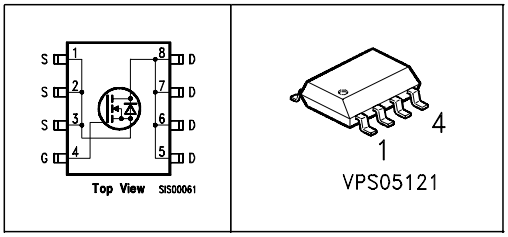
OptiMOS® Small-Signal-Transistor

Product Summary

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

Feature

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



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

Maximum Ratings,at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current	I_D		A
T_A=25°C		11.1	
T_A=70°C		8.9	
Pulsed drain current	$I_{D\ puls}$	44.5	
T_A=25°C			
Avalanche energy, single pulse	E_{AS}	126	mJ
I_D=11.1 A , V_{DD}=25V, R_{GS}=25Ω			
Reverse diode d*v*/d*t*	d*v*/d*t*	6	kV/µs
I_S=11.1A, V_{DS}=24V, d*i*/d*t*=200A/µs, T_{jmax}=150°C			
Gate source voltage	V_{GS}	±20	V
Power dissipation	P_{tot}	2.5	W
T_A=25°C			
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}	-	-	35	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint; t ≤ 10 sec.		-	-	110	
@ 6 cm^2 cooling area [1]; t ≤ 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=42µA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=30V, V_{GS}=0V, T_j=25°C		-	0.01	1	
V_{DS}=30V, V_{GS}=0V, T_j=125°C		-	10	100	
Gate-source leakage current V_{GS}=20V, V_{DS}=0V	I_{GSS}	-	1	100	nA
Drain-source on-state resistance V_{GS}=4.5V, I_D=9.2A	$R_{DS(on)}$	-	15.6	18.8	mΩ
Drain-source on-state resistance V_{GS}=10V, I_D=11.1A	$R_{DS(on)}$	-	11	13	

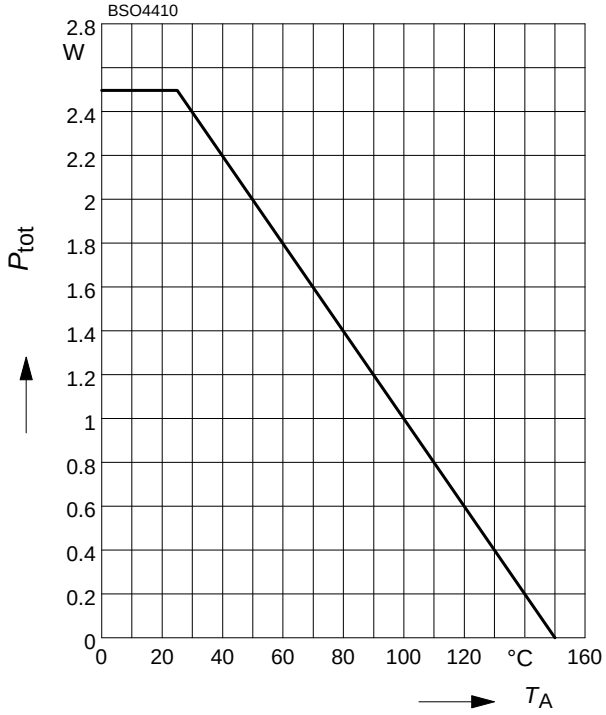
[1] Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, 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=6.8Ω	-	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}=15V, I_D=11.1A	-	3.2	4	nC
Gate to drain charge	Q_{gd}		-	9.3	14	
Gate charge total	Q_g	V_{DD}=15V, I_D=11.1A, V_{GS}=0 to 5V	-	17	21	
Output charge	Q_{oss}	V_{DS}=15V, I_D=11.1A, V_{GS}=0V	-	14.6	18	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=15V, I_D=11.1A	-	3	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_A=25°C	-	-	2	A
Inverse diode direct current, pulsed	I_{SM}		-	-	44.5	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=2A	-	0.84	1.2	V
Reverse recovery time	t_{rr}	V_R=15V, I_F=I_S, di_F/dt=100A/µs	-	29	36	ns
Reverse recovery charge	Q_{rr}		-	28	35	nC

1 Power dissipation

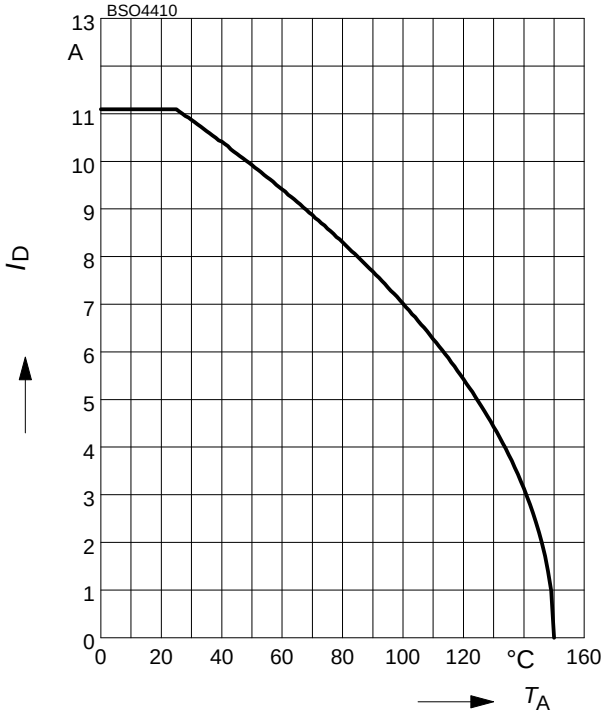
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

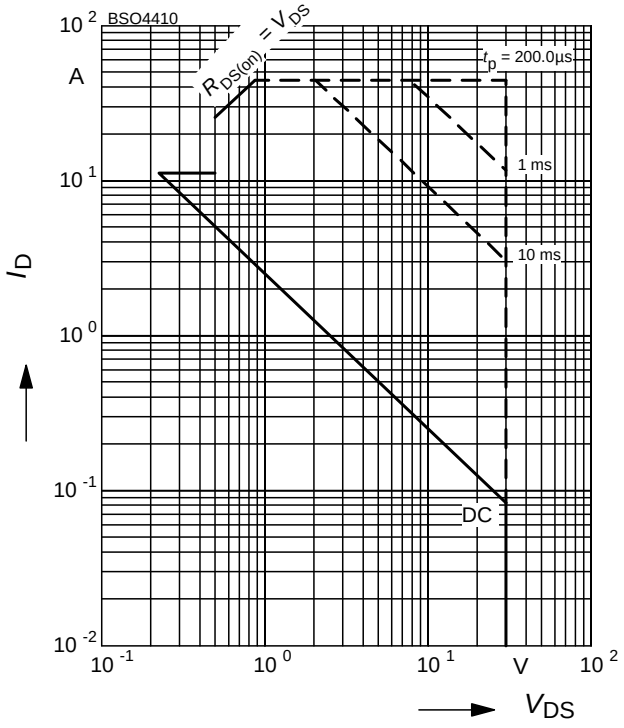
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

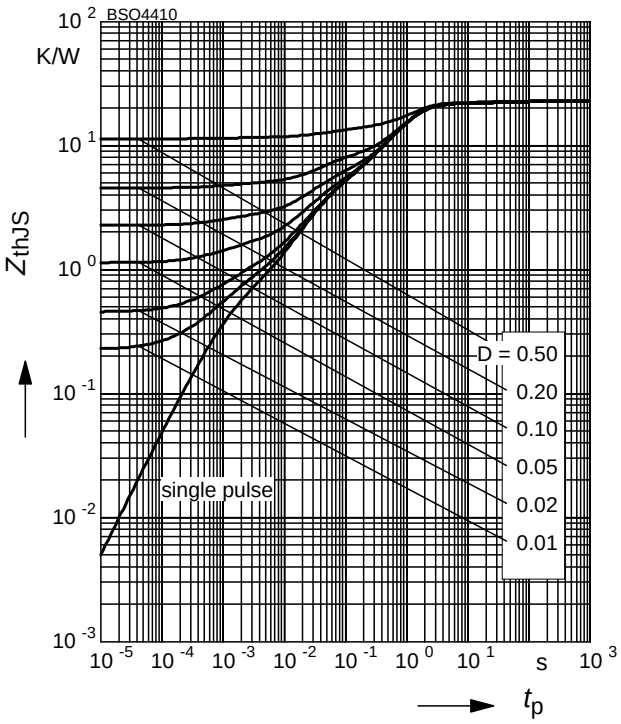
parameter : $D = 0$, $T_A = 25$ °C



4 Transient thermal impedance

$Z_{thJS} = f(t_p)$

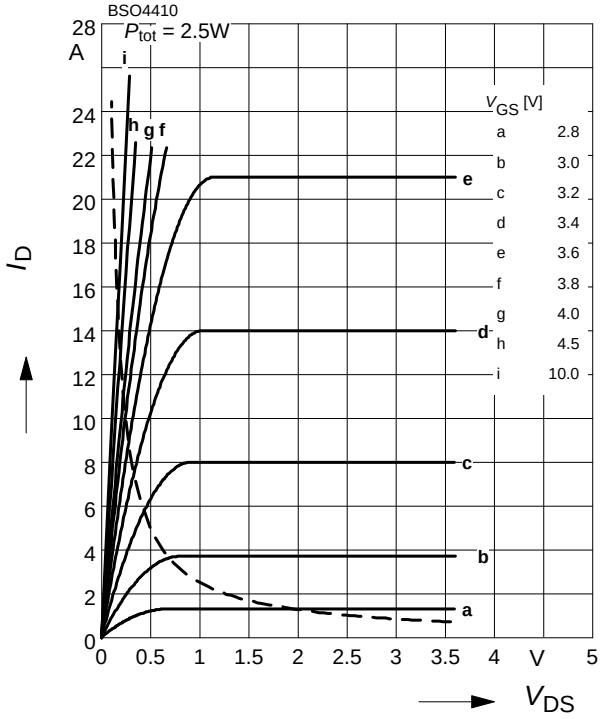
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

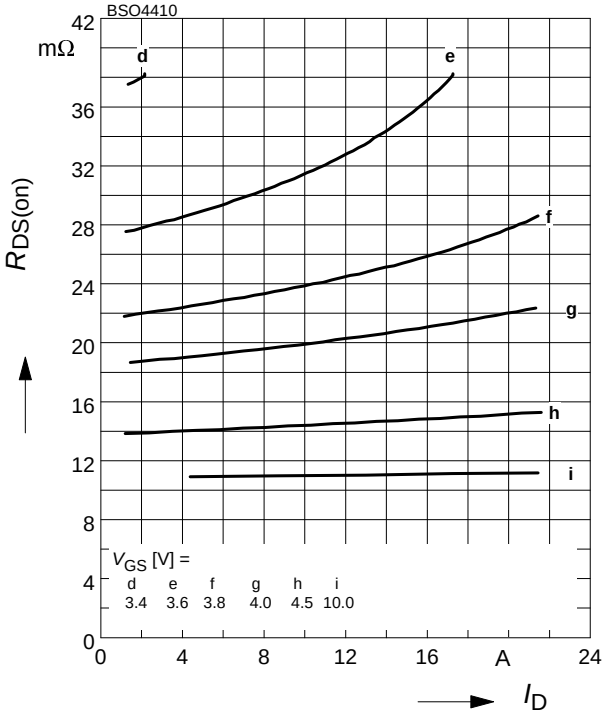
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

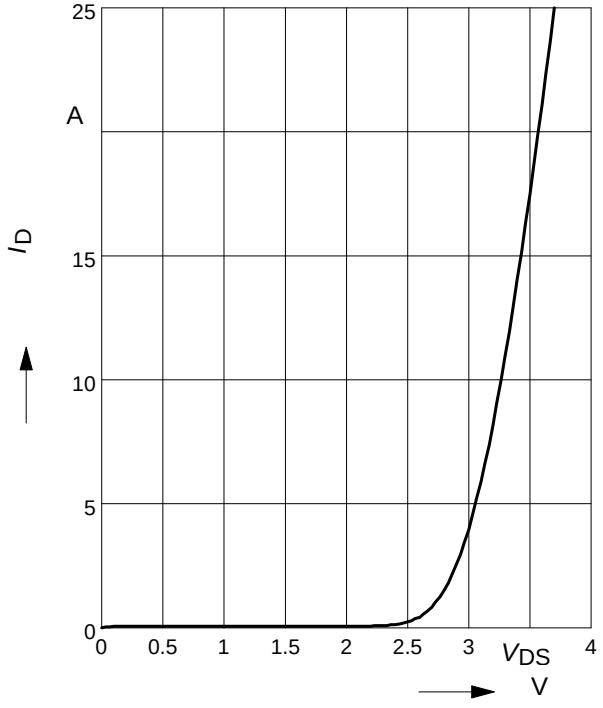
parameter: V_{GS}



7 Typ. transfer characteristics

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

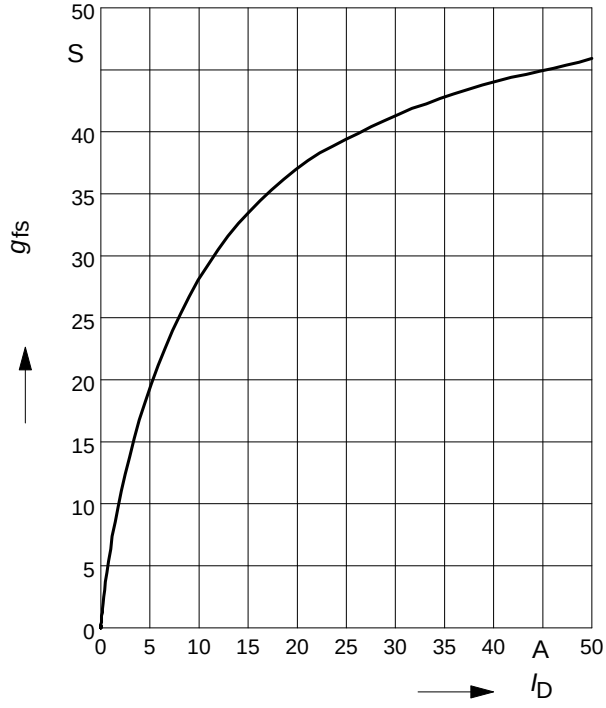
parameter: t_p = 80 µs



8 Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

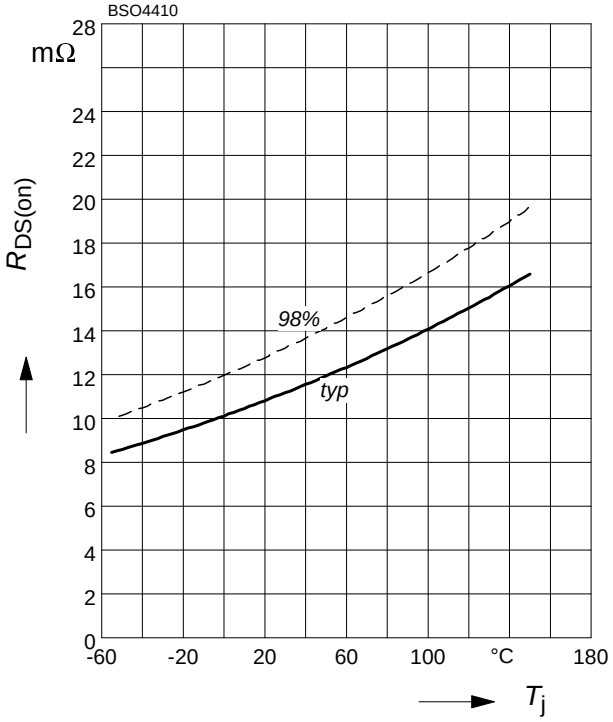
parameter: g_{fs}



9 Drain-source on-state resistance

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

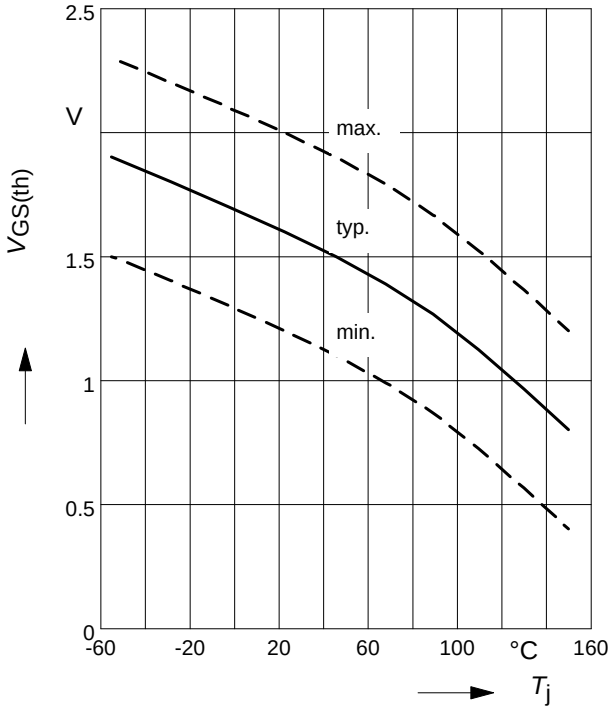
parameter : I_D = 11.1 A, V_{GS} = 10 V



10 Gate threshold voltage

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

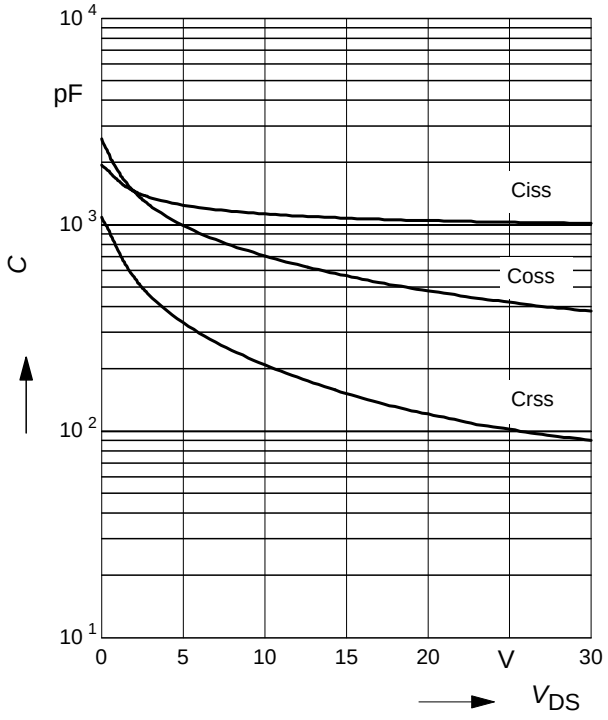
parameter: $V_{GS} = V_{DS}$, I_D = 42 µA



11 Typ. capacitances

$C = f(V_{DS})$

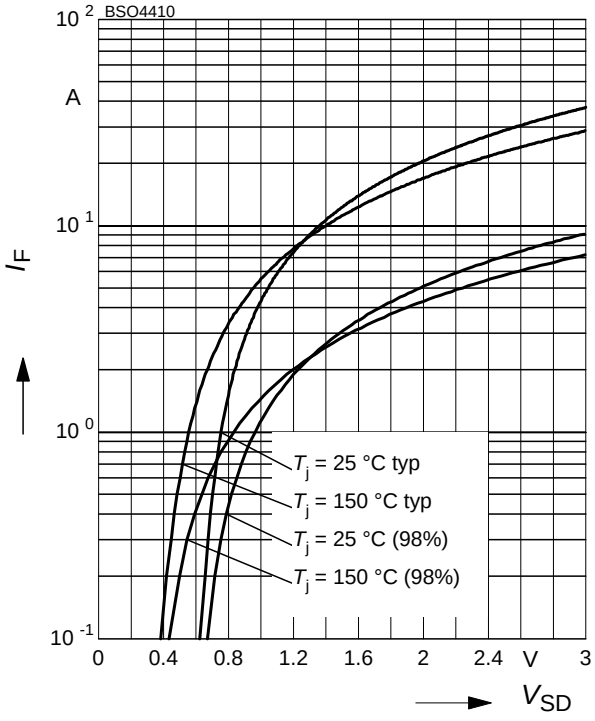
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

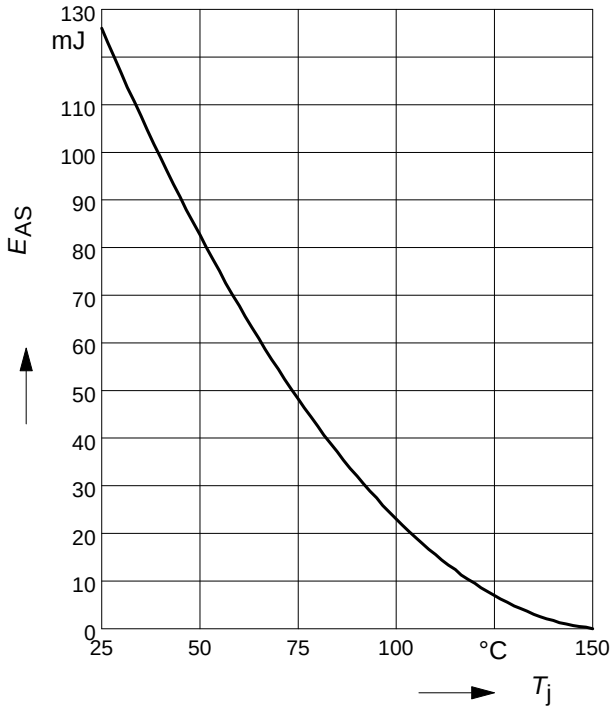
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

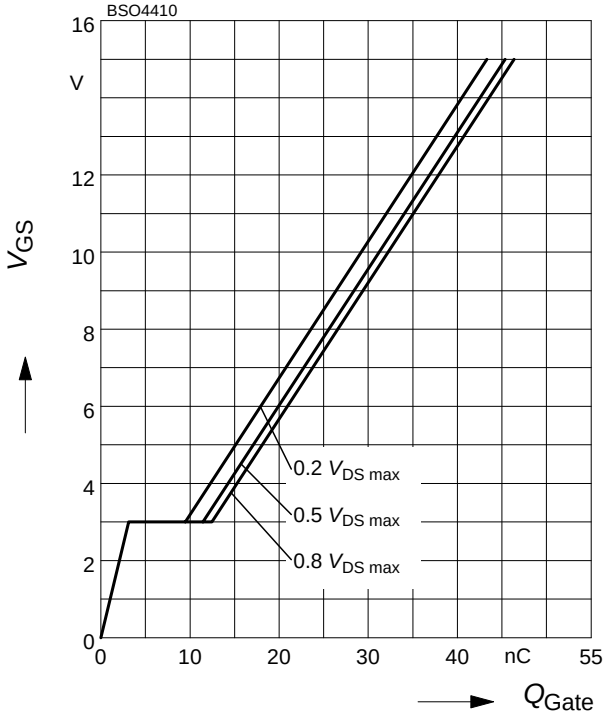
par.: I_D = 11.1 A , V_{DD} = 25 V, R_{GS} = 25 Ω



14 Typ. gate charge

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

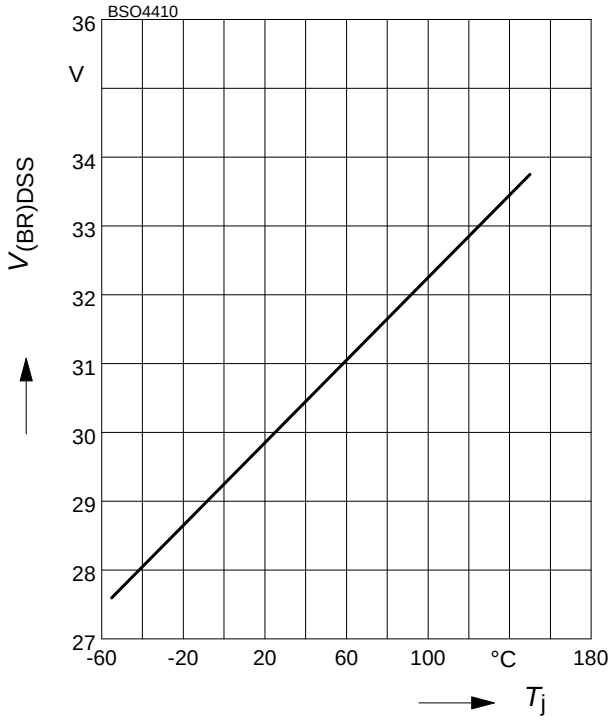
parameter: I_D = 11.1 A pulsed



15 Drain-source breakdown voltage

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

parameter: I_D=10 mA



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