

英飞凌40V 175°C N沟道
增强型OptiMOS™-功率晶体管

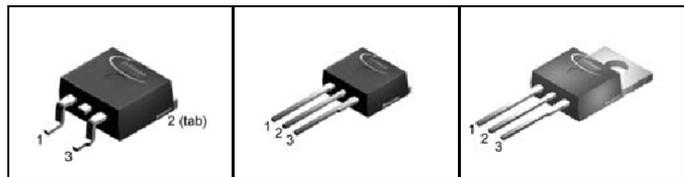
产品概述

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

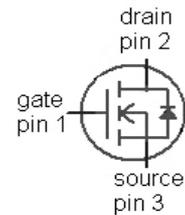
特性

- N沟道-增强模式
- 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
- 超低 $R_{ds(on)}$
- 100% 雪崩测试
- 绿色产品：符合 RoHS 标准

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


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

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	E_{AS}	$I_D=80\text{ A}$	660	mJ
Gate source voltage	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
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}		-	-	0.5	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	

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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$	2.1	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	0.01	1	μA
		$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}^{2)}$	-	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	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=80\text{ A}$	-	3.5	4.0	m Ω
		$V_{GS}=10\text{ V}, I_D=80\text{ A},$ SMD version	-	3.2	3.7	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	4400	-	pF
Output capacitance	C_{oss}		-	1800	-	
Reverse transfer capacitance	C_{rss}		-	480	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=20\text{ V}, V_{GS}=10\text{ V},$ $I_D=80\text{ A}, R_G=1.3\ \Omega$	-	23	-	ns
Rise time	t_r		-	63	-	
Turn-off delay time	$t_{d(off)}$		-	46	-	
Fall time	t_f		-	22	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=32\text{ V}, I_D=80\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	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

反向二极管

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ }^\circ\text{C}$	-	-	80	A
Diode pulse current ²⁾	$I_{S,pulse}$		-	-	320	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=80\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.9	1.3	V
Reverse recovery time ²⁾	t_{rr}	$V_R=20\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	195	-	ns
Reverse recovery charge ²⁾	Q_{rr}	$V_R=20\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	370	-	nC

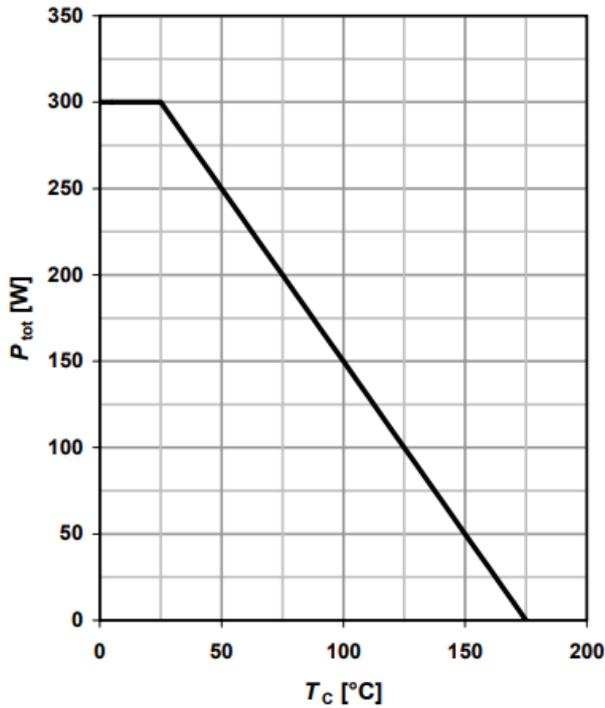
¹⁾ 电流受接合线限制； $R_{thJC} = 0.5\text{K/W}$ 时，芯片在 25°C 时能够承载电流 200A。有关详细信息，请参阅 www.infineon.com/optimos 上的应用注释 ANPS071E

²⁾ 由设计标定，不受制于生产测试。

³⁾ 在 $40\text{ mm} \times 40\text{ mm} \times 1.5\text{ mm}$ 环氧树脂印刷电路板 FR4 上器件，具有 6 cm^2 （一层， $70\ \mu\text{m}$ 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。

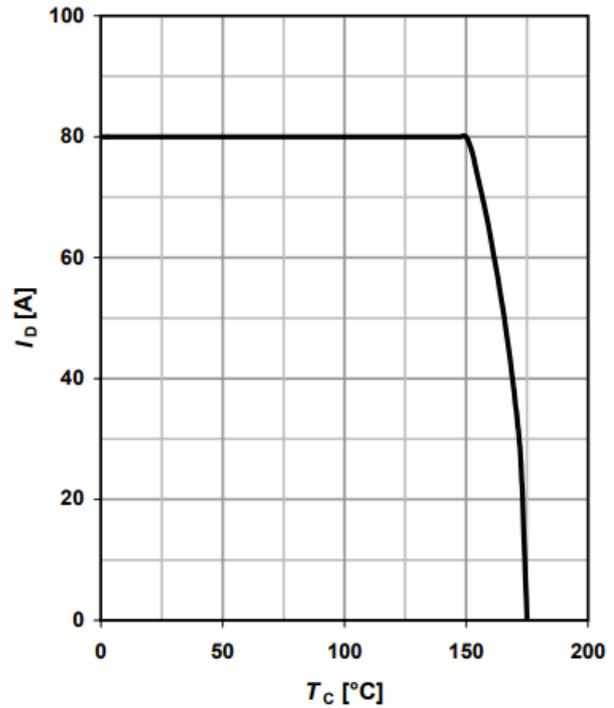
1 功率耗散

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



2 漏极电流

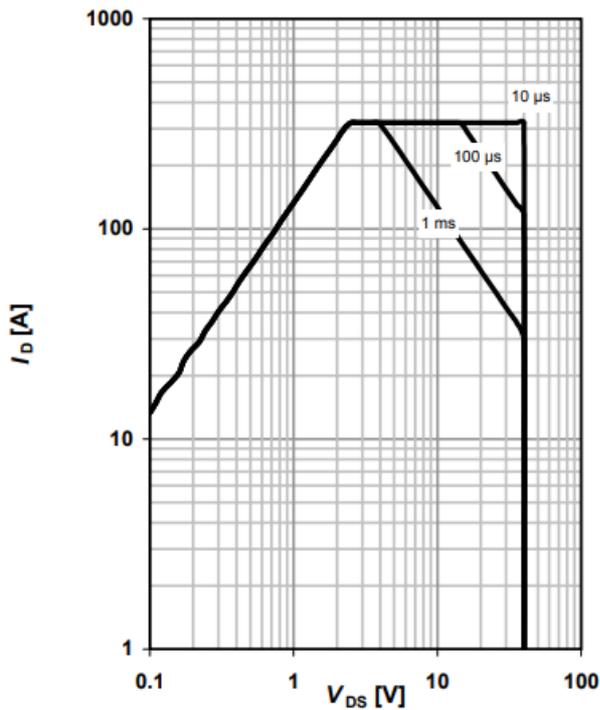
$I_D = f(T_C); V_{GS} \geq 10 V$



3 安全工作区

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

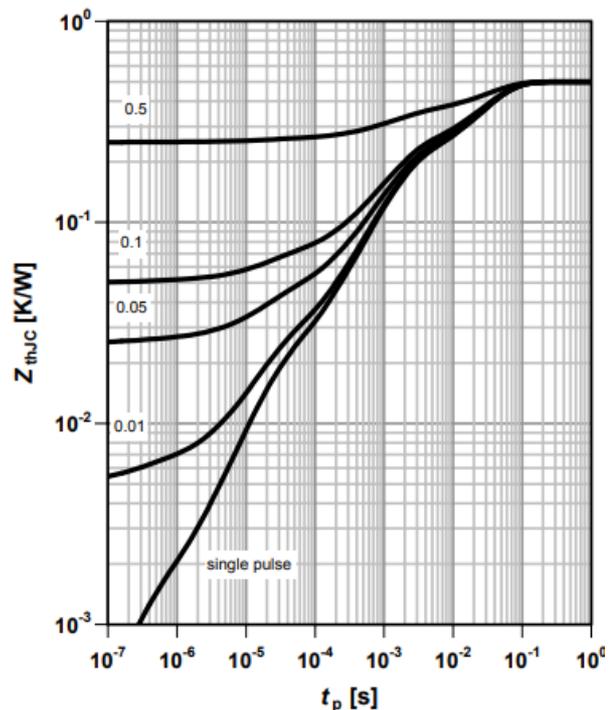
parameter: t_p



4 最大瞬态热阻抗

$Z_{thJC} = f(t_p)$

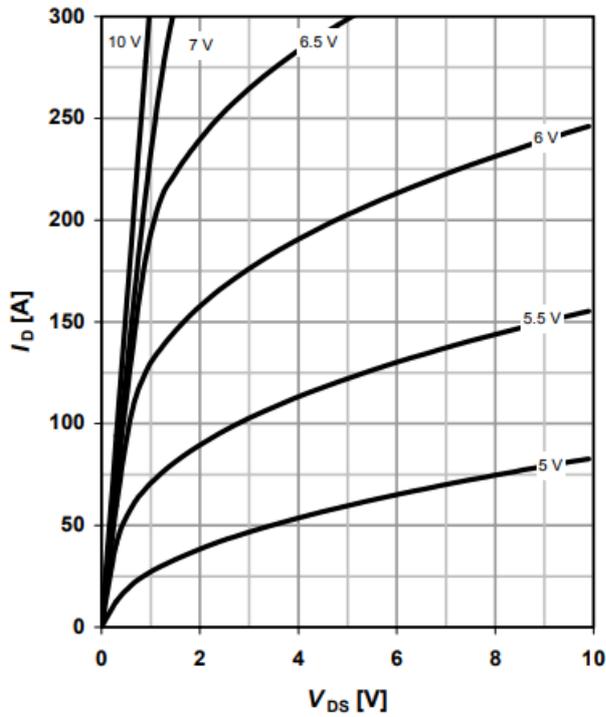
parameter: $D = t_p/T$



5 典型输出特性

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

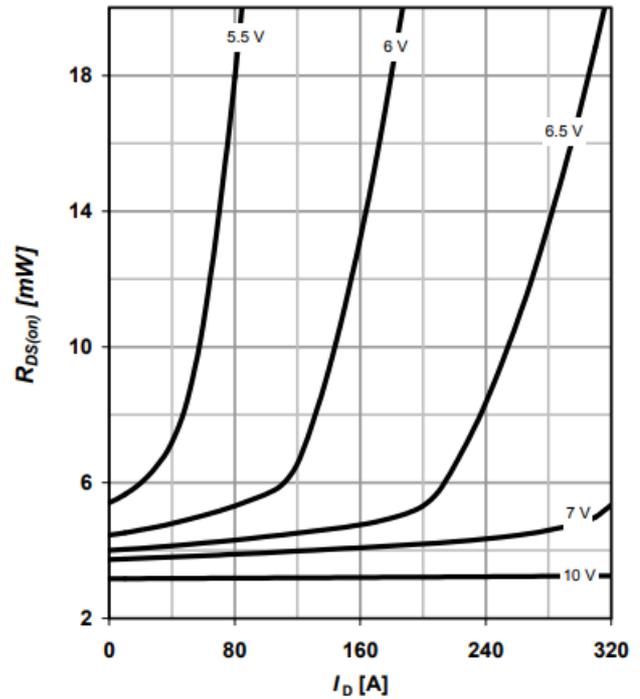
parameter: V_{GS}



6 典型漏源导通电阻

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

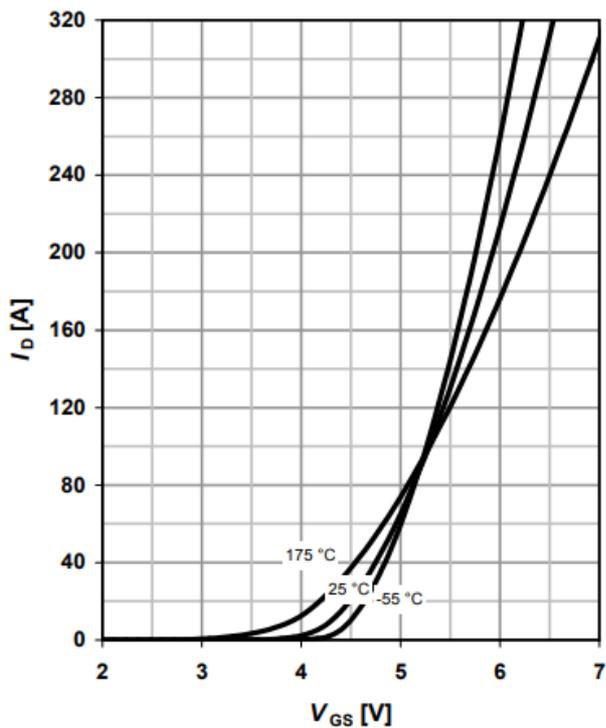
parameter: V_{GS}



7 典型传输特性

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

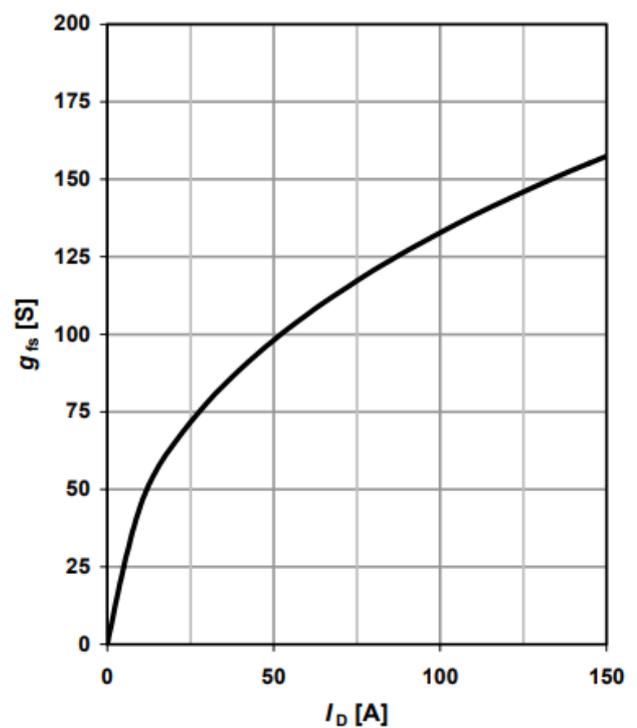
parameter: T_j



8 典型正向跨导

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

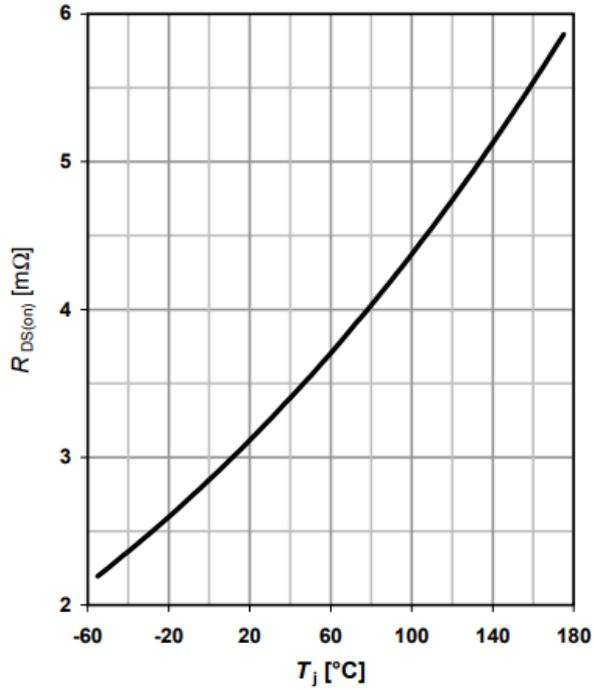
parameter: g_{fs}



9 典型漏源导通电阻

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

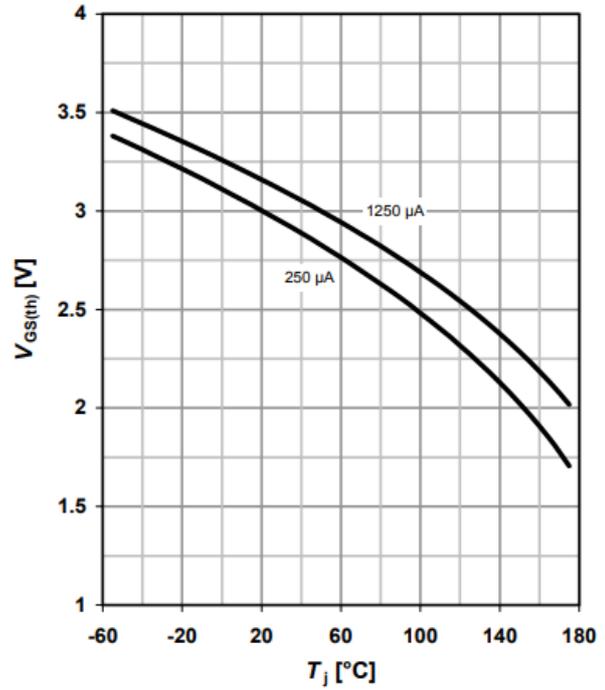
parameter: $I_D = 80\text{ A}$; $V_{GS} = 10\text{ V}$



10 典型栅极阈值电压

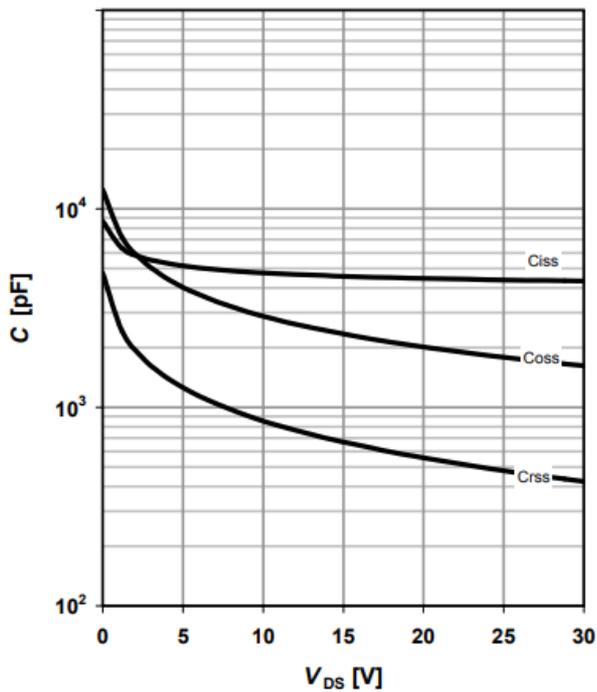
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



11 典型电容值

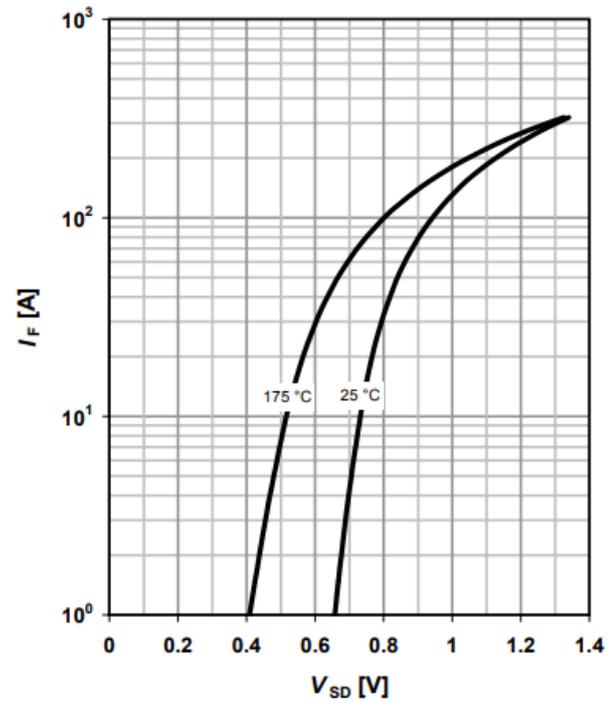
$$C = f(V_{DS}); V_{GS} = 0\text{ V}; f = 1\text{ MHz}$$



12 典型正向二极管特性

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

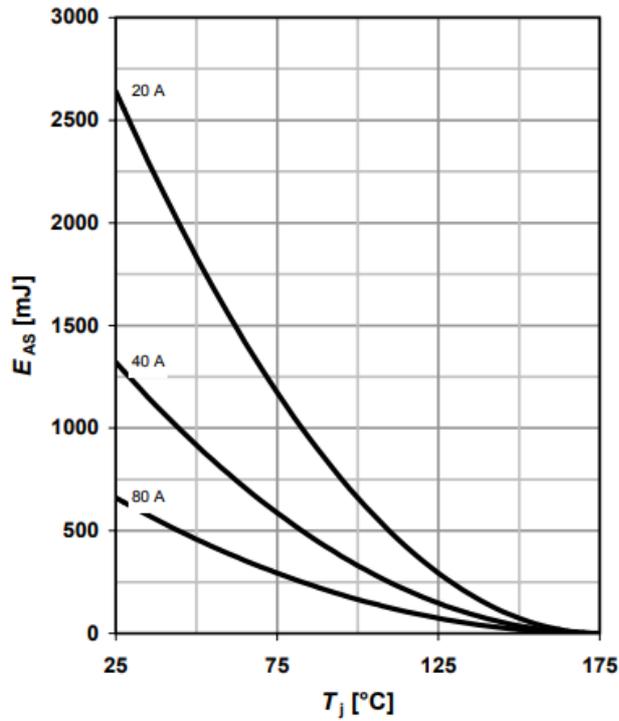
parameter: T_j



13 典型雪崩能量

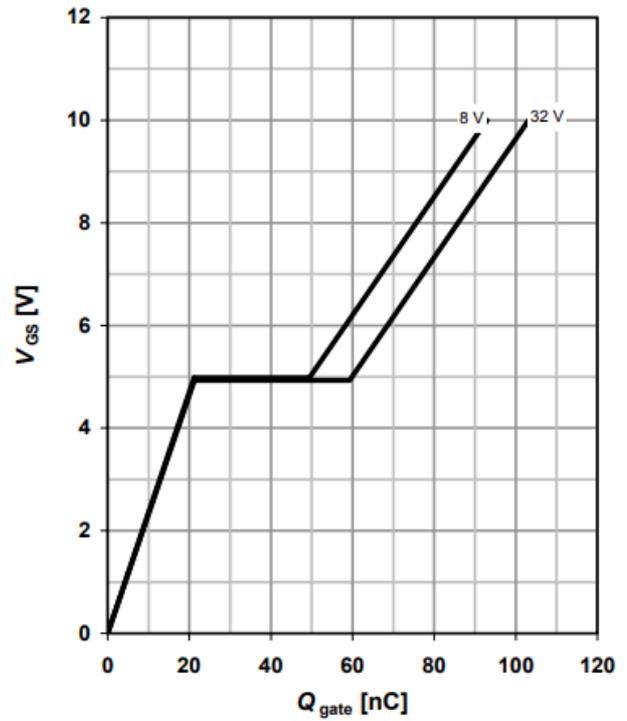
$$E_{AS} = f(T_j)$$

parameter: I_D



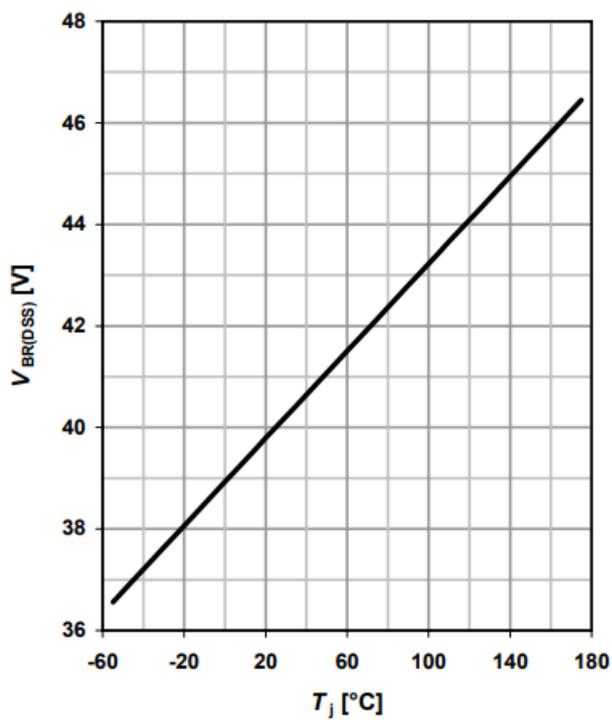
14 典型栅极电荷

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

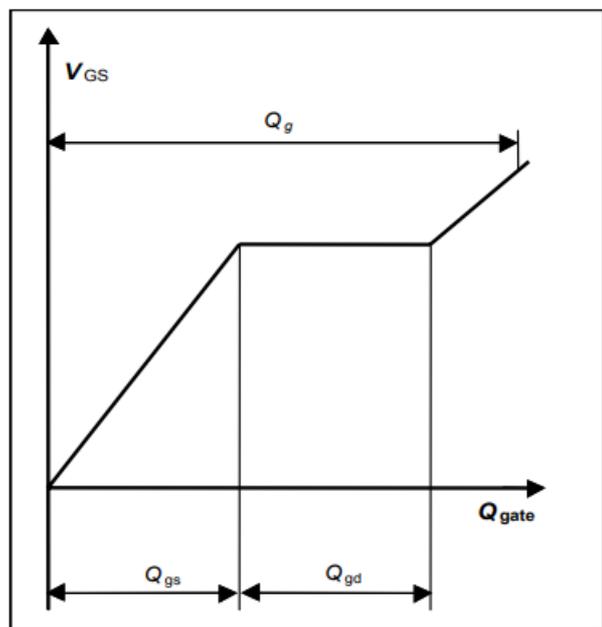


15 漏源击穿电压

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



16 栅极充电波形



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修订记录

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



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