

具有清零和预设功能的 SN74LVC1G74 单路上升沿触发式 D 类触发器

1 特性

- 采用德州仪器 (TI) NanoFree™ 封装
- 支持 5V V_{CC} 运行
- 输入接收高达 5.5V 的电压
- 支持向下转换到 V_{CC}
- 电压为 3.3V 时, t_{pd} 最大值为 5.9ns
- 低功耗, I_{CC} 最大值为 10 μ A
- 电压为 3.3V 时, 输出驱动为 ± 24 mA
- V_{OLP} (输出接地反弹) 典型值小于 0.8V ($V_{CC} = 3.3$ V、 $T_A = 25^\circ$ C 时)
- V_{OHV} (输出 V_{OH} 下冲) 典型值大于 2V ($V_{CC} = 3.3$ V、 $T_A = 25^\circ$ C 时)
- I_{off} 支持带电插入、局部关断模式和后驱动保护
- 闩锁性能超过 100mA, 符合 JESD 78 II 类规范
- ESD 保护性能超过 JESD 22 规范要求
 - 2000V 人体放电模型
 - 200V 机器放电模型
 - 1000V 充电器件模型

2 应用

- 服务器
- LED 显示屏
- 网络交换机
- 电信基础设施
- 电机驱动器
- I/O 扩展器

3 说明

这款单路上升沿触发 D 类触发器需在 1.65V 至 5.5V V_{CC} 下运行。

NanoFree™ 封装技术是 IC 封装概念的一项重大突破, 它将硅晶片用作封装。

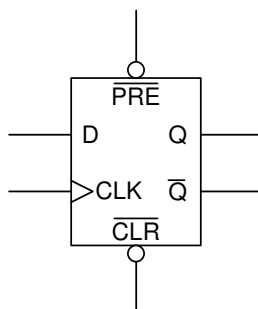
预设 (\overline{PRE}) 或清零 (\overline{CLR}) 输入端的低电平将会设置或重置输出, 而不受其他输入端的电平的影响。当 \overline{PRE} 和 \overline{CLR} 处于非活动状态 (高电平) 时, 数据 (D) 输入处满足设置时间要求的数据将传输到时钟脉冲正向缘上的输出端。时钟触发在一定电压电平下发生, 与时钟脉冲的上升时间没有直接关系。经过保持时间间隔后, 可以更改 D 输入端的数据而不影响输出端的电平。

该器件完全符合使用 I_{off} 的部分断电应用的规范要求。 I_{off} 电路禁用输出, 从而可防止其断电时破坏性电流从该器件回流。

器件信息

器件型号	封装 (1)	封装尺寸
SN74LVC1G74	SM8 (8)	2.95mm × 2.80mm
	US8 (8)	2.30mm × 2.00mm
	X2SON (8)	1.40mm × 1.00mm
	UQFN (8)	1.50mm × 1.50mm

(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。



简化版原理图



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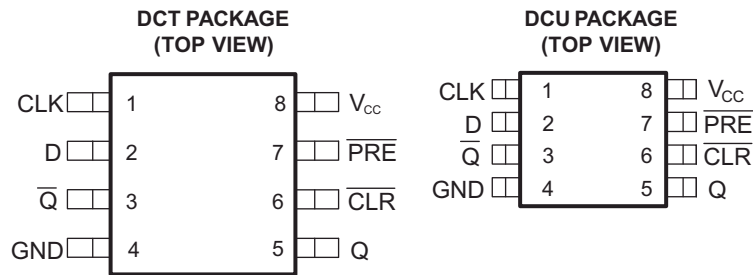
4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision F (April 2020) to Revision G (September 2021)	Page
• 更新了整个文档中的表格、图和交叉参考的编号格式.....	1
• Updated the <i>Application and Information</i> section.....	11
• Updated the <i>Device Power Button Circuit</i> figure <i>Typical Power Button Circuit</i> section.....	11
Changes from Revision E (January 2015) to Revision F (April 2020)	Page
• Match RSE pinout with signal names.....	4
Changes from Revision D (January 2013) to Revision E (January 2015)	Page
• 添加了应用、器件信息表、引脚功能表、ESD 等级表、热性能信息表、典型特性、特性说明部分、器件功能模式、应用和实施部分、电源相关建议部分、布局部分、器件和文档支持部分以及机械、封装和可订购信息部分.....	1
• 删除了订购信息表.....	1
• 更新了特性.....	1
Changes from Revision C (November 2012) to Revision D (January 2013)	Page
• 删除了 DQE 封装的热数据.....	1
• Added Thermal data for DQE Package.....	6
Changes from Revision B (March 2012) to Revision C (November 2012)	Page
• 为 RES 器件添加了预发布.....	1
• Added QFN package ordering information.....	14
Changes from Revision A (November 2011) to Revision B (February 2012)	Page
• Added SN74LVC1G74DCURG4 part number to ORDERING INFORMATION table.....	14
Changes from Revision * (October 2009) to Revision A (November 2011)	Page
• 更改了特性中的 I_{off} 说明.....	1

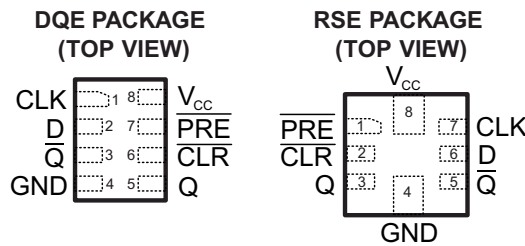
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- Changed temperature range for DCT and DCU package from (-40°C to 85°C) to (-40°C to 125°C)..... 6
 - Changed *Timing Requirements* table..... 7
 - Changed *Switching Requirements* table..... 7
-

5 Pin Configuration and Functions



See mechanical drawings for dimensions.

图 5-1. DCT 8-Pin SM8 and DCU 8-Pin VSSOP Package Top View



See mechanical drawings for dimensions

图 5-2. DQE 8-Pin X2SON and RSE UQFN 8-Pin Package Top View

Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
CLK	1	I	Clock input
CLR	6	I	Clear input – Pull low to set Q output low
D	2	I	Input
GND	4	—	Ground
PRE	7	I	Preset input – Pull low to set Q output high
Q	5	O	Output
Q̄	3	O	Inverted output
V _{CC}	8	—	Supply

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	6.5	V
V _I	Input voltage range ⁽²⁾	- 0.5	6.5	V
V _O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	- 0.5	6.5	V
V _O	Voltage range applied to any output in the high or low state ^{(2) (3)}	- 0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current		- 50	mA
I _{OK}	Output clamp current		- 50	mA
I _O	Continuous output current		±50	mA
	Continuous current through V _{CC} or GND		±100	mA
T _{stg}	Storage temperature range	- 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 clamp-current ratings are observed.
- (3) The value of V_{CC} is provided in the *Recommended Operating Conditions* table.

6.2 ESD Ratings

PARAMETER	DEFINITION	VALUE	UNIT
V _(ESD)	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾	2000	V
	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽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	Operating	1.65	5.5	V
		Data retention only	1.5		
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V	1.7		
		V _{CC} = 3 V to 3.6 V	2		
		V _{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V		0.7	
		V _{CC} = 3 V to 3.6 V		0.8	
		V _{CC} = 4.5 V to 5.5 V		0.3 × V _{CC}	
V _I	Input voltage		0	5.5	V
V _O	Output voltage		0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 1.65 V		-4	mA
		V _{CC} = 2.3 V		-8	
		V _{CC} = 3 V		-16	
		V _{CC} = 4.5 V		-24	
I _{OL}	Low-level output current	V _{CC} = 1.65 V		4	mA
		V _{CC} = 2.3 V		8	
		V _{CC} = 3 V		16	
		V _{CC} = 4.5 V		24	
Δt/Δv	Input transition rise or fall rate	V _{CC} = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V		20	ns/V
		V _{CC} = 3.3 V ± 0.3 V		10	
		V _{CC} = 5 V ± 0.5 V		5	
T _A	Operating free-air temperature	RSE Package	-40	85	°C
		DQE Package			
		DCT Package	-40	125	
		DCU Package			

(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⁾	SN74LVC1G74				UNIT	
	DCT	DCU	RSE	DQE		
	8 PINS	8 PINS	8 PINS	8 PINS		
R _{θJA}	Junction-to-ambient thermal resistance	220	227	243	261	°C/W

(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}	MIN	TYP ⁽¹⁾	MAX	UNIT
V _{OH}		I _{OH} = - 100 μA	1.65 V to 5.5 V	V _{CC} - 0.1			V
		I _{OH} = - 4 mA	1.65 V	1.2			
		I _{OH} = - 8 mA	2.3 V	1.9			
		I _{OH} = - 16 mA	3 V	2.4			
		I _{OH} = - 24 mA		2.3			
		I _{OH} = - 32 mA	4.5 V	3.8			
V _{OL}		I _{OL} = 100 μA	1.65 V to 5.5 V			0.1	V
		I _{OL} = 4 mA	1.65 V			0.45	
		I _{OL} = 8 mA	2.3 V			0.3	
		I _{OL} = 16 mA	3 V			0.4	
		I _{OL} = 24 mA				0.55	
		I _{OL} = 32 mA	4.5 V			0.55	
I _I	Data or control inputs	V _I = 5.5 V or GND	0 to 5.5 V			±5	μA
I _{off}		V _I or V _O = 5.5 V	0			±10	μA
I _{CC}		V _I = 5.5 V or GND, I _O = 0	1.65 V to 5.5 V			10	μA
Δ I _{CC}		One input at V _{CC} - 0.6 V, Other inputs at V _{CC} or GND	3 V to 5.5 V			500	μA
C _i		V _I = V _{CC} or GND	3.3 V			5	pF

(1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

6.6 Timing Requirements

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	- 40°C to 85°C				- 40°C to 125°C				UNIT				
			V _{CC} = 1.8 V		V _{CC} = 2.5 V		V _{CC} = 3.3 V		V _{CC} = 5 V			V _{CC} = 3.3 V		V _{CC} = 5 V	
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
f _{clock}			80		175		175		200		175		200		MHz
t _w	CLK	CLK	6.2		2.7		2.7		2		2.7		2		ns
		PRE or CLR low	6.2		2.7		2.7		2		2.7		2		ns
t _{su}		Data	2.9		1.7		1.3		1.1		1.3		1.1		ns
		PRE or CLR inactive	1.9		1.4		1.2		1		1.2		1.2		ns
t _h			0		0.3		1.2		0.5		1.2		0.5		ns

6.7 Switching Characteristics

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

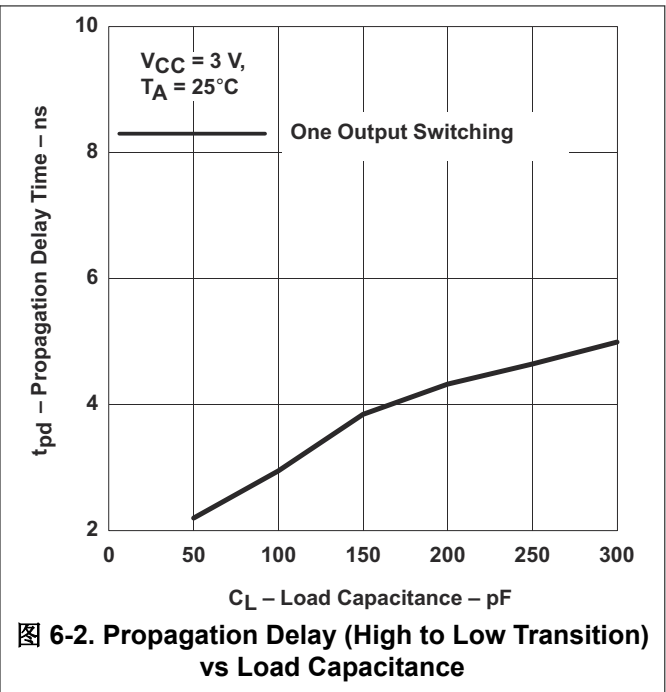
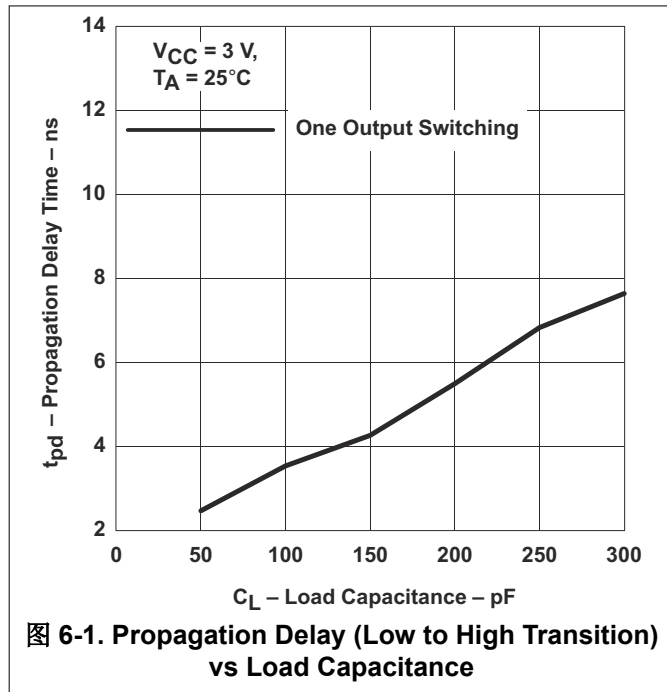
PARAMETER	FROM (INPUT)	TO (OUTPUT)	- 40°C to 85°C				- 40°C to 125°C				UNIT				
			V _{CC} = 1.8 V		V _{CC} = 2.5 V		V _{CC} = 3.3 V		V _{CC} = 5 V			V _{CC} = 3.3 V		V _{CC} = 5 V	
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
f _{max}			80		175		175		200		175		200		MHz
t _{pd}	CLK	Q	4.8	13.4	2.2	7.1	2.2	5.9	1.4	4.1	2.2	7.9	1.4	6.1	ns
		Q̄	6	14.4	3	7.7	2.6	6.2	1.6	4.4	2.6	8.2	1.6	6.4	
	PRE or CLR low	Q or Q̄	4.4	12.9	2.3	7	1.7	5.9	1.6	4.1	1.7	7.9	1.6	6.1	

6.8 Operating Characteristics

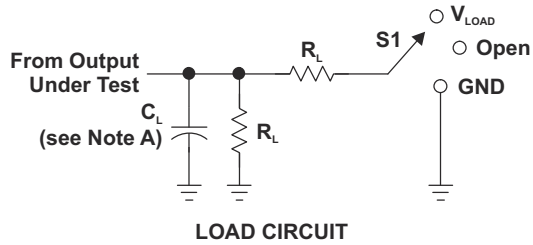
T_A = 25°C

PARAMETER	TEST CONDITIONS	V _{CC} = 1.8 V	V _{CC} = 2.5 V	V _{CC} = 3.3 V	V _{CC} = 5 V	UNIT
		TYP	TYP	TYP	TYP	
C _{pd} Power dissipation capacitance	f = 10 MHz	35	35	37	40	pF

6.9 Typical Characteristics

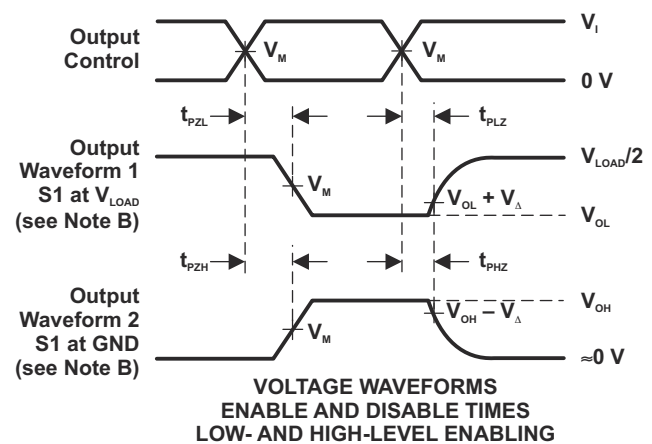
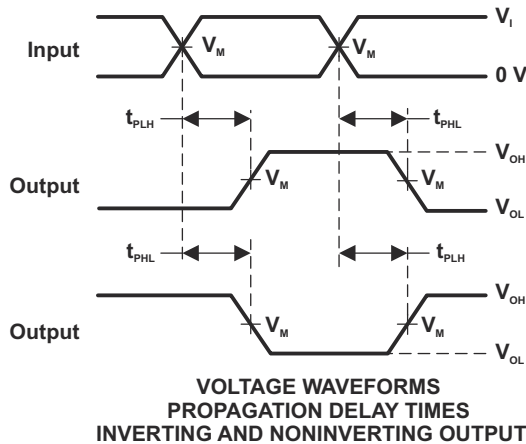
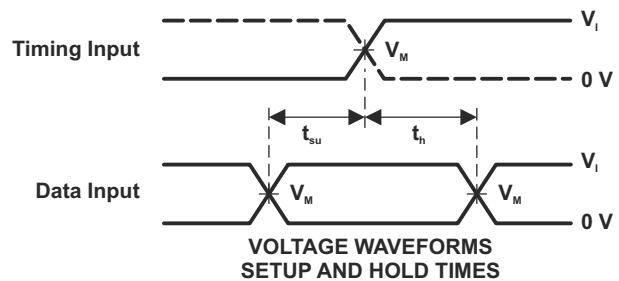
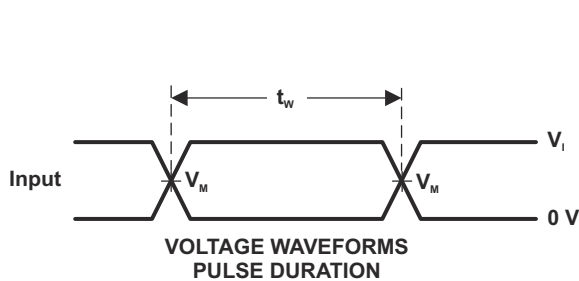


7 Parameter Measurement Information



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k Ω	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V
$5\text{ V} \pm 0.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	50 pF	500 Ω	0.3 V



- 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: $PRR \leq 10\text{ MHz}$, $Z_o = 50\ \Omega$.
 D. The outputs are measured one at a time, with one transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

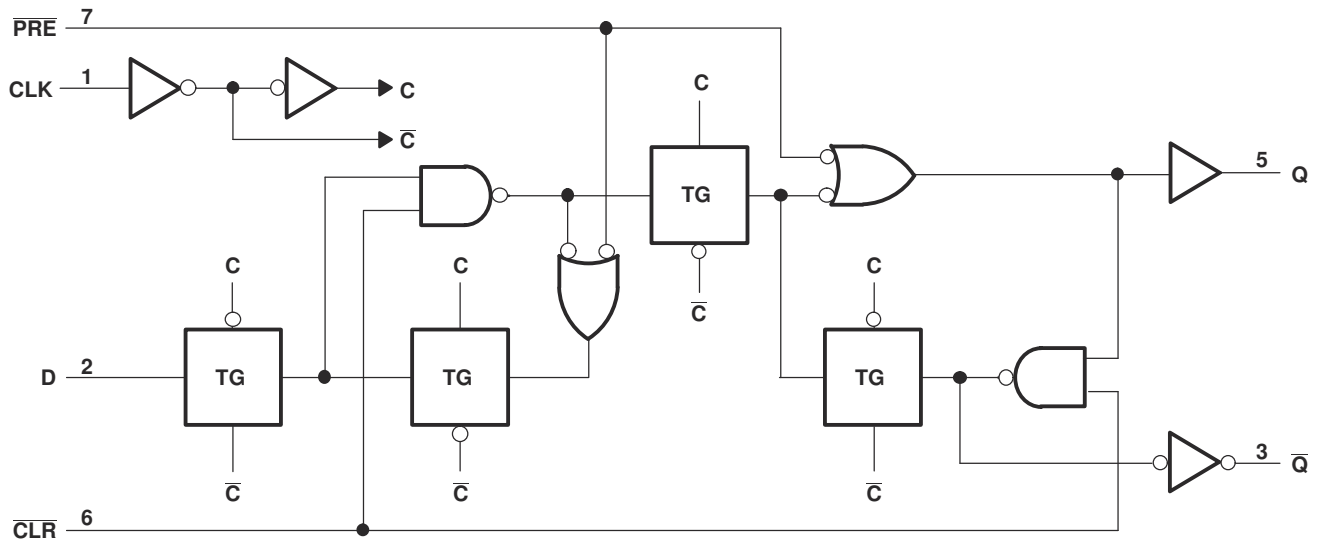
图 7-1. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

8.2 Functional Block Diagram



8.3 Feature Description

- Allow down voltage translation
 - 5-V to 3.3-V
 - 5.0-V to 1.8-V
 - 3.3-V to 1.8-V
- Inputs accept voltage levels up to 5.5-V
- I_{off} Feature
 - Can prevent backflow current that can damage device when powered down

8.4 Device Functional Modes

表 8-1. Function Table

INPUTS				OUTPUTS	
PRE	CLR	CLK	D	Q	Q̄
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H ⁽¹⁾	H ⁽¹⁾
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q ₀	Q̄ ₀

(1) This configuration is nonstable; that is, it does not persist when $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ returns to its inactive (high) level.

9 Application and Implementation

Note

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

A low level at the preset ($\overline{\text{PRE}}$) or clear ($\overline{\text{CLR}}$) input sets or resets the outputs, regardless of the levels of the other inputs. When $\overline{\text{PRE}}$ and $\overline{\text{CLR}}$ are inactive (high), data at the data (D) input meeting the setup time requirements is transferred to the outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not related directly to the rise time of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the levels at the outputs.

The 330 Ω resistor and 22 pF capacitor shown in 图 9-1 produce enough delay to meet the hold time requirement of the D input. To calculate the delay for a particular RC combination, use 方程式 1. The delay with this RC combination is 5.03 ns

$$t_{\text{delay}} = -RC \ln(0.5) \approx 0.693 RC \quad (1)$$

To ensure proper operation, check that the transition time of the RC circuit meets the transition time requirements of the device inputs listed in the Recommended Operating Conditions table. Transition time for an RC can be approximated with 方程式 2.

$$t_t \approx 2.2 RC \quad (2)$$

9.2 Typical Power Button Circuit

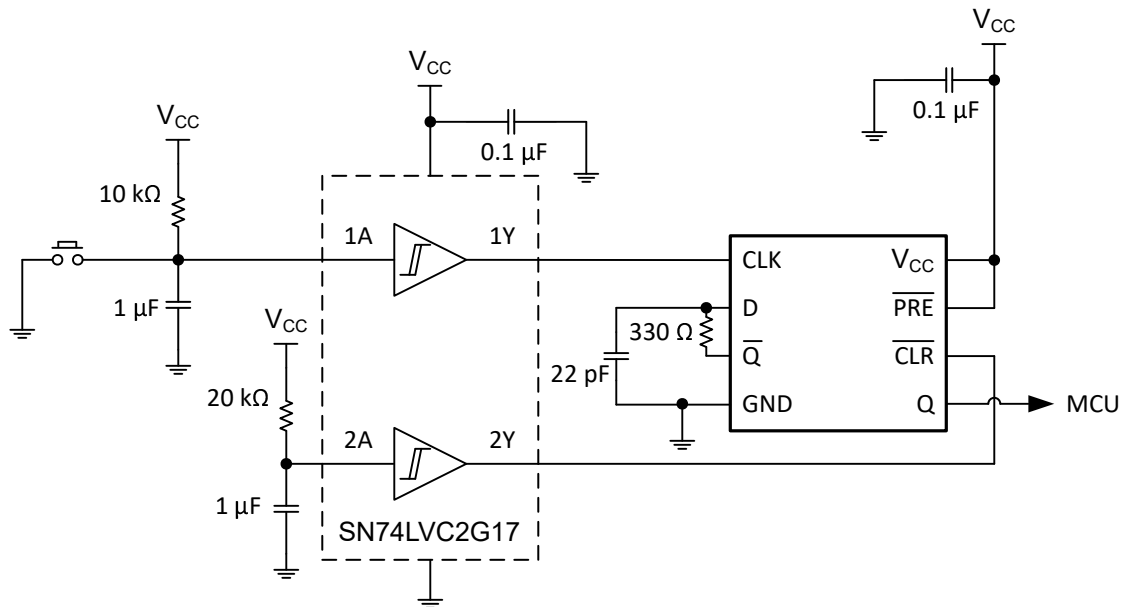


图 9-1. Device Power Button Circuit

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads so routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

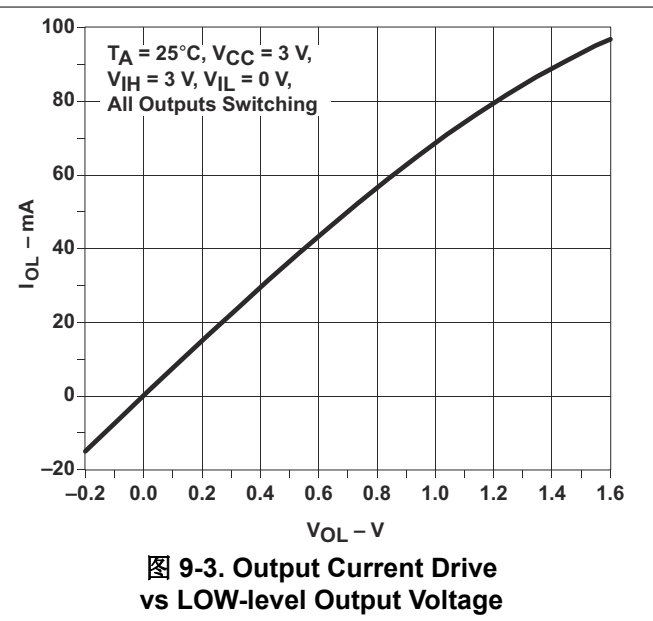
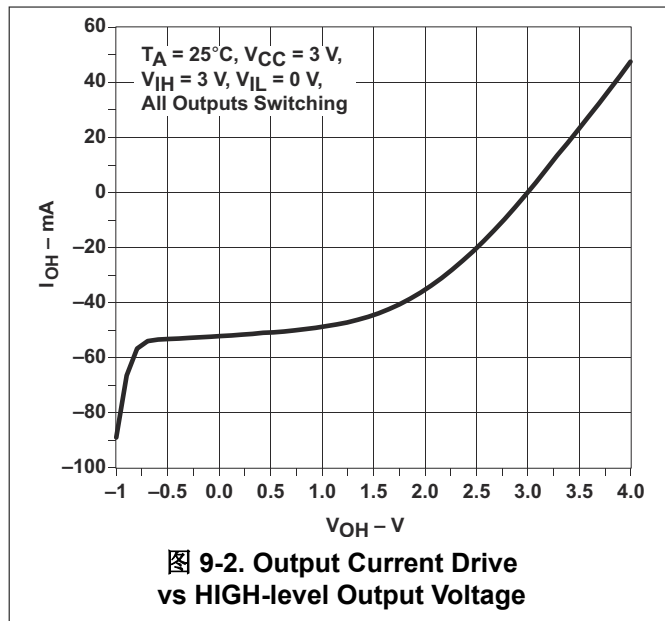
1. Recommended Input Conditions:

- For rise time and fall time specifications, see ($\Delta t / \Delta V$) in the [Recommended Operating Conditions](#) table.
- For specified high and low levels, see (V_{IH} and V_{IL}) in the [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 50-mA per output and 100-mA total for the part.
- Series resistors on the output may be used if the user desires to slow the output edge signal or limit the output current.

9.2.3 Application Curves



10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the [Recommended Operating Conditions](#) table. Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- μ F capacitor is recommended and if there are multiple V_{CC} terminals then .01- μ F or .022- μ F capacitors are recommended for each power terminal. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- μ F and 1- μ F capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when 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 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 makes more sense or is more convenient. It is 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 I/Os so they also cannot float when disabled.

11.2 Layout Example

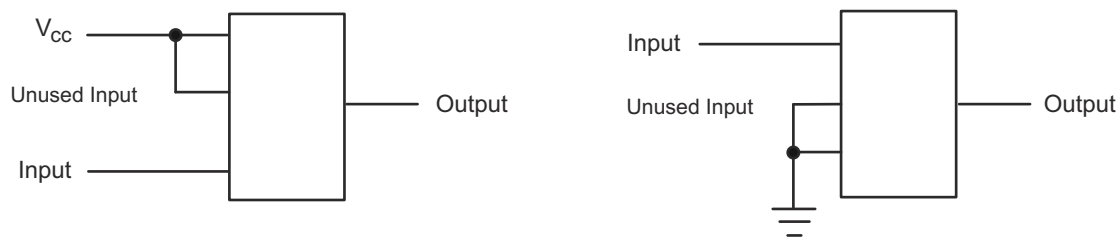


图 11-1. Layout Diagram

12 Device and Documentation Support

12.1 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。

12.2 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](#)》。

12.3 Trademarks

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12.4 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.

12.5 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.

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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
SN74LVC1G74DCTR	ACTIVE	SM8	DCT	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	N74 Z	Samples
SN74LVC1G74DCUR	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(N74J, N74Q, N74R)	Samples
SN74LVC1G74DCURG4	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	N74R	Samples
SN74LVC1G74DCUT	ACTIVE	VSSOP	DCU	8	250	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(N74J, N74Q, N74R)	Samples
SN74LVC1G74DQER	ACTIVE	X2SON	DQE	8	5000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	DP	Samples
SN74LVC1G74RSE2	ACTIVE	UQFN	RSE	8	5000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	DP	Samples
SN74LVC1G74RSER	ACTIVE	UQFN	RSE	8	5000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	DP	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
SN74LVC1G74DCTR	SM8	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	178.0	9.5	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCUT	VSSOP	DCU	8	250	178.0	9.5	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCUT	VSSOP	DCU	8	250	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DCUT	VSSOP	DCU	8	250	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC1G74DQER	X2SON	DQE	8	5000	180.0	9.5	1.15	1.6	0.5	4.0	8.0	Q1
SN74LVC1G74RSE2	UQFN	RSE	8	5000	180.0	9.5	1.7	1.7	0.75	4.0	8.0	Q3
SN74LVC1G74RSER	UQFN	RSE	8	5000	180.0	9.5	1.7	1.7	0.75	4.0	8.0	Q2

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G74DCTR	SM8	DCT	8	3000	182.0	182.0	20.0
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC1G74DCUR	VSSOP	DCU	8	3000	180.0	180.0	18.0
SN74LVC1G74DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC1G74DCUT	VSSOP	DCU	8	250	202.0	201.0	28.0
SN74LVC1G74DCUT	VSSOP	DCU	8	250	202.0	201.0	28.0
SN74LVC1G74DCUT	VSSOP	DCU	8	250	180.0	180.0	18.0
SN74LVC1G74DQER	X2SON	DQE	8	5000	184.0	184.0	19.0
SN74LVC1G74RSE2	UQFN	RSE	8	5000	184.0	184.0	19.0
SN74LVC1G74RSER	UQFN	RSE	8	5000	184.0	184.0	19.0



4225266/A 09/2014

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. Reference JEDEC registration MO-187 variation CA.

EXAMPLE BOARD LAYOUT

DCU0008A

VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 25X



4225266/A 09/2014

NOTES: (continued)

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

EXAMPLE STENCIL DESIGN

DCU0008A

VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 25X

4225266/A 09/2014

NOTES: (continued)

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



4220784/C 06/2021

NOTES:

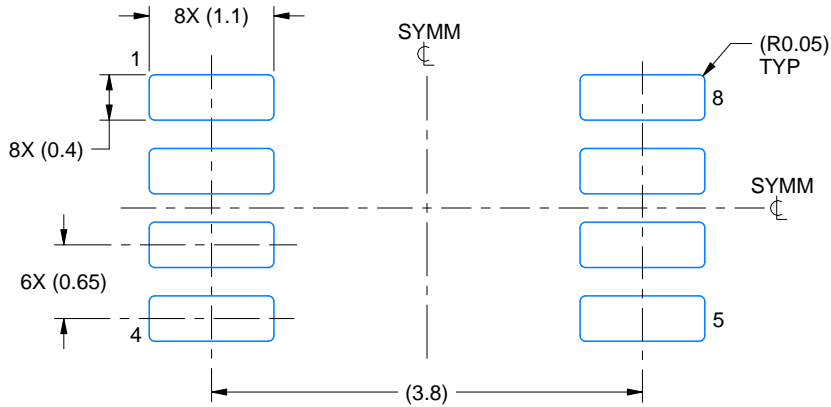
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate 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.

EXAMPLE BOARD LAYOUT

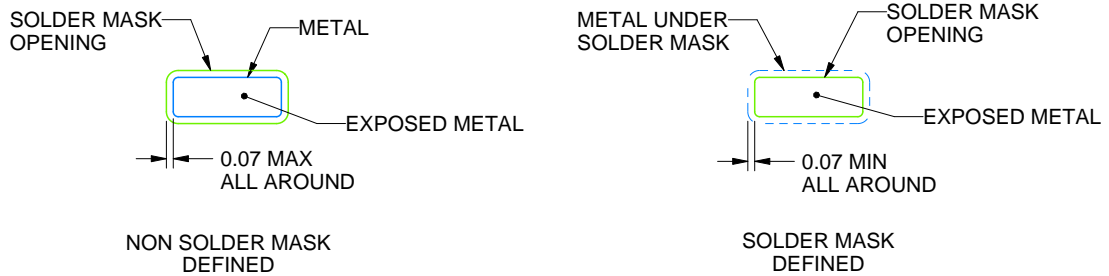
DCT0008A

SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X



SOLDER MASK DETAILS

4220784/C 06/2021

NOTES: (continued)

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

EXAMPLE STENCIL DESIGN

DCT0008A

SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:15X

4220784/C 06/2021

NOTES: (continued)

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



4225204/A 08/2019

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 package complies to JEDEC MO-287 variation X2EAF.

EXAMPLE BOARD LAYOUT

DQE0008A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 40X



SOLDER MASK DETAILS

4225204/A 08/2019

NOTES: (continued)

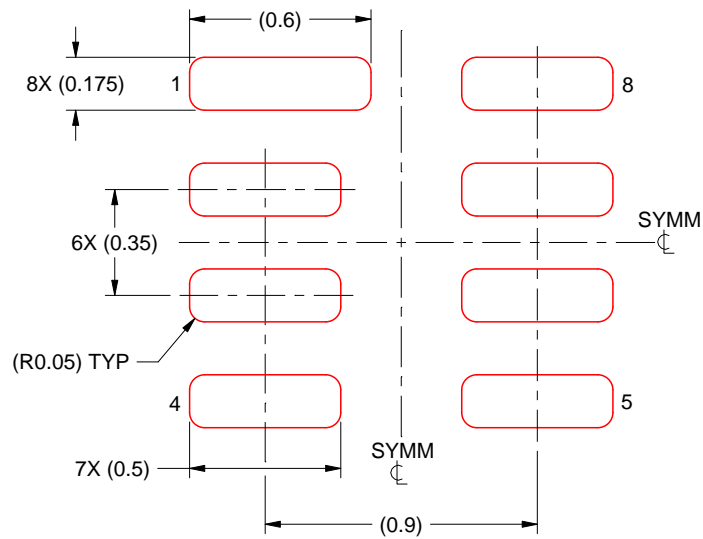
- This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DQE0008A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

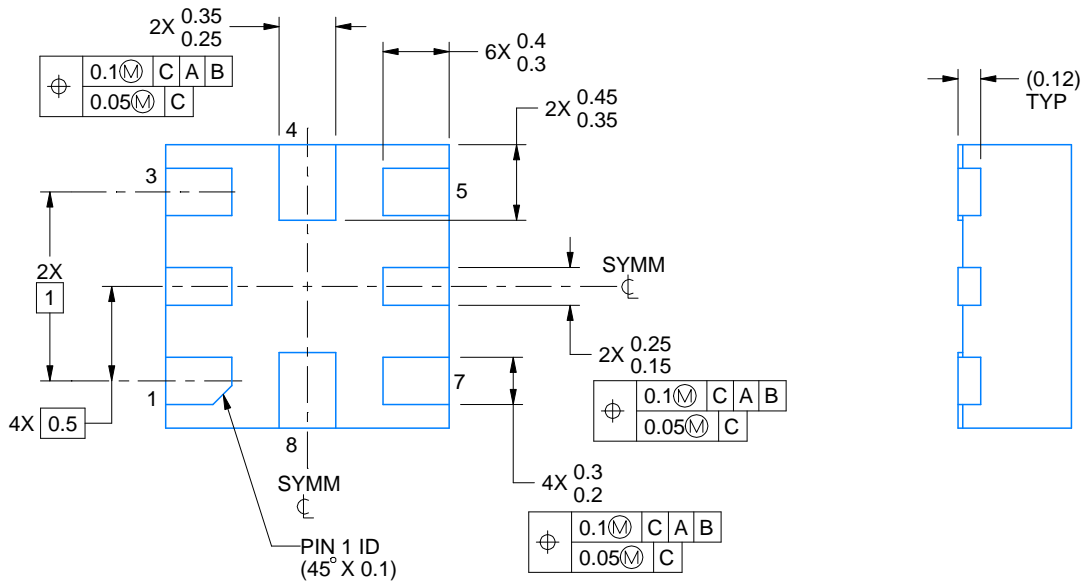
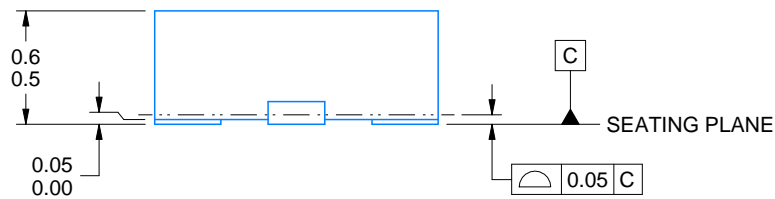


SOLDER PASTE EXAMPLE
BASED ON 0.075 MM THICK STENCIL
SCALE: 40X

4225204/A 08/2019

NOTES: (continued)

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



4220323/B 03/2018

NOTES:

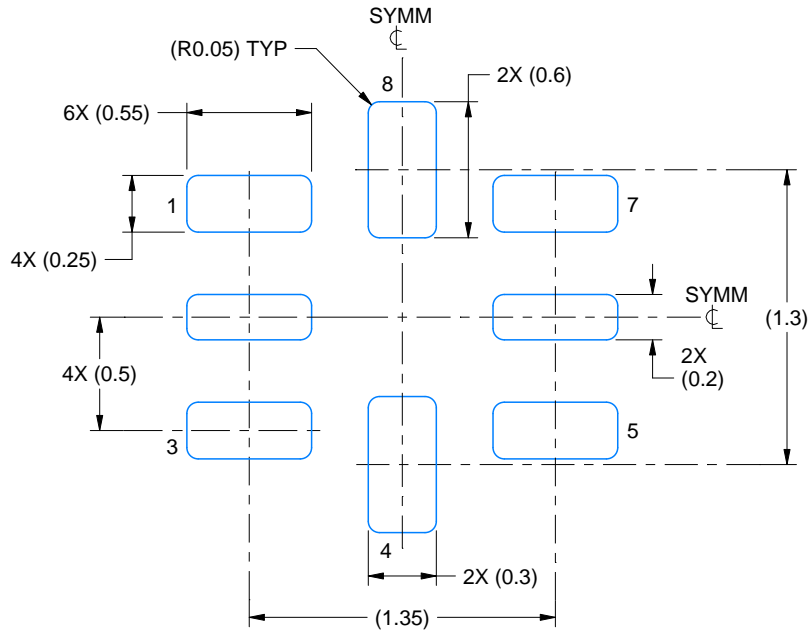
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

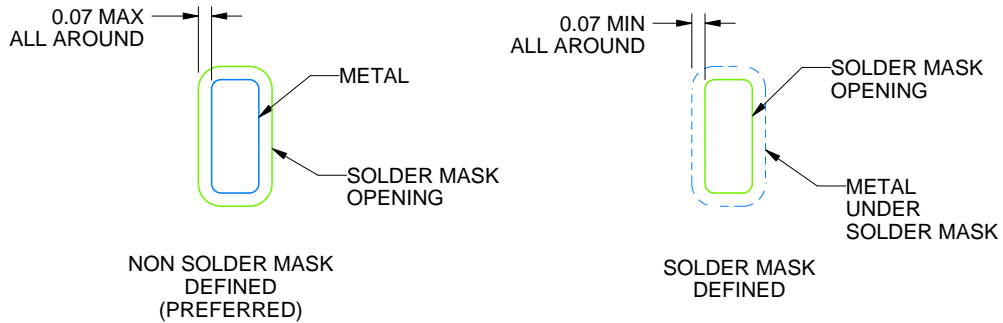
RSE0008A

UQFN - 0.6 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE
SCALE:30X



SOLDER MASK DETAILS
NOT TO SCALE

4220323/B 03/2018

NOTES: (continued)

3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

RSE0008A

UQFN - 0.6 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICKNESS
SCALE: 30X

4220323/B 03/2018

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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