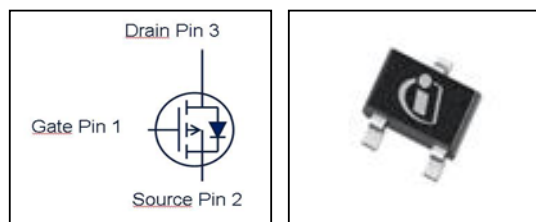


**OptiMOS® -P Small-Signal-Transistor**
**Features**

- 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 $\Omega$
$I_D$	-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/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 12$	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 <sup>2</sup> cooling area <sup>1)</sup>	-	-	350	

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

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=-250\mu\text{A}$	-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	$I_{DSS}$	$V_{DS}=-20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$	-	-0.1	-1	$\mu\text{A}$
		$V_{DS}=-20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=150\text{ °C}$	-	-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

<sup>1)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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 Characteristics<sup>3)</sup>**

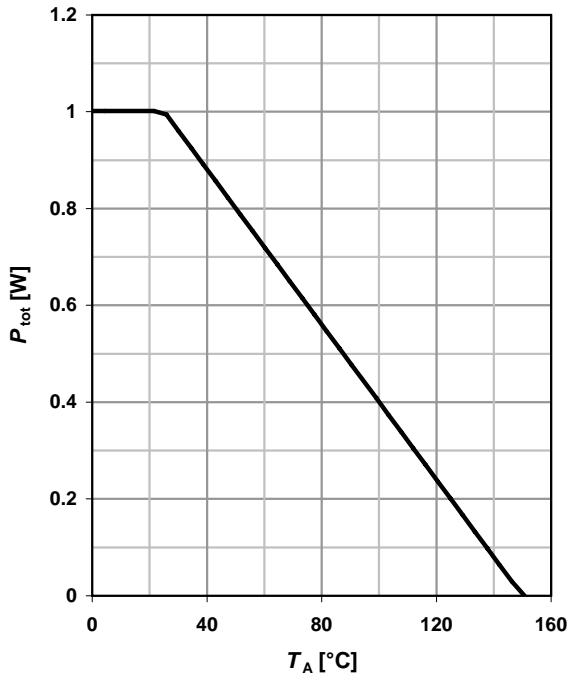
Gate to source charge	$Q_{gs}$	$V_{DD}=10\text{ V}, I_D=0.58\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	-0.18	-0.24	nC
Gate to drain charge	$Q_{gd}$		-	-0.46	-0.7	
Gate charge total	$Q_g$		-	-1.0	-1.3	
Gate plateau voltage	$V_{plateau}$		-	-2.0	-	V

**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	nC

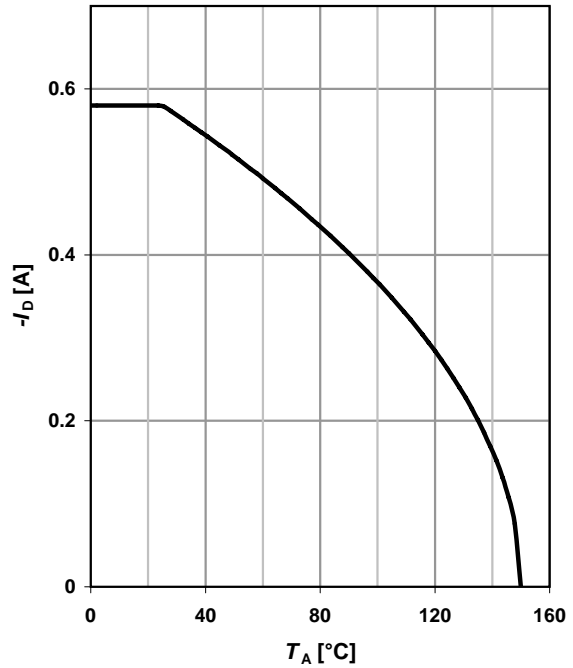
**1 Power dissipation**

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



**2 Drain current**

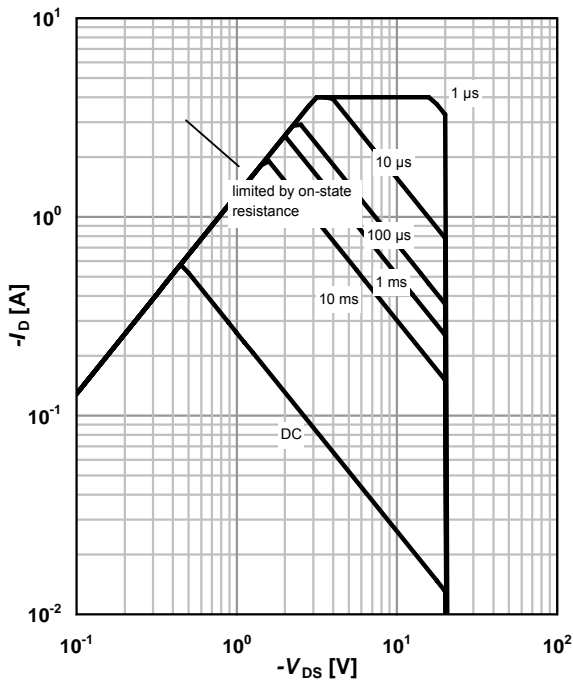
$$I_D = f(T_A); |V_{GS}| \geq 4.5 \text{ V}$$



**3 Safe operating area**

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

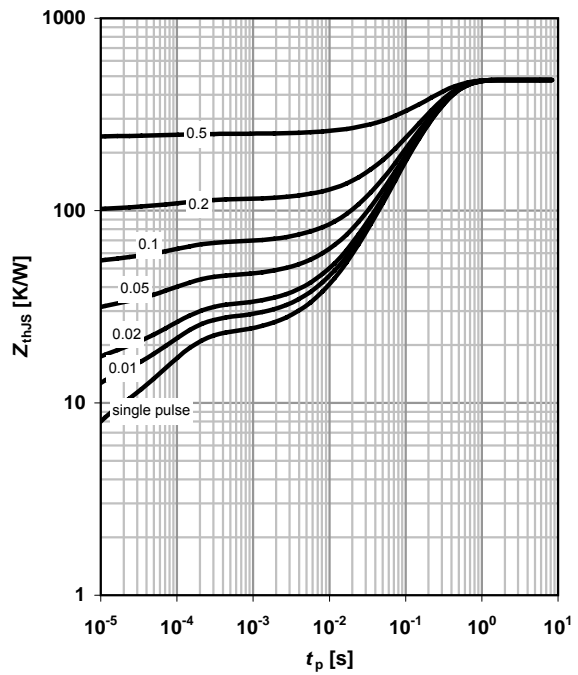
parameter:  $t_p$



**4 Max. transient thermal impedance**

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

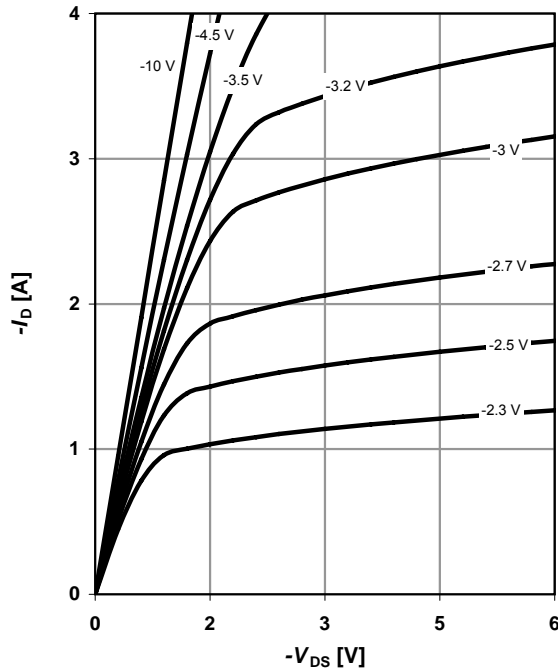
parameter:  $D = t_p / T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

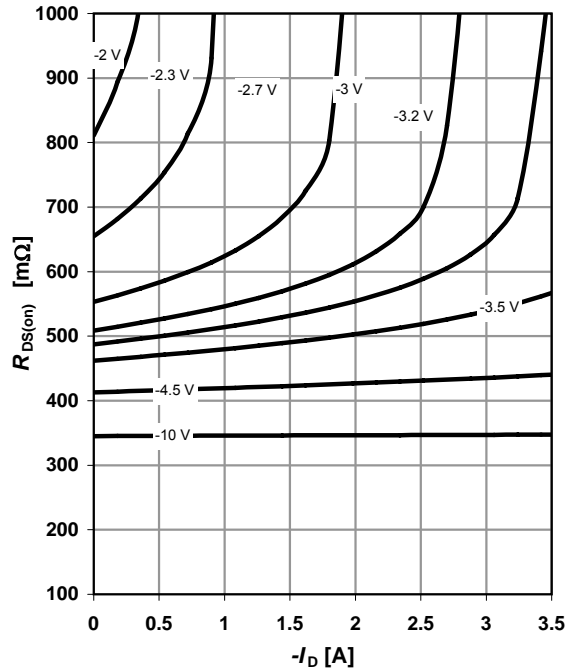
parameter:  $V_{GS}$



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

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

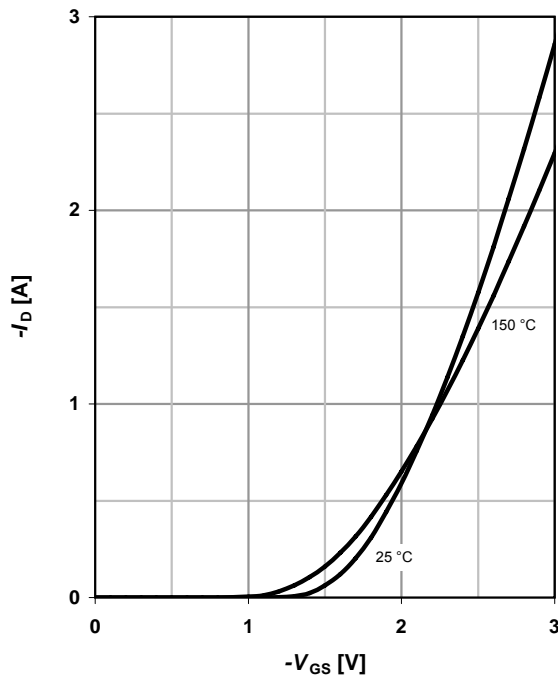
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

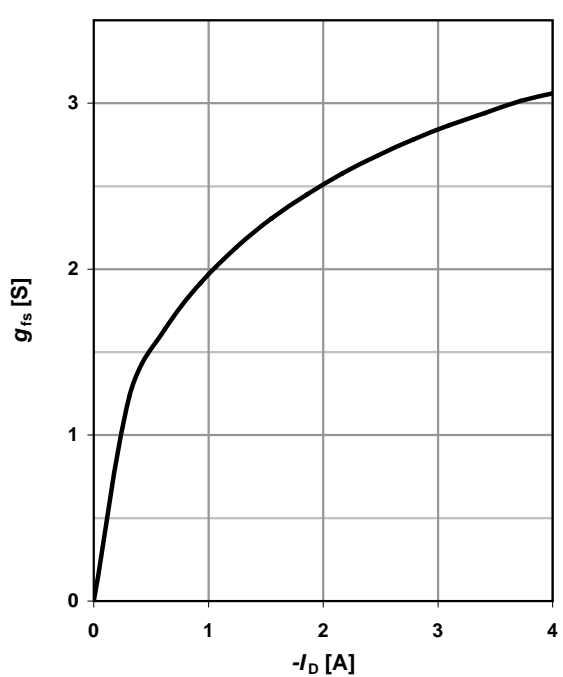
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



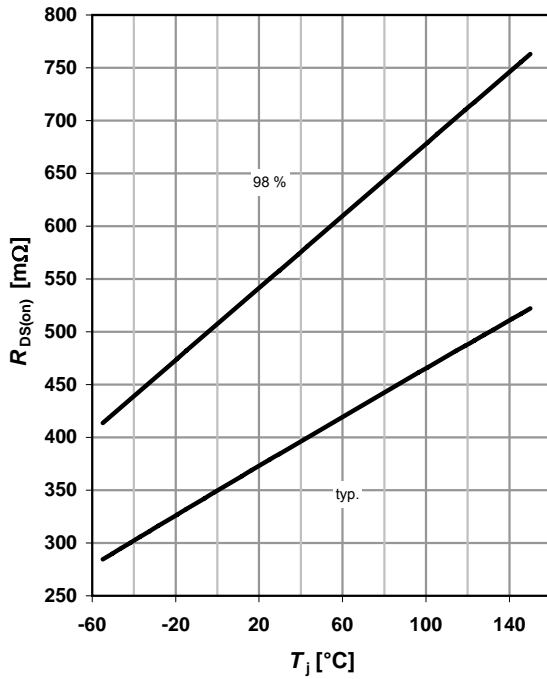
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



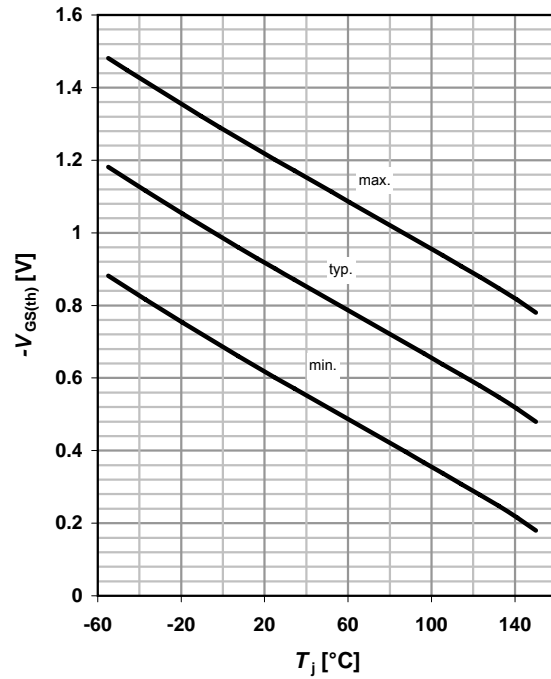
**9 Drain-source on-state resistance**

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



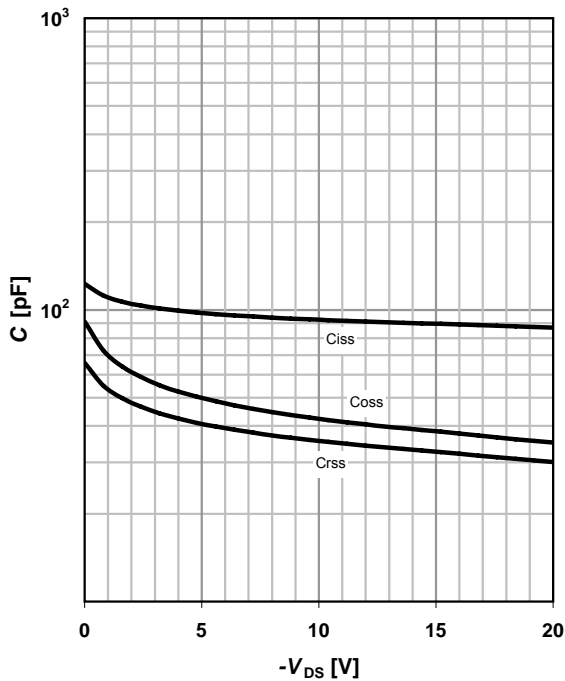
**10 Typ. gate threshold voltage**

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



**11 Typ. capacitances**

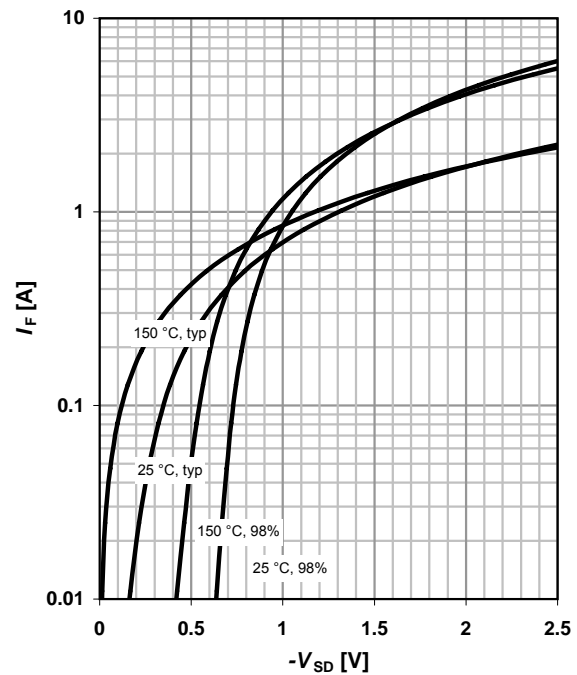
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

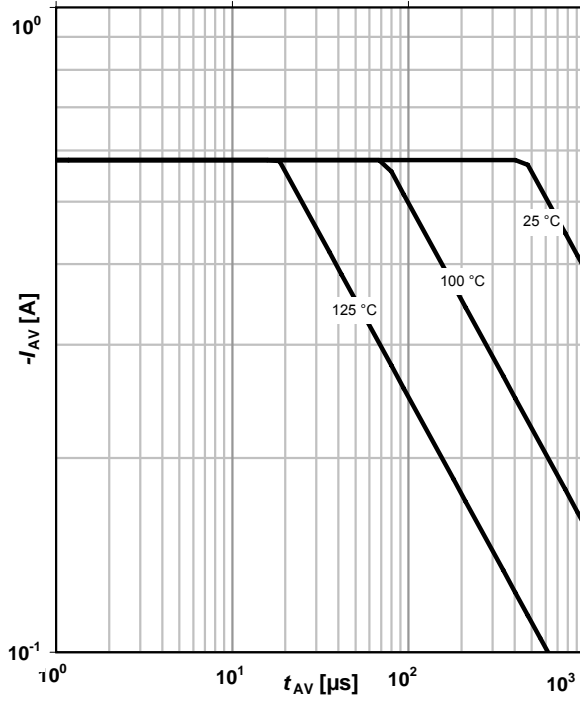
parameter:  $T_j$



**13 Avalanche characteristics**

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

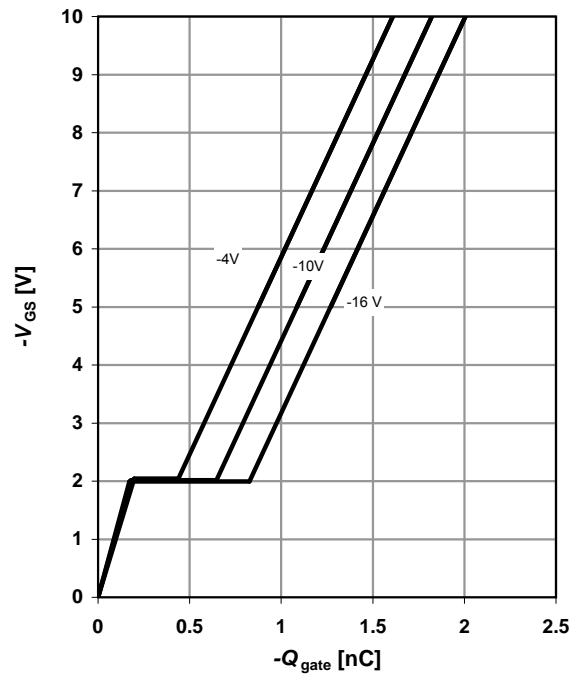
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

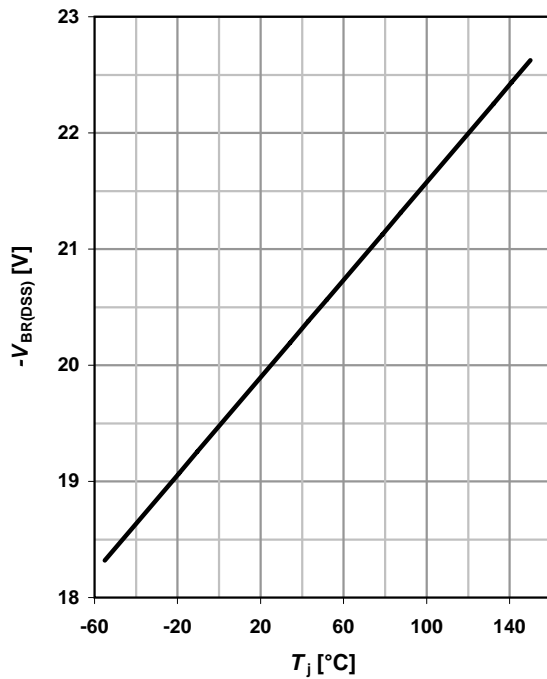
$V_{GS}=f(Q_{gate}); I_D=-0.58\ A\ pulsed$

parameter:  $V_{DD}$

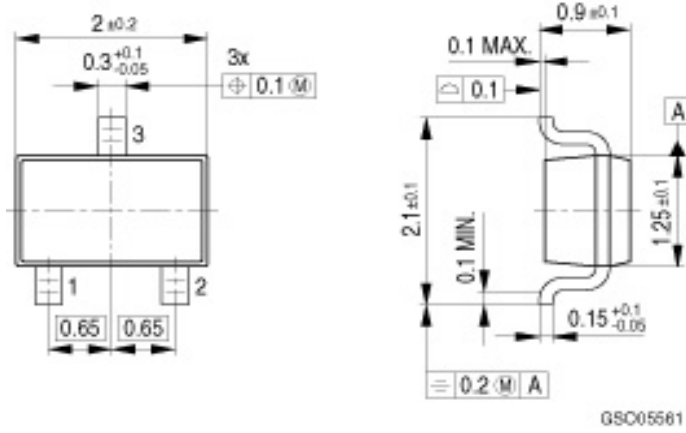


**15 Drain-source breakdown voltage**

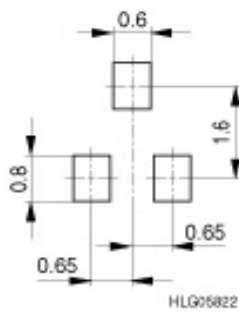
$V_{BR(DSS)}=f(T_j); I_D=-250\ \mu A$



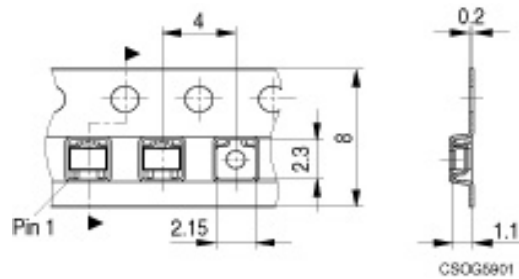
Package Outline:



Footprint:



Packaging:





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