

74LVTH16245BBX,518 Datasheet



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DiGi Electronics Part Number 74LVTH16245BBX,518-DG

Manufacturer Nexperia USA Inc.

Manufacturer Product Number 74LVTH16245BBX,518

Description IC TXRX NON-INVERT 3.6V 60HXQFN

Detailed Description Transceiver, Non-Inverting 2 Element 8 Bit per Elem

ent 3-State Output 60-HXQFNU (4x6)



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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
74LVTH16245BBX,518	Nexperia USA Inc.
Series:	Product Status:
74LVTH	Obsolete
Logic Type:	Number of Elements:
Transceiver, Non-Inverting	2
Number of Bits per Element:	Input Type:
8	
Output Type:	Current - Output High, Low:
3-State	32mA, 64mA
Voltage - Supply:	Operating Temperature:
2.7V ~ 3.6V	-40°C ~ 125°C (TA)
Mounting Type:	Package / Case:
Surface Mount	60-XFQFN Dual Rows, Exposed Pad
Supplier Device Package:	Base Product Number:
60-HXQFNU (4x6)	74LVTH16245

Environmental & Export classification

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	2 (1 Year)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



1. General description

The 74LVT16245B; 74LVTH16245B is a 16-bit transceiver with 3-state outputs. The device can be used as two 8-bit transceivers or one 16-bit transceiver. The device features two output enables $(1\overline{OE} \text{ and } 2\overline{OE})$ each controlling eight outputs, and two send/receive (1DIR and 2DIR) inputs for direction control. A HIGH on $n\overline{OE}$ causes the outputs to assume a high-impedance OFF-state. Bus hold data inputs eliminate the need for external pull-up resistors to define unused inputs

2. Features and benefits

- · 16-bit bidirectional bus interface
- 3-state buffers
- Wide supply voltage range from 2.7 to 3.6 V
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Output capability: +64 mA and -32 mA
- Direct interface with TTL levels
- Input and output interface capability to systems at 5 V supply
- · Bus hold data inputs eliminate need for external pull-up resistors to hold unused inputs
- · Live insertion and extraction permitted
- Power-up 3-state
- · No bus current loading when output is tied to 5 V bus
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- Complies with JEDEC standard JESD8C (2.7 V to 3.6 V)
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to 85 °C

3. Ordering information

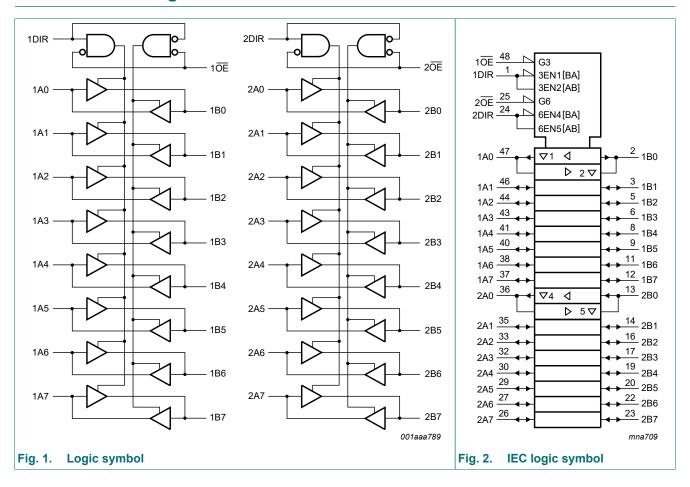
Table 1. Ordering information

Type number	Package					
	Temperature range	Description	Version			
74LVT16245BDGG 74LVTH16245BDGG	-40 °C to +85 °C	TSSOP48	plastic thin shrink small outline package; 48 leads; body width 6.1 mm	SOT362-1		



3.3 V 16-bit transceiver; 3-state

4. Functional diagram

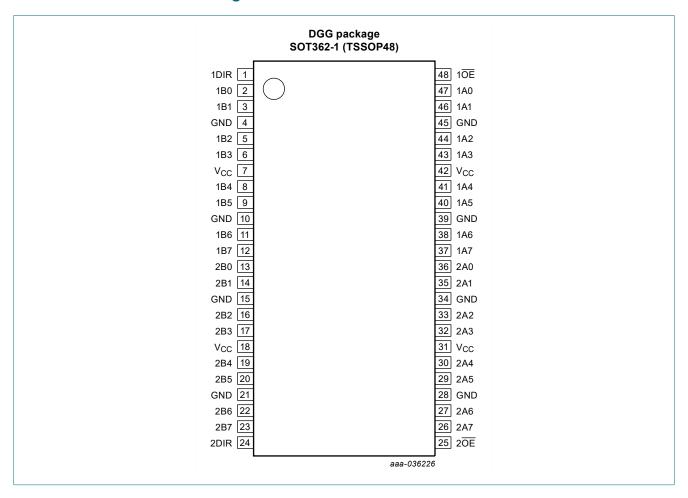


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3.3 V 16-bit transceiver; 3-state

5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1DIR, 2DIR	1, 24	direction control input
1B0, 1B1, 1B2, 1B3, 1B4, 1B5, 1B6, 1B7	2, 3, 5, 6, 8, 9, 11, 12	data input/output
2B0, 2B1, 2B2, 2B3, 2B4, 2B5, 2B6, 2B7	13, 14, 16, 17, 19, 20, 22, 23	data input/output
GND	4, 10, 15, 21, 28, 34, 39, 45	ground (0 V)
Vcc	7, 18, 31, 42	supply voltage
10E, 20E	48, 25	output enable input (active LOW)
2A0, 2A1, 2A2, 2A3, 2A4, 2A5, 2A6, 2A7	36, 35, 33, 32, 30, 29, 27, 26	data input/output
1A0, 1A1, 1A2, 1A3, 1A4, 1A5, 1A6, 1A7	47, 46, 44, 43, 41, 40, 38, 37	data input/output

3.3 V 16-bit transceiver; 3-state

6. Functional description

Table 3. Function table

 $H = HIGH \text{ voltage level}; L = LOW \text{ voltage level}; X = don't care; Z = high-impedance OFF-state.}$

Control		Input/output		
n OE nDIR		nAn	nBn	
L	L	output nAn = nBn	input	
L	Н	input	output nBn = nAn	
Н	X	Z	Z	

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+4.6	V
VI	input voltage	[1]	-0.5	+7.0	V
Vo	output voltage	output in OFF-state or HIGH-state [1]	-0.5	+7.0	V
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
I _{OK}	output clamping current	V _O < 0 V	-50	-	mA
Io	output current	output in LOW-state	-	128	mA
		output in HIGH-state	-64	-	mA
T _{stg}	storage temperature		-65	+150	°C
Tj	junction temperature	[2]	-	150	°C
P _{tot}	total power dissipation	T_{amb} = -40 °C to +85 °C;	-	500	mW

^[1] The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{CC}	supply voltage		2.7	-	3.6	V
VI	input voltage		0	-	5.5	V
V _{IH}	HIGH-level input voltage		2.0	-	-	V
V _{IL}	LOW-level input voltage		-	-	0.8	V
I _{OH}	HIGH-level output current		-32	-	-	mA
I _{OL}	LOW-level output current	none	-	-	32	mA
		current duty cycle ≤ 50 %; f _i ≥ 1 kHz	-	-	64	mA
T _{amb}	ambient temperature	in free-air	-40	-	+85	°C
Δt/ΔV	input transition rise and fall rate	outputs enabled	-	-	10	ns/V

^[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.

3.3 V 16-bit transceiver; 3-state

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; T_{amb} = -40 °C to +85 °C; Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
V _{IK}	input clamping voltage	V _{CC} = 2.7 V; I _{IK} = -18 mA	-1.2	-0.85	-	V
V _{OH}	HIGH-level output	I _{OH} = -100 μA; V _{CC} = 2.7 V to 3.6 V	V _{CC} - 0.2	V _{CC}	-	V
	voltage	I _{OH} = -8 mA; V _{CC} = 2.7 V	2.4	2.5	-	V
		I _{OH} = -32 mA; V _{CC} = 3.0 V	2.0	2.3	-	V
V_{OL}	LOW-level output voltage	V _{CC} = 2.7 V				
		I _{OL} = 100 μA	-	0.07	0.2	V
		I _{OL} = 24 mA	-	0.3	0.5	V
		V _{CC} = 3.0 V				
		I _{OL} = 16 mA	-	0.25	0.4	V
		I _{OL} = 32 mA	-	0.3	0.5	V
		I _{OL} = 64 mA	-	0.4	0.55	V
I _I	input leakage current	control pins				
		V_{CC} = 3.6 V; V_{I} = V_{CC} or GND	-	0.1	±1	μΑ
		V _{CC} = 0 V or 3.6 V; V _I = 5.5 V	-	0.1	10	μA
		input/output data pins; V _{CC} = 3.6 V [2]				
		V _I = 5.5 V	-	0.1	20	μA
		V _I = V _{CC}	-	0.5	10	μA
		V _I = 0 V	-5	-0.1	-	μΑ
I _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 0 \text{ V to } 4.5 \text{ V}$	-	0.1	±100	μA
I _{BHL}	bus hold LOW current	V _{CC} = 3 V; V _I = 0.8 V	75	135	-	μA
I _{BHH}	bus hold HIGH current	V _{CC} = 3 V; V _I = 2.0 V	-	-135	-75	μA
I _{BHLO}	bus hold LOW overdrive current	nAn input; $V_I = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 3.6 \text{ V}$ [3]	500	-	-	μΑ
I _{BHHO}	bus hold HIGH overdrive current	nAn input; $V_I = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 3.6 \text{ V}$ [3]	-	-	-500	μΑ
I _{LO}	output leakage current	output in HIGH-state when $V_O > V_{CC}$; $V_O = 5.5 \text{ V}$; $V_{CC} = 3.0 \text{ V}$	-	75	125	μA
I _{O(pu/pd)}	power-up/power-down output current	$V_{CC} \le 1.2 \text{ V}; V_O = 0.5 \text{ V to } V_{CC};$ [4] $V_I = \text{GND or } V_{CC}; \text{ n}\overline{\text{OE}} = \text{don't care}$	-	40	±100	μΑ

3.3 V 16-bit transceiver; 3-state

Symbol	Parameter	Conditions		Min	Typ [1]	Max	Unit
I _{CC}	supply current	V_{CC} = 3.6 V; V_I = GND or V_{CC} ; I_O = 0 A					
		outputs HIGH		-	0.07	0.12	mA
		outputs LOW		-	4.7	6.0	mA
		outputs disabled	[5]	-	0.07	0.12	mA
Δl _{CC}	additional supply current	per input pin; V_{CC} = 3.0 V to 3.6 V; one input at V_{CC} - 0.6 V, other inputs at V_{CC} or GND	[6]	-	0.1	0.2	mA
Cı	input capacitance	pins nDIR and \overline{OE} , $V_O = 0 \text{ V or } 3.0 \text{ V}$		-	3	-	pF
C _{io(off)}	off-state input/output capacitance	pins nAn and nBn, outputs disabled; $V_{\rm O}$ = GND or $V_{\rm CC}$		-	9	-	pF

- [1] Typical values are measured at V_{CC} = 3.3 V and at T_{amb} = 25 °C.
- [2] Unused pins at V_{CC} or GND.
- [3] This is the bus hold overdrive current required to force the input to the opposite logic state.
- This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From V_{CC} = 1.2 V to V_{CC} = 3.3 V ± 0.3 V a transition time of 100 µs is permitted. This parameter is valid for T_{amb} = 25 °C only.
- [5] I_{CC} is measured with outputs pulled to V_{CC} or GND.
- [6] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

10. Dynamic characteristics

Table 7. Dynamic characteristics

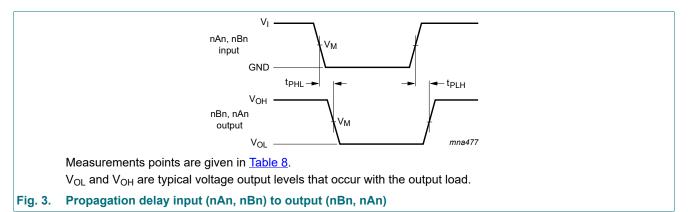
Voltages are referenced to GND (ground = 0 V); T_{amb} = -40 °C to +85 °C; For test circuit see Fig. 5.

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
t _{PLH}	LOW to HIGH	nAn to nBn or nBn to nAn; see Fig. 3				
	propagation delay	V _{CC} = 2.7 V	-	-	3.5	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	1.9	3.3	ns
t _{PHL}	HIGH to LOW	nAn to nBn or nBn to nAn; see Fig. 3				
	propagation delay	V _{CC} = 2.7 V	-	-	3.5	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	1.7	3.3	ns
t _{PZH}	OFF-state to HIGH	nOE to nAn or nBn; see Fig. 4				
	propagation delay	V _{CC} = 2.7 V	-	-	5.3	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.8	4.5	ns
t _{PZL}	OFF-state to LOW propagation delay	nOE to nAn or nBn; see Fig. 4				
		V _{CC} = 2.7 V	-	-	5.1	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.8	4.1	ns
t _{PHZ}	HIGH to OFF-state	nOE to nAn or nBn; see Fig. 4				
	propagation delay	V _{CC} = 2.7 V	-	-	5.7	ns
		V _{CC} = 3.0 V to 3.6 V	1.5	3.2	5.1	ns
t_{PLZ}	LOW to OFF-state	nOE to nAn or nBn; see Fig. 4				
	propagation delay	V _{CC} = 2.7 V	-	-	4.6	ns
		V _{CC} = 3.0 V to 3.6 V	1.5	3.0	4.6	ns

[1] All typical values are at V_{CC} = 3.3 V and T_{amb} = 25 °C.

3.3 V 16-bit transceiver; 3-state

10.1. Waveforms and test circuit



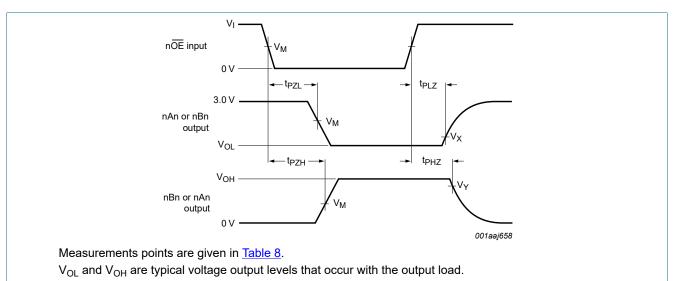
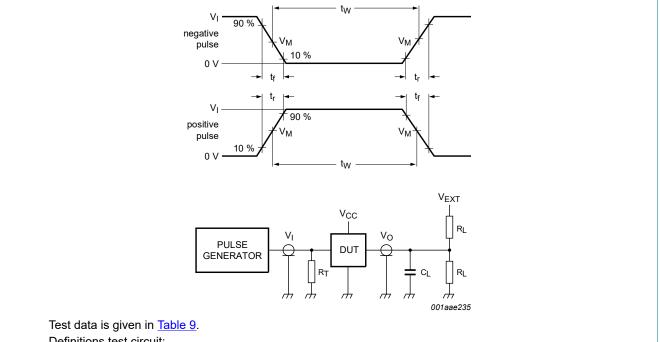


Fig. 4. 3-state output enable and disable times

Table 8. Measurement points

Input	Dutput			
V _M	V _M	V _X	V _Y	
1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V	

3.3 V 16-bit transceiver; 3-state



Definitions test circuit:

R_I = Load resistance;

C_L = Load capacitance including jig and probe capacitance;

 R_{T} = Termination resistance should be equal to output impedance Z_{o} of the pulse generator;

 V_{EXT} = External voltage for measuring switching times.

Fig. 5. Test circuit for measuring switching times

Table 9. Test data

Input			Load	ad V _{EXT}				
VI	fi	t _W	t _r , t _f	CL	R_L	t _{PHZ} , t _{PZH}	t _{PLZ} , t _{PZL}	t _{PLH} , t _{PHL}
2.7 V	≤ 10 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	GND	6 V	open

3.3 V 16-bit transceiver; 3-state

11. Package outline

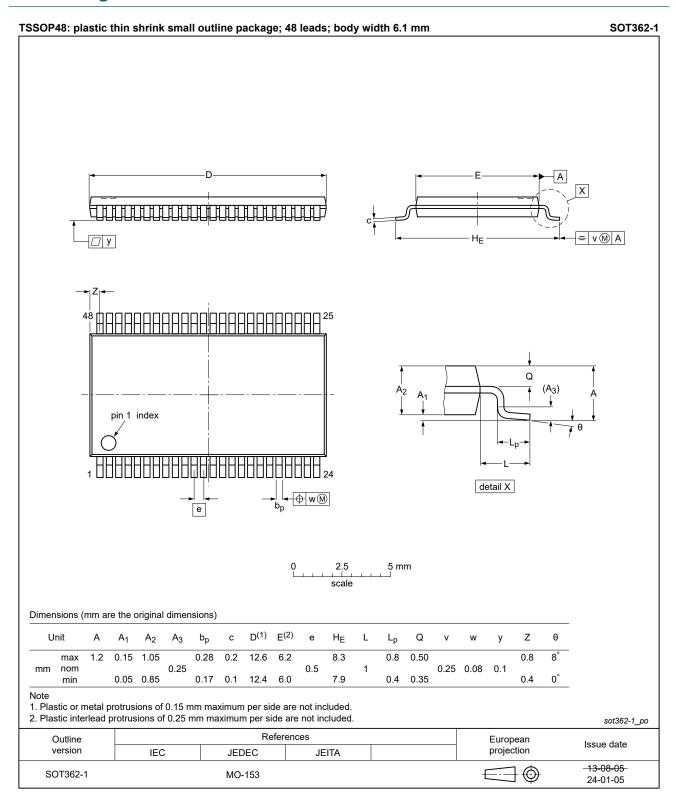


Fig. 6. Package outline SOT362-1 (TSSOP48)

3.3 V 16-bit transceiver; 3-state

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
BiCMOS	Bipolar Complementary Metal Oxide Semiconductor
CDM	Charge Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
НВМ	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVT_LVTH16245B v.14	20240708	Product data sheet	-	74LVT_LVTH16245B v.13		
Modifications:	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.					
74LVT_LVTH16245B v.13	20240325	Product data sheet	-	74LVT_LVTH16245B v.12		
Modifications:	Fig. 6: Updated package outline drawing SOT362-1 (TSSOP48).					
74LVT_LVTH16245B v.12	20210812	Product data sheet	-	74LVT_LVTH16245B v.11		
Modifications:	 Type numbers 74LVT16245BDL and 74LVTH16245BDL (SOT370-1/SSOP48) removed. Section 1 and Section 2 updated. Section 7: Derating values for P_{tot} total power dissipation removed. 					
74LVT_LVTH16245B v.11	20181031	Product data sheet	-	74LVT_LVTH16245B v.10		
Modifications:	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type numbers 74LVT16245BEV (SOT702-1), 74LVT16245BBX and 74LVTH16245BBX (SOT1134-2) removed. Package outline drawing SOT362-1 updated. 					
74LVT_LVTH16245B v.10	20120301	Product data sheet	-	74LVT_LVTH16245B v.9		
Modifications:	For type number 74LVT16245BBX and 74LVTH16245BBX the sot code has changed to SOT1134-2.					
74LVT_LVTH16245B v.9	20111122	Product data sheet	-	74LVT_LVTH16245B v.8		
Modifications:	Legal pages updated.					
74LVT_LVTH16245B v.8	20110617	Product data sheet	-	74LVT_LVTH16245B v.7		
74LVT_LVTH16245B v.7	20100329	Product data sheet	-	74LVT_LVTH16245B v.6		
74LVT_LVTH16245B v.6	20090409	Product data sheet	-	74LVT_LVTH16245B v.5		
74LVT_LVTH16245B v.5	20090312	Product data sheet	-	74LVT_LVTH16245B v.4		
74LVT_LVTH16245B v.4	20060323	Product data sheet	-	74LVT16245B v.3		
74LVT16245B v.3	20021031	Product data sheet	-	74LVT16245B v.2		
74LVT16245B v.2	19980219	Product specification	-	74LVT16245B v.1		

3.3 V 16-bit transceiver; 3-state

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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74LVT16245B; 74LVTH16245B

3.3 V 16-bit transceiver; 3-state

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