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 Members of the Texas Instruments Widebus™ Family State-of-the-Art EPIC-IIB™ BiCMOS Design 	SN54ABTE16246 WD PACKAGE SN74ABTE16246 DGG OR DL PACKAGE (TOP VIEW)
Significantly Reduces Power Dissipation	
 Support the VME64 ETL Specification 	11OE 1 48 V _{CC} BIAS 11DIR 2 47 11A
Reduced TTL-Compatible Input Threshold	11B 3 46 10DIR
Range	GND 4 45 GND
 High-Drive Outputs (I_{OH} = -60 mA 	10B 🛛 5 44 🕽 10A
I_{OL} = 90 mA) Support Equivalent 25- Ω	9B 🛛 6 43 🗋 9A
Incident-Wave Switching	V _{CC} [] 7 42 [] V _{CC}
 V_{CC}BIAS Pin Minimizes Signal Distortion 	8BI 8 41 9DIR
During Live Insertion	
 Internal Pullup Resistor on OE Keeps 	GND 10 39 GND 7BO 11 38 7A
Outputs in High-Impedance State During	6BI 12 37 7BI
Power Up or Power Down	6BO [13 36] 6A
 Distributed V_{CC} and GND Pin Configuration 	5BO [14 35] 5A
Minimizes High-Speed Switching Noise	GND 15 34 GND
 Equivalent 25-Ω Series Damping Resistor 	4BO 🛛 16 33 🗍 5BI
on B Port	4BI 🛛 17 🛛 32 🗗 4A
 Bus Hold on Data Inputs Eliminates the 	V _{CC} [] 18 31 [] V _{CC}
Need for External Pullup/Pulldown	3BO 🛛 19 30 🖸 3A
Resistors	2BI 20 29 3BI
 Package Options Include Plastic Shrink 	GND 21 28 GND
Small-Outline (DL) and Thin-Shrink	2BO [22 27] 2A
Small-Outline (DGG) Packages and 380-mil	1BO [23 26] 1A 1BI [24 25] OE
Fine-Pitch Ceramic Flat (WD) Package	
Using 25-mil Center-to-Center Spacings	

description

The 'ABTE16246 devices are 11-bit noninverting transceivers designed for asynchronous two-way communication between buses. These devices have open-collector and 3-state outputs. They allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (OE) input can be used to disable the device so that the buses are effectively isolated. When \overline{OE} is low, the device is active.

The B port has an equivalent 25Ω series output resistor to reduce ringing. Active bus-hold inputs on the B port hold unused or floating inputs at a valid logic level.

The A port provides for the precharging of the outputs via V_{CC} BIAS, which establishes a voltage between 1.3 V and 1.7 V when V_{CC} is not connected.

The SN54ABTE16246 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ABTE16246 is characterized for operation from -40°C to 85°C.



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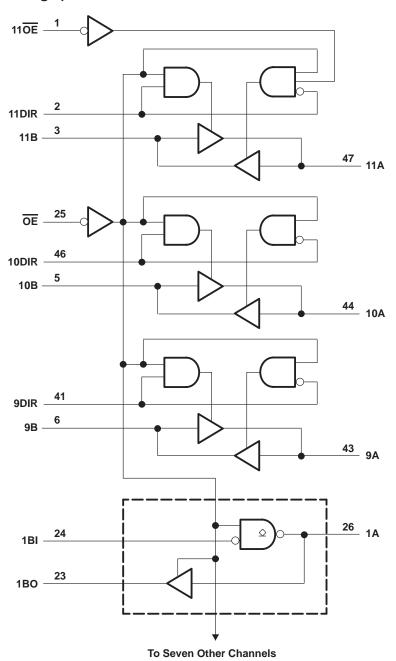
	FUNCTION TABLE												
		INPUTS		OPERATION									
OE	9DIR	10DIR	11DIR	11 <mark>0E</mark>	OFERATION								
Н	Х	Х	Х	Х	Isolation								
L	Х	х	Х	Х	1BI–8BI data to 1A–8A bus (OC [†]), 1A–8A data to 1BO–8BO bus								
L	L	Х	Х	Х	9A data to 9B bus								
L	Н	Х	Х	Х	9B data to 9A bus								
L	Х	L	Х	Х	10A data to 10B bus								
L	Х	Н	Х	Х	10B data to 10A bus								
L	Х	Х	L	L	11A data to 11B bus								
L	Х	Х	L	Н	11A, 11B isolation								
L	Х	Х	Н	Х	11B data to 11A bus								

 $\overline{\dagger OC} = \overline{Open-collector}$ outputs



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logic diagram (positive logic)





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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V _{CC} Input voltage range, V _I (except I/O ports) (see Note 1)	
Voltage range applied to any output in the high or power-off state, Vo	–0.5 V to 5.5 V
Current into any output in the low state, I _O	128 mA
Input clamp current, I _{IK} (V _I < 0)	–18 mA
Output clamp current, I _{OK} (V _O < 0)	
Package thermal impedance, θ_{JA} (see Note 2): DGG package	
DL package	94°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.

recommended operating conditions (see Note 3)

			SN54	4ABTE1	6246	SN74	ABTE16	6246	UNIT	
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
VCC	Supply voltage		4.5	5	5.5	4.5	5	5.5	V	
	IH High-level input voltage	OE	2			2			V	
VIH		Except OE	1.6			1.6			v	
. V	Low lovel input veltage	OE			0.8			0.8	V	
VIL	Low-level input voltage	Except OE		1.4				1.4	v	
VOH	High-level output voltage	1A–8A		PP.	5.5	0		5.5	V	
VI	Input voltage		0	5	VCC	0		VCC	V	
1	High lovel output ourrest	B bus	4	50	-12			-12	mA	
ЮН	High-level output current	9A–11A	20)	-24			-64	ША	
1		B bus	Q		12			12	mA	
IOL	Low-level output current	A bus		64				90		
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled			10			10	ns/V	
ТА	Operating free-air temperature		-55		125	-40		85	°C	

NOTE 3: All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.



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

PARAMETER		TERTO		SN	54ABTE1	6246	SN	74ABTE1	6246	UNIT				
PA	AWEIER	TEST C	ONDITIONS	MIN	TYP [†]	MAX	MIN			UNIT				
VIK		V _{CC} = 4.5 V,	lı = -18 mA			-1.2			-1.2					
		V _{CC} = 5.5 V,	I _{OH} = -100 μA		,	V _{CC} -0.2			V _{CC} -0.2					
	B port	B port	B port	B port	B port	V _{CC} = 4.5 V	$I_{OH} = -1 \text{ mA}$	2.4			2.4			
Vон		$v_{CC} = 4.5 v$	$I_{OH} = -12 \text{ mA}$	2			2			V				
VОН		V _{CC} = 5.5 V,	$I_{OH} = -1 \text{ mA}$			4.5			4.5	v				
	9A–11A	V _{CC} = 4.5 V	I _{OH} = -32 mA	2.4			2.4							
		VCC = 4.5 V	I _{OH} =64 mA				2							
IOH	1A–8A	$V_{CC} = 4.5 V,$	V _{OH} = 5.5 V			20			20	μΑ				
	Rport	V _{CC} = 4.5 V	I _{OL} = 1 mA			0.4			0.4					
Va	B port	VCC = 4.5 V	I _{OL} = 12 mA						0.8	V				
VOL	A port	V _{CC} = 4.5 V	I _{OL} = 64 mA			0.55			0.55	v				
	Apon	VCC = 4.5 V	I _{OL} = 90 mA			M			0.9					
V _{hys}					100			100		mV				
		V _{CC} = 4.5 V	V _I = 0.8 V	100	S.		100							
II(hold)	B port		V _I = 2 V	-100	6		-100			μΑ				
. ,		V _{CC} = 5.5 V,	V _I = 0 to 5.5 V		20	±500			±500					
1.	Control inputs			4	20	±1			±1	۵				
łį	A or B ports	V _{CC} = 5.5 V,	$V_I = V_{CC}$ or GND	Q		±20			±20	μA				
IOZH‡	9A–11A	V _{CC} = 5.5 V,	V _O = 2.7 V			10			10	μΑ				
Iozl‡	9A–11A	V _{CC} = 5.5 V,	V _O = 0.5 V			-10			-10	μΑ				
	A port			-50	-120	-180	-50		-180	4				
10	B port	V _{CC} = 5.5 V,	V _O = 2.5 V	-25	-52	-90	-25		-90	mA				
loff	-	V_{CC} = 0, V_{I} or $V_{O} \le$	4.5 V, V _{CC} BIAS = 0			±100			±100	μΑ				
		V _{CC} = 5.5 V,	Outputs high		28	36		28	36					
ICC	A or B ports	0 = 0.	Outputs low		38	48		38	48	mA				
		$V_{I} = V_{CC}$ or GND	Outputs disabled		20	32		20	32					
1	A or D ports	V _{CC} = 5 V,	OE high		0.02			0.02		mA				
ICCD	A or B ports	$C_L = 50 \text{ pF}$	OE low		0.33			0.33		MH				
Ci	Control inputs	V _I = 2.5 V or 0.5 V	-		2.5	4		2.5	4	pF				
Cio	I/O ports	V _O = 2.5 V or 0.5 V			4.5	8		4.5	8	pF				

[†] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$. [‡] The parameters I_{OZH} and I_{OZL} include the input leakage current.



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live-insertion specifications over recommended operating free-air temperature range

	METER	TEST CONDITIONS				ABTE16	6246	SN74	UNIT					
PARA	MEIER		TEST CONDIT	IONS	MIN	TYP†	MAX	MIN	TYP†	MAX	UNIT			
	O DIAS)	$V_{CC} = 0$ to 4.5 V, $V_{CC}BIAS = 4.5$ V	to 5.5 V, I _{O(DC}) = 0		250	700		250	700	1			
	CCBIAS)	$V_{CC} = 4.5 V \text{ to } 5.5 V_{CC} BIAS = 4.5 V$) = 0		PREL	20			20	μA			
Va	A port		$V_{CC}BIAS = 4$.5 V to 5.5 V	1.1	01.5	1.9	1.1	1.5	1.9	V			
vo	VO A port	VCC = 0	$V_{CC}BIAS = 4$.75 V to 5.25 V	1.3	1.5	1.7	1.3	1.5	1.7	v			
			V _O = 0,	$V_{CC}BIAS = 4.5 V$	-20		-100	-20		-100				
U U	IO A port	V port $V_{CC} = 0$ $V_{O} = 3 V$, $V_{CC}BIAS = 4.5 V$		20		100	20		100	μA				

[†] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$.

 $V_{CC} = 0.5 V < V_{CC} BIAS$

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)		CC = 5 \ \ \ = 25°C		SN54ABT	E16246	SN74ABT	E16246	UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
^t PLH	А	В	1.5	3.1	4.2	1.5	5.4	1.5	5.2	ns
^t PHL	A	D	1.5	3.5	4.6	1.5	5.4	1.5	5.2	115
^t PLH	9B–11B	9A–11A	1.5	3	3.8	1.5	4.7	1.5	4.5	
^t PHL	90-110	9A-11A	1.5	3.2	4	1.5	4.7	1.5	4.5	ns
^t PLH [§]			1.5	3.2	4	1.5	4.7	1.5	4.5	
t₽LH [¶]	1B–8B	1A–8A	7.5	8.9	9.7	7.5	\$10.6	7.5	10.3	ns
^t PHL			1.5	3.2	4	1.5	č 4.7	1.5	4.5	
^t PZH	ŌĒ	9A–11A	2	4.3	5.3	2	6.4	2	6.2	ns
^t PZL	OE	1A–11A	2	4.4	5.4	2	7	2	6.8	115
^t PZH	ŌĒ	В	2	4.3	6	2 2	7.3	2	7.1	ns
^t PZL	ÛE	В	2	4.5	6.4	Q 2	7.5	2	7.3	115
^t PHZ	ŌĒ	9A–11A	2	4.2	5.9	2	7	2	6.7	ns
^t PLZ	UE	1A–11A	2	3.5	4.6	2	5.4	2	5.1	115
^t PHZ	ŌĒ	В	2.5	4.3	6.2	2.5	7.2	2.5	7	
^t PLZ	UE	В	2	3.6	5	2	5.8	2	5.5	ns

Measurement point is V_{OL} + 0.3 V.

¶ Measurement point is V_{OL} + 1.5 V.



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extended switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD		CC = 5 \ A = 25°C		SN54ABT	E16246	SN74ABT	E16246	UNIT		
		(001-01)		MIN	TYP	MAX	MIN	MAX	MIN	MAX			
^t PLH	9B–11B	9A–11A	Rχ = 13 Ω	1.5	3.2	4	1.5	5	1.5	4.8	ns		
^t PHL		9A-11A	$K\chi = 15.52$	1.5	3.8	4.7	1.5	5.8	1.5	5.6	115		
^t PHL	1B–8B	1A–8A	Rχ = 13 Ω	1.5	3.3	4.2	1.5	5	1.5	4.8	ns		
^t PLH	0P 11P	9A–11A	$B_{\rm M} = 26.0$	1.5	3.1	4	1.5	4.8	1.5	4.6	ns		
^t PHL	9B–11B	9A-11A	Rχ = 26 Ω	1.5	3.5	4.4	1.5	5.2	1.5	4.9	115		
^t PHL	1B–8B	1A–8A	Rχ = 26 Ω	1.5	3.1	4	1.5	4.6	1.5	4.4	ns		
^t PLH	9B–11B	0D 11D	00 110	1A-8A		1.5	3	3.8	1.5	4.7	1.5	4.5	ns
^t PHL		IA-6A	Rχ = 56 Ω	1.5	3.3	4.2	1.5	5.1	1.5	4.7	ns		
^t PHL	1B–8B	1A–8A	Rχ = 56 Ω	1.5	3	4	1.5	4.6	1.5	4.4	ns		
	В	А	Rχ = Open		0.1	0.6	$\eta_{Q_{\ell}}$	2		2			
^t sk(p)	А	В			0.4	0.8	Ye a	2		2	ns		
	В	A	Rχ = 26 Ω		0.3	0.8		2		2			
	В	A	Rχ = Open		0.3	0.7		1.3		1.3			
^t sk(o)	А	В			0.7	1.1		1.3		1.3	ns		
	В	A	Rχ = 26 Ω		0.5	1		1.3		1.3			
t _t †	В	А	Rχ = 26 Ω	0.5	0.8	1.5	0.5	1.5	0.5	1.5	ns		
tt‡	A	В	Rise or fall time 10%–90%	3.5	5.5	7.3	3.5	8.1	3.5	7.9	ns		

 t_t is measured between 1 V and 2 V of the output waveform.

 \ddagger t_t is measured between 10% and 90% of the output waveform.

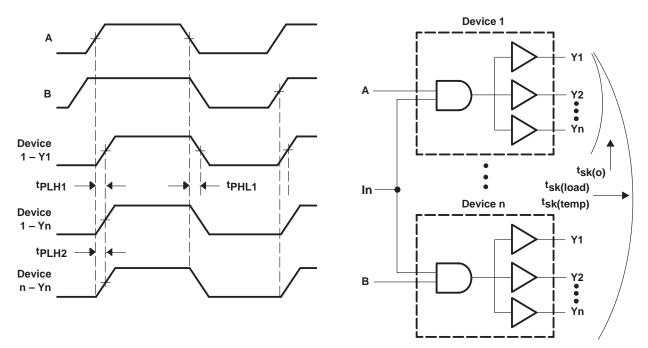
extended output characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (see Figures 1 and 2)

PARAMETER	FROM TO		FROM TO TEST CONDITIONS LOAD		SN54ABTE16246	SN74ABTE16246	UNIT
PARAMETER	(INPUT)	(OUTPUT)	TEST CONDITIONS	LOAD	MIN MAX	MIN MAX	UNIT
+ · · · · ·	А	В	V _{CC} = constant,		3	2.5	20
^t sk(temp)	В	А	$\Delta T_A = 20^{\circ}C$	Rχ = 56 Ω	4.5	4	ns
^t sk(load)	В	A	V _{CC} = constant, Temperature = constant	R _X = 13, 26, or 56 Ω	4.5	4	ns



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PARAMETER MEASUREMENT INFORMATION



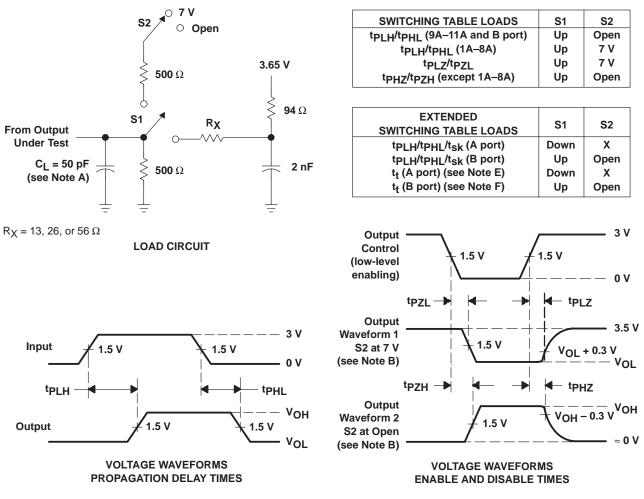
- NOTES: A. Pulse skew, t_{sk(p)}, is defined as the difference in propagation delay times t_{PLH1} and t_{PHL1} on the same terminal at identical operating conditions.
 - B. Output skew, t_{sk(0)}, is defined as the difference in propagation delay of any two outputs of the same device switching in the same direction (e.g., |t_{PLH1} t_{PLH2}|).
 - C. Temperature skew, $t_{sk(temp)}$, is the output skew of two devices, both having the same value of $V_{CC} \pm 1\%$ and with package temperature differences of 20°C.
 - D. Load skew, $t_{sk(load)}$, is measured with R_X in Figure 2 at 13 Ω for one unit and 56 Ω for the other unit.

Figure 1. Voltage Waveforms for Extended Characteristics



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- NOTES: A. CL 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 MHz, Z_Q = 50 Ω , t_f \leq 2.5 ns, t_f \leq 2.5 ns.
 - D. The outputs are measured one at a time with one transition per measurement.
 - E. t_t is measured between 1 V and 2 V of the output waveform.
 - F. t_f is measured between 10% and 90% of the output waveform.

Figure 2. Load Circuit and Voltage Waveforms



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