

# CSD17577Q3A 30V N 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

## 1 特性

- 低  $Q_g$  和  $Q_{gd}$
- 低热阻
- 雪崩额定值
- 无铅
- 符合 RoHS 环保标准
- 无卤素
- 小外形尺寸无引线 (SON) 3.3mm x 3.3mm 封装

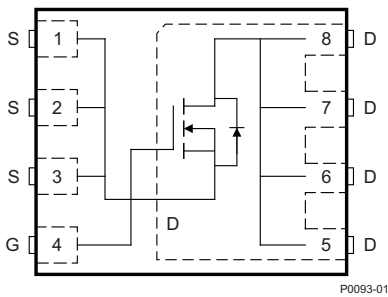
## 2 应用范围

- 网络互联、电信和计算系统中的负载点同步降压
- 针对控制和同步 FET 应用进行了优化

## 3 说明

这款 30V, 4.0mΩ, SON 3.3mm x 3.3mm NexFET™ 功率 MOSFET 被设计成在功率转换应用中以最大程度降低电阻。

顶部图标



### 产品概要

$T_A = 25^\circ\text{C}$		典型值		单位
$V_{DS}$	漏源电压	30		V
$Q_g$	栅极电荷总量 (4.5V)	12		nC
$Q_{gd}$	栅漏栅极电荷	2.5		nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = 4.5\text{V}$	5.3	mΩ
		$V_{GS} = 10\text{V}$	4	mΩ
$V_{GS(th)}$	阈值电压	1.4		V

### 订购信息<sup>(1)</sup>

器件	数量	介质	封装	出货
CSD17577Q3A	2500	13 英寸卷带	SON 3.3mm x 3.3mm 塑料封装	卷带封装
CSD17577Q3AT	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。

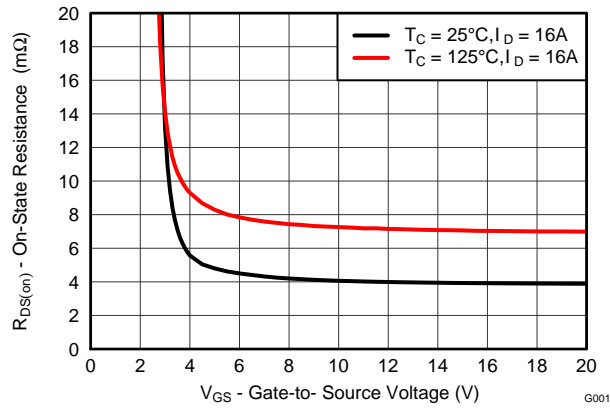
### 最大绝对额定值

$T_A = 25^\circ\text{C}$		值	单位
$V_{DS}$	漏源电压	30	V
$V_{GS}$	栅源电压	±20	V
$I_D$	持续漏极电流 (受封装限制)	35	A
	持续漏极电流 (受芯片限制), $T_C = 25^\circ\text{C}$ 时测得	83	
	持续漏极电流 <sup>(1)</sup>	19	
$I_{DM}$	脉冲漏极电流 <sup>(2)</sup>	239	A
$P_D$	功率耗散 <sup>(1)</sup>	2.8	W
	功率耗散, $T_C = 25^\circ\text{C}$	53	
$T_J, T_{stg}$	运行结温和储存温度范围	-55 至 150	°C
$E_{AS}$	雪崩能量, 单一脉冲 $I_D = 28\text{A}, L = 0.1\text{mH}, R_G = 25\Omega$	39	mJ

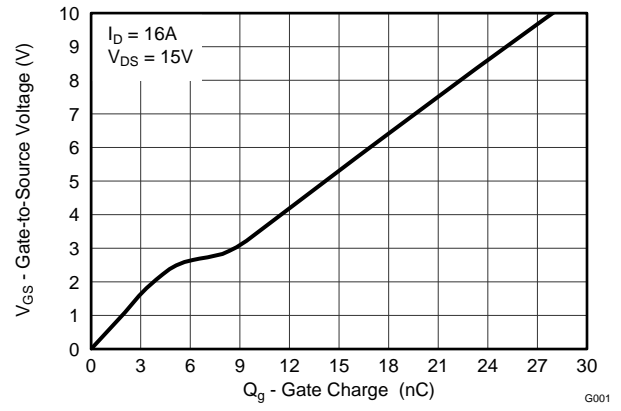
(1)  $R_{\theta JA} = 50^\circ\text{C/W}$ , 这是在一个厚度 0.06 英寸环氧树脂 (FR4) 印刷电路板 (PCB) 上的 1 英寸<sup>2</sup>, 2 盎司的铜焊盘上测得的典型值。

(2) 最大  $R_{\theta JC} = 3.0^\circ\text{C/W}$ , 脉冲持续时间  $\leq 100\mu\text{s}$ , 占空比  $\leq 1\%$ 。

$R_{DS(on)}$  与  $V_{GS}$  间的关系



栅极电荷



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## 4 修订历史记录

日期	修订版本	注释
2014 年 8 月	*	最初发布。

## 5 Specifications

### 5.1 Electrical Characteristics

 (T<sub>A</sub> = 25°C unless otherwise stated)

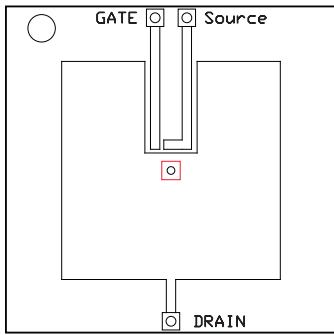
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>STATIC CHARACTERISTICS</b>						
B <sub>V</sub> DSS	Drain-to-Source Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 24 V			1	μA
I <sub>GSS</sub>	Gate-to-Source Leakage Current	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V			100	nA
V <sub>GS(th)</sub>	Gate-to-Source Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.1	1.4	1.8	V
R <sub>DS(on)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		5.3	6.4	mΩ
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 16 A		4	4.8	mΩ
g <sub>fs</sub>	Transconductance	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 16 A		76		S
<b>DYNAMIC CHARACTERISTICS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15 V, f = 1 MHz		1780	2310	pF
C <sub>oss</sub>	Output Capacitance			208	270	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			79	103	pF
R <sub>G</sub>	Series Gate Resistance			1.4	2.8	Ω
Q <sub>g</sub>	Gate Charge Total (4.5 V)	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 16 A		13	17	nC
Q <sub>g</sub>	Gate Charge Total (10 V)			27	35	nC
Q <sub>gd</sub>	Gate Charge Gate-to-Drain			2.8		nC
Q <sub>gs</sub>	Gate Charge Gate-to-Source			5.1		nC
Q <sub>g(th)</sub>	Gate Charge at V <sub>th</sub>			2.5		nC
Q <sub>oss</sub>	Output Charge		V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V		6	
t <sub>d(on)</sub>	Turn On Delay Time	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 16 A, R <sub>G</sub> = 0 Ω		4		ns
t <sub>r</sub>	Rise Time			31		ns
t <sub>d(off)</sub>	Turn Off Delay Time			20		ns
t <sub>f</sub>	Fall Time			4		ns
<b>DIODE CHARACTERISTICS</b>						
V <sub>SD</sub>	Diode Forward Voltage	I <sub>SD</sub> = 16 A, V <sub>GS</sub> = 0 V		0.8	1	V
Q <sub>rr</sub>	Reverse Recovery Charge	V <sub>DS</sub> = 15 V, I <sub>F</sub> = 16 A, di/dt = 300 A/μs		8.2		nC
t <sub>rr</sub>	Reverse Recovery Time			8.6		ns

### 5.2 Thermal Information

 (T<sub>A</sub> = 25°C unless otherwise stated)

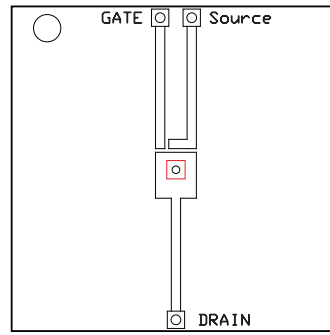
THERMAL METRIC		MIN	TYP	MAX	UNIT
R <sub>θJC</sub>	Junction-to-Case Thermal Resistance <sup>(1)</sup>			3.0	°C/W
R <sub>θJA</sub>	Junction-to-Ambient Thermal Resistance <sup>(1)(2)</sup>			55	

- (1) R<sub>θJC</sub> is determined with the device mounted on a 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz. (0.071-mm thick) Cu pad on a 1.5-inches × 1.5-inches (3.81-cm × 3.81-cm), 0.06-inch (1.52-mm) thick FR4 PCB. R<sub>θJC</sub> is specified by design, whereas R<sub>θJA</sub> is determined by the user's board design.
- (2) Device mounted on FR4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz. (0.071-mm thick) Cu.



M0161-01

Max  $R_{\theta JA} = 55^{\circ}\text{C/W}$   
when mounted on  
1 inch<sup>2</sup> (6.45 cm<sup>2</sup>) of  
2-oz. (0.071-mm thick)  
Cu.

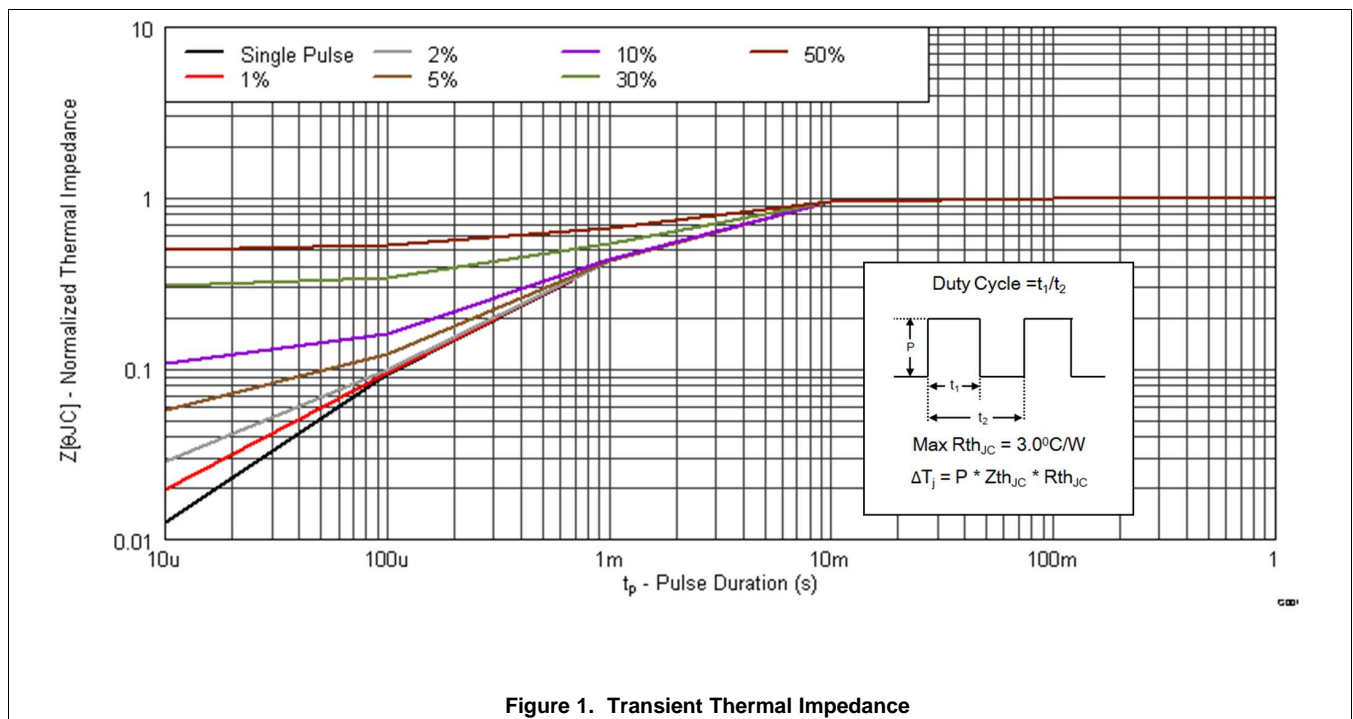


M0161-02

Max  $R_{\theta JA} = 190^{\circ}\text{C/W}$   
when mounted on a  
minimum pad area of  
2-oz. (0.071-mm thick)  
Cu.

### 5.3 Typical MOSFET Characteristics

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



Typical MOSFET Characteristics (continued)

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

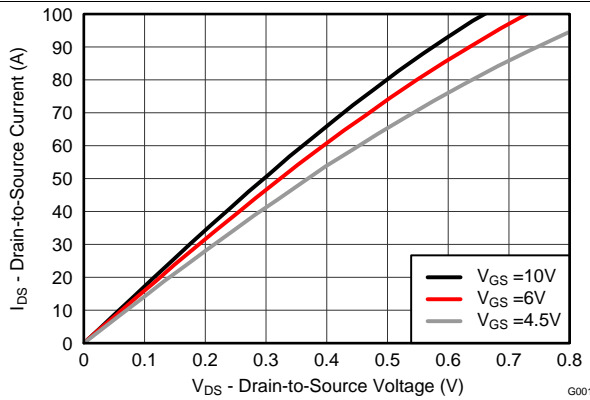


Figure 2. Saturation Characteristics

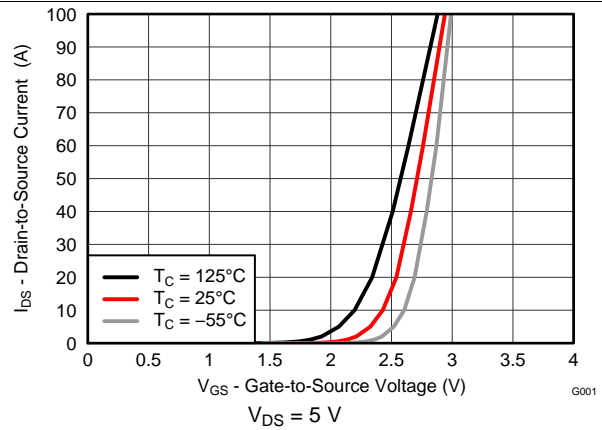


Figure 3. Transfer Characteristics

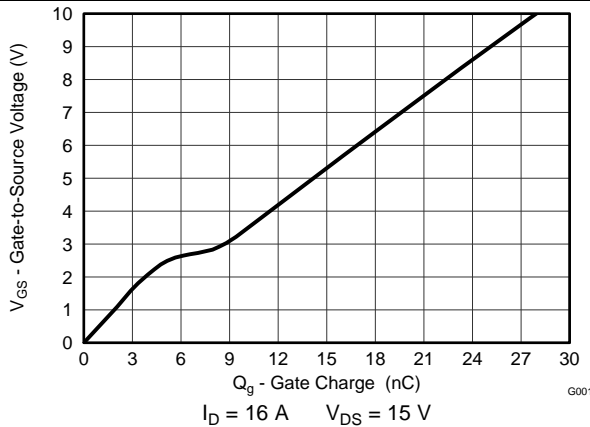


Figure 4. Gate Charge

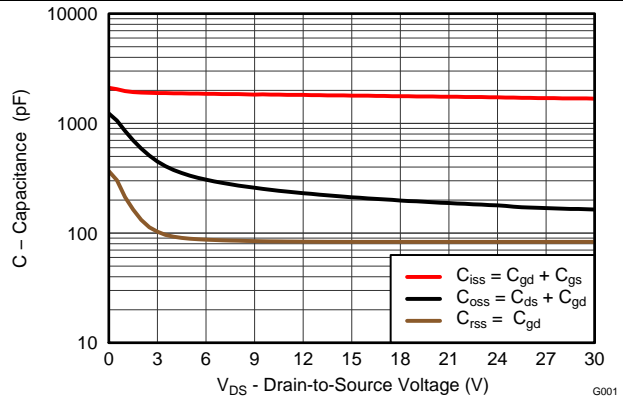


Figure 5. Capacitance

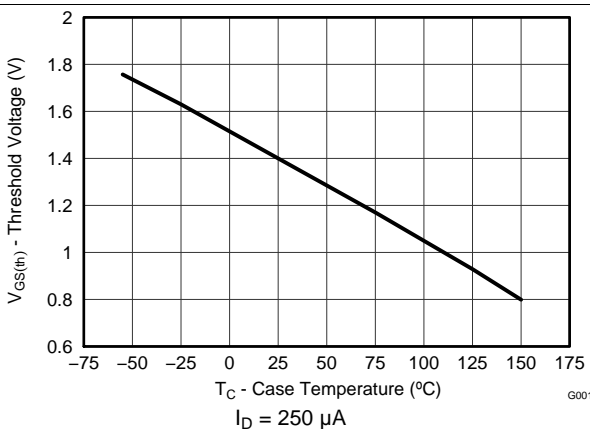


Figure 6. Threshold Voltage vs Temperature

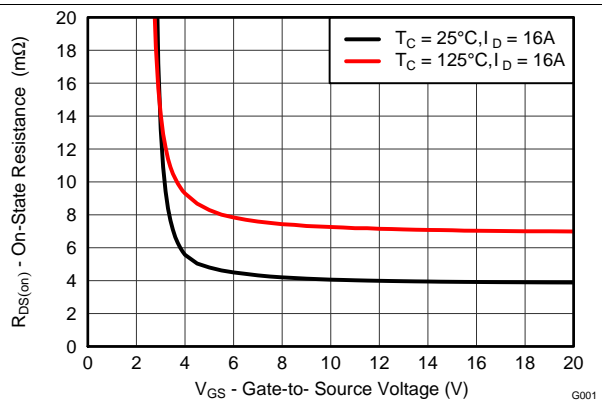


Figure 7. On-State Resistance vs Gate-to-Source Voltage

Typical MOSFET Characteristics (continued)

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

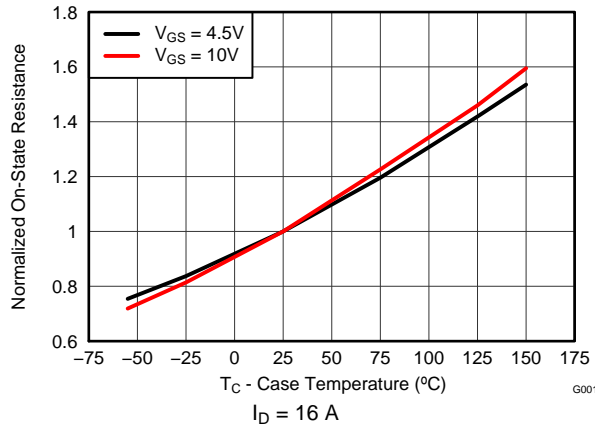


Figure 8. Normalized On-State Resistance vs Temperature

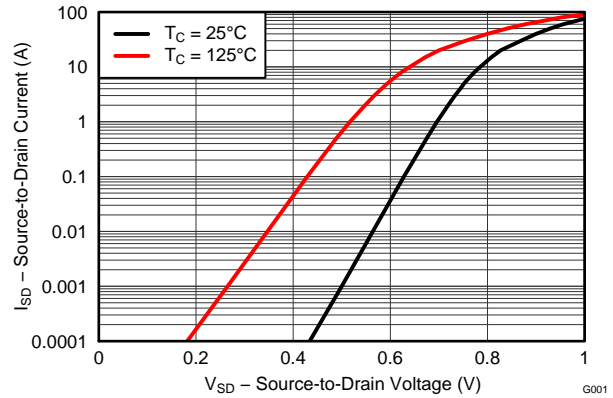


Figure 9. Typical Diode Forward Voltage

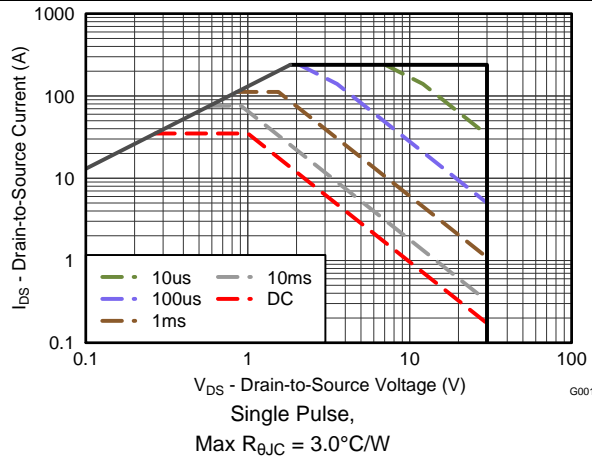


Figure 10. Maximum Safe Operating Area

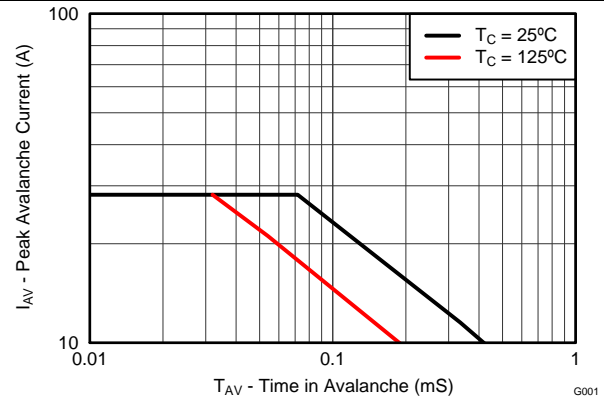


Figure 11. Single Pulse Unclamped Inductive Switching

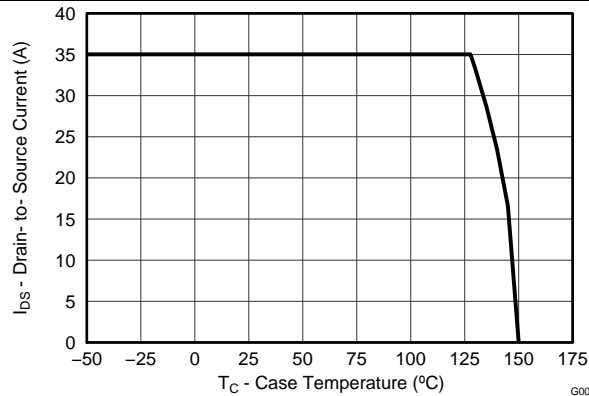


Figure 12. Maximum Drain Current vs Temperature

## 6 器件和文档支持

### 6.1 Trademarks

NexFET is a trademark of Texas Instruments.

### 6.2 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 6.3 术语表

[SLYZ022](#) — *TI* 术语表。

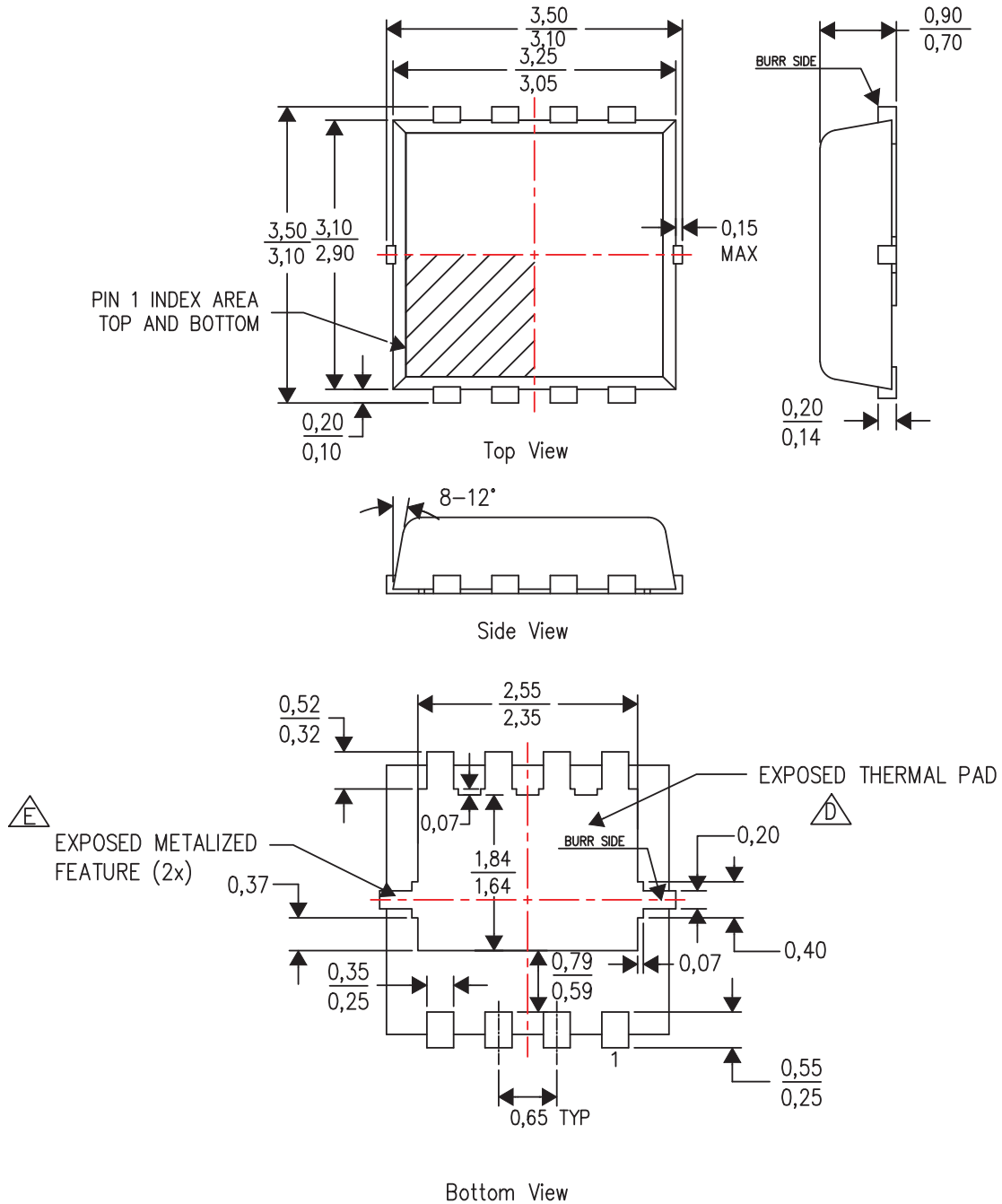
这份术语表列出并解释术语、首字母缩略词和定义。



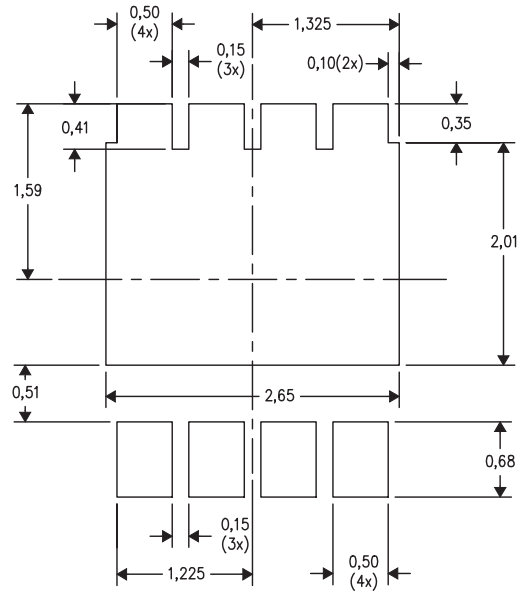
## 7 机械封装和可订购信息

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 Q3A 封装尺寸

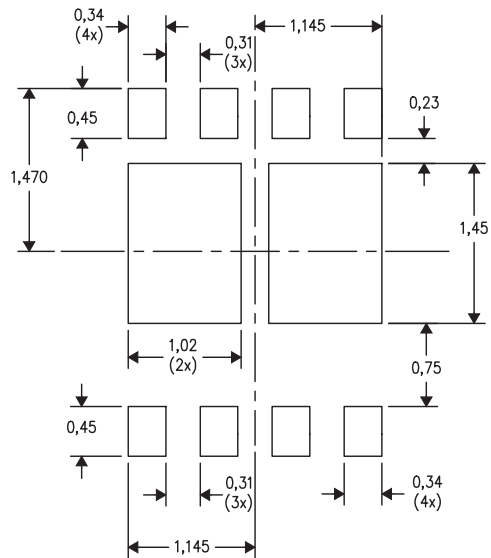


## 7.2 Q3A 建议的 PCB 布局

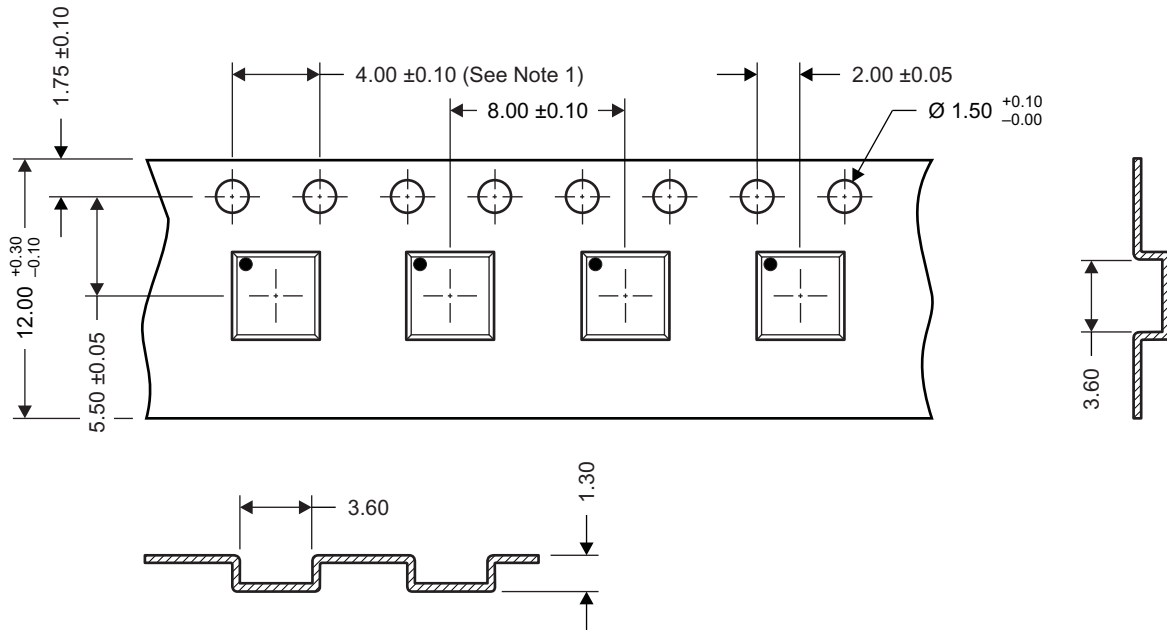


要获得与印刷电路板 (PCB) 设计相关的建议电路布局布线, 请参见《应用说明》[SLPA005 - 通过 PCB 布局布线技巧来减少振铃](#)。

## 7.3 Q3A 建议的模板布局



## 7.4 Q3A 卷带信息



M0144-01

- Notes:
1. 10 链轮孔距累积容差  $\pm 0.2$
  2. 每 100mm 长度的翘曲不能超过 1mm, 在 250mm 长度上不累积
  3. 材料: 黑色抗静电聚苯乙烯
  4. 全部尺寸单位为 mm, 除非另外注明。
  5. 厚度:  $0.30 \pm 0.05$ mm
  6. MSL1 260°C (红外 (IR) 和传导) PbF 回流焊兼容

**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
CSD17577Q3A	ACTIVE	VSONP	DNH	8	2500	RoHS & Green	SN	Level-1-260C-UNLIM	-55 to 150	17577	<a href="#">Samples</a>
CSD17577Q3AT	ACTIVE	VSONP	DNH	8	250	RoHS & Green	SN	Level-1-260C-UNLIM	-55 to 150	17577	<a href="#">Samples</a>

(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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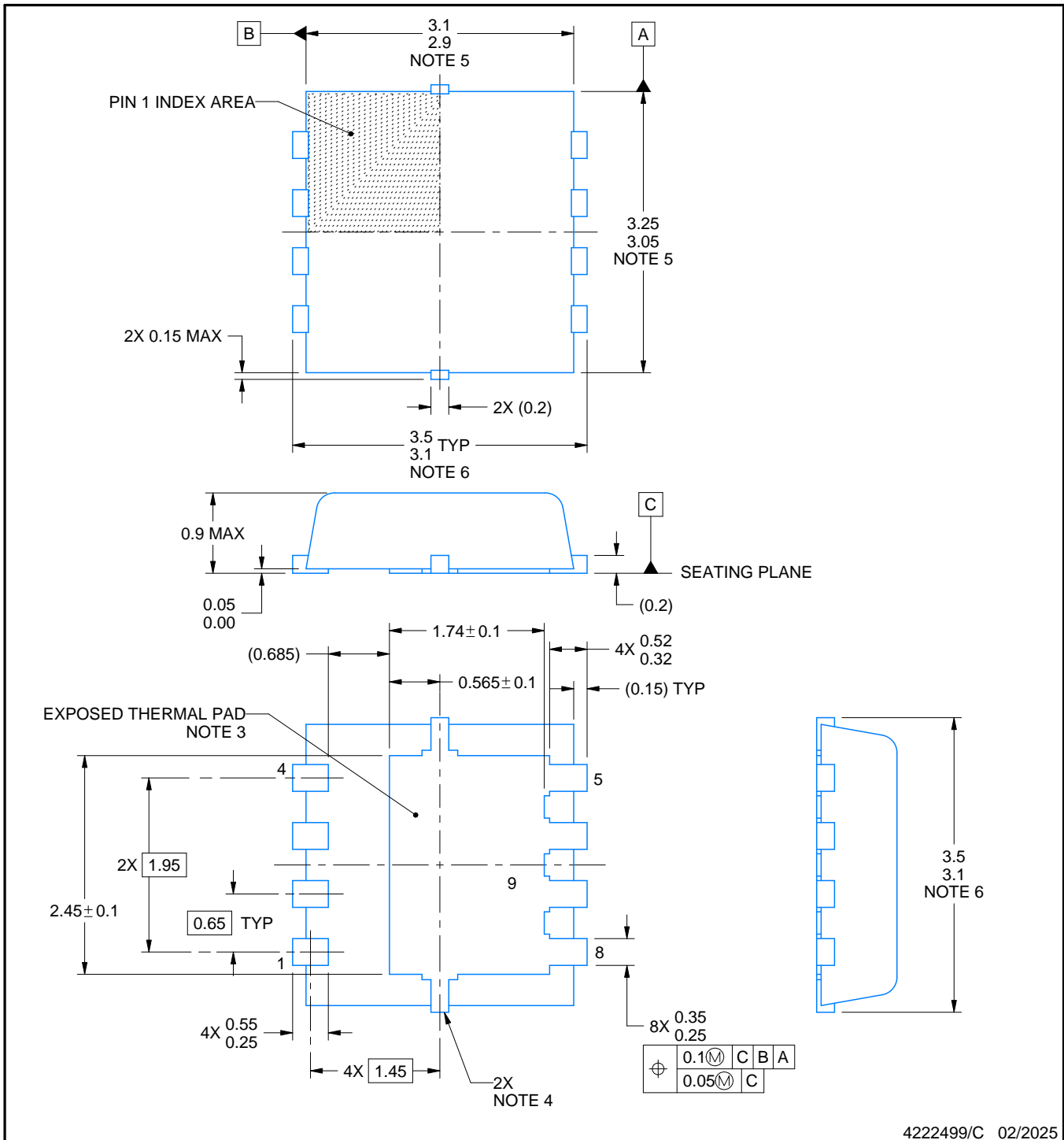
# DNH0008A



# PACKAGE OUTLINE

## VSONP - 0.9 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



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### NOTES:

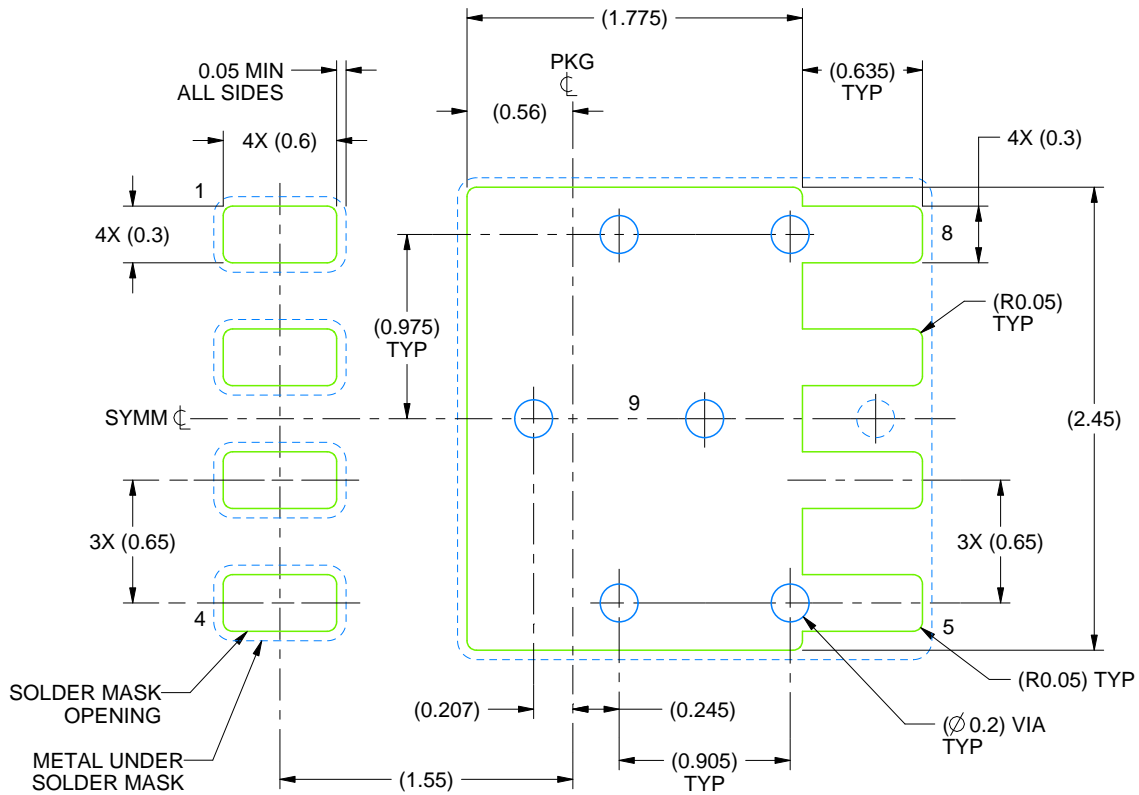
- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.
- Metalized features are supplier options and may not be on the package.
- These dimensions do not include mold flash protrusions or gate burrs.
- These dimensions include interterminal flash or protrusion. Interterminal flash or protrusion shall not exceed 0.25 mm per side.

# EXAMPLE BOARD LAYOUT

DNH0008A

VSONP - 0.9 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
SOLDER MASK DEFINED  
SCALE: 25X

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NOTES: (continued)

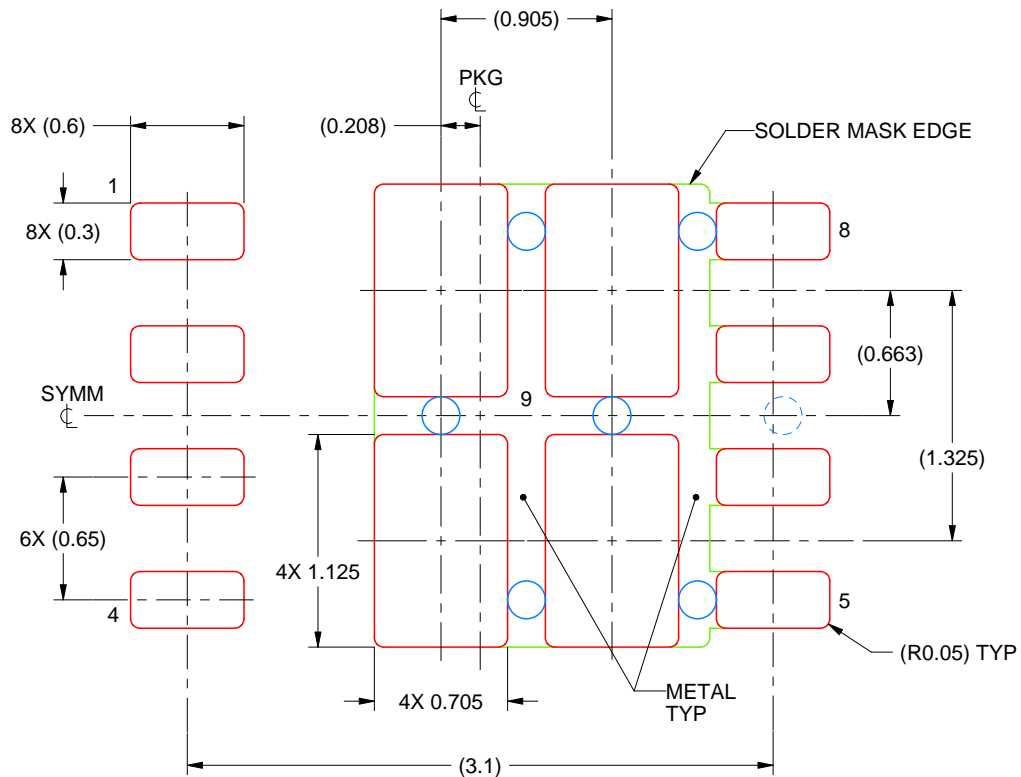
- This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).
- Vias are optional depending on application, refer to device data sheet. If some or all are implemented, recommended via locations are shown.

# EXAMPLE STENCIL DESIGN

DNH0008A

VSONP - 0.9 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 9:  
76% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE  
SCALE: 25X

4222499/C 02/2025

NOTES: (continued)

9. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



## 重要通知和免责声明

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