



**THE DATASHEET OF  
BS0615CGXUMA1**



## SIPMOS<sup>®</sup> Small-Signal-Transistor

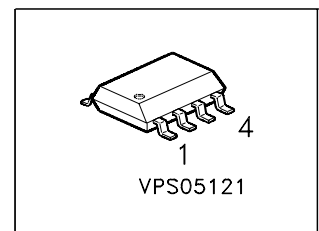
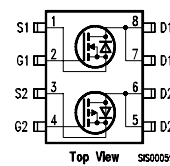
### Features

- Dual N- and P -Channel
- Enhancement mode
- Logic Level
- Avalanche rated
- Pb-free lead plating; RoHS compliant



### Product Summary

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



Type	Package	Marking
BSO 615 C	PG-DSO-8	615C

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

Parameter	Symbol	Value		Unit
		N	P	
Continuous drain current $T_A = 25\text{ °C}$ $T_A = 70\text{ °C}$	$I_D$	3.1 2.5	-2 -1.6	A
Pulsed drain current $T_A = 25\text{ °C}$	$I_{D\text{ puls}}$	12.4	-8	
Avalanche energy, single pulse $I_D = 3.1\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$ $I_D = -2\text{ A}$ , $V_{DD} = -25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$	$E_{AS}$	47 -	- 70	mJ
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$	0.2	0.2	
Reverse diode $dv/dt$ , $T_{jmax} = 150\text{ °C}$ $I_S = 3.1\text{ A}$ , $V_{DS} = 48\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ $I_S = -2\text{ A}$ , $V_{DS} = -48\text{ V}$ , $di/dt = -200\text{ A}/\mu\text{s}$	$dv/dt$	6 -	- 6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Power dissipation $T_A = 25\text{ °C}$	$P_{tot}$	2	2	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.	

**Dynamic Characteristics**

Thermal resistance, junction - soldering point ( Pin 4)	N	$R_{thJS}$	-	-	40	K/W
	P		-	-	40	
SMD version, device on PCB: @ min. footprint; $t \leq 10$ sec. @ 6 cm <sup>2</sup> cooling area <sup>1)</sup> ; $t \leq 10$ sec. @ min. footprint; $t \leq 10$ sec. @ 6 cm <sup>2</sup> cooling area <sup>1)</sup> ; $t \leq 10$ sec.	N	$R_{thJA}$	-	-	100	
	N		-	-	62.5	
	P		-	-	110	
	P		-	-	62.5	

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

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

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu$ m thick) copper area for drain connection. PCB is vertical without blown air.

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

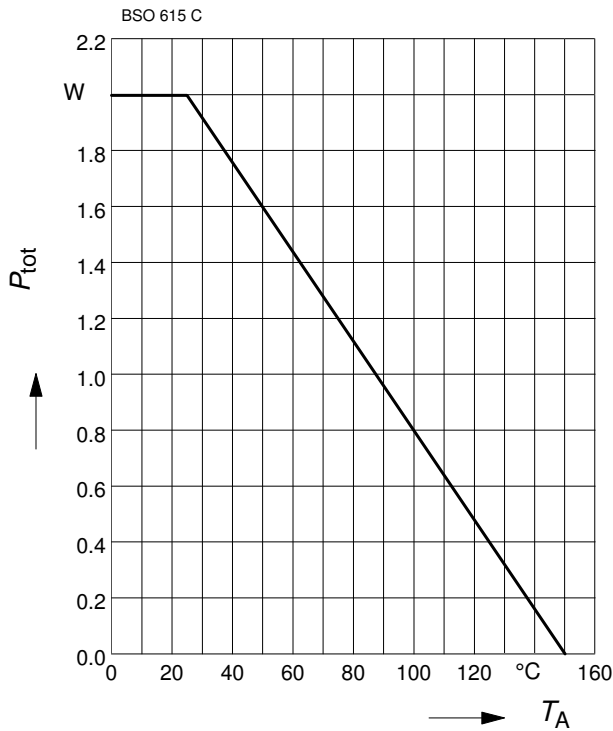
Parameter	Symbol	Values			Unit	
		min.	typ.	max.		
<b>Characteristics</b>						
Transconductance		$g_{fs}$				S
$V_{DS} \geq 2 * I_D * R_{DS(on)max}$ , $I_D = 2.7\text{ A}$	N		2.25	5.5	-	
$V_{V_{DS} \geq 2 * I_D * R_{DS(on)max}}$ , $I_D = -1.7\text{ A}$	P		1.2	2.4	-	
Input capacitance		$C_{iss}$				pF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

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

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

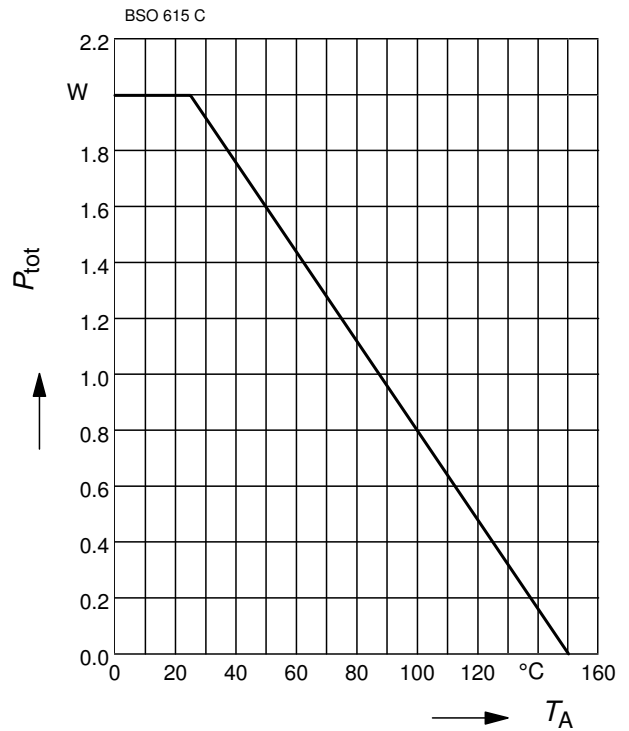
**Power Dissipation (N-Ch.)**

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



**Power Dissipation (P-Ch.)**

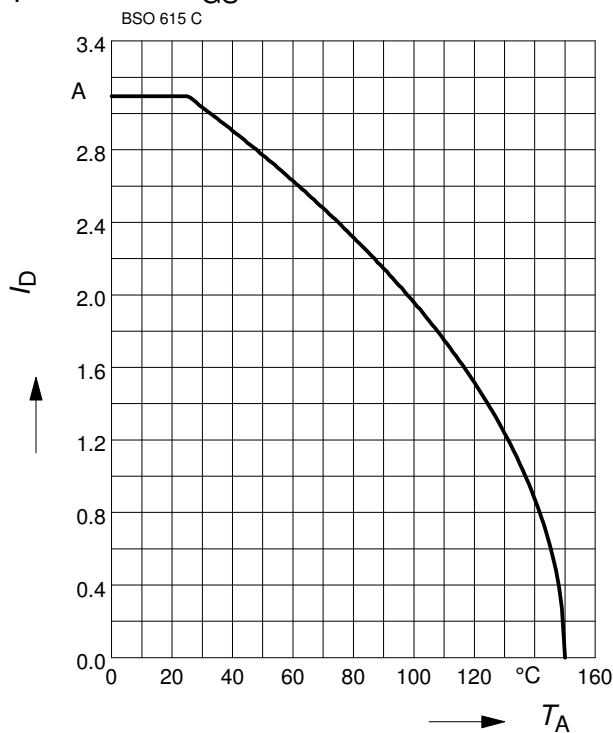
$$P_{\text{tot}} = f(T_A)$$



**Drain current (N-Ch.)**

$$I_D = f(T_A)$$

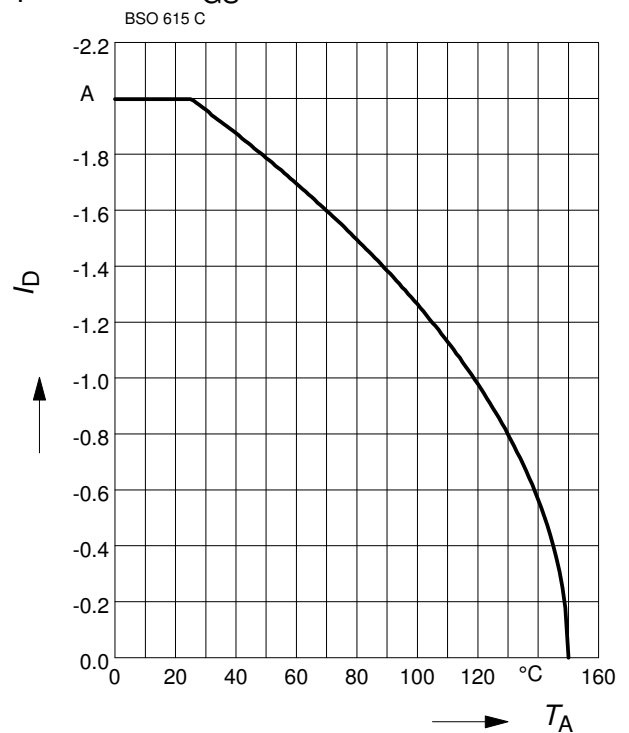
parameter:  $V_{GS} \geq 10 \text{ V}$



**Drain current (P-Ch.)**

$$I_D = f(T_A)$$

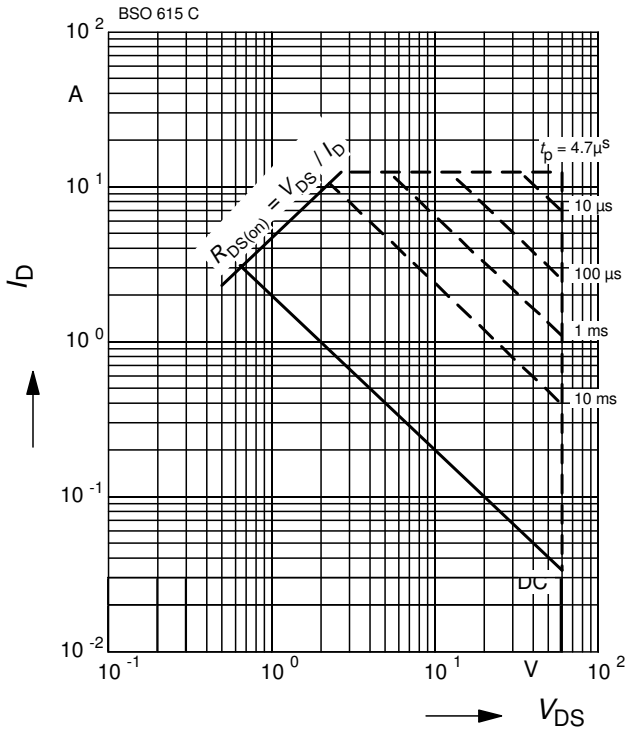
parameter:  $V_{GS} \geq -10 \text{ V}$



**Safe operating area (N-Ch.)**

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

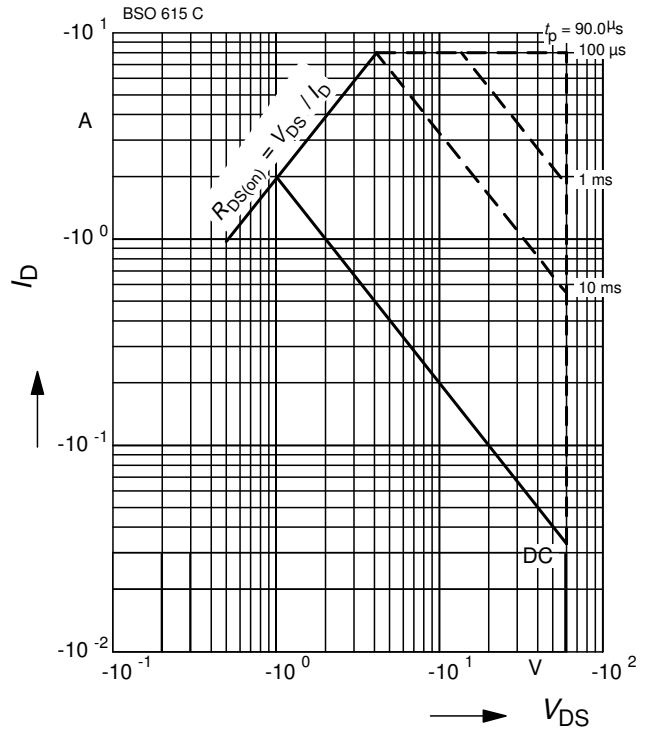
parameter :  $D = 0, T_A = 25\text{ }^\circ\text{C}$



**Safe operating area (P-Ch.)**

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

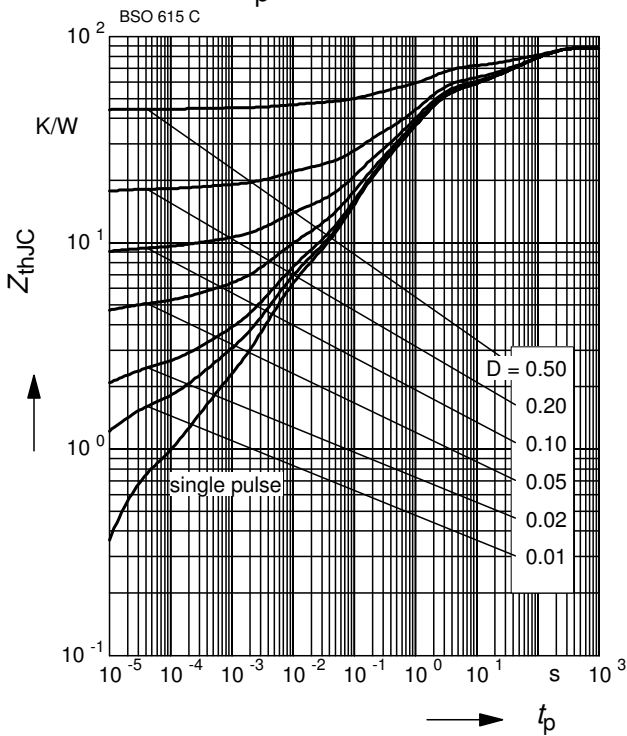
parameter :  $D = 0, T_A = 25\text{ }^\circ\text{C}$



**Transient thermal impedance (N-Ch.)**

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

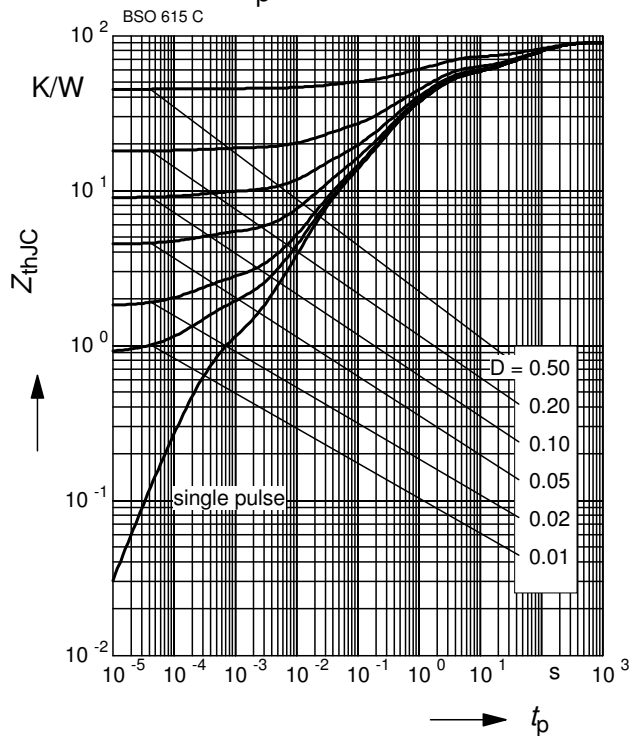
parameter :  $D = t_p/T$



**Transient thermal impedance (P-Ch.)**

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

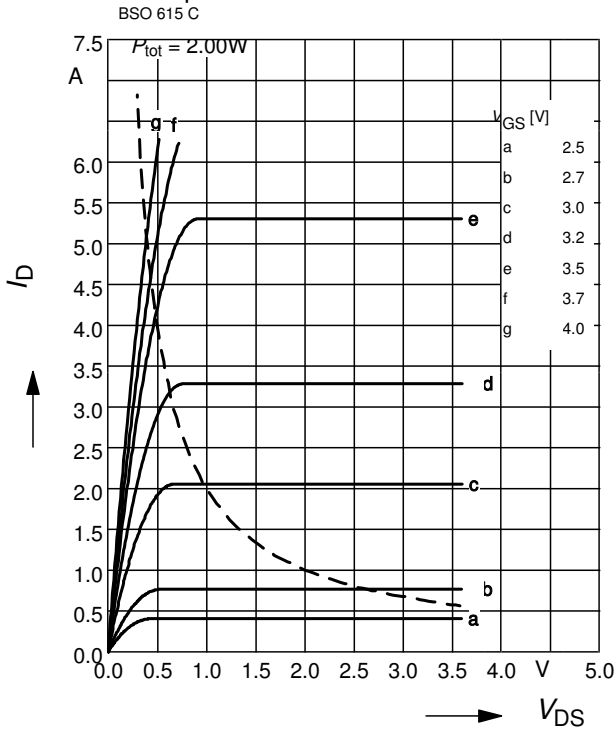
parameter :  $D = t_p/T$



Typ. output characteristics (N-Ch.)

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

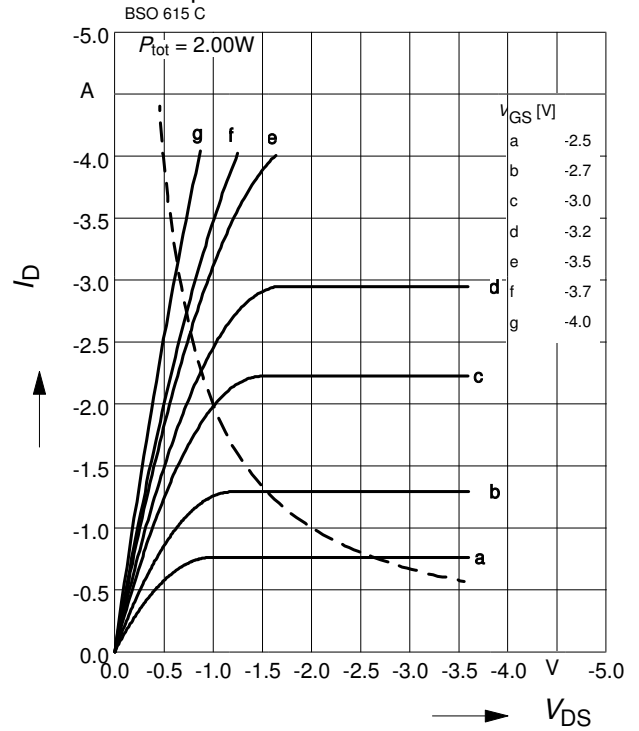
parameter:  $t_p = 80 \mu s$



Typ. output characteristics (P-Ch.)

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

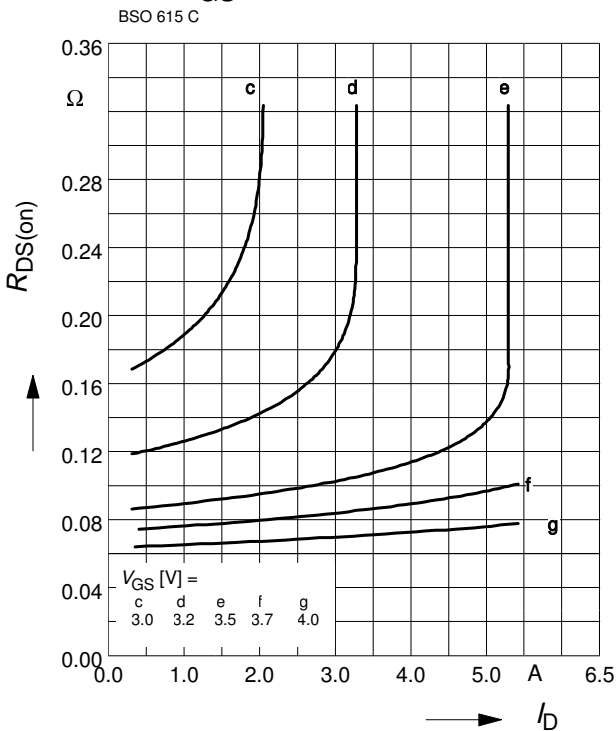
parameter:  $t_p = 80 \mu s$



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

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

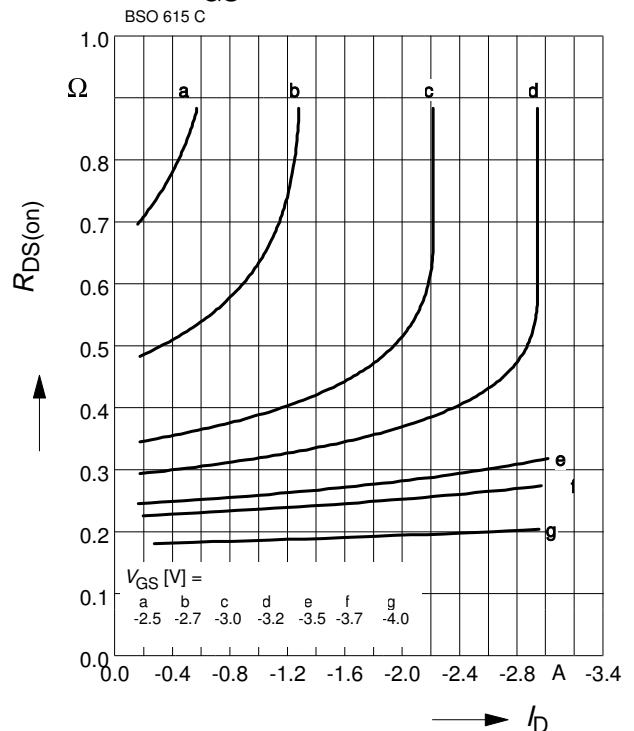
parameter:  $V_{GS}$



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

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

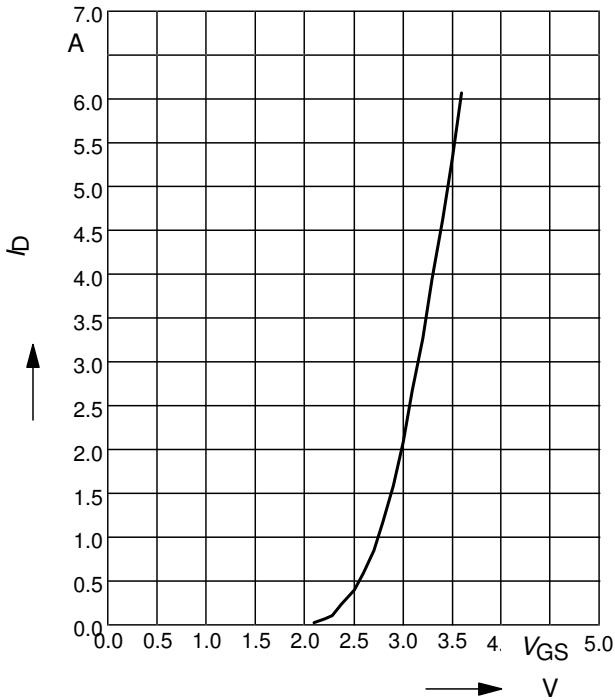
parameter:  $V_{GS}$



**Typ. transfer characteristics (N-Ch.)**

parameter:  $t_p = 80 \mu s$

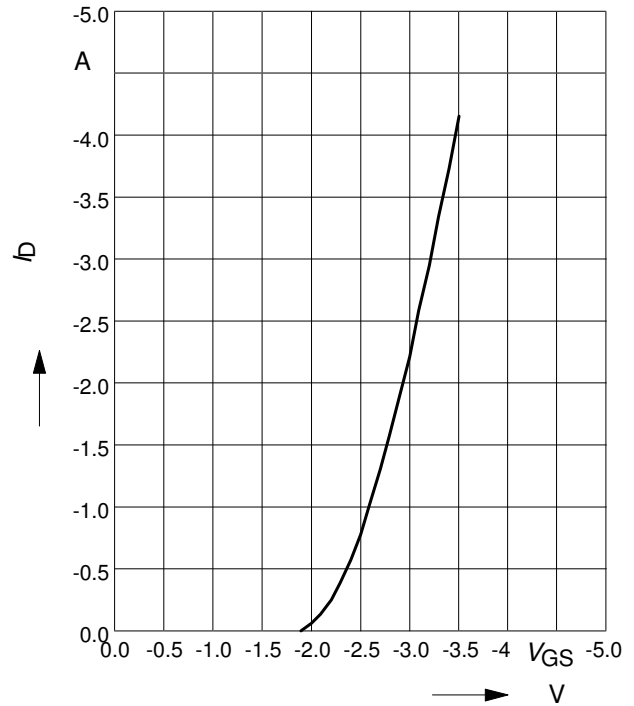
$I_D = f(V_{GS}), V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Typ. transfer characteristics (P-Ch.)**

parameter:  $t_p = 80 \mu s$

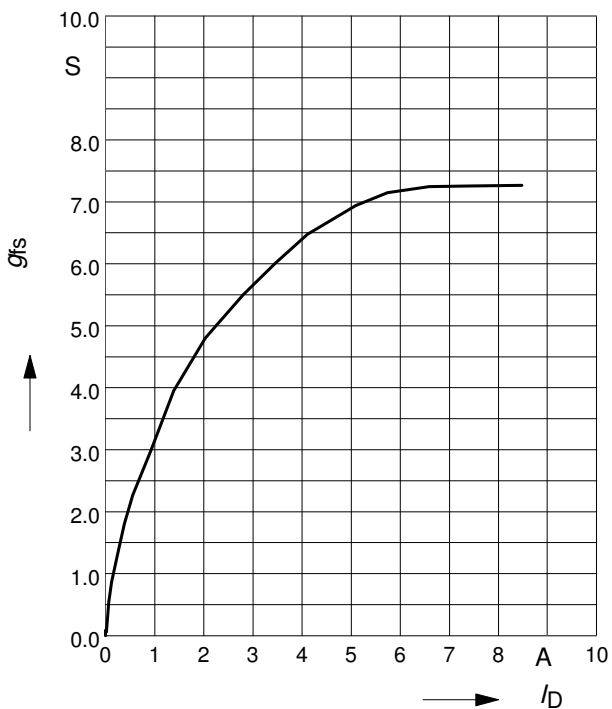
$I_D = f(V_{GS}), V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Typ. forward transconductance (N-Ch.)**

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

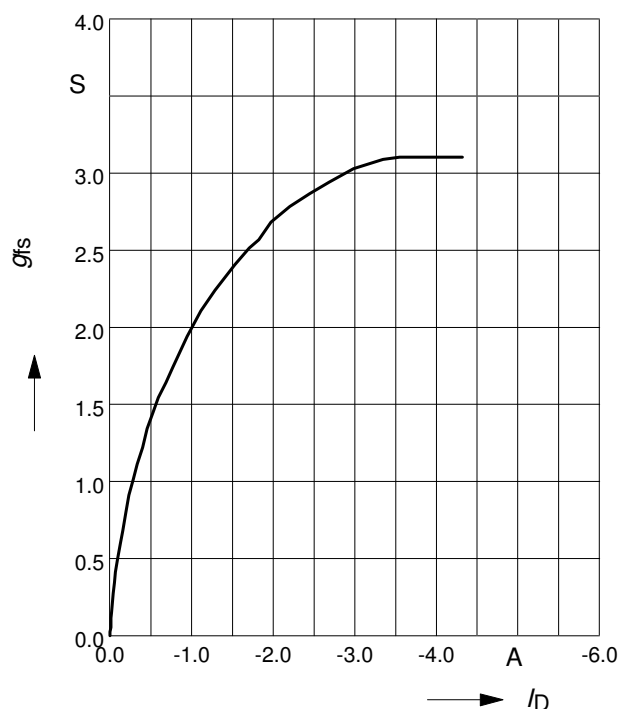
parameter:  $g_{fs}$



**Typ. forward transconductance (P-Ch.)**

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

parameter:  $g_{fs}$

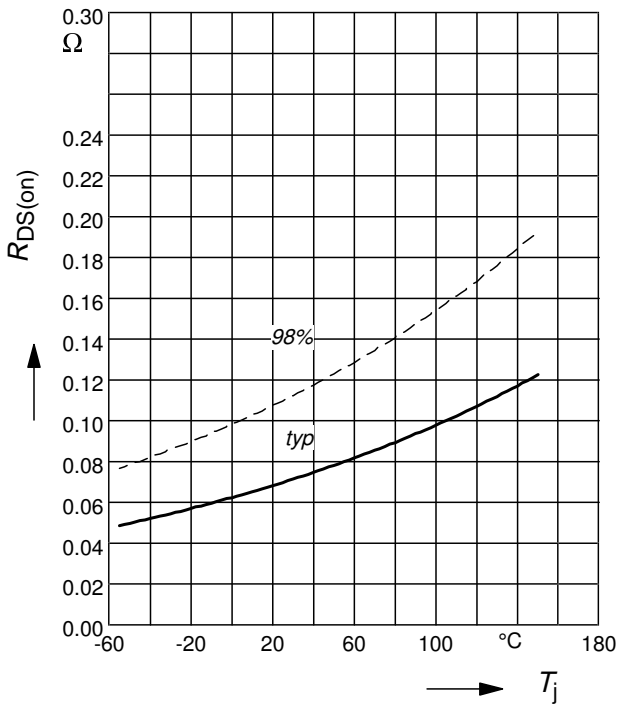


**Drain-source on-resistance (N-Ch.)**

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

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

BSO 615 C

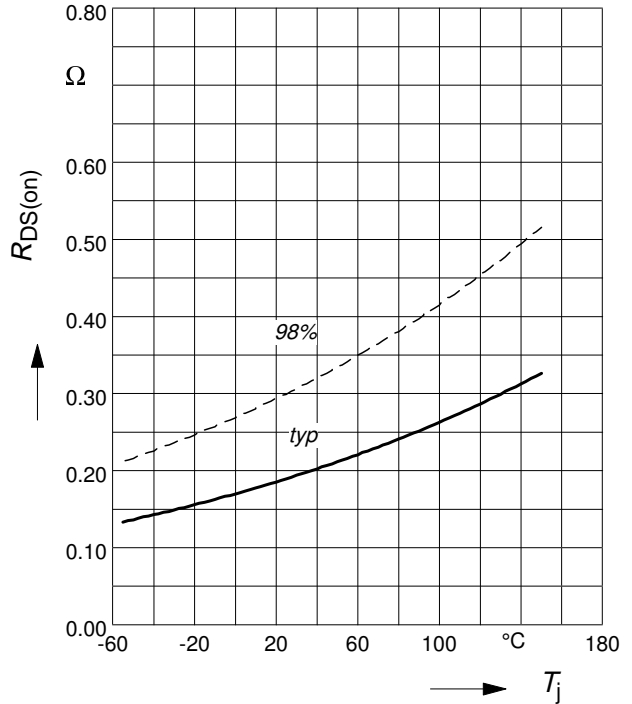


**Drain-source on-resistance (P-Ch.)**

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

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

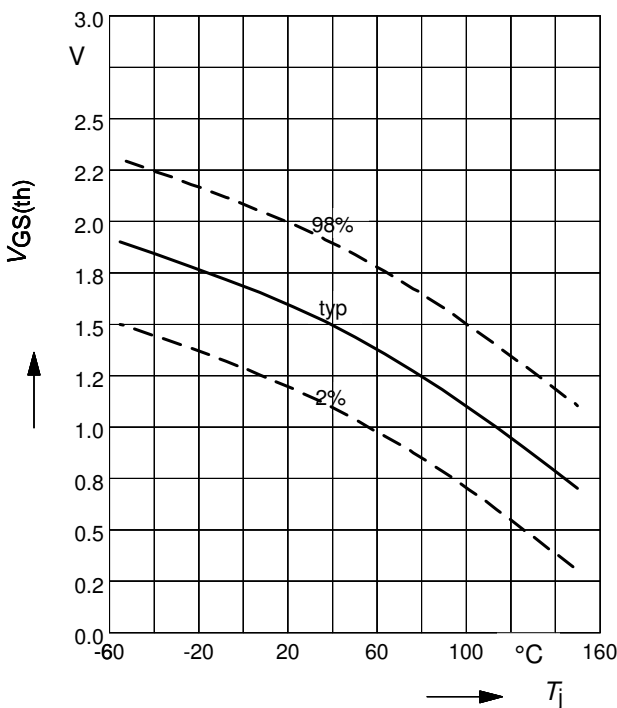
BSO 615 C



**Gate threshold voltage (N-Ch.)**

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

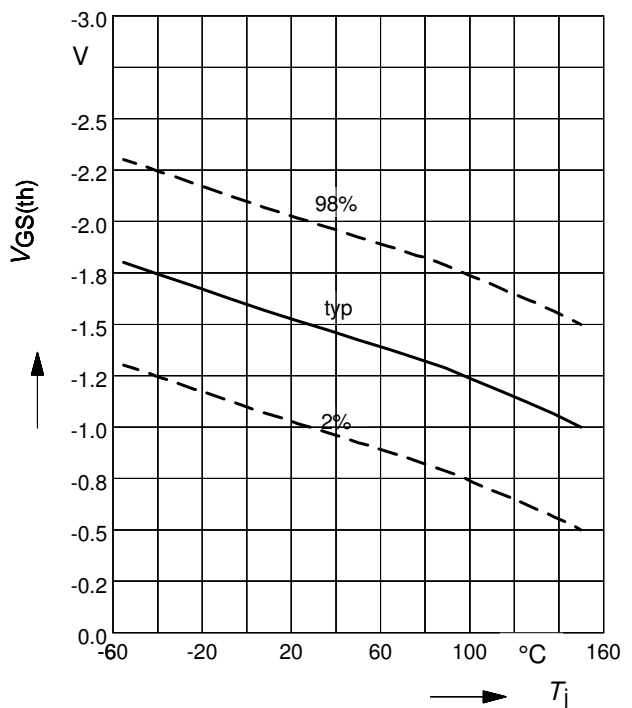
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 20 \mu\text{A}$



**Gate threshold voltage (P-Ch.)**

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

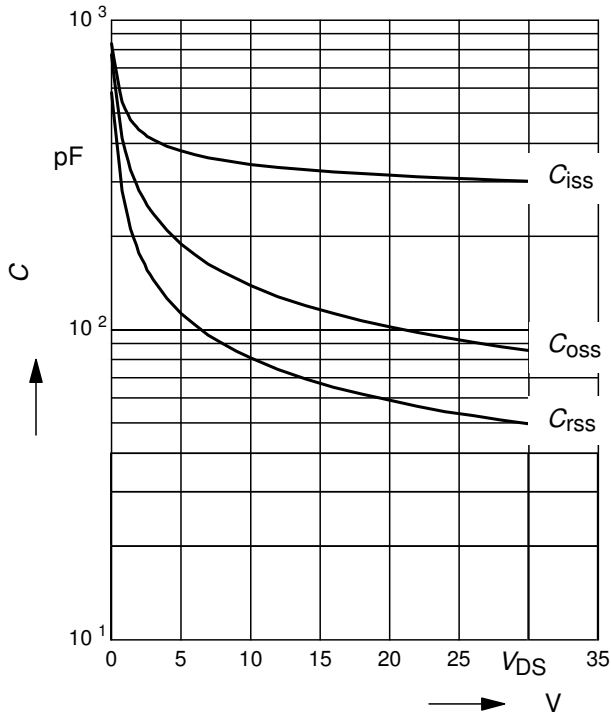
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -450 \mu\text{A}$



**Typ. capacitances (N-Ch.)**

$C = f(V_{DS})$

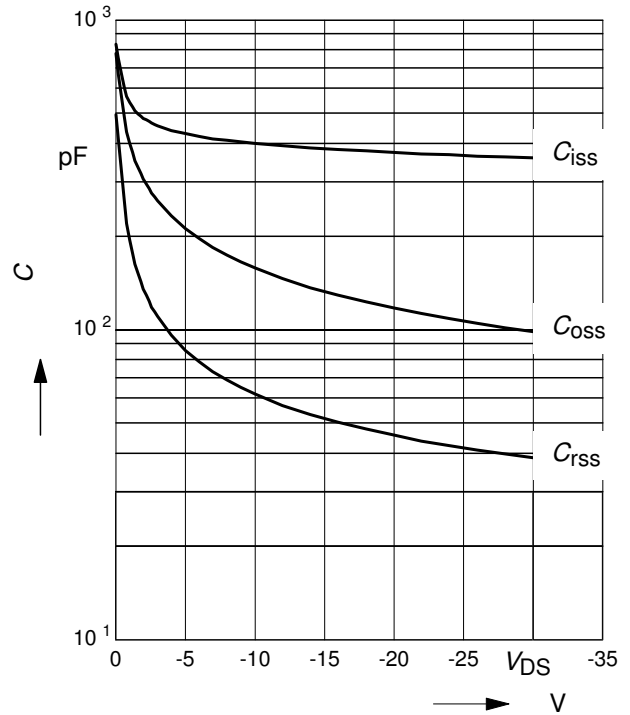
parameter:  $V_{GS}=0\text{ V}$ ,  $f=1\text{ MHz}$



**Typ. capacitances (P-Ch.)**

$C = f(V_{DS})$

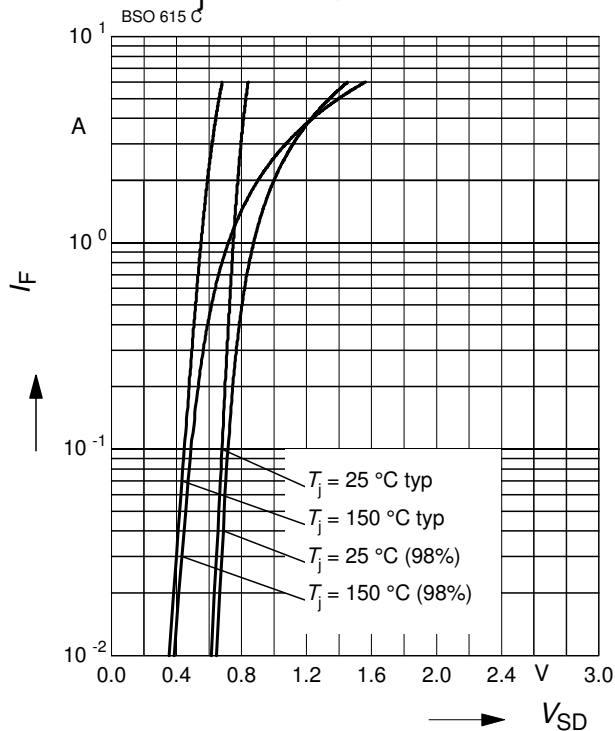
parameter:  $V_{GS}=0\text{ V}$ ,  $f=1\text{ MHz}$



**Forward characteristics of reverse diode**

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

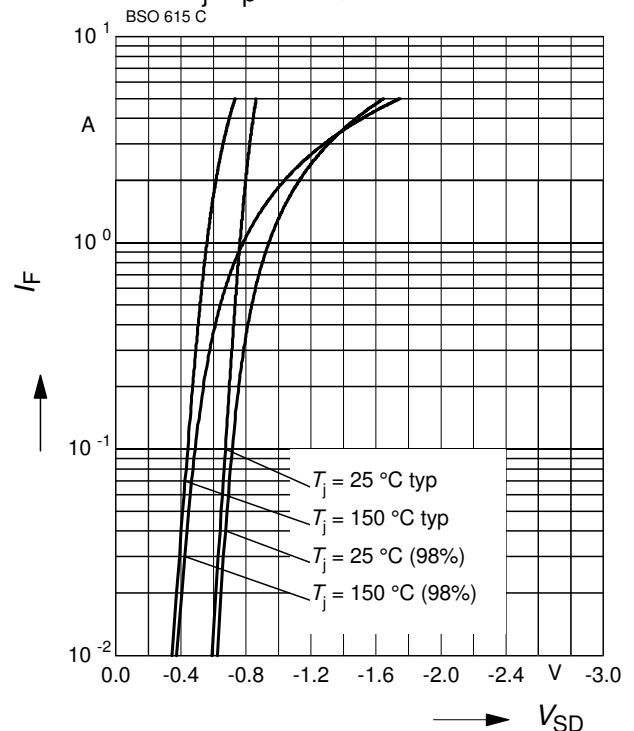
parameter:  $T_j$ ,  $t_p = 80\ \mu\text{s}$



**Forward characteristics of reverse diode**

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

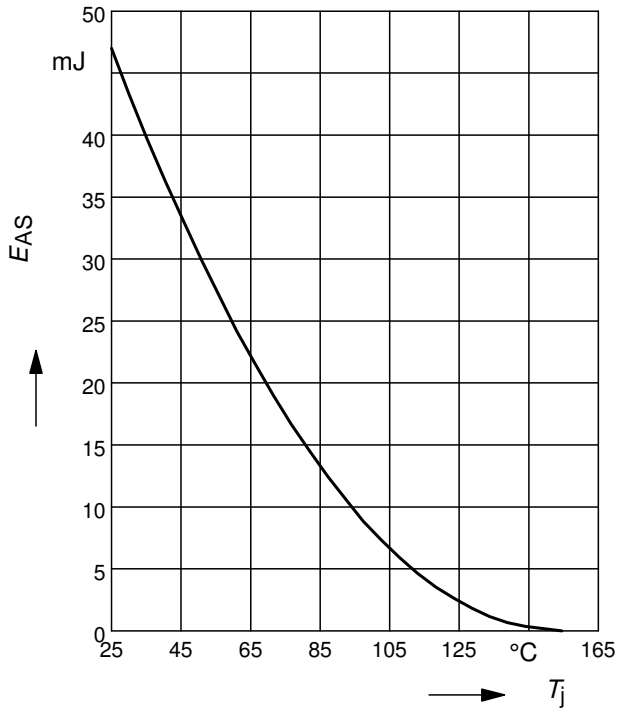
parameter:  $T_j$ ,  $t_p = 80\ \mu\text{s}$



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

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

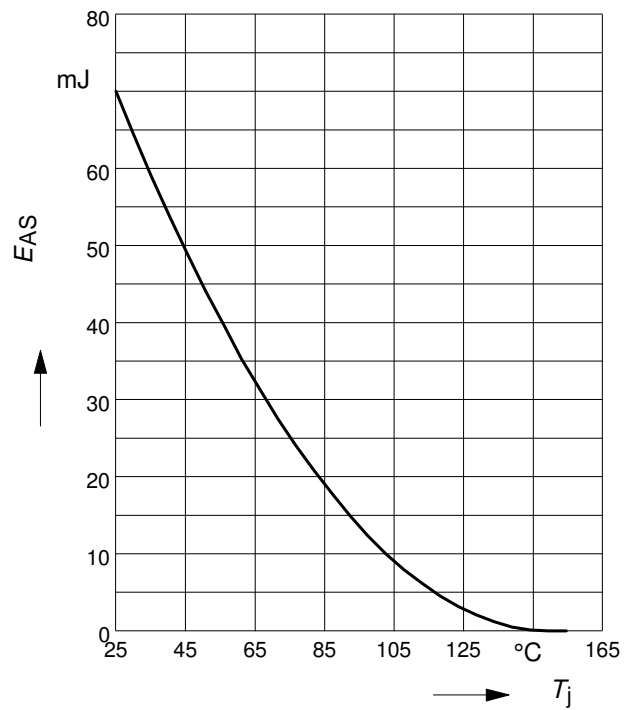
$R_{GS} = 25 \text{ } \Omega$



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

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

$R_{GS} = 25 \text{ } \Omega$

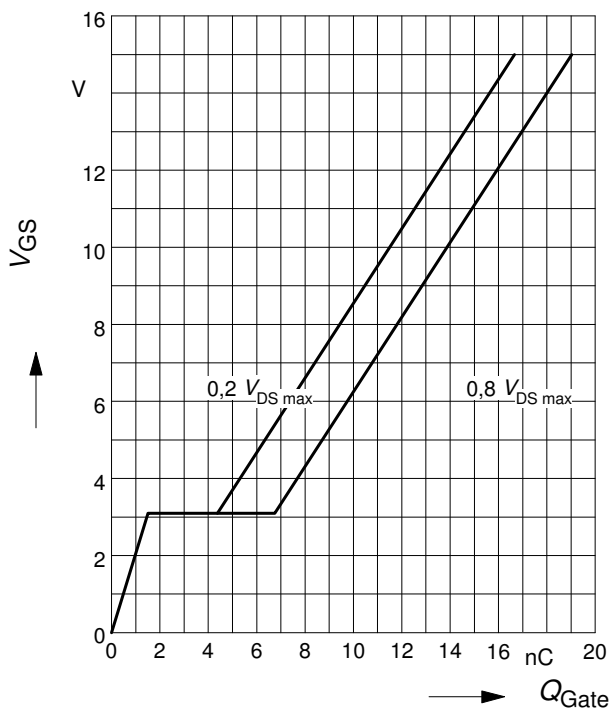


**Typ. gate charge (N-Ch.)**

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

parameter:  $I_D = 3.1 \text{ A}$

BSO 615 C

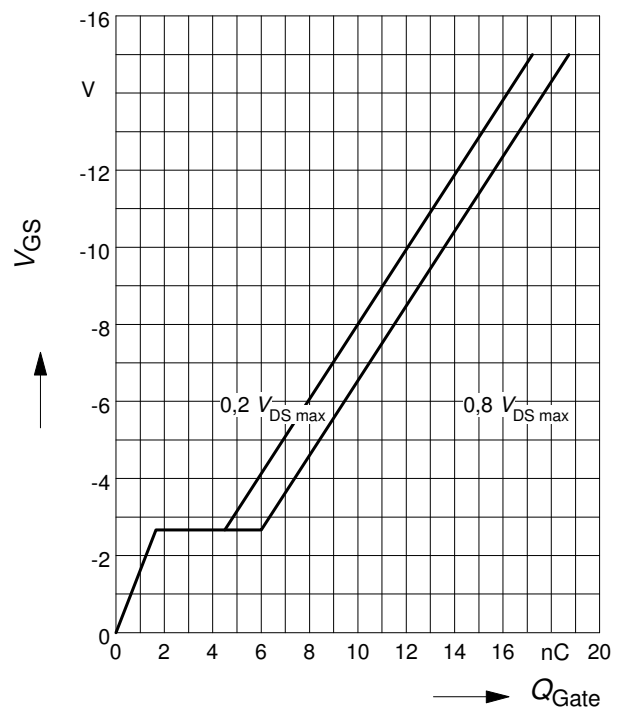


**Typ. gate charge (P-Ch.)**

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

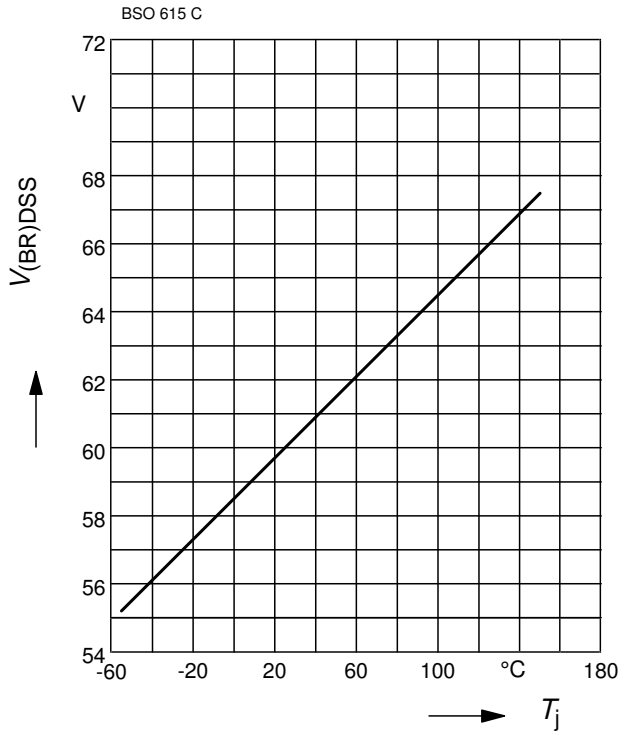
parameter:  $I_D = -2 \text{ A}$

BSO 615 C



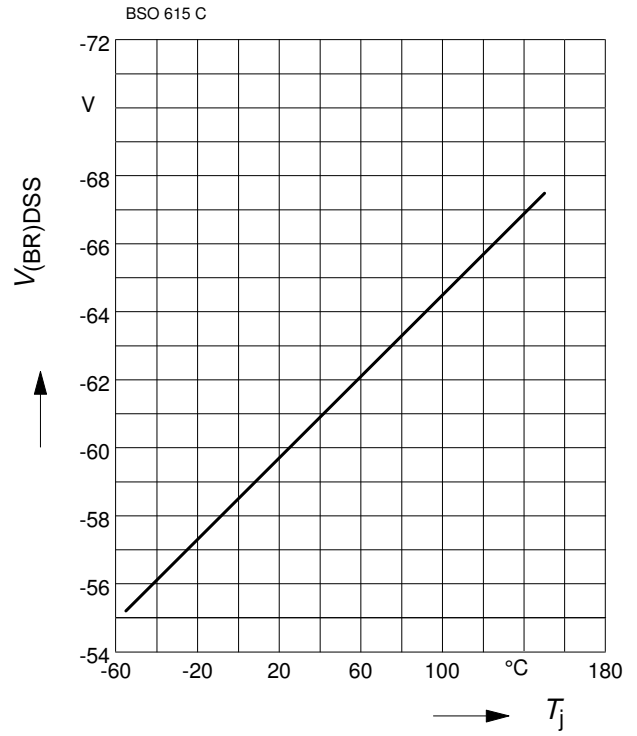
Drain-source breakdown voltage

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



Drain-source breakdown voltage

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



## Revision History

BSO615C G

**Revision: 2019-08-06, Rev. 2.2**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.2	2019-08-06	Update logos

### Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

### We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to:

[erratum@infineon.com](mailto:erratum@infineon.com)

### Published by

**Infineon Technologies AG**  
**81726 München, Germany**  
**© 2019 Infineon Technologies AG**  
**All Rights Reserved.**

### Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffungsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

### Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).



### Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.




The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View BSO615CGXUMA1 on WIN SOURCE](#)
-  [Infineon Technologies](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management