

英飞凌汽车级80V 175°C N沟道

增强型OptiMOS™ 5 功率晶体管



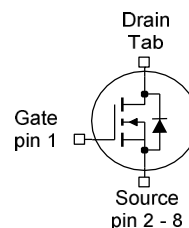
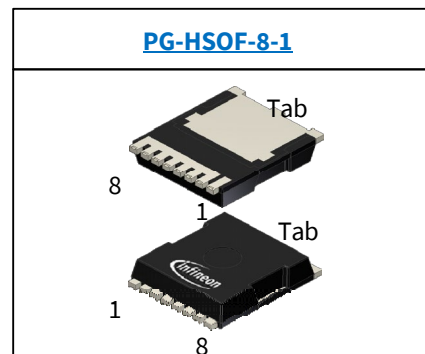
特点

- 适用于汽车应用的功率MOSFET
- N 沟道 – 增强型 – 标准电平
- 严苛于AEC-Q101的扩展认证
- 加强电气测试
- 坚固的设计
- 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
IAUT300N08S5N011	PG-HSOF-8-1	5N08011

产品概述

V_{DS}	80	V
$R_{DS(on)}$	1.1	mΩ
I_D	300	A



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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_C=25^\circ\text{C}$, $V_{GS}=10\text{ V}$, Chip limitation ^{1,2)}	410	A
		$V_{GS}=10\text{ V}$, DC current ³⁾	300	
		$T_a=85^\circ\text{C}$, $V_{GS}=10\text{ V}$, R_{thJA} on 2s2p ^{2,4)}	52	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25^\circ\text{C}$, $t_p=100\ \mu\text{s}$	1505	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=150\text{ A}$	817	mJ
Avalanche current, single pulse	I_{AS}	-	300	A
Gate source voltage	V_{GS}	-	± 20	V
Power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	375	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}		-	-	0.4	K/W
Thermal resistance, junction - ambient ⁴⁾	R_{thJA}		-	14.8	-	

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	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$	80	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=275\text{ }\mu\text{A}$	2.2	3	3.8	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$	-	0.1	1	μA
		$V_{DS}=50\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=85\text{ °C}^{2)}$	-	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	$R_{DS(on)}$	$V_{GS}=6\text{ V}$, $I_D=75\text{ A}$	-	1.3	1.7	m Ω
		$V_{GS}=10\text{ V}$, $I_D=100\text{ A}$	-	1.0	1.1	
Gate resistance ²⁾	R_G	-	-	1.5	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V},$ $f=1\text{ MHz}$	-	12500	16250	pF
Output capacitance	C_{oss}		-	2000	2600	
Reverse transfer capacitance	C_{rss}		-	86	130	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V},$ $I_D=100\text{ A}, R_G=3.5\Omega$	-	31	-	ns
Rise time	t_r		-	19	-	
Turn-off delay time	$t_{d(off)}$		-	69	-	
Fall time	t_f		-	55	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=40\text{ V}, I_D=100\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	56	73	nC
Gate to drain charge	Q_{gd}		-	37	56	
Gate charge total	Q_g		-	178	231	
Gate plateau voltage	$V_{plateau}$		-	4.5	-	V

反向二极管

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	300	A
Diode pulse current ²⁾	$I_{S,pulse}$	$T_C=25\text{ °C}$	-	-	1505	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=100\text{ A},$ $T_j=25\text{ °C}$	-	0.9	1.2	V
Reverse recovery time ²⁾	t_{rr}	$V_R=40\text{ V}, I_F=50\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	86	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	177	-	nC

¹⁾ 实际上，电流能力受到包括客户特定的印刷电路板在内的整体系统设计的限制。

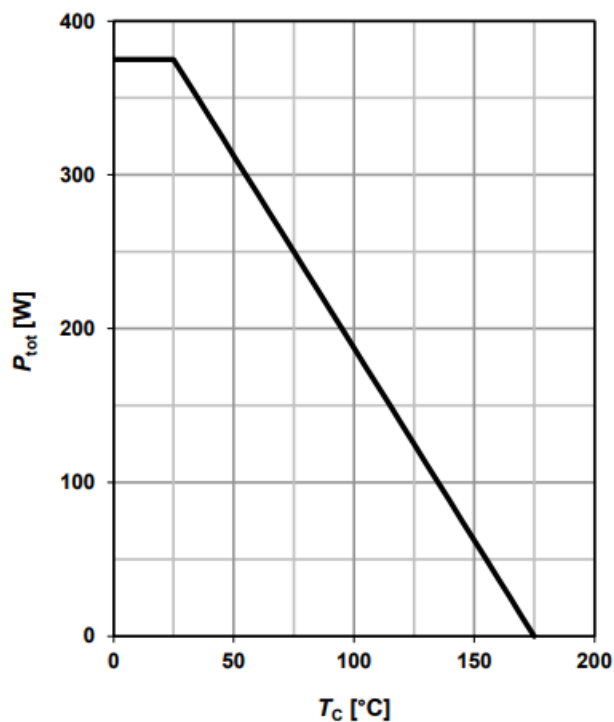
²⁾ 该参数不受限于生产测试 – 由设计标定。

³⁾ 电流受到接合线的限制。

⁴⁾ 器件放置于根据JEDEC标准 (JESD51-5, -7) 定义的 2s2p FR4 印刷电路板上。印刷电路板垂直放置在静止空气中。

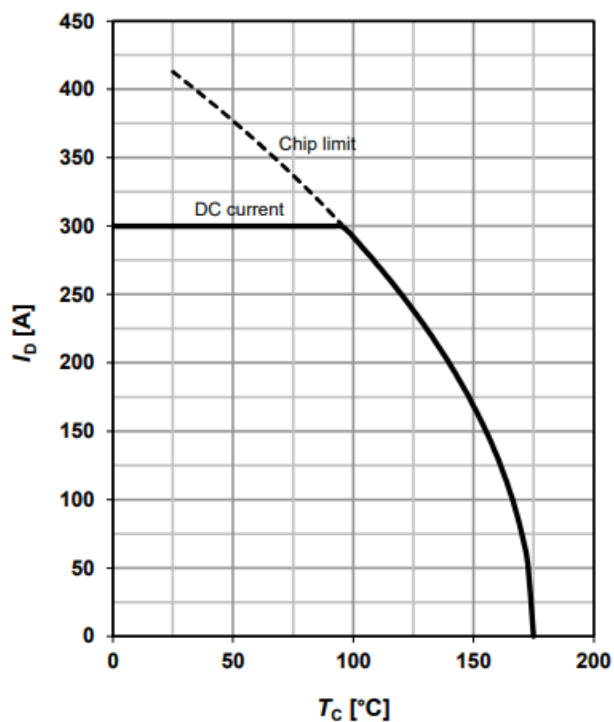
1 功率耗散

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



2 漏极电流

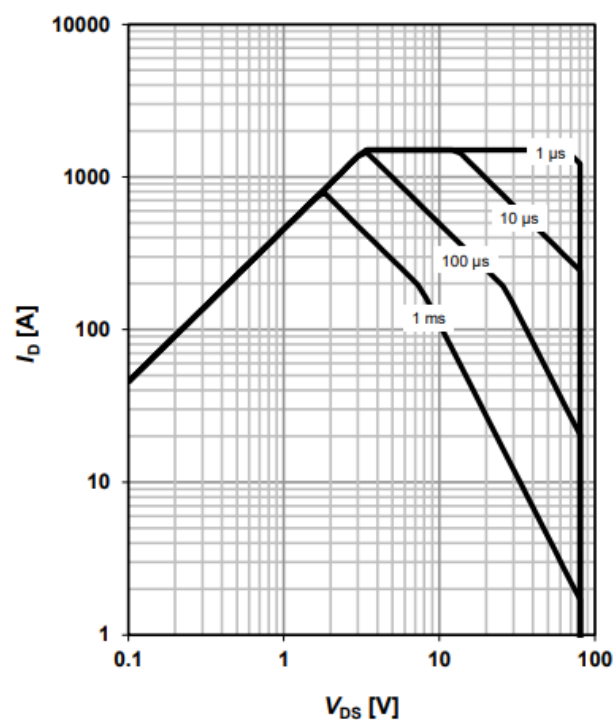
$$I_D = f(T_c); V_{\text{GS}} \geq 6 \text{ V}$$



3 安全工作区

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

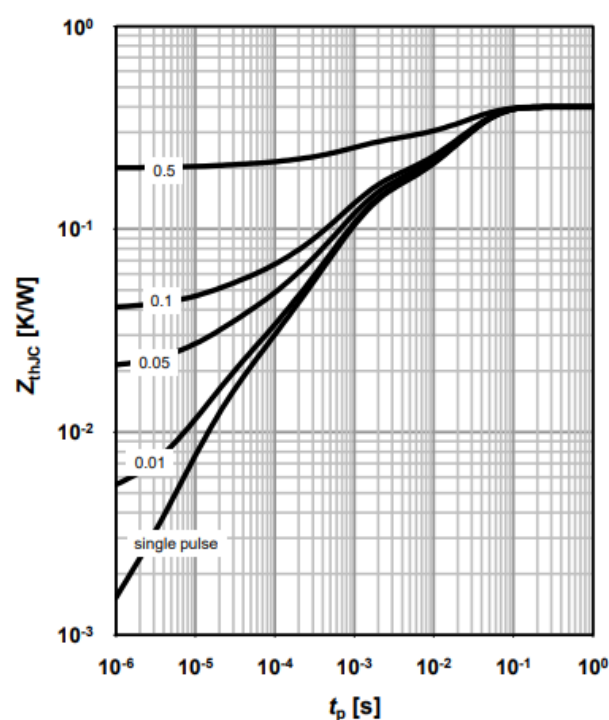
parameter: t_p



4 最大瞬态热阻抗

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

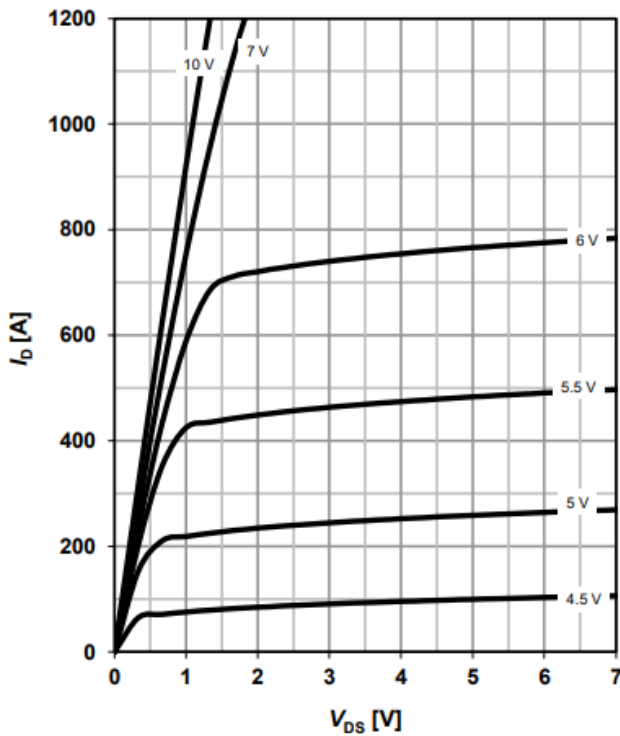
parameter: $D = t_p/T$



5 典型输出特性

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

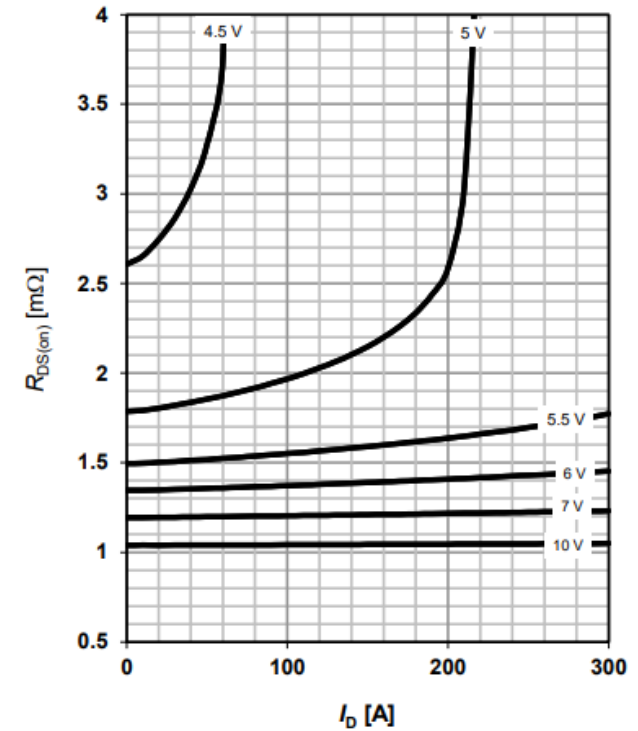
parameter: V_{GS}



6 典型漏源导通电阻

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

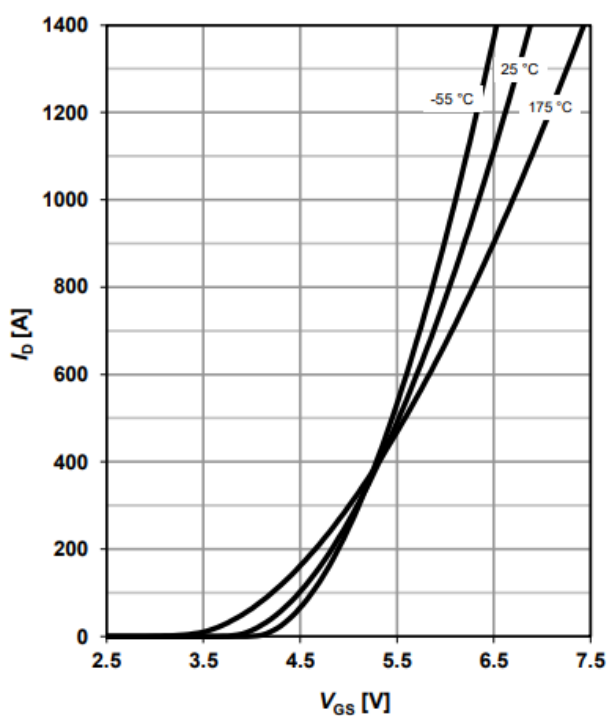
parameter: V_{GS}



7 典型转移特性

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

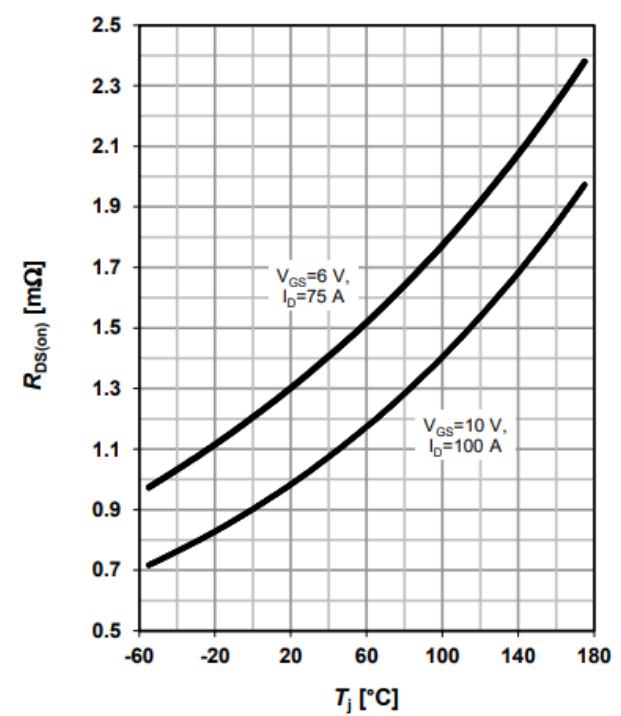
parameter: T_j



8 典型漏源导通电阻

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

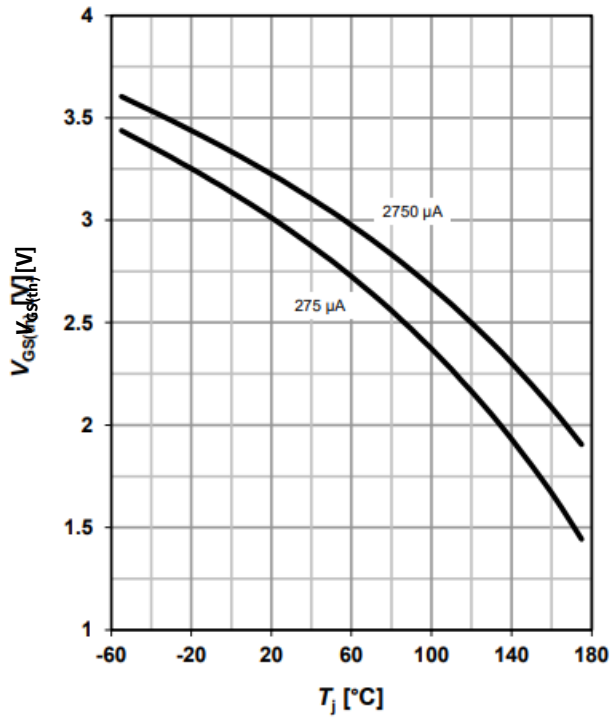
parameter: I_D, V_{GS}



9 典型栅极阈值电压

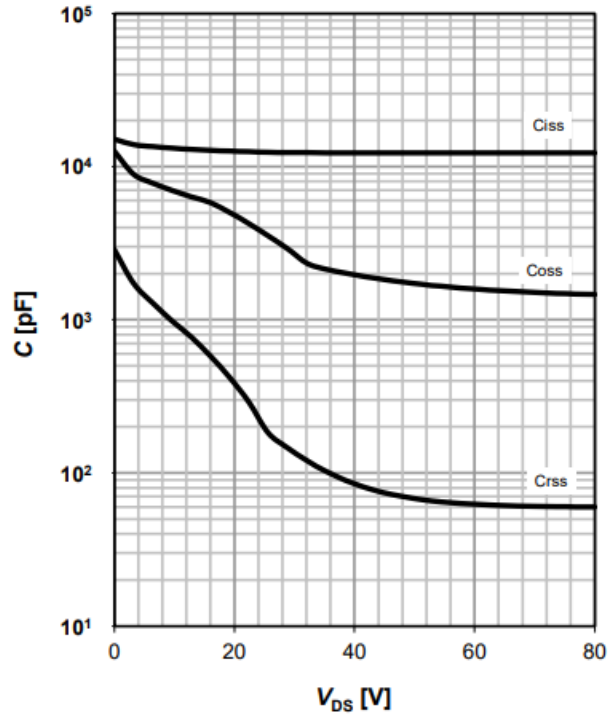
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



10 典型电容值

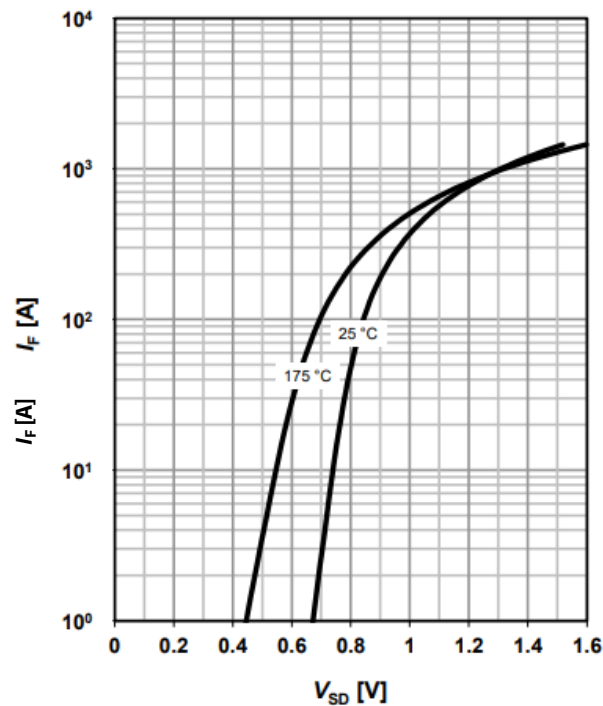
$$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$$



11 典型二极管正向导通特性

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

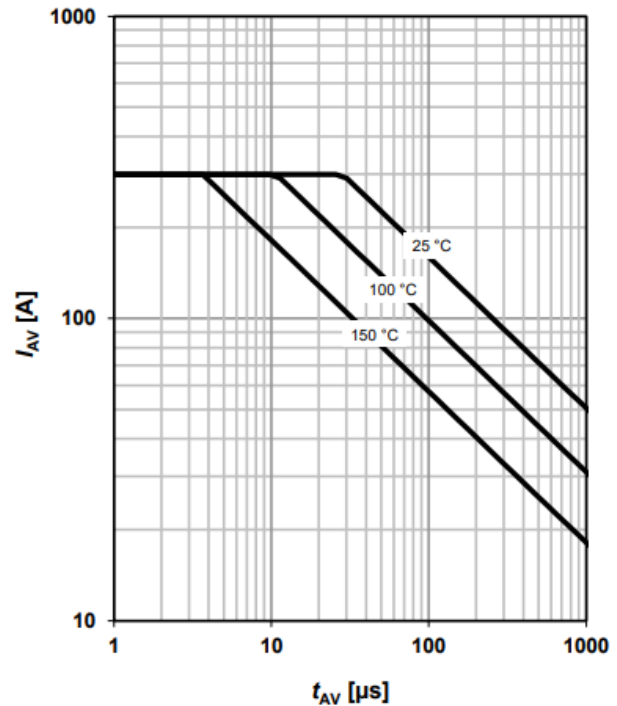
parameter: T_j



12 典型雪崩特性

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

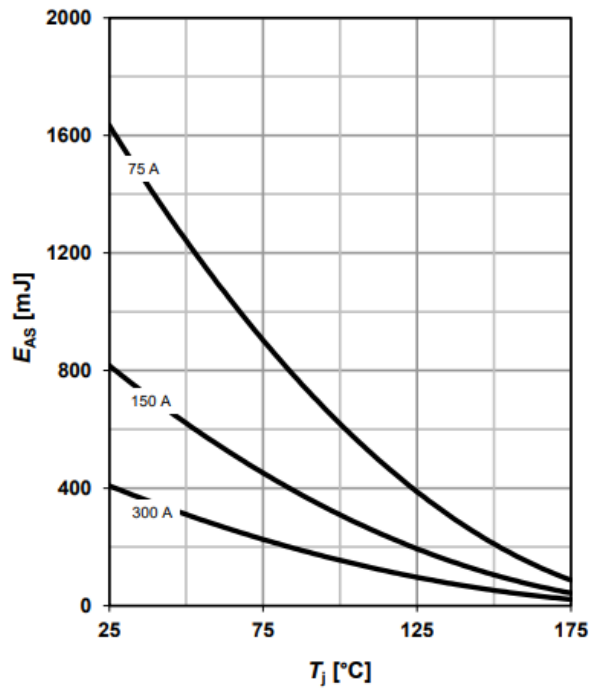
parameter: $T_{j(start)}$



13 典型雪崩能量

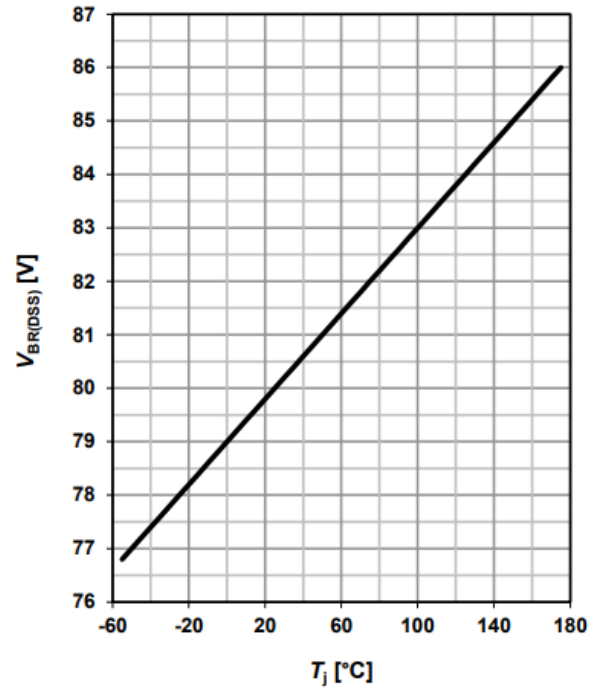
$$E_{AS} = f(T_j)$$

parameter: I_D



14 漏源击穿电压

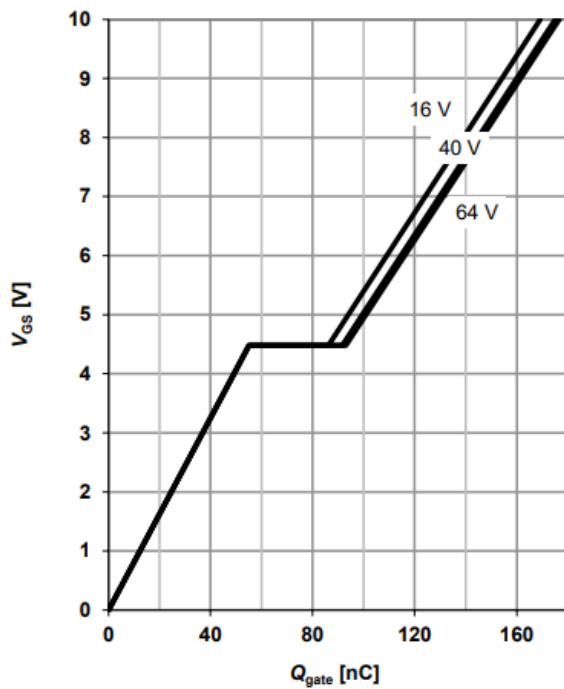
$$V_{BR(DSS)} = f(T_j); I_{D_typ} = 1 \text{ mA}$$



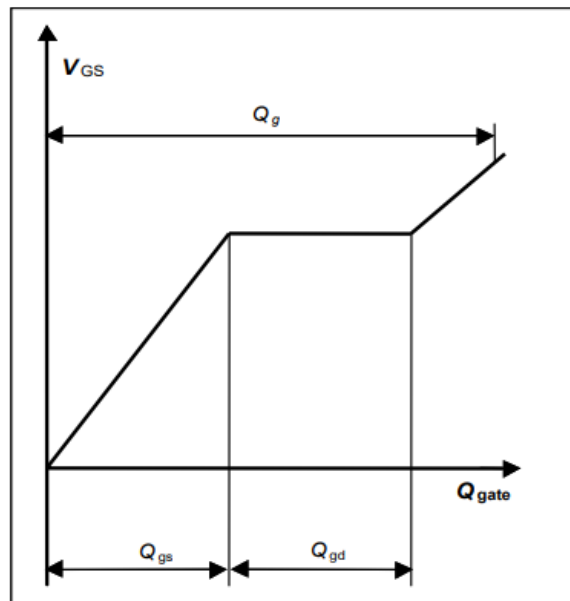
15 典型栅极电荷

$$V_{GS} = f(Q_{gate}); I_D = 100 \text{ A pulsed}$$

parameter: V_{DD}



16 栅极充电波形



The drawing is in compliance with ISO 128-30, Projection Method 1 []
Drawing according to ISO 8015, general tolerances $\pm 0,1$; $\pm 1^{\circ}30'$

Technical drawing of a PCB pad layout for a 42x42 array of pins. The drawing includes a top view and a side view. The top view shows a central copper pad (dark grey) with a diameter of 10.1 mm, surrounded by a solder mask (hatched) and a stencil aperture (diagonal lines). The side view shows the pad thickness of 1.5 mm. Dimensions are given in mm. A legend indicates: copper (dark grey), solder mask (hatched), and stencil apertures (diagonal lines).

Legend:

- copper
- solder mask
- stencil apertures

All pads are solder mask defined
All dimensions are in units mm

All dimensions are in units mm.
The drawing is in compliance with ISO 128-30, Projection Method 1 (1st angle)

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修订记录

Version	Date	Changes
Version 1.0	2021-01-19	Final Datasheet
Version 1.1	2021-01-26	Part Marking Info corrected
Version 1.2	2023-02-07	package outline corrected, footprint updated



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