

**XRT7295/96**

**Evaluation System**  
**For Surface Mount Products**  
**User Manual**

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### INTRODUCTION

The XR-T7295/96 Evaluation System (see *Figure 1.*) is intended to facilitate and speed-up the evaluation of this high performance DS3/STS-1/E3 Integrated Line Receiver/Transmitter. The XR-T7295 is a fully integrated line receiver designed for DS3 or STS-1 applications. The XR-T7295E is designed for E3 applications. Functions included are receive equalizer (optional), automatic gain control (AGC), clock recovery and data retiming, loss of signal and loss of frequency lock detection. Input sensitivity for the receiver section is adjustable which allows input signals at the monitor level (-20dB below the allowed DSX-3 signal levels).

The XR-T7296 is a fully integrated line transmitter designed to operate at DS3, E3 or STS-1 data rates and complement either the XR-T7295 or the XR-T7295E receiver. The transmitter converts unipolar data and clock inputs into AMI encoded pulses according to AT&T Technical Advisory No. 34 or CCITT G.703 recommendations. This device provides B3ZS or HDB3 encoding and complimentary decoding and loopback (remote and local) functions which can be externally controlled. Coding errors and bipolar violations are detected and flagged at an output pin.

### ORDER INFORMATION

The evaluation board can emulate DS3, E3 or STS-1, depending on switch setting. To order your evaluation board, please contact your local sales office.

Two boards available:

- One assembled for DS3/STS-1 (XR-T7295IW)
- One assembled for E3 (XR-T7295-1EIW)

Please specify the type of transmission (E3 or DS3/STS-1) in the order.

### BOARD LAYOUT CONSIDERATIONS

The following considerations are provided to obtain maximum device sensitivity and performance: Analog ground (GNDA) must connect to the ground plane at the pin.

Digital outputs should have series resistor to reduce reflections. Follow the recommended power supply bypassing scheme as shown in the schematic.

Place line termination resistor, PLL loop filter capacitor, and power supply bypassing components as close as possible to the IC.

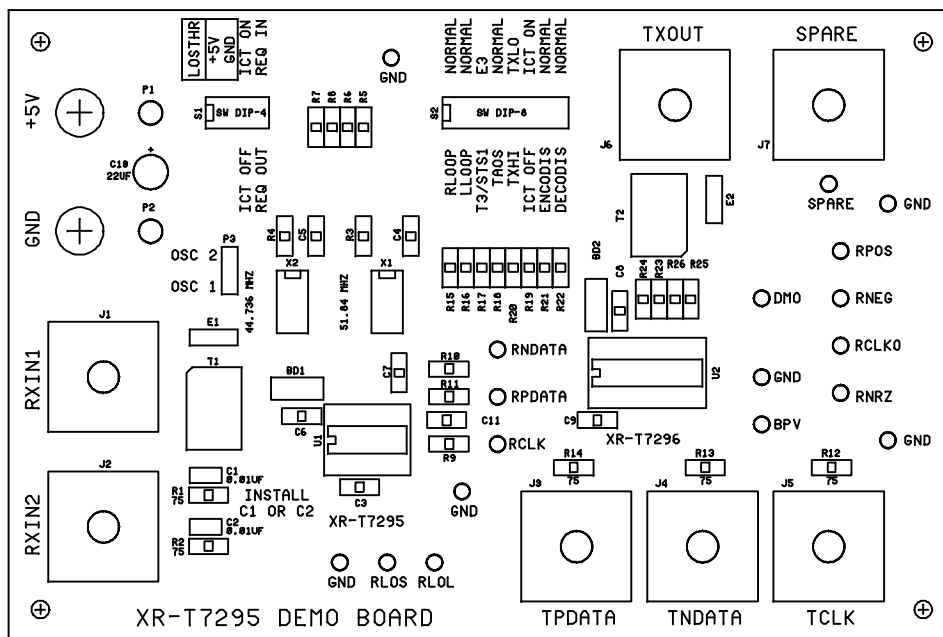


Figure 1. Evaluation Board

## POWER SUPPLY CONNECTORS

### V<sub>CC</sub>, GND

Banana plug input connectors are provided to supply power and ground to the receiver and transmitter.

## RECEIVER I/O S AND CONTROL PINS

### Receiver Input

The bipolar input is a single ended analog input for the XR-T7295 receiver IC. Two input configurations are possible, one input method is to use a transformer coupled system this require C1 in place and C2 removed, the other method is to connect the line to the receiver via a capacitor therefore C2 must a mounted and C1 removed. The data rate at this input must correspond to the crystal oscillator provided in the locations X1 or X2. The jumpers E1 and E2 are for the possibility to electrically isolate the board from the system and have the demo board floating towards the line.

### EXCLK

Two crystal oscillators are provided on the board the crystal in location X1 is selected by inserting a jumper between pin 1 and 2 on P3, X2 will be selected by inserting a jumper between pin 2 and 3 of P3.

### $\overline{\text{ICT}}$ On/Off

The  $\overline{\text{ICT}}$  input is a static digital input which sets all digital outputs of the receiver and/or the transmitter in a high impedance state.

### REQB In/Out

This input pin selects the receive equalizer in or out of the data path.

## RECEIVER MONITOR OUTPUTS

The RLOS and the RLOL outputs are digital status indicators for loss of signal and loss of lock, respectively.

### LOSTHR

This pin controls the loss of signal threshold. Three settings are provided ( $V_{CC}$ ,  $V_{CC}/2$ , GND). Setting of this pin works as follows:

LOSTHR PIN VOLTAGE	V <sub>CC</sub>	GND
$V_{CC}/2$	ON	ON
$V_{CC}$	ON	OFF
GND	OFF	ON
FLOAT	OFF	OFF

Table 1.

## TRANSMITTER I/O s AND CONTROL PINS

### RLOOP, LLOOP

When set for RLOOP (remote loopback), all signals appearing on RPDATA and RNDATA are transmitted to the line using RCLK.

LLOOP (Local Loopback) causes TPDATA and TNDATA to go through the encoder and output at RPOS and RNEG respectively.

### T3, STS1 or E3 Operation

This input selects which encoder/decoder combination should be used. A high on this pin sets the B3ZS encoder/encoder, a low selects HDB3 mode.

### TAOS

A high on this pin causes a continuous AMI of all 1 s to be transmitted on the line.

### ENCODIS/DECODIS

These two pins enable or disable the B3ZS or HDB3 coders from their respective data path.

### TXH1/TXL0

The output signal amplitude at TTIP and TRING can be selected by taking this pin high or low. For cable lengths greater than 225 feet TXLEV should be set high. For cable lengths less than 225 feet, it should be set low.

## RECEIVER OUTPUTS

RPOS, RNEG, RCLK AND RNRZ are the receiver outputs after going through the receive side decoder of the transmitter IC.

## TRANSMITTER OUTPUT

This is a bipolar output signal to be transmitted to the line through a 1:1 transformer from the TTIP and TRING outputs. The output signal complies to the AT&T TA #34 or G.703 pulse template.

## TRANSMITTER INPUTS

These are dual rail NRZ data signals which correspond to the bipolar data to be transmitted to the line. TPDATA and TNDATA are both sampled on the falling edge of TCLK and can be tied together for binary input signals.

## TRANSMITTER MONITOR OUTPUTS

Bipolar Violations (BVP) and Driver Monitor (DMO) outputs are digital status indicators. The Bipolar Violations pin goes high for one bit period when a bipolar violation or coding error is detected in the received signal.

The driver monitor circuit monitor senses the transmitted signals at MTIP/MRING and goes high if there is no transmitted signal for 128+/-32 TCLK periods.



QTY	REFERENCE	DESCRIPTION	SUPPLIER
2	T1,2	Transformer, 1:1 Ratio	Pulse Corp. PE-68629
5	R1,2,12,13,14	75 $\Omega$ , 1/8 W, 1%, 1206 Size, Chip Resistor, Panasonic	Digikey P75.0FCT-ND (Bulk Packed)
14	R3,4,5,6,7,8,15,16,17,18,19,20,21,22	22.1K, 1/8 W, 1%, 1206 Size, Chip Resistor, Panasonic	Digikey P22.1KFCT-ND (Bulk Packed)
5	R9,10,11,23,24	36.5 $\Omega$ , 1/8 W, 1%, 1206 Size, Chip Resistor, Panasonic	Digikey P36.5KFCT-ND (Bulk Packed)
2	R25,25	274 $\Omega$ , 1/8 W, 1%, 1206 Size, Chip Resistor, Panasonic	Digikey P274CT-ND (Bulk Packed)
2	C1,2	0.01 $\mu$ F, 63V, X7R Dielectric, Axial lead, 0.1 Spacing (Thru-hole), Panasonic	Digikey P4881-ND
8	C3,4,5,6,7,8,9,11	0.1 $\mu$ F, 50V, X7R Dielectric, Chip Capacitor, Panasonic	Digikey PCC104BCT-ND
1	C10	22 $\mu$ f, 16V Electrolytic Cap., Radial lead, 0.1 spacing (Thru-hole)	Digi-key P5228
2	BD1,2	SMT ferrite bead	Fair-Rite Products 2743019446
7	J1,2,3,4,5,6,7	PC board mount BNC Connector	H&P 44FO794
1	X1	44.736MHz Osc. Module - Tristate (DS3/STS1 Unit, XR-T7295)	Monitor Products 975HHT
1	X2	51.84MHz Osc. Module - Tristate (DS3/STS1 Unit, XR-T7295)	Monitor Products 975HHT
1	X1	34.368MHz Osc. Module (E3 Unit, XR-T7295E)	Monitor Products 975HHT or 975H (not tri-satate)
1	S1	4-SECTION DIP SWITCH	Digi-key CT-2064
1	S2	8-SECTION DIP SWITCH	Digi-key CT-2068
1	E1,E2	Shorting jumper (shunt)	(Oscillator Selection)
1	P3	3 pin single-row header, gold	Digi-key S9002-ND
18	TP1 to TP18	Pins for Test Point connections	Digi-key ED-5052-ND
2	P1,P2	Banana Jacks (1 Black and 1 Red)	Digi-key J151-ND
4		Spacers to elevate board	
4		4-40 x 5/16 screws for spacers	

**Table 2. XR-T7295 Demo Board Parts List**

### Alternative Transformers

PULSE PE65966

PULSE PE65967 (Surface mount)

TTI 7170



## Magnetic Supplier Information

### **Transpower Technologies, Inc.**

24 Highway 28, Suite 202  
Crystal Bay, NV 89402-0187  
Tel. (702) 831-0140  
Fax. (702) 831-3521

### **Pulse**

Telecom Product Group  
P.O. Box 12235  
San Diego, CA 92112  
Tel. (619) 674-8100  
Fax. (619) 674-8262

### **Fair-Rite Products Corp.**

P.O. Box J  
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Walkkill, NY 12589  
Tel. (914) 895-2055  
Fax. (914) 895-2629  
E-Mail. ferrites@fair-rite.com



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