Final Data Sheet

英飞凌-40V 175°C P沟道

增强型OptiMOS®-P2 功率晶体管

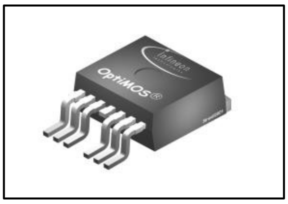
产品概述

V_{DS}	-40	V
$R_{DS(on)}$	2.8	mΩ
I_D	-180	A

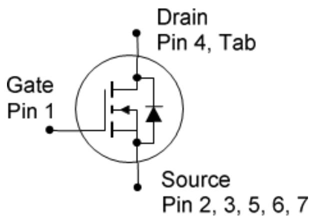
特点

- P 沟道 - 标准电平 - 增强模式
- 符合 AEC-Q100
- 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

PG-TO263-7-3



Type	Package	Marking
IPB180P04P4-03	PG-TO263-7-3	4QP0403



除非另有规定，否则均为T_j=25 °C 的**最大额定值。**

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current[1]	I_D	T_C=25°C, V_{GS}=-10V	-180	A
		T_C=100°C, V_{GS}=-10V[2]	-131	
Pulsed drain current[2]	$I_{D,pulse}$	T_C=25°C	-720	
Avalanche energy, single pulse	E_{AS}	I_D=-90A	90	mJ
Avalanche current, single pulse	I_{AS}	-	-180	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation	P_{tot}	T_C=25 °C	150	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

本数据手册的原文使用英文撰写。为方便起见，英飞凌提供了译文；由于翻译过程中可能使用了自动化工具，英飞凌不保证译文的准确性。为确认准确性，请务必访问 infineon.com 参考最新的英文版本（控制文档）。

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

热特性[2)]

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	-	1.0	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 °C 的**电气特性。**

静态参数特性

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
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=-410µA	-2.0	-3.0	-4.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=-32V, V_{GS}=0V, T_j=25°C	-	-0.1	-1	µA
		V_{DS}=-32V, V_{GS}=0V, T_j=125°C[2)]	-	-20	-200	
Gate-source leakage current	I_{GSS}	V_{GS}=-20V, V_{DS}=0V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=-10V, I_D=-100A	-	2.0	2.8	mΩ

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

动态参数特性[2)]

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-25V, f=1MHz	-	13570	17640	pF
Output capacitance	C_{oss}		-	4070	5290	
Reverse transfer capacitance	C_{rss}		-	110	220	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-20V, V_{GS}=-10V, I_D=-180A, R_G=3.5 Ω	-	48	-	ns
Rise time	t_r		-	31	-	
Turn-off delay time	$t_{d(off)}$		-	72	-	
Fall time	t_f		-	81	-	

栅极电荷特性[2)]

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Gate to source charge	Q_{gs}	V_{DD}=-32V, I_D=-180A, V_{GS}=0 to -10V	-	70	95	nC
Gate to drain charge	Q_{gd}		-	35	70	
Gate charge total	Q_g		-	190	250	
Gate plateau voltage	$V_{plateau}$		-	-5.2	-	V

反向二极管

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Diode continous forward current[2)]	I_S	T_C=25°C	-	-	-180	A
Diode pulse current[2)]	$I_{S,pulse}$		-	-	-720	
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=-100A, T_j=25°C	-	-1	-1.3	V
Reverse recovery time[2)]	t_{rr}	V_R=-20V, I_F=-50A, di_F/dt=-100A/µs	-	83	-	ns
Reverse recovery charge[2)]	Q_{rr}		-	131	-	nC

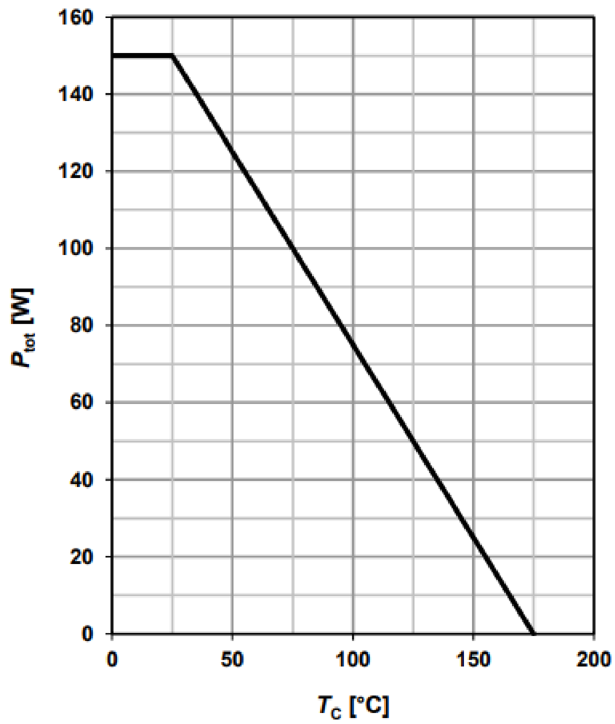
[1)]电流受封装限制；当R_{thJC}= 1.0 K/W时，该芯片在25°C时能够承载-185 A。

[2)]由设计标定，不受制于生产测试。

[3)] 器件安装在 40 mm x 40 mm x 1.5 mm环氧树脂印刷电路板 FR4 上，漏极连接用铜面积为 6 cm² （一层，70 µm厚）。印刷电路板垂直放置在静止空气中。

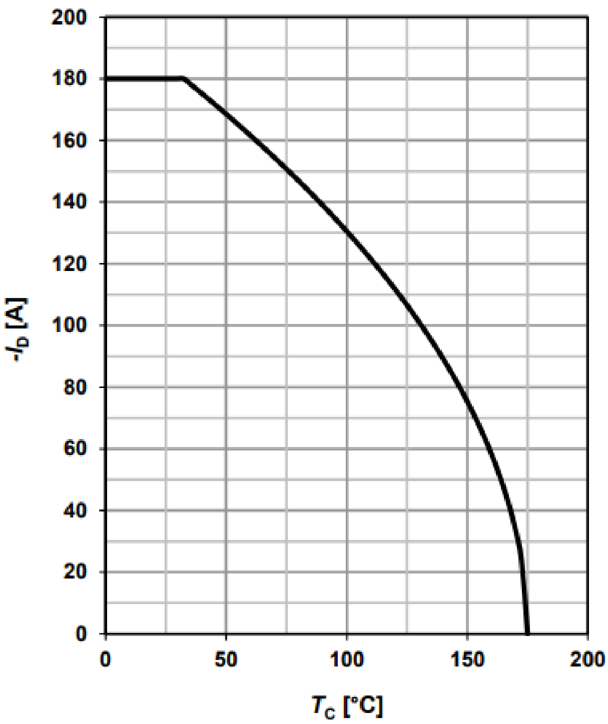
1 功率耗散

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



2 漏极电流

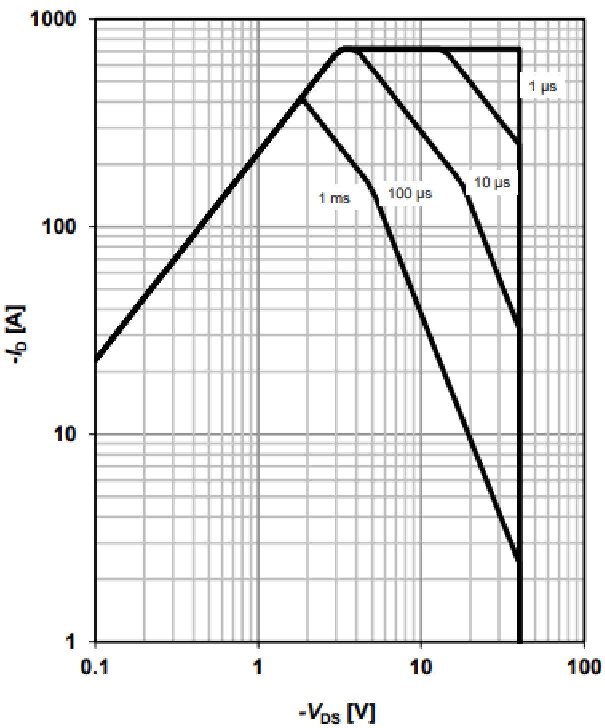
$I_D = f(T_C)$; $V_{GS} \leq -6V$; SMD



3 安全工作区

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

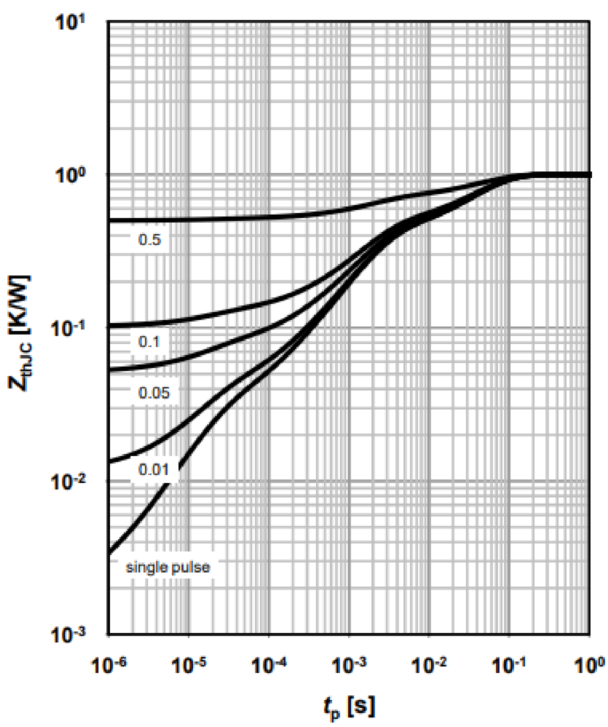
parameter: t_p



4 最大瞬态热阻抗

$Z_{thJC} = f(t_p)$

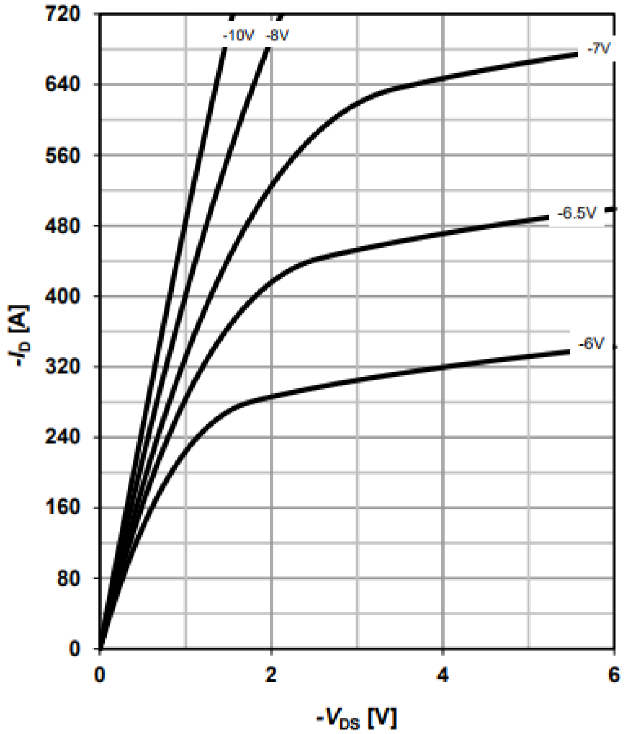
parameter: $D = t_p/T$



5 典型输出特性

$I_D = f(V_{DS})$; $T_j = 25$ °C; SMD

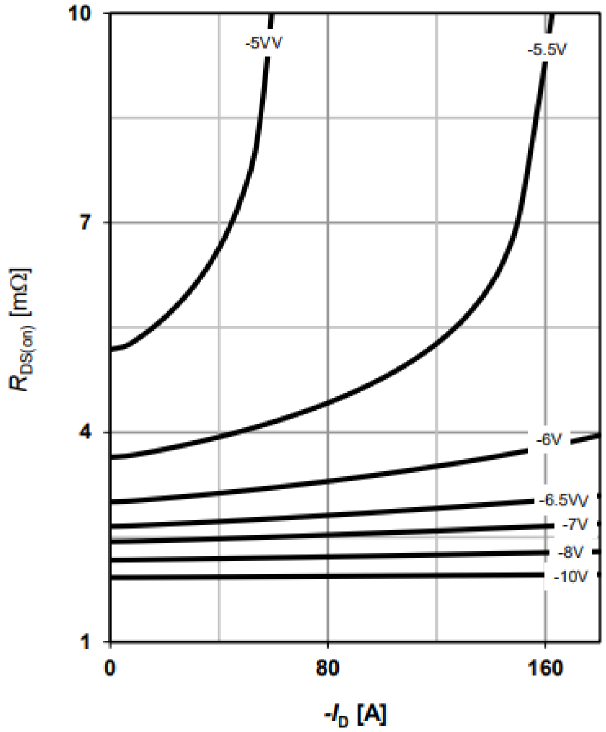
parameter: V_{GS}



6 典型漏源导通电阻

$R_{DS(on)} = (I_D)$; $T_j = 25$ °C; SMD

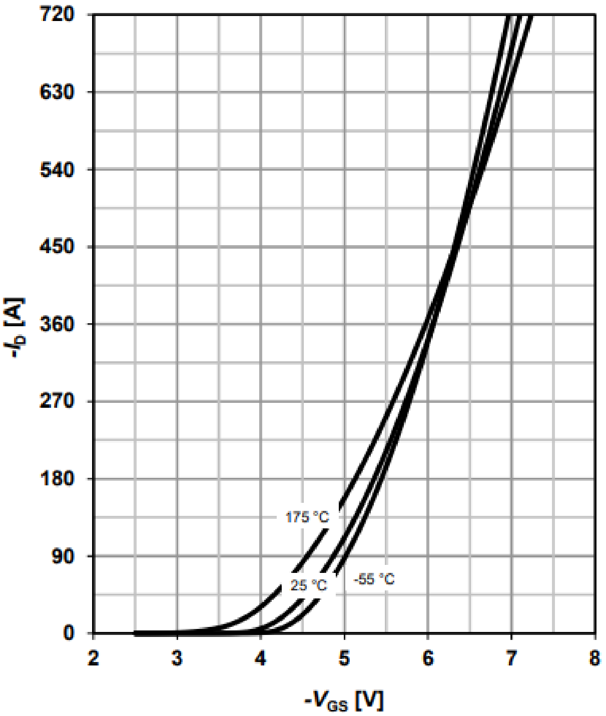
parameter: V_{GS}



7 典型转移特性

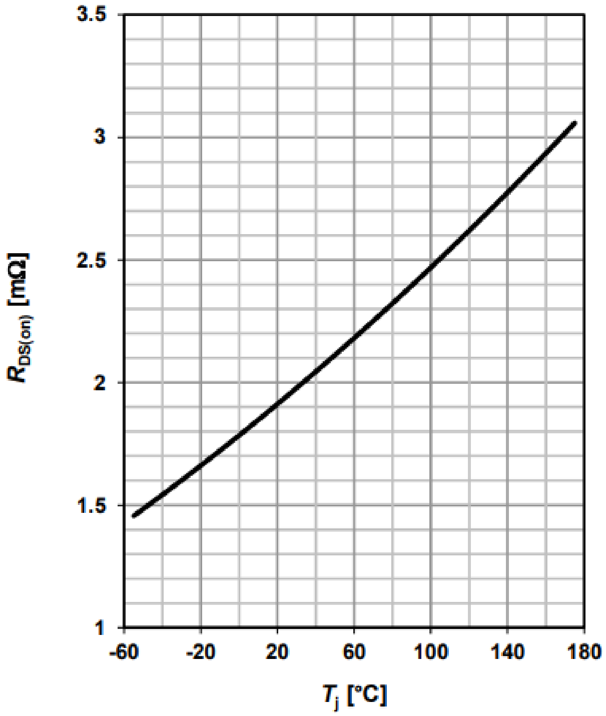
$I_D = f(V_{GS})$; $V_{DS} = -6$V

parameter: T_j



8 典型漏源导通电阻

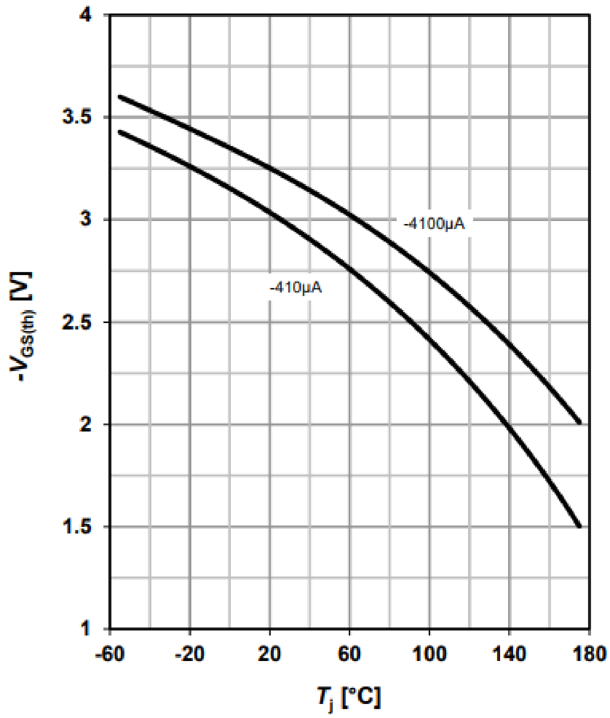
$R_{DS(on)} = f(T_j)$; $I_D = -100$ A; $V_{GS} = -10$ V; SMD



9 典型栅极阈值电压

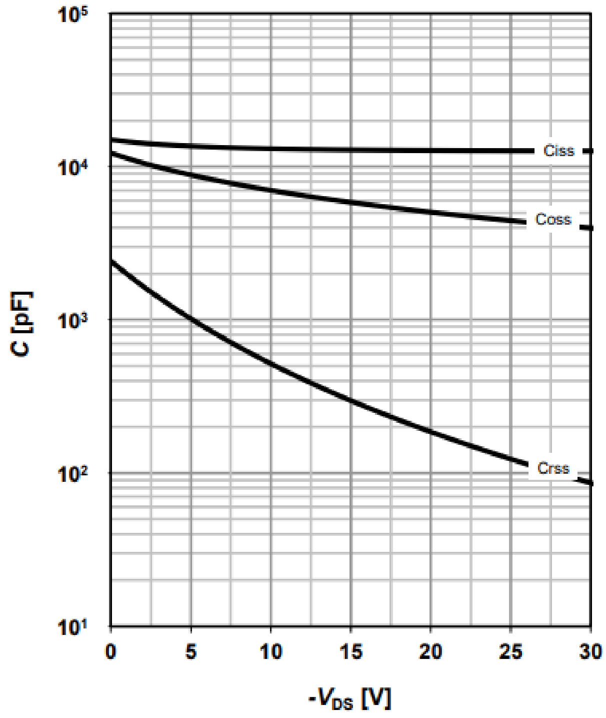
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 典型电容值

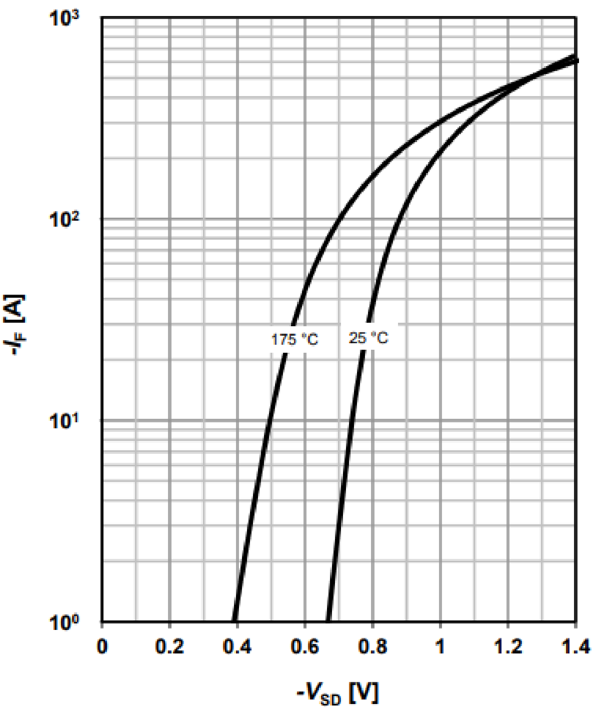
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 典型正向二极管特性

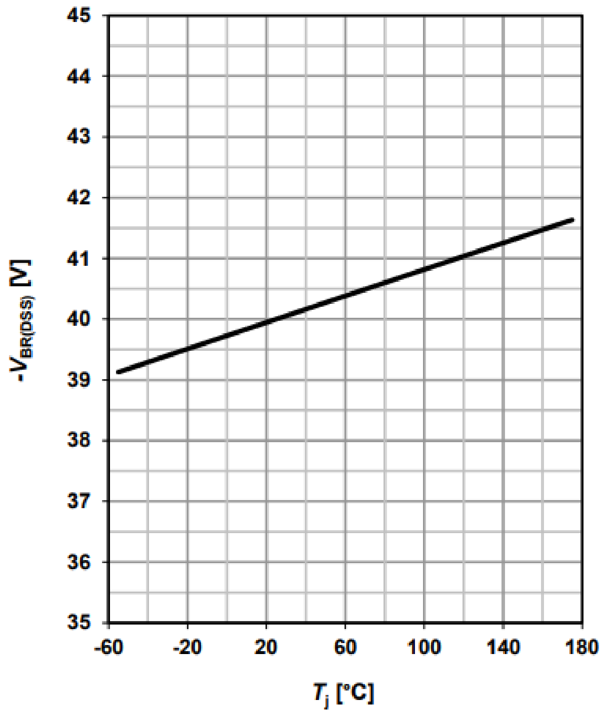
IF = f(V_{SD})

parameter: T_j



12 漏源击穿电压

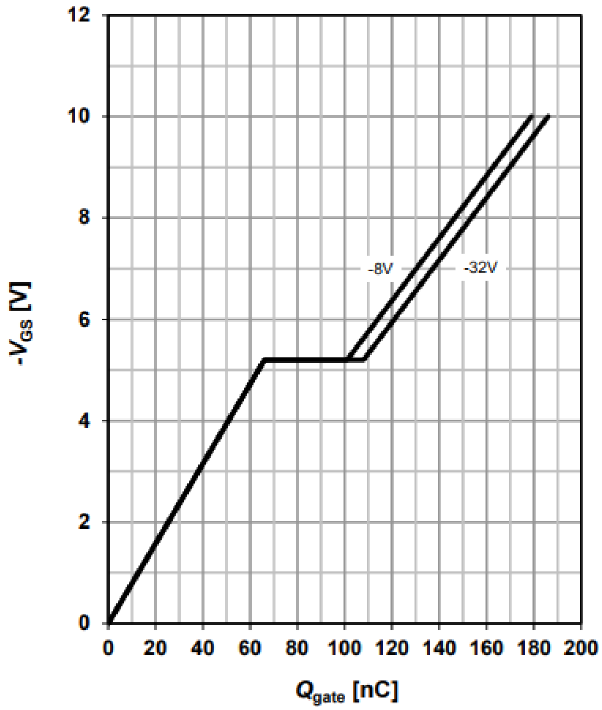
$V_{BR(DSS)} = f(T_j)$; $I_D = -1$ mA



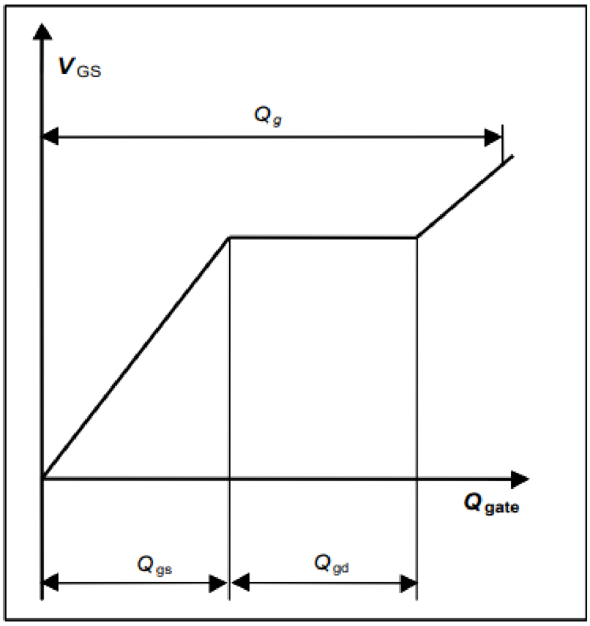
13 典型栅极电荷

V_{GS} = f(Q_{gate}); I_D = -180 A pulsed

parameter: V_{DD}



14 栅极充电波形



Published by
Infineon Technologies AG
81726 Munich, Germany

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information
For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings
Due to technical requirements, components may contain dangerous substances.
For information on the types in question, please contact the nearest Infineon Technologies Office.
Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life.
If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

修订记录

Version	Date	Changes
1.0	27.04.2011	Final Data Sheet
1.1	18.01.2018	Condition for Avalanche energy

免责声明

请注意，本文件的原文使用英文撰写，为方便客户浏览英飞凌提供了中文译文。该中文译文仅供参考，并不可作为任何论点之依据。
由于翻译过程中可能使用了自动化程序，以及语言翻译和转换过程中的差异，最后的中文译文与最新的英文版本原文含义可能存在不尽相同之处。
因此，我们同时提供该中文译文版本的最新英文原文供您阅读，请参见 http://www.infineon.com
英文原文和中文译文版本之间若存有任何歧异，以最新的英文版本为准，并且仅认可英文版本为正式文件。

您如果使用本文件，即表示您同意并理解上述说明。英飞凌不对因翻译过程中可能存在的任何不完整或不准确信息而产生的任何直接或间接损失或损害负责。英飞凌不承担中文译文版本的完整性和准确性责任。如果您不同意上述说明，请不要使用本文件。

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Edition 2025-04-17
Published by

Infineon Technologies AG
81726 Munich, Germany

Do you have a question about this document?
Email:
erratum@infineon.com

重要提示

本文档所提供的任何信息绝不应当被视为针对任何条件或者品质而做出的保证（质量保证）。英飞凌对于本文档中所提及的任何事例、提示或者任何特定数值及/或任何关于产品应用方面的信息均在此明确声明其不承担任何保证或者责任，包括但不限于其不侵犯任何第三方知识产权的保证均在此排除。此外，本文档所提供的任何信息均取决于客户履行本文档所载明的义务和客户遵守适用于客户产品以及与客户对于英飞凌产品的应用所相关的任何法律要求、规范和标准。

本文档所含的数据仅供经过专业技术培训的人员使用。客户自身的技术部门有义务对于产品是否适宜于其预期的应用和针对该等应用而言本文档中所提供的信息是否充分自行予以评估。

警告事项

由于技术所需产品可能含有危险物质。如需了解该等物质的类型，请向离您最近的英飞凌科技办公室接洽。

除非由经英飞凌科技授权代表签署的书面文件中做出另行明确批准的情况外，英飞凌科技的产品不应当被用于任何一项一旦产品失效或者产品使用的后果可被合理地预料到可能导致人身伤害的任何应用领域。