14,400 BPS Modem for Data, Fax, Voice

Description

Xecom's XE1414 and XE1414M combine high-speed data and Group III send/receive fax in a compact component.

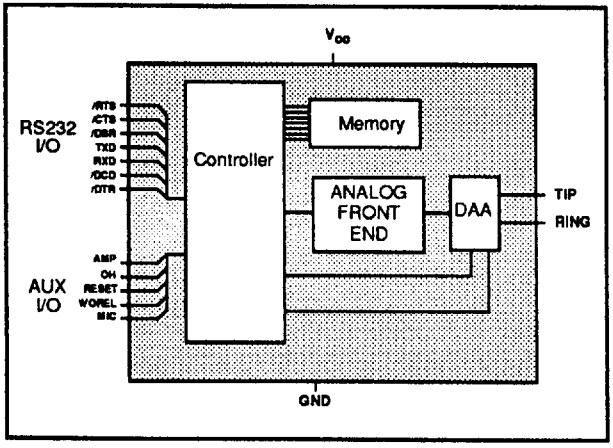
The XE1414 and XE1414M are not just modem chips but complete modems including the telephone interface. They provide user transferable FCC Part 68 registration and can connect directly to the telephone line through an RJ11 jack. The modem connects to the host through a TTL level serial interface. The XE1414M adds MNP10 error control to support cellular links.

Xecom designed the XE1414 and XE1414M specifically for commercial and industrial systems with a need for high-speed communications and minimal space.

Features

- Small Size; 2.75 " x 1.38" x 0.42"
- Modem control with "AT" commands
- Class 1 and Class 2 fax commands
- Data transfer up to 14,400 bps
- Send and receive fax to 14,400 bps
- MNP and V.42 Error Control
- MNP5 Data Compression to 28,800 bps
- MNP10 Error Control for Cellular links.
- V.42bis Data Compression to 57,600 bps
- Low power, single +5V supply
  Operating Power 600 mW (Typ.)
  Sleep mode: 30 mW (Typ.)
- NVRAM for modem configuration storage

BLOCK DIAGRAM



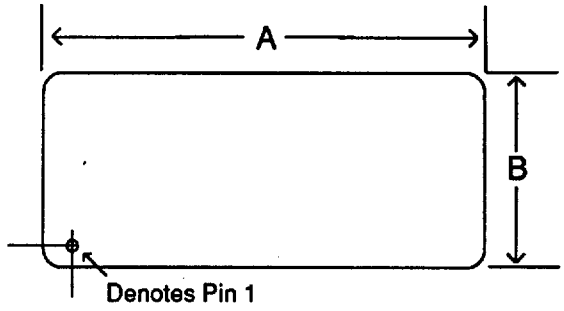
PIN CONFIGURATION

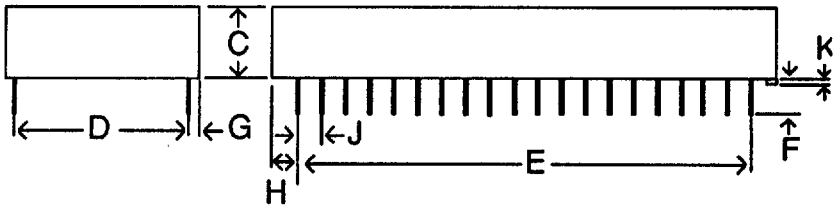
NC	1	40	VCC
NC	2	39	/DSR
RXD	3	38	/DCD
NC	4	37	NC
NC	5	36	RESET
NC	6	35	NC
/VOREL	7	34	NC
MIC	8	33	NC
/DTR	9	32	NC
NC	10	31	NC
/CTS	11	30	OH
NC	12	29	NC
TXD	13	28	NC
/RTS	14	27	NC
NC	15		
/RI	16		
TIP	18		
		22	AMP
RING	20	21	GND

Mechanical Specifications - XE1414 & XE1414M

	INCHES		METRIC(MM)	
PIN	MIN	MAX	MIN	MAX
A	2.74	2.760	69.60	70.10
B	1.370	1.390	34.80	35.31
C	0.420	0.430	10.67	10.92
D	1.190	1.210	30.23	30.73
E	1.890	1.910	48.01	48.51
F	0.125	0.200	3.18	5.08
G	0.080	0.100	2.03	2.54
H	0.415	0.435	10.54	11.05
J	0.090	0.110	2.29	2.79
K	0.020	0.025	0.51	0.64

Pins = 0.025 inch square pin
All pins tin-plated





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

Symbol	Parameter	Model	Typ	Max	Units	Comments
Vcc	Supply Voltage	Both	5.0	5.25	Volts	
Icc	Vcc Supply Current	XE1414	120	150	mA	Active, On Line
		XE1414	30		mA	Active, Idle
		XE1414M	130	170	mA	Active, On line
		XE1414M	35		mA	Active, Idle
Iccs	Sleep Current	Both	6.0	10.0	mA	Sleep Mode

Power Management: The XE1414 and XE1414M have an integrated power management capability. If no activity is detected on the RXD, DTR, or RI the modem will, within 5 seconds, automatically go into a smart sleep mode. In this mode power consumption is typically less than 50 milliwatts.

Pin Descriptions

PIN	NAME	I/O	DESCRIPTION
3	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.
9	\DTR	I	Data Terminal Ready, input, active Low, TTL. The function of this pin is set by the &D command. Normally the modem ignores DTR.
11	\CTS	O	Clear to Send, output, active Low, TTL/CMOS. This pin regulates the flow of data from the DTE during hardware flow control.
13	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.
14	\RTS	I	Request to Send, input, active Low, TTL. This signal regulates the flow of data from the modem during hardware flow control.
16	\RI	O	Ring Indicator, output, active Low, TTL. When low indicates the modem is receiving a ring signal.
19	TIP	—	Tip connection to the phone line(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**
21	GND	—	Ground (0 volts)
22	AMP	O	Audio output function is determined by L & M commands and the value in register S22. This output can drive a 50Kohm load.
30	OH	O	DAA hookswitch relay is closed in the "off-hook" position connecting the DAA to the telephone line.
36	RESET	I	Hardware reset pin, active High, TTL. Use of an external reset is not recommended. Any signal applied to Pin 36 must remain high for a minimum of 100 milliseconds.
38	\DCD	O	Data Carrier Detect, output, active Low, TTL/CMOS. Function is set by the &C command and the value in register S21.
39	\DSR	O	Data Set Ready, output, active Low, TTL/CMOS. Function is set by the &S command and the value in register S21.
40	Vcc	—	+5 Volts

XE1414 & XE1414M AT Command List

Command	Description	Command	Description
A	Answer Command -	%En	Line Quality Monitor/, Auto-Retrain
Bn	Select Communication Std	%L	Read Recevied Signal Level
D	Dial Command	%Q	Read Line Signal Quality
En	Command Echo	\An	MNP Block Size
Fn	Select Line Modulation	\Bn	Transmit Break
Hn	Switch Hook Control	\Gn	Set Modem Port Flow Cntrl
In	Modem Identification	\Jn	DTE Rate Adjust
Ln	Speaker Volume	\Kn	Break control
Mn	Speaker Activity	\Nn	Error Control Selection
Nn	Data Rate	\On	Originate Reliable Link
On	On Line	\Qn	Flow Control Selection
Qn	Responses	)Mn	Cellular Power Level Adjustment
Sr?	Interrogate Register	*Hn	MNP10 Link Negotiation Speed
Sr=n	Set Register Value	-Kn	MNP Extended Services
Vn	Result Codes	Qn	Fallback to V.22bis/V.22
Wn	Connect Message Rate	@Mn	Initial Cellular Transmit Level
Xn	Result Code Set	:En	Compromise Equalizer
Yn	Long Space Disconnect		
Zn	Reset		
&Cn	DCD Operation		
&Dn	DTR		
&Fn	Return to Factory Defaults		
&Gn	Guard Tone		
&Kn	Flow Control		
&Ln	Line Type		
&Pn	Pulse Make/Break Ratio		
&Qn	Line Connection		
&Sn	DSR Operation		
&Tn	Test Modes		
&Vn	View Configuration		
&Wn	Store Active Profile		
&Zn=x	Store telephone number "x" in memory location "n"		

Class 1 Fax Command List

Command	Description	Command	Description
AT+FCLASS?	Service Class Indication	AT+FRS<time>	Receive Silence
AT+FCLASS=?	Service Class Capability	AT+FRTn	Receive Test Data
AT+FCLASS=n	Set Service Class	AT+FTH<mod>	Transmit HDLC Data
AT+FAE=n	Data/Fax Auto Answer	AT+FTM<mod>	Transmit Fax
AT+FF	Enhanced Flow Control	AT+FTS<time>	Transmit Silence
AT+FRH<mod>	Receive HDLC Data	AT+FTTn	Transmit Test Data
AT+FRM<mod>	Receive Fax		

Class 2 Fax Command List

Command	Description	Command	Description
+FCLASS=n	Set Service Class	AT+FDIS =VR, BR, WD, LN, DF, ED, BF, ST	Set Current Sessions Capabilities Parameters
+FCLASS=?	Available Service Class		
+FCLASS?	Current Service Class	AT+FDR	Begin/Continue Phase C Receive Data
+FAA=n	Adaptive Answer		
AT+FAXERR	Fax Error Value	AT+FDT	Data Transmission
AT+FBOR=n	T.4 Data Bit Order	AT+FET=<ppm>	Transmit Page Punctuation
AT+FBUF?	Buffer Size	AT+FK	Terminate Session
AT+FCR=n	Capability to Receive	AT+FLID<local ID>=	Local ID String
AT+FDCC = VR, BR, WD, LN, DF, ED, BF, ST	Set DCE Capabilities Parameters	AT+FPHCTO <value>	Phase C Time Out
AT+FDCS?	Current Session Results		

XE1414 & XE1414M 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	TIES Escape Code Time Limit	050
S18	0-255/sec	Modem test timer	000
S24	Bit Mapped	Sleep Mode timer	010
S25	Bit Mapped	DTR Transitions	005
S30	0-255/10msec	Disconnect on Inactivity Timer	000
S32	0-255 /ASCII	XON Character	017
S33	0-255 / ASCII	XOFF Character	019
S37	Bit Mapped	Maximum Link Speed	000
S46	136/138	Data Compression Control	138
S48	0,7,128	V.42 Negotiations	007

XE1414 & XE1414M Result Codes

DIGIT	FULL	DEFINITIONS
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	Connection established with 2400 bps link or DTE speed
11	CONNECT 4800	Connection established with 4800 bps link or DTE speed
12	CONNECT 9600	Connection established with 9600 bps link or DTE speed
13	CONNECT 7200	Connection established with 7200 bps link or DTE speed
14	CONNECT 12000	Connection established with 12,000 bps link or DTE speed
15	CONNECT 14400	Connection established with 14,400 bps link or DTE speed
16	CONNECT 19200	Connection established with 19,200 bps DTE speed
17	CONNECT 38400	Connection established with 38,400 bps DTE speed
18	CONNECT 57600	Connection established with 57,600 bps DTE speed
22	CONNECT 75TX/1200RX	V.23 originate connection established
23	CONNECT 1200TX/75RX	V.23 answer connection established
33	FAX	Fax connection established
34	DATA	Data connection established in Fax mode
40	CARRIER 300	300 bps carrier received
44	CARRIER 1200/75	V.23 reverse channel carrier received
45	CARRIER 75/1200	V.23 forward channel carrier received
46	CARRIER 1200	1200 bps carrier received
47	CARRIER 2400	2400 bps carrier received
48	CARRIER 4800	4800 bps carrier received
49	CARRIER 7200	7200 bps carrier received
50	CARRIER 9600	9600 bps carrier received
51	CARRIER 12000	12,000 bps carrier received
52	CARRIER 14400	14,400 bps carrier received
66	COMPRESSION: CLASS 5	MNP Class 5 data compression has been established
67	COMPRESSION: V.42bis	V.42bis data compression has been established
69	COMPRESSION: NONE	The link was established without data compression
70	PROTOCOL: NONE	The link was established without error correction
77	PROTOCOL: LAPM	The link was established with LAPM error correction
80	PROTOCOL: ALT	The link was established with MNP error correction
+F4	+FCERROR	Fax carrier error detected