

# DATA SHEET

## **74LVT573**

**3.3 V Octal D-type transparent latch  
(3-State)**

Product data  
Supersedes data of 1998 Feb 19  
File under Integrated Circuits, IC23 Handbook

2001 Dec 17

# 3.3 V Octal D-type transparent latch (3-State)

74LVT573

## FEATURES

- Inputs and outputs on opposite side of package allow easy interface to microprocessors
- 3-State output buffers
- Common output enable
- TTL input and output switching levels
- Input and output interface capability to systems at 5 V supply
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs
- Live insertion/extraction permitted
- No bus current loading when output is tied to 5 V bus
- Latch-up protection exceeds 500 mA per JEDEC Std 17
- Power-up 3-State
- Power-up reset
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model

## DESCRIPTION

The LVT573 is a high-performance BiCMOS product designed for  $V_{CC}$  operation at 3.3 V. This device is an octal transparent latch coupled to eight 3-State output buffers. The two sections of the device are controlled independently by Enable (E) and Output Enable ( $\overline{OE}$ ) control gates. The 74LVT573 has a broadside pinout configuration to facilitate PC board layout and allow easy interface with microprocessors.

The data on the D inputs are transferred to the latch outputs when the Latch Enable (E) input is High. The latch remains transparent to the data inputs while E is High, and stores the data that is present one setup time before the High-to-Low enable transition.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors. The active-Low Output Enable ( $\overline{OE}$ ) controls all eight 3-State buffers independent of the latch operation.

When  $\overline{OE}$  is Low, the latched or transparent data appears at the outputs. When  $\overline{OE}$  is High, the outputs are in the High-impedance "OFF" state, which means they will neither drive nor load the bus.

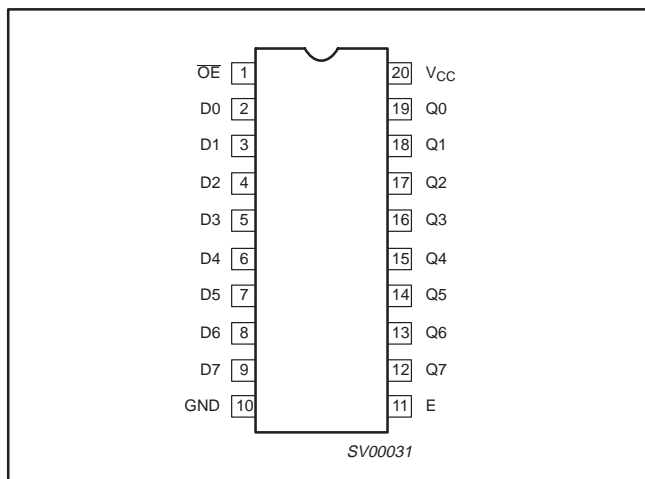
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25\text{ }^\circ\text{C}; GND = 0\text{ V}$	TYPICAL	UNIT
$t_{PLH}$ $t_{PHL}$	Propagation delay Dn to Qn	$C_L = 50\text{ pF}; V_{CC} = 3.3\text{ V}$	2.5 2.7	ns
$C_{IN}$	Input capacitance	$V_I = 0\text{ V or }3.0\text{ V}$	4	pF
$C_{OUT}$	Output capacitance	Outputs disabled; $V_O = 0\text{ V or }3.0\text{ V}$	8	pF
$I_{CCZ}$	Total supply current	Outputs disabled; $V_{CC} = 3.6\text{ V}$	0.13	mA

## ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	TYPE NUMBER	DWG NUMBER
20-Pin Plastic SOL	-40 °C to +85 °C	74LVT573D	SOT163-1
20-Pin Plastic SSOP Type II	-40 °C to +85 °C	74LVT573DB	SOT339-1
20-Pin Plastic TSSOP Type I	-40 °C to +85 °C	74LVT573PW	SOT360-1

## PIN CONFIGURATION



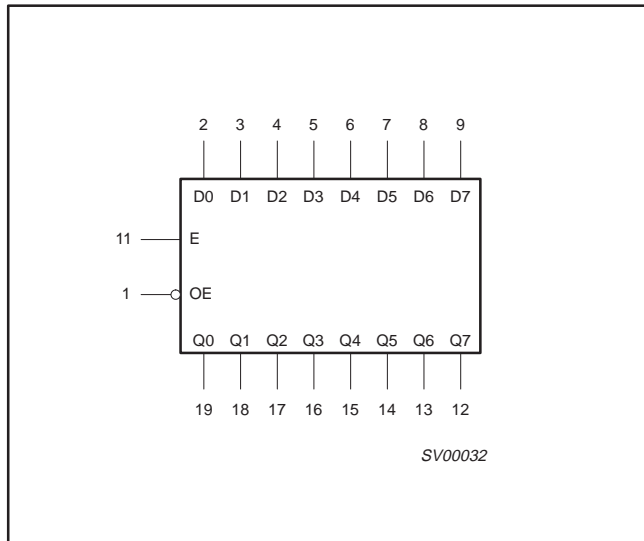
## PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
1	$\overline{OE}$	Output enable input (active-Low)
2, 3, 4, 5, 6, 7, 8, 9	D0-D7	Data inputs
19, 18, 17, 16, 15, 14, 13, 12	Q0-Q7	Data outputs
11	E	Enable input (active-High)
10	GND	Ground (0 V)
20	$V_{CC}$	Positive supply voltage

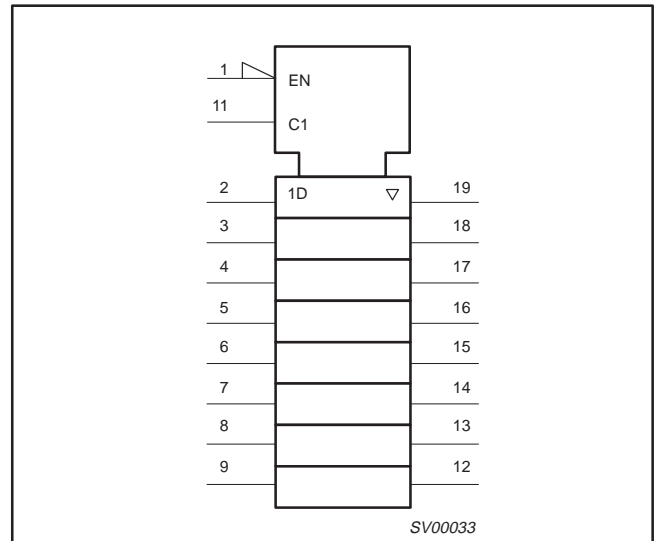
# 3.3 V Octal D-type transparent latch (3-State)

74LVT573

## LOGIC SYMBOL



## LOGIC SYMBOL (IEEE/IEC)

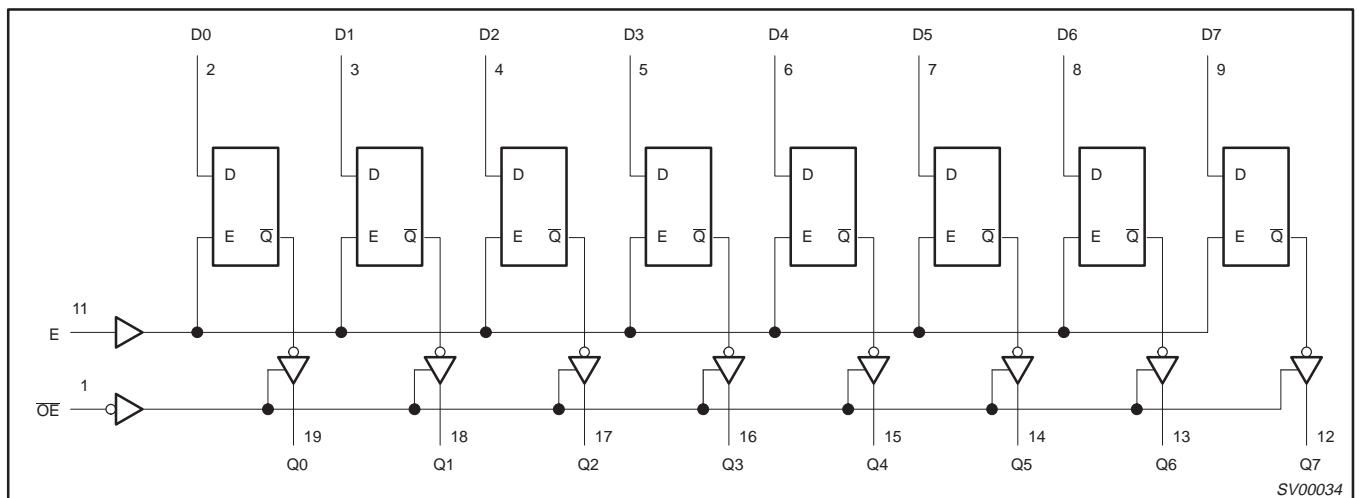


## FUNCTION TABLE

INPUTS			INTERNAL REGISTER	OUTPUTS	OPERATING MODE
$\overline{OE}$	E	Dn		Q0 – Q7	
L	H	L	L	L	Enable and read register
L	H	H	H	H	
L	↓	l	L	L	Latch and read register
L	↓	h	H	H	
L	L	X	NC	NC	Hold
H	X	X	NC	Z	Disable outputs

- H = High voltage level
- h = High voltage level one set-up time prior to the High-to-Low E transition
- L = Low voltage level
- l = Low voltage level one set-up time prior to the High-to-Low E transition
- NC= No change
- X = Don't care
- Z = High impedance "off" state
- ↓ = High-to-Low E transition

## LOGIC DIAGRAM



### 3.3 V Octal D-type transparent latch (3-State)

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#### ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V <sub>CC</sub>	DC supply voltage		-0.5 to +4.6	V
I <sub>IK</sub>	DC input diode current	V <sub>I</sub> < 0	-50	mA
V <sub>I</sub>	DC input voltage <sup>3</sup>		-0.5 to +7.0	V
I <sub>OK</sub>	DC output diode current	V <sub>O</sub> < 0	-50	mA
V <sub>OUT</sub>	DC output voltage <sup>3</sup>	Output in Off or High state	-0.5 to +7.0	V
I <sub>OUT</sub>	DC output current	Output in Low state	128	mA
		Output in High state	-64	
T <sub>stg</sub>	Storage temperature range		-65 to 150	°C

#### NOTES:

- Stresses beyond those listed 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.
- The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150 °C.
- The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

#### RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		MIN	MAX	
V <sub>CC</sub>	DC supply voltage	2.7	3.6	V
V <sub>I</sub>	Input voltage	0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0		V
V <sub>IL</sub>	Input voltage		0.8	V
I <sub>OH</sub>	High-level output current		-32	mA
I <sub>OL</sub>	Low-level output current		32	mA
	Low-level output current; current duty cycle ≤ 50%, f ≥ 1kHz		64	
Δt/Δv	Input transition rise or fall rate; outputs enabled		10	ns/V
T <sub>amb</sub>	Operating free-air temperature range	-40	+85	°C

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#### DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Temp = -40 °C to +85 °C			
			MIN	TYP <sup>1</sup>	MAX	
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = 2.7 V; I <sub>IK</sub> = -18 mA		-0.9	-1.2	V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = 2.7 V to 3.6 V; I <sub>OH</sub> = -100 μA	V <sub>CC</sub> -0.2	V <sub>CC</sub> -0.1		V
		V <sub>CC</sub> = 2.7 V; I <sub>OH</sub> = -8 mA	2.4	2.5		
		V <sub>CC</sub> = 3.0 V; I <sub>OH</sub> = -32 mA	2.0	2.2		
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 100 μA		0.1	0.2	V
		V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 24 mA		0.3	0.5	
		V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 16 mA		0.25	0.4	
		V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 32 mA		0.3	0.5	
		V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 64 mA		0.4	0.55	
V <sub>RST</sub>	Power-up output low voltage <sup>5</sup>	V <sub>CC</sub> = 3.6 V; I <sub>O</sub> = 1 mA; V <sub>I</sub> = GND or V <sub>CC</sub>		0.13	0.55	V
I <sub>I</sub>	Input leakage current	V <sub>CC</sub> = 0 or 3.6 V; V <sub>I</sub> = 5.5 V		1	10	μA
		V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND	Control pins	±0.1	±1	
		V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub>	Data pins <sup>4</sup>	0.1	1	
		V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 0 V		-1	-5	
I <sub>OFF</sub>	Output off current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 0 V to 4.5 V		1	±100	μA
I <sub>HOLD</sub>	Bus Hold current A inputs <sup>7</sup>	V <sub>CC</sub> = 3 V; V <sub>I</sub> = 0.8 V	75	150		μA
		V <sub>CC</sub> = 3 V; V <sub>I</sub> = 2.0 V	-75	-150		
		V <sub>CC</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 3.6 V	±500			
I <sub>EX</sub>	Current into an output in the High state when V <sub>O</sub> > V <sub>CC</sub>	V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 3.0 V		60	125	μA
I <sub>PU/PD</sub>	Power-up/down 3-State output current <sup>3</sup>	V <sub>CC</sub> ≤ 1.2 V; V <sub>O</sub> = 0.5 V to V <sub>CC</sub> ; V <sub>I</sub> = GND or V <sub>CC</sub> ; OE/OE = Don't care		1	±100	μA
I <sub>OZH</sub>	3-State output High current	V <sub>CC</sub> = 3.6 V; V <sub>O</sub> = 3 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		1	5	μA
I <sub>OZL</sub>	3-State output Low current	V <sub>CC</sub> = 3.6 V; V <sub>O</sub> = 0.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		-1	-5	
I <sub>CCH</sub>	Quiescent supply current	V <sub>CC</sub> = 3.6 V; Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		0.13	0.19	mA
I <sub>CCL</sub>		V <sub>CC</sub> = 3.6 V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0		3	12	
I <sub>CCZ</sub>		V <sub>CC</sub> = 3.6 V; Outputs Disabled; V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0 <sup>5</sup>		0.13	0.19	
ΔI <sub>CC</sub>	Additional supply current per input pin <sup>2</sup>	V <sub>CC</sub> = 3 V to 3.6 V; One input at V <sub>CC</sub> -0.6 V, Other inputs at V <sub>CC</sub> or GND		0.1	0.2	mA

#### NOTES:

- All typical values are at V<sub>CC</sub> = 3.3 V and T<sub>amb</sub> = 25 °C.
- This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND.
- This parameter is valid for any V<sub>CC</sub> between 0 V and 1.2 V with a transition time of up to 10 msec. From V<sub>CC</sub> = 1.2 V to V<sub>CC</sub> = 3.3 V ± 0.3 V a transition time of 100 μsec is permitted. This parameter is valid for T<sub>amb</sub> = 25 °C only.
- Unused pins at V<sub>CC</sub> or GND.
- For valid test results, data must not be loaded into the flip-flops (or latches) after applying the power.
- I<sub>CCZ</sub> is measured with outputs pulled to V<sub>CC</sub> or GND.
- This is the bus hold overdrive current required to force the input to the opposite logic state.

# 3.3 V Octal D-type transparent latch (3-State)

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## AC CHARACTERISTICS

GND = 0 V,  $t_R = t_F = 2.5$  ns,  $C_L = 50$  pF,  $R_L = 500$   $\Omega$ ;  $T_{amb} = -40$  °C to  $+85$  °C.

SYMBOL	PARAMETER	WAVEFORM	LIMITS				UNIT
			$V_{CC} = 3.3 V \pm 0.3 V$		$V_{CC} = 2.7 V$		
			MIN	TYP <sup>1</sup>	MAX	MAX	
$t_{PLH}$ $t_{PHL}$	Propagation delay Dn to Qn	2	1.0 1.0	2.5 2.7	4.2 4.3	4.7 5.2	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay E to Qn	1	1.6 2.5	3.5 4.3	5.6 6.5	6.3 7.2	ns
$t_{PZH}$ $t_{PZL}$	Output enable time to High and Low level	4 5	1.0 1.3	2.8 3.3	5.1 5.5	6.2 6.6	ns
$t_{PHZ}$ $t_{PLZ}$	Output disable time from High and Low level	4 5	2.0 1.5	3.7 3.0	5.7 4.6	6.7 5.1	ns

**NOTE:**

1. All typical values are at  $V_{CC} = 3.3$  V and  $T_{amb} = 25$  °C.

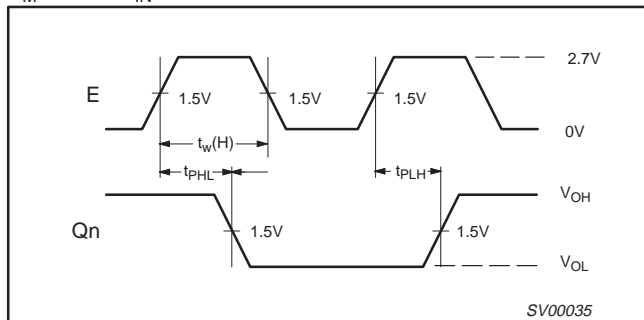
## AC SETUP REQUIREMENTS

GND = 0 V,  $t_R = t_F = 2.5$  ns,  $C_L = 50$  pF,  $R_L = 500$   $\Omega$ ;  $T_{amb} = -40$  °C to  $+85$  °C.

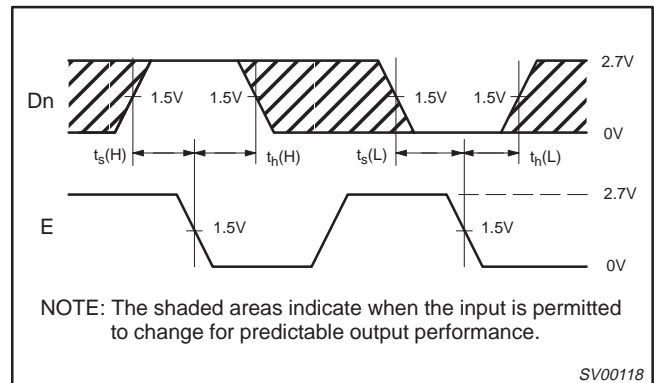
SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			$V_{CC} = 3.3 V \pm 0.3 V$		$V_{CC} = 2.7 V$	
			MIN	MAX	MIN	
$t_{S(H)}$ $t_{S(L)}$	Set-up time, High or Low, Dn to E	3	0.7 0.7		0.6 0.6	ns
$t_{h(H)}$ $t_{h(L)}$	Hold time, High or Low, Dn to E	3	1.6 1.6		1.8 1.8	ns
$t_w(H)$	E pulse width High	1	3.3		3.3	ns

## AC WAVEFORMS

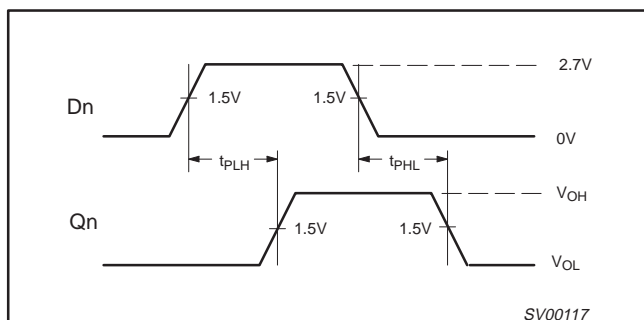
$V_M = 1.5$  V,  $V_{IN} =$  GND to 2.7 V



**Waveform 1. Propagation Delay, Enable to Output, and Enable Pulse Width**



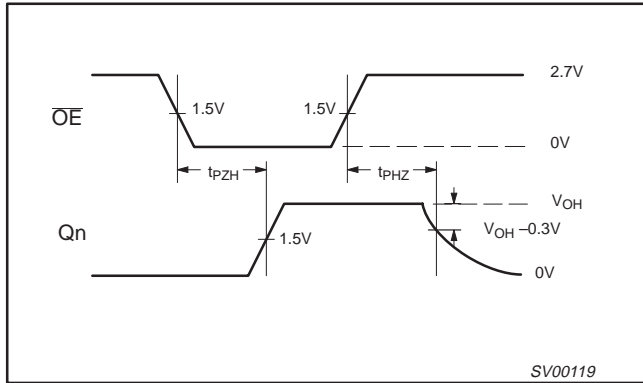
**Waveform 3. Data Set-up and Hold Times**



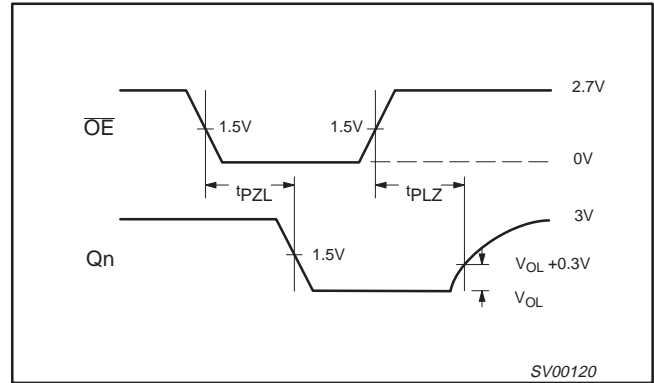
**Waveform 2. Propagation Delay for Data to Outputs**

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Waveform 4. 3-State Output Enable Time to High Level and Output Disable Time from High Level



Waveform 5. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

## TEST CIRCUIT AND WAVEFORM

Test Circuit for 3-State Outputs

$V_M = 1.5\text{ V}$   
Input Pulse Definition

**SWITCH POSITION**

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

**DEFINITIONS**

$R_L$  = Load resistor; see AC CHARACTERISTICS for value.

$C_L$  = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

$R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.

SV00092

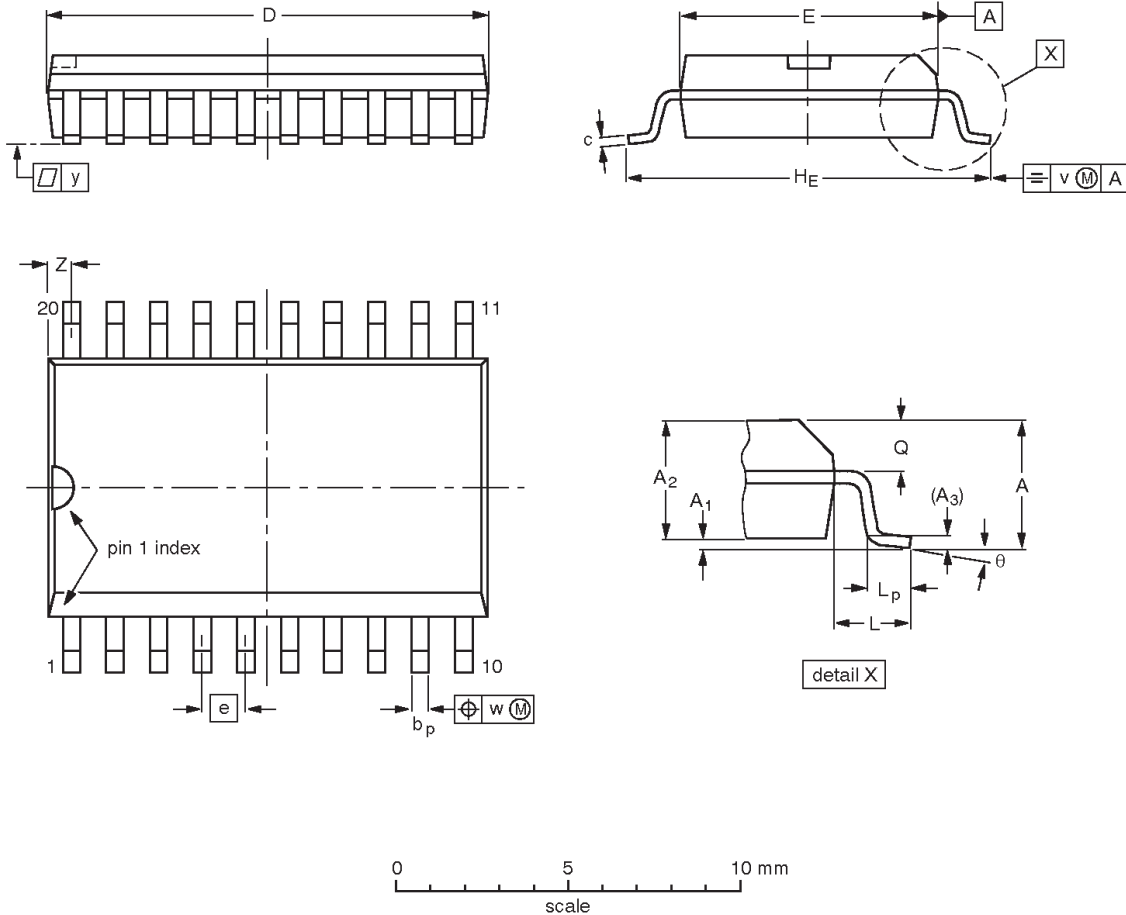
FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	$t_w$	$t_r$	$t_f$
74LVT	2.7 V	$\leq 10\text{ MHz}$	500 ns	$\leq 2.5\text{ ns}$	$\leq 2.5\text{ ns}$

# 3.3 V Octal D-type transparent latch (3-State)

74LVT573

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	HE	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	$\theta$
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.050	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

**Note**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013				97-05-22 99-12-27

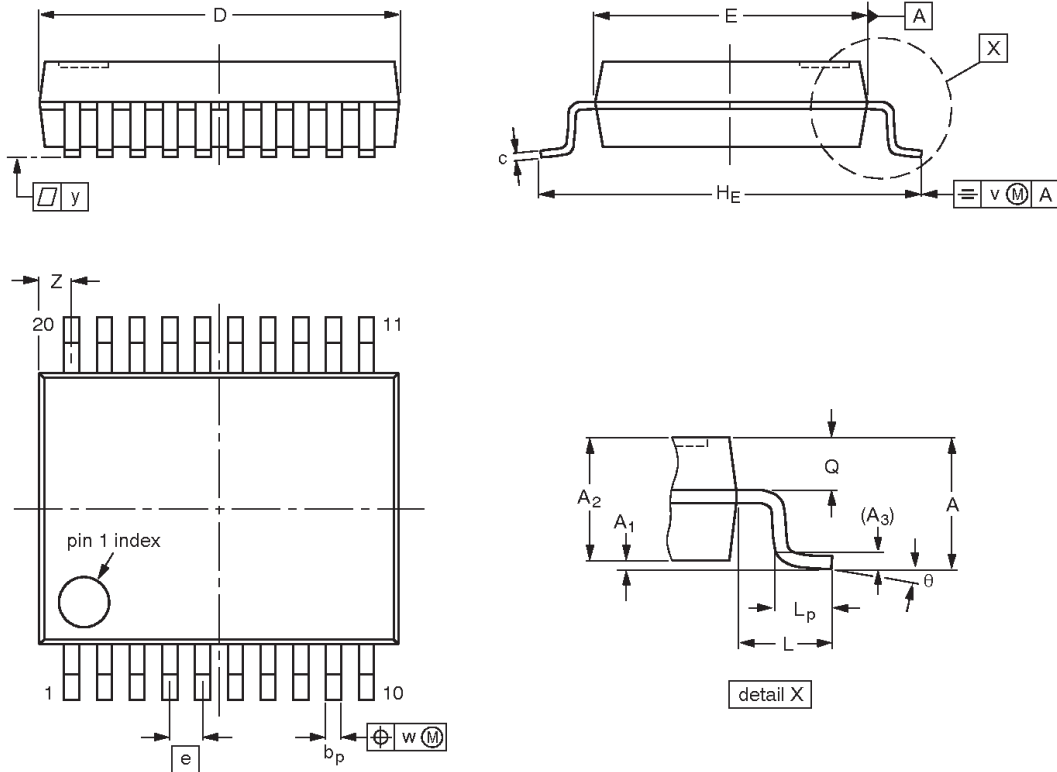


# 3.3 V Octal D-type transparent latch (3-State)

74LVT573

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



**DIMENSIONS (mm are the original dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	HE	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	7.4 7.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	0.9 0.5	8° 0°

**Note**

1. Plastic or metal protrusions of 0.20 mm maximum per side are not included.

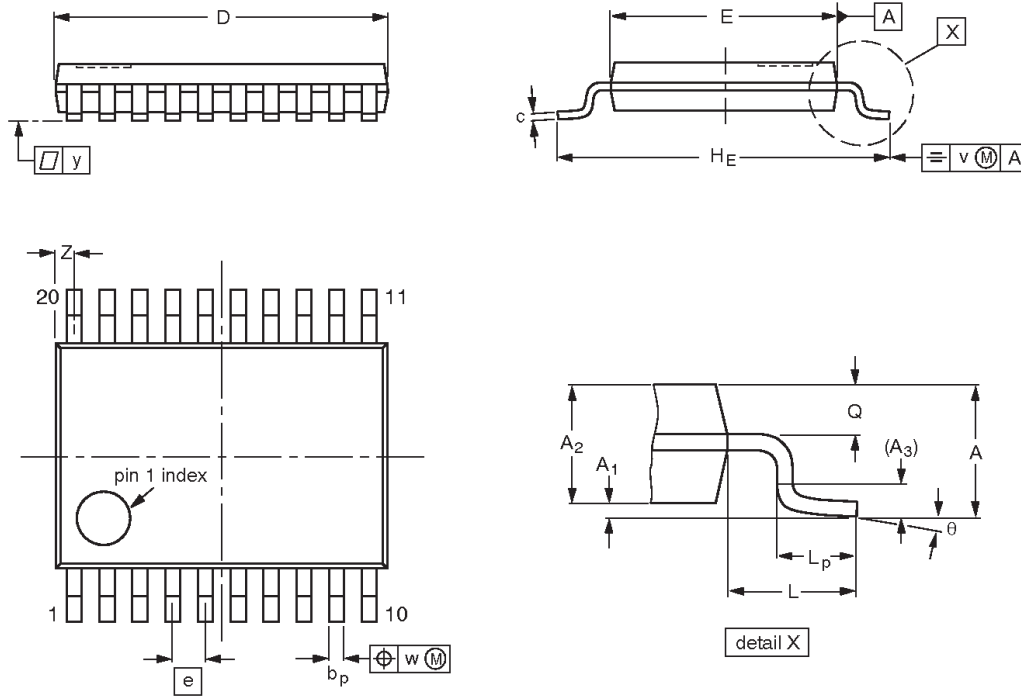
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT339-1		MO-150				95-02-04 99-12-27

# 3.3 V Octal D-type transparent latch (3-State)

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TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1



**DIMENSIONS (mm are the original dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	HE	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.10	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	6.6 6.4	4.5 4.3	0.65	6.6 6.2	1.0	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	8° 0°

**Notes**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT360-1		MO-153				95-02-04 99-12-27

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**3.3 V Octal D-type transparent latch  
(3-State)**

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**74LVT573**

**NOTES**

# 3.3 V Octal D-type transparent latch (3-State)

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## Data sheet status

Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup>	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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