Automotive MOSFET

OptiMOS™ 6 Power-Transistor

RoHS

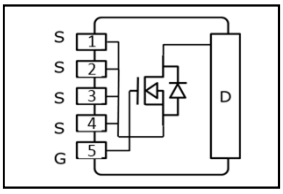
Infineon Automotive Quality

AEC Qualified

PG-HSOF-5-1

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 validation

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

Product Summary

V_{DS}	40	V
$R_{DS(on),max}$	0.8	mΩ
I_D (chip limited)	340	A

Type	Package	Marking
IAUA250N04S6N008	PG-HSOF-5-1	6N04R8

Table of Contents

Maximum ratings

at Tj=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	V_{GS} = 10 V, Chip limitation[1,2)]	340	A
		V_{GS} = 10 V, DC current[3)]	250	
		T_a = 85 °C, V_{GS} = 10 V, R_{thJA} on 2s2p[2,4)]	51	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C = 25 °C, t_p = 100 µs	1100	
Avalanche energy, single pulse[2)]	E_{AS}	I_D = 47 A, $R_{G,min}$ = 25 Ω	480	mJ
Avalanche current, single pulse	I_{AS}	$R_{G,min}$ = 25 Ω	95	A
Gate source voltage	V_{GS}	–	±20	V
Power dissipation	P_{tot}	T_C = 25 °C	172	W
Operating and storage temperature	T_j, T_{stg}	–	-55 ... +175	°C

Thermal characteristics[2)]

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	–	–	–	0.87	K/W
Thermal resistance, junction - ambient[4)]	R_{thJA}	–	–	23	–	

Electrical characteristics

at Tj=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	40	–	–	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 90 µA	2.2	2.6	3.0	
Zero gate voltage drain current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V, T_j = 25 °C	–	–	1	µA
		V_{DS} = 40 V, V_{GS} = 0 V, T_j = 125 °C[2)]	–	–	27	
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} = 7 V, I_D = 100 A	–	0.74	0.96	mΩ
		V_{GS} = 10 V, I_D = 100 A	–	0.60	0.80	
Gate resistance[2)]	R_G	–	–	0.9	–	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	–	5452	7088	pF
Output capacitance	C_{oss}		–	1642	2135	
Reverse transfer capacitance	C_{rss}		–	80	105	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 32 V, V_{GS} = 10 V, I_D = 250 A, R_G = 3.5 Ω	–	11	–	ns
Rise time	t_r		–	14	–	
Turn-off delay time	$t_{d(off)}$		–	22	–	
Fall time	t_f		–	15	–	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD} = 32 V, I_D = 250 A, V_{GS} = 0 to 10 V	–	23	30	nC
Gate to drain charge	Q_{gd}		–	16	25	
Gate charge total	Q_g		–	81	109	
Gate plateau voltage	$V_{plateau}$		–	4.3	–	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C = 25 °C	–	–	250	A
Diode pulse current[2]	$I_{S,pulse}$	T_C = 25 °C, t_p = 100 µs	–	–	1100	
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 125 A, T_j = 25 °C	–	0.8	1.1	V
Reverse recovery time[2]	t_{rr}	V_R = 20 V, I_F = 50 A, di_F/dt = 100 A/µs	–	55	–	ns
Reverse recovery charge[2]	Q_{rr}		–	62	–	nC

[1] Current is limited by the overall system design and the customer-specific PCB.

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

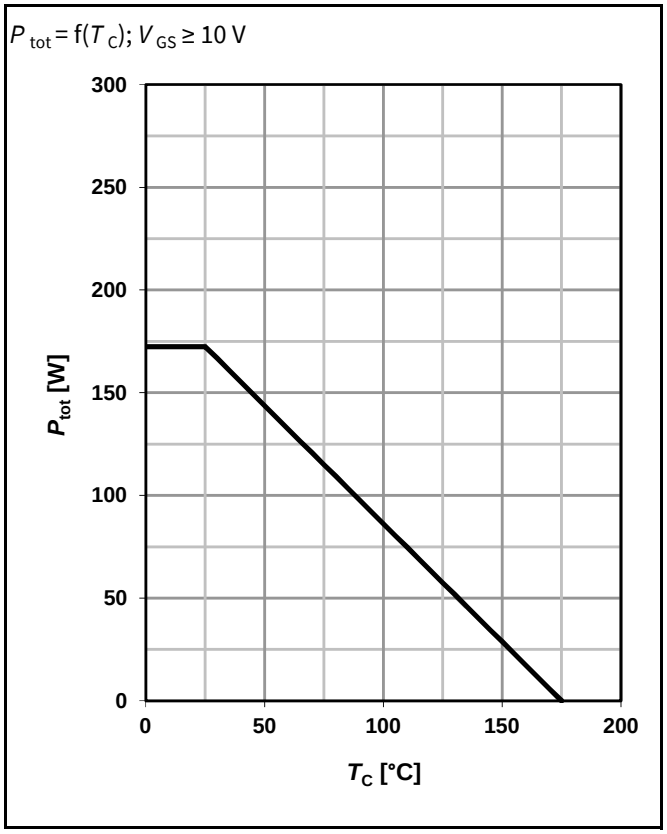
[3] Current is limited by the package.

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

Electrical characteristics diagrams

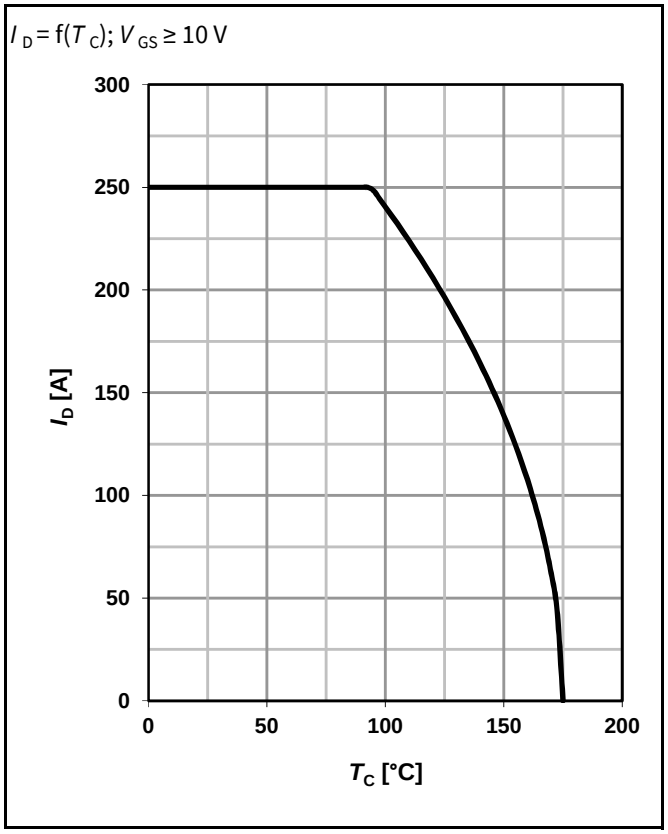
1 Power dissipation

$P_{tot} = f(T_C)$; $V_{GS} \geq 10$ V



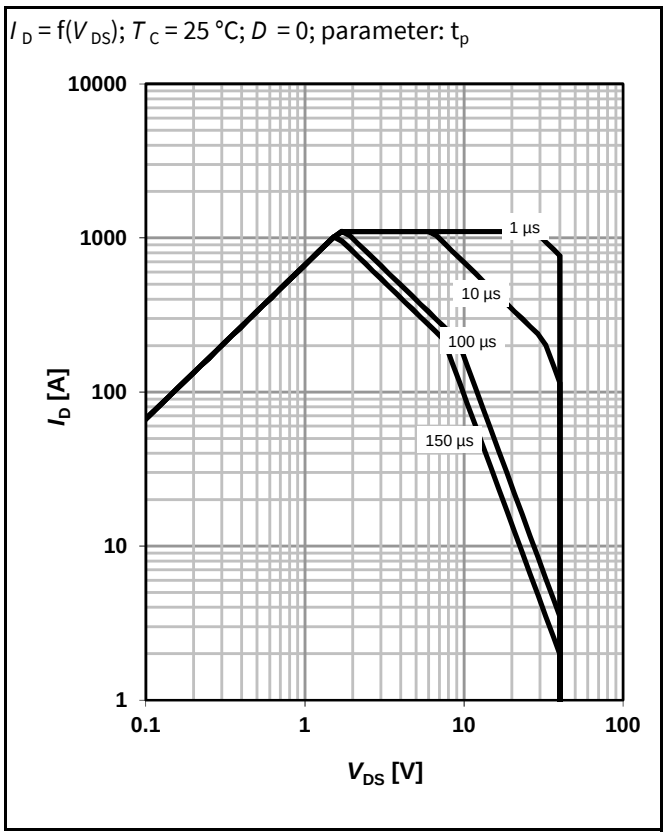
2 Drain current

$I_D = f(T_C)$; $V_{GS} \geq 10$ V



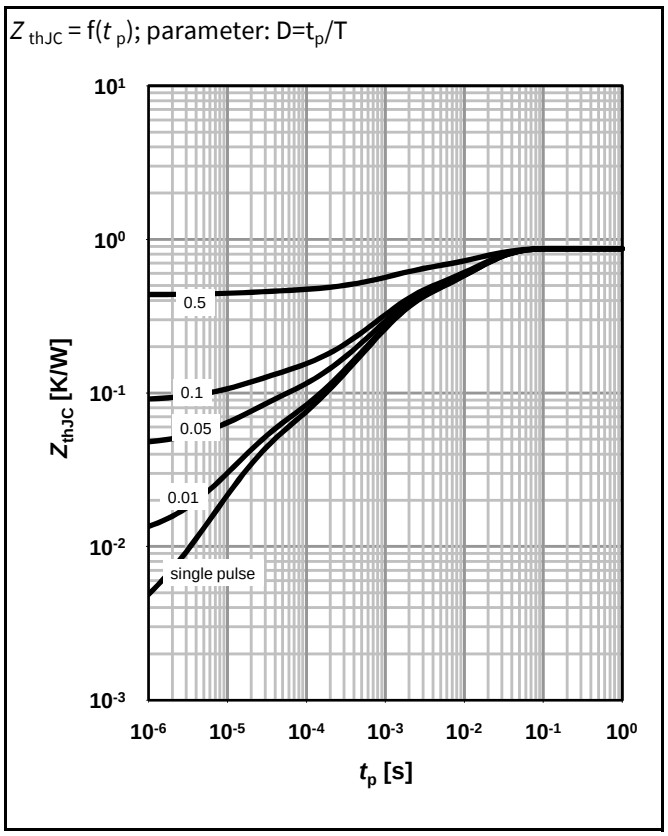
3 Safe operating area

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



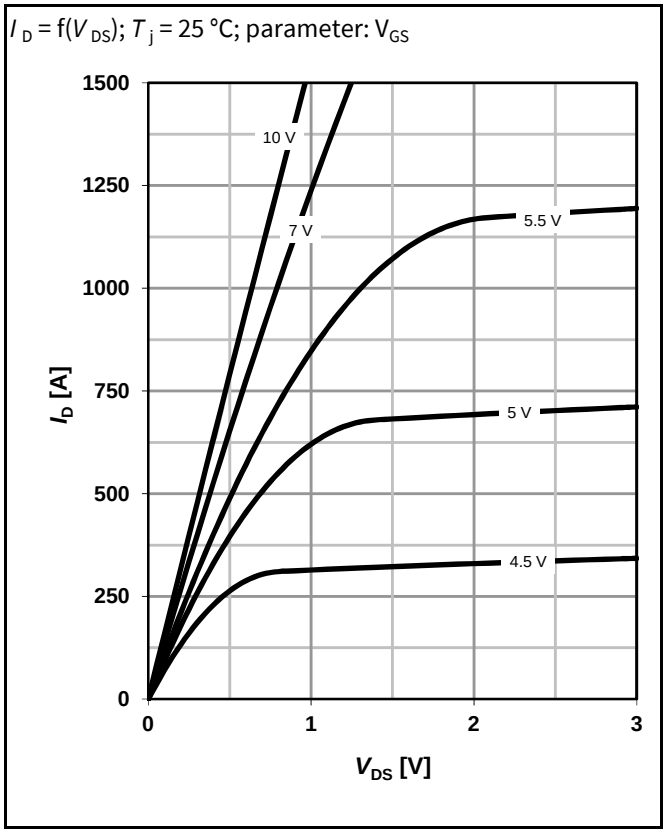
4 Max. transient thermal impedance

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



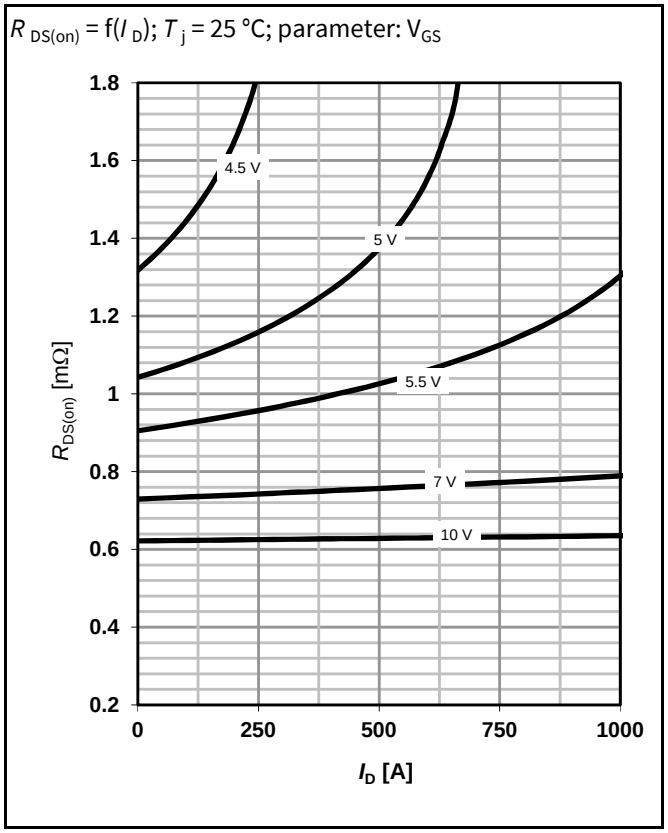
5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C; parameter: V_{GS}



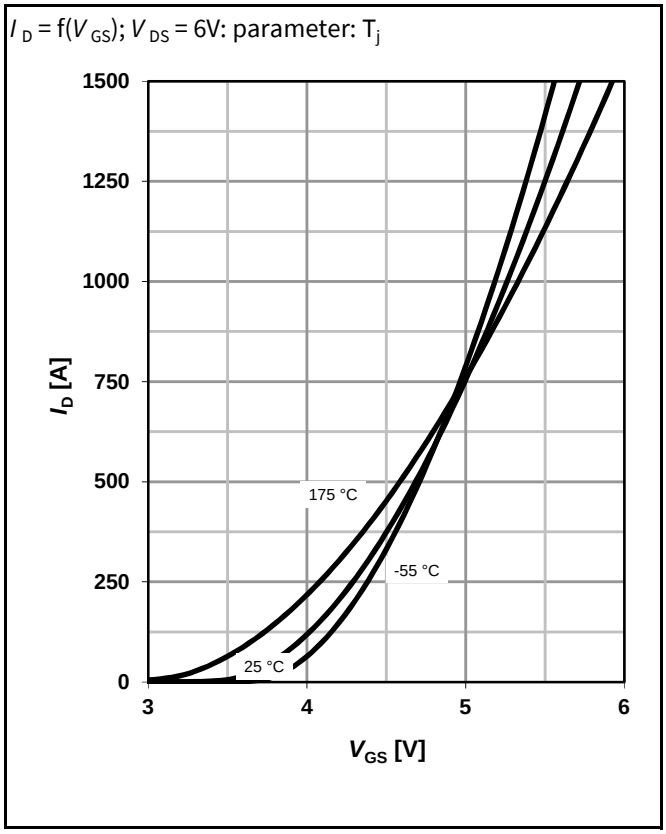
6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C; parameter: V_{GS}



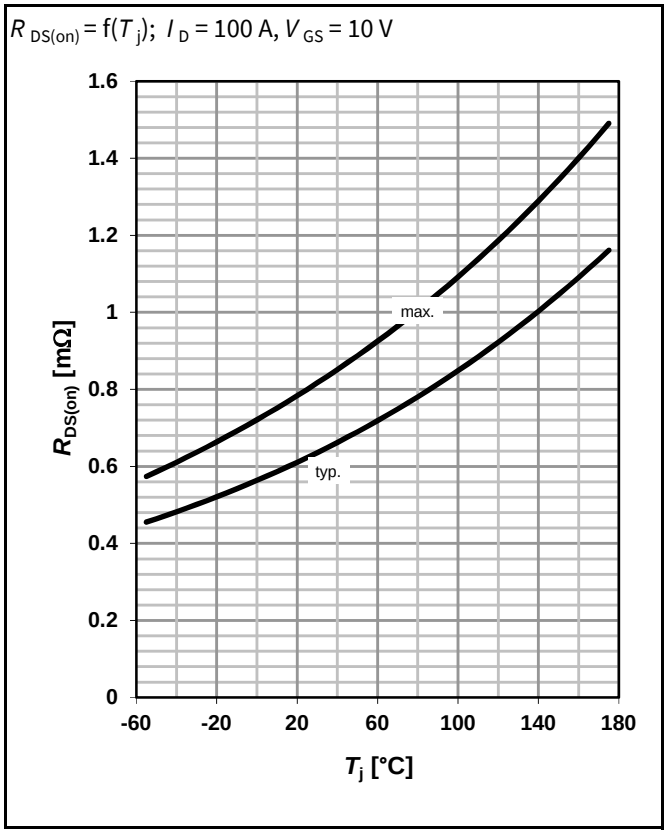
7 Typ. transfer characteristics

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



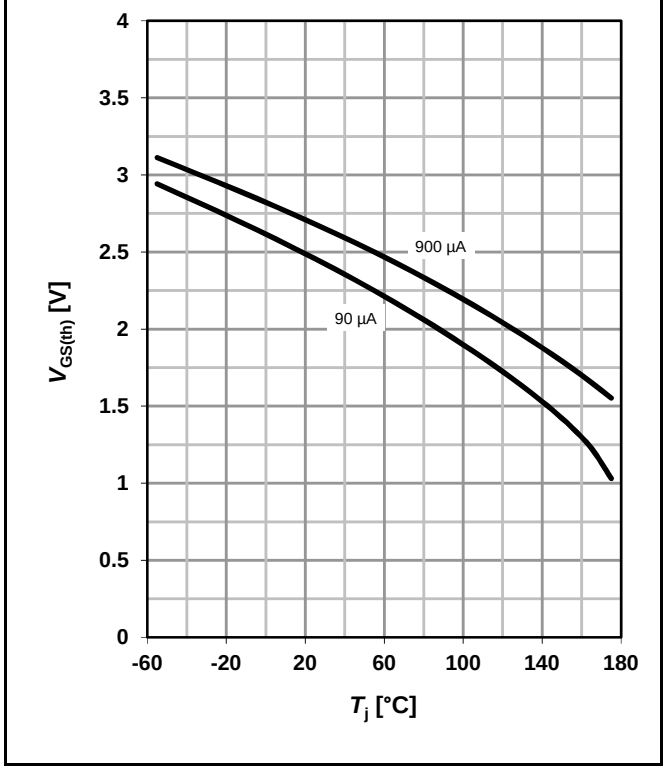
8 Typ. drain-source on-state resistance

$R_{DS(on)} = f(T_j)$; $I_D = 100$ A, $V_{GS} = 10$ V



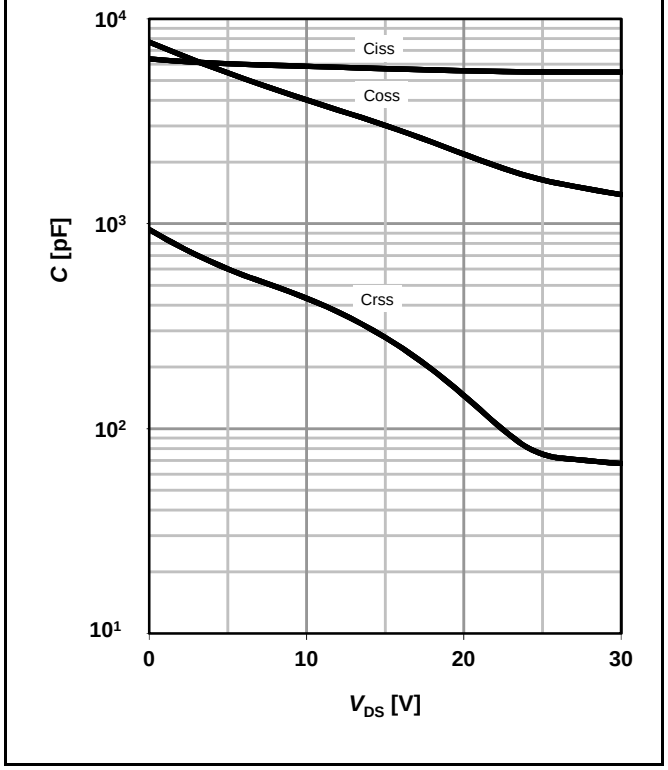
9 Typ. gate threshold voltage

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



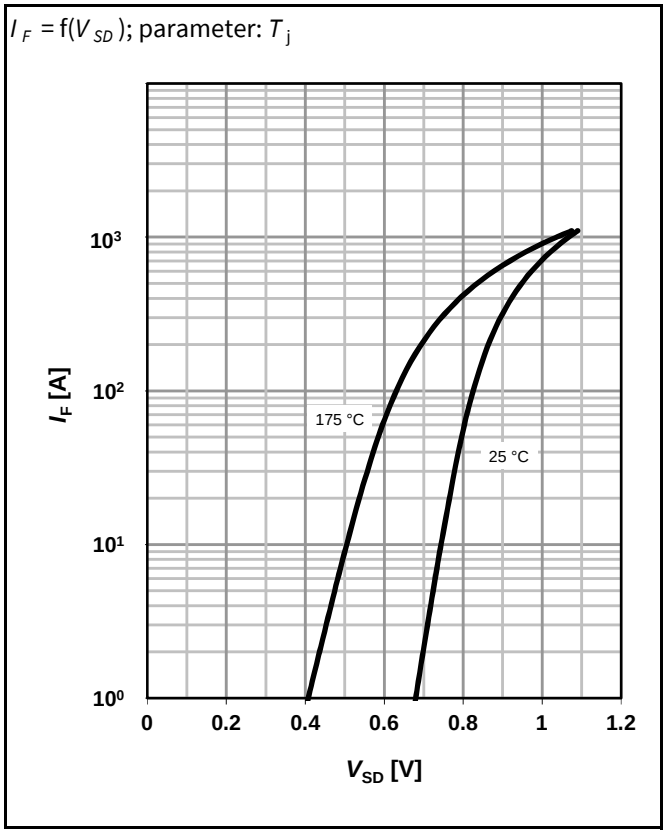
10 Typ. capacitances

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



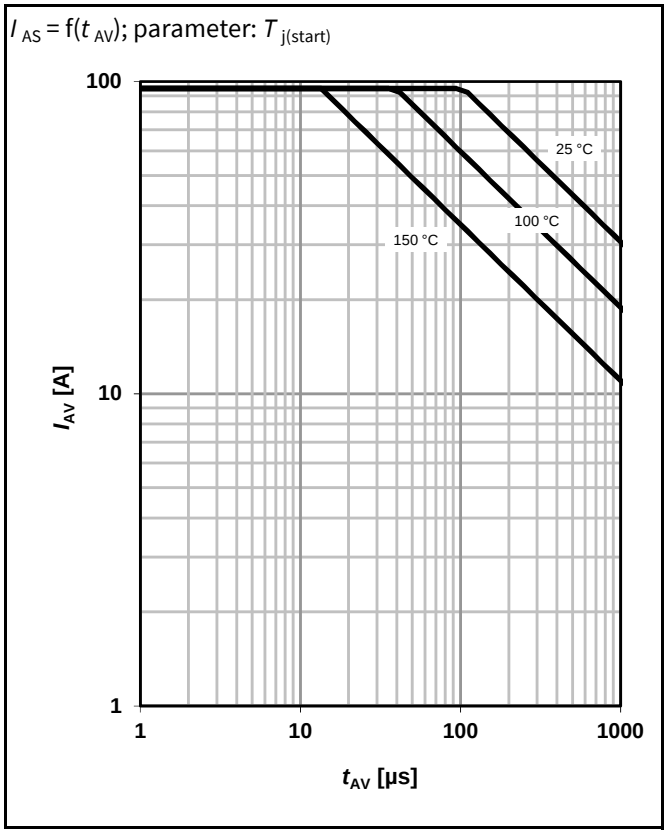
11 Typical forward diode characteristics

$I_F = f(V_{SD})$; parameter: T_j



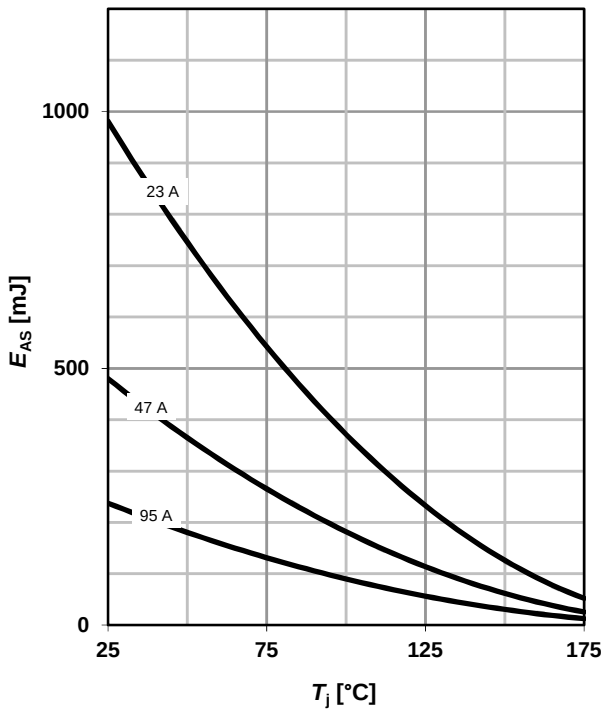
12 Typ. avalanche characteristics

$I_{AS} = f(t_{AV})$; parameter: $T_{j(start)}$



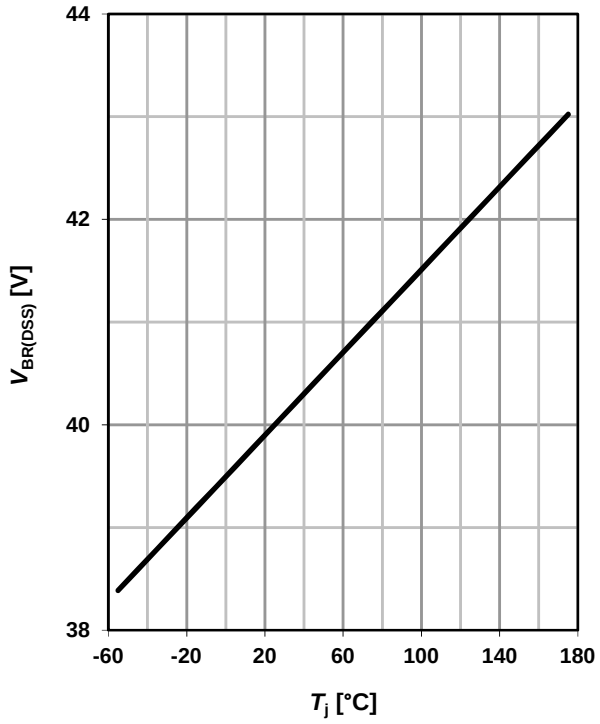
13 Typical avalanche energy

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



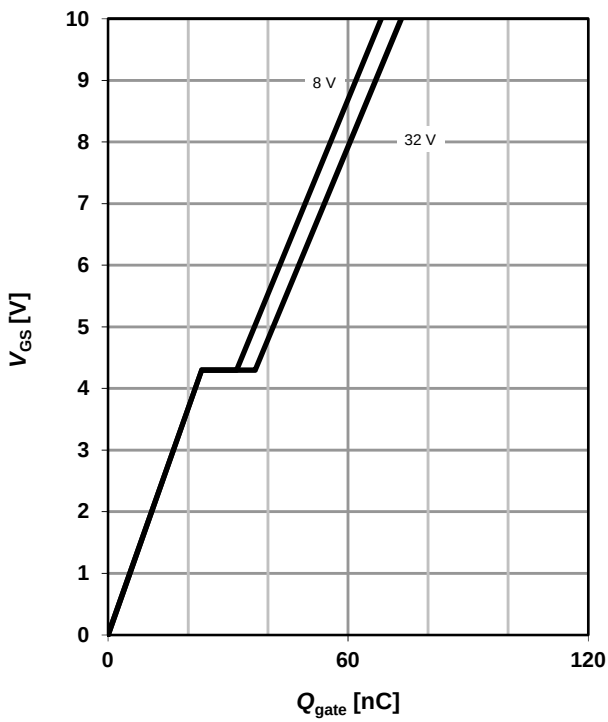
14 Drain-source breakdown voltage

$V_{BR(DSS)} = f(T_j)$; I_{D_typ} = 1 mA

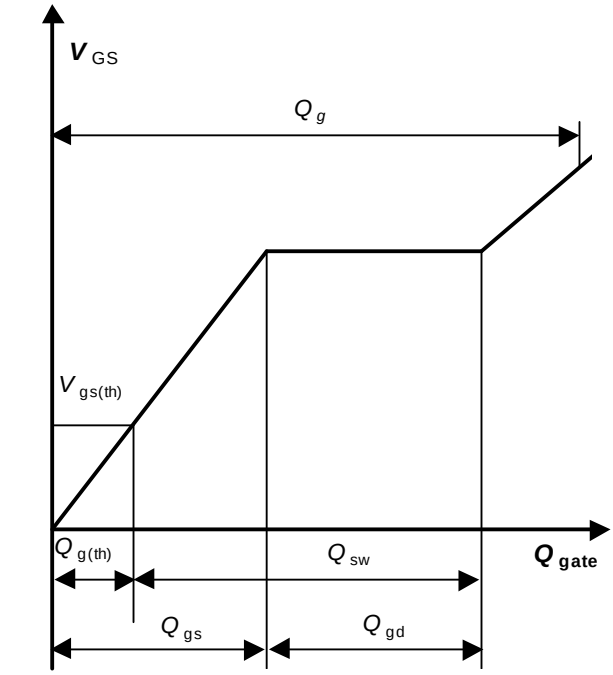


15 Typ. gate charge

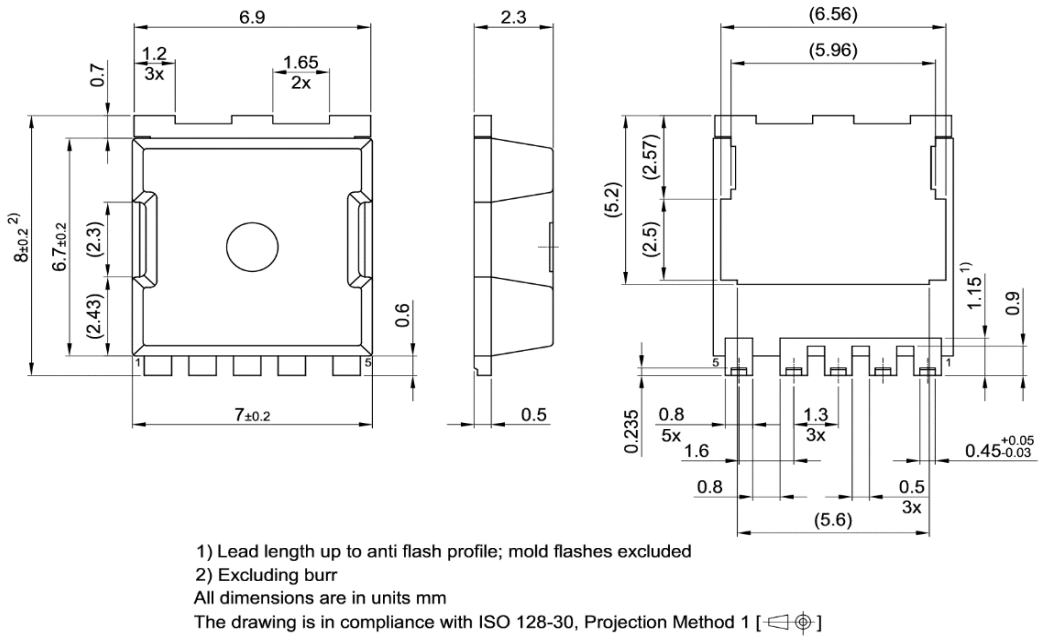
$V_{GS} = f(Q_{gate})$; I_D = 250 A pulsed; parameter: V_{DD}



16 Gate charge waveforms

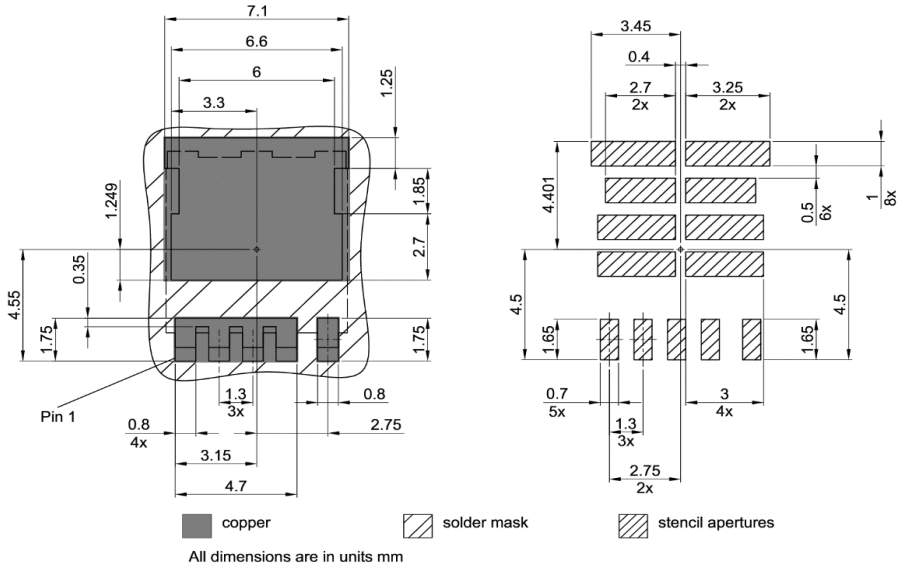


Package Outline



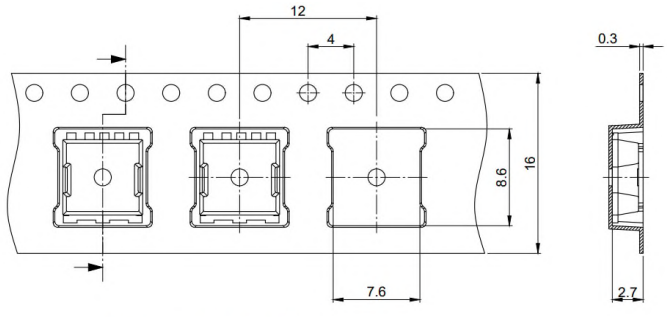
1) Lead length up to anti flash profile; mold flashes excluded
2) Excluding burr
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⊲⊕]

Footprint



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 [⊲⊕]

Revision History

Revision	Date	Changes
Revision 1.0	24.01.2022	Final Data Sheet

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Edition 2022-01-24

Published by

Infineon Technologies AG

81726 Munich, Germany

Do you have any questions about any aspect of this document?

Email: erratum@infineon.com

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications. The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (**www.infineon.com**).

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact the nearest Infineon Technologies Office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.