

英飞凌汽车级60V 175°C N沟道

增强型OptiMOS™ 5 功率晶体管



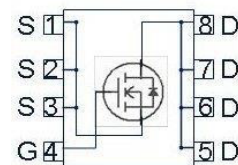
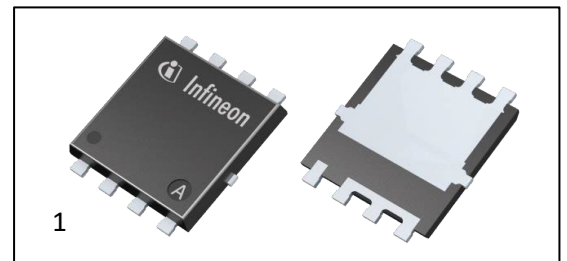
特点

- 适用于汽车应用的功率MOSFET
- N 沟道 - 增强型 - 标准电平
- 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

产品概述

V_{DS}	60	V
$R_{DS(on),max}$	1.7	mΩ
I_D	120	A

PG-TDSON-8-43



Type	Package	Marking
IAUC120N06S5N017	PG-TDSON-8-43	5N06N017

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
Drain current	I_D	$V_{GS}=10\text{ V}$, Chip limitation ^{1,2)}	226	A
		$V_{GS}=10\text{ V}$, DC current ³⁾	120	
		$T_a=85^\circ\text{C}$, $V_{GS}=10\text{ V}$, R_{thJA} on 2s2p ^{2,4)}	30	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_c=25^\circ\text{C}$, $t_p=100\text{ }\mu\text{s}$	757	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=60\text{ A}$	345	mJ
Avalanche current, single pulse	I_{AS}	-	120	A
Gate source voltage	V_{GS}	-	± 20	V
Power dissipation	P_{tot}	$T_c=25^\circ\text{C}$	167	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C

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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

热特性²⁾

Thermal resistance, junction - case	R_{thJC}	-	-	-	0.9	K/W
Thermal resistance, junction - ambient ⁴⁾	R_{thJA}	-	-	23.3	-	

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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=1mA$	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=94\mu A$	2.2	2.8	3.4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V, T_j=25\text{ °C}$	-	-	1	μA
		$V_{DS}=60V, V_{GS}=0V, T_j=125\text{ °C}^{1)}$	-	-	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=7V, I_D=30A$	-	1.6	1.9	m Ω
		$V_{GS}=10V, I_D=60A$	-	1.3	1.7	
Gate resistance ²⁾	R_G	-	-	1.6	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=30V,$ $f=1MHz$	-	5348	6952	pF
Output capacitance	C_{oss}		-	1160	1507	
Reverse transfer capacitance	C_{rss}		-	56	84	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30V, V_{GS}=10V,$ $I_D=60A, R_{G,ext}=3.5\Omega$	-	13.4	-	ns
Turn-off delay time	$t_{d(off)}$		-	26.9	-	
Rise time	t_r		-	7.0	-	
Fall time	t_f		-	17.2	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=30V, I_D=60A,$ $V_{GS}=0 \text{ to } 10V$	-	24.0	31.2	nC
Gate to drain charge	Q_{gd}		-	13.7	20.6	
Gate charge total	Q_g		-	73.7	95.9	
Gate plateau voltage	$V_{plateau}$		-	4.5	-	V

反向二极管

Diode continuous forward current ²⁾	I_S	$T_C=25^\circ C$	-	-	120	A
Diode pulse current ²⁾	$I_{S,pulse}$	$T_C=25^\circ C, t_p=100\mu s$	-	-	757	
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_F=60A,$ $T_J=25^\circ C$	-	0.8	1.1	V
Reverse recovery time ²⁾	t_{rr}	$V_R=30V, I_F=50A,$ $di_F/dt=100A/\mu s$	-	49	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	49	-	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。

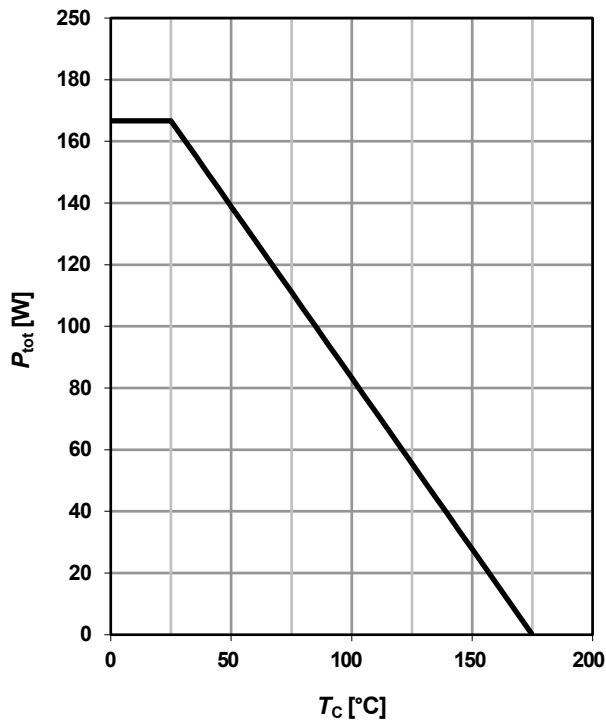
²⁾ 这些参数不经过生产测试，但经过设计和/或特性验证。

³⁾ 该产品可以根据最佳实践在指定电流下运行，以最大限度地减少焊点处的电迁移。对于罕见事件和浪涌电流，该值可能会超出。

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。

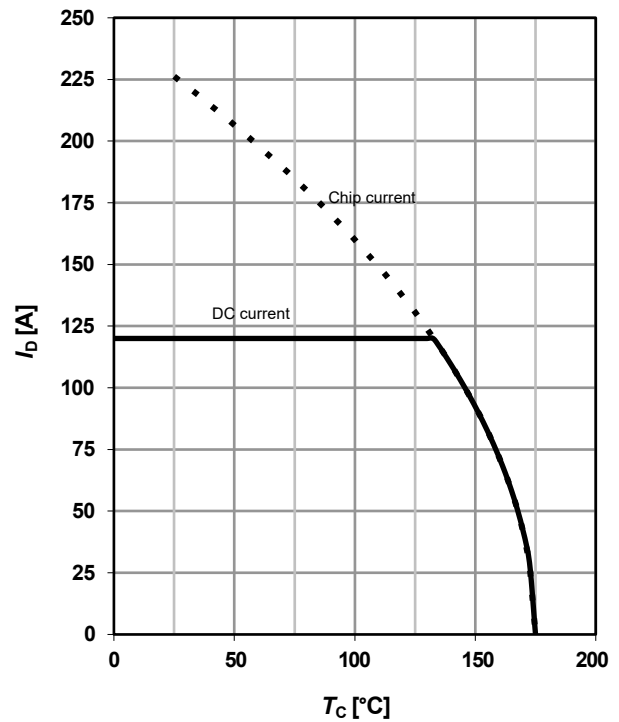
1 功率耗散

$$P_{\text{tot}} = f(T_C); V_{\text{GS}} = 10 \text{ V}$$



2 漏极电流

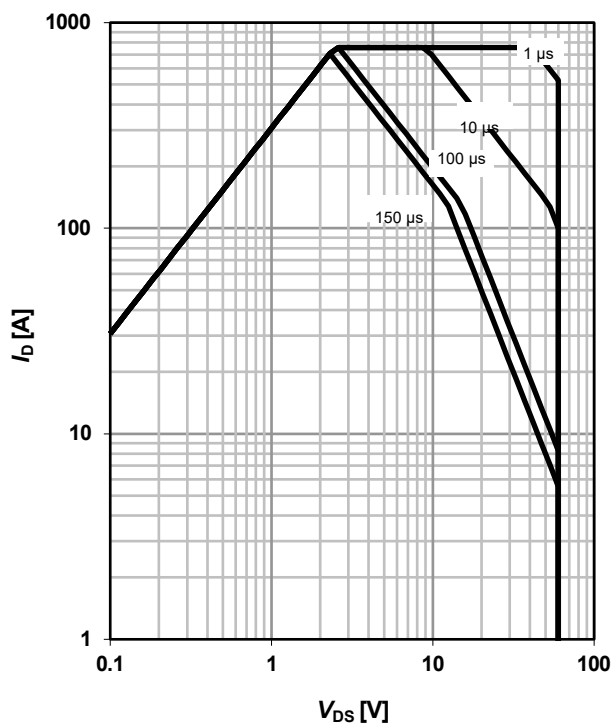
$$I_D = f(T_C); V_{\text{GS}} = 10 \text{ V}$$



3 安全工作区

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

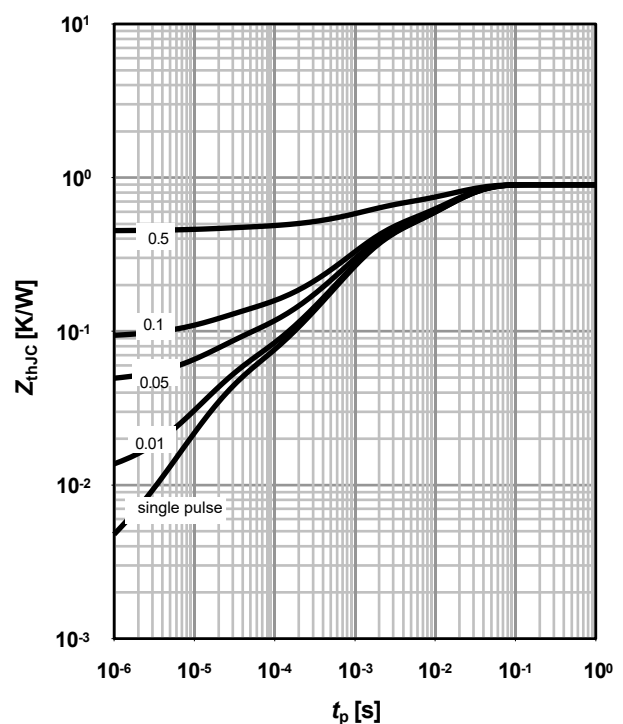
parameter: t_p



4 最大瞬态热阻抗

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

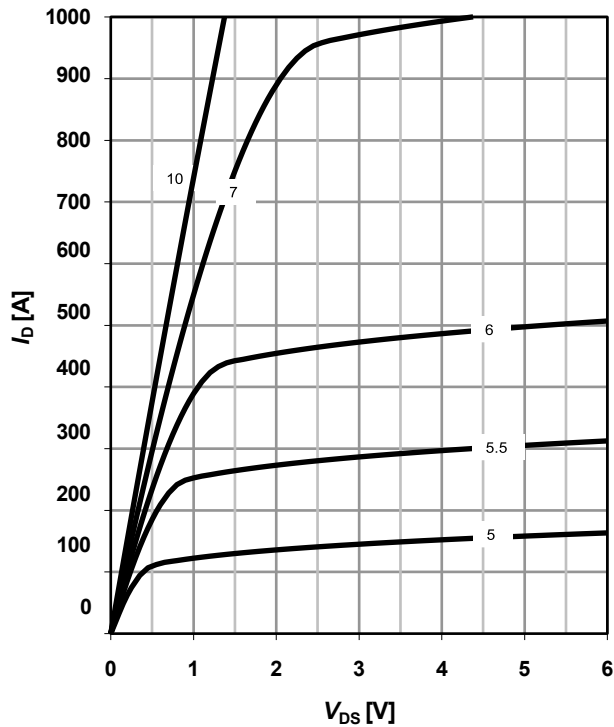
parameter: $D = t_p/T$



5 典型输出特性

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

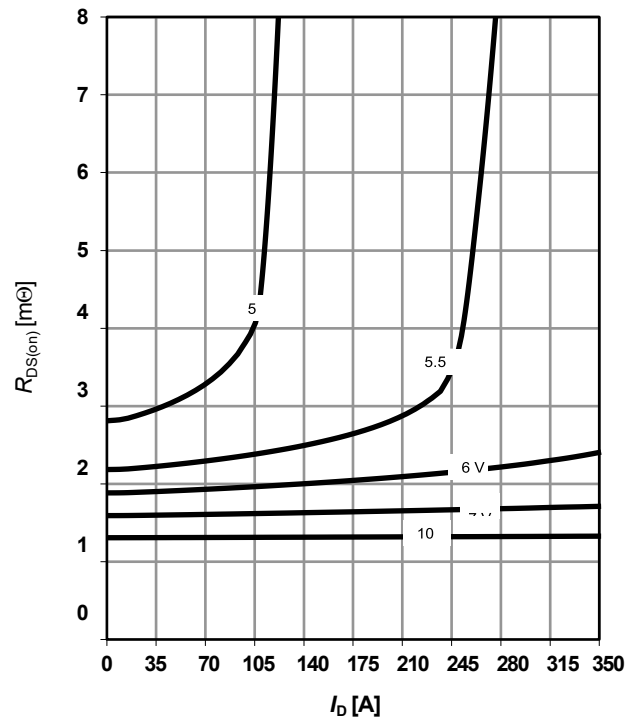
parameter: V_{GS}



6 典型漏源导通电阻

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

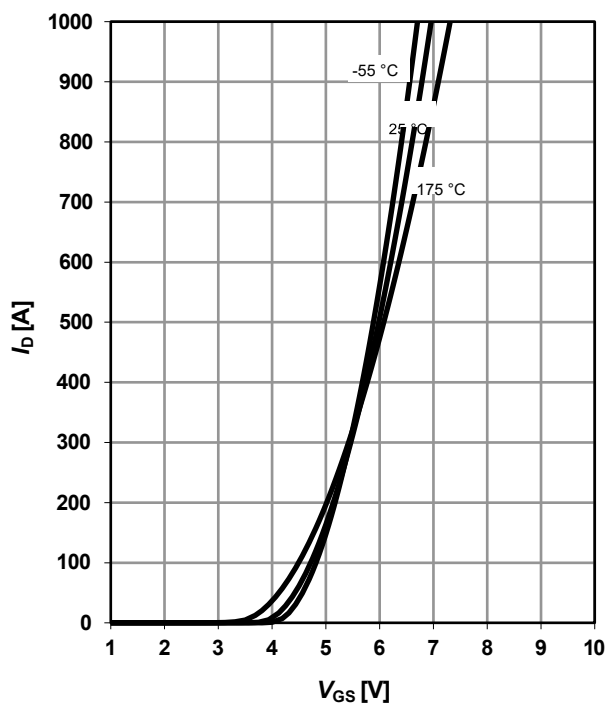
parameter: V_{GS}



7 典型转移特性

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

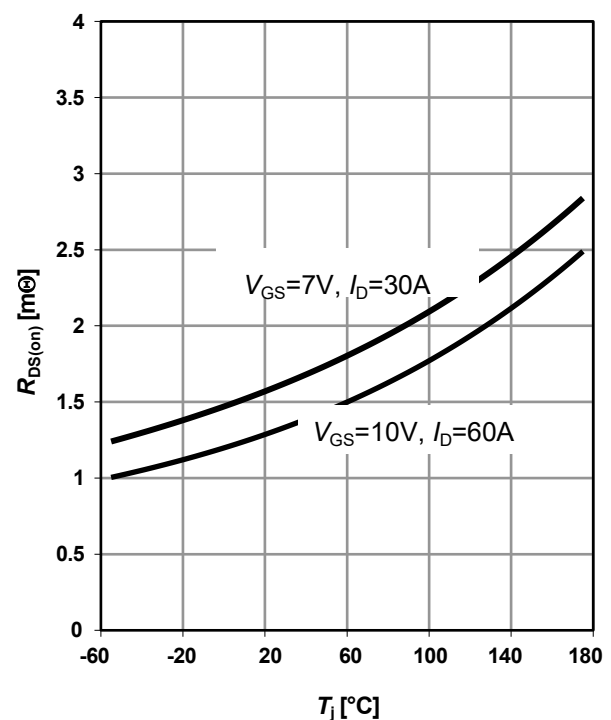
parameter: T_j



8 典型漏源导通电阻

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

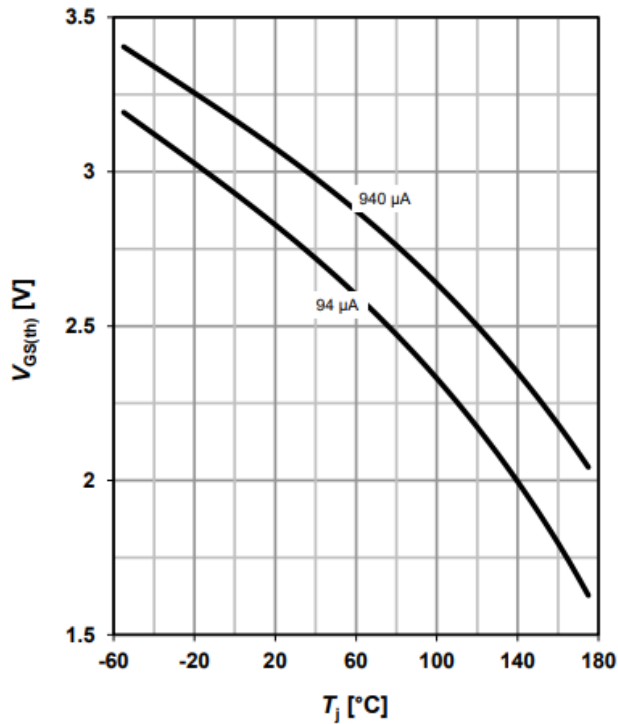
parameter: I_D, V_{GS}



9 典型栅极阈值电压

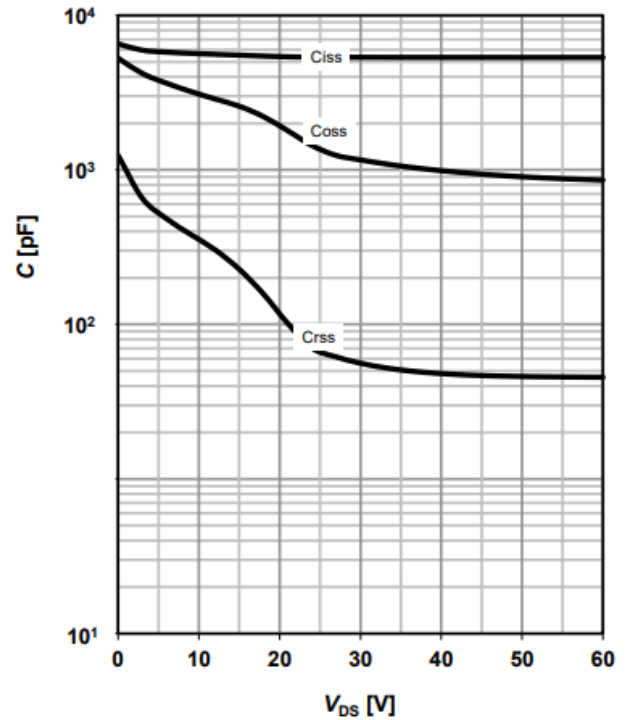
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



10 典型电容值

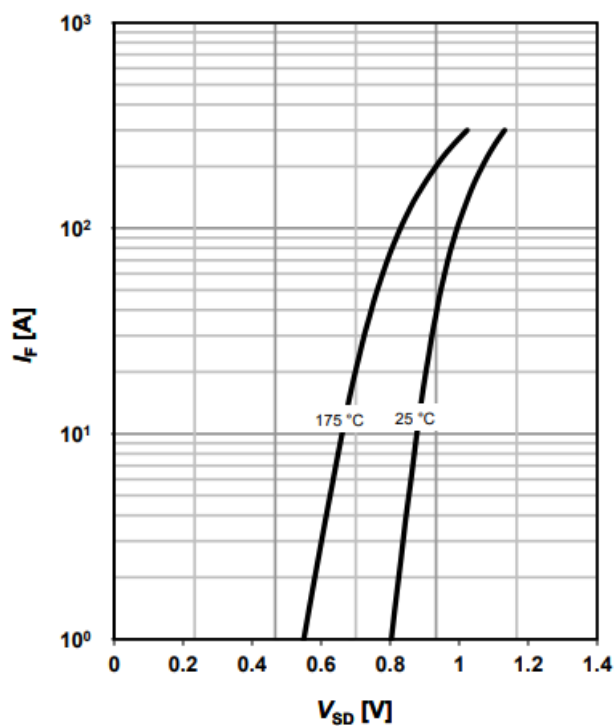
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



11 典型二极管正向导通特性

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

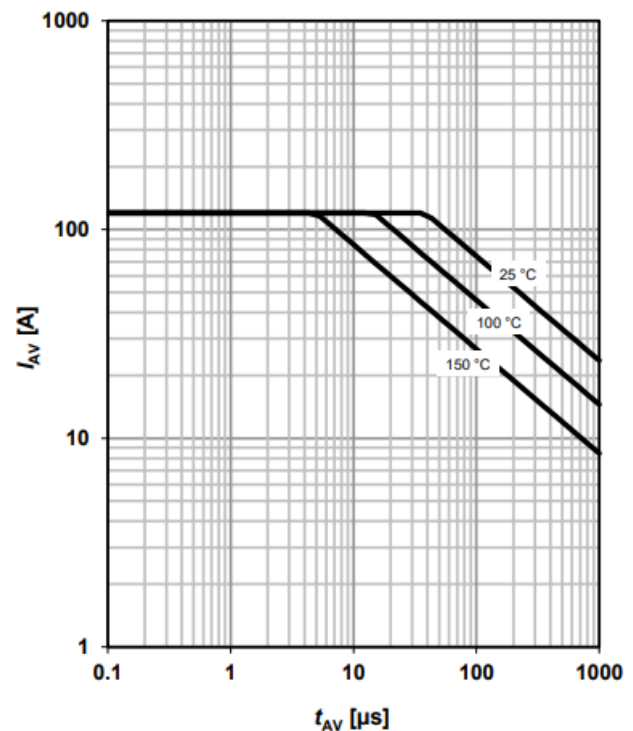
parameter: T_j



12 典型雪崩特性

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

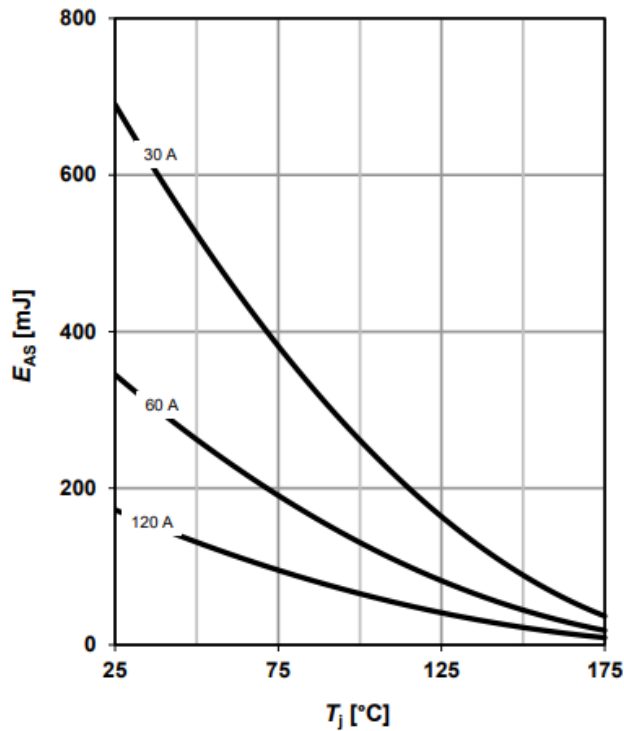
parameter: $T_{j(start)}$



13 典型雪崩能量

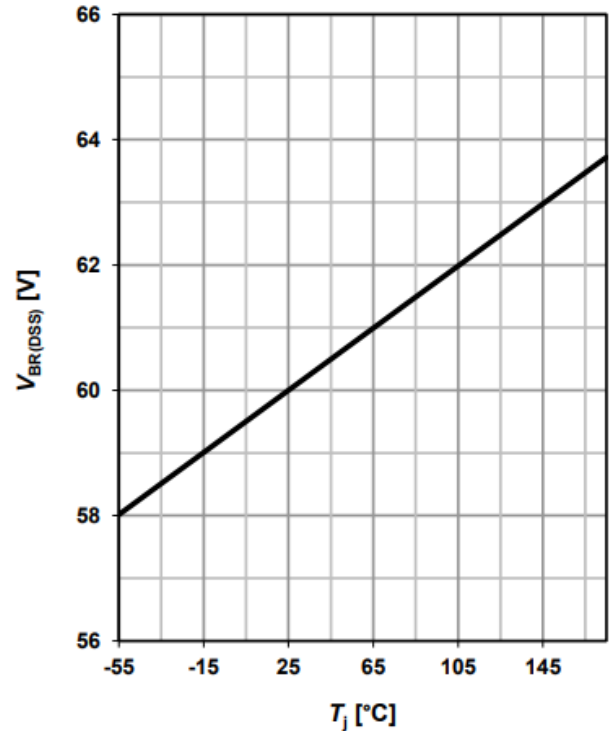
$$E_{AS} = f(T_j)$$

parameter: I_D



14 漏源击穿电压

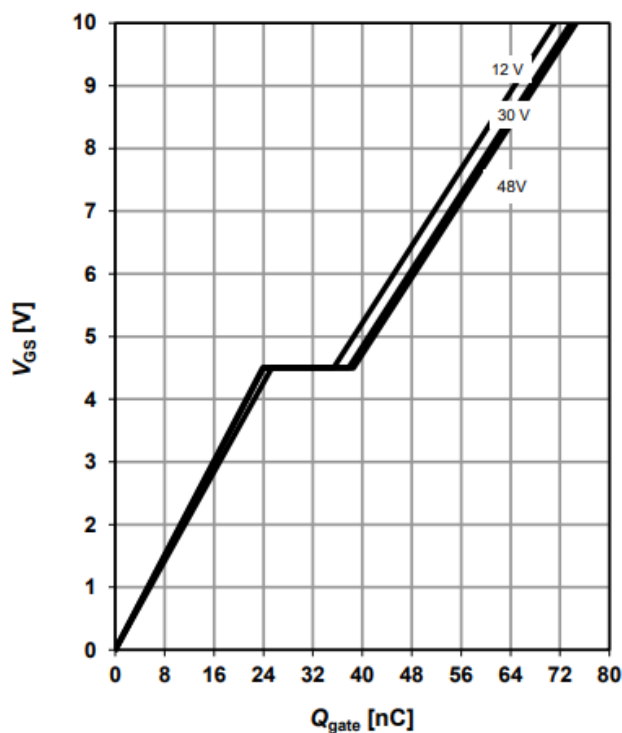
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$



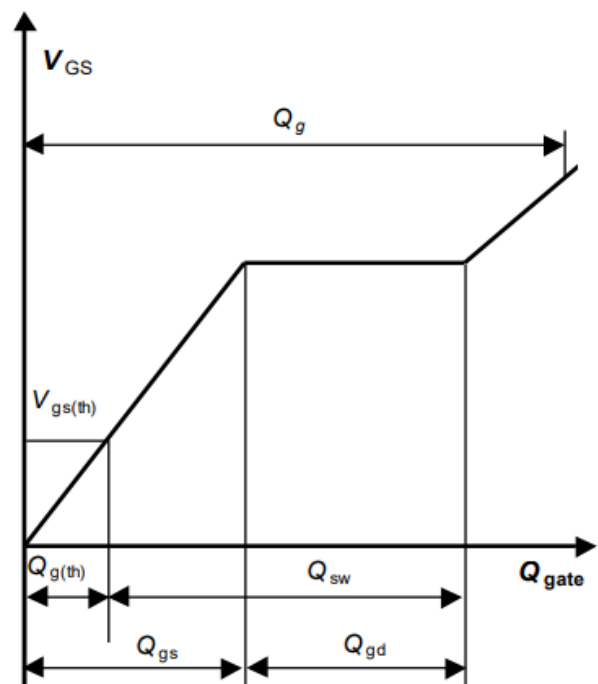
15 典型栅极电荷

$$V_{GS} = f(Q_{gate}); I_D = 60 \text{ A pulsed}$$

parameter: V_{DD}



16 栅极充电波形



Technical drawing of a square microfluidic chip. The drawing includes a top view, a side view, and a cross-sectional view. The top view shows a square chip with a central square region and four corner ports. Dimensions include a total width of 5.15 ± 0.1 mm, a central square width of 4.3 ± 0.1 mm, and a port width of 0.8 ± 0.1 mm. The chip has a thickness of 0.25 ± 0.1 mm. A cross-sectional view shows the chip's profile with a central channel of 0.4 ± 0.1 mm and a port height of 0.12 ± 0.1 mm. A side view shows the chip's profile with a central channel of 0.48 ± 0.1 mm and a port height of 0.13 ± 0.1 mm. A detail view of the port shows a width of 0.44 ± 0.1 mm and a height of 0.12 mm. A detail view of the central square shows a width of 0.03 mm. A detail view of the chip's surface shows a roughness of 0.0075 mm. A detail view of the chip's edge shows a roughness of 0.25 mm. A detail view of the chip's corner shows a radius of 0.12 mm. A detail view of the chip's port shows a width of 0.44 ± 0.1 mm and a height of 0.12 mm. A detail view of the chip's central square shows a width of 0.03 mm. A detail view of the chip's surface shows a roughness of 0.0075 mm. A detail view of the chip's edge shows a roughness of 0.25 mm. A detail view of the chip's corner shows a radius of 0.12 mm.

- 1) EXCLUDE MOLD FLASH
2) REMOVAL ON MOLD GATE, INTRUSION 0.1MM AND PROTRUSION 0.1MM
3) LEAD LENGTH UP TO ANTI FLASH LINE
4) ALL METAL SURFACE ARE PLATED, EXCEPT AREA OF CUT
ALL DIMENSIONS ARE IN UNITS MM
THE DRAWING IS IN COMPLIANCE WITH ISO 128 & PROJECTION METHOD 1 []

Figure 1 consists of two technical drawings, (a) and (b), showing the dimensions of a PCB layout. Drawing (a) is a top view of the copper pad, showing dimensions such as 1.27, 0.6, 1.35, 4.9, 1.125, 0.935, 4.41, 1.5, 0.6, 1.27, 0.6, 3.14, and 0.67. Drawing (b) is a side view of the solder mask and stencil apertures, showing dimensions such as 0.385, 1.5, 0.5, 0.77, 3.72, 0.96, 0.85, 0.45, 0.2, 2.155, 0.75, 0.5, 0.25, 1.2, and 0.77. A legend at the bottom indicates that the solid gray area represents copper, the hatched area represents solder mask, and the cross-hatched area represents stencil apertures.

All dimensions are in units mm

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Revision History

Version	Date	Changes
Revision 1.0	04.05.2020	Final Data Sheet



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