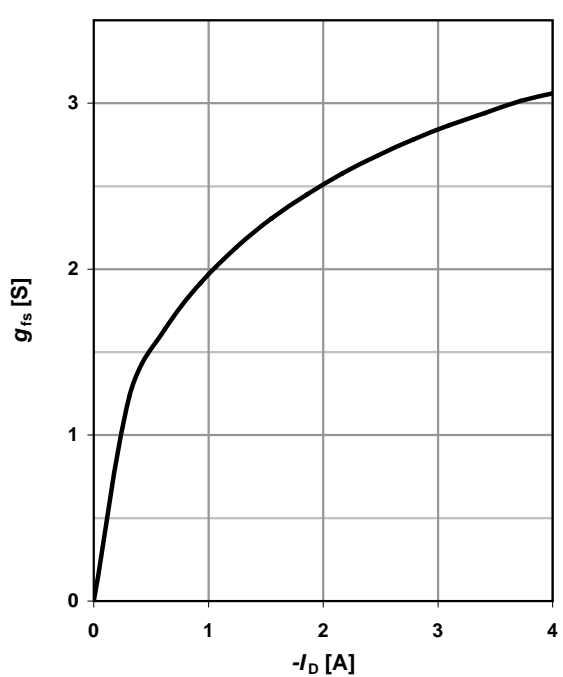
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



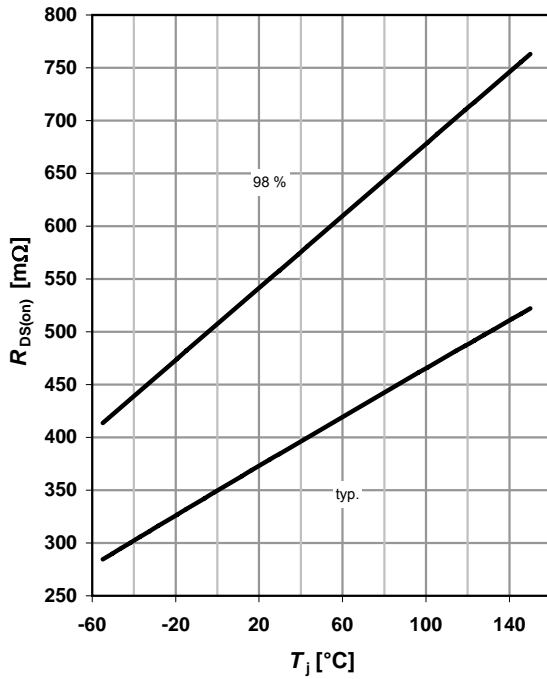
8 Typ. forward transconductance

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



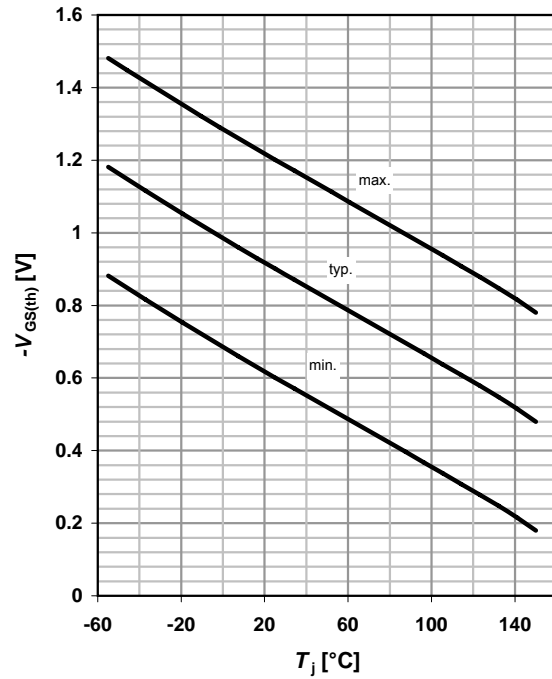
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = -0.58 \text{ A}; V_{GS} = -4.5 \text{ V}$



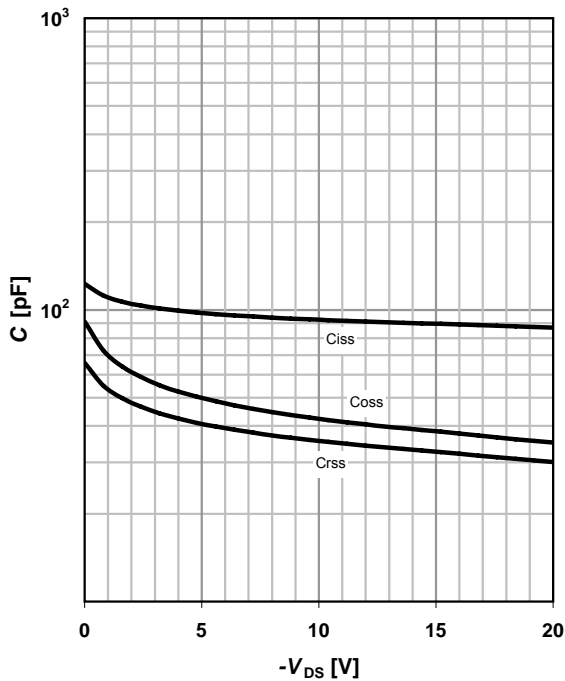
10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -3.5 \mu\text{A}$



11 Typ. capacitances

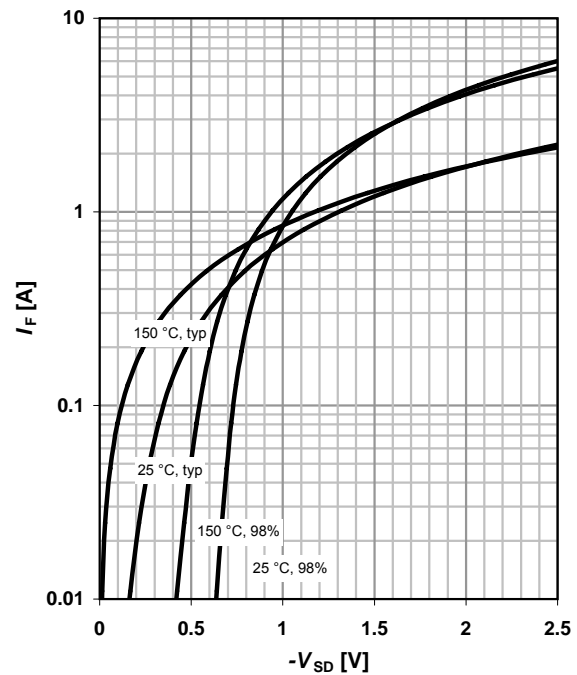
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

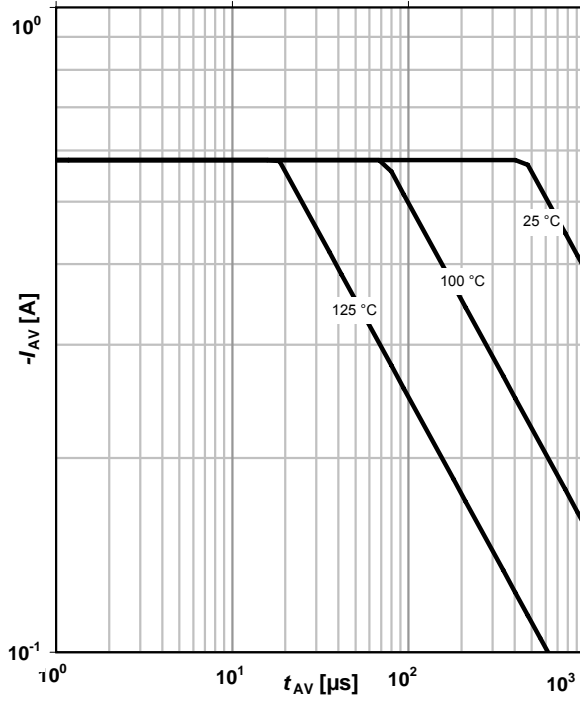
parameter: T_j



13 Avalanche characteristics

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

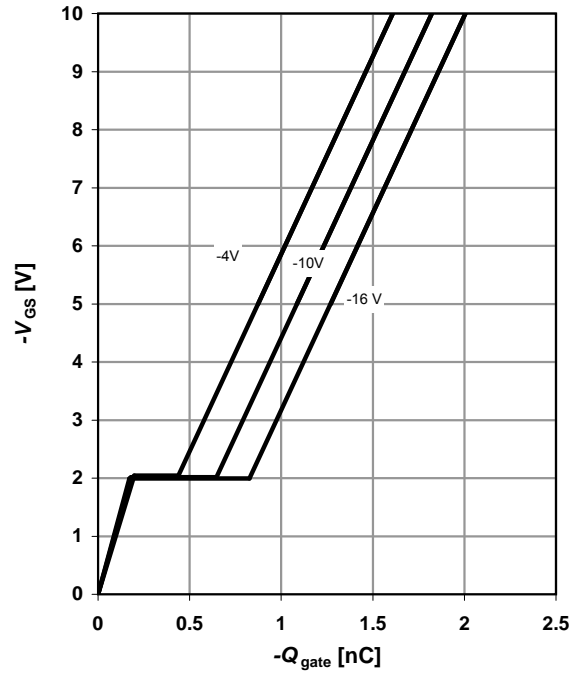
parameter: $T_{j(start)}$



14 Typ. gate charge

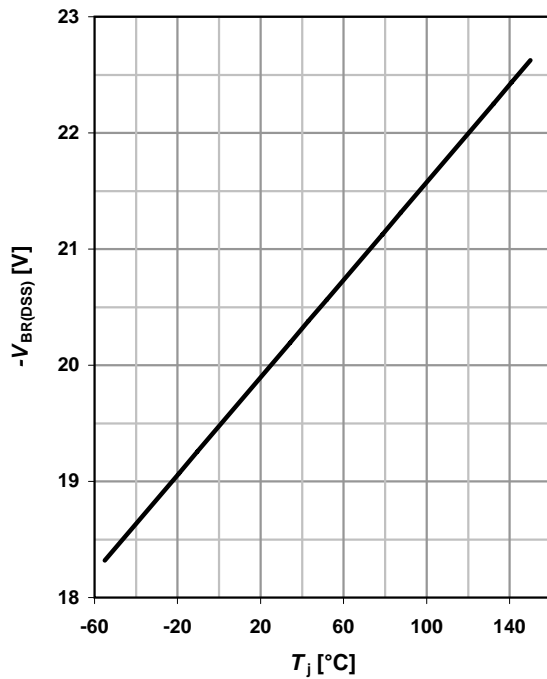
$V_{GS}=f(Q_{gate}); I_D=-0.58\ \text{A pulsed}$

parameter: V_{DD}

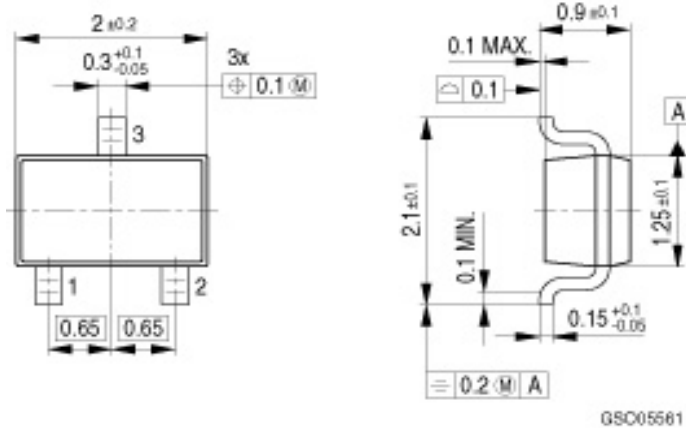


15 Drain-source breakdown voltage

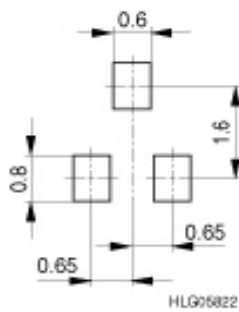
$V_{BR(DSS)}=f(T_j); I_D=-250\ \mu\text{A}$



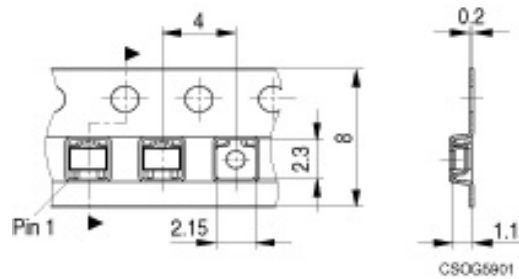
Package Outline:



Footprint:



Packaging:



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