OptiMOS® Power-Transistor

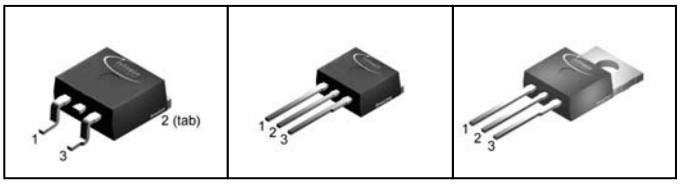
Product Summary

V_{DS}	40	V
$R_{DS(on),max}$ (SMD version)	3.7	mΩ
I_D	80	A

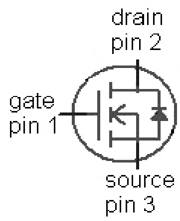
Features

- N-channel - Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Ultra low Rds(on)
- 100% Avalanche tested
- Green product (RoHS compliant)

PG-TO263-3-2 PG-TO262-3-1 PG-TO220-3-1



Type	Package	Marking
IPB80N04S2-H4	PG-TO263-3-2	2N04H4
IPP80N04S2-H4	PG-TO220-3-1	2N04H4
IPI80N04S2-0H4	PG-TO262-3-1	2N04H4



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	80	A
		T_C=100 °C, V_{GS}=10 V[2]	80	
Pulsed drain current[2]	$I_{D,pulse}$	T_C=25 °C	320	
Avalanche energy, single pulse	E_{AS}	I_D=80A	660	mJ
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_C=25 °C	300	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}		-	-	0.5	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}=0 V, I_D= 1 mA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	2.1	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C	-	0.01	1	µA
		V_{DS}=40 V, V_{GS}=0 V, T_j=125 °C[2]	-	1	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=80 A	-	3.5	4.0	mΩ
		V_{GS}=10 V, I_D=80 A, SMD version	-	3.2	3.7	

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	-	4400	-	pF
Output capacitance	C_{oss}		-	1800	-	
Reverse transfer capacitance	C_{rss}		-	480	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20 V, V_{GS}=10 V, I_D=80 A, R_G=1.3 Ω	-	23	-	ns
Rise time	t_r		-	63	-	
Turn-off delay time	$t_{d(off)}$		-	46	-	
Fall time	t_f		-	22	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=32 V, I_D=80 A, V_{GS}=0 to 10 V	-	21	29	nC
Gate to drain charge	Q_{gd}		-	38	70	
Gate charge total	Q_g		-	103	148	
Gate plateau voltage	$V_{plateau}$		-	4.9	-	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C=25 °C	-	-	80	A
Diode pulse current[2]	$I_{S,pulse}$		-	-	320	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=80 A, T_j=25 °C	-	0.9	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=20 V, I_F=I_S, di_F/dt=100 A/µs	-	195	-	ns
Reverse recovery charge[2]	Q_{rr}	V_R=20 V, I_F=I_S, di_F/dt=100 A/µs	-	370	-	nC

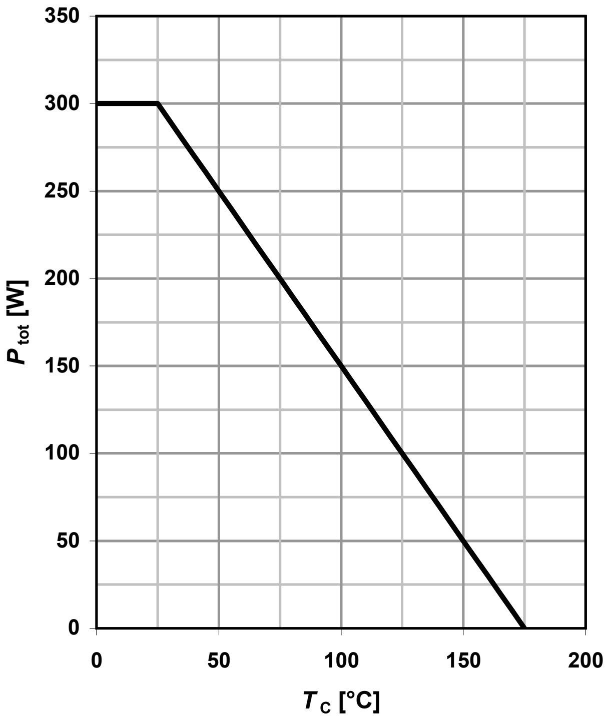
[1] Current is limited by bondwire; with an R_{thJC} = 0.5K/W the chip is able to carry 200A at 25°C. For detailed information see Application Note ANPS071E at *www.infineon.com/optimos*

[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 cm2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

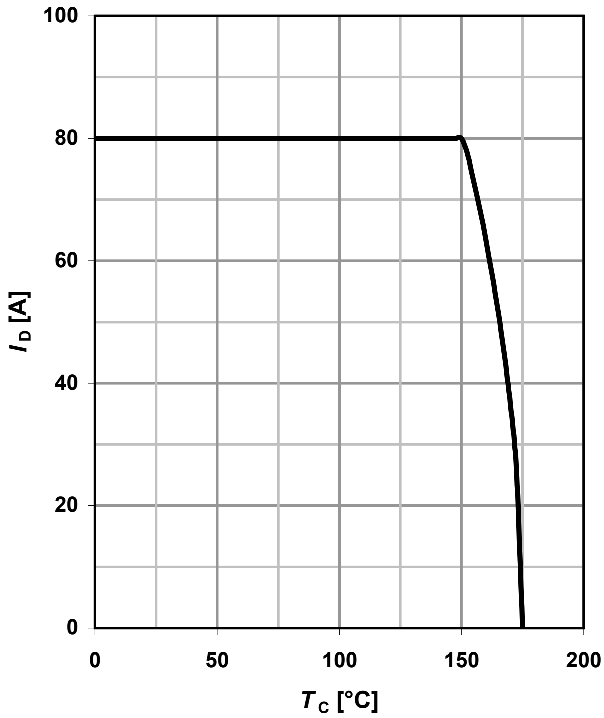
1 Power dissipation

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



2 Drain current

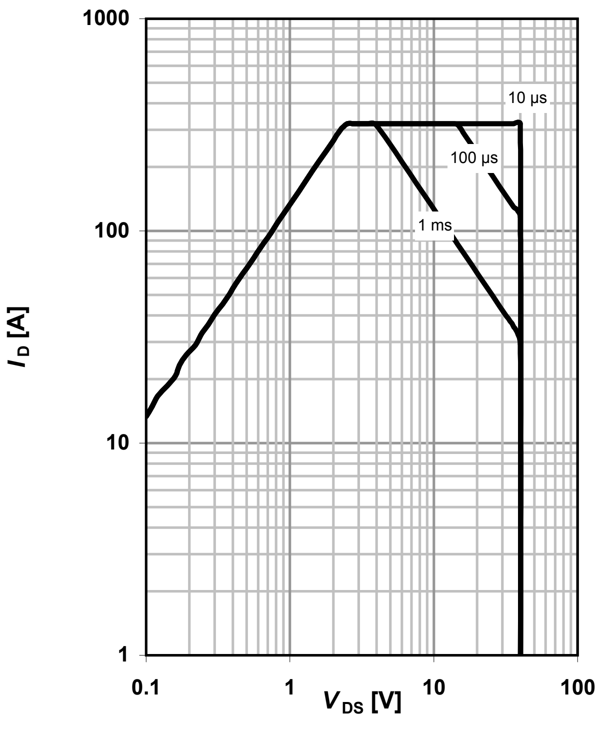
$I_D = f(T_C)$; $V_{GS} \geq 10$ V



3 Safe operating area

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

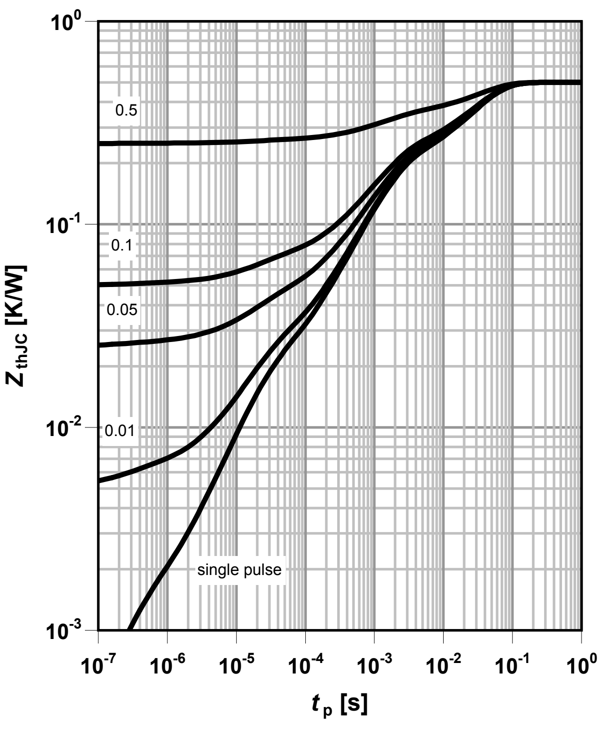
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

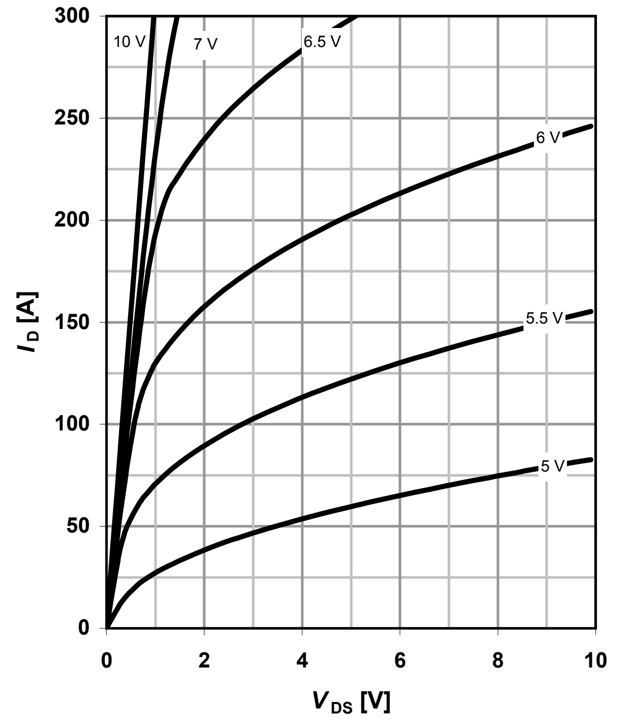
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25\ °C$

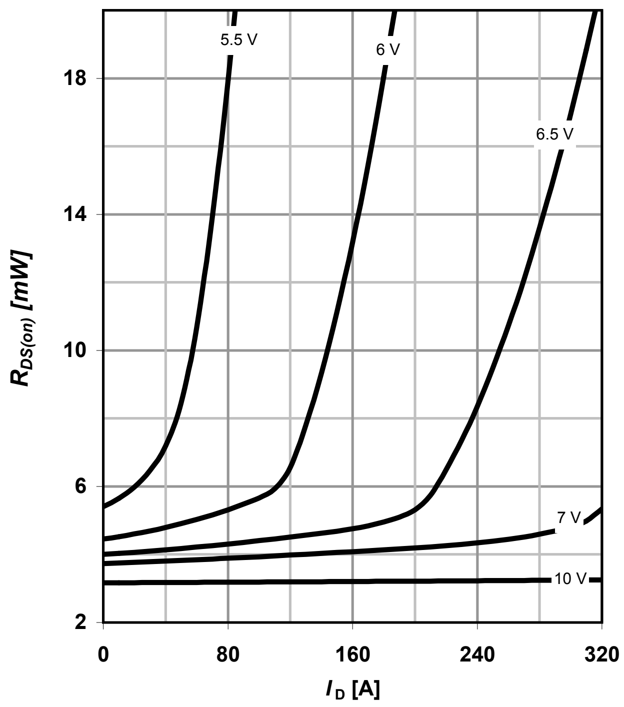
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = (I_D)$; $T_j = 25\ °C$

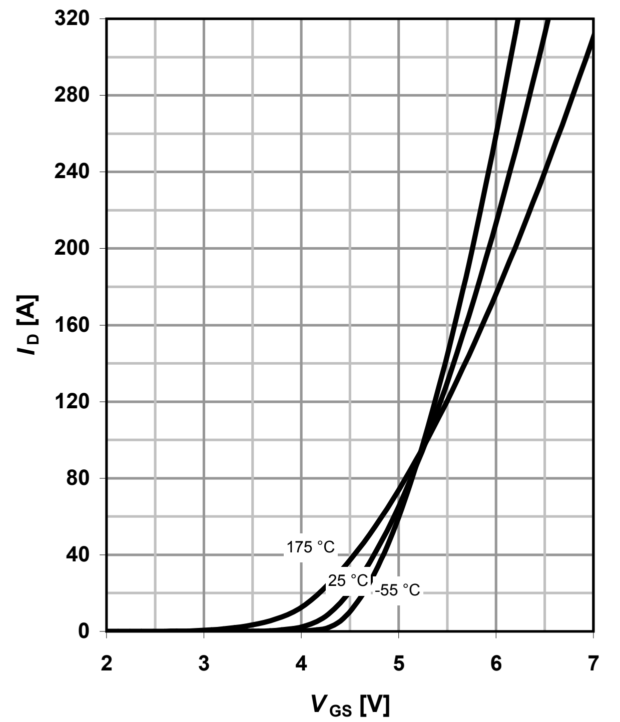
parameter: V_{GS}



7 Typ. transfer characteristics

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

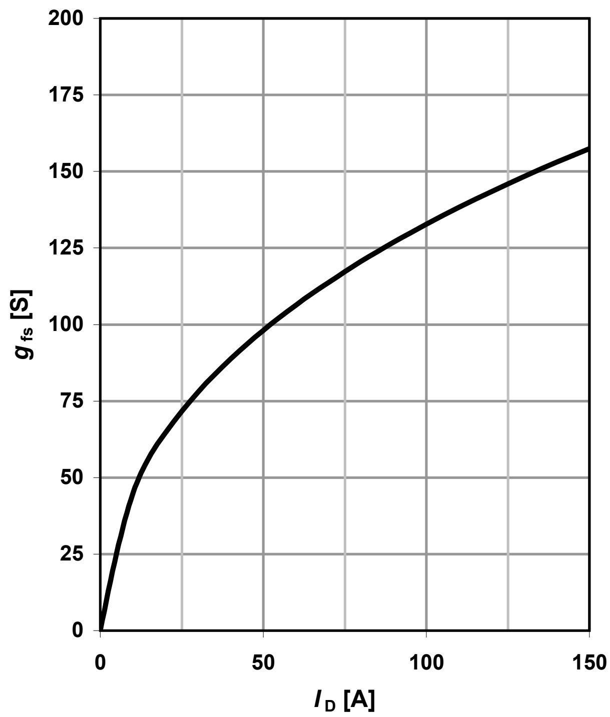
parameter: T_j



8 Typ. Forward transconductance

$g_{fs} = f(I_D)$; $T_j = 25°C$

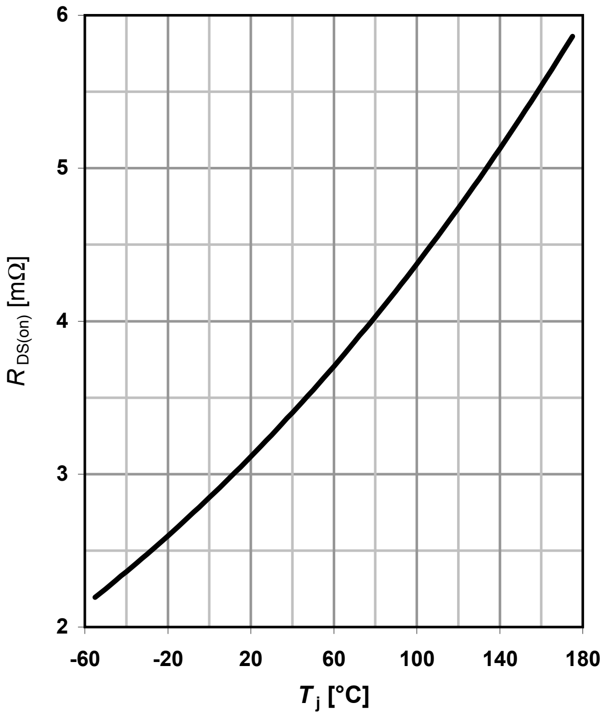
parameter: g_{fs}



9 Typ. Drain-source on-state resistance

$R_{DS(ON)} = f(T_j)$

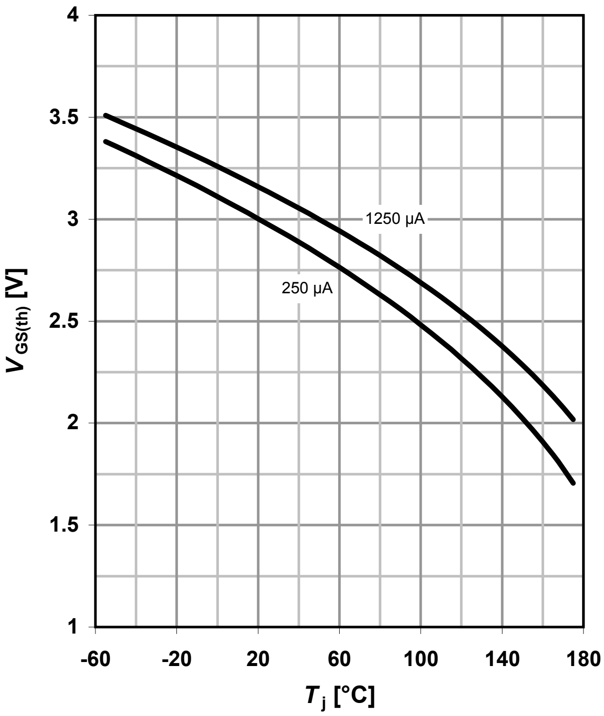
parameter: I_D = 80 A; V_{GS} = 10 V



10 Typ. gate threshold voltage

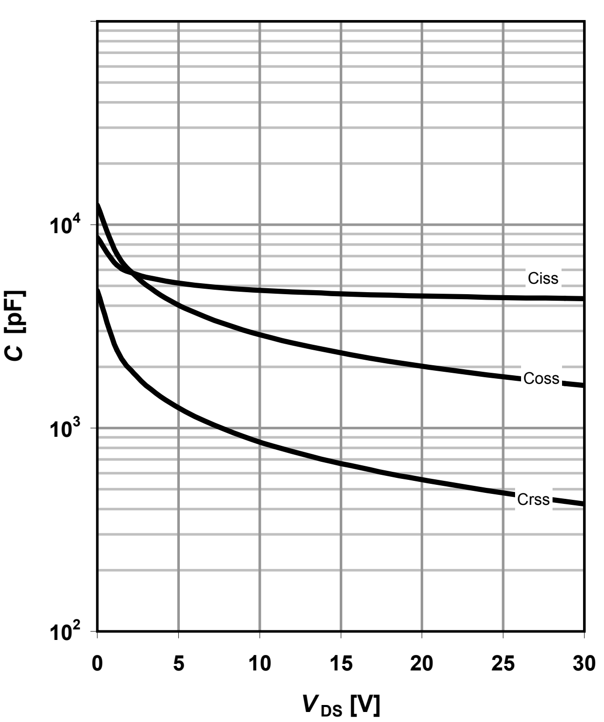
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



11 Typ. capacitances

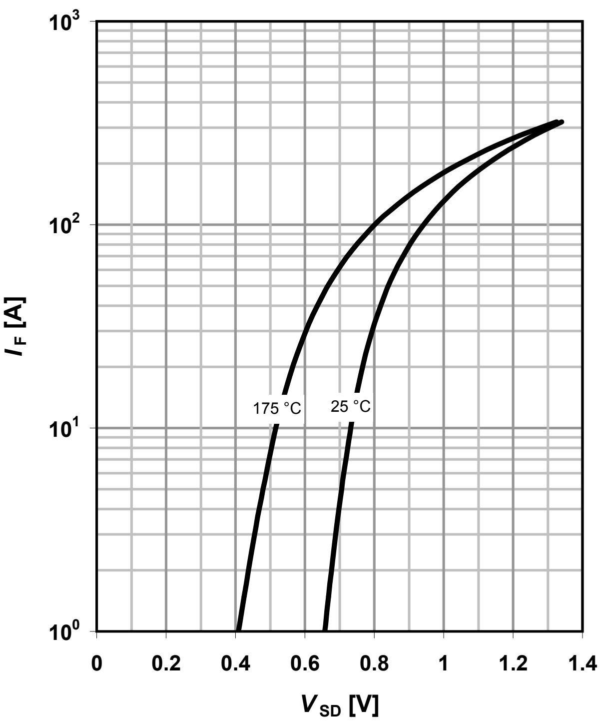
$C = f(V_{DS})$; V_{GS} = 0 V; f = 1 MHz



12 Typical forward diode characteristicis

$IF = f(V_{SD})$

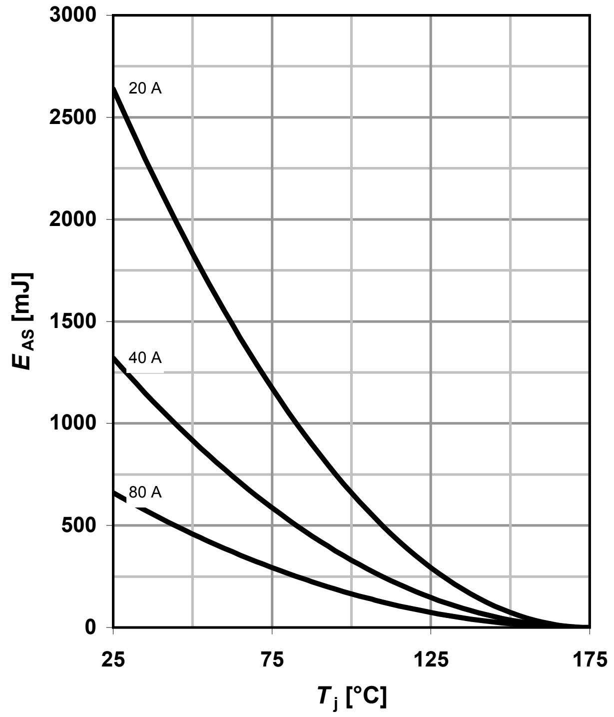
parameter: T_j



13 Avalanche energy

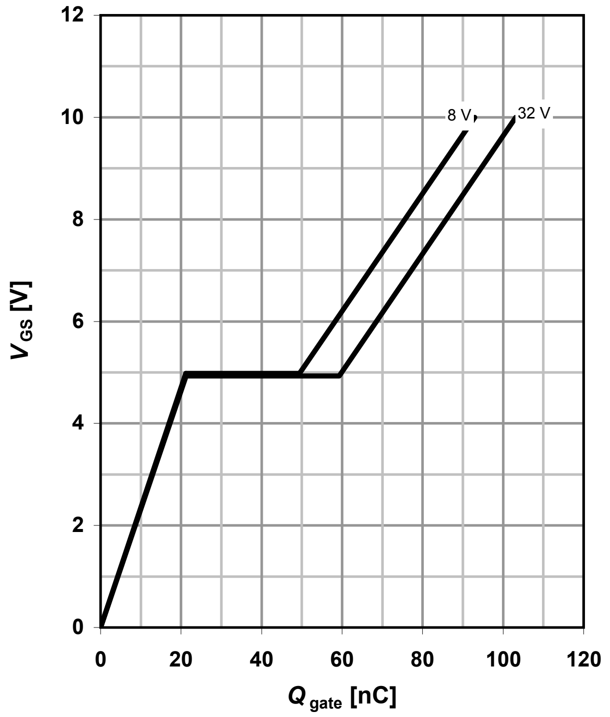
$E_{AS} = f(T_j)$

parameter: I_D



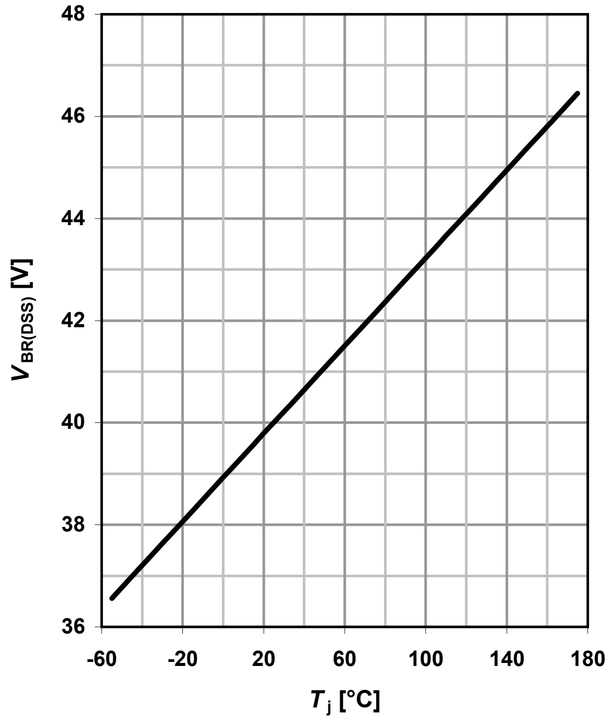
14 Typ. gate charge

$V_{GS} = f(Q_{gate})$; I_D = 80 A pulsed

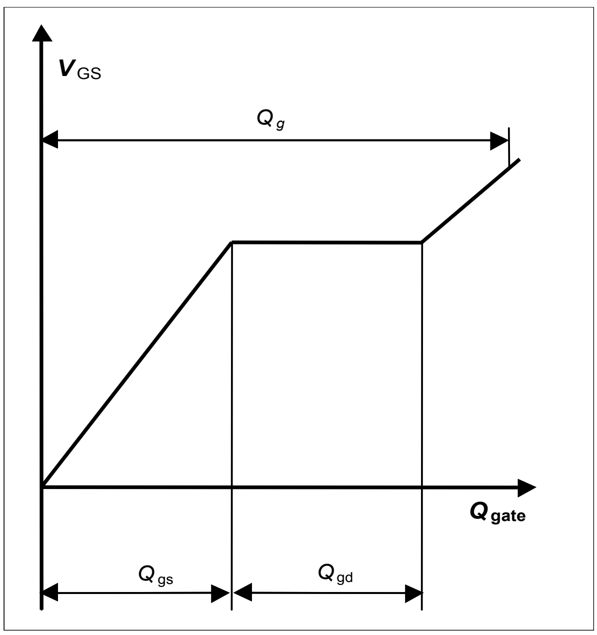


15 Drain-source breakdown voltage

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



16 Gate charge waveforms



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Revision History

Version	Date	Changes
Revision 1.1	22.02.2008	Update of side 1 and 10 according to new template
Revision 1.1	22.02.2008	Update of SOA diagram, labelling