

OptiMOS® Power-Transistor

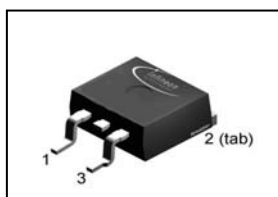
Features

- N-channel Logic Level - Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- **Green package (lead free)**
- Ultra low $R_{DS(on)}$
- 100% Avalanche tested

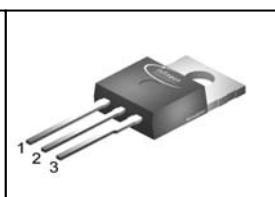
Product Summary

V_{DS}	55	V
$R_{DS(on),max}$ (SMD version)	4.5	mΩ
I_D	80	A

PG-TO263-3-2



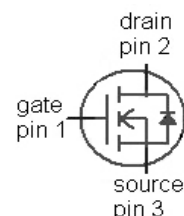
PG-TO220-3-1



PG-TO262-3-1



Type	Package	Ordering Code	Marking
IPB80N06S2L-05	PG-TO263-3-2	SP0002-19004	2N06L05
IPP80N06S2L-05	PG-TO220-3-1	SP0002-19000	2N06L05
IPI80N06S2L-05	PG-TO262-3-1	SP0002-19002	2N06L05



Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current ¹⁾	I_D	$T_C=25\text{ °C}$, $V_{GS}=10\text{ V}$	80	A
		$T_C=100\text{ °C}$, $V_{GS}=10\text{ V}^{2)}$	80	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$	320	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=80\text{ A}$	800	mJ
Gate source voltage ⁴⁾	V_{GS}		±20	V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	300	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}		-	-	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 ⁵⁾	-	-	40	

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$	55	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$	1.2	1.6	2.0	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=55\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$	-	0.01	1	μA
		$V_{DS}=55\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}^{2)}$	-	1	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}$, $I_D=80\text{ A}$	-	4.4	6	m Ω
		$V_{GS}=4.5\text{ V}$, $I_D=80\text{ A}$, SMD version	-	4.1	5.7	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}$, $I_D=80\text{ A}$, SMD version	-	3.6	4.8	m Ω
		$V_{GS}=10\text{ V}$, $I_D=80\text{ A}$, SMD version	-	3.3	4.5	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	5700	-	pF
Output capacitance	C_{oss}		-	1330	-	
Reverse transfer capacitance	C_{rss}		-	360	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V},$ $I_D=80\text{ A}, R_G=1.3\ \Omega$	-	19	-	ns
Rise time	t_r		-	93	-	
Turn-off delay time	$t_{d(off)}$		-	67	-	
Fall time	t_f		-	90	-	

Gate Charge Characteristics²⁾

Gate to source charge	Q_{gs}	$V_{DD}=44\text{ V}, I_D=80\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	19	25	nC
Gate to drain charge	Q_{gd}		-	60	90	
Gate charge total	Q_g		-	170	230	
Gate plateau voltage	$V_{plateau}$		-	3.3	-	V

Reverse Diode

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	80	A
Diode pulse current ²⁾	$I_{S,pulse}$		-	-	320	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=80\text{ A},$ $T_J=25\text{ °C}$	-	0.9	1.3	V
Reverse recovery time ²⁾	t_{rr}	$V_R=30\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	65	80	ns
Reverse recovery charge ²⁾	Q_{rr}		-	125	160	

¹⁾ Current is limited by bondwire; with an $R_{thJC} = 0.5\text{ K/W}$ the chip is able to carry 173 A at 25°C. For detailed information see Application Note ANPS071E at www.infineon.com/optimos

²⁾ Defined by design. Not subject to production test.

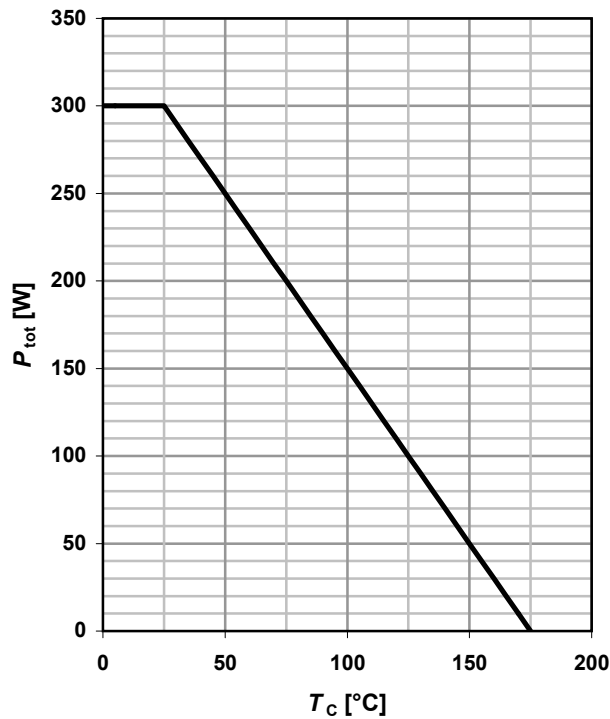
³⁾ See diagram 13

⁴⁾ Qualified at -20V and +20V.

⁵⁾ 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.

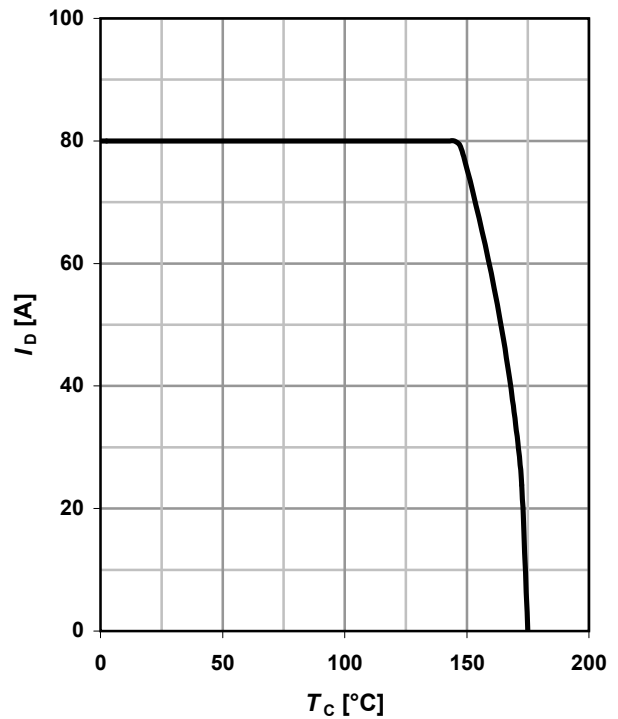
1 Power dissipation

$$P_{\text{tot}} = f(T_C); V_{\text{GS}} \geq 4 \text{ V}$$



2 Drain current

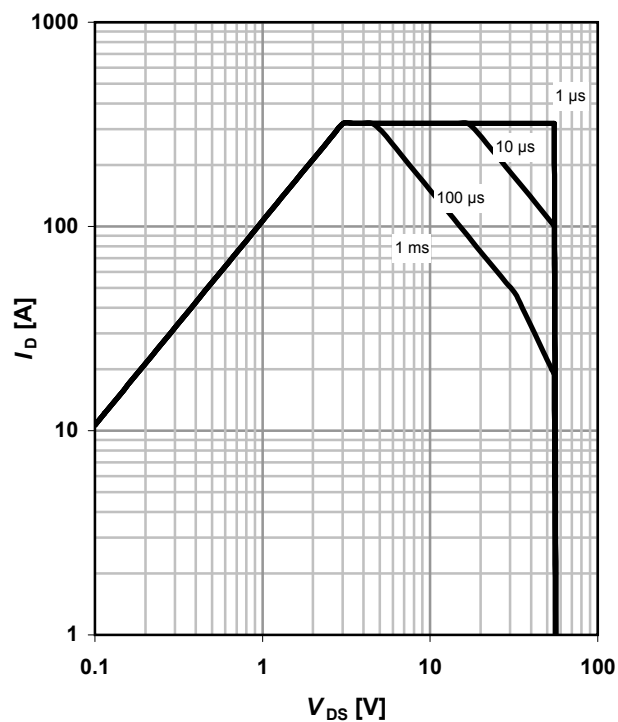
$$I_D = f(T_C); V_{\text{GS}} \geq 10 \text{ V}$$



3 Safe operating area

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

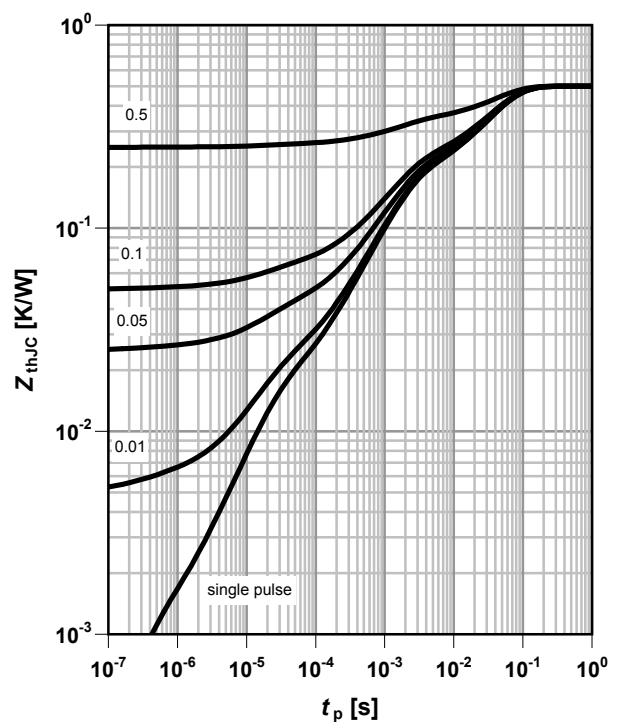
parameter: t_p



4 Max. transient thermal impedance

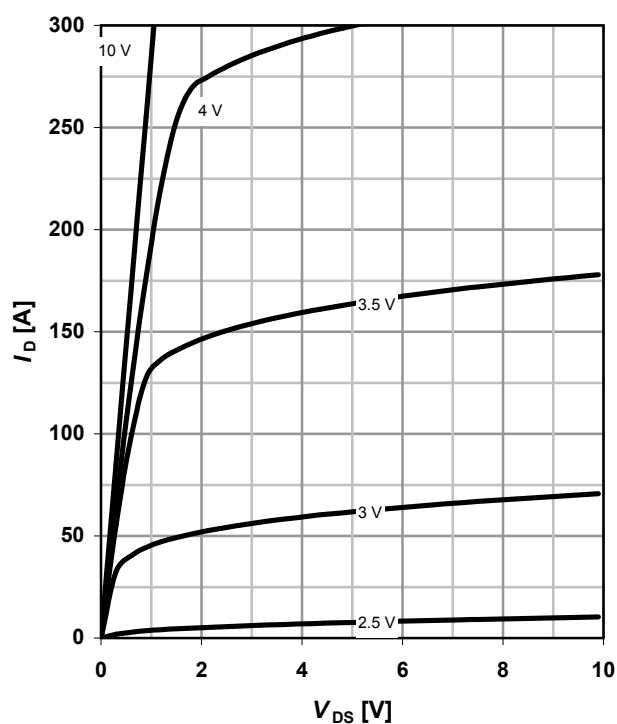
$$Z_{\text{thJC}} = f(t_p)$$

parameter: $D = t_p/T$



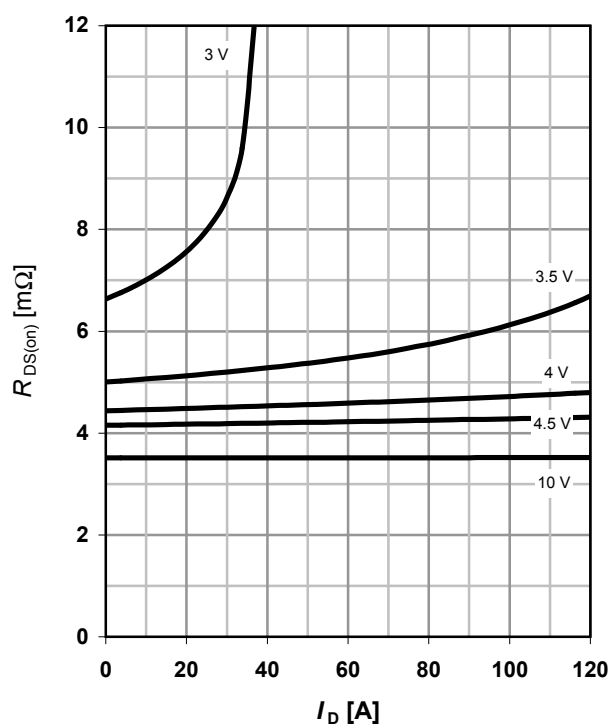
5 Typ. output characteristics

 $I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

parameter: V_{GS}


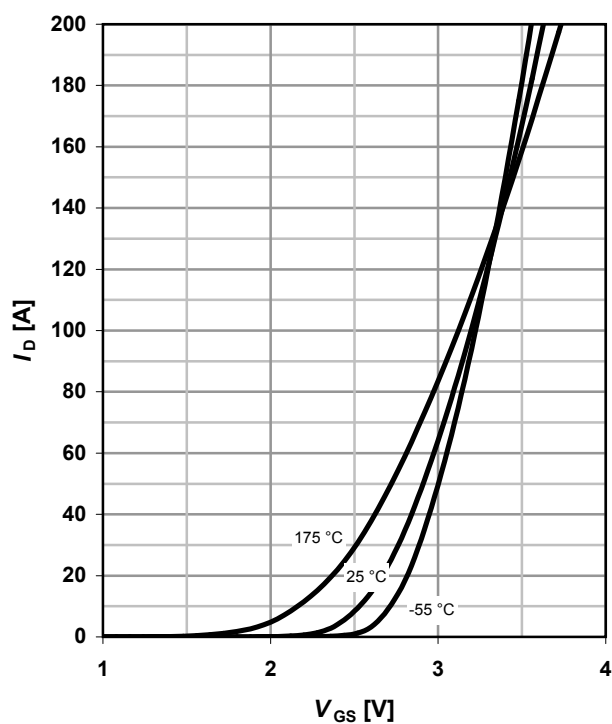
6 Typ. drain-source on-state resistance

 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter: V_{GS}


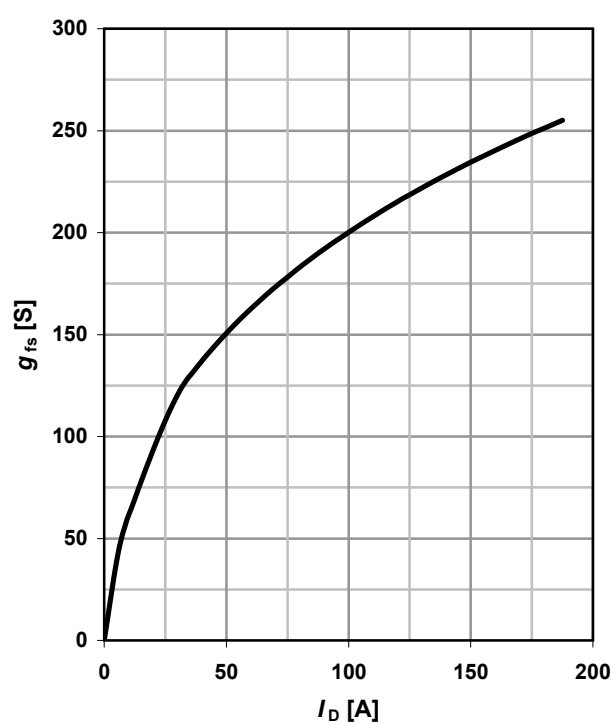
7 Typ. transfer characteristics

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

parameter: T_j


8 Typ. Forward transconductance

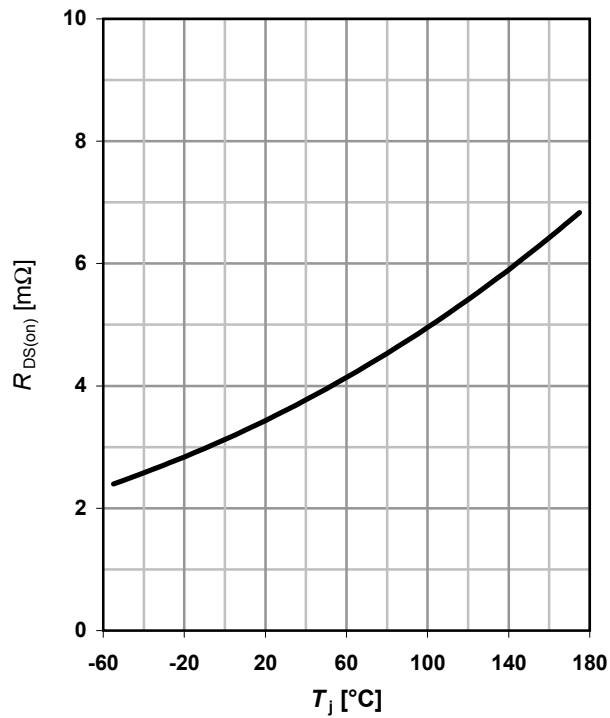
 $g_{fs} = f(I_D); T_j = 25^\circ\text{C}$

parameter: g_{fs}


9 Typ. Drain-source on-state resistance

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

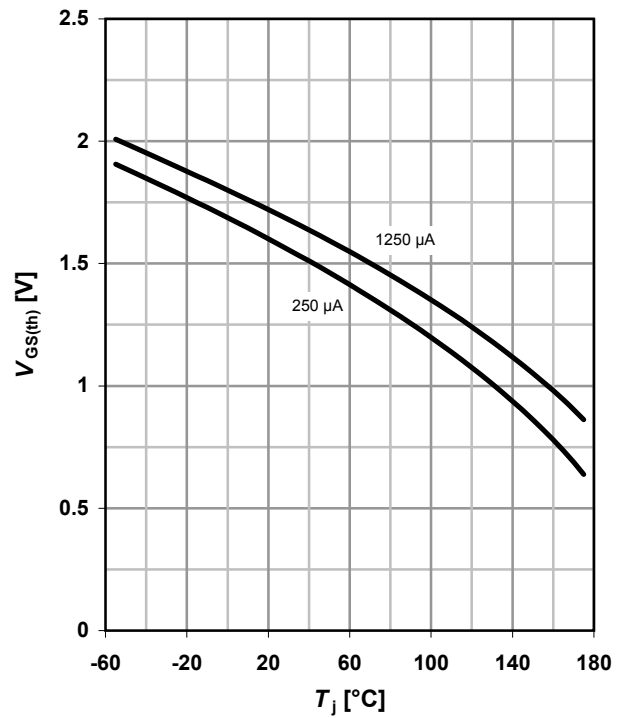
parameter: $I_D = 80 \text{ A}$; $V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

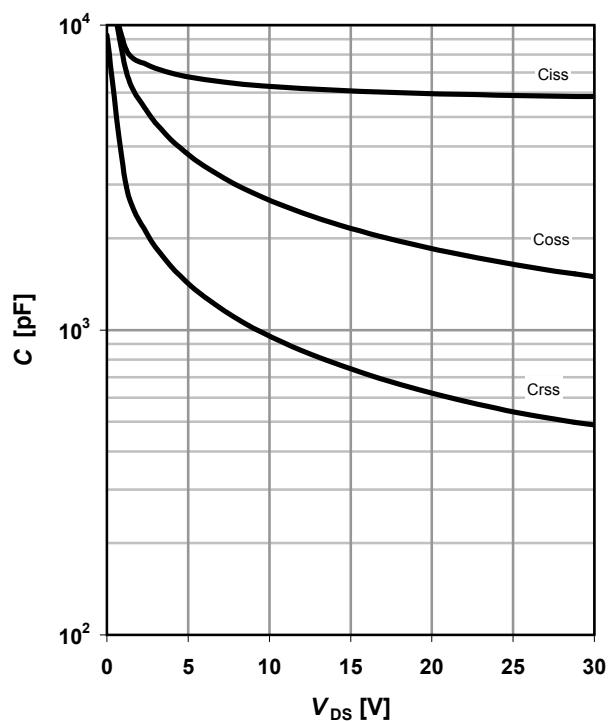
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



11 Typ. capacitances

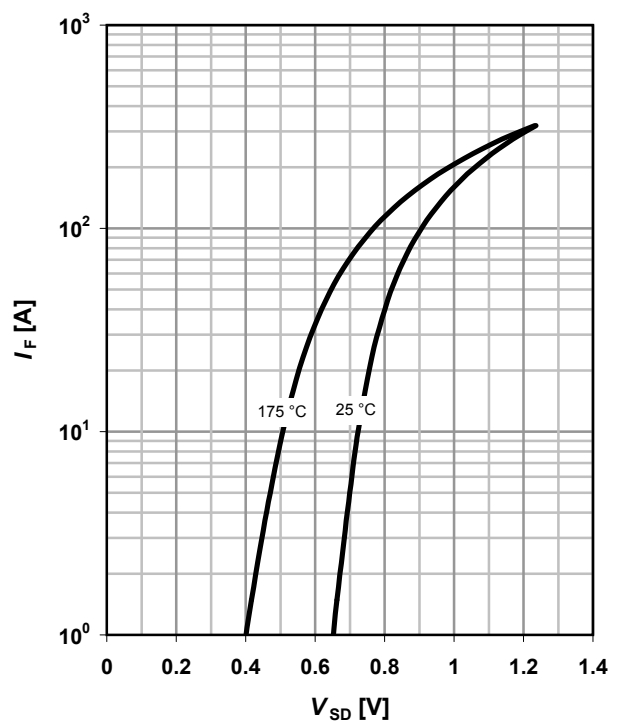
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Typical forward diode characteristics

$$I_F = f(V_{SD})$$

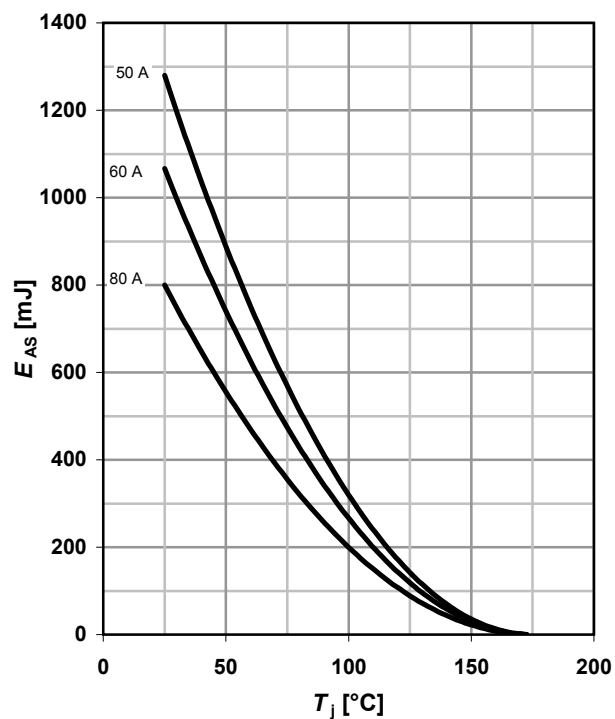
parameter: T_j



13 Typical avalanche energy

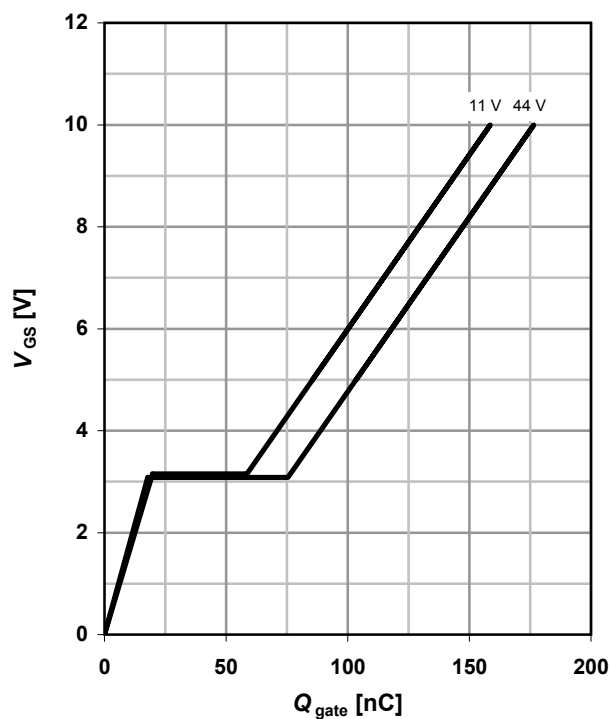
$$E_{AS} = f(T_j)$$

parameter: I_D



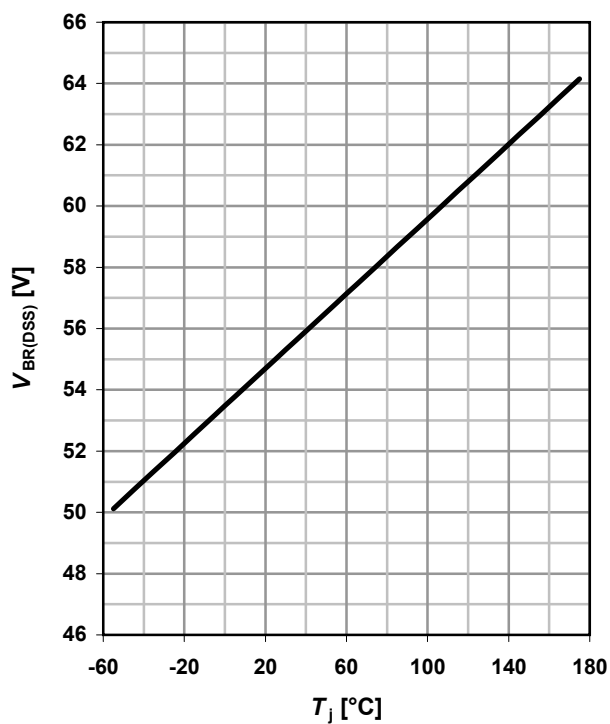
14 Typ. gate charge

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

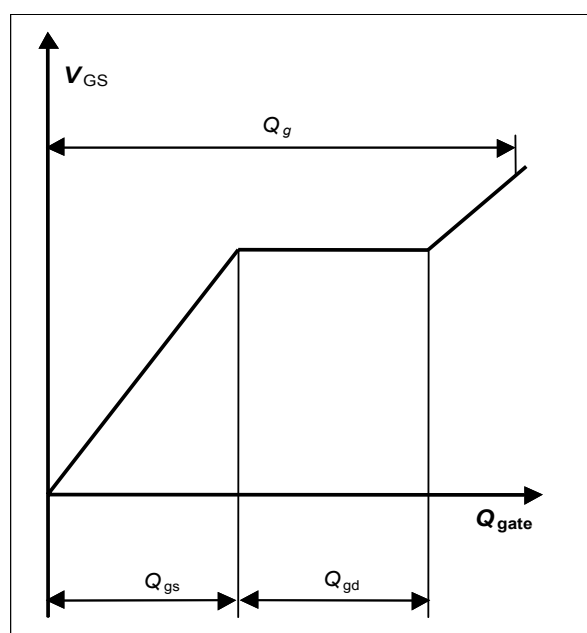


15 Typ. drain-source breakdown voltage

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



16 Gate charge waveforms



Published by
Infineon Technologies AG
St.-Martin-Straße 53
D-81541 München
© Infineon Technologies AG 2004
All Rights Reserved.

Attention please!

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

Information

For further information on technology, delivery terms and conditions and prices, please contact your nearest Infineon Technologies Office (www.infineon.com)

Warnings

Due to technical requirements, components may contain dangerous substances.

For information on the types in question, please contact your nearest Infineon Technologies Office.

effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.