Octal D-type transparent latch; 3-state Rev. 5 — 13 December 2011

#### **General description** 1.

The 74HC373; 74HCT373 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL. It is specified in compliance with JEDEC standard no. 7A.

The 74HC373; 74HCT373 is an octal D-type transparent latch featuring separate D-type inputs for each latch and 3-state outputs for bus oriented applications. A latch enable (LE) input and an output enable  $(\overline{OE})$  input are common to all latches.

The 74HC373; 74HCT373 consists of eight D-type transparent latches with 3-state true outputs. When LE is HIGH, data at the Dn inputs enters the latches. In this condition the latches are transparent, i.e. a latch output will change 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 highimpedance OFF-state. Operation of the OE input does not affect the state of the latches.

The 74HC373; 74HCT373 is functionally identical to:

- 74HC563; 74HCT563: but inverted outputs and different pin arrangement
- 74HC573; 74HCT573: but different pin arrangement

#### Features and benefits 2.

- 3-state non-inverting outputs for bus oriented applications
- Common 3-state output enable input
- Functionally identical to the 74HC563; 74HCT563 and 74HC573; 74HCT573
- 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

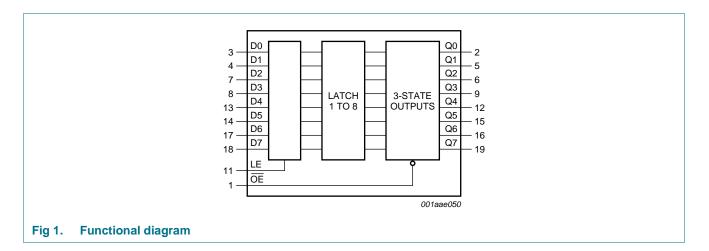


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# 3. Ordering information

Table 1. Orc	lering information			
Type number	Package			
	Temperature range	Name	Description	Version
74HC373N	–40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HCT373N				
74HC373D	–40 °C to +125 °C	SO20	plastic small outline package; 20 leads;	SOT163-1
74HCT373D			body width 7.5 mm	
74HC373DB	–40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads;	SOT339-1
74HCT373DB			body width 5.3 mm	
74HC373PW	–40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads;	SOT360-1
74HCT373PW			body width 4.4 mm	
74HC373BQ	–40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very	SOT764-1
74HCT373BQ			thin quad flat package; no leads; 20 terminals; body $2.5 \times 4.5 \times 0.85$ mm	

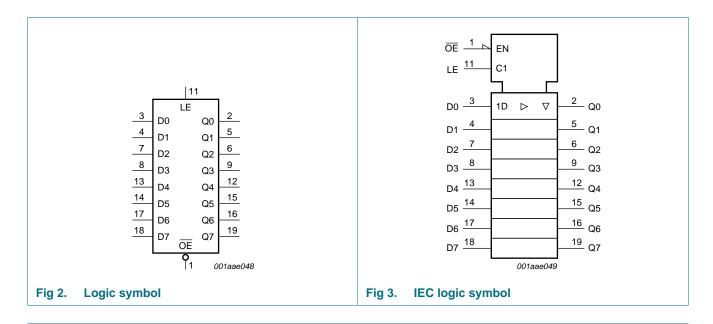
# 4. Functional diagram

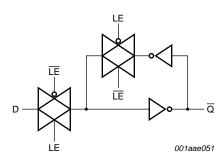


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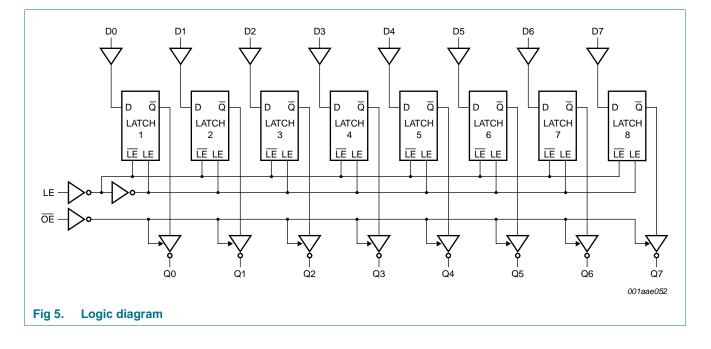
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### Fig 4. Logic diagram (one latch)

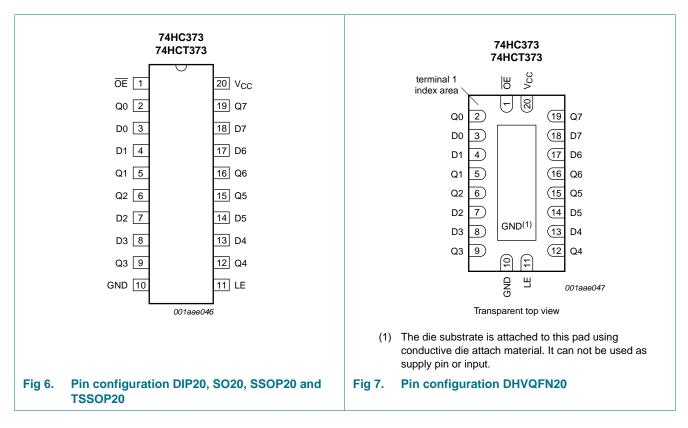


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# 5. Pinning information

## 5.1 Pinning



## 5.2 Pin description

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

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# 6. Functional description

## 6.1 Function table

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

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

[1] 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;

X = don't care;

Z = high-impedance OFF-state.

# 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 <sub>CC</sub>	supply voltage		-0.5	+7	V
I <sub>IK</sub>	input clamping current	$V_{\rm I}$ < –0.5 V or $V_{\rm I}$ > $V_{\rm CC}$ + 0.5 V	-	±20	mA
I <sub>OK</sub>	output clamping current	$V_{\rm O}$ < –0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V	-	±20	mA
lo	output current	$V_{O} = -0.5 \text{ V}$ to ( $V_{CC} + 0.5 \text{ V}$ )	-	±35	mA
I <sub>CC</sub>	supply current		-	+70	mA
I <sub>GND</sub>	ground current		-	-70	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation				
		DIP20 package	<u>[1]</u> _	750	mW
		SO20 package	[2] _	500	mW
		SSOP20 package	[3]	500	mW
		TSSOP20 package	[3]	500	mW
		DHVQFN20 package	[4] _	500	mW

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

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

[3] For SSOP20 and TSSOP20 packages: P<sub>tot</sub> derates linearly with 5.5 mW/K above 60  $^\circ$ C.

[4] For DHVQFN20 package:  $P_{tot}$  derates linearly with 4.5 mW/K above 60  $^\circ C.$ 

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# 8. Recommended operating conditions

## Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions	-	74HC373	3	7	4HCT37	3	Unit
			Min	Тур	Max	Min	Тур	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	V <sub>CC</sub>	0	-	$V_{CC}$	V
Vo	output voltage		0	-	V <sub>CC</sub>	0	-	$V_{CC}$	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t / \Delta V$	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 74HC373

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

Symbol	Parameter	Conditions	Min	Тур	Мах	Unit
T <sub>amb</sub> = 25	°C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC} = 2.0 V$	1.5	1.2	-	V
		$V_{CC} = 4.5 V$	3.15	2.4	-	V
		$V_{CC} = 6.0 V$	4.2	3.2	-	V
V <sub>IL</sub>	LOW-level input voltage	$V_{CC} = 2.0 V$	-	0.8	0.5	V
		$V_{CC} = 4.5 V$	-	2.1	1.35	V
		$V_{CC} = 6.0 V$	-	2.8	1.8	V
V <sub>ОН</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$	-	-	-	
		$I_{O} = -20 \ \mu A; \ V_{CC} = 2.0 \ V$	1.9	2.0	-	V
		$I_{O} = -20 \ \mu A; \ V_{CC} = 4.5 \ V$	4.4	4.5	-	V
		$I_{O} = -20 \ \mu A; \ V_{CC} = 6.0 \ V$	5.9	6.0	-	V
		$I_0 = -6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.98	4.32	-	V
		$I_0 = -7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.48	5.81	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_0 = 20 \ \mu A; \ V_{CC} = 2.0 \ V$	-	0	0.1	V
		$I_0 = 20 \ \mu A; \ V_{CC} = 4.5 \ V$	-	0	0.1	V
		$I_0 = 20 \ \mu A; \ V_{CC} = 6.0 \ V$	-	0	0.1	V
		$I_{O}$ = 6.0 mA; $V_{CC}$ = 4.5 V	-	0.15	0.26	V
		$I_0 = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.26	V
li –	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0$ V	-	-	±0.1	μΑ
I <sub>OZ</sub>	OFF-state output current	$V_{I} = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 6.0$ V; $V_{O} = V_{CC}$ or GND	-	-	±0.5	μΑ
I <sub>CC</sub>	supply current	$V_{CC} = 6.0 \text{ V}; I_O = 0 \text{ A};$ $V_I = V_{CC} \text{ or GND}$	-	-	8.0	μΑ
CI	input capacitance		-	3.5	-	pF
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Symbol	Parameter	Conditions	Min	Тур	Max	Uni
T <sub>amb</sub> = -4	0 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC} = 2.0 V$	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		$V_{CC} = 6.0 V$	4.2	-	-	V
VIL	LOW-level input voltage	$V_{CC} = 2.0 V$	-	-	0.5	V
		$V_{CC} = 4.5 V$	-	-	1.35	V
		$V_{CC} = 6.0 V$	-	-	1.8	V
V <sub>он</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_0 = -20 \ \mu A; \ V_{CC} = 2.0 \ V$	1.9	-	-	V
		$I_{O} = -20 \ \mu A; \ V_{CC} = 4.5 \ V$	4.4	-	-	V
		$I_0 = -20 \ \mu A; \ V_{CC} = 6.0 \ V$	5.9	-	-	V
		$I_0 = -6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.84	-	-	V
		$I_{O} = -7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.34	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_0 = 20 \ \mu A; \ V_{CC} = 2.0 \ V$	-	-	0.1	V
		$I_0 = 20 \ \mu A; V_{CC} = 4.5 \ V$	-	-	0.1	V
		$I_0 = 20 \ \mu A; \ V_{CC} = 6.0 \ V$	-	-	0.1	V
		$I_0 = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.33	V
		$I_0 = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	-	0.33	V
I <sub>I</sub>	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0$ V	-	-	±1.0	μA
oz	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 6.0 \text{ V};$ $V_O = V_{CC} \text{ or GND}$	-	-	±5.0	μΑ
lcc	supply current	$V_{CC} = 6.0 \text{ V}; I_O = 0 \text{ A};$ $V_I = V_{CC} \text{ or GND}$		-	80	μA
T <sub>amb</sub> = -4	0 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC} = 2.0 V$	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		$V_{CC} = 6.0 V$	4.2	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		$V_{CC} = 4.5 V$	-	-	1.35	V
		$V_{CC} = 6.0 V$	-	-	1.8	V
V <sub>он</sub>	HIGH-level output voltage	$V_{I} = V_{IH}$ or $V_{IL}$				
		$I_{O} = -20 \ \mu A; V_{CC} = 2.0 \ V$	1.9	-	-	V
		$I_{\rm O} = -20 \ \mu \text{A}; \ V_{\rm CC} = 4.5 \ \text{V}$	4.4	-	-	V
		$I_{\rm O} = -20 \ \mu \text{A}; \ V_{\rm CC} = 6.0 \ \text{V}$	5.9	-	-	V
		$I_{\rm O} = -6.0$ mA; $V_{\rm CC} = 4.5$ V	3.7	-	-	V
		$I_{\rm O} = -7.8 \text{ mA}; V_{\rm CC} = 6.0 \text{ V}$	5.2	-	-	V

### Table 6. Static characteristics 74HC373 ...continued

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	_							
Symbol	Parameter	Conditions	Min	Тур	Мах	Unit		
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$						
		$I_{O}$ = 20 µA; $V_{CC}$ = 2.0 V	-	-	0.1	V		
		$I_{O} = 20 \ \mu A; \ V_{CC} = 4.5 \ V$	-	-	0.1	V		
		$I_{O} = 20 \ \mu A; \ V_{CC} = 6.0 \ V$	-	-	0.1	V		
		$I_{O} = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.4	V		
		$I_{O} = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	-	0.4	V		
l <sub>l</sub>	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 6.0 V$	-	-	±1.0	μA		
I <sub>OZ</sub>	OFF-state output current	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 6.0 \text{ V};$ $V_{O} = V_{CC} \text{ or GND}$	-	-	±10.0	μA		
I <sub>CC</sub>	supply current	$V_{CC} = 6.0 \text{ V}; I_O = 0 \text{ A};$ $V_I = V_{CC} \text{ or GND}$	-	-	160	μA		

## Table 6. Static characteristics 74HC373 ...continued

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

### Table 7. Static characteristics 74HCT373

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 25	°C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	2.0	1.6	-	V
V <sub>IL</sub>	LOW-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	-	1.2	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 4.5 \ V$	4.4	4.5	-	V
		$I_{O}$ = -6.0 mA; $V_{CC}$ = 4.5 V	3.98	4.32	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \ \mu\text{A}; \ V_{CC} = 4.5 \ V$	-	0.0	0.1	V
		$I_{O} = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.16	0.26	V
l <sub>l</sub>	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±0.1	μΑ
I <sub>OZ</sub>	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	μΑ
I <sub>CC</sub>	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	8.0	μΑ
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 2.1 V;$ other inputs at V <sub>CC</sub> or GND; $V_{CC} = 4.5 V$ to 5.5 V; $I_O = 0 A$				
		Dn	-	30	108	μΑ
		LE	-	150	540	μΑ
		ŌĒ	-	100	360	μA
CI	input capacitance		-	3.5	-	pF
T <sub>amb</sub> = -4	0 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	-	-	0.8	V

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	nended operating conditions; vo	Itages are referenced to $GND$ (ground = 0 V).				
Symbol	Parameter	Conditions	Min	Тур	Мах	Unit
V <sub>OH</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \ \mu\text{A}; \ V_{CC} = 4.5 \ \text{V}$	4.4	-	-	V
		$I_O = -6.0~\mu\text{A};~V_{CC} = 4.5~\text{V}$	3.84	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \ \mu\text{A}; \ V_{CC} = 4.5 \ V$	-	-	0.1	V
		$I_{O} = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.33	V
I <sub>I</sub>	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 V$	-	-	±1.0	μΑ
I <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 5.5 \text{ V};$ $V_O = V_{CC} \text{ or GND per input pin};$ other inputs at $V_{CC} \text{ or GND}; I_O = 0 \text{ A}$	-	-	±5.0	μΑ
I <sub>CC</sub>	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	80	μΑ
ΔI <sub>CC</sub>	additional supply current	$      V_I = V_{CC} - 2.1 \text{ V}; \\       other inputs at V_{CC} \text{ or GND}; \\       V_{CC} = 4.5 \text{ V to 5.5 V}; I_O = 0 \text{ A} $				
		Dn	-	-	135	μA
		LE	-	-	675	μA
		OE	-	-	450	μΑ
T <sub>amb</sub> = -4	0 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	$V_{CC}$ = 4.5 V to 5.5 V	-	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_{O} = -20 \ \mu A; \ V_{CC} = 4.5 \ V$	4.4	-	-	V
		$I_{O} = -6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.7	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \ \mu\text{A}; \ V_{CC} = 4.5 \ V$	-	-	0.1	V
		$I_{O}$ = 6.0 mA; $V_{CC}$ = 4.5 V	-	-	0.4	V
l <sub>l</sub>	input leakage current	$V_{I} = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±1.0	μΑ
I <sub>OZ</sub>	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	-	-	±10	μA
I <sub>CC</sub>	supply current		-	-	160	μΑ
ΔI <sub>CC</sub>	additional supply current	$\label{eq:VI} \begin{array}{l} V_{I} = V_{CC} - 2.1 \ V; \\ \text{other inputs at } V_{CC} \ \text{or GND}; \\ V_{CC} = 4.5 \ V \ \text{to } 5.5 \ V; \ I_{O} = 0 \ \text{A} \end{array}$				
		Dn	-	-	147	μA
		LE	-	-	735	μA
		ŌĒ	-	-	490	μA

#### Static characteristics 74HCT373 ... continued Table 7.

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# **10.** Dynamic characteristics

### Table 8. Dynamic characteristics 74HC373

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see <u>Figure 12</u>.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 2	25 °C					
t <sub>pd</sub>	propagation delay	Dn to Qn; see Figure 8	<u>[1]</u>			
		$V_{CC} = 2.0 V$	-	41	150	ns
		$V_{CC} = 4.5 V$	-	15	30	ns
		$V_{CC} = 5 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$	-	12	-	ns
		$V_{CC} = 6.0 V$	-	12	26	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 2.0 V$	-	50	175	ns
		$V_{CC} = 4.5 V$	-	18	35	ns
		$V_{CC} = 5 V; C_L = 15 pF$	-	15	-	ns
		$V_{CC} = 6.0 V$	-	14	30	ns
en	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 2.0 V$	-	44	150	ns
		$V_{CC} = 4.5 V$	-	16	30	ns
		$V_{CC} = 6.0 V$	-	13	26	ns
dis	disable time	OE to Qn; see Figure 10	<u>[3]</u>			
		$V_{CC} = 2.0 V$	-	47	150	ns
		$V_{CC} = 4.5 V$	-	17	30	ns
		$V_{CC} = 6.0 V$	-	14	26	ns
	transition time	Qn; see Figure 8 and Figure 9	[4]			
		$V_{CC} = 2.0 V$	-	14	60	ns
		$V_{CC} = 4.5 V$	-	5	12	ns
		$V_{CC} = 6.0 V$	-	4	10	ns
N	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 2.0 V$	80	17	-	ns
		$V_{CC} = 4.5 V$	16	6	-	ns
		$V_{CC} = 6.0 V$	14	5	-	ns
su	set-up time	Dn to LE; see Figure 11				
		$V_{CC} = 2.0 V$	50	14	-	ns
		$V_{CC} = 4.5 V$	10	5	-	ns
		$V_{CC} = 6.0 V$	9	4	-	ns
h	hold time	Dn to LE; see Figure 11				
		$V_{CC} = 2.0 V$	+5	-8	-	ns
		$V_{CC} = 4.5 V$	+5	-3	-	ns
		$V_{CC} = 6.0 V$	+5	-2	-	ns
PD	power dissipation capacitance	per latch; $V_I = GND$ to $V_{CC}$	[5] _	45	-	pF

Octal D-type transparent latch; 3-state

## Table 8. Dynamic characteristics 74HC373 ...continued

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see Figure 12.

Symb	ol Parameter	Conditions	Min	Тур	Max	Uni
T <sub>amb</sub> =	= –40 °C to +85 °C					
t <sub>pd</sub>	propagation delay	Dn to Qn; see Figure 8	<u>[1]</u>			
		$V_{CC} = 2.0 V$	-	-	190	ns
		$V_{CC} = 4.5 V$	-	-	38	ns
		$V_{CC} = 6.0 V$	-	-	33	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 2.0 V$	-	-	220	ns
		$V_{CC} = 4.5 V$	-	-	44	ns
		$V_{CC} = 6.0 V$	-	-	37	ns
en	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 2.0 V$	-	-	190	ns
		$V_{CC} = 4.5 V$	-	-	38	ns
		$V_{CC} = 6.0 V$	-	-	33	ns
dis	disable time	OE to Qn; see Figure 10	[3]			
		$V_{CC} = 2.0 V$	-	-	190	ns
		$V_{CC} = 4.5 V$	-	-	38	ns
		$V_{CC} = 6.0 V$	-	-	33	ns
t	transition time	Qn; see Figure 8 and Figure 9	[4]			
		$V_{CC} = 2.0 V$	-	-	75	ns
		$V_{CC} = 4.5 V$	-	-	15	ns
		$V_{CC} = 6.0 V$	-	-	13	ns
N	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 2.0 V$	100	-	-	ns
		$V_{CC} = 4.5 V$	20	-	-	ns
		$V_{CC} = 6.0 V$	17	-	-	ns
su	set-up time	Dn to LE; see Figure 11				
		$V_{CC} = 2.0 V$	65	-	-	ns
		$V_{CC} = 4.5 V$	13	-	-	ns
		$V_{CC} = 6.0 V$	11	-	-	ns
ı	hold time	Dn to LE; see Figure 11				
		$V_{CC} = 2.0 V$	5	-	-	ns
		$V_{CC} = 4.5 V$	5	-	-	ns
		$V_{CC} = 6.0 V$	5	-	-	ns

Octal D-type transparent latch; 3-state

## Table 8. Dynamic characteristics 74HC373 ...continued

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see Figure 12.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -	-40 °C to +125 °C					
t <sub>pd</sub>	propagation delay	Dn to Qn; see Figure 8	[1]			
		$V_{CC} = 2.0 V$	-	-	225	ns
		$V_{CC} = 4.5 V$	-	-	45	ns
		$V_{CC} = 6.0 V$	-	-	38	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 2.0 V$	-	-	265	ns
		$V_{CC} = 4.5 V$	-	-	53	ns
		$V_{CC} = 6.0 V$	-	-	45	ns
en	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 2.0 V$	-	-	225	ns
		$V_{CC} = 4.5 V$	-	-	45	ns
		$V_{CC} = 6.0 V$	-	-	38	ns
dis	<sub>lis</sub> disable time	OE to Qn; see Figure 10	[3]			
		$V_{CC} = 2.0 V$	-	-	225	ns
		$V_{CC} = 4.5 V$	-	-	45	ns
		$V_{CC} = 6.0 V$	-	-	38	ns
t	transition time	Qn; see <u>Figure 8</u> and <u>Figure 9</u>	[4]			
	$V_{CC} = 2.0 V$	-	-	90	ns	
		$V_{CC} = 4.5 V$	-	-	18	ns
		$V_{CC} = 6.0 V$	-	-	15	ns
W	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 2.0 V$	120	-	-	ns
		$V_{CC} = 4.5 V$	24	-	-	ns
		$V_{CC} = 6.0 V$	20	-	-	ns
su	set-up time	Dn to LE; see Figure 11				
		$V_{CC} = 2.0 V$	75	-	-	ns
		$V_{CC} = 4.5 V$	15	-	-	ns
		$V_{CC} = 6.0 V$	13	-	-	ns

## Octal D-type transparent latch; 3-state

vonages	are relevenced to GN	$D$ (ground = 0 V); $C_L = 50 \text{ pr unless otherwise specified}$		silcult se	e <u>rigure</u>	<u>12</u> .
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
t <sub>h</sub>	hold time	Dn to LE; see Figure 11				
	$V_{CC} = 2.0 V$	5	-	-	ns	
	$V_{CC} = 4.5 V$	5	-	-	ns	
		$V_{CC} = 6.0 V$	5	-	-	ns

### Table 8. Dynamic characteristics 74HC373 ... continued

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see Figure 12

[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<sub>D</sub> in  $\mu$ W).

$$\begin{split} P_D &= C_{PD} \times V_{CC}{}^2 \times f_i \times N + \sum (C_L \times V_{CC}{}^2 \times f_o) \text{ where:} \\ f_i &= \text{input frequency in MHz;} \\ f_o &= \text{output frequency in MHz;} \\ C_L &= \text{output load capacitance in pF;} \\ V_{CC} &= \text{supply voltage in V;} \\ N &= \text{number of inputs switching;} \end{split}$$

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

### Table 9. Dynamic characteristics 74HCT373

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see <u>Figure 12</u>.

-						
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 2	5 °C					
t <sub>pd</sub>	propagation delay	Dn to Qn; see Figure 8	<u>[1]</u>			
		$V_{CC} = 4.5 V$	-	17	30	ns
		$V_{CC} = 5 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$	-	14	-	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 4.5 V$	-	16	32	ns
		$V_{CC} = 5 \text{ V}; \text{ C}_{L} = 15 \text{ pF}$	-	13	-	ns
t <sub>en</sub>	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 4.5 V$	-	19	32	ns
t <sub>dis</sub>	<sub>lis</sub> disable time	OE to Qn; see Figure 10	[3]			
		$V_{CC} = 4.5 V$	-	18	30	ns
t <sub>t</sub>	transition time	Qn; see Figure 8 and Figure 9	<u>[4]</u>			
		$V_{CC} = 4.5 V$	-	5	12	ns
t <sub>W</sub>	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 4.5 V$	16	4	-	ns
su	set-up time	Dn to LE; see Figure 11				
		$V_{CC} = 4.5 V$	12	6	-	ns
t <sub>h</sub>	hold time	Dn to LE; see Figure 11				
		$V_{CC} = 4.5 V$	4	-1	-	ns
C <sub>PD</sub>	power dissipation capacitance	per latch; $V_I = GND$ to ( $V_{CC} - 1.5$ V)	<u>[5]</u>	41	-	pF

Octal D-type transparent latch; 3-state

Symbol	Parameter	Conditions	Min	Тур	Мах	Unit
amb = -	-40 °C to +85 °C					
pd	propagation delay	Dn to Qn; see <u>Figure 8</u>	[1]			
		$V_{CC} = 4.5 V$	-	-	38	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 4.5 V$	-	-	40	ns
n	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 4.5 V$	-	-	40	ns
lis	disable time	OE to Qn; see Figure 10	[3]			
		$V_{CC} = 4.5 V$	-	-	38	ns
	transition time	Qn; see <u>Figure 8</u> and <u>Figure 9</u>	[4]			
		$V_{CC} = 4.5 V$	-	-	15	ns
v	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 4.5 V$	20	-	-	ns
u	set-up time	Dn to LE; see Figure 11				
	$V_{CC} = 4.5 V$	15	-	-	ns	
	hold time	Dn to LE; see Figure 11				
		$V_{CC} = 4.5 V$	4	-	-	ns
amb = -	-40 °C to +125 °C					
d	propagation delay	Dn to Qn; see Figure 8	[1]			
		$V_{CC} = 4.5 V$	-	-	45	ns
		LE to Qn; see Figure 9				
		$V_{CC} = 4.5 V$	-	-	48	ns
n	enable time	OE to Qn; see Figure 10	[2]			
		$V_{CC} = 4.5 V$	-	-	48	ns
is	disable time	OE to Qn; see Figure 10	[3]			
		$V_{CC} = 4.5 V$	-	-	45	ns
	transition time	Qn; see <u>Figure 8</u> and <u>Figure 9</u>	[4]			
	$V_{CC} = 4.5 V$	-	-	18	ns	
1	pulse width	LE HIGH; see Figure 9				
		$V_{CC} = 4.5 V$	24	-	-	ns
J	set-up time Dn to LE	Dn to LE; see Figure 11				
		$V_{CC} = 4.5 V$	18	-	-	ns

#### Table 9 Dynamic characteristics 74HCT373 ... continued

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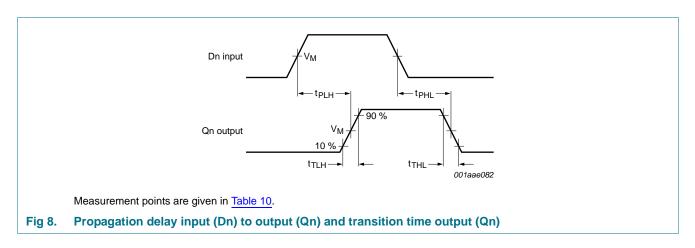
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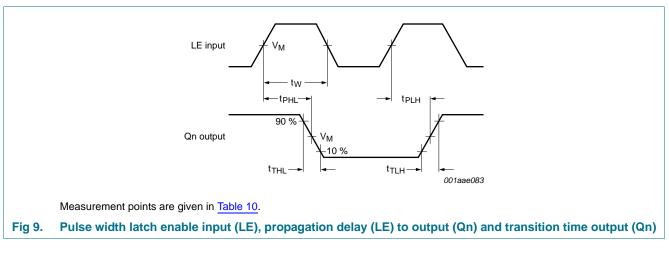
# 74HC373; 74HCT373

### Octal D-type transparent latch; 3-state

Symbo	Parameter	Conditions	Min	Тур	Мах	Unit
t <sub>h</sub>	hold time Dn to LE	Id time Dn to LE Dn to LE; see Figure 11				
		$V_{CC} = 4.5 V$	4	-	-	ns
1] t <sub>pd</sub> is	the same as $t_{PLH}$ and $t_{PHL}$ .					
2] t <sub>en</sub> is	the same as $t_{\text{PZH}}$ and $t_{\text{PZL}}$ .					
3] t <sub>dis</sub> is	s the same as $t_{PLZ}$ and $t_{PHZ}$ .					
4] t <sub>t</sub> is t	he same as $t_{THL}$ and $t_{TLH}$ .					
5] C <sub>PD</sub>	is used to determine the dynamic p	power dissipation (P <sub>D</sub> in $\mu$ W).				
P <sub>D</sub> =	$C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2)^2$	$^2 \times f_o$ ) where:				
$f_i = i$	nput frequency in MHz;					
$f_0 =$	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;					
5/0	$\times V_{CC}^2 \times f_0$ ) = sum of outputs.					

## 11. Waveforms



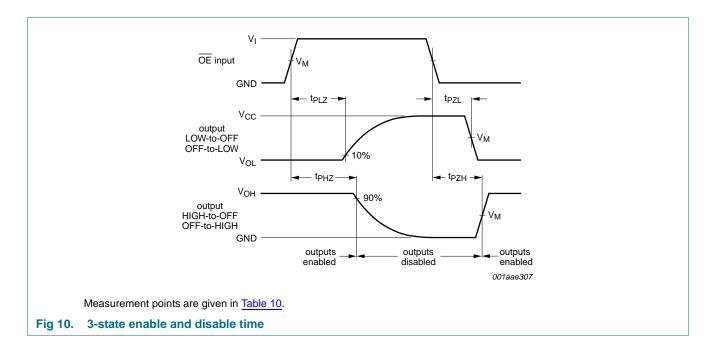


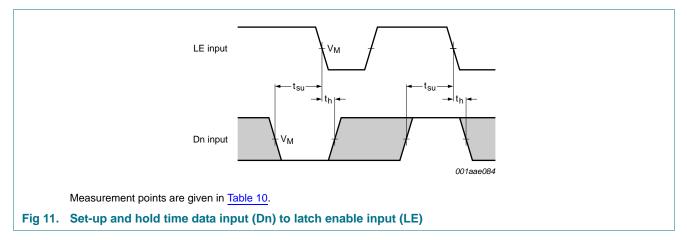
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# 74HC373; 74HCT373

Octal D-type transparent latch; 3-state





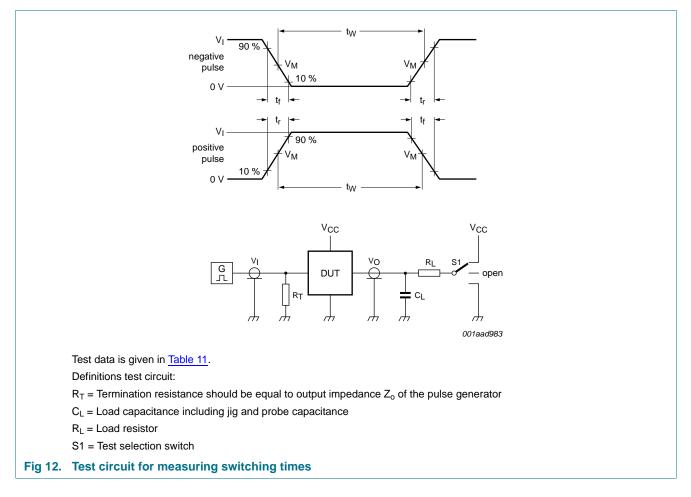
## Table 10.Measurement points

Туре	Input	Output
	V <sub>M</sub>	V <sub>M</sub>
74HC373	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
74HCT373	1.3 V	1.3 V

## **NXP Semiconductors**

# 74HC373; 74HCT373

## Octal D-type transparent latch; 3-state

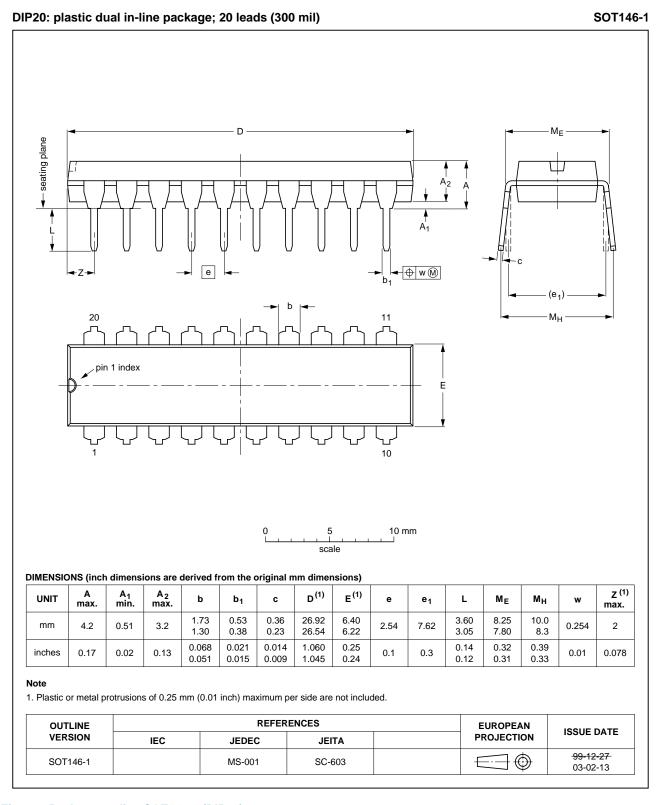


### Table 11. Test data

Туре	Input		Load		S1 position		
	VI	t <sub>r</sub> , t <sub>f</sub>	CL	RL	t <sub>PHL</sub> , t <sub>PLH</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
74HC373	V <sub>CC</sub>	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>
74HCT373	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>

Octal D-type transparent latch; 3-state

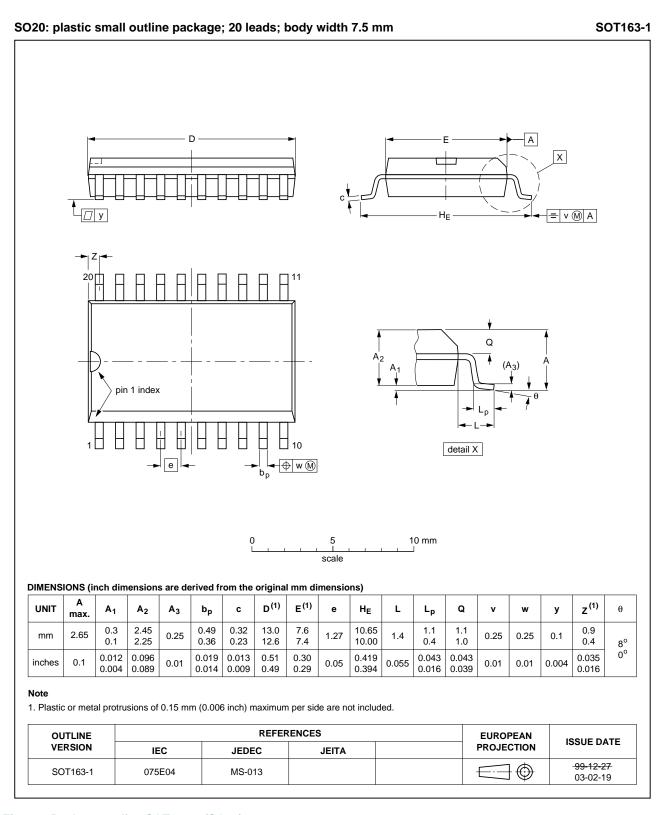
# 12. Package outline



## Fig 13. Package outline SOT146-1 (DIP20)

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### Fig 14. Package outline SOT163-1 (SO20)

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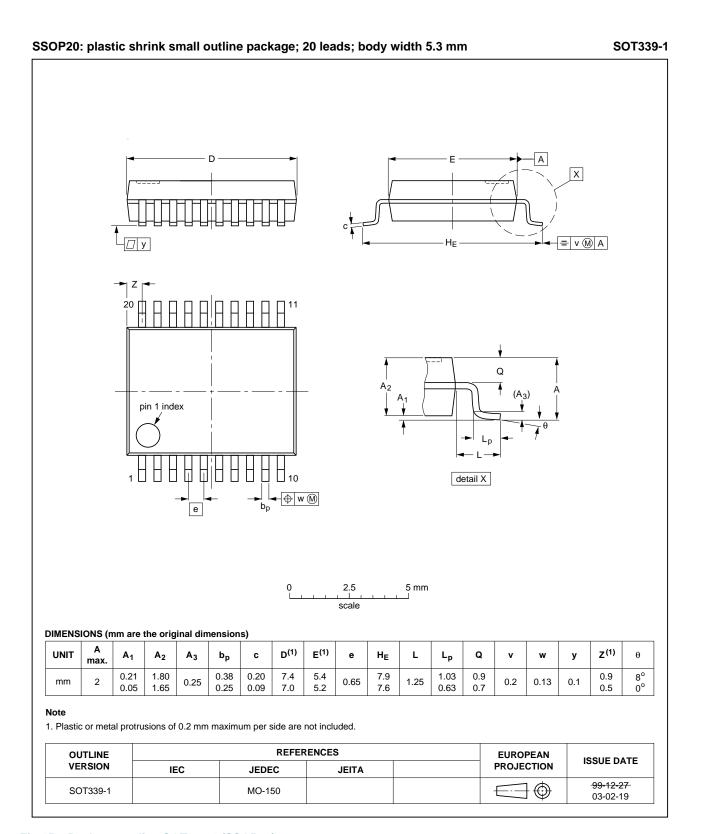
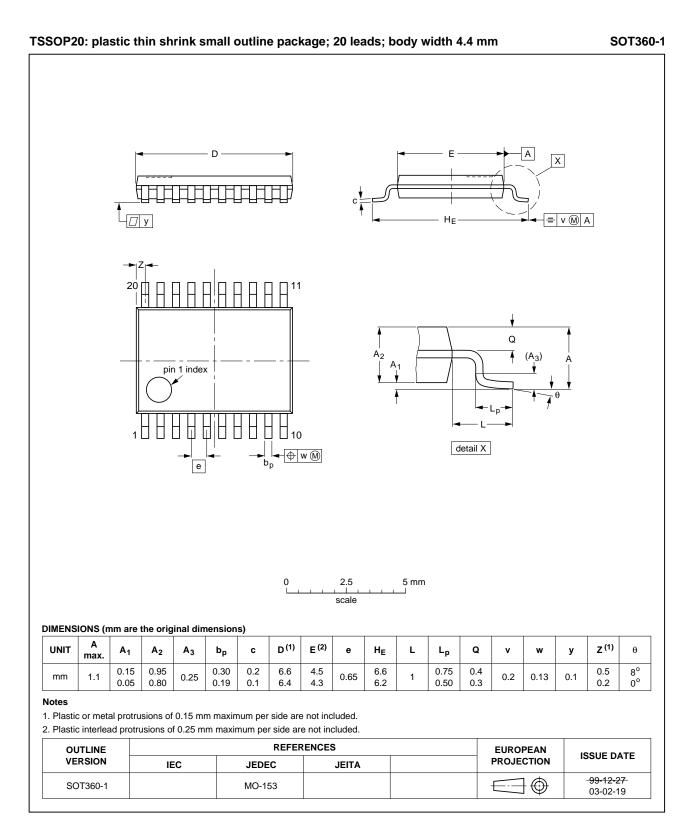


Fig 15. Package outline SOT339-1 (SSOP20)

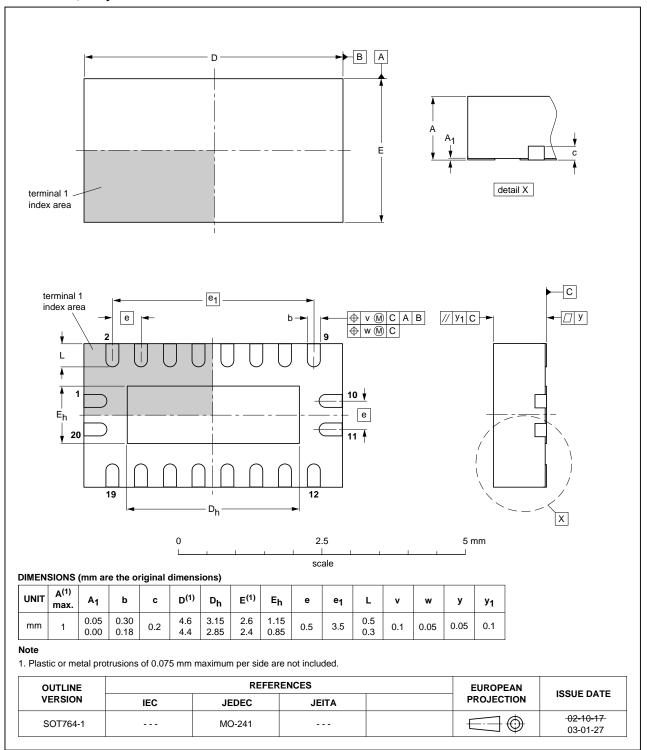
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### Fig 16. Package outline SOT360-1 (TSSOP20)

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### DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm SOT764-1

Fig 17. Package outline SOT764-1 (DHVQFN20)

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# **13. Abbreviations**

	Abbreviations
Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

# 14. Revision history

## Table 13.Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT373 v.5	20111213	Product data sheet	-	74HC_HCT373 v.4
Modifications:	<ul> <li>Legal page</li> </ul>	es updated.		
74HC_HCT373 v.4	20100903	Product data sheet	-	74HC_HCT373 v.3
74HC_HCT373 v.3	20060120	Product data sheet	-	74HC_HCT373_CNV v.2
74HC_HCT373_CNV v.2	19970827	Product specification	-	-

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# 15. Legal information

## 15.1 Data sheet status

Document status[1][2]	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 <a href="http://www.nxp.com">http://www.nxp.com</a>.

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