

3.3V ABT 16-bit transceiver with 3-state outputs

74LVT16245

FEATURES

- 16-bit bidirectional bus interface
- 3-State buffers
- Output capability: +64mA/-32mA
- TTL input and output switching levels
- Input and output interface capability to systems at 5V supply
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs
- Live insertion/extraction permitted

- No bus current loading when output is tied to 5V bus
- Latch-up protection exceeds 500mA per JEDEC JC40.2 Std 17
- ESD protection exceeds 2000V per MIL STD 883C Method 3015.6 and 200V per Machine Model

DESCRIPTION

The LVT16245 is a high-performance BiCMOS product designed for V_{CC} operation at 3.3V.

This device is an 16-bit transceiver featuring non-inverting 3-State bus compatible outputs in both send and receive directions. The control function implementation minimizes external timing requirements. The device features an Output Enable (OE) input for easy cascading and a Direction (DIR) input for direction control.

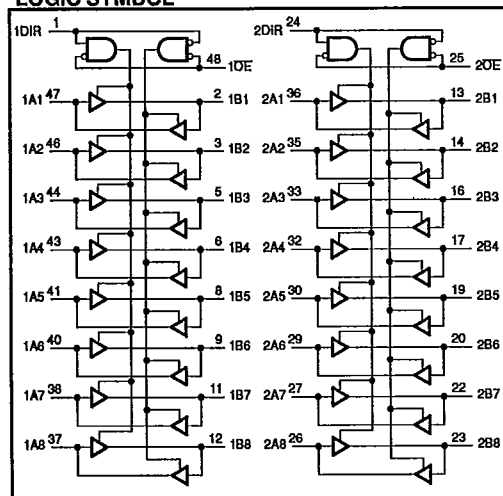
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}$; $GND = 0V$	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	$C_L = 50\text{pF}$; $V_{CC} = 3.3V \pm 0.3V$	2.4	ns
C_{IN}	Input capacitance DIR, OE	$V_I = 0V$ or $3.0V$	4	pF
C_{IO}	I/O pin capacitance	$V_I = 0V$ or $3.0V$	10	pF
I_{CCZ}	Total supply current	Outputs disabled; $V_{CC} = 3.6V$	0.13	mA

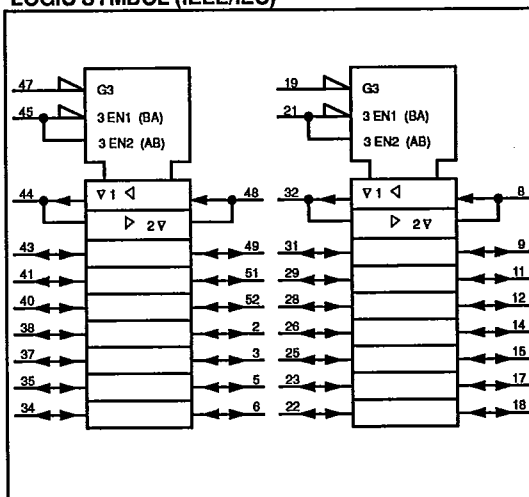
ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DRAWING NUMBER
48-Pin Plastic Shrink Small Outline (SSOP) Type III	-40°C to $+85^{\circ}\text{C}$	74LVT16245DL	TBD
48-Pin Plastic Thin Shrink Small Outline (TSSOP) Type II	-40°C to $+85^{\circ}\text{C}$	74LVT16245DGG	TBD

LOGIC SYMBOL



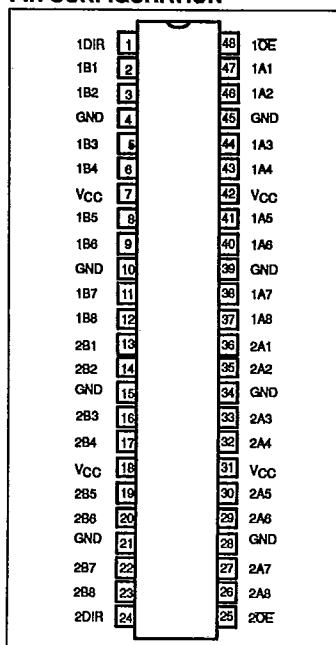
LOGIC SYMBOL (IEEE/IEC)



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PIN CONFIGURATION



PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 24	DIR	Direction control input
2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 19, 20, 22, 23	A1 – A8	Data inputs/outputs (A side)
47, 46, 44, 43, 41, 40, 38, 37, 36, 35, 33, 32, 30, 29, 27, 26	B1 – B8	Data inputs/outputs (B side)
25, 48	OE	Output enable Input (active-Low)
34, 39, 4, 45, 15, 21, 28	GND	Ground (0V)
7, 18, 31, 42	V _{CC}	Positive supply voltage

FUNCTION TABLE

Inputs		Inputs/Outputs	
OEn	DIR	A _n	B _n
L	L	A _n = B _n	Inputs
L	H	Inputs	B _n = A _n
H	X	Z	Z

H = High voltage level
L = Low voltage level

X = Don't care
Z = High Impedance "off" state

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ABSOLUTE MAXIMUM RATINGS^{1,2}

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 to +4.6	V
I_{IK}	DC input diode current	$V_I < 0$	-50	mA
V_I	DC input voltage ³		-0.5 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	-50	mA
V_{OUT}	DC output voltage ³	Output in Off or High state	-0.5 to +7.0	V
I_{OUT}	DC output current	Output in Low state	128	mA
T_{stg}	Storage temperature range		-65 to +150	°C

NOTES:

- Stresses beyond those listed 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.
- The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
- The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		MIN	MAX	
V_{CC}	DC supply voltage	2.7	3.6	V
V_I	Input voltage	0	5.5	V
V_{IH}	High-level input voltage	2.0		V
V_{IL}	Input voltage		0.8	V
I_{OH}	High-level output current		-32	mA
I_{OL}	Low-level output current		32	mA
	Low-level output current; current duty cycle $\leq 50\%$; $f \geq 1$ kHz		64	
$\Delta t/\Delta V$	Input transition rise or fall rate; Outputs enabled		10	ns/V
T_{amb}	Operating free-air temperature range	-40	+85	°C

AC CHARACTERISTICS

GND = 0V; $t_R = t_F = 2.5$ ns; $C_L = 50$ pF; $R_L = 500\Omega$; $T_{amb} = -40^\circ\text{C}$ to $+85^\circ\text{C}$.

GND = 0V, $t_H = t_L = 2.0ns$, $V_{OL} = 0.05V$, $V_{OH} = 0.95V$, $t_{AMB} = 40^\circ C$ to $+85^\circ C$.							
SYMBOL	PARAMETER	WAVEFORM	LIMITS				UNIT
			$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 2.7V$		
			MIN	TYP ¹	MAX	MAX	
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	1		2.4 2.3			ns
t_{pZH} t_{pZL}	Output enable time to High and Low level	2		3 3.1			ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low Level	2		4.6 4.3			ns

NOTE:

- All typical values are at $V_{CC} = 3.3V$ and $T_{amb} = 25^\circ\text{C}$.

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DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Temp = -40°C to +85°C			
			MIN	TYP ¹	MAX	
V _{IK}	Input clamp voltage	V _{CC} = 2.7V; I _{IK} = -18mA			-1.2	V
V _{OH}	High-level output voltage	V _{CC} = 2.7 to 3.6V; I _{OH} = -100μA	V _{CC} -0.2			V
		V _{CC} = 2.7V; I _{OH} = -8mA	2.4			
		V _{CC} = 3.0V; I _{OH} = -32mA	2.0			
V _{OL}	Low-level output voltage	V _{CC} = 2.7V; I _{OL} = 100μA			0.2	V
		V _{CC} = 2.7V; I _{OL} = 24mA			0.5	
		V _{CC} = 3.0V; I _{OL} = 16mA			0.4	
		V _{CC} = 3.0V; I _{OL} = 32mA			0.5	
		V _{CC} = 3.0V; I _{OL} = 64mA			0.55	
I _I	Input leakage current	V _{CC} = 3.6V; V _I = V _{CC} or GND	Control pins		±1	μA
		V _{CC} = 0 or 3.6V; V _I = 5.5V			10	
		V _{CC} = 3.6V; V _I = 5.5V	Data pins ⁴		20	
		V _{CC} = 3.6V; V _I = V _{CC}			1	
		V _{CC} = 3.6V; V _I = 0			-5	
I _{OFF}	Output off current	V _{CC} = 0V; V _I or V _O = 0 to 4.5V			±100	μA
I _{HOLD}	Bus Hold current A or B outputs	V _{CC} = 3V; V _I = 0.8V	75			μA
		V _{CC} = 3V; V _I = 2.0V	-75			μA
I _{EX}	Current into an output in the High state when V _O > V _{CC}	V _O = 5.5V; V _{CC} = 3.0V			100	μA
I _{CCH}	Quiescent supply current	V _{CC} = 3.6V; Outputs High, V _I = GND or V _{CC} , I _O = 0		0.13	0.19	mA
I _{CCL}		V _{CC} = 3.6V; Outputs Low, V _I = GND or V _{CC} , I _O = 0		3.5	5	
I _{CCZ}		V _{CC} = 3.6V; Outputs Disabled; V _I = GND or V _{CC} , I _O = 0		0.13	0.19	
ΔI _{CC}	Additional supply current per input pin ²	V _{CC} = 3V to 3.6V; One input at V _{CC} -0.6V, Other inputs at V _{CC} or GND			0.2	mA
I _{PU/PD}	Power up/down 3-State output current ³	V _{CC} ≤ 1.2V; V _O = 0.5V to V _{CC} ; V _I = GND or V _{CC} ; OE/OE = X			±100	μA
C _I	Input capacitance	V _I = 3V or 0		4		pF
C _O	Output capacitance	V _O = 3V or 0		10		pF

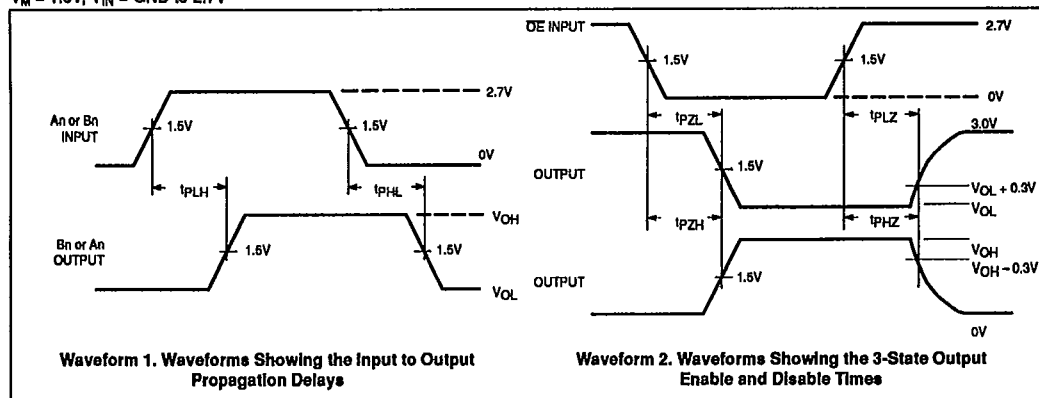
NOTES:

- All typical values are at $V_{CC} = 3.3V$ and $T_{amb} = 25^\circ C$.
- This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.
- This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From $V_{CC} = 1.2V$ to $V_{CC} = 3.3V \pm 0.3V$ a transition time of 100 μ sec is permitted. X = Don't care.
- Unused pins at V_{CC} or GND.

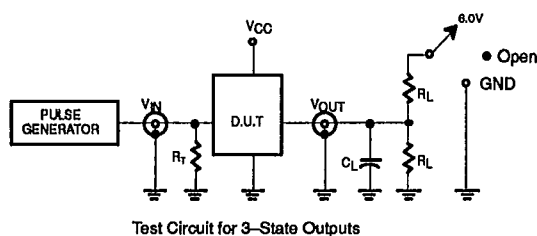
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AC WAVEFORMS

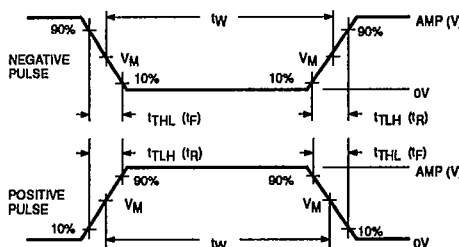
 $V_M = 1.5V$, $V_{IN} = GND$ to 2.7V

TEST CIRCUIT AND WAVEFORMS



SWITCH POSITION

TEST	SWITCH
t_{PLZ}/t_{PZL}	6V
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND

 $V_M = 1.5V$
Input Pulse Definition

DEFINITIONS

 R_L = Load resistor; see AC CHARACTERISTICS for value. C_L = Load capacitance includes jig and probe capacitance; See AC CHARACTERISTICS for value. R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74LVT	2.7V	$\leq 10MHz$	500ns	$\leq 2.5ns$	$\leq 2.5ns$