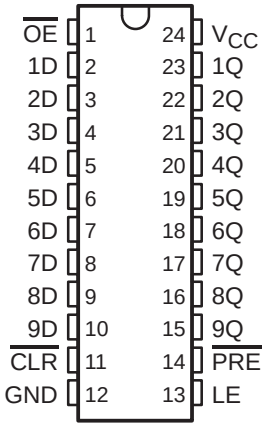
- **BiCMOS Technology With Low Quiescent Power**
- **Buffered Inputs**
- **Noninverted Outputs**
- **Input/Output Isolation From V_{CC}**
- **Controlled Output Edge Rates**
- **48-mA Output Sink Current**
- **Output Voltage Swing Limited to 3.7 V**
- **SCR Latch-Up-Resistant BiCMOS Process and Circuit Design**
- **Packaged in Plastic Small-Outline Package**

M PACKAGE
(TOP VIEW)



description

The CD74FCT843A is a 9-bit, bus-interface, D-type latch with 3-state outputs, designed specifically for driving highly capacitive or relatively low-impedance loads. It is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The device uses a small-geometry BiCMOS technology. The output stage is a combination of bipolar and CMOS transistors that limits the output high level to two diode drops below V_{CC}. This resultant lowering of output swing (0 V to 3.7 V) reduces power-bus ringing [a source of electromagnetic interference (EMI)] and minimizes V_{CC} bounce and ground bounce and their effects during simultaneous output switching. The output configuration also enhances switching speed and is capable of sinking 48 mA.

The CD74FCT843A outputs are transparent to the inputs when the latch-enable (LE) input is high. The latches are transparent D-type latches. When LE goes low, the data is latched. The output-enable ($\overline{OE}$) input controls the 3-state outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state. The latch operation is independent of the state of the output enable. This device, having preset ($\overline{PRE}$) and clear ($\overline{CLR}$), are ideal for parity-bus interfacing. When $\overline{PRE}$ is low, the outputs are high if $\overline{OE}$ is low. $\overline{PRE}$ overrides $\overline{CLR}$. When $\overline{CLR}$ is low, the outputs are low if $\overline{OE}$ is low. When $\overline{CLR}$ is high, data can be entered into the latch. The device provides noninverted outputs.

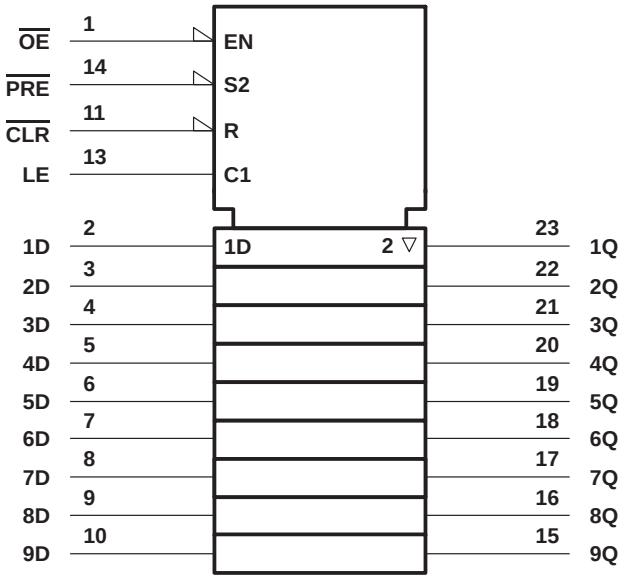
$\overline{OE}$ does not affect the internal operations of the latch. Previously stored data can be retained or new data can be entered while the outputs are in the high-impedance state.

The CD74FCT843A is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each latch)

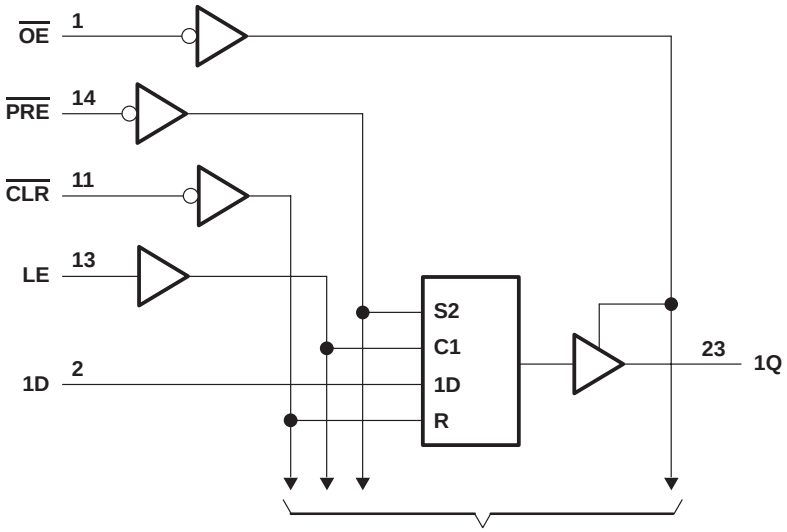
INPUTS					OUTPUT
$\overline{PRE}$	$\overline{CLR}$	$\overline{OE}$	LE	D	Q
L	X	L	X	X	H
H	L	L	X	X	L
H	H	L	H	L	L
H	H	L	H	H	H
H	H	L	L	X	Q_0
X	X	H	X	X	Z

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

DC supply voltage range, V_{CC} . . . . . –0.5 V to 6 V
DC input clamp current, I_{IK} (V_I < –0.5 V) . . . . . –20 mA
DC output clamp current, I_{OK} (V_O < –0.5 V) . . . . . –50 mA
DC output sink current per output pin, I_{OL} . . . . . 70 mA
DC output source current per output pin, I_{OH} . . . . . –30 mA
Continuous current through V_{CC}, (I_{CC}) . . . . . 237 mA
Continuous current through GND . . . . . 453 mA
Package thermal impedance, θ_{JA} (see Note 1) . . . . . 46°C/W
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions (see Note 2)

		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.75	5.25	V
V_{IH}	High-level input voltage	2		V
V_{IL}	Low-level input voltage		0.8	V
V_I	Input voltage	0	V_{CC}	V
V_O	Output voltage	0	V_{CC}	V
I_{OH}	High-level output current		–15	mA
I_{OL}	Low-level output current		48	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	ns/V
T_A	Operating free-air temperature	0	70	°C

NOTE 2: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

electrical characteristics over recommended operating temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C		MIN	MAX	UNIT
			MIN	MAX			
V_{IK}	I_I = –18 mA	4.75 V		–1.2		–1.2	V
V_{OH}	I_{OH} = –15 mA	4.75 V	2.4		2.4		V
V_{OL}	I_{OL} = 48 mA	4.75 V		0.55		0.55	V
I_I	V_I = V_{CC} or GND	5.25 V		±0.1		±1	μA
I_{OZ}	V_O = V_{CC} or GND	5.25 V		±0.5		±10	μA
I_{OS}‡	V_I = V_{CC} or GND, V_O = 0	5.25 V	–75		–75		mA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.25 V		8		80	μA
ΔI_{CC}§	One input at 3.4 V, Other inputs at V_{CC} or GND	5.25 V		1.6		1.6	mA
C_i	V_I = V_{CC} or GND			10		10	pF
C_o	V_O = V_{CC} or GND			15		15	pF

‡ Not more than one output should be tested at a time, and the duration of the test should not exceed 100 ms.

§ This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

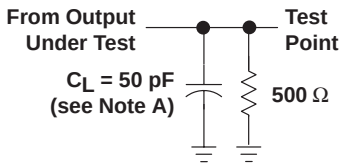
timing requirements over recommended operating temperature conditions (unless otherwise noted) (see Figure 1)

			MIN	MAX	UNIT
t_w	Pulse duration	CLR low	8		ns
		$\overline{PRE}$ low	8		
		LE low	4		
t_{su}	Setup time	Data before LE↓	2.5		ns
		$\overline{PRE}$ inactive	1.4		
		$\overline{CLR}$ inactive	1.4		
t_h	Hold time	Data before LE↓	2.5		ns
t_{rec}	Recovery time	$\overline{PRE}$, $\overline{CLR}$	14		ns

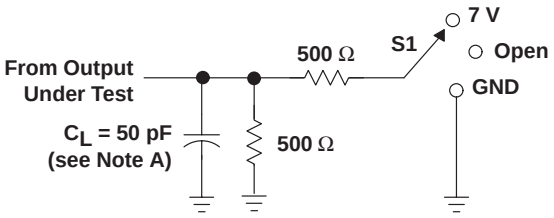
switching characteristics over recommended operating temperature conditions (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C	MIN	MAX	UNIT
			TYP			
t_{pd}	D	Q	6.8	1.5	9	ns
	LE		9	1.5	12	
t_{PLH}	$\overline{PRE}$	Q	9	1.5	12	ns
t_{PHL}	$\overline{CLR}$	Q	9.8	1.5	13	ns
t_{en}	$\overline{OE}$	Q	10.5	1.5	14	ns
t_{dis}	$\overline{OE}$	Q	6	1.5	8	ns

PARAMETER MEASUREMENT INFORMATION

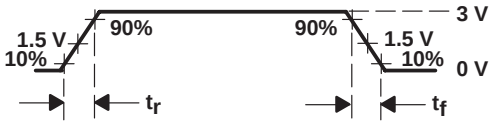


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

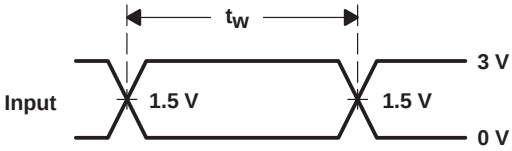


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open
Open Drain	7 V

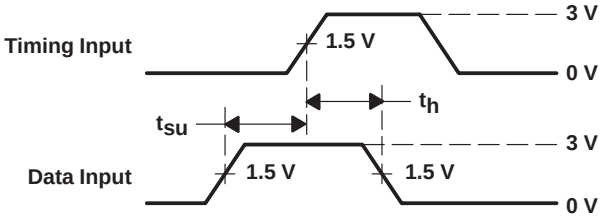
LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS



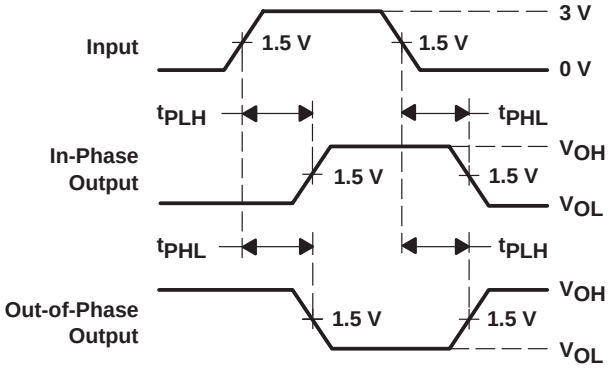
VOLTAGE WAVEFORM
INPUT RISE AND FALL TIMES



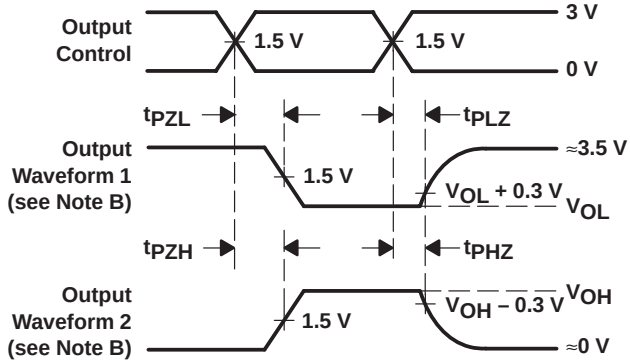
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r and t_f = 2.5 ns.
D. The outputs are measured one at a time with one input transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PHL} and t_{PLH} are the same as t_{pd}.

Figure 1. Load Circuit and Voltage Waveforms

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