CSD13302W 12V N 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

1 特性

- 超低导通电阻
- 低 Q_g 和 Q_{gd}
- 1mm x 1mm 小尺寸封装
- 低高度（高度为 0.62mm）
- 无铅
- 符合 RoHS 环保标准
- 无卤素

2 应用范围

- 电池管理
- 负载开关
- 电池保护

3 说明

这款 14.6mΩ、12V N 通道器件设计用于在超薄且具有出色散热特性的 1mm × 1mm 小外形封装内提供最低的导通电阻和栅极电荷。

产品概要

T_A = 25°C		典型值		单位
V_{DS}	漏源电压	12		V
Q_g	栅极电荷总量 (4.5V)	6.0		nC
Q_{gd}	栅极电荷（栅极到漏极）	2.1		nC
$R_{DS(on)}$	漏源导通电阻	V_{GS} = 2.5V	21.2	mΩ
		V_{GS} = 4.5V	14.6	mΩ
$V_{GS(th)}$	阈值电压	1.0		V

订购信息(1)

器件	数量	介质	封装	出货
CSD13302W	3000	7 英寸卷带	1.0mm × 1.0mm 晶圆级封装	卷带封装
CSD13302WT	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

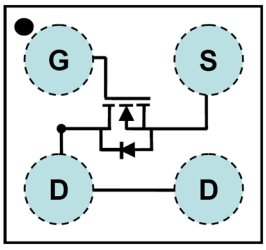
T_A = 25°C		值	单位
V_{DS}	漏源电压	12	V
V_{GS}	栅源电压	±10	V
I_D	持续漏极电流 (1)	1.6	A
I_{DM}	脉冲漏极电流 (2)	29	A
P_D	功耗(3)	1.8	W
T_J, T_{stg}	运行结温和储存温度范围	-55 至 150	°C

(1) 器件在 105ºC 温度下运行

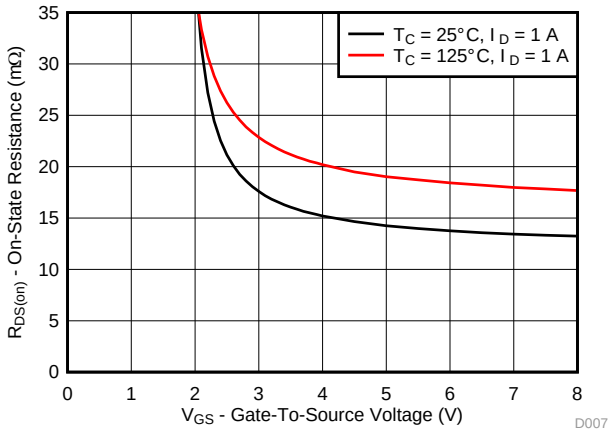
(2) $R_{\theta JA}$ = 170°C/W（覆铜面积最小时的典型值），脉宽 ≤ 100µs，占空比 ≤ 1%

(3) $R_{\theta JA}$ = 70°C/W（覆铜面积最大时的典型值）

顶视图



$R_{DS(on)}$ 与 V_{GS} 间的关系



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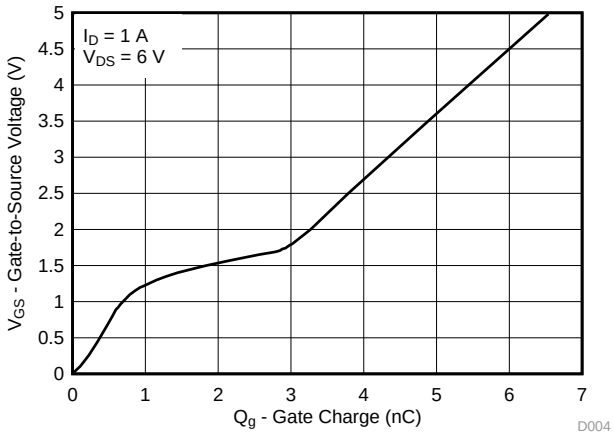
栅极电荷



D004

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.

目录

4 修订历史记录

日期	修订版本	注释
2015 年 3 月	*	最初发布。

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5 Specifications

5.1 Electrical Characteristics

(T_A = 25°C)

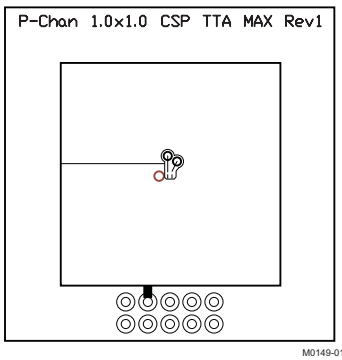
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
BV_{DSS}	Drain-to-Source Voltage	V_{GS} = 0 , I_D = 250 µA	12			V
I_{DSS}	Drain-to-Source Leakage Current	V_{GS} = 0 V, V_{DS} = 9.6 V			1	µA
I_{GSS}	Gate-to-Source Leakage Current	V_{DS} = 0 V, V_{GS} = 10 V			100	nA
$V_{GS(th)}$	Gate-to-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	0.7	1.0	1.3	V
$R_{DS(on)}$	Drain-to-Source On-Resistance	V_{GS} = 2.5 V, I_D = 1 A		21.2	25.8	mΩ
		V_{GS} = 4.5 V, I_D = 1 A		14.6	17.1	
g_{fs}	Transconductance	V_{DS} = 1.2 V, I_D = 1 A		10		S
DYNAMIC CHARACTERISTICS						
C_{ISS}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 6 V, f = 1 MHz		663	862	pF
C_{OSS}	Output Capacitance			211	274	pF
C_{RSS}	Reverse Transfer Capacitance			151	196	pF
R_g	Series Gate Resistance			3.6	7.2	Ω
Q_g	Gate Charge Total (4.5 V)	V_{DS} = 6 V, I_D = 1 A		6.0	7.8	nC
Q_{gd}	Gate Charge Gate-to-Drain			2.1		nC
Q_{gs}	Gate Charge Gate-to-Source			0.7		nC
$Q_{g(th)}$	Gate Charge at Vth			0.7		nC
Q_{OSS}	Output Charge	V_{DS} = 6 V, V_{GS} = 0 V		1.3		nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = 6 V, V_{GS} = 4.5 V, I_D = 1 A R_G = 0 Ω		6		ns
t_r	Rise Time			7		ns
$t_{d(off)}$	Turn Off Delay Time			17		ns
t_f	Fall Time			7		ns
DIODE CHARACTERISTICS						
V_{SD}	Diode Forward Voltage	I_S = 1 A, V_{GS} = 0 V		0.7	1.0	V
Q_{rr}	Reverse Recovery Charge	V_{DS}= 6 V, I_S = 1 A, di/dt = 200 A/µs		11.6		nC
t_{rr}	Reverse Recovery Time			19.6		ns

5.2 Thermal Information

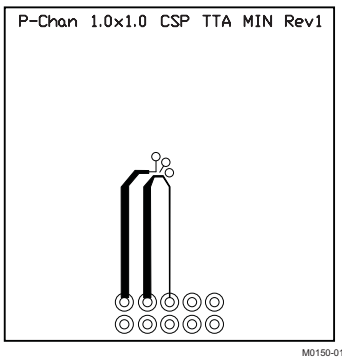
(T_A = 25°C unless otherwise stated)

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance(1)		275		°C/W
	Junction-to-Ambient Thermal Resistance(2)		70		

(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.



Typical $R_{\theta JA}$ = 70°C/W when mounted on 1 inch^2 of 2 oz. Cu.



Typical $R_{\theta JA}$ = 275°C/W when mounted on minimum pad area of 2 oz. Cu.

5.3 Typical MOSFET Characteristics

(T_A = 25°C unless otherwise stated)

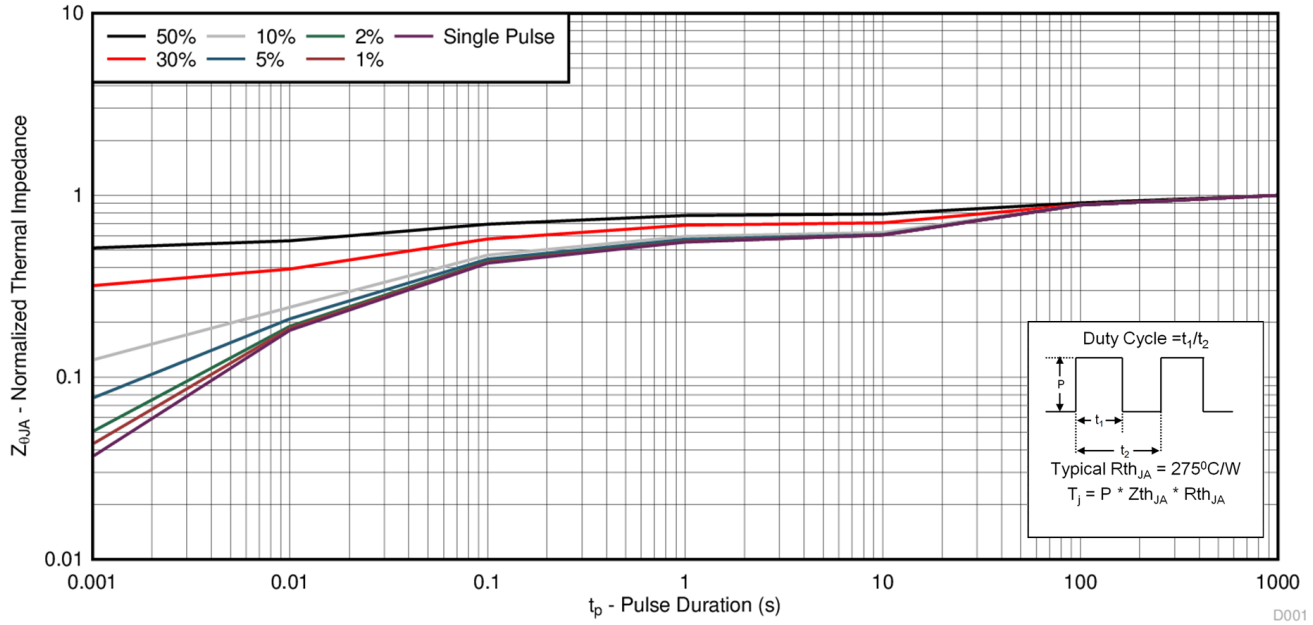


Figure 1. Transient Thermal Impedance

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Typical MOSFET Characteristics (continued)

(T_A = 25°C unless otherwise stated)

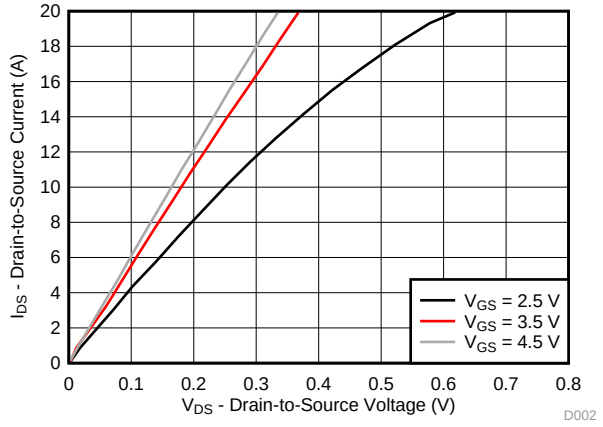

Figure 2. Saturation Characteristics

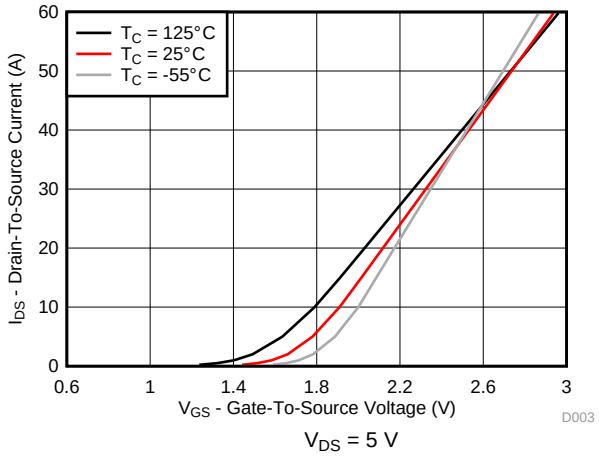

Figure 3. Transfer Characteristics

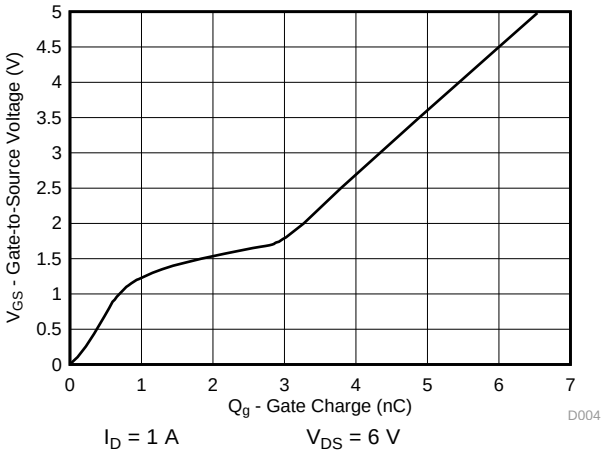

Figure 4. Gate Charge

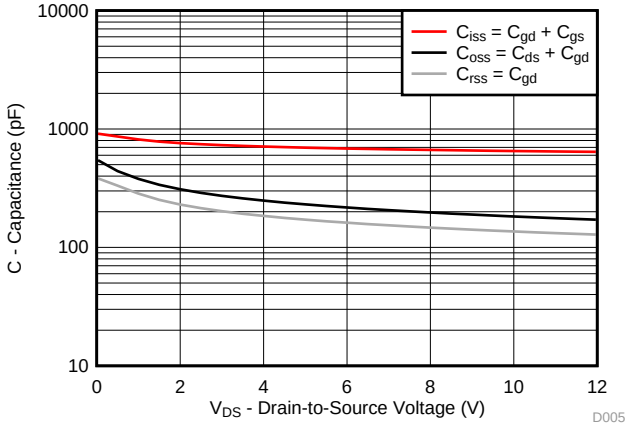

Figure 5. Capacitance

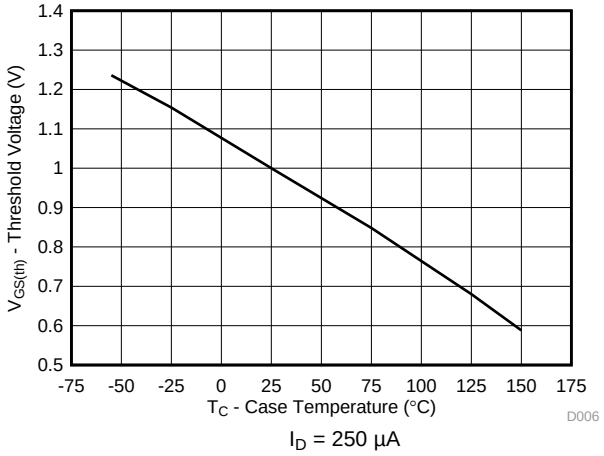

Figure 6. Threshold Voltage vs Temperature

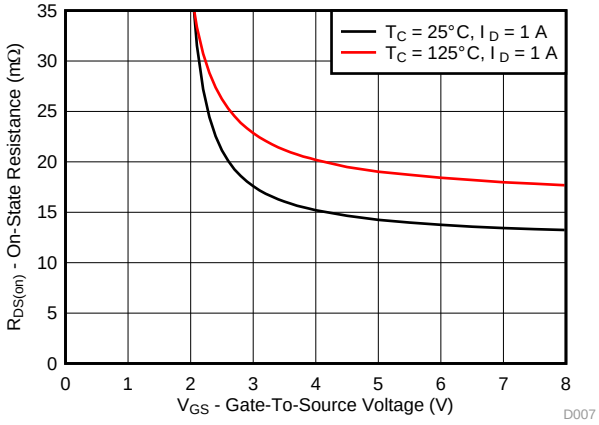

Figure 7. On-State Resistance vs Gate-to-Source Voltage

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Typical MOSFET Characteristics (continued)

(T_A = 25°C unless otherwise stated)

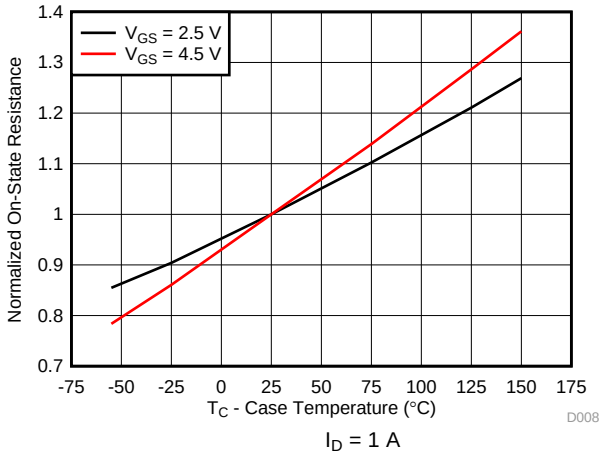

Figure 8. Normalized On-State Resistance vs Temperature

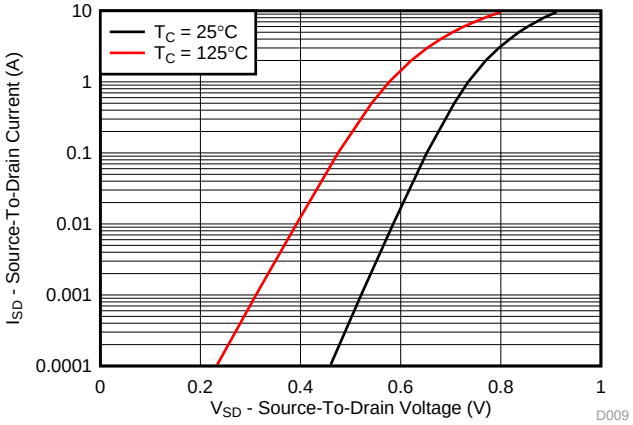

Figure 9. Typical Diode Forward Voltage

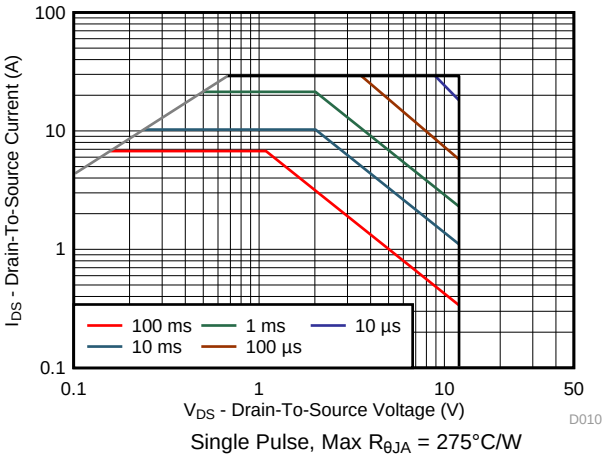

Figure 10. Maximum Safe Operating Area

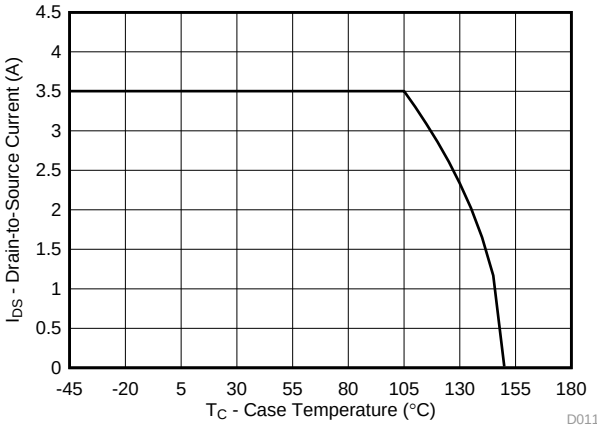

Figure 11. Maximum Drain Current vs Temperature

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6 器件和文档支持

6.1 商标

NexFET is a trademark of Texas Instruments.
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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。

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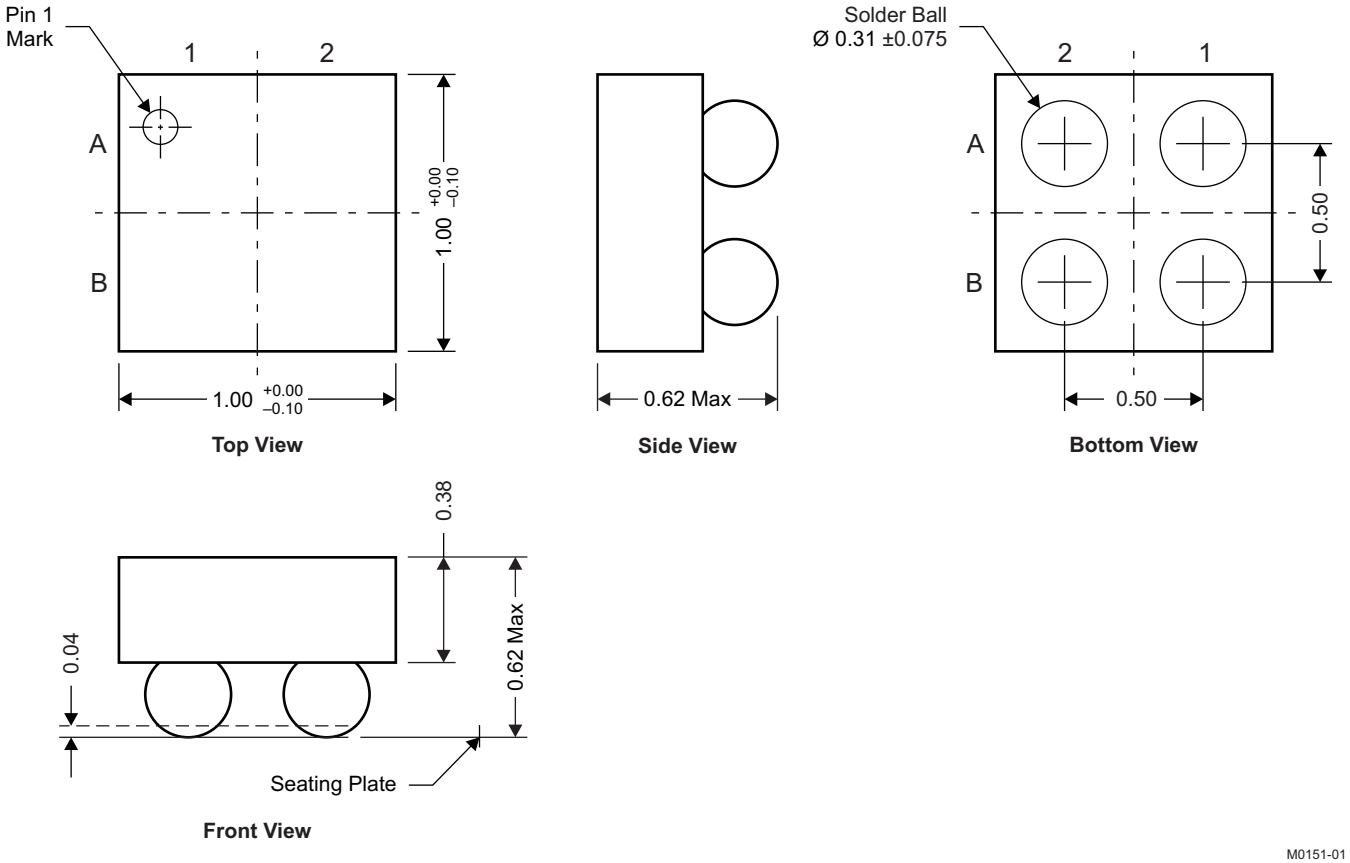
7 机械封装和可订购信息

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 CSD13302W 封装尺寸



NOTE: 全部尺寸单位为 mm（除非另外注明）

引脚配置表

位置	名称
A2	源极
A1	栅极
B1，B2	漏极

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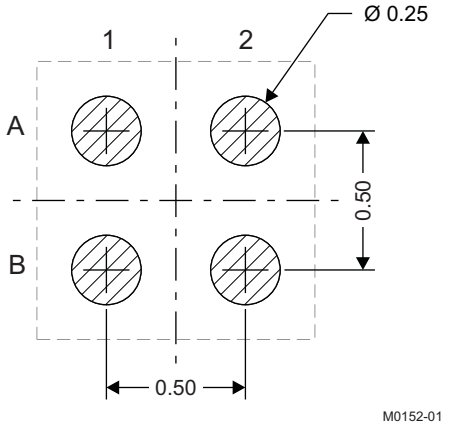
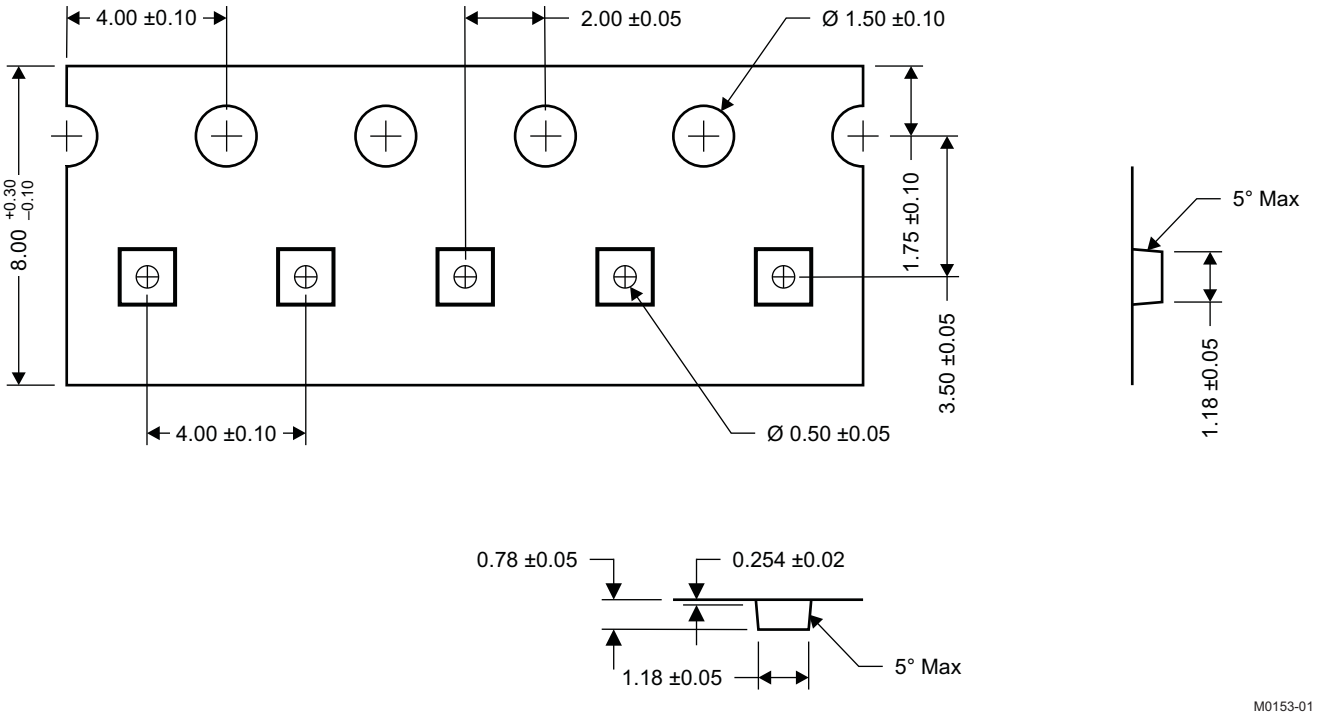
焊盘布局建议



NOTE: 全部尺寸单位为 mm（除非另外注明）

7.2 卷带信息



NOTE: 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
CSD13302W	ACTIVE	DSBGA	YZB	4	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM		302	Samples
CSD13302WT	ACTIVE	DSBGA	YZB	4	250	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-55 to 150	302	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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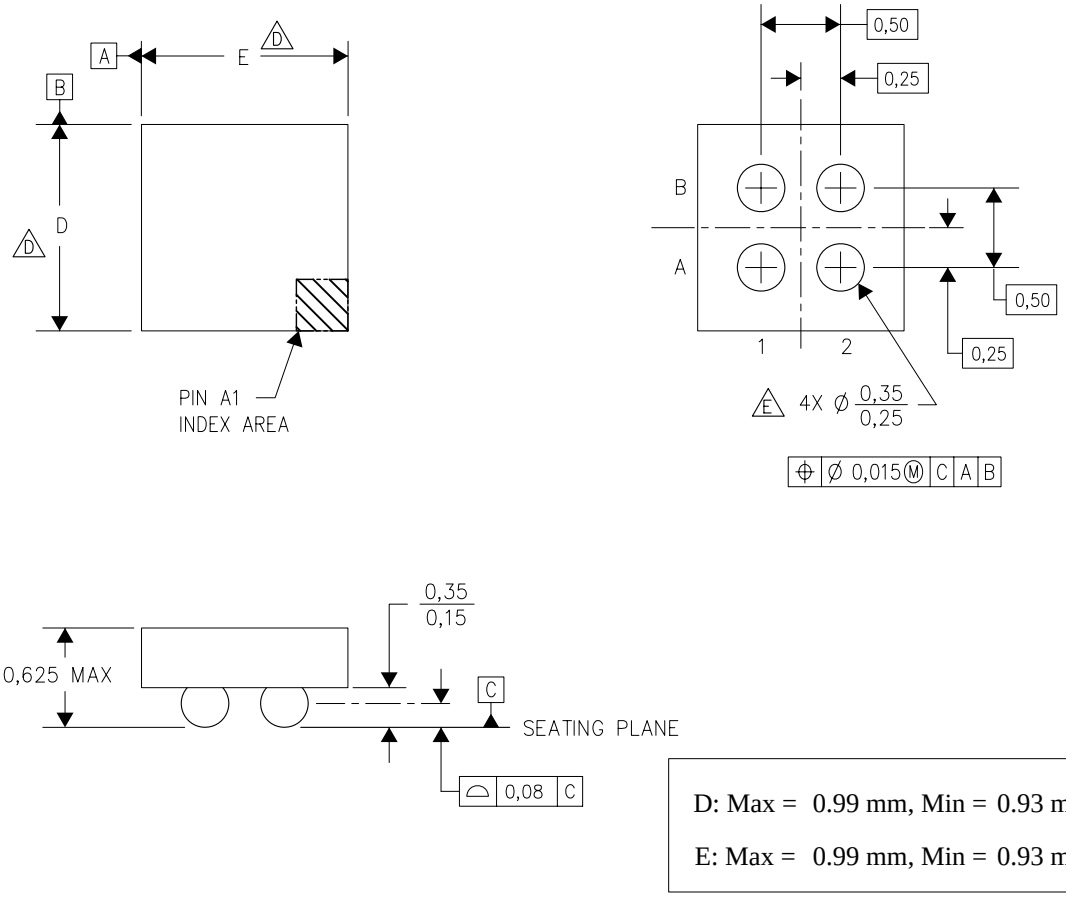
YZB (S–XBGA–N4) DIE–SIZE BALL GRID ARRAY



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. NanoFree™ package configuration.
D. Devices in YZB package can have dimension D ranging from 0.94 to 1.65 mm and dimension E ranging from 0.94 to 1.65 mm. To determine the exact package size of a particular device, refer to the device datasheet or contact a local TI representative.
E. Reference Product Data Sheet for array population. 2 x 2 matrix pattern is shown for illustration only.
F. This package contains lead–free balls. Refer to YEB (Drawing #4204178) for tin–lead (SnPb) balls.

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