xecom

XE1414VS, XE9624VS, XE9624GS

04-20-94

Single In-line Modem Family for Data, Fax, Voice

Description

Xecom now offers a family of Single In-line Modems. They combine data, fax, and voice in the smallest available package.

These Single In-line Modems are not just modem chips. They are complete modems including the telephone interface. They include user transferable FCC Part 68 registration and connect directly to the telephone line through an RJ11 jack.

We offer three versions of the Single In-line Modem; XE9624GS, XE9624VS, and XE1414VS. All models include both fax and data communications. The XE9624VS and XE1414VS also support ADPCM voice messaging applications. All models connect to the host through a TTL level serial interface. The chart below shows the capabilities of each model.

You can order the Single In-line Modems for upright or horizontal mounting. Upright mounting minimizes the board space the modem requires. The horizontal package can sit above small components to minimize space when vertical clearance is critical.

Xecom designed the XE1414VS specifically for notebook computer, industrial and telecommunications systems applications where communications is essential and space is at a premium.

Features

- Small Size; 1.5 " x 1.5" x 0.4"
- Modem control with "AT" commands
- Class 1 commands for facsimile control
- MNP and V.42 Error Control
- MNP5 Data Compression to 28,800 bps
- V.42bis Data Compression to 57,600 bps
- Plays and Records audio as ADPCM data

Single In-line Modem Capabilities

	XE9624GS	XE9624VS	XE1414VS
Maximum Fax Rate (Send and Receive)	9600 bps	9600 bps	14400 bps
Maximum Data Rate	2400 bps	2400 bps	14400 bps
Maximum Data Rate with Compression	2400 bps	9600 bps	57600 bps
Voice Sampling Rate	N/A	9600 s/sec	9600 s/sec
+5 Volt Power (operating)	200 mW	250 mW	550 mW
(Sleep Mode)	25 mW	25 mW	50 mW
(Power-Down)	<5 uW	<5 uW	<5 uW

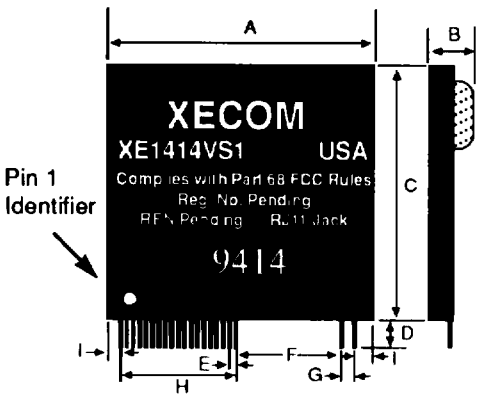
Single In-line Modem Models

Model	Description
XE9624GS1	2400 bps data, 9600 bps fax; upright mounting
XE9624GS2	2400 bps data, 9600 bps fax; horizontal mounting
XE9624VS1	ADPCM Voice, 2400 bps data, 9600 bps fax ; upright mounting
XE9624VS2	ADPCM Voice, 2400 bps data, 9600 bps fax ; horizontal mounting
XE1414VS1	ADPCM Voice, 14400 bps data & fax ; upright mounting
XE1414VS2	ADPCM Voice, 14400 bps data & fax ; horizontal mounting

Mechanical Specifications

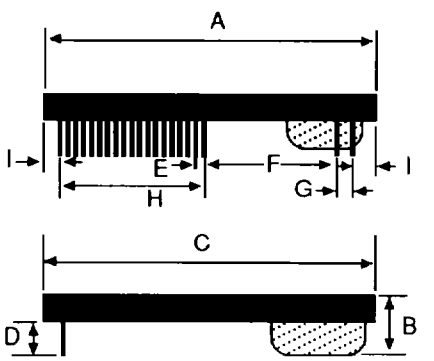
Upright Package

	INCHES		METRIC(MM)	
DIM	MIN	MAX	MIN	MAX
A	1.500	1.540	38.10	39.12
B	0.400	0.440	10.92	11.18
C	1.500	1.540	38.10	39.12
D	0.090	0.140	2.23	3.56
E	0.045	0.055	1.14	1.40
F	0.145	0.155	3.68	3.94
G	0.095	0.105	2.41	2.67
H	0.845	0.855	21.46	21.72
I	0.200	0.220	5.08	5.56



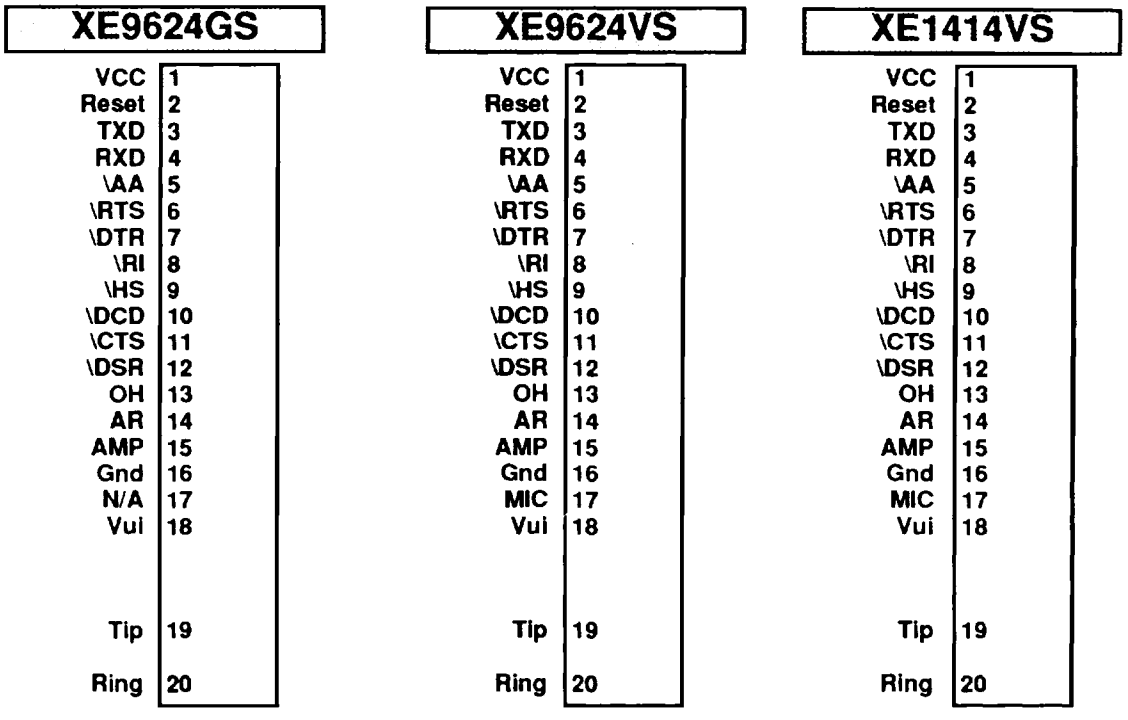
Horizontal Package

	INCHES		METRIC(MM)	
DIM	MIN	MAX	MIN	MAX
A	1.500	1.540	38.10	39.12
B	0.400	0.440	10.92	11.18
C	1.500	1.540	38.10	39.12
D	0.120	0.200	3.05	5.08
E	0.045	0.055	1.14	1.40
F	0.145	0.155	3.68	3.94
G	0.095	0.105	2.41	2.67
H	0.845	0.855	21.46	21.72
I	0.200	0.220	5.08	5.56



All Pins 0.018 inch square; tin-plated

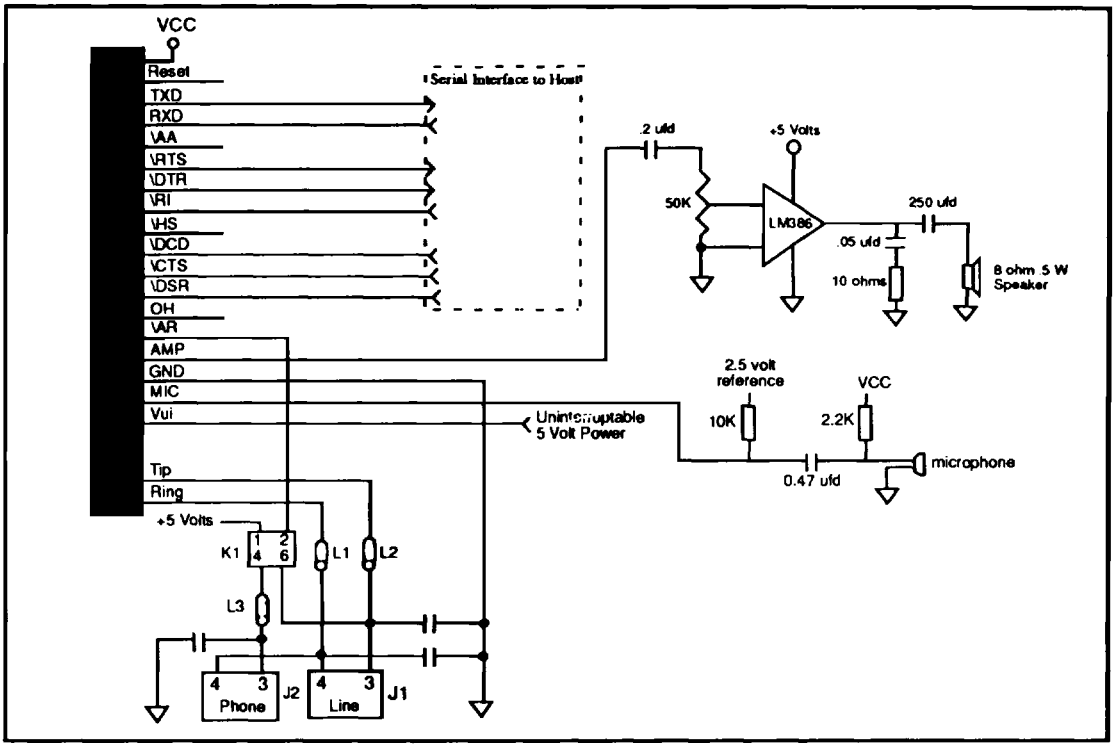
Pin Configuration and Definitions



PIN	NAME	I/O	DESCRIPTION
1	Vcc	—	+5 Volt power for the modem.
2	RESET	I	Hardware reset pin, Schmitt input, active HI, TTL. Xecom doesn't recommend use of an external reset.
3	TXD	I	Serial data input from the DTE (i.e. external UART). A logic "high" represents a "mark" and a low represents a"space", TTL.
4	RXD	O	Serial data output to the DTE (i.e. external UART). A logic "high" represents a "mark" and a logic "low" represents a "space", TTL.
5	\AA	O	Auto Answer enable indicator, output, active LO, TTL/CMOS. A low indicates the modem is set to automatically answer an incoming call.
6	\RTS	I	Request to Send, input, active LO, TTL. This pin regulates the flow of data from the modem during hardware flow control.

PIN	NAME	I/O	DESCRIPTION
7	\DTR	I	Data Terminal Ready, input, active LO, TTL. The function of this pin is set by the &D command.
8	\RI	O	Ring Indicator, output, active LO, TTL. When low indicates the telephone line is ringing. Vui provides power for the ring indicate output. The XE1414VS will detect a ring with VCC dropped provided Vui is supplied to the modem.
9	\HS	O	High Speed indicator, output, active LO, TTL/CMOS. Low when operating at 14,400bps rate, high otherwise.
10	\DCD	O	Data Carrier Detect, output, active LO, TTL/CMOS. Function is set by the &C command.
11	\CTS	O	Clear to Send, output, active LO, TTL/CMOS. This pin regulates the flow of data from the host during hardware flow control.
12	\DSR	O	Data Set Ready, output, active LO, TTL/CMOS. Function is controlled by the &S command.
13	OH	O	DAA hookswitch relay is closed in the "off-hook" position connecting the DAA to the telephone line.
14	\AR	O	Auxiliary Data/Voice Relay output, active Low, TTL/CMOS. AR closes an external auxiliary relay to allow the telephone line to be used for voice.
15	AMP	O	Audio output to speaker. Function is determined by L & M commands. This output can drive a 50Kohm load.
16	GND	—	Ground (0 volts)
17	MIC	—	Microphone input to the modem for audio recording. The XE9624GS does not include a microphone input.
18	Vui	—	Vui provides uninterupted power for the Ring Indication circuit.
19	TIP	—	Tip connection to the phone 3line(RJ11 pin3) from the internal DAA.
20	RING	—	Ring connection to the phone line(RJ11 pin4) from the internal DAA. **Caution: Observe design rules for Tip & Ring trace layout**

Modem Applications Schematic



Note: RJ11 Pin assignments reflect a 6-pin connector. Tip and Ring are always the center pins of the RJ11 jack.

Recommended Parts	
Reference Designation	**Recommended Part Number**
L1, L2, L3	TDK CB30-1812
C1, C2, C3	Sprague 30GAT47, 470 pfd, 3000 Volts
J1, J2	Stewart SS6446NF
K1	Theta J LCB110

AT Commands

The Single In-line Modem Family uses "AT" commands for configuration and control. Extensions to the AT commands support fax and voice.

Modes of Operation

Modems have four operational modes; Command, Fax, Data and Voice.

Data Mode: A modem enters data mode after establishing a connection and issuing a "CONNECT" result code. In the Data Mode all Transmit Data is sent to the remote modem and data from the remote modem is placed onto Received Data for the host equipment. When the modem exits data mode, it issues a "NO CARRIER" result code.

Command Mode: The modem enters command mode on power-up, reset, a lost connection, or receipt of an escape code. In command mode, the modem accepts commands from the host on transmit data. More than one instruction may be placed in each command line. Appropriate result codes are returned to the host on Received Data.

Fax Mode: The modem enters fax mode on receipt of AT+FCLASS=1. In fax mode commands and responses are issued at 19,200 bits per second; the character format is 8 bits no parity. The modem accepts Class 1 fax commands only while in the fax mode. The A/, ATO, AT&T and escape commands are not valid in fax mode.

Voice Mode: The XE1414VS and XE9624VS will enter voice mode on receipt of AT#VCL=1. The data rate in voice mode depends upon the type of voice compression used. (See Chart below) The voice sampling rate is 9600 samples per second. The modem accepts Voice commands only while in Voice mode.

Compression	Data Rate
Cirrus	57,600 bps
3-bit ADPCM	19,200 bps
4-bit ADPCM	38,400 bps

Command Line Format

Command lines issued to the modem follow a strict format. Each command begins with the prefix AT. The command line is stored in the command buffer and executed upon receipt of a carriage return. Until executed, the command line can be edited with the backspace key.

Command Prefix - Each command, except for the A/ command, begins with the AT prefix. The "A" and "T" may be either both caps or both lower case but cannot be of different cases. The prefix identifies the speed and parity of the commands sent by the host. Speed is determined by measuring the width of the incoming bits. The modem compares the parity bits of the "A" and the "T" to determine system parity. Result codes are normally sent at the speed and parity determined by the prefix.

Command Line - Multiple commands may be placed in a single command line. Commands are executed in the sequence they appear. Spaces may be inserted to improve legibility but do not fill space in the command buffer. A carriage return terminates the command line and causes the commands to be executed. Register S3 allows the user to select a character other than a carriage return to terminate the command line.

Command Buffer - Only 40 characters, including the AT prefix, may be loaded into the command buffer. If the command buffer overflows, the modem issues an "ERROR" result code and commands are not executed.

Command Line Editing - A backspace can be used to edit the command line. Hitting the backspace key, or Control and H keys simultaneously on some systems, erases the previous character in the command line. All of the characters in the command line can be erased except for the "A" and "T." Register S5 allows the user to select another character other than a backspace to edit the command line.

Re-Execute Last Command - The A/ command causes the modem to re-execute the last command line. This is the only command which does not require the "AT" prefix.

Omitted Parameters - Most commands include a parameter which determines the command function. When this parameter is omitted from the command string, it is assumed to be a 0.

Escape Characters - A three character escape sequence may be entered while in data mode to switch the modem into command mode while remaining on line. The escape character, set by Register S2, must be entered 3 times in succession to execute the escape. The default escape sequence is "+++."

Result Codes - The modem issues a result code after each action. Result codes may be provided as full words, numeric codes or may be disabled all together. Each result code ends with a carriage return when numeric result codes are chosen. When full word result codes are chosen, a Line feed and Carriage Return preceed and follow each result code.

AT Command Useage

The table below shows which AT commands are used on each of the Single In-line Modems. Command Descriptions follow.

	XE9624GS	XE9624VS	XE1414VS
A	Yes	Yes	Yes
Bn	Yes	Yes	Yes
D	Yes	Yes	Yes
En	Yes	Yes	Yes
Hn	Yes	Yes	Yes
In	Yes	Yes	Yes
Ln	Yes	Yes	Yes
Mn	Yes	Yes	Yes
Nn	Yes	Yes	Yes
On	Yes	Yes	Yes
Qn	Yes	Yes	Yes
Sr=n	Yes	Yes	Yes
Vn	Yes	Yes	Yes
Xn	Yes	Yes	Yes
Yn	Yes	Yes	Yes
Z	Yes	Yes	Yes
&Cn	Yes	Yes	Yes
&Dn	Yes	Yes	Yes
&F	Yes	Yes	Yes
&Gn	Yes	Yes	Yes
&Pn	Yes	Yes	Yes
&Sn	Yes	Yes	Yes
&Tn	Yes	Yes	Yes
&Un	No	No	Yes

	XE9624GS	XE9624VS	XE1414VS
&V	Yes	Yes	Yes
-Cn	No	No	Yes
-Jn	No	Yes	Yes
"Hn	No	Yes	Yes
"On	No	Yes	Yes
%A	No	Yes	Yes
%Cn	No	Yes	Yes
%Q	No	No	Yes
\An	No	Yes	Yes
\Bn	No	Yes	Yes
\Gn	No	Yes	Yes
\Jn	No	Yes	Yes
\Kn	No	Yes	Yes
\Nn	No	Yes	Yes
\On	No	Yes	Yes
\Qn	No	Yes	Yes
\Tn	No	Yes	Yes
\U	No	Yes	Yes
\Vn	No	Yes	Yes
\Xn	No	Yes	Yes
\Y	No	Yes	Yes
\Z	No	Yes	Yes
#V	No	Yes	Yes

AT Command List

A - Answer Command -

Bn - Select Communications Standard
- n=0 Selects CCITT standards
- n=1 Selects Bell standards

D - Dial Command -
- P = Pulse dial
- T = Tone dial
- R = Connect as an answering modem
- W = Wait for dial tone
- , = Pause for the duration ofr S8
- @ = Wait for silence
- ! = Switch hook flash
- ; = Return to the command state

En - Command Echo
- n=0 Do not echo commands
- n=1 Enable command echo*

Hn - Switch Hook Control -
- n=0 Switch hook relay opens
- n=1 The switch hook relay closes

In - Modem Identification

Ln - Speaker Volume -
- n=0 Lowest speaker volume
- n=1 Low speaker volume
- n=2 Moderate speaker volume*
- n=3 High speaker volume

Mn - Speaker Activity -
- n=0 Speaker off
- n=1 Speaker on until carrier received*
- n=2 Speaker remains on
- n=3 Speaker on after dialing until carrier is detected.

Nn - Data Rate -
- n=0 Handshake only at DTE rate
- n=1 Initiate handshaking at DTE rate; Fall back if unsuccessfull*

On - On Line
- n=0 Return On Line with no retrain*
- n=1 Initiate retrain when returning On line.

Qn - Responses
- n=0 Send responses
- n=1 No Responses

Sr? - Interogate Register -

Sr=n - Set Register Value -

Vn - Result Codes -
- n=0 Numeric Result Codes
- n=1 English Word Result Codes*

Xn - Result Code Set -
- n=0 Result codes 0 to 4
- n=1 Result codes 0 to 5 and 10
- n=2 Result codes 0 to 6 and 10
- n=3 Result codes 0 to 5, 7 and 10
- n=4 Full Result codes*

Yn - Long Space Disconnect -
- n=0 Long Space Disconnect Disabled*
- n=1 Disconnect on long space

Z - Reset -

&Cn - DCD Operation
- n=0 DCD is forced active.*
- n=1 DCD indicates a valid carrier signal

&Dn - DTR
- n=0 DTR is ignored by the modem.
- n=1 Modem switches from data to command mode on an on-to-off transition of DTR.
- n=2 Modem disconnects if the host rescinds DTR.*
- n=3 The modem performs a soft reset when DTR is rescinded.

AT Command List (continued)

&F - Return to Factory Defaults

&Gn - Guard Tone
- n=0 Guard Tone Disabled*
- n=1 550 Hz Guard Tone
- n=2 1800 Hz Guard Tone

&Pn - Dial Pulse Make/Break Ratio
- n=0 39/61%*
- n=1 33/67%

&Sn - DSR Operation
- n=0 DSR always active.*
- n=1 DSR in accordance with V.25.

&Tn - Test Modes
- n=0 Exit test mode*
- n=1 Local analog loopback
- n=3 Initiate local digital loopback
- n=4 Respond to remote loop request
- n=5 Deny remote loop request
- n=6 Intiate a Remote Digital loopback
- n=7 Remote digital loopback w self-test
- n=8 Local analog loopback w self-test

&Un - Trellis Coding
- n=0 V.32 uses Trellis Coding with QAM backup*
- n=1 V.32 uses QAM only

&V - View Active Profile -

-Cn - Calling Tone
- n=0 Caling tone Disabled*
- n=1 Transmit 1300 Hz Calling tone

-Jn - V.42 Detect
- n=0 LAPM only
- n=1 MNP or LAPM*

"Hn - V.42bis Compression
- n=0 Disabled
- n=1 V.42bis only when transmitting
- n=2 V.42bis only when receiving
- n=3 V.42bis when transmitting and receiving*

"On - V.42bis String Length

%A - Set Auto-reliable Fallback Character

%Cn - MNP5 Data Compression
- n=0 No Compression
- n=1 MNP 5 Data Compression*

%Q - Read Line Signal Quality

\An - MNP Block Size
- n=0 Maximum 64 characters
- n=1 Maximum 128 characters
- n=2 Maximum 192 characters
- n=3 Maximum 256 characters*

\Bn - Transmit Break

\Gn - Set Modem Port Flow Control
- n=0 Disables port flow control*
- n=1 XON/XOFF port flow control

\Jn - DTE Rate Adjust
- n=0 Serial port speed independent of link speed
- n=1 Serial port rate automatically changed to link speed*

AT Command List (continued)

\Kn - Break control

Break received from host with Reliable link established.

n=0 Enter on-line command mode; do not transmit break
n=1 Purge buffers, immediately transmit break
n=2 Same as n=0
n=3 Immediately send break
n=4 same as n=0
n=5 Send break in sequence with the buffered data*

Break received from host with Direct link established.

n=0 Immediately transmit break, then enter on-line command mode
n=1 Immediately send break
n=2 Enter command mode but do not transmit break signal
n=3 same as n=1
n=4 same as n=0
n=5 same as n=1*

Break received from modem with Normal link established.

n=0 Purge buffers, Immediately send break to the host
n=1 same as n=0
n=2 Immediately send break to the host
n=3 Same as n=2
n=4 Send break to host in sequence with data.
n=5 Send break to host in sequence with data.*

Host initiates break with \B command; Reliable link established.

n=0 Purge buffers and immediately transmit break
n=1 Same as n=0
n=2 Immediately transmit break
n=3 Same as n=1
n=4 Transmit break in sequence with data
n=5 Same as n=4*

\Nn - Error Control Selection

n=0 Normal mode, no error correction
n=1 Direct mode, no buffering, no error correction
n=2 MNP Reliable mode, MNP connection required
n=3 V.42 Auto-reliable mode, accept either an error controlled or non-error controlled link
n=4 V.42 Reliable mode, LAPM required*

\On - Originate Reliable Link

\Qn - Flow Control Selection

n=0 Disabled
n=1 XON/XOFF Flow Control
n=2 CTS Flow Control
n=3 RTS/CTS Flow Control*

\Tn - Inactivity Timer

\U - Select Auto-reliable Link

\Vn - Extended Result Codes

n=0 Normal result codes
n=1 MNP result codes
n=2 V.42 result codes*

AT Command List (continued)

\Xn - Passthrough Flow Control
- n=0 Process flow control characters*
- n=1 Process XON/XOFF and pass them down the link

\Y - Switch to Reliable Link

\Z - Switch to Normal Mode

Class 1 Fax Command List

AT+FAA=n - Data/Fax Auto Answer
- 0 = Answer as a fax modem only
- 1 = Either a fax or data modem

AT+FCLASS? - Service Class Indication
- 0 = Configured as a data modem
- 1 = Configured for Service Class 1.

AT+FCLASS=? - Service Class Capability
- 0 = Configured as a data modem
- 1 = Configured for Service Class 1.

AT+FCLASS=n - Set Service Class
- 0 = Configured as a data modem
- 1 = Configured for Service Class 1.

AT+FF - Enhanced Flow Control

AT+FRH<mod> - Receive HDLC Data
- 3 V.21 Channel 2, 300 bps
- 24 V.27ter, 2400 bps
- 48 V.27ter, 4800 bps
- 72 V.29, 7200 bps
- 96 V.29, 9600 bps
- 97 V.17, 9600 bps
- 98 V.17 short train, 9600 bps
- 121 V.17, 12,000 bps
- 122 V.17 short train, 12,000 bps
- 145 V.17, 14,400 bps
- 146 V.17 short train, 14,400 bps

AT+FRM<mod> - Receive Fax
(see AT+FRH for "mod" values)

AT+FRS<time> - Receive Silence

AT+FRTn - Receive Test Data

AT+FTH<mod> - Transmit HDLC Data
(see AT+FRH for "mod" values)

AT+FTM<mod> - Transmit Fax
(see AT+FRH for "mod" values)

AT+FTS<time> - Transmit Silence

AT+FTTn - Transmit Test Data

Voice Command List

#VB P- Generate Beep

#VCL=n - Voice Mode Selection
- n=0 Voice Mode Disabled
- n=1 Voice Mode Enabled

#VCSD - Voice Command Mode Silence Detection

#VIP=n - Initialize Voice
- n=0 Set voice parameters to factory defaults, deactivate speaker and relay.
- n=1 Set voice parameters to factory defaults, relay and speaker configuration are unchanged,

#VLN=n - Playback Control (bit-mapped)
- Bit 0 Off-hook relay Control
- Bit1 Voice Relay Control
- Bit 2 A/A1 Relay Control
- Bit 3 Auxilliary Relay Control
- Bit 4 Speaker Control
- Bit 5 Microphone input
- Bit 6 Reserved
- Bit 7 Reserved

#VPH - Telephone Emulation Mode

#VPL=n - Playback Level (default 127)

#VPB - Playback Voice

#VPB - Record Voice

#VRL=n - Record Level (default 127)

#VSL=n - Record Silence Detection Threshold (default 127)

#VSM=n - Sample Mode

n	Compression	Data Rate	UART
CLI*	Cirrus Logic	48,000	57,600
AD3	3-bit ADPCM	18,000	19,200
AD4	4-bit ADPCM	24,000	38,400

#VSQT=n - Record <DLE>q Silence Detection Time (default 0)

#VSR=n - Sampling Rate (9600 bps)

#VSST=n - Record <DLE>s Silence Detection Time (default 60)

S-Register Summary

REG.	RANGE/UNITS	DESCRIPTION	DEFAULT
S0	0-255/rings	Number of rings to answer on	000
S1	0-255/rings	Count number of incoming rings	000
S2	0-127/ASCII	Escape character	043
S3	0-127/ASCII	Carriage return character	013
S4	0-127/ASCII	Line feed character	010
S5	0-32,127/ASCII	Backspace character	008
S6	2-255/sec	Dial tone wait time	002
S7	1-60/sec	Wait time for remote carrier	060
S8	0-255/sec	Comma pause time	002
S9	1-255/0.1 sec	Carrier detect response time	006
S10	1-255/0.1 sec	Delay from loss of carrier to hang up	014
S11	50-255/msec	DTMF dialing speed	095
S12	0-255/0.02 sec	Escape guard time	050
S18	0-255/sec	Modem test timer	000
S25	Bit Mapped	DTR Transitions	005
S30	Bit Mapped	Sleep Mode timer	010
S37	Bit Mapped	Maximum Link Speed	000
S90	Bit Mapped	Disconnect Inactivity Timer	000
S108	Bit mapped	Retrain Signal Quality Selector	001
S109	Bit mapped	Line Speeds Permitted	062

Basic Result Codes

DIGIT	FULL	DEFINITION
0	OK	Successfully executed command line
1	CONNECT	300 bps connection established
2	RING	Ring signal detected
3	NO CARRIER	Carrier not detected or Carrier lost
4	ERROR	Error found in command line; returns to command mode
5	CONNECT 1200	1200 bps connection established
6	NO DIAL TONE	No dial tone detected within 5 Sec. after going off-hook
7	BUSY	Busy signal detected after automatically dialing a call
8	NO ANSWER	5 seconds of silence not detected
10	CONNECT 2400	2400 bps connection established
11	CONNECT 4800	4800 bps connection established
12	CONNECT 7200	7200 bps connection established
13	DATA	Connected in data mode after automatically answering the call.
14	CONNECT 9600	9600 bps connection established
15	FAX	Connected in fax mode after automatically answering the call.
16	CONNECT 12000	12,000 bps connection established
17	CONNECT 14400	14,400 bps connection established
+F4	+FCERROR	Fax carrier errror detected.

MNP Result Codes (\V1)

DIGIT	FULL	DEFINITION
22	CONNECT 300/REL	300 bps MNP Connection established
24	CONNECT 1200/REL	1200 bps MNP Connection established
25	CONNECT 2400/REL	2400 bps MNP Connection established
26	CONNECT 4800/REL	4800 bps MNP Connection established
27	CONNECT 7200/REL	7200 bps MNP Connection established
28	CONNECT 9600/REL	9600 bps MNP Connection established
29	CONNECT 12000/REL	12,000 bps MNP Connection established
30	CONNECT 14400/REL	14,400 bps MNP Connection established

V.42 Result Codes (\V2)

DIGIT	FULL RESPONSES	DEFINITION
32	CONNECT 300/REL-MNP	300 bps MNP Connection established
34	CONNECT 1200/REL-MNP	1200 bps MNP Connection established
35	CONNECT 2400/REL-MNP	2400 bps MNP Connection established
36	CONNECT 4800/REL-MNP	4800 bps MNP Connection established
37	CONNECT 7200/REL-MNP	7200 bps MNP Connection established
38	CONNECT 9600/REL-MNP	9600 bps MNP Connection established
39	CONNECT 12000/REL-MNP	12,000 bps MNP Connection established
40	CONNECT 14400/REL-MNP	14,400 bps MNP Connection established
42	CONNECT 300/REL-MNP	300 bps MNP Connection established
44	CONNECT 1200/REL-MNP5	1200 bps MNP5 Connection established
45	CONNECT 2400/REL-MNP5	2400 bps MNP5 Connection established
46	CONNECT 4800/REL-MNP5	4800 bps MNP5 Connection established
47	CONNECT 7200/REL-MNP5	7200 bps MNP5 Connection established
48	CONNECT 9600/REL-MNP5	9600 bps MNP5 Connection established
49	CONNECT 12000/REL-MNP5	12,000 bps MNP5 Connection established
50	CONNECT 14400/REL-MNP5	14,400 bps MNP5 Connection established
54	CONNECT 1200/REL-LAPM	1200 bps LAPM Connection established
55	CONNECT 2400/REL-LAPM	2400 bps LAPM Connection established
56	CONNECT 4800/REL-LAPM	4800 bps LAPM Connection established
57	CONNECT 7200/REL-LAPM	7200 bps LAPM Connection established
58	CONNECT 9600/REL-LAPM	9600 bps LAPM Connection established
59	CONNECT 12000/REL-LAPM	12,000 bps LAPM Connection established
60	CONNECT 14400/REL-LAPM	14,400 bps LAPM Connection established
64	CONNECT 1200/REL-LAPM V.42bis	1200 bps LAPM V.42bis Connection
65	CONNECT 2400/REL-LAPM V.42bis	2400 bps LAPM V.42bis Connection
66	CONNECT 4800/REL-LAPM V.42bis	4800 bps LAPM V.42bis Connection
67	CONNECT 7200/REL-LAPM V.42bis	7200 bps LAPM V.42bis Connection
68	CONNECT 9600/REL-LAPM V.42bis	9600 bps LAPM V.42bis Connection
69	CONNECT 12000/REL-LAPM V.42bis	12,000 bps LAPM V.42bis Connection
70	CONNECT 14400/REL-LAPM V.42bis	14,400 bps LAPM V.42bis Connection

Electrical Specifications

ABSOLUTE MAXIMUM RATINGS*	
SUPPLY VOLTAGE - Vcc	+6.5 Volts
DC INPUT VOLTAGE	-0.6 Volts to +6.5 Volts
STORAGE TEMPERATURE RANGE	-25° C TO +85° C
LEAD TEMPERATURE (Soldering, 2 sec per wave)	260° C
OPERATING TEMPERATURE RANGE	0 TO 70° C
*Exceeding these values may result in permanent damage to the device.	

Power Supply Characteristics *(T_A = 0 - 70°C, Vcc = 5v ±5%)*

Symbol	Parameter	Typ	Max	Units	Comments
Vcc	Supply Voltage	5.0	5.25	V	
Icc	Vcc Supply Current	110	150	mA	XE1414VS, On Line
		60	80	mA	XE9624VS, On Line
		50	75	mA	CE9624GS, On Line
Iccs	Sleep Current	10		mA	XE1414VS
		5		mA	XE9624VS, XE9624GS
Iui	Power for \RI	7	10	mA	Ring Signal Present
		<1	5	uA	No Ring Signal

Power Management:
The Single In-line Modem Family includes intelligent power management capabilities. The capabilites include both an automatic sleep mode and total power shutdown.

Sleep Mode: When there is no activity on TXD, RXD or RI the modem will, within 5 seconds, automatically enter sleep mode. In this mode power consumption is typically less than 25milliwatts (50 milliwatts for the XE1414VS). The modem resumes full operation as soon as there is activity on TXD or RI.

Power Shutdown: Where power consumption is extremely critical, power can be removed from the modem. The ring detector operates even without VCC. Power for RI comes from Vui. Vui typically requires less than 1 microamp until a ring is detected. VCC can be restored when a ring is detected or any time the host wishes to intiate communications.

Other Performance Specifications

PARAMETER		MIN	TYP	MAX	UNIT	COMMENTS
DTMF Level			-2.2	0	dBm	
DTMF Twist (Balance)				3	dB	
DTMF Tone Duration			70		ms	
Pulse Dialing Rate			10		pps	
Pulse Interdigit Interval			785		ms	
Billing Delay Interval		2.0			sec.	
Tone Detection Bandpass Frequency		290		665	Hz	3 dB point
Tone Detection OFF to ON Threshold		-33			dBm	into 600 ohms
Tone Detection ON to OFF Threshold		-35			dBm	into 600 ohms
Dial Tone Detect Duration			3.0			sec.
Ringback Tone Detect	Duration	0.75			sec.	
	Cadence	1.5			sec.	OFF/ON Ratio
Busy Tone Detect	Duration	0.2			sec.	
	Cadence	0.67		1.5	sec.	OFF/ON Ratio

Telephone Line Interface Specifications

PARAMETER	MIN	TYP	MAX	UNIT
Telephone Line Impedance Match		600		ohms
Ring Detect Sensitivity (on hook, Type B ringer)	38			Vrms
Telephone Line Holding Current	0	20	100	mA

I/O Characteristics

Signals	Description		
DIGITAL INPUTS	**Input High**	**Input Low**	
/DTR, /RTS, TXD, RESET	min. 2.0 V	max. 0.8 V	
DIGITAL OUTPUTS	**Output High**	**Output Low**	**Current Drive**
AR, /RI	min. 2.4 V	max. 0.8 V	15 ma
/CTS, /DSR, /DCD, RXD	min. 2.4 V	max. 0.4 V	1.6 ma

FCC Instructions

These products comply with part 68 of the FCC Rules and Regulations. With each device shipped, there is a label which contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this product. You must, upon request, provide this information to your telephone company.

The mounting of these devices in the final assembly must be made in such a manner as to preserve the high voltage protection between the TIP/RING Connection and the rest of the system. Typically, this may be accomplished by maintaining a minimum spacing .100 mils between the TIP/RING Traces to the RJ-11C Jack and low voltage portion of the system. No additional circuitry may be attached between TIP/RING and the telephone line connection, unless specifically allowed in the rules.

The REN is useful to determine the quantity of devices you may connect to a telephone line and still have all of these devices ring when the number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to the line, as determined by the REN, you should contact the local telephone company to determine the maximum REN for you calling area.

If your system causes harm to the telephone network, the telephone company may discontinue service temporarily. If possible, they will notify you in advance. If advance notification is not practical, you will be notified as soon as possible.

Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this device, please contact XECOM at (408) 945-6640 for information on obtaining service or repairs. The telephone company may ask you to disconnect this device from the network until the problem has been corrected or until you are sure that the device is not malfunctioning.

The device may not be used on coin service lines provided by the telephone company (this does not apply to private coin telephone applications which use standard telephone lines). Connection to party lines is subject to state tariffs.

XE9624GS FCC Registration Number: DWEUSA-_ _ _ _ _-FA-E Ringer Equivalence: _._B\

XE9624VS FCC Registration Number: DWEUSA-_ _ _ _ _-FA-E Ringer Equivalence: _._B

XE1414VS FCC Registration Number: DWEUSA-_ _ _ _ _-FA-E Ringer Equivalence: _._B

Terms of Sale

Devices sold by XECOM are covered by the warranty provisions appearing in its Terms of Sale only. XECOM makes no warranty, express, statutory, implied, or by description regarding the information set forth herein, or regarding the freedom of the described devices from patent infringement. XECOM makes no warranty of merchantability or fitness for any purposes. XECOM reserves the right to discontinue production and change specifications and prices at any time and without notice. This product is intended for use in normal commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment, are specifically not recommended without additional processing and authorization by XECOM for such application.

Xecom assumes no responsibility for the use of any circuitry other than circuitry embodied in a Xecom product. No other circuits, patents, or licenses are implied.

Life Support Policy

Xecom's products are not authorized for use as Critical Components in Life Support Devices or Systems.

Life Support Devices or Systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions provided in the labeling, can be reasonably expected to result in significant injury to the user.

A Critical Component is any component of a life support device or system whose failure to perform can be reasonably expected to cause failure of the life support device or system, or to affect its safety or effectiveness.

XECOM
Xecom Incorporated
374 Turquoise Street, Milpitas, CA 95035
Ph:408-945-6640 Fax:408-942-1346