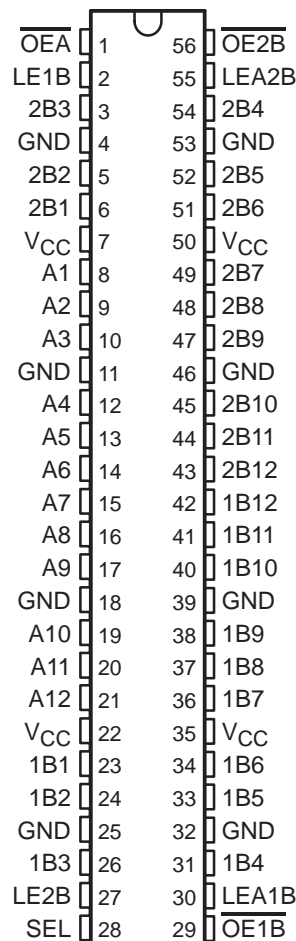


# SN54ABT16260, SN74ABTH16260 12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES WITH 3-STATE OUTPUTS

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- Members of the Texas Instruments *Widebus*™ Family
- State-of-the-Art *EPIC-II B*™ BiCMOS Design Significantly Reduces Power Dissipation
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical  $V_{OLP}$  (Output Ground Bounce) < 1 V at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- Distributed  $V_{CC}$  and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- High-Drive Outputs ( $-32\text{-mA } I_{OH}$ ,  $64\text{-mA } I_{OL}$ )
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL) Package and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings

SN54ABT16260 . . . WD PACKAGE  
SN74ABTH16260 . . . DL PACKAGE  
(TOP VIEW)



## description

The SN54ABT16260 and SN74ABTH16260 are 12-bit to 24-bit multiplexed D-type latches used in applications in which two separate data paths must be multiplexed onto, or demultiplexed from, a single data path. Typical applications include multiplexing and/or demultiplexing of address and data information in microprocessor or bus-interface applications. This device is also useful in memory-interleaving applications.

Three 12-bit I/O ports (A1–A12, 1B1–1B12, and 2B1–2B12) are available for address and/or data transfer. The output-enable ( $\overline{OE1B}$ ,  $\overline{OE2B}$ , and  $\overline{OEA}$ ) inputs control the bus-transceiver functions. The  $\overline{OE1B}$  and  $\overline{OE2B}$  control signals also allow bank control in the A-to-B direction.

Address and/or data information can be stored using the internal storage latches. The latch-enable (LE1B, LE2B, LEA1B, and LEA2B) inputs are used to control data storage. When the latch-enable input is high, the latch is transparent. When the latch-enable input goes low, the data present at the inputs is latched and remains latched until the latch-enable input is returned high.



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# SN54ABT16260, SN74ABTH16260

## 12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES

### WITH 3-STATE OUTPUTS

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#### description (continued)

When  $V_{CC}$  is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

The SN54ABT16260 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ABTH16260 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

#### Function Tables

B TO A ( $\overline{OE} = H$ )

INPUTS						OUTPUT
1B	2B	SEL	LE1B	LE2B	$\overline{OEA}$	A
H	X	H	H	X	L	H
L	X	H	H	X	L	L
X	X	H	L	X	L	$A_0$
X	H	L	X	H	L	H
X	L	L	X	H	L	L
X	X	L	X	L	L	$A_0$
X	X	X	X	X	H	Z

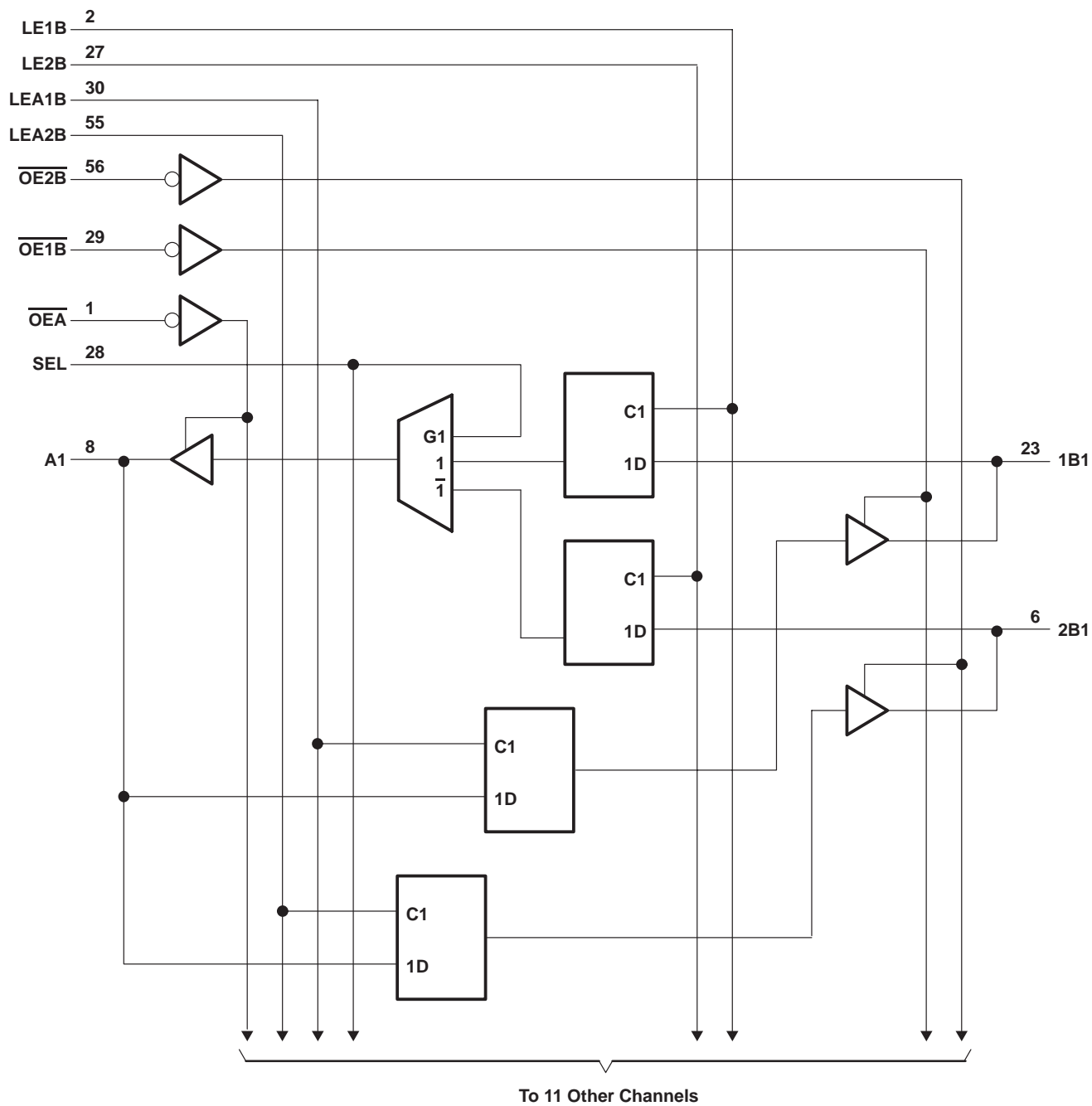
A TO B ( $\overline{OEA} = H$ )

INPUTS					OUTPUTS	
A	LEA1B	LEA2B	$\overline{OE1B}$	$\overline{OE2B}$	1B	2B
H	H	H	L	L	H	H
L	H	H	L	L	L	L
H	H	L	L	L	H	$2B_0$
L	H	L	L	L	L	$2B_0$
H	L	H	L	L	$1B_0$	H
L	L	H	L	L	$1B_0$	L
X	L	L	L	L	$1B_0$	$2B_0$
X	X	X	H	H	Z	Z
X	X	X	L	H	Active	Z
X	X	X	H	L	Z	Active
X	X	X	L	L	Active	Active

SN54ABT16260, SN74ABTH16260  
 12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES  
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logic diagram (positive logic)



# SN54ABT16260, SN74ABTH16260 12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES WITH 3-STATE OUTPUTS

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## 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 high or power-off state, $V_O$	–0.5 V to 5.5 V
Current into any output in the low state, $I_O$ : SN54ABT16260	96 mA
SN74ABTH16260	128 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–18 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ )	–50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DL package	74°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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
2. The package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51.

## recommended operating conditions (see Note 3)

	SN54ABT16260		SN74ABTH16260		UNIT
	MIN	MAX	MIN	MAX	
$V_{CC}$ Supply voltage	4.5	5.5	4.5	5.5	V
$V_{IH}$ High-level input voltage	2		2		V
$V_{IL}$ Low-level input voltage		0.8		0.8	V
$V_I$ Input voltage	0	$V_{CC}$	0	$V_{CC}$	V
$I_{OH}$ High-level output current		–24		–32	mA
$I_{OL}$ Low-level output current		48		64	mA
$\Delta t/\Delta v$ Input transition rise or fall rate	Outputs enabled		10	10	ns/V
$\Delta t/\Delta V_{CC}$ Power-up ramp rate	200		200		$\mu$ s/V
$T_A$ Operating free-air temperature	–55	125	–40	85	°C

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



**SN54ABT16260, SN74ABTH16260**  
**12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES**  
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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER	TEST CONDITIONS		T <sub>A</sub> = 25°C			SN54ABT16260		SN74ABTH16260		UNIT		
			MIN	TYP†	MAX	MIN	MAX	MIN	MAX			
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA		-1.2			-1.2		-1.2		V		
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -3 mA		2.5			2.5		2.5		V		
	V <sub>CC</sub> = 5 V, I <sub>OH</sub> = -3 mA		3			3		3				
	V <sub>CC</sub> = 4.5 V		I <sub>OH</sub> = -24 mA		2			2				
		I <sub>OH</sub> = -32 mA		2*								
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V		I <sub>OL</sub> = 48 mA		0.36			0.5		V		
			I <sub>OL</sub> = 64 mA		0.55*			0.55				
V <sub>hys</sub>			100							mV		
I <sub>I</sub>	Control inputs	V <sub>CC</sub> = 0 to 5.5 V, V <sub>I</sub> = V <sub>CC</sub> or GND		±1			±1		±1		μA	
	A or B ports	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>I</sub> = V <sub>CC</sub> or GND		±20			±100		±20			
I <sub>I</sub> (hold)	A or B ports	V <sub>CC</sub> = 4.5 V		V <sub>I</sub> = 0.8 V		100			100		μA	
				V <sub>I</sub> = 2 V		-100			-100			
I <sub>OZPU</sub> ‡	V <sub>CC</sub> = 0 to 2.1 V, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$		±50			±50		±50		μA		
I <sub>OZPD</sub> ‡	V <sub>CC</sub> = 2.1 V to 0, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$		±50			±50		±50		μA		
I <sub>OZH</sub> §	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 2.7 V, $\overline{OE} \geq 2$ V		10			10		10		μA		
I <sub>OZL</sub> §	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 0.5 V, $\overline{OE} \geq 2$ V		-10			-10		-10		μA		
I <sub>off</sub>	V <sub>CC</sub> = 0, V <sub>I</sub> or V <sub>O</sub> ≤ 4.5 V		±100					±100		μA		
I <sub>CEX</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 5.5 V		Outputs high		50			50		50	μA	
I <sub>O</sub> ¶	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.5 V		-50	-100	-225	-50	-225	-50	-225	mA		
I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V, I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND		Outputs high		1.5			1.5		1.5		mA
			Outputs low		63			63		63		
			Outputs disabled		1			1		1		
ΔI <sub>CC</sub> #	V <sub>CC</sub> = 5.5 V, One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND		1.5			1.5		1.5		mA		
C <sub>i</sub>	V <sub>I</sub> = 2.5 V or 0.5 V		3							pF		
C <sub>io</sub>	V <sub>O</sub> = 2.5 V or 0.5 V		11.5							pF		

\* On products compliant to MIL-PRF-38535, this parameter does not apply.

† All typical values are at V<sub>CC</sub> = 5 V.

‡ This parameter is characterized, but not production tested.

§ The parameters I<sub>OZH</sub> and I<sub>OZL</sub> include the input leakage current.

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

# This is the increase in supply current for each input that is at the specified TTL voltage level rather than V<sub>CC</sub> or GND.



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**WITH 3-STATE OUTPUTS**

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timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

		$V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}^\dagger$		SN54ABT16260		SN74ABTH16260		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
$t_w$	Pulse duration, LE1B, LE2B, LEA1B, or LEA2B high	3.3		3.3		3.3		ns
$t_{su}$	Setup time, data before LE1B, LE2B, LEA1B, or LEA2B↓	1.5		2		1.5		ns
$t_h$	Hold time, data after LE1B, LE2B, LEA1B, or LEA2B↓	1		1.5		1		ns

† These values apply only to the SN74ABTH16260.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ABT16260				UNIT	
			$V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$			MIN		MAX
			MIN	TYP	MAX			
$t_{PLH}$	A or B	B or A	1	3.1	5.3	1	5.9	ns
$t_{PHL}$			1	3.4	5.4	1	6.3	
$t_{PLH}$	LE	A or B	1.1	3.2	5.4	1.1	6.6	ns
$t_{PHL}$			1.1	3.3	5.3	1.1	5.9	
$t_{PLH}$	SEL (B1)	A	1.3	3.2	5.1	1.3	5.4	ns
	SEL (B2)		1.1	3.4	5.4	1.1	6.3	
$t_{PHL}$	SEL (B1)		1.5	3.1	4.6	1.5	5	
	SEL (B2)		1.6	3.6	5.3	1.6	6.2	
$t_{PZH}$	$\overline{OE}$	A or B	1	3.3	5.6	1	6.4	ns
$t_{PZL}$			1.6	3.8	5.9	1.6	6.5	
$t_{PHZ}$	$\overline{OE}$	A or B	2.2	4.1	5.9	2.2	7.5	ns
$t_{PLZ}$			1.3	3.2	5	1.3	5.4	

switching characteristics over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)

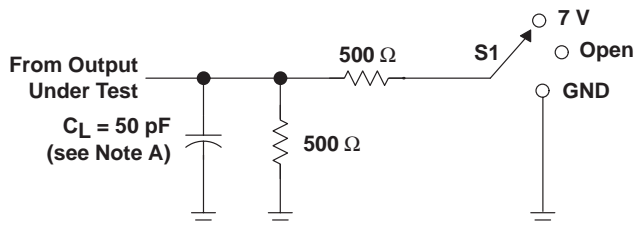
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ABTH16260				UNIT	
			$V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$			MIN		MAX
			MIN	TYP	MAX			
$t_{PLH}$	A or B	B or A	1	3.1	4.8	1	5.6	ns
$t_{PHL}$			1	3.4	5	1	5.9	
$t_{PLH}$	LE	A or B	1.1	3.2	4.9	1.1	5.8	ns
$t_{PHL}$			1.1	3.3	4.9	1.1	5.3	
$t_{PLH}$	SEL (B1)	A	1.3	3.2	4.6	1.3	5.3	ns
	SEL (B2)		1.1	3.4	4.9	1.1	6	
$t_{PHL}$	SEL (B1)		1.5	3.1	4.4	1.5	4.4	
	SEL (B2)		1.6	3.6	5.1	1.6	5.9	
$t_{PZH}$	$\overline{OE}$	A or B	1	3.3	4.7	1	5.7	ns
$t_{PZL}$			1.6	3.8	5.1	1.6	5.8	
$t_{PHZ}$	$\overline{OE}$	A or B	2.2	4.1	5.4	2.2	6.4	ns
$t_{PLZ}$			1.3	3.2	4.4	1.3	4.8	



SN54ABT16260, SN74ABTH16260  
12-BIT TO 24-BIT MULTIPLEXED D-TYPE LATCHES  
WITH 3-STATE OUTPUTS

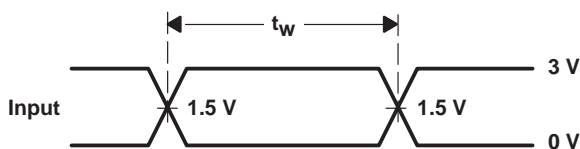
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PARAMETER MEASUREMENT INFORMATION

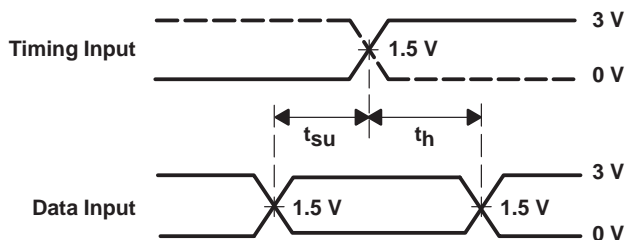


LOAD CIRCUIT

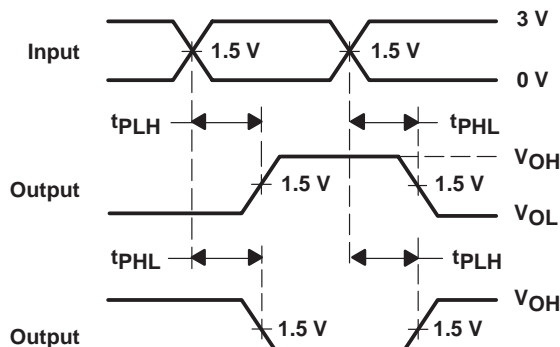
TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	7 V
$t_{PHZ}/t_{PZH}$	Open



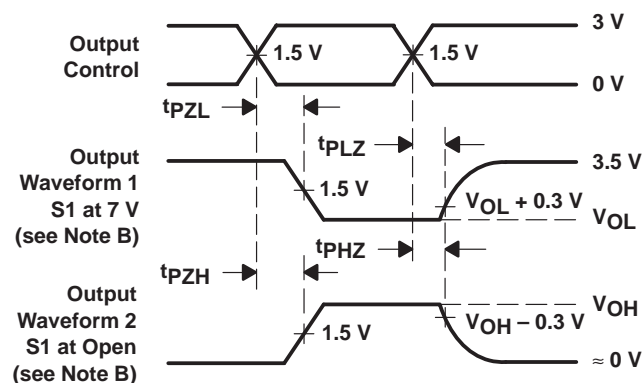
VOLTAGE WAVEFORMS  
PULSE DURATION



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:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ABTH16260DL	ACTIVE	SSOP	DL	56	20	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABTH16260	<a href="#">Samples</a>
SN74ABTH16260DLR	ACTIVE	SSOP	DL	56	1000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABTH16260	<a href="#">Samples</a>

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

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ABTH16260DLR	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABTH16260DLR	SSOP	DL	56	1000	367.0	367.0	55.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74ABTH16260DL	DL	SSOP	56	20	473.7	14.24	5110	7.87

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