74LVT573

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

Rev. 04 — 15 September 2008   **Product data sheet**

1. General description

The 74LVT573 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 Latch Enable (LE) 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 (LE) input is High. The latch remains transparent to the data inputs while LE 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.
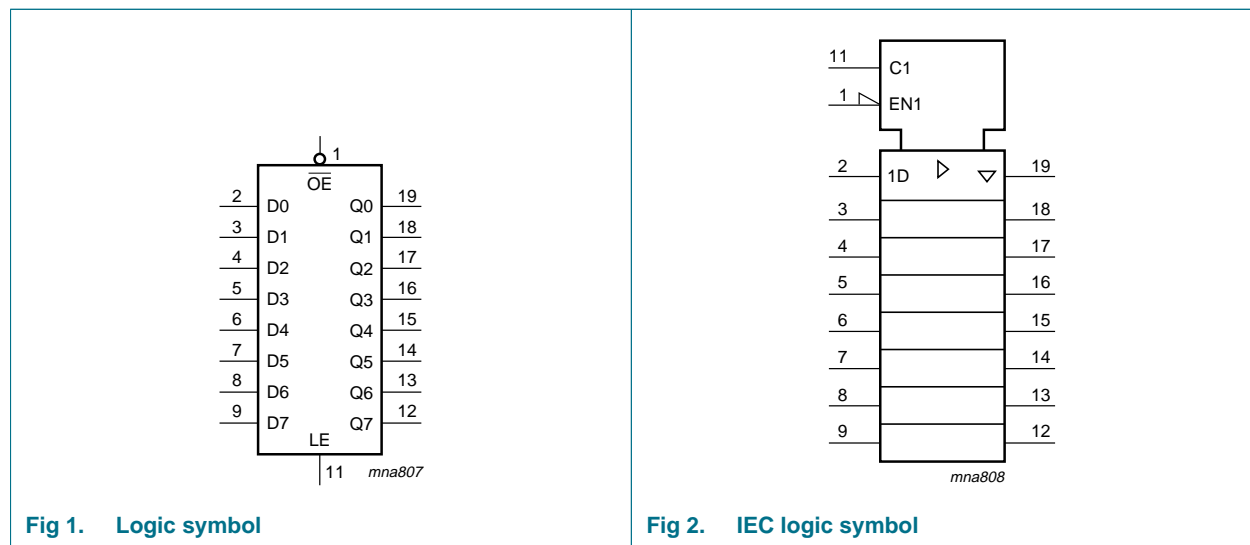
2. Features

- Inputs and outputs arranged for easy interfacing to microprocessors
- 3-state outputs for bus interfacing
- Common output enable control
- TTL input and output switching 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
- Latch-up protection
    - JESD78 class II exceeds 500 mA
- 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

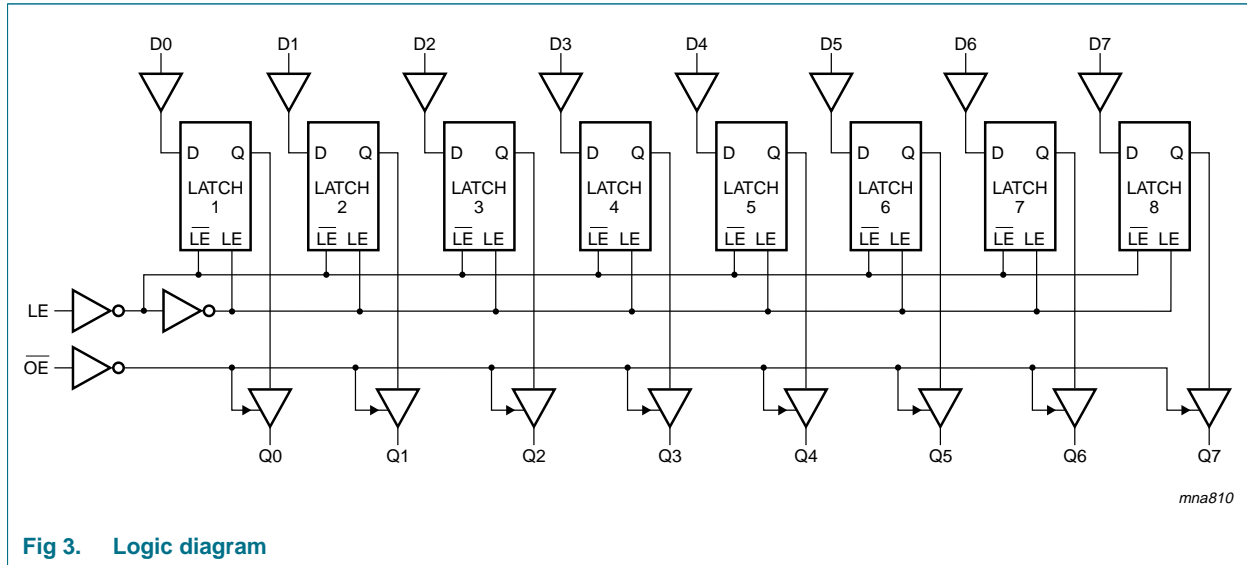| Type number	Package			
	Temperature range	**Name**	**Description**	**Version**
74LVT573D	−40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74LVT573DB	−40 °C to +85 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74LVT573PW	−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

74LVT573
74LVTH573

$\overline{OE}$	1		20	V_{CC}	
D0	2		19	Q0	
D1	3		18	Q1	
D2	4		17	Q2	
D3	5		16	Q3	
D4	6		15	Q4	
D5	7		14	Q5	
D6	8		13	Q6	
D7	9		12	Q7	
GND	10		11	LE	

001aah713
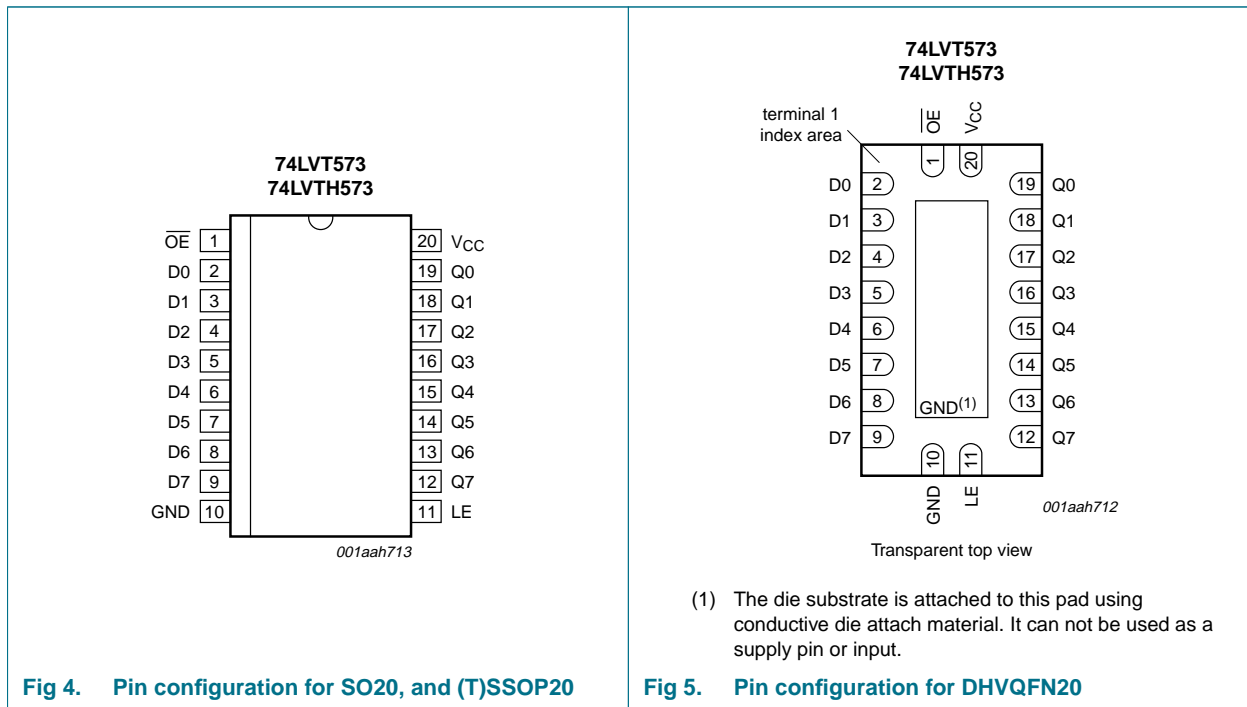
Fig 4.   Pin configuration for SO20, and (T)SSOP20

74LVT573
74LVTH573

terminal 1
index area

D0	2	19	Q0
D1	3	18	Q1
D2	4	17	Q2
D3	5	16	Q3
D4	6	15	Q4
D5	7	14	Q5
D6	8	13	Q6
D7	9	12	Q7

GND(1)

001aah712

Transparent top view

(1)   The die substrate is attached to this pad using
conductive die attach material. It can not be used as a
supply pin or input.

Fig 5.   Pin configuration for DHVQFN20

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
$\overline{OE}$	1	output enable input (active LOW)
D0 to D7	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable (active HIGH)
Q0 to Q7	19, 18, 17, 16, 15, 14, 13, 12	data output
V_{CC}	20	supply voltage

6. Functional description

6.1 Function table

Table 3. Function table [1]

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	↓	I	L	L
			h	H	H
Hold	L	L	X	NC	NC
Disable outputs	H	X	X	NC	Z

[1] H = HIGH voltage level;

L = LOW voltage level;

↓ = HIGH-to-LOW latch enable transition;

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

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

Z = high-impedance OFF-state;

NC = no change;

X = don't care.

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

Table 4. **Limiting values** …continued

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

Symbol	Parameter	Conditions		Min	Max	Unit
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	[3] -		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.

[3] For SO20 packages: above 70 °C derate linearly with 8 mW/K.
For SSOP20 and TSSOP20 packages: above 60 °C derate linearly with 5.5 mW/K.
For DHVQFN20 packages: above 60 °C derate linearly with 4.5 mW/K.

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 ≤ 50 %; f_i ≥ 1 kHz	-	-	64	mA
T_{amb}	ambient temperature	in free air	−40	-	+85	°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 °C to +85 °C			Unit
			Min	Typ[1]	Max	
V_{IK}	input clamping voltage	V_{CC} = 2.7 V; I_{IK} = −18 mA	−1.2	−0.9	-	V
V_{OH}	HIGH-level output voltage	V_{CC} = 2.7 V to 3.6 V; I_{OH} = −100 µA	V_{CC} − 0.2	V_{CC} − 0.1	-	V
		V_{CC} = 2.7 V; I_{OH} = −8 mA	2.4	2.5	-	V
		V_{CC} = 3.0 V; I_{OH} = −32 mA	2.0	2.2	-	V
V_{OL}	LOW-level output voltage	V_{CC} = 2.7 V; I_{OL} = 100 µA	-	0.1	0.2	V
		V_{CC} = 2.7 V; I_{OL} = 24 mA	-	0.3	0.5	V
		V_{CC} = 3.0 V I_{OL} = 16 mA	-	0.25	0.4	V
		V_{CC} = 3.0 V I_{OL} = 32 mA	-	0.3	0.5	V
		V_{CC} = 3.0 V I_{OL} = 64 mA	-	0.4	0.55	V
$V_{OL(pu)}$	power-up LOW-level output voltage	V_{CC} = 3.6 V; I_O = 1 mA; V_I = GND or V_{CC} [2]	-	0.13	0.55	V

Table 6. **Static characteristics** …continued

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

Symbol	Parameter	Conditions		T_{amb} = −40 °C to +85 °C			Unit
				Min	Typ[1]	Max	
I_I	input leakage current	all input pins;					
		V_{CC} = 0 V or 3.6 V; V_I = 5.5 V		-	1	10	µA
		control pins;					
		V_{CC} = 3.6 V; V_{CC} or GND		-	±0.1	±1	µA
		data pins					
		V_{CC} = 3.6 V; V_I = V_{CC}	[3]	-	0.1	1	µA
		V_{CC} = 3.6 V; V_I = 0 V		−5	−1	-	µA
I_{OFF}	power-off leakage current	V_{CC} = 0 V; V_I or V_O = 0 V to 4.5 V		-	1	±100	µA
I_{BHL}	bus hold LOW current	Dn input; V_{CC} = 3 V; V_I = 0.8 V	[4]	75	150	-	µA
I_{BHH}	bus hold HIGH current	Dn input; V_{CC} = 3 V; V_I = 2.0 V		-	−150	−75	µA
I_{BHHO}	bus hold HIGH overdrive current	Dn input; V_{CC} = 0 V to 3.6 V	[4]	-	-	500	µA
I_{BHLO}	bus hold LOW overdrive current	Dn input; V_I = 3.6 V		−500	-	-	µA
I_{LO}	output leakage current	Qn output HIGH when V_O = 5.5 V and V_{CC} = 3.0 V		-	60	125	µA
$I_{O(pu/pd)}$	power-up/power-down output current	$V_{CC} \leq 1.2$ V; V_O = 0.5 V to V_{CC}; V_I = GND or V_{CC}; $\overline{OE}$ = don't care	[5]	-	1	±100	µA
I_{OZ}	OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IH} or V_{IL}					
		output HIGH: V_O = 3.0 V		-	1	5	µA
		output LOW: V_O = 0.5 V		−5	−1	-	µA
I_{CC}	supply current	V_{CC} = 3.6 V; V_I = GND or V_{CC}; I_O = 0 A					
		outputs HIGH		-	0.13	0.19	mA
		outputs LOW		-	3	12	mA
		outputs disabled	[6]	-	0.13	0.19	mA
ΔI_{CC}	additional supply current	per input pin; V_{CC} = 3 V to 3.6 V; one input at V_{CC} − 0.6 V and other inputs at V_{CC} or GND	[7]	-	0.1	0.2	mA
C_I	input capacitance	V_I = 0 V or 3.0 V		-	4	-	pF
C_O	output capacitance	outputs disabled; V_O = 0 V or 3.0 V		-	8	-	pF

[1] Typical values are measured at V_{CC} = 3.3 V and T_{amb} = 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_{CC} 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_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From V_{CC} = 1.2 V to V_{CC} = 3.3 V ± 0.3 V a transition time of 100 µs is permitted. This parameter is valid for T_{amb} = 25 °C only.

[6] I_{CC} is measured with outputs pulled to V_{CC} or GND.

[7] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

74LVT573_4

Product data sheet **Rev. 04 — 15 September 2008** **6 of 16**

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to ground (GND = 0 V); for test circuit see Figure 11.

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

[1] Typical values are at V_{CC} = 3.3 V and T_{amb} = 25 °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 $t_{h(H)}$.
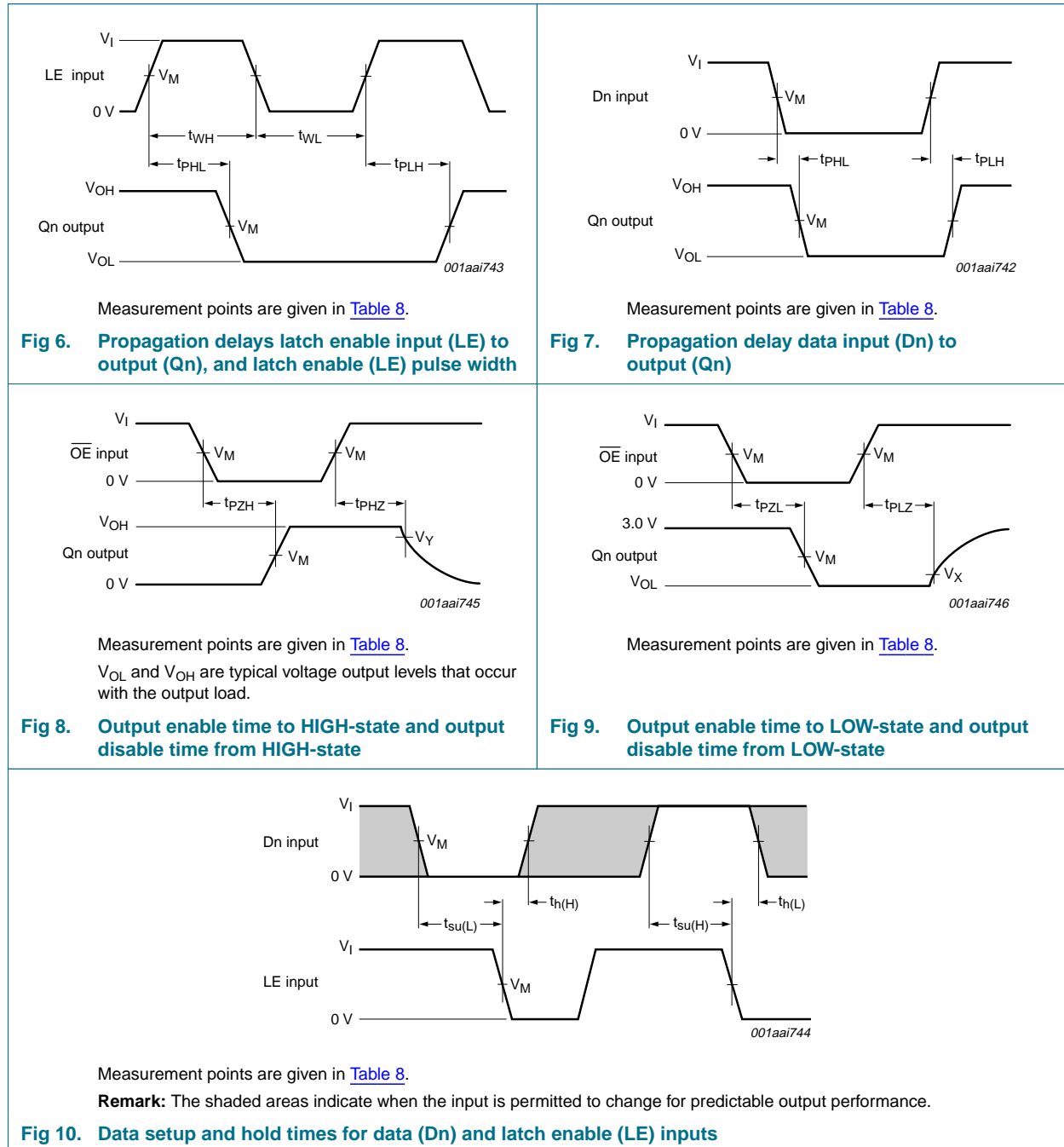
[4] t_W is the same as t_{WL} and t_{WH}.

74LVT573_4

Product data sheet Rev. 04 — 15 September 2008 **7 of 16**

11. Waveforms

Measurement points are given in Table 8.

Fig 6.   **Propagation delays latch enable input (LE) to output (Qn), and latch enable (LE) pulse width**

Measurement points are given in Table 8.

Fig 7.   **Propagation delay data input (Dn) to output (Qn)**

Measurement points are given in Table 8.

V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 8.   **Output enable time to HIGH-state and output disable time from HIGH-state**

Measurement points are given in Table 8.

Fig 9.   **Output enable time to LOW-state and output disable time from LOW-state**

Measurement points are given in Table 8.

Remark: The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig 10.   **Data setup and hold times for data (Dn) and latch enable (LE) inputs**

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 circuitry for switching times
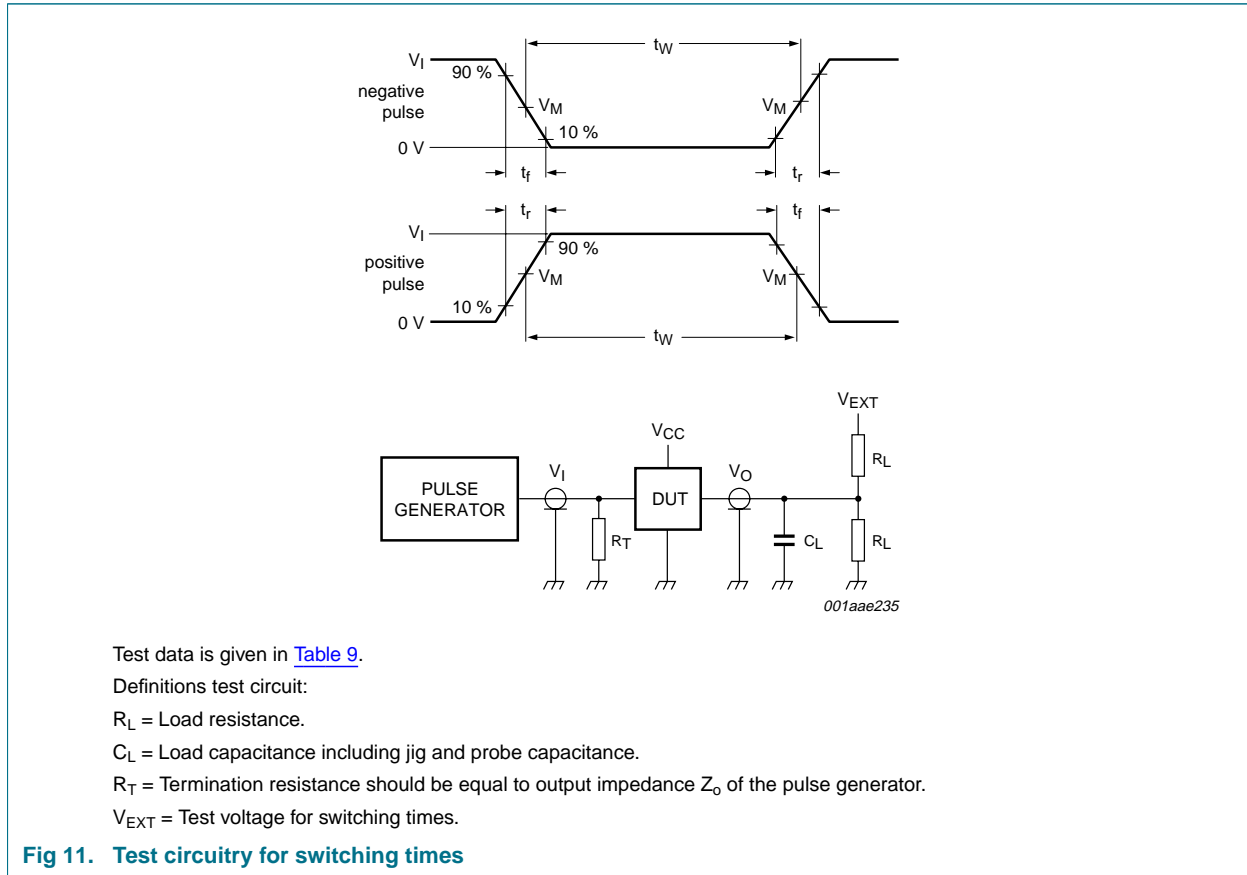
Table 9. Test data

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	≤ 10 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	GND	6 V	open

12. Package outline

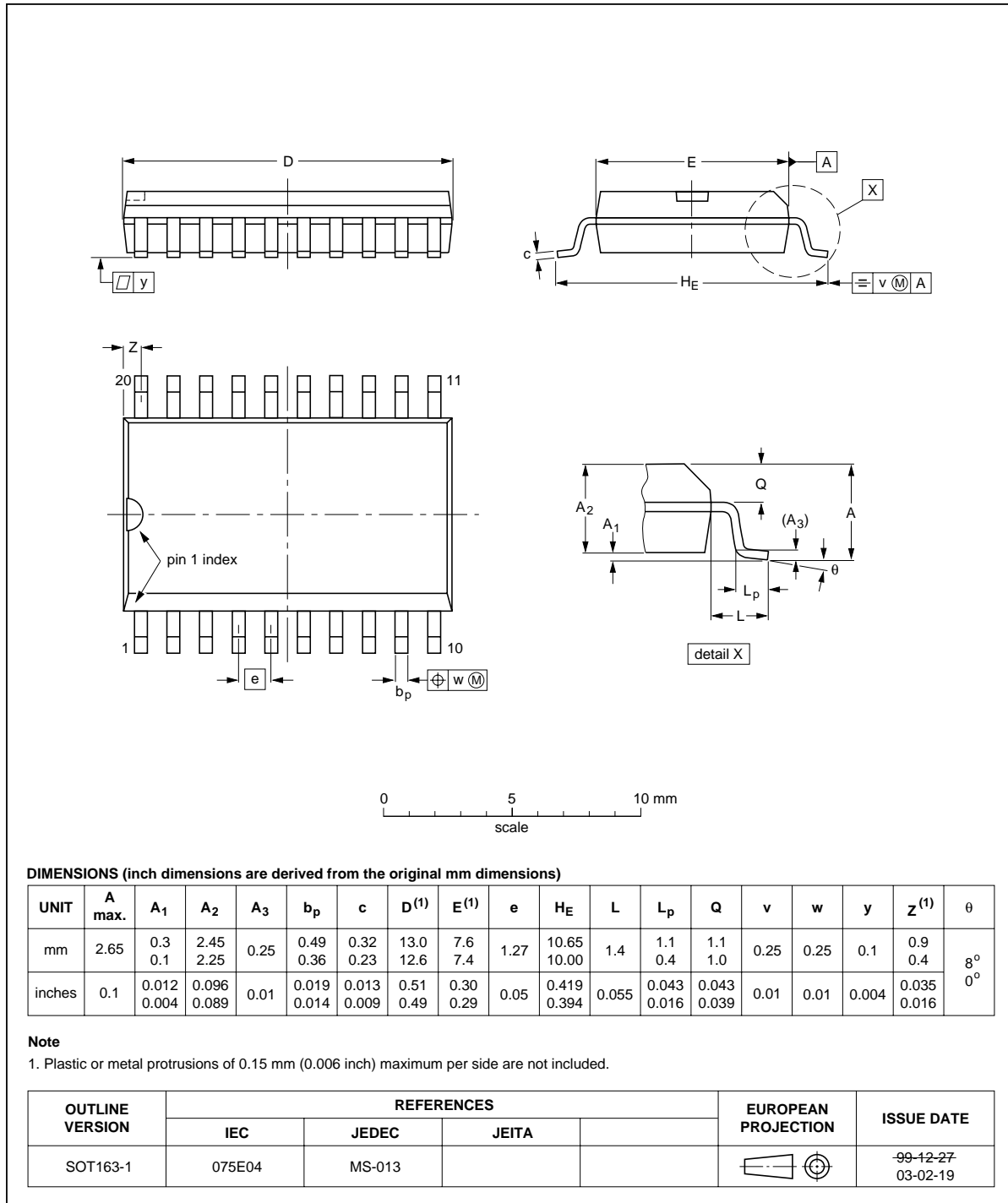**SO20: plastic small outline package; 20 leads; body width 7.5 mm** **SOT163-1**

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

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	2.65	0.3 0.1	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	0.1	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	0.05	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 (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT163-1	075E04	MS-013				~~99-12-27~~ 03-02-19

Fig 12. Package outline SOT163-1 (SO20)

74LVT573_4

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm **SOT339-1**

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	b_p	c	D[1]	E[1]	e	H_E	L	L_p	Q	v	w	y	Z[1]	θ
mm	2	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 0.2 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT339-1		MO-150				~~99-12-27~~ 03-02-19
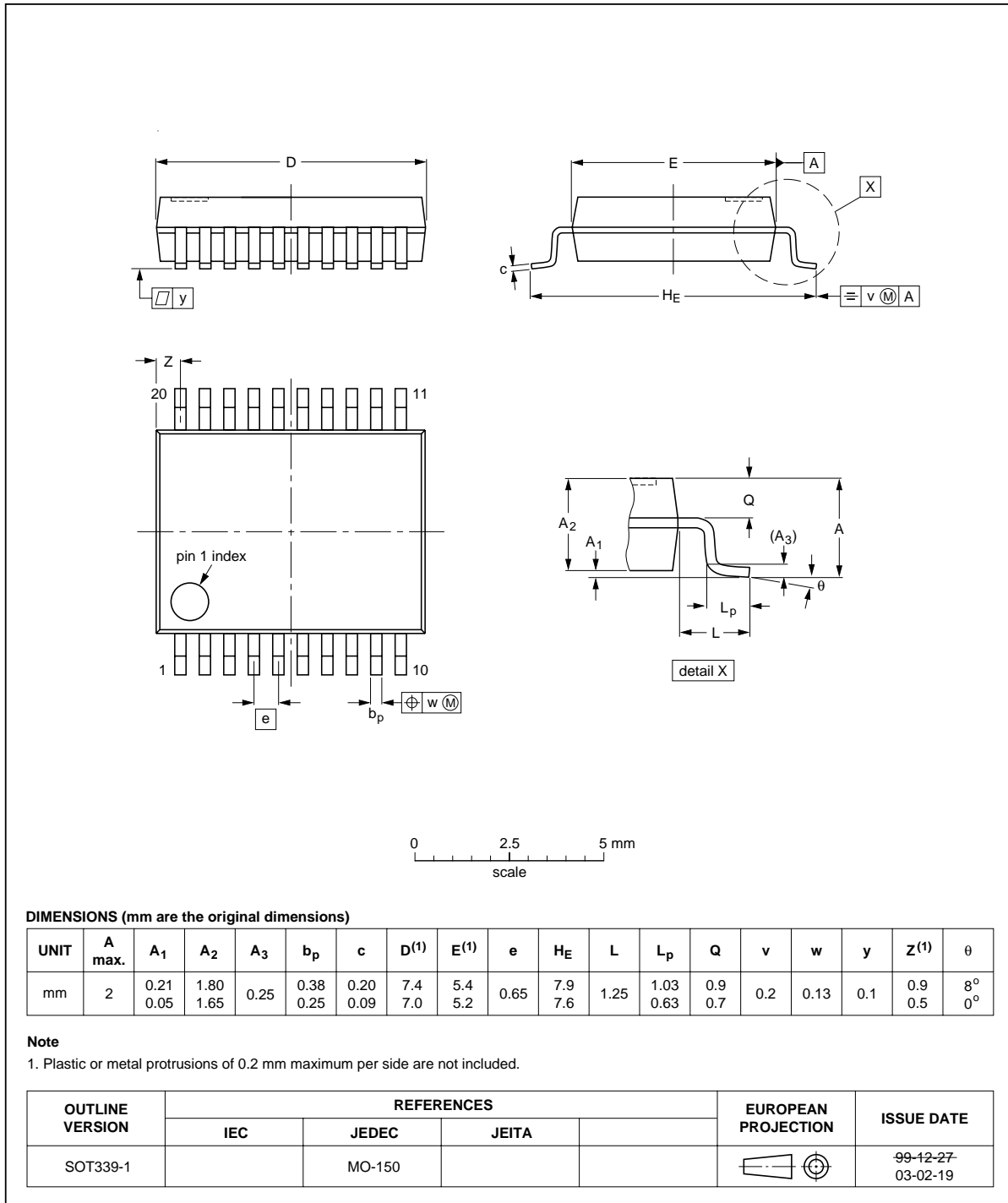
Fig 13. Package outline SOT339-1 (SSOP20)

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.	A₁	A₂	A₃	bₚ	c	D[1]	E[2]	e	H_E	L	Lₚ	Q	v	w	y	Z[1]	θ
mm	1.1	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	0.75 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	JEITA			
SOT360-1		MO-153				~~99-12-27~~ 03-02-19
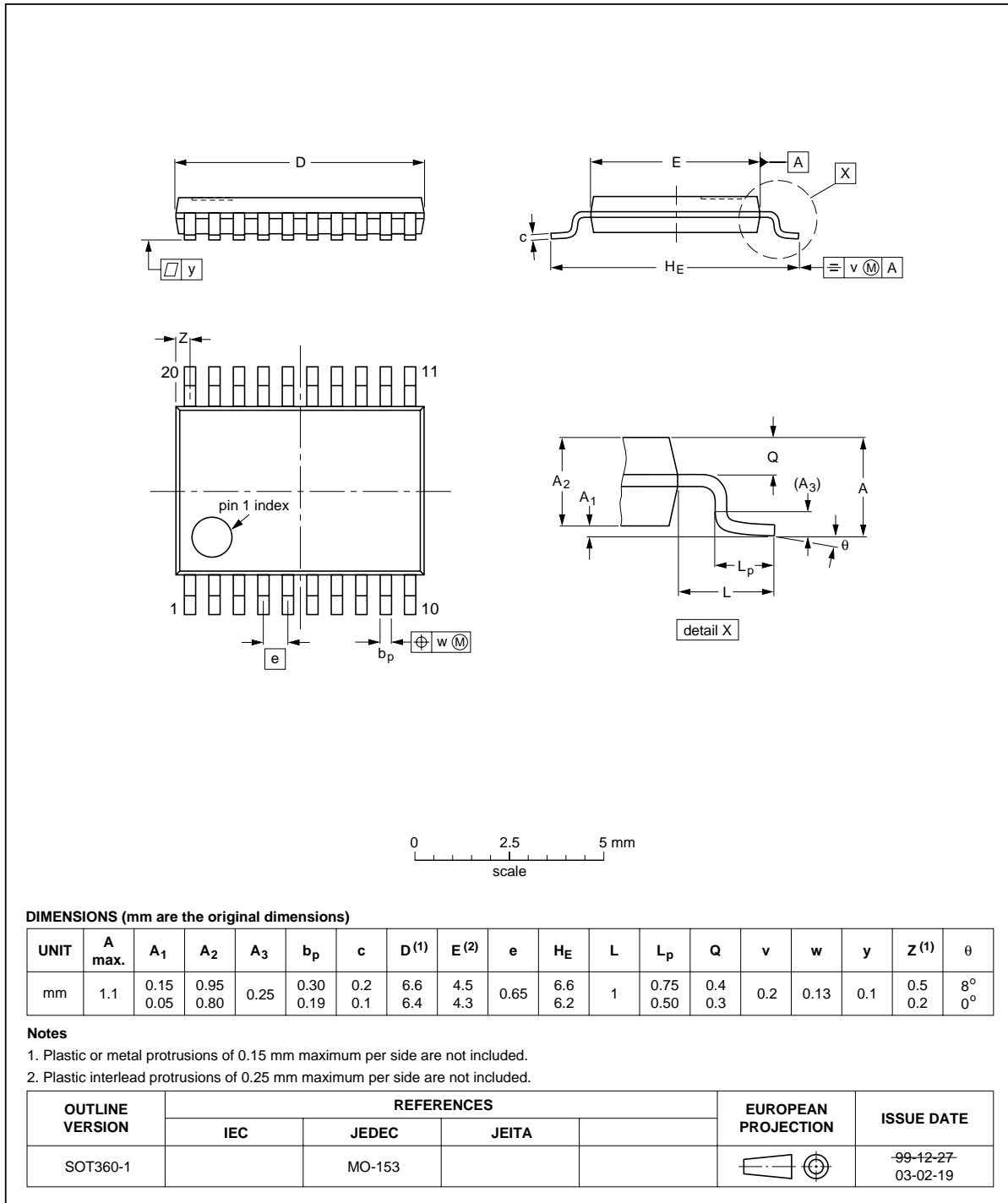
Fig 14. Package outline SOT360-1 (TSSOP20)

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**

terminal 1
index area

detail X

terminal 1
index area

DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max.	A_1	b	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	4.6 4.4	3.15 2.85	2.6 2.4	1.15 0.85	0.5	3.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT764-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

Fig 15. Package outline SOT764-1 (DHVQFN20)

13. 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

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVT573_4	20080915	Product data sheet	-	74LVT573_3
Modifications:	- The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. - Legal texts have been adapted to the new company name where appropriate. - Section 3 "Ordering information" and Section 12 "Package outline": DGHVQFN20 package added. - Table 4 "Limiting values" T_j and P_{tot} added. - Table 6 "Static characteristics" V_{RST} changed to V_{OL}; I_{HOLD} changed to I_{BHL}, I_{BHH}, I_{BHHO} and I_{BHLO}; I_{CCH}, I_{CCL} and I_{CCZ} changed to I_{CC}; C_i changed to C_I and C_{OUT} changed to C_O. - Table 7 "Dynamic characteristics" $t_{su(H)}$ and $t_{su(L)}$ changed to t_{su}; $t_{h(H)}$ and $t_{h(L)}$ changed to t_h and $t_{W(H)}$ and $t_{W(L)}$ changed to t_W.			
74LVT573_3	20011217	Product data sheet	-	74LVT573_2
74LVT573_2	19980219	Product specification	-	-

15. Legal information

15.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

15.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

15.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or

malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

16. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

17. Contents

founded by

PHILIPS