



**THE DATASHEET OF  
SN74LVTH573DWR**

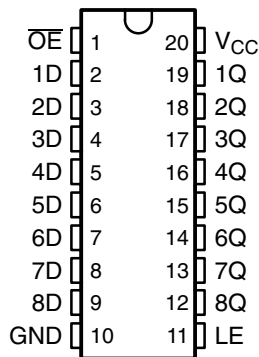


# SN54LVTH573, SN74LVTH573 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

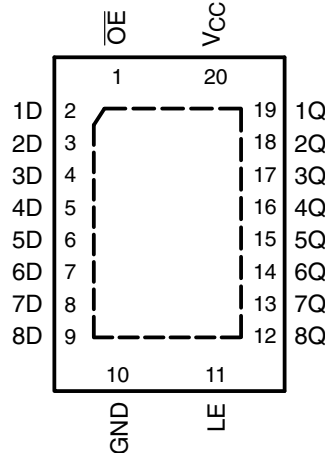
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- Support Mixed-Mode Signal Operation (5-V Input and Output Voltages With 3.3-V  $V_{CC}$ )
- Support Unregulated Battery Operation Down to 2.7 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $<0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- $I_{off}$  and Power-Up 3-State Support Hot Insertion
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Latch-Up Performance Exceeds 500 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)

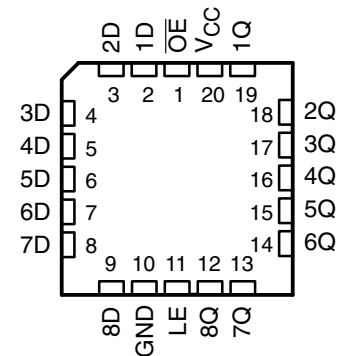
SN54LVTH573 . . . J OR W PACKAGE  
SN74LVTH573 . . . DB, DW, NS,  
OR PW PACKAGE  
(TOP VIEW)



SN74LVTH573 . . . RGY PACKAGE  
(TOP VIEW)



SN54LVTH573 . . . FK PACKAGE  
(TOP VIEW)



## description/ordering information

### ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Tape and reel	SN74LVTH573RGYR	LXH573
	SOIC – DW	Tube	SN74LVTH573DW	LVTH573
		Tape and reel	SN74LVTH573DWR	LVTH573
	SOP – NS	Tape and reel	SN74LVTH573NSR	LVTH573
	SSOP – DB	Tape and reel	SN74LVTH573DBR	LXH573
		Tube	SN74LVTH573PW	LXH573
	TSSOP – PW	Tape and reel	SN74LVTH573PWR	
		VFBGA – GQN	Tape and reel	SN74LVTH573GQNR
SN74LVTH573ZQNR				
–55°C to 125°C	CDIP – J	Tube	SNJ54LVTH573J	SNJ54LVTH573J
	CFP – W	Tube	SNJ54LVTH573W	SNJ54LVTH573W
	LCCC – FK	Tube	SNJ54LVTH573FK	SNJ54LVTH573FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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INSTRUMENTS**

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# SN54LVTH573, SN74LVTH573

## 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCBS687H – MAY 1997 – REVISED SEPTEMBER 2003

### description/ordering information (continued)

These octal latches are designed specifically for low-voltage (3.3-V)  $V_{CC}$  operation, but with the capability to provide a TTL interface to a 5-V system environment.

The eight latches of the 'LVTH573 devices are transparent D-type latches. While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the logic levels set up at the D inputs.

A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

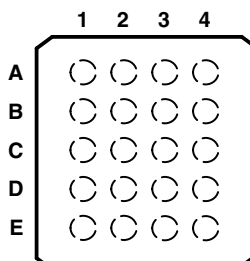
$\overline{OE}$  does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended.

These devices are fully specified for hot-insertion applications using  $I_{off}$  and power-up 3-state. The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

### SN74LVTH573 . . . GQN OR ZQN PACKAGE (TOP VIEW)



### terminal assignments

	1	2	3	4
A	1D	$\overline{OE}$	$V_{CC}$	1Q
B	3D	3Q	2D	2Q
C	5D	4D	5Q	4Q
D	7D	7Q	6D	6Q
E	GND	8D	LE	8Q

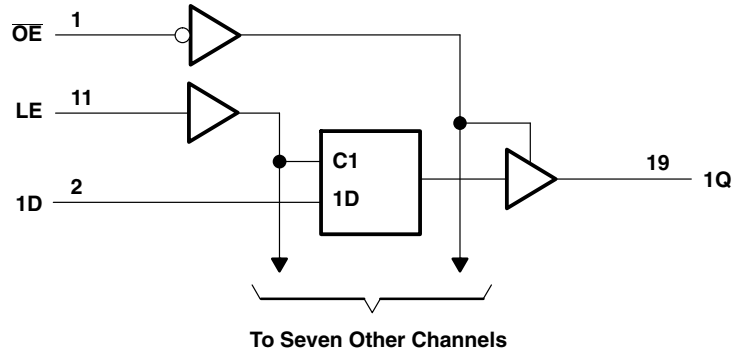
### FUNCTION TABLE (each latch)

INPUTS			OUTPUT
$\overline{OE}$	LE	D	Q
L	H	H	H
L	H	L	L
L	L	X	$Q_0$
H	X	X	Z

# SN54LVTH573, SN74LVTH573 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCBS687H – MAY 1997 – REVISED SEPTEMBER 2003

## logic diagram (positive logic)



Pin numbers shown are for the DB, DW, FK, J, NS, PW, RGY, and W packages.

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, $V_{CC}$ .....	-0.5 V to 4.6 V
Input voltage range, $V_I$ (see Note 1) .....	-0.5 V to 7 V
Voltage range applied to any output in the high-impedance or power-off state, $V_O$ (see Note 1) .....	-0.5 V to 7 V
Voltage range applied to any output in the high state, $V_O$ (see Note 1) .....	-0.5 V to $V_{CC} + 0.5$ V
Current into any output in the low state, $I_O$ : SN54LVTH573 .....	96 mA
SN74LVTH573 .....	128 mA
Current into any output in the high state, $I_O$ (see Note 2): SN54LVTH573 .....	48 mA
SN74LVTH573 .....	64 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	-50 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ ) .....	-50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 3): DB package .....	70°C/W
(see Note 3): DW package .....	58°C/W
(see Note 3): GQN/ZQN package .....	78°C/W
(see Note 3): NS package .....	60°C/W
(see Note 3): PW package .....	83°C/W
(see Note 4): RGY package .....	37°C/W
Storage temperature range, $T_{stg}$ .....	-65°C to 150°C

<sup>†</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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
 2. This current flows only when the output is in the high state and  $V_O > V_{CC}$ .  
 3. The package thermal impedance is calculated in accordance with JESD 51-7.  
 4. The package thermal impedance is calculated in accordance with JESD 51-5.



**SN54LVTH573, SN74LVTH573**  
**3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES**  
**WITH 3-STATE OUTPUTS**

SCBS687H – MAY 1997 – REVISED SEPTEMBER 2003

**recommended operating conditions (see Note 5)**

		SN54LVTH573		SN74LVTH573		UNIT
		MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage	2.7	3.6	2.7	3.6	V
V <sub>IH</sub>	High-level input voltage	2		2		V
V <sub>IL</sub>	Low-level input voltage		0.8		0.8	V
V <sub>I</sub>	Input voltage		5.5		5.5	V
I <sub>OH</sub>	High-level output current		-24		-32	mA
I <sub>OL</sub>	Low-level output current		48		64	mA
Δt/Δv	Input transition rise or fall rate	Outputs enabled		10	10	ns/V
Δt/ΔV <sub>CC</sub>	Power-up ramp rate	200		200		μs/V
T <sub>A</sub>	Operating free-air temperature	-55	125	-40	85	°C

NOTE 5: All unused control 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*, literature number SCBA004.



# SN54LVTH573, SN74LVTH573 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCBS687H – MAY 1997 – REVISED SEPTEMBER 2003

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

PARAMETER		TEST CONDITIONS		SN54LVTH573			SN74LVTH573			UNIT		
				MIN	TYP†	MAX	MIN	TYP†	MAX			
$V_{IK}$		$V_{CC} = 2.7\text{ V}$ , $I_I = -18\text{ mA}$		-1.2			-1.2			V		
$V_{OH}$		$V_{CC} = 2.7\text{ V to }3.6\text{ V}$ , $I_{OH} = -100\text{ }\mu\text{A}$		$V_{CC}-0.2$			$V_{CC}-0.2$			V		
		$V_{CC} = 2.7\text{ V}$ , $I_{OH} = -8\text{ mA}$		2.4			2.4					
		$V_{CC} = 3\text{ V}$		$I_{OH} = -24\text{ mA}$			2					
				$I_{OH} = -32\text{ mA}$			2					
$V_{OL}$		$V_{CC} = 2.7\text{ V}$		$I_{OL} = 100\text{ }\mu\text{A}$		0.2			0.2			V
				$I_{OL} = 24\text{ mA}$		0.5			0.5			
		$V_{CC} = 3\text{ V}$		$I_{OL} = 16\text{ mA}$		0.4			0.4			
				$I_{OL} = 32\text{ mA}$		0.5			0.5			
				$I_{OL} = 48\text{ mA}$		0.55						
				$I_{OL} = 64\text{ mA}$					0.55			
$I_I$		Control inputs $V_{CC} = 0\text{ or }3.6\text{ V}$ , $V_I = 5.5\text{ V}$		10			10			$\mu\text{A}$		
				$V_{CC} = 3.6\text{ V}$ , $V_I = V_{CC}\text{ or GND}$		$\pm 1$			$\pm 1$			
Data inputs		$V_{CC} = 3.6\text{ V}$		$V_I = V_{CC}$		1			1			
				$V_I = 0$		-5			-5			
$I_{off}$		$V_{CC} = 0$ , $V_I\text{ or }V_O = 0\text{ to }4.5\text{ V}$					$\pm 100$			$\mu\text{A}$		
$I_{I(\text{hold})}$		Data inputs $V_{CC} = 3\text{ V}$		$V_I = 0.8\text{ V}$		75			75			$\mu\text{A}$
				$V_I = 2\text{ V}$		-75			-75			
		$V_{CC} = 3.6\text{ V}^\ddagger$ , $V_I = 0\text{ to }3.6\text{ V}$					$\pm 500$					
$I_{OZH}$		$V_{CC} = 3.6\text{ V}$ , $V_O = 3\text{ V}$		5			5			$\mu\text{A}$		
$I_{OZL}$		$V_{CC} = 3.6\text{ V}$ , $V_O = 0.5\text{ V}$		-5			-5			$\mu\text{A}$		
$I_{OZPU}$		$V_{CC} = 0\text{ to }1.5\text{ V}$ , $V_O = 0.5\text{ V to }3\text{ V}$ , $\overline{OE} = \text{don't care}$		$\pm 100^*$			$\pm 100$			$\mu\text{A}$		
$I_{OZPD}$		$V_{CC} = 1.5\text{ V to }0$ , $V_O = 0.5\text{ V to }3\text{ V}$ , $\overline{OE} = \text{don't care}$		$\pm 100^*$			$\pm 100$			$\mu\text{A}$		
$I_{CC}$		$V_{CC} = 3.6\text{ V}$ , $I_O = 0$ , $V_I = V_{CC}\text{ or GND}$		Outputs high		0.19			0.19			mA
				Outputs low		5			5			
				Outputs disabled		0.19			0.19			
$\Delta I_{CC}^\S$		$V_{CC} = 3\text{ V to }3.6\text{ V}$ , One input at $V_{CC} - 0.6\text{ V}$ , Other inputs at $V_{CC}\text{ or GND}$		0.2			0.2			mA		
$C_i$		$V_I = 3\text{ V or }0$		3			3			pF		
$C_o$		$V_O = 3\text{ V or }0$		7			7			pF		

\*On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All typical values are at  $V_{CC} = 3.3\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

§ This is the increase in supply current for each input that is at the specified TTL voltage level, rather than  $V_{CC}$  or GND.

# SN54LVTH573, SN74LVTH573

## 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES

### WITH 3-STATE OUTPUTS

SCBS687H – MAY 1997 – REVISED SEPTEMBER 2003

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

	SN54LVTH573				SN74LVTH573				UNIT
	$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 2.7\text{ V}$		
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$t_w$ Pulse duration, LE high	3		3		3		3		ns
$t_{su}$ Setup time, data before LE↓	0.7		0.6		0.7		0.6		ns
$t_h$ Hold time, data after LE↓	1.5		1.7		1.5		1.7		ns

switching characteristics over recommended free-air temperature,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)

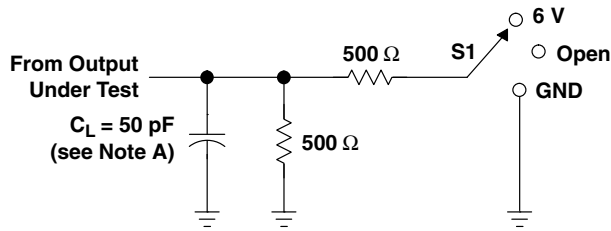
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LVTH573				SN74LVTH573				UNIT	
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			$V_{CC} = 2.7\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	TYP†	MAX	MIN		MAX
$t_{PLH}$	D	Q	1.4	4.1	4.7		1.5	2.6	3.9	4.5		ns
$t_{PHL}$			1.4	4.5	4.8		1.5	2.9	3.9	4.5		
$t_{PLH}$	LE	Q	1	4.4	5.4		1.9	2.9	4.2	4.9		ns
$t_{PHL}$			1.4	4.4	5.1		1.9	2.9	4.2	4.9		
$t_{PZH}$	$\overline{OE}$	Q	1.4	5.2	6.2		1.5	3.2	5.1	5.9		ns
$t_{PZL}$			1.4	5.2	6.2		1.5	3.9	5.1	5.9		
$t_{PHZ}$	$\overline{OE}$	Q	1.2	5.4	5.7		2	3.5	4.9	5.5		ns
$t_{PLZ}$			1	5.2	5.2		2	3.2	4.6	4.9		

† All typical values are at  $V_{CC} = 3.3\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

# SN54LVTH573, SN74LVTH573 3.3-V ABT OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

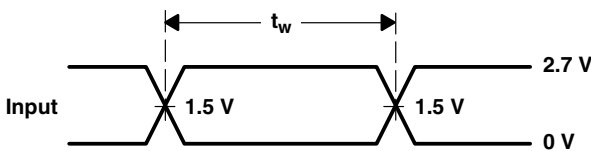
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## PARAMETER MEASUREMENT INFORMATION

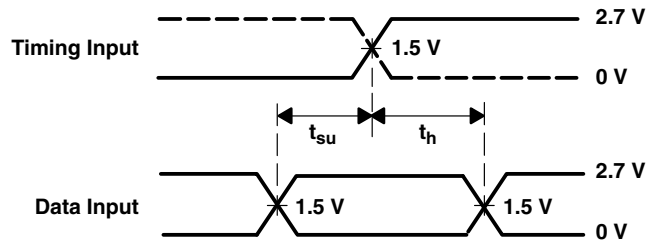


LOAD CIRCUIT

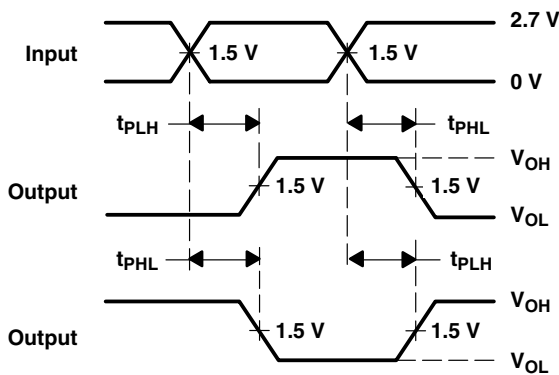
TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	6 V
$t_{PHZ}/t_{PZH}$	GND



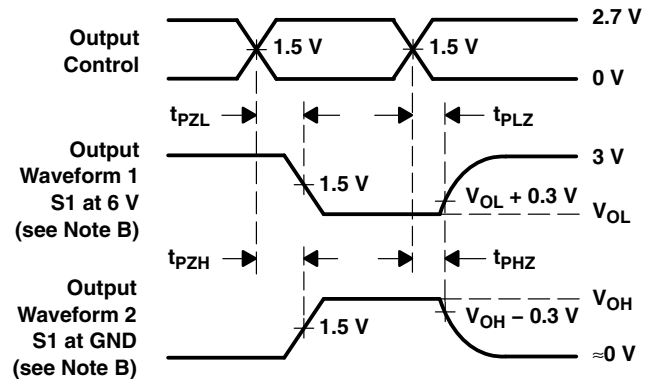
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



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

- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
 D. The outputs are measured one at a time with one transition per measurement.  
 E. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9583101Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9583101Q2A SNJ54LVTH 573FK	<a href="#">Samples</a>
5962-9583101QRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9583101QR A SNJ54LVTH573J	<a href="#">Samples</a>
5962-9583101QSA	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9583101QS A SNJ54LVTH573W	<a href="#">Samples</a>
SN74LVTH573DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LXH573	<a href="#">Samples</a>
SN74LVTH573DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LVTH573	<a href="#">Samples</a>
SN74LVTH573DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LVTH573	<a href="#">Samples</a>
SN74LVTH573DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LVTH573	<a href="#">Samples</a>
SN74LVTH573NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LVTH573	<a href="#">Samples</a>
SN74LVTH573PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LXH573	<a href="#">Samples</a>
SN74LVTH573PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LXH573	<a href="#">Samples</a>
SN74LVTH573RGYR	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	LXH573	<a href="#">Samples</a>
SNJ54LVTH573FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9583101Q2A SNJ54LVTH 573FK	<a href="#">Samples</a>
SNJ54LVTH573J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9583101QR A SNJ54LVTH573J	<a href="#">Samples</a>
SNJ54LVTH573W	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9583101QS A	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
										SNJ54LVTH573W	

(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/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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**OTHER QUALIFIED VERSIONS OF SN54LVTH573, SN74LVTH573 :**

- Catalog: [SN74LVTH573](#)

- Enhanced Product: [SN74LVTH573-EP](#), [SN74LVTH573-EP](#)
- Military: [SN54LVTH573](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense 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
SN74LVTH573DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74LVTH573DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74LVTH573NSR	SO	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74LVTH573RGYR	VQFN	RGY	20	3000	330.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVTH573DBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74LVTH573DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74LVTH573NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74LVTH573RGYR	VQFN	RGY	20	3000	367.0	367.0	35.0

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. 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

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- 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.

# DB0020A



# PACKAGE OUTLINE

## TSSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/A 12/2017

### 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.
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.

# EXAMPLE BOARD LAYOUT

DB0020A

TSSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4214851/A 12/2017

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

DB0020A

TSSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4214851/A 12/2017

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.

# DW0020A



# PACKAGE OUTLINE

## SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

**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.

# EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

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

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

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.

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- 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.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



4040064-5/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

## GENERIC PACKAGE VIEW

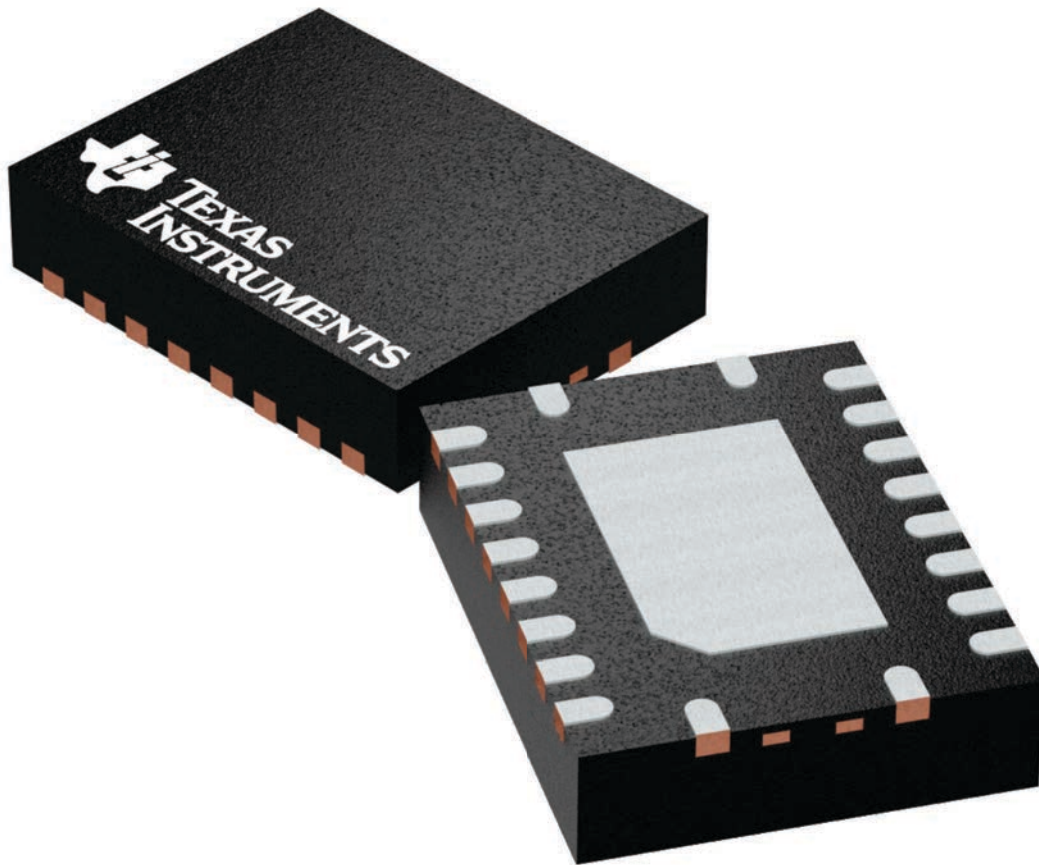
**RGY 20**

**VQFN - 1 mm max height**

3.5 x 4.5, 0.5 mm pitch

PLASTIC QUAD FGLATPACK - NO LEAD

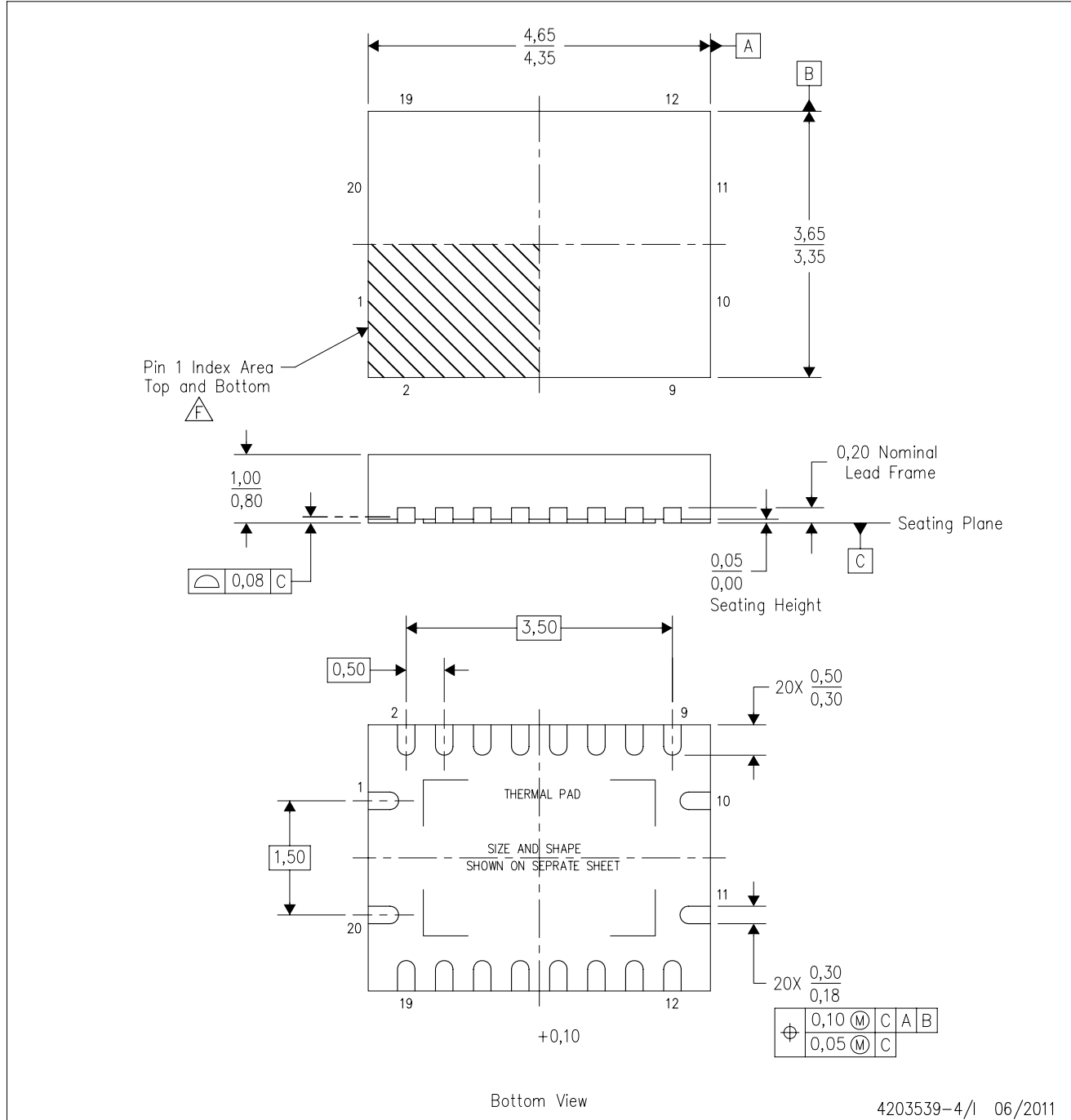
This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4225264/A

RGY (R-PVQFN-N20)

PLASTIC QUAD FLATPACK NO-LEAD



4203539-4/1 06/2011

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - QFN (Quad Flatpack No-Lead) package configuration.
  - The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
  - Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
  - Package complies to JEDEC MO-241 variation BA.

RGY (R-PVQFN-N20)

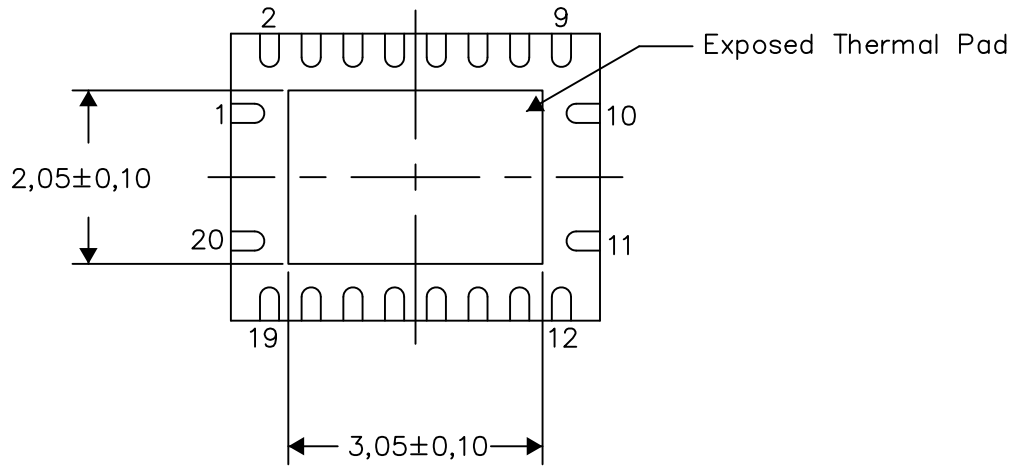
PLASTIC QUAD FLATPACK NO-LEAD

**THERMAL INFORMATION**

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at [www.ti.com](http://www.ti.com).

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

Exposed Thermal Pad Dimensions

4206353-4/P 03/14

NOTE: All linear dimensions are in millimeters

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