

# 74HC594; 74HCT594

## 8-bit shift register with output register

Rev. 03 — 20 December 2006

Product data sheet

### 1. General description

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The 74HC594; 74HCT594 is a high-speed Si-gate CMOS device and is pin compatible with Low-Power Schottky TTL (LSTTL).

The 74HC594; 74HCT594 is an 8-bit, non-inverting, serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. Separate clocks (SHCP and STCP) and direct overriding clears (SHR and STR) are provided on both the shift and storage registers. A serial output (Q7S) is provided for cascading purposes.

Both the shift and storage register clocks are positive-edge triggered. If the user wishes to connect both clocks together, the shift register will always be one count pulse ahead of the storage register.

### 2. Features

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- Synchronous serial input and output
- Complies with JEDEC standard No.7A
- 8-bit parallel output
- Shift and storage registers have independent direct clear and clocks
- Independent clocks for shift and storage registers
- 100 MHz (typical)
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

### 3. Applications

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- Serial-to parallel data conversion
- Remote control holding register

## 4. Ordering information

Table 1. Ordering information

| Type number | Package           |        |   | Version  |
|-------------|-------------------|--------|---|----------|
|             | Temperature range | Name   | Description   |          |
| 74HC594D    | -40 °C to +125 °C | SO16   | plastic small outline package; 16 leads; body width 3.9 mm        | SOT109-1 |
| 74HC594DB   | -40 °C to +125 °C | SSOP16 | plastic shrink small outline package; 16 leads; body width 5.3 mm | SOT338-1 |
| 74HC594N    | -40 °C to +125 °C | DIP16  | plastic dual in-line package; 16 leads (300 mil)                  | SOT38-4  |
| 74HCT594D   | -40 °C to +125 °C | SO16   | plastic small outline package; 16 leads; body width 3.9 mm        | SOT109-1 |
| 74HCT594DB  | -40 °C to +125 °C | SSOP16 | plastic shrink small outline package; 16 leads; body width 5.3 mm | SOT338-1 |
| 74HCT594N   | -40 °C to +125 °C | DIP16  | plastic dual in-line package; 16 leads (300 mil)                  | SOT38-4  |

## 5. Functional diagram

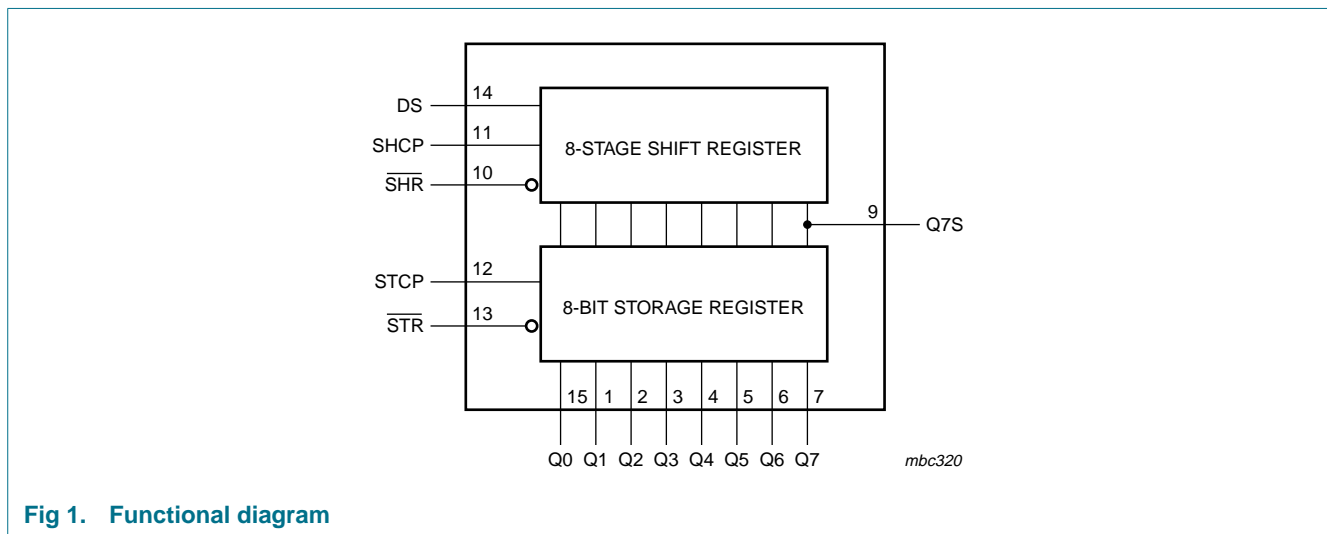


Fig 1. Functional diagram

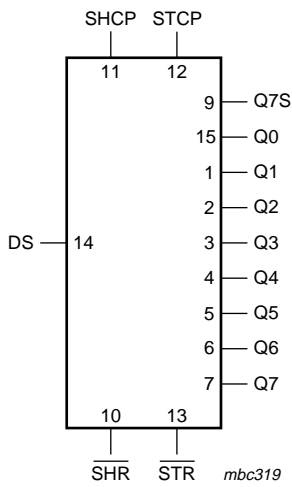


Fig 2. Logic symbol

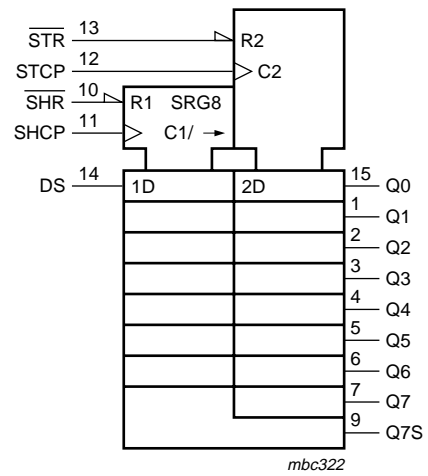


Fig 3. IEC logic symbol

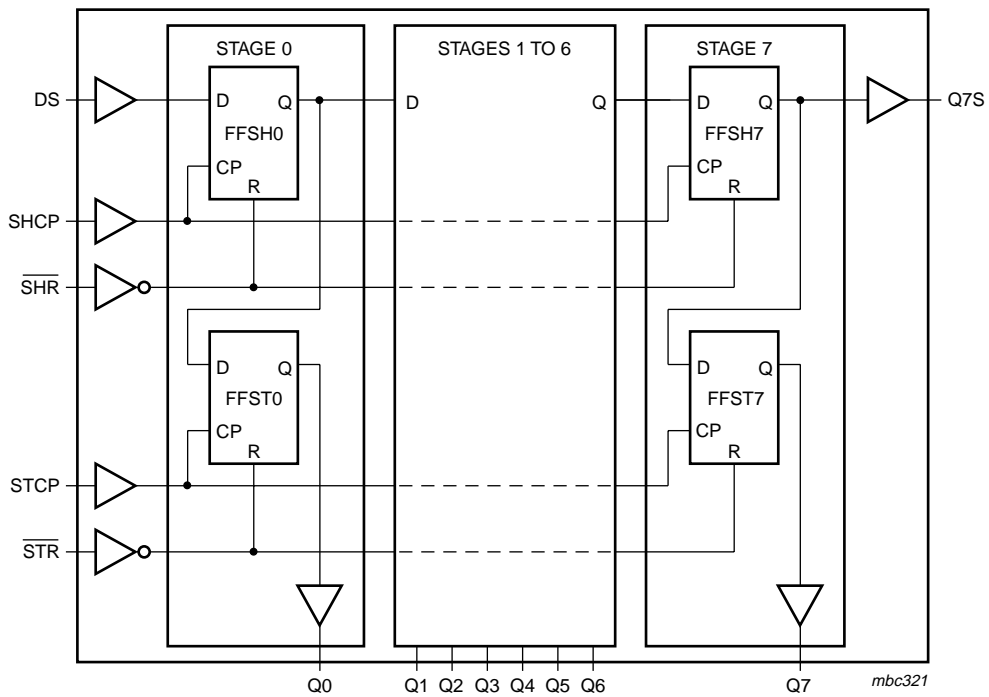


Fig 4. Logic diagram

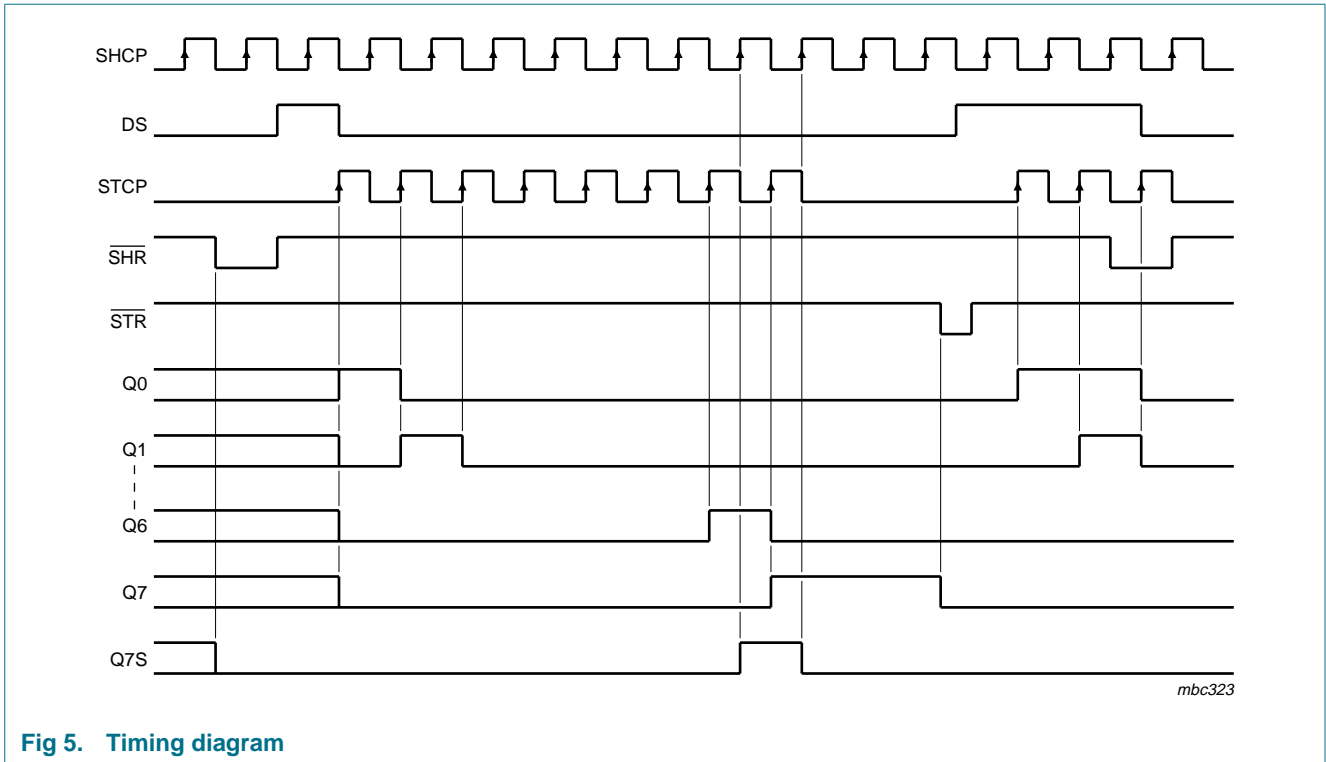


Fig 5. Timing diagram

## 6. Pinning information

### 6.1 Pinning

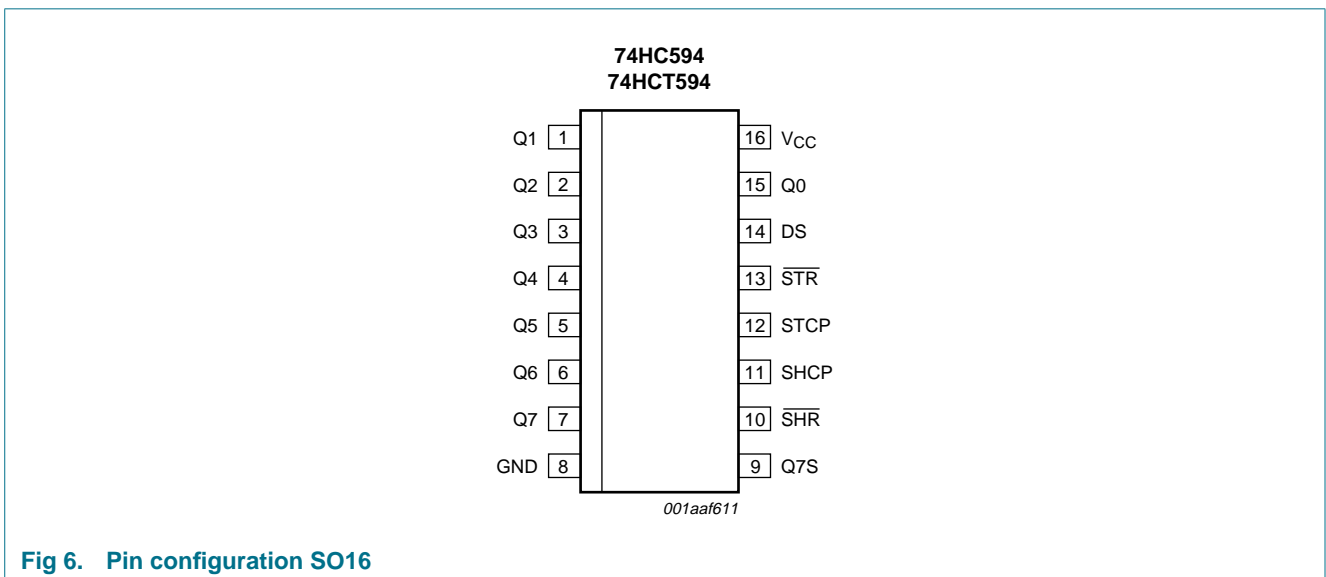


Fig 6. Pin configuration SO16

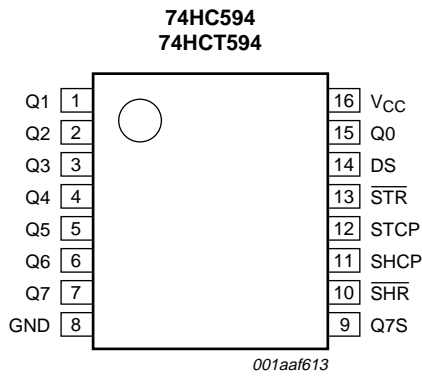


Fig 7. Pin configuration SSOP16

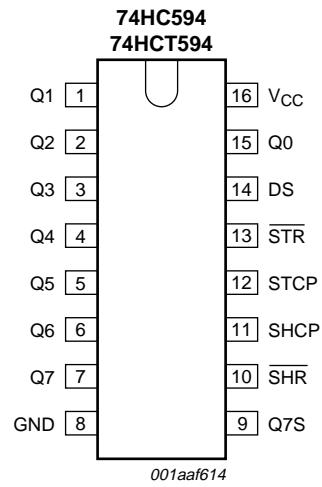


Fig 8. Pin configuration DIP16

## 6.2 Pin description

Table 2. Pin description

| Symbol          | Pin | Description                         |
|-----------------|-----|-------------------------------------|
| Q1              | 1   | parallel data output 1              |
| Q2              | 2   | parallel data output 2              |
| Q3              | 3   | parallel data output 3              |
| Q4              | 4   | parallel data output 4              |
| Q5              | 5   | parallel data output 5              |
| Q6              | 6   | parallel data output 6              |
| Q7              | 7   | parallel data output 7              |
| GND             | 8   | ground (0 V)                        |
| Q7S             | 9   | serial data output                  |
| SHR             | 10  | shift register reset (active LOW)   |
| SHCP            | 11  | shift register clock input          |
| STCP            | 12  | storage register clock input        |
| STR             | 13  | storage register reset (active LOW) |
| DS              | 14  | serial data input                   |
| Q0              | 15  | parallel data output 0              |
| V <sub>CC</sub> | 16  | supply voltage                      |

## 7. Functional description

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

| Function   | Input |     |      |      |        |
|--|-------|-----|------|------|--------|
|  | SHR   | STR | SHCP | STCP | DS     |
| Clear shift register   | L     | X   | X    | X    | X      |
| Clear storage register   | X     | L   | X    | X    | X      |
| Load DS into shift register stage 0, advance previous stage data to the next stage | H     | X   | ↑    | X    | H or L |
| Transfer shift register data to storage register and outputs Qn                    | X     | H   | X    | ↑    | X      |
| Shift register one count pulse ahead of storage register                           | H     | H   | ↑    | ↑    | X      |

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

## 8. 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  | +7.0 | 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          | V <sub>O</sub> = -0.5 V to V <sub>CC</sub> + 0.5 V                  |       |      |      |
|                  |                         | Serial data output Q7S  | -     | ±25  | mA   |
|                  |                         | Parallel data output  | -     | ±35  | mA   |
| I <sub>CC</sub>  | supply current          | Serial data output Q7S  | -     | 50   | mA   |
|                  |                         | Parallel data output  | -     | 70   | mA   |
| I <sub>GND</sub> | ground current          | Serial data output Q7S  | -     | -50  | mA   |
|                  |                         | Parallel data output  | -     | -70  | 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 DIP16 packages: above 70 °C the value of P<sub>tot</sub> derates linearly with 12 mW/K.  
 For SO16 packages: above 70 °C the value of P<sub>tot</sub> derates linearly with 8 mW/K.  
 For SSOP16 packages: above 60 °C the value of P<sub>tot</sub> derates linearly with 5.5 mW/K.

## 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol               | Parameter           | Conditions              | Min | Typ | Max      | Unit |
|----------------------|---------------------|-------------------------|-----|-----|----------|------|
| <b>Type 74HC594</b>  |                     |                         |     |     |          |      |
| $V_{CC}$             | supply voltage      |                         | 2.0 | 5.0 | 6.0      | V    |
| $V_I$                | input voltage       |                         | 0   | -   | $V_{CC}$ | V    |
| $V_O$                | output voltage      |                         | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$            | ambient temperature |                         | -40 | +25 | +125     | °C   |
| $t_r$                | rise time           | $V_{CC} = 2.0\text{ V}$ | -   | -   | 1000     | ns   |
|                      |                     | $V_{CC} = 4.5\text{ V}$ | -   | 6.0 | 500      | ns   |
|                      |                     | $V_{CC} = 6.0\text{ V}$ | -   | -   | 400      | ns   |
| $t_f$                | fall time           | $V_{CC} = 2.0\text{ V}$ | -   | -   | 1000     | ns   |
|                      |                     | $V_{CC} = 4.5\text{ V}$ | -   | 6.0 | 500      | ns   |
|                      |                     | $V_{CC} = 6.0\text{ V}$ | -   | -   | 400      | ns   |
| <b>Type 74HCT594</b> |                     |                         |     |     |          |      |
| $V_{CC}$             | supply voltage      |                         | 4.5 | 5.0 | 5.5      | V    |
| $V_I$                | input voltage       |                         | 0   | -   | $V_{CC}$ | V    |
| $V_O$                | output voltage      |                         | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$            | ambient temperature |                         | -40 | +25 | +125     | °C   |
| $t_r$                | rise time           | $V_{CC} = 4.5\text{ V}$ | -   | 6.0 | 500      | ns   |
| $t_f$                | fall time           | $V_{CC} = 4.5\text{ V}$ | -   | 6.0 | 500      | ns   |

## 10. Static characteristics

**Table 6. Static characteristics type 74HC594**

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

| Symbol                                     | Parameter                 | Conditions                                    | Min  | Typ  | Max  | Unit |
|--|---------------------------|---|------|------|------|------|
| <b><math>T_{amb} = 25\text{ °C}</math></b> |                           |   |      |      |      |      |
| $V_{IH}$                                   | HIGH-level input voltage  | $V_{CC} = 2.0\text{ V}$                       | 1.5  | 1.2  | -    | V    |
|  |                           | $V_{CC} = 4.5\text{ V}$                       | 3.15 | 2.4  | -    | V    |
|  |                           | $V_{CC} = 6.0\text{ V}$                       | 4.2  | 3.2  | -    | V    |
| $V_{IL}$                                   | LOW-level input voltage   | $V_{CC} = 2.0\text{ V}$                       | -    | 0.8  | 0.5  | V    |
|  |                           | $V_{CC} = 4.5\text{ V}$                       | -    | 2.1  | 1.35 | V    |
|  |                           | $V_{CC} = 6.0\text{ V}$                       | -    | 2.8  | 1.8  | V    |
| $V_{OH}$                                   | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                    |      |      |      |      |
|  |                           |   |      |      |      |      |
| <b>Serial data output Q7S</b>              |                           |   |      |      |      |      |
|  |                           | $I_O = -4.0\text{ mA}; V_{CC} = 4.5\text{ V}$ | 3.98 | 4.32 | -    | V    |
|  |                           | $I_O = -5.2\text{ mA}; V_{CC} = 6.0\text{ V}$ | 5.48 | 5.81 | -    | V    |
| <b>Parallel data outputs</b>               |                           |   |      |      |      |      |
|  |                           | $I_O = -6.0\text{ mA}; V_{CC} = 4.5\text{ V}$ | 3.98 | 4.32 | -    | V    |
|  |                           | $I_O = -7.8\text{ mA}; V_{CC} = 6.0\text{ V}$ | 5.48 | 5.81 | -    | V    |

**Table 6. Static characteristics type 74HC594 ...continued**  
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                                     | Parameter                 | Conditions   | Min  | Typ  | Max  | Unit |  |
|--|---------------------------|--|------|------|------|------|--|
| V <sub>OL</sub>                            | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |      |      |      |  |
|  |                           | <b>Serial data output Q7S</b>  |      |      |      |      |  |
|  |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V                                       | -    | 0.15 | 0.26 | V    |  |
|  |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                                       | -    | 0.16 | 0.26 | V    |  |
|  |                           | <b>Parallel data outputs</b>   |      |      |      |      |  |
|  |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                       | -    | 0.15 | 0.26 | V    |  |
|  |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                       | -    | 0.16 | 0.26 | 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 | 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  | µA   |  |
| C <sub>i</sub>                             | input capacitance         |  | -    | 3.5  | -    | pF   |  |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b>  |                           |  |      |      |      |      |  |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5  | -    | -    | V    |  |
|  |                           | V <sub>CC</sub> = 4.5 V  | 3.15 | -    | -    | V    |  |
|  |                           | V <sub>CC</sub> = 6.0 V  | 4.2  | -    | -    | V    |  |
| V <sub>IL</sub>                            | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -    | -    | 0.5  | V    |  |
|  |                           | V <sub>CC</sub> = 4.5 V  | -    | -    | 1.35 | V    |  |
|  |                           | V <sub>CC</sub> = 6.0 V  | -    | -    | 1.8  | V    |  |
| V <sub>OH</sub>                            | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |      |      |      |  |
|  |                           | <b>Serial data output Q7S</b>  |      |      |      |      |  |
|  |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.84 | -    | -    | V    |  |
|  |                           | I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V                                      | 5.34 | -    | -    | V    |  |
|  |                           | <b>Parallel data outputs</b>   |      |      |      |      |  |
|  |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.84 | -    | -    | V    |  |
|  |                           | I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V                                      | 5.34 | -    | -    | V    |  |
| V <sub>OL</sub>                            | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |      |      |      |  |
|  |                           | <b>Serial data output Q7S</b>  |      |      |      |      |  |
|  |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V                                       | -    | -    | 0.33 | V    |  |
|  |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                                       | -    | -    | 0.33 | V    |  |
|  |                           | <b>Parallel data outputs</b>   |      |      |      |      |  |
|  |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                       | -    | -    | 0.33 | V    |  |
|  |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                       | -    | -    | 0.33 | 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                       | -    | -    | ±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; V <sub>CC</sub> = 6.0 V | -    | -    | 80   | µA   |  |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                           |  |      |      |      |      |  |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5  | -    | -    | V    |  |
|  |                           | V <sub>CC</sub> = 4.5 V  | 3.15 | -    | -    | V    |  |
|  |                           | V <sub>CC</sub> = 6.0 V  | 4.2  | -    | -    | V    |  |



**Table 6. Static characteristics type 74HC594 ...continued**  
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                  | Parameter                 | Conditions   | Min            | Typ  | Max  | Unit |     |
|-------------------------|---------------------------|--|----------------|--|------|------|-----|
| V <sub>IL</sub>         | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -              | -  | 0.5  | V    |     |
|                         |                           | V <sub>CC</sub> = 4.5 V  | -              | -  | 1.35 | V    |     |
|                         |                           | V <sub>CC</sub> = 6.0 V  | -              | -  | 1.8  | V    |     |
| V <sub>OH</sub>         | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>              |                |  |      |      |     |
|                         |                           | <b>Serial data output Q7S</b>                                    |                |  |      |      |     |
|                         |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 4.5 V                | 3.7            | -  | -    | V    |     |
|                         |                           | I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V                | 5.2            | -  | -    | V    |     |
|                         |                           | <b>Parallel data outputs</b>                                     |                |  |      |      |     |
|                         |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V                | 3.7            | -  | -    | V    |     |
|                         |                           | I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V                | 5.2            | -  | -    | V    |     |
| V <sub>OL</sub>         | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>              |                |  |      |      |     |
|                         |                           | <b>Serial data output Q7S</b>                                    |                |  |      |      |     |
|                         |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V                 | -              | -  | 0.4  | V    |     |
|                         |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                 | -              | -  | 0.4  | V    |     |
|                         |                           | <b>Parallel data outputs</b>                                     |                |  |      |      |     |
|                         |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                 | -              | -  | 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 | -              | -  | ±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; | -    | -    | 160 |
| V <sub>CC</sub> = 6.0 V |                           |  |                |  |      |      |     |

**Table 7. Static characteristics type 74HCT594**

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

| Symbol                                    | Parameter                 | Conditions   | Min  | Typ  | Max  | Unit |
|---|---------------------------|--|------|------|------|------|
| <b>T<sub>amb</sub> = 25 °C</b>            |                           |  |      |      |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V   | 2.0  | 1.6  | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V   | -    | 1.2  | 0.8  | V    |
| V <sub>OH</sub>                           | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |      |      |      |      |
|   |                           | <b>Serial data output Q7S</b>  |      |      |      |      |
|   |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 4.5 V  | 3.98 | 4.32 | -    | V    |
|   |                           | <b>Parallel data outputs</b>   |      |      |      |      |
|   |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V  | 3.98 | 4.32 | -    | V    |
| V <sub>OL</sub>                           | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |      |      |      |      |
|   |                           | <b>Serial data output Q7S</b>  |      |      |      |      |
|   |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V   | -    | 0.15 | 0.26 | V    |
|   |                           | <b>Parallel data outputs</b>   |      |      |      |      |
|   |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V   | -    | 0.16 | 0.26 | 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 | 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  | µA   |
| ΔI <sub>CC</sub>                          | additional supply current | per input pin; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V and other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 4.5 V to 5.5 V |      |      |      |      |
|   |                           | pins SHR, SHCP, STCP, STR  | -    | 150  | 540  | µA   |
|   |                           | pin DS   | -    | 25   | 90   | µA   |
| C <sub>i</sub>                            | input capacitance         |  | -    | 3.5  | -    | pF   |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |                           |  |      |      |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V   | 2.0  | -    | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V   | -    | -    | 0.8  | V    |
| V <sub>OH</sub>                           | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |      |      |      |      |
|   |                           | <b>Serial data output Q7S</b>  |      |      |      |      |
|   |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 4.5 V  | 3.84 | -    | -    | V    |
|   |                           | <b>Parallel data outputs</b>   |      |      |      |      |
|   |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V  | 3.84 | -    | -    | V    |
| V <sub>OL</sub>                           | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |      |      |      |      |
|   |                           | <b>Serial data output</b>  |      |      |      |      |
|   |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V   | -    | -    | 0.33 | V    |
|   |                           | <b>Parallel data outputs</b>   |      |      |      |      |
|   |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V   | -    | -    | 0.33 | 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   | -    | -    | ±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; V <sub>CC</sub> = 5.5 V   | -    | -    | 80   | µA   |

**Table 7. Static characteristics type 74HCT594 ...continued**  
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol   | Parameter                 | Conditions  | Min | Typ | Max       | Unit    |  |
|--|---------------------------|---|-----|-----|-----------|---------|--|
| $\Delta I_{CC}$  | additional supply current | per input pin; $V_I = V_{CC} - 2.1$ V and other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 4.5$ V to 5.5 V |     |     |           |         |  |
|  |                           | pins $\overline{SHR}$ , SHCP, STCP, $\overline{STR}$  | -   | -   | 675       | $\mu$ A |  |
|  |                           | pin DS  | -   | -   | 112.5     | $\mu$ A |  |
| <b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b> |                           |   |     |     |           |         |  |
| $V_{IH}$   | HIGH-level input voltage  | $V_{CC} = 4.5$ V to 5.5 V   | 2.0 | -   | -         | V       |  |
| $V_{IL}$   | LOW-level input voltage   | $V_{CC} = 4.5$ V to 5.5 V   | -   | -   | 0.8       | V       |  |
| $V_{OH}$   | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$  |     |     |           |         |  |
|  |                           | <b>Serial data output Q7S</b>   |     |     |           |         |  |
|  |                           | $I_O = -4.0$ mA; $V_{CC} = 4.5$ V   | 3.7 | -   | -         | V       |  |
|  |                           | <b>Parallel data outputs</b>  |     |     |           |         |  |
|  |                           | $I_O = -6.0$ mA; $V_{CC} = 4.5$ V   | 3.7 | -   | -         | V       |  |
| $V_{OL}$   | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$  |     |     |           |         |  |
|  |                           | <b>Serial data output Q7S</b>   |     |     |           |         |  |
|  |                           | $I_O = 4.0$ mA; $V_{CC} = 4.5$ V  | -   | -   | 0.4       | V       |  |
|  |                           | <b>Parallel data outputs</b>  |     |     |           |         |  |
|  |                           | $I_O = 6.0$ mA; $V_{CC} = 4.5$ V  | -   | -   | 0.4       | V       |  |
| $I_I$  | input leakage current     | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V   | -   | -   | $\pm 1.0$ | $\mu$ A |  |
| $I_{CC}$   | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V  | -   | -   | 160       | $\mu$ A |  |
| $\Delta I_{CC}$  | additional supply current | per input pin; $V_I = V_{CC} - 2.1$ V and other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 4.5$ V to 5.5 V |     |     |           |         |  |
|  |                           | pins $\overline{SHR}$ , SHCP, STCP, $\overline{STR}$  | -   | -   | 735       | $\mu$ A |  |
|  |                           | pin DS  | -   | -   | 122.5     | $\mu$ A |  |

11. Dynamic characteristics

Table 8. Dynamic characteristics type 74HC594

GND = 0 V;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$ ; see Figure 15.

| Symbol    | Parameter                          | Conditions                                       | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|-----------|------------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
|           |                                    |  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $t_{pd}$  | propagation delay                  | SHCP to Q7S; see Figure 9 [1]                    |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 44  | 150 | -                | 185 | -                 | 225 | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 16  | 30  | -                | 37  | -                 | 45  | ns   |
|           |                                    | $V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$ | -     | 13  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 14  | 26  | -                | 31  | -                 | 38  | ns   |
|           |                                    | STCP to Qn; see Figure 10                        |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 44  | 150 | -                | 185 | -                 | 225 | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 16  | 30  | -                | 37  | -                 | 45  | ns   |
|           |                                    | $V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$ | -     | 13  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 14  | 26  | -                | 31  | -                 | 38  | ns   |
| $t_{PHL}$ | HIGH to LOW propagation delay      | SHR to Q7S; see Figure 13                        |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 39  | 150 | -                | 185 | -                 | 225 | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 14  | 30  | -                | 37  | -                 | 45  | ns   |
|           |                                    | $V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$ | -     | 11  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 12  | 26  | -                | 31  | -                 | 38  | ns   |
|           |                                    | STR to Qn; see Figure 14                         |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 39  | 125 | -                | 155 | -                 | 185 | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 14  | 25  | -                | 31  | -                 | 37  | ns   |
|           |                                    | $V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$ | -     | 11  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 12  | 21  | -                | 26  | -                 | 31  | ns   |
| $t_{THL}$ | HIGH to LOW output transition time | see Figure 9                                     |       |     |     |                  |     |                   |     |      |
|           |                                    | <b>Serial data output Q7S</b>                    |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 19  | 75  | -                | 95  | -                 | 110 | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 6   | 13  | -                | 16  | -                 | 19  | ns   |
|           |                                    | <b>Parallel data outputs</b>                     |       |     |     |                  |     |                   |     |      |
|           |                                    | $V_{CC} = 2.0 \text{ V}$                         | -     | 14  | 60  | -                | 75  | -                 | 90  | ns   |
|           |                                    | $V_{CC} = 4.5 \text{ V}$                         | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
|           |                                    | $V_{CC} = 6.0 \text{ V}$                         | -     | 4   | 10  | -                | 13  | -                 | 15  | ns   |

**Table 8. Dynamic characteristics type 74HC594 ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; see [Figure 15](#).

| Symbol   | Parameter                          | Conditions                    | 25 °C       |  |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|--|------------------------------------|-------------------------------|-------------|--|-----|------------------|-----|-------------------|-----|------|
|  |                                    |                               | Min         | Typ  | Max | Min              | Max | Min               | Max |      |
| $t_{TLH}$  | LOW to HIGH output transition time | see <a href="#">Figure 9</a>  |             |  |     |                  |     |                   |     |      |
|  |                                    | <b>Serial data output Q7S</b> |             |  |     |                  |     |                   |     |      |
|  |                                    | $V_{CC} = 2.0\text{ V}$       | -           | 19   | 75  | -                | 95  | -                 | 110 | ns   |
|  |                                    | $V_{CC} = 4.5\text{ V}$       | -           | 7  | 15  | -                | 19  | -                 | 22  | ns   |
|  |                                    | $V_{CC} = 6.0\text{ V}$       | -           | 6  | 13  | -                | 16  | -                 | 19  | ns   |
|  |                                    | <b>Parallel data outputs</b>  |             |  |     |                  |     |                   |     |      |
|  |                                    | $V_{CC} = 2.0\text{ V}$       | -           | 14   | 60  | -                | 75  | -                 | 90  | ns   |
|  |                                    | $V_{CC} = 4.5\text{ V}$       | -           | 5  | 12  | -                | 15  | -                 | 18  | ns   |
|  |                                    | $V_{CC} = 6.0\text{ V}$       | -           | 4  | 10  | -                | 13  | -                 | 15  | ns   |
|  |                                    | $t_w$                         | pulse width | SHCP (HIGH or LOW); see <a href="#">Figure 9</a> |     |                  |     |                   |     |      |
| $V_{CC} = 2.0\text{ V}$  | 80                                 |                               |             | 10   | -   | 100              | -   | 120               | -   | ns   |
| $V_{CC} = 4.5\text{ V}$  | 16                                 |                               |             | 4  | -   | 20               | -   | 24                | -   | ns   |
| $V_{CC} = 6.0\text{ V}$  | 14                                 |                               |             | 3  | -   | 17               | -   | 20                | -   | ns   |
| STCP (HIGH or LOW); see <a href="#">Figure 10</a>                                      |                                    |                               |             |  |     |                  |     |                   |     |      |
| $V_{CC} = 2.0\text{ V}$  | 80                                 |                               |             | 10   | -   | 100              | -   | 120               | -   | ns   |
| $V_{CC} = 4.5\text{ V}$  | 16                                 |                               |             | 4  | -   | 20               | -   | 24                | -   | ns   |
| $V_{CC} = 6.0\text{ V}$  | 14                                 |                               |             | 3  | -   | 17               | -   | 20                | -   | ns   |
| SHR and STR (HIGH or LOW); see <a href="#">Figure 13</a> and <a href="#">Figure 14</a> |                                    |                               |             |  |     |                  |     |                   |     |      |
| $V_{CC} = 2.0\text{ V}$  | 80                                 |                               |             | 14   | -   | 100              | -   | 120               | -   | ns   |
| $V_{CC} = 4.5\text{ V}$  | 16                                 |                               |             | 5  | -   | 20               | -   | 24                | -   | ns   |
| $V_{CC} = 6.0\text{ V}$  | 14                                 |                               |             | 4  | -   | 17               | -   | 20                | -   | ns   |

**Table 8. Dynamic characteristics type 74HC594 ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; see [Figure 15](#).

| 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       | DS to SHCP;<br>see <a href="#">Figure 11</a>   |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 100   | 10  | -   | 125              | -   | 150               | -   | ns   |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 20    | 4   | -   | 25               | -   | 30                | -   | ns   |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 17    | 3   | -   | 21               | -   | 26                | -   | ns   |
|           |                   | SHR to STCP;<br>see <a href="#">Figure 12</a>  |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 100   | 14  | -   | 125              | -   | 150               | -   | ns   |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 20    | 5   | -   | 25               | -   | 30                | -   | ns   |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 17    | 4   | -   | 21               | -   | 26                | -   | ns   |
|           |                   | SHCP to STCP;<br>see <a href="#">Figure 10</a>   |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 100   | 17  | -   | 125              | -   | 150               | -   | ns   |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 20    | 6   | -   | 25               | -   | 30                | -   | ns   |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 17    | 5   | -   | 21               | -   | 26                | -   | ns   |
| $t_h$     | hold time         | DS to SHCP;<br>see <a href="#">Figure 11</a>   |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 25    | -8  | -   | 30               | -   | 35                | -   | ns   |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 5     | -3  | -   | 6                | -   | 7                 | -   | ns   |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 4     | -2  | -   | 5                | -   | 6                 | -   | ns   |
| $t_{rec}$ | recovery time     | SHR to SHCP<br>and<br>STR to STCP;<br>see <a href="#">Figure 13</a><br>and <a href="#">Figure 14</a> |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 50    | -14 | -   | 65               | -   | 75                | -   | ns   |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 10    | -5  | -   | 13               | -   | 15                | -   | ns   |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 9     | -4  | -   | 11               | -   | 13                | -   | ns   |
| $f_{max}$ | maximum frequency | SHCP or STCP;<br>see <a href="#">Figure 9</a> and<br><a href="#">Figure 10</a>                       |       |     |     |                  |     |                   |     |      |
|           |                   | $V_{CC} = 2.0\text{ V}$  | 6.0   | 30  | -   | 4.8              | -   | 4.0               | -   | MHz  |
|           |                   | $V_{CC} = 4.5\text{ V}$  | 30    | 92  | -   | 24               | -   | 20                | -   | MHz  |
|           |                   | $V_{CC} = 5.0\text{ V}$ ;<br>$C_L = 15\text{ pF}$  | -     | 100 | -   | -                | -   | -                 | -   | MHz  |
|           |                   | $V_{CC} = 6.0\text{ V}$  | 35    | 109 | -   | 28               | -   | 24                | -   | MHz  |

**Table 8. Dynamic characteristics type 74HC594 ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; see [Figure 15](#).

| Symbol   | Parameter                     | Conditions   | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|----------|-------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
|          |                               |  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $C_{PD}$ | power dissipation capacitance | $V_I = GND$ to $V_{CC}$ ; <a href="#">[2]</a><br>$V_{CC} = 5\text{ V}$ ;<br>$f_i = 1\text{ MHz}$ | -     | 84  | -   | -                | -   | -                 | -   | pF   |

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

[2]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

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

**Table 9. Dynamic characteristics type 74HCT594**

$GND = 0\text{ V}$ ;  $V_{CC} = 4.5\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; see [Figure 15](#).

| Symbol    | Parameter                          | Conditions   | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|-----------|------------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
|           |                                    |  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $t_{pd}$  | propagation delay                  | SHCP to Q7S; <a href="#">[1]</a><br>see <a href="#">Figure 9</a> | -     | 18  | 32  | -                | 40  | -                 | 48  | ns   |
|           |                                    | $V_{CC} = 5.0\text{ V}$ ;<br>$C_L = 15\text{ pF}$                | -     | 15  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | STCP to Qn; see <a href="#">Figure 10</a>                        | -     | 18  | 32  | -                | 40  | -                 | 48  | ns   |
| $t_{PHL}$ | HIGH to LOW propagation delay      | $V_{CC} = 5.0\text{ V}$ ;<br>$C_L = 15\text{ pF}$                | -     | 15  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | STR to Qn; see <a href="#">Figure 14</a>                         | -     | 17  | 30  | -                | 38  | -                 | 45  | ns   |
|           |                                    | $V_{CC} = 5.0\text{ V}$ ;<br>$C_L = 15\text{ pF}$                | -     | 14  | -   | -                | -   | -                 | -   | ns   |
|           |                                    | $V_{CC} = 5.0\text{ V}$ ;<br>$C_L = 15\text{ pF}$                | -     | 14  | -   | -                | -   | -                 | -   | ns   |
| $t_{THL}$ | HIGH to LOW output transition time | see <a href="#">Figure 9</a><br><b>Serial data output Q7S</b>    | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|           |                                    | $V_{CC} = 4.5\text{ V}$  | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|           |                                    | <b>Parallel data outputs</b><br>$V_{CC} = 4.5\text{ V}$          | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
| $t_{TLH}$ | LOW to HIGH output transition time | see <a href="#">Figure 9</a><br><b>Serial data output Q7S</b>    | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|           |                                    | $V_{CC} = 4.5\text{ V}$  | -     | 7   | 15  | -                | 19  | -                 | 22  | ns   |
|           |                                    | <b>Parallel data outputs</b><br>$V_{CC} = 4.5\text{ V}$          | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |

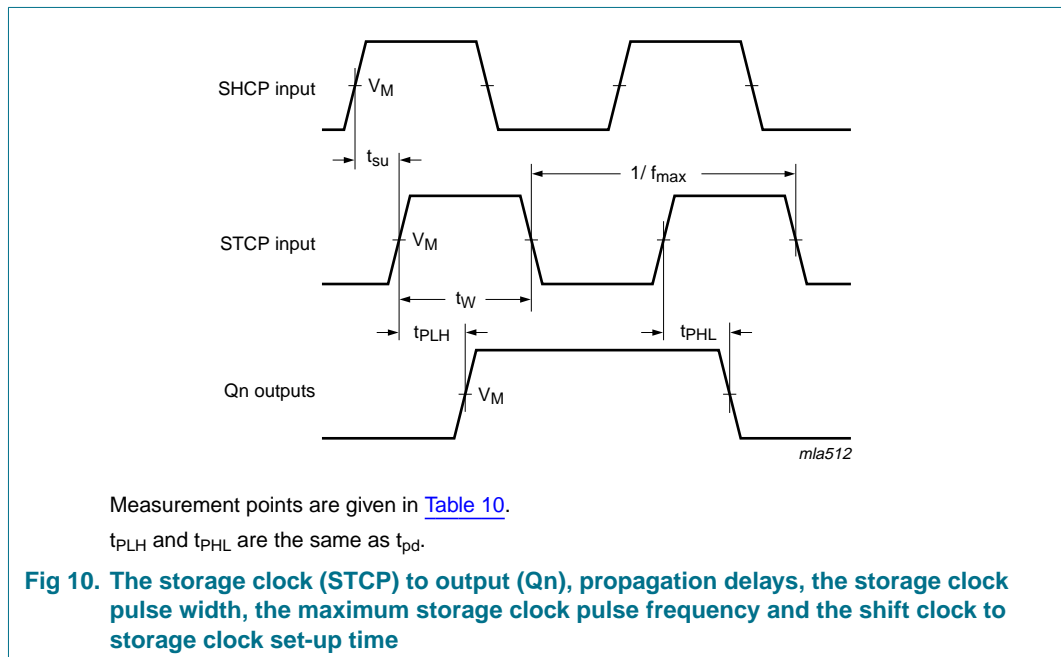
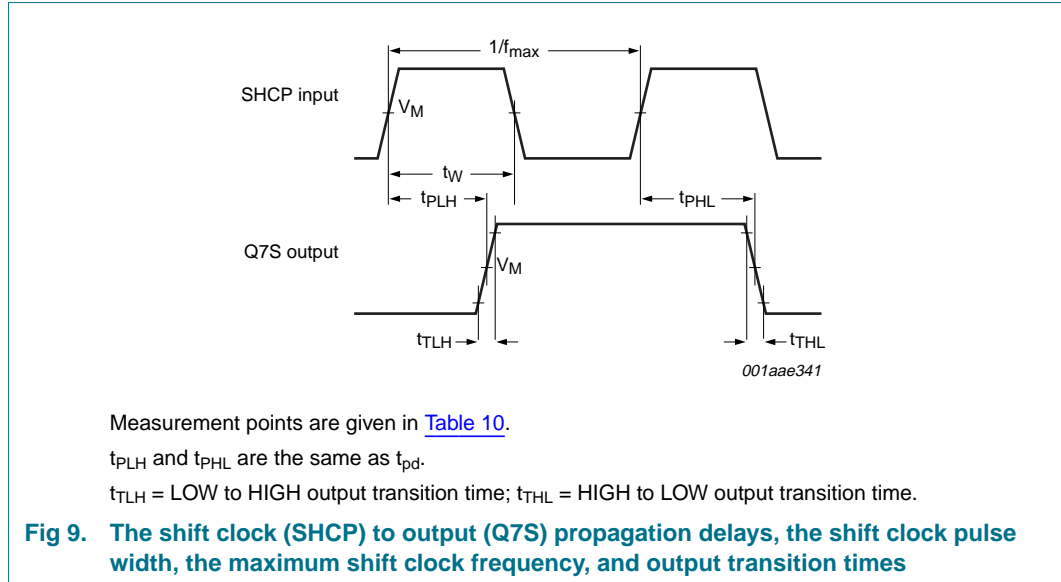
**Table 9. Dynamic characteristics type 74HCT594 ...continued**  
*GND = 0 V; V<sub>CC</sub> = 4.5 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF; see Figure 15.*

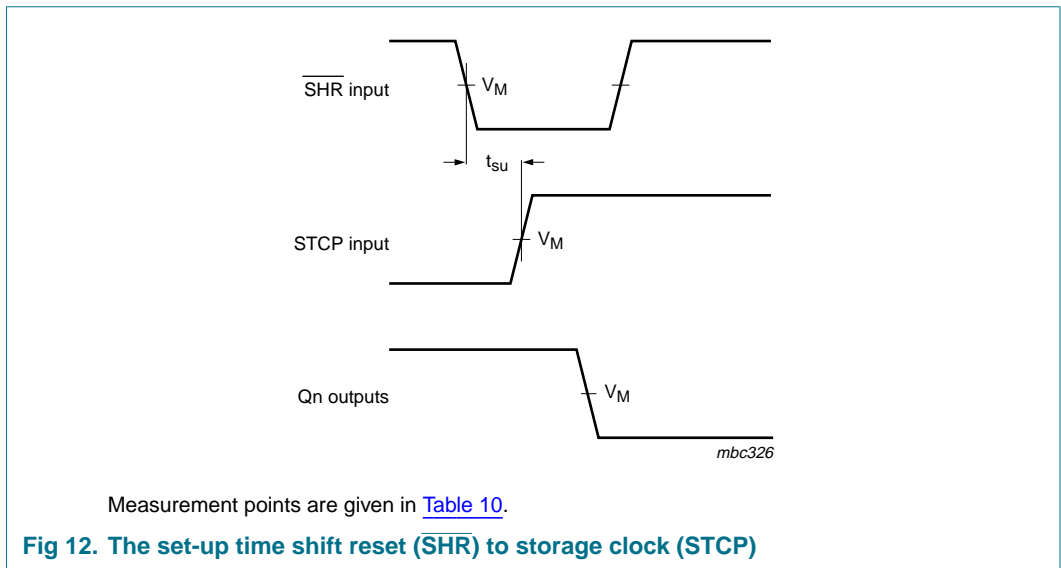
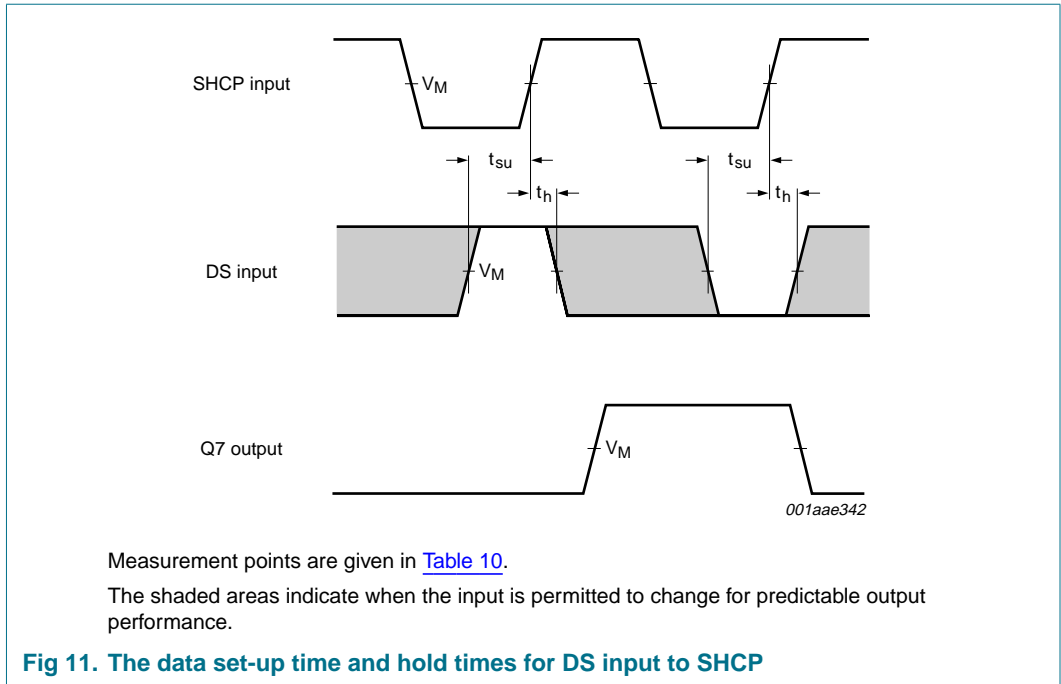
| Symbol           | Parameter                     | Conditions   | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                               |  | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| t <sub>W</sub>   | pulse width                   | SHCP (HIGH or LOW); see Figure 9   | 16    | 4   | -   | 20               | -   | 24                | -   | ns   |
|                  |                               | STCP (HIGH or LOW); see Figure 10  | 16    | 4   | -   | 20               | -   | 24                | -   | ns   |
|                  |                               | SHR and STR (HIGH or LOW); see Figure 13 and Figure 14   | 16    | 6   | -   | 20               | -   | 24                | -   | ns   |
| t <sub>su</sub>  | set-up time                   | DS to SHCP; see Figure 11  | 20    | 4   | -   | 25               | -   | 30                | -   | ns   |
|                  |                               | SHR to STCP; see Figure 12   | 20    | 6   | -   | 25               | -   | 30                | -   | ns   |
|                  |                               | SHCP to STCP; see Figure 10  | 20    | 7   | -   | 25               | -   | 30                | -   | ns   |
| t <sub>h</sub>   | hold time                     | DS to SHCP; see Figure 11  | 5     | -3  | -   | 6                | -   | 7                 | -   | ns   |
| t <sub>rec</sub> | recovery time                 | SHR to SHCP and STR to STCP; see Figure 13 and Figure 14   | 10    | -5  | -   | 13               | -   | 15                | -   | ns   |
| f <sub>max</sub> | maximum frequency             | SHCP or STCP; see Figure 9 and Figure 10   | 30    | 92  | -   | 24               | -   | 20                | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF  | -     | 100 | -   | -                | -   | -                 | -   | MHz  |
| C <sub>PD</sub>  | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub> - 1.5 V; V <sub>CC</sub> = 5 V; f <sub>i</sub> = 1 MHz [2] | -     | 89  | -   | -                | -   | -                 | -   | pF   |

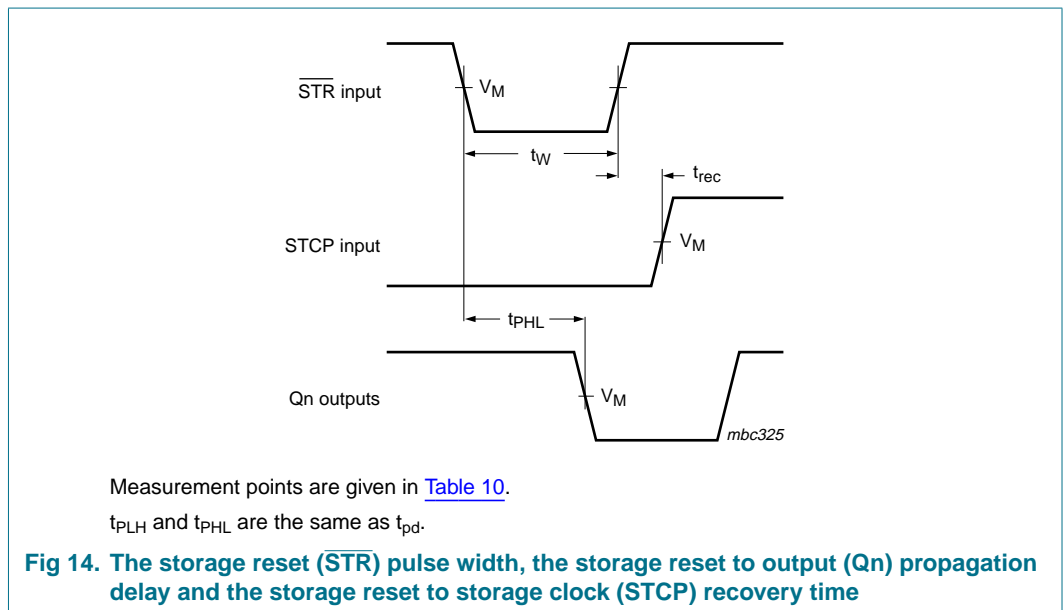
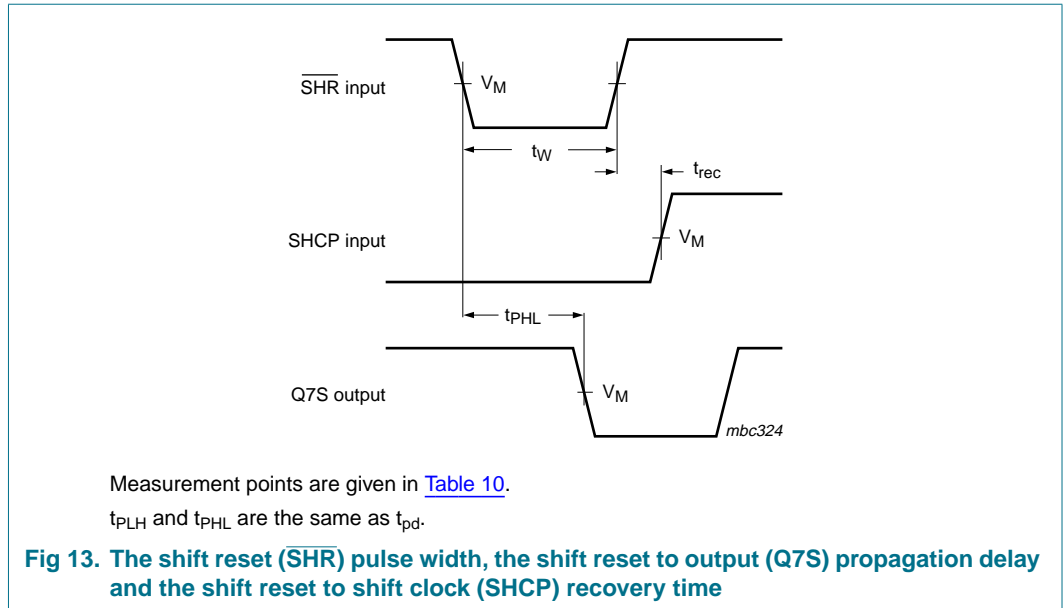
[1] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.  
 [2] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW):  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  where:  
 f<sub>i</sub> = input frequency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



12. Waveforms

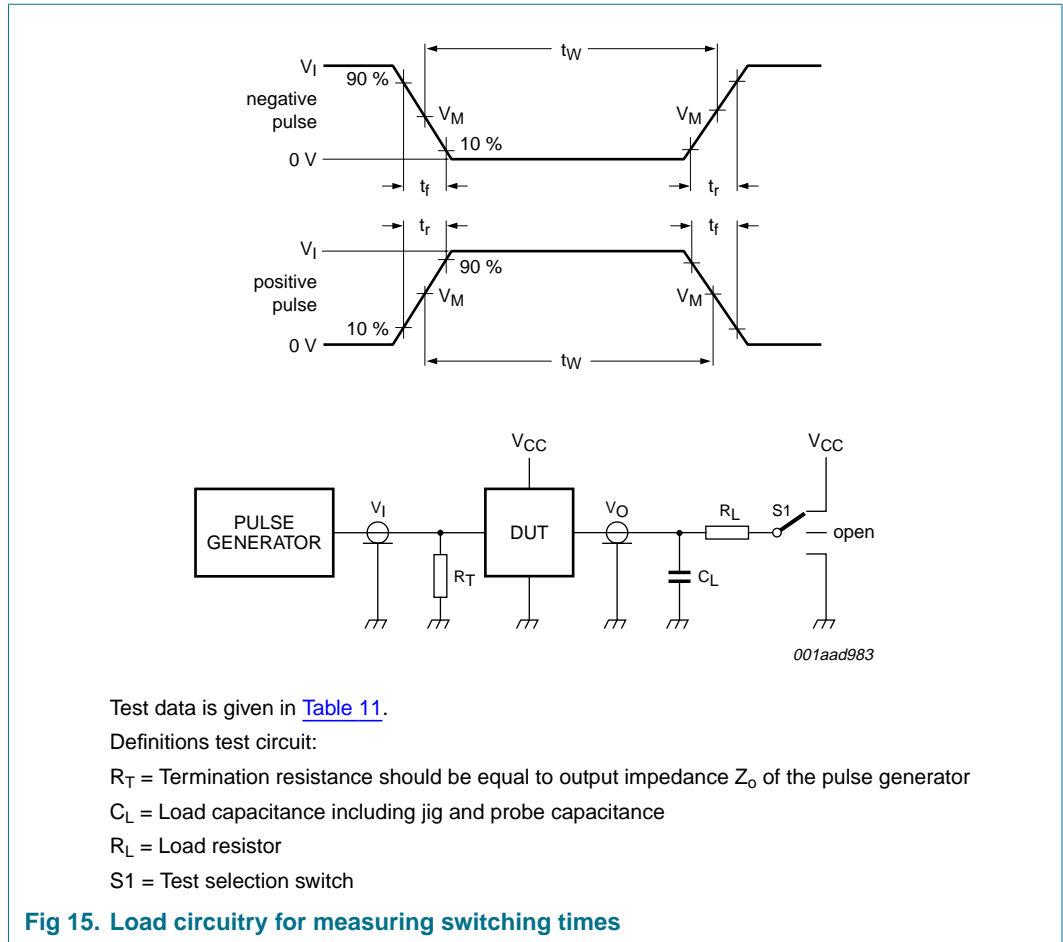






**Table 10. Measurement points**

| Type     | Input                      | Output                     |
|----------|----------------------------|----------------------------|
|          | $V_M$                      | $V_M$                      |
| 74HC594  | $0.5 \times V_{\text{CC}}$ | $0.5 \times V_{\text{CC}}$ |
| 74HCT594 | 1.3 V                      | 1.3 V                      |



**Table 11. Test data**

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC594  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT594 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

13. Package outline

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

SOT109-1

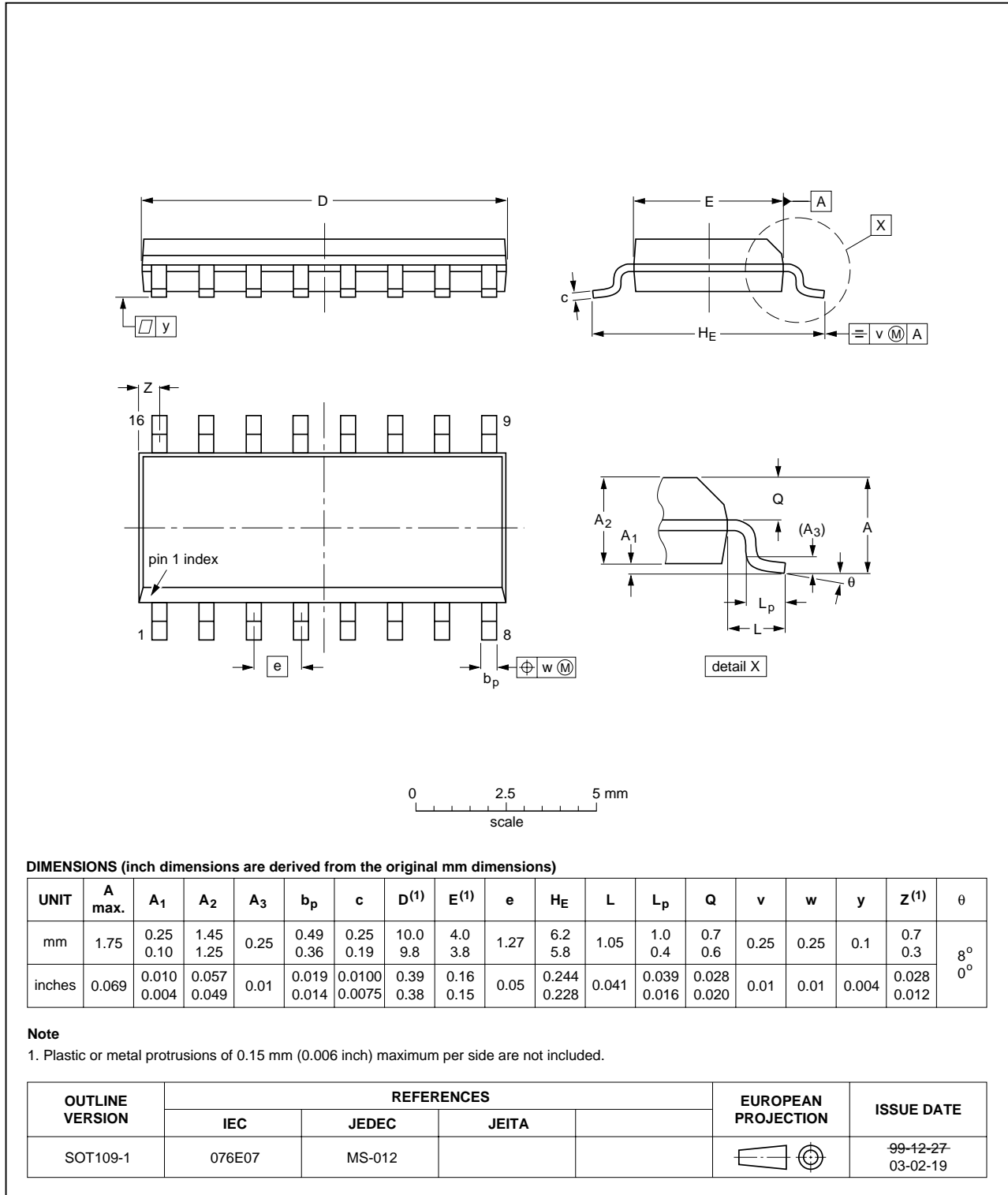


Fig 16. Package outline SOT109-1 (SO16)

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

SOT338-1

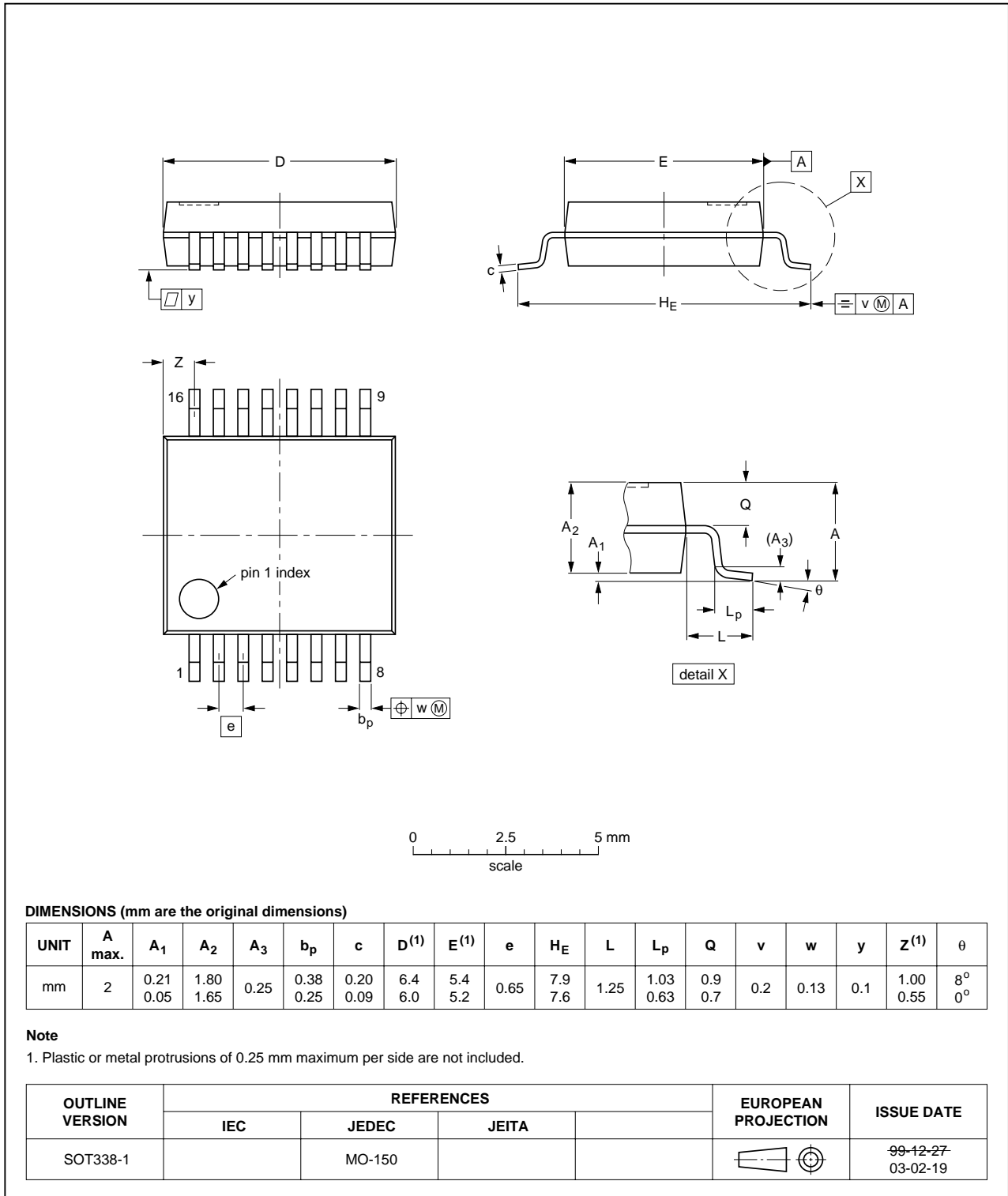


Fig 17. Package outline SOT338-1 (SSOP16)

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4

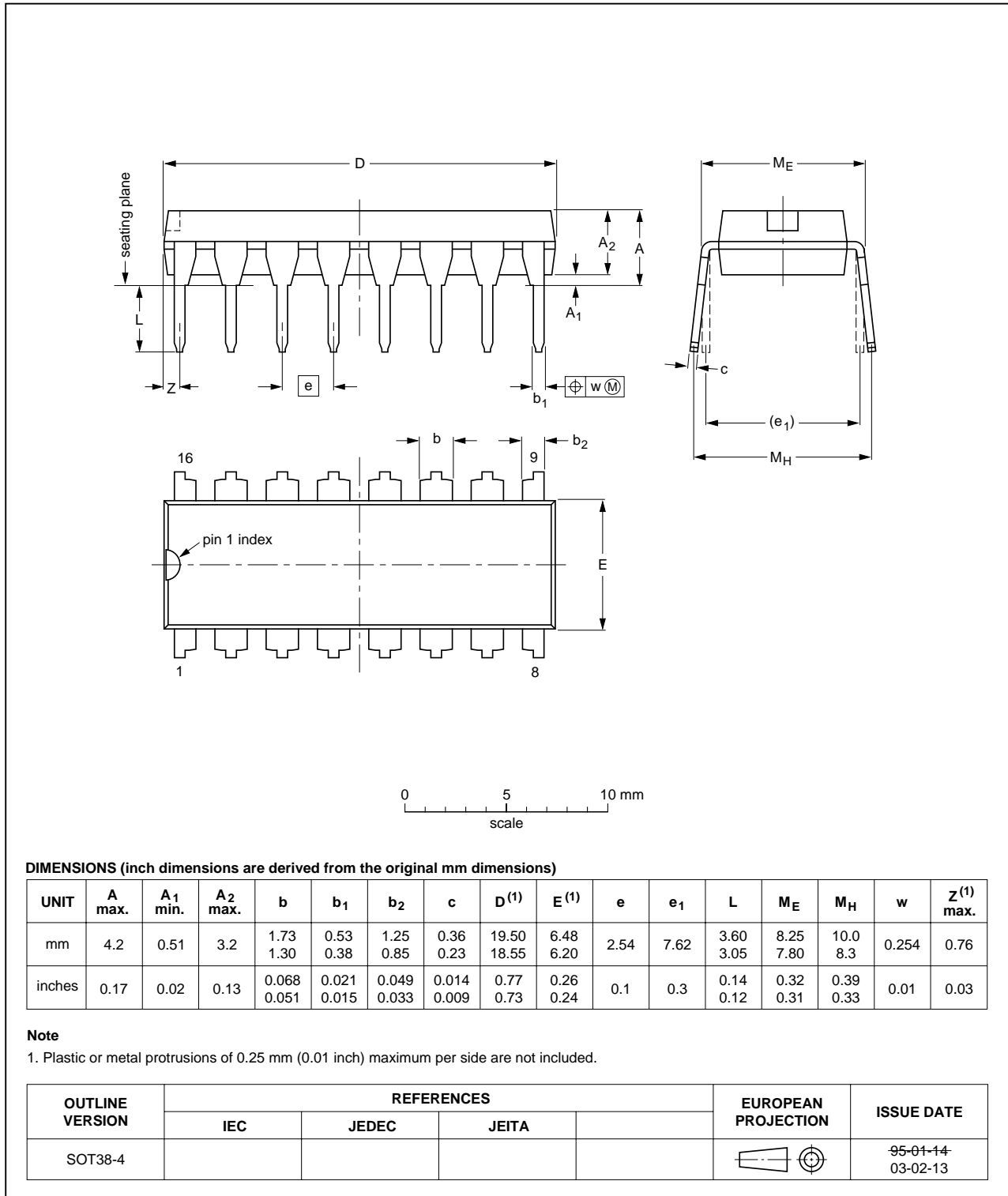


Fig 18. Package outline SOT38-4 (DIP16)

## 14. Abbreviations

Table 12. Abbreviations

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

## 15. Revision history

Table 13. Revision history

| Document ID       | Release date   | Data sheet status     | Change notice | Supersedes        |
|-------------------|--|-----------------------|---------------|-------------------|
| 74HC_HCT594_3     | 20061220   | Product data sheet    | -             | 74HC_HCT594_CNV_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> <li><a href="#">Table 1 "Ordering information"</a> updated.</li> </ul> |                       |               |                   |
| 74HC_HCT594_CNV_2 | 19970908   | Product specification | -             | 74HC_HCT594_CNV_1 |



## 16. Legal information

### 16.1 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.nxp.com>.

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Date of release: 20 December 2006

Document identifier: 74HC\_HCT594\_3