## SIPMOS® Power-Transistor

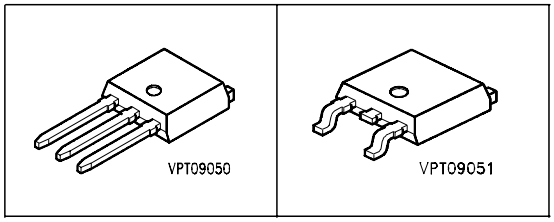
### Feature

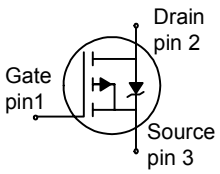
- P-Channel
- Enhancement mode
- Logic Level
- 175°C operating temperature
- Avalanche rated
- d*v*/d*t* rated
- Pb-free lead plating; RoHS compliant

**Product Summary**

| | | |
|---|---|---|
| $V_{DS}$ | -60 | V |
| $R_{DS(on)}$ | 0.25 | Ω |
| $I_D$ | -9.7 | A |

PG-TO251-3-1 PG-TO252




| Type | Package | Ordering Code |
|---|---|---|
| SPD09P06PL | PG-TO252 | Q67042-S4007 |
| SPU09P06PL | PG-TO251-3-1 | Q67042-S4020 |

**Maximum Ratings**,at $T_j$ = 25 °C, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Continuous drain current | $I_D$ | | A |
| $T_C$=25°C | | -9.7 | |
| $T_C$=100°C | | -6.8 | |
| Pulsed drain current | $I_{D\ puls}$ | -38.8 | |
| $T_C$=25°C | | | |
| Avalanche energy, single pulse | $E_{AS}$ | 70 | mJ |
| $I_D$=-9.7 A , $V_{DD}$=-25V, $R_{GS}$=25Ω | | | |
| Avalanche energy, periodic limited by $T_{jmax}$ | $E_{AR}$ | 4.2 | |
| Reverse diode d*v*/d*t* | d*v*/d*t* | 6 | kV/µs |
| $I_S$=-9.7A, $V_{DS}$=-48, d*i*/d*t*=200A/µs, $T_{jmax}$=175°C | | | |
| Gate source voltage | $V_{GS}$ | ±20 | V |
| Power dissipation | $P_{tot}$ | 42 | W |
| $T_C$=25°C | | | |
| Operating and storage temperature | $T_j$ , $T_{stg}$ | -55... +175 | °C |
| IEC climatic category; DIN IEC 68-1 | | 55/175/56 | |

## Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Characteristics** | | | | | |
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 3.6 | K/W |
| Thermal resistance, junction - ambient, leaded | $R_{thJA}$ | - | - | 100 | |
| SMD version, device on PCB: | $R_{thJA}$ | | | | |
| @ min. footprint | | - | - | 75 | |
| @ 6 cm$^2$ cooling area [1)] | | - | - | 50 | |

**Electrical Characteristics**, at $T_j$ = 25 °C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Static Characteristics** | | | | | |
| Drain-source breakdown voltage<br>$V_{GS}$=0V, $I_D$=-250µA | $V_{(BR)DSS}$ | -60 | - | - | V |
| Gate threshold voltage, $V_{GS}$ = $V_{DS}$<br>$I_D$=-250µA | $V_{GS(th)}$ | -1 | -1.5 | -2 | |
| Zero gate voltage drain current | $I_{DSS}$ | | | | µA |
| $V_{DS}$=-60V, $V_{GS}$=0V, $T_j$=25°C | | - | -0.1 | -1 | |
| $V_{DS}$=-60V, $V_{GS}$=0V, $T_j$=150°C | | - | -10 | -100 | |
| Gate-source leakage current<br>$V_{GS}$=-20V, $V_{DS}$=0V | $I_{GSS}$ | - | -10 | -100 | nA |
| Drain-source on-state resistance<br>$V_{GS}$=-4.5V, $I_D$=-5.4A | $R_{DS(on)}$ | - | 0.3 | 0.4 | Ω |
| Drain-source on-state resistance<br>$V_{GS}$=-10V, $I_D$=-6.8A | $R_{DS(on)}$ | - | 0.2 | 0.25 | |

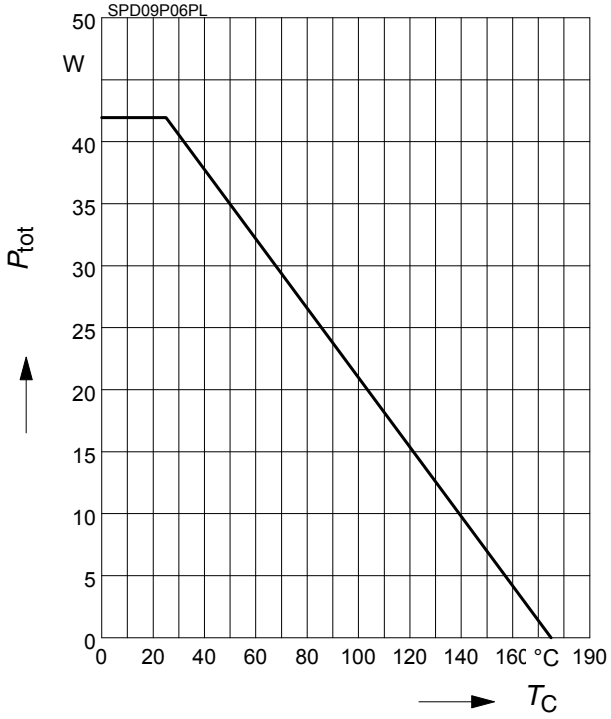
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**, at $T_j$ = 25 °C, unless otherwise specified

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic Characteristics** | | | | | | |
| Transconductance | $g_{fs}$ | $V_{DS}\geq 2*I_D*R_{DS(on)max}$, $I_D$=-5.4 | 1.8 | 3.5 | - | S |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=-25V, $f$=1MHz | - | 360 | 450 | pF |
| Output capacitance | $C_{oss}$ | | - | 103 | 130 | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 40 | 50 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-30V, $V_{GS}$=-4.5V, $I_D$=-5.4, $R_G$=6Ω | - | 11 | 17 | ns |
| Rise time | $t_r$ | $V_{DD}$=-30V, $V_{GS}$=-4.5V, $I_D$=-5.4A, $R_G$=6Ω | - | 168 | 252 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 49 | 74 | |
| Fall time | $t_f$ | | - | 89 | 134 | |
| **Gate Charge Characteristics** | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=-48V, $I_D$=-9.7A | - | 1.3 | 2 | nC |
| Gate to drain charge | $Q_{gd}$ | | - | 5.1 | 7.5 | |
| Gate charge total | $Q_g$ | $V_{DD}$=-48V, $I_D$=-9.7A, $V_{GS}$=0 to -10V | - | 14 | 21 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD}$=-48V, $I_D$=-9.7A | - | -4.1 | - | V |
| **Reverse Diode** | | | | | | |
| Inverse diode continuous forward current | $I_S$ | $T_C$=25°C | - | - | -9.7 | A |
| Inverse diode direct current, pulsed | $I_{SM}$ | | - | - | -38.8 | |
| Inverse diode forward voltage | $V_{SD}$ | $V_{GS}$=0V, $I_F$=-9.7A | - | -1.1 | -1.4 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=-30V, $I_F$=$I_S$, $di_F/dt$=100A/µs | - | 52 | 76 | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 64 | 96 | nC |

## 1 Power dissipation

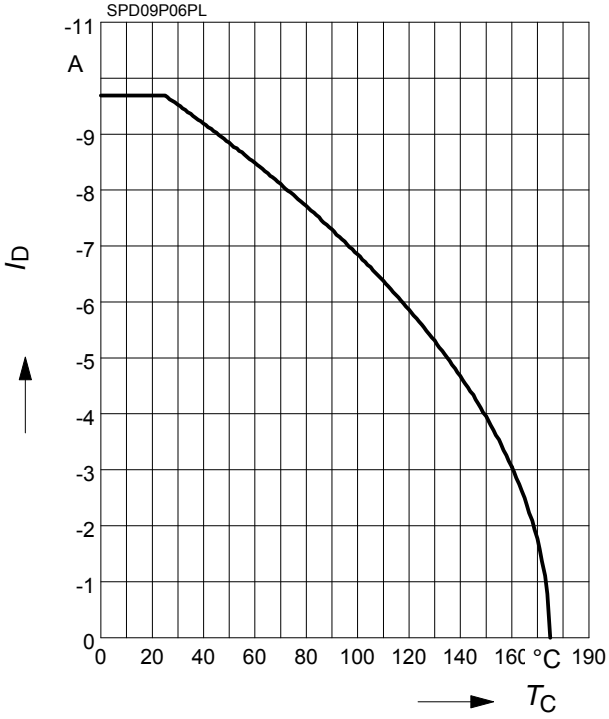
$P_{tot} = f(T_C)$




## 2 Drain current

$I_D = f(T_C)$

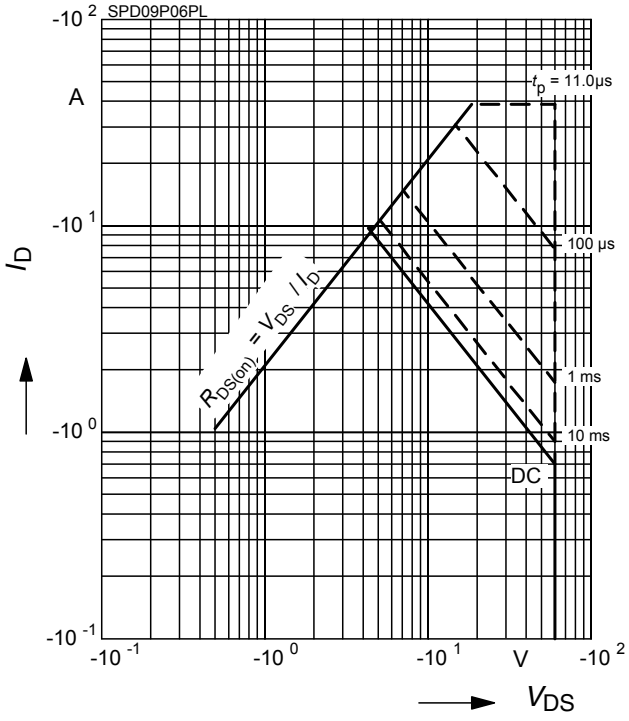
parameter: $V_{GS} \geq 10$ V




## 3 Safe operating area

$I_D = f(V_{DS})$

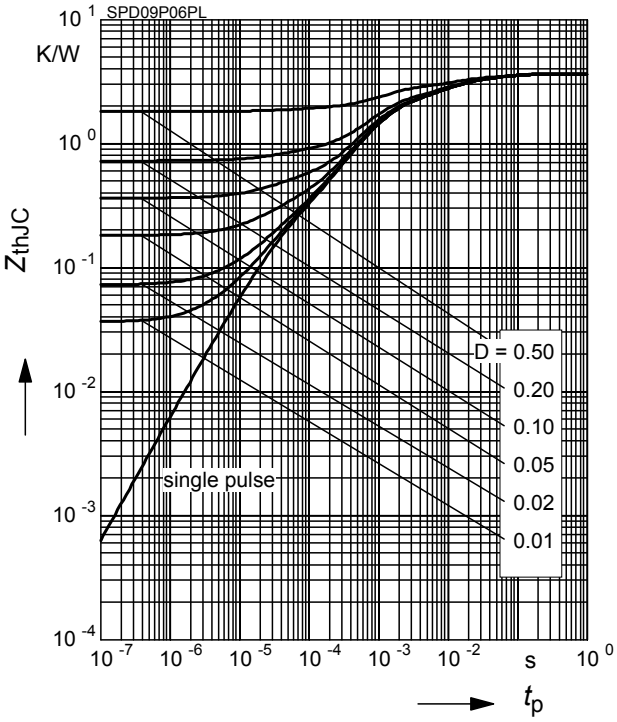
parameter : $D = 0$ , $T_C = 25$ °C




## 4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

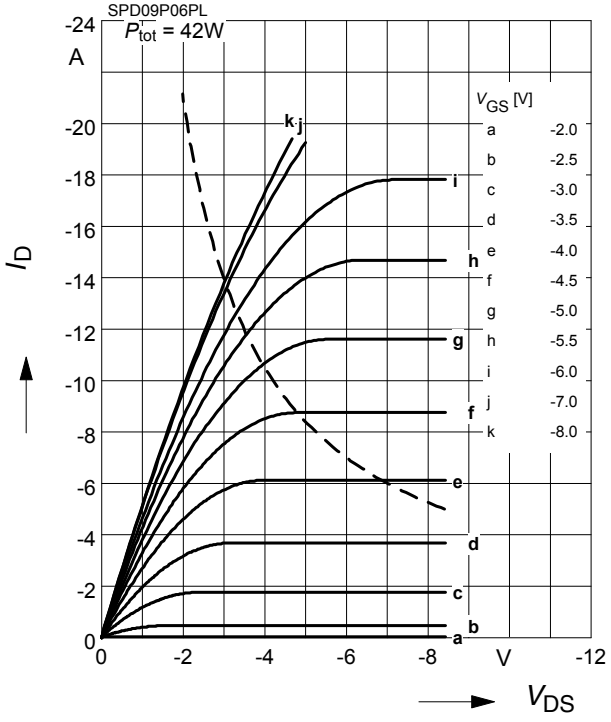
parameter : $D = t_p/T$



## 5 Typ. output characteristic

$I_D = f(V_{DS})$; $T_j$=25°C

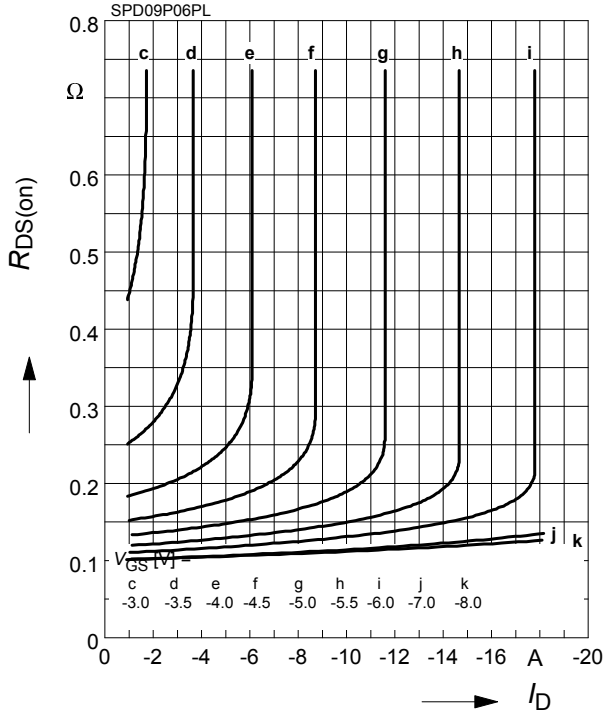
parameter: $t_p$ = 80 µs




## 6 Typ. drain-source on resistance

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

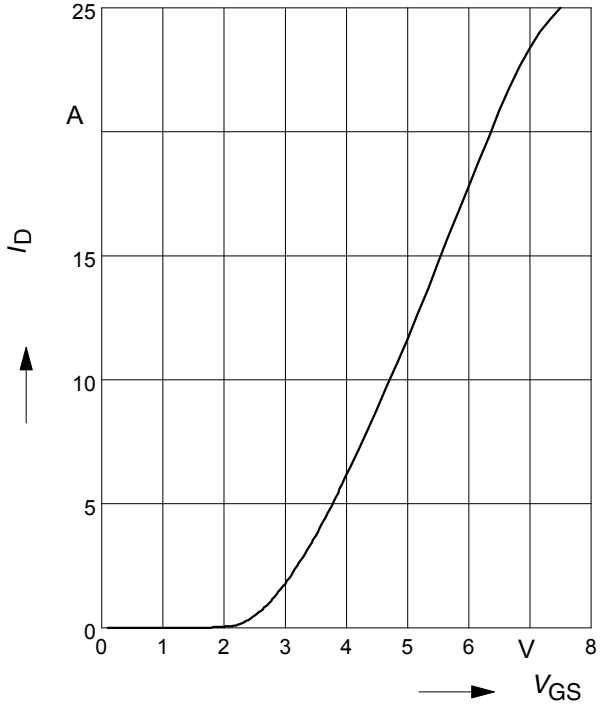
parameter: $V_{GS}$




## 7 Typ. transfer characteristics

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

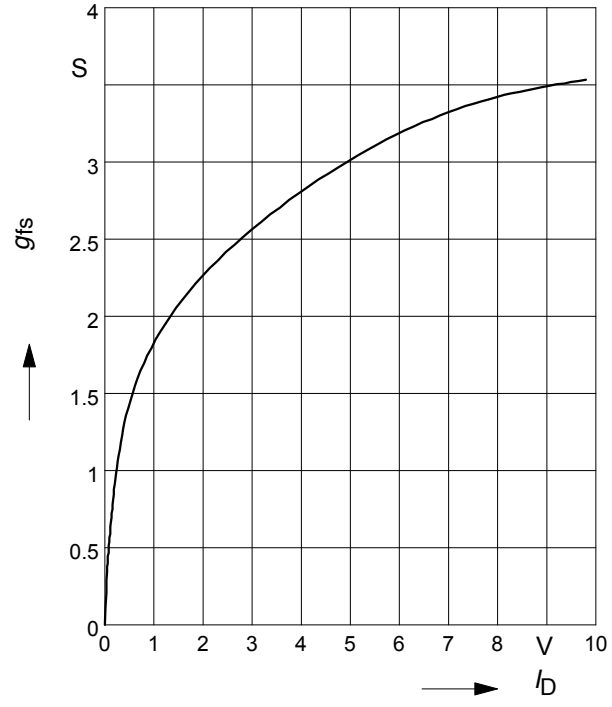
parameter: $t_p$ = 80 µs




## 8 Typ. forward transconductance

$g_{fs}$ = f($I_D$); $T_j$=25°C

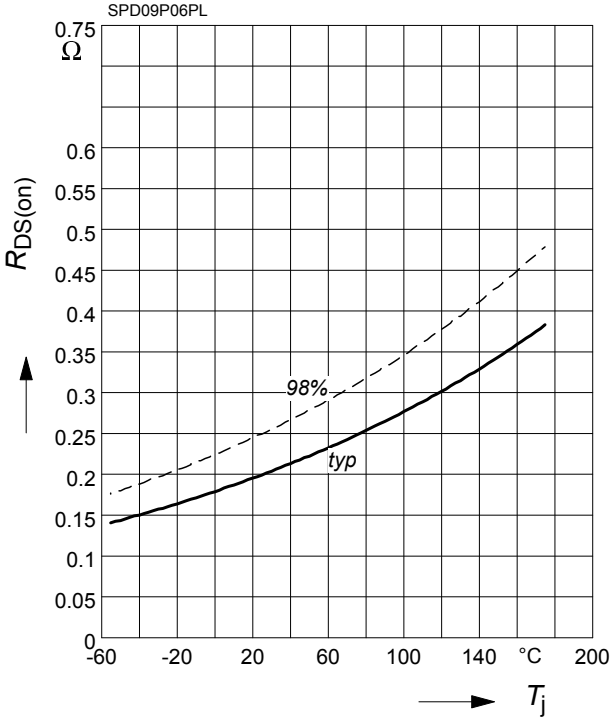
parameter: $g_{fs}$



### 9 Drain-source on-state resistance

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

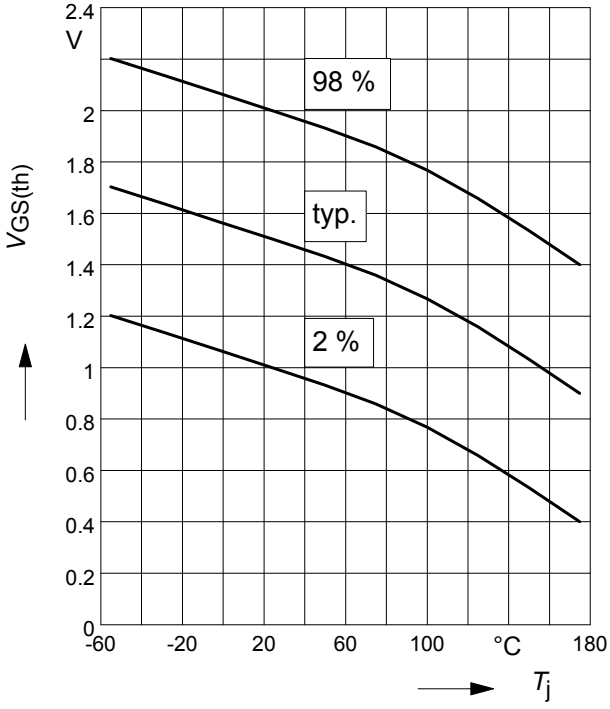
parameter : $I_D$ = -6.8 A, $V_{GS}$ = -10 V




### 10 Gate threshold voltage

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

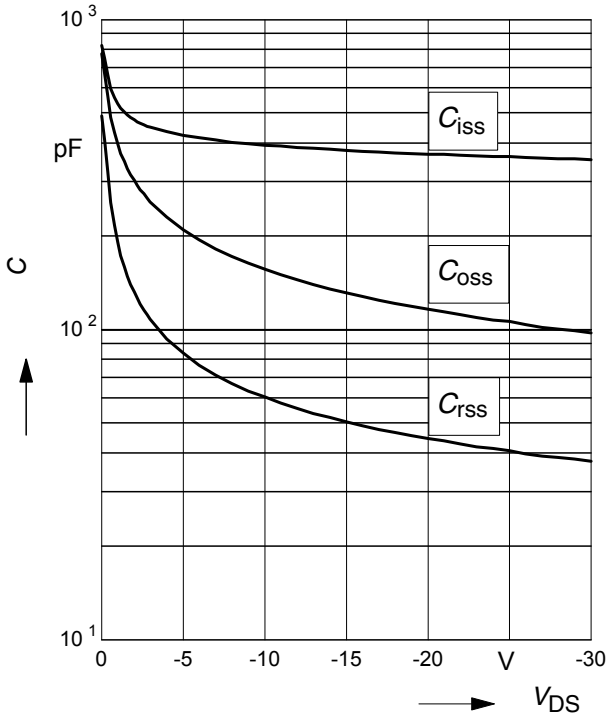
parameter: $V_{GS} = V_{DS}$, $I_D$ = -250 µA




### 11 Typ. capacitances

$C = f(V_{DS})$

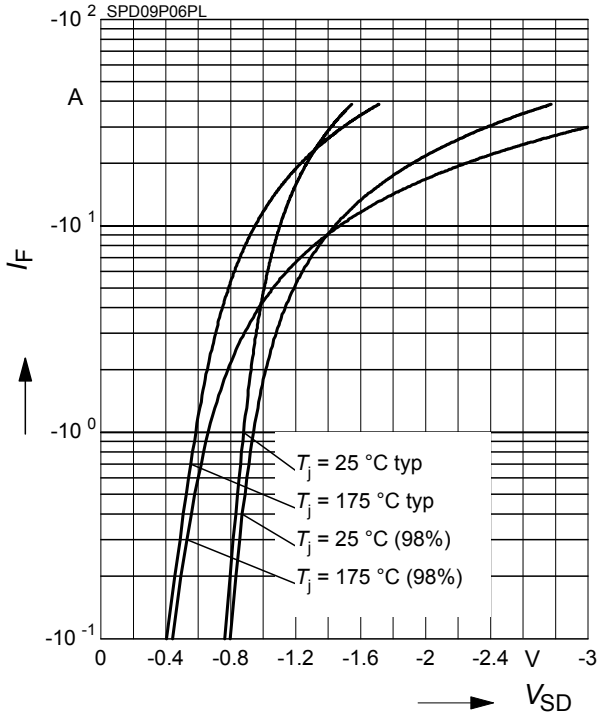
parameter: $V_{GS}$=0V, $f$=1 MHz




### 12 Forward character. of reverse diode

$I_F = f(V_{SD})$

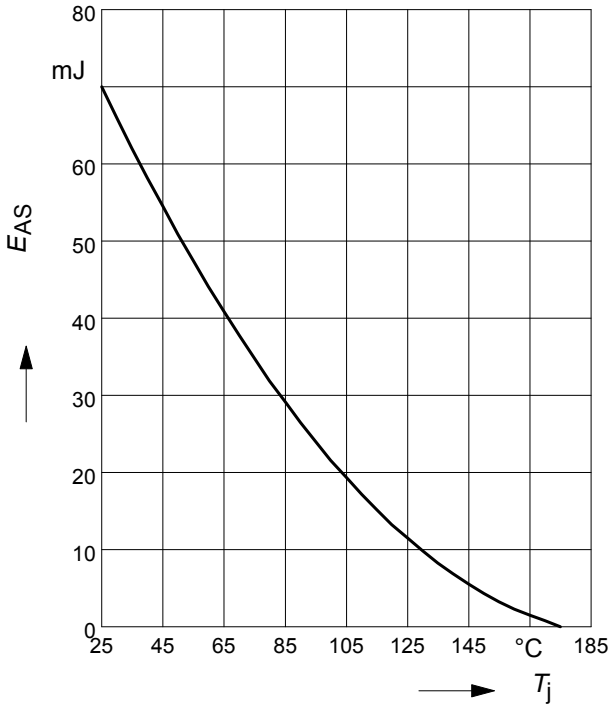
parameter: $T_j$ , tp = 80 µs



## 13 Typ. avalanche energy

$E_{AS} = f(T_j)$

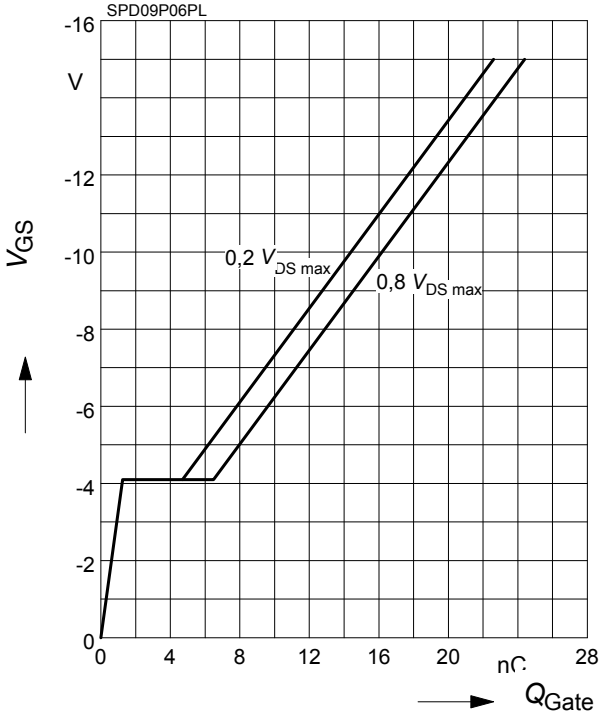
par.: $I_D$ = -9.7 A , $V_{DD}$ = -25 V, $R_{GS}$ = 25 Ω




## 14 Typ. gate charge

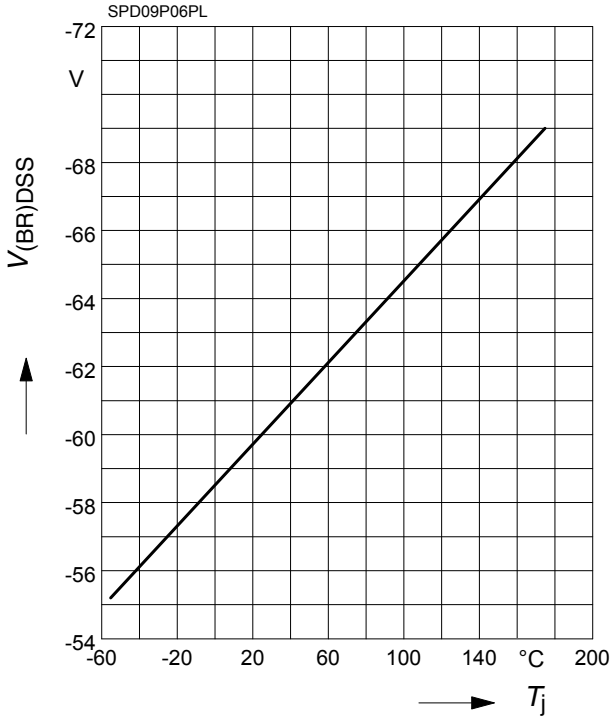
$V_{GS} = f(Q_{Gate})$

parameter: $I_D$ = -9.7 A pulsed




## 15 Drain-source breakdown voltage

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



**Published by**
**Infineon Technologies AG,**
**Bereichs Kommunikation**
**St.-Martin-Strasse 53,**
**D-81541 München**


**Attention please!**
The information herein is given to describe certain components and shall not be considered as warranted characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

Infineon Technologies is an approved CECC manufacturer.

**Information**
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office in Germany or our Infineon Technologies Reprensatives worldwide (see address list).

**Warnings**
Due to technical requirements components may contain dangerous substances.
For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.