

SN54BCT374, SN74BCT374 OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

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- State-of-the-Art BiCMOS Design Significantly Reduces I_{CC}
- Full Parallel Access for Loading
- Buffered Control Inputs
- 3-State True Outputs Drive Bus Lines or Buffer Memory Address Registers
- ESD Protection Exceeds 2000 V Per MIL-Std-883C, Method 3015
- Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic and Ceramic 300-mil DIPs (J, N)

description

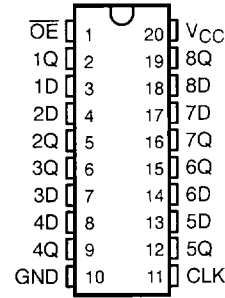
These 8-bit flip-flops feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the 'BCT374 are edge-triggered D-type flip-flops. On the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels that were set up at the data (D) inputs.

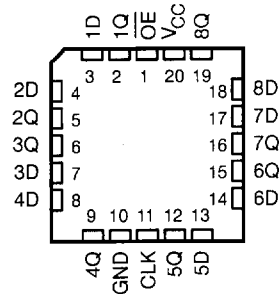
A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without need for interface or pullup components. The output-enable (\overline{OE}) input does not affect internal operations of the flip-flop. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54BCT374 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74BCT374 is characterized for operation from 0°C to 70°C .

SN54BCT374 . . . J OR W PACKAGE
SN74BCT374 . . . DB OR DW OR N PACKAGE
(TOP VIEW)



SN54BCT374 . . . FK PACKAGE
(TOP VIEW)



FUNCTION TABLE
(each flip-flop)

INPUTS			OUTPUT
\overline{OE}	CLK	D	Q
L	\uparrow	H	H
L	\uparrow	L	L
L	H or L	X	Q_0
H	X	X	Z

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

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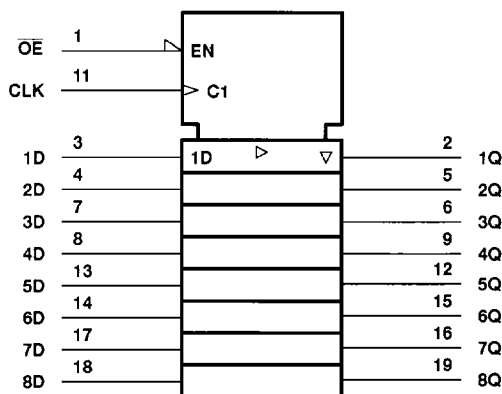
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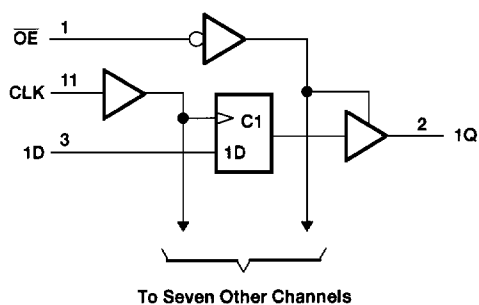
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logic symbol†



logic diagram (positive logic)



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

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

Supply voltage range, V_{CC}	- 0.5 V to 7 V
Input voltage range, V_I (see Note 1)	- 0.5 V to 7 V
Voltage range applied to any output in the disabled or power-off state, V_O	- 0.5 V to 5.5 V
Voltage range applied to any output in the high state, V_{OH}	- 0.5 V to V_{CC}
Input clamp current	- 30 mA
Current into any output in the low state: SN54BCT374	96 mA
SN74BCT374	128 mA
Operating free-air temperature range: SN54BCT374	- 55°C to 125°C
SN74BCT374	0°C to 70°C
Storage temperature range	- 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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

	SN54BCT374			SN74BCT374			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC} Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH} High-level input voltage	2			2			V
V_{IL} Low-level input voltage			0.8			0.8	V
I_{IK} Input clamp current			-18			-18	mA
I_{OH} High-level output current			-12			-15	mA
I_{OL} Low-level output current			48			64	mA
T_A Operating free-air temperature	-55		125	0		70	°C



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

PARAMETER	TEST CONDITIONS		SN54BCT374		SN74BCT374		UNIT	
			MIN	TYP†	MAX	MIN		TYP†
V_{JK}	$V_{CC} = 4.5\text{ V}$,	$I_J = -18\text{ mA}$			-1.2		-1.2	V
V_{OH}	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -3\text{ mA}$	2.4	3.3	2.4	3.3		V
		$I_{OH} = -12\text{ mA}$	2	3.2				
		$I_{OH} = -15\text{ mA}$				2	3.1	
V_{OL}	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 48\text{ mA}$		0.38	0.55			V
		$I_{OL} = 64\text{ mA}$				0.42	0.55	
I_I	$V_{CC} = 5.5\text{ V}$,	$V_I = 5.5\text{ V}$			0.4		0.4	mA
I_{IH}	$V_{CC} = 5.5\text{ V}$,	$V_I = 2.7\text{ V}$			20		20	μA
I_{IL}	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.5\text{ V}$			-0.6		-0.6	mA
I_{OS}^\ddagger	$V_{CC} = 5.5\text{ V}$,	$V_O = 0$	-100		-225	-100	-225	mA
I_{OZH}	$V_{CC} = 5.5\text{ V}$,	$V_O = 2.7\text{ V}$			50		50	μA
I_{OZL}	$V_{CC} = 5.5\text{ V}$,	$V_O = 0.5\text{ V}$			-50		-50	μA
I_{CCL}	$V_{CC} = 5.5\text{ V}$		37	60	37	60	mA	
I_{CCH}	$V_{CC} = 5.5\text{ V}$		2	5	2	5	mA	
I_{CCZ}	$V_{CC} = 5.5\text{ V}$		5	8	5	8	mA	
C_i	$V_{CC} = 5\text{ V}$,	$V_I = 2.5\text{ V}$ or 0.5 V		6		6		pF
C_o	$V_{CC} = 5\text{ V}$,	$V_O = 2.5\text{ V}$ or 0.5 V		10		10		pF

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

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

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

		$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$		SN54BCT374		SN74BCT374		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency		70		70		70	MHz
t_w	Pulse duration		7	8		7		ns
t_{su}	Setup time before CLK↑		6.5	6.5		6.5		ns
t_h	Hold time after CLK↑		0	0		0		ns



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switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V},$ $C_L = 50\text{ pF},$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = 25^\circ\text{C}$			$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = \text{MIN to MAX}^\dagger$			UNIT	
			'BCT374			SN54BCT374		SN74BCT374		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
f_{max}			70			70		70		MHz
t_{PLH}	CLK	Q	2	7.2	9.1	2	11.6	2	10.6	ns
t_{PHL}			2	7.1	8.8	2	10.6	2	10	
t_{PZH}	$\overline{\text{OE}}$	Q	1	8.3	10.1	1	12.7	1	12.3	ns
t_{PZL}			1	8.6	10.6	1	13	1	12.7	
t_{PHZ}	$\overline{\text{OE}}$	Q	1	4.7	6.3	1	7.1	1	6.8	ns
t_{PLZ}			1	4.8	6.3	1	7.5	1	6.8	

[†] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

