# 74HC175; 74HCT175

## Quad D-type flip-flop with reset; positive-edge trigger

Rev. 5 — 29 January 2016 Product data sheet

## 1. General description

The 74HC175; 74HCT175 is a quad positive-edge triggered D-type flip-flop with individual data inputs (Dn) and complementary outputs (Qn and $\overline{Qn}$). The common clock (CP) and master reset ($\overline{MR}$) inputs load and reset all flip-flops simultaneously. The D-input that meets the set-up and hold time requirements on the LOW-to-HIGH clock transition will be stored in the flip-flop and appear at the Q output. A LOW on $\overline{MR}$ causes the flip-flops and outputs to be reset LOW. 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

- Input levels:
  - For 74HC175: CMOS level
  - For 74HCT175: TTL level
- Four edge-triggered D-type flip-flops
- Asynchronous master reset
- Complies with JEDEC standard no. 7A
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V.
- Multiple package options
- Specified from −40 °C to +85 °C and −40 °C to +125 °C.

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC175D | −40 °C to +125 °C | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |
| 74HCT175D | | | | |
| 74HC175DB | −40 °C to +125 °C | SSOP16 | plastic shrink small outline package; 16 leads; body width 5.3 mm | SOT338-1 |
| 74HCT175DB | | | | |
| 74HC175PW | −40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HCT175PW | | | | |

## 4. Functional diagram

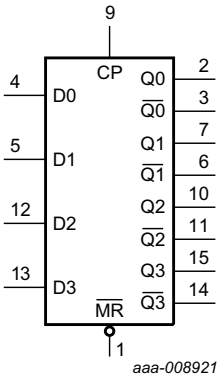


Fig 1. Logic symbol

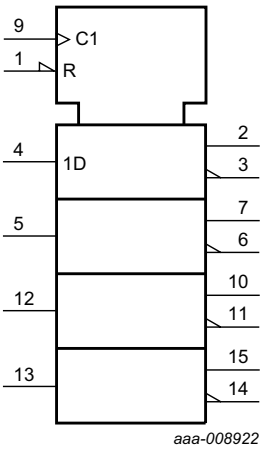


Fig 2. IEC logic symbol

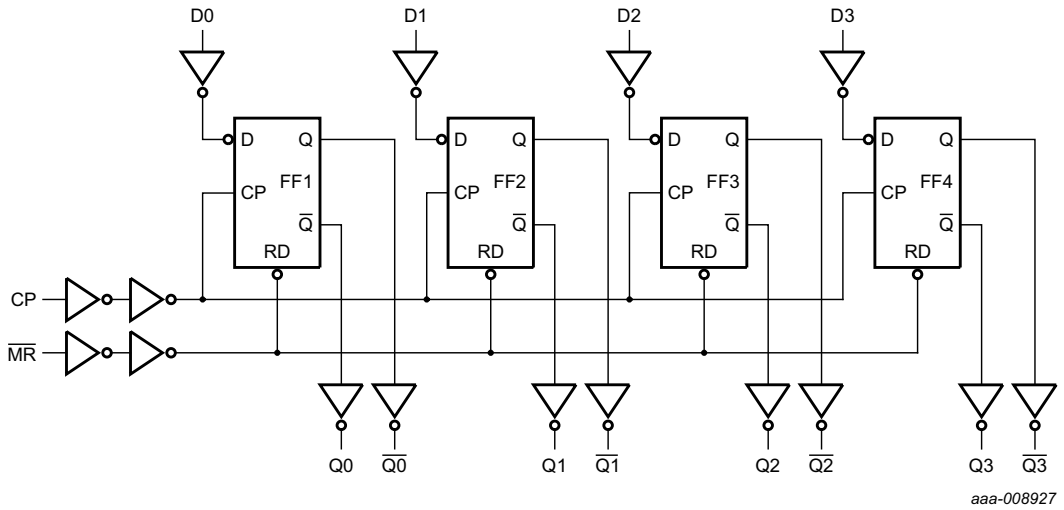


Fig 3. Logic diagram



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# 5. Pinning information

## 5.1 Pinning

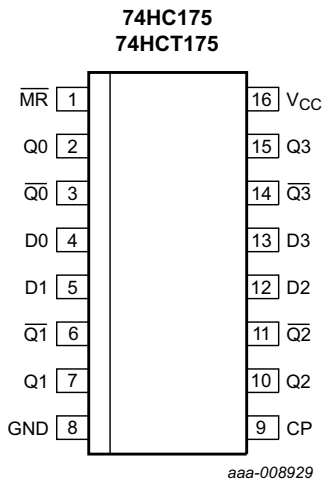


Fig 4. Pin configuration SO16

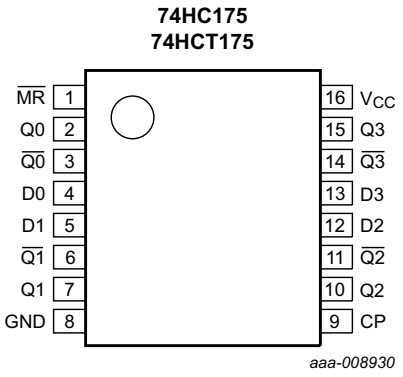


Fig 5. Pin configuration SSOP16 and TSSOP16

## 5.2 Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|---|---|---|
| $\overline{MR}$ | 1 | asynchronous master reset input (active LOW) |
| Q0 to Q3 | 2, 7, 10, 15 | flip-flop output |
| $\overline{Q0}$ to $\overline{Q3}$ | 3, 6, 11, 14 | complementary flip-flop output |
| D0 to D3 | 4, 5, 12, 13 | data input |
| GND | 8 | ground (0 V) |
| CP | 9 | clock input (LOW-to-HIGH edge-triggered) |
| $V_{CC}$ | 16 | positive supply voltage |


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# 6. Functional description

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

| Operating modes | Inputs | | | Outputs | |
|---|---|---|---|---|---|
| | $\overline{MR}$ | CP | Dn | Qn | $\overline{Qn}$ |
| reset (clear) | L | X | X | L | H |
| load “1” | H | ↑ | h | H | L |
| load “0” | H | ↑ | l | L | H |

[1] H = HIGH voltage level;
h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition;
L = LOW voltage level;
l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;
X = don’t care;
↑ = LOW-to-HIGH clock transition.

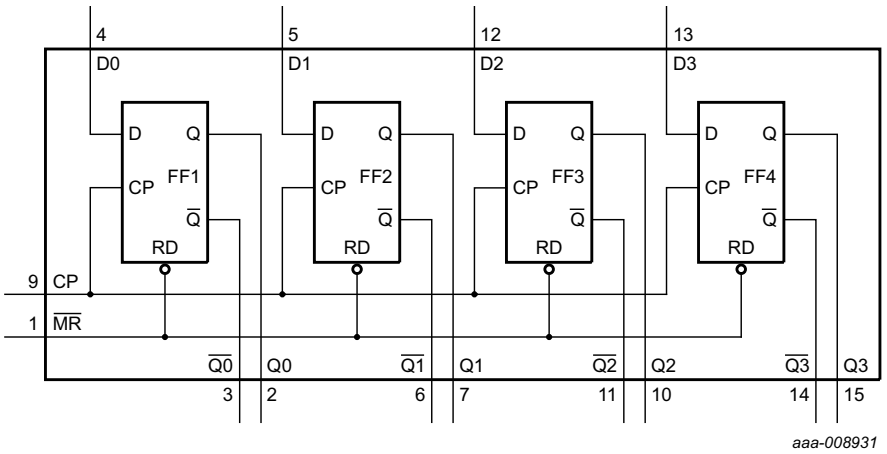


**Fig 6. Functional diagram**


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# 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 | - | ±20 | mA |
| $I_{OK}$ | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | - | ±20 | mA |
| $I_O$ | output current | $-0.5$ V $< V_O < V_{CC} + 0.5$ V | - | ±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 °C to +125 °C | | | |
| | | SO16, SSOP16 and TSSOP16 [1] | - | 500 | mW |

[1] For SO16 package: above 70 °C the value of $P_{tot}$ derates linearly with 8 mW/K.
For SSOP16 and TSSOP16 packages: above 60 °C the value of $P_{tot}$ derates linearly with 5.5 mW/K.

# 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

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

| Symbol | Parameter | Conditions | 74HC175 | | | 74HCT175 | | | 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 | - | +125 | −40 | - | +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 |


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# 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC175** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 2.0 V | 1.5 | 1.2 | - | 1.5 | - | 1.5 | - | V |
| | | $V_{CC}$ = 4.5 V | 3.15 | 2.4 | - | 3.15 | - | 3.15 | - | V |
| | | $V_{CC}$ = 6.0 V | 4.2 | 3.2 | - | 4.2 | - | 4.2 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 2.0 V | - | 0.8 | 0.5 | - | 0.5 | - | 0.5 | V |
| | | $V_{CC}$ = 4.5 V | - | 2.1 | 1.35 | - | 1.35 | - | 1.35 | V |
| | | $V_{CC}$ = 6.0 V | - | 2.8 | 1.8 | - | 1.8 | - | 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 | - | 1.9 | - | 1.9 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 6.0 V | 5.9 | 6.0 | - | 5.9 | - | 5.9 | - | V |
| | | $I_O$ = –4.0 mA; $V_{CC}$ = 4.5 V | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| | | $I_O$ = –5.2 mA; $V_{CC}$ = 6.0 V | 5.48 | 5.81 | - | 5.34 | - | 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 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 μA; $V_{CC}$ = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 μA; $V_{CC}$ = 6.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 4.0 mA; $V_{CC}$ = 4.5 V | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| | | $I_O$ = 5.2 mA; $V_{CC}$ = 6.0 V | - | 0.16 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V | - | - | ±0.1 | - | ±1 | - | ±1 | μA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 6.0 V | - | - | 8.0 | - | 80 | - | 160 | μA |
| $C_I$ | input capacitance | | - | 3.5 | - | - | - | - | - | pF |
| **74HCT175** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | 2.0 | 1.6 | - | 2.0 | - | 2.0 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | - | 1.2 | 0.8 | - | 0.8 | - | 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 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O$ = –4.0 mA | 3.98 | 4.32 | - | 3.84 | - | 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; $V_{CC}$ = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 5.2 mA; $V_{CC}$ = 5.5 V | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | ±0.1 | - | ±1 | - | ±1 | μA |


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

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

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 8.0 | - | 80 | - | 160 | µA |
| $\Delta I_{CC}$ | additional supply current | per input pin; $V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V | | | | | | | | |
| | | Dn input | - | 40 | 144 | - | 180 | - | 196 | µA |
| | | CP input | - | 60 | 216 | - | 270 | - | 294 | µA |
| | | $\overline{MR}$ input | - | 100 | 360 | - | 450 | - | 490 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | - | - | - | - | pF |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

*GND (ground = 0 V); $C_L = 50$ pF unless otherwise specified; for test circuit, see Figure 10*

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC175** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | CP to Qn, $\overline{Qn}$; see Figure 7 [1] | | | | | | | | |
| | | $V_{CC} = 2.0$ V | - | 55 | 175 | - | 220 | - | 265 | ns |
| | | $V_{CC} = 4.5$ V | - | 20 | 35 | - | 44 | - | 53 | ns |
| | | $V_{CC} = 5$ V; $C_L = 15$ pF | - | 17 | - | - | - | - | - | ns |
| | | $V_{CC} = 6.0$ V | - | 16 | 30 | - | 37 | - | 45 | ns |
| $t_{PHL}$ | HIGH to LOW propagation delay | $\overline{MR}$ to Qn, $\overline{Qn}$; see Figure 9 | | | | | | | | |
| | | $V_{CC} = 2.0$ V | - | 50 | 150 | - | 190 | - | 225 | ns |
| | | $V_{CC} = 4.5$ V | - | 18 | 30 | - | 38 | - | 45 | ns |
| | | $V_{CC} = 5$ V; $C_L = 15$ pF | - | 15 | - | - | - | - | - | ns |
| | | $V_{CC} = 6.0$ V | - | 14 | 26 | - | 33 | - | 38 | ns |
| $t_t$ | transition time | Qn output; see Figure 7 [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 |


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**Table 7. Dynamic characteristics** *...continued*

*GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; for test circuit, see Figure 10*

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $t_W$ | pulse width | CP input HIGH or LOW; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 80 | 22 | - | 100 | - | 120 | - | ns |
| | | $V_{CC}$ = 4.5 V | 16 | 8 | - | 20 | - | 24 | - | ns |
| | | $V_{CC}$ = 6.0 V | 14 | 6 | - | 17 | - | 20 | - | ns |
| | | $\overline{MR}$ input LOW; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 80 | 19 | - | 100 | - | 120 | - | ns |
| | | $V_{CC}$ = 4.5 V | 16 | 7 | - | 20 | - | 24 | - | ns |
| | | $V_{CC}$ = 6.0 V | 14 | 6 | - | 17 | - | 20 | - | ns |
| $t_{rec}$ | recovery time | $\overline{MR}$ to CP; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 5 | –33 | - | 5 | - | 5 | - | ns |
| | | $V_{CC}$ = 4.5 V | 5 | –12 | - | 5 | - | 5 | - | ns |
| | | $V_{CC}$ = 6.0 V | 5 | –10 | - | 5 | - | 5 | - | ns |
| $t_{su}$ | set-up time | Dn to CP; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 80 | 3 | - | 100 | - | 120 | - | ns |
| | | $V_{CC}$ = 4.5 V | 16 | 1 | - | 20 | - | 24 | - | ns |
| | | $V_{CC}$ = 6.0 V | 14 | 1 | - | 17 | - | 20 | - | ns |
| $t_h$ | hold time | Dn to CP; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 25 | 2 | - | 30 | - | 40 | - | ns |
| | | $V_{CC}$ = 4.5 V | 5 | 0 | - | 6 | - | 8 | - | ns |
| | | $V_{CC}$ = 6.0 V | 4 | 0 | - | 5 | - | 7 | - | ns |
| $f_{max}$ | maximum frequency | CP input; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 6 | 25 | - | 4.8 | - | 4 | - | MHz |
| | | $V_{CC}$ = 4.5 V | 30 | 75 | - | 24 | - | 20 | - | MHz |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 83 | - | - | - | - | - | MHz |
| | | $V_{CC}$ = 6.0 V | 35 | 89 | - | 28 | - | 24 | - | MHz |
| $C_{PD}$ | power dissipation capacitance | per package; $V_I$ = GND to $V_{CC}$ [3] | - | 32 | - | - | - | - | - | pF |


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**Table 7. Dynamic characteristics** *...continued*

*GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; for test circuit, see Figure 10*

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HCT175** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | CP to Qn, $\overline{Q}$n; see Figure 7 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 19 | 33 | - | 41 | - | 50 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 16 | - | - | - | - | - | ns |
| $t_{PHL}$ | HIGH to LOW propagation delay | $\overline{MR}$ to Qn; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 22 | 38 | - | 48 | - | 57 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 19 | - | - | - | - | - | ns |
| | | $\overline{MR}$ to $\overline{Q}$n; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 19 | 35 | - | 44 | - | 53 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 16 | - | - | - | - | - | ns |
| $t_t$ | transition time | Qn output; see Figure 7 [2] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 7 | 15 | - | 19 | - | 22 | ns |
| $t_W$ | pulse width | CP input; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 20 | 12 | - | 25 | - | 30 | - | ns |
| | | $\overline{MR}$ input LOW; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 20 | 11 | - | 25 | - | 30 | - | ns |
| $t_{rec}$ | recovery time | $\overline{MR}$ to CP; see Figure 9 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 5 | –10 | - | 5 | - | 5 | - | ns |
| $t_{su}$ | set-up time | Dn to CP; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 16 | 5 | - | 20 | - | 24 | - | ns |
| $t_h$ | hold time | Dn to CP; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 5 | 0 | - | 5 | - | 5 | - | ns |
| $f_{max}$ | maximum frequency | CP input; see Figure 7 | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 25 | 49 | - | 20 | - | 17 | - | MHz |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 54 | - | - | - | - | - | MHz |
| $C_{PD}$ | power dissipation capacitance | per package; $V_I$ = GND to $V_{CC}$ − 1.5 V [3] | - | 34 | - | - | - | - | - | pF |

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

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

[3] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where:
$f_i$ = input frequency in MHz;
$f_o$ = output frequency in MHz;
$\Sigma (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs;
$C_L$ = output load capacitance in pF;
$V_{CC}$ = supply voltage in V.



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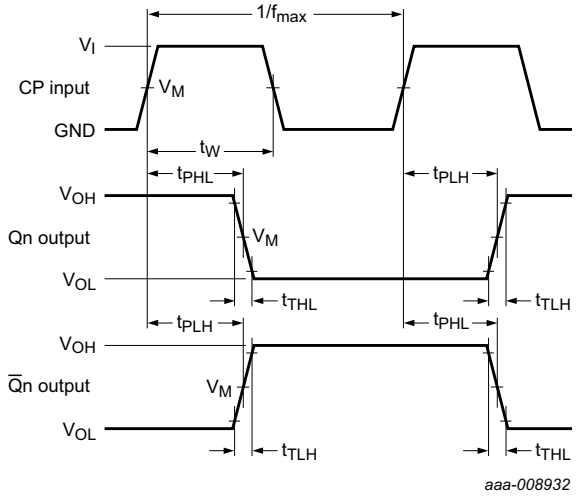
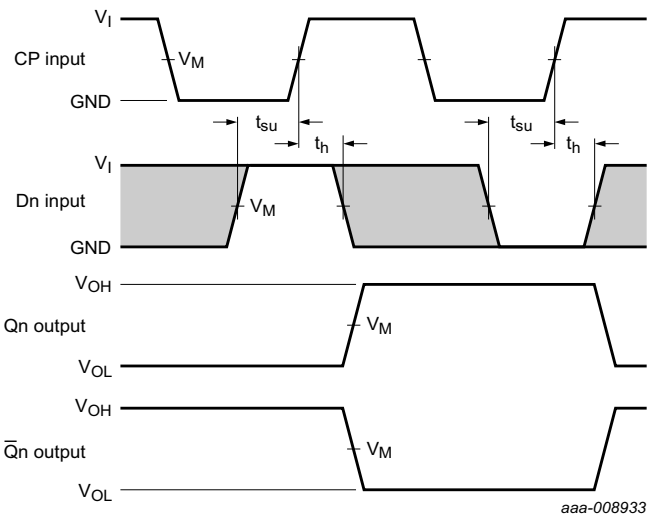
## 11. Waveforms




Measurement points are given in Table 8.

**Fig 7. Input to output propagation delay, output transition time, clock input pulse width and maximum frequency**




Measurement points are given in Table 8.

**Fig 8. Data set-up and hold times for data input**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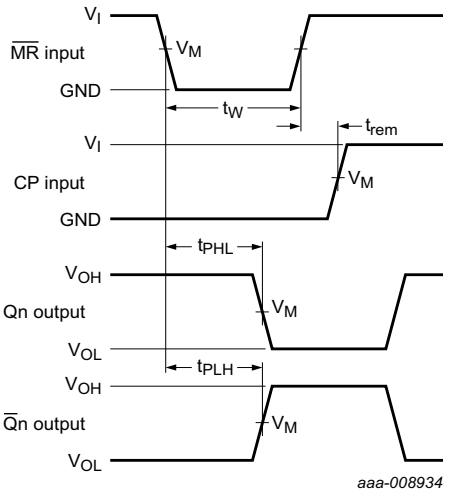


Measurement points are given in Table 8.

**Fig 9. Master reset to output propagation delays, master reset pulse width and master reset to clock recovery time**

**Table 8. Measurement points**

| Type | Input | | Output |
|---|---|---|---|
| | $V_I$ | $V_M$ | $V_M$ |
| 74HC175 | $V_{CC}$ | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74HCT175 | 3 V | 1.3 V | 1.3 V |


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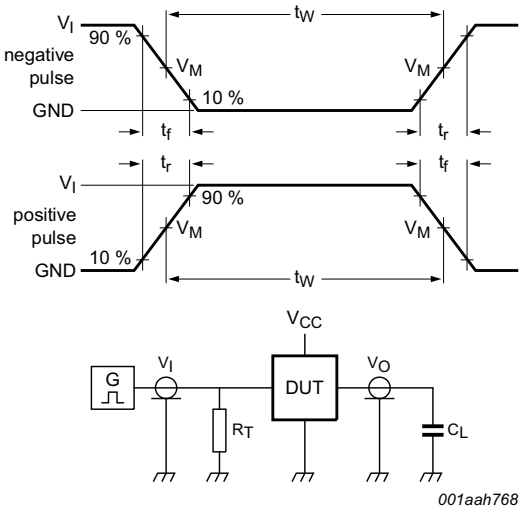


Test data is given in Table 9.

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 resistance.

**Fig 10. Test circuit for measuring switching times**

**Table 9. Test data**

| Type | Input | | Load | | Test |
|---|---|---|---|---|---|
| | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | |
| 74HC175 | $V_{CC}$ | 6 ns | 15 pF, 50 pF | 1 kΩ | $t_{PLH}$, $t_{PHL}$ |
| 74HCT175 | 3 V | 6 ns | 15 pF, 50 pF | 1 kΩ | $t_{PLH}$, $t_{PHL}$ |


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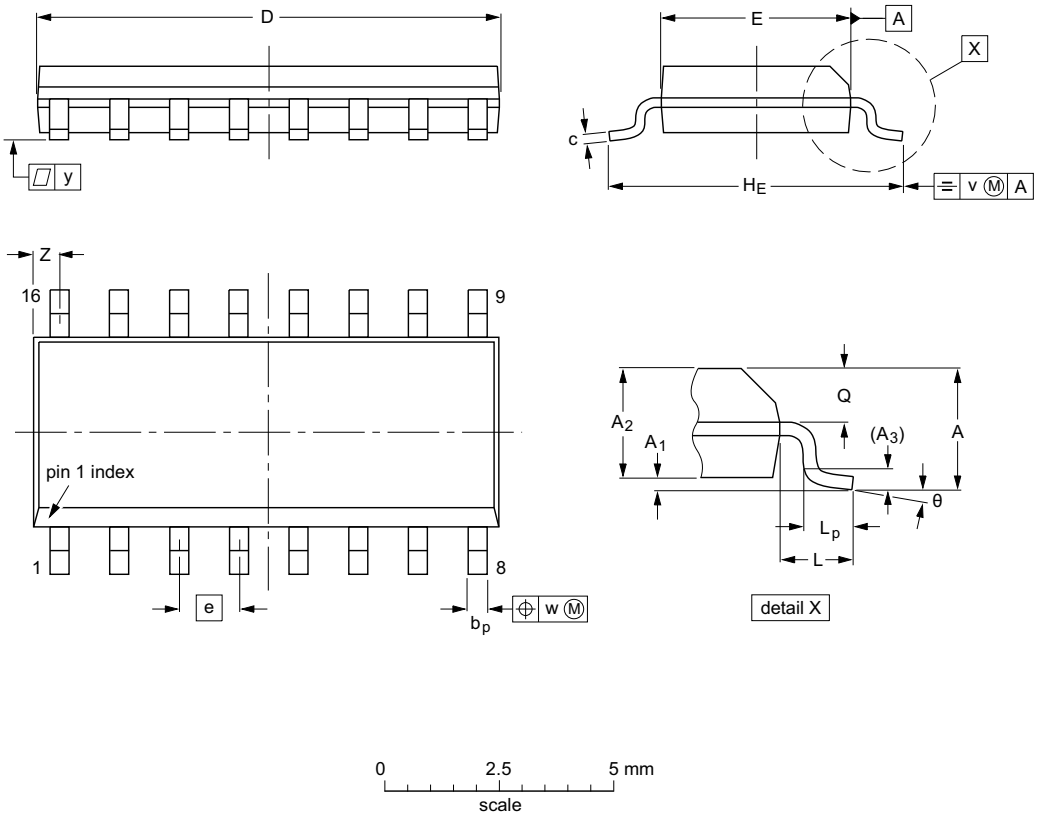
## 12. Package outline

**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 11. Package outline SOT109-1 (SO16)**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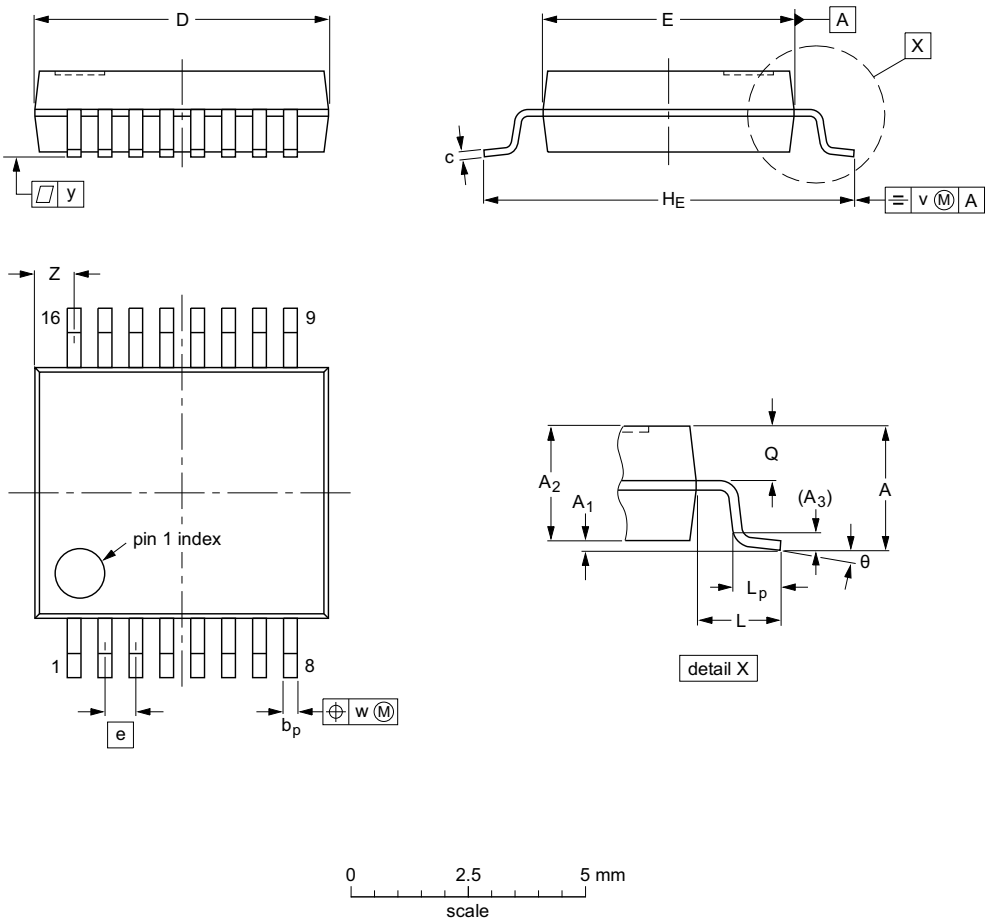
**SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm** **SOT338-1**




**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 12. Package outline SOT338-1 (SSOP16)**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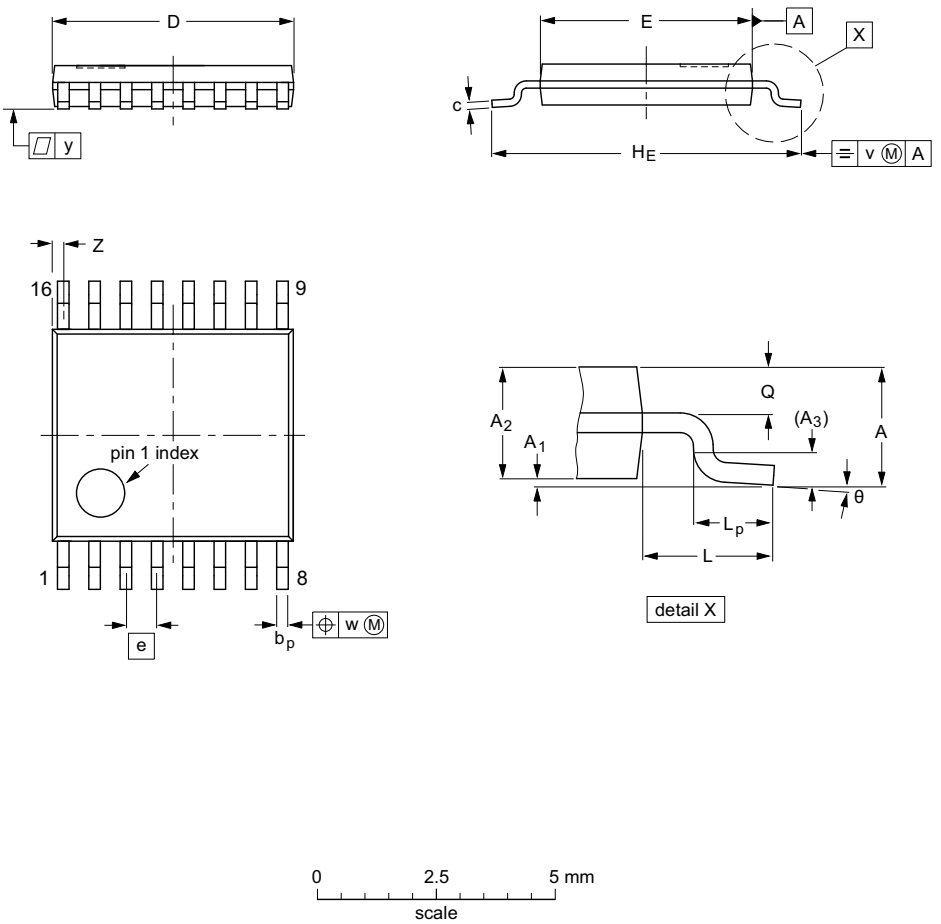
**TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm** **SOT403-1**




**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 13. Package outline SOT403-1 (TSSOP16)**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## 13. Abbreviations

**Table 10. Abbreviations**

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

## 14. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT175 v.5 | 20160129 | Product data sheet | - | 74HC_HCT175 v.4 |
| Modifications: | • Type numbers 74HC175N and 74HCT175N (SOT38-4) removed. | | | |
| 74HC_HCT175 v.4 | 20140408 | Product data sheet | - | 74HC_HCT175 v.3 |
| Modifications: | • General description corrected (errata). | | | |
| 74HC_HCT175 v.3 | 20140331 | Product data sheet | - | 74HC_HCT175_CNV_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_HCT175_CNV_2 | 19980708 | Product specification | - | - |


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| 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".

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