SIPMOS® Small-Signal-Transistor

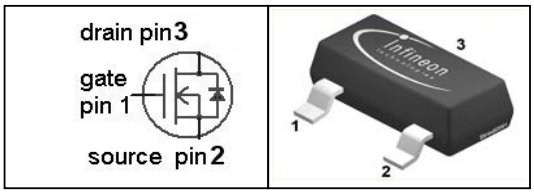
Features

- N-channel
- Depletion mode
- d*v*/d*t* rated
- Available with $V_{GS(th)}$ indicator on reel
- Pb-free lead-plating; RoHS compliant
- ° Halogen free according to IEC61249-2-21
- ° Qualified according to AEC Q101

Product Summary

V_{DS}	250	V
$R_{DS(on),max}$	30	Ω
$I_{DSS,min}$	0.03	A

PG-SOT-23



Type	Package	Tape and Reel Information	Marking	Pb-free
BSS139	PG-SOT-23	H6327: 3000 pcs/ree	STs	Yes
BSS139	PG-SOT-23	H6906: 3000 pcs/reel sorted in $V_{S(th)}$ bands [1)]	STs	Yes

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_A=25 °C	0.10	A
		T_A=70 °C	0.08	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	0.4	
Reverse diode d*v*/d*t*	d*v*/d*t*	I_D=0.1 A, V_{DS}=200 V, d*i*/d*t*=200 A/µs, $T_{j,max}$=150 °C	6	kV/µs
Gate source voltage	V_{GS}		±20	V
ESD class (JESD22-A114-HBM)			0 (<250V)	
Power dissipation	P_{tot}	T_A=25 °C	0.36	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

[1)] see table on next page and diagram 11

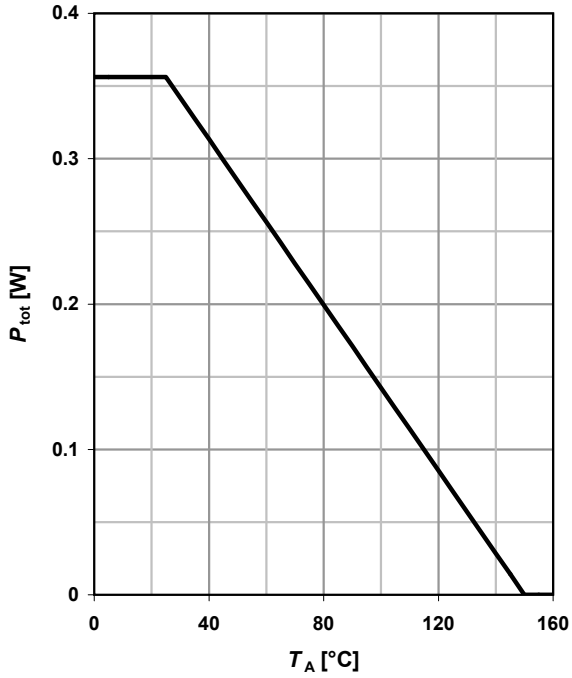
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - ambient	R_{thJA}	minimal footprint	-	-	350	K/W
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=-3 V, I_D=250 µA	250	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=3 V, I_D=56 µA	-2.1	-1.4	-1	
Drain-source cutoff current	$I_{D(off)}$	V_{DS}=250 V, V_{GS}=-3 V, T_j=25 °C	-	-	0.1	µA
		V_{DS}=250 V, V_{GS}=-3 V, T_j=125 °C	-	-	10	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	-	10	nA
On-state drain current	I_{DSS}	V_{GS}=0 V, V_{DS}=10 V	30	-	-	mA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=0 V, I_D=15 mA	-	12.5	30	Ω
		V_{GS}=10 V,I_D=0.1 mA	-	7.8	14	
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=0.08 A	0.060	0.13	-	S
Threshold voltage $V_{GS(th)}$ sorted in bands[2)]						
J	$V_{GS(th)}$	V_{DS}=3 V, I_D=56 µA	-1.2	-	-1	V
K			-1.35	-	-1.15	
L			-1.5	-	-1.3	
M			-1.65	-	-1.45	
N			-1.8	-	-1.6	

[2)] Each reel contains transistors out of one band whose identifying letter is printed on the reel label. A specific band cannot be ordered separately.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=-3 V, V_{DS}=25 V, f=1 MHz	-	60	76	pF
Output capacitance	C_{oss}		-	6.7	8.4	
Reverse transfer capacitance	C_{rss}		-	2.6	3.3	
Turn-on delay time	$t_{d(on)}$	V_{DD}=125 V, V_{GS}=-3...5 V, I_D=0.04 A, R_G=6 Ω	-	5.8	8.7	ns
Rise time	t_r		-	5.4	8.1	
Turn-off delay time	$t_{d(off)}$		-	29	43	
Fall time	t_f		-	182	273	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=200 V, I_D=0.04 A, V_{GS}=-3 to 5 V	-	0.14	0.21	nC
Gate to drain charge	Q_{gd}		-	1.3	2.0	
Gate charge total	Q_g		-	2.3	3.5	
Gate plateau voltage	$V_{plateau}$		-	-0.28	-	V
Reverse Diode						
Diode continous forward current	I_S	T_A=25 °C	-	-	0.10	A
Diode pulse current	$I_{S,pulse}$		-	-	0.4	
Diode forward voltage	V_{SD}	V_{GS}=-3 V, I_F=0.1 A, T_j=25 °C	-	0.81	1.2	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=0.04 A, di_F/dt=100 A/µs	-	8.6	12.9	ns
Reverse recovery charge	Q_{rr}		-	2.1	3.1	nC

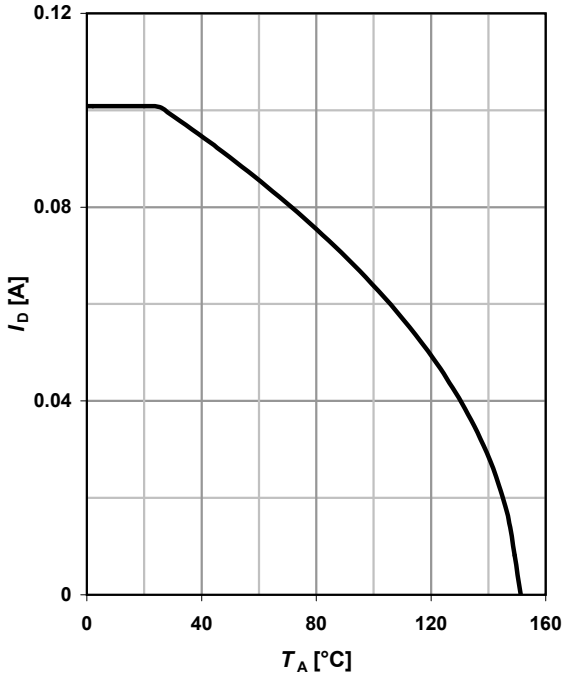
1 Power dissipation

$P_{tot}=f(T_A)$



2 Drain current

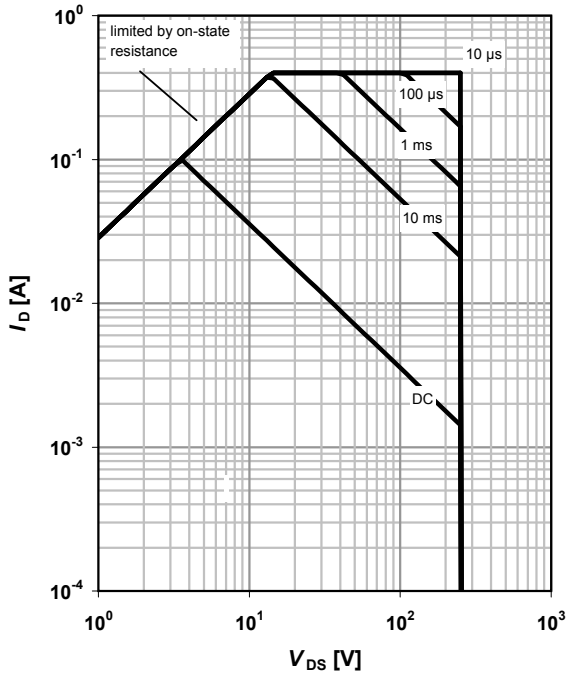
$I_D=f(T_A)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C; $D=0$

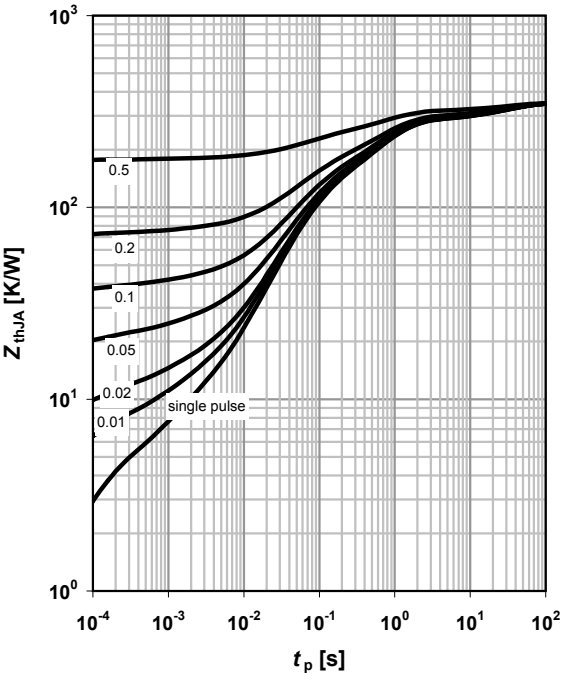
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)$

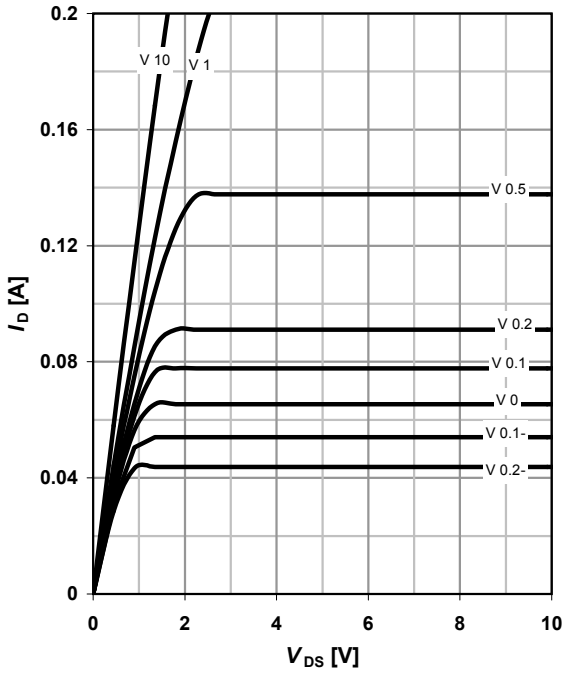
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

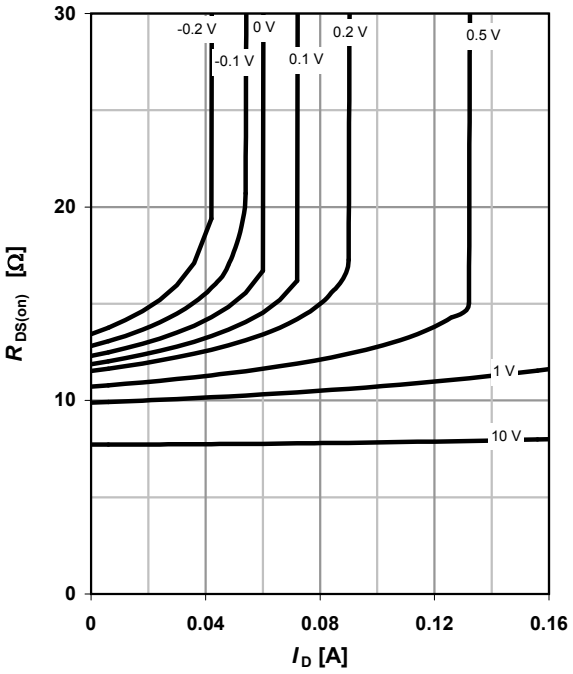
parameter: V_{GS}



6 Typ. drain-source on resistance

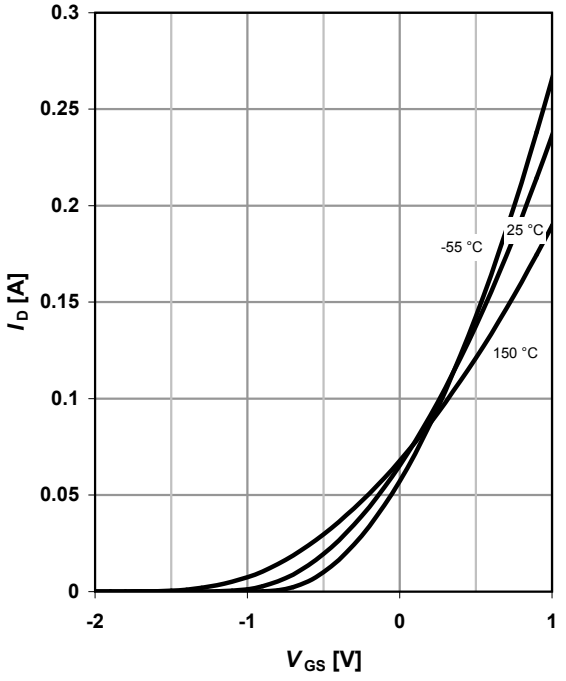
$R_{DS(on)}$=f(I_D); T_j=25 °C

parameter: V_{GS}



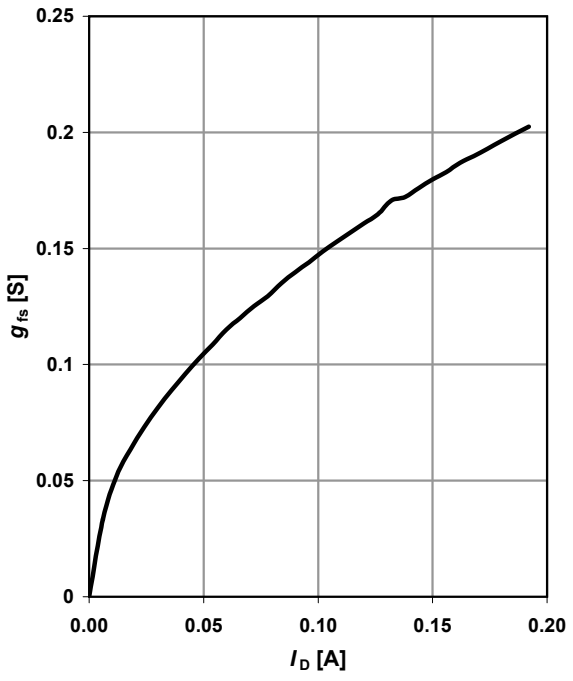
7 Typ. transfer characteristics

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



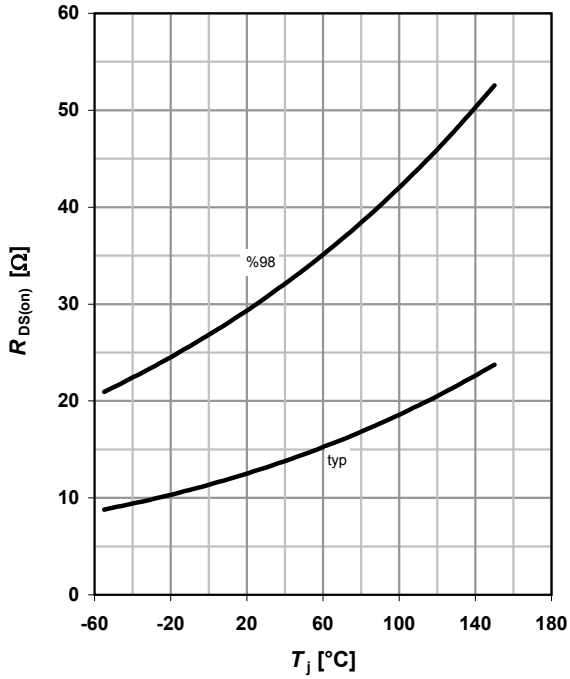
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



9 Drain-source on-state resistance

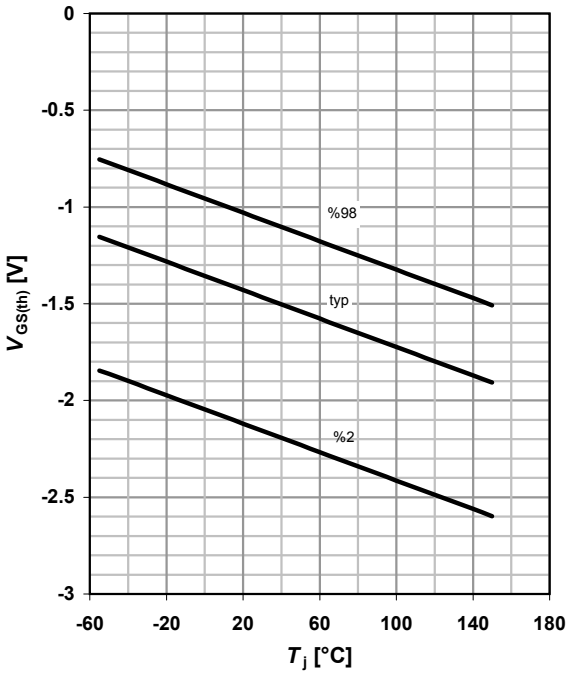
$R_{DS(on)}$=f(T_j); I_D=0.015 A; V_{GS}=0 V



10 Typ. gate threshold voltage

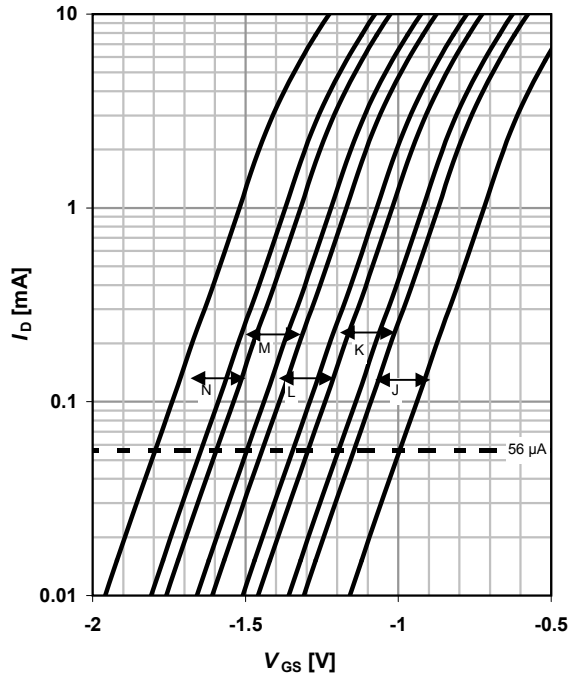
$V_{GS(th)}$=f(T_j); V_{DS}=3 V; I_D=56 µA

parameter: I_D



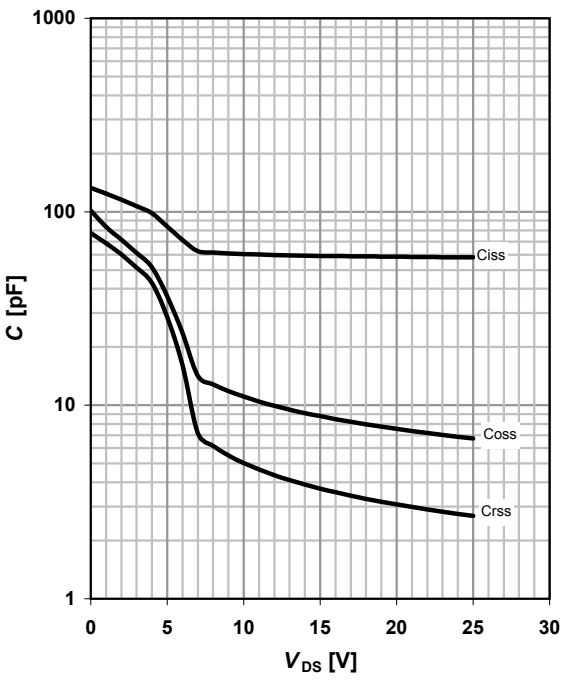
11 Threshold voltage bands

I_D=f(V_{GS}); V_{DS}=3 V; T_j=25 °C



12 Typ. capacitances

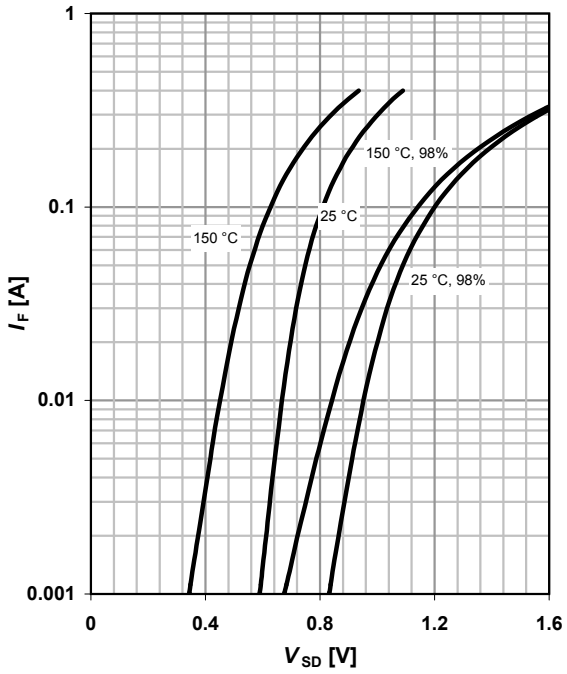
C=f(V_{DS}); V_{GS}=-3 V; f=1 MHz



13 Forward characteristics of reverse diode

I_F=f(V_{SD})

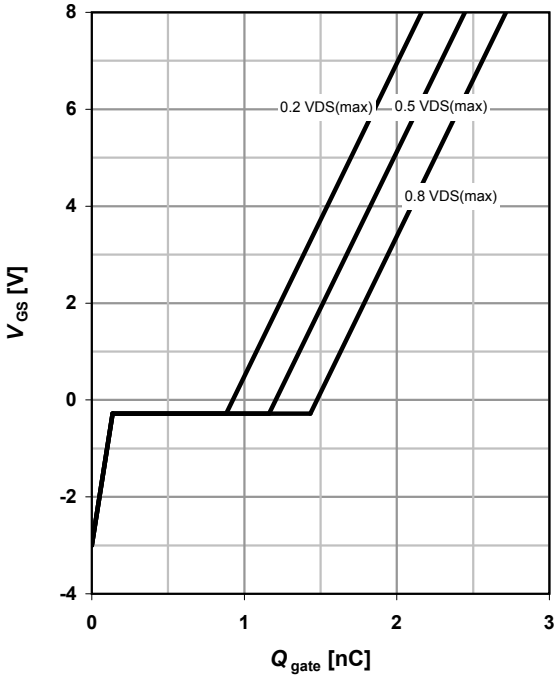
parameter: T_j



15 Typ. gate charge

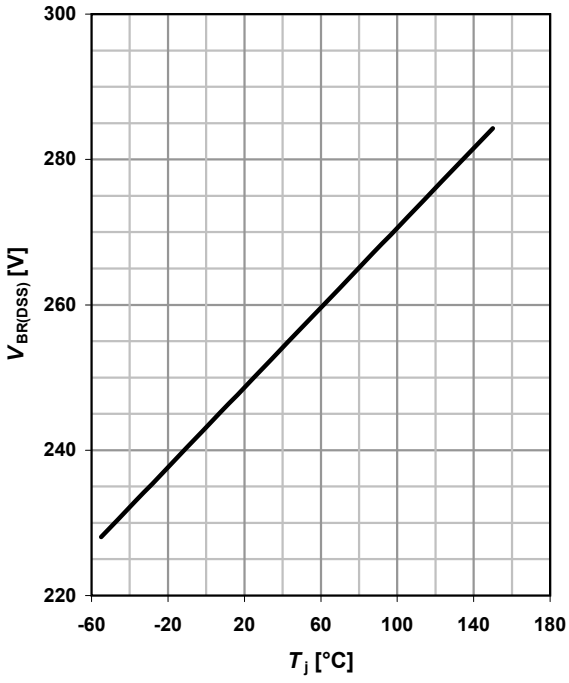
V_{GS}=f(Q_{gate}); I_D=0.1 A pulsed

parameter: V_{DD}

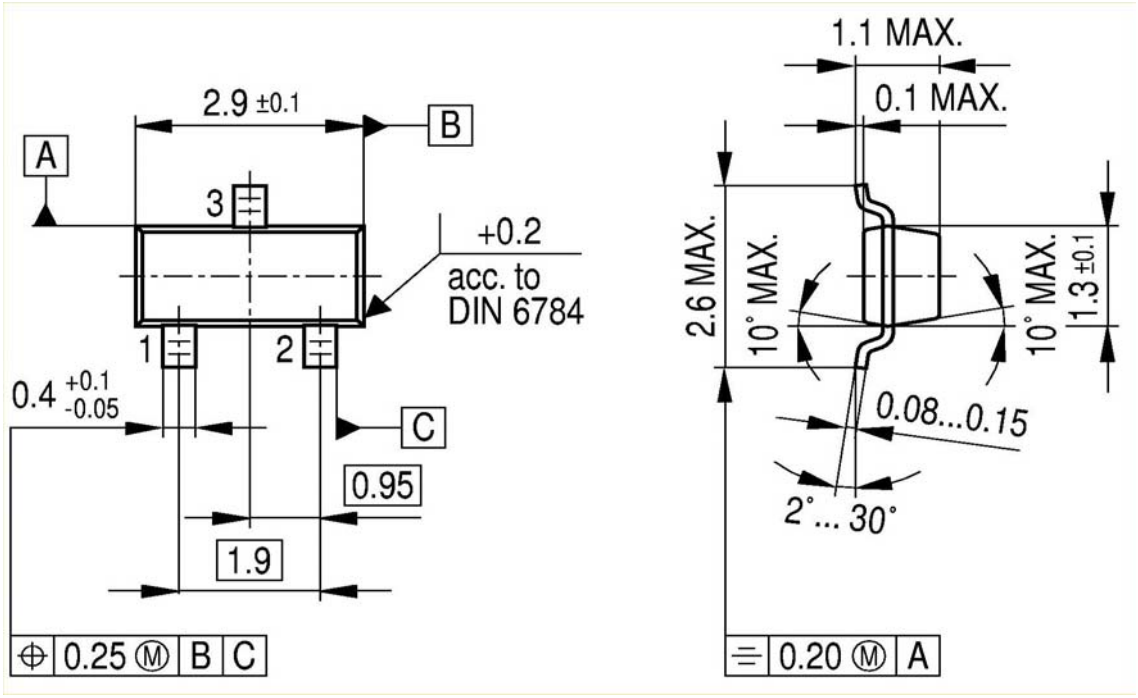


16 Drain-source breakdown voltage

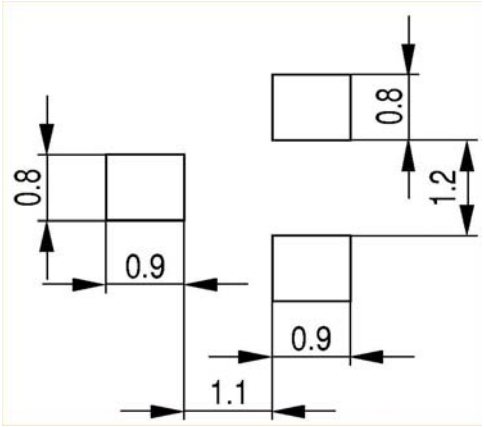
$V_{BR(DSS)}$=f(T_j); I_D=250 µA



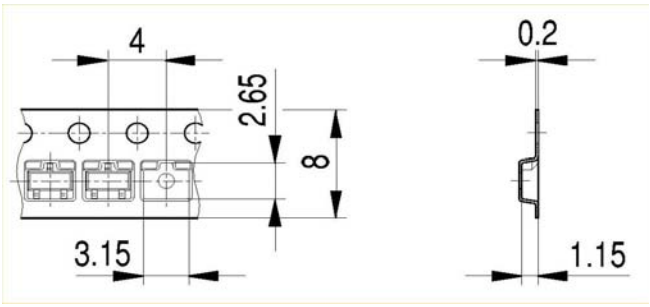
Package Outline:



Footprint:



Packaging:



Dimensions in mm

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