## Compact 14,400 BPS Data and Fax Modem

Description

Xecom's XE1486L combines 14,400 BPS data and Group III send/receive fax in a compact component. Xecom designed the XE1486L to be embedded by OEM designers. Xecom also offers pin compatible 2400 BPS, 33,600 BPS and 56 KBPS alternatives to the XE1486L for applications with other date rate requirements.

The XE1486L is not a modem chip but a complete modem including the telephone interface integrated into a compact module. It provides user transferable FCC Part 68 registration and can connect directly to the telephone line through an RJ11 jack. The modem connects to the host through a TTL level serial interface. The XE1486L also includes MNP2-4, MNP10 and V.42 error control and MNP5 and V.42bis data compression to provide an error free connection with the greatest possible data throughput rate.

Features

- Small Size; 1.385 " x 1.36" x 0.575"
- Modem control with "AT" commands
- Class 1 Fax commands
- Data transfer up to 14,400 bps
- Send and receive fax to 14,400 bps
- MNP and V.42 Error Control
- MNP10 Error Control for Cellular Links
- MNP5 Data Compression to 28,800 bps
- V.42bis Data Compression to 57,600 bps
- Low power, single +5V supply
  Operating Power 800 mW (Typ.)
  Sleep Mode 200 mW (Typ.)
- NVRAM for modem configuration storage

Block Diagram
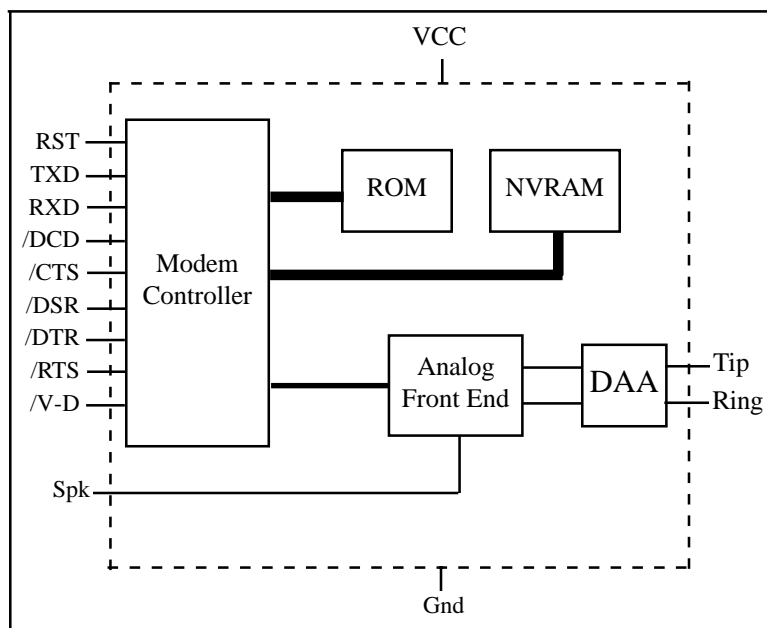
XE1486L Pin Configuration

(Top View)

XE1486L Mechanical Specifications

Dim	INCHES Min	INCHES Max	METRIC(MM) Min	METRIC(MM) Max
A	1.350	1.370	34.29	34.80
B	1.375	1.395	34.92	35.43
C	0.555	0.585	14.10	14.86
D	0.190	0.210	4.83	5.33
E	0.090	0.110	2.29	2.79
F	0.115	0.135	2.92	3.43
G	0.280	0.300	7.11	7.62
H	0.790	0.810	20.07	20.57
J	1.090	1.110	27.69	28.19

Pins = 0.025 inches Square

A

B

Denotes Pin 1

D

G   G

H

C

F   E   F

J
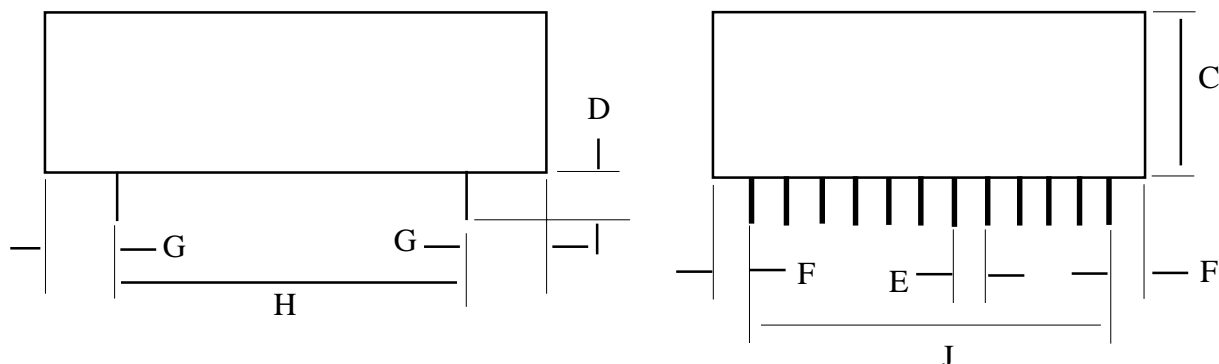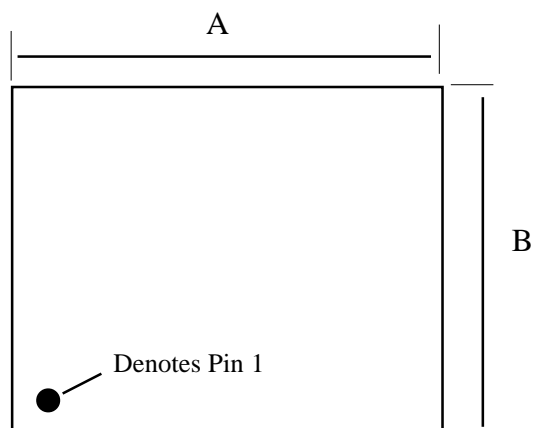
ABSOLUTE MAXIMUM RATINGS*

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.	

XE1486L Typical Connection Diagram
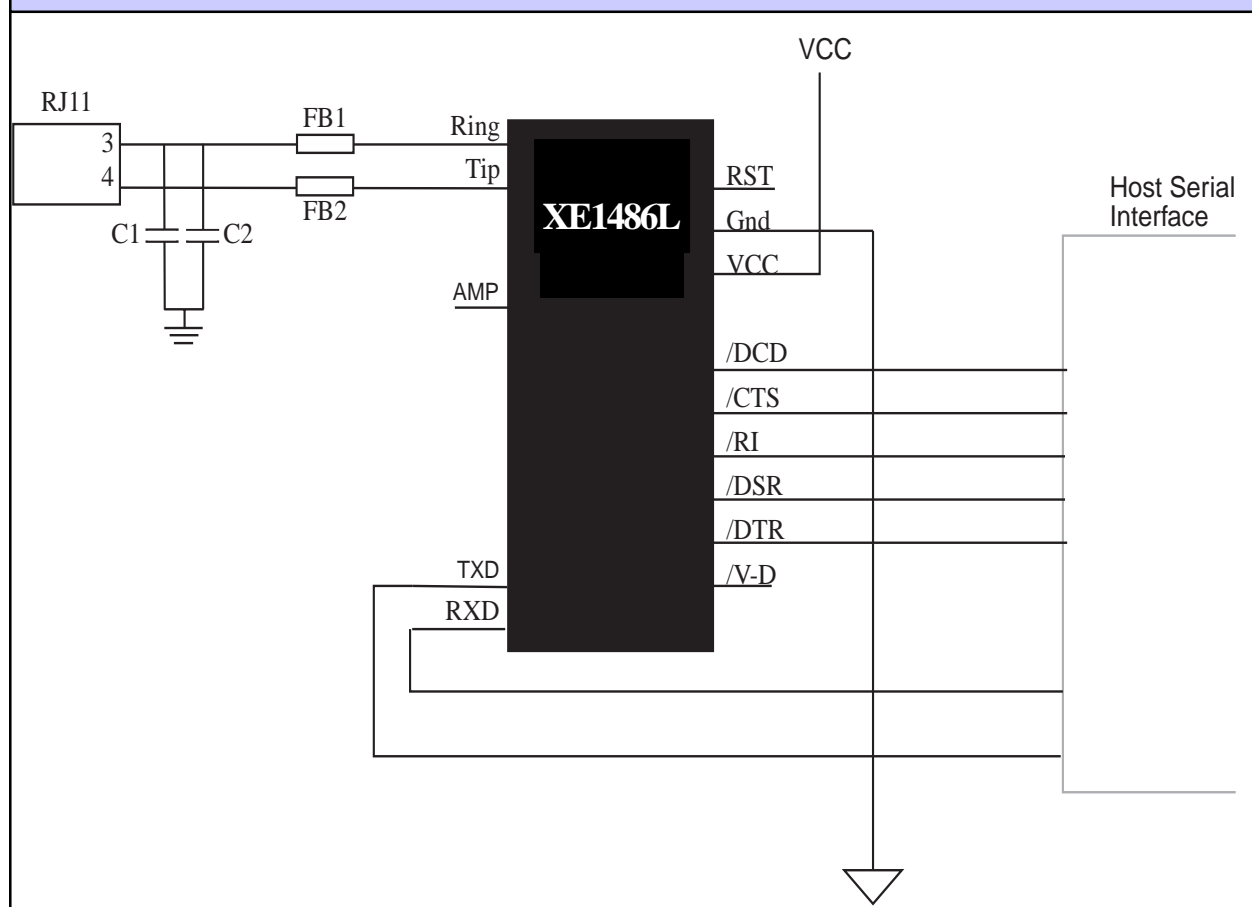
Recommended Parts

Reference Designation	Description	Recommended Part Number
FB1, FB2	Ferrite Beads	TDK CB30-1812
C1, C2	Capacitors	Sprague 30GAT47, 470 pfd, 3000 Volts

Power Supply Characteristics $(T_A = 0 - 70°C,\ Vcc = 5v \pm 5\%)$

Symbol	Parameter	Typ	Max	Units	Comments
Vcc	Supply Voltage	5.0	5.25	Volts	
Icc	Vcc Supply Current	160	180	mA	Active, On Line
		40	60	mA	Sleep Mode

XE1486L Pin Descriptions

PIN	NAME	DESCRIPTION
1	Ring	Ring provides half of the two-wire connection to the telephone network, RJ-11 Pin 4. A 1500 volt barrier isolates Ring from all other circuits. This isolation must be pre-served throughout the system. The battery voltage on Ring may be positive or negative with respect to Tip.
2	Tip	Tip provides half of the two-wire connection to the telephone network, RJ-11 Pin 3. A 1500 volt barrier isolates Tip from all other circuits. This isolation must be preserved throughout the system. The battery voltage on Tip may be positive or negative with respect to Ring.
3, 4	Not Used	No Connection should be made to these pins.
5	SPK	SPK provides the audio output to a speaker. Speaker output is controlled by the ATL and ATM commands. The input impedance to the speaker driver must be greater than 300 ohms.
6-9	N/C	No Connection
10	TXD	TXD provides serial data input from the host. A logic high represents a "Mark" and a low represents a "Space".
11	RXD	RXD provides serial data output to the host. A logic high represents a "Mark" and a low represents a "Space".
12	/V-D	The Voice-Data output can be used to drive an external relay for switching between the modem and handset connected to the same telephone line.
13	/DTR	Data Terminal Ready is an active low input to the modem. The AT&D command sets the function of DTR.
14	/DSR	Data Set Ready is an active low output from the modem. Its operation is determined by the AT&S command.
15	/RI	Ring Indicator is an active low output which marks the presence of a ring on the line.
16	/CTS	The XE1486L uses Clear to Send for hardware flow control. With hardware flow control active the modem raises \CTS to signal the host that the modem's transmit data buffer is nearly full. When the buffer empties, the modem reactivates CTS.
17	/DCD	Data Carrier Detect goes low to indicate receipt of a valid incoming carrier. The AT&C1 command enables the carrier detect function.
18	N/C	No Connection
19	VCC	VCC provides the +5 volt power required by the modem.
20	GND	Ground provides the common reference for the XE1486L.
21	RST	This active high input causes a hardware reset in the XE1486L. The reset pulse must be held high for at least 10 milliseconds to correctly reset the modem.
22	RTS	The modem uses Request to Send for hardware flow control. The modem stops sending data to the host when the hosts raises /RTS. The modem resumes transferring data to the host when the host activates /RTS

XE1486L Electrical Specifications *(T$_A$ = 0 - 70°C, Vcc = 5v ±5%)*

Parameter	Min	Typ	Max	Unit	Comments
DTMF Level		-2.2	0	dBm	3 second average
Modem Transmit Level	-12	-10.5	-9.0	dBm	600 ohm line
Pulse Dialing Rate			10	pps	
Pulse Dialing Make/Break		39/61		%	USA
Billing Delay Interval	2.0			sec.	
Phone Line Impedance Match		600		ohms	
Ring Detect Sensitivity	38		150	VRMS	Type B Ringer
Telephone Loop Current	20		100	milliamps	Off-hook
Input High Voltage (TXD, RTS, DTR)	2.0			Volts	
Input Low Voltage (TXD, RTS, DTR)			0.8	Volts	
Output High Voltage (DCD, DSR, CTS, RXD, RI, OH)	2.4			Volts	RXD -100 microamps; DCD, RI, OH - 1.6 milliamps
Output Low Voltage			0.4	Volts	RXD - 1.6 milliamps;

XE1486L AT Commands

Modes of Operation
The XE1486L has three operational modes; Command, Fax and Data.

Data Mode: The XE1486L enters data mode after it establishes a connection and issues a "CONNECT" result code. In the Data Mode the modem sends all signals on Transmit Data to the remote modem and puts data from the remote modem onto Received Data for the host equipment. When the modem exits data mode, it issues a "NO CARRIER" result code.

Command Mode: The XE1486L enters command mode on power-up, reset, loss of the connection, or receipt of the escape sequence. In command mode the modem accepts commands from the host on Transmit Data. Appropriate result codes are returned on Received Data.

Fax Mode: The XE1486L enters Class 1 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 fax commands only in fax mode. The A/, ATO, AT&T and escape commands are not valid in fax mode.

Command Line Format
Commands sent to the modem follow a strict format. Each command line begins with the prefix AT. The modem stores the command line in the command buffer and executes it upon receipt of a carriage return. Until executed, a backspace edits the command line.

Command Prefix - The "A" and "T" command prefix may be both upper or both lower case but cannot be of different cases. The prefix identifies the speed and parity of the host. The modem determines speed by measuring the width of the incoming bits and parity by comparing the parity bits of the "A" and "T." The XE1486L normally sends result codes at the speed and parity determined by the prefix.

Command Line - One command line may include multiple commands. The modem executes commands in the sequence they appear. Spaces inserted into the command line 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 - The command buffer accepts only 40 characters, including the AT prefix. If the command buffer overflows, the modem issues an "ERROR" result code and does not execute the commands.

Command Line Editing - The backspace edits the command line. Hitting the backspace key, or Control and H simultaneously on some systems, erases the previous character in the command line. All characters can be erased except for the "A" and "T." Register S5 allows the user to select a 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 that does not require the "AT" prefix.

Omitted Parameters - Most commands include a parameter which determines the command function. If the command omits the parameter, he modem assumes the parameter is a zero.

Escape Characters - A three character escape sequence switches the modem from data mode to 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. The modem sends result codes as full words, numeric codes or the user may disable the result codes. Each result code ends with a carriage return when the user chooses numeric result. The modem terminates full word result codes with a Line Feed and Carriage Return.

XE1486L AT Command List

List of Commands

An asterisk indicates the default setting of the command for the XE1486L.

A - Answer Command - ATA forces the modem to immediately go off-hook and begin transmitting the answer tone sequence.

Bn - Select Communications Standard - ATBn selects the modulation scheme used for connections below 2400 bits per second

    n=0   Selects CCITT standards
    n=1   Selects Bell standards*

D - Dial Command - Below are the characters accepted in a dialing command.

0-9, #, * = Dialing Digits
    L = Re-dial last number
    P = Pulse dial
    T = Tone dial
  S=n = Dial stored number
    W = Wait for dial tone
    ^ = Toggles state of calling tone
    , = Pause for the duration of S8
    @ = Wait for silence
    ! = Switch hook flash
    ; = Return to the command state

En - Command Echo - ATEn determines whether commands will be echoed back to the host.

    n=0   Do not echo commands
    n=1   Enable command echo*

Hn - Switch Hook Control - ATHn opens and closes the modem's hook switch.

    n=0 Switch hook relay opens
    n=1 The switch hook relay closes

In - Modem Identification - ATIn identifies the modem

Ln - Speaker Volume - ATLn sets the amplitude of the modem's audio output.

    n=0 Lowest speaker volume
    n=1 Low speaker volume*
    n=2 Moderate speaker volume
    n=3 High speaker volume

Mn - Speaker Activity - ATMn determines when the modem's audio output is active.

    n=0   Speaker off
    n=1   Speaker on until carrier received*
    n=2   Speaker remains on
    n=3   Speaker off during dialing, on until carrier

On - On Line - ATOn switches the modem from the command mode to the data mode.

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

Qn - Responses - ATQn determines if the modem will issue responses.

    n=0 Send responses*
    n=1 No Responses

Sr? - Interrogate Register - ATSr? requests the current value in register Sr.

Sr=n - Set Register Value - ATsr=n sets the value of register Sr to n.

Vn - Result Codes - ATVn sets the modem to issue Numeric or Full Word result codes .

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

Wn - Connect Message Rate - ATWn determines whether the data rate reported in the Connect response is the host data rate, the link data rate or whether both are provide along with the error control and data compression protocols negotiated.

    n=0   Send "CONNECT" at DTE Rate*
    n=1   Report line speed, DTE speed and Link protocol
    n=2   "CONNECT" Reports Link speed

Xn - Result Code Set - ATXn selects which set of result codes the modem may send.

    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*

Zn - Reset - ATZn executes a soft reset to the modem and resets the modem configuration.

    n=0 Reset to user profile 0*
    n=1 reset to user profile 1

&Cn - DCD Operation - AT&Cn determines the operation of the DCD output.

    n=0 DCD is forced active.

    n=1 DCD indicates a valid carrier*

&Dn - DTR - AT&Dn determines how the modem will respond to changes to DTR.

    n=0 DTR is ignored by the modem.

    n=1 Enter command mode if DTR revoked.

    n=2 Disconnect if DTR revoked.*

    n=3 Soft reset when DTR revoked

&Fn - Return to Factory Defaults - AT&Fn returns the modem configuration to one of two factory configurations.

    n=0 Restore configuration 0*

    n=1 Restore configuration 1

&Gn - Guard Tone - AT&Gn controls the guard tone produced by the modem

    n=0 Guard Tone Disabled*

    n=1 Guard Tone Disabled

    n=2 1800 Hz Guard Tone

&Kn - Flow Control - AT&Kn selects the flow control method used by the modem.

    n=0 Disabled

    n=3 RTS/CTS

    n=4 XON/XOFF

    n=5 Transparent XON/XOFF

&Pn - Dial Pulse Make/Break Ratio - AT&Pn determines the specific pulse dialing parameters used by the modem.

    n=0 39/61% @ 10 pps*

    n=1 33/67% @ 10 pps

    n=2 39/61% @ 20 pps

    n=3 33/67% @ 20 pps

&Qn - Line Connection - AT&Qn determines if error control or data buffering are active on the link.

    n=0 Direct mode (no data buffering)*

    n=5 Use Error Correction

    n=6 Normal Mode (Speed buffering)

&Sn - DSR Operation - AT&Sn sets the operation of the DSR signal.

    n=0 DSR always active*

    n=1 DSR in accordance with V.25.

&Tn - Test Modes - AT&T selects modem test mode.

    n=0 Exit test mode

    n=1 Local analog loopback

&Vn - View Configuration Profiles - AT&V permits the user to check on the modems current configuration or conditions of the last call

    n=0 View active profile & user profiles *

    n=1 View statistics on last call

&Wn - Store Active Profile - AT&Wn stores the current modem configuration in NVRAM.

    n=0 Store active profile as profile 0*

    n=1 Store active profile as profile 1

&Yn - Recall Stored Profile - AT&Yn sets the stored modem configuration to be used after a hard reset.

    n=0 Recall profile 0 on power-up*

    n=1 Recall profile 1 on power-up

&Zn=x - Store telephone number "x" in memory location "n"

%En - Line Quality Monitor/Auto Retrain - AT%En determines if the modem will monitor line quality during a connection and initiate a retrain if quality drops below acceptable levels.

    n=0 Disabled

    n=1 Enabled

    n=2 Line quality, fallback, fall forward

%L - Read Received Signal Level - AT%L permits the user to read the magnitude of the receive signal in dBm.

%Q - Read Line Signal Quality - AT%Q permits the user to read the EQM value of the received signal.

\Bn - Transmit Break - AT\Bn selects the duration of the break signal sent. Break = n x 100 msec.

\Gn - Modem Port Flow Control -

    n=0 No Modem Port Flow Control

    n=1 XON/XOFF Port Flow Control

\Kn - Break control - AT\Kn determines how the modem will handle a break signal received from the host.

Break received from host in data transfer mode.
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 data *

Break received from the host during the on-line command mode.
n=0 Purge buffers, immediately transmit break
n=1 Same as n=0
n=2 Immediately send break
n=3 Same as n=2
n=4 Send break in sequence with data
n=5 same as n=4 *

Break received from modem during a non-error corrected link
n=0 Purge buffers, Immediately send break to 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 in sequence with data.
n=5 Same as n=2*

\Nn - Error Control Selection - AT\Nn determines how the modem will handle error control negotiations.
n=0 Normal mode, no error correction
n=1 Direct mode, no buffering, no error correction
n=2 Reliable mode, error correction 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
n=5 MNP required

/V<value> - Single Line Connect Messages - This command allows users to select single line connect messages in the format shown below.
<DTE Speed> <Modulation> <Protocol> <Compression> <Line Speed> <Voice & Data>
n=0 No single Line Connect Messages
n=1 Issue a complete response in a single line

-Kn - MNP Extended Services - AT-Kn determines how the modem handles MNP10.
n=0 No LAPM to MNP10 conversion
n=1 LAPM to MNP10 conversion*
n=2 LAPM to MNP10 conversion but no MNP Extended Service during V.42 LAPM answer mode detect.

+MS - Select Modulation - AT+MS sets the modulation and data rates to be supported by the modem. The format for the +MS command is shown below.
AT+MS=a, b, c, d, e, f<CR>

a - modulation type
 B103 - Bell 103 (300 BPS)
 B212 - Bell 212A (1200 BPS)
 V21 - V.21 (300 BPS)
 V22 - V.22 (1200 BPS)
 V.22B - V.22bis (1200 or 2400 BPS)
 V23 - V.23 (1200 Tx / 75 RX or 75 Tx / 1200 Rx)
 V32 - V.32 (4800 or 9600 BPS)
 V32B - V.32bis (4800 to 14,400 BPS)
b - Automode Detection
 0 - Automatic Negotiation Disabled
 1 - Automatic Negotiation Enabled
c - Minimum Receive Data Rate (300 to 14400 BPS)
d - Maximum Receive Data Rate (300 to 14400 BPS)
e - Minimum Transmit Data Rate (300 to 14400 BPS)
f - Maximum Transmit Data Rate (300 to 14400 BPS)

Default: AT+MS=V34, 1, 300, 300, 300, 14400

XE1486L S-Registers

S0 Answer on nth Ring: S0 sets the modem to automatically answer on the nth ring. Setting S0 to 0 disables automatic answer.
    Range: 0 to 255
    Units   Rings
    Default   0

S1 Ring Count: S1 is a read-only register showing the number of rings detected. If a ring is not detected within 8 seconds, S1 is reset to zero.
    Range: 0 to 255
    Units   Rings
    Default   0

S2 Escape Character: S2 sets the ASCII escape character. Values of 0-127 select valid ASCII escape characters; values from 128 to 255 disable the escape sequence.
    Range: 0 to 255
    Units   ASCII Character
    Default   43 (+)

S3 Carriage Return Character: S3 determines the ASCII character to serve as a carriage return to terminate commands and modem responses.
    Range: 0 to 127
    Units   ASCII Character
    Default   13 (Carriage Return)

S4 Line Feed Character: S4 sets the ASCII character to act as a line feed character in modem responses.
    Range: 0 to 127
    Units   ASCII Character
    Default   10 (Line Feed)

S5 Back Space Character: S5 defines the ASCII character used as a backspace to edit the command line.
    Range: 0 to 32
    Units   ASCII Character
    Default   8 (Back Space)

S6 Dial Tone Wait Time: S6 determines how long the modem waits for dial tone before dialing begins. The Dial Tone Wait Time cannot be set to less than two seconds.
    Range: 2 to 255
    Units   Seconds
    Default   2

S7 Wait for Carrier after Dialing: S7 determines how long the modem waits for a valid carrier signal after dialing.
    Range: 1 to 255
    Units   Seconds
    Default   50

S8 Comma Pause Time: S8 defines the duration of the pause set by a comma in the dialing string. The pause is generally used when waiting for a second dial tone.
    Range: 1 to 255
    Units   Seconds
    Default   50

S9 Reserved

S10 Carrier Off Disconnect Delay: S10 selects how long carrier must be lost before the modem disconnects.
    Range: 1 to 255
    Units   0.1 Seconds
    Default   14

S11 Tone Dialing Speed: S10 sets the duration and spacing of the dialing tones.   S11 does not affect pulse dialing.
    Range: 50 to 255
    Units   1 Millisecond
    Default   95

S12 Escape Code Guard Timer: S12 sets the guard timer for the escape sequence. If characters are received within the guard time, the modem aborts the escape attempt and remains in data mode.
    Range: 0 to 255
    Units   0.02 Seconds
    Default   50

S14 General Bit-Mapped Options: S14 reflects the state of several "AT" commands.
    Bit 0,4,6 Not Used
    Bit 1   0 = Echo Disabled (ATE0)
              1 = Echo Active (ATE1)
    Bit 2   0 = Send Result Codes (ATQ0)
              1 = No Result Codes (ATQ1)
    Bit 3   0 = Numeric Result Codes (ATV0)
              1 = Full Word Result Codes (ATV1)
    Bit 5   0 = Tone Dialing Selected (T)
              1 = Pulse Dialing Selected (P)
    Bit 7   0 = Answer
              1 = Originate

S16 **Test Status:** S16 shows the modem test status.
    Bit 0   0 = No Local Analog Loopback
             1 = Local ALB Active
    Bit 2 - 7 Not Used

S21 **General Bit-Mapped Options:** S21 reflects the state of several "AT" commands.
    Bit 0-2, 7   Not Used
    Bit 3,4 0 = DTR ignored (&D0)
             1 = Enter command mode on DTR off (&D1)
             2 = Disconnect on DTR off (&D2)
             3 = Reset on DTR off (&D3)
    Bit 5   0 = DCD always active (&C0)
             1 = DCD on with Carrier (&C1)
    Bit 6   0 = DSR always active (&S0)
             1= DSR on when modem ready (&S1)

S22 **General Bit-Mapped Options:** S22 reflects the state of several "AT" commands.
    Bit 0-1 0 = Low speaker volume (ATL0)
             1 = Low speaker volume (ATL1)
             2 = Moderate speaker volume (ATL2)
             3 = High speaker volume (ATL3)
    Bit 2-3 0 = Speaker off (ATM0)
             1 = Speaker off with carrier (ATM1)
             2 = Speaker always on (ATM2)
             3 = Speaker on during handshake (ATM3)
    Bit 4-6 0 = Basic Result codes (ATX0)
             4 = Connect speed result codes (ATX1)
             5 = No Blind Dial (ATX2)
             6 = Busy Detection (ATX3)
             7 = Full result codes (ATX4)
    Bit 7   Not Used

S23 **General Bit-Mapped Options:** S23 reflects the state of several "AT" commands.
    Bit 0-5 Not Used
    Bit 6-7 0 = No Guard Tone (AT&G0)
             1 = No Guard Tone (AT&G1)
             2 = 1800 Hz guard tone (AT&G2)
             3 = Not Used

S24 **Sleep Mode Timer:** S24 sets the length of time in seconds that the modem must be idle before entering the low power, sleep mode. When S24 is set to 0, sleep mode is disabled.
    Range: 0 to 255
    Units: seconds
    Default: 0

S27 **General Bit-Mapped Options:** S27 reflects the state of several "AT" commands.
    Bit   0 1 3
            0 0 0 = Normal Mode (AT&Q0)
            1 0 1 = Error control enabled (AT&Q5)
            0 1 1 = Direct Mode (AT&Q6)
    Bit 2, 4-5, 7 Not Used
    Bit 6   0 = CCITT Protocols (ATB0)
             1 = Bell Protocols (ATB1)

S28 **Pulse Dialing Bit-Mapped Options:** S28 stores the modem's pulse dialing configuration.
    Bit 0-2, 5-7 Not Used
    Bit 3-4 0 = Make/Break ratio 39%/61%; 10
                 pulses per second (AT&P0)
             1 = Make/Break ratio 33%/67%; 10
                 pulses per second (AT&P1)
             2 = Make/Break ratio 39%/61%; 20
                 pulses per second (AT&P2)
             3 = Make/Break ratio 33%/67%; 20
                 pulses per second (AT&P3)

S29 **Hook Flash Timer:** S29 determines the length for time the modem closes its off-hook relay on receipt of the "!" dial modifier to simulate a switch hook flash.
    Range: 0 to 255
    Units   10 milliseconds
    Default 70

S30 **Disconnect on Inactivity Timer:** S30 sets the period the modem is idle before it disconnects. A 0 disables the inactivity timer.
    Range: 0 to 255
    Units   10 Seconds
    Default 0

S31 **General Bit-Mapped Options:** S31 stores the status of various AT commands.
    Bit 0   0 = No single-line Connect messages (AT\V0)
             1 = Use single-line connect messages (AT\V1)
    Bit 1, 4-7   Not Used
    Bit 2-3 0 = Report host speed (ATW0)
             1 = Report all parameters (ATW1)
             2 = Report modem speed only (ATW2)

S36 **LAPM Failure:** S36 instructs the modem what to do if the error control negotiations fail.

Bit 0-2 0 = Modem Disconnects
   1 = Establish Direct Connection
   3 = Establish normal Connection
   4 = Disconnect if MNP handshake fails
   5 = Establish Direct Connection if
    MNP handshake fails.
   7 = Establish Normal Connection if
    MNP handshake fails.

Bit 3-7 Not Used

S38 **Forced Disconnect Timer:** S38 sets the delay between receipt of the command to disconnect and the actual opening of the switch hook. If S38 is set to 255 the modem disconnects only after its buffers are empty.

Range: 0 to 255
Units 1 Second
Default 20

S39 **Flow Control Bit-Mapped Options:** S39 shows the modem's flow control status, AT&K.

Bit 0-2 0 = Flow Control Disabled
   3 = Hardware Flow Control, RTS/CTS
   4 = In-Band Flow Control XON/XOFF
   5 = Transparent In-Band Flow Control

Bit 3-7 Not use

S40 **MNP Bit-Mapped Options:** S40 shows the status of the modem's MNP commands, .

Bit 0-1 0 = No LAPM/MNP10 conversion (AT-K0)
   1 = Enable LAPM/MNP10 conversion (AT-K1)
   2 = Enable LAPM to MNP10 conversion except
    for LAPM answer mode (AT-K1)

Bit 2 Not Used

Bit 3-5 0 = AT\K0 break handling selected
   1 = AT\K1 break handling selected
   2 = AT\K2 break handling selected
   3 = AT\K3 break handling selected
   4 = AT\K4 break handling selected
   5 = AT\K5 break handling selected

Bit 6-7 Not Used

S41 **General Bit-Mapped Options:** S41 stores the condition of various "AT" commands.

Bit 0-1 0 = No Data Compression (AT%C0)
    1 = MNP5 Data Compression (AT&C1)
    2 = V.42bis Data Compression (AT&C2)
    3 = Either MNP5 or V.42bis (AT&C3)

Bit 2, 6
  0 0 = No Fallback/Forward (AT%E0)
  1 0 = Retrain Enabled (AT%E1)
  0 0 = Fallback/Forward Enabled (AT%E2)

Bit 3-5, 7 Not Used

S46 **Data Compression Control:** S46 selects whether or not the modem will support data compression.

S46=136 No data compression
S46=138 Data Compression selected
Default 138

S48 **V.42 Negotiations:** S48 determines the modem's V.42 negotiation process.

S48=0 Proceed with LAPM
S48=7 Negotiate per V.42*
S48=128 Assume LAPM failure

S86 **Call Failure Code:** S86 shows why the last "NO CARRIER response was issued.

S86=0   Normal Disconnect
S86=3   Call Waiting caused Disconnect
S86=4   Loss of Carrier
S86=5   V.42 Negotiation Failure
S86=6   No response to feature Negotiation
S86=7   Other modem is Synchronous modem
S86=8   No common framing technique
S86=9   Modem Handshake Failure
S86=10 Bad response to Feature Negotiation
S86=12 Disconnect Initiated by remote modem
S86=13 No response after 10 retries
S86=14 Protocol Violation
S86=15 Lost DTR
S86=16 Received GSTN cleardown
S86=17 Inactivity timeout
S86=18 Speed not supported
S86=20 Key abort disconnect
S86=22 No connection established
S86=23 Disconnect after 3 retrains
S86=24 Call Waiting tone detected

XE1486L S-Registers (continued)

S95 **Extended Result Codes:** S95 permits the user to customize the extended result codes.

    Bit 0 Connect result code shows link speed

    Bit 1 Add /ARQ to connect response

    Bit 2 Add /VFC to Carrier response

    Bit 3 Enable Protocol response

    Bit 4 Not Used

    Bit 5 Enable Compression Result Code

    Bit 6 Not used

    Bit 7 Not Used

XE1486L Class 1 Fax Commands

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+FAE=n - Data/Fax Auto Answer

    0 = Answer as a fax modem only

    1 = Either a fax or data modem

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

XE1486L Result Codes

Digits	Verbose	Description	Digits	Verbose	Description
0	OK	Successfully executed command line	33	FAX	Fax connection
1	CONNECT	300 bps connection	35	DATA	Data connection in Fax mode
2	RING	Ring signal detected	40	+MRR: 300	300 bps carrier received
3	NO CARRIER	Carrier not detected/lost	44	+MRR: 1200/75	V.23 reverse channel carrier received
4	ERROR	Error in command line	45	+MRR: 75/1200	V.23 forward channel carrier received
5	CONNECT 1200	1200 bps connection	46	+MRR: 1200	1200 bps carrier received
6	NO DIAL TONE	No dial tone detected	47	+MRR: 2400	2400 bps carrier received
7	BUSY	Busy signal detected	48	+MRR: 4800	4800 bps carrier received
8	NO ANSWER	5 second silence not detected	49	+MRR: 7200	7200 bps carrier received
9	CONNECT 600	600 bps connection	50	+MRR: 9600	9600 bps carrier received
10	CONNECT 2400	2400 bps Connection	51	+MRR: 12000	12,000 bps carrier received
11	CONNECT 4800	4800 bps Connection	52	+MRR: 14400	14,400 bps carrier received
12	CONNECT 9600	9600 bps Connection	66	+DR: Alt	MNP5 data compression
13	CONNECT 7200	7200 bps Connection	67	+DR: V42B	V.42bis data compression
14	CONNECT 12000	12,000 bps Connection	69	+DR: NONE	No data compression
15	CONNECT 14400	14,400 bps Connection	70	+ER: NONE	No error correction
16	CONNECT 19200	19,200 bps Connection	77	+ER: LAPM	LAPM error correction
17	CONNECT 38400	38,400 bps Connection	78	+MRR:31200	31,200 bps carrier received
18	CONNECT 57600	57,600 bps Connection	79	+MRR: 33600	33,600 bps carrier received
19	CONNECT 115200	115200 bps Connection	80	+ER: ALT	MNP error correction
22	CONNECT 75TX/1200RX	.23 originate connection	81	+ER: ALT CELLULAR	MNP10 error correction
23	CONNECT 1200TX/75RX	V.23 answer connection	+F4	+FCERROR	Fax carrier error

XE1486L FCC Instructions

This product complies with Part 68 of the FCC Rules and Regulations. Each device shipped includes a label which contains the FCC Registration Number and Ringer Equivalence (REN). If requested, this FCC information must be provided to the telephone company. A registration label must be affixed to the cabinet's exterior for each device mounted within a closed assembly.

Ringer Equivalence (REN) is used to calculate the number of devices you may connect to one telephone line and still have all of the devices respond to an incoming call. Typically, the sum of the RENs of all devices connected to one line should not exceed five (5.0). Contact your local telephone company to determine the maximum REN for your area.

Mount this device in the final assembly so as to prevent exposure to any hazardous voltages in the system and to preserve the high voltage protection between Tip/Ring and the rest of the system. Installation must provide adequate separation and restraint of cables and cords. Xecom recommends maintaining a minimum of .100 inches between the Tip and Ring traces and all other circuits. No circuitry may be added between Tip/Ring and the telephone line connection unless specifically allowed by the rules.

This device requires use of an RSOC RJ-11C jack for the telephone line connection. The jack selected must be certified to meet FCC Part 68 subpart F requirements.

If you experience trouble with this device, contact XECOM at (408)945-6640 to obtain service. There are no repairs the customer may make to this device. If your system causes harm to the telephone network, the telephone company may discontinue service temporarily until the problem has been corrected or it is demonstrated that the device is not malfunctioning. If possible, you will be notified in advance that service is being discontinued. If advance notice is not practical, you will be notified as soon as possible.

Your telephone company may make changes to their facilities, equipment, or operation that affect proper functioning of your equipment. You will be notified in advance of such changes to give you the opportunity to maintain uninterrupted telephone service.

This device cannot be used on coin operated telephone lines provided by the telephone company. Connection of this equipment to party lines is subject to state tariffs.

Any one using this device for fax transfer must include sender identification information as required in the Telephone Consumer Protection Act of 1991. The Telephone Consumer Protection Act of 1991 makes it unlawful to send a fax without clearly identifying the fax sender (business or individual) and the number of the transmitting fax machine. This information may be provided either on the first page of the fax or in the top or bottom margin of each page. The number listed may not be a 900 number or other number for which charges exceed local or long distance transmission.

The final assembler must provide these FCC instructions to the end user of the equipment.

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.

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