OptiMOS™-T2 Power-Transistor

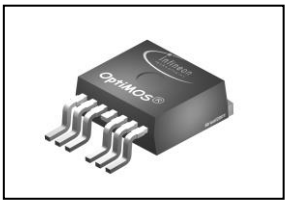
Product Summary

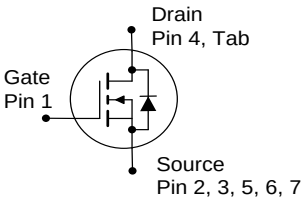
V_{DS}	40	V
$R_{DS(on)}$	1.2	mΩ
I_D	180	A

Features

- N-channel Logic Level - Enhancement mode
- AEC qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green product (RoHS compliant)
- 100% Avalanche tested

PG-TO263-7-3





Type	Package	Marking
IPB180N04S4L-01	PG-TO263-7-3	4N04L01

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25°C, V_{GS}=10V[1)]	180	A
		T_C=100 °C, V_{GS}=10 V[2)]	180	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C	720	
Avalanche energy, single pulse	E_{AS}	I_D=90 A	550	mJ
Avalanche current, single pulse	I_{AS}	-	180	A
Gate source voltage	V_{GS}	-	+20/-16	V
Power dissipation	P_{tot}	T_C=25 °C	188	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[2]						
Thermal resistance, junction - case	R_{thJC}	-	-	-	0.8	K/W
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
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=140 µA	1.2	1.7	2.2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C	-	0.06	1	µA
		V_{DS}=18 V, V_{GS}=0 V, T_j=85 °C[2]	-	1	20	
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}=4.5 V, I_D=50 A	-	1.3	1.6	mΩ
		V_{GS}=10 V, I_D=100 A	-	1.0	1.2	

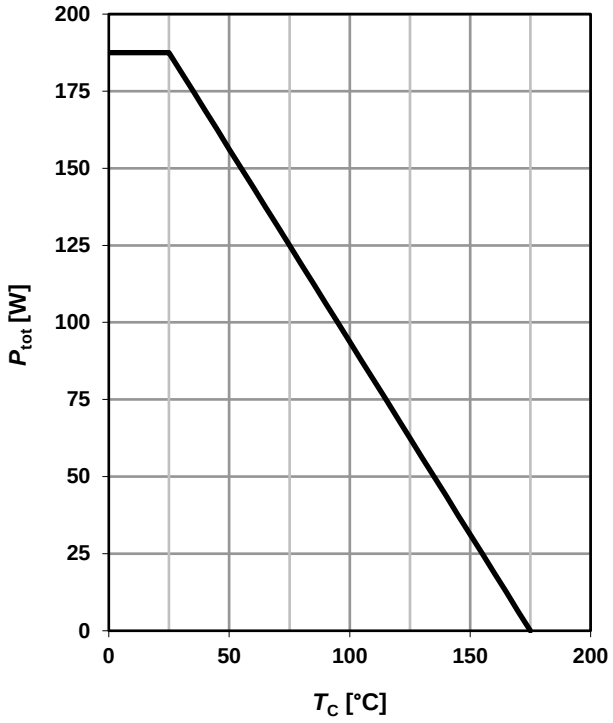
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=25 V, f=1 MHz	-	14700	19100	pF
Output capacitance	C_{oss}		-	2400	3120	
Reverse transfer capacitance	C_{rss}		-	120	280	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20 V, V_{GS}=10 V, I_D=180 A, R_G=3.5 Ω	-	20	-	ns
Rise time	t_r		-	21	-	
Turn-off delay time	$t_{d(off)}$		-	90	-	
Fall time	t_f		-	80	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=32 V, I_D=180 A, V_{GS}=0 to 10 V	-	42	55	nC
Gate to drain charge	Q_{gd}		-	20	47	
Gate charge total	Q_g		-	188	245	
Gate plateau voltage	$V_{plateau}$		-	2.9	-	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C=25 °C	-	-	180	A
Diode pulse current[2]	$I_{S,pulse}$		-	-	720	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=100 A, T_j=25 °C	-	0.9	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=20 V, I_F=50A, di_F/dt=100 A/µs	-	70	-	ns
Reverse recovery charge[2]	Q_{rr}		-	95	-	nC

[1] Current is limited by bondwire; with an R_{thJC} = 0.8 K/W the chip is able to carry 300 A at 25°C.

[2] Defined by design. Not subject to production test.

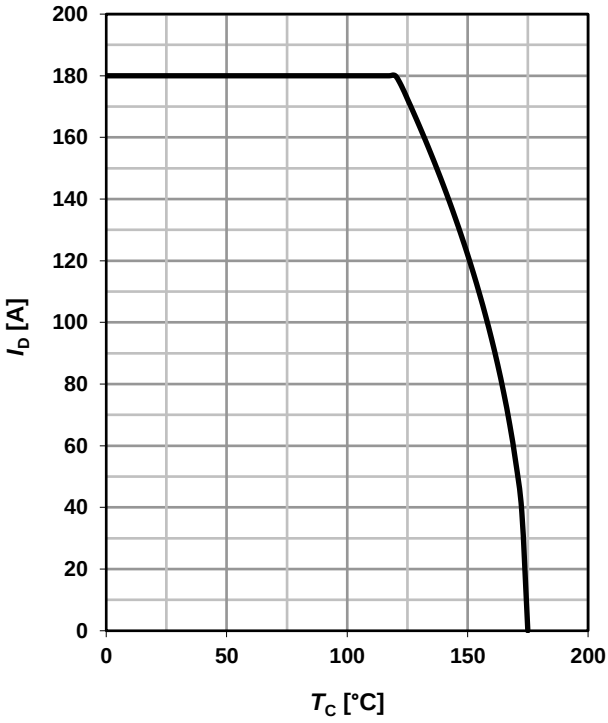
1 Power dissipation

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



2 Drain current

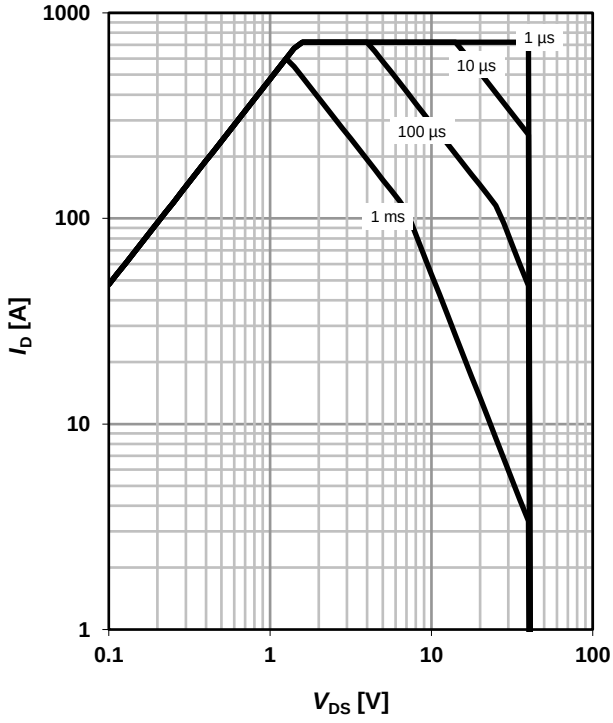
$I_D = f(T_C)$; $V_{GS} \geq 6$ V



3 Safe operating area

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

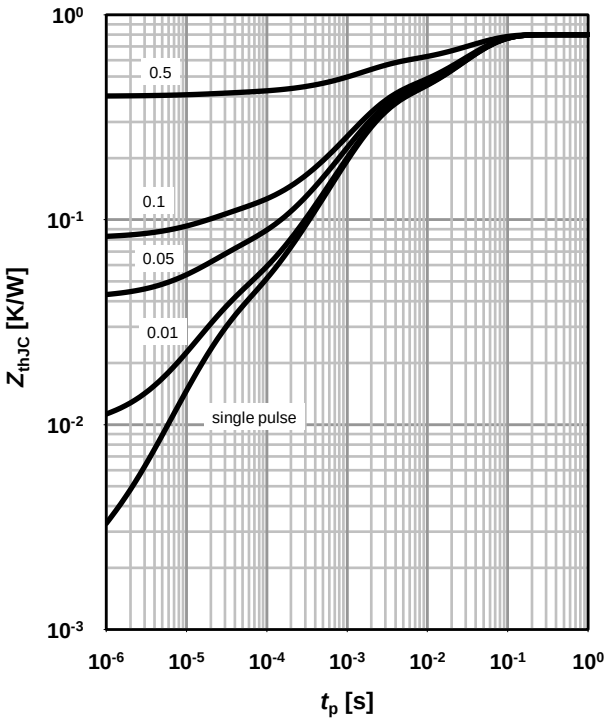
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

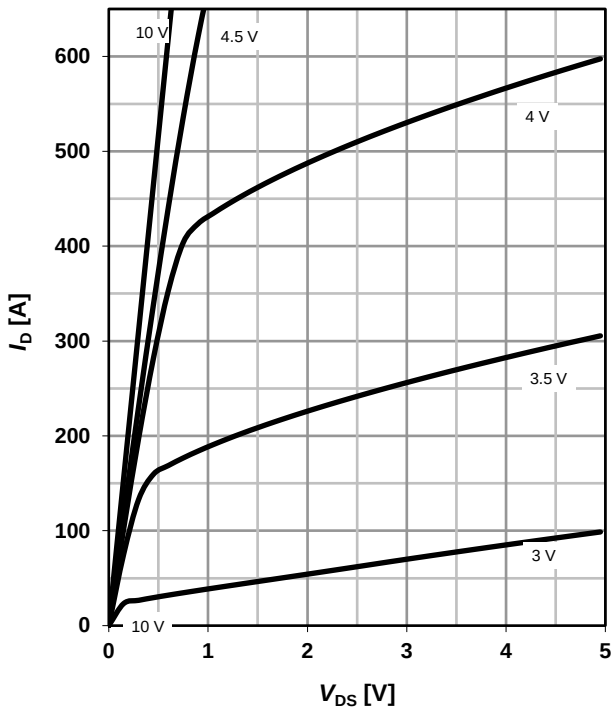
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

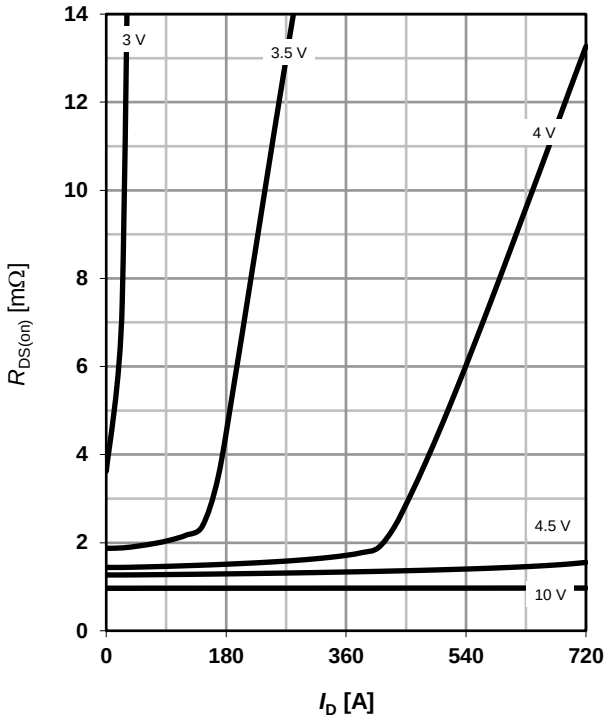
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = (I_D)$; $T_j = 25$ °C

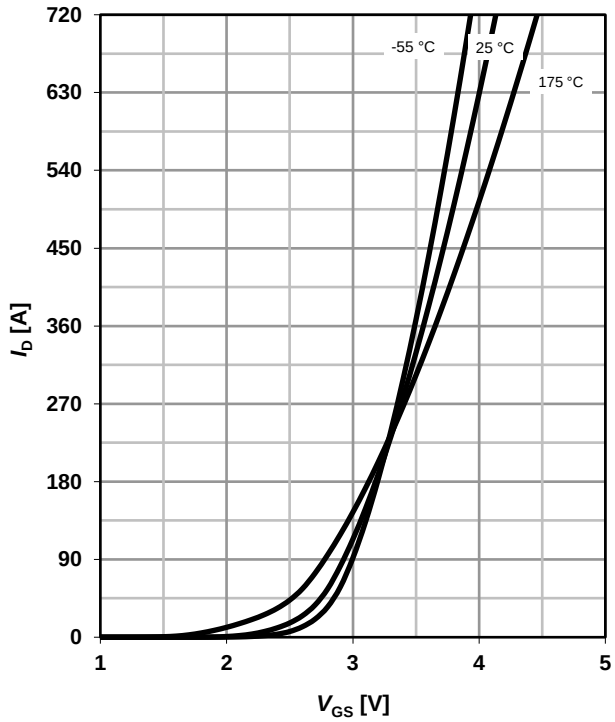
parameter: V_{GS}



7 Typ. transfer characteristics

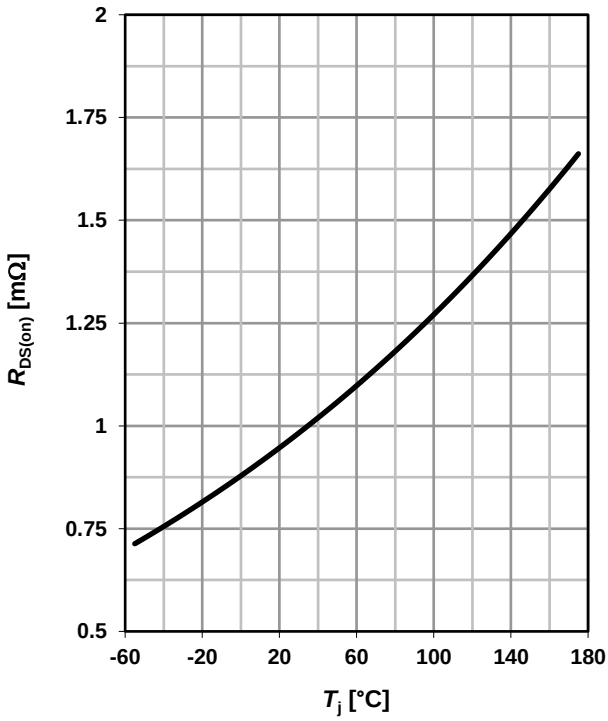
$I_D = f(V_{GS})$; $V_{DS} = 6$V

parameter: T_j



8 Typ. drain-source on-state resistance

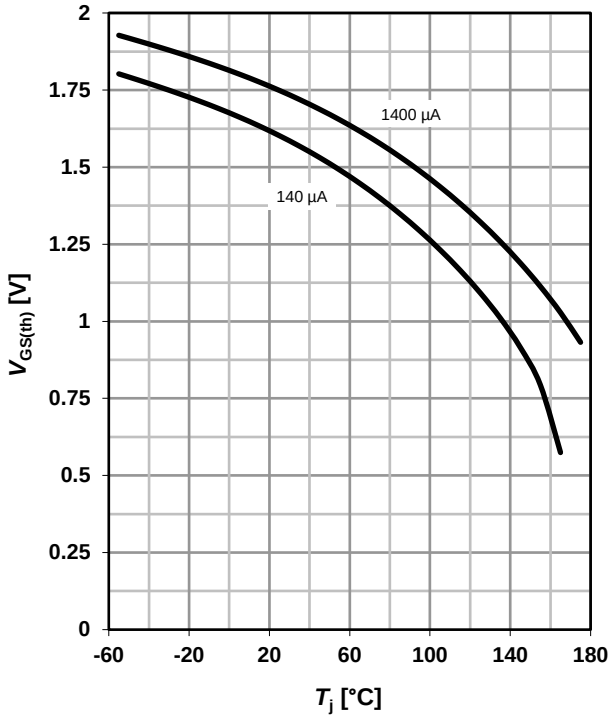
$R_{DS(on)} = f(T_j)$; $I_D = 100$ A; $V_{GS} = 10$ V



9 Typ. gate threshold voltage

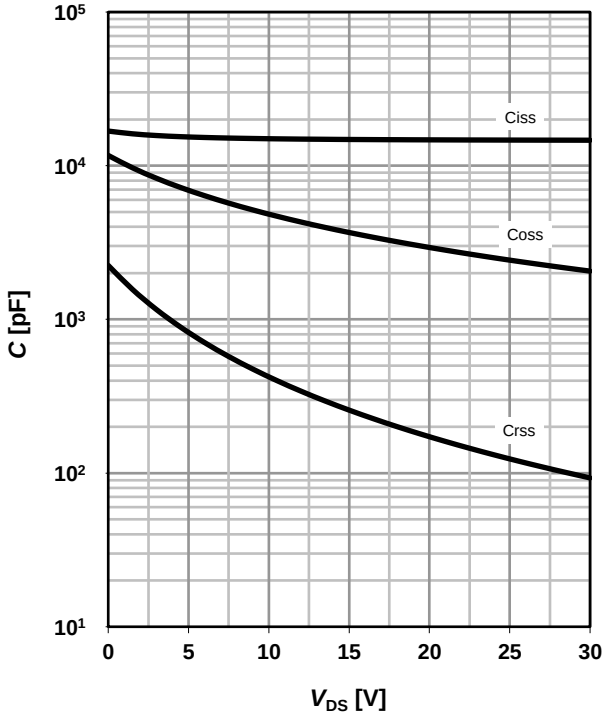
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

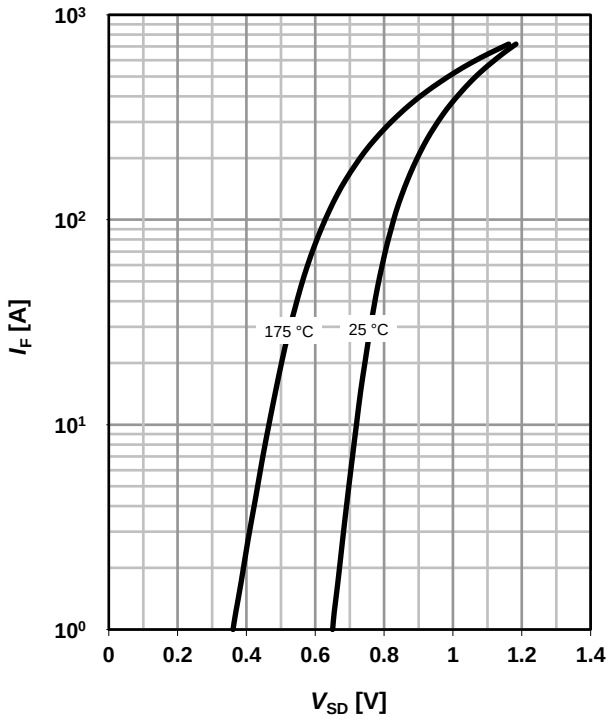
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristicis

IF = f(V_{SD})

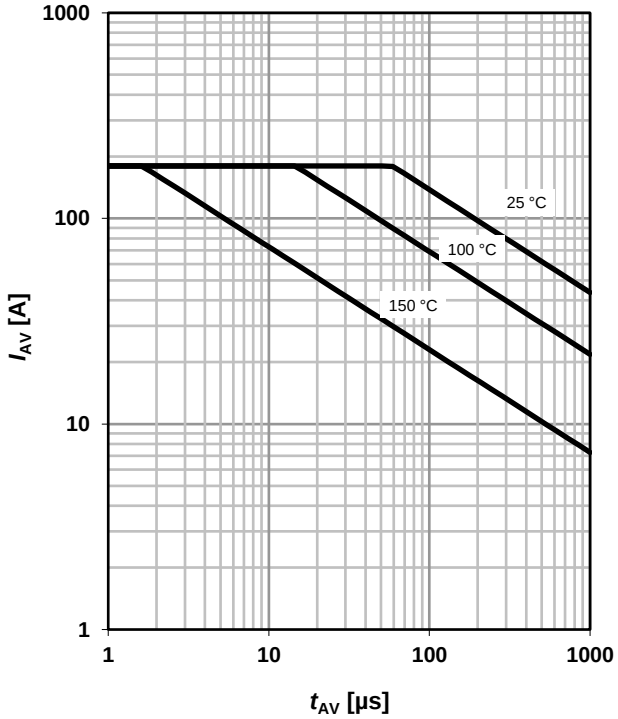
parameter: T_j



12 Typ. avalanche characteristics

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

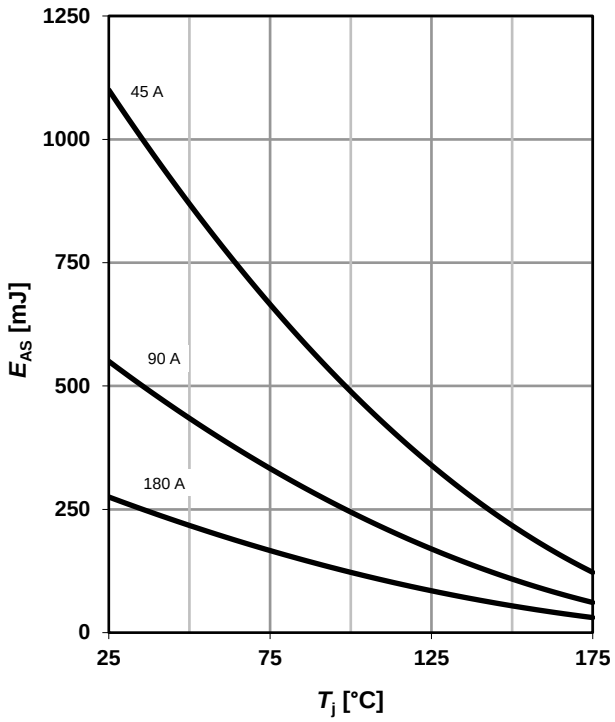
parameter: $T_{j(start)}$



13 Typical avalanche energy

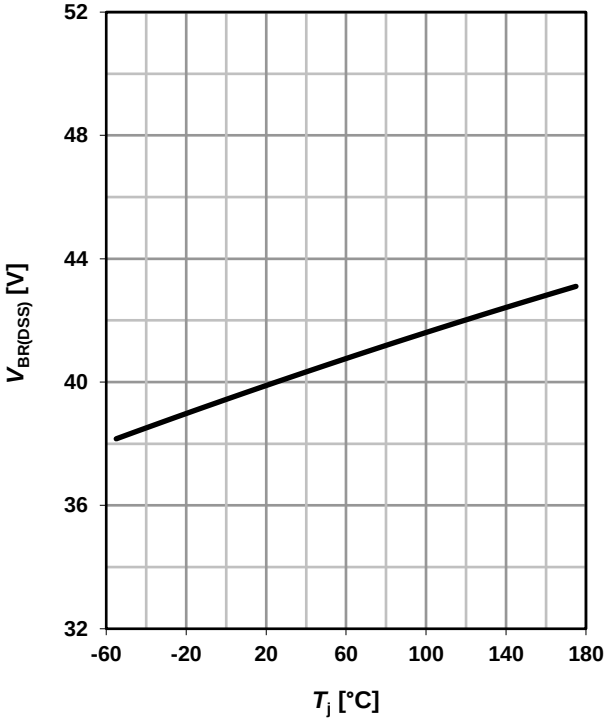
$E_{AS} = f(T_j)$

parameter: I_D



14 Drain-source breakdown voltage

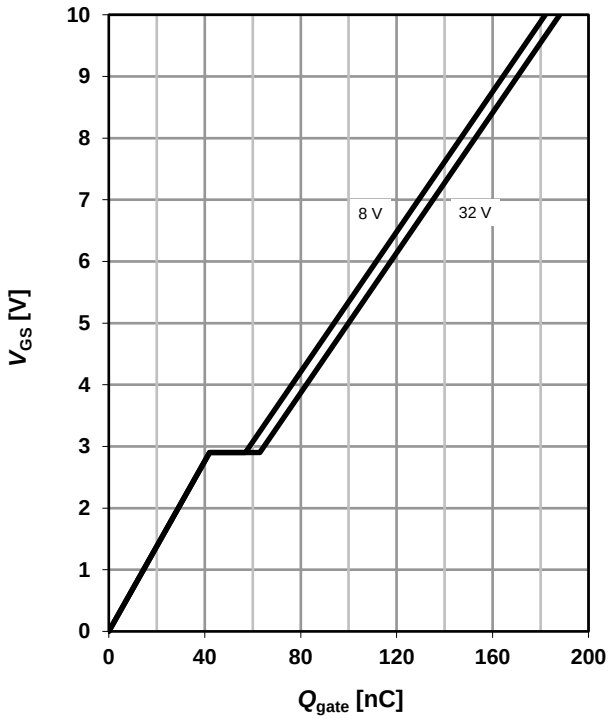
$V_{BR(DSS)} = f(T_j)$; $I_D = 1$ mA



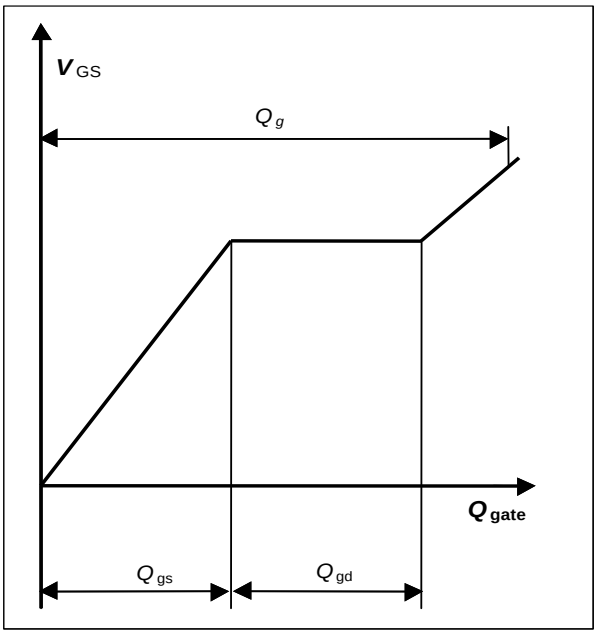
15 Typ. gate charge

$V_{GS} = f(Q_{gate})$; $I_D = 180$ A pulsed

parameter: V_{DD}



16 Gate charge waveforms



Published by
Infineon Technologies AG
81726 Munich, Germany

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, 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.

Information
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, components may contain dangerous substances.
For information on the types in question, please contact the nearest Infineon Technologies Office.
Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life.
If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History

Version	Date	Changes
Revision 1.0	03.06.2013	Data Sheet
Revision 1.1	06.08.2019	QGD corrected