74HC373; 74HCT373

Octal D-type transparent latch; 3-state

Rev. 03 — 20 January 2006 Product data sheet

1. General description

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; HCT373 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 $\overline{OE}$ is LOW, the contents of the 8 latches are available at the outputs. When $\overline{OE}$ is HIGH, the outputs go to the high-impedance OFF-state. Operation of the $\overline{OE}$ input does not affect the state of the latches.

The 74HC373; 74HCT373 is functionally identical to:

- 74HC533; 74HCT533: but inverted outputs
- 74HC563; 74HCT563: but inverted outputs and different pin arrangement
- 74HC573; 74HCT573: but different pin arrangement

2. Features

- 3-state non-inverting outputs for bus oriented applications
- Common 3-state output enable input
- Functionally identical to the 74HC563; 74HCT563, 74HC573; 74HCT573 and 74HC533; 74HCT533
- ESD protection:
  - HBM EIA/JESD22-A114-C exceeds 2 000 V
  - MM EIA/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. Quick reference data

Table 1: Quick reference data

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f$ = 6 ns.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
74HC373							
t_{PHL}, t_{PLH}	propagation delay	V_{CC} = 5 V; C_L = 15 pF					
	Dn to Qn			-	12	-	ns
	LE to Qn			-	15	-	ns
C_i	input capacitance			-	3.5	-	pF
C_{PD}	power dissipation capacitance	per latch; V_I = GND to V_{CC}	[1]	-	45	-	pF
74HCT373							
t_{PHL}, t_{PLH}	propagation delay	V_{CC} = 5 V; C_L = 15 pF					
	Dn to Qn			-	14	-	ns
	LE to Qn			-	13	-	ns
C_i	input capacitance			-	3.5	-	pF
C_{PD}	power dissipation capacitance	per latch; V_I = GND to (V_{CC} – 1.5 V)	[1]	-	41	-	pF

[1] 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;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

4. Ordering information

Table 2: Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC373				
74HC373N	–40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HC373D	–40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HC373DB	–40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HC373PW	–40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HC373BQ	–40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1

Table 2: Ordering information *…continued*

Type number	Package			
	Temperature range	Name	Description	Version
74HCT373				
74HCT373N	–40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HCT373D	–40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HCT373DB	–40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HCT373PW	–40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HCT373BQ	–40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1

5. Functional diagram

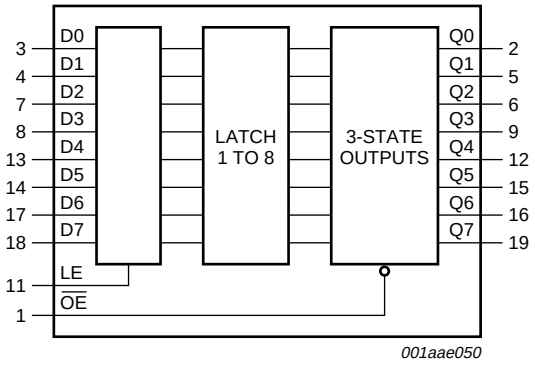


Fig 1. Functional diagram

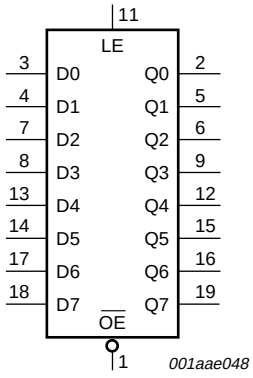


Fig 2. Logic symbol

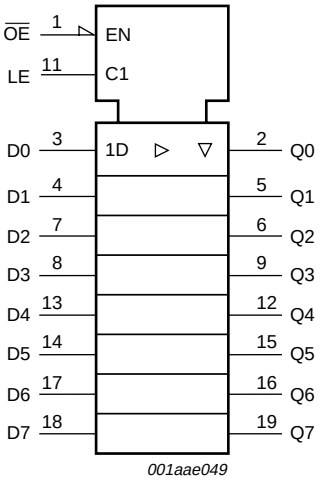


Fig 3. IEC logic symbol

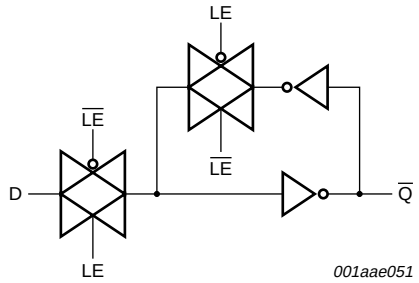


Fig 4. Logic diagram (one latch)

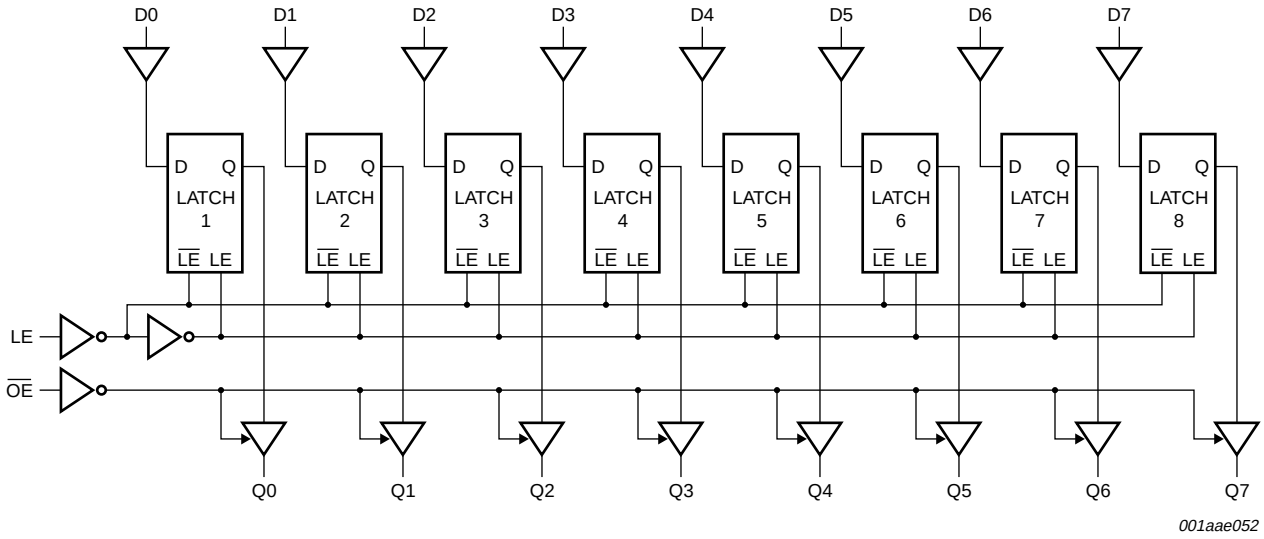


Fig 5. Logic diagram

6. Pinning information

6.1 Pinning

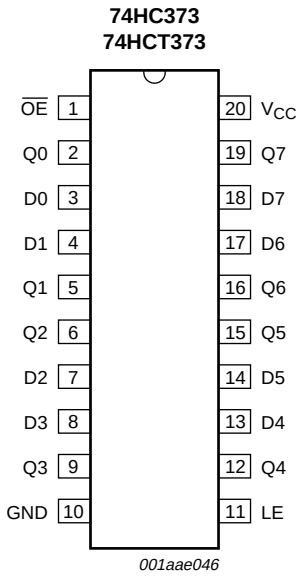
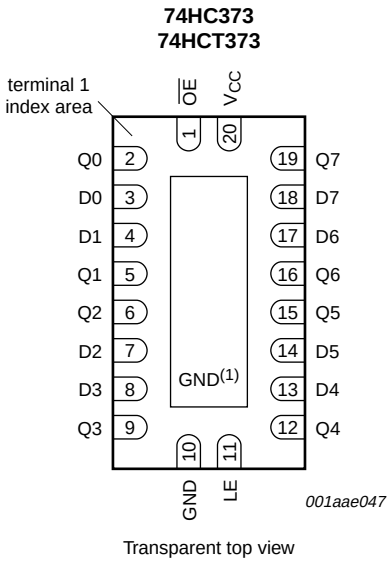


Fig 6. Pin configuration DIP20, SO20, SSOP20 and TSSOP20



Transparent top view

(1) The die substrate is attached to this pad using conductive die attach material. It can not be used as supply pin or input.

Fig 7. Pin configuration DHVQFN20

6.2 Pin description

Table 3: Pin description

Symbol	Pin	Description
$\overline{OE}$	1	3-state output enable input (active LOW)
Q0	2	3-state latch output 0
D0	3	data input 0
D1	4	data input 1
Q1	5	3-state latch output 1
Q2	6	3-state latch output 2
D2	7	data input 2
D3	8	data input 3
Q3	9	3-state latch output 3
GND	10	ground (0 V)
LE	11	latch enable input (active HIGH)
Q4	12	3-state latch output 4
D4	13	data input 4
D5	14	data input 5

Table 3: Pin description *...continued*

Symbol	Pin	Description
Q5	15	3-state latch output 5
Q6	16	3-state latch output 6
D6	17	data input 6
D7	18	data input 7
Q7	19	3-state latch output 7
V_{CC}	20	supply voltage

7. Functional description

7.1 Function table

Table 4: Function table [1]

Operating mode	Control		Input	Internal latches	Output
	$\overline{OE}$	LE	Dn		Qn
Enable and read register (transparent mode)	L	H	L	L	L
			H	H	H
Latch and read register	L	L	l	L	L
			h	H	H
Latch register and disable outputs	H	X	X	X	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;
l = LOW voltage level one set-up time prior to the HIGH-to-LOW LE transition;
X = don't care;
Z = high-impedance OFF-state.

8. Limiting values

Table 5: 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	$V_O < –0.5$ V or $V_O > V_{CC} + 0.5$ V		-	±20	mA
I_O	output current	$V_O = –0.5$ V to ($V_{CC} + 0.5$ V)		-	±35	mA
I_{CC}	quiescent supply current			-	+70	mA
I_{GND}	ground current			-	–70	mA
T_{stg}	storage temperature			–65	+150	°C
P_{tot}	total power dissipation					
	DIP20 package		[1]	-	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 °C.

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

[3] For SSOP20 and TSSOP20 packages: P_{tot} derates linearly with 5.5 mW/K above 60 °C.

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

9. Recommended operating conditions

Table 6: Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
74HC373						
V_{CC}	supply voltage		2.0	5.0	6.0	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C
t_r, t_f	input rise and fall time	$V_{CC} = 2.0$ V	-	-	1000	ns
		$V_{CC} = 4.5$ V	-	6.0	500	ns
		$V_{CC} = 6.0$ V	-	-	400	ns
74HCT373						
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C
t_r, t_f	input rise and fall time	$V_{CC} = 4.5$ V	-	6.0	500	ns

10. Static characteristics

Table 7: Static characteristics 74HC373

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{IH}	HIGH-state 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_{IL}	LOW-state 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_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}	-	-	-	
		I_O = –20 µA; V_{CC} = 2.0 V	1.9	2.0	-	V
		I_O = –20 µA; V_{CC} = 4.5 V	4.4	4.5	-	V
		I_O = –20 µA; V_{CC} = 6.0 V	5.9	6.0	-	V
		I_O = –6.0 mA; V_{CC} = 4.5 V	3.98	4.32	-	V
		I_O = –7.8 mA; V_{CC} = 6.0 V	5.48	5.81	-	V
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 2.0 V	-	0	0.1	V
		I_O = 20 µA; V_{CC} = 4.5 V	-	0	0.1	V
		I_O = 20 µA; 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_O = 7.8 mA; V_{CC} = 6.0 V	-	0.16	0.26	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	-	±0.1	µA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; V_{CC} = 6.0 V; $V_O = V_{CC}$ or GND	-	-	±0.5	µA
I_{CC}	quiescent supply current	V_{CC} = 6.0 V; I_O = 0 A; $V_I = V_{CC}$ or GND	-	-	8.0	µA
C_i	input capacitance		-	3.5	-	pF
T_{amb} = –40 °C to +85 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 2.0 V	1.5	-	-	V
		V_{CC} = 4.5 V	3.15	-	-	V
		V_{CC} = 6.0 V	4.2	-	-	V
V_{IL}	LOW-state 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_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = –20 µA; V_{CC} = 2.0 V	1.9	-	-	V
		I_O = –20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = –20 µA; V_{CC} = 6.0 V	5.9	-	-	V
		I_O = –6.0 mA; V_{CC} = 4.5 V	3.84	-	-	V
		I_O = –7.8 mA; V_{CC} = 6.0 V	5.34	-	-	V

Table 7: Static characteristics 74HC373 *...continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 2.0 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 6.0 V	-	-	0.1	V
		I_O = 6.0 mA; V_{CC} = 4.5 V	-	-	0.33	V
		I_O = 7.8 mA; V_{CC} = 6.0 V	-	-	0.33	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	-	±1.0	µA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; V_{CC} = 6.0 V; $V_O = V_{CC}$ or GND	-	-	±5.0	µA
I_{CC}	quiescent supply current	V_{CC} = 6.0 V; I_O = 0 A; $V_I = V_{CC}$ or GND		-	80	µA
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 2.0 V	1.5	-	-	V
		V_{CC} = 4.5 V	3.15	-	-	V
		V_{CC} = 6.0 V	4.2	-	-	V
V_{IL}	LOW-state 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_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = −20 µA; V_{CC} = 2.0 V	1.9	-	-	V
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = −20 µA; V_{CC} = 6.0 V	5.9	-	-	V
		I_O = −6.0 mA; V_{CC} = 4.5 V	3.7	-	-	V
		I_O = −7.8 mA; V_{CC} = 6.0 V	5.2	-	-	V
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 2.0 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 6.0 V	-	-	0.1	V
		I_O = 6.0 mA; V_{CC} = 4.5 V	-	-	0.4	V
		I_O = 7.8 mA; V_{CC} = 6.0 V	-	-	0.4	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	-	±1.0	µA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; V_{CC} = 6.0 V; $V_O = V_{CC}$ or GND	-	-	±10.0	µA
I_{CC}	quiescent supply current	V_{CC} = 6.0 V; I_O = 0 A; $V_I = V_{CC}$ or GND	-	-	160	µA

Table 8: Static characteristics 74HCT373

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	0.8	V
V_{OH}	HIGH-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = –20 µA; 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_{OL}	LOW-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 20 µA; V_{CC} = 4.5 V	-	0.0	0.1	V
		I_O = 6.0 mA; V_{CC} = 4.5 V	-	0.16	0.26	V
I_{LI}	input leakage current	V_I = V_{CC} or GND; V_{CC} = 5.5 V	-	-	±0.1	µA
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	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	8.0	µA
ΔI_{CC}	additional quiescent 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				
	Dn		-	30	108	µA
	LE		-	150	540	µA
	$\overline{OE}$		-	100	360	µA
C_i	input capacitance		-	3.5	-	pF
T_{amb} = –40 °C to +85 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	V
V_{OH}	HIGH-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = –20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = –6.0 µA; V_{CC} = 4.5 V	3.84	-	-	V
V_{OL}	LOW-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 6.0 mA; V_{CC} = 4.5 V	-	-	0.33	V
I_{LI}	input leakage current	V_I = V_{CC} or GND; V_{CC} = 5.5 V	-	-	±1.0	µA
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	-	-	±5.0	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	80	µA
ΔI_{CC}	additional quiescent 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				
	Dn		-	-	135	µA
	LE		-	-	675	µA
	$\overline{OE}$		-	-	450	µA

Table 8: Static characteristics 74HCT373 *…continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	V
V_{OH}	HIGH-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = −6.0 mA; V_{CC} = 4.5 V	3.7	-	-	V
V_{OL}	LOW-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 6.0 mA; V_{CC} = 4.5 V	-	-	0.4	V
I_{LI}	input leakage current	V_I = V_{CC} or GND; V_{CC} = 5.5 V	-	-	±1.0	µA
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	-	-	±10	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	160	µA
ΔI_{CC}	additional quiescent 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				
	Dn		-	-	147	µA
	LE		-	-	735	µA
	$\overline{OE}$		-	-	490	µA

11. Dynamic characteristics

Table 9: Dynamic characteristics 74HC373

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
t_{PHL}, t_{PLH}	propagation delay					
	Dn to Qn	see Figure 8				
		V_{CC} = 2.0 V	-	41	150	ns
		V_{CC} = 4.5 V	-	15	30	ns
		V_{CC} = 5 V; C_L = 15 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

Table 9: Dynamic characteristics 74HC373 *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	see Figure 10					
		V_{CC} = 2.0 V		-	44	150	ns
		V_{CC} = 4.5 V		-	16	30	ns
		V_{CC} = 6.0 V		-	13	26	ns
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	see Figure 10					
		V_{CC} = 2.0 V		-	47	150	ns
		V_{CC} = 4.5 V		-	17	30	ns
		V_{CC} = 6.0 V		-	14	26	ns
t_{THL}, t_{TLH}	output transition time	see Figure 9					
		V_{CC} = 2.0 V		-	14	60	ns
		V_{CC} = 4.5 V		-	5	12	ns
		V_{CC} = 6.0 V		-	4	10	ns
t_W	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
t_{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
t_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
C_{PD}	power dissipation capacitance	per latch; V_I = GND to V_{CC}	[1]	-	45	-	pF
T_{amb} = –40 °C to +85 °C							
t_{PHL}, t_{PLH}	propagation delay						
	Dn to Qn	see Figure 8					
		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
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	see Figure 10					
		V_{CC} = 2.0 V		-	-	190	ns
		V_{CC} = 4.5 V		-	-	38	ns
		V_{CC} = 6.0 V		-	-	33	ns

Table 9: Dynamic characteristics 74HC373 *...continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	see Figure 10				
		V_{CC} = 2.0 V	-	-	190	ns
		V_{CC} = 4.5 V	-	-	38	ns
		V_{CC} = 6.0 V	-	-	33	ns
t_{THL}, t_{TLH}	output transition time	see Figure 8				
		V_{CC} = 2.0 V	-	-	75	ns
		V_{CC} = 4.5 V	-	-	15	ns
		V_{CC} = 6.0 V	-	-	13	ns
t_W	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
t_{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
t_h	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
T_{amb} = −40 °C to +125 °C						
t_{PHL}, t_{PLH}	propagation delay					
	Dn to Qn	see Figure 8				
		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
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	see Figure 10				
		V_{CC} = 2.0 V	-	-	225	ns
		V_{CC} = 4.5 V	-	-	45	ns
		V_{CC} = 6.0 V	-	-	38	ns
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	see Figure 10				
		V_{CC} = 2.0 V	-	-	225	ns
		V_{CC} = 4.5 V	-	-	45	ns
		V_{CC} = 6.0 V	-	-	38	ns

Table 9: Dynamic characteristics 74HC373 *...continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{THL}, t_{TLH}	output transition time	see Figure 8				
		V_{CC} = 2.0 V	-	-	90	ns
		V_{CC} = 4.5 V	-	-	18	ns
		V_{CC} = 6.0 V	-	-	15	ns
t_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
t_{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
t_h	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

[1] 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;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

Table 10: Dynamic characteristics 74HCT373

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
t_{PHL}, t_{PLH}	propagation delay					
	Dn to Qn	see Figure 8				
		V_{CC} = 4.5 V	-	17	30	ns
		V_{CC} = 5 V; C_L = 15 pF	-	14	-	ns
	LE to Qn	see Figure 9				
		V_{CC} = 4.5 V	-	16	32	ns
		V_{CC} = 5 V; C_L = 15 pF	-	13	-	ns
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V; see Figure 10	-	19	32	ns
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V; see Figure 10	-	18	30	ns
t_{THL}, t_{TLH}	output transition time	V_{CC} = 4.5 V; see Figure 8	-	5	12	ns

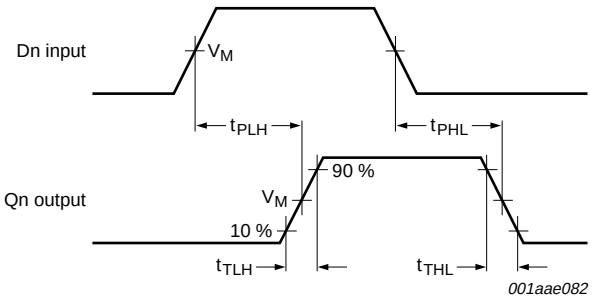
Table 10: Dynamic characteristics 74HCT373 *…continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
t_W	pulse width LE HIGH	V_{CC} = 4.5 V; see Figure 9		16	4	-	ns
t_{su}	set-up time Dn to LE	V_{CC} = 4.5 V; see Figure 11		12	6	-	ns
t_h	hold time Dn to LE	V_{CC} = 4.5 V; see Figure 11		4	–1	-	ns
C_{PD}	power dissipation capacitance	per latch; V_I = GND to (V_{CC} – 1.5 V)	[1]	-	41	-	pF
T_{amb} = –40 °C to +85 °C							
t_{PHL}, t_{PLH}	propagation delay						
	Dn to Qn	V_{CC} = 4.5 V; see Figure 8		-	-	38	ns
	LE to Qn	V_{CC} = 4.5 V; see Figure 9		-	-	40	ns
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V; see Figure 10		-	-	40	ns
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V; see Figure 10		-	-	38	ns
t_{THL}, t_{TLH}	output transition time	V_{CC} = 4.5 V; see Figure 8		-	-	15	ns
t_W	pulse width LE HIGH	V_{CC} = 4.5 V; see Figure 9		20	-	-	ns
t_{su}	set-up time Dn to LE	V_{CC} = 4.5 V; see Figure 11		15	-	-	ns
t_h	hold time Dn to LE	V_{CC} = 4.5 V; see Figure 11		4	-	-	ns
T_{amb} = –40 °C to +125 °C							
t_{PHL}, t_{PLH}	propagation delay						
	Dn to Qn	V_{CC} = 4.5 V; see Figure 8		-	-	45	ns
	LE to Qn	V_{CC} = 4.5 V; see Figure 9		-	-	48	ns
t_{PZH}, t_{PZL}	3-state output enable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V, see Figure 10		-	-	48	ns
t_{PHZ}, t_{PLZ}	3-state output disable time $\overline{OE}$ to Qn	V_{CC} = 4.5 V; see Figure 10		-	-	45	ns
t_{THL}, t_{TLH}	output transition time	V_{CC} = 4.5 V; see Figure 8		-	-	18	ns
t_W	pulse width LE HIGH	V_{CC} = 4.5 V; see Figure 8		24	-	-	ns
t_{su}	set-up time Dn to LE	V_{CC} = 4.5 V; see Figure 11		18	-	-	ns
t_h	hold time Dn to LE	V_{CC} = 4.5 V; see Figure 11		4	-	-	ns

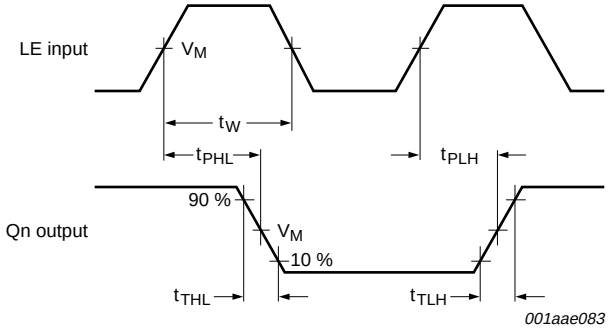
[1] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
C_L = output load capacitance in pF;
V_{CC} = supply voltage in V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

12. Waveforms



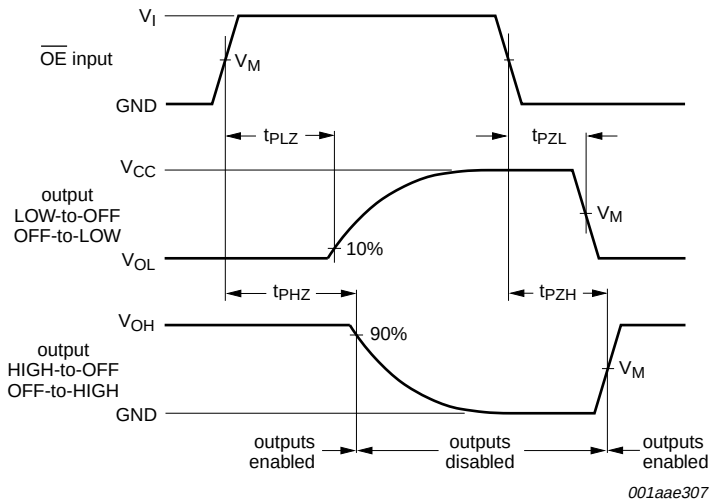
Measurement points are given in Table 11.

Fig 8. Propagation delay input (Dn) to output (Qn) and transition time output (Qn)



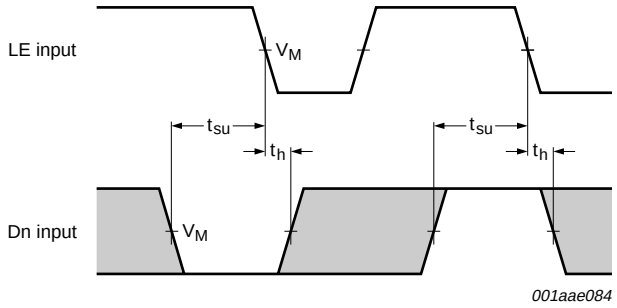
Measurement points are given in Table 11.

Fig 9. Pulse width latch enable input (LE), propagation delay (LE) to output (Qn) and transition time output (Qn)



Measurement points are given in Table 11.

Fig 10. 3-state enable and disable time

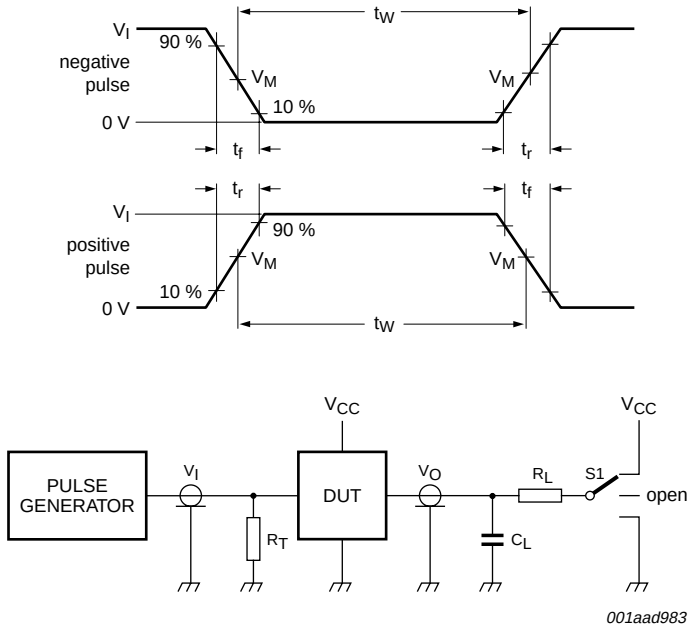


Measurement points are given in Table 11.

Fig 11. Set-up and hold time data input (Dn) to latch enable input (LE)

Table 11: Measurement points

Type	Input	Output
	V_M	V_M
74HC373	$0.5V_{CC}$	$0.5V_{CC}$
74HCT373	1.3 V	1.3 V



Test data is given in Table 12.

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 resistor

S1 = Test selection switch

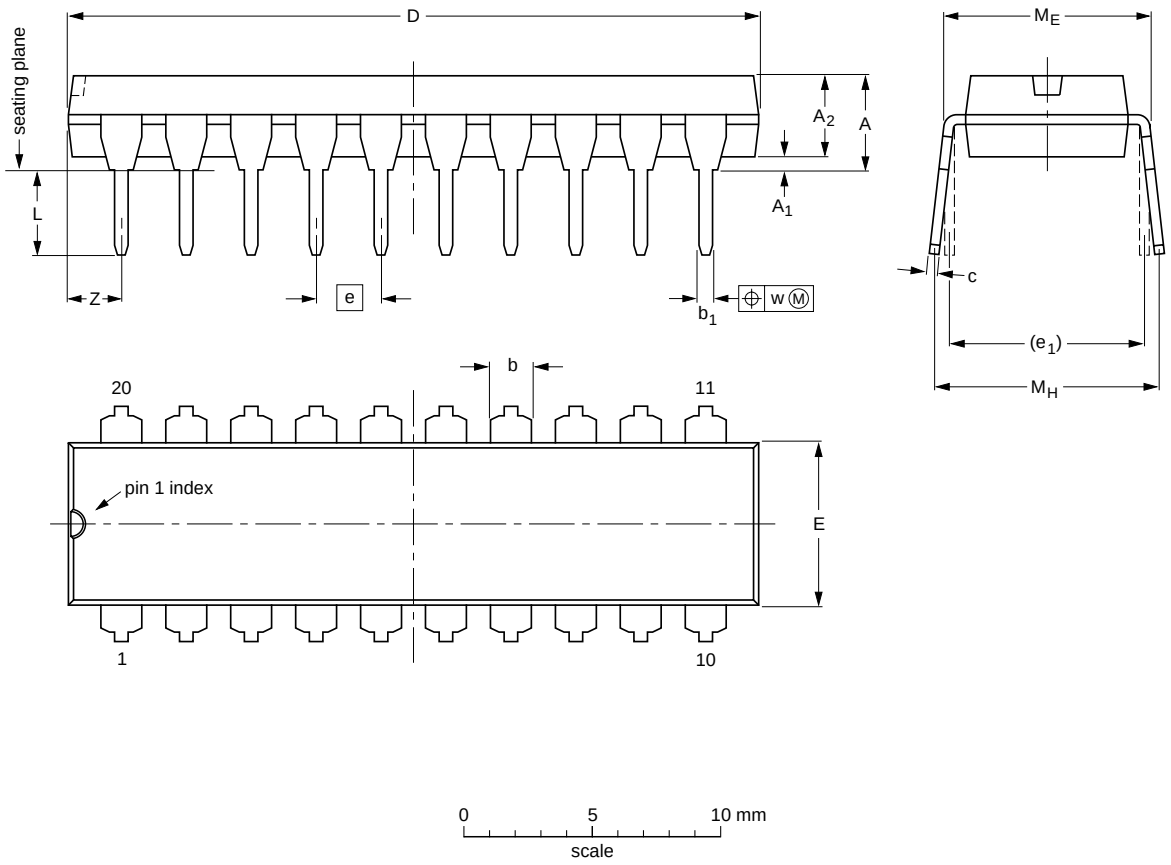
Fig 12. Load circuitry for measuring switching times

Table 12: 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}
74HC373	V_{CC}	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}
74HCT373	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}

13. Package outline

DIP20: plastic dual in-line package; 20 leads (300 mil) **SOT146-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2
inches	0.17	0.02	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

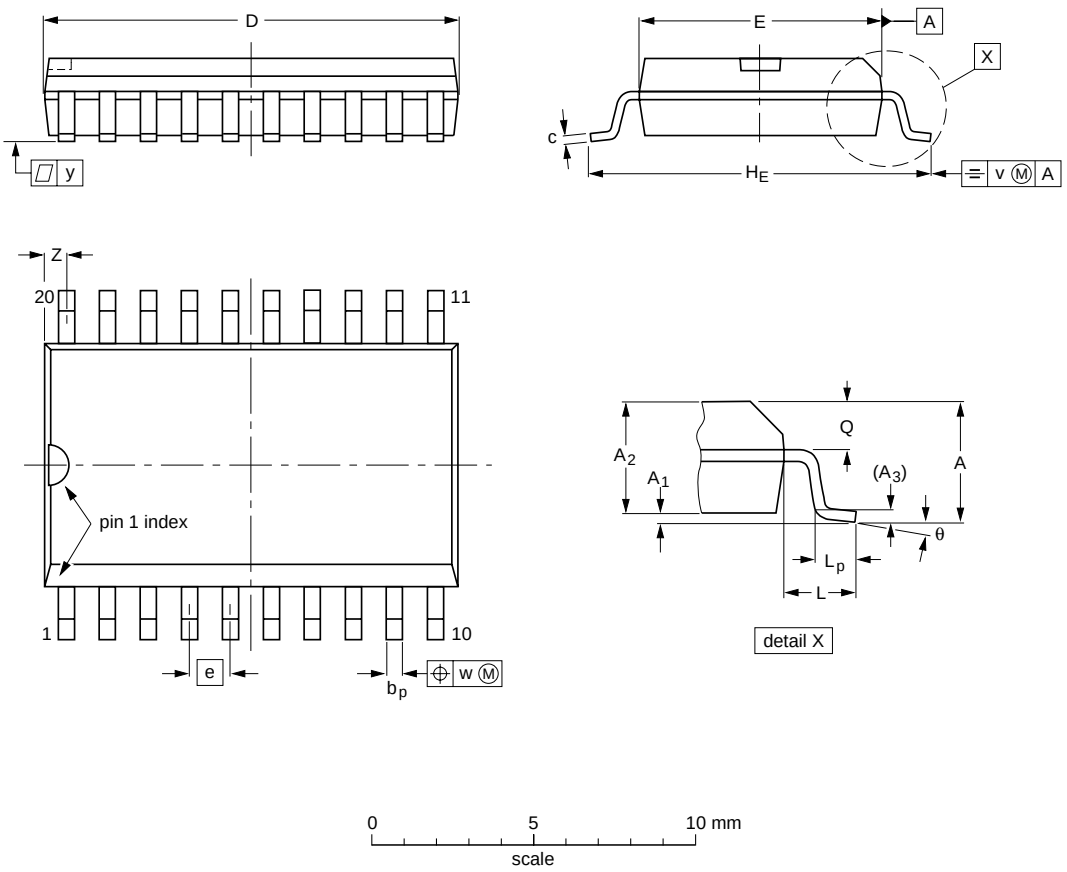
Note

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

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

Fig 13. Package outline SOT146-1 (DIP20)

SO20: plastic small outline package; 20 leads; body width 7.5 mm **SOT163-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	2.65	0.3 0.1	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8^o 0^o
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.05	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

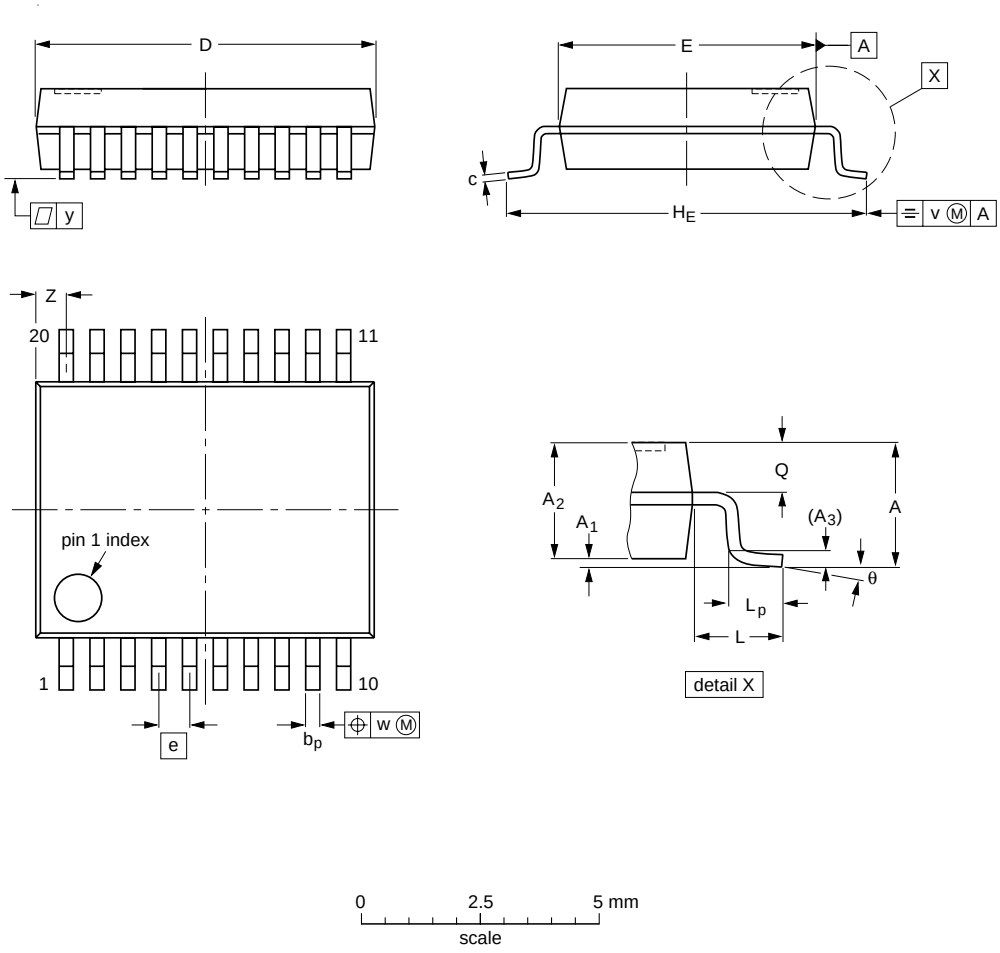
Note

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

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

Fig 14. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm **SOT339-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	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^o 0^o

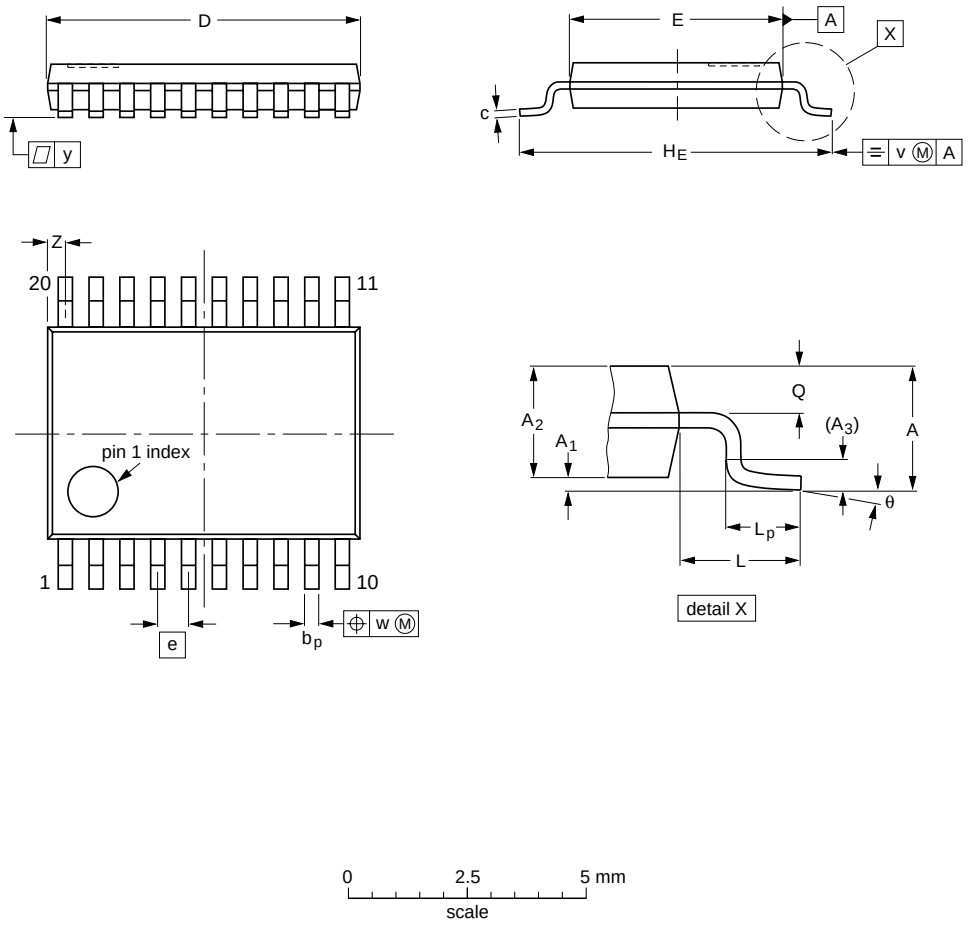
Note

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

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

Fig 15. Package outline SOT339-1 (SSOP20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm **SOT360-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (2)	e	H_E	L	L_p	Q	v	w	y	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^o 0^o

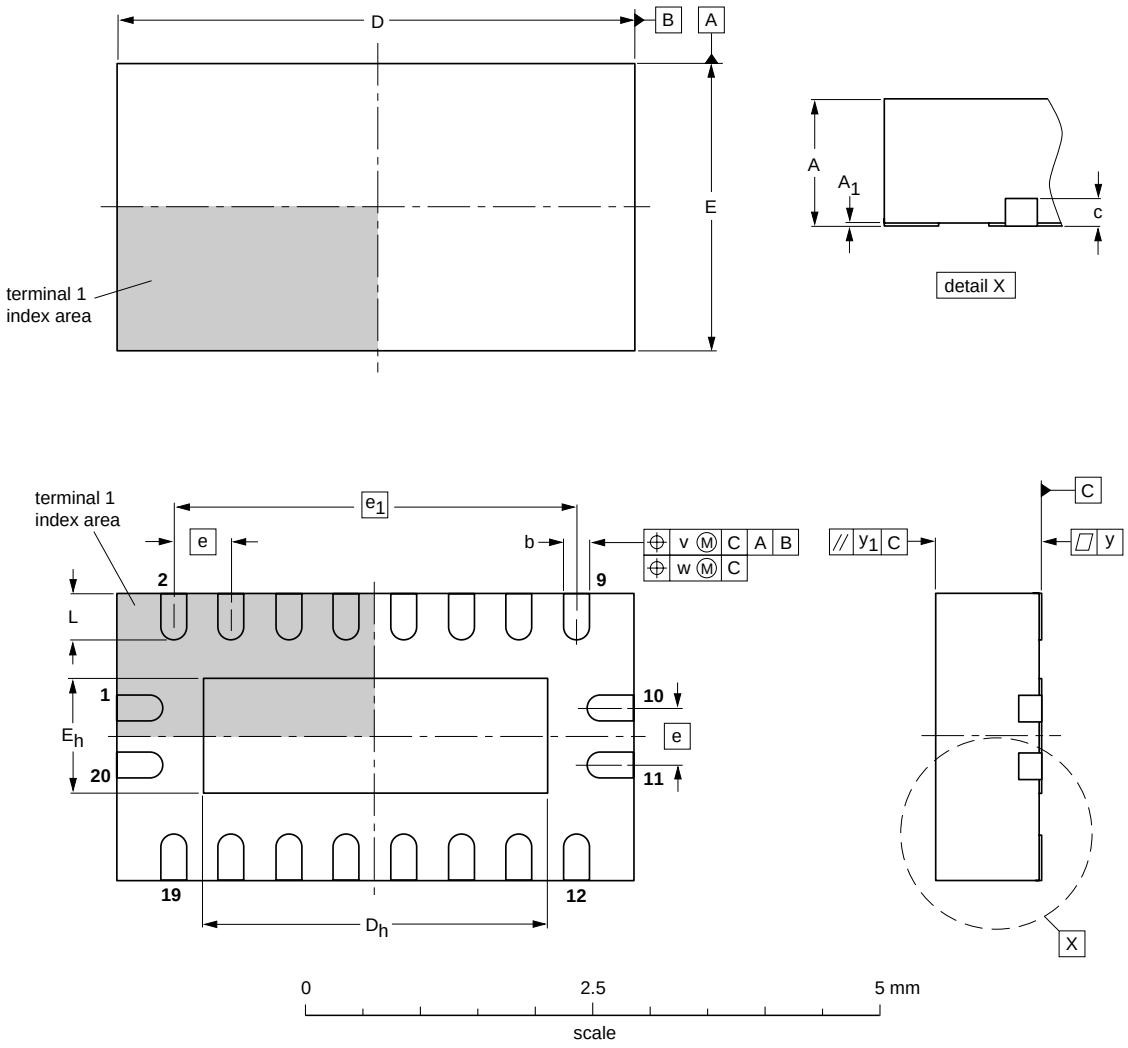
Notes

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.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT360-1		MO-153				~~99-12-27~~ 03-02-19

Fig 16. Package outline SOT360-1 (TSSOP20)

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**



DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max.	A_1	b	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	4.6 4.4	3.15 2.85	2.6 2.4	1.15 0.85	0.5	3.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT764-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

Fig 17. Package outline SOT764-1 (DHVQFN20)

14. Abbreviations

Table 13: Abbreviations

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

15. Revision history

Table 14: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74HC_HCT373_3	20060120	Product data sheet	-	-	74HC_HCT373_CNV_2
Modifications:	• The format of this data sheet is redesigned to comply with the current presentation and information standard of Philips Semiconductors. • Added type numbers 74HC373BQ and 74HCT373BQ (package DHVQFN20). • Added family specifications. • Added abbreviations list.				
74HC_HCT373_CNV_2	19970827	Product specification	-	-	-

16. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

17. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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21. Contents

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