# 74HC365; 74HCT365

## Hex buffer/line driver; 3-state

Rev. 4 — 27 January 2016 Product data sheet

## 1. General description

The 74HC365; 74HCT365 is a hex buffer/line driver with 3-state outputs controlled by the output enable inputs (OEn). A HIGH on OEn causes the outputs to assume a high impedance OFF-state. 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

- Inverting outputs
- Input levels:
  - For 74HC365: CMOS level
  - For 74HC365: TTL level
- Complies with JEDEC standard no. 7A
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Specified from −40 °C to +85 °C and from −40 °C to +125 °C
- Multiple package options

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC365D | −40 °C to +125 °C | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |
| 74HCT365D | | | | |
| 74HC365DB | −40 °C to +125 °C | SSOP16 | plastic shrink small outline package; 16 leads; body width 5.3 mm | SOT338-1 |
| 74HCT365DB | | | | |
| 74HC365PW | −40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HCT365PW | | | | |

## 4. Functional diagram

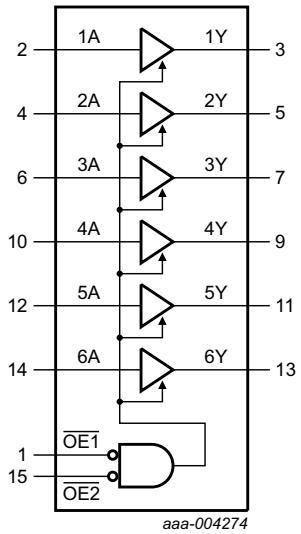



Fig 1. Functional diagram

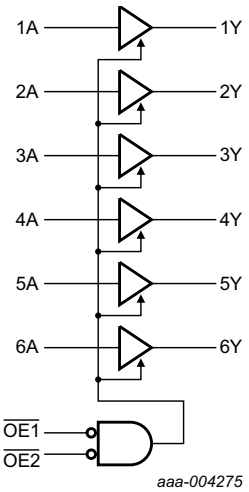



Fig 2. Logic symbol

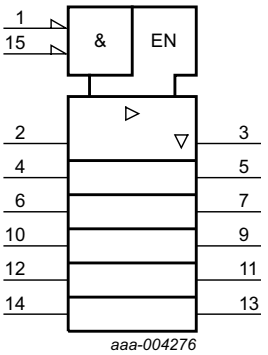



Fig 3. IEC logic symbol

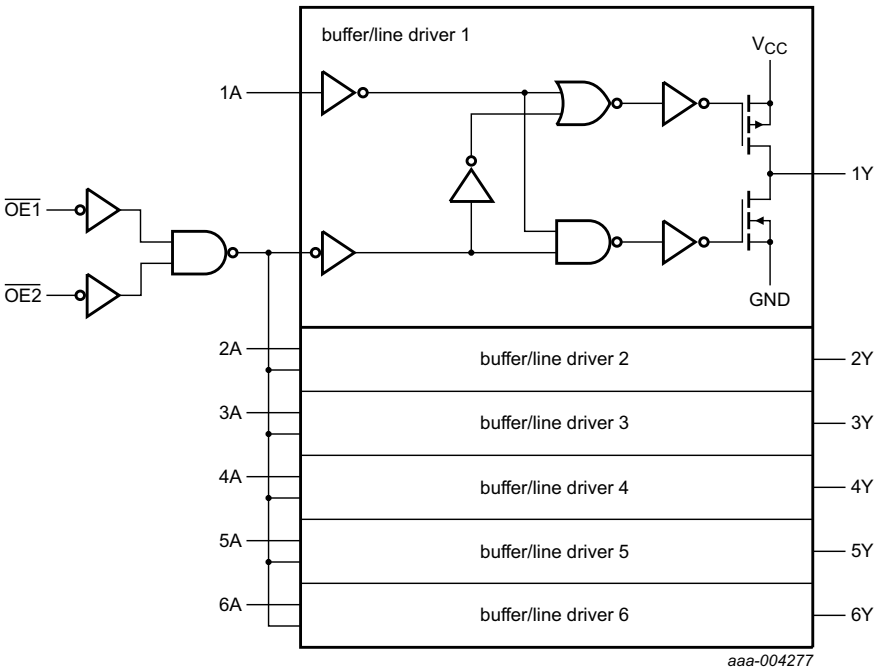



Fig 4. Logic diagram

# 5. Pinning information

## 5.1 Pinning

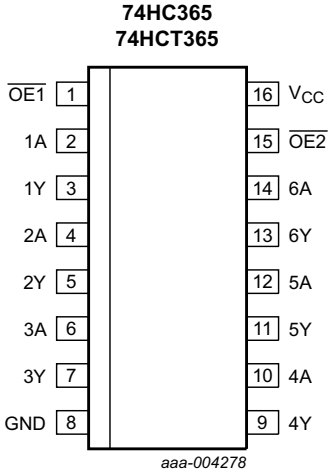



**Fig 5. Pin configuration**

## 5.2 Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| $\overline{OE1}$ | 1 | output enable input 1 (active LOW) |
| 1A | 2 | data input 1 |
| 1Y | 3 | data output 1 |
| 2A | 4 | data input 2 |
| 2Y | 5 | data output 2 |
| 3A | 6 | data input 3 |
| 3Y | 7 | data output 3 |
| GND | 8 | ground (0 V) |
| 4Y | 9 | data output 4 |
| 4A | 10 | data input 4 |
| 5Y | 11 | data output 5 |
| 5A | 12 | data input 5 |
| 6Y | 13 | data output 6 |
| 6A | 14 | data input 6 |
| $\overline{OE2}$ | 15 | output enable input 2 (active LOW) |
| $V_{CC}$ | 16 | supply voltage |

# 6. Functional description

**Table 3. Function table[1]**

| Control | | Input | Output |
|---|---|---|---|
| $\overline{OE1}$ | $\overline{OE2}$ | nA | nY |
| L | L | L | L |
| L | L | H | H |
| X | H | X | Z |
| H | X | X | 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 |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | | –0.5 | +7 | V |
| $I_{IK}$ | input clamping current | $V_I < –0.5$ V or $V_I > V_{CC} + 0.5$ V | [1] | - | ±20 | mA |
| $I_{OK}$ | output clamping current | $V_O < –0.5$ V or $V_O > V_{CC} + 0.5$ V | [1] | - | ±20 | mA |
| $I_O$ | output current | $V_O = –0.5$ V to $(V_{CC} + 0.5$ V) | | - | ±35 | mA |
| $I_{CC}$ | supply current | | | - | 70 | mA |
| $I_{GND}$ | ground current | | | –70 | - | mA |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |
| $P_{tot}$ | total power dissipation | SO16 package | [2] | - | 500 | mW |
| | | SSOP16 package | [3] | - | 500 | mW |
| | | TSSOP16 package | [3] | - | 500 | mW |

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

[2] For SO16 packages: $P_{tot}$ derates linearly with 8 mW/K above 70 °C.

[3] For SSOP16 and TSSOP16 packages: $P_{tot}$ derates linearly with 5.5 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 | 74HC365 | | | 74HCT365 | | | 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 V | - | - | 625 | - | - | - | ns/V |
| | | $V_{CC}$ = 4.5 V | - | 1.67 | 139 | - | 1.67 | 139 | ns/V |
| | | $V_{CC}$ = 6.0 V | - | - | 83 | - | - | - | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics 74HC365**

*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 $V_{IL}$ | - | - | - | |
| | | $I_O$ = –20 μA; $V_{CC}$ = 2.0 V | 1.9 | 2.0 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 4.5 V | 4.4 | 4.5 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 6.0 V | 5.9 | 6.0 | - | V |
| | | $I_O$ = –6.0 mA; $V_{CC}$ = 4.5 V | 3.98 | 4.32 | - | V |
| | | $I_O$ = –7.8 mA; $V_{CC}$ = 6.0 V | 5.48 | 5.81 | - | V |
| $V_{OL}$ | 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 |
| $I_I$ | 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 |
| $I_{CC}$ | 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 |

**Table 6. Static characteristics 74HC365** *…continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –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 |
| $I_I$ | 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 |
| $I_{CC}$ | 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 |
| $V_{IL}$ | 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 |

**Table 6. Static characteristics 74HC365** *…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 | - | - | 0.1 | 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 |
| $I_I$ | 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 |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 6.0 V | - | - | 160 | μA |

**Table 7. Static characteristics 74HCT365**

*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 |
| | | $I_O$ = −6.0 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 | - | 0.16 | 0.26 | V |
| $I_I$ | 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 $V_{IL}$; $V_O = V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | ±0.5 | μA |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 8.0 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC}$ − 2.1 V; other inputs at $V_{CC}$ or GND; $I_O$ = 0 A | | | | |
| | | pins nA | - | 100 | 360 | μA |
| | | pin $\overline{OE1}$ | - | 100 | 360 | μA |
| | | pin $\overline{OE2}$ | - | 90 | 324 | 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 |
| | | $I_O$ = −6.0 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 |
| | | $I_O$ = 6.0 mA | - | - | 0.33 | V |
| $I_I$ | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | ±1.0 | μA |
| $I_{OZ}$ | OFF-state output current | $V_I = V_{IH}$ or $V_{IL}$; $V_O = V_{CC}$ or GND; $V_{CC}$ = 5.5 V | | | ±5.0 | μA |

**Table 7. Static characteristics 74HCT365** *…continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 80 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A | | | | |
| | | pins nA | - | - | 450 | μA |
| | | pin $\overline{OE1}$ | - | - | 450 | μA |
| | | pin $\overline{OE2}$ | - | - | 405 | 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 |
| | | $I_O$ = –6.0 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 |
| | | $I_O$ = 6.0 mA | - | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | ±1.0 | μA |
| $I_{OZ}$ | OFF-state output current | $V_I = V_{IH}$ or $V_{IL}$; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | ±10.0 | μA |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 160 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A | | | | |
| | | pins nA | - | - | 490 | μA |
| | | pin $\overline{OE1}$ | - | - | 490 | μA |
| | | pin $\overline{OE2}$ | - | - | 441 | μA |

## 10. Dynamic characteristics

**Table 8. Dynamic characteristics 74HC365**

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; see test circuit Figure 8.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = 25 °C** | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 [1] | | | | |
| | | $V_{CC}$ = 2.0 V | - | 30 | 95 | ns |
| | | $V_{CC}$ = 4.5 V | - | 11 | 19 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 9 | - | ns |
| | | $V_{CC}$ = 6.0 V | - | 9 | 16 | ns |
| $t_{en}$ | enable time | $\overline{OE}n$ to nY; see Figure 7 [2] | | | | |
| | | $V_{CC}$ = 2.0 V | - | 47 | 150 | ns |
| | | $V_{CC}$ = 4.5 V | - | 17 | 30 | ns |
| | | $V_{CC}$ = 6.0 V | - | 14 | 26 | ns |
| $t_{dis}$ | disable time | $\overline{OE}n$ to nY; see Figure 7 [3] | | | | |
| | | $V_{CC}$ = 2.0 V | - | 61 | 150 | ns |
| | | $V_{CC}$ = 4.5 V | - | 22 | 30 | ns |
| | | $V_{CC}$ = 6.0 V | - | 18 | 26 | ns |
| $t_t$ | transition time | see Figure 6 [4] | | | | |
| | | $V_{CC}$ = 2.0 V | - | 14 | 60 | ns |
| | | $V_{CC}$ = 4.5 V | - | 5 | 12 | ns |
| | | $V_{CC}$ = 6.0 V | - | 4 | 10 | ns |
| $C_{PD}$ | power dissipation capacitance | per buffer; $V_I$ = GND to $V_{CC}$ [5] | - | 40 | - | pF |
| **$T_{amb}$ = –40 °C to +85 °C** | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 [1] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 120 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 24 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 20 | ns |
| $t_{en}$ | enable time | $\overline{OE}n$ to nY; see Figure 7 [2] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 190 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 38 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 33 | ns |
| $t_{dis}$ | disable time | $\overline{OE}n$ to nY; see Figure 7 [3] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 190 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 38 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 33 | ns |
| $t_t$ | transition time | see Figure 6 [4] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 75 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 15 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 13 | ns |

**Table 8. Dynamic characteristics 74HC365** *...continued*

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; see test circuit Figure 8.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +125 °C** | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 [1] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 145 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 29 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 25 | ns |
| $t_{en}$ | enable time | $\overline{OE}n$ to nY; see Figure 7 [2] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 225 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 45 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 38 | ns |
| $t_{dis}$ | disable time | $\overline{OE}n$ to nY; see Figure 7 [3] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 225 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 45 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 38 | ns |
| $t_t$ | transition time | see Figure 6 [4] | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 90 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 18 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 15 | ns |

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

[2] $t_{en}$ is the same as $t_{PZH}$ and $t_{PZL}$.

[3] $t_{dis}$ is the same as $t_{PHZ}$ and $t_{PLZ}$.

[4] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[5] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$ 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 9. Dynamic characteristics 74HCT365**

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; see test circuit Figure 8.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = 25 °C** | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 [1] | | | | |
| | | $V_{CC}$ = 4.5 V | - | 14 | 25 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 11 | - | ns |
| $t_{en}$ | enable time | $\overline{OE}n$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 [2] | - | 18 | 35 | ns |
| $t_{dis}$ | disable time | $\overline{OE}n$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 [3] | - | 23 | 35 | ns |
| $t_t$ | transition time | $V_{CC}$ = 4.5 V; see Figure 6 [4] | - | 5 | 12 | ns |
| $C_{PD}$ | power dissipation capacitance | per buffer; $V_I$ = GND to ($V_{CC}$ – 1.5 V) [5] | - | 40 | - | pF |

**Table 9. Dynamic characteristics 74HCT365** *…continued*

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; see test circuit Figure 8.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +85 °C** | | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; $V_{CC}$ = 4.5 V; see Figure 6 | [1] | - | - | 31 | ns |
| $t_{en}$ | enable time | $\overline{OEn}$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 | [2] | - | - | 44 | ns |
| $t_{dis}$ | disable time | $\overline{OEn}$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 | [3] | - | - | 44 | ns |
| $t_t$ | transition time | $V_{CC}$ = 4.5 V; see Figure 6 | [4] | - | - | 15 | ns |
| **$T_{amb}$ = –40 °C to +125 °C** | | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; $V_{CC}$ = 4.5 V; see Figure 6 | [1] | - | - | 38 | ns |
| $t_{en}$ | enable time | $\overline{OEn}$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 | [2] | - | - | 53 | ns |
| $t_{dis}$ | disable time | $\overline{OEn}$ to nY; $V_{CC}$ = 4.5 V; see Figure 7 | [3] | - | - | 53 | ns |
| $t_t$ | transition time | $V_{CC}$ = 4.5 V; see Figure 6 | [4] | - | - | 18 | ns |

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

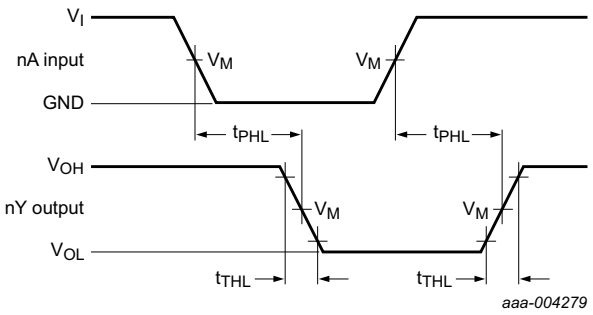
[2] $t_{en}$ is the same as $t_{PZH}$ and $t_{PZL}$.

[3] $t_{dis}$ is the same as $t_{PHZ}$ and $t_{PLZ}$.

[4] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[5] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

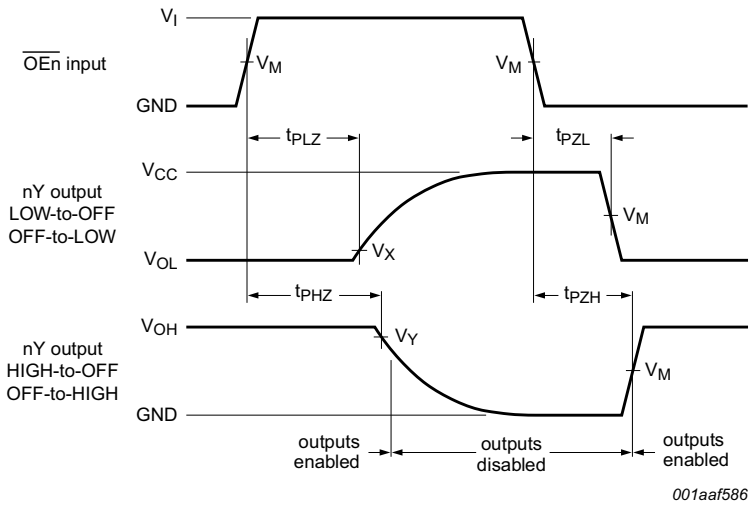
## 11. Waveforms




Measurement points are given in Table 10.

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

**Fig 6. Propagation delay data input (nA) to output (nY) and output transition time**



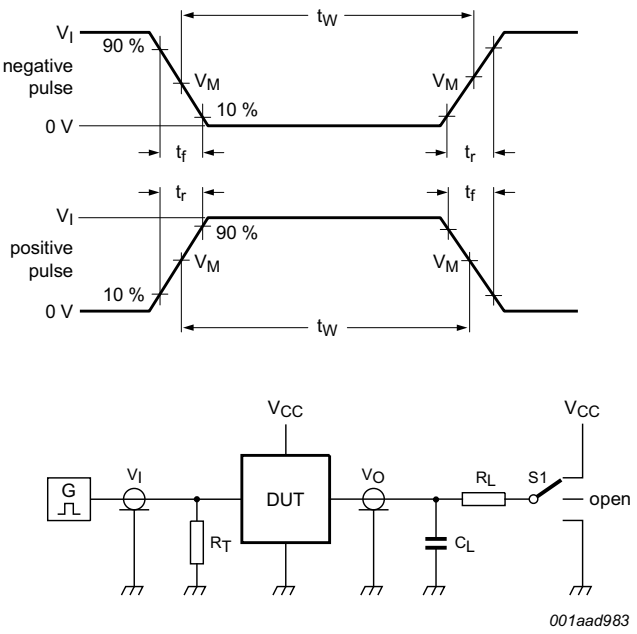

Measurement points are given in Table 10.

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

**Fig 7. 3-state enable and disable times**

**Table 10. Measurement points**

| Type | Input | Output | | |
|---|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 74HC365 | $0.5V_{CC}$ | $0.5V_{CC}$ | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |
| 74HCT365 | 1.3 V | 1.3 V | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |




Test data is given in Table 11.

Definitions 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 resistance

S1 = Test selection switch

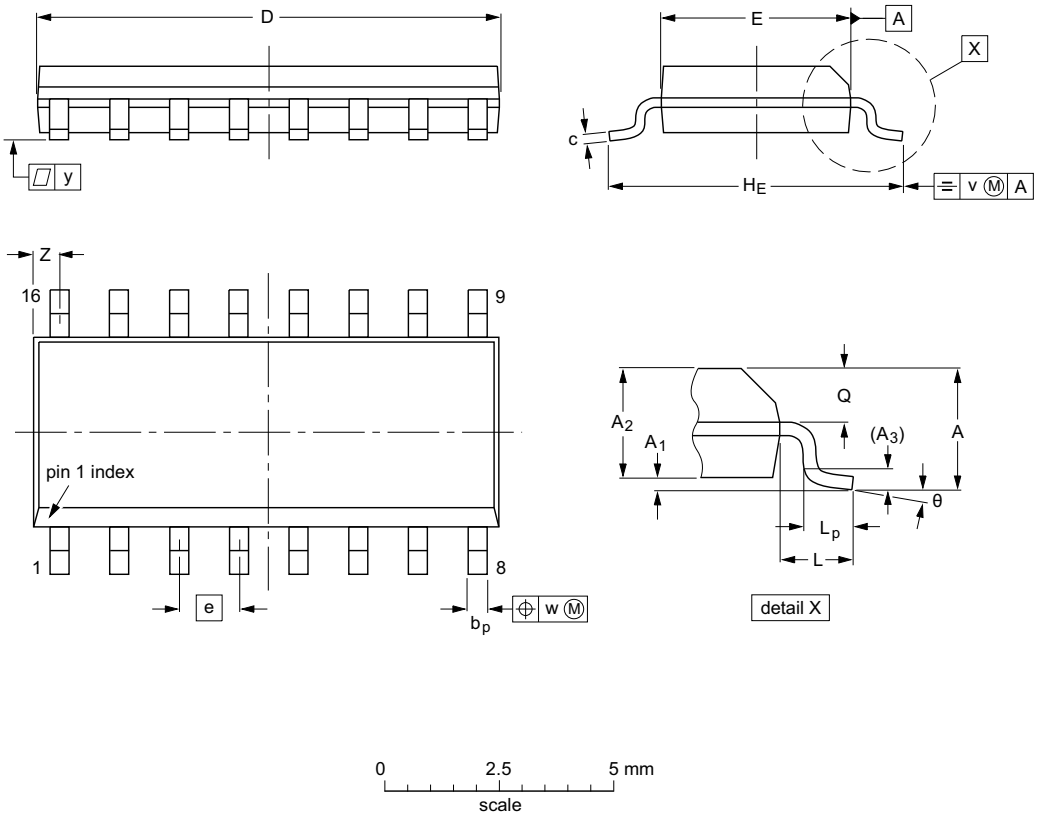
**Fig 8. Test circuit for measuring switching times**

**Table 11. Test data**

| Type | Input | | Load | | S1 position | | |
|---|---|---|---|---|---|---|---|
| | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | $t_{PHL}$, $t_{PLH}$ | $t_{PZH}$, $t_{PHZ}$ | $t_{PZL}$, $t_{PLZ}$ |
| 74HC365 | $V_{CC}$ | 6 ns | 15 pF, 50 pF | 1 kΩ | open | GND | $V_{CC}$ |
| 74HCT365 | 3 V | 6 ns | 15 pF, 50 pF | 1 kΩ | open | GND | $V_{CC}$ |

## 12. Package outline

**SO16: plastic small outline package; 16 leads; body width 3.9 mm** **SOT109-1**




**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.75 | 0.25<br>0.10 | 1.45<br>1.25 | 0.25 | 0.49<br>0.36 | 0.25<br>0.19 | 10.0<br>9.8 | 4.0<br>3.8 | 1.27 | 6.2<br>5.8 | 1.05 | 1.0<br>0.4 | 0.7<br>0.6 | 0.25 | 0.25 | 0.1 | 0.7<br>0.3 | $8^o$<br>$0^o$ |
| inches | 0.069 | 0.010<br>0.004 | 0.057<br>0.049 | 0.01 | 0.019<br>0.014 | 0.0100<br>0.0075 | 0.39<br>0.38 | 0.16<br>0.15 | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 | 0.028<br>0.020 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012 | |

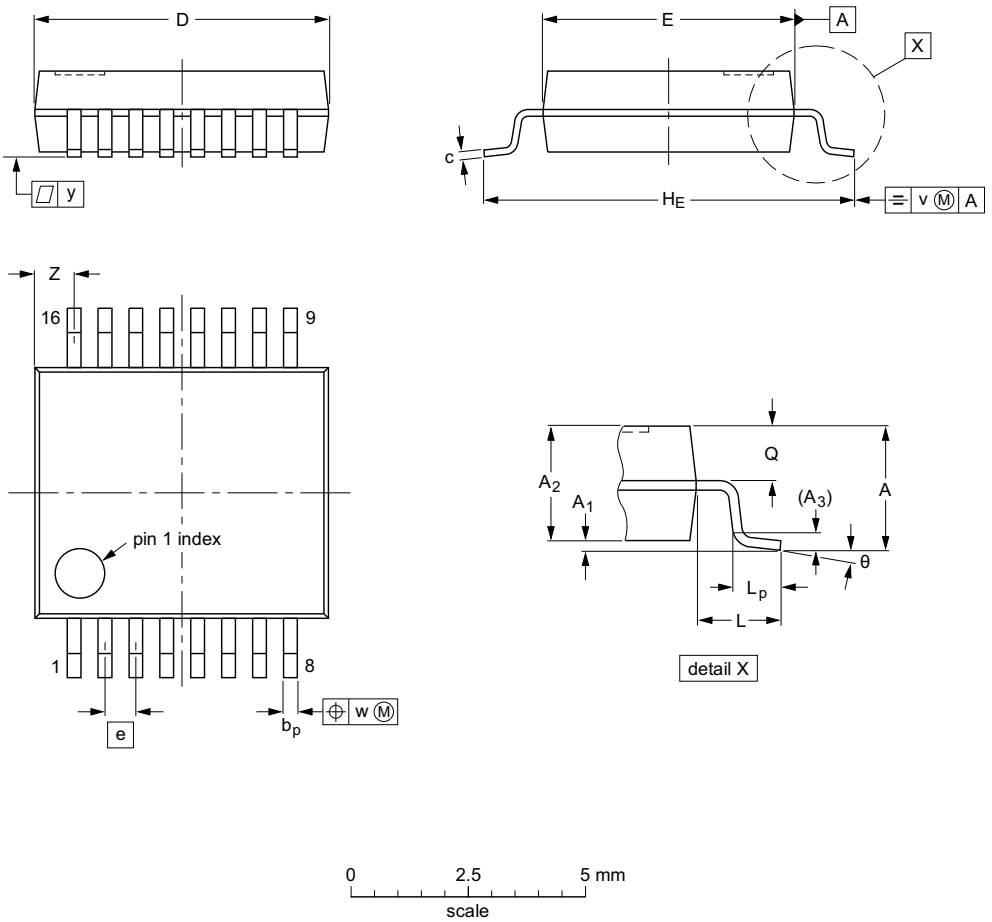
**Note**

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 | | | |
| SOT109-1 | 076E07 | MS-012 | | | | ~~99-12-27~~<br>03-02-19 |

**Fig 9. Package outline SOT109-1 (SO16)**

**SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm** **SOT338-1**




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

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | D (1) | E (1) | e | $H_E$ | L | $L_p$ | Q | v | w | y | Z (1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 2 | 0.21<br>0.05 | 1.80<br>1.65 | 0.25 | 0.38<br>0.25 | 0.20<br>0.09 | 6.4<br>6.0 | 5.4<br>5.2 | 0.65 | 7.9<br>7.6 | 1.25 | 1.03<br>0.63 | 0.9<br>0.7 | 0.2 | 0.13 | 0.1 | 1.00<br>0.55 | 8°<br>0° |

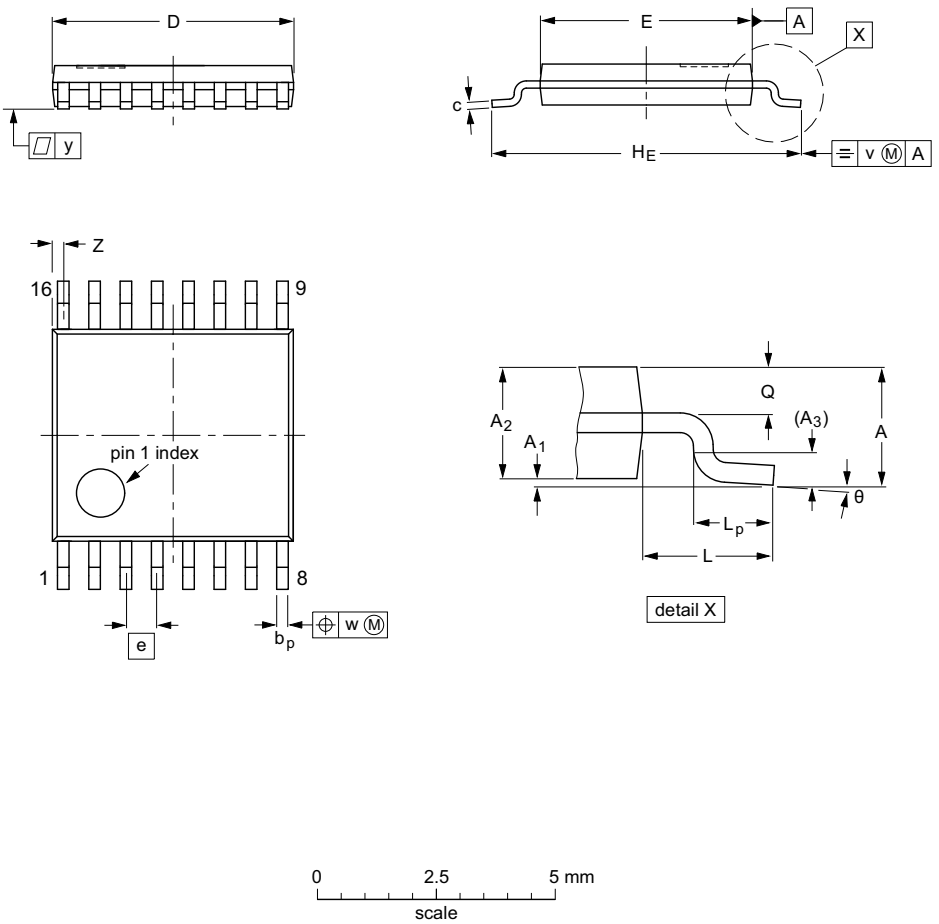
**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT338-1 | | MO-150 | | | | ~~99-12-27~~<br>03-02-19 |

**Fig 10. Package outline SOT338-1 (SSOP16)**

**TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm** **SOT403-1**




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

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | D (1) | E (2) | e | $H_E$ | L | $L_p$ | Q | v | w | y | Z (1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.05 | 0.95<br>0.80 | 0.25 | 0.30<br>0.19 | 0.2<br>0.1 | 5.1<br>4.9 | 4.5<br>4.3 | 0.65 | 6.6<br>6.2 | 1 | 0.75<br>0.50 | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.40<br>0.06 | 8°<br>0° |

**Notes**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT403-1 | | MO-153 | | | | ~~99-12-27~~<br>03-02-18 |

**Fig 11. Package outline SOT403-1 (TSSOP16)**

## 13. Abbreviations

**Table 12. Abbreviations**

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

## 14. Revision history

**Table 13. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT365 v.4 | 20160127 | Product data sheet | - | 74HC_HCT365 v.3 |
| Modifications: | • Type numbers 74HC365N and 74HCT365N (SOT38-4) removed. | | | |
| 74HC_HCT365 v.3 | 20120905 | Product data sheet | - | 74HC_HCT365_CNV v.2 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.<br>• Legal texts have been adapted to the new company name where appropriate. | | | |
| 74HC_HCT365_CNV v.2 | 19970829 | Product specification | - | - |

# 15. Legal information

## 15.1 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.nexperia.com.

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## 17. Contents





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**Date of release: 27 January 2016**