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 ($\overline{OE}$) input for easy cascading and a Direction (DIR) input for direction control.

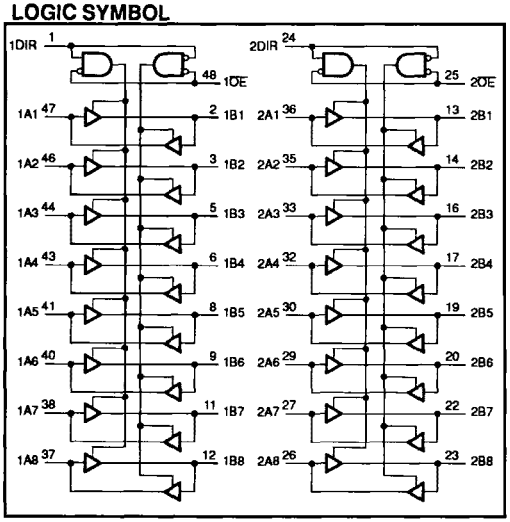
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	C_L = 50pF; V_{CC} = 3.3V ± 0.3V	2.4	ns
C_{IN}	Input capacitance DIR, $\overline{OE}$	V_I = 0V or 3.0V	4	pF
$C_{I/O}$	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

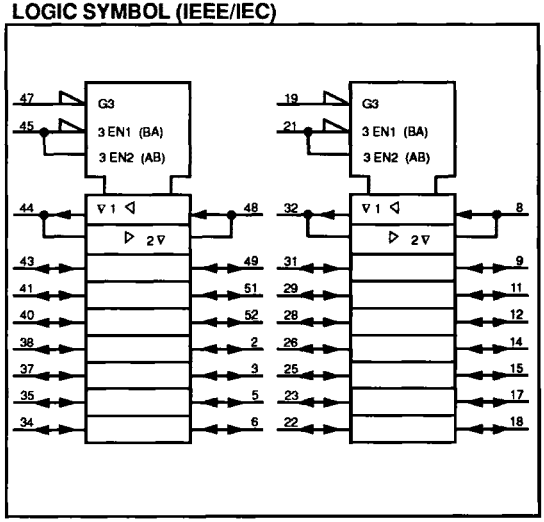
ORDERING INFORMATION

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

LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



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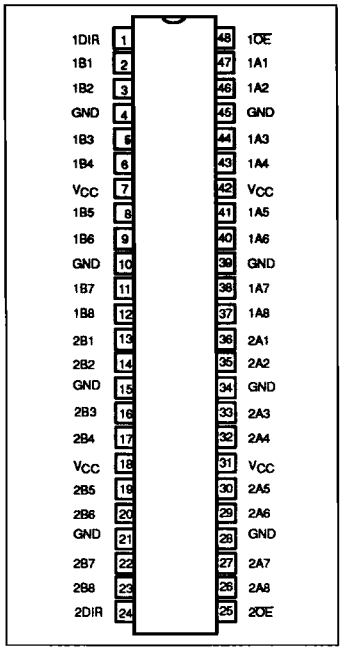
PIN CONFIGURATION



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	$\overline{OE}$	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	An	Bn
L	L	An = Bn	Inputs
L	H	Inputs	Bn = An
H	X	Z	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High Impedence "off" state

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:
1. 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.
2. 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.
3. 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 ≤ 50%; f ≥ 1kHz		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; $t_R = t_F$ = 2.5ns; C_L = 50pF; R_L = 500Ω; T_{amb} = –40°C to +85°C.

SYMBOL	PARAMETER	WAVEFORM	LIMITS				UNIT
			V_{CC} = 3.3V +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:
1. All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.

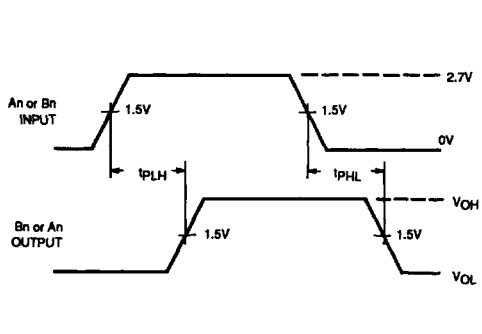
DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS Temp = -40°C to +85°C MIN	TYP[1]	MAX	UNIT
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_{IHOLD}	Bus Hold current A	V_{CC} = 3V; V_I = 0.8V		75			µA
	or B outputs	V_{CC} = 3V; V_I = 2.0V		–75			µA
I_{EX}	Current into an ouptut 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]	$V_{CC} \leq$ 1.2V; V_O = 0.5V to V_{CC}; V_I = GND or V_{CC}; $\overline{OE}$/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

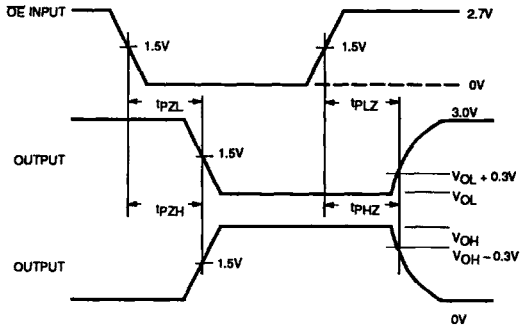
NOTES:
1. All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.
2. This is the increase in supply current for each input at the specificed voltage level other than V_{CC} or GND
3. This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From V_{CC} = 1.2V to V_{CC} = 3.3V ± 0.3V a transition time of 100µsec is permitted. X = Don't care.
4. Unused pins at V_{CC} or GND.

AC WAVEFORMS

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

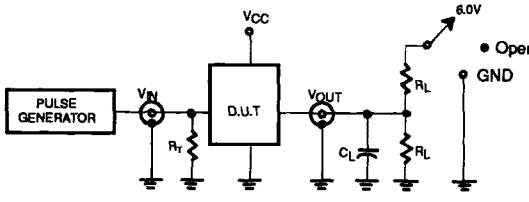


Waveform 1. Waveforms Showing the Input to Output Propagation Delays

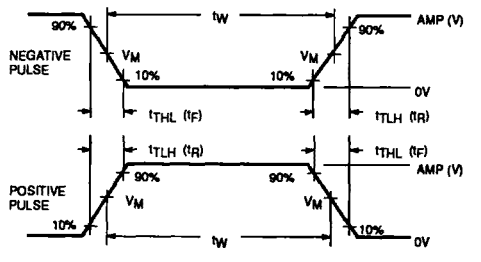


Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS



Test Circuit for 3–State Outputs



V_M = 1.5V
Input Pulse Definition

SWITCH POSITION

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

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	≤10MHz	500ns	≤2.5ns	≤2.5ns