

**SIPMOS® Power-Transistor**
**Features**

- N-channel - Normal Level -Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Avalanche test
- Repetive Avalanche up to  $T_{jmax} = 175\text{ °C}$
- $dv/dt$  rated

**Product Summary**

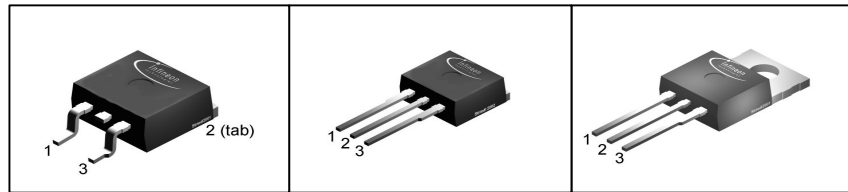
|                                |     |    |
|--------------------------------|-----|----|
| $V_{DS}$                       | 55  | V  |
| $R_{DS(on),max}$ (SMD version) | 7.7 | mΩ |
| $I_D$                          | 80  | A  |

**Green Package**

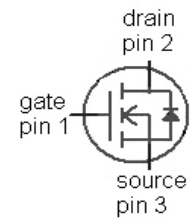
PG-TO263-3-2

PG-TO262-3-1

PG-TO220-3-1



| Type         | Package      | Ordering Code | Marking |
|--------------|--------------|---------------|---------|
| SPB80N06S-08 | PG-TO263-3-2 | SP0000-84808  | 1N0608  |
| SPI80N06S-08 | PG-TO262-3-1 | SP0000-82518  | 1N0608  |
| SPP80N06S-08 | PG-TO220-3-1 | SP0000-84809  | 1N0608  |


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

| Parameter                                | Symbol            | Conditions   | Value        | Unit  |
|--|-------------------|--|--------------|-------|
| Continuous drain current <sup>1)</sup>   | $I_D$             | $T_C=25\text{ °C}$ , $V_{GS}=10\text{ V}$  | 80           | A     |
|  |                   | $T_C=100\text{ °C}$ , $V_{GS}=10\text{ V}$   | 80           |       |
| Pulsed drain current <sup>2)</sup>       | $I_{D,pulse}$     | $T_C=25\text{ °C}$   | 320          |       |
| Avalanche energy, single pulse           | $E_{AS}$          | $I_D=80\text{ A}$ , $R_{GS}=25\text{ Ω}$ ,<br>$V_{DD}=25\text{ V}$                                   | 700          | mJ    |
| Avalanche energy, periodic <sup>2)</sup> | $E_{AR}$          | $T_j=175\text{ °C}$  | 30           |       |
| Reverse diode $dv/dt$ <sup>2)</sup>      | $dv/dt$           | $I_D=80\text{ A}$ , $V_{DS}=40\text{ V}$ ,<br>$di/dt=200\text{ A/μs}$ ,<br>$T_{j,max}=175\text{ °C}$ | 6            | kV/μs |
| Gate source voltage                      | $V_{GS}$          |  | ±20          | V     |
| Power dissipation                        | $P_{tot}$         | $T_C=25\text{ °C}$   | 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. |      |
| <b>Thermal characteristics<sup>2)</sup></b>    |            |  |        |      |      |      |
| 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 cm <sup>2</sup> cooling area <sup>3)</sup> | -      | -    | 40   |      |

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

**Static characteristics**

|                                  |               |   |     |     |     |               |
|----------------------------------|---------------|---|-----|-----|-----|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$                            | 55  | -   | -   | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=240\text{ }\mu\text{A}$                     | 2.1 | 3.0 | 4   |               |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$       | -   | 0.1 | 1   | $\mu\text{A}$ |
|                                  |               | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}^{2)}$ | -   | 10  | 100 |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                         | -   | 10  | 100 | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=10\text{ V}, I_D=80\text{ A}$                           | -   | 6.5 | 8   | m $\Omega$    |
|                                  |               | $V_{GS}=10\text{ V}, I_D=80\text{ A}$<br>SMD version            | -   | 6.2 | 7.7 |               |
| Transconductance <sup>2)</sup>   | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=80\text{ A}$                 | -   | 73  | -   | S             |

footnote on page 3

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

**Dynamic characteristics<sup>2)</sup>**

|                              |              |   |   |      |   |    |
|------------------------------|--------------|---|---|------|---|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$<br>$f=1\text{ MHz}$                    | - | 3660 | - | pF |
| Output capacitance           | $C_{oss}$    |   | - | 1075 | - |    |
| Reverse transfer capacitance | $C_{rss}$    |   | - | 540  | - |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=30\text{ V}, I_D=80\text{ A},$<br>$V_{GS}=10\text{ V}, R_G=2.4\ \Omega$ | - | 22   | - | ns |
| Rise time                    | $t_r$        |   | - | 53   | - |    |
| Turn-off delay time          | $t_{d(off)}$ |   | - | 54   | - |    |
| Fall time                    | $t_f$        |   | - | 32   | - |    |

**Gate Charge Characteristics<sup>2)</sup>**

|                       |               |  |   |     |     |    |
|-----------------------|---------------|--|---|-----|-----|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=44\text{ V}, I_D=80\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$ | - | 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<sup>2)</sup>**

|                                  |               |   |   |     |     |    |
|----------------------------------|---------------|---|---|-----|-----|----|
| Diode continuous forward current | $I_S$         | $T_C=25\text{ }^\circ\text{C}$  | - | -   | 80  | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -   | 320 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=80\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$ | - | 0.9 | 1.3 | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=27.5\text{ V}, I_F=I_S,$<br>$di_F/dt=100\text{ A}/\mu\text{s}$     | - | 105 | -   | ns |
| Reverse recovery charge          | $Q_{rr}$      |   | - | 30  | -   |    |

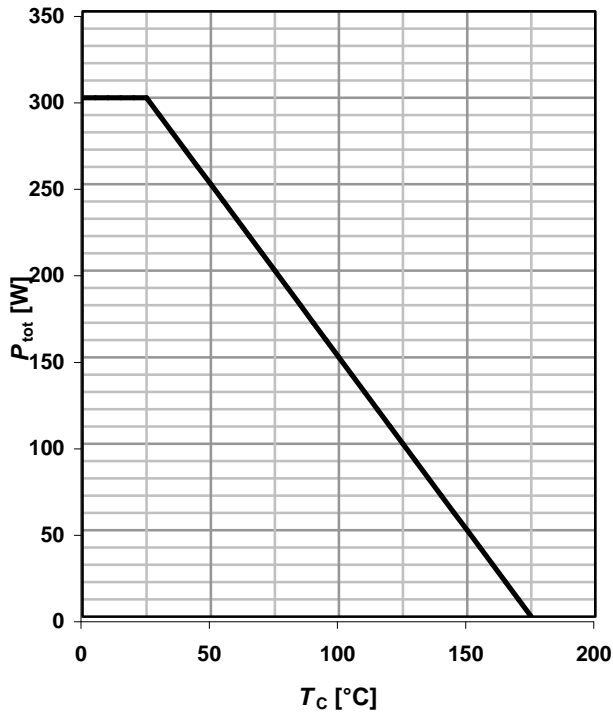
<sup>1)</sup> Current is limited by bondwire; with an  $R_{thJC}=0.5\text{ K/W}$  the chip is able to carry 132A at 25°C. For detailed information see Application Note APPS071E at [www.infineon.com/optimos](http://www.infineon.com/optimos)

<sup>2)</sup> Defined by design not subjected to production test.

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

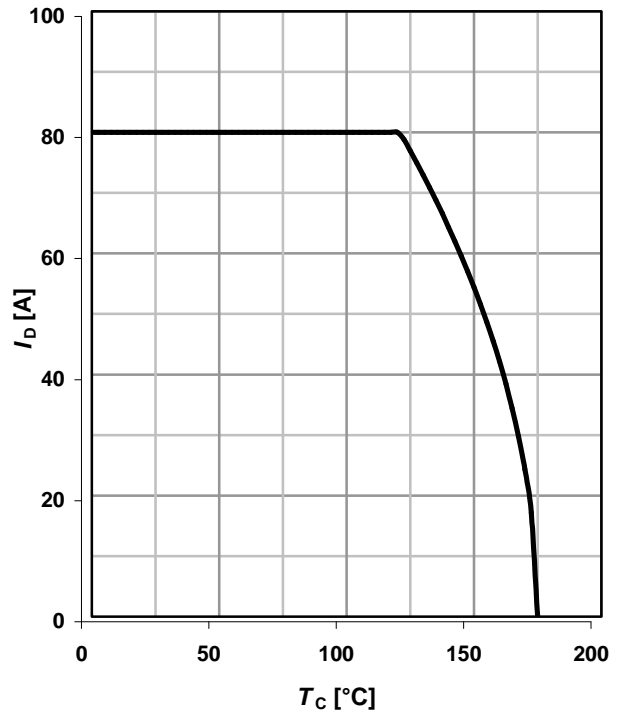
### 1 Power dissipation

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



### 2 Drain current

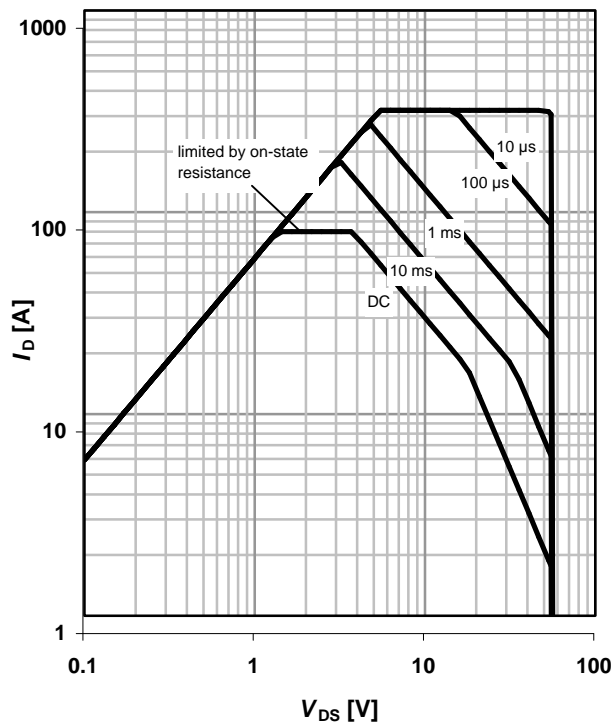
$$I_D=f(T_C); V_{GS}=10\text{ V}$$



### 3 Safe operating area

$$I_D=f(V_{DS}); T_C=25\text{ °C}; D=0$$

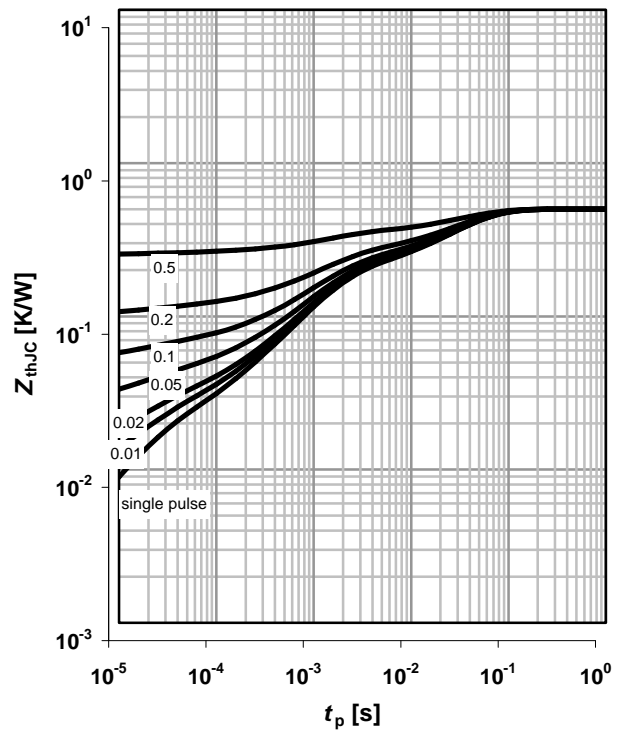
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

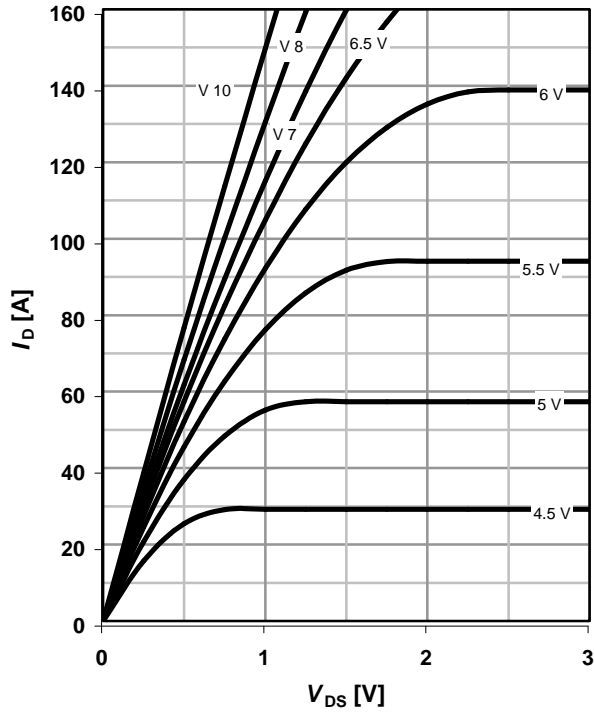
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

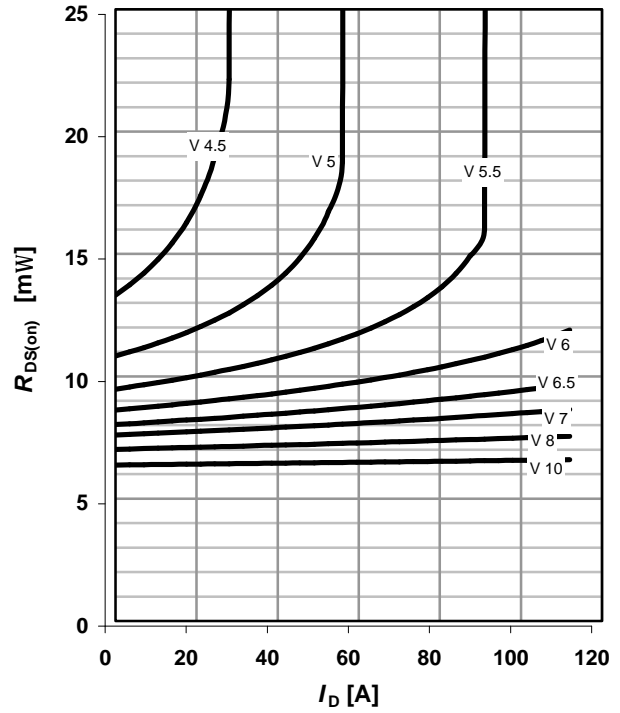
parameter:  $V_{GS}$



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

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

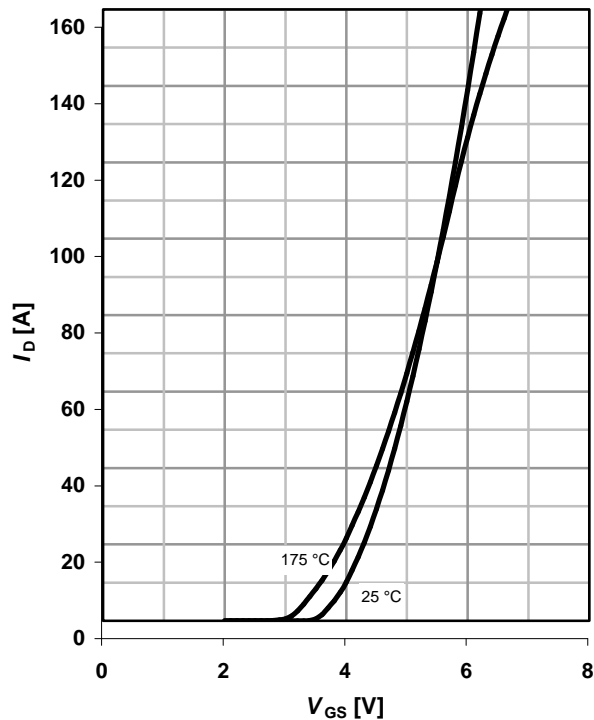
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

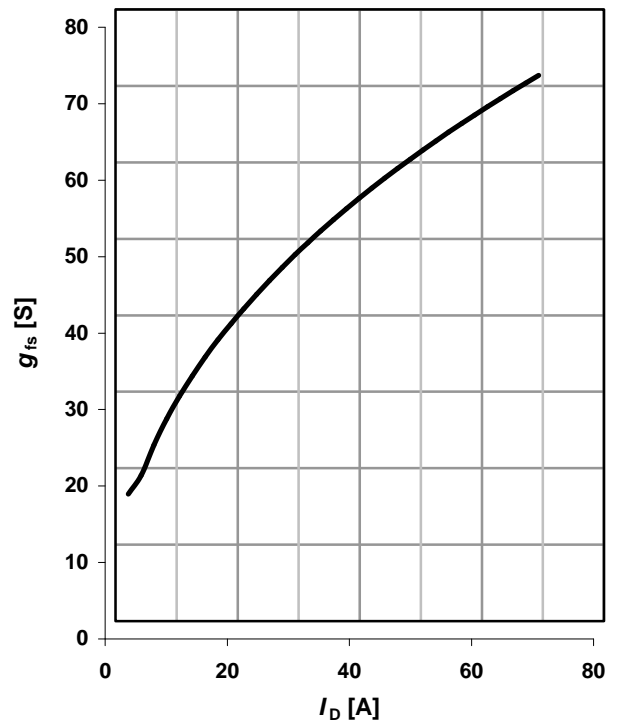
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



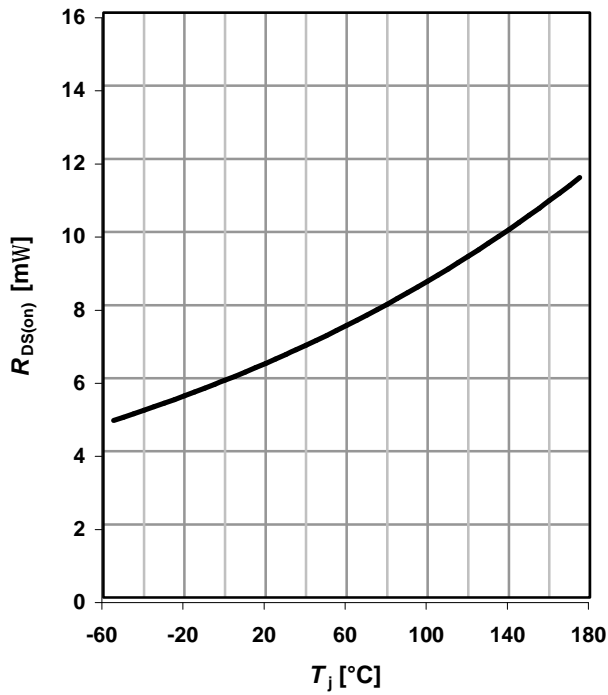
**8 Typ. forward transconductance**

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



**9 Typical Drain-source on-state resistance**

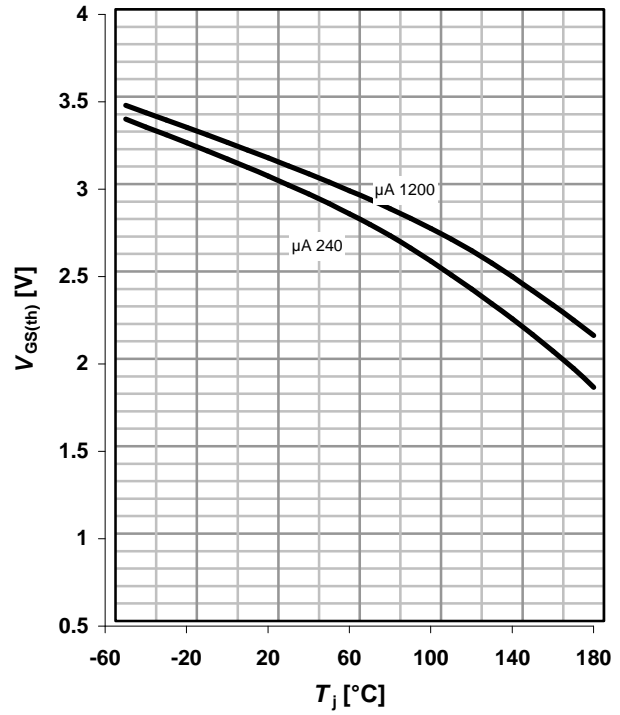
$R_{DS(on)}=f(T_j)$ ;  $I_D=80\text{ A}$ ;  $V_{GS}=10\text{ V}$



**10 Typ. gate threshold voltage**

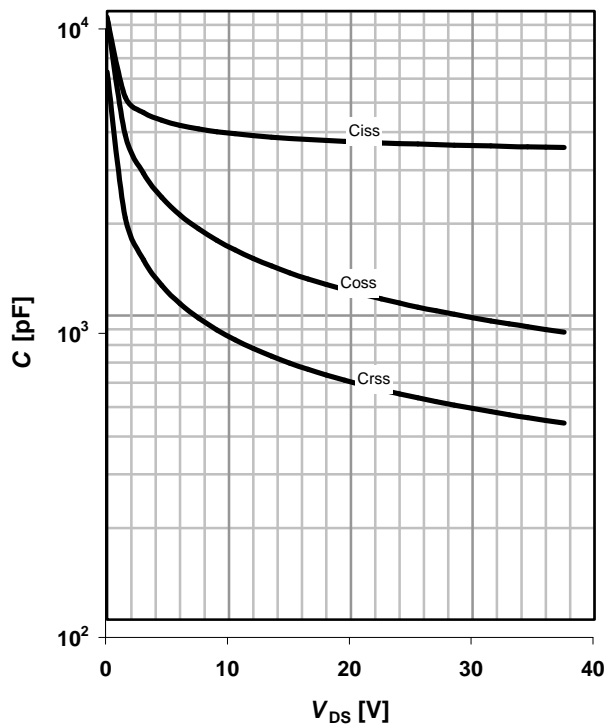
$V_{GS(th)}=f(T_j)$ ;  $V_{GS}=V_{DS}$

parameter:  $I_D$



**11 Typ. capacitances**

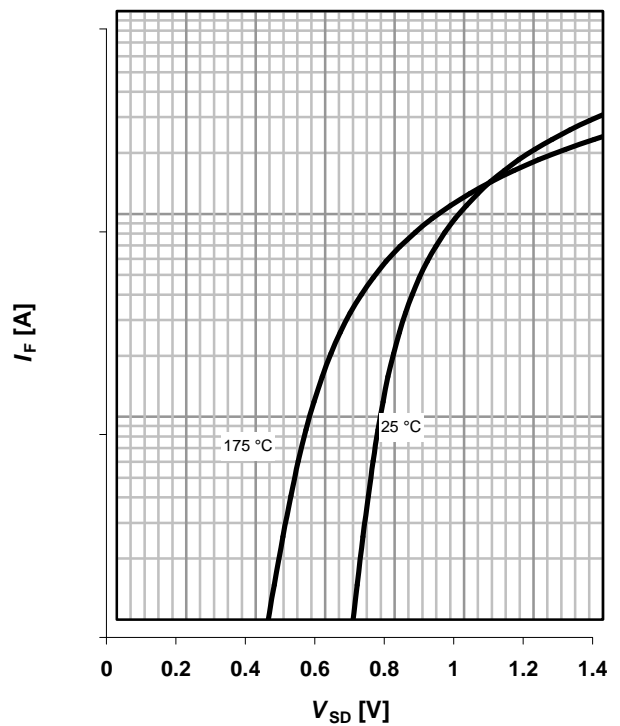
$C=f(V_{DS})$ ;  $V_{GS}=0\text{ V}$ ;  $f=1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

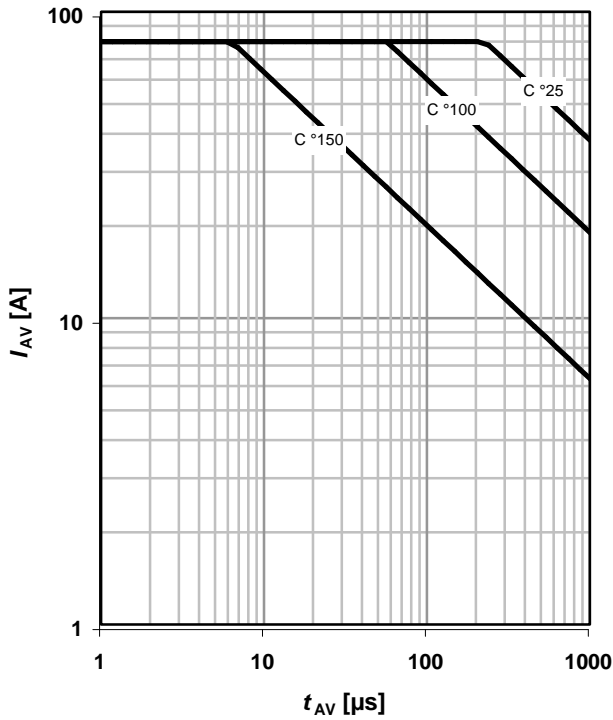
parameter:  $T_j$



**13 Typ. Avalanche characteristics**

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

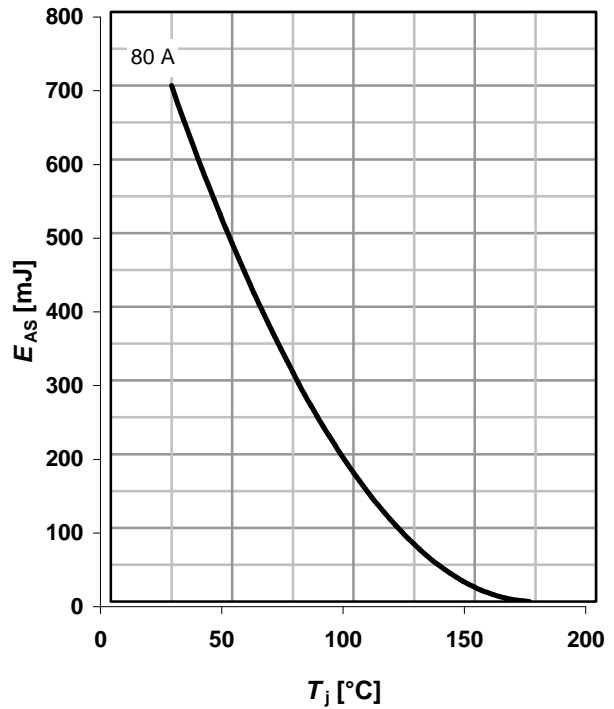
parameter:  $T_{j(\text{start})}$



**14 Typ. Avalanche Energy**

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

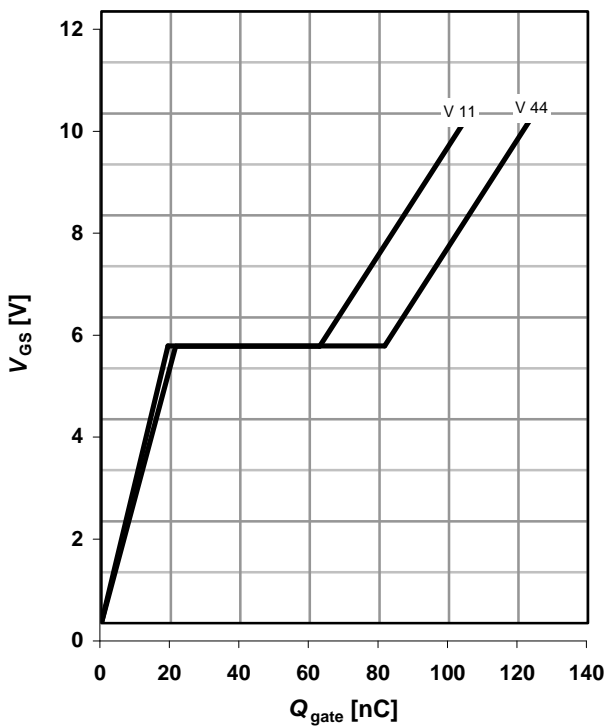
parameter:  $I_D$



**15 Typ. gate charge**

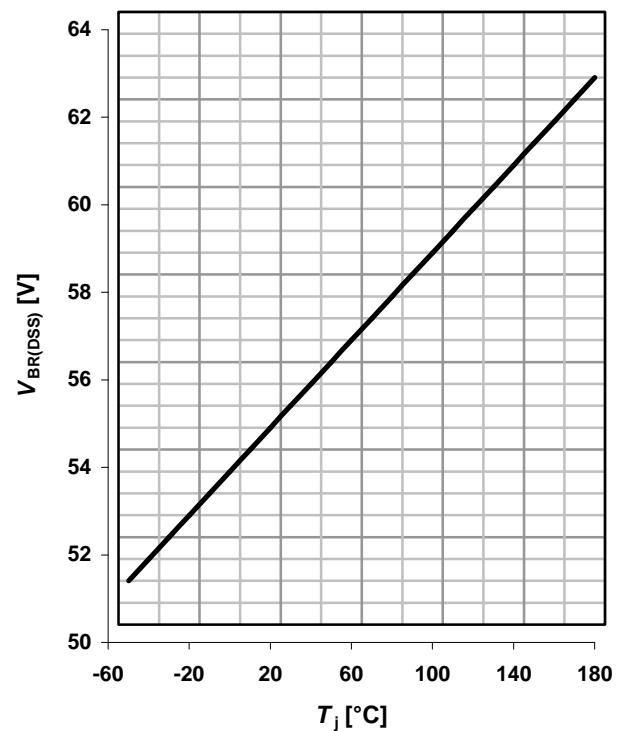
$V_{GS}=f(Q_{\text{gate}}); I_D=80 \text{ A pulsed}$

parameter:  $V_{DD}$



**16 Drain-source breakdown voltage**

$V_{BR(DSS)}=f(T_j); I_D=250 \mu\text{A}$





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