OptiMOS®-T2 Power-Transistor

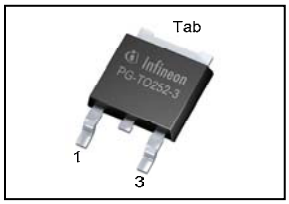
Product Summary

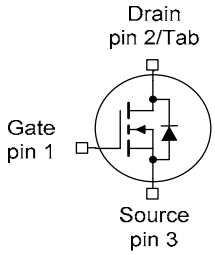
V_{DS}	60	V
$R_{DS(on),max}$	3.8	mΩ
I_D	90	A

Features

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

PG-TO252-3-11





Type	Package	Marking
IPD90N06S4-04	PG-TO252-3-11	4N0604

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current[1]	I_D	T_C=25°C, V_{GS}=10V	90	A
		T_C=100°C, V_{GS}=10V[2]	90	
Pulsed drain current[2]	$I_{D,pulse}$	T_C=25°C	360	
Avalanche energy, single pulse[2]	E_{AS}	I_D=45A	331	mJ
Avalanche current, single pulse	I_{AS}	-	90	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation	P_{tot}	T_C=25°C	150	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}	-	-	-	1.0	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	-	62	
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	62	
		6 cm^2 cooling area[3]	-	-	40	
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	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=90µA	2.0	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V, T_j=25°C	-	0.03	1	µA
		V_{DS}=60V, V_{GS}=0V, T_j=125°C[2]	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=90A	-	3.2	3.8	mΩ

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	-	7980	10400	pF
Output capacitance	C_{oss}		-	1960	2540	
Reverse transfer capacitance	C_{rss}		-	75	150	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=10V, I_D=90A, R_G=3.5Ω	-	30	-	ns
Rise time	t_r		-	70	-	
Turn-off delay time	$t_{d(off)}$		-	40	-	
Fall time	t_f		-	5	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=48V, I_D=90A, V_{GS}=0 to 10V	-	44	57	nC
Gate to drain charge	Q_{gd}		-	10	20	
Gate charge total	Q_g		-	99	128	
Gate plateau voltage	$V_{plateau}$		-	5.4	-	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C=25°C	-	-	90	A
Diode pulse current[2]	$I_{S,pulse}$		-	-	360	
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=90A, T_j=25°C	0.6	0.95	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=30V, I_F=50A, di_F/dt=100A/µs	-	125	-	ns
Reverse recovery charge[2]	Q_{rr}		-	110	-	nC

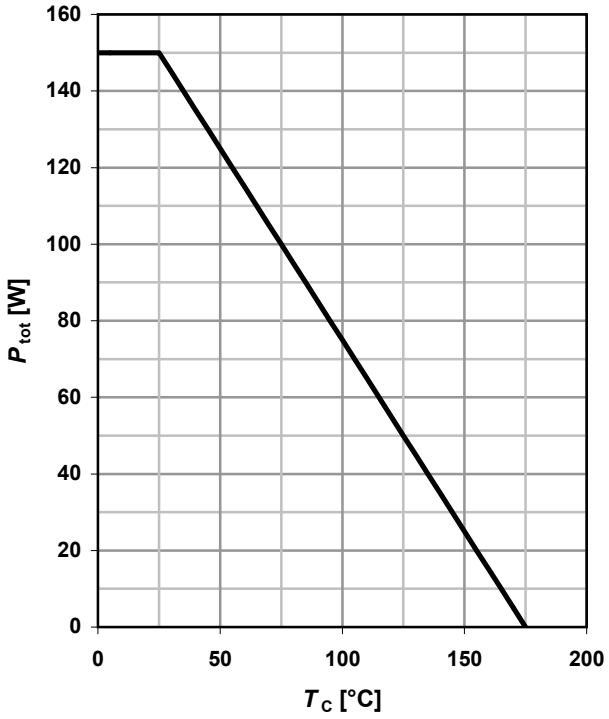
[1] Current is limited by bondwire; with an R_{thJC} = 1.0K/W the chip is able to carry 152A at 25°C.

[2] Defined 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.

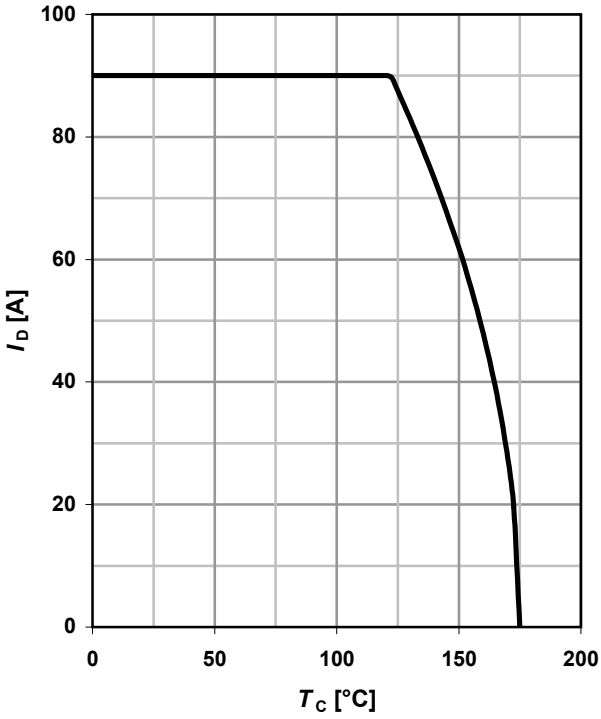
1 Power dissipation

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



2 Drain current

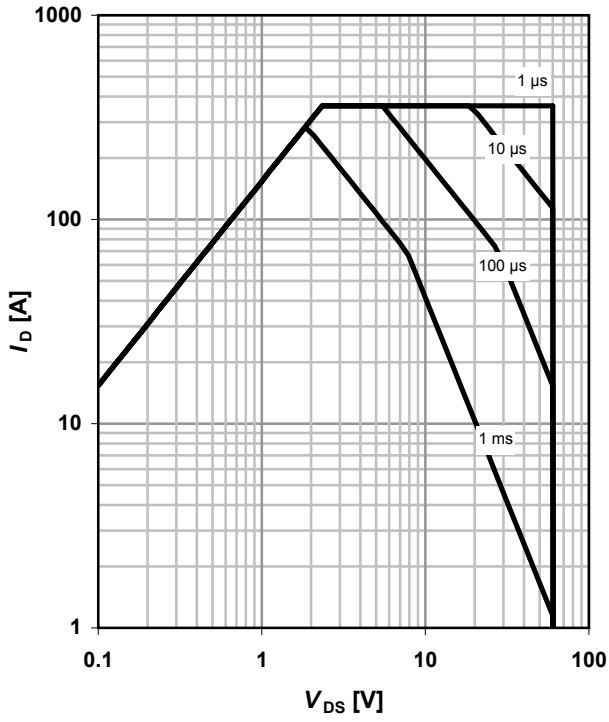
$I_D = f(T_C)$; $V_{GS} \geq 6$ V



3 Safe operating area

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

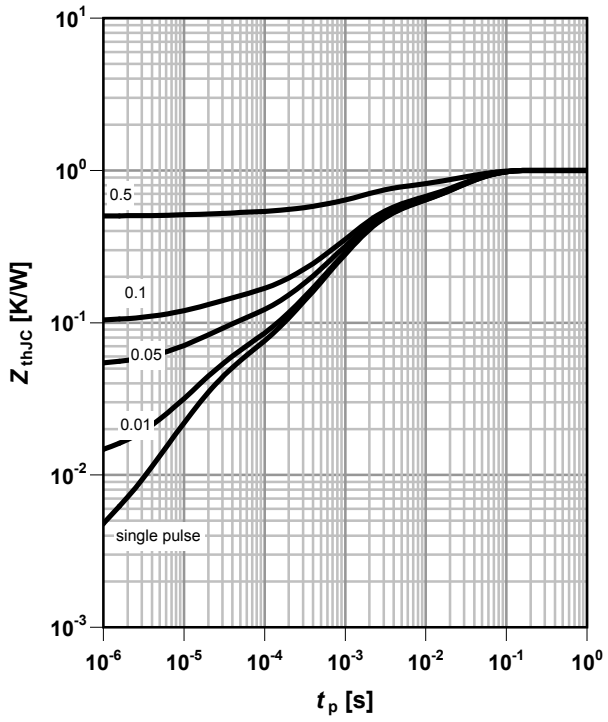
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

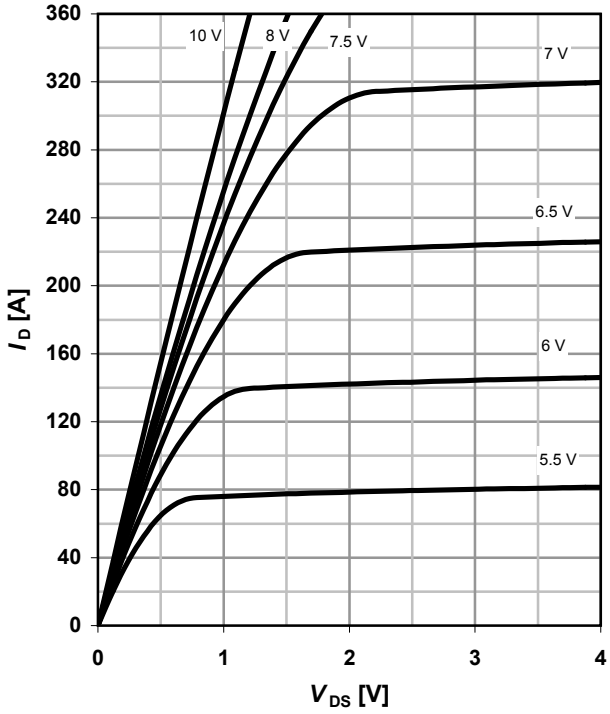
parameter: $D = t_p / T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

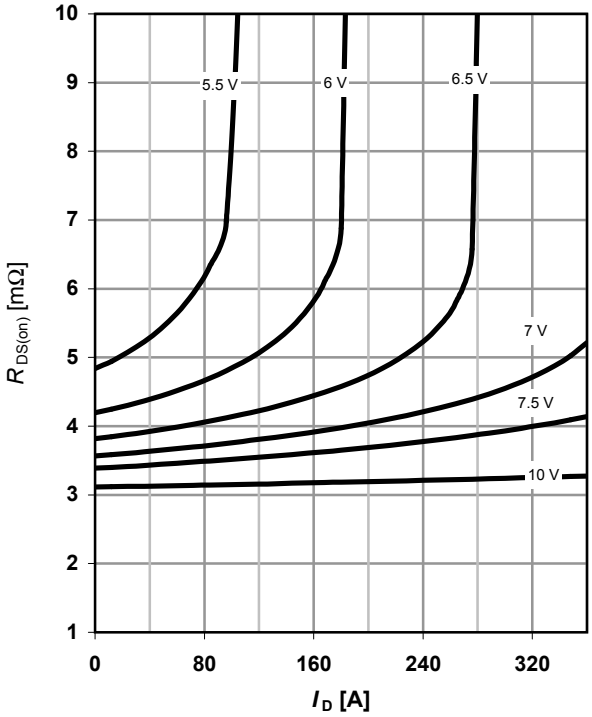
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

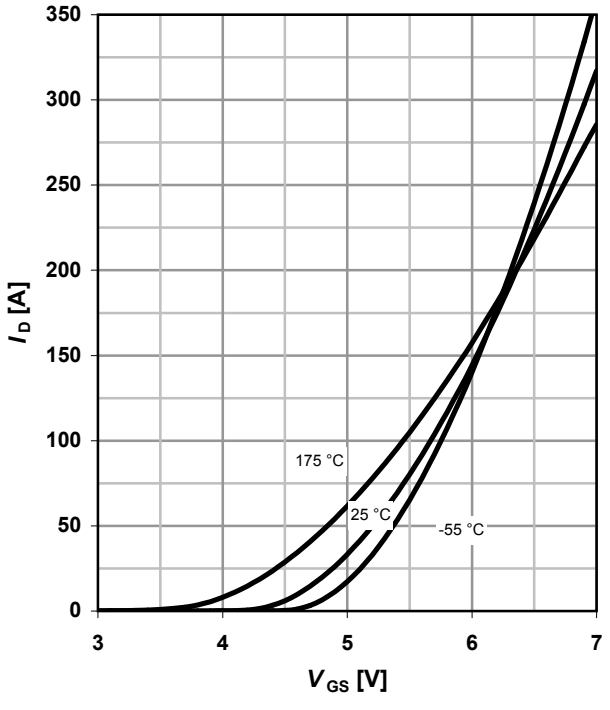
parameter: V_{GS}



7 Typ. transfer characteristics

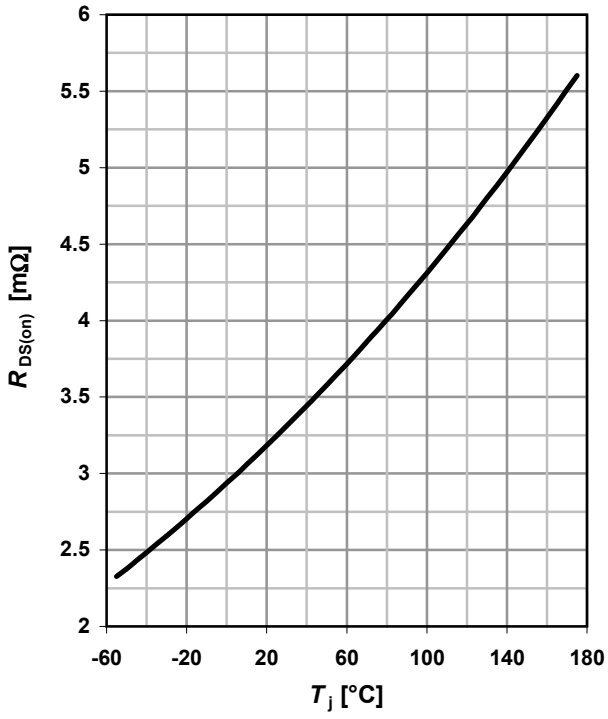
$I_D = f(V_{GS})$; $V_{DS} = 6$V

parameter: T_j



8 Typ. drain-source on-state resistance

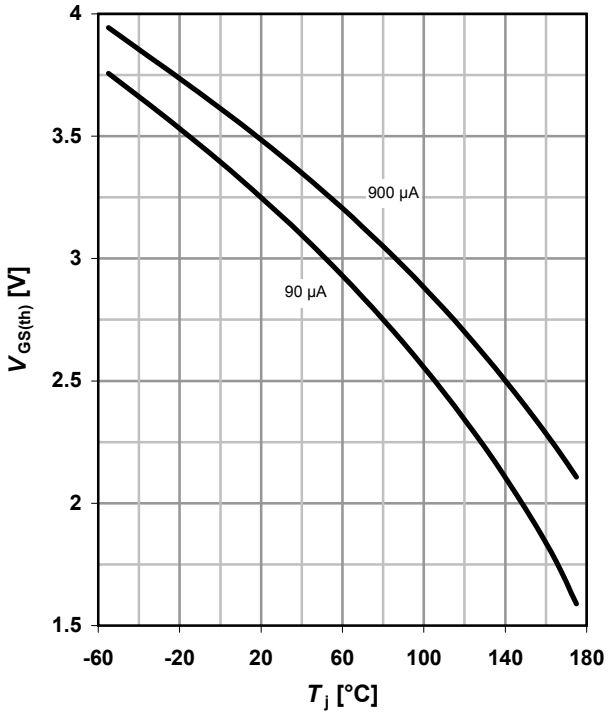
$R_{DS(on)} = f(T_j)$; $I_D = 90$ A; $V_{GS} = 10$ V



9 Typ. gate threshold voltage

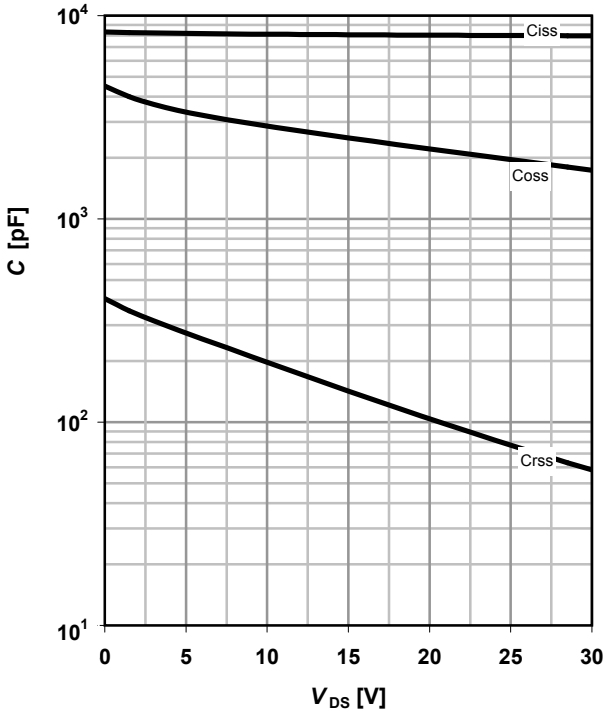
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

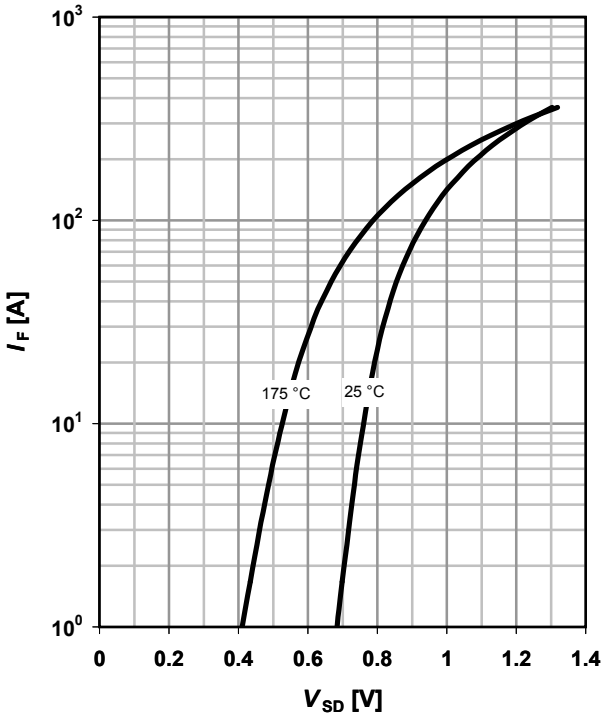
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristicis

IF = f(V_{SD})

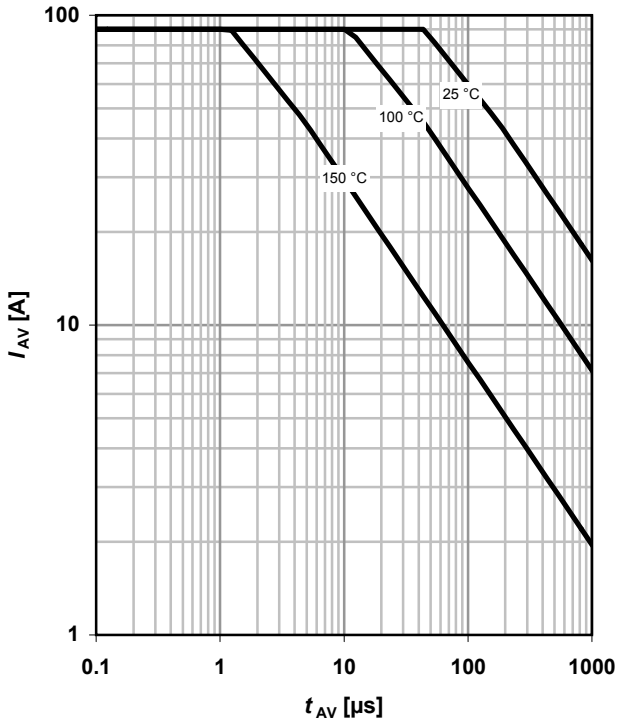
parameter: T_j



12 Avalanche characteristics

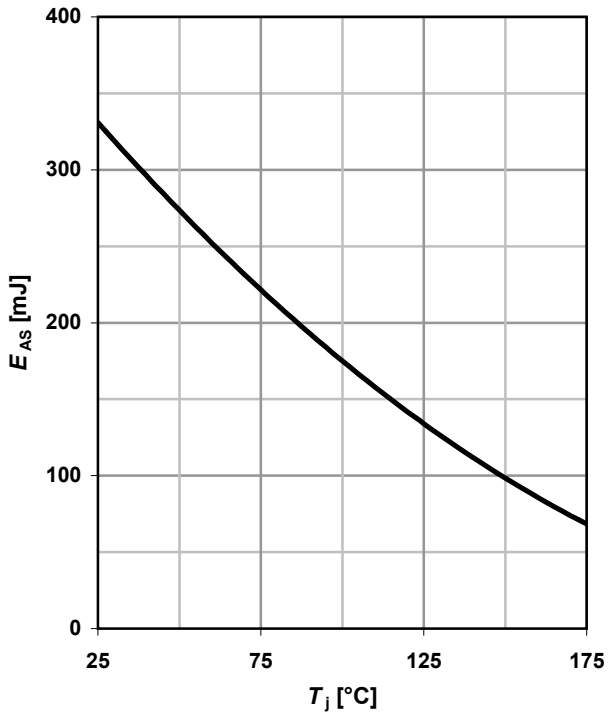
$I_{AS} = f(t_{AV})$

parameter: $T_{j(start)}$



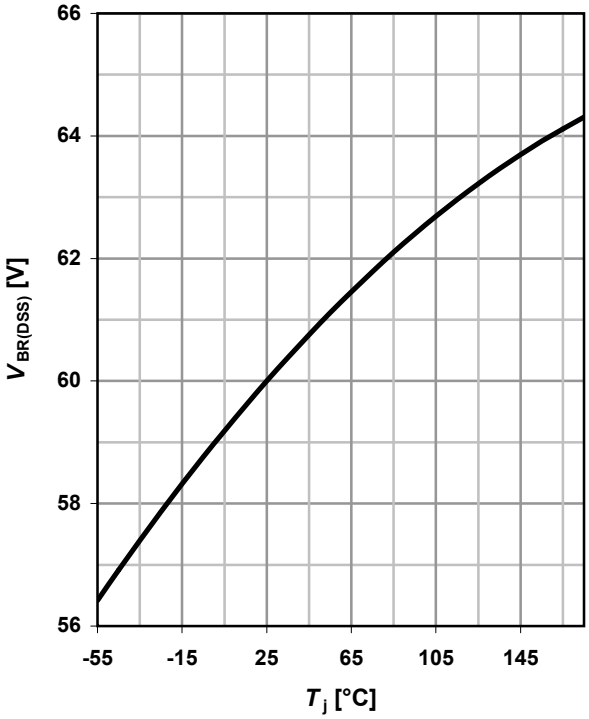
13 Avalanche energy

$E_{AS} = f(T_j)$; I_D = 45 A



14 Drain-source breakdown voltage

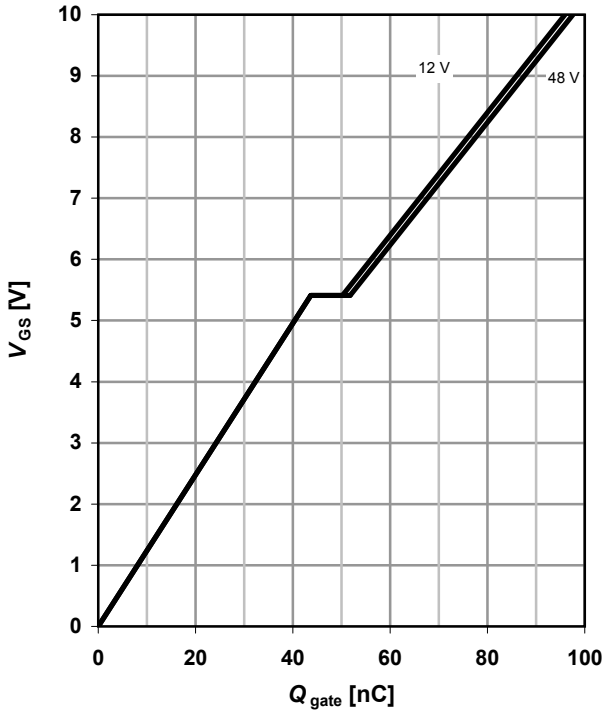
$V_{BR(DSS)} = f(T_j)$; I_D = 1 mA



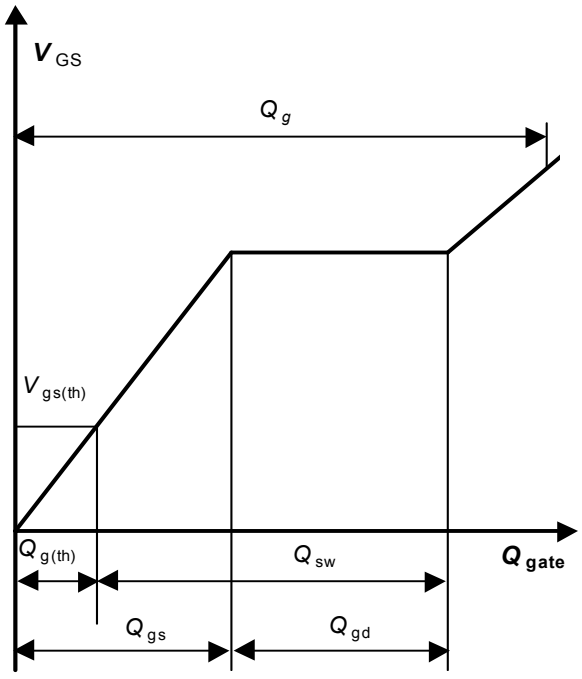
15 Typ. gate charge

$V_{GS} = f(Q_{gate})$; I_D = 90 A pulsed

parameter: V_{DD}



16 Gate charge waveforms



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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 1.1	12.09.2008	Update of RthJC and related parameters from 0.8K/W to 1.0K/W
Revision 1.2	01.07.2009	Update of SOA diagram