

# DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

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## 74HC/HCT597

8-bit shift register with input  
flip-flops

Product specification  
File under Integrated Circuits, IC06

December 1990

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

## 74HC/HCT597

## FEATURES

- 8-bit parallel storage register inputs
- Shift register has direct overriding load and clear
- Output capability: standard
- $I_{CC}$  category: MSI

## GENERAL DESCRIPTION

The 74HC/HCT597 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT597 consist each 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.

## QUICK REFERENCE DATA

GND = 0 V;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f = 6\text{ ns}$

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
$t_{PHL}/t_{PLH}$	propagation delay	$C_L = 15\text{ pF}; V_{CC} = 5\text{ V}$			
	SH <sub>CP</sub> to Q		17	20	ns
	ST <sub>CP</sub> to Q		25	29	ns
	$\overline{PL}$ to Q		21	26	ns
$f_{max}$	maximum clock frequency SH <sub>CP</sub>		96	83	MHz
$C_I$	input capacitance		3.5	3.5	pF
$C_{PD}$	power dissipation capacitance per package	notes 1 and 2	29	32	pF

## Notes

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

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

$f_i$  = input frequency in MHz

$f_o$  = output frequency in MHz

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

$C_L$  = output load capacitance in pF

$V_{CC}$  = supply voltage in V

2. For HC the condition is  $V_I = \text{GND to } V_{CC}$   
For HCT the condition is  $V_I = \text{GND to } V_{CC} - 1.5\text{ V}$

## ORDERING INFORMATION

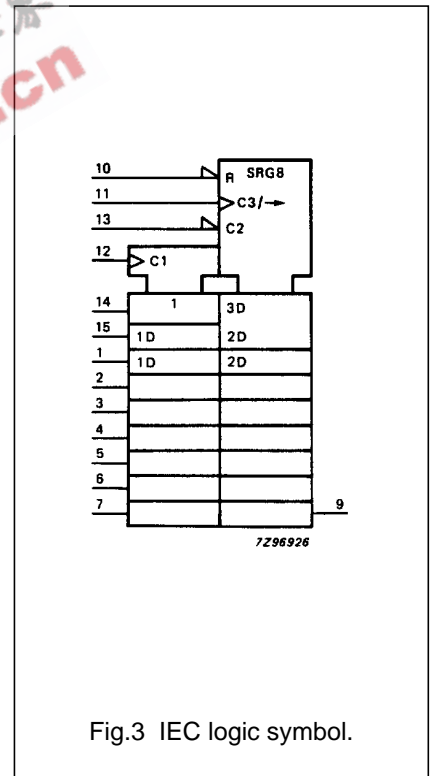
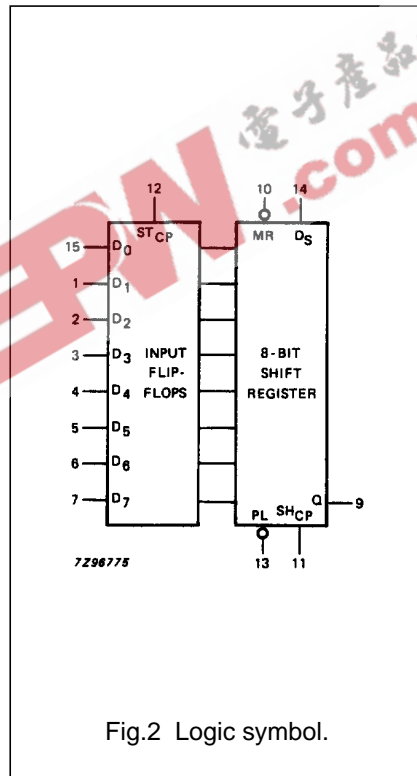
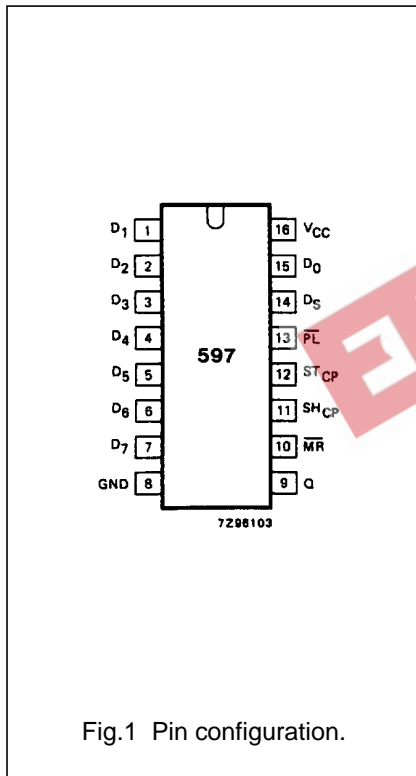
See "74HC/HCT/HCU/HCMOS Logic Package Information".

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PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
8	GND	ground (0 V)
9	Q	serial data output
10	$\overline{MR}$	asynchronous reset input (active LOW)
11	SH <sub>CP</sub>	shift clock input (LOW-to-HIGH, edge-triggered)
12	ST <sub>CP</sub>	storage clock input (LOW-to-HIGH, edge-triggered)
13	$\overline{PL}$	parallel load input (active LOW)
14	D <sub>S</sub>	serial data input
15, 1, 2, 3, 4, 5, 6, 7	D <sub>0</sub> to D <sub>7</sub>	parallel data inputs
16	V <sub>CC</sub>	positive supply voltage



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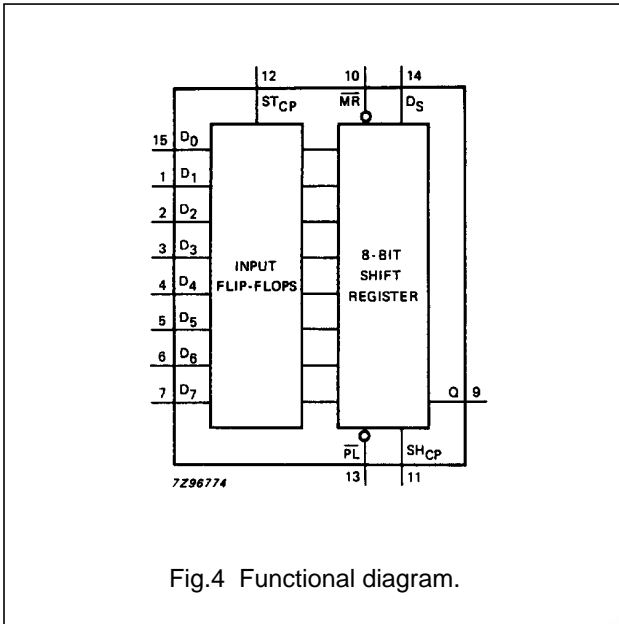


Fig.4 Functional diagram.

FUNCTION TABLE

ST <sub>CP</sub>	SH <sub>CP</sub>	$\overline{PL}$	$\overline{MR}$	FUNCTION
↑	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 indeterminate when signals removed
X	X	H	L	shift register cleared
X	↑	H	H	shift register clocked $Q_n = Q_{n-1}, Q_0 = D_S$

Notes

- H = HIGH voltage level  
 L = LOW voltage level  
 X = don't care  
 ↑ = LOW-to-HIGH CP transition

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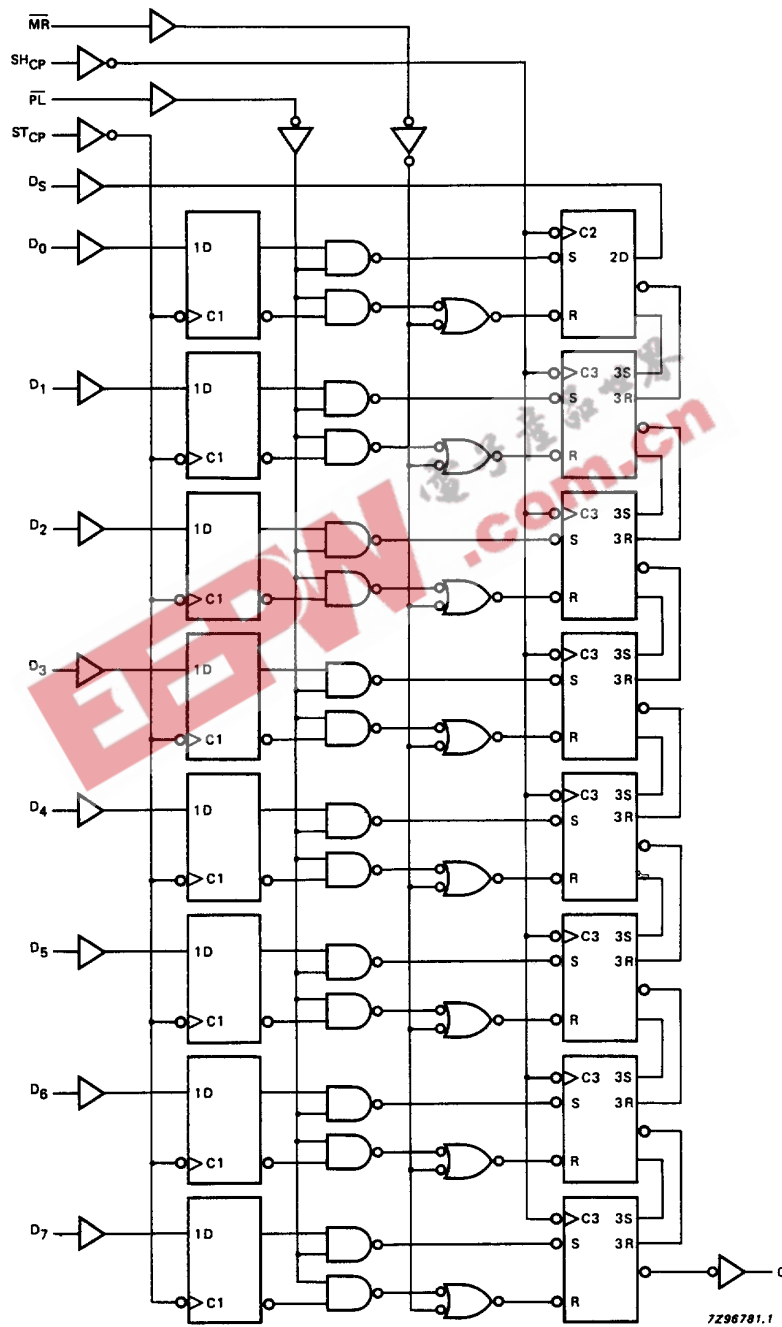


Fig.5 Logic diagram.

8-bit shift register with input flip-flops

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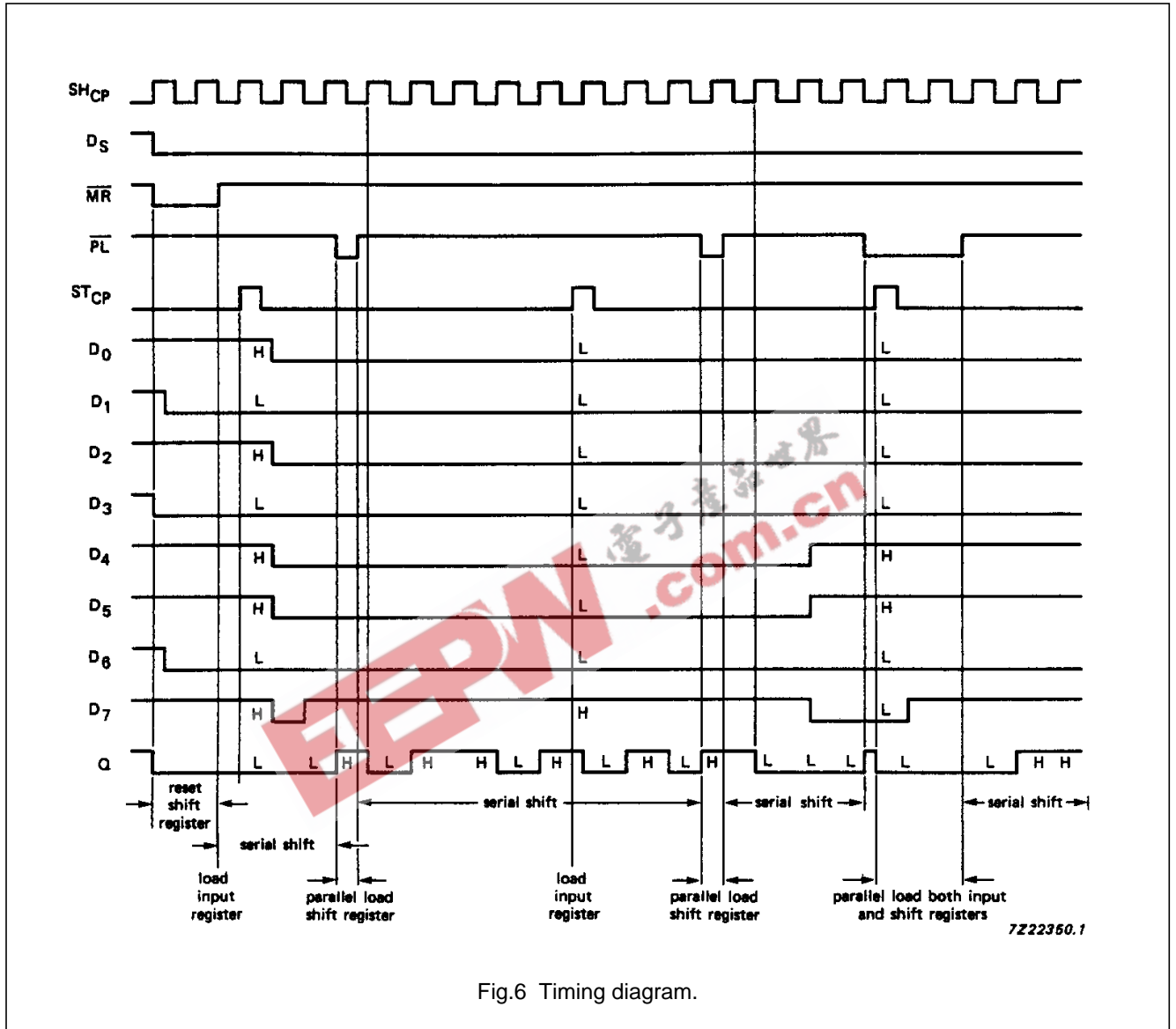


Fig.6 Timing diagram.

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

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**DC CHARACTERISTICS FOR 74HC**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I<sub>CC</sub> category: MSI

**AC CHARACTERISTICS FOR 74HC**

GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

SYMBOL	PARAMETER	T <sub>amb</sub> (°C)						UNIT	TEST CONDITIONS		
		74HC							V <sub>CC</sub> (V)	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay SH <sub>CP</sub> to Q		55 20 16	175 35 30		220 44 37	265 53 45	ns	2.0 4.5 6.0	Fig.7	
t <sub>PHL</sub>	propagation delay MR to Q		58 21 17	175 35 30		220 44 37	265 53 45	ns	2.0 4.5 6.0	Fig.8	
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay ST <sub>CP</sub> to Q		80 29 23	250 50 43		315 63 54	375 75 64	ns	2.0 4.5 6.0	Fig.7	
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay PL to Q		69 25 20	215 43 37		270 54 46	325 65 55	ns	2.0 4.5 6.0	Fig.9	
t <sub>THL</sub> / t <sub>TLH</sub>	output transition time		19 7 6	75 15 13		95 19 16	110 22 19	ns	2.0 4.5 6.0	Fig.9	
t <sub>w</sub>	ST <sub>CP</sub> pulse width HIGH or LOW	80 16 14	11 4 3		100 20 17		120 24 20	ns	2.0 4.5 6.0	Fig.7	
t <sub>w</sub>	SH <sub>CP</sub> pulse width HIGH or LOW	80 16 14	14 5 4		100 20 17		120 24 20	ns	2.0 4.5 6.0	Fig.7	
t <sub>w</sub>	MR pulse width LOW	80 16 14	22 8 6		100 20 17		120 24 20	ns	2.0 4.5 6.0	Fig.8	
t <sub>w</sub>	PL pulse width LOW	80 16 14	22 8 6		100 20 17		120 24 20	ns	2.0 4.5 6.0	Fig.9	
t <sub>rem</sub>	removal time MR to SH <sub>CP</sub>	60 12 10	-3 -1 -1		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.10	
t <sub>su</sub>	set-up time D <sub>n</sub> to ST <sub>CP</sub>	60 12 10	8 3 2		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.11	

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SYMBOL	PARAMETER	$T_{amb}$ (°C)							UNIT	TEST CONDITIONS	
		74HC								$V_{CC}$ (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.	max.			
$t_{su}$	set-up time $D_S$ to $SH_{CP}$	60 12 10	11 4 3		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.11	
$t_{su}$	set-up time $\overline{PL}$ to $SH_{CP}$	60 12 10	11 4 3		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig.12	
$t_h$	hold time $D_n$ to $ST_{CP}$	5 5 5	-3 -1 -1		5 5 5		5 5 5	ns	2.0 4.5 6.0	Fig.11	
$t_h$	hold time $\overline{PL}$ , $D_S$ to $SH_{CP}$	5 5 5	-6 -2 -2		5 5 5		5 5 5	ns	2.0 4.5 6.0	Fig.11	
$f_{max}$	maximum pulse frequency $SH_{CP}$	6.0 30 35	29 87 104		4.8 24 28		4.0 20 24	MHz	2.0 4.5 6.0	Fig.7	



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**DC CHARACTERISTICS FOR 74HCT**

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I<sub>CC</sub> category: MSI

**Note to HCT types**

The value of additional quiescent supply current ( $\Delta I_{CC}$ ) for a unit load of 1 is given in the family specifications. To determine  $\Delta I_{CC}$  per input, multiply this value by the unit load coefficient shown in the table below.

INPUT	UNIT LOAD COEFFICIENT
D <sub>S</sub>	0.25
D <sub>n</sub>	0.30
$\overline{PL}$ , $\overline{MR}$	1.50
ST <sub>CP</sub> , SH <sub>CP</sub>	1.50

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## AC WAVEFORMS FOR 74HCT

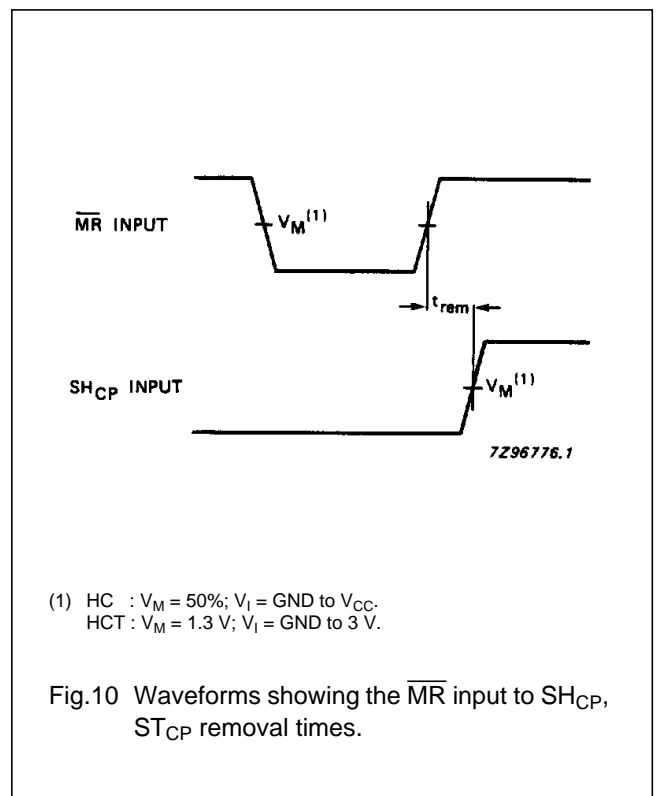
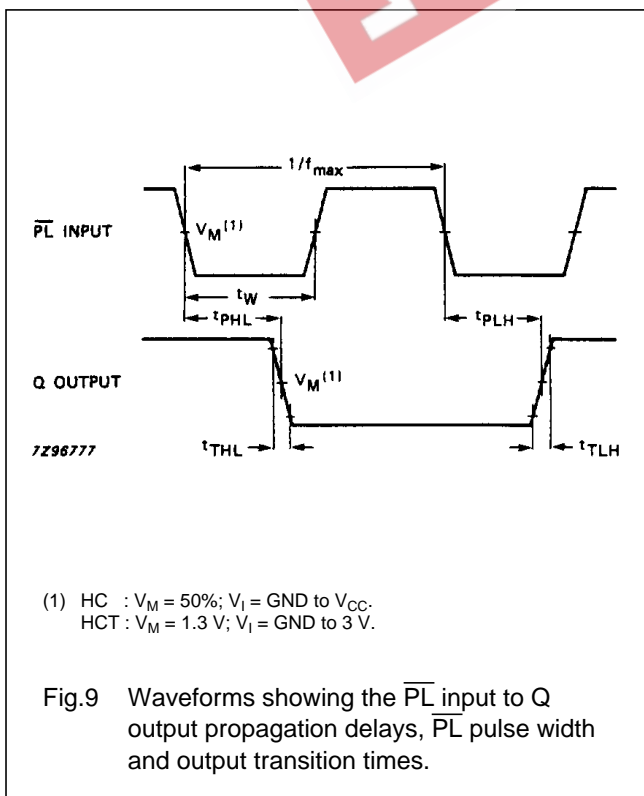
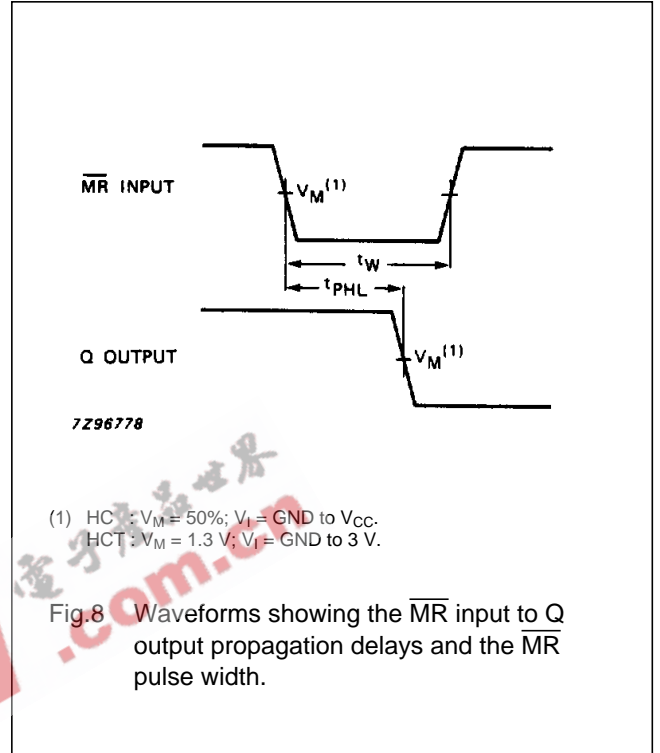
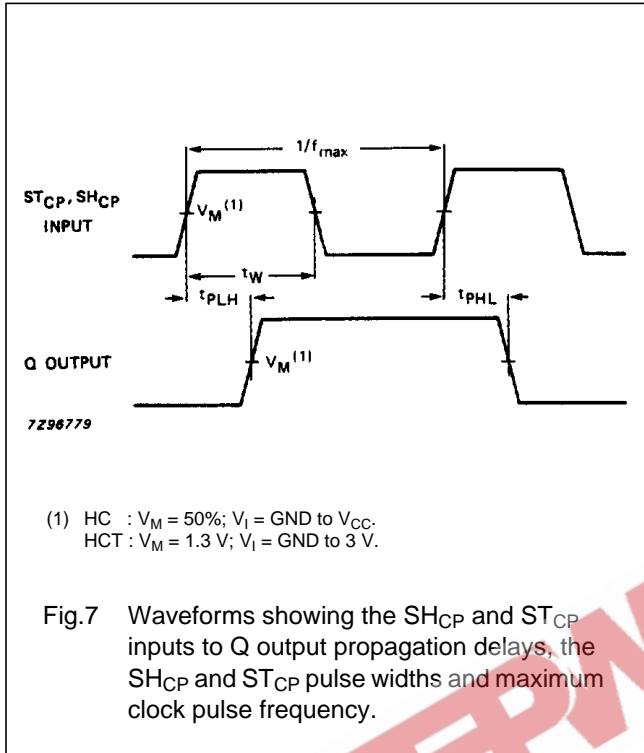
GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF

SYMBOL	PARAMETER	$T_{amb}$ (°C)						UNIT	TEST CONDITIONS		
		74HCT							$V_{CC}$ (V)	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
$t_{PHL}/t_{PLH}$	propagation delay SH <sub>CP</sub> to Q		23	40		50		60	ns	4.5	Fig.7
$t_{PHL}$	propagation delay MR to Q		28	49		61		74	ns	4.5	Fig.8
$t_{PHL}/t_{PLH}$	propagation delay ST <sub>CP</sub> to Q		33	57		71		86	ns	4.5	Fig.7
$t_{PHL}/t_{PLH}$	propagation delay PL to Q		30	52		65		78	ns	4.5	Fig.9
$t_{THL}/t_{TLH}$	output transition time		7	15		19		22	ns	4.5	Fig.9
$t_W$	SH <sub>CP</sub> pulse width HIGH or LOW	16	7		20		24		ns	4.5	Fig.7
$t_W$	ST <sub>CP</sub> pulse width HIGH or LOW	16	6		20		24		ns	4.5	Fig.7
$t_W$	MR pulse width LOW	25	14		31		38		ns	4.5	Fig.8
$t_W$	PL pulse width LOW	20	10		25		30		ns	4.5	Fig.9
$t_{rem}$	removal time MR to SH <sub>CP</sub>	12	-2		15		18		ns	4.5	Fig.10
$t_{su}$	set-up time D <sub>n</sub> to ST <sub>CP</sub>	12	5		15		18		ns	4.5	Fig.11
$t_{su}$	set-up time D <sub>S</sub> to SH <sub>CP</sub>	12	2		15		18		ns	4.5	Fig.11
$t_{su}$	set-up time PL to SH <sub>CP</sub>	12	4		15		18		ns	4.5	Fig.12
$t_h$	hold time D <sub>n</sub> to ST <sub>CP</sub>	5	-1		5		5		ns	4.5	Fig.11
$t_h$	hold time PL, D <sub>S</sub> to SH <sub>CP</sub>	5	-2		5		5		ns	4.5	Fig.11
$f_{max}$	maximum pulse frequency SH <sub>CP</sub>	30	75		24		20		MHz	4.5	Fig.7

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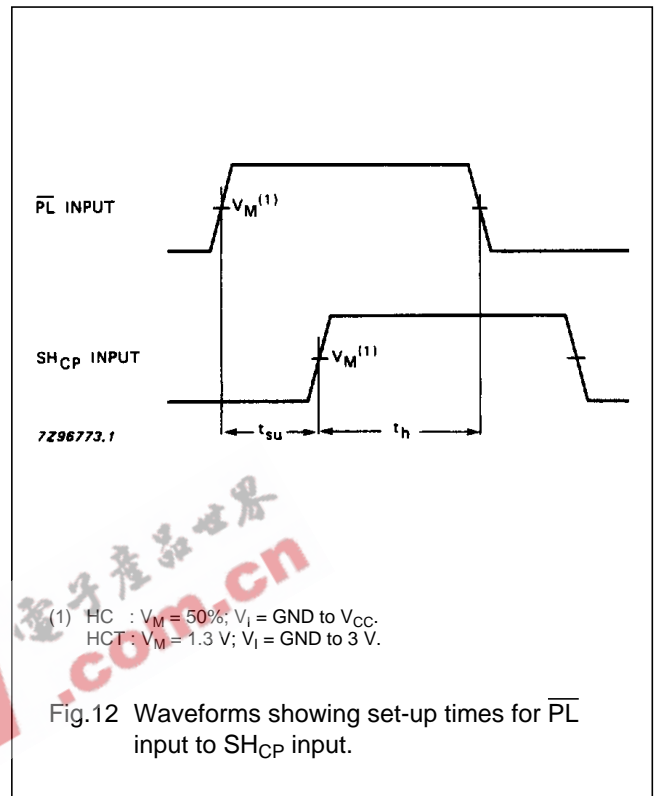
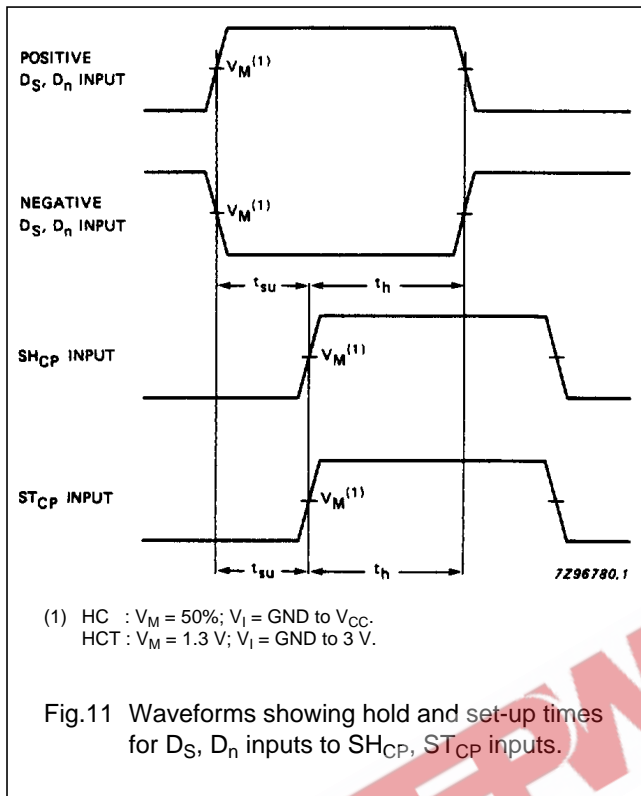
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AC WAVEFORMS



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PACKAGE OUTLINES

See "74HC/HCT/HCU/HCMOS Logic Package Outlines".