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- Members of the Texas Instruments Widebus™ Family
- 3-State True Outputs
- Full Parallel Access for Loading
- Flow-Through Architecture Optimizes
 PCB Layout
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- EPIC[™] (Enhanced-Performance Implanted CMOS) 1-µm Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL) Packages Using 25-mil Center-to-Center Pin Spacings and 380-mil Fine-Pitch Ceramic Flat (WD) Packages Using 25-mil Center-to-Center Pin Spacings

description

The 'AC16373 are 16-bit transparent D-type latches with 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 device can be used as two 8-bit latches or one 16-bit latch. When the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the levels set up at the D inputs.

54AC16373... WD PACKAGE 74AC16373... DL PACKAGE (TOP VIEW)

	$\overline{}$		1
10E	U	48	1LE
1Q1 [2	47] 1D1
1Q2 [3	46] 1D2
GND [4	45	GND
1Q3 [5	44	D3
1Q4 [6	43	D4 1D4
V _{CC}	7	42	₽ v _{cc}
1Q5 L	8	41	1D5
1Q6 L	9	40	1D6
GND [10	39	GND
1Q7 L	11	38	1D7
1Q8	12	37	D8 1D8
2Q1 [13	36	2D1
2Q2 [14	35	2D2
GND [15	34	GND
2Q3 [16	33	2D3
2Q4 [17	32	2D4
v _{cc} [18	31] v _{cc}
2Q5 [19	30	2D5
2Q6 [20	29	2D6
GND [21	28	GND
2Q7 [22	27	2D7
2Q8	23	26	2D8
20E	24	25] 2LE

A buffered output-enable (\overline{OE}) 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 state and the increased drive provide the capability to drive bus lines without need for interface or pullup components. \overline{OE} does not affect internal operations of the latch. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The 74AC16373 is packaged in TI's shrink small-outline package (DL), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The 54AC16373 is characterized for operation over the full military temperature range of –55°C to 125°C. The 74AC16373 is characterized for operation from –40°C to 85°C.



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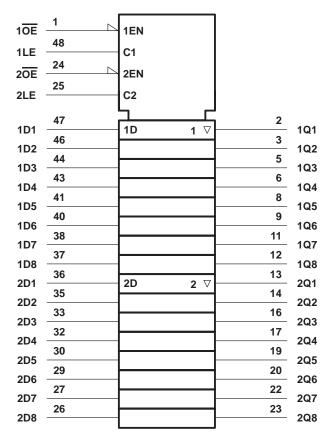
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FUNCTION TABLE

	INPUTS		OUTPUT
OE	LE	D	Q
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q ₀
Н	X	Χ	Z

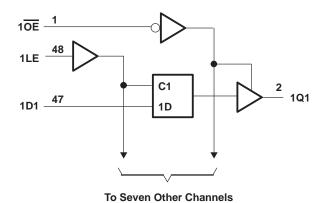
logic symbol†

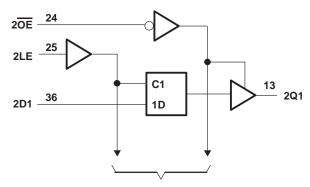


[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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logic diagram (positive logic)





To Seven Other Channels

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)	\dots -0.5 V to V _{CC} + 0.5 V
Output voltage range, V _O (see Note 1)	
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	±20 mA
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{CC})	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V _{CC} or GND	±400 mA
Maximum power dissipation at $T_A = 55^{\circ}$ C (in still air) (see Note 2): DL package	1.2 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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.



^{2.} The maximum package power dissipation is calculated using a junction temperature of 150 °C and a board trace length of 750 mils.

54AC16373, 74AC16373 16-BIT TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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recommended operating conditions (see Note 3)

					3	74	AC1637	3	UNIT	
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Vcc	Supply voltage		3	5	5.5	3	5	5.5	V	
		V _{CC} = 3 V	2.1			2.1				
VIH	High-level input voltage	V _{CC} = 4.5 V	3.15			3.15			V	
		V _{CC} = 5.5 V	3.85			3.85				
		V _{CC} = 3 V			0.9			0.9		
VIL	Low-level input voltage	V _{CC} = 4.5 V		Ž,	1.35			1.35	V	
		V _{CC} = 5.5 V		13.	1.65			1.65		
VI	Input voltage		0	Q.	VCC	0		VCC	V	
Vo	Output voltage		0	5	VCC	0		VCC	V	
		VCC = 3 V	,Q)	-4			-4		
ІОН	High-level output current	V _{CC} = 4.5 V	200		-24			-24	mA	
		V _{CC} = 5.5 V	-		-24			-24		
		V _{CC} = 3 V			12			12		
lOL	Low-level output current	V _{CC} = 4.5 V			24			24	mA	
		V _{CC} = 5.5 V			24			24		
Δt/Δν	Input transition rise or fall rate		0		10	0		10	ns/V	
TA	Operating free-air temperature		-55		125	-40		85	°C	

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

DADAMETED	TEST CONDITIONS	V	T,	_A = 25°C		54AC	16373	74AC1	6373	UNIT
PARAMETER	TEST CONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	
		3 V	2.9			2.9		2.9		
	I _{OH} = -50 μA	4.5 V	4.4			4.4		4.4		
		5.5 V	5.4			5.4		5.4		
Voн	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48		2.48		V
	I _{OL} = -24 mA	4.5 V	3.94			3.8	4	3.8		
	10L = -24 IIIA	5.5 V	4.94			4.8	1/5	4.8		
	I _{OH} = -75 mA [†]	5.5 V				3.85	9E	3.85		
		3 V			0.1	4	0.1		0.1	
	I _{OL} = 50 μA	4.5 V			0.1	05	0.1		0.1	
		5.5 V			0.1	³ 0	0.1		0.1	
VOL	I _{OL} = 12 mA	3 V			0.36	Ya	0.44		0.44	V
	I _{OL} = 24 mA	4.5 V			0.36		0.44		0.44]
	IOL - 24 IIIA	5.5 V			0.36		0.44		0.44	
	$I_{OL} = 75 \text{ mA}^{\dagger}$	5.5 V					1.65		1.65	
lį	V _I = V _{CC} or GND	5.5 V			±0.1		±1		±1	μΑ
loz	$V_O = V_{CC}$ or GND	5.5 V			±0.5		±5		±5	μΑ
ICC	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			8		80		80	μΑ
C _i	$V_I = V_{CC}$ or GND	5 V		4.5						pF
Co	$V_O = V_{CC}$ or GND	5 V		12	·					pF

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



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timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted) (see Figure 1)

		$T_A = 2$	25°C	54AC1	6373	74AC1	6373	UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	UNIT
t _W	Pulse duration, LE high	5		5	100	5		ns
t _{su}	Setup time, data before LE↓	1.5		1.5	11/2	1.5		ns
th	Hold time, data after LE↓	3	·	3		3		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

		T _A = 1	25°C	54AC	16373	74AC1	6373	UNIT
			MAX	MIN	MAX	MIN	MAX	UNIT
t _W	Pulse duration, LE high	4		4	J. W	4		ns
t _{su}	Setup time, data before LE↓	1.5		1.5	116	1.5		ns
t _h	Hold time, data after LE \downarrow	2.5		2.5		2.5		ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	T,	T _A = 25°C			6373	74AC1	6373	UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t _{PLH}	D	Q	3.7	10.6	13.4	3.7	15.1	3.7	15.1	ns
^t PHL	Ь	ζ	4.3	11.3	14	4.3	14.8	4.3	14.8	115
^t PLH	LE	Q	4.6	12.9	15.8	4.6	18.6	4.6	18.6	ns
^t PHL	LL		4.5	12.1	14.6	4.5	16.4	4.5	16.4	113
^t PZH	ŌĒ	Q	4.2	11.8	14.8	4.2	17.5	4.2	17.5	ns
t _{PZL}	OE	ζ	5.4	16.3	19.8	5.4	22.3	5.4	22.3	115
^t PHZ		Q	4.2	7.9	9.5	4.2	10.2	4.2	10.2	ns
^t PLZ	ŌĒ	α	3.8	7.1	8.9	3.8	9.8	3.8	9.8	115

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	T _A = 25°C			54AC16373		74AC16373		UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
^t PLH	D	Q	3.1	6.7	8.5	3.1	9.7	3.1	9.7	ne
tPHL the term of t	Ь	ά	3.5	7.3	9.1	3.5	10.1	3.5	10.1	ns
t _{PLH}	LE	Q	3.8	8.2	10.2	3.8	11.9	3.8	11.9	ns
t _{PHL}	LE	Q	3.6	7.8	9.7	3.6	10.9	3.6	10.9	115
^t PZH	ŌĒ	Q	3.5	7.4	9.4	3.5	10.8	3.5	10.8	20
t _{PZL}	OE	Q	4.3	9.1	11.3	4.3	12.8	4.3	12.8	ns
^t PHZ	ŌĒ	ŌĒ Q	3.9	6.6	8	3.9	8.8	3.9	8.8	ns
t _{PLZ}	OE .	ų ų	3.7	5.9	7.4	3.7	8.1	3.7	8.1	115

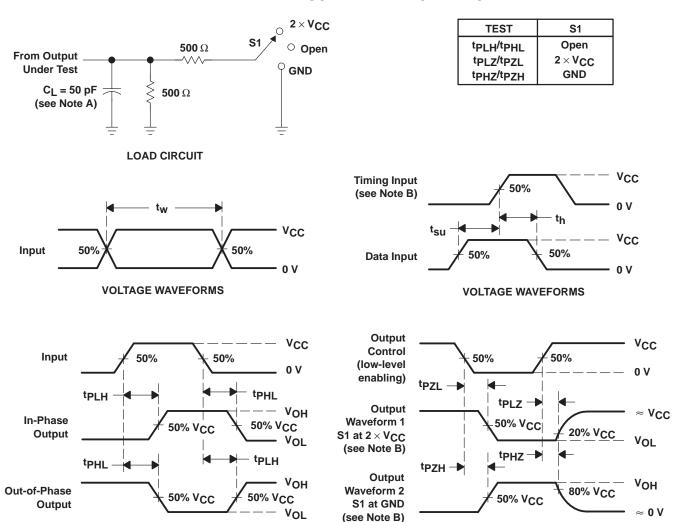
operating characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$

	PARAMETER	TEST COM	TYP	UNIT		
C . Power dissination conscitones nor latch		Outputs enabled	0. 50 = 5 4 4 4 1 1 -		43	pF
Cpd	Power dissipation capacitance per latch	Outputs disabled	C _L = 50 pF,	f = 1 MHz	5	pr

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PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_I includes probe and jig capacitance.

VOLTAGE WAVEFORMS

- 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 \leq 1 MHz, $Z_O = 50 \ \Omega$, $t_f = 3 \ ns$, $t_f = 3 \ ns$.

VOLTAGE WAVEFORMS

D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







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PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74AC16373DL	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC16373DLG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC16373DLR	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC16373DLRG4	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

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OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

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(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

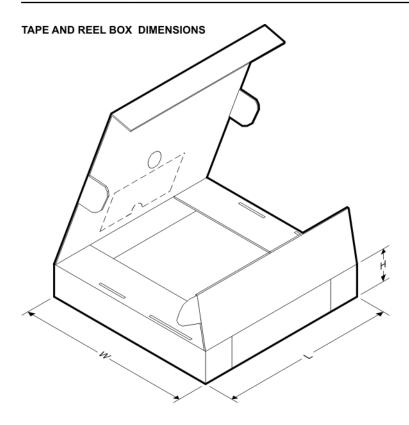
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device		Package Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74AC16373DLR	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1





*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74AC16373DLR	SSOP	DL	48	1000	346.0	346.0	49.0

DL (R-PDSO-G**)

48 PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).

D. Falls within JEDEC MO-118

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