



英飞凌40V 175°C N沟道

增强型OptiMOS™ 5 功率晶体管



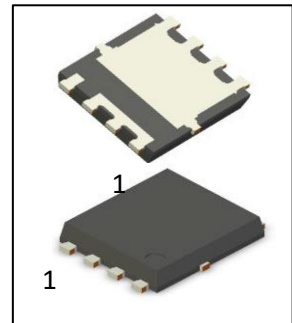
产品概述

V_{DS}	40	V
$R_{DS(on),max}$	1.2	mΩ
I_D	100	A

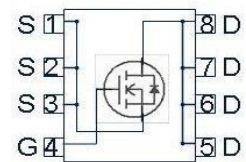
特点

- 适用于汽车应用的功率MOSFET
- N 沟道 - 增强型 - 标准电平
- 通过 AEC-Q101 认证
- 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

PG-TDSON-8-34



Type	Package	Marking
IPC100N04S5-1R2	PG-TDSON-8-34	5N041R2



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 ¹⁾	I_D	$T_c=25^\circ\text{C}$, $V_{GS}=10\text{V}$	100	A
		$T_c=100^\circ\text{C}$, $V_{GS}=10\text{V}^{2)}$	100	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_c=25^\circ\text{C}$	400	
Avalanche energy, single pulse ²⁾	E_{AS}	$I_D=50\text{A}$	480	mJ
Avalanche current, single pulse	I_{AS}	-	100	A
Gate source voltage	V_{GS}	-	± 20	V
Power dissipation	P_{tot}	$T_c=25^\circ\text{C}$	150	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}	-	-	-	1.0	K/W
Thermal resistance, junction - ambient	R_{thJA}	6 cm ² cooling area ³⁾	-	-	50	

除非另有规定，否则均为 $T_j=25^\circ\text{C}$ 的电气特性。

静态参数特性

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=1mA$	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=90\mu A$	2.2	2.8	3.4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_j=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=40V, V_{GS}=0V, T_j=125^\circ\text{C}^{2)}$	-	-	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=7V, I_D=50A$	-	1.2	1.4	m Ω
		$V_{GS}=10V, I_D=50A$	-	1.0	1.2	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V,$ $f=1MHz$	-	5750	7650	pF
Output capacitance	C_{oss}		-	1600	2130	
Reverse transfer capacitance	C_{rss}		-	80	120	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=20V, V_{GS}=10V,$ $I_D=100A, R_G=3.5\Omega$	-	12	-	ns
Rise time	t_r		-	7	-	
Turn-off delay time	$t_{d(off)}$		-	21	-	
Fall time	t_f		-	15	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=32V, I_D=100A,$ $V_{GS}=0 \text{ to } 10V$	-	25	33	nC
Gate to drain charge	Q_{gd}		-	21	32	
Gate charge total	Q_g		-	99	131	
Gate plateau voltage	$V_{plateau}$		-	4.4	-	V

体内寄生反向二极管

Diode continuous forward current ²⁾	I_S	$T_C=25^\circ C$	-	-	100	A
Diode pulse current ²⁾	$I_{S,pulse}$		-	-	400	
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_F=50A,$ $T_J=25^\circ C$	-	0.8	1.1	V
Reverse recovery time ²⁾	t_{rr}	$V_R=20V, I_F=50A,$ $di_F/dt=100A/\mu s$	-	66	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	97	-	nC

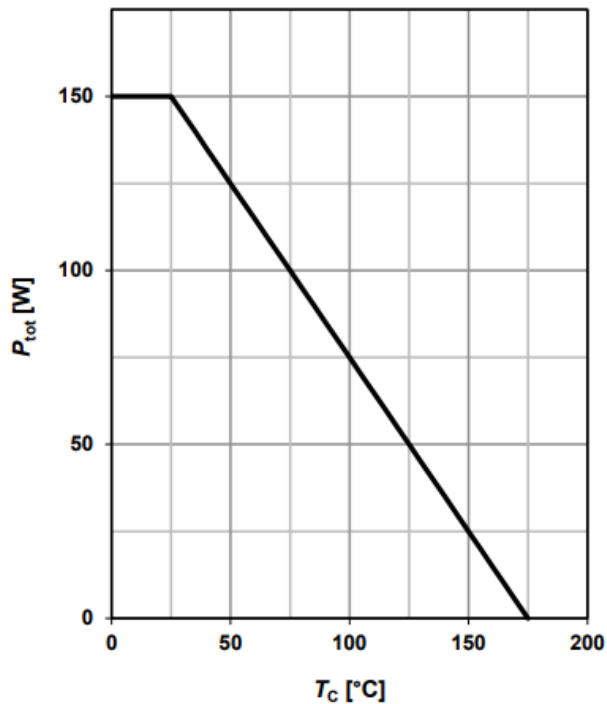
¹⁾ 电流受封装限制；当 $R_{thJC} = 1 \text{ K/W}$ 时，该芯片在 $25^\circ C$ 时能够承载 265 A。

²⁾ 这些参数不经过生产测试，但经过设计和/或特性验证。

³⁾ 器件安装在 $40 \text{ mm} \times 40 \text{ mm} \times 1.5 \text{ mm}$ 环氧树脂印刷电路板 FR4 上，漏极连接用铜面积为 6 cm^2 （一层， $70 \mu\text{m}$ 厚）。印刷电路板垂直放置在静止空气中。

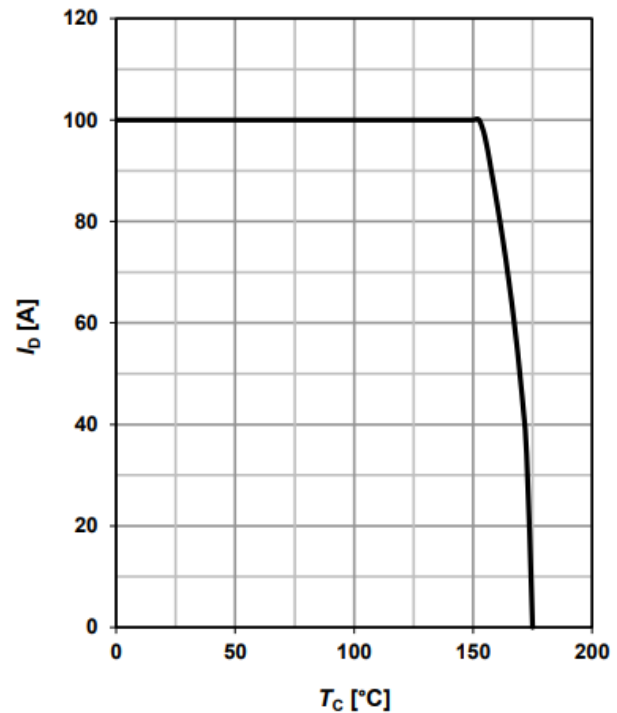
1 功率耗散

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



2 漏极电流

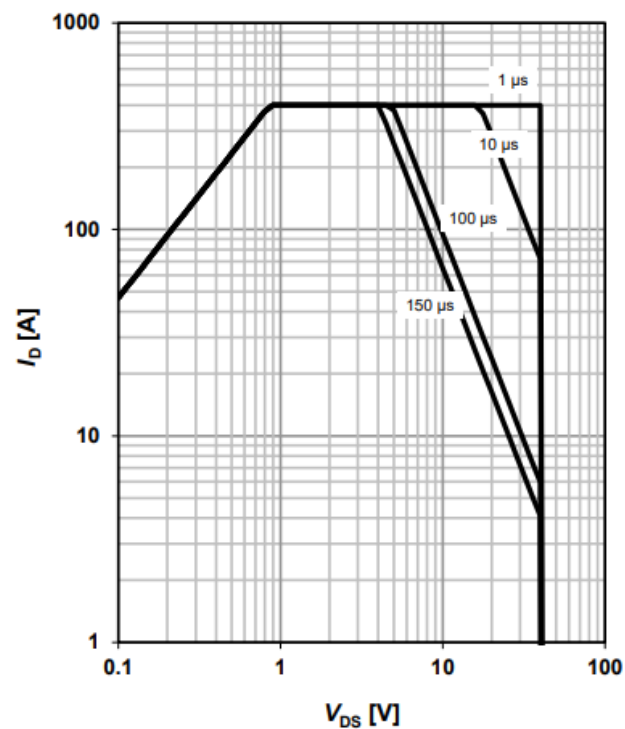
$$I_D = f(T_C); V_{\text{GS}} = 10 \text{ V}$$



3 安全工作区

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

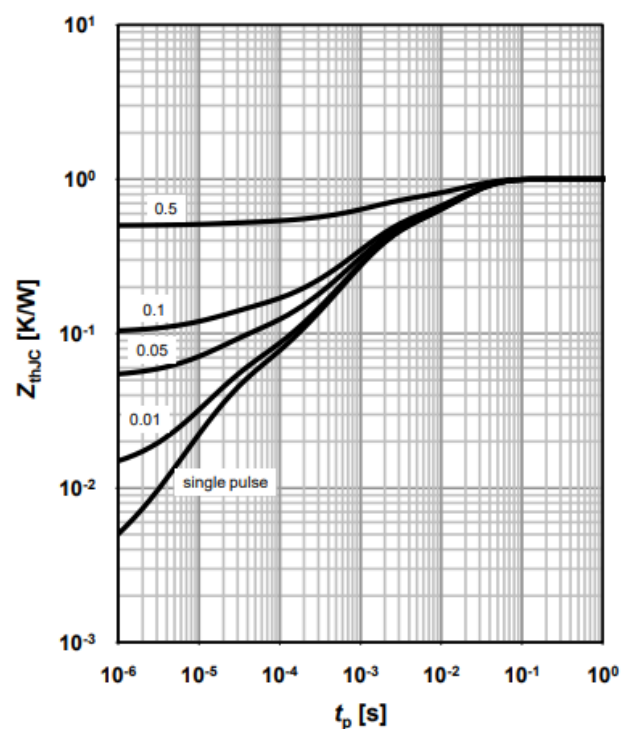
parameter: t_p



4 最大瞬态热阻抗

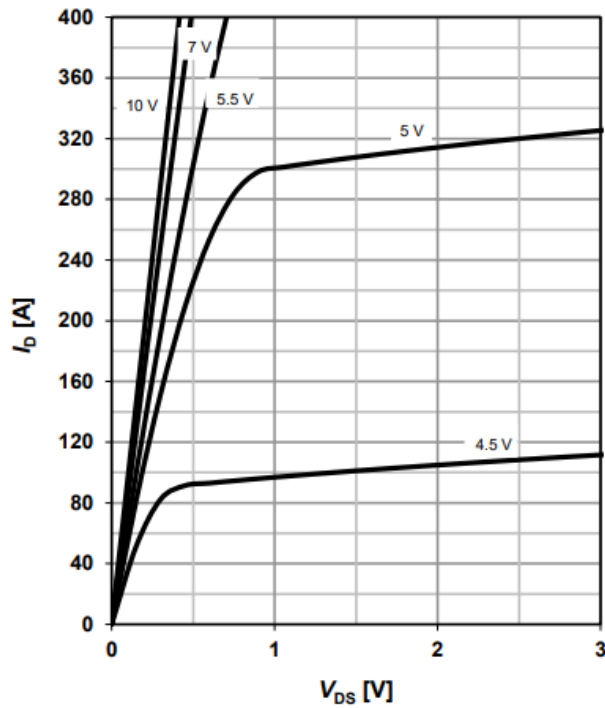
$$Z_{\text{thJC}} = f(t_p)$$

parameter: $D = t_p/T$



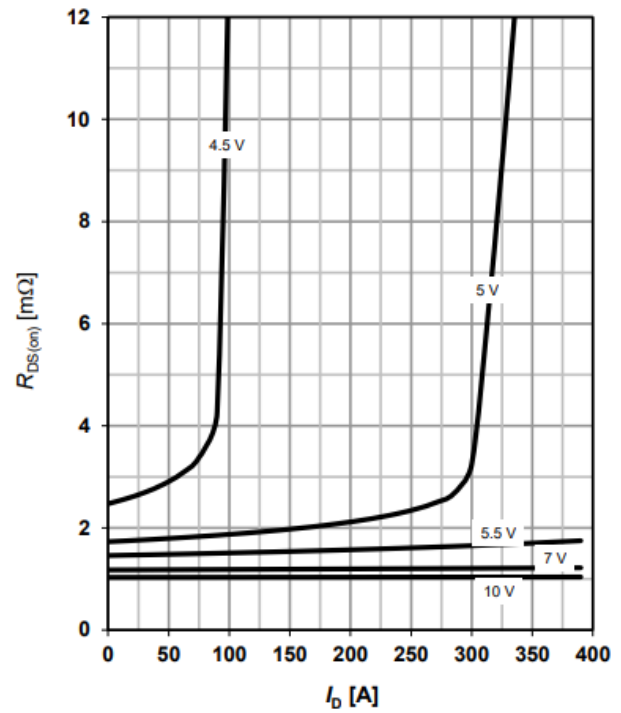
5 典型输出特性

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

parameter: V_{GS}


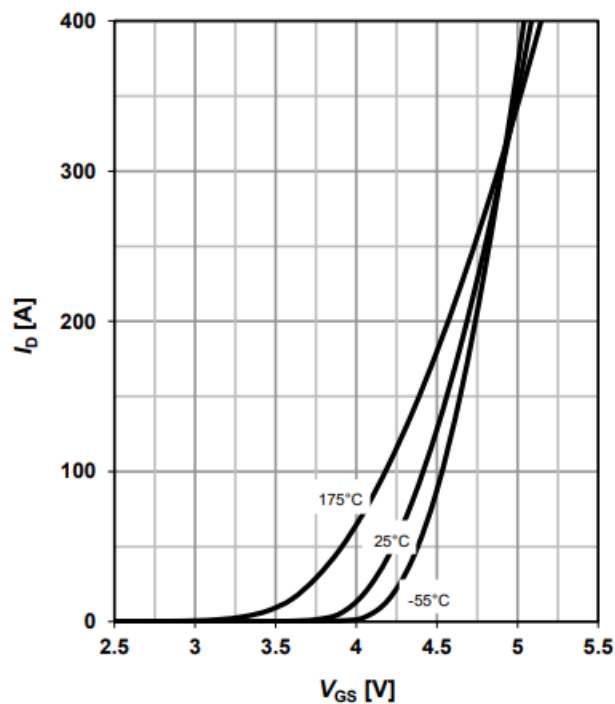
6 典型漏源导通电阻

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

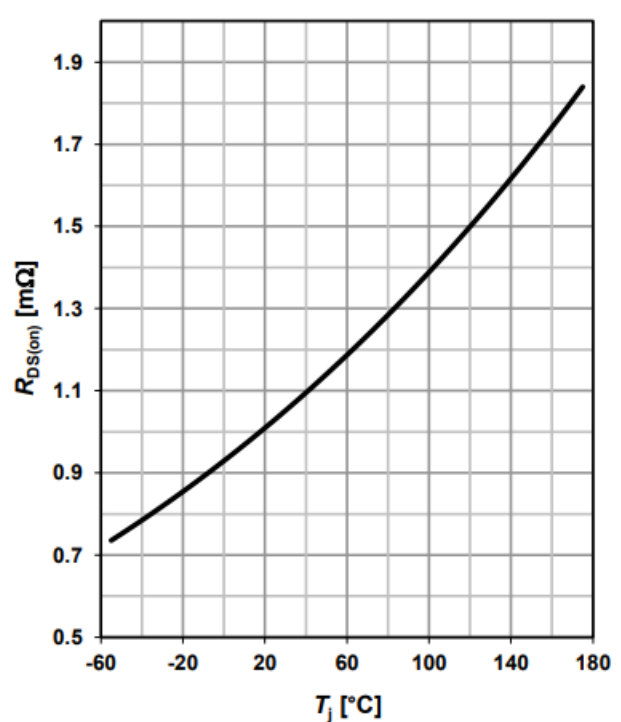
parameter: V_{GS}


7 典型转移特性

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

parameter: T_j


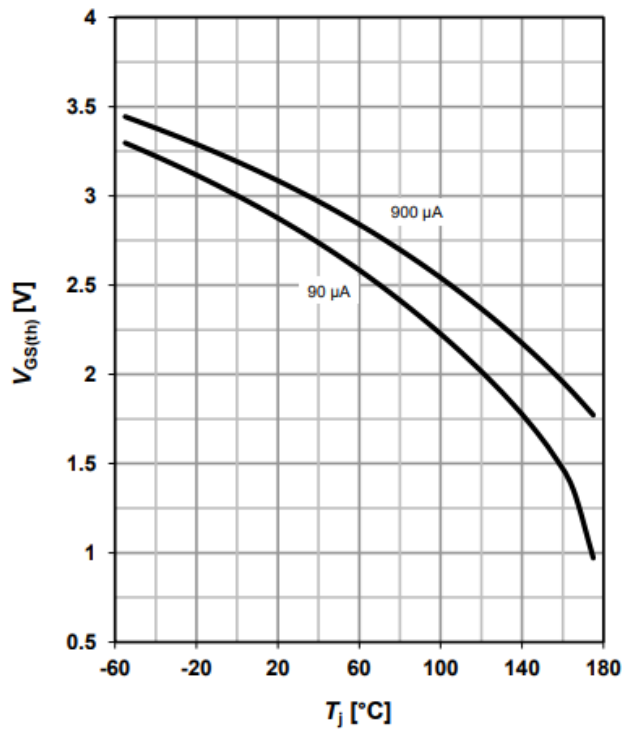
8 典型漏源导通电阻

 $R_{DS(on)} = f(T_j); I_D = 50\text{ A}; V_{GS} = 10\text{ V}$


9 典型栅极阈值电压

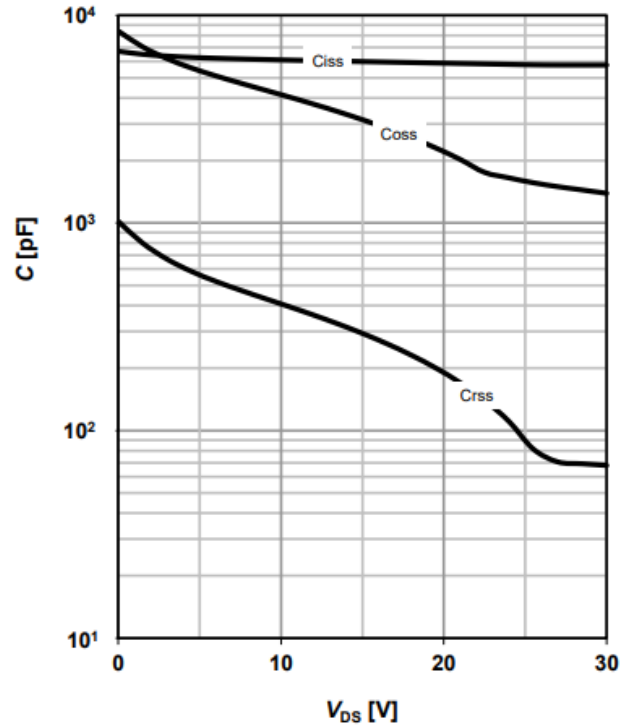
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



10 典型电容值

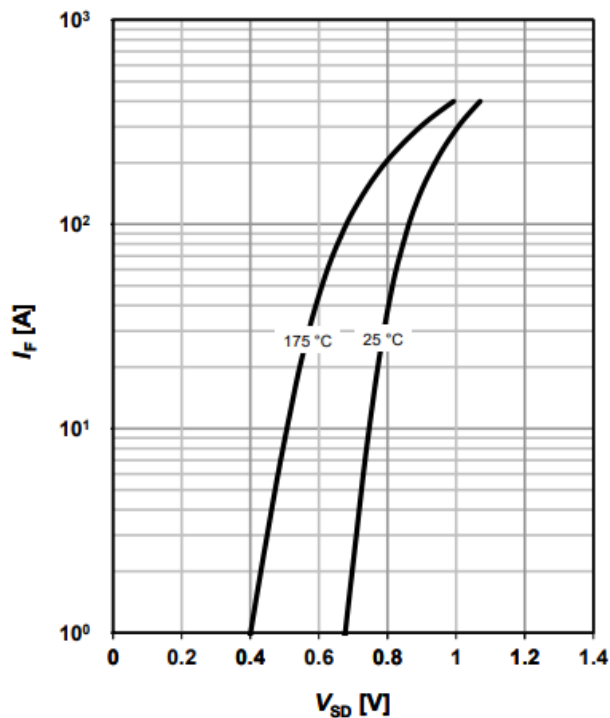
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



11 典型二极管正向导通特性

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

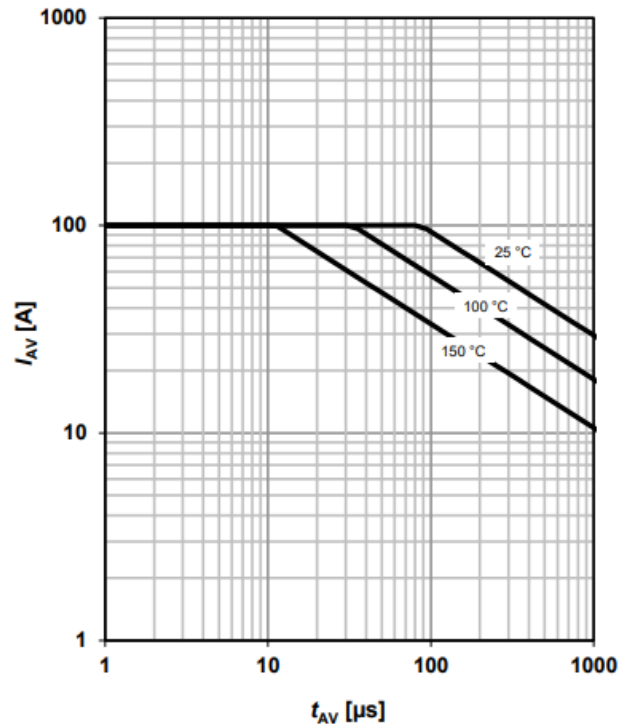
parameter: T_j



12 典型雪崩特性

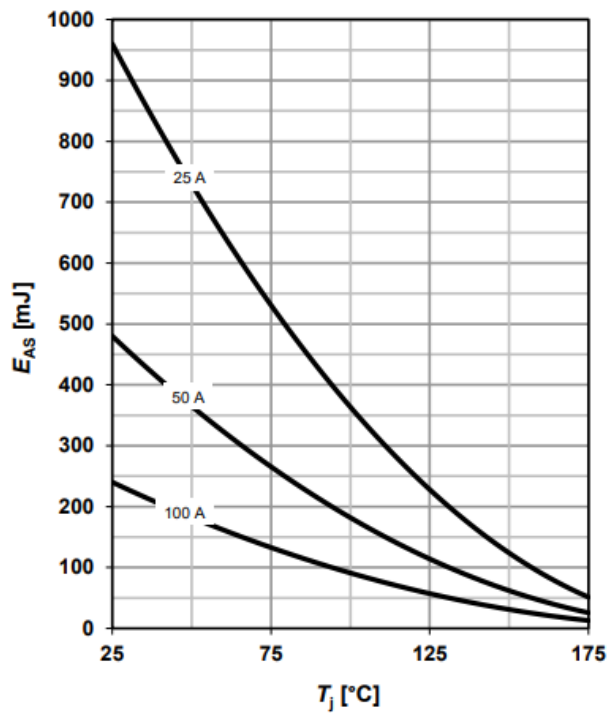
$$I_{AS} = f(t_{AV})$$

parameter: $T_{j(start)}$



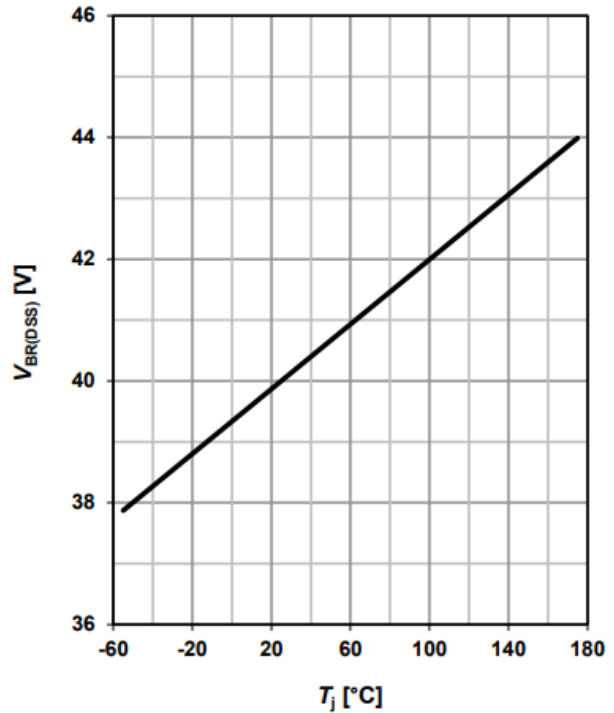
13 典型雪崩能量

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



14 漏源击穿电压

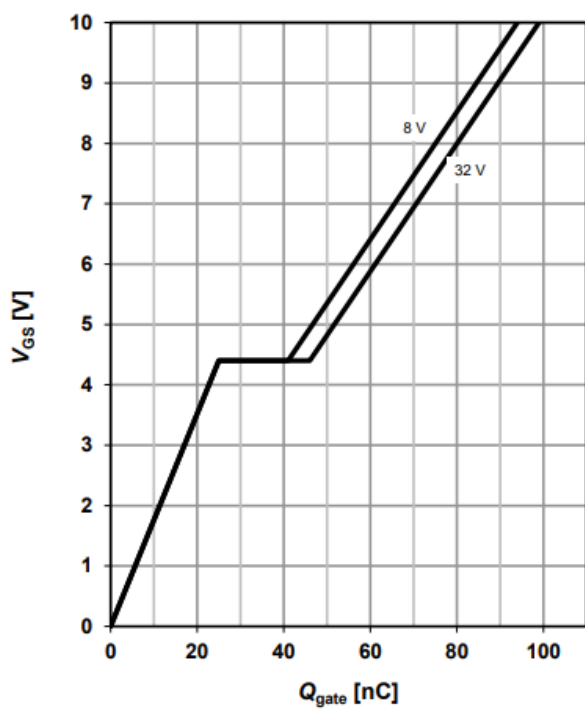
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$



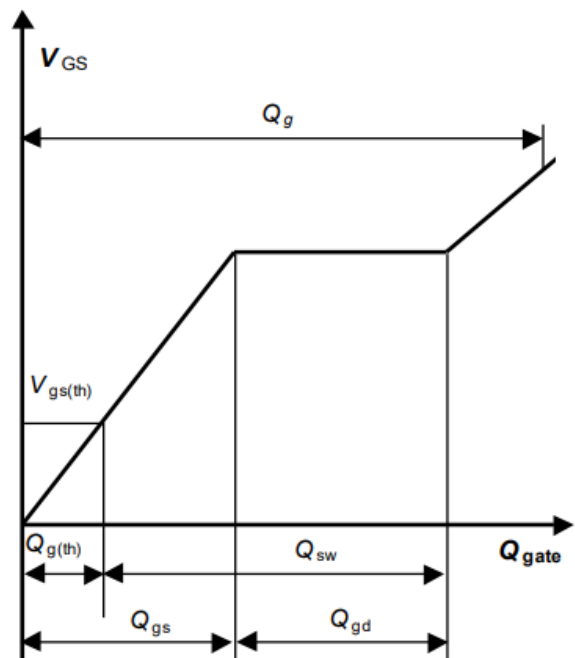
15 典型栅极电荷

$$V_{GS} = f(Q_{gate}); I_D = 40 \text{ A pulsed}$$

parameter: V_{DD}



16 栅极充电波形



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修订记录

Version	Date	Changes
Revision 1.0	14.03.2016	Final Data Sheet
Revision 1.1	07.09.2016	Detailed package name added
Revision 1.2	06.12.2016	Update the IDSS for Tj=25°C
Revision 1.3	03.08.2017	Update the Qrr and trr test condition to IF=50A



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