PCM Line Receiver & Clock Recovery Circuit

GENERAL DESCRIPTION

The XR-T5650 is a monolithic bipolar IC designed for PCM type line receiver applications operating at T1. T148C, T1C and 2 M bit/s data rates. It provides all the active circuitry required to perform automatic line build out (ALBO), threshold detection, positive and negative data and clock recovery.

Clock recover using a crystal filter instead of an LC tank circuit is also available as XR-T5750.

FEATURES

On Chip Positive and Negative Data, Clock Recovery
Less than 10 ns Sampling Pulse over the Operating Range
Double Matched ALBO Ports
Single 5.1 V Power Supply
2 M Bit/s Capability

APPLICATIONS

T1 PCM Line Receiver
T148C Line Receiver
T1C PCM Line Receiver (requires external amplifier)
General Purpose Bipolar Line Receiver
HDB3 Line Receiver
B8ZS Line Receiver

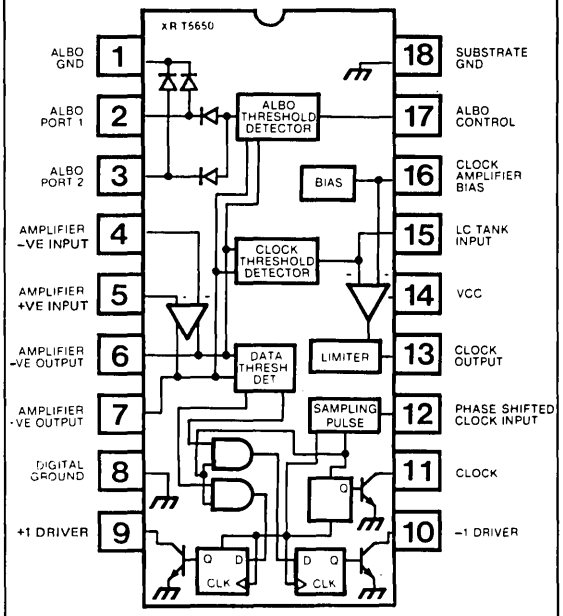
ABSOLUTE MAXIMUM RATINGS

Storage Temperature	-65°C to +150°C
Operating Temperature	-40° to +85°C
Supply Voltage	-0.5 to +10 V
Supply Voltage Surge (10 ms)	+25 V
Input Voltage (except Pins 2,3,4,17)	-0.5 to 7 V
Input Voltage (Pins 2,3,4,17)	-0.5 to +0.5 V
Data Output Voltage (Pins 10,11)	20 V
Voltage Surge (Pins 5,6,10,11) (10 msec only)	50 V

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-T5650	Ceramic	-40°C to +85°C

FUNCTIONAL BLOCK DIAGRAM



SYSTEM DESCRIPTION

The XR-T5650 is designed for interfacing T1, T148C and 2 Mbit/s PCM carrier lines on plastic or pulp insulated cables. It can also be used at T1C rate (3.152 M bit/s) with external gain. Since it outputs plus and minus ones on a bipolar pulse stream together with the clock, it can be used to interface systems having different line codes like AMI, AMI-B8ZS or AMI-HDB3.

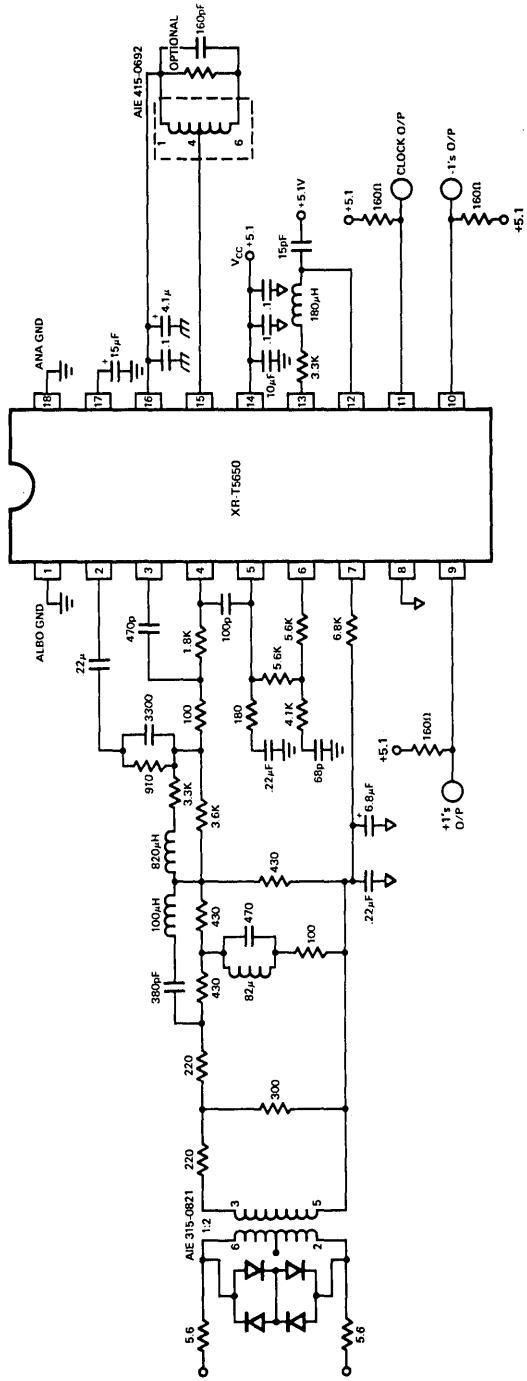
The XR-T5650 is a modified version of XR-T5620 PCM repeater IC. It contains all the active circuitry needed to build a PCM line receiver up to 6300 ft. cable length. The preamplifier, the clock amplifier, threshold detectors, data latches and output drivers are similar to the ones on XR-T5620. Clock extraction is done by means of an LC tank circuit.

In addition to plus and minus one outputs, a synchronous clock signal is made available at Pin 11 by deleting one of the ALBO ports on XR-T5620 thus leaving two matched ALBO ports. All outputs have high current open collector transistors.

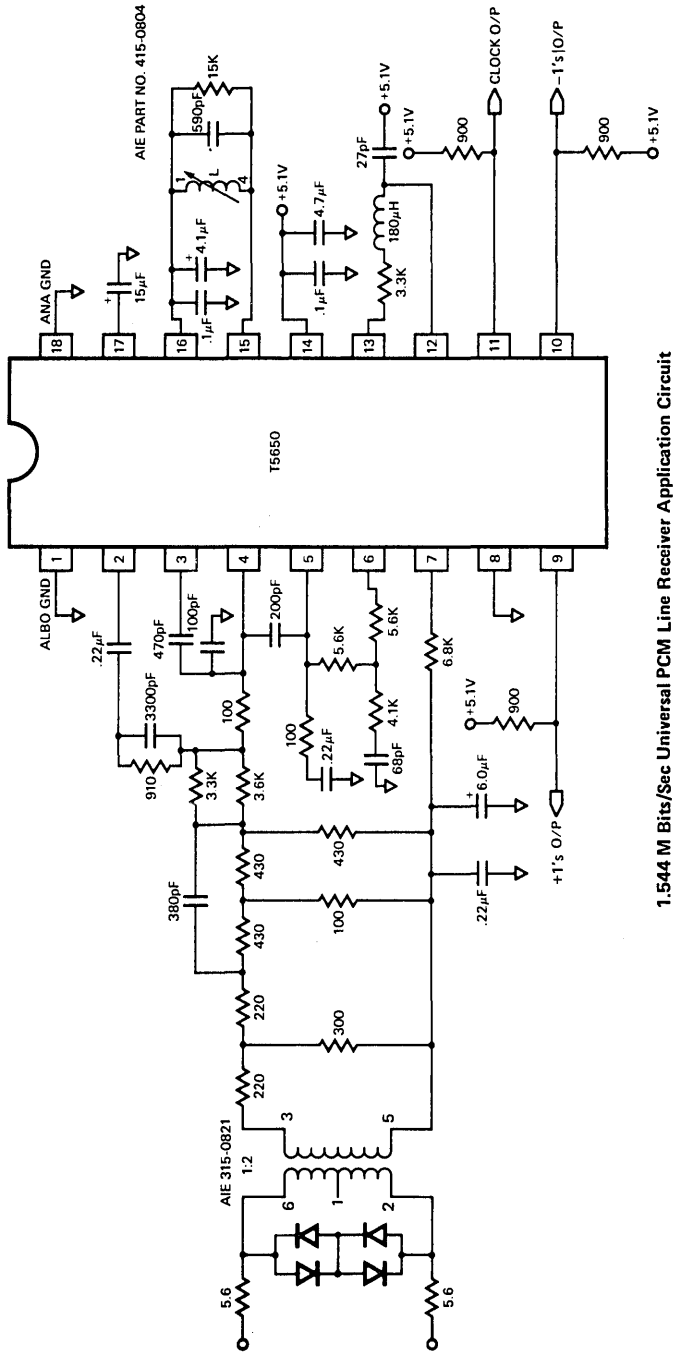
ELECTRICAL CHARACTERISTICS

Test Conditions: V_{CC} = 5.1 V ± 5%, T_A = 25°C, unless specified otherwise.

SYMBOL	PARAMETERS	MIN.	TYP.	MAX.	UNIT	CONDITIONS
	Supply Current		26	34	mA	ALBO Off
	Clock & Data Output					
	Output Leakeage Current		0	100	µA	$V_{pull\text{-}up}$ = 15 V
	Amplifier Pin Voltages	2.4	2.9	3.4	V	At DC Unity Gain
	Amplifier Output					
	Offset Voltage	-50	0	50	mV	R_S = 8.2 kΩ
	Voltage Swing	2.2			V	Measured Differentially from Pin 7 to Pin 6
	Amplifier Input					
	Bias Current			5	µA	
	ALBO on Current	3			mA	
	Drive Current		1		mA	
AC CHARACTERISTICS						
	Pre Amplifier					
	AC Gain @ 1 MHz		50		dB	
	Input Impedance	20			kΩ	
	Output Impedance			200	Ω	
	Clock Amplifier					
	AC Gain		32		dB	
	-3 dB Bandwidth	10			MHz	
	Delay		10		ns	
	Output impedance			200	Ω	
	ALBO					
	Off Impedance	20			kΩ	
	On Impedance			25	Ω	
CLOCK DATA OUTPUT BUFFERS						R_L = 130Ω, $V_{pull\text{-}up}$ = 5.1 V ± 5%
	Rise Time		30		ns	
	Fall Time		30		ns	
	Output Pulse Width		244		ns	
	Sample Pulse Width		10		ns	
	V_{OL}		0.7		V	
	I_L sink		35		mA	
THRESHOLDS						
	ALBO	1.4	1.5	1.6	V	
	Clock Drive Current Peak		1.0		mA	At $V_O = V_{ALBO}$ Threshold
CLOCK THRESHOLD						
	% of ALBO	63	69	75	%	
DATA THRESHOLD						
	% of ALBO	40	46	52	%	



1.544 M Bits/Sec Universal PCM Line Receiver Application Circuit
Random Pattern – Max. Cable Loss 36 dB



1.544 M Bits/Sec Universal PCM Line Receiver Application Circuit
Maximum Cable Loss 25 dB