

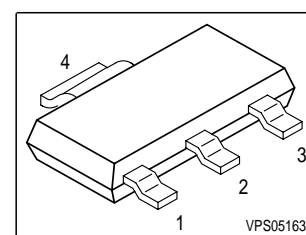
**SIPMOS® Small-Signal-Transistor**
**Features**

- 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 | $R_{DS(on)}$ | 0.8   | $\Omega$ |
| Continuous drain current         | $I_D$        | -1.17 | A        |

|              |               |              |
|--------------|---------------|--------------|
| <b>Pin 1</b> | <b>Pin2/4</b> | <b>PIN 3</b> |
| G            | D             | S            |



Halogen-Free



| Type    | Package   | Tape and Reel Information | Marking | Packaging |
|---------|-----------|---------------------------|---------|-----------|
| BSP315P | PG-SOT223 | H6327: 1000 pcs/reel      | BSP315P | Non dry   |

**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>$T_A = 70\text{ °C}$   | $I_D$             | -1.17<br>-0.94 | A                  |
| Pulsed drain current<br>$T_A = 25\text{ °C}$   | $I_D$ puls        | -4.68          |                    |
| Avalanche energy, single pulse<br>$I_D = -1.17\text{ A}$ , $V_{DD} = -25\text{ V}$ , $R_{GS} = 25\ \Omega$                                   | $E_{AS}$          | 24             | mJ                 |
| Avalanche energy, periodic limited by $T_{jmax}$   | $E_{AR}$          | 0.18           |                    |
| Reverse diode dv/dt<br>$I_S = -1.17\text{ A}$ , $V_{DS} = -48\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ ,<br>$T_{jmax} = 150\text{ °C}$ | dv/dt             | 6              | kV/ $\mu\text{s}$  |
| Gate source voltage  | $V_{GS}$          | $\pm 20$       | V                  |
| Power dissipation<br>$T_A = 25\text{ °C}$  | $P_{tot}$         | 1.8            | W                  |
| Operating and storage temperature  | $T_j$ , $T_{stg}$ | -55...+150     | $^{\circ}\text{C}$ |
| 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.      |      |
| <b>Characteristics</b>  |            |        |      |           |      |
| Thermal resistance, junction - soldering point<br>(Pin 4)   | $R_{thJS}$ | -      | -    | 25        | K/W  |
| SMD version, device on PCB:<br>@ min. footprint<br>@ 6 cm <sup>2</sup> cooling area <sup>1)</sup> | $R_{thJA}$ | -      | -    | 115<br>70 | K/W  |

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

| Parameter  | Symbol        | Values |             |            | Unit          |
|--|---------------|--------|-------------|------------|---------------|
|  |               | min.   | typ.        | max.       |               |
| <b>Static Characteristics</b>  |               |        |             |            |               |
| 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>$I_D = -160\text{ }\mu\text{A}$   | $V_{GS(th)}$  | -1     | -1.5        | -2         |               |
| Zero gate voltage drain current<br>$V_{DS} = -60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ °C}$<br>$V_{DS} = -60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125\text{ °C}$ | $I_{DSS}$     | -      | -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       | nA            |
| Drain-Source on-state resistance<br>$V_{GS} = -4.5\text{ V}$ , $I_D = -0.89\text{ A}$  | $R_{DS(on)}$  | -      | 0.8         | 1.4        | $\Omega$      |
| Drain-Source on-state resistance<br>$V_{GS} = -10\text{ V}$ , $I_D = -1.17\text{ A}$   | $R_{DS(on)}$  | -      | 0.5         | 0.8        | $\Omega$      |

<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  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

| Parameter  | Symbol       | Values |      |      | Unit |
|--|--------------|--------|------|------|------|
|  |              | min.   | typ. | max. |      |
| <b>Dynamic Characteristics</b>   |              |        |      |      |      |
| Transconductance<br>$V_{DS} \leq 2 * I_D * R_{DS(on)max}$ , $I_D = -0.89\text{ A}$   | $g_{fs}$     | 0.7    | 1.4  | -    | S    |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$  | $C_{iss}$    | -      | 130  | 160  | pF   |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                                       | $C_{oss}$    | -      | 40   | 50   |      |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{rss}$    | -      | 17   | 21   |      |
| Turn-on delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.89\text{ A}$ ,<br>$R_G = 18\text{ }\Omega$  | $t_{d(on)}$  | -      | 24   | 36   | ns   |
| Rise time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.89\text{ A}$ ,<br>$R_G = 18\text{ }\Omega$           | $t_r$        | -      | 9    | 14   |      |
| Turn-off delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.89\text{ A}$ ,<br>$R_G = 18\text{ }\Omega$ | $t_{d(off)}$ | -      | 32   | 48   |      |
| Fall time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.89\text{ A}$ ,<br>$R_G = 18\text{ }\Omega$           | $t_f$        | -      | 19   | 28   |      |

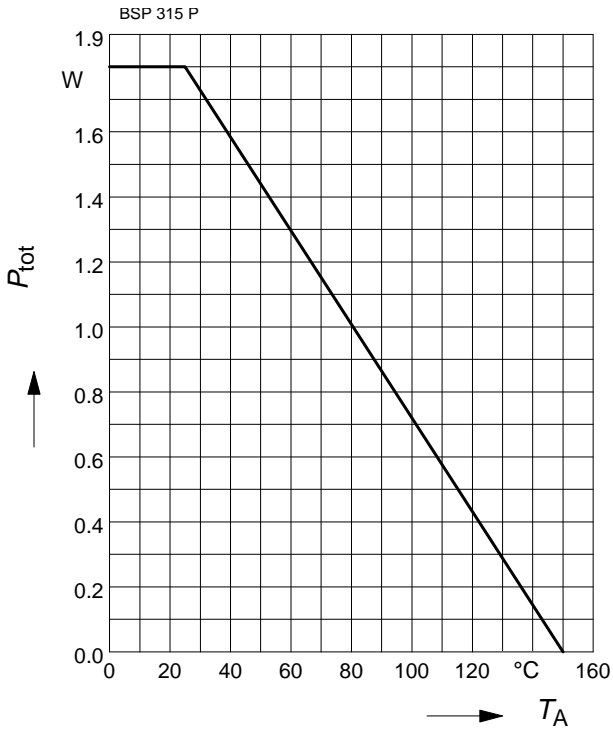
**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

| Parameter   | Symbol          | Values |       |      | Unit |
|---|-----------------|--------|-------|------|------|
|   |                 | min.   | typ.  | max. |      |
| <b>Dynamic Characteristics</b>  |                 |        |       |      |      |
| Gate to source charge<br>$V_{DD} = -48\text{ V}, I_D = -1.17\text{ A}$                                | $Q_{gs}$        | -      | 0.7   | 1.1  | nC   |
| Gate to drain charge<br>$V_{DD} = -48\text{ V}, I_D = -1.17\text{ A}$                                 | $Q_{gd}$        | -      | 1.8   | 2.6  |      |
| Gate charge total<br>$V_{DD} = -48\text{ V}, I_D = -1.17\text{ A}, V_{GS} = 0\text{ to }-10\text{ V}$ | $Q_g$           | -      | 5.2   | 7.8  |      |
| Gate plateau voltage<br>$V_{DD} = -48\text{ V}, I_D = -1.17\text{ A}$                                 | $V_{(plateau)}$ | -      | -3.14 | -    | V    |

| Parameter  | Symbol   | Values |       |       | Unit          |
|--|----------|--------|-------|-------|---------------|
|  |          | min.   | typ.  | max.  |               |
| <b>Reverse Diode</b>   |          |        |       |       |               |
| Inverse diode continuous forward current<br>$T_A = 25\text{ °C}$                               | $I_S$    | -      | -     | -1.17 | A             |
| Inverse diode direct current,pulsed<br>$T_A = 25\text{ °C}$                                    | $I_{SM}$ | -      | -     | -4.68 |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}, I_F = -1.17\text{ A}$                   | $V_{SD}$ | -      | -0.97 | -1.3  | V             |
| Reverse recovery time<br>$V_R = -30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 30.5  | 46    | ns            |
| Reverse recovery charge<br>$V_R = -30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 36    | 54    | $\mu\text{C}$ |

**Power Dissipation**

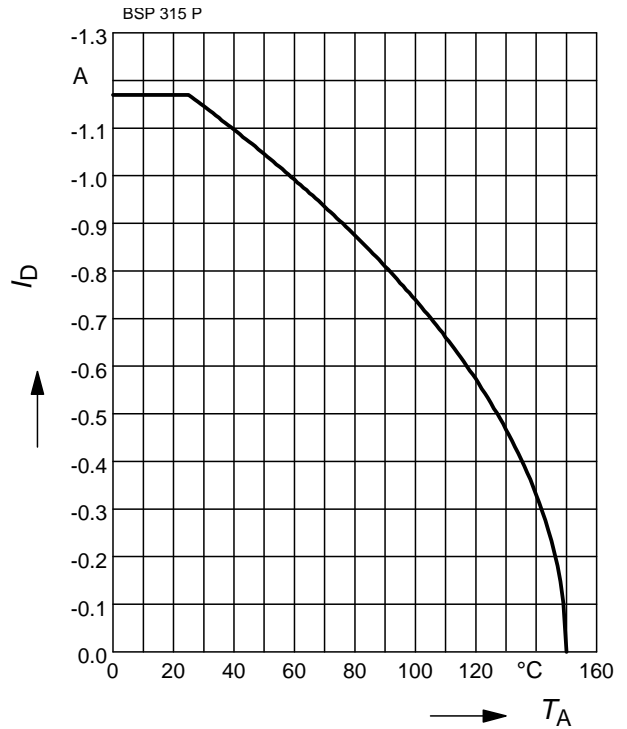
$$P_{tot} = f(T_A)$$



**Drain current**

$$I_D = f(T_A)$$

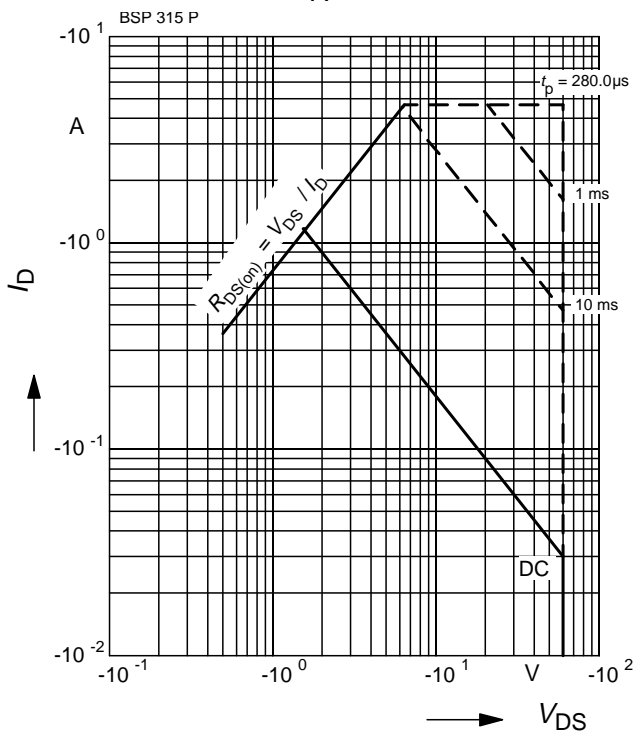
parameter :  $V_{GS} \geq -10V$



**Safe operating area**

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

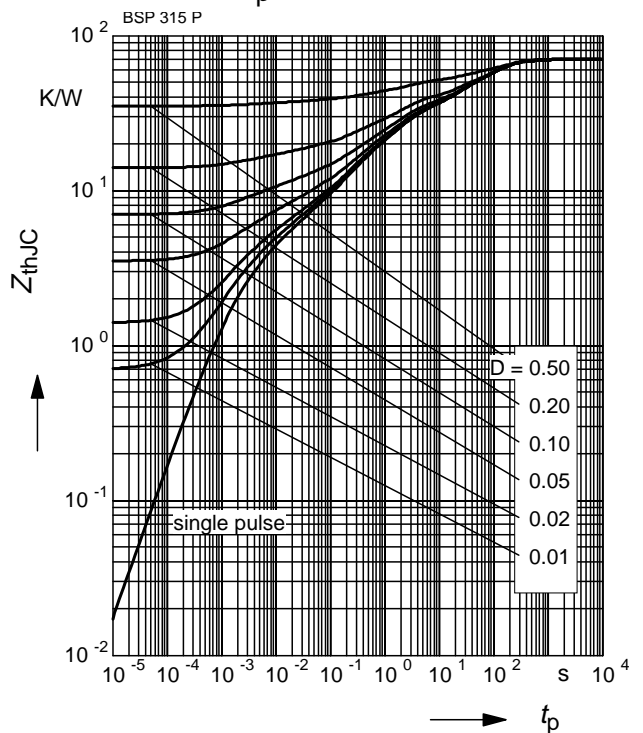
parameter :  $D = 0, T_A = 25\text{ °C}$



**Transient thermal impedance**

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

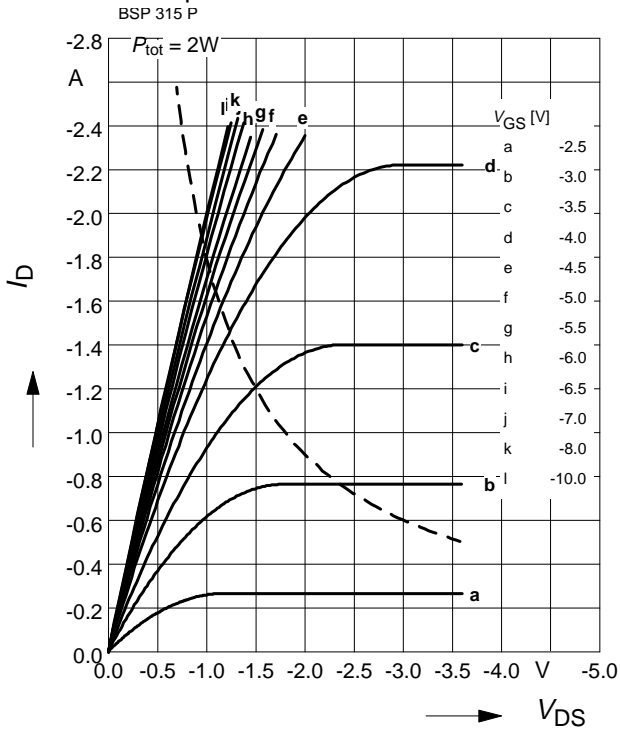
parameter :  $D = t_p/T$



**Typ. output characteristics**

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

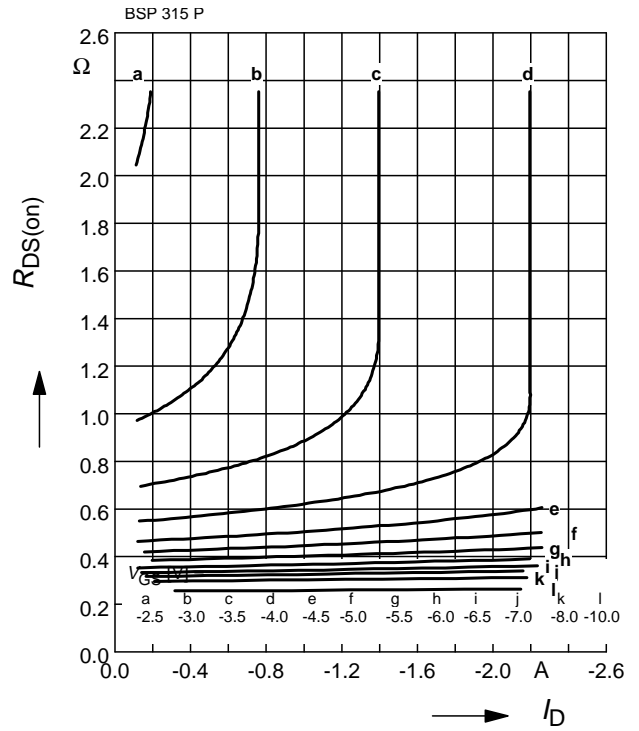
parameter:  $t_p = 80 \mu s$



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

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

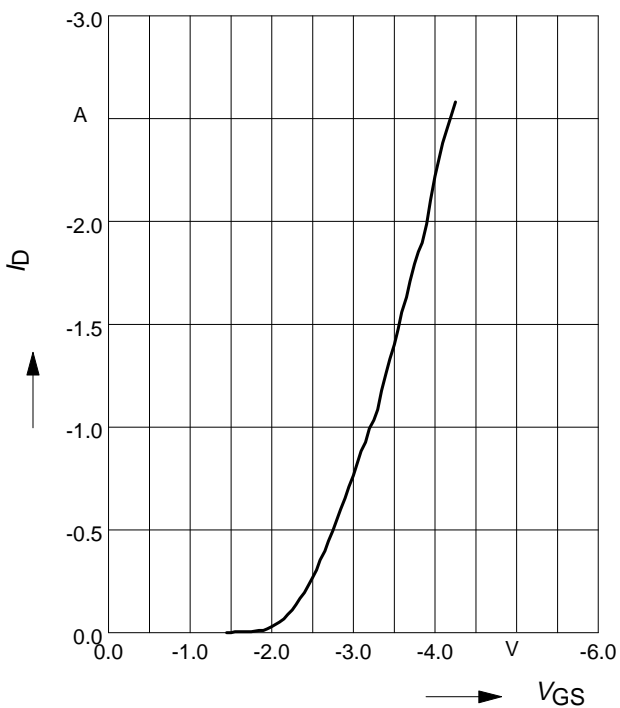
parameter:  $V_{GS}$



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

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

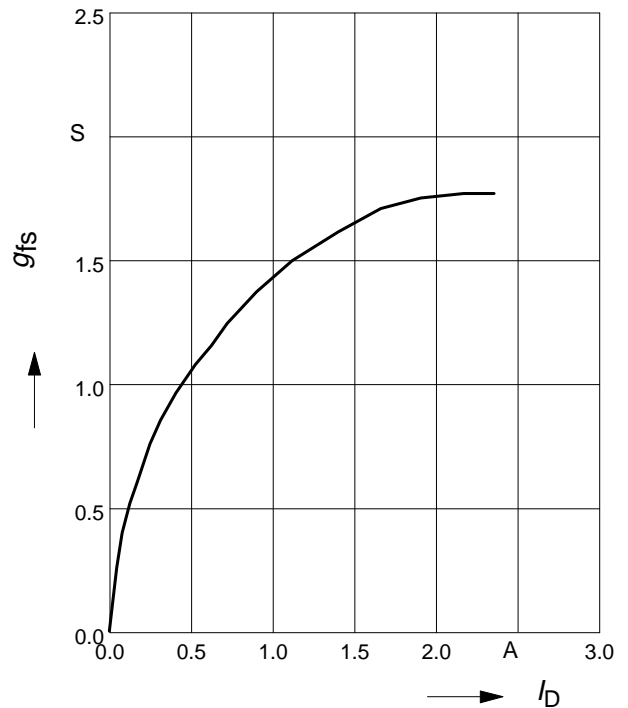
parameter:  $t_p = 80 \mu s$



**Typ. forward transconductance**

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

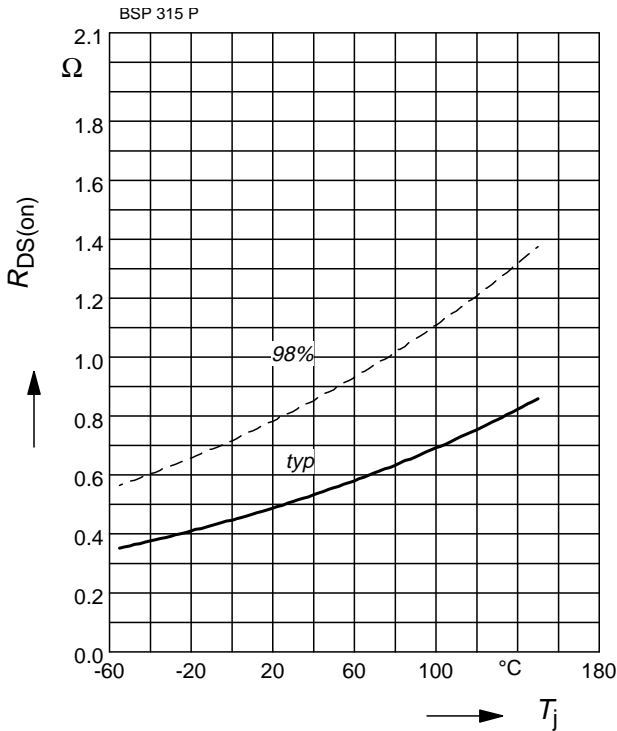
parameter:  $g_{fs}$



**Drain-source on-resistance**

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

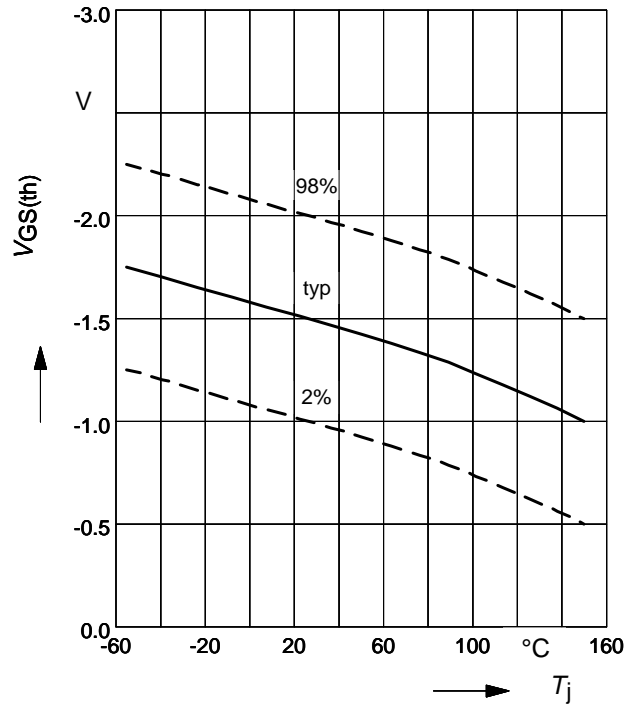
parameter:  $I_D = -1.17 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



**Gate threshold voltage**

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

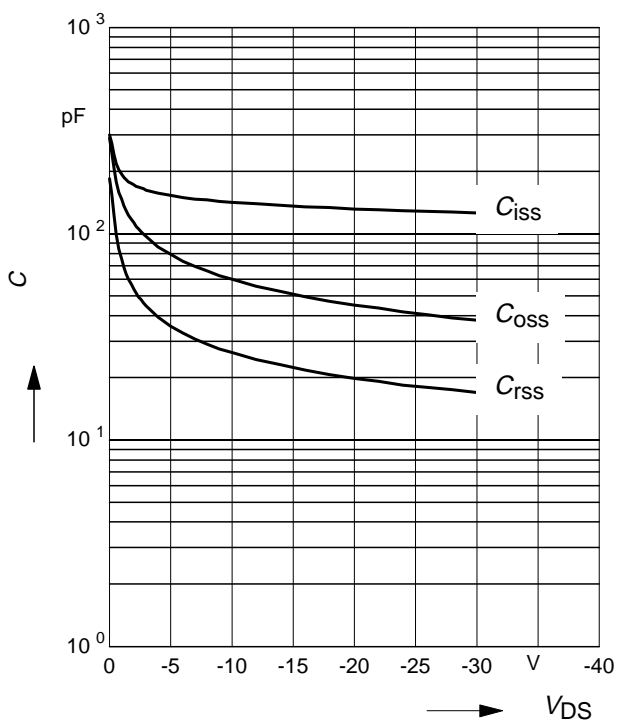
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -160 \mu\text{A}$



**Typ. capacitances**

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

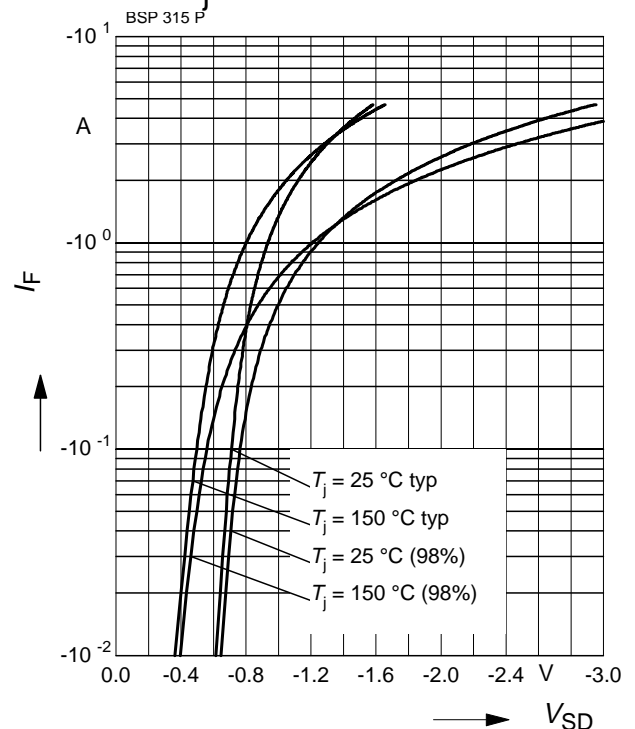
Parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



**Forward characteristics of reverse diode**

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

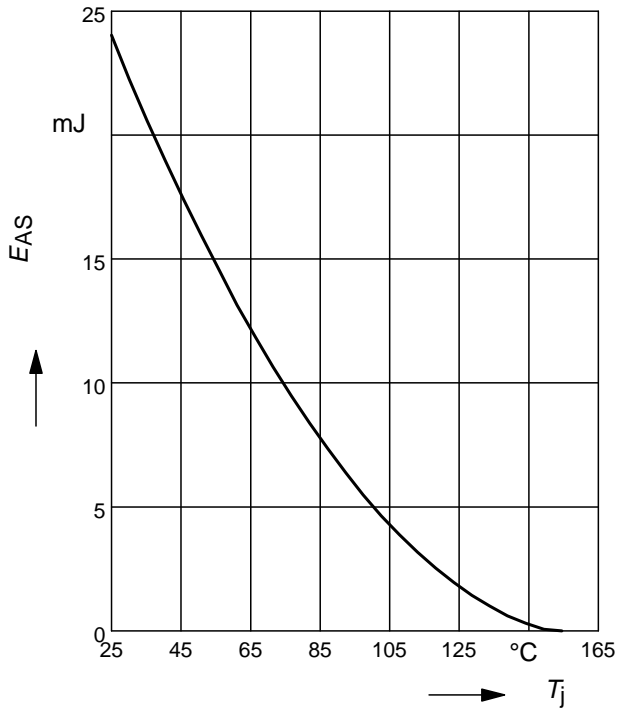
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**Avalanche Energy  $E_{AS} = f(T_j)$**

parameter:  $I_D = -1.17\text{ A}$  ,  $V_{DD} = -25\text{ V}$

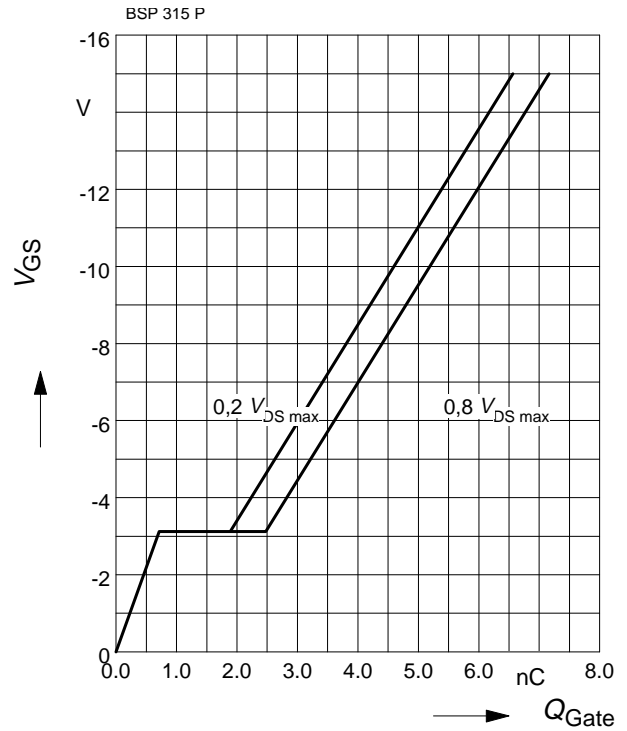
$R_{GS} = 25\ \Omega$



**Typ. gate charge**

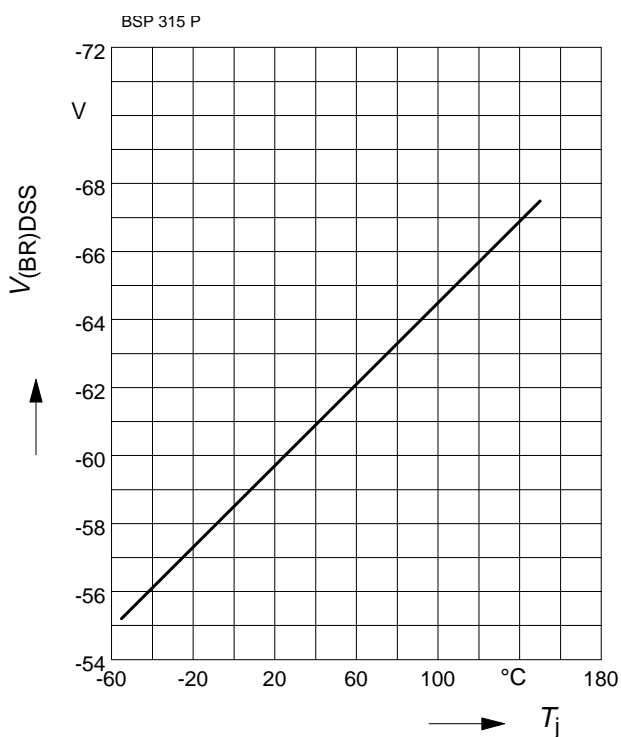
$V_{GS} = f(Q_{Gate})$

parameter:  $I_D = -1.17\text{ A pulsed}$



**Drain-source breakdown voltage**

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







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