

英飞凌40V 175°C N沟道增强型

OptiMOS®-T 功率晶体管



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
- 绿色封装（符合 RoHS 要求）
- 100% 雪崩测试

产品概述

V_{DS}	40	V
$R_{DS(on),max}$ (SMD version)	5.4	mΩ
I_D	80	A

PG-T0263-3-2



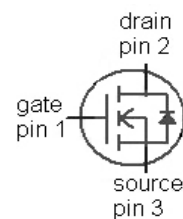
PG-T0262-3-1



PG-T0220-3-1



Type	Package	Marking
IPB80N04S3-06	PG-T0263-3-2	3N0406
IPI80N04S3-06	PG-T0262-3-1	3N0406
IPP80N04S3-06	PG-T0220-3-1	3N0406



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	$T_C=25^\circ\text{C}$, $V_{GS}=10\text{V}^{(1)}$	80	A
		$T_C=100^\circ\text{C}$, $V_{GS}=10\text{V}^{(2)}$	71	
Pulsed drain current ⁽²⁾	$I_{D,pulse}$	$T_C=25^\circ\text{C}$	320	
Avalanche energy, single pulse	E_{AS}	$I_D=80\text{A}$	125	mJ
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_C=25^\circ\text{C}$	100	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}		-	-	1.5	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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=52\text{ }\mu\text{A}$	2.1	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	1	μA
		$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}^{2)}$	-	-	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=80\text{ A}$	-	4.6	5.7	m Ω
		$V_{GS}=10\text{ V}, I_D=80\text{ A},$ SMD version	-	4.3	5.4	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	2500	3250	pF
Output capacitance	C_{oss}		-	660	860	
Reverse transfer capacitance	C_{rss}		-	100	130	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=20\text{ V}, V_{GS}=10\text{ V},$ $I_D=80\text{ A}, R_G=6\ \Omega$	-	15	-	ns
Rise time	t_r		-	10	-	
Turn-off delay time	$t_{d(off)}$		-	20	-	
Fall time	t_f		-	10	-	

栅极电荷特性²⁾

Gate to source charge	Q_{gs}	$V_{DD}=32\text{ V}, I_D=80\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	15	20	nC
Gate to drain charge	Q_{gd}		-	9	16	
Gate charge total	Q_g		-	36	47	
Gate plateau voltage	$V_{plateau}$		-	6.0	-	V

反向二极管

Diode continuous forward current ²⁾	I_S	$T_C=25\text{ °C}$	-	-	80	A
Diode pulse current ²⁾	$I_{S,pulse}$		-	-	320	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=80\text{ A},$ $T_J=25\text{ °C}$	-	1	1.3	V
Reverse recovery time ²⁾	t_{rr}	$V_R=20\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	34	-	ns
Reverse recovery charge ²⁾	Q_{rr}		-	36	-	nC

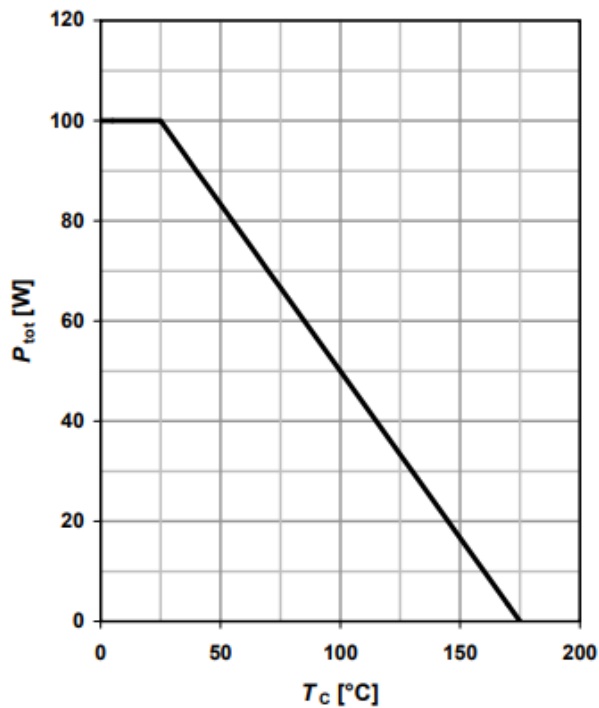
¹⁾ 电流受接合线限制； $R_{thJC}=1.5\text{ K/W}$ 时，芯片在 25 °C 时能够承载电流100A。有关详细信息，请参阅 www.infineon.com/optimos 上的应用注释 ANPS071E

²⁾ 由设计标定，不受制于生产测试。

³⁾ 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， $70\text{ }\mu\text{m}$ 厚）。印刷电路板垂直放置在静止空气中。

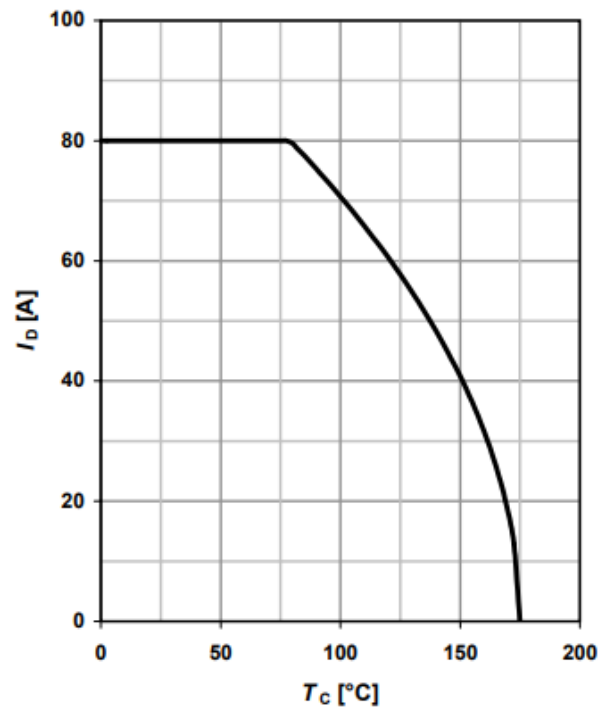
1 功率耗散

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



2 漏极电流

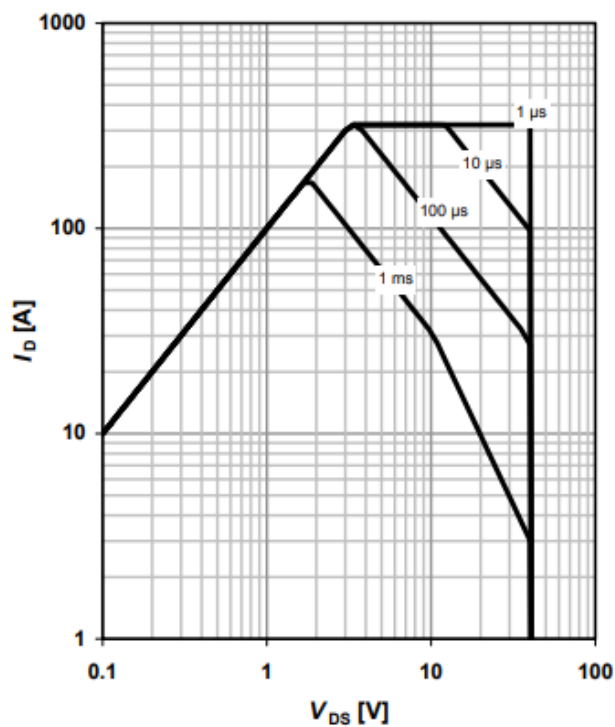
$$I_D = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$



3 安全工作区

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

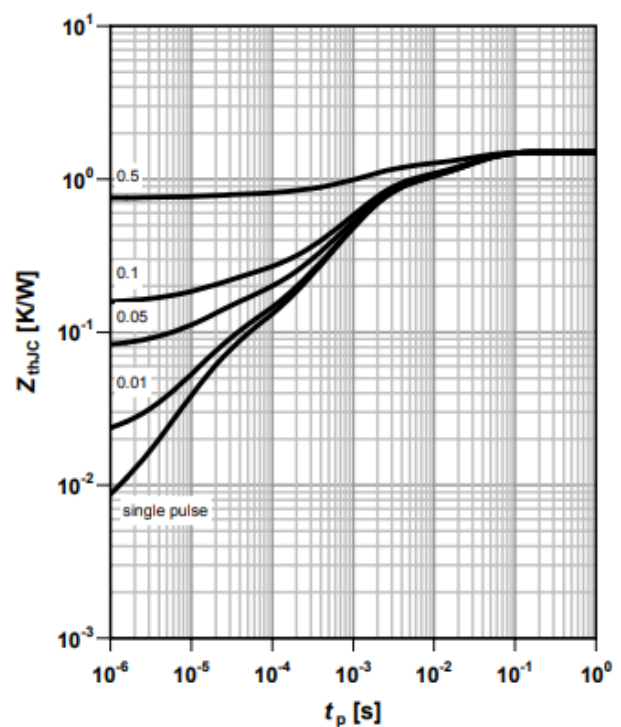
parameter: t_p



4 最大瞬态热阻抗

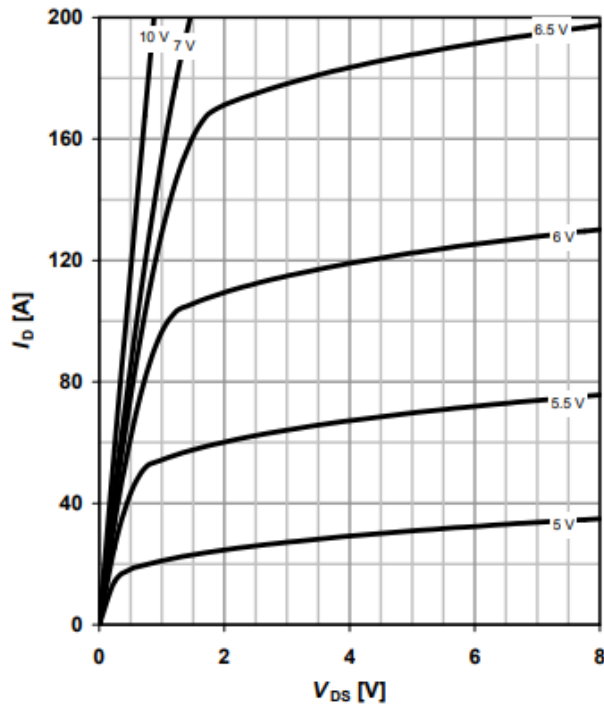
$$Z_{\text{thJC}} = f(t_p)$$

parameter: $D = t_p/T$



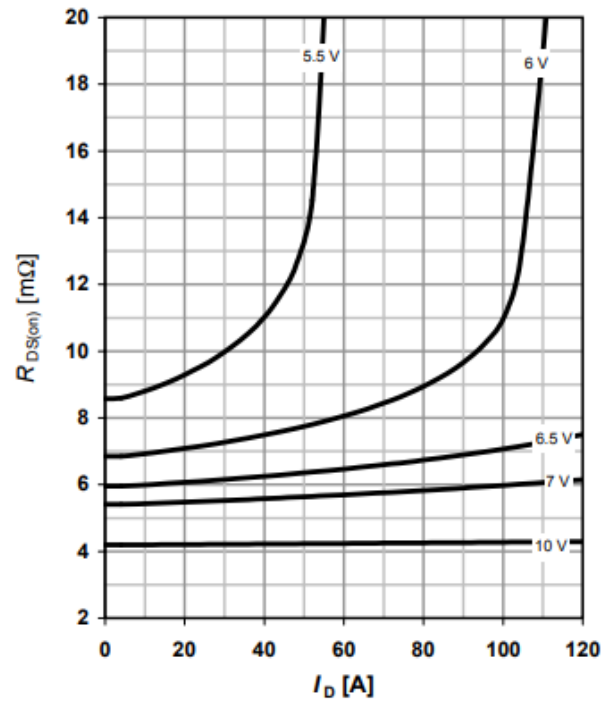
5 典型输出特性

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

parameter: V_{GS}


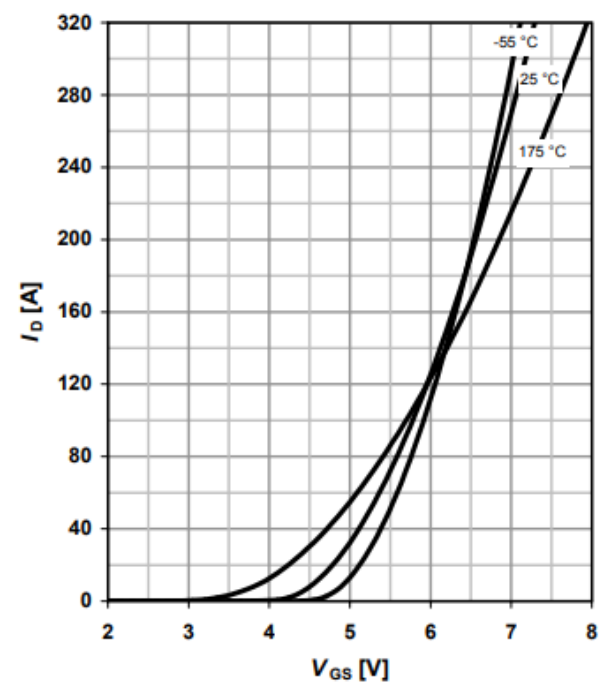
6 典型漏源导通电阻

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

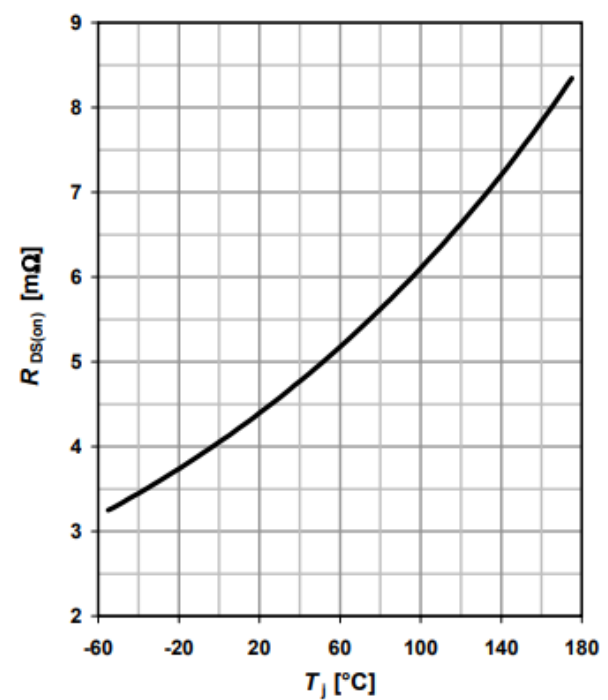
parameter: V_{GS}


7 典型转移特性

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

parameter: T_j


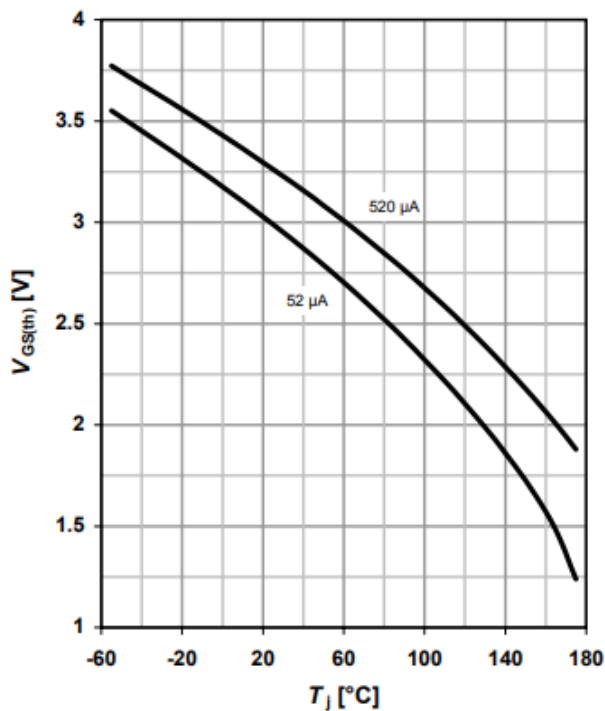
8 典型漏源导通电阻

 $R_{DS(on)} = f(T_j); I_D = 80\text{ A}; V_{GS} = 10\text{ V}; \text{SMD}$


9 典型栅极阈值电压

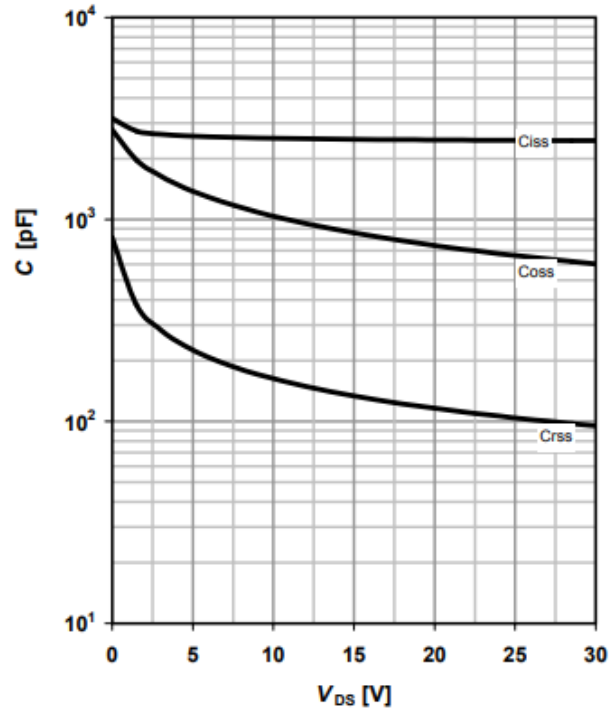
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



10 典型电容值

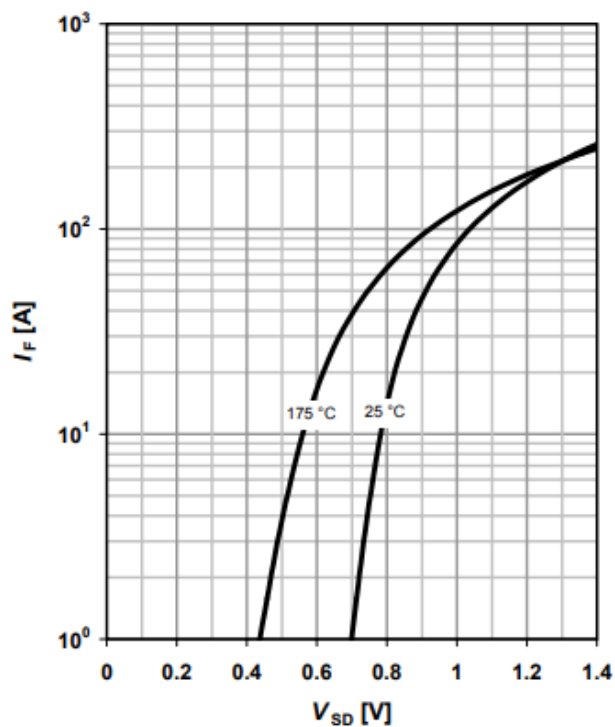
$$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$$



11 典型二极管正向导通特性

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

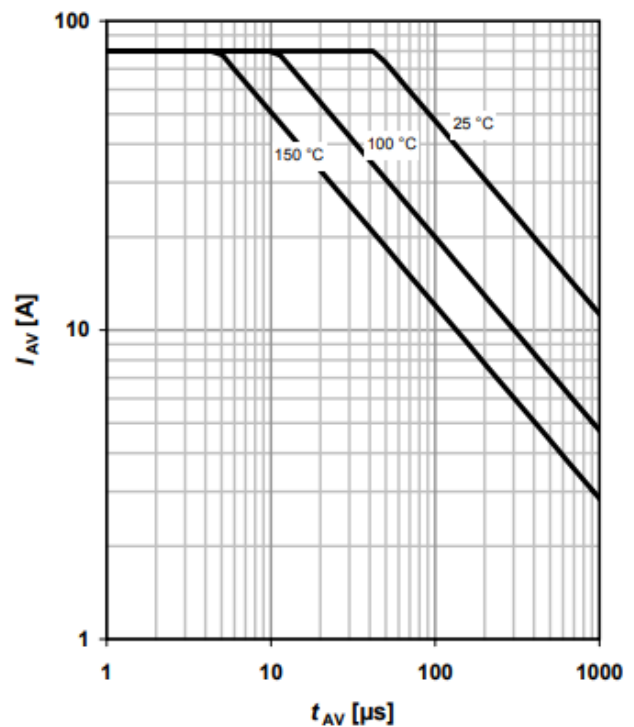
parameter: T_j



12 典型雪崩特性

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

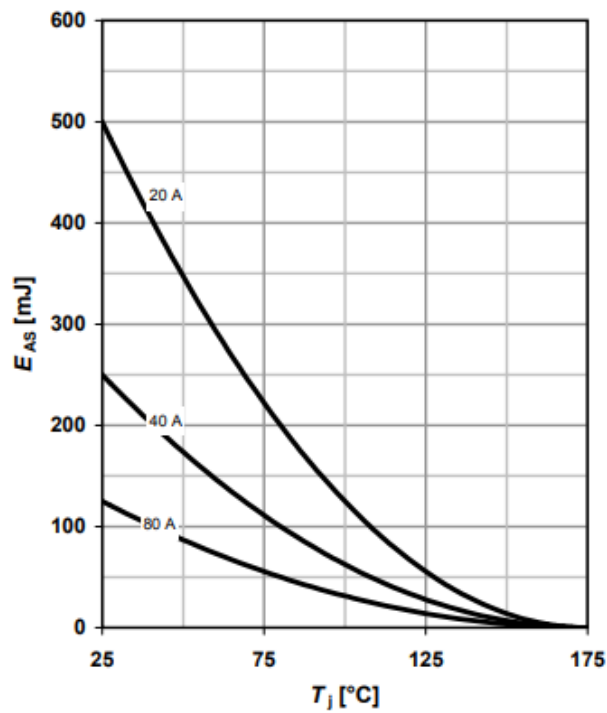
parameter: $T_{j(start)}$



17 典型雪崩能量

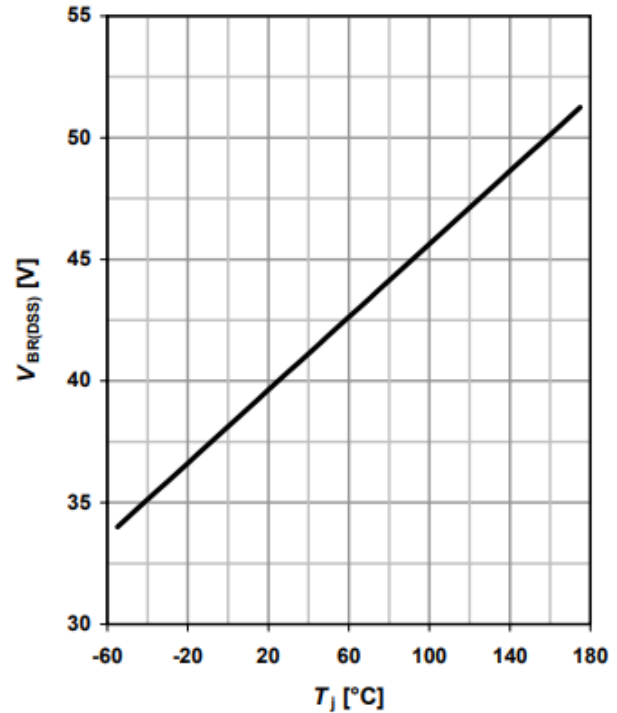
$$E_{AS} = f(T_j)$$

parameter: I_D



18 典型漏源击穿电压

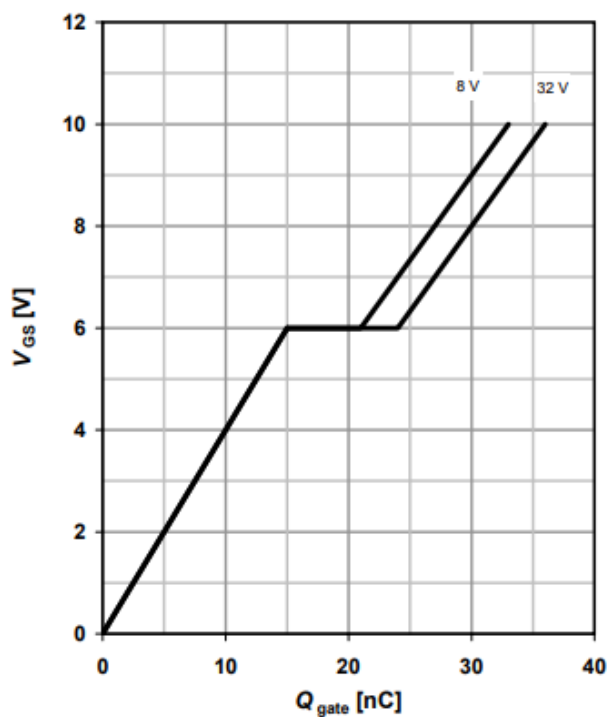
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$



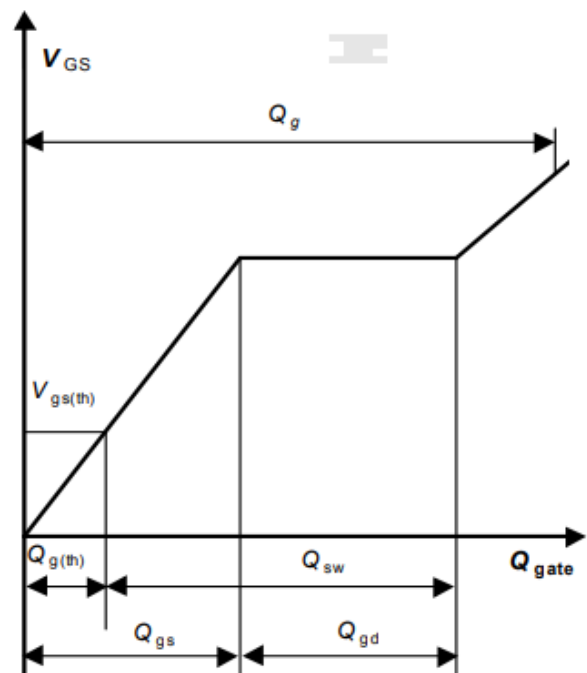
15 典型栅极电荷

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

parameter: V_{DD}



16 栅极充电波形



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修订记录

Version	Date	Changes
1.1	30.04.2007	RthJC from 1.7K/W to 1.5K/W
1.1	30.04.2007	RDSon max IPB from 5.8mOhm to 5.4mOhm
1.1	30.04.2007	RDSon max IPP/I from 6.1mOhm to 5.7mOhm
1.1	30.04.2007	Update of diagrams involving RthJC and RDSon_max
1.1	30.04.2007	QGD max from 13nC to 16nC



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