

74LVT244B; 74LVTH244B

3.3 V octal buffer/line driver; 3-state

Rev. 03 — 3 March 2006

Product data sheet

1. General description

The 74LVT244B; 74LVTH244B is a high-performance BiCMOS product designed for V_{CC} operation at 3.3 V.

This device is an octal buffer that is ideal for driving bus lines. The device features two output enable inputs ($\overline{1OE}$ and $\overline{2OE}$), each controlling four of the 3-state outputs.

2. Features

- Octal bus interface
- 3-state buffers
- Speed upgrade of 74LVT244A
- Output capability: +64 mA and –32 mA
- 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
- Power-up 3-state
- Live insertion and extraction permitted
- No bus current loading when output is tied to 5 V bus
- Latch-up protection:
 - ◆ JESD78: exceeds 500 mA
- ESD protection:
 - ◆ HBM EIA/JESD22-A114-C exceeds 2000 V
 - ◆ MM EIA/JESD22-A115-A 200 V

3. Quick reference data

Table 1. Quick reference data

$GND = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PLH}	LOW-to-HIGH propagation delay nA_n to nY_n	$C_L = 50\text{ pF}$; $V_{CC} = 3.3\text{ V}$	-	1.9	-	ns
t_{PHL}	HIGH-to-LOW propagation delay nA_n to nY_n	$C_L = 50\text{ pF}$; $V_{CC} = 3.3\text{ V}$	-	2.0	-	ns

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Table 1. Quick reference data ...continued

 $GND = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

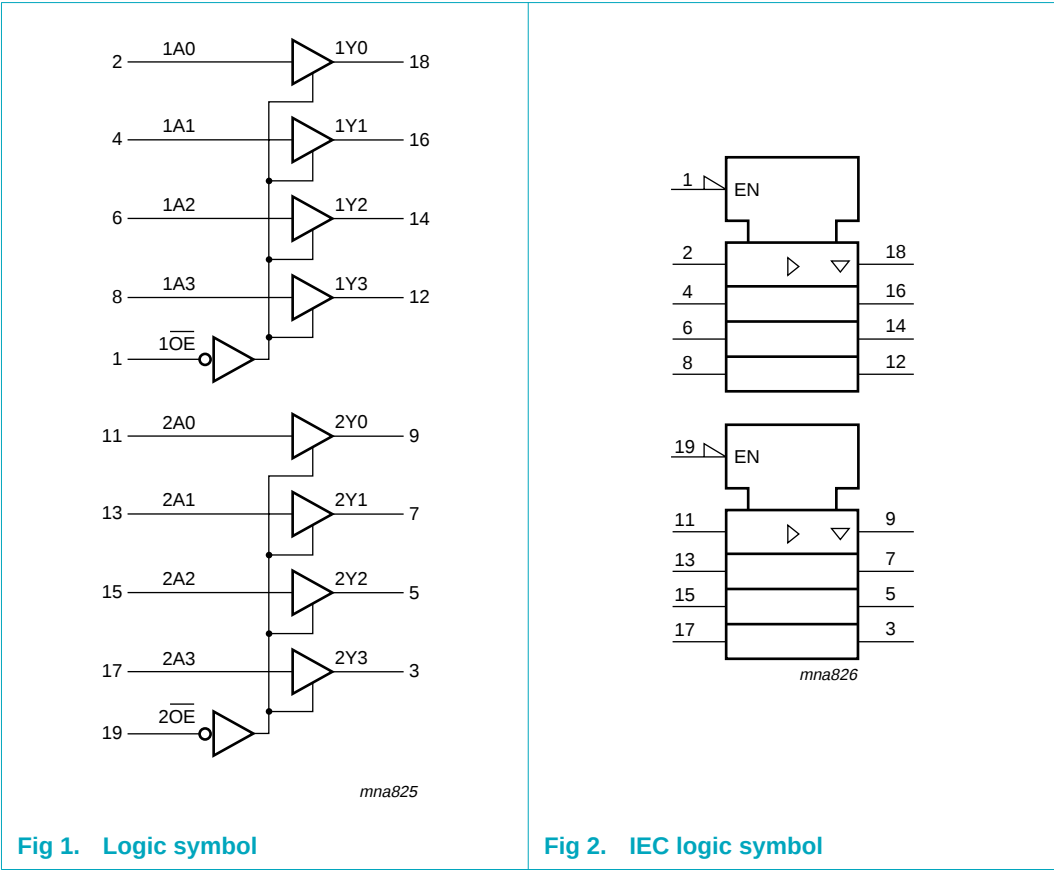
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_i	input capacitance	$V_i = 0\text{ V}$ or 3.0 V	-	4	-	pF
C_o	output capacitance	outputs disabled; $V_o = 0\text{ V}$ or 3.0 V	-	8	-	pF
I_{CC}	quiescent supply current	outputs disabled; $V_{CC} = 3.6\text{ V}$; $I_O = 0\text{ A}$; $V_i = GND$ or V_{CC}	-	0.13	-	mA

4. Ordering information

Table 2. Ordering information

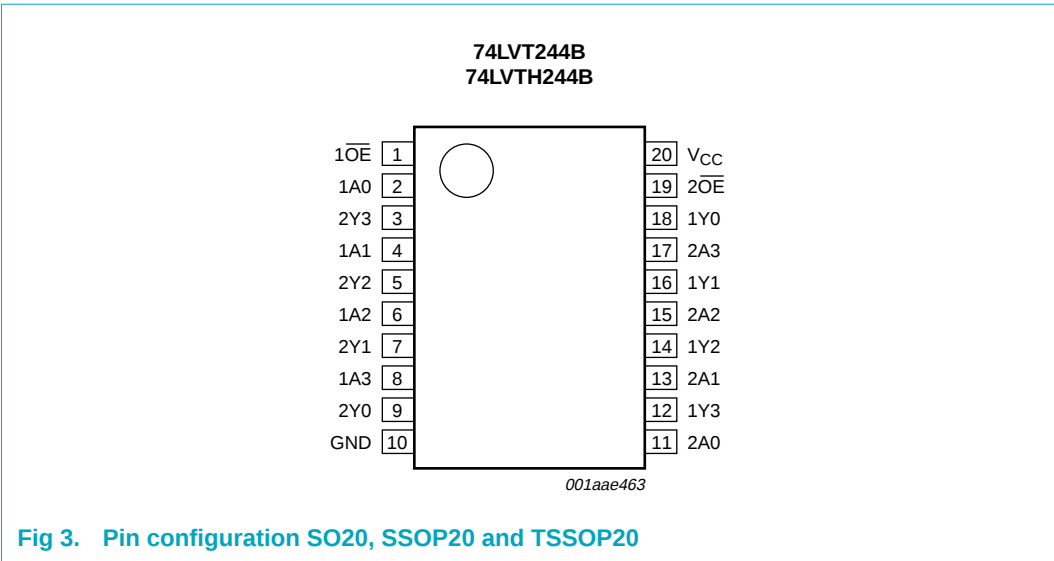
Type number	Package			
	Temperature range	Name	Description	Version
74LVT244BD	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74LVT244BDB	-40 °C to +85 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74LVT244BPW	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74LVTH244BD	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74LVTH244BDB	-40 °C to +85 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74LVTH244BPW	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1

5. Functional diagram



6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
$1\overline{OE}$	1	1 output enable input
1A0	2	1 data input 0
2Y3	3	2 data output 3
1A1	4	1 data input 1
2Y2	5	2 data output 2
1A2	6	1 data input 2
2Y1	7	2 data output 1
1A3	8	1 data input 3
2Y0	9	2 data output 0
GND	10	ground (0 V)
2A0	11	2 data input 0
1Y3	12	1 data output 3
2A1	13	2 data input 1
1Y2	14	1 data output 2
2A2	15	2 data input 2
1Y1	16	1 data output 1
2A3	17	2 data input 3
1Y0	18	1 data output 0
$2\overline{OE}$	19	2 output enable input
V _{CC}	20	supply voltage

7. Functional description

7.1 Function table

Table 4. Function table [\[1\]](#)

Control	Input	Output
$n\overline{OE}$	nAn	nYn
L	L	L
	H	H
H	X	Z

- [1] H = HIGH voltage level;
 L = LOW voltage level;
 X = don't care;
 Z = high-impedance OFF-state.

8. Limiting values

Table 5. 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

[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.

9. Recommended operating conditions

Table 6. 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-state input voltage		2.0	-	-	V
V_{IL}	LOW-state input voltage		-	-	0.8	V
I_{OH}	HIGH-state output current		-	-	-32	mA
I_{OL}	LOW-state output current	none	-	-	32	mA
		current duty cycle ≤ 50 %; $f_i \geq 1$ 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

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = –40 °C to +85 °C [1]						
V _{IK}	input clamping voltage	V _{CC} = 2.7 V; I _{IK} = –18 mA	-	–0.9	–1.2	V
V _{OH}	HIGH-state output voltage	V _{CC} = 2.7 V				
		I _{OH} = –100 µA	V _{CC} – 2.0	V _{CC} – 2.1	-	V
		I _{OH} = –8 mA	2.4	2.5	-	V
		V _{CC} = 3.0 V				
V _{OL}	LOW-state output voltage	I _{OH} = –32 mA	2.0	2.2	-	V
		V _{CC} = 2.7 V				
		I _{OL} = 100 µA	-	0.1	0.2	V
		I _{OL} = 24 mA	-	0.3	0.5	V
		V _{CC} = 3.0 V				
		I _{OL} = 16 mA	-	0.25	0.4	V
		I _{OL} = 32 mA	-	0.3	0.5	V
I _{LI}	input leakage current	I _{OL} = 64 mA	-	0.4	0.55	V
		all pins	V _{CC} = 0 V or 3.6 V; V _I = 5.5 V	-	0.1	10 µA
		control pins	V _{CC} = 3.6 V; V _I = V _{CC} or GND	-	±0.1	±1 µA
		I/O data pins	V _{CC} = 3.6 V [2]			
		V _I = V _{CC}	-	0.1	1	µA
I _{OFF}	power-off leakage current	V _I = 0 V	-	–1	–5	µA
		V _{CC} = 0 V; V _I or V _O = 0 V to 4.5 V	-	1	±100	µA
I _{HOLD}	bus hold current data input	V _{CC} = 3 V [3]				
		V _I = 0.8 V	75	130	-	µA
		V _I = 2.0 V	–75	–140	-	µA
		V _{CC} = 0 V to 3.6 V				
I _{EX}	external current into output	V _I = 3.6 V	±500	-	-	µA
		output in HIGH-state when V _O > V _{CC} ; V _O = 5.5 V; V _{CC} = 3.3 V	-	60	125	µA
I _{O(pu/pd)}	power-up/power-down output current	V _{CC} ≤ 1.2 V; V _O = 0.5 V to V _{CC} ; V _I = GND or V _{CC} ; n _{OE} = don't care [4]	-	±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	-	–1	–5	µA
I _{CC}	quiescent supply current	V _{CC} = 3.6 V; V _I = GND or V _{CC} ; I _O = 0 A				
		output HIGH	-	0.13	0.19	mA
		output LOW	-	2	5	mA
		outputs disabled [5]	-	0.13	0.19	mA

Table 7. Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔI_{CC}	additional quiescent supply current	per input pin; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$; one input at $V_{CC} - 0.6\text{ V}$ and other inputs at V_{CC} or GND	[6] -	0.1	0.2	mA
C_i	input capacitance	$V_i = 0\text{ V or }3.0\text{ V}$	-	4	-	pF
C_o	output capacitance	outputs disabled; $V_O = 0\text{ V or }3.0\text{ V}$	-	8	-	pF

[1] Typical values are measured at $T_{amb} = 25\text{ }^{\circ}\text{C}$.[2] Unused pins at V_{CC} or GND.

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

[4] 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 $V_{CC} = 1.2\text{ V}$ to $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ a transition time of 100 μs is permitted. This parameter is valid for $T_{amb} = 25\text{ }^{\circ}\text{C}$ only.[5] I_{CC} is measured with outputs pulled to V_{CC} or GND.[6] This is the increase in supply current for each input at $V_{CC} - 0.6\text{ V}$.

11. Dynamic characteristics

Table 8. Dynamic characteristicsVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{amb} = -40\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$ [1]						
t_{PLH}	LOW-to-HIGH propagation delay nAn to nYn	see Figure 4				
		$V_{CC} = 2.7\text{ V}$	-	-	3.8	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.1	1.9	3.5	ns
t_{PHL}	HIGH-to-LOW propagation delay nAn to nYn	see Figure 4				
		$V_{CC} = 2.7\text{ V}$	-	-	3.6	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.3	2.0	3.3	ns
t_{PZH}	output enable time to HIGH-level $\overline{nOE}$ to nYn	see Figure 5				
		$V_{CC} = 2.7\text{ V}$	-	-	5.3	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.1	2.8	4.5	ns
t_{PZL}	output enable time to LOW-level $\overline{nOE}$ to nYn	see Figure 5				
		$V_{CC} = 2.7\text{ V}$	-	-	4.9	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.4	2.3	4.4	ns
t_{PHZ}	output disable time from HIGH-level $\overline{nOE}$ to nYn	see Figure 5				
		$V_{CC} = 2.7\text{ V}$	-	-	4.5	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.9	2.9	4.4	ns
t_{PLZ}	output disable time from LOW-level $\overline{nOE}$ to nYn	see Figure 5				
		$V_{CC} = 2.7\text{ V}$	-	-	4.4	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.8	2.5	4.4	ns

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

12. Waveforms

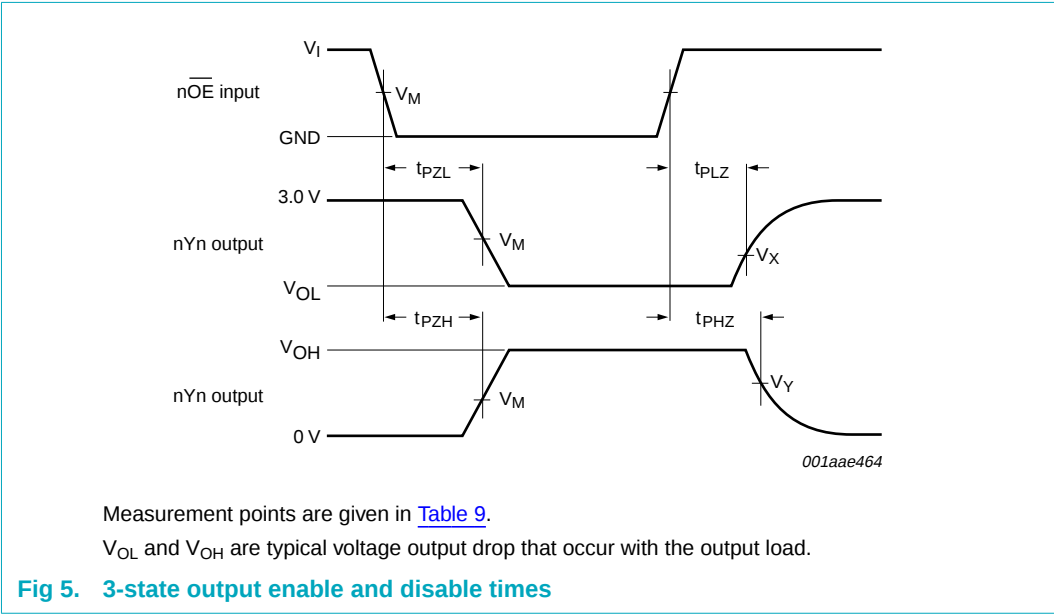
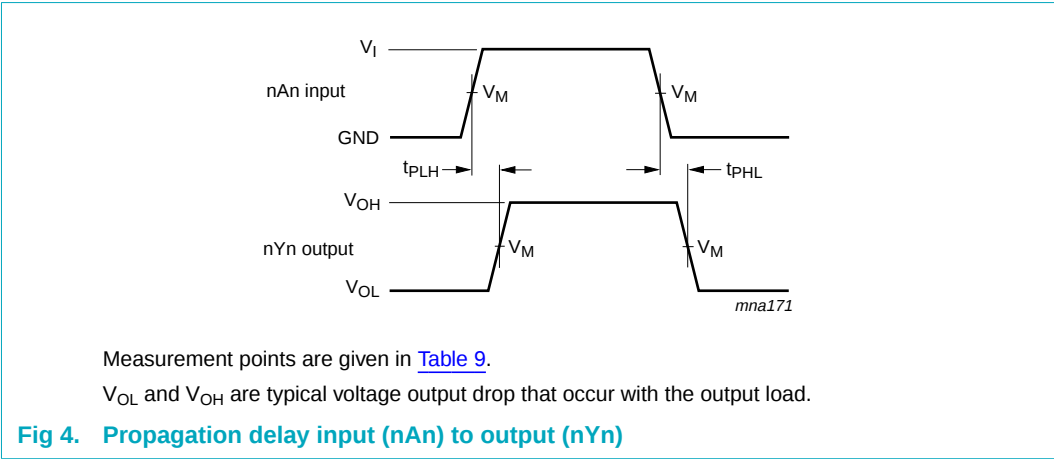


Table 9. Measurement points

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

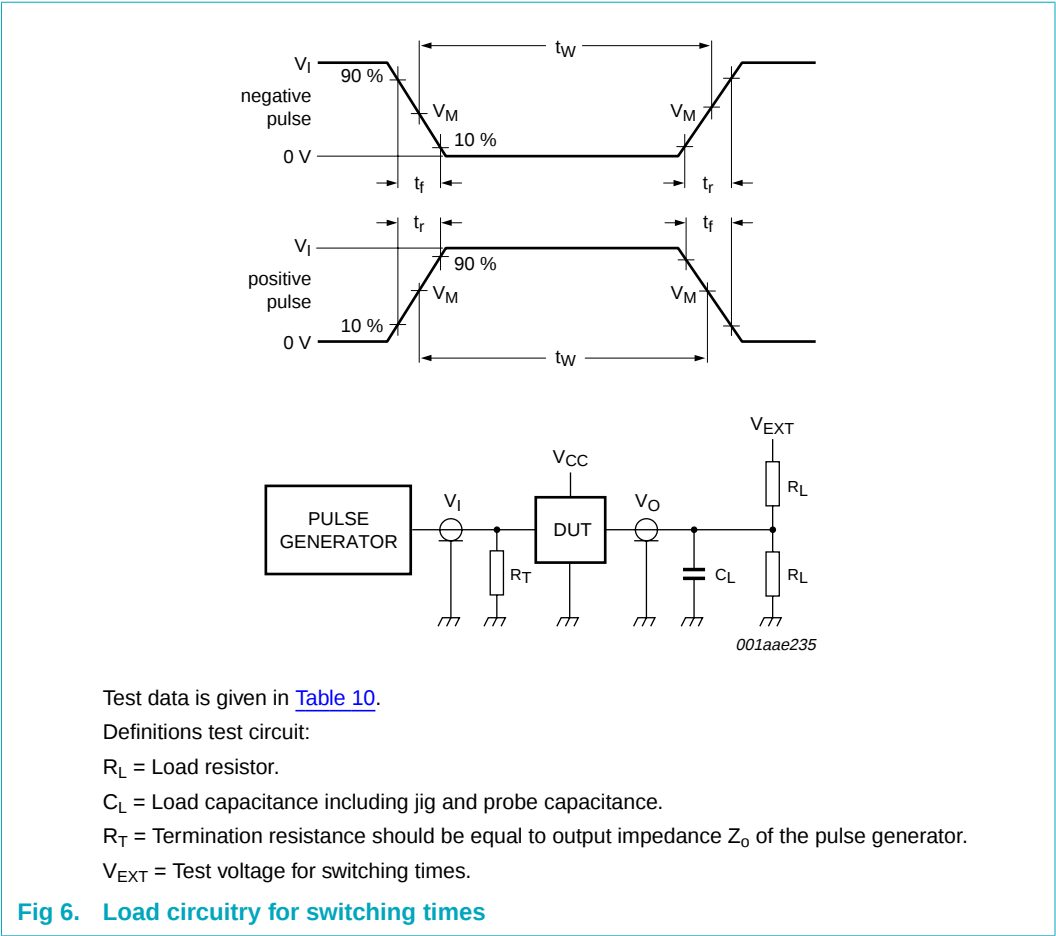


Table 10. Test data

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	

13. Package outline

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

SOT163-1

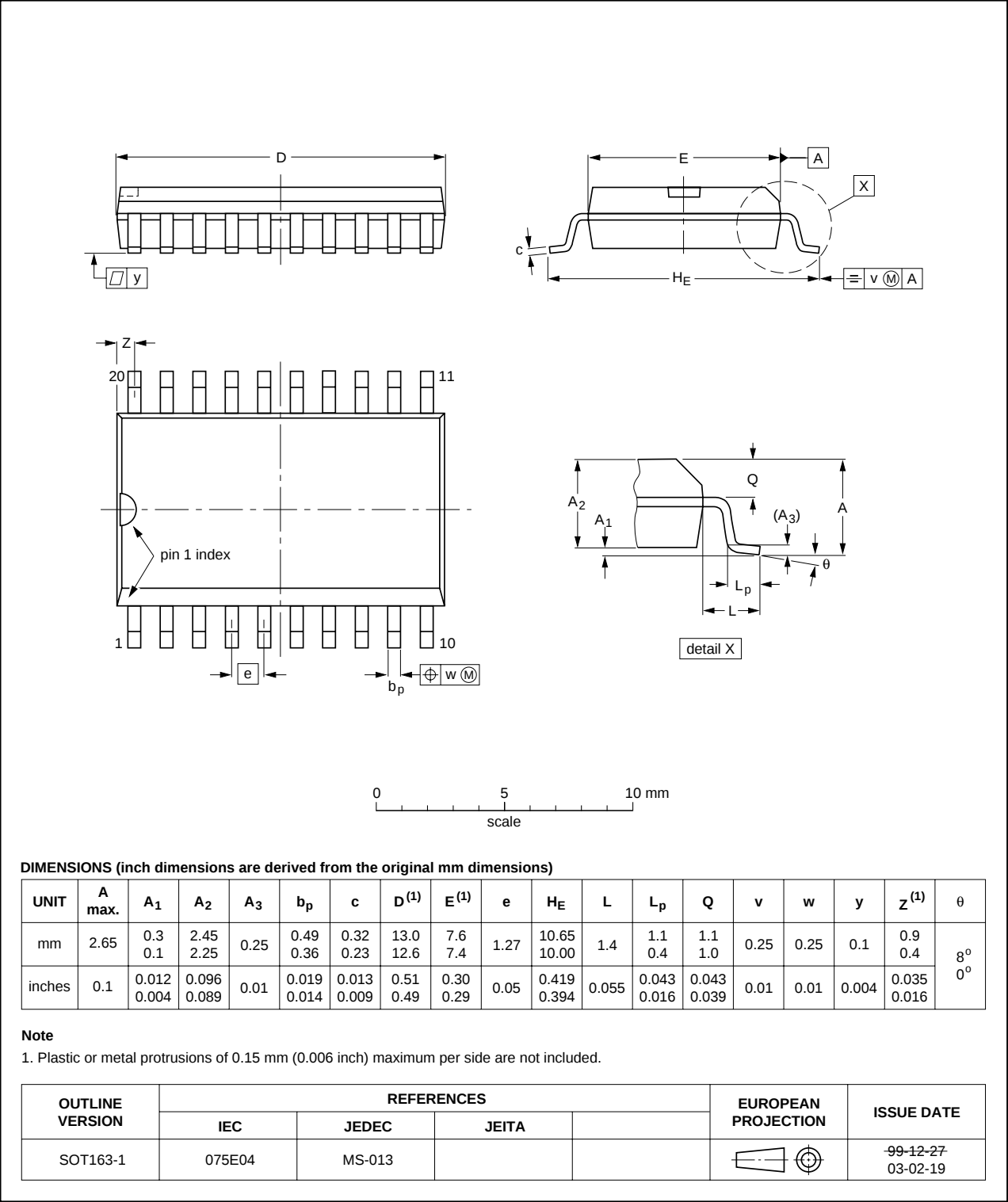


Fig 7. Package outline SOT163-1 (SO20)

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

SOT339-1

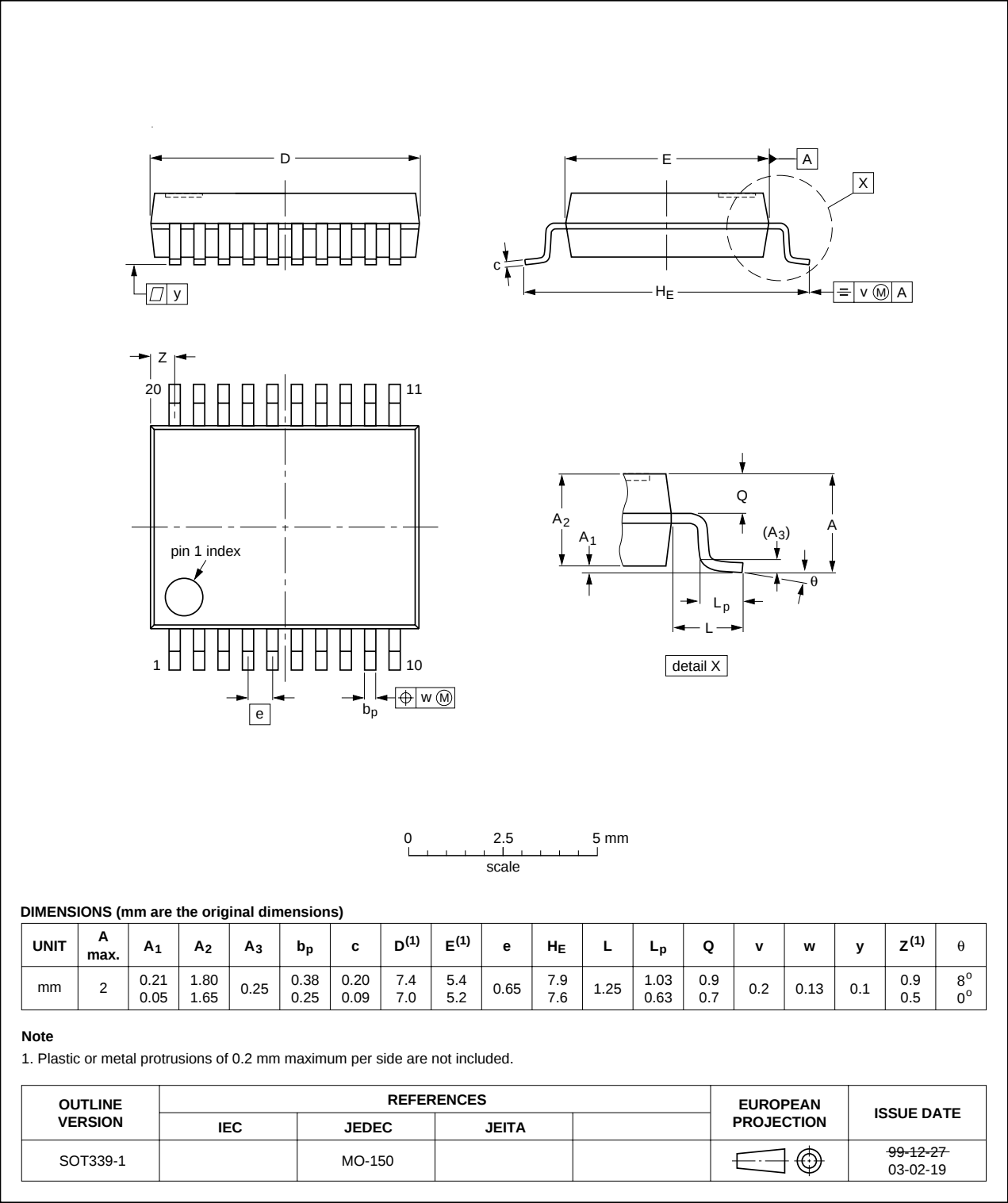


Fig 8. Package outline SOT339-1 (SSOP20)

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

SOT360-1

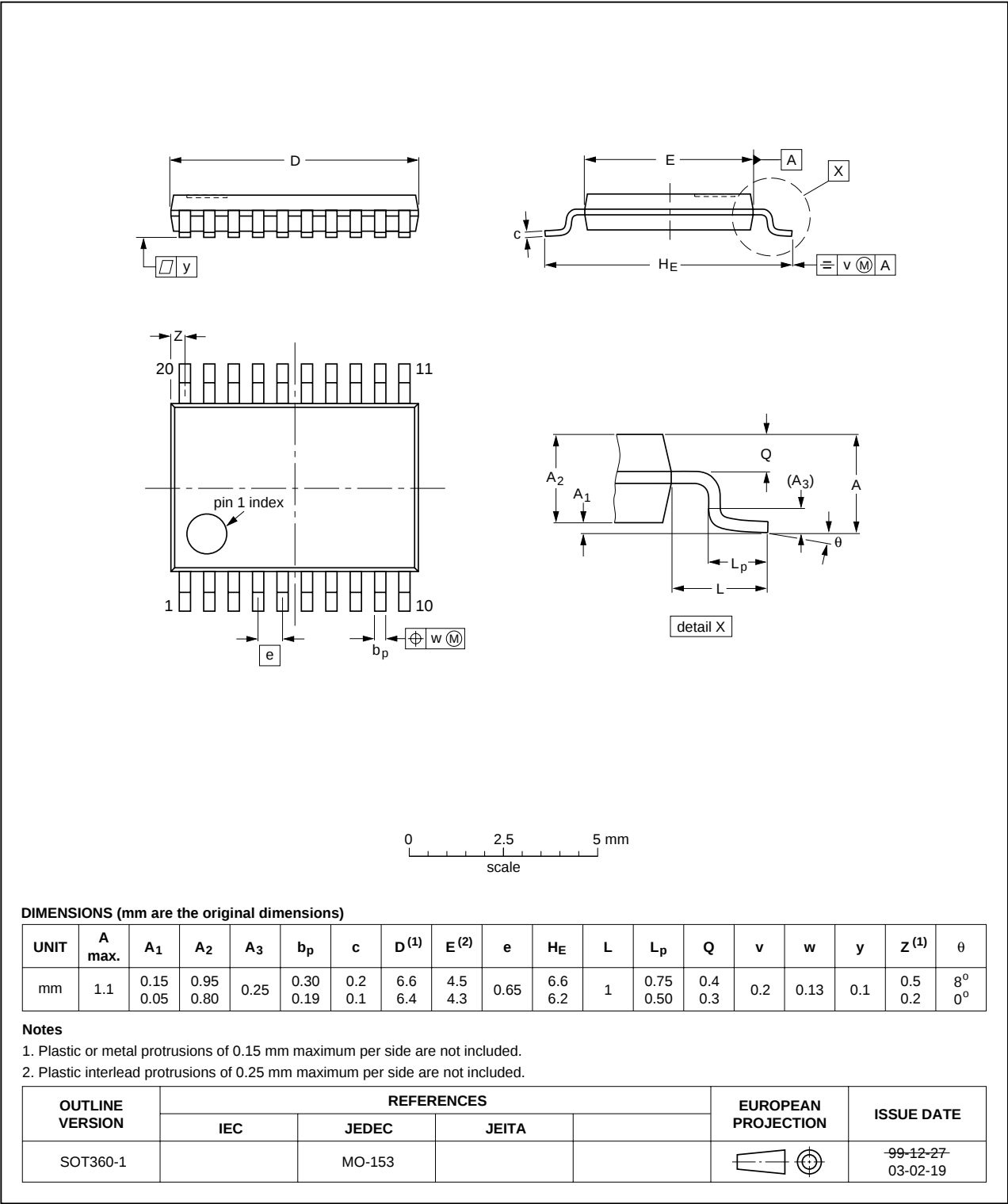


Fig 9. Package outline SOT360-1 (TSSOP20)

14. Abbreviations

Table 11. 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

15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVT_LVTH244B_3	20060303	Product data sheet	-	74LVT244B_2 (9397 750 11918)
Modifications:	- The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. Section 4: Added type numbers 74LVTH244BD, 74LVTH244BDB and 74LVTH244BPW.			
74LVT244B_2	20030919	Product specification	-	74LVT244B_1 (9397 750 04814)
74LVT244B_1	19981101	Product specification	-	-

16. Legal information

16.1 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.
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[1] Please consult the most recently issued document before initiating or completing a design.

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