

# MC74AC273, MC74ACT273

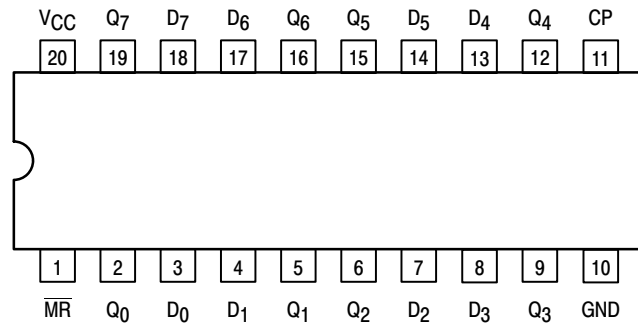
## Octal D Flip-Flop

The MC74AC273/74ACT273 has eight edge-triggered D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) and Master Reset ( $\overline{MR}$ ) inputs load and reset (clear) all flip-flops simultaneously.

The register is fully edge-triggered. The state of each D input, one setup time before the LOW-to-HIGH clock transition, is transferred to the corresponding flip-flop's Q output.

All outputs will be forced LOW independently of Clock or Data inputs by a LOW voltage level 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.

- Ideal Buffer for MOS Microprocessor or Memory
- Eight Edge-Triggered D Flip-Flops
- Buffered Common Clock
- Buffered, Asynchronous Master Reset
- See MC74AC377 for Clock Enable Version
- See MC74AC373 for Transparent Latch Version
- See MC74AC374 for 3-State Version
- Outputs Source/Sink 24 mA
- 'ACT273 Has TTL Compatible Inputs



**Figure 1. Pinout: 20-Lead Packages Conductors (Top View)**

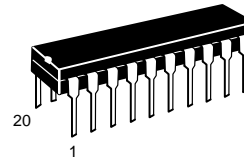
### PIN ASSIGNMENT

PIN	FUNCTION
D <sub>0</sub> -D <sub>7</sub>	Data Inputs
$\overline{MR}$	Master Reset
CP	Clock Pulse Input
Q <sub>0</sub> -Q <sub>7</sub>	Data Outputs

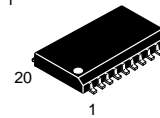


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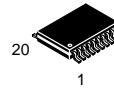
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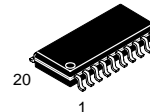
**PDIP-20  
N SUFFIX  
CASE 738**



**SO-20  
DW SUFFIX  
CASE 751**



**TSSOP-20  
DT SUFFIX  
CASE 948E**



**EIAJ-20  
M SUFFIX  
CASE 967**

### ORDERING INFORMATION

Device	Package	Shipping
MC74AC273N	PDIP-20	18 Units/Rail
MC74ACT273N	PDIP-20	18 Units/Rail
MC74AC273DW	SOIC-20	38 Units/Rail
MC74AC273DWR2	SOIC-20	1000 Tape & Reel
MC74ACT273DW	SOIC-20	38 Units/Rail
MC74ACT273DWR2	SOIC-20	1000 Tape & Reel
MC74AC273DT	TSSOP-20	75 Units/Rail
MC74AC273DTR2	TSSOP-20	2500 Tape & Reel
MC74ACT273DT	TSSOP-20	75 Units/Rail
MC74ACT273DTR2	TSSOP-20	2500 Tape & Reel
MC74AC273M	EIAJ-20	40 Units/Rail
MC74AC273MEL	EIAJ-20	2000 Tape & Reel
MC74ACT273M	EIAJ-20	40 Units/Rail
MC74ACT273MEL	EIAJ-20	2000 Tape & Reel

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 221 of this data sheet.

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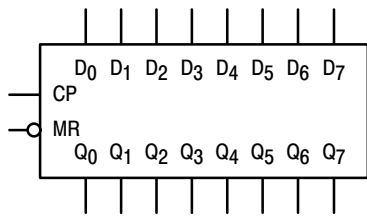
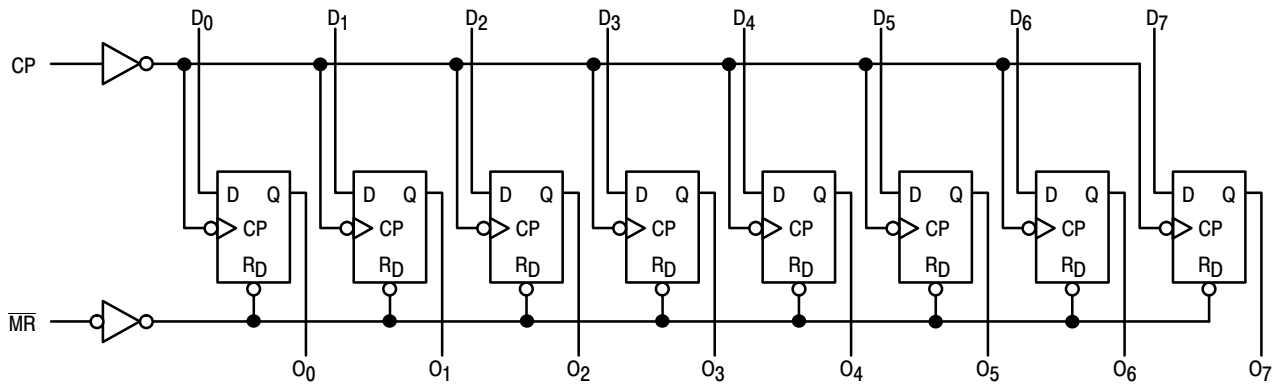


Figure 2. Logic Symbol

MODE SELECT-FUNCTION TABLE

Operating Mode	Inputs			Outputs
	$\overline{MR}$	CP	$D_n$	$Q_n$
Reset (Clear)	L	X	X	L
Load '1'	H	$\uparrow$	H	H
Load '0'	H	$\uparrow$	L	L

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 $\uparrow$  = LOW-to-HIGH Clock Transition



NOTE: That this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

## MAXIMUM RATINGS\*

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{IN}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{OUT}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{IN}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{OUT}$	DC Output Sink/Source Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$T_{stg}$	Storage Temperature	-65 to +150	$^{\circ}C$

\*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

# MC74AC273, MC74ACT273

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
V <sub>CC</sub>	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V <sub>in</sub> , V <sub>out</sub>	DC Input Voltage, Output Voltage (Ref. to GND)	0	–	V <sub>CC</sub>	V	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V <sub>CC</sub> @ 3.0 V	–	150	–	ns/V
		V <sub>CC</sub> @ 4.5 V	–	40	–	
		V <sub>CC</sub> @ 5.5 V	–	25	–	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V <sub>CC</sub> @ 4.5 V	–	10	–	ns/V
		V <sub>CC</sub> @ 5.5 V	–	8.0	–	
T <sub>J</sub>	Junction Temperature (PDIP)	–	–	140	°C	
T <sub>A</sub>	Operating Ambient Temperature Range	–40	25	85	°C	
I <sub>OH</sub>	Output Current – High	–	–	–24	mA	
I <sub>OL</sub>	Output Current – Low	–	–	24	mA	

- V<sub>IN</sub> from 30% to 70% V<sub>CC</sub>; see individual Data Sheets for devices that differ from the typical input rise and fall times.
- V<sub>IN</sub> from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		74ACT	Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = –40°C to +85°C		
			Typ	Guaranteed Limits			
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V
		4.5	2.25	3.15	3.15		
		5.5	2.75	3.85	3.85		
V <sub>IL</sub>	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V
		4.5	2.25	1.35	1.35		
		5.5	2.75	1.65	1.65		
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I <sub>OUT</sub> = –50 μA
		4.5	4.49	4.4	4.4		
		5.5	5.49	5.4	5.4		
		3.0	–	2.56	2.46	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> –12 mA I <sub>OH</sub> –24 mA –24 mA
		4.5	–	3.86	3.76		
		5.5	–	4.86	4.76		
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I <sub>OUT</sub> = 50 μA
		4.5	0.001	0.1	0.1		
		5.5	0.001	0.1	0.1		
		3.0	–	0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 12 mA I <sub>OL</sub> 24 mA 24 mA
		4.5	–	0.36	0.44		
		5.5	–	0.36	0.44		
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5	–	–	75	mA	V <sub>OLD</sub> = 1.65 V Max
I <sub>OHD</sub>		5.5	–	–	–75	mA	V <sub>OHD</sub> = 3.85 V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	–	8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

NOTE: Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# MC74AC273, MC74ACT273

**AC CHARACTERISTICS** (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	3.3 5.0	90 140	125 175	– –	75 125	– –	Mhz	3–3
t <sub>PLH</sub>	Propagation Delay Clock to Output	3.3 5.0	4.0 3.0	7.0 5.5	12.5 9.0	3.0 2.5	14.0 10.0	ns	3–6
t <sub>PHL</sub>	Propagation Delay Clock to Output	3.3 5.0	4.0 3.0	7.0 5.0	13.0 10.0	3.5 2.5	14.5 11.0	ns	3–6
t <sub>PHL</sub>	Propagation Delay MR to Output	3.3 5.0	4.0 3.0	7.0 5.0	13.0 10.0	3.5 2.5	14.0 10.5	ns	3–6

\*Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

## AC OPERATING REQUIREMENTS

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC		74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Typ	Guaranteed Minimum				
t <sub>s</sub>	Setup Time, HIGH or LOW Data to CP	3.3 5.0	3.5 2.5	5.5 4.0	6.0 4.5	ns	3–9	
t <sub>h</sub>	Hold Time, HIGH or LOW Data to CP	3.3 5.0	-2.0 -1.0	0 1.0	0 1.0	ns	3–9	
t <sub>w</sub>	Clock Pulse Width HIGH or LOW	3.3 5.0	3.5 2.5	5.5 4.0	6.0 4.5	ns	3–6	
t <sub>w</sub>	MR Pulse Width HIGH or LOW	3.3 5.0	2.0 1.5	5.5 4.0	6.0 4.5	ns	3–6	
t <sub>rec</sub>	Recovery Time MR to CP	3.3 5.0	1.5 1.0	3.5 2.0	4.5 3.0	ns	3–9	

\*Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC273, MC74ACT273

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5	-	3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24 mA	
		5.5	-	4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5	-	0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OL</sub> = 24 mA	
		5.5	-	0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CCCT</sub>	Additional Max. I <sub>CC</sub> /Input	5.5	0.6	-	1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5	-	-	75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	-	8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

## AC CHARACTERISTICS (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	5.0	125	200	-	125	-	MHz	3-3
t <sub>PHL</sub>	Propagation Delay Clock to Output	5.0	3.0	6.0	10	2.5	11.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay Clock to Output	5.0	3.0	6.5	11	2.5	12.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay MR to Output	5.0	3.0	7.0	11	2.5	11.5	ns	3-6

\*Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC273, MC74ACT273

## AC OPERATING REQUIREMENTS

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT		74ACT	Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		
			Typ	Guaranteed Minimum			
t <sub>s</sub>	Setup Time, HIGH or LOW Data to CP	5.0	3.0	4.5	5.0	ns	3-9
t <sub>h</sub>	Hold Time, HIGH or LOW Data to CP	5.0	-2.5	2.0	2.0	ns	3-9
t <sub>w</sub>	Clock Pulse Width HIGH or LOW	5.0	2.5	4.0	4.5	ns	3-6
t <sub>w</sub>	MR Pulse Width HIGH or LOW	5.0	2.5	4.0	4.5	ns	3-6
t <sub>rec</sub>	Recovery Time MR to CP	5.0	-1.0	2.0	3.0	ns	3-6

\*Voltage Range 5.0 V is 5.0 V ±0.5 V.

## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	50	pF	V <sub>CC</sub> = 5.0 V

# MC74AC273, MC74ACT273

## MARKING DIAGRAMS

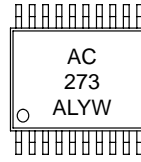
PDIP-20



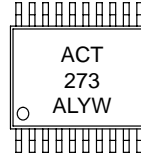
SO-20



TSSOP-20



EIAJ-20



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week