## OptiMOS™-5 Power-Transistor

AEC Qualified | Infineon Automotive Quality | RoHS

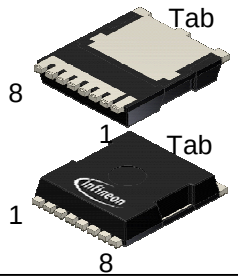
### Features

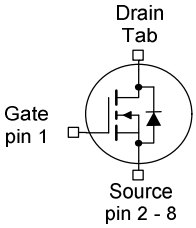
- OptiMOS™ power MOSFET for automotive applications
- N-channel – Enhancement mode – Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green product (RoHS compliant)
- 100% Avalanche tested

### Product Summary

| | | |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $R_{DS(on)}$ | 1.4 | mΩ |
| $I_D$ | 300 | A |

**PG-HSOF-8-1**




| Type | Package | Marking |
|---|---|---|
| IAUT300N10S5N014 | PG-HSOF-8-1 | 5N10014 |

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

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous drain current | $I_D$ | $V_{GS}$=10 V, Chip limitation[1,2)] | 360 | A |
| | | $V_{GS}$=10V, DC current[3)] | 300 | |
| | | $T_a$=85 °C, $V_{GS}$=10 V, $R_{thJA}$ on 2s2p[2,4)] | 46 | |
| Pulsed drain current[2)] | $I_{D,pulse}$ | $T_C$=25 °C, $t_p$= 100 µs | 1315 | |
| Avalanche energy, single pulse[2)] | $E_{AS}$ | $I_D$=150 A | 652 | mJ |
| Avalanche current, single pulse | $I_{AS}$ | - | 300 | A |
| Gate source voltage | $V_{GS}$ | - | ±20 | V |
| Power dissipation | $P_{tot}$ | $T_C$=25 °C | 375 | 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 | $R_{thJC}$ | - | - | - | 0.4 | K/W |
| Thermal resistance, junction - ambient[4] | $R_{thJA}$ | - | - | 14.8 | - | |
| **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 | 100 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=275 µA | 2.2 | 3.0 | 3.8 | |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=100 V, $V_{GS}$=0 V, $T_j$=25 °C | - | 0.1 | 1 | µA |
| | | $V_{DS}$=50 V, $V_{GS}$=0 V, $T_j$=85 °C[2] | - | 1 | 20 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=20 V, $V_{DS}$=0 V | - | - | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=6 V, $I_D$=75 A | - | 1.6 | 2.0 | mΩ |
| | | $V_{GS}$=10 V, $I_D$=100 A | - | 1.3 | 1.4 | |
| Gate resistance[2] | $R_G$ | - | - | 1.5 | - | Ω |

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic characteristics**[2] | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=1 MHz | - | 12316 | 16011 | pF |
| Output capacitance | $C_{oss}$ | | - | 1920 | 2496 | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 84 | 126 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=50 V, $V_{GS}$=10 V, $I_D$=100 A, $R_G$=3.5 Ω | - | 29 | - | ns |
| Rise time | $t_r$ | | - | 15 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 70 | - | |
| Fall time | $t_f$ | | - | 48 | - | |
| **Gate Charge Characteristics**[2] | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=50 V, $I_D$=100 A, $V_{GS}$=0 to 10 V | - | 52 | 68 | nC |
| Gate to drain charge | $Q_{gd}$ | | - | 33 | 50 | |
| Gate charge total | $Q_g$ | | - | 166 | 216 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 4.4 | - | V |
| **Reverse Diode** | | | | | | |
| Diode continous forward current[2] | $I_S$ | $T_C$=25 °C | - | - | 300 | A |
| Diode pulse current[2] | $I_{S,pulse}$ | $T_C$=25 °C | - | - | 1315 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=100 A, $T_j$=25 °C | - | 0.9 | 1.3 | V |
| Reverse recovery time[2] | $t_{rr}$ | $V_R$=50 V, $I_F$=50A, d$i_F$/d$t$=100 A/µs | - | 90 | - | ns |
| Reverse recovery charge[2] | $Q_{rr}$ | | - | 220 | - | nC |

[1] Practically the current is limited by the overall system design including the customer-specific PCB.

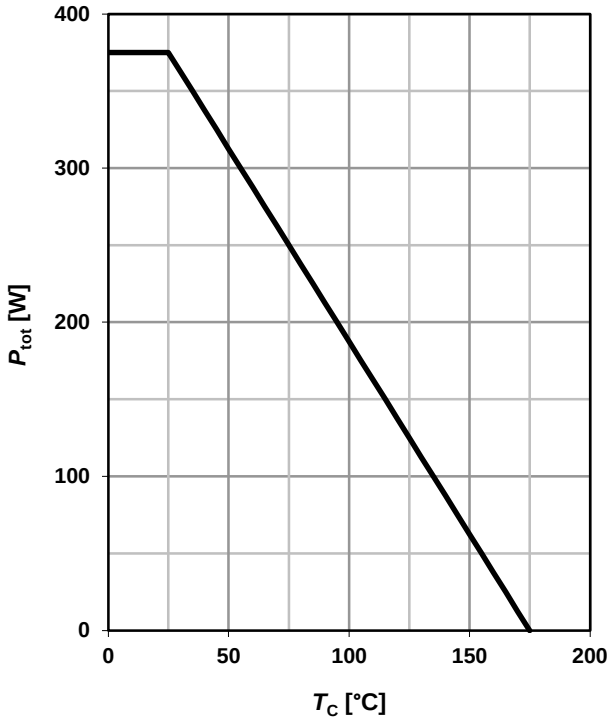
[2] The parameter is not subject to production testing – specified by design.

[3] Current is limited by the bondwires.

[4] Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5, -7). PCB is vertical in still air

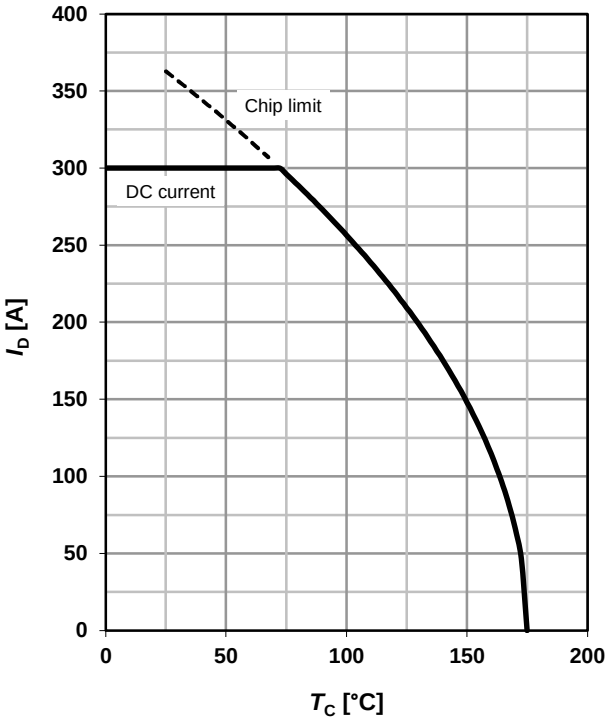
### 1 Power dissipation

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




### 2 Drain current

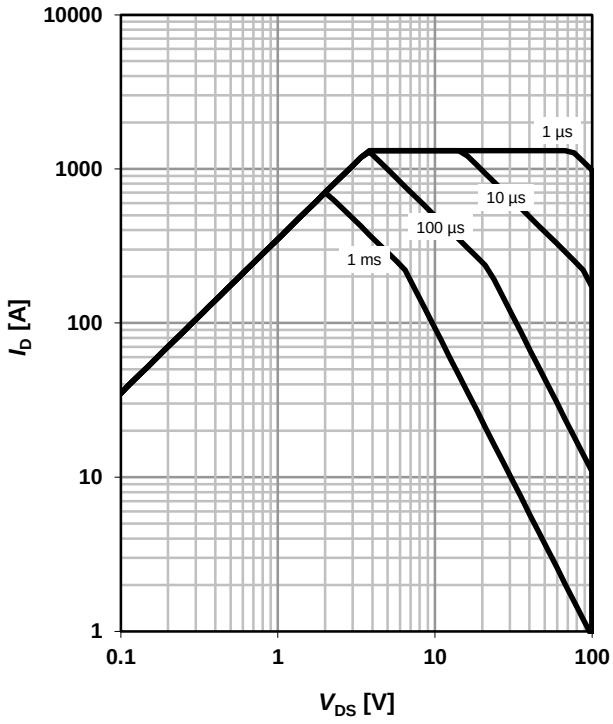
$I_D = f(T_C)$; $V_{GS} \geq 6$ V




### 3 Safe operating area

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

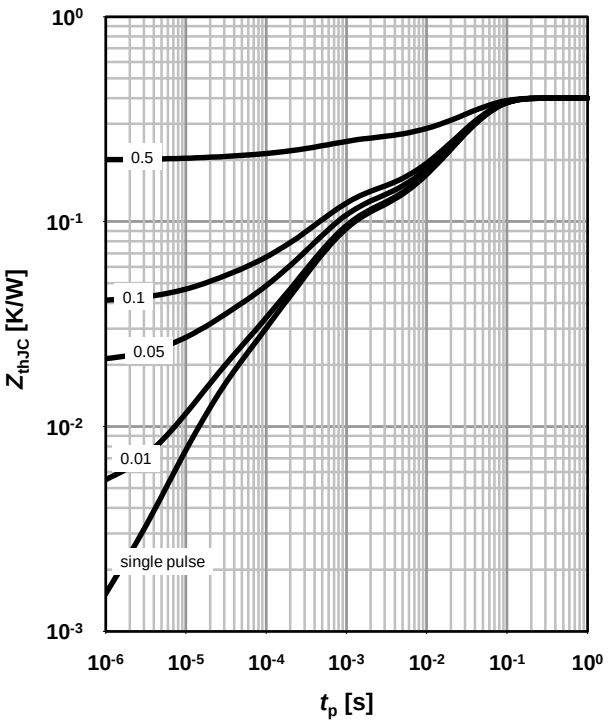
parameter: $t_p$




### 4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

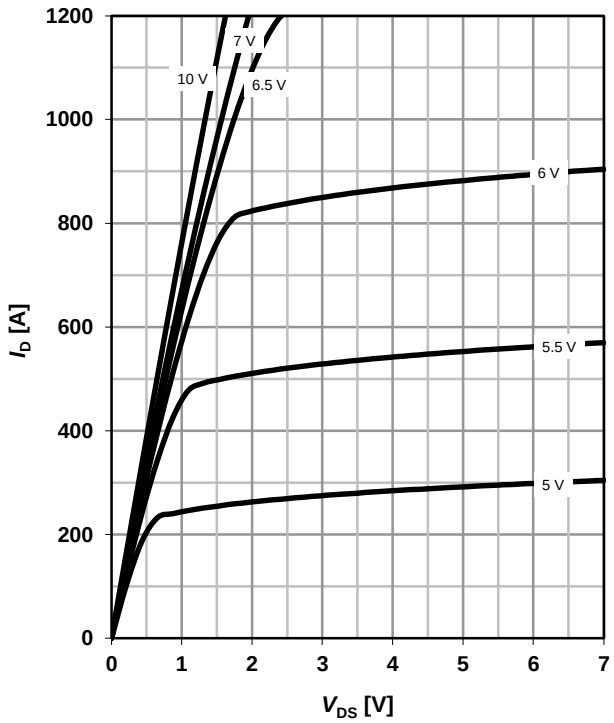
parameter: $D = t_p/T$



### 5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

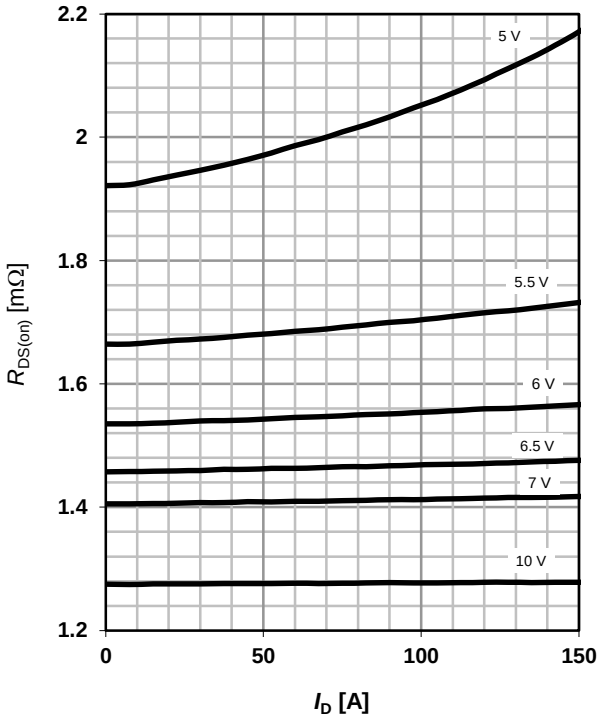
parameter: $V_{GS}$




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

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

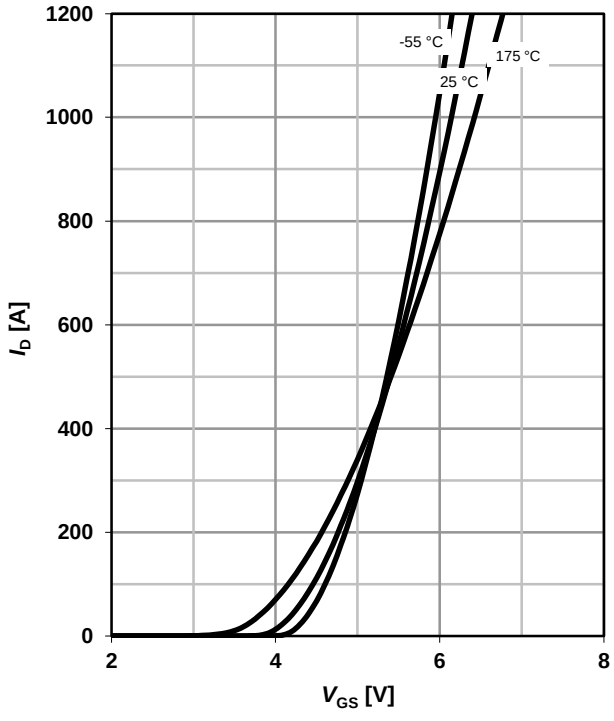
parameter: $V_{GS}$




### 7 Typ. transfer characteristics

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

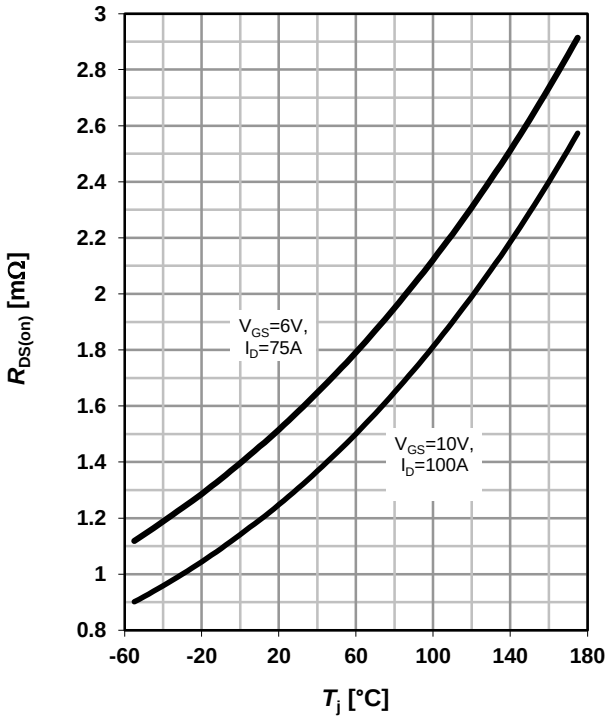
parameter: $T_j$




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

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

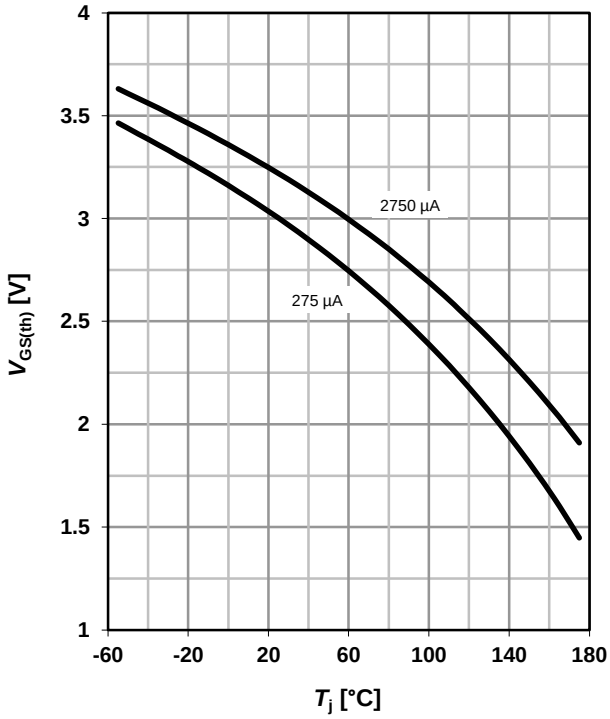
parameter: $I_D$, $V_{GS}$



### 9 Typ. gate threshold voltage

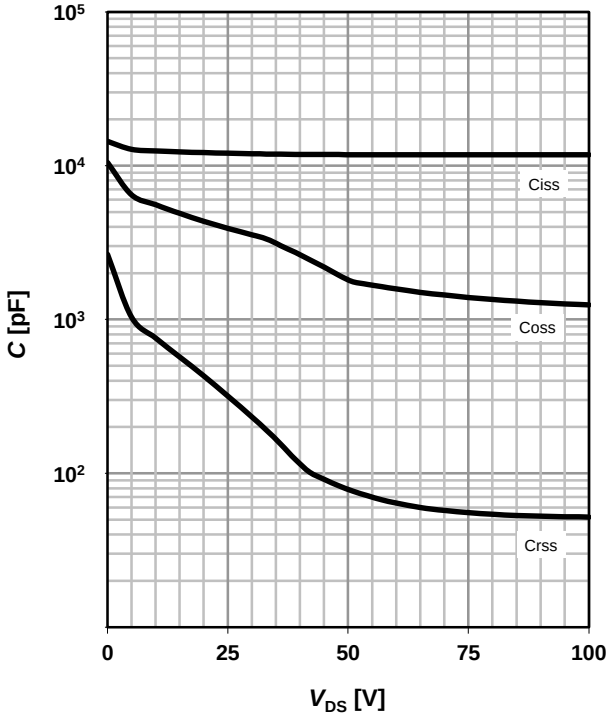
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: $I_D$




### 10 Typ. capacitances

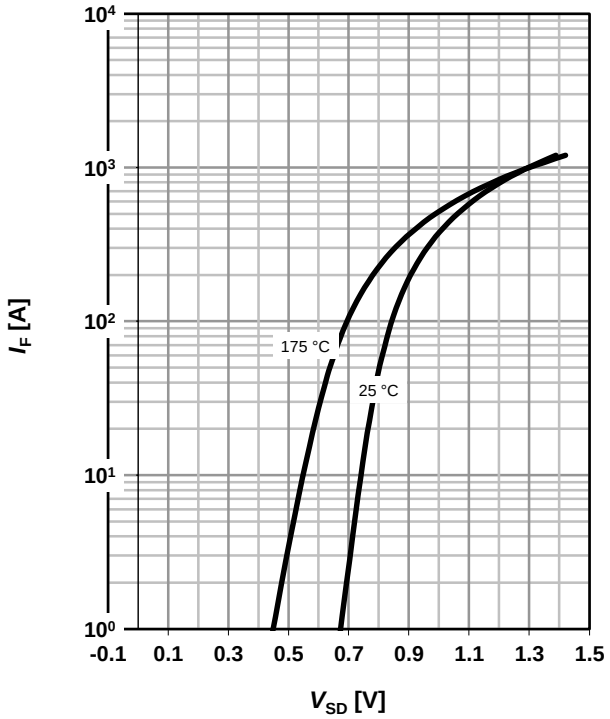
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz




### 11 Typical forward diode characteristics

$I_F = f(V_{SD})$

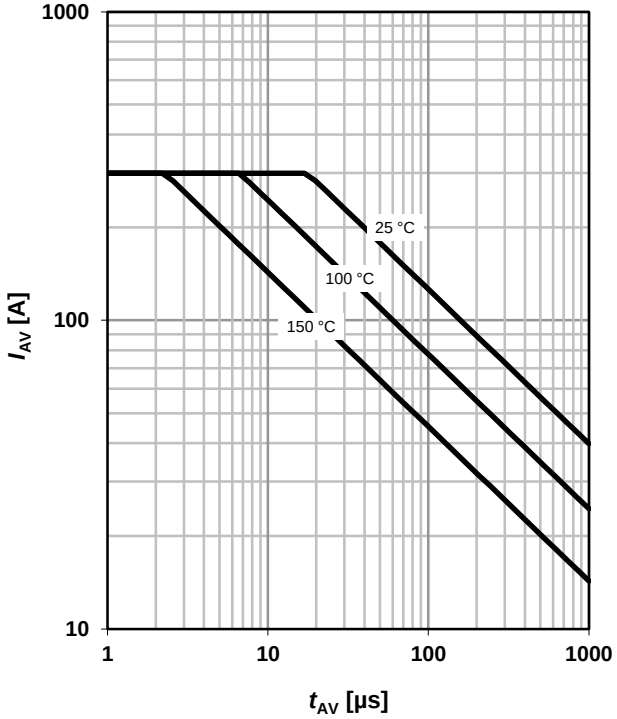
parameter: $T_j$




### 12 Typ. avalanche characteristics

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

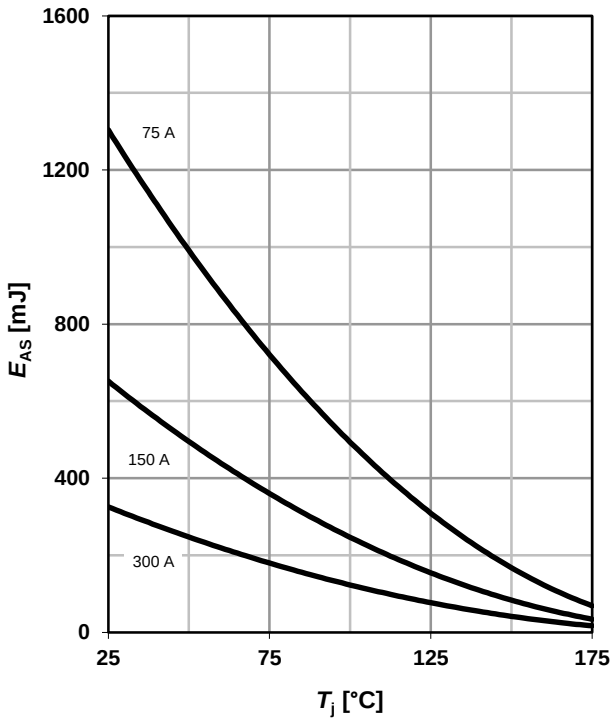
parameter: $T_{j(start)}$



## 13 Typical avalanche energy

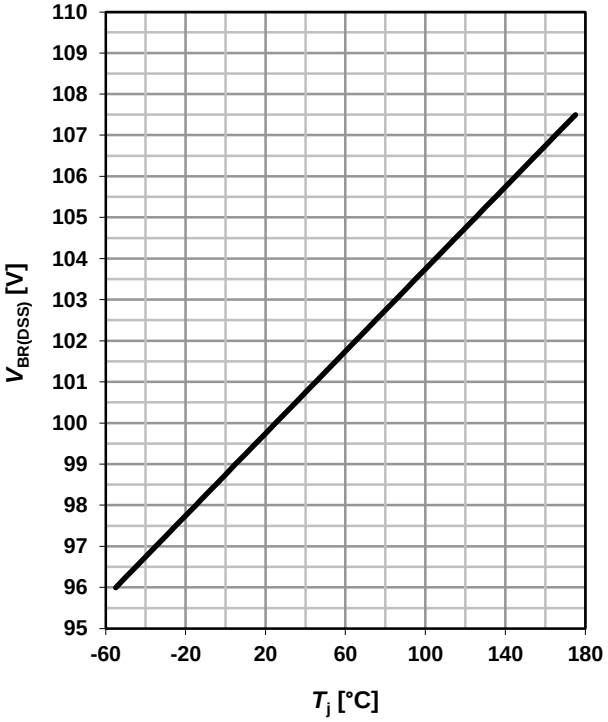
$E_{AS} = f(T_j)$

parameter: $I_D$




## 14 Drain-source breakdown voltage

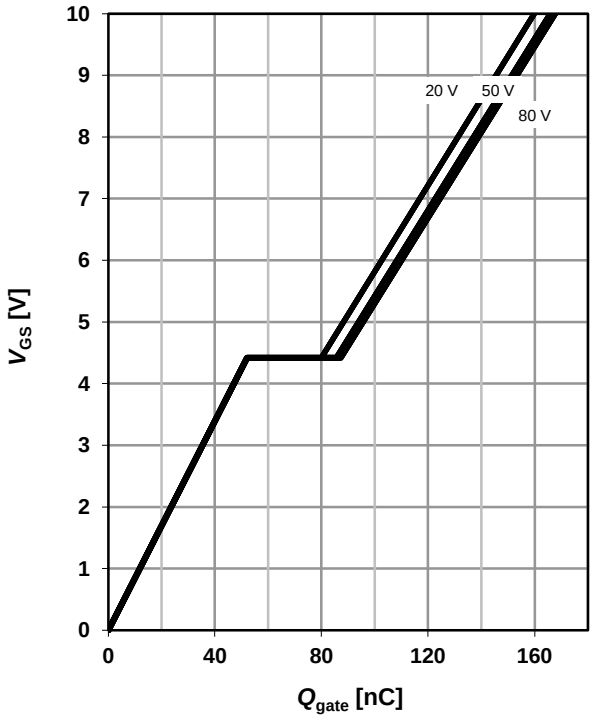
$V_{BR(DSS)} = f(T_j)$; $I_{D\_typ} = 1$ mA



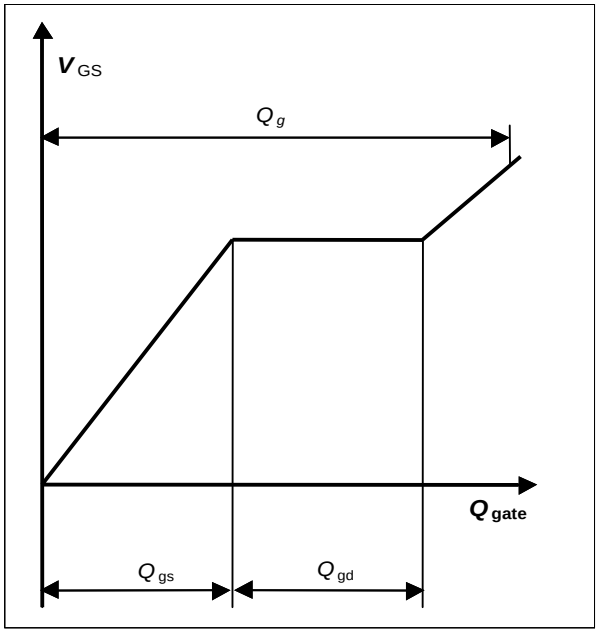

## 15 Typ. gate charge

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

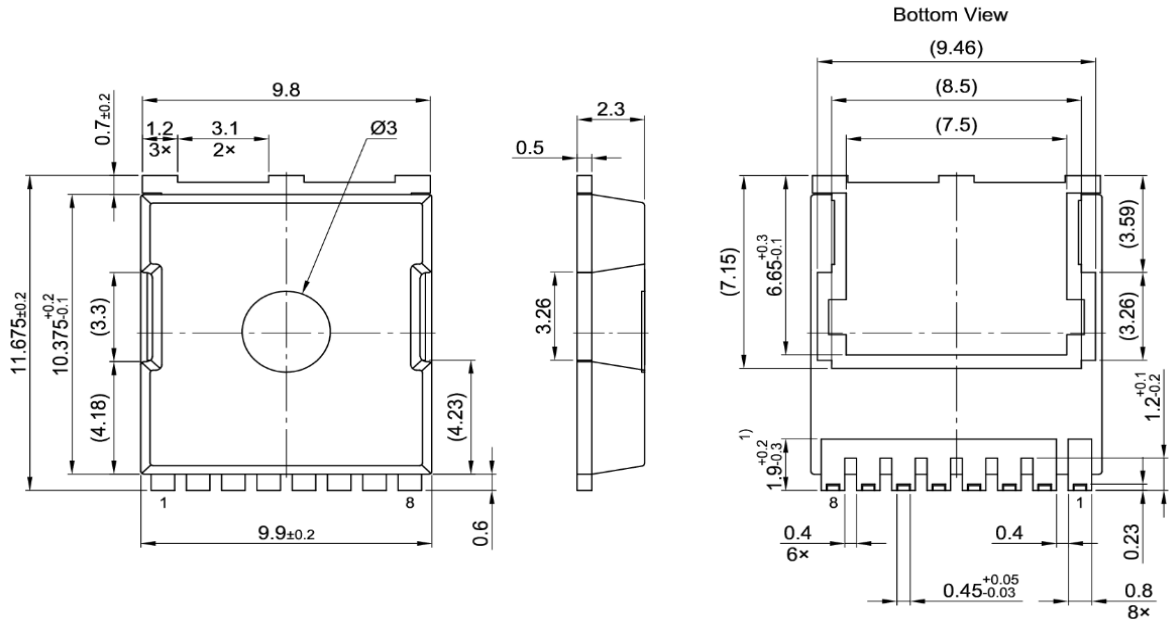
parameter: $V_{DD}$




## 16 Gate charge waveforms

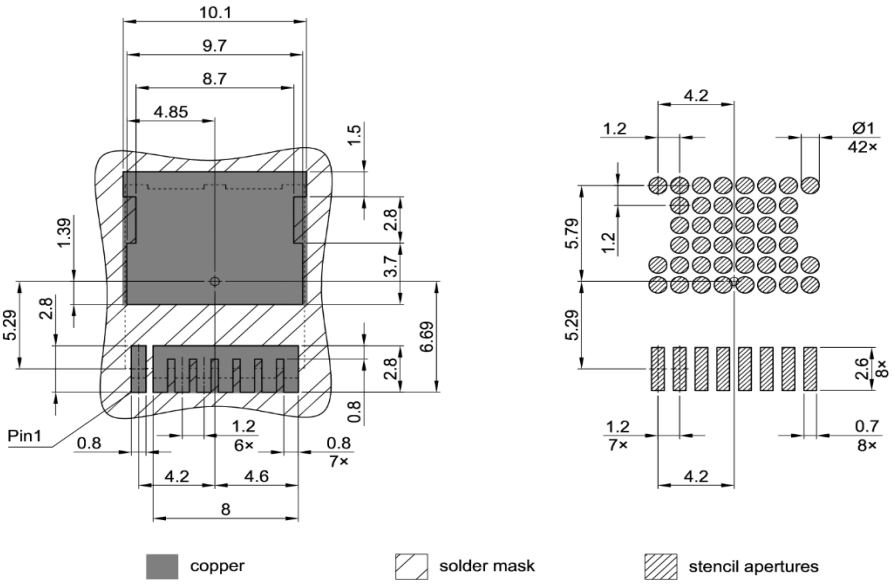


## Package Outline



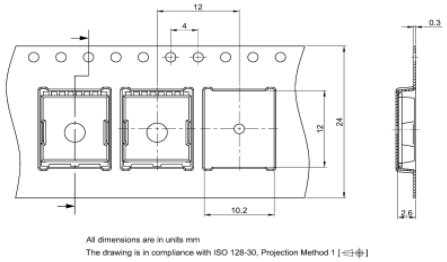

1) Lead length up to anti flash profile; mold flashes excluded
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⇿]
Drawing according to ISO 8015, general tolerances ±0,1; ±1°30'

## Footprint




All pads are solder mask defined
All dimensions are in units mm

## Packaging



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If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History

| **Version** | Date | Changes |
|---|---|---|
| Version 1.0 | 2021-01-19 | Final Datasheet |
| Version 1.1 | 2023-02-07 | package outline corrected, footprint updated |