

英飞凌40V 175°C N沟道

增强型OptiMOS™-T2 功率晶体管



特性

- N沟道-逻辑电平-增强模式
- 符合 AEC
- MSL1 回流焊峰值温度高达 260°C
- 工作温度 175°C
- 绿色产品：符合 RoHS 标准
- 100% 雪崩测试

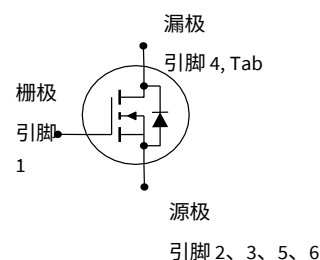
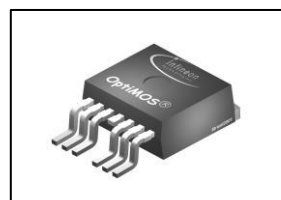
Type	Package	Marking
IPB180N04S4L-01	PG-T0263-7-3	4N04L01

除非另有规定，否则均为 $T_j=25^{\circ}\text{C}$ 的**最大额定值**。

产品概述

V_{DS}	40	V
$R_{DS(on)}$	1.2	$\text{m}\Omega$
I_D	180	A

PG-T0263-7-3



Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_c=25^{\circ}\text{C}, V_{GS}=10\text{V}^{(1)}$	180	A
		$T_c=100^{\circ}\text{C}, V_{GS}=10\text{V}^{(2)}$	180	
Pulsed drain current ⁽²⁾	$I_{D,pulse}$	$T_c=25^{\circ}\text{C}$	720	
Avalanche energy, single pulse	E_{AS}	$I_D=90\text{ A}$	550	mJ
Avalanche current, single pulse	I_{AS}	-	180	A
Gate source voltage	V_{GS}	-	+20/-16	V
Power dissipation	P_{tot}	$T_c=25^{\circ}\text{C}$	188	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

热特性²⁾

Thermal resistance, junction - case	R_{thJC}	-	-	-	0.8	K/W
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除非另有规定，否则均为 $T_j=25\text{ °C}$ 的电气特性。

静态参数特性

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=140\text{ }\mu\text{A}$	1.2	1.7	2.2	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	0.06	1	μA
		$V_{DS}=18\text{ V}, V_{GS}=0\text{ V}, T_j=85\text{ °C}^{2)}$	-	1	20	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=50\text{ A}$	-	1.3	1.6	$\text{m}\Omega$
		$V_{GS}=10\text{ V}, I_D=100\text{ A}$	-	1.0	1.2	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	14700	19100	pF
Output capacitance	C_{oss}		-	2400	3120	
Reverse transfer capacitance	C_{rss}		-	120	280	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=20\text{ V}, V_{GS}=10\text{ V},$ $I_D=180\text{ A}, R_G=3.5\ \Omega$	-	20	-	ns
Rise time	t_r		-	21	-	
Turn-off delay time	$t_{d(off)}$		-	90	-	
Fall time	t_f		-	80	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=32\text{ V}, I_D=180\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	42	55	nC
Gate to drain charge	Q_{gd}		-	20	47	
Gate charge total	Q_g		-	188	245	
Gate plateau voltage	$V_{plateau}$		-	2.9	-	V

反向二极管

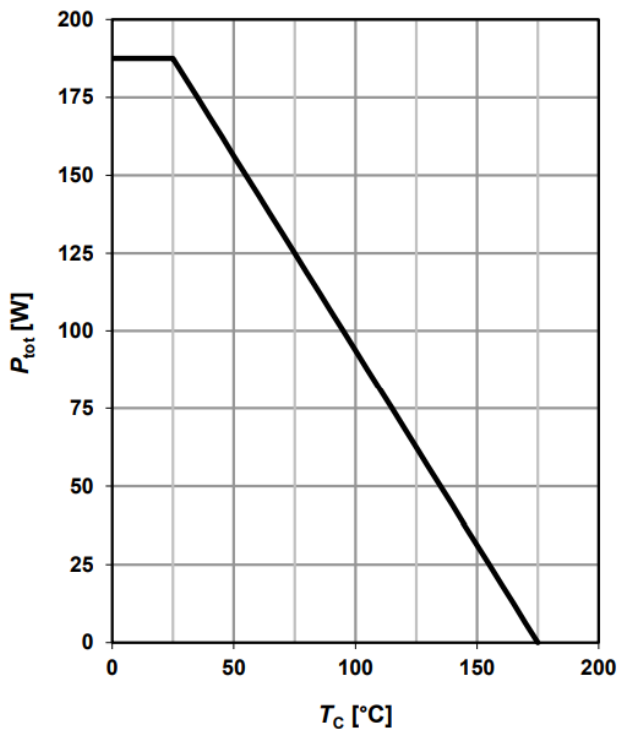
Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	180	A
Diode pulse current ²⁾	$I_{S,pulse}$		-	-	720	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=100\text{ A},$ $T_J=25\text{ °C}$	-	0.9	1.3	V
Reverse recovery time ²⁾	t_{rr}	$V_R=20\text{ V}, I_F=50\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	70	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	95	-	nC

¹⁾ 电流受封装限制；当 $R_{thJC} = 0.8\text{ K/W}$ 时，该芯片在 25°C 时能够承载 300 A。

²⁾ 由设计标定，不受限于生产测试。

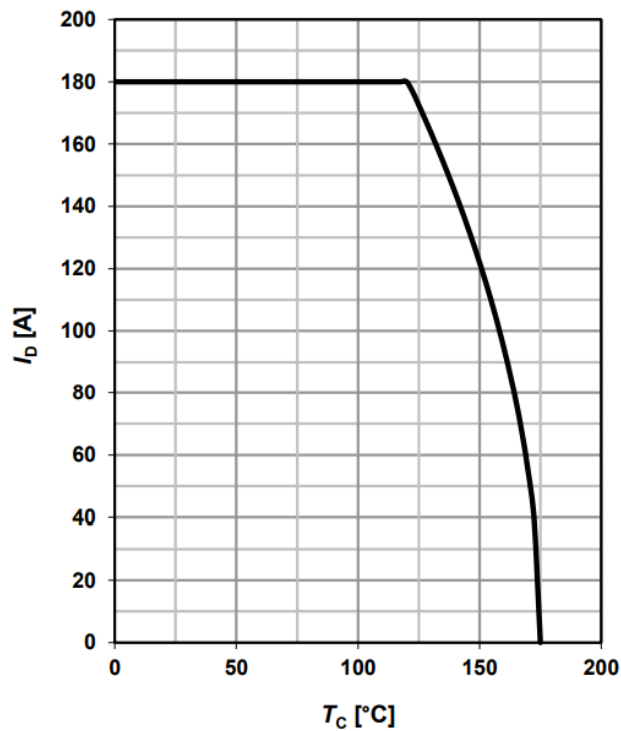
1 功率耗散

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



2 漏极电流

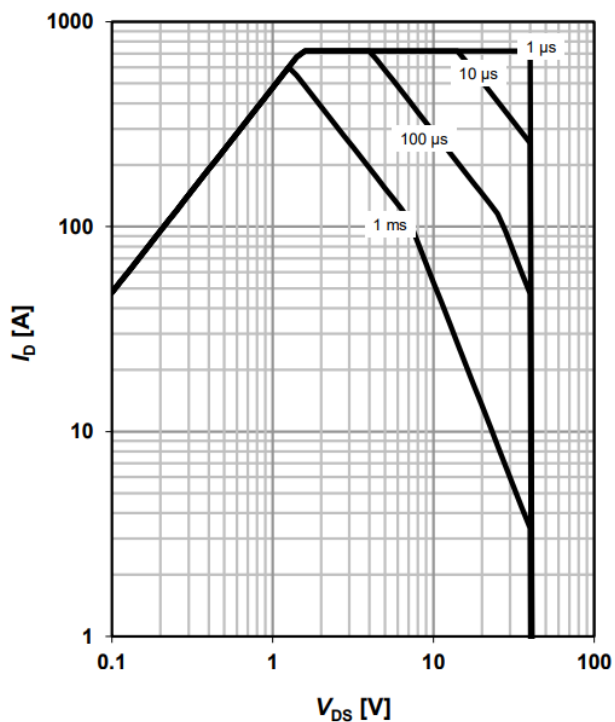
$$I_D = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$



3 安全工作区

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

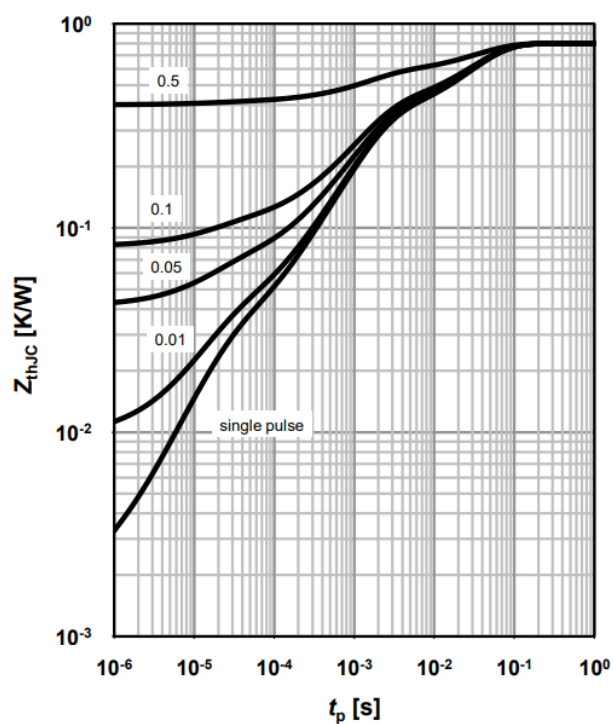
parameter: t_p



4 最大瞬态热阻抗

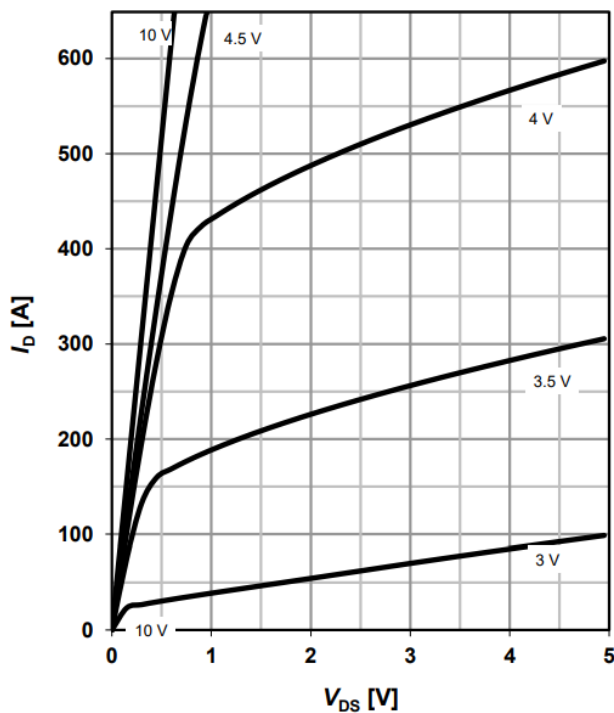
$$Z_{\text{thJC}} = f(t_p)$$

parameter: $D = t_p/T$



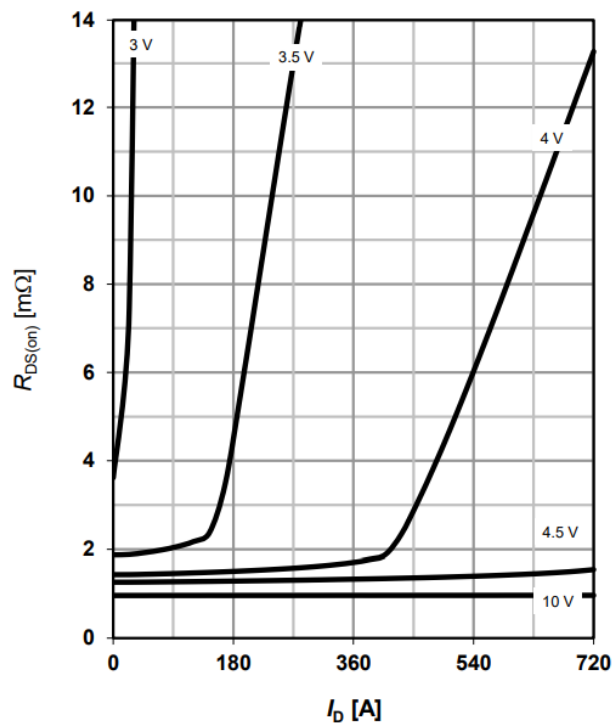
5 典型输出特性

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

parameter: V_{GS}


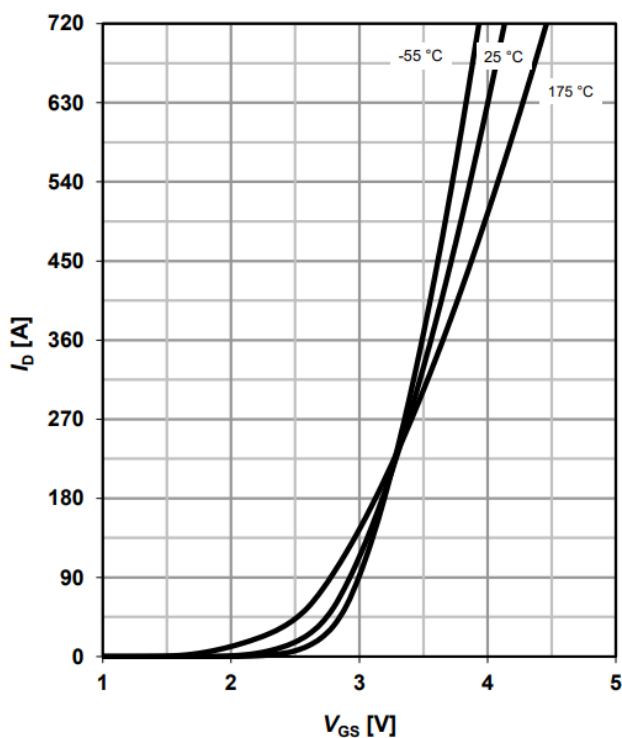
6 典型漏源导通电阻

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

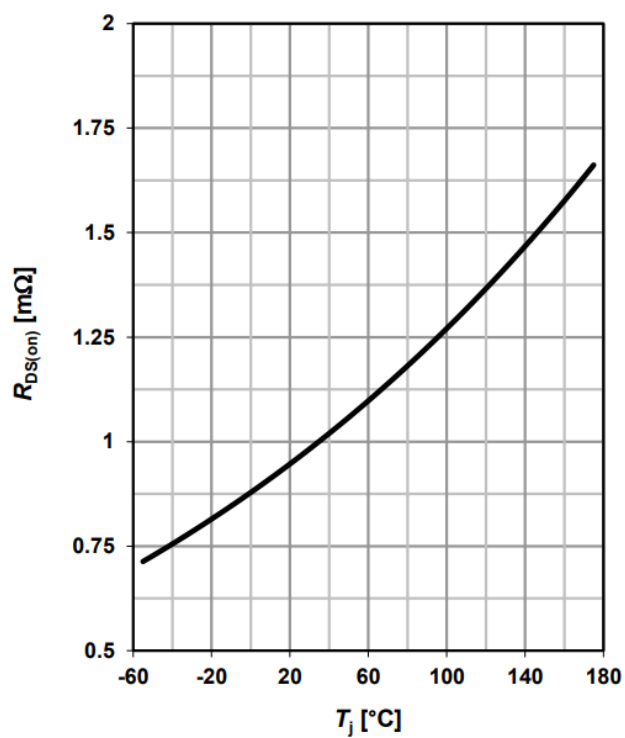
parameter: V_{GS}


7 典型转移特性

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

parameter: T_j


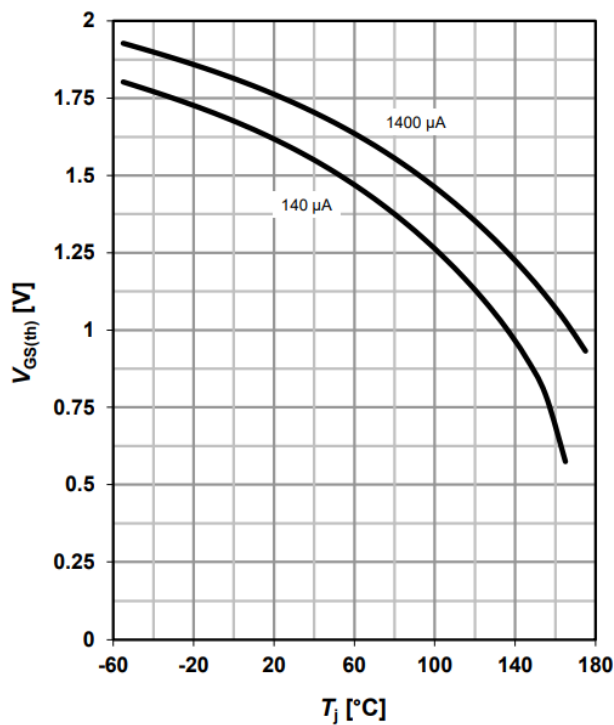
8 典型漏源导通电阻

 $R_{DS(on)} = f(T_j); I_D = 100\text{A}; V_{GS} = 10\text{V}$


9 典型栅极阈值电压

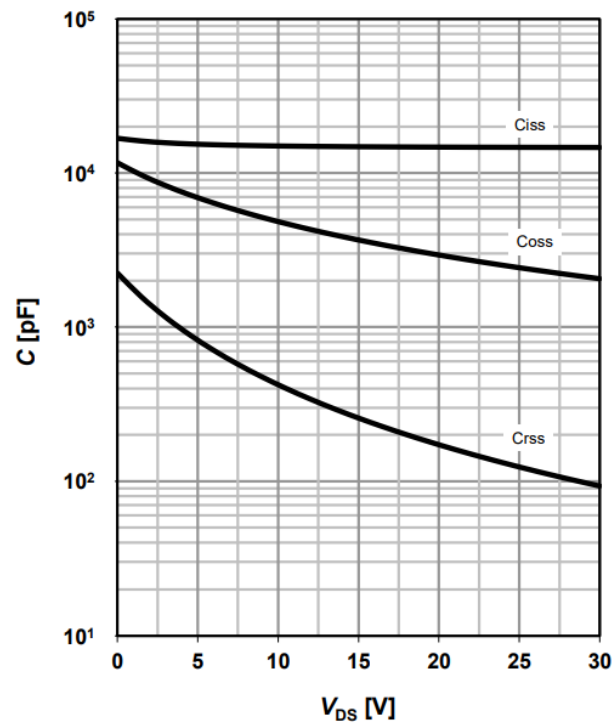
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



10 典型电容值

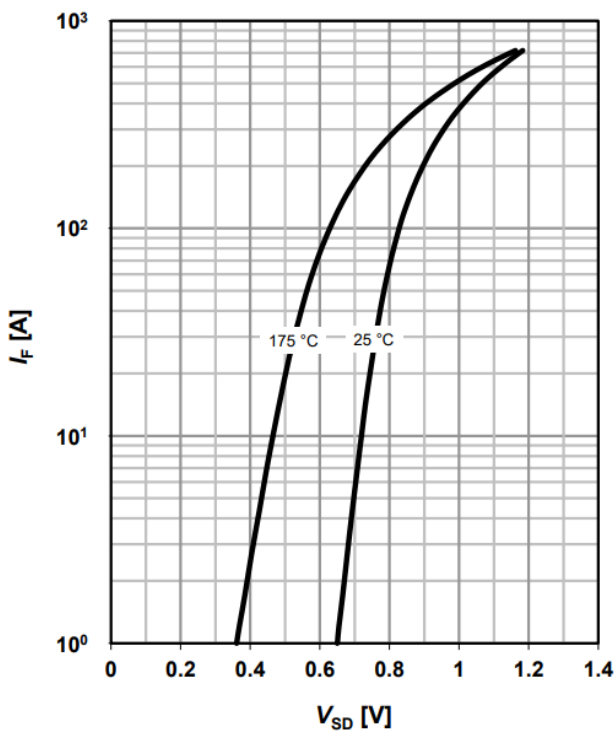
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



11 典型二极管正向导通特性

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

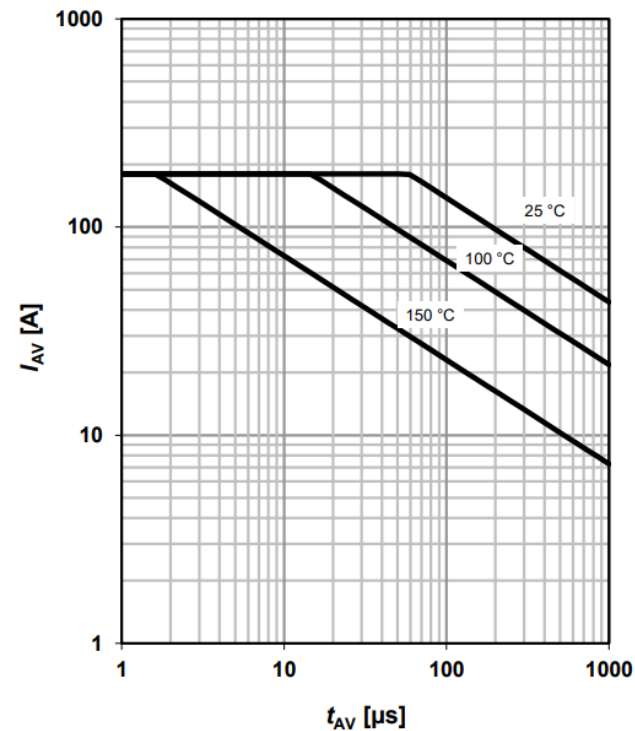
parameter: T_j



12 典型雪崩特性

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

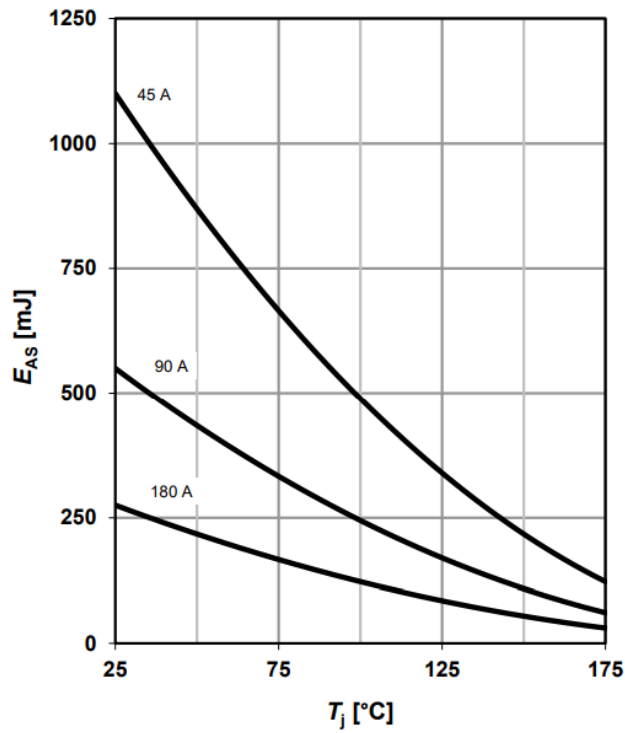
parameter: $T_{j(start)}$



13 典型雪崩能量

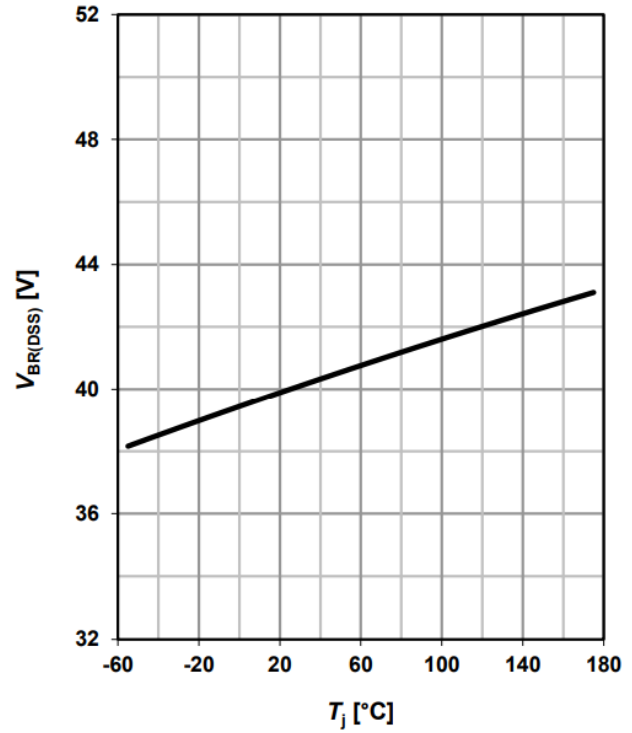
$$E_{AS} = f(T_j)$$

parameter: I_D



14 漏源击穿电压

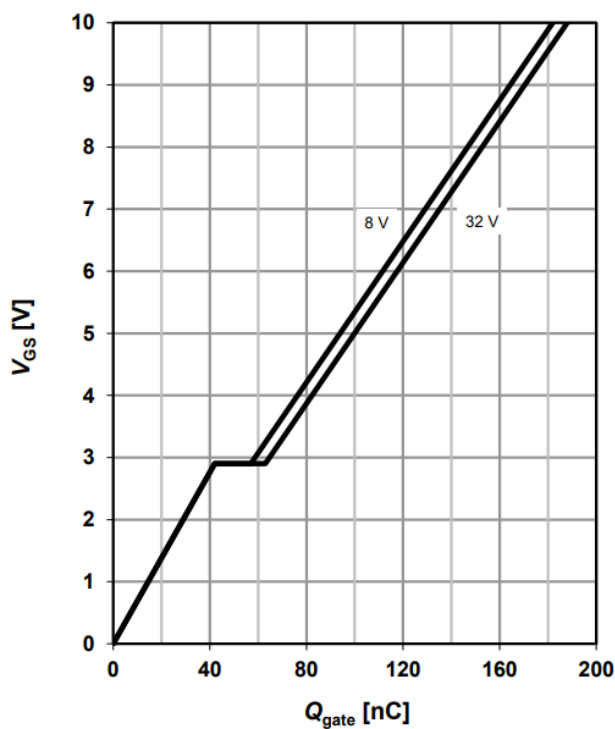
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$



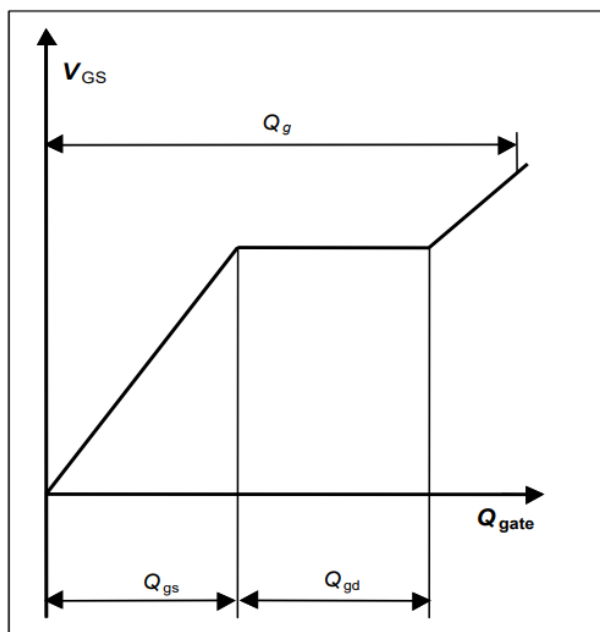
15 典型栅极电荷

$$V_{GS} = f(Q_{gate}); I_D = 180 \text{ A pulsed}$$

parameter: V_{DD}



16 栅极充电波形



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Infineon Technologies AG
81726 Munich, Germany

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修订记录

Version	Date	Changes
Revision 1.0	03.06.2013	Data Sheet
Revision 1.1	06.08.2019	QGD corrected



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Edition 2025-04-17

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