xecom®

Low-Cost, 2400 BPS Surface-Mount Modem

Description

XE2422H is a complete miniature, surface-mount, 2400 bps modem. It permits the designer to easily incorporate dial-up communications into set top box, security, vending, or point-of-sale applications.

XE2422H is not just a modem chip. The only design requirements are a serial port connection to the micro-controller and the connection to the telephone line. The XE2422H includes transferable FCC Part 68 Registration eliminating FCC Part 68 testing for the Xecom customer.

With the XE2422H, Xecom lowers the total cost of modem ownership. As a complete modem, it dramatically reduces modem development and certification costs. Assembly costs are reduced as dozens of components are replaced with this single, surface-mount module. And since Xecom tests 100% of all modules, quality is also improved. The cost of the XE2422H is under nine dollars in 100,000 piece quantities. Contact Xecom for pricing at other quantities

Features

- Small Size: 1.60" by 0.80" by 0.152"
- Data transfer rates from 300 bps to 2400 bps
- Supports V.21, V.22, V.22bis, V.23, Bell 103, Bell 212A modem protocols
- V.22/Bell 212 Fast Connect
- Supports Pulse and FSK Alarm formats
- Serial data rates to 115,200 bps.
- Control and configuration via AT Commands.
- 3.3 and 5 volt compatible Serial Interface
- Shared Line Features prevent interference with voice communications on an extension telephone.
- Complete integrated DAA.
- User Transferrable FCC Part 68 Registration
- UL60950 Recognition
- Low Operating Power, 3.3 Volts, <30 mW;
- Sleep Mode with Wake-on-Ring feature;
- Power Down reduces current draw to 100 µA
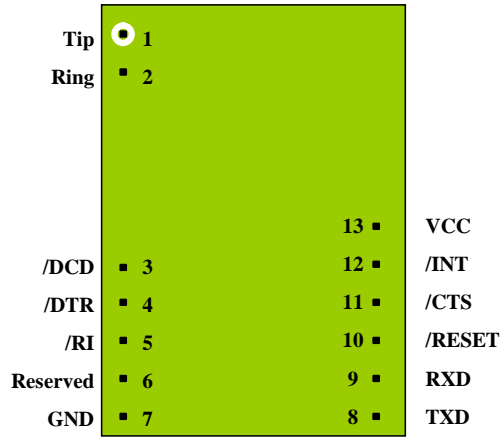
XE2422H BLOCK DIAGRAM
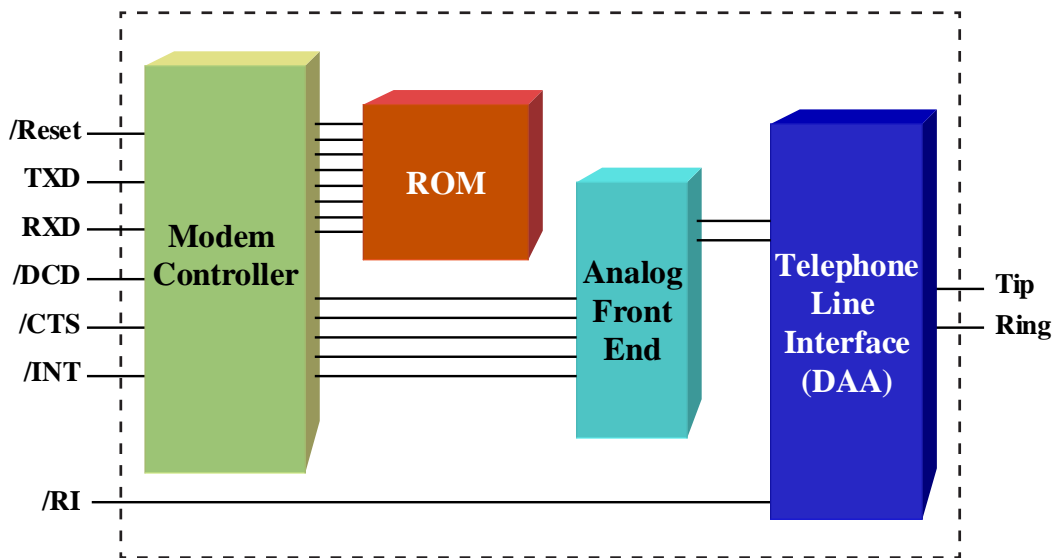
XE2422H Mechanical Specifications
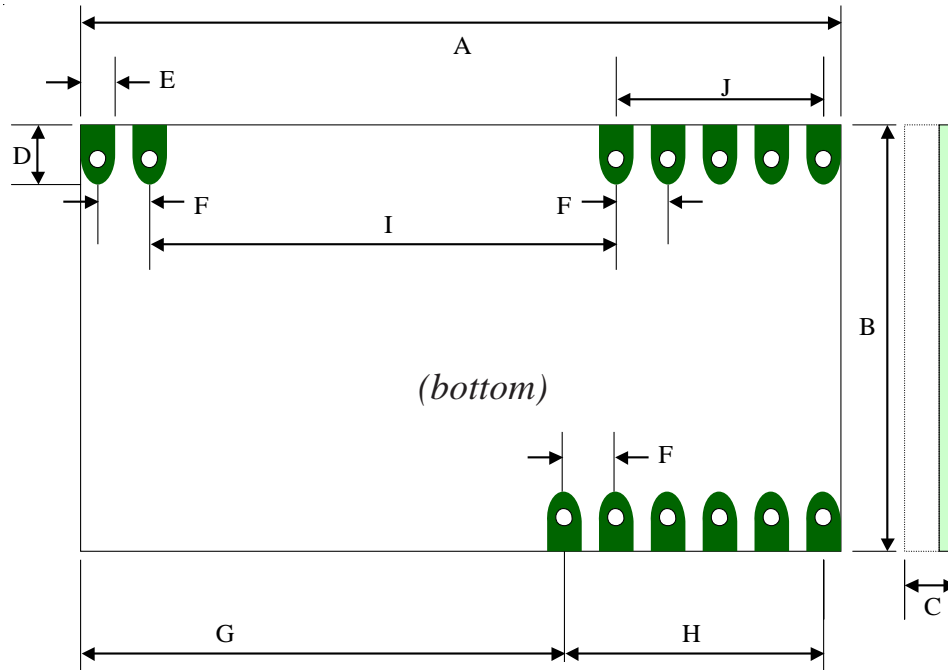
Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	1.595	1.600	1.605	40.51	40.64	40.77
B	0.795	0.800	0.805	20.19	20.32	20.45
C	0.147	0.152	0.157	3.73	3.86	3.99
D	0.095	0.100	0.105	2.41	2.54	2.67
E	0.055	0.060	0.065	1.40	1.52	1.65
F	0.095	0.100	0.105	2.41	2.54	2.67
G	1.045	1.050	1.055	26.54	26.67	26.80
H	0.495	0.500	0.505	12.57	12.70	12.83
I	0.995	1.000	1.005	25.27	25.40	25.53
J	0.395	0.400	0.405	10.03	10.16	10.29

XE2422H Pin Configuration

Top View

Tip	● 1				
Ring	■ 2				
			13 ■	VCC	
/DCD	■ 3		12 ■	/INT	
/DTR	■ 4		11 ■	/CTS	
/RI	■ 5		10 ■	/RESET	
Reserved	■ 6		9 ■	RXD	
GND	■ 7		8 ■	TXD	

Note: Pin 1 is marked with a white circle on the top of the module

Pin Descriptions

PIN	NAME	DESCRIPTION
1	Tip	The Ring and Tip signals connect the modem to the telephone line. FCC Part 68 Rules require a 1500 volt isolation barrier between the telephone line and all other circuits. This isolation must be preserved throughout the system.
		The telephone company places a DC "Battery" voltage across Tip and Ring on public switched telephone lines. The XE2422H operates regardless of the polarity of this voltage. The "Battery" voltage drives up to 120 milliampere of DC loop current.
		UL60950 requires minimum creepage and clearances distances between the Tip and Ring traces and all other circuits. Clearance is the shortest distance between conductive circuits; creepage is the distance between conductive points along the surface
2	Ring	The Ring and Tip signals connect the modem to the telephone line. FCC Part 68 Rules require a 1500 volt isolation barrier between the telephone line and all other circuits. This isolation must be preserved throughout the system.
		The telephone company places a DC "Battery" voltage across Tip and Ring on public switched telephone lines. The XE2422H operates regardless of the polarity of this voltage. The "Battery" voltage drives up to 120 milliampere of DC loop current.
		UL60950 requires minimum creepage and clearances distances between the Tip and Ring traces and all other circuits. Clearance is the shortest distance between conductive circuits; creepage is the distance between conductive points along the surface.

XE2422H Pin Descriptions (continued)

PIN	NAME	DESCRIPTION
3	/DCD	/DCD is an active low output from the modem that indicates the presence of a valid carrier signal. The SE2 register controls /DCD in the XE2422H. The default state is for /DCD to be disabled ATSE2=04 enables /DCD.
4	/DTR	/DTR is an active low input to the modem. The operation of /DTR is controlled by register SE2 and is normally disabled. When enabled, the modem will exit data mode and enter command mode if /DTR is removed while the modem is on-line. In Pulse and FSK Alarm modes raising /DTR is the only was to disconnect the data link.
5	/RI	The /RI signal reports on the presence of an incoming ring signal. When a ring occurs across Tip and Ring, the /RI output goes low and toggles with the cadence of the ring signal. /RI is controlled by register S0D bit 6. The default condition is for /RI to be disabled.
6	Reserved	Reserved for future use
7	Ground	Ground provides the reference voltage for all host interface signals.
8	TXD	TXD provides the path for transmitted data and modem commands to be passed from the host controller to the modem. A logic high on TXD represents a "Mark" condition and a logic low represents a "Space" condition.
9	RXD	RXD provides the path for received data and modem responses to be sent from the modem to the host controller. A logic high on RXD represents a "Mark" condition and a logic low represents a "Space" condition.
10	/RESET	/RESET is an active low input which initiates a modem hardware reset.
11	/CTS	/CTS is an active low output from the modem. The modem asserts /CTS to indicate that it can accept data from the terminal equipment on TXD.
12	/INT	/INT provides an active low hardware interrupt signal from the XE2422H. The operation of this interrupt pin is programmable using registers SE2 and S08. /INT can be programmed to indicate Loss of Carrier, Wake-on-Ring, Loss of Loop Current, or Shared Line Activity. Once triggered the /INT line remains active until cleared by the AT:I command.
13	VCC	VCC provides 3.3 volt power to the modem.

XE2422H Electrical Specifications

Parameter	Min	Typ	Max	Units	Comments
VCC	3.0	3.3	3.6	Volts	
ICC		8		mA	On Line
		7		mA	Sleep
		.1		mA	Power Down
Ring Voltage Detected	26		150	VRMS	Type B Ringer
Ring Frequency Detected	15.3		68	Hz	Type B Ringer
Telephone Loop Current	16	40	120	ma	
Line Impedance		600		Ohms	
Data Transmit level			-9.0	dBm	
DTMF Transmit Level		-2.5	0	dBm	Avg over 3 second interval
Voh	2.4			Volts	
Vol			0.4	Volts	
Vih	2.0		5.0	Volts	
Vil	-0.3		0.8	Volts	

| XE2422H ABSOLUTE MAXIMUM RATINGS	
Storage Temperature	-25° C to $+85^O$ C
[1] Maximum Operating Temperature Range	0° C to $+70^O$ C
Maximum Time Above Eutectic (183° C)	90 seconds
Preheat Dwell Time	120 to 180 seconds

XE2422H Surface-Mount Soldering Instructions

The XE2422H is subject to damage if overexposed to heat during solder reflow operations. Following the soldering instructions below will ensure that the process of soldering the module to the board does not damage the modem.

Maximum Temperature	220° C
Maximum Time at 220° C	20 Seconds
Maximum Time above Eutectic (180° C)	90 Seconds
Maximum Preheat Dwell Time	180 Seconds

Maximum Recommended Solder Temperature Profile
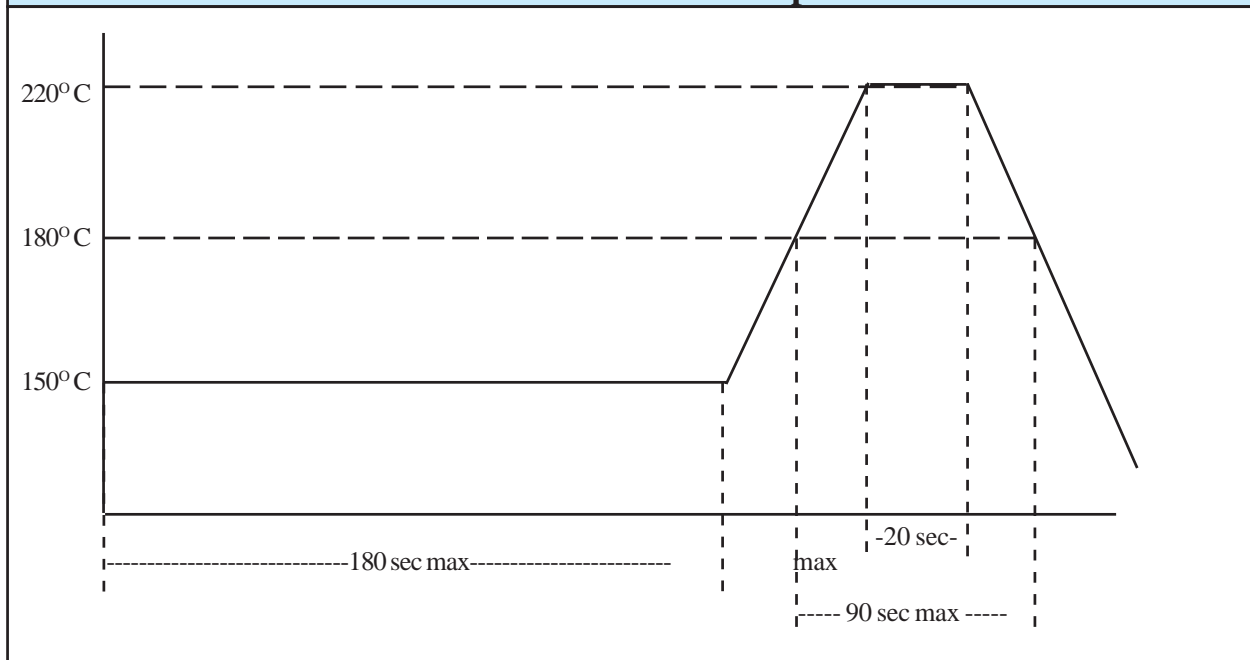
XE2422H Typical Connection Diagram
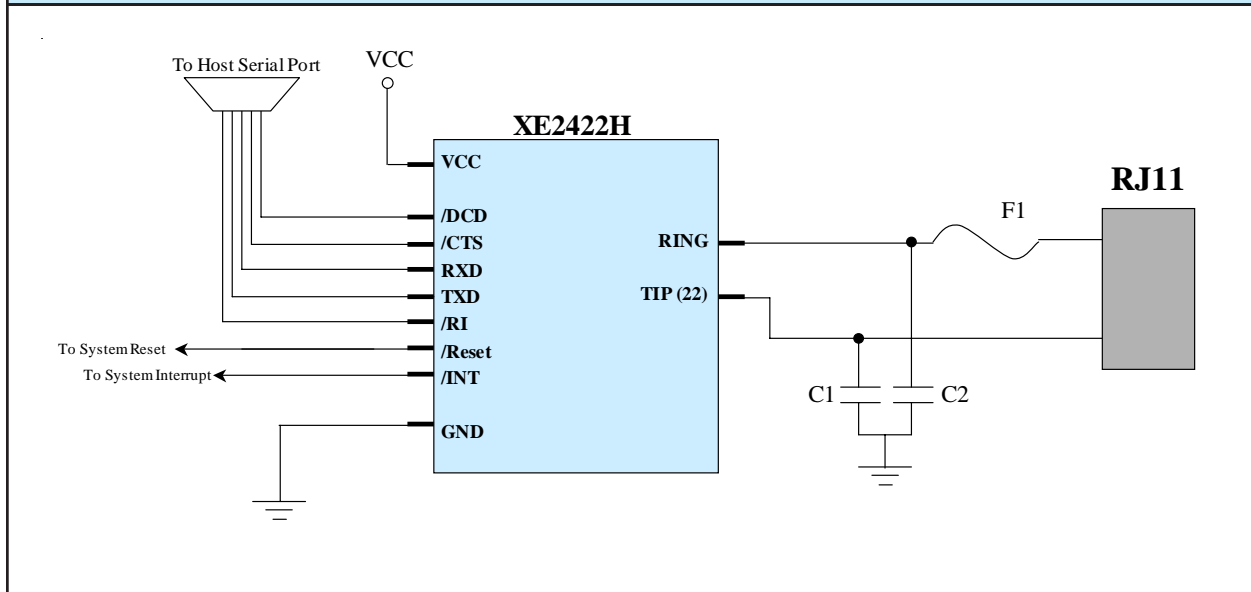
Parts List for XE2422H Typical Connection Diagram

Reference Designation	Qty	Description
C1, C2	2	Cap. 1000 pfd, 1500V minimum
F1	1	PTC, TR600-150

Notes:

1 Capacitors, C1 and C2, may be required for EMI filtering in your system. Without these components you may experience unintended radiation when the telephone cable is attached. C1 and C2 are high-voltage capacitors. We recommend the Johanson Dielectrics 502S47N102KV6T. This 1000 pfd, 3000 volt capacitor will direct the high frequency harmonics to the system ground. These capacitors must be rated at a minimum of 1500 volts to maintain the isolation required by FCC Part 68 Rules.

3. F1 is a positive thermal coefficient (PTC) device which protects the modem from excessive current flow. These devices are required for your system to pass UL60950. Fuses may be used in place of the PTC's

XE2422H Shared Line Features

The XE2422H monitors line conditions before, after, and during calls. This allows conflicts with other equipment connected to the telephone line to be avoided. The XE2422H includes two Shared Line Features; Connect Detect and Handset Interrupt.

Connect Detect

Register SDB stores the XE2422H on-hook telephone line voltage. The modem checks the value of register SDB before going off-hook to avoid interrupting a call in progress. The typical value for telephone line voltage while on-hook is 48 volts. A lower voltage level indicates that the line is either disconnected from the modem or is currently in use.

Register SDB is an 8 bit register. It stores the loop voltage as a 2's complement number with each bit representing 1 volt. The Most Significant Bit represents the polarity of the loop voltage.

Handset Interrupt:

Handset Interrupt permits the modem to yield the phone line when other equipment on the line goes off-hook. This prevents the modem from blocking outgoing emergency calls when the telephone line is shared as in residential use. The modem monitors loop current while it is off-hook. The loop current will drop if another device on the line goes off-hook.

Register SF3 holds the loop current value in 1.1 milliamp increments. The XE2422H updates SF3 regularly. The loop current value stored in SF3 is compared to the values of registers S11 and S12. If the value S12 is greater than the value of SF3 plus S11, then the XE2422H assumes the equipment connected to the telephone line has gone off-hook, issues the Handset Interrupt response "i" and, if so configured, issues an Interrupt to the host controller. The host controller determines whether to terminate the call and yield the line to the other equipment.

V.22/Bell 212 Fast Connect

The XE2422H supports Fast Connect algorithms for Bell 212 and V.22 operation. These reduce the handshaking time required for faster transaction times in applications with small data loads. Nine Registers are used to control the Fast Connect feature as shown in the chart below

Register	Function	Units	Default	Fast Connect
S1E	Transmit Answer Tone Length	1 s	0x03	0x00
S1F	Answer Tone to Transmit Delay	5/3 ms	0x2D	0x00
S20	Unscrambled Ones Length (V.22)	5/3 ms	0x5D	0x00
S21	Transmit Scrambled Ones Delay (V.22)	53.3 ms	0x09	0x00
S22	Transmit Scrambled Ones Length (V.22)	5/3 ms	0xA2	0x00
S23	V.22/V.22b Data Delay Low	5/3 ms	0xCB	0x00
S24	V.22/V.22b Data Delay High	5/3 ms	0x08	0x00
S34	Answer Tone Length (S1E =0x00)	5/3 ms	0x5A	0xF0
S35	Receive V.22 Scrambled Ones Length	5/3 ms	0xA2	0x00

XE2422H AT Commands

The XE2422H uses a simplified "AT" command set for configuration and control. This section describes the AT command format and lists the AT commands, registers and result codes. XE2422H "AT" commands have three operational modes; command mode, alarm mode and data mode. The Data Rate for the XE2422H is set by Register SE0.

Data Mode: The XE2422H enters data mode after it connects to a remote modem and issues the appropriate result code. In the data mode the modem sends all data presented on Transmit Data (TXD) to the remote modem and puts data from the remote modem onto Received Data (RXD). When the modem exits data mode, it issues a "NO CARRIER" result code.

Command Mode: The XE2422H enters command mode on power-up, reset, a lost connection, or receipt of the escape code. In command mode the modem accepts commands from the host on transmit data. Appropriate result codes are returned on RXD.

Command Line Format
Command lines issued to the modem follow a strict format. Each command line begins with the prefix AT. All commands except the "z" command must be entered in upper case characters. The command line is a string of commands between the AT prefix and the carriage return which terminates the command. The command buffer stores the command line and executes it upon receipt of a carriage return. Commands will be executed in the sequence they appear in the command line.

Result Codes - The modem issues a result code after each command line. Result codes may be sent as single characters or single characters followed by a carriage return.

Alarm Mode:
The XE2422H supports a unique set of commands to establish alarm industry connections. Both Pulse messaging and FSK formats are supported. The AT!1 command initiates Pulse messaging and AT!2 initiates FSK messaging. The ATD command must precede either AT! command to begin the Alarm transaction. In Alarm mode, /DTR must be removed to disconnect the modem link. /DTR is activated by setting register SE2 bits 4 and 5.

Pulse Mode: In Pulse Mode messages are passed using DTMF tones. The receiving station acknowledges receipt of the message by transmitting the "Kissoff" tone. A sample transaction is shown below.

Alarm Panel	XE2422H
ATDT#!1<message 1><CR>	
	K
!<message 2><CR>	
	K
!<message n><CR>	
	K

Disconnect is accomplished by raising /DTR.

FSK Mode: In FSK Mode messages are passed on a 300 bps, half-duplex carrier signal. The X1, X2, and X3 commands switch the modem between monitoring the line for acknowledgments (X1), transmitting messages (X2), and receiving messages (X3). As in the pulse mode disconnect is only possible by pulling the /DTR signal high.

XE2422H AT Commands

An asterisk indicates the factory default

A - Answer Command -

D - Dial Command -
    0-9, A-D, #, * = Dialing Digits
    P = Pulse dial
    T = Tone dial
    ,   = Pause for two seconds
    I   = Pause for 125 milliseconds
    ;   = 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 Switch hook relay closes

In - Modem Identification

:I Read Interrupt Register - Read and reset the interrupt status register S09

O - Return On Line

SR? - Read Value of register R

SR=n - Write value "n" into register "R".
    The values of both "n" and "R" are hexa-decimal.

Vn - Result Codes -
    n=0 Single Character Result Codes
    n=1 Result Codes followed by a Carriage Return*

Z - Reset -

z - Wake from Sleep Mode on Ring

!1<message> - Switch to Pulse Mode: This command must follow the dialing command in the same command string.

!2<message> - Switch to FSK Mode: This command must follow the dialing command in the same command string. This command allows the modem to establish a 300 bps half-duplex FSK signal.

X1 - FSK Signal Search: Turns off the modem transmitter and monitors the line for an acknowledgment.

X2 - Return On-line as Transmitter: Places the modem in the transmit mode during FSK half-duplex operation.

X3: - Return on-line as Receiver: Places the modem in the receive mode during FSK half-duplex operation.

~ - Resend Last Pulse Mode Message:

XE2422H RESPONSES

Result Code	Description
a	British Caller ID Tone Detected
b	Busy Tone Detected
c	Connect
d	Connect 1200
f	Battery Voltage Reversal Detected
H	Modem automatically hung up in Security Mode
I	Parallel Handset Returned On-Hook
i	Handset Interrupt Detected
K	Kissoff Tone Detected in Security Mode
k	Kissoff Tone exceeds Limit set by S36
L	Phone Line Detected
l	No Phone Line Detected
m	Caller ID Signal Detected
N	No Carrier Detected
n	No Dial Tone
O	OK Response
R	Ringing
r	Ringback Tone Detected
t	Dial Tone Detected
x	Over-current Condition Detected
v	Connect in V.23 originate mode
^	Kissoff Tone Detection Required
,	Dialing Complete

XE2422H REGISTER SETTINGS

XE2422H register values are stored in Hex format. An asterisk "*" signifies the default setting of a bit-mapped register.

S00   **Answer on nth Ring:** S00 sets the modem to automatically answer on the nth ring. Setting S00 to 0 disables automatic answer.

    Range: 00 to 7F (0 to 127 rings)
    Units   Rings
    Default   00 (Auto Answer Disabled)

S01   **Wait to Dial:** S01 determines the maximum time the modem will wait to dial

    Range: 0 to 6D (0 to 109 seconds)
    Units   Seconds
    Default   02 (2 seconds)

S02   **Wait for Dial Tone** S02 determines how long the modem waits for Dial Tone before hanging up.

    Range: 00 to 6D (0 to 109 seconds)
    Units   Seconds
    Default   03 (3 seconds)

S03   **Carrier Off Disconnect Delay**: S03 determines how long carrier must be lost before modem disconnect.

    Range: 00 to 7F (0 to 6.78 seconds)
    Units   0.0533 Seconds
    Default   0E (0.75 seconds)

S04   **DTMF Duration and Spacing:** S04 sets duration and spacing of DTMF dialing tones.

    Range: 00 to 7F (0 to 211 milliseconds)
    Units   1.666 milliseconds
    Default   30 (80 milliseconds)

S05   **Duration Off-Hook during Pulse Dialing:** S05 defines how long the hookswitch is active between dialing pulses.

    Range: 00 to 7F (0 to 211 milliseconds)
    Units   1.666 milliseconds
    Default   18 (40 milliseconds)

S06   **Duration of Dialing Pulses:** S06 determines how long the modem goes on-hook to generate dialing pulses.

    Range: 00 to 7F (0 to 211 milliseconds)
    Units   1.666 milliseconds
    Default   24 (60 milliseconds)

XE2422H REGISTER SETTINGS

S07 **Modem Protocol Selection:** S07 sets the protocol and speed of the modem connection.

Protocol	Data Rate	Register Value
V.22bis	2400 bps	06 *
V.22	1200 bps	02
V.21	300 bps	03
Bell 212A	1200 bps	00
Bell 103	300 bps	01

S08 **Interrupt Control Register:** S08 is a bit-mapped register which defines the events that will cause the /INT signal to be activated. Default = 00

Bit #	Definition	Action
7	Issue Interrupt when Carrier Detect is lost	0 = No Interrupt * 1= Activate Interrupt
6	Issue Interrupt on Ring with Wake-on-Ring selected	0 = No Interrupt * 1= Activate Interrupt
5	Issue Interrupt on Handset Interrupt Detection	0 = No Interrupt * 1= Activate Interrupt
4	Issue Interrupt on No Connect Detection	0 = No Interrupt * 1= Activate Interrupt
3	Issue Interrupt on Ring Detection	0 = No Interrupt * 1= Activate Interrupt
2	Issue Interrupt on Caller ID	0 = No Interrupt * 1= Activate Interrupt
1	Issue Interrupt on Over-current Detection	0 = No Interrupt * 1= Activate Interrupt
0	Reserved	

S09 **Interrupt Status Register:** S09 is a bit-mapped register. The active bit indicates the cause of the most recent interrupt. S09 is cleared when read on receipt of the :I command. Default = 00

Bit #	Definition
7	Interrupt issued when Carrier Detect was lost
6	Interrupt issued when a Ring was detected with Wake-on-Ring selected
5	Interrupt issued on Handset Interrupt Detection
4	Interrupt issued on No Connect Detection
3	Interrupt issued on Ring Detection
2	Interrupt issued on Caller ID
1	Interrupt issued on Over-current Detection
0	Reserved

XE2422H REGISTER SETTINGS

S0C **Modem Function Register:** S0C is a bit-mapped register which controls the designated modem functions. Default = 00

Bit #	Definition	Action
7	Enable Carrier Detect IO pin	0 = No DCD output *
		1= DCD Active
6	Reserved	
5	Enable Caller ID	0 = No Caller ID *
		1= Caller ID Active
4:3	Reserved	
2	Blind Dialing, dialing without detecting dial tone	0 = Dial Tone Required *
		1 = Blind Dialing Selected
1:0	Reserved	

S0D **Modem Function Register:** S0D is a bit-mapped register which controls the designated modem functions. Default = 00

Bit #	Definition	Action
7	Reserved	
6	Enable Ring Indicate IO pin	0 = No RI output *
		1 = RI Active
5:4:3	Reserved	
2	Disconnect upon detection of a Busy Signal	0 = Disabled *
		1 = Hang-up on Busy Detect
1	Disconnect on Handset Interrupt detection	0= Disabled *
		1 = Enabled
0	Reserved	

S0E **Pulse Dialing Interdigit Delay:** S0E determines the length of the time between numbers dialed using dialing pulses. The minimum time between digits is 64 milliseconds. The value of S0E adds to that 64 millisecond delay in 10 millisecond increments

Range: 00 to 7F (64 to 1374 milliseconds)
Units   10 milliseconds
Default   46 (764 milliseconds)

S0F **Escape Character:** S0F defines the character to be used in the escape sequence to move from data mode to command mode. Values of 0 to 127 select valid ASCII characters.

Range: 00 to 7F
Units   ASCII Character
Default   2B (+)

XE2422H REGISTER SETTINGS

S10 Escape Code Guard Timer: S10 defines the duration of the guard timer surrounding the escape sequence. The guard time is the time preceding and following the escape sequence during which any character received by the modem will abort the escape sequence.

Range: 00 to 7F (0 to 6.78 seconds)
Units   0.0533 Seconds
Default   13 (1 second)

S11 Handset Interrupt Differential Current Threshold: S11 sets the differential loop current threshold for the XE2422H handset Interrupt detection algorithm. If loop current falls by the value of S11 below the value of S12, Handset Interrupt is activated.

Range: 00 to 07 (0 to 7 milliamps)
Units   1 Milliamp
Default   04 (4 milliamps)

S12 Handset Interrupt Current Threshold: S12 sets the loop current threshold for the XE2422H Handset Interrupt detection algorithm. If loop current falls by the value of S11 below the value of S12, Handset Interrupt is activated.

Range: 00 to 64 (0 to 100 milliamps)
Units   1 Milliamp
Default   00 (0 milliamps)

S15 Modem Link Control Register: S15 selects modem guard tones, calling tones and data format..
Default = 04

Bit #	Definition	Action
7	Reserved	
6	Transmit V.25 Calling Tone	0 = Disabled *
		1 = Calling Tone Active
5	Transmit 550 Hz Guard Tone	0 = Disabled *
		1= 550 Hz Guard tone Active
4	Transmit 1800 Hz Guard Tone	0 = Disabled *
		1= 1800 Hz Guard tone Active
3	Number of Stop Bits	0 = 1 Stop Bit *
		1 = 2 Stop Bits
2:1	Number of Data Bits	00 = 6 Data Bits
		01 = 7 Data Bits
		10 = 8 Data Bits *
		11 = 9 Data Bits
0	Reserved	

S29 Handset Interrupt Blocking Time: S29 provides a set duration for blocking the Handset Interrupt feature to avoid false detections. This timer is activated by S82.

Range: 00 to 7F (0 to 63.5 Seconds)
Units   0.5 Seconds
Default   00 (disabled)

XE2422H REGISTER SETTINGS

S37 **Carrier Detect Recovery Time:** S37 determines how long after being lost the data carrier signal must be detected before the modem recognizes it as being recovered.

    Range: 00 to 7F (0 to 211 milliseconds)
    Units   1.66 milliseconds
    Default   20 (53.33 milliseconds)

S39 **Carrier Detect Response Time:** S39 determines how long the modem will wait for the initial data carrier signal to be detected before aborting a call..

    Range: 00 to 7F (0 to 127 Seconds)
    Units   1 Second
    Default   3C (60 Seconds)

S62 **Result Code Register:** S62 allows selection of specific modem result codes. Default = 41

Bit #	Definition	Action
7	Reserved	
6	Over-current Result code "x"	0 = Result Code "x" supported
		1 = Disabled *
5:4:3	Reserved	
2	Handset Interrupt Result Codes "I" and "i"	0 = Disabled *
		1 = Support result codes "I' and "i"
1	Connect Detect Result Codes "L" and "l"	0 = Disabled *
		1 = Support result codes "L' and "l"
0	Ring Result Code "R"	0 = Disabled
		1 = Result Code "R" supported

S82 **Loop Current Register:** S82 allows selection of specific modem result codes. Default = 08

Bit #	Definition	Action
7:6:5:4	Reserved	
3	Detect Loss of Loop Current	0 = Disabled
		1 = Enabled *
2:1	Block Handset Interrupt on initial connection	00 = No Handset Interrupt Blocking *
		01 = Blocked during dialing
		10 = Blocked unit S29 Time out
		11 = Blocked unit Carrier Detect
0	Reserved	

XE2422H REGISTER SETTINGS

SDB **Line Voltage Status:** SDB is a read only register that stores the value of the loop voltage in two's compliment form. The most significant bit, Bit 7, indicates the polarity of the voltage on Tip and Ring.

Units   1 Volt
Default   00 (Tip and Ring Voltage less than 3 volts)

SE2 **Interrupt Enable:** SE2 activates the XE2422H Interrupt output. Default = 00

Bit #	Definition	Action
7:6:	Interrupt Output Control	00 = Disabled *
		01 = Disabled
		10 = Disabled
		11 = Interrupt Output Enabled
5:4	/DTR Control	00 = Disabled *
		01 = Disabled
		10 = Disabled
		11 = /DTR Enabled
3:2	/DCD	00 = /DCD Disabled*
		01 = /DCD Enabled
		10 = /DCD Disabled
		11 = /DCD Disabled
1:0	Reserved	

SF1 **Power Down Register:** SF1 allows the XE2422H to be placed in power down mode. The modem draws only about 100 microamps in Power down mode. Default = 0C

Bit #	Definition	Action
7	Reserved	
6	Power Down Mode	0 = Normal Operation
		1 = Power Down Selected
5:4	Reserved	
3:2	Forced Active	
1:0	Reserved	

SF3 **Loop Current Status:** SF3 is a read only register that stores the current value of the loop current.
Units   1.1 Volt
Default   00 (no Loop Current Present)

FCC Instructions

The XE2422H complies with Part 68 of the FCC Rules and Regulations. With each device shipped, there is a label which contains the FCC Registration Number. The FCC Registration number incorporates the Model Number, Manufacturer Indentifier, Product Type identifier and Ringer Equivalence Number (REN) for this product. You must, upon request, provide this information to your telephone company. The format of the FCC Registration Number is shown below.

US: DWEMM00BXE2422H

The mounting of this device 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.

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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