



# THE DATASHEET OF BSS214N

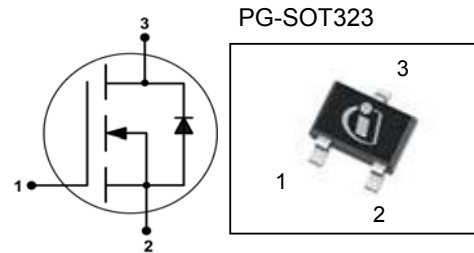


**OptiMOS™ 2 Small-Signal-Transistor**
**Features**

- N-channel
- Enhancement mode
- Super Logic level (2.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to IEC61249-2-21


**Product Summary**

$V_{DS}$		20	V
$R_{DS(on),max}$	$V_{GS}=4.5\text{ V}$	140	m $\Omega$
	$V_{GS}=2.5\text{ V}$	250	
$I_D$		1.5	A



Type	Package	Tape and Reel Information	Marking	Lead Free	Packing
BSS214NW	PG-SOT323	H6327: 3000 pcs/ reel	X5s	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_A=25\text{ }^\circ\text{C}$	1.5	A
		$T_A=70\text{ }^\circ\text{C}$	1.2	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ }^\circ\text{C}$	6	
Avalanche energy, single pulse	$E_{AS}$	$I_D=1.5\text{ A}$ , $R_{GS}=25\text{ }\Omega$	3.7	mJ
Reverse diode $dv/dt$	$dv/dt$	$I_D=1.5\text{ A}$ , $V_{DS}=16\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ }^\circ\text{C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 12$	V
Power dissipation <sup>1)</sup>	$P_{tot}$	$T_A=25\text{ }^\circ\text{C}$	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	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$	20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=0\text{ V}$ , $I_D=3.7\text{ }\mu\text{A}$	0.7	0.95	1.2	
Drain-source leakage current	$I_{DSS}$	$V_{DS}=20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=20\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=150\text{ °C}$	-	-	100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=12\text{ V}$ , $V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=2.5\text{ V}$ , $I_D=0.7\text{ A}$	-	171	250	$\text{m}\Omega$
		$V_{GS}=4.5\text{ V}$ , $I_D=1.5\text{ A}$	-	106	140	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=1.2\text{ A}$	-	4	-	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	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=10\text{ V},$ $f=1\text{ MHz}$	-	107	143	pF
Output capacitance	$C_{oss}$		-	46	62	
Reverse transfer capacitance	$C_{rss}$		-	6	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=10\text{ V}, V_{GS}=4.5\text{ V},$ $I_D=1.5\text{ A}, R_G=6\ \Omega$	-	4.1	-	ns
Rise time	$t_r$		-	7.8	-	
Turn-off delay time	$t_{d(off)}$		-	6.8	-	
Fall time	$t_f$		-	1.4	-	

**Gate Charge Characteristics**

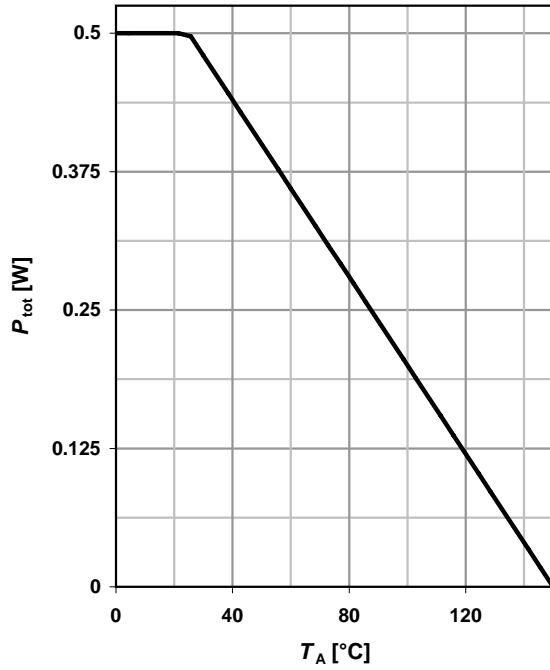
Gate to source charge	$Q_{gs}$	$V_{DD}=10\text{ V}, I_D=1.5\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	0.24	-	nC
Gate to drain charge	$Q_{gd}$		-	0.2	-	
Gate charge total	$Q_g$		-	0.8	-	
Gate plateau voltage	$V_{plateau}$		-	2.2	-	V

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	0.5	A
Diode pulse current	$I_{S,pulse}$		-	-	6	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=1.5\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.8	1.1	V
Reverse recovery time	$t_{rr}$	$V_R=10\text{ V}, I_F=1.5\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	8.4	-	ns
Reverse recovery charge	$Q_{rr}$		-	1.7	-	

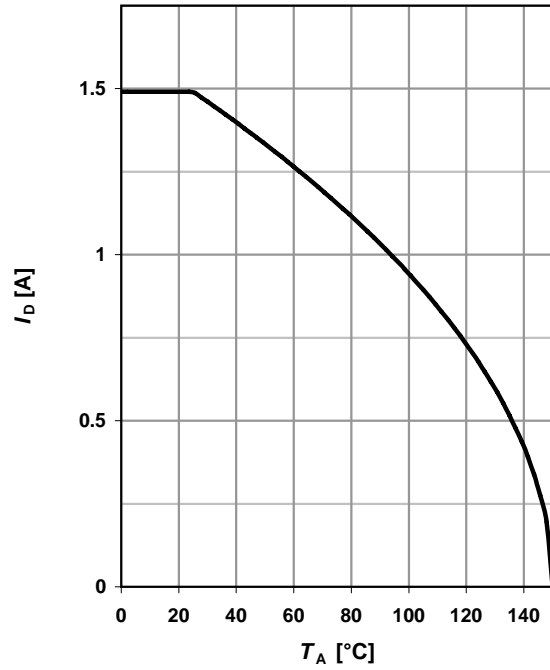
**1 Power dissipation**

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



**2 Drain current**

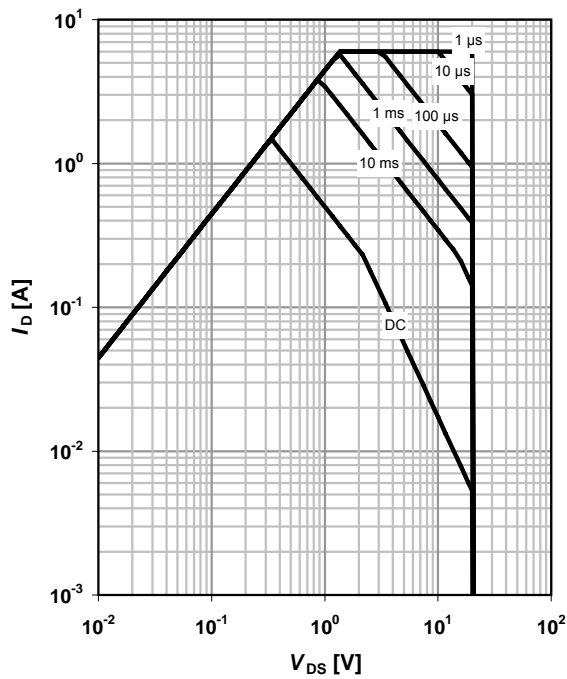
$$I_D = f(T_A); V_{GS} \geq 4.5 \text{ V}$$



**3 Safe operating area**

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

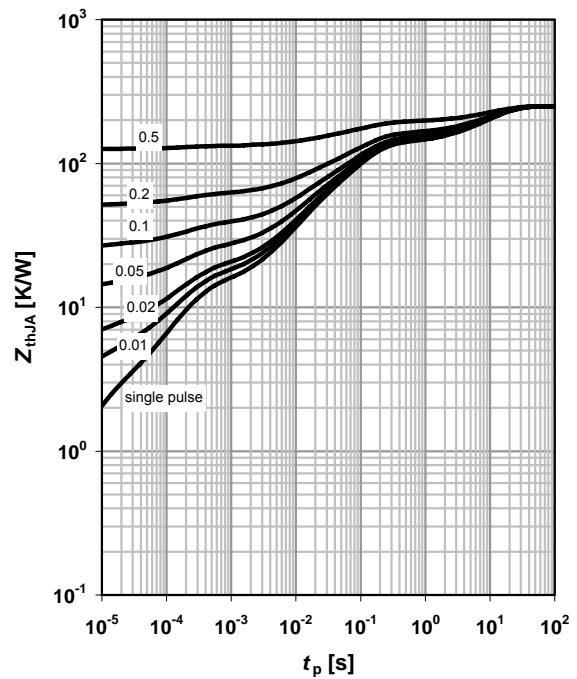
parameter:  $t_p$



**4 Max. transient thermal impedance**

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

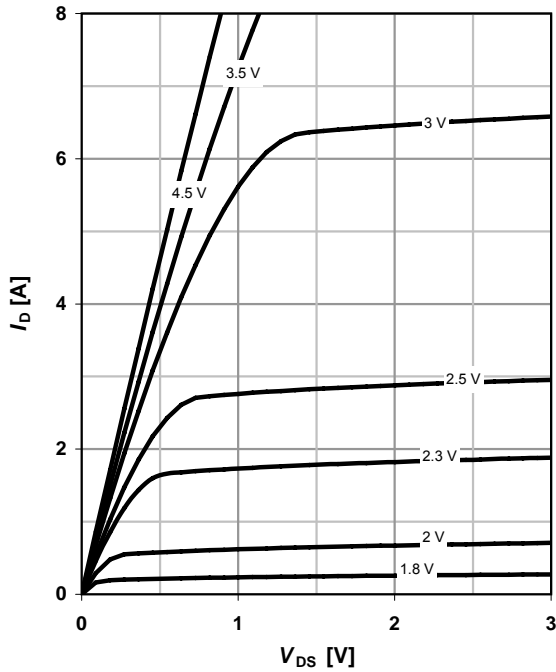
parameter:  $D = t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

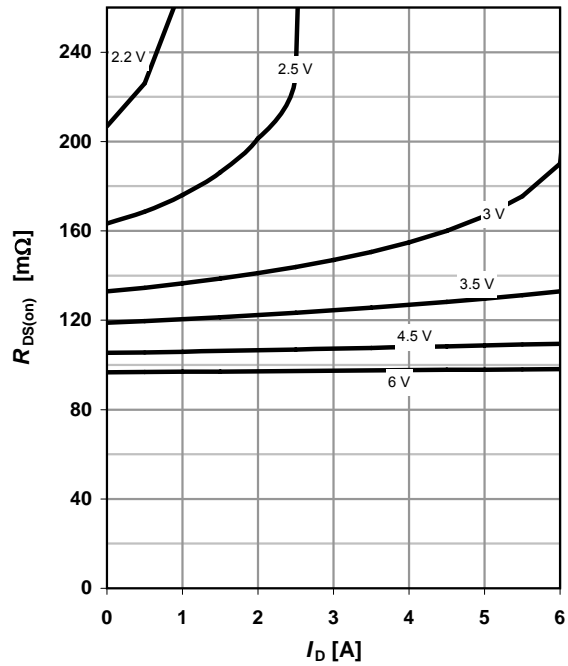
parameter:  $V_{GS}$



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

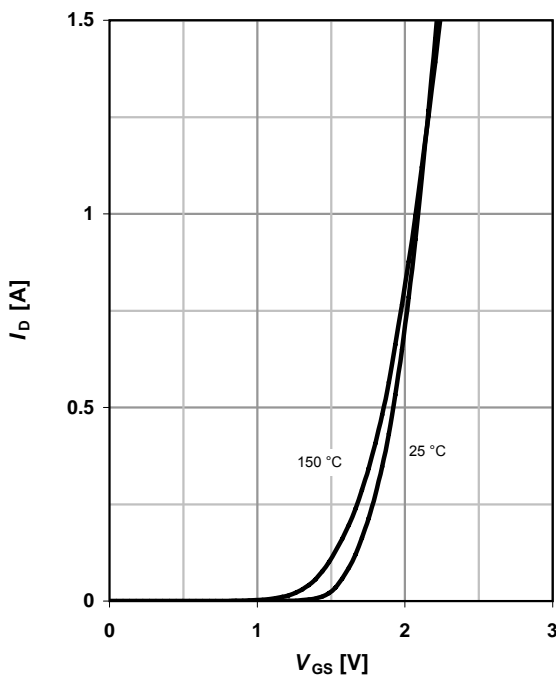
$R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$

parameter:  $V_{GS}$



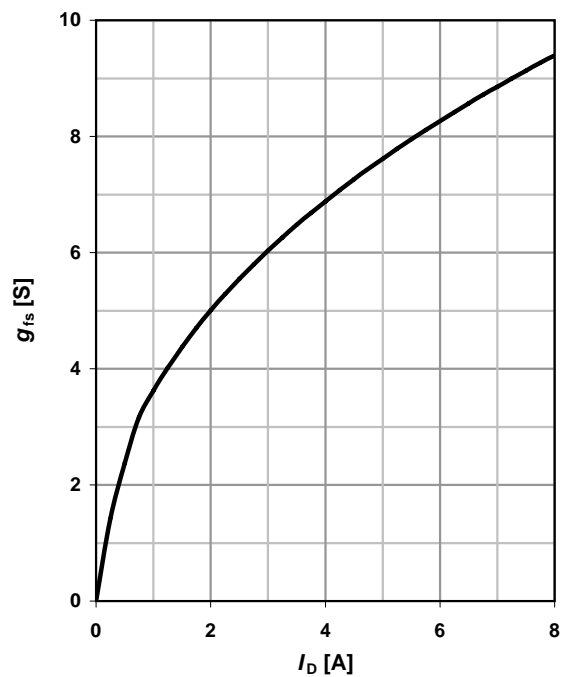
**7 Typ. transfer characteristics**

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



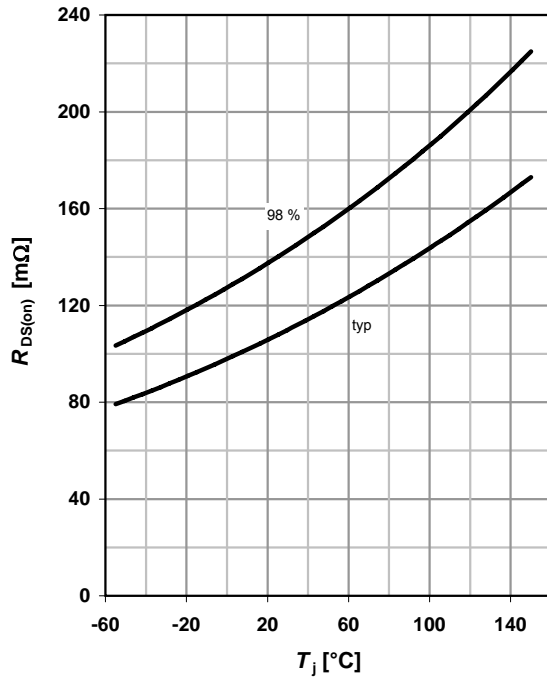
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



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

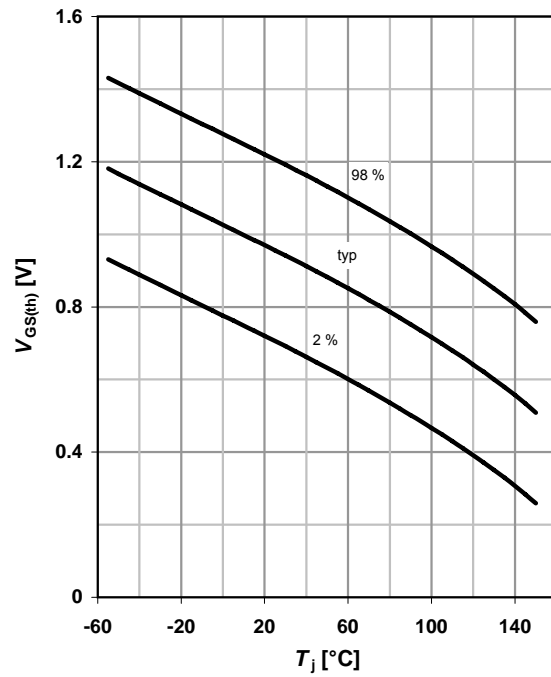
$R_{DS(on)} = f(T_j); I_D = 1.5 \text{ A}; V_{GS} = 4.5 \text{ V}$



**10 Typ. gate threshold voltage**

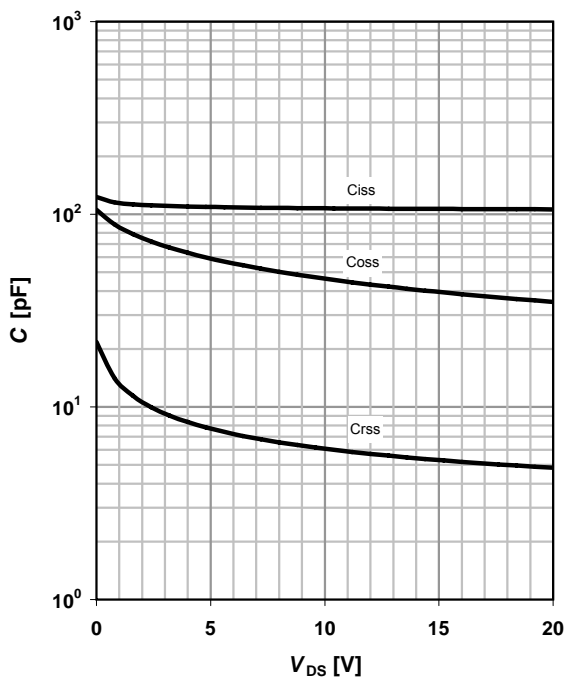
$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 3.7 \mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

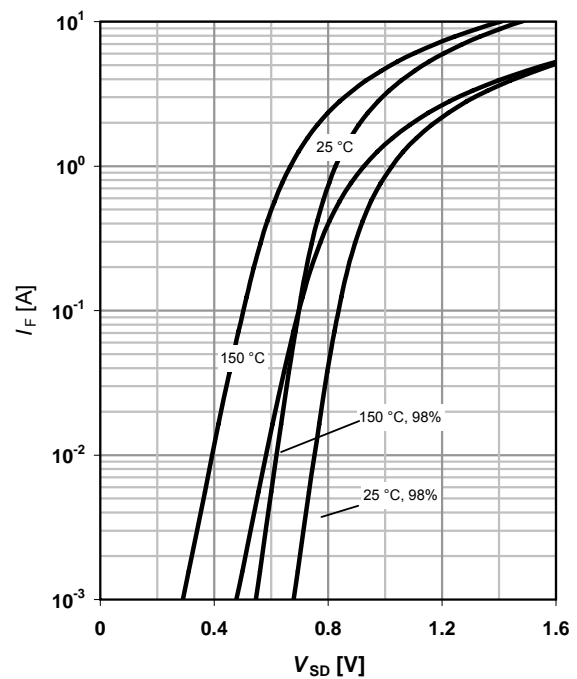
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

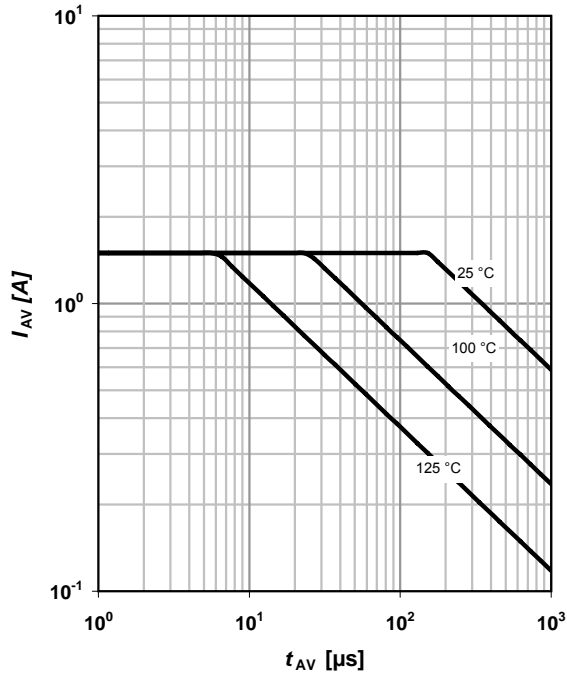
parameter:  $T_j$



**13 Avalanche characteristics**

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

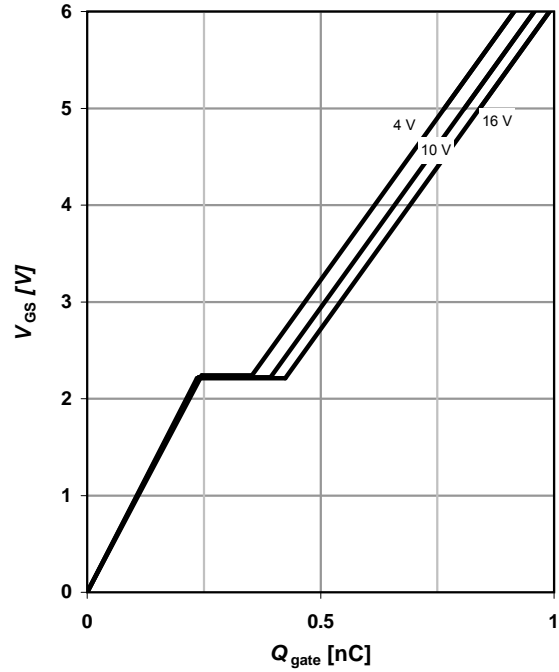
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

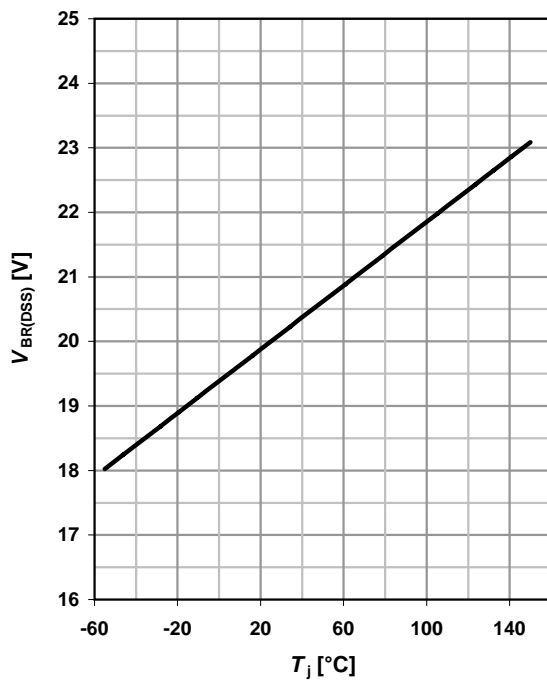
$V_{GS}=f(Q_{gate}); I_D=1.5\ A\ pulsed$

parameter:  $V_{DD}$

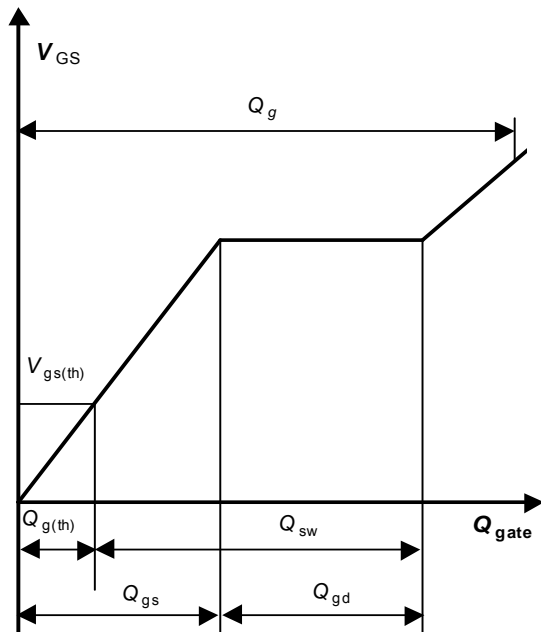


**15 Drain-source breakdown voltage**

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



**16 Gate charge waveforms**





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