

Ver 1.2

**Radiation Hardened 3.3V Quad
Differential Line Receiver**

Datasheet

Part Number: B26LV32TERH



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Page of Revise Control

Version No.	Publish Time	Revised Chapter	Revise Introduction	Note
1.1	20170324	——	——	
1.2	20180227	——	change version	

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1. Features

- Single 3.3V Supply
- CMOS Compatible Outputs
- High Impedance Outputs when Disabled or Powered Down
- EIA RS-422 Compatible Inputs
- Full -55°C to +125°C Military Temperature Range
- Radiation-hardened design:
 - Total-dose: 100 krad(Si)
 - Latchup immune (LET > 75MeV-cm²/mg)
- Packaging options:
 - 16-lead Flatpack
- Low quiescent current
- Input Fail Safe Circuitry

2. General Description

The B26LV32TERH is a quad differential line receiver designed for digital data transmission over balanced lines and meets the requirements of EIA Standard RS-422. Radiation hardened CMOS processing assures low power consumption, high speed, and reliable operation in the most severe radiation environments.

3. Function Block Diagram

B26LV32TERH function block diagram is shown in figure 3-1.

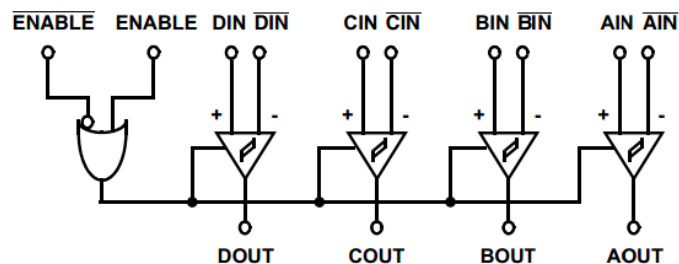


Figure 3-1 B26LV32TERH function block diagram

4. Packages and Pin Function Descriptions

The provided package is: FP16.

B26LV32TERH- pin configuration is shown in 4-1, Pin Function Descriptions is shown in Table 4-1.

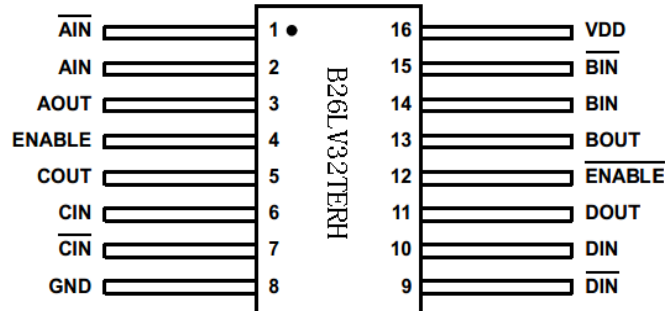


Figure 4-1 FP16 pin configuration

Table 4-1 B26LV32TERH Pin Function Descriptions

Pin No.	Name	Description
1, 7, 9, 15	\overline{AIN} , \overline{CIN} , \overline{DIN} , \overline{BIN}	Inverting receiver input pin
2, 6, 10, 14	AIN, CIN, DIN, BIN	Non-inverting receiver input pin
3, 5, 11, 13	AOUT, COUT, DOUT, BOUT	Receiver output pin
4	ENABLE	Active high enable pin
12	\overline{ENABLE}	Active low enable pin
16	VDD	Power supply pin
8	GND	Ground pin

5. Pin List

B26LV32TERH-FP16 pin list is shown in table 5-1.

Table 5-1 B26LV32TERH-FP16 pin list

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	\overline{AIN}	INPUT DATA1 NEGATIVE	9	\overline{DIN}	INPUT DATA4 NEGATIVE

2	A1N	INPUT DATA1 POSITIVE	10	D1N	INPUT DATA4 POSITIVE
3	A0UT	OUTPUT DATA1	11	D0UT	OUTPUT DATA1
4	ENABLE	Active high enable pin	12	\overline{ENABLE}	Active low enable pin
5	C0UT	OUTPUT DATA3	13	B0UT	OUTPUT DATA2
6	C1N	INPUT DATA3 POSITIVE	14	B1N	INPUT DATA2 POSITIVE
7	$\overline{C1N}$	INPUT DATA3 NEGATIVE	15	$\overline{B1N}$	INPUT DATA2 NEGATIVE
8	GND	GND	16	VDD	POWER

6. Detailed Description

6.1 Function Description

The B26LV32TERH can detect signals as low as $\pm 200\text{mV}$ over the common mode range of -7V to $+7\text{V}$. The receivers are also equipped with input fail safe circuitry, which causes the outputs to go to a logic “1” when the inputs are open. Enable and Disable functions are common to all four receivers. truth table is shown in table 6-1.

Table 6-1 truth table

ENABLE	\overline{ENABLE}	Input	Output
L	H	X	Z
All other combinations of ENABLE inputs		$V_{ID} \geq V_{Th} (\text{Max})$	H
		$V_{ID} \leq V_{Th} (\text{Min})$	L
		Open	H

L = Low logic state

X = Irrelevant

H = High logic state

Z = TRI-STATE (high impedance)

6.2 Storage Condition

Packaged product should be stored in the ventilate warehouse with ambient temperature $10^{\circ}\text{C} \sim 30^{\circ}\text{C}$ and relative humidity less than 70%. There should be no acid, alkali or other radiant gas in the environment,

6.3 Absolute Maximum Ratings

- a) Supply voltage (V_{DD}) : $-0.5\text{ V} \sim 7.0\text{V}$
- b) Common Mode Range (V_{CM}): $\pm 10\text{V}$
- c) Differential Input Voltage (V_{Diff}): $\pm 10\text{V}$
- d) Enable Input Voltage (V_I): $-0.5\text{V} \sim V_{DD} + 0.5\text{V}$
- e) Storage temperature (T_{stg}) : $-65^{\circ}\text{C} \sim 150^{\circ}\text{C}$
- f) Lead temperature (T_h) : 260°C

6.4 Recommended Operation Conditions

- a) Supply Voltage (V_{DD}): $3.0\text{ V} \sim 3.6\text{ V}$
- b) Case operation temperature range(T_A) : $-55^{\circ}\text{C} \sim 125^{\circ}\text{C}$

7. Specifications

All electrical characteristics are shown in table 7-1, Propagation Delay and Transition Time Waveforms are shown in Figure 7-1, Three-State Delay Waveform is shown in Figure 7-2.

Table 7-1 B26LV32TERH electrical characteristics

PARAMETER	SYMBOL	CONDITION	LIMIT		UNIT
		$(-55^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$, $3.0\text{V} \leq V_{DD} \leq 3.6\text{V}$) unless otherwise specified	MIN	MAX	
Enabled high level input voltage	V_{IH}	$V_{DD}=3.0\text{V}, 3.6\text{V}$	2.0	—	V

Enabled low level input voltage	V_{IL}	$V_{DD}=3.0V, 3.6V$	—	0.8	V
High-level output voltage	V_{OH}	$V_{DD}=3.0V, V_{DIFF}=1.0V, I_O=-6mA$	2.4	—	V
Low-level output voltage	V_{OL}	$V_{DD}=3.0V, V_{DIFF}=-1.0V, I_O=6mA$	—	0.5	V
Input leakage current, enable pins	I_{EN}	$V_{IN}=0V, 3.6V, V_{DD}=3.6V$	-1.0	1.0	μA
Differential input voltage	V_{TH}	$V_{DD}=3.0V, 3.6V, -0.5V < V_{CM} < 5.5V$	-0.2	+0.2	V
Input leakage current (differential inputs)	I_{IN}	$V_{DD}=3.6V, +V=10V, -V=0V$ $\alpha +V=0V, -V=10V$	—	1.8	mA
		$V_{DD}=3.6V, +V=-10V, -V=0V$ $\alpha +V=0V, -V=-10V$	-1.8	—	mA
		$V_{DD}=0V, +V=10V, -V=0V$ $\alpha +V=0V, -V=10V$	—	1.8	mA
		$V_{DD}=0V, +V=-10V, -V=0V$ $\alpha +V=0V, -V=-10V$	-1.8	—	mA
Output Three-State Current	I_{OZ}	$V_{DD}=3.6V, V_O=V_{DD}$ or GND	-50	50	μA
Standby supply current	I_{CC}	$V_{DD}=3.6V, V_{DIFF}=1.0V,$ Outputs= open, $-0.5V < V_{CM} < 5.5V$ ENABLE、 ENABLE = V_{DD}	—	20	mA
Input reistance	R_{IN}	$V_{DD}=3.6V, -0.5V < V_{CM} < 5.5V$	5	—	k Ω
Output Short Circuit Current ^{1/}	I_{OS}	$V_{DD}=3.0V, 3.6V V_O=0V V_{DIFF}=1.0V$	-10	-70	mA
Function test	FT	$f=10MHz$			
Differential Propagation Delay High to Low ^{2/}	t_{PHL}	$V_{DD}=3.0V, V_{CM}=1.5V, V_{DIFF}=1.0V$ $C_L=50p$ Figure 7-1	6	45	ns
Differential Propagation Delay Low to High ^{2/}	t_{PLH}	$V_{DD}=3.0V, V_{CM}=1.5V, V_{DIFF}=1.0V$ $C_L=50p$ Figure 7-1	6	45	ns
Differential skew $t_{PHLD}-t_{PLHD}$ (same channel) ^{2/}	t_{SK1}	$V_{DD}=3.0V, V_{CM}=1.5V, V_{DIFF}=1.0V$ $C_L=50p$ Figure 7-1	—	6	ns

Pin to pin skew (same device)b	t_{SK2}	$V_{DD}=3.0V, V_{CM}=1.5V, V_{DIFF}=1.0V$ $C_L=50p$ Figure 7-1	—	6	ns
Disable Time High to Z ^{3/}	t_{PHZ}	$V_{DD}=3.0V R_L=2K\Omega$ to GND $V_{DIFF}=1.0V C_L=50p$ Figure 7-2	—	50	ns
Disable Time Low to Z ^{3/}	t_{PLZ}	$V_{DD}=3.0V R_L=2K\Omega$ to V_{DD} $V_{DIFF}=1.0V C_L=50p$ Figure 7-2	—	50	ns
Enable Time Z to High ^{3/}	t_{PZH}	$V_{DD}=3.0V R_L=2K\Omega$ to GND $V_{DIFF}=1.0V C_L=50p$ Figure 7-2	—	50	ns
Enable Time Z to Low ^{3/}	t_{PZL}	$V_{DD}=3.0V R_L=2K\Omega$ to V_{DD} $V_{DIFF}=1.0V C_L=50p$ Figure 7-2	—	50	ns

1/ Only one output at a time may be shorted.

2/Generator waveform is specified as follows: $f = 1 \text{ MHz}$, duty cycle = 50%, $t_r = t_f \leq 6 \text{ ns}$. Receiver inputs = 1 V to 2 V with measure points equal to 1.5 V on the inputs to $\frac{1}{2} V_{DD}$ on the output.

3/ Generator waveform is specified as follows: $f = 1 \text{ MHz}$, duty cycle = 50%, $t_r = t_f \leq 6 \text{ ns}$. ENABLE/
ENABLE inputs 0 V to 3 V with measure points equal to 1.5 V on the inputs, to $\frac{1}{2} V_{DD}$ on the outputs for Z_L and Z_H , and $(V_{OL} + 0.3 \text{ V})$ for LZ, and $(V_{OH} - 0.3 \text{ V})$ for H_Z .

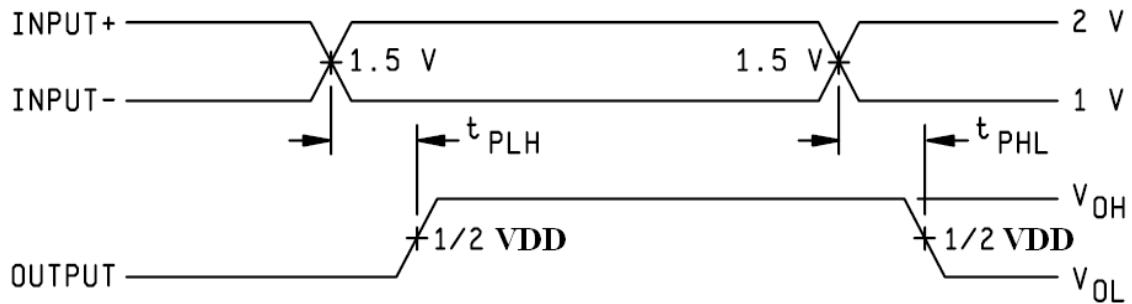


Figure.7-1. Receiver Propagation Delay and Transition Time Waveforms

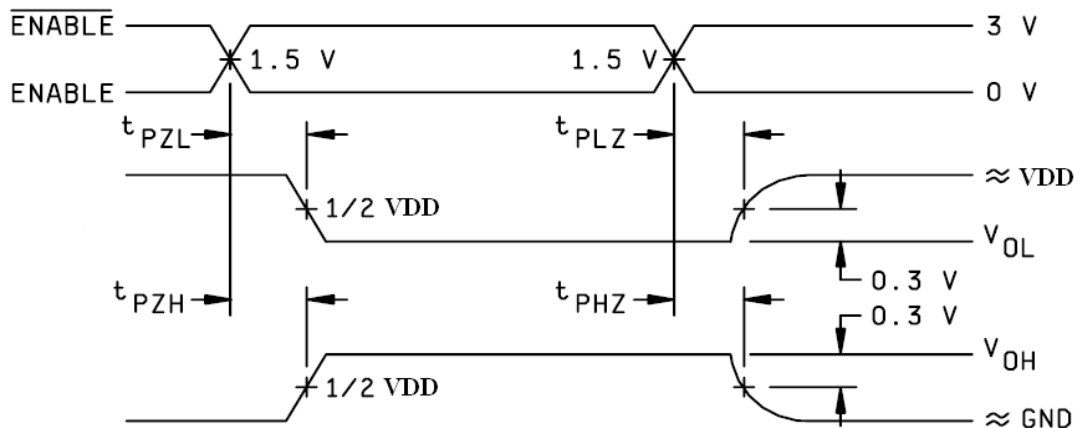


Figure.7-2. Receiver Three-State Delay Waveform

8. Package Specifications

The specifications of FP16 package are shown in figure8-1.

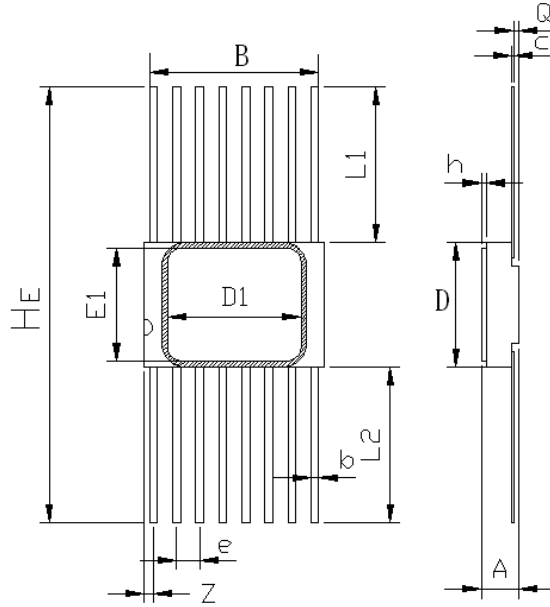


Figure 8-1 FP16 package specifications

Table 8-1 size symbol list

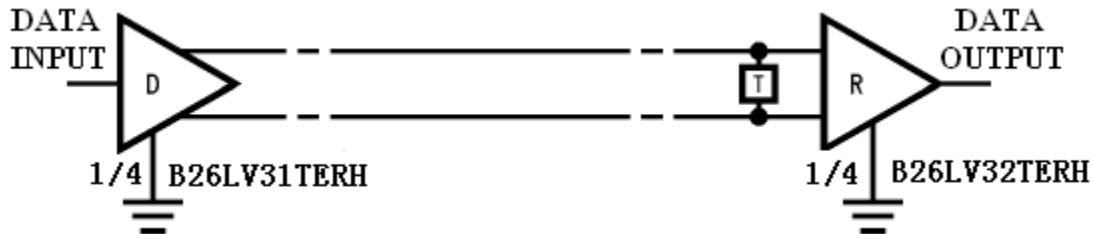
Symbol	Value (unit: mm)		
	Min	Normal	Max
A	1.60	—	2.50
B	8.94	—	9.69
b	0.25	—	0.54
c	0.07	—	0.20
D	6.55	—	7.25
e	—	1.27	—
He	18.76	19.41	20.06
Q	0.13	—	0.90
L1	5.75	—	6.75



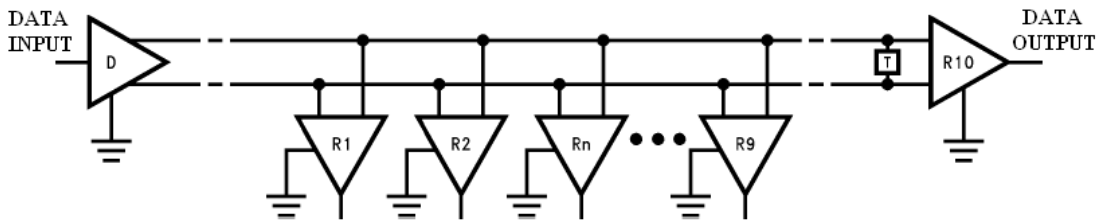
L2	5.75	—	6.75
Z	—	—	1.27
D1	—	7.366	—
E1	—	6.223	—
h	0.22	—	0.28

9. Appendix I Typical Application Example

The B26LV32TERH receiver's intended use is primarily in an uncomplicated point-to-point configuration as is shown in Appendix figure 1-1. This configuration provides a clean signaling environment for quick edge rates of the drivers. The receiver is connected to the driver through a balanced media such as a standard twisted pair cable. Typically, the characteristic impedance of the media is in the range of 100Ω. A termination resistor of 100Ω should be selected to match the media and is located as close to the receiver input pins as possible. Other configurations are possible such as a multireceiver configuration, Multidrop configuration as is shown in Appendix figure 1-2.



Appendix figure 1-1 Point-to-Point Application



Appendix figure 1-2 Multidrop Application

10. Appendix II Replaced Product

Appendix table.1-1

Device Type	Substituted Device Type
B26LV32TERH	NSC DS26LV32AQML

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