

74ABT16240A

16-bit inverting buffer/line driver; 3-state

Rev. 6 — 3 November 2011

Product data sheet

1. General description

The 74ABT16240A high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16240A is an inverting 16-bit buffer that is ideal for driving bus lines. The device features four output enable inputs ($\overline{1OE}$, $\overline{2OE}$, $\overline{3OE}$, $\overline{4OE}$), each controlling four of the 3-state outputs.

2. Features and benefits

- 16-bit bus interface
- Multiple V_{CC} and GND pins minimize switching noise
- Power-up 3-state
- 3-state buffers
- TTL input and output switching levels
- Input and output interface capability to systems at 5 V supply
- Output capability: +64 mA and -32 mA
- Live insertion and extraction permitted
- Latch-up protection exceeds 500 mA per JESD78 class II level A
- ESD protection:
 - ◆ HBM JESD-A114E exceeds 2000 V
 - ◆ CDM JESD22-C101-C exceeds 1000 V

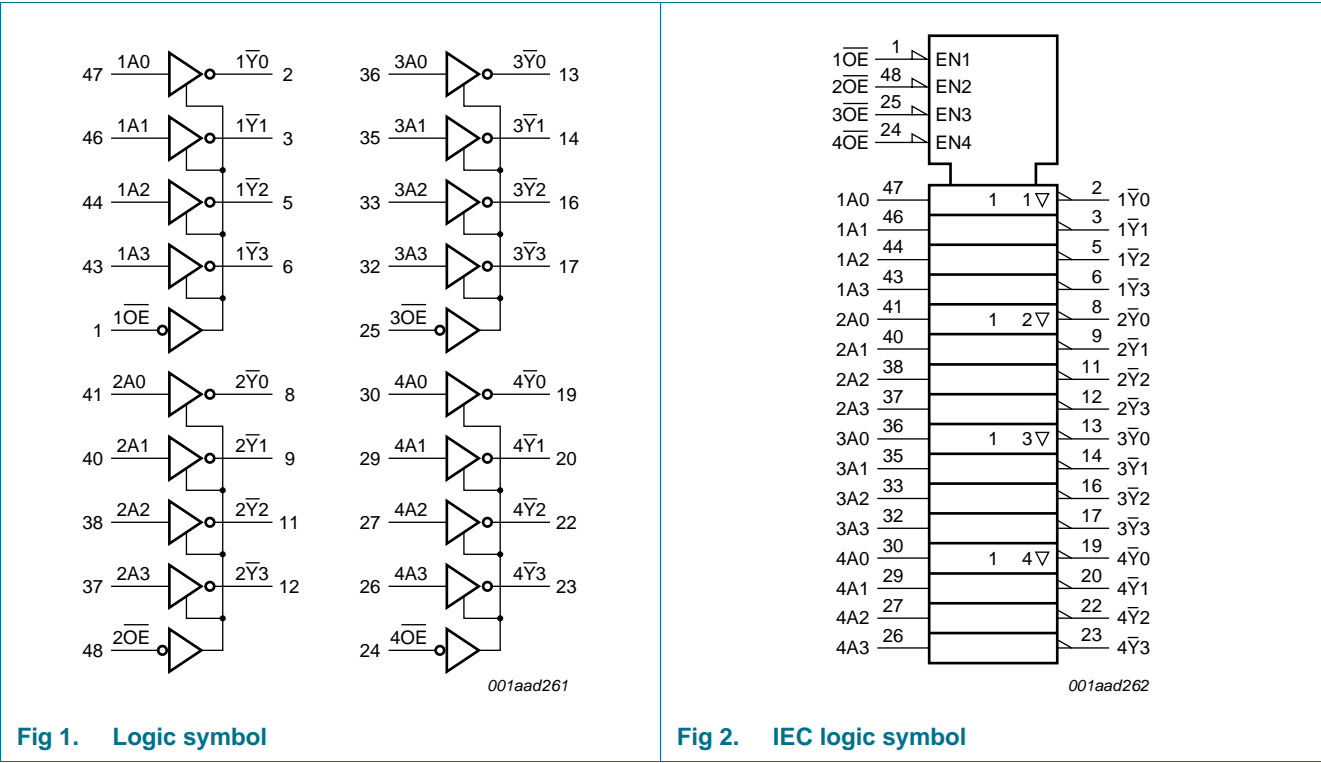
3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74ABT16240ADGG	-40 °C to +85 °C	TSSOP48	plastic thin shrink small outline package; 48 leads; body width 6.1 mm	SOT362-1
74ABT16240ADL	-40 °C to +85 °C	SSOP48	plastic shrink small outline package; 48 leads; body width 7.5 mm	SOT370-1



4. Functional diagram



5. Pinning information

5.1 Pinning

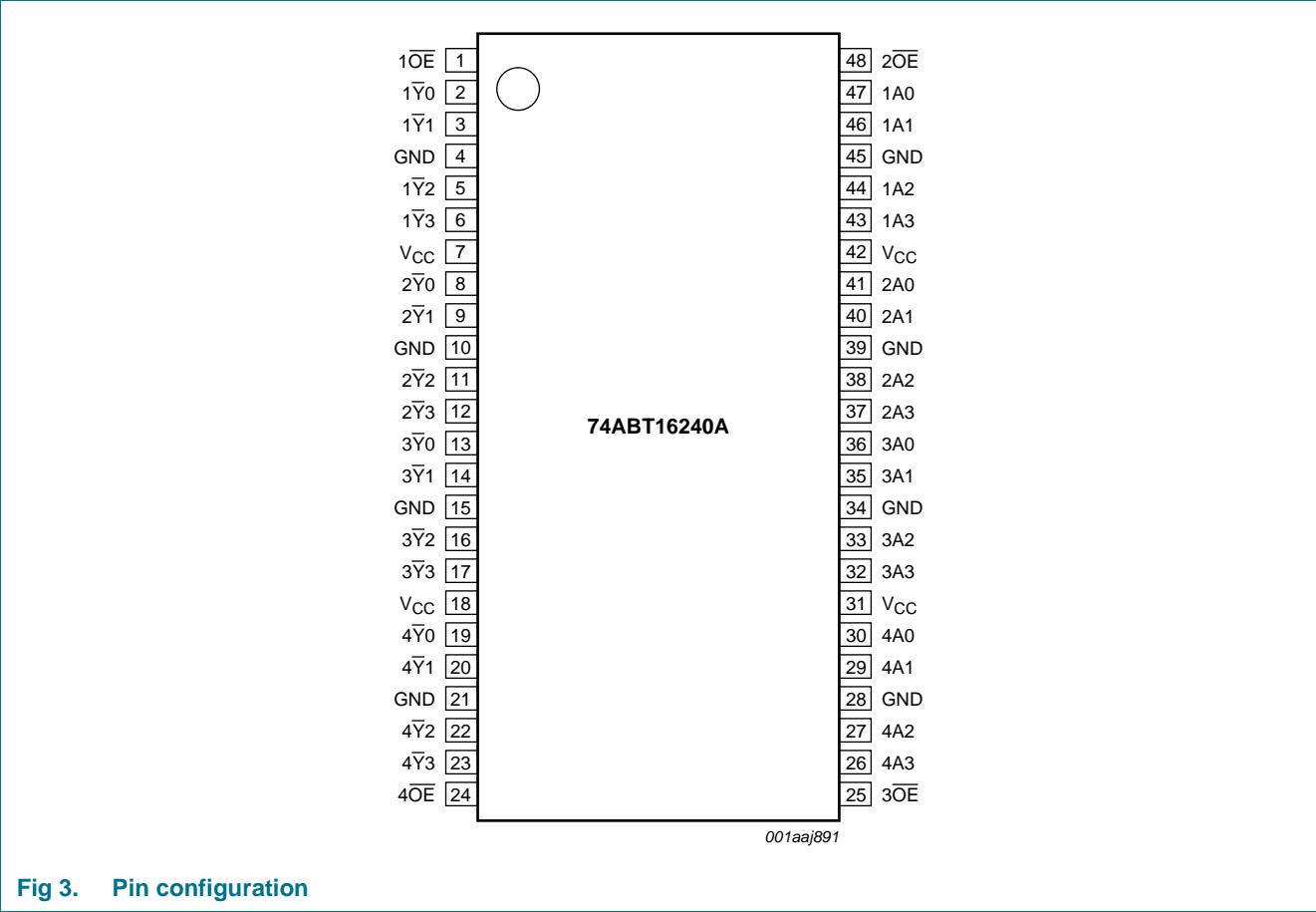


Fig 3. Pin configuration

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1 $\overline{\text{OE}}$, 2 $\overline{\text{OE}}$, 3 $\overline{\text{OE}}$, 4 $\overline{\text{OE}}$	1, 48, 25, 24	output enable (LOW active)
1 $\overline{\text{Y0}}$, 1 $\overline{\text{Y1}}$, 1 $\overline{\text{Y2}}$, 1 $\overline{\text{Y3}}$	2, 3, 5, 6	1 data output
GND	4, 10, 15, 21, 28, 34, 39, 45	ground (0 V)
V _{CC}	7, 18, 31, 42	supply voltage
2 $\overline{\text{Y0}}$, 2 $\overline{\text{Y1}}$, 2 $\overline{\text{Y2}}$, 2 $\overline{\text{Y3}}$	8, 9, 11, 12	2 data output
3 $\overline{\text{Y0}}$, 3 $\overline{\text{Y1}}$, 3 $\overline{\text{Y2}}$, 3 $\overline{\text{Y3}}$	13, 14, 16, 17	3 data output
4 $\overline{\text{Y0}}$, 4 $\overline{\text{Y1}}$, 4 $\overline{\text{Y2}}$, 4 $\overline{\text{Y3}}$	19, 20, 22, 23	4 data output
4A0, 4A1, 4A2, 4A3	30, 29, 27, 26	4 data input
3A0, 3A1, 3A2, 3A3	36, 35, 33, 32	3 data input
2A0, 2A1, 2A2, 2A3	41, 40, 38, 37	2 data input
1A0, 1A1, 1A2, 1A3	47, 46, 44, 43	1 data input

6. Functional description

Table 3. Function table^[1]

Control	Input	Output
$\overline{\text{nOE}}$	nAn	$\overline{\text{nYn}}$
L	L	H
L	H	L
H	X	Z

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

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7.0	V
V_I	input voltage		^[1] -1.2	+7.0	V
V_O	output voltage	output in OFF-state or HIGH-state	^[1] -0.5	+5.5	V
I_{IK}	input clamping current	$V_I < 0$ V	-18	-	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_j	junction temperature		^[2] -	150	°C
T_{stg}	storage temperature		-65	+150	°C

[1] The input and output voltage ratings may be exceeded if the input and output 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. Operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		4.5	-	5.5	V
V_I	input voltage		0	-	V_{CC}	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
		duty cycle ≤ 50 %; $f_i \geq 1$ kHz	-	-	64	mA
$\Delta t/\Delta V$	input transition rise and fall rate		-	-	10	ns/V
T_{amb}	ambient temperature	in free air	-40	-	+85	°C

9. Static characteristics

Table 6. Static characteristics

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
V_{IK}	input clamping voltage	$V_{CC} = 4.5\text{ V}$; $I_{IK} = -18\text{ mA}$	-1.2	-0.9	-	-1.2	-	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IL}$ or V_{IH}						
		$V_{CC} = 4.5\text{ V}$; $I_{OH} = -3\text{ mA}$	2.5	2.9	-	2.5	-	V
		$V_{CC} = 5.0\text{ V}$; $I_{OH} = -3\text{ mA}$	3.0	3.4	-	3.0	-	V
		$V_{CC} = 4.5\text{ V}$; $I_{OH} = -32\text{ mA}$	2.0	2.4	-	2.0	-	V
V_{OL}	LOW-level output voltage	$V_{CC} = 4.5\text{ V}$; $I_{OL} = 64\text{ mA}$; $V_I = V_{IL}$ or V_{IH}	-	0.42	0.55	-	0.55	V
I_I	input leakage current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{CC}$ or GND	-	± 0.01	± 1.0	-	± 1.0	μA
I_{OFF}	power-off leakage current	$V_{CC} = 0\text{ V}$; V_I or $V_O \leq 4.5\text{ V}$	-	± 5.0	± 100	-	± 100	μA
$I_{O(pu/pd)}$	power-up/power-down output current	$V_{CC} = 2.0\text{ V}$; $V_O = 0.5\text{ V}$; $V_I = \text{GND}$ or V_{CC} ; $\overline{nOE} = \text{HIGH}$	[1]	± 5.0	± 50	-	± 50	μA
I_{OZ}	OFF-state output current	$V_{CC} = 5.5\text{ V}$; $V_I = V_{IL}$ or V_{IH}						
		output HIGH-state at $V_O = 5.5\text{ V}$	-	1.0	10	-	10	μA
		output LOW-state at $V_O = 0.5\text{ V}$	-	-1.0	-10	-	-10	μA
I_{LO}	output leakage current	HIGH-state; $V_O = 5.5\text{ V}$; $V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or V_{CC}	-	1.0	50	-	50	μA
I_O	output current	$V_{CC} = 5.5\text{ V}$; $V_O = 2.5\text{ V}$	[2]	-180	-70	-50	-180	mA
I_{CC}	supply current	$V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or V_{CC}						
		outputs HIGH-state	-	0.5	1.0	-	1.0	mA
		outputs LOW-state	-	8	19	-	19	mA
		outputs 3-state	-	0.5	1.0	-	1.0	mA
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 5.5\text{ V}$; one input at 3.4 V and other inputs at V_{CC} or GND	[3][4]	10	200	-	200	μA
C_I	input capacitance	$V_I = 0\text{ V}$ or V_{CC}	-	4	-	-	-	pF
$C_{I/O}$	input/output capacitance	outputs disabled; $V_O = 0\text{ V}$ or V_{CC}	-	6	-	-	-	pF

[1] This parameter is valid for any V_{CC} between 0 V and 2.1 V, with a transition time of up to 10 ms. From $V_{CC} = 2.1\text{ V}$ to $V_{CC} = 5\text{ V} \pm 10\%$, a transition time of up to 100 μs is permitted.

[2] Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

[3] This is the increase in supply current for each input at 3.4 V.

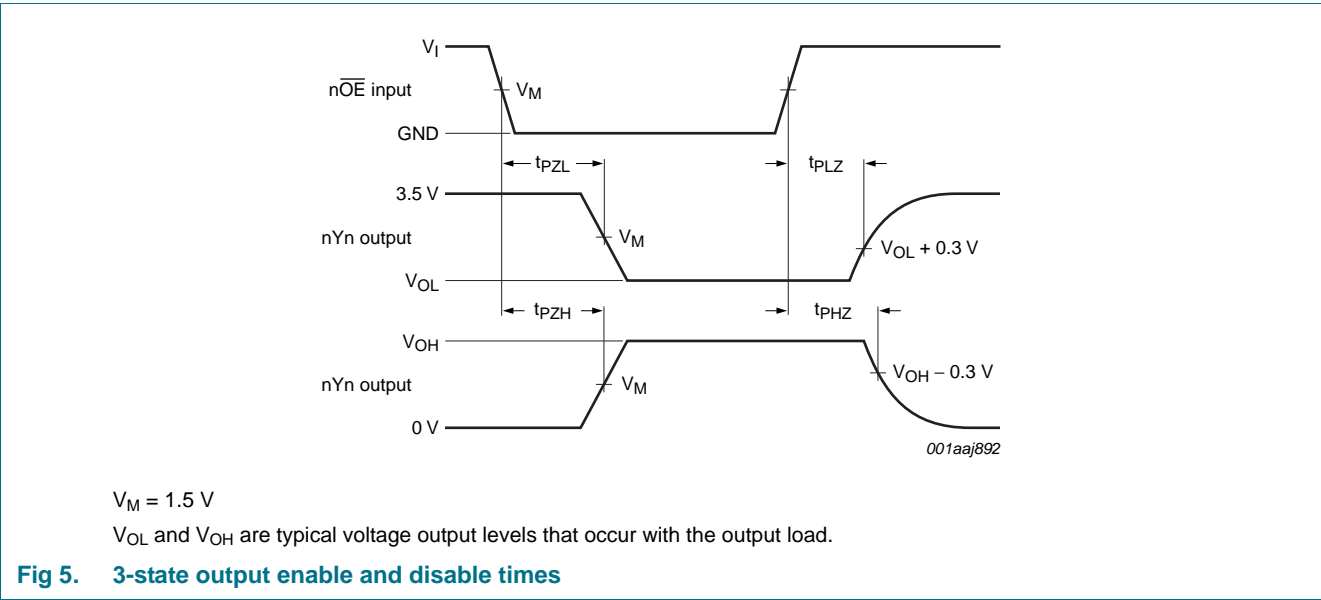
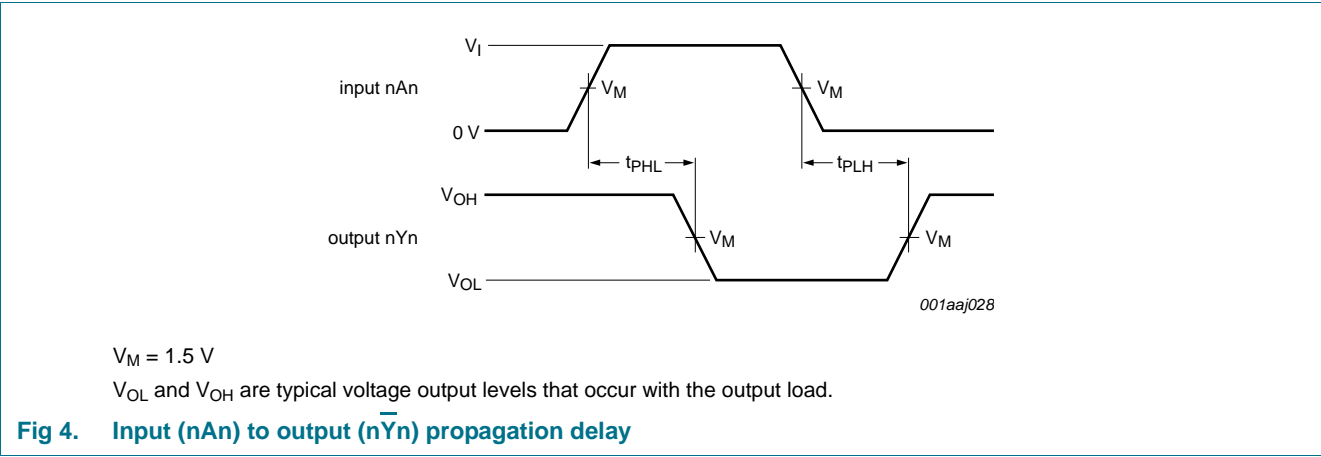
[4] This data sheet limit may vary among suppliers.

10. Dynamic characteristics

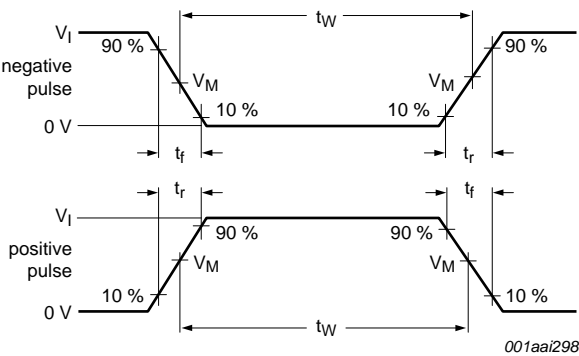
Table 7. Dynamic characteristics
GND = 0 V. For test circuit, see [Figure 6](#).

Symbol	Parameter	Conditions	25 °C; V _{CC} = 5.0 V			–40 °C to +85 °C; V _{CC} = 5.0 V ± 0.5 V		Unit
			Min	Typ	Max	Min	Max	
t _{PLH}	LOW to HIGH propagation delay	nAn to nȲn; see Figure 4	1.0	2.0	3.0	1.0	3.7	ns
t _{PHL}	HIGH to LOW propagation delay	nAn to nȲn; see Figure 4	1.0	1.5	3.0	1.0	3.5	ns
t _{PZH}	OFF-state to HIGH propagation delay	nOE to nȲn; see Figure 5	1.2	2.4	3.3	1.2	4.2	ns
t _{PZL}	OFF-state to LOW propagation delay	nOE to nȲn; see Figure 5	1.2	2.3	3.2	1.0	4.2	ns
t _{PHZ}	HIGH to OFF-state propagation delay	nOE to nȲn; see Figure 5	1.3	2.7	4.1	1.6	4.7	ns
t _{PLZ}	LOW to OFF-state propagation delay	nOE to nȲn; see Figure 5	1.3	2.5	3.6	1.4	4.1	ns

11. Waveforms

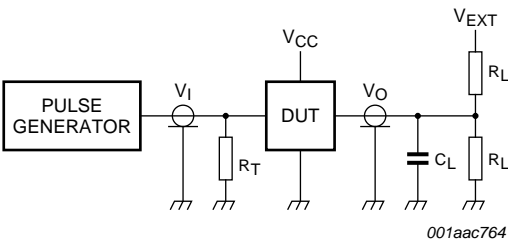


12. Test information



V_M = 1.5 V

a. Input pulse definition



Test data is given in [Table 8](#).

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.

b. Test circuit for 3-state outputs

Fig 6. Load circuitry for switching times

Table 8. 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}
3.0 V	1 MHz	500 ns	2.5 ns	50 pF	500 Ω	open	7.0 V	open

13. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1

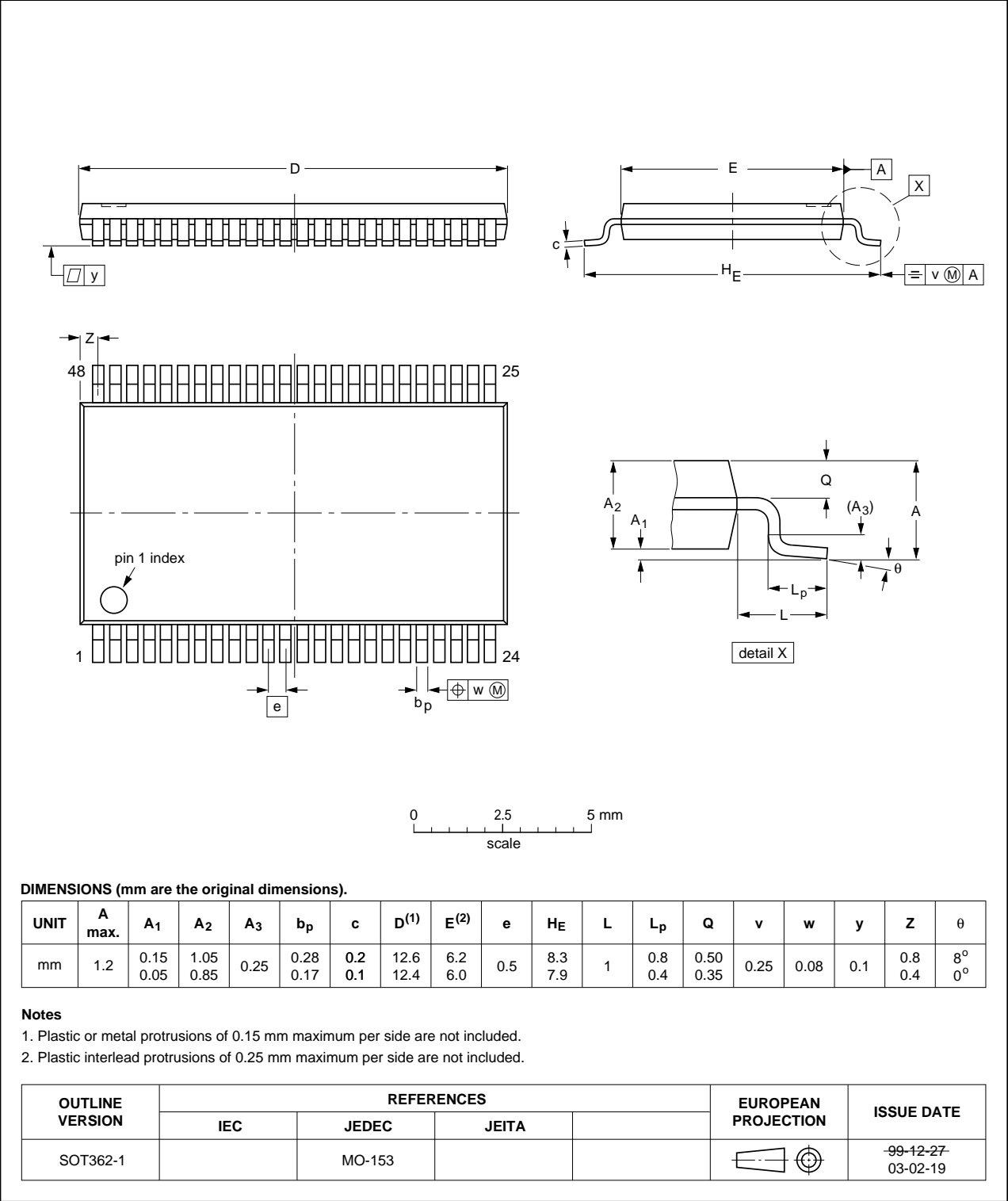


Fig 7. Package outline SOT362-1 (TSSOP48)

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1

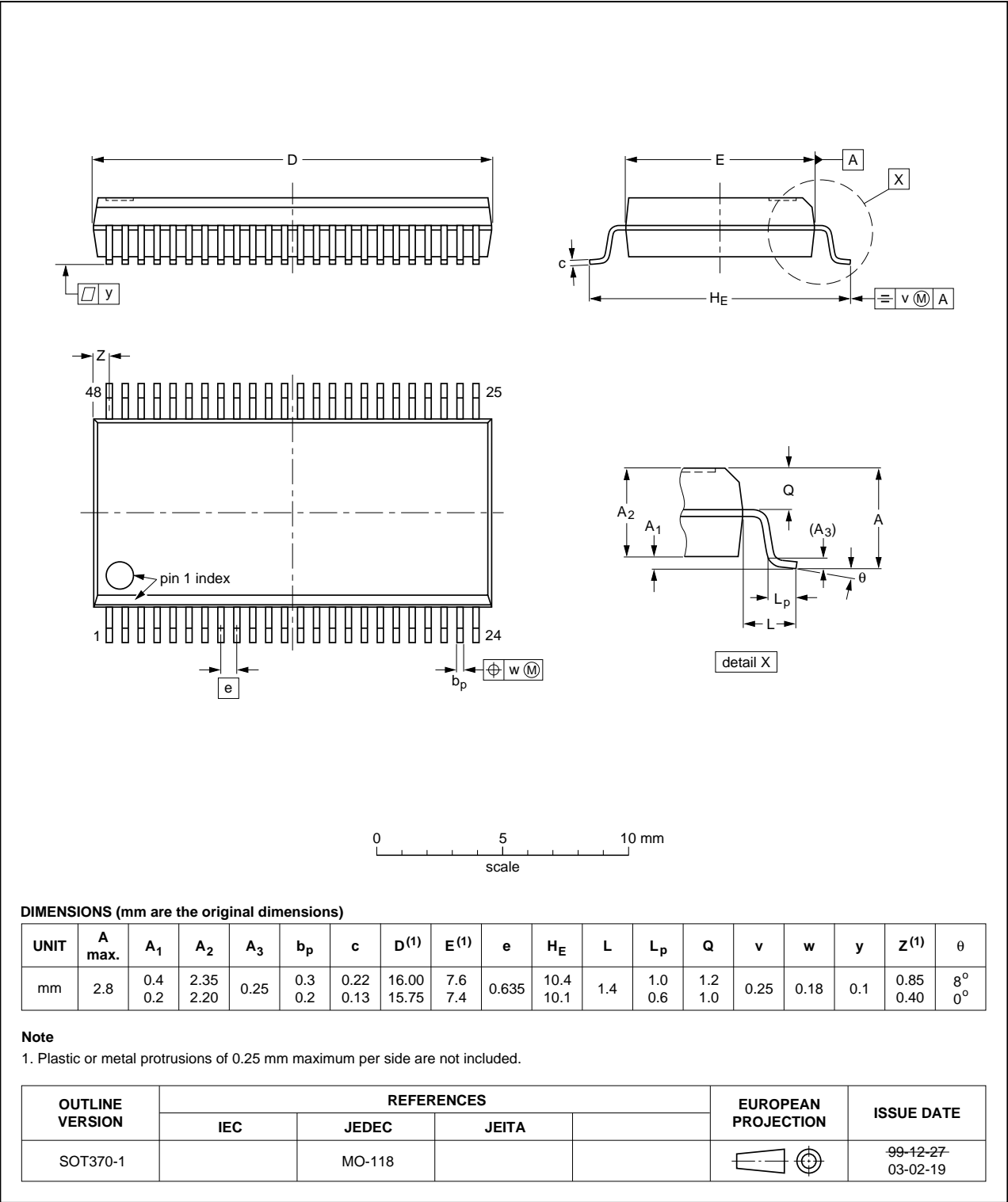


Fig 8. Package outline SOT370-1 (SSOP48)

14. Abbreviations

Table 9. Abbreviations

Acronym	Description
BiCMOS	Bipolar CMOS
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
CDM	Charged Device Model
TTL	Transistor-Transistor Logic

15. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ABT16240A v.6	20111103	Product data sheet	-	74ABT16240A v.5
Modifications:	• Legal pages updated			
74ABT16240A v.5	20100525	Product data sheet	-	74ABT16240A v.4
74ABT16240A v.4	20090325	Product data sheet	-	74ABT16240A v.3
74ABT16240A v.3	20040212	Product specification	01-A15420	74ABT_H16240A v.2
74ABT_H16240A v.2	19980225	Product specification	853-1880 19019	74ABT_H16240A
74ABT_H16240A	19961001	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.
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>.

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18. Contents

1	General description	1
2	Features and benefits	1
3	Ordering information	1
4	Functional diagram	2
5	Pinning information	3
5.1	Pinning	3
5.2	Pin description	3
6	Functional description	4
7	Limiting values	4
8	Recommended operating conditions	4
9	Static characteristics	5
10	Dynamic characteristics	6
11	Waveforms	7
12	Test information	8
13	Package outline	9
14	Abbreviations	11
15	Revision history	11
16	Legal information	12
16.1	Data sheet status	12
16.2	Definitions	12
16.3	Disclaimers	12
16.4	Trademarks	13
17	Contact information	13
18	Contents	14

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