Octal D Flip-Flop

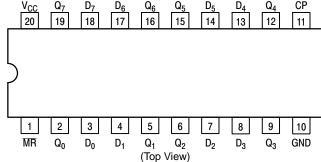
The MC74AC273/74ACT273 has eight edge-triggered D–type flip–flops with individual D inputs and Q outputs. The common buffered Clock (CP) and Master Reset ($\overline{\text{MR}}$) inputs load and reset (clear) all flip–flops simultaneously.

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.

Features

- 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
- These are Pb-Free Devices



Pinout: 20-Lead Packages Conductors

MODE SELECT-FUNCTION TABLE

Operating Mede		Inputs	Outputs		
Operating Mode	MR	СР	D _n	Qn	
Reset (Clear)	L	Х	Х	L	
Load '1'	Н	7	Н	Н	
Load '0'	Н	7	L	L	

H = HIGH Voltage Level

L = LOW Voltage Level

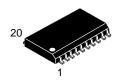
X = Immaterial

_ = LOW-to-HIGH Clock Transition



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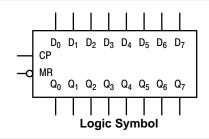
SOIC-20WB SUFFIX DW CASE 751D



TSSOP-20 SUFFIX DT CASE 948E

PIN ASSIGNMENT

PIN	FUNCTION			
D ₀ –D ₇	Data Inputs			
MR	Master Reset			
CP	Clock Pulse Input			
Q ₀ –Q ₇	Data Outputs			

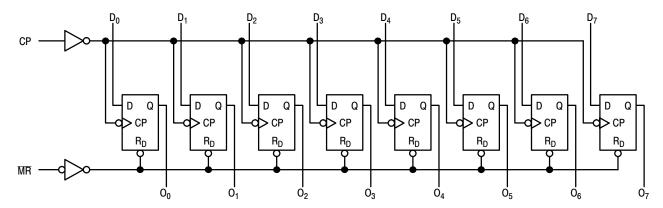


ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.



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

Figure 1. Logic Diagram

MAXIMUM RATINGS

Symbol		Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to 0	GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GN	ND)	-0.5 to V _{CC} +0.5	V
V _{OUT}	DC Output Voltage (Referenced to C	-0.5 to V _{CC} +0.5	V	
I _{IK}	DC Input Diode Current		±20	mA
I _{OK}	DC Output Diode Current		±50	mA
I _{OUT}	DC Output Sink/Source Current		±50	mA
I _{CC}	DC Supply Current, per Output Pin		±50	mA
I _{GND}	DC Ground Current, per Output Pin	±100	mA	
T _{STG}	Storage Temperature Range	-65 to +150	°C	
TL	Lead temperature, 1 mm from Case	260	°C	
TJ	Junction Temperature Under Bias		140	°C
θЈА	Thermal Resistance (Note 2)	SOIC TSSOP	65.8 110.7	°C/W
MSL	Moisture Sensitivity	SOIC TSSOP	Level 3 Level 1	
F _R	Flammability Rating	Oxygen Index: 30% – 35%	UL 94 V-0 @ 0.125 in	
V _{ESD}	ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	> 2000 > 200 > 1000	V
I _{Latchup}	Latchup Performance	Above V _{CC} and Below GND at 85°C (Note 6)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- I_{OUT} absolute maximum rating must be observed.
- 2. The package thermal impedance is calculated in accordance with JESD 51–7.
- 3. Tested to EIA/JESD22-A114-A.
- Tested to EIA/JESD22-A115-A.
- 5. Tested to JESD22-C101-A.
- 6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Тур	Max	Unit
.,	Const. Valence	'AC	2.0	5.0	6.0	V
V _{CC}	Supply Voltage	'ACT	4.5	5.0	5.5	V
V _{in} , V _{out}	DC Input Voltage, Output Voltage (Ref. to GND)		0	-	V _{CC}	V
			-	150	-	
t _r , t _f	Input Rise and Fall Time (Note 7) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	40	-	ns/V
	The Devices except commit inputs	V _{CC} @ 5.5 V	-	25	-	
	Input Rise and Fall Time (Note 8)	V _{CC} @ 4.5 V	-	10	-	
t _r , t _f	'ACT Devices except Schmitt Inputs	V _{CC} @ 5.5 V	-	8.0	-	ns/V
T _A	Operating Ambient Temperature Range	-40	25	85	°C	
I _{OH}	Output Current – High	-	-	-24	mA	
I _{OL}	Output Current – Low		-	-	24	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

7. V_{IN} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.

- 8. V_{IN} 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

			74	AC	74AC		
Symbol	Parameter	V _{CC}	T _A = -	+25°C	T _A = -40°C to +85°C	Unit	Conditions
		(V)	Тур	Gu	aranteed Limits		
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	>	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OH}	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V	I _{OUT} = -50 μA
		3.0 4.5 5.5	- - -	2.56 3.86 4.86	2.46 3.76 4.76	٧	$^{*}V_{IN} = V_{IL} \text{ or } V_{IH}$ -12 mA $I_{OH} -24 \text{ mA}$ -24 mA
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	I _{OUT} = 50 μA
		3.0 4.5 5.5	- - -	0.36 0.36 0.36	0.44 0.44 0.44	V	$^{*}V_{IN} = V_{IL} \text{ or } V_{IH}$ $^{12} \text{ mA}$ ^{1}OL $^{24} \text{ mA}$ $^{24} \text{ mA}$
I _{IN}	Maximum Input Leakage Current	5.5	_	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
I _{OLD} I _{OHD}	†Minimum Dynamic Output Current	5.5 5.5	-	_ _	75 –75	mA	V _{OLD} = 1.65 V Max V _{OHD} = 3.85 V Min
Icc	Maximum Quiescent Supply Current	5.5	_	8.0	80	μΑ	$V_{IN} = V_{CC}$ 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_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC} .

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

	Symbol Parameter			74AC		74			
Symbol			$T_A = +25^{\circ}C C_L = 50 pF$			$T_A = -40^{\circ}C \text{ to } +8$	Unit	Figure No.	
		(V)	Min	Тур	Max	Min	Max		1101
f _{max}	Maximum Clock Frequency	3.3 5.0	90 140	125 175	-	75 125	-	Mhz	3–3
t _{PLH}	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 _{PHL}	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 _{PHL}	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

			74.	AC	74AC		
Symbol	Parameter	V _{CC} *	T _A = +25°C	C _L = 50 pF	$T_A = -40^{\circ}C \text{ to } +85^{\circ}C C_L = 50 \text{ pF}$	Unit	Figure No.
		(*)	Тур		Guaranteed Minimum		110.
ts	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 _h	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 _w	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 _w	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 _{rec}	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.

DC CHARACTERISTICS

			74	CT	74ACT		
Symbol	Parameter	V _{CC} (V)	T _A = -	+25°C	T _A = -40°C to +85°C	Unit	Conditions
			Тур	Gua	ranteed Limits		
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = -50 μA
		4.5 5.5	- -	3.86 4.86	3.76 4.76	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OH} = -24 \text{ mA}$ $= -24 \text{ mA}$
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA
		4.5 5.5	_ _	0.36 0.36	0.44 0.44	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ $^{24} \text{ mA}$ $^{1}_{OL}$ $^{24} \text{ mA}$
I _{IN}	Maximum Input Leakage Current	5.5	_	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
ΔI_{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	_	1.5	mA	$V_{I} = V_{CC} - 2.1 \text{ V}$
I _{OLD} I _{OHD}	†Minimum Dynamic Output Current	5.5 5.5	_ _	_ _	75 –75	mA	V _{OLD} = 1.65 V Max V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	_	8.0	80	μΑ	$V_{IN} = V_{CC}$ or GND

^{*}All outputs loaded; thresholds on input associated with output under test.

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

			74ACT			74	CT		
Symbol Parameter		V _{CC} * (V)	T _A = +25°C C _L = 50 pF			T _A = -40°C C _L =		Unit	Figure No.
			Min	Тур	Max	Min	Max		
f _{max}	Maximum Clock Frequency	5.0	125	200	-	125	-	MHz	3–3
t _{PHL}	Propagation Delay Clock to Output	5.0	3.0	6.0	10	2.5	11.0	ns	3–6
t _{PLH}	Propagation Delay Clock to Output	5.0	3.0	6.5	11	2.5	12.0	ns	3–6
t _{PHL}	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.

AC OPERATING REQUIREMENTS

			744	CT	74ACT		
Symbol	Parameter	V _{CC} * (V)	T _A = +25°C	C _L = 50 pF	T _A = -40°C to +85°C C _L = 50 pF	Unit	Figure No.
			Тур	Guara	inteed Minimum		
t _s	Setup Time, HIGH or LOW – Data to CP	5.0	3.0	4.5	5.0	ns	3–9
t _h	Hold Time, HIGH or LOW – Data to CP	5.0	-2.5	2.0	2.0	ns	3–9
t _w	Clock Pulse Width – HIGH or LOW	5.0	2.5	4.0	4.5	ns	3–6
t _w	MR Pulse Width – HIGH or LOW	5.0	2.5	4.0	4.5	ns	3–6
t _{rec}	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 _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	50	pF	V _{CC} = 5.0 V

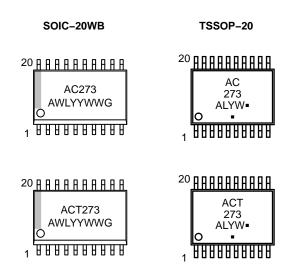
[†]Maximum test duration 2.0 ms, one output loaded at a time.

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74AC273DWG	SOIC-20WB (Pb-Free)	38 Units / Rail
MC74AC273DWR2G	SOIC-20WB (Pb-Free)	1000 / Tape & Reel
MC74AC273DTR2G	TSSOP-20 (Pb-Free)	2500 / Tape & Reel
MC74ACT273DWG	SOIC-20WB (Pb-Free)	38 Units / Rail
MC74ACT273DWR2G	SOIC-20WB (Pb-Free)	1000 / Tape & Reel
MC74ACT273DTR2G	TSSOP-20 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MARKING DIAGRAMS



A = Assembly Location

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

G or ■ = Pb–Free Package (Note: Microdot may be in either location)

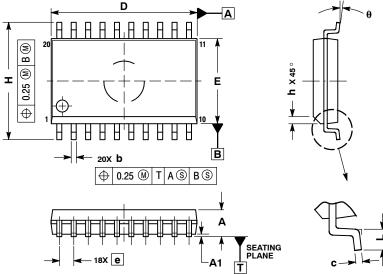




SOIC-20 WB CASE 751D-05 **ISSUE H**

DATE 22 APR 2015

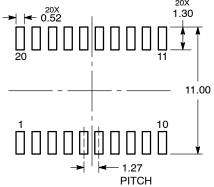
SCALE 1:1



- DIMENSIONS ARE IN MILLIMETERS.
 INTERPRET DIMENSIONS AND TOLERANCES.
- PER ASME Y14.5M, 1994.
 3. DIMENSIONS D AND E DO NOT INCLUDE MOLD
- PROTRUSION.
 MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
- DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL

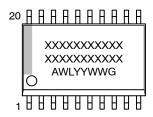
	MILLIMETERS		
DIM	MIN	MAX	
Α	2.35	2.65	
A1	0.10	0.25	
b	0.35	0.49	
С	0.23	0.32	
D	12.65	12.95	
E	7.40	7.60	
е	1.27 BSC		
Н	10.05	10.55	
h	0.25	0.75	
L	0.50	0.90	
A	0 °	7 °	

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code = Assembly Location

WL = Wafer Lot ΥY = Year WW = Work Week = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



TSSOP-20 WB CASE 948E ISSUE D

DATE 17 FEB 2016





NOTES:

- DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
- 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K
- (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

 7. DIMENSION A AND B ARE TO BE
- DETERMINED AT DATUM PLANE -W-

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
Α	6.40	6.60	0.252	0.260
В	4.30	4.50	0.169	0.177
С		1.20		0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
Н	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252	BSC
M	0°	8°	0°	8°

SOLDERING FOOTPRINT



GENERIC MARKING DIAGRAM*



= Assembly Location

= Wafer Lot

= Year

= Work Week

= Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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MC74ACT273DTR2G MC74ACT273DW MC74ACT273DWG MC74ACT273DWR2 MC74ACT273DWR2G

MC74ACT273M MC74ACT273MEL MC74ACT273MELG MC74ACT273MG MC74ACT273N MC74ACT273NG