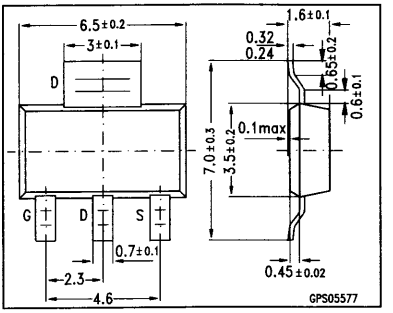
SIEMENS

SIPMOS® Small-Signal Transistor — BSP 17

V_{DS} = 50 V
I_D = 2.9 A
$R_{DS(on)}$ = 0.1 Ω

- N channel
- Enhancement mode
- Avalanche rated
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 17	Q67000-S220

Maximum Ratings

Parameter	Symbol	Values	Unit
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current, T_A = 30 °C	I_D	2.9	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	11.6	
Avalanche current, limited by $T_{j\,max}$	I_{AR}	2.9	
Avalanche energy, periodic limited by $T_{j\,max}$	E_{AR}	1	mJ
Avalanche energy, single pulse I_D = 2.9 A, V_{DD} = 25 V, R_{GS} = 25 Ω L = 713 µH, T_j = 25 °C	E_{AS}	6	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.5	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	70	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	6	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: tape 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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, I_D = 0.25 mA	$V_{(BR)DSS}$	50	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}$, I_D = 1 mA	$V_{GS(th)}$	2.1	3.0	4.0	
Zero gate voltage drain current V_{DS} = 50 V, V_{GS} = 0 T_j = 25 °C T_j = 125 °C	I_{DSS}	 – –	 0.1 10	 1.0 100	µA
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 = 2.9 A	$R_{DS(on)}$	–	0.09	0.1	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 2.9 A	g_{fs}	2.5	4.0	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	450	600	pF
Output capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	220	350	
Reverse transfer capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	85	150	
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 = 3 A	$t_{d(on)}$ t_r	– –	20 40	30 60	ns
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 = 3 A	$t_{d(off)}$ t_f	– –	55 40	70 55	

Electrical Characteristics (cont'd)

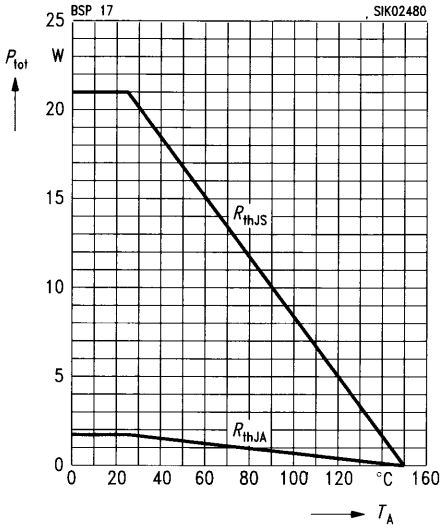
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current	I_S	–	–	2.9	A
Pulsed source current	I_{SM}	–	–	11.6	
Diode forward on-voltage I_F = 5.8 A, V_{GS} = 0	V_{SD}	–	1.0	1.2	V
Reverse recovery time V_R = 30 V, $I_F = I_S$, di_F/dt = 100 A/µs	t_{rr}	–	40	–	ns
Reverse recovery charge V_R = 30 V, $I_F = I_S$, di_F/dt = 100 A/µs	Q_{rr}	–	0.04	–	µC

Characteristics

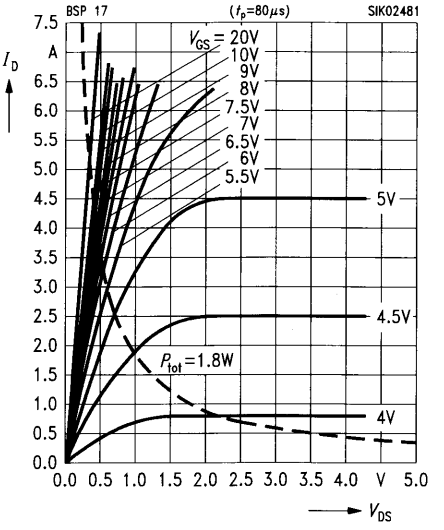
at T_j = 25 °C, unless otherwise specified.

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

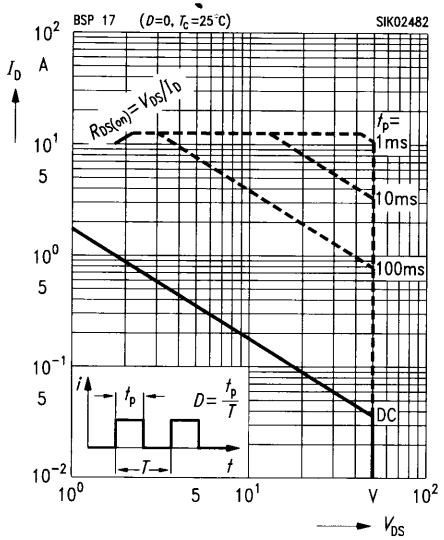


Typ. output characteristics $I_D = f(V_{DS})$

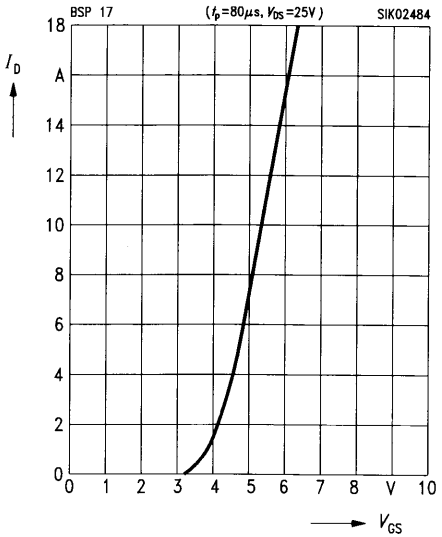
parameter: t_p = 80 µs



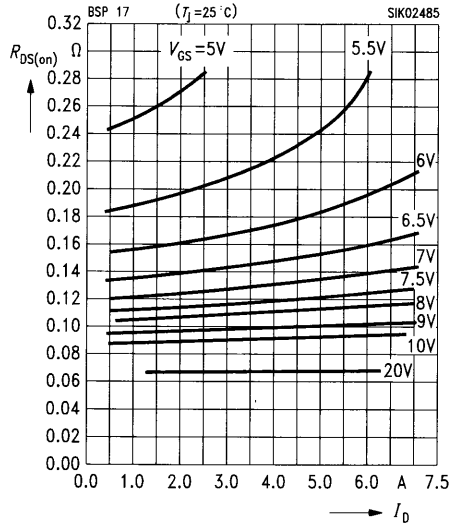
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



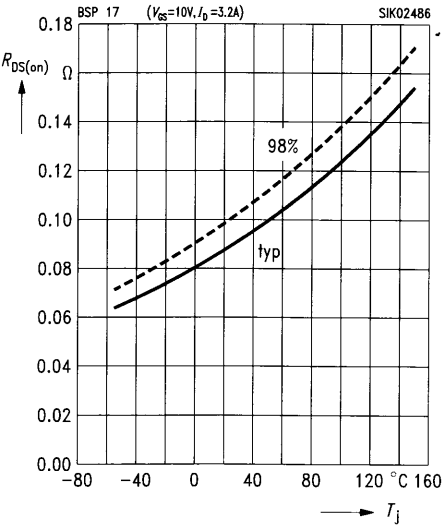
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, V_{DS} = 25 V



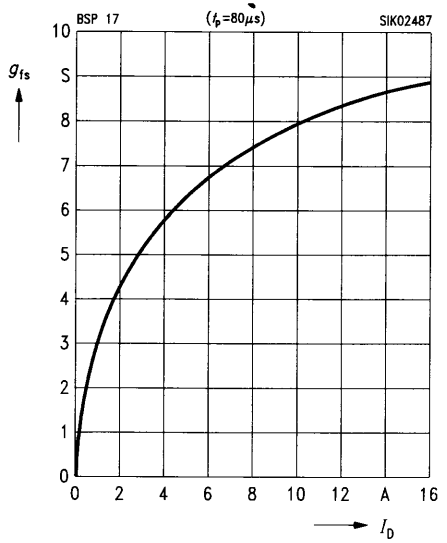
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



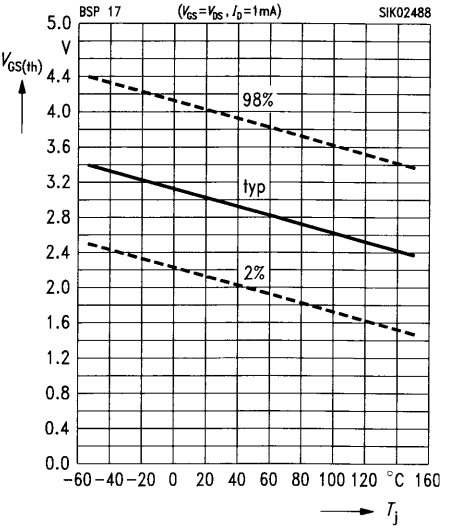
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = 2.9 A, V_{GS} = 10 V, (spread)



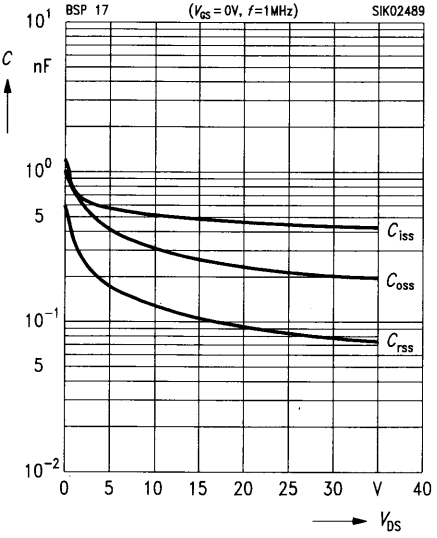
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, $t_p = 80\ \mu s$



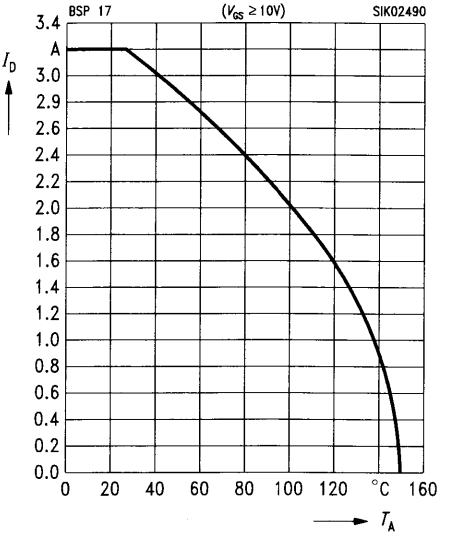
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



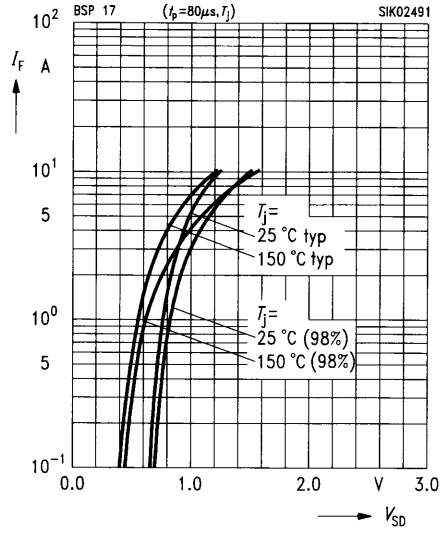
Typ. capacitances $C = f(V_{DS})$
parameter: $V_{GS} = 0$, f = 1 MHz



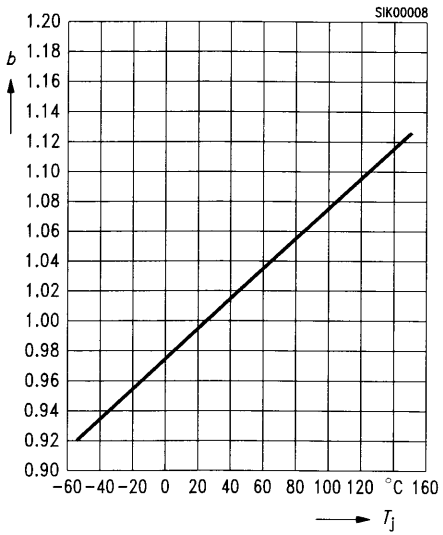
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 10$ V



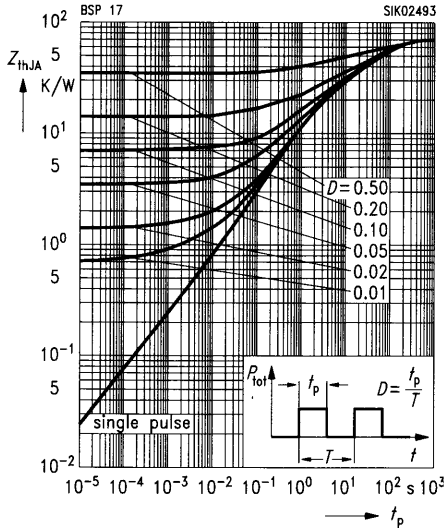
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



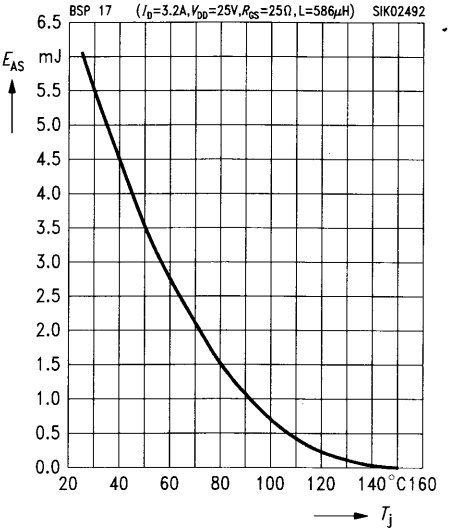
Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



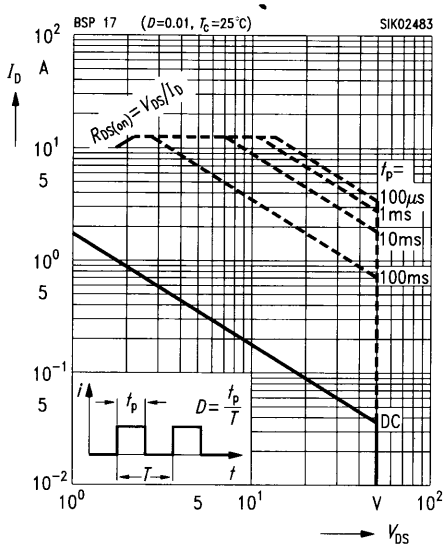
Transient thermal impedance $Z_{thJA} = f(t_p)$
parameter: $D = t_p / T$



Avalanche energy $E_{AS} = f(T_j)$
parameter: I_D = 2.9 A, V_{DD} = 25 V,
R_{GS} = 25 Ω, L = 713 µH



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C

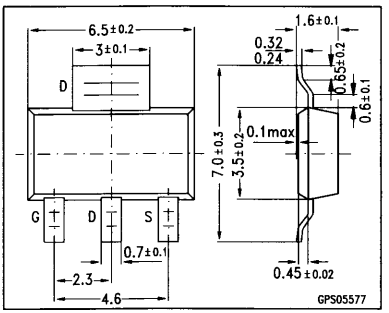


SIEMENS

SIPMOS® Small-Signal Transistor — BSP 88

V_{DS} = 240 V
I_D = 0.29 A
$R_{DS(on)}$ = 8 Ω

- N channel
- Enhancement mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 88	Q67000-S70

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	240	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	240	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 29 °C	I_D	0.29	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	1.16	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.5	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	72	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	9	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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, I_D = 0.25 mA	$V_{(BR)DSS}$	240	–	–	V
Gate threshold voltage V_{GS} = V_{DS}, I_D = 1 mA	$V_{GS(th)}$	0.6	0.8	1.2	
Zero gate voltage drain current V_{DS} = 240 V, V_{GS} = 0 T_j = 25 °C T_j = 125 °C	I_{DSS}	 – –	 0.1 10	 1.0 100	µA
V_{DS} = 100 V, V_{GS} = 0 T_j = 25 °C		–	–	20	nA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 4.5 V, I_D = 0.29 A V_{GS} = 1.8 V, I_D = 14 mA	$R_{DS(on)}$	– –	4 6	8 15	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.29 A	g_{fs}	0.14	0.33	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	100	135	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}	–	8	12	
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 = 0.28 A	$t_{d(on)}$ t_r	– –	5 10	8 15	ns
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 = 0.28 A	$t_{d(off)}$ t_f	– –	40 30	55 40	

Electrical Characteristics (cont'd)

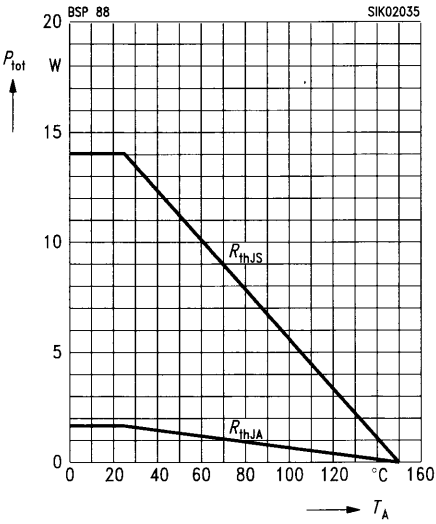
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.29	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	1.16	
Diode forward on-voltage I_F = 0.58 A, V_{GS} = 0	V_{SD}	–	1.0	1.3	V

Characteristics

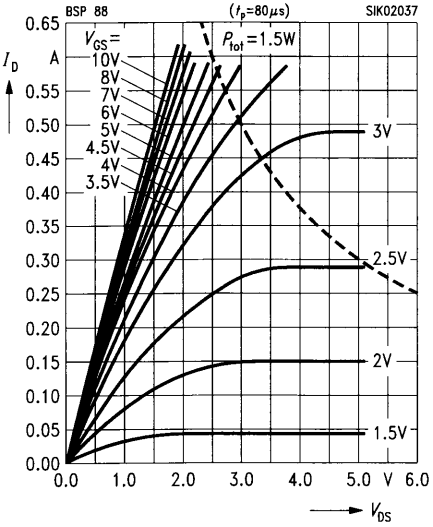
at T_j = 25 °C, unless otherwise specified

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

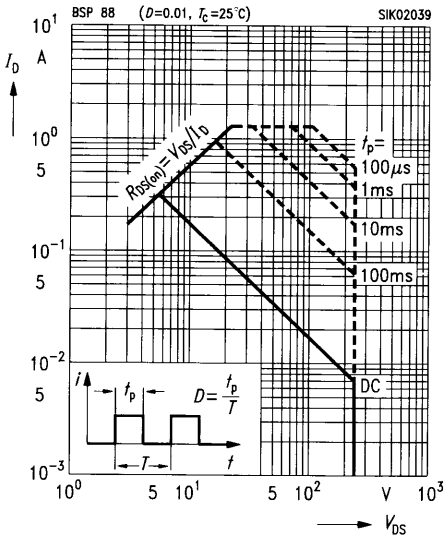


Typ. output characteristics $I_D = f(V_{DS})$

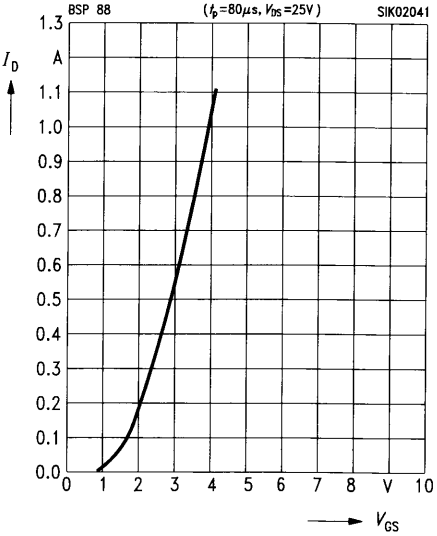
parameter: t_p = 80 µs



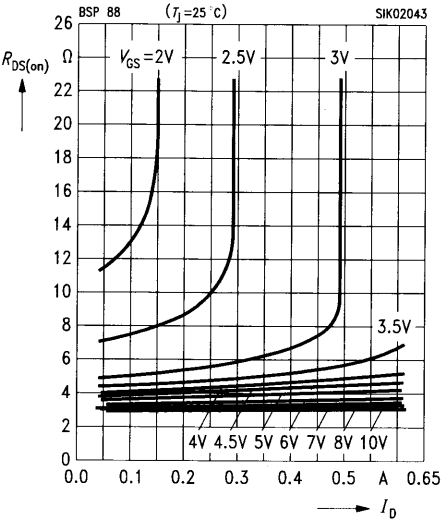
Safe operating area $I_D = f(V_{DS})$
parameter: $D = 0.01$, $T_C = 25$ °C



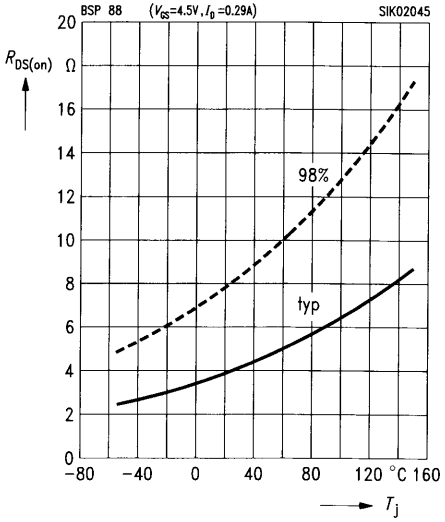
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs, $V_{DS} = 25$ V



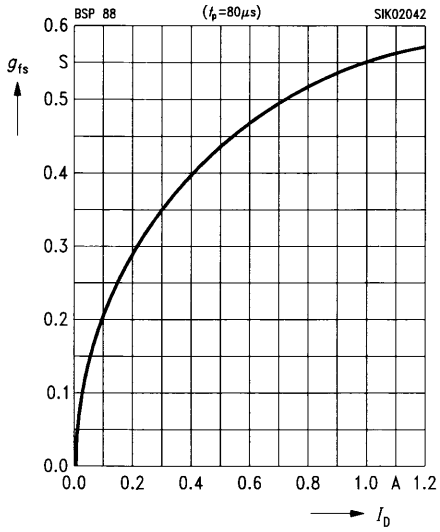
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



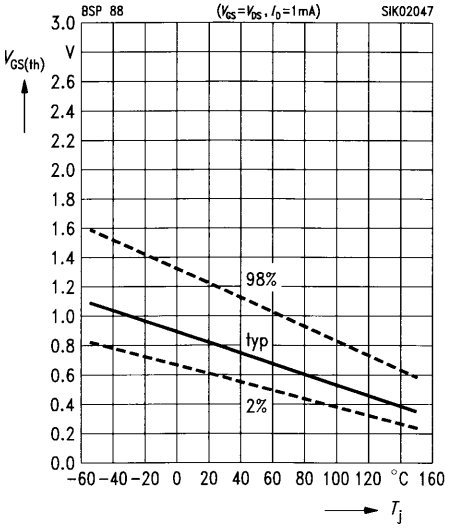
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: $I_D = 0.29$ A, $V_{GS} = 4.5$ V, (spread)



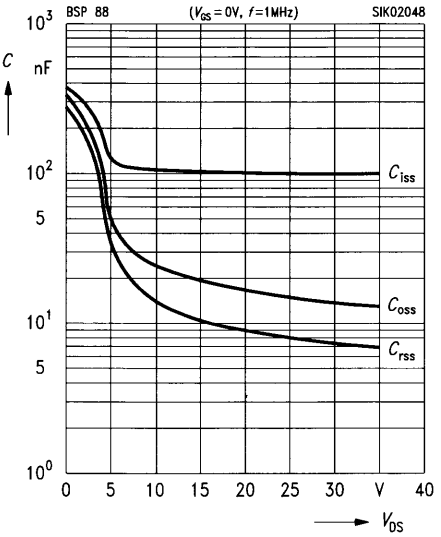
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, $t_p = 80\ \mu s$



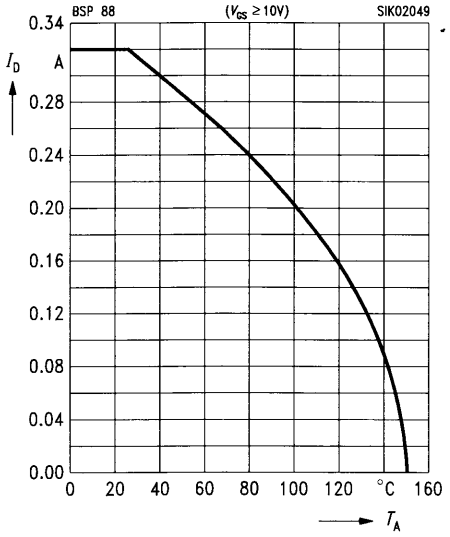
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



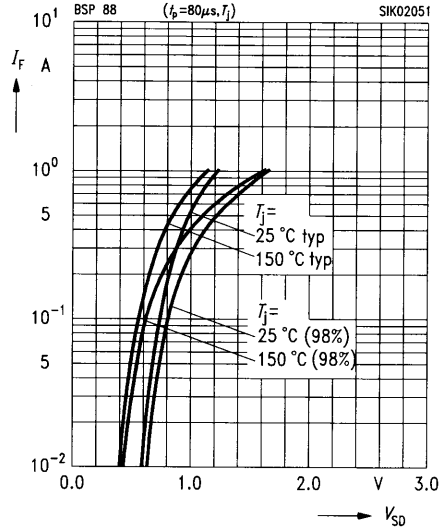
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



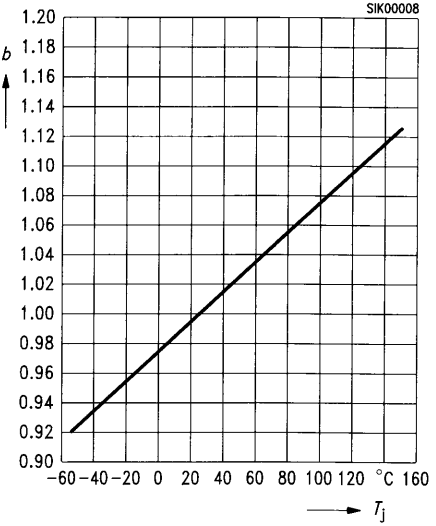
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 10$ V



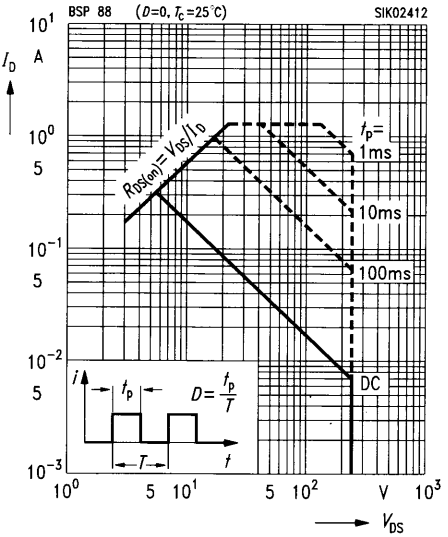
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



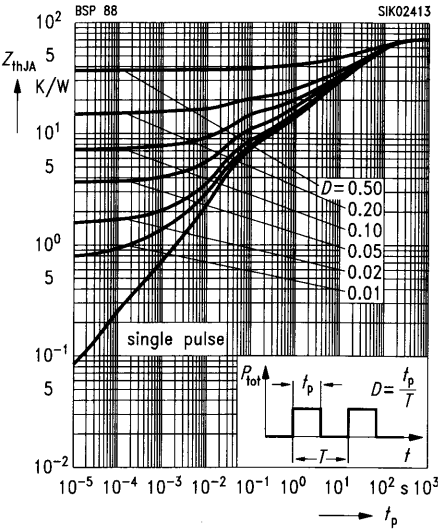
Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C



Transient thermal impedance $Z_{thJA} = f(t_p)$
parameter: $D = t_p / T$

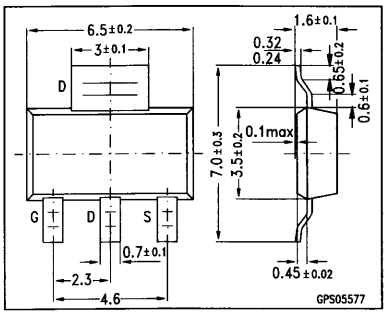


SIEMENS

SIPMOS® Small-Signal Transistor — BSP 89

V_{DS} = 240 V
I_D = 0.34 A
$R_{DS(on)}$ = 6.0 Ω

- N channel
- Enhancement mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm-tape [2]
BSP 89	Q62702-S652

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	240	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	240	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 25 °C	I_D	0.34	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	1.36	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.5	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	72	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	9	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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_{DS} = 0, I_D = 0.25 mA	$V_{(BR)DSS}$	240	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}$, I_D = 1 mA	$V_{GS(th)}$	0.8	1.5	2.0	
Zero gate voltage drain current V_{DS} = 240 V, V_{GS} = 0 T_j = 25 °C T_j = 125 °C V_{DS} = 60 V, V_{GS} = 0 T_j = 25 °C	I_{DSS}	 – – –	 0.1 10 –	 1.0 100 0.2	µA
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 = 0.34 A V_{GS} = 4.5 V, I_D = 0.34 A	$R_{DS(on)}$	 – –	 3.5 4.0	 6.0 10.0	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.34 A	g_{fs}	0.14	0.36	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	115	155	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}	–	8	12	
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 = 0.28 A	$t_{d(on)}$ t_r	– –	6 10	9 15	ns
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 = 0.28 A	$t_{d(off)}$ t_f	– –	33 22	45 30	

Electrical Characteristics (cont'd)

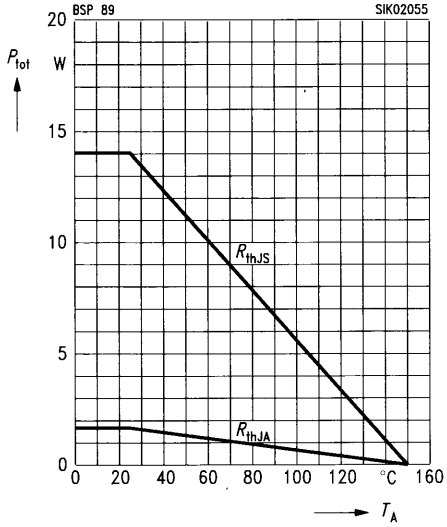
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.34	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	1.36	
Diode forward on-voltage I_F = 0.68 A, V_{GS} = 0	V_{SD}	–	1.1	1.4	V

Characteristics

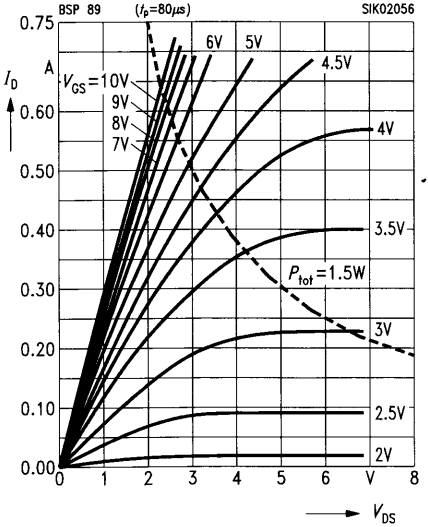
at T_j = 25 °C, unless otherwise specified

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

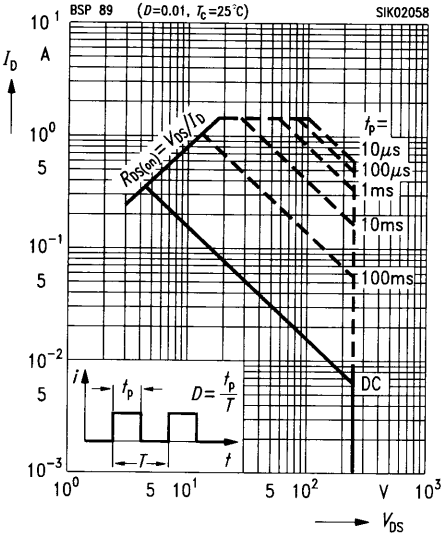


Typ. output characteristics $I_D = f(V_{DS})$

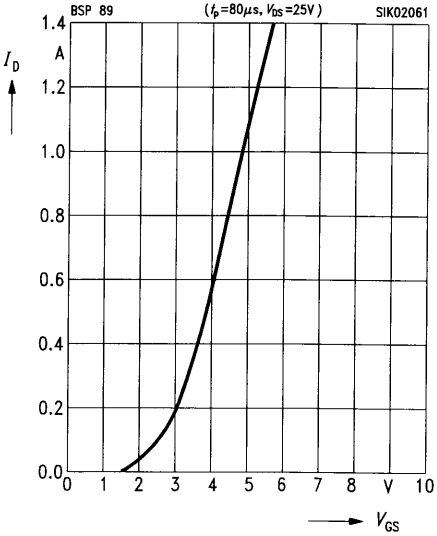
parameter: t_p = 80 µs



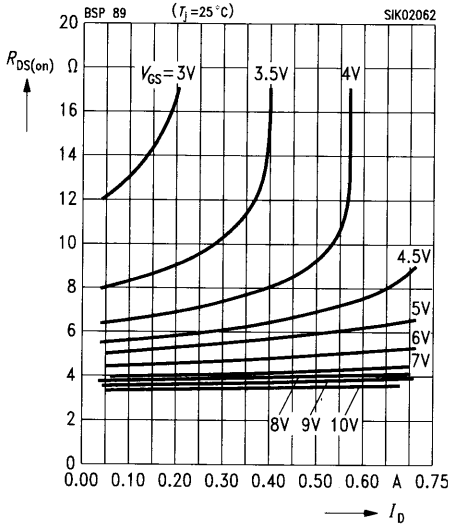
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



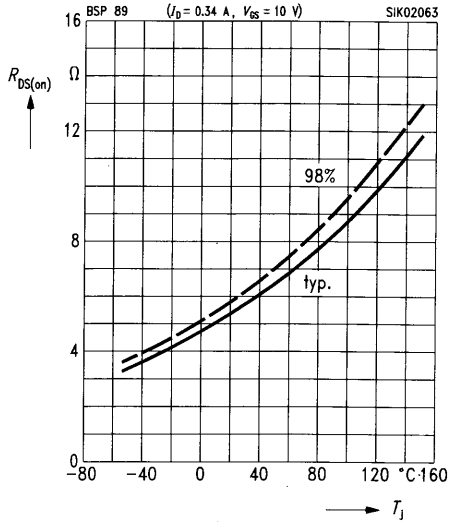
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, $V_{DS} = 2 \times I_D \times R_{DS(on)max}$



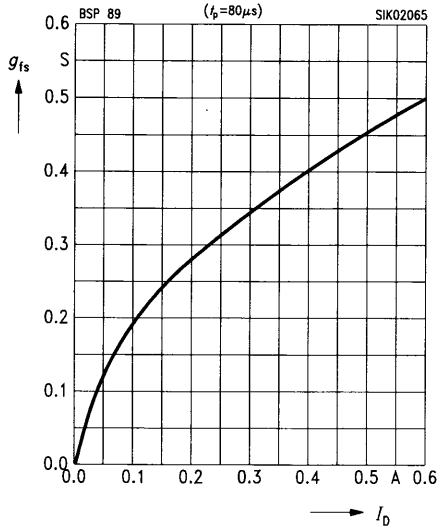
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



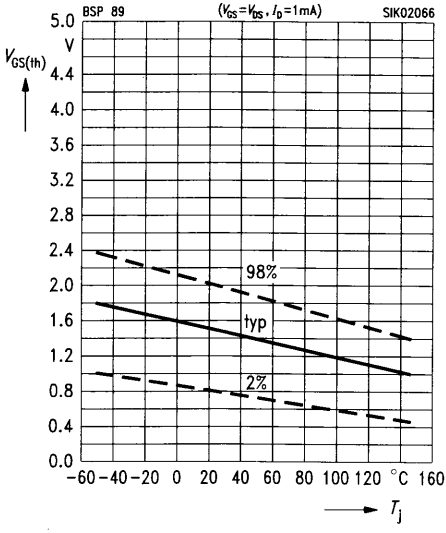
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = 0.34 A, V_{GS} = 10 V, (spread)



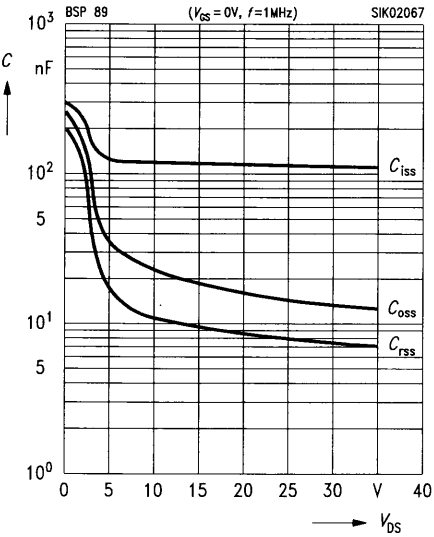
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, t_p = 80 µs



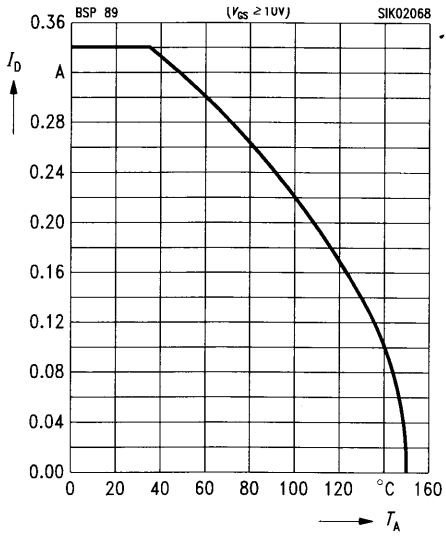
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



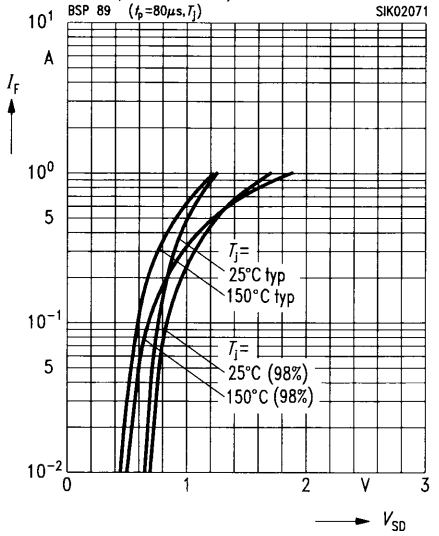
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



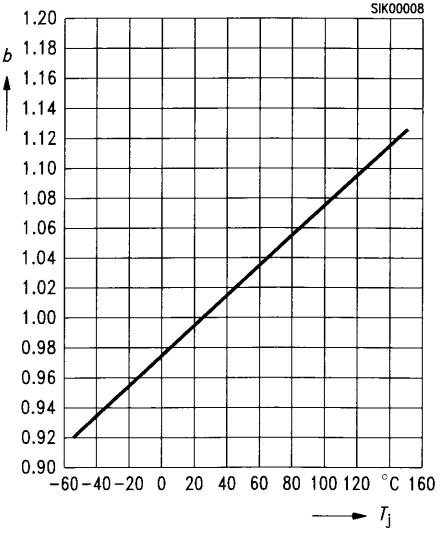
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq$ 10 V



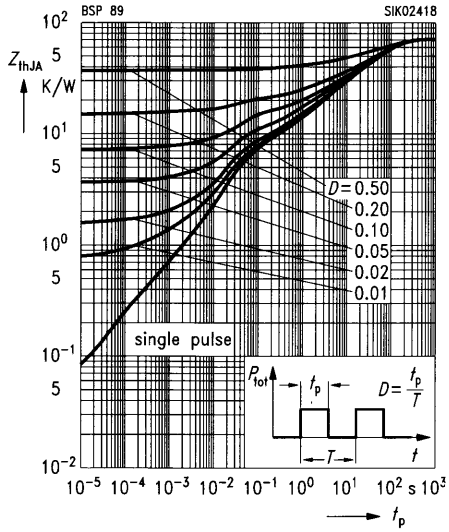
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



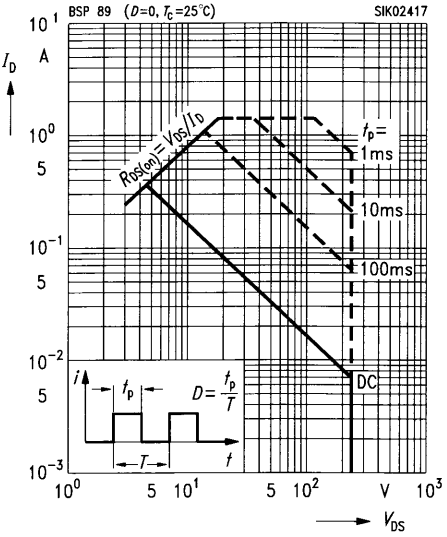
Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Transient thermal impedance $Z_{thJA} = f(t_p)$



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C

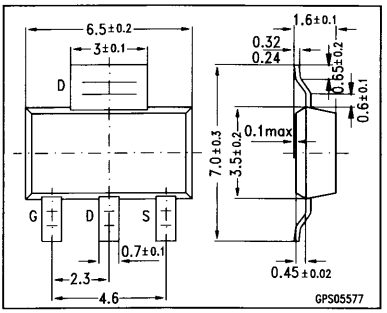


SIEMENS

SIPMOS® Small-Signal Transistor — BSP 92

V_{DS} = – 240 V
I_D = – 0.18 A
$R_{DS(on)}$ = 20 Ω

- P channel
- Enhancement mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 92	Q62702-S653

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	– 240	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	– 240	
Gate-source voltage	V_{GS}	± 20	
Continuous drain current, T_A = 35 °C	I_D	– 0.18	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	– 0.72	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.5	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	72	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	9	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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, I_D = – 0.25 mA	$V_{(BR)DSS}$	– 240	–	–	V
Gate threshold voltage V_{GS} = V_{DS}, I_D = – 1 mA	$V_{GS(th)}$	– 0.8	– 1.5	– 2.0	
Zero gate voltage drain current V_{DS} = – 240 V, V_{GS} = 0 T_j = 25 °C T_j = 125 °C V_{DS} = – 60 V, V_{GS} = 0 T_j = 25 °C	I_{DSS}	 – – –	 – 0.1 – 10 –	 – 1.0 – 100 – 0.2	µA
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 = – 0.18 A	$R_{DS(on)}$	–	12	20	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = – 0.18 A	g_{fs}	0.06	0.13	–	S
Input capacitance V_{GS} = 0, V_{DS} = – 25 V, f = 1 MHz	C_{iss}	–	95	130	pF
Output capacitance V_{GS} = 0, V_{DS} = – 25 V, f = 1 MHz	C_{oss}	–	20	30	
Reverse transfer capacitance V_{GS} = 0, V_{DS} = – 25 V, f = 1 MHz	C_{rss}	–	10	15	
Turn-on time t_{on}, (t_{on} = $t_{d(on)}$ + t_r)	$t_{d(on)}$	–	8	12	ns
V_{DD} = – 30 V, V_{GS} = – 10 V, R_{GS} = 50 Ω, I_D = – 0.25 A	t_r	–	25	40	
Turn-off time t_{off}, (t_{off} = $t_{d(off)}$ + t_f)	$t_{d(off)}$	–	25	33	
V_{DD} = – 30 V, V_{GS} = – 10 V, R_{GS} = 50 Ω, I_D = – 0.25 A	t_f	–	42	55	

Electrical Characteristics (cont'd)

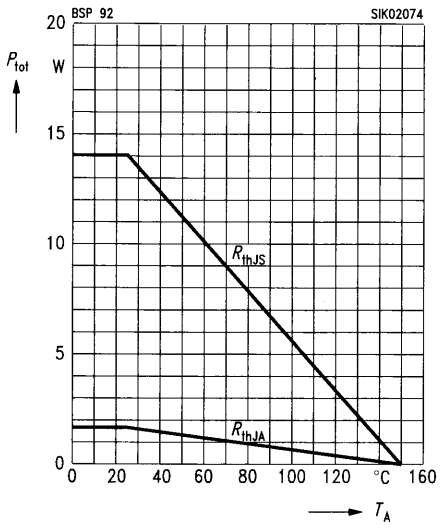
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	– 0.18	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	– 0.72	
Diode forward on-voltage I_F = – 0.36 A, V_{GS} = 0	V_{SD}	–	– 0.9	– 1.2	V

Characteristics

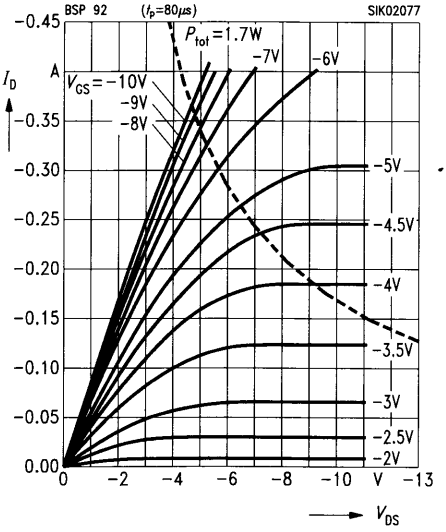
at T_j = 25 °C, unless otherwise specified

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

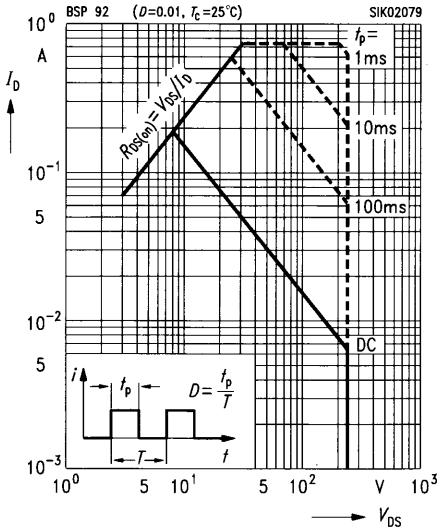


Typ. output characteristics $I_D = f(V_{DS})$

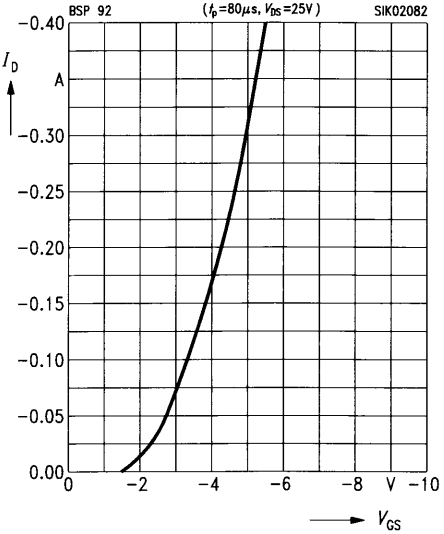
parameter: t_p = 80 µs



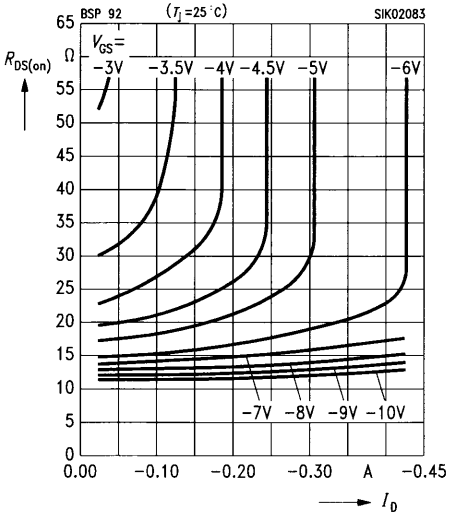
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



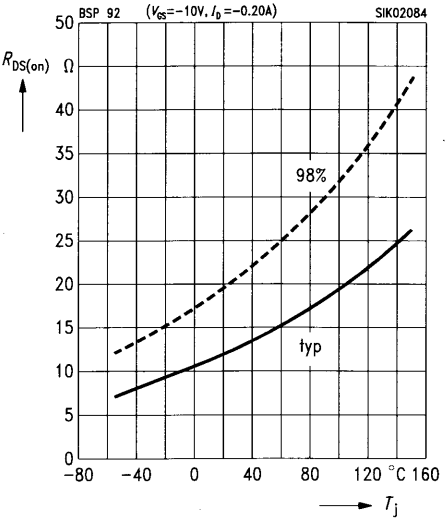
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, V_{DS} = 25 V



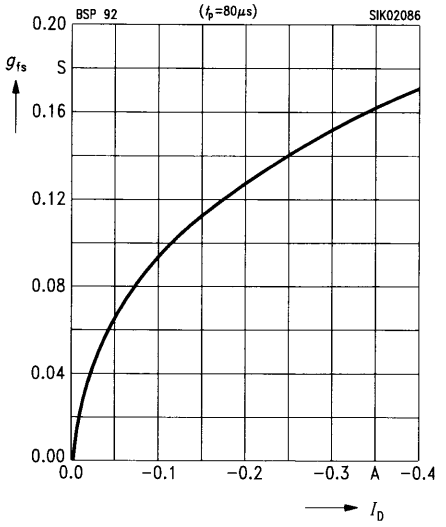
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



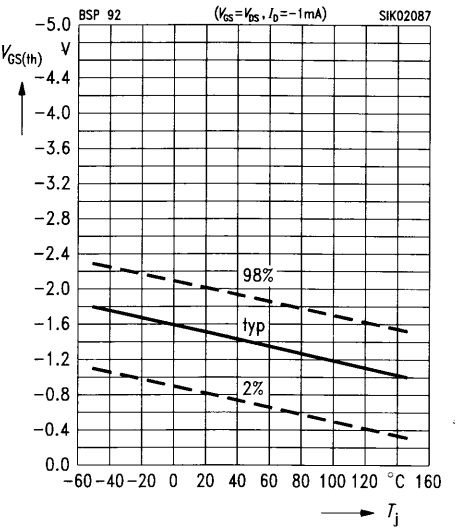
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = – 0.18 A, V_{GS} = 10 V, (spread)



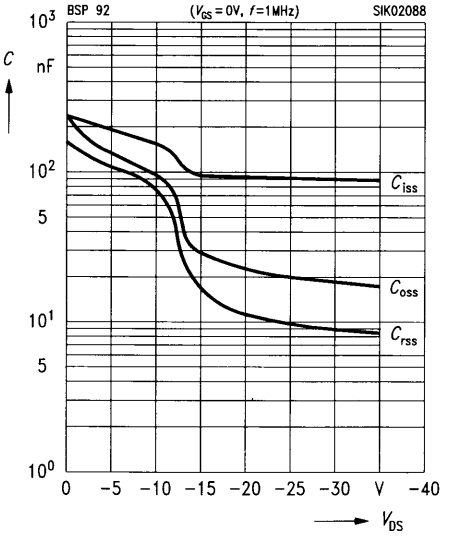
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, t_p = 80 µs



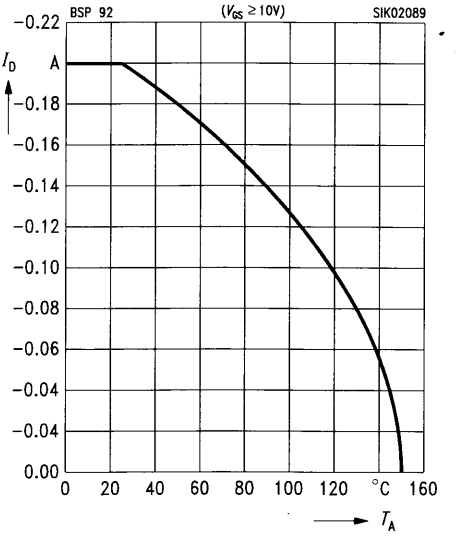
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



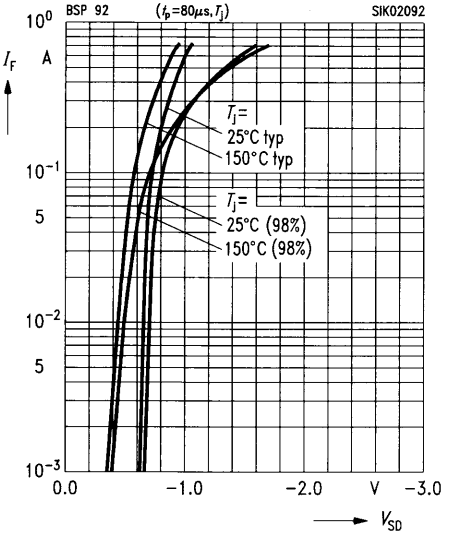
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



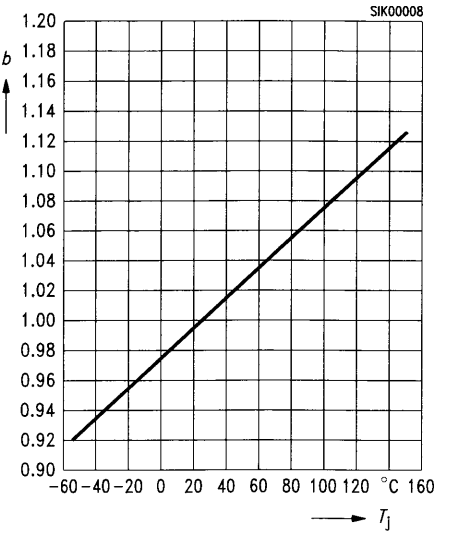
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq$ 10 V



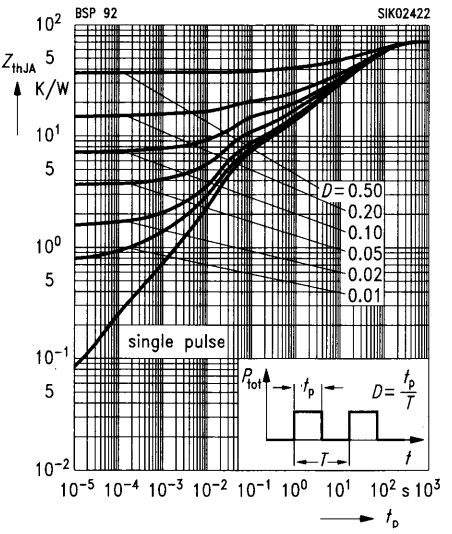
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



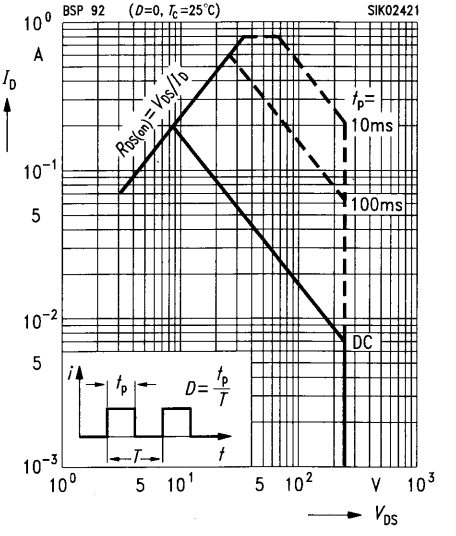
Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Transient thermal impedance $Z_{thJA} = f(t_p)$
parameter: $D = t_p / T$



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C



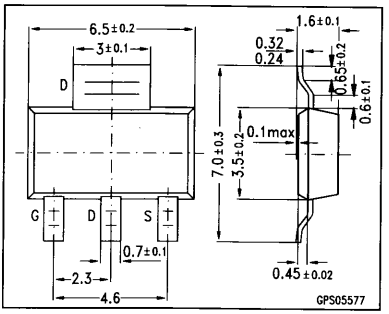
SIEMENS

SIPMOS® Small-Signal Transistor

BSP 129

V_{DS} = 240 V
I_D = 0.19 A
$R_{DS(on)}$ = 20 Ω

- N channel
- Depletion mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape
BSP 129	Q67000-S73 [2]

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	240	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	240	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 34 °C	I_D	0.2	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	0.6	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.7	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	72	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	9	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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} = – 3 V, I_D = 0.25 mA	$V_{(BR)DSS}$	240	–	–	V
Gate threshold voltage V_{DS} = 3 V, I_D = 1 mA	$V_{GS(th)}$	– 1.8	– 1.2	– 0.7	
Drain-source cutoff current V_{DS} = 240 V, V_{GS} = – 3 V T_j = 25 °C T_j = 125 °C	I_{DSS}	– –	– –	100 200	nA µA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 0 V, I_D = 0.014 A	$R_{DS(on)}$	–	7.0	20	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.25 A	g_{fs}	0.14	0.2	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	110	150	pF
Output capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	20	30	
Reverse transfer capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	7	10	
Turn-on time t_{on}, ($t_{on} = t_{d(on)} + t_r$)	$t_{d(on)}$	–	4	6	ns
V_{DD} = 30 V, V_{GS} = – 2 V ... + 5 V, R_{GS} = 50 Ω, I_D = 0.25 A	t_r	–	10	15	
Turn-off time t_{off}, ($t_{off} = t_{d(off)} + t_f$)	$t_{d(off)}$	–	15	20	
V_{DD} = 30 V, V_{GS} = – 2 V ... + 5 V, R_{GS} = 50 Ω, I_D = 0.25 A	t_f	–	25	35	

Electrical Characteristics (cont'd)

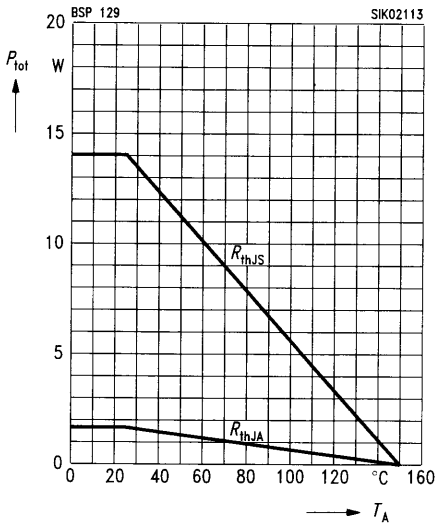
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.15	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	0.45	
Diode forward on-voltage I_F = 0.3 A, V_{GS} = 0	V_{SD}	–	0.7	1.4	V

Characteristics

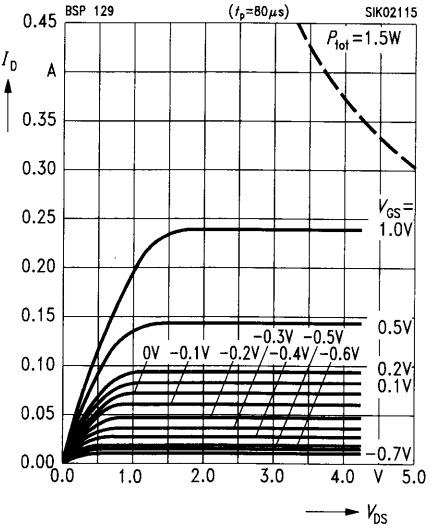
at T_j = 25 °C, unless otherwise specified

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

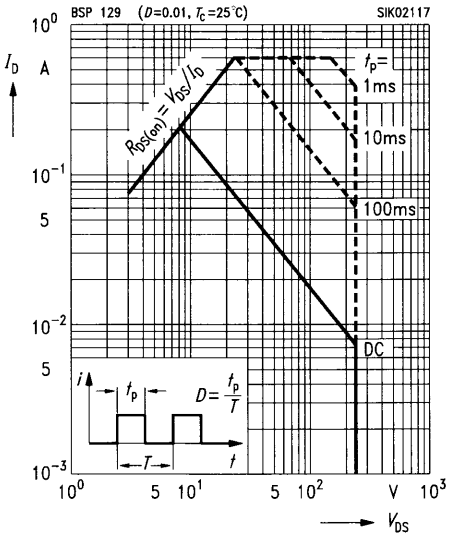


Typ. output characteristics $I_D = f(V_{DS})$

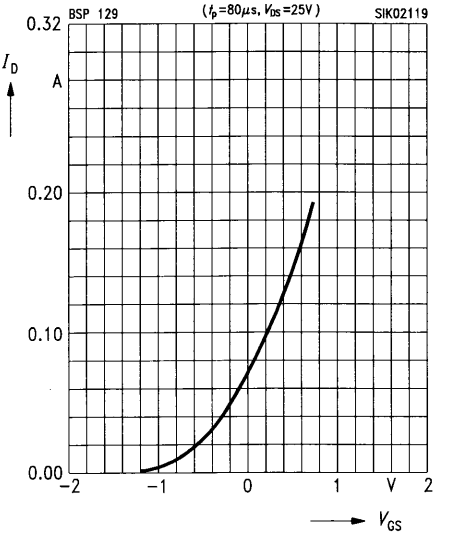
parameter: t_p = 80 µs



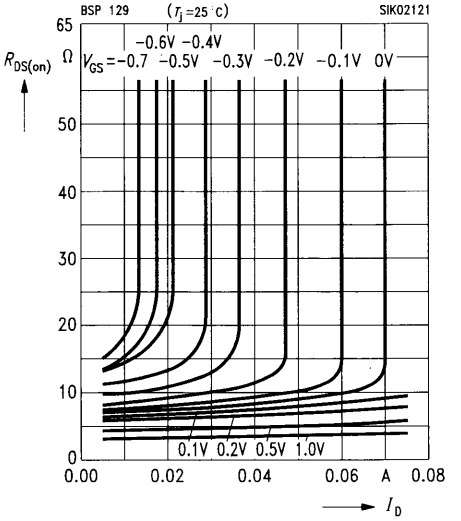
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



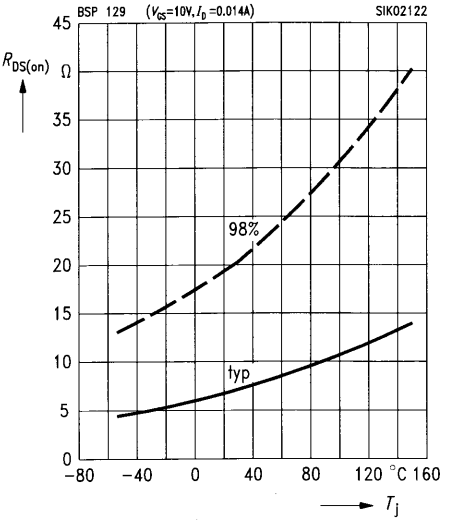
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, V_{DS} = 25 V



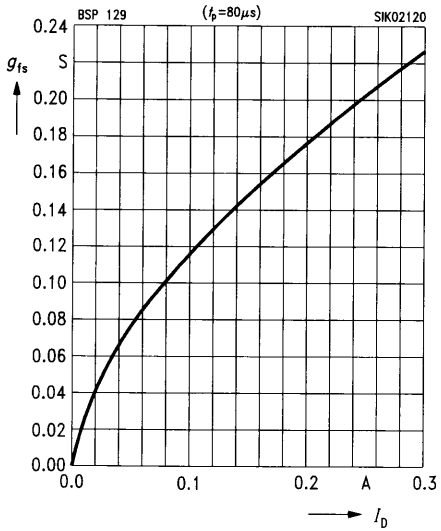
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



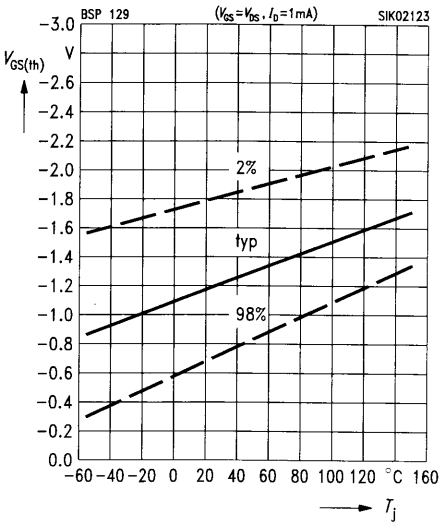
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = 0.014 A, V_{GS} = 10 V, (spread)



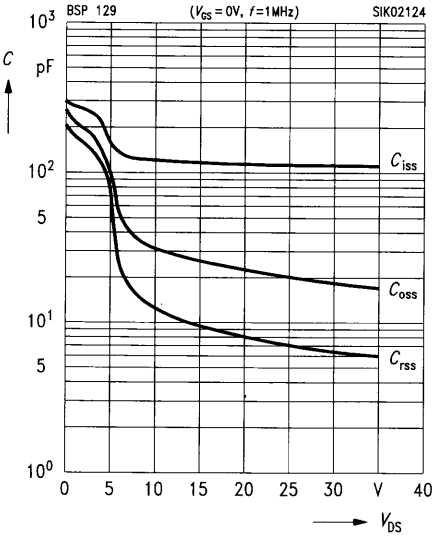
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, $t_p = 80\ \mu s$



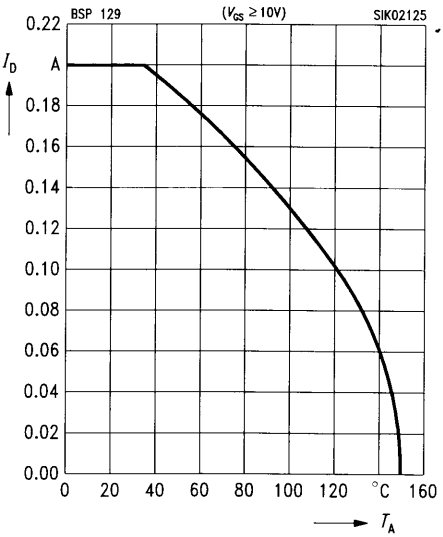
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



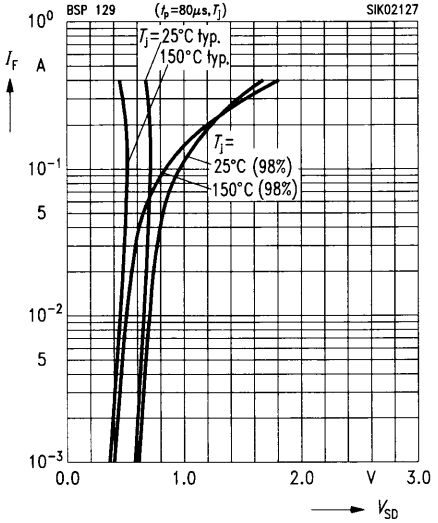
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



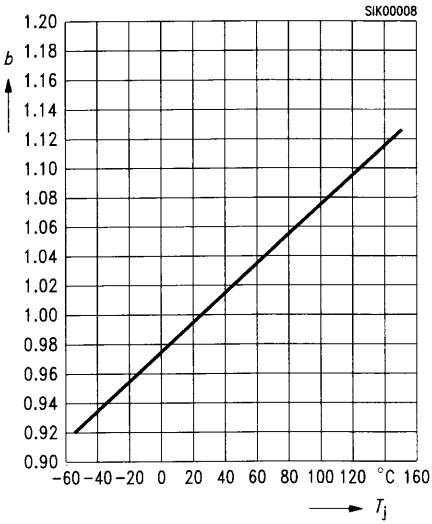
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 10$ V



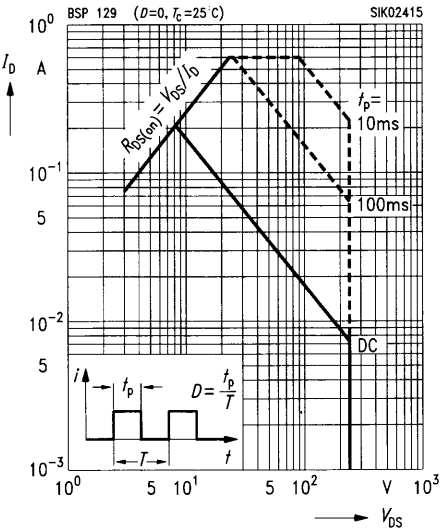
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C



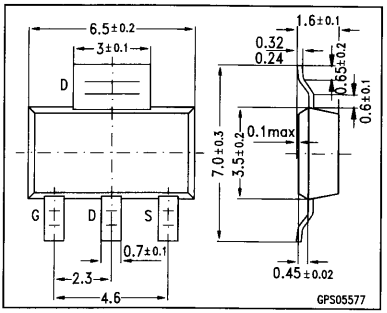
SIEMENS

SIPMOS® Small-Signal Transistor

BSP 135

V_{DS} = 600 V
I_D = 0.100 A
$R_{DS(on)}$ = 60 Ω

- N channel
- Depletion mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 135	Q62702-S655

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	600	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	600	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 44 °C	I_D	0.100	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	0.30	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.7	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	72	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	9	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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} = – 3 V, I_D = 0.25 mA	$V_{(BR)DSS}$	600	–	–	V
Gate threshold voltage V_{DS} = 3 V, I_D = 1 mA	$V_{GS(th)}$	– 1.8	– 1.5	– 0.7	
Drain-source cutoff current V_{DS} = 600 V, V_{GS} = – 3 V T_j = 25 °C T_j = 125 °C	I_{DSV}	 – –	 – –	 100 200	 nA µA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 0 V, I_D = 0.01 A	$R_{DS(on)}$	–	40	60	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.01 A	g_{fs}	0.01	0.04	–	S
Input capacitance V_{GS} = – 3 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	110	150	pF
Output capacitance V_{GS} = – 3 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	8	12	
Reverse transfer capacitance V_{GS} = – 3 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	3	5	
Turn-on time t_{on}, ($t_{on} = t_{d(on)} + t_r$)	$t_{d(on)}$	–	4	6	ns
V_{DD} = 30 V, V_{GS} = – 3 V ... + 5 V, R_{GS} = 50 Ω, I_D = 0.2 A	t_r	–	10	15	
Turn-off time t_{off}, ($t_{off} = t_{d(off)} + t_f$)	$t_{d(off)}$	–	15	20	
V_{DD} = 30 V, V_{GS} = – 3 V ... + 5 V, R_{GS} = 50 Ω, I_D = 0.2 A	t_f	–	20	30	

Electrical Characteristics (cont'd)

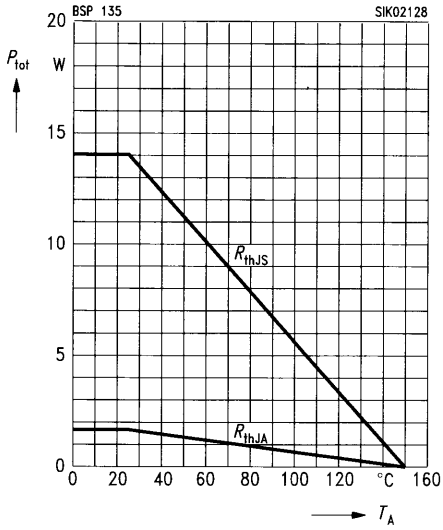
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.100	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	0.300	
Diode forward on-voltage I_F = 0.2 A, V_{GS} = 0	V_{SD}	–	0.90	1.30	V

Characteristics

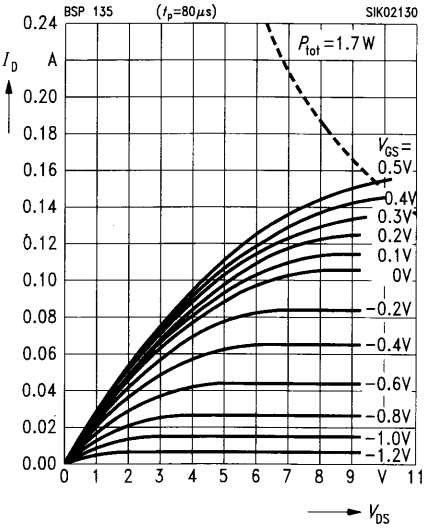
at T_j = 25 °C, unless otherwise specified

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

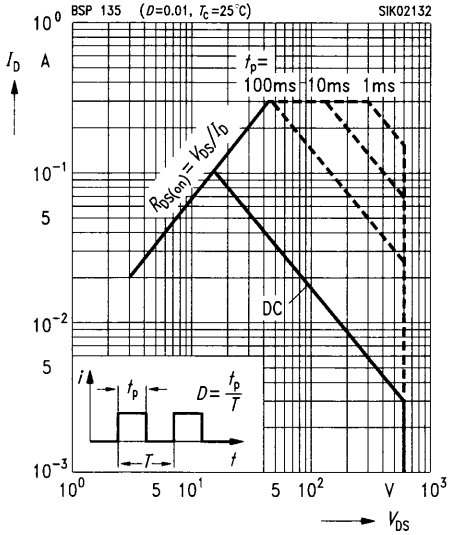


Typ. output characteristics $I_D = f(V_{DS})$

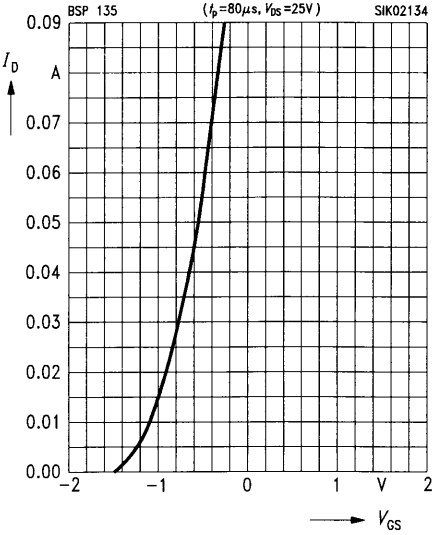
parameter: t_p = 80 µs



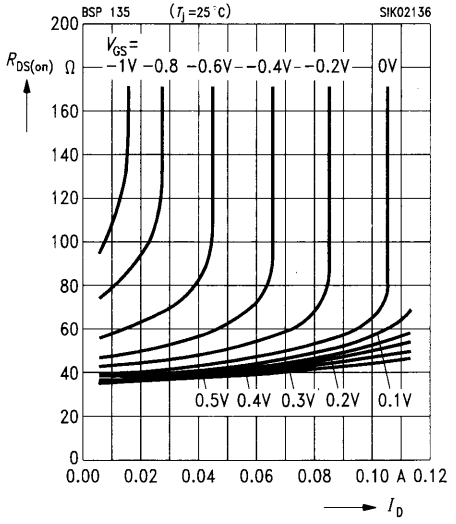
Safe operating area $I_D = f(V_{DS})$
parameter: D = 0.01, T_C = 25 °C



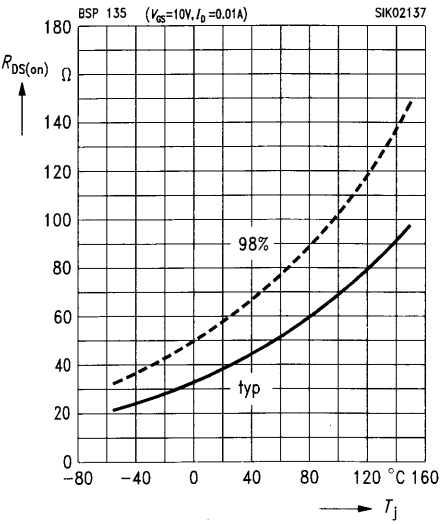
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs, V_{DS} = 25 V



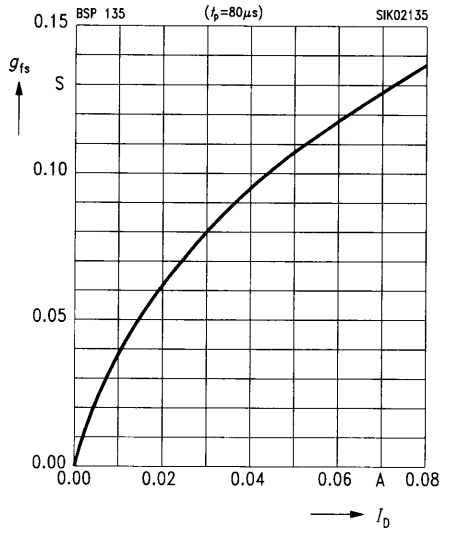
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



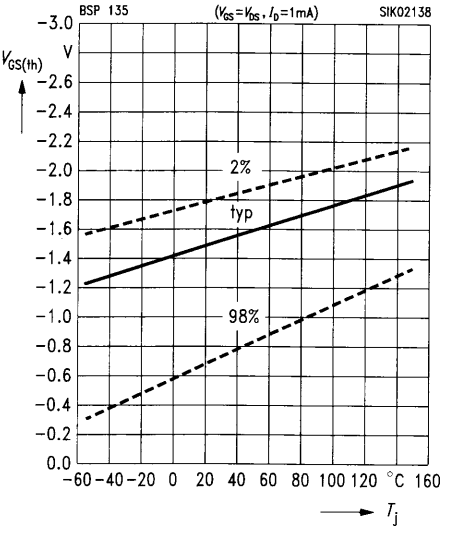
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: I_D = 0.01 A, V_{GS} = 10 V, (spread)



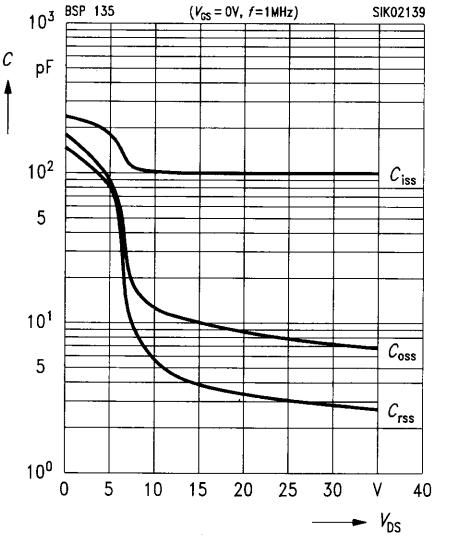
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, t_p = 80 µs



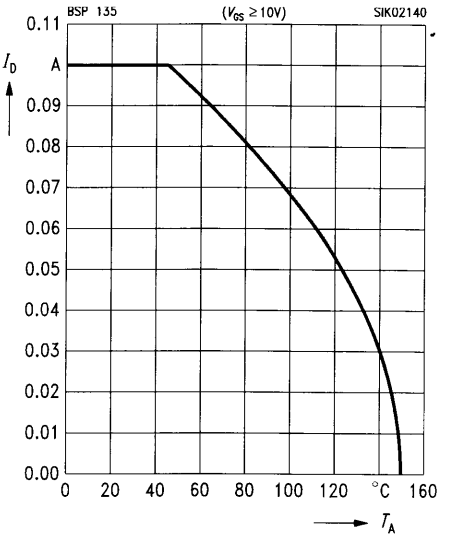
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



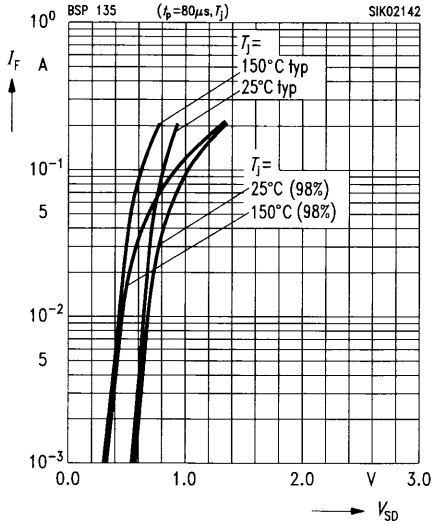
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



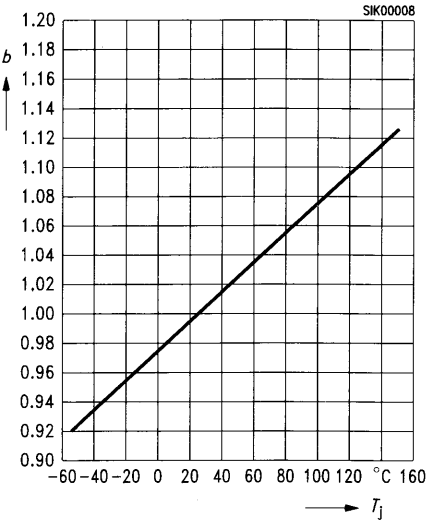
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq$ 10 V



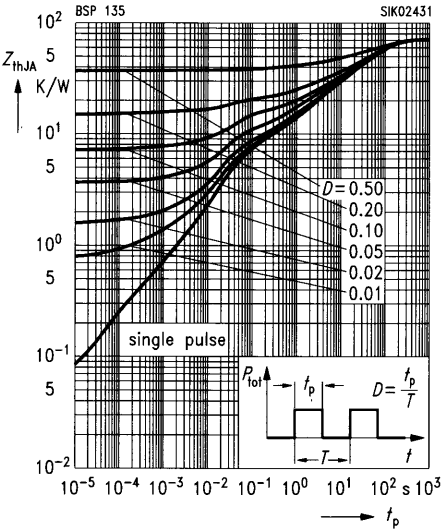
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



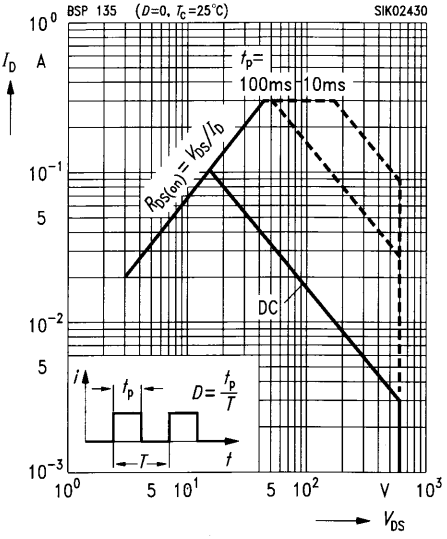
Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Transient thermal impedance $Z_{thJA} = f(t_p)$
parameter: $D = t_p / T$



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C

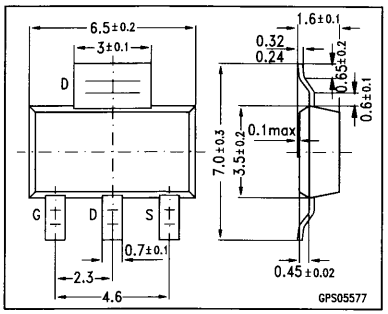


SIEMENS

SIPMOS® Small-Signal Transistor — BSP 149

V_{DS} = 200 V
I_D = 0.44 A
$R_{DS(on)}$ = 3.5 Ω

- N channel
- Depletion mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 149	Q67000-S71

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	200	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	200	
Gate-source voltage	V_{GS}	± 14	
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Continuous drain current, T_A = 28 °C	I_D	0.48	A
Pulsed drain current, T_A = 25 °C	$I_{D\,puls}$	1.44	
Max. power dissipation, T_A = 25 °C	P_{tot}	1.8	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	70	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	7	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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} = – 3 V, I_D = 0.25 mA	$V_{(BR)DSS}$	200	–	–	V
Gate threshold voltage V_{DS} = 3 V, I_D = 1 mA	$V_{GS(th)}$	– 1.8	– 1.2	– 0.7	
Drain-source cutoff current V_{DS} = 200 V, V_{GS} = – 3 V T_j = 25 °C T_j = 125 °C	I_{DSV}	 – –	 – –	 0.2 200	µA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 0 V, I_D = 0.03 A	$R_{DS(on)}$	–	2.5	3.5	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 0.48 A	g_{fs}	0.4	0.75	–	S
Input capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	500	670	pF
Output capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	40	60	
Reverse transfer capacitance V_{GS} = 0, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	12	20	
Turn-on time t_{on}, ($t_{on} = t_{d(on)} + t_r$) V_{DD} = 30 V, V_{GS} = – 2 ... + 5 V, R_{GS} = 50 Ω, I_D = 0.29 A	$t_{d(on)}$ t_r	– –	7 20	10 30	ns
Turn-off time t_{off}, ($t_{off} = t_{d(off)} + t_f$) V_{DD} = 30 V, V_{GS} = – 2 ... + 5 V, R_{GS} = 50 Ω, I_D = 0.29 A	$t_{d(off)}$ t_f	– –	60 50	80 65	

Electrical Characteristics (cont'd)

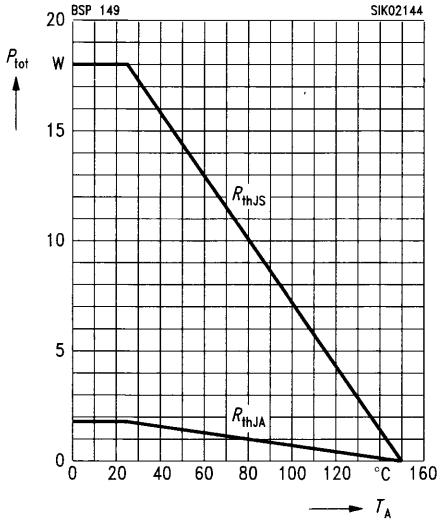
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current T_A = 25 °C	I_S	–	–	0.48	A
Pulsed reverse drain current T_A = 25 °C	I_{SM}	–	–	1.44	
Diode forward on-voltage I_F = 0.96 A, V_{GS} = 0	V_{SD}	–	0.9	1.2	V

Characteristics

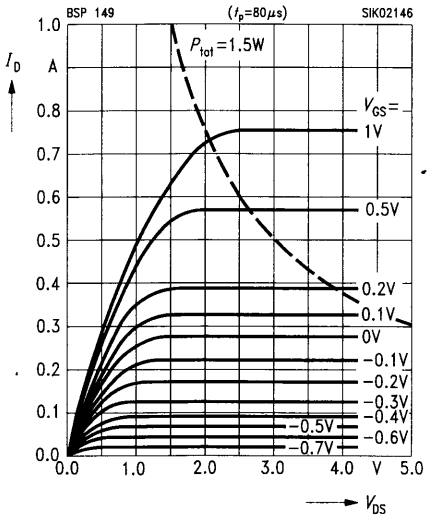
at T_j = 25 °C, unless otherwise specified

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

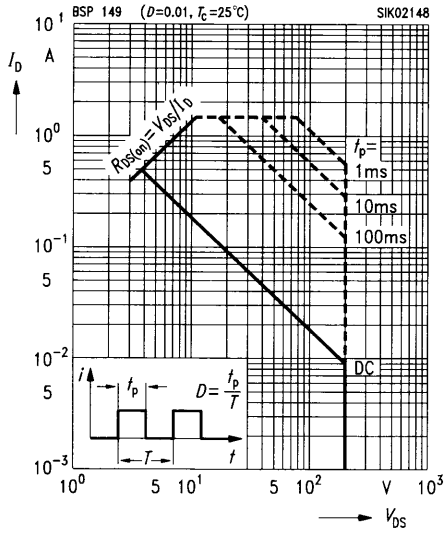


Typ. output characteristics $I_D = f(V_{DS})$

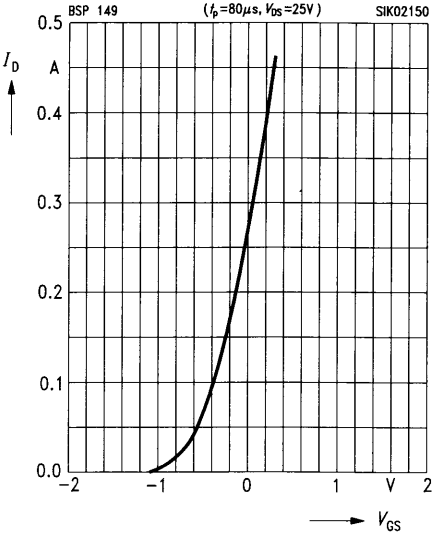
parameter: t_p = 80 µs



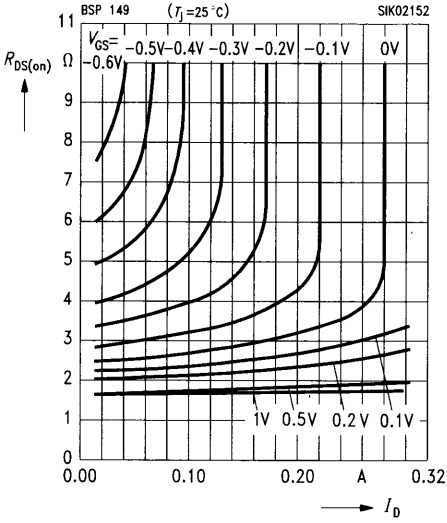
Safe operating area $I_D = f(V_{DS})$
parameter: $D = 0.01$, $T_C = 25$ °C



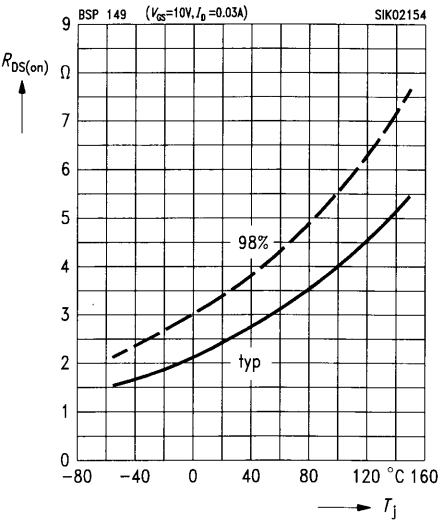
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs, $V_{DS} = 25$ V



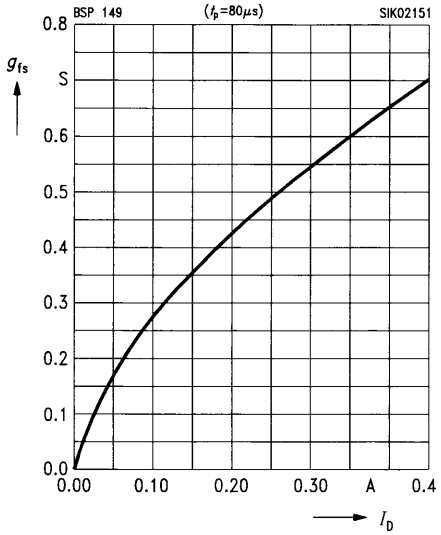
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



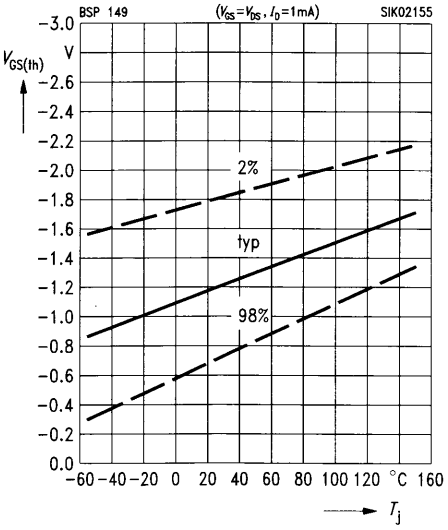
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: $I_D = 0.03$ A, $V_{GS} = 10$ V, (spread)



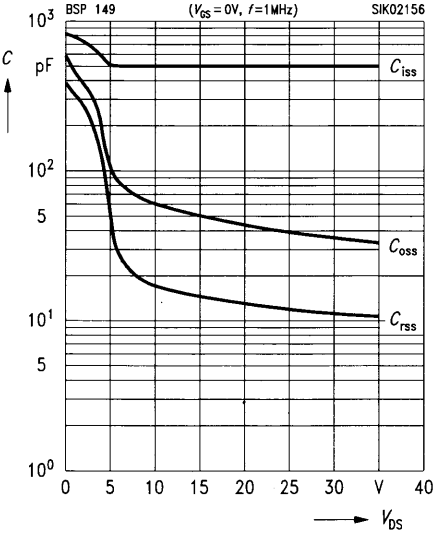
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, $t_p = 80\ \mu s$



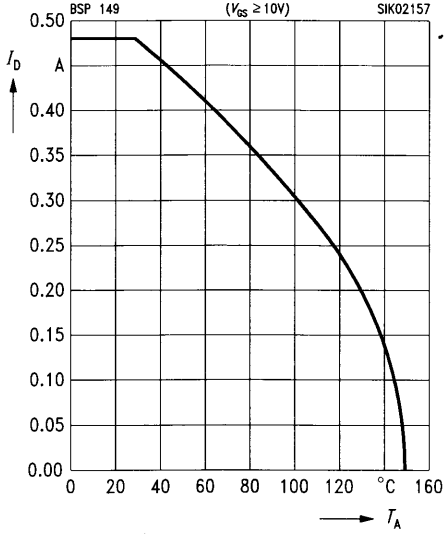
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = 1 mA, (spread)



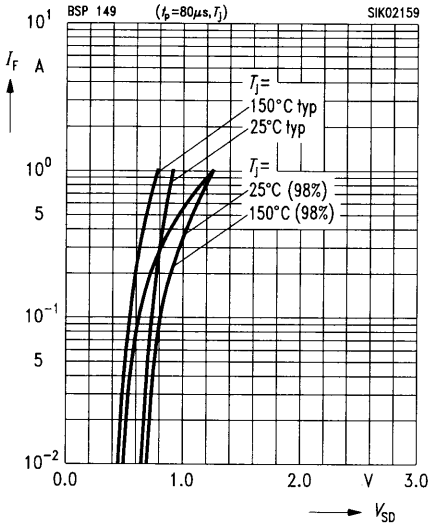
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



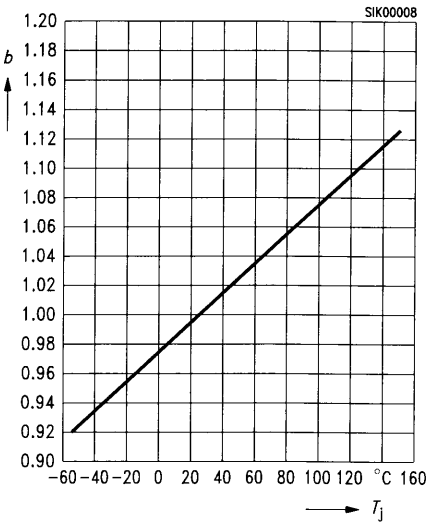
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 10$ V



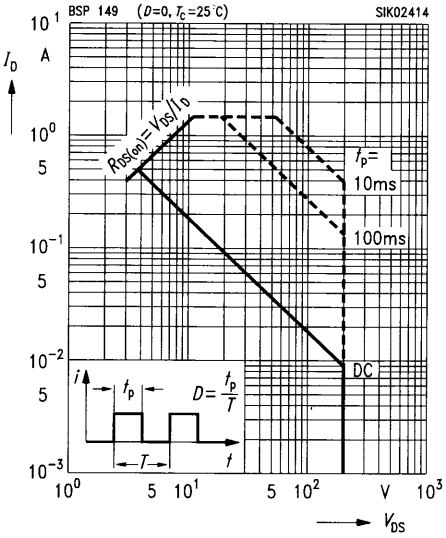
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C

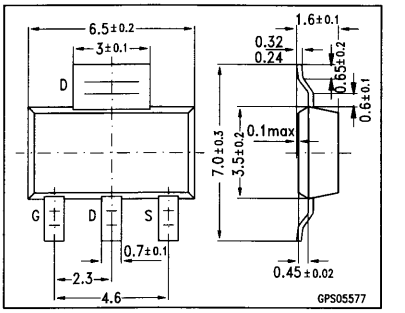


SIEMENS

SIPMOS® Small-Signal Transistor — BSP 171

V_{DS} = – 60 V
I_D = – 1.6 A
$R_{DS(on)}$ = 0.35 Ω

- P channel
- Enhancement mode
- Package: SOT-223 [1]



Type	Ordering code for version on 12-mm tape [2]
BSP 171	Q67000-S224

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	– 60	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	– 60	
Gate-source voltage	V_{GS}	± 20	
Continuous drain current, T_A = 24 °C	I_D	– 1.6	A
Pulsed drain current, T_C = 25 °C	$I_{D\,puls}$	– 6.4	
Max. power dissipation, T_C = 25 °C	P_{tot}	1.5	W
Operating and storage temperature range	T_j, T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-ambient [3]	R_{thJA}	70	K/W
Thermal resistance, chip soldering point R_{thJS}	R_{thJS}	6	
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

[1] See chapter Package Outlines.
[2] E-6327: 1000 pieces / reel
[3] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm² 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	$V_{(BR)DSS}$	– 60	–	–	V
Gate threshold voltage V_{GS} = V_{DS}, I_D = – 1 mA	$V_{GS(th)}$	– 0.8	– 1.4	– 2.0	
Zero gate voltage drain current V_{DS} = – 60 V, V_{GS} = 0 V T_j = 25 °C T_j = 125 °C	I_{DSS}	 – –	 – 0.1 – 10	 – 1.0 – 100	µA
Gate-source leakage current V_{GS} = – 20 V, V_{DS} = 0 V	I_{GSS}	–	– 10	– 100	nA
Drain-source on-resistance V_{GS} = – 10 V, I_D = – 1.6 A	$R_{DS(on)}$	–	0.21	0.35	Ω
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = – 1.6 A	g_{fs}	1.0	1.5	–	S
Input capacitance V_{GS} = 0 V, V_{DS} = – 25 V, f = 1 MHz	C_{iss}	–	720	960	pF
Output capacitance V_{GS} = 0 V, V_{DS} = – 25 V, f = 1 MHz	C_{oss}	–	290	435	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = – 25 V, f = 1 MHz	C_{rss}	–	120	180	
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 = – 0.3 A	$t_{d(on)}$	–	16	25	ns
	t_r	–	70	105	
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 = – 0.3 A	$t_{d(off)}$	–	230	310	
	t_f	–	280	375	

Electrical Characteristics (cont'd)

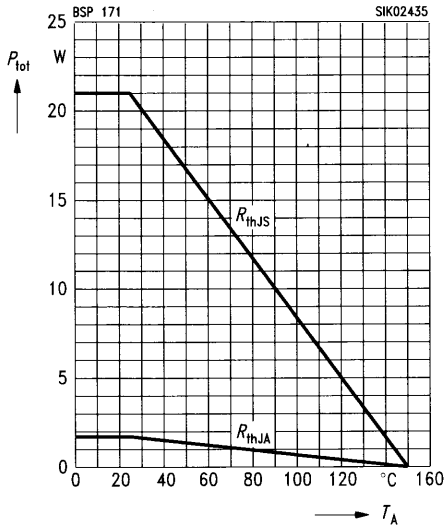
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Continuous reverse drain current	I_S	–	–	– 1.6	A
Pulsed reverse drain current	I_{SM}	–	–	– 6.4	
Diode forward on-voltage I_F = – 3.2 A, V_{GS} = 0	V_{SD}	–	– 0.85	– 1.2	V

Characteristics

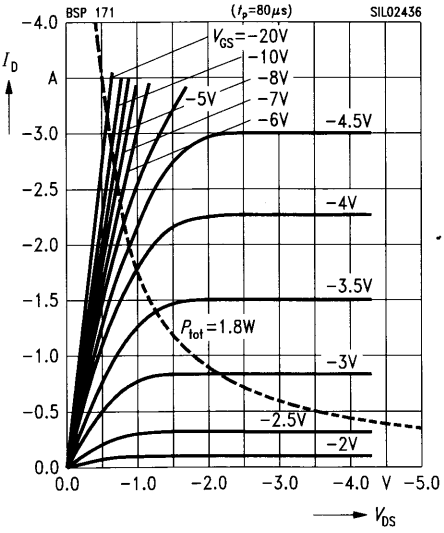
at T_j = 25 °C, unless otherwise specified

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

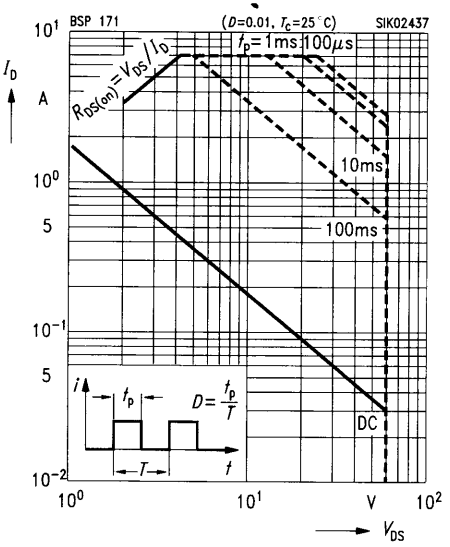


Typ. output characteristics $I_D = f(V_{DS})$

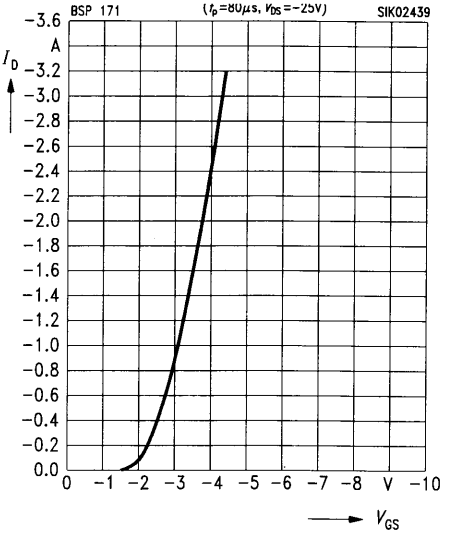
parameter: t_p = 80 µs



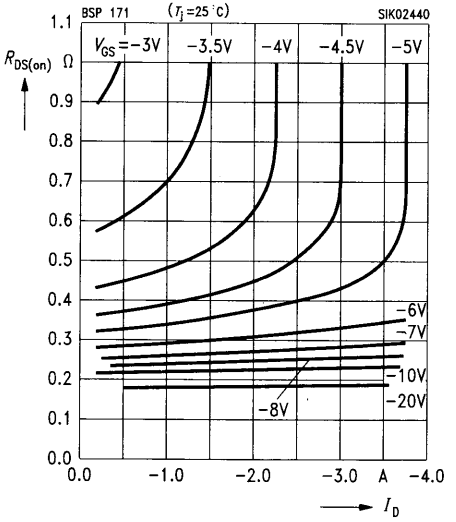
Safe operating area $I_D = f(V_{DS})$
parameter: $D = 0.01$, $T_C = 25$ °C



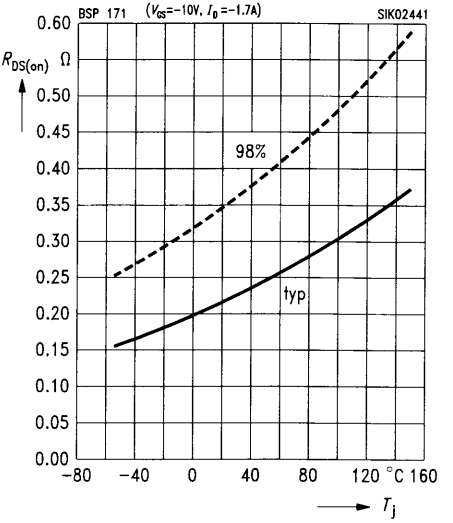
Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs, $V_{DS} = -25$ V



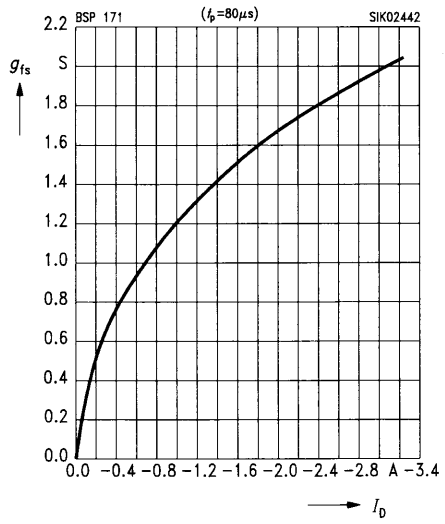
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



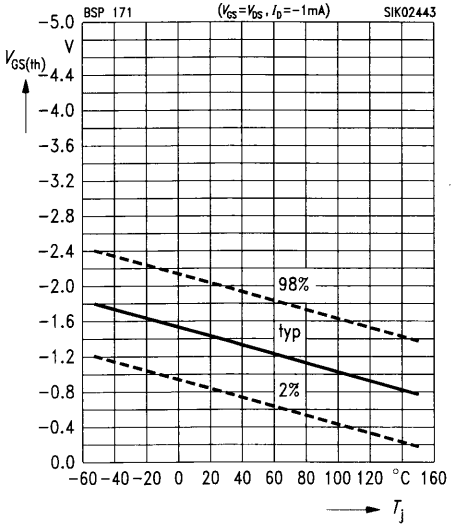
Drain-source on-resistance
$R_{DS(on)} = f(T_j)$
parameter: $I_D = -1.7$ A, $V_{GS} = -10$ V, (spread)



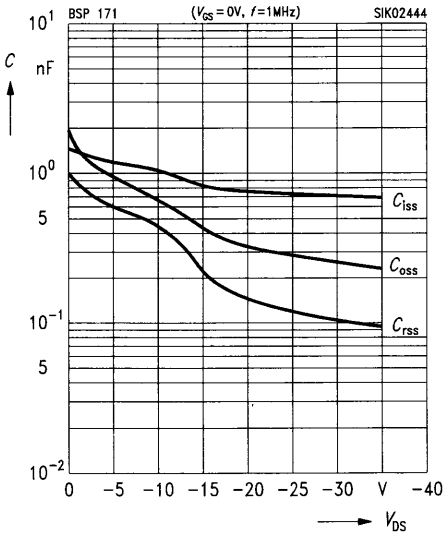
Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, t_p = 80 µs



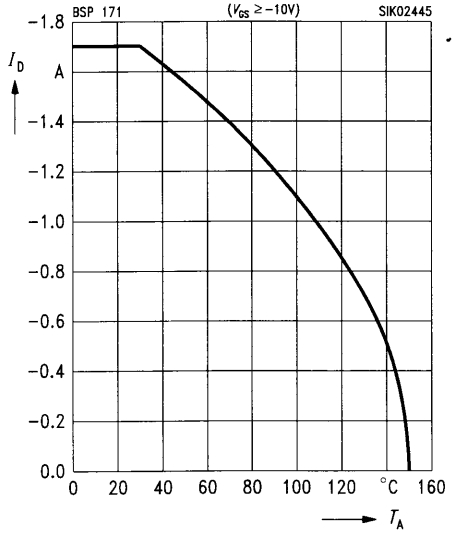
Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS} = V_{GS}$, I_D = − 1 mA, (spread)



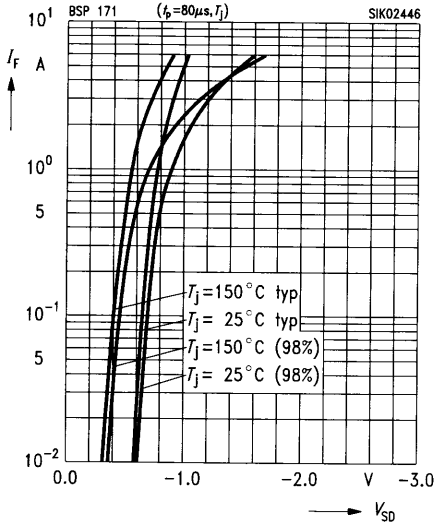
Typ. capacitances $C = f(V_{DS})$
parameter: V_{GS} = 0, f = 1 MHz



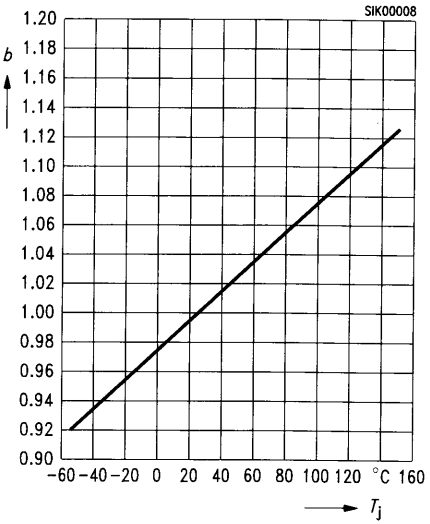
Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq -10$ V



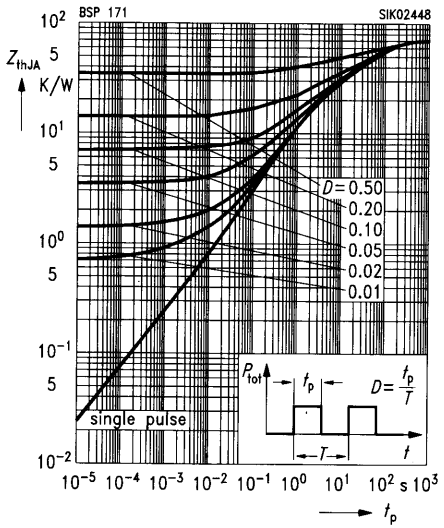
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: t_p = 80 µs, T_j, (spread)



Drain-source breakdown voltage
$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 °C)



Transient thermal impedance
$Z_{thJA} = f(t_p)$



Safe operating area $I_D = f(V_{DS})$
parameter: D = 0, T_C = 25 °C