Data Buffer

GENERAL DESCRIPTION

The XR-2125 is a logic circuit designed to perform the data buffer function for Bell 212A type modem systems. Both asynchronous to synchronous and synchronous to asynchronous conversions are performed at nominal data rates of 1200 bits per second. The XR-2125 is selectable for character lengths of 9 or 10 bits. Separate enable/disable inputs are supplied for async to sync and sync to async converter sections. These inputs allow the same data lines to be used for asynchronous or synchronous operation.

The receive data buffer section (sync to async) accepts input sync data (typically from the modem demodulator) at 1200 BPS and converts it to a 1219 BPS async data format. The transmit data buffer (async to sync) accepts input async. format data with a data rate of 1200 BPS +1%, -2.5% and it is synchronized to 1200 BPS, which is typically sent to the modulator. This section also provides break signal automatic extension.

The XR-2125 is constructed using silicon gate CMOS technology for low power operation. Operation is designed for an input clock frequency of 1.8432 MHz. The XR-2125, available in a 14 pin package, is designed for single 5 volt operation.

FEATURES

Bell 212A Compatible
Asynchronous to Synchronous Conversion
Synchronous to Asynchronous Conversion
Independent Disable Input for Receiver and Transmitter Sections
1.8432 MHz Clock
Break Signal Automatic Extension for Transmitter
1200 BPS +1%, -2.5% Operation
Single 5 Volt Operation
Standby Mode

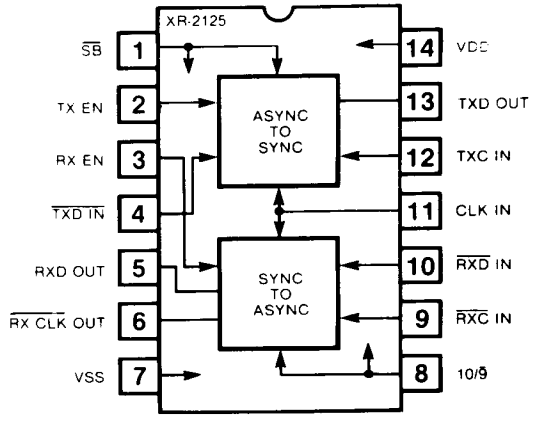
APPLICATIONS

Bell 212A Data Buffer
Dedicated 1200 BPS Terminals
Point-of-Sale Terminals

ABSOLUTE MAXIMUM RATINGS

Power Supply	-0.3 to +7.0 V
Input Voltage	-0.3 to V_{DD} +0.3
DC Input Current (Any Input)	±100μA
Power Dissipation	250 mW
Storage Temperature Range	-65°C to +125°C

FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-2125CN	Ceramic	0°C to 70°C
XR-2125CP	Plastic	0°C to 70°C

SYSTEM DESCRIPTION

The XR-2125 provides the complete interface between synchronous and character - asynchronous data systems. The synchronous side consists of two lines, T_{XD} and R_{XD}, each with their respective clocks, T_{XC} and R_{XC}. The synchronous portion is designed for data rates of 1200 ± .01% BPS. The asynchronous side handles data oriented in characters where the actual data bits are bracketed by a start and stop bit. Character lengths of 9 or 10 bits (7 or 8 data bits), pin selectable, are accepted.

To perform this interface, the XR-2125 consists of two main sections: synchronous to asynchronous (receive section) converter to reinsert stop bits deleted by the sending modem. The other section is the asynchronous to synchronous converter (transmit section) to add or delete stop bits to correct the transmit data rate to 1200 BPS. This section also extends the break signal to two character lengths plus three bits when it comes in at a shorter period.

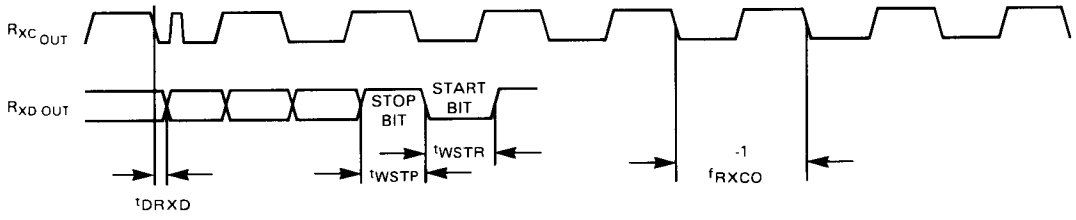
A standby mode is included to put the XR-2125 in a low supply current, non-operative, mode on command.

ELECTRICAL CHARACTERISTICS

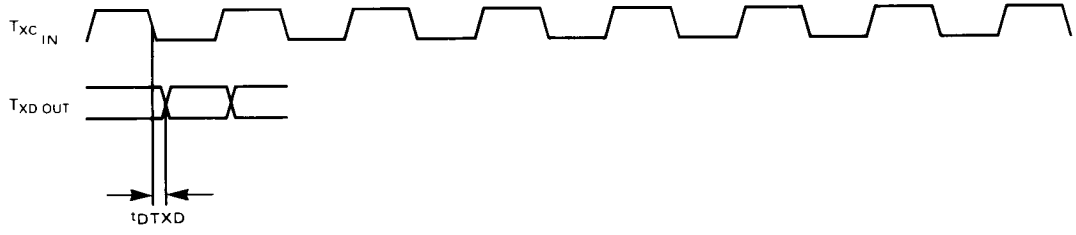
Test Conditions: V_{DD} = 5 V ± 5%, T_A = 25°C, CLK IN = 1.8432 MHz ±0.01%, unless otherwise specified.

SYMBOL	PARAMETERS	MIN.	TYP.	MAX.	UNIT	CONDITIONS
DC CHARACTERISTICS						
V_{OL}	Output Low Voltage		0.05	0.8	V	I_{OL} = 2 mA
V_{OH}	Output High Voltage	2.4			V	I_{OM} = −400 µA
V_{IL}	Input Low Voltage			0.8	V	
V_{IH}	Input High Voltage	2.4			V	
I_{OL}	Output Low Current		2		mA	
I_{OH}	Output High Current			−400	µA	
I_{IN}	Input Current			±10	µA	V_{IN} = 0 - V_{DD}
I_{DD}	Supply Current Quiesent		100	250	µA	
I_{DD}	Supply Current Standby			1	µA	
AC CHARACTERISTICS: $f_{TXC\ IN}$ = 1200 ±0.01% Hz, $f_{RXC\ IN}$ = 1200 ±0.01% Hz.						
t_{wstr}	Start Bit Width		820		µs	
t_{wstp}	Stop Bit Width 9 Bit Character 10 Bit Character		 938 951		 µs µs	 Reinserted Stop Bits and (n) (820 µs) long
f_{txd}	TXD in Bit Rate	1170	1200	1212	BPS	
t_{dtxd}	TXD Out Delay Time			200	ns	C_L = 50 pf; 10/$\overline{9}$ = Hi
t_{drxd}	RXD Out Delay Time			200	ns	10/9 = Hi
f_{rxco}	RXC Out Frequency		1219		Hz	

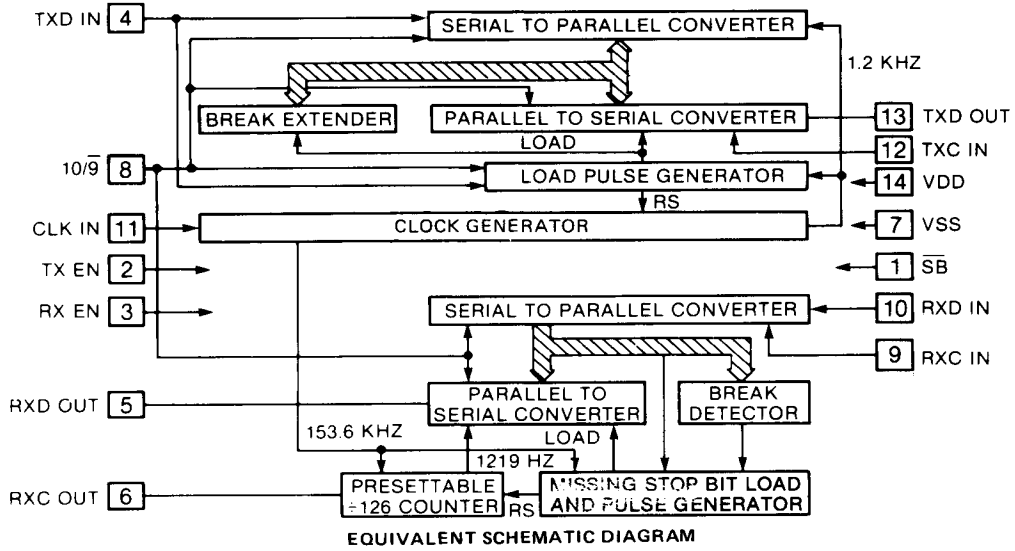
RECEIVE TIMING



TRANSMIT TIMING



TRANSMIT AND RECEIVE TIMING CHARACTERISTICS



EQUIVALENT SCHEMATIC DIAGRAM

DESCRIPTION OF INPUTS AND OUTPUTS

Pin	Name	Description
1	SB	This pin places the XR-2125 in a non-operative, low quiesent current mode, when low.
2	T_{XEN}	An enable input for the transmitter section (async to sync). When enabled, async to sync conversion is performed on $T_{XD\ IN}$. When disabled, the data on $T_{XD\ OUT}$ will be identical to that of $T_{XD\ IN}$ (flow through mode) In Bell 212A type modem applications the sync to async will be disabled for 300 BPS FSK operation and for 1200 BPS synchronous operation.
3	$R_{X\ EN}$	A digital enable input for the receiver section (sync to async). When enabled, sync to async conversion is performed on $R_{XD\ IN}$. When disabled, the data on $R_{X\ OUT}$ will be identical to that of $R_{XD\ IN}$ (flow through mode). In Bell 212A type modem applications the sync to async will be disabled for 300 BPS FSK operation and for 1200 BPS synchronous operation.
4	$T_{XD\ IN}$	The transmitter data input. This is a serial data stream with a data rate of 1200 BPS +1%/-2.5% ($T_{X\ EN}$ active).
5	$R_{XD\ OUT}$	The asynchronous serial data out-from the sync to async converter ($R_{X\ EN}$ active). The data rate of this signal is 1219 BPS (asychronous operation).
6	$R_{X\ CLK\ OUT}$	Received clock output.
7	V_{SS}	Ground pin. This should be tied to digital ground of the system.
8	$10/\overline{9}$	Asynchronous character length selection input. Ten bit (start bit, 8 data bits and a stop bit) or nine bit (7 data bits) can be selected.
9	$R_{XC\ IN}$	The receive clock input, which typically is supplied by the demodulator (XR-2122). The frequency should be 1200 Hz ± 0.01%.
10	$R_{XD\ IN}$	The synchronous serial data input which is typicall from the demodulator data output (R_{XD} of the XR-2122). The data rate of this signal is 1200 BPS ± 0.01%.
11	CLK IN	Master clock input of 1.8432 Hz ± 0.01%.
12	$T_{XC\ IN}$	The transmit clock input which is typically supplied by the modulator (XR-2121). The frequency should be 1200 Hz ± 0.01%.
13	$T_{XD\ OUT}$	The synchronous serial data output which typically goes to the modulator input (XR-2121). The data rate of this signal is 1200 BPS ± 0.01%.
14	V_{DD}	This pin provides the input for the positive power supply which should be +5 ± 0.25 volts.

CONTROL INPUTS

Table 1 gives the logic conditions for the various control inputs of the XR-2125.

PIN	NAME	FUNCTION LOGIC HIGH	FUNCTION LOGIC LOW
1	$\overline{SB}$	Normal Operation	Standby Mode
2	T_{XEN}	Transmitter Enabled	Transmitter Disabled
3	R_{XEN}	Receiver Enabled	Receiver Disabled
8	$10/\overline{9}$	10 Bit Character	9 Bit Character

Table 1. Control Input Conditions

PRINCIPLES OF OPERATION

The XR-2125 performs the complete asynchronous to synchronous and synchronous to asynchronous conversion on the serial transmit and receive data paths in a Bell 212A type modem. This conversion allows the synch modulator/demodulator such as the XR-2121/XR-2122 to communicate with the async DTE. The async format is character type as shown in Figure 1. The asynchronous to synchronous conversion is performed by detection of the start and stop bits with the proper timing relationship (9 or 10 bit word). When this pattern is detected, the serial-to-parallel

register is loaded and shifted into the parallel to serial converter to be clocked out with the synchronous transmit clock provided.

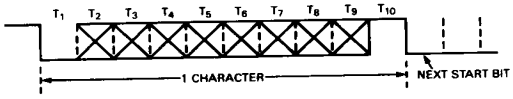


Figure 1. Async Character

Figure 1 shows each character starting with a start bit (T1) followed by either 7 or 8 data bits (8 shown → T2 - T9) and ending by a stop bit (T10) this makes a total character length of either 9 or 10 bits, which the XR-2125 can be selected for by pin 8, 10/9.

The XR-2125 can also provide "flow through" operation by disabling the transmit and receive sections using pins 2 and 3, T_{XEN} and R_{XEN}. This mode would be used for 1200 BPS sync mode or 300 BPS bit async operation.

Figure 2 illustrates a typical connection of the XR-2125. Pins 2 and 3 (T_{XEN} and R_{XEN}) are used to toggle the XR-2125 into the high speed asynchronous mode. The main function of the XR-2125 is to synchronize asyn-chronous data (1200 BPS + 1% - 2.5%) from the DTE to synchronous data (1200 BPS) for the modulator, and to take synchronous demodulated data (1200 BPS) and con-ver it to the 1219 BPS asynchronous format for the DTE.

The break detector serves to distinguish between an actual break character and two consecutive nulls with the stop bit deleted. It forces reinsertion of the stop bit between the nulls and passes

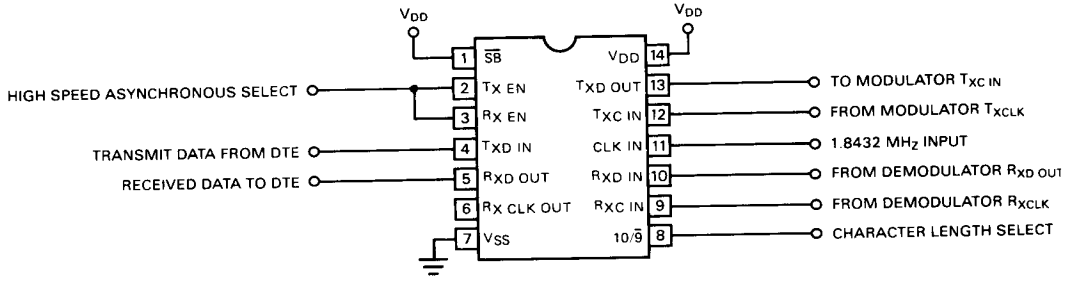


Figure 2. Typical Connection XR-2125