

# 74ABT245

Octal transceiver with direction pin; 3-State

Rev. 4 — 6 October 2017

Product data sheet

## 1 General description

The 74ABT245 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT245 is an 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 an output enable ( $\overline{OE}$ ) input for easy cascading and a direction (DIR) input for direction control.

## 2 Features and benefits

- Octal bidirectional bus interface
- 3-State buffers
- Output capability: +64 mA/–32 mA
- Power-up 3-State
- Live insertion/extraction permitted
- Inputs are disabled during 3-state mode
- Latch-up protection exceeds 500 mA per JESD78 class II level A
- ESD protection:
  - HBM JESD22-A114F 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	
74ABT245D	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74ABT245DB	-40 °C to +85 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74ABT245PW	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1

## 4 Functional diagram

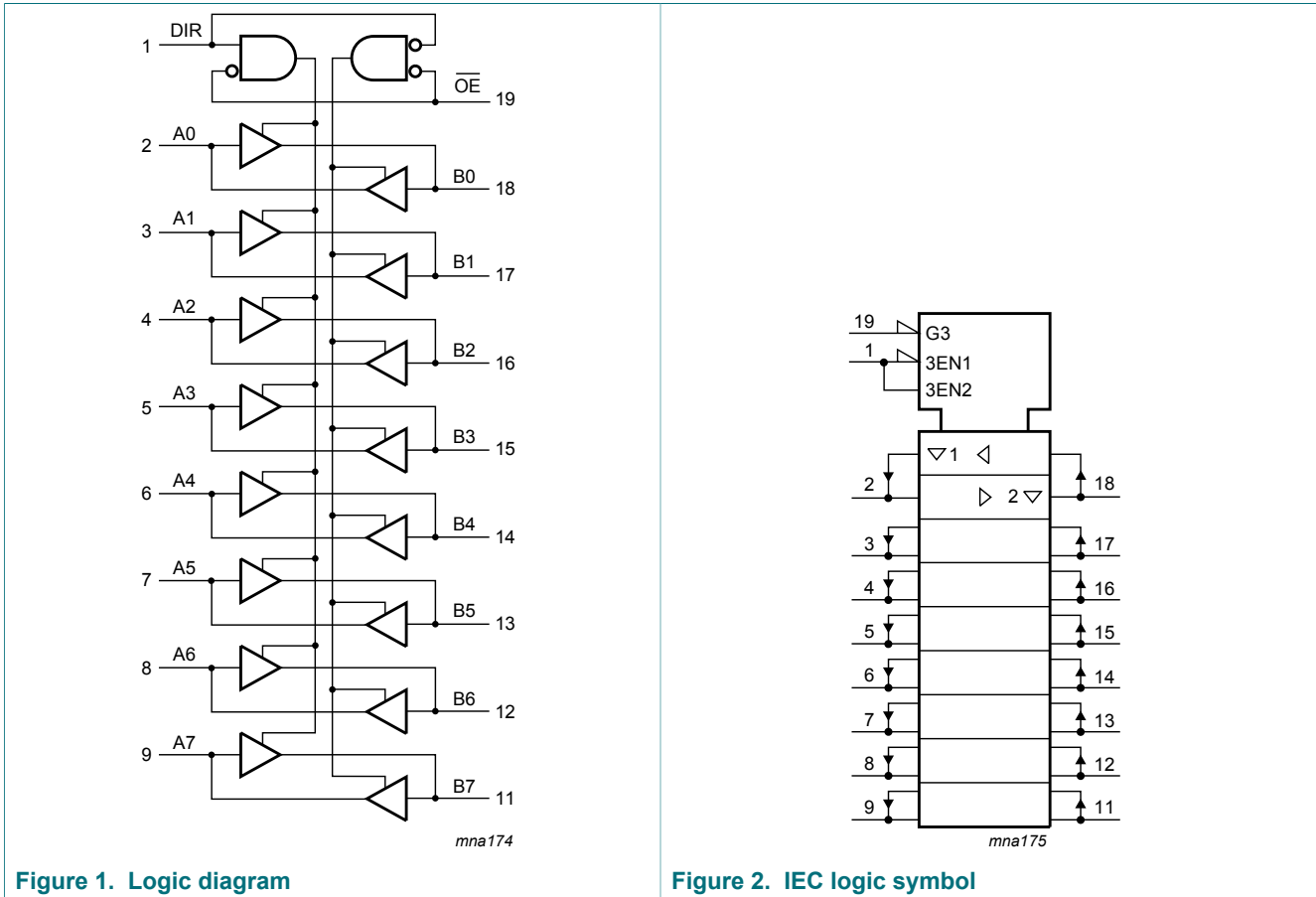
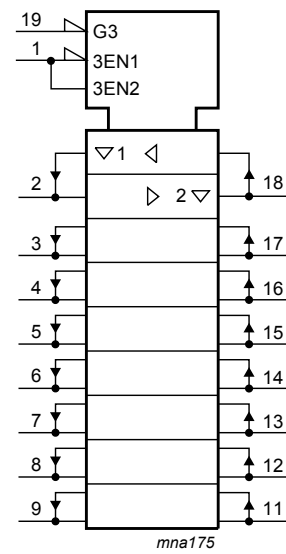


Figure 2. IEC logic symbol



## 5 Pinning information

### 5.1 Pinning

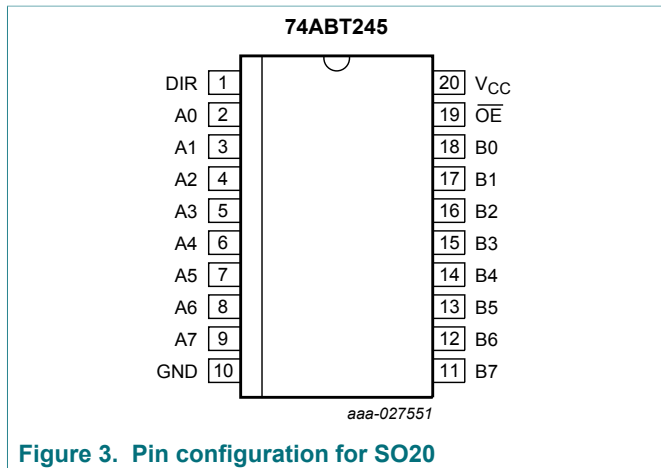


Figure 3. Pin configuration for SO20

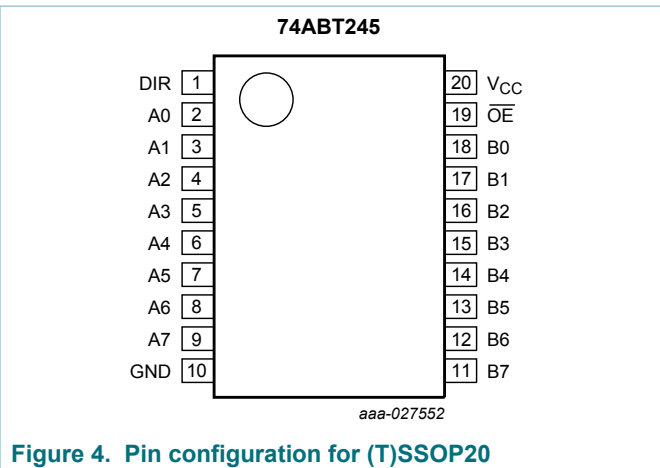


Figure 4. Pin configuration for (T)SSOP20

### 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
DIR	1	direction control input
A0, A1, A2, A3, A4, A5, A6, A7	2, 3, 4, 5, 6, 7, 8, 9	data input/output
GND	10	ground (0 V)
B0, B1, B2, B3, B4, B5, B6, B7	18, 17, 16, 15, 14, 13, 12, 11	data input/output
OE	19	output enable input (active LOW)
V <sub>CC</sub>	20	supply voltage

## 6 Functional description

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

Input		Input/output	
OE	DIR	An	Bn
L	L	output An = Bn	input
L	H	input	output Bn = An
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).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		-0.5	+7.0	V
V <sub>I</sub>	input voltage		[1] -1.2	+7.0	V
V <sub>O</sub>	output voltage	output in OFF-state or HIGH-state	[1] -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
T <sub>j</sub>	junction temperature		[2] -	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. The maximum junction temperature of this integrated circuit should not exceed 150 °C.

## 8 Recommended operating conditions

Table 5. Operating conditions

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CC</sub>	supply voltage		4.5	-	5.5	V
V <sub>I</sub>	input voltage		0	-	V <sub>CC</sub>	V
I <sub>OH</sub>	HIGH-level output current		-	-	-32	mA
I <sub>OL</sub>	LOW-level output current		-	-	64	mA
Δt/ΔV	input transition rise and fall rate		0	-	5	ns/V
T <sub>amb</sub>	ambient temperature	in free air	-40	-	+85	°C

## 9 Static characteristics

**Table 6. Static characteristics**

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

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -45 °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>IH</sub>	HIGH-level input voltage		2.0	-	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage		-	-	0.8	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>						
		I <sub>OH</sub> = -3 mA	2.5	2.9	-	2.5	-	V
		I <sub>OH</sub> = -32 mA	2.0	2.4	-	2.0	-	V
		V <sub>CC</sub> = 5.0 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>						
		I <sub>OH</sub> = -3 mA	3.0	3.4	-	3.0	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub> ; I <sub>OL</sub> = 64 mA	-	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> = GND or 5.5 V	-	±0.01	±1.0	-	±1.0	µA
		Data pins; V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or 5.5 V	-	±5	±100	-	±100	µA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>O</sub> or V <sub>I</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> ; $\overline{OE}$ = don't care <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> = 2.7 V	-	5.0	50	-	50	µA
		output LOW-state at V <sub>O</sub> = 0.5 V	-	-5.0	-50	-	-50	µA
I <sub>CEX</sub>	output high leakage current	V <sub>CC</sub> = 5.5 V; V <sub>O</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>	-40	-100	-180	-40	-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	-	50	250	-	250	µA
		outputs LOW-state	-	24	30	-	30	mA
		outputs disabled	-	50	250	-	250	µA

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -45 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>CC</sub> = 5.5 V						
		outputs enabled; one input at 3.4 V and other inputs at V <sub>CC</sub> or GND	[3] -	0.5	1.5	-	1.5	mA
		outputs disabled; one data input at 3.4 V and other inputs at V <sub>CC</sub> or GND	[3] -	50	250	-	250	μA
		outputs disabled; one enable input at 3.4 V and other inputs at V <sub>CC</sub> or GND	[3] -	0.5	1.5	-	1.5	mA
C <sub>I</sub>	input capacitance	DIR; $\overline{OE}$ ; V <sub>I</sub> = 0 V or V <sub>CC</sub>	-	4	-	-	-	pF
C <sub>I/O</sub>	input/output capacitance	outputs disabled; V <sub>O</sub> = 0 V or V <sub>CC</sub>	-	7	-	-	-	pF

- [1] This parameter is valid for any V<sub>CC</sub> between 0 V and 2.1 V, with a transition time of up to 10 ms. From V<sub>CC</sub> = 2.1 V to V<sub>CC</sub> = 5 V ± 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.

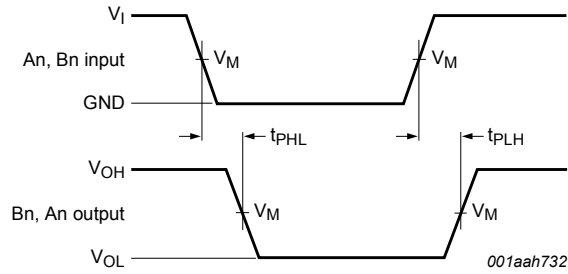
## 10 Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 7.

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C; V <sub>CC</sub> = 5.0 V			T <sub>amb</sub> = -40 °C to 85 °C; V <sub>CC</sub> = 5.0 V ± 0.5 V		Unit
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub>	LOW to HIGH propagation delay	An to Bn or Bn to An; see Figure 5	1.0	2.2	4.1	1.0	4.6	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	An to Bn or Bn to An; see Figure 5	1.0	2.9	4.2	1.0	4.6	ns
t <sub>PZH</sub>	OFF-state to HIGH propagation delay	$\overline{OE}$ to An or Bn; see Figure 6	1.3	3.0	4.8	1.3	5.3	ns
t <sub>PZL</sub>	OFF-state to LOW propagation delay	$\overline{OE}$ to An or Bn; see Figure 6	2.3	4.0	5.8	2.3	6.3	ns
t <sub>PHZ</sub>	HIGH to OFF-state propagation delay	$\overline{OE}$ to An or Bn; see Figure 6	1.0	4.7	6.2	1.0	7.2	ns
t <sub>PLZ</sub>	LOW to OFF-state propagation delay	$\overline{OE}$ to An or Bn; see Figure 6	1.0	4.1	5.8	1.0	6.3	ns

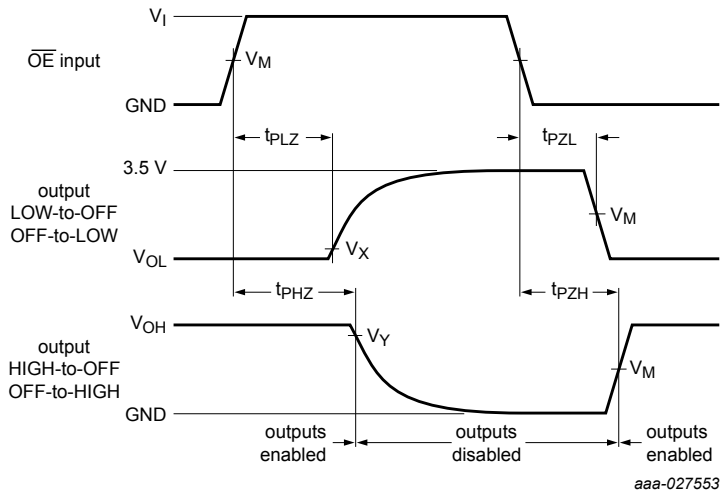
10.1 Waveforms and test circuit



Measurement points are given in [Table 8](#).

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

Figure 5. Input (An or Bn) to output (Bn or An) propagation delays



Measurement points are given in [Table 8](#).

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

Figure 6. 3-state output enable and disable propagation delays

Table 8. Measurement points

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

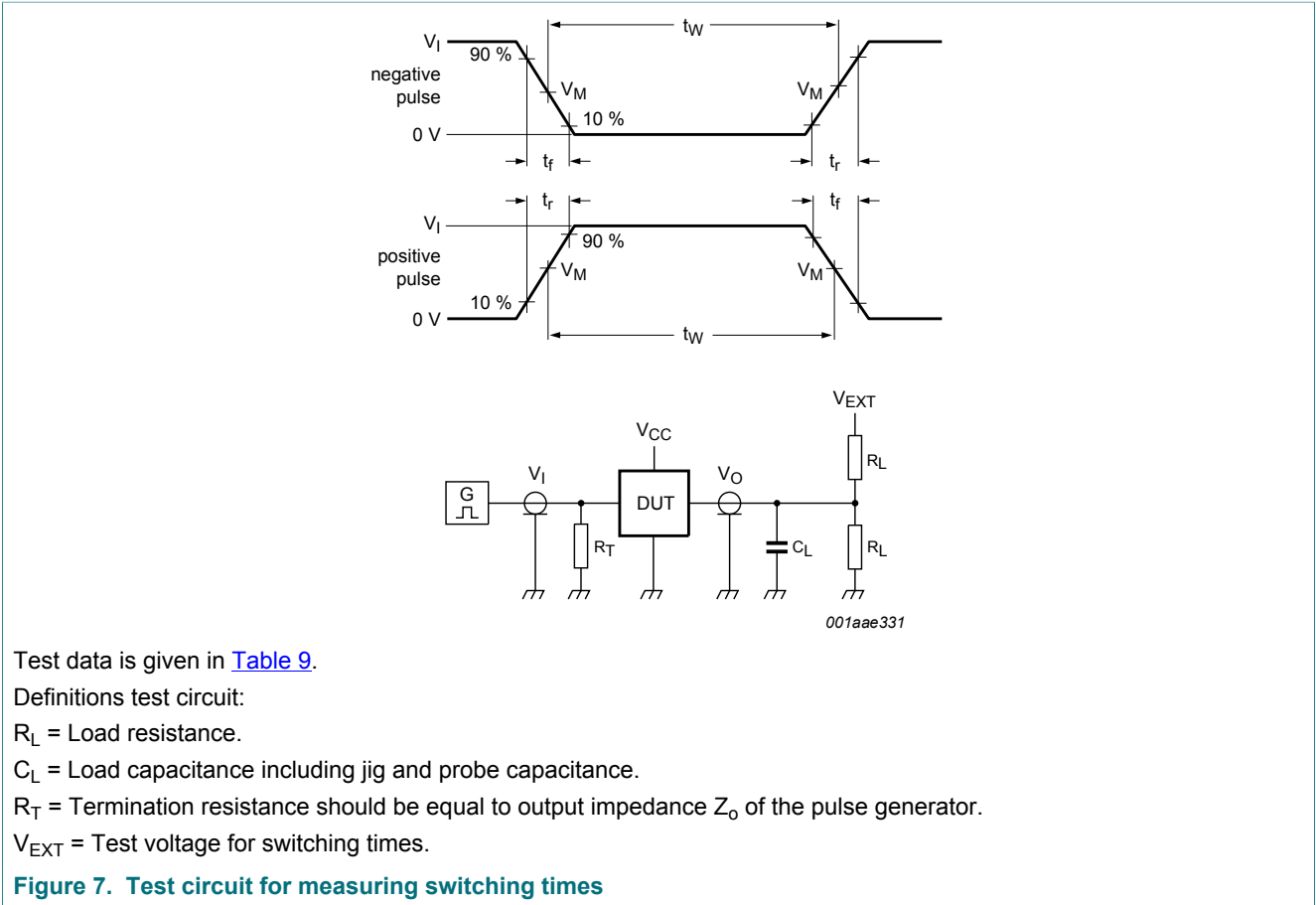


Table 9. Test data

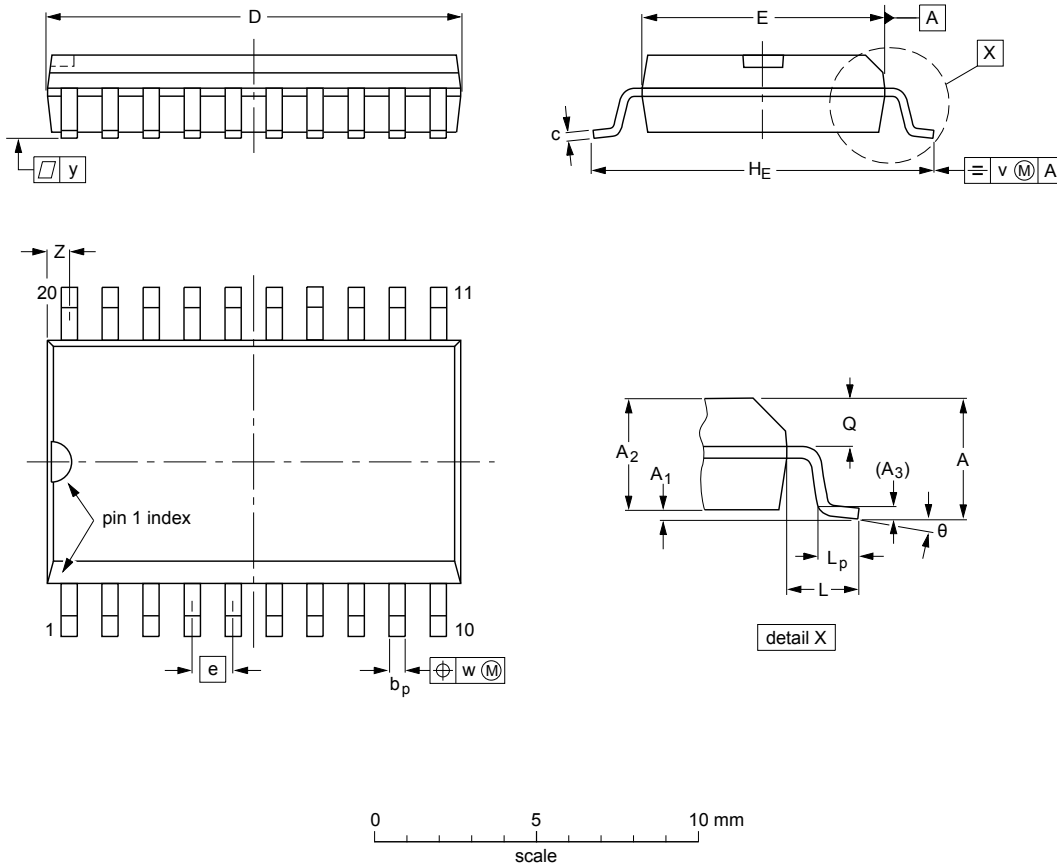
Input				Load		$V_{EXT}$		
$V_I$	$f_i$	$t_W$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHZ}, t_{PZH}$	$t_{PLZ}, t_{PZL}$	$t_{PLH}, t_{PHL}$
3.0 V	$\leq 1$ MHz	500 ns	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	7 V	open



11 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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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

Figure 8. Package outline SOT163-1 (SO20)

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

SOT339-1



**DIMENSIONS (mm are the original dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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

Figure 9. Package outline SOT339-1 (SSOP20)

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

SOT360-1

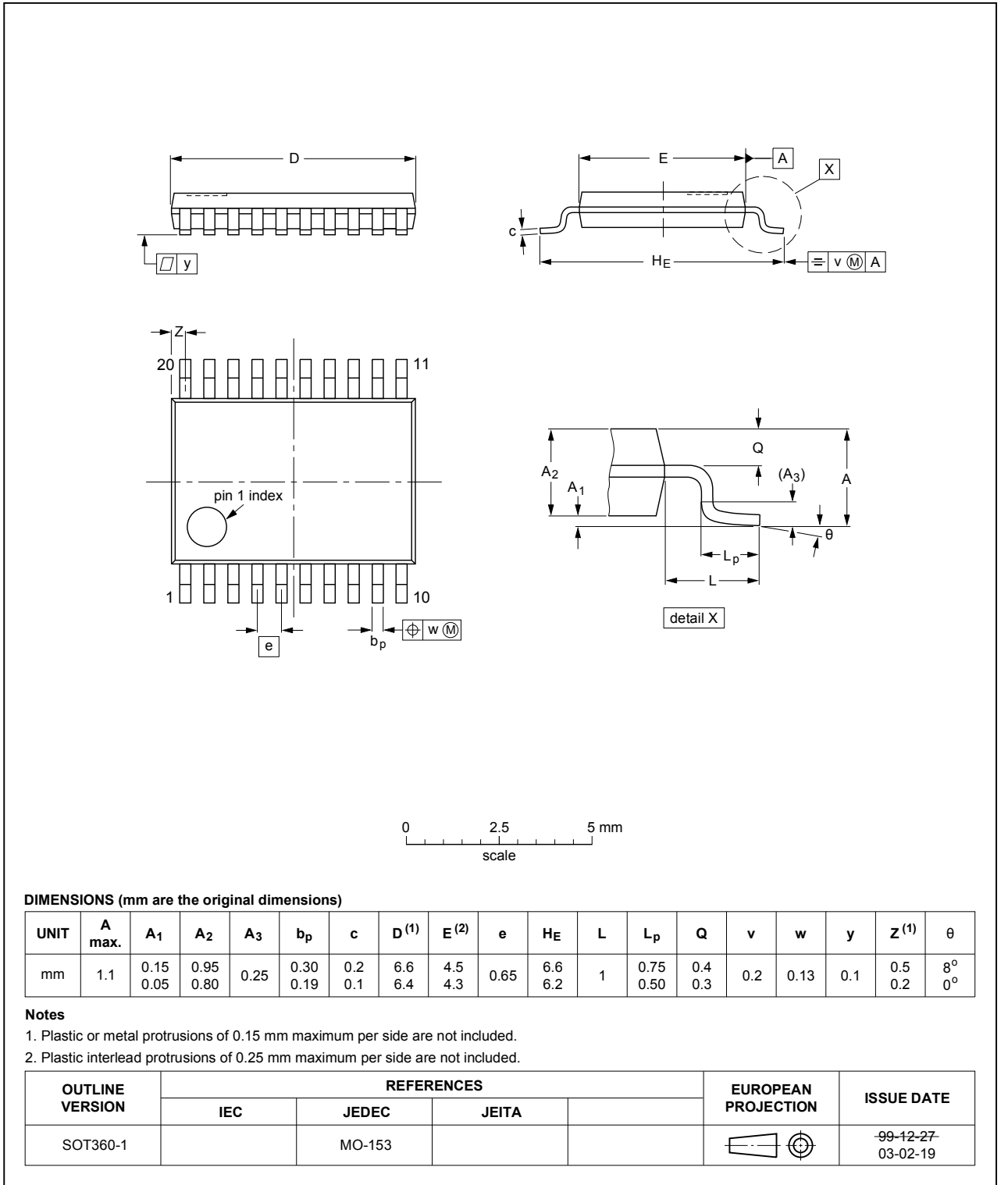


Figure 10. Package outline SOT360-1 (TSSOP20)

## 12 Abbreviations

Table 10. Abbreviations

Acronym	Description
BICMOS	Bipolar Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
MIL	Military
MM	Machine Model

## 13 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ABT245 v.4	20171006	Product data sheet	-	74ABT245 v.3
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> </ul>			
74ABT245 v.3	20030206	Product data sheet	ECN 853-1447 29305	74ABT245 v.2
Modifications:	<ul style="list-style-type: none"> <li>Delete all references to N package. DIP20 package option discontinued.</li> </ul>			
74ABT245 v.2	19980116	Product specification	ECN 853-1447 18867	74ABT245 v.1
74ABT245 v.1	19960910	Product specification	-	-

## 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.
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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Date of release: 6 October 2017

Document identifier: 74ABT245