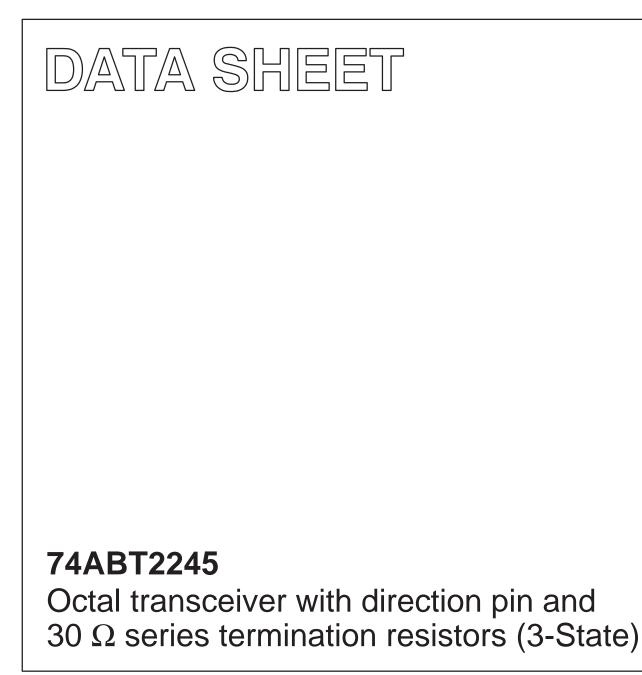
INTEGRATED CIRCUITS



Product data Supersedes data of 1998 Jan 16 2002 Dec 17



Philips Semiconductors

74ABT2245

FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Output capability: +12 mA / -32 mA
- Latch-up protection exceeds 500 mA per Jedec Std 17
- ESD protection exceeds 2000 V per MIL STD 833 Method 3015 and 200 V per Machine Model
- Power-up 3-State
- Live insertion/extraction permitted
- Same as 74ABT245-1
- Outputs include series resistance of 30 Ω, making external termination resistors unnecessary
- Inputs are disabled during 3-State mode

DESCRIPTION

The 74ABT2245 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed.

The 74ABT2245 device 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.

The 74ABT2245 is designed with 30 Ω series resistance in both the HIGH and LOW states of the output. This design reduces line noise in applications such as memory address drivers, clock drivers, and bus receivers/transmitters.

The 74ABT2245 is the same as the 74ABT245-1. The part number has been changed to reflect industry standards.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS T _{amb} = 25 °C; GND = 0 V | TYPICAL | UNIT |
|--------------------------------------|-------------------------------------------|---------------------------------------------------|---------|------|
| t _{PLH} t _{PHL} | Propagation delay An to Bn or Bn to An | C _L = 50 pF; V _{CC} = 5 V | 3.9 | ns |
| C _{IN} | Input capacitance DIR, OE | $V_I = 0 V \text{ or } V_{CC}$ | 4 | pF |
| C _{I/O} | I/O pin capacitance | Outputs disabled; $V_0 = 0 V \text{ or } V_{CC}$ | 7 | pF |
| I _{CCZ} | Total supply current | Outputs disabled; V_{CC} = 5.5 V | 50 | μΑ |

ORDERING INFORMATION

| PACKAGES | TEMPERATURE RANGE | PART NUMBER | DWG NUMBER |
|-----------------------------|-------------------|-------------|------------|
| 20-Pin plastic SO | –40 °C to +85 °C | 74ABT2245D | SOT163-1 |
| 20-Pin Plastic SSOP Type II | –40 °C to +85 °C | 74ABT2245DB | SOT339-1 |
| 20-Pin Plastic TSSOP Type I | –40 °C to +85 °C | 74ABT2245PW | SOT360-1 |

PIN CONFIGURATION

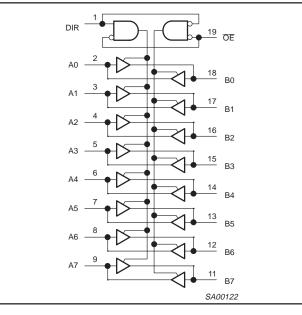
| DIR | | 20 V _{CC} |
|-----|----|--------------------|
| A0 | 2 | 19 OE |
| A1 | 3 | 18 B0 |
| A2 | 4 | 17 B1 |
| A3 | 5 | 16 B2 |
| A4 | 6 | 15 B3 |
| A5 | 7 | 14 B4 |
| A6 | 8 | 13 B5 |
| A7 | 9 | 12 B6 |
| GND | 10 | 11 B7 |
| | S | A00121 |

PIN DESCRIPTION

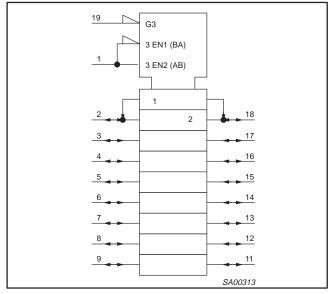
| PIN NUMBER | SYMBOL | NAME AND FUNCTION |
|-----------------------------------|-----------------|-------------------------------------|
| 1 | DIR | Direction control input |
| 2, 3, 4, 5, 6, 7, 8, 9 | A0 – A7 | Data inputs/outputs (A side) |
| 18, 17, 16, 15, 14, 13, 12, 11 | B0 – B7 | Data inputs/outputs (B side) |
| 19 | ŌĒ | Output enable input (active-LOW) |
| 10 | GND | Ground (0 V) |
| 20 | V _{CC} | Positive supply voltage |

74ABT2245

LOGIC SYMBOL



LOGIC SYMBOL IEEE/IEC



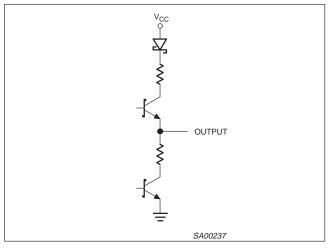
FUNCTION TABLE

| INP | UTS | INPUTS/C | OUTPUTS |
|-----|-----|----------|---------|
| OE | DIR | An | Bn |
| L | L | An = Bn | Inputs |
| L | Н | Inputs | Bn = An |
| н | Х | Z | Z |

H = High voltage level L = Low voltage level

X = Don't care Z = High impedance "off" state

SCHEMATIC OF EACH OUTPUT



74ABT2245

ABSOLUTE MAXIMUM RATINGS^{1, 2}

| SYMBOL | PARAMETER | CONDITIONS | RATING | UNIT |
|------------------|--------------------------------|-----------------------------|--------------|------|
| V _{CC} | DC supply voltage | | -0.5 to +7.0 | V |
| I _{IK} | DC input diode current | V _I < 0 V | -18 | mA |
| VI | DC input voltage ³ | | -1.2 to +7.0 | V |
| I _{ОК} | DC output diode current | V _O < 0 V | -50 | mA |
| V _{OUT} | DC output voltage ³ | output in Off or HIGH state | -0.5 to +5.5 | V |
| I _{OUT} | DC output current | output in LOW state | 128 | mA |
| T _{stg} | Storage temperature range | | -65 to 150 | °C |

NOTES:

 Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

 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.

3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

| SYMBOL | PARAMETER | LIM | UNIT | |
|---------------------|--------------------------------------|-----|-----------------|------|
| | | Min | Max | |
| V _{CC} | DC supply voltage | 4.5 | 5.5 | V |
| VI | Input voltage | 0 | V _{CC} | V |
| VIH | 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 | - | 12 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | 0 | 5 | ns/V |
| T _{amb} | Operating free-air temperature range | -40 | +85 | °C |

DC ELECTRICAL CHARACTERISTICS

| | | | | | | LIMITS | | | |
|------------------------------------|----------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------|-----------------|---------------------|--------|--------------------|-----------------|------|
| SYMBOL | PARAMETER | | TEST CONDITIONS | T _{ar} | _{nb} = +25 | °C | T _{amb} = | –40 °C 85 °C | UNIT |
| | | | | Min | Тур | Мах | Min | Max | |
| V _{IK} | Input clamp vol | tage | $V_{CC} = 4.5 \text{ V}; \text{ I}_{IK} = -18 \text{ mA}$ | - | -0.9 | -1.2 | - | -1.2 | V |
| | | | V_{CC} = 4.5 V; I_{OH} = -3 mA; V_I = V_{IL} or V_{IH} | 2.5 | 2.9 | - | 2.5 | - | V |
| V _{OH} | HIGH-level out | out voltage | V_{CC} = 5.0 V; I_{OH} = –3 mA; V_{I} = V_{IL} or V_{IH} | 3.0 | 3.4 | - | 3.0 | - | V |
| | | | V_{CC} = 4.5 V; I_{OH} = –32 mA; V_{I} = V_{IL} or V_{IH} | 2.0 | 2.4 | - | 2.0 | - | V |
| M | LOW-level outp | utvoltogo | V_{CC} = 4.5 V; I_{OL} = 5 mA; V_{I} = V_{IL} or V_{IH} | - | 0.32 | 0.55 | - | 0.55 | V |
| V _{OL} | | out voltage | V_{CC} = 4.5 V; I_{OL} = 12 mA; V_{I} = V_{IL} or V_{IH} | - | 0.5 | 0.8 | - | 0.8 | V |
| 1. | Input leakage | Control pins | V_{CC} = 5.5 V; V_I = GND or 5.5 V | - | ±0.01 | ±1.0 | - | ±1.0 | μΑ |
| 1 ₁ | current | Data pins | V_{CC} = 5.5 V; V_{I} = GND or 5.5 V | - | ±5 | ±100 | - | ±100 | μΑ |
| I _{OFF} | Power-off leaka | age current | V_{CC} = 0.0 V; V1 or V_{O} \leq 4.5 V | - | ±5.0 | ±100 | - | ±100 | μΑ |
| I _{PU} /I _{PD} | Power-up/dowr output current ³ | | V_{CC} = 2.1 V; V_{O} = 0.5 V; V_{I} = GND or V_{CC} ; V _{OE} = Don't care | _ | ±5.0 | ±50 | - | ±50 | μA |
| I _{IH} + I _{OZH} | 3-State output I | High current | V_{CC} = 5.5 V; V_{O} = 2.7 V; V_{I} = V_{IL} or V_{IH} | - | 5.0 | 50 | - | 50 | μΑ |
| I _{IL} + I _{OZL} | 3-State output I | Low current | V_{CC} = 5.5 V; V_{O} = 0.5 V; V_{I} = V_{IL} or V_{IH} | - | -5.0 | -50 | - | -50 | μΑ |
| I _{CEX} | Output high lea | kage current | V_{CC} = 5.5 V; V_{O} = 5.5 V; V_{I} = GND or V_{CC} | - | 5.0 | 50 | - | 50 | μΑ |
| Ι _Ο | Output current ¹ | | $V_{CC} = 5.5 \text{ V}; V_{O} = 2.5 \text{ V}$ | -40 | -100 | -180 | -40 | -180 | mA |
| I _{CCH} | | | V_{CC} = 5.5 V; Outputs HIGH, V_{I} = GND or V_{CC} | - | 50 | 250 | - | 250 | μΑ |
| I _{CCL} | Quiescent supp | olv current | V_{CC} = 5.5 V; Outputs LOW, V_{I} = GND or V_{CC} | - | 24 | 30 | - | 30 | mA |
| I _{CCZ} | | , | V_{CC} = 5.5 V; Outputs 3-State; V _I = GND or V _{CC} | - | 50 | 250 | - | 250 | μA |
| | | | Outputs enabled, one input at 3.4 V, other inputs at V _{CC} or GND; V _{CC} = 5.5 V | - | 0.5 | 1.5 | - | 1.5 | mA |
| ΔI_{CC} | Additional supp input pin ² | ly current per | Outputs 3-State, one data input at 3.4 V, other inputs at V _{CC} or GND; V _{CC} = 5.5 V | - | 50 | 250 | - | 250 | μA |
| | | | Outputs 3-State, one enable input at 3.4 V, other inputs at V _{CC} or GND; $V_{CC} = 5.5$ V | - | 0.5 | 1.5 | - | 1.5 | mA |

NOTES:

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

This is the increase in supply current for each input at 3.4 V.
 This parameter is valid for any V_{CC} between 0 V and 2.1 V with a transition time of up to 10 msec. From V_{CC} = 2.1 V to V_{CC} = 5 V ± 10%, a transition time of up to 100 μsec is permitted.

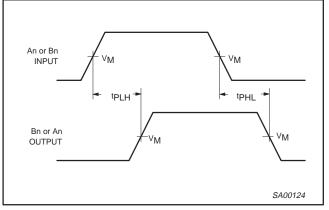
AC CHARACTERISTICS

GND = 0 V; t_R = t_F = 2.5 ns; CL = 50 pF, RL = 500 Ω

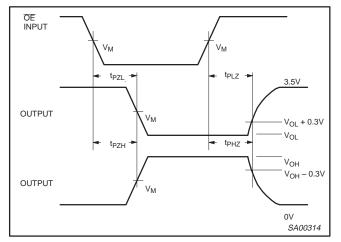
| | | | | | LIMI | TS | | |
|--------------------------------------|------------------------------------------------|----------|---------------------|-----------------------------------------------|------------|----------------------------------------------------|----------------------------|------|
| SYMBOL | PARAMETER | WAVEFORM | T _a V | _{mb} = +25 ° _{CC} = +5.0 | °C V | T _{amb} = -40 ° V _{CC} = +5.0 | °C to +85 °C 0 V ±0.5 V | UNIT |
| | | | Min | Тур | Мах | Min | Max | |
| t _{PLH} t _{PHL} | Propagation delay An to Bn or Bn to An | 1 | 1.0 1.0 | 2.8 3.9 | 4.2 5.0 | 1.0 1.0 | 4.7 5.4 | ns |
| t _{PZH} t _{PZL} | Output enable time to HIGH and LOW level | 2 | 1.3 3.0 | 3.5 5.5 | 4.6 7.0 | 1.3 3.0 | 5.5 7.8 | ns |
| t _{PHZ} t _{PLZ} | Output disable time from HIGH and LOW Level | 2 | 1.5 1.0 | 4.0 3.4 | 5.4 4.6 | 1.5 1.0 | 6.3 5.0 | ns |

AC WAVEFORMS

 V_{M} = 1.5 V, V_{IN} = GND to 3.0 V



Waveform 1. Waveforms Showing the Input to Output Propagation Delays

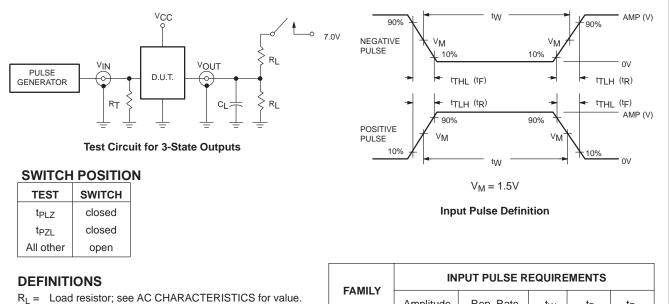


Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

74ABT2245

74ABT2245

TEST CIRCUIT AND WAVEFORMS



 $C_L =$ Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

 $\label{eq:RT} \mathsf{R}_{\mathsf{T}} = \quad \text{Termination resistance should be equal to } \mathsf{Z}_{\mathsf{OUT}} \text{ of } \\ \text{pulse generators.}$

| FAMILY | IN | PUT PULSE R | EQUIRE | MENTS | |
|--------|-----------|-------------|----------------|----------------|----------------|
| FAMIL | Amplitude | Rep. Rate | t _W | t _R | t _F |
| 74ABT | 3.0V | 1MHz | 500ns | 2.5ns | 2.5ns |

SA00012

Product data

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

2002 Dec 17

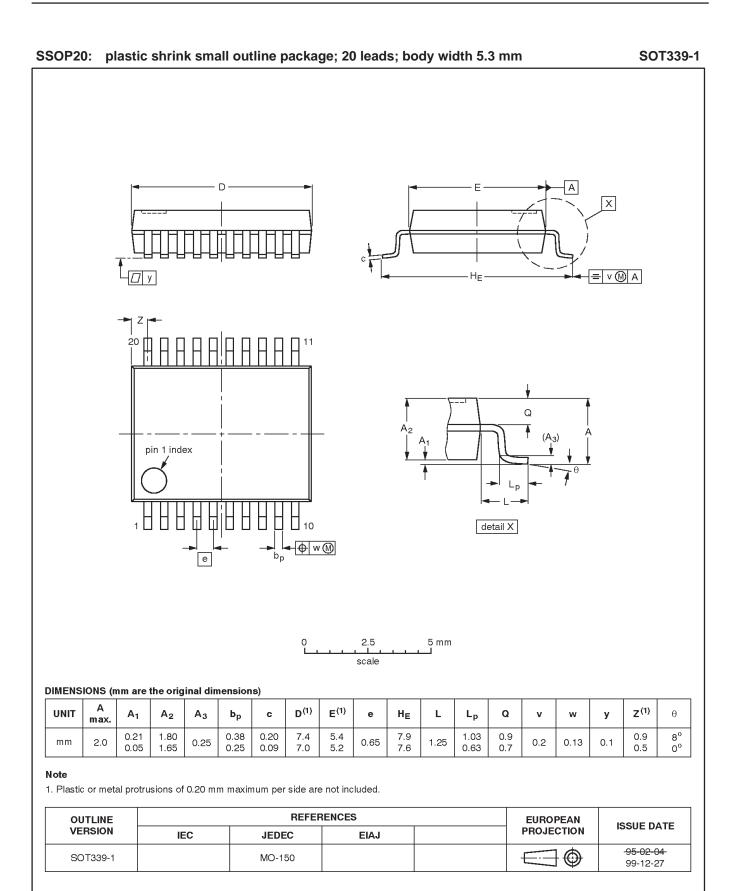
| | | _] y | | | | | | | c | | | | | | | | MA | |
|--------------------------------------------|---------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------|---------------------------------------|-------------------------------------------|--------------|---------------------------|------------------------------|------------------|----------------------|-----------------|---------------------------------------|----------|
| | | <u> </u> | | | | | | | | | 2 A1 1 | | detail | | | | | |
| | | | | . e . | _ | _ → 0 L | νþ | <u>→ ~ ()</u> | 5 I scale | | | 10 mm J | | | | | | |
| DIMENS | IONS (ii | nch dim | | | - | 0 L | ~р | | scale | | | 10 mm J | | | | | | |
| DIMENS | IONS (il A max. | nch dim A1 | nension: | | erived fi | 0 L | ~р | | scale | ns) | L | IO mm J | Q | v | w | у | z ⁽¹⁾ | θ |
| | Α | | | s are de | | 0 L | origina | , , | scale mensio | | | J | Q 1.1 1.0 | v 0.25 | w 0.25 | y 0.1 | z ⁽¹⁾ 0.9 0.4 | 8° |
| UNIT | A max. | A 1 0.30 | A ₂ 2.45 | s are de | b p 0.49 | 0 L rom the c 0.32 | origina D ⁽¹⁾ 13.0 | I mm di E ⁽¹⁾ 7.6 | scale mensio | H E 10.65 | L | J Lp 1.1 | 1.1 | | | | 0.9 | |
| UNIT mm | A max. 2.65 0.10 | A ₁ 0.30 0.10 0.012 0.004 | A2 2.45 2.25 0.096 0.089 | s are de A ₃ 0.25 0.01 | b p 0.49 0.36 0.019 0.014 | 0 c 0.32 0.23 0.013 0.009 | origina D(1) 13.0 12.6 0.51 0.49 | I mm di E (1) 7.6 7.4 0.30 0.29 | scale mensio e 1.27 0.050 | H _E 10.65 10.00 0.419 | L 1.4 | Lp 1.1 0.4 0.043 | 1.1 1.0 0.043 | 0.25 | 0.25 | 0.1 | 0.9 0.4 0.035 | 8° |
| UNIT mm inches Note 1. Plastic | A max. 2.65 0.10 | A ₁ 0.30 0.10 0.012 0.004 | A ₂ 2.45 2.25 0.096 0.089 | s are de A ₃ 0.25 0.01 | b p 0.49 0.36 0.019 0.014 | 0 c 0.32 0.23 0.013 0.009 | origina D(1) 13.0 12.6 0.51 0.49 side arc REFEI | I mm di E (1) 7.6 7.4 0.30 0.29 | scale mensio e 1.27 0.050 | H _E 10.65 10.00 0.419 | L 1.4 | Lp 1.1 0.4 0.043 | 1.1 1.0 0.043 0.039 | 0.25 | 0.25 0.01 PEAN | 0.1 | 0.9 0.4 0.035 | 8° 0° |

SOT163-1

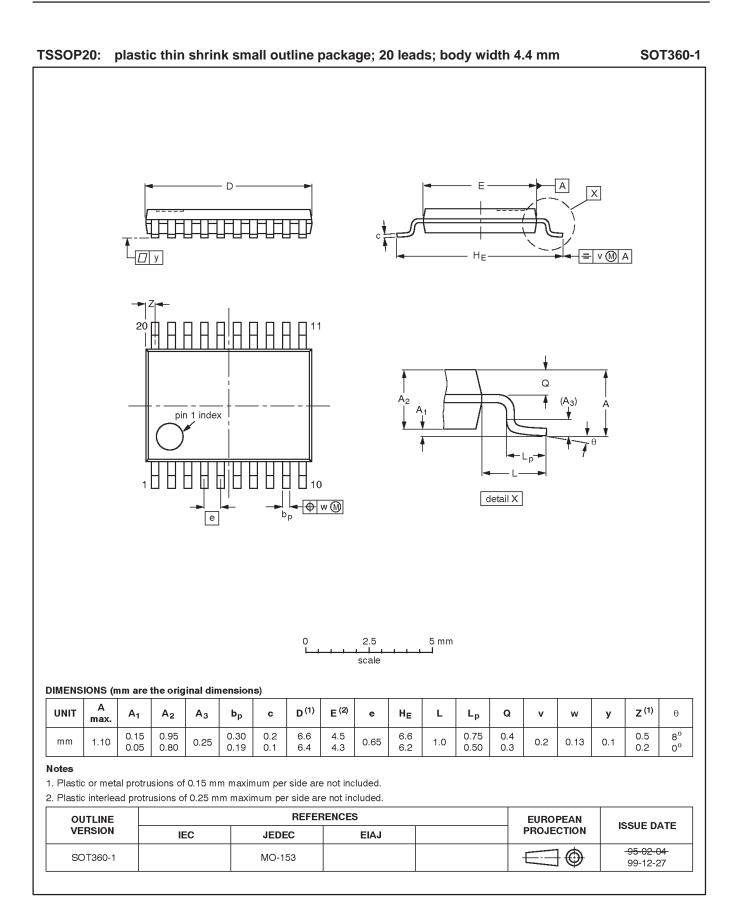
74ABT2245

74ABT2245

Product data



74ABT2245



74ABT2245

REVISION HISTORY

| Rev | Date | Description |
|-----|----------|--------------------------------------------------------------------------------------------------------------------------------|
| _3 | 20021217 | Product data (9397 750 10846); ECN 853-1761 29292 of 12 December 2002. Supersedes data of 16 January 1998 (9397 750 03468). |
| | | Modifications: |
| | | Ordering information table: remove "North America" column; remove 74ABT2245N package offering. |
| _2 | 19980116 | Product specification (9397 750 03468); ECN 853-1761 18865 of 16 January 1998. Supersedes data of 1995 September 06. |
| _1 | 19950906 | Product specification; ECN 853-1761 15701 of 06 September 1995. |

74ABT2245

Data sheet status

| Level | Data sheet status ^[1] | Product status ^{[2] [3]} | Definitions |
|-------|----------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
| 111 | Product data | Production | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

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

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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

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