Octal D-type transparent latch; 3-state Rev. 8 — 10 September 2021

1. General description

The 74HC573; 74HCT573 is an 8-bit D-type transparent latch with 3-state outputs. The device features latch enable (LE) and output enable (\overline{OE}) inputs. When LE is HIGH, data at the inputs enter the latches. In this condition the latches are transparent, a latch output will change each time its corresponding D-input changes. When LE is LOW the latches store the information that was present at the inputs a set-up time preceding the HIGH-to-LOW transition of LE. A HIGH on \overline{OE} causes the outputs to assume a high-impedance OFF-state. Operation of the \overline{OE} input does not affect the state of the latches. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

2. Features and benefits

- Wide supply voltage range from 2.0 to 6.0 V
- CMOS low power dissipation
- High noise immunity
- 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
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
 - Complies with JEDEC standards:
 - JESD8C (2.7 V to 3.6 V)
 - JESD7A (2.0 V to 6.0 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- 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				
74HC573D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads;	SOT163-1				
74HCT573D			body width 7.5 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	SOT764-1				
74HCT573BQ	_	very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm						

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Octal D-type transparent latch; 3-state

4. Functional diagram

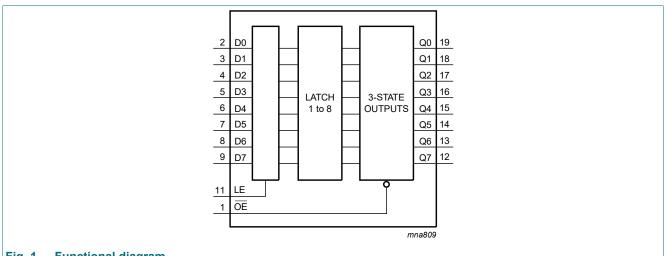
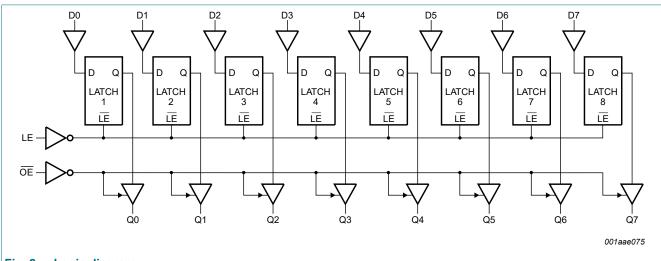
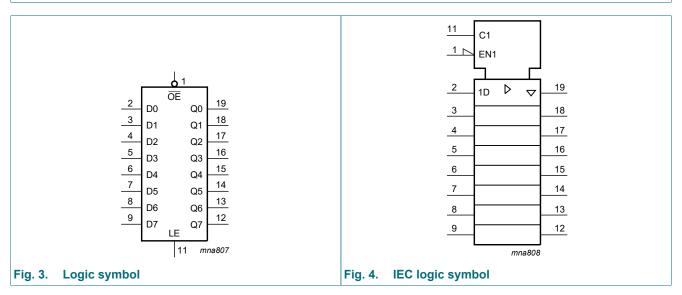


Fig. 1. Functional diagram

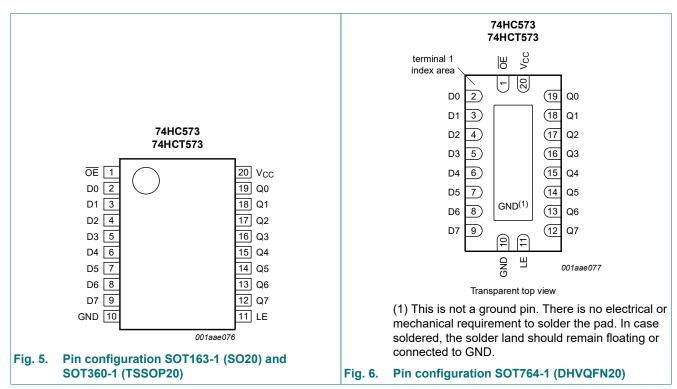






74HC_HCT573

5. Pinning information



5.1. Pinning

5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
ŌE	1	3-state output enable input (active LOW)
D0, D1, D2, D3, D4, D5, D6, D7	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable input (active HIGH)
Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7	19, 18, 17, 16, 15, 14, 13, 12	3-state latch output
V _{CC}	20	supply voltage

6. Functional description

Table 3. Function table

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

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.

Operating mode	Control		Input	Internal latches	Output
	OE	LE	Dn		Qn
Enable and read register	L	Н	L	L	L
ransparent mode)			Н	Н	Н
Latch and read register	L	L	1	L	L
			h	Н	Н
tch register and disable outputs H		1	L	Z	
			h	Н	Z

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 V or V_{I} > V_{CC} + 0.5 V	-	±20	mA
I _{OK}	output clamping current	$V_{\rm O}$ < -0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V	-	±20	mA
I _O	output current	V_{O} = -0.5 V to (V _{CC} + 0.5 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	[1]	-	500	mW

[1] For SOT163-1 (SO20) package: P_{tot} derates linearly with 12.3 mW/K above 109 °C.

For SOT360-1 (TSSOP20) package: P_{tot} derates linearly with 10.0 mW/K above 100 °C.

For SOT764-1 (DHVQFN20) package: Ptot derates linearly with 12.9 mW/K above 111 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions		74HC573			74HCT573			
			Min	Тур	Max	Min	Тур	Max	1	
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	V _{CC} = 2.0 V	-	-	625	-	-	-	ns/V	
	rate	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			°C to 5 °C		°C to 5 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	1
74HC57	3									
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
VIL	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 V	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	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 = -6.0 mA; V _{CC} = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I _O = -7.8 mA; V _{CC} = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	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 = 6.0 mA; V _{CC} = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I _O = 7.8 mA; V _{CC} = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
l _l	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0 V$	-	-	±0.1	-	±1.0	-	±1.0	μA
I _{OZ}	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 6.0 \text{ V};$ $V_O = V_{CC} \text{ or GND}$	-	-	±0.5	-	±5.0	-	±10.0	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V	-	-	8.0	-	80	-	160	μA
CI	input capacitance		-	3.5	-					pF
74HCT5	73									
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	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -20 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -6 mA	3.98	4.32	-	3.84	-	3.7	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 20 μA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 6.0 mA	-	0.16	0.26	-	0.33	-	0.4	V

Octal D-type transparent latch; 3-state

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Тур	Мах	Min	Max	Min	Max	
l _l	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 5.5 V$	-	-	±0.1	-	±1.0	-	±1.0	μA
I _{OZ}		$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 5.5 \text{ V};$ $V_{O} = V_{CC} \text{ or GND}$	-	-	±0.5	-	±5.0	-	±10	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	8.0	-	80	-	160	μA
ΔI _{CC}	additional supply current	$V_1 = V_{CC} - 2.1 V;$ other inputs at V_{CC} or GND; $V_{CC} = 4.5 V$ to 5.5 V; $I_0 = 0 A$								
		per input pin; Dn inputs	-	35	126	-	158	-	172	μA
		per input pin; LE input	-	65	234	-	293	-	319	μA
		per input pin; OE input	-	125	450	-	563	-	613	μA
Cı	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 Fig. 11.

Symbol	Parameter	Conditions		25 °C			°C to 5 °C	-40 °C to +125 °C		Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HC57	3									
t _{pd}	propagation	Dn to Qn; see Fig. 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
		LE to Qn; see Fig. 8 [1]								
		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	OE to Qn; see Fig. 9 [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	OE to Qn; see Fig. 9 [3]								
		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

Octal D-type transparent latch; 3-state

Symbol	Parameter	Conditions			25 °C			°C to 5 °C		°C to 5 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
t _t	transition time	Qn; see <u>Fig. 7</u>	[4]								
		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 <u>Fig. 8</u>									
		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 <u>Fig. 10</u>									
		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 <u>Fig. 10</u>									
		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	C_L = 50 pF; f = 1 MHz; V _I = GND to V _{CC}	[5]	-	26	-	-	-	-	-	pF
74HCT5	73	1					1				_
t _{pd}	propagation	Dn to Qn; see <u>Fig. 7</u>	[1]								
	delay	V _{CC} = 4.5 V		-	20	35	-	44	-	53	ns
		V _{CC} = 5 V; C _L = 15 pF		-	17	-	-	-	-	-	ns
		LE to Qn; see <u>Fig. 8</u>	[1]								
		V _{CC} = 4.5 V		-	18	35	-	44	-	53	ns
		V _{CC} = 5 V; C _L = 15 pF		-	15	-	-	-	-	-	ns
t _{en}	enable time	OE to Qn; see <u>Fig. 9</u>	[2]								
		V _{CC} = 4.5 V		-	17	30	-	38	-	45	ns
t _{dis}	disable time	OE to Qn; see <u>Fig. 9</u>	[3]								
		V _{CC} = 4.5 V		-	18	30	-	38	-	45	ns
tt	transition time	Qn; see <u>Fig. 7</u>	[4]								
		V _{CC} = 4.5 V		-	5	12	-	15	-	18	ns
t _W	pulse width	LE HIGH; see <u>Fig. 8</u>									
		V _{CC} = 4.5 V		16	5	-	20	-	24	-	ns

Octal D-type transparent latch; 3-state

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Тур	Max	Min	Max	Min	Max	
t _{su}	set-up time	Dn to LE; see <u>Fig. 10</u>								
		V _{CC} = 4.5 V	13	7	-	16	-	20	-	ns
t _h	hold time	Dn to LE; see <u>Fig. 10</u>								
		V _{CC} = 4.5 V	9	4	-	11	-	15	-	ns
C _{PD}	power dissipation capacitance	$C_L = 50 \text{ pF}; f = 1 \text{ MHz};$ [5] V _I = GND to V _{CC} - 1.5 V	-	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).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

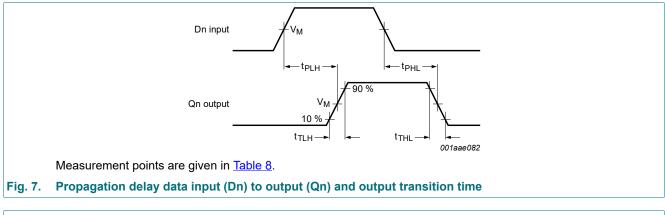
 C_L = output load capacitance in pF;

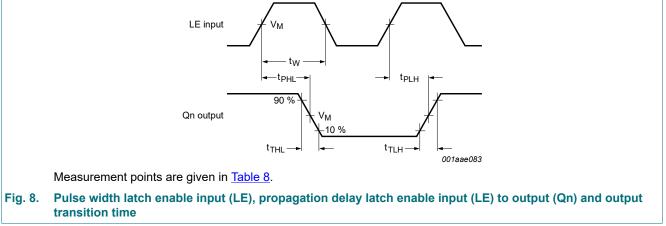
 V_{CC} = supply voltage in V;

N = number of inputs switching;

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

10.1. Waveforms and test circuit

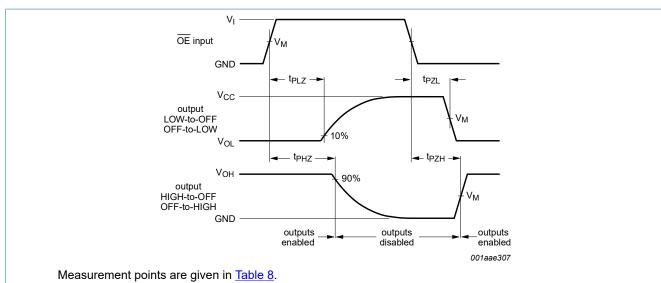




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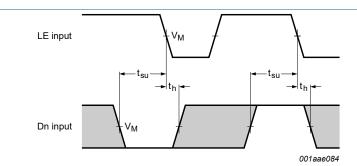
74HC573; 74HCT573

Octal D-type transparent latch; 3-state



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

Fig. 9. Enable and disable times



Measurement points are given in <u>Table 8</u>.

The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig. 10. Set-up and hold times for data input (Dn) to latch input (LE)

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

Octal D-type transparent latch; 3-state

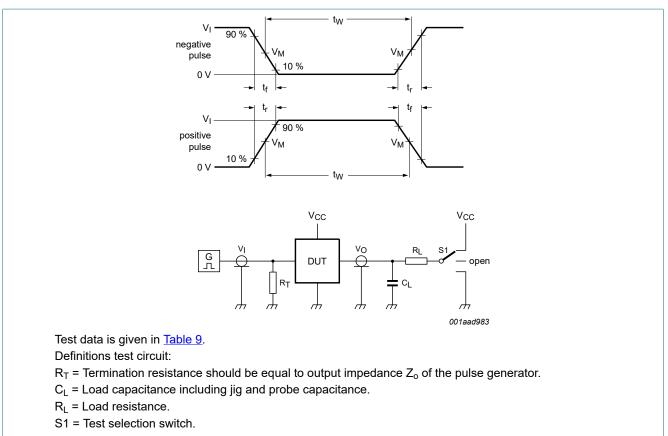


Fig. 11. Test circuit for measuring switching times

Table 9. Test data

Туре	Input		Load		S1 position			
	VI	t _r , t _f	CL	RL	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}	

11. Package outline

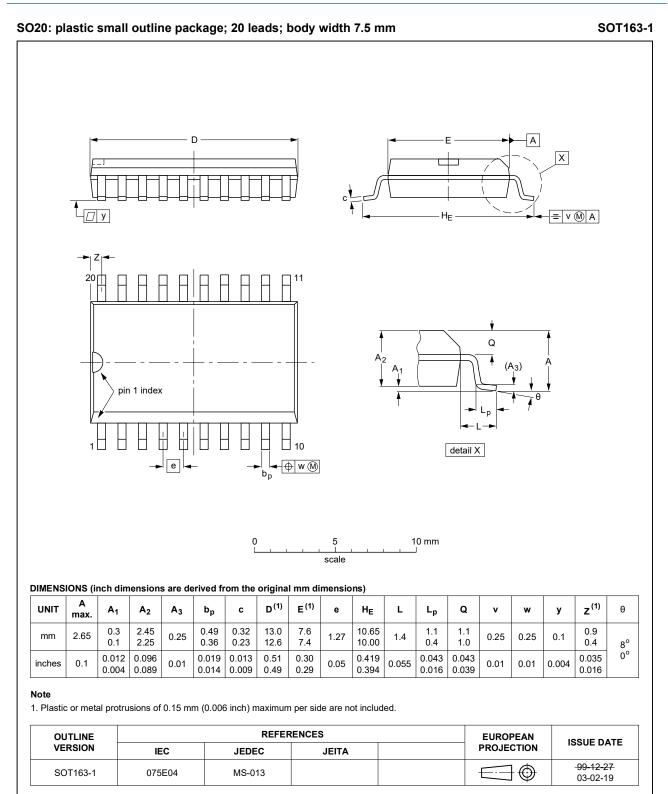


Fig. 12. Package outline SOT163-1 (SO20)

Octal D-type transparent latch; 3-state

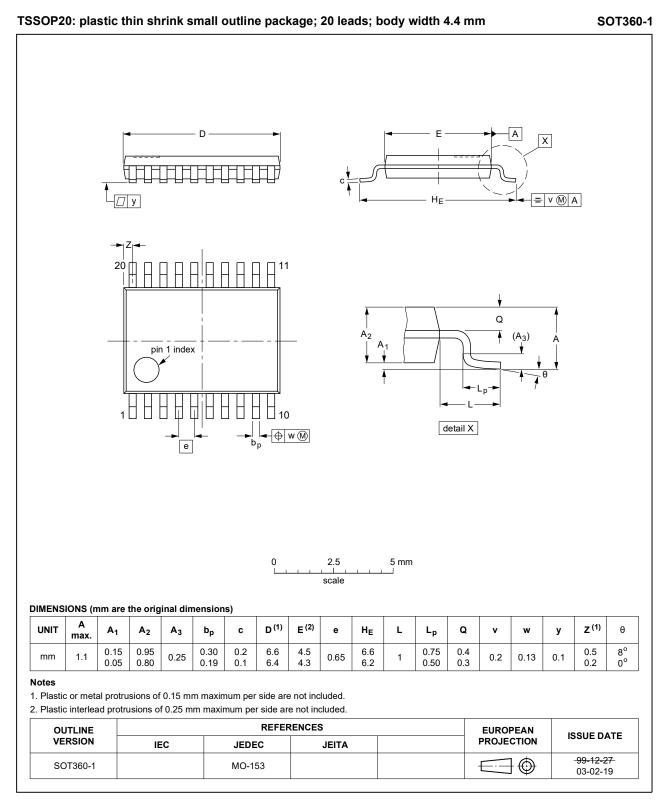


Fig. 13. Package outline SOT360-1 (TSSOP20)

Octal D-type transparent latch; 3-state

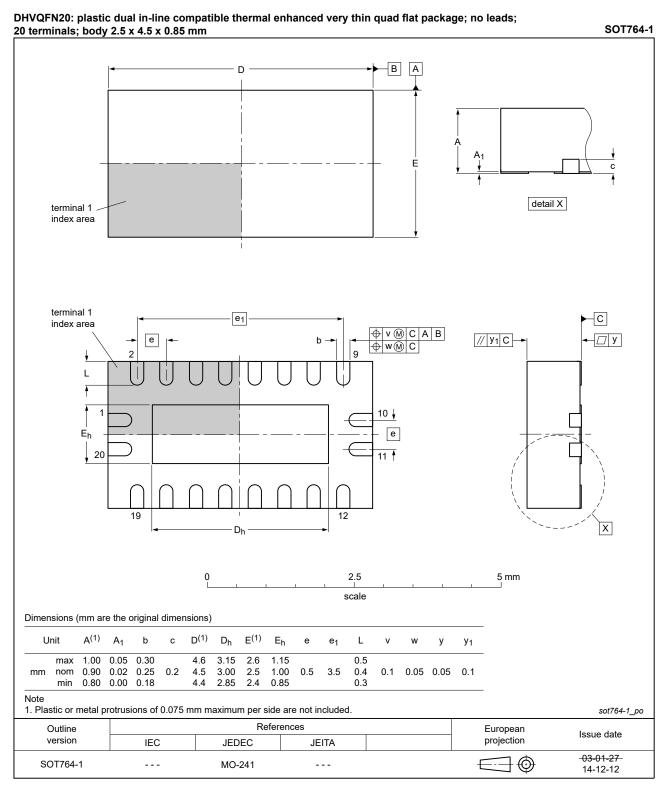


Fig. 14. Package outline SOT764-1 (DHVQFN20)

12. 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			

13. Revision history

Table 11. Revision history						
Document ID	Release date	Data sheet status	Change notice	Supersedes		
74HC_HCT573 v.8	20210910	Product data sheet	-	74HC_HCT573 v.7		
Modifications:	 Type numbers 74HC573DB and 74HCT573DB (SO339-1/SSOP20) removed. <u>Section 2</u> updated. <u>Section 7</u>: Derating values for P_{tot} have been updated. 					
74HC_HCT573 v.7	20160304	Product data sheet	-	74HC_HCT573 v.6		
Modifications:	Type numbers 74HC573N and 74HCT573N (SOT146-1) removed.					
74HC_HCT573 v.6	20150126	Product data sheet	-	74HC_HCT573 v.5		
Modifications:	• <u>Table 7</u> : Power dissipation capacitance condition for 74HCT573 is corrected.					
74HC_HCT573 v.5	20120815	Product data sheet	-	74HC_HCT573 v.4		
Modifications:	Alternative descriptive title corrected (errata).					
74HC_HCT573 v.4	20120806	Product data sheet	-	74HC_HCT573 v.3		
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_HCT573 v.3	20060117	Product data sheet	-	74HC_HCT573_CNV v.2		
74HC_HCT573_CNV v.2	19901201	Product specification	-	-		

14. Legal information

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.

 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 <u>https://www.nexperia.com</u>.

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Octal D-type transparent latch; 3-state

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