OptiMOS™-T2 Power-Transistor

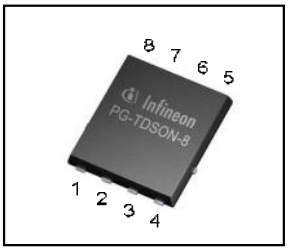
Product Summary

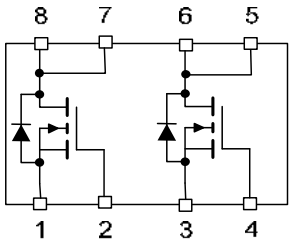
V_{DS}	100	V
$R_{DS(on),max}$ [4]	22	mΩ
I_D	20	A

Features

- Dual N-channel Logic Level - Enhancement mode
- AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green Product (RoHS compliant)
- 100% Avalanche tested

PG-TDSON-8-4





Type	Package	Marking
IPG20N10S4L-22	PG-TDSON-8-4	4N10L22

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current one channel active [1]	I_D	T_C=25°C, V_{GS}=10V	20	A
		T_C=100°C, V_{GS}=10V [2]	20	
Pulsed drain current [2] one channel active	$I_{D,pulse}$	-	80	
Avalanche energy, single pulse [2, 4]	E_{AS}	I_D=10A	130	mJ
Avalanche current, single pulse [4]	I_{AS}	-	15	A
Gate source voltage	V_{GS}	-	±16	V
Power dissipation one channel active	P_{tot}	T_C=25°C	60	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics[2]						
Thermal resistance, junction - case	R_{thJC}	-	-	-	2.5	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	100	-	
		6cm^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}=0V, I_D= 1mA	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D= 25µA	1.1	1.6	2.1	
Zero gate voltage drain current[4]	I_{DSS}	V_{DS}=100V, V_{GS}=0V, T_j=25°C	-	0.01	1	µA
		V_{DS}=100V, V_{GS}=0V, T_j=125°C[2]	-	1	100	
Gate-source leakage current[4]	I_{GSS}	V_{GS}=16V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance[4]	$R_{DS(on)}$	V_{GS}=4.5V, I_D=10A	-	24	28	mΩ
		V_{GS}=10V, I_D=17A	-	20	22	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance[4]	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	1350	1755	pF
Output capacitance[4]	C_{oss}		-	450	585	
Reverse transfer capacitance[4]	C_{rss}		-	42	84	
Turn-on delay time	$t_{d(on)}$	V_{DD}=50V, V_{GS}=10V, I_D=20A, R_G=11Ω	-	5	-	ns
Rise time	t_r		-	3	-	
Turn-off delay time	$t_{d(off)}$		-	30	-	
Fall time	t_f		-	18	-	
Gate Charge Characteristics[2, 4]						
Gate to source charge	Q_{gs}	V_{DD}=80V, I_D=20A, V_{GS}=0 to 10V	-	4.3	5.6	nC
Gate to drain charge	Q_{gd}		-	4.8	9.6	
Gate charge total	Q_g		-	21	27	
Gate plateau voltage	$V_{plateau}$		-	3.2	-	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}=0V, I_F=17A, T_j=25°C	-	1.0	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=50V, I_F=I_S, di_F/dt=100A/µs	-	55	-	ns
Reverse recovery charge[2, 4]	Q_{rr}		-	100	-	nC

[1] Current is limited by bondwire; with an R_{thJC} = 2.5K/W the chip is able to carry 36A at 25°C.

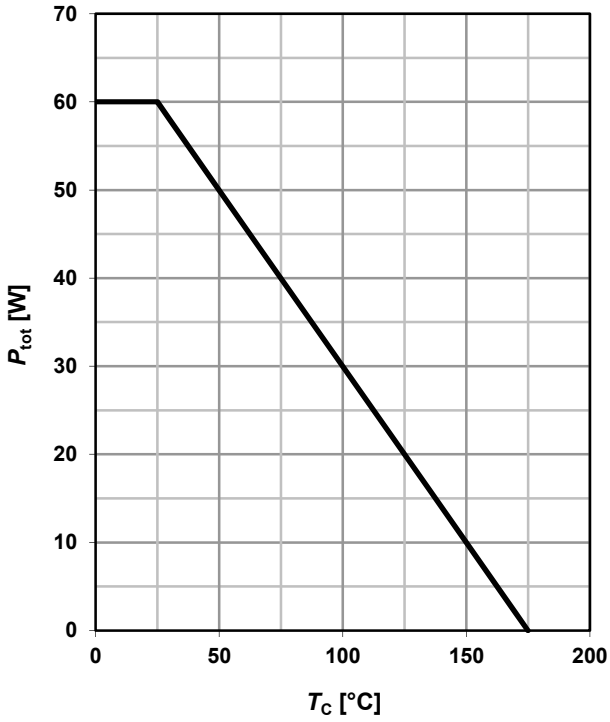
[2] Specified by design. Not subject to production test.

[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

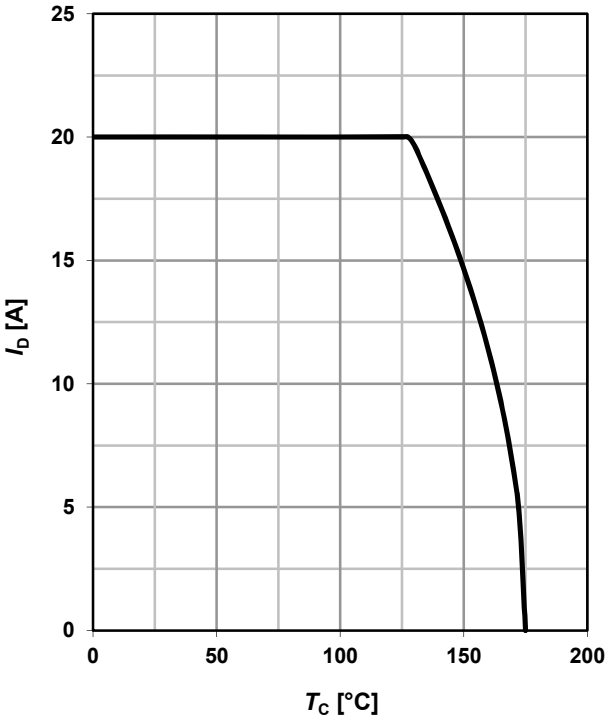
1 Power dissipation

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



2 Drain current

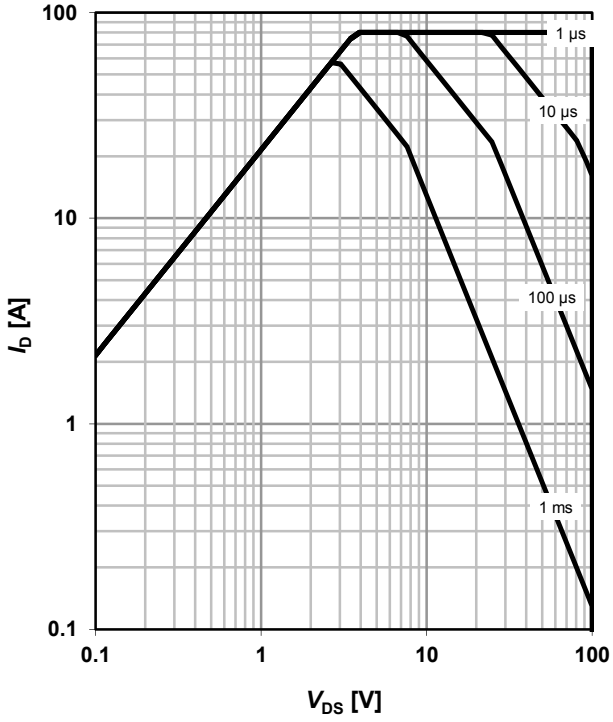
$I_D=f(T_C)$; $V_{GS}\geq 6V$; one channel active



3 Safe operating area

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

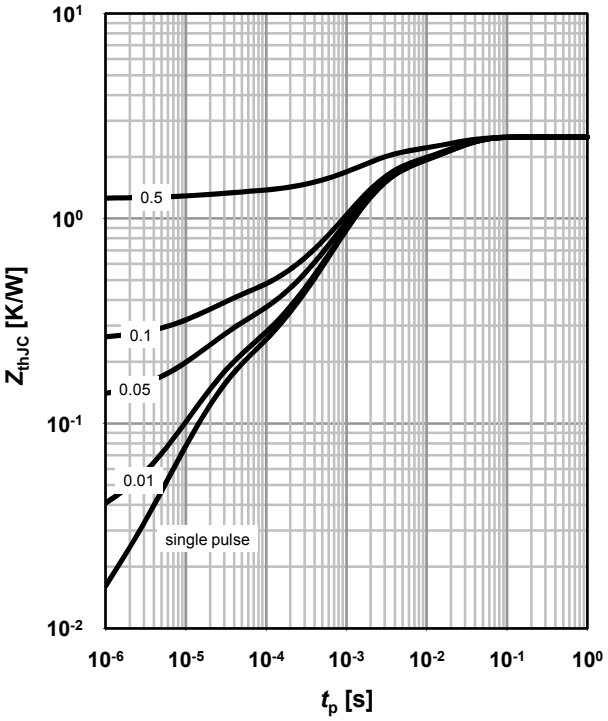
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

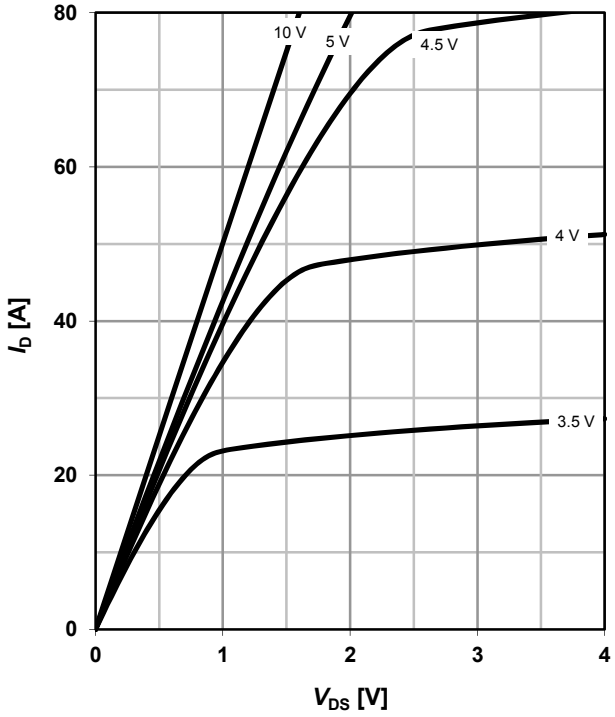
parameter: $D=t_p/T$



5 Typ. output characteristics[5)]

I_D=f(V_{DS}); T_j=25°C

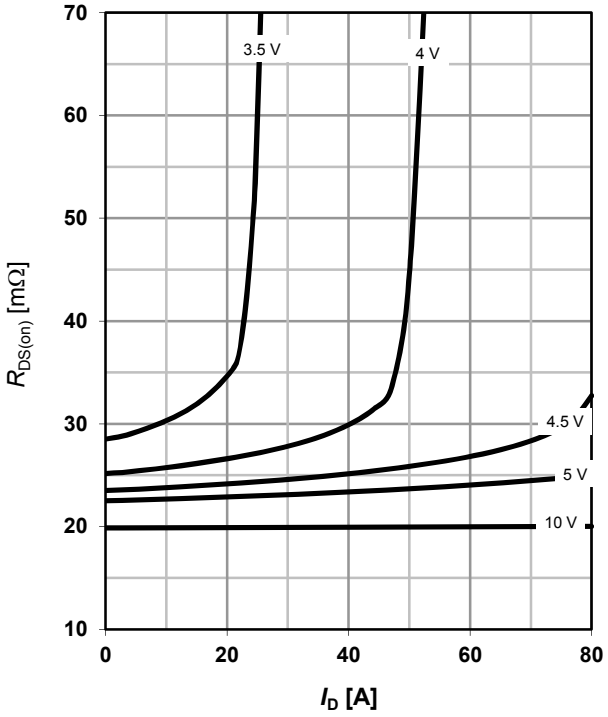
parameter: V_{GS}



6 Typ. drain-source on-state resistance[5)]

$R_{DS(on)}$=f(I_D); T_j=25°C

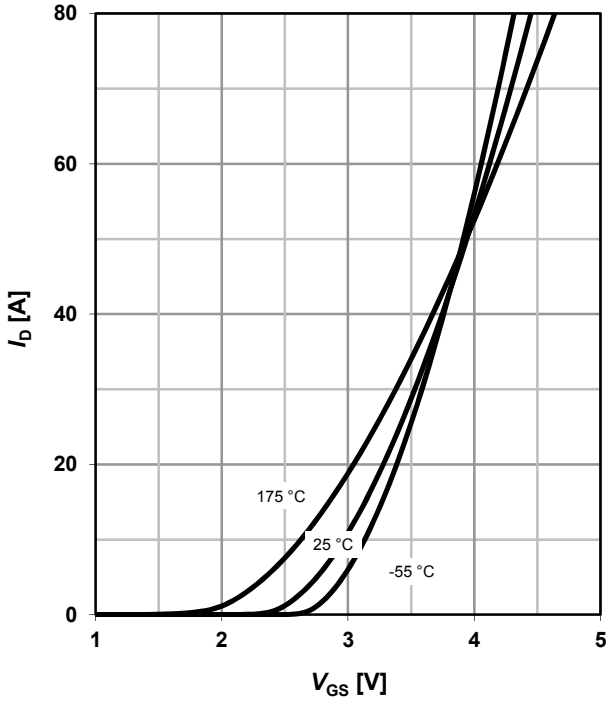
parameter: V_{GS}



7 Typ. transfer characteristics[5)]

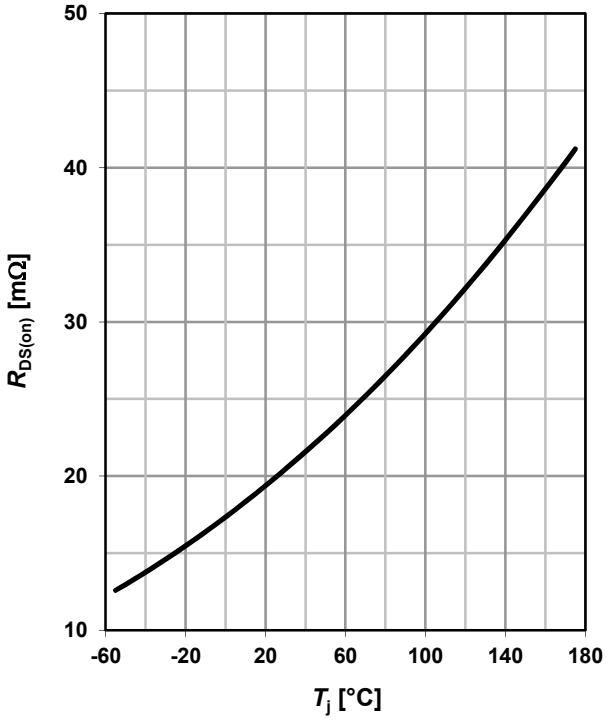
I_D=f(V_{GS}); V_{DS}=6V

parameter: T_j



8 Typ. drain-source on-state resistance[5)]

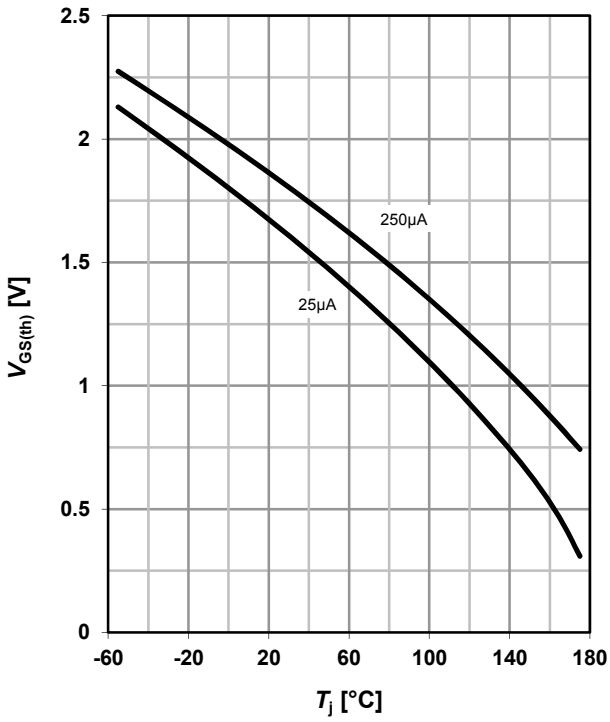
$R_{DS(on)}$=f(T_j); I_D=17A; V_{GS}=10V



9 Typ. gate threshold voltage

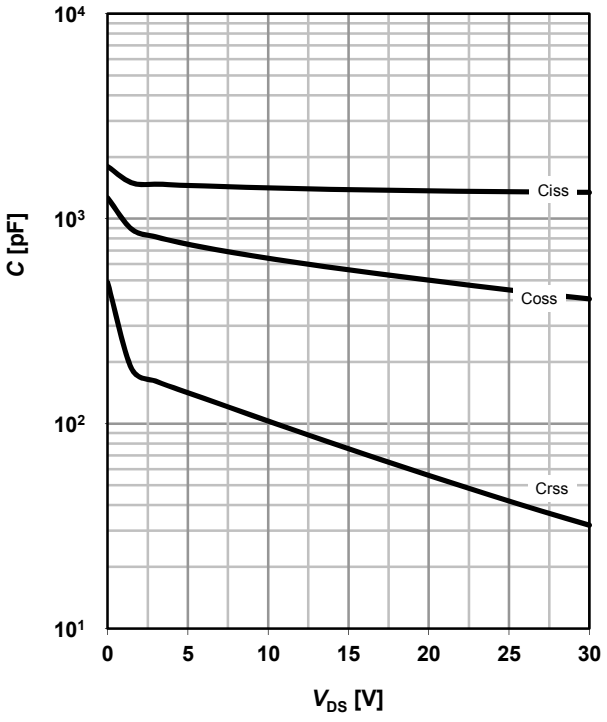
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$

parameter: I_D



10 Typ. Capacitances[5)]

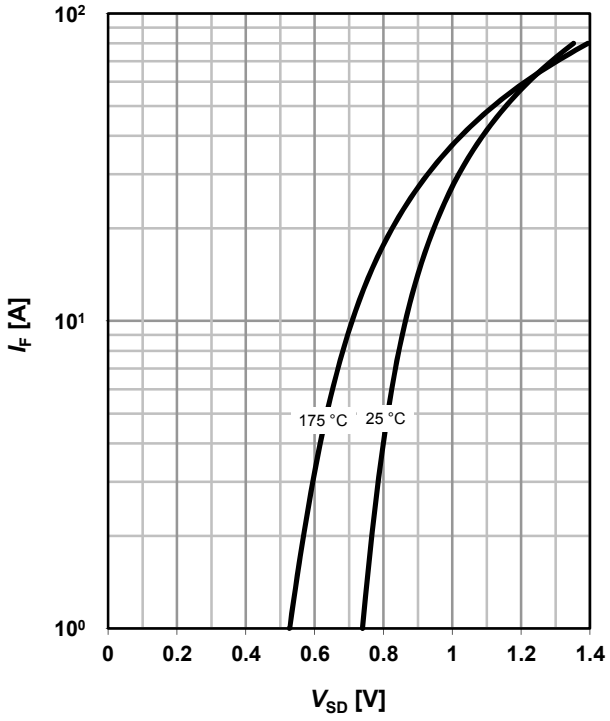
$C=f(V_{DS})$; $V_{GS}=0V$; $f=1MHz$



11 Typical forward diode characteristicis[5)]

$I_F=f(V_{SD})$

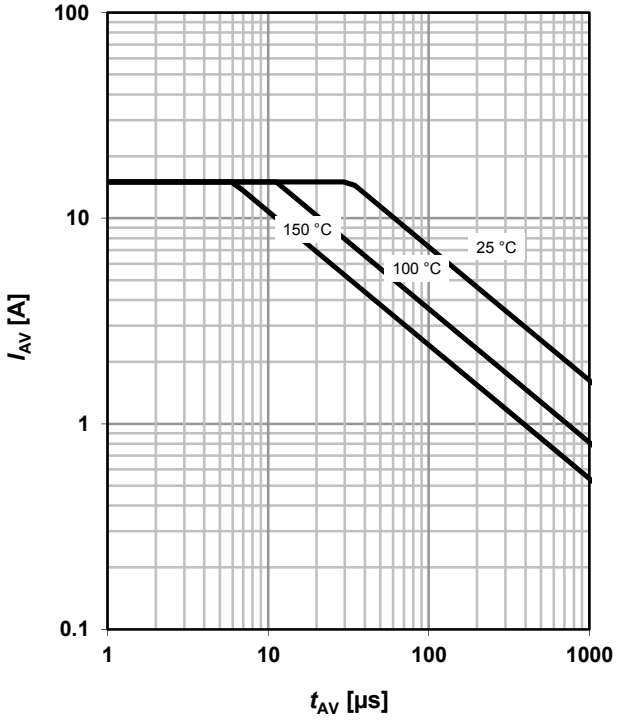
parameter: T_j



12 Avalanche characteristics[5)]

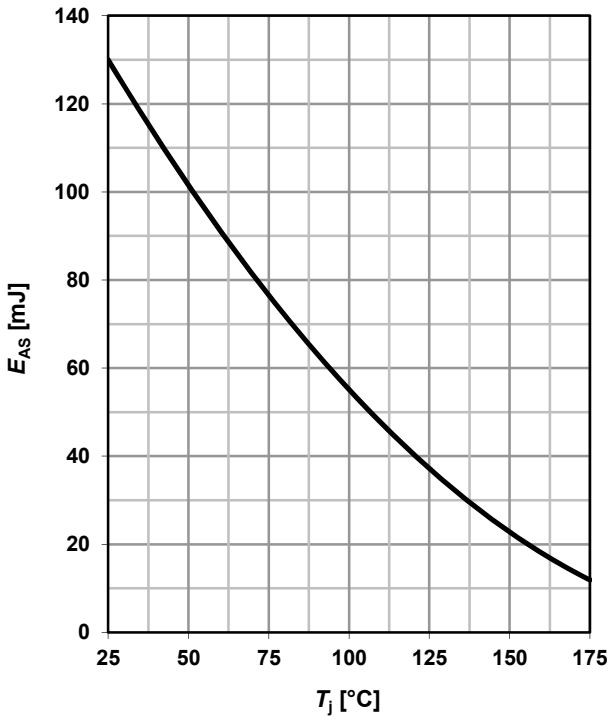
$I_{AS}=f(t_{AV})$

parameter: $T_{j(start)}$



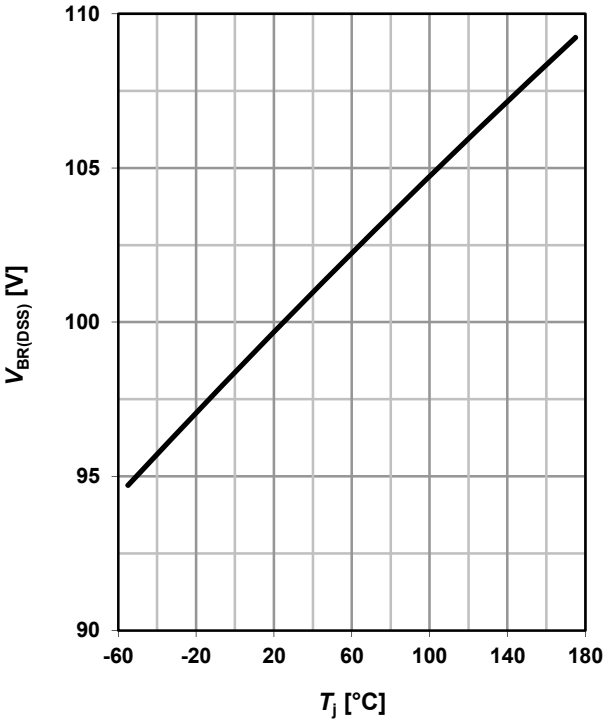
13 Avalanche energy[5)]

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



14 Drain-source breakdown voltage

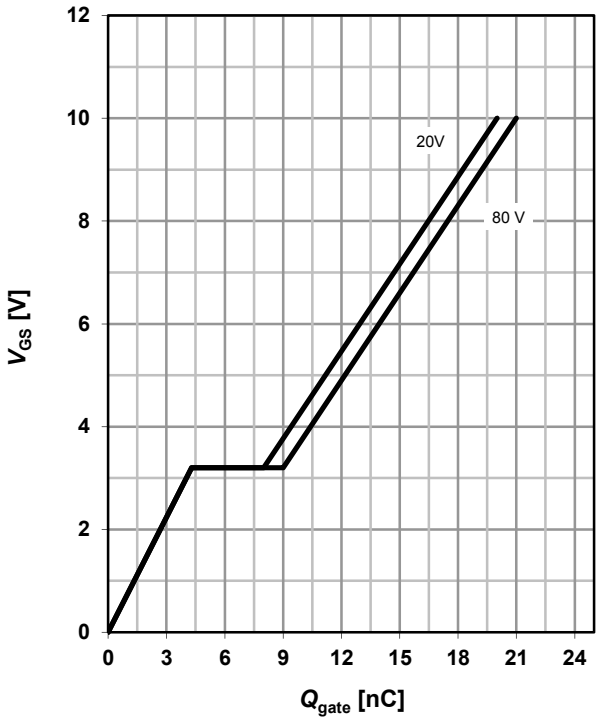
$V_{BR(DSS)}$=f(T_j); I_D=1mA



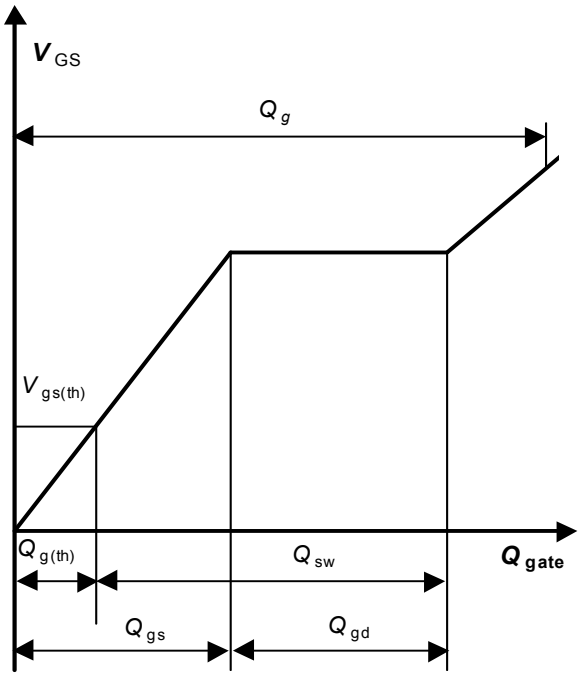
15 Typ. gate charge[5)]

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

parameter: V_{DD}



16 Gate charge waveforms



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Revision History

Version	Date	Changes
Revision 1.0	29.11.2011	Final Data Sheet
Revision 1.1	30.01.2013	Updte of marking