V.35 Interface Receiver/Transmitter

GENERAL DESCRIPTION

The V.35 chip set consists of two bipolar chips, one performing a receive function, the other a transmit function according to the specification requirements laid down in Appendix II of the V.35 CCITT Recommendation and Bell 306 modem interface specification.

Typical applications require three transmit and receive pairs to establish the link between distant DTE's at data rates ranging from 48Kbps to 10Mbps. To conserve power (especially in the case of the transmitter, which requires approximately 22mA for each output stage to meet CCITT specifications), power-down functions are included in both devices, allowing any of the three receive/transmit circuits to be disabled. All inputs and outputs are TTL compatible and designed to offer maximum versatility and performance.

Both the transmitter and receiver require termination resistors external to each device, to meet the V.35 specification tolerance.

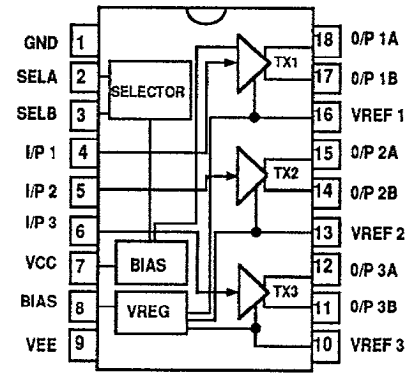
FEATURES

Compatible with CCITT V.35 and Bell 306 Interface Requirements
TTL Input Compatibility
High Common Mode Output Voltage Range
Excellent Stability over Supply and Temperature Range
High Speed Operation (up to 10Mbps)
Individual Receive/Transmit Power-down capability

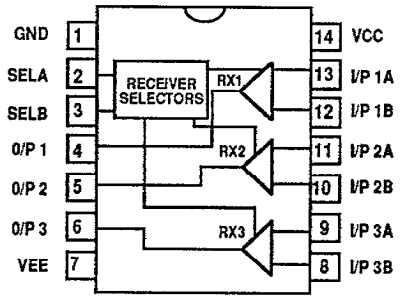
APPLICATIONS

High Speed Data Transmission Systems
Short Haul Modems
Signal Converters and Adapters
Network and Diagnostic Systems
Matrix Switches
Modem Emulators

PIN ASSIGNMENT



XR-T3588
TRANSMITTER



XR-T3589
RECEIVER

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-T3588CN	Ceramic	0°C to 70°C
XR-T3589CN	Ceramic	0°C to 70°C

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±7V
Storage Temperature	-65°C to +150°C
Power Dissipation	
XR-T3588CN	1000mW
XR-T3589CN	300mW

TRANSMITTER: XR-T3588
SYSTEM DESCRIPTION

The function of the transmitter is to take a TTL input signal at a maximum bit rate of 10Mbps and output a balanced differential signal with a peak amplitude of 0.55V and a maximum DC offset of 0.6V. An internal buffer provides the regulated output voltage to set the mean level of the transmitters to less than 0.6V.

To meet the pulse shape and offset requirements laid down in the V.35 specification, the transmitter employs an internal temperature compensated voltage generator to provide reference voltages for both offset control and output current generation. Load resistors for the output stage, which provide the required source impedance for the transmitter, are external to the IC and are required to meet the V.35 specified tolerance.

To generate well defined output pulses, device current is set using an external resistor, which should be of the same type as the transmitter load resistors. Each device contains three independent transmit circuits.

Individual transmitters may be shut down to achieve power savings for applications not requiring three channels. Two TTL compatible inputs provide four combinations of transmitter configurations, as defined in table 1. If either of the select pins is left open a high state is adopted, hence with no inputs applied, all channels are powered up.

TRANSMITTER	SEL A	SEL B
1-2-3	HIGH	HIGH
1-2	HIGH	LOW
1	LOW	HIGH
ALL OFF	LOW	LOW

TABLE 1. TRANSMITTER SELECTORS

XR-T3588 DC ELECTRICAL CHARACTERISTICS (TRANSMITTER)
Test Conditions: V_{CC} = 5V ± 5%, V_{EE} = -5V ± 5%, T_A = 0°C to 70°C

SYMBOL	PARAMETER	PINS	MIN	TYP	MAX	UNITS	CONDITIONS
V_{CC}	Positive Supply Voltage	7	4.75	5	5.25	V	
V_{EE}	Negative Supply Voltage	9	-4.75	-5	-5.25	V	
I_{CC}	Input Current	7		86	124	mA	
I_{EE}	Input Current	9		-92	-132	mA	
I_{PDL}	Power-down Input Current Low	2-6		-0.4		mA	Per Transmitter
I_{PDH}	Power Down Input Current High	2-6			50	mA	
I_{PCCO}	Power Down I_{CC} Current			9.2		mA	No Termination Resistors
I_{PEEO}	Power Down I_{EE} Current			11.6		mA	Mo Termination Resistors
I_{PCCT}	Power Down I_{CC} Current			51		mA	With Termination Resistor
I_{PEET}	Power Down I_{EE} Current			11.6		mA	With Termination Resistors
D_{IH}	High Level Input Voltage		2	2.5	V_{CC}	V	Data Inputs
D_{IL}	Low Level Input Voltage			0.4	0.8	V	Data Inputs
V_{SIH}	Selector High Level Voltage	2&3	2	2.5	V_{CC}	V	
V_{SIL}	Selector Low Level Voltage	2&3		0.4	0.6	V	
V_{OL}	Output Low Voltage			-0.275		V	*(NOTE 1)*
V_{OH}	Output High Voltage			0.275		V	*(NOTE 1)*
Z_s	Source Impedance		90	100	110	Ohm	per CCITT V.35
R_{GND}	Resistance to GND		135	150	165	Ohm	per CCITT V.35
I_{INH}	Input Current High			-10		µA	
I_{INL}	Input Current Low			1		mA	
I_{ODIFF}	Output Current Differential			22		mA	with 3.9K bias resistor *(NOTE 3)*

NOTE 1. *O/P Terminated with 100 Ohm Differential Load across external network pins 11, 12, 14, 15, 17, 18.*
NOTE 2. *O/P Terminated with External Network pins 11,12, 14, 15, 17, 18.*
NOTE 3. *O/P Terminated with External Network, common mode resistance between any pair of generator outputs and ground.*

AC CHARACTERISTICS

Test Conditions: V_{CC} = 5V ± 5%, V_{EE} = -5V ± 5%, T_A = 0°C to 70°C

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
$t_{(PLH)}$	Input (I/P to O/P)		25	50	nsec	***(NOTE 1)***
$t_{(PHL)}$	Input 1, 2, 3		25	50	nsec	***(NOTE 1)***
t_R	TX Rise Time		10	20	nsec	***(NOTE 1)***
t_F	TX Fall Time		10	20	nsec	***(NOTE 1)***

NOTE 1. *O/P Terminated with External Network.*

RECEIVER: XR-T3589
SYSTEM DESCRIPTION

The XR-T3589 Line Receiver contains three identical receive circuits to complement the XR-T3588 Line Transmitter. Received differential signals are converted into a single TTL compatible output. The input stage is designed to meet the full V.35 noise and common mode input specification.

Individual receivers may be shut down to achieve power savings for applications not requiring three channels. Two TTL compatible inputs provide four combinations of transmitter configurations, as defined in table 2. If either of the select pins is left open a high state is adopted, hence with no inputs applied, all channels are powered up.

RECEIVER	SEL A	SEL B
1-2-3	HIGH	HIGH
1-2	HIGH	LOW
1	LOW	HIGH
ALL OFF	LOW	LOW

TABLE 2. RECEIVER SELECTORS

XR-T3589 DC ELECTRICAL CHARACTERISTICS

Test Conditions: V_{CC} = 5V ± 5%, V_{EE} = -5V ± 5%, T_A = 0°C to 70°C

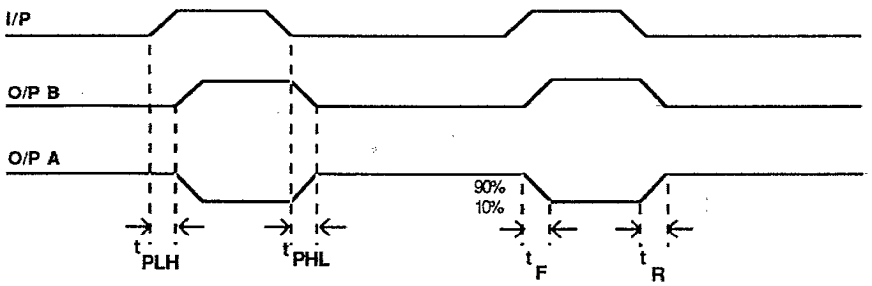
SYMBOL	PARAMETER	PINS	MIN	TYP	MAX	UNITS	CONDITIONS
V_{CC}	Supply Voltage	14	4.75	5	5.25	V	
V_{EE}	Supply Voltage	7	-4.75	-5	-5.25	V	
I_{CC}	Input Current	14		40	60	mA	
I_{EE}	Input Current	7		7	9	mA	
I_{CCH}	High Level Current	4,5,6	40			µA	
V_{CCL}	Low Level Current	4,5,6			-1.6	mA	
V_{OH}	High Level Output	4,5,6	2.4			V	
V_{OL}	Low Level Output	4,5,6			0.4	V	
Z_{IN}	Input Impedance		8			KOhm	Differential ***(NOTE 2)***
Z_{IN}	Input Impedance		90	100	110	Ohm	per CCITT V.35 ***(NOTE 1,2)***
R_{GND}	Resistance to GND		135	150	165	Ohm	per CCITT V.35 ***(NOTE 1,2)***
V_{TH}	Power-down Threshold Voltage			2		V	
I_{PCC}	Power Down I_{CC} Current			1.1		mA	
I_{PEE}	Power Down I_{EE} Current		0.3		mA		

NOTE 1. *I/P Terminated with External Network*
NOTE 2. *Pins (8,9), (10,11), (12-13)*

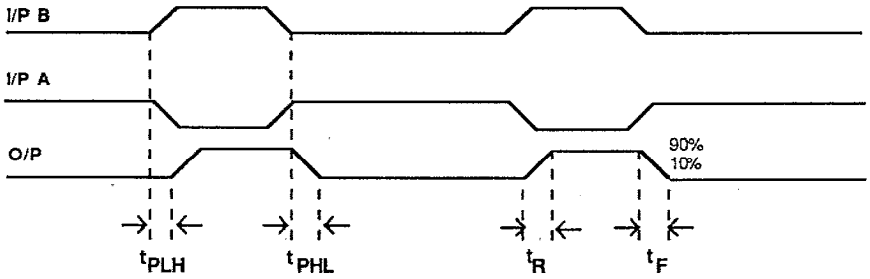
AC CHARACTERISTICS

Test Conditions: V_{CC} = 5V ± 5%, V_{EE} = -5V ± 5%, T_A = 0°C to 70°C

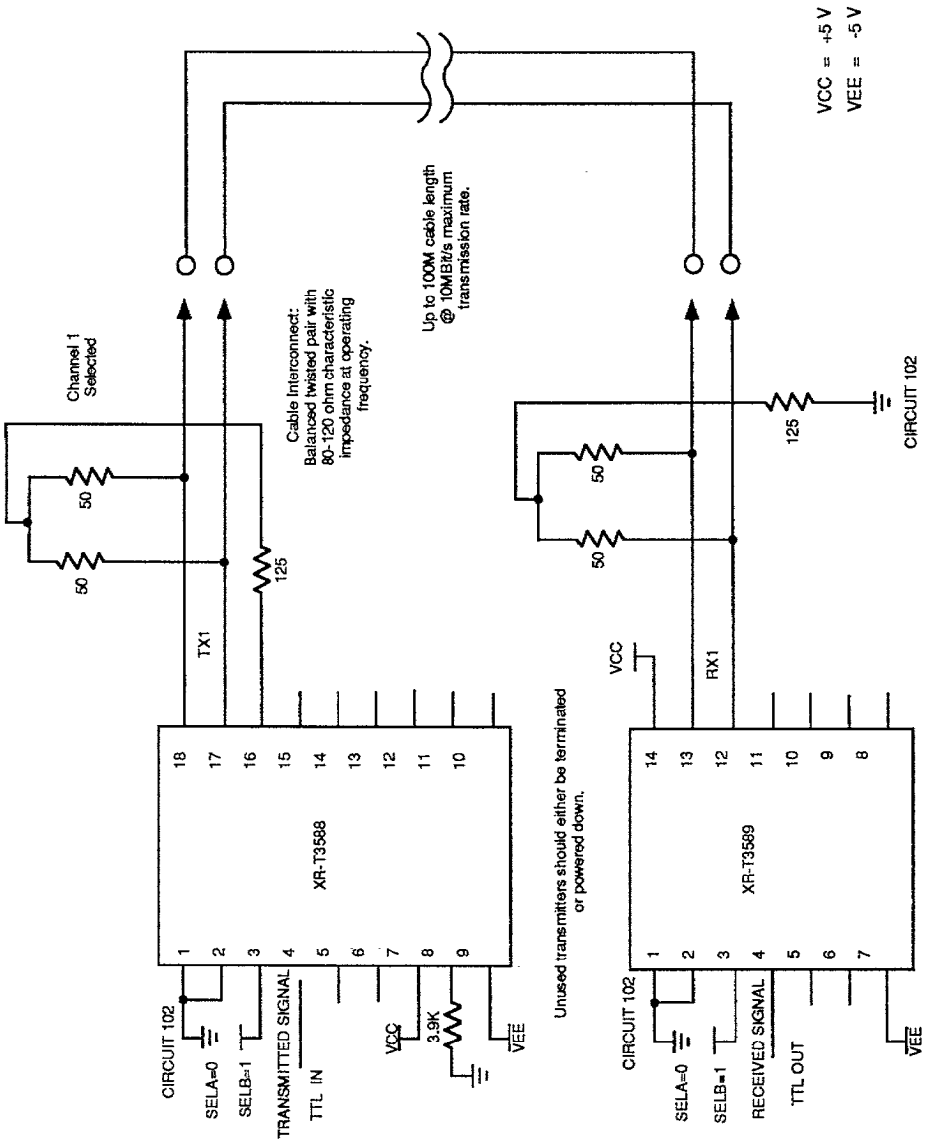
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
$t_{(PLH)}$	Input 1, 2, 3		50	70	nsec	
$t_{(PHL)}$	Input 1, 2, 3		50	70	nsec	
t_R	RX Rise Time		18	40	nsec	
t_F	RX Fall Time		12	30	nsec	



TRANSMITTER WAVEFORMS



RECEIVER WAVEFORMS



APPLICATION CIRCUIT XR-T3588, XR-T3589 (TERMINATION DIAGRAM)