SIEMENS

SIPMOS® Small-Signal Transistor — BSS 138

- V_{DS} 50 V
- I_D 0.22 A
- $R_{DS(on)}$ 3.5 Ω
- $V_{GS(th)}$ 0.8 ... 1.6 V
- N channel
- Enhancement mode
- Logic level

5:1

Type	Ordering Code	Tape and Reel Information	Pin Configuration 1	2	3	Marking	Package
BSS 138	Q62702-S566	E6327: 3000 pcs/reel	G	S	D	BSS 138 marked SSs	SOT-23
BSS 138	Q67000-S216	E6433: 10000 pcs/reel					

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	50	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	50	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 31 ℃	I_D	0.22	A
Pulsed drain current, T_A = 25 ℃	$I_{D\,puls}$	0.88	
Max. power dissipation, T_A = 25 ℃	P_{tot}	0.36	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	℃

Thermal resistance, chip-ambient (without heat sink)	R_{thJA}	≤ 350	K/W
chip-substrate – reverse side [1]	R_{thJSR}	≤ 285	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] For package mounted on aluminum 25 mm × 25 mm × 0.7 mm.

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, I_D = 0.25 mA	$V_{(BR)DSS}$	50	–	–	V
Gate threshold voltage V_{GS} = V_{DS}, I_D = 1 mA	$V_{GS(th)}$	0.8	1.2	1.6	
Zero gate voltage drain current V_{DS} = 50 V, V_{GS} = 0 T_j = 25 °C T_j = 125 °C	I_{DSS}	 – –	 0.05 –	 0.5 5	µA
V_{DS} = 30 V, V_{GS} = 0 T_j = 25 °C		–	–	100	nA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 10 V, I_D = 0.22 A V_{GS} = 4.5 V, I_D = 0.22 A	$R_{DS(on)}$	 –	 1.8 2.8	 3.5 6.0	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.22 A	g_{fs}	0.12	0.20	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	40	55	pF
Output capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	15	25	
Reverse transfer capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	5	8	
Turn-on time t_{on}, (t_{on} = $t_{d(on)}$ + t_r) V_{DD} = 30 V, V_{GS} = 10 V, R_{GS} = 50 Ω, I_D = 0.29 A	$t_{d(on)}$	–	5	8	ns
	t_r	–	6	9	
Turn-off time t_{off}, (t_{off} = $t_{d(off)}$ + t_f) V_{DD} = 30 V, V_{GS} = 10 V, R_{GS} = 50 Ω, I_D = 0.29 A	$t_{d(off)}$	–	12	16	
	t_f	–	15	20	

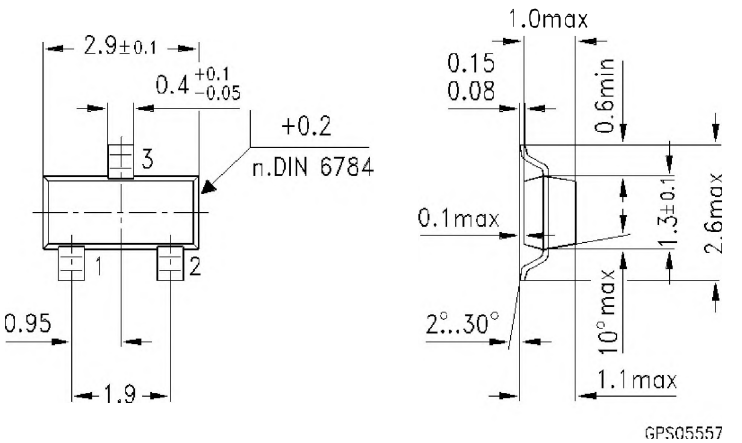
Electrical Characteristics (cont'd)

at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.22	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	0.88	
Diode forward on-voltage I_F = 0.44 A, V_{GS} = 0	V_{SD}	–	0.9	1.4	V

Package Outline

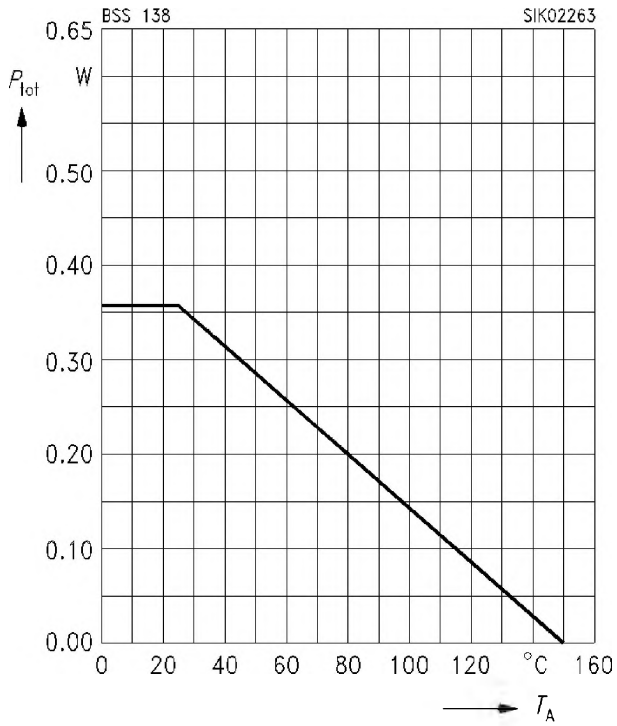
SOT-23



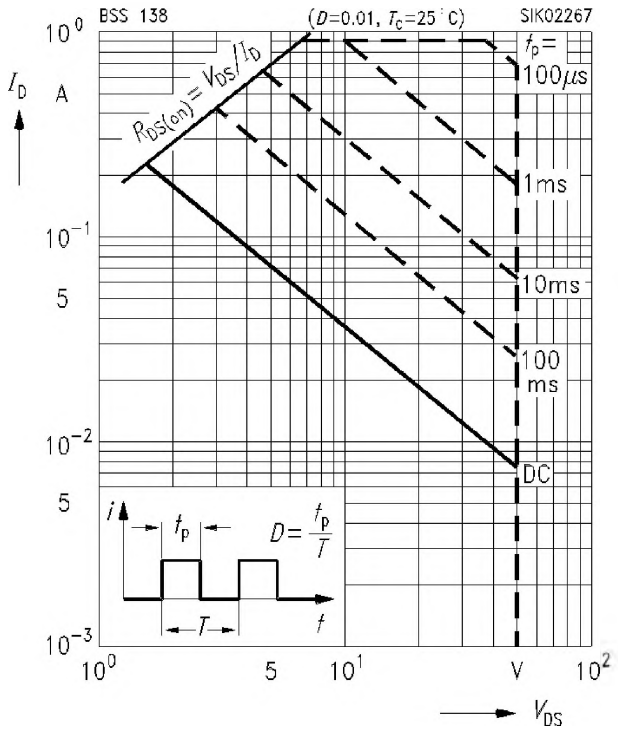
Dimensions in mm

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

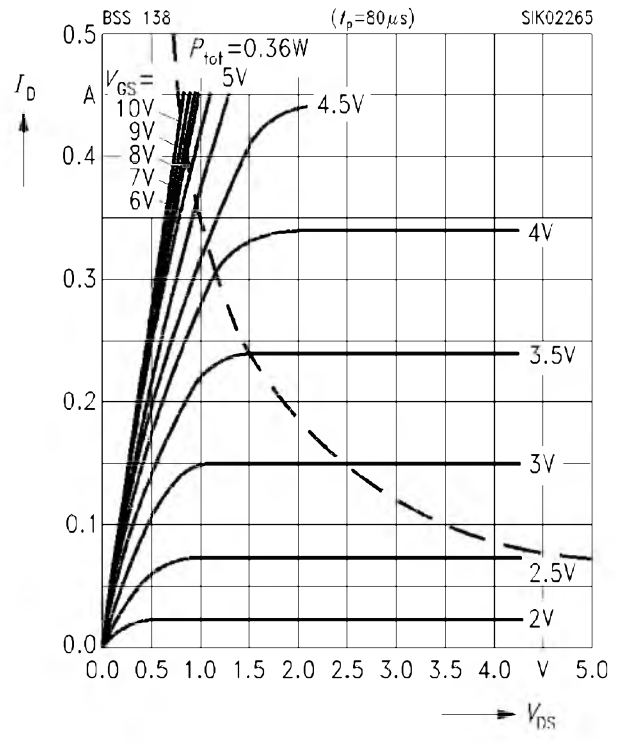
Total power dissipation $P_{tot} = f(T_A)$



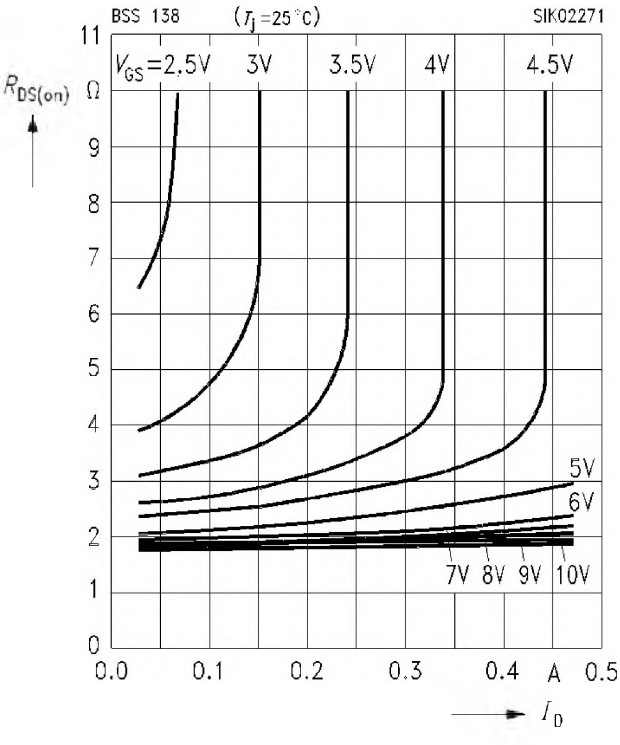
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



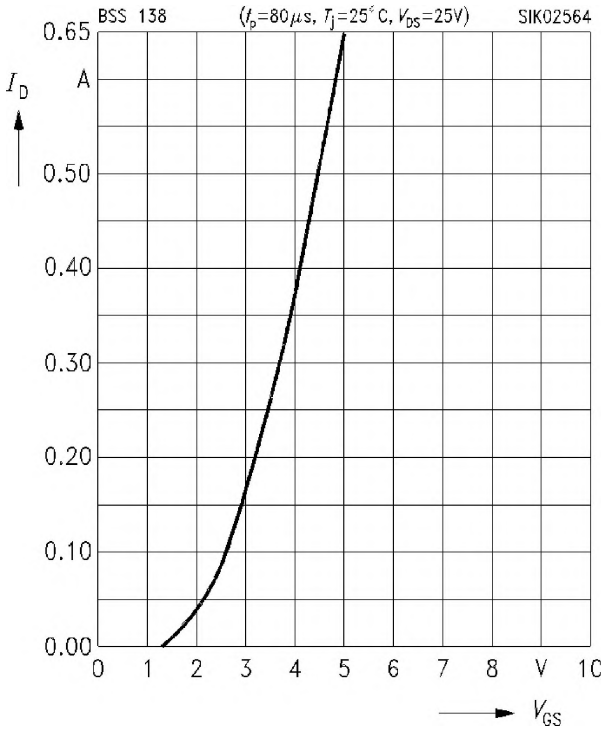
Typ. output characteristics $I_D = f(V_{DS})$
parameter: t_p = 80 µs



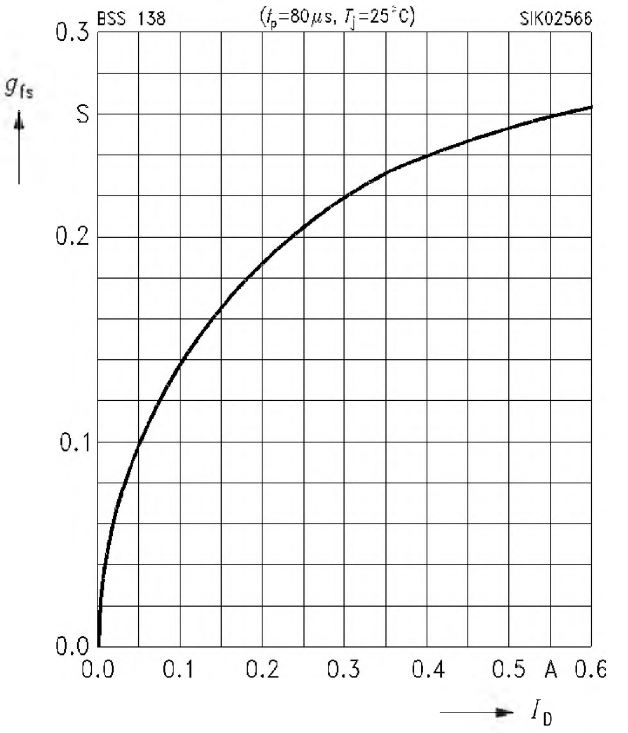
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



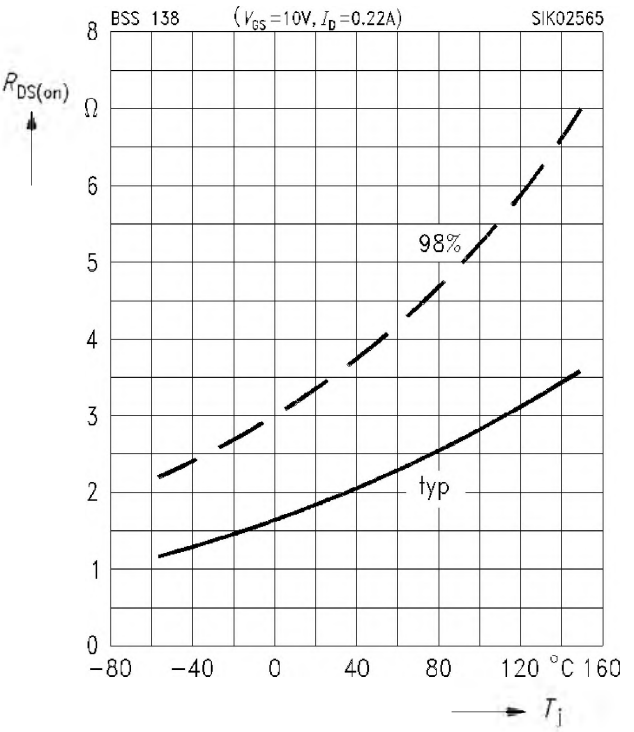
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$



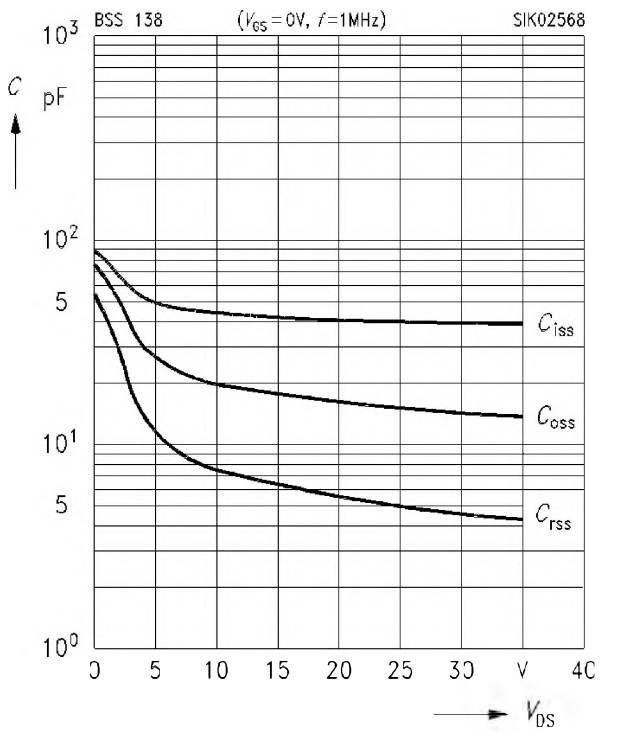
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, t_p = 80 µs



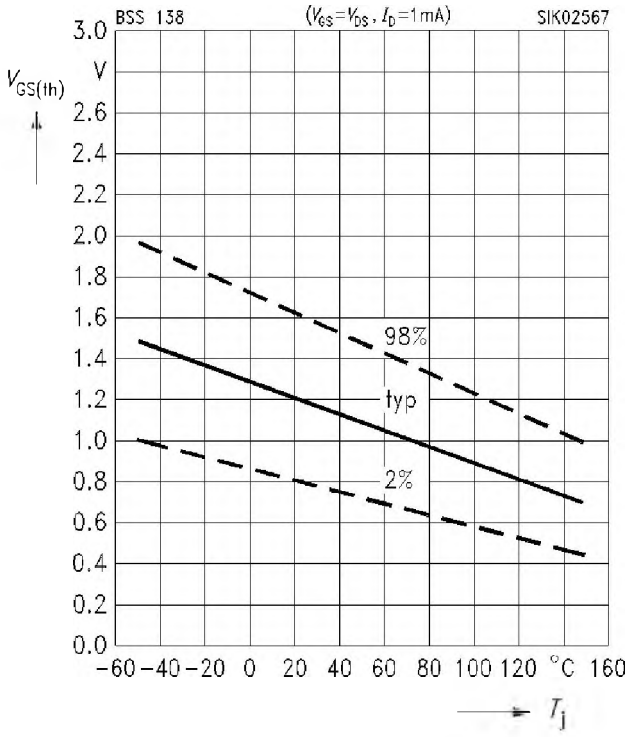
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = 0.22 A, V_{GS} = 10 V, (spread)



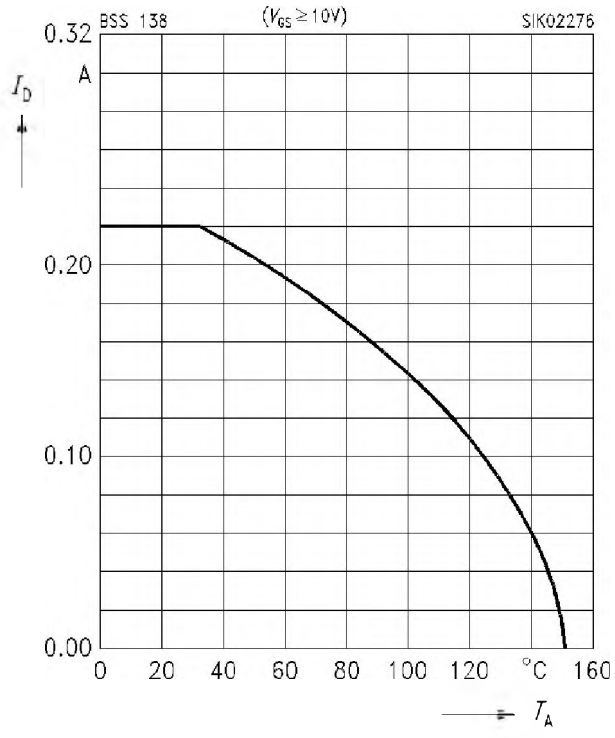
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



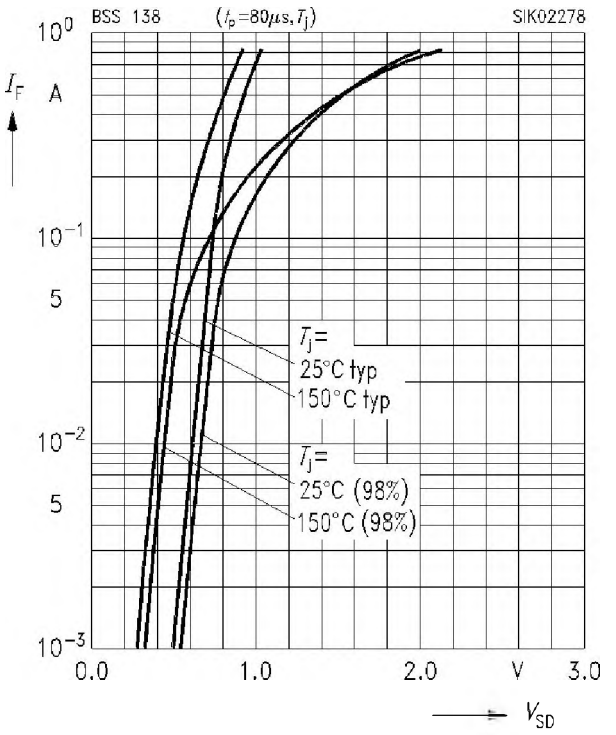
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 5$ V



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

parameter: t_p = 80 µs, T_j, (spread)



Drain-source breakdown voltage

$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)