

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

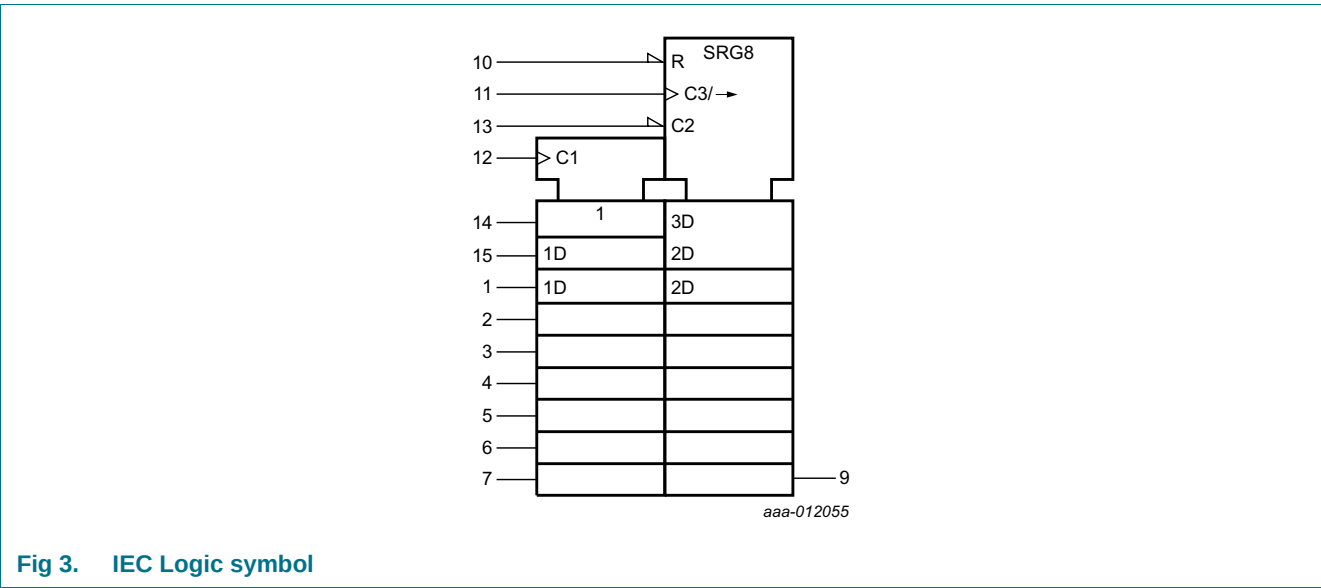
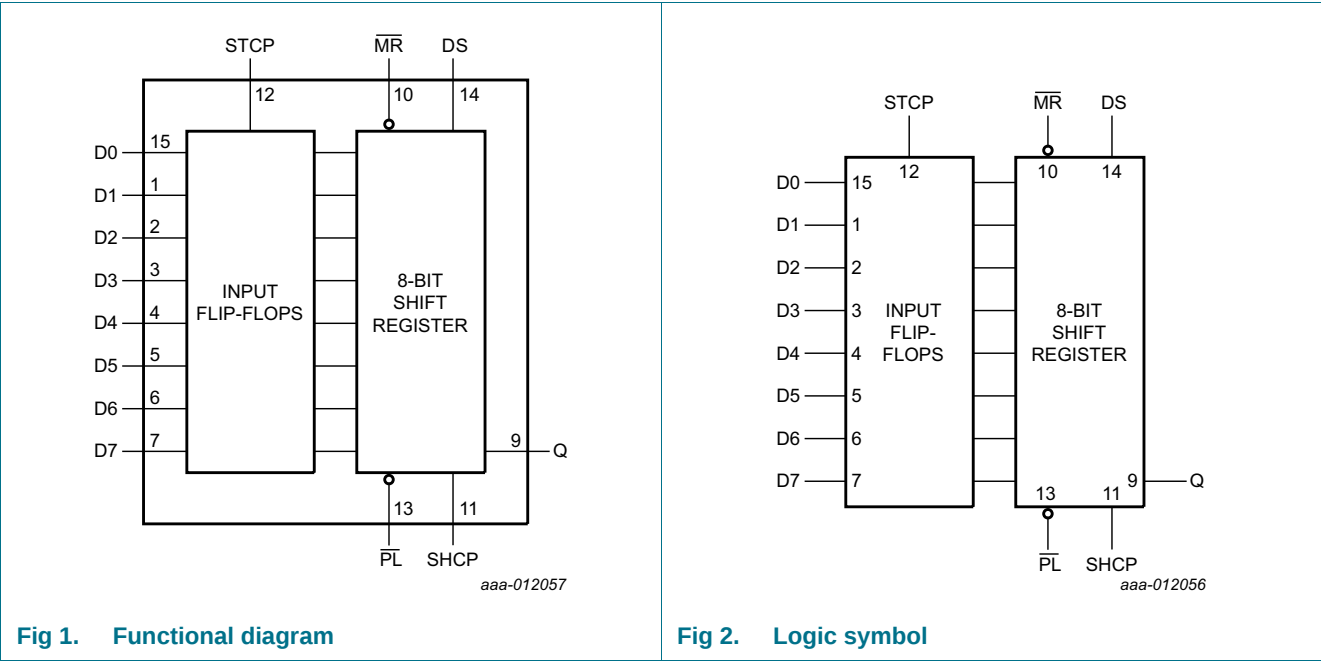
- Complies with JEDEC standard JESD7A
- Input levels:
 - ◆ For 74HC597: CMOS level
 - ◆ For 74HCT597: TTL level
- 8-bit parallel storage register inputs
- Shift register has direct overriding load and clear
- ESD protection:
 - ◆ HBM EIA/JESD22-A114F exceeds 2000 V
 - ◆ MM EIA/JESD22-A115-A exceeds 200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

3. Ordering information

Table 1. Ordering information

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

4. Functional diagram



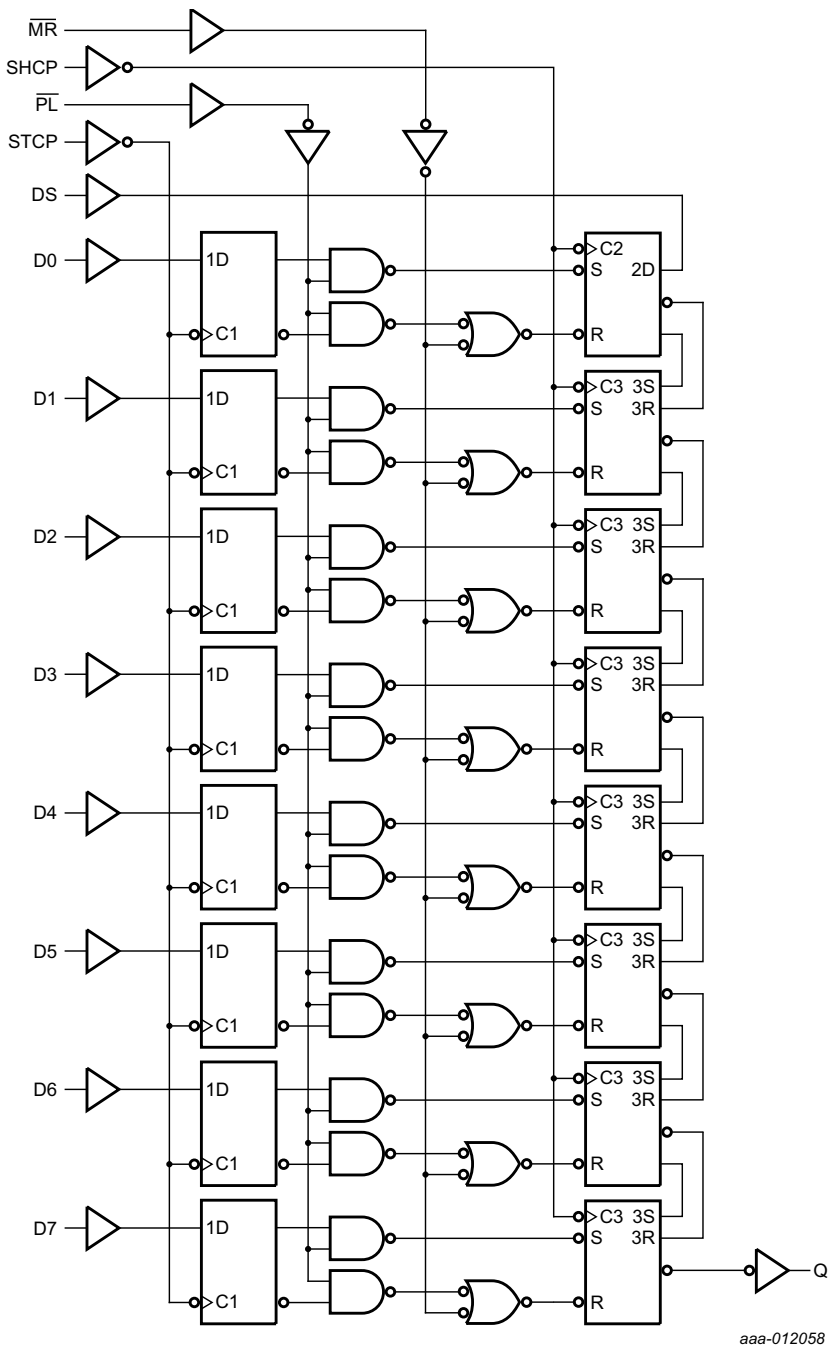


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning

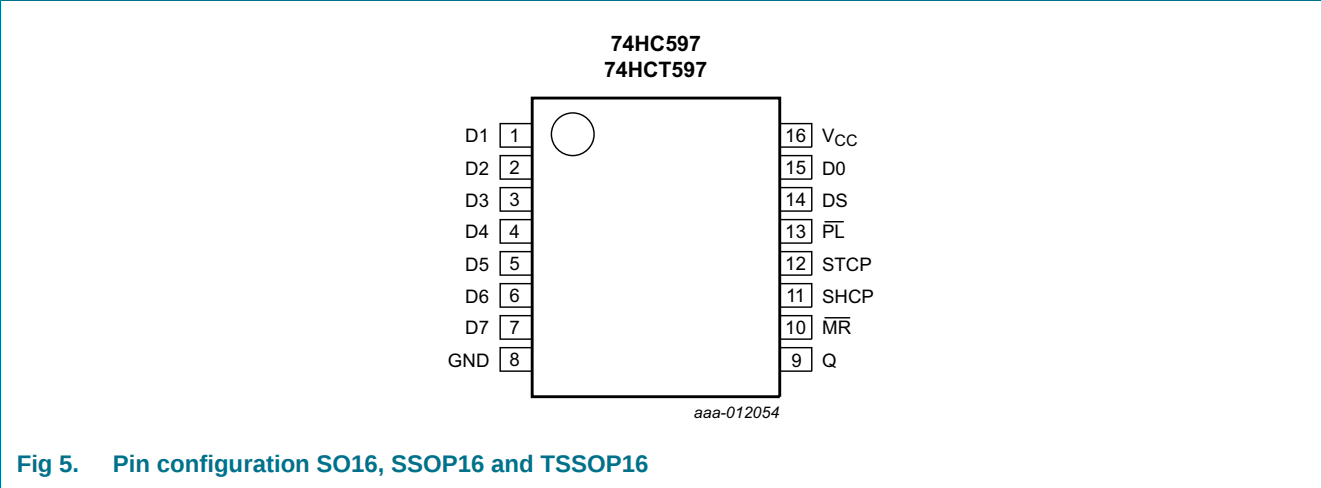


Fig 5. Pin configuration SO16, SSOP16 and TSSOP16

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
VCC	16	supply voltage

6. Functional description

Table 3. Function table^[1]

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.

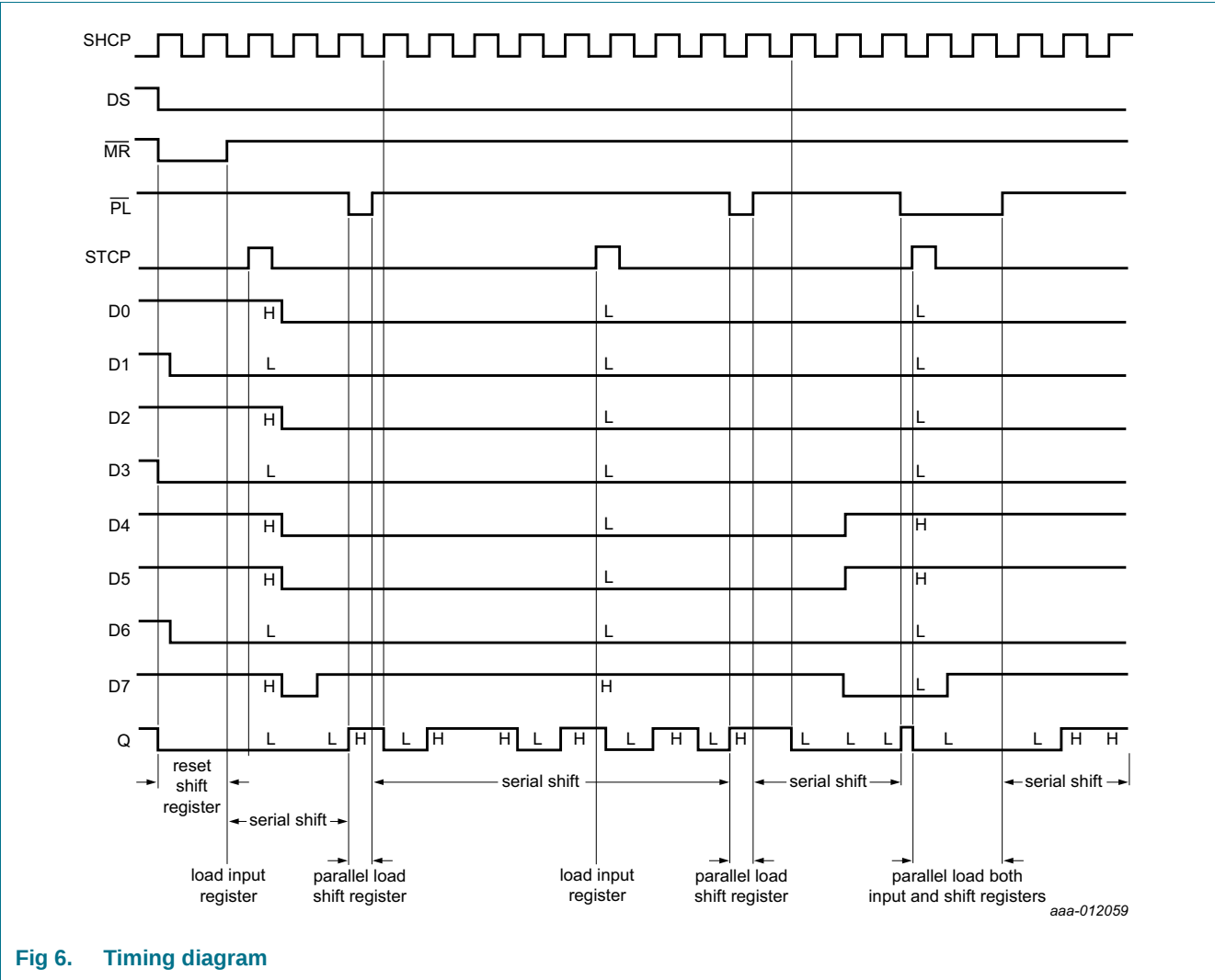


Fig 6. Timing diagram

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 $V_I > V_{CC} + 0.5\text{ V}$	-	± 20	mA
I_{OK}	output clamping current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	-	± 20	mA
I_O	output current	$V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$	-	± 25	mA
I_{CC}	supply current		-	+50	mA
I_{GND}	ground current		-50	-	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	total power dissipation	SO16, SSOP16 and TSSOP16 packages [1]	-	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	
74HC597										
V _{IH}	HIGH-level input voltage	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V _{CC} = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V _{CC} = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = –20 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I _O = –20 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = –20 μA; V _{CC} = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I _O = –4.0 mA; V _{CC} = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I _O = –5.2 mA; V _{CC} = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = 20 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I _O = 5.2 mA; V _{CC} = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 6.0 V	-	-	±0.1	-	±1.0	-	±1.0	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V	-	-	8.0	-	80.0	-	160.0	μA
C _I	input capacitance		-	3.5	-	-	-	-	-	pF
74HCT597										
V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V								
		I _O = –20 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = –4.0 mA	3.98	4.32	-	3.84	-	3.7	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V								
		I _O = 20 μA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 4.0 mA	-	0.15	0.26	-	0.33	-	0.4	V
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 5.5 V	-	-	±0.1	-	±1.0	-	±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; $V_{CC} = 5.5$ V	-	-	8.0	-	80.0	-	160.0	μ A
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 2.1$ V; other inputs at V_{CC} or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A								
		per input pin; DS input	-	25	90	-	112.5	-	122.5	μ A
		per input pin; Dn inputs	-	30	108	-	135	-	147	μ A
		per input pin; $\overline{PL}$, $\overline{MR}$ inputs	-	150	540	-	675	-	735	μ A
		per input pin; STCP, SHCP inputs	-	150	540	-	675	-	735	μ A
C_I	input capacitance		-	3.5	-	-	-	-	-	pF

10. Dynamic characteristics

Table 7. Dynamic characteristicsVoltages 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	
74HC597										
t _{pd}	propagation delay	SHCP to Q; see Figure 7 [1]								
		V _{CC} = 2.0 V	-	55	175	-	220	-	265	ns
		V _{CC} = 4.5 V	-	20	35	-	44	-	53	ns
		V _{CC} = 5.0 V; C _L = 15 pF	-	17	-	-	-	-	-	ns
		V _{CC} = 6.0 V	-	16	30	-	37	-	45	ns
		$\overline{\text{MR}}$ to Q; see Figure 8 [1]								
		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 Figure 7 [1]								
		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
		$\overline{\text{PL}}$ to Q; see Figure 9 [1]								
		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 Figure 9 [2]								
		$V_{CC} = 2.0$ V	-	19	75	-	95	-	110	ns
		$V_{CC} = 4.5$ V	-	7	15	-	19	-	22	ns
		$V_{CC} = 6.0$ V	-	6	13	-	16	-	19	ns
t_w	pulse width	STCP HIGH or LOW; see Figure 7								
		$V_{CC} = 2.0$ 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; see Figure 7								
		$V_{CC} = 2.0$ 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
		$\overline{MR}$ LOW; see Figure 8								
		$V_{CC} = 2.0$ V	80	22	-	100	-	120	-	ns
		$V_{CC} = 4.5$ V	16	8	-	20	-	24	-	ns
		$V_{CC} = 6.0$ V	14	6	-	17	-	20	-	ns
		$\overline{PL}$ LOW; see Figure 9								
		$V_{CC} = 2.0$ 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	$\overline{MR}$ to SHCP; see Figure 10								
		$V_{CC} = 2.0$ 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

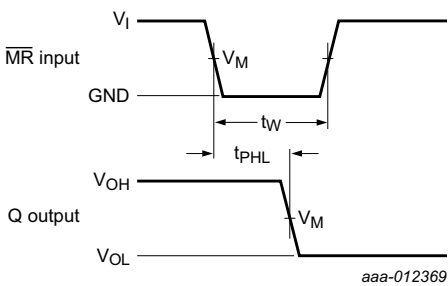
Voltages are referenced to GND (ground = 0 V); $C_L = 50$ pF unless otherwise specified; for test circuit, see [Figure 13](#).

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 Figure 11								
		$V_{CC} = 2.0$ 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 Figure 11								
		$V_{CC} = 2.0$ 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 Figure 12								
		$V_{CC} = 2.0$ 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 Figure 11								
		$V_{CC} = 2.0$ 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 Figure 11								
		$V_{CC} = 2.0$ 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 Figure 7								
		$V_{CC} = 2.0$ 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; $V_I = GND$ to V_{CC} [3]	-	29	-	-	-	-	-	pF

Table 7. Dynamic characteristics ...continued

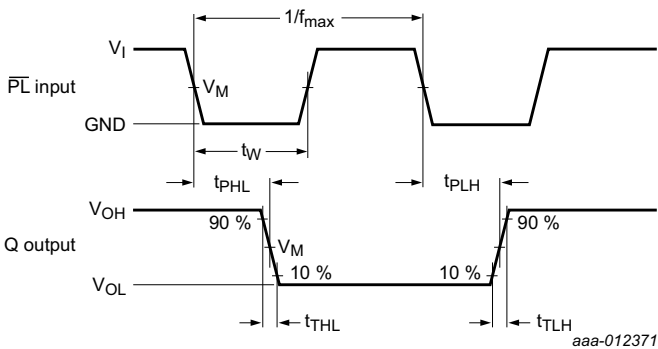
Voltages are referenced to GND (ground = 0 V); $C_L = 50$ pF unless otherwise specified; for test circuit, see [Figure 13](#).

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HCT597										
t _{pd}	propagation delay	SHCP to Q; see Figure 7 ^[1]								
		V _{CC} = 4.5 V	-	23	40	-	50	-	60	ns
		V _{CC} = 5.0 V; C _L = 15 pF	-	20	-	-	-	-	-	ns
		MR to Q; see Figure 8 ^[1]								
		V _{CC} = 4.5 V	-	28	49	-	61	-	74	ns
		STCP to Q; see Figure 7 ^[1]								
		V _{CC} = 4.5 V	-	33	57	-	71	-	86	ns
		V _{CC} = 5.0 V; C _L = 15 pF	-	29	-	-	-	-	-	ns
		PL to Q; see Figure 9 ^[1]								
		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 Figure 7 ^[2]								
		V _{CC} = 4.5 V	-	7	15	-	19	-	22	ns
t _w	pulse width	STCP HIGH or LOW; see Figure 7								
		V _{CC} = 4.5 V	16	6	-	20	-	24	-	ns
		SHCP HIGH or LOW; see Figure 7								
		V _{CC} = 4.5 V	16	7	-	20	-	24	-	ns
		MR LOW; see Figure 8								
		V _{CC} = 4.5 V	25	14	-	31	-	38	-	ns
		PL LOW; see Figure 9								
V _{CC} = 4.5 V	20	10	-	25	-	30	-	ns		
t _{rec}	recovery time	MR to SHCP; see Figure 10								
		V _{CC} = 4.5 V	12	–2	-	15	-	18	-	ns
t _{su}	set-up time	Dn to STCP; see Figure 11								
		V _{CC} = 4.5 V	12	5	-	15	-	18	-	ns
		DS to SHCP; see Figure 11								
		V _{CC} = 4.5 V	12	2	-	15	-	18	-	ns
		PL to SHCP; see Figure 12								
		V _{CC} = 4.5 V	12	4	-	15	-	18	-	ns



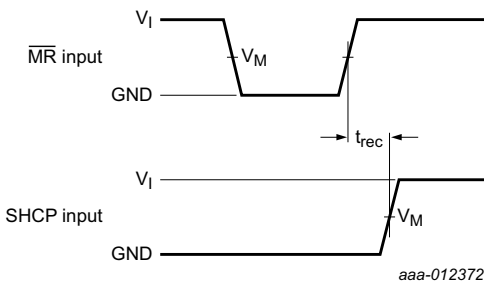
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

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



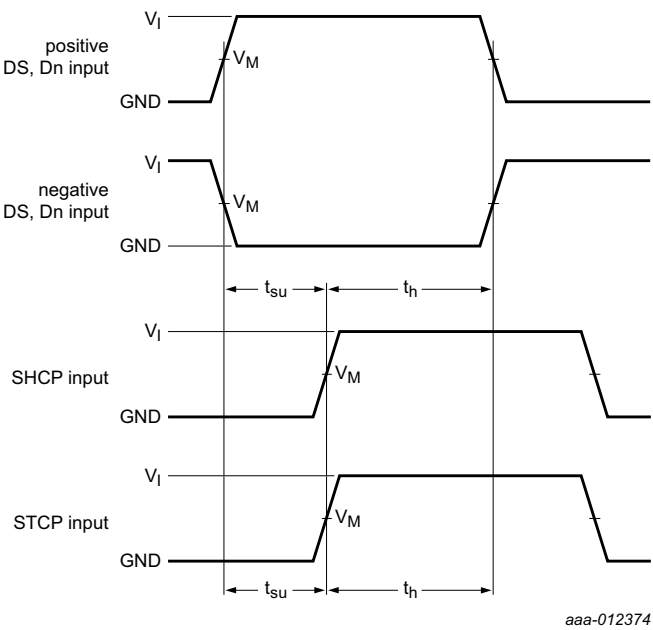
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

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



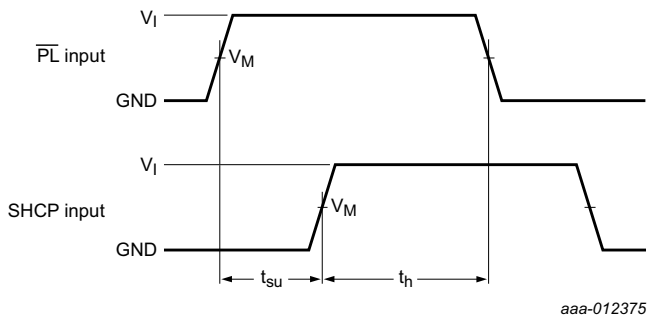
Measurement points are given in [Table 8](#).

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 ($\overline{PL}$) 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

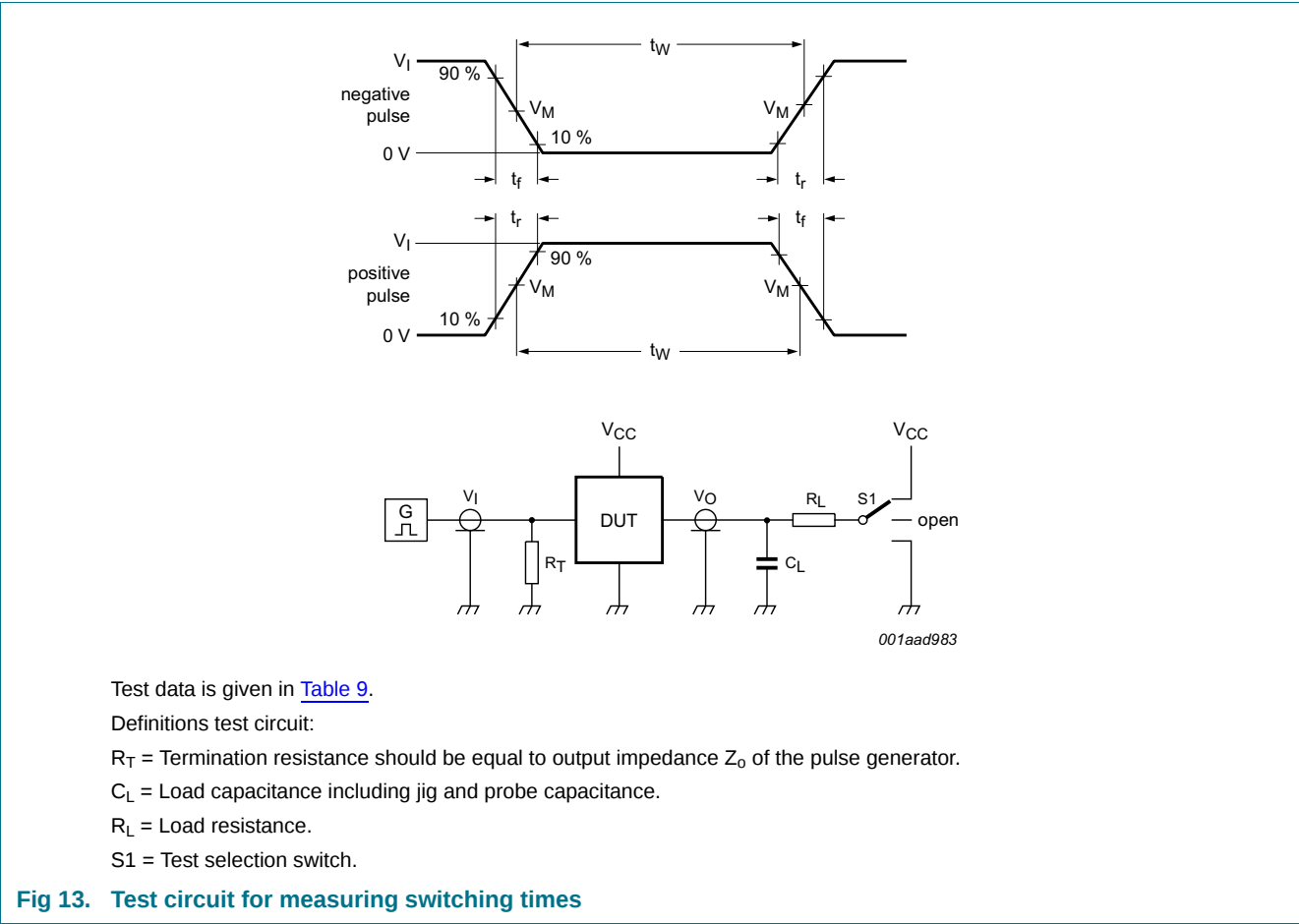


Table 9. Test data

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 Ω	open	GND	V_{CC}
74HCT597	3 V	6 ns	15 pF, 50 pF	1 k Ω	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

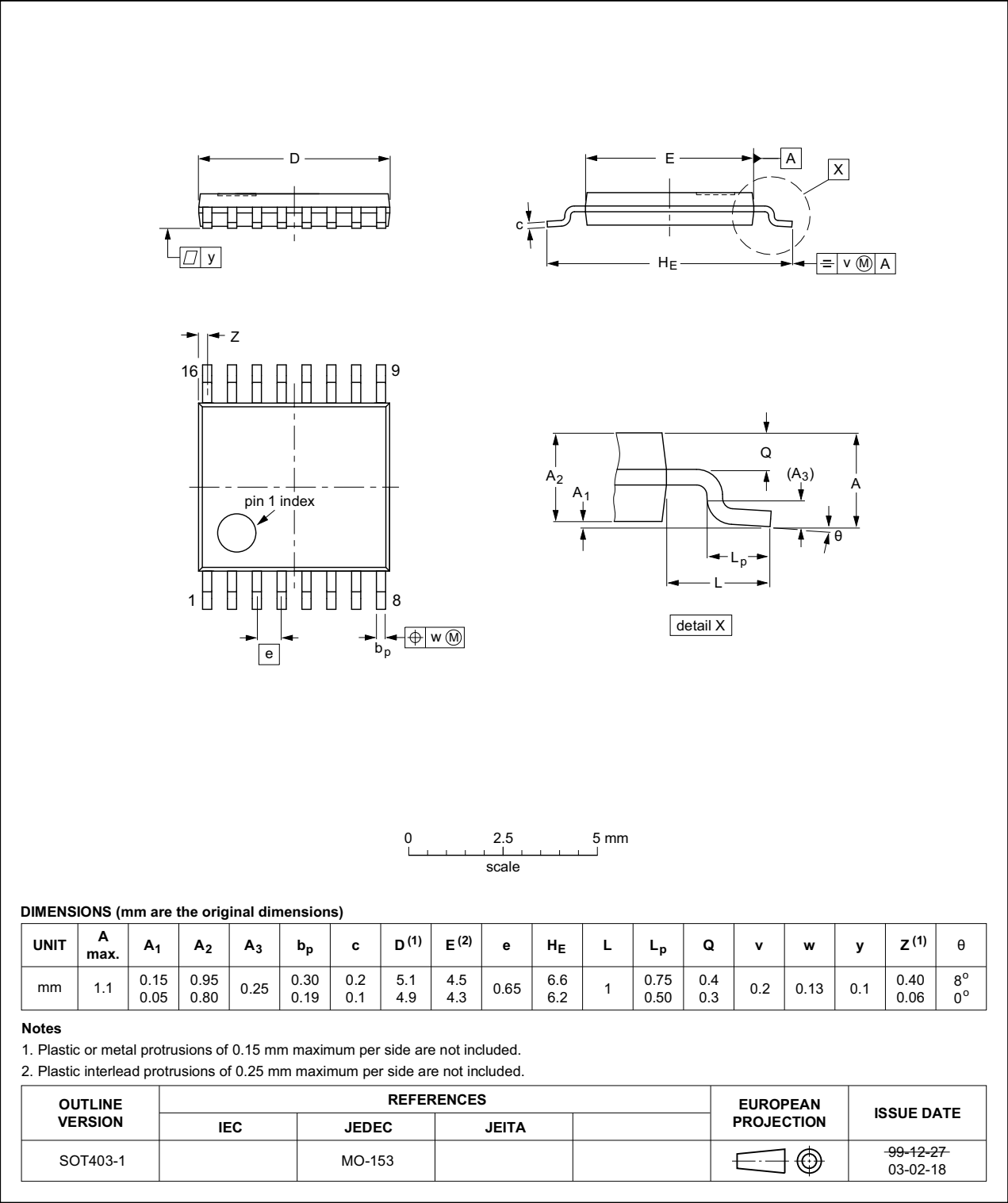


Fig 16. Package outline SOT403-1 (TSSOP16)

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:	Type numbers 74HC597N and 74HCT597N (SOT38-4) removed.			
74HC_HCT597 v.3	20140415	Product data sheet	-	74HC_HCT597_CNV v.2
Modifications:	- The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. - Legal texts have been adapted to the new company name where appropriate.			
74HC_HCT597_CNV v.2	19901201	Product specification	-	-

15. Legal information

15.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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17. Contents

1	General description	1
2	Features and benefits	1
3	Ordering information	1
4	Functional diagram	2
5	Pinning information	4
5.1	Pinning	4
5.2	Pin description	4
6	Functional description	5
7	Limiting values	6
8	Recommended operating conditions	6
9	Static characteristics	7
10	Dynamic characteristics	8
11	Waveforms	12
12	Package outline	16
13	Abbreviations	19
14	Revision history	19
15	Legal information	20
15.1	Data sheet status	20
15.2	Definitions	20
15.3	Disclaimers	20
15.4	Trademarks	21
16	Contact information	21
17	Contents	22



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