



Rev. 1.0

BSP297

## SIPMOS® Small-Signal-Transistor

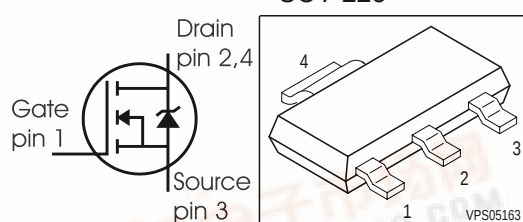
### Feature

- N-Channel
- Enhancement mode
- Logic Level
- dv/dt rated

### Product Summary

|              |      |          |
|--------------|------|----------|
| $V_{DS}$     | 200  | V        |
| $R_{DS(on)}$ | 1.8  | $\Omega$ |
| $I_D$        | 0.66 | A        |

SOT-223



| Type   | Package | Ordering Code | Tape and Reel Information | Marking |
|--------|---------|---------------|---------------------------|---------|
| BSP297 | SOT-223 | Q67000-S068   | E6327: 3000 pcs/reel      | BSP297  |

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

| Parameter                                                                                                                 | Symbol                | Value       | Unit              |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|-------------------|
| Continuous drain current                                                                                                  | $I_D$                 |             | A                 |
| $T_A = 25^\circ\text{C}$                                                                                                  |                       | 0.66        |                   |
| $T_A = 70^\circ\text{C}$                                                                                                  |                       | 0.53        |                   |
| Pulsed drain current                                                                                                      | $I_{D \text{ puls}}$  | 2.64        |                   |
| $T_A = 25^\circ\text{C}$                                                                                                  |                       |             |                   |
| Reverse diode dv/dt                                                                                                       | dv/dt                 | 6           | kV/ $\mu\text{s}$ |
| $I_S = 0.66\text{A}$ , $V_{DS} = 160\text{V}$ , $di/dt = 200\text{A}/\mu\text{s}$ , $T_{j\text{max}} = 150^\circ\text{C}$ |                       |             |                   |
| Gate source voltage                                                                                                       | $V_{GS}$              | $\pm 20$    | V                 |
| ESD Sensitivity (HBM) as per MIL-STD 883                                                                                  |                       | Class 1     |                   |
| Power dissipation                                                                                                         | $P_{\text{tot}}$      | 1.8         | W                 |
| $T_A = 25^\circ\text{C}$                                                                                                  |                       |             |                   |
| Operating and storage temperature                                                                                         | $T_j, T_{\text{stg}}$ | -55... +150 | $^\circ\text{C}$  |
| IEC climatic category; DIN IEC 68-1                                                                                       |                       | 55/150/56   |                   |

## Thermal Characteristics

| Parameter                                                 | Symbol     | Values |      |      | Unit |
|-----------------------------------------------------------|------------|--------|------|------|------|
|                                                           |            | min.   | typ. | max. |      |
| Characteristics                                           |            |        |      |      |      |
| Thermal resistance, junction - soldering point<br>(Pin 4) | $R_{thJS}$ | -      | 15   | 25   | K/W  |
| SMD version, device on PCB:                               | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                                          |            | -      | 80   | 115  |      |
| @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>            |            | -      | 48   | 70   |      |

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

| Parameter                                                                                                                            | Symbol        | Values |         |            | Unit     |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|---------|------------|----------|
|                                                                                                                                      |               | min.   | typ.    | max.       |          |
| Static Characteristics                                                                                                               |               |        |         |            |          |
| Drain-source breakdown voltage<br>$V_{GS}=0$ , $I_D=250\mu A$                                                                        | $V_{(BR)DSS}$ | 200    | -       | -          | V        |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D=400\mu A$                                                                          | $V_{GS(th)}$  | 0.8    | 1.4     | 1.8        |          |
| Zero gate voltage drain current<br>$V_{DS}=200V$ , $V_{GS}=0$ , $T_j=25^{\circ}C$<br>$V_{DS}=200V$ , $V_{GS}=0$ , $T_j=150^{\circ}C$ | $I_{DSS}$     | -<br>- | -<br>10 | 0.1<br>100 | $\mu A$  |
| Gate-source leakage current<br>$V_{GS}=20V$ , $V_{DS}=0$                                                                             | $I_{GSS}$     | -      | 1       | 10         |          |
| Drain-source on-state resistance<br>$V_{GS}=4.5V$ , $I_D=0.53A$                                                                      | $R_{DS(on)}$  | -      | 1.2     | 3          | $\Omega$ |
| Drain-source on-state resistance<br>$V_{GS}=10V$ , $I_D=0.66A$                                                                       | $R_{DS(on)}$  | -      | 1       | 1.8        |          |

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

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

### Dynamic Characteristics

|                              |              |                                                                                             |      |      |      |    |
|------------------------------|--------------|---------------------------------------------------------------------------------------------|------|------|------|----|
| Transconductance             | $g_{fs}$     | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ ,<br>$I_D = 0.53\text{A}$                     | 0.47 | 0.94 | -    | S  |
| Input capacitance            | $C_{iss}$    | $V_{GS} = 0$ , $V_{DS} = 25\text{V}$ ,<br>$f = 1\text{MHz}$                                 | -    | 286  | 357  | pF |
| Output capacitance           | $C_{oss}$    |                                                                                             | -    | 38   | 47   |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                             | -    | 15.7 | 23.5 |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD} = 100\text{V}$ , $V_{GS} = 4.5\text{V}$ ,<br>$I_D = 0.6\text{A}$ , $R_G = 15\Omega$ | -    | 5.2  | 7.8  | ns |
| Rise time                    | $t_r$        |                                                                                             | -    | 3.8  | 5.7  |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                             | -    | 49   | 74   |    |
| Fall time                    | $t_f$        |                                                                                             | -    | 19   | 29   |    |

### Gate Charge Characteristics

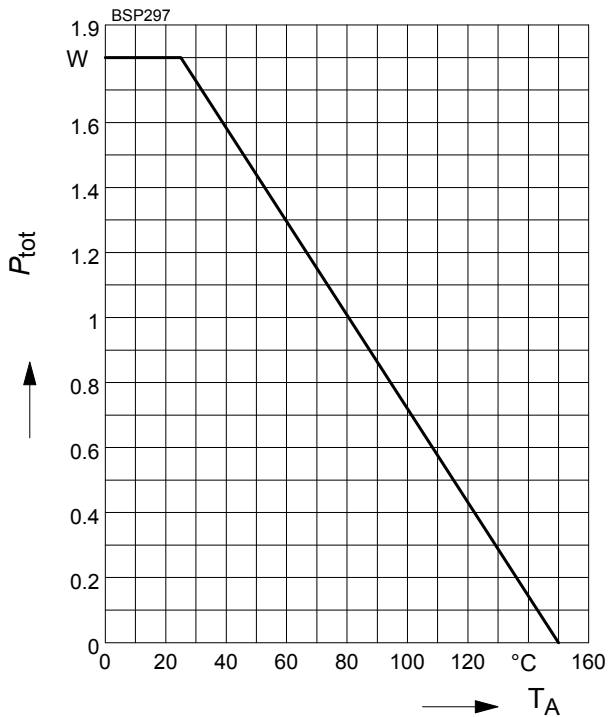
|                       |                 |                                                                                 |   |      |      |    |
|-----------------------|-----------------|---------------------------------------------------------------------------------|---|------|------|----|
| Gate to source charge | $Q_{gs}$        | $V_{DD} = 160\text{V}$ , $I_D = 0.66\text{A}$                                   | - | 0.7  | 0.9  | nC |
| Gate to drain charge  | $Q_{gd}$        |                                                                                 | - | 5.2  | 7.8  |    |
| Gate charge total     | $Q_g$           | $V_{DD} = 160\text{V}$ , $I_D = 0.66\text{A}$ ,<br>$V_{GS} = 0$ to $10\text{V}$ | - | 12.9 | 16.1 |    |
| Gate plateau voltage  | $V_{(plateau)}$ | $V_{DD} = 160\text{V}$ , $I_D = 0.66\text{A}$                                   | - | 2.7  | 3.3  | V  |

### Reverse Diode

|                                          |          |                                                                            |   |      |      |    |
|------------------------------------------|----------|----------------------------------------------------------------------------|---|------|------|----|
| Inverse diode continuous forward current | $I_S$    | $T_A = 25^\circ\text{C}$                                                   | - | -    | 0.66 | A  |
| Inv. diode direct current, pulsed        | $I_{SM}$ |                                                                            | - | -    | 2.64 |    |
| Inverse diode forward voltage            | $V_{SD}$ | $V_{GS} = 0$ , $I_F = I_S$                                                 | - | 0.84 | 1.2  | V  |
| Reverse recovery time                    | $t_{rr}$ | $V_R = 100\text{V}$ , $I_F = I_S$ ,<br>$di_F/dt = 100\text{A}/\mu\text{s}$ | - | 52   | 78   | ns |
| Reverse recovery charge                  | $Q_{rr}$ |                                                                            | - | 80   | 120  |    |

### 1 Power dissipation

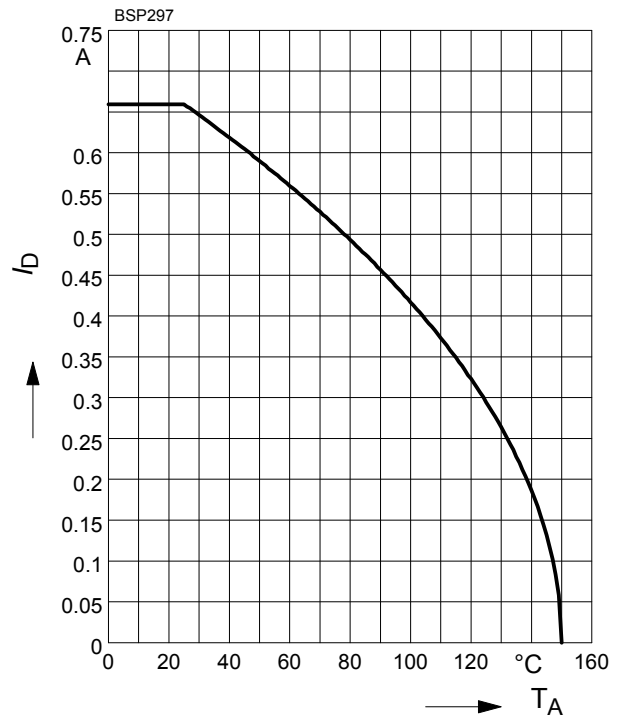
$$P_{\text{tot}} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

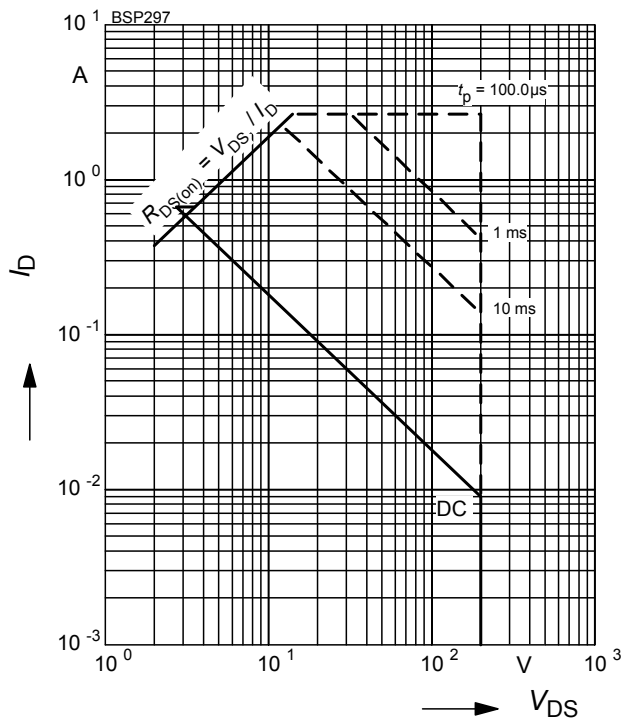
parameter:  $V_{GS} \geq 10$  V



### 3 Safe operating area

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

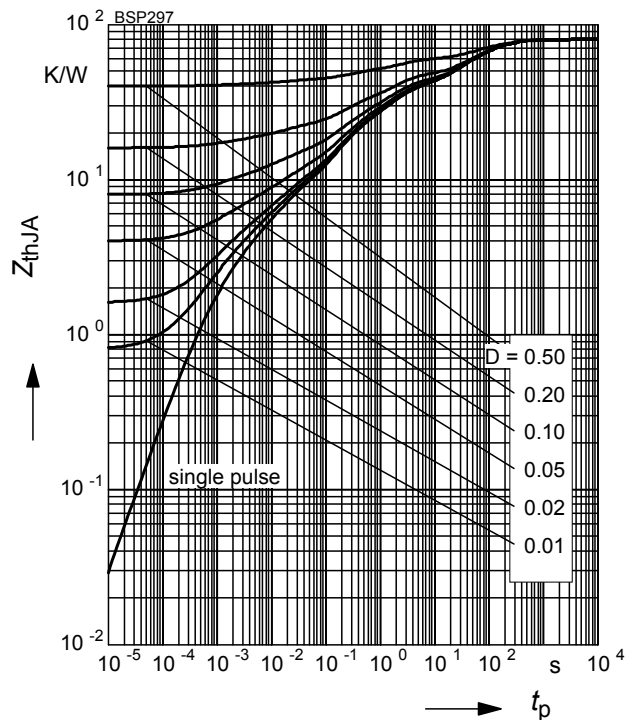
parameter:  $D = 0$ ,  $T_A = 25$  °C



### 4 Transient thermal impedance

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

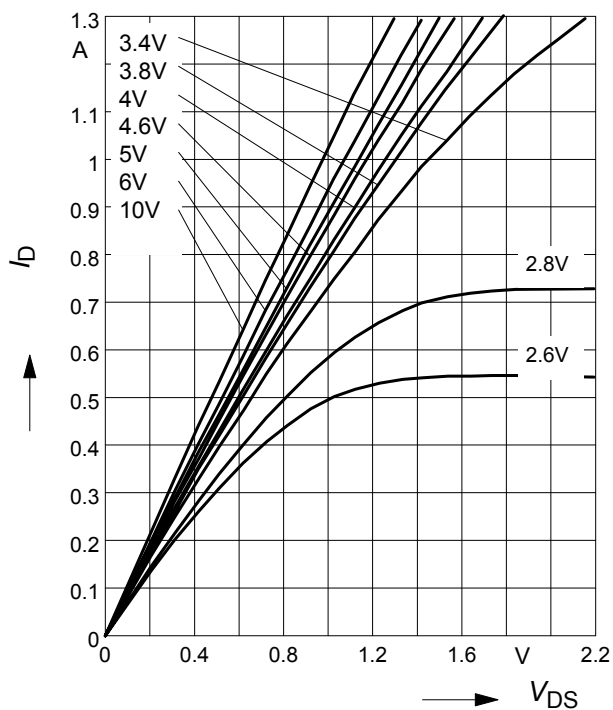
parameter:  $D = t_p/T$



### 5 Typ. output characteristic

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

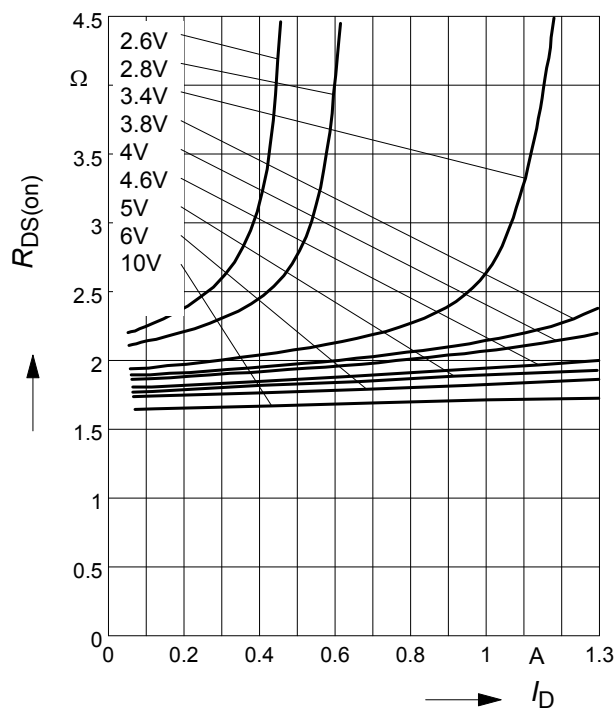
parameter:  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_{GS}$



### 6 Typ. drain-source on resistance

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

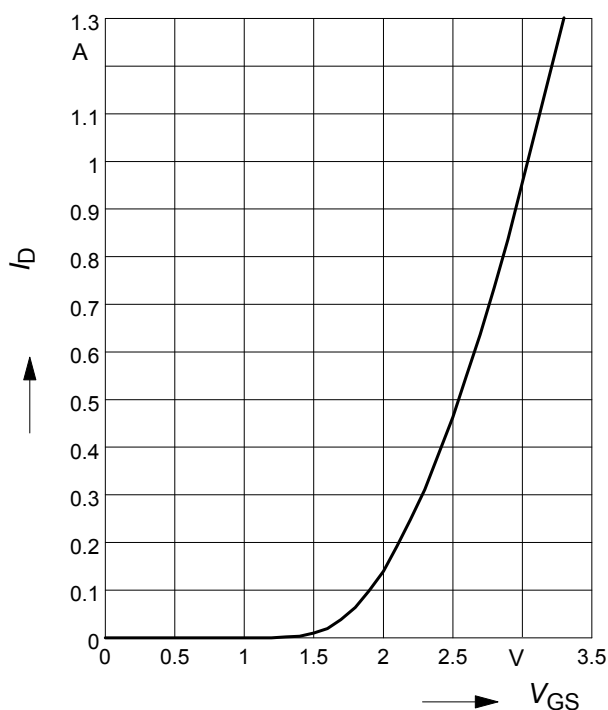
parameter:  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_{GS}$



### 7 Typ. transfer characteristics

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

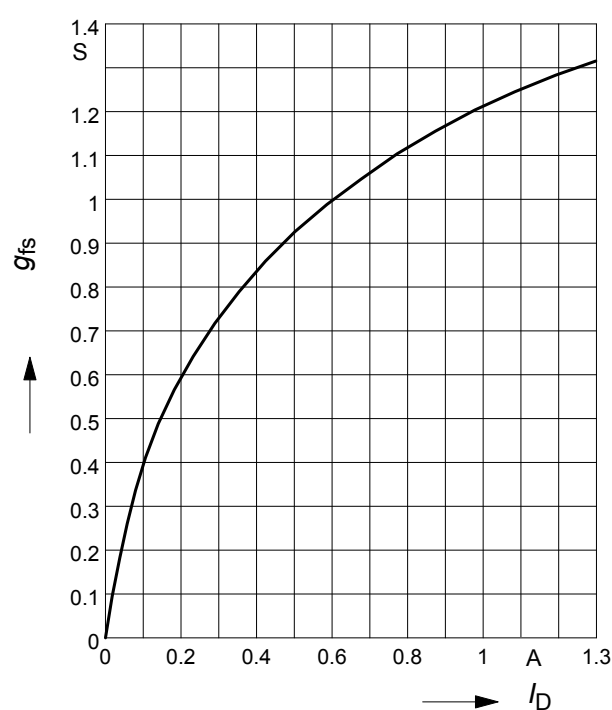
parameter:  $T_j = 25\text{ }^{\circ}\text{C}$



### 8 Typ. forward transconductance

$$g_{fs} = f(I_D)$$

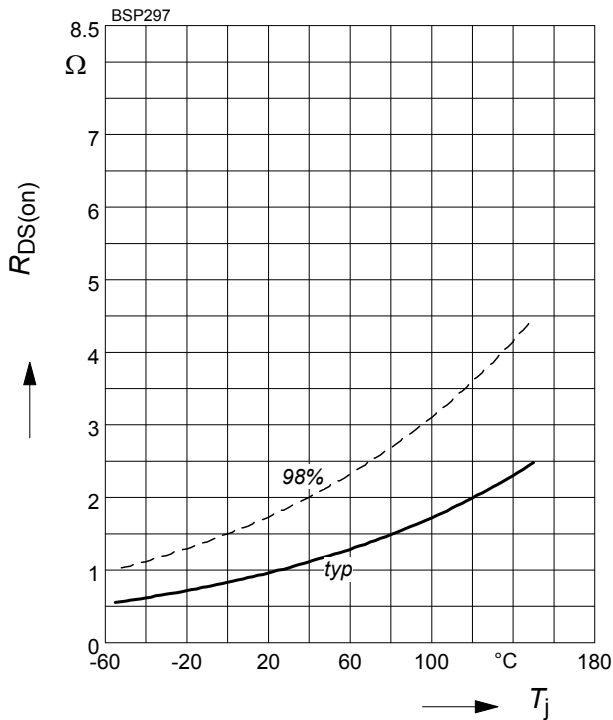
parameter:  $T_j = 25\text{ }^{\circ}\text{C}$



## 9 Drain-source on-state resistance

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

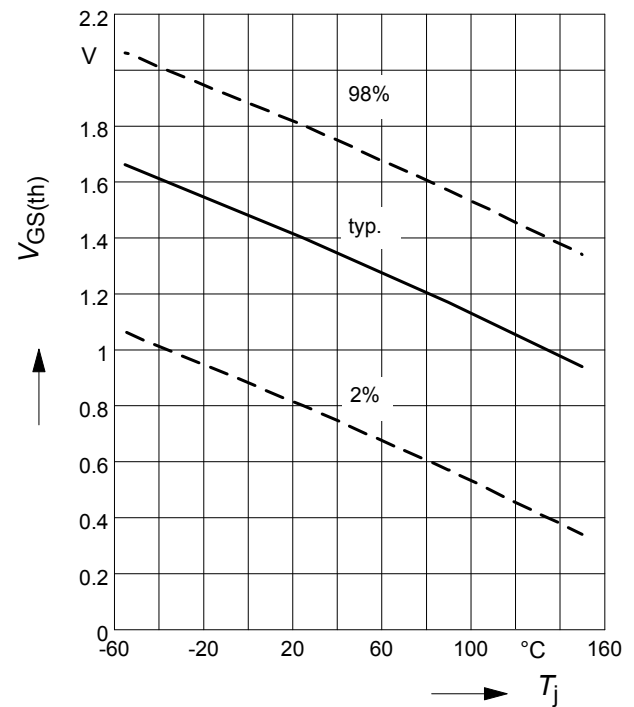
parameter:  $I_D = 0.66 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



## 10 Typ. gate threshold voltage

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

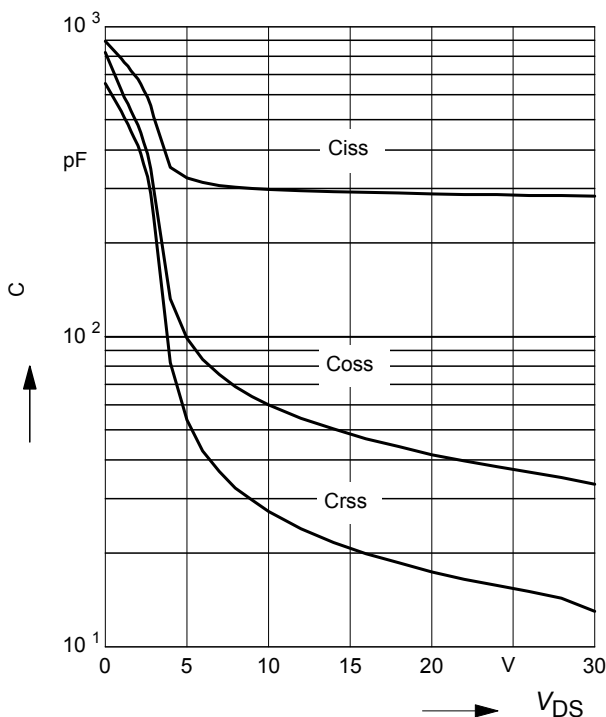
parameter:  $V_{GS} = V_{DS}$ ;  $I_D = 400 \mu\text{A}$



## 11 Typ. capacitances

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

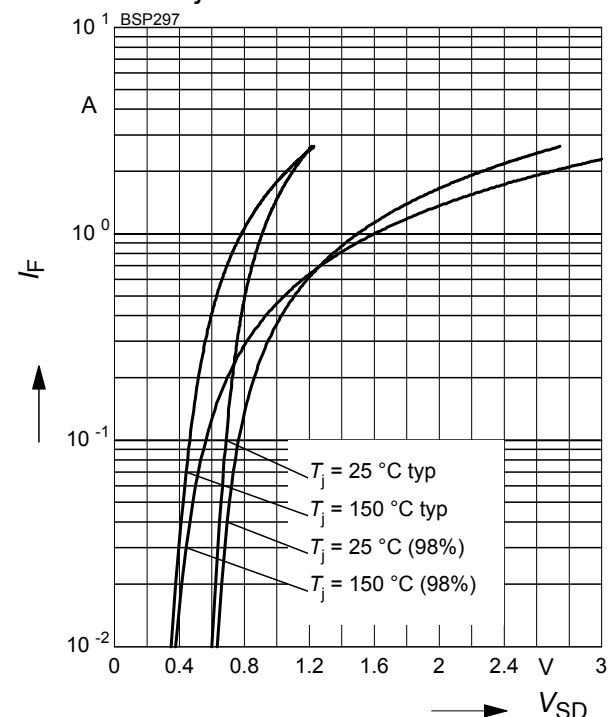
parameter:  $V_{GS} = 0$ ,  $f = 1 \text{ MHz}$ ,  $T_j = 25^{\circ}\text{C}$



## 12 Forward character. of reverse diode

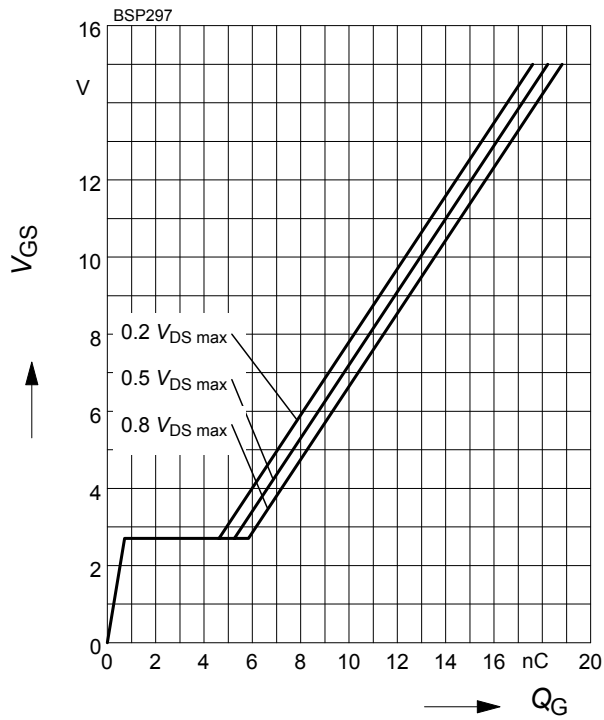
$$I_F = f(V_{SD})$$

parameter:  $T_j$

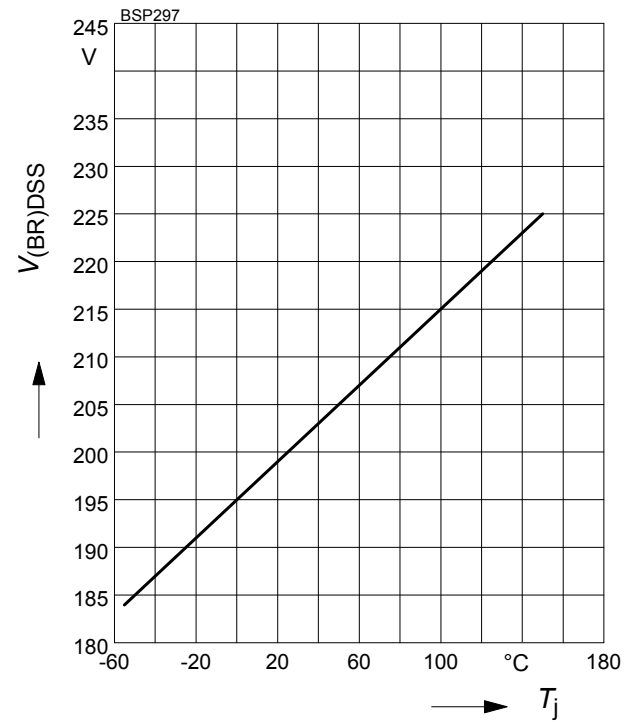


### 13 Typ. gate charge

 $V_{GS} = f(Q_G)$ ; parameter:  $V_{DS}$ ,

 $I_D = 0.66 \text{ A pulsed}, T_j = 25^\circ\text{C}$ 


### 14 Drain-source breakdown voltage

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


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