

Automotive MOSFET

OptiMOS™ 5 Power-Transistor



Features

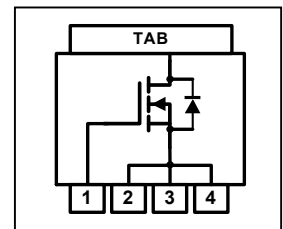
- OptiMOS™ power MOSFET for automotive applications
- N-channel – Enhancement mode – Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- MSL2 up to 260°C peak reflow
- 175°C operating temperature
- RoHS compliant
- 100% Avalanche tested

Potential applications

General automotive applications.

Product validation

Qualified for automotive applications. Product validation according to AEC-Q101.



Product Summary

V_{DS}	80	V
$R_{DS(on)}$	1.3	m Ω
I_D (chip limited)	350	A

Type	Package	Marking
IAUMN08S5N013G	PG-HSOG-4-1	5N08N013



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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 ^{1,2)}	350	A
		$V_{GS}=10\text{V}$, DC current ³⁾	250	
		$T_a=100\text{ °C}$, $V_{GS}=10\text{ V}$, R_{thJA} on 2s2p ^{2,4)}	30	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$, $t_p=100\text{ }\mu\text{s}$	1400	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=125\text{ A}$	535	mJ
Avalanche current, single pulse	I_{AS}	–	250	A
Gate source voltage	V_{GS}	–	± 20	V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	307	W
Operating and storage temperature	T_j, T_{stg}	–	-55 ... +175	°C

Thermal characteristics²⁾

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	–	–	–	0.49	K/W
Thermal resistance, junction - ambient ³⁾	R_{thJA}	–	–	23	–	

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	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=214\text{ }\mu\text{A}$	2.2	3	3.8	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$	–	–	1	μA
		$V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=100\text{ °C}^{2)}$	–	–	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$	–	–	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=6\text{ V}$, $I_D=50\text{ A}$	–	1.6	1.8	m Ω
		$V_{GS}=10\text{ V}$, $I_D=100\text{ A}$	–	1.0	1.3	
Gate resistance ²⁾	R_G	–	–	1.4	–	Ω



Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$	-	9612	12496	pF
Output capacitance	C_{oss}		-	1657	2160	
Reverse transfer capacitance	C_{rss}		-	84	130	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=100\text{ A}, R_G=3.5\ \Omega$	-	24	-	ns
Rise time	t_r		-	15	-	
Turn-off delay time	$t_{d(off)}$		-	48	-	
Fall time	t_f		-	51	-	

Gate Charge Characteristics²⁾

Gate to source charge	Q_{gs}	$V_{DD}=40\text{ V}, I_D=100\text{ A}, V_{GS}=0\text{ to }10\text{ V}$	-	44	57	nC
Gate to drain charge	Q_{gd}		-	30	45	
Gate charge total	Q_g		-	138	179	
Gate plateau voltage	$V_{plateau}$		-	4.6	-	V

Reverse Diode

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	250	A
Diode pulse current ²⁾	$I_{S,pulse}$	$T_C=25\text{ °C}, t_p=100\ \mu\text{s}$	-	-	1400	
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}	$V_R=40\text{ V}, I_F=50\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$	-	49	73	ns
Reverse recovery charge ²⁾	Q_{rr}		-	55	109	

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.

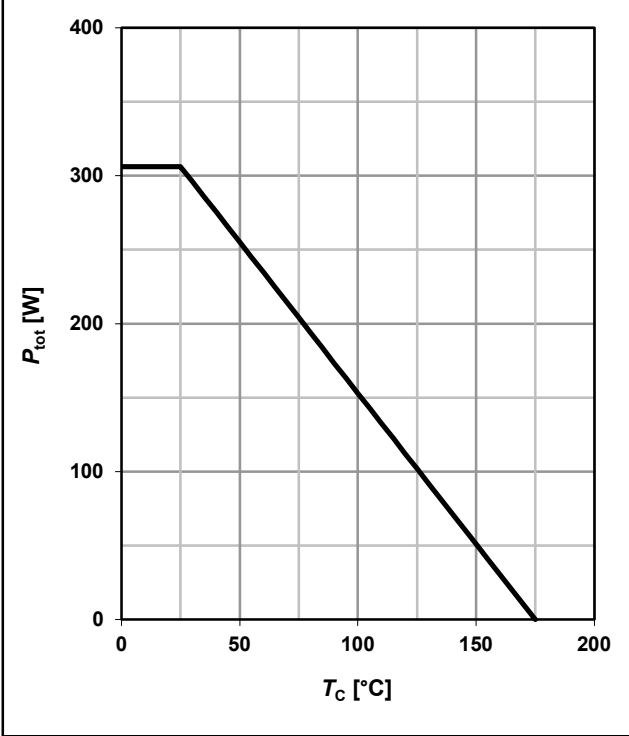
³⁾ Current is limited by package.

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

Electrical characteristics diagrams

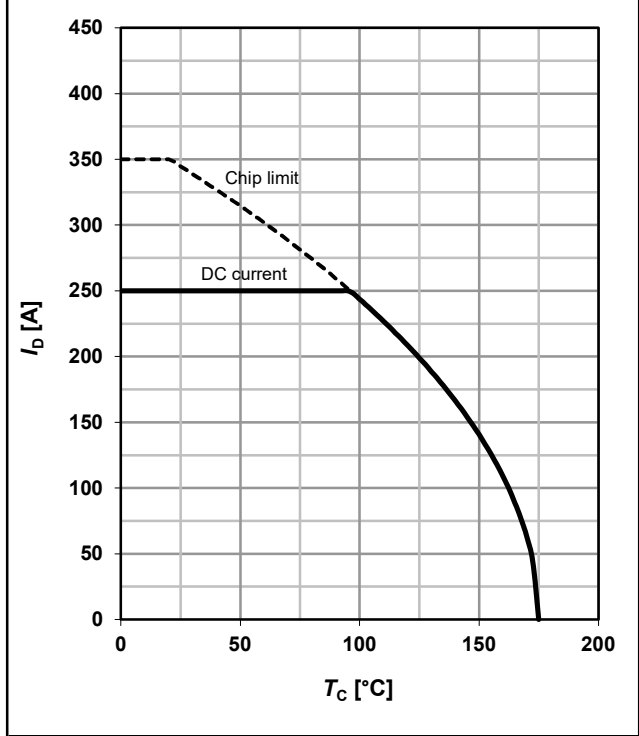
1 Power dissipation

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



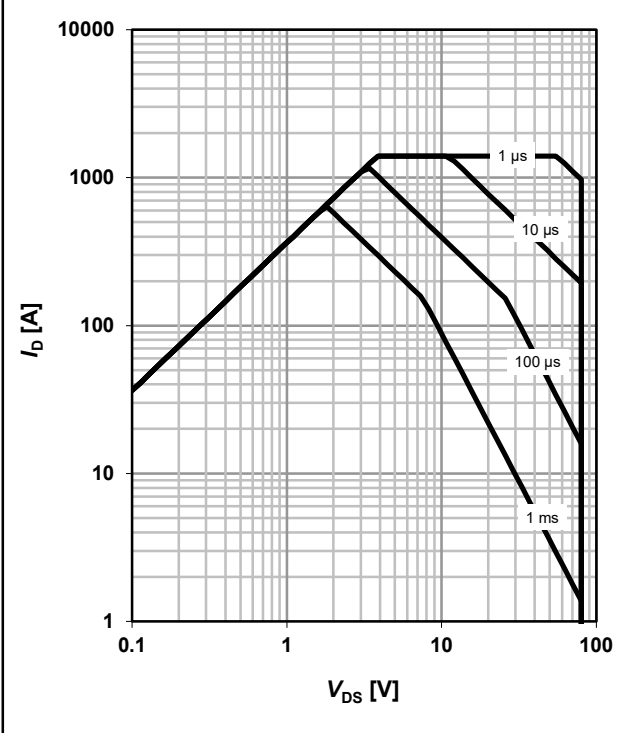
2 Drain current

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



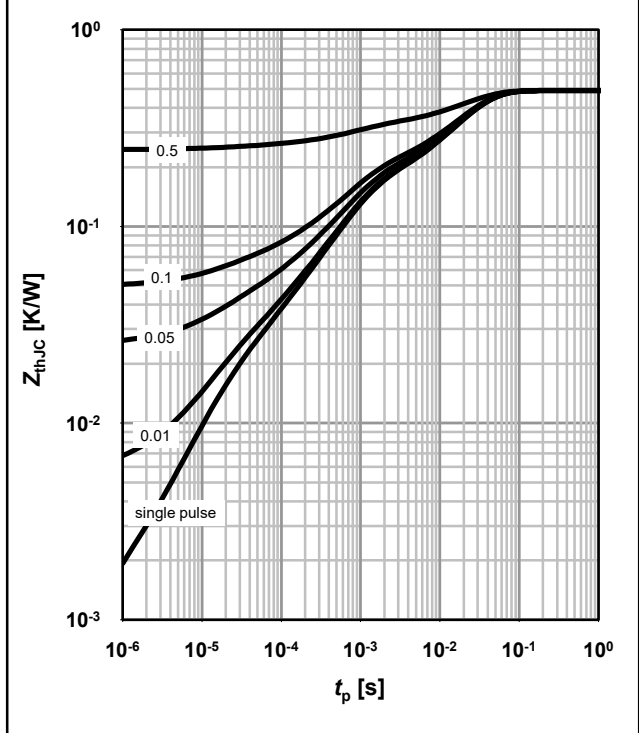
3 Safe operating area

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

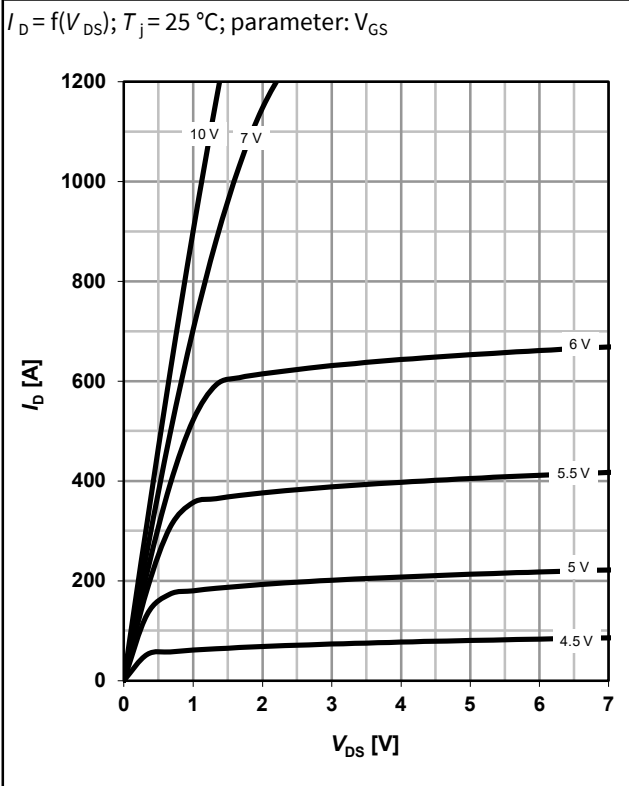


4 Max. transient thermal impedance

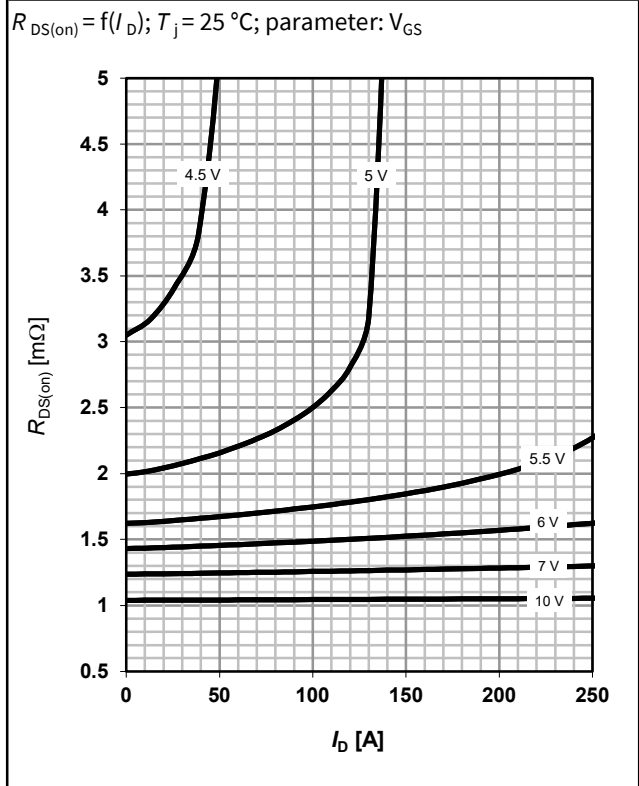
$$Z_{thJC} = f(t_p); \text{parameter: } D = t_p/T$$



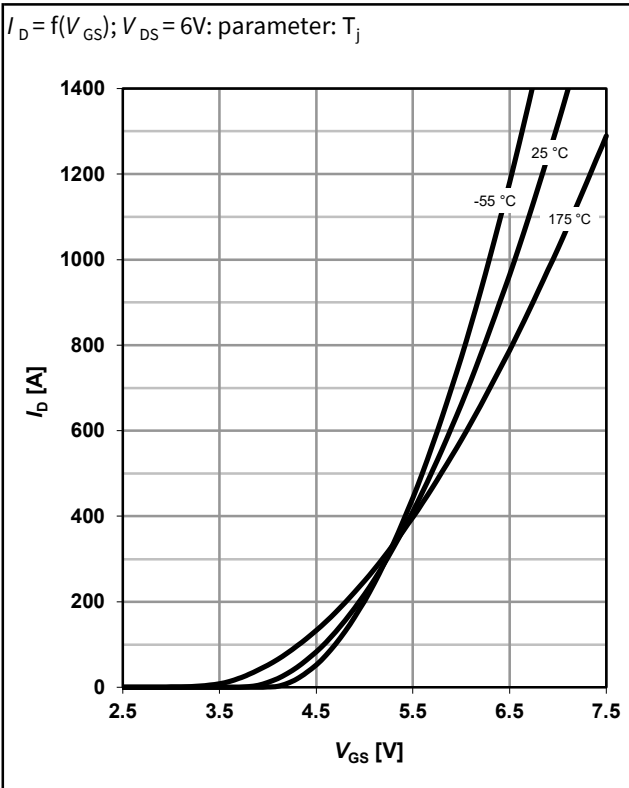
5 Typ. output characteristics



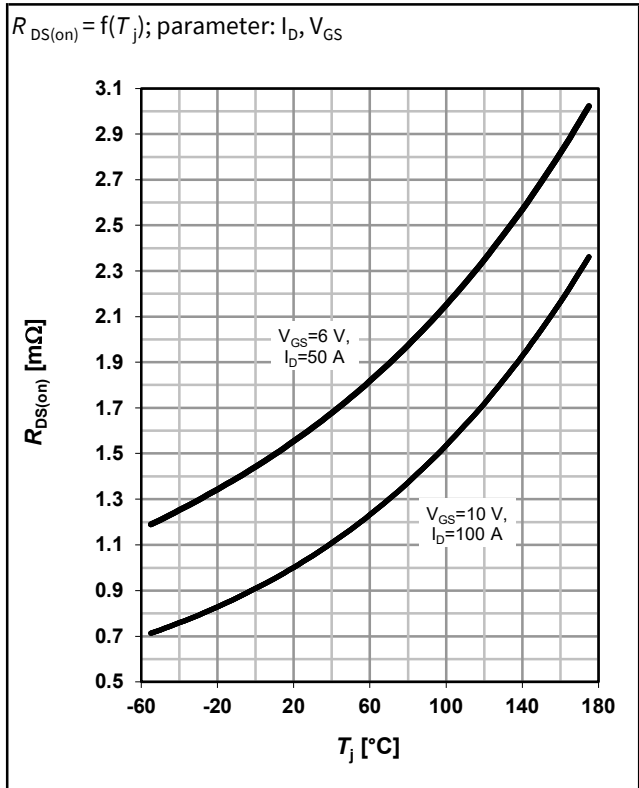
6 Typ. drain-source on-state resistance



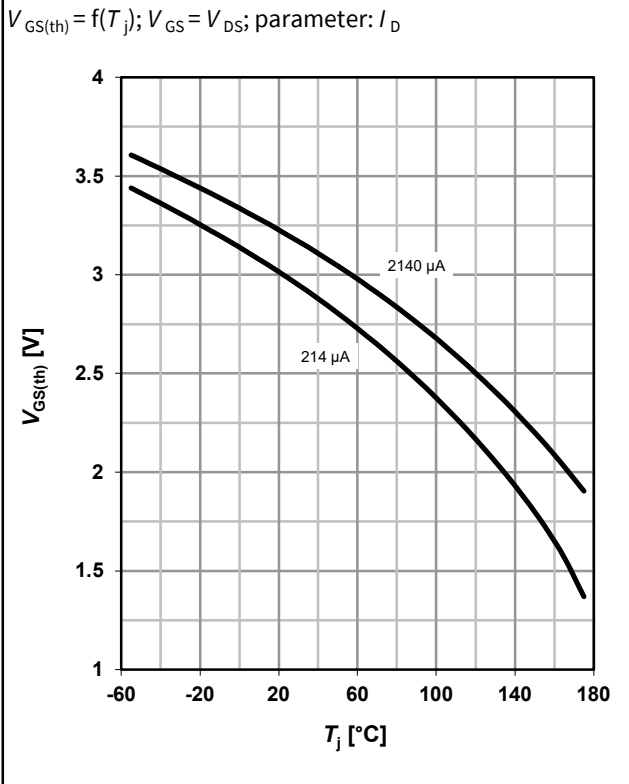
7 Typ. transfer characteristics



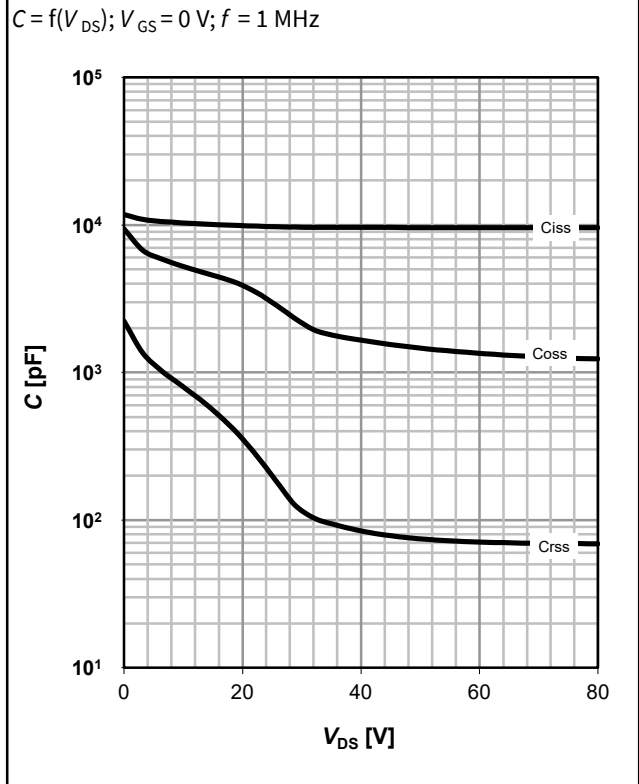
8 Typ. drain-source on-state resistance



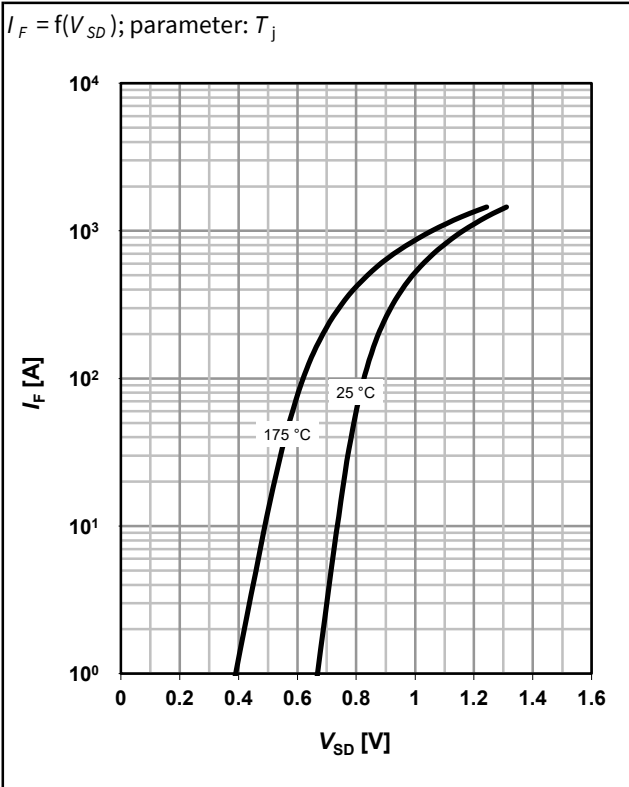
9 Typ. gate threshold voltage



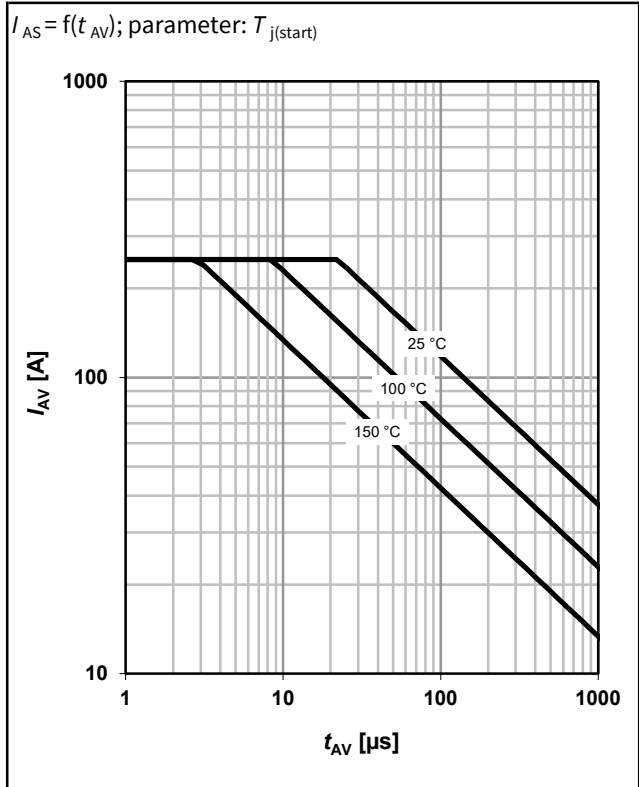
10 Typ. capacitances



11 Typical forward diode characteristics

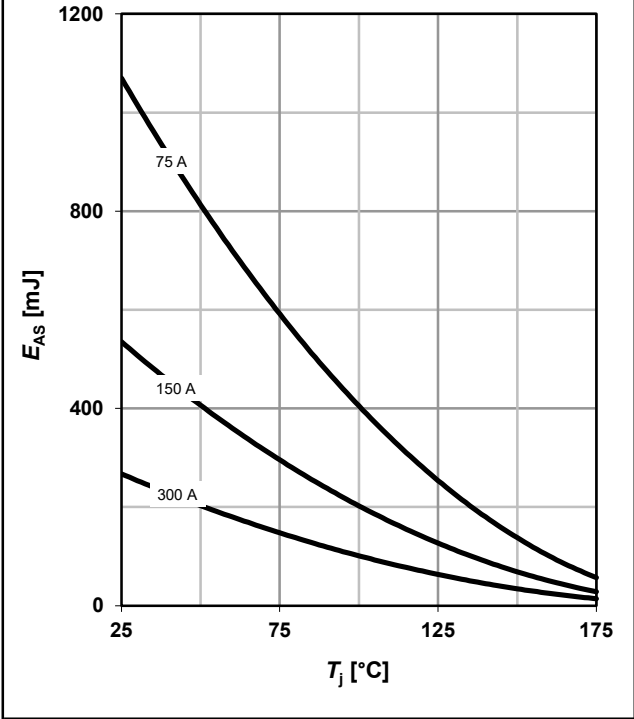


12 Typ. avalanche characteristics



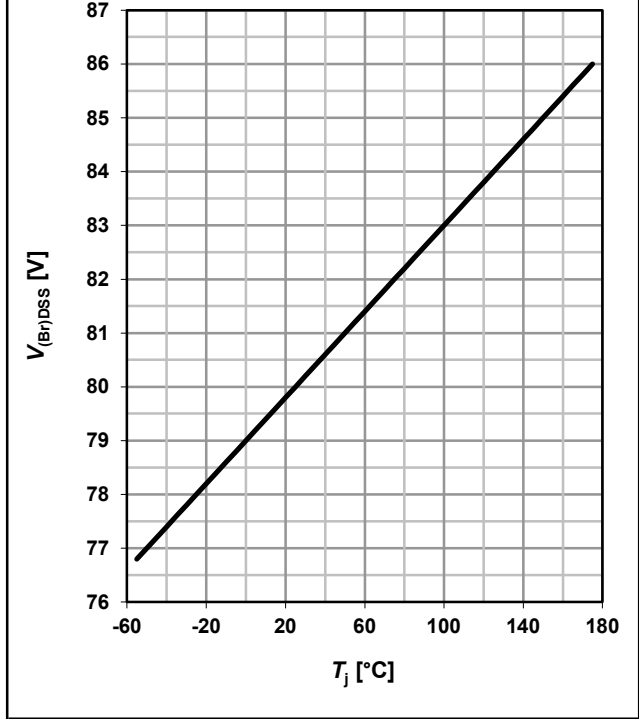
13 Typical avalanche energy

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



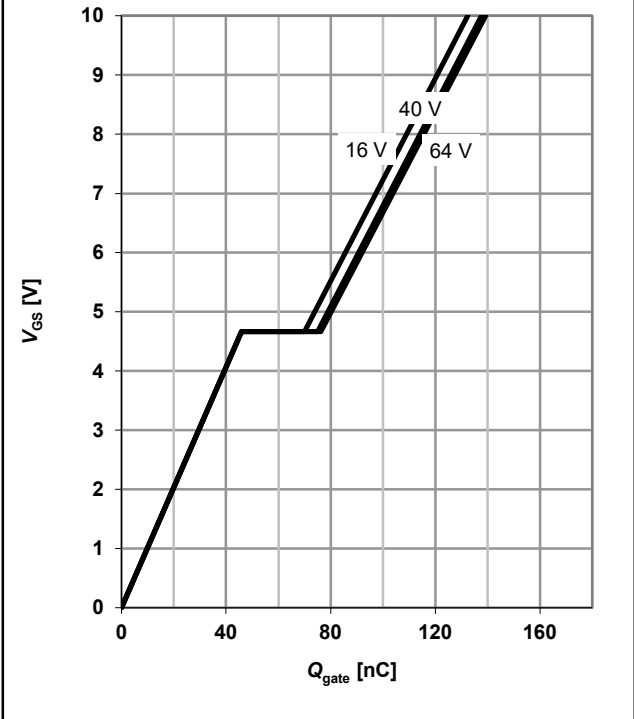
14 Drain-source breakdown voltage

$V_{(Br)DSS} = f(T_j)$; $I_D = 1$ mA

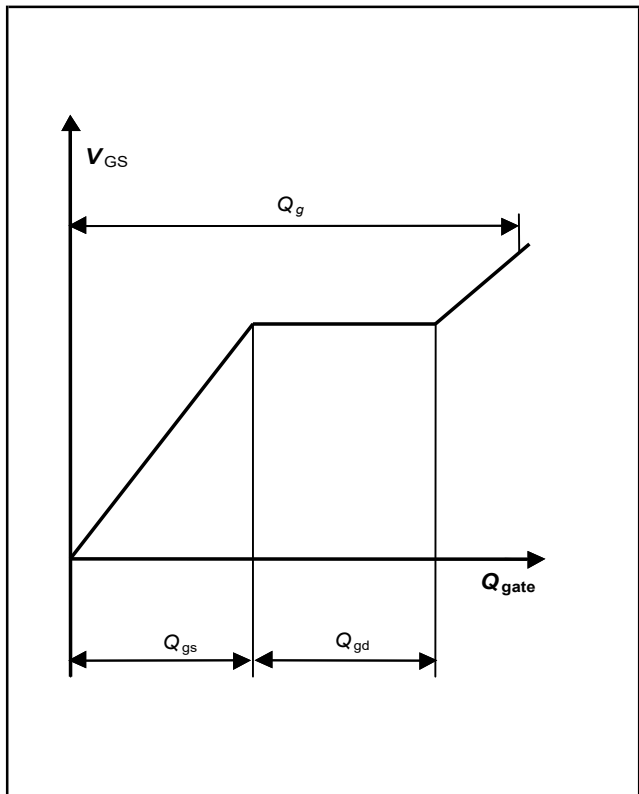


15 Typ. gate charge

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



16 Gate charge waveforms





Revision History

Revision	Date	Changes
Revision 1.0	02.05.2024	Final Data Sheet

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