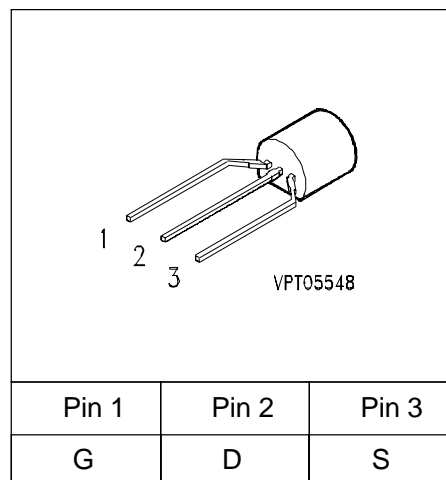


## BSS 89

### SIPMOS® Small-Signal Transistor

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



Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Marking
BSS 89	240 V	0.3 A	6 $\Omega$	TO-92	SS89

Type	Ordering Code	Tape and Reel Information
BSS 89	Q62702-S519	E6288
BSS 89	Q62702-S619	E6296
BSS 89	Q62702-S385	E6325

### Maximum Ratings

Parameter	Symbol	Values	Unit
Drain source voltage	$V_{DS}$	240	V
Drain-gate voltage	$V_{DGR}$	240	
$R_{GS} = 20 \text{ k}\Omega$		$\pm 20$	
Gate source voltage	$V_{GS}$	Class 1	
ESD Sensitivity (HBM) as per MIL-STD 883			
Continuous drain current	$I_D$	0.3	A
$T_A = 25 \text{ }^\circ\text{C}$			
DC drain current, pulsed	$I_{Dpuls}$	1.2	
$T_A = 25 \text{ }^\circ\text{C}$			
Power dissipation	$P_{tot}$	1	W
$T_A = 25 \text{ }^\circ\text{C}$			

**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 <sup>1)</sup>	$R_{thJA}$	≤ 125	K/W
DIN humidity category, DIN 40 040		E	
IEC climatic category, DIN IEC 68-1		55 / 150 / 56	

**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 $V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$	$V_{(BR)DSS}$	240	-	-	V
Gate threshold voltage $V_{GS}=V_{DS}$ , $I_D = 1\text{ mA}$	$V_{GS(th)}$	0.8	1.5	2	
Zero gate voltage drain current $V_{DS} = 240\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$ $V_{DS} = 240\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$ $V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$	$I_{DSS}$	- - -	0.1 10 -	1 100 0.2	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	-	10	100	
Drain-Source on-state resistance $V_{GS} = 10\text{ V}$ , $I_D = 0.3\text{ A}$ $V_{GS} = 4.5\text{ V}$ , $I_D = 0.3\text{ A}$	$R_{DS(on)}$	- -	4.5 5.3	6 10	$\Omega$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**Dynamic Characteristics**

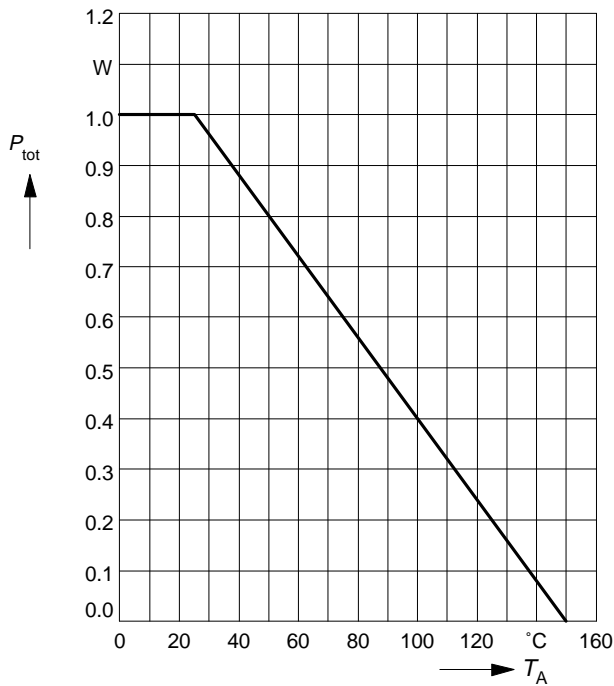
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 0.3\text{ A}$	$g_{fs}$	0.14	0.33	-	S
Input capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	-	115	155	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	-	15	25	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	-	8	12	
Turn-on delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.28\text{ A}$ $R_G = 50\ \Omega$	$t_{d(on)}$	-	5	8	ns
Rise time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.28\text{ A}$ $R_G = 50\ \Omega$	$t_r$	-	10	15	
Turn-off delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.28\text{ A}$ $R_G = 50\ \Omega$	$t_{d(off)}$	-	30	40	
Fall time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.28\text{ A}$ $R_G = 50\ \Omega$	$t_f$	-	20	27	

**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 $T_A = 25\text{ }^{\circ}\text{C}$	$I_S$	-	-	0.3	A
Inverse diode direct current,pulsed $T_A = 25\text{ }^{\circ}\text{C}$	$I_{SM}$	-	-	1.2	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 0.6\text{ A}$	$V_{SD}$	-	0.9	1.4	V

### Power dissipation

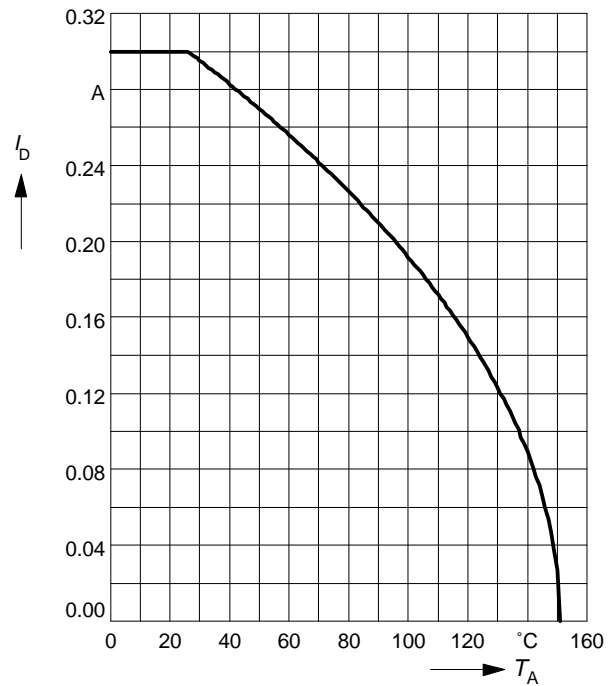
$$P_{\text{tot}} = f(T_A)$$



### Drain current

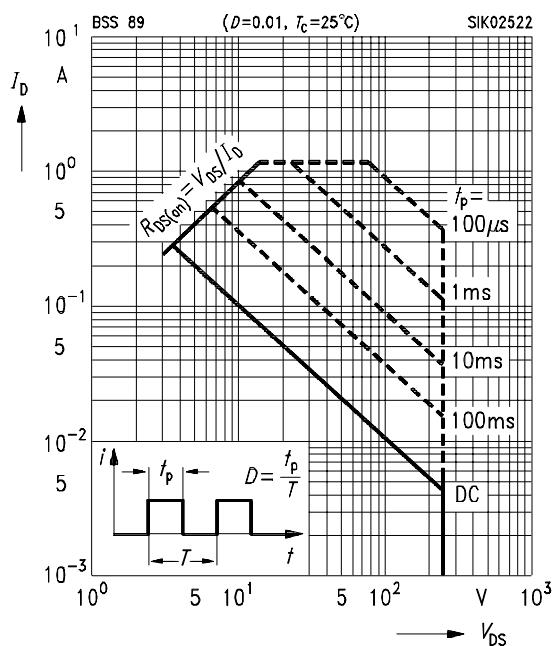
$$I_D = f(T_A)$$

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



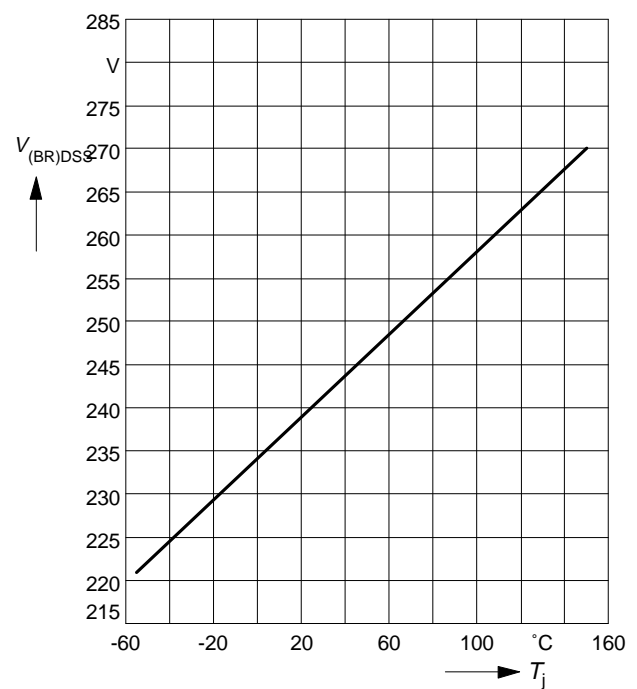
### Safe operating area $I_D = f(V_{DS})$

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



### Drain-source breakdown voltage

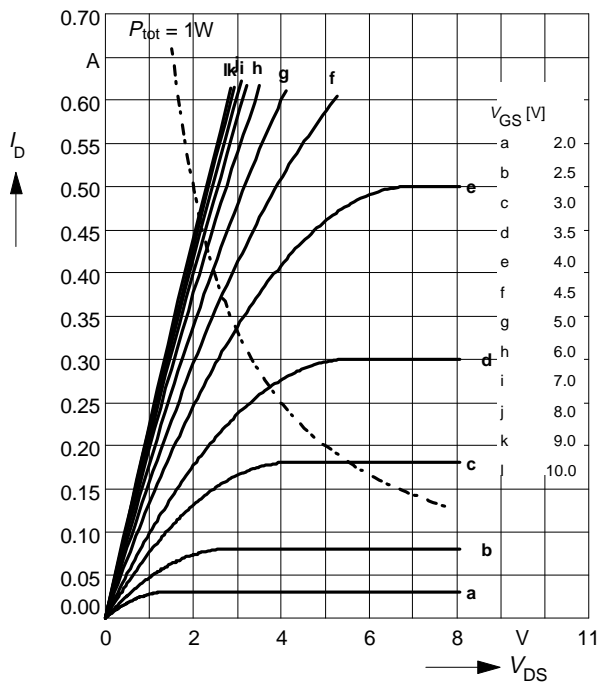
$$V_{(BR)DSS} = f(T_j)$$



### Typ. output characteristics

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

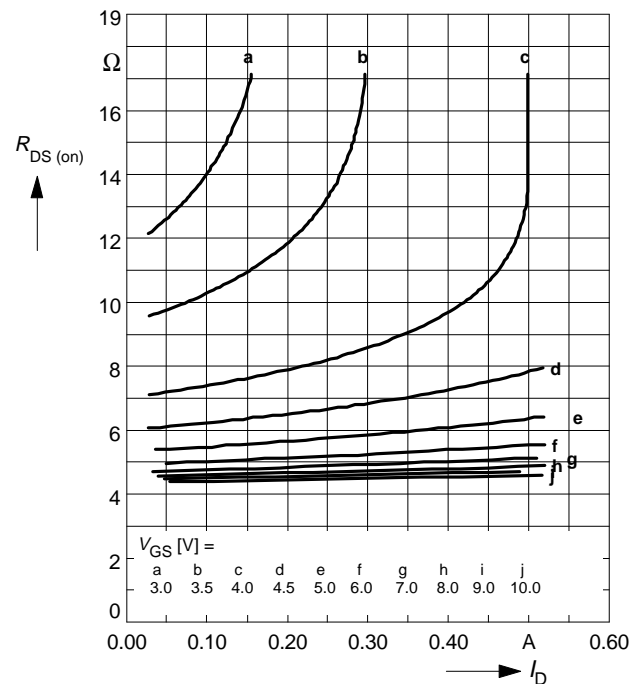
parameter:  $t_p = 80 \mu s$



### Typ. drain-source on-resistance

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

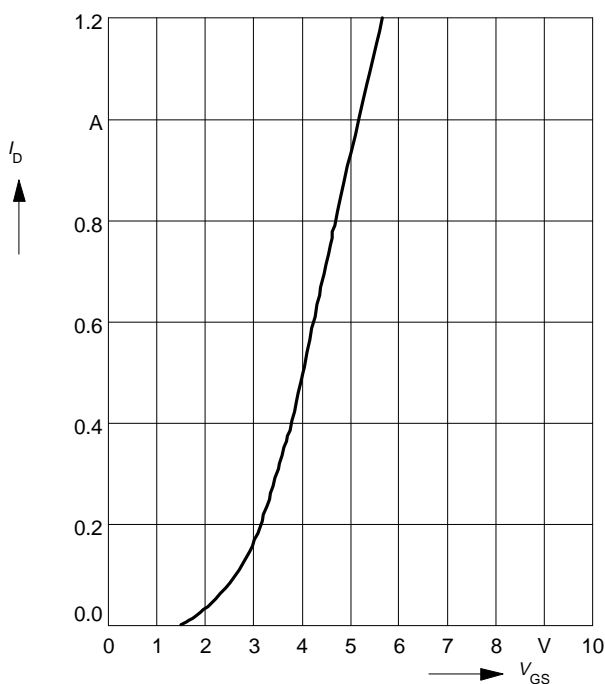
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25^\circ C$



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

parameter:  $t_p = 80 \mu s$

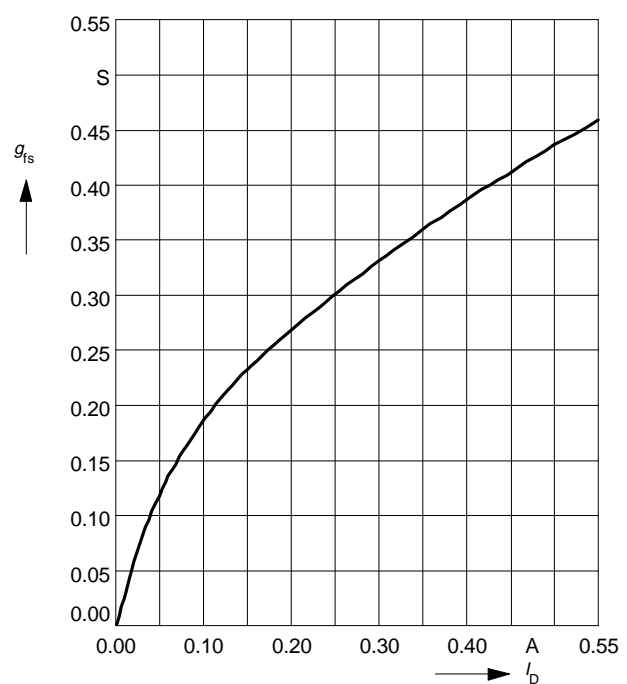
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



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

parameter:  $t_p = 80 \mu s$ ,

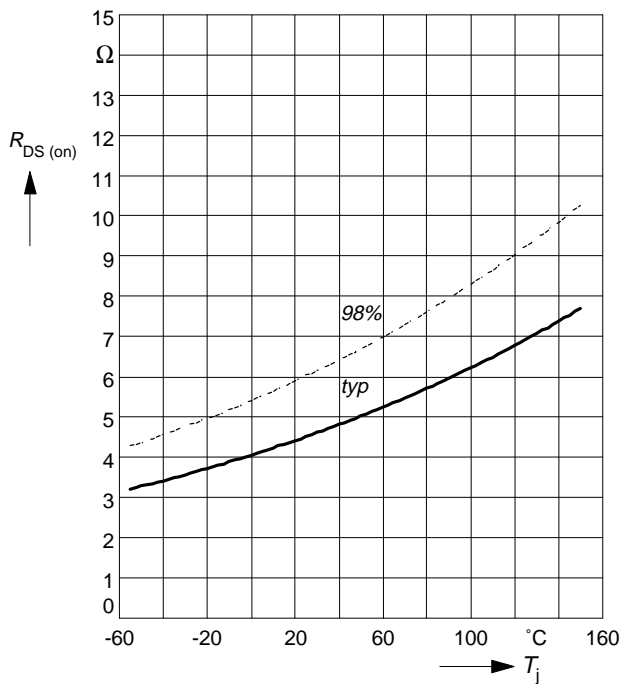
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



### Drain-source on-resistance

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

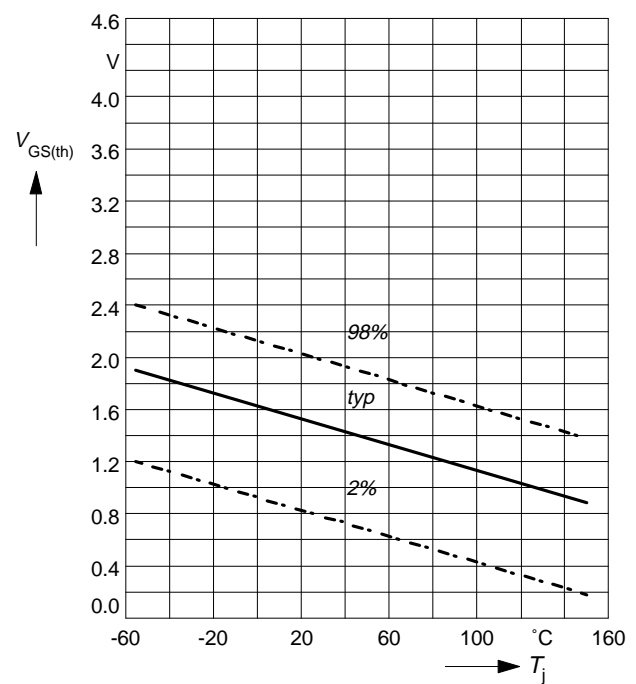
parameter:  $I_D = 0.3 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



### Gate threshold voltage

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

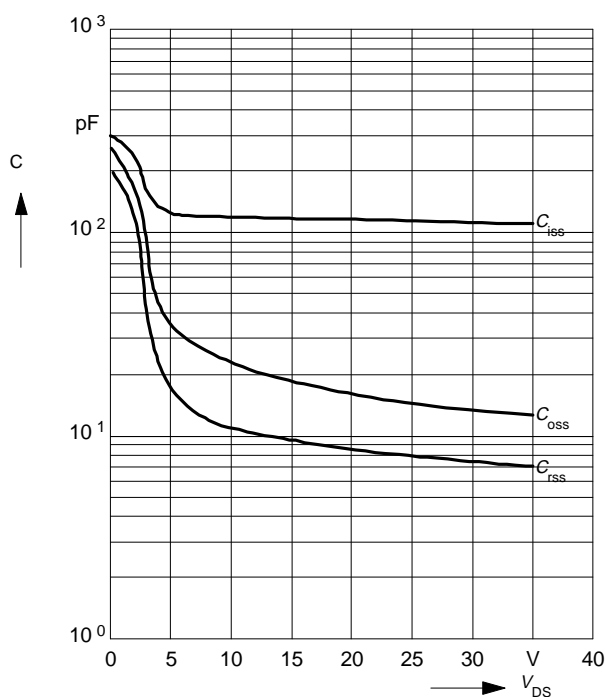
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$



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

