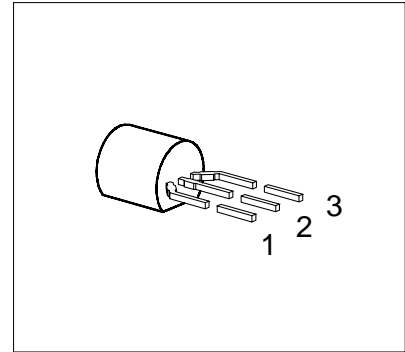


SIEMENS

SIPMOS® Small-Signal Transistor

BSS 229

- V_{DS} 250 V
- I_D 0.07 A
- $R_{DS(on)}$ 100 Ω
- N channel
- Depletion mode
- High dynamic resistance
- Available grouped in $V_{GS(th)}$



| Type | Ordering Code | Tape and Reel Information | Pin Configuration | | | Marking | Package |
|---------|---------------|---|-------------------|---|---|---------|---------|
| | | | 1 | 2 | 3 | | |
| BSS 229 | Q62702-S600 | E6296: 1500 pcs/reel; 2 reels/carton; source first | G | D | S | SS229 | TO-92 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|----------------------|------------------|------------------|
| Drain-source voltage | V_{DS} | 250 | V |
| Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$ | V_{DGR} | 250 | |
| Gate-source voltage | V_{GS} | ± 14 | |
| Gate-source peak voltage, aperiodic | V_{gs} | ± 20 | |
| Continuous drain current, $T_A = 25 \text{ }^\circ\text{C}$ | I_D | 0.07 | A |
| Pulsed drain current, $T_A = 25 \text{ }^\circ\text{C}$ | $I_{D \text{ puls}}$ | 0.21 | |
| Max. power dissipation, $T_A = 25 \text{ }^\circ\text{C}$ | P_{tot} | 0.63 | W |
| Operating and storage temperature range | T_j, T_{stg} | $-55 \dots +150$ | $^\circ\text{C}$ |
| Thermal resistance, chip-ambient (without heat sink) | R_{thJA} | ≤ 200 | K/W |
| DIN humidity category, DIN 40 040 | – | E | – |
| IEC climatic category, DIN IEC 68-1 | – | 55/150/56 | – |

Electrical Characteristics

at $T_j = 25\text{ °C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

Static Characteristics

| | | | | | |
|--|---------------|-------|-------|------------|----------|
| Drain-source breakdown voltage $V_{GS} = -3\text{ V}$, $I_D = 0.25\text{ mA}$ | $V_{(BR)DSS}$ | 250 | – | – | V |
| Gate threshold voltage $V_{DS} = 3\text{ V}$, $I_D = 1\text{ mA}$ | $V_{GS(th)}$ | – 1.8 | – 1.4 | – 0.7 | |
| Drain-source cutoff current $V_{DS} = 250\text{ V}$, $V_{GS} = -3\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$ | I_{DSS} | – | – | 100 200 | nA μA |
| Gate-source leakage current $V_{GS} = 20\text{ V}$, $V_{DS} = 0$ | I_{GSS} | – | 10 | 100 | nA |
| Drain-source on-resistance $V_{GS} = 0\text{ V}$, $I_D = 0.014\text{ A}$ | $R_{DS(on)}$ | – | 75 | 100 | Ω |

Dynamic Characteristics

| | | | | | |
|---|--------------|------|------|-----|----|
| Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, $I_D = 0.07\text{ A}$ | g_{fs} | 0.05 | 0.10 | – | S |
| Input capacitance $V_{GS} = 0$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{iss} | – | 85 | 120 | pF |
| Output capacitance $V_{GS} = 0$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{oss} | – | 6 | 10 | |
| Reverse transfer capacitance $V_{GS} = 0$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{rss} | – | 2 | 3 | |
| Turn-on time t_{on} , ($t_{on} = t_{d(on)} + t_r$) $V_{DD} = 30\text{ V}$, $V_{GS} = -2\text{ V} \dots +5\text{ V}$, $R_{GS} = 50\text{ Ω}$, $I_D = 0.15\text{ A}$ | $t_{d(on)}$ | – | 4 | 6 | ns |
| | t_r | – | 10 | 15 | |
| Turn-off time t_{off} , ($t_{off} = t_{d(off)} + t_f$) $V_{DD} = 30\text{ V}$, $V_{GS} = -2\text{ V} \dots +5\text{ V}$, $R_{GS} = 50\text{ Ω}$, $I_D = 0.15\text{ A}$ | $t_{d(off)}$ | – | 10 | 13 | |
| | t_f | – | 15 | 20 | |

Electrical Characteristics (cont'd)

at $T_j = 25\text{ °C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|--|----------|--------|------|------|------|
| | | min. | typ. | max. | |
| Reverse Diode | | | | | |
| Continuous reverse drain current $T_A = 25\text{ °C}$ | I_S | – | – | 0.07 | A |
| Pulsed reverse drain current $T_A = 25\text{ °C}$ | I_{SM} | – | – | 0.21 | |
| Diode forward on-voltage $I_F = 0.14\text{ A}$, $V_{GS} = 0$ | V_{SD} | – | 0.8 | 1.2 | V |

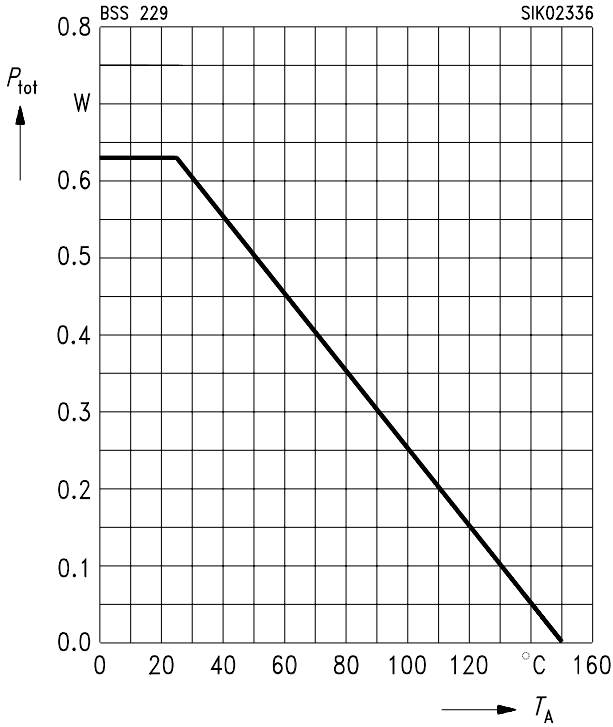
| $V_{GS(th)}$ Grouping | Symbol | Limit Values | | Unit | Test Condition |
|---|---------------------|--------------|---------|------|---|
| | | min. | max. | | |
| Range of $V_{GS(th)}$ | $\Delta V_{GS(th)}$ | – | 0.15 | V | – |
| Threshold voltage selected in groups: ¹⁾ | $V_{GS(th)}$ | | | | $V_{DS1} = 0.2\text{ V};$ $V_{DS2} = 3\text{ V};$ $I_D = 10\text{ }\mu\text{A}$ |
| F | | – 1.535 | – 1.385 | V | |
| G | | – 1.635 | – 1.485 | V | |
| A | | – 1.735 | – 1.585 | V | |
| B | | – 1.835 | – 1.685 | V | |
| C | | – 1.935 | – 1.785 | V | |
| D | | – 2.035 | – 1.885 | V | |

- 1) A specific group cannot be ordered separately.
Each reel only contains transistors from one group.

Characteristics

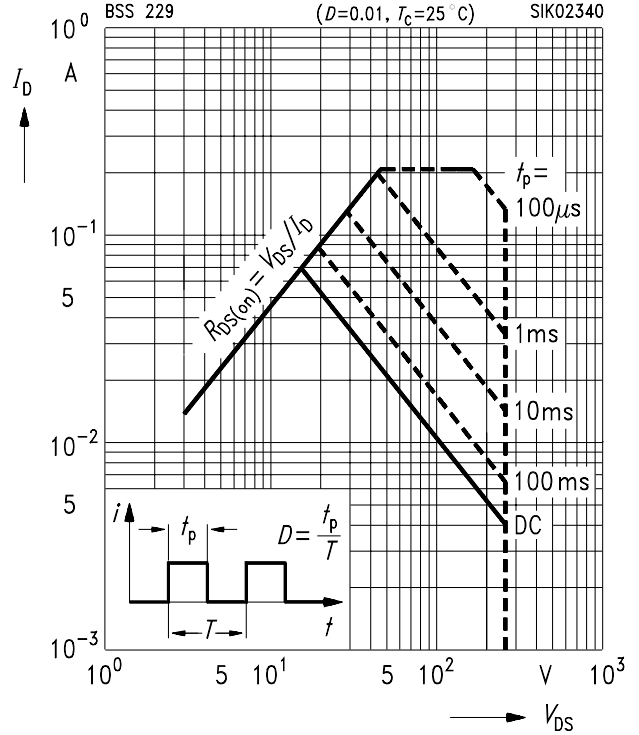
at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified.

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



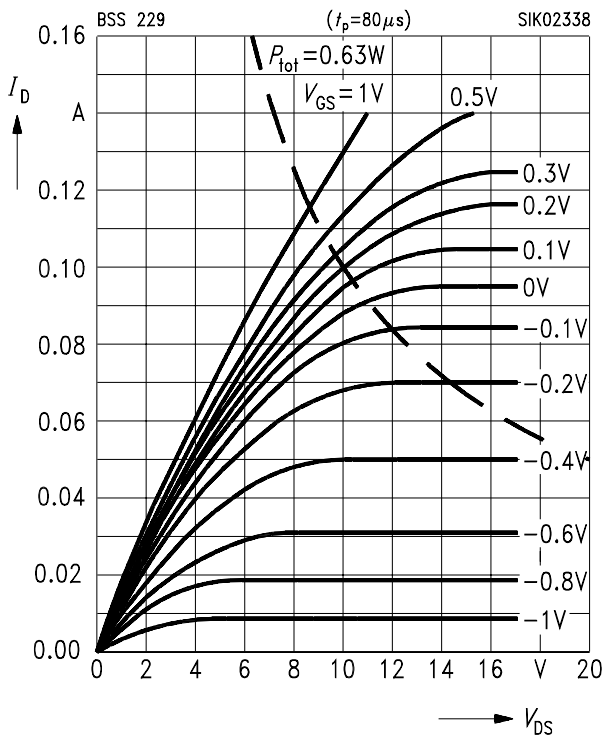
Safe operating area $I_D = f(V_{\text{DS}})$

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



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

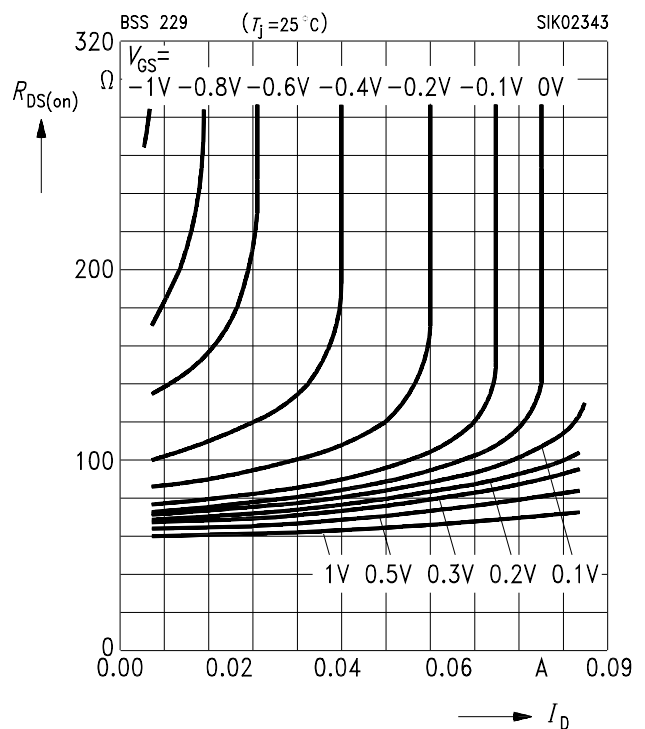
parameter: $t_p = 80\text{ }\mu\text{s}$



Typ. drain-source on-resistance

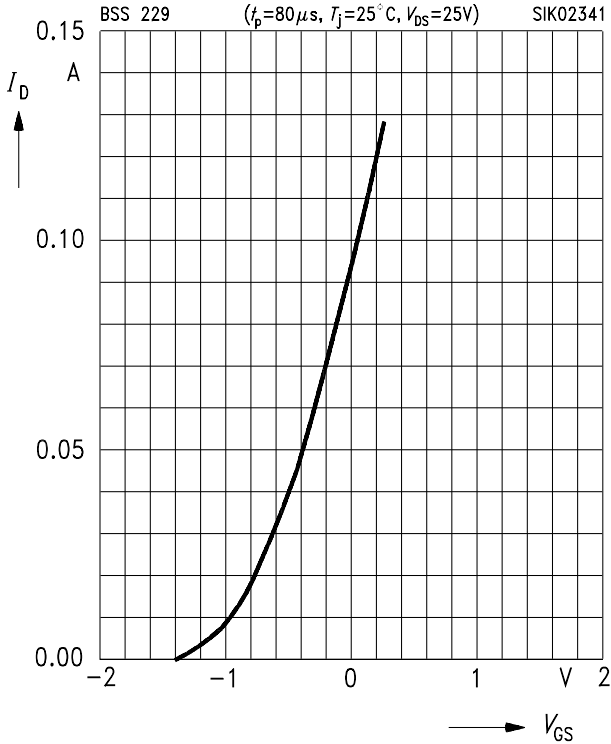
$R_{\text{DS(on)}} = f(I_D)$

parameter: V_{GS}



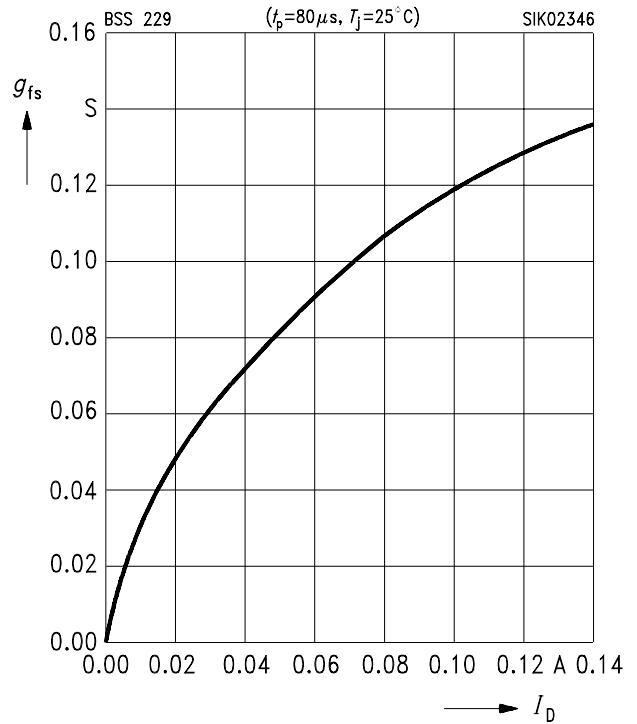
Typ. transfer characteristics $I_D = f(V_{GS})$

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



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

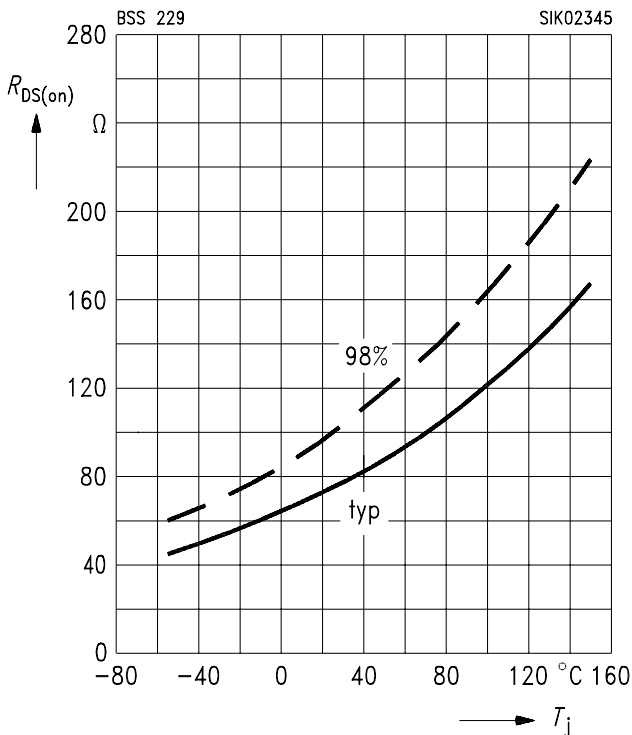
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}, t_p = 80 \mu s$



Drain-source on-resistance

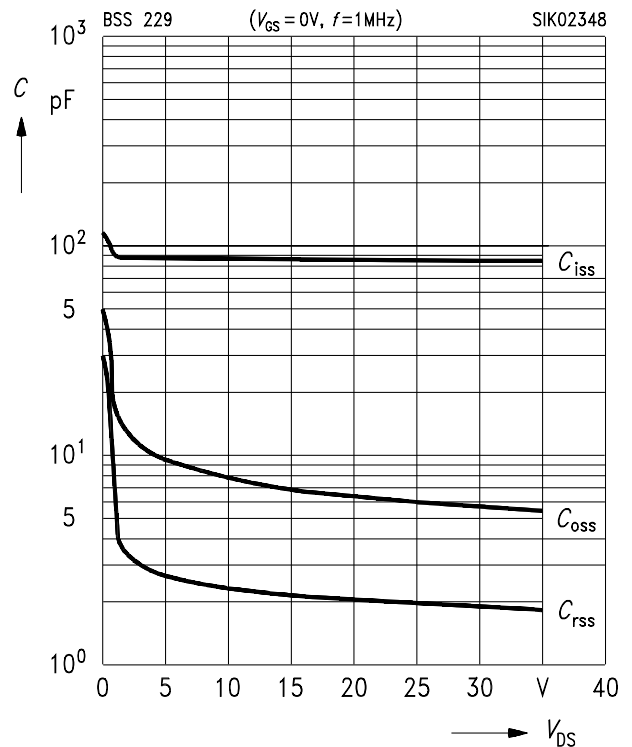
$R_{DS(on)} = f(T_j)$

parameter: $I_D = 0.014 A, V_{GS} = 0 V, (spread)$

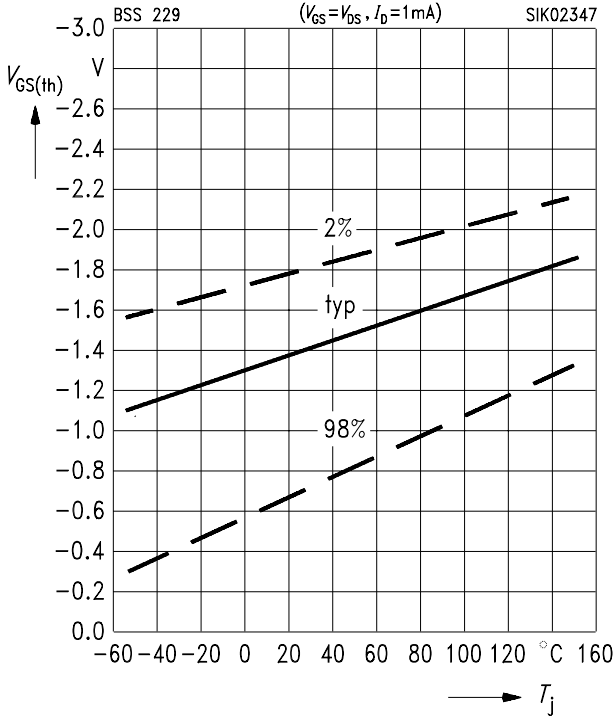


Typ. capacitances $C = f(V_{DS})$

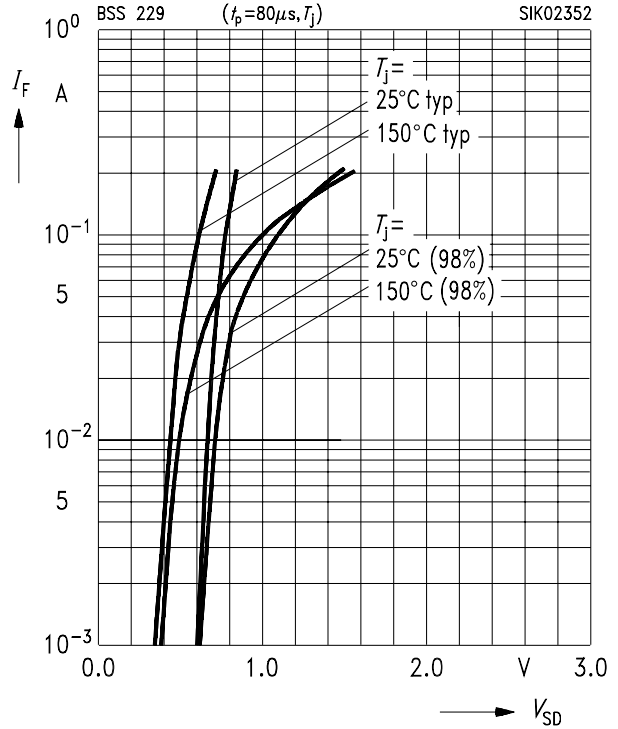
parameter: $V_{GS} = 0 V, f = 1 MHz$



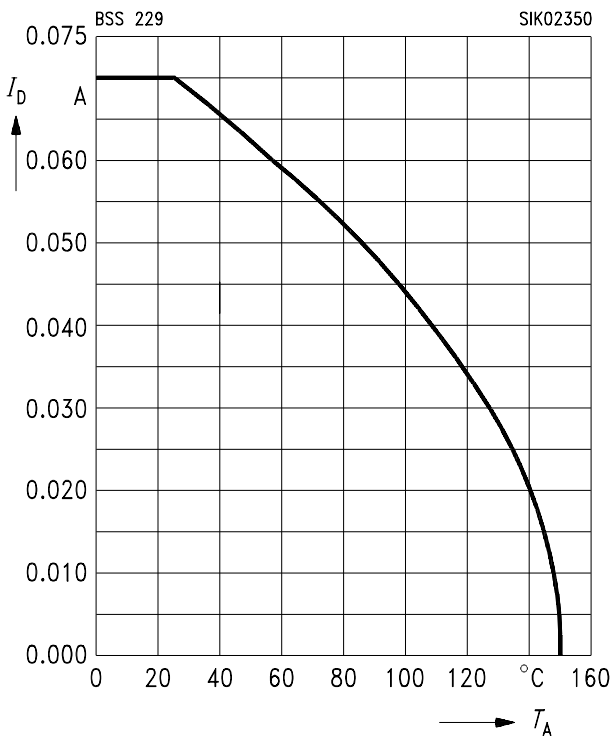
Gate threshold voltage $V_{GS(th)} = f(T_j)$
 parameter: $V_{DS} = 3\text{ V}$, $I_D = 1\text{ mA}$, (spread)



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



Drain current $I_D = f(T_A)$
 parameter: $V_{GS} \geq 3\text{ V}$



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

