

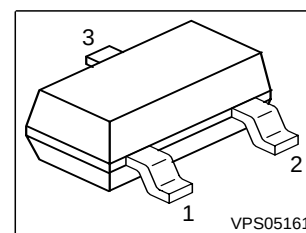
## SIPMOS® Small-Signal-Transistor

### Features

- P-Channel
- Enhancement mode
- Avalanche rated
- Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

### Product Summary

|                                  |              |       |          |
|----------------------------------|--------------|-------|----------|
| Drain source voltage             | $V_{DS}$     | -60   | V        |
| Drain-source on-state resistance | $R_{DS(on)}$ | 2     | $\Omega$ |
| Continuous drain current         | $I_D$        | -0.33 | A        |



| Type     | Package   | Tape and Reel     | Marking | Pin 1 | PIN 2 | PIN 3 |
|----------|-----------|-------------------|---------|-------|-------|-------|
| BSS 83 P | PG-SOT-23 | H6327: 3000pcs/r. | YAs     | G     | S     | D     |

**Maximum Ratings**, at  $T_j = 25\text{ °C}$ , unless otherwise specified

| Parameter                                                                                                                                    | Symbol             | Value          | Unit              |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|-------------------|
| Continuous drain current<br>$T_A = 25\text{ °C}$<br>$T_A = 70\text{ °C}$                                                                     | $I_D$              | -0.33<br>-0.27 | A                 |
| Pulsed drain current<br>$T_A = 25\text{ °C}$                                                                                                 | $I_D \text{ puls}$ | -1.32          |                   |
| Avalanche energy, single pulse<br>$I_D = -0.33\text{ A}$ , $V_{DD} = -25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$                             | $E_{AS}$           | 9.5            | mJ                |
| Avalanche energy, periodic limited by $T_{jmax}$                                                                                             | $E_{AR}$           | 0.036          |                   |
| Reverse diode dv/dt<br>$I_S = -0.33\text{ A}$ , $V_{DS} = -48\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ ,<br>$T_{jmax} = 150\text{ °C}$ | dv/dt              | 6              | kV/ $\mu\text{s}$ |
| Gate source voltage                                                                                                                          | $V_{GS}$           | $\pm 20$       | V                 |
| Power dissipation<br>$T_A = 25\text{ °C}$                                                                                                    | $P_{tot}$          | 0.36           | W                 |
| Operating and storage temperature                                                                                                            | $T_j$ , $T_{stg}$  | -55...+150     | °C                |
| IEC climatic category; DIN IEC 68-1                                                                                                          |                    | 55/150/56      |                   |
| ESD Class; JESD22-A114-HBM                                                                                                                   |                    | Class 0        |                   |

**Thermal Characteristics**

| Parameter                                                   | Symbol     | Values |      |      | Unit |
|-------------------------------------------------------------|------------|--------|------|------|------|
|                                                             |            | min.   | typ. | max. |      |
| Characteristics                                             |            |        |      |      |      |
| Thermal resistance, junction - soldering point<br>( Pin 3 ) | $R_{thJS}$ | -      | -    | 150  | K/W  |
| SMD version, device on PCB:                                 | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                                            |            | -      | -    | 350  |      |
| @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>              |            | -      | -    | 300  |      |

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

| Parameter                                                                                                                                                                                                        | Symbol        | Values |             |            | Unit          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-------------|------------|---------------|
|                                                                                                                                                                                                                  |               | min.   | typ.        | max.       |               |
| Static Characteristics                                                                                                                                                                                           |               |        |             |            |               |
| Drain- source breakdown voltage<br>$V_{GS} = 0\text{ V}$ , $I_D = -250\text{ }\mu\text{A}$                                                                                                                       | $V_{(BR)DSS}$ | -60    | -           | -          | V             |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D = -80\text{ }\mu\text{A}$                                                                                                                                      | $V_{GS(th)}$  | -1     | -1.5        | -2         |               |
| Zero gate voltage drain current<br>$V_{DS} = -60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ }^{\circ}\text{C}$<br>$V_{DS} = -60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125\text{ }^{\circ}\text{C}$ | $I_{DSS}$     | -      | -0.1<br>-10 | -1<br>-100 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS} = -20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                                                                   | $I_{GSS}$     | -      | -10         | -100       |               |
| Drain-source on-state resistance<br>$V_{GS} = -4.5\text{ V}$ , $I_D = -0.27\text{ A}$                                                                                                                            | $R_{DS(on)}$  | -      | 2           | 3          | $\Omega$      |
| Drain-source on-state resistance<br>$V_{GS} = -10\text{ V}$ , $I_D = -0.33\text{ A}$                                                                                                                             | $R_{DS(on)}$  | -      | 1.4         | 2          |               |

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

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

| Parameter                                                                                                                        | Symbol       | Values |      |      | Unit |
|----------------------------------------------------------------------------------------------------------------------------------|--------------|--------|------|------|------|
|                                                                                                                                  |              | min.   | typ. | max. |      |
| Dynamic Characteristics                                                                                                          |              |        |      |      |      |
| Transconductance<br>$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(ON)max}$ , $I_D = -0.27\text{ A}$                                       | $g_{fs}$     | 0.24   | 0.47 | -    | S    |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                                        | $C_{iss}$    | -      | 62   | 78   | pF   |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                                       | $C_{oss}$    | -      | 19   | 24   |      |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{rss}$    | -      | 7    | 9    |      |
| Turn-on delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.27\text{ A}$ ,<br>$R_G = 43\text{ }\Omega$  | $t_{d(ON)}$  | -      | 23   | 35   | ns   |
| Rise time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.27\text{ A}$ ,<br>$R_G = 43\text{ }\Omega$           | $t_r$        | -      | 71   | 106  |      |
| Turn-off delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.27\text{ A}$ ,<br>$R_G = 43\text{ }\Omega$ | $t_{d(OFF)}$ | -      | 56   | 70   |      |
| Fall time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.27\text{ A}$ ,<br>$R_G = 43\text{ }\Omega$           | $t_f$        | -      | 61   | 76   |      |

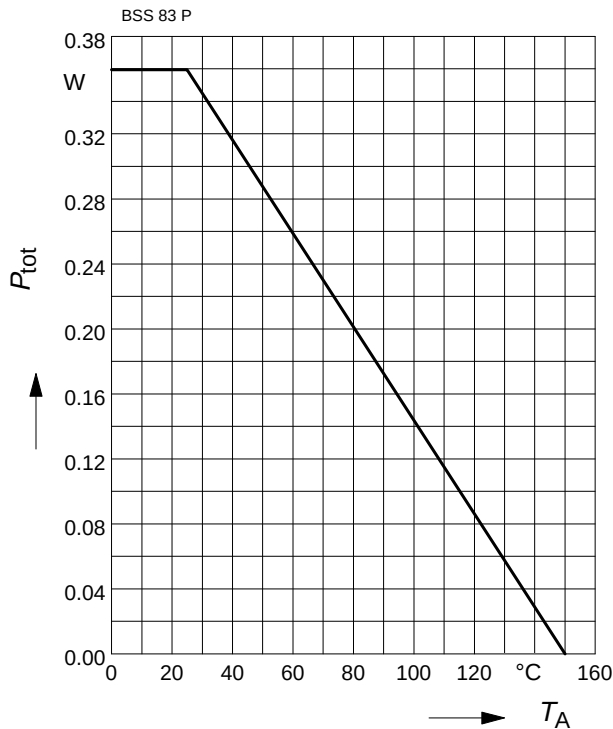
**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

| Parameter                                                                                                   | Symbol          | Values |       |      | Unit |
|-------------------------------------------------------------------------------------------------------------|-----------------|--------|-------|------|------|
|                                                                                                             |                 | min.   | typ.  | max. |      |
| Dynamic Characteristics                                                                                     |                 |        |       |      |      |
| Gate to source charge<br>$V_{DD} = -48\text{ V}$ , $I_D = -0.33\text{ A}$                                   | $Q_{gs}$        | -      | 0.12  | 0.18 | nC   |
| Gate to drain charge<br>$V_{DD} = -48$ , $I_D = -0.33\text{ A}$                                             | $Q_{gd}$        | -      | 1.1   | 1.65 |      |
| Gate charge total<br>$V_{DD} = -48\text{ V}$ , $I_D = -0.33\text{ A}$ , $V_{GS} = 0\text{ to }-10\text{ V}$ | $Q_g$           | -      | 2.38  | 3.57 |      |
| Gate plateau voltage<br>$V_{DD} = -48\text{ V}$ , $I_D = -0.33\text{ A}$                                    | $V_{(plateau)}$ | -      | -2.94 | -    | V    |

| Parameter                                                                                           | Symbol   | Values |       |       | Unit |
|-----------------------------------------------------------------------------------------------------|----------|--------|-------|-------|------|
|                                                                                                     |          | min.   | typ.  | max.  |      |
| Reverse Diode                                                                                       |          |        |       |       |      |
| Inverse diode continuous forward current<br>$T_A = 25\text{ }^{\circ}\text{C}$                      | $I_S$    | -      | -     | -0.33 | A    |
| Inverse diode direct current,pulsed<br>$T_A = 25\text{ }^{\circ}\text{C}$                           | $I_{SM}$ | -      | -     | -1.32 |      |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = -0.33$                              | $V_{SD}$ | -      | -0.84 | -1.1  | V    |
| Reverse recovery time<br>$V_R = -30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 80\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 59.4  | 89    | ns   |
| Reverse recovery charge<br>$V_R = -30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 80\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 37.5  | 56    | nC   |

### Power Dissipation

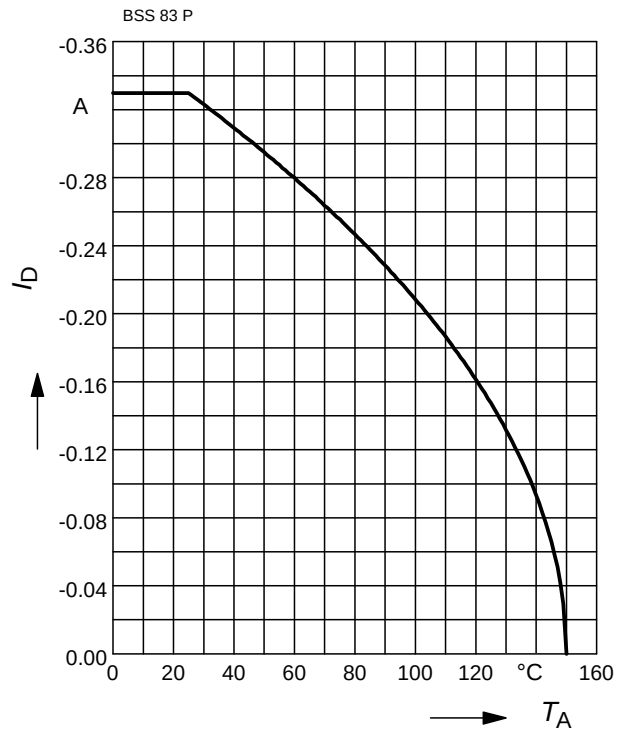
$$P_{\text{tot}} = f(T_A)$$



### Drain current

$$I_D = f(T_A)$$

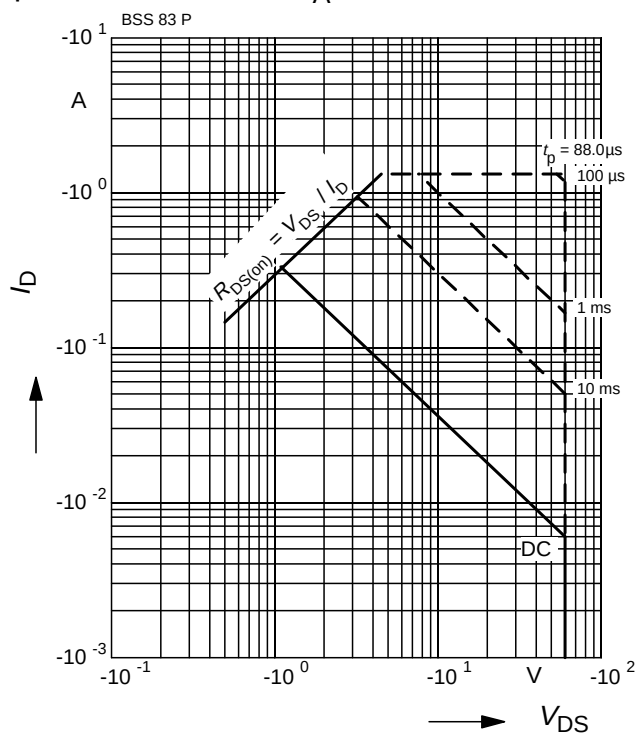
parameter:  $V_{GS} \geq 10 \text{ V}$



### Safe operating area

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

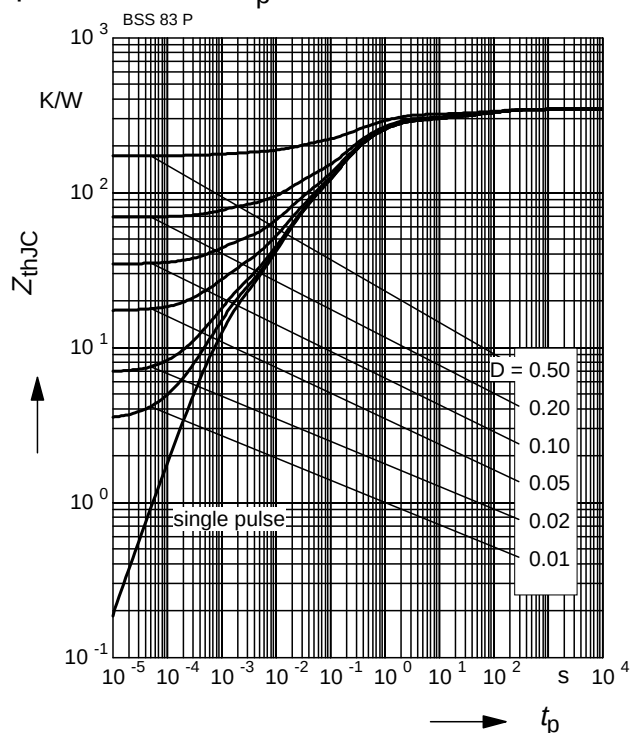
parameter:  $D = 0$ ,  $T_A = 25^\circ\text{C}$



### Transient thermal impedance

$$Z_{\text{thJC}} = f(t_p)$$

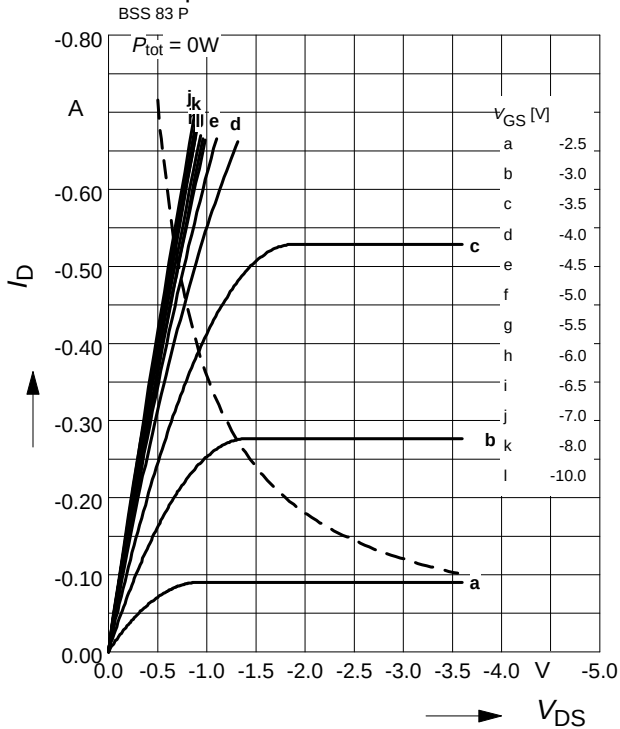
parameter:  $D = t_p/T$



**Typ. output characteristic**

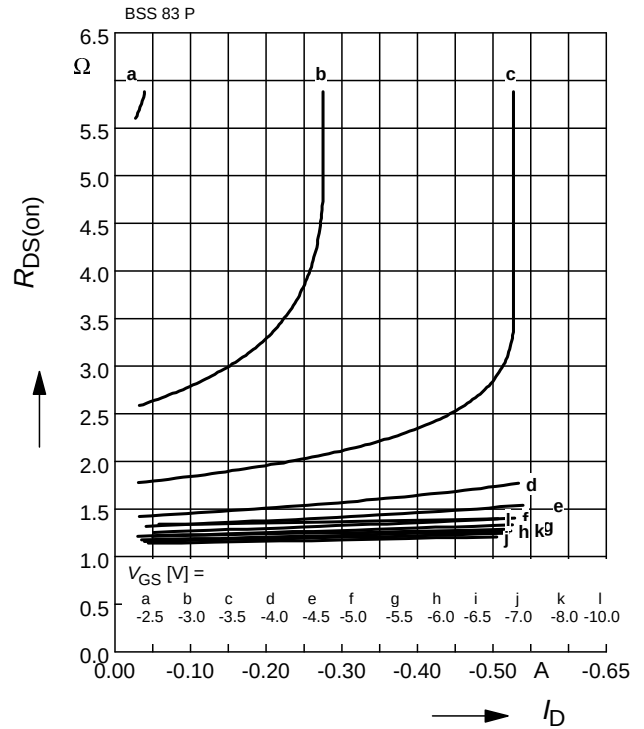
$$I_D = f(V_{DS}); T_J = 25^\circ\text{C}$$

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


**Typ. drain-source-on-resistance**

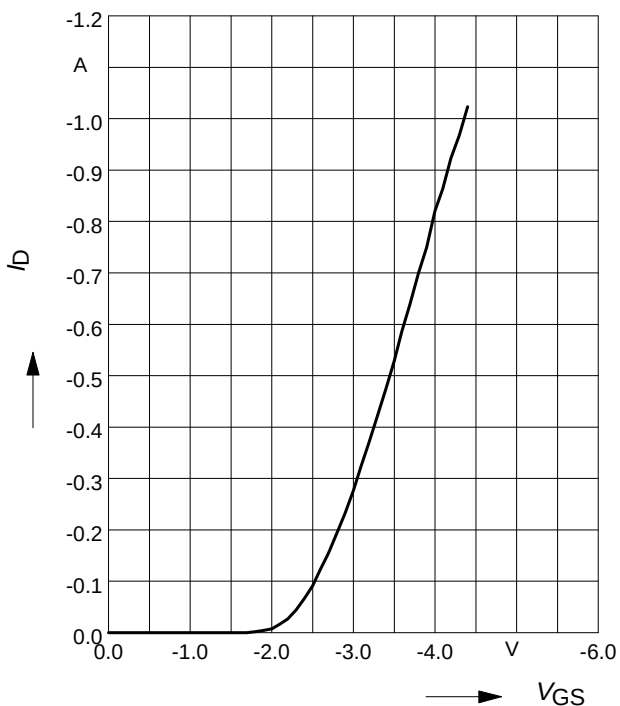
$$R_{DS(\text{on})} = f(I_D)$$

parameter:  $V_{GS}$


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

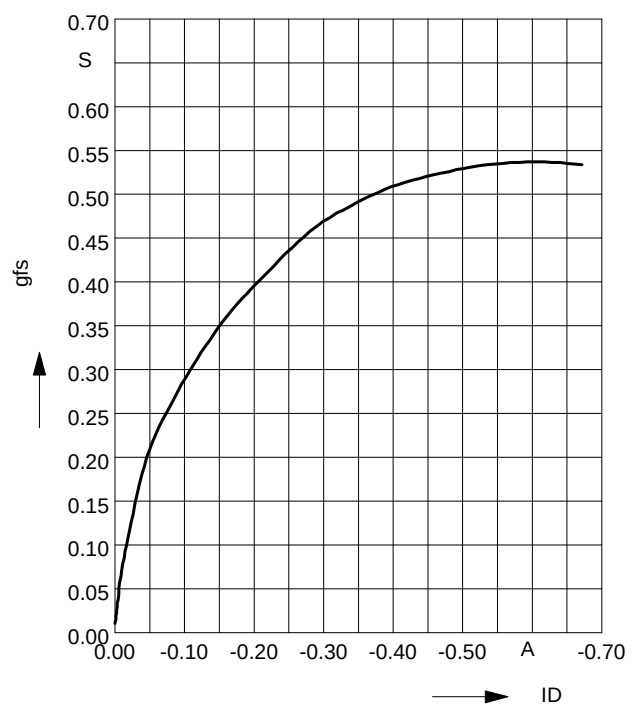
$$V_{DS} \geq 2 \times I_D \times R_{DS(\text{on})\text{max}}$$

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


**Typ. forward transconductance**

$$g_{fs} = f(I_D); T_J = 25^\circ\text{C}$$

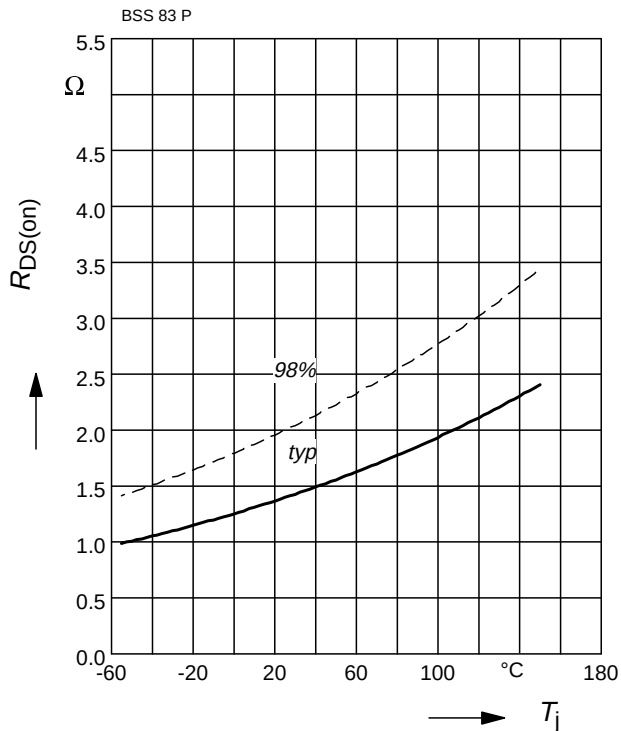
parameter:  $g_{fs}$



### Drain-source on-state resistance

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

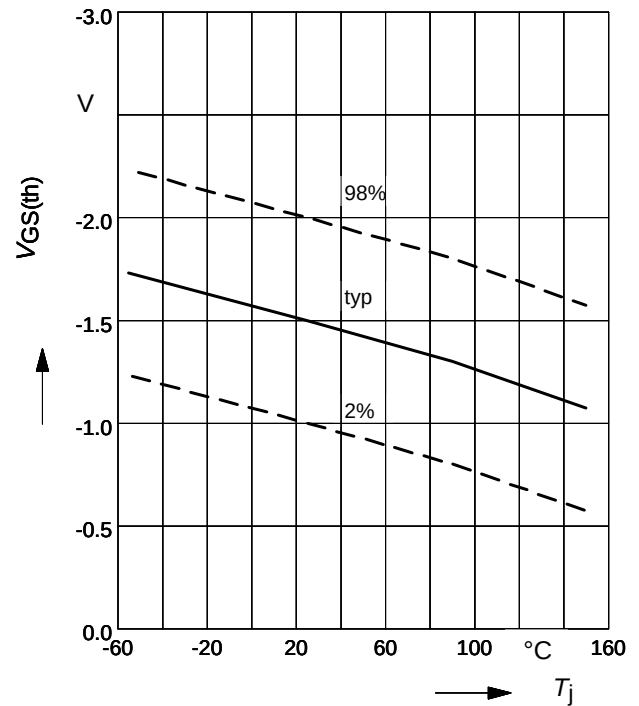
parameter:  $I_D = -0.33 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



### Gate threshold voltage

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

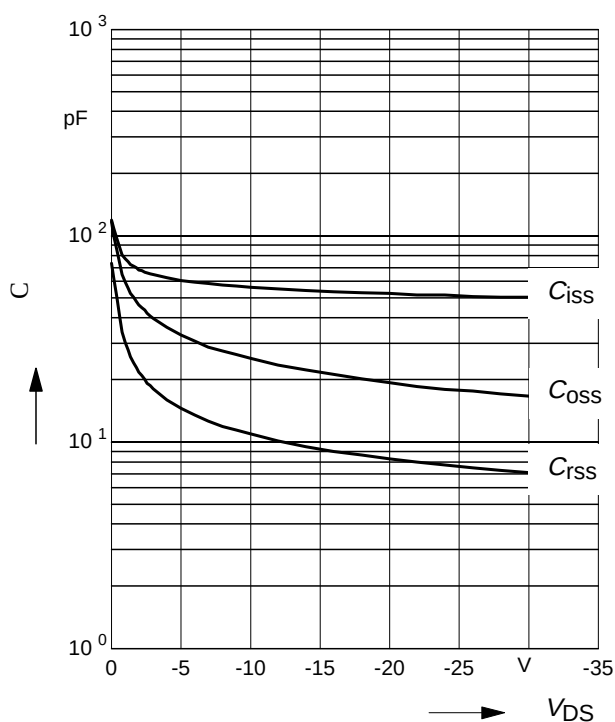
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -80 \mu\text{A}$



### Typ. capacitances

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

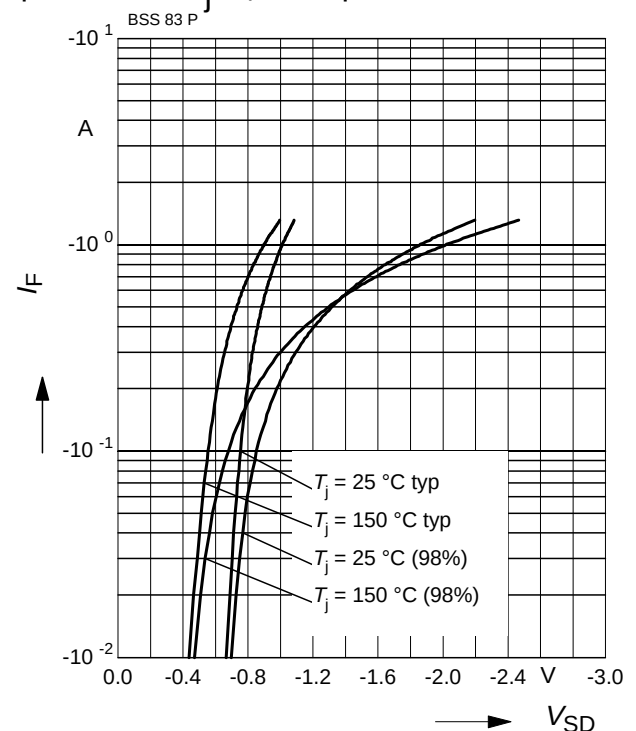
parameter:  $V_{GS}=0\text{V}$ ,  $f=1 \text{ MHz}$



### Forward characteristics of reverse diode

$$I_F = f(V_{SD})$$

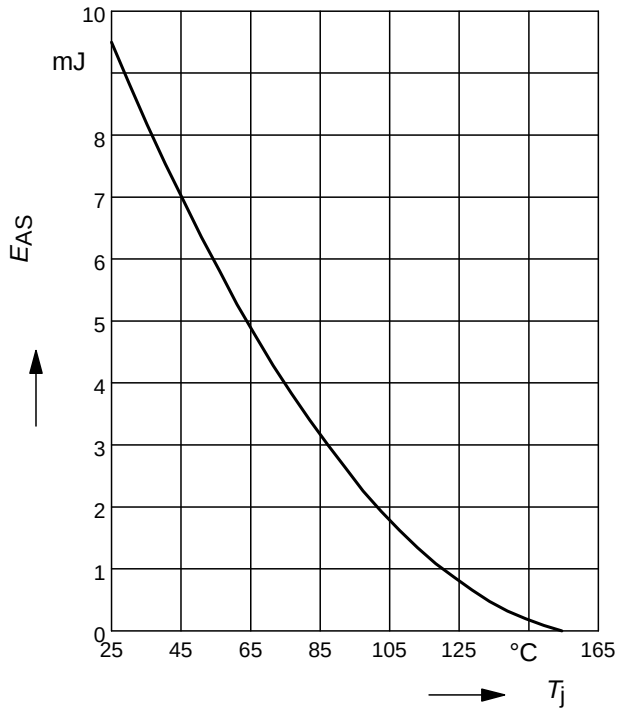
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**Avalanche energy**

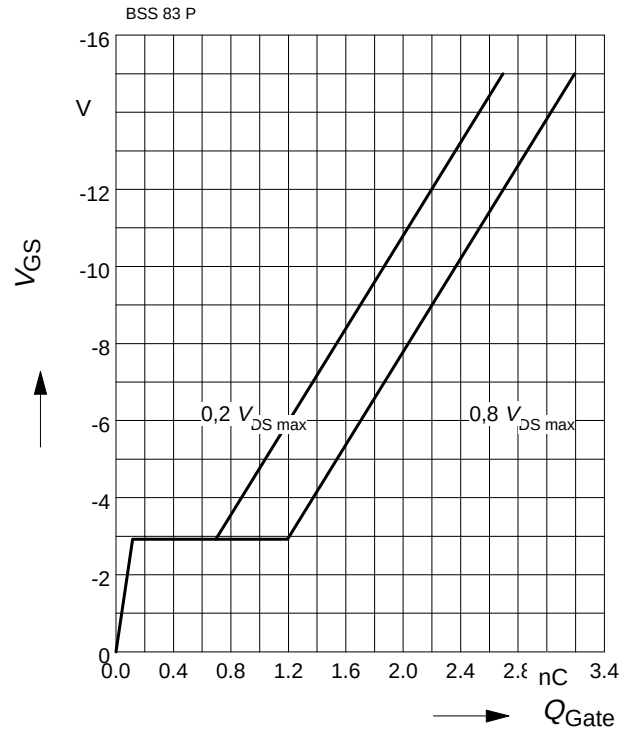
$$E_{AS} = f(T_j)$$

para.:  $I_D = -0.33 \text{ A}$  ,  $V_{DD} = -25 \text{ V}$  ,  $R_{GS} = 25$

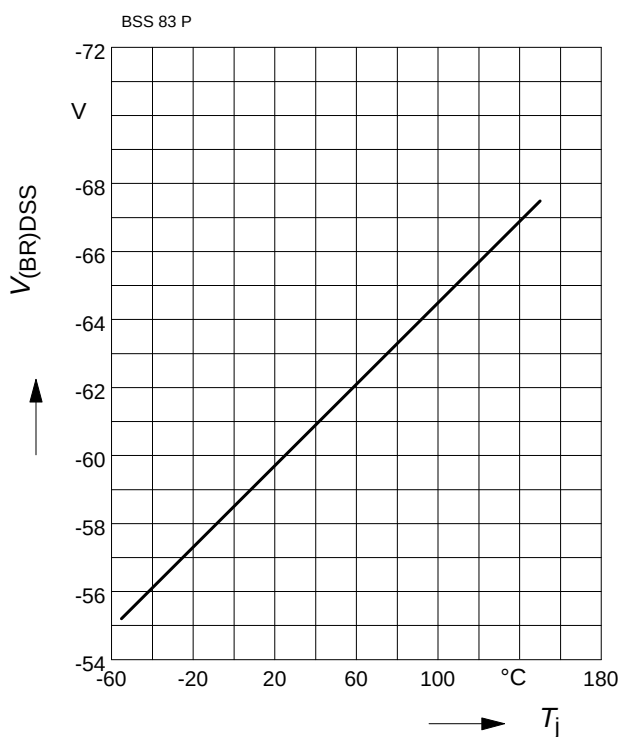

**Typ. gate charge**

$$V_{GS} = f(Q_{Gate})$$

parameter:  $I_D = -0.33 \text{ A}$  pulsed

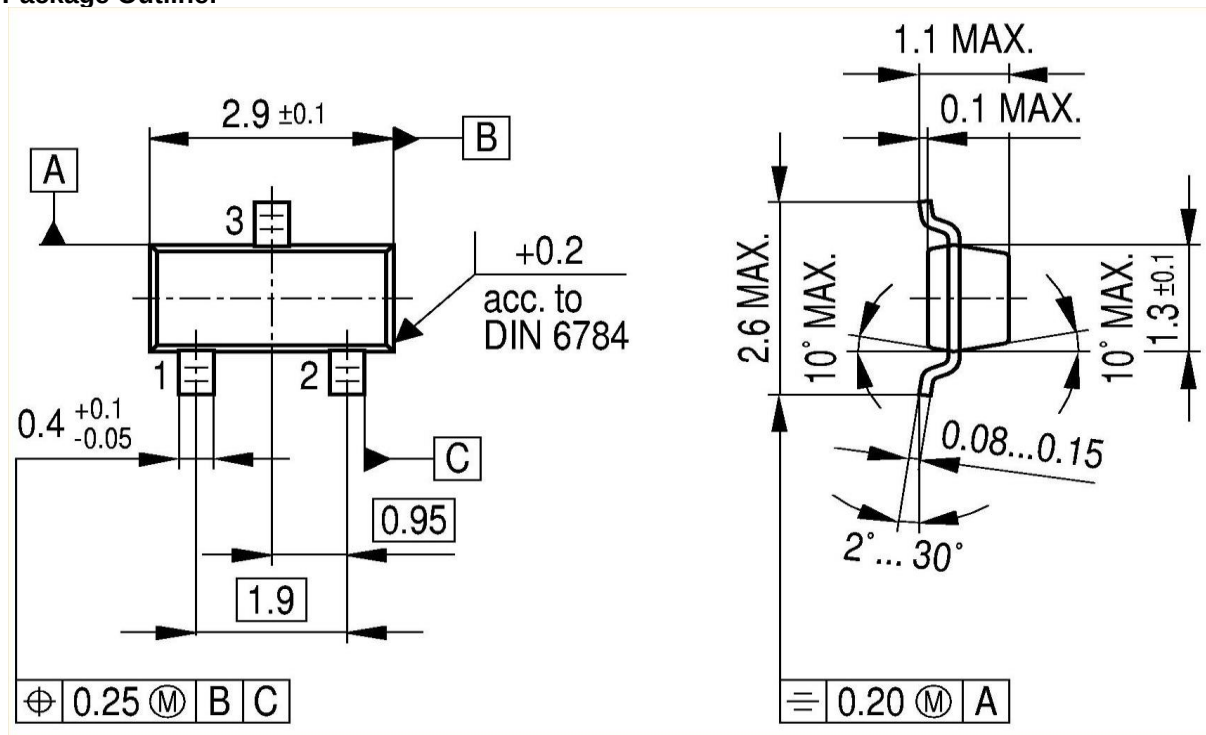

**Drain-source breakdown voltage**

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

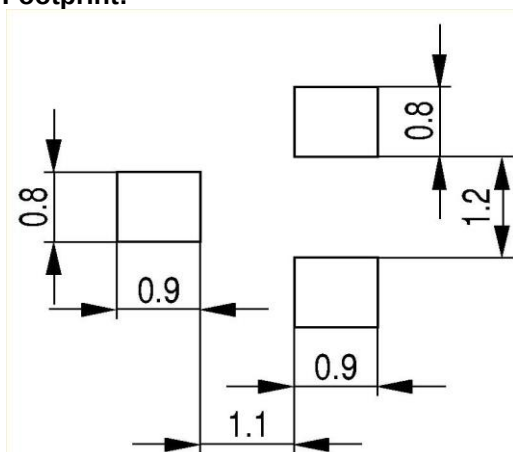




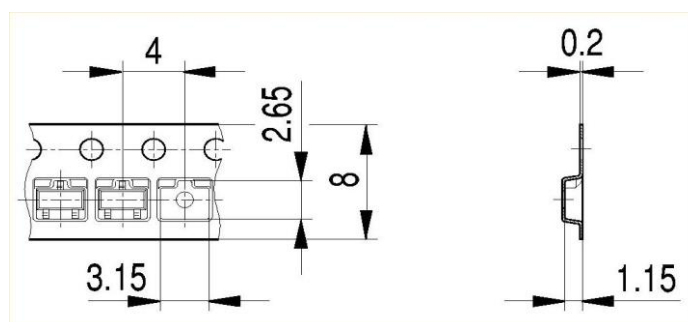
# Package Outline:



# Footprint:



# Packaging:



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