CSD25211W1015 P 沟道 NexFET™ 功率 MOSFET

1 特性

- 超低导通电阻
- 超低 Q_g 和 Q_{gd}
- 1.0mm × 1.5mm 小尺寸封装
- 超薄型，高 0.62mm
- 无铅
- 栅源电压钳位
- 栅极 ESD 保护 - 3kV
- 符合 RoHS
- 无卤素

2 应用

- 电池管理
- 负载开关
- 电池保护

3 说明

此器件设计用于在超薄且具有出色散热特性的超小外形尺寸封装内产生尽可能低的导通电阻和栅极电荷。

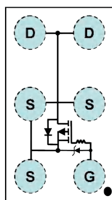


图 3-1. 顶视图

产品概要

T_A = 25°C 时测得，除非另外注明		典型值		单位
V_{DS}	漏源电压	-20		V
Q_g	栅极电荷总量 (-4.5V)	3.4		nC
Q_{gd}	栅漏栅极电荷	0.2		nC
$R_{DS(on)}$	漏源导通电阻	V_{GS} = -2.5V	36	mΩ
		V_{GS} = -4.5V	27	mΩ
$V_{GS(th)}$	电压阈值	-0.8		V

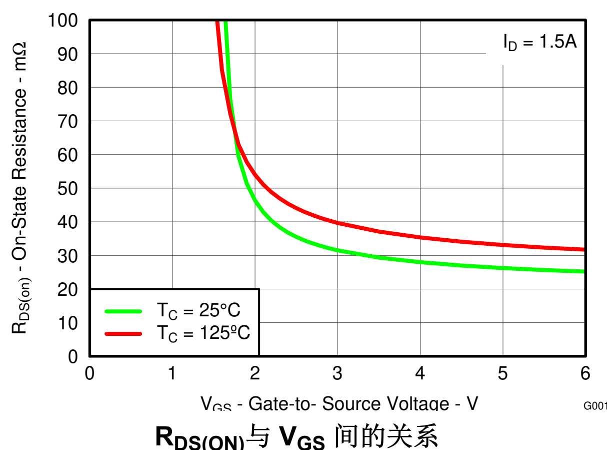
订购信息

器件	封装	介质	数量	出货
CSD25211W1015	1 × 1.5 晶圆级封装	7 英寸卷带	3000	卷带包装

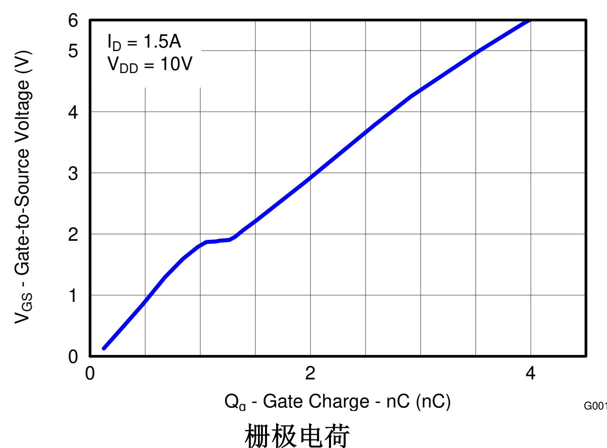
绝对最大额定值

T_A = 25°C 时测得，除非另外注明		值	单位
V_{DS}	漏源电压	-20	V
V_{GS}	栅源电压	-6	V
I_D	持续漏极电流，T_A = 25°C(1)	-3.2	A
I_{DM}	脉冲漏极电流，T_A = 25°C(2)	-9.5	A
I_G	持续栅极电流，T_A = 25°C	-0.5	A
	脉冲栅极电流	-7	A
P_D	功率耗散(1)	1	W
T_{STG}	储存温度范围	-55 至 150	°C
T_J	工作结温范围		

(1) 0.06 英寸厚 FR4 PCB 上采用 1 平方英寸、2 盎司铜焊盘时的 $R_{\theta JA}$ 典型值为 119°C/W
(2) 脉宽 ≤ 10μs，占空比 ≤ 2%



$R_{DS(ON)}$与 V_{GS} 间的关系



栅极电荷

本文档旨在为方便起见，提供有关 TI 产品中文版本的信息，以确认产品的概要。有关适用的官方英文版本的最新信息，请访问 www.ti.com，其内容始终优先。TI 不保证翻译的准确性和有效性。在实际设计之前，请务必参考最新版本的英文版本。

English Data Sheet: SLPS296

Table of Contents

1 特性.......... 1
2 应用.......... 1
3 说明.......... 1
4 Revision History.......... 2
5 Electrical Characteristics.......... 3
6 Thermal Characteristics.......... 4
7 Typical MOSFET Characteristics.......... 5
8 Mechanical Data.......... 8
8.1 CSD25211W1015 Package Dimensions.......... 8
8.2 Land Pattern Recommendation.......... 9
9 静电放电警告.......... 9
10 Device and Documentation Support.......... 10
10.1 第三方产品免责声明.......... 10
10.2 接收文档更新通知.......... 10
10.3 支持资源.......... 10
10.4 Trademarks.......... 10
10.5 静电放电警告.......... 10
10.6 术语表.......... 10

4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision A (January 2014) to Revision B (September 2022) **Page**

- 将“绝对最大额定值”表中的“持续漏极电流”更改为“持续栅极电流” 1
- 将“绝对最大额定值”表中的“脉冲漏极电流”更改为“脉冲栅极电流” 1

Copyright © 2022 Texas Instruments Incorporated

5 Electrical Characteristics

(T_A = 25°C unless otherwise stated)

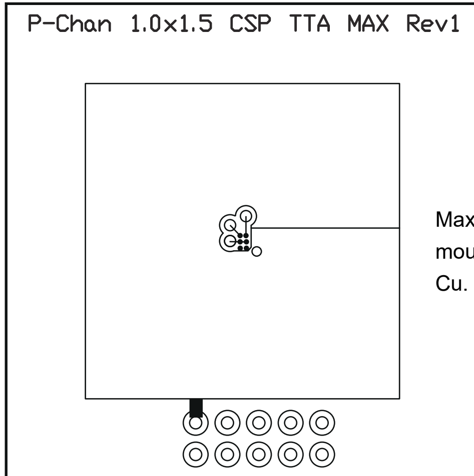
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 V, I_D = –250 μA	–20			V
BV_{GSS}	Gate-to-Source Voltage	V_{DS} = 0 V, I_G = –250 μA	–6.1		–7.2	V
I_{DSS}	Drain-to-Source Leakage Current	V_{GS} = 0 V, V_{DS} = –16 V			–1	μA
I_{GSS}	Gate-to-Source Leakage Current	V_{DS} = 0 V, V_{GS} = –6 V			–100	nA
$V_{GS(th)}$	Gate-to-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 μA	–0.5	–0.8	–1.1	V
$R_{DS(on)}$	Drain-to-Source On Resistance	V_{GS} = –2.5 V, I_D = –1.5 A		36	44	mΩ
		V_{GS} = –4.5 V, I_D = –1.5 A		27	33	mΩ
g_{fs}	Transconductance	V_{DS} = –10 V, I_D = –1.5 A		12		S
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0 V, V_{DS} = –10 V, f = 1 MHz		475	570	pF
C_{OSS}	Output Capacitance			234	281	pF
C_{RSS}	Reverse Transfer Capacitance			10.5	13.1	pF
Q_g	Gate Charge Total (–4.5 V)	V_{DS} = –10 V, I_D = –1.5 A		3.4	4.1	nC
Q_{gd}	Gate Charge Gate to Drain			0.2		nC
Q_{gs}	Gate Charge Gate to Source			1.1		nC
$Q_{g(th)}$	Gate Charge at V_{th}			0.6		nC
Q_{OSS}	Output Charge	V_{DS} = –10 V, V_{GS} = 0 V		3.8		nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = –10 V, V_{GS} = –4.5 V, I_D = –1.5 A R_G = 4 Ω		13.6		ns
t_r	Rise Time			8.8		ns
$t_{d(off)}$	Turn Off Delay Time			36.9		ns
t_f	Fall Time			14.2		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_S = –1.5 A, V_{GS} = 0 V		–0.8	–1	V
Q_{rr}	Reverse Recovery Charge	V_{dd}= –10 V, I_F = –1.5 A, di/dt = 200 A/μs		6.9		nC
t_{rr}	Reverse Recovery Time			11.6		ns

Copyright © 2022 Texas Instruments Incorporated

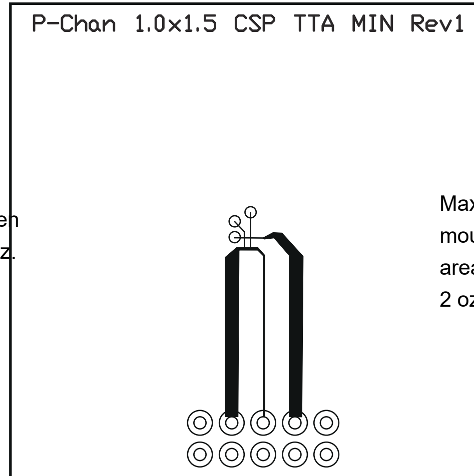
6 Thermal Characteristics

(T_A = 25°C unless otherwise stated)

	PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Minimum Cu area)			230	°C/W
	Thermal Resistance Junction to Ambient (1 in^2 Cu area)			149	°C/W



Max $R_{\theta JA}$ = 149°C/W when mounted on 1 $inch^2$ of 2 oz. Cu.



Max $R_{\theta JA}$ = 230°C/W when mounted on minimum pad area of 2 oz. Cu.

Copyright © 2022 Texas Instruments Incorporated

7 Typical MOSFET Characteristics

(T_A = 25°C unless otherwise stated)

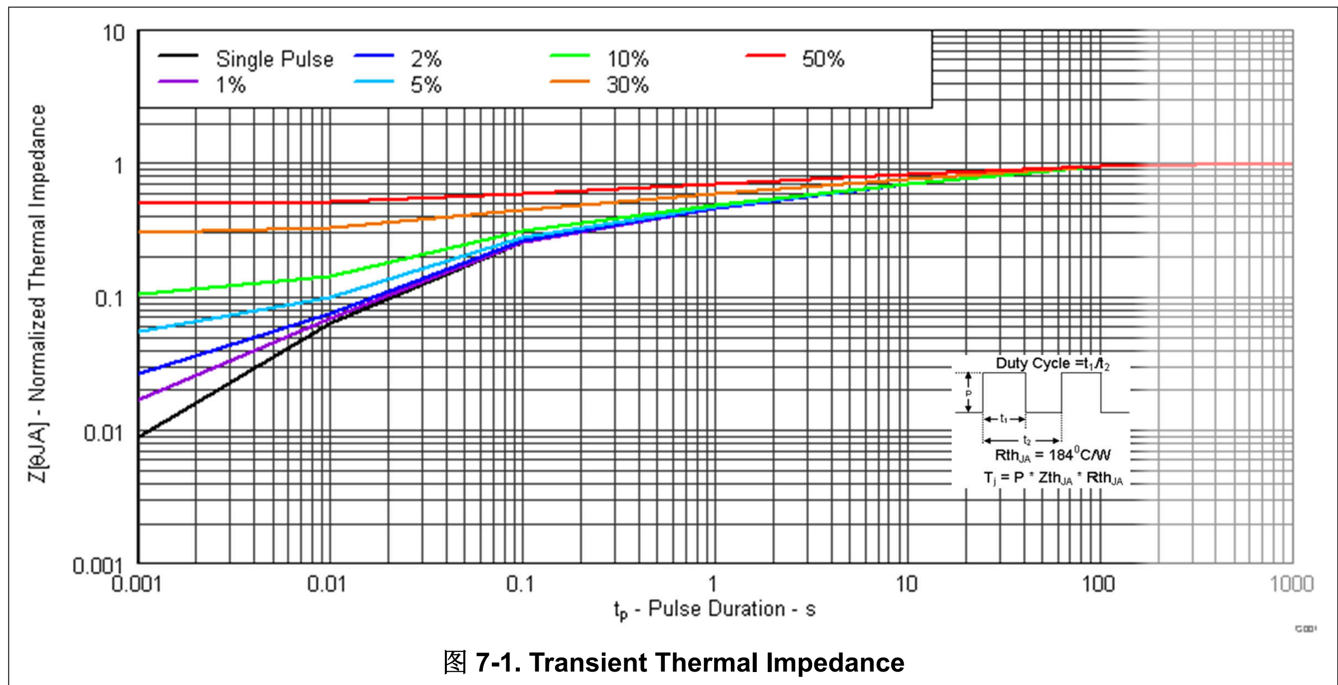


图 7-1. Transient Thermal Impedance

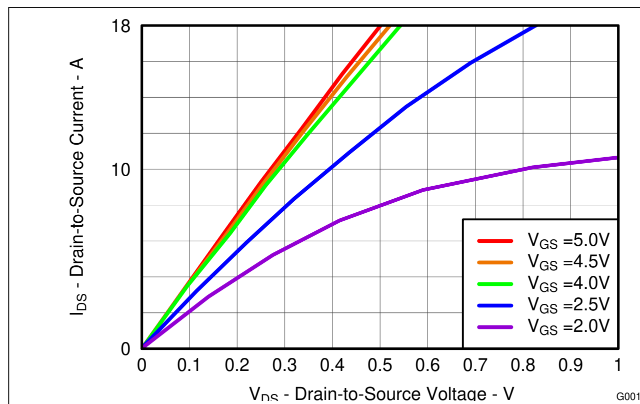


图 7-2. Saturation Characteristics

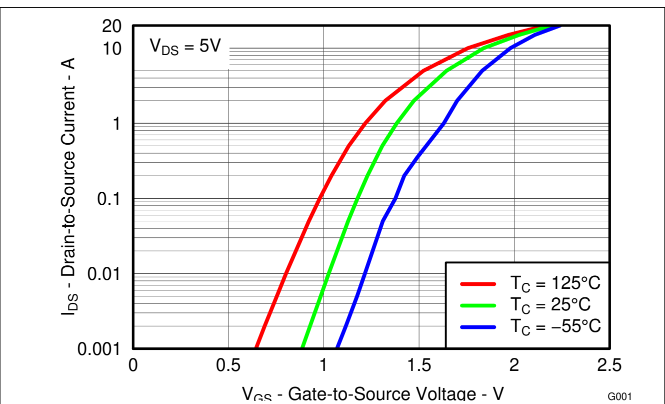


图 7-3. Transfer Characteristics

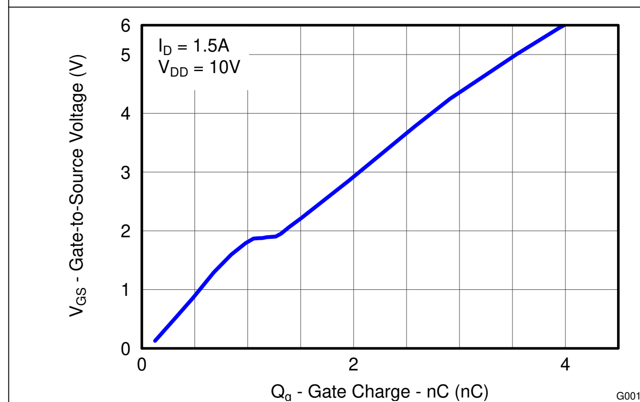


图 7-4. Gate Charge

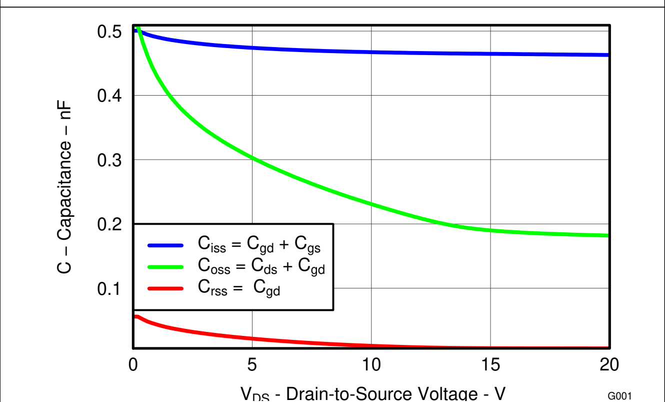


图 7-5. Capacitance

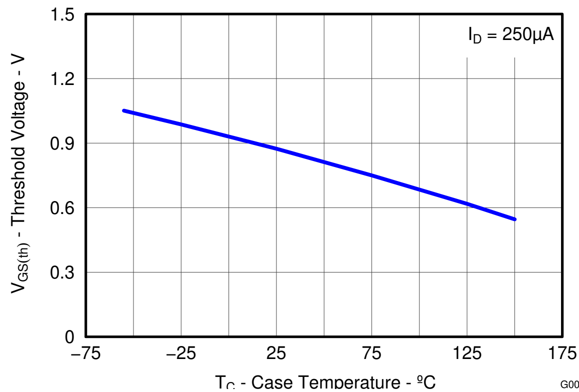


图 7-6. Threshold Voltage vs Temperature

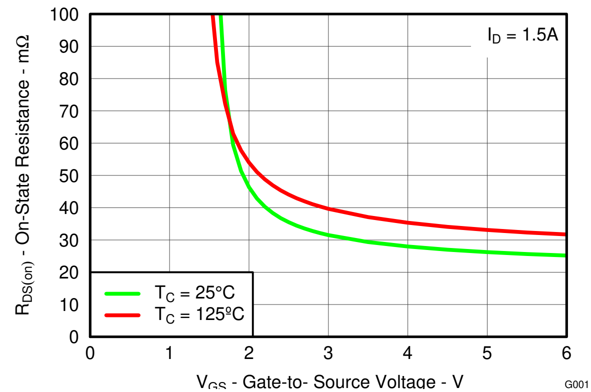


图 7-7. On Resistance vs Gate Voltage

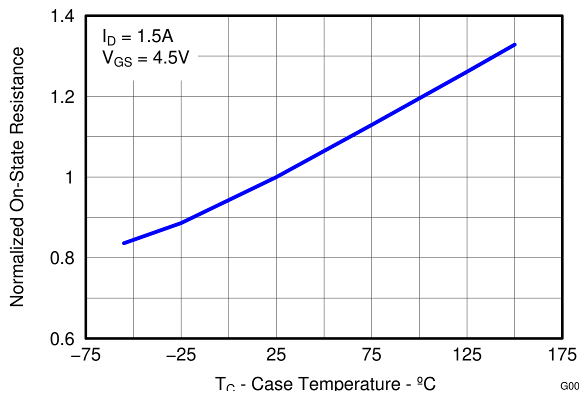


图 7-8. Normalized On Resistance vs Temperature

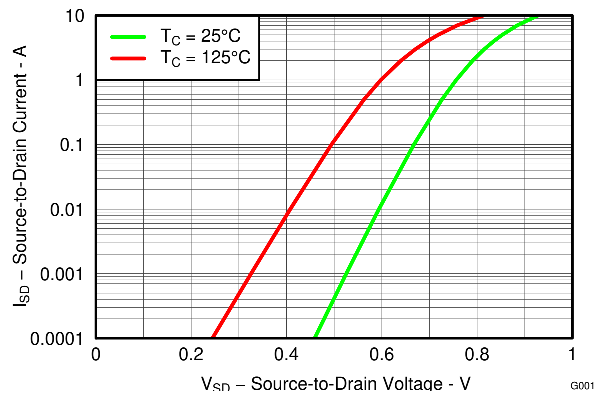


图 7-9. Typical Diode Forward Voltage

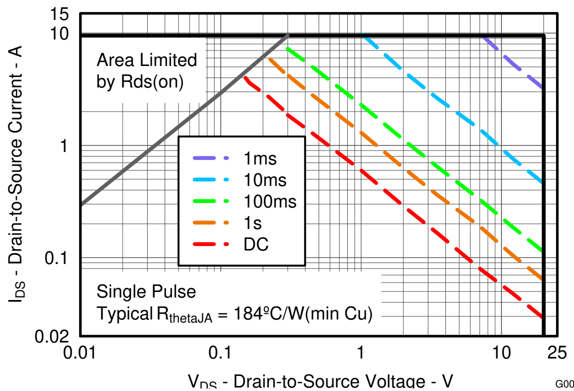


图 7-10. Maximum Safe Operating Area

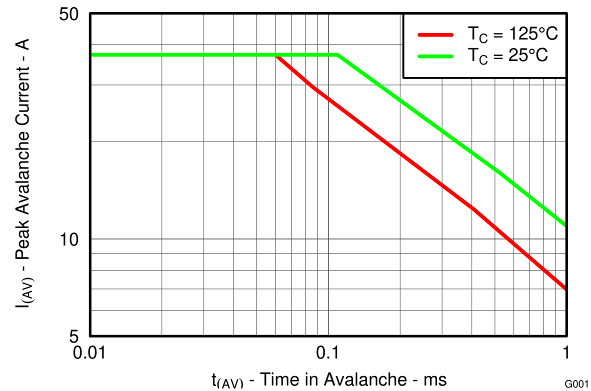


图 7-11. Single Pulse Unclamped Inductive Switching

Copyright © 2022 Texas Instruments Incorporated

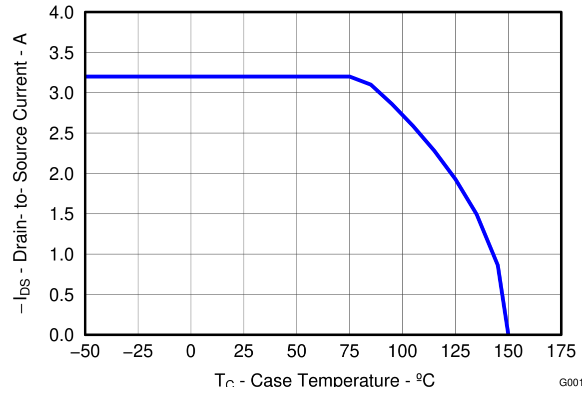
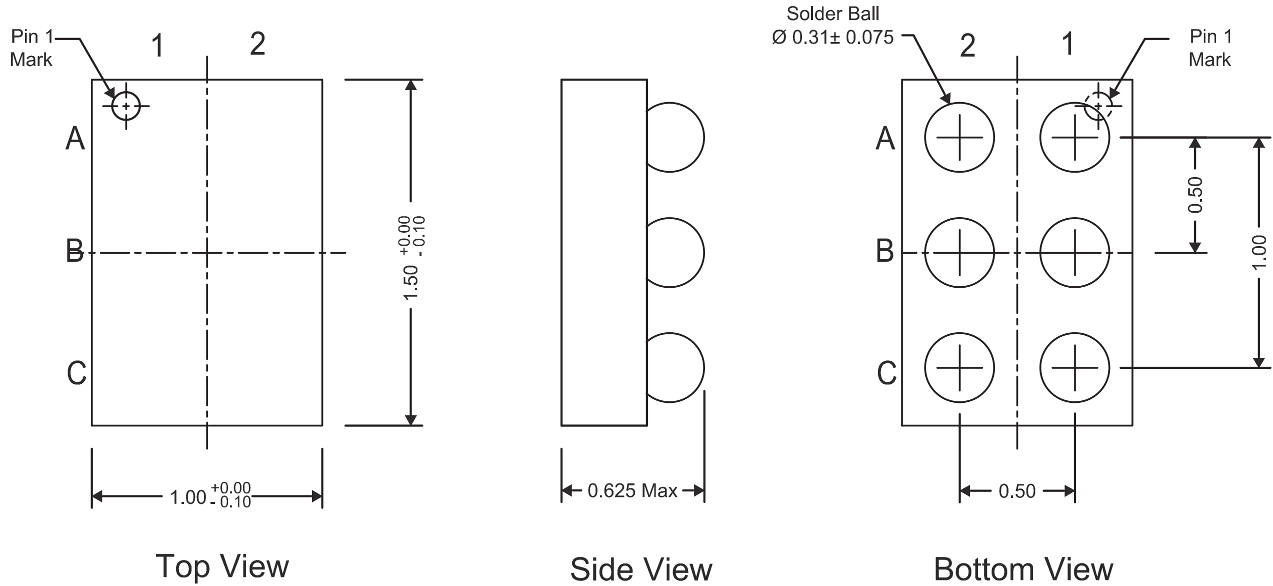
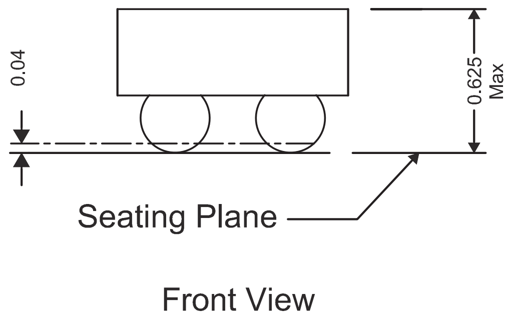


图 7-12. Maximum Drain Current vs Temperature

8 Mechanical Data

8.1 CSD25211W1015 Package Dimensions





Front View

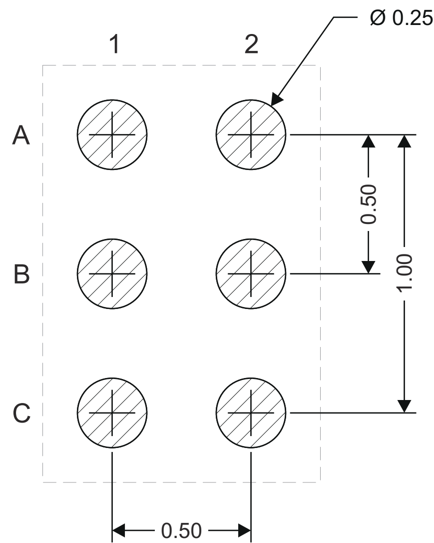
All dimensions are in mm (unless otherwise specified)

Pinout

POSITION	DESIGNATION
C1, C2	Drain
A1	Gate
A2, B1, B2	Source

Copyright © 2022 Texas Instruments Incorporated

8.2 Land Pattern Recommendation



All dimensions are in mm (unless otherwise specified)

9 静电放电警告

静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

Copyright © 2022 Texas Instruments Incorporated

10 Device and Documentation Support

10.1 第三方产品免责声明

TI 发布的与第三方产品或服务有关的信息，不能构成与此类产品或服务或保修的适用性有关的认可，不能构成此类产品或服务单独或与任何 TI 产品或服务一起的表示或认可。

10.2 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击*订阅更新* 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

10.3 支持资源

TI E2E™ 支持论坛是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

10.4 Trademarks

NexFET™ is a trademark of TI.
TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

10.5 静电放电警告

静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

10.6 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

Copyright © 2022 Texas Instruments Incorporated

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CSD25211W1015	Active	Production	DSBGA (YZC) | 6	3000 | LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	25211
CSD25211W1015.B	Active	Production	DSBGA (YZC) | 6	3000 | LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	25211

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

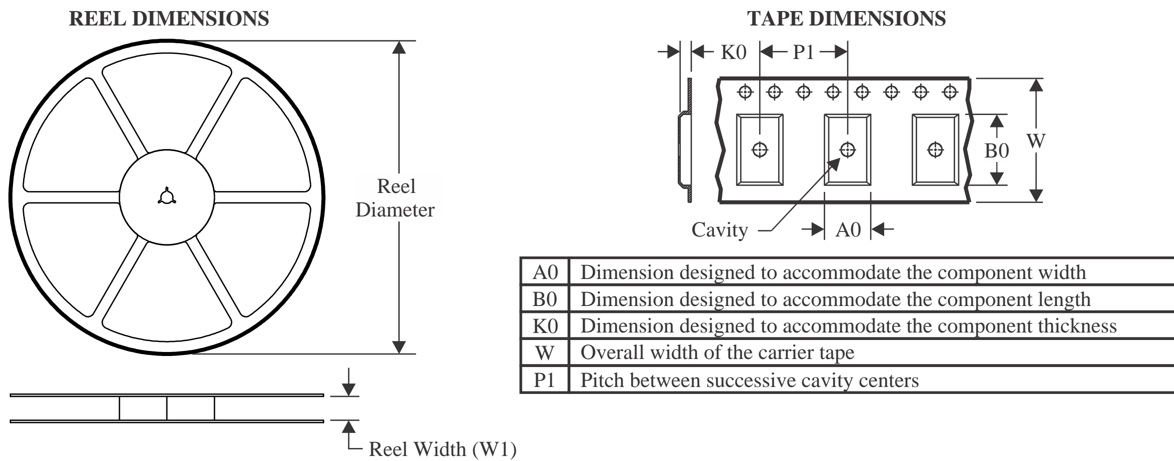
(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

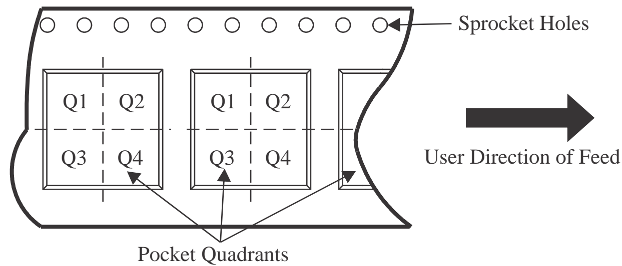
Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

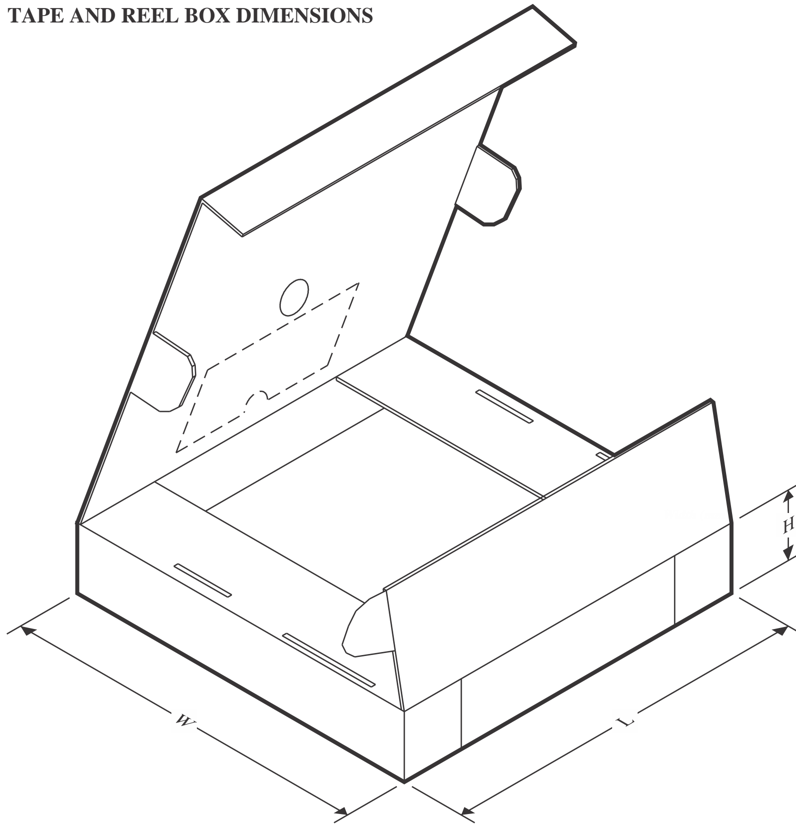


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CSD25211W1015	DSBGA	YZC	6	3000	180.0	8.4	1.09	1.56	0.65	2.0	8.0	Q1



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD25211W1015	DSBGA	YZC	6	3000	182.0	182.0	20.0

重要通知和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做出任何明示或暗示的担保，包括但不限于对适销性、与某特定用途的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他安全、安保法规或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的相关应用。严禁以其他方式对这些资源进行复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。对于因您对这些资源的使用而对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，您将全额赔偿，TI 对此概不负责。

TI 提供的产品受 TI 销售条款)、TI 通用质量指南 或 ti.com 上其他适用条款或 TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。 除非德州仪器 (TI) 明确将某产品指定为定制产品或客户特定产品，否则其产品均为按确定价格收入目录的标准通用器件。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

版权所有 © 2025，德州仪器 (TI) 公司

最后更新日期：2025 年 10 月