OptiMOS®-T2 Power-Transistor

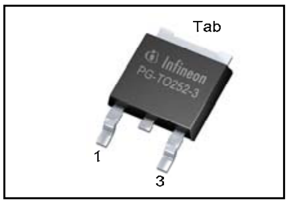
Product Summary

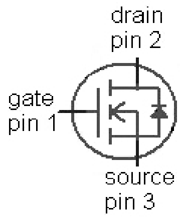
V_{DS}	30	V
$R_{DS(on),max}$	3.3	mΩ
I_D	90	A

Features

- N-channel - Enhancement mode
- Automotive AEC Q101 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
IPD90N03S4L-03	PG-TO252-3-11	4N03L03

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}=10 V	90	A
		T_C=100 °C, V_{GS}=10 V[2]	90	
Pulsed drain current[2]	$I_{D,pulse}$	T_C=25 °C	360	
Avalanche energy, single pulse	E_{AS}	I_D=90 A	85	mJ
Avalanche current, single pulse	I_{AS}	T_C=25 °C	90	A
Gate source voltage	V_{GS}	-	±16	V
Power dissipation	P_{tot}	T_C=25 °C	94	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}		-	-	1.6	K/W
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}=0 V, I_D= 1 mA	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=45 µA	1.0	1.6	2.2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=30 V, V_{GS}=0 V, T_j=25 °C	-	0.01	1	µA
		V_{DS}=30 V, V_{GS}=0 V, T_j=125 °C[2)]	-	10	1000	
		V_{DS}=18 V, V_{GS}=0 V, T_j=85 °C[2)]	-	5	60	
Gate-source leakage current	I_{GSS}	V_{GS}=16 V, V_{DS}=0 V	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=45 A	-	3.4	4.4	mΩ
		V_{GS}=10 V, I_D=90 A	-	2.5	3.3	

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	-	4000	5100	pF
Output capacitance	C_{oss}		-	1000	1300	
Reverse transfer capacitance	C_{rss}		-	53	100	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15 V, V_{GS}=10 V, I_D=90 A, R_G=3.5 Ω	-	9	-	ns
Rise time	t_r		-	6	-	
Turn-off delay time	$t_{d(off)}$		-	37	-	
Fall time	t_f		-	7	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=24 V, I_D=90 A, V_{GS}=0 to 10 V	-	12	15	nC
Gate to drain charge	Q_{gd}		-	8	16	
Gate charge total	Q_g		-	60	75	
Gate plateau voltage	$V_{plateau}$		-	3.1	-	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}=0 V, I_F=90 A, T_j=25 °C	0.6	0.9	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=15 V, I_F=I_S, di_F/dt=100 A/µs	-	60	-	ns
Reverse recovery charge[2]	Q_{rr}		-	50	-	nC

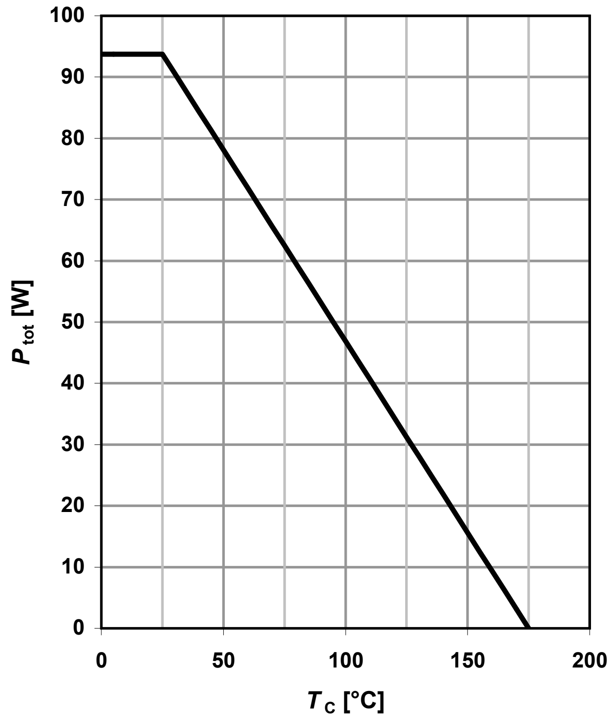
[1] Current is limited by bondwire; with an R_{thJC} = 1.6K/W the chip is able to carry 129A at 25°C.

[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.

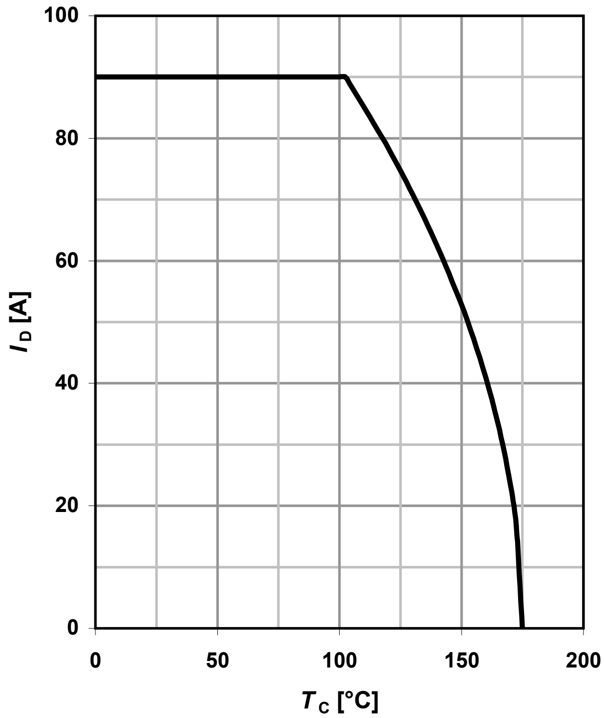
1 Power dissipation

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



2 Drain current

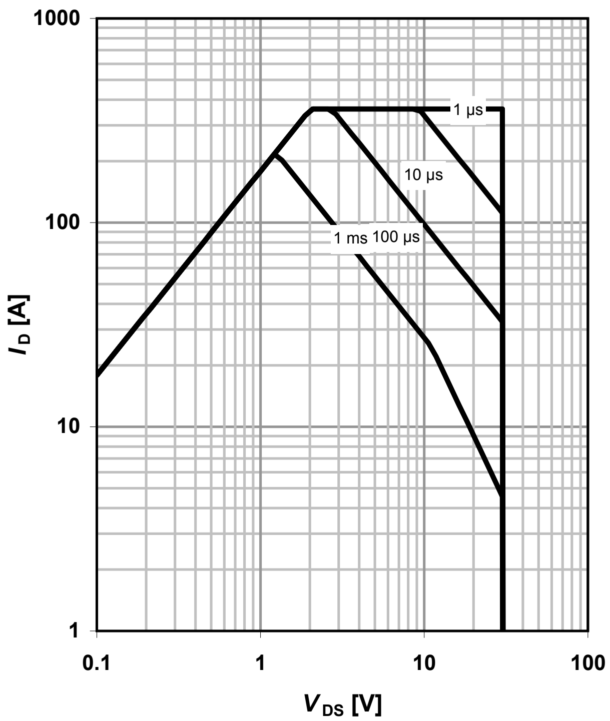
$I_D = f(T_C);\ V_{GS} \geq 6$ V



3 Safe operating area

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

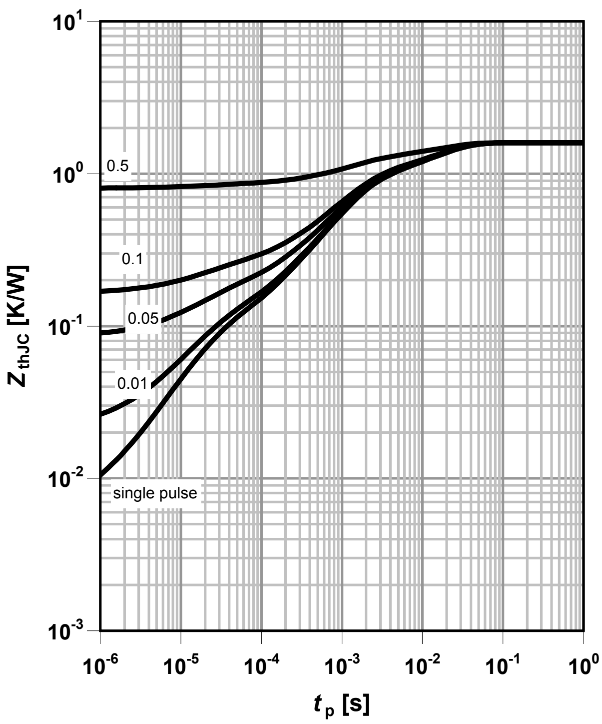
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

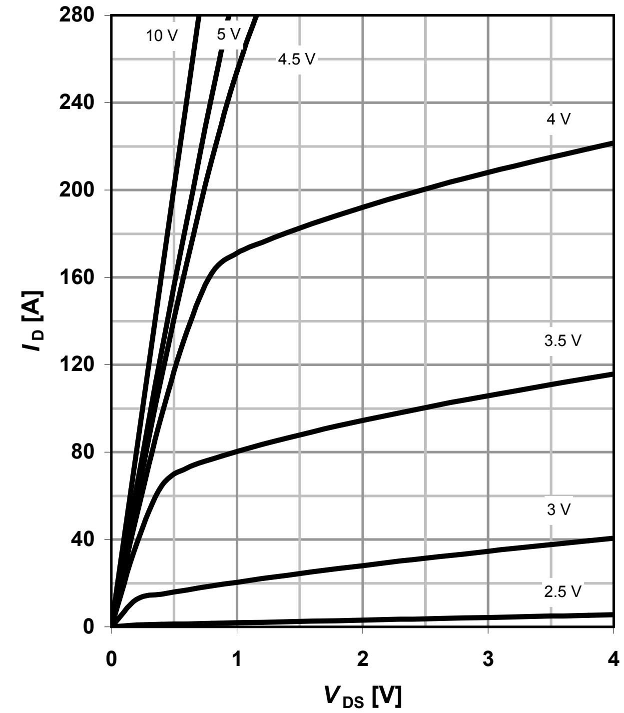
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

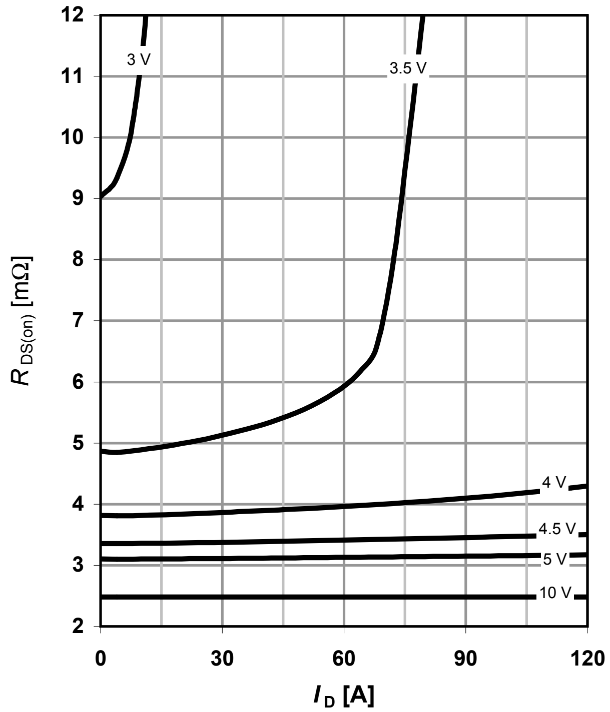
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

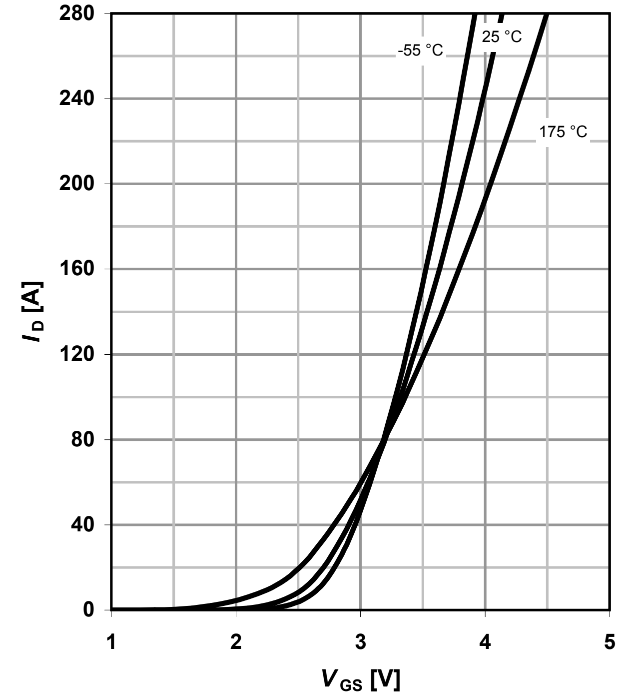
parameter: V_{GS}



7 Typ. transfer characteristics

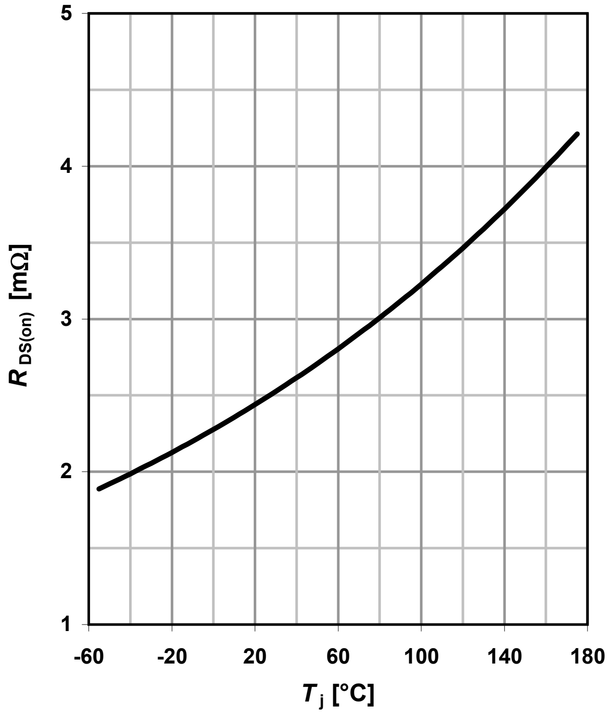
$I_D = f(V_{GS})$; $V_{DS} = 6$V

parameter: T_j



8 Typ. drain-source on-state resistance

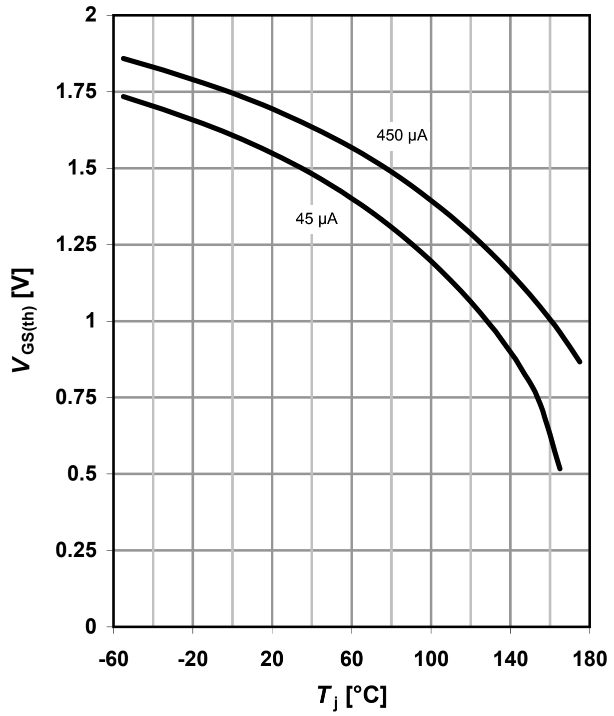
$R_{DS(on)} = f(T_j)$; $I_D = 90$ A; $V_{GS} = 10$ V



9 Typ. gate threshold voltage

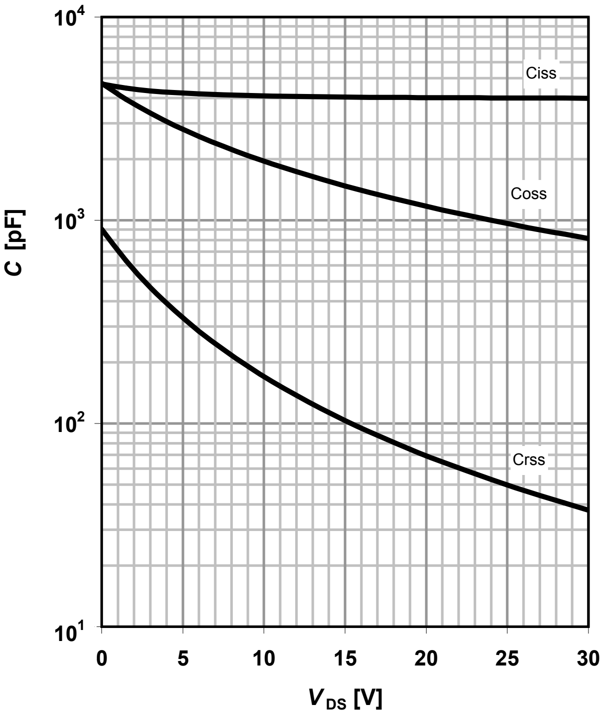
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

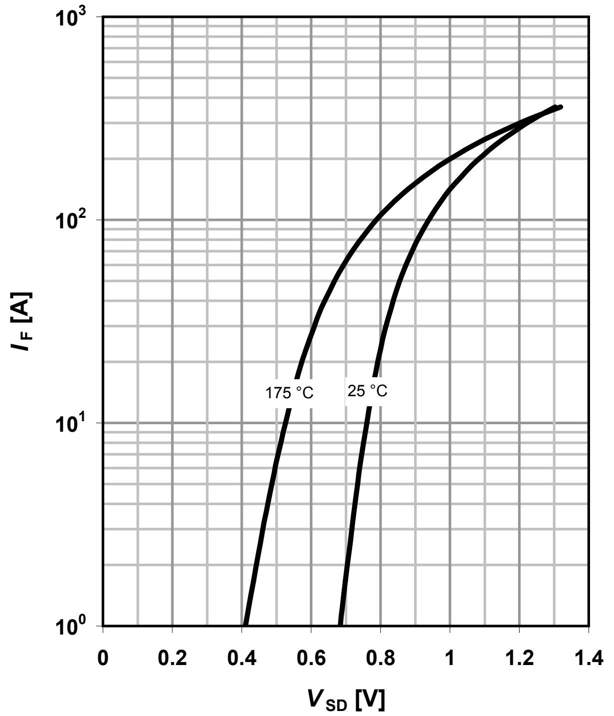
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristicis

IF = f(V_{SD})

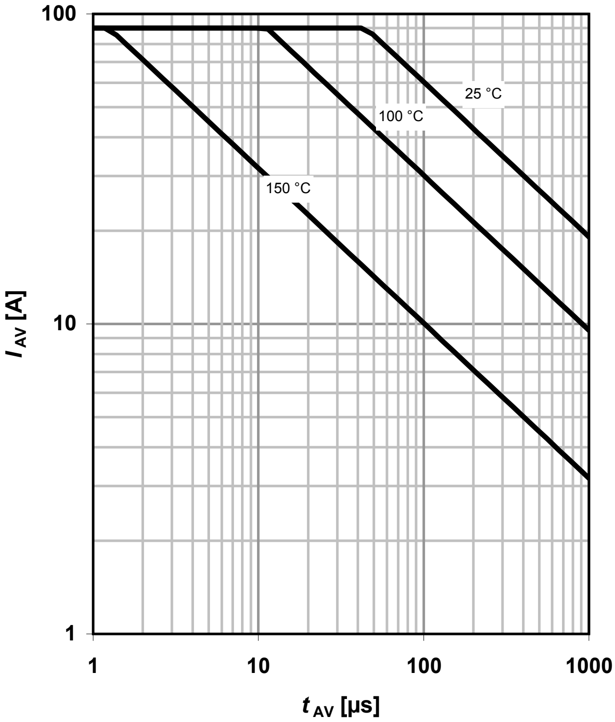
parameter: T_j



12 Typ. avalanche characteristics

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

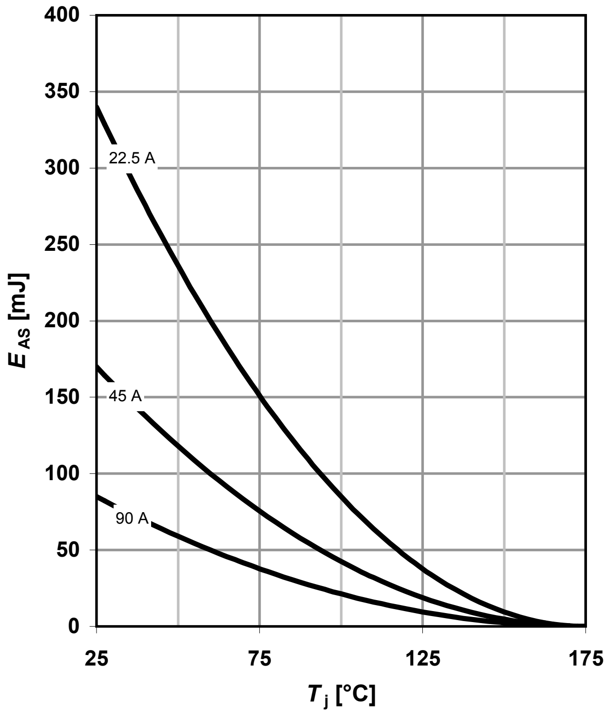
parameter: $T_{j(start)}$



13 Typical avalanche energy

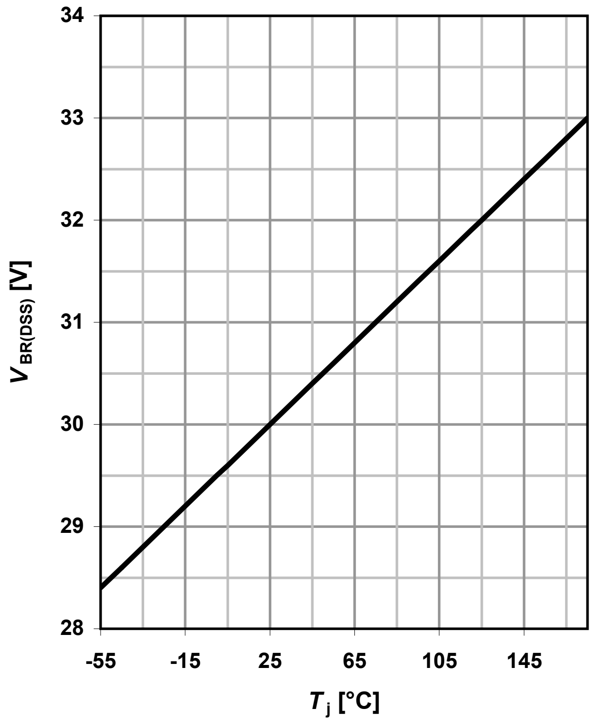
$E_{AS} = f(T_j)$

parameter: I_D



14 Typ. drain-source breakdown voltage

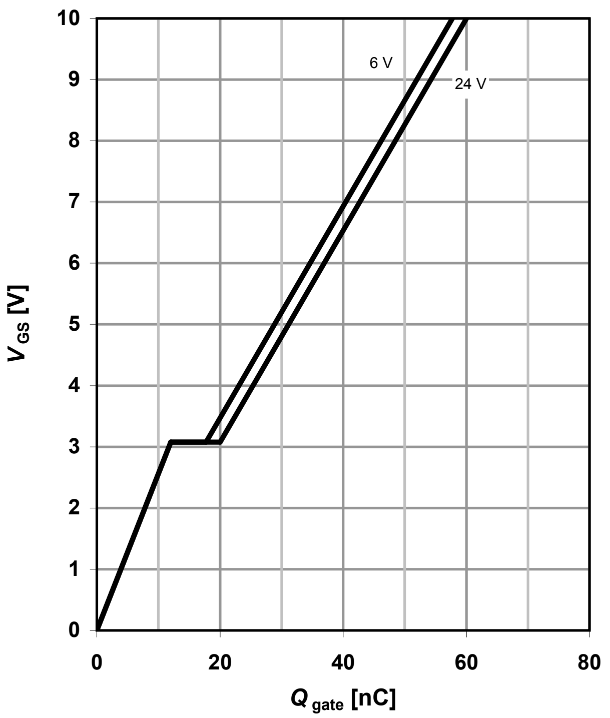
$V_{BR(DSS)} = f(T_j)$; $I_D = 1$ mA



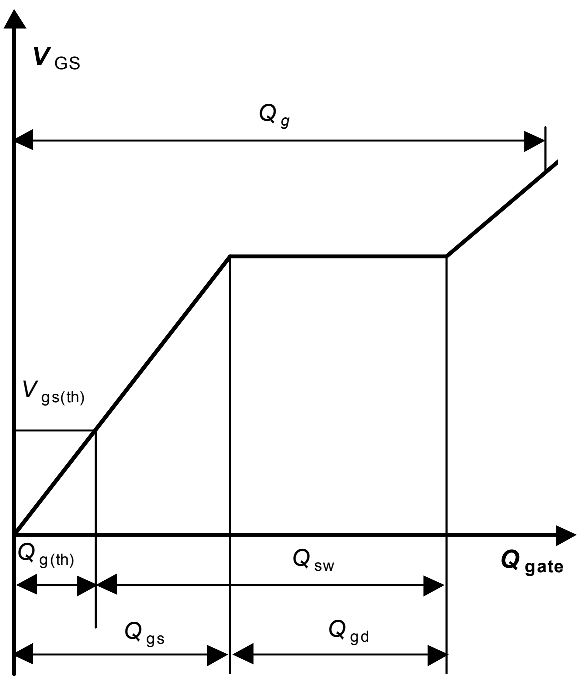
15 Typ. gate charge

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

parameter: V_{DD}



16 Gate charge waveforms



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Revision History

Version	Date	Changes
Rev 2.0	09.03.2007	Final data sheet
Rev 2.1	08.03.2010	Update of RDSon

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