

CSD22206W -8V P 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

1 特性

- 超低电阻
- 小尺寸封装 1.5mm x 1.5mm
- 无铅
- 栅极静电放电 (ESD) 保护
- 符合 RoHS 环保标准
- 无卤素
- 栅 - 源电压钳位

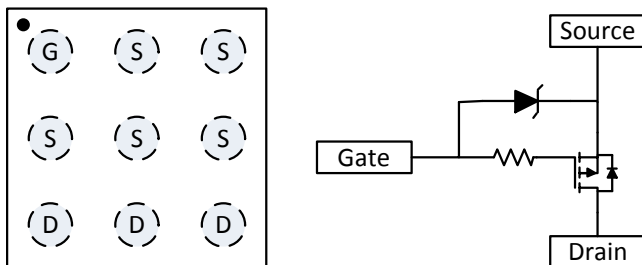
2 应用范围

- 负载开关 应用范围
- 电池管理
- 电池保护

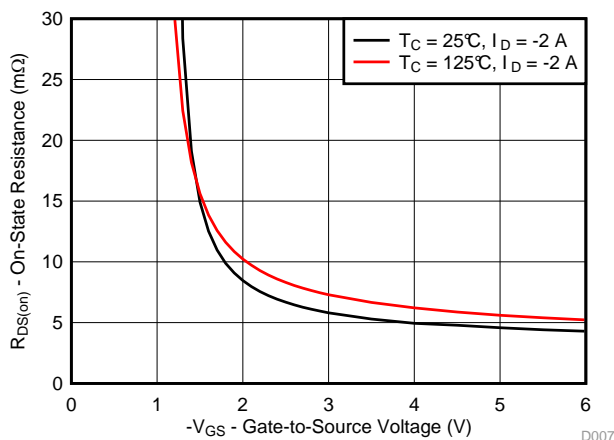
3 说明

这款 -8V、4.7mΩ、1.5mm × 1.5mm 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提供最低的导通电阻和栅极电荷。低导通电阻与小型封装尺寸和低高度结合在一起，使得此器件非常适合于电池供电运行的空间受限应用。

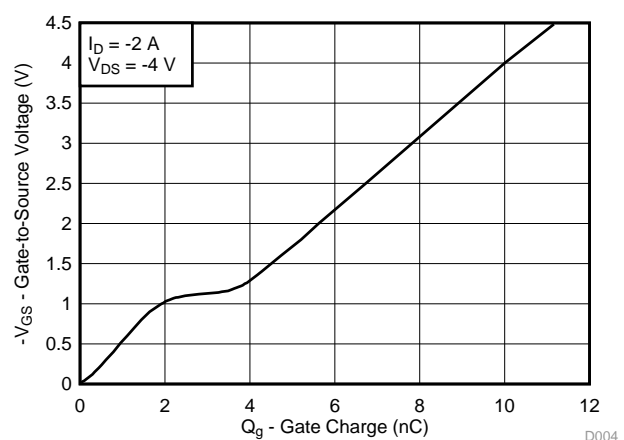
顶视图和电路配置



$R_{DS(on)}$ 与 V_{GS} 对比



栅极电荷



产品概要

$T_A = 25^\circ\text{C}$		典型值		单位
V_{DS}	漏源电压	-8		V
Q_g	栅极电荷总量 (-4.5V)	11.2		nC
Q_{gd}	栅极电荷 (栅极到漏极)	1.8		nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = -2.5\text{V}$	6.8	mΩ
		$V_{GS} = -4.5\text{V}$	4.7	
$V_{GS(th)}$	阈值电压	-0.7		V

器件信息

器件	数量	包装介质	封装	运输
CSD22206W	3000	7 英寸卷带	1.50mm × 1.50mm 晶圆级球状引脚栅格阵列 (BGA) 封装	卷带封装
CSD22206WT	250			

绝对最大额定值

$T_A = 25^\circ\text{C}$		值	单位
V_{DS}	漏源电压	-8	V
V_{GS}	栅源电压	-6	V
I_D	持续漏极电流 ⁽¹⁾	-5	A
	脉冲漏极电流 ⁽²⁾	-108	A
P_D	功率耗散	1.7	W
T_J, T_{stg}	工作结温, 储存温度	-55 至 150	°C

(1) 器件在 105°C 温度下运行。

(2) 典型 $R_{\theta JA} = 75^\circ\text{C/W}$ (安装于具有最大铜安装区域的 FR4 材料), 脉宽 $\leq 100\mu\text{s}$, 占空比 $\leq 1\%$ 。



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4 修订历史记录

日期	修订版本	注释
2017 年 5 月	*	初始发行版。

5 Specifications

5.1 Electrical Characteristics

 $T_A = 25^\circ\text{C}$ (unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
BV_{DSS}	Drain-to-source voltage	$V_{GS} = 0\text{ V}, I_{DS} = -250\ \mu\text{A}$	-8			V
BV_{GSS}	Gate-to-source voltage	$V_{DS} = 0\text{ V}, I_G = -250\ \mu\text{A}$	-6			V
I_{DSS}	Drain-to-source leakage current	$V_{GS} = 0\text{ V}, V_{DS} = -6.4\text{ V}$			-1	μA
I_{GSS}	Gate-to-source leakage current	$V_{DS} = 0\text{ V}, V_{GS} = -6\text{ V}$			-100	nA
$V_{GS(th)}$	Gate-to-source threshold voltage	$V_{DS} = V_{GS}, I_{DS} = -250\ \mu\text{A}$	-0.4	-0.7	-1.05	V
$R_{DS(on)}$	Drain-to-source on resistance	$V_{GS} = -2.5\text{ V}, I_{DS} = -2\text{ A}$		6.8	9.1	m Ω
		$V_{GS} = -4.5\text{ V}, I_{DS} = -2\text{ A}$		4.7	5.7	
g_{fs}	Transconductance	$V_{DS} = -0.8\text{ V}, I_{DS} = -2\text{ A}$		20		S
DYNAMIC CHARACTERISTICS						
C_{ISS}	Input capacitance	$V_{GS} = 0\text{ V}, V_{DS} = -4\text{ V},$ $f = 1\text{ MHz}$		1750	2275	pF
C_{OSS}	Output capacitance			960	1250	pF
C_{RSS}	Reverse transfer capacitance			340	440	pF
R_G	Series gate resistance			30		Ω
Q_g	Gate charge total (-4.5 V)	$V_{DS} = -4\text{ V},$ $I_D = -2\text{ A}$		11.2	14.6	nC
Q_{gd}	Gate charge gate-to-drain			1.8		nC
Q_{gs}	Gate charge gate-to-source			2.1		nC
$Q_{g(th)}$	Gate charge at V_{th}			1.3		nC
Q_{OSS}	Output charge		$V_{DS} = -4\text{ V}, V_{GS} = 0\text{ V}$		7.2	
$t_{d(on)}$	Turnon delay time	$V_{DS} = -4\text{ V}, V_{GS} = -4.5\text{ V},$ $I_{DS} = -2\text{ A}, R_G = 0\ \Omega$		37		ns
t_r	Rise time			17		ns
$t_{d(off)}$	Turnoff delay time			118		ns
t_f	Fall time			45		ns
DIODE CHARACTERISTICS						
V_{SD}	Diode forward voltage	$I_{DS} = -2\text{ A}, V_{GS} = 0\text{ V}$	-0.69	-1.0		
Q_{rr}	Reverse recovery charge	$V_{DS} = -4\text{ V}, I_F = -1\text{ A},$ $di/dt = 200\text{ A}/\mu\text{s}$		24		nC
t_{rr}	Reverse recovery time			59		ns

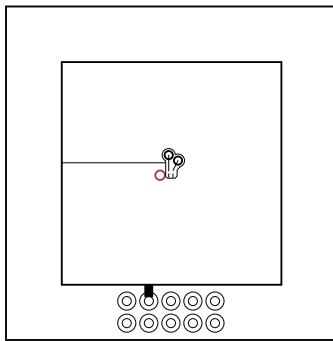
5.2 Thermal Information

 $T_A = 25^\circ\text{C}$ (unless otherwise stated)

THERMAL METRIC		TYPICAL VALUES	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽¹⁾	75	$^\circ\text{C}/\text{W}$
	Junction-to-ambient thermal resistance ⁽²⁾	230	

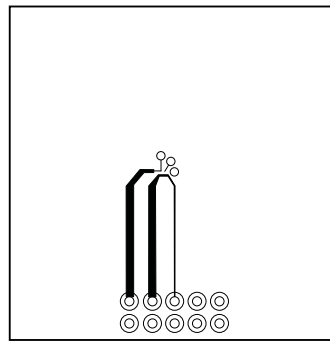
(1) Device mounted on FR4 material with 1-in² (6.45-cm²), 2-oz (0.071-mm) thick Cu.

(2) Device mounted on FR4 material with minimum Cu mounting area.



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Typ $R_{\theta JA} = 75^{\circ}\text{C/W}$
when mounted on 1 in²
of 2-oz Cu.

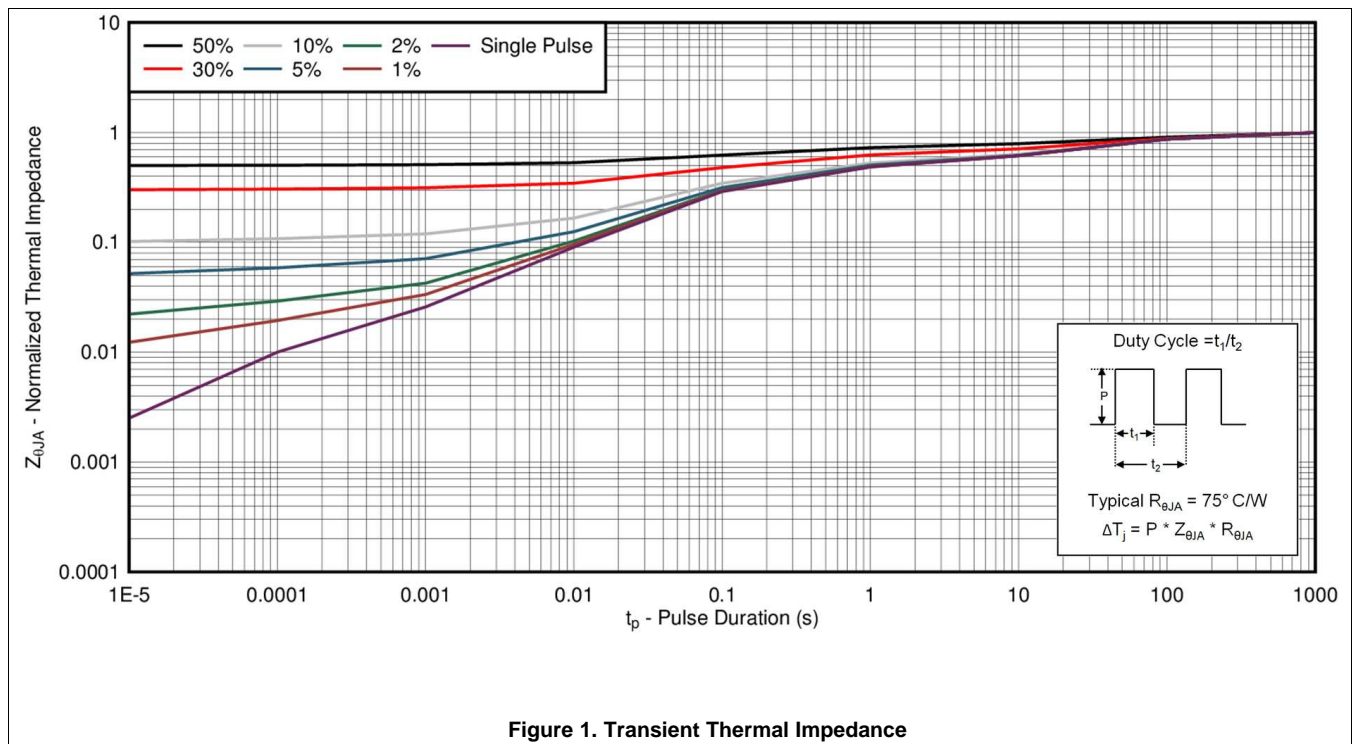


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Typ $R_{\theta JA} = 230^{\circ}\text{C/W}$
when mounted on
minimum pad area of
2-oz Cu.

5.3 Typical MOSFET Characteristics

$T_A = 25^{\circ}\text{C}$ (unless otherwise stated)



Typical MOSFET Characteristics (continued)

T_A = 25°C (unless otherwise stated)

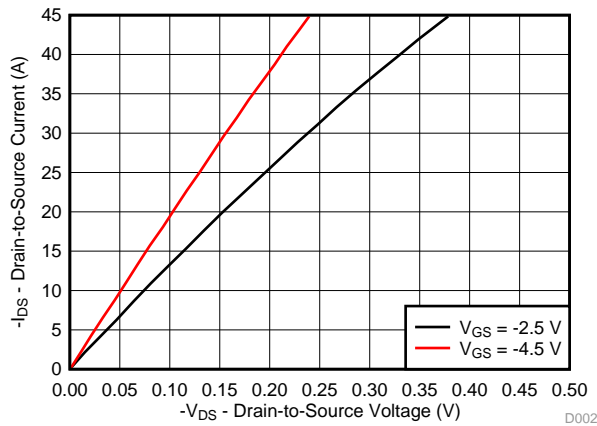


Figure 2. Saturation Characteristics

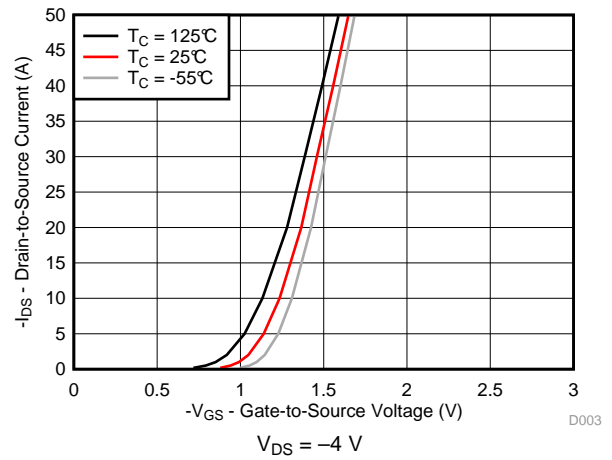


Figure 3. Transfer Characteristics

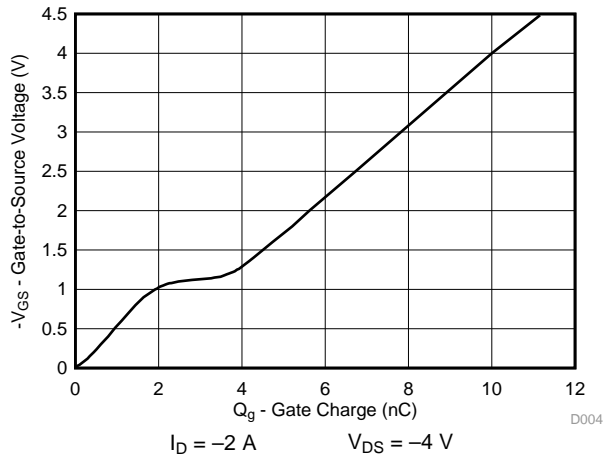


Figure 4. Gate Charge

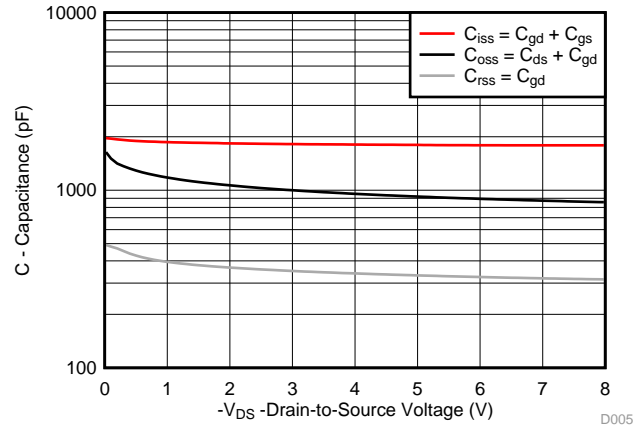


Figure 5. Capacitance

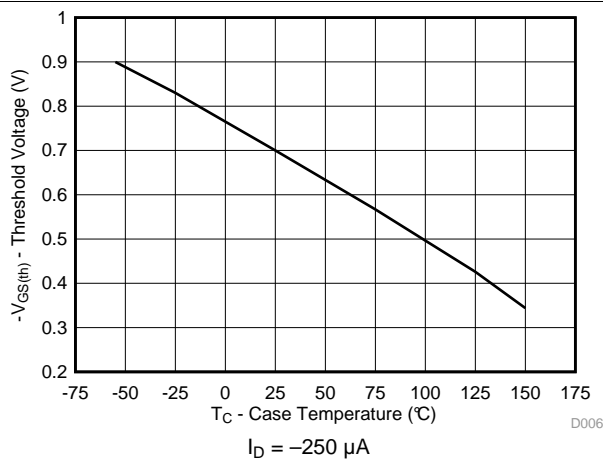


Figure 6. Threshold Voltage vs Temperature

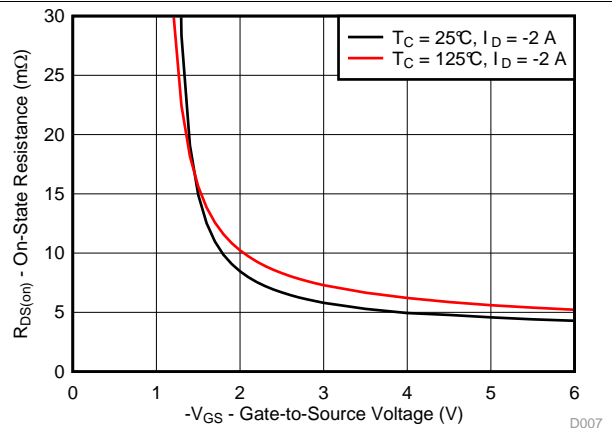
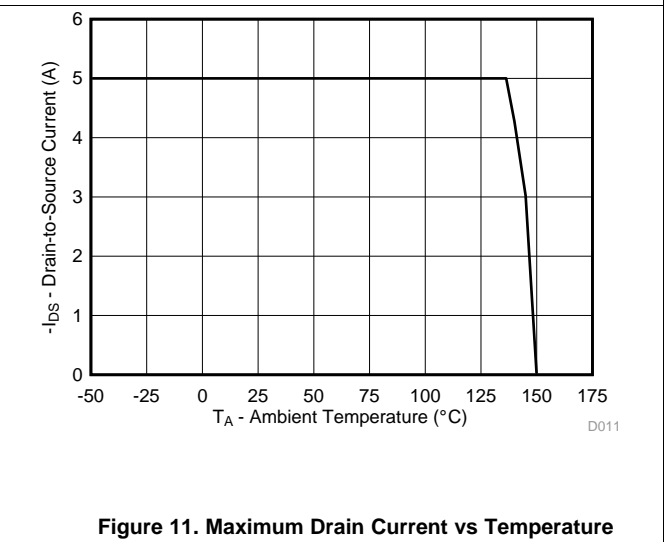
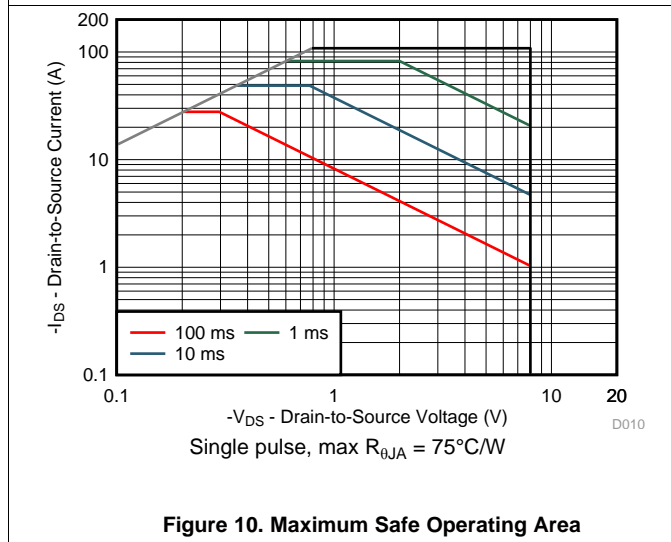
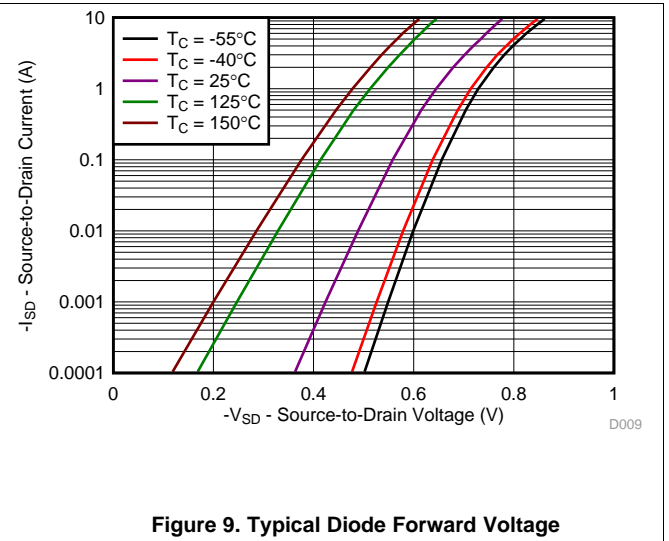
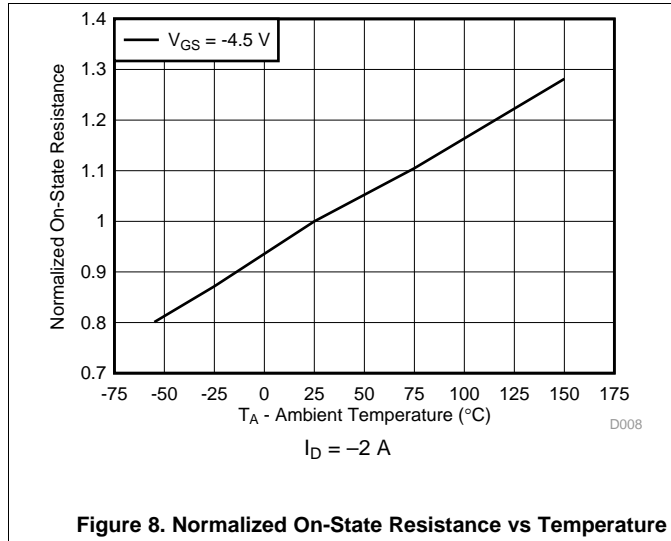


Figure 7. On-State Resistance vs Gate-to-Source Voltage

Typical MOSFET Characteristics (continued)

$T_A = 25^\circ\text{C}$ (unless otherwise stated)



6 器件和文档支持

6.1 接收文档更新通知

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6.2 社区资源

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TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

6.3 商标

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6.4 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。

6.5 Glossary

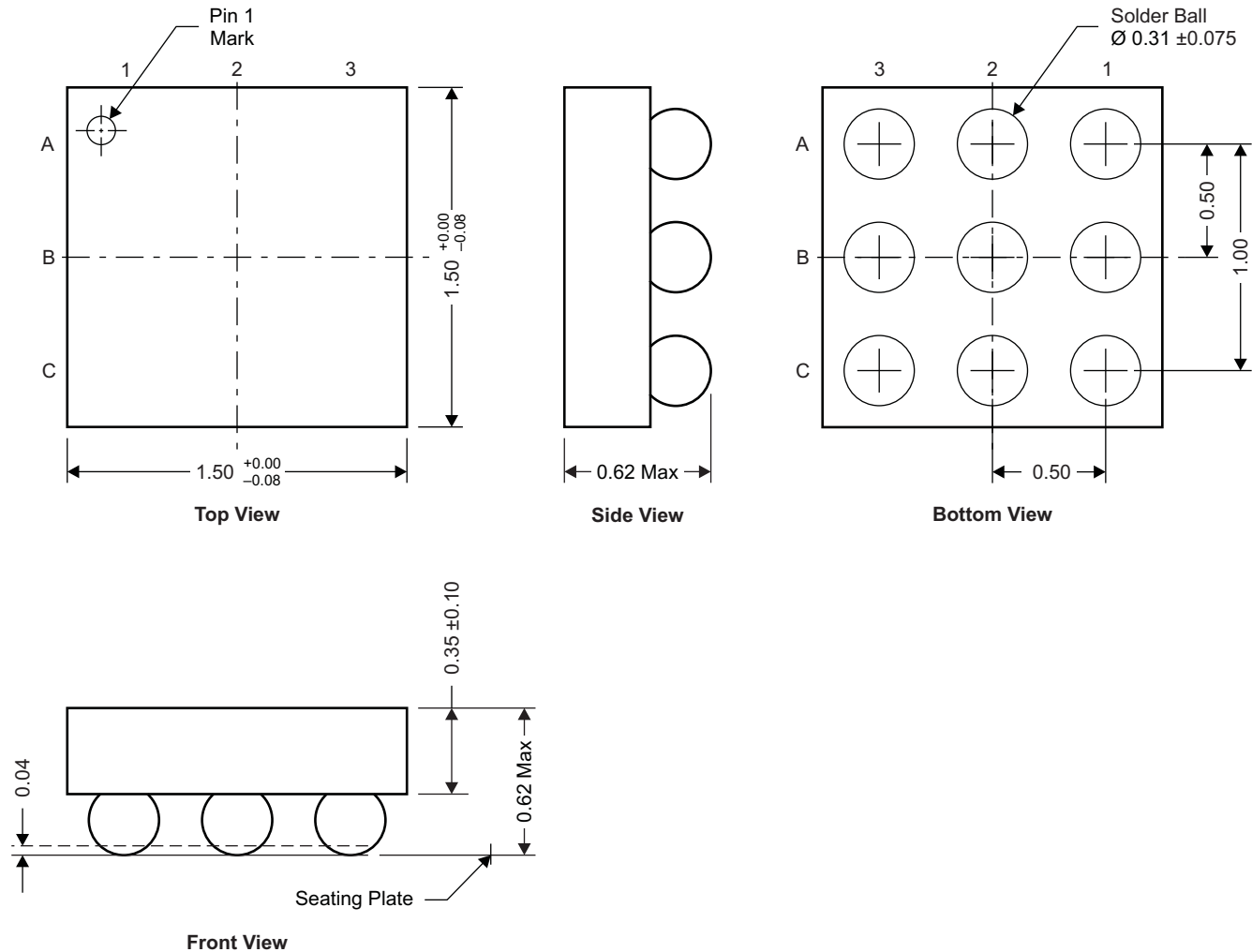
[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

7 机械、封装和可订购信息

以下页面包括机械、封装和可订购信息。这些信息是指定器件的最新可用数据。这些数据发生变化时，我们可能不会另行通知或修订此文档。如欲获取此产品说明书的浏览器版本，请参见左侧的导航栏。

7.1 CSD22206W 封装尺寸



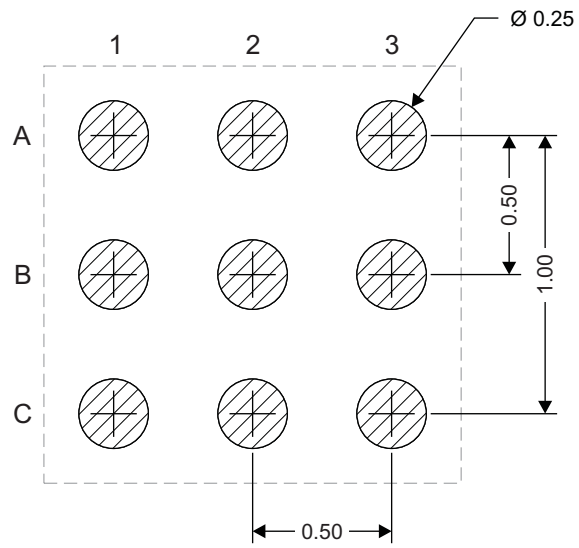
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NOTE: 全部尺寸单位为 mm (除非另外注明)。

表 1. 引脚分配

位置	名称
A1	栅极
A2, A3, B1, B2, B3	源极
C1, C2, C3	漏极

7.2 建议的焊盘图案



M0172-01

NOTE: 全部尺寸单位为 mm (除非另外注明)。

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)
CSD22206W	Active	Production	DSBGA (YZF) 9	3000 LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	22206
CSD22206W.B	Active	Production	DSBGA (YZF) 9	3000 LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	22206
CSD22206WT	Active	Production	DSBGA (YZF) 9	250 SMALL T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	22206
CSD22206WT.B	Active	Production	DSBGA (YZF) 9	250 SMALL T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-55 to 150	22206

⁽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.

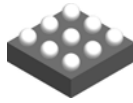
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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.

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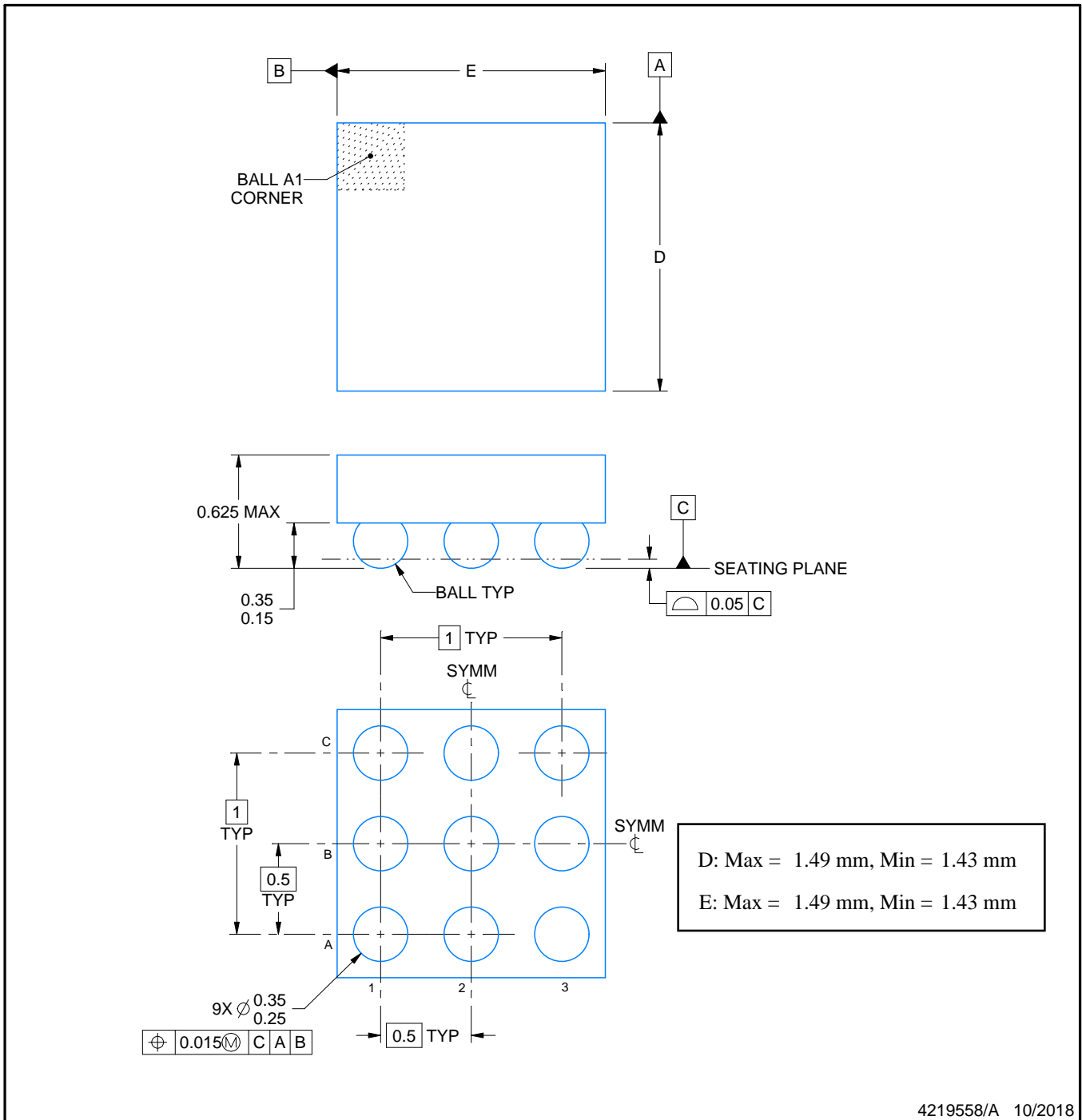
YZF0009



PACKAGE OUTLINE

DSBGA - 0.625 mm max height

DIE SIZE BALL GRID ARRAY



NOTES:

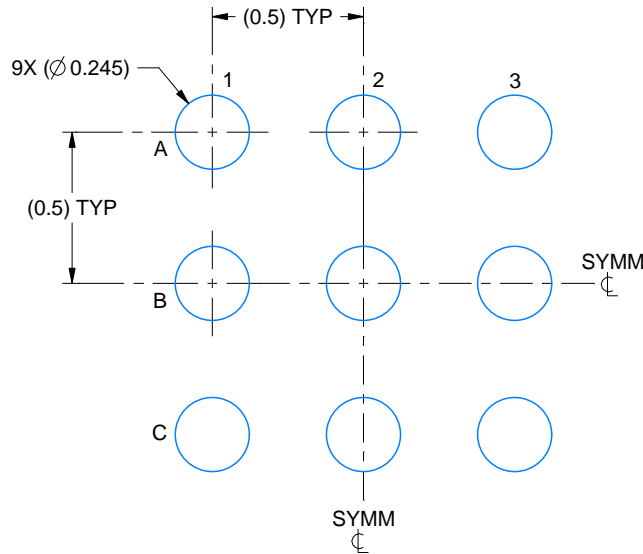
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

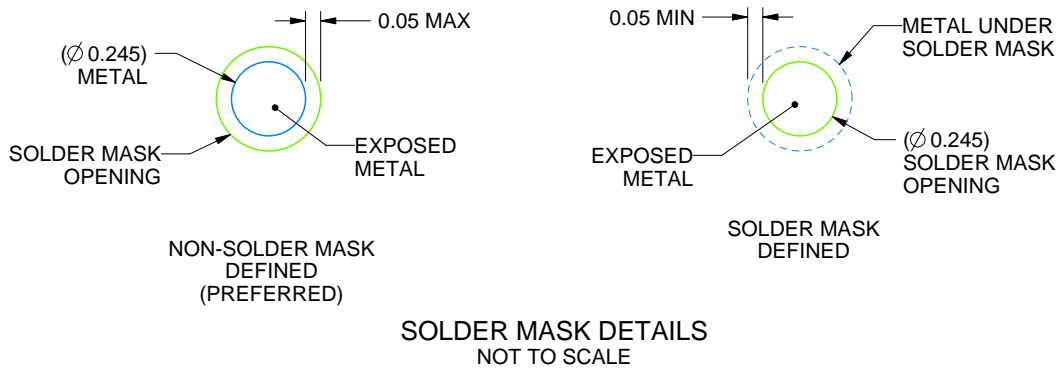
YZF0009

DSBGA - 0.625 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 40X



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NOTES: (continued)

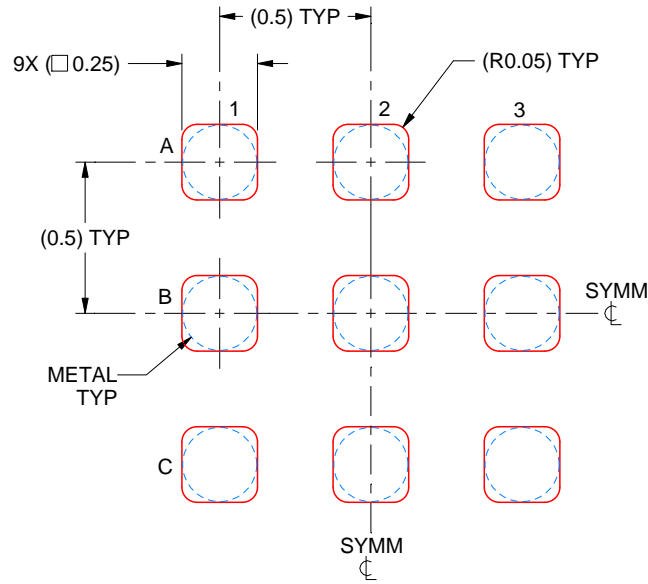
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. See Texas Instruments Literature No. SNVA009 (www.ti.com/lit/snva009).

EXAMPLE STENCIL DESIGN

YZF0009

DSBGA - 0.625 mm max height

DIE SIZE BALL GRID ARRAY



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

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NOTES: (continued)

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

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