IPD90N04S403ATMA1 Datasheet

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DiGi Electronics Part Number	IPD90N04S403ATMA1-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	IPD90N04S403ATMA1
Description	MOSFET N-CH 40V 90A TO252-3
Detailed Description	N-Channel 40 V 90A (Tc) 94W (Tc) Surface Mount PG-TO252-3-313

Purchase and inquiry

Manufacturer Product Number:	IPD90N04S403ATMA1	Manufacturer:	Infineon Technologies
Series:	OptiMOS™	Product Status:	Active
FET Type:	N-Channel	Technology:	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	40 V	Current - Continuous Drain (Id) @ 25°C:	90A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	10V	Rds On (Max) @ Id, Vgs:	3.2mOhm @ 90A, 10V
Vgs(th) (Max) @ Id:	4V @ 53µA	Gate Charge (Qg) (Max) @ Vgs:	66.8 nC @ 10 V
Vgs (Max):	±20V	Input Capacitance (Ciss) (Max) @ Vds:	5260 pF @ 25 V
FET Feature:	-	Power Dissipation (Max):	94W (Tc)
Operating Temperature:	-55°C ~ 175°C (TJ)	Grade:	Automotive
Qualification:	AEC-Q101	Mounting Type:	Surface Mount
Supplier Device Package:	PG-TO252-3-313	Package / Case:	TO-252-3, DPAK (2 Leads + Tab), SC-63
Base Product Number:	IPD90		

Environmental & Export classification

RoHS Status:	ROHS3 Compliant	Moisture Sensitivity Level (MSL):	1 (Unlimited)
REACH Status:	REACH Unaffected	ECCN:	EAR99
HTSUS:	8541.29.0095		

OptiMOS®-T2 Power-Transistor

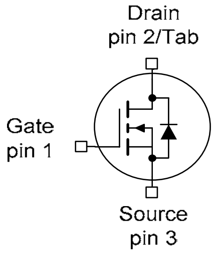
Product Summary

V_{DS}	40	V
$R_{DS(on),max}$	3.2	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-TO252-3-313



Type	Package	Marking
IPD90N04S4-03	PG-TO252-3-313	4N0403

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	185	mJ
Avalanche current, single pulse	I_{AS}	-	90	A
Gate source voltage	V_{GS}	-	±20	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
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	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=53µA	2.0	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=40V, V_{GS}=0V, T_j=25°C	-	0.03	1	µA
		V_{DS}=18V, V_{GS}=0V, T_j=85°C[2]	-	1	20	
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	-	2.7	3.2	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	-	4050	5260	pF
Output capacitance	C_{oss}		-	950	1230	
Reverse transfer capacitance	C_{rss}		-	31	71	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, V_{GS}=10V, I_D=90A, R_G=3.5Ω	-	14	-	ns
Rise time	t_r		-	11	-	
Turn-off delay time	$t_{d(off)}$		-	14	-	
Fall time	t_f		-	15	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=32V, I_D=90A, V_{GS}=0 to 10V	-	24	31	nC
Gate to drain charge	Q_{gd}		-	7	17	
Gate charge total	Q_g		-	51	66	
Gate plateau voltage	$V_{plateau}$		-	5.8	-	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	-	0.9	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=20V, I_F=50A, di_F/dt=100A/µs	-	43	-	ns
Reverse recovery charge[2]	Q_{rr}		-	44	-	nC

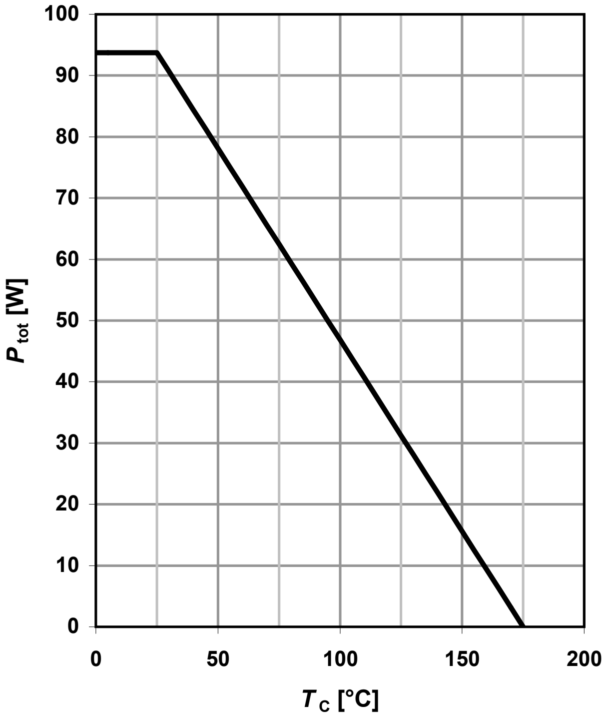
[1] Current is limited by bondwire; with an R_{thJC} = 1.6K/W the chip is able to carry 130A at 25°C.

[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.

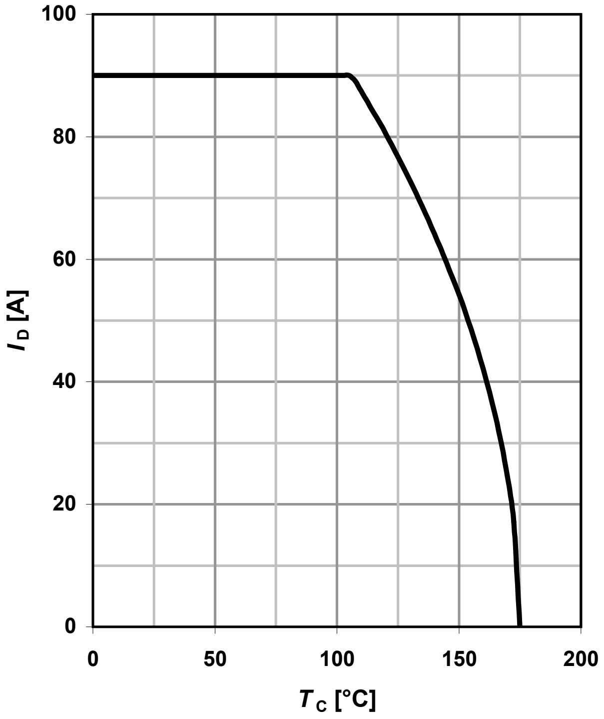
1 Power dissipation

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



2 Drain current

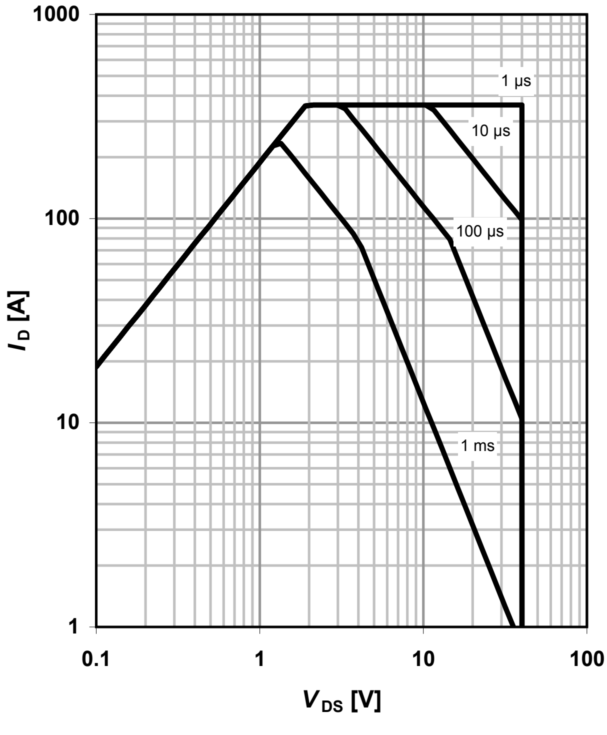
$I_D = f(T_C)$; $V_{GS} \geq 6$ V



3 Safe operating area

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

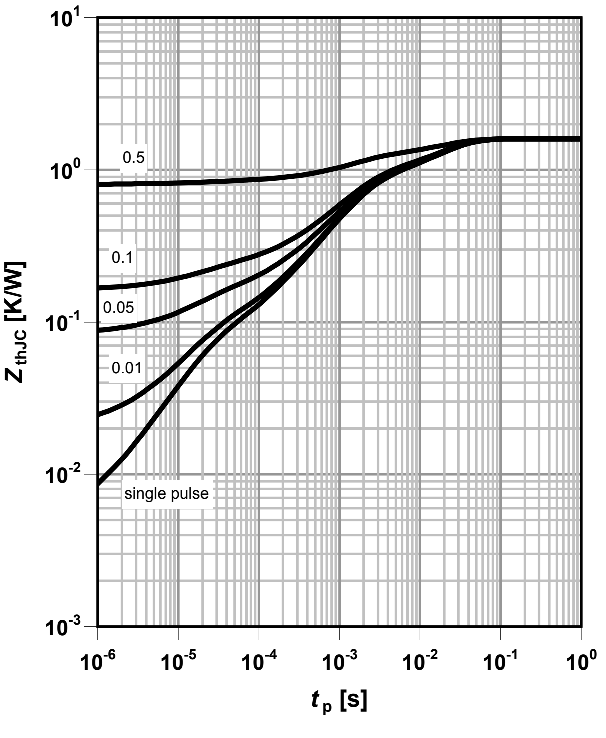
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

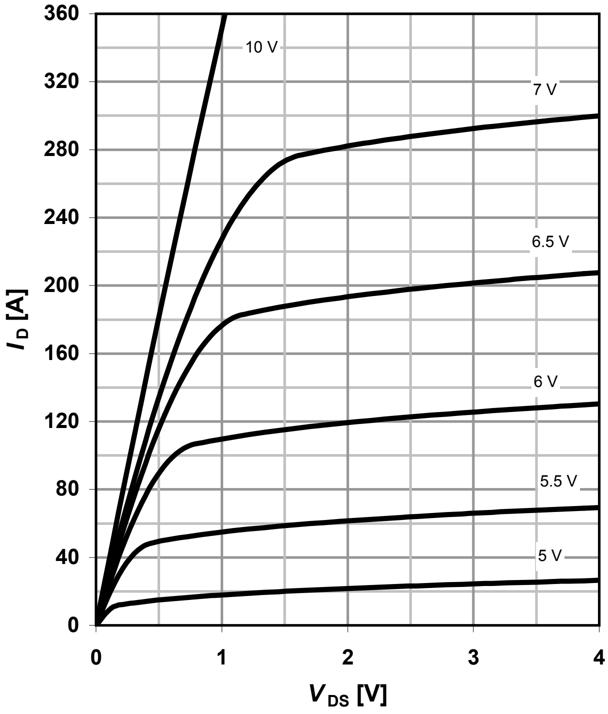
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25\ °C$

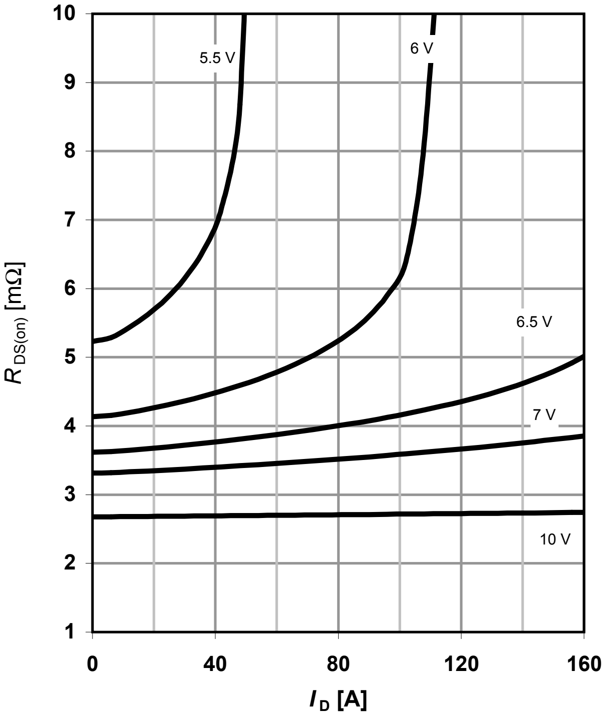
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25\ °C$

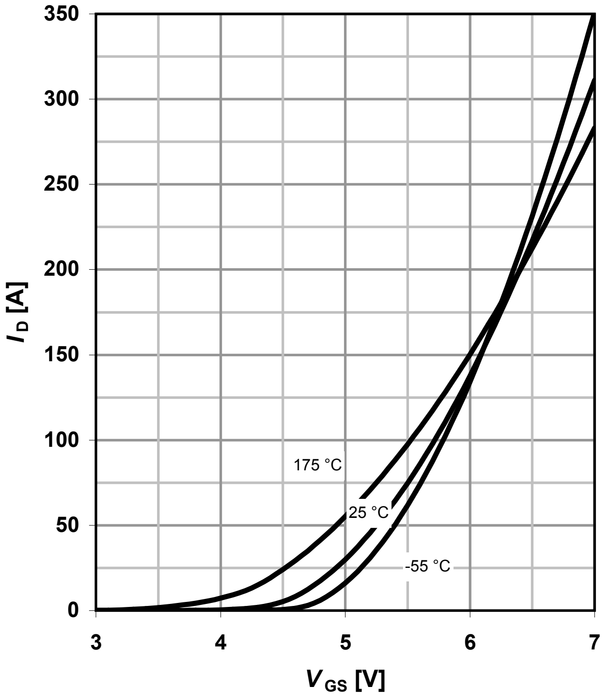
parameter: V_{GS}



7 Typ. transfer characteristics

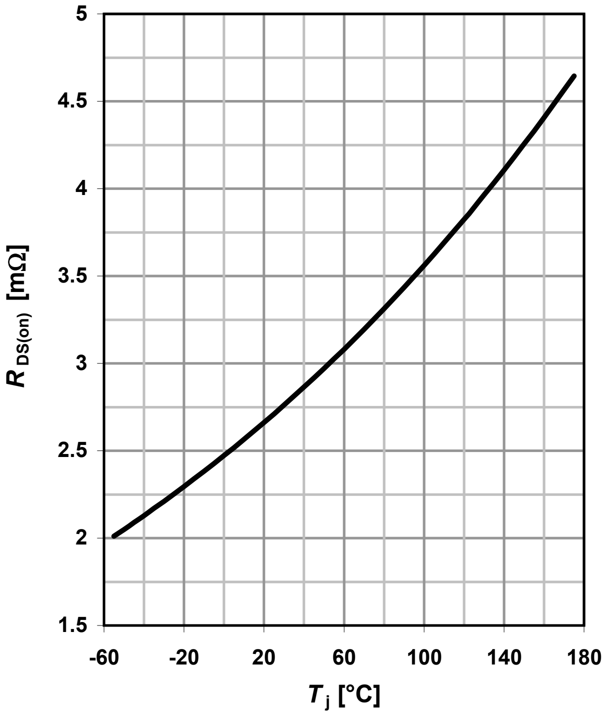
$I_D = f(V_{GS})$; $V_{DS} = 6V$

parameter: T_j



8 Typ. drain-source on-state resistance

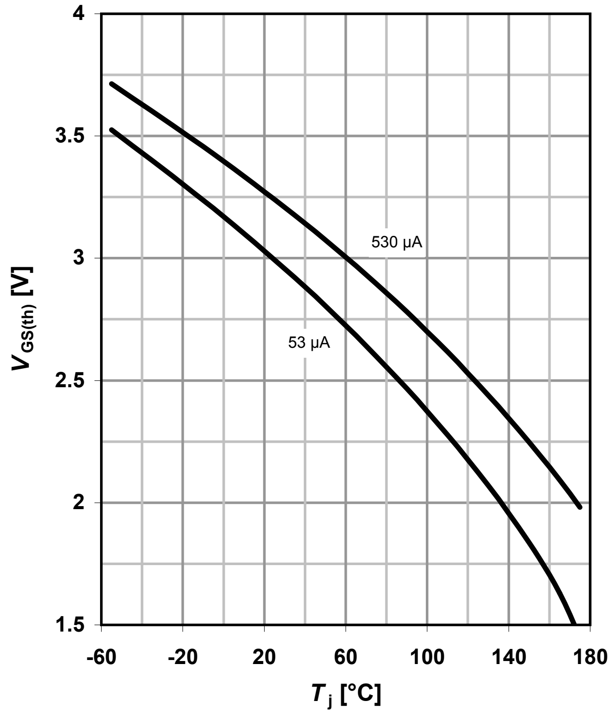
$R_{DS(on)} = f(T_j)$; $I_D = 90\ A$; $V_{GS} = 10\ V$



9 Typ. gate threshold voltage

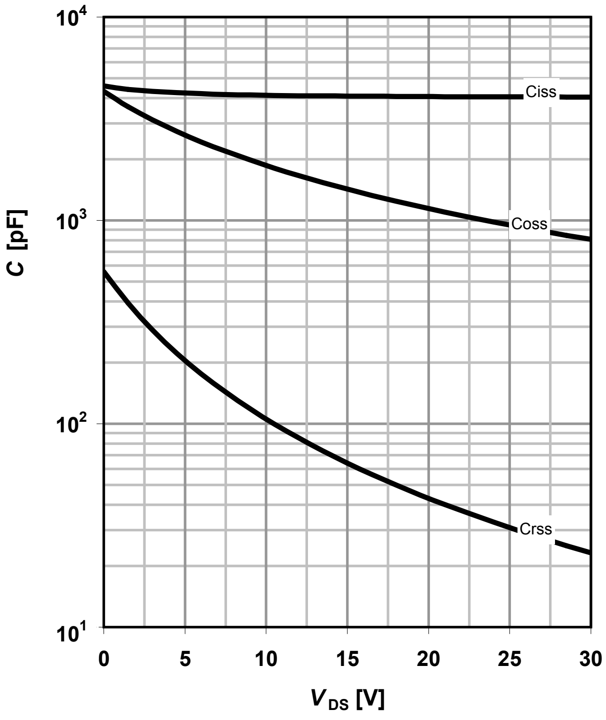
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

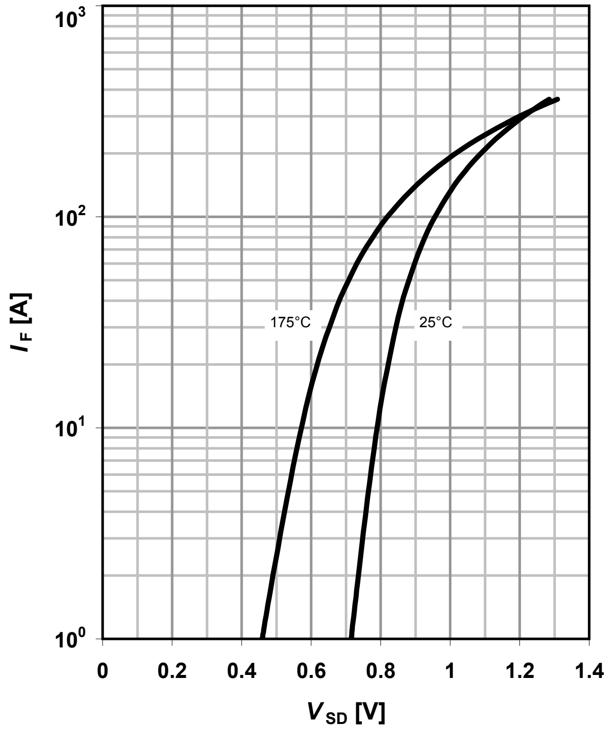
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristicis

$IF = f(V_{SD})$

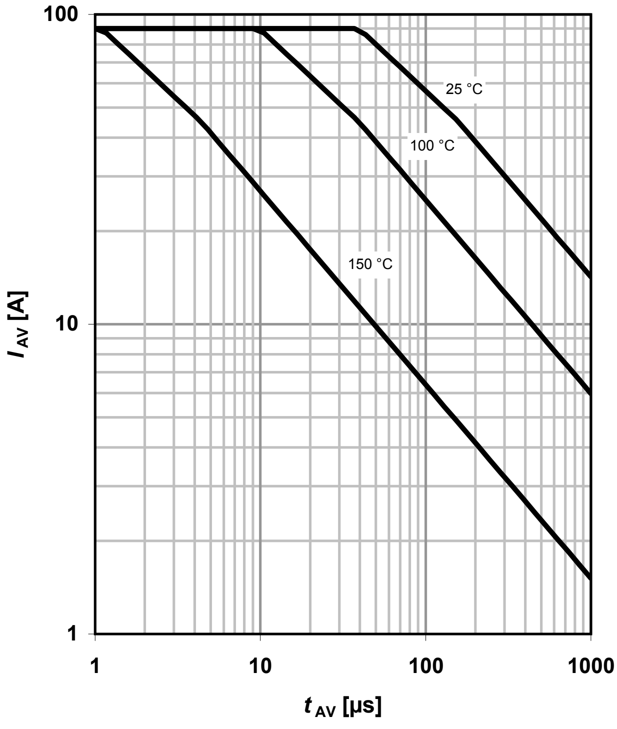
parameter: T_j



12 Avalanche characteristics

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

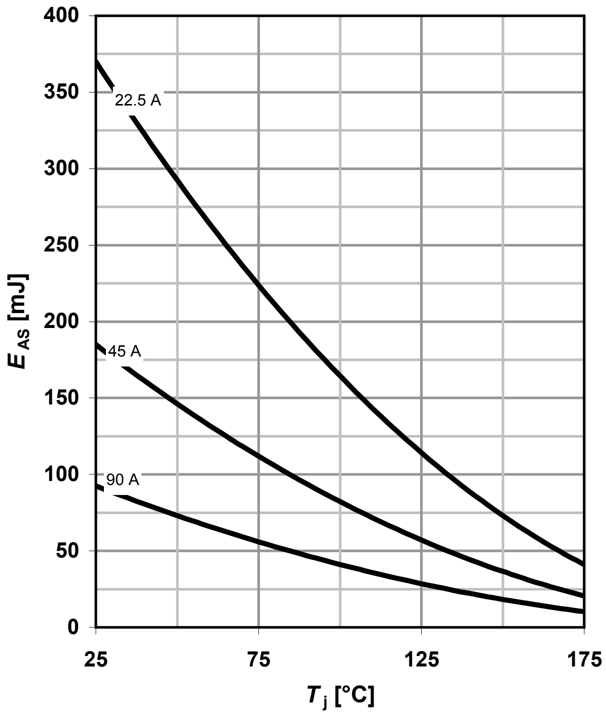
parameter: $T_{j(start)}$



13 Avalanche energy

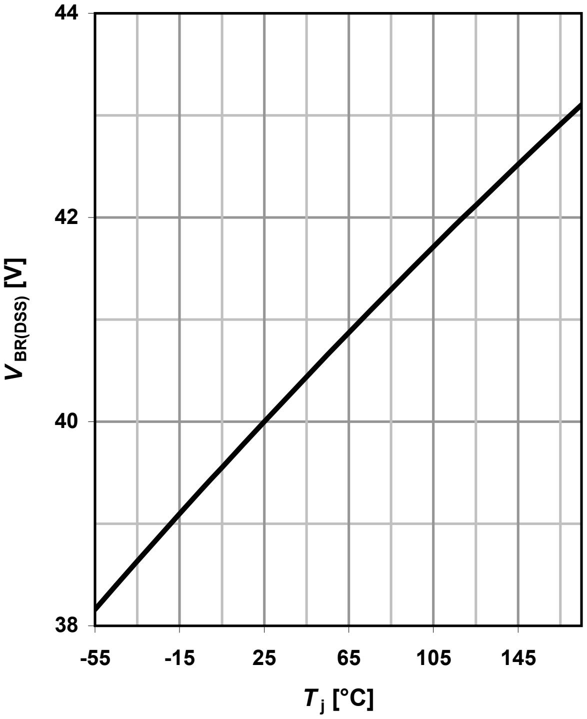
$E_{AS} = f(T_j)$

parameter: I_D



14 Drain-source breakdown voltage

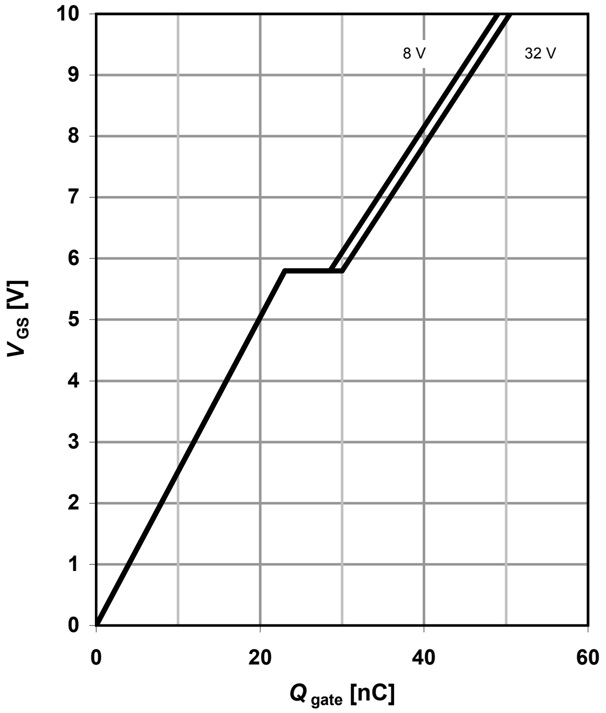
$V_{BR(DSS)} = f(T_j)$; $I_D = 1$ mA



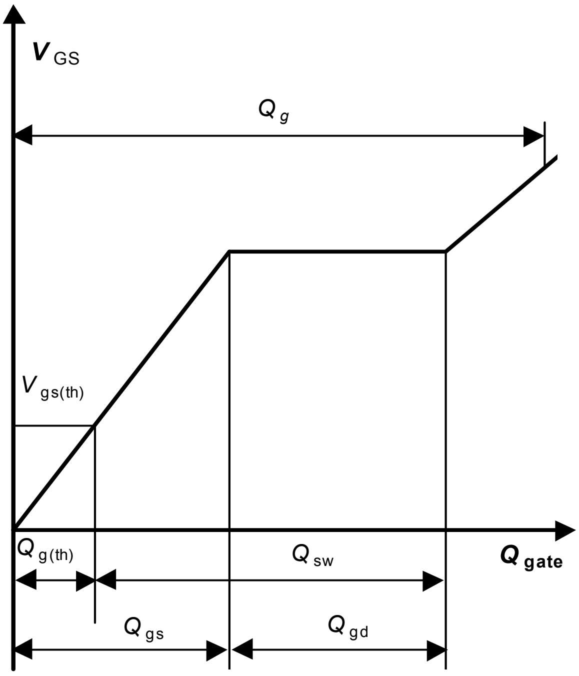
15 Typ. gate charge

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

parameter: V_{DD}



16 Gate charge waveforms



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Revision History

Version	Date	Changes
Revision 1.0	13.04.2010	Final Data Sheet

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President


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