CSD25304W1015 20V P 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

1 特性

- 超低 Q_g 和 Q_{gd}
- 小封装尺寸
- 低高度（高度为 0.62mm）
- 无铅
- 符合 RoHS 环保标准
- 无卤素
- 芯片级封装 (CSP) 1 x 1.5mm 晶圆级封装

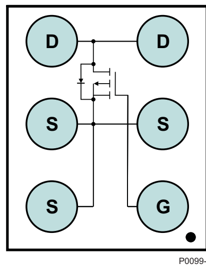
2 应用范围

- 电池管理
- 负载开关
- 电池保护

3 说明

这款 27mΩ，20V P 通道器件设计用于在超薄且具有出色散热特性的 1.0mm x 1.5mm 小外形封装内提供最低的导通电阻和栅极电荷。

顶视图



产品概要

T_A = 25°C		典型值		单位
V_{DS}	漏源电压	-20		V
Q_g	栅极电荷总量 (4.5V)	3.3		nC
Q_{gd}	栅漏栅极电荷	0.5		nC
$R_{DS(on)}$	漏源导通电阻	V_{GS} = –1.8V	65	mΩ
		V_{GS} = -2.5V	36	mΩ
		V_{GS} = -4.5V	27	mΩ
$V_{GS(th)}$	电压阀值	-0.8		V

订购信息(1)

器件	数量	介质	封装	出货
CSD25304W1015	3000	7 英寸卷带	1.0mm × 1.5mm 晶圆级封装	卷带封装
CSD25304W1015T	250	7 英寸卷带		

(1) 要了解所有可用封装，请见数据表末尾的可订购产品附录。

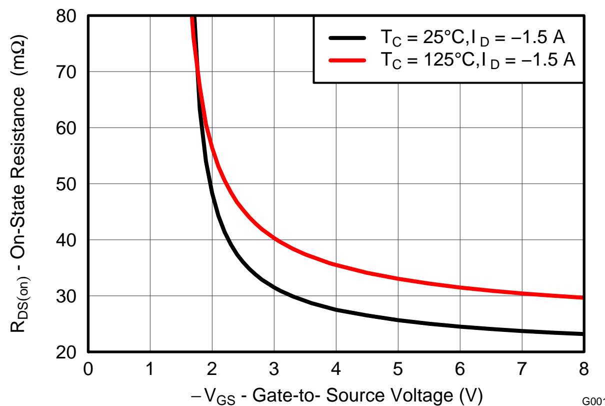
最大绝对额定值

T_A = 25°C		值	单位
V_{DS}	漏源电压	-20	V
V_{GS}	栅源电压	±8	V
I_D	持续漏极电流(1)	–3.0	A
I_{DM}	脉冲漏极电流(2)	–41	A
P_D	功率耗散	0.75	W
T_J, T_{stg}	运行结温和储存温度范围	-55 至 150	°C

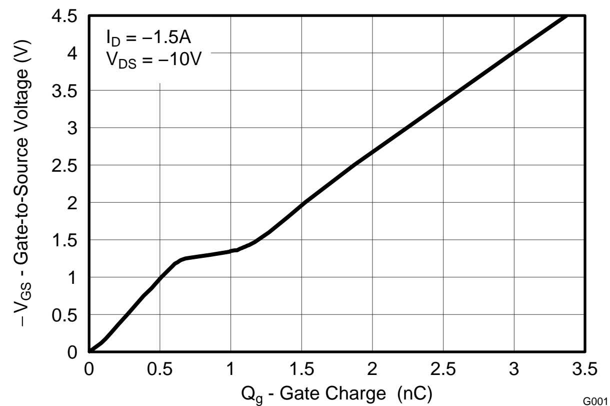
(1) 器件在 105ºC 温度下运行

(2) $R_{\theta JA}$ 典型值 = 165°C/W，脉宽 ≤100μs，占空比 ≤1%

$R_{DS(on)}$ 与 V_{GS} 间的关系



栅极电荷



PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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4 修订历史记录

Changes from Original (July 2014) to Revision A **Page**

- 已将功耗额定值降至 0.75W（Cu 计算得出的最小值） ... 1
- Corrected Min Thermal Information from 85 to 165 ... 3
- Corrected Max Thermal Information from 165 to 85 ... 3
- 已更新机械制图以提高精度 ... 8

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5 Specifications

5.1 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
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} = ±8 V			–100	nA
$V_{GS(th)}$	Gate-to-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 μA	–0.55	–0.8	–1.15	V
$R_{DS(on)}$	Drain-to-Source On-Resistance	V_{GS} = –1.8 V, I_D = –1.5 A		65	92	mΩ
		V_{GS} = –2.5 V, I_D = –1.5 A		36	45.5	mΩ
		V_{GS} = –4.5 V, I_D = –1.5 A		27	32.5	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		458	595	pF
C_{OSS}	Output Capacitance			231	300	pF
C_{RSS}	Reverse Transfer Capacitance			12	15.6	pF
Q_g	Gate Charge Total (–4.5 V)	V_{DS} = –10 V, I_D = –1.5 A		3.3	4.4	nC
Q_{gd}	Gate Charge Gate-to-Drain			0.5		nC
Q_{gs}	Gate Charge Gate-to-Source			0.7		nC
$Q_{g(th)}$	Gate Charge at V_{th}			0.4		nC
Q_{OSS}	Output Charge	V_{DS} = –10 V, V_{GS} = 0 V		3.7		nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = –10 V, V_{GS} = –4.5 V, I_D = –1.5 A R_G = 20 Ω		6		ns
t_r	Rise Time			4		ns
$t_{d(off)}$	Turn Off Delay Time			24		ns
t_f	Fall Time			10		ns
DIODE CHARACTERISTICS						
V_{SD}	Diode Forward Voltage	I_S = –1.5 A, V_{GS} = 0 V		–0.75	–1	V
Q_{rr}	Reverse Recovery Charge	V_{DS}= –10 V, I_F = –1.5 A, di/dt = 200 A/μs		7.2		nC
t_{rr}	Reverse Recovery Time	V_{DS}= –10 V, I_F = –1.5 A, di/dt = 200 A/μs		11.6		ns

5.2 Thermal Information

(T_A = 25°C unless otherwise stated)

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{θJA}$	Junction-to-Ambient Thermal Resistance (1)		165		°C/W
	Junction-to-Ambient Thermal Resistance (2)		85		

(1) Device mounted on FR4 material with minimum Cu mounting area.
(2) Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.

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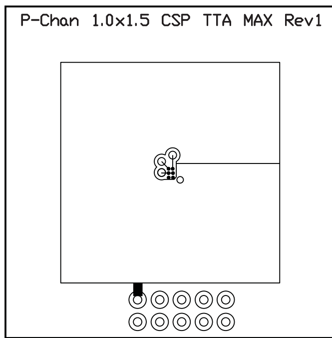
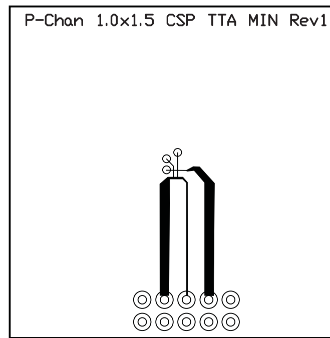


Typ $R_{θJA}$ = 85°C/W when mounted on 1 inch² of 2 oz. Cu.



Typ $R_{θJA}$ = 165°C/W when mounted on minimum pad area of 2 oz. Cu.

5.3 Typical MOSFET Characteristics

(T_A = 25°C unless otherwise stated)

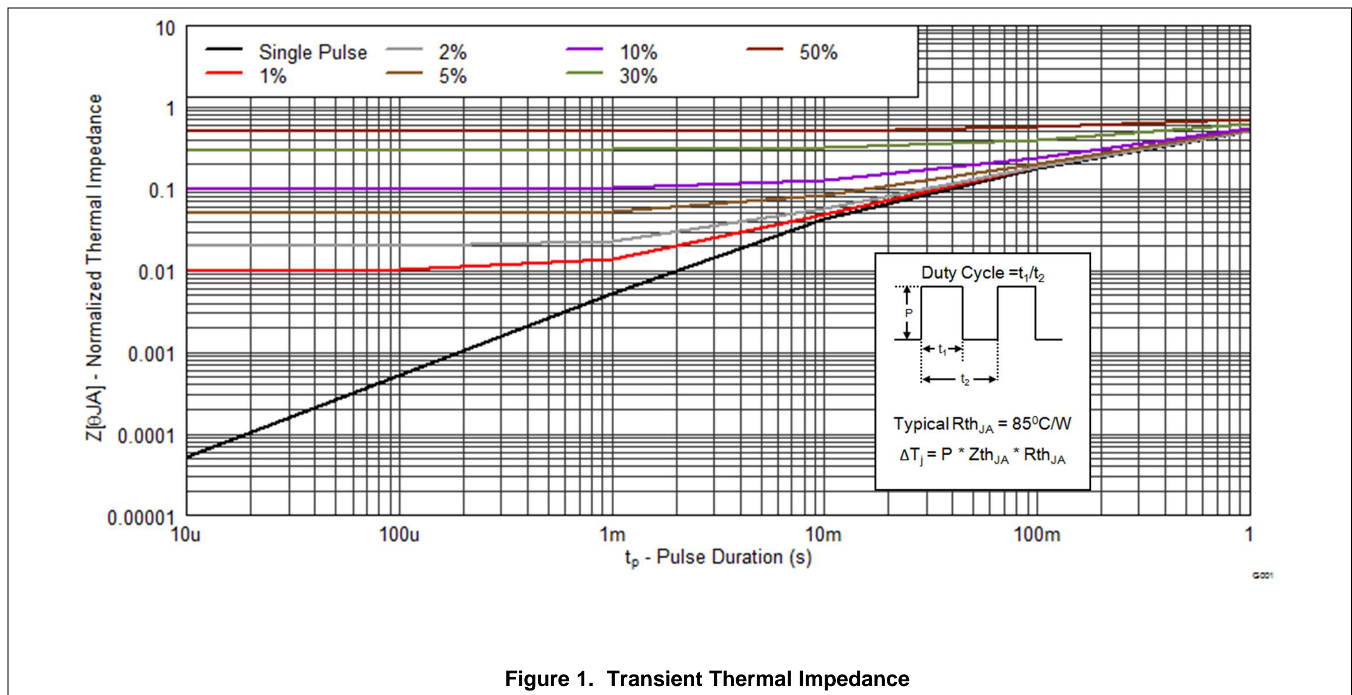


Figure 1. Transient Thermal Impedance

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Typical MOSFET Characteristics (continued)

(T_A = 25°C unless otherwise stated)

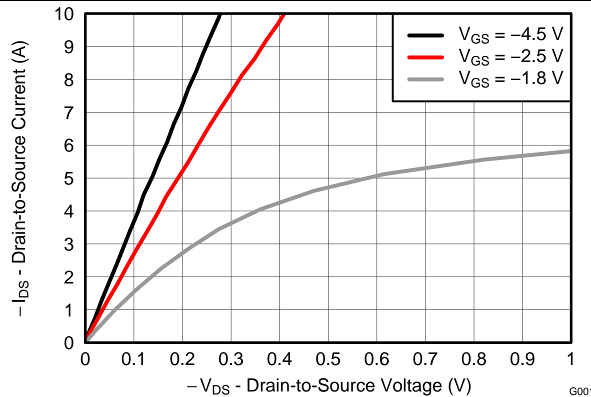
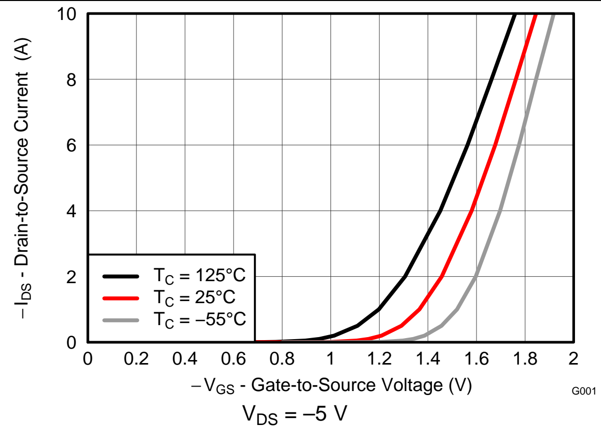
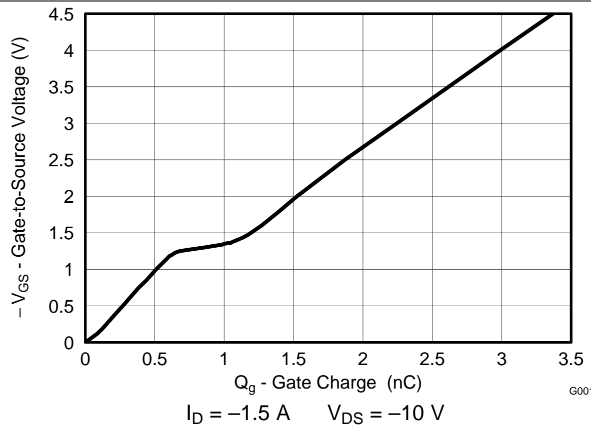


Figure 2. Saturation Characteristics



V_{DS} = –5 V

Figure 3. Transfer Characteristics



I_D = –1.5 A V_{DS} = –10 V

Figure 4. Gate Charge

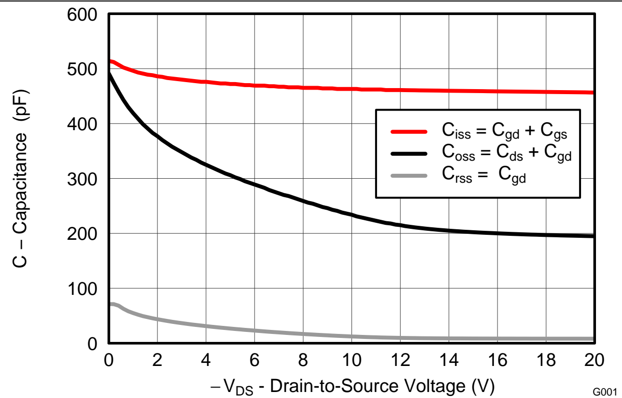
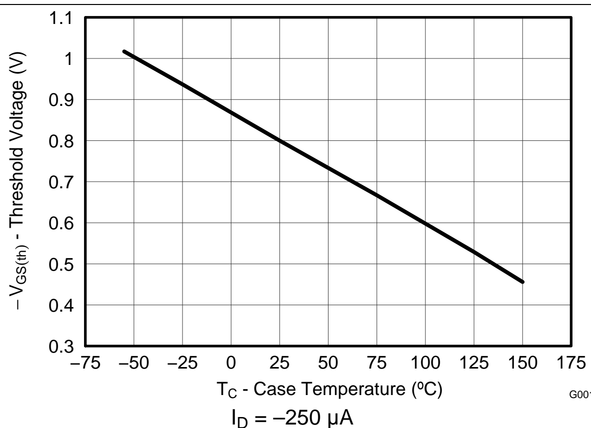


Figure 5. Capacitance



I_D = –250 µA

Figure 6. Threshold Voltage vs Temperature

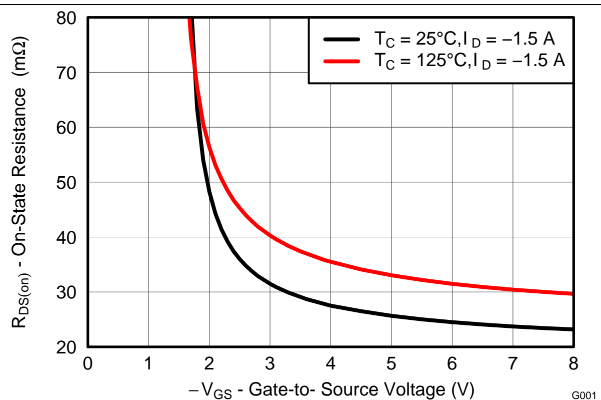


Figure 7. On-State Resistance vs Gate-to-Source Voltage

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Typical MOSFET Characteristics (continued)

(T_A = 25°C unless otherwise stated)

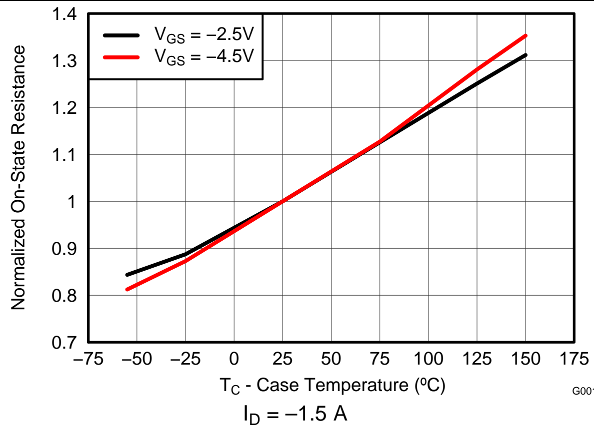

Figure 8. Normalized On-State Resistance vs Temperature

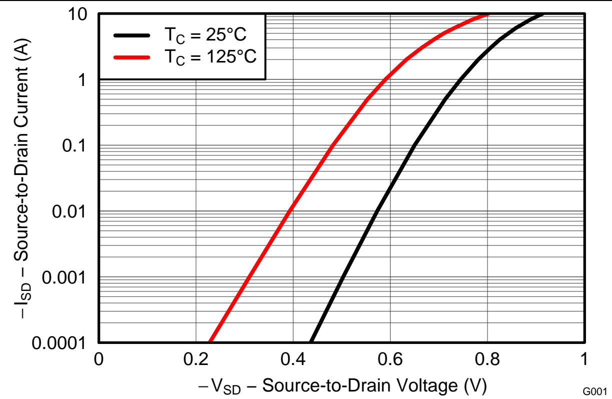

Figure 9. Typical Diode Forward Voltage

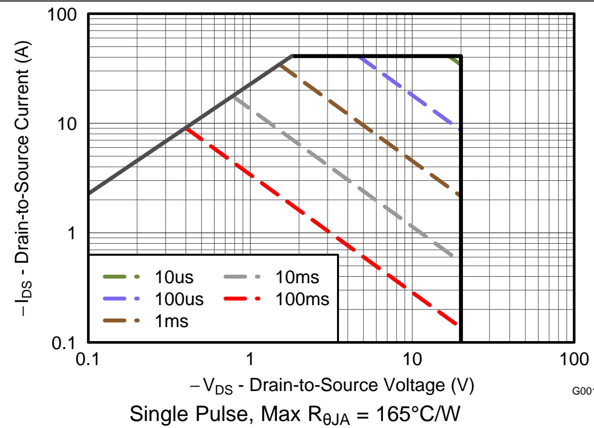

Figure 10. Maximum Safe Operating Area

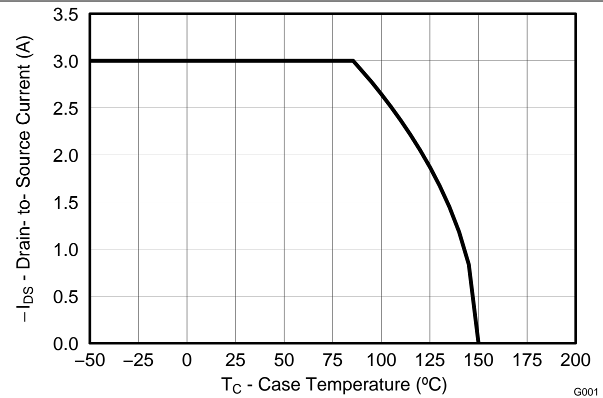

Figure 11. Maximum Drain Current vs Temperature

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6 器件和文档支持

6.1 商标

NexFET is a trademark of Texas Instruments.

6.2 静电放电警告

这些装置包含有限的内置 ESD 保护。 存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

6.3 术语表

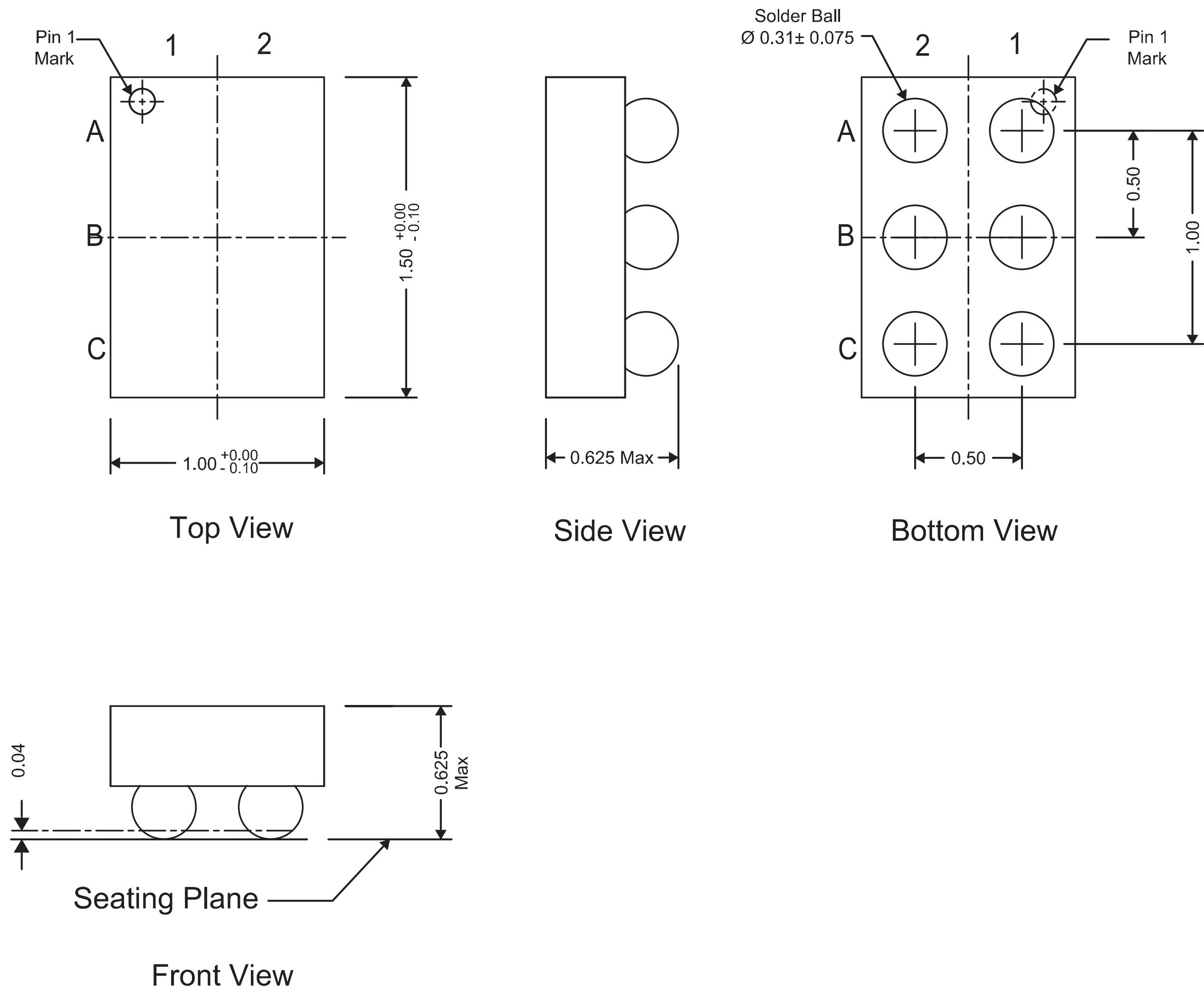
SLYZ022 — *TI 术语表*。

这份术语表列出并解释术语、首字母缩略词和定义。

7 机械封装和可订购信息

以下页中包括机械封装和可订购信息。 这些信息是针对指定器件可提供的最新数据。 这些数据会在无通知且不对本文档进行修订的情况下发生改变。 欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

7.1 CSD25304W1015 封装尺寸



注意：全部尺寸单位为 mm（除非另外注明）。

引脚分配

位置	名称
C1，C2	漏极
A1	栅极
A2，B1，B2	源极

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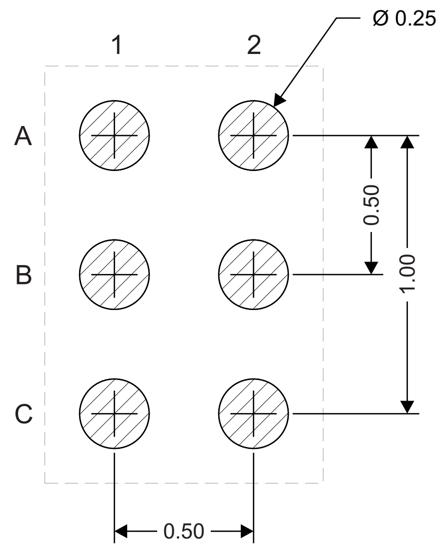
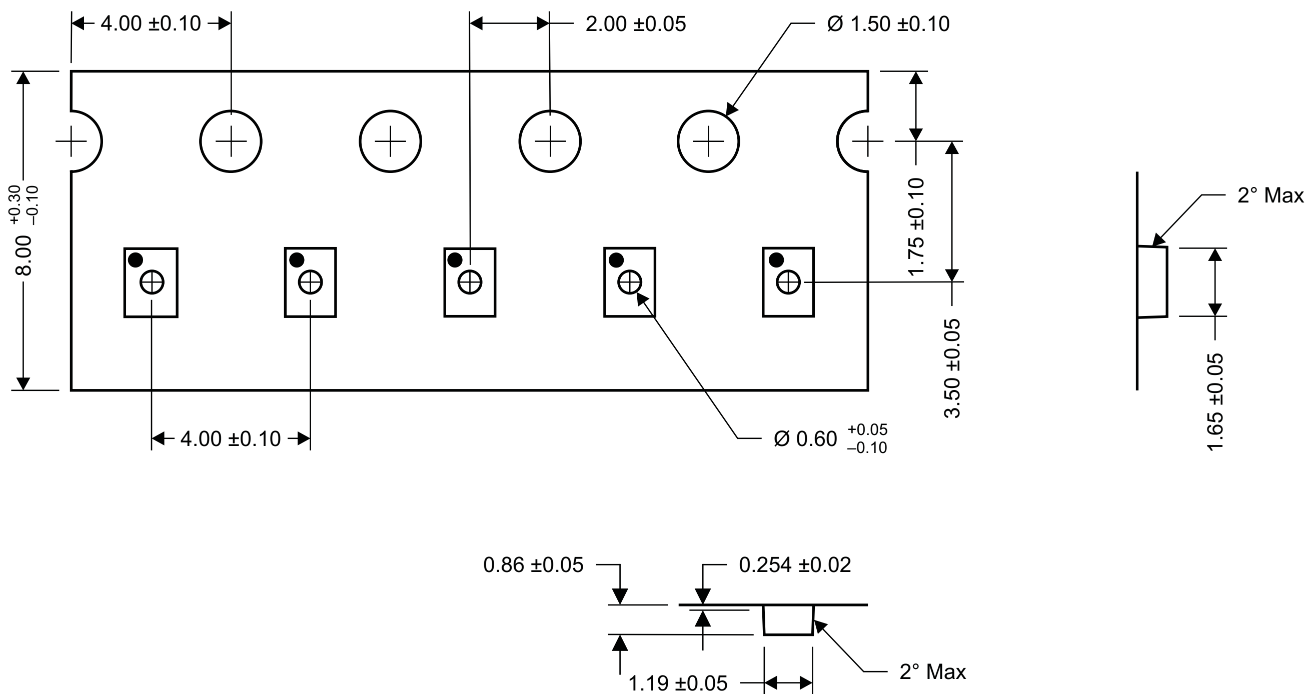
7.2 焊盘布局建议



注意：全部尺寸单位为 mm（除非另外注明）。

7.3 卷带封装信息



注意：全部尺寸单位为 mm（除非另外注明）。

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CSD25304W1015	ACTIVE	DSBGA	YZC	6	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM		25304	Samples
CSD25304W1015T	ACTIVE	DSBGA	YZC	6	250	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-55 to 150	25304	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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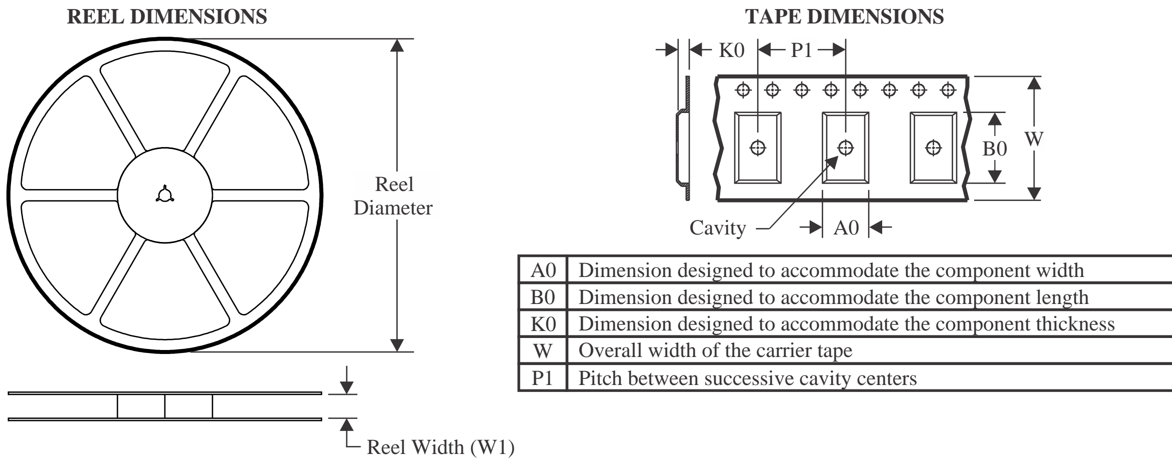
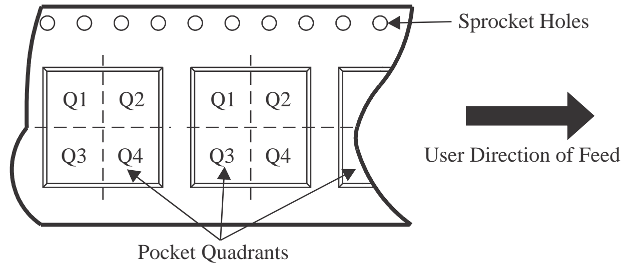
TAPE AND REEL INFORMATION



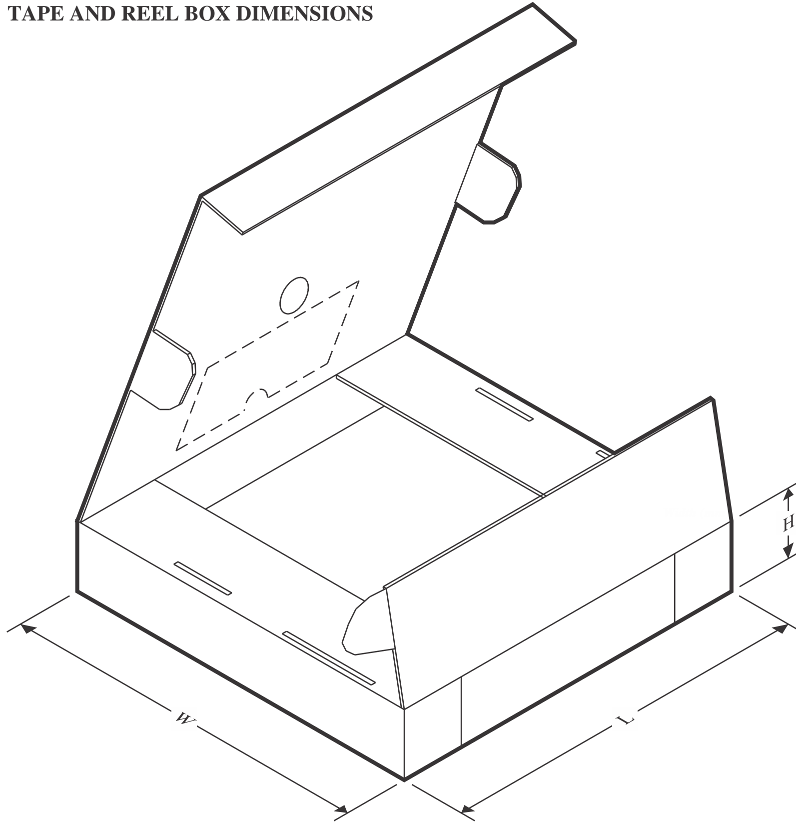
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

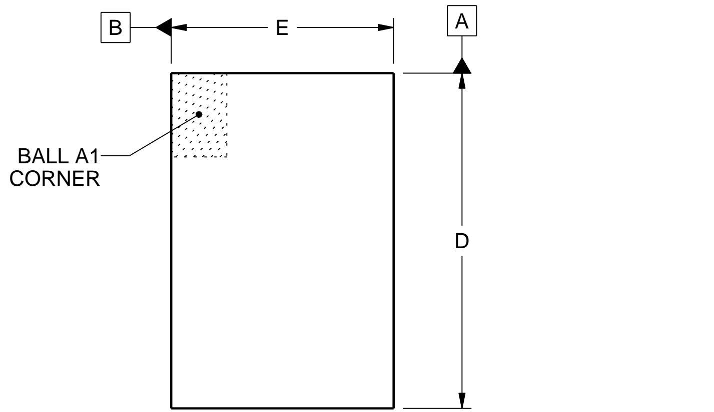
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CSD25304W1015	DSBGA	YZC	6	3000	180.0	9.0	1.18	1.68	0.83	4.0	8.0	Q1
CSD25304W1015T	DSBGA	YZC	6	250	180.0	9.0	1.18	1.68	0.83	4.0	8.0	Q1

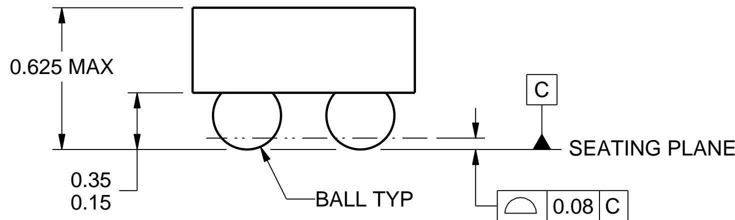
TAPE AND REEL BOX DIMENSIONS

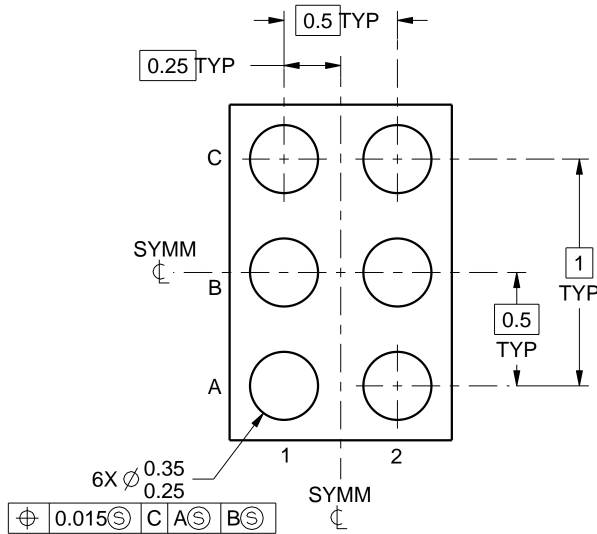


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD25304W1015	DSBGA	YZC	6	3000	195.0	210.0	39.0
CSD25304W1015T	DSBGA	YZC	6	250	195.0	210.0	39.0







D: Max = 1.49 mm, Min = 1.43 mm

E: Max = 0.996 mm, Min =0.936 mm

4219522/A 02/2015

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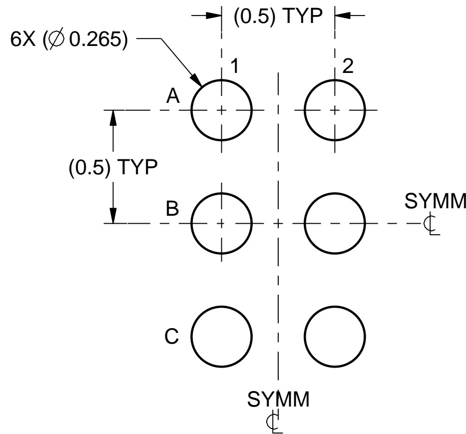
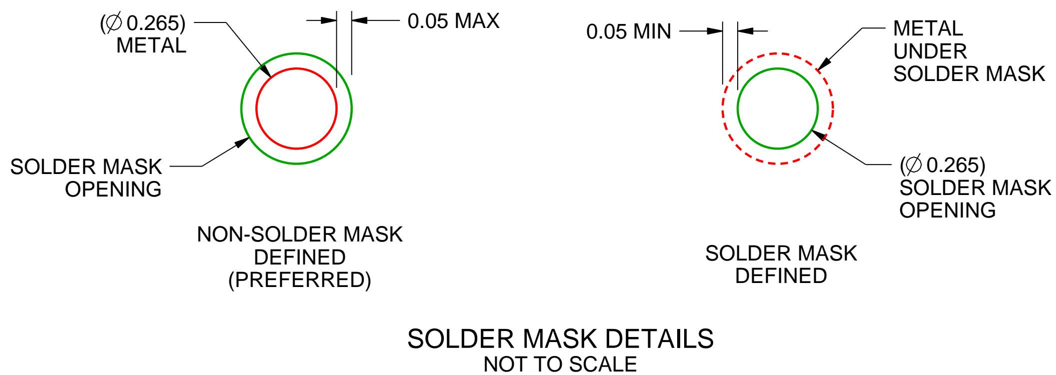
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. NanoFree™ package configuration.



LAND PATTERN EXAMPLE
SCALE:30X

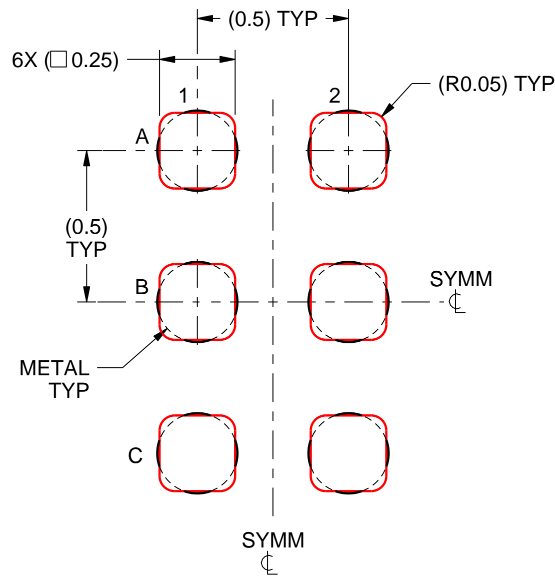


SOLDER MASK DETAILS
NOT TO SCALE

4219522/A 02/2015

NOTES: (continued)

4. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:40X

4219522/A 02/2015

NOTES: (continued)

5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

重要声明和免责声明

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