SN74LV4T125 具有三态输出 CMOS 逻辑电平转换器的单电源四路缓冲器转换器门

1 特性

- V_{CC} 为 5V、3.3V、2.5V 和 1.8V 的单电源电压转换器
- 工作电压范围为 1.8V 至 5.5V
- 升压转换
  - 1.8V V_{CC} 时，1.2V(1) 至 1.8V
  - 2.5V V_{CC} 时，1.5V(1) 至 2.5V
  - 3.3V V_{CC} 时，1.8V(1) 至 3.3V
  - 5.0V V_{CC} 时，3.3V 至 5.0V
- 降压转换
  - 1.8V V_{CC} 时，3.3V 至 1.8V
  - 2.5V V_{CC} 时，3.3V 至 2.5V
  - 3.3V V_{CC} 时，5.0 V 至 3.3V
- 逻辑输出以 V_{CC} 为基准
- V_{CC} 为 3.3V 时，频率高达 50MHz
- 输入引脚可耐受 5.5V 电压
- -40°C 至 125°C 工作温度范围
- 可提供无铅封装：SC-70 (RGY)
  - 3.5 × 3.5 × 1mm
- 闩锁性能超过 250mA，符合 JESD 17 规范
- 支持标准逻辑引脚排列
- I_{off} 支持局部关断模式运行
- 与 AUP125、LVC125 兼容的 CMOS 输出 B[1]

2 应用范围

- 平板电脑
- 智能手机
- 个人计算机
- 工业汽车应用

3 说明

SN74LV4T125 是一款具有较宽电压范围的低压 CMOS 缓冲门逻辑器件，用于便携式、电信、工业和汽车应用。输出电平以电源电压为基准，并且能够支持 1.8V、2.5V、3.3V 和 5V CMOS 电平。

该输入采用较低阈值电路设计，可匹配 V_{CC} = 3.3V 时的 1.8V 输入逻辑电平，并且可用于 1.8V 至 3.3V 升压转换。此外，5V 耐压输入引脚可实现降压转换（例如，在 V_{CC} = 2.5V 时，从 3.3V 输入至 2.5V 输出）。1.8V 至 5.5V 的宽 V_{CC} 范围使生成的所需输出电平能够连接至控制器或处理器。

SN74LV4T125 器件的设计电流驱动能力为 8mA，能减少由高驱动输出导致的线路反射、过冲和下冲。

器件信息

器件型号 (1)	封装	封装尺寸（标称值）
SN74LV4T125	PW (TSSOP, 14)	5.00mm x 4.40mm
	RGY（VQFN，14）	3.50mm x 3.50mm

(1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。

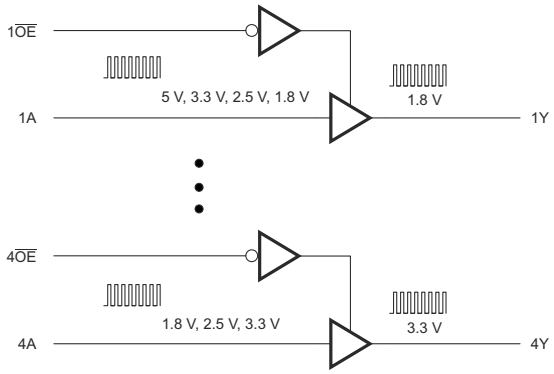


图 3-1. 简化版应用示意图

[1] 请参考较低 V_{CC} 条件下的 V_{IH}/V_{IL} 和输出驱动。

Table of Contents

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 B (March 2014) to Revision C (June 2022) — **Page**

- 向“特性”部分添加了“I_{off} 支持局部关断模式运行” 1
- 更新了整个文档中的表格、图和交叉参考的编号格式。 1
- 添加了“ESD 等级”表、“接收文档更新通知”部分和“支持资源”部分 1

Changes from Revision A (March 2014) to Revision B (September 2014) — **Page**

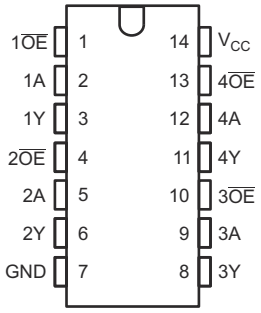
- 更新了“特性” 1
- Updated Pin Functions table. 3
- Added ESD Ratings table, Thermal Information table, Typical Characteristics section, Pin Configuration and Functions section, Detailed Description section, Power Supply Recommendations section, Layout section, Receiving Notification of Documentation Updates section, and Community Resources section 4
- Updated Detailed Design Procedure section. 13

Changes from Revision * (February 2014) to Revision A (March 2014) — **Page**

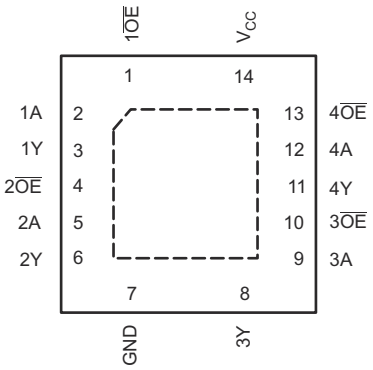
- 将第一页预览文档更新为完整版 1

5 Pin Configuration and Functions

PW Package
(TOP VIEW)



RGY Package
(Transparent TOP VIEW)



Pin Functions

PIN		TYPE [1]	DESCRIPTION
NO.	NAME		
1	1 $\overline{OE}$	I	Enable 1
2	1A	I	Input 1
3	1Y	O	Output 1
4	2 $\overline{OE}$	I	Enable 2
5	2A	I	Input 2
6	2Y	O	Output 2
7	GND	—	Ground Pin
8	3Y	O	Output 3
9	3A	I	Input 3
10	3 $\overline{OE}$	I	Enable 3
11	4Y	O	Output 4
12	4A	I	Input 4
13	4 $\overline{OE}$	I	Enable 4
14	V_{CC}	—	Power Pin

(1) I = Input, O = Output, I/O = Input or Output, G = Ground, P = Power.

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		– 0.5	7.0	V
V_I	Input voltage range(2)		– 0.5	7.0	V
V_O	Voltage range applied to any output in the high-impedance or power-off state(2)		– 0.5	4.6	V
	Voltage range applied to any output in the high or low state(2)		– 0.5	V_{CC} + 0.5	
I_{IK}	Input clamp current	V_I < 0		– 20	mA
I_{OK}	Output clamp current	V_O < 0 or V_O > V_{CC}		±50	mA
I_O	Continuous output current			±35	mA
	Continuous current through V_{CC} or GND			±70	mA
T_J	Junction temperature			150	°C
T_{stg}	Storage temperature		– 65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	±2000	V
		Machine Model (MM), per JEDEC specification	±200	
		Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002 (2)	±1000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		1.6	5.5	V
V_I	Input voltage		0	5.5	V
V_O	Output voltage	High or Low State	0	V_{CC}	V
		H-Z	0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 1.8 V		–3	mA
		V_{CC} = 2.5 V		–5	
		V_{CC} = 3.3 V		–8	
		V_{CC} = 5.0 V		–16	
I_{OL}	Low-level output current	V_{CC} = 1.8 V		3	mA
		V_{CC} = 2.5 V		5	
		V_{CC} = 3.3 V		8	
		V_{CC} = 5.0 V		16	
$\Delta t/\Delta v$	Input transition rise or fall rate	V_{CC} = 1.6 V to 2.0 V		20	ns/V
		V_{CC} = 2.3 V to 2.7 V		20	
		V_{CC} = 3 V or 3.6 V		20	
		V_{CC} = 4.5 V to 5.0 V		20	
T_A	Operating free-air temperature		–40	125	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

6.4 Thermal Information

THERMAL METRIC(1)		SN74LV4T125		UNIT
		PW	RGY	
		14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	126.9	52.9	°C/W
$R_{\theta JCtop}$	Junction-to-case (top) thermal resistance	54.2	67.8	
$R_{\theta JB}$	Junction-to-board thermal resistance	68.6	29.0	
ψ_{JT}	Junction-to-top characterization parameter	7.5	2.6	
ψ_{JB}	Junction-to-board characterization parameter	68.0	29.1	
$R_{\theta JCbot}$	Junction-to-case (bottom) thermal resistance	—	9.3	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report (SPRA953).

6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	V_{CC}	T_A = 25°C			T_A = –40°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
V_{IH}	High-level input voltage		V_{CC} = 1.65 V to 1.9 V	0.95			1		V
			V_{CC} = 2.3 V to 2.7 V	1.1			1.2		
			V_{CC} = 3 V to 3.6 V	1.3			1.35		
			V_{CC} = 4.5 V to 5.0 V	2			2		
V_{IL}	Low-level input voltage		V_{CC} = 1.65 V to 1.9 V			0.55		0.5	V
			V_{CC} = 2.3 V to 2.77 V			0.7		0.6	
			V_{CC} = 3 V to 3.6 V			0.85		0.75	
			V_{CC} = 4.5 V to 5.5 V			0.9		0.85	
V_{OH}	High-level output voltage	I_{OH} = – 50 µA	V_{CC} = 1.65 V to 5.5 V	V_{CC} – 0.1			V_{CC} – 0.1		V
		I_{OH} = – 2 mA	V_{CC} = 1.65 V	1.4			1.35		V
		I_{OH} = – 3 mA	V_{CC} = 2.3 V	2.05			2.0		V
		I_{OH} = – 5 mA	V_{CC} = 3.0 V	2.7			2.6		V
		I_{OH} = – 8 mA		2.6			2.5		
		I_{OH} = – 8 mA	V_{CC} = 4.5 V	3.7			3.6		V
		I_{OH} = – 16 mA		3.8			3.7		
		I_{OH} = – 16 mA	V_{CC} = 5.0 V	4.4			4.3		V
V_{OL}	Low-level output voltage	I_{OL} = 50 µA	V_{CC} = 1.65 V to 5.5 V			0.1		0.1	V
		I_{OH} = 2 mA	V_{CC} = 1.65 V			0.1		0.1	V
			V_{CC} = 1.8 V			0.2		0.3	
		I_{OH} = 3 mA	V_{CC} = 2.3 V			0.2		0.3	V
			V_{CC} = 2.5 V			0.25		0.3	
		I_{OH} = 5 mA	V_{CC} = 3.0 V			0.35		0.4	V
		I_{OH} = 8 mA				0.4		0.45	
		I_{OH} = 8 mA	V_{CC} = 3.3 V			0.45		0.5	V
		I_{OH} = 8 mA	V_{CC} = 4.5 V			0.50		0.55	V
		I_{OH} = 16 mA				0.55		0.55	
		I_{OH} = 16 mA	V_{CC} = 5.0 V			0.55		0.55	V
I_I	Input leakage current	V_I =0 V or V_{CC}	V_{CC} = 0 V, 1.8 V, 2.5 V, 3.3 V, 5.5 V			±0.1		±1	µA
I_{CC}	Static supply current	V_I = 0 V or V_{CC}, I_O = 0; open on loading	V_{CC} = 5.0 V			2		20	µA
			V_{CC} = 3.3 V			2		20	
			V_{CC} = 2.5 V			2		20	
			V_{CC} = 1.8 V			2		20	
ΔI_{CC}	Additional static supply current	One input at 0.3 V or 3.4 V Other inputs at 0 or V_{CC}, I_O = 0	V_{CC} = 5.5 V			1.35		1.5	µA
		One input at 0.3 V or 1.1 V Other inputs at 0 or V_{CC}, I_O = 0	V_{CC} = 1.8 V						
I_{OZ}	Off-state (High Impedance State) Output Current	V_O = V_{CC} or GND	V_{CC} = 5.5 V			±0.25		±2.5	µA
I_{off}	Partial power down current	V_O or V_I = 0 to 5.5 V	V_{CC} = 0 V			0.5		5	µA
C_i	Input capacitance	V_I = V_{CC} or GND	V_{CC} = 3.3 V		1.6		1.6		pF
C_o	Output capacitance	V_O = V_{CC} or GND	V_{CC} = 3.3 V		4.8		4.8		pF

6.6 Switching Characteristics

over operating free-air temperature range (unless otherwise noted) (see 图 7-1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	FREQUENCY (TYP)	V_{CC}	C_L	T_A = 25°C			T_A = –65°C to 125°C			UNIT
						MIN	TYP	MAX	MIN	TYP	MAX	
t_{pd}	Any In	Y	DC to 50 MHz	5.0 V	15 pF		2.8	3.2		3	3.5	ns
					30 pF		3	3.5		3	4.5	
				3.3 V	15 pF		4	4.5		5	5.5	
					30 pF		5	5.5		5.5	6.5	
			DC to 50 MHz	2.5 V	15 pF		5.5	6.5		7	7.5	ns
					30 pF		6.5	7		7.5	8.5	
			DC to 30 MHz	1.8 V	15 pF		10	11		11	12	ns
					30 pF		11	12		12.5	13	
t_{PZH}	$\overline{OE}$	Y	DC to 50 MHz	5.0 V	15 pF		3.5	4		3.5	4	ns
					30 pF		3.8	4.2		4	4.5	
				3.3 V	15 pF		5	5.8		5.8	6.1	
					30 pF		5.5	6		5.7	6.5	
			DC to 50 MHz	2.5 V	15 pF		7.5	8		8.5	9	ns
					30 pF		8	8.5		9	9.5	
			DC to 30 MHz	1.8 V	15 pF		14.5	15		15.5	16.5	ns
					30 pF		15.5	16		16	17	
t_{PZL}	$\overline{OE}$	Y	DC to 50 MHz	5.0 V	15 pF		3	3.5		3.5	4	ns
					30 pF		3.5	4		4	4.5	
				3.3 V	15 pF		5.3	5.6		6	6.2	
					30 pF		5.8	6.2		7	7.5	
			DC to 50 MHz	2.5 V	15 pF		8	8.5		9	9.5	ns
					30 pF		9	9.5		10.5	11	
			DC to 30 MHz	1.8 V	15 pF		17	17.5		18	18.5	ns
					30 pF		18	18.5		19	20	
t_{PHZ}	$\overline{OE}$	Y	DC to 50 MHz	5.0 V	15 pF		3	3.5		3.5	4	ns
					30 pF		3.5	4		4	4.5	
				3.3 V	15 pF		3.5	4		4.5	5	
					30 pF		5	6		6.5	7	
			DC to 50 MHz	2.5 V	15 pF		5.5	6		6	6.5	ns
					30 pF		7.5	8		8	9	
			DC to 30 MHz	1.8 V	15 pF		7.5	8		8	8.5	ns
					30 pF		11	12		12	13	
t_{PLZ}	$\overline{OE}$	Y	DC to 50 MHz	5.0 V	15 pF		2	2.5		2	2.7	ns
					30 pF		2	3		2	3.2	
				3.3 V	15 pF		2.3	2.8		2.5	3.2	
					30 pF		2.8	3.2		3.3	4	
			DC to 50 MHz	2.5 V	15 pF		3.3	3.8		3.8	4.2	ns
					30 pF		4	4.3		4.2	5	
			DC to 30 MHz	1.8 V	15 pF		5	5.5		5	5.7	ns
					30 pF		6.5	7		7	8.5	
t_{sk}	Any In	Y	DC to 50 MHz	5.0 V to 2.5 V	15 pF				1		1	ns
			DC to 30 MHz	1.8 V	15 pF							

6.7 Noise Characteristics

V_{CC} = 3.3 V, C_L = 50 pF, T_A = 25°C(1)

PARAMETER		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.4	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.3	–0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		3		V
$V_{IH(D)}$	High-level dynamic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

(1) Characteristics are for surface-mount packages only.

6.8 Operating Characteristics

V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	C_L = 50 pF, f = 10 MHz	16	pF

6.9 Typical Characteristics

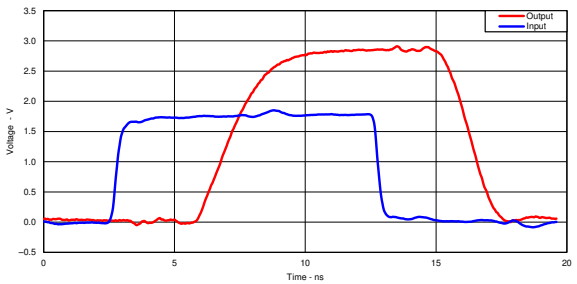
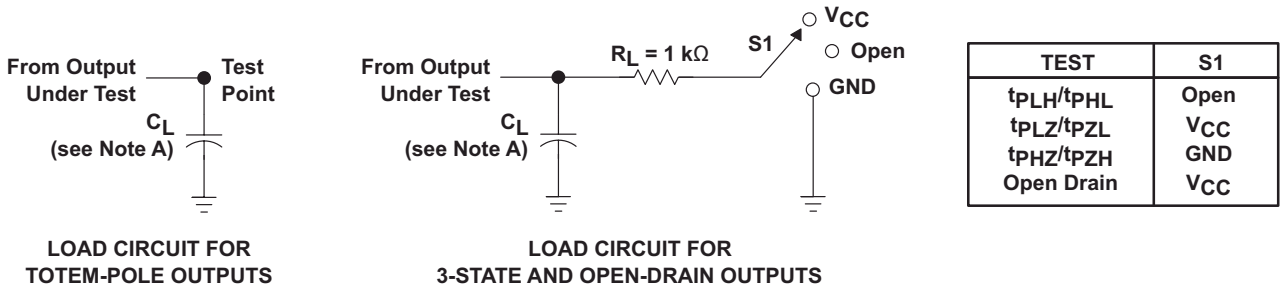


图 6-1. Switching Characteristics at 50 MHz Excellent Signal Integrity (1.8 V to 3.3 V at 3.3-V V_{CC})

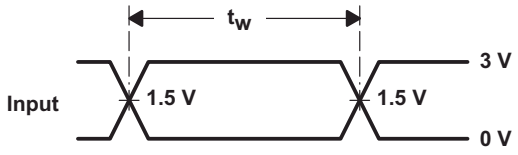
7 Parameter Measurement Information

7.1

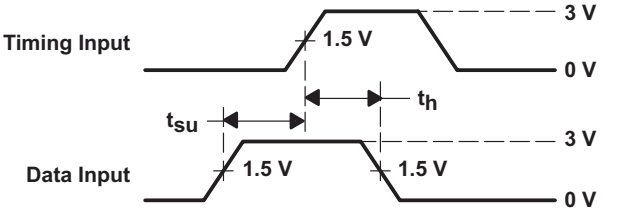


LOAD CIRCUIT FOR TOTEM-POLE OUTPUTS

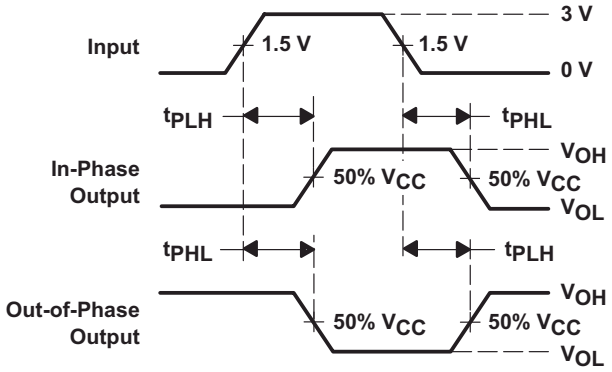
LOAD CIRCUIT FOR 3-STATE AND OPEN-DRAIN OUTPUTS



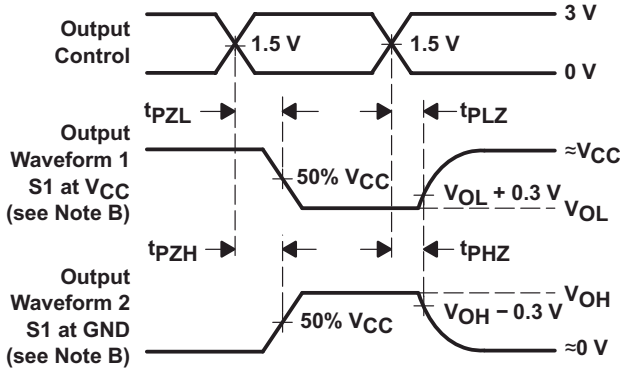
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
D. The outputs are measured one at a time, with one input transition per measurement.
E. All parameters and waveforms are not applicable to all devices.

图 7-1. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74LVxTxx family was created to allow up- or down-voltage translation with only one power rail. The family has over-voltage tolerant inputs that allow down translation from up to 5.5 V to the V_{CC} level that can be as low as 1.8 V. The family SN74LVxTxx also has a lowered switching threshold that allows it to translate up to the V_{CC} level that can be as high as 5.5 V.

8.1.1 Translating Down

Using these parts to translate down is very simple. Because the inputs are tolerant to 5.5 V at any valid V_{CC}, they can be used to down translate. The input can be any level above V_{CC} up to 5.5 V and the output will equal the V_{CC} level, which can be as low as 1.8 V. One important advantage to down translating using this part is that the I_{CC} current will remain less than or equal to the specified value.

Down translation possibilities with SN74LVxTxx:

- With 1.8-V V_{CC} from 2.5 V, 3.3 V, or 5 V down to 1.8 V.
- With 2.5-V V_{CC} from 3.3 V or 5 V down to 2.5 V.
- With 3.3-V V_{CC} from 5 V down to 3.3 V.

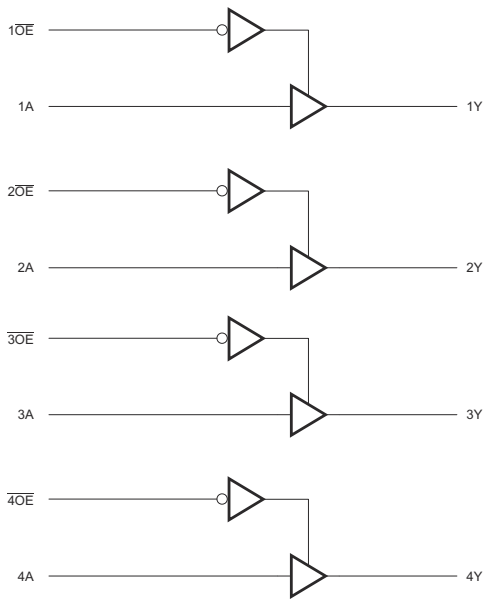
8.1.2 Translating Up

Using the SN74LVxTxx family to translate up is very simple. The input switching threshold is lowered so the high level of the input voltage can be much lower than a typical CMOS V_{IH}. For instance, If the V_{CC} is 3.3 V then the typical CMOS switching threshold would be V_{CC} / 2 or 1.65 V. This means the input high level must be at least V_{CC} × 0.7 or 2.31 V. On the LVxT devices the input threshold for 3.3-V V_{CC} is approximately 1 V. This allows a signal with a 1.8-V V_{IH} to be translated up to the V_{CC} level of 3.3 V.

Up translation possibilities with SN74LVxTxx:

- With 2.5-V V_{CC} from 1.8 V to 2.5 V.
- With 3.3-V V_{CC} from 1.8 V or 2.5 V to 3.3 V.
- With 5-V V_{CC} From 2.5 V or 3.3 V to 5 V.

8.2 Functional Block Diagram



8.3 Feature Description

This part is a single supply buffer that is capable up or down translation. The output will equal V_{CC} while the input can vary from 1.2 V to 5.5 V.

Up Translation Mode:

- 1.2 V to 1.8 V at 1.8-V V_{CC}
- 1.5 V to 2.5 V at 2.5-V V_{CC}
- 1.8 V to 3.3 V at 3.3-V V_{CC}
- 3.3 V to 5.0 V at 5.0-V V_{CC}

Down Translation Mode:

- 3.3 V to 1.8 V at 1.8-V V_{CC}
- 3.3 V to 2.5 V at 2.5-V V_{CC}
- 5.0 V to 3.3 V at 3.3-V V_{CC}

8.4 Device Functional Modes

This device performs the function of a buffer where input logic level equals the output logic level, while providing buffering and drive to the output. The SN74LV4T125 device will also translate voltages up or down while performing this function.

表 8-1. Function Table (Each Buffer)

INPUTS (1)		OUTPUT (2)
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

表 8-2. Supply V_{CC} = 3.3 V

INPUT b (Lower Level Input)		OUTPUT (V_{CC} CMOS)
A	B	Y
V_{IH}(min) = 1.35 V		V_{OH}(min) = 2.9 V
V_{IL}(max) = 0.8 V		V_{OL}(max) = 0.2 V

(1) H = High Voltage Level, L = Low Voltage Level, X = Do not Care, Z = High Impedance
(2) H = Driving High, L = Driving Low, Z = High Impedance State

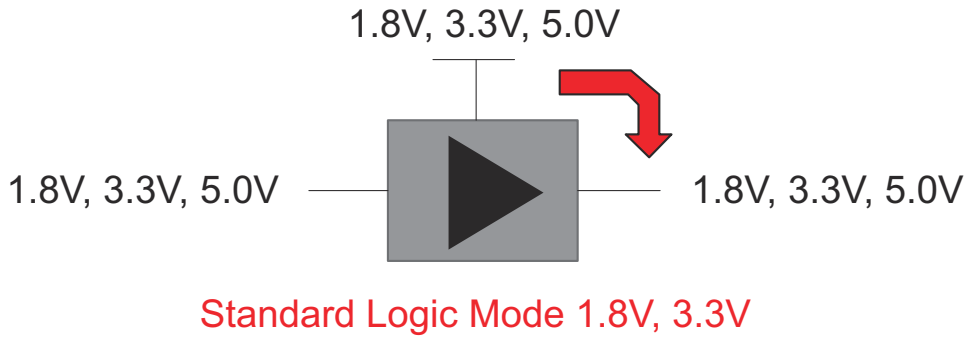
9 Applications and Implementation

备注

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客 户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

9.1 Application Information

Based upon the lower-threshold circuit design of the LVxT family, the LVxT family also supports level translation. For level translation up and down, the LVxT family requires only a single power supply.



9.2 Typical Application

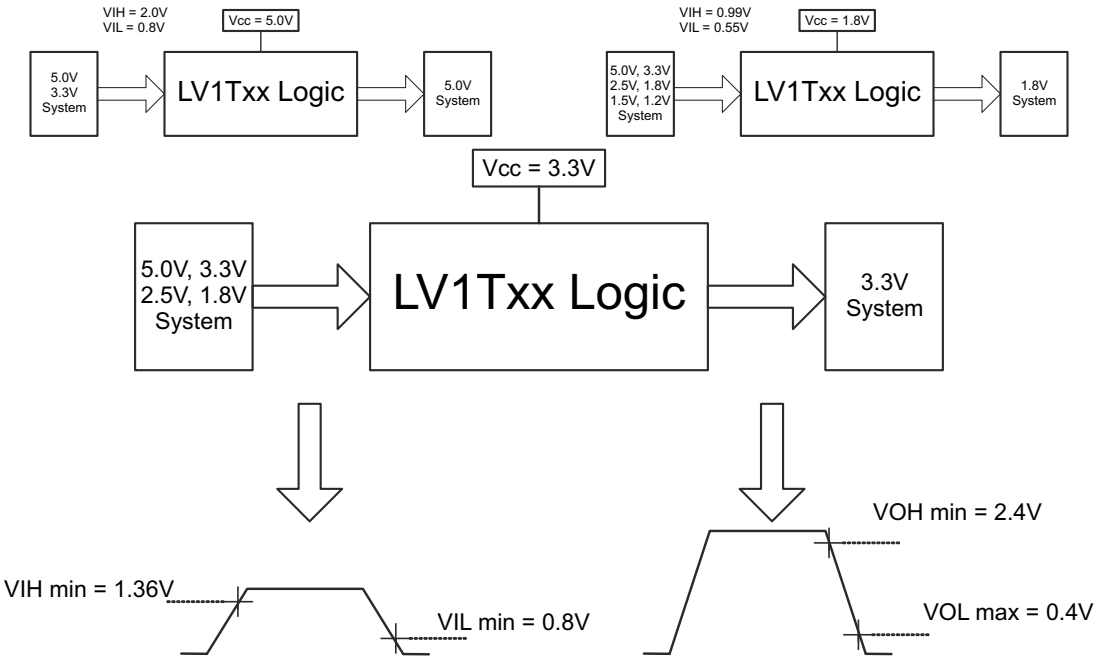


图 9-1. Switching Thresholds for 1.8 V to 3.3 V Translation

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. The input threshold levels are lowered to allow for up translation. At 5 V the device has equivalent TTL input levels.

9.2.2 Detailed Design Procedure

1. Recommended input conditions:
   - Rise time and fall time specifications. See ($\Delta t/\Delta V$) in *Recommended Operating Conditions* table.
   - Specified high and low levels. See (V_{IH} and V_{IL}) in *Recommended Operating Conditions* table.
   - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC}.
2. Recommend output conditions:
   - Load currents should not exceed 35 mA per output and 70 mA total for the part.
   - Outputs should not be pulled above V_{CC}.

9.2.3 Application Curves

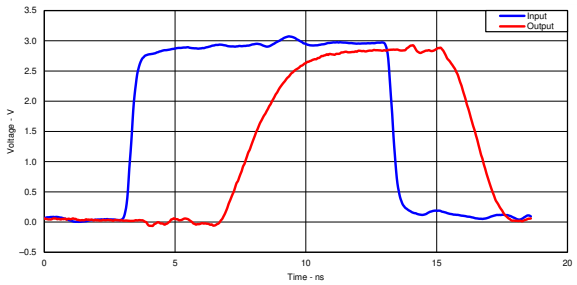


图 9-2. Switching Characteristics at 50 MHz Excellent Signal Integrity (3.3 V to 3.3 V at 3.3-V V_{CC})

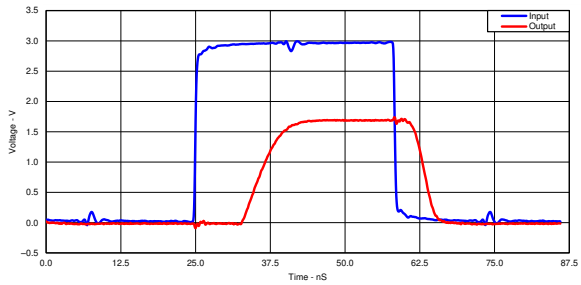


图 9-3. Switching Characteristics at 15 MHz Excellent Signal Integrity (3.3 V to 1.8 V at 1.8-V V_{CC})

10 Power Supply Recommendations

The power supply can be any voltage between the Min and Max supply voltage rating located in the *Recommended Operating Conditions*.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 µF is recommended. If there are multiple V_{CC} pins, then 0.01 µF or 0.022 µF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 µF and 1 µF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Specified in 图 11-1 are the rules that must be observed under all circumstances.

All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} whichever make more sense or is more convenient.

It is generally acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin it will disable the outputs section of the part when asserted. This will not disable the input section of the IOs so they also cannot float when disabled.

11.2 Layout Example

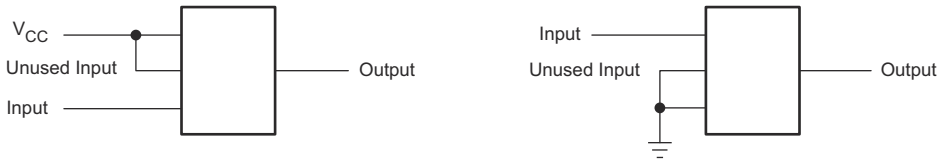


图 11-1. Layout Diagram

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Additional Product Selection

DEVICE	PACKAGE	DESCRIPTION
SN74LV1T00	DCK, DBV	2 - Input Positive - NAND Gate
SN74LV1T02	DCK, DBV	2 - Input Positive - NOR Gate
SN74LV1T04	DCK, DBV	Inverter Gate
SN74LV1T08	DCK, DBV	2 - Input Positive - AND Gate
SN74LV1T34	DCK, DBV, DRL	Single Buffer Gate
SN74LV1T14	DCK, DBV	Single Schmitt - Trigger Inverter Gate
SN74LV1T32	DCK, DBV	2 - Input Positive - OR Gate
SN74LV1T86	DCK, DBV	Single 2 - Input Exclusive - Or Gate
SN74LV1T125	DCK, DBV, DRL	Single Buffer Gate with 3 - state Output
SN74LV1T126	DCK, DBV, DRL	Single Buffer Gate with 3 - state Output
SN74LV4T125	RGY, PW	Quadruple Bus Buffer Gate With 3 - State Outputs

12.2 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。

12.3 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》。

12.4 Trademarks

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

12.5 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

12.6 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。

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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)
SN74LV4T125PWR	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 125	LV4T125
SN74LV4T125RGYR	Active	Production	VQFN (RGY) | 14	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LVT125

(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.

OTHER QUALIFIED VERSIONS OF SN74LV4T125 :

- Automotive : SN74LV4T125-Q1

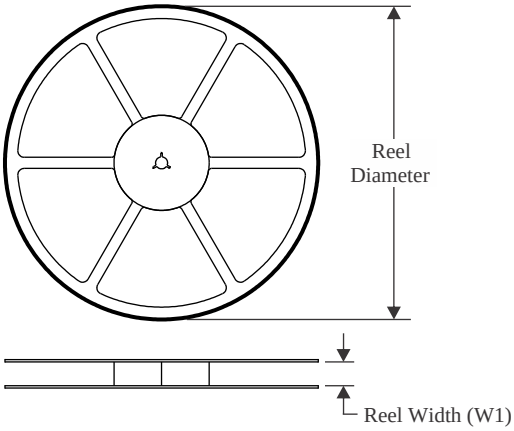
- Enhanced Product : SN74LV4T125-EP

NOTE: Qualified Version Definitions:

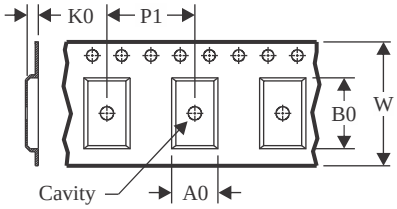
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

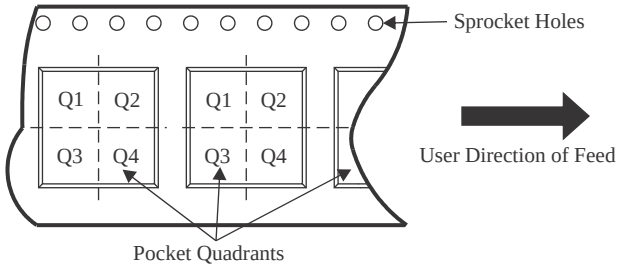


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

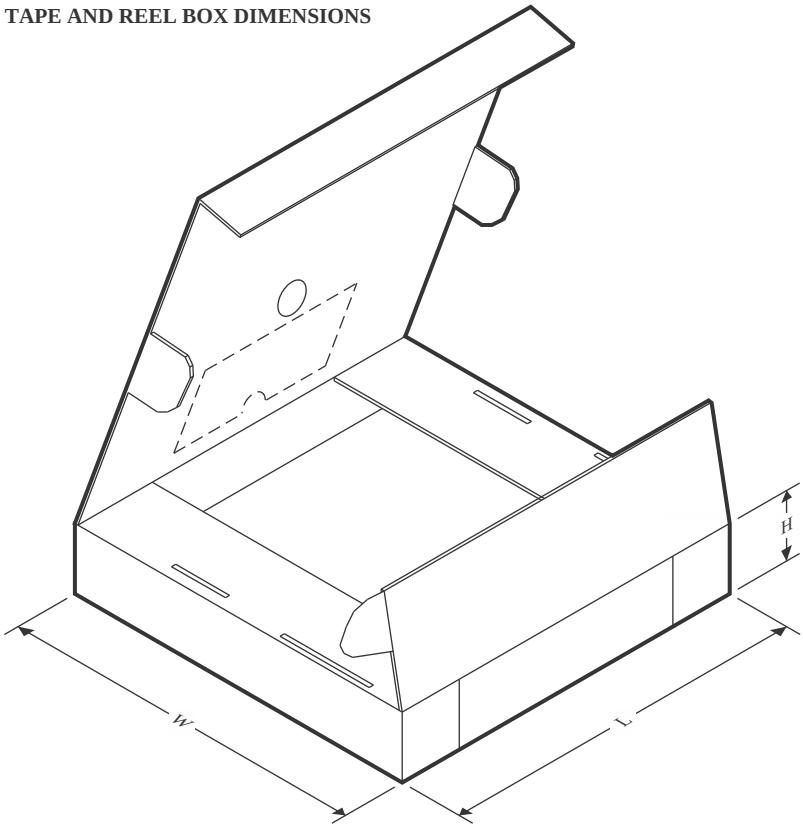
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74LV4T125PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LV4T125RGYR	VQFN	RGY	14	3000	330.0	12.4	3.75	3.75	1.15	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

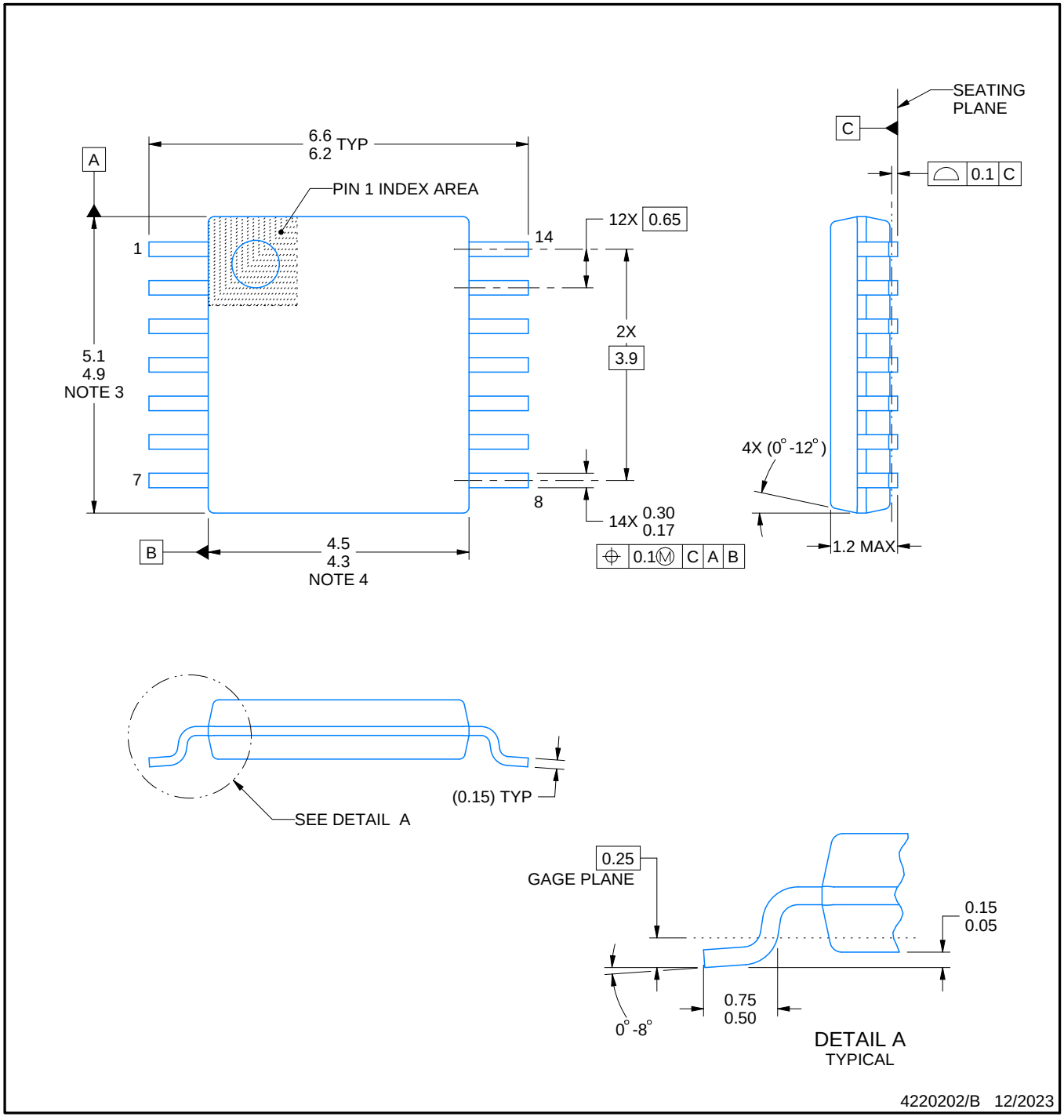
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV4T125PWR	TSSOP	PW	14	2000	353.0	353.0	32.0
SN74LV4T125RGYR	VQFN	RGY	14	3000	360.0	360.0	36.0

PACKAGE OUTLINE

PW0014A

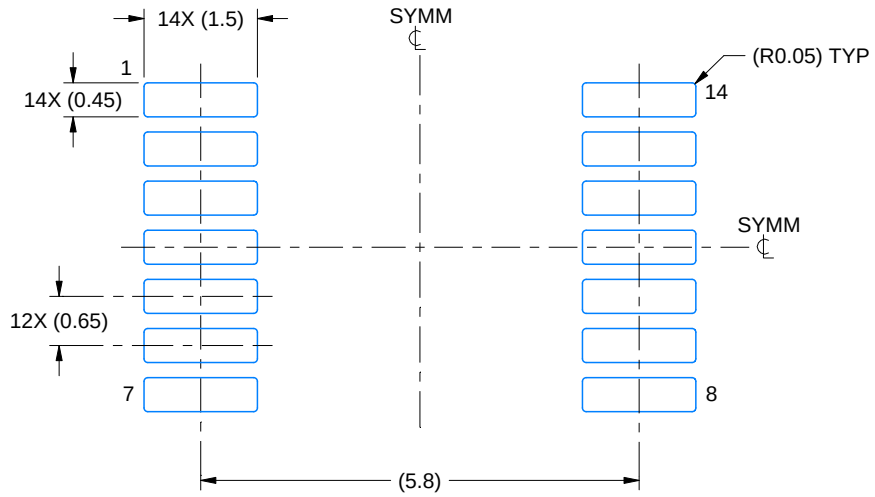
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

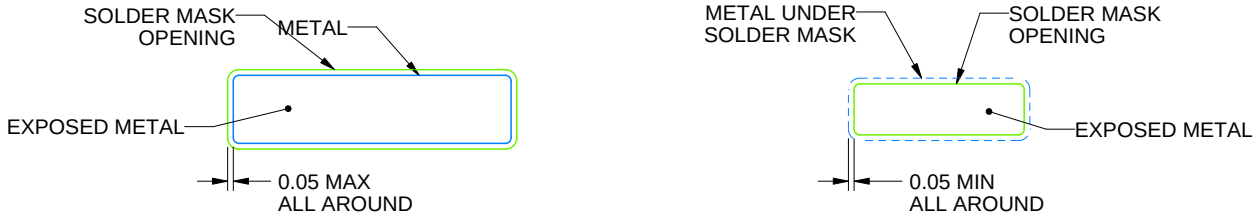


NOTES:

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. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

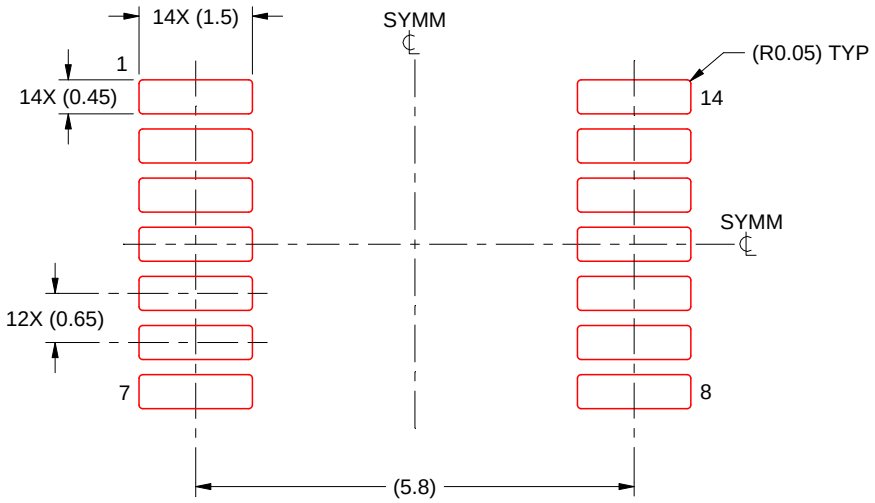


SOLDER MASK DETAILS

4220202/B 12/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220202/B 12/2023

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

GENERIC PACKAGE VIEW

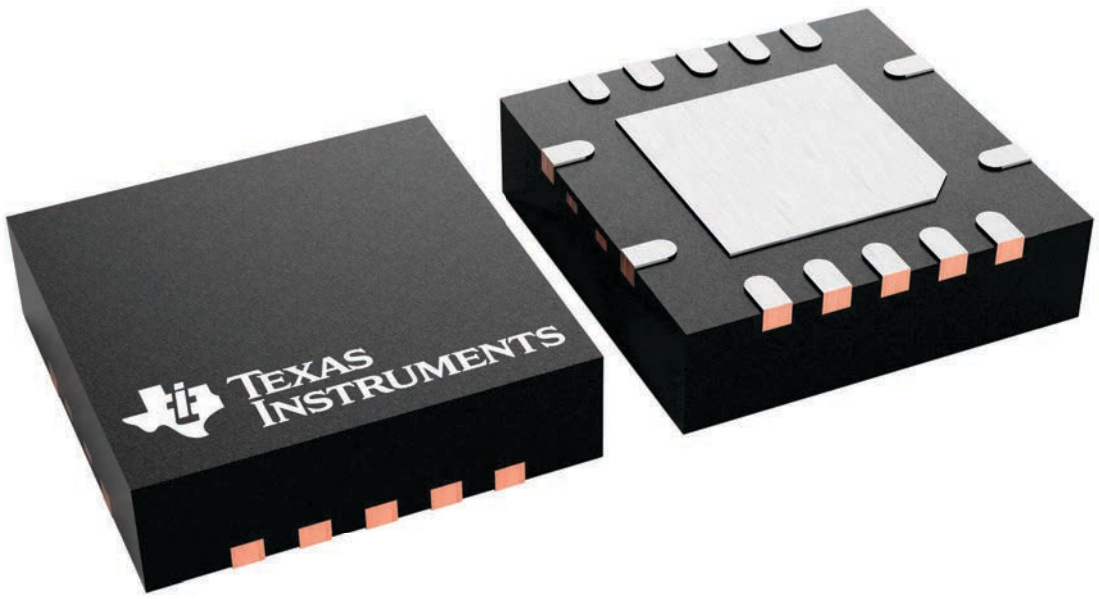
RGY 14

VQFN - 1 mm max height

3.5 x 3.5, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



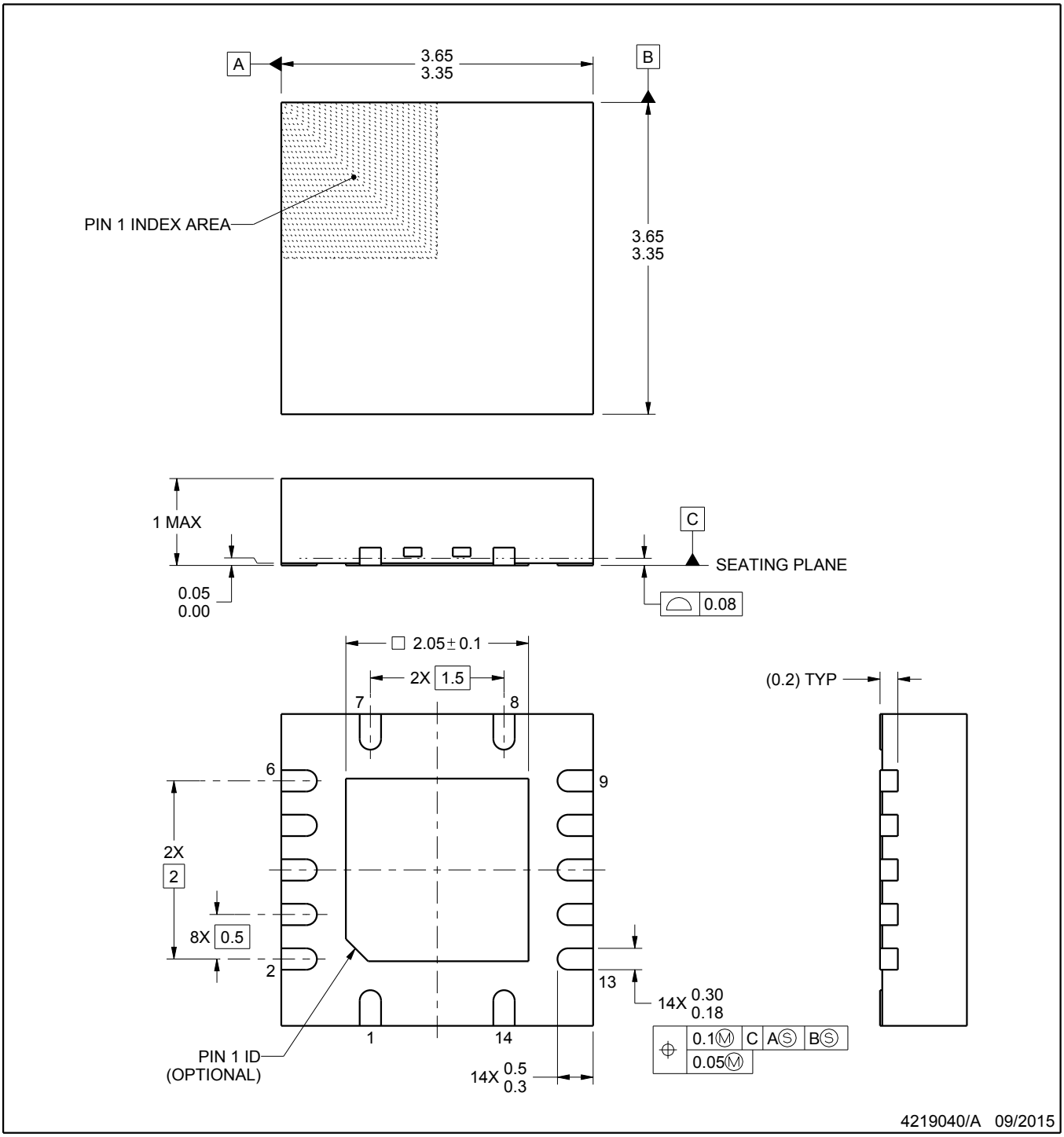
4231541/A

PACKAGE OUTLINE

RGY0014A

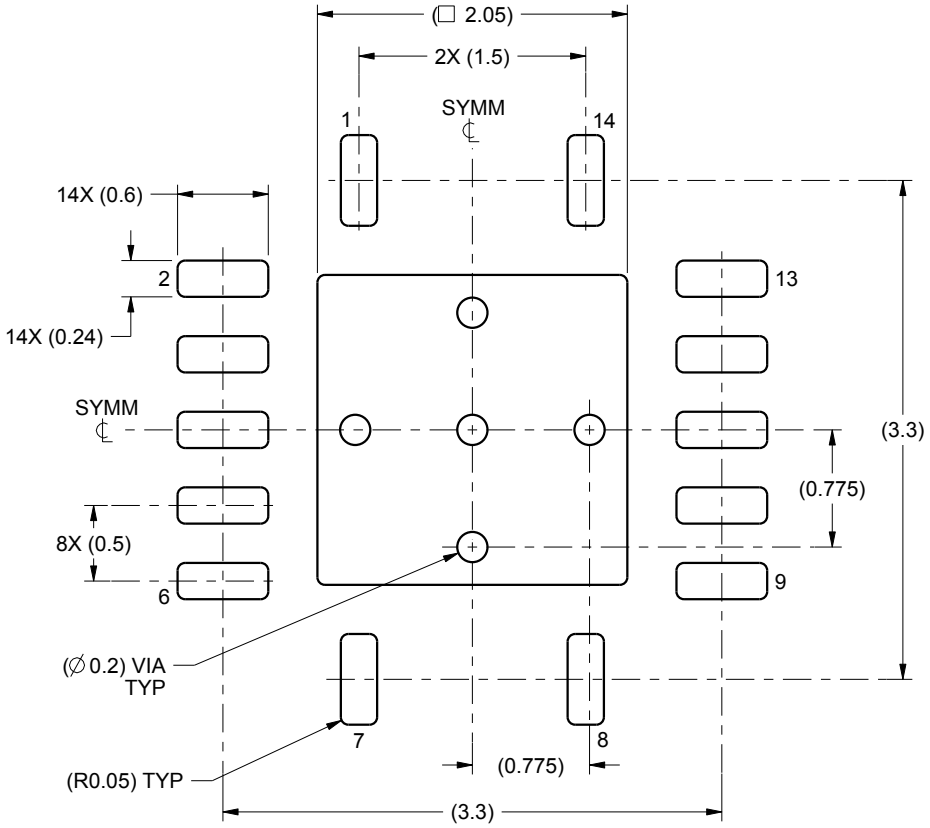
VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD

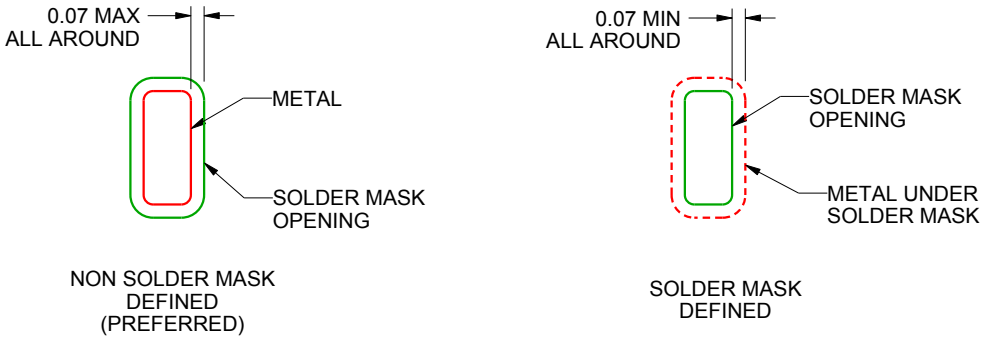


NOTES:

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. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.



LAND PATTERN EXAMPLE
SCALE:20X

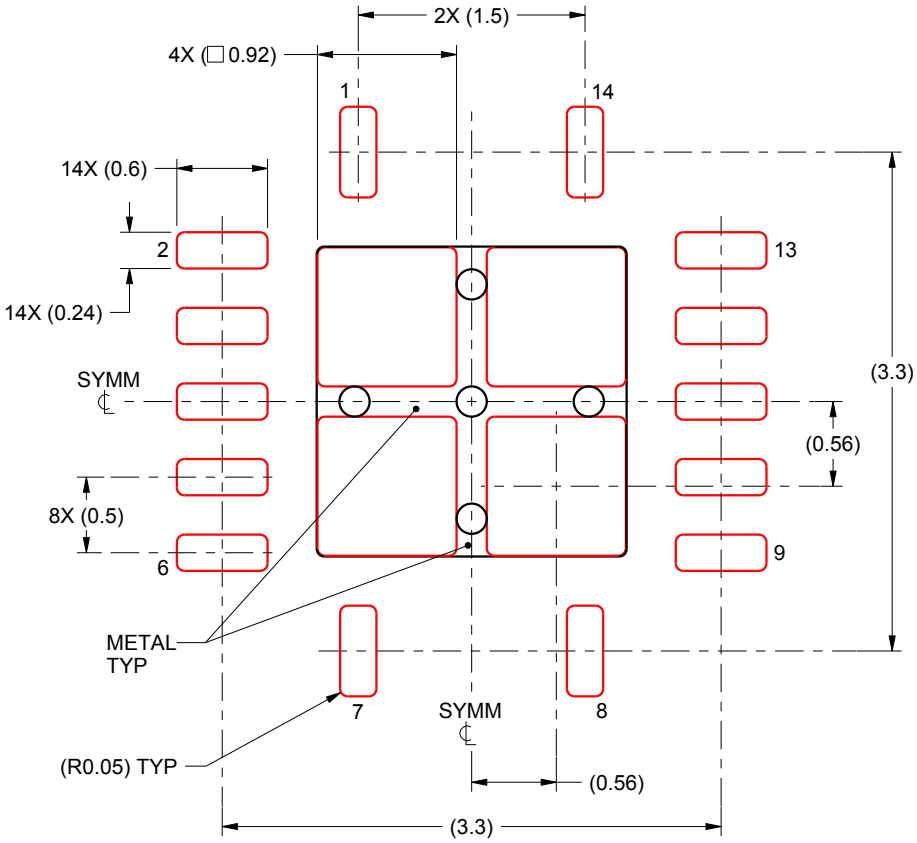


SOLDER MASK DETAILS

4219040/A 09/2015

NOTES: (continued)

4. 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/slua271).



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
80% PRINTED SOLDER COVERAGE BY AREA
SCALE:20X

4219040/A 09/2015

NOTES: (continued)

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

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