OptiMOS™-T2 Power-Transistor

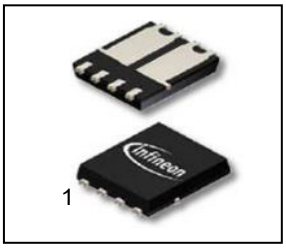
Product Summary

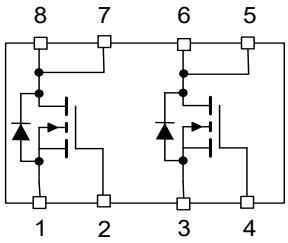
V_{DS}	100	V
$R_{DS(on),max}$4)	36	mΩ
I_D	20	A

Features

- Dual N-channel Normal Level - Enhancement mode
- AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green Product (RoHS compliant)
- 100% Avalanche tested
- Feasible for automatic optical inspection (AOI)

PG-TDSON-8





Type	Package	Marking
IPG20N10S4-36A	PG-TDSON-8	4N1036

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current one channel active	I_D	T_C=25 °C, V_{GS}=10 V[1)]	20	A
		T_C=100 °C, V_{GS}=10 V[2)]	17	
Pulsed drain current[2)] one channel active	$I_{D,pulse}$	-	80	
Avalanche energy, single pulse[2, 4)]	E_{AS}	I_D=10A	60	mJ
Avalanche current, single pulse[4)]	I_{AS}	-	15	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation one channel active	P_{tot}	T_C=25 °C	43	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics[2, 4]						
Thermal resistance, junction - case	R_{thJC}	-	-	-	3.5	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	100	-	
		6 cm^2 cooling area[3]	-	60	-	
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	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D= 16µA	2.0	2.7	3.5	
Zero gate voltage drain current[4]	I_{DSS}	V_{DS}=100 V, V_{GS}=0 V, T_j=25 °C	-	0.01	1	µA
		V_{DS}=100 V, V_{GS}=0 V, T_j=125 °C[2]	-	1	100	
Gate-source leakage current[4]	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	-	100	nA
Drain-source on-state resistance[4]	$R_{DS(on)}$	V_{GS}=10 V, I_D=17 A	-	31	36	mΩ

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance[4]	C_{iss}	V_{GS}=0 V, V_{DS}=25 V, f=1 MHz	-	660	990	pF
Output capacitance[4]	C_{oss}		-	210	370	
Reverse transfer capacitance[4]	C_{rss}		-	16	32	
Turn-on delay time	$t_{d(on)}$	V_{DD}=50 V, V_{GS}=10 V, I_D=20 A, R_G=3.5 Ω	-	3.0	-	ns
Rise time	t_r		-	1.0	-	
Turn-off delay time	$t_{d(off)}$		-	4.0	-	
Fall time	t_f		-	3.0	-	
Gate Charge Characteristics[2, 4]						
Gate to source charge	Q_{gs}	V_{DD}=80 V, I_D=20 A, V_{GS}=0 to 10 V	-	3.3	4.3	nC
Gate to drain charge	Q_{gd}		-	2.0	4.0	
Gate charge total	Q_g		-	9.4	15.0	
Gate plateau voltage	$V_{plateau}$		-	5.2	-	V
Reverse Diode						
Diode continous forward current[2] one channel active	I_S	T_C=25 °C	-	-	20	A
Diode pulse current[2] one channel active	$I_{S,pulse}$		-	-	80	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=17 A, T_j=25 °C	-	1.0	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=50 V, I_F=I_S, di_F/dt=100 A/µs	-	50	-	ns
Reverse recovery charge[2, 4]	Q_{rr}		-	80	-	nC

[1] Current is limited by bondwire; with an R_{thJC} = 3.5K/W the chip is able to carry 24A at 25°C.

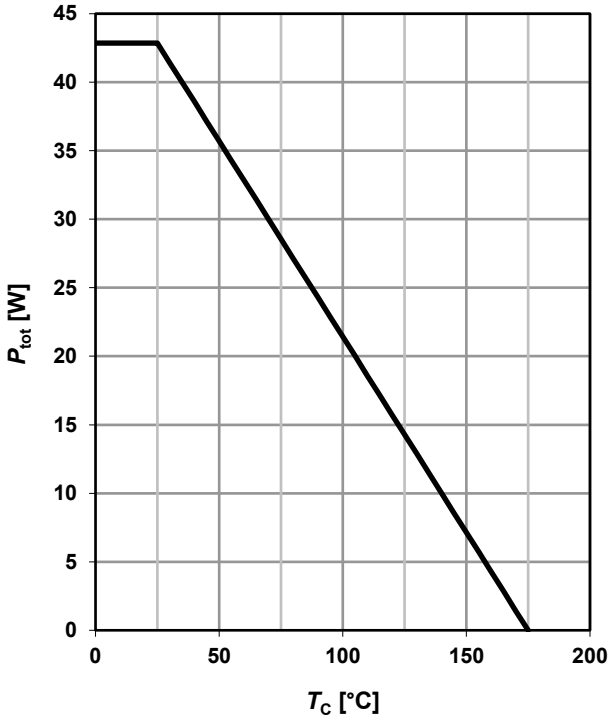
[2] Specified by design. Not subject to production test.

[3] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

[4] Per channel

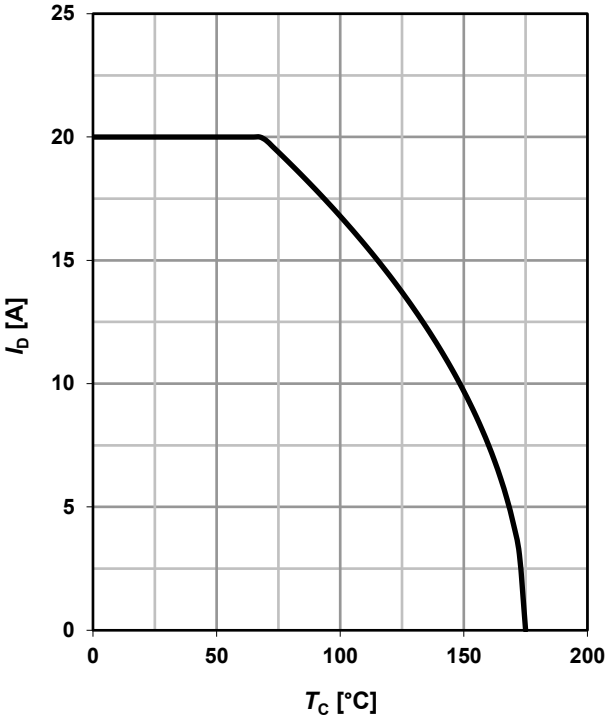
1 Power dissipation

$P_{tot}=f(T_C)$; $V_{GS}=10V$; one channel active



2 Drain current

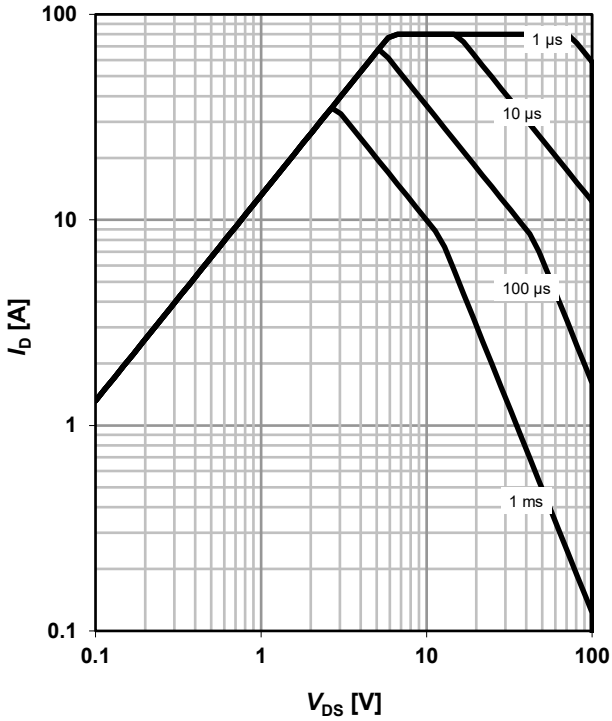
$I_D=f(T_C)$; $V_{GS}=10V$; one channel active



3 Safe operating area

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

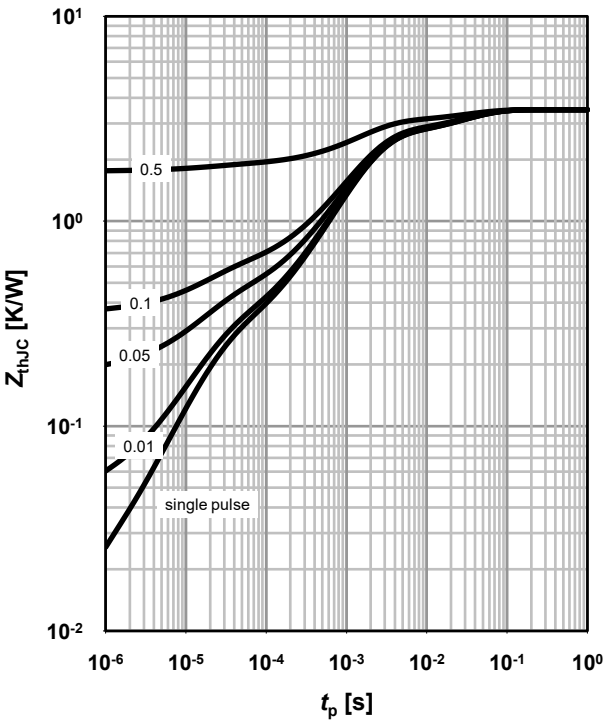
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

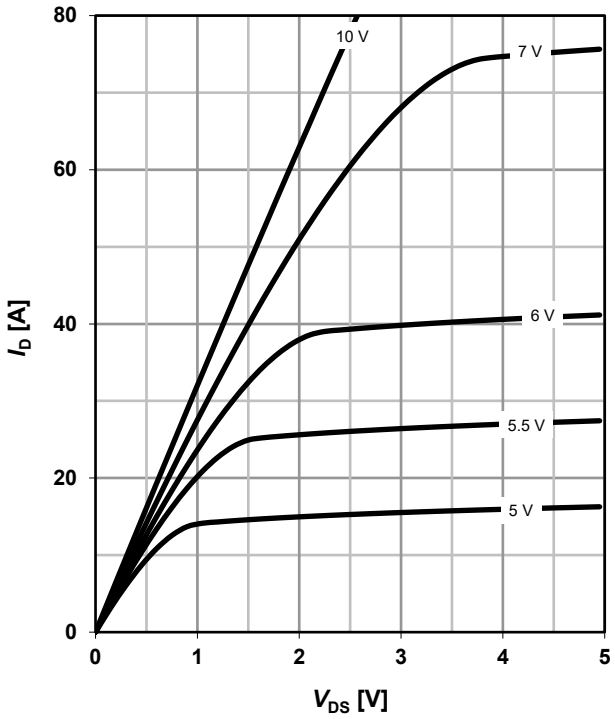
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25°C

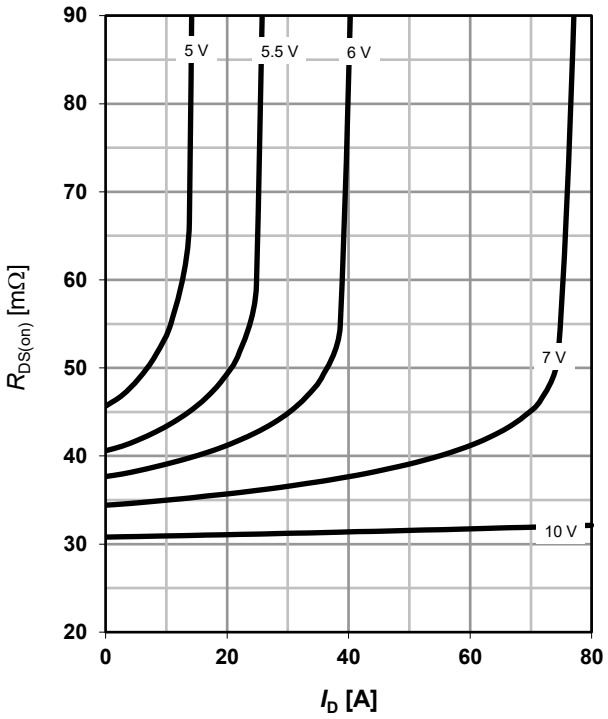
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)}$=f(I_D); T_j=25°C

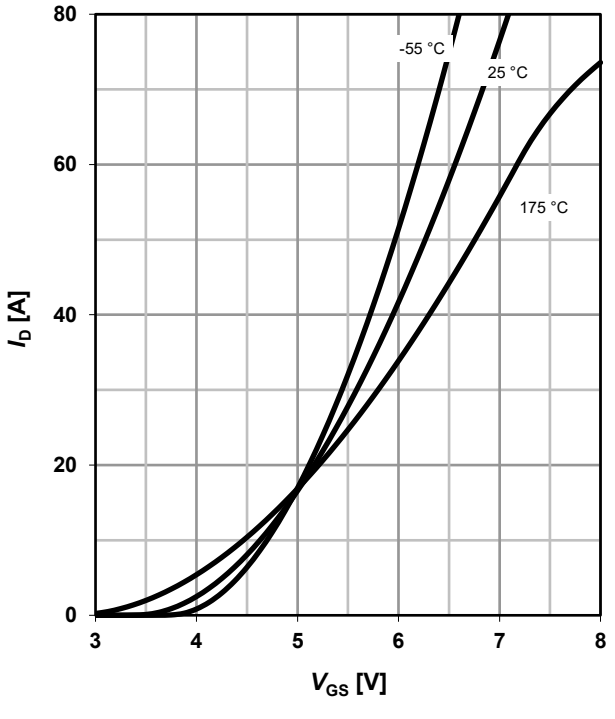
parameter: V_{GS}



7 Typ. transfer characteristics

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

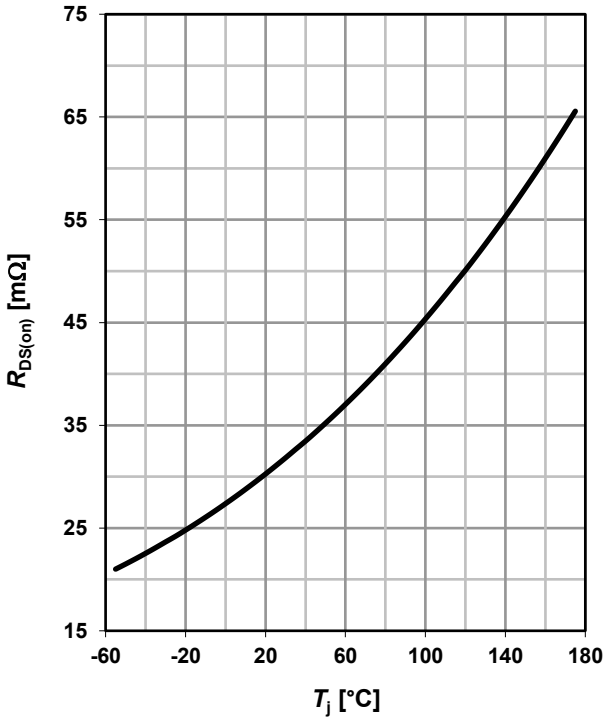
parameter: T_j



8 Typ. drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=17A; V_{GS}=10V

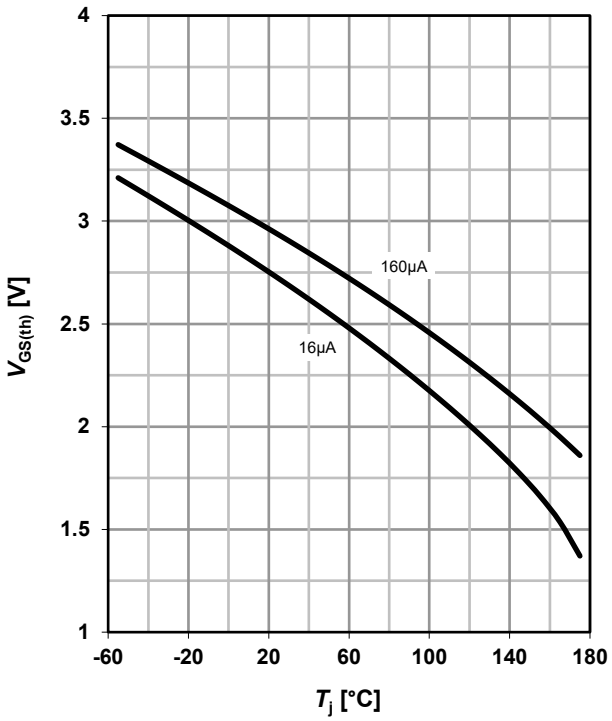
α = 0.4



9 Typ. gate threshold voltage

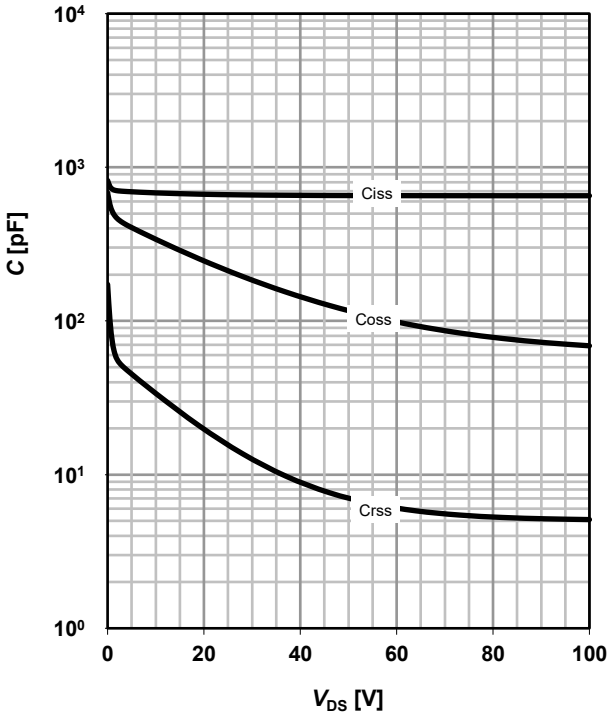
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$

parameter: I_D



10 Typ. Capacitances

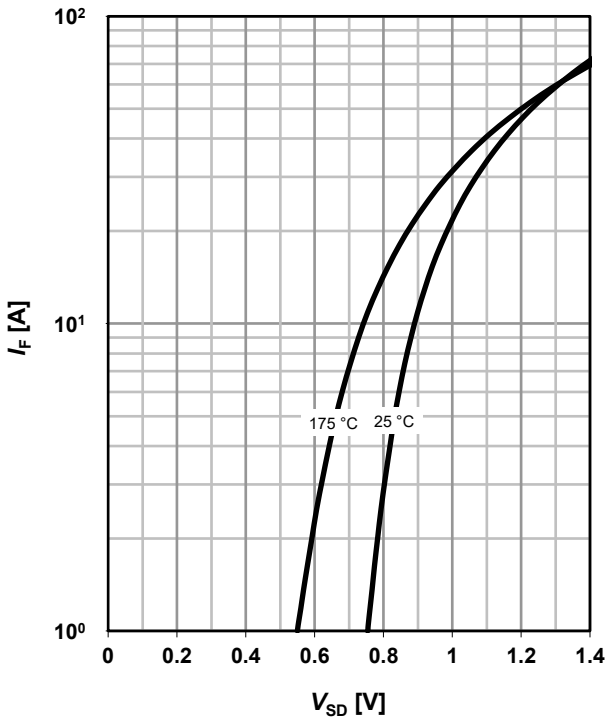
$C=f(V_{DS})$; $V_{GS}=0V$; $f=1MHz$



11 Typical forward diode characteristicis

$I_F=f(V_{SD})$

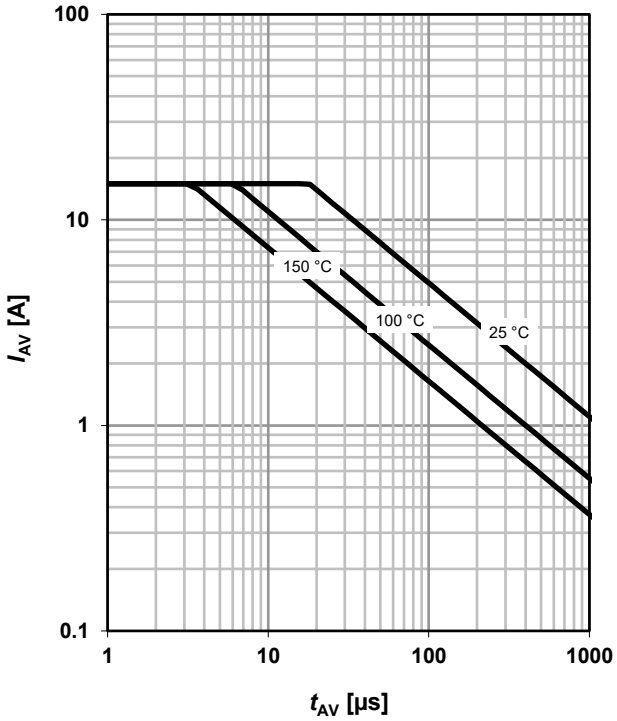
parameter: T_j



12 Avalanche characteristics

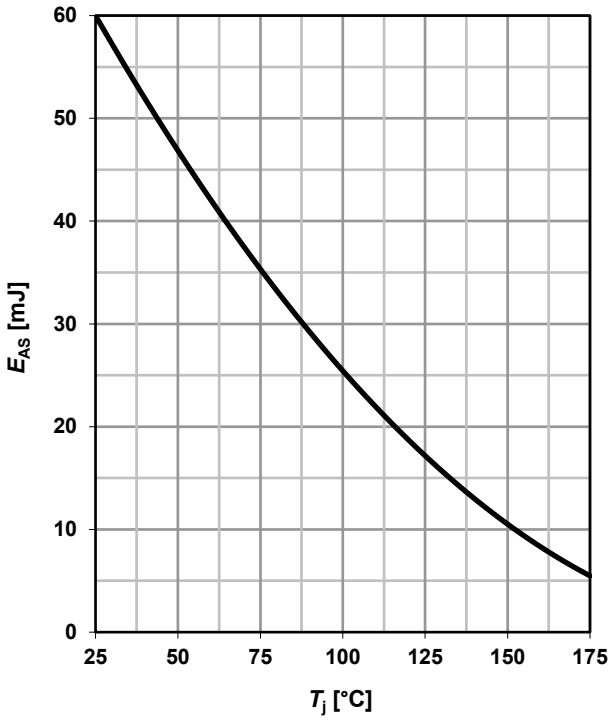
$I_{AS}= f(t_{AV})$

parameter: $T_{j(start)}$



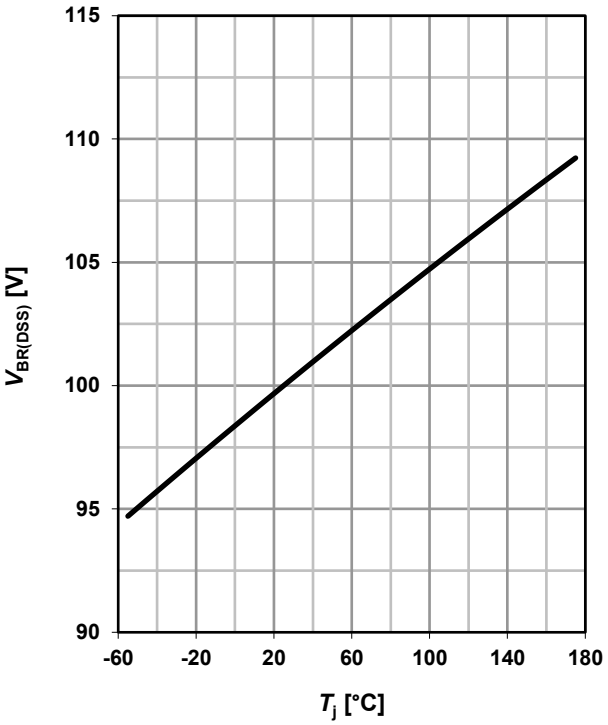
13 Avalanche energy

E_{AS}=f(T_j), I_D=10A



14 Drain-source breakdown voltage

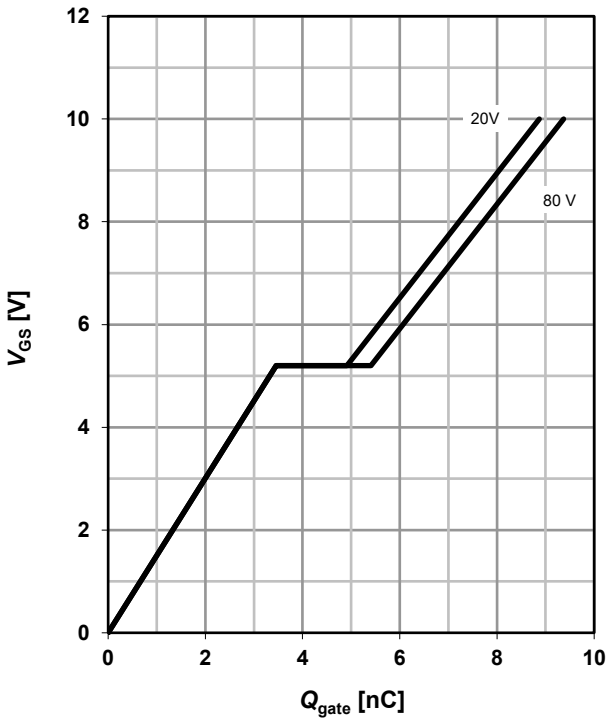
$V_{BR(DSS)}$=f(T_j); I_D=1mA



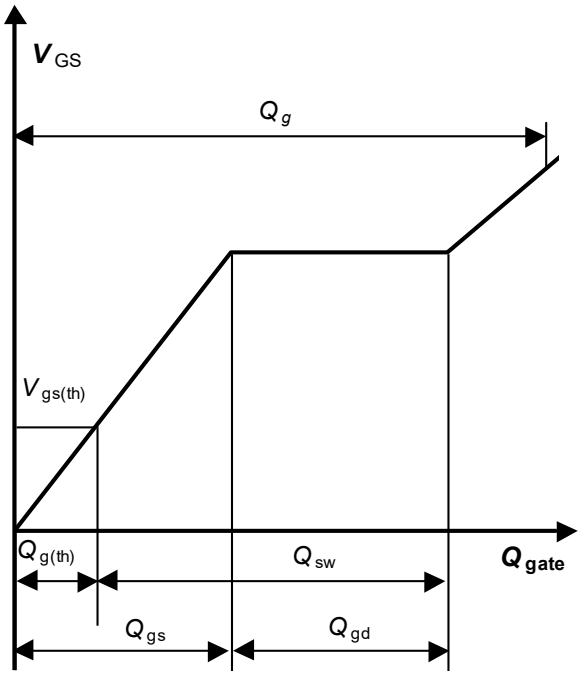
15 Typ. gate charge

V_{GS}=f(Q_{gate}); I_D=20A pulsed

parameter: V_{DD}



16 Gate charge waveforms



Published by
Infineon Technologies AG
81726 Munich, Germany

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Revision History

Version	Date	Changes
Revision 1.0	11.07.2014	Data Sheet Revision 1.0
Revision 1.1	13.04.2015	Operating and storage temperature added
Revision 1.2	30.01.2023	Diagram 8 Typ. drain-source on-state resistance: used α value clarified
Revision 1.21	22.07.2024	Package naming updated