

74HC245; 74HCT245

Octal bus transceiver; 3-state

Rev. 03 — 31 January 2005

Product data sheet

1. General description

The 74HC245; 74HCT245 is a high-speed Si-gate CMOS device and is pin compatible with Low-Power Schottky TTL (LSTTL).

The 74HC245; 74HCT245 is an octal transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The 74HC245; 74HCT245 features an output enable input (\overline{OE}) for easy cascading and a send/receive input (DIR) for direction control. \overline{OE} controls the outputs so that the buses are effectively isolated.

The 74HC245; 74HCT245 is similar to the 74HC640; 74HCT640 but has true (non-inverting) outputs.

2. Features

- Octal bidirectional bus interface
- Non-inverting 3-state outputs
- Multiple package options
- Complies with JEDEC standard no. 7A
- ESD protection:
 - ◆ HBM EIA/JESD22-A114-B exceeds 2000 V
 - ◆ MM EIA/JESD22-A115-A exceeds 200 V
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$

3. Quick reference data

Table 1: Quick reference data
 $GND = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $t_r = t_f = 6\text{ ns}$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|-----------------------------------------------------|-------------------------------------------------|---------------------|-----|-----|------|
| Type 74HC245 | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay An to Bn or Bn to An | $C_L = 15\text{ pF}$; $V_{CC} = 5\text{ V}$ | - | 7 | - | ns |
| C_I | input capacitance | | - | 3.5 | - | pF |
| $C_{I/O}$ | input/output capacitance | | - | 10 | - | pF |
| C_{PD} | power dissipation capacitance per transceiver | $V_I = GND\text{ to }V_{CC}$ | 1 - | 30 | - | pF |
| Type 74HCT245 | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay An to Bn or Bn to An | $C_L = 15\text{ pF}$; $V_{CC} = 5\text{ V}$ | - | 10 | - | ns |

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Table 1: Quick reference data ...continued $GND = 0\text{ V}$; $T_{amb} = 25\text{ °C}$; $t_r = t_f = 6\text{ ns}$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|-----------------------------------------------|----------------------------------------|-----|-----|-----|------|
| C_I | input capacitance | | - | 3.5 | - | pF |
| $C_{I/O}$ | input/output capacitance | | - | 10 | - | pF |
| C_{PD} | power dissipation capacitance per transceiver | $V_I = GND$ to $V_{CC} - 1.5\text{ V}$ | [1] | - | 30 | pF |

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

 f_i = input frequency in MHz; f_o = output frequency in MHz; C_L = output load capacitance in pF; V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

4. Ordering information

Table 2: Ordering information

| Type number | Package | | | |
|-------------|-------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------|----------|
| | Temperature range | Name | Description | Version |
| 74HC245N | -40 °C to +125 °C | DIP20 | plastic dual in-line package; 20 leads (300 mil) | SOT146-1 |
| 74HC245D | -40 °C to +125 °C | SO20 | plastic small outline package; 20 leads; body width 7.5 mm | SOT163-1 |
| 74HC245PW | -40 °C to +125 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | SOT360-1 |
| 74HC245DB | -40 °C to +125 °C | SSOP20 | plastic shrink small outline package; 20 leads; body width 5.3 mm | SOT339-1 |
| 74HC245BQ | -40 °C to +125 °C | DHVQFN20 | plastic dual-in-line compatible thermal enhanced very thin quad flat package no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm | SOT764-1 |
| 74HCT245N | -40 °C to +125 °C | DIP20 | plastic dual in-line package; 20 leads (300 mil) | SOT146-1 |
| 74HCT245D | -40 °C to +125 °C | SO20 | plastic small outline package; 20 leads; body width 7.5 mm | SOT163-1 |
| 74HCT245PW | -40 °C to +125 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | SOT360-1 |
| 74HCT245DB | -40 °C to +125 °C | SSOP20 | plastic shrink small outline package; 20 leads; body width 5.3 mm | SOT339-1 |
| 74HCT245BQ | -40 °C to +125 °C | DHVQFN20 | plastic dual-in-line compatible thermal enhanced very thin quad flat package no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm | SOT764-1 |

5. Functional diagram

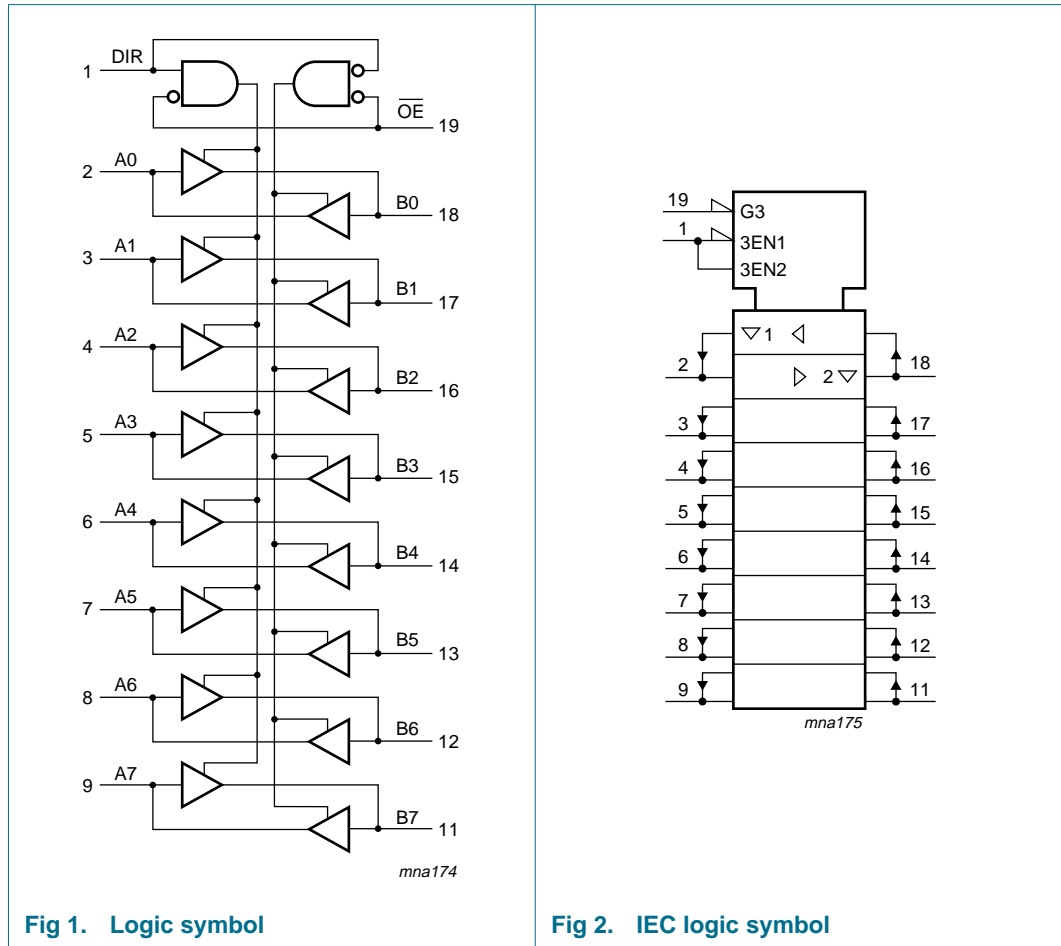
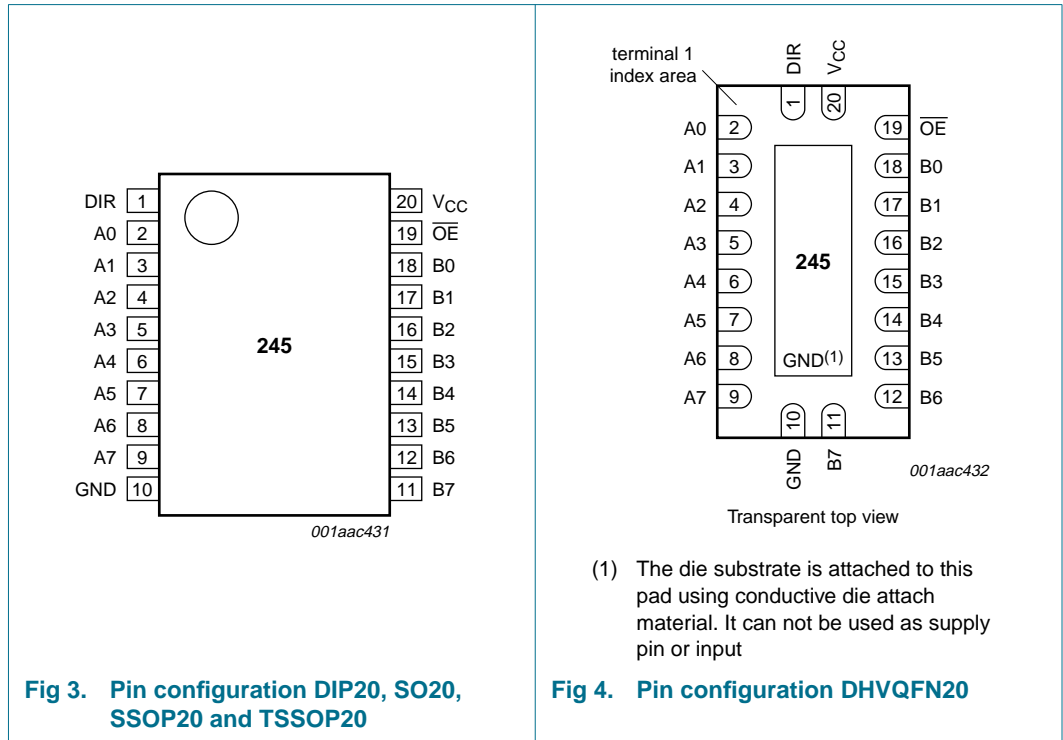


Fig 1. Logic symbol

Fig 2. IEC logic symbol

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3: Pin description

| Symbol | Pin | Description |
|--------|-----|-------------------|
| DIR | 1 | direction control |
| A0 | 2 | data input/output |
| A1 | 3 | data input/output |
| A2 | 4 | data input/output |
| A3 | 5 | data input/output |
| A4 | 6 | data input/output |
| A5 | 7 | data input/output |
| A6 | 8 | data input/output |
| A7 | 9 | data input/output |
| GND | 10 | ground (0 V) |
| B7 | 11 | data input/output |
| B6 | 12 | data input/output |
| B5 | 13 | data input/output |
| B4 | 14 | data input/output |
| B3 | 15 | data input/output |
| B2 | 16 | data input/output |

Table 3: Pin description ...continued

| Symbol | Pin | Description |
|-----------------|-----|----------------------------------|
| B1 | 17 | data input/output |
| B0 | 18 | data input/output |
| \overline{OE} | 19 | output enable input (active LOW) |
| V_{CC} | 20 | supply voltage |

7. Functional description

7.1 Function table

Table 4: Function table [1]

| Input | | Input/output | |
|-----------------|-----|--------------|-------|
| \overline{OE} | DIR | An | Bn |
| L | L | A = B | input |
| L | H | input | B = A |
| H | X | Z | 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 | +7 | V |
| I_{IK} | input diode current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | - | ± 20 | mA |
| I_{OK} | output diode current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | - | ± 20 | mA |
| I_O | output source or sink current | $V_O = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$ | - | ± 35 | mA |
| I_{CC}, I_{GND} | V_{CC} or GND current | | - | ± 70 | mA |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| P_{tot} | total power dissipation | | [1] | | |
| | DIP20 package | | - | 750 | mW |
| | SO20, SSOP20, TSSOP20 and DHVQFN20 packages | | - | 500 | mW |

- [1] For DIP20 packages: above 70 °C, P_{tot} derates linearly with 12 mW/K.
 For SO20 packages: above 70 °C, P_{tot} derates linearly with 8 mW/K.
 For SSOP20 and TSSOP20 packages: above 60 °C, P_{tot} derates linearly with 5.5 mW/K.
 For DHVQFN20 packages: above 60 °C, P_{tot} derates linearly with 4.5 mW/K.

9. Recommended operating conditions

Table 6: Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|---------------------------|-------------------------|-----|-----|----------|------|
| Type 74HC245 | | | | | | |
| V_{CC} | supply voltage | | 2.0 | 5.0 | 6.0 | V |
| V_I | input voltage | | 0 | - | V_{CC} | V |
| V_O | output voltage | | 0 | - | V_{CC} | V |
| t_r, t_f | input rise and fall times | $V_{CC} = 2.0\text{ V}$ | - | - | 1000 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | 6.0 | 500 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 400 | ns |
| T_{amb} | ambient temperature | | -40 | - | +125 | °C |
| Type 74HCT245 | | | | | | |
| V_{CC} | supply voltage | | 4.5 | 5.0 | 5.5 | V |
| V_I | input voltage | | 0 | - | V_{CC} | V |
| V_O | output voltage | | 0 | - | V_{CC} | V |
| t_r, t_f | input rise and fall times | $V_{CC} = 4.5\text{ V}$ | - | 6.0 | 500 | ns |
| T_{amb} | ambient temperature | | -40 | - | +125 | °C |

10. Static characteristics

Table 7: Static characteristics type 74HC245

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------------------|-----------------------------------------------|-------------------------------------------------------|------|------|------|------|
| $T_{amb} = 25\text{ °C}$ | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 2.0\text{ V}$ | 1.5 | 1.2 | - | V |
| | | $V_{CC} = 4.5\text{ V}$ | 3.15 | 2.4 | - | V |
| | | $V_{CC} = 6.0\text{ V}$ | 4.2 | 3.2 | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 2.0\text{ V}$ | - | 0.8 | 0.5 | V |
| | | $V_{CC} = 4.5\text{ V}$ | - | 2.1 | 1.35 | V |
| | | $V_{CC} = 6.0\text{ V}$ | - | 2.8 | 1.8 | V |
| V_{OH} | HIGH-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | |
| | | $I_O = -20\text{ }\mu\text{A}; V_{CC} = 2.0\text{ V}$ | 1.9 | 2.0 | - | V |
| | | $I_O = -20\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$ | 4.4 | 4.5 | - | V |
| | | $I_O = -20\text{ }\mu\text{A}; V_{CC} = 6.0\text{ V}$ | 5.9 | 6.0 | - | V |
| | | $I_O = -6.0\text{ mA}; V_{CC} = 4.5\text{ V}$ | 3.98 | 4.32 | - | V |
| | $I_O = -7.8\text{ mA}; V_{CC} = 6.0\text{ V}$ | 5.48 | 5.81 | - | V | |

Table 7: Static characteristics type 74HC245 ...continued
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | I _O = 20 μA; V _{CC} = 2.0 V | - | 0 | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 4.5 V | - | 0 | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 6.0 V | - | 0 | 0.1 | V |
| | | I _O = 6.0 mA; V _{CC} = 4.5 V | - | 0.15 | 0.26 | V |
| | | I _O = 7.8 mA; V _{CC} = 6.0 V | - | 0.16 | 0.26 | V |
| I _{LI} | input leakage current | V _I = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±0.1 | μA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±0.5 | μA |
| I _{CC} | quiescent supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V | - | - | 8.0 | μA |
| C _I | input capacitance | | - | 3.5 | - | pF |
| C _{I/O} | input/output capacitance | | - | 10 | - | pF |
| T_{amb} = -40 °C to +85 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | - | - | V |
| | | V _{CC} = 4.5 V | 3.15 | - | - | V |
| | | V _{CC} = 6.0 V | 4.2 | - | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | - | 0.5 | V |
| | | V _{CC} = 4.5 V | - | - | 1.35 | V |
| | | V _{CC} = 6.0 V | - | - | 1.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | I _O = -20 μA; V _{CC} = 2.0 V | 1.9 | - | - | V |
| | | I _O = -20 μA; V _{CC} = 4.5 V | 4.4 | - | - | V |
| | | I _O = -20 μA; V _{CC} = 6.0 V | 5.9 | - | - | V |
| | | I _O = -6.0 mA; V _{CC} = 4.5 V | 3.84 | - | - | V |
| | | I _O = -7.8 mA; V _{CC} = 6.0 V | 5.34 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | I _O = 20 μA; V _{CC} = 2.0 V | - | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 4.5 V | - | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 6.0 V | - | - | 0.1 | V |
| | | I _O = 6.0 mA; V _{CC} = 4.5 V | - | - | 0.33 | V |
| | | I _O = 7.8 mA; V _{CC} = 6.0 V | - | - | 0.33 | V |
| I _{LI} | input leakage current | V _I = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±1.0 | μA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±5.0 | μA |
| I _{CC} | quiescent supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V | - | - | 80 | μA |
| T_{amb} = -40 °C to +125 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | - | - | V |
| | | V _{CC} = 4.5 V | 3.15 | - | - | V |
| | | V _{CC} = 6.0 V | 4.2 | - | - | V |

Table 7: Static characteristics type 74HC245 ...continued
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|------|
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | - | 0.5 | V |
| | | V _{CC} = 4.5 V | - | - | 1.35 | V |
| | | V _{CC} = 6.0 V | - | - | 1.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | - | - | - | - |
| | | I _O = -20 μA; V _{CC} = 2.0 V | 1.9 | - | - | V |
| | | I _O = -20 μA; V _{CC} = 4.5 V | 4.4 | - | - | V |
| | | I _O = -20 μA; V _{CC} = 6.0 V | 5.9 | - | - | V |
| | | I _O = -6.0 mA; V _{CC} = 4.5 V | 3.7 | - | - | V |
| | | I _O = -7.8 mA; V _{CC} = 6.0 V | 5.2 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | - | - | - | - |
| | | I _O = 20 μA; V _{CC} = 2.0 V | - | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 4.5 V | - | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 6.0 V | - | - | 0.1 | V |
| | | I _O = 6.0 mA; V _{CC} = 4.5 V | - | - | 0.4 | V |
| | | I _O = 7.8 mA; V _{CC} = 6.0 V | - | - | 0.4 | V |
| I _{LI} | input leakage current | V _I = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±1.0 | μA |
| I _{oZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±10.0 | μA |
| I _{CC} | quiescent supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V | - | - | 160 | μA |

Table 8: Static characteristics type 74HCT245
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| T_{amb} = 25 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 4.5 V to 5.5 V | 2.0 | 1.6 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 4.5 V to 5.5 V | - | 1.2 | 0.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | - | - | - | - |
| | | I _O = -20 μA | 4.4 | 4.5 | - | V |
| | | I _O = -6 mA | 3.98 | 4.32 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | - | - | - | - |
| | | I _O = 20 μA | - | 0 | 0.1 | V |
| | | I _O = 6.0 mA | - | 0.15 | 0.26 | V |
| I _{LI} | input leakage current | V _I = V _{CC} or GND; V _{CC} = 5.5 V | - | - | ±0.1 | μA |
| I _{oZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _{CC} = 5.5 V; V _O = V _{CC} or GND per input pin; other inputs at V _{CC} or GND; I _O = 0 A | - | - | ±0.5 | μA |
| I _{CC} | quiescent supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 8.0 | μA |

Table 8: Static characteristics type 74HCT245 ...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 | $V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A | | | | |
| | An or Bn inputs | | - | 40 | 144 | μ A |
| | \overline{OE} input | | - | 150 | 540 | μ A |
| | DIR input | | - | 90 | 324 | μ A |
| C_I | input capacitance | | - | 3.5 | - | pF |
| $C_{I/O}$ | input/output capacitance | | - | 10 | - | pF |
| $T_{amb} = -40$ °C to $+85$ °C | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | 2.0 | - | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | - | - | 0.8 | V |
| V_{OH} | HIGH-level output voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5$ V | | | | |
| | | $I_O = -20$ μ A | 4.4 | - | - | V |
| | | $I_O = -6$ mA | 3.84 | - | - | V |
| V_{OL} | LOW-level output voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5$ V | | | | |
| | | $I_O = 20$ μ A | - | - | 0.1 | V |
| | | $I_O = 6.0$ mA | - | - | 0.33 | V |
| I_{LI} | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | ± 1.0 | μ A |
| I_{OZ} | OFF-state output current | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V; $V_O = V_{CC}$ or GND per input pin; other inputs at V_{CC} or GND; $I_O = 0$ A | - | - | ± 5.0 | μ A |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 80 | μ A |
| ΔI_{CC} | additional quiescent supply current per input pin | $V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A | | | | |
| | An or Bn inputs | | - | - | 180 | μ A |
| | \overline{OE} input | | - | - | 675 | μ A |
| | DIR input | | - | - | 405 | μ A |
| $T_{amb} = -40$ °C to $+125$ °C | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | 2.0 | - | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 4.5$ V to 5.5 V | - | - | 0.8 | V |
| V_{OH} | HIGH-level output voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5$ V | | | | |
| | | $I_O = -20$ μ A | 4.4 | - | - | V |
| | | $I_O = -6$ mA | 3.7 | - | - | V |
| V_{OL} | LOW-level output voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5$ V | | | | |
| | | $I_O = 20$ μ A | - | - | 0.1 | V |
| | | $I_O = 6.0$ mA | - | - | 0.4 | V |
| I_{LI} | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | ± 1.0 | μ A |
| I_{OZ} | OFF-state output current | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V; $V_O = V_{CC}$ or GND per input pin; other inputs at V_{CC} or GND; $I_O = 0$ A | - | - | ± 10 | μ A |

Table 8: Static characteristics type 74HCT245 ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------|
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 160 | μ A |
| ΔI_{CC} | additional quiescent supply current per input pin | $V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A | | | | |
| | An or Bn inputs | | - | - | 196 | μ A |
| | \overline{OE} input | | - | - | 735 | μ A |
| | DIR input | | - | - | 441 | μ A |

11. Dynamic characteristics

Table 9: Dynamic characteristics type 74HC245GND = 0 V; test circuit see [Figure 7](#).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------|-------------------|-----------------|----------------------|
| $T_{amb} = 25$ °C | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay An to Bn or Bn to An | see Figure 5 $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 5.0$ V; $C_L = 15$ pF $V_{CC} = 6.0$ V | - | 25 9 7 7 | 90 18 - | ns ns ns ns |
| t_{PZH} , t_{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V | - | 30 11 9 | 150 30 26 | ns ns ns |
| t_{PHZ} , t_{PLZ} | 3-state output disable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V | - | 41 15 12 | 150 30 26 | ns ns ns |
| t_{THL} , t_{TLH} | output transition time | see Figure 5 $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V | - | 14 5 4 | 60 12 10 | ns ns ns |
| C_{PD} | power dissipation capacitance per transceiver | $V_I = GND$ to V_{CC} | [1] - | 30 | - | pF |
| $T_{amb} = -40$ °C to $+85$ °C | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay An to Bn or Bn to An | see Figure 5 $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V | - | - - - | 115 23 20 | ns ns ns |

Table 9: Dynamic characteristics type 74HC245 ...continued
GND = 0 V; test circuit see Figure 7.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------|-----|-----|-----|------|
| t_{PZH} , t_{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 190 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 38 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 33 | ns |
| t_{PHZ} , t_{PLZ} | 3-state output disable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 190 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 38 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 33 | ns |
| t_{THL} , t_{TLH} | output transition time | see Figure 5 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 75 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 15 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 13 | ns |
| $T_{amb} = -40\text{ °C to }+125\text{ °C}$ | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay An to Bn or Bn to An | see Figure 5 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 135 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 27 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 23 | ns |
| t_{PZH} , t_{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 225 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 45 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 38 | ns |
| t_{PHZ} , t_{PLZ} | 3-state output disable time \overline{OE} to An or \overline{OE} to Bn | see Figure 6 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 225 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 45 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 38 | ns |
| t_{THL} , t_{TLH} | output transition time | see Figure 5 | | | | |
| | | $V_{CC} = 2.0\text{ V}$ | - | - | 90 | ns |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 18 | ns |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 15 | ns |

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

Table 10: Dynamic characteristics type 74HCT245

GND = 0 V; test circuit see [Figure 7](#).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------|-----|-----|-----|------|
| T_{amb} = 25 °C | | | | | | |
| t _{PHL} , t _{PLH} | propagation delay An to Bn or Bn to An | see Figure 5 V _{CC} = 4.5 V | - | 12 | 22 | ns |
| | | V _{CC} = 5.0 V; C _L = 15 pF | - | 10 | - | ns |
| t _{PZH} , t _{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | V _{CC} = 4.5 V; see Figure 6 | - | 16 | 30 | ns |
| t _{PHZ} , t _{PLZ} | 3-state output disable time \overline{OE} to An or OE to Bn | V _{CC} = 4.5 V; see Figure 6 | - | 16 | 30 | ns |
| t _{THL} , t _{TLH} | output transition time | V _{CC} = 4.5 V; see Figure 5 | - | 5 | 12 | ns |
| C _{PD} | power dissipation capacitance per transceiver | V _I = GND to V _{CC} - 1.5 V | [1] | 30 | - | pF |
| T_{amb} = -40 °C to +85 °C | | | | | | |
| t _{PHL} , t _{PLH} | propagation delay An to Bn or Bn to An | V _{CC} = 4.5 V; see Figure 5 | - | - | 28 | ns |
| t _{PZH} , t _{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | V _{CC} = 4.5 V; see Figure 6 | - | - | 38 | ns |
| t _{PHZ} , t _{PLZ} | 3-state output disable time \overline{OE} to An or \overline{OE} to Bn | V _{CC} = 4.5 V; see Figure 6 | - | - | 38 | ns |
| t _{THL} , t _{TLH} | output transition time | V _{CC} = 4.5 V; see Figure 5 | - | - | 15 | ns |
| T_{amb} = -40 °C to +125 °C | | | | | | |
| t _{PHL} , t _{PLH} | propagation delay An to Bn or Bn to An | V _{CC} = 4.5 V; see Figure 5 | - | - | 33 | ns |
| t _{PZH} , t _{PZL} | 3-state output enable time \overline{OE} to An or \overline{OE} to Bn | V _{CC} = 4.5 V; see Figure 6 | - | - | 45 | ns |
| t _{PHZ} , t _{PLZ} | 3-state output disable time \overline{OE} to An or \overline{OE} to Bn | V _{CC} = 4.5 V; see Figure 6 | - | - | 45 | ns |
| t _{THL} , t _{TLH} | output transition time | V _{CC} = 4.5 V; see Figure 5 | - | - | 18 | ns |

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;f_o = output frequency in MHz;C_L = output load capacitance in pF;V_{CC} = supply voltage in V;

N = number of inputs switching;

∑ (C_L × V_{CC}² × f_o) = sum of outputs.

12. Waveforms

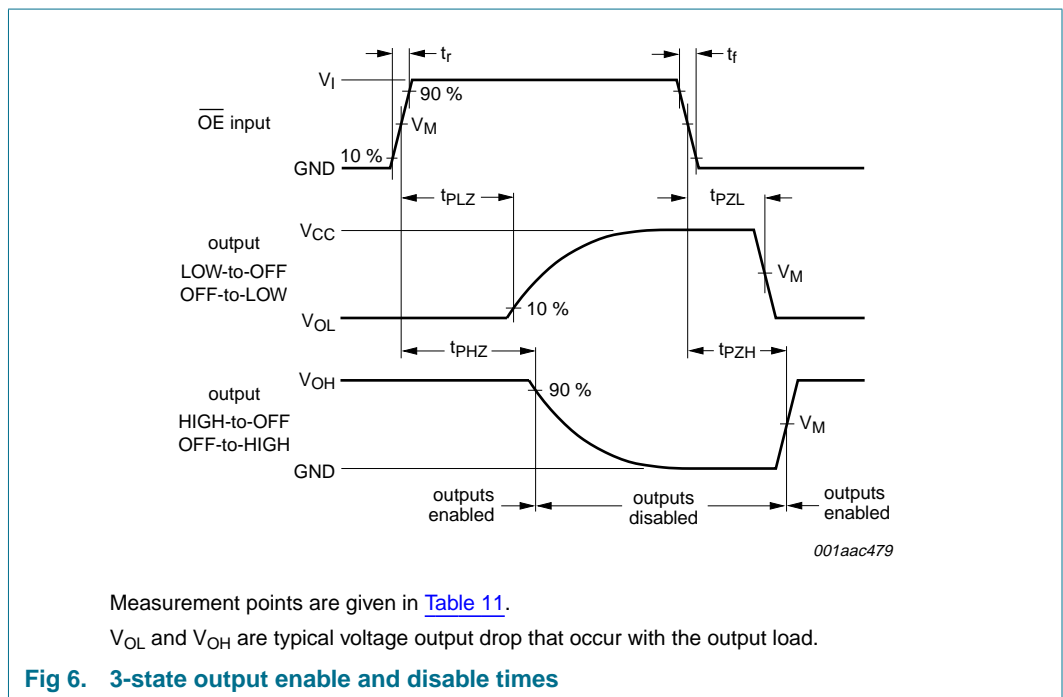
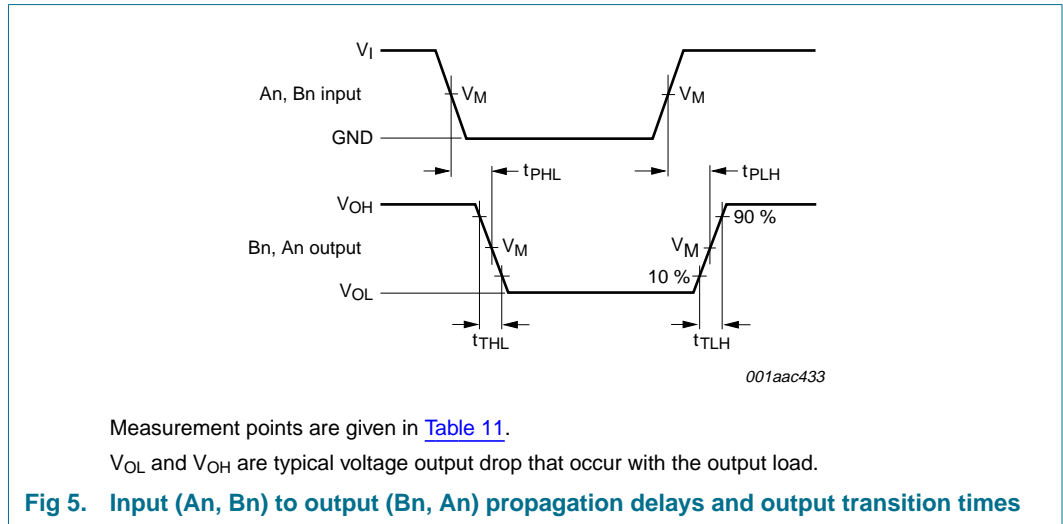


Table 11: Measurement points

| Type | Input | Output |
|----------|-------------|-------------|
| | V_M | V_M |
| 74HC245 | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74HCT245 | 1.3 V | 1.3 V |

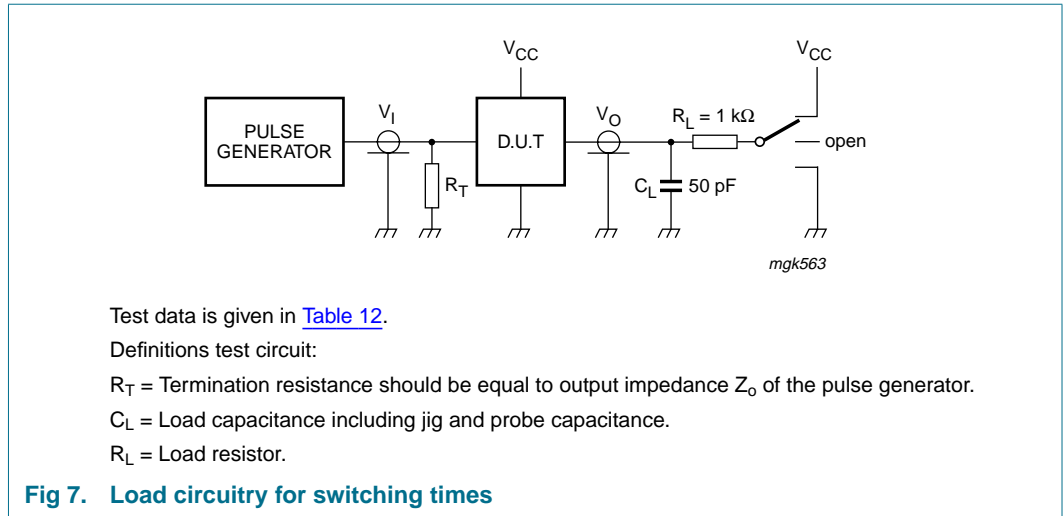


Table 12: Test data

| Type | Input | | Test | | |
|----------|----------|------------|--------------------|--------------------|--------------------|
| | V_I | t_r, t_f | t_{PHL}, t_{PLH} | t_{PZH}, t_{PHZ} | t_{PZL}, t_{PLZ} |
| 74HC245 | V_{CC} | 6 ns | open | GND | V_{CC} |
| 74HCT245 | 3 V | 6 ns | open | GND | V_{CC} |

13. Package outline

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1

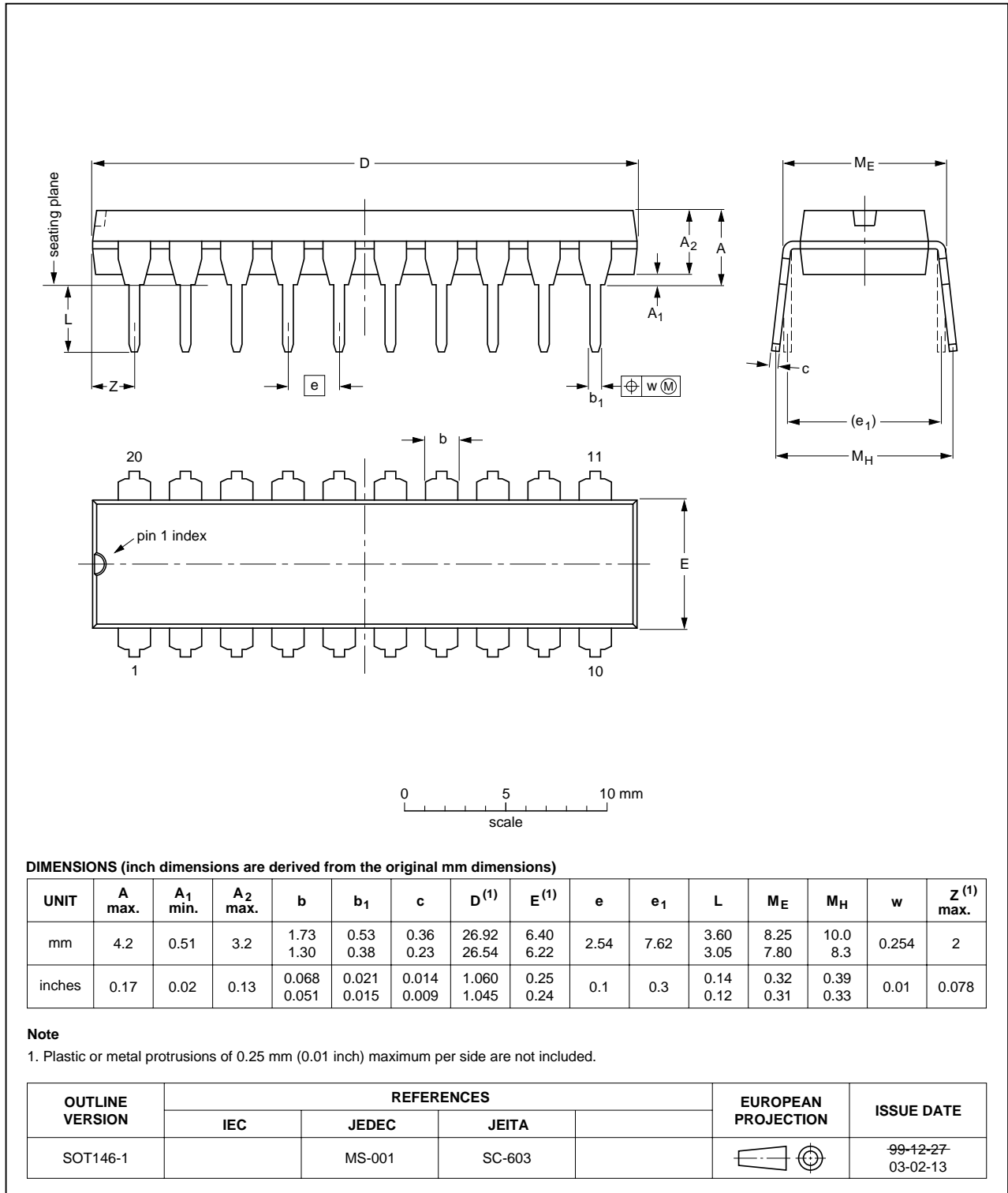


Fig 8. Package outline SOT146-1 (DIP20)

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

SOT163-1

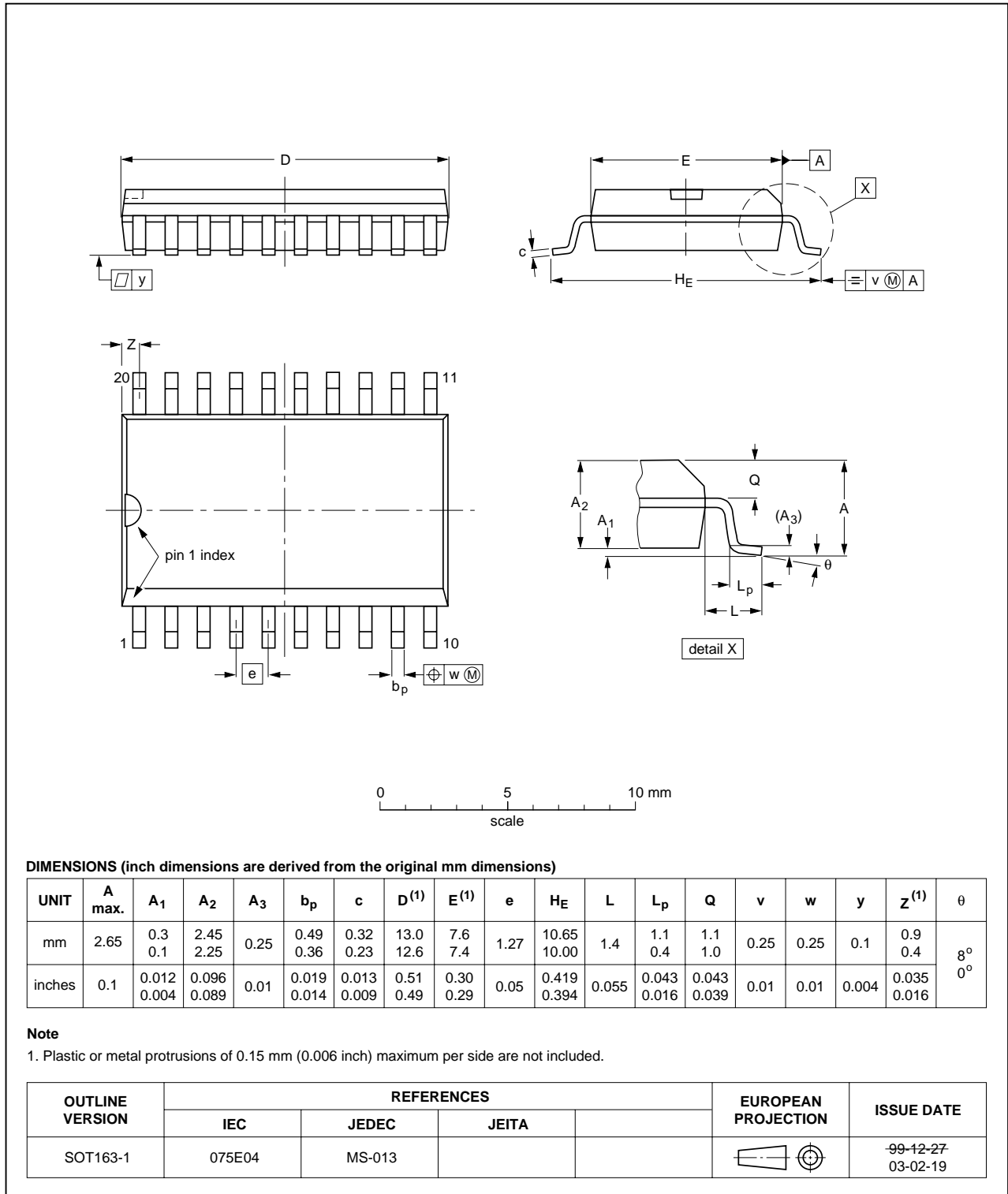


Fig 9. Package outline SOT163-1 (SO20)

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

SOT339-1

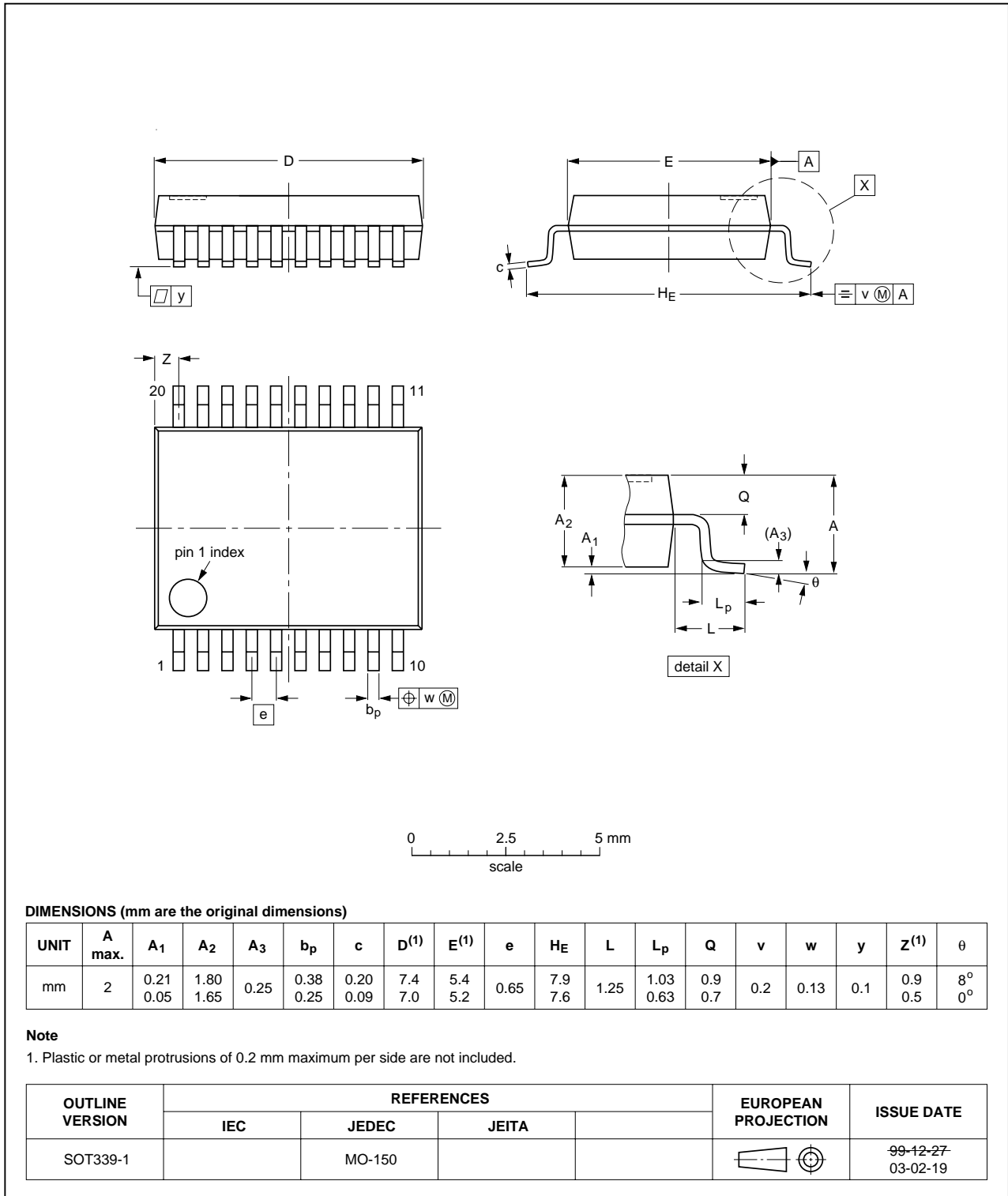


Fig 10. Package outline SOT339-1 (SSOP20)

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

SOT360-1

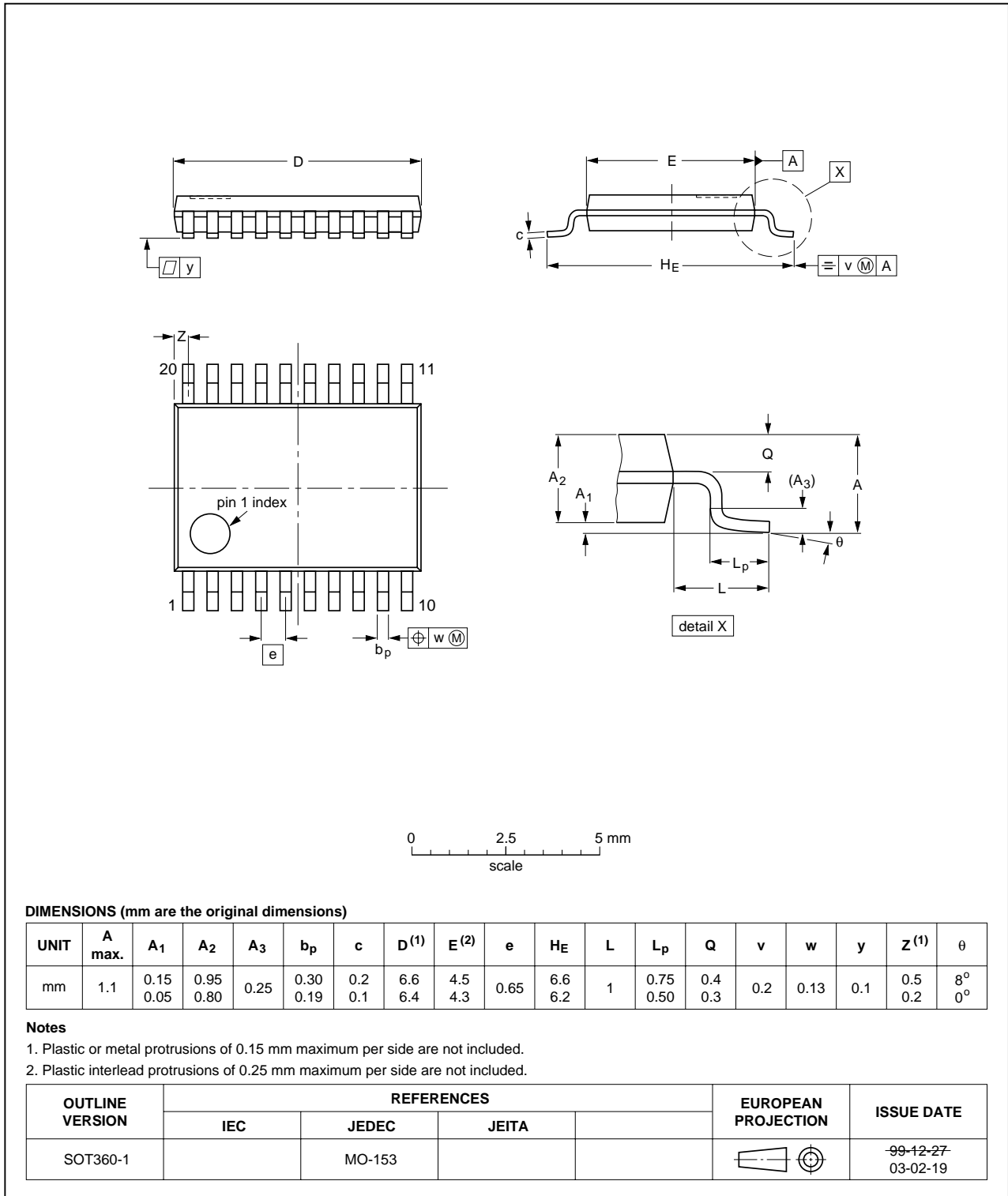


Fig 11. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1

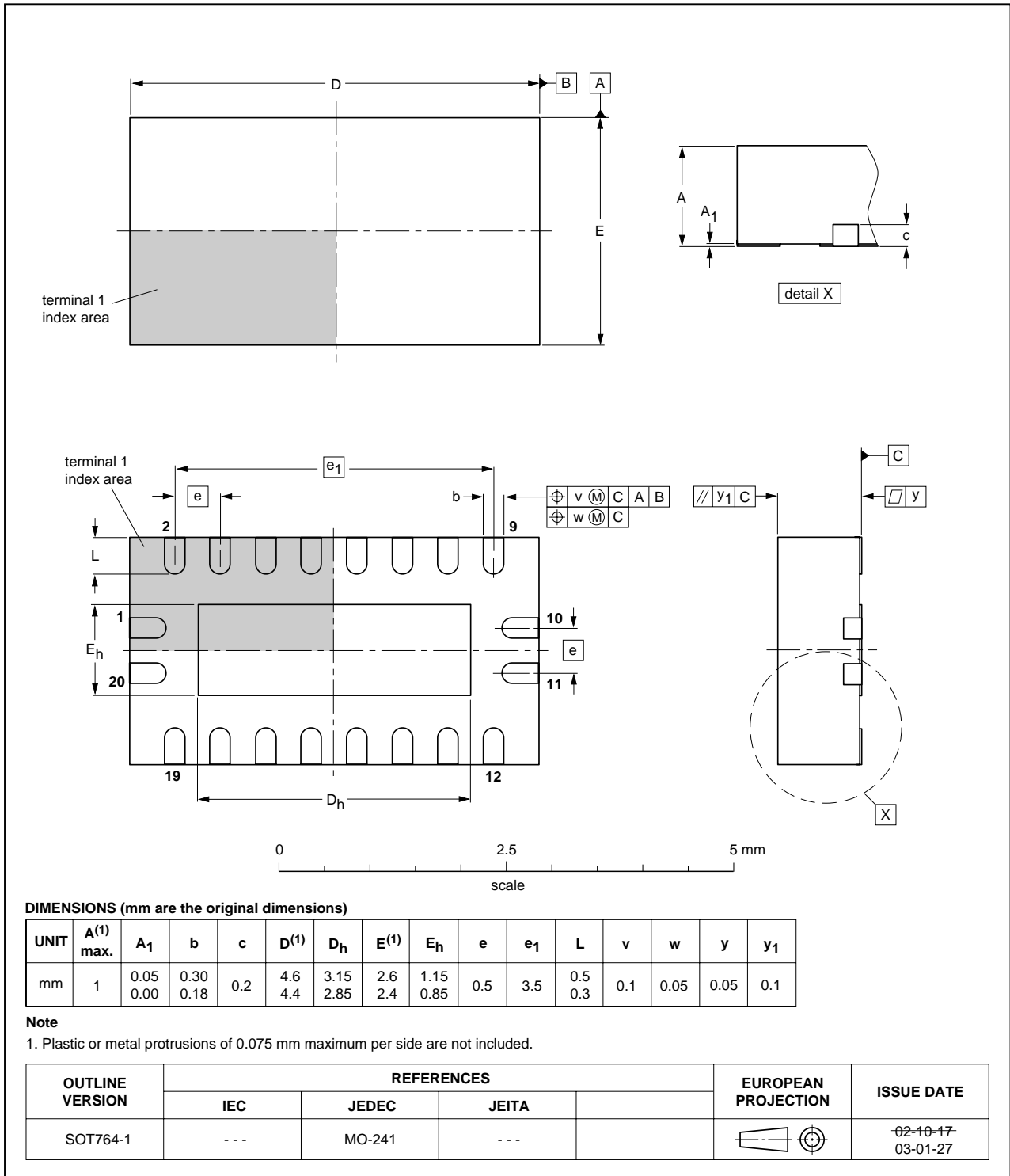


Fig 12. Package outline SOT764-1 (DHVQFN20)

14. Revision history

Table 13: Revision history

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|----------------|-------------------|
| 74HC_HCT245_3 | 20050131 | Product data sheet | - | 9397 750 14502 | 74HC_HCT245_CNV_2 |
| Modifications: | <ul style="list-style-type: none">• The format of this data sheet is redesigned to comply with the new presentation and information standard of Philips Semiconductors• Section 4 “Ordering information”, Section 6 “Pinning information” and Section 13 “Package outline” are modified to include the DHVQFN20 package. | | | | |
| 74HC_HCT245_CNV_2 | 19930930 | Product specification | - | - | - |

15. Data sheet status

| Level | Data sheet status ^[1] | Product status ^[2] ^[3] | Definition |
|-------|----------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |
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[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.

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