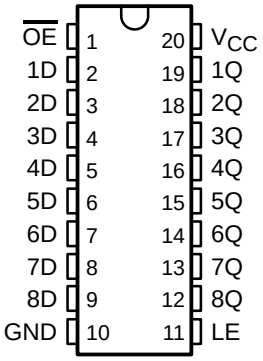
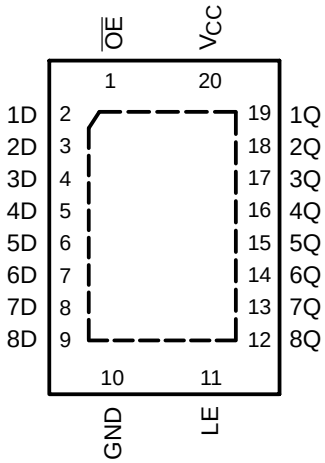
- 2-V to 5.5-V V_{CC} Operation
- Max t_{pd} of 8 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at V_{CC} = 3.3 V , T_A = 25°C
- Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at V_{CC} = 3.3 V , T_A = 25°C
- Support Mixed-Mode Voltage Operation on All Ports
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

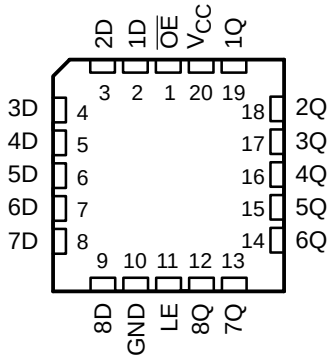
SN54LV573A . . . J OR W PACKAGE
SN74LV573A . . . DB, DGV, DW, NS, OR PW PACKAGE
(TOP VIEW)



SN74LV573A . . . RGY PACKAGE
(TOP VIEW)



SN54LV573A . . . FK PACKAGE
(TOP VIEW)



description/ordering information

The ’LV573A devices are octal transparent D-type latches designed for 2-V to 5.5-V V_{CC} operation.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Tape and reel	SN74LV573ARGYR	LV573A
	SOIC – DW	Tube	SN74LV573ADW	LV573A
		Tape and reel	SN74LV573ADWR	
	SOP – NS	Tape and reel	SN74LV573ANSR	74LV573A
	SSOP – DB	Tape and reel	SN74LV573ADBR	LV573A
	TSSOP – PW	Tape and reel	SN74LV573APWR	LV573A
	TVSOP – DGV	Tape and reel	SN74LV573ADGVR	LV573A
	VFBGA – GQN	Tape and reel	SN74LV573AGQNR	LV573A
–55°C to 125°C	CDIP – J	Tube	SNJ54LV573AJ	SNJ54LV573AJ
	CFP – W	Tube	SNJ54LV573AW	SNJ54LV573AW
	LCCC – FK	Tube	SNJ54LV573AFK	SNJ54LV573AFK

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

description/ordering information (continued)

These devices feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. This device is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

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.

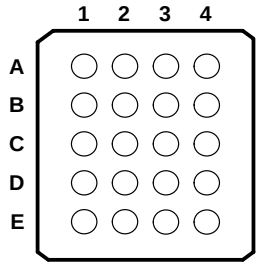
A buffered output-enable ($\overline{OE}$) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased 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.

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

GQN PACKAGE
(TOP VIEW)



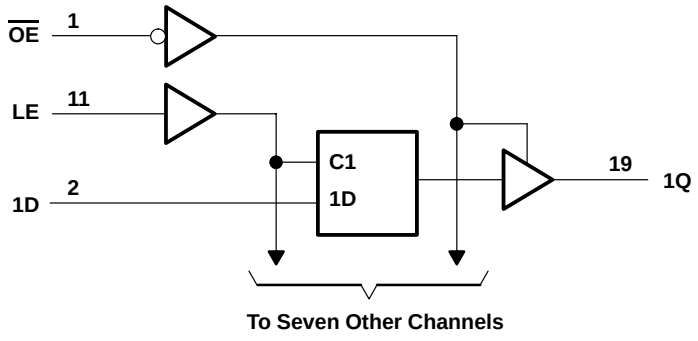
terminal assignments

	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

logic diagram (positive logic)



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

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

Supply voltage range, V_{CC} . . . . . –0.5 V to 7 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
Output voltage range applied in the high or low state, V_O (see Notes 1 and 2) . . . . . –0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0) . . . . . –20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) . . . . . ±50 mA
Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . . ±35 mA
Continuous current through V_{CC} or GND . . . . . ±70 mA
Package thermal impedance, θ_{JA} (see Note 3): DB package . . . . . 70°C/W
(see Note 3): DGV package . . . . . 92°C/W
(see Note 3): DW package . . . . . 58°C/W
(see Note 3): GQN 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

† 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 voltage ratings may be exceeded if the input and output current ratings are observed.
2. This value is limited to 5.5 V maximum.
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.

recommended operating conditions (see Note 5)

			SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage		2	5.5	2	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5		1.5		V
		V_{CC} = 2.3 V to 2.7 V	$V_{CC} \times 0.7$		$V_{CC} \times 0.7$		
		V_{CC} = 3 V to 3.6 V	$V_{CC} \times 0.7$		$V_{CC} \times 0.7$		
		V_{CC} = 4.5 V to 5.5 V	$V_{CC} \times 0.7$		$V_{CC} \times 0.7$		
V_{IL}	Low-level input voltage	V_{CC} = 2 V		0.5		0.5	V
		V_{CC} = 2.3 V to 2.7 V		$V_{CC} \times 0.3$		$V_{CC} \times 0.3$	
		V_{CC} = 3 V to 3.6 V		$V_{CC} \times 0.3$		$V_{CC} \times 0.3$	
		V_{CC} = 4.5 V to 5.5 V		$V_{CC} \times 0.3$		$V_{CC} \times 0.3$	
V_I	Input voltage		0	5.5	0	5.5	V
V_O	Output voltage	High or low state	0	V_{CC}	0	V_{CC}	V
		3-state	0	5.5	0	5.5	
I_{OH}	High-level output current	V_{CC} = 2 V		–50		–50	μA
		V_{CC} = 2.3 V to 2.7 V		–2		–2	mA
		V_{CC} = 3 V to 3.6 V		–8		–8	
		V_{CC} = 4.5 V to 5.5 V		–16		–16	
I_{OL}	Low-level output current	V_{CC} = 2 V		50		50	μA
		V_{CC} = 2.3 V to 2.7 V		2		2	mA
		V_{CC} = 3 V to 3.6 V		8		8	
		V_{CC} = 4.5 V to 5.5 V		16		16	
$\Delta t/\Delta v$	Input transition rise or fall rate	V_{CC} = 2.3 V to 2.7 V		200		200	ns/V
		V_{CC} = 3 V to 3.6 V		100		100	
		V_{CC} = 4.5 V to 5.5 V		20		20	
T_A	Operating free-air temperature		–55	125	–40	85	°C

NOTE 5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	SN54LV573A			SN74LV573A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OH}	I_{OH} = –50 μA	2 V to 5.5 V	V_{CC}–0.1			V_{CC}–0.1			V
	I_{OH} = –2 mA	2.3 V	2			2			
	I_{OH} = –8 mA	3 V	2.48			2.48			
	I_{OH} = –16 mA	4.5 V	3.8			3.8			
V_{OL}	I_{OL} = 50 μA	2 V to 5.5 V			0.1			0.1	V
	I_{OL} = 2 mA	2.3 V			0.4			0.4	
	I_{OL} = 8 mA	3 V			0.44			0.44	
	I_{OL} = 16 mA	4.5 V			0.55			0.55	
I_I	V_I = 5.5 V or GND	0 to 5.5 V			±1			±1	μA
I_{OZ}	V_O = V_{CC} or GND	5.5 V			±5			±5	μA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V			20			20	μA
I_{off}	V_I or V_O = 0 to 5.5 V	0			5			5	μA
C_i	V_I = V_{CC} or GND	3.3 V		1.8			1.8		pF

timing requirements over recommended operating free-air temperature range, V_{CC} = 2.5 V ± 0.2 V (unless otherwise noted) (see Figure 1)

PARAMETER			T_A = 25°C		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	6.5		6.5		6.5		ns
t_{su}	Setup time	Data before LE↓	5		5		5		ns
t_h	Hold time	Data after LE↓	2		2		2		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER			T_A = 25°C		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	5		5		5		ns
t_{su}	Setup time	Data before LE↓	3.5		3.5		3.5		ns
t_h	Hold time	Data after LE↓	1.5		1.5		1.5		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER			T_A = 25°C		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	5		5		5		ns
t_{su}	Setup time	Data before LE↓	3.5		3.5		3.5		ns
t_h	Hold time	Data after LE↓	1.5		1.5		1.5		ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 2.5 V ± 0.2 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			SN54LV573A		SN74LV573A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	D	Q	C_L = 15 pF		8.9*	15.8*	1*	18*	1	18	ns
	LE	Q			9.6*	16.2*	1*	19*	1	19	
t_{en}	$\overline{OE}$	Q			9.3*	16.2*	1*	19*	1	19	
t_{dis}	$\overline{OE}$	Q			6.7*	12.6*	1*	15*	1	15	
t_{pd}	D	Q	C_L = 50 pF		10.9	18.7	1	21	1	21	ns
	LE	Q			11.6	19.1	1	23	1	23	
t_{en}	$\overline{OE}$	Q			11.4	19	1	22	1	22	
t_{dis}	$\overline{OE}$	Q			8.6	17.3	1	19	1	19	
$t_{sk(o)}$						2				2	

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

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			SN54LV573A		SN74LV573A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	D	Q	C_L = 15 pF		6.2*	11*	1*	13*	1	13	ns
	LE	Q			6.8*	11.9*	1*	14*	1	14	
t_{en}	$\overline{OE}$	Q			6.6*	11.5*	1*	13.5*	1	13.5	
t_{dis}	$\overline{OE}$	Q			4.9*	11*	1*	13*	1	13	
t_{pd}	D	Q	C_L = 50 pF		7.7	14.5	1	16.5	1	16.5	ns
	LE	Q			8.2	15.4	1	17.5	1	17.5	
t_{en}	$\overline{OE}$	Q			8	15	1	17	1	17	
t_{dis}	$\overline{OE}$	Q			6.2	14.5	1	16.5	1	16.5	
$t_{sk(o)}$						1.5				1.5	

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

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			SN54LV573A		SN74LV573A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	D	Q	C_L = 15 pF		4.3*	6.8*	1*	8*	1	8	ns
	LE	Q			4.7*	7.7*	1*	9*	1	9	
t_{en}	$\overline{OE}$	Q			4.7*	7.7*	1*	9*	1	9	
t_{dis}	$\overline{OE}$	Q			3.5*	7.7*	1*	9*	1	9	
t_{pd}	D	Q	C_L = 50 pF		5.3	8.8	1	10	1	10	ns
	LE	Q			5.7	9.7	1	11	1	11	
t_{en}	$\overline{OE}$	Q			5.7	9.7	1	11	1	11	
t_{dis}	$\overline{OE}$	Q			4.2	9.7	1	11	1	11	
$t_{sk(o)}$						1				1	

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

noise characteristics, V_{CC} = 3.3 V, C_L = 50 pF, T_A = 25°C (see Note 6)

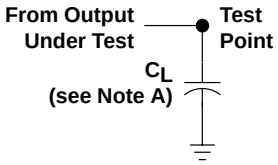
PARAMETER		SN74LV573A			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.6	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.5	–0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		2.9		V
$V_{IH(D)}$	High-level dynamic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

NOTE 6: Characteristics are for surface-mount packages only.

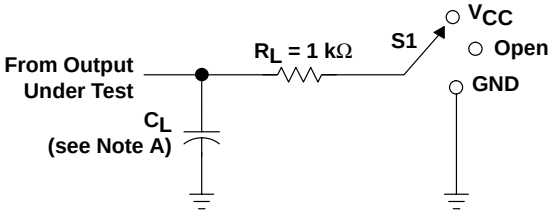
operating characteristics, T_A = 25°C

PARAMETER				TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd} Power dissipation capacitance	Outputs enabled	D to Q	C_L = 50 pF, f = 10 MHz		3.3 V	16	pF
					5 V	18	
		LE to Q			3.3 V	18.2	
					5 V	21.3	

PARAMETER MEASUREMENT INFORMATION

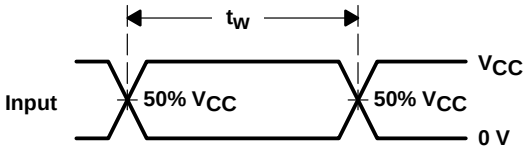


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

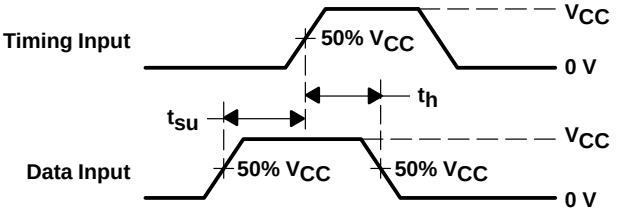


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}

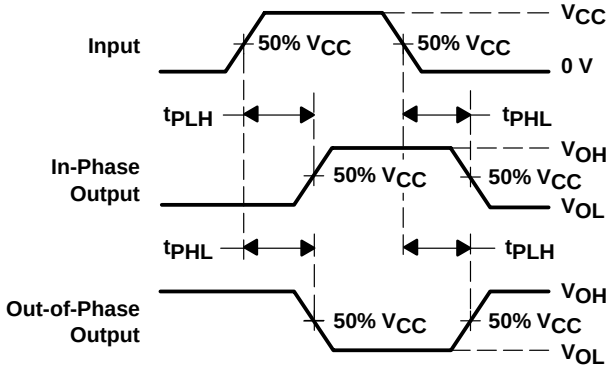
LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS



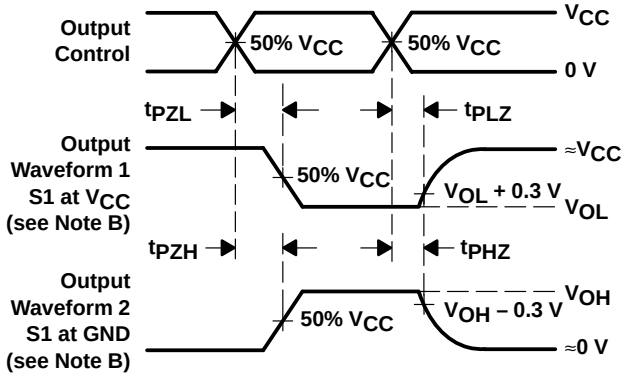
VOLTAGE WAVEFORMS
PULSE DURATION



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 ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
D. The outputs are measured one at a time with one input 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_{PHL} and t_{PLH} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

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