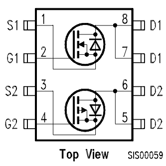
SIPMOS® Small-Signal-Transistor

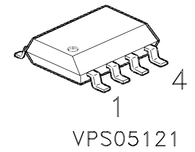
Features

- Dual N- and P -Channel
- Enhancement mode
- Logic Level
- Avalanche rated
- d*v*/d*t* rated

Product Summary

		N	P	
Drain source voltage	V_{DS}	60	-60	V
Drain-Source on-state resistance	$R_{DS(on)}$	0.11	0.3	Ω
Continuous drain current	I_D	3.1	-2	A





Type	Package	Ordering Code
BSO 615 C	SO 8	Q67041-S4024

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

Parameter	Symbol	Value		Unit
		N	P	
Continuous drain current	I_D			A
T_A = 25 °C		3.1	-2	
T_A = 70 °C		2.5	-1.6	
Pulsed drain current T_A = 25 °C	$I_{D\ puls}$	12.4	-8	
Avalanche energy, single pulse	E_{AS}			mJ
I_D = 3.1 A , V_{DD} = 25 V, R_{GS} = 25 Ω		47	-	
I_D = -2 A , V_{DD} = -25 V, R_{GS} = 25 Ω		-	70	
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	0.2	0.2	
Reverse diode d*v*/d*t*, T_{jmax} = 150 °C	d*v*/d*t*			kV/µs
I_S = 3.1 A, V_{DS} = 48 V, d*i*/d*t* = 200 A/µs		6	-	
I_S = -2 A, V_{DS} = -48 V, d*i*/d*t* = -200 A/µs		-	6	
Gate source voltage	V_{GS}	±20	±20	V
Power dissipation T_A = 25 °C	P_{tot}	2	2	W
Operating and storage temperature	T_j , T_{stg}	-55...+150		°C
IEC climatic category; DIN IEC 68-1		55/150/56		

Termal Characteristics

Parameter		Symbol	Values min.	Values typ.	Values max.	Unit
Dynamic Characteristics						
Thermal resistance, junction - soldering point	N	R_{thJS}	-	-	40	K/W
(Pin 4)	P		-	-	40	
SMD version, device on PCB:		R_{thJA}				
@ min. footprint; t ≤ 10 sec.	N		-	-	100	
@ 6 cm^2 cooling area [1]); t ≤ 10 sec.	N		-	-	62.5	
@ min. footprint; t ≤ 10 sec.	P		-	-	110	
@ 6 cm^2 cooling area [1]); t ≤ 10 sec.	P		-	-	62.5	

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

Parameter		Symbol	min.	typ.	max.	Unit
Drain- source breakdown voltage		$V_{(BR)DSS}$				V
V_{GS} = 0 V, I_D = 250 µA	N		60	-	-	
V_{GS} = 0 V, I_D = -250 µA	P		-60	-	-	
Gate threshold voltage, V_{GS} = V_{DS}		$V_{GS(th)}$				
I_D = 20 µA	N		1.2	1.6	2.0	
I_D = -450 µA	P		-1	-1.5	-2.0	
Zero gate voltage drain current		I_{DSS}				µA
V_{DS} = 60 V, V_{GS} = 0 V, T_j = 25 °C	N		-	0.1	1	
V_{DS} = 60 V, V_{GS} = 0 V, T_j = 125 °C	N		-	10	100	
V_{DS} = -60 V, V_{GS} = 0 V, T_j = 25 °C	P		-	-0.1	-1	
V_{DS} = -60 V, V_{GS} = 0 V, T_j = 125 °C	P		-	-10	-100	
Gate-source leakage current		I_{GSS}				nA
V_{GS} = 20 V, V_{DS} = 0 V	N		-	10	100	
V_{GS} = -20 V, V_{DS} = 0 V	P		-	-10	-100	
Drain-Source on-state resistance		$R_{DS(on)}$				Ω
V_{GS} = 4.5 V, I_D = 2.7 A	N		-	0.1	0.15	
V_{GS} = -4.5 V, I_D = -1.7 A	P		-	0.27	0.45	
Drain-Source on-state resistance		$R_{DS(on)}$				
V_{GS} = 10 V, I_D = 3.1 A	N		-	0.07	0.11	
V_{GS} = -10 V , I_D = -2 A	P		-	0.19	0.3	

[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm [2] (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

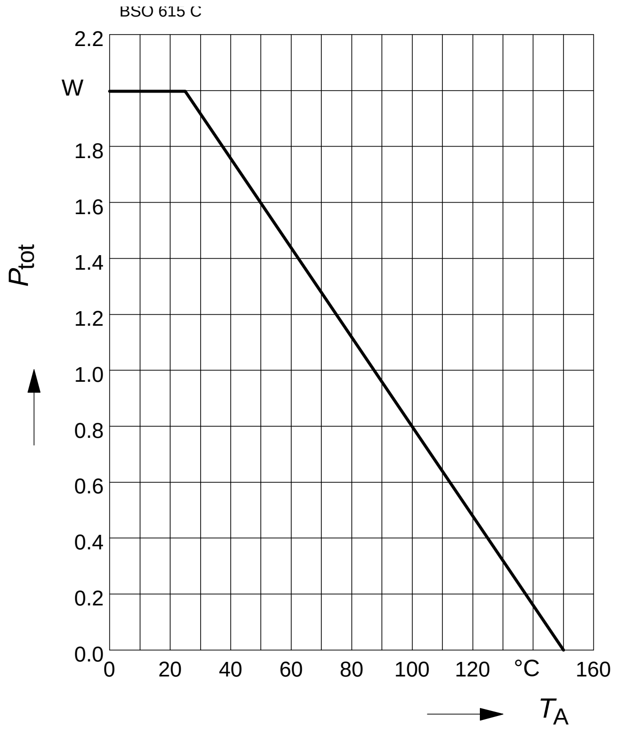
Parameter		Symbol	Values			Unit
			min.	typ.	max.	
Characteristics						
Transconductance		g_{fs}				S
$V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = 2.7 A	N		2.25	5.5	-	
$VV_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = -1.7 A	P		1.2	2.4	-	
Input capacitance		C_{iss}				pF
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	N		-	300	380	
V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	P		-	365	460	
Output capacitance		C_{oss}				
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	N		-	90	120	
V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	P		-	105	135	
Reverse transfer capacitance		C_{rss}				
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	N		-	50	65	
V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	P		-	40	50	
Turn-on delay time		$t_{d(on)}$				ns
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 2.7 A, R_G = 16 Ω	N		-	16	24	
V_{DD} = -30 V, V_{GS} = -4.5 V, I_D = -1.7 A, R_G = 13 Ω	P		-	24	36	
Rise time		t_r				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 2.7 A, R_G = 16 Ω	N		-	75	115	
V_{DD} = -30 V, V_{GS} = -4.5 V, I_D = -1.7 A, R_G = 13 Ω	P		-	105	160	
Turn-off delay time		$t_{d(off)}$				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 2.7 A, R_G = 16 Ω	N		-	25	40	
V_{DD} = -30 V, V_{GS} = -4.5 V, I_D = -1.7 A, R_G = 13 Ω	P		-	125	190	
Fall time		t_f				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 2.7 A, R_G = 16 Ω	N		-	18	27	
V_{DD} = -30 V, V_{GS} = -4.5 V, I_D = -1.7 , R_G = 13 Ω	P		-	90	135	

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

Parameter		Symbol	Values min.	Values typ.	Values max.	Unit
Characteristics						
Gate to source charge		Q_{gs}				nC
V_{DD} = 48 V, I_D = 3.1 A	N		-	0.5	0.75	
V_{DD} = -48 V, I_D = -2 A	P		-	1.7	2.6	
Gate to drain charge		Q_{gd}				
V_{DD} = 48 V, I_D = 3.1 A	N		-	6.3	9.5	
V_{DD} = -48 V, I_D = -2 A	P		-	4.3	6.5	
Gate charge total		Q_g				
V_{DD} = 48 V, I_D = 3.1 A, V_{GS} = 0 to 10V	N		-	15	22.5	
V_{DD} = -48 V, I_D = -2 A, V_{GS} = 0 to -10V	P		-	13.5	20	
Gate plateau voltage		$V_{(plateau)}$				V
V_{DD} = 48 V, I_D = 3.1 A	N		-	3.1	-	
V_{DD} = -48 V, I_D = -2 A	P		-	-2.8	-	
Reverse Diode						
Inverse diode continuous forward current	N	I_S	-	-	3.1	A
T_A = 25 °C	P		-	-	-2	
Inverse diode direct current,pulsed	N	I_{SM}	-	-	12.4	
T_A = 25 °C	P		-	-	-8	
Inverse diode forward voltage		V_{SD}				V
V_{GS} = 0 V, I_F = I_S	N		-	0.8	1.1	
V_{GS} = 0 V, I_F = I_S	P		-	-0.8	-1.1	
Reverse recovery time		t_{rr}				ns
V_R = 30 V, I_F=I_S, di_F/dt = 100 A/µs	N		-	50	75	
V_R = -30 V, I_F=I_S , di_F/dt = -100 A/µs	P		-	85	130	
Reverse recovery charge		Q_{rr}				µC
V_R = 30 V, I_F=I_S , di_F/dt = 100 A/µs	N		-	70	105	
V_R = -30 V, I_F=I_S, di_F/dt = -100 A/µs	P		-	120	180	

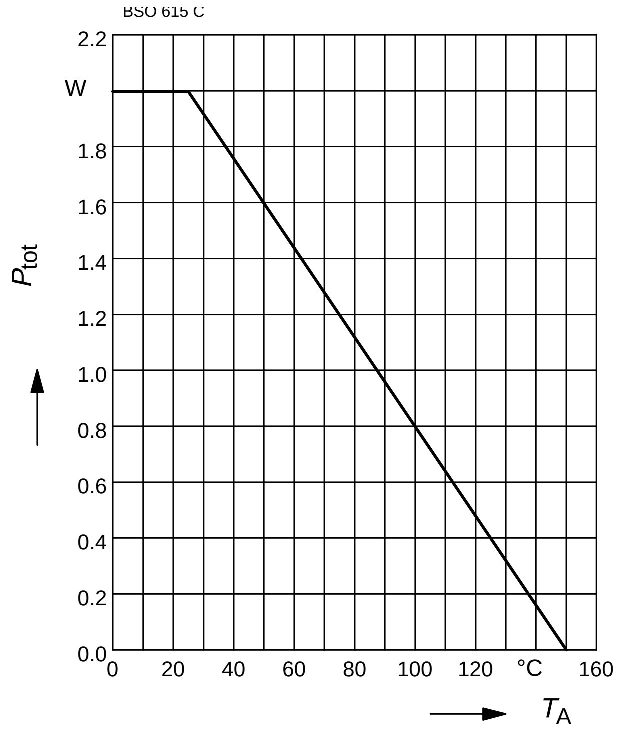
Power Dissipation (N-Ch.)

$P_{tot} = f(T_A)$



Power Dissipation (P-Ch.)

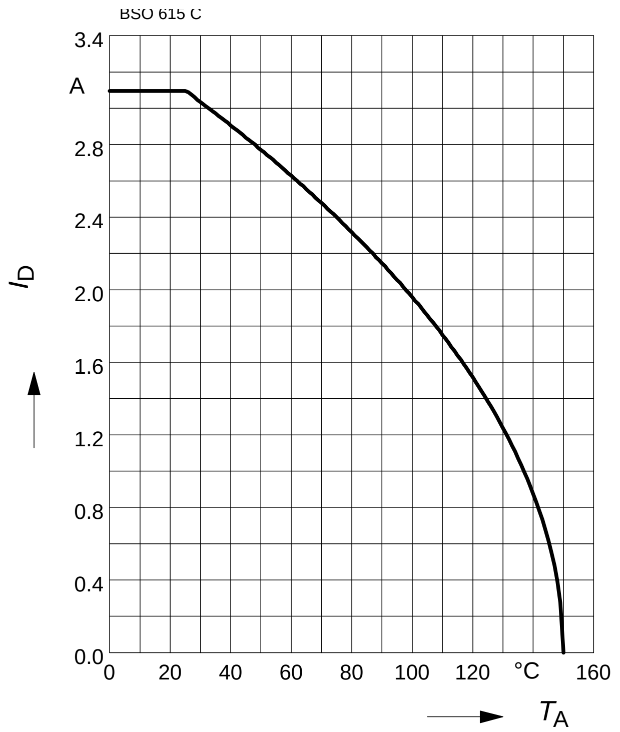
$P_{tot} = f(T_A)$



Drain current (N-Ch.)

$I_D = f(T_A)$

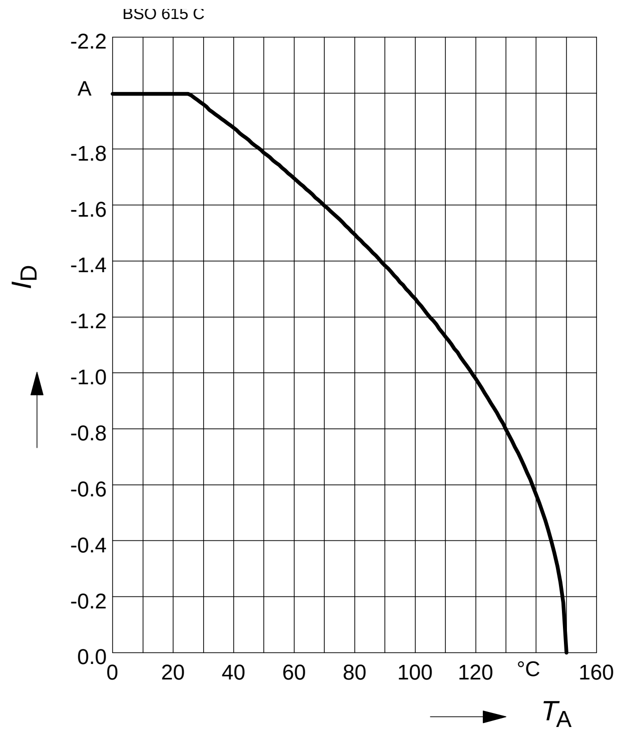
parameter: $V_{GS} \geq 10$ V



Drain current (P-Ch.)

$I_D = f(T_A)$

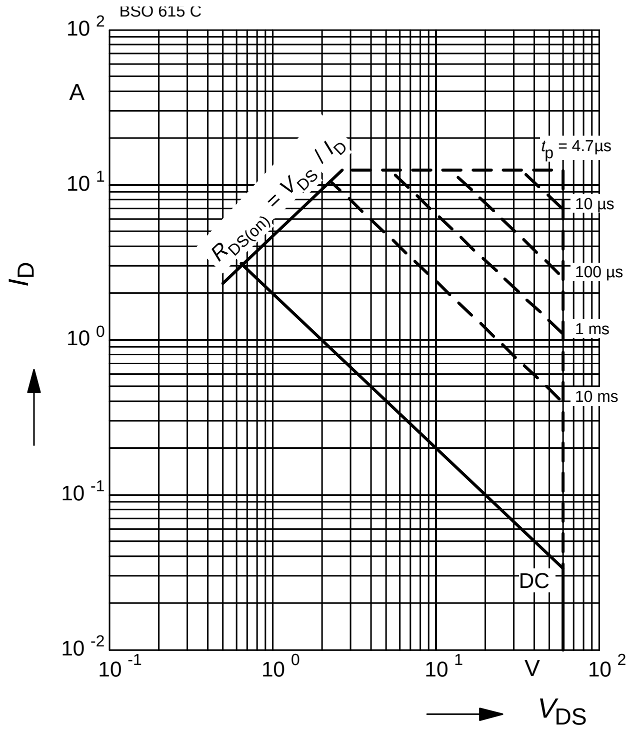
parameter: $V_{GS} \geq -10$ V



Safe operating area (N-Ch.)

$I_D = f(V_{DS})$

parameter : $D = 0$, $T_A = 25$ °C



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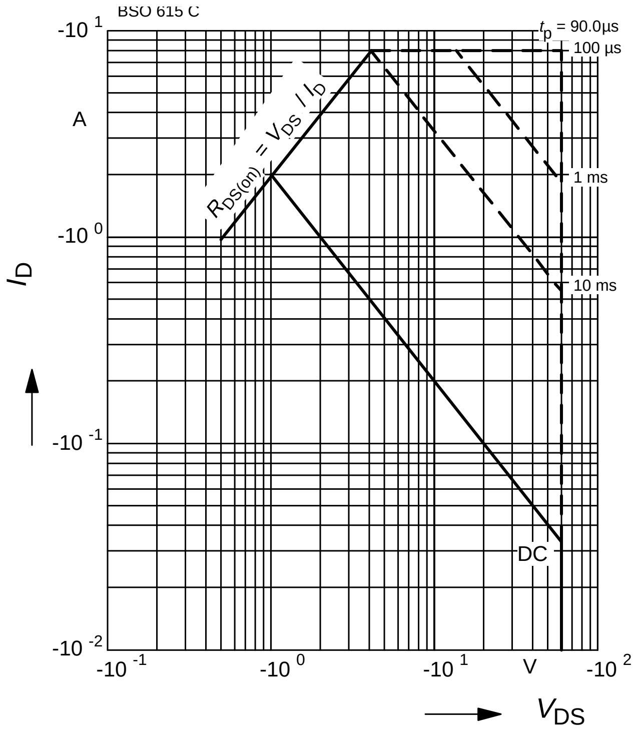
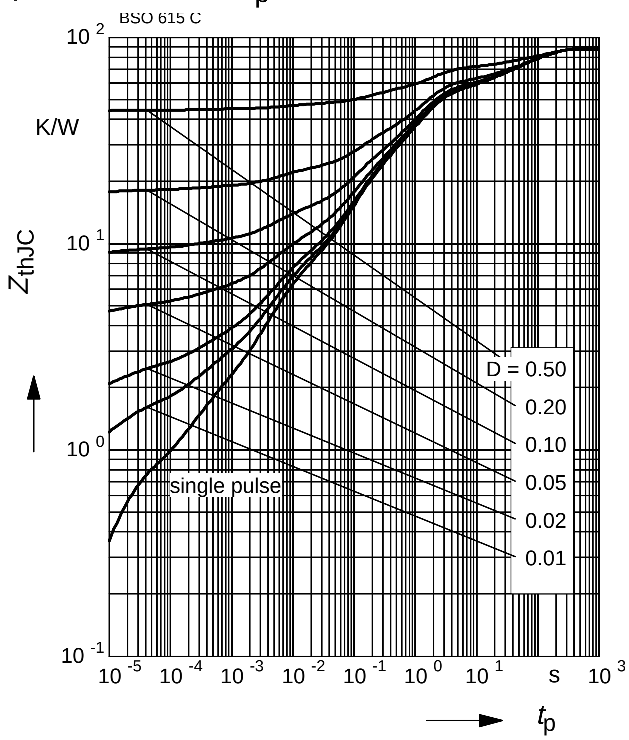


Transient thermal impedance (N-Ch.)

$Z_{thJC} = f(t_p)$

parameter : $D = t_p/T$



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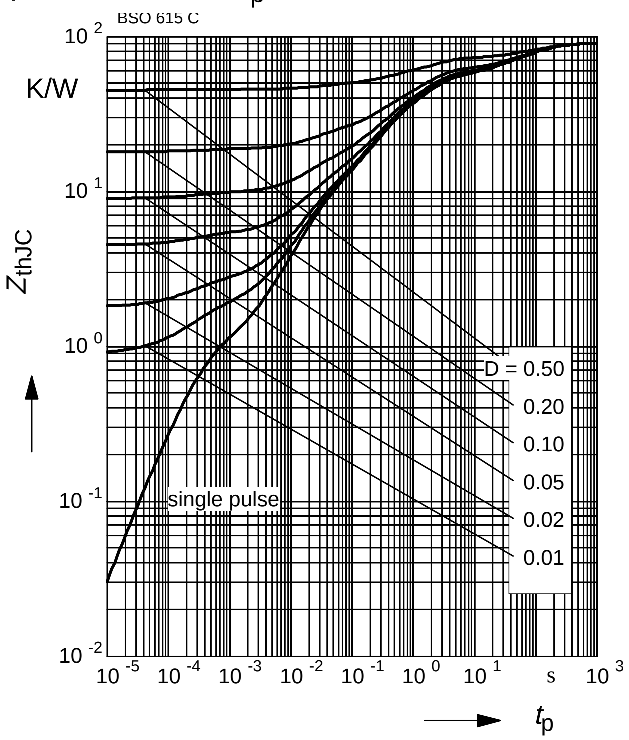
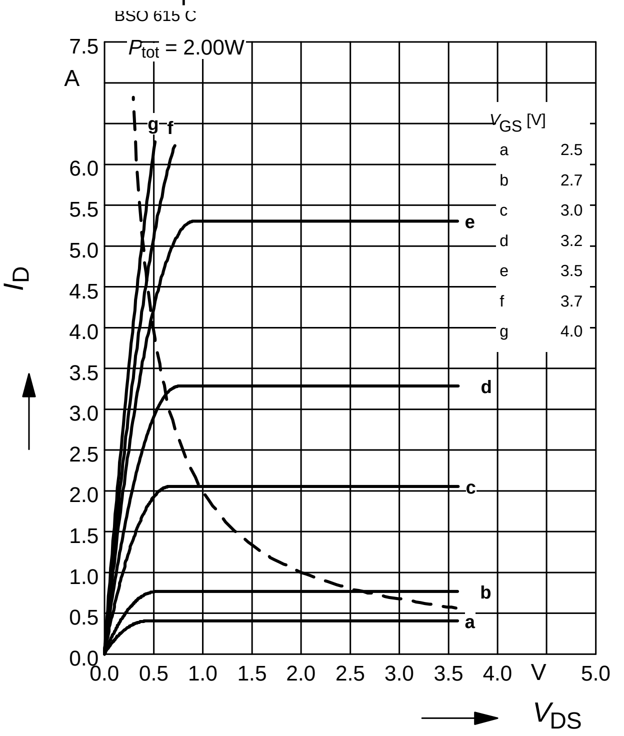


Typ. output characteristics (N-Ch.)

$I_D = f(V_{DS})$

parameter: t_p = 80 µs



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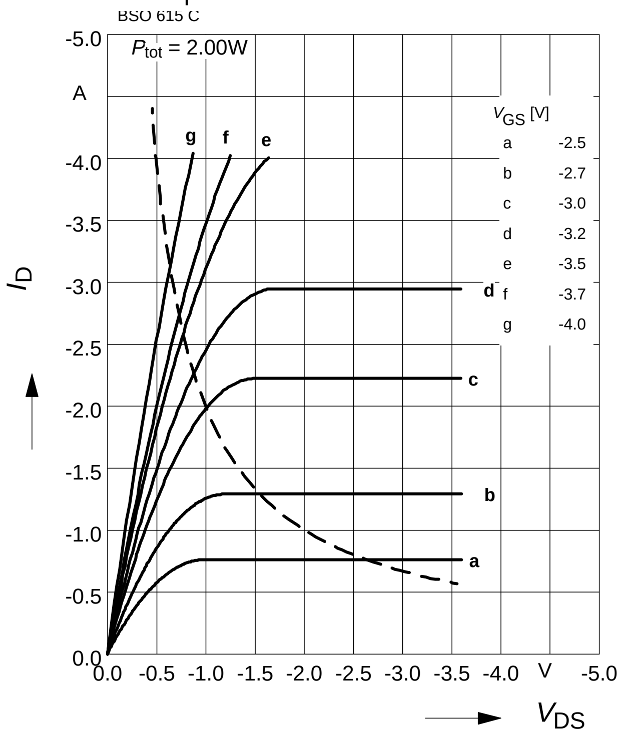
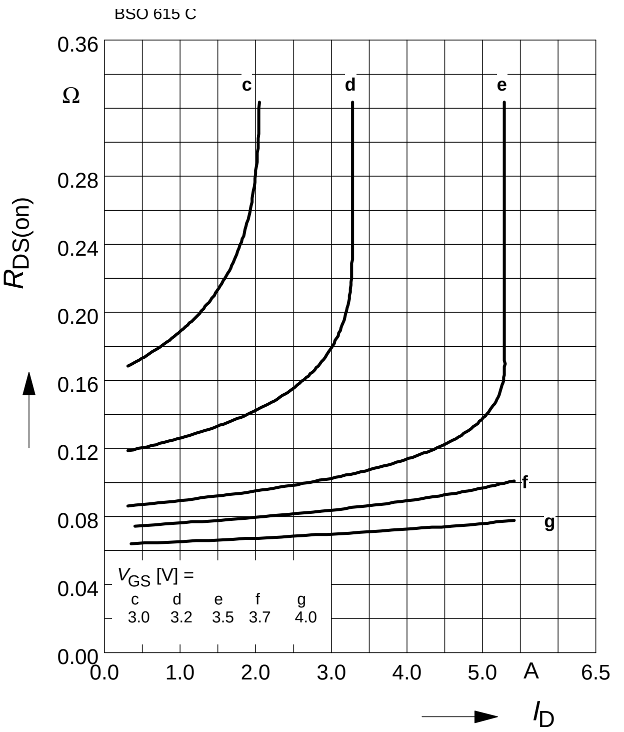
parameter: t_p = 80 µs



Typ. drain-source-on-resistance (N-Ch.)

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

parameter: V_{GS}



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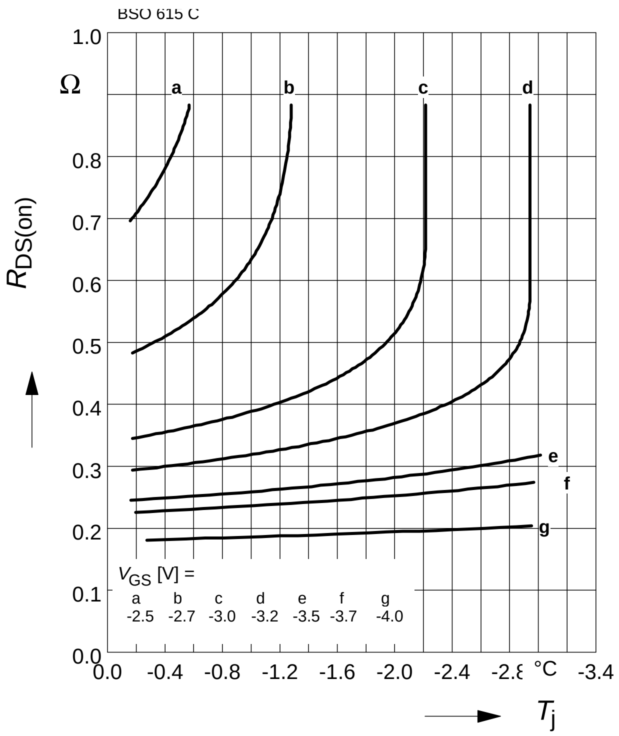
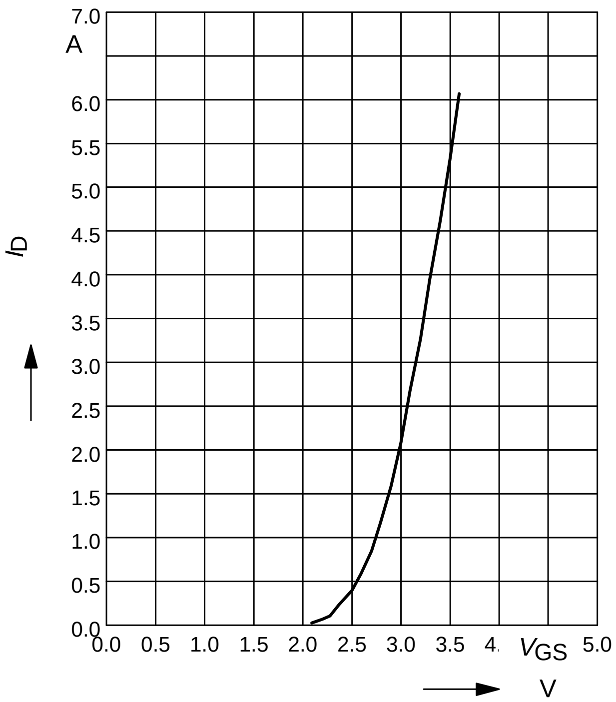


Typ. transfer characteristics (N-Ch.)

parameter: t_p = 80 µs

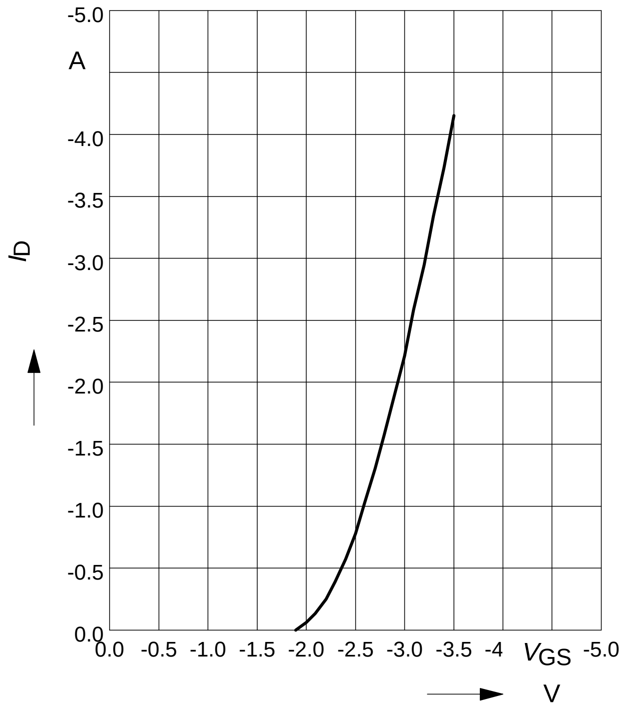
$I_D = f(V_{GS})$, $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Typ. transfer characteristics (P-Ch.)

parameter: t_p = 80 µs

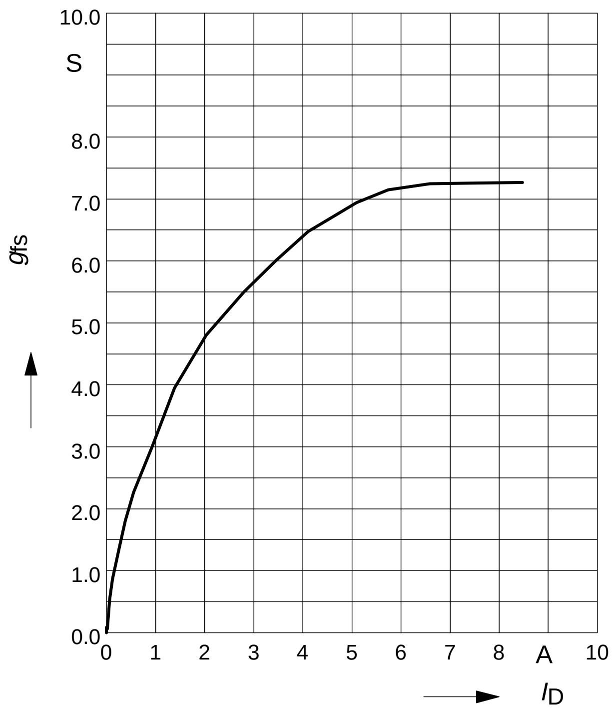
$I_D = f(V_{GS})$, $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Typ. forward transconductance (N-Ch.)

g_{fs} = f(I_D); T_j = 25 °C

parameter: g_{fs}



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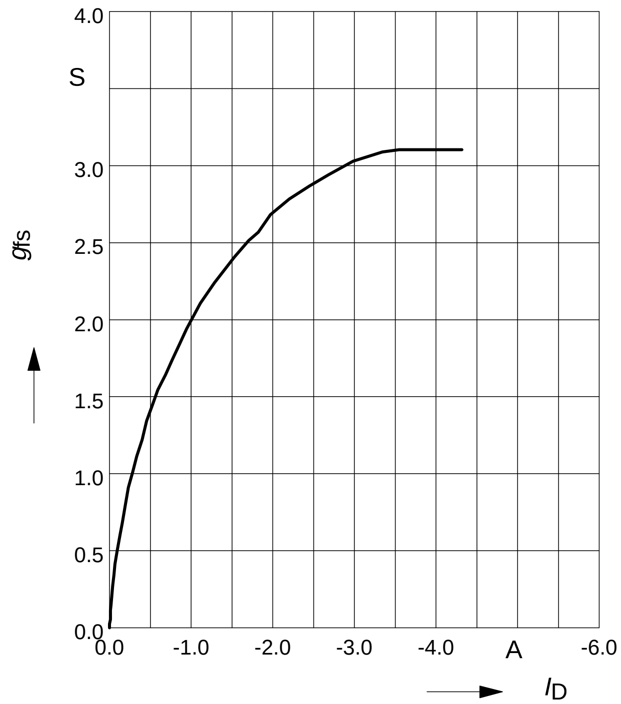
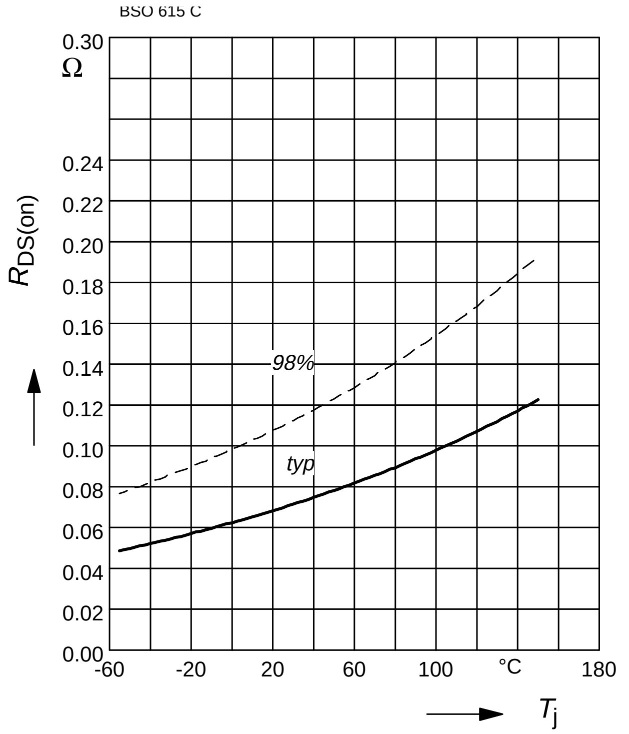
parameter: g_{fs}



Drain-source on-resistance (N-Ch.)

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

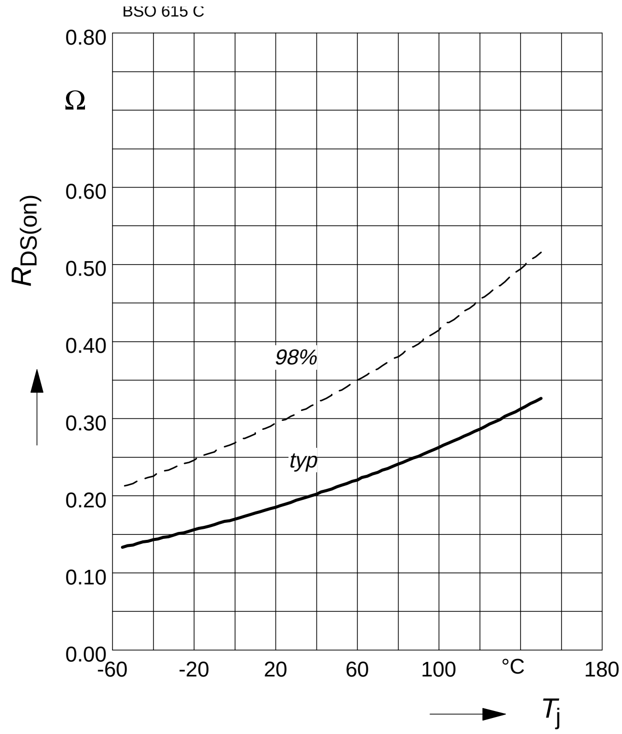
parameter : I_D = 3.1 A , V_{GS} = 10 V



Drain-source on-resistance (P-Ch.)

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

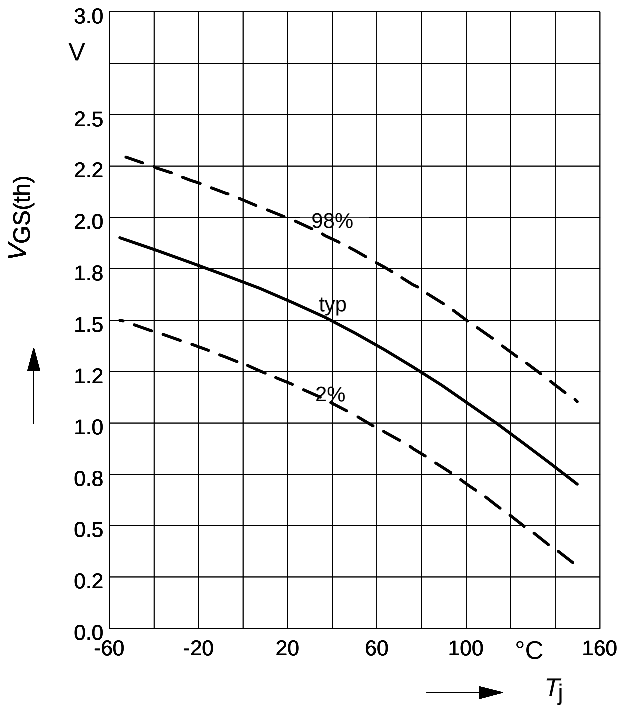
parameter : I_D = -2 A , V_{GS} = -10 V



Gate threshold voltage (N-Ch.)

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

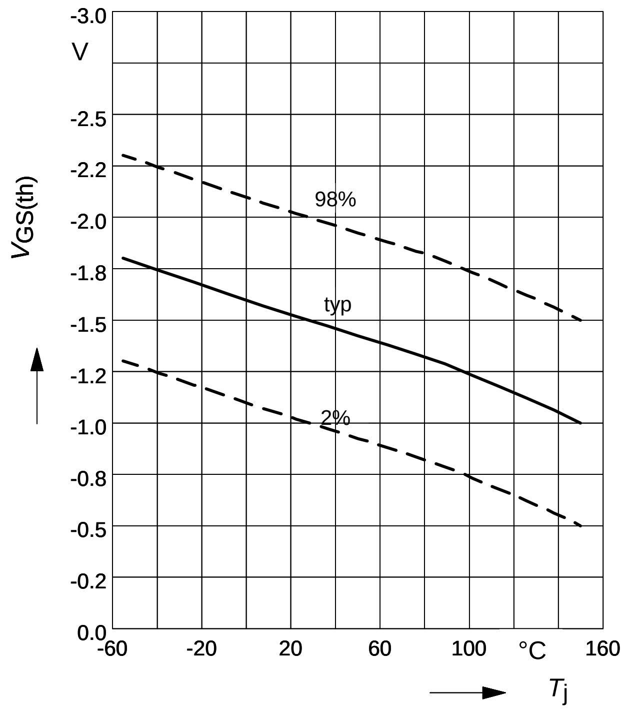
parameter: $V_{GS} = V_{DS}$, I_D = 20 µA



Gate threshold voltage (P-Ch.)

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

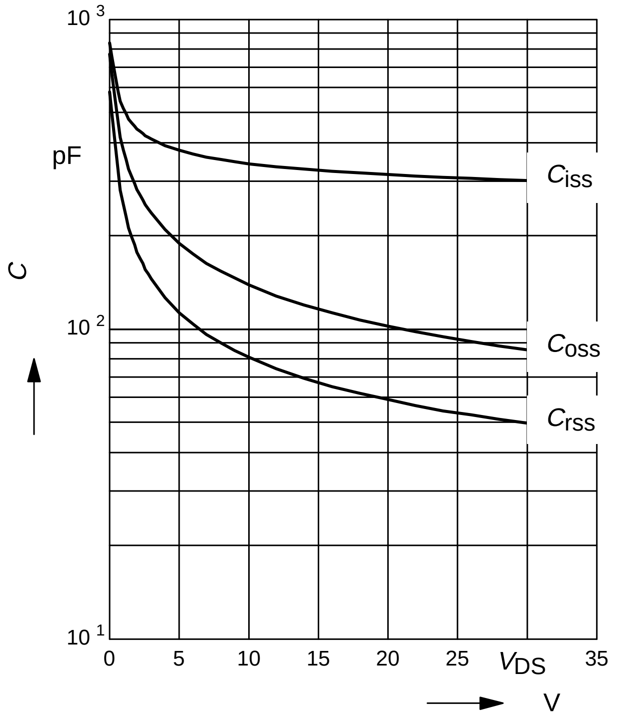
parameter: $V_{GS} = V_{DS}$, I_D = -450 µA



Typ. capacitances (N-Ch.)

$C = f(V_{DS})$

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



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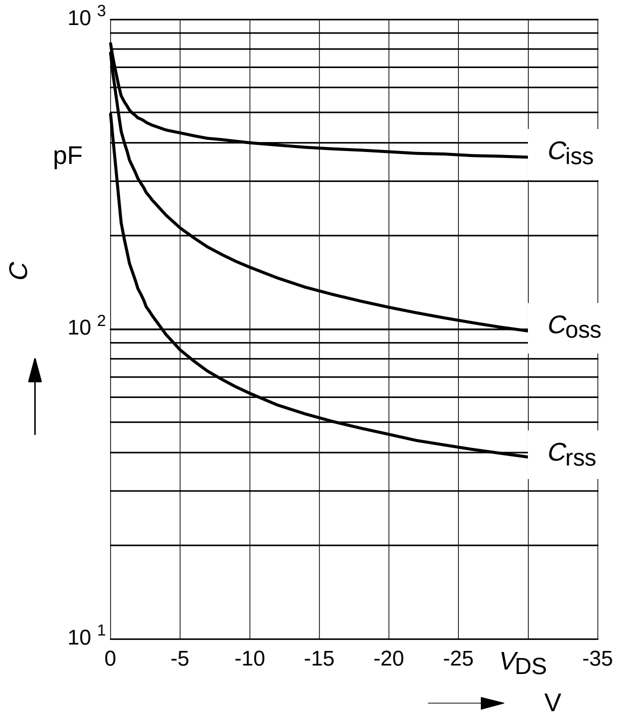
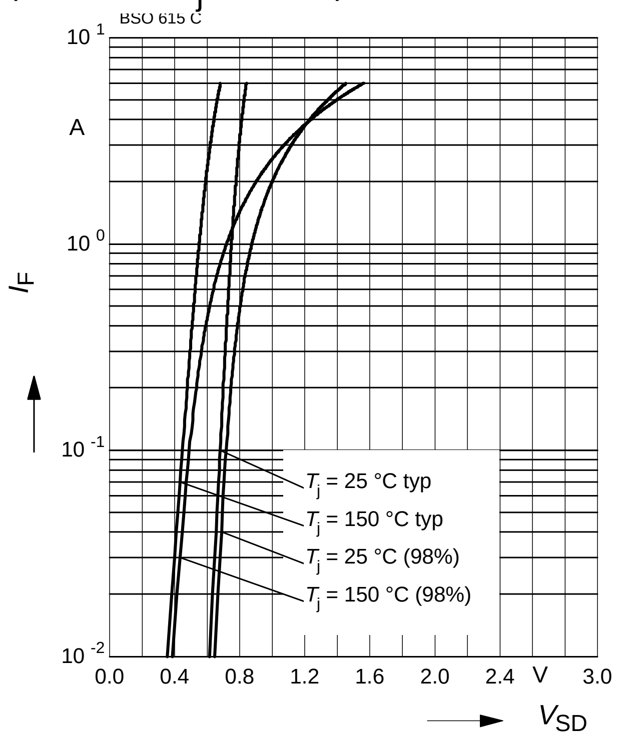


Forward characteristics of reverse diode

$I_F = f(V_{SD})$, (N-Ch.)

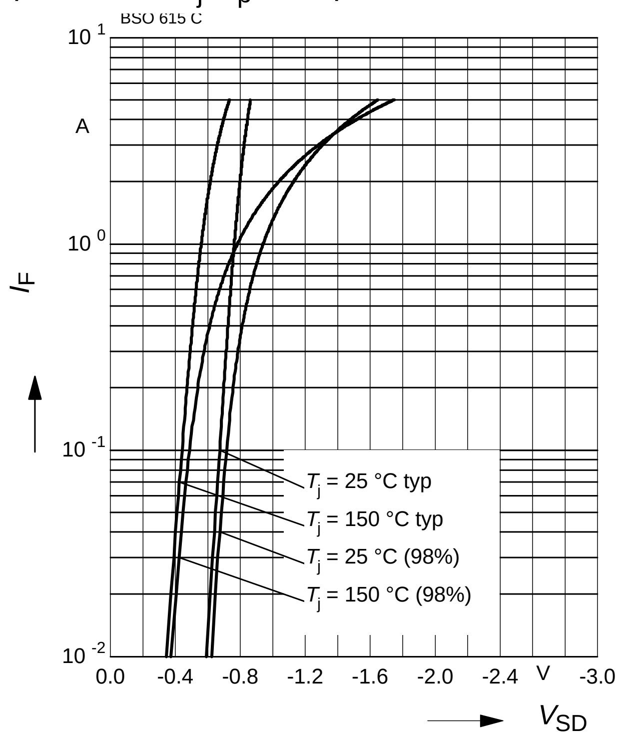
parameter: T_j , tp = 80 µs



Forward characteristics of reverse diode

$I_F = f(V_{SD})$, (P-Ch.)

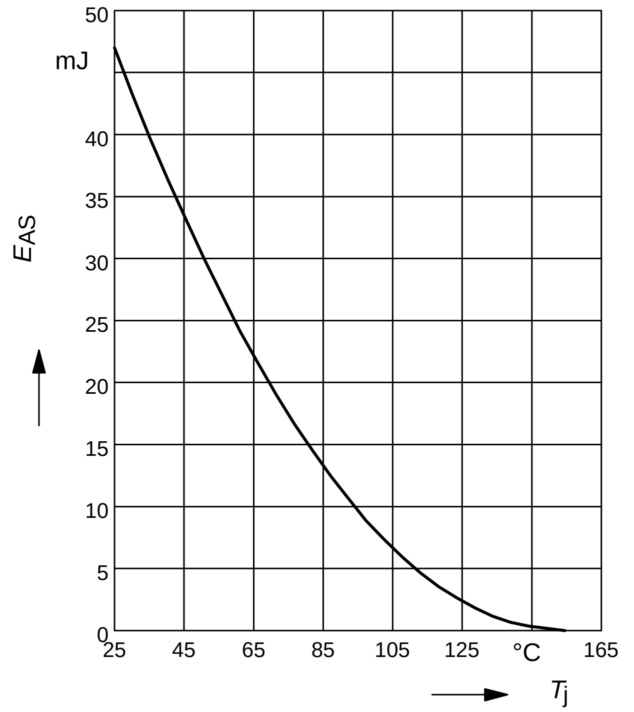
parameter: T_j , t_p = 80 µs



Avalanche Energy $E_{AS} = f(T_j)$ (N-Ch.)

parameter: I_D = 3.1 A , V_{DD} = 25 V

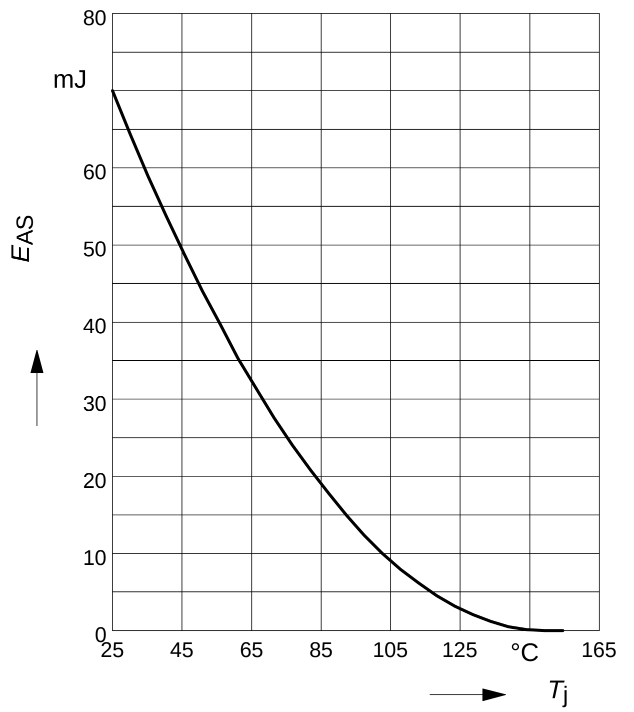
R_{GS} = 25 Ω



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

parameter: I_D = -2 A , V_{DD} = -25 V

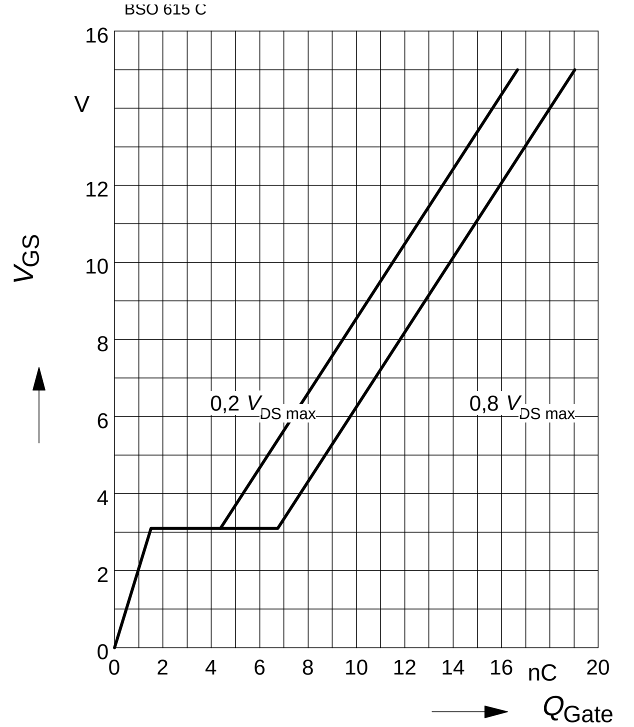
R_{GS} = 25 Ω



Typ. gate charge (N-Ch.)

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

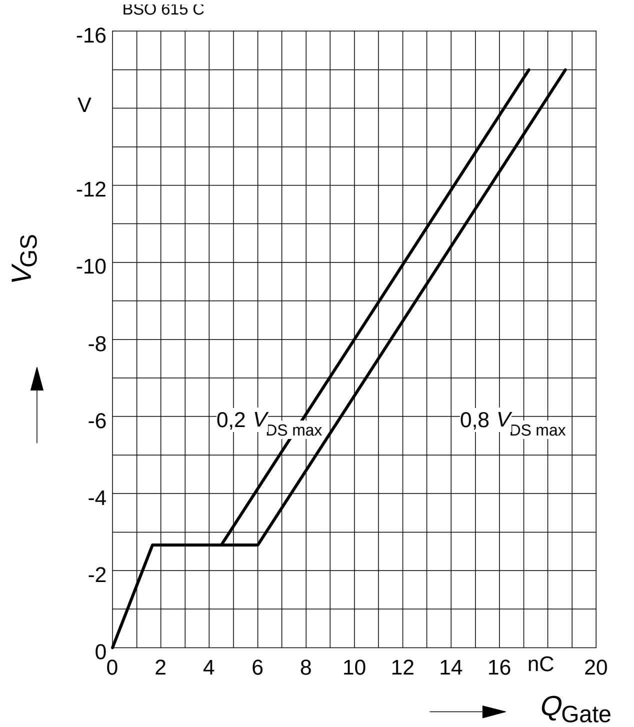
parameter: I_D = 3.1 A



Typ. gate charge (P-Ch.)

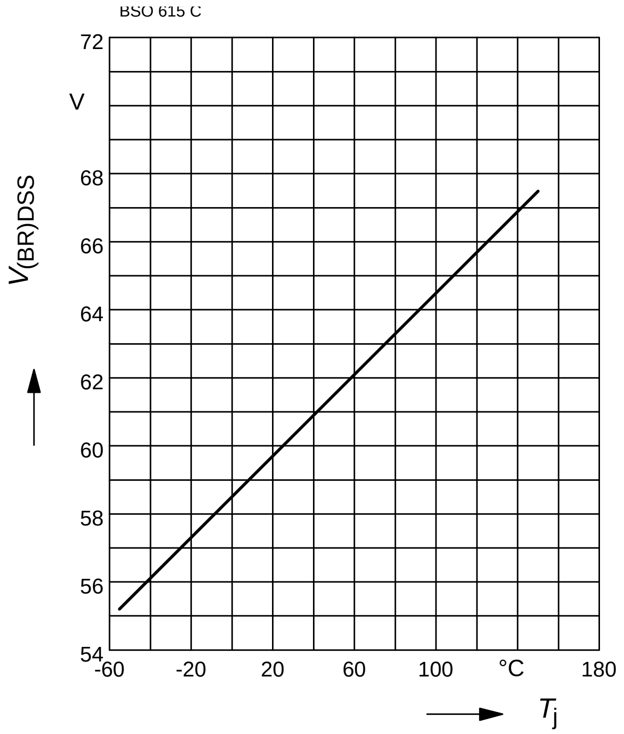
V_{GS} = f (Q_{Gate})

parameter: I_D = -2 A



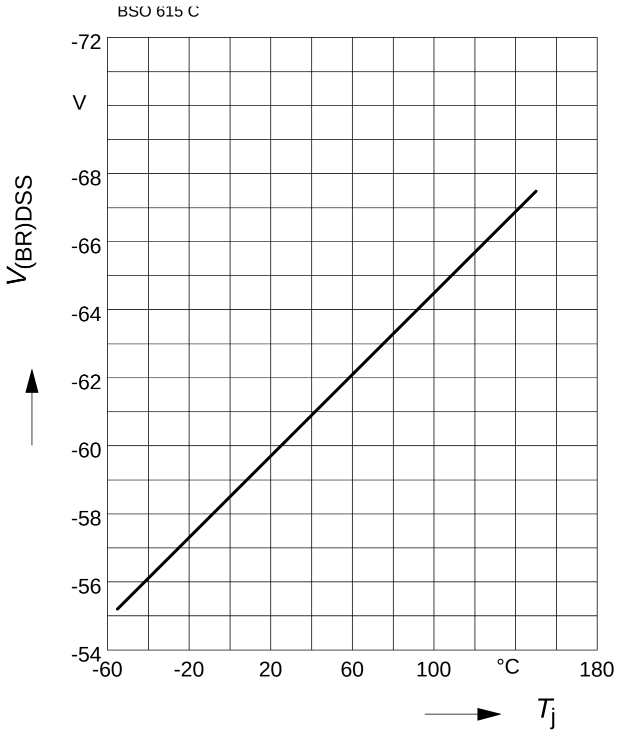
Drain-source breakdown voltage

$V_{(BR)DSS}$ = f (T_j), (N-Ch.)



Drain-source breakdown voltage

$V_{(BR)DSS}$ = f (T_j), (P-Ch.)



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