

# 74HC377; 74HCT377

Octal D-type flip-flop with data enable; positive-edge trigger

Rev. 6 — 5 August 2024

Product data sheet

## 1. General description

The 74HC377; 74HCT377 is an octal positive-edge triggered D-type flip-flop. The device features clock (CP) and data enable ( $\bar{E}$ ) inputs. When  $\bar{E}$  is LOW, the outputs Qn assume the state of their corresponding Dn inputs that meet the set-up and hold time requirements on the LOW-to-HIGH clock (CP) transition. Input  $\bar{E}$  must be stable one set-up time prior to the LOW-to-HIGH transition for predictable operation. Inputs include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards:
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- Common clock and master reset
- Eight positive edge-triggered D-type flip-flops
- Input levels:
  - For 74HC377: CMOS level
  - For 74HCT377: TTL level
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

| Type number                                             | Package           |         |                                                                        |                          |
|---------------------------------------------------------|-------------------|---------|------------------------------------------------------------------------|--------------------------|
|                                                         | Temperature range | Name    | Description                                                            | Version                  |
| <a href="#">74HC377D</a><br><a href="#">74HCT377D</a>   | -40 °C to +125 °C | SO20    | plastic small outline package; 20 leads; body width 7.5 mm             | <a href="#">SOT163-1</a> |
| <a href="#">74HC377PW</a><br><a href="#">74HCT377PW</a> | -40 °C to +125 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | <a href="#">SOT360-1</a> |

4. Functional diagram

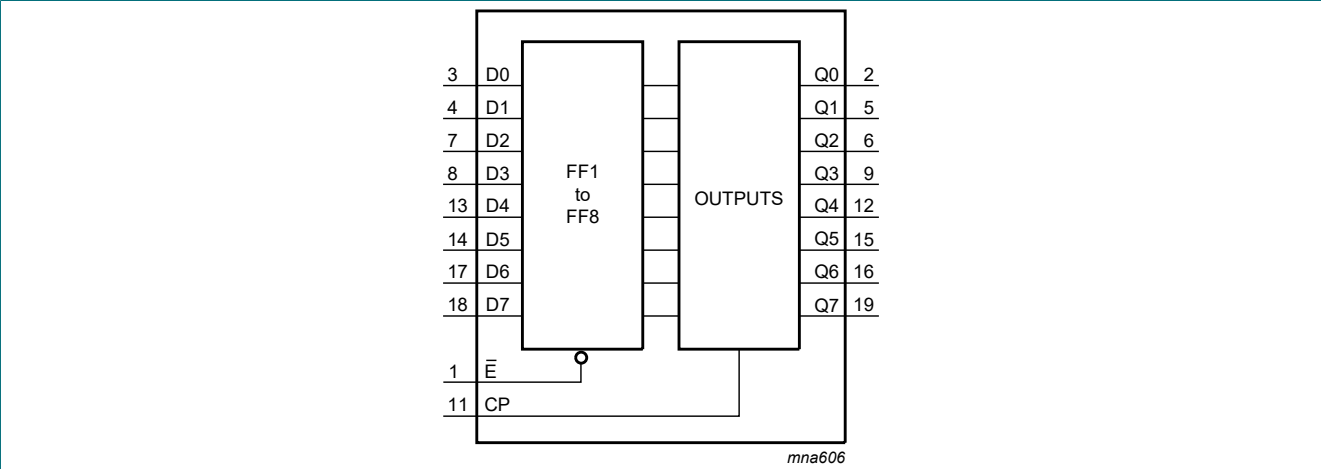


Fig. 1. Functional diagram

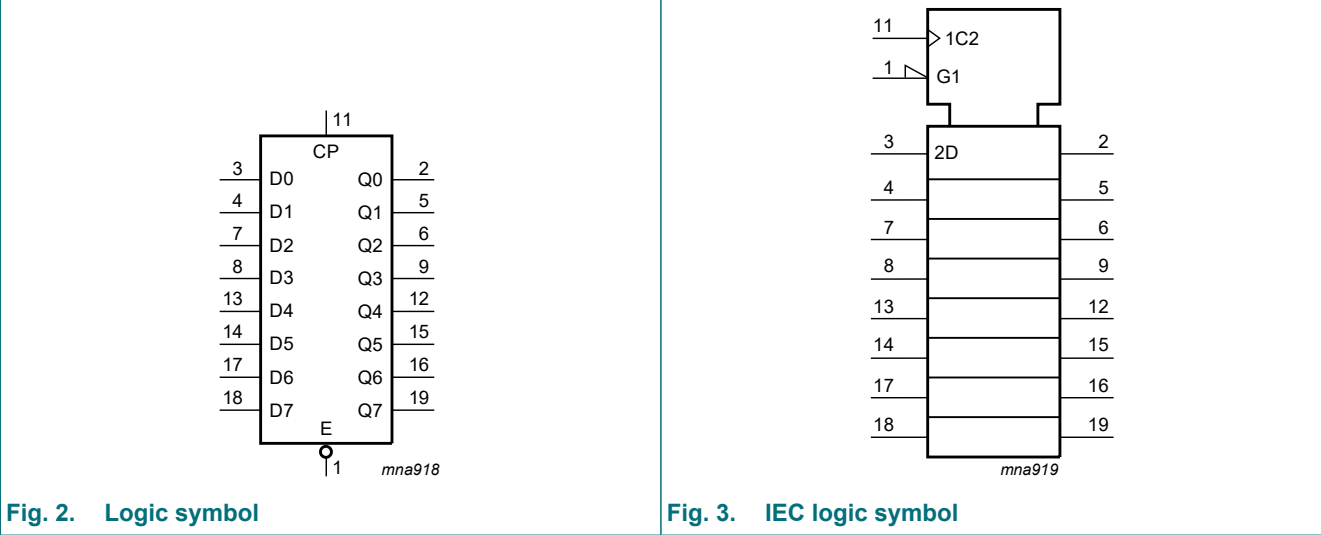


Fig. 2. Logic symbol

Fig. 3. IEC logic symbol

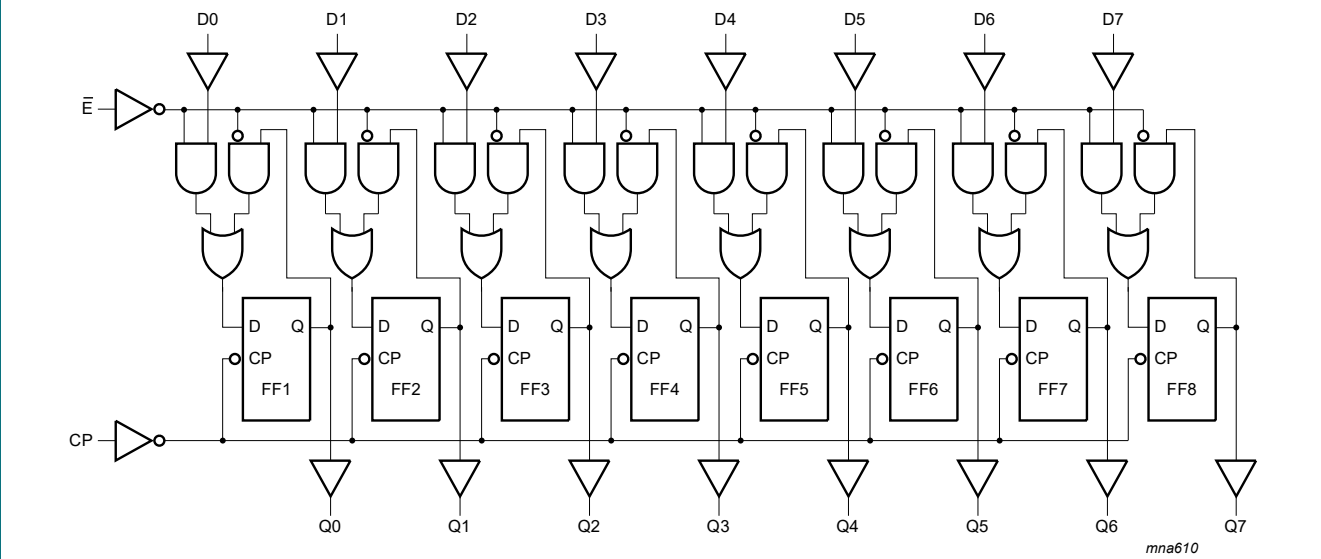
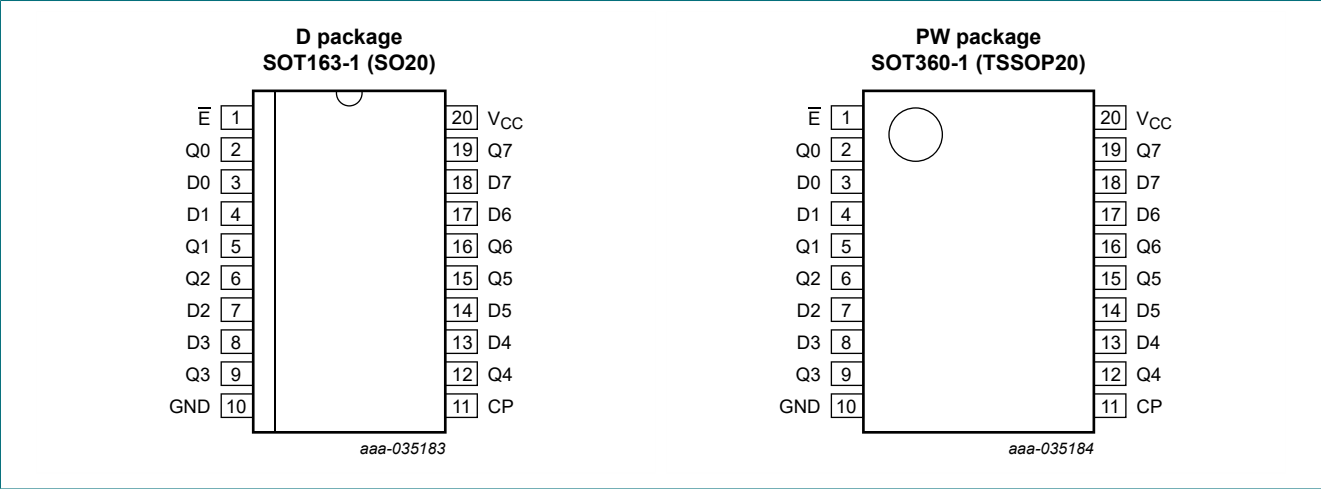


Fig. 4. Logic diagram

5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

| Symbol                         | Pin                        | Description                               |
|--------------------------------|----------------------------|-------------------------------------------|
| $\overline{E}$                 | 1                          | data enable input (active LOW)            |
| Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7 | 2, 5, 6, 9, 12, 15, 16, 19 | flip-flop output                          |
| D0, D1, D2, D3, D4, D5, D6, D7 | 3, 4, 7, 8, 13, 14, 17, 18 | data input                                |
| GND                            | 10                         | ground (0 V)                              |
| CP                             | 11                         | clock input (LOW-to-HIGH, edge triggered) |
| V <sub>CC</sub>                | 20                         | supply voltage                            |

6. Functional description

Table 3. Function table

*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.*

| Operating modes   | Inputs |   |    | Outputs   |
|-------------------|--------|---|----|-----------|
|                   | CP     | E | Dn | Qn        |
| load "1"          | ↑      | l | h  | H         |
| load "0"          | ↑      | l | l  | L         |
| hold (do nothing) | ↑      | h | X  | no change |
|                   | X      | H | X  | no change |

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 <sub>CC</sub>  | supply voltage          |                                                                         | -0.5 | +7   | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V [1] | -    | ±20  | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V [1] | -    | ±20  | mA   |
| I <sub>O</sub>   | output current          | -0.5 V < V <sub>O</sub> < V <sub>CC</sub> + 0.5 V                       | -    | ±25  | mA   |
| I <sub>CC</sub>  | supply current          |                                                                         | -    | 50   | mA   |
| I <sub>GND</sub> | ground current          |                                                                         | -50  | -    | mA   |
| T <sub>stg</sub> | storage temperature     |                                                                         | -65  | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C [2]                                | -    | 500  | mW   |

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
[2] For SOT163-1 (SO20) package: P<sub>tot</sub> derates linearly with 12.3 mW/K above 109 °C.  
For SOT360-1 (TSSOP20) package: P<sub>tot</sub> derates linearly with 10.0 mW/K above 100 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

| Symbol           | Parameter                           | Conditions              | 74HC377 |      |                 | 74HCT377 |      |                 | Unit |
|------------------|-------------------------------------|-------------------------|---------|------|-----------------|----------|------|-----------------|------|
|                  |                                     |                         | Min     | Typ  | Max             | Min      | Typ  | Max             |      |
| V <sub>CC</sub>  | supply voltage                      |                         | 2.0     | 5.0  | 6.0             | 4.5      | 5.0  | 5.5             | V    |
| V <sub>I</sub>   | input voltage                       |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| V <sub>O</sub>   | output voltage                      |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 |                         | -40     | -    | +125            | -40      | -    | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 2.0 V | -       | -    | 625             | -        | -    | -               | ns/V |
|                  |                                     | V <sub>CC</sub> = 4.5 V | -       | 1.67 | 139             | -        | 1.67 | 139             | ns/V |
|                  |                                     | V <sub>CC</sub> = 6.0 V | -       | -    | 83              | -        | -    | -               | ns/V |

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  |      |
| 74HC377         |                           |                                                                                        |       |      |      |                  |      |                   |      |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                | 1.5   | 1.2  | -    | 1.5              | -    | 1.5               | -    | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                | 3.15  | 2.4  | -    | 3.15             | -    | 3.15              | -    | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                | 4.2   | 3.2  | -    | 4.2              | -    | 4.2               | -    | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                | -     | 0.8  | 0.5  | -                | 0.5  | -                 | 0.5  | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                | -     | 2.1  | 1.35 | -                | 1.35 | -                 | 1.35 | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                | -     | 2.8  | 1.8  | -                | 1.8  | -                 | 1.8  | V    |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |       |      |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 2.0 V                                       | 1.9   | 2.0  | -    | 1.9              | -    | 1.9               | -    | V    |
|                 |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                       | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -    | V    |
|                 |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                       | 5.9   | 6.0  | -    | 5.9              | -    | 5.9               | -    | V    |
|                 |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -    | V    |
|                 |                           | I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V                                      | 5.48  | 5.81 | -    | 5.34             | -    | 5.2               | -    | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |       |      |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 2.0 V                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V                                        | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V                                       | -     | 0.15 | 0.26 | -                | 0.33 | -                 | 0.4  | V    |
|                 |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                                       | -     | 0.16 | 0.26 | -                | 0.33 | -                 | 0.4  | V    |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V                       | -     | -    | ±0.1 | -                | ±1   | -                 | ±1   | µA   |
| I <sub>CC</sub> | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V | -     | -    | 8.0  | -                | 80   | -                 | 160  | µA   |
| C <sub>I</sub>  | input capacitance         |                                                                                        | -     | 3.5  | -    | -                | -    | -                 | -    | pF   |

Octal D-type flip-flop with data enable; positive-edge trigger

| Symbol           | Parameter                 | Conditions                                                                                                                        | 25 °C |      |      | -40 °C to +85 °C |      | -40 °C to +125 °C |     | Unit |
|------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------|------|------|------------------|------|-------------------|-----|------|
|                  |                           |                                                                                                                                   | Min   | Typ  | Max  | Min              | Max  | Min               | Max |      |
| 74HCT377         |                           |                                                                                                                                   |       |      |      |                  |      |                   |     |      |
| V <sub>IH</sub>  | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                  | 2.0   | 1.6  | -    | 2.0              | -    | 2.0               | -   | V    |
| V <sub>IL</sub>  | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                  | -     | 1.2  | 0.8  | -                | 0.8  | -                 | 0.8 | V    |
| V <sub>OH</sub>  | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                     |       |      |      |                  |      |                   |     |      |
|                  |                           | I <sub>O</sub> = -20 µA                                                                                                           | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -   | V    |
|                  |                           | I <sub>O</sub> = -4.0 mA                                                                                                          | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -   | V    |
| V <sub>OL</sub>  | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                     |       |      |      |                  |      |                   |     |      |
|                  |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                                                                   | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1 | V    |
|                  |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 5.5 V                                                                                  | -     | 0.15 | 0.26 | -                | 0.33 | -                 | 0.4 | V    |
| I <sub>I</sub>   | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                                                                  | -     | -    | ±0.1 | -                | ±1   | -                 | ±1  | µA   |
| I <sub>CC</sub>  | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V                                            | -     | -    | 8.0  | -                | 80   | -                 | 160 | µA   |
| ΔI <sub>CC</sub> | additional supply current | per input pin; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V |       |      |      |                  |      |                   |     |      |
|                  |                           | E input                                                                                                                           | -     | 150  | 540  | -                | 675  | -                 | 735 | µA   |
|                  |                           | CP input                                                                                                                          | -     | 50   | 180  | -                | 225  | -                 | 245 | µA   |
|                  |                           | Dn input                                                                                                                          | -     | 20   | 72   | -                | 90   | -                 | 98  | µA   |
| C <sub>I</sub>   | input capacitance         |                                                                                                                                   | -     | 3.5  | -    | -                | -    | -                 | -   | pF   |

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND (ground = 0 V); C<sub>L</sub> = 50 pF unless otherwise specified; for test circuit, see Fig. 7.

| Symbol           | Parameter                     | Conditions                                               | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|----------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                               |                                                          | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| 74HC377          |                               |                                                          |       |     |     |                  |     |                   |     |      |
| t <sub>pd</sub>  | propagation delay             | CP to Qn; see <a href="#">Fig. 5</a> [1]                 |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | -     | 44  | 160 | -                | 200 | -                 | 240 | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | -     | 16  | 32  | -                | 40  | -                 | 48  | ns   |
|                  |                               | V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF          | -     | 13  | -   | -                | -   | -                 | -   | -    |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | -     | 13  | 27  | -                | 34  | -                 | 41  | ns   |
| t <sub>t</sub>   | transition time               | Qn output; see <a href="#">Fig. 5</a> [2]                |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | -     | 19  | 75  | -                | 95  | -                 | 110 | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | -     | 6   | 13  | -                | 16  | -                 | 19  | ns   |
| t <sub>W</sub>   | pulse width                   | CP input HIGH or LOW; see <a href="#">Fig. 5</a>         |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 80    | 14  | -   | 100              | -   | 120               | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 16    | 5   | -   | 20               | -   | 24                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 14    | 4   | -   | 17               | -   | 20                | -   | ns   |
| t <sub>su</sub>  | set-up time                   | Dn to CP; see <a href="#">Fig. 6</a>                     |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 60    | 14  | -   | 75               | -   | 90                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 12    | 5   | -   | 15               | -   | 18                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 10    | 4   | -   | 13               | -   | 15                | -   | ns   |
|                  |                               | E to CP; see <a href="#">Fig. 6</a>                      |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 60    | 6   | -   | 75               | -   | 90                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 12    | 2   | -   | 15               | -   | 18                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 10    | 2   | -   | 13               | -   | 15                | -   | ns   |
| t <sub>h</sub>   | hold time                     | Dn to CP; see <a href="#">Fig. 6</a>                     |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 3     | -8  | -   | 3                | -   | 3                 | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 3     | -3  | -   | 3                | -   | 3                 | -   | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 3     | -2  | -   | 3                | -   | 3                 | -   | ns   |
|                  |                               | E to CP; see <a href="#">Fig. 6</a>                      |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 4     | -3  | -   | 4                | -   | 4                 | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 4     | -1  | -   | 4                | -   | 4                 | -   | ns   |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 4     | -1  | -   | 4                | -   | 4                 | -   | ns   |
| f <sub>max</sub> | maximum frequency             | CP input; see <a href="#">Fig. 5</a>                     |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.0 V                                  | 6     | 23  | -   | 5                | -   | 4                 | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 4.5 V                                  | 30    | 70  | -   | 24               | -   | 20                | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF          | -     | 77  | -   | -                | -   | -                 | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 6.0 V                                  | 35    | 83  | -   | 28               | -   | 24                | -   | MHz  |
| C <sub>PD</sub>  | power dissipation capacitance | per package; V <sub>I</sub> = GND to V <sub>CC</sub> [3] | -     | 20  | -   | -                | -   | -                 | -   | pF   |

| Symbol           | Parameter                     | Conditions                                                       | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|------------------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                               |                                                                  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| 74HCT377         |                               |                                                                  |       |     |     |                  |     |                   |     |      |
| t <sub>pd</sub>  | propagation delay             | CP to Qn; see <a href="#">Fig. 5</a> [1]                         |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | -     | 17  | 32  | -                | 40  | -                 | 48  | ns   |
|                  |                               | V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF                  | -     | 14  | -   | -                | -   | -                 | -   | ns   |
| t <sub>t</sub>   | transition time               | Qn output; see <a href="#">Fig. 5</a> [2]                        |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
| t <sub>W</sub>   | pulse width                   | CP input; see <a href="#">Fig. 5</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 20    | 8   | -   | 25               | -   | 30                | -   | ns   |
| t <sub>su</sub>  | set-up time                   | Dn to CP; see <a href="#">Fig. 6</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 12    | 4   | -   | 15               | -   | 18                | -   | ns   |
|                  |                               | $\overline{E}$ to CP; see <a href="#">Fig. 6</a>                 |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 22    | 12  | -   | 28               | -   | 33                | -   | ns   |
| t <sub>h</sub>   | hold time                     | Dn to CP; see <a href="#">Fig. 6</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 2     | -4  | -   | 2                | -   | 2                 | -   | ns   |
|                  |                               | $\overline{E}$ to CP; see <a href="#">Fig. 6</a>                 |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 3     | -2  | -   | 3                | -   | 3                 | -   | ns   |
| f <sub>max</sub> | maximum frequency             | CP input; see <a href="#">Fig. 5</a>                             |       |     |     |                  |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 4.5 V                                          | 27    | 48  | -   | 22               | -   | 18                | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF                  | -     | 53  | -   | -                | -   | -                 | -   | MHz  |
| C <sub>PD</sub>  | power dissipation capacitance | per package; V <sub>I</sub> = GND to V <sub>CC</sub> - 1.5 V [3] | -     | 20  | -   | -                | -   | -                 | -   | pF   |

[1] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.  
[2] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.  
[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = input frequency in MHz;  
f<sub>o</sub> = output frequency in MHz;  
 $\Sigma (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs;  
C<sub>L</sub> = output load capacitance in pF;  
V<sub>CC</sub> = supply voltage in V.

10.1. Waveforms and test circuit

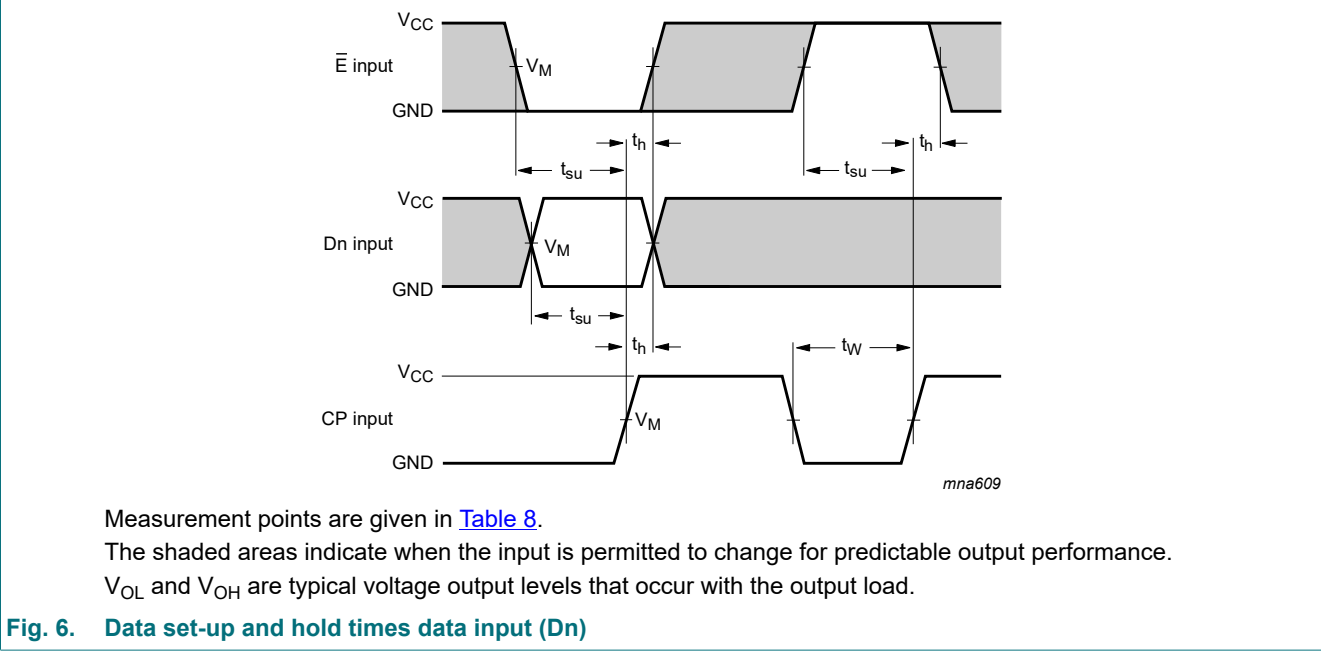
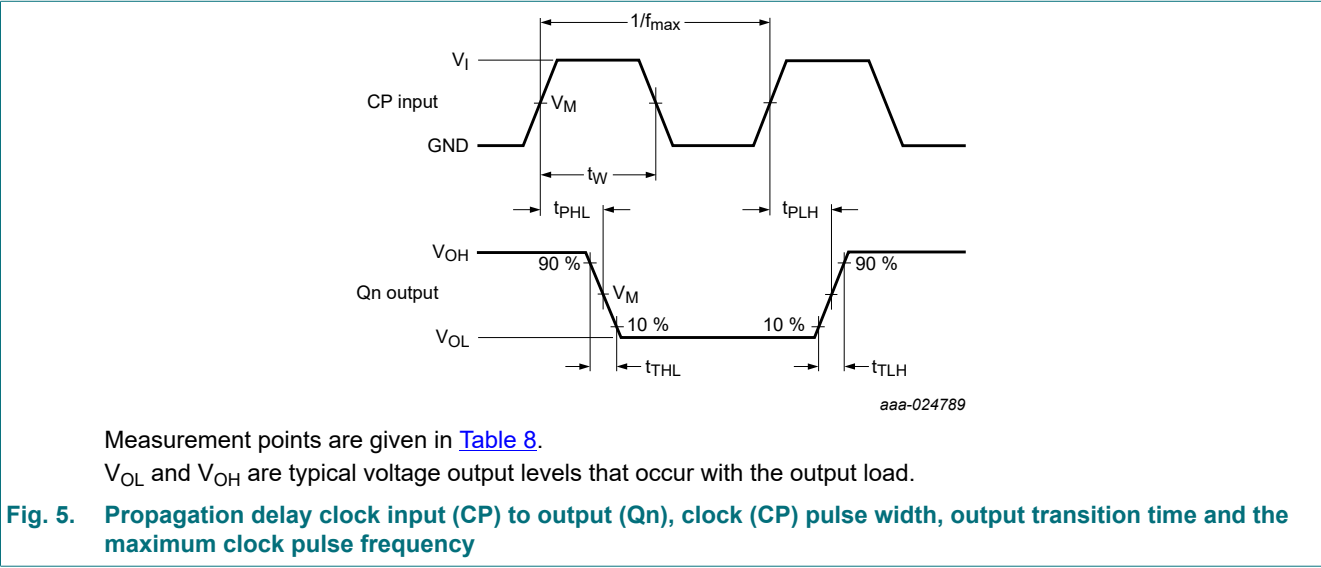


Table 8. Measurement points

| Type     | Input    |                     | Output              |
|----------|----------|---------------------|---------------------|
|          | $V_I$    | $V_M$               | $V_M$               |
| 74HC377  | $V_{CC}$ | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 74HCT377 | 3 V      | 1.3 V               | 1.3 V               |

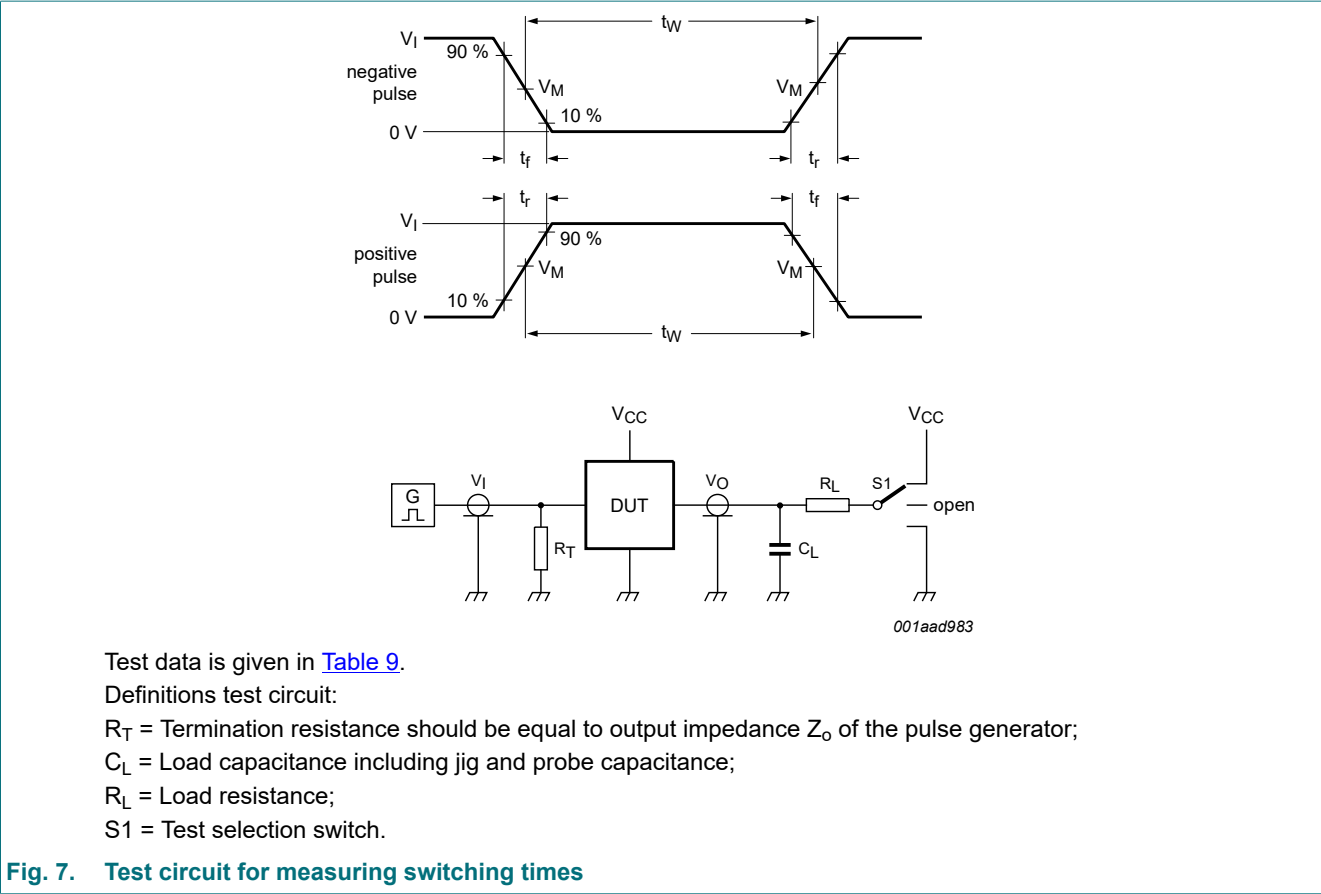


Fig. 7. Test circuit for measuring switching times

Table 9. Test data

| Type     | Input    |            | Load         |              | S1 position        |
|----------|----------|------------|--------------|--------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ |
| 74HC377  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               |
| 74HCT377 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               |

11. Package outline

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

SOT163-1



Fig. 8. Package outline SOT163-1 (SO20)

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

SOT360-1



Fig. 9. Package outline SOT360-1 (TSSOP20)

12. Abbreviations

Table 10. Abbreviations

| Acronym | Description                               |
|---------|-------------------------------------------|
| ANSI    | American National Standards Institute     |
| CDM     | Charged Device Model                      |
| CMOS    | Complementary Metal-Oxide Semiconductor   |
| DUT     | Device Under Test                         |
| ESD     | ElectroStatic Discharge                   |
| ESDA    | ElectroStatic Discharge Association       |
| HBM     | Human Body Model                          |
| JEDEC   | Joint Electron Device Engineering Council |
| TTL     | Transistor-Transistor Logic               |

13. Revision history

Table 11. Revision history

| Document ID         | Release date                                                                                                                                                                                                                                                                                                                                                                                                                         | Data sheet status     | Change notice | Supersedes          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|---------------------|
| 74HC_HCT377 v.6     | 20240805                                                                                                                                                                                                                                                                                                                                                                                                                             | Product data sheet    | -             | 74HC_HCT377 v.5     |
| Modifications:      | <ul style="list-style-type: none"><li>Section 2: ESD specification updated according to the latest JEDEC standard.</li></ul>                                                                                                                                                                                                                                                                                                         |                       |               |                     |
| 74HC_HCT377 v.5     | 20210225                                                                                                                                                                                                                                                                                                                                                                                                                             | Product data sheet    | -             | 74HC_HCT377 v.4     |
| Modifications:      | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li><li>Section 2 updated.</li><li>Section 7: Derating values for P<sub>tot</sub> total power dissipation updated.</li><li>Type numbers 74HC377DB and 74HCT377DB (SOT339-1 / SSOP20) removed.</li></ul> |                       |               |                     |
| 74HC_HCT377 v.4     | 20160224                                                                                                                                                                                                                                                                                                                                                                                                                             | Product data sheet    | -             | 74HC_HCT377 v.3     |
| Modifications:      | <ul style="list-style-type: none"><li>Type numbers 74HC377N and 74HCT377N (SOT146-1) removed.</li></ul>                                                                                                                                                                                                                                                                                                                              |                       |               |                     |
| 74HC_HCT377 v.3     | 20130925                                                                                                                                                                                                                                                                                                                                                                                                                             | Product data sheet    | -             | 74HC_HCT377_CNV v.2 |
| Modifications:      | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul>                                                                                                                                                                                 |                       |               |                     |
| 74HC_HCT377_CNV v.2 | 19901227                                                                                                                                                                                                                                                                                                                                                                                                                             | Product specification | -             | -                   |

## 14. Legal information

### 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 <https://www.nexperia.com>.

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