OptiMOS™ Small-Signal-Transistor

Features

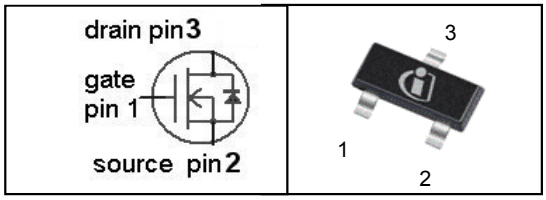
- N-channel
- Enhancement mode
- Logic level
- Avalanche rated
- fast switching
- Pb-free lead-plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

RoHS Halogen-Free

Product Summary

V_{DS}		60	V
$R_{DS(on),max}$	V_{GS}=10 V	3	Ω
	V_{GS}=4.5 V	4	
I_D		0.3	A

PG-SOT23



Type	Package	Tape and Reel Information	Marking	HalogenFree	Packing
2N7002	PG-SOT-23	H6327: 3000 pcs/reel	72s	Yes	Non Dry

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_A=25 °C	0.30	A
		T_A=70 °C	0.24	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	1.2	
Avalanche energy, single pulse	E_{AS}	I_D=0.3 A, R_{GS}=25 Ω	1.3	mJ
Reverse diode dv/dt	dv/dt	I_D=0.3 A, V_{DS}=48 V, di/dt=200 A/µs, $T_{j,max}$=150 °C	6	kV/µs
Gate source voltage	V_{GS}		±20	V
ESD class		JESD22-A114 (HBM)	class 0 (<250V)	
Power dissipation	P_{tot} (2)	T_A=25 °C	0.5	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

(1) J-STD20 and JESD22

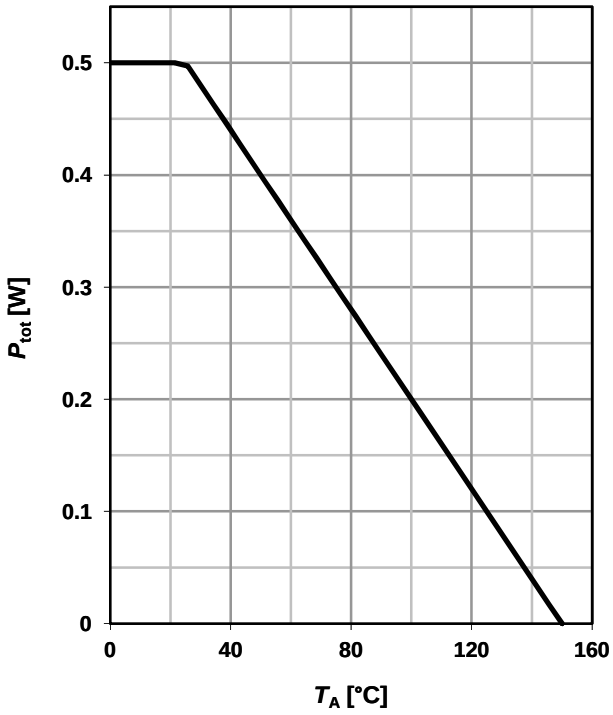
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - minimal footprint[2]	R_{thJA}		-	-	250	K/W
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}= 0 V, I_D=250 µA	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS} , I_D=250 µA	1.5	2.1	2.5	
Drain-source leakage current	$I_{D (off)}$	V_{DS}=60 V, V_{GS}=0 V, T_j=25 °C	-	-	0.1	µA
		V_{DS}=60 V, V_{GS}=0 V, T_j=150 °C	-	-	5	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	1	10	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=0.25 A	-	2.0	4	Ω
		V_{GS}=10 V, I_D=0.5 A	-	1.6	3	
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=0.24 A	0.2	0.36	-	S

[2] Perfomed on a 40x40mm^2 FR4 PCB with both sided Cu sense-force traces, each 1mm wide, 70 µm thick and 20mm long.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=25 V, f=1 MHz	-	13	20	pF
Output capacitance	C_{oss}		-	4.1	6	
Reverse transfer capacitance	C_{rss}		-	2.0	3	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30 V, V_{GS}=10 V, I_D=0.5 A, R_G=6 Ω	-	3.0	4.5	ns
Rise time	t_r		-	3.3	5	
Turn-off delay time	$t_{d(off)}$		-	5.5	9	
Fall time	t_f		-	3.1	5	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=48 V, I_D=0.5 A, V_{GS}=0 to 10 V	-	0.05	0.1	nC
Gate to drain charge	Q_{gd}		-	0.2	0.4	
Gate charge total	Q_g		-	0.4	0.6	
Gate plateau voltage	$V_{plateau}$		-	4.0	-	V
Reverse Diode						
Diode continous forward current	I_S	T_A=25 °C	-	-	0.3	A
Diode pulse current	$I_{S,pulse}$		-	-	1.2	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=0.5 A, T_j=25 °C	-	0.96	1.2	V
Reverse recovery time	t_{rr}	V_R=30 V, I_F=0.5 A, di_F/dt=100 A/µs	-	8.5	13	ns
Reverse recovery charge	Q_{rr}		-	2.4	4	nC

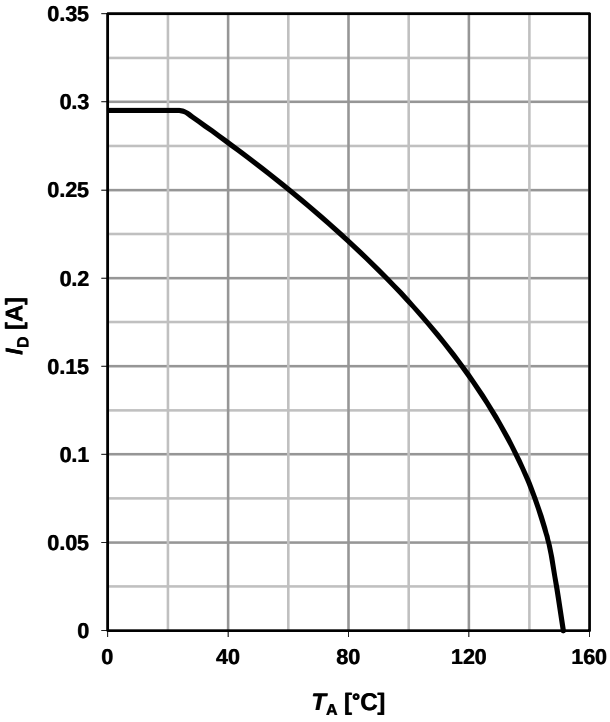
1 Power dissipation

$P_{tot}=f(T_A)$



2 Drain current

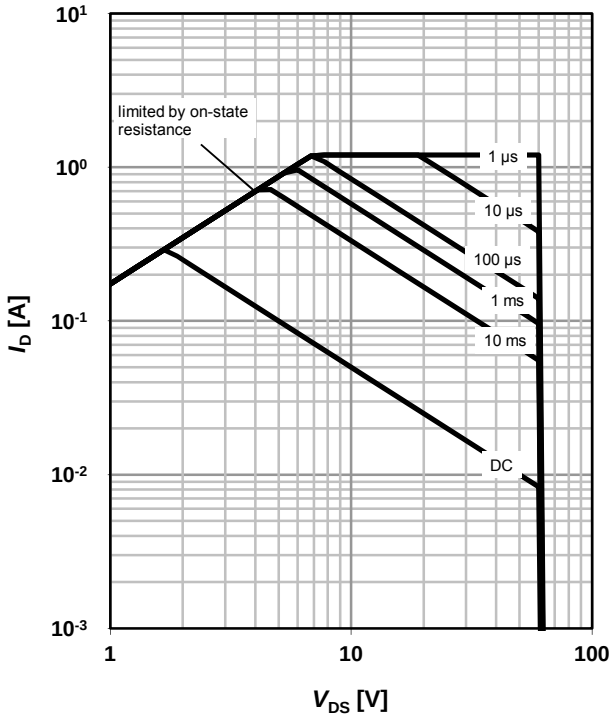
$I_D=f(T_A)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C; $D=0$

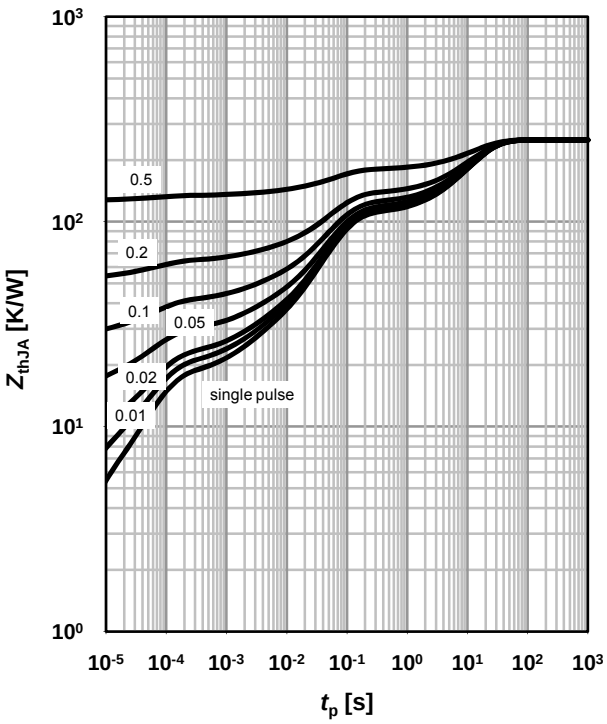
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)$

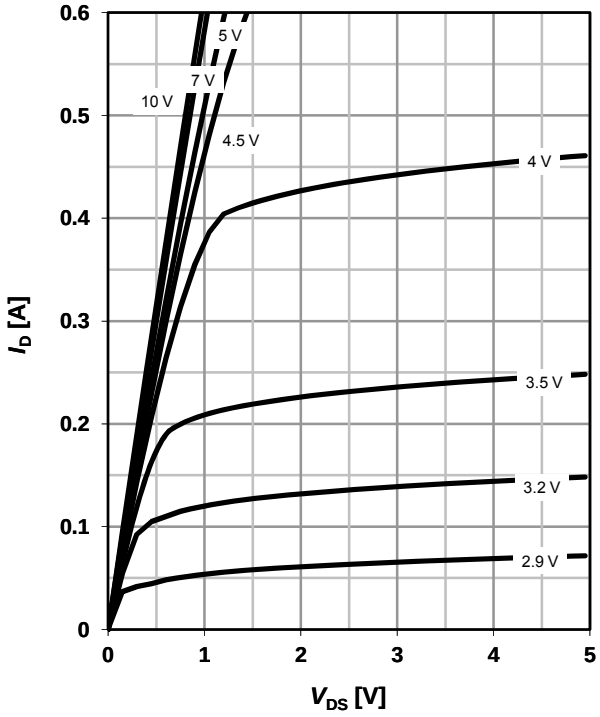
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

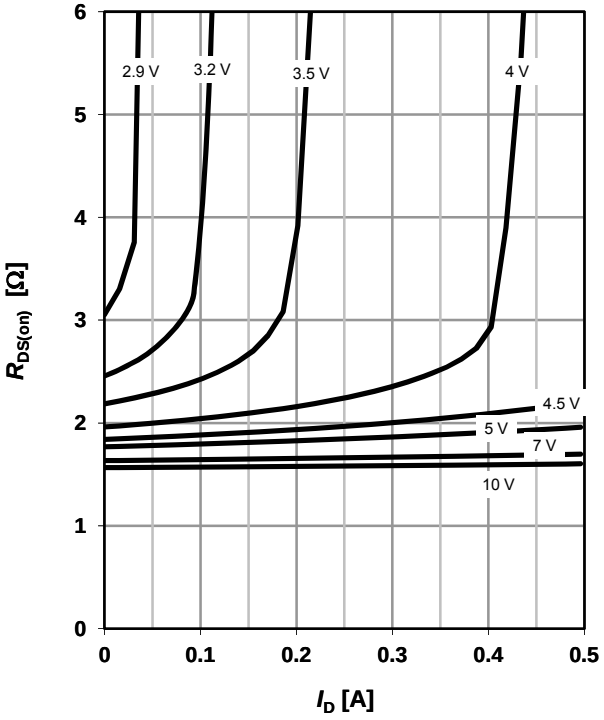
parameter: V_{GS}



6 Typ. drain-source on resistance

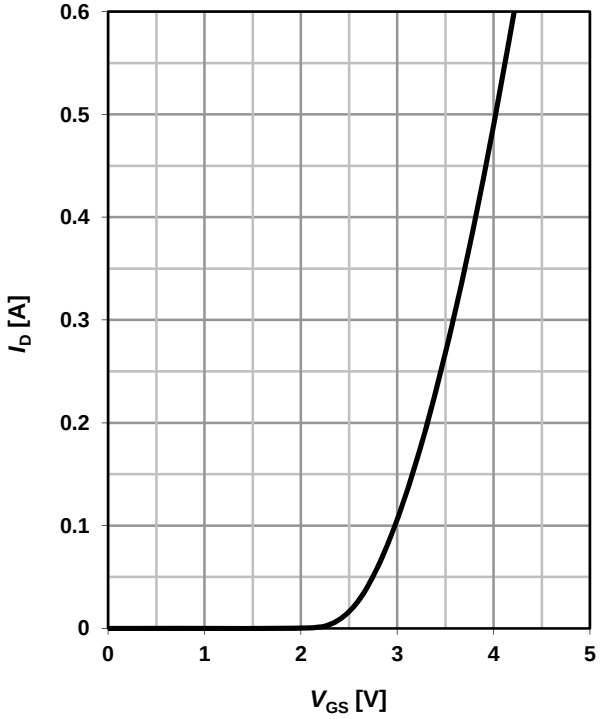
$R_{DS(on)}$=f(I_D); T_j=25 °C

parameter: V_{GS}



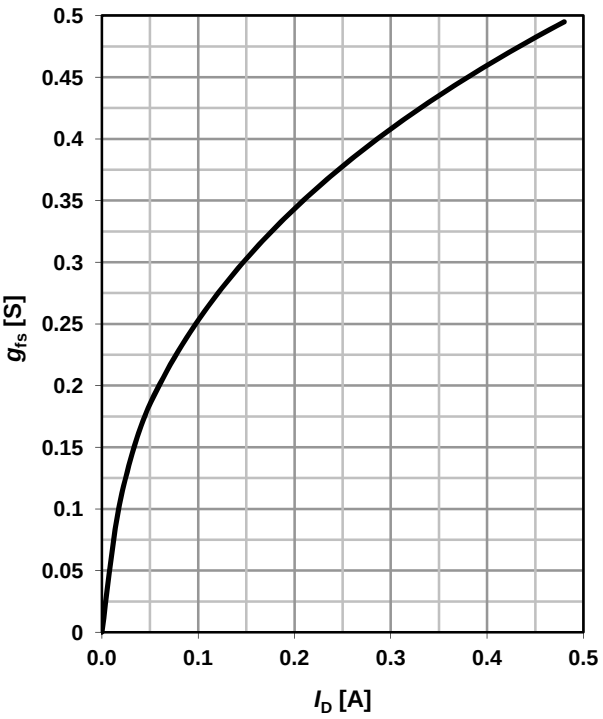
7 Typ. transfer characteristics

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



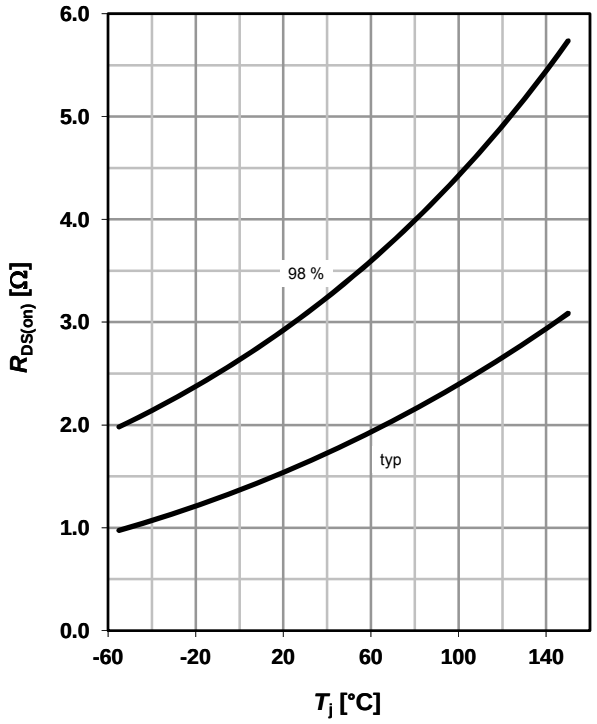
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



9 Drain-source on-state resistance

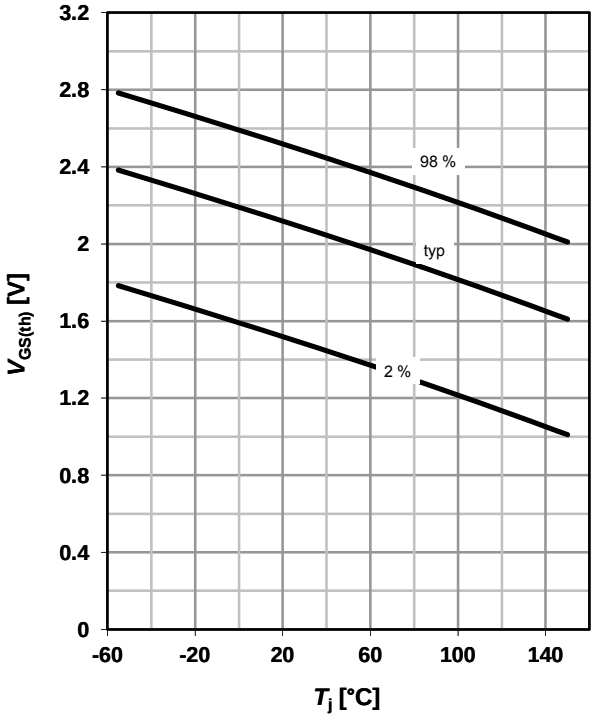
$R_{DS(on)}=f(T_j)$; $I_D=0.3$ A; $V_{GS}=10$ V



10 Typ. gate threshold voltage

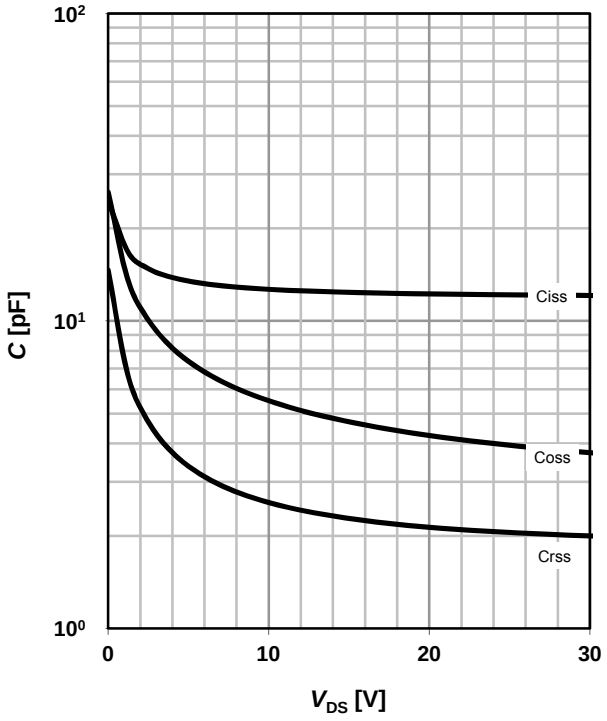
$V_{GS(th)}=f(T_j)$; $V_{DS}=V_{GS}$; $I_D=250$ µA

parameter: I_D



11 Typ. capacitances

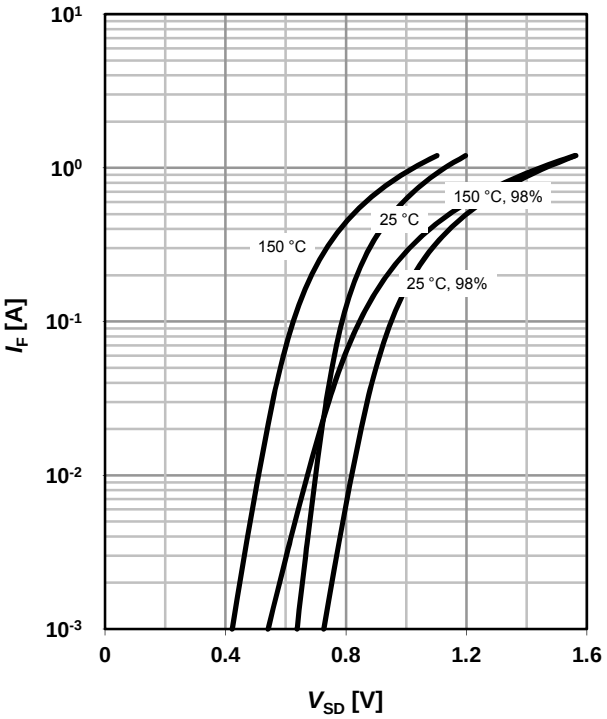
$C=f(V_{DS})$; $V_{GS}=0$ V; $f=1$ MHz; $T_j=25$°C



12 Forward characteristics of reverse diode

$I_F=f(V_{SD})$

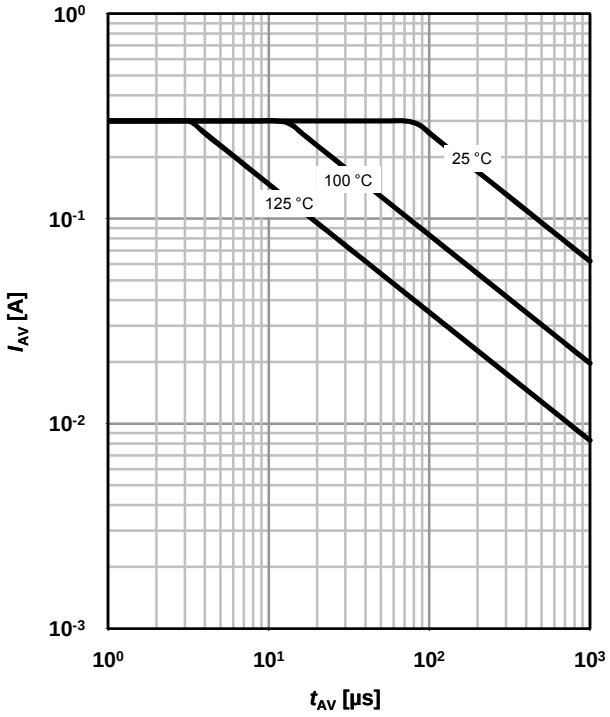
parameter: T_j



13 Avalanche characteristics

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

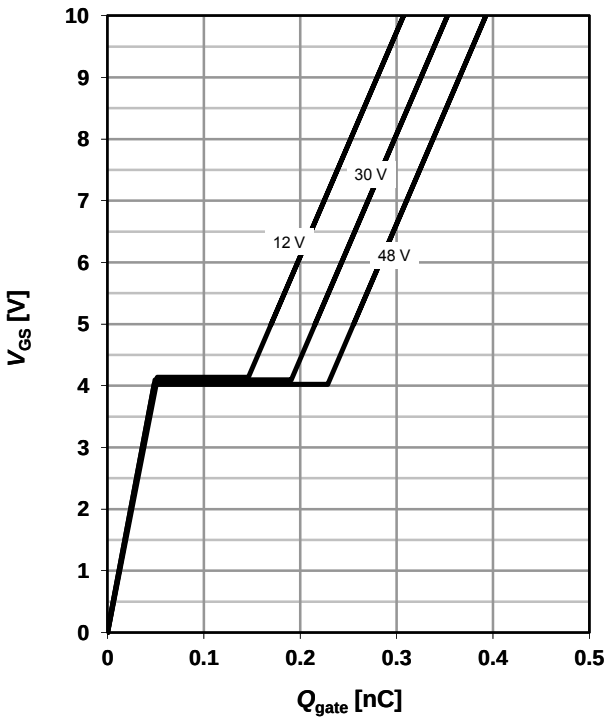
parameter: $T_{j(start)}$



14 Typ. gate charge

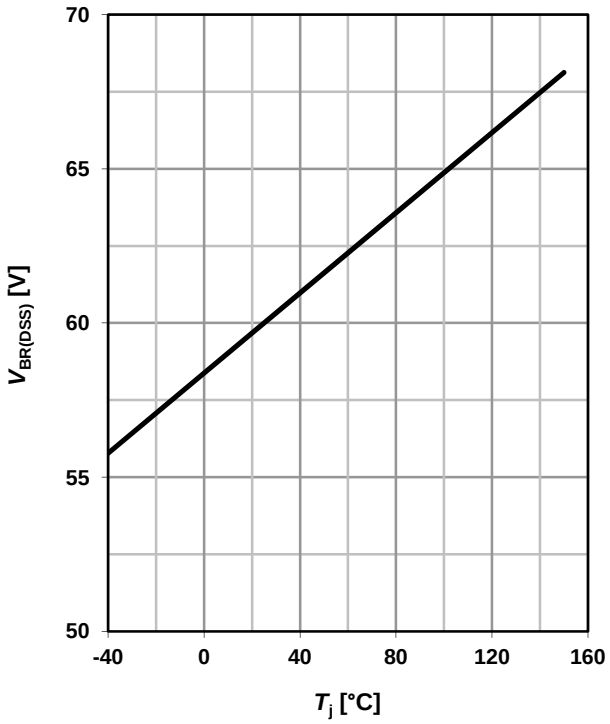
$V_{GS}=f(Q_{gate})$; $I_D=0.5$ A pulsed

parameter: V_{DD}

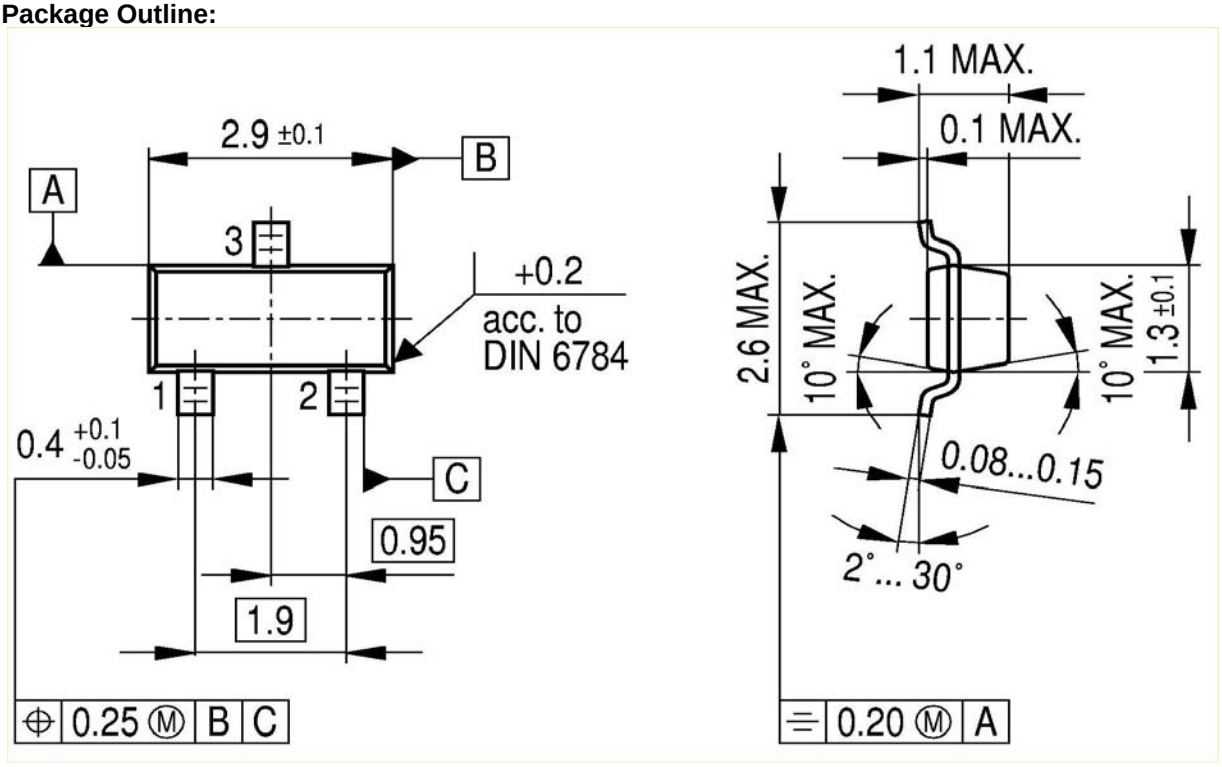


15 Drain-source breakdown voltage

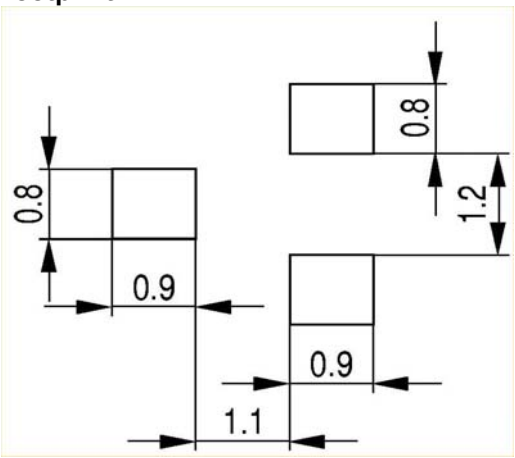
$V_{BR(DSS)}=f(T_j)$; $I_D=250$ µA



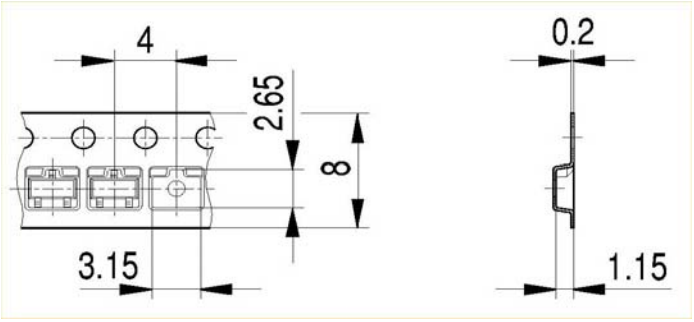
Package Outline:



Footprint:



Packing:



Dimensions in mm

Published by
Infineon Technologies AG
81726 Munich, Germany

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