

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

- 3-State Buffer-Type Outputs Drive Bus Lines Directly
- Bus-Structured Pinout
- True Logic Outputs
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), Standard Plastic (N) and Ceramic (J) 300-mil DIPs, and Ceramic Flat (W) Packages

## description

These octal D-type transparent latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

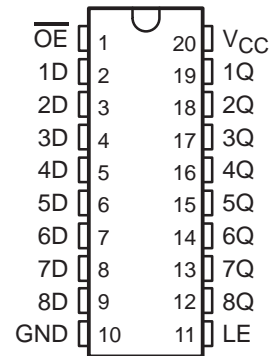
While the latch-enable (LE) input is high, outputs (Q) respond to the data (D) inputs. When LE is low, the outputs are latched to retain the data that was set up.

A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low) 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 the increased drive provide the capability to drive bus lines without interface or pullup components.

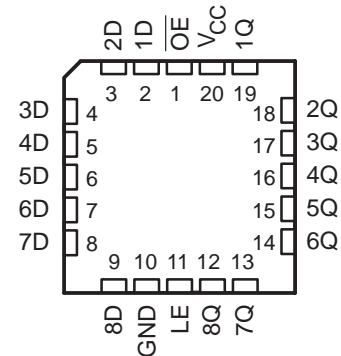
$\overline{OE}$  does not affect internal operation of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54ALS573C and SN54AS573A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS573C and SN74AS573A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS573C, SN54AS573A . . . J OR W PACKAGE  
SN74ALS573C, SN74AS573A . . . DW OR N PACKAGE  
(TOP VIEW)



SN54ALS573C, SN54AS573A . . . FK PACKAGE  
(TOP VIEW)



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

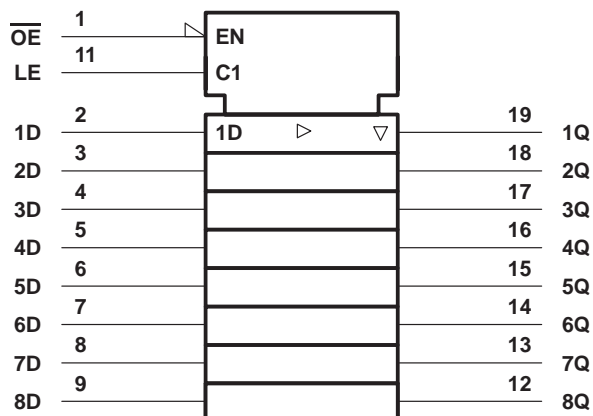
# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A

## OCTAL D-TYPE TRANSPARENT LATCHES

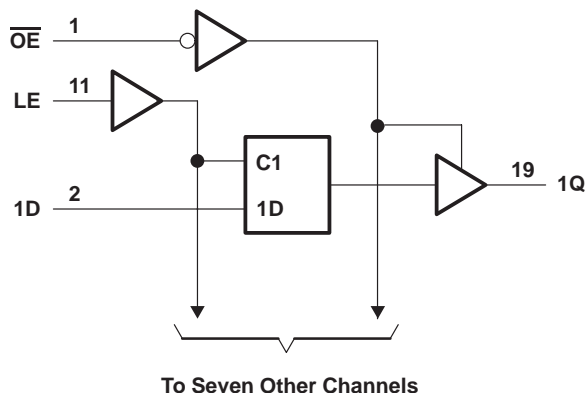
### WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

#### logic symbol†



#### logic diagram (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range, $T_A$ : SN54ALS573C	-55°C to 125°C
SN74ALS573C	0°C to 70°C
Storage temperature range	-65°C to 150°C

‡ 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.

#### recommended operating conditions

	SN54ALS573C			SN74ALS573C			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage	4.5	5	5.5	4.5	5	5.5	V
$V_{IH}$ High-level input voltage	2			2			V
$V_{IL}$ Low-level input voltage			0.7			0.8	V
$I_{OH}$ High-level output current			-1			-2.6	mA
$I_{OL}$ Low-level output current			12			24	mA
$t_w$ Pulse duration, LE high	25			10			ns
$t_{su}$ Setup time, data before LE↓	10			10			ns
$t_h$ Hold time, data after LE↓	7			7			ns
$T_A$ Operating free-air temperature	-55		125	0		70	°C

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A

## OCTAL D-TYPE TRANSPARENT LATCHES

### WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

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

PARAMETER	TEST CONDITIONS		SN54ALS573C		SN74ALS573C		UNIT
			MIN	TYP†	MAX	MIN	
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ ,	$I_I = -18\text{ mA}$	-1.2		-1.2		V
$V_{OH}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ ,	$I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$		$V_{CC} - 2$		V
	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -1\text{ mA}$	2.4	3.3			
$V_{OL}$	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 12\text{ mA}$	0.25	0.4	0.25	0.4	V
		$I_{OL} = 24\text{ mA}$			0.35	0.5	
$I_{OZH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 2.7\text{ V}$	20		20		$\mu\text{A}$
$I_{OZL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0.4\text{ V}$	-20		-20		$\mu\text{A}$
$I_I$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 7\text{ V}$	0.1		0.1		mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 2.7\text{ V}$	20		20		$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 0.4\text{ V}$	-0.13		-0.1		mA
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 2.25\text{ V}$	-20	-112	-30	-112	mA
$I_{CC}$	$V_{CC} = 5.5\text{ V}$	Outputs high	10	17	10	17	mA
		Outputs low	15	24	15	24	
		Outputs disabled	16	27	16	27	

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

### switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_1 = 500\ \Omega$ , $R_2 = 500\ \Omega$ , $T_A = \text{MIN to MAX}\S$				UNIT
			SN54ALS573C		SN74ALS573C		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	D	Q	2	20	2	14	ns
$t_{PHL}$			2	17	2	14	
$t_{PLH}$	LE	Q	8	33	6	20	ns
$t_{PHL}$			8	24	6	19	
$t_{PZH}$	$\overline{OE}$	Q	4	28	3	18	ns
$t_{PZL}$			4	21	4	18	
$t_{PHZ}$	$\overline{OE}$	Q	2	20	1	10	ns
$t_{PLZ}$			3	26	1	15	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A

## OCTAL D-TYPE TRANSPARENT LATCHES

### WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

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

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range, $T_A$ : SN54AS573A	–55°C to 125°C
SN74AS573A	0°C to 70°C
Storage temperature range	–65°C to 150°C

† 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.

#### recommended operating conditions

		SN54AS573A			SN74AS573A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			2			V
$V_{IL}$	Low-level input voltage			0.8			0.8	V
$I_{OH}$	High-level output current			–12			–15	mA
$I_{OL}$	Low-level output current			32			48	mA
$t_w^*$	Pulse duration, LE high	5.5			4.5			ns
$t_{su}^*$	Setup time, data before LE↓	2			2			ns
$t_h^*$	Hold time, data after LE↓	3			3			ns
$T_A$	Operating free-air temperature	–55		125	0		70	°C

\* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.

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

PARAMETER	TEST CONDITIONS	SN54AS573A			SN74AS573A			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA			–1.2			–1.2	V
$V_{OH}$	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA	$V_{CC} - 2$			$V_{CC} - 2$			V
	$V_{CC} = 4.5$ V, $I_{OH} = -12$ mA	2.4	3.2		2.4	3.3		
	$V_{CC} = 4.5$ V, $I_{OH} = -15$ mA							
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 32$ mA		0.28	0.5				V
	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA					0.33	0.5	
$I_{OZH}$	$V_{CC} = 5.5$ V, $V_O = 2.7$ V			50			50	μA
$I_{OZL}$	$V_{CC} = 5.5$ V, $V_O = 0.4$ V			–50			–50	μA
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1			0.1	mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20			20	μA
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			–0.1			–0.5	mA
$I_{O§}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–30		–112	–30		–112	mA
$I_{CC}$	$V_{CC} = 5.5$ V, Outputs high		56	93		56	93	mA
	$V_{CC} = 5.5$ V, Outputs low		55	90		55	90	
	$V_{CC} = 5.5$ V, Outputs disabled		65	106		65	106	

‡ All typical values are at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$ .

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .



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**WITH 3-STATE OUTPUTS**

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

**switching characteristics (see Figure 1)**

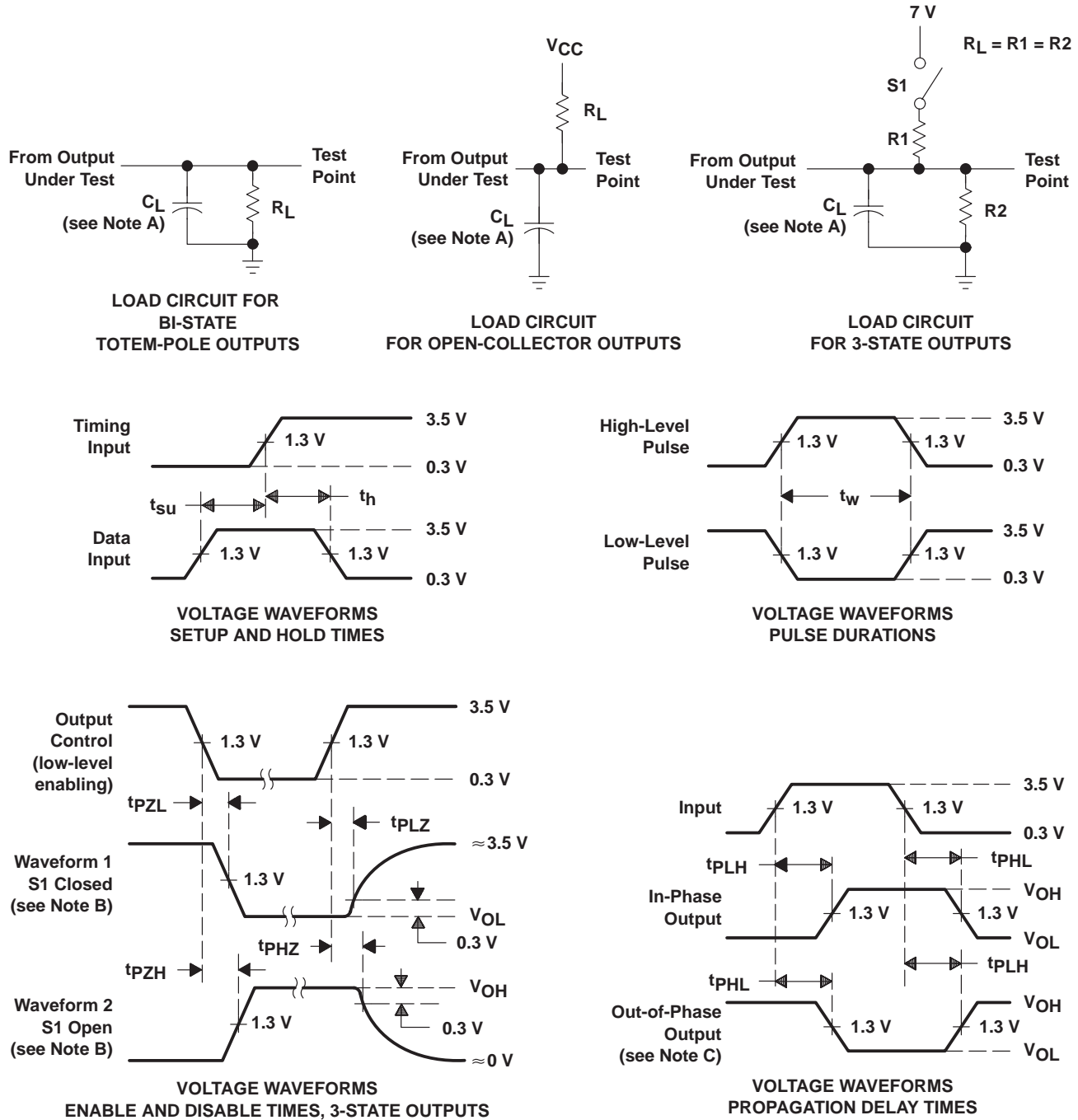
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX†				UNIT
			SN54AS573A		SN74AS573A		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	D	Q	3	11	3	8	ns
t <sub>PHL</sub>			3	8	3	7	
t <sub>PLH</sub>	LE	Q	6	16.5	6	13	ns
t <sub>PHL</sub>			4	9	4	7.5	
t <sub>PZH</sub>	$\overline{\text{OE}}$	Q	2	8	2	6.5	ns
t <sub>PZL</sub>			4	11	4	9.5	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	Q	2	8	2	6.5	ns
t <sub>PLZ</sub>			2	8	2	7	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

## PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
84012012A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
8401201RA	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
8401201SA	ACTIVE	CFP	W	20	1	None	Call TI	Level-NC-NC-NC
JM38510/38201B2A	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
JM38510/38201BRA	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
SN54ALS573CJ	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
SN54AS573AJ	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
SN74ALS573CDBLE	OBSOLETE	SSOP	DB	20		None	Call TI	Call TI
SN74ALS573CDBR	ACTIVE	SSOP	DB	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74ALS573CDW	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74ALS573CDWR	ACTIVE	SOIC	DW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74ALS573CN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ALS573CN3	OBSOLETE	PDIP	N	20		None	Call TI	Call TI
SN74ALS573CNSR	ACTIVE	SO	NS	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74AS573ADW	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74AS573ADWR	ACTIVE	SOIC	DW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74AS573AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74AS573AN3	OBSOLETE	PDIP	N	20		None	Call TI	Call TI
SNJ54ALS573CFK	ACTIVE	LCCC	FK	20	1	None	Call TI	Level-NC-NC-NC
SNJ54ALS573CJ	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC
SNJ54ALS573CW	ACTIVE	CFP	W	20	1	None	Call TI	Level-NC-NC-NC
SNJ54AS573AFK	OBSOLETE	LCCC	FK	20		None	Call TI	Call TI
SNJ54AS573AJ	ACTIVE	CDIP	J	20	1	None	Call TI	Level-NC-NC-NC

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**None:** Not yet available Lead (Pb-Free).

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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