

# SN74LVC1G79 シングル正エッジ・トリガ、Dタイプ・フリップ・フロップ

## 1 特長

- テキサス・インスツルメンツの NanoFree™ パッケージで供給
- JESD 78, Class II 準拠で 100mA 超のラッチアップ性能
- JESD 22 を超える ESD 保護
  - 2000V、人体モデル (A114-A)
  - 200V、マシン・モデル (A115-A)
  - 1000V、荷電デバイス・モデル (C101)
- 5V  $V_{CC}$  動作をサポート
- 5.5V までの入力電圧に対応
- $V_{CC}$  への降圧変換をサポート
- 3.3V および 50pF 負荷で最大  $t_{pd}$  が 6ns
- 低消費電力、最大  $I_{CC}$  10 $\mu$ A
- 3.3V において  $\pm 24$ mA の出力駆動能力
- $I_{off}$  により部分的パワーダウン・モードおよびバック・ドライブ保護をサポート

## 2 アプリケーション

- 試験および測定機器
- エンタープライズ・スイッチング
- 通信インフラ
- 個人用電子機器
- 白物家電

## 3 概要

SN74LVC1G79 デバイスはシングル正エッジ・トリガ、D タイプ・フリップ・フロップで、1.65V ~ 5.5V の  $V_{CC}$  で動作するように設計されています。

データ (D) 入力のデータがセットアップ時間の要件と合致すると、クロック・パルスが正に変化するエッジで、データが Q 出力へ転送されます。クロックのトリガは電圧レベルで発生し、クロック・パルスの立ち上がり時間とは直接関係しません。ホールド時間のインターバルの後で、出力のレベルに影響を及ぼすことなく、D 入力のデータが変化できます。

NanoFree™ パッケージ技術は IC パッケージの概念における主要なブレイクスルーであり、ダイをパッケージとして使用します。

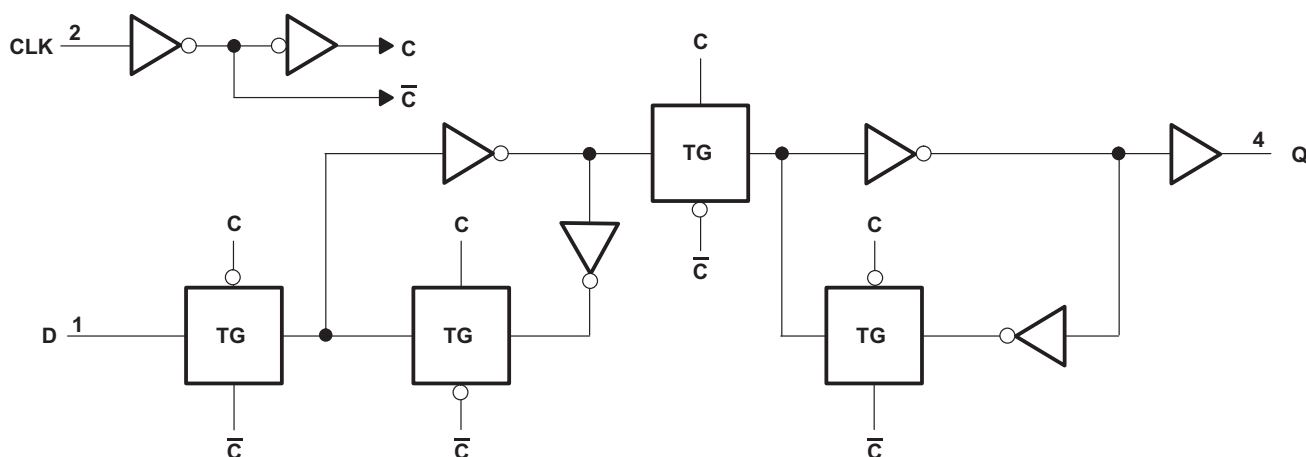
このデバイスは、 $I_{off}$  を使用する部分的パワーダウン・アプリケーション用に完全に動作が規定されています。 $I_{off}$  回路は、デバイスの電源がオフになったとき、出力をディセーブルします。これによってデバイスへの電流の逆流が抑止され、デバイスが損傷から保護されます。

### 製品情報<sup>(1)</sup>

型番	パッケージ	本体サイズ
SN74LVC1G79DBV	SOT-23 (5)	2.90mm x 1.60mm
SN74LVC1G79DCK	SC70 (5)	2.00mm x 1.25mm
SN74LVC1G79DRL	SOT (5)	1.60mm x 1.20mm
SN74LVC1G79YZP	DSBGA (5)	1.14mm x 0.91mm

(1) 利用可能なすべてのパッケージについては、このデータシートの末尾にある注文情報を参照してください。

### ロジック図 (正論理)



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## 4 改訂履歴

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

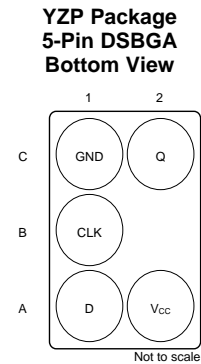
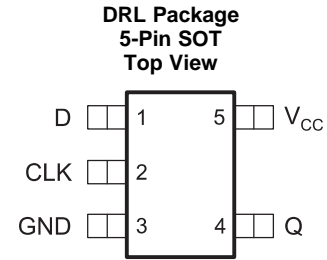
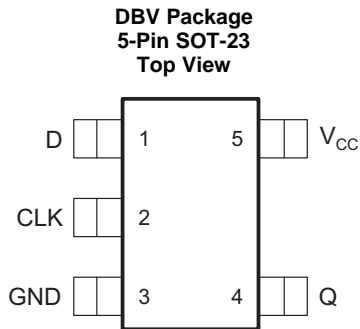
### Revision T (December 2013) から Revision U に変更 Page

• 「製品情報」表、「ESD定格」表、「熱に関する情報」表、「機能説明」セクション、「デバイスの機能モード」セクション、「アプリケーションと実装」セクション、「電源に関する推奨事項」セクション、「レイアウト」セクション、「デバイスおよびドキュメントのサポート」セクション、「メカニカル、パッケージ、および注文情報」セクション 追加.....	<b>1</b>
• Changed thermal information to align with JEDEC standards. ....	<b>5</b>

### Revision S (November 2007) から Revision T に変更 Page

• ドキュメントを新しいTIデータシートのフォーマットに更新.....	<b>1</b>
• 「注文情報」表を削除.....	<b>1</b>
• 「特長」の $I_{off}$ を更新.....	<b>1</b>
• Updated operating temperature range. ....	<b>5</b>
• ESDの警告を追加.....	<b>15</b>

## 5 Pin Configuration and Functions



See mechanical drawings for dimensions.

### Pin Functions

NAME	PIN		I/O	DESCRIPTION
	DBV, DCK, DRL	YZP		
D	1	A1	I	Data input
CLK	2	B1	I	Positive-Edge-Triggered Clock input
GND	3	C1	—	Ground
Q	4	C2	O	Non-inverted output
V <sub>CC</sub>	5	A2	—	Positive Supply

## 6 Specifications

### 6.1 Absolute Maximum Ratings

 over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	-0.5	6.5	V
V <sub>I</sub>	Input voltage <sup>(2)</sup>	-0.5	6.5	V
V <sub>O</sub>	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	-0.5	6.5	V
V <sub>O</sub>	Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>	-0.5	V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> < 0	-50	mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> < 0	-50	mA
I <sub>O</sub>	Continuous output current		±50	mA
	Continuous current through V <sub>CC</sub> or GND		±100	mA
T <sub>stg</sub>	Storage temperature	-65	150	°C
T <sub>J</sub>	Junction temperature		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.
- (3) The value of V<sub>CC</sub> is provided in the *Recommended Operating Conditions* table.

### 6.2 ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)</sup>	±2000
		Charged device model (CDM), per JEDEC specification JESD22-C101 <sup>(2)</sup>	±1000
		Machine Model (MM), A115-A	200

- (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)<sup>(1)</sup>

		MIN	MAX	UNIT	
V <sub>CC</sub>	Supply voltage	Operating	1.65	5.5	V
		Data retention only	1.5		
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		
		V <sub>CC</sub> = 3 V to 3.6 V	2		
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.35 × V <sub>CC</sub>		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.7		
		V <sub>CC</sub> = 3 V to 3.6 V	0.8		
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.3 × V <sub>CC</sub>		
V <sub>I</sub>	Input voltage	0	5.5	V	
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>	V	
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 1.65 V	–4		mA
		V <sub>CC</sub> = 2.3 V	–8		
		V <sub>CC</sub> = 3 V	–16		
			–24		
		V <sub>CC</sub> = 4.5 V	–32		
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 1.65 V	4		mA
		V <sub>CC</sub> = 2.3 V	8		
		V <sub>CC</sub> = 3 V	16		
			24		
		V <sub>CC</sub> = 4.5 V	32		
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V	20		ns/V
		V <sub>CC</sub> = 3.3 V ± 0.3 V	10		
		V <sub>CC</sub> = 5 V ± 0.5 V	5		
T <sub>A</sub>	Operating free-air temperature	–40	125	°C	

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. See [Implications of Slow or Floating CMOS Inputs](#), SCBA004.

### 6.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>	SN74LVC1G79				UNIT	
	DBV (SOT-23)	DCK (SC70)	DRL (SOT)	YZP (DSBGA)		
	5 PINS	5 PINS	5 PINS	5 PINS		
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	247.2	277.6	294.3	144.4	°C/W
R <sub>θJC(top)</sub>	Junction-to-case (top) thermal resistance	154.5	179.5	129.9	1.3	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	86.8	75.9	143.4	39.9	°C/W
ψ <sub>JT</sub>	Junction-to-top characterization parameter	58.0	49.7	14.3	0.5	°C/W
ψ <sub>JB</sub>	Junction-to-board characterization parameter	86.4	75.1	144.0	39.7	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

## 6.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = –40°C to +85°C			T <sub>A</sub> = –40°C to +125°C			UNIT
			MIN	TYP <sup>(1)</sup>	MAX	MIN	TYP <sup>(1)</sup>	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = –100 μA	1.65 V to 5.5 V	V <sub>CC</sub> – 0.1			V <sub>CC</sub> – 0.1			V
	I <sub>OH</sub> = –4 mA	1.65 V	1.2			1.2			
	I <sub>OH</sub> = –8 mA	2.3 V	1.9			1.9			
	I <sub>OH</sub> = –16 mA	3 V	2.4			2.4			
	I <sub>OH</sub> = –24 mA		2.3			2.3			
	I <sub>OH</sub> = –32 mA	4.5 V	3.8			3.8			
V <sub>OL</sub>	I <sub>OL</sub> = 100 μA	1.65 V to 5.5 V				0.1			V
	I <sub>OL</sub> = 4 mA	1.65 V	0.45			0.45			
	I <sub>OL</sub> = 8 mA	2.3 V	0.3			0.3			
	I <sub>OL</sub> = 16 mA	3 V	0.4			0.4			
	I <sub>OL</sub> = 24 mA		0.55			0.55			
	I <sub>OL</sub> = 32 mA	4.5 V	0.55			0.55			
I <sub>I</sub>	All inputs V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V	±10			±5			μA
I <sub>off</sub>	V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0	±10			±10			μA
I <sub>CC</sub>	V <sub>I</sub> = 5.5 V or GND, I <sub>O</sub> = 0	1.65 V to 5.5 V	10			10			μA
ΔI <sub>CC</sub>	One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND	3 V to 5.5 V	500			500			μA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V	4			4			pF

 (1) All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

## 6.6 Timing Requirements: T<sub>A</sub> = –40°C to +85°C

over operating free-air temperature range (unless otherwise noted) (see Figure 3)

PARAMETER		T <sub>A</sub> = –40°C to +85°C								UNIT	
		V <sub>CC</sub> = 1.8 ± 0.15 V		V <sub>CC</sub> = 2.5 ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V			
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
f <sub>clock</sub>	Clock frequency	160		160		160		160		MHz	
t <sub>w</sub>	Pulse duration, CLK high or low	2.5		2.5		2.5		2.5		ns	
t <sub>su</sub>	Setup time before CLK↑	Data high	2.2		1.4		1.3		1.2		ns
		Data low	2.6		1.4		1.3		1.2		
t <sub>h</sub>	Hold time, data after CLK↑	0.3		0.4		1		0.5		ns	

## 6.7 Timing Requirements: T<sub>A</sub> = –40°C to +125°C

over operating free-air temperature range (unless otherwise noted) (see Figure 3)

PARAMETER		T <sub>A</sub> = –40°C to +125°C								UNIT	
		V <sub>CC</sub> = 1.8 ± 0.15 V		V <sub>CC</sub> = 2.5 ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V			
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
f <sub>clock</sub>	Clock frequency	160		160		160		160		MHz	
t <sub>w</sub>	Pulse duration, CLK high or low	2.5		2.5		2.5		2.5		ns	
t <sub>su</sub>	Setup time before CLK↑	Data high	2.2		1.4		1.3		1.2		ns
		Data low	2.6		1.4		1.3		1.2		
t <sub>h</sub>	Hold time, data after CLK↑	0.3		0.4		1		0.5		ns	

### 6.8 Switching Characteristics: $C_L = 15\text{ pF}$ , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

over recommended operating free-air temperature range,  $C_L = 15\text{ pF}$  (unless otherwise noted) (see [Figure 3](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$f_{\text{max}}$			160		160		160		160		MHz
$t_{\text{pd}}$	CLK	Q	2.5	9.1	1.2	6	1	4	0.8	3.8	ns

### 6.9 Switching Characteristics: $C_L = 30$ or $50\text{ pF}$ , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

over recommended operating free-air temperature range,  $C_L = 30\text{ pF}$  or  $50\text{ pF}$  (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$f_{\text{max}}$			160		160		160		160		MHz
$t_{\text{pd}}$	CLK	Q	3.9	9.9	2	7	1.7	5	1	4.5	ns

### 6.10 Switching Characteristics: $C_L = 30\text{ pF}$ or $50\text{ pF}$ , $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$

over recommended operating free-air temperature range,  $C_L = 30\text{ pF}$  or  $50\text{ pF}$  (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$f_{\text{max}}$			160		160		160		160		MHz
$t_{\text{pd}}$	CLK	Q	3.9	12	2	8.5	1.7	6	1	5	ns

### 6.11 Operating Characteristics

 $T_A = 25^\circ\text{C}$ 

PARAMETER	TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	$V_{CC} = 5\text{ V}$	UNIT	
		TYP	TYP	TYP	TYP		
$C_{\text{pd}}$	Power dissipation capacitance	f = 10 MHz	26	26	27	30	pF

SN74LVC1G79

JAJS79U – APRIL 1999 – REVISED APRIL 2017

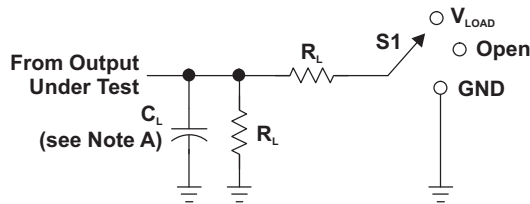
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6.12 Typical Characteristics

This plot shows the different  $I_{CC}$  values for various voltages on the data input (D). Voltage sweep on the input is from 0 V to 6.5 V.



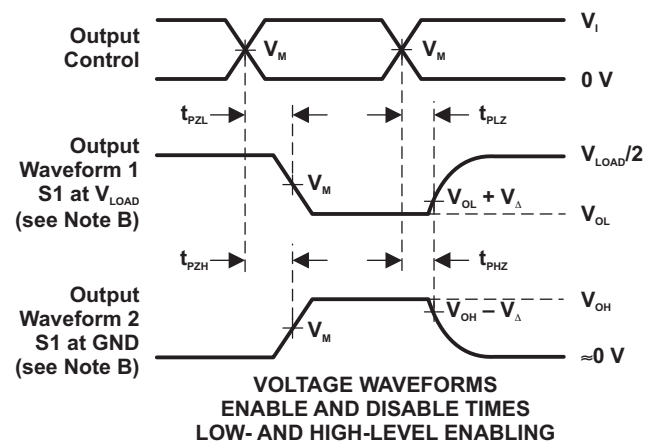
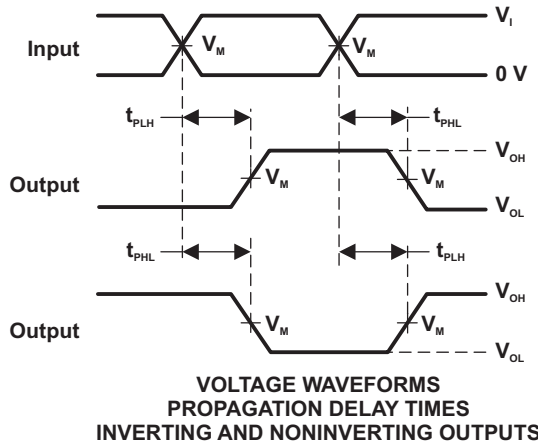
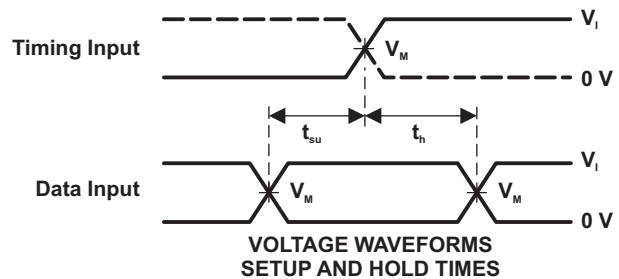
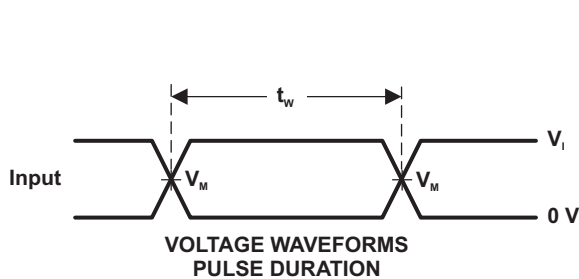
## 7 Parameter Measurement Information



LOAD CIRCUIT

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

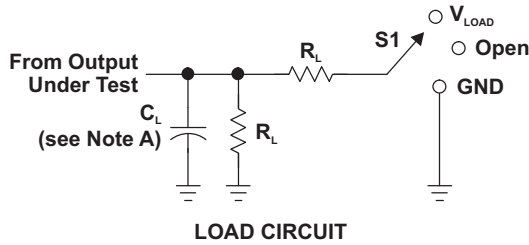
$V_{CC}$	INPUTS		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_i$	$t_i/t_r$					
$1.8\text{ V} \pm 0.15\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M $\Omega$	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M $\Omega$	0.15 V
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	15 pF	1 M $\Omega$	0.3 V
$5\text{ V} \pm 0.5\text{ V}$	$V_{CC}$	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M $\Omega$	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 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.

Figure 3. Load Circuit and Voltage Waveforms

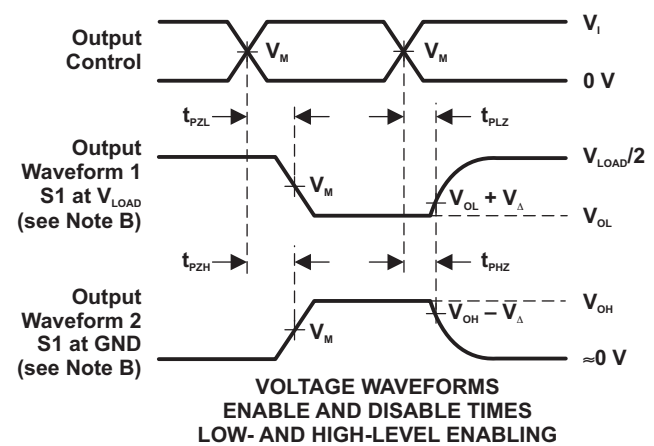
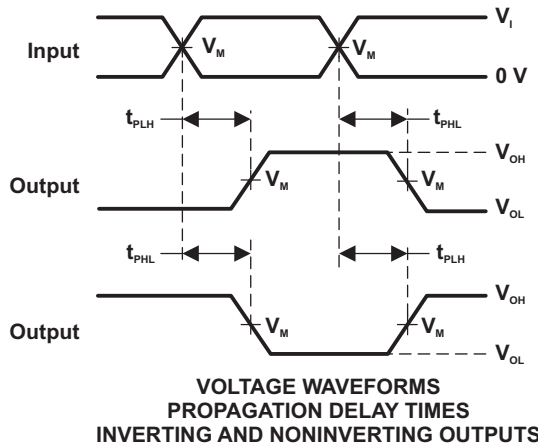
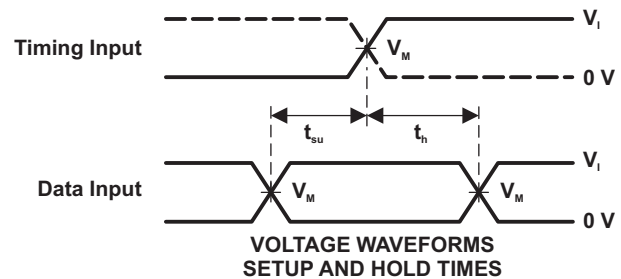
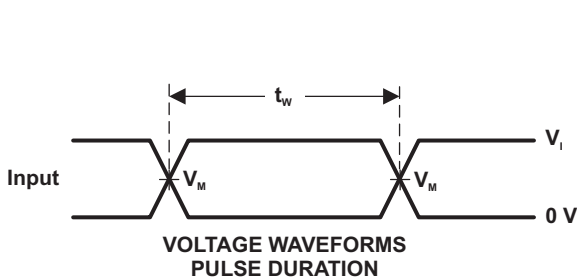
Parameter Measurement Information (continued)



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

LOAD CIRCUIT

$V_{CC}$	INPUTS		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
$1.8\text{ V} \pm 0.15\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k $\Omega$	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 $\Omega$	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 $\Omega$	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 $\Omega$	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 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  $t_{on}$ .  
 G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .  
 H. All parameters and waveforms are not applicable to all devices.

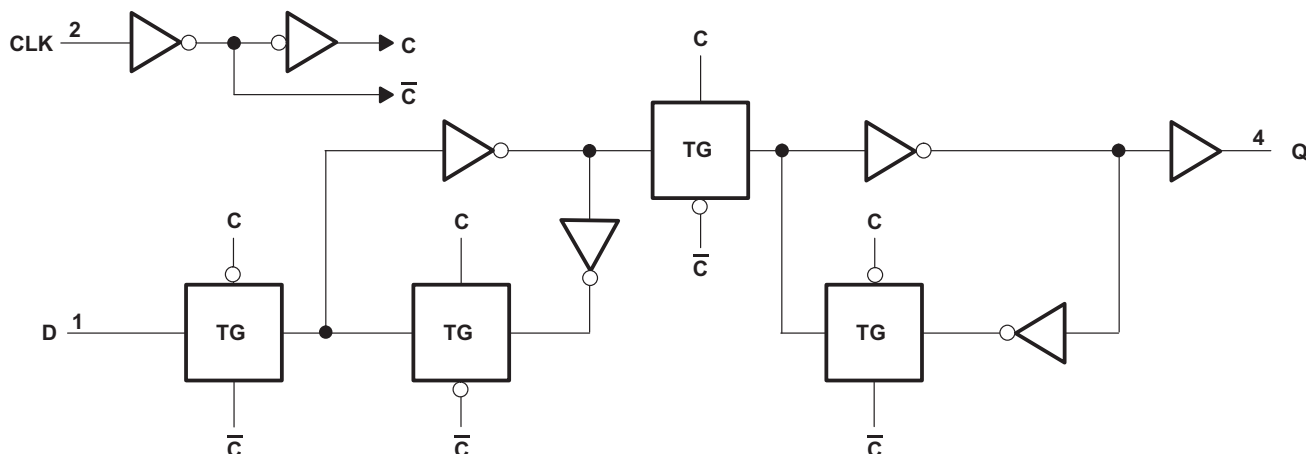
Figure 4. Load Circuit and Voltage Waveforms

## 8 Detailed Description

### 8.1 Overview

The SN74LVC1G79 is a single positive-edge-triggered D-type flip-flop. Data at the input (D) is transferred to the output (Q) on the positive-going edge of the clock pulse when the setup time requirement is met. Because the clock triggering occurs at a voltage level, it is not directly related to the rise time of the clock pulse. This allows for data at the input to be changed without affecting the level at the output, following the hold-time interval.

### 8.2 Functional Block Diagram



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Figure 5. Logic Diagram (Positive Logic)

### 8.3 Feature Description

#### 8.3.1 Balanced High-Drive CMOS Push-Pull Outputs

A balanced output allows the device to sink and source similar currents. The high drive capability of this device creates fast edges into light loads so routing and load conditions should be considered to prevent ringing. Additionally, the outputs of this device are capable of driving larger currents than the device can sustain without being damaged. It is important for the power output of the device to be limited to avoid thermal runaway and damage due to over-current. The electrical and thermal limits defined in the [Absolute Maximum Ratings](#) must be followed at all times.

#### 8.3.2 Standard CMOS Inputs

Standard CMOS inputs are high impedance and are typically modeled as a resistor in parallel with the input capacitance given in the [Electrical Characteristics](#). The worst case resistance is calculated with the maximum input voltage, given in the [Recommended Operating Conditions](#), and the maximum input leakage current, given in the [Electrical Characteristics](#), using ohm's law ( $R = V \div I$ ).

Signals applied to the inputs need to have fast edge rates, as defined by  $\Delta t/\Delta v$  in [Recommended Operating Conditions](#) to avoid excessive currents and oscillations. If tolerance to a slow or noisy input signal is required, a device with a Schmitt-trigger input should be utilized to condition the input signal prior to the standard CMOS input.

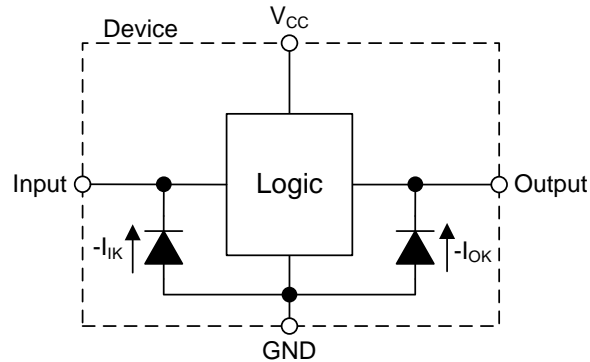
## Feature Description (continued)

### 8.3.3 Clamp Diodes

The inputs and outputs to this device have negative clamping diodes.

**CAUTION**

Voltages beyond the values specified in the [Absolute Maximum Ratings](#) table can cause damage to the device. The input negative-voltage and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.



**Figure 6. Electrical Placement of Clamping Diodes for Each Input and Output**

### 8.3.4 Partial Power Down ( $I_{off}$ )

The inputs and outputs for this device enter a high impedance state when the supply voltage is 0 V. The maximum leakage into or out of any input or output pin on the device is specified by  $I_{off}$  in the [Electrical Characteristics](#).

### 8.3.5 Over-Voltage Tolerant Inputs

Input signals to this device can be driven above the supply voltage so long as they remain below the maximum input voltage value specified in the [Absolute Maximum Ratings](#).

## 8.4 Device Functional Modes

[Table 1](#) lists the functional modes of SN74LVC1G79.

**Table 1. Function Table**

INPUTS		OUTPUT Y
CLK	D	
↑	H	H
↑	L	L
L	X	$Q_0$

## 9 Application and Implementation

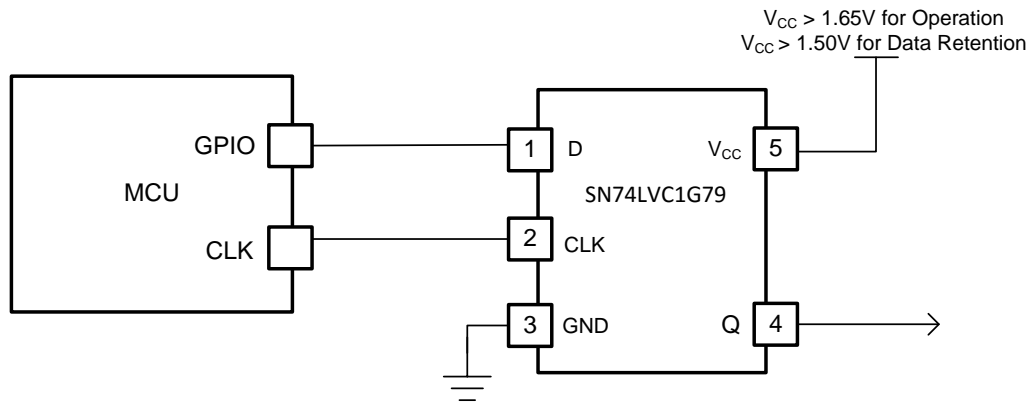
### NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

### 9.1 Application Information

A useful application for the SN74LVC1G79 is using it as a data latch with low-voltage data retention. This application implements the use of a microcontroller GPIO pin to act as a clock to set the output state and a second GPIO to provide the input data. If the SN74LVC1G79 is being powered from 1.8 V and there is concern that a power glitch could exist as low as 1.5 V, the device will retain the state of the Q output. An example of this data retention is shown in Figure 8 where the  $V_{CC}$  drops to 1.5 V and the Q output maintains the HIGH output state when  $V_{CC}$  returns to 1.8 V. If the  $V_{CC}$  voltage drops below 1.5 V, data retention is not guaranteed.

### 9.2 Typical Application



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Figure 7. Low Voltage Data Retention With SN74LVC1G79

#### 9.2.1 Design Requirements

The SN74LVC1G79 device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits.

#### 9.2.2 Detailed Design Procedure

1. Recommended input conditions:
  - For rise time and fall time specifications, see  $\Delta t/\Delta v$  in [Recommended Operating Conditions](#).
  - For specified high and low levels, see  $V_{IH}$  and  $V_{IL}$  in [Recommended Operating Conditions](#).
  - Input voltages are recommended to not go below 0 V and not exceed 5.5 V for any  $V_{CC}$ . See [Recommended Operating Conditions](#).
2. Recommended output conditions:
  - Load currents should not exceed  $\pm 50$  mA. See [Absolute Maximum Ratings](#).
  - Output voltages are recommended to not go below 0 V and not exceed the  $V_{CC}$  voltage. See [Recommended Operating Conditions](#).

## Typical Application (continued)

### 9.2.3 Application Curve

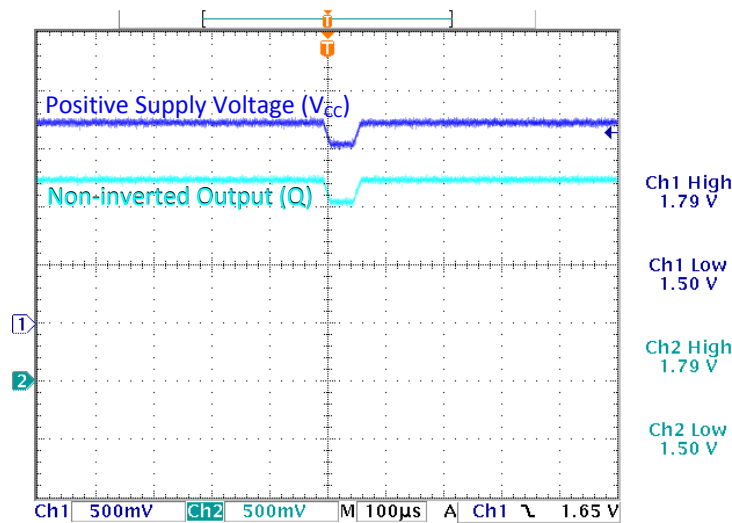


Figure 8. Data Retention With  $V_{CC}$  Glitch Down to 1.5 V

## 10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in [Recommended Operating Conditions](#). A 0.1- $\mu\text{F}$  bypass capacitor is recommended to be connected from the VCC terminal to GND to prevent power disturbance. To reject different frequencies of noise, use multiple bypass capacitors in parallel. Capacitors with values of 0.1  $\mu\text{F}$  and 1  $\mu\text{F}$  are commonly used in parallel. The bypass capacitor must be installed as close to the power terminal as possible for best results.

## 11 Layout

### 11.1 Layout Guidelines

When a PCB trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self-inductance of the trace which results in the reflection. Not all PCB traces can be straight and therefore some traces must turn corners. [Figure 9](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

### 11.2 Layout Example

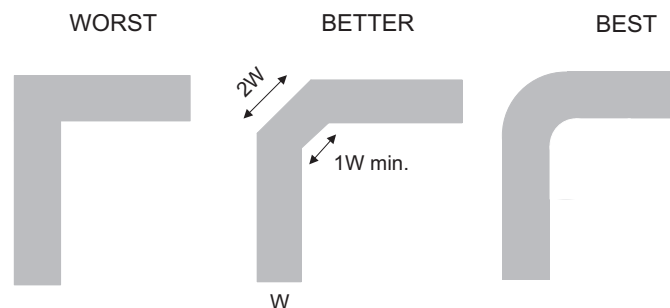


Figure 9. Trace Example

## 12 デバイスおよびドキュメントのサポート

### 12.1 ドキュメントのサポート

#### 12.1.1 関連資料

関連資料については、以下を参照してください:

- 『低速またはフローティングCMOS入力の影響』、SCBA004
- 『標準ロジック・データシートの理解と解釈』、SZZA036
- 『クロック使用デバイスの電源オン時の動作』、SCHA005

### 12.2 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、[ti.com](http://ti.com)のデバイス製品フォルダを開いてください。右上の隅にある「通知を受け取る」をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取れます。変更の詳細については、修正されたドキュメントに含まれている改訂履歴をご覧ください。

### 12.3 コミュニティ・リソース

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

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**設計サポート** *TIの設計サポート* 役に立つE2Eフォーラムや、設計サポート・ツールをすばやく見つけることができます。技術サポート用の連絡先情報も参照できます。

### 12.4 商標

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### 12.6 Glossary

**SLYZ022** — *TI Glossary*.

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

## 13 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。これらの情報は、指定のデバイスに対して提供されている最新のデータです。このデータは予告なく変更されることがあり、ドキュメントが改訂される場合もあります。このデータシートのブラウザ対応版については、左側にあるナビゲーションを参照してください。

**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)
<a href="#">SN74LVC1G79DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(C795, C79F, C79J, C79R)
SN74LVC1G79DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C795, C79F, C79J, C79R)
SN74LVC1G79DBVR.B	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C795, C79F, C79J, C79R)
<a href="#">SN74LVC1G79DBVT</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(C795, C79F, C79J, C79R)
SN74LVC1G79DBVT.B	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C795, C79F, C79J, C79R)
<a href="#">SN74LVC1G79DBVTG4</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C79F
SN74LVC1G79DBVTG4.B	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C79F
<a href="#">SN74LVC1G79DCKR</a>	Active	Production	SC70 (DCK)   5	3000   LARGE T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(CR5, CRF, CRJ, CR R)
SN74LVC1G79DCKR.A	Active	Production	SC70 (DCK)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(CR5, CRF, CRJ, CR R)
SN74LVC1G79DCKR.B	Active	Production	SC70 (DCK)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(CR5, CRF, CRJ, CR R)
<a href="#">SN74LVC1G79DCKRG4</a>	Active	Production	SC70 (DCK)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	CR5
SN74LVC1G79DCKRG4.B	Active	Production	SC70 (DCK)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	CR5
<a href="#">SN74LVC1G79DCKT</a>	Active	Production	SC70 (DCK)   5	250   SMALL T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(CR5, CRF, CRJ, CR R)
SN74LVC1G79DCKT.B	Active	Production	SC70 (DCK)   5	250   SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(CR5, CRF, CRJ, CR R)
<a href="#">SN74LVC1G79DCKTG4</a>	Active	Production	SC70 (DCK)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	CR5
SN74LVC1G79DCKTG4.B	Active	Production	SC70 (DCK)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	CR5
<a href="#">SN74LVC1G79DRLR</a>	Active	Production	SOT-5X3 (DRL)   5	4000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	(CR7, CRR)
SN74LVC1G79DRLR.A	Active	Production	SOT-5X3 (DRL)   5	4000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	(CR7, CRR)
SN74LVC1G79DRLR.B	Active	Production	SOT-5X3 (DRL)   5	4000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	(CR7, CRR)
<a href="#">SN74LVC1G79YZPR</a>	Active	Production	DSBGA (YZP)   5	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	(CR7, CRN)
SN74LVC1G79YZPR.B	Active	Production	DSBGA (YZP)   5	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	(CR7, CRN)

(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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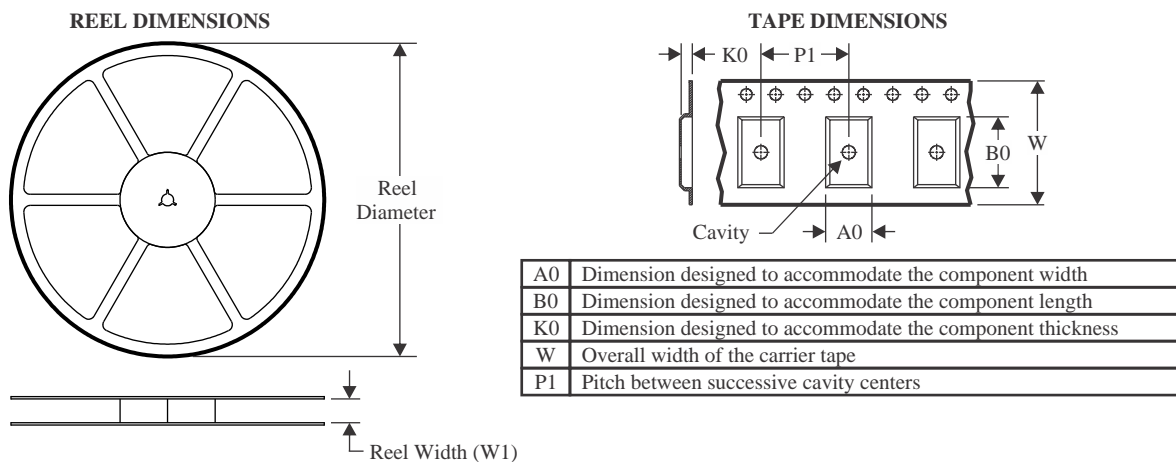
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF SN74LVC1G79 :

- Automotive : [SN74LVC1G79-Q1](#)
- Enhanced Product : [SN74LVC1G79-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**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

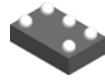
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC1G79DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G79DBVT	SOT-23	DBV	5	250	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G79DBVT	SOT-23	DBV	5	250	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G79DBVTG4	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74LVC1G79DCKR	SC70	DCK	5	3000	178.0	8.4	2.25	2.45	1.2	4.0	8.0	Q3
SN74LVC1G79DCKRG4	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74LVC1G79DCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.5	1.2	4.0	8.0	Q3
SN74LVC1G79DCKTG4	SC70	DCK	5	250	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74LVC1G79DRLR	SOT-5X3	DRL	5	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
SN74LVC1G79YZPR	DSBGA	YZP	5	3000	178.0	9.2	1.02	1.52	0.63	4.0	8.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G79DBVR	SOT-23	DBV	5	3000	210.0	185.0	35.0
SN74LVC1G79DBVT	SOT-23	DBV	5	250	210.0	185.0	35.0
SN74LVC1G79DBVT	SOT-23	DBV	5	250	210.0	185.0	35.0
SN74LVC1G79DBVTG4	SOT-23	DBV	5	250	180.0	180.0	18.0
SN74LVC1G79DCKR	SC70	DCK	5	3000	208.0	191.0	35.0
SN74LVC1G79DCKRG4	SC70	DCK	5	3000	180.0	180.0	18.0
SN74LVC1G79DCKT	SC70	DCK	5	250	210.0	185.0	35.0
SN74LVC1G79DCKTG4	SC70	DCK	5	250	180.0	180.0	18.0
SN74LVC1G79DRLR	SOT-5X3	DRL	5	4000	202.0	201.0	28.0
SN74LVC1G79YZPR	DSBGA	YZP	5	3000	220.0	220.0	35.0

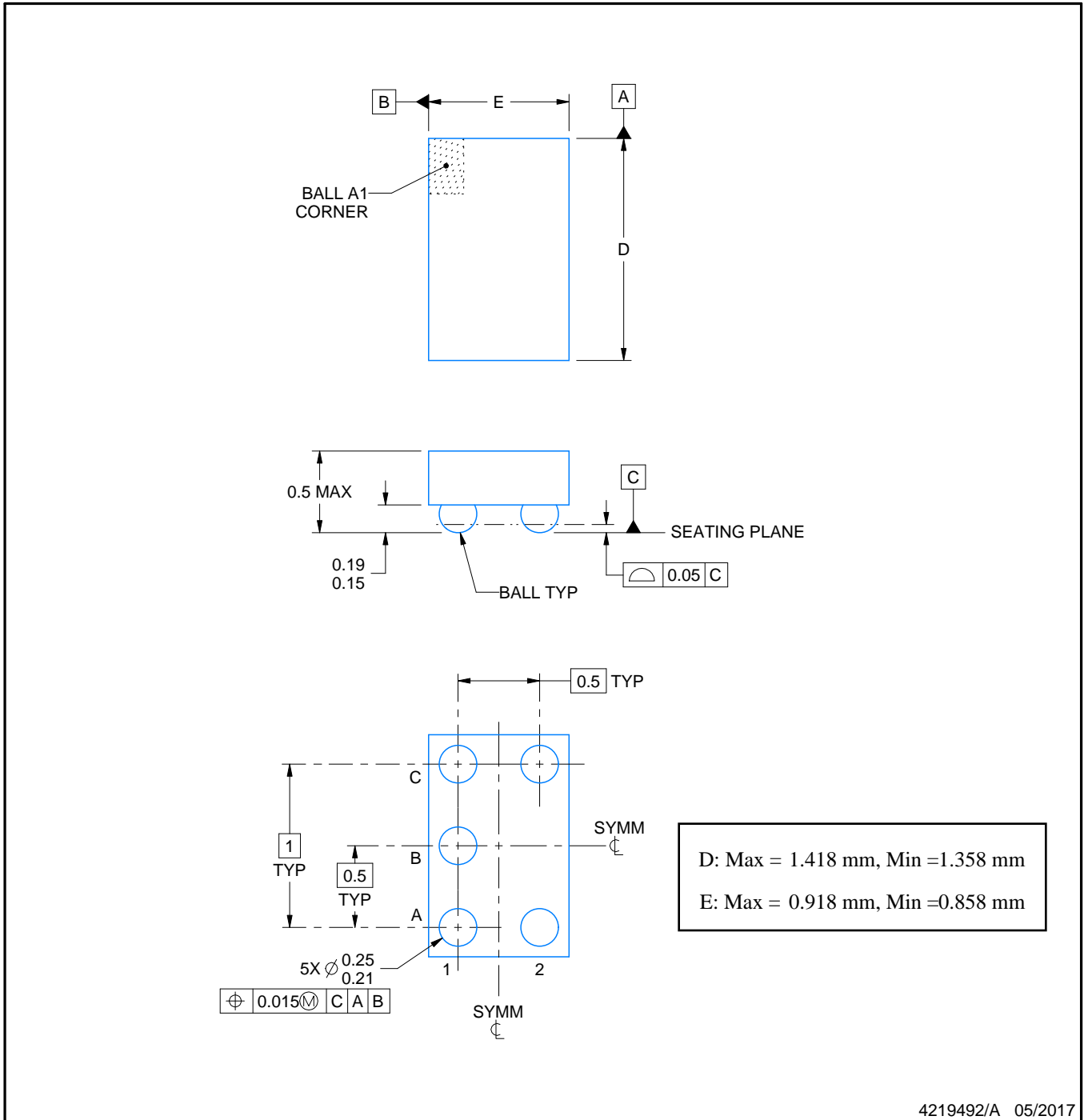
YZP0005



# PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



4219492/A 05/2017

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.

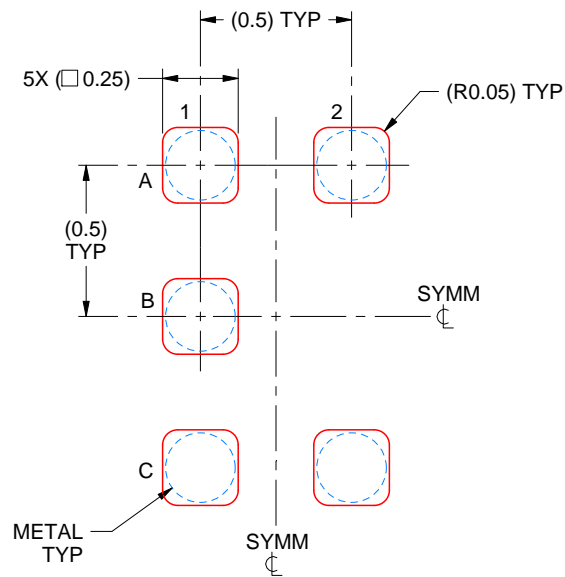


# EXAMPLE STENCIL DESIGN

YZP0005

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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

4219492/A 05/2017

NOTES: (continued)

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

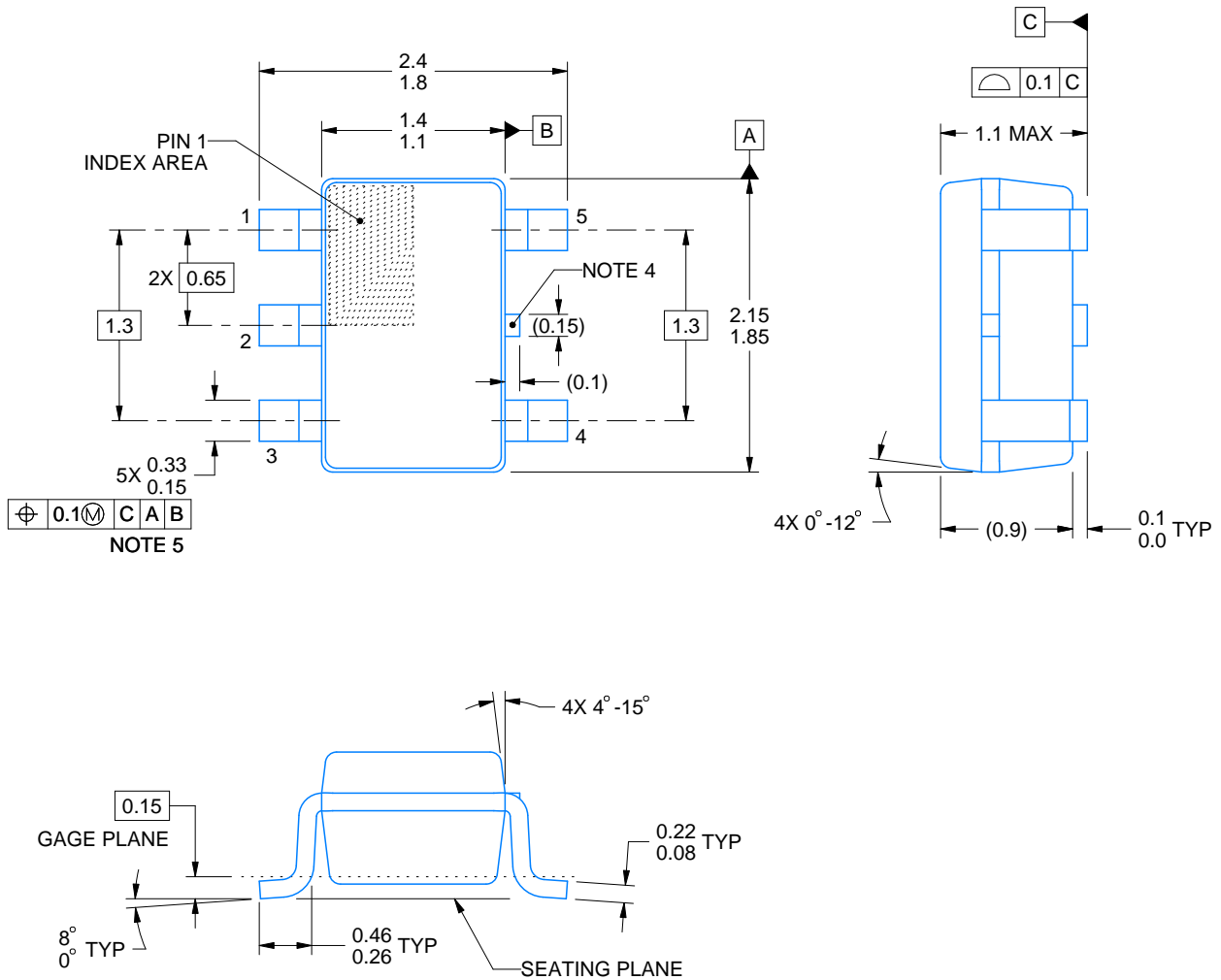
# DCK0005A



# PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214834/G 11/2024

## 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. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.
5. Lead width does not comply with JEDEC.
6. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side

# EXAMPLE BOARD LAYOUT

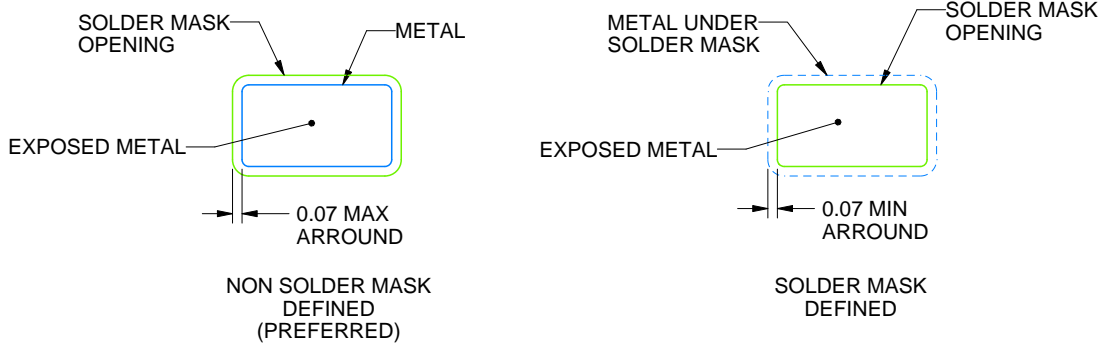
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



SOLDER MASK DETAILS

4214834/G 11/2024

NOTES: (continued)

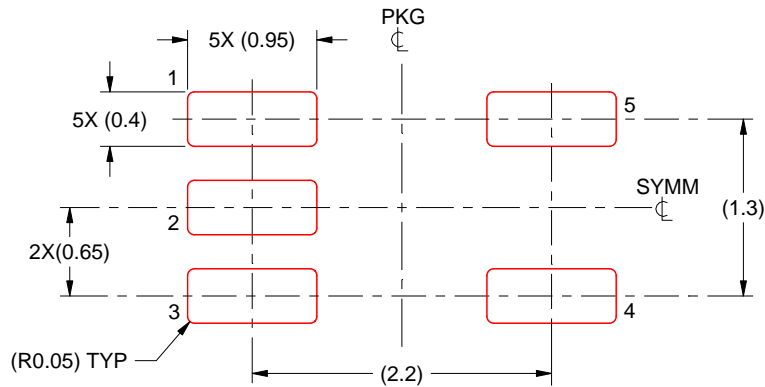
- 7. Publication IPC-7351 may have alternate designs.
- 8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE  
BASED ON 0.125 THICK STENCIL  
SCALE: 18X

4214834/G 11/2024

NOTES: (continued)

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



# EXAMPLE BOARD LAYOUT

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/K 08/2024

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.

# EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



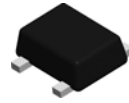
SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

4214839/K 08/2024

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.

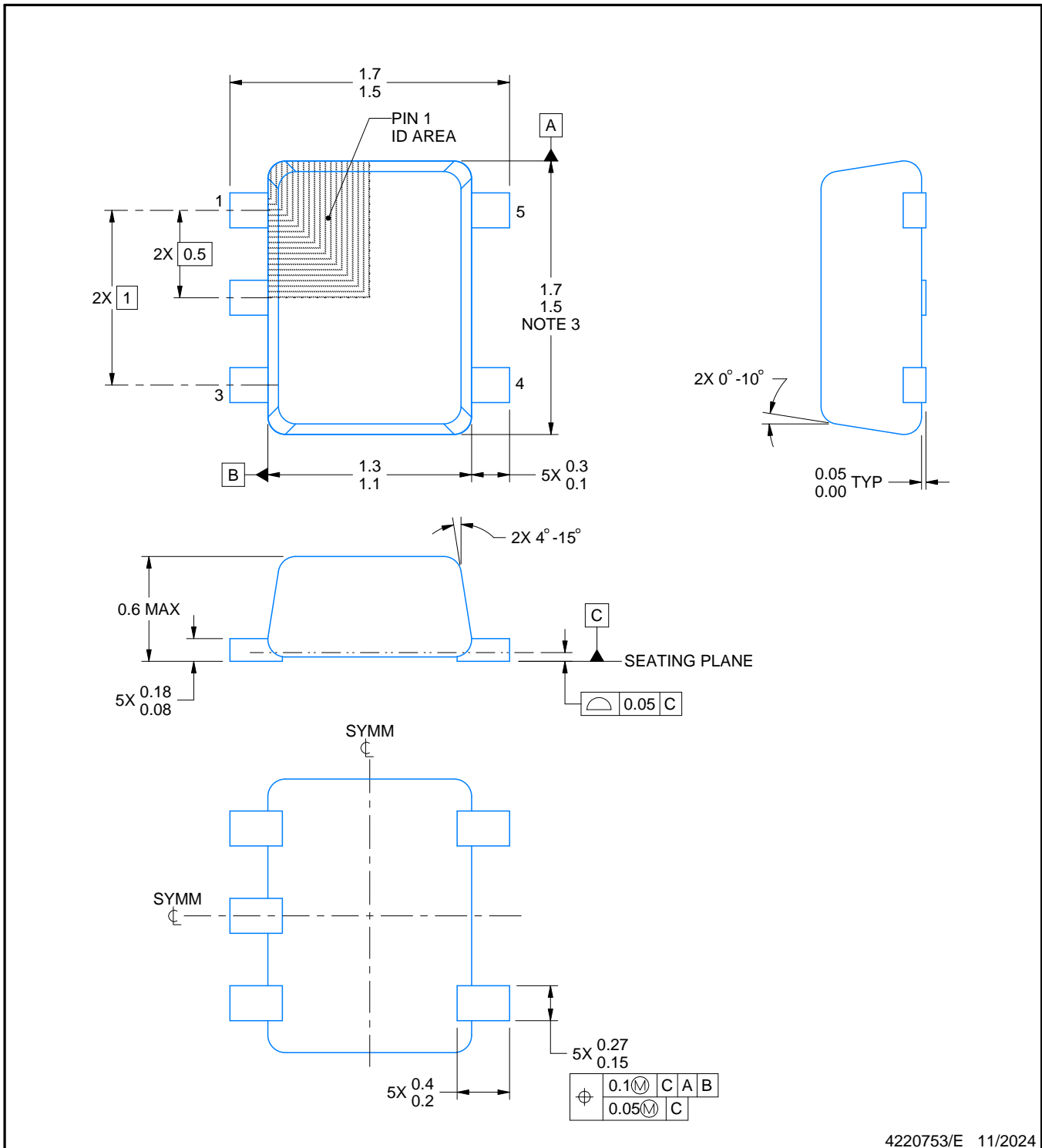
DRL0005A



# PACKAGE OUTLINE

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



4220753/E 11/2024

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-293 Variation UAAD-1

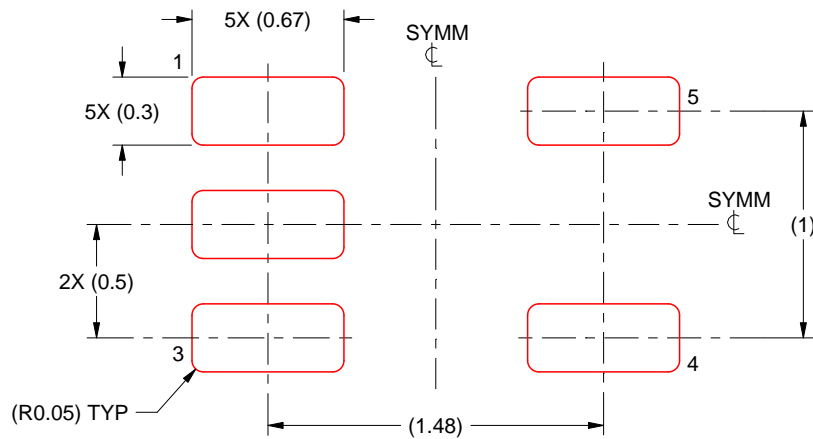


# EXAMPLE STENCIL DESIGN

DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:30X

4220753/E 11/2024

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.

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