74AHC373

Octal D-type transparant latch; 3-state

Rev. 4 — 5 March 2019

Product data sheet

1. General description

The 74AHC373 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. 7-A.

The 74AHC373 consists of eight D-type transparent latches featuring separate D-type inputs for each latch and 3-state true outputs for bus oriented applications. A latch enable input (LE) and an output enable input (OE) are common to all latches.

When pin 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 Dn input changes. When pin LE is LOW, the latches store the information that is present at the Dn inputs, after a set-up time preceding the HIGH-to-LOW transition of LE.

When pin \overline{OE} is LOW, the contents of the 8 latches are available at the outputs. When pin \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 74AHC373 is functionally identical to the 74AHC573; 74AHCT573, but has a different pin arrangement.

2. Features and benefits

- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- · Common 3-state output enable input
- Inputs accepts voltages higher than V_{CC}
- Functionally identical to the 74AHC573; 74AHCT573
- Input levels at CMOS input level
- ESD protection:
 - HBM EIA/JESD22-A114E exceeds 2000 V
 - MM EIA/JESD22-A115-A exceeds 200 V
 - CDM EIA/JESD22-C101C exceeds 1000 V
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

3. Ordering information

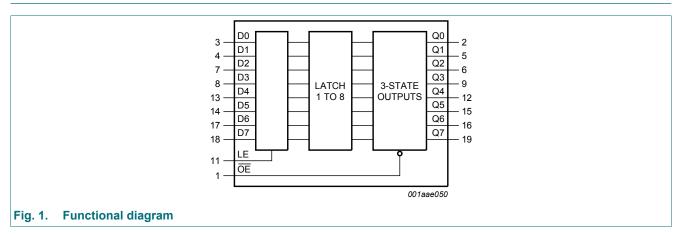
Table 1. Ordering information

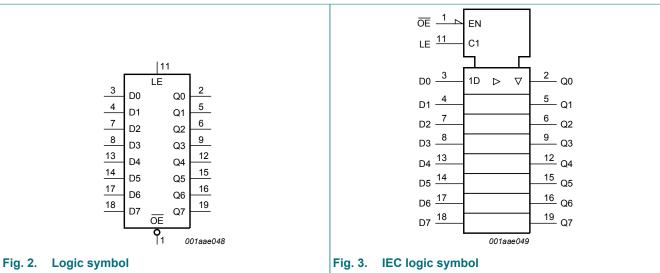
Type number	Package									
	Temperature range	Name	Description	Version						
74AHC373D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1						
74AHC373PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1						

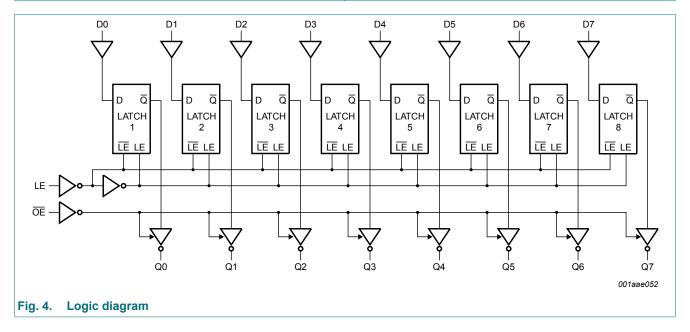


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4. Functional diagram

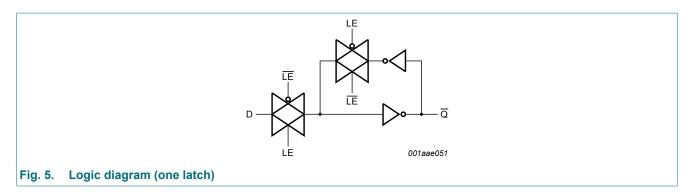






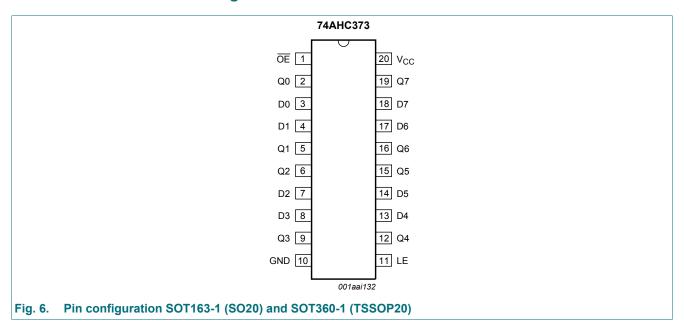
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5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
ŌE	1	3-state output enable input (active LOW)
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 _{CC}	20	supply voltage

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6. Functional description

Table 3. Function table

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

X = don't care; Z = high-impedance OFF-state.

Operating mode	Control		Input	Internal	Output
	OE	LE	Dn	latch	Q0 to Q7
Enable and read register (transparent mode)	L	Н	L	L	L
			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
			Х	X	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	+7.0	V
VI	input voltage		-0.5	+7.0	V
I _{IK}	input clamping current	$V_1 < -0.5 \text{ V}$ [1]	-20	-	mA
I _{OK}	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$ [1]	-20	+20	mA
Io	output current	$V_{\rm O} = -0.5 \text{V} \text{ to } (V_{\rm CC} + 0.5 \text{V})$	-25	+25	mA
I _{CC}	supply current		-	+75	mA
I _{GND}	ground current		-75	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	$T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$ [2]	-	500	mW

^[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

8. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{CC}	supply voltage		2.0	5.0	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage		0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 3.0 V to 3.6 V	-	-	100	ns/V
		V _{CC} = 4.5 V to 5.5 V	-	-	20	ns/V

^[2] For SO20 packages: above 70 °C the value of P_{tot} derates linearly at 8 mW/K. For TSSOP20 packages: above 60 °C the value of P_{tot} derates linearly at 5.5 mW/K.

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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	
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	LOW-level	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
	input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH}	HIGH-level	V _I = V _{IH} or V _{IL}								
	output voltage	I _O = -50 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
	voltage	I _O = -50 μA; V _{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I _O = -50 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I_{O} = -4.0 mA; V_{CC} = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I _O = -8.0 mA; V _{CC} = 4.5 V	3.94	-	-	3.80	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	I _O = 50 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
	voltage	I _O = 50 μA; V _{CC} = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 50 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
		$I_O = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
I _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±0.25	-	±2.5	-	±10.0	μA
lı	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 0$ V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μA
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	μA
Cı	input capacitance	V _I = V _{CC} or GND	-	3	10	-	10	-	10	pF
Co	output capacitance		-	4	-	-	-	-	10	pF

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10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 11.

Symbol	Parameter	Conditions		25 °C			°C to 5 °C		°C to 5 °C	Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
t _{pd}	propagation	Dn to Qn; see Fig. 7 [2]								
	delay	V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF	-	6.0	11.4	1.0	13.5	1.0	14.5	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF	-	7.8	14.9	1.0	17.0	1.0	19.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF	-	4.0	7.2	1.0	8.5	1.0	9.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF	-	5.3	9.2	1.0	10.5	1.0	11.5	ns
		LE to Qn; see Fig. 8 [2]								
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF	-	6.3	11.0	1.0	13.0	1.0	14.0	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF	-	8.3	14.5	1.0	16.5	1.0	18.5	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF	-	4.3	7.2	1.0	8.5	1.0	9.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF	-	5.6	9.7	1.0	11.1	1.0	12.5	ns
t _{en}	enable time	OE to Qn; see Fig. 9 [3]								
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF	-	5.6	11.4	1.0	13.5	1.0	14.5	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF	-	7.5	14.9	1.0	17.0	1.0	19.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF	-	3.8	8.1	1.0	9.5	1.0	10.5	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF	-	5.2	10.1	1.0	11.5	1.0	13.0	ns
t _{dis}	disable time	OE to Qn; see Fig. 9 [4]								
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF	-	5.6	10.0	1.0	12.0	1.0	13.0	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF	-	9.2	13.3	1.0	15.0	1.0	17.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF	-	4.3	7.2	1.0	8.5	1.0	9.5	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF	-	6.4	9.2	1.0	10.5	1.0	11.5	ns
t _W	pulse width	LE HIGH or LOW; see Fig. 8								
		V _{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V _{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
t _{su}	set-up time	Dn to LE; see Fig. 10								
		V _{CC} = 3.0 V to 3.6 V	4.0	-	-	4.0	-	4.0	-	ns
		V _{CC} = 4.5 V to 5.5 V	4.0	-	-	4.0	-	4.0	-	ns
t _h	hold time	Dn to LE; see Fig. 10								
		V _{CC} = 3.0 V to 3.6 V	1.0	-	-	1.0	-	1.0	-	ns
		V _{CC} = 4.5 V to 5.5 V	1.0	-	-	1.0	-	1.0	-	ns
C _{PD}	power dissipation capacitance	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$ [5]	-	10	-	-	-	-	-	pF

^[1] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V).

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^[2] t_{pd} is the same as t_{PHL} and t_{PLH} .

^[3] t_{en} is the same as t_{PZH} and t_{PZL} .

^[4] t_{dis} is the same as t_{PHZ} and t_{PLZ} .

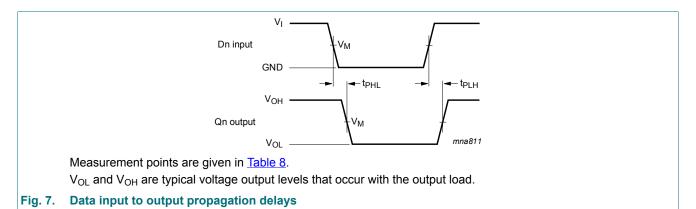
^[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μ W). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where: f_i = input frequency in MHz; f_o = output frequency in MHz;

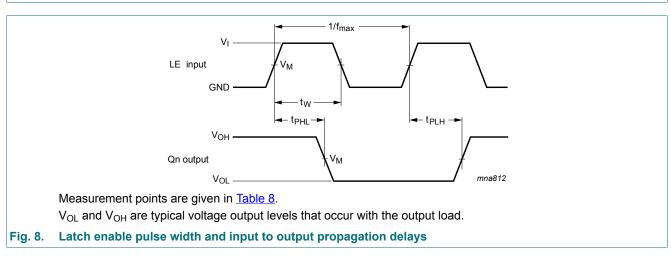
 C_L = output load capacitance in pF; V_{CC} = supply voltage in V;

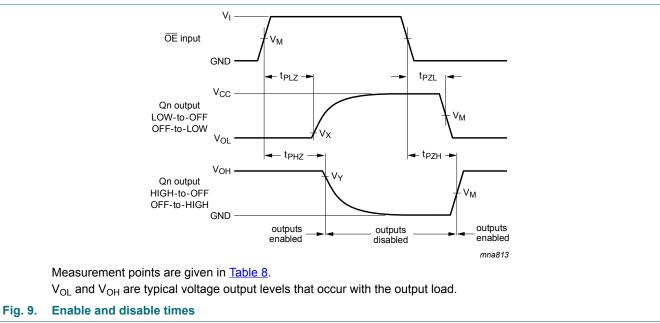
N = number of inputs switching; $\Sigma(C_L \times V_{CC}^2 \times f_0)$ = sum of the outputs.

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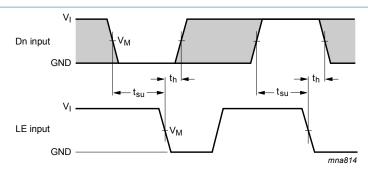
10.1. Waveforms and test circuit







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Measurement points are given in Table 8.

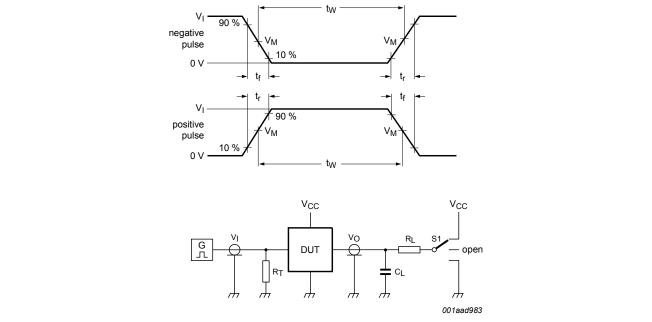
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

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

Fig. 10. Data set-up and hold times

Table 8. Measurement points

Input	Output	utput							
V _M	V _M	V _X	V _Y						
0.5 × V _{CC}	0.5 × V _{CC}	V _{OL} + 0.3 V	V _{OH} - 0.3 V						



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

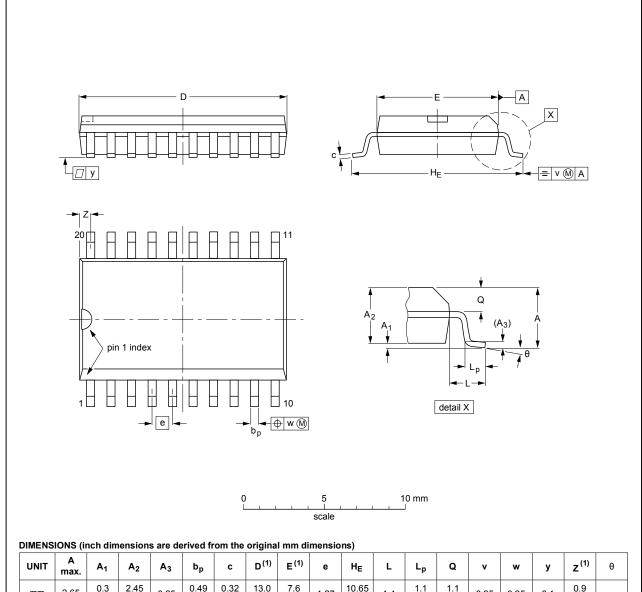
Input		Load		S1 position			
V _I	t _r , t _f		C _L R _L		t _{PHL} , t _{PLH} t _{PZH} , t _{PHZ}		
V _{CC}	≤ 3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	

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11. Package outline

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

SOT163-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Q	v	w	у	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°
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	0°

Note

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

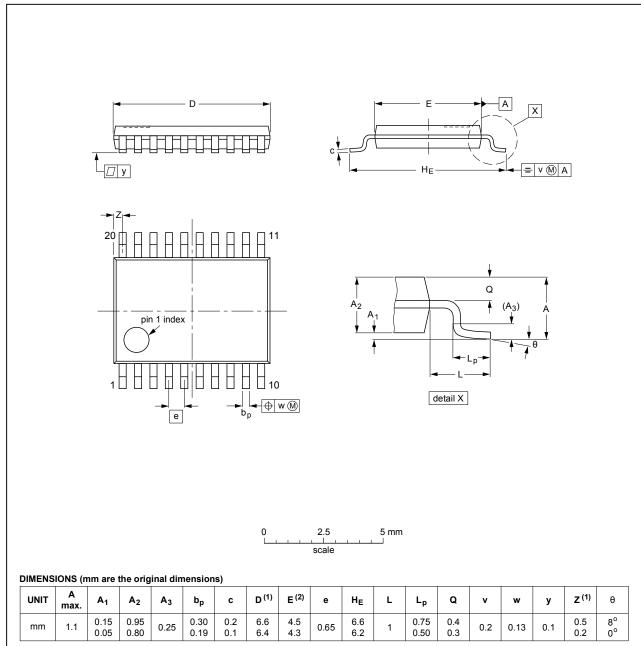
OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT163-1	075E04	MS-013				99-12-27 03-02-19

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

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

SOT360-1



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

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

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12. Abbreviations

Table 10. Abbreviations

Acronym	Description	
CDM	Charged Device Model	
CMOS	Complementary Metal-Oxide Semiconductor	
DUT	Device Under Test	
ESD	ElectroStatic Discharge	
HBM	Human Body Model	
LSTTL	Low-power Schottky Transistor-Transistor Logic	
MM	Machine Model	

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74AHC373 v.4	20190305	Product data sheet	-	74AHC_AHCT373_3		
Modifications:	of Nexperia. • Legal texts h	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type numbers 74AHCT373D (SOT163-1) and 74AHCT373PW (SOT360-1) removed. 				
74AHC_AHCT373_3	20080520	Product data sheet	-	74AHC_AHCT373_2		
Modifications:	guidelines of • Legal texts h	 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. Table 6: conditions for the input leakage current have been changed. 				
74AHC_AHCT373_2	19991123	Product specification	-	74AHC_AHCT373_1		
74AHC_AHCT373_1	19981211	Product specification	-	-		

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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] Qualification data sheet		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".
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