









SN54HC273, SN74HC273 SCLS136F - DECEMBER 1982 - REVISED APRIL 2022

# SNx4HC273 Octal D-Type Flip-Flops With Clear

#### 1 Features

- Wide operating voltage range of 2 V to 6 V
- Outputs can drive up to 10 LSTTL loads
- Low power consumption, 80-µA maximum I<sub>CC</sub>
- Typical  $t_{pd}$  = 12 ns
- ±4-mA output drive at 5 V
- Low input current of 1-µA maximum
- Contain eight flip-flops with single-rail outputs
- Direct clear input
- Individual data input to each flip-flop
- On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

### 2 Applications

- Buffer or storage registers
- Shift registers
- Pattern generators

### 3 Description

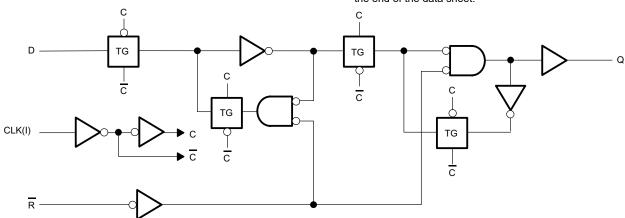
The SNx4HC273 devices are positive-edge-triggered D-type flip-flops with a direct active low clear (  $\overline{\text{CLR}}$ ) input.

Information at the data (D) inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock (CLK) pulse. Clock triggering occurs at a particular voltage level and is not related directly to the transition time of the positive-going pulse. When CLK is at either the high or low level, the D input has no effect at the output.

#### Device Information<sup>(1)</sup>

PART NUMBER	PACKAGE (PINS)	BODY SIZE (NOM)
SN54HC273J	CDIP (20)	24.20 mm × 6.92 mm
SN54HC273W	CFP (20)	13.09 mm × 6.92 mm
SN54HC273FK	LCCC (20)	8.89 mm × 8.89 mm
SN74HC273D	SOIC (20)	12.80 mm × 7.50 mm
SN74HC273DB	SSOP (20)	7.20 mm × 5.30 mm
SN74HC273NS	SO (20)	12.60 mm × 5.30 mm
SN74HC273N	PDIP (20)	24.33 mm × 6.35 mm
SN74HC273PW	TSSOP (20)	6.50 mm × 4.40 mm

For all available packages, see the orderable addendum at the end of the data sheet.



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**Functional Block Diagram** 



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1 Pavision History		

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

### Changes from Revision E (August 2003) to Revision F (April 2022) **Page** Updated the ESD ratings table to fit modern standards......4 Changed package thermal impedance, R<sub>6.IA</sub>, values from: 90.3 to: 122.7 (DB), from: 77.4 to: 109.1 (DW), Updated Power Supply Recommendations and Layout Guidelines sections to include current TI terminology... 14

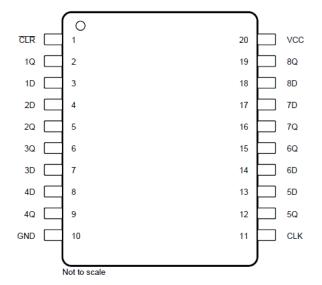
### Changes from Revision D (December 1982) to Revision E (July 2016)

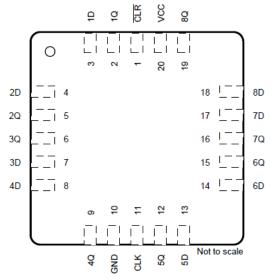
Page

- Added Device Information table, ESD Ratings table, Feature Description section, Device Functional Modes, Application and Implementation section, Power Supply Recommendations section, Layout section, Device and Documentation Support section, and Mechanical, Packaging, and Orderable Information section............1



### **5 Pin Configuration and Functions**





J, W, DB, DW N, NS, or PW Package, 20-Pin CDIP, CFP, SSOP, SOIC, SO, PDIP, or TSSOP (Top View)

FK Package, 20-Pin LCCC (Top View)

**Table 5-1. Pin Functions** 

PIN		TYPE <sup>(1)</sup>	DESCRIPTION
NO.	NAME	ITPE\'	DESCRIPTION
1	CLR	I	Active low clear input
2	1Q	0	Output 1
3	1D	I	Input 1
4	2D	I	Input 2
5	2Q	0	Output 2
6	3Q	0	Output 3
7	3D	I	Input 3
8	4D	I	Input 4
9	4Q	0	Output 4
10	GND	_	Ground
11	CLK	I	Clock input
12	5Q	0	Output 5
13	5D	I	Input 5
14	6D	I	Input 6
15	6Q	0	Output 6
16	7Q	0	Output 7
17	7D	I	Input 7
18	8D	I	Input 8
19	8Q	0	Output 8
20	V <sub>CC</sub>	_	Power

<sup>(1)</sup> Signal Types: I = Input, O = Output, I/O = Input or Output.



### **6 Specifications**

### 6.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage		-0.5	7	V
I <sub>IK</sub>	Input clamp current <sup>(2)</sup>	$V_I < 0$ or $V_I > V_{CC}$		±20	mA
I <sub>OK</sub>	Output clamp current <sup>(2)</sup>	$V_O < 0$ or $V_O > V_{CC}$		±20	mA
Io	Continuous output current	V <sub>O</sub> = 0 to V <sub>CC</sub>		±25	mA
	Continuous current through V <sub>CC</sub> or GND			±50	mA
T <sub>J</sub>	Junction temperature			150	°C
T <sub>stg</sub>	Storage temperature		-65	150	°C

<sup>(1)</sup> 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.

### 6.2 ESD Ratings - SN74HC273

			VALUE	UNIT
V Floretus etatis disabanna	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)</sup>	±2000	V
V <sub>(ESD)</sub>	Liectiostatic discharge	Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002 <sup>(2)</sup>	±500	"

<sup>(1)</sup> JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500-V HBM is possible with the necessary precautions.

### **6.3 Recommended Operating Conditions**

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

			MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage		2	5	6	V
		V <sub>CC</sub> = 2 V	1.5			
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 4.5 V	3.15			V
		V <sub>CC</sub> = 6 V	4.2			
V <sub>IL</sub>		V <sub>CC</sub> = 2 V			0.5	
	Low-level input voltage	V <sub>CC</sub> = 4.5 V			1.35	V
		V <sub>CC</sub> = 6 V			1.8	
VI	Input voltage		0		V <sub>CC</sub>	V
Vo	Output voltage		0		V <sub>CC</sub>	V
		V <sub>CC</sub> = 2 V			1000	
Δt/Δν	Input transition rise and fall time	V <sub>CC</sub> = 4.5 V			500	ns
		V <sub>CC</sub> = 6 V			400	
_	Operating free air temperature	SN54HC273	-55		125	°C
T <sub>A</sub>	Operating free-air temperature	SN74HC273	-40		85	C

<sup>(1)</sup> All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs.

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<sup>(2)</sup> The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

<sup>(2)</sup> JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250-V CDM is possible with the necessary precautions.

### **6.4 Thermal Information**

			SN74HC273				
	THERMAL METRIC	DW (SOIC)	DB (SSOP)	N (PDIP)	NS (SO)	PW (TSSOP)	
		20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance <sup>(1)</sup>	109.1	122.7	84.6	113.4	131.8	°C/W
R <sub>θJC (top)</sub>	Junction-to-case (top) thermal resistance	76	81.6	72.5	78.6	72.2	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	77.6	77.5	65.3	78.4	82.8	°C/W
$\Psi_{JT}$	Junction-to-top characterization parameter	51.5	46.1	55.3	47.1	21.5	°C/W
$\Psi_{JB}$	Junction-to-board characterization parameter	77.1	77.1	65.2	78.1	82.4	°C/W
R <sub>0</sub> JC(bot)	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	N/A	N/A	°C/W

<sup>(1)</sup> For more information about traditional and new thermal metrics, see Semiconductor and IC Package Thermal Metrics.

### 6.5 Electrical Characteristics

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

PARAMETER	,	TEST CONDITIONS				MAX	UNIT
			V <sub>CC</sub> = 2 V	1.9	1.998		
		I <sub>OH</sub> = -20 μA	V <sub>CC</sub> = 4.5 V	4.4	4.499		
V <sub>OH</sub>	$V_I = V_{IH}$ or $V_{IL}$		V <sub>CC</sub> = 6 V	5.9	5.999		V
		$I_{OH} = -4 \text{ mA}, V_{CC} = 4.5 \text{ V}$		3.98	4.3		
		$I_{OH} = -5.2 \text{ mA}, V_{CC} = 6 \text{ V}$		5.48	5.8		
		I <sub>OL</sub> = 20 μA	V <sub>CC</sub> = 2 V		0.002	0.1	
			V <sub>CC</sub> = 4.5 V		0.001	0.1	
V <sub>OL</sub>	$V_I = V_{IH}$ or $V_{IL}$		V <sub>CC</sub> = 6 V		0.001	0.1	V
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = 4.5 V			0.17	0.26	
		I <sub>OL</sub> = 5.2 mA, V <sub>CC</sub> = 6 V			0.15	0.26	
I <sub>1</sub>	$V_I = V_{CC}$ or 0, $V_{CC} = 6 V$	$V_1 = V_{CC}$ or 0, $V_{CC} = 6 V$			±0.1	±100	nA
Icc	$V_{I} = V_{CC}$ or 0, $I_{O} = 0$ , $V_{CC} = 6$ V					8	μA
C <sub>i</sub>	V <sub>CC</sub> = 2 V to 6 V				3	10	pF

### 6.6 Electrical Characteristics - SN54HC273

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

PARAMETER		TEST CONDITIONS	·	MIN	TYP	MAX	UNIT
V <sub>OH</sub>			V <sub>CC</sub> = 2 V	1.9			
		I <sub>OH</sub> = -20 μA	V <sub>CC</sub> = 4.5 V	4.4			
	$V_I = V_{IH}$ or $V_{IL}$		V <sub>CC</sub> = 6 V	5.9			V
		I <sub>OH</sub> = -4 mA, V <sub>CC</sub> = 4.5 V	·	3.7			
		I <sub>OH</sub> = -5.2 mA, V <sub>CC</sub> = 6 V		5.2			
			V <sub>CC</sub> = 2 V			0.1	
		I <sub>OL</sub> = 20 μA	V <sub>CC</sub> = 4.5 V			0.1	
V <sub>OL</sub>	$V_I = V_{IH}$ or $V_{IL}$	V <sub>CC</sub> = 6 V				0.1	V
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = 4.5 V				0.4	
		I <sub>OL</sub> = 5.2 mA, V <sub>CC</sub> = V				0.4	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, V <sub>CC</sub> = 6 V			±	1000	nA	
Icc	$V_{I} = V_{CC} \text{ or } 0, I_{O} = 0, V_{CC} = 0$	= 6 V				160	μΑ



### 6.6 Electrical Characteristics - SN54HC273 (continued)

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
C <sub>i</sub>	V <sub>CC</sub> = 2 V to 6 V			10	pF

#### 6.7 Electrical Characteristics - SN74HC273

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

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
			V <sub>CC</sub> = 2 V	1.9			
		I <sub>OH</sub> = -20 μA	V <sub>CC</sub> = 4.5 V	4.4			
V <sub>OH</sub>	$V_I = V_{IH}$ or $V_{IL}$		V <sub>CC</sub> = 6 V	5.9			V
		$I_{OH} = -4 \text{ mA}, V_{CC} = 4.5$	V	3.84			
		$I_{OH} = -5.2 \text{ mA}, V_{CC} = 6$	V	5.34			
			V <sub>CC</sub> = 2 V			0.1	
	$V_{I} = V_{IH}$ or $V_{IL}$		V <sub>CC</sub> = 4.5 V			0.1	
V <sub>OL</sub>			V <sub>CC</sub> = 6 V			0.1	V
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = 4.5 V	,			0.33	
		I <sub>OL</sub> = 5.2 mA, V <sub>CC</sub> = 6 V				0.33	
l <sub>l</sub>	$V_I = V_{CC}$ or 0, $V_{CC} = 6$	= V <sub>CC</sub> or 0, V <sub>CC</sub> = 6 V				±1000	nA
Icc	$V_{I} = V_{CC} \text{ or } 0, I_{O} = 0, V_{CC}$	/ <sub>CC</sub> = 6 V				80	μA
Ci	V <sub>CC</sub> = 2 V to 6 V					10	pF

### 6.8 Timing Requirements

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

	·			MIN MA	XX UNIT
			V <sub>CC</sub> = 2 V		5
f <sub>clock</sub>	Clock frequency		V <sub>CC</sub> = 4.5 V		27 MHz
			V <sub>CC</sub> = 6 V		32
			V <sub>CC</sub> = 2 V	80	
t <sub>w</sub> Pul:		CLR low	V <sub>CC</sub> = 4.5 V	16	
	Pulse duration		V <sub>CC</sub> = 6 V	14	no
	Puise duration	CLK high or low	V <sub>CC</sub> = 2 V	80	ns
			V <sub>CC</sub> = 4.5 V	16	
			V <sub>CC</sub> = 6 V	14	
			V <sub>CC</sub> = 2 V	100	
		Data	V <sub>CC</sub> = 4.5 V	20	
	Satura tima hafara CLKA		V <sub>CC</sub> = 6 V	17	ns
t <sub>su</sub>	Setup time before CLK↑		V <sub>CC</sub> = 2 V	100	115
		CLR inactive	V <sub>CC</sub> = 4.5 V	20	
			V <sub>CC</sub> = 6 V	17	
			V <sub>CC</sub> = 2 V	0	
t <sub>h</sub>	Hold time, data after CLK↑		V <sub>CC</sub> = 4.5 V	0	ns
			V <sub>CC</sub> = 6 V	0	



### 6.9 Timing Requirements – SN54HC273

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

				MIN MAX	UNIT		
			V <sub>CC</sub> = 2 V	4	1		
f <sub>clock</sub>	Clock frequency	Clock frequency		18	B MHz		
			V <sub>CC</sub> = 6 V	2.	I		
			V <sub>CC</sub> = 2 V	120			
		CLR low	V <sub>CC</sub> = 4.5 V	24			
	Pulse duration		V <sub>CC</sub> = 6 V	20	200		
t <sub>w</sub>	Puise duration	CLK high or low	V <sub>CC</sub> = 2 V	120	ns		
			V <sub>CC</sub> = 4.5 V	24			
			V <sub>CC</sub> = 6 V	20			
					V <sub>CC</sub> = 2 V	150	
		Data	V <sub>CC</sub> = 4.5 V	30			
	Setup time before CLK↑		V <sub>CC</sub> = 6 V	25	ns		
t <sub>su</sub>	Setup time before CLK		V <sub>CC</sub> = 2 V	150	115		
		CLR inactive	V <sub>CC</sub> = 4.5 V	30			
			V <sub>CC</sub> = 6 V	25			
			V <sub>CC</sub> = 2 V	0			
t <sub>h</sub>	Hold time, data after CLK↑		V <sub>CC</sub> = 4.5 V	0	ns		
			V <sub>CC</sub> = 6 V	0			

### 6.10 Timing Requirements – SN74HC273

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

	- '	1 3 (	·	MIN MA	K UNIT
			V <sub>CC</sub> = 2 V		4
f <sub>clock</sub>	Clock frequency		V <sub>CC</sub> = 4.5 V	2	1 MHz
			V <sub>CC</sub> = 6 V	2	5
			V <sub>CC</sub> = 2 V	100	
	t <sub>w</sub> Pulse duration	CLR low	V <sub>CC</sub> = 4.5 V	20	
4			V <sub>CC</sub> = 6 V	17	ns
ι <sub>W</sub>		CLK high or low	V <sub>CC</sub> = 2 V	100	115
			V <sub>CC</sub> = 4.5 V	20	
			V <sub>CC</sub> = 6 V	17	
			V <sub>CC</sub> = 2 V	125	
		Data	V <sub>CC</sub> = 4.5 V	25	
4	Satura tima hafara CLIKA		V <sub>CC</sub> = 6 V	21	ns
t <sub>su</sub>	Setup time before CLK↑		V <sub>CC</sub> = 2 V	125	115
		CLR inactive	V <sub>CC</sub> = 4.5 V	25	
			V <sub>CC</sub> = 6 V	21	
			V <sub>CC</sub> = 2 V	0	
t <sub>h</sub>	Hold time, data after CLK↑		V <sub>CC</sub> = 4.5 V	0	ns
			V <sub>CC</sub> = 6 V	0	



### **6.11 Switching Characteristics**

 $T_A = 25$ °C and  $C_L = 50$  pF (unless otherwise noted; see Figure 7-1)

PARAMETER	TEST CONDIT	IONS	MIN	TYP	MAX	UNIT
		V <sub>CC</sub> = 2 V	5	11		
f <sub>max</sub>		V <sub>CC</sub> = 4.5 V	27	50		MHz
		V <sub>CC</sub> = 6 V	32	60		
		V <sub>CC</sub> = 2 V		55	160	
t <sub>PHL</sub>	From CLR (input) to any (output)	V <sub>CC</sub> = 4.5 V		15	32	ns
		V <sub>CC</sub> = 6 V		12	27	
		V <sub>CC</sub> = 2 V		56	160	
t <sub>pd</sub>	From CLK (input) to any (output)	V <sub>CC</sub> = 4.5 V		15	32	ns
		V <sub>CC</sub> = 6 V		13	27	
t <sub>t</sub>	To any (output)	V <sub>CC</sub> = 2 V		38	75	
		V <sub>CC</sub> = 4.5 V		8	15	ns
		V <sub>CC</sub> = 6 V		6	13	

### 6.12 Switching Characteristics - SN54HC273

over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted; see Figure 7-1)

PARAMETER	TEST COND	MIN	MAX	UNIT	
		V <sub>CC</sub> = 2 V	4		
$f_{\text{max}}$		V <sub>CC</sub> = 4.5 V	18		MHz
		V <sub>CC</sub> = 6 V	21		
		V <sub>CC</sub> = 2 V		240	
t <sub>PHL</sub>	From CLR (input) to any (output)	V <sub>CC</sub> = 4.5 V		48	ns
		V <sub>CC</sub> = 6 V		41	
		V <sub>CC</sub> = 2 V		240	
t <sub>pd</sub>	From CLK (input) to any (output)	V <sub>CC</sub> = 4.5 V		48	ns
		V <sub>CC</sub> = 6 V		41	
t <sub>t</sub>		V <sub>CC</sub> = 2 V		110	
	To any (output)	V <sub>CC</sub> = 4.5 V		22	ns
		V <sub>CC</sub> = 6 V		19	

### 6.13 Switching Characteristics - SN74HC273

over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted; see Figure 7-1)

PARAMETER	TEST CONDITIONS		MIN	MAX	UNIT
		V <sub>CC</sub> = 2 V	4		
f <sub>max</sub>		V <sub>CC</sub> = 4.5 V	21		MHz
		V <sub>CC</sub> = 6 V	25		
		V <sub>CC</sub> = 2 V		200	
t <sub>PHL</sub>	From CLR (input) to any (output)	V <sub>CC</sub> = 4.5 V		40	ns
		V <sub>CC</sub> = 6 V		34	
		V <sub>CC</sub> = 2 V		200	
t <sub>pd</sub>		V <sub>CC</sub> = 4.5 V		40	ns
		V <sub>CC</sub> = 6 V		34	



### 6.13 Switching Characteristics - SN74HC273 (continued)

over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted; see Figure 7-1)

PARAMETER	TEST CONDITIONS	MIN MAX	UNIT	
		V <sub>CC</sub> = 2 V	95	
t <sub>t</sub>	To any (output)	V <sub>CC</sub> = 4.5 V	19	ns
		V <sub>CC</sub> = 6 V	16	1

### **6.14 Operating Characteristics**

T<sub>A</sub> = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance per flip-flop	No load	35	pF

# **6.15 Typical Characteristics**

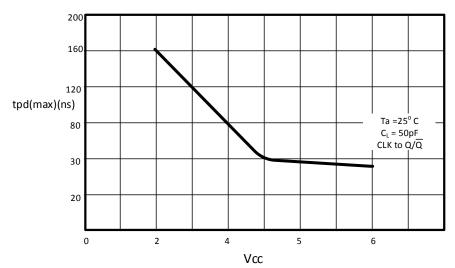
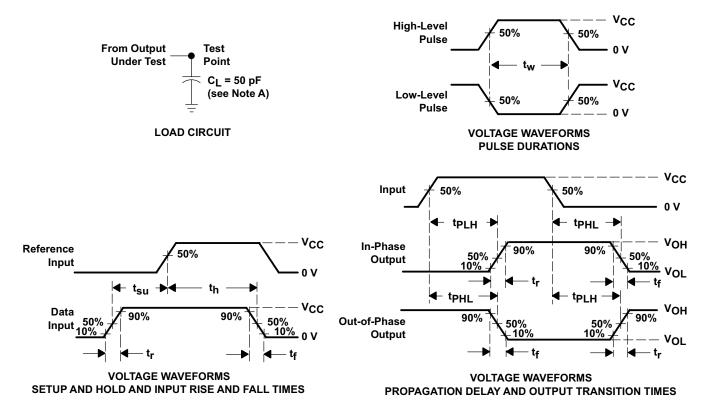


Figure 6-1. Max  $t_{pd}$  vs  $V_{CC}$ 



#### 7 Parameter Measurement Information



NOTES: A. C<sub>L</sub> includes probe and test-fixture capacitance.

- B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O = 50 \ \Omega$ ,  $t_\Gamma = 6 \ ns$ ,  $t_f = 6 \ ns$ .
- C. For clock inputs,  $f_{\mbox{max}}$  is measured when the input duty cycle is 50%.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. tpLH and tpHL are the same as tpd.

Figure 7-1. Load Circuit and Voltage Waveforms

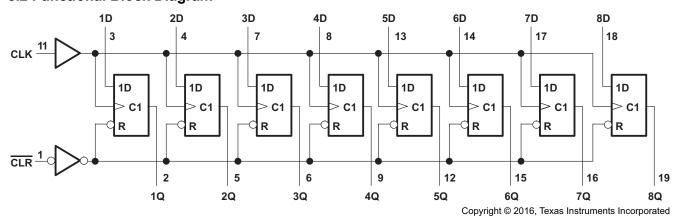


### **8 Detailed Description**

### 8.1 Overview

The SNx4HC273 contains eight flip-flops with single-rail outputs with individual data input to each flip-flop. The outputs can drive up to 10 LSTTL loads. The device has direct active low clear input.

### 8.2 Functional Block Diagram



### **8.3 Feature Description**

The SNx4HC273 has low power consumption with a maximum  $_{CC}$  of 80  $\mu A$ .

The typical  $t_{pd}$  for the SNx4HC273 is 12 ns and the output drive is ±4 mA at 5 V.

The SNx4HC273 also has very low input current, with the maximum set at 1 µA.

#### 8.4 Device Functional Modes

Table 8-1 lists the functional modes of the SNx4HC273.

Table 8-1. Function Table (Each Flip-Flop)

	OUTPUT		
CLR	CLK	D	Q
L	Х	Х	L
Н	1	Н	Н
Н	1	L	L
Н	L	Х	$Q_0$

### 9 Application and Implementation

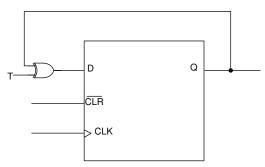
#### Note

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, as well as validating and testing their design implementation to confirm system functionality.

### 9.1 Application Information

The SNx4HC273 is octal D Flip flop with active low clear input. It has low input current and low power consumption. The D flip-flop can be used as a Toggle flip flop using an XOR gate at the input. The output toggles from the previous state whenever the T input is high.

### 9.2 Typical Application



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#### 9.2.1 Design Requirements

This SNx4Hc273 device uses CMOS technology and has balanced output drive.

### 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*.
  - Specified high and low levels: see (V<sub>IH</sub> and V<sub>IL</sub>) in *Recommended Operating Conditions*.
  - Inputs are not overvoltage tolerant and must not be above any valid V<sub>CC</sub> as per Recommended Operating
    Conditions.
- 2. Absolute maximum output conditions:
  - Continuos output currents must not exceed (I<sub>O</sub> max) per output and must not exceed total current
     (continuous current through V<sub>CC</sub> or GND) for the part. These limits are located in the Absolute Maximum
     Ratings.
  - Outputs must not be pulled above V<sub>CC</sub>.



### 9.2.3 Application Curve

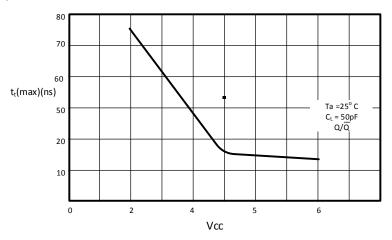


Figure 9-1. Maximum Transition Time vs  $V_{\text{CC}}$ 

### 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*. Each V<sub>CC</sub> terminal should have a good bypass capacitor to prevent power disturbance. A 0.1-µF capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1-µF and 1-µF 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-input and multiple-channel logic devices inputs must not ever be left floating. 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 unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or VCC, whichever makes more sense for the logic function or is more convenient.

### 11.2 Layout Example



Figure 11-1. SNx4HC273 Layout



## 12 Device and Documentation Support

### **12.1 Documentation Support**

#### 12.1.1 Related Documentation

For related documentation, see the following:

Texas Instruments, Implications of Slow or Floating CMOS Inputs application report

#### 12.2 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 12-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN54HC273	Click here	Click here	Click here	Click here	Click here
SN74HC273	Click here	Click here	Click here	Click here	Click here

### 12.3 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 12.4 Support Resources

TI E2E<sup>™</sup> support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is 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.

#### 12.5 Trademarks

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#### 12.6 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.

#### 12.7 Glossary

TI Glossary

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

#### 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 part number	Status (1)	Material type	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
5962-8409901VRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8409901VR A SNV54HC273J
5962-8409901VRA.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8409901VR A SNV54HC273J
5962-8409901VSA	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8409901VS A SNV54HC273W
5962-8409901VSA.A	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8409901VS A SNV54HC273W
84099012A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84099012A SNJ54HC 273FK
8409901RA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901RA SNJ54HC273J
8409901SA	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901SA SNJ54HC273W
JM38510/65601BRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BRA
JM38510/65601BRA.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BRA
JM38510/65601BSA	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BSA
JM38510/65601BSA.A	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BSA
M38510/65601BRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BRA
M38510/65601BSA	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65601BSA
SN54HC273J	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC273J
SN54HC273J.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC273J
SN74HC273DBR	Active	Production	SSOP (DB)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273





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Orderable part number	Status (1)	Material type	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
SN74HC273DBR.A	Active	Production	SSOP (DB)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273DW	Obsolete	Production	SOIC (DW)   20	-	-	Call TI	Call TI	-40 to 85	HC273
SN74HC273DWR	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273DWR.A	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273DWRE4	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273DWRG4	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273DWRG4.A	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273N	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC273N
SN74HC273N.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC273N
SN74HC273NE4	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC273N
SN74HC273NSR	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273NSR.A	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273PW	Obsolete	Production	TSSOP (PW)   20	-	-	Call TI	Call TI	-40 to 85	HC273
SN74HC273PWR	Active	Production	TSSOP (PW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273PWR.A	Active	Production	TSSOP (PW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273PWRG4	Active	Production	TSSOP (PW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC273
SN74HC273PWT	Obsolete	Production	TSSOP (PW)   20	-	-	Call TI	Call TI	-40 to 85	HC273
SNJ54HC273FK	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84099012A SNJ54HC 273FK
SNJ54HC273FK.A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84099012A SNJ54HC 273FK
SNJ54HC273J	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901RA SNJ54HC273J
SNJ54HC273J.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901RA SNJ54HC273J
SNJ54HC273W	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901SA SNJ54HC273W
SNJ54HC273W.A	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8409901SA SNJ54HC273W

<sup>(1)</sup> Status: For more details on status, see our product life cycle.

PACKAGE OPTION ADDENDUM

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(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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#### OTHER QUALIFIED VERSIONS OF SN54HC273, SN54HC273-SP, SN74HC273:

Catalog: SN74HC273, SN54HC273

Automotive: SN74HC273-Q1, SN74HC273-Q1

Military: SN54HC273

Space: SN54HC273-SP

NOTE: Qualified Version Definitions:



### PACKAGE OPTION ADDENDUM

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- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military QML certified for Military and Defense Applications
- Space Radiation tolerant, ceramic packaging and qualified for use in Space-based application

**PACKAGE MATERIALS INFORMATION** 

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### TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	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		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74HC273DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74HC273DWR	SOIC	DW	20	2000	330.0	24.4	10.9	13.3	2.7	12.0	24.0	Q1
SN74HC273DWRG4	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74HC273NSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74HC273PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1



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\*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)	
SN74HC273DBR	SSOP	DB	20	2000	353.0	353.0	32.0	
SN74HC273DWR	SOIC	DW	20	2000	356.0	356.0	45.0	
SN74HC273DWRG4	SOIC	DW	20	2000	356.0	356.0	45.0	
SN74HC273NSR	SOP	NS	20	2000	356.0	356.0	45.0	
SN74HC273PWR	TSSOP	PW	20	2000	353.0	353.0	32.0	



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### **TUBE**



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
5962-8409901VSA	W	CFP	20	25	506.98	26.16	6220	NA
5962-8409901VSA.A	W	CFP	20	25	506.98	26.16	6220	NA
84099012A	FK	LCCC	20	55	506.98	12.06	2030	NA
8409901SA	W	CFP	20	25	506.98	26.16	6220	NA
JM38510/65601BSA	W	CFP	20	25	506.98	26.16	6220	NA
JM38510/65601BSA.A	W	CFP	20	25	506.98	26.16	6220	NA
M38510/65601BSA	W	CFP	20	25	506.98	26.16	6220	NA
SN74HC273N	N	PDIP	20	20	506	13.97	11230	4.32
SN74HC273N.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74HC273NE4	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54HC273FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC273FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC273W	W	CFP	20	25	506.98	26.16	6220	NA
SNJ54HC273W.A	W	CFP	20	25	506.98	26.16	6220	NA





#### 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-150.





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.





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.



### **MECHANICAL DATA**

### NS (R-PDSO-G\*\*)

# 14-PINS SHOWN

### PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



#### 14 LEADS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

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



**INSTRUMENTS** www.ti.com

# N (R-PDIP-T\*\*)

### PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.





SOIC



#### 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 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



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.



SOIC



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.



# W (R-GDFP-F20)

### CERAMIC DUAL FLATPACK



NOTES:

- A. All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.

  D. Index point is provided on cap for terminal identification only.

  E. Falls within Mil—Std 1835 GDFP2—F20







#### 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.





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.





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.



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Last updated 10/2025