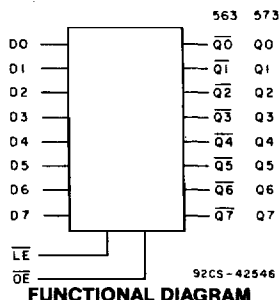


CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573



Octal Transparent Latch, 3-State

CD54/74AC/ACT563 - Inverting
CD54/74AC/ACT573 - Non-Inverting

Type Features:

- Buffered inputs
- Typical propagation delay:
4.3 ns @ $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{ C}$, $C_L = 50\text{ pF}$

The RCA-CD54/74AC563 and CD54/74AC573 and the CD54/74ACT563 and CD54/74ACT573 octal transparent 3-state latches use the RCA ADVANCED CMOS technology. The outputs are transparent to the inputs when the Latch Enable ($\overline{\text{LE}}$) is HIGH. When the Latch Enable ($\overline{\text{LE}}$) goes LOW, the data is latched. The Output Enable ($\overline{\text{OE}}$) controls the 3-state outputs. When the Output Enable ($\overline{\text{OE}}$) is HIGH, the outputs are in the high-impedance state. The latch operation is independent of the state of the Output Enable.

The CD74AC/ACT563 and CD74AC/ACT573 are supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead dual-in-line small-outline plastic packages (M suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to +85°C); and Extended Industrial/Military (-55 to +125°C).

The CD54AC/ACT563 and CD54AC/ACT573, available in chip form (H suffix), are operable over the -55 to +125°C temperature range.

Family Features:

- Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015
- SCR-Latchup-resistant CMOS process and circuit design
- Speed of bipolar FAST*/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply
- $\pm 24\text{-mA}$ output drive current
 - Fanout to 15 FAST* ICs
 - Drives 50-ohm transmission lines

*FAST is a Registered Trademark of Fairchild Semiconductor Corp.

TRUTH TABLE

Output Enable	Latch Enable	Data	AC/ACT563 Output	AC/ACT573 Output
L	H	H	L	H
L	H	L	H	L
L	L	l	H	L
L	L	h	L	H
H	X	X	Z	Z

Note

- | | |
|--|--|
| L = Low voltage level | h = High voltage level one set-up time prior to the high to low latch enable transition. |
| H = High voltage level | X = Don't Care |
| l = Low voltage level one set-up time prior to the high to low latch enable transition | Z = High Impedance State |

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE (V_{CC})	-0.5 to 6 V
DC INPUT DIODE CURRENT, I_{IK} (for $V_i < -0.5$ V or $V_i > V_{CC} + 0.5$ V)	± 20 mA
DC OUTPUT DIODE CURRENT, I_{OK} (for $V_o < -0.5$ V or $V_o > V_{CC} + 0.5$ V)	± 50 mA
DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I_o (for $V_o > -0.5$ V or $V_o < V_{CC} + 0.5$ V)	± 50 mA
DC V_{CC} or GROUND CURRENT (I_{CC} or I_{GND})	± 100 mA*
POWER DISSIPATION PER PACKAGE (P_D):	
For $T_A = -55$ to $+100^\circ\text{C}$ (PACKAGE TYPE E)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE E)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -55$ to $+70^\circ\text{C}$ (PACKAGE TYPE M)	400 mW
For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M)	Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW
OPERATING-TEMPERATURE RANGE (T_A):	
PACKAGE TYPE F	-55 to $+125^\circ\text{C}$
PACKAGE TYPE E, M	-40 to $+125^\circ\text{C}$
STORAGE TEMPERATURE (T_{STG})	
LEAD TEMPERATURE (DURING SOLDERING):	-65 to $+150^\circ\text{C}$
At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s maximum	$+265^\circ\text{C}$
Unit inserted into PC board min. thickness $1/16$ in. (1.59 mm) with solder contacting lead tips only	$+300^\circ\text{C}$

*For up to 4 outputs per device; add ± 25 mA for each additional output.

RECOMMENDED OPERATING CONDITIONS:

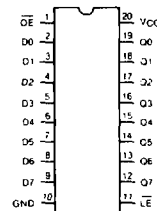
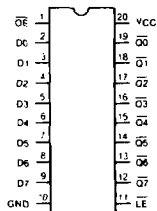
For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V_{CC} *: (For $T_A =$ Full Package-Temperature Range) AC Types ACT Types	1.5 4.5	5.5 5.5	V V
DC Input or Output Voltage, V_i, V_o	0	V_{CC}	V
Operating Temperature, T_A :	-55	+125	$^\circ\text{C}$
Input Rise and Fall Slew Rate, dt/dv at 1.5 V to 3 V (AC Types) at 3.6 V to 5.5 V (AC Types) at 4.5 V to 5.5 V (ACT Types)	0 0 0	50 20 10	ns/V ns/V ns/V

*Unless otherwise specified, all voltages are referenced to ground.

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TERMINAL ASSIGNMENT DIAGRAMS



CD54/74AC563, CD54/74ACT563

CD54/74AC573, CD54/74ACT573

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS	
				+25		-40 to +85		-55 to +125			
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.		
High-Level Input Voltage V _{IH}			1.5	1.2	—	1.2	—	1.2	—	V	
			3	2.1	—	2.1	—	2.1	—		
			5.5	3.85	—	3.85	—	3.85	—		
Low-Level Input Voltage V _{IL}			1.5	—	0.3	—	0.3	—	0.3	V	
			3	—	0.9	—	0.9	—	0.9		
			5.5	—	1.65	—	1.65	—	1.65		
High-Level Output Voltage V _{OH}	V _{IH} or V _{IL}		-0.05	1.5	1.4	—	1.4	—	1.4	V	
			-0.05	3	2.9	—	2.9	—	2.9		
			-0.05	4.5	4.4	—	4.4	—	4.4		
	#, *	-4	3	2.58	—	2.48	—	2.4	—		
		-24	4.5	3.94	—	3.8	—	3.7	—		
		-75	5.5	—	—	3.85	—	—	—		
Low-Level Output Voltage V _{OL}	V _{IH} or V _{IL}		0.05	1.5	—	0.1	—	0.1	—	V	
			0.05	3	—	0.1	—	0.1	—		0.1
			0.05	4.5	—	0.1	—	0.1	—		0.1
	#, *	12	3	—	0.36	—	0.44	—	0.5		
		24	4.5	—	0.36	—	0.44	—	0.5		
		75	5.5	—	—	—	1.65	—	—		
Input Leakage Current I _I	V _{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA	
3-State Leakage Current I _{OZ}	V _{IH} or V _{IL} V _O = V _{CC} or GND		5.5	—	±0.5	—	±5	—	±10	μA	
Quiescent Supply Current, MSI I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	μA	

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS	
				+25		-40 to +85		-55 to +125			
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V _{IH}		4.5 to 5.5	2	—	2	—	2	—	V	
Low-Level Input Voltage	V _{IL}		4.5 to 5.5	—	0.8	—	0.8	—	0.8	V	
High-Level Output Voltage	V _{OH}	V _{IH} or V _{IL} #, *	-0.05	4.5	4.4	—	4.4	—	4.4	—	V
			-24	4.5	3.94	—	3.8	—	3.7	—	
			-75	5.5	—	—	3.85	—	—	—	
			-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage	V _{OL}	V _{IH} or V _{IL} #, *	0.05	4.5	—	0.1	—	0.1	—	0.1	V
			24	4.5	—	0.36	—	0.44	—	0.5	
			75	5.5	—	—	—	1.65	—	—	
			50	5.5	—	—	—	—	—	1.65	
Input Leakage Current	I _I	V _{CC} or GND	5.5	—	±0.1	—	±1	—	±1	μA	
3-State Leakage Current	I _{oz}	V _{IH} or V _{IL} V _O = V _{CC} or GND	5.5	—	±0.5	—	±5	—	±10	μA	
Quiescent Supply Current, MSI	I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High 1 Unit Load	ΔI _{CC}	V _{CC} -2.1	4.5 to 5.5	—	2.4	—	2.8	—	3	mA	

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#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

ACT INPUT LOADING TABLE

INPUT	UNIT LOAD*	
	ACT563	ACT573
OE	0.87	0.87
Dn	0.5	0.5
LE	0.8	0.8

*Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

PREREQUISITE FOR SWITCHING: AC Series

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
LE Pulse Width	t _w	1.5 3.3* 5†	44 4.9 3.5	— — —	50 5.6 4	— — —	ns
Setup Time Data to LE	t _{su}	1.5 3.3 5	2 2 2	— — —	2 2 2	— — —	ns
Hold Time Data to LE	t _h	1.5 3.3 5	33 3.7 2.6	— — —	38 4.2 3	— — —	ns

*3.3 V: min. is @ 3 V

†5 V: min. is @ 4.5 V

SWITCHING CHARACTERISTICS: AC Series; t_r, t_f = 3 ns, C_L = 50 pF

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Qn AC563	t _{PLH}	1.5	—	119	—	131	ns
	t _{PHL}	3.3* 5†	3.8 2.7	13.4 9.5	3.7 2.6	14.7 10.5	
AC573	t _{PLH}	1.5	—	96	—	106	ns
	t _{PHL}	3.3 5	3.1 2.2	10.8 7.7	3 2.1	11.9 8.5	
LE on Qn AC563	t _{PLH}	1.5	—	136	—	150	ns
	t _{PHL}	3.3 5	4.3 3.1	15.3 10.9	4.2 3	16.8 12	
AC573	t _{PLH}	1.5	—	136	—	150	ns
	t _{PHL}	3.3 5	4.3 3.1	15.3 10.9	4.2 3	16.8 12	
Output Enable Times	t _{PZL}	1.5	—	119	—	131	ns
	t _{PZH}	3.3 5	4.1 2.7	14.4 9.5	4 2.6	15.8 10.5	
Output Disable Times	t _{PLZ}	1.5	—	131	—	144	ns
	t _{PHZ}	3.3 5	3.7 3	13.1 10.5	3.6 2.9	14.4 11.5	
Power Dissipation Capacitance	C _{PD§}	—	63 Typ.		63 Typ.		pF
Min. (Valley) V _{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V _{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C _I	—	—	10	—	10	pF
3-State Output Capacitance	C _O	—	—	15	—	15	pF

*3.3 V: min. is @ 3.6 V
max. is @ 3 V

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

§C_{PD} is used to determine the dynamic power consumption, per latch.

$$P_D = V_{CC}^2 f_i (C_{PD} + C_L)$$

where f_i = input frequency
C_L = output load capacitance
V_{CC} = supply voltage.

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

PREREQUISITE FOR SWITCHING: ACT Series

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
LE Pulse Width	t _w	5†	3.5	—	4	—	ns
Setup Time Data to LE	t _{su}	5	2	—	2	—	ns
Hold Time Data to LE	t _H	5	2.6	—	3	—	ns

†5 V: min. is @ 4.5 V

SWITCHING CHARACTERISTICS: ACT Series; t_r, t_f = 3 ns, C_L = 50 pF

CHARACTERISTICS	SYMBOL	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Qn 563	t _{PLH} t _{PHL}	5†	2.9	10.4	2.9	11.4	ns
573			2.7	9.4	2.6	10.4	
LE to Qn 563 573	t _{PLH} t _{PHL}	5	3.2	11.4	3.1	12.5	ns
Output Enable Times	t _{PZL} t _{PZH}	5	3.5	12.3	3.4	13.5	ns
Output Disable Times	t _{PLZ} t _{PHZ}	5	3.2	11.4	3.1	12.5	ns
Power Dissipation Capacitance	C _{PD} §	—	63 Typ.		63 Typ.		pF
Min. (Valley) V _{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V _{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V _{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C _I	—	—	10	—	10	pF
3-State Output Capacitance	C _O	—	—	15	—	15	pF

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

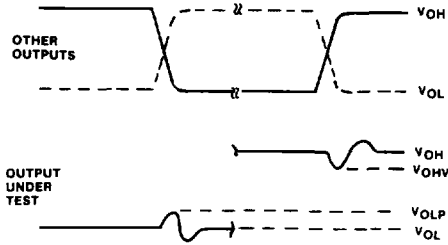
§C_{PD} is used to determine the dynamic power consumption, per latch.

$$P_D = V_{CC}^2 f (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$$

where f = input frequency
C_L = output load capacitance
V_{CC} = supply voltage.

CD54/74AC563, CD54/74AC573 CD54/74ACT563, CD54/74ACT573

PARAMETER MEASUREMENT INFORMATION

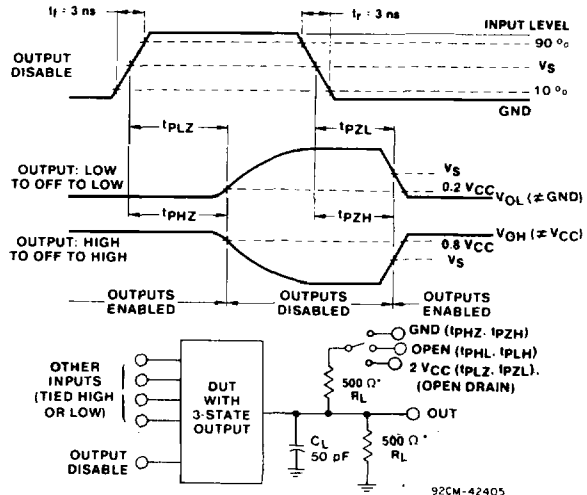


NOTES:

1. V_{OHV} AND V_{OLP} ARE MEASURED WITH RESPECT TO A GROUND REFERENCE NEAR THE OUTPUT UNDER TEST.
2. INPUT PULSES HAVE THE FOLLOWING CHARACTERISTICS:
PRR = 1 MHz, $t_f = 3$ ns, $t_r = 3$ ns, SKEW = 1 ns.
3. R.F. FIXTURE WITH 700-MHz DESIGN RULES REQUIRED. IC SHOULD BE SOLDERED INTO TEST BOARD AND BYPASSED WITH $0.1 \mu\text{F}$ CAPACITOR. SCOPE AND PROBES REQUIRE 700-MHz BANDWIDTH.

92CS-4240E

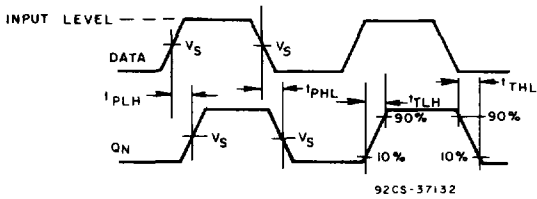
Fig. 1 - Simultaneous switching transient waveforms.



*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5$ V, $R_L = 1$ k Ω

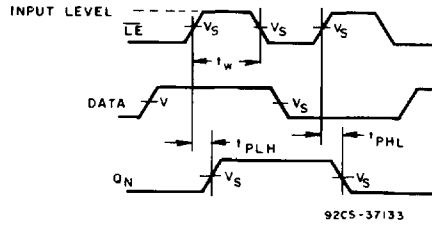
92CM-42405

Fig. 2 - Three-state propagation delay waveforms and test circuit.



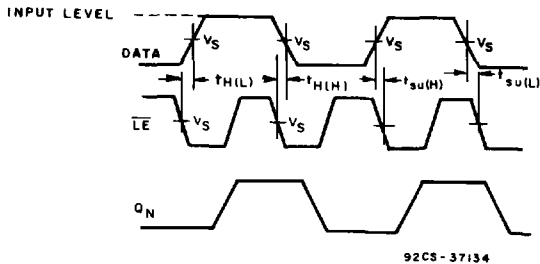
92CS-37132

Fig. 3 - Data to Qn output propagation delays.



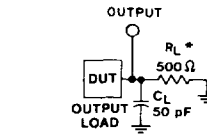
92CS-37133

Fig. 4 - Latch enable propagation delays.



92CS-37134

Fig. 5 - Latch enable prerequisite times.



*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5$ V, $R_L = 1$ k Ω

92CS-42389

Fig. 6 - Test circuit.

	CD54/74AC	CD54/74ACT
Input Level	V_{CC}	3 V
Input Switching Voltage, V_S	$0.5 V_{CC}$	1.5 V
Output Switching Voltage, V_S	$0.5 V_{CC}$	$0.5 V_{CC}$