

# 74ABT16245B-Q100

16-bit bus transceiver; 3-state

Rev. 1 — 10 April 2017

Product data sheet

## 1 General description

The 74ABT16245B-Q100 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16245B-Q100 device is a dual octal transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The control function implementation minimizes external timing requirements. The device features two output enable ( $1\overline{OE}$ ,  $2\overline{OE}$ ) inputs for easy cascading and two direction ( $1DIR$ ,  $2DIR$ ) inputs for direction control.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 3) and is suitable for use in automotive applications.

## 2 Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 3)
  - Specified from -40 °C to +85 °C
- 16-bit bidirectional bus interface
- Multiple  $V_{CC}$  and GND pins minimize switching noise
- Power-up 3-state
- 3-state buffers
- Output capability: +64 mA / -32 mA
- Live insertion/extraction permitted
- Latch-up performance: JESD 78 Class II
- ESD protection:
  - HBM JESD22-A114E exceeds 2000 V
  - CDM JESD22-C101C exceeds 1000 V

## 3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74ABT16245BDGG-Q100	-40 °C to +85 °C	TSSOP48	plastic thin shrink small outline package; 48 leads; body width 6.1 mm	SOT362-1

4 Functional diagram

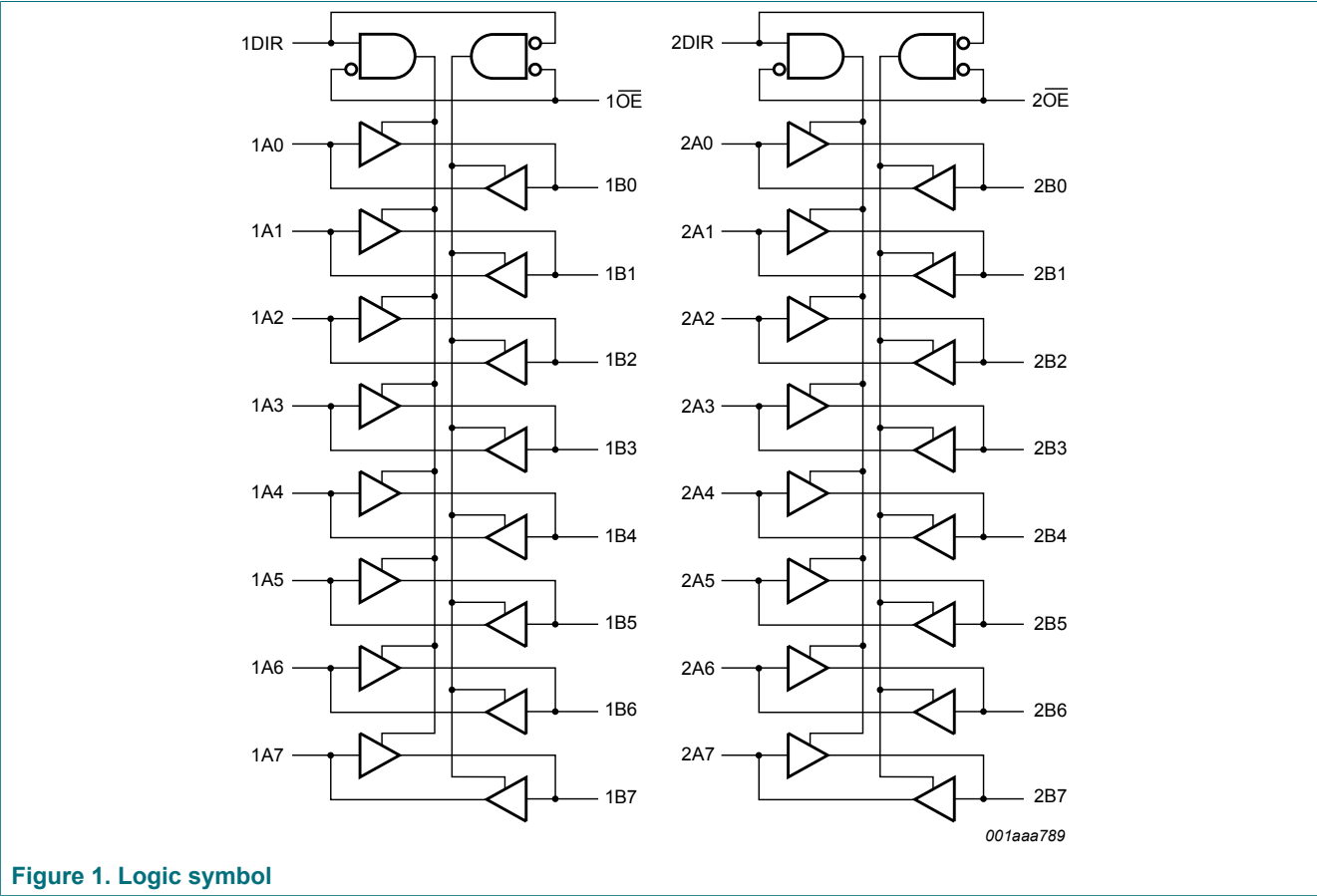


Figure 1. Logic symbol

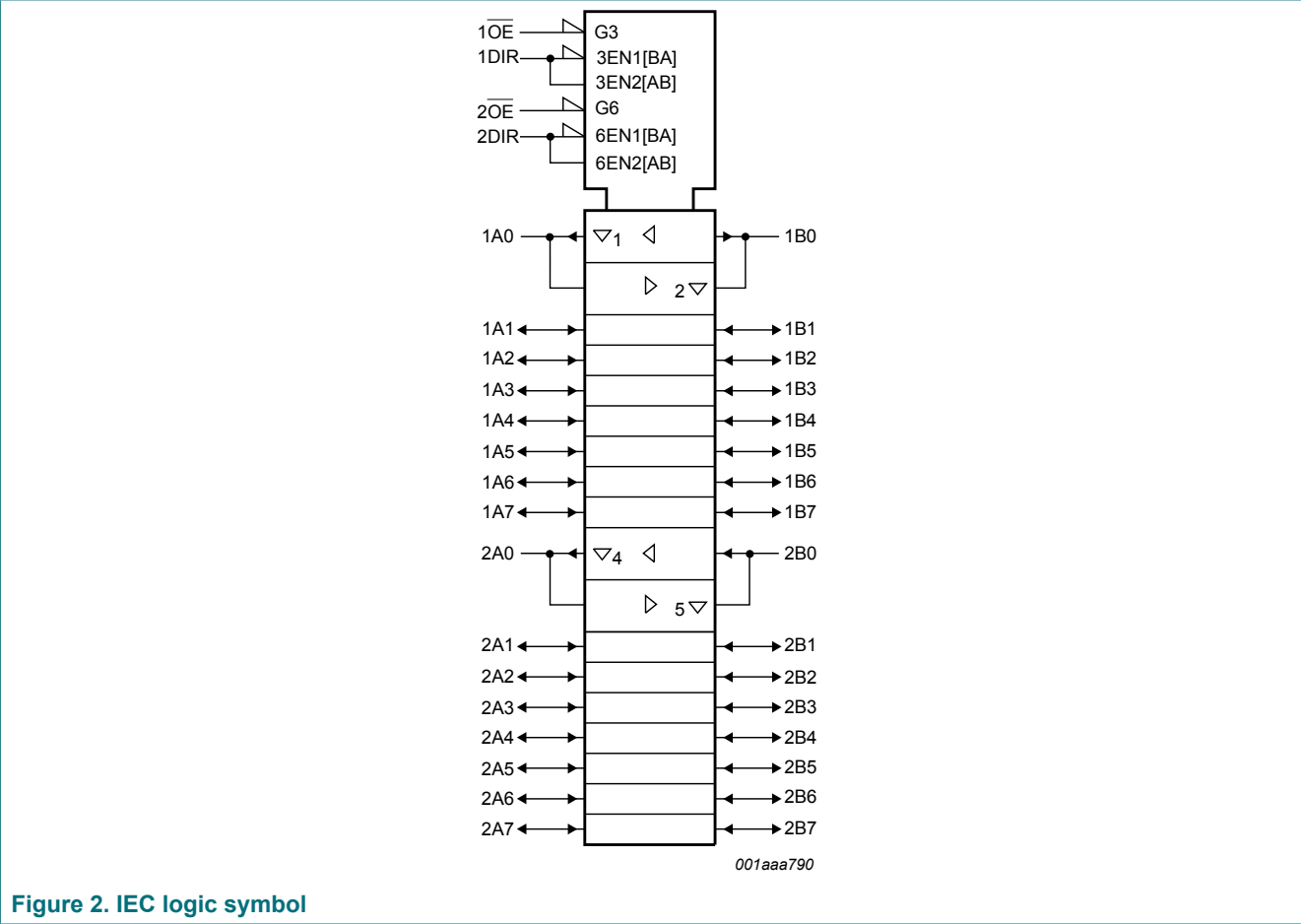


Figure 2. IEC logic symbol

5 Pinning information

5.1 Pinning

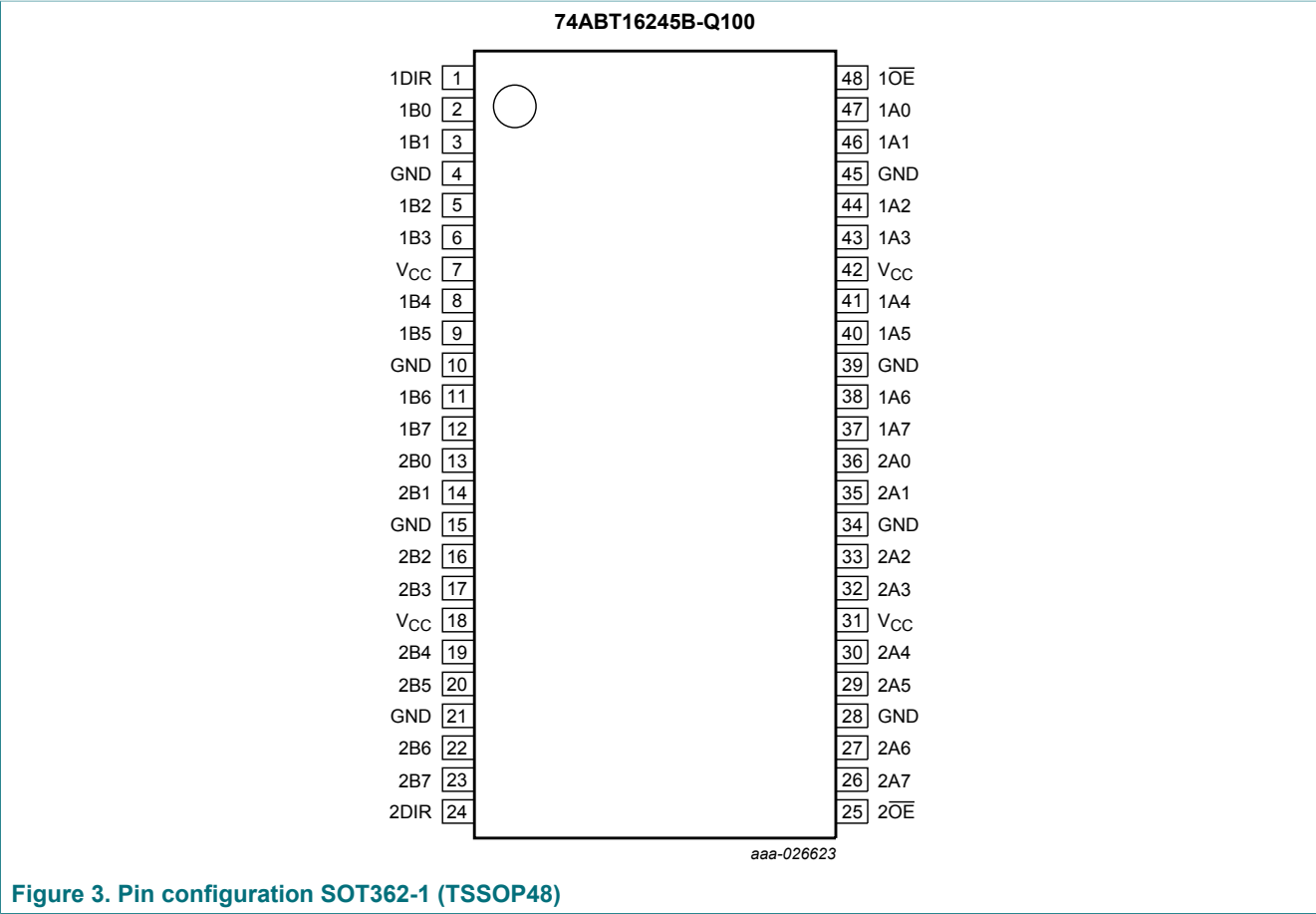


Figure 3. Pin configuration SOT362-1 (TSSOP48)

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1DIR, 2DIR	1, 24	direction control input
1B0 to 1B7	2, 3, 5, 6, 8, 9, 11, 12	data input/output
2B0 to 2B7	13, 14, 16, 17, 19, 20, 22, 23	data input/output
GND	4, 10, 15, 21, 28, 34, 39, 45	ground (0 V)
V <sub>CC</sub>	7, 18, 31, 42	supply voltage
1OE, 2OE	48, 25	output enable input (active LOW)
1A0 to 1A7	47, 46, 44, 43, 41, 40, 38, 37	data input/output
2A0 to 2A7	36, 35, 33, 32, 30, 29, 27, 26	data input/output

## 6 Functional description

Table 3. Function table <sup>[1]</sup>

Inputs		Outputs	
nOE	nDIR	nAn	nBn
L	L	nAn = nBn	inputs
L	H	inputs	nBn = nAn
H	X	Z	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). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		-0.5	+7.0	V
V <sub>I</sub>	input voltage	<sup>[1]</sup>	-1.2	+7.0	V
V <sub>O</sub>	output voltage	output in OFF-state or HIGH-state <sup>[1]</sup>	-0.5	+5.5	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-18	-	mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
I <sub>O</sub>	output current	output in LOW-state	-	128	mA
		output in HIGH-state	-64	-	mA
T <sub>j</sub>	junction temperature	<sup>[2]</sup>	-	150	°C
T <sub>stg</sub>	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	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		-	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 <sub>IK</sub>	input clamping voltage	V <sub>CC</sub> = 4.5 V; I <sub>IK</sub> = -18 mA	-1.2	-0.9	-	-1.2	-	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>						
		V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = -3 mA	2.5	2.9	-	2.5	-	V
		V <sub>CC</sub> = 5.0 V; I <sub>OH</sub> = -3 mA	3.0	3.4	-	3.0	-	V
		V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = -32 mA	2.0	2.4	-	2.0	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>CC</sub> = 4.5 V; I <sub>OL</sub> = 64 mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>	-	0.42	0.55	-	0.55	V
I <sub>I</sub>	input leakage current	control pins; V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND	-	±0.01	±1.0	-	±1.0	µA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> ≤ 4.5 V	-	±5.0	±100	-	±100	µA
I <sub>O(pu/pd)</sub>	power-up/ power-down output current	V <sub>CC</sub> = 2.0 V; V <sub>O</sub> = 0.5 V; V <sub>I</sub> = GND or V <sub>CC</sub> ; nOE = HIGH <sup>[1]</sup>	-	±5.0	±50	-	±50	µA
I <sub>OZ</sub>	OFF-state output current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>						
		output HIGH-state at V <sub>O</sub> = 5.5 V	-	0.1	10	-	10	µA
		output LOW-state at V <sub>O</sub> = 0 V	-	-0.1	-10	-	-10	µA
I <sub>CEX</sub>	output high leakage current	HIGH-state; V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>	-	5.0	50	-	50	µA
I <sub>O</sub>	output current	V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 2.5 V <sup>[2]</sup>	-50	-92	-180	-50	-180	mA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>						
		outputs HIGH-state	-	0.30	0.7	-	0.7	mA

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
$\Delta I_{CC}$	additional supply current	outputs LOW-state	-	10	19	-	19	mA
		outputs 3-state	-	0.30	0.7	-	0.7	mA
		per input pin; $V_{CC} = 5.5$ V; one data input at 3.4 V and other inputs at $V_{CC}$ or GND <sup>[3]</sup>						
		outputs enabled	-	400	700	-	700	$\mu$ A
		outputs disabled	-	100	250	-	250	$\mu$ A
		control pins; outputs disabled; one enable input at 3.4 V and other inputs at $V_{CC}$ or GND	-	400	700	-	700	$\mu$ A
$C_I$	input capacitance	$V_I = 0$ V or $V_{CC}$	-	4	-	-	-	pF
$C_{I/O}$	input/output capacitance	outputs disabled; $V_O = 0$ V or $V_{CC}$	-	7	-	-	-	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  $V_{CC} = 2.1$  V to  $V_{CC} = 5$  V  $\pm 10$  %, a transition time of up to 100  $\mu$ s 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.

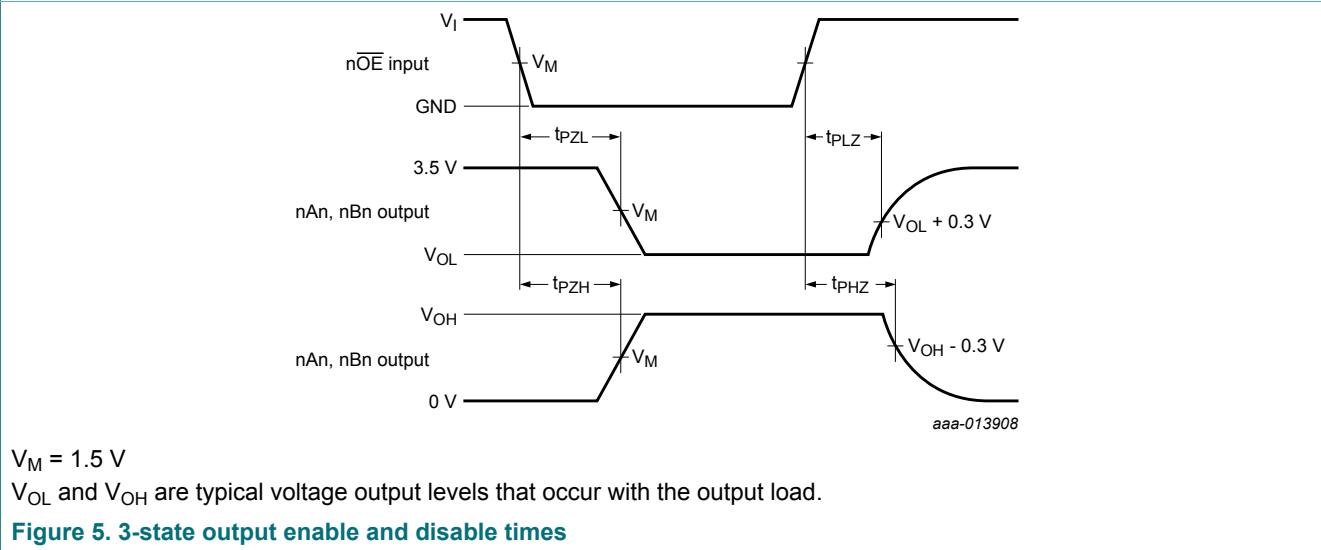
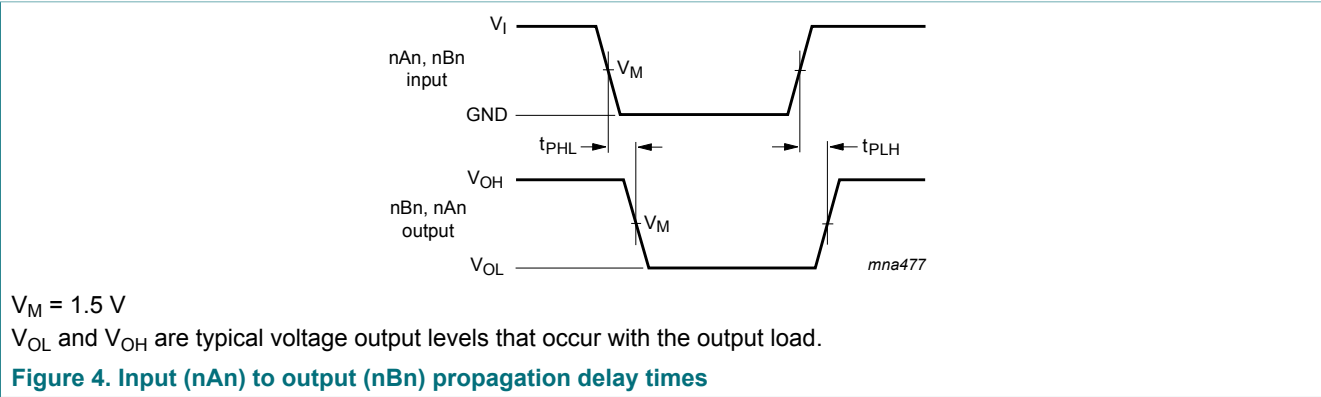
## 10 Dynamic characteristics

**Table 7. Dynamic characteristics**

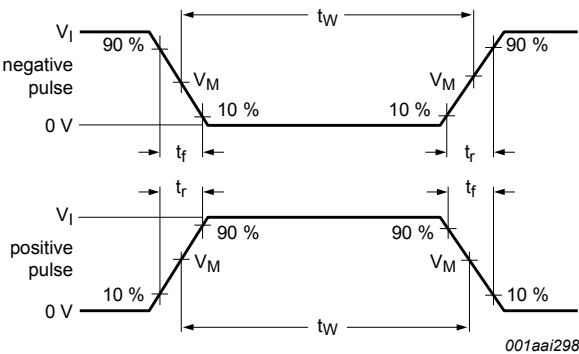
$GND = 0$  V. For test circuit, see [Figure 6](#).

Symbol	Parameter	Conditions	25 °C; $V_{CC} = 5.0$ V			-40 °C to +85 °C; $V_{CC} = 5.0$ V $\pm 0.5$ V		Unit
			Min	Typ	Max	Min	Max	
$t_{PLH}$	LOW to HIGH propagation delay	nAn to nBn; see <a href="#">Figure 4</a>	1.0	2.0	3.2	1.0	3.5	ns
$t_{PHL}$	HIGH to LOW propagation delay	nAn to nBn; see <a href="#">Figure 4</a>	1.0	2.3	3.5	1.0	4.0	ns
$t_{PZH}$	OFF-state to HIGH propagation delay	n $\overline{OE}$ to nAn or nBn; see <a href="#">Figure 5</a>	1.0	3.0	4.4	1.0	5.1	ns
$t_{PZL}$	OFF-state to LOW propagation delay	n $\overline{OE}$ to nAn or nBn; see <a href="#">Figure 5</a>	1.7	4.0	5.2	1.7	6.1	ns
$t_{PHZ}$	HIGH to OFF-state propagation delay	n $\overline{OE}$ to nAn or nBn; see <a href="#">Figure 5</a>	1.7	3.5	4.9	1.7	5.4	ns
$t_{PLZ}$	LOW to OFF-state propagation delay	n $\overline{OE}$ to nAn or nBn; see <a href="#">Figure 5</a>	1.5	3.2	4.4	1.5	5.0	ns

10.1 Waveforms and test circuit

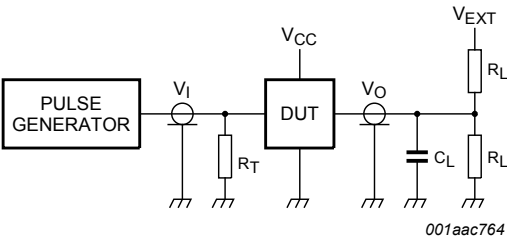






$V_M = 1.5\text{ V}$

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

Figure 6. Test circuit for measuring 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 $\Omega$	open	7.0 V	open

11 Package outline

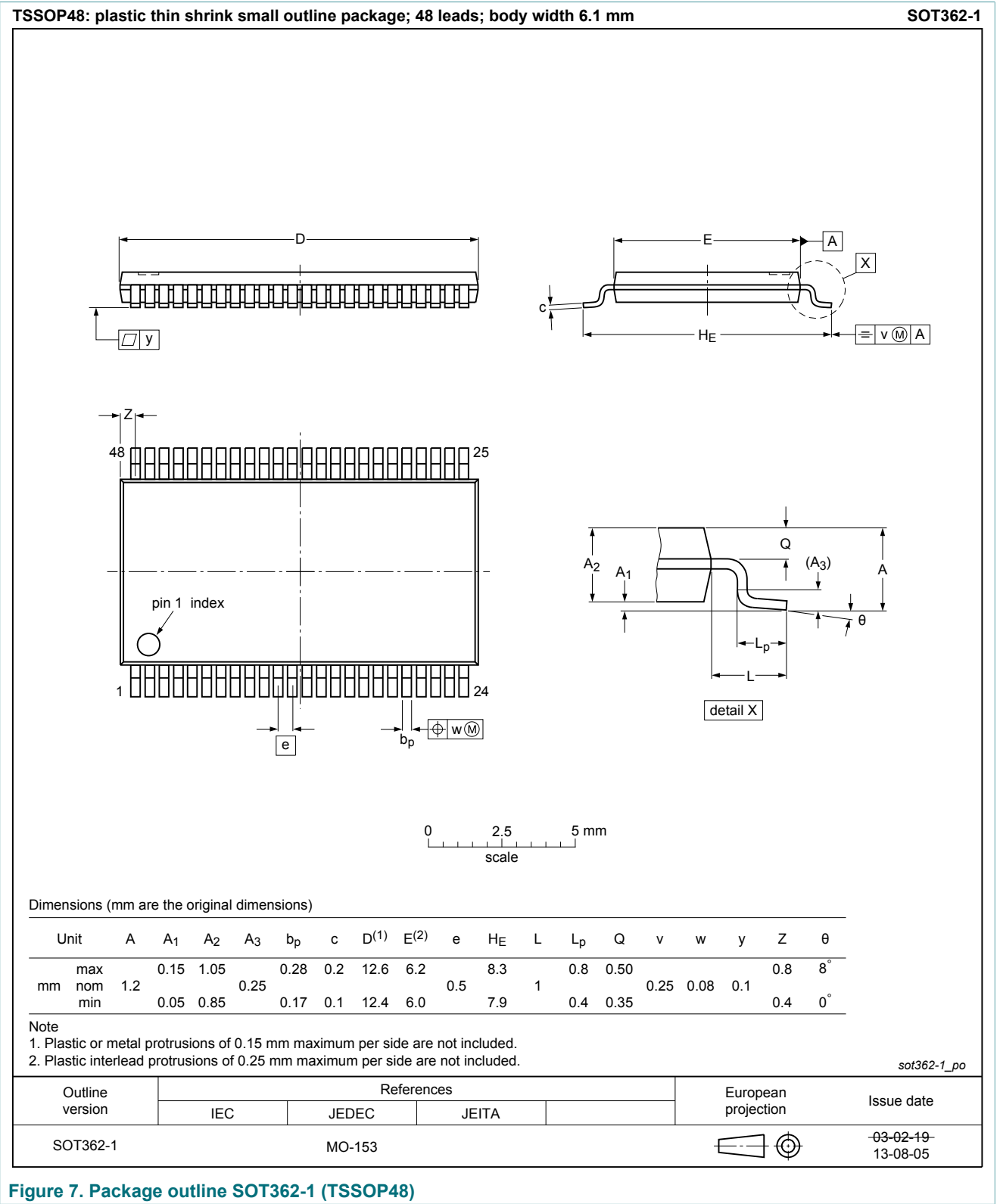


Figure 7. Package outline SOT362-1 (TSSOP48)

12 Abbreviations

Table 9. Abbreviations

Acronym	Description
BiCMOS	Bipolar Complementary Metal Oxide Semiconductor
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model

13 Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ABT16245B_Q100 v.1	20170410	Product data sheet	-	-

## 14 Legal information

### 14.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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[2] The term 'short data sheet' is explained in section "Definitions".

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