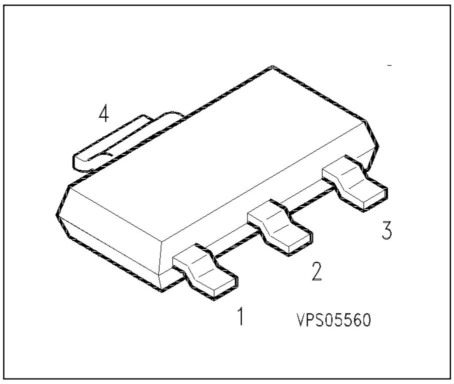
BSP 123

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 123	100 V	0.38 A	6 Ω	SOT-223	BSP 123

Type	Ordering Code	Tape and Reel Information
BSP 123	Q67000-S306	E6327

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain source voltage	V_{DS}	100	V
Drain-gate voltage R_{GS} = 20 kΩ	V_{DGR}	100	
Gate source voltage	V_{GS}	± 20	
ESD Sensitivity (HBM) as per MIL-STD 883		Class 1	
Continuous drain current T_A = 29 °C	I_D	0.38	A
DC drain current, pulsed T_A = 25 °C	I_{Dpuls}	0.68	
Power dissipation T_A = 25 °C	P_{tot}	1.7	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}	≤ 72	K/W
Therminal resistance, junction-soldering point 1)	R_{thJS}	≤ 12	
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^2 copper area for drain connection

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} = 0 V, I_D = 0.25 mA, T_j = 25 °C	$V_{(BR)DSS}$	100	-	-	V
Gate threshold voltage V_{GS}=V_{DS}, I_D = 1 mA	$V_{GS(th)}$	0.8	1.5	2	
Zero gate voltage drain current	I_{DSS}				
V_{DS} = 100 V, V_{GS} = 0 V, T_j = 25 °C		-	0.1	1	µA
V_{DS} = 100 V, V_{GS} = 0 V, T_j = 125 °C		-	10	100	
V_{DS} = 20 V, V_{GS} = 0 V, T_j = 25 °C		-	-	10	nA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	-	10	50	nA
Drain-Source on-state resistance	$R_{DS(on)}$				Ω
V_{GS} = 10 V, I_D = 0.38 A		-	4	6	
V_{GS} = 4.5 V, I_D = 0.38 A		-	6	10	

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

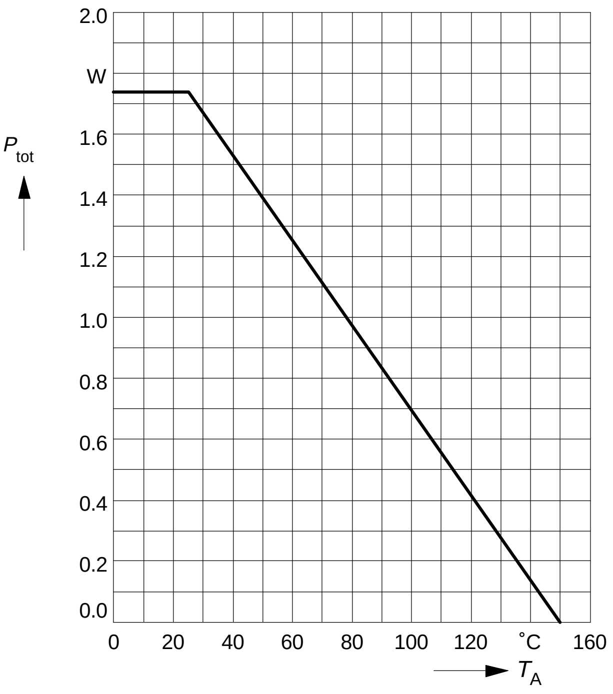
Parameter	**Symbol**	**Values**			**Unit**
		min.	**typ.**	**max.**	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = 0.38 A	g_{fs}	0.08	0.28	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	65	85	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	10	15	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	4	6	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 0.28 A R_{GS} = 50 Ω	$t_{d(on)}$	-	5	8	ns
Rise time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 0.28 A R_{GS} = 50 Ω	t_r	-	5	8	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 0.28 A R_{GS} = 50 Ω	$t_{d(off)}$	-	10	13	
Fall time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 0.28 A R_{GS} = 50 Ω	t_f	-	12	16	

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

Parameter	**Symbol**	**Values**			**Unit**
		min.	**typ.**	**max.**	
Reverse Diode					
Inverse diode continuous forward current $T_A = 25\ °C$	I_S	-	-	0.38	A
Inverse diode direct current,pulsed $T_A = 25\ °C$	I_{SM}	-	-	1.5	
Inverse diode forward voltage $V_{GS} = 0$ V, $I_F = 0.76$ A, $T_j = 25\ °C$	V_{SD}	-	1	1.3	V

Power dissipation

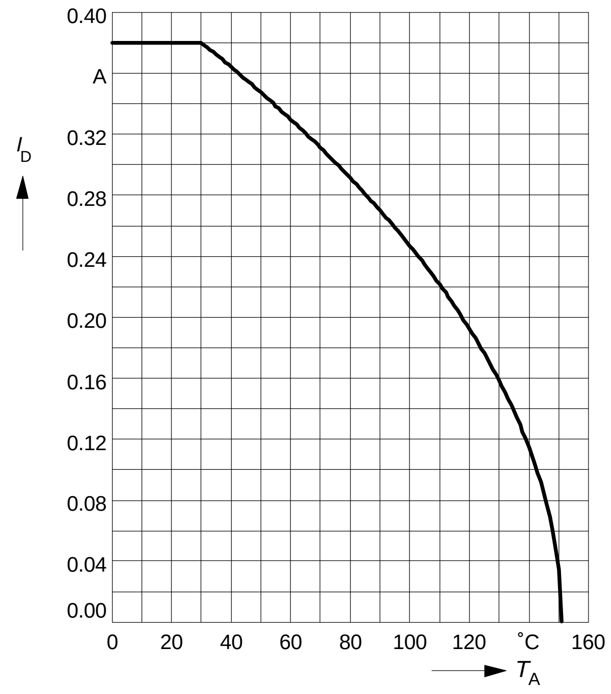
$P_{tot} = f(T_A)$



Drain current

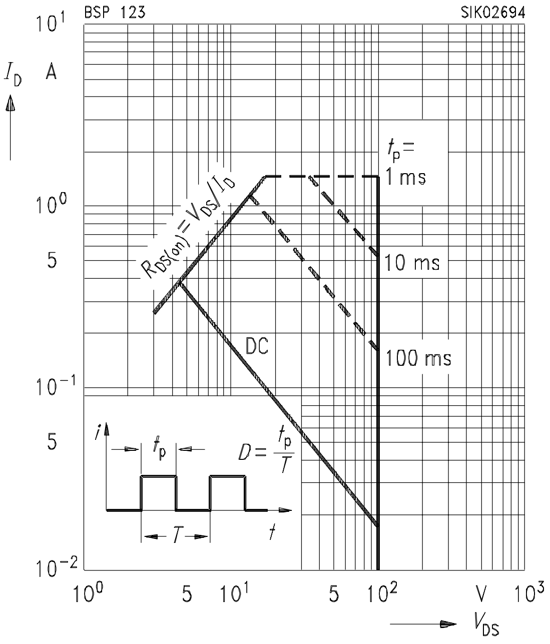
$I_D = f(T_A)$

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



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

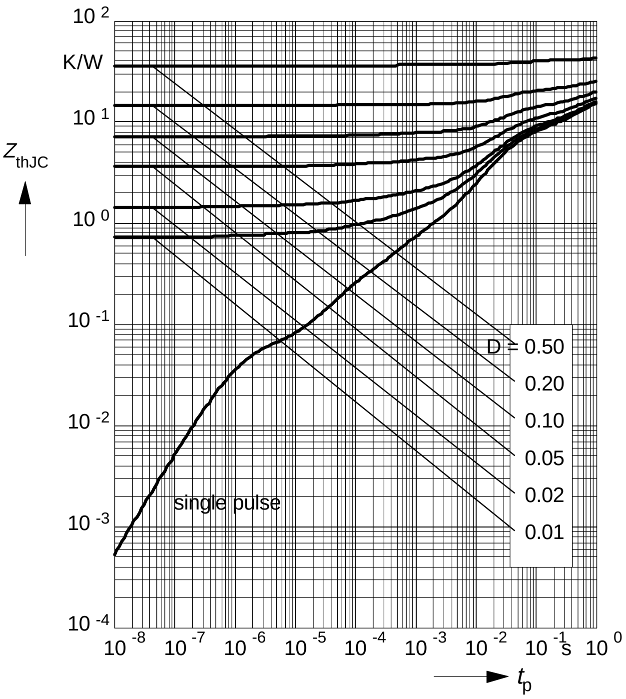
parameter : $D = 0$, T_C=25˚C



Transient thermal impedance

$Z_{th\ JA} = f(t_p)$

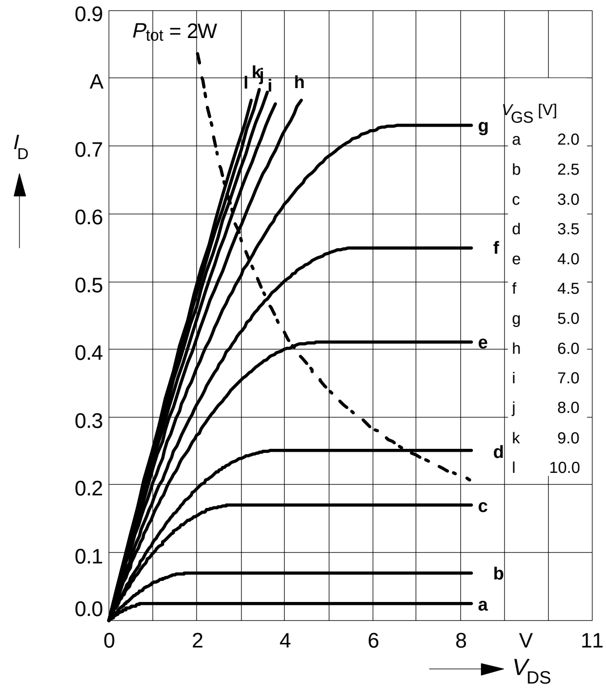
parameter: $D = t_p / T$



Typ. output characteristics

$I_D = f(V_{DS})$

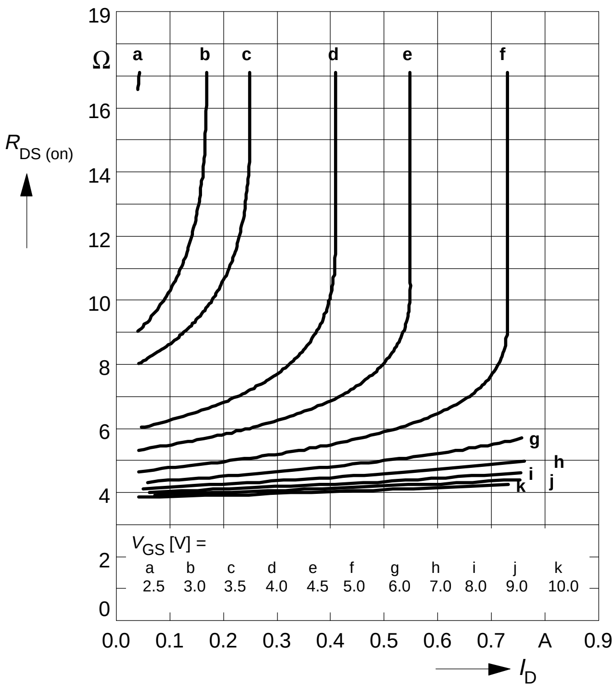
parameter: t_p = 80 µs , T_j = 25 °C



Typ. drain-source on-resistance

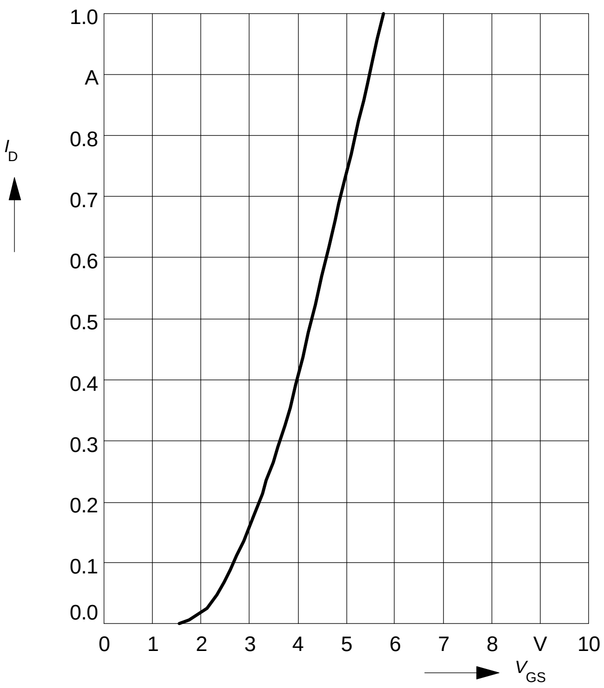
$R_{DS\,(on)} = f(I_D)$

parameter: t_p = 80 µs, T_j = 25 °C



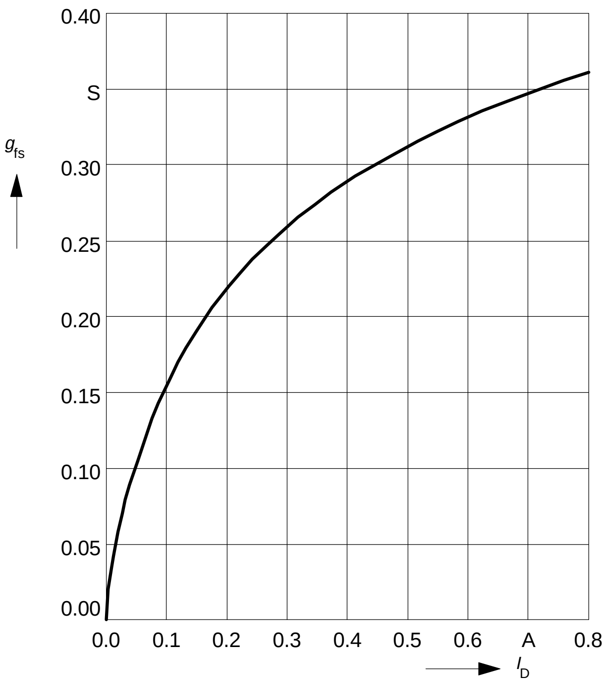
Typ. transfer characteristics $I_D = f(V_{GS})$

parameter: t_p = 80 µs



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

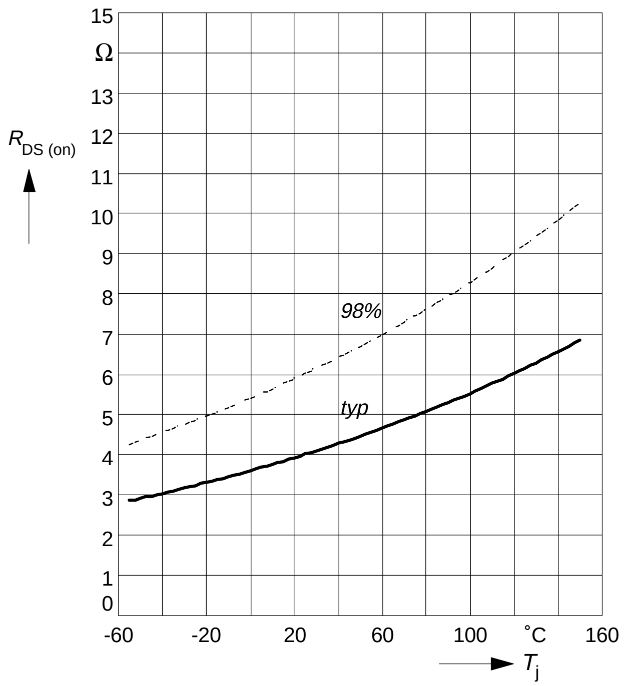
parameter: t_p = 80 µs,



Drain-source on-resistance

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

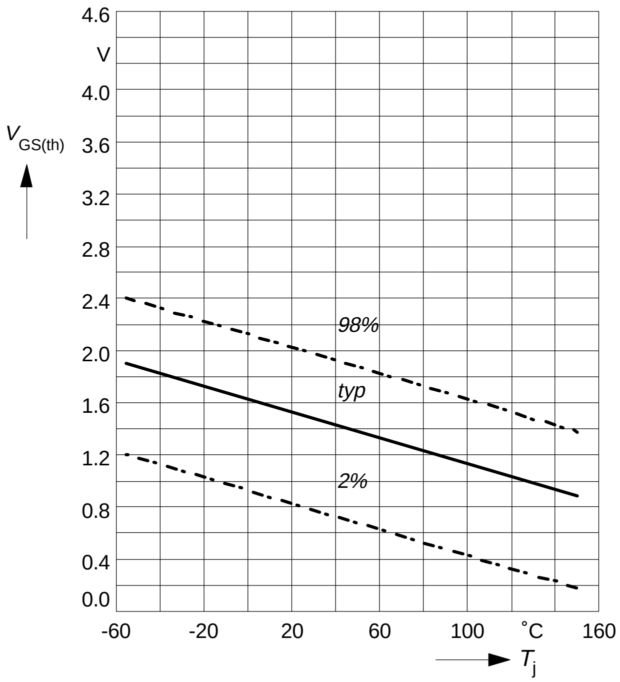
parameter: I_D = 0.38 A, V_{GS} = 10 V



Gate threshold voltage

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

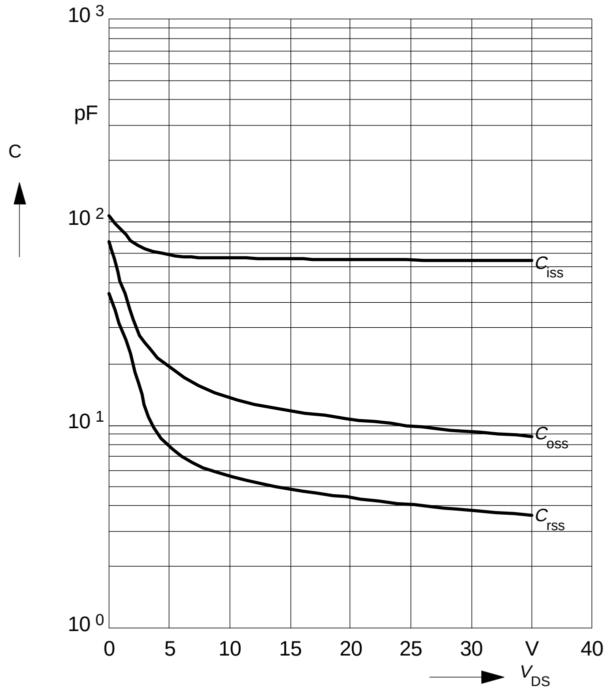
parameter: $V_{GS} = V_{DS}$, I_D = 1 mA



Typ. capacitances

$C = f(V_{DS})$

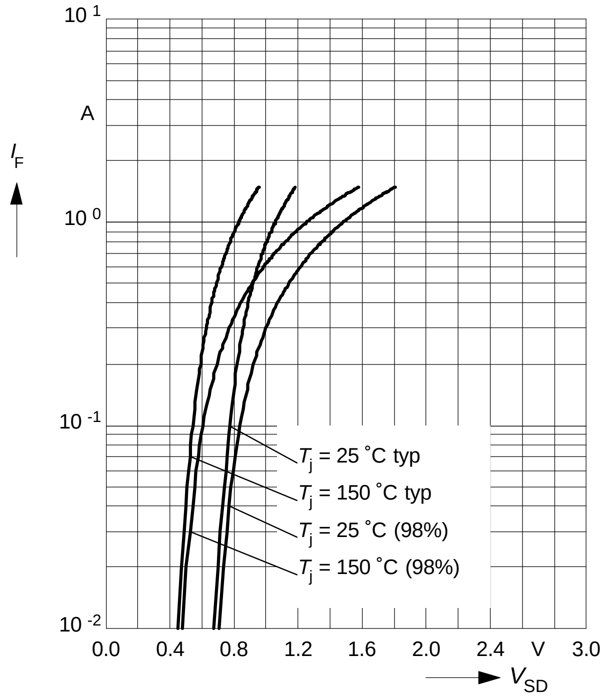
parameter: V_{GS}=0V, f = 1 MHz



Forward characteristics of reverse diode

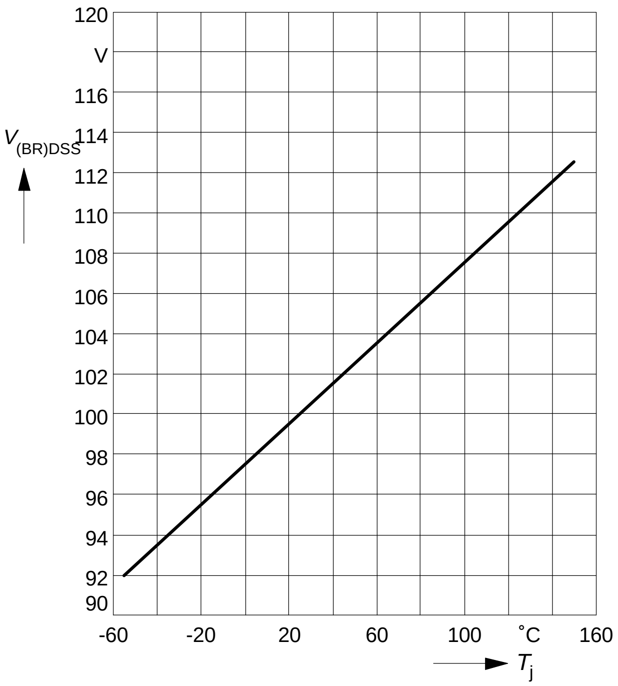
$I_F = f(V_{SD})$

parameter: T_j, t_p = 80 µs



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°C