

# DATA SHEET

## **74AHC273; 74AHCT273**

Octal D-type flip-flop with reset;  
positive-edge trigger

Product specification  
Supersedes data of 1999 Sep 01

2003 Jul 21

## Octal D-type flip-flop with reset; positive-edge trigger

## 74AHC273; 74AHCT273

### FEATURES

- Ideal buffer for MOS microcontroller or memory
- Common clock and master reset
- 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
- Inputs accepts voltages higher than  $V_{CC}$
- Related products:
  - See 74AHC(T)377 for clock enable version
  - See 74AHC(T)373 for transparent latch version
  - See 74AHC(T)374 for 3-state version.
- 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/AHCT273 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/AHCT273 have eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs.

The common clock (CP) and master reset ( $\overline{MR}$ ) inputs load and reset (clear) all flip-flops simultaneously.

The state of each D input, one set-up time before the LOW-to-HIGH clock transition, is transferred to the corresponding output (Qn) of the flip-flop.

All outputs will be forced LOW independently of clock or data inputs by a LOW on the  $\overline{MR}$  input.

The device is useful for applications where the true output only is required and the clock and master reset are common to all storage elements.

### QUICK REFERENCE DATA

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

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			74AHC273	74AHCT273	
$t_{PHL}/t_{PLH}$	propagation delay CP to Qn	$C_L = 15$ pF; $V_{CC} = 5$ V	4.2	4.0	ns
	$\overline{MR}$ to Qn		3.7	3.9	ns
$f_{max}$	maximum clock frequency	$C_L = 15$ pF; $V_{CC} = 5$ V	165	120	MHz
$C_I$	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	14.0	18.0	pF

### Notes

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = 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  $V_I = \text{GND to } V_{CC}$

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**FUNCTION TABLE**

See note 1.

OPERATING MODES	INPUT			OUTPUT
	$\overline{\text{MR}}$	CP	Dn	Qn
Reset (clear)	L	X	X	L
Load '1'	H	↑	h	H
Load '0'	H	↑	l	L

**Note**

- H = HIGH voltage level;  
h = HIGH voltage level one set-up time prior to the HIGH-to-LOW CP transition;  
L = LOW voltage level;  
l = LOW voltage level one set-up time prior to the HIGH-to-LOW CP transition;  
X = don't care;  
↑ = LOW-to-HIGH transition.

**ORDERING INFORMATION**

TYPE NUMBER	TEMPERATURE RANGE	PACKAGE			
		PINS	PACKAGE	MATERIAL	CODE
74AHC273D	-40 to +125 °C	20	SO20	plastic	SOT163-1
74AHCT273D	-40 to +125 °C	20	SO20	plastic	SOT163-1
74AHC273PW	-40 to +125 °C	20	TSSOP20	plastic	SOT360-1
74AHCT273PW	-40 to +125 °C	20	TSSOP20	plastic	SOT360-1
74AHC273BQ	-40 to +125 °C	20	DHVQFN20	plastic	SOT764-1
74AHCT273BQ	-40 to +125 °C	20	DHVQFN20	plastic	SOT764-1

**PINNING**

PIN	SYMBOL	DESCRIPTION
1	$\overline{\text{MR}}$	master reset input (active LOW)
2	Q0	flip-flop output
3	D0	data input
4	D1	data input
5	Q1	flip-flop output
6	Q2	flip-flop output
7	D2	data input
8	D3	data input
9	Q3	flip-flop output
10	GND	ground (0 V)

PIN	SYMBOL	DESCRIPTION
11	CP	clock input (LOW-to-HIGH; edge-triggered)
12	Q4	flip-flop output
13	D4	data input
14	D5	data input
15	Q5	flip-flop output
16	Q6	flip-flop output
17	D6	data input
18	D7	data input
19	Q7	flip-flop output
20	V <sub>CC</sub>	supply voltage

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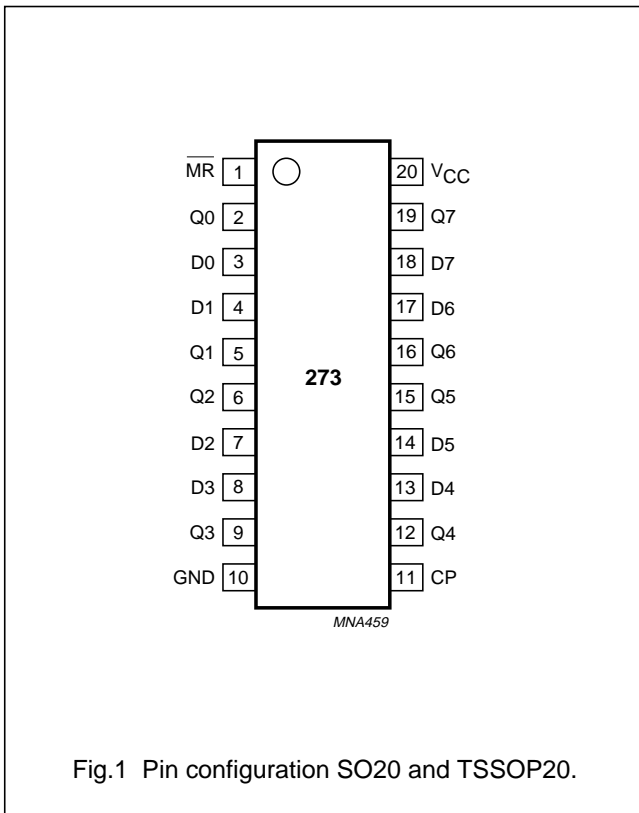
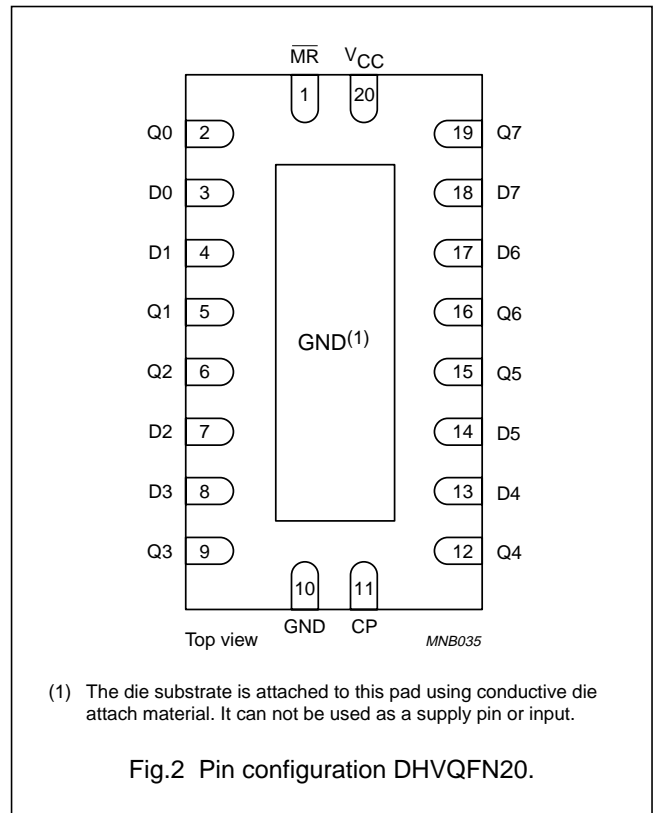


Fig.1 Pin configuration SO20 and TSSOP20.



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

Fig.2 Pin configuration DHVQFN20.

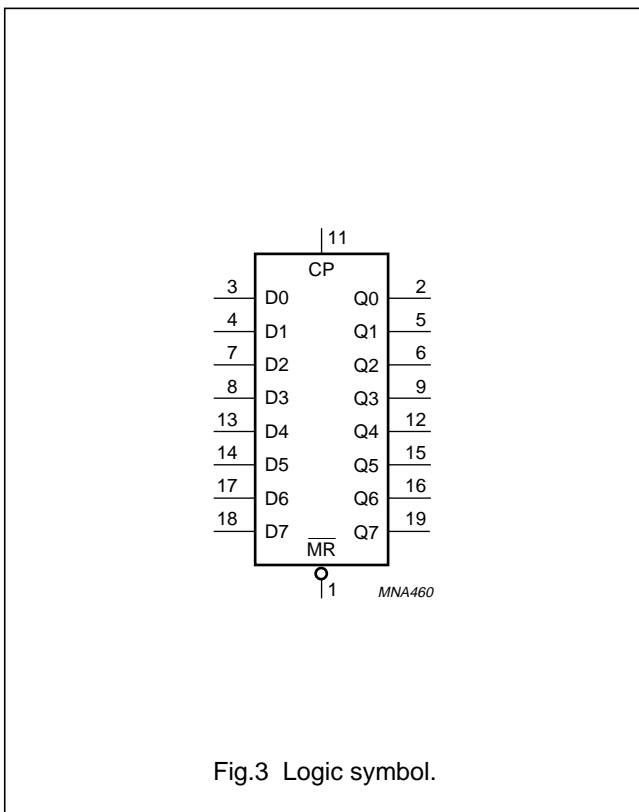


Fig.3 Logic symbol.

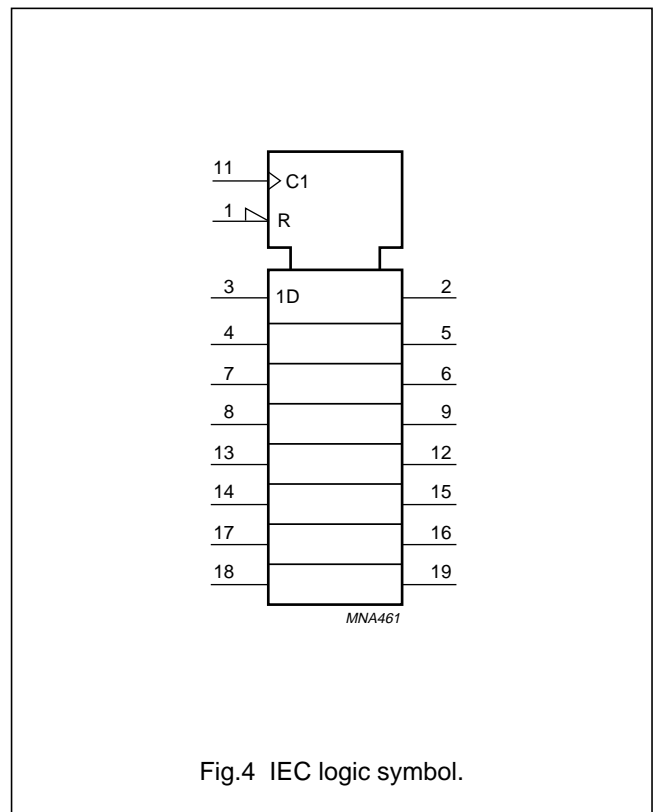


Fig.4 IEC logic symbol.

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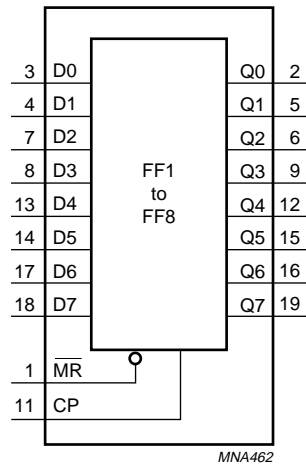


Fig.5 Function diagram.

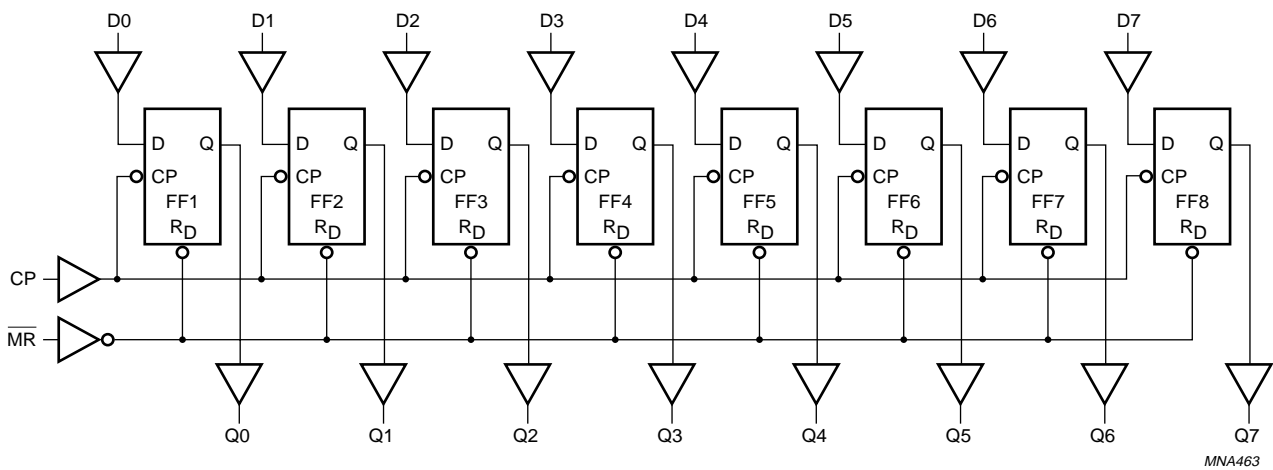


Fig.6 Logic diagram.

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### 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
$T_{amb}$	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 ratio	$V_{CC} = 3.3 \pm 0.3$ V	–	–	100	–	–	–	ns/V
		$V_{CC} = 5 \pm 0.5$ 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	–	$\pm 20$	mA
$I_O$	output source or sink current	$V_O = -0.5$ V to $V_{CC} + 0.5$ V	–	$\pm 25$	mA
$I_{CC}, I_{GND}$	$V_{CC}$ or GND current		–	$\pm 75$	mA
$T_{stg}$	storage temperature		–65	+150	°C
$P_D$	power dissipation	$T_{amb} = -40$ to $+125$ °C; note 2	–	500	mW

### Notes

- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
- For SO20 packages: above 70 °C the value of  $P_D$  derates linearly with 8 mW/K.  
For TSSOP20 packages: above 60 °C the value of  $P_D$  derates linearly with 5.5 mW/K.  
For DHVQFN20 packages: above 60 °C the value of  $P_D$  derates linearly with 4.5 mW/K.

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### DC CHARACTERISTICS

#### Type 74AHC273

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = 25 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V <sub>IL</sub>	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = –50 µA	2.0	1.9	2.0	–	V
			3.0	2.9	3.0	–	V
			4.5	4.4	4.5	–	V
		I <sub>O</sub> = –4.0 mA	3.0	2.58	–	–	V
		I <sub>O</sub> = –8.0 mA	4.5	3.94	–	–	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 µA	2.0	–	0	0.1	V
			3.0	–	0	0.1	V
			4.5	–	0	0.1	V
		I <sub>O</sub> = 4.0 mA	3.0	–	–	0.36	V
		I <sub>O</sub> = 8.0 mA	4.5	–	–	0.36	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5	–	–	0.1	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	4.0	µA
C <sub>I</sub>	input capacitance		–	–	3	10	pF

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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +85 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V <sub>IL</sub>	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = -50 µA	2.0	1.9	–	–	V
			3.0	2.9	–	–	V
			4.5	4.4	–	–	V
		I <sub>O</sub> = -4.0 mA I <sub>O</sub> = -8.0 mA	3.0	2.48	–	–	V
			4.5	3.8	–	–	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 µA	2.0	–	–	0.1	V
			3.0	–	–	0.1	V
			4.5	–	–	0.1	V
		I <sub>O</sub> = 4.0 mA I <sub>O</sub> = 8.0 mA	3.0	–	–	0.44	V
			4.5	–	–	0.44	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5	–	–	1.0	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	40	µA
C <sub>I</sub>	input capacitance		–	–	–	10	pF



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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +125 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		2.0	1.5	–	–	V
			3.0	2.1	–	–	V
			5.5	3.85	–	–	V
V <sub>IL</sub>	LOW-level input voltage		2.0	–	–	0.5	V
			3.0	–	–	0.9	V
			5.5	–	–	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = -50 µA	2.0	1.9	–	–	V
			3.0	2.9	–	–	V
			4.5	4.4	–	–	V
		I <sub>O</sub> = -4.0 mA I <sub>O</sub> = -8.0 mA	3.0	2.40	–	–	V
			4.5	3.70	–	–	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 µA	2.0	–	–	0.1	V
			3.0	–	–	0.1	V
			4.5	–	–	0.1	V
		I <sub>O</sub> = 4.0 mA I <sub>O</sub> = 8.0 mA	3.0	–	–	0.55	V
			4.5	–	–	0.55	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5	–	–	2.0	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	80	µA
C <sub>I</sub>	input capacitance		–	–	–	10	pF

# Octal D-type flip-flop with reset; positive-edge trigger

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**Type 74AHCT273**

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = 25 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V <sub>IL</sub>	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = –50 µA	4.5	4.4	4.5	–	V
		I <sub>O</sub> = –8.0 mA	4.5	3.94	–	V	
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 µA	4.5	–	0	0.1	V
		I <sub>O</sub> = 8.0 mA	4.5	–	–	0.36	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	5.5	–	–	0.1	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	4.0	µA
ΔI <sub>CC</sub>	additional quiescent supply current per input pin	V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0	4.5 to 5.5	–	–	1.35	mA
C <sub>I</sub>	input capacitance		–	–	3	10	pF
<b>T<sub>amb</sub> = –40 to +85 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V <sub>IL</sub>	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = –50 µA	4.5	4.4	–	–	V
		I <sub>O</sub> = –8.0 mA	4.5	3.8	–	V	
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 µA	4.5	–	–	0.1	V
		I <sub>O</sub> = 8.0 mA	4.5	–	–	0.44	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	5.5	–	–	1.0	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	40	µA
ΔI <sub>CC</sub>	additional quiescent supply current per input pin	V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0	4.5 to 5.5	–	–	1.5	mA
C <sub>I</sub>	input capacitance		–	–	–	10	pF

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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +125 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V <sub>IL</sub>	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = -50 μA	4.5	4.4	–	–	V
		I <sub>O</sub> = -8.0 mA	4.5	3.70	–	–	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> I <sub>O</sub> = 50 μA	4.5	–	–	0.1	V
		I <sub>O</sub> = 8.0 mA	4.5	–	–	0.55	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	5.5	–	–	2.0	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0	5.5	–	–	80	μA
ΔI <sub>CC</sub>	additional quiescent supply current per input pin	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0	4.5 to 5.5	–	–	1.5	mA
C <sub>I</sub>	input capacitance		–	–	–	10	pF

# Octal D-type flip-flop with reset; positive-edge trigger

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## AC CHARACTERISTICS

### Type 74AHC273

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

SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT	
		WAVEFORMS	$C_L$ (pF)	$V_{CC}$ (V)					
$T_{amb} = 25$ °C; note 1									
$t_{PHL}/t_{PLH}$	propagation delay CP to Qn	see Figs 7 and 10	15	3.0 to 3.6	–	6.0	13.6	ns	
				4.5 to 5.5	–	4.2	9	ns	
			50	3.0 to 3.6	–	8.6	17.1	ns	
				4.5 to 5.5	–	6.0	11.0	ns	
$t_{PHL}$	propagation delay MR to Qn	see Figs 8 and 10	15	3.0 to 3.6	–	5.1	13.6	ns	
				4.5 to 5.5	–	3.7	8.5	ns	
			50	3.0 to 3.6	–	7.3	17.1	ns	
				4.5 to 5.5	–	5.3	10.5	ns	
$f_{max}$	maximum clock pulse frequency		15	3.0 to 3.6	75	120	–	MHz	
				4.5 to 5.5	120	165	–	MHz	
			50	3.0 to 3.6	50	75	–	MHz	
				4.5 to 5.5	80	110	–	MHz	
$t_W$	clock pulse width HIGH or LOW	see Figs 7 and 10	50	3.0 to 3.6	5.0	–	–	ns	
				4.5 to 5.5	5.0	–	–	ns	
	master reset pulse width LOW		see Figs 8 and 10	50	3.0 to 3.6	5.0	–	–	ns
					4.5 to 5.5	5.0	–	–	ns
$t_{rem}$	removal time MR to CP	see Figs 8 and 10	50	3.0 to 3.6	2.5	–	–	ns	
				4.5 to 5.5	2.0	–	–	ns	
$t_{su}$	set-up time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	3.0	–	–	ns	
				4.5 to 5.5	3.0	–	–	ns	
$t_h$	hold time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	1.0	–	–	ns	
				4.5 to 5.5	1.0	–	–	ns	

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SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +85 °C</b>								
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	3.0 to 3.6	1.0	–	16.0	ns
				4.5 to 5.5	1.0	–	10.5	ns
			50	3.0 to 3.6	1.0	–	19.5	ns
				4.5 to 5.5	1.0	–	12.5	ns
t <sub>PHL</sub>	propagation delay MR to Qn	see Figs 8 and 10	15	3.0 to 3.6	1.0	–	16.0	ns
				4.5 to 5.5	1.0	–	10.0	ns
			50	3.0 to 3.6	1.0	–	19.5	ns
				4.5 to 5.5	1.0	–	12.0	ns
f <sub>max</sub>	maximum clock pulse frequency		15	3.0 to 3.6	65	–	–	MHz
				4.5 to 5.5	100	–	–	MHz
			50	3.0 to 3.6	45	–	–	MHz
				4.5 to 5.5	70	–	–	MHz
t <sub>w</sub>	clock pulse width HIGH or LOW	see Figs 7 and 10	50	3.0 to 3.6	6.5	–	–	ns
				4.5 to 5.5	5.0	–	–	ns
	master reset pulse width LOW	see Figs 8 and 10	50	3.0 to 3.6	6.0	–	–	ns
				4.5 to 5.5	5.0	–	–	ns
t <sub>rem</sub>	removal time MR to CP	see Figs 8 and 10	50	3.0 to 3.6	2.5	–	–	ns
				4.5 to 5.5	2.0	–	–	ns
t <sub>su</sub>	set-up time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	3.0	–	–	ns
				4.5 to 5.5	3.0	–	–	ns
t <sub>h</sub>	hold time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	1.0	–	–	ns
				4.5 to 5.5	1.0	–	–	ns

Octal D-type flip-flop with reset;  
positive-edge trigger

## 74AHC273; 74AHCT273

SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +125 °C</b>								
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	3.0 to 3.6	1.0	–	17.0	ns
				4.5 to 5.5	1.0	–	11.5	ns
			50	3.0 to 3.6	1.0	–	21.5	ns
				4.5 to 5.5	1.0	–	14.0	ns
t <sub>PHL</sub>	propagation delay MR to Qn	see Figs 8 and 10	15	3.0 to 3.6	1.0	–	17.0	ns
				4.5 to 5.5	1.0	–	11.0	ns
			50	3.0 to 3.6	1.0	–	21.5	ns
				4.5 to 5.5	1.0	–	13.5	ns
f <sub>max</sub>	maximum clock pulse frequency		15	3.0 to 3.6	65	–	–	MHz
				4.5 to 5.5	100	–	–	MHz
			50	3.0 to 3.6	45	–	–	MHz
				4.5 to 5.5	70	–	–	MHz
t <sub>w</sub>	clock pulse width HIGH or LOW	see Figs 7 and 10	50	3.0 to 3.6	6.5	–	–	ns
				4.5 to 5.5	5.0	–	–	ns
	master reset pulse width LOW	see Figs 8 and 10	50	3.0 to 3.6	6.0	–	–	ns
				4.5 to 5.5	5.0	–	–	ns
t <sub>rem</sub>	removal time MR to CP	see Figs 8 and 10	50	3.0 to 3.6	2.5	–	–	ns
				4.5 to 5.5	2.0	–	–	ns
t <sub>su</sub>	set-up time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	3.0	–	–	ns
				4.5 to 5.5	3.0	–	–	ns
t <sub>h</sub>	hold time Dn to CP	see Figs 9 and 10	50	3.0 to 3.6	1.0	–	–	ns
				4.5 to 5.5	1.0	–	–	ns

**Note**

1. Typical values are measured at V<sub>CC</sub> = 3.3 V for V<sub>CC</sub> = 3.0 to 3.6 V and at V<sub>CC</sub> = 5.0 V for V<sub>CC</sub> = 4.5 to 5.5 V.

Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

## Type 74AHCT273

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

SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = 25 °C; note 1</b>								
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	4.5 to 5.5	–	4.0	7.5	ns
			50	4.5 to 5.5	–	5.8	9.2	ns
t <sub>PHL</sub>	propagation delay MR to Qn	see Figs 8 and 10	15	4.5 to 5.5	–	3.9	10.0	ns
			50	4.5 to 5.5	–	5.6	11.0	ns
f <sub>max</sub>	maximum clock pulse frequency		15	4.5 to 5.5	75	120	–	MHz
			50	4.5 to 5.5	50	75	–	MHz
t <sub>W</sub>	clock pulse width HIGH or LOW	see Figs 7 and 10	50	4.5 to 5.5	5.0	–	–	ns
	master reset pulse width LOW	see Figs 8 and 10	50	4.5 to 5.5	5.0	–	–	ns
t <sub>rem</sub>	removal time MR to CP	see Figs 8 and 10	50	4.5 to 5.5	2.5	–	–	ns
t <sub>su</sub>	set-up time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	3.0	–	–	ns
t <sub>h</sub>	hold time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	1.0	–	–	ns
<b>T<sub>amb</sub> = –40 to +85 °C</b>								
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	4.5 to 5.5	1.0	–	8.8	ns
			50	4.5 to 5.5	1.0	–	10.5	ns
t <sub>PHL</sub>	propagation delay MR to Qn	see Figs 8 and 10	15	4.5 to 5.5	1.0	–	11.6	ns
			50	4.5 to 5.5	1.0	–	12.6	ns
f <sub>max</sub>	maximum clock pulse frequency		15	4.5 to 5.5	65	–	–	MHz
			50	4.5 to 5.5	45	–	–	MHz
t <sub>W</sub>	clock pulse width HIGH or LOW	see Figs 7 and 10	50	4.5 to 5.5	6.5	–	–	ns
	master reset pulse width LOW	see Figs 8 and 10	50	4.5 to 5.5	6.0	–	–	ns
t <sub>rem</sub>	removal time MR to CP	see Figs 8 and 10	50	4.5 to 5.5	2.5	–	–	ns
t <sub>su</sub>	set-up time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	3.0	–	–	ns
t <sub>h</sub>	hold time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	1.0	–	–	ns

Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	C <sub>L</sub> (pF)	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 to +125 °C</b>								
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	4.5 to 5.5	1.0	–	9.5	ns
			50	4.5 to 5.5	1.0	–	11.5	ns
t <sub>PHL</sub>	propagation delay MR to Qn	see Figs 8 and 10	15	4.5 to 5.5	1.0	–	12.5	ns
			50	4.5 to 5.5	1.0	–	14.0	ns
f <sub>max</sub>	maximum clock pulse frequency		15	4.5 to 5.5	65	–	–	MHz
			50	4.5 to 5.5	45	–	–	MHz
t <sub>w</sub>	clock pulse width HIGH or LOW	see Figs 7 and 10	50	4.5 to 5.5	6.5	–	–	ns
	master reset pulse width LOW	see Figs 8 and 10	50	4.5 to 5.5	6.0	–	–	ns
t <sub>rem</sub>	removal time MR to CP	see Figs 8 and 10	50	4.5 to 5.5	2.5	–	–	ns
t <sub>su</sub>	set-up time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	3.0	–	–	ns
t <sub>h</sub>	hold time Dn to CP	see Figs 9 and 10	50	4.5 to 5.5	1.0	–	–	ns
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay CP to Qn	see Figs 7 and 10	15	4.5 to 5.5	1.0	–	9.5	ns

**Note**

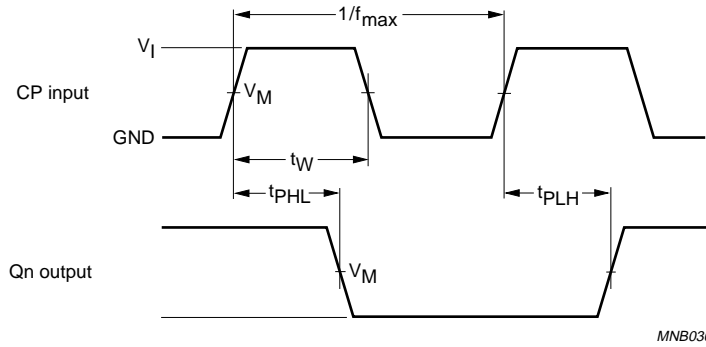
1. All typical values are measured at V<sub>CC</sub> = 5.0 V.



Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

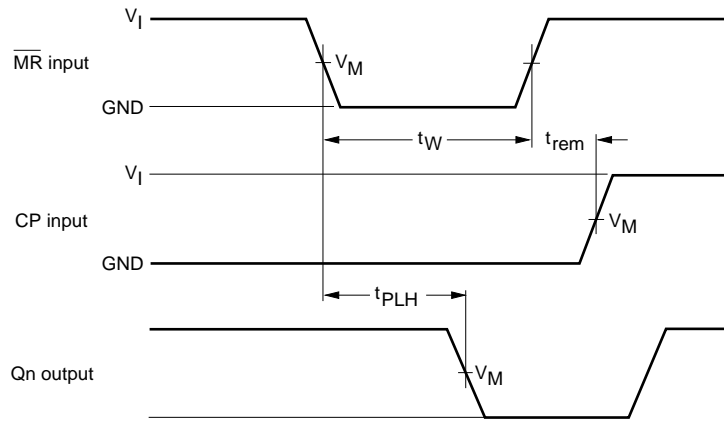
AC WAVEFORMS



MNB036

FAMILY	$V_I$	$V_M$ INPUT	$V_M$ OUTPUT
AHC	GND to $V_{CC}$	$0.5V_{CC}$	$0.5V_{CC}$
AHCT	GND to 3.0 V	1.5 V	$0.5V_{CC}$

Fig.7 The clock (CP) to output (Qn) propagation delays, the clock pulse width output transition times and the maximum clock pulse frequency.



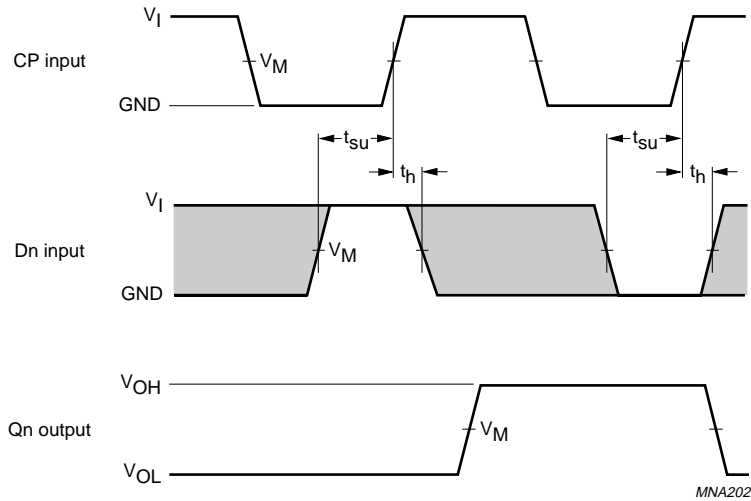
MNA464

FAMILY	$V_I$	$V_M$ INPUT	$V_M$ OUTPUT
AHC	GND to $V_{CC}$	$0.5V_{CC}$	$0.5V_{CC}$
AHCT	GND to 3.0 V	1.5 V	$0.5V_{CC}$

Fig.8 The master reset ( $\overline{MR}$ ) pulse width, the master reset to output (Qn) propagation delays and master reset to clock (CP) removal time.

Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

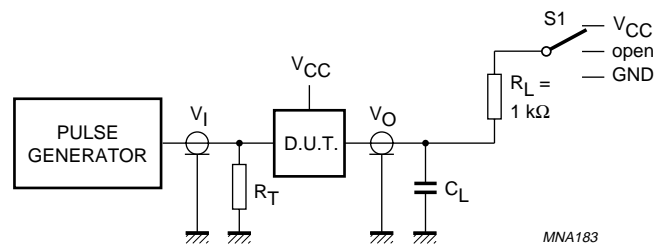


MNA202

FAMILY	V <sub>I</sub>	V <sub>M</sub> INPUT	V <sub>M</sub> OUTPUT
AHC	GND to V <sub>CC</sub>	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
AHCT	GND to 3.0 V	1.5 V	0.5V <sub>CC</sub>

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

Fig.9 The data set-up and hold times for the data input (Dn).



MNA183

TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	open
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>CC</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND

Definitions for test circuit.

C<sub>L</sub> = Load capacitance including jig and probe capacitance (See Chapter "AC characteristics").

R<sub>L</sub> = Load resistor.

R<sub>T</sub> = Termination resistance should be equal to the output impedance Z<sub>o</sub> of the pulse generator.

Fig.10 Load circuitry for switching times.

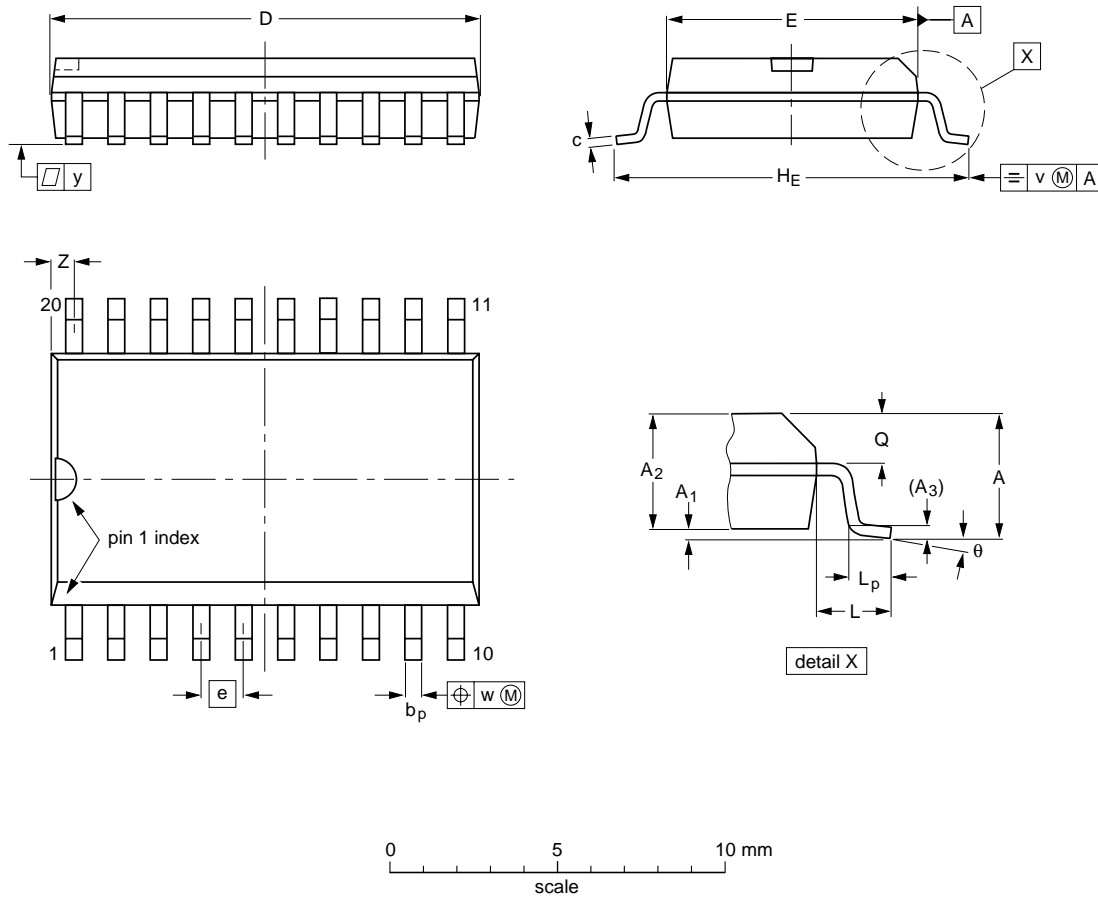
Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	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° 0°
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.

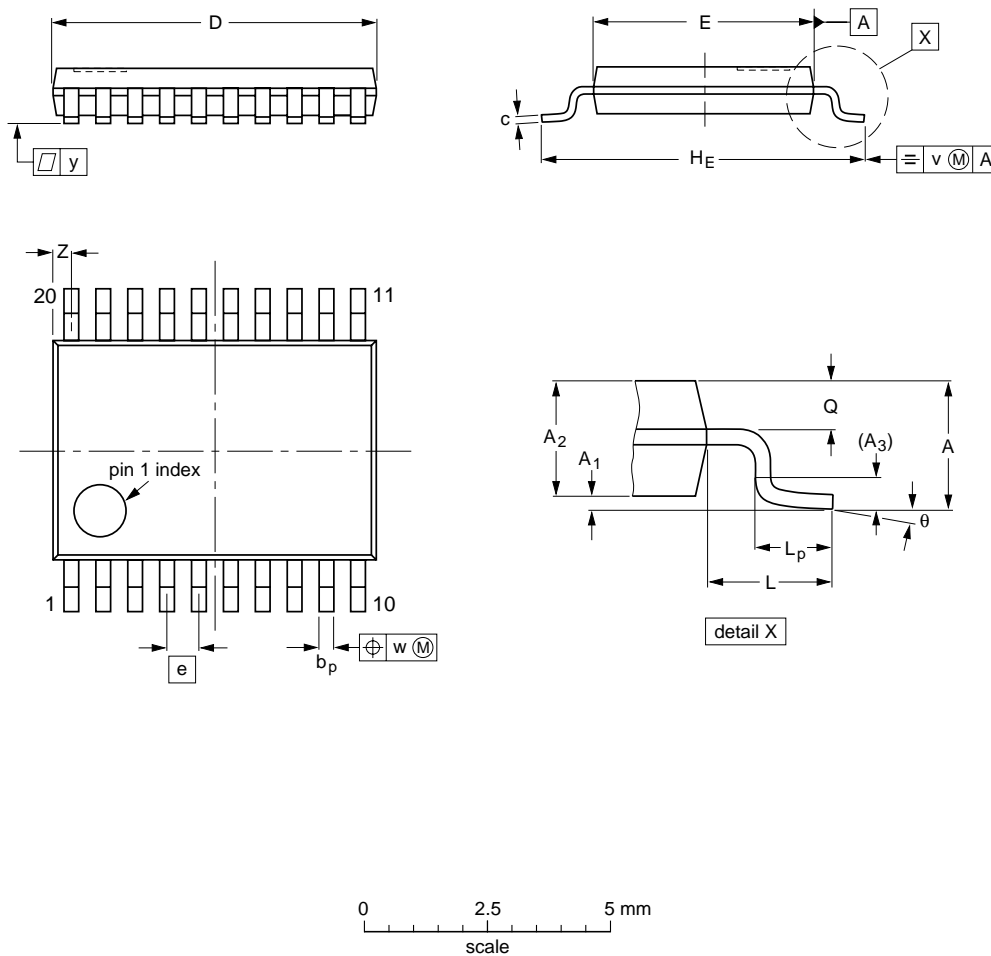
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT163-1	075E04	MS-013				99-12-27 03-02-19

Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	$\theta$
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° 0°

**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.

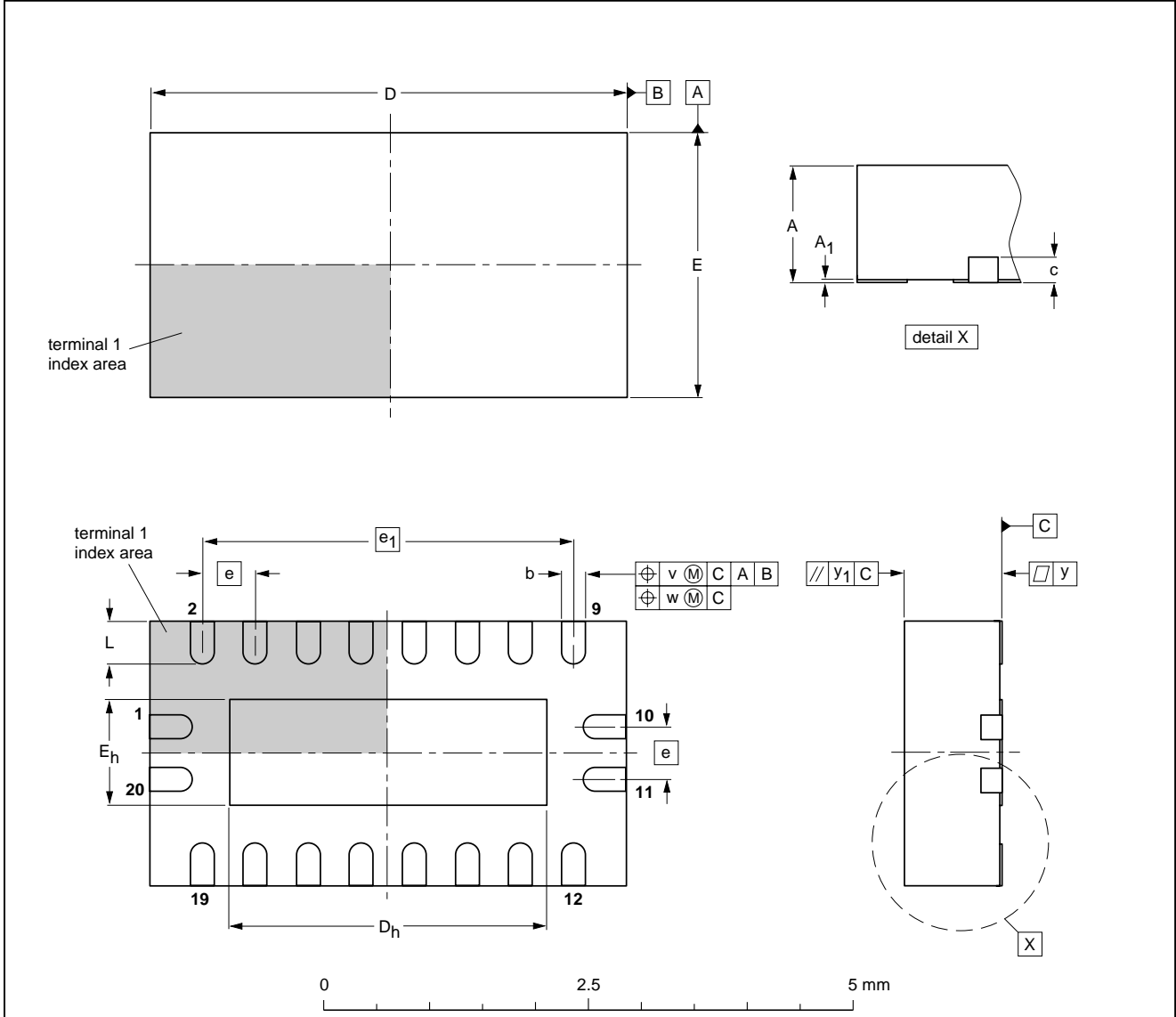
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT360-1		MO-153				99-12-27 03-02-19

Octal D-type flip-flop with reset;  
positive-edge trigger

74AHC273; 74AHCT273

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 <sup>(1)</sup> max.	A <sub>1</sub>	b	c	D <sup>(1)</sup>	D <sub>h</sub>	E <sup>(1)</sup>	E <sub>h</sub>	e	e <sub>1</sub>	L	v	w	y	y <sub>1</sub>
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

# Octal D-type flip-flop with reset; positive-edge trigger

74AHC273; 74AHCT273

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	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.
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**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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