DATA SHEET

74AHC573; 74AHCT573

Octal D-type transparent latch; 3-state

Product specification
Supersedes data of 1999 Sep 27

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Philips
Semiconductors

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Octal D-type transparent latch; 3-state 74AHC573; 74AHCT573

FEATURES

- ESD protection:
  HBM EIA/JESD22-A114-A exceeds 2000 V
  MM EIA/JESD22-A115-A exceeds 200 V.
- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Common 3-state output enable input
- Functionally identical to the 74AHC/AHCT563 and 74AHC/AHCT373
- Inputs accepts voltages higher than V_{CC}
- For AHC only: operates with CMOS input levels
- For AHCT only: operates with TTL input levels
- Specified from –40 to +85 °C and –40 to +125 °C.

DESCRIPTION

The 74AHC/AHCT573 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard No. 7A.

The 74AHC/AHCT573 are octal D-type transparent latches 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 74AHC/AHCT573 consists of eight D-type transparent latches with 3-state true outputs. 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 D-input changes.

When pin 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 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 74AHC/AHCT573 is functionally identical to the 74AHC/AHCT533, 74AHC/AHCT563 and 74AHC/AHCT373, but the 74AHC/AHCT533 and 74AHC/AHCT563 have inverted outputs and the 74AHC/AHCT563 and 74AHC/AHCT373 have a different pin arrangement.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f \leq 3.0$ ns.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			AHC	AHCT	
t_{PHL}/t_{PLH}	propagation delay Dn to Qn; LE to Qn	C_L = 15 pF; V_{CC} = 5 V	3.9	3.5	ns
C_I	input capacitance	$V_I = V_{CC}$ or GND	3.0	3.0	pF
C_O	output capacitance		4.0	4.0	pF
C_{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz; notes 1 and 2	12	18	pF

Notes

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 Volts;
   N = total load switching outputs;
   $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.
2. The condition is V_I = GND to V_{CC}.

FUNCTION TABLE

See note 1.

OPERATING MODE	INPUT			INTERNAL LATCH	OUTPUT
	$\overline{OE}$	LE	Dn		Q0 to Q7
Enable and read register (transparent mode)	L	H	L	L	L
	L	H	H	H	H
Latch and read register	L	L	l	L	L
	L	L	h	H	H
Latch register and disable outputs	H	L	l	L	Z
	H	L	h	H	Z

Note

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;
   Z = high-impedance OFF-state.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE			
	PINS	PACKAGE	MATERIAL	CODE
74AHC573D	20	SO20	plastic	SOT163-1
74AHCT573D	20	SO20	plastic	SOT163-1
74AHC573PW	20	TSSOP20	plastic	SOT360-1
74AHCT573PW	20	TSSOP20	plastic	SOT360-1

PINNING

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

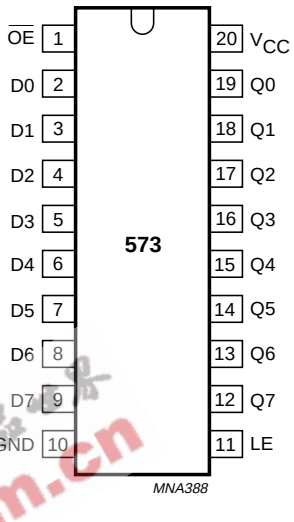

Fig.1 Pin configuration SO20 and TSSSOP20.

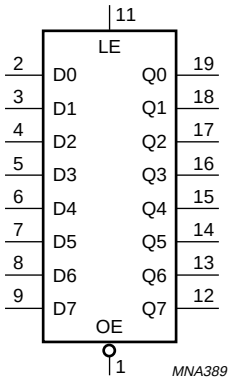

Fig.2 Logic symbol.

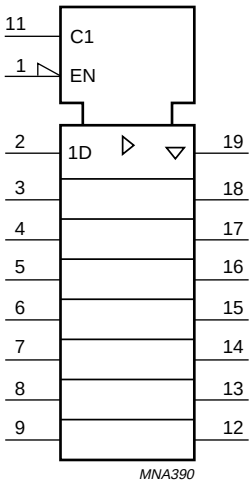

Fig.3 IEC logic symbol.

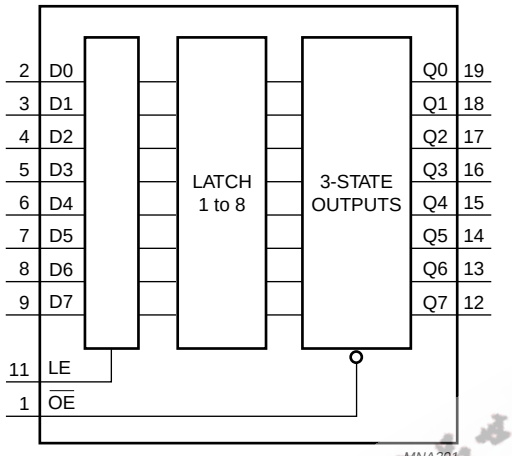

Fig.4 Functional diagram.

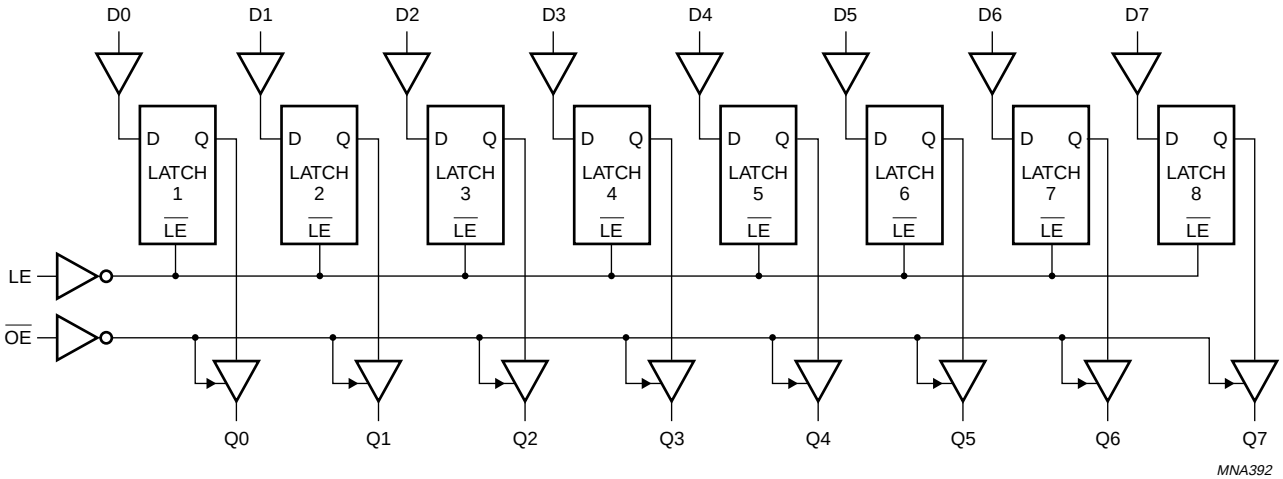

Fig.5 Logic diagram.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	74AHC			74AHCT			UNIT
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
V_{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V_I	input voltage		0	–	5.5	0	–	5.5	V
V_O	output voltage		0	–	V_{CC}	0	–	V_{CC}	V
T_{amb}	operating ambient temperature	see DC and AC characteristics per device	–40	+25	+85	–40	+25	+85	°C
			–40	+25	+125	–40	+25	+125	°C
t_r, t_f	input rise and fall rates	V_{CC} = 3.3 V ±0.3 V	–	–	100	–	–	–	ns/V
		V_{CC} = 5 V ±0.5 V	–	–	20	–	–	20	ns/V

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
V_I	input voltage		–0.5	+7.0	V
I_{IK}	input diode current	V_I < –0.5 V; note 1	–	–20	mA
I_{OK}	output diode current	V_O < –0.5 V or V_O > V_{CC} + 0.5 V; note 1	–	±20	mA
I_O	output source or sink current	–0.5 V < V_O < V_{CC} + 0.5 V	–	±25	mA
I_{CC}	V_{CC} or GND current		–	±75	mA
T_{stg}	storage temperature		–65	+150	°C
P_{tot}	power dissipation	T_{amb} = –40 to +125 °C; note 2	–	500	mW

Notes

1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. For SO20packages: above 70 °C the value of P_{tot} derates linearly with 8 mW/K.
   For TSSOP20 packages: above 60 °C the value of P_{tot} derates linearly with 5.5 mW/K.

DC CHARACTERISTICS

74AHC type

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V_{CC} (V)				
T_{amb} = 25 °C							
V_{IH}	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V_{IL}	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	2.0	1.9	2.0	–	V
		I_O = –50 µA	3.0	2.9	3.0	–	V
		I_O = –50 µA	4.5	4.4	4.5	–	V
		I_O = –4.0 mA	3.0	2.58	–	–	V
		I_O = –8.0 mA	4.5	3.94	–	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	2.0	–	0	0.1	V
		I_O = 50 µA	3.0	–	0	0.1	V
		I_O = 50 µA	4.5	–	0	0.1	V
		I_O = 4.0 mA	3.0	–	–	0.36	V
		I_O = 8.0 mA	4.5	–	–	0.36	V
I_{LI}	input leakage current	V_I = V_{CC} or GND	5.5	–	–	0.1	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND	5.5	–	–	±0.25	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	4.0	µA
C_I	input capacitance		–	–	3	10	pF

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V_{CC} (V)				
T_{amb} = −40 to +85 °C							
V_{IH}	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V_{IL}	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	2.0	1.9	–	–	V
		I_O = –50 µA	3.0	2.9	–	–	V
		I_O = –50 µA	4.5	4.4	–	–	V
		I_O = –4.0 mA	3.0	2.48	–	–	V
		I_O = –8.0 mA	4.5	3.8	–	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	2.0	–	–	0.1	V
		I_O = 50 µA	3.0	–	–	0.1	V
		I_O = 50 µA	4.5	–	–	0.1	V
		I_O = 4.0 mA	3.0	–	–	0.44	V
		I_O = 8.0 mA	4.5	–	–	0.44	V
I_{LI}	input leakage current	V_I = V_{CC} or GND	5.5	–	–	1.0	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND	5.5	–	–	±2.5	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	40	µA
C_I	input capacitance		–	–	–	10	pF

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V_{CC} (V)				
T_{amb} = −40 to +125 °C							
V_{IH}	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V_{IL}	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	2.0	1.9	1.9	–	V
		I_O = –50 µA	3.0	2.9	2.9	–	V
		I_O = –50 µA	4.5	4.4	4.4	–	V
		I_O = –4.0 mA	3.0	2.48	2.48	–	V
		I_O = –8.0 mA	4.5	3.8	3.8	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	2.0	–	–	–	V
		I_O = 50 µA	3.0	–	–	0.1	V
		I_O = 50 µA	4.5	–	–	0.1	V
		I_O = 4.0 mA	3.0	–	–	0.1	V
		I_O = 8.0 mA	4.5	–	–	0.44	V
I_{LI}	input leakage current	V_I = V_{CC} or GND	5.5	–	–	2.0	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND	5.5	–	–	±10.0	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	80	µA
C_I	input capacitance		–	–	–	10	pF

74AHCT type

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V_{CC} (V)				
T_{amb} = 25 °C							
V_{IH}	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V_{IL}	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	4.5	4.4	4.5	–	V
		I_O = –8.0 mA	4.5	3.94	–	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	4.5	–	0	0.1	V
		I_O = 8.0 mA	4.5	–	–	0.36	V
I_{LI}	input leakage current	V_I = V_{IH} or V_{IL}	5.5	–	–	0.1	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND per input pin; other inputs at V_{CC} or GND; I_O = 0	5.5	–	–	±0.25	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	4.0	µA
ΔI_{CC}	additional quiescent supply current per input pin	V_I = V_{CC} – 2.1 V; other inputs at V_{CC} or GND; I_O = 0	4.5 to 5.5	–	–	1.35	mA
C_I	input capacitance		–	–	3	10	pF
T_{amb} = –40 to +85 °C							
V_{IH}	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V_{IL}	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	4.5	4.4	–	–	V
		I_O = –8.0 mA	4.5	3.8	–	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	4.5	–	–	0.1	V
		I_O = 8.0 mA	4.5	–	–	0.44	V
I_{LI}	input leakage current	V_I = V_{IH} or V_{IL}	5.5	–	–	1.0	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND per input pin; other inputs at V_{CC} or GND; I_O = 0	5.5	–	–	±2.5	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	40	µA
ΔI_{CC}	additional quiescent supply current per input pin	V_I = V_{CC} – 2.1 V; other inputs at V_{CC} or GND; I_O = 0	4.5 to 5.5	–	–	1.5	mA
C_I	input capacitance		–	–	–	10	pF

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V_{CC} (V)				
T_{amb} = −40 to +125 °C							
V_{IH}	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V_{IL}	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = –50 µA	4.5	4.4	–	–	V
		I_O = –8.0 mA	4.5	3.70	–	–	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}					
		I_O = 50 µA	4.5	–	–	0.1	V
		I_O = 8.0 mA	4.5	–	–	0.55	V
I_{LI}	input leakage current	V_I = V_{IH} or V_{IL}	5.5	–	–	2.0	µA
I_{OZ}	3-state output OFF current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND per input pin; other inputs at V_{CC} or GND; I_O = 0	5.5	–	–	±10.0	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0	5.5	–	–	80	µA
ΔI_{CC}	additional quiescent supply current per input pin	V_I = V_{CC} – 2.1 V; other inputs at V_{CC} or GND; I_O = 0	4.5 to 5.5	–	–	1.5	mA
C_I	input capacitance		–	–	–	10	pF

AC CHARACTERISTICS

74AHC573

GND = 0 V; $t_r = t_f \leq 3.0$ ns.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C_L (pF)				
V_{CC} = 3.0 to 3.6 V							
T_{amb} = 25 °C; note 1							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	–	5.5	11.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	–	5.8	11.9	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	5.8	11.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	6.8	11.0	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	–	7.8	14.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	–	8.3	15.4	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	8.3	15.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	9.7	14.5	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns
T_{amb} = −40 to +85 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1.0	–	13.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1.0	–	14.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	13.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	13.0	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	1.0	–	16.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1.0	–	17.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	17.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	16.5	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C_L (pF)				
T_{amb} = −40 to +125 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1.0	–	14.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1.0	–	15.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	14.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	14.0	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	1.0	–	18.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1.0	–	19.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	19.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	18.5	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns
V_{CC} = 4.5 to 5.5 V							
T_{amb} = 25 °C; note 2							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	–	3.9	6.8	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	–	4.2	7.7	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	4.4	7.7	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	4.6	7.7	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	–	5.5	8.8	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	–	5.9	9.7	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	6.3	9.7	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	7.4	9.7	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns
T_{amb} = −40 to +85 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1.0	–	8.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1.0	–	9.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	9.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	9.0	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	1.0	–	10.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1.0	–	11.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	11.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	11.0	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C_L (pF)				
T_{amb} = −40 to +125 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1.0	–	8.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1.0	–	10.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	10.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1.0	–	10.0	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn2	see Figs 6 and 10	50	1.0	–	11.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1.0	–	12.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	12.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1.0	–	12.5	ns
t_W	enable pulse width HIGH	see Figs 7 and 10	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns

Notes

1. Typical values at V_{CC} = 3.3 V.
2. Typical values at V_{CC} = 5.0 V.

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GND = 0 V; $t_r = t_f \leq 3.0$ ns.

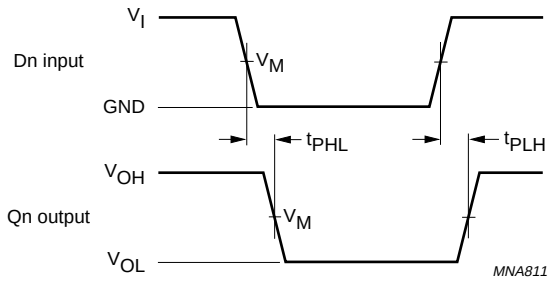
SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C_L (pF)				
V_{CC} = 4.5 to 5.5 V; note 1							
T_{amb} = 25 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	–	3.5	5.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	–	3.9	6.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	4.1	6.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	–	4.5	6.5	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	–	4.9	7.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	–	5.5	8.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	5.9	8.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	–	6.4	9.0	ns
t_W	enable pulse width HIGH	see Figs 7 and 9	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns
T_{amb} = −40 to +85 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1	–	6.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1	–	7.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1	–	7.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1	–	7.5	ns
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	50	1	–	8.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1	–	9.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1	–	10.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1	–	10.0	ns
t_W	enable pulse width HIGH	see Figs 7 and 9	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C_L (pF)				
T_{amb} = −40 to +125 °C							
t_{PHL}/t_{PLH}	propagation delay Dn to Qn	see Figs 6 and 10	15	1	–	7.0	ns
	propagation delay LE to Qn	see Figs 7 and 10	15	1	–	7.5	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1	–	8.5	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	15	1	–	8.5	ns
t_{PHL}/t_{PLH}	propagation delay Don to Qn	see Figs 6 and 10	50	1	–	9.5	ns
	propagation delay LE to Qn	see Figs 7 and 10	50	1	–	11.0	ns
t_{PZH}/t_{PZL}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1	–	11.0	ns
t_{PHZ}/t_{PLZ}	propagation delay $\overline{OE}$ to Qn	see Figs 9 and 10	50	1	–	11.5	ns
t_W	enable pulse width HIGH	see Figs 7 and 9	50	5.0	–	–	ns
t_{su}	set-up time Dn to LE	see Fig.8	50	3.5	–	–	ns
t_h	hold time Dn to LE	see Fig.8	50	1.5	–	–	ns

Note

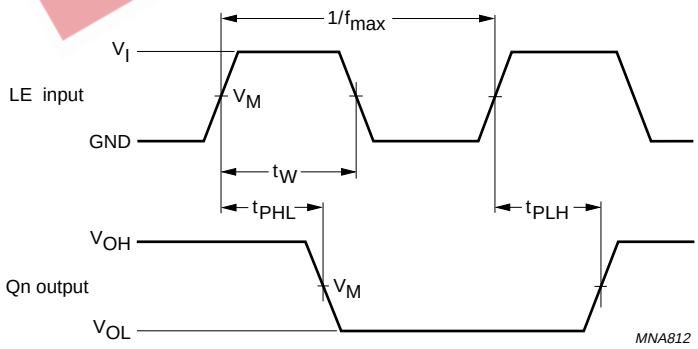
1. Typical values at V_{CC} = 5.0 V.

AC WAVEFORMS



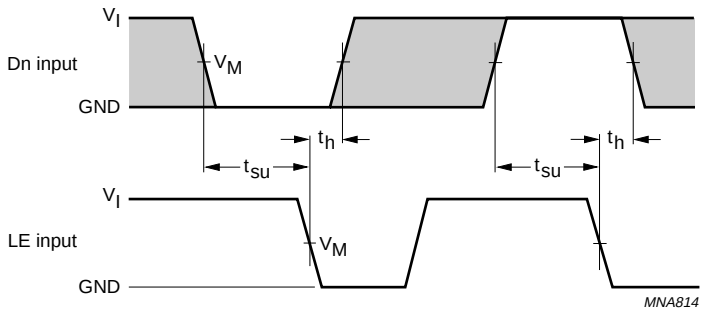
FAMILY	V_I INPUT REQUIREMENTS	V_M INPUT	V_M OUTPUT
AHC	GND to V_{CC}	50% V_{CC}	50% V_{CC}
AHCT	GND to 3.0 V	1.5 V	50% V_{CC}

Fig.6 The data input (Dn) to output (Qn) propagation delays.



FAMILY	V_I INPUT REQUIREMENTS	V_M INPUT	V_M OUTPUT
AHC	GND to V_{CC}	50% V_{CC}	50% V_{CC}
AHCT	GND to 3.0 V	1.5 V	50% V_{CC}

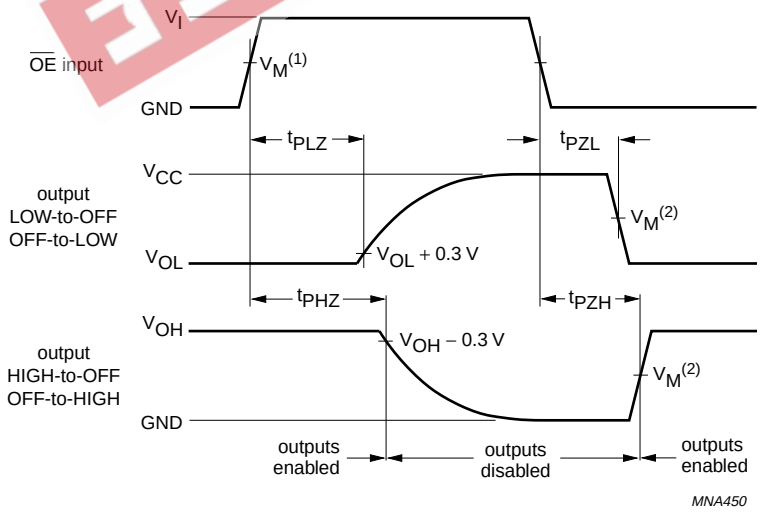
Fig.7 The latch enable input (LE) pulse width, the latch enable input to output (Qn) propagation delays.



FAMILY	V_I INPUT REQUIREMENTS	V_M INPUT
AHC	GND to V_{CC}	50% V_{CC}
AHCT	GND to 3.0 V	1.5 V

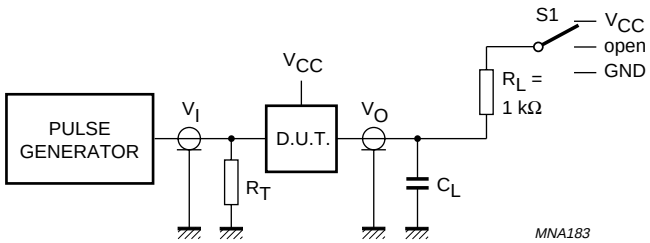
The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig.8 Data set-up and hold times for the Dn input to the LE input.



FAMILY	V_I INPUT REQUIREMENTS	$V_M^{(1)}$ INPUT	$V_M^{(2)}$ OUTPUT
AHC	GND to V_{CC}	50% V_{CC}	50% V_{CC}
AHCT	GND to 3.0 V	1.5 V	50% V_{CC}

Fig.9 The 3-state enable and disable times.



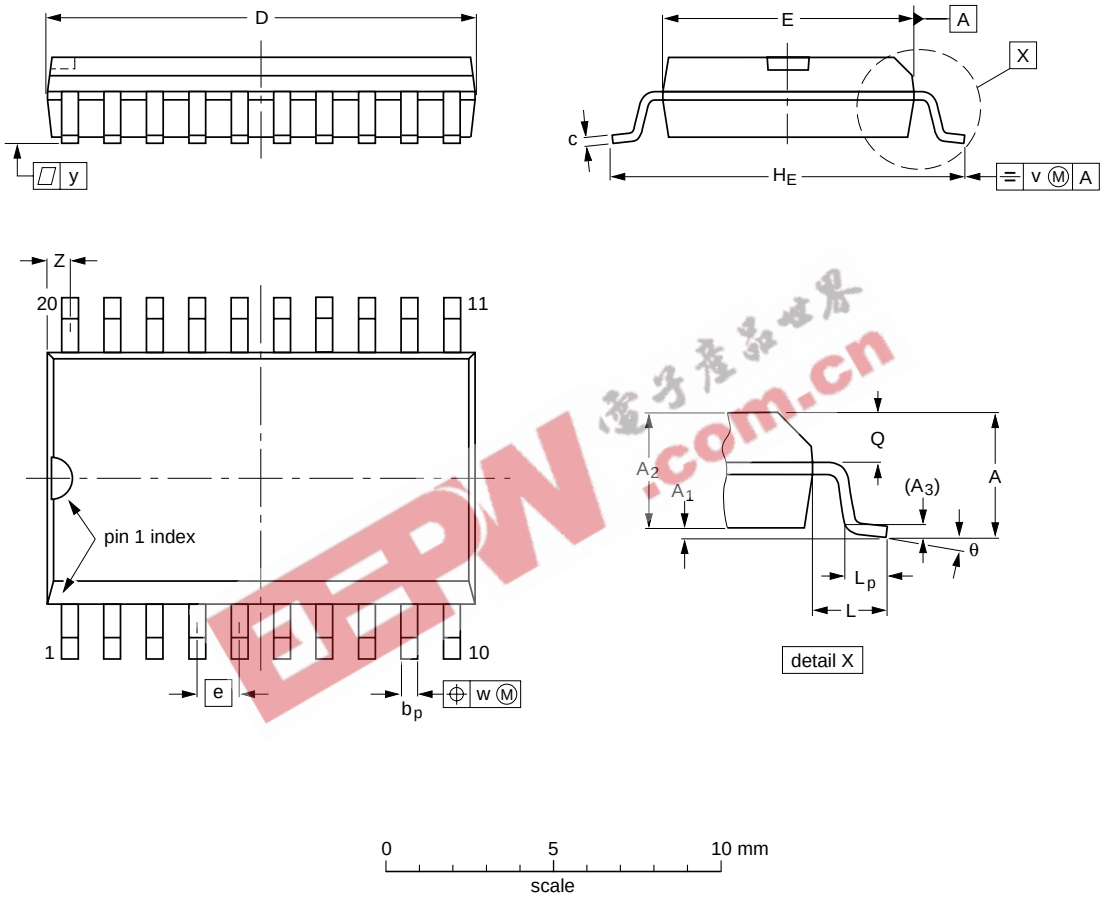
TEST	S1
t_{PLH}/t_{PHL}	open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND

Definitions for test circuit:
R_L = Load resistor.
C_L = Load capacitance including jig and probe capacitance.
R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator.

Fig.10 Load circuitry for switching times.

PACKAGE OUTLINES

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



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

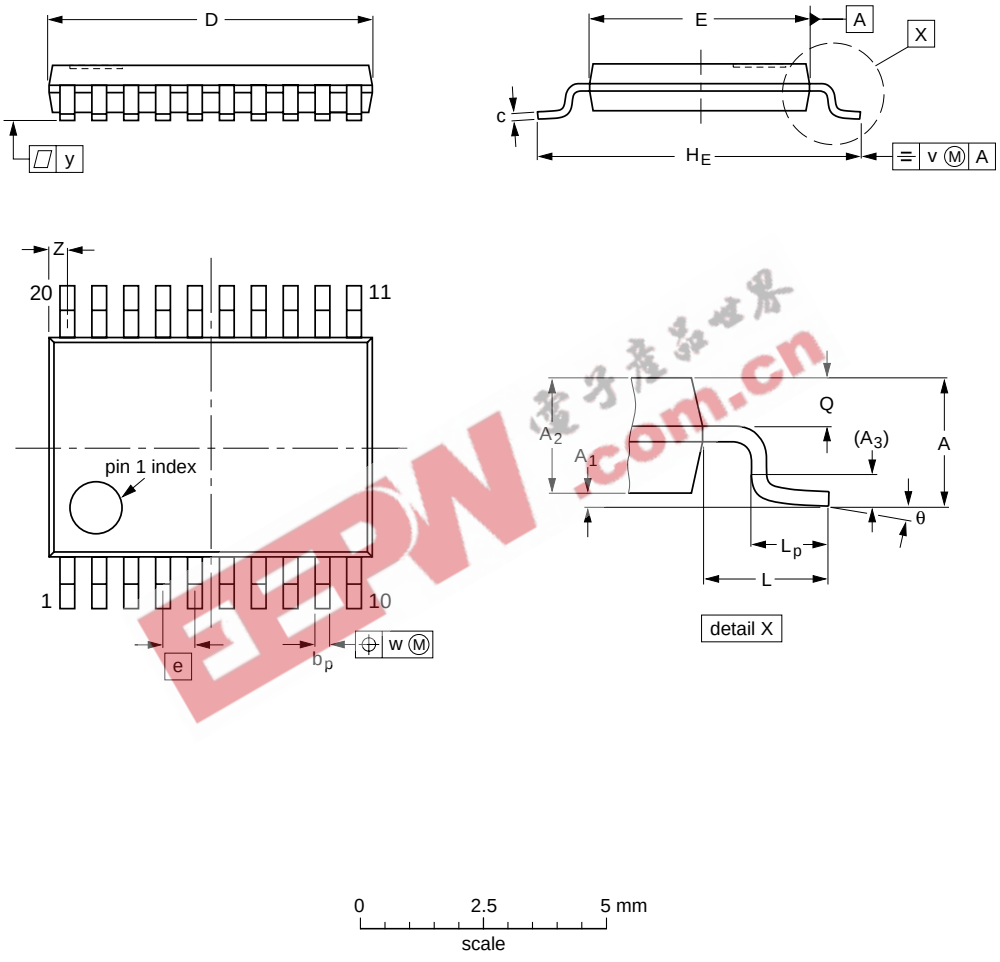
UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	2.65	0.3 0.1	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8^o 0^o
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.05	0.419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

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

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