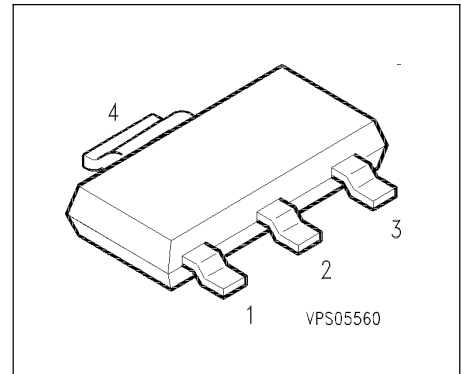


## BSP 296

### SIPMOS® Small-Signal Transistor

- N channel
- Enhancement mode
- Logic Level
- $V_{GS(th)} = 0.8...2.0V$



Pin 1	Pin 2	Pin 3	Pin 4
G	D	S	D

Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Marking
BSP 296	100 V	1 A	0.8 $\Omega$	SOT-223	BSP 296

Type	Ordering Code	Tape and Reel Information
BSP 296	Q67000-S067	E6327

### Maximum Ratings

Parameter	Symbol	Values	Unit
Drain source voltage	$V_{DS}$	100	V
Drain-gate voltage $R_{GS} = 20 \text{ k}\Omega$	$V_{DGR}$	100	
Gate source voltage	$V_{GS}$	$\pm 20$	
ESD Sensitivity (HBM) as per MIL-STD 883		Class 1	
Continuous drain current $T_A = 42 \text{ }^\circ\text{C}$	$I_D$	1	A
DC drain current, pulsed $T_A = 25 \text{ }^\circ\text{C}$	$I_{Dpuls}$	4	
Power dissipation $T_A = 25 \text{ }^\circ\text{C}$	$P_{tot}$	1.8	W

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Chip or operating temperature	$T_j$	-55 ... + 150	°C
Storage temperature	$T_{stg}$	-55 ... + 150	
Thermal resistance, chip to ambient air	$R_{thJA}$	≤ 70	K/W
Thermal resistance, junction-soldering point <sup>1)</sup>	$R_{thJS}$	≤ 10	
DIN humidity category, DIN 40 040		E	
IEC climatic category, DIN IEC 68-1		55 / 150 / 56	

1) Transistor on epoxy pcb 40 mm x 40 mm x 1,5 mm with 6 cm<sup>2</sup> copper area for drain connection

**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 $V_{GS} = 0\text{ V}, I_D = 0.25\text{ mA}, T_j = 25^\circ\text{C}$	$V_{(BR)DSS}$	100	-	-	V
Gate threshold voltage $V_{GS} = V_{DS}, I_D = 1\text{ mA}$	$V_{GS(th)}$	0.8	1.4	2	
Zero gate voltage drain current $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_j = 25^\circ\text{C}$ $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_j = 125^\circ\text{C}$ $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_j = 25^\circ\text{C}$	$I_{DSS}$	-	0.1 8 -	1 50 100	$\mu\text{A}$  nA
Gate-source leakage current $V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	$I_{GSS}$	-	10	100	nA
Drain-Source on-state resistance $V_{GS} = 10\text{ V}, I_D = 1\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 1\text{ A}$	$R_{DS(on)}$	-	0.55 0.95	0.8 1.4	$\Omega$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}, I_D = 1 \text{ A}$	$g_{fs}$	0.5	1.3	-	S
Input capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{iss}$	-	300	400	pF
Output capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{oss}$	-	60	90	
Reverse transfer capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{rss}$	-	30	45	
Turn-on delay time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.29 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(on)}$	-	8	12	ns
Rise time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.29 \text{ A}$ $R_{GS} = 50 \Omega$	$t_r$	-	15	25	
Turn-off delay time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.29 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(off)}$	-	120	160	
Fall time $V_{DD} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 0.29 \text{ A}$ $R_{GS} = 50 \Omega$	$t_f$	-	65	85	

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

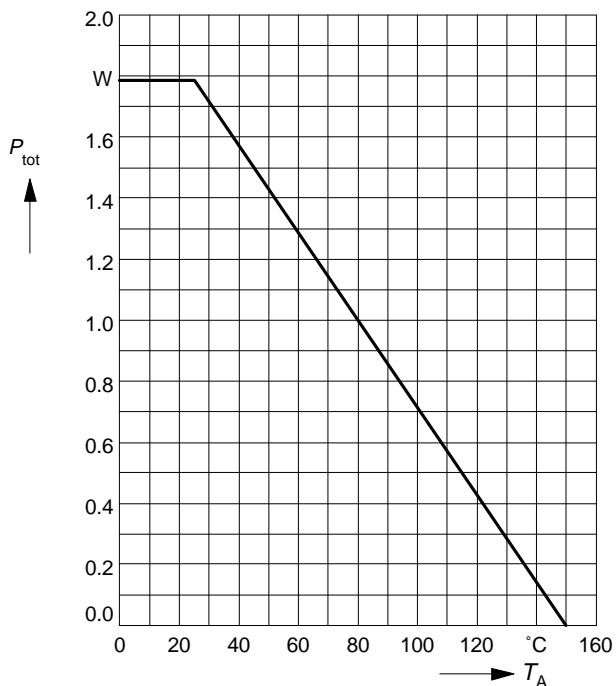
Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**Reverse Diode**

Inverse diode continuous forward current $T_A = 25^\circ\text{C}$	$I_S$	-	-	1	A
Inverse diode direct current,pulsed $T_A = 25^\circ\text{C}$	$I_{SM}$	-	-	4	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 2\text{ A}, T_j = 25^\circ\text{C}$	$V_{SD}$	-	0.95	1.3	V

**Power dissipation**

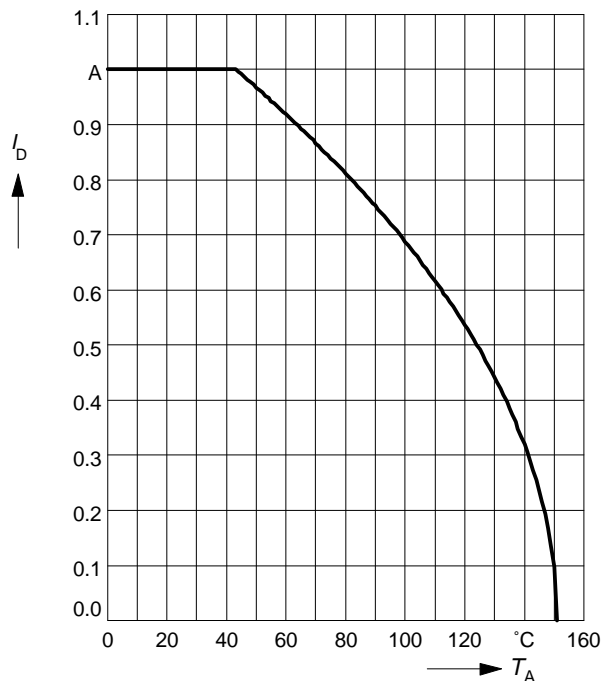
$$P_{\text{tot}} = f(T_A)$$



**Drain current**

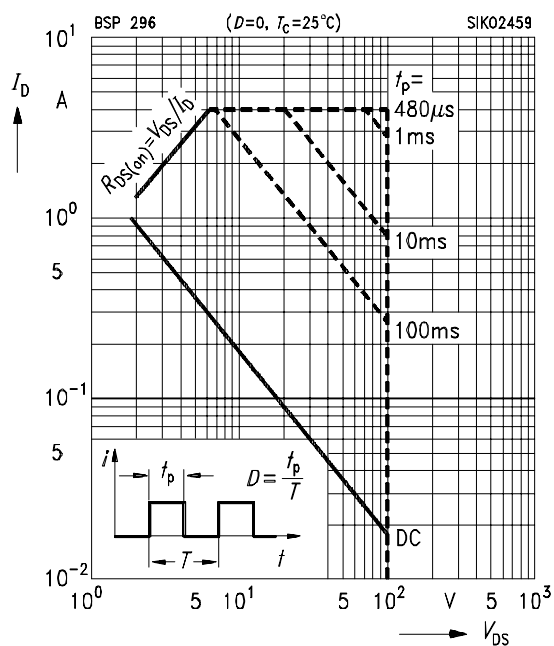
$$I_D = f(T_A)$$

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



**Safe operating area  $I_D = f(V_{DS})$**

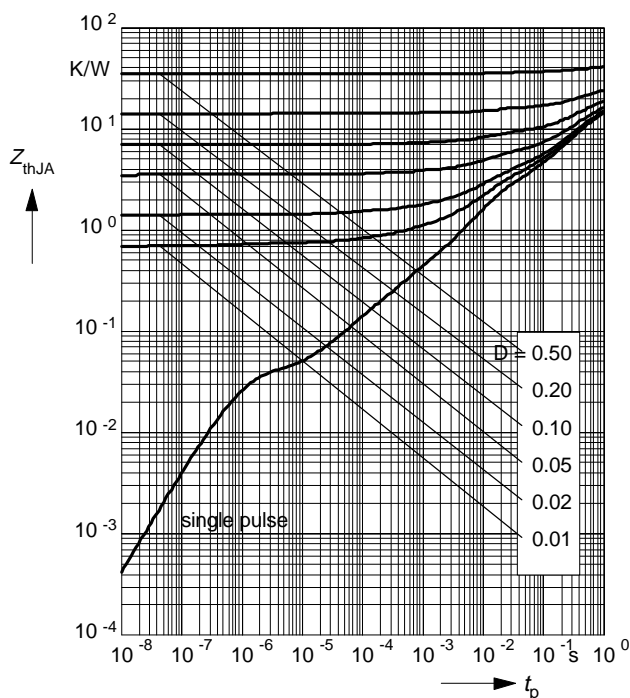
parameter:  $D = 0, T_C = 25^\circ\text{C}$



**Transient thermal impedance**

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

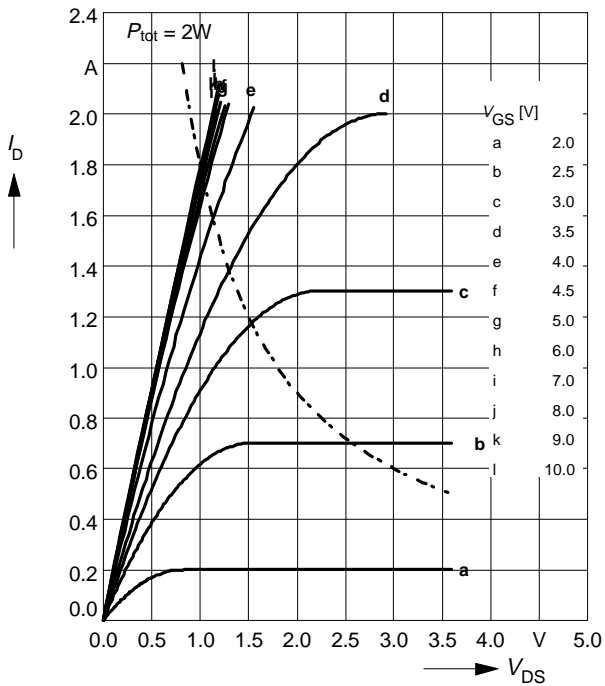
parameter:  $D = t_p / T$



**Typ. output characteristics**

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

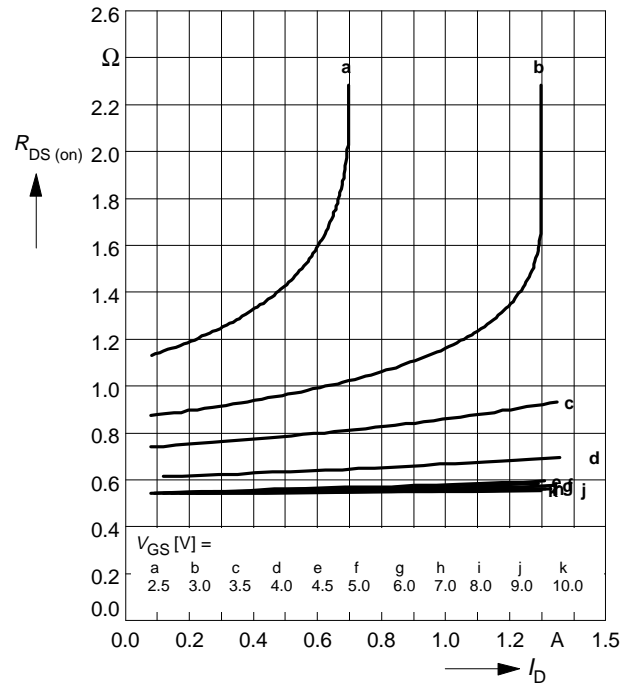
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25 \text{ }^\circ\text{C}$



**Typ. drain-source on-resistance**

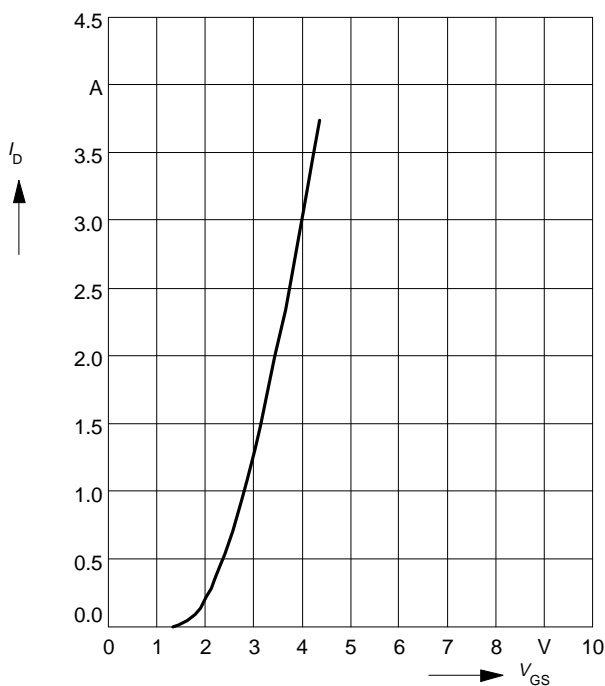
$$R_{DS(on)} = f(I_D)$$

parameter:  $t_p = 80 \mu s$ ,  $T_j = 25 \text{ }^\circ\text{C}$



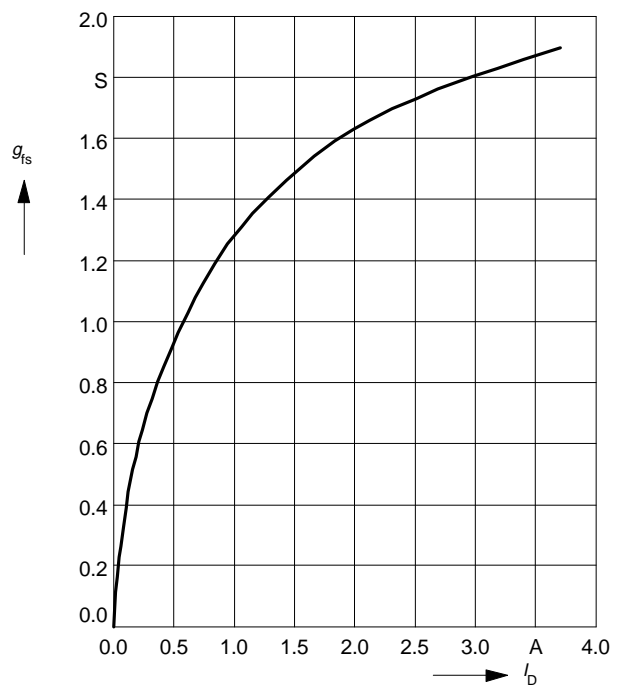
**Typ. transfer characteristics  $I_D = f(V_{GS})$**

parameter:  $t_p = 80 \mu s$



**Typ. forward transconductance  $g_{fs} = f(I_D)$**

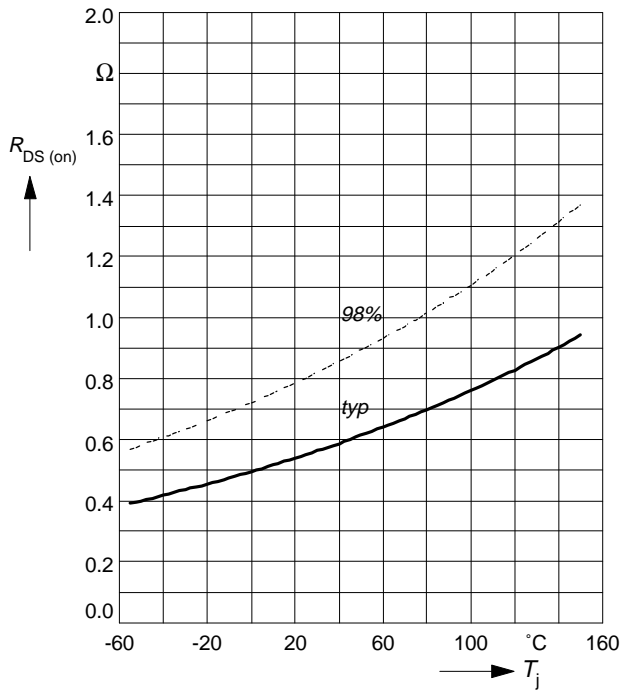
parameter:  $t_p = 80 \mu s$ ,



**Drain-source on-resistance**

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

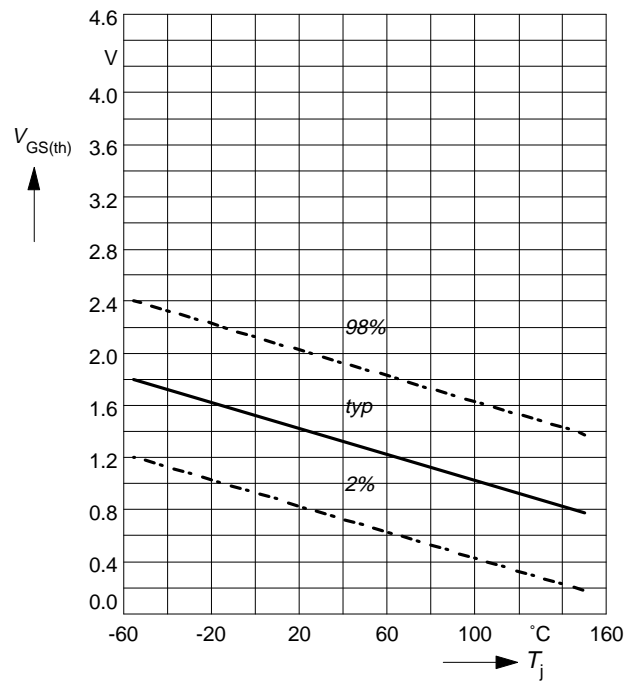
parameter:  $I_D = 1\text{ A}$ ,  $V_{GS} = 10\text{ V}$



**Gate threshold voltage**

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

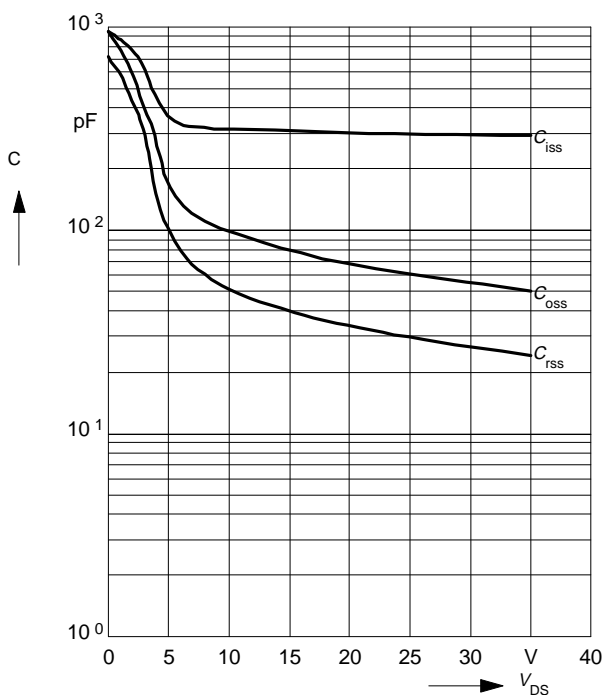
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1\text{ mA}$



**Typ. capacitances**

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

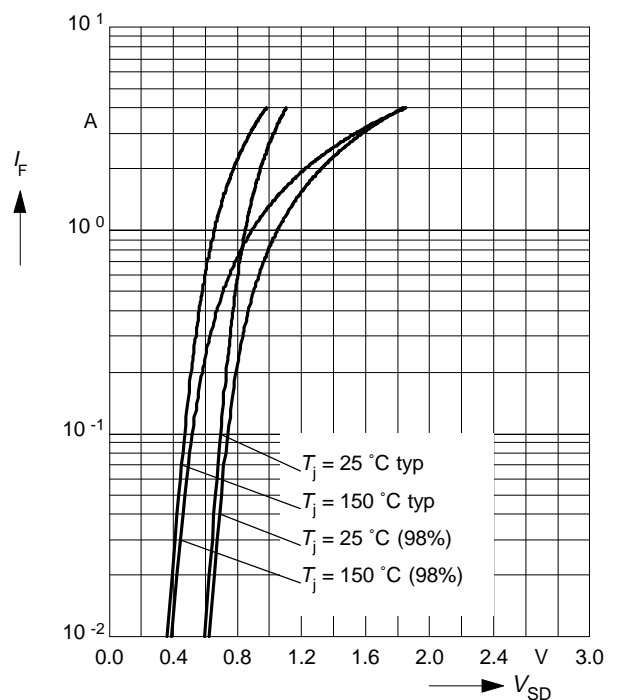
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



**Forward characteristics of reverse diode**

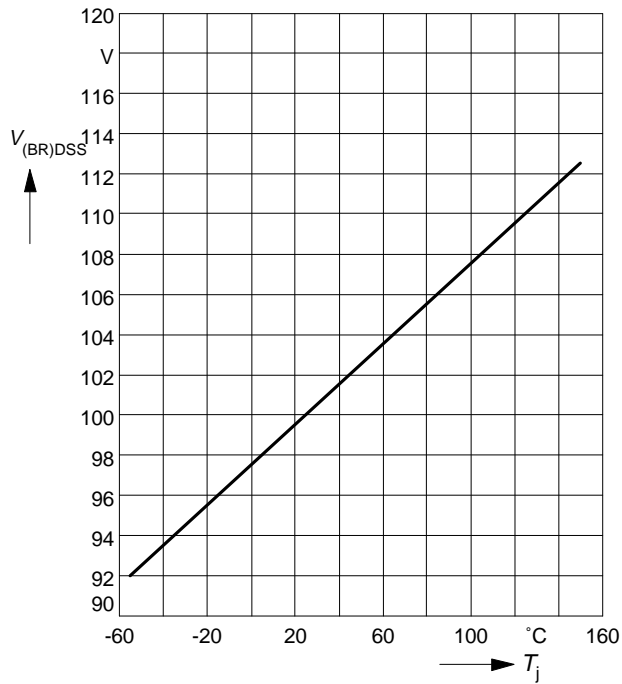
$$I_F = f(V_{SD})$$

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



**Drain-source breakdown voltage**

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



**Safe operating area  $I_D=f(V_{DS})$**

parameter :  $D = 0.01$ ,  $T_C=25^\circ\text{C}$

