



MOTOROLA

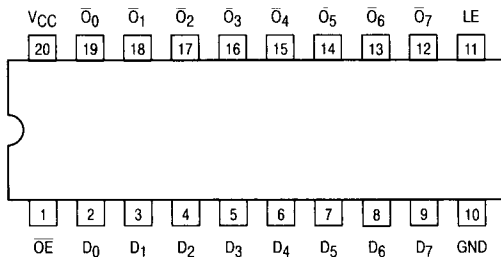
MC74AC563 MC74ACT563

Octal D-Type Latch with 3-State Outputs

The MC74AC563/74ACT563 is a high-speed octal latch with buffered common Latch Enable (LE) and buffered common Output Enable (OE) inputs.

The MC74AC563/74ACT563 device is functionally identical to the MC74AC573/74ACT573, but with inverted outputs.

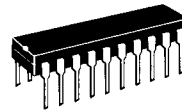
- Inputs and Outputs on Opposite Sides of Package Allowing Easy Interface with Microprocessors
- Useful as Input or Output Port for Microprocessors
- Functionally Identical to MC74AC573/74ACT573 but with Inverted Outputs
- Outputs Source/Sink 24 mA
- 'ACT563 Has TTL Compatible Inputs



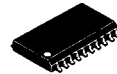
PIN NAMES

- D₀-D₇ Data Inputs
- LE Latch Enable Input
- OE 3-State Output Enable Input
- O₀-O₇ 3-State Latch Outputs

OCTAL D-TYPE
LATCH WITH
3-STATE OUTPUTS

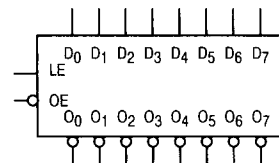


N SUFFIX
CASE 738-03
PLASTIC



DW SUFFIX
CASE 751D-04
PLASTIC

LOGIC SYMBOL



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FUNCTIONAL DESCRIPTION

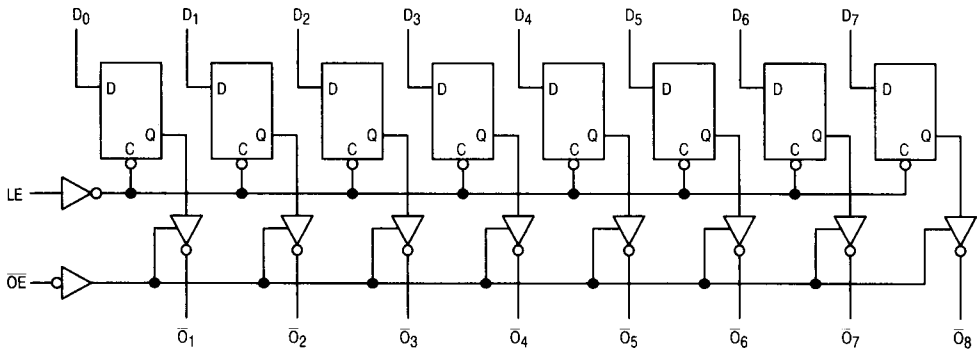
The MC74AC563/74ACT563 contains eight D-type latches with 3-state complementary outputs. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state buffers are controlled by the Output Enable (\overline{OE}) input. When \overline{OE} is LOW, the buffers are in the bi-state mode. When \overline{OE} is HIGH the buffers are in the high impedance mode but that does not interfere with entering new data into the latches.

FUNCTION TABLE

Inputs			Internal	Outputs	Function
\overline{OE}	LE	D	Q	O	
H	X	X	X	Z	High Z
H	H	L	H	Z	High Z
H	H	H	L	Z	High Z
H	L	X	NC	Z	Latched
L	H	L	H	H	Transparent
L	H	H	L	L	Transparent
L	L	X	NC	NC	Latched

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 Z = High Impedance
 NC = No Change

LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

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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	±20	mA
I _{out}	DC Output Sink/Source Current, per Pin	±50	mA
I _{CC}	DC V _{CC} or GND Current per Output Pin	±50	mA
T _{stg}	Storage Temperature	-65 to +150	°C

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

RECOMMENDED OPERATING CONDITIONS

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

1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. 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.

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DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74AC		74AC		Unit	Conditions
			T _A = +25°C		T _A = -40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1		V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V _{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9		V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V _{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9		V	I _{OUT} = -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 _{IN} = V _{IL} or V _{IH} -12 mA I _{OH} -24 mA -24 mA
		4.5		3.86	3.76			
		5.5		4.86	4.76			
V _{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1		V	I _{OUT} = 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 _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA
		4.5		0.36	0.44			
		5.5		0.36	0.44			
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0		μA	V _I = V _{CC} , GND
I _{OZ}	Maximum 3-State Current	5.5		±0.5	±5.0		μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	†Minimum Dynamic Output Current	5.5			75		mA	V _{OLD} = 1.65 V Max
I _{OHD}		5.5			-75		mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80		μA	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: 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}.

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AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to \bar{O}_n	3.3 5.0	3.5 2.0		13.0 10.0	3.5 2.0	15.0 11.5	ns	3-5
t _{PHL}	Propagation Delay D _n to \bar{O}_n	3.3 5.0	3.5 2.0		12.0 9.5	3.5 2.0	14.0 11.0	ns	3-5
t _{PLH}	Propagation Delay LE to \bar{O}_n	3.3 5.0	3.5 2.0		13.0 9.5	3.5 2.0	15.0 11.0	ns	3-6
t _{PHL}	Propagation Delay LE to \bar{O}_n	3.3 5.0	3.5 2.0		12.0 8.5	3.5 2.0	14.0 9.5	ns	3-6
t _{PZH}	Output Enable Time	3.3 5.0	2.5 2.0		11.0 9.0	2.5 2.0	12.0 10.0	ns	3-7
t _{PZL}	Output Enable Time	3.3 5.0	3.0 1.5		11.0 8.5	3.5 2.0	12.5 9.5	ns	3-8
t _{PHZ}	Output Disable Time	3.3 5.0	4.0 2.0		12.5 11.0	4.5 2.0	13.5 12.0	ns	3-7
t _{PLZ}	Output Disable Time	3.3 5.0	2.0 1.5		9.5 8.0	2.5 1.5	10.5 9.0	ns	3-8

* 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 _{CC} * (V)	74AC		74AC		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Typ	Guaranteed Minimum				
t _s	Setup Time, HIGH or LOW D _n to LE	3.3 5.0		2.5 2.0		3.0 2.5	ns	3-9
t _h	Hold Time, HIGH or LOW D _n to LE	3.3 5.0		2.0 2.0		2.0 2.0	ns	3-9
t _w	LE Pulse Width, HIGH	3.3 5.0		6.0 4.0		7.0 5.0	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.

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DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74ACT		74ACT		Unit	Conditions
			T _A = +25°C		T _A = -40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0		V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
		5.5	1.5	2.0	2.0			
V _{IL}	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8		V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
		5.5	1.5	0.8	0.8			
V _{OH}	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4		V	I _{OUT} = -50 μA
		5.5	5.49	5.4	5.4			
V _{OL}	Maximum Low Level Output Voltage	4.5		3.86	3.76		V	*V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA
		5.5		4.86	4.76			
V _{OL}	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1		V	I _{OUT} = 50 μA
		5.5	0.001	0.1	0.1			
V _{OL}	Maximum Low Level Output Voltage	4.5		0.36	0.44		V	*V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA
		5.5		0.36	0.44			
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0		μA	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 V
I _{OZ}	Maximum 3-State Current	5.5		±0.5	±5.0		μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	†Minimum Dynamic Output Current	5.5			75		mA	V _{OLD} = 1.65 V Max
I _{OHD}		5.5			-75		mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80		μA	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.

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} ^a (V)	74ACT			74ACT		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to \bar{O}_n	5.0	3.0		11.5	2.5	12.5	ns	3-5
t _{PHL}	Propagation Delay D _n to \bar{O}_n	5.0	3.0		10	2.5	11	ns	3-5
t _{PLH}	Propagation Delay LE to \bar{O}_n	5.0	3.0		10.5	2.5	11.5	ns	3-6
t _{PHL}	Propagation Delay LE to \bar{O}_n	5.0	2.5		9.5	2.0	10.5	ns	3-6
t _{PZH}	Output Enable Time	5.0	2.5		9.0	2.0	10	ns	3-7
t _{PZL}	Output Enable Time	5.0	2.0		8.5	2.0	9.5	ns	3-8
t _{PHZ}	Output Disable Time	5.0	3.5		10.5	2.5	11.5	ns	3-7
t _{PLZ}	Output Disable Time	5.0	2.0		8.0	1.0	8.5	ns	3-8

^a Voltage Range 5.0 V is 5.0 V ±0.5 V.

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AC OPERATING REQUIREMENTS

Symbol	Parameter	VCC* (V)	74ACT		74ACT		Unit	Fig. No.
			TA = +25°C CL = 50 pF		TA = -40°C to +85°C CL = 50 pF			
			Typ	Guaranteed Minimum				
t _s	Setup Time, HIGH or LOW D _n to LE	5.0		4.0	4.5	ns	3-9	
t _h	Hold Time, HIGH or LOW D _n to LE	5.0		0	0	ns	3-9	
t _w	LE Pulse Width, HIGH	5.0		3.0	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