RS-422, RS-423 CMOS DIFFERENTIAL LINE RECEIVERS AND DRIVERS

GENERAL DESCRIPTION

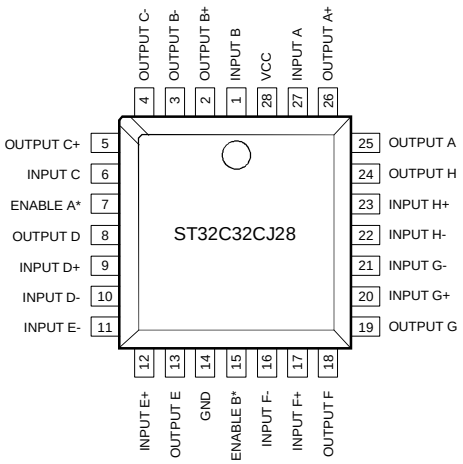
The ST31C32 is a high speed CMOS combo differential line receiver and driver designed to meet the standard RS-422, RS-423 requirements for digital and transmission over balanced lines. It provides five differential line receivers with three state control and three line drivers also with three state control.

The line driver inputs and line receiver outputs are TTL compatible to interface with standard 74LS and CMOS environments. The ST31C32 has been designed for low power 5 volts operation and is especially suited for MODEM/UART applications.

The receiver in the ST31C32 has an input sensitivity of 200mv over the common mode input voltage range of ±7V. They incorporate hysteresis for improved noise margin with slow changing input signals. Input fail-safe circuitry is also included which will cause the output of the receiver to go to a logic "1" level if the inputs are left open.

A special voltage sensing circuit is utilized in the drivers that will three-state the outputs during power down and power up. This will prevent spurious glitches from appearing on the outputs.

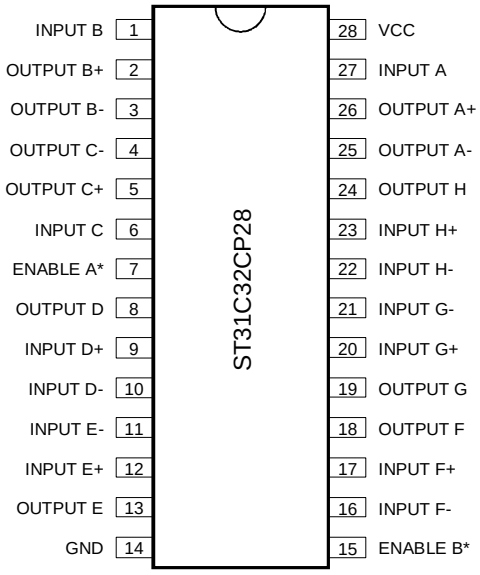
PLCC Package



FEATURES

- Low power CMOS design
- Three-state outputs with enable pin
- Meets the EIA RS-422/423 requirements
- Low propagation delays
- High speed
- Five line receivers with three state control
- Three line drivers with three state control
- 28 pin PLCC and SOIC package

DIP Package

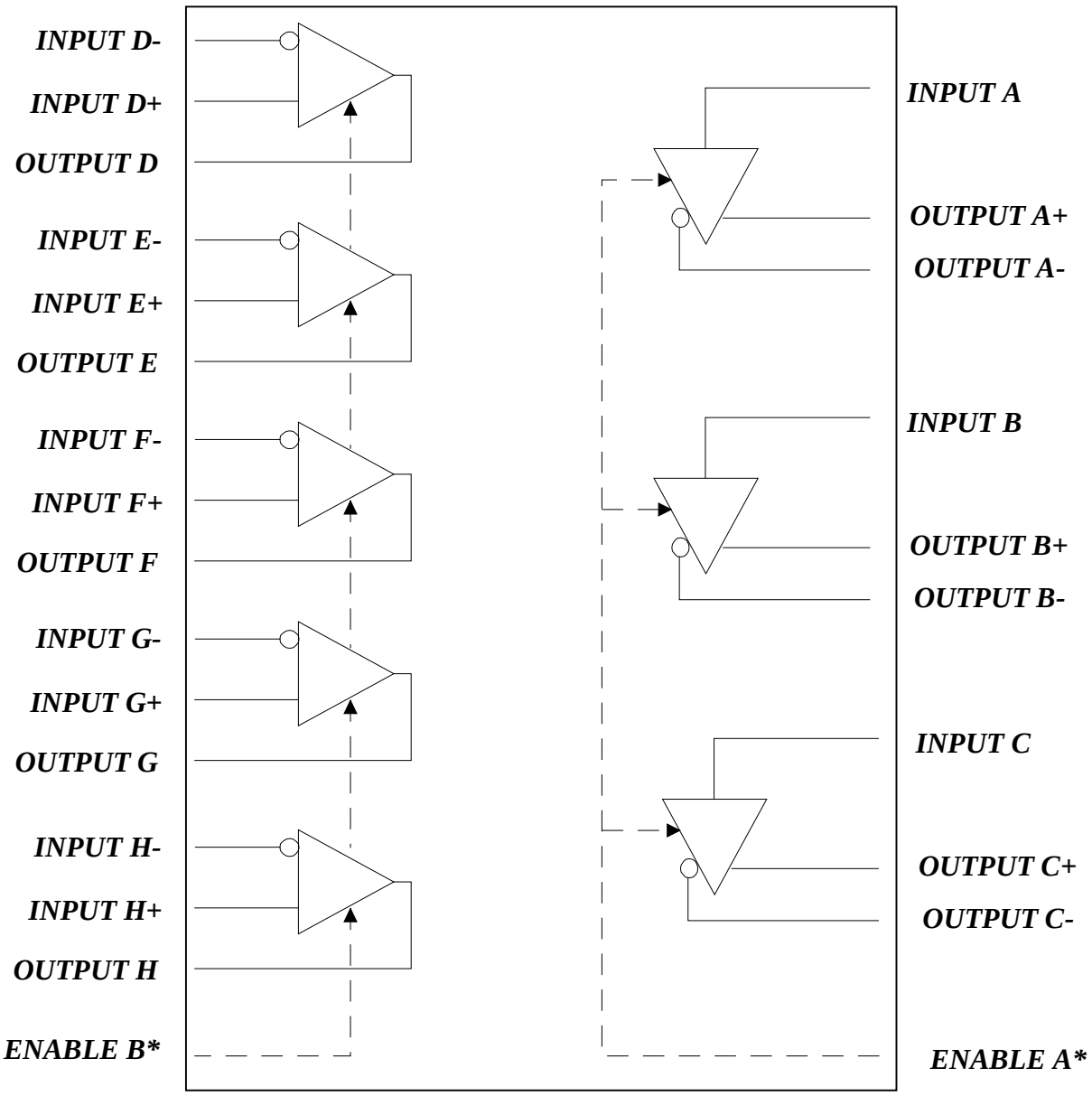


ORDERING INFORMATION

Part number	Package	Operating temperature
ST31C32CJ28	PLCC	0° C to + 70° C
ST31C32CF28	SOIC	0° C to + 70° C
ST31C32IJ28	PLCC	-40° C to + 85° C
ST31C32IF28	SOIC	-40° C to + 85° C

ST31C32

BLOCK DIAGRAM



SYMBOL DESCRIPTION

Symbol	Pin	Signal Type	Pin Description
INPUT B	1	I	Line driver B input pin.
OUTPUT B+	2	O	Line driver B differential non-inverted output pin.
OUTPUT B -	3	O	Line driver B differential inverted output pin.
OUTPUT C -	4	O	Line driver C differential inverted output pin.
OUTPUT C+	5	O	Line driver C differential non-inverted output pin.
INPUT C	6	I	Line driver C input pin.
ENABLE A*	7*	I	Gate control A (active low). This pin enables/ disables the three line driver outputs.
OUTPUT D	8	O	Line receiver D output pin.
INPUT D +	9	I	Line receiver D differential non-inverted input pin.
INPUT D -	10	I	Line receiver D differential inverted input pin.
INPUT E -	11	I	Line receiver E differential inverted input pin.
INPUT E +	12	I	Line receiver E differential non-inverted input pin.
OUTPUT E	13	O	Line receiver E output pin.
GND	14	O	Signal and power ground.
ENABLE B*	15*	I	Gate control B (active low). This pin enables/ disables the five line receiver outputs.
INPUT F -	16	I	Line receiver F differential inverted input pin.
INPUT F +	17	I	Line receiver F differential non-inverted input pin.
OUTPUT F	18	O	Line receiver F output pin.
OUTPUT G	19	O	Line receiver G output pin.
INPUT G +	20	I	Line receiver G differential non-inverted input pin.

ST31C32

SYMBOL DESCRIPTION

Symbol	Pin	Signal Type	Pin Description
INPUT G -	21	I	Line receiver G differential inverted input pin.
INPUT H -	22	I	Line receiver H differential inverted input pin.
INPUT H +	23	I	Line receiver H differential non-inverted input pin.
OUTPUT H	24	O	Line receiver H output pin.
OUTPUT A -	25	O	Line driver A differential inverted output pin.
OUTPUT A+	26	O	Line driver A differential non-inverted output pin.
INPUT A	27	I	Line driver A input pin.
VCC	28	I	Power supply pin.

*Has internal pull-up resistor on input

Receiver Functional table

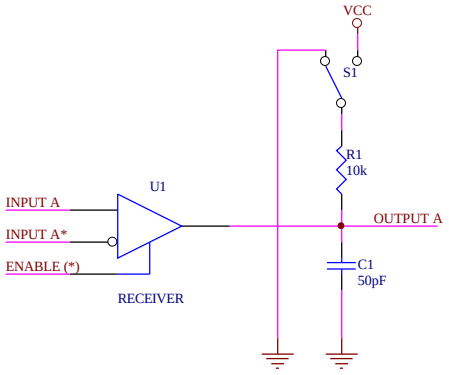
Enable B	Differential Non-Inverting Input	Differential Inverting Input	Output
H	X	X	Z
L	L	H	L
L	H	L	H

Driver Functional table

Enable A	Input	Differential Non-Inverted Output	Differential Inverted Output
H	X	Z	Z
L	L	L	H
L	H	H	L

X=Don't care
Z=Three state (high impedance)

ST31C32 RECEIVER AC TEST CIRCUIT



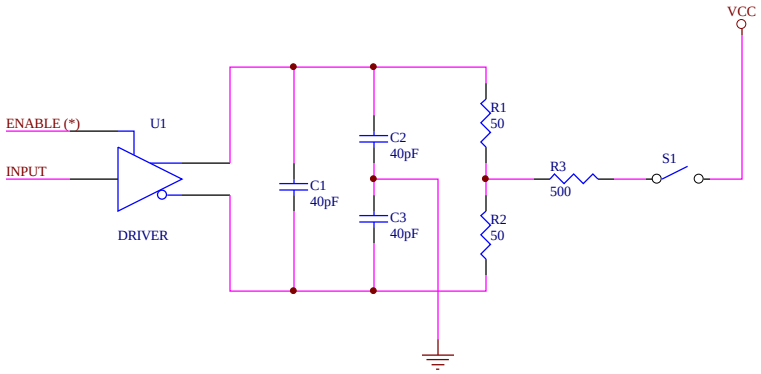
ST31C32

AC ELECTRICAL CHARACTERISTICS

T_A=0° - 70° C, Vcc=5.0 V ± 10% unless otherwise specified.

Symbol	Parameter	Limits Min	Limits Typ	Limits Max	Units	Conditions
	Line Receiver Timing					
T_1	Propagation delay, input to output		8	10	ns	S1=VCC
T_2	Propagation delay, input to putput		18	20	ns	S1=GND
T_3	Output enable time		18	20	ns	V_{DIF}=2.5V
T_4	Output disable time		18	20	ns	V_{DIF}=2.5V
	Line Driver Timing					
T_1	Propagation delay, input to output		8	10	ns	S1 open
T_2	Differential output rise and fall time		8	10	ns	S1 open
T_3	Output enable time		18	20	ns	S1 close
T_4	Output disable time		18	20	ns	S1 close
T_5	Skew		0.5		ns	S1 open

ST31C32 DRIVER AC TEST CIRCUIT



ST31C32

ABSOLUTE MAXIMUM RATINGS

Supply range	7 Volts
Voltage at any pin	GND-0.3 V to VCC+0.3 V
Operating temperature	0° C to +70° C
Storage temperature	-40° C to +150° C
Package dissipation	500 mW

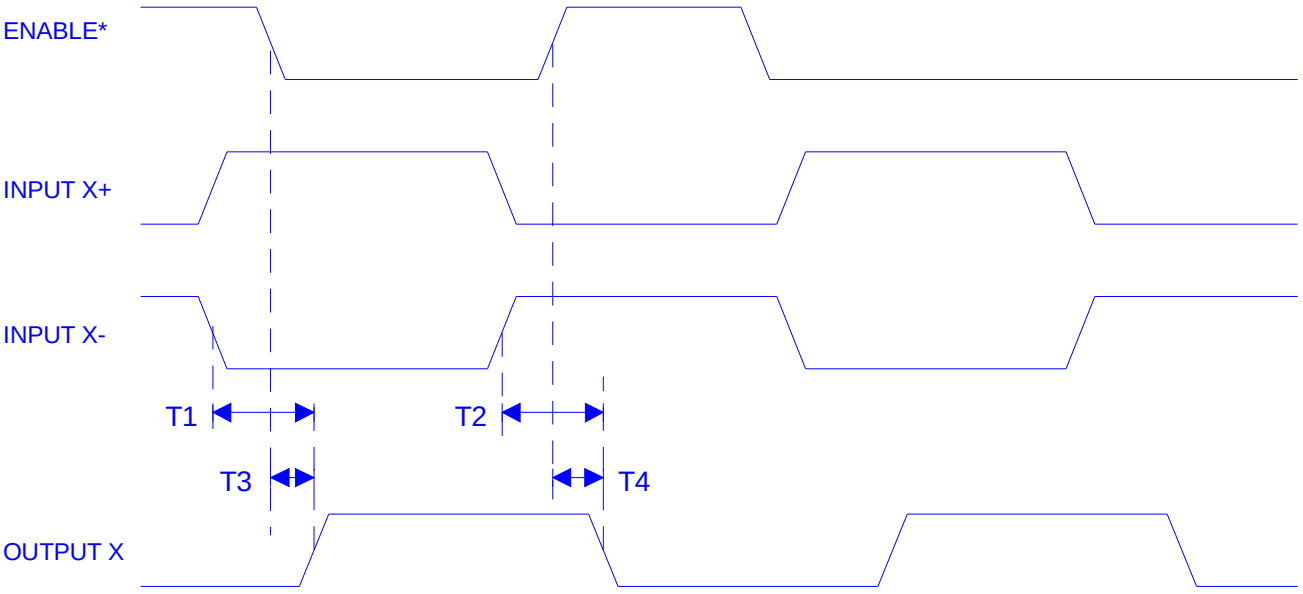
DC ELECTRICAL CHARACTERISTICS

T_A=0° - 70°C, Vcc=5.0 V ± 10% unless otherwise specified.

Symbol	Parameter	Limits Min	Typ	Max	Units	Conditions
V_{IH}	Enable high level	2.0			V	
V_{IL}	Enable low level			0.8	V	
V_{ROH}	Receiver output high level	3.8			V	
V_{ROL}	Receiver output low level			0.4	V	
V_{RID}	Receiver differential input level	-0.2		+0.2	V	R_L=100Ω
V_{RH}	Receiver input hysteresis		50		mV	
I_{RIN}	Receiver input current			±1.0	μA	
V_{RR}	Receiver input resistance	5		15	KΩ	
I_{CC}	Operating current		25		mA	
I_{OZ}	Three state output leakage		±2.0		μA	
V_{DOH}	Driver input high level	2.5			V	
V_{DOL}	Driver output low level			0.5	V	
V_{DOS}	Driver differential output level	2.0			V	R_L=100Ω
V_{DOC}	Driver Common mode output voltage			3.0	V	R_L=100Ω
V_{DOD}	Driver difference in common mode output			0.4	V	R_L=100Ω
I_{DIN}	Driver input current			±1.0	μA	

ST31C32

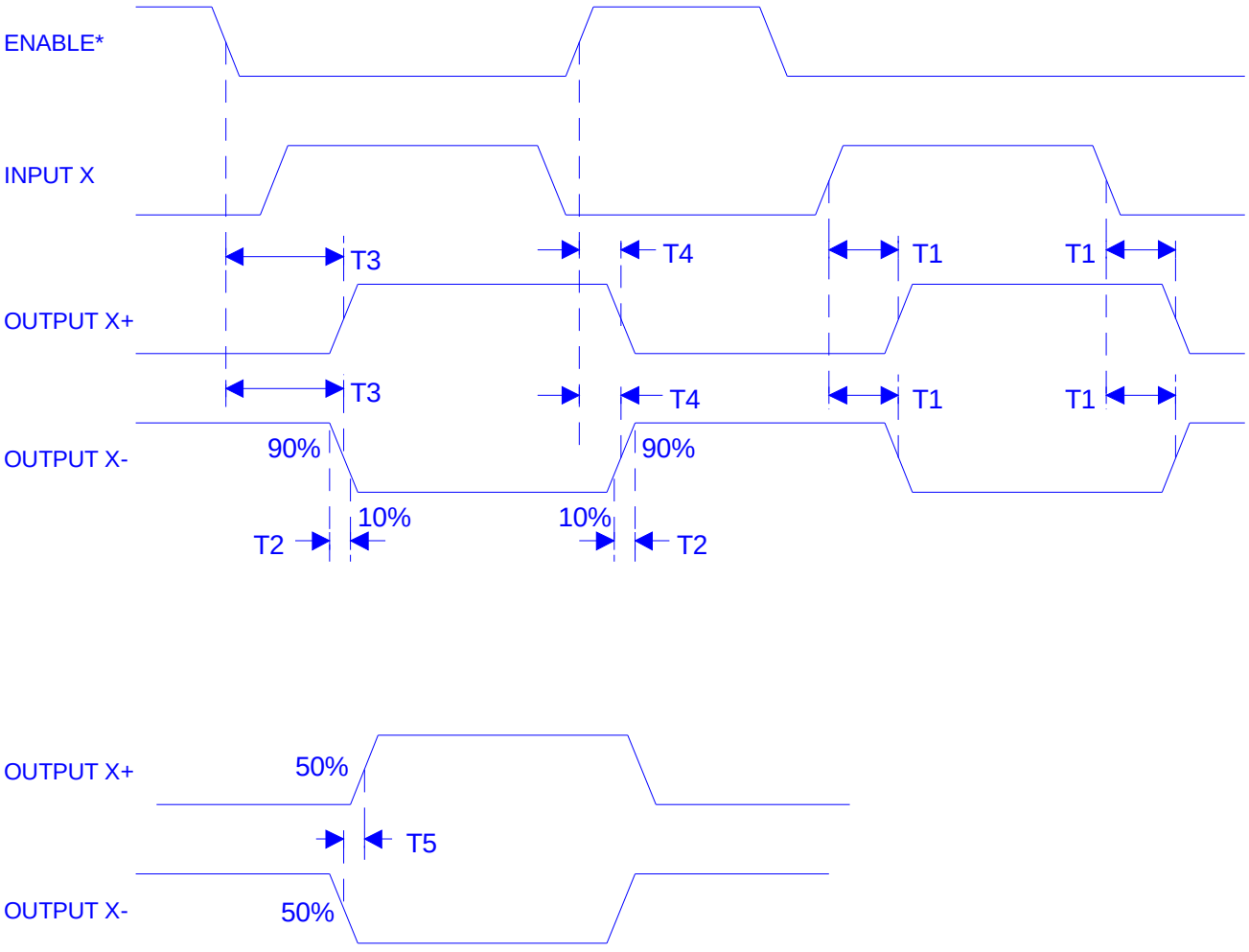
DIFFERENTIAL LINE RECEIVER TIMING



3450-CK-2

ST31C32

DIFFERENTIAL LINE DRIVER TIMING



3132-CK-1