74HC573; 74HCT573

Octal D-type transparent latch; 3-state Rev. 6 — 26 January 2015

Product data sheet

General description 1.

The 74HC573; 74HCT573 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard no. 7A.

The 74HC573; 74HCT573 has octal D-type transparent latches featuring separate D-type inputs for each latch and 3-state true outputs for bus-oriented applications. A latch enable (LE) input and an output enable (OE) input are common to all latches.

When LE is HIGH, data at the Dn inputs enter the latches. In this condition, the latches are transparent, i.e. a latch output changes state each time its corresponding D input changes.

When LE is LOW the latches store the information that was present at the D-inputs a set-up time preceding the HIGH-to-LOW transition of LE. When OE is LOW, the contents of the 8 latches are available at the outputs. When OE is HIGH, the outputs go to the high-impedance OFF-state. Operation of the OE input does not affect the state of the latches.

The 74HC573; 74HCT573 is functionally identical to:

- 74HC563; 74HCT563, but inverted outputs
- 74HC373; 74HCT373, but different pin arrangement

2. Features and benefits

- Input levels:
 - ◆ For 74HC573: CMOS level
 - For 74HCT573: TTL level
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors and microcomputers
- 3-state non-inverting outputs for bus-oriented applications
- Common 3-state output enable input
- Multiple package options
- ESD protection:
 - HBM JESD22-A114F exceeds 2 000 V
 - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

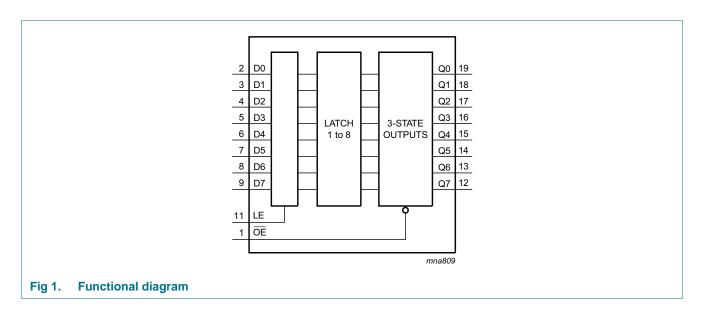


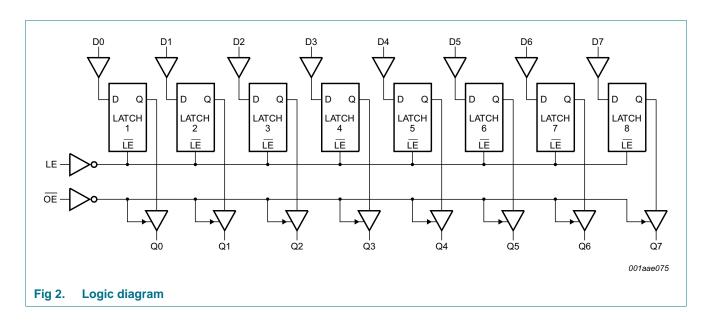
3. Ordering information

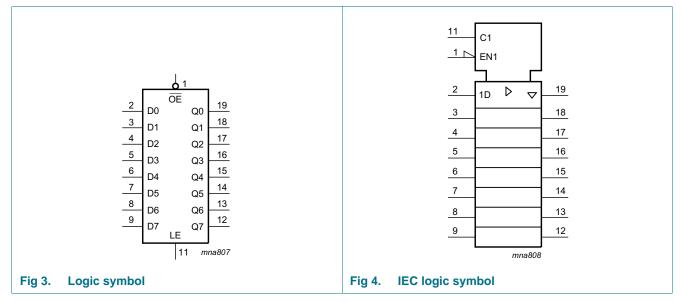
Table 1. Ordering information

Type number	Package									
	Temperature range	Name	Description	Version						
74HC573N	–40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1						
74HCT534N										
74HC573D	–40 °C to +125 °C	SO20	plastic small outline package; 20 leads;	SOT163-1						
74HCT573D			body width 7.5 mm							
74HC573DB	-40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads;	SOT339-1						
74HCT573DB			body width 5.3 mm							
74HC573PW	–40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads;	SOT360-1						
74HCT573PW			body width 4.4 mm							
74HC573BQ	-40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very	SOT764-1						
74HCT573BQ	-		thin quad flat package; no leads; 20 terminals; body $2.5 \times 4.5 \times 0.85$ mm							

4. Functional diagram

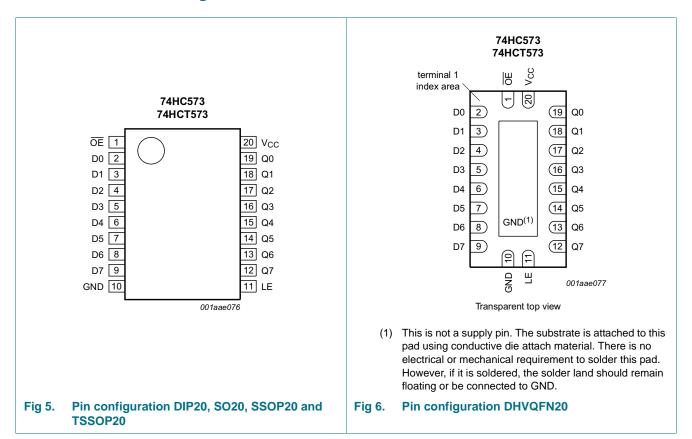






5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
ŌĒ	1	3-state output enable input (active LOW)
D[0:7]	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable input (active HIGH)
Q[0:7]	19, 18, 17, 16, 15, 14, 13, 12	3-state latch output
V_{CC}	20	supply voltage

6. Functional description

Table 3. Function table[1]

Operating mode	Control		Input	Internal	Output
	OE	LE	Dn	latches	Qn
Enable and read register (transparent	L	Н	L	L	L
mode)			Н	Н	Н
Latch and read register	L	L	I	L	L
			h	Н	Н
Latch register and disable outputs	Н	L	I	L	Z
			h	Н	Z

^[1] H = HIGH voltage level;

h = HIGH voltage level one set-up time prior to the HIGH-to-LOW LE 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	$V_{I} < -0.5 \text{ V or } V_{I} > V_{CC} + 0.5 \text{ V}$		-	±20	mA
I _{OK}	output clamping current	$V_{O} < -0.5 \text{ V or } V_{O} > V_{CC} + 0.5 \text{ V}$		-	±20	mA
Io	output current	$V_{O} = -0.5 \text{ V to } (V_{CC} + 0.5 \text{ V})$		-	±35	mA
I _{CC}	supply current			-	+70	mA
I _{GND}	ground current			-	-70	mA
T _{stg}	storage temperature			-65	+150	°C
P _{tot}	total power dissipation	DIP20 package	<u>[1]</u>	-	750	mW
		SO20, SSOP20, TSSOP20 and DHVQFN20 packages	[2]	-	500	mW

^[1] For DIP20 package: P_{tot} derates linearly with 12 mW/K above 70 °C.

For SSOP20 and TSSOP20 packages: P_{tot} derates linearly with 5.5 mW/K above 60 $^{\circ}\text{C}.$

For DHVQFN20 package: P_{tot} derates linearly with 4.5 mW/K above 60 °C.

L = LOW voltage level;

I = LOW voltage level one set-up time prior to the HIGH-to-LOW LE transition;

Z = high-impedance OFF-state.

^[2] For SO20: P_{tot} derates linearly with 8 mW/K above 70 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions 74HC573				7	4HCT57	3	Unit
			Min	Тур	Max	Min	Тур	Max	_
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	V _{CC}	0	-	V _{CC}	V
Vo	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 2.0 V	-	-	625	-	-	-	ns/V
		V _{CC} = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V _{CC} = 6.0 V	-	-	83	-	-	-	ns/V

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions		25 °C		-40 °C t	o +85 °C	–40 °C to	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HC573	3							1		1
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
	input voltage	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	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
	input voltage	V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		$V_{CC} = 6.0 \text{ V}$	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = -20 \mu A; V_{CC} = 2.0 V$	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -20 \mu A; V_{CC} = 4.5 V$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -20 \mu A; V_{CC} = 6.0 V$	5.9	6.0	-	5.9	-	5.9	-	V
		$I_{O} = -6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.98	4.32	-	3.84	-	3.7	-	V
		$I_{O} = -7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = 20 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 20 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 20 \mu A; V_{CC} = 6.0 \text{ V}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.26	-	0.33	-	0.4	V
		$I_O = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μА
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.5	-	±5.0	-	±10.0	μΑ

 Table 6.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions		25 °C		-40 °C t	o +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0 \text{ V}$	-	-	8.0	-	80	-	160	μΑ
C _I	input capacitance		-	3.5	-					pF
74HCT5	73		1		1					
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}	·									
	output voltage	$I_{O} = -20 \mu A$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -6 \text{ mA}$	3.98	4.32	-	3.84	-	3.7	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 20 μA	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 6.0 \text{ mA}$	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μА
I _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V; $V_O = V_{CC}$ or GND per input pin; other inputs at V_{CC} or GND; $I_O = 0$ A	-	-	±0.5	-	±5.0	-	±10	μА
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	8.0	-	80	-	160	μΑ
Δl _{CC}	additional supply current	$\begin{aligned} &V_{I} = V_{CC} - 2.1 \text{ V;} \\ &\text{other inputs at } V_{CC} \text{ or GND;} \\ &V_{CC} = 4.5 \text{ V to } 5.5 \text{ V;} \\ &I_{O} = 0 \text{ A} \end{aligned}$								
		per input pin; Dn inputs	-	35	126	-	158	-	172	μΑ
		per input pin; LE input	-	65	234	-	293	-	319	μΑ
		per input pin; OE input	-	125	450	-	563	-	613	μΑ
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 11.

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HC573	3									
t _{pd}	propagation	Dn to Qn; see Figure 7	1]							
	delay	V _{CC} = 2.0 V	-	47	150	-	190	-	225	ns
		V _{CC} = 4.5 V	-	17	30	-	38	-	45	ns
		V _{CC} = 5 V; C _L = 15 pF	-	14	-	-	-	-	-	ns
		V _{CC} = 6.0 V	-	14	26	-	33	-	38	ns
t _{pd}	propagation	LE to Qn; see Figure 8	1]							
	delay	V _{CC} = 2.0 V	-	50	150	-	190	-	225	ns
		V _{CC} = 4.5 V	-	18	30	-	38	-	45	ns
		V _{CC} = 5 V; C _L = 15 pF	-	15	-	-	-	-	-	ns
		V _{CC} = 6.0 V	-	14	26	-	33	-	38	ns
t _{en}	enable time		[2]							
		V _{CC} = 2.0 V	-	44	140	-	175	-	210	ns
		V _{CC} = 4.5 V	-	16	28	-	35	-	42	ns
		V _{CC} = 6.0 V	-	13	24	-	30	-	36	ns
t _{dis}	disable time		3]							
disdisio timo	V _{CC} = 2.0 V	-	55	150	-	190	-	225	ns	
		V _{CC} = 4.5 V	-	20	30	-	38	-	45	ns
		V _{CC} = 6.0 V	-	16	26	-	33	-	38	ns
t _t	transition		4]							
	time	V _{CC} = 2.0 V	-	14	60	-	75	-	90	ns
		V _{CC} = 4.5 V	-	5	12	-	15	-	18	ns
		V _{CC} = 6.0 V	-	4	10	-	13	-	15	ns
t _W	pulse width	LE HIGH; see Figure 8								
		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
t _{su}	set-up time	Dn to LE; see Figure 10								
		V _{CC} = 2.0 V	50	11	-	65	-	75	-	ns
		V _{CC} = 4.5 V	10	4	-	13	-	15	-	ns
		V _{CC} = 6.0 V	9	3	-	11	-	13	-	ns
t _h	hold time	Dn to LE; see Figure 10								
		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
C _{PD}	power dissipation capacitance		5] _	26	-	-	-	-	-	pF

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 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 11.

Symbol P	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
74HCT5	73							1			-1
t _{pd}	propagation	Dn to Qn; see Figure 7	[1]								
	delay	V _{CC} = 4.5 V		-	20	35	-	44	-	53	ns
		V _{CC} = 5 V; C _L = 15 pF		-	17	-	-	-	-	-	ns
t _{pd}	propagation	LE to Qn; see Figure 8	[1]								
	delay	V _{CC} = 4.5 V		-	18	35	-	44	-	53	ns
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$		-	15	-	-	-	-	-	ns
t _{en}	enable time	OE to Qn; see Figure 9	[2]								
	V _{CC} = 4.5 V			-	17	30	-	38	-	45	ns
t _{dis}	disable time	OE to Qn; see Figure 9	[3]								
		V _{CC} = 4.5 V		-	18	30	-	38	-	45	ns
t _t	transition	Qn; see Figure 7	[4]								
	time	V _{CC} = 4.5 V		-	5	12	-	15	-	18	ns
t _W	pulse width	LE HIGH; see Figure 8									
		V _{CC} = 4.5 V		16	5	-	20	-	24	-	ns
t _{su}	set-up time	Dn to LE; see Figure 10									
		V _{CC} = 4.5 V		13	7	-	16	-	20	-	ns
t _h	hold time	Dn to LE; see Figure 10									
		V _{CC} = 4.5 V		9	4	-	11	-	15	-	ns
C _{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz; V _I = GND to V _{CC} - 1.5 V	[5]	-	26	-	-	-	-	-	pF

- [1] t_{pd} is the same as t_{PLH} and t_{PHL} .
- [2] t_{en} is the same as t_{PZH} and t_{PZL} .
- [3] t_{dis} is the same as t_{PLZ} and t_{PHZ} .
- [4] t_t is the same as t_{THL} and t_{TLH} .
- [5] C_{PD} is used to determine the dynamic power dissipation (P_D 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_i = input frequency in MHz;

f_o = output frequency in MHz;

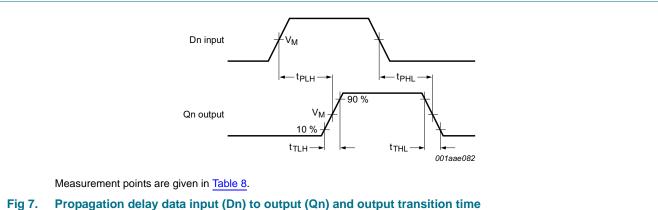
C_L = output load capacitance in pF;

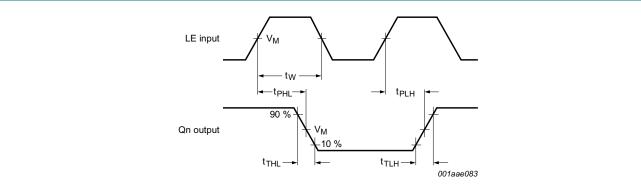
V_{CC} = supply voltage in V;

N = number of inputs switching;

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

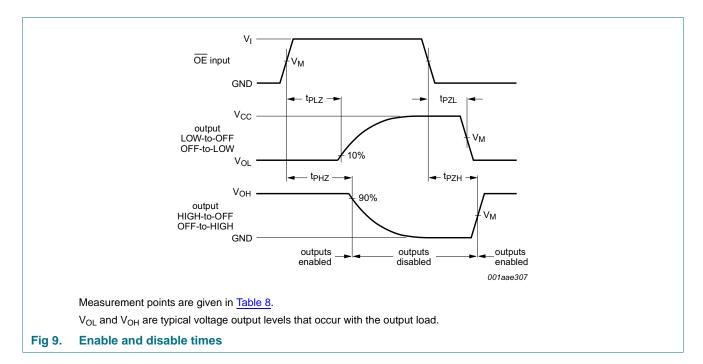
11. Waveforms





Measurement points are given in Table 8.

Fig 8. Pulse width latch enable input (LE), propagation delay latch enable input (LE) to output (Qn) and output transition time



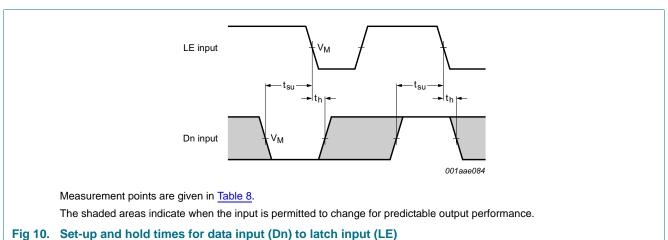
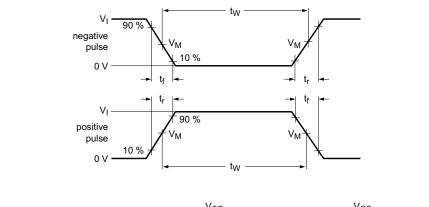
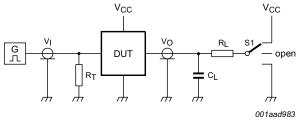


Table 8. Measurement points

Туре	Input	Output
	V _M	V _M
74HC573	0.5V _{CC}	0.5V _{CC}
74HCT573	1.3 V	1.3 V

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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 11. Test circuit for measuring switching times

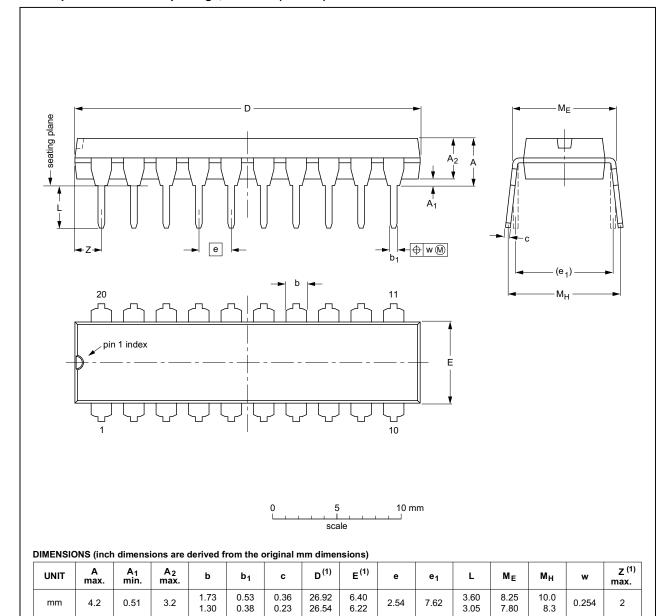
Table 9. Test data

Туре	Input		Load		S1 position			
	VI	t _r , t _f	CL	R _L	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}	
74HC573	V _{CC}	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	
74HCT573	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	

12. Package outline

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1



inches

0.17

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

0.068

0.021

0.015

0.014

0.009

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT146-1		MS-001	SC-603			99-12-27 03-02-13

1.060

0.25

0.14

0.3

0.32

0.39

0.01

0.078

Fig 12. Package outline SOT146-1 (DIP20)

0.02

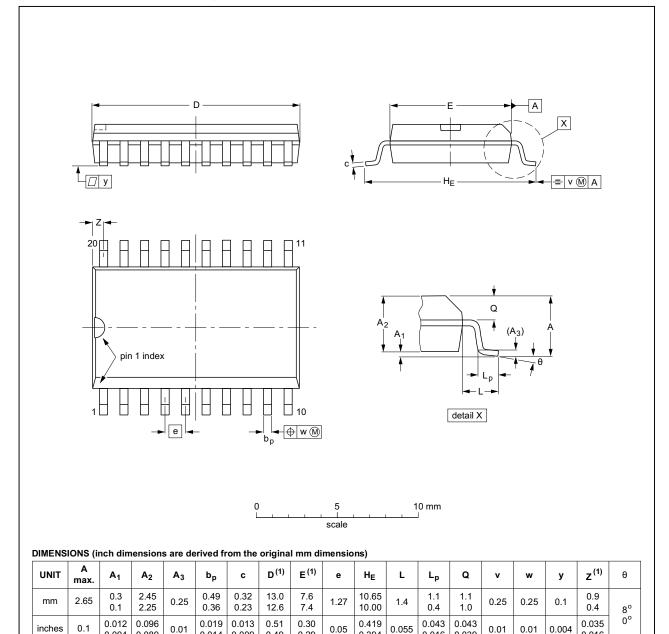
0.13

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

SOT163-1



Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

0.014

0.009

OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT163-1	075E04	MS-013				99-12-27 03-02-19	

0.394

0.016

0.039

Fig 13. Package outline SOT163-1 (SO20)

0.004

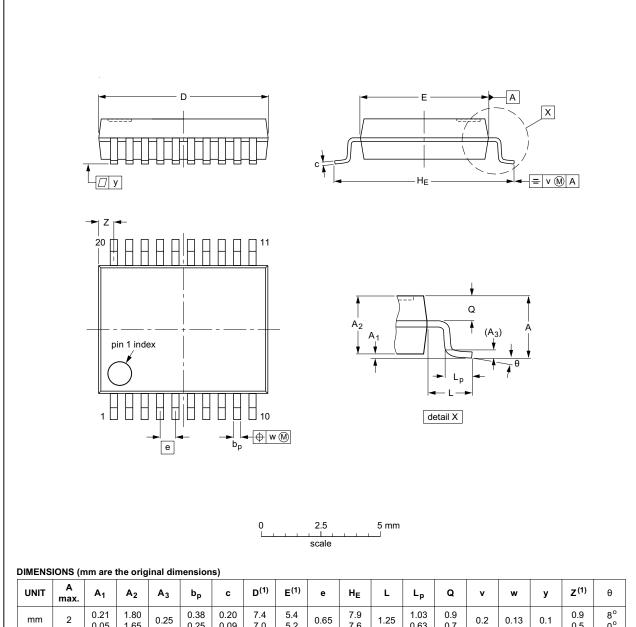
0.089

74HC_HCT573

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SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	ø	v	¥	у	Z ⁽¹⁾	θ
mm	2	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	7.4 7.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	0.9 0.5	8° 0°

Note

1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT339-1		MO-150				99-12-27 03-02-19	

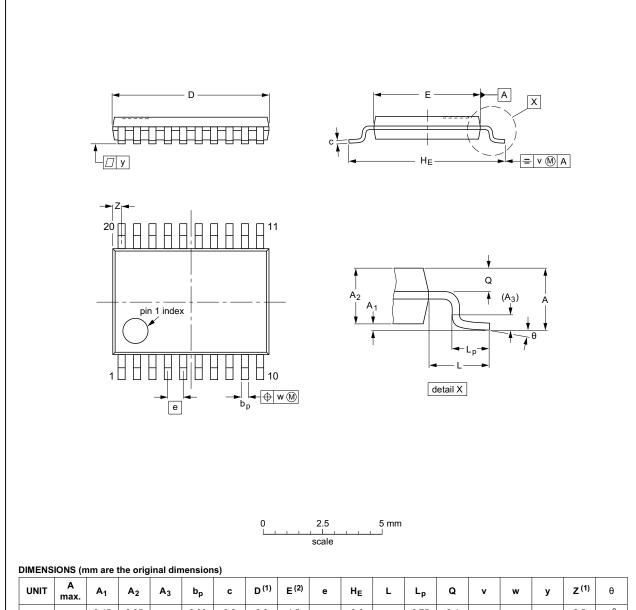
Fig 14. Package outline SOT339-1 (SSOP20)

74HC_HCT573

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

SOT360-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	C	D ⁽¹⁾	E ⁽²⁾	e	HE	L	Lp	Q	>	w	у	Z ⁽¹⁾	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	6.6 6.4	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	8° 0°

Notes

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

		EUROPEAN	ISSUE DATE			
IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
	MO-153				99-12-27 03-02-19	
_	IEC				IEC JEDEC JEHA	

Fig 15. Package outline SOT360-1 (TSSOP20)

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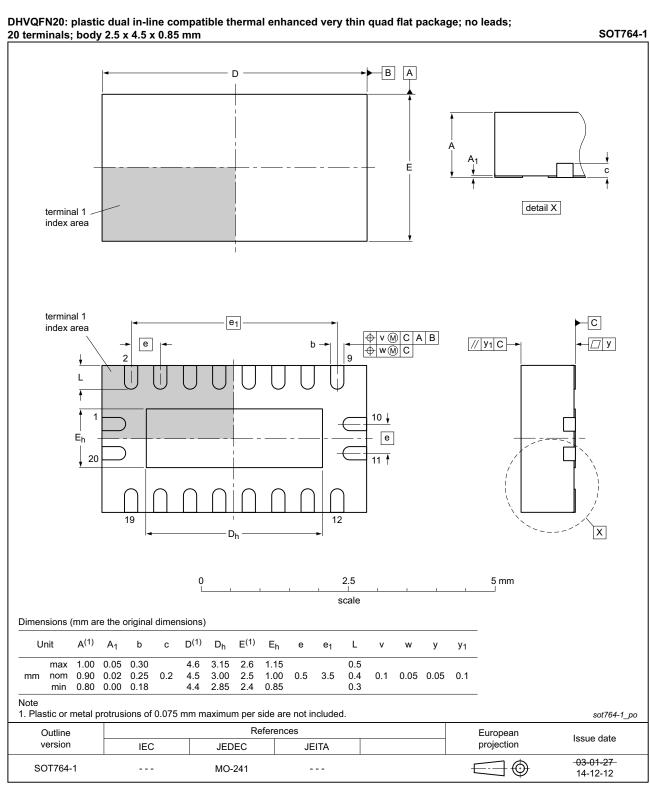


Fig 16. Package outline SOT764-1 (DHVQFN20)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	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_HCT573 v.6	20150126	Product data sheet	-	74HC_HCT573 v.5					
Modifications:	• <u>Table 7</u> : Po	wer dissipation capacitance	e condition for 74HCT	573 is corrected.					
74HC_HCT573 v.5	20120815	Product data sheet	-	74HC_HCT573 v.4					
Modifications:	Alternative	Alternative descriptive title corrected (errata).							
74HC_HCT573 v.4	20120806	Product data sheet	-	74HC_HCT573 v.3					
Modifications:	guidelines								
74HC HCT573 v.3	20060117	Product data sheet	-	74HC HCT573 CNV v.2					
74HC_HCT573_CNV v.2	19901201	Product specification	-	-					

15. Legal information

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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.

- Please consult the most recently issued document before initiating or completing a design.
- The term 'short data sheet' is explained in section "Definitions"
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Octal D-type transparent latch; 3-state

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