

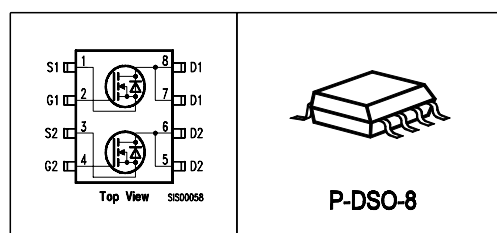
OptiMOS™ Power-Transistor

Feature

- Dual N-Channel
- Enhancement mode
- Logic Level
- 150 °C operating temperature
- Avalanche rated
- dv/dt rated

Product Summary

V_{DS}	55	V
$R_{DS(on)}$	35	mΩ
I_D	5	A



Type	Package	Ordering Code	Marking
BSO604NS2	P-DSO-8-6	Q67060-S7309	2N604L

Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25\text{ °C}$, one channel active $T_A=70\text{ °C}$, one channel active	I_D	5 4	A
Pulsed drain current, one channel active $T_A=25\text{ °C}$	$I_{D\text{ puls}}$	20	
Avalanche energy, single pulse $I_D=5\text{ A}$, $V_{DD}=25\text{ V}$, $R_{GS}=25\text{ Ω}$	E_{AS}	90	mJ
Reverse diode dv/dt $I_S=5\text{ A}$, $V_{DS}=44\text{ V}$, $di/dt=200\text{ A/μs}$, $T_{jmax}=150\text{ °C}$	dv/dt	6	kV/μs
Gate source voltage	V_{GS}	±20	V
Power dissipation, one channel active $T_A=25\text{ °C}$	P_{tot}	2	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point	R_{thJS}	-	-	50	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint ; t ≤ 10 s		-	-	100	
@ 6 cm ² cooling area ¹⁾ ; t ≤10 s		-	-	62.5	

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=30\mu A$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS}=55V, V_{GS}=0V, T_j=25^{\circ}C$ $V_{DS}=55V, V_{GS}=0V, T_j=150^{\circ}C$	I_{DSS}	- -	0.01 1	1 100	μA
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	I_{GSS}	-	1	100	
Drain-source on-state resistance $V_{GS}=4.5V, I_D=2.6A$	$R_{DS(on)}$	-	34	44	m Ω
Drain-source on-state resistance $V_{GS}=10V, I_D=2.6A$	$R_{DS(on)}$	-	27	35	

¹Device on $40\text{mm} \times 40\text{mm} \times 1.5\text{mm}$ epoxy PCB FR4 with 6cm^2 (one layer, $70 \mu\text{m}$ thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic Characteristics

Transconductance	g_{fs}	$V_{DS} \geq 2 \cdot I_D$ $R_{DS(on)max}=0.4V, I_D=5A$	6.7	13.4	-	S
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V,$ $f=1MHz$	-	735	920	pF
Output capacitance	C_{oss}		-	174	220	
Reverse transfer capacitance	C_{rss}		-	118	160	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=27.5V, V_{GS}=4.5V,$ $I_D=5A, R_G=75\Omega$	-	9	14	ns
Rise time	t_r		-	16	24	
Turn-off delay time	$t_{d(off)}$		-	52	78	
Fall time	t_f		-	8	12	

Gate Charge Characteristics

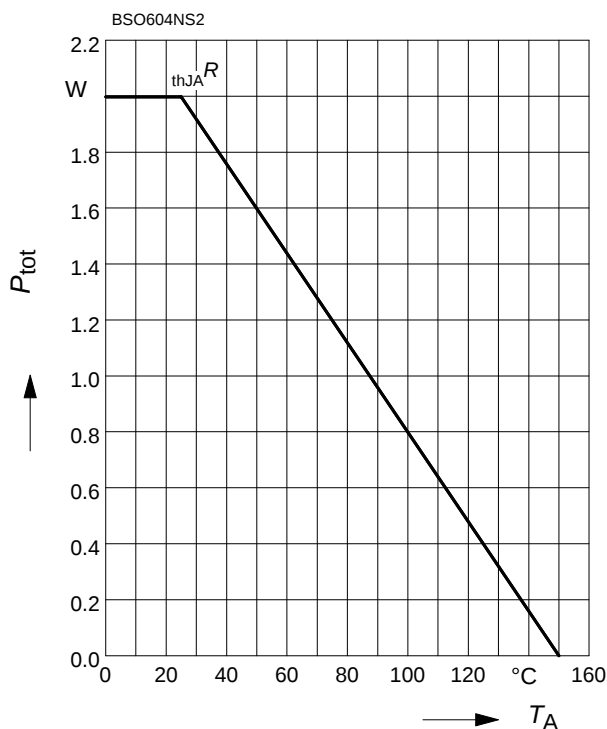
Gate to source charge	Q_{gs}	$V_{DD}=44V, I_D=5A$	-	2	3	nC
Gate to drain charge	Q_{gd}		-	6	8	
Gate charge total	Q_g	$V_{DD}=44V, I_D=5A,$ $V_{GS}=0 \text{ to } 10V$	-	19	24	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD}=44V, I_D=5A$	-	2.9	-	V

Reverse Diode

Inverse diode continuous forward current	I_S	$T_A=25^\circ\text{C}$	-	-	5	A
Inverse diode direct current, pulsed	I_{SM}		-	-	20	
Inverse diode forward voltage	V_{SD}	$V_{GS}=0V, I_F=5A$	-	0.9	1.3	V
Reverse recovery time	t_{rr}	$V_R=27.5V, I_F=I_S,$ $di_F/dt=100A/\mu s$	-	32	40	ns
Reverse recovery charge	Q_{rr}		-	34	43	nC

1 Power dissipation

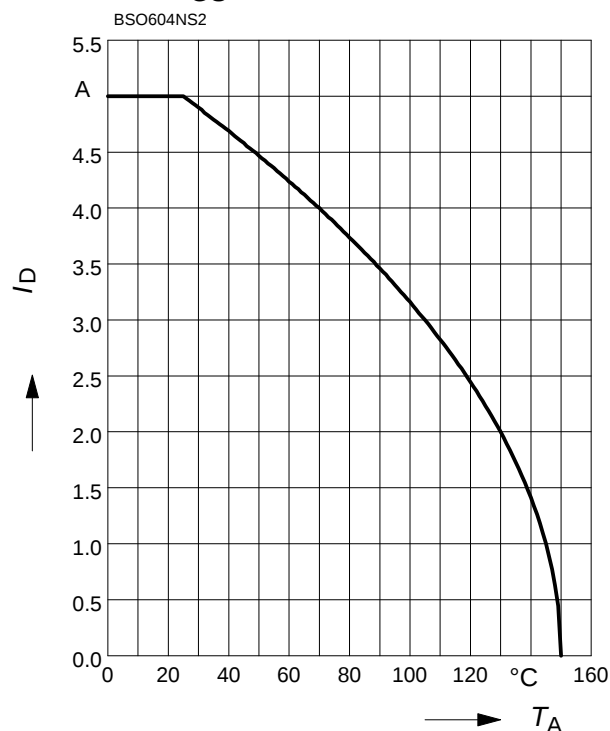
$$P_{\text{tot}} = f(T_A)$$



2 Drain current

$$I_D = f(T_A)$$

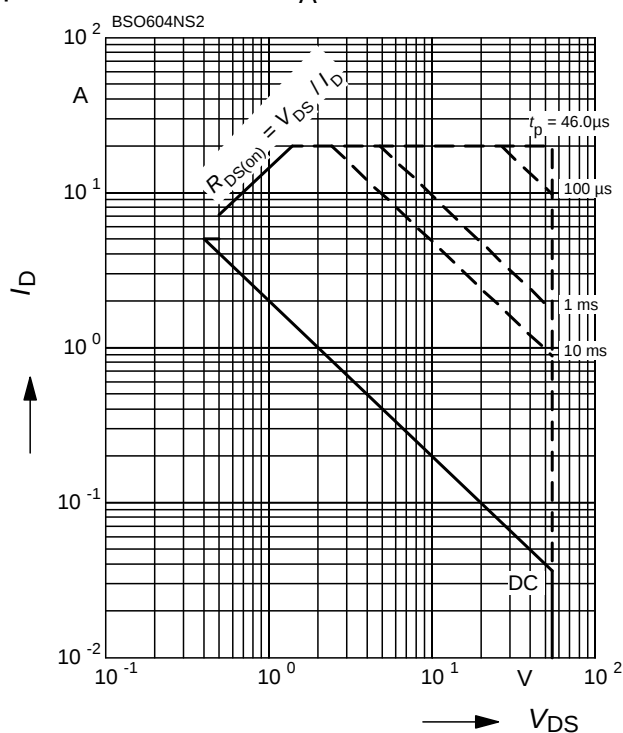
parameter: $V_{GS} \geq 10 \text{ V}$



3 Safe operating area

$$I_D = f(V_{DS})$$

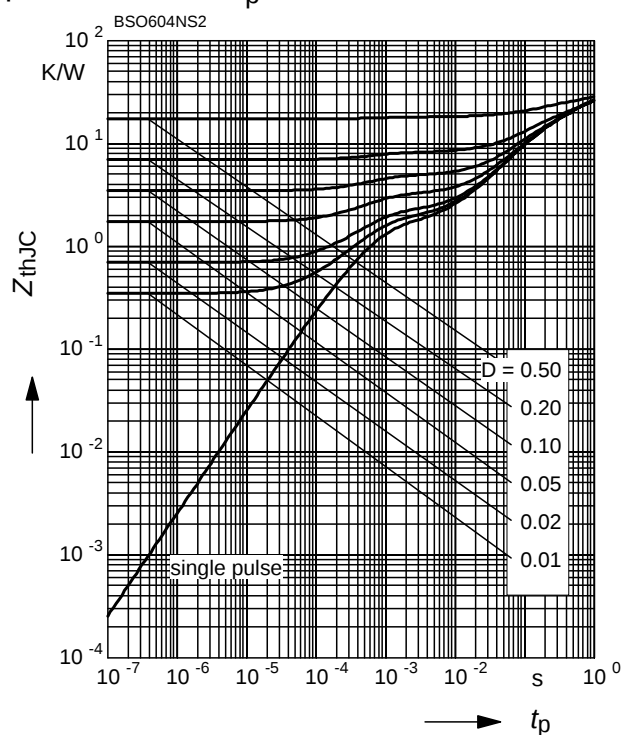
parameter: $D = 0$, $T_A = 25 \text{ °C}$



4 Transient thermal impedance

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

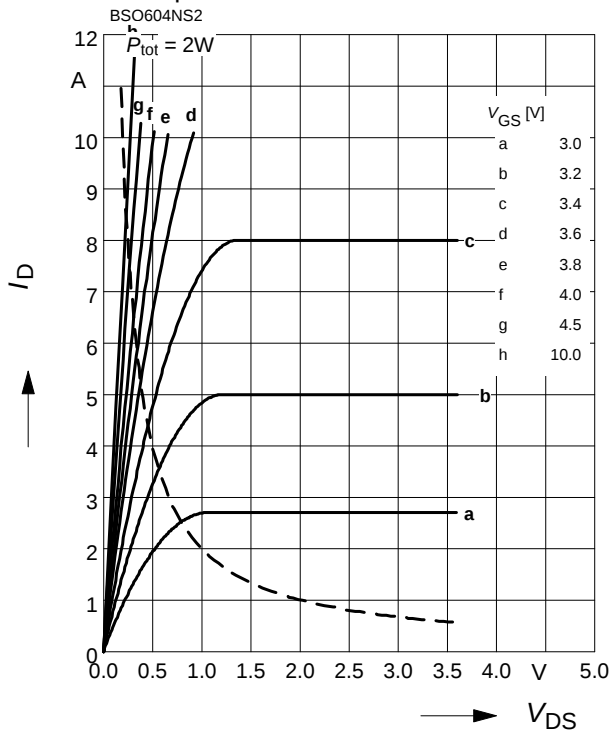
parameter: $D = t_p/T$



5 Typ. output characteristic

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

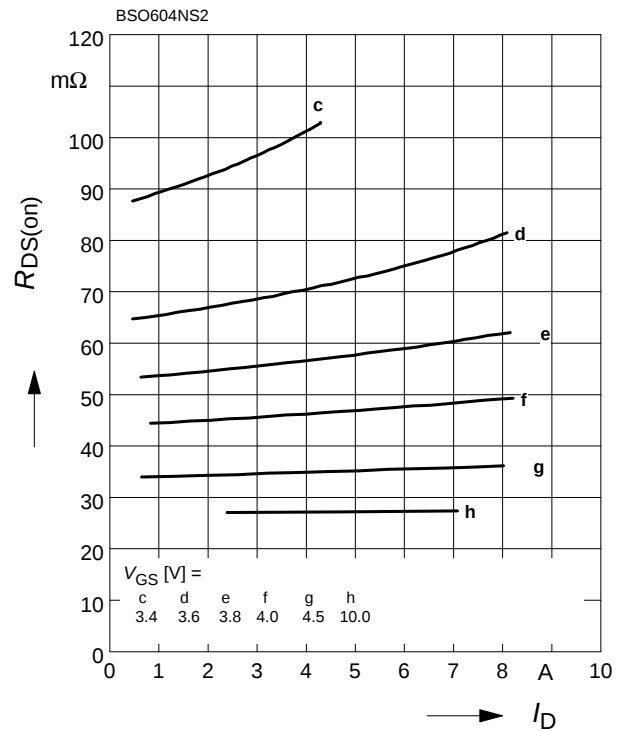
parameter: $t_p = 80 \mu\text{s}$



6 Typ. drain-source on resistance

$$R_{DS(\text{on})} = f(I_D)$$

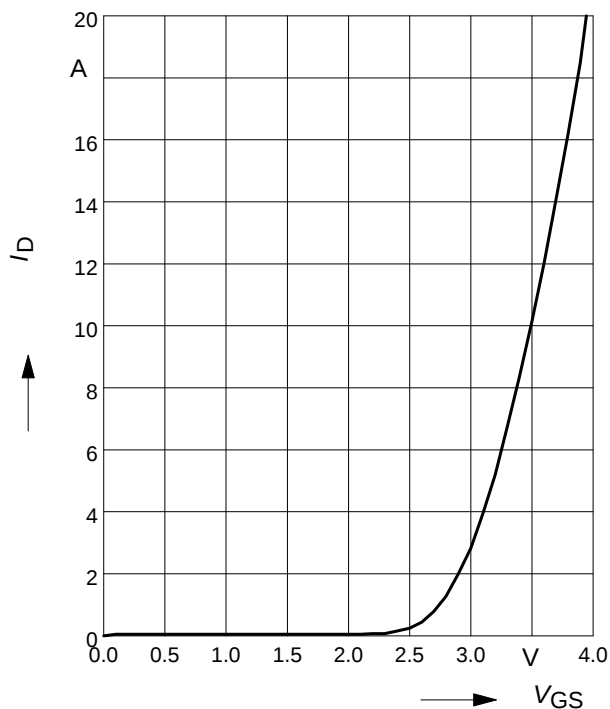
parameter: V_{GS}



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(\text{on})\text{max}}$$

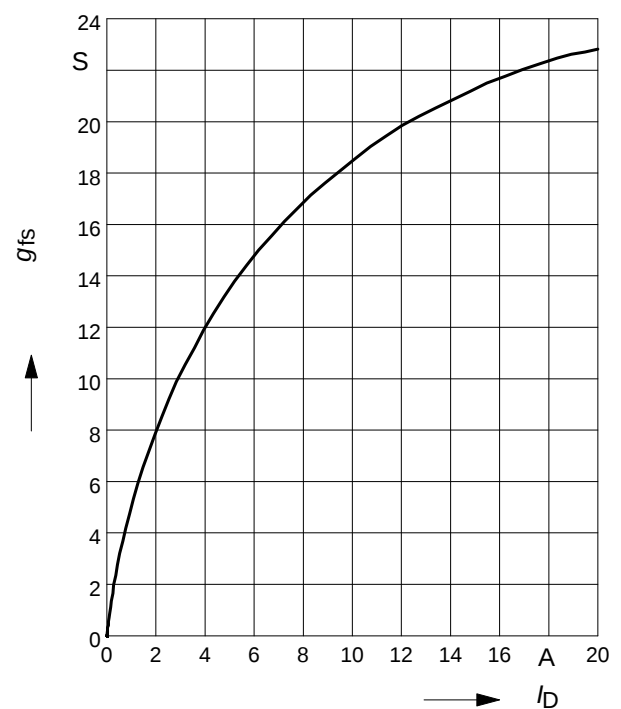
parameter: $t_p = 80 \mu\text{s}$



8 Typ. forward transconductance

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

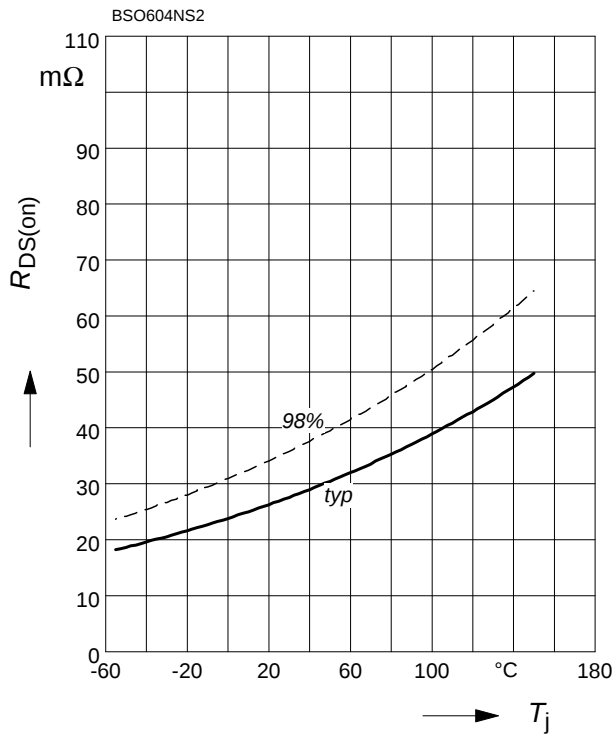
parameter: g_{fs}



9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j)$$

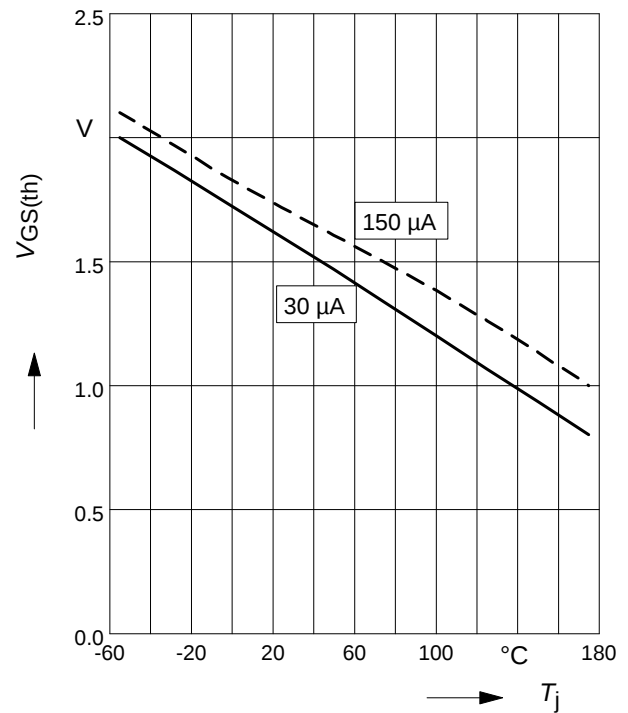
parameter: $I_D = 2.6 \text{ A}$, $V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

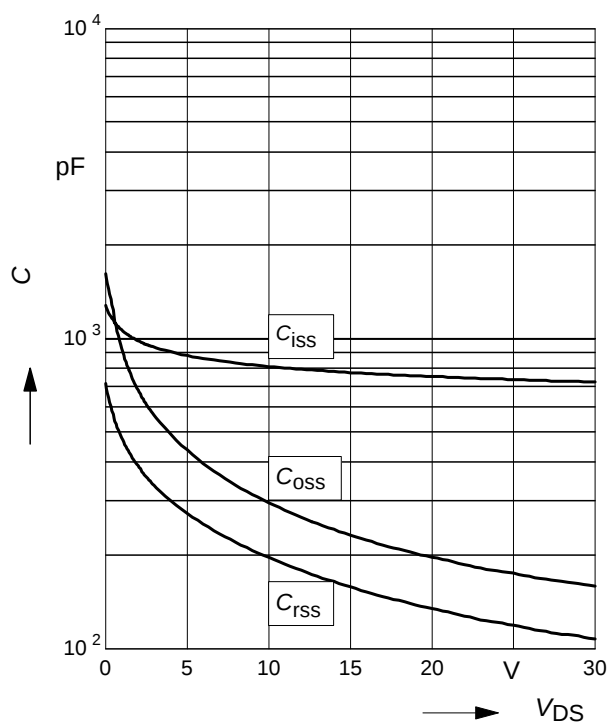
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$$C = f(V_{DS})$$

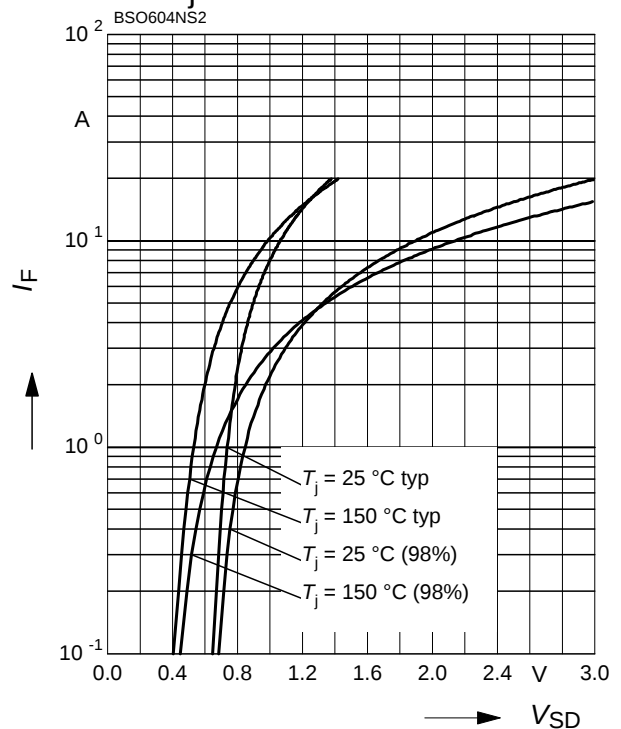
parameter: $V_{GS}=0\text{V}$, $f=1 \text{ MHz}$



12 Forward character. of reverse diode

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

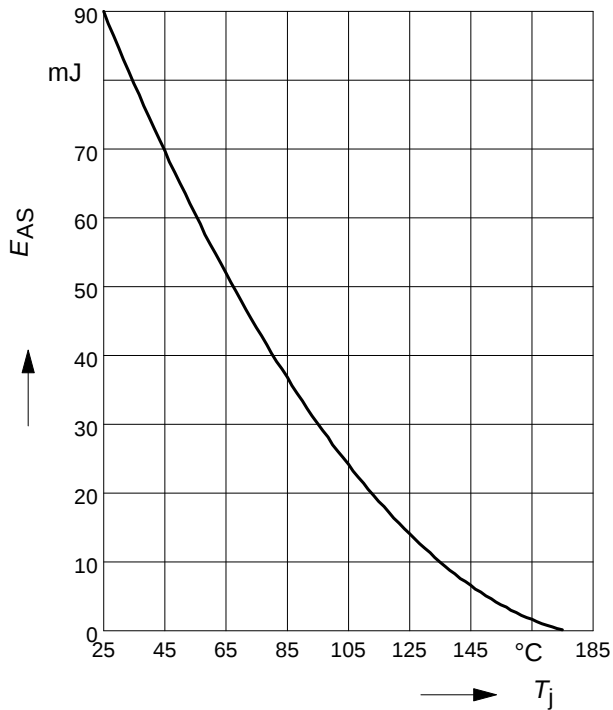
parameter: T_j , $t_p = 80 \mu\text{s}$



13 Avalanche energy

$$E_{AS} = f(T_j)$$

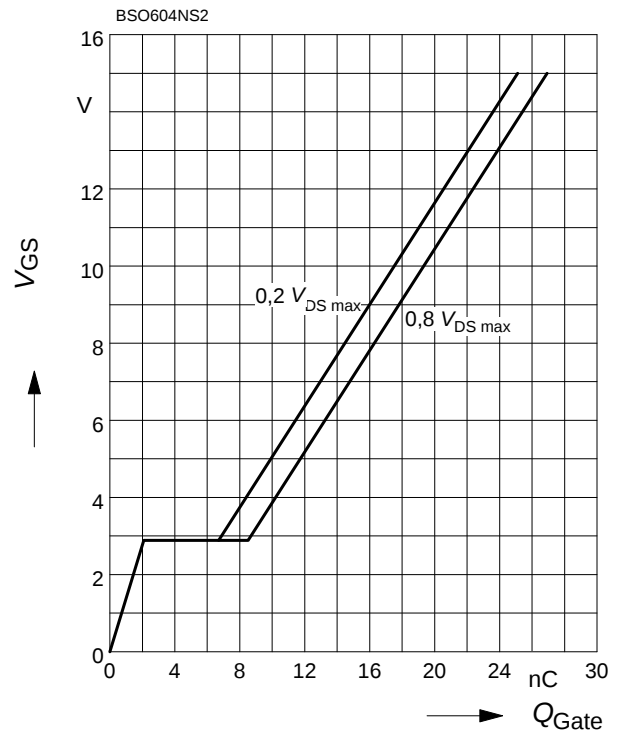
par.: $I_D = 5\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\text{ }\Omega$



14 Typ. gate charge

$$V_{GS} = f(Q_{Gate})$$

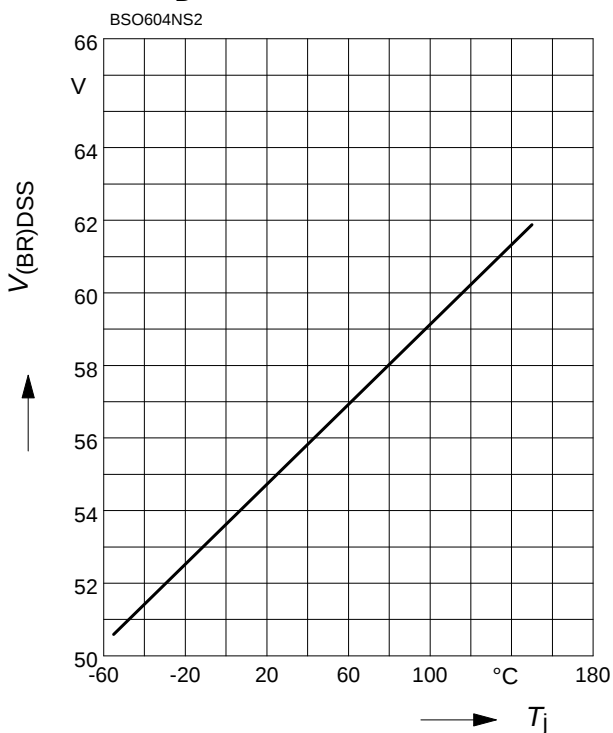
parameter: $I_D = 5\text{ A}$ pulsed



15 Drain-source breakdown voltage

$$V_{(BR)DSS} = f(T_j)$$

parameter: $I_D = 10\text{ mA}$



Published by
Infineon Technologies AG,
Bereichs Kommunikation
St.-Martin-Strasse 53,
D-81541 München
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