

SN54ABT853, SN74ABT853 8-BIT TO 9-BIT PARITY BUS TRANSCEIVERS

SCBS198F – FEBRUARY 1991 – REVISED OCTOBER 1997

- State-of-the-Art *EPIC-IIB™* 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 JESD 17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- High-Drive Outputs (–32-mA I_{OH} , 64-mA I_{OL})
- High-Impedance State During Power Up and Power Down
- Parity-Error Flag With Parity Generator/Checker
- Latch for Storage of Parity-Error Flag
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), Ceramic Flat (W) Package, and Plastic (NT) and Ceramic (JT) DIPs

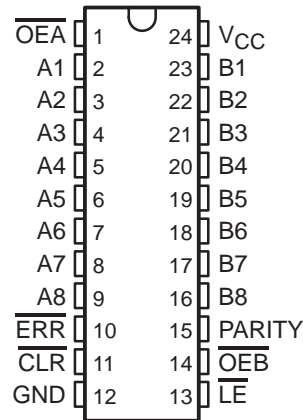
description

The 'ABT853 8-bit to 9-bit parity transceivers are designed for communication between data buses. When data is transmitted from the A bus to the B bus, a parity bit is generated. When data is transmitted from the B bus to the A bus with its corresponding parity bit, the open-collector parity-error (ERR) output indicates whether or not an error in the B data has occurred. The output-enable (\overline{OEA} and \overline{OEB}) inputs can be used to disable the device so that the buses are effectively isolated. The 'ABT853 transceivers provide true data at their outputs.

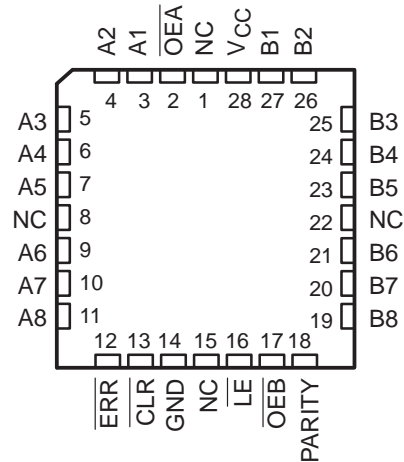
A 9-bit parity generator/checker generates a parity-odd (PARITY) output and monitors the parity of the I/O ports with the ERR flag. The parity-error output can be passed, sampled, stored, or cleared from the latch using the latch-enable (\overline{LE}) and clear (CLR) control inputs. When both \overline{OEA} and \overline{OEB} are low, data is transferred from the A bus to the B bus and inverted parity is generated. Inverted parity is a forced error condition that gives the designer more system diagnostic capability.

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.

SN54ABT853 . . . JT OR W PACKAGE
SN74ABT853 . . . DB, DW, NT, OR PW PACKAGE
(TOP VIEW)



SN54ABT853 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

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description (continued)

The SN54ABT853 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT853 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE

INPUTS						OUTPUTS AND I/Os				FUNCTION
$\overline{\text{OEB}}$	$\overline{\text{OEA}}$	$\overline{\text{CLR}}$	LE	A_i Σ OF H	B_i [†] Σ OF H	A	B	PARITY	$\overline{\text{ERR}}$ [‡]	
L	H	X	X	Odd Even	NA	NA	A	L H	NA	A data to B bus and generate parity
H	L	X	L	NA	Odd Even	B	NA	NA	H L	B data to A bus and check parity
H	L	H	H	NA	X	X	NA	NA	NC	Store error flag
X	X	L	H	X	X	X	NA	NA	H	Clear error flag register
H	H	H	H	X	X	Z	Z	Z	NC	Isolation [§] (parity check)
		L	H	H						
		X	L	L Odd H Even						
L	L	X	X	Odd Even	NA	NA	A	H L	NA	A data to B bus and generate inverted parity

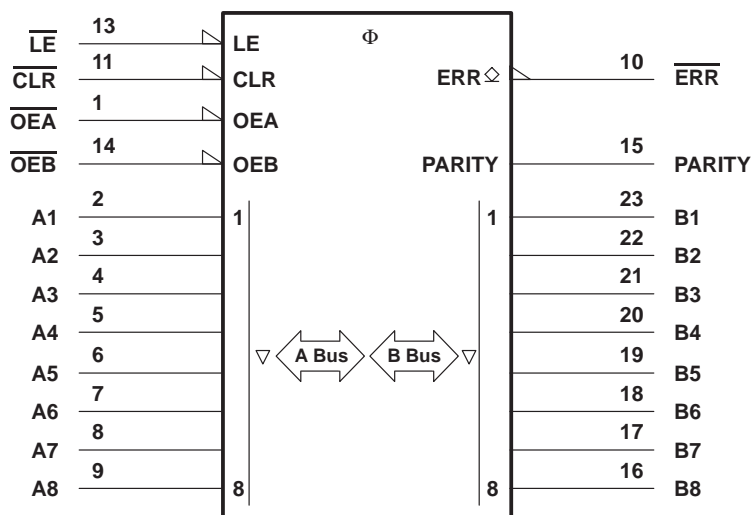
NA = not applicable, NC = no change, X = don't care

[†] Summation of high-level inputs includes PARITY along with B_i inputs.

[‡] Output states shown assume $\overline{\text{ERR}}$ was previously high.

[§] In this mode, $\overline{\text{ERR}}$ (when clocked) shows inverted parity of the A bus.

logic symbol[¶]



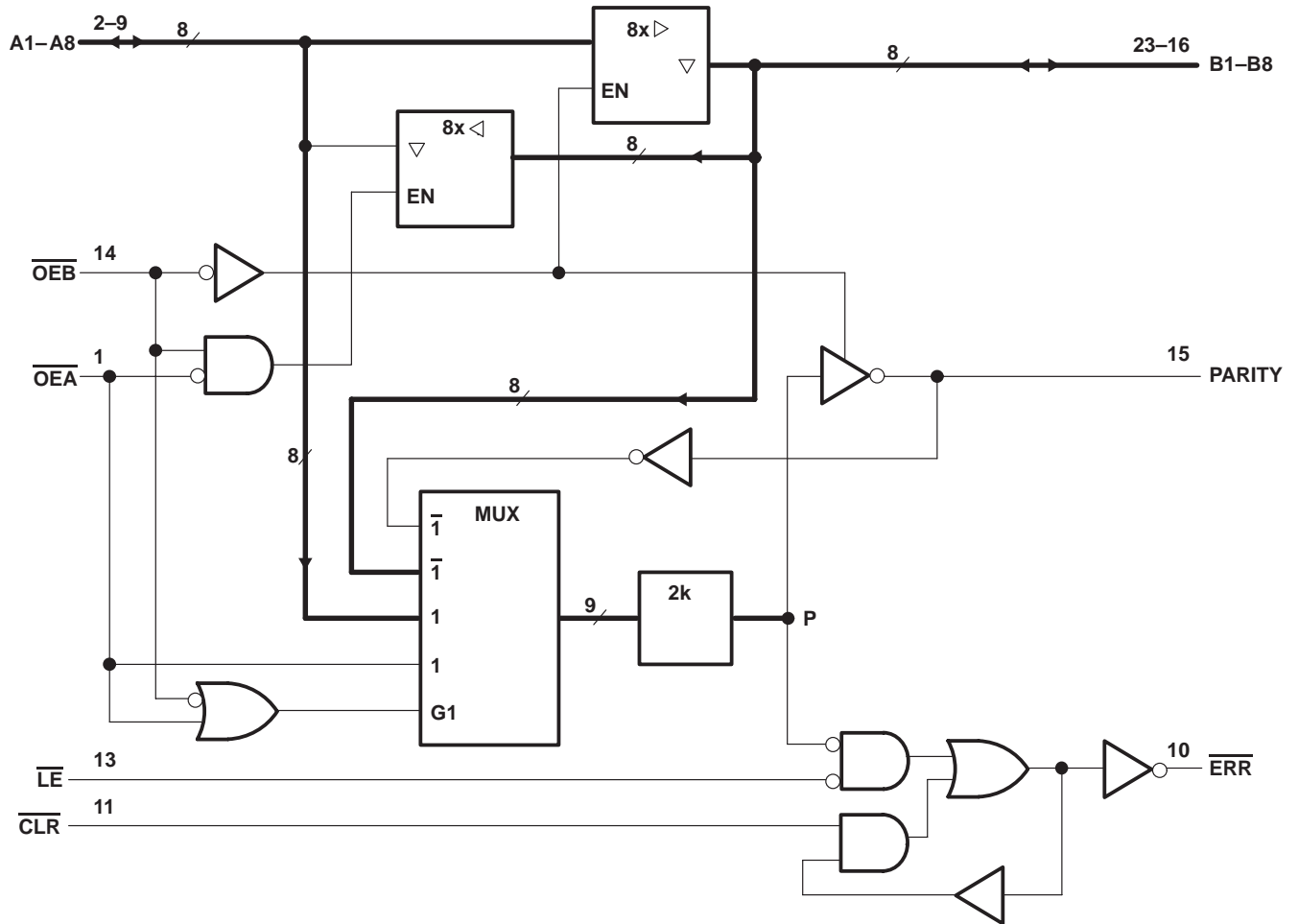
[¶] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

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logic diagram (positive logic)



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

ERROR-FLAG FUNCTION TABLE

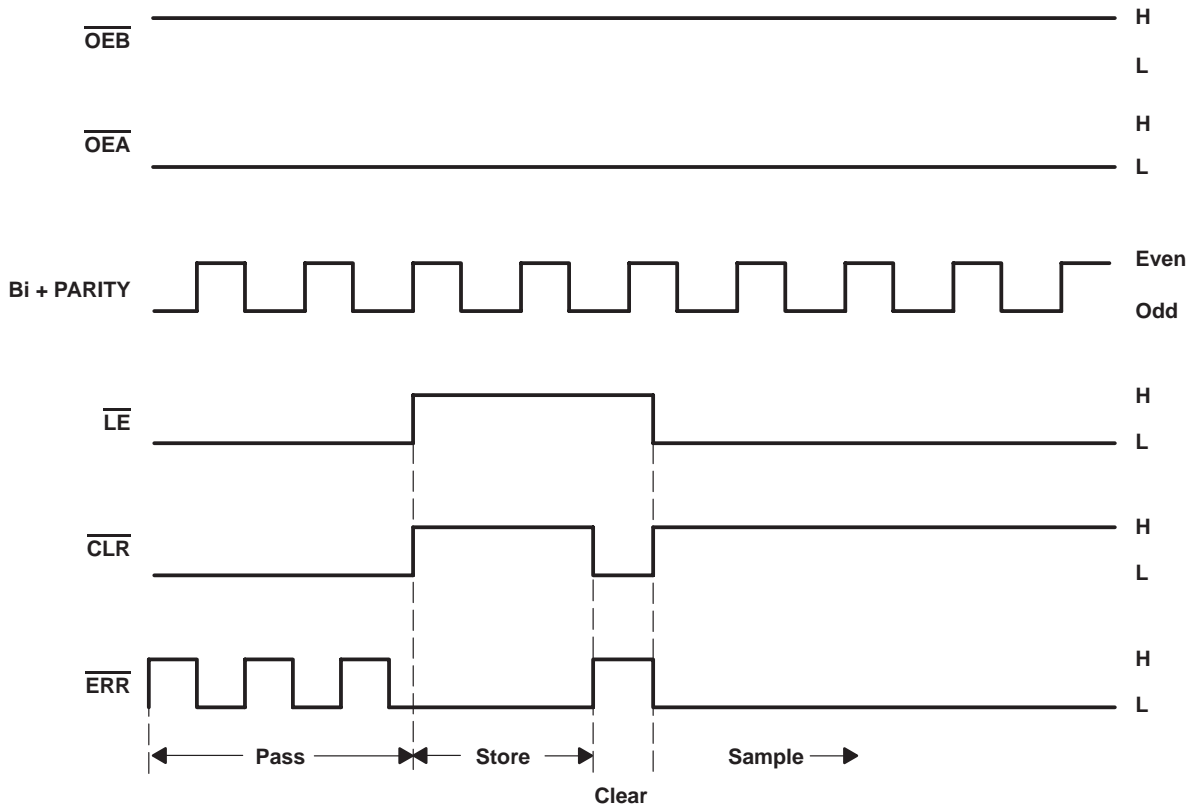
INPUTS		INTERNAL TO DEVICE	OUTPUT PRESTATE	OUTPUT ERR	FUNCTION
CLR	LE	POINT P	$\overline{\text{ERR}}_{N-1}^\dagger$		
L	L	L	X	L	Pass
		H	X	H	
H	L	L	X	L	Sample
		H	H	H	
L	H	X	X	H	Clear
H	H	X	L	L	Store
			H	H	

† The state of $\overline{\text{ERR}}$ before changes at CLR, LE, or point P

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error-flag waveforms



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 or power-off state, V_O	-0.5 V to 5.5 V
Current into any output in the low state, I_O : SN54ABT853	96 mA
SN74ABT853	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): DB package	104°C/W
DW package	81°C/W
N package	67°C/W
PW package	120°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 JESD 51, except for through-hole packages, which use a trace length of zero.



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recommended operating conditions (see Note 3)

		SN54ABT853		SN74ABT853		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
V _{OH}	High-level output voltage	ERR		5.5		V
I _{OH}	High-level output current	Except ERR		-24		mA
I _{OL}	Low-level output current			48		mA
Δt/Δv	Input transition rise or fall rate	Outputs enabled		10		ns/V
Δt/ΔV _{CC}	Power-up ramp rate	200		200		μs/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: Unused pins (input or I/O) 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			SN54ABT853		SN74ABT853		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}	All outputs except ERR	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			
								2		
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 24 mA				0.55		0.55	V	
		I _{OL} = 64 mA				0.55*		0.55		
V _{hys}				100					mV	
I _{OH}	ERR	V _{CC} = 4.5 V, V _{OH} = 5.5 V		50		50		50	μA	
I _I	Control inputs	V _{CC} = 5.5 V, V _I = V _{CC} or GND		±1		±1		±1	μA	
	A or B ports			±100		±100		±100		
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} = 5.5 V, V _O = 2.7 V			10		10		10	μA	
I _{OZL} §	V _{CC} = 5.5 V, V _O = 0.5 V			-10		-10		-10	μA	
I _{off}	V _{CC} = 0, 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	-200#		-50	-200#	mA
I _{CC}	A or B ports	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high	1	250		450		250	μA
			Outputs low	24	38		38		38	mA
			Outputs disabled	0.5	250		450		250	μA
ΔI _{CC}	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled		1.5		1.5		1.5	mA
			Outputs disabled		50		50		50	μA
	Control inputs	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	Control inputs	V _I = 2.5 V or 0.5 V		4.5					pF	
C _{io}	A or B ports	V _O = 2.5 V or 0.5 V		10.5					pF	

* 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.

§ 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 data sheet limit can vary among suppliers.

|| 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)

		$V_{CC} = 5\text{ V},$ $T_A = 25^\circ\text{C}$		SN54ABT853		SN74ABT853		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	\overline{LE} high or low	3.5	3.5	3.5	3.5	ns	
		\overline{CLR} low	4	4	4			
t_{su}	Setup time	B or PARITY before $\overline{LE}\downarrow$	9.4†	10.2	9.4†	ns		
		\overline{CLR} before $\overline{LE}\downarrow$	2	2	2			
t_h	Hold time	B or PARITY after $\overline{LE}\downarrow$	0	0	0	ns		
		\overline{CLR} after $\overline{LE}\downarrow$	3	3	3			

† This data sheet limit can vary among suppliers.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V},$ $T_A = 25^\circ\text{C}$			SN54ABT853		SN74ABT853		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1.2	4.8	1.2	6.4	1.2	5.3	ns	
t_{PHL}			1	4.8†	1	5.4	1	5.3†		
t_{PLH}	A	PARITY	2.1	9.5	2.1	13.3	2.1	11.2	ns	
t_{PHL}			2.5	9.7	2.5	11	2.5	11		
t_{PLH}	\overline{OE}	PARITY	1.8	8.5	1.8	13.6	1.8	10.5	ns	
t_{PHL}			2.3	8.6	2.3	11.7	2.3	10		
t_{PLH}	\overline{CLR}	\overline{ERR}	1	5.5	1	6.3	1	6.2	ns	
t_{PLH}	\overline{LE}	ERR	1.8	5.1	1.8	6.1	1.8	6	ns	
t_{PHL}			1†	5.8	1†	6.7	1	6.6		
t_{PLH}	B or PARITY	ERR	2	10.1	2	11.8	2	11.7	ns	
t_{PHL}			2.2†	11.5	2.2†	12.9	2.2†	12.8		
t_{PZH}	\overline{OE}	A or B or PARITY	1	5.8†	1	8.8	1	6.7†	ns	
t_{PZL}			1.5†	5.8	1.5†	9.8	1.5†	6.7		
t_{PHZ}	\overline{OE}	A or B or PARITY	1.8†	7.3	1.8†	9.5	1.8†	7.9	ns	
t_{PLZ}			2.1†	7.2	2.1†	8.2	2.1†	8.1		

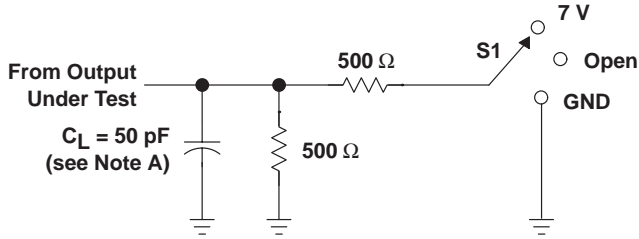
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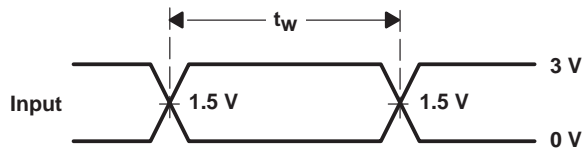
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PARAMETER MEASUREMENT INFORMATION

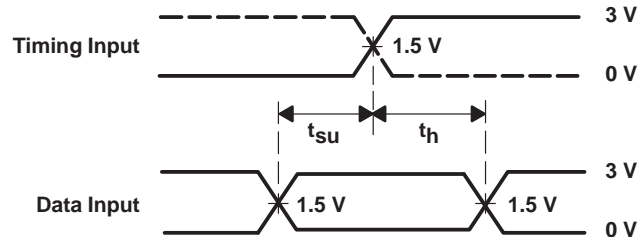


LOAD CIRCUIT

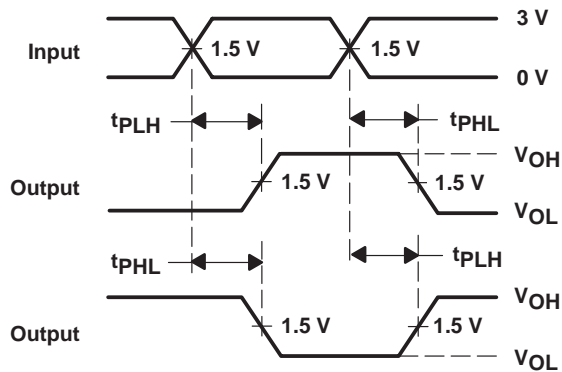
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open



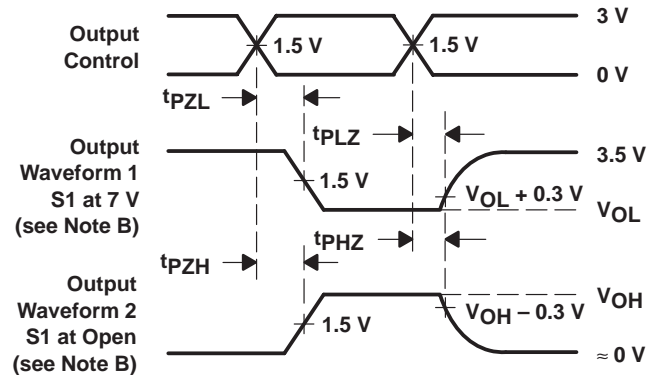
VOLTAGE WAVEFORMS
PULSE DURATION



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/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9674601Q3A	ACTIVE	LCCC	FK	28	1	TBD	POST-PLATE	N / A for Pkg Type
5962-9674601QKA	ACTIVE	CFP	W	24	1	TBD	A42	N / A for Pkg Type
5962-9674601QLA	ACTIVE	CDIP	JT	24	1	TBD	A42	N / A for Pkg Type
SN74ABT853DBLE	OBSOLETE	SSOP	DB	24		TBD	Call TI	Call TI
SN74ABT853DBRE4	ACTIVE	SSOP	DB	24		TBD	Call TI	Call TI
SN74ABT853DBRG4	ACTIVE	SSOP	DB	24		TBD	Call TI	Call TI
SN74ABT853DW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853DWE4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853DWG4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853DWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853DWRE4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853DWRG4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT853NSRE4	ACTIVE	SO	NS	24		TBD	Call TI	Call TI
SN74ABT853NSRG4	ACTIVE	SO	NS	24		TBD	Call TI	Call TI
SN74ABT853NT	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ABT853NTE4	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ABT853PWE4	ACTIVE	TSSOP	PW	24		TBD	Call TI	Call TI
SN74ABT853PWG4	ACTIVE	TSSOP	PW	24		TBD	Call TI	Call TI
SN74ABT853PWLE	OBSOLETE	TSSOP	PW	24		TBD	Call TI	Call TI
SN74ABT853PWRE4	ACTIVE	TSSOP	PW	24		TBD	Call TI	Call TI
SN74ABT853PWRG4	ACTIVE	TSSOP	PW	24		TBD	Call TI	Call TI
SNJ54ABT853FK	ACTIVE	LCCC	FK	28	1	TBD	POST-PLATE	N / A for Pkg Type
SNJ54ABT853JT	ACTIVE	CDIP	JT	24	1	TBD	A42	N / A for Pkg Type
SNJ54ABT853W	ACTIVE	CFP	W	24	1	TBD	A42	N / A for Pkg Type

⁽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⁾ 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.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS

compatible) as defined above.

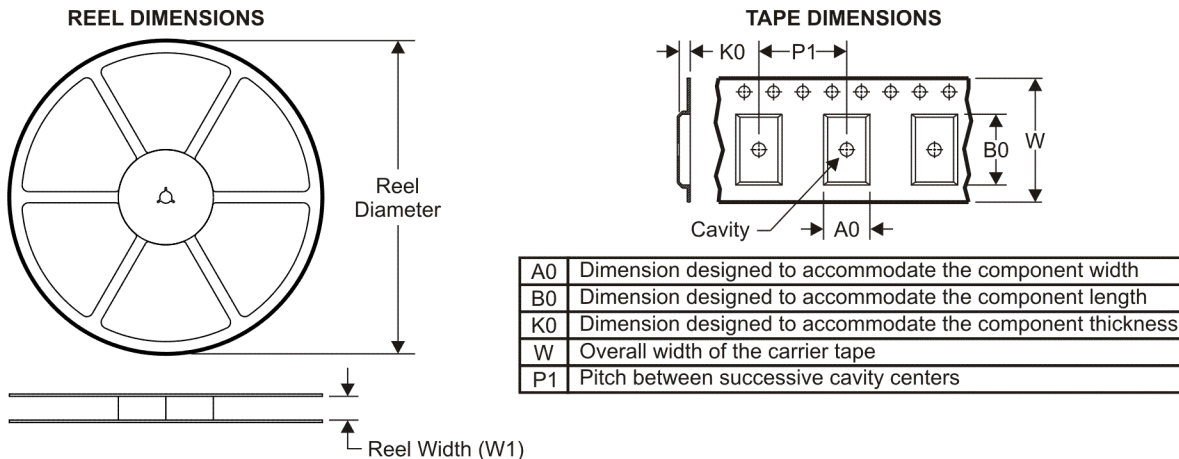
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

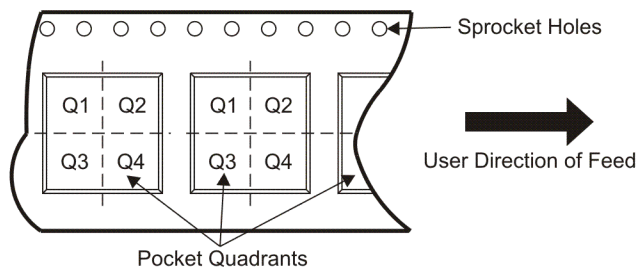
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TAPE AND REEL INFORMATION



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
SN74ABT853DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABT853DWR	SOIC	DW	24	2000	346.0	346.0	41.0

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



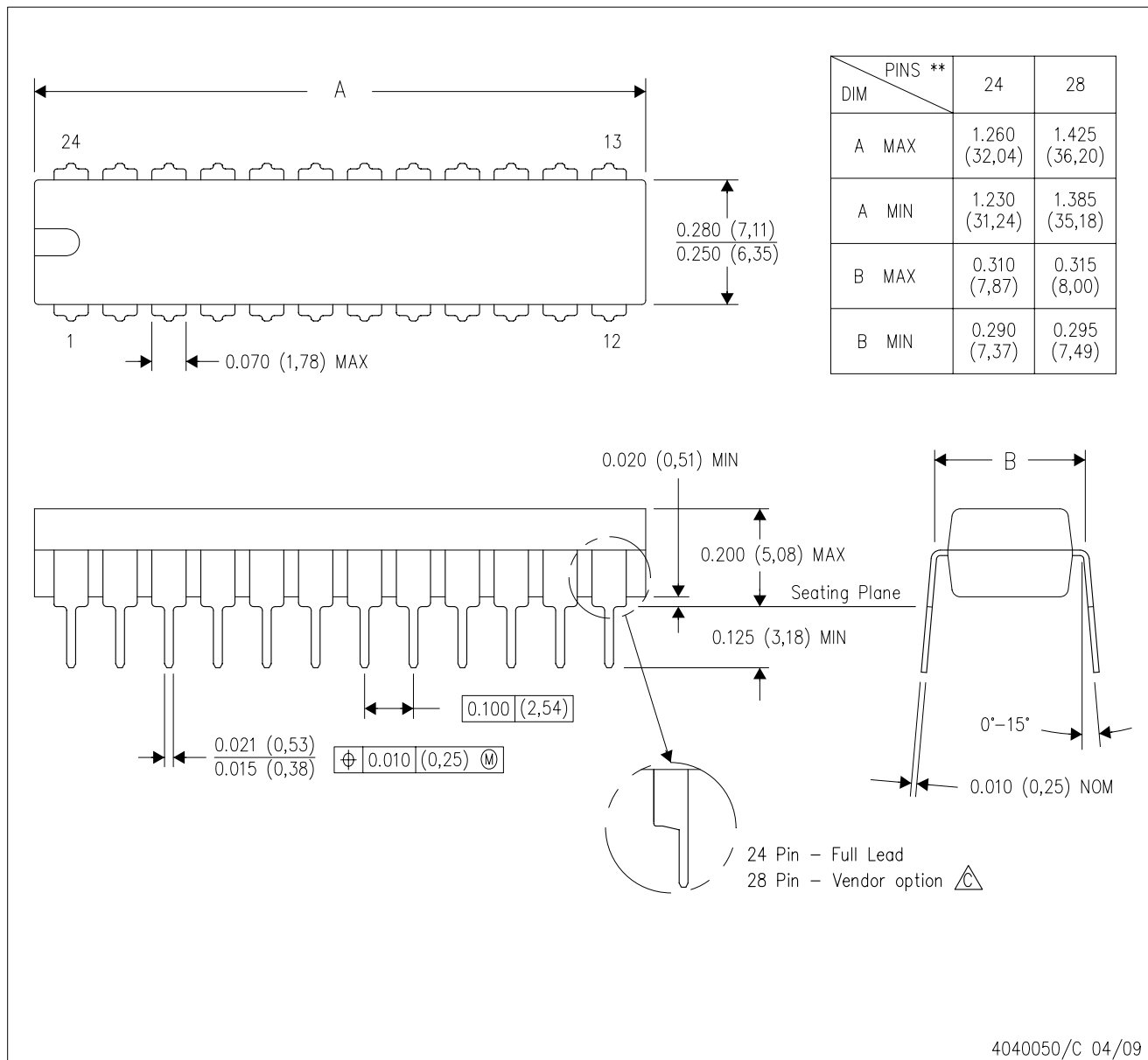
4040064/F 01/97


- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

MECHANICAL DATA

NT (R-PDIP-T**) 24 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE

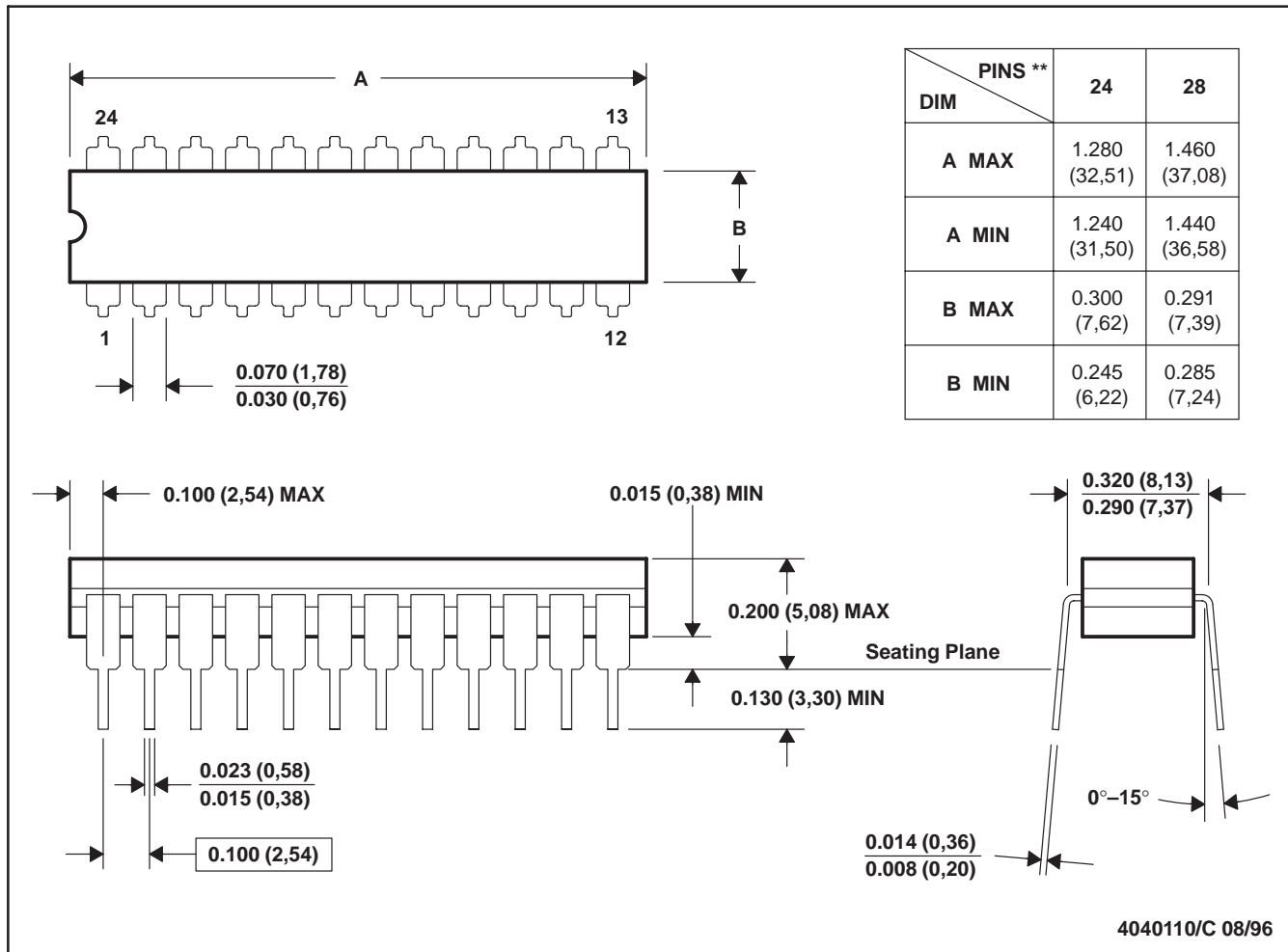


- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 -  The 28 pin end lead shoulder width is a vendor option, either half or full width.

JT (R-GDIP-T**)

CERAMIC DUAL-IN-LINE

24 LEADS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. This package can be hermetically sealed with a ceramic lid using glass frit.
 D. Index point is provided on cap for terminal identification.
 E. Falls within MIL STD 1835 GDIP3-T24, GDIP4-T28, and JEDEC MO-058 AA, MO-058 AB

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