

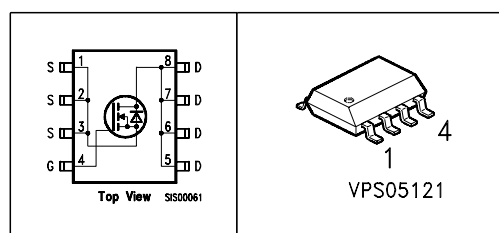
OptiMOS® Small-Signal-Transistor

Feature

- N-Channel
- Enhancement mode
- Logic Level
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Ideal for fast switching applications

Product Summary

V_{DS}	30	V
$R_{DS(on)}$	13	mΩ
I_D	11.1	A



Type	Package	Ordering Code	Marking
BSO4410	SO 8	Q67042-S4096	4410

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

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25^\circ\text{C}$ $T_A=70^\circ\text{C}$	I_D	11.1 8.9	A
Pulsed drain current $T_A=25^\circ\text{C}$	$I_{D \text{ puls}}$	44.5	
Avalanche energy, single pulse $I_D=11.1 \text{ A}$, $V_{DD}=25\text{V}$, $R_{GS}=25\Omega$	E_{AS}	126	mJ
Reverse diode dv/dt $I_S=11.1\text{A}$, $V_{DS}=24\text{V}$, $di/dt=200\text{A}/\mu\text{s}$, $T_{jmax}=150^\circ\text{C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_A=25^\circ\text{C}$	P_{tot}	2.5	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	$^\circ\text{C}$
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}	-	-	35	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint; $t \leq 10$ sec.		-	-	110	
@ 6 cm ² cooling area ¹⁾ ; $t \leq 10$ sec.		-	-	50	

Electrical Characteristics, at $T_j = 25$ °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	30	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=42\mu A$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS}=30V, V_{GS}=0V, T_j=25^{\circ}C$ $V_{DS}=30V, V_{GS}=0V, T_j=125^{\circ}C$	I_{DSS}	- -	0.01 10	1 100	μA
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	I_{GSS}	-	1	100	
Drain-source on-state resistance $V_{GS}=4.5V, I_D=9.2A$	$R_{DS(on)}$	-	15.6	18.8	m Ω
Drain-source on-state resistance $V_{GS}=10V, I_D=11.1A$	$R_{DS(on)}$	-	11	13	

¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm 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}	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D=8.9A$	13.5	27	-	S
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V,$ $f=1MHz$	-	1020	1280	pF
Output capacitance	C_{oss}		-	420	530	
Reverse transfer capacitance	C_{rss}		-	100	150	
Gate resistance	R_G		-	1.2	-	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15V, V_{GS}=10V,$ $I_D=11.1A, R_G=6.8\Omega$	-	7.5	11.3	ns
Rise time	t_r		-	33	49	
Turn-off delay time	$t_{d(off)}$		-	31	47	
Fall time	t_f		-	23	35	

Gate Charge Characteristics

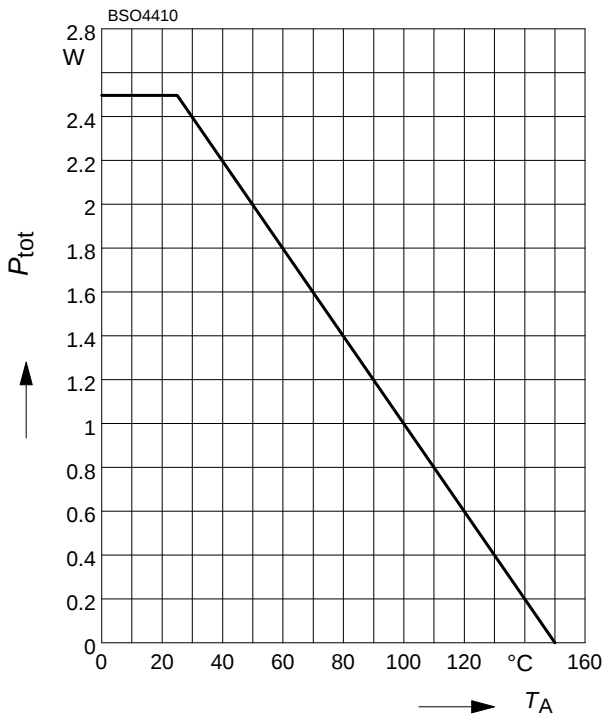
Gate to source charge	Q_{gs}	$V_{DD} = 15\text{V}$, $I_D = 11.1\text{A}$	-	3.2	4	nC
Gate to drain charge	Q_{gd}		-	9.3	14	
Gate charge total	Q_g	$V_{DD} = 15\text{V}$, $I_D = 11.1\text{A}$, $V_{GS} = 0$ to 5V	-	17	21	
Output charge	Q_{oss}	$V_{DS} = 15\text{V}$, $I_D = 11.1\text{A}$, $V_{GS} = 0\text{V}$	-	14.6	18	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 15\text{V}$, $I_D = 11.1\text{A}$	-	3	-	V

Reverse Diode

Inverse diode continuous forward current	I_S	$T_A = 25^\circ\text{C}$	-	-	2	A
Inverse diode direct current, pulsed	I_{SM}		-	-	44.5	
Inverse diode forward voltage	V_{SD}	$V_{GS} = 0\text{V}$, $I_F = 2\text{A}$	-	0.84	1.2	V
Reverse recovery time	t_{rr}	$V_R = 15\text{V}$, $I_F = I_S$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	29	36	ns
Reverse recovery charge	Q_{rr}		-	28	35	nC

1 Power dissipation

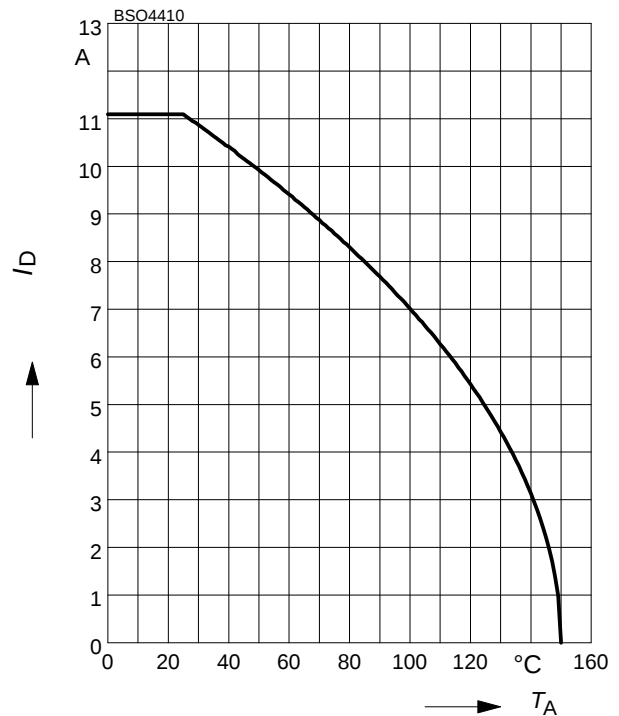
$$P_{\text{tot}} = f(T_A)$$



2 Drain current

$$I_D = f(T_A)$$

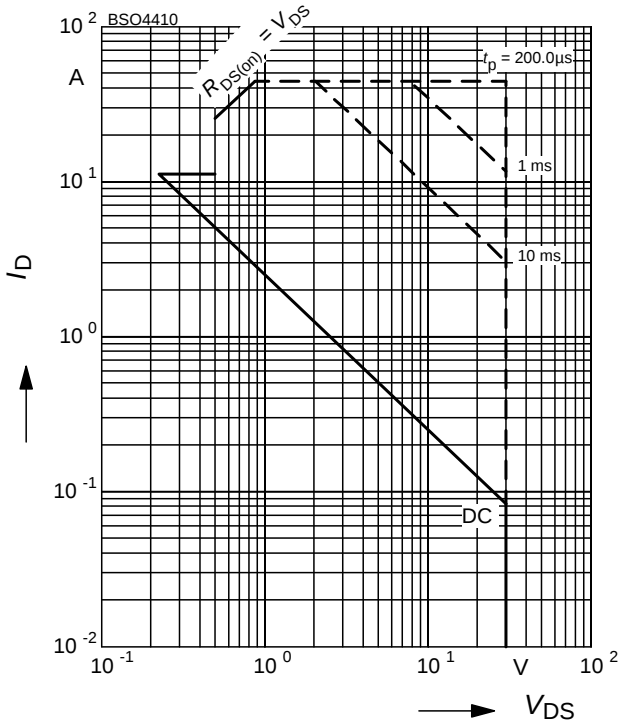
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

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

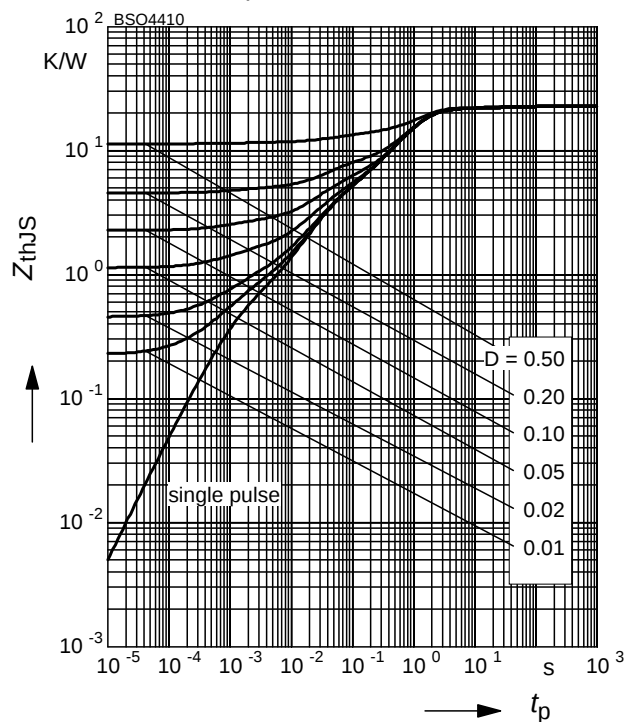
parameter: $D = 0$, $T_A = 25$ °C



4 Transient thermal impedance

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

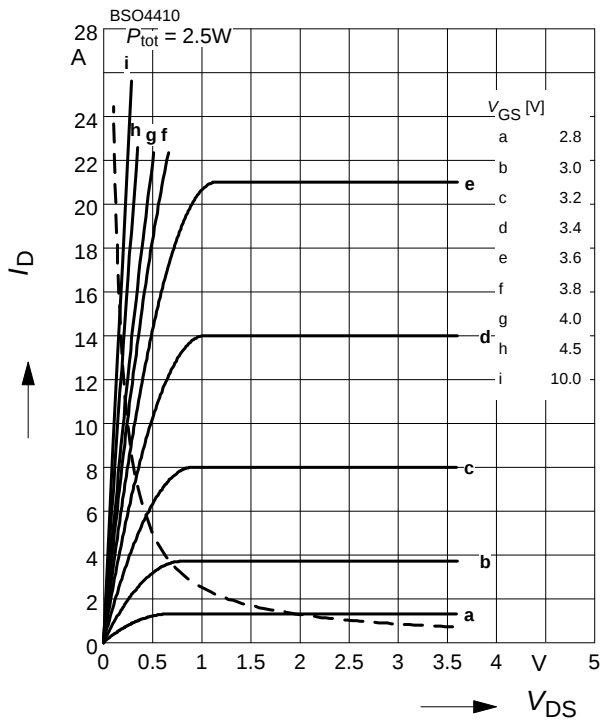
parameter: $D = t_p/T$



5 Typ. output characteristic

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

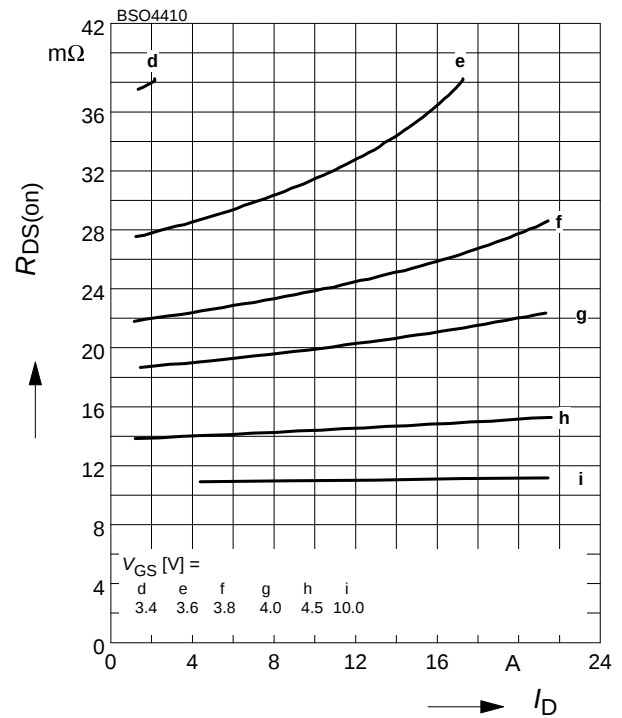
parameter: $t_p = 80 \mu\text{s}$



6 Typ. drain-source on resistance

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

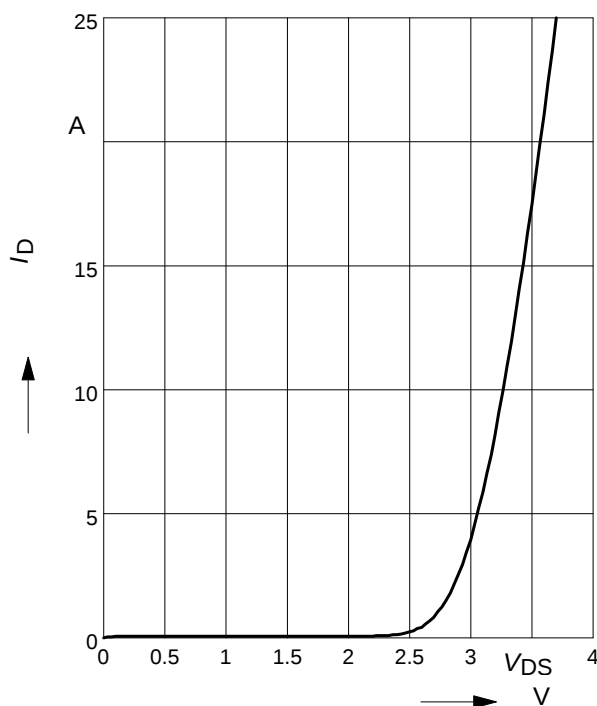
parameter: V_{GS}



7 Typ. transfer characteristics

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

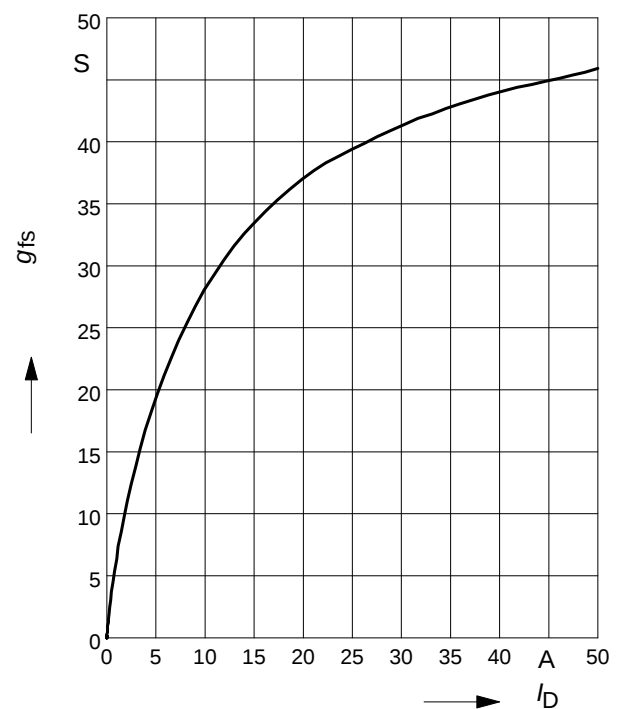
parameter: $t_p = 80 \mu\text{s}$



8 Typ. forward transconductance

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

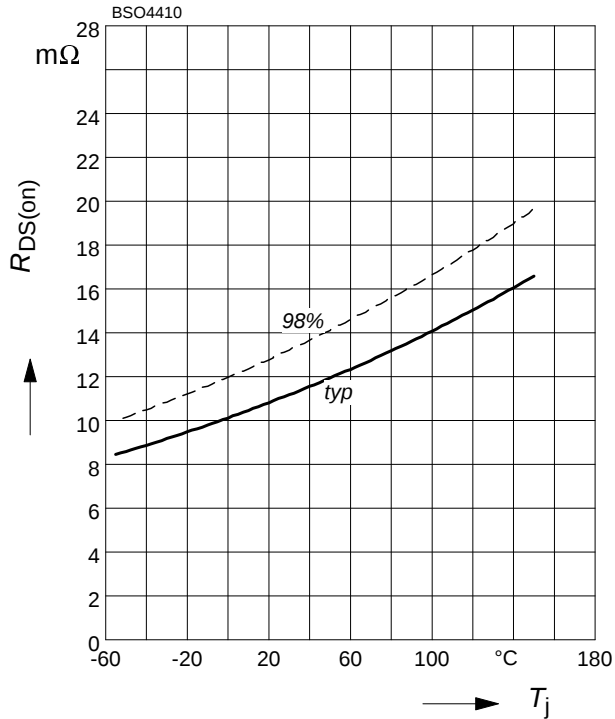
parameter: g_{fs}



9 Drain-source on-state resistance

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

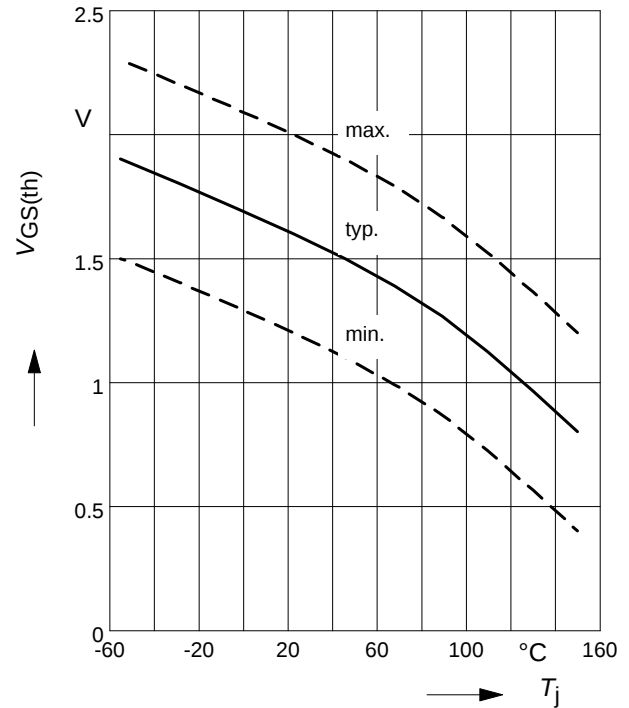
parameter: $I_D = 11.1 \text{ A}$, $V_{GS} = 10 \text{ V}$



10 Gate threshold voltage

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

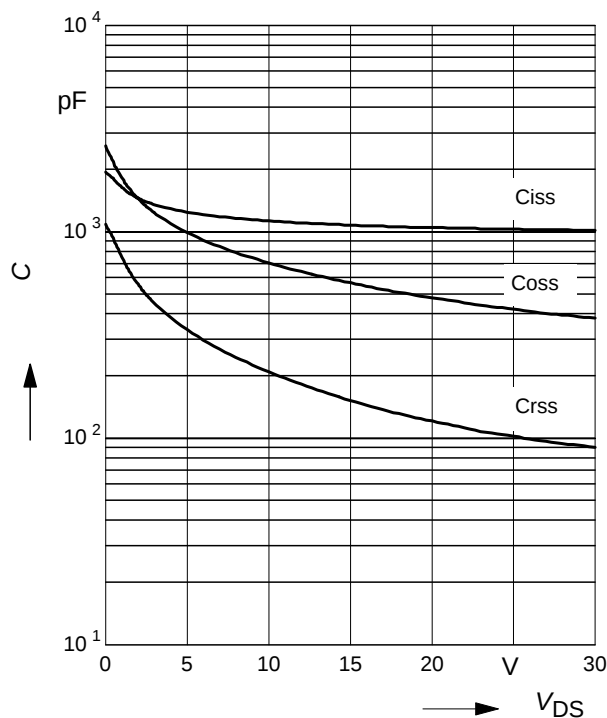
parameter: $V_{GS} = V_{DS}$, $I_D = 42 \mu\text{A}$



11 Typ. capacitances

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

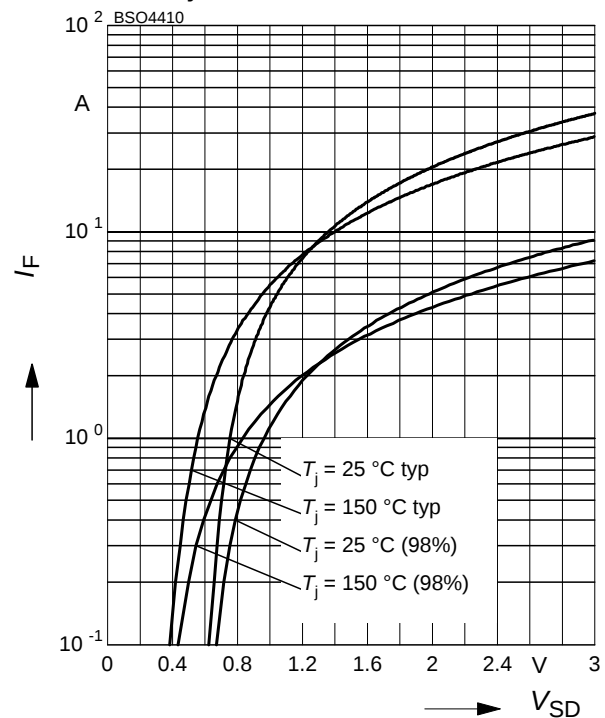
parameter: $V_{GS}=0\text{V}$, $f=1 \text{ MHz}$



12 Forward character. of reverse diode

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

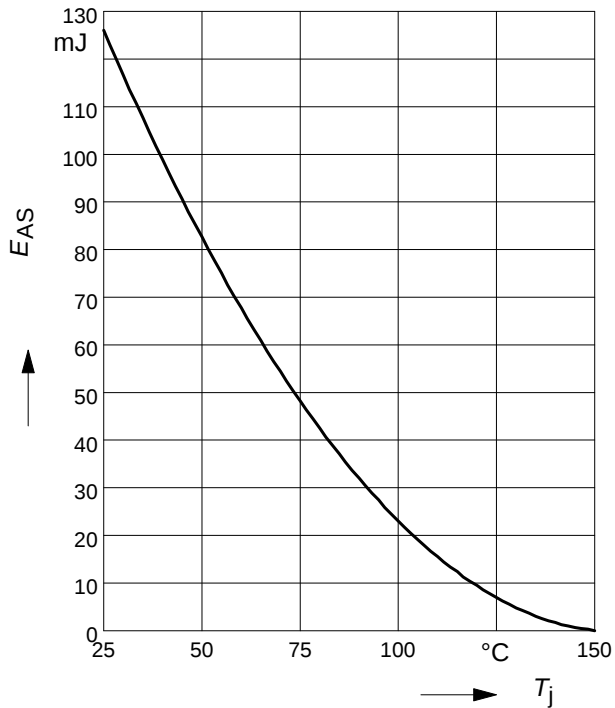
parameter: T_j , $t_p = 80 \mu\text{s}$



13 Typ. avalanche energy

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

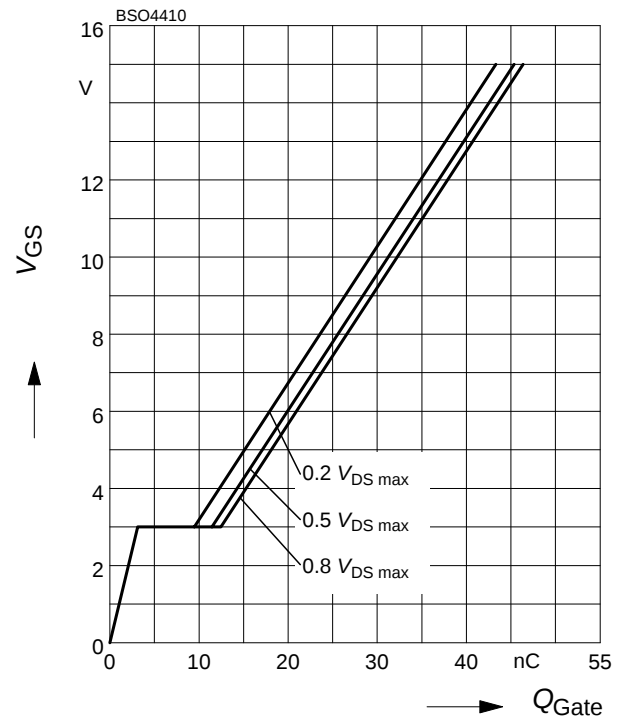
par.: $I_D = 11.1 \text{ A}$, $V_{DD} = 25 \text{ V}$, $R_{GS} = 25 \Omega$



14 Typ. gate charge

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

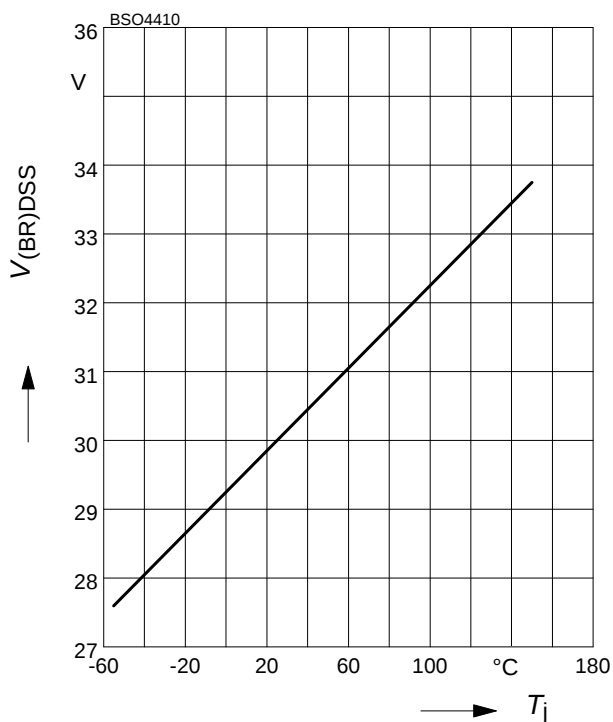
parameter: $I_D = 11.1 \text{ A}$ pulsed



15 Drain-source breakdown voltage

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

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



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