CD74FCT543

BiCMOS FCT Interface Logic, Octal Register/Transceiver, Three-State

NOT RECOMMENDED FOR NEW DESIGNS
Use CMOS Technology

Features

- Buffered Inputs
- Typical Propagation Delay: 6.4ns at V_{CC} = 5V, T_A = 25°C, C_L = 50pF
- Noninverting
- Family Features
  - SCR Latchup Resistant BiCMOS Process and

Circuit Design
- Speed of Bipolar FAST™/AS/S
- 64mA Output Sink Current
- Output Voltage Swing Limited to 3.7V at V_{CC} = 5V
- Controlled Output Edge Rates
- Input/Output Isolation to V_{CC}
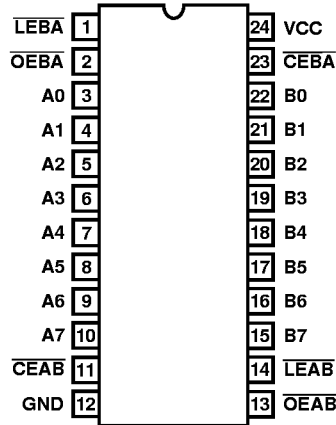- BiCMOS Technology with Low Quiescent Power

Ordering Information

PART NUMBER	TEMP. RANGE ($^\circ$C)	PACKAGE	PKG. NO.
CD74FCT543EN	0 to 70	24 Ld PDIP	E24.3
CD74FCT543M	0 to 70	24 Ld SOIC	M24.3
CD74FCT543SM	0 to 70	24 Ld SSOP	M24.209

NOTE: When ordering the suffix M and SM packages, use the entire part number. Add the suffix 96 to obtain the variant in the tape and reel.
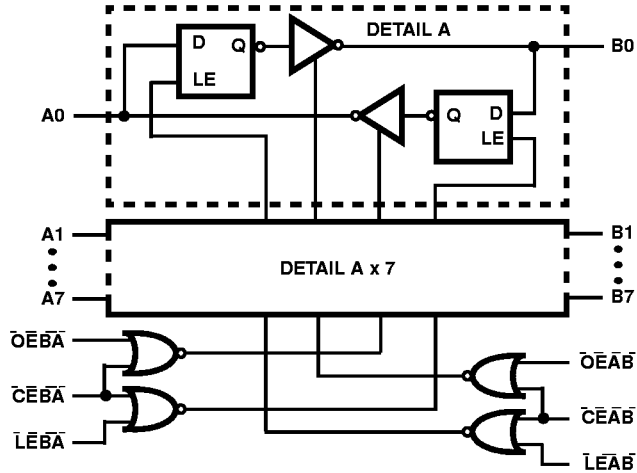
Pinout

CD74FCT543
(PDIP, SOIC, SSOP)
TOP VIEW

Pin	Signal		Pin	Signal
1	$\overline{LEBA}$		24	VCC
2	$\overline{OEBA}$		23	$\overline{CEBA}$
3	A0		22	B0
4	A1		21	B1
5	A2		20	B2
6	A3		19	B3
7	A4		18	B4
8	A5		17	B5
9	A6		16	B6
10	A7		15	B7
11	$\overline{CEAB}$		14	$\overline{LEAB}$
12	GND		13	$\overline{OEAB}$

File Number **2399.2**

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Functional Diagram

TRUTH TABLE For A to B (Symmetric with B to A)

INPUTS			LATCH STATUS	OUTPUT BUFFERS
$\overline{CEAB}$	$\overline{LEAB}$	$\overline{OEAB}$	A TO B	B0 THRU B7
H	X	X	Storing	High Z
X	H	–	Storing	-
X	-	H	-	High Z
L	L	L	Transparent	Current A Inputs
L	H	L	Storing	Previous A Inputs (Note 1)

NOTE:

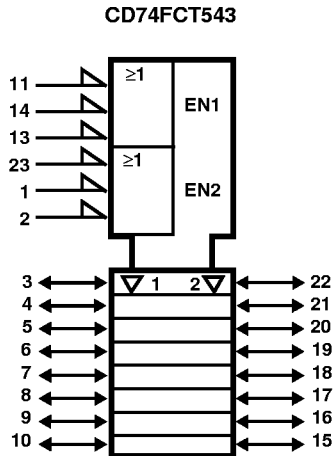1. Before $\overline{LEAB}$ LOW to HIGH Transition
    H = HIGH Voltage Level
    L = LOW Voltage Level
    X = Immaterial
    A to B data flow shown; B to A flow control is the same, except using $\overline{CEBA}$, $\overline{LEBA}$, and $\overline{OEBA}$.

IEC Logic Symbol

CD74FCT543

Absolute Maximum Ratings

DC Supply Voltage (V_{CC}) . . . . -0.5V to 6V
DC Input Diode Current, I_{IK} (For V_I < -0.5V) . . . . -20mA
DC Output Diode Current, I_{OK} (for V_O < -0.5V) . . . . -50mA
DC Output Sink Current per Output Pin, IO . . . . -70mA
DC Output Source Current per Output Pin, IO . . . . -30mA
DC V_{CC} Current (I_{CC}) 140mA
DC Ground Current (I_{GND}) 528mA

Operating Conditions

Operating Temperature Range (T_A) . . . . .0°C to 70°C
Supply Voltage Range, V_{CC} . . . . .4.75V to 5.25V
DC Input Voltage, V_I . . . . 0 to V_{CC}
DC Output Voltage, V_O . . . . 0 to ≤ V_{CC}
Input Rise and Fall Slew Rate, dt/dv . . . . 0 to 10ns/V

Thermal Information

Thermal Resistance (Typical, Note 2) θ_{JA} (°C/W)
 PDIP Package 75
 SOIC Package 75
 SSOP Package 125
Maximum Junction Temperature . . . . .150°C
Maximum Storage Temperature Range . . . .-65°C to 150°C
Maximum Lead Temperature (Soldering 10s) . . . . .300°C
 (SOIC and SSOP-Lead Tips Only)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

2. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications Commercial Temperature Range 0°C to 70°C, V_{CC} Max = 5.25V, V_{CC} Min = 4.75V

PARAMETER	SYMBOL	TEST CONDITIONS V_I (V)	I_O (mA)	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) 25°C MIN	MAX	0°C TO 70°C MIN	MAX	UNITS
High Level Input Voltage	V_{IH}			4.75 to 5.25	2	-	2	-	V
Low Level Input Voltage	V_{IL}			4.75 to 5.25	-	0.8	-	0.8	V
High Level Output Voltage	V_{OH}	V_{IH} or V_{IL}	-15	Min	2.4	-	2.4	-	V
Low Level Output Voltage	V_{OL}	V_{IH} or V_{IL}	64	Min	-	0.55	-	0.55	V
High Level Input Current	I_{IH}	V_{CC}		Max	-	0.1	-	1	μA
Low Level Input Current	I_{IL}	GND		Max	-	-0.1	-	-1	μA
Three-State Leakage Current	I_{OZH}	V_{CC}		Max	-	0.5	-	10	μA
	I_{OZL}	GND		Max	-	-0.5	-	-10	μA
Input Clamp Voltage	V_{IK}	V_{CC} or GND	-18	Min	-	-1.2	-	-1.2	V
Short Circuit Output Current (Note 3)	I_{OS}	V_O = 0 V_{CC} or GND		Max	-60	-	-60	-	mA
Quiescent Supply Current, MSI	I_{CC}	V_{CC} or GND	0	Max	-	8	-	80	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High, 1 Unit Load	ΔI_{CC}	3.4V (Note 4)		Max	-	1.6	-	1.6	mA

NOTES:

3. Not more than one output should be shorted at one time. Test duration should not exceed 100ms.

4. Inputs that are not measured are at V_{CC} or GND.

5. FCT Input Loading: All inputs are 1 unit load. Unit load is ΔI_{CC} limit specified in Electrical Specifications table, e.g., 1.6mA Max. at 70°C.

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Switching Specifications Over Operating Range FCT Series t_r, t_f = 2.5ns, C_L = 50pF, R_L (Figure 4)

PARAMETER	SYMBOL	V_{CC} (V)	25°C	0°C TO 70°C			UNITS
			TYP	MIN	TYP	MAX	
Propagation Delays							
An ↔ Bn	t_{PLH}; t_{PHL}	5	6.4	2.5	-	8.5	ns
$\overline{LEBA}$ to An or $\overline{LEAB}$ to Bn	t_{PLH}; t_{PHL}	5	9.4	2.5	-	12.5	ns
$\overline{CEBA}$ or $\overline{CEAB}$ to An or Bn	t_{PLZ}; t_{PHZ}	5	6.8	2	-	9	ns
	t_{PZL}; t_{PZH}	5	9	2	-	12	ns
Power Dissipation Capacitance	C_{PD} (Note 6)	-	49	-	49	-	pF
Minimum (Valley) V_{OHV} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OHV}	5	0.5	-	-	-	V
Maximum (Peak) V_{OLP} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OLP}	5	1	-	-	-	V
Input Capacitance	C_I	-	-	-	-	10	pF
Input/Output Capacitance	$C_{I/O}$	-	-	-	-	15	pF

NOTE:

6. C_{PD}, measured per flip-flop, is used to determine the dynamic power consumption.

    P_D (per package) = V_{CC} I_{CC} + $\Sigma(V_{CC}^2 f_I C_{PD} + V_O^2 f_O C_L + V_{CC} \Delta I_{CC} D)$ where:

    V_{CC} = supply voltage
    ΔI_{CC} = flow through current x unit load
    C_L = output load capacitance
    D = duty cycle of input high
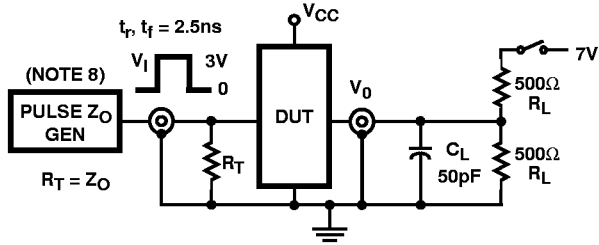 f_O = output frequency
    f_I = input frequency

Prerequisite for Switching

PARAMETER	SYMBOL	V_{CC} (V)	25°C	0°C TO 70°C		UNITS
			TYP	MIN	MAX	
Data to Latch Enable Setup Time	t_{SU}	5 (Note 7)	-	3	-	ns
Data to Latch Enable Hold Time	t_H	5	-	2	-	ns
Latch Enable Pulse Width	t_W	5	-	9	-	ns

NOTE:

7. 5V: Minimum is at 4.75V for 0°C to 70°C, Typical is at 5V.

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Test Circuits and Waveforms

NOTE:

8. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; $Z_{OUT} \leq 50\Omega$; $t_f, t_r \leq 2.5ns$.
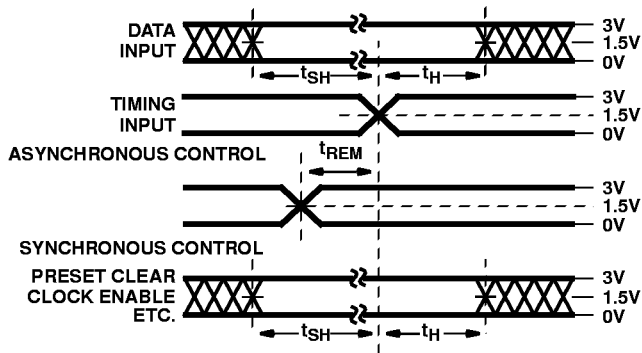
FIGURE 1. TEST CIRCUIT

SWITCH POSITION

TEST	SWITCH
t_{PLZ}, t_{PZL}, Open Drain	Closed
t_{PHZ}, t_{PZH}, t_{PLH}, t_{PHL}	Open

DEFINITIONS:

C_L = Load capacitance, includes jig and probe capacitance.

R_T = Termination resistance, should be equal to Z_{OUT} of the Pulse Generator.

V_{IN} = 0V to 3V.

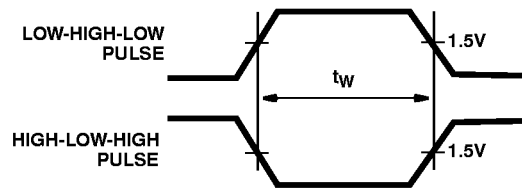Input: $t_r = t_f = 2.5ns$ (10% to 90%), unless otherwise specified

FIGURE 2. SETUP, HOLD, AND RELEASE TIMING

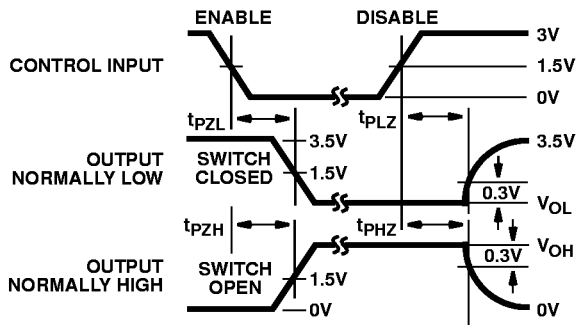**FIGURE 3. PULSE WIDTH**

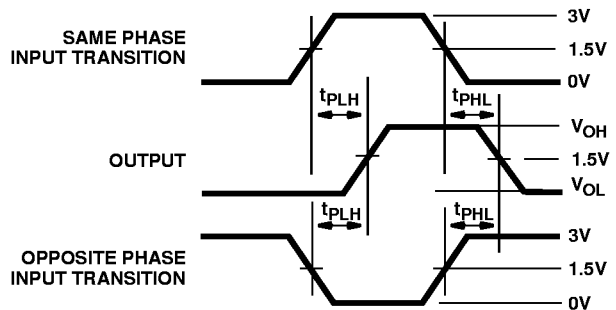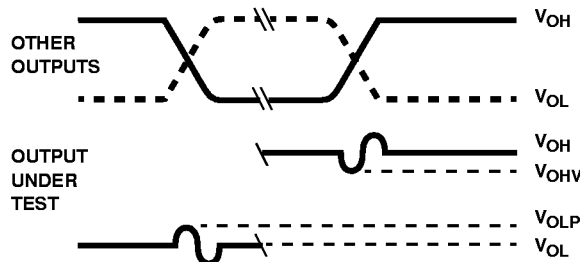**FIGURE 4. ENABLE AND DISABLE TIMING**

FIGURE 5. PROPAGATION DELAY

NOTES:

9. V_{OLP} is measured with respect to a ground reference near the output under test. V_{OHV} is measured with respect to V_{OH}.

10. Input pulses have the following characteristics:
    $P_{RR} \leq 1MHz$, $t_r = 2.5ns$, $t_f = 2.5ns$, skew 1ns.

11. R.F. fixture with 700MHz design rules required. IC should be soldered into test board and bypassed with 0.1μF capacitor. Scope and probes require 700MHz bandwidth.

FIGURE 6. SIMULTANEOUS SWITCHING TRANSIENT WAVEFORMS