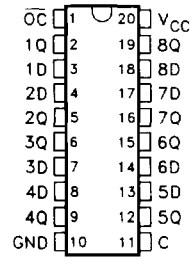
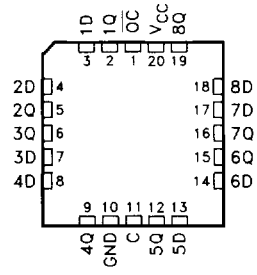
D3145, SEPTEMBER 1988—REVISED OCTOBER 1988

- **8-Latches in a Single Package**
- **3-State Bus-Driving True Outputs**
- **Full Parallel Access for Loading**
- **State of the Art BiCMOS Design Significantly Reduces I_{CC}**
- **Comparable Speed and Improved Power Performance Relative to 54F/74F373**
- **3-State 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" Packages, Ceramic Chip Carriers, and Standard Plastic Ceramic 300-mil DIPs**

SN54BCT373 . . . J PACKAGE
SN74BCT373 . . . DW OR N PACKAGE
(TOP VIEW)



SN54BCT373 . . . FK PACKAGE
(TOP VIEW)



description

These 8-bit latches feature three-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 latches of the 'BCT373 are transparent D-type latches. While the enable (C) is high, the Q outputs will follow the data (D) inputs. When the enable is taken low, the Q outputs will be latched at the levels that were set up at the D inputs.

A buffered output-control ($\overline{OC}$) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly. The high-impedance third state and increased drive provide the capability to drive the bus lines in a bus-organized system without need for interface components.

The output control ($\overline{OC}$) does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are off.

The SN54BCT373 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74BCT373 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each latch)

INPUTS			OUTPUT
$\overline{OC}$	ENABLE C	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

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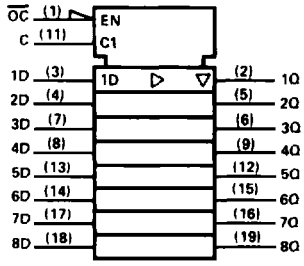
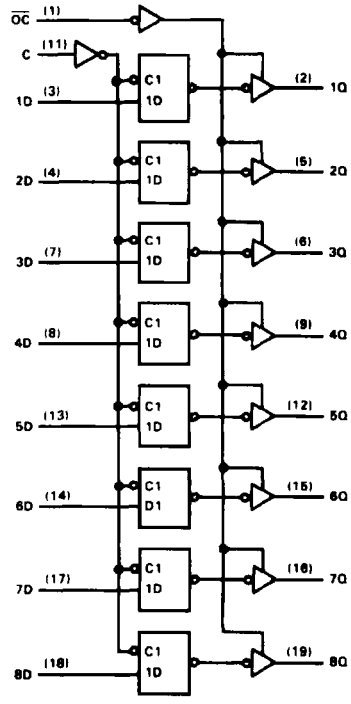
logic symbol†



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

Pin numbers shown are for DW, J, and N packages.

logic diagram (positive logic)



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

Supply voltage, V_{CC}	−0.5 V to 7 V
Input voltage (see Note 1)	−0.5 V to 7 V
Voltage applied to any output in the disabled or power-off state	−0.5 V to 7 V
Voltage applied to any output in the high state	−0.5 V to V_{CC}
Input clamp current	−30 mA
Current into any output in the low state: SN54BCT373	96 mA
SN74BCT373	128 mA
Operating free-air temperature range: SN54BCT373	−55°C to 125°C
SN74BCT373	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 negative-voltage rating may be exceeded if the input clamp current rating is observed.

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recommended operating conditions

		SN54BCT373			SN74BCT373			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

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

PARAMETER	TEST CONDITIONS		SN54BCT373			SN74BCT373			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V, I_I = −18 mA				−1.2			−1.2	V
V_{OH}	V_{CC} = 4.5 V	I_{OH} = −3 mA	2.4	3.3		2.4	3.3		V
		I_{OH} = −12 mA	2	3.2					
		I_{OH} = −15 mA				2	3.1		
V_{OL}	V_{CC} = 4.5 V	I_{OL} = 48 mA		0.38	0.55				V
		I_{OL} = 64 mA					0.42	0.55	
I_{OZH}	V_{CC} = 5.5 V, V_O = 2.7 V				50			50	μA
I_{OZL}	V_{CC} = 5.5 V, V_O = 0.5 V				−50			−50	μA
I_I	V_{CC} = 5.5 V, V_I = 5.5 V				0.4			0.4	mA
I_{IH}	V_{CC} = 5.5 V, V_I = 2.7 V				20			20	μA
I_{IL}	V_{CC} = 5.5 V, V_I = 0.5 V				−0.6			−0.6	mA
I_{OS}‡	V_{CC} = 5.5 V, V_O = 0		−100		−225	−100		−225	mA
I_{CCL}	V_{CC} = 5.5 V			37	60		37	60	mA
I_{CCH}	V_{CC} = 5.5 V			2	5		2	5	mA
I_{CCZ}	V_{CC} = 5.5V			5	8		5	8	mA
C_i	V_{CC} = 5 V, V_I = 2.5 V or 0.5 V			6			6		pF
C_o	V_{CC} = 5 V, V_O = 2.5 V or 0.5 V			11			11		pF

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.

timing requirements

		V_{CC} = 5V, T_A = 25°C		V = 4.5 V to 5.5 V, T_A = MIN to MAX§				UNIT
		'BCT373		SN54BCT373		SN74BCT373		
		MIN	MAX	MIN	MAX	MIN	MAX	
t_{su}	Setup time, Data before enable C ↓	2		2		2		ns
t_h	Hold time, Data after enable C ↓	5.5		5.5		5.5		ns
t_w	Pulse duration, Enable C high	7.5		7.5		7.5		ns

§ For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'BCT373			SN54BCT373		SN74BCT373		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	D	Any Q	2	5.9	7.7	1.5	10.1	2	9.3	ns
t_{PHL}	D	Any Q	2	6.7	8.5	1	10.3	1.5	9.5	ns
t_{PLH}	C	Any Q	2	6.2	8.2	2	10.1	2	9.3	ns
t_{PHL}	C	Any Q	2	5.9	7.8	2	9.2	2	8.8	ns
t_{PZH}	$\overline{OC}$	Any Q	1	7.8	9.6	1	12.3	1	11.8	ns
t_{PZL}	$\overline{OC}$	Any Q	1	8.2	10.2	1	12.5	1	12	ns
t_{PHZ}	$\overline{OC}$	Any Q	1	4.9	6.6	1	7.4	1	7	ns
t_{PLZ}	$\overline{OC}$	Any Q	1	5	6.7	1	8.1	1	7.4	ns

† For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

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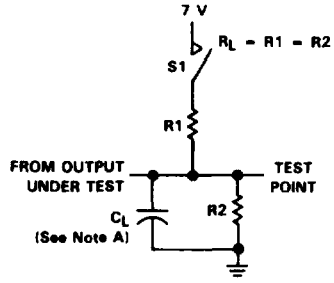
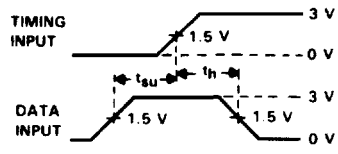
PARAMETER MEASUREMENT INFORMATION



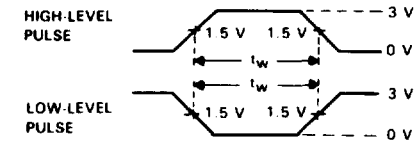
LOAD CIRCUIT 1 ALL OUTPUTS EXCEPT FOR ERROR FLAG

SWITCH POSITION TABLE

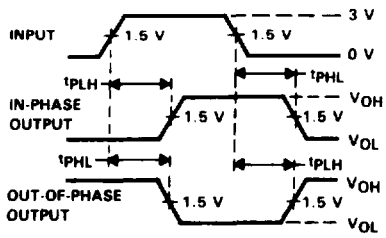
TEST	S1
t_{PLH}	Open
t_{PHL}	Open
t_{PZH}	Open
t_{PZL}	Closed
t_{PHZ}	Open
t_{PLZ}	Closed



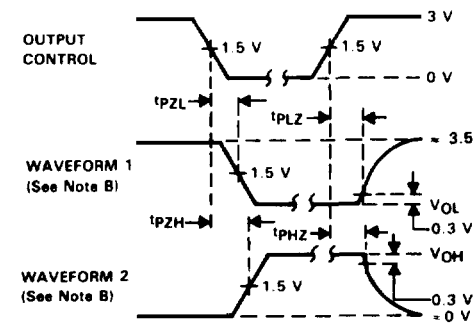
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS

NOTES: A. C_L includes probe and jig capacitance.
B. Input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 2.5 ns, t_f = 2.5 ns.
C. 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.
D. The outputs are measured one at a time with one input transition per measurement.

FIGURE 1. SWITCHING CHARACTERISTICS