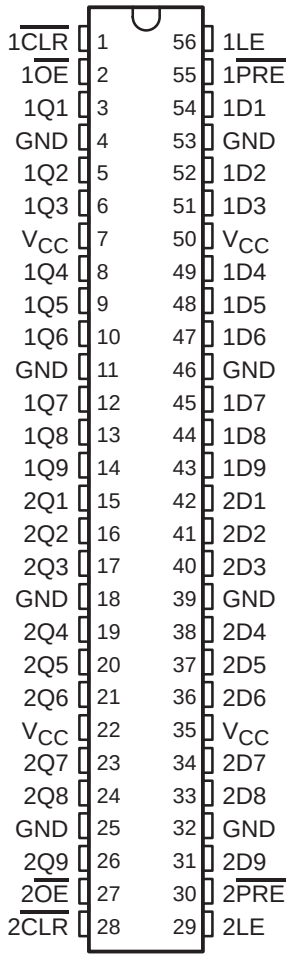
- **Members of the Texas Instruments *Widebus*™ Family**
- **State-of-the-Art *EPIC*-II*B*™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- **Flow-Through Architecture Optimizes PCB Layout**
- **High-Impedance State During Power Up and Power Down**
- **High-Drive Outputs (–32-mA I_{OH}, 64-mA I_{OL})**
- **Package Options Include Plastic Thin Shrink Small-Outline (DGG), 300-mil Shrink Small-Outline (DL) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings**

SN54ABT16843 . . . WD PACKAGE
SN74ABT16843 . . . DGG OR DL PACKAGE
(TOP VIEW)



description

The ’ABT16843 18-bit bus-interface D-type latches are 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 ’ABT16843 can be used as two 9-bit latches or one 18-bit latch. The 18 latches are transparent D-type latches. The device provides true data at its outputs.

A buffered output-enable ($\overline{OE}$) input can be used to place the nine outputs in either a normal logic state (high or low logic levels) or a high-impedance state. The outputs are in the high-impedance state during power up and power down. The outputs remain in the high-impedance state while the device is powered down. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

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description (continued)

$\overline{OE}$ 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.

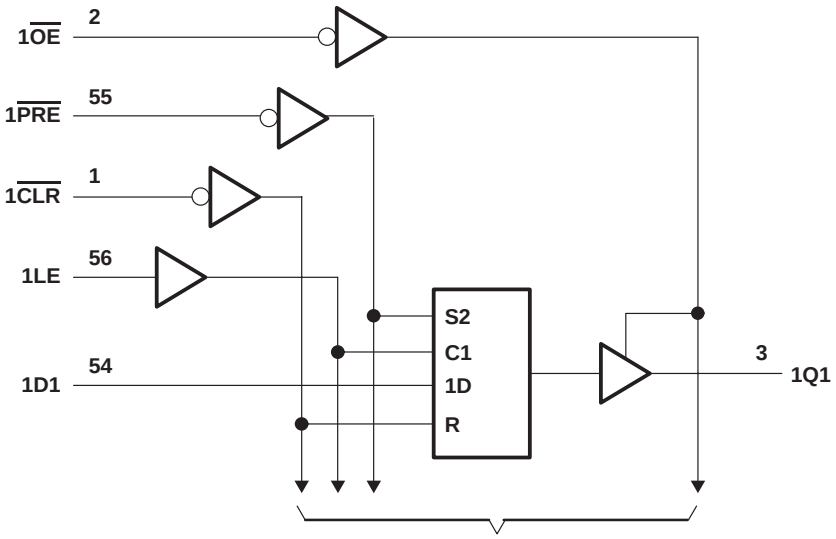
When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking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

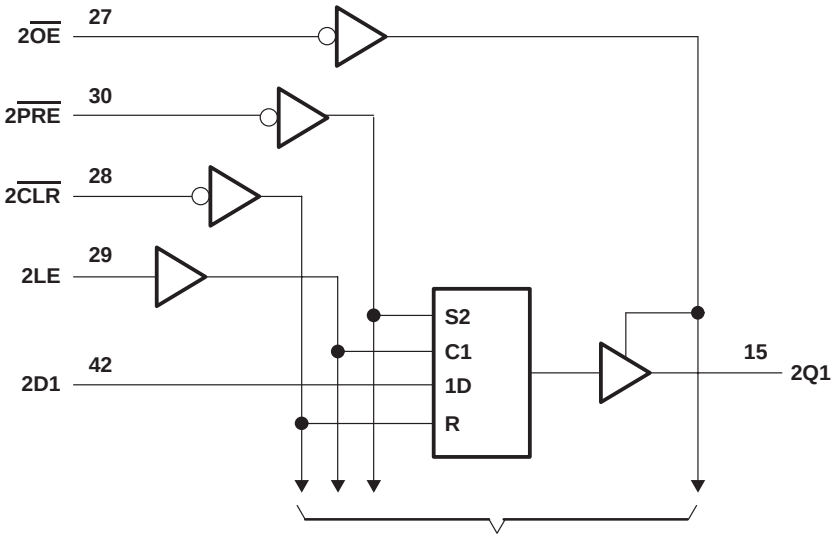
The SN54ABT16843 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ABT16843 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each 9-bit 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 diagram (positive logic)





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: SN54ABT16843 . . . . . 96 mA
SN74ABT16843 . . . . . 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, θ_{JA} (see Note 2): DGG package . . . . . 81°C/W
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)

			SN54ABT16843		SN74ABT16843		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		µs/V
T_A	Operating free-air temperature		–55	125	–40	85	°C

PRODUCT PREVIEW

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

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

PARAMETER		TEST CONDITIONS		T_A = 25°C			SN54ABT16843		SN74ABT16843		UNIT
				MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2		–1.2		–1.2	V
V_{OH}		V_{CC} = 4.5 V,	I_{OH} = –3 mA	2.5			2.5		2.5		V
		V_{CC} = 5 V,	I_{OH} = –3 mA	3			3		3		
		V_{CC} = 4.5 V	I_{OH} = –24 mA	2			2				
			I_{OH} = –32 mA	2*					2		
V_{OL}		V_{CC} = 4.5 V	I_{OL} = 48 mA			0.55		0.55			V
			I_{OL} = 64 mA			0.55*				0.55	
V_{hys}					100						mV
I_I		V_{CC} = 0 to 5.5 V, V_I = V_{CC} or GND				±1		±1		±1	µA
I_{OZPU}‡		V_{CC} = 0 to 2.1 V, V_O = 0.5 V to 2.7 V, $\overline{OE}$ = X				±50		±50		±50	µA
I_{OZPD}‡		V_{CC} = 2.1 V to 0, V_O = 0.5 V to 2.7 V, $\overline{OE}$ = X				±50		±50		±50	µA
I_{OZH}		V_{CC} = 2.1 V to 5.5 V, V_O = 2.7 V, $\overline{OE}$ ≥ 2 V				10		10		10	µA
I_{OZL}		V_{CC} = 2.1 V to 5.5 V, V_O = 0.5 V, $\overline{OE}$ ≥ 2 V				–10		–10		–10	µA
I_{off}		V_{CC} = 0,	V_I or V_O ≤ 4.5 V			±100				±100	µA
I_{CEX}	Outputs high	V_{CC} = 5.5 V,	V_O = 5.5 V			50		50		50	µA
I_O§		V_{CC} = 5.5 V,	V_O = 2.5 V	–50	–100	–180	–50	–180	–50	–180	mA
I_{CC}	Outputs high	V_{CC} = 5.5 V, I_O = 0, V_I = V_{CC} or GND				0.5		0.5		0.5	mA
	Outputs low					85		85		85	
	Outputs disabled					0.5		0.5		0.5	
ΔI_{CC}¶		V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND				1.5		1.5		1.5	mA
C_i		V_I = 2.5 V or 0.5 V			3.5						pF
C_o		V_O = 2.5 V or 0.5 V			8						pF

PRODUCT PREVIEW

* On products compliant to MIL-PRF-38535, this parameter does not apply.
† All typical values are at V_{CC} = 5 V.
‡ This parameter is characterized, but not production tested.
§ 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_{CC} or GND.

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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 V, T_A = 25°C		SN54ABT16843		SN74ABT16843		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	$\overline{CLR}$ low	3.3		3.3		3.3		ns
		$\overline{PRE}$ low	3.3		3.3		3.3		
		LE high	3.3		3.3		3.3		
t_{su}	Setup time, data before LE↓	High	0.9		0.9		0.9		ns
		Low	0.6		0.6		0.6		
t_h	Hold time, data after LE↓	High	1.7		1.7		1.7		ns
		Low	1.8		1.8		1.8		

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, T_A = 25°C			SN54ABT16843		SN74ABT16843		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	D	Q	1.6	3.1	4.2	1.6	5.1	1.6	4.8	ns
t_{PHL}			1.6	3.2	4.2	1.6	5	1.6	4.8	
t_{PLH}	LE	Q	2.3	4	5	2.3	6.3	2.3	5.9	ns
t_{PHL}			2.5	3.9	4.8	2.5	5.6	2.5	5.3	
t_{PLH}	$\overline{PRE}$	Q	2.1	4	5.1	2.1	6.3	2.1	6.1	ns
t_{PHL}			2.2	3.7	4.6	2.2	5.3	2.2	5	
t_{PLH}	$\overline{CLR}$	Q	1.9	3.7	4.8	1.9	5.7	1.9	5.4	ns
t_{PHL}			2.2	4.2	5.3	2.2	6.1	2.2	6	
t_{PZH}	$\overline{OE}$	Q	1.6	3.3	4.3	1.6	5.5	1.6	5.4	ns
t_{PZL}			2	3.2	4.6	2	5.9	2	5.8	
t_{PHZ}	$\overline{OE}$	Q	1.7	4	5.5	1.7	6.4	1.7	6.3	ns
t_{PLZ}			1.7	3.7	4.4	1.7	5.3	1.7	5.2	

PRODUCT PREVIEW

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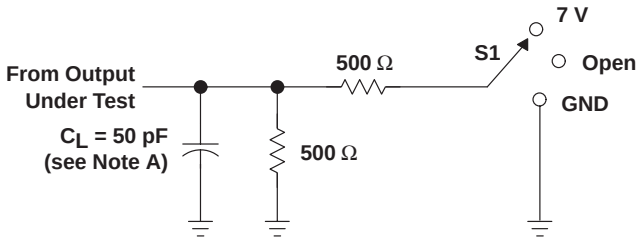
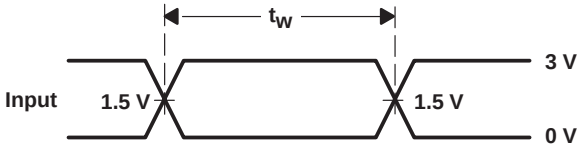
PARAMETER MEASUREMENT INFORMATION

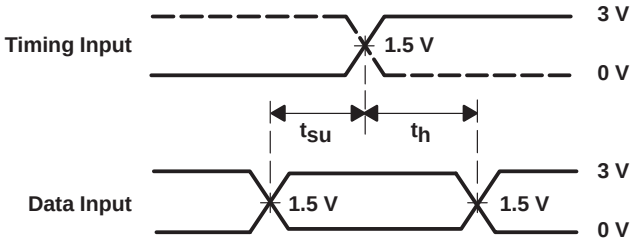


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

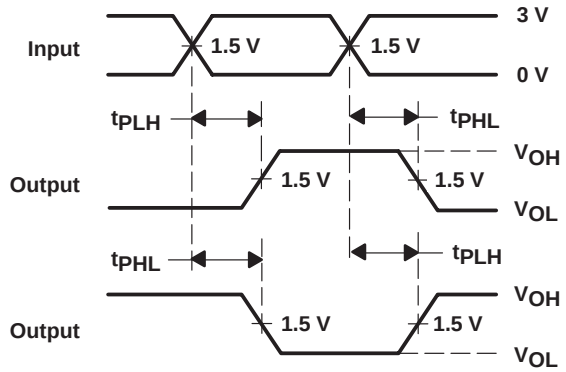
LOAD CIRCUIT



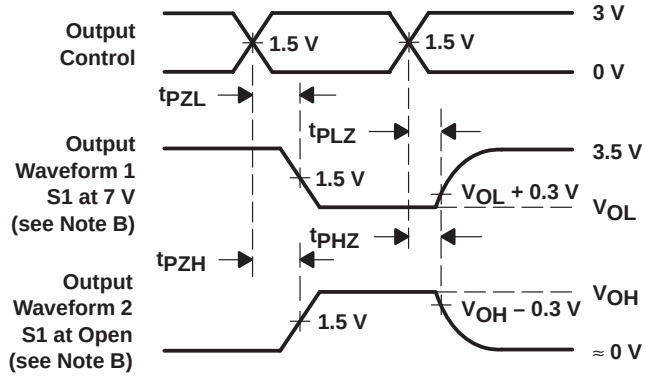
VOLTAGE WAVEFORMS
PULSE DURATION



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 ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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