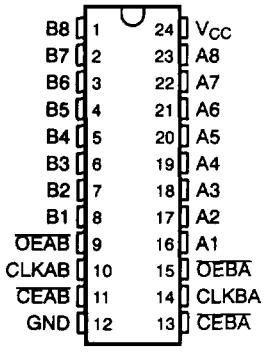
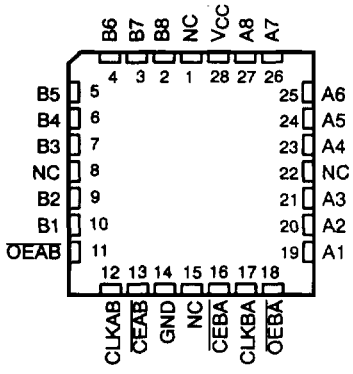
- **Space-Saving Package Option: Shrink Small-Outline Package (DB) Features EIAJ 0.65-mm Lead Pitch**
- **State-of-the-Art *EPIC-IIB*™ BICMOS Design Significantly Reduces Power Dissipation**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**
- **Two 8-Bit, Back-to-Back Registers Store Data Flowing in Both Directions**
- **Inverting Outputs**
- **Typical V_{OLP} (Output Ground Bounce) < 1 V at V_{CC} = 5 V, T_A = 25°C**
- **Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

SN54ABT2953 . . . JT PACKAGE
SN74ABT2953 . . . DB, DW, OR NT PACKAGE
(TOP VIEW)



SN54ABT2953 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The 'ABT2953 consists of two 8-bit back-to-back registers that store data flowing in both directions between two bidirectional buses. Data on the A or B bus is stored in the registers on the low-to-high transition of the clock (CLKAB or CLKBA) input provided that the clock-enable ($\overline{CEAB}$ or $\overline{CEBA}$) input is low. Taking the output-enable ($\overline{OEAB}$ or $\overline{OEBA}$) input low accesses the data on either port.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ 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 SN74ABT2953 is packaged in TI's shrink small-outline package (DB), which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN54ABT2953 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ABT2953 is characterized for operation from −40°C to 85°C.

PRODUCT PREVIEW

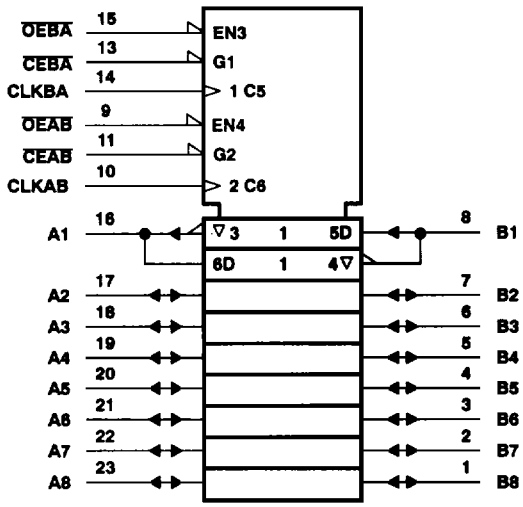
EPIC-IIB is a trademark of Texas Instruments Incorporated.

FUNCTION TABLE†

INPUTS				OUTPUT
$\overline{CEAB}$	CLKAB	$\overline{OEAB}$	A	B
H	X	L	X	B_0‡
X	L	L	X	B_0‡
L	↑	L	L	H
L	↑	L	H	L
X	X	H	X	Z

† A-to-B data flow is shown; B-to-A data flow is similar but uses $\overline{CEBA}$, CLKBA, and $\overline{OEBA}$.
‡ Level of B before the indicated steady-state input conditions were established.

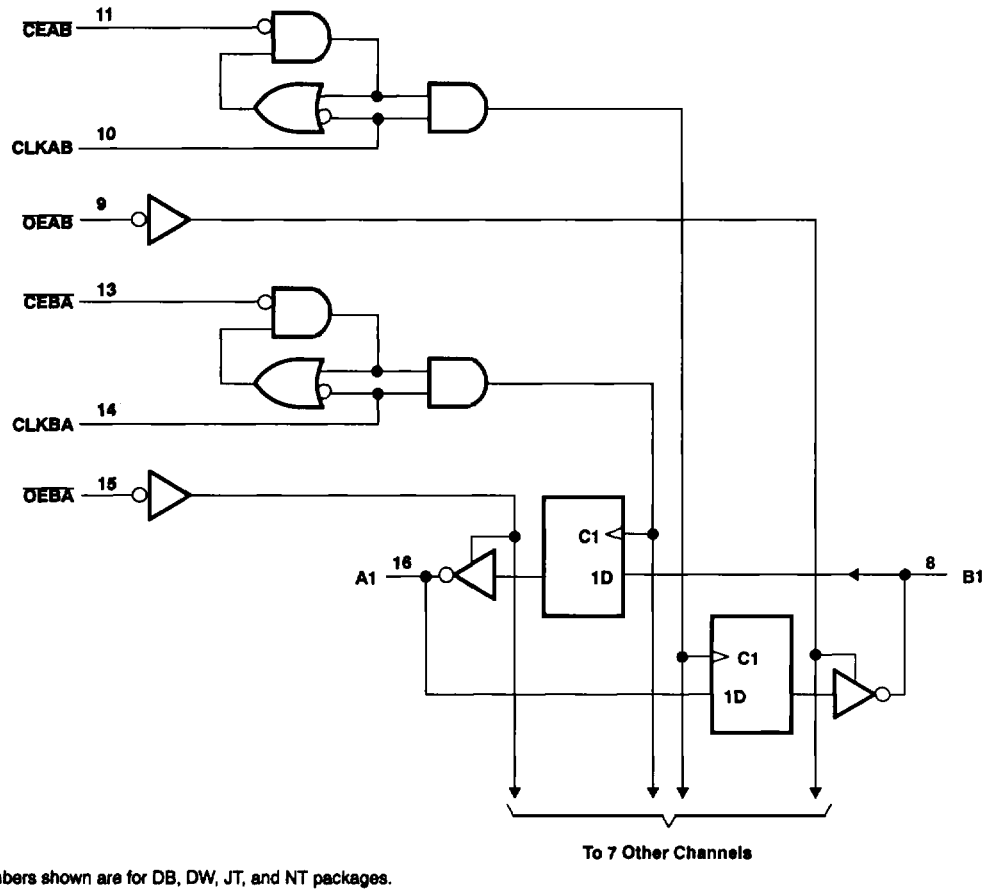
logic symbol§



§ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DB, DW, JT, and NT packages.

PRODUCT PREVIEW

logic diagram (positive logic)



Pin numbers shown are for DB, DW, JT, and NT packages.

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 (except I/O ports) (see Note 1) ..... −0.5 V to 7 V
Voltage range applied to any output in the high state or power-off state, V_O ..... −0.5 V to 5.5 V
Current into any output in the low state, I_O: SN54ABT2953 ..... 96 mA
SN74ABT2953 ..... 128 mA
Input clamp current, I_{IK} ($V_I < 0$) ..... −18 mA
Output clamp current, I_{OK} ($V_O < 0$) ..... −50 mA
Maximum power dissipation at T_A = 55°C (in still air): DB package ..... 0.5 W
DW package ..... 1 W
NT package ..... 1.3 W
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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

PRODUCT PREVIEW

recommended operating conditions (see Note 2)

			SN54ABT2953		SN74ABT2953		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
T_A	Operating free-air temperature		–55	125	–40	85	°C

NOTE 2: Unused or floating pins (input or I/O) must be held high or low.

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

PARAMETER	TEST CONDITIONS			T_A = 25°C			SN54ABT2953		SN74ABT2953		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				
	V_{CC} = 4.5 V,	I_{OH} = –32 mA		2‡					2		
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 48 mA				0.55		0.55			V
	V_{CC} = 4.5 V,	I_{OL} = 64 mA				0.55‡				0.55	
I_I	V_{CC} = 5.5 V,		Control inputs			±1		±1		±1	µA
	V_I = V_{CC} or GND		A or B ports			±100		±100		±100	
I_{OZH}§	V_{CC} = 5.5 V,	V_O = 2.7 V				50		50		50	µA
I_{OZL}§	V_{CC} = 5.5 V,	V_O = 0.5 V				–50		–50		–50	µA
I_{OFF}	V_{CC} = 0 V,	V_I or V_O ≤ 4.5 V				±100				±100	µA
I_{CEX}	V_{CC} = 5.5 V,	V_O = 5.5 V	Outputs high			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}	V_{CC} = 5.5 V,	A or B ports	Outputs high		1	250		250		250	µA
	I_O = 0,		Outputs low		24	35		35		35	mA
	V_I = V_{CC} or GND		Outputs disabled		0.5	250		250		250	µA
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		Control inputs		4						pF
C_{io}	V_O = 2.5 V or 0.5 V		A or B ports		7						pF

† All typical values are at V_{CC} = 5 V.
‡ On products compliant to MIL-STD-883, Class B, this parameter does not apply.
§ The parameters I_{OZH} and I_{OZL} 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_{CC} or GND.

PRODUCT PREVIEW

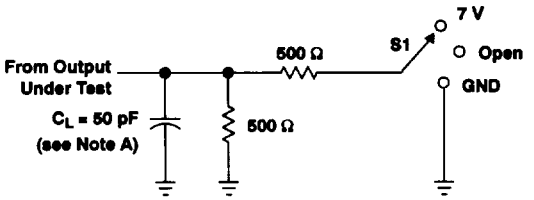
timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

				V_{CC} = 5 V, T_A = 25°C		SN54ABT2953		SN74ABT2953		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency			0	150	0	150	0	150	MHz
t_w	Pulse duration		CLK high	3		3		3		ns
			CLK low	3.5		3.5		3.5		
t_{su}	Setup time before CLK↑	A or B	High	4		4		4		ns
			Low	3		3		3		
		$\overline{CE}$	High	3.5		3.5		3.5		
			Low	2.5		2.5		2.5		
t_h	Hold time after CLK↑	A or B		0		0		0		ns
		$\overline{CE}$		0		0		0		

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

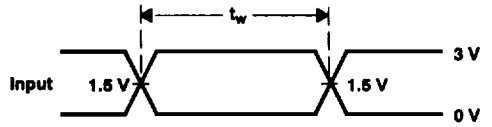
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, T_A = 25°C			SN54ABT2953		SN74ABT2953		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			150			150		150		MHz
t_{PLH}	CLKBA or CLKAB	A or B	2.6	5.1	6.6	2.6		2.6	7.6	ns
t_{PHL}			3.2	5.7	7.2	3.2		3.2	8.2	
t_{PZH}	$\overline{OEBA}$ or $\overline{OEAB}$	A or B	1	3.3	4.8	1		1	5.8	ns
t_{PZL}			2.2	4.7	6.2	2.2		2.2	7.5	
t_{PHZ}	$\overline{OEBA}$ or $\overline{OEAB}$	A or B	3.6	6.1	7.6	3.6		3.6	8.1	ns
t_{PLZ}			3.1	6.6	7.1	3.1		3.1	7.6	

PARAMETER MEASUREMENT INFORMATION

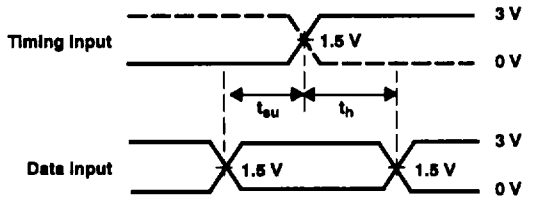


LOAD CIRCUIT FOR OUTPUTS

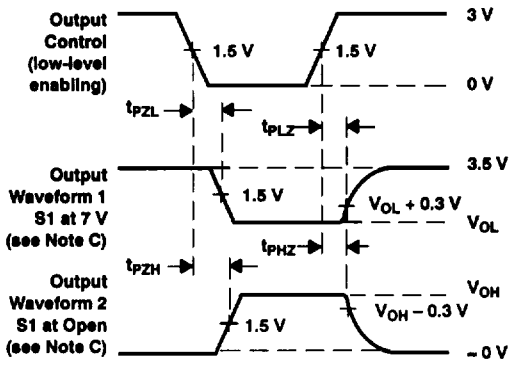
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open



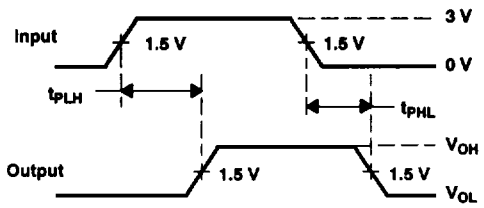
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

NOTES: A. C_L includes probe and jig capacitance.
B. 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.
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 transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms