

# 74HC597; 74HCT597

## 8-bit shift register with input flip-flops

Rev. 4 — 25 February 2016

Product data sheet

### 1. General description

The 74HC597; 74HCT597 is an 8-bit shift register with input flip-flops. It consists of an 8-bit storage register feeding a parallel-in, serial-out 8-bit shift register. Both the storage register and the shift register have positive edge-triggered clocks. The shift register also has direct load (from storage) and clear inputs. 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

- Complies with JEDEC standard JESD7A
- Input levels:
  - ◆ For 74HC597: CMOS level
  - ◆ For 74HCT597: TTL level
- 8-bit parallel storage register inputs
- Shift register has direct overriding load and clear
- ESD protection:
  - ◆ HBM EIA/JESD22-A114F exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
- Specified from  $-40\text{ °C}$  to  $+85\text{ °C}$  and from  $-40\text{ °C}$  to  $+125\text{ °C}$
- Multiple package options

### 3. Ordering information

Table 1. Ordering information

| Type number | Package                             |         |  |          |
|-------------|-------------------------------------|---------|--|----------|
|             | Temperature range                   | Name    | Description  | Version  |
| 74HC597D    | $-40\text{ °C}$ to $+125\text{ °C}$ | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| 74HCT597D   |                                     |         |  |          |
| 74HC597DB   | $-40\text{ °C}$ to $+125\text{ °C}$ | SSOP16  | plastic shrink small outline package; 16 leads; body width 5.3 mm      | SOT338-1 |
| 74HCT597DB  |                                     |         |  |          |
| 74HC597PW   | $-40\text{ °C}$ to $+125\text{ °C}$ | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |

## 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

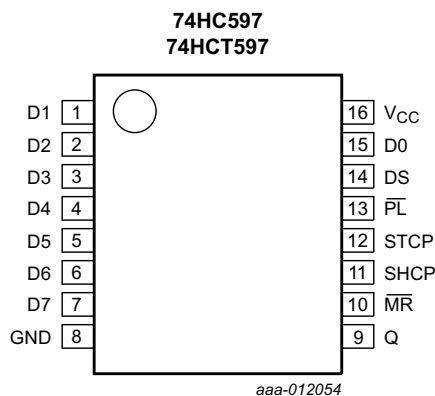


Fig 5. Pin configuration SO16, SSOP16 and TSSOP16

### 5.2 Pin description

Table 2. Pin description

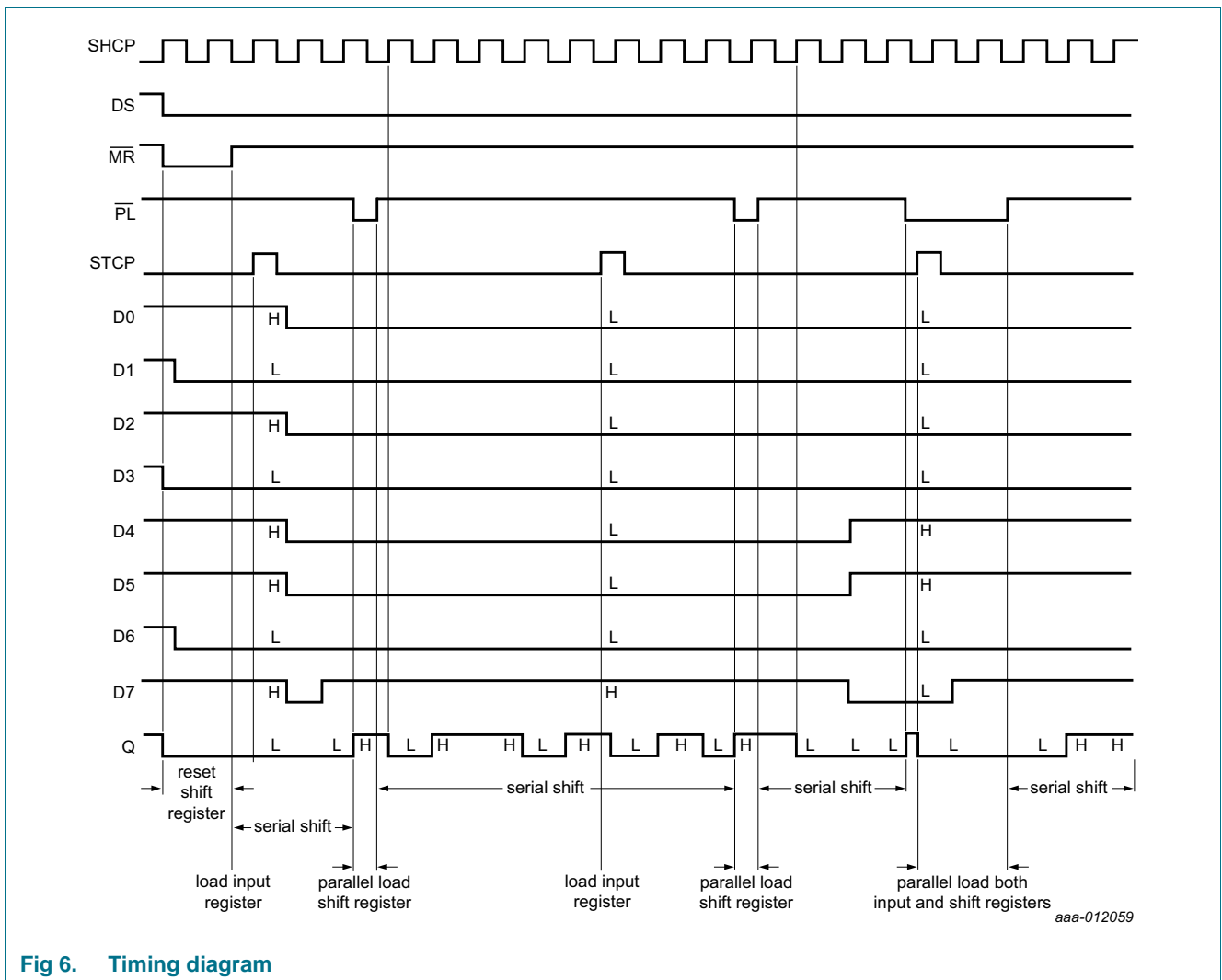
| Symbol                         | Pin                     | Description  |
|--------------------------------|-------------------------|--|
| GND                            | 8                       | ground (0 V)   |
| Q                              | 9                       | serial data output   |
| MR                             | 10                      | asynchronous master reset input (active LOW)               |
| SHCP                           | 11                      | shift register clock input (LOW-to-HIGH, edge-triggered)   |
| STCP                           | 12                      | storage register clock input (LOW-to-HIGH, edge-triggered) |
| PL                             | 13                      | parallel load input (active LOW)                           |
| DS                             | 14                      | serial data input  |
| D0, D1, D2, D3, D4, D5, D6, D7 | 15, 1, 2, 3, 4, 5, 6, 7 | parallel data inputs                                       |
| V <sub>CC</sub>                | 16                      | supply voltage   |

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

| Inputs        |      |                        |                        | Function   |
|---------------|------|------------------------|------------------------|--|
| STCP          | SHCP | $\overline{\text{PL}}$ | $\overline{\text{MR}}$ |  |
| ↑             | X    | X                      | X                      | data loaded to input latches   |
| ↑             | X    | L                      | H                      | data loaded from inputs to shift register                                    |
| no clock edge | X    | L                      | H                      | data transferred from input flip-flops to shift register                     |
| X             | X    | L                      | L                      | invalid logic, state of shift register is indeterminate when signals removed |
| X             | X    | H                      | L                      | shift register cleared   |
| X             | ↑    | H                      | H                      | shift register clocked $Q_n = Q_{n-1}$ , $Q_0 = \text{DS}$                   |

- [1] H = HIGH voltage level.  
 L = LOW voltage level.  
 X = don't care.  
 ↑ = positive-going transition.



## 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  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_O$     | output current          | $V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$     | -    | $\pm 25$ | 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 | SO16, SSOP16 and TSSOP16 packages <a href="#">[1]</a>  | -    | 500      | mW   |

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

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              | 74HC597 |      |          | 74HCT597 |      |          | Unit |
|---------------------|-------------------------------------|-------------------------|---------|------|----------|----------|------|----------|------|
|                     |                                     |                         | Min     | Typ  | Max      | Min      | Typ  | Max      |      |
| $V_{CC}$            | supply voltage                      |                         | 2.0     | 5.0  | 6.0      | 4.5      | 5.0  | 5.5      | V    |
| $V_I$               | input voltage                       |                         | 0       | -    | $V_{CC}$ | 0        | -    | $V_{CC}$ | V    |
| $V_O$               | output voltage                      |                         | 0       | -    | $V_{CC}$ | 0        | -    | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                         | -40     | +25  | +125     | -40      | +25  | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0\text{ V}$ | -       | -    | 625      | -        | -    | -        | ns/V |
|                     |                                     | $V_{CC} = 4.5\text{ V}$ | -       | 1.67 | 139      | -        | 1.67 | 139      | ns/V |
|                     |                                     | $V_{CC} = 6.0\text{ V}$ | -       | -    | 83       | -        | -    | -        | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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  |      |
| <b>74HC597</b>  |                           |   |                |   |      |                  |      |                   |      |      |
| 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    |
| 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>I</sub>  | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V           | -              | -   | ±0.1 | -                | ±1.0 | -                 | ±1.0 | μA   |
|                 |                           | I <sub>CC</sub>   | supply current | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 6.0 V | -    | -                | 8.0  | -                 | 80.0 | -    |
| C <sub>I</sub>  | input capacitance         |   | -              | 3.5   | -    | -                | -    | -                 | -    | pF   |
| <b>74HCT597</b> |                           |   |                |   |      |                  |      |                   |      |      |
| 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  | -              | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 4.0 mA   | -              | 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;<br>V <sub>CC</sub> = 5.5 V           | -              | -   | ±0.1 | -                | ±1.0 | -                 | ±1.0 | μA   |

**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;<br>$V_{CC} = 5.5$ V  | -     | -   | 8.0 | -                | 80.0  | -                 | 160.0   | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current        | $V_I = V_{CC} - 2.1$ V;<br>other inputs at $V_{CC}$ or GND;<br>$V_{CC} = 4.5$ V to 5.5 V;<br>$I_O = 0$ A |       |     |     |                  |       |                   |         |         |
|                 |                                  | per input pin; DS input  | -     | 25  | 90  | -                | 112.5 | -                 | 122.5   | $\mu$ A |
|                 |                                  | per input pin; Dn inputs   | -     | 30  | 108 | -                | 135   | -                 | 147     | $\mu$ A |
|                 |                                  | per input pin; $\overline{PL}$ , MR inputs   | -     | 150 | 540 | -                | 675   | -                 | 735     | $\mu$ A |
|                 | per input pin; STCP, SHCP inputs | -  | 150   | 540 | -   | 675              | -     | 735               | $\mu$ A |         |
| $C_I$           | input capacitance                |  | -     | 3.5 | -   | -                | -     | -                 | -       | pF      |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit, see [Figure 13](#).

| Symbol                          | Parameter         | Conditions  | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|---------------------------------|-------------------|---|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                                 |                   |   | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| <b>74HC597</b>                  |                   |   |       |     |     |                  |     |                   |     |      |
| $t_{pd}$                        | propagation delay | SHCP to Q; see <a href="#">Figure 7</a> <sup>[1]</sup>            |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 2.0$ V  | -     | 55  | 175 | -                | 220 | -                 | 265 | ns   |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 20  | 35  | -                | 44  | -                 | 53  | ns   |
|                                 |                   | $V_{CC} = 5.0$ V; $C_L = 15$ pF                                   | -     | 17  | -   | -                | -   | -                 | -   | ns   |
|                                 |                   | $V_{CC} = 6.0$ V  | -     | 16  | 30  | -                | 37  | -                 | 45  | ns   |
|                                 |                   | $\overline{MR}$ to Q; see <a href="#">Figure 8</a> <sup>[1]</sup> |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 2.0$ V  | -     | 58  | 175 | -                | 220 | -                 | 265 | ns   |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 21  | 35  | -                | 44  | -                 | 53  | ns   |
|                                 |                   | $V_{CC} = 6.0$ V  | -     | 17  | 30  | -                | 37  | -                 | 45  | ns   |
|                                 |                   | STCP to Q; see <a href="#">Figure 7</a> <sup>[1]</sup>            |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 2.0$ V  | -     | 80  | 250 | -                | 315 | -                 | 375 | ns   |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 29  | 50  | -                | 63  | -                 | 75  | ns   |
|                                 |                   | $V_{CC} = 5.0$ V; $C_L = 15$ pF                                   | -     | 25  | -   | -                | -   | -                 | -   | ns   |
|                                 |                   | $V_{CC} = 6.0$ V  | -     | 23  | 43  | -                | 54  | -                 | 64  | ns   |
|                                 |                   | $\overline{PL}$ to Q; see <a href="#">Figure 9</a> <sup>[1]</sup> |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 2.0$ V  | -     | 69  | 215 | -                | 270 | -                 | 325 | ns   |
| $V_{CC} = 4.5$ V                | -                 | 25  | 43    | -   | 54  | -                | 65  | ns                |     |      |
| $V_{CC} = 5.0$ V; $C_L = 15$ pF | -                 | 21  | -     | -   | -   | -                | -   | ns                |     |      |
| $V_{CC} = 6.0$ V                | -                 | 20  | 37    | -   | 46  | -                | 55  | ns                |     |      |



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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit, see [Figure 13](#).

| Symbol    | Parameter       | Conditions  | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|-----------|-----------------|---|-------|-----|-----|------------------|-----|-------------------|-----|------|
|           |                 |   | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $t_t$     | transition time | see <a href="#">Figure 9</a> <a href="#">[2]</a>  |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ 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   |
| $t_w$     | pulse width     | STCP HIGH or LOW;<br>see <a href="#">Figure 7</a> |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ V                                  | 80    | 11  | -   | 100              | -   | 120               | -   | ns   |
|           |                 | $V_{CC} = 4.5$ V                                  | 16    | 4   | -   | 20               | -   | 24                | -   | ns   |
|           |                 | $V_{CC} = 6.0$ V                                  | 14    | 3   | -   | 17               | -   | 20                | -   | ns   |
|           |                 | SHCP HIGH or LOW;<br>see <a href="#">Figure 7</a> |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ V                                  | 80    | 14  | -   | 100              | -   | 120               | -   | ns   |
|           |                 | $V_{CC} = 4.5$ V                                  | 16    | 5   | -   | 20               | -   | 24                | -   | ns   |
|           |                 | $V_{CC} = 6.0$ V                                  | 14    | 4   | -   | 17               | -   | 20                | -   | ns   |
|           |                 | MR LOW; see <a href="#">Figure 8</a>              |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ 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   |
|           |                 | PL LOW; see <a href="#">Figure 9</a>              |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ 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   |
| $t_{rec}$ | recovery time   | MR to SHCP; see <a href="#">Figure 10</a>         |       |     |     |                  |     |                   |     |      |
|           |                 | $V_{CC} = 2.0$ V                                  | 60    | -3  | -   | 75               | -   | 90                | -   | ns   |
|           |                 | $V_{CC} = 4.5$ V                                  | 12    | -1  | -   | 15               | -   | 18                | -   | ns   |
|           |                 | $V_{CC} = 6.0$ V                                  | 10    | -1  | -   | 13               | -   | 15                | -   | ns   |

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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit, see [Figure 13](#).

| Symbol           | Parameter                     | Conditions   | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                               |  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $t_{su}$         | set-up time                   | Dn to STCP; see <a href="#">Figure 11</a>                          |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 60    | 8   | -   | 75               | -   | 90                | -   | ns   |
|                  |                               | $V_{CC} = 4.5$ V   | 12    | 3   | -   | 15               | -   | 18                | -   | ns   |
|                  |                               | $V_{CC} = 6.0$ V   | 10    | 2   | -   | 13               | -   | 15                | -   | ns   |
|                  |                               | DS to SHCP; see <a href="#">Figure 11</a>                          |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 60    | 11  | -   | 75               | -   | 90                | -   | ns   |
|                  |                               | $V_{CC} = 4.5$ V   | 12    | 4   | -   | 15               | -   | 18                | -   | ns   |
|                  |                               | $V_{CC} = 6.0$ V   | 10    | 3   | -   | 13               | -   | 15                | -   | ns   |
|                  |                               | PL to SHCP; see <a href="#">Figure 12</a>                          |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 60    | 11  | -   | 75               | -   | 90                | -   | ns   |
| $V_{CC} = 4.5$ V | 12                            | 4  | -     | 15  | -   | 18               | -   | ns                |     |      |
| $V_{CC} = 6.0$ V | 10                            | 3  | -     | 13  | -   | 15               | -   | ns                |     |      |
| $t_h$            | hold time                     | Dn to STCP; see <a href="#">Figure 11</a>                          |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 5     | -3  | -   | 5                | -   | 5                 | -   | ns   |
|                  |                               | $V_{CC} = 4.5$ V   | 5     | -1  | -   | 5                | -   | 5                 | -   | ns   |
|                  |                               | $V_{CC} = 6.0$ V   | 5     | -1  | -   | 5                | -   | 5                 | -   | ns   |
|                  |                               | PL, DS to SHCP; see <a href="#">Figure 11</a>                      |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 5     | -6  | -   | 5                | -   | 5                 | -   | ns   |
|                  |                               | $V_{CC} = 4.5$ V   | 5     | -2  | -   | 5                | -   | 5                 | -   | ns   |
| $V_{CC} = 6.0$ V | 5                             | -2   | -     | 5   | -   | 5                | -   | ns                |     |      |
| $f_{max}$        | maximum frequency             | SHCP; see <a href="#">Figure 7</a>                                 |       |     |     |                  |     |                   |     |      |
|                  |                               | $V_{CC} = 2.0$ V   | 6.0   | 29  | -   | 4.8              | -   | 4.0               | -   | MHz  |
|                  |                               | $V_{CC} = 4.5$ V   | 30    | 87  | -   | 24               | -   | 20                | -   | MHz  |
|                  |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF                                    | -     | 96  | -   | -                | -   | -                 | -   | MHz  |
| $V_{CC} = 6.0$ V | 35                            | 104  | -     | 28  | -   | 24               | -   | MHz               |     |      |
| $C_{PD}$         | power dissipation capacitance | $C_L = 50$ pF; $f = 1$ MHz; $V_1 = GND$ to $V_{CC}$ <sup>[3]</sup> | -     | 29  | -   | -                | -   | -                 | -   | pF   |

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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit, see [Figure 13](#).

| Symbol                          | Parameter         | Conditions  | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|---------------------------------|-------------------|---|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                                 |                   |   | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| <b>74HCT597</b>                 |                   |   |       |     |     |                  |     |                   |     |      |
| $t_{pd}$                        | propagation delay | SHCP to Q; see <a href="#">Figure 7</a> <sup>[1]</sup>            |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 23  | 40  | -                | 50  | -                 | 60  | ns   |
|                                 |                   | $V_{CC} = 5.0$ V; $C_L = 15$ pF                                   | -     | 20  | -   | -                | -   | -                 | -   | ns   |
|                                 |                   | $\overline{MR}$ to Q; see <a href="#">Figure 8</a> <sup>[1]</sup> |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 28  | 49  | -                | 61  | -                 | 74  | ns   |
|                                 |                   | STCP to Q; see <a href="#">Figure 7</a> <sup>[1]</sup>            |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 33  | 57  | -                | 71  | -                 | 86  | ns   |
|                                 |                   | $V_{CC} = 5.0$ V; $C_L = 15$ pF                                   | -     | 29  | -   | -                | -   | -                 | -   | ns   |
|                                 |                   | $\overline{PL}$ to Q; see <a href="#">Figure 9</a> <sup>[1]</sup> |       |     |     |                  |     |                   |     |      |
| $V_{CC} = 4.5$ V                | -                 | 30  | 52    | -   | 65  | -                | 78  | ns                |     |      |
| $V_{CC} = 5.0$ V; $C_L = 15$ pF | -                 | 26  | -     | -   | -   | -                | -   | ns                |     |      |
| $t_t$                           | transition time   | see <a href="#">Figure 7</a> <sup>[2]</sup>                       |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
| $t_w$                           | pulse width       | STCP HIGH or LOW; see <a href="#">Figure 7</a>                    |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 16    | 6   | -   | 20               | -   | 24                | -   | ns   |
|                                 |                   | SHCP HIGH or LOW; see <a href="#">Figure 7</a>                    |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 16    | 7   | -   | 20               | -   | 24                | -   | ns   |
|                                 |                   | $\overline{MR}$ LOW; see <a href="#">Figure 8</a>                 |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 25    | 14  | -   | 31               | -   | 38                | -   | ns   |
|                                 |                   | $\overline{PL}$ LOW; see <a href="#">Figure 9</a>                 |       |     |     |                  |     |                   |     |      |
| $V_{CC} = 4.5$ V                | 20                | 10  | -     | 25  | -   | 30               | -   | ns                |     |      |
| $t_{rec}$                       | recovery time     | $\overline{MR}$ to SHCP; see <a href="#">Figure 10</a>            |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 12    | -2  | -   | 15               | -   | 18                | -   | ns   |
| $t_{su}$                        | set-up time       | Dn to STCP; see <a href="#">Figure 11</a>                         |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 12    | 5   | -   | 15               | -   | 18                | -   | ns   |
|                                 |                   | DS to SHCP; see <a href="#">Figure 11</a>                         |       |     |     |                  |     |                   |     |      |
|                                 |                   | $V_{CC} = 4.5$ V  | 12    | 2   | -   | 15               | -   | 18                | -   | ns   |
|                                 |                   | $\overline{PL}$ to SHCP; see <a href="#">Figure 12</a>            |       |     |     |                  |     |                   |     |      |
| $V_{CC} = 4.5$ V                | 12                | 4   | -     | 15  | -   | 18               | -   | ns                |     |      |

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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit, see [Figure 13](#).

| Symbol    | Parameter                     | Conditions  | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|-----------|-------------------------------|---|-------|-----|-----|------------------|-----|-------------------|-----|------|
|           |                               |   | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $t_h$     | hold time                     | Dn to STCP; see <a href="#">Figure 11</a>   |       |     |     |                  |     |                   |     |      |
|           |                               | $V_{CC} = 4.5 \text{ V}$  | 5     | -1  | -   | 5                | -   | 5                 | -   | ns   |
|           |                               | PL, DS to SHCP; see <a href="#">Figure 11</a>   |       |     |     |                  |     |                   |     |      |
|           |                               | $V_{CC} = 4.5 \text{ V}$  | 5     | -2  | -   | 5                | -   | 5                 | -   | ns   |
| $f_{max}$ | maximum frequency             | SHCP; see <a href="#">Figure 7</a>  |       |     |     |                  |     |                   |     |      |
|           |                               | $V_{CC} = 4.5 \text{ V}$  | 30    | 75  | -   | 24               | -   | 20                | -   | MHz  |
|           |                               | $V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$  | -     | 83  | -   | -                | -   | -                 | -   | MHz  |
| $C_{PD}$  | power dissipation capacitance | $C_L = 50 \text{ pF}$ ; $f = 1 \text{ MHz}$ ; $V_I = \text{GND to } V_{CC} - 1.5 \text{ V}$ [3] | -     | 32  | -   | -                | -   | -                 | -   | pF   |

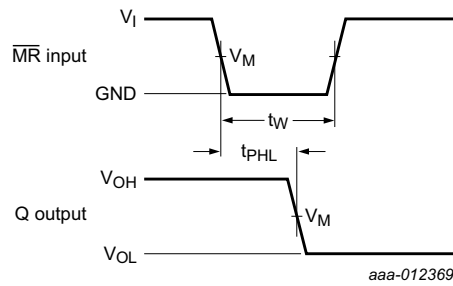
- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [2]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .
- [3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  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.

## 11. Waveforms



Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

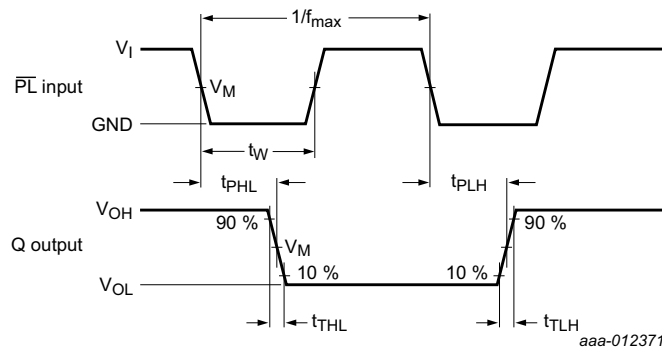
**Fig 7. Shift clock and storage clock inputs to output, propagation delays, pulse widths and maximum clock frequency**



Measurement points are given in [Table 8](#).

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

**Fig 8. input ( $\overline{MR}$ ) to (Q), output propagation delays and ( $\overline{MR}$ ) pulse width**



Measurement points are given in [Table 8](#).

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

**Fig 9. Input ( $\overline{PL}$ ) to (Q), output propagation delays,  $\overline{PL}$  pulse width and output transition times**



Measurement points are given in [Table 8](#).

**Fig 10. Input ( $\overline{MR}$ ) to shift clock (SHCP) and storage clock (STCP) recovery times**



Measurement points are given in [Table 8](#).

**Fig 11. Hold and set-up times for (DS), (Dn) inputs to (SHCP), (STCP) inputs**

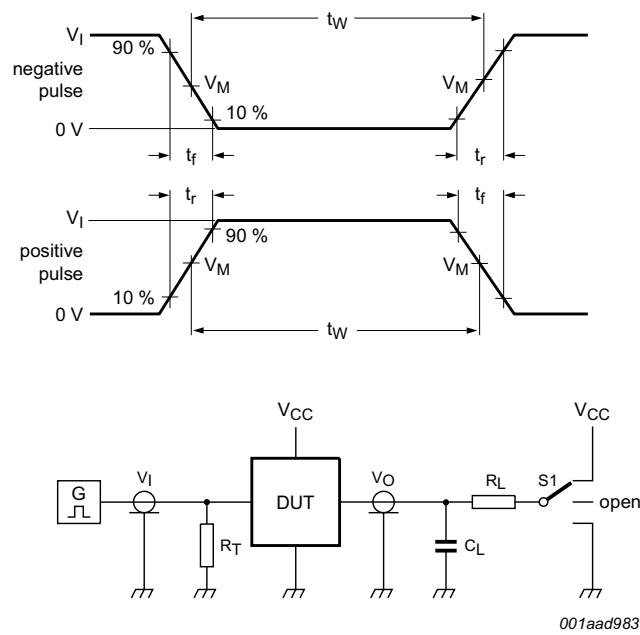


Measurement points are given in [Table 8](#).

**Fig 12. Set-up times for (PL) input to (SHCP) input**

**Table 8. Measurement points**

| Type     | Input               |                 | Output              |
|----------|---------------------|-----------------|---------------------|
|          | $V_M$               | $V_I$           | $V_M$               |
| 74HC597  | $0.5 \times V_{CC}$ | GND to $V_{CC}$ | $0.5 \times V_{CC}$ |
| 74HCT597 | 1.3 V               | GND to 3 V      | 1.3 V               |



Test data is given in [Table 9](#).

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 13. Test circuit for measuring switching times**

**Table 9. Test data**

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC597  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT597 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1



Fig 14. Package outline SOT109-1 (SO16)



SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1



Fig 15. Package outline SOT338-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1



Fig 16. Package outline SOT403-1 (TSSOP16)

## 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_HCT597 v.4     | 20160225  | Product data sheet    | -             | 74HC_HCT597 v.3     |
| Modifications:      | <ul style="list-style-type: none"> <li>Type numbers 74HC597N and 74HCT597N (SOT38-4) removed.</li> </ul>  |                       |               |                     |
| 74HC_HCT597 v.3     | 20140415  | Product data sheet    | -             | 74HC_HCT597_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_HCT597_CNV v.2 | 19901201  | Product specification | -             | -                   |

## 15. Legal information

### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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