英飞凌30V 175℃ N沟道

增强型OptiMOS™-T2 功率晶体管

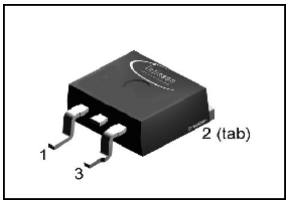
产品概述

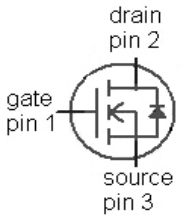
V_{DS}	30	V
$R_{DS(on),max}$	3	mΩ
I_D	120	A

特性

- N沟道-增强型
- 符合汽车级 AEC Q101 标准
- MSL1 回流焊峰值温度高达 260°C
- 工作温度 175°C
- 绿色封装（无铅）
- 100% 雪崩测试

PG-TO263-3-2





Type	Package	Ordering Code	Marking
IPB120N03S4L-03	PG-TO263-3-2	-	4N03L03

除非另有规定，否则均为T_j=25 °C 的**最大额定值。**

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current[1]	I_D	T_C=25°C, V_{GS}=10V	120	A
		T_C=100°C, V_{GS}=10V[2]	88	
Pulsed drain current[2]	$I_{D,pulse}$	T_C=25°C	480	
Avalanche energy, single pulse	E_{AS}	I_D=60A	75	mJ
Avalanche current, single pulse	I_{AS}	-	120	A

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Gate source voltage	V_{GS}		±16			V
Power dissipation	P_{tot}	T_C=25°C	79			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.**	

热特性[2)]

Thermal resistance, junction - case	R_{thJC}		-	-	1.9	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}		-	-	62	
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	62	
		6 cm² cooling area[3)]	-	-	40	

除非另有规定，否则均为T_j=25 °C 的**电气特性。**

静态参数特性

Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D= 1mA	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=40µA	1.0	1.6	2.2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V, T_j=25°C	-	-	1	µA
		V_{DS}=30V, V_{GS}=0V, T_j=125 °C[2)]	-	-	100	
Gate-source leakage current	I_{GSS}	V_{GS}=16V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=60A	-	3.7	5.1	mΩ
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=100A	-	2.6	3	mΩ

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
动态参数特性[2)]						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	4100	5300	pF
Output capacitance	C_{oss}		-	900	1200	
Reverse transfer capacitance	C_{rss}		-	45	90	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V, V_{GS}=10V, I_D=120A, R_G=3.5 Ω	-	7	-	ns
Rise time	t_r		-	24	-	
Turn-off delay time	$t_{d(off)}$		-	21	-	
Fall time	t_f		-	34	-	
栅极电荷特性[2)]						
Gate to source charge	Q_{gs}	V_{DD}=24V, I_D=120A, V_{GS}=0 to 10V	-	13	17	nC
Gate to drain charge	Q_{gd}		-	8	16	
Gate charge total	Q_g		-	55	72	
Gate plateau voltage	$V_{plateau}$		-	3.3	-	V
反向二极管						
Diode continous forward current[2)]	I_S	T_C=25°C	-	-	120	A
Diode pulse current[2)]	$I_{S,pulse}$		-	-	480	
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=100A, T_j=25°C	-	0.9	1.3	V
Reverse recovery time[2)]	t_{rr}	V_R=15V, I_F=I_S, di_F/dt=100A/µs	-	85	-	ns
Reverse recovery charge[2)]	Q_{rr}		-	150	-	nC

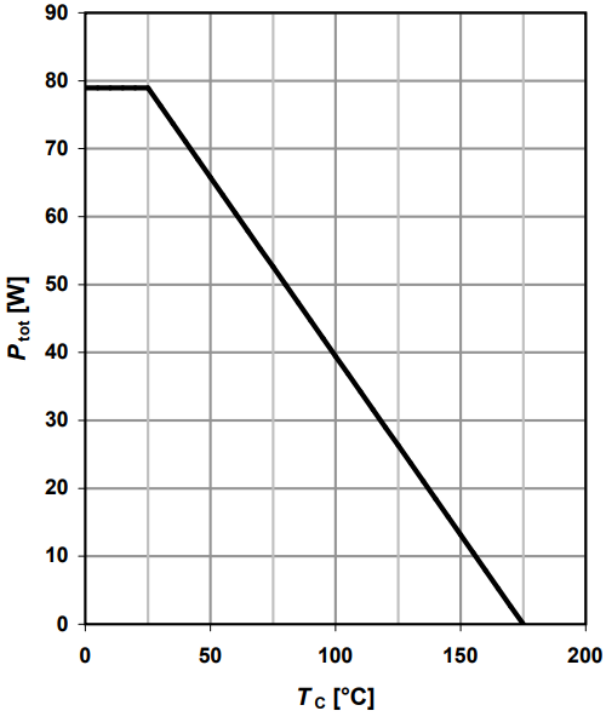
[1)]电流受封装限制；当R_{thJC} = 1.9 K/W时，该芯片在25°C时能够承载124 A。

[2)]由设计标定，不受制于生产测试。

[3)]在 40 mm x 40 mm x 1.5 mm 环氧树脂印刷电路板 FR4 上器件，具有 6 cm2（一层，70 µm 厚）铜区域用于漏极连接。印刷电路板在静止空气中是垂直的。

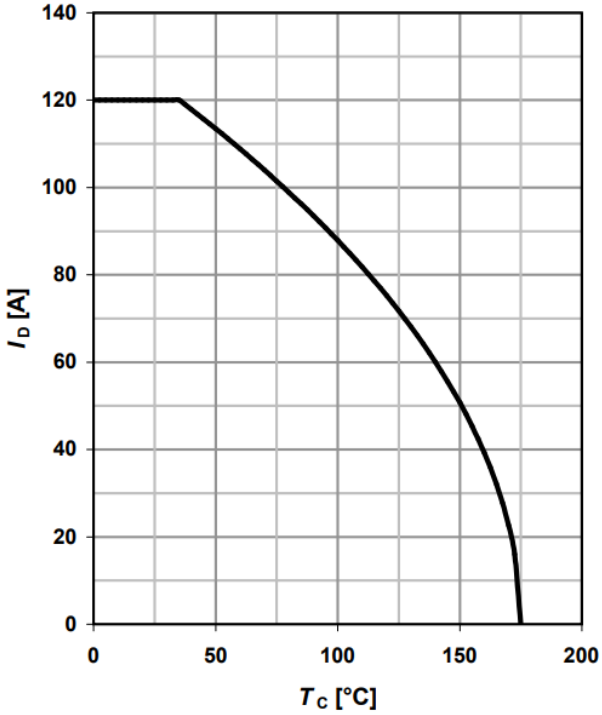
1 功率耗散

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



2 漏极电流

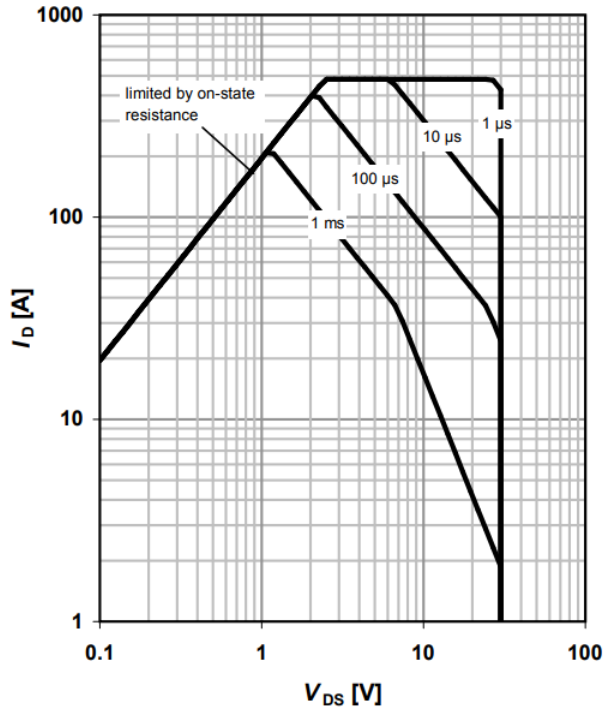
$I_D = f(T_C)$; $V_{GS} \geq 6$ V



3 安全工作区

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

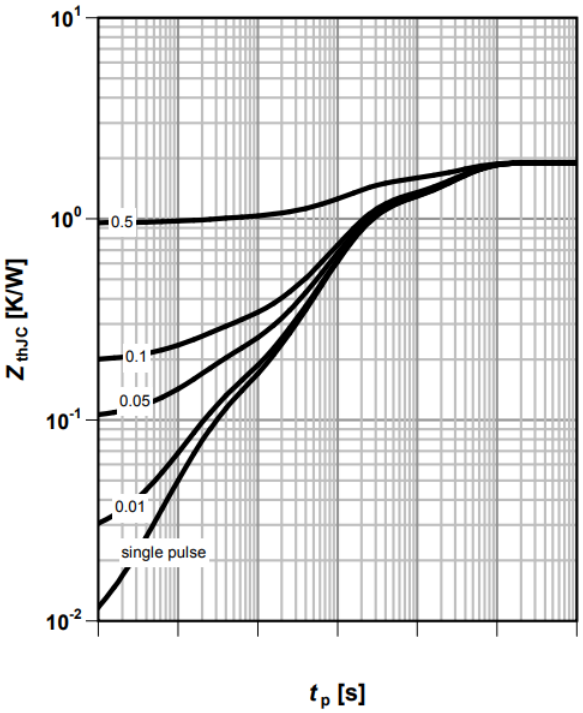
parameter: t_p



4 最大瞬态热阻抗

$Z_{thJC} = f(t_p)$

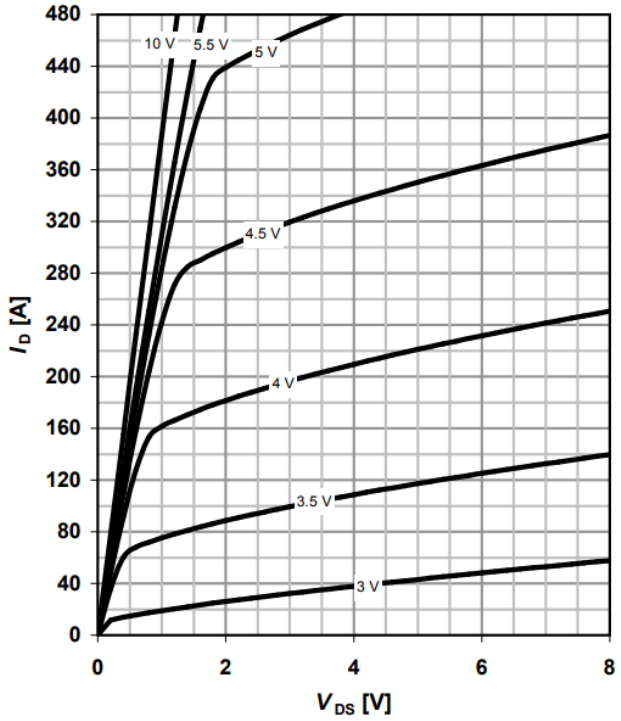
parameter: $D = t_p/T$



5 典型输出特性

$I_D = f(V_{DS})$; $T_j = 25$ °C

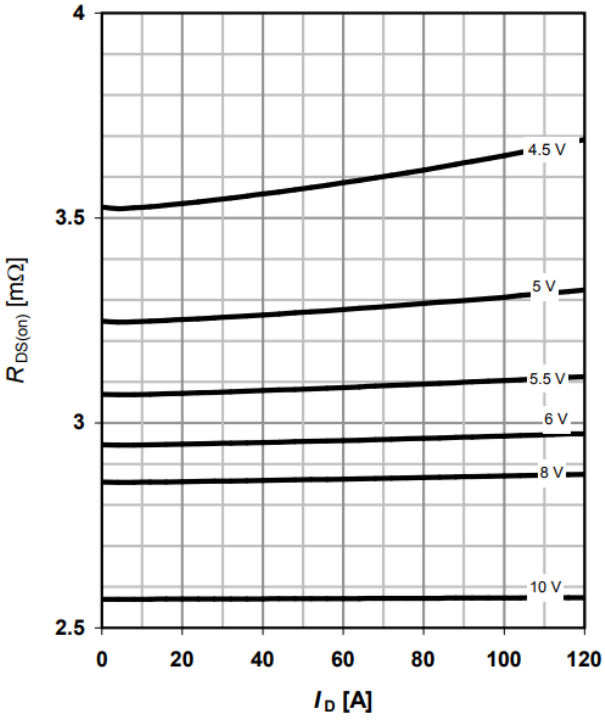
parameter: V_{GS}



6 典型漏源导通电阻

$R_{DS(on)} = (I_D)$; $T_j = 25$ °C

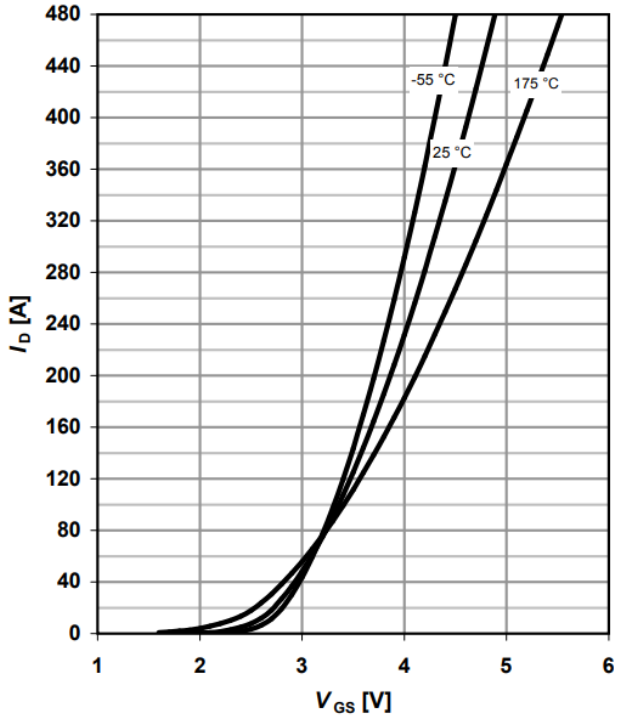
parameter: V_{GS}



7 典型转移特性

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

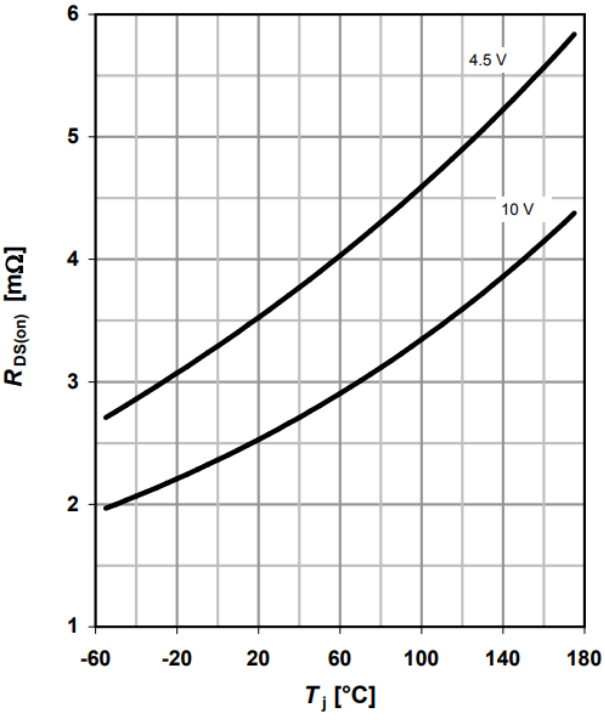
parameter: T_j



8 典型漏源导通电阻

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

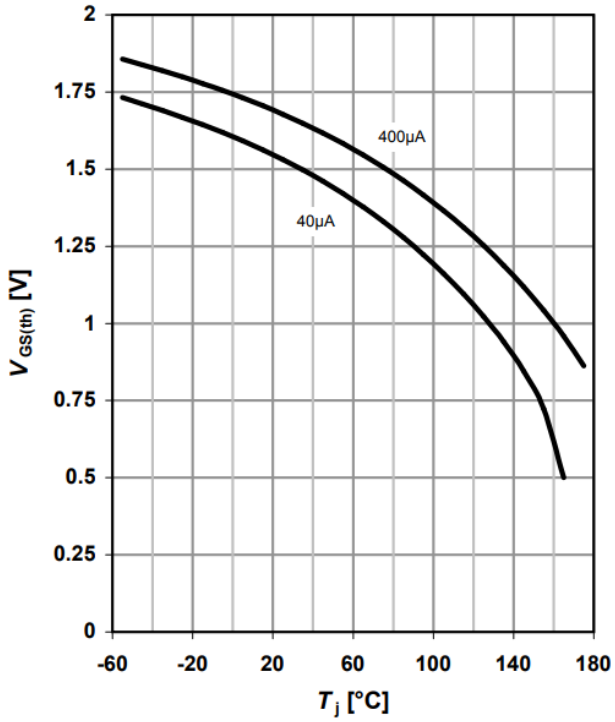
$I_D = 60$ A; $V_{GS} = 4.5$ V



9 典型栅极阈值电压

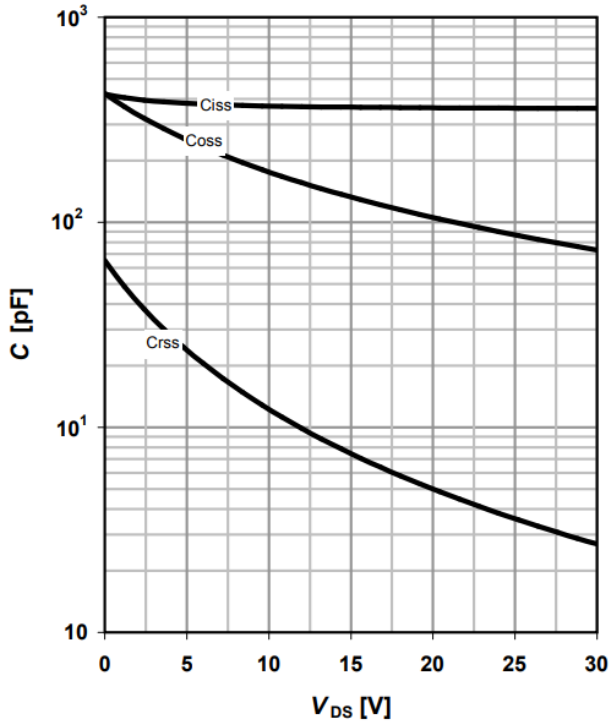
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 典型电容值

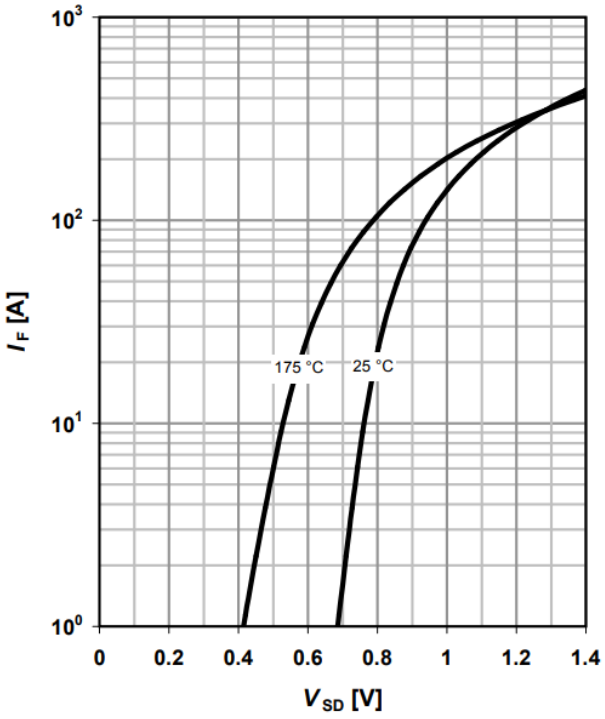
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 典型二极管正向导通特性

IF = f(V_{SD})

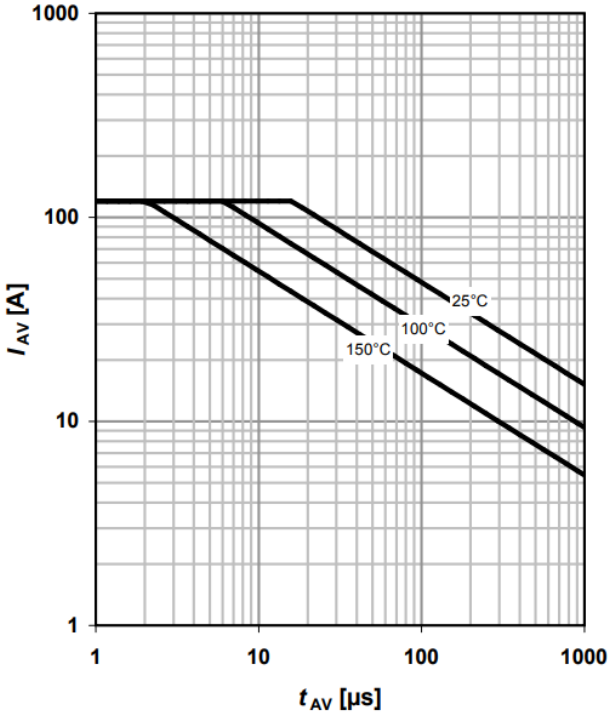
parameter: T_j



12 典型雪崩特性

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

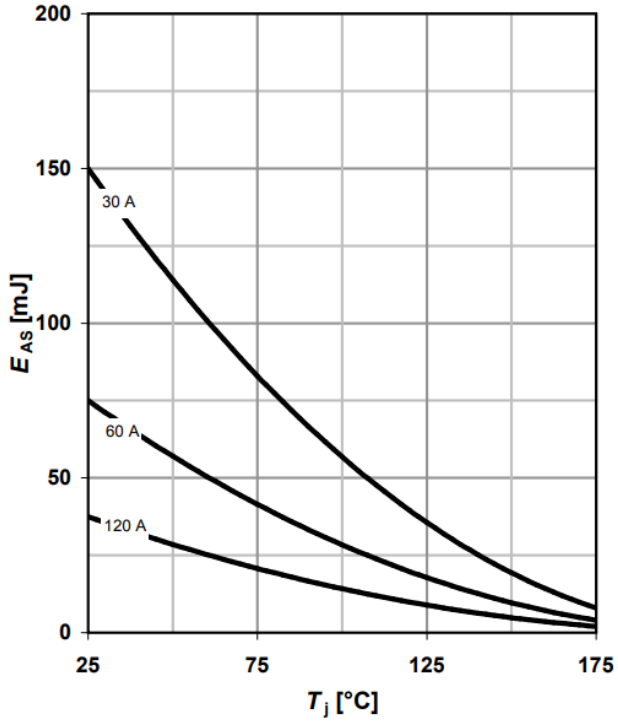
parameter: $T_{j(start)}$



13 典型雪崩能量

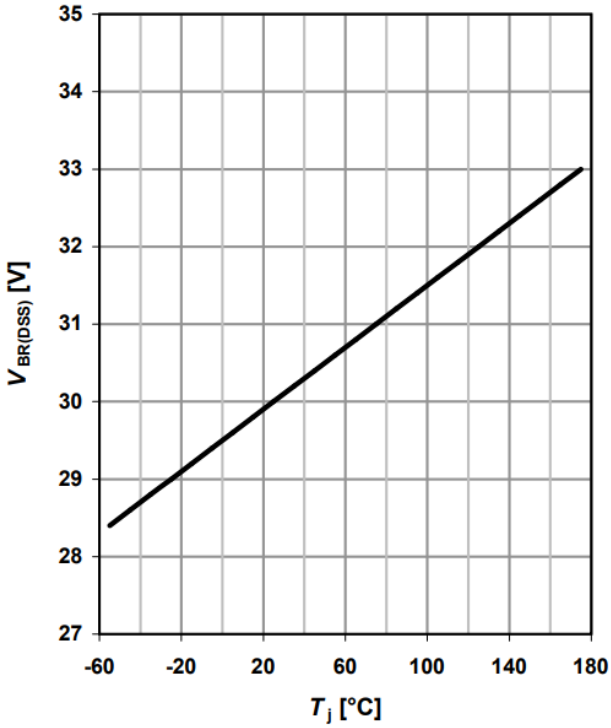
$E_{AS} = f(T_j)$

parameter: I_D



14 典型漏源击穿电压

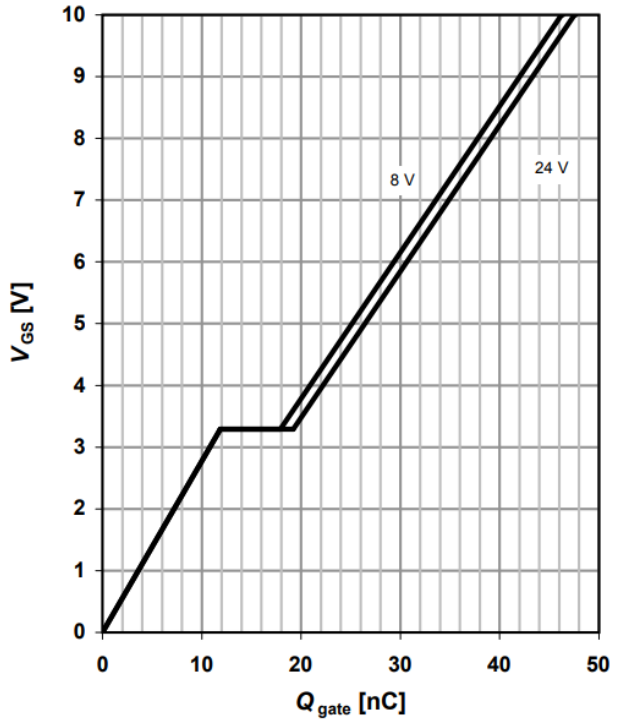
$V_{BR(DSS)} = f(T_j)$; I_D = 1 mA



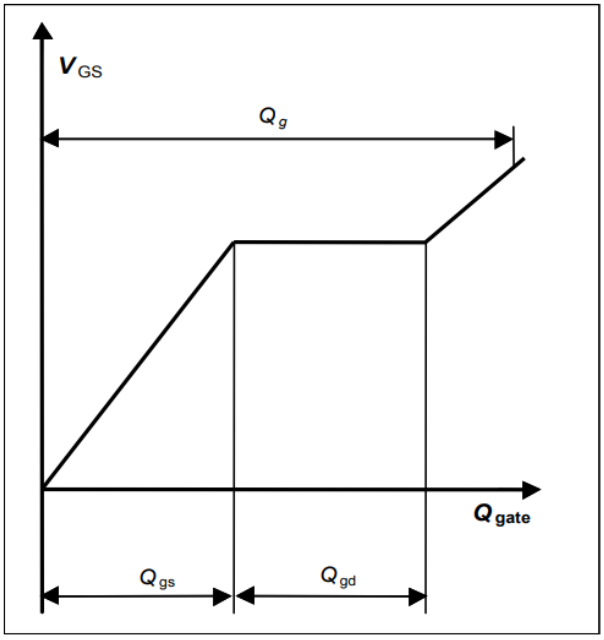
15 典型栅极电荷

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

parameter: V_{DD}



16 栅极充电波形



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修订记录

Version	Date	Changes
Revision 1.0	21.10.2013	Final Datasheet
Revision 1.1	28.04.2014	Changed Capacitances and Gate Charge

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