XECOM

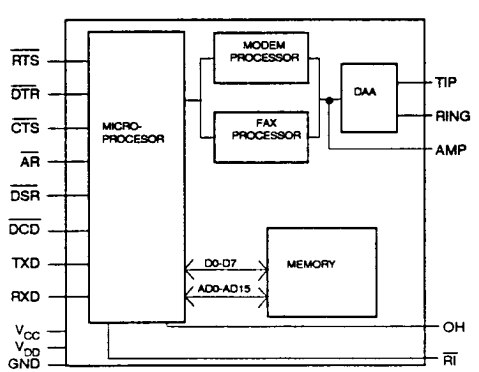
FaxDat™ Component Modem — XE9624FDB/XE96FSB*

Features

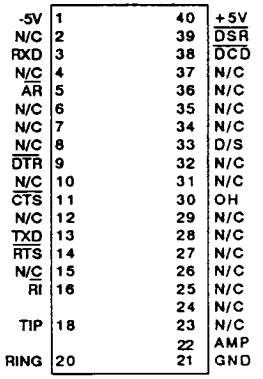
- Small Size - 2.75" x 1.38" x 0.50"
- FCC Part 68 Registered
- Group 3 Facsimile
- Full 9600 bps FAX/2400 bps MNP5 Modem Transmission Capability
- CCITT V.22bis, V.22/V.21 and Bell 212A/103 Compatible Modem
- Synchronous (Fax) and Asynchronous (Data) Operation
- CCITT V.29, V.27ter, V.23, V.21 Compatible Facsimile
- Low Power CMOS Technology
- Complete Industry Standard "AT" Command Set (Modem)
- TTL Serial Interface
- Dial, busy, ringback and modem answer tone detection
- DTMF and Pulse Dialing (Fax and Modem)
- Telephone Line Audio Monitor Output
- Firmware downloaded from host, allowing easy upgrades and additions

Description

The XECOM XE9624FDB is a complete, CCITT/ Bell compatible, high performance 9600 bps facsimile and 2400 bps component modem in one unit. It supports full CCITT V.29 and V.27ter facsimile and CCITT V.22bis modem operation and contains all circuitry necessary to achieve complete FAX/modem functionality, including a user transferable FCC Part 68 data access arrangement (DAA) registration allowing direct connection to the telephone line. The XE9624FDB comes complete with XECOM proprietary fax applications software, which features intuitive, menu driven screens and runs in background, so the computer can be freed to complete other tasks while transmitting faxes. MNP class 5 is also included for faster, error free communications. MNP can increase throughput to 4800bps for shorter connect time and lower telephone bills . The XE9624FDB is designed to transmit facsimiles or data from one compact unit. Modem control is accomplished with the industry standard "AT" command set, and provides full compatibility with all popular communications software written for personal computers. The XE9624FDB is pin compatible with the XE2400A and XE2400MNP component modems for easy upgrading of existing designs.



Block Diagram



Pin Configuration

*The XE96FSB is FAX only and described on pp 18-19.

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The XECOM FaxDat™ is both a facsimile and data modem in one modular component. Firmware coding is downloadable from the data terminal equipment to the unit and will determine whether the FaxDat™ is in facsimile or data mode. The operating software included with each unit is designed for a MS-DOS environment and contains all the coding necessary to load the module as a fully AT compatible 2400 bps MNP5 modem or a Group III compatible fax. Communications software for creating, controlling, sending and receiving facsimiles is also included in this package. Modem operation is accomplished with any commercially available communications package that utilizes the AT command set.

Features of the fax applications software include user friendly windowing techniques and menu driven instructions. Facsimiles can be transmitted and received in background, thereby freeing the data terminal equipment to run other programs concurrently. A conversion utility included in this package allows for sending .TIF, .PCX or ASCII .TXT files and converting received information into .TIF or .PCX for further processing or printing. Other features include a telephone directory which allows for grouping of telephone numbers, so one fax can be sent to everyone in that group with a few keystrokes. Received faxes can be printed out directly or viewed on the screen. With over 175 printers supported, making a hard copy is no problem. When viewing a fax on the screen, you can rotate, flip and zoom the display. You can also program the software to 'delay' sending a fax, so you can have faxes transmitted at night, when telephone rates are cheaper.

Both the modem and fax portion of the module have autoanswer and autodial features, along with telephone number and modem configuration storage capabilities. Testing parameters include local analog and digital loopback along with remote digital loopback. All these features are described in detail in the XECOM FaxDat™ Application Notes.

Table 1. MODES OF OPERATION

Protocol	Speed(bps)	Type	Modulation
CCITT V.29	9600 7200	Half Duplex, Synchronous Half Duplex, Synchronous	16 pt QAM 8 pt QAM
CCITT V.27ter	4800 2400	Half Duplex, Synchronous Half Duplex, Synchronous	8 pt PSK 4 pt PSK
CCITT V.22bis	2400	Full Duplex, Asynchronous	16 pt QAM
CCITT V.22	1200	Full Duplex, Asynchronous	4 pt QAM
Bell 212A	1200	Full Duplex, Asynchronous	4 pt QAM
CCITT V.21	300	Full Duplex, Asynchronous	FSK
Bell 103	300	Full Duplex, Asynchronous	FSK
CCITT V.23	75	Transmission only	FSK

MNP SERVICE CLASSES

Class 1: MNP Class 1 uses an asynchronous, byte-oriented format. Standard byte framing techniques are used (start and stop bits) and transmission is half-duplex.

Class 2: MNP Class 2 uses an asynchronous, byte- oriented format. Standard byte framing techniques are used (start and stop bits) and transmission is full duplex.

*Class 3: MNP Class 3 uses a synchronous, bit-oriented format. Standard byte framing techniques are removed, thereby increasing throughput by 20% (8 bits transmitted per byte instead of 10).

With a 20% reduction in actual bits transmitted, overall throughput is increased to approximately 2600 bps.

*Class 4: MNP Class 4 uses more efficient framing techniques and allows for larger data block transmissions. Data block size is adjusted larger for high quality connections and smaller for poorer lines. This technique reduces the number of retransmissions and maximizes transfer rate on varying quality lines.

The automatic adaptiveness of this class can maximize data transmission at rates up to 2900 bps.

*Class 5: MNP Class 5 includes the features of Class 4, plus adds data compression techniques. Data is compressed using a real-time adaptive algorithm. Both downloaded and interactive, real-time data is compressed.

This class can realize up to a 200% increase in throughput, producing an actual data transfer rate of up to 4800 bps.

* Overall throughput greater than 2400 bps can only be realized when the communications between the XE9624FDB and the terminal equipment (DTE) is greater than 2400 bps (up to a maximum speed of 9600 bps) and flow control is used.

Modem Configuration

The XE9624FDB modem configuration is stored in 28 configuration S-registers. Seven registers are reserved and cannot be modified. The contents of the remaining S-registers may be manipulated by sending configuration commands, which affect specific bits in the associated registers, or by directly writing into the registers. The format of the command which sets the register to a specific value is:

ATS n = x

where n represents the register number (decimal integer between 0 and 27), and x represents the value to be written (decimal integer between 0 and 255).

Example: Terminal: ATS0 = 2
Modem: OK

In this example, 2 is written into the S0 register, thus conditioning the modem to automatically answer a call after the second ring. The modem comes back with the message OK - an acknowledgment of successful execution of the command.

Format for reading S-register: ATSn?
where n is the S-register number (decimal integer between 0 and 27).

Example: Terminal: ATS0?
Modem:002
OK

In this example, the modem comes back with the value which was previously stored in the S0 register.

Table 2. S-Registers Summary

REG.	RANGE/UNITS	DESCRIPTION	DEFAULT
S0	0-255/rings	Ring to answer	0
S1	0-255/rings	Ring count (read only)	0
S2	0-127/ASCII	Escape code character	43(+)
S3	0-127/ASCII	Carriage return character	13(CR)
S4	0-127/ASCII	Line feed character	10(LF)
S5	0-32,127/ASCII	Back space character	8 (BS)
S6	2-255/sec	Wait for dial tone	2
S7	1-255/sec	Wait for data carrier	30
S8	0-255/sec	Pause time for the comma dial modifier	2
S9	1-255/0.1 sec	Carrier detect response time	6
S10	1-255/0.1 sec	Lost carrier to hang up delay	14
S11	50-255/msec	DTMF interval	100
S12	20-255/0.02 sec	Escape code guard time	50
S13		Not used	
S14	none	Bit mapped options register	AA hex
S15		Not used	
S16	none	Modem test options	0
S17		Not used	
S18	0-255 sec	Test timer	0
S19		Not used	
S20		Not used	
S21	none	Bit mapped options register	0
S22	none	Bit mapped options register	76 hex
S23	none	Bit mapped options register	7
S24		Not used	
S25	0-255/0.01 sec	Detect DTR transition	5
S26	0-255/0.01 sec	RTS to CTS delay	1
S27	none	Bit mapped options register	40 hex

Notes: 1. All default values are decimal numbers with exception of those marked "hex" (hexidecimal). 2. S-registers S0, S14, S18, S21, S22, S23, S25, S26 and S27 can be stored in the non-volatile memory by issuing the &W command. The preserved configuration data is restored upon power up of the modem, or when the modem receives the Z command. 3. For more information on S-registers refer to the FaxDat Application Note.

Pin Description

PIN#	NAME	I/O	DESCRIPTION
1	V_{DD}	-	Negative supply voltage (-5 volts)
2	N/C	-	
3	RXD	O	Serial data output to the DTE. A logic "high" represents a "mark" and a logic "low" represents a "space".
4	N/C	-	
5	$\overline{AR}$	O	Auxiliary relay control can be used for switching between the telephone handset and the modem, which are connected to the same telephone line. When the modem is taken "off-hook", the $\overline{AR}$ pin is low and can be used to control an external relay to disconnect the handset from the telephone line.
6	N/C	-	
7	N/C	-	
8	N/C	-	
9	$\overline{DTR}$	I	Data terminal ready. The function of this pin is determined by the &D command and the value in register S21.
10	N/C	-	
11	$\overline{CTS}$	O	Clear to Send to the DTE. "Low" on this pin indicates that the modem is ready to accept data signals for transmission.
12	N/C	-	
13	TXD	I	Serially transmitted data from the DTE. A logic "high" represents a marking signal and a logic "low" represents a space. In the synchronous mode , the data is sampled on the rising edge of TCLK.
14	$\overline{RTS}$	I	Request to Send from the DTE. The function of $\overline{RTS}$ is determined by the &R command and the values in registers S21 and S26.

PIN#	NAME	I/O	DESCRIPTION
15	N/C	-	
16	$\overline{RI}$	O	Ring indicator from the DAA. A "low" level on this pin indicates the presence of the ring signal.
18,20	TIP, RING	-	TIP and RING connections to the telephone line from the internal DAA. In order to preserve the high voltage isolation provided by the DAA, traces from these pins to the RJ11C Jack should have a minimum spacing of 0.15 inches (3.8 mm) between them and any other traces on the PC board.
21	GND	-	Ground (0 volts)
22	AMP	O	Output to monitor speaker. The function of AMP is determined by the L and M commands and the value in register S22.
23	N/C	-	
24	N/C	-	
25-28	N/C	-	
29	N/C	-	
30	OH	O	"Off-hook" - "On-hook" status line. OH high indicates that the hookswitch relay is closed and the modem is connected to the phone line.
31-37	N/C	-	
38	$\overline{DCD}$	O	Data Carrier Detect. The $\overline{DCD}$ function is determined by the &C command and the value in register S21.
39	$\overline{DSR}$	O	Data Set Ready to the DTE. The function of $\overline{DSR}$ is determined by the &S command and the value in the register S21.
40	Vcc	-	+5 Volts
Note: Pins 23, 24, 25, 26, 27, 28 & 32 require no connection and must be left open.			

"AT" COMMANDS

The "AT" commands are subdivided into three major groups: configuration, immediate action and diagnostic commands.

Configuration commands, affect the modem configuration by changing the contents of the S-registers. The B command , which selects CCITT or BELL protocols, is an example of this type of command. As a result of the B command, bit 6 of S27 is set or cleared, depending on which protocol is chosen. Immediate action commands instruct the modem to perform an action. The "A" command (go off hook in Answer mode) and the "D" command (dial) are typical commands in this group. Diagnostic commands initiate local analog ,and digital Loopback test and remote digital loopback test.

The "AT" prefix begins every command line with the exception of the + + + (escape) and the A/ (repeat) commands. "AT", often referred to as the attention code, delivers information to the modem about the data rate and the parity setting of the local DTE. The XE9624FDB will adapt to these parameters until a new "AT" command is received. Multiple commands can be placed on a single line and spaces are allowed between commands to improve readability. A command line must be terminated with the ASCII carriage return character (value in registers S3). A line feed character following the carriage return character is optional. The backspace or delete key can be used to delete any character entered from the keyboard, except the "AT" prefix. Upon execution of the command the result code is returned by the modem.

Example: Terminal: ATH
Modem: OK

This example demonstrates the hang up command. This example demonstrates placing the modem 'on-hook'. Upon successful completion of the command, an OK message is returned to the user.

Table 3. Result Codes

SHORT FORM	LONG FORM	DESCRIPTION
0	OK	Command line executed without errors
1	CONNECT	Connected at 300 bps
2	RING	Local telephone line ringing
3	NO CARRIER	Carrier lost, or never received
4	ERROR	Error in command line, invalid command line, command line exceeds command buffer or invalid character format
5	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone received within time-out period
7	BUSY	Called line busy
8	NO ANSWER	Called line not answered within time-out period
9	CONNECT 600	Connection established at 600 bps
10	CONNECT 2400	Connection established at 2400 bps

Note: Long-form results are preceded and terminated with both carriage return and line feed characters. Short-form codes are only terminated with a carriage return.

'AT' Commands Summary

Basic Commands

AT	Attention code that precedes all command lines except +++ (escape) and A/ (repeat)
A	Go off hook into answer mode
A/	Repeat previous command line
B	CCITT V.22 operation at 1200 bps
B1	Bell 212A operation at 1200 bps *
D	Dial a number (0-9 ABCD*#)
E	Turn echo off
E1	Turn echo on *
H	Go on hook (hang up) *
H1	Go off hook and switch the auxiliary relay
I	Request product code
I1	Compute and return checksum (firmware ROM)
L,L1	Low speaker volume
L2	Medium speaker volume *
L3	High speaker volume
M	Speaker is off
M1	Speaker is off while carrier is present *
M2	Speaker is always on
M3	Speaker is disabled while dialing or receiving carrier
O	Return to on-line mode
O1	Return to on-line mode and initiate retrain sequence (in 2400 bps only)
Q	Return result codes *
Q1	Do not return result codes
S*n*=*x*	Write *x* in S-register *n*
S*n*?	Read S-register *n*
V	Enable short form result codes
V1	Enable full word result codes *
X	CONNECT result code enabled (300 bps operation)
X1	All CONNECT result codes enabled; dial blind; busy signal is not recognized
X2	All CONNECT result codes enabled; wait for dial tone before dialing; busy signal is not recognized
X3	All CONNECT result codes enabled; dial blind; busy signal is recognized
X4	All CONNECT result codes enabled; wait for dial tone before dialing; busy signal is recognized*

(*=default)

Y Disable long space disconnect *
Y1 Enable long space disconnect

Z*n* Reset component and fetch configuration profile (*n*=0-1) ('ATZ' fetches profile 0)
+++ The default escape code

Extended Commands

&C DCD always ON
&C1 DCD tracks the state of the carrier signal*

&D DTR ignored
&D1 Assume command state on ON-to-OFF transition of DTR
&D2 Go on-hook, disable auto-answer, assume command state on ON-to-OFF transition of DTR*
&D3 Assume initialization state on ON-to-OFF transition of DTR

&F Fetch factory configuration profile from internal ROM

&G No guard tone *
&G1 550 Hz guard tone

&M Asynchronous mode *
&M1 Synchronous mode 1
&M2 Synchronous mode 2 (dial stored number mode)
&M3 Synchronous mode 1 (manual dial with DTR off)

&P Make/Break pulse ratio = 39/61 (USA/Canada)*
&P1 Make/Break pulse ratio = 33/67 (CCITT)

&R CTS OFF-to-ON transition follows RTS OFF-to-ON transition*
&R1 CTS always ON; RTS ignored

&S DSR always ON*
&S1 DSR operates according to CCITT V.22 bis/V.22 recommendation

&T Terminate any test currently in process
&T1 Initiate local analog loopback
&T3 Initiate local digital loopback
&T4 Grant request from remote modem for remote digital loopback
&T5 Deny request from remote modem for remote digital loopback
&T6 Initiate remote digital loopback
&T7 Initiate remote digital loopback with self test
&T8 Initiate local analog loopback with self test

&W*n* Write configuration to nonvolatile memory (*n*=0-1)

&X Transmit clock source is modem*
&X1 Transmit clock source is DTE
&X2 Transmit clock source is derived from received carrier signal

&Z*n*=*x* Stored telephone # *x* at location *n* (*n*=0-3)
(*=default)

MNP Commands

\A0	Maximum MNP block size of 64 bytes
\A1	Maximum MNP block size of 128 bytes
\A2	Maximum MNP block size of 192 bytes
\A3	Maximum MNP block size of 256 bytes *
\B*n*	(*n*=1-9) Transmit break *n* times
\C0	Auto reliable fallback character & buffer disabled *
\C1	512 character buffer size
\C2	If the ASCII code set by %A is received before a reliable connection is established, the modem will make a normal connection
\G0	Disable modem to modem flow control *
\G1	Enable modem to modem XON/XOFF flow control
\J0	Disable automatic bps rate adjust
\J1	Enable automatic bps rate adjust *
\K*n*	(*n*=0-5) Set break control (default = 5)
\L0	Stream MNP link mode *
\L1	Block MNP link mode
\N0	Normal mode
\N1	Direct mode *
\N2	Reliable mode
\N3	Auto reliable mode
\O	Originate reliable link
\Q0	Disable serial port flow control *
\Q1	Enable XON/XOFF flow control
\Q2	Enable unidirectional hardware flow control
\Q3	Enable bidirectional hardware flow control
\S	Display a list of AT commands and their current settings
\U	Accept reliable link
\V0	Select standard 'CONNECT' result codes *
\V1	Select modified MNP 'CONNECT' result codes
\X0	Recognize XON/XOFF characters, but do not pass through modem *
\X1	Recognize XON/XOFF characters and pass through modem
\Y	Switch to reliable mode
\Z	Switch to normal mode
%A*n*	(*n*=0-127)ASCII character recognized as fallback character (See \C2)
%C0	Data compression disabled (Class 4 operation)
%C1	Data compression enabled (Class 5 operation) *

(* = default)

Dial Modifers

P	Pulse dial
R	Originate call in Answer mode
T	Tone dial
S*n*	Dial stored number *n* (*n*=0-3)
W	Wait for dial tone
,	Pause
;	Return to command state
!	Flash
@	Wait for silence

Note: For more information on "AT" commands refer to the XE2400A and XE2400MNP Application Notes.

Factory Configuration

The following is the "preset operating configuration of the modem"

Modem

2400 bps communications rate
Even parity
Auto answer disable
Command echo ON
All result codes enabled
Wait for dial tone before dialing
Busy signal detect
Full word result codes
Pulse dial make/break ratio 39/61
Test timer set to zero seconds
CTS follows RTS after delay of 10ms
RTS to CTS delay of 10 milliseconds
Modem goes on hook in command mode,
with ON-to-OFF transition of DTR
DCD follows true carrier
DSR always On
Long space disconnect disabled
Speaker enabled and off while receiving a carrier
Speaker volume set to medium
Local modem will grant RDL request from remote
Guard tones disabled
Minimum DTR pulse width is 0.05 seconds
Ring count to answer is 0 (auto answer disabled)
Escape code character is 43 (+)

Fax

9600bps communication rate
Dial using tones
Auto answer disabled
Speaker enabled & off while receiving a carrier

Factory Configuration (con't)

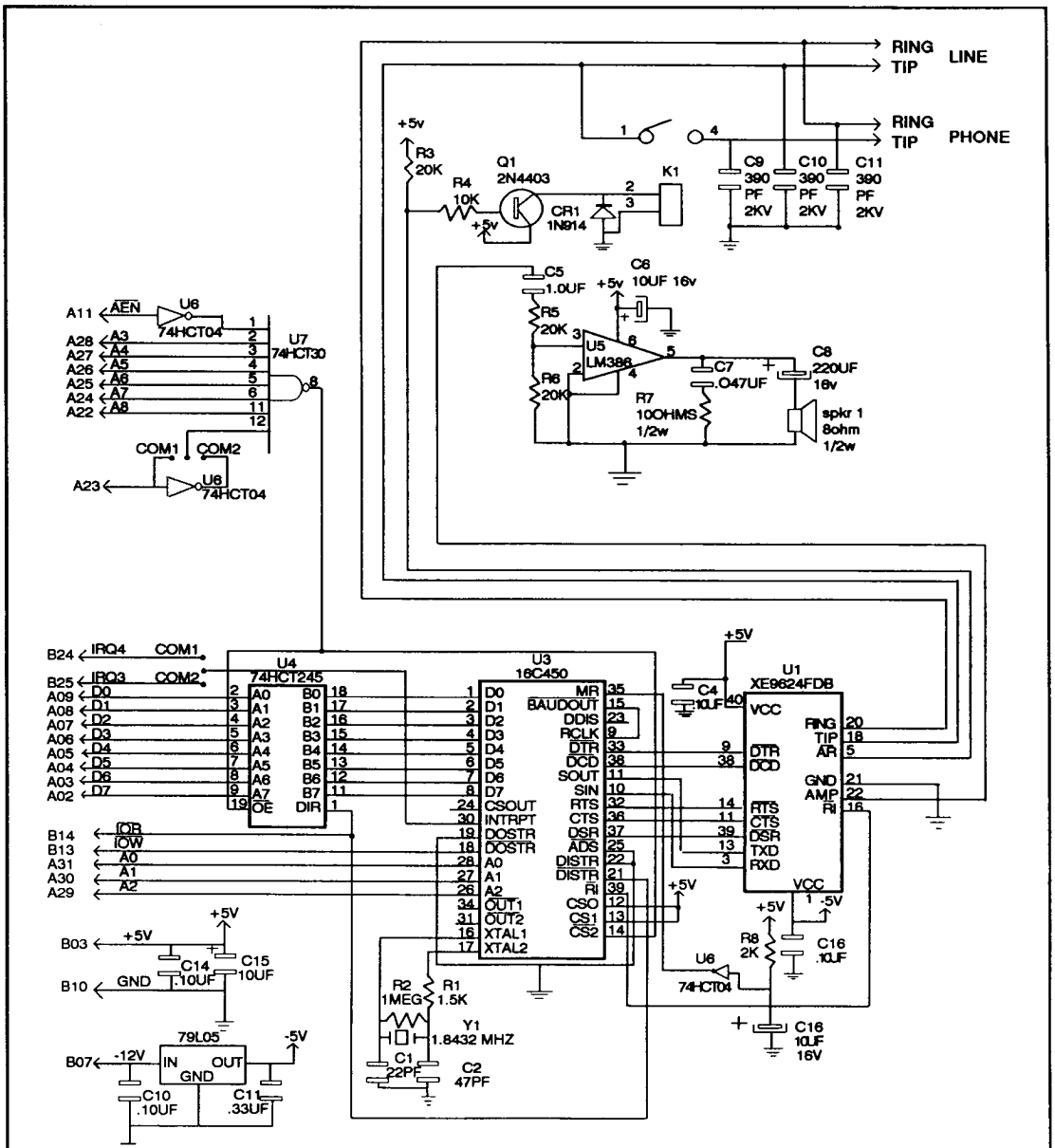
Carriage return character is 13 (CR)
Line feed character is 10 (LF)
Back space character is 8 (BS)
Wait for dial tone is 2 seconds
Wait for carrier after dialing is 30 seconds
Dial pause (comma) is 2 seconds
Carrier detect response time is 0.6 seconds
Lost carrier to hang-up delay is 1.4 seconds
Escape code guard time is 1 second

Programmable Options Not Saved in NVRAM

Factory Default Value	Option
0	Ring count
43	Escape code character
13	Carriage return character
10	Line feed character
8	Back space character
2 sec	Duration of wait for dial tone
30 sec	Duration of wait for carrier after dialing
2 sec	Duration of dial pause for the comma
0.6 sec	Carrier detect response time
1.4 sec	Lost carrier to hang-up delay
1 sec	Escape code guard time

Programmable Options Saved in NVRAM (modem operation only)

Baud rate (300, 600, 1200 and 2400 bps)
Asynchronous parity option (odd, even, mark, space, none)
Number of ring to answer on (1 to 255)
Automatic answer (enable/disabled)
Command echo (enable/disabled)
Result codes (enable/disabled)
Result codes (short/full word)
Dialing (pulse or touch tone)
Test timer timeout (0 to 255)
RTS/CTS circuit option
RTS/CTS delay
DTR circuit option
DCD circuit option
DSR circuit option
Long space disconnect (enable/disabled)
Speaker volume (L1, L2 or L3)
Pulse dial make/break ratio
Grant or deny remote digital loop
Guard tone selection (550Hz or none)
Minimum DTR pulse width
Bell 212A/CCITT V.22 compatibility at 1200 bps



Typical Connection Diagram

Absolute Maximum Ratings

Supply Voltage	- Vcc	+6.5 Volts
	- Vdd	- 6.5 Volts
Input Voltage		-0.6 Volts to +6.5 Volts
Storage Temperature Range		-25 Deg C to +85 Deg C

DC Characteristics (T_A = 0-70°C, V_{CC} = 5V ±5%, V_{DD} = -5 V ± 5%)

SYMBOL	PARAMETER	MIN	MAX	UNITS	COMMENTS
V_{IL}	Input Low Voltage	-0.3	+0.8	V	
V_{IH}	Input High Voltage	2.0	V_{CC}	V	
V_{OL}	Output Low Voltage		0.45	V	See Note 1.
V_{OH}	Output High Voltage	2.4		V	See Note 2.
I_{CC}	V_{CC} Supply Current		140	mA	All outputs disconnected
I_{DD}	V_{DD} Supply Current		25	mA	
I_{L1}	Input Low Current		-50	uA	V_{IL} = 0.45V
I_{L2}	Input Low Current		-100	uA	V_{IL} = 0.45V
I_{H1}	Input High Current		-100	uA	V_{IH} = 2.4V
I_{H2}	Input High Current		100	uA	V_{IH}= 2.4V

NOTES:

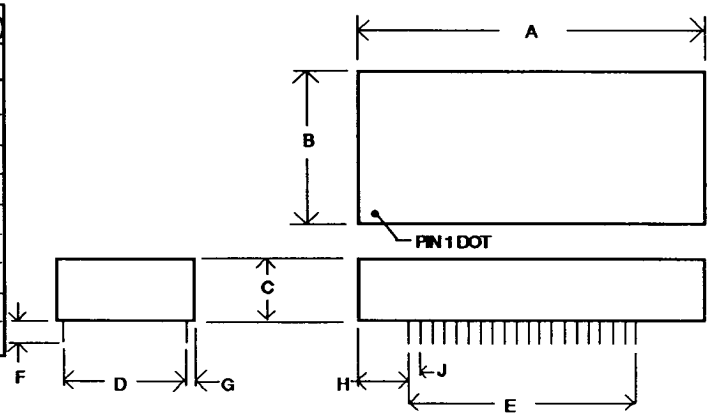
1. Iol = 1.6mA for pins RXD, TSD, $\overline{DTR}$, $\overline{RTS}$, $\overline{CD}$ = 0.45V
   Ioh = -60mA for pins RXD, TSD, $\overline{DTR}$, $\overline{RTS}$, $\overline{CD}$ = 2.4V

2. Ioh = -2.5mA for pins AR, CD $\overline{DSR}$, $\overline{CTS}$, OH = 3.0V
   Iol = +2.5mA for pins AR, CD, $\overline{DSR}$, $\overline{CTS}$, OH = 0.4V

System Compatibilty Specifications

PARAMETER	SPECIFICATION
Synchronous	9600, 7200, 4800, 2400 bps, character synchronous
Asynchronous	2400, 1200, 600 bps, character asynchronous 0 - 300 bps asynchronous
Asynchronous Speed Range	-2.5% to +2.3% in character asynchronous mode
Asynchronous Format	10 bits, including start, stop, parity and data bits
Telephone Line Interface	Two wire full duplex (Data) and half duplex (Fax) over public switched network FCC Part 68 registered DAA
Modulation	V.29, 16/8 point QAM at 2400baud (9600/7200bps) V.27ter, 8 point PSK at 1600 baud (4800bps) 4 point PSK at 1200 baud (2400bps) V.23, FSK at 75 baud (75bps) V.22 bis, 16 point QAM at 600 baud V.22 and 212A, 4 point QAM at 600 baud V.21 and 103, binary phase coherent FSK
Output Spectral Shaping	Square root of 75% raised cosine, QAM/PSK
Transmit Carrier Frequencies	
V.29	Originate 1200Hz 9600bps 1700Hz 7200bps 1700Hz
V.27ter	4800bps 1800Hz 2400bps 1800Hz
V.23	75 bps "space" 450Hz "mark" 390Hz
V.22 bis, V.22, 212A, V.21	Answer 2400Hz Originate 'space' 1180Hz Originate 'mark' 980Hz Answer 'space' 1850Hz Answer 'mark' 1650Hz
Bell 103	Originate 'space' 1070Hz Originate 'mark' 1270Hz Answer 'space' 2025Hz Answer 'mark' 2225Hz
Maximum Carrier Output Level	-9dBm
Receiver Sensitivity	OFF to ON threshold -45 dBm ON to OFF threshold -48 dBm
Line Equalization	Fixed modem compromise equalization, transmit. Adaptive equalization - Fax Adaptive equalizer for PSK/QAM, receive.
Diagnostics Available	Local analog loopback Local digital loopback Remote digital loopback Local interface loopback modem
Self Test Pattern Generator	Alternate 'ones' and 'zeros' and error detector, to be used along with most loopbacks. A number indicating the bit errors detected is sent toDTE.

PIN	INCHES		METRIC(mm)	
	MIN	MAX	MIN	MAX
A	2.725	2.775	69.2	70.5
B	1.360	1.390	34.5	35.3
C	0.485	0.515	12.3	13.1
D	1.190	1.210	30.2	30.7
E	1.890	1.910	48.0	48.5
F	.125	-	3.1	---
G	.080	.100	2.0	2.5
H	.42	.45	10.6	11.4
J	.090	.110	2.2	2.8



PIN = 0.020" x 0.014"
RECOMMENDED HOLE SIZE = 0.045"

Mechanical Specifications

Telephone Line Interface Specifications

DESCRIPTION	MIN	TYP	MAX	UNITS
Telephone Line Impedance Match		600		Ohms
Ring Detect Sensitivity (on hook, Type B Ringer)	38			Vrms
Telephone Line Holding Current	0	20	100	mA

Analog Output: AMP (T_A = 25°C, V_{CC} = +5V, GND = +0V, V_{DD} = -5V)

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNITS
Load Resistance AMP (pin 22)		10			KOhms
Load Capacitance AMP (pin 22)				100	pF
Audio Amp Output Level	Controlled via Ln & Mn commands. No signal input		3 1.5 0.75	 30	Vp Vp Vp mV

DTMF Transmit Signals

PARAMETER	MIN	TYP	MAX	UNITS
Row 1 Frequency	691	697	703	Hz
Row 2 Frequency	763	770	777	Hz
Row 3 Frequency	844	852	860	Hz
Row 4 Frequency	932	941	950	Hz
Column 1 Frequency	1197	1209	1221	Hz
Column 2 Frequency	1323	1336	1349	Hz
Column 3 Frequency	1463	1477	1491	Hz

Other Performance Specifications

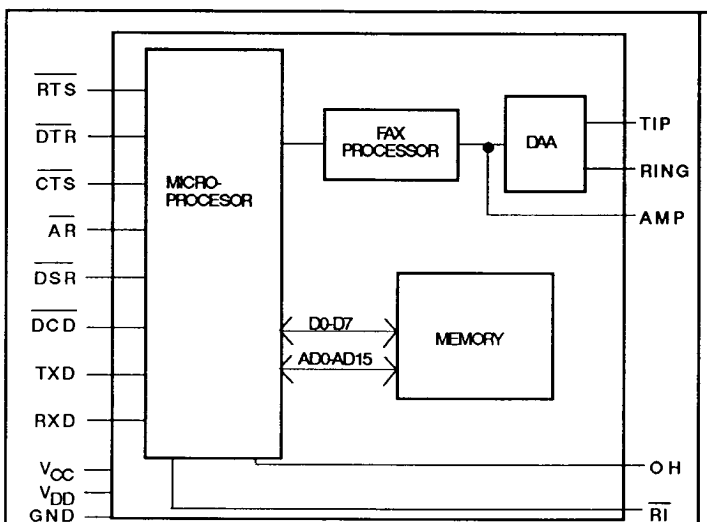
PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
DTMF Level		-2.2	0	dBm	
DTMF Twist (Balance)			3	dB	
DTMF Tone Duration		70		ms	
Pulse Dialing Rate		10		pps	
Pulse Dialing Make/Break		39/61 33/67		% %	US CCITT
Pulse Interdigit Interval		785		ms	
Billing Delay Interval	2.0			sec	
Guard Tone Frequency Amplitude Frequency Amplitude		550 -3 1800 -6		Hz dB Hz dB	referenced to High channel transmit
High Channel Transmit Amplitude		-1		dB	referenced to Low channel, Guard Tone enabled
Tone Detection Passband Frequency	290		665	Hz	3 dB Point
Tone Detection OFF to ON Threshold	-33			dBm	into 600 Ohm
Tone Detection ON to OFF Threshold	-35			dBm	into 600 Ohm
Dial Tone Detect Duration	3.0			sec	
Ringback Tone Detect Duration Cadence	 0.75 1.5			 sec sec	 OFF/ON Ratio
Busy Tone Detect Duration Cadence	 0.2 0.67		 1.5	 sec sec	 OFF/ON Ratio

Features

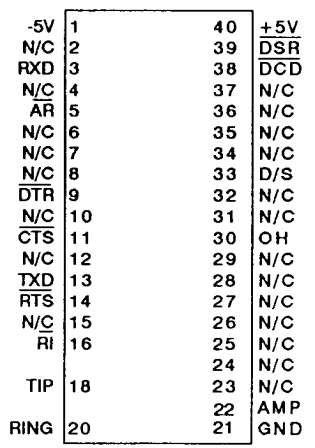
- Small Size - 2.75" x 1.38" x 0.50"
- FCC Part 68 Registered
- Group 3 Facsimile
- Full 9600 bps FAX Transmission Capability
- Synchronous Operation
- CCITT V.29, V.27ter, V.23, V.21 Compatible Facsimile
- Low Power CMOS Technology
- TTL Serial Interface
- Dial, busy and ringback detection
- DTMF Dialing
- Telephone Line Audio Monitor Output
- Firmware downloaded from host, allowing easy upgrades and additions

Description

The XECOM XE96FSB is a complete, CCITT compatible, high performance 9600 bps facsimile modem in one unit. It supports full CCITT V.29 and V.27ter facsimile and contains all circuitry necessary to achieve complete FAX functionality, including a user transferable FCC Part 68 data access arrangement (DAA) registration allowing direct connection to the telephone line. The XE96FSB comes complete with XECOM proprietary fax applications software, which features intuitive menu driven screens and runs in background, so the computer can be freed for doing other tasks while it is transmitting faxes. The XE96FSB is pin compatible with the XE2400A, XE2400MNP and XE9624FDB component modems for easy upgrading of existing designs.



Block Diagram



Pin Configuration

The XECOM XE96FSB is a complete, fully functional facsimile modem in one modular component. Firmware coding is downloadable from the data terminal equipment to the unit and can easily be upgraded or changed for future product enhancements. The operating software included with each unit is designed for a MS-DOS environment and contains all the coding necessary to load the module as a Group III compatible fax. Communications software for creating, controlling, sending and receiving facsimiles is also included in this package.

Features of the fax applications software include user friendly windowing techniques and menu driven instructions. Facsimiles can be transmitted and received in background, thereby freeing the data terminal equipment to run other programs concurrently. A conversion utility included in this package allows for sending .TIF, .PCX or ASCII .TXT files and converting received information into .TIF or .PCX for further processing or printing. Other features include a telephone directory which allows for grouping of telephone numbers, so one fax can be sent to everyone in that group with a few keystrokes. Received faxes can be printed out directly or viewed on the screen. With over 175 printers supported, making a hard copy is no problem. When viewing a fax on the screen, you can rotate, flip and zoom the display. You can also program the software to 'delay' sending a fax, so you can have faxes transmitted at night, when telephone rates are cheaper.

This fax modem module has features such as autoanswer and autodial, along with telephone number and modem configuration storage capabilities. All these features are described in detail in the XECOM FaxDat™ Application Notes.

Table 1. **MODES OF OPERATION**

Protocol	Speed(bps)	Type	Modulation
CCITT V.29	9600 7200	Half Duplex, Synchronous Half Duplex, Synchronous	16 pt QAM 8 pt QAM
CCITT V.27ter	4800 2400	Half Duplex, Synchronous Half Duplex, Synchronous	8 pt PSK 4 pt PSK
CCITT V.21	300	Full Duplex, Asynchronous	FSK
Bell 103	300	Full Duplex, Asynchronous	FSK
CCITT V.23	75	Transmission only	FSK

USER INSTRUCTIONS

This product complies 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. This label should be affixed to the end system which uses this product, in a location visible from the outside. You must, upon request, provide this information to your telephone company.

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 Connections and the rest of the system. Typically, this may be accomplished by maintaining a minimum spacing of 150 mils between the TIP/RING Traces to the RJ-11C Jack and the 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 a line, as determined by the REN, you should contact the local telephone company to determine the maximum REN for your calling area.

If your system causes harm to the telephone network, the telephone company may discontinue your 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.

This 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.

JACK RJ11C RINGER EQUIVALENCE = 0.9B
FCC REGISTRATION NUMBER DWEUSA-61190-MD-E

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