

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	9600 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

XECOM, Inc.

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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

4

Pin Configuration and Definitions

XE9624GS

VCC	1
Reset	2
TXD	3
RXD	4
VA	5
\RTS	6
\DTR	7
\RI	8
\HS	9
\DCD	10
\CTS	11
\DSR	12
OH	13
AR	14
AMP	15
Gnd	16
N/A	17
Vui	18

Tip	19
Ring	20

XE9624VS

VCC	1
Reset	2
TXD	3
RXD	4
VA	5
\RTS	6
\DTR	7
\RI	8
\HS	9
\DCD	10
\CTS	11
\DSR	12
OH	13
AR	14
AMP	15
Gnd	16
MIC	17
Vui	18

Tip	19
Ring	20

XE1414VS

VCC	1
Reset	2
TXD	3
RXD	4
VA	5
\RTS	6
\DTR	7
\RI	8
\HS	9
\DCD	10
\CTS	11
\DSR	12
OH	13
AR	14
AMP	15
Gnd	16
MIC	17
Vui	18

Tip	19
Ring	20

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 host. A logic "high" represents a "mark" and a low represents a "space", TTL.
4	RXD	O	Serial data output to the host. A logic "high" represents a "mark" and a logic "low" represents a "space", TTL.
5	VAA	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.
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)

PIN	NAME	I/O	DESCRIPTION
17	MIC	—	Microphone input to the modem for audio recording. The XE9624GS does not include a microphone input.
18	Vui	—	Vui provides uninterrupted power for the Ring Indication circuit.
19	TIP	—	Tip connection to the phone 4-39line(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

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

AT+FRS<time> - Receive Silence

AT+FRTn - Receive Test Data

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+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

AT Command Useage

The table below shows the AT commands used on each of the Single In-line Modems.

	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

4

Voice Command List

#VB P- Generate Beep	#VPB - Record Voice
#VCL=n - Voice Mode Selection	#VRL=n - Record Level
#VCSD - Voice Mode Silence Detection	#VSL=n - Record Silence Detection ThresholdI
#VIP=n - Initialize Voice	#VSM=n - Sample Mode
#VLN=n - Playback Control (bit-mapped)	#VSQT=n - Record <DLE>q Silence Detection
#VPH - Telephone Emulation Mode	#VSR=n - Sampling Rate (9600 bps)
#VPL=n - Playback Level	#VSST=n - Record <DLE> Silence Detection
#VPB - Playback Voice	

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

4

Result Codes

DIGIT	FULL RESPONSES
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 7200
13	DATA
14	CONNECT 9600
15	FAX
16	CONNECT 12000
17	CONNECT 14400
22	CONNECT 300/REL
24	CONNECT 1200/REL
25	CONNECT 2400/REL
26	CONNECT 4800/REL
27	CONNECT 7200/REL
28	CONNECT 9600/REL
29	CONNECT 12000/REL
30	CONNECT 14400/REL
32	CONNECT 300/REL-MNP
34	CONNECT 1200/REL-MNP
35	CONNECT 2400/REL-MNP

DIGIT	FULL RESPONSES
36	CONNECT 4800/REL-MNP
37	CONNECT 7200/REL-MNP
38	CONNECT 9600/REL-MNP
39	CONNECT 12000/REL-MNP
40	CONNECT 14400/REL-MNP
42	CONNECT 300/REL-MNP
44	CONNECT 1200/REL-MNP5
45	CONNECT 2400/REL-MNP5
46	CONNECT 4800/REL-MNP5
47	CONNECT 7200/REL-MNP5
48	CONNECT 9600/REL-MNP5
49	CONNECT 12000/REL-MNP5
50	CONNECT 14400/REL-MNP5
54	CONNECT 1200/REL-LAPM
55	CONNECT 2400/REL-LAPM
56	CONNECT 4800/REL-LAPM
57	CONNECT 7200/REL-LAPM
58	CONNECT 9600/REL-LAPM
59	CONNECT 12000/REL-LAPM
60	CONNECT 14400/REL-LAPM
64	CONNECT 1200/REL-LAPM V.42bis
65	CONNECT 2400/REL-LAPM V.42bis
66	CONNECT 4800/REL-LAPM V.42bis
67	CONNECT 7200/REL-LAPM V.42bis
68	CONNECT 9600/REL-LAPM V.42bis
69	CONNECT 12000/REL-LAPM V.42bis
70	CONNECT 14400/REL-LAPM V.42bis
+F4	+FCERROR

4

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 ($T_A = 0 - 70^\circ C$, $V_{cc} = 5v \pm 5\%$)

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 capabilities 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 initiate 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

4

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