

74HC154; 74HCT154

4-to-16 line decoder/demultiplexer

Rev. 7 — 29 February 2016

Product data sheet

1. General description

The 74HC154; 74HCT154 is a 4-to-16 line decoder/demultiplexer. It decodes four binary weighted address inputs (A0 to A3) to sixteen mutually exclusive outputs ($\overline{Y0}$ to $\overline{Y15}$). The device features two input enable ($\overline{E0}$ and $\overline{E1}$) inputs. A HIGH on either of the input enables forces the outputs HIGH. The device can be used as a 1-to-16 demultiplexer by using one of the enable inputs as the multiplexed data input. When the other enable input is LOW the addressed output will follow the state of the applied data. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

2. Features and benefits

- 16-line demultiplexing capability
- Decodes 4 binary-coded inputs into 16 mutually-exclusive outputs
- Complies with JEDEC standard no. 7A
- Input levels:
 - ◆ For 74HC154: CMOS level
 - ◆ For 74HCT154: TTL level
- ESD protection:
 - ◆ HBM JESD22-A114F exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$

3. Ordering information

Table 1. Ordering information

| Type number | Package | | | Version |
|-------------|---|----------|---|----------|
| | Temperature range | Name | Description | |
| 74HC154D | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO24 | plastic small outline package; 24 leads; body width 7.5 mm | SOT137-1 |
| 74HCT154D | | | | |
| 74HC154DB | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SSOP24 | plastic shrink small outline package; 24 leads; body width 5.3 mm | SOT340-1 |
| 74HCT154DB | | | | |
| 74HC154PW | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP24 | plastic thin shrink small outline package; 24 leads; body width 4.4 mm | SOT355-1 |
| 74HCT154PW | | | | |
| 74HC154BQ | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DHVQFN24 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body $3.5 \times 5.5 \times 0.85\text{ mm}$ | SOT815-1 |
| 74HCT154BQ | | | | |



4. Functional diagram

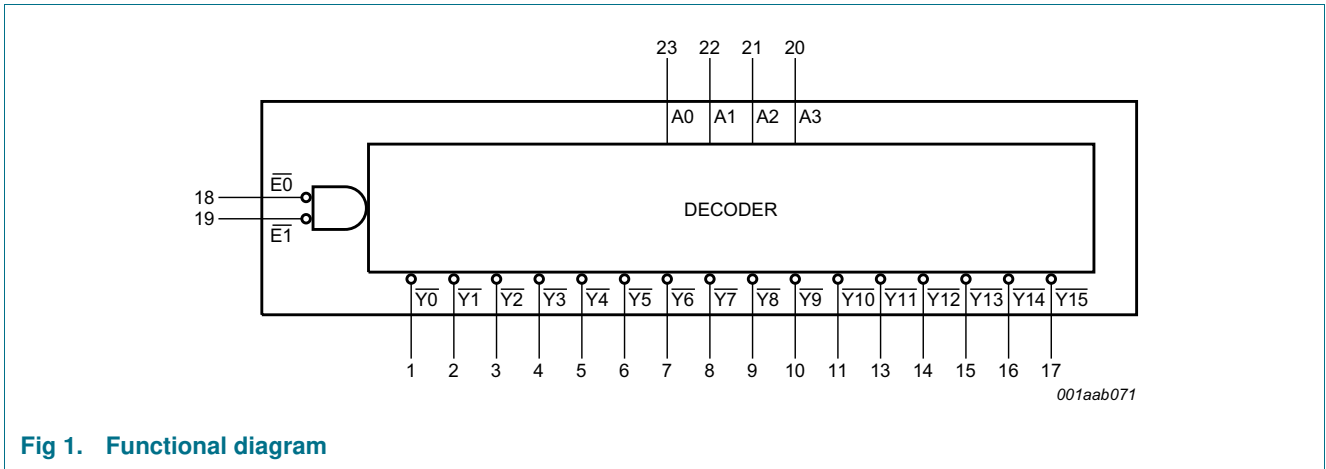


Fig 1. Functional diagram

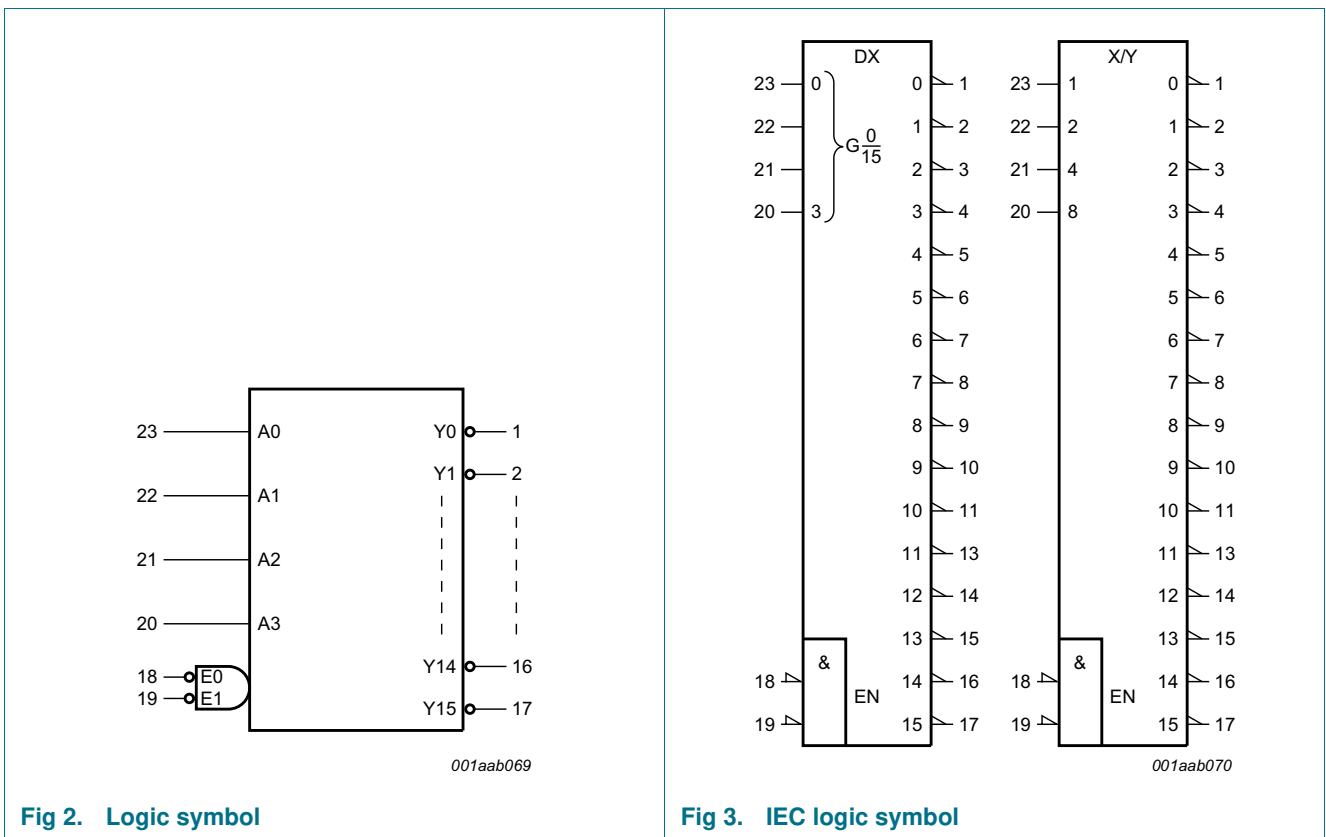


Fig 2. Logic symbol

Fig 3. IEC logic symbol

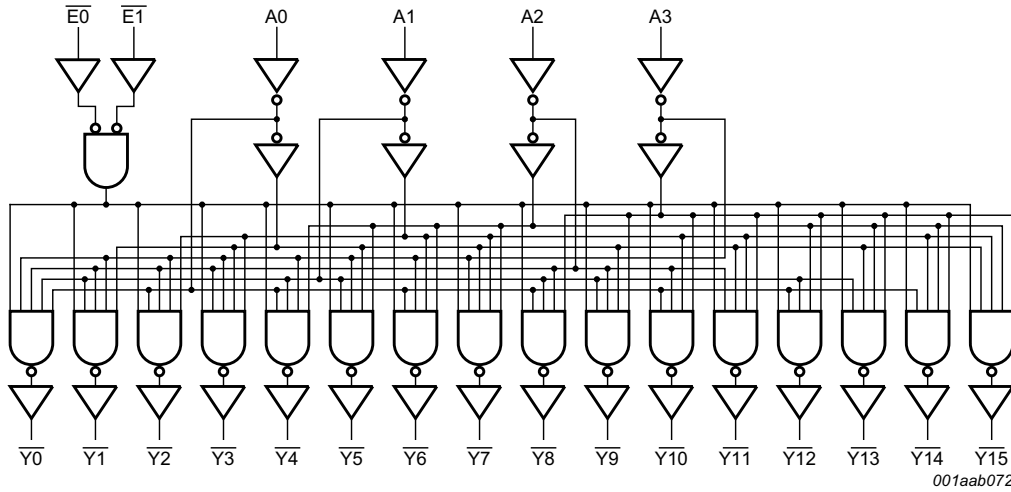


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning

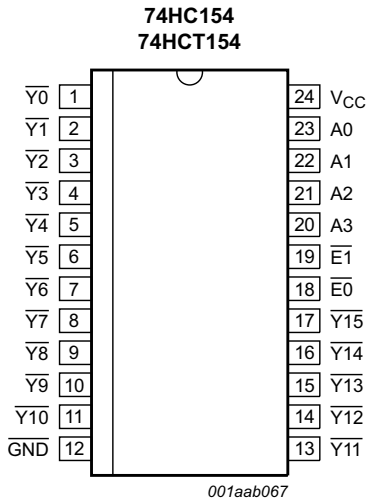
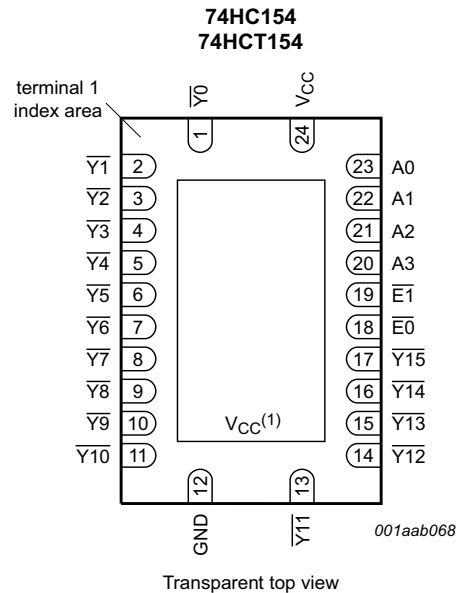


Fig 5. Pin configuration for SO24, SSOP24 and TSSOP24



- (1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to VCC.

Fig 6. Pin configuration for DHVQFN24

5.2 Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|--|---|---------------------------|
| $\overline{Y0}, \overline{Y1}, \overline{Y2}, \overline{Y3}, \overline{Y4}, \overline{Y5}, \overline{Y6}, \overline{Y7}, \overline{Y8}, \overline{Y9}, \overline{Y10}, \overline{Y11}, \overline{Y12}, \overline{Y13}, \overline{Y14}, \overline{Y15}$ | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17 | data output (active LOW) |
| GND | 12 | ground (0 V) |
| $\overline{E0}, \overline{E1}$ | 18, 19 | enable input (active LOW) |
| A0, A1, A2, A3 | 23, 22, 21, 20 | address input |
| V _{CC} | 24 | supply voltage |

6. Functional description

Table 3. Function table^[1]

| Input | | | | | | Output | | | | | | | | | | | | | | | | | | |
|-----------------|-----------------|----|----|----|----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|---|---|---|
| $\overline{E0}$ | $\overline{E1}$ | A0 | A1 | A2 | A3 | $\overline{Y0}$ | $\overline{Y1}$ | $\overline{Y2}$ | $\overline{Y3}$ | $\overline{Y4}$ | $\overline{Y5}$ | $\overline{Y6}$ | $\overline{Y7}$ | $\overline{Y8}$ | $\overline{Y9}$ | $\overline{Y10}$ | $\overline{Y11}$ | $\overline{Y12}$ | $\overline{Y13}$ | $\overline{Y14}$ | $\overline{Y15}$ | | | |
| H | H | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| H | L | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| L | H | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| L | L | L | L | L | L | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| | | H | L | L | L | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| | | L | H | L | L | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | | |
| | | H | H | L | L | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | |
| | | L | L | H | L | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | |
| | | H | L | H | L | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H |
| | | L | H | H | L | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H |
| | | H | H | H | L | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H |
| | | L | L | L | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H |
| | | H | L | L | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H |
| | | L | H | L | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H |
| | | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H |
| | | L | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H |
| | | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H |
| | | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H |
| | | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H |

[1] H = HIGH voltage level
 L = LOW voltage level
 X = don't care.

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_{CC} | supply voltage | | -0.5 | +7.0 | V |
| I_{IK} | input clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ [1] | - | ± 20 | mA |
| I_{OK} | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ [1] | - | ± 20 | mA |
| I_O | output current | $-0.5\text{ V} < V_O < V_{CC} + 0.5\text{ V}$ [1] | - | ± 25 | mA |
| I_{CC} | supply current | | - | 50 | mA |
| I_{GND} | ground current | | - | -50 | mA |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| P_{tot} | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [2] | - | 300 | mW |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SO24 packages: P_{tot} derates linearly at 8 mW/K above 70 °C.

For SSOP24 and TSSOP24 packages: P_{tot} derates linearly at 5.5 mW/K above 60 °C.

For DHVQFN24 packages: P_{tot} derates linearly at 4.5 mW/K above 60 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

| Symbol | Parameter | Conditions | 74HC154 | | | 74HCT154 | | | Unit |
|---------------------|-------------------------------------|-------------------------|---------|------|----------|----------|------|----------|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| V_{CC} | supply voltage | | 2.0 | 5.0 | 6.0 | 4.5 | 5.0 | 5.5 | V |
| V_I | input voltage | | 0 | - | V_{CC} | 0 | - | V_{CC} | V |
| V_O | output voltage | | 0 | - | V_{CC} | 0 | - | V_{CC} | V |
| T_{amb} | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0\text{ V}$ | - | - | 625 | - | - | - | ns/V |
| | | $V_{CC} = 4.5\text{ V}$ | - | 1.67 | 139 | - | 1.67 | 139 | ns/V |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 83 | - | - | - | ns/V |

9. Static characteristics

Table 6. Static characteristics 74HC154

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} = 2.0 V | 1.5 | 1.2 | - | V |
| | | V _{CC} = 4.5 V | 3.15 | 2.4 | - | V |
| | | V _{CC} = 6.0 V | 4.2 | 3.2 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | 0.8 | 0.5 | V |
| | | V _{CC} = 4.5 V | - | 2.1 | 1.35 | V |
| | | V _{CC} = 6.0 V | - | 2.8 | 1.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 2.0 V; I _O = -20 μA | 1.9 | 2.0 | - | V |
| | | V _{CC} = 4.5 V; I _O = -20 μA | 4.4 | 4.5 | - | V |
| | | V _{CC} = 6.0 V; I _O = -20 μA | 5.9 | 6.0 | - | V |
| | | V _{CC} = 4.5 V; I _O = -4.0 mA | 3.98 | 4.32 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 2.0 V; I _O = 20 μA | - | 0 | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 20 μA | - | 0 | 0.1 | V |
| | | V _{CC} = 6.0 V; I _O = 20 μA | - | 0 | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 4.0 mA | - | 0.15 | 0.26 | V |
| I _I | input leakage current | V _{CC} = 6.0 V; V _I = V _{CC} or GND | - | - | ±0.1 | μA |
| | | V _{CC} = 6.0 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 8.0 | μA |
| C _I | input capacitance | | - | 3.5 | - | 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} | | | | |
| | | V _{CC} = 2.0 V; I _O = -20 μA | 1.9 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -20 μA | 4.4 | - | - | V |
| | | V _{CC} = 6.0 V; I _O = -20 μA | 5.9 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -4.0 mA | 3.84 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 6.0 V; I _O = -5.2 mA | 5.34 | - | - | V |

Table 6. Static characteristics 74HC154 ...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} | | | | |
| | | V _{CC} = 2.0 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 6.0 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 4.0 mA | - | - | 0.33 | V |
| | | V _{CC} = 6.0 V; I _O = 5.2 mA | - | - | 0.33 | V |
| I _I | input leakage current | V _{CC} = 6.0 V; V _I = V _{CC} or GND | - | - | ±1.0 | μA |
| I _{CC} | supply current | V _{CC} = 6.0 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 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 |
| 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} | | | | |
| | | V _{CC} = 2.0 V; I _O = -20 μA | 1.9 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -20 μA | 4.4 | - | - | V |
| | | V _{CC} = 6.0 V; I _O = -20 μA | 5.9 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -4.0 mA | 3.7 | - | - | V |
| | | V _{CC} = 6.0 V; I _O = -5.2 mA | 5.2 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 2.0 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 6.0 V; I _O = 20 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 4.0 mA | - | - | 0.4 | V |
| | | V _{CC} = 6.0 V; I _O = 5.2 mA | - | - | 0.4 | V |
| I _I | input leakage current | V _{CC} = 6.0 V; V _I = V _{CC} or GND | - | - | ±0.1 | μA |
| I _{CC} | supply current | V _{CC} = 6.0 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 160 | μA |

Table 7. Static characteristics 74HCT154

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 |
| | | V _{CC} = 4.5 V; I _O = -4 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 |
| | | V _{CC} = 4.5 V; I _O = 4 mA | - | 0.15 | 0.25 | V |
| I _I | input leakage current | V _{CC} = 5.5 V; V _I = V _{CC} or GND | - | - | ±0.1 | μA |
| I _{CC} | supply current | V _{CC} = 5.5 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 8.0 | μA |
| ΔI _{CC} | additional supply current | per input pin; V _{CC} = 4.5 V to 5.5 V; V _I = V _{CC} - 2.1 V; I _O = 0 A | - | - | 360 | μA |
| C _I | input capacitance | | - | 3.5 | - | 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 μA | 4.4 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -4 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 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 4 mA | - | - | 0.33 | V |
| I _I | input leakage current | V _{CC} = 5.5 V; V _I = V _{CC} or GND | - | - | ±1.0 | μA |
| I _{CC} | supply current | V _{CC} = 5.5 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 80 | μA |
| ΔI _{CC} | additional supply current | per input pin; V _{CC} = 4.5 V to 5.5 V; V _I = V _{CC} - 2.1 V; I _O = 0 A | - | - | 450 | μA |
| 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 μA | 4.4 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -4 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 μA | - | - | 0.1 | V |
| | | V _{CC} = 4.5 V; I _O = 4 mA | - | - | 0.4 | V |
| I _I | input leakage current | V _{CC} = 5.5 V; V _I = V _{CC} or GND | - | - | ±1.0 | μA |
| I _{CC} | supply current | V _{CC} = 5.5 V; V _I = V _{CC} or GND; I _O = 0 A | - | - | 160 | μA |
| ΔI _{CC} | additional supply current | per input pin; V _{CC} = 4.5 V to 5.5 V; V _I = V _{CC} - 2.1 V; I _O = 0 A | - | - | 490 | μA |

10. Dynamic characteristics

Table 8. Dynamic characteristics

GND (ground = 0 V); $C_L = 50$ pF unless otherwise specified; for test circuit, see [Figure 9](#).

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit |
|-----------------|-------------------------------|---|-------|-----|-----|-------------------|-------------|--------------|------|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| 74HC154 | | | | | | | | | |
| t_{pd} | propagation delay | An to \overline{Y}_n ; see Figure 7 [1] | | | | | | | |
| | | $V_{CC} = 2.0$ V | - | 36 | 150 | - | 190 | 225 | ns |
| | | $V_{CC} = 4.5$ V | - | 13 | 30 | - | 38 | 45 | ns |
| | | $V_{CC} = 5$ V; $C_L = 15$ pF | - | 11 | - | - | - | - | ns |
| | | $V_{CC} = 6.0$ V | - | 10 | 26 | - | 33 | 38 | ns |
| | | \overline{E}_n to \overline{Y}_n ; see Figure 8 | | | | | | | |
| | | $V_{CC} = 2.0$ V | - | 39 | 150 | - | 190 | 225 | ns |
| | | $V_{CC} = 4.5$ V | - | 14 | 30 | - | 38 | 45 | ns |
| t_t | transition time | see Figure 7 and 8 [2] | | | | | | | |
| | | $V_{CC} = 2.0$ V | - | 19 | 75 | - | 95 | 110 | ns |
| | | $V_{CC} = 4.5$ V | - | 7 | 15 | - | 19 | 22 | ns |
| | | $V_{CC} = 6.0$ V | - | 6 | 13 | - | 16 | 19 | ns |
| C_{PD} | power dissipation capacitance | per gate; $V_i = \text{GND}$ to V_{CC} [3] | - | 60 | - | - | - | - | pF |
| 74HCT154 | | | | | | | | | |
| t_{pd} | propagation delay | An to \overline{Y}_n ; see Figure 7 [1] | | | | | | | |
| | | $V_{CC} = 4.5$ V | - | 16 | 35 | - | 44 | 53 | ns |
| | | $V_{CC} = 5$ V; $C_L = 15$ pF | - | 13 | - | - | - | - | ns |
| | | \overline{E}_n to \overline{Y}_n ; see Figure 8 | | | | | | | |
| | | $V_{CC} = 4.5$ V | - | 15 | 32 | - | 40 | 48 | ns |
| t_t | transition time | see Figure 7 and 8 [2] | | | | | | | |
| | | $V_{CC} = 4.5$ V | - | 7 | 15 | - | 19 | 22 | ns |
| C_{PD} | power dissipation capacitance | per gate; $V_i = \text{GND}$ to $(V_{CC} - 1.5)$ V [3] | - | 60 | - | - | - | - | pF |

[1] t_{pd} is the same as t_{PLH} and t_{PHL}

[2] t_t is the same as t_{TLH} and t_{THL}

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

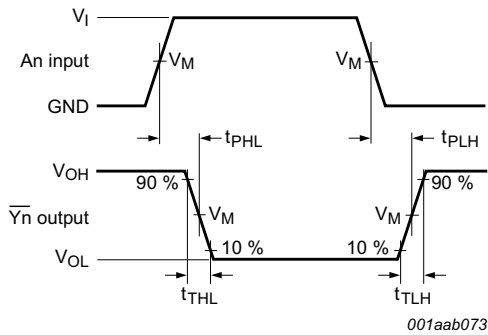
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of load switching outputs;

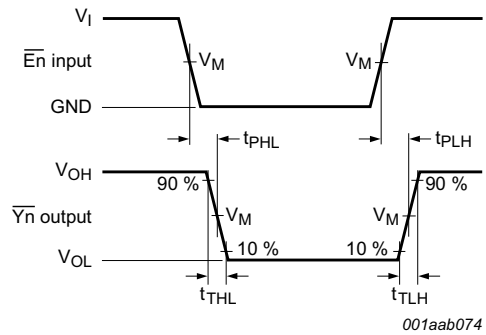
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

11. Waveforms



Measurement points are given in [Table 9](#).

Fig 7. Propagation delay address input (A_n) to output (Y_n) and transition time output (Y_n)

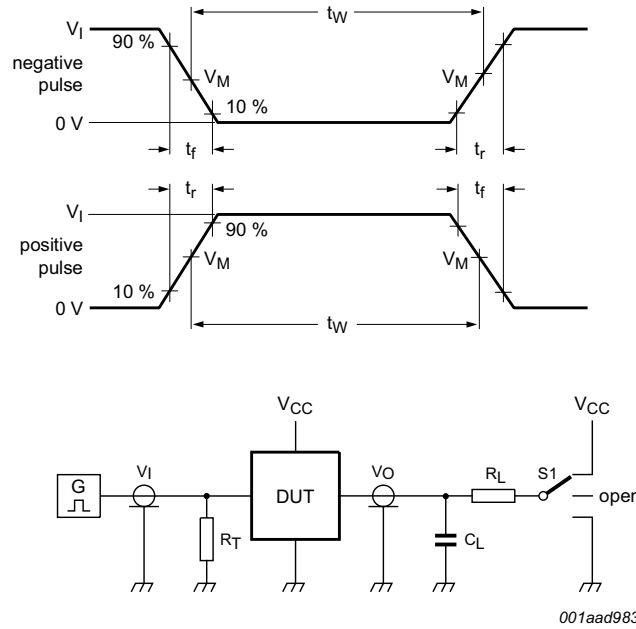


Measurement points are given in [Table 9](#).

Fig 8. Propagation delay enable input (\bar{E}_n) to output (Y_n) and transition time output (Y_n)

Table 9. Measurement points

| Type | Input | Output |
|----------|-------------|-------------|
| | V_M | V_M |
| 74HC154 | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74HCT154 | 1.3 V | 1.3 V |



Test data is given in [Table 10](#).

Definitions for test circuit:

R_T = Termination resistance; should be equal to output impedance Z_o of the pulse generator.

C_L = Load capacitance including jig and probe capacitance.

R_L = Load resistor.

S1 = Test selection switch.

Fig 9. Test circuit for measuring switching times

Table 10. Test data

| Type | Input | | Load | | S1 position |
|----------|----------|------------|--------------|--------------|--------------------|
| | V_I | t_r, t_f | C_L | R_L | t_{PHL}, t_{PLH} |
| 74HC154 | V_{CC} | 6 ns | 15 pF, 50 pF | 1 k Ω | open |
| 74HCT154 | 3 V | 6 ns | 15 pF, 50 pF | 1 k Ω | open |

12. Application information

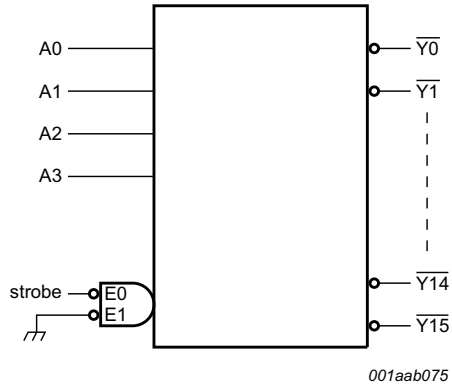


Fig 10. 1-of-16 decoder; LOW level output selected

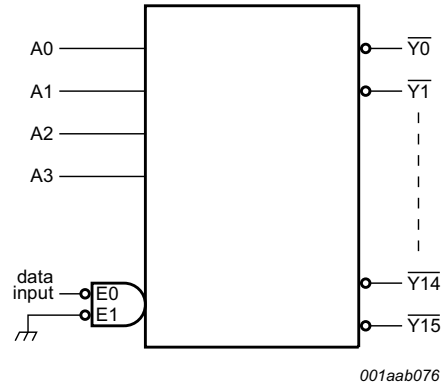


Fig 11. 1-of-16 demultiplexer; logic level on selected outputs follow the logic level on the data input

13. Package outline

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1

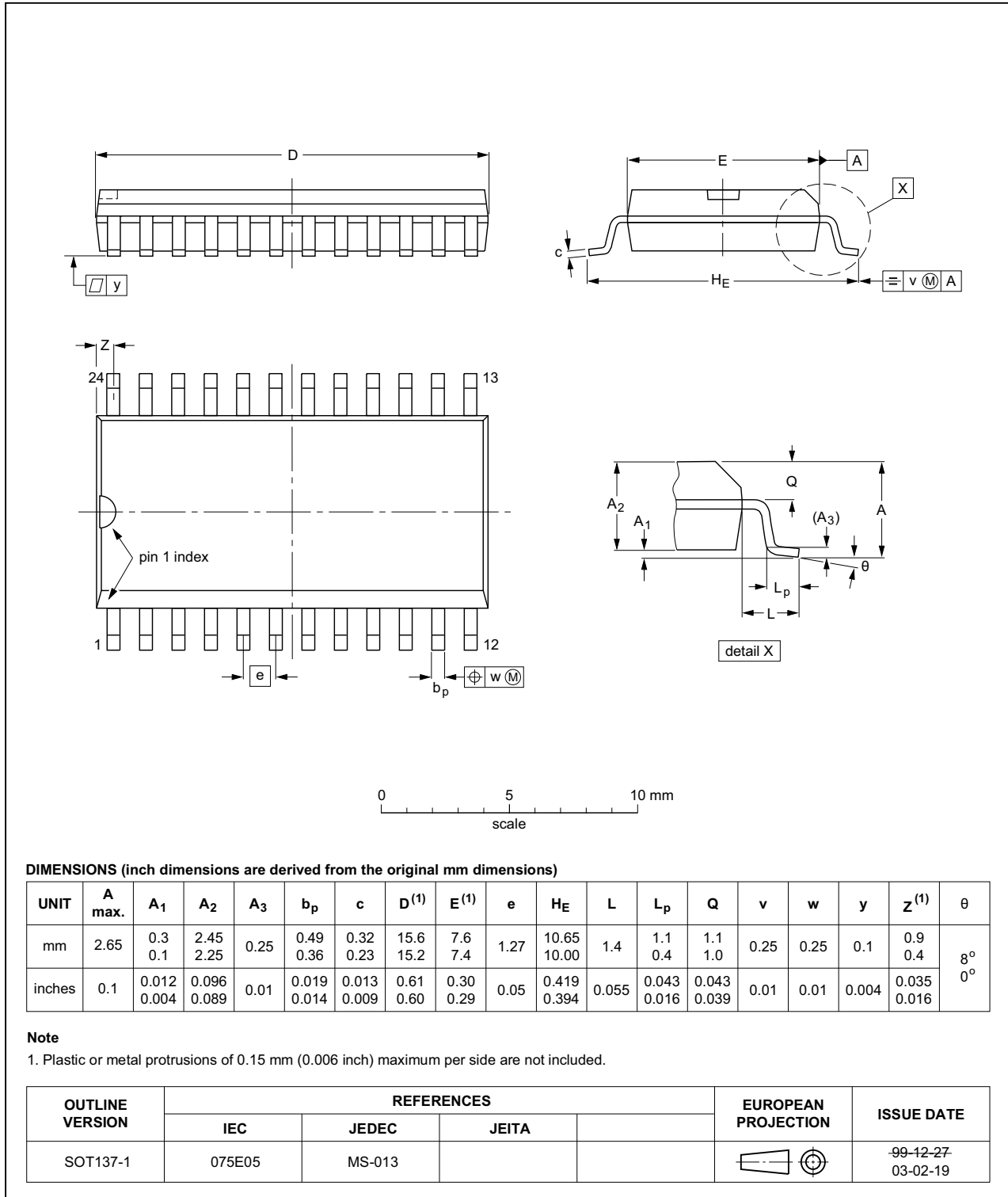


Fig 12. Package outline SOT137-1 (SO24)

SSOP24: plastic shrink small outline package; 24 leads; body width 5.3 mm

SOT340-1

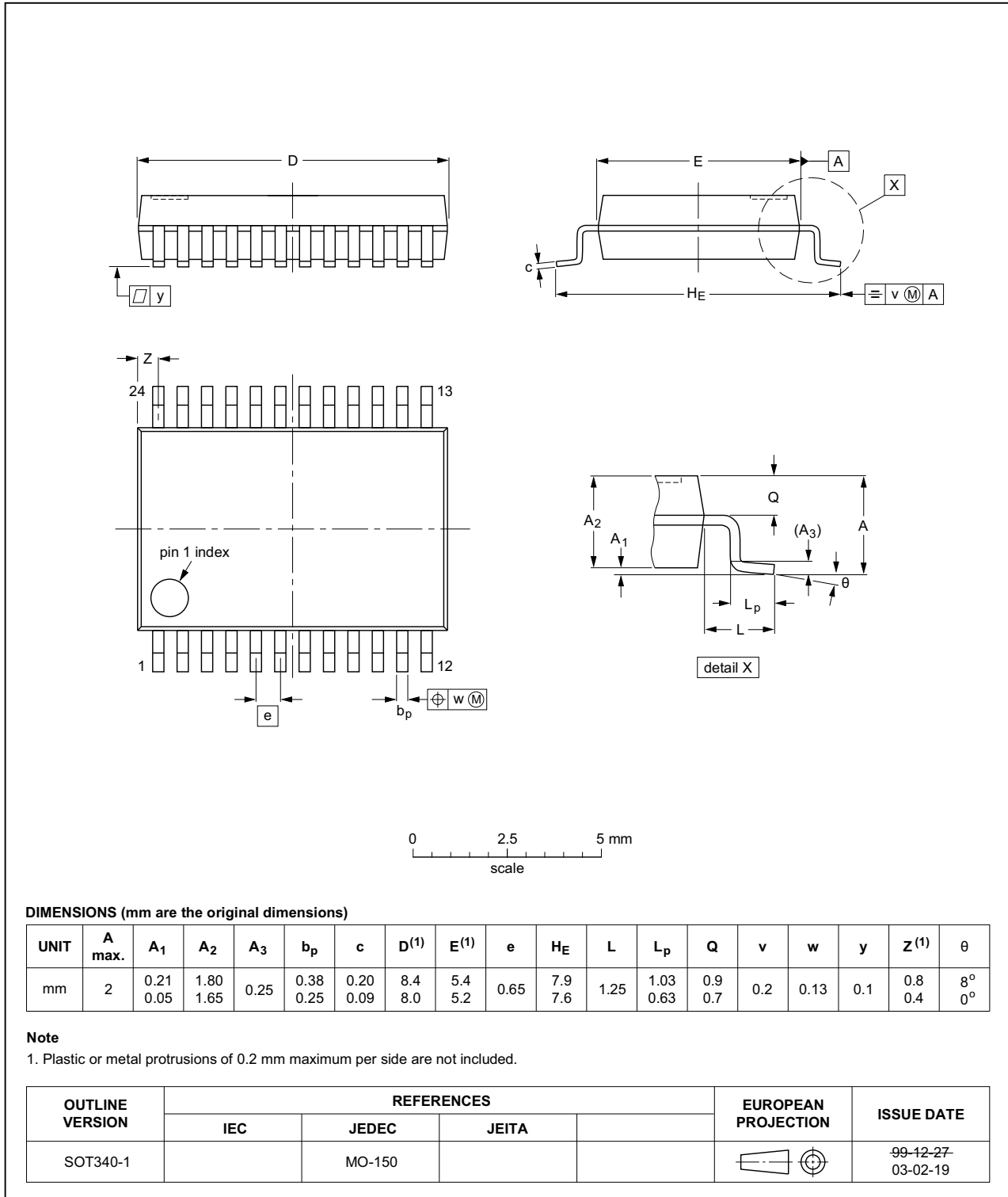


Fig 13. Package outline SOT340-1 (SSOP24)

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1

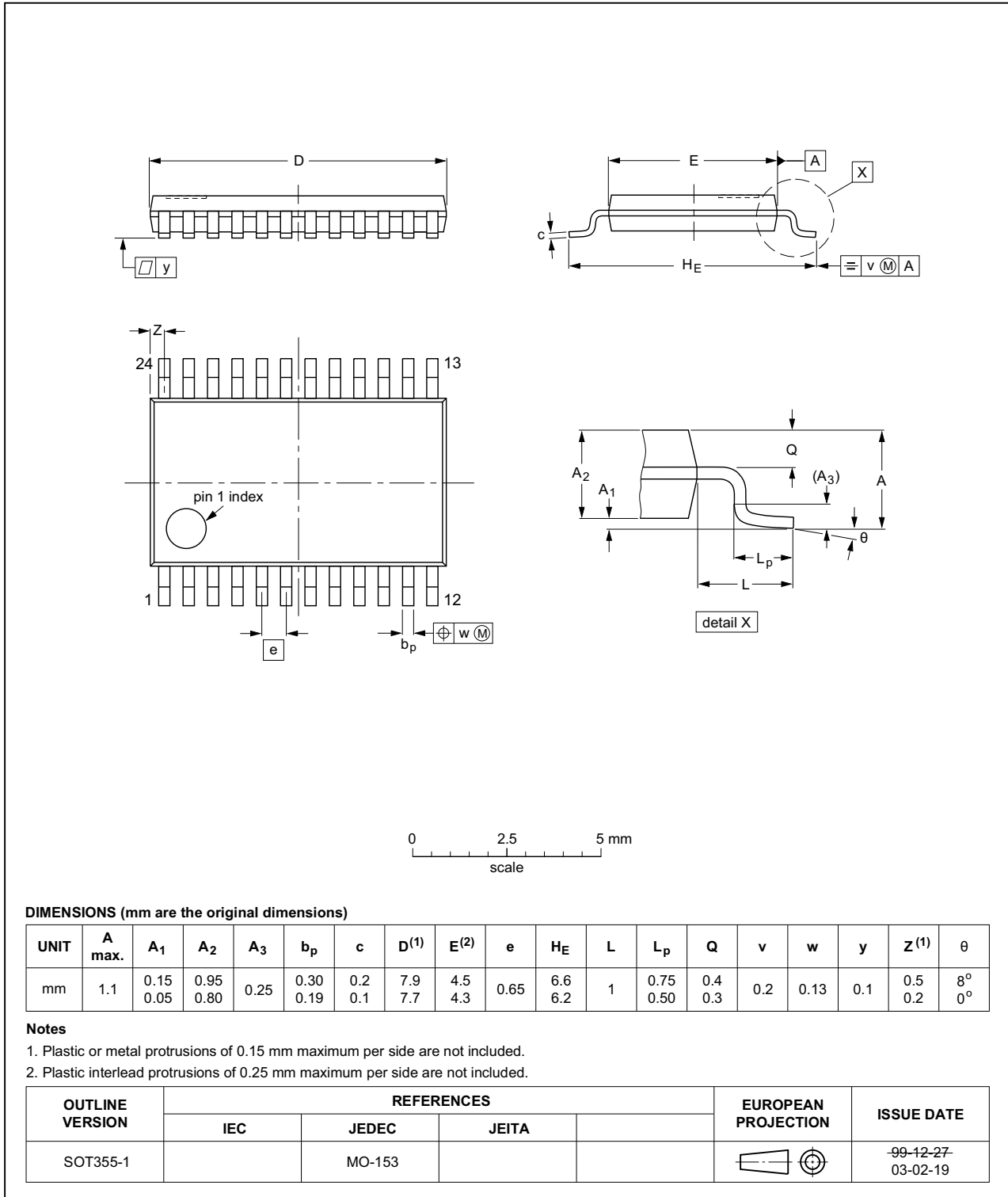


Fig 14. Package outline SOT355-1 (TSSOP24)

DHVQFN24: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm

SOT815-1

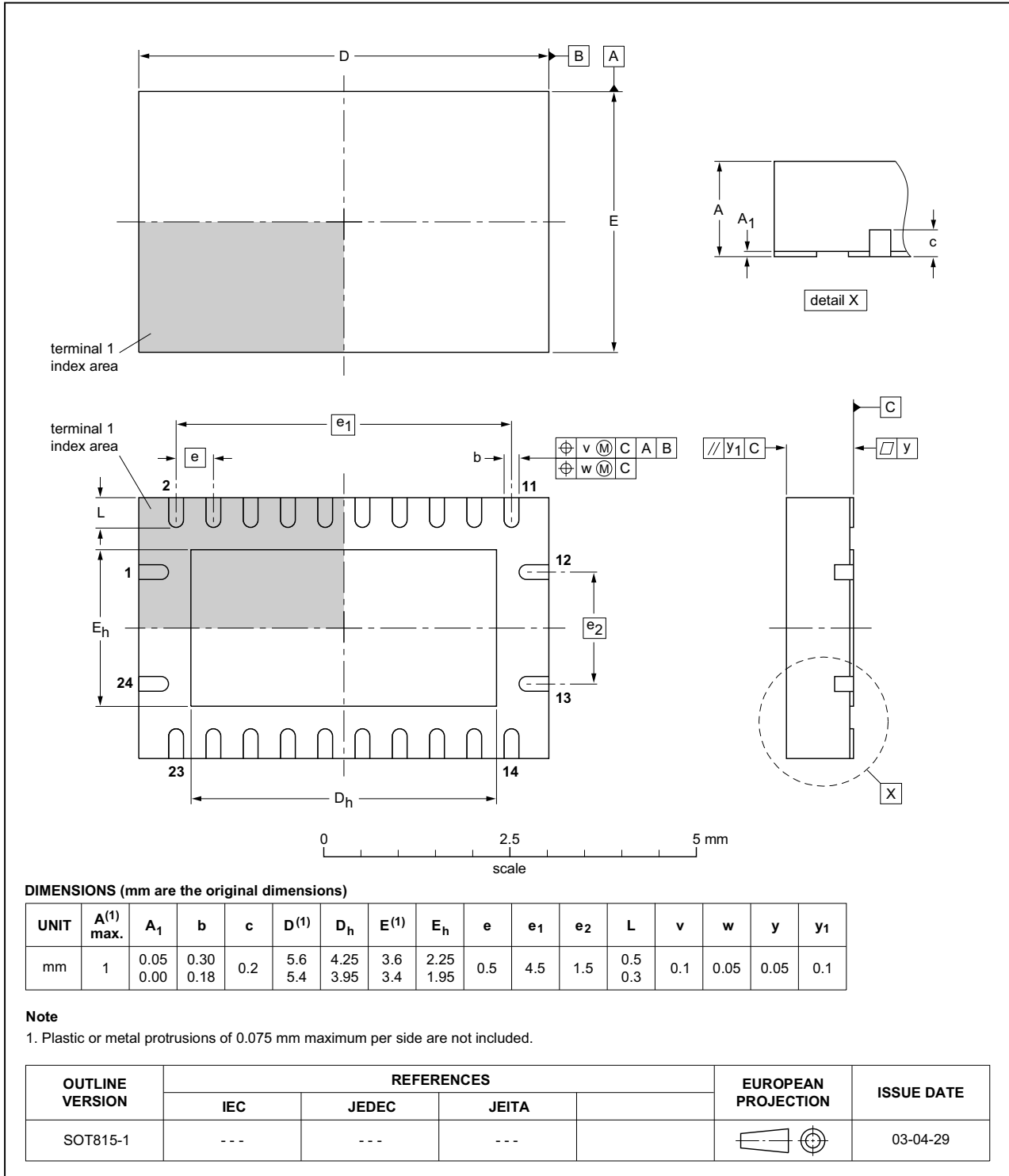


Fig 15. Package outline SOT815-1 (DHVQFN24)

14. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| TTL | Transistor-Transistor Logic |
| MM | Machine Model |

15. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|---|-----------------------|---------------|---------------------|
| 74HC_HCT154 v.7 | 20160229 | Product data sheet | - | 74HC_HCT154 v.6 |
| Modifications: | <ul style="list-style-type: none"> Type numbers 74HC154N and 74HCT154N (SOT101-1) removed. | | | |
| 74HC_HCT154 v.6 | 20070212 | Product data sheet | - | 74HC_HCT154 v.5 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. Table 3 on page 4: Corrected errors in output information. | | | |
| 74HC_HCT154 v.5 | 20041012 | Product specification | - | 74HC_HCT154 v.4 |
| 74HC_HCT154 v.4 | 20041005 | Product specification | - | 74HC_HCT154 v.3 |
| 74HC_HCT154 v.3 | 20040601 | Product specification | - | 74HC_HCT154_CNV v.2 |

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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