# SIPMOS® Power-Transistor

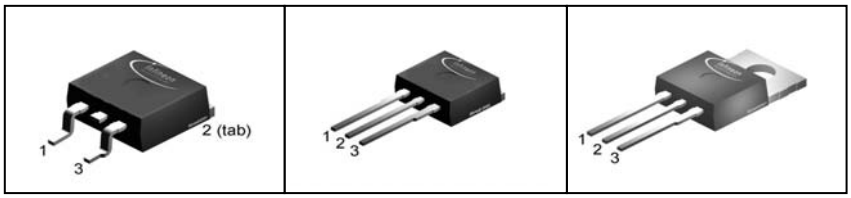
## Features

- N-channel - Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Avalanche test
- Repetive Avalanche up to $T_{jmax}$ = 175 °C
- d*v*/d*t* rated

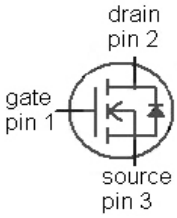
## Product Summary

| | | |
|---|---|---|
| $V_{DS}$ | 55 | V |
| $R_{DS(on),max}$ (SMD version) | 7.7 | mΩ |
| $I_D$ | 80 | A |

P-TO263-3-2 P-TO262-3-1 P-TO220-3-1




| Type | Package | Ordering Code | Marking |
|---|---|---|---|
| SPB80N06S-08 | P-TO263-3-2 | Q67060-S6185 | 1N0608 |
| SPI80N06S-08 | P-TO262-3-1 | Q67060-S6187 | 1N0608 |
| SPP80N06S-08 | P-TO220-3-1 | Q67060-S6186 | 1N0608 |




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

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous drain current[1] | $I_D$ | $T_C$=25 °C, $V_{GS}$=10 V | 80 | A |
| | | $T_C$=100 °C, $V_{GS}$=10 V | 80 | |
| Pulsed drain current[2] | $I_{D,pulse}$ | $T_C$=25 °C | 320 | |
| Avalanche energy, single pulse | $E_{AS}$ | $I_D$=80 A, $R_{GS}$=25 Ω, $V_{DD}$=25 V | 700 | mJ |
| Avalanche energy, periodic[2] | $E_{AR}$ | $T_j$≤175 °C | 30 | |
| Reverse diode d*v*/d*t*[2] | d*v*/d*t* | $I_D$=80 A, $V_{DS}$=40 V, d*i*/d*t*=200 A/µs, $T_{j,max}$=175 °C | 6 | kV/µs |
| Gate source voltage | $V_{GS}$ | | ±20 | V |
| Power dissipation | $P_{tot}$ | $T_C$=25 °C | 300 | W |
| Operating and storage temperature | $T_j$, $T_{stg}$ | | -55 ... +175 | °C |
| IEC climatic category; DIN IEC 68-1 | | | 55/175/56 | |

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Thermal characteristics**[2] | | | | | | |
| Thermal resistance, junction - case | $R_{thJC}$ | | - | 0.38 | 0.5 | K/W |
| Thermal resistance, junction - ambient, leaded | $R_{thJA}$ | | - | - | 62 | |
| SMD version, device on PCB | $R_{thJA}$ | minimal footprint | - | - | 62 | |
| | | 6 cm2 cooling area[3] | - | - | 40 | |
| **Electrical characteristics,** at $T_j$=25 °C, unless otherwise specified | | | | | | |
| **Static characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$=0 V, $I_D$=1 mA | 55 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=240 µA | 2.1 | 3.0 | 4 | |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=25 V, $V_{GS}$=0 V, $T_j$=25 °C | - | 0.1 | 1 | µA |
| | | $V_{DS}$=25 V, $V_{GS}$=0 V, $T_j$=150 °C[2] | - | 10 | 100 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=20 V, $V_{DS}$=0 V | - | 10 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=10 V, $I_D$=80 A | - | 6.5 | 8 | mΩ |
| | | $V_{GS}$=10 V, $I_D$=80 A SMD version | - | 6.2 | 7.7 | |
| Transconductance[2] | $g_{fs}$ | $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, $I_D$=80 A | - | 73 | - | S |

footnote on page 3

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic characteristics**[2] | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=25 V, $f$=1 MHz | - | 3660 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 1075 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 540 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=30 V, $I_D$=80 A, $V_{GS}$=10 V, $R_G$=2.4 Ω | - | 22 | - | ns |
| Rise time | $t_r$ | | - | 53 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 54 | - | |
| Fall time | $t_f$ | | - | 32 | - | |
| **Gate Charge Characteristics**[2] | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=44 V, $I_D$=80 A, $V_{GS}$=0 to 10 V | - | 19 | - | nC |
| Gate to drain charge | $Q_{gd}$ | | - | 62 | - | |
| Gate charge total | $Q_g$ | | - | 125 | 187 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 5.4 | - | V |
| **Reverse Diode**[2] | | | | | | |
| Diode continous forward current | $I_S$ | $T_C$=25 °C | - | - | 80 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 320 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=80 A, $T_j$=25 °C | - | 0.9 | 1.3 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=27.5 V, $I_F$=$I_S$, d$i_F$/d$t$=100 A/µs | - | 105 | | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 30 | - | nC |

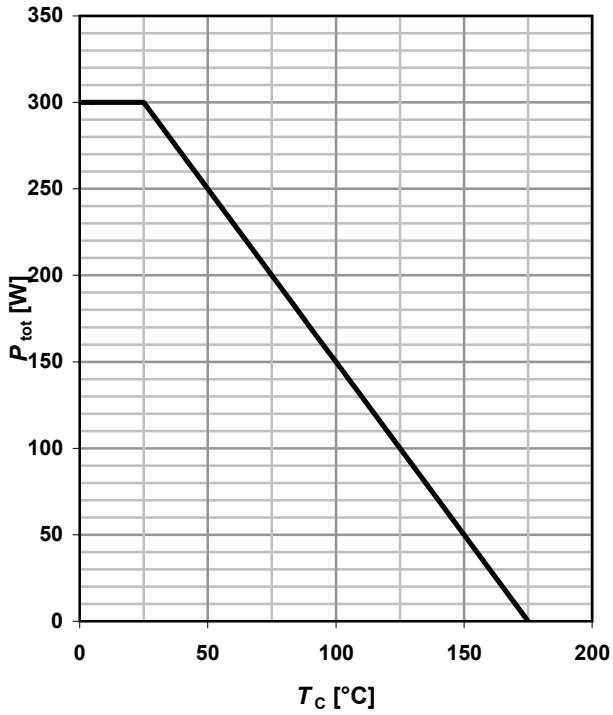
[1] Current is limited by bondwire; with an $R_{thJC}$=0.5 K/W the chip is able to carry 132A at 25°C. For detailed information see Application Note APPS071E at *www.infineon.com/optimos*

[2] Defined by design not subjected to production test.

[3] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm$^2$ (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

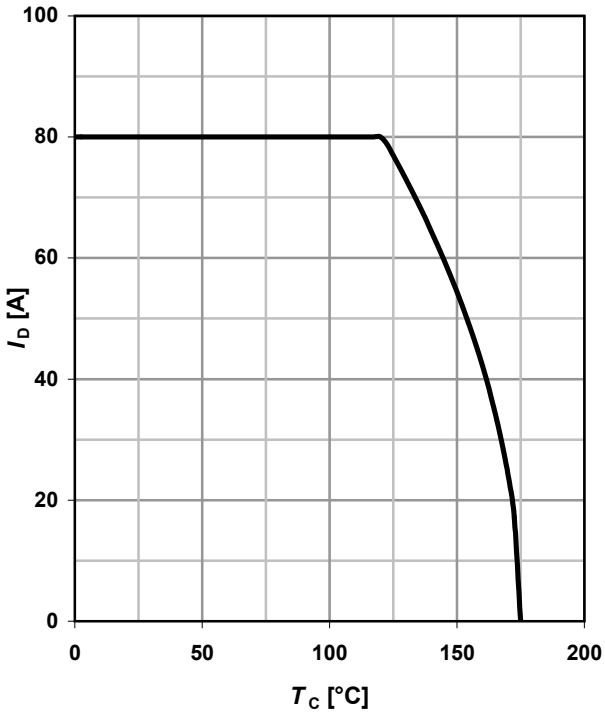
## 1 Power dissipation

$P_{tot}=f(T_C)$




## 2 Drain current

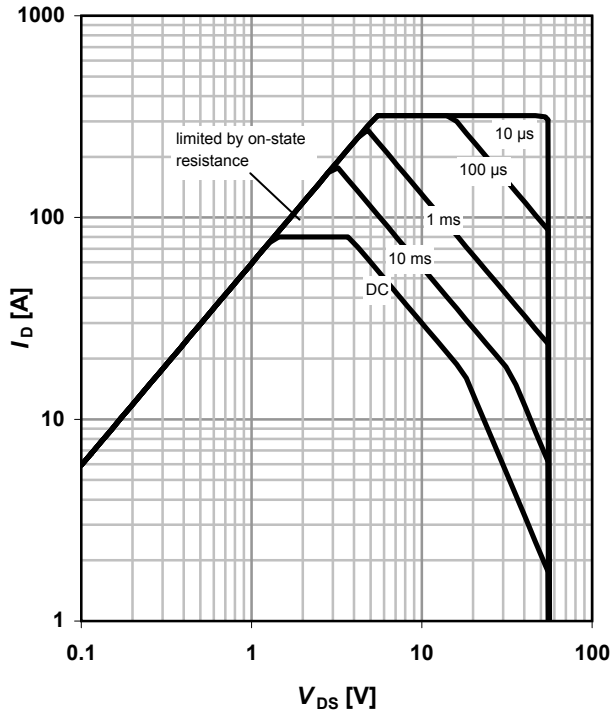
$I_D=f(T_C)$; $V_{GS}\geq 10$ V




## 3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

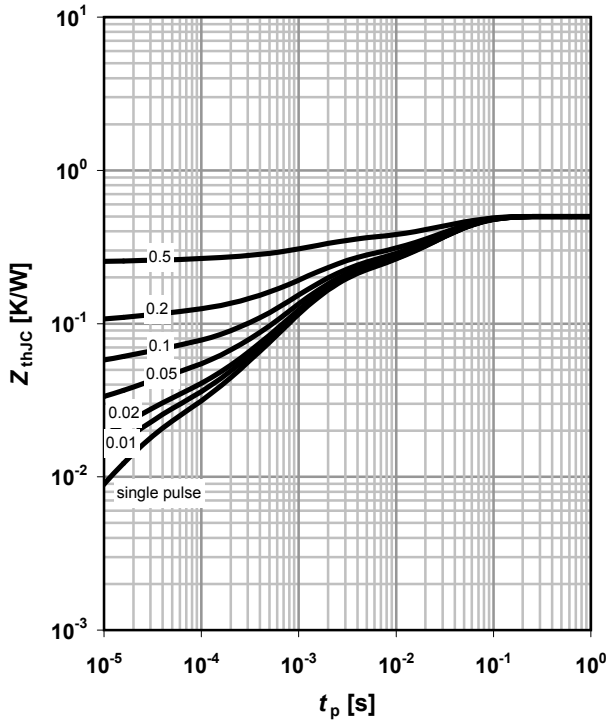
parameter: $t_p$




## 4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

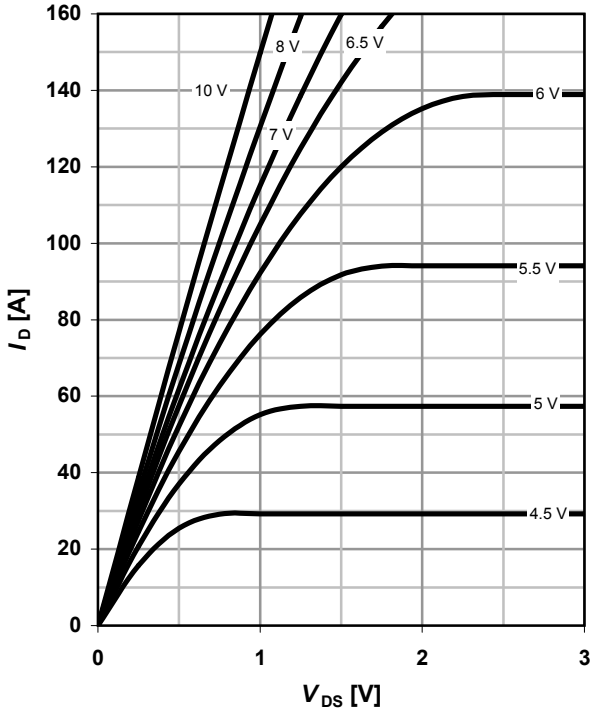
parameter: $D=t_p/T$



## 5 Typ. output characteristics

$I_D$=f($V_{DS}$); $T_j$=25 °C

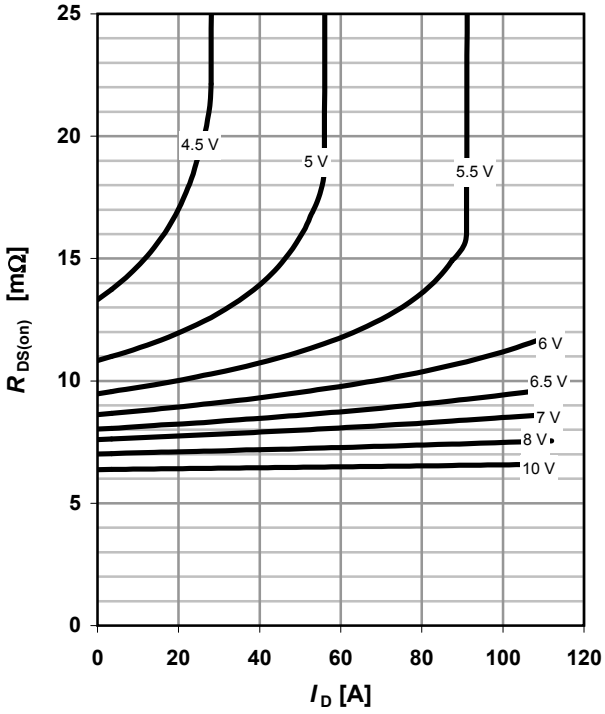
parameter: $V_{GS}$




## 6 Typ. drain-source on resistance

$R_{DS(on)}$=f($I_D$); $T_j$=25 °C

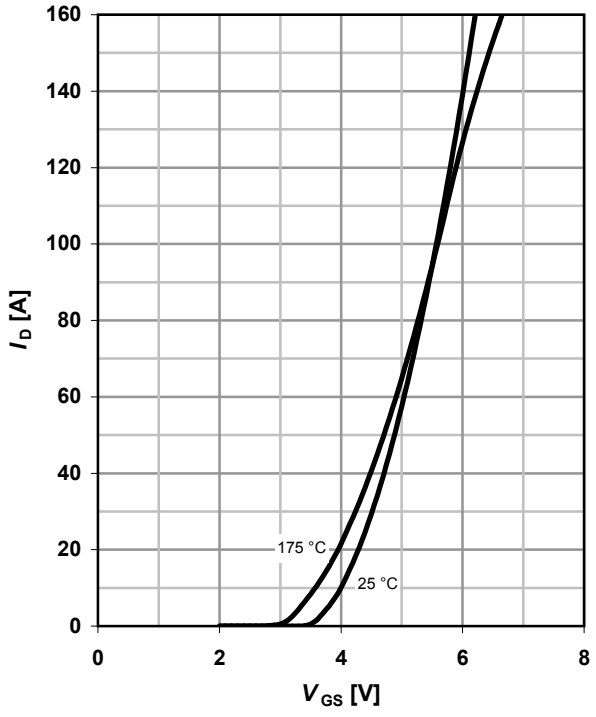
parameter: $V_{GS}$




## 7 Typ. transfer characteristics

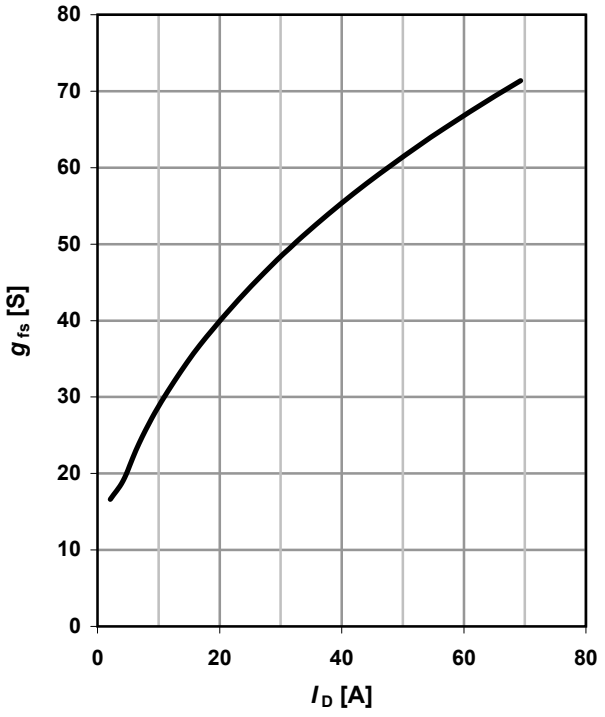
$I_D$=f($V_{GS}$); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: $T_j$



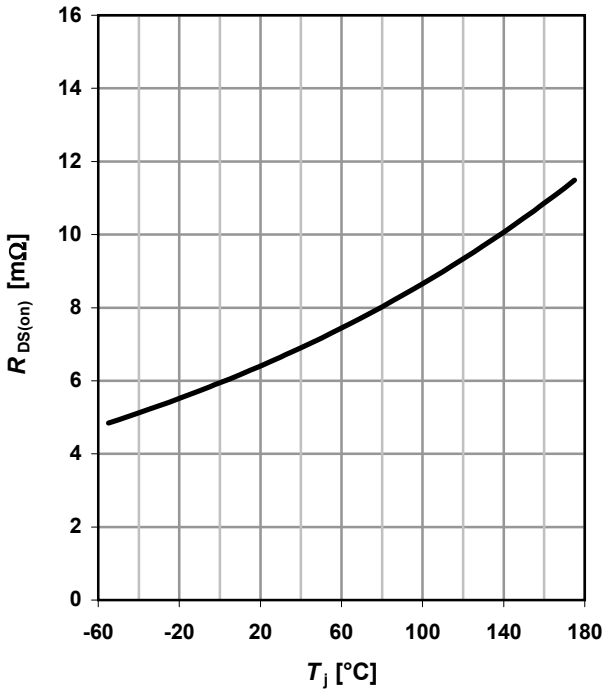

## 8 Typ. forward transconductance

$g_{fs}$=f($I_D$); $T_j$=25 °C



## 9 Typical Drain-source on-state resistance

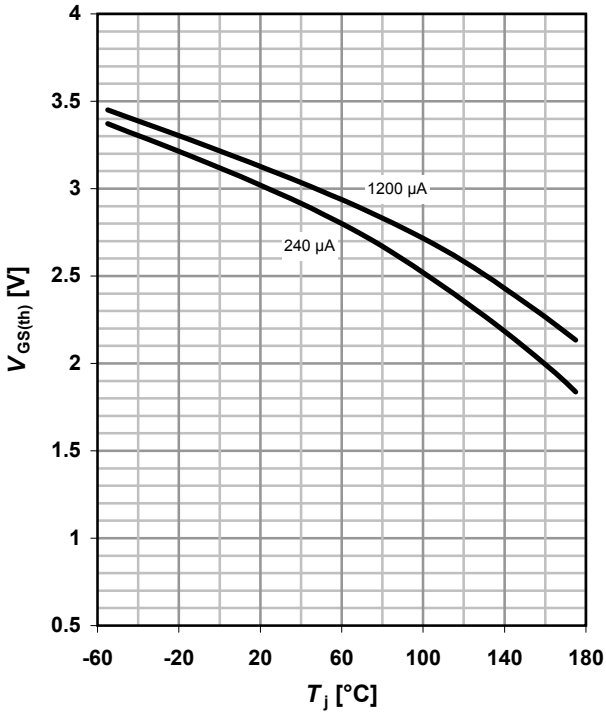
$R_{DS(on)}=f(T_j)$; $I_D=80$ A; $V_{GS}=10$ V




## 10 Typ. gate threshold voltage

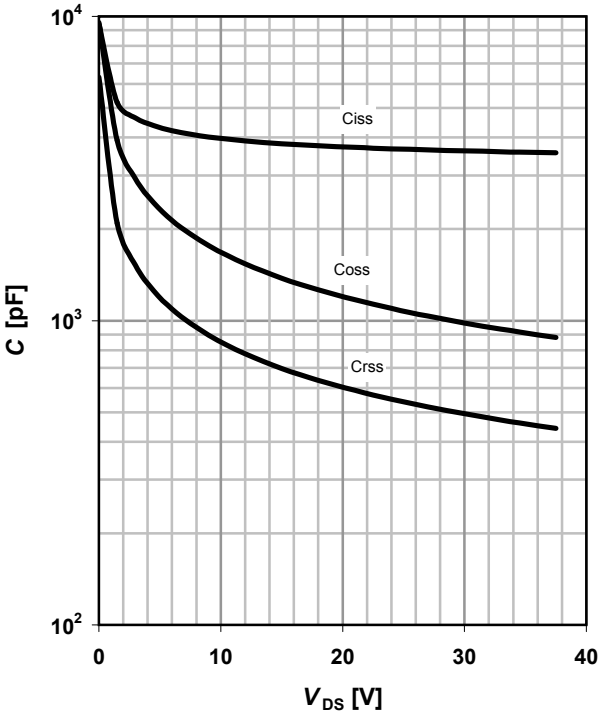
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$

parameter: $I_D$




## 11 Typ. capacitances

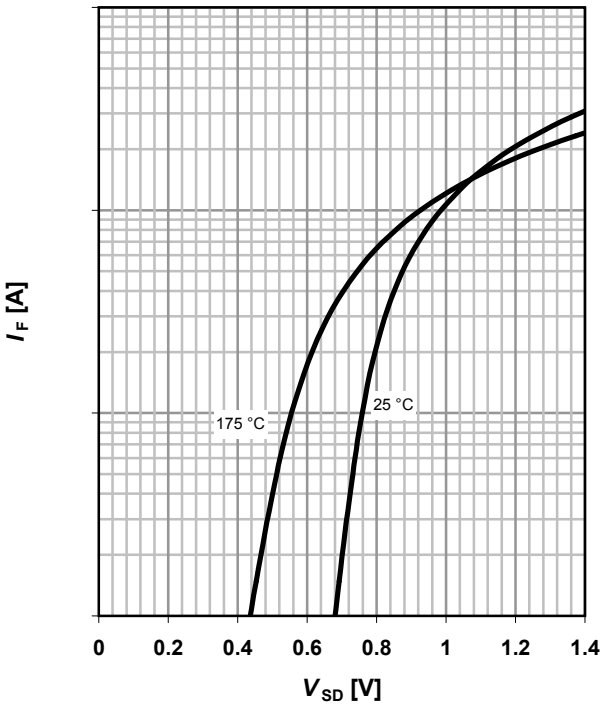
$C=f(V_{DS})$; $V_{GS}=0$ V; $f=1$ MHz




## 12 Forward characteristics of reverse diode

$I_F=f(V_{SD})$

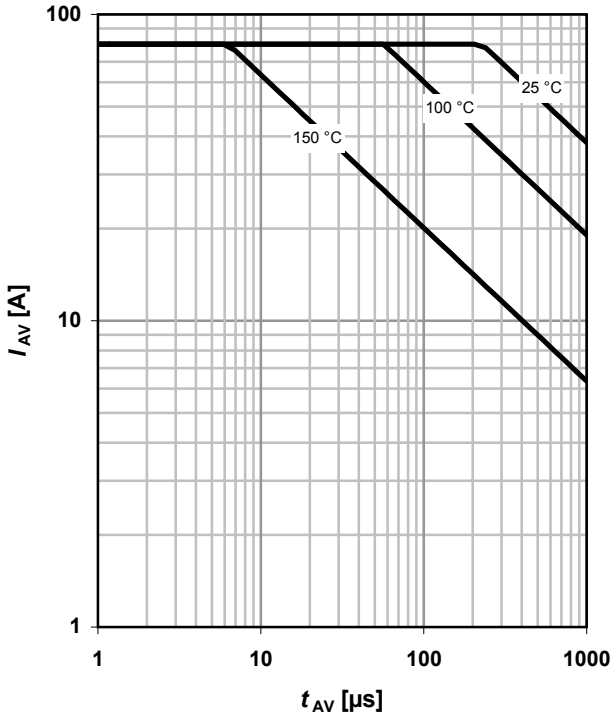
parameter: $T_j$



## 13 Typ. Avalanche characteristics

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω

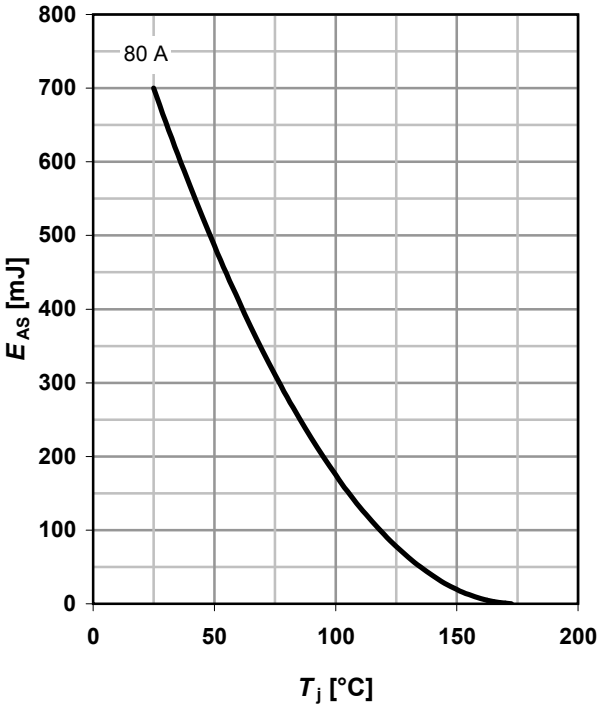
parameter: $T_{j(start)}$




## 14 Typ. Avalanche Energy

$E_{AS}$=f($T_j$); $V_{DD}$ = 25 V; $R_{GS}$=25 Ω

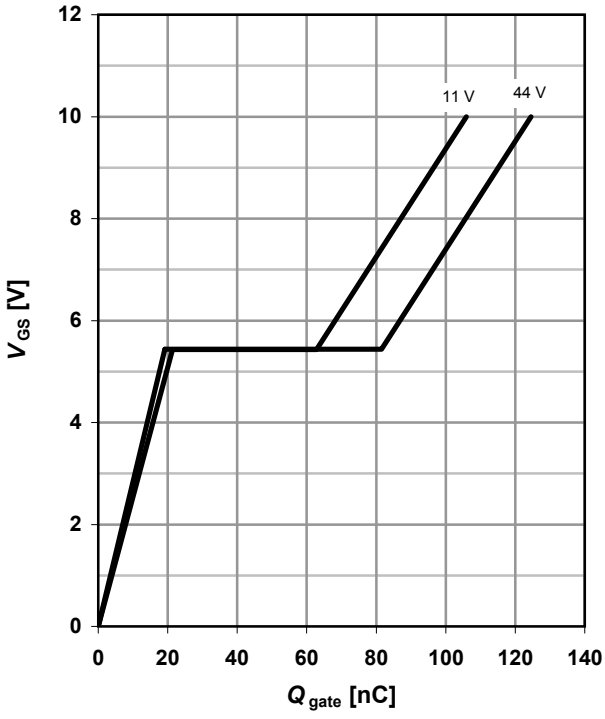
parameter: $I_D$




## 15 Typ. gate charge

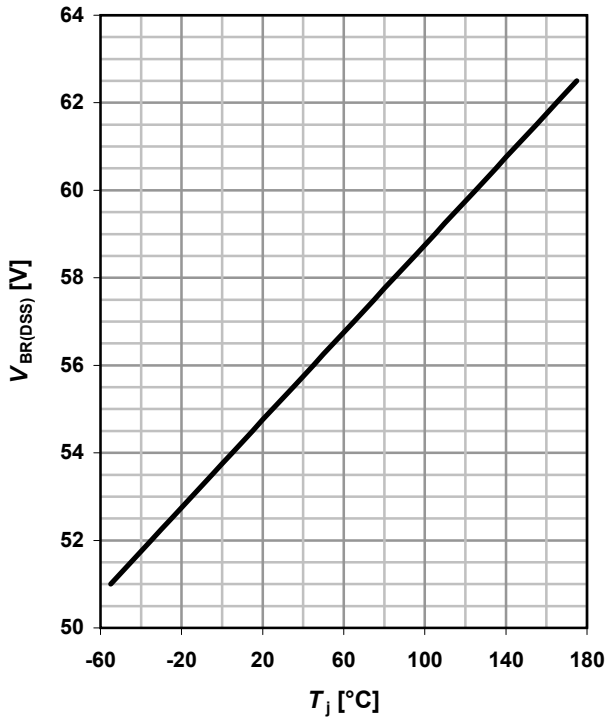
$V_{GS}$=f($Q_{gate}$); $I_D$=80 A pulsed

parameter: $V_{DD}$




## 16 Drain-source breakdown voltage

$V_{BR(DSS)}$=f($T_j$); $I_D$=250 µA



**Published by**
**Infineon Technologies AG**
**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 representatives 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 expressed 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.