

# 74LVT573

3.3 V octal D-type transparent latch; 3-state

Rev. 9 — 30 July 2021

Product data sheet

## 1. General description

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The 74LVT573 is an 8-bit D-type transparent latch with 3-state outputs. The device features latch enable (LE) and output enable ( $\overline{OE}$ ) inputs. When LE is HIGH, data at the inputs enter the latches. In this condition the latches are transparent, a latch output will change each time its corresponding D-input changes. When LE is LOW the latches store the information that was present at the inputs a set-up time preceding the HIGH-to-LOW transition of LE. A HIGH on  $\overline{OE}$  causes the outputs to assume a high-impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the latches. Bus hold data inputs eliminate the need for external pull-up resistors to define unused inputs

## 2. Features and benefits

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- Wide supply voltage range from 2.7 to 3.6 V
- Inputs and outputs arranged for easy interfacing to microprocessors
- 3-state outputs for bus interfacing
- Common output enable control
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Direct interface with TTL levels
- Input and output interface capability to systems at 5 V supply
- Bus hold data inputs eliminate need for external pull-up resistors to hold unused inputs
- Live insertion and extraction permitted
- No bus current loading when output is tied to 5 V bus
- Power-up reset
- Power-up 3-state
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- Complies with JEDEC standard JESD8C (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114E exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LVT573D	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74LVT573PW	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74LVT573BQ	-40 °C to +85 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1

### 4. Functional diagram

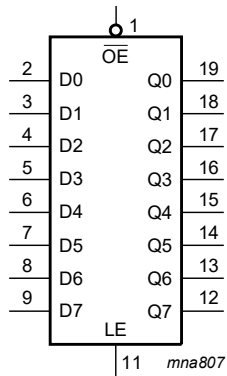


Fig. 1. Logic symbol

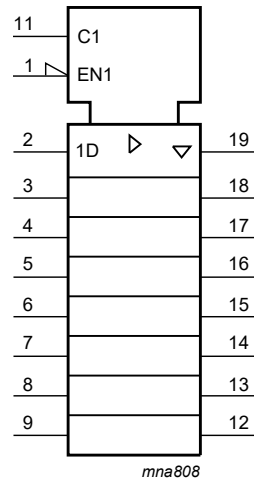


Fig. 2. IEC logic symbol

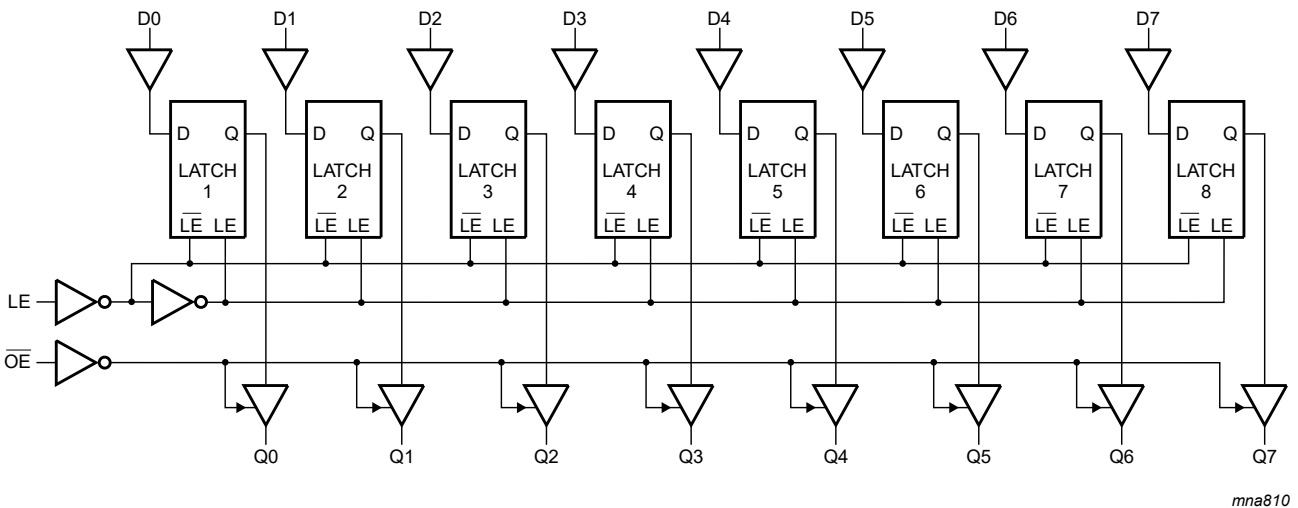
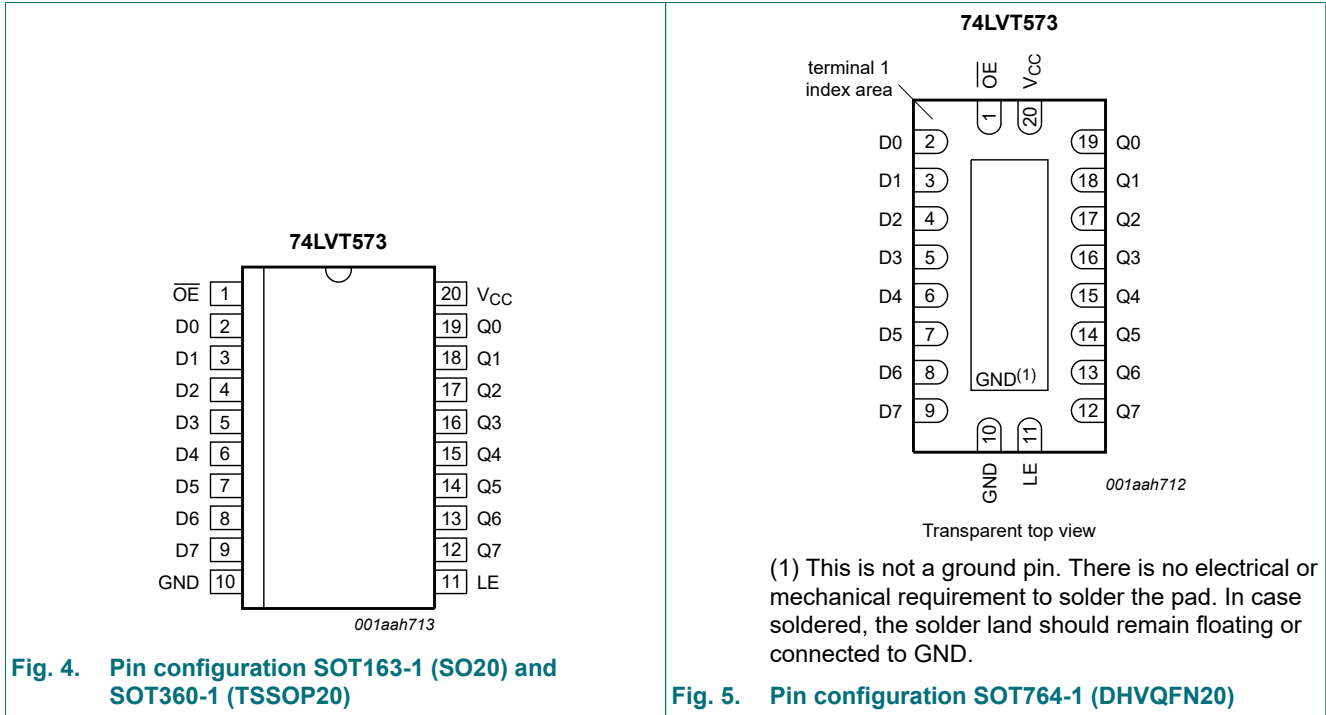


Fig. 3. Logic diagram

## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
OE	1	output enable input (active LOW)
D0, D1, D2, D3, D4, D5, D6, D7	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable (active HIGH)
Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7	19, 18, 17, 16, 15, 14, 13, 12	data output
VCC	20	supply voltage

## 6. Functional description

**Table 3. Function table**

*H = HIGH voltage level; h = HIGH voltage level one setup time prior to the LOW-to-HIGH clock transition;*

*L = LOW voltage level; l = LOW voltage level one setup time prior to the LOW-to-HIGH clock transition;*

*↓ = HIGH-to-LOW latch enable transition;*

*Z = high-impedance OFF-state; NC = no change; X = don't care.*

Operating mode	Control $\overline{OE}$	Control LE	Input Dn	Internal register	Output Qn
Load and read register enable	L	H	L	L	L
			H	H	H
Latch and read register	L	↓	l	L	L
			h	H	H
Hold	L	L	X	NC	NC
Disable outputs	H	L	X	NC	Z
		H	Dn	Dn	Z

## 7. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).*

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+4.6	V
$V_I$	input voltage		[1] -0.5	+7.0	V
$V_O$	output voltage	output in OFF-state or HIGH-state	[1] -0.5	+7.0	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-	-50	mA
$I_{OK}$	output clamping current	$V_O < 0$ V	-	-50	mA
$I_O$	output current	output in LOW-state	-	128	mA
		output in HIGH-state	-	-64	mA
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		[2] -	150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +85 °C	-	500	mW

[1] The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CC}$	supply voltage		2.7	-	3.6	V
$V_I$	input voltage		0	-	5.5	V
$V_{IH}$	HIGH-level input voltage		2.0	-	-	V
$V_{IL}$	LOW-level input voltage		-	-	0.8	V
$I_{OH}$	HIGH-level output current		-	-	-32	mA
$I_{OL}$	LOW-level output current		-	-	32	mA
		current duty cycle $\leq 50\%$ ; $f_i \geq 1$ kHz	-	-	64	mA
$T_{amb}$	ambient temperature	in free air	-40	-	+85	$^{\circ}\text{C}$
$\Delta t/\Delta V$	input transition rise and fall rate	outputs enabled	-	-	10	ns/V

## 9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	$T_{amb} = -40\text{ }^{\circ}\text{C to } +85\text{ }^{\circ}\text{C}$			Unit
			Min	Typ [1]	Max	
$V_{IK}$	input clamping voltage	$V_{CC} = 2.7\text{ V}$ ; $I_{IK} = -18\text{ mA}$	-1.2	-0.9	-	V
$V_{OH}$	HIGH-level output voltage	$V_{CC} = 2.7\text{ V to } 3.6\text{ V}$ ; $I_{OH} = -100\text{ }\mu\text{A}$	$V_{CC} - 0.2$	$V_{CC} - 0.1$	-	V
		$V_{CC} = 2.7\text{ V}$ ; $I_{OH} = -8\text{ mA}$	2.4	2.5	-	V
		$V_{CC} = 3.0\text{ V}$ ; $I_{OH} = -32\text{ mA}$	2.0	2.2	-	V
$V_{OL}$	LOW-level output voltage	$V_{CC} = 2.7\text{ V}$ ; $I_{OL} = 100\text{ }\mu\text{A}$	-	0.1	0.2	V
		$V_{CC} = 2.7\text{ V}$ ; $I_{OL} = 24\text{ mA}$	-	0.3	0.5	V
		$V_{CC} = 3.0\text{ V}$ ; $I_{OL} = 16\text{ mA}$	-	0.25	0.4	V
		$V_{CC} = 3.0\text{ V}$ ; $I_{OL} = 32\text{ mA}$	-	0.3	0.5	V
		$V_{CC} = 3.0\text{ V}$ ; $I_{OL} = 64\text{ mA}$	-	0.4	0.55	V
$V_{OL(pu)}$	power-up LOW-level output voltage	$V_{CC} = 3.6\text{ V}$ ; $I_O = 1\text{ mA}$ ; $V_I = \text{GND or } V_{CC}$ [2]	-	0.13	0.55	V
$I_I$	input leakage current	all input pins;				
		$V_{CC} = 0\text{ V or } 3.6\text{ V}$ ; $V_I = 5.5\text{ V}$	-	1	10	$\mu\text{A}$
		control pins;				
		$V_{CC} = 3.6\text{ V}$ ; $V_{CC}$ or GND	-	$\pm 0.1$	$\pm 1$	$\mu\text{A}$
		data pins				
		$V_{CC} = 3.6\text{ V}$ ; $V_I = V_{CC}$ [3]	-	0.1	1	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_{CC} = 0\text{ V}$ ; $V_I$ or $V_O = 0\text{ V to } 4.5\text{ V}$	-	1	$\pm 100$	$\mu\text{A}$
		$V_{CC} = 3.6\text{ V}$ ; $V_I = 0\text{ V}$	-5	-1	-	$\mu\text{A}$
$I_{BHL}$	bus hold LOW current	Dn input; $V_{CC} = 3\text{ V}$ ; $V_I = 0.8\text{ V}$ [4]	75	150	-	$\mu\text{A}$
$I_{BHH}$	bus hold HIGH current	Dn input; $V_{CC} = 3\text{ V}$ ; $V_I = 2.0\text{ V}$	-	-150	-75	$\mu\text{A}$
$I_{BHHO}$	bus hold HIGH overdrive current	Dn input; $V_{CC} = 3.6\text{ V}$ ; $V_I = 0\text{ V to } 3.6\text{ V}$ [4]	-	-	500	$\mu\text{A}$
$I_{BHLO}$	bus hold LOW overdrive current	Dn input; $V_{CC} = 3.6\text{ V}$ ; $V_I = 0\text{ V to } 3.6\text{ V}$	-500	-	-	$\mu\text{A}$

## 3.3 V octal D-type transparent latch; 3-state

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			Unit
			Min	Typ [1]	Max	
I <sub>LO</sub>	output leakage current	Qn output HIGH when V <sub>O</sub> = 5.5 V and V <sub>CC</sub> = 3.0 V	-	60	125	μA
I <sub>O(pu/pd)</sub>	power-up/power-down output current	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> ; $\overline{OE}$ = don't care [5]	-	1	±100	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		output HIGH: V <sub>O</sub> = 3.0 V	-	1	5	μA
		output LOW: V <sub>O</sub> = 0.5 V	-5	-1	-	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A				
		outputs HIGH	-	0.13	0.19	mA
		outputs LOW	-	3	12	mA
		outputs disabled [6]	-	0.13	0.19	mA
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>CC</sub> = 3 V to 3.6 V; one input at V <sub>CC</sub> - 0.6 V and other inputs at V <sub>CC</sub> or GND [7]	-	0.1	0.2	mA
C <sub>I</sub>	input capacitance	V <sub>I</sub> = 0 V or 3.0 V	-	4	-	pF
C <sub>O</sub>	output capacitance	outputs disabled; V <sub>O</sub> = 0 V or 3.0 V	-	8	-	pF

[1] Typical values are measured at V<sub>CC</sub> = 3.3 V and T<sub>amb</sub> = 25 °C.

[2] For valid test results, data must not be loaded into the flip-flops (or latches) after applying power.

[3] Unused pins at V<sub>CC</sub> or GND.

[4] This is the bus hold overdrive current required to force the input to the opposite logic state.

[5] 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 ms.

From V<sub>CC</sub> = 1.2 V to V<sub>CC</sub> = 3.3 V ± 0.3 V a transition time of 100 μs is permitted. This parameter is valid for T<sub>amb</sub> = 25 °C only.

[6] I<sub>CC</sub> is measured with outputs pulled to V<sub>CC</sub> or GND.

[7] This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND.

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to ground ( $GND = 0\text{ V}$ ); for test circuit see [Fig. 11](#).

Symbol	Parameter	Conditions	$T_{amb} = -40\text{ °C to }+85\text{ °C}$			Unit
			Min	Typ [1]	Max	
$t_{PLH}$	LOW to HIGH propagation delay	LE to Qn; see <a href="#">Fig. 6</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.6	3.5	5.6	ns
		$V_{CC} = 2.7\text{ V}$	-	-	6.3	ns
		Dn to Qn; see <a href="#">Fig. 7</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	2.5	4.2	ns
		$V_{CC} = 2.7\text{ V}$	-	-	4.7	ns
$t_{PHL}$	HIGH to LOW propagation delay	LE to Qn; see <a href="#">Fig. 6</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	2.5	4.3	6.5	ns
		$V_{CC} = 2.7\text{ V}$	-	-	7.2	ns
		Dn to Qn; see <a href="#">Fig. 7</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	2.7	4.3	ns
		$V_{CC} = 2.7\text{ V}$	-	-	5.2	ns
$t_{PZH}$	OFF-state to HIGH propagation delay	$\overline{OE}$ to Qn; see <a href="#">Fig. 8</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	2.8	5.1	ns
		$V_{CC} = 2.7\text{ V}$	-	-	6.2	ns
$t_{PZL}$	OFF-state to LOW propagation delay	$\overline{OE}$ to Qn; see <a href="#">Fig. 9</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.3	3.3	5.5	ns
		$V_{CC} = 2.7\text{ V}$	-	-	6.6	ns
$t_{PHZ}$	HIGH to OFF-state propagation delay	$\overline{OE}$ to Qn; see <a href="#">Fig. 8</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	2.0	3.7	5.7	ns
		$V_{CC} = 2.7\text{ V}$	-	-	6.7	ns
$t_{PLZ}$	LOW to OFF-state propagation delay	$\overline{OE}$ to Qn; see <a href="#">Fig. 9</a>				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.5	3.0	4.6	ns
		$V_{CC} = 2.7\text{ V}$	-	-	5.1	ns
$t_{su}$	set-up time	Dn to LE; see <a href="#">Fig. 10</a> [2]				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	0.7	-	-	ns
		$V_{CC} = 2.7\text{ V}$	0.6	-	-	ns
$t_h$	hold time	Dn to LE; see <a href="#">Fig. 10</a> [3]				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.6	-	-	ns
		$V_{CC} = 2.7\text{ V}$	1.8	-	-	ns
$t_w$	pulse width	LE input HIGH; see <a href="#">Fig. 6</a> [4]				
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	3.3	-	-	ns
		$V_{CC} = 2.7\text{ V}$	3.3	-	-	ns

[1] Typical values are at  $V_{CC} = 3.3\text{ V}$  and  $T_{amb} = 25\text{ °C}$ .

[2]  $t_{su}$  is the same as  $t_{su(L)}$  and  $t_{su(H)}$ .

[3]  $t_h$  is the same as  $t_{h(L)}$  and  $t_{h(H)}$ .

[4]  $t_w$  is the same as  $t_{wL}$  and  $t_{wH}$ .

10.1. Waveforms and test circuit

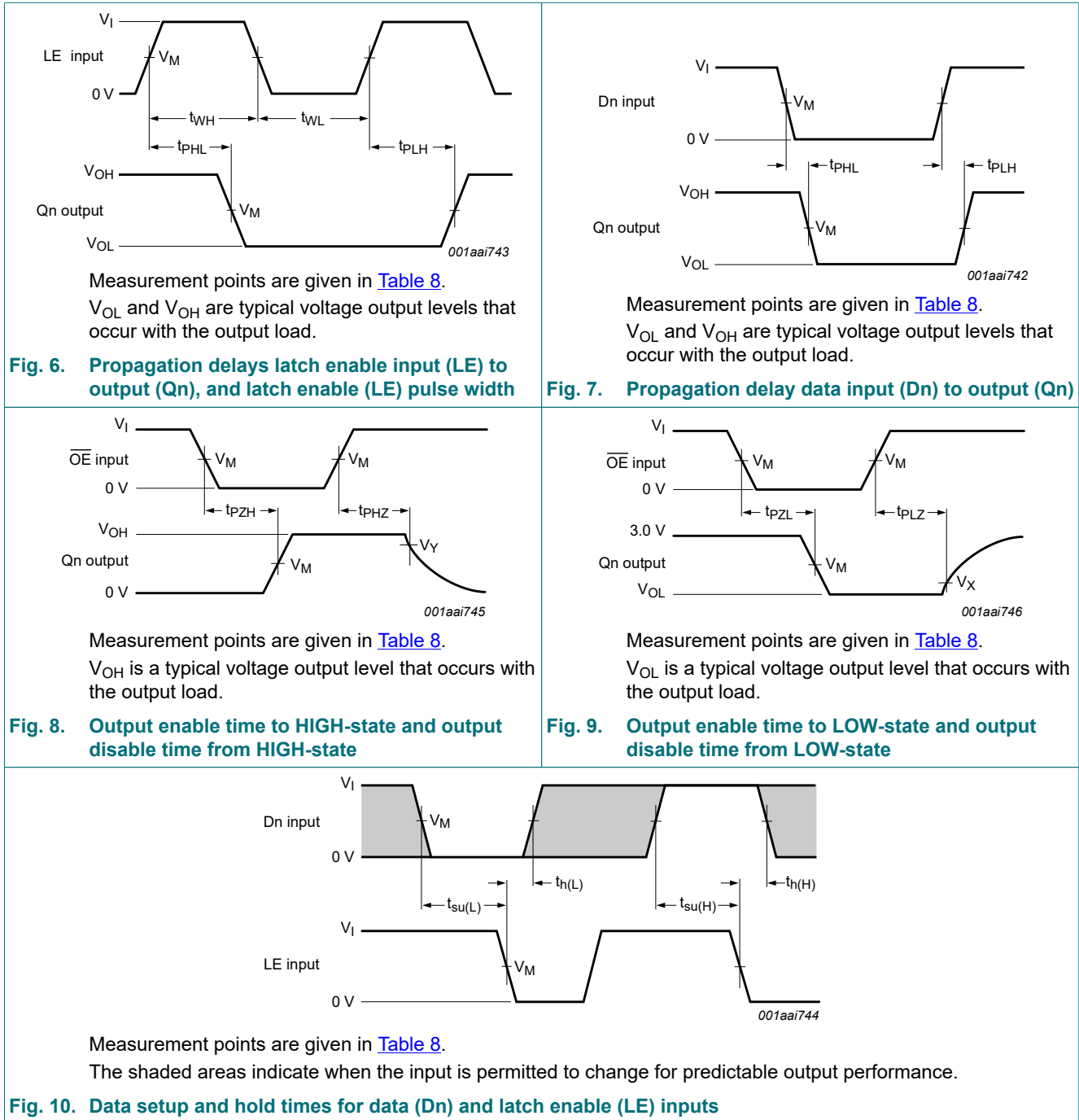
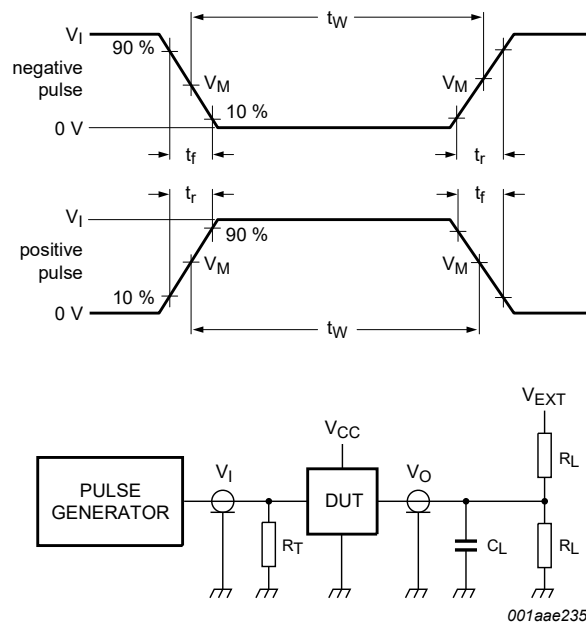


Table 8. Measurement points

Input	Output		
$V_M$	$V_M$	$V_X$	$V_Y$
1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$





Test data is given in [Table 9](#).

Definitions test circuit:

$R_L$  = Load resistance.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

$V_{EXT}$  = Test voltage for switching times.

**Fig. 11. Test circuit for measuring switching times**

**Table 9. Test data**

Input				Load		$V_{EXT}$		
$V_I$	$f_i$	$t_w$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHZ}, t_{PZH}$	$t_{PLZ}, t_{PZL}$	$t_{PLH}, t_{PHL}$
2.7 V	$\leq 10$ MHz	500 ns	$\leq 2.5$ ns	50 pF	500 $\Omega$	GND	6 V	open

11. Package outline

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

SOT163-1



Fig. 12. Package outline SOT163-1 (SO20)

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

SOT360-1



Fig. 13. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1



Fig. 14. Package outline SOT764-1 (DHVQFN20)

## 12. Abbreviations

Table 10. Abbreviations

Acronym	Description
BiCMOS	Bipolar Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

## 13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVT573 v.9	20210730	Product data sheet	-	74LVT573 v.8
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type number 74LVT573DB (SOT339-1/SSOP20) removed.</li> <li><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li><a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation removed.</li> <li><a href="#">Fig. 14</a>: Package outline drawing SOT764-1 (DHVQFN20) updated.</li> </ul>			
74LVT573 v.8	20111122	Product data sheet	-	74LVT573 v.7
Modifications:	<ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>			
74LVT573 v.7	20110912	Product data sheet	-	74LVT573 v.6
74LVT573 v.6	20110727	Product data sheet	-	74LVT573 v.5
74LVT573 v.5	20110629	Product data sheet	-	74LVT573 v.4
74LVT573 v.4	20080915	Product data sheet	-	74LVT573 v.3
74LVT573 v.3	20011217	Product data sheet	-	74LVT573 v.2
74LVT573 v.2	19980219	Product specification	-	-

## 14. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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