

## OptiMOS™ 2 Small-Signal-Transistor

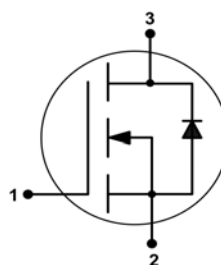
### Features

- N-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100%lead-free; RoHS compliant
- Halogen-free according to IEC61249-2-21

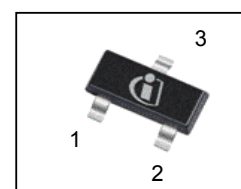


### Product Summary

$V_{DS}$		30	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	160	$m\Omega$
	$V_{GS}=4.5\text{ V}$	280	
$I_D$		1.4	A



PG-SOT23



Type	Package	Tape and Reel Information	Marking	Lead Free	Packing
BSS316N	SOT23	H6327: 3000 pcs/ reel	SYs	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	$E_{AS}$	$I_D=1.4\text{ A}$ , $R_{GS}=25\text{ }\Omega$	3.7	mJ
Reverse diode $dv/dt$	$dv/dt$	$I_D=1.4\text{ A}$ , $V_{DS}=16\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ °C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}$	0.5	W
Operating and storage temperature	$T_j$ , $T_{stg}$		-55 ... 150	$^{\circ}\text{C}$
ESD Class		JESD22-A114 -HBM	0 (<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 - ambient	$R_{thJA}$	minimal footprint <sup>1)</sup>	-	-	250	K/W
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**Electrical characteristics, at  $T_j=25\text{ °C}$ , unless otherwise specified**
**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=3.7\text{ }\mu\text{A}$	1.2	1.6	2.0	
Drain-source leakage current	$I_{DSS}$	$V_{DS}=30\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=30\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=150\text{ °C}$	-	-	100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=30\text{ V}$ , $V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}$ , $I_D=1.1\text{ A}$	-	191	280	$\text{m}\Omega$
		$V_{GS}=10\text{ V}$ , $I_D=1.4\text{ A}$	-	119	160	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=1.1\text{ A}$		2.3	-	S

<sup>1)</sup> Performed on 40mm<sup>2</sup> FR4 PCB. The traces are 1mm wide, 70 $\mu\text{m}$  thick and 20mm long; they are present on both sides of the PCB.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$	-	71	94	pF
Output capacitance	$C_{oss}$		-	26	35	
Reverse transfer capacitance	$C_{rss}$		-	5	7	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=1.4\text{ A}, R_G=6\text{ }\Omega$	-	3.4	-	ns
Rise time	$t_r$		-	2.3	-	
Turn-off delay time	$t_{d(off)}$		-	5.8	-	
Fall time	$t_f$		-	1	-	

**Gate Charge Characteristics**

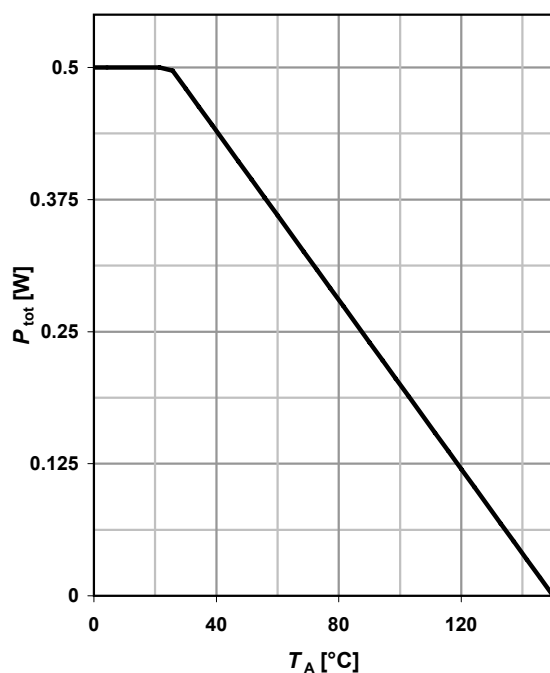
Gate to source charge	$Q_{gs}$	$V_{DD}=15\text{ V}, I_D=1.4\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	0.3	-	nC
Gate to drain charge	$Q_{gd}$		-	0.2	-	
Gate charge total	$Q_g$		-	0.6	-	
Gate plateau voltage	$V_{plateau}$		-	3.4	-	V

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	0.5	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	$t_{rr}$	$V_R=10\text{ V}, I_F=1.4\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	9.1	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.6	-	nC

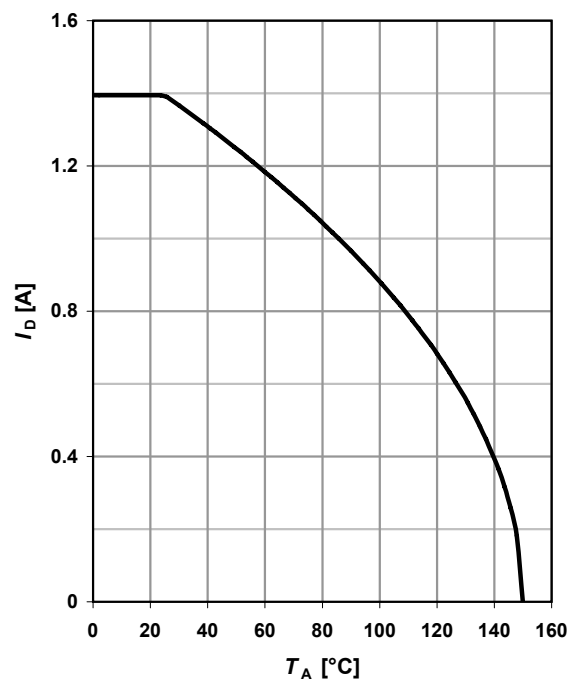
### 1 Power dissipation

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



### 2 Drain current

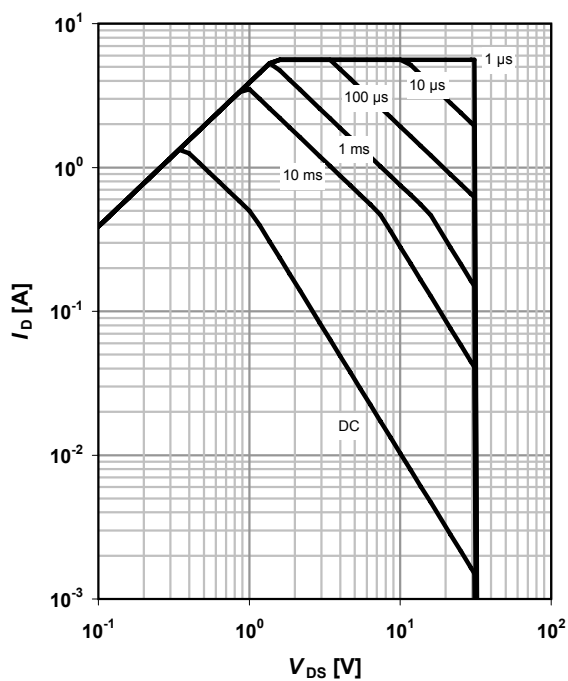
$$I_D = f(T_A); V_{\text{GS}} \geq 10 \text{ V}$$



### 3 Safe operating area

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

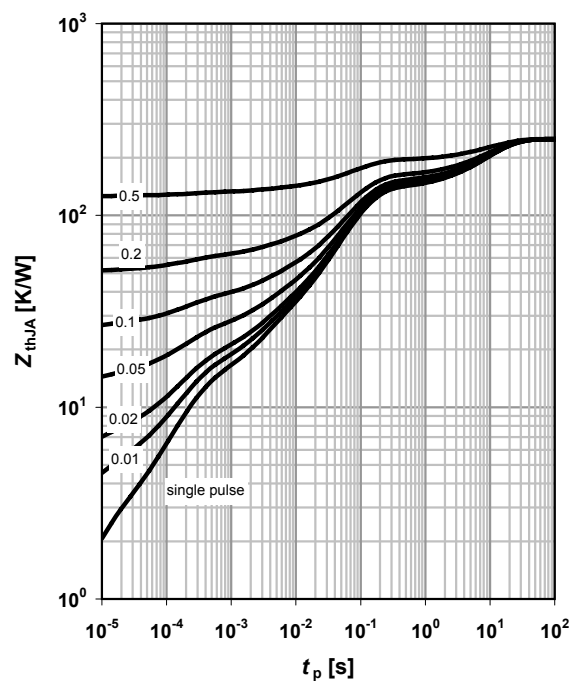
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

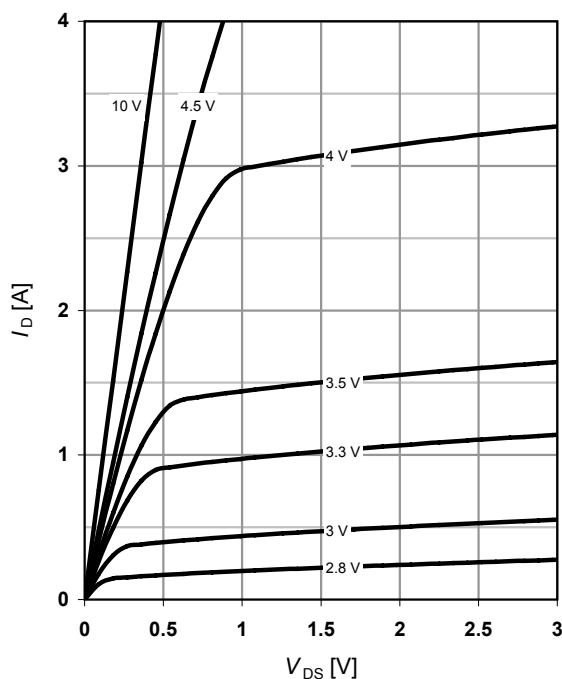
parameter:  $D = t_p / T$



### 5 Typ. output characteristics

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

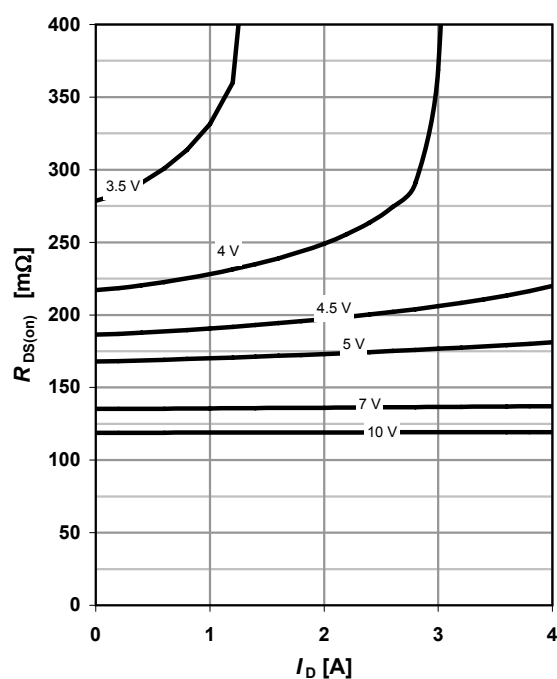
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

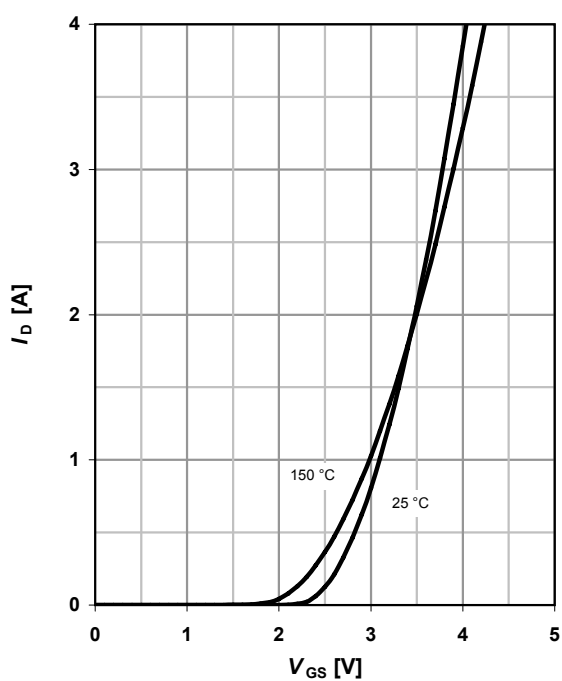
$$R_{DS(on)} = f(I_D); T_J = 25^\circ\text{C}$$

parameter:  $V_{GS}$



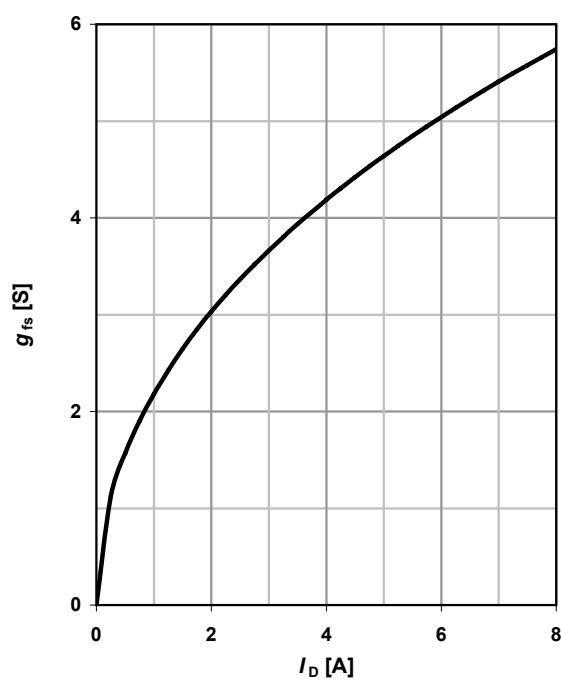
### 7 Typ. transfer characteristics

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



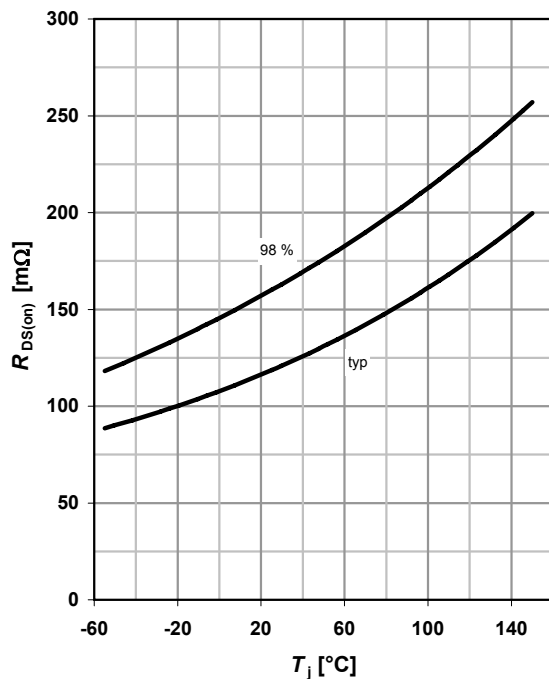
### 8 Typ. forward transconductance

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



### 9 Drain-source on-state resistance

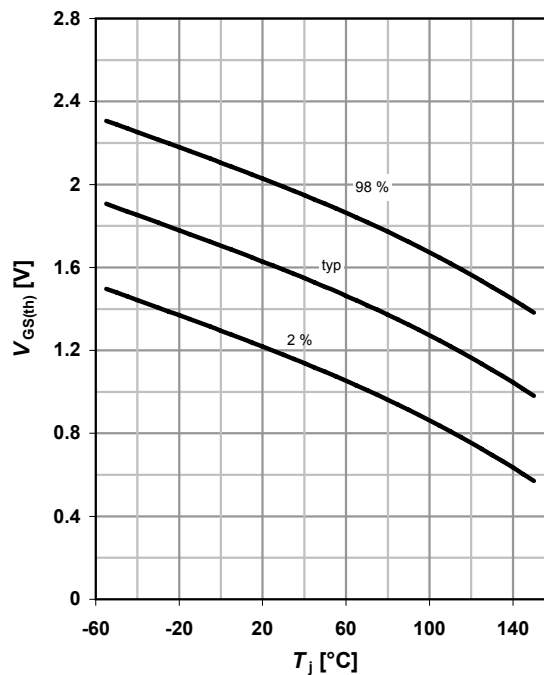
$$R_{DS(on)} = f(T_j); I_D = 1.4 \text{ A}; V_{GS} = 10 \text{ V}$$



### 10 Typ. gate threshold voltage

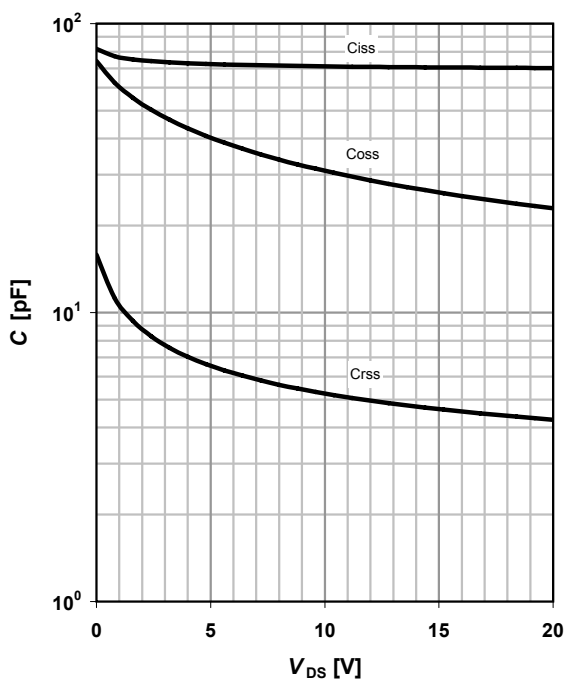
$$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 3.7 \mu\text{A}$$

parameter:  $I_D$



### 11 Typ. capacitances

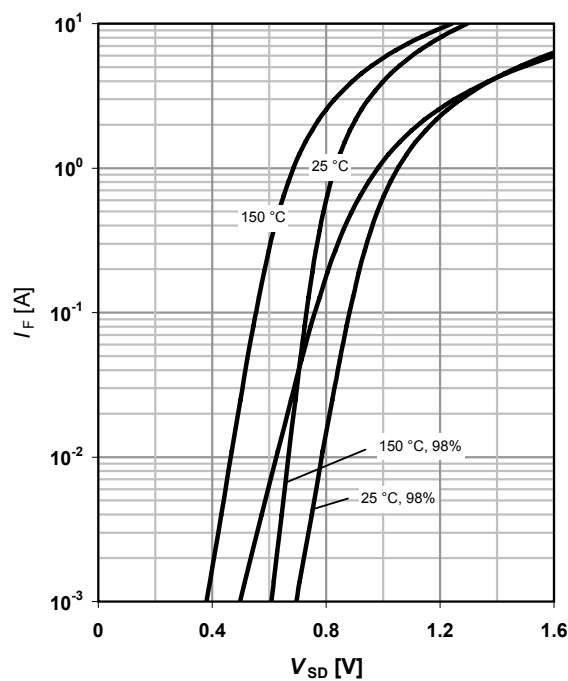
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$$



### 12 Forward characteristics of reverse diode

$$I_F = f(V_{SD})$$

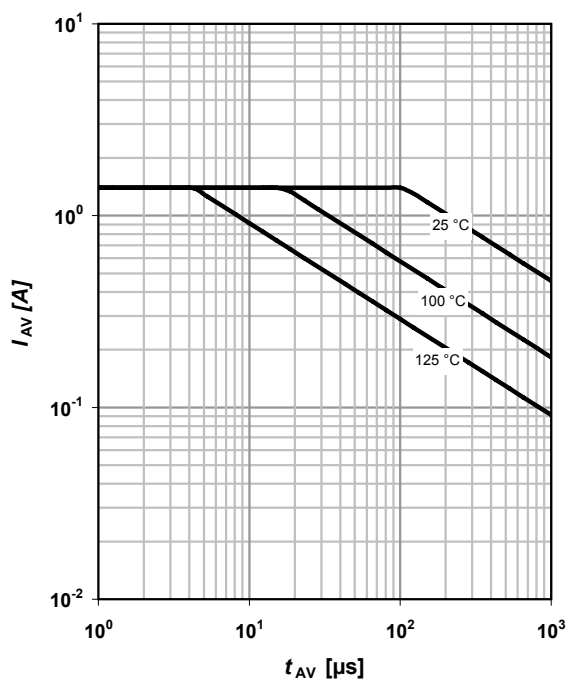
parameter:  $T_j$



### 13 Avalanche characteristics

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

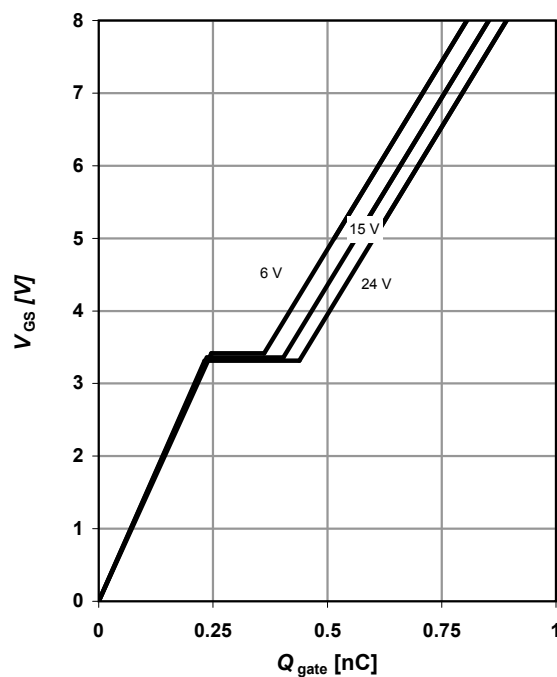
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

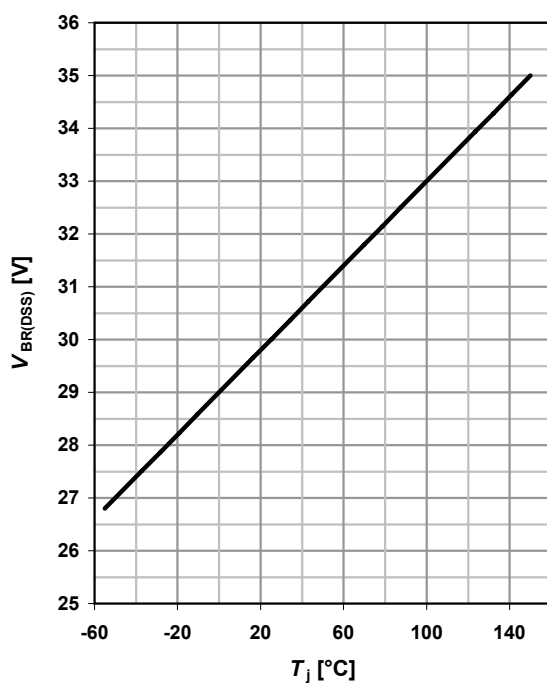
$$V_{GS}=f(Q_{\text{gate}}); I_D=1.4\ \text{A pulsed}$$

parameter:  $V_{DD}$

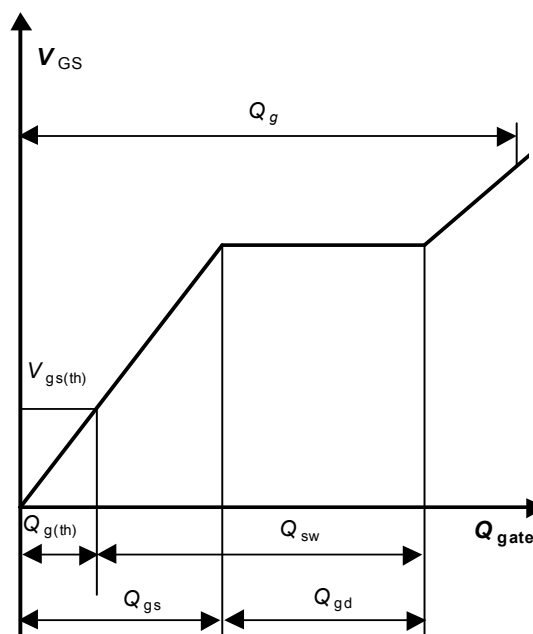


### 15 Drain-source breakdown voltage

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

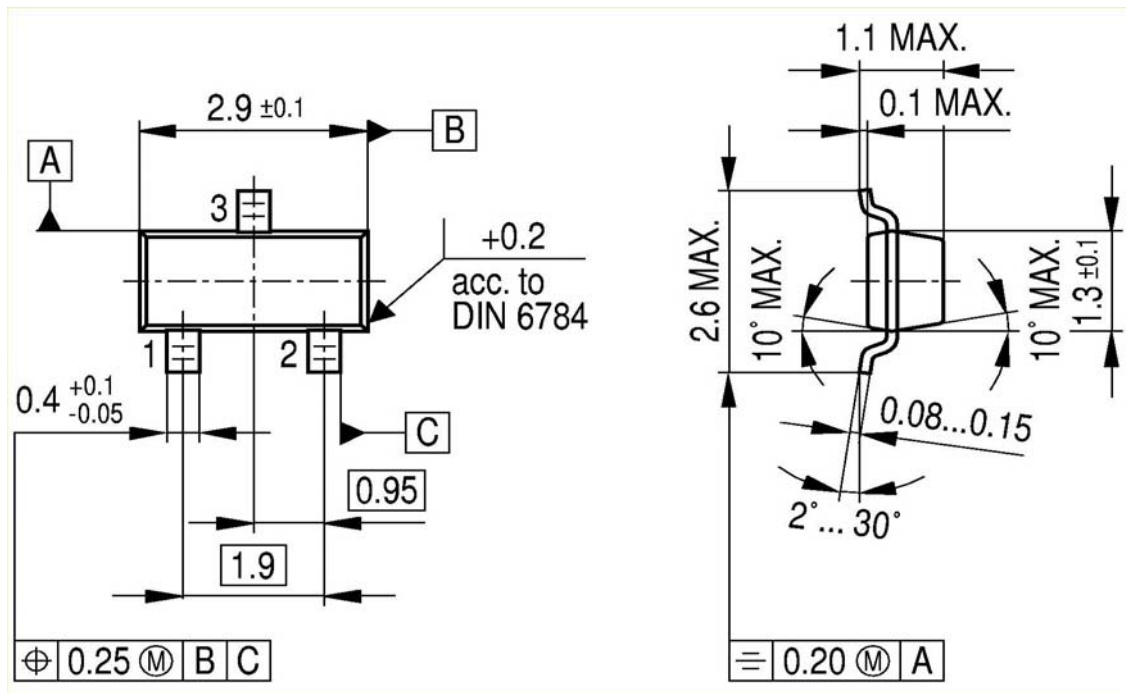


### 16 Gate charge waveforms

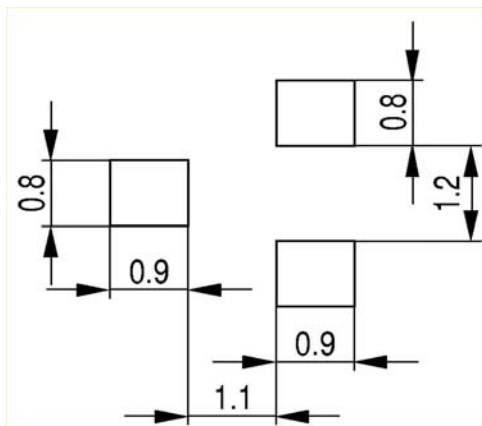


# SOT23

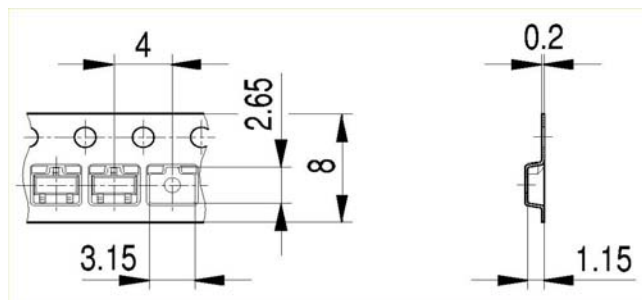
## Package Outline:



## Footprint:



## Packaging:



Dimensions in mm



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