

**OptiMOS™-5 Power-Transistor**

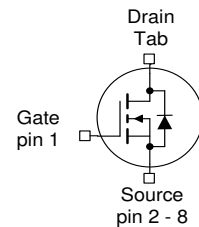
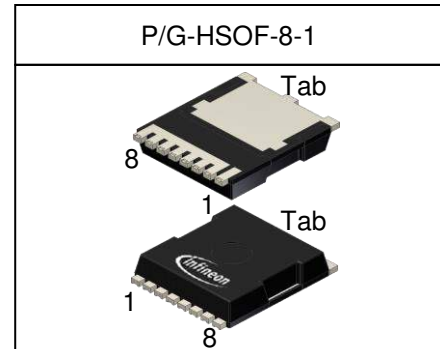
**Features**

- N-channel - Enhancement mode
- AEC-Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green product (RoHS compliant)
- Ultra low Rds(on)
- 100% Avalanche tested

| Type             | Package      | Marking |
|------------------|--------------|---------|
| IAUT150N10S5N035 | P/G-HSOF-8-1 | 5N10035 |

**Product Summary**

|              |     |    |
|--------------|-----|----|
| $V_{DS}$     | 100 | V  |
| $R_{DS(on)}$ | 3.5 | mΩ |
| $I_D$        | 150 | A  |


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

| Parameter                                    | Symbol         | Conditions                                   | Value        | Unit |
|--|----------------|--|--------------|------|
| Continuous drain current                     | $I_D$          | $T_C=25\text{ °C}, V_{GS}=10\text{V}$        | 150          | A    |
|  |                | $T_C=100\text{ °C}, V_{GS}=10\text{ V}^{1)}$ | 95           |      |
| Pulsed drain current <sup>1)</sup>           | $I_{D,pulse}$  | $T_C=25\text{ °C}$                           | 600          |      |
| Avalanche energy, single pulse <sup>1)</sup> | $E_{AS}$       | $I_D=75\text{ A}$                            | 210          | mJ   |
| Avalanche current, single pulse              | $I_{AS}$       | -  | 120          | A    |
| Gate source voltage                          | $V_{GS}$       | -  | ±20          | V    |
| Power dissipation                            | $P_{tot}$      | $T_C=25\text{ °C}$                           | 166          | 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>1)</sup></b> |            |            |        |      |      |      |
| Thermal resistance, junction - case         | $R_{thJC}$ | -          | -      | -    | 0.9  | K/W  |

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

|                                  |               |   |     |     |     |                  |
|----------------------------------|---------------|---|-----|-----|-----|------------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}$ ,<br>$I_D=1\text{ mA}$                              | 100 | -   | -   | V                |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_D=110\text{ }\mu\text{A}$                          | 2.2 | 3.0 | 3.8 |                  |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ ,<br>$T_j=25\text{ °C}$     | -   | 0.1 | 1   | $\mu\text{A}$    |
|                                  |               | $V_{DS}=50\text{ V}$ , $V_{GS}=0\text{ V}$ ,<br>$T_j=85\text{ °C}^{2)}$ | -   | 1   | 20  |                  |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$                              | -   | -   | 100 | nA               |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=6\text{ V}$ , $I_D=40\text{ A}$                                 | -   | 3.7 | 5.0 | $\text{m}\Omega$ |
|                                  |               | $V_{GS}=10\text{ V}$ , $I_D=75\text{ A}$                                | -   | 3.0 | 3.5 |                  |

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

**Dynamic characteristics<sup>1)</sup>**

|                              |              |   |   |      |      |    |
|------------------------------|--------------|---|---|------|------|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=50\text{ V},$<br>$f=1\text{ MHz}$                          | - | 4700 | 6110 | pF |
| Output capacitance           | $C_{oss}$    |   | - | 780  | 1014 |    |
| Reverse transfer capacitance | $C_{rss}$    |   | - | 34   | 52   |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=50\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=50\text{ A}, R_{G,ext}=3.5\ \Omega$ | - | 12   | -    | ns |
| Rise time                    | $t_r$        |   | - | 7    | -    |    |
| Turn-off delay time          | $t_{d(off)}$ |   | - | 23   | -    |    |
| Fall time                    | $t_f$        |   | - | 26   | -    |    |

**Gate Charge Characteristics<sup>1)</sup>**

|                       |               |   |   |     |    |    |
|-----------------------|---------------|---|---|-----|----|----|
| Gate to source charge | $Q_{gs}$      | $V_{DD}=50\text{ V}, I_D=100\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$ | - | 23  | 30 | nC |
| Gate to drain charge  | $Q_{gd}$      |   | - | 15  | 23 |    |
| Gate charge total     | $Q_g$         |   | - | 67  | 87 |    |
| Gate plateau voltage  | $V_{plateau}$ |   | - | 5.2 | -  | V  |

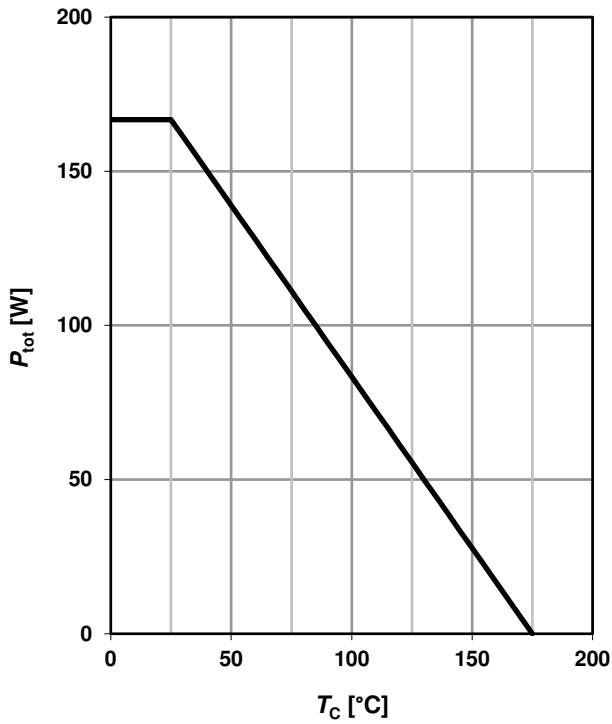
**Reverse Diode**

|  |               |   |   |     |     |    |
|--|---------------|---|---|-----|-----|----|
| Diode continuous forward current <sup>1)</sup> | $I_S$         | $T_C=25\text{ °C}$  | - | -   | 150 | A  |
| Diode pulse current <sup>1)</sup>              | $I_{S,pulse}$ |   | - | -   | 600 |    |
| Diode forward voltage                          | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=75\text{ A},$<br>$T_j=25\text{ °C}$               | - | 0.9 | 1.3 | V  |
| Reverse recovery time <sup>1)</sup>            | $t_{rr}$      | $V_R=50\text{ V}, I_F=50\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 63  | -   | ns |
| Reverse recovery charge <sup>1)</sup>          | $Q_{rr}$      |   | - | 120 | -   | nC |

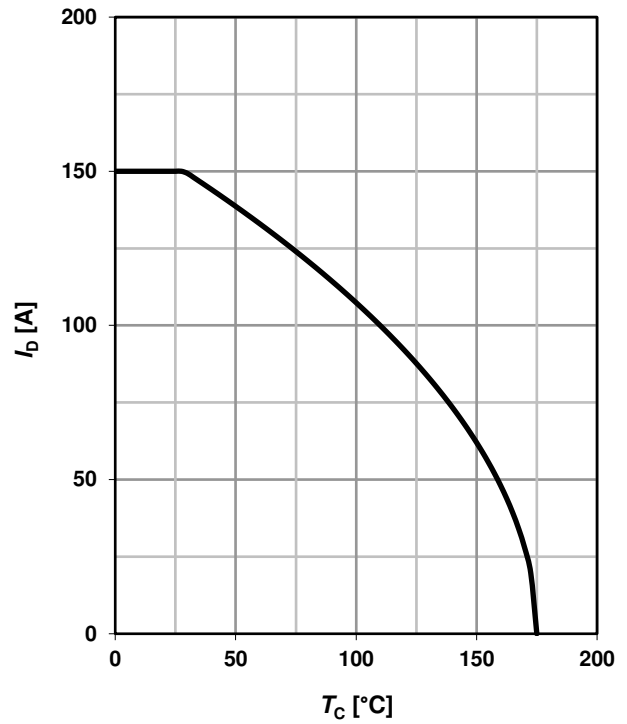
<sup>1)</sup> Defined by design. Not subject to production test.

**1 Power dissipation**

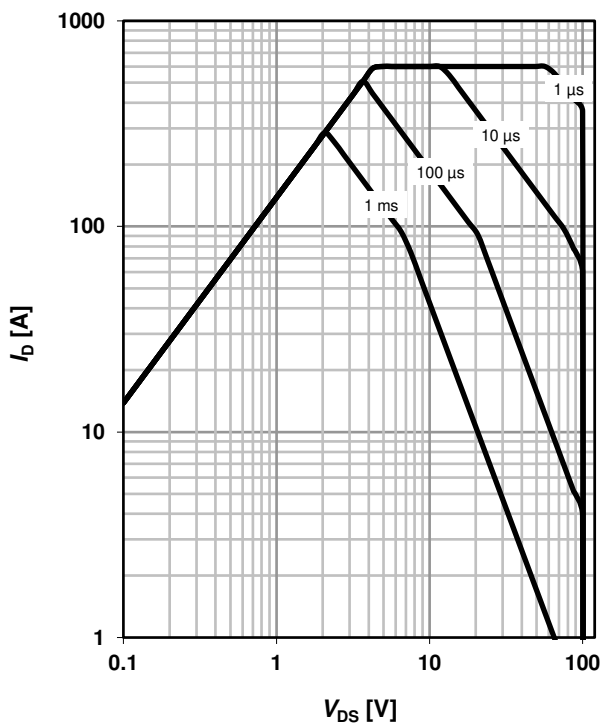
$$P_{\text{tot}} = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$


**2 Drain current**

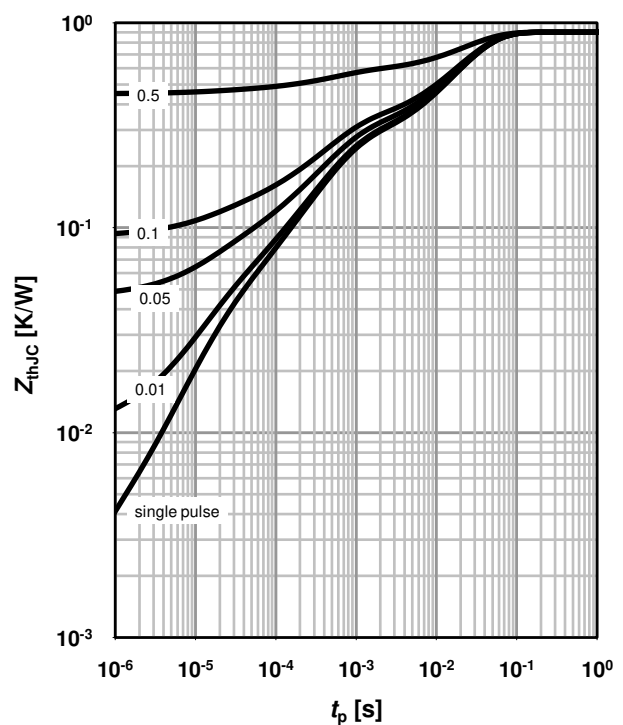
$$I_D = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$


**3 Safe operating area**

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

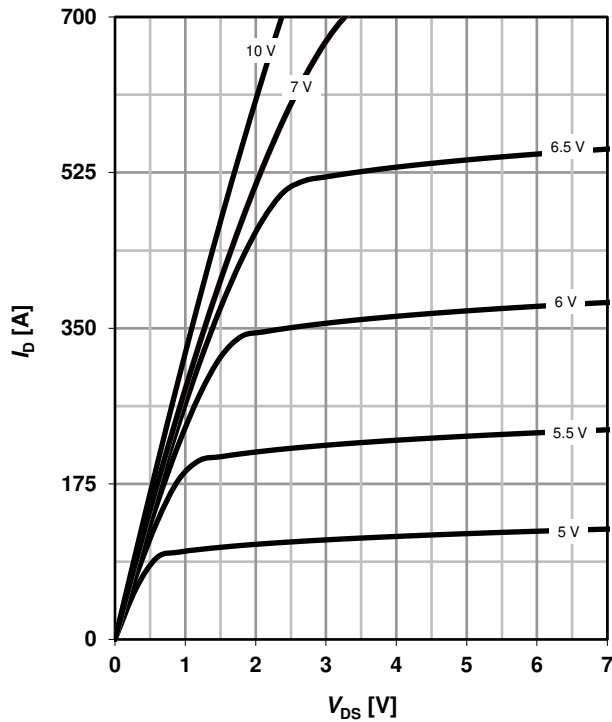
 parameter:  $t_p$ 

**4 Max. transient thermal impedance**

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

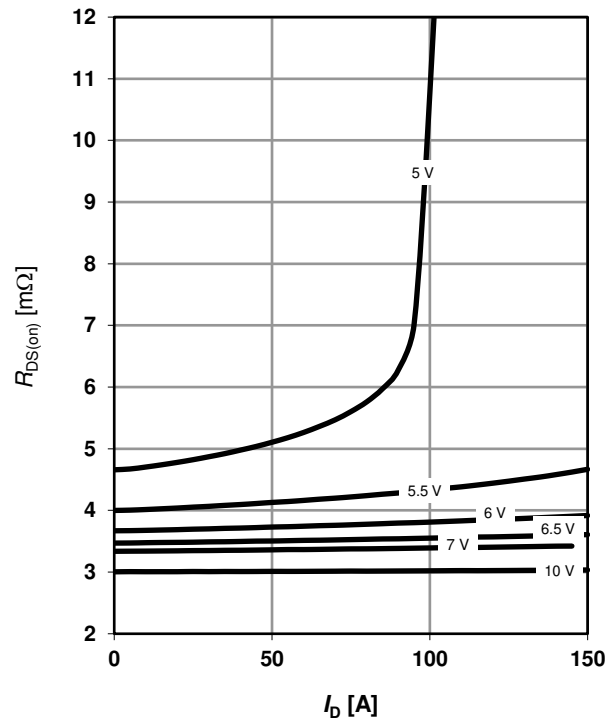
 parameter:  $D = t_p/T$ 


**5 Typ. output characteristics**

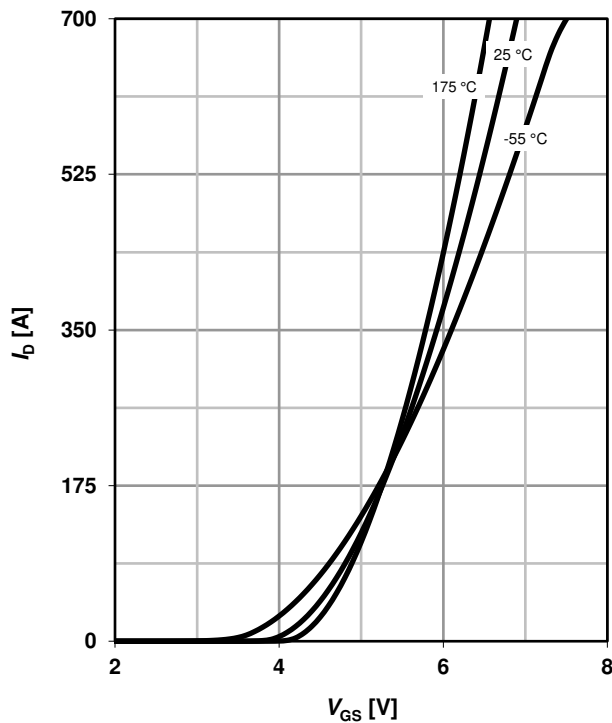
$$I_D = f(V_{DS}); T_j = 25\text{ °C}$$

 parameter:  $V_{GS}$ 

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

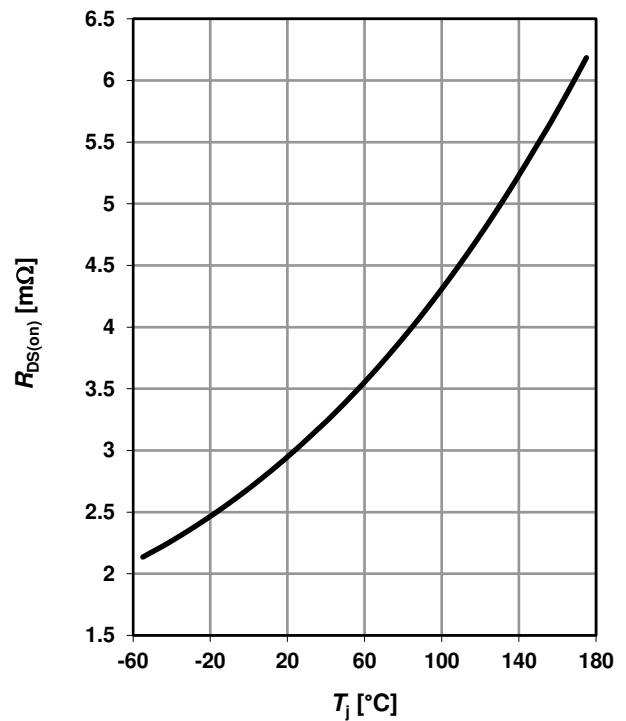
$$R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$$

 parameter:  $V_{GS}$ 

**7 Typ. transfer characteristics**

$$I_D = f(V_{GS}); V_{DS} = 6V$$

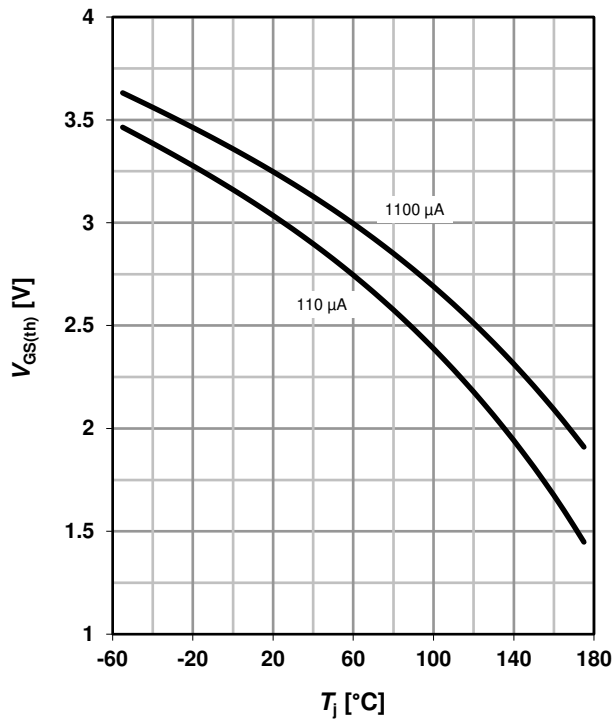
 parameter:  $T_j$ 

**8 Typ. drain-source on-state resistance**

$$R_{DS(on)} = f(T_j); I_D = 75\text{ A}; V_{GS} = 10\text{ V}$$

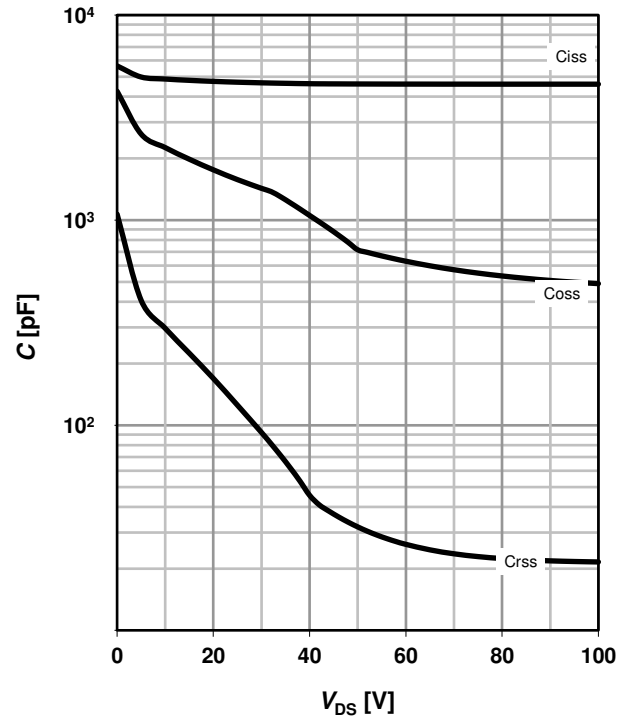


**9 Typ. gate threshold voltage**

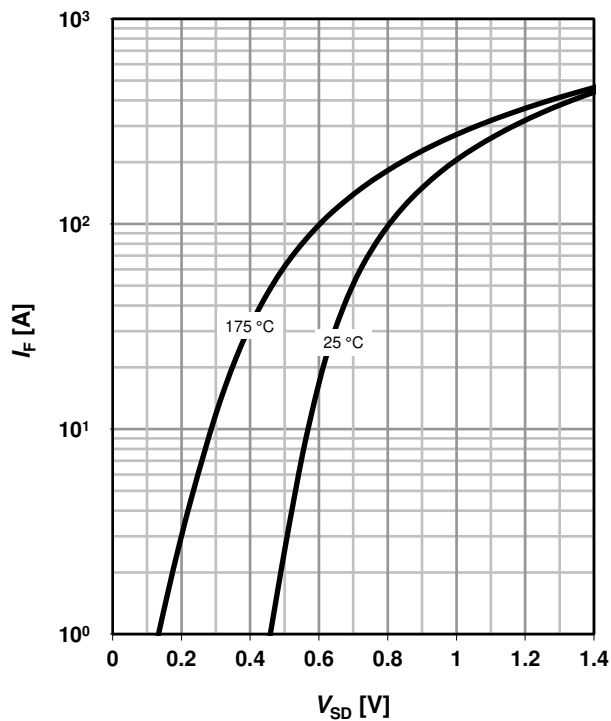
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

 parameter:  $I_D$ 

**10 Typ. capacitances**

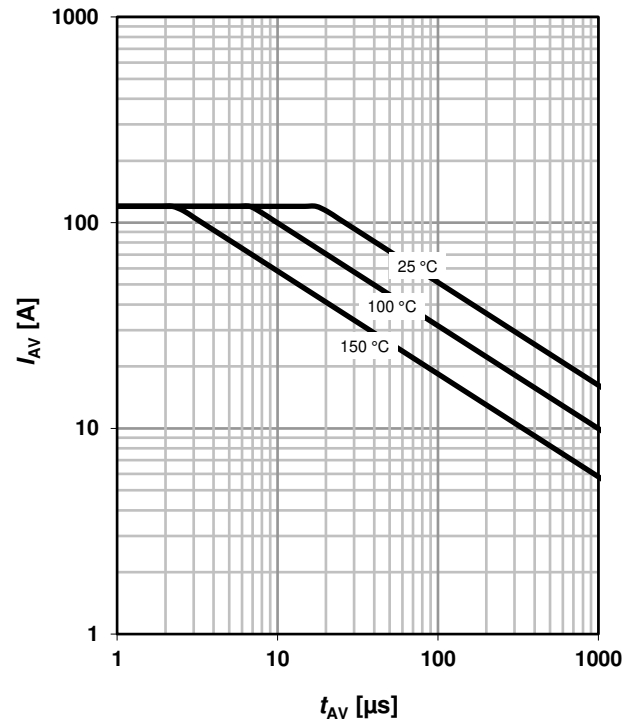
$$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$$


**11 Typical forward diode characteristics**

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

 parameter:  $T_j$ 

**12 Typ. avalanche characteristics**

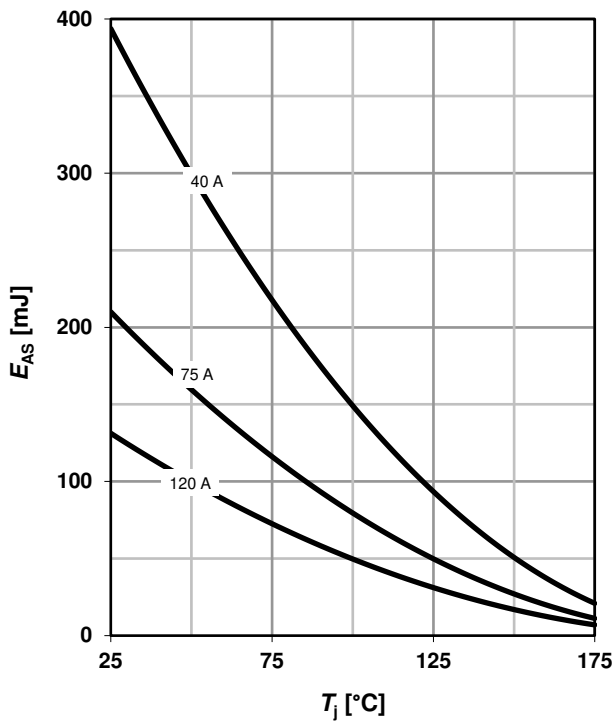
$$I_{AS} = f(t_{AV})$$

 parameter:  $T_{j(start)}$ 


### 13 Typical avalanche energy

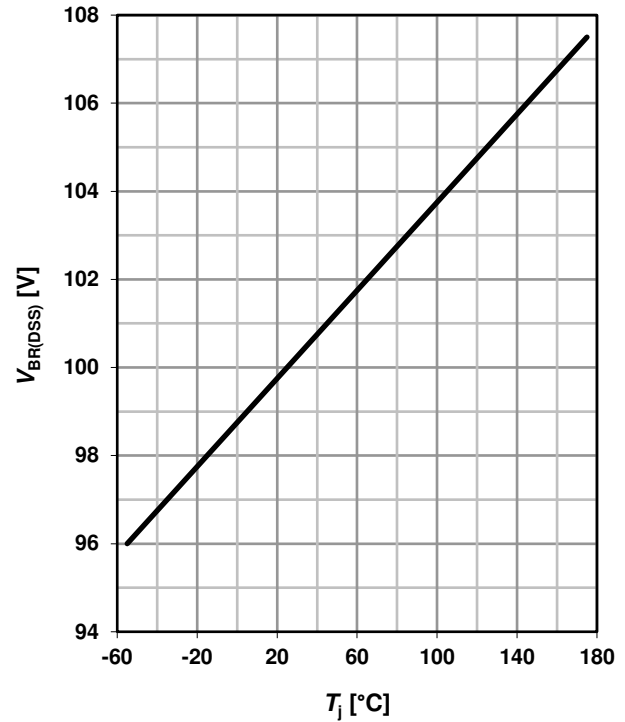
$$E_{AS} = f(T_j)$$

parameter:  $I_D$



### 14 Drain-source breakdown voltage

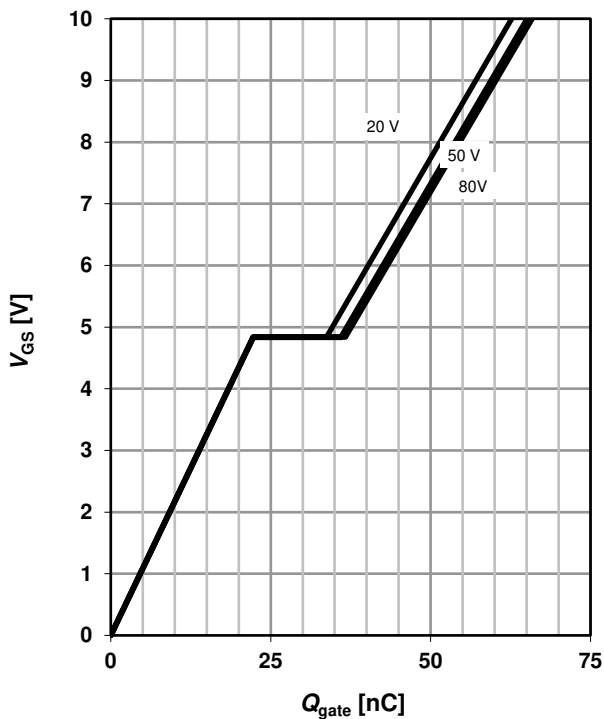
$$V_{BR(DSS)} = f(T_j); I_{D\_typ} = 1 \text{ mA}$$



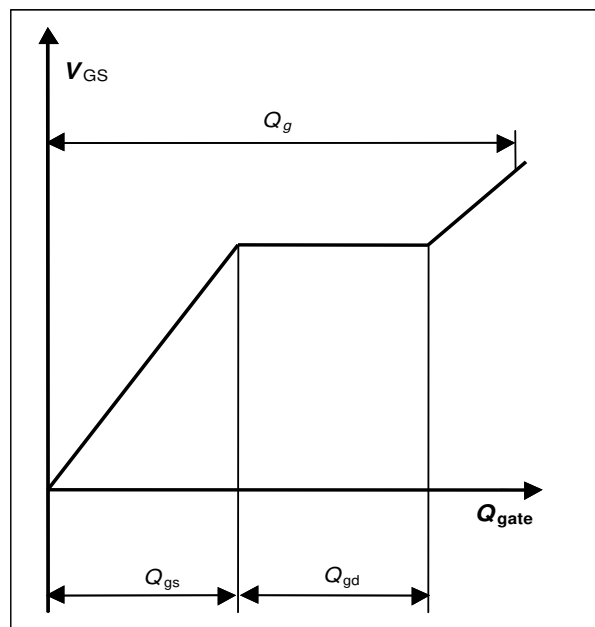
### 15 Typ. gate charge

$$V_{GS} = f(Q_{gate}); I_D = 100 \text{ A pulsed}$$

parameter:  $V_{DD}$



### 16 Gate charge waveforms



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## Revision History

| Version     | Date       | Changes                      |
|-------------|------------|------------------------------|
| Version 1.0 | 02.10.2017 | Final Data Sheet             |
| Version 2.0 | 14.03.2019 | Updated avalanche parameters |