

Automotive MOSFET

OptiMOS™-5 Power-Transistor

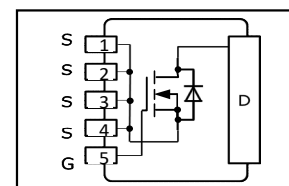


Features

- 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
$R_{DS(on)}$	2.1	m Ω
I_D (chip limited)	220	A

Type	Package	Marking
IAUA220N08S5N021	PG-HSOF-5-4	5N08021



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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 ¹⁾	220	A
		$V_{GS}=10\text{V}$, DC current	220	
		$T_a=85\text{ °C}$, $V_{GS}=10\text{ V}$, R_{thJA} on 2s2p ^{2,3)}	27	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$, $t_p=100\text{ }\mu\text{s}$	677	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=110\text{ A}$	275	mJ
Avalanche current, single pulse	I_{AS}	-	220	A
Gate source voltage	V_{GS}	-	± 20	V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	211	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

Thermal characteristics²⁾

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	-	-	-	0.71	K/W
Thermal resistance, junction - ambient ³⁾	R_{thJA}	-	-	22.8	-	

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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=120\text{ }\mu\text{A}$	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	μA
		$V_{DS}=80\text{ V}, V_{GS}=0\text{ V}, T_j=100\text{ °C}^{2)}$	-	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	$R_{DS(on)}$	$V_{GS}=6\text{ V}, I_D=55\text{ A}$	-	2.5	3.0	m Ω
		$V_{GS}=10\text{ V}, I_D=100\text{ A}$	-	1.8	2.1	
Gate resistance ²⁾	R_G	-	-	1.4	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics²⁾						
Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$	-	5553	7219	pF
Output capacitance	C_{oss}		-	963	1252	
Reverse transfer capacitance	C_{rss}		-	40	60	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=100\text{ A}, R_G=3.5\ \Omega$	-	14	-	ns
Rise time	t_r		-	9	-	
Turn-off delay time	$t_{d(off)}$		-	26	-	
Fall time	t_f		-	19	-	

Gate Charge Characteristics²⁾

Gate to source charge	Q_{gs}	$V_{DD}=40\text{ V}, I_D=100\text{ A}, V_{GS}=0\text{ to }10\text{ V}$	-	27	35	nC
Gate to drain charge	Q_{gd}		-	18	28	
Gate charge total	Q_g		-	81	105	
Gate plateau voltage	$V_{plateau}$		-	4.8	-	V

Reverse Diode

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	220	A
Diode pulse current ²⁾	$I_{S,pulse}$	$T_C=25\text{ °C}, t_p=100\ \mu\text{s}$	-	-	677	
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 ²⁾	t_{rr}	$V_R=40\text{ V}, I_F=50\text{ A}, di_f/dt=100\text{ A}/\mu\text{s}$	-	54	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	69	-	nC

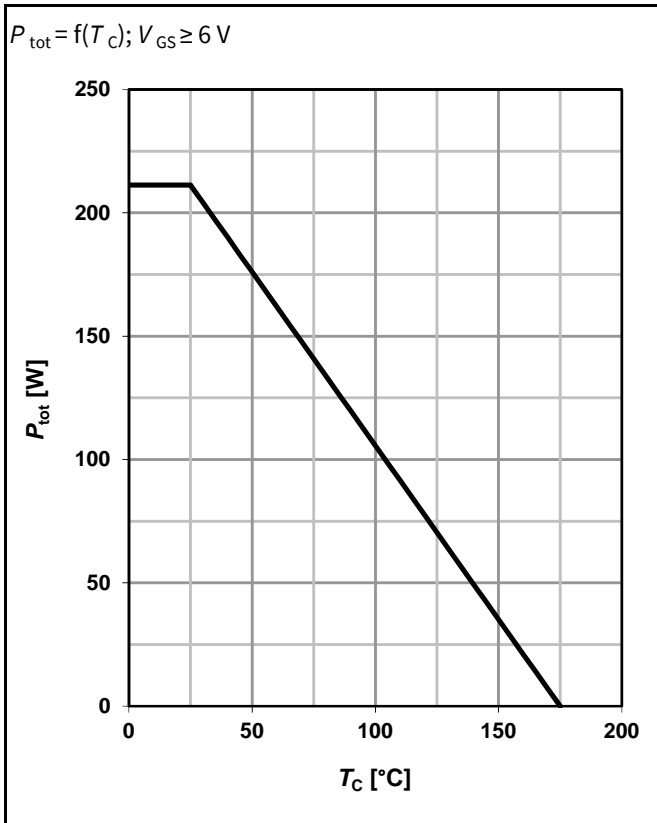
¹⁾ Practically the current is limited by the overall system design including the customer-specific PCB.

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

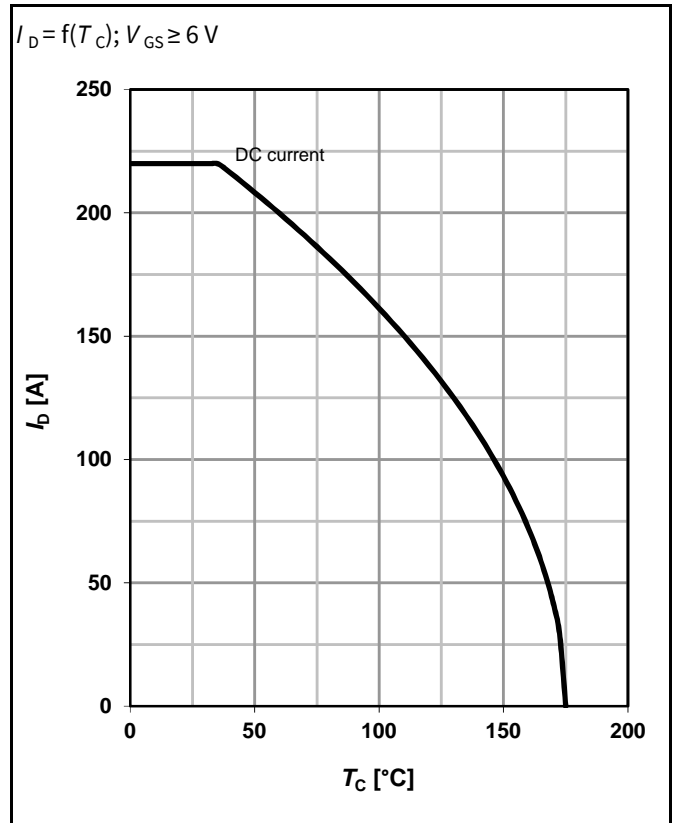
³⁾ Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5, -7). PCB is vertical in still air.

Electrical characteristics diagrams

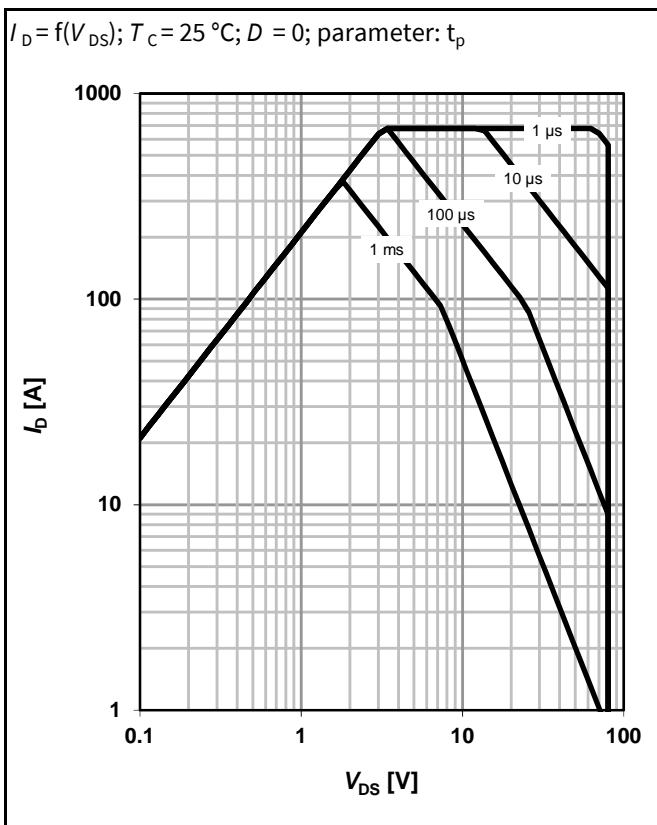
1 Power dissipation



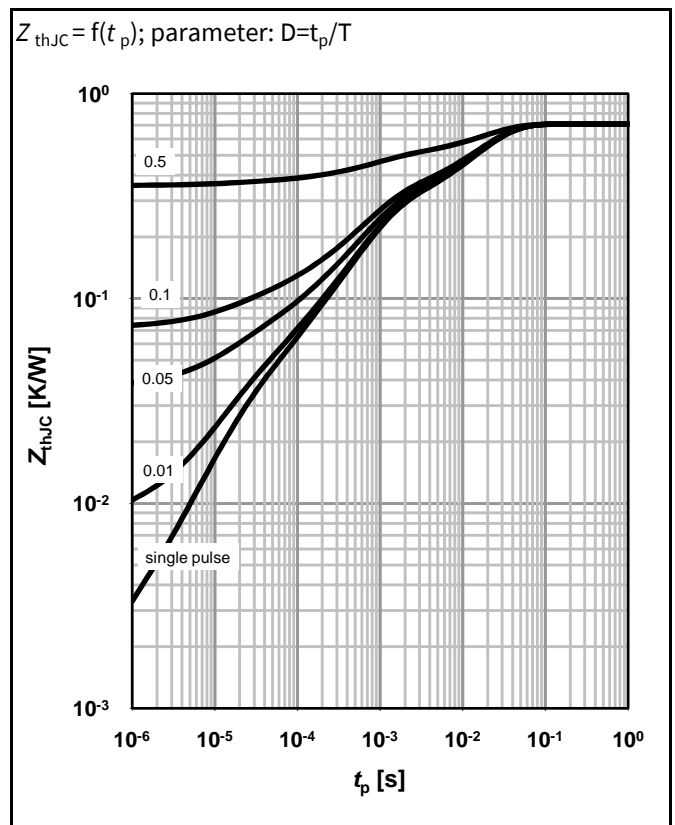
2 Drain current



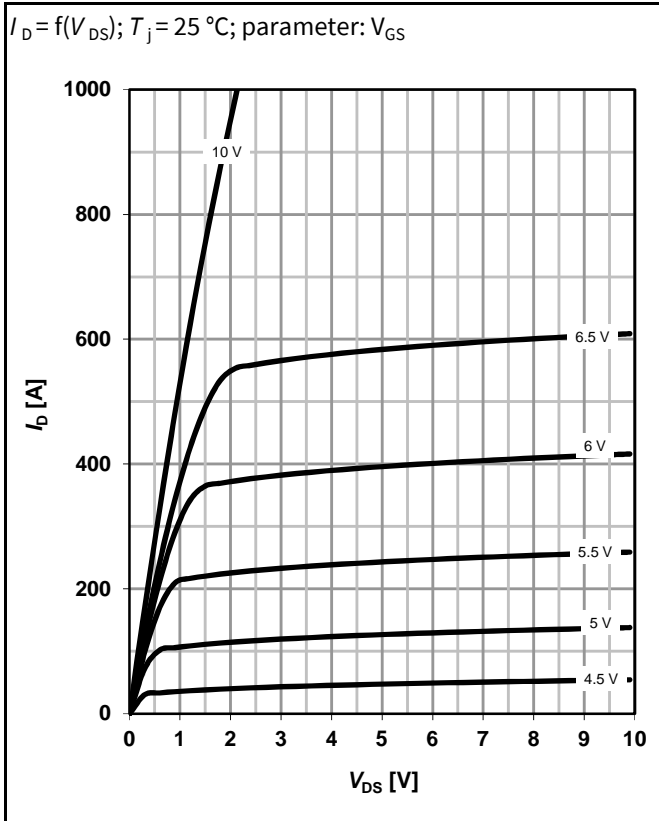
3 Safe operating area



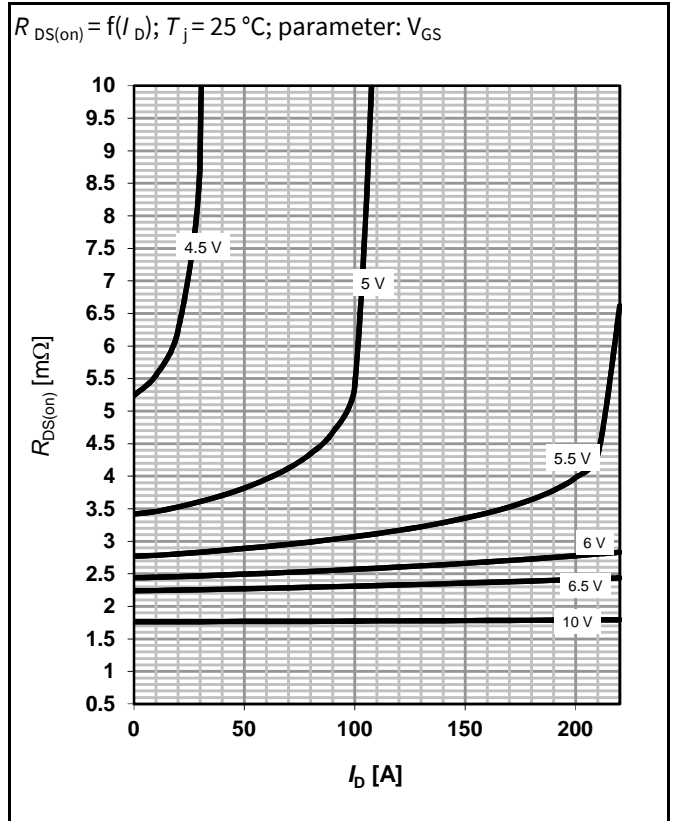
4 Max. transient thermal impedance



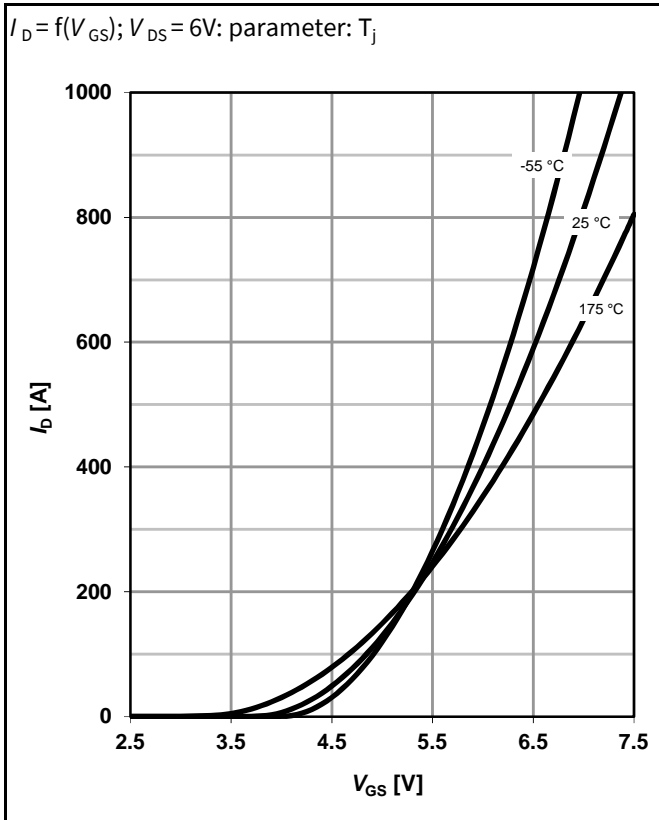
5 Typ. output characteristics



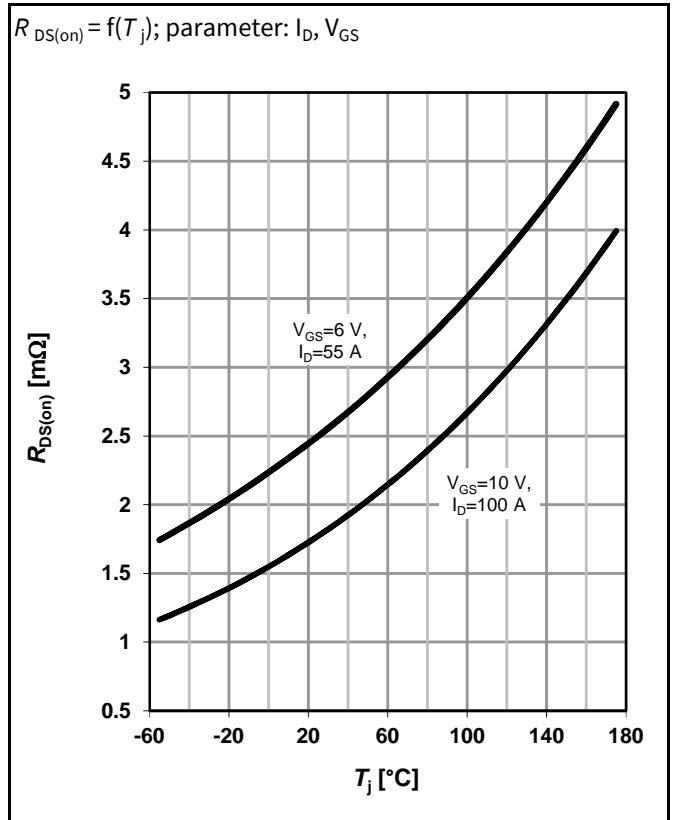
6 Typ. drain-source on-state resistance



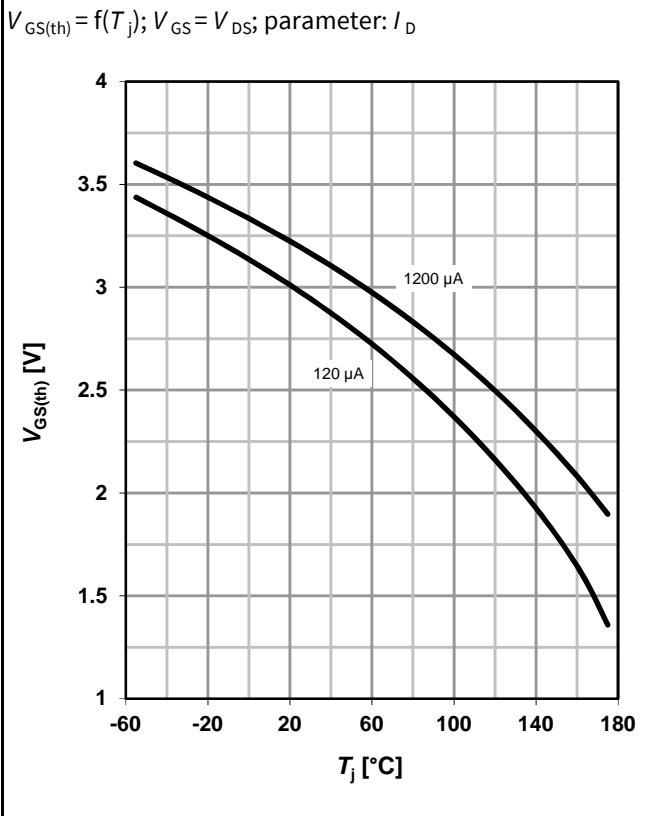
7 Typ. transfer characteristics



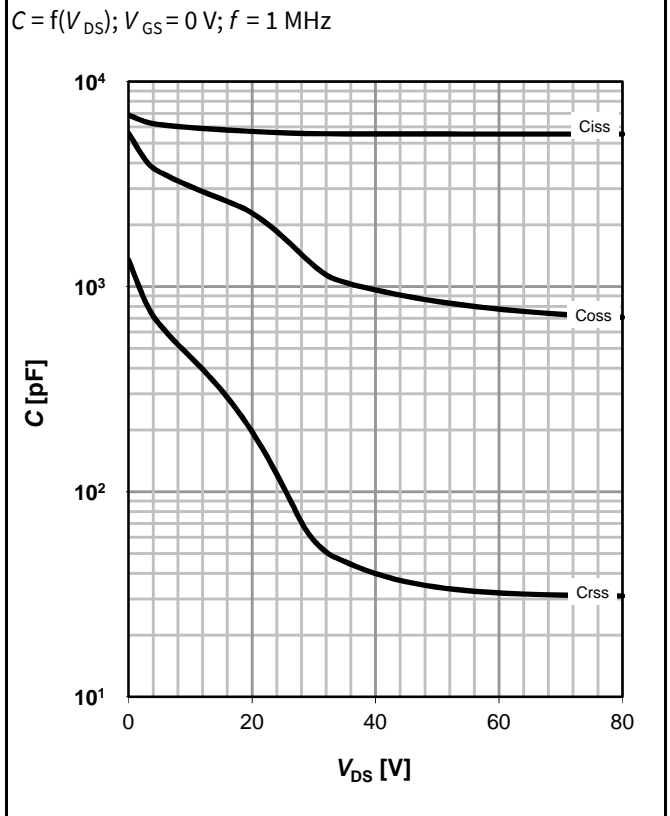
8 Typ. drain-source on-state resistance



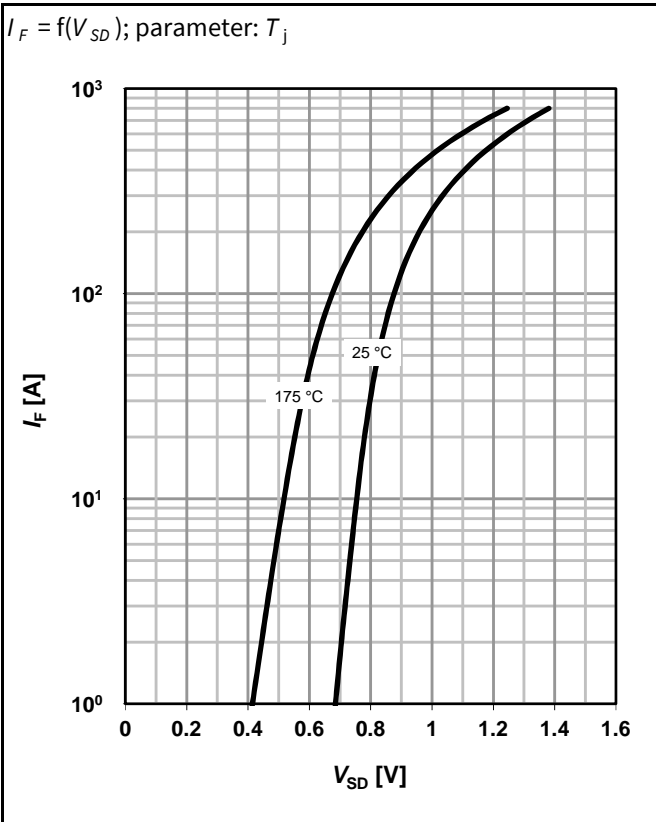
9 Typ. gate threshold voltage



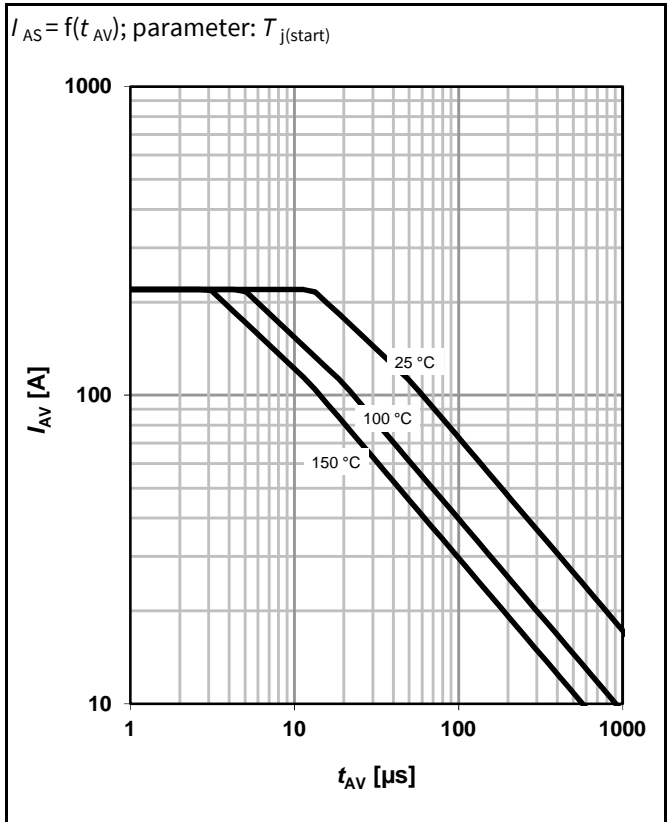
10 Typ. capacitances



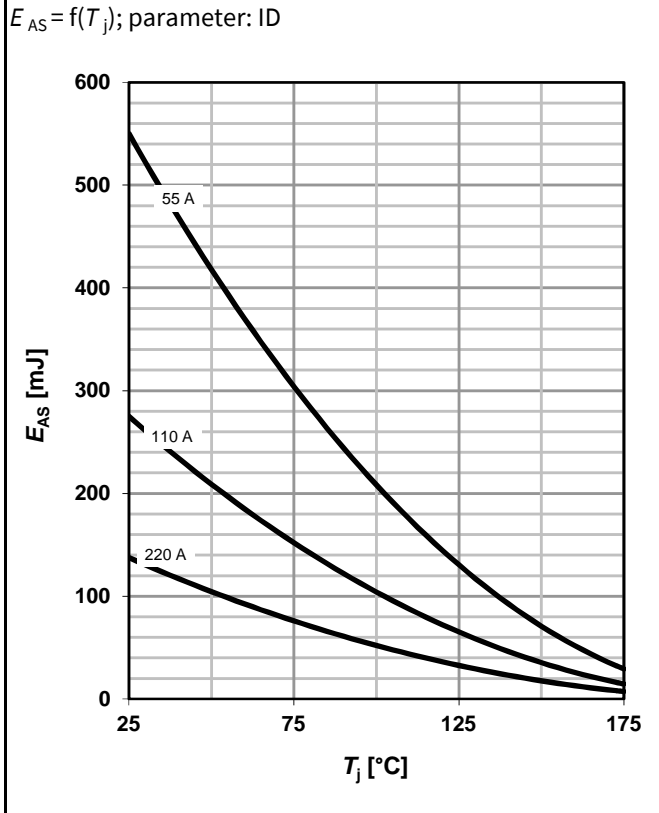
11 Typical forward diode characteristics



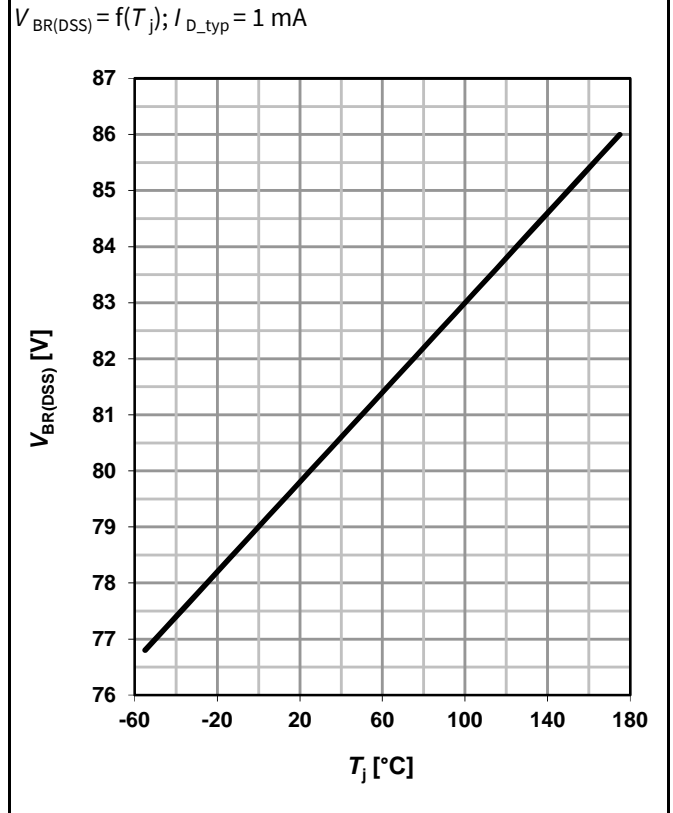
12 Typ. avalanche characteristics



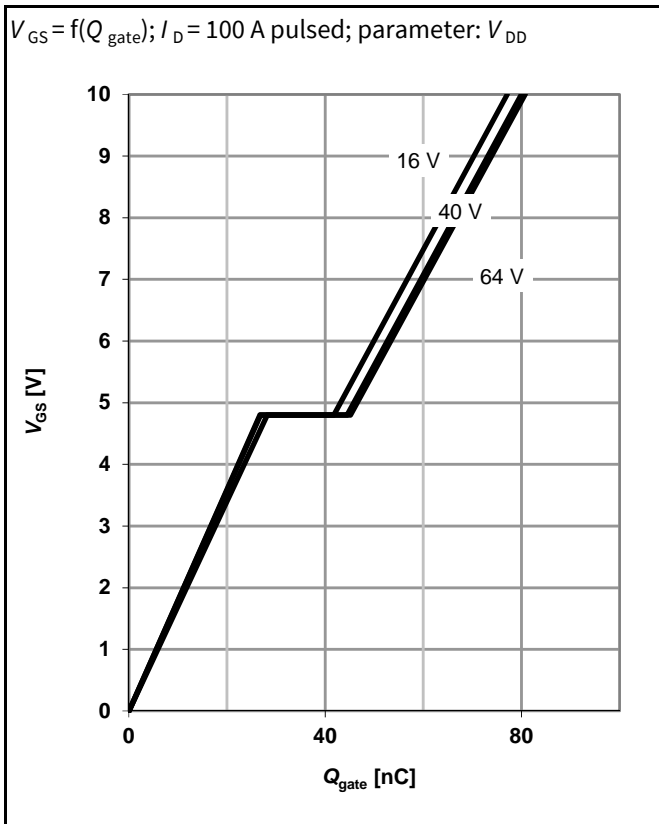
13 Typical avalanche energy



14 Drain-source breakdown voltage



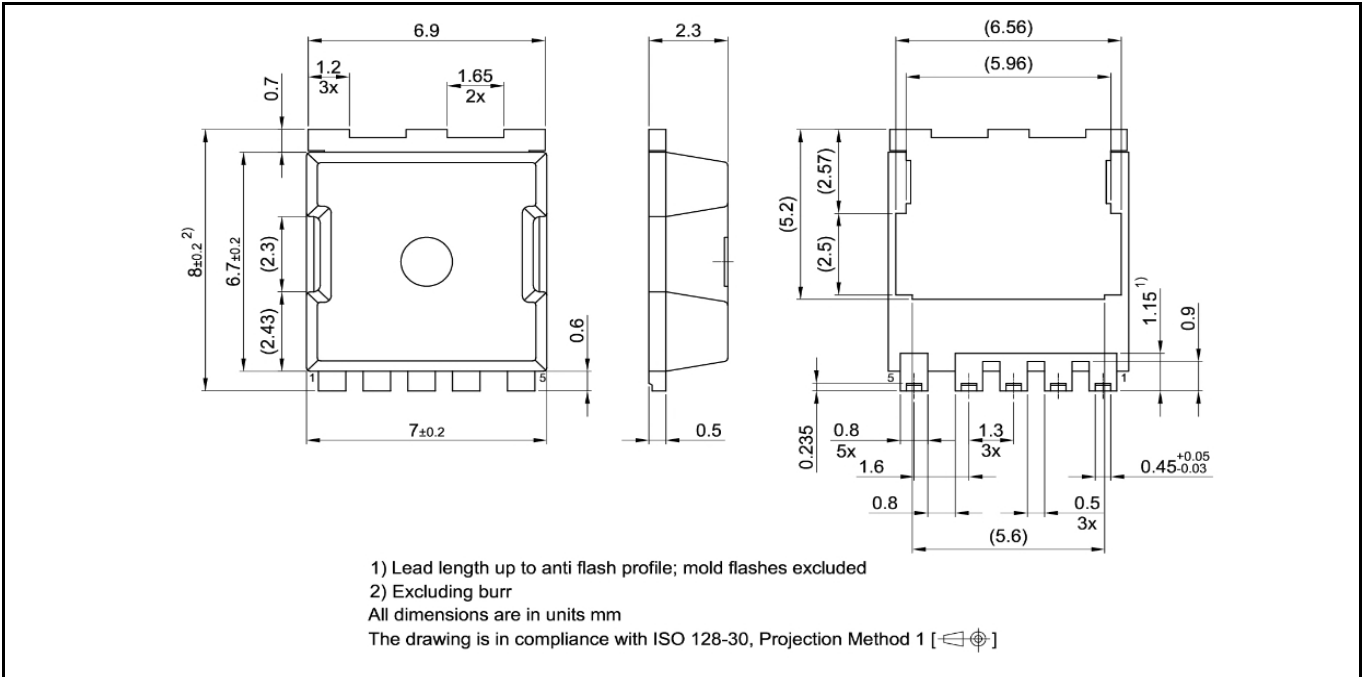
15 Typ. gate charge



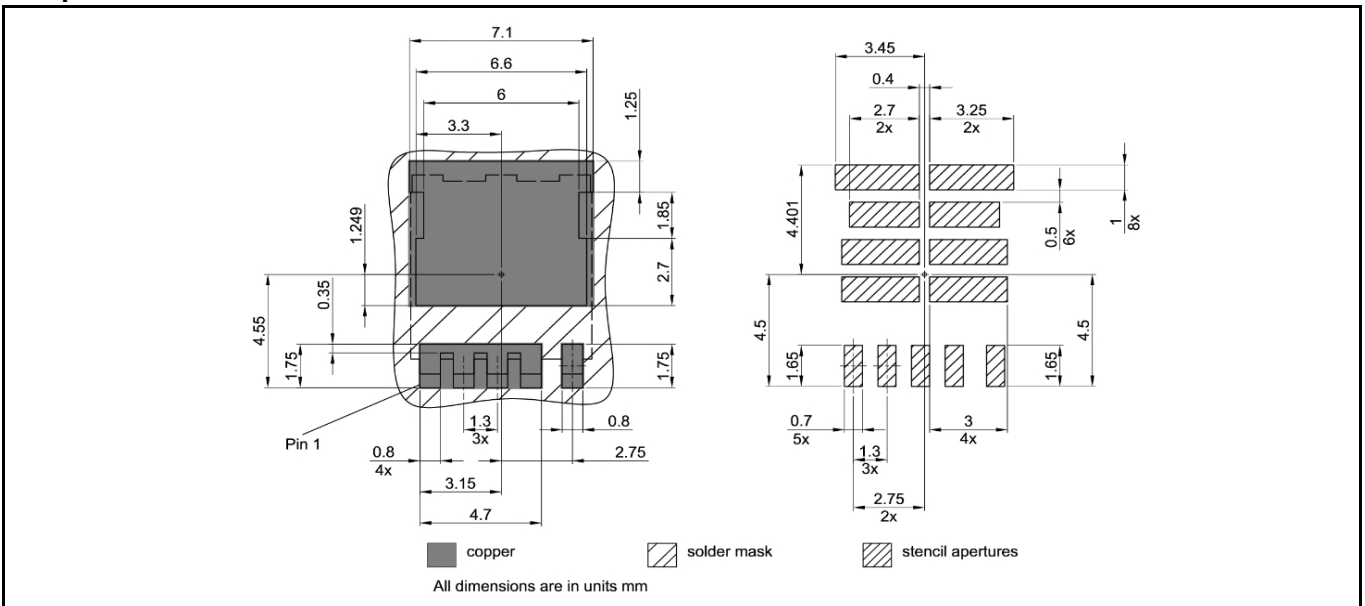
16 Gate charge waveforms



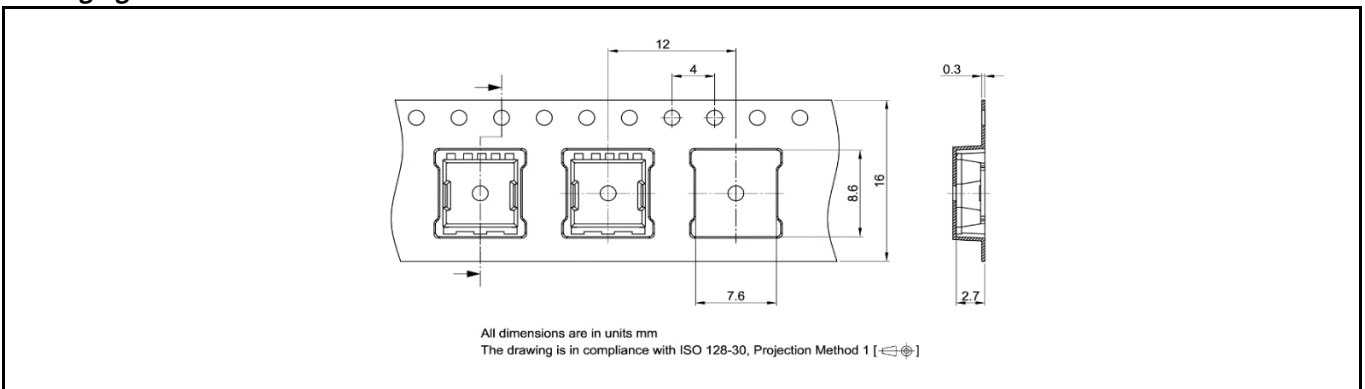
Package Outline



Footprint



Packaging





Revision History

Revision	Date	Changes
Revision 1.0	15.03.2021	Final Datasheet

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