

## Automotive MOSFET

## OptiMOS™-5 Power-Transistor

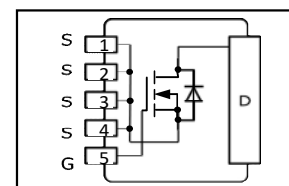


## Features

- OptiMOS™ power MOSFET for automotive applications
- N-channel – Enhancement mode – Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- MSL3 up to 260°C peak reflow
- 175°C operating temperature
- Green product (RoHS compliant)
- 100% Avalanche tested

## Potential applications

General automotive applications.



## Product Summary

$V_{DS}$	80	V
$R_{DS(on)}$	2.6	mΩ
$I_D$ (chip limited)	180	A

Type	Package	Marking
IAUA180N08S5N026	PG-HSOF-5-4	5N08026



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## Maximum ratings

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$V_{GS}=10\text{ V}$ , Chip limitation <sup>1)</sup>	180	A
		$V_{GS}=10\text{V}$ , DC current	180	
		$T_a=85\text{ °C}$ , $V_{GS}=10\text{ V}$ , $R_{thJA}$ on 2s2p <sup>2,3)</sup>	25	
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	$T_C=25\text{ °C}$ , $t_p=100\text{ }\mu\text{s}$	546	
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	$I_D=90\text{ A}$	235	mJ
Avalanche current, single pulse	$I_{AS}$	-	180	A
Gate source voltage	$V_{GS}$	-	$\pm 20$	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	179	W
Operating and storage temperature	$T_j, T_{stg}$	-	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction - case	$R_{thJC}$	-	-	-	0.84	K/W
Thermal resistance, junction - ambient <sup>3)</sup>	$R_{thJA}$	-	-	22.9	-	

## Electrical characteristics

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

### Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	80	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=100\text{ }\mu\text{A}$	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	$\mu\text{A}$
		$V_{DS}=80\text{ V}, V_{GS}=0\text{ V}, T_j=100\text{ °C}^{2)}$	-	1	100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=6\text{ V}, I_D=45\text{ A}$	-	3.0	3.6	m $\Omega$
		$V_{GS}=10\text{ V}, I_D=90\text{ A}$	-	2.1	2.6	
Gate resistance <sup>2)</sup>	$R_G$	-	-	1.3	-	$\Omega$

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Dynamic characteristics<sup>2)</sup></b>						
Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$	-	4600	5980	pF
Output capacitance	$C_{oss}$		-	803	1045	
Reverse transfer capacitance	$C_{rss}$		-	34	51	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V},$ $I_D=90\text{ A}, R_G=3.5\ \Omega$	-	11	-	ns
Rise time	$t_r$		-	7	-	
Turn-off delay time	$t_{d(off)}$		-	21	-	
Fall time	$t_f$		-	16	-	

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

Gate to source charge	$Q_{gs}$	$V_{DD}=40\text{ V}, I_D=90\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	22	29	nC
Gate to drain charge	$Q_{gd}$		-	15	22	
Gate charge total	$Q_g$		-	67	87	
Gate plateau voltage	$V_{plateau}$		-	4.9	-	V

**Reverse Diode**

Diode continuous forward current <sup>2)</sup>	$I_S$	$T_C=25\text{ °C}$	-	-	180	A
Diode pulse current <sup>2)</sup>	$I_{S,pulse}$	$T_C=25\text{ °C}, t_p=100\ \mu\text{s}$	-	-	546	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=90\text{ A},$ $T_j=25\text{ °C}$	-	0.9	1.2	V
Reverse recovery time <sup>2)</sup>	$t_{rr}$	$V_R=40\text{ V}, I_F=50\text{ A},$ $di_f/dt=100\text{ A}/\mu\text{s}$	-	59	-	ns
Reverse recovery charge <sup>2)</sup>	$Q_{rr}$		-	85	-	nC

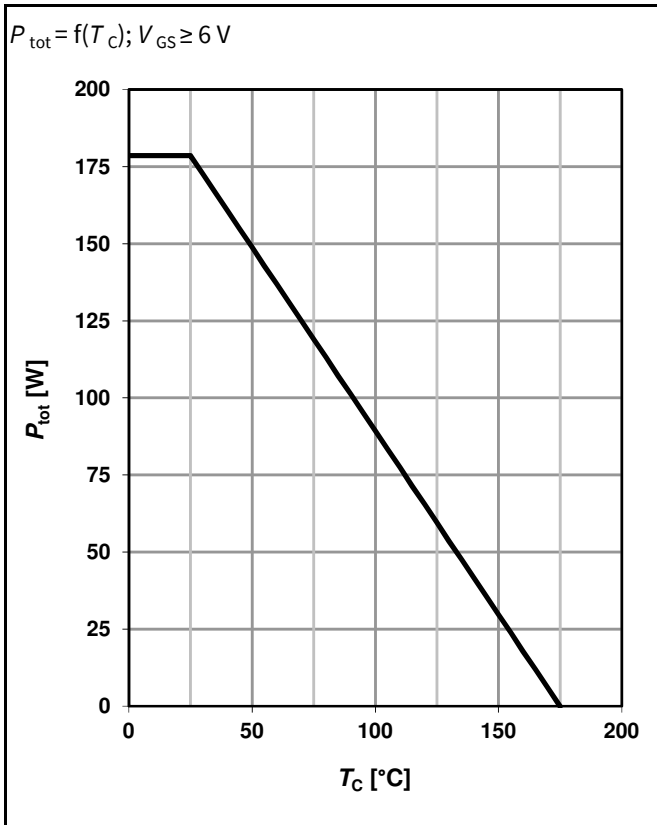
<sup>1)</sup> Practically the current is limited by the overall system design including the customer-specific PCB.

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

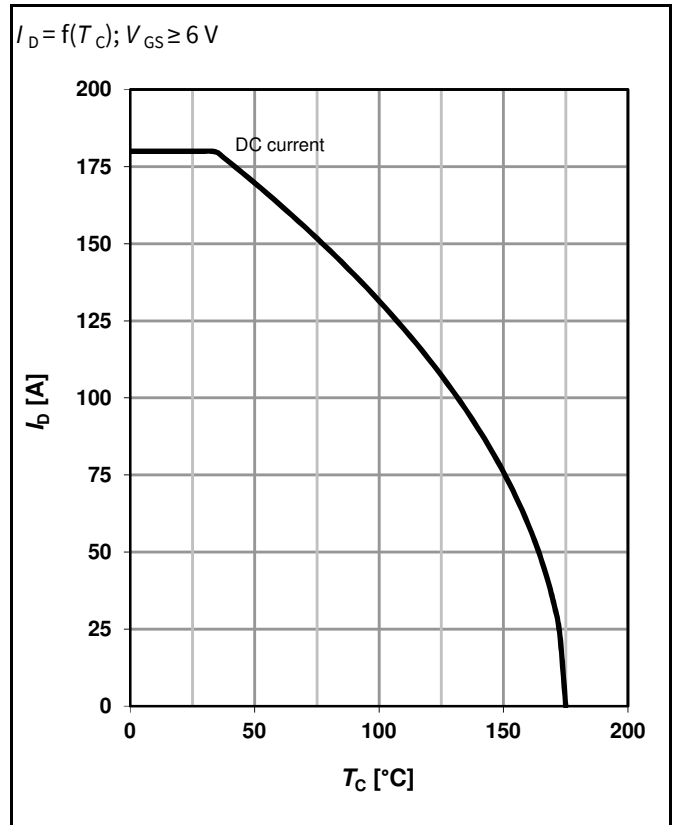
<sup>3)</sup> Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5, -7). PCB is vertical in still air.

## Electrical characteristics diagrams

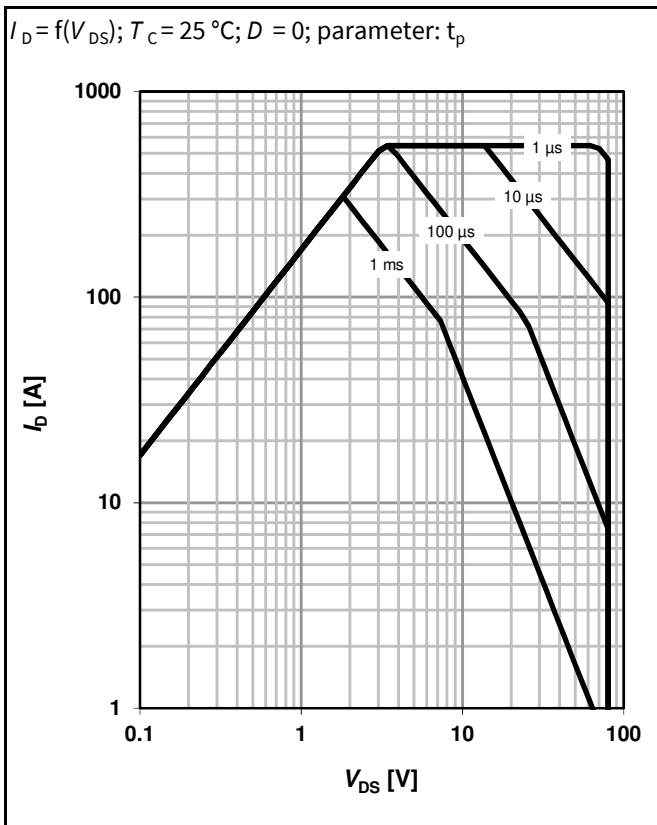
### 1 Power dissipation



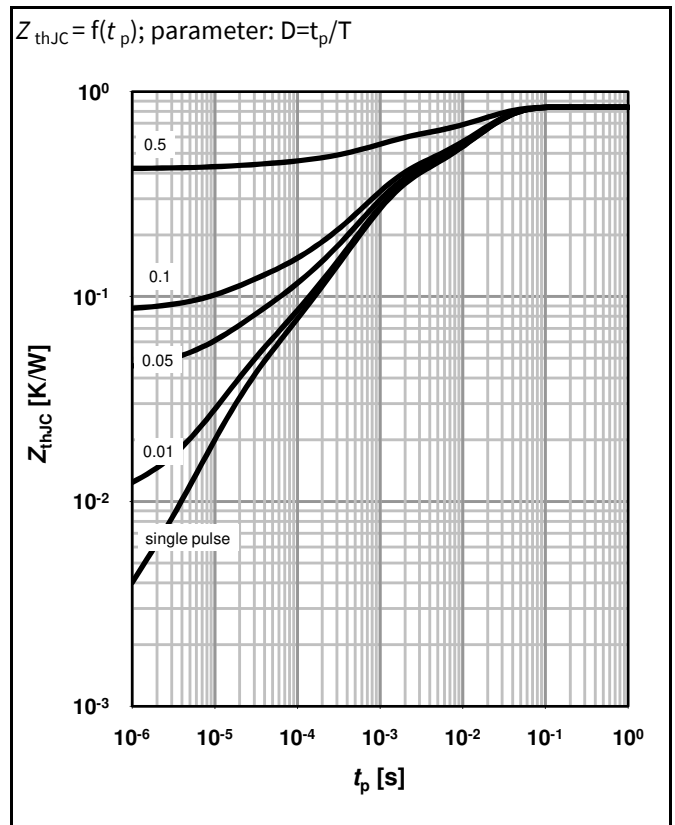
### 2 Drain current



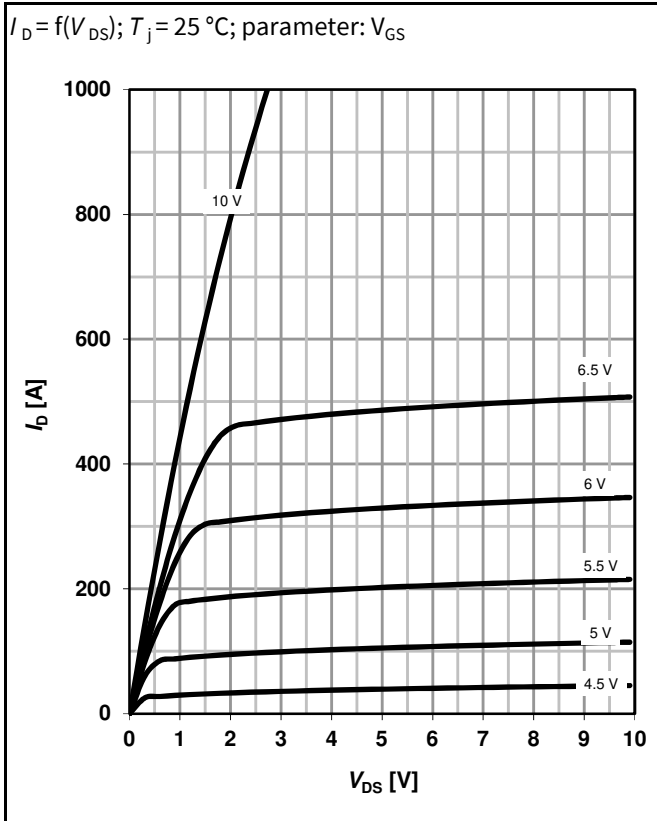
### 3 Safe operating area



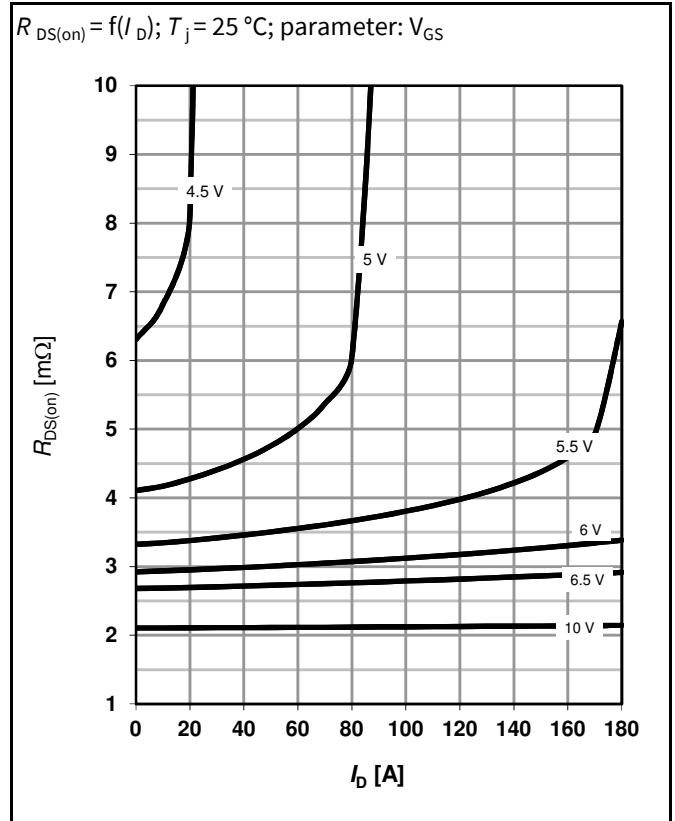
### 4 Max. transient thermal impedance



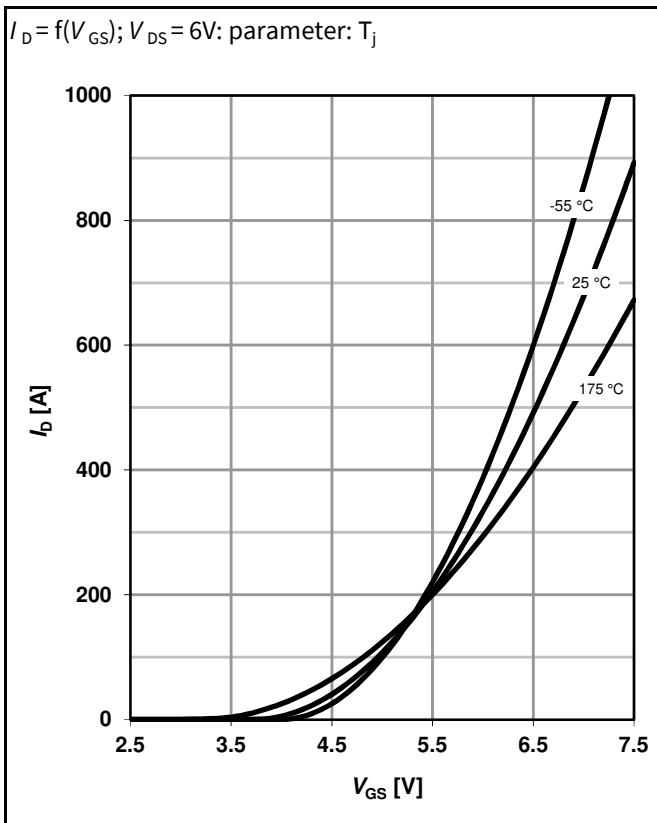
5 Typ. output characteristics



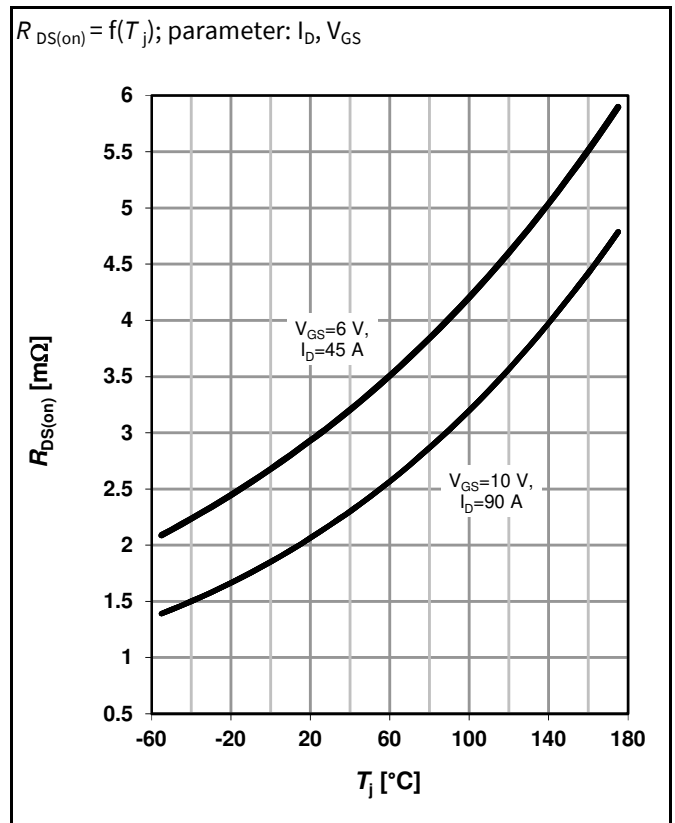
6 Typ. drain-source on-state resistance



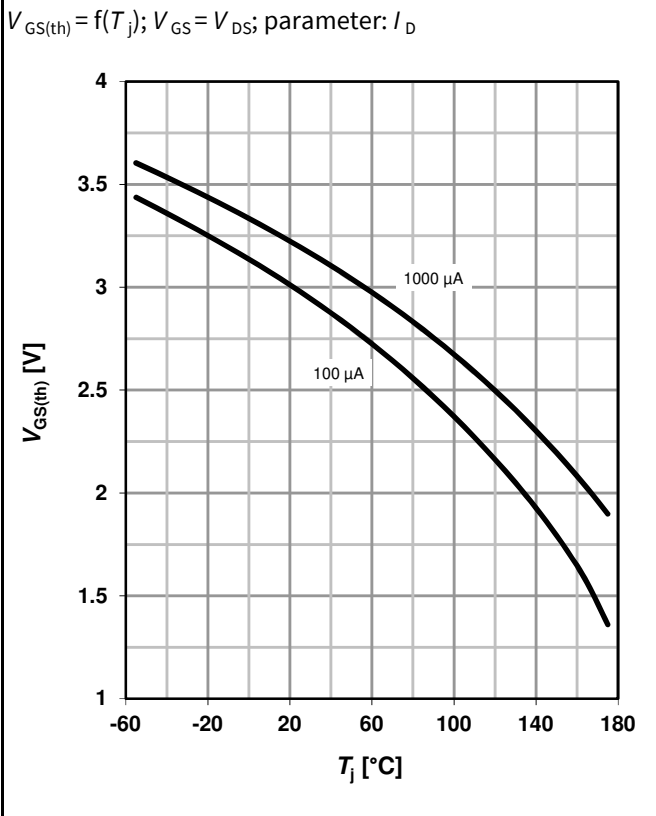
7 Typ. transfer characteristics



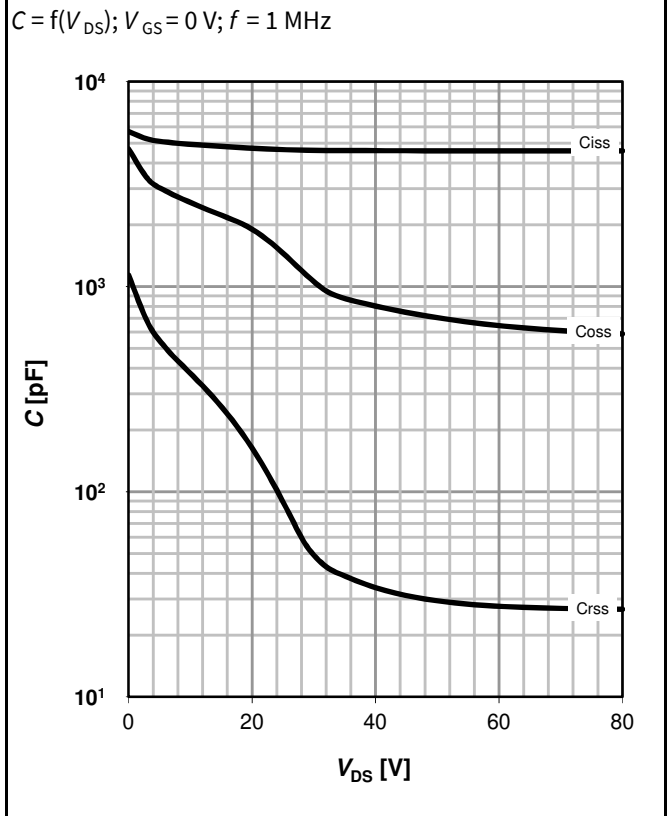
8 Typ. drain-source on-state resistance



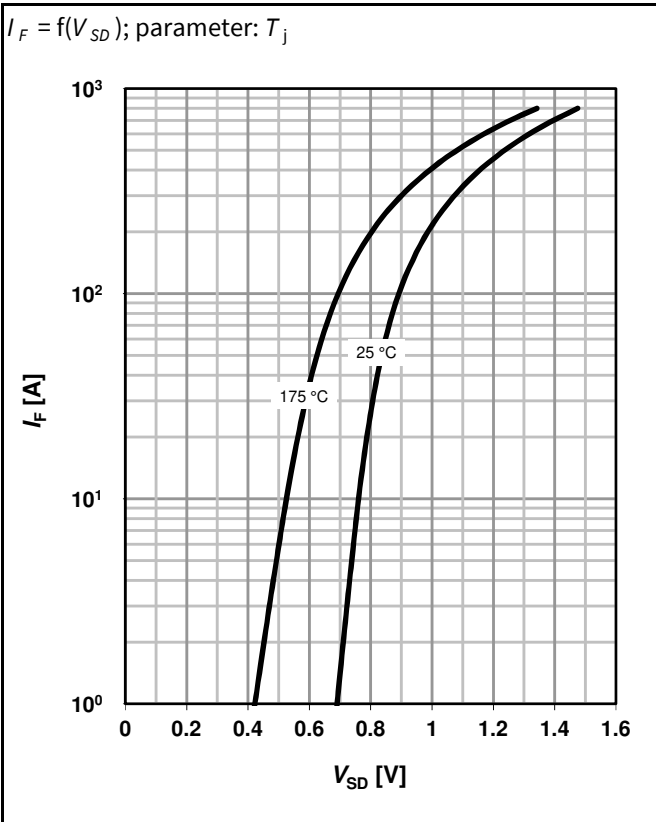
9 Typ. gate threshold voltage



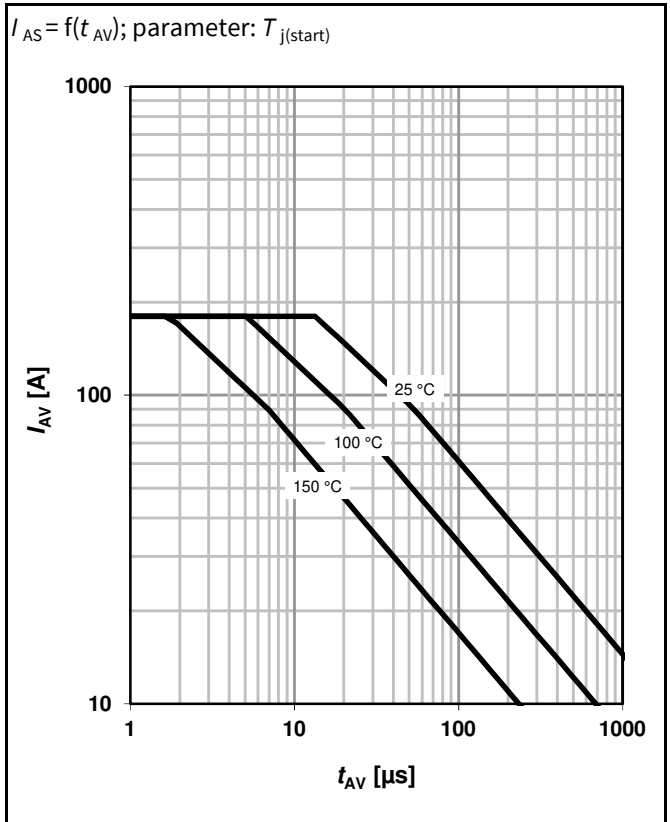
10 Typ. capacitances



11 Typical forward diode characteristics



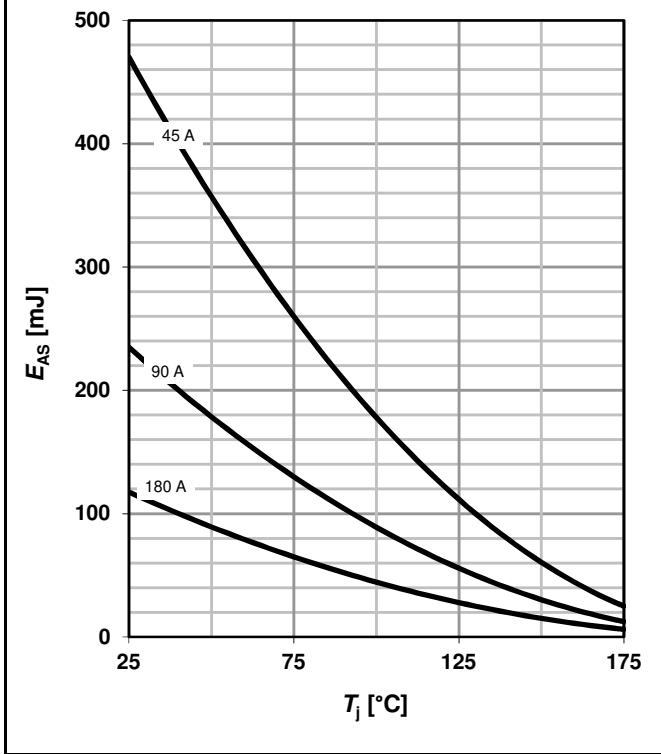
12 Typ. avalanche characteristics





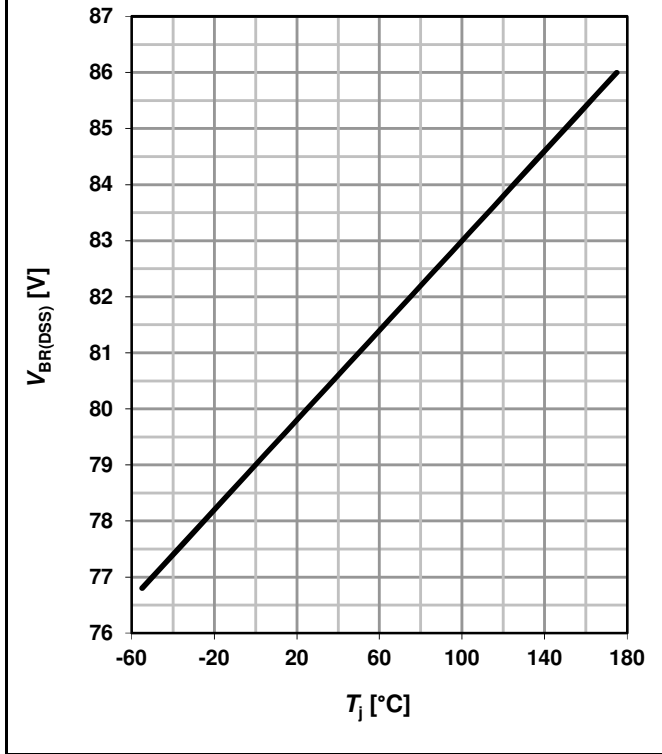
13 Typical avalanche energy

$E_{AS} = f(T_j)$ ; parameter: ID



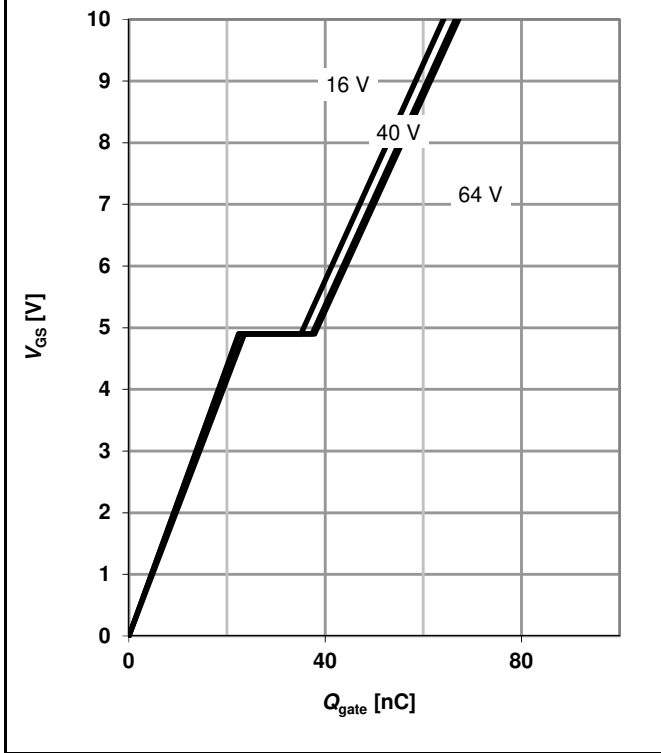
14 Drain-source breakdown voltage

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

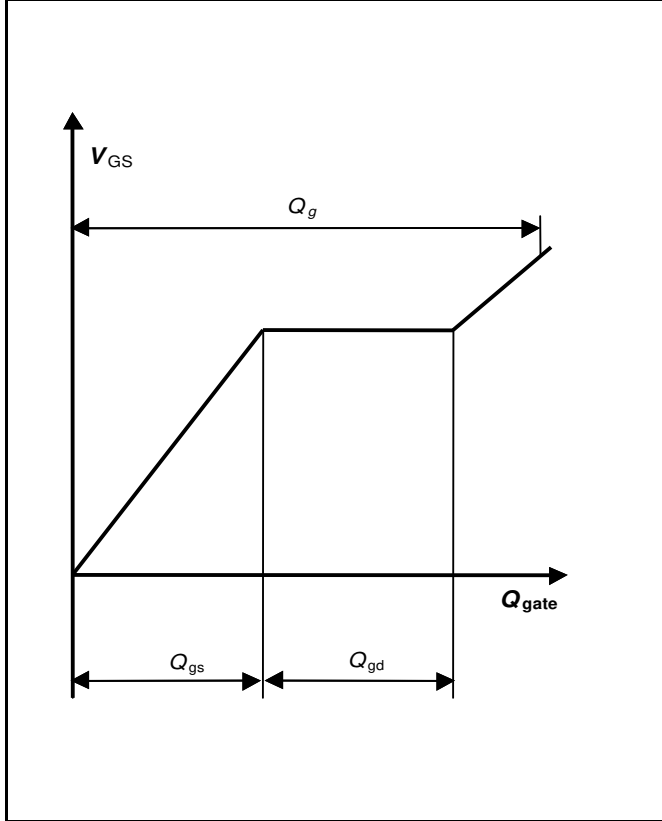


15 Typ. gate charge

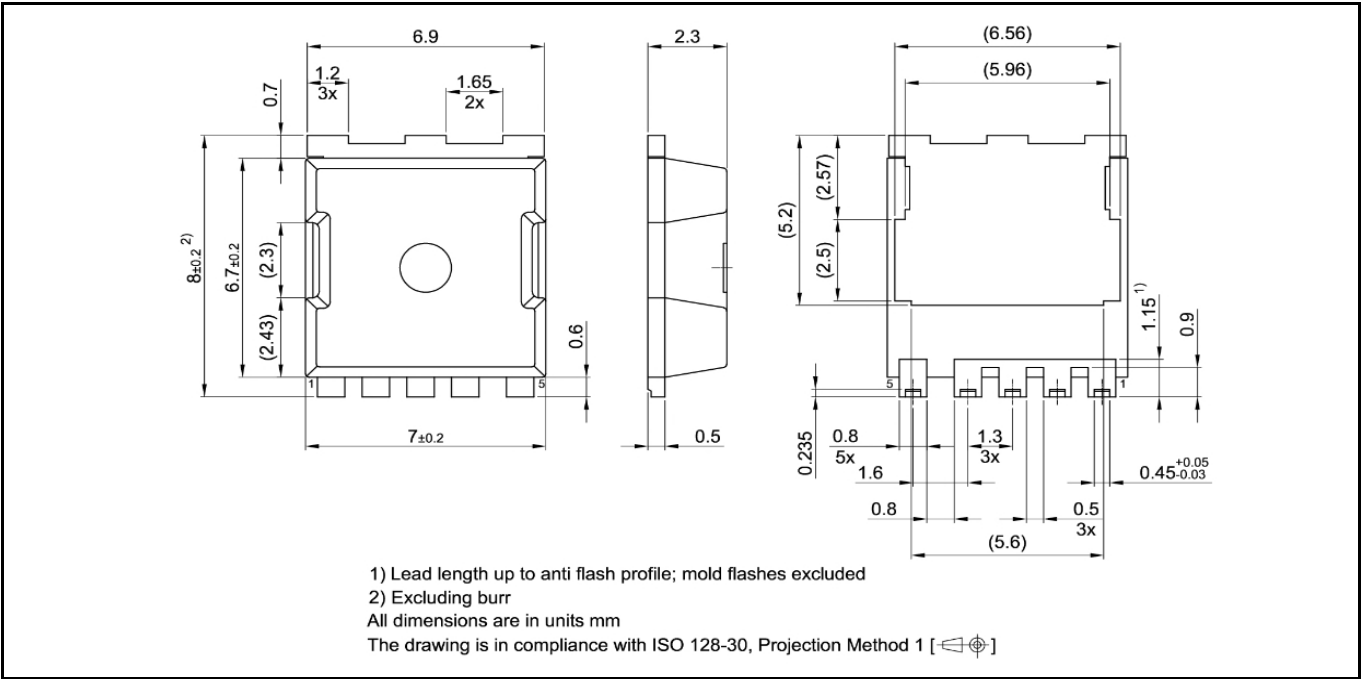
$V_{GS} = f(Q_{gate})$ ;  $I_D = 90$  A pulsed; parameter:  $V_{DD}$



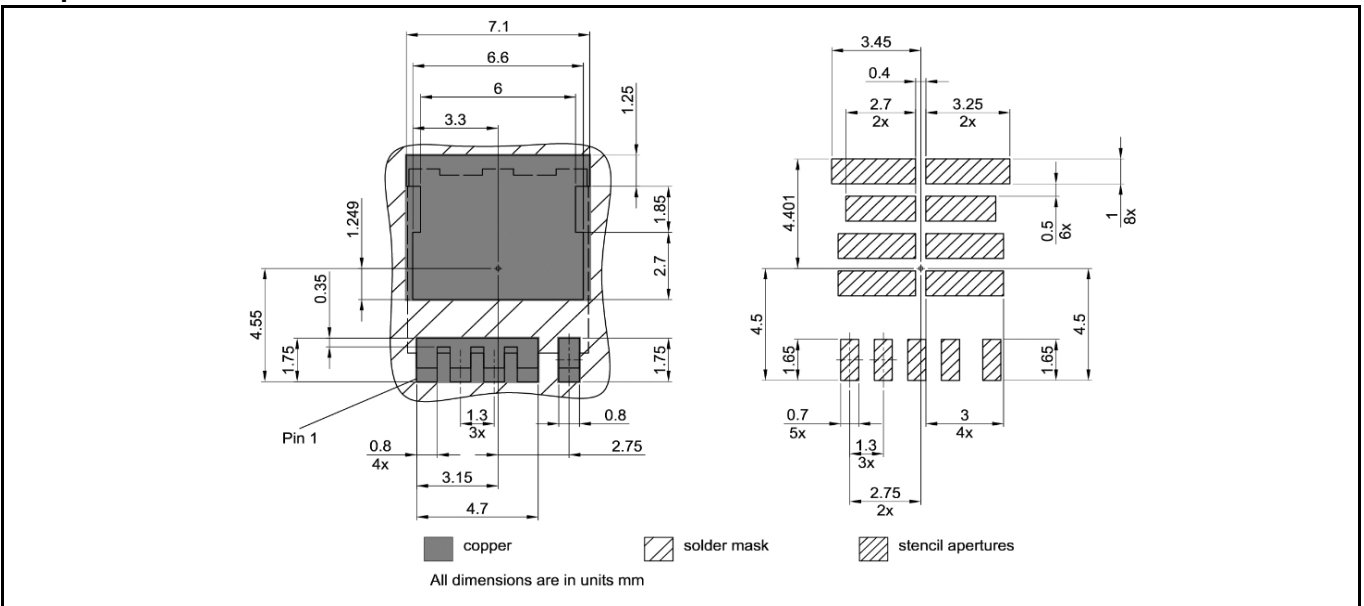
16 Gate charge waveforms



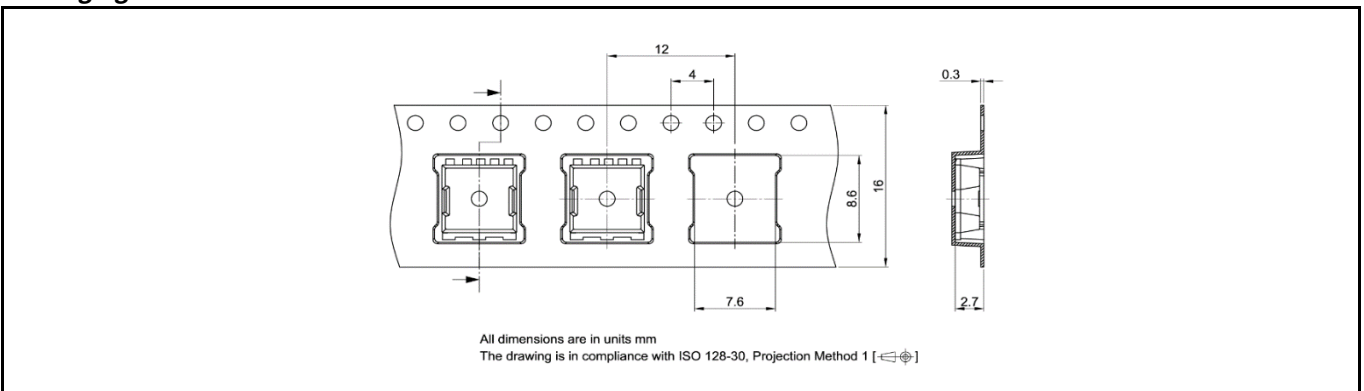
## Package Outline



## Footprint



## Packaging



## Revision History

Revision	Date	Changes
Revision 1.0	16.03.2021	Final Datasheet

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