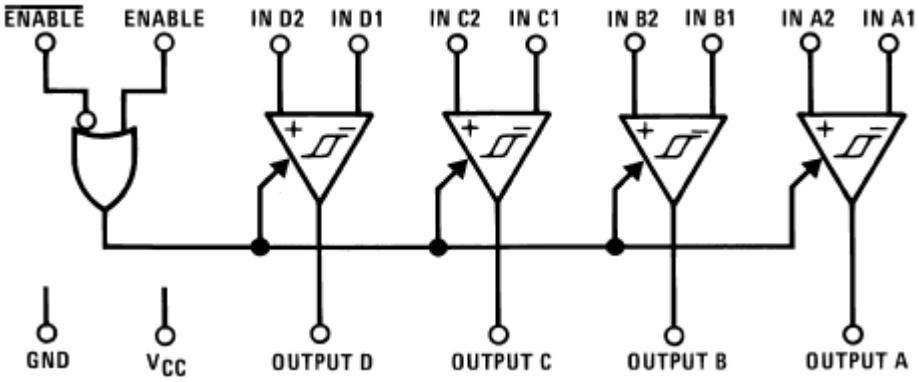
CMOS 4-CH. Differential Line Receiver

General Description

The BL1502 is a 4-channel differential line receiver designed to meet the RS-422, RS-423, and Federal Standards 1020 and 1030 for balanced and unbalanced digital data transmission, while retaining the low power characteristics of CMOS. This device has an input sensitivity of 200 mV over the common mode input voltage range of ±7V. The BL1502 features internal pull-up and pull-down resistors that prevent output oscillation on unused channels. The BL1502 provides an enable and disable function common to all four receivers, and features 3-STATE outputs with 6 mA source and sink capability. This product is pin compatible with the DS26C32T and the AM26C32.

Logic Diagram：

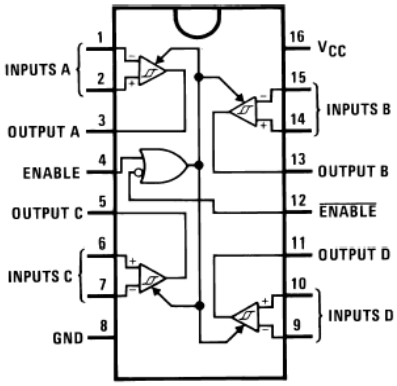


Features

- CMOS design for low power
- ±0.2V sensitivity over input common mode voltage range
- Typical propagation delays: 19 ns
- Typical input hysteresis: 60 mV
- Inputs won't load line when VCC = 0V
- Meets the requirements of EIA standard RS-422
- TRI-STATE outputs for connection to system buses
- Available in Surface Mount

Connection Diagrams

Dual-In-Line Package



Pin Description

NO.	Name	Description
1，7，9，15	INA-,INC-,IND-,INB-	Differential negative input
2，6，10，14	INA+,INC+,IND+,INB+	Differential positive input
3，5，11，13	OUTA,OUTC,OUTD,OUTB	Non-balance output
4	En	Positive enable input
12	En-	Negative enable input
16	Vcc	＋5V power supply
8	GND	Gnd

Absolute Maximum Ratings

Supply Voltage (VCC) 7V
Common Mode Range (VCM) ±14V
Differential Input Voltage (V DIFF) ±14V
Enable Input Voltage (V IN) 7V
Storage Temperature Range (T STG) -65℃ to +150℃
Maximum Current Per Output ±25 mA

Operating Conditions

	Min	Max	Units
Supply Voltage (VCC)	4.50	5.50	V
Operating Temperature Range (TA)	-40	+85	℃
Enable Input Rise or Fall Times		500	ns

DC Electrical Characteristics

VCC = 5V ±10% (unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{TH}	Minimum Differential Input Voltage	V_{OUT}= V_{OH} or V_{OL} -7V<V_{CM}<+7V	-200	35	+200	mV
R_{IN}	Input Resistance	V_{IN}=-7V,+7V (other input=GND)	5.0	6.8	10	KΩ
I_{IN}	Input Current	V_{IN}=+10V Other input=GND		+1.1	+1.5	mA
		V_{IN}=-10V Other input=GND		-2.0	-2.5	mA
V_{OH}	Minimum High Level Output Voltage	Vcc=Min, V_{DIFF}=+1V I_{OUT}=-6.0 mA	3.8	4.2		V
V_{OL}	Maximum Low Level Output Voltage	Vcc=Max, V_{DIFF}=-1V I_{OUT}=6.0 mA		0.2	0.3	V
V_{IH}	Minimum Enable High Input Level Voltage		2.0			V
V_{IL}	Maximum Enable Low Input Level Voltage				0.8	V
I_{OZ}	Maximum TRI-STATE Output Leakage Current	VOUT=Vcc or GND, ENABLE=V_{IL}, $\overline{ENABLE}=V_{IH}$		±0.5	±5.0	uA
I_I	Maximum Enable Input Current	V_{IN}=Vcc 或 GND			±1.0	uA
Icc	Quiescent	Vcc=Max,		16	23	mA

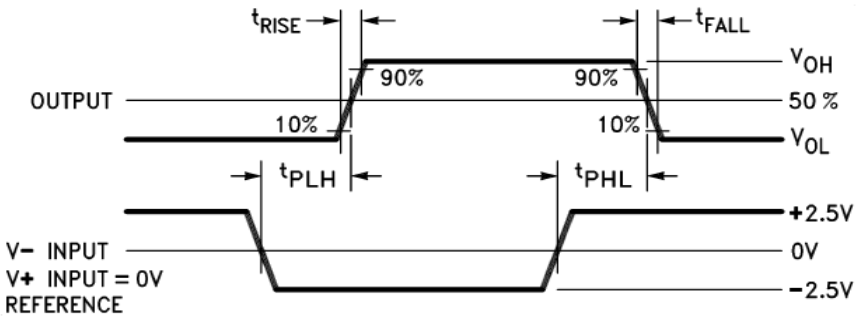
	Power Supply Current	V_{DIFF}=+1V				
V_{HYST}	Input Hysteresis	V_{CM}=0V		60		mV

AC Electrical Characteristics

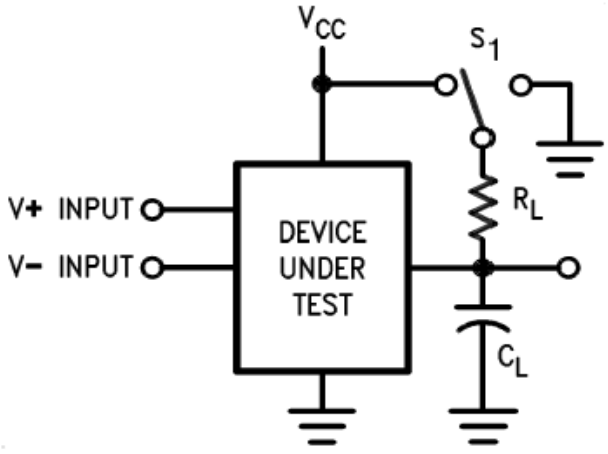
Vcc=5V±10%

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PLH} t_{PHL}	Propagation Delay Input to Output	C_L=50pF V_{DIFF}=2.5V V_{CM}=0V	10	19	30	ns
t_{RISE} t_{FALL}	Output Rise and Fall Times	C_L=50pF V_{DIFF}=2.5V V_{CM}=0V		4	9	ns
t_{PLZ} t_{PHZ}	Propagation Delay ENABLE to Output	C_L=50pF R_L=1kΩ V_{DIFF}=2.5V		13	22	ns
t_{PZL} t_{PZH}	Propagation Delay ENABLE to Output	C_L=50pF R_L=1kΩ V_{DIFF}=2.5V		13	23	ns

Test and Switching Waveforms

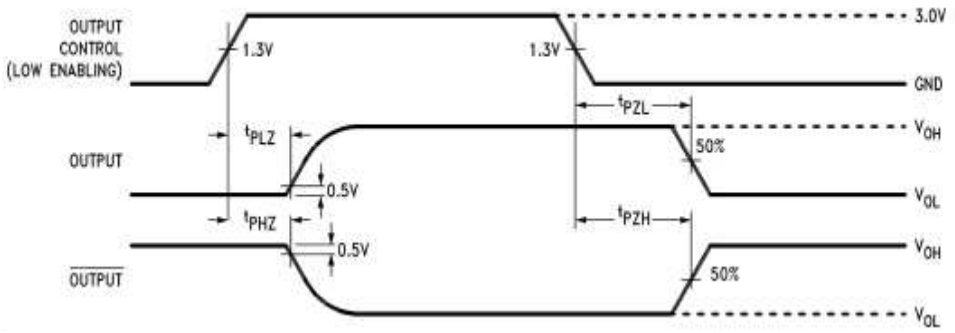


Propagation Delay



Test Circuit for TRI-STATE Output Tests

C_L includes load and test jig capacitance.
S1 = VCC for t_{PZL}, and t_{PLZ} measurements.
S1 = Gnd for t_{PZH} and t_{PHZ} measurements.

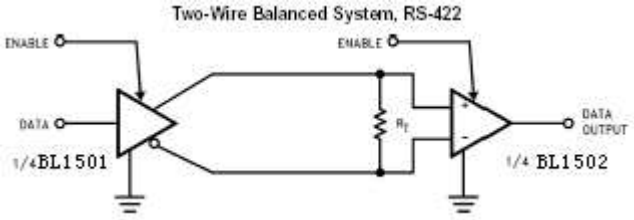


TRI-STATE Output Enable and Disable Waveforms

Truth table

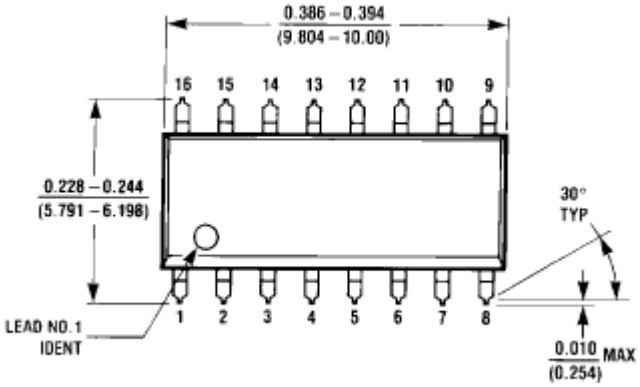
ENABLE	$\overline{\text{ENABLE}}$	Input	Output
L	H	X	Z
All Other Combinations of Enable Inputs		$V_{ID} \geq V_{TH}$ (Max)	H
		$V_{ID} \leq V_{TH}$ (Min)	L
		Open	H

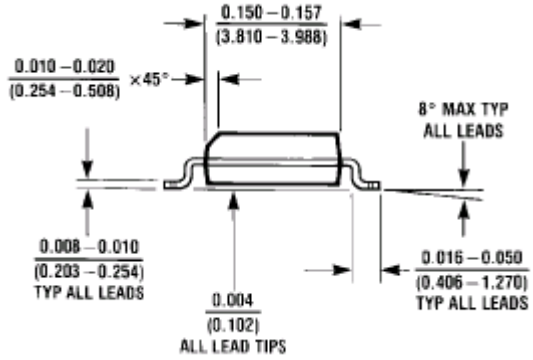
Typical Applications

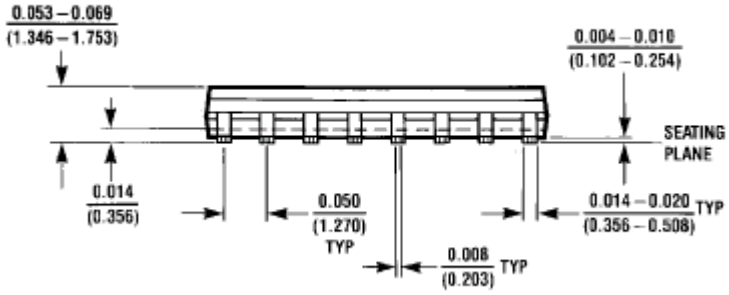


Rt=100Ω (When the transmission line is short, Rt could be omitted.)

- **Package dimension:** inches(millimeters)
  Narrow SOP Pin16 package


0.386 – 0.394
(9.804 – 10.00)
16 15 14 13 12 11 10 9
0.228 – 0.244
(5.791 – 6.198)
30°
TYP
LEAD NO.1
IDENT
1 2 3 4 5 6 7 8
0.010 MAX
(0.254)


0.150 – 0.157
(3.810 – 3.988)
0.010 – 0.020
(0.254 – 0.508)
×45°
8° MAX TYP
ALL LEADS
0.008 – 0.010
(0.203 – 0.254)
TYP ALL LEADS
0.004
(0.102)
ALL LEAD TIPS
0.016 – 0.050
(0.406 – 1.270)
TYP ALL LEADS


0.053 – 0.069
(1.346 – 1.753)
0.004 – 0.010
(0.102 – 0.254)
SEATING
PLANE
0.014
(0.356)
0.050
(1.270)
TYP
0.014 – 0.020
(0.356 – 0.508)
TYP
0.008
(0.203)
TYP