

## OptiMOS™-5 Power-Transistor

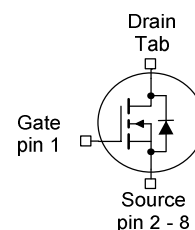
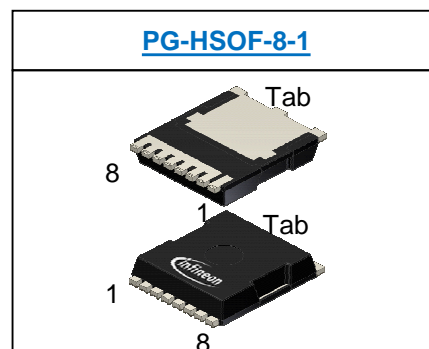


### Features

- 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

$V_{DS}$	80	V
$R_{DS(on)}$	1.1	mΩ
$I_D$	300	A



Type	Package	Marking
IAUT300N08S5N011	<a href="#">PG-HSOF-8-1</a>	5N08011

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_C=25\text{ °C}$ , $V_{GS}=10\text{ V}$ , Chip limitation <sup>1,2)</sup>	410	A
		$V_{GS}=10\text{ V}$ , DC current <sup>3)</sup>	300	
		$T_a=85\text{ °C}$ , $V_{GS}=10\text{ V}$ , $R_{thJA}$ on 2s2p <sup>2,4)</sup>	52	
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	$T_C=25\text{ °C}$ , $t_p=100\text{ μs}$	1505	
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	$I_D=150\text{ A}$	817	mJ
Avalanche current, single pulse	$I_{AS}$	-	300	A
Gate source voltage	$V_{GS}$	-	±20	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	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<sup>2)</sup>

Thermal resistance, junction - case	$R_{thJC}$		-	-	0.4	K/W
Thermal resistance, junction - ambient <sup>4)</sup>	$R_{thJA}$		-	14.8	-	

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

#### Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=1\text{ mA}$	80	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=275\text{ }\mu\text{A}$	2.2	3	3.8	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=80\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$	-	0.1	1	$\mu\text{A}$
		$V_{DS}=50\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=85\text{ °C}^{2)}$	-	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	$R_{DS(on)}$	$V_{GS}=6\text{ V}$ , $I_D=75\text{ A}$	-	1.3	1.7	m $\Omega$
		$V_{GS}=10\text{ V}$ , $I_D=100\text{ A}$	-	1.0	1.1	
Gate resistance <sup>2)</sup>	$R_G$	-	-	1.5	-	$\Omega$

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

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

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V},$ $f=1\text{ MHz}$	-	12500	16250	pF
Output capacitance	$C_{oss}$		-	2000	2600	
Reverse transfer capacitance	$C_{rss}$		-	86	130	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V},$ $I_D=100\text{ A}, R_G=3.5\ \Omega$	-	31	-	ns
Rise time	$t_r$		-	19	-	
Turn-off delay time	$t_{d(off)}$		-	69	-	
Fall time	$t_f$		-	55	-	

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

Gate to source charge	$Q_{gs}$	$V_{DD}=40\text{ V}, I_D=100\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	56	73	nC
Gate to drain charge	$Q_{gd}$		-	37	56	
Gate charge total	$Q_g$		-	178	231	
Gate plateau voltage	$V_{plateau}$		-	4.5	-	V

### Reverse Diode

Diode continuous forward current <sup>2)</sup>	$I_S$	$T_C=25\text{ °C}$	-	-	300	A
Diode pulse current <sup>2)</sup>	$I_{S,pulse}$	$T_C=25\text{ °C}$	-	-	1505	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=100\text{ A},$ $T_j=25\text{ °C}$	-	0.9	1.2	V
Reverse recovery time <sup>2)</sup>	$t_{rr}$	$V_R=40\text{ V}, I_F=50\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	86	-	ns
Reverse recovery charge <sup>2)</sup>	$Q_{rr}$		-	177	-	nC

<sup>1)</sup> Practically the current is limited by the overall system design including the customer-specific PCB.

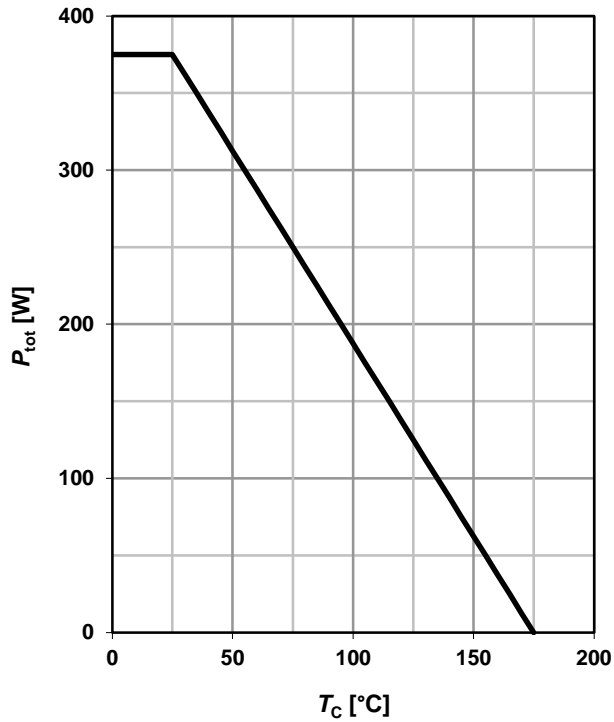
<sup>2)</sup> The parameter is not subject to production testing – specified by design.

<sup>3)</sup> Current is limited by the bondwires.

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

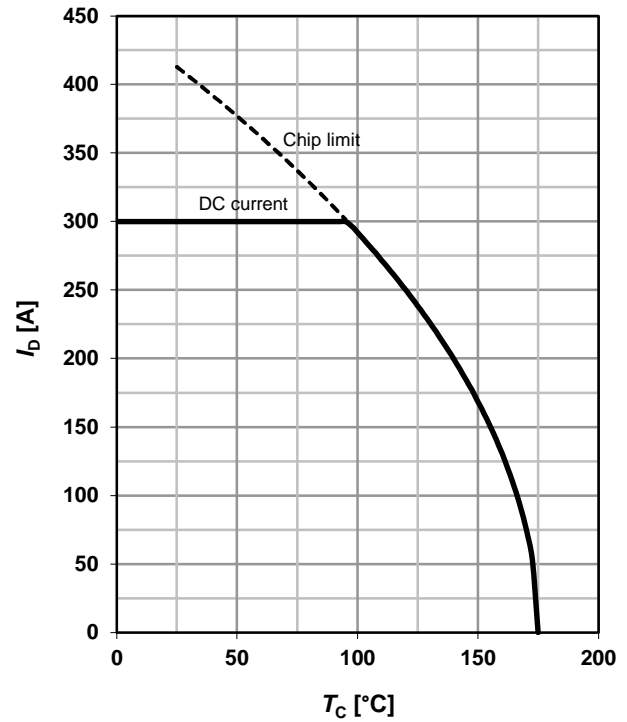
### 1 Power dissipation

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



### 2 Drain current

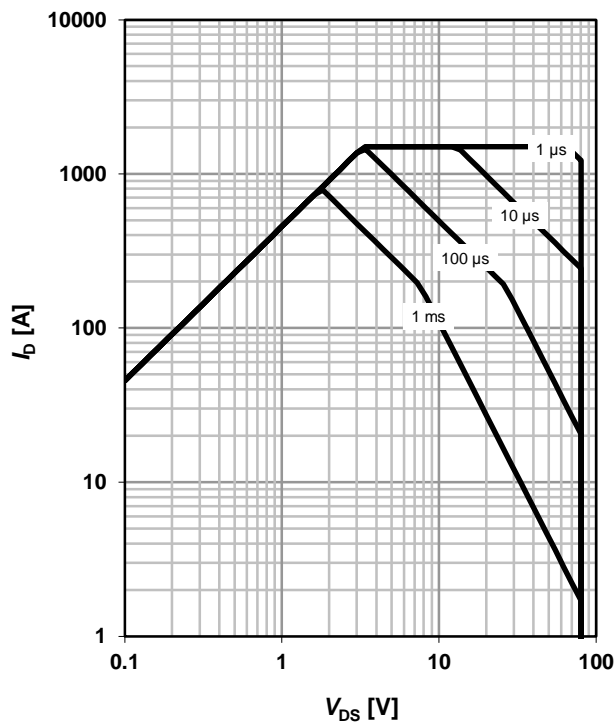
$$I_D = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$



### 3 Safe operating area

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

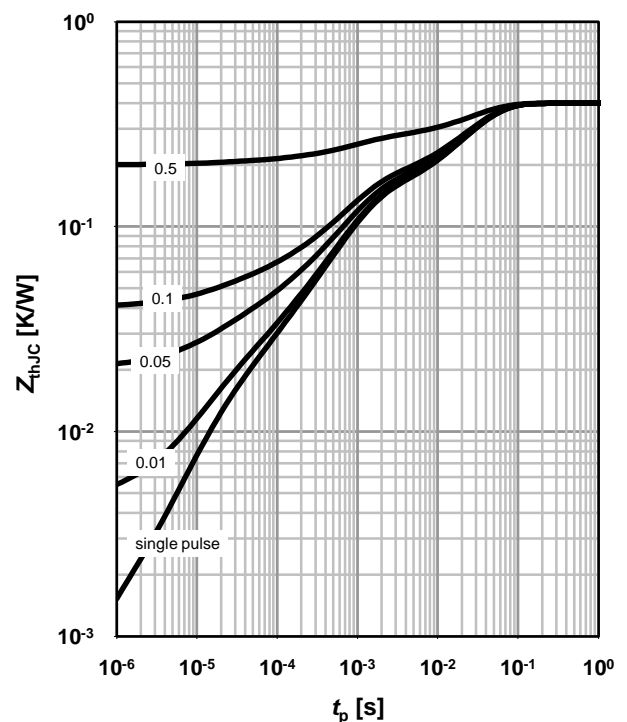
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

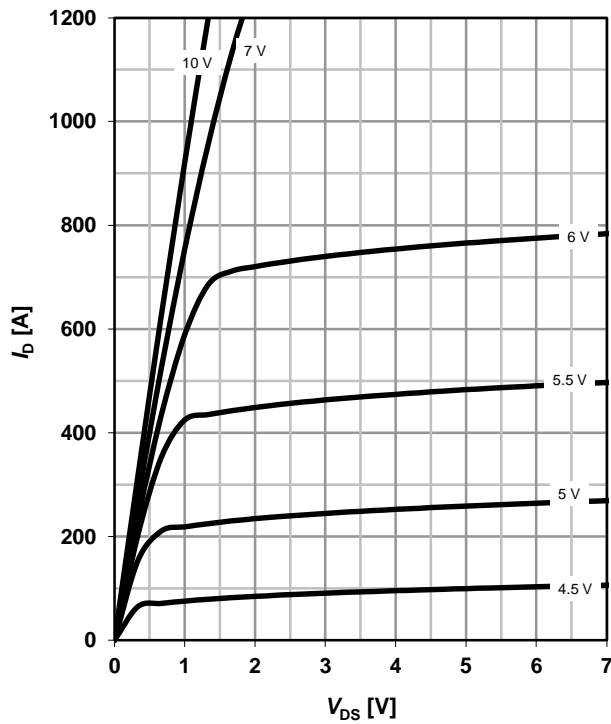
parameter:  $D = t_p/T$



## 5 Typ. output characteristics

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

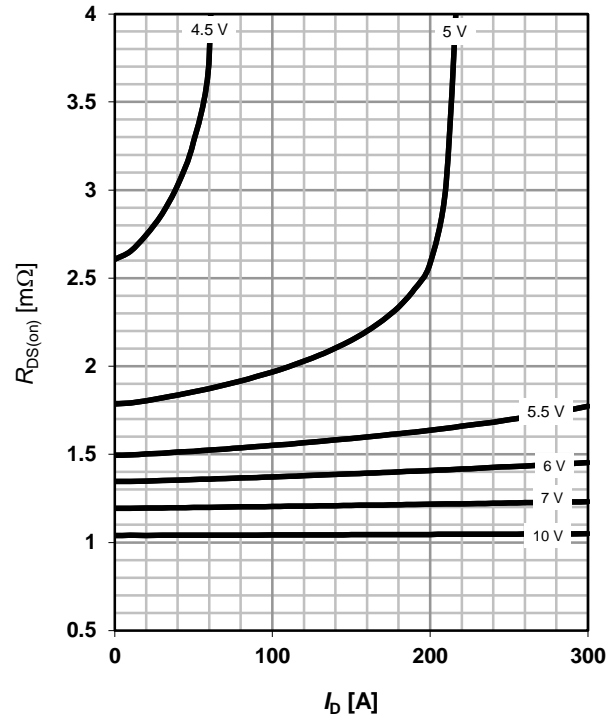
parameter:  $V_{GS}$



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

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

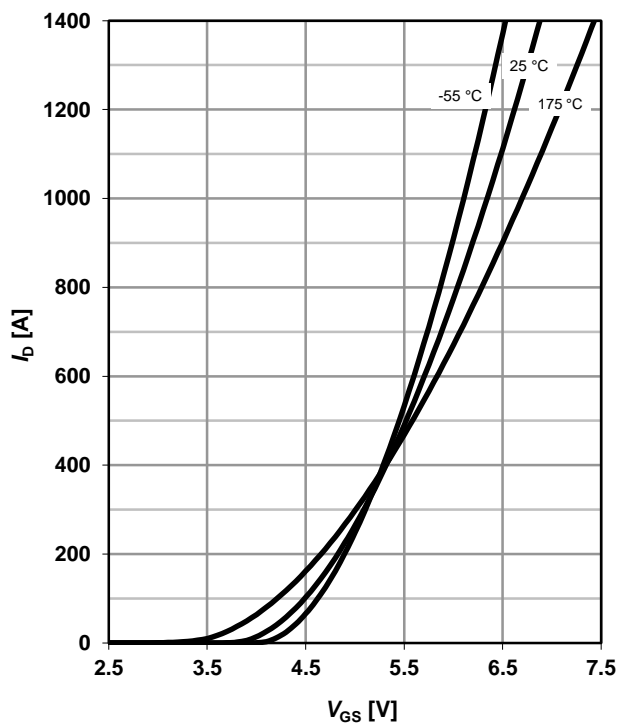
parameter:  $V_{GS}$



## 7 Typ. transfer characteristics

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

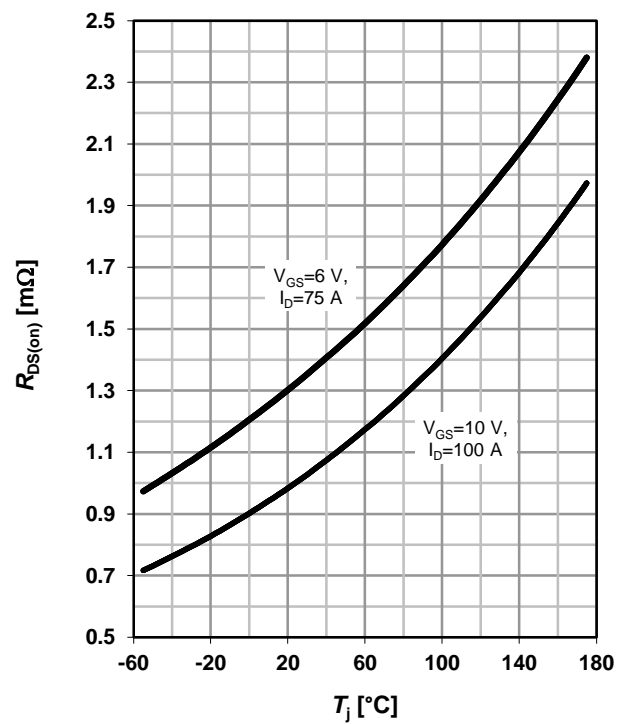
parameter:  $T_j$



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

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

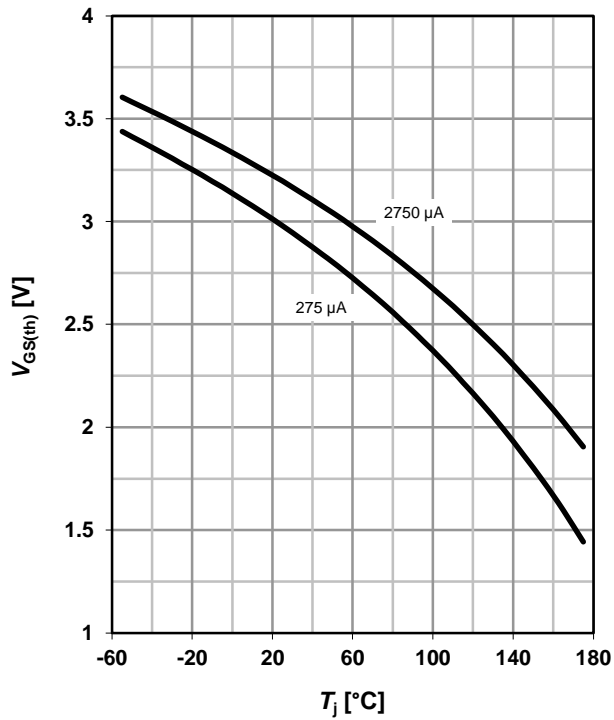
parameter:  $I_D, V_{GS}$



## 9 Typ. gate threshold voltage

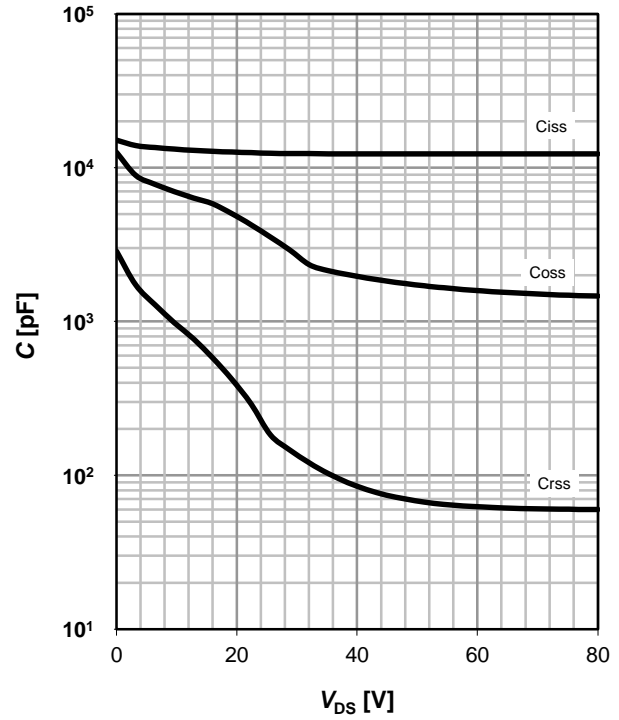
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter:  $I_D$



## 10 Typ. capacitances

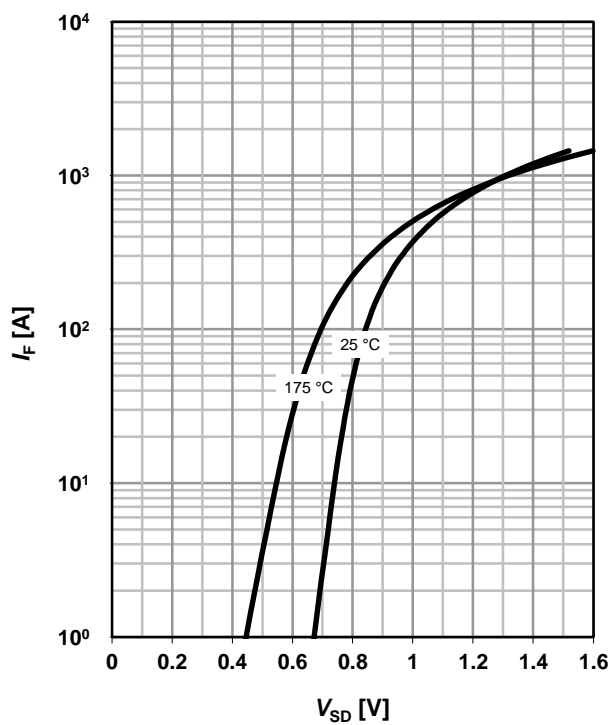
$$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$$



## 11 Typical forward diode characteristics

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

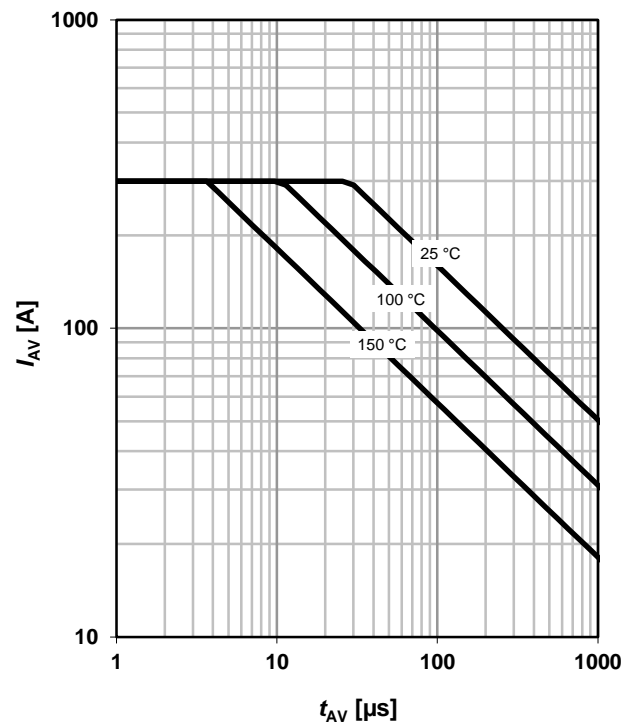
parameter:  $T_j$



## 12 Typ. avalanche characteristics

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

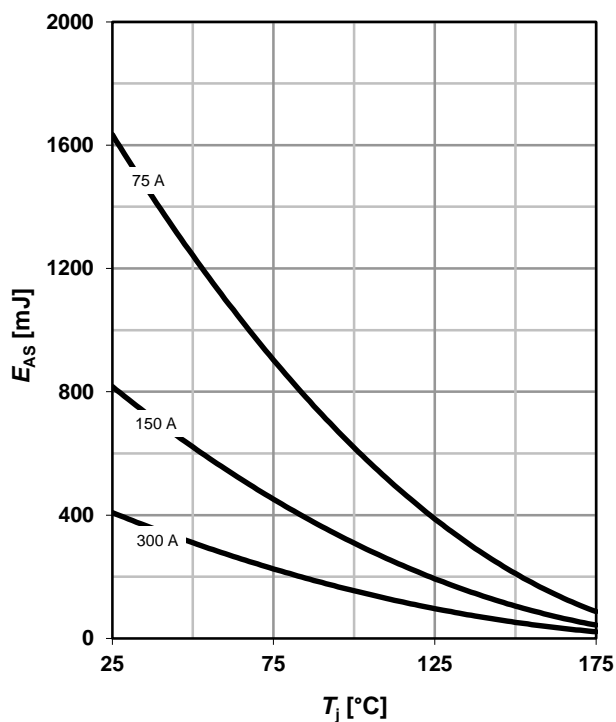
parameter:  $T_{j(start)}$



### 13 Typical avalanche energy

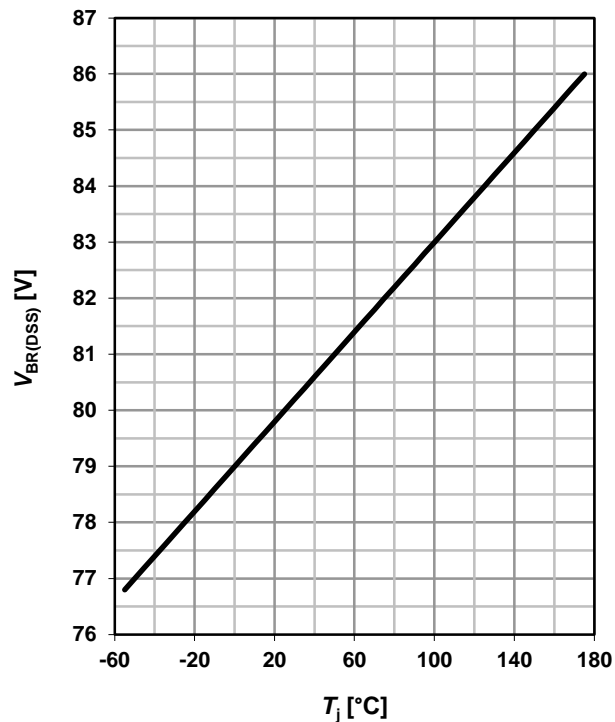
$$E_{AS} = f(T_j)$$

parameter:  $I_D$



### 14 Drain-source breakdown voltage

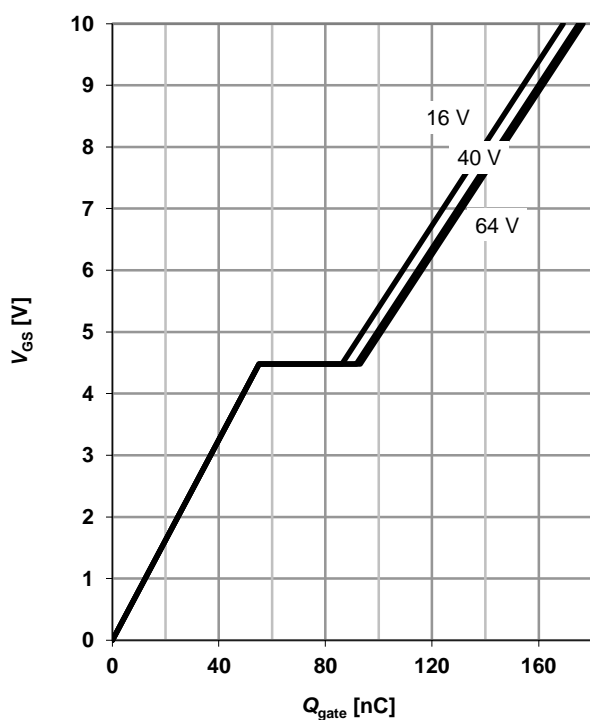
$$V_{BR(DSS)} = f(T_j); I_{D\_typ} = 1 \text{ mA}$$



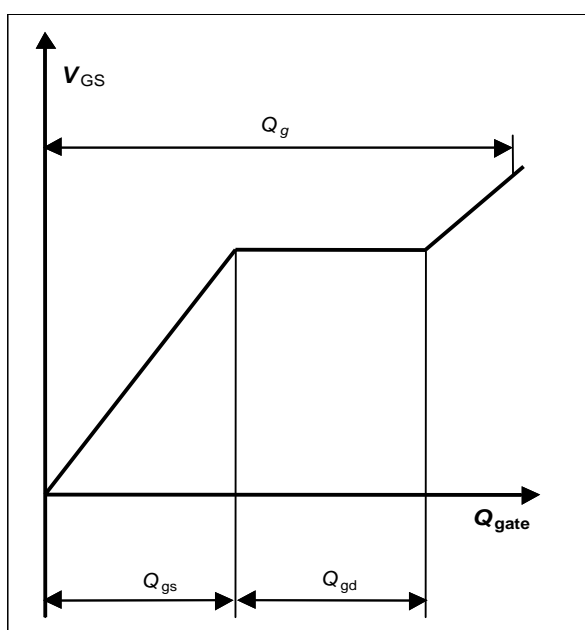
### 15 Typ. gate charge

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

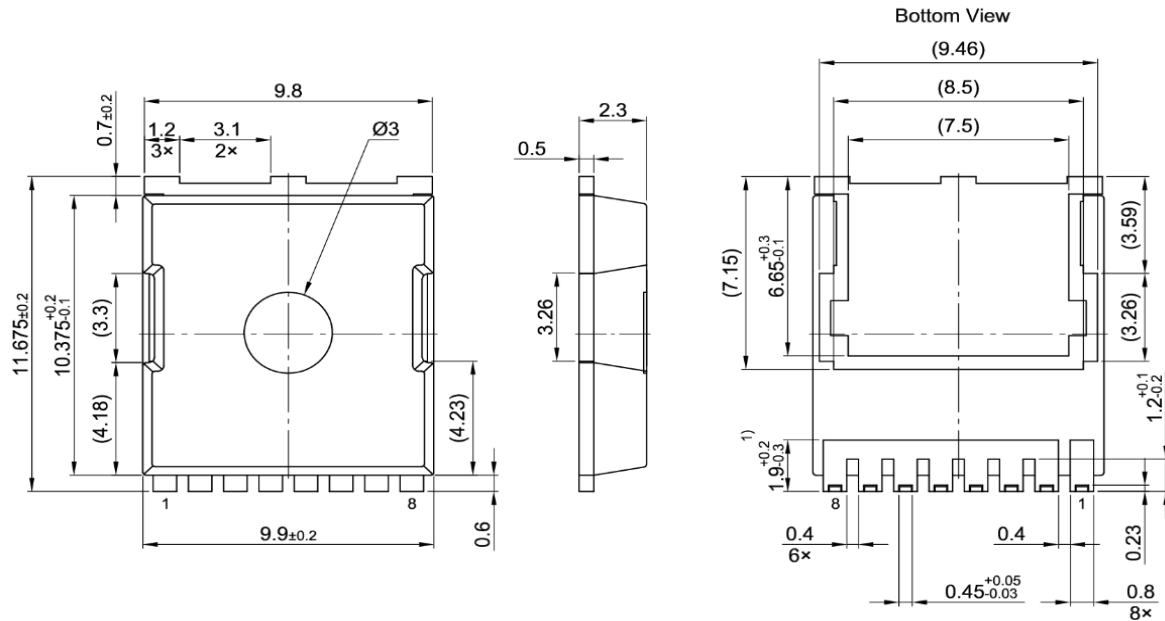
parameter:  $V_{DD}$



### 16 Gate charge waveforms



## Package Outline



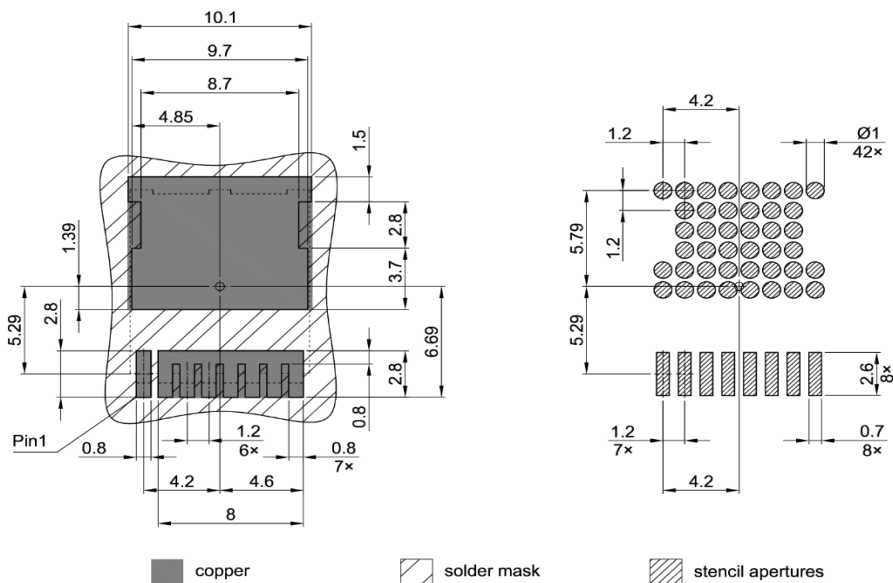
1) Lead length up to anti flash profile; mold flashes excluded

All dimensions are in units mm

The drawing is in compliance with ISO 128-30, Projection Method 1 [ ]

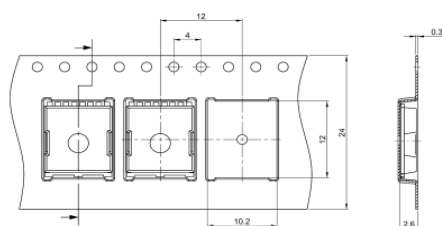
Drawing according to ISO 8015, general tolerances  $\pm 0,1$ ;  $\pm 1^\circ 30'$

## Footprint



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

## Packaging



All dimensions are in units mm  
The drawing is in compliance with ISO 128-30, Projection Method 1 [ ]



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## Revision History

Version	Date	Changes
Version 1.0	2021-01-19	Final Datasheet
Version 1.1	2021-01-26	Part Marking Info corrected
Version 1.2	2023-02-07	package outline corrected, footprint updated