

## OptiMOS<sup>®</sup>-P Small-Signal-Transistor Feature

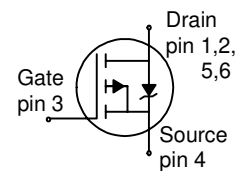
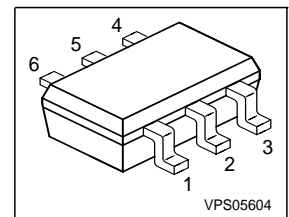
- P-Channel
- Enhancement mode
- Super Logic Level (2.5 V rated)
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21



### Product Summary

|              |      |            |
|--------------|------|------------|
| $V_{DS}$     | -20  | V          |
| $R_{DS(on)}$ | 175  | m $\Omega$ |
| $I_D$        | -1.5 | A          |

PG-SOT-363



| Type      | Package    | Tape and Reel inf | Marking |
|-----------|------------|-------------------|---------|
| BSV 236SP | PG-SOT-363 | H6327:3000pcs/r.  | X2s     |

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

| Parameter   | Symbol             | Value       | Unit              |
|---|--------------------|-------------|-------------------|
| Continuous drain current  | $I_D$              |             | A                 |
| $T_A=25\text{ }^\circ\text{C}$  |                    | -1.5        |                   |
| $T_A=70\text{ }^\circ\text{C}$  |                    | -1.2        |                   |
| Pulsed drain current  | $I_D \text{ puls}$ | -6          |                   |
| $T_A=25\text{ }^\circ\text{C}$  |                    |             |                   |
| Avalanche energy, single pulse  | $E_{AS}$           | 9.5         | mJ                |
| $I_D=-1.5\text{ A}$ , $V_{DD}=-10\text{ V}$ , $R_{GS}=25\text{ }\Omega$   |                    |             |                   |
| Reverse diode dv/dt   | dv/dt              | -6          | kV/ $\mu\text{s}$ |
| $I_S=-1.5\text{ A}$ , $V_{DS}=-16\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{jmax}=150\text{ }^\circ\text{C}$ |                    |             |                   |
| Gate source voltage   | $V_{GS}$           | $\pm 12$    | V                 |
| Power dissipation   | $P_{tot}$          | 0.56        | W                 |
| $T_A=25\text{ }^\circ\text{C}$  |                    |             |                   |
| 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<br>JESD22-A114-HBM  |                    | Class 0     |                   |

**Thermal Characteristics**

| Parameter                                      | Symbol     | Values |      |      | Unit |
|--|------------|--------|------|------|------|
|  |            | min.   | typ. | max. |      |
| <b>Characteristics</b>                         |            |        |      |      |      |
| Thermal resistance, junction - soldering point | $R_{thJS}$ | -      | -    | 90   | K/W  |
| SMD version, device on PCB:                    | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                               |            | -      | -    | 220  |      |
| @ 6 cm <sup>2</sup> cooling area <sup>1)</sup> |            | -      | -    | 110  |      |

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

| Parameter  | Symbol        | Values |             |            | Unit             |
|--|---------------|--------|-------------|------------|------------------|
|  |               | min.   | typ.        | max.       |                  |
| <b>Static Characteristics</b>  |               |        |             |            |                  |
| Drain-source breakdown voltage<br>$V_{GS}=0, I_D=-250\mu\text{A}$  | $V_{(BR)DSS}$ | -20    | -           | -          | V                |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D=-8\mu\text{A}$   | $V_{GS(th)}$  | -0.6   | -0.9        | -1.2       |                  |
| Zero gate voltage drain current<br>$V_{DS}=-20\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$<br>$V_{DS}=-20\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$ | $I_{DSS}$     | -      | -0.1<br>-10 | -1<br>-100 | $\mu\text{A}$    |
| Gate-source leakage current<br>$V_{GS}=-12\text{V}, V_{DS}=0$  | $I_{GSS}$     | -      | -10         | -100       |                  |
| Drain-source on-state resistance<br>$V_{GS}=-2.5\text{V}, I_D=-0.8\text{A}$  | $R_{DS(on)}$  | -      | 193         | 285        | $\text{m}\Omega$ |
| Drain-source on-state resistance<br>$V_{GS}=-4.5, I_D=-1.5\text{A}$  | $R_{DS(on)}$  | -      | 131         | 175        |                  |

<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;  $t \leq 10$  sec.

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

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

**Dynamic Characteristics**

|                              |              |  |     |      |      |    |
|------------------------------|--------------|--|-----|------|------|----|
| Transconductance             | $g_{fs}$     | $ V_{DS}  \geq 2 *  I_D  * R_{DS(on)max}$<br>$I_D = -1.2A$     | 2.2 | 4.4  | -    | S  |
| Input capacitance            | $C_{iss}$    | $V_{GS} = 0, V_{DS} = -15V,$<br>$f = 1MHz$                     | -   | 228  | -    | pF |
| Output capacitance           | $C_{oss}$    |  | -   | 92   | -    |    |
| Reverse transfer capacitance | $C_{rss}$    |  | -   | 75   | -    |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD} = -10V, V_{GS} = -4.5V,$<br>$I_D = -1A, R_G = 6\Omega$ | -   | 5.7  | 8.5  | ns |
| Rise time                    | $t_r$        |  | -   | 8.5  | 12.7 |    |
| Turn-off delay time          | $t_{d(off)}$ |  | -   | 14.1 | 21.1 |    |
| Fall time                    | $t_f$        |  | -   | 12.2 | 18.3 |    |

**Gate Charge Characteristics**

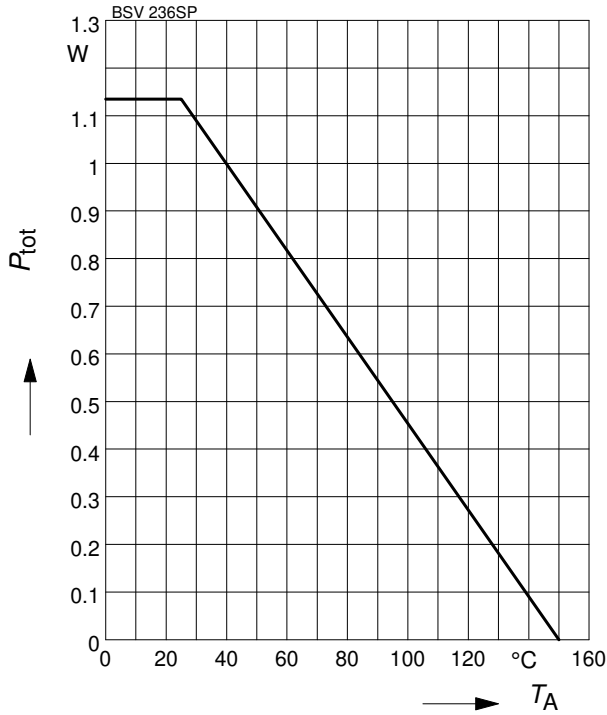
|                       |                 |   |   |      |      |    |
|-----------------------|-----------------|---|---|------|------|----|
| Gate to source charge | $Q_{gs}$        | $V_{DD} = -10V, I_D = -1.5A$                                    | - | -0.4 | -0.6 | nC |
| Gate to drain charge  | $Q_{gd}$        |   | - | -1.8 | -2.7 |    |
| Gate charge total     | $Q_g$           | $V_{DD} = -10V, I_D = -1.5A,$<br>$V_{GS} = 0 \text{ to } -4.5V$ | - | -3.8 | -5.7 |    |
| Gate plateau voltage  | $V_{(plateau)}$ | $V_{DD} = -10V, I_D = -1.5A$                                    | - | -1.6 | -    | V  |

**Reverse Diode**

|  |          |  |   |      |       |    |
|--|----------|--|---|------|-------|----|
| Inverse diode continuous forward current | $I_S$    | $T_A = 25\text{ °C}$                                   | - | -    | -0.11 | A  |
| Inverse diode direct current, pulsed     | $I_{SM}$ |  | - | -    | -6    |    |
| Inverse diode forward voltage            | $V_{SD}$ | $V_{GS} = 0,  I_F  =  I_D $                            | - | 0.88 | 1.3   | V  |
| Reverse recovery time                    | $t_{rr}$ | $V_R = -10V,  I_F  =  I_D ,$<br>$di_F/dt = 100A/\mu s$ | - | 16.4 | 20.5  | ns |
| Reverse recovery charge                  | $Q_{rr}$ |  | - | 3.4  | 4.3   | nC |

### 1 Power dissipation

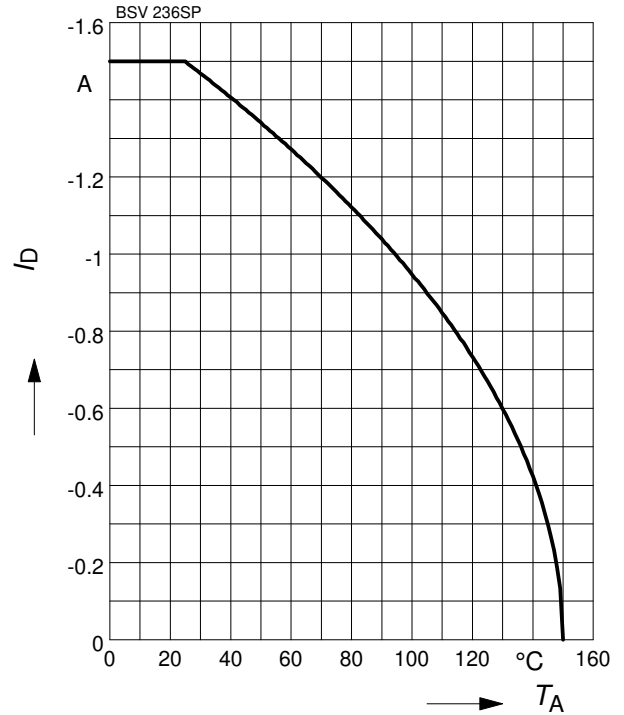
$$P_{tot} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

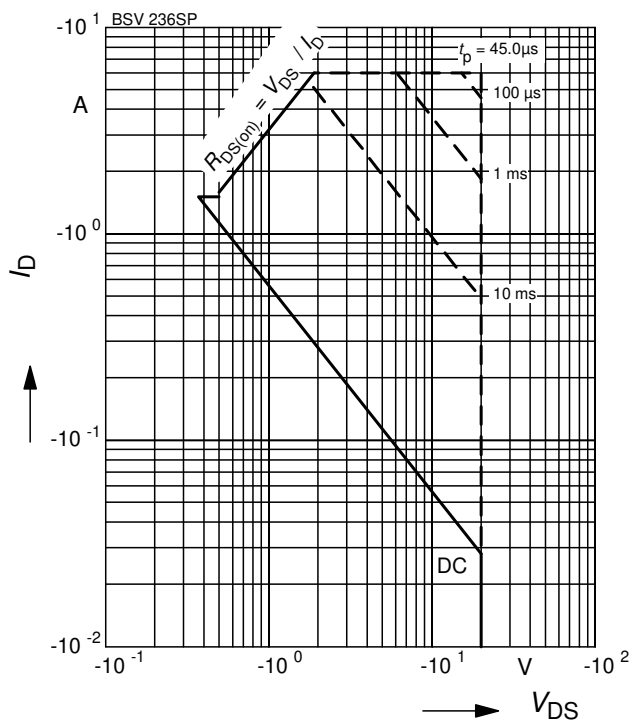
parameter:  $|V_{GS}| \geq 4.5 \text{ V}$



### 3 Safe operating area

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

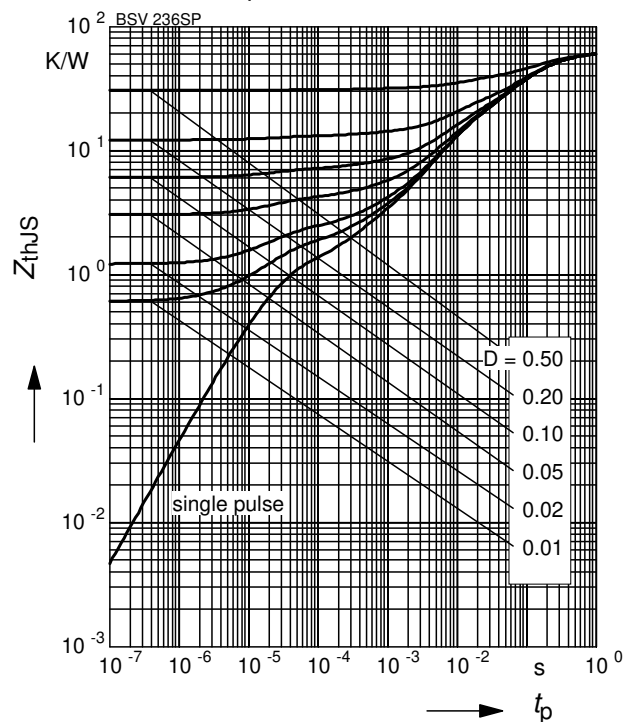
parameter:  $D = 0$ ,  $T_A = 25 \text{ °C}$



### 4 Transient thermal impedance

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

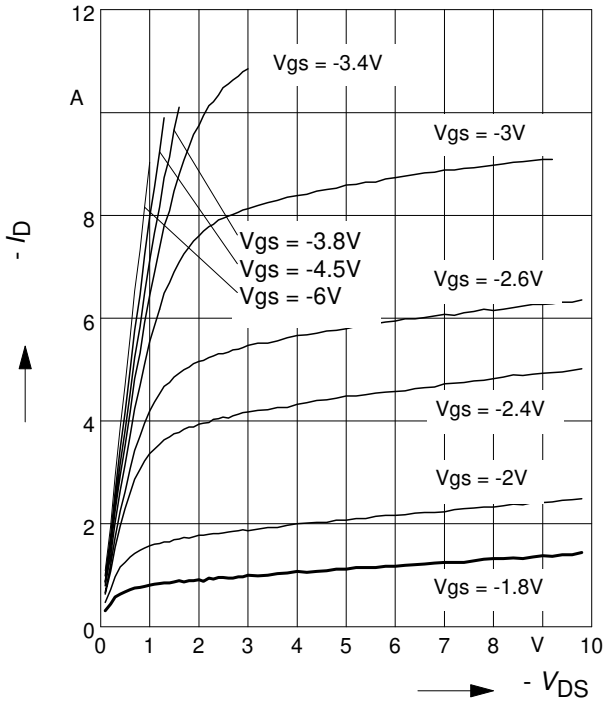
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

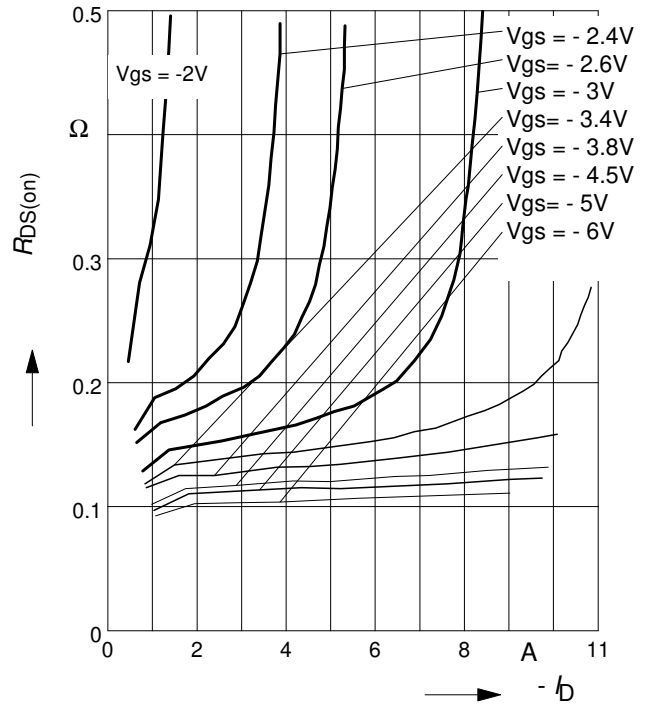
parameter:  $t_p = 80 \mu\text{s}$



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

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

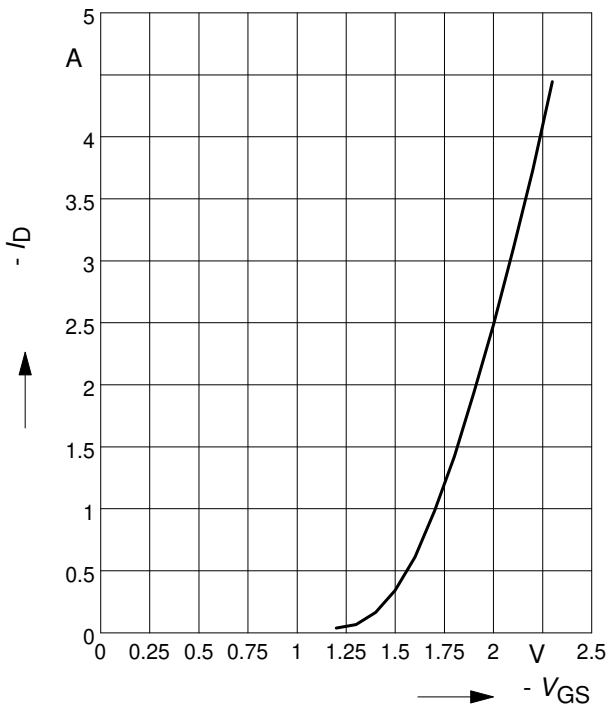
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$

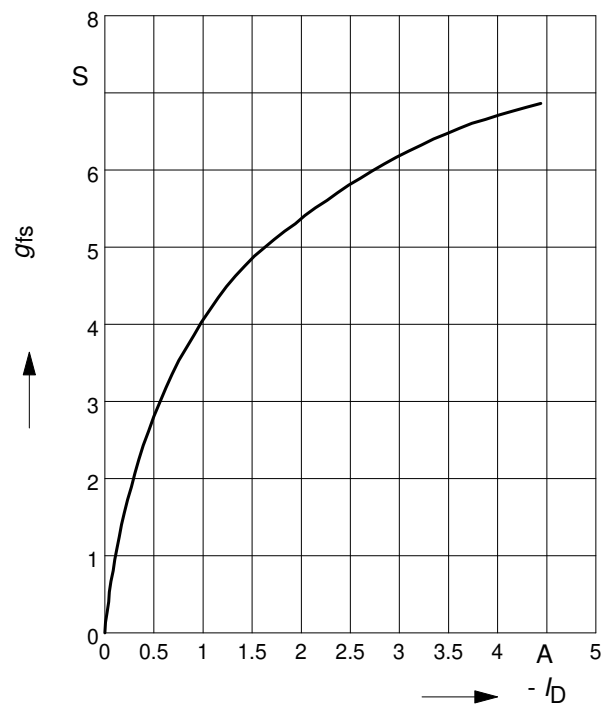
parameter:  $t_p = 80 \mu\text{s}$



**8 Typ. forward transconductance**

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

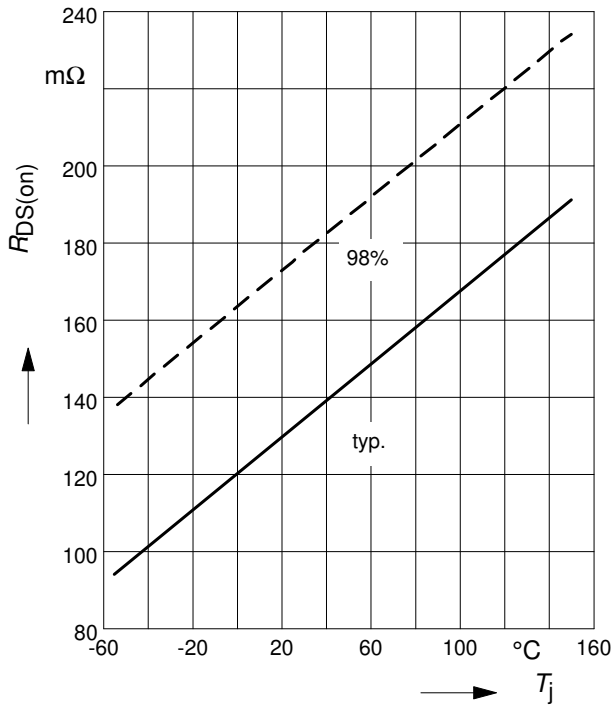
parameter:  $t_p = 80 \mu\text{s}$



### 9 Drain-source on-resistance

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

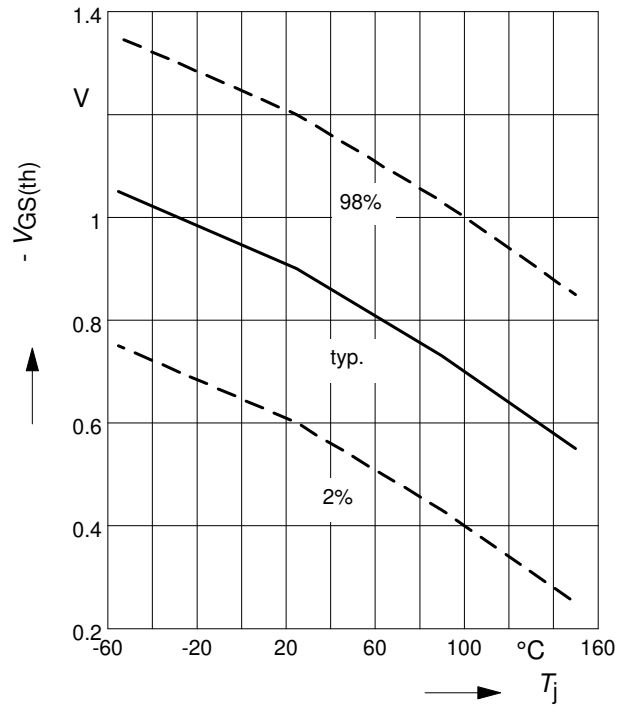
parameter:  $I_D = -1.5 \text{ A}$ ,  $V_{GS} = -4.5 \text{ V}$



### 10 Gate threshold voltage

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

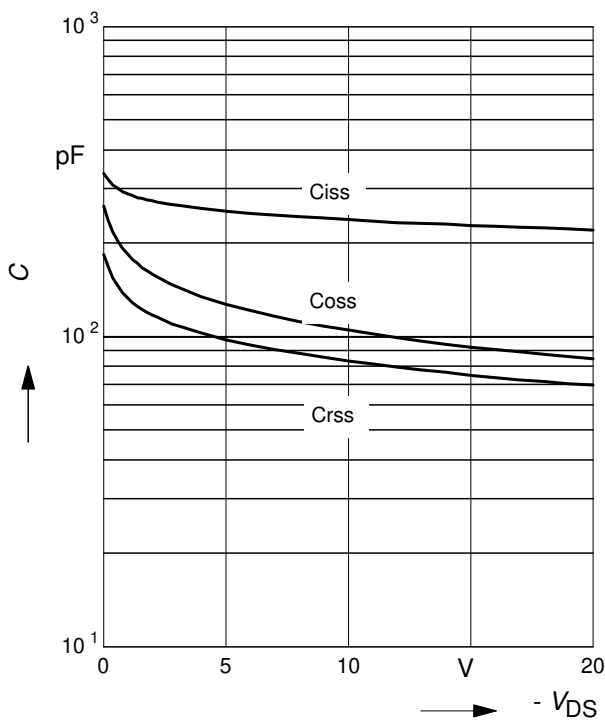
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -8 \mu\text{A}$



### 11 Typ. capacitances

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

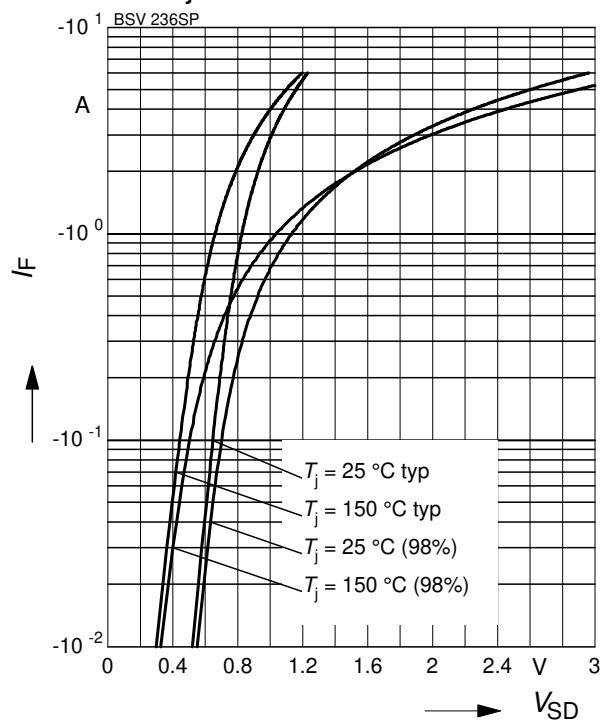
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$



### 12 Forward character. of reverse diode

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

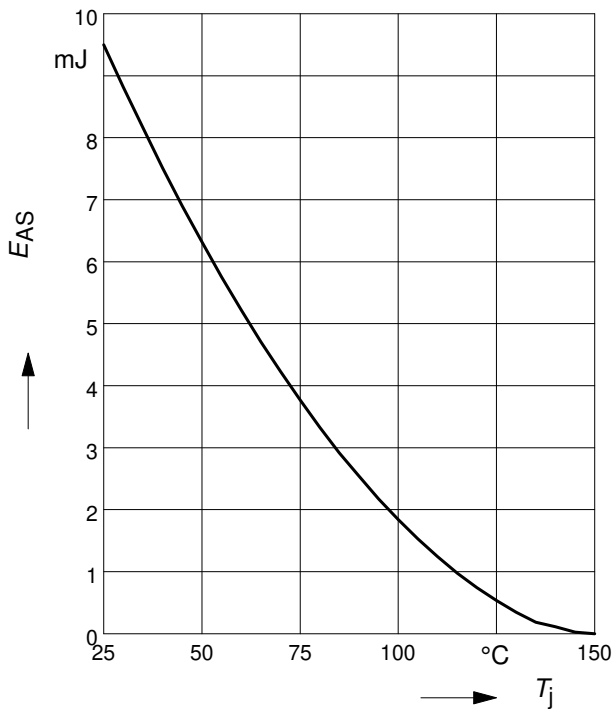
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**13 Typ. avalanche energy**

$E_{AS} = f(T_j)$ , par.:  $I_D = -1.5\text{ A}$

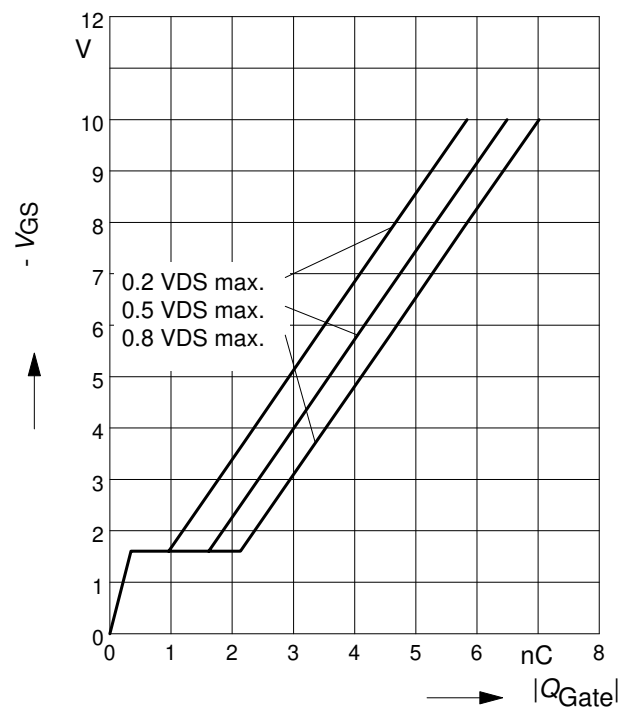
$V_{DD} = -10\text{ V}$ ,  $R_{GS} = 25\ \Omega$



**14 Typ. gate charge**

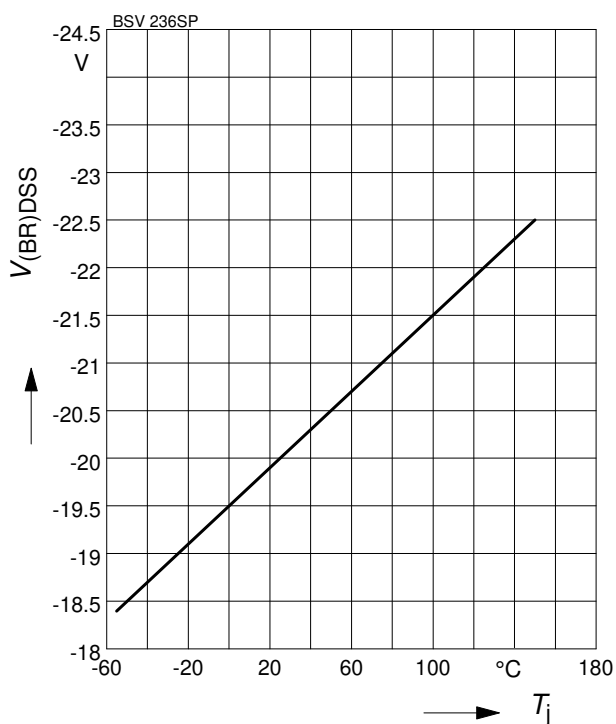
$|V_{GS}| = f(Q_{Gate})$

parameter:  $I_D = -1.5\text{ A}$  pulsed



**15 Drain-source breakdown voltage**

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



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