



**Communication  
Automation  
Corporation**

---

1180 McDermott Dr ♦ West Chester, PA 19380-4022

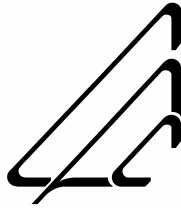
Tel: (610) 692-9526 ♦ Toll-free: (800) 367-6735 ♦ Fax: (610) 436-8258 ♦ <http://www.cacdsp.com> ♦ Email: [sales@cacdsp.com](mailto:sales@cacdsp.com)

# Foundation Board for the ETPhone System

Foundation Board  
Technical Reference  
Version 0.0

email: [support@cacdsp.com](mailto:support@cacdsp.com)

# ETPhone Foundation Board



ã 2003 - 2005 Communication Automation Corporation  
West Chester, PA (USA)

## License Agreement

The international copyright laws that pertain to computer software and hardware protect this Software/Hardware. It is illegal to duplicate the design and implementation of the Hardware and/or to make copies of the Software except as provided in this license agreement. It is illegal to give copies of CAC Software to another person, or to duplicate the Software by any other means, including electronic transmission, except as provided in this license agreement. CAC Software and Hardware contains trade secrets and, to protect them, you may not decompose, reverse engineer, disassemble, or otherwise reduce the applicable object code or binary portions of the Software or Hardware to human perceivable form.

Our software is a product of Communication Automation Corporation (CAC) and is licensed for unrestricted use WITH CAC HARDWARE PRODUCTS ONLY. CAC software may be reproduced and used by the customer only if this legend is included on all distribution media and this legend is included as a part of the software comments, whether the CAC software is used in whole or in part.

Users may copy or modify CAC software without royalty, but are not authorized to license, sub-license, or distribute this copied or modified CAC software to any other person or organization except as part of a hardware product or software developed by the user that incorporates CAC hardware products. You are permitted, however, to freely distribute your own derived software that communicates to the CAC boards through these software drivers and libraries, free of any royalty to CAC.

## Warranty

Communication Automation Corporation reserves the right to make changes to these products, including any software and/or hardware described herein, without notice. No warranty of merchantability or fitness for a particular purpose is expressed or implied. CAC shall not be held liable for incidental or consequential damages in connection with, or arising out of, the use of this Software. CAC does not recommend the use of any of its products, Software or Hardware, for medical or life support applications wherein a failure or malfunction of the product may threaten life or cause injury and will not knowingly license or sell its products for either such use. No rights under any patent accompany the sale of any such products.

## Trademarks

ETPhone™ and ETC12™ are trademarks of Communication Automation Corporation.

MS-DOS, Windows95, WindowsNT and Windows are registered trademarks of Microsoft Corporation in the United States of America and other countries.

SPARC, SunOS and Solaris are registered trademarks of Sun Microsystems Computer Corporation and SunSoft.

Unix is a registered trademark of Santa Cruz Operations.

VME and VMEbus are registered trademarks of Motorola, Inc.

Use of a term in this manual should not be regarded as affecting the validity of any trademark or service mark.

# ETPhone Foundation Board

## Table of Contents

<b>1.</b>	<b>ETPHONE FOUNDATION BOARD .....</b>	<b>1-5</b>
<b>1.1</b>	<b>ETPhone Foundation Board Overview.....</b>	<b>1-5</b>
<b>1.2</b>	<b>Foundation Board Top Level Description.....</b>	<b>1-7</b>
<b>1.3</b>	<b>Electrical Specification.....</b>	<b>1-9</b>
1.3.1	RISC Processor .....	1-9
1.3.2	Processor SDRAM.....	1-9
1.3.3	Flash.....	1-9
1.3.4	RS-232 Serial Port .....	1-10
1.3.5	Digital Signal Processor .....	1-10
1.3.6	E1/T1 Framer .....	1-10
1.3.7	Audio Codec .....	1-10
1.3.8	Dual RJ-45 Ethernet Jack .....	1-11
1.3.9	Front Panel Rotary Encoder and Push-Button Switch.....	1-11
1.3.10	MMC Card.....	1-11
1.3.11	CPLD .....	1-11
1.3.12	Mezzanine Connector and Interface .....	1-11
<b>1.4</b>	<b>Input/Output Connection.....</b>	<b>1-12</b>
1.4.1	Front Panel.....	1-12
1.4.1.1	Audio Codec Connections .....	1-12
1.4.1.2	MultiMedia Card Socket.....	1-12
1.4.2	Rear Panel.....	1-12
1.4.2.1	Serial Port .....	1-12
1.4.2.2	E1/T1 Interface .....	1-12
1.4.2.3	USB Port.....	1-12
1.4.2.4	Ethernet Connection .....	1-12
<b>1.5</b>	<b>Mechanical Characteristics.....</b>	<b>1-13</b>
<b>1.6</b>	<b>Power Consumption.....</b>	<b>1-13</b>
<b>1.7</b>	<b>Software .....</b>	<b>1-13</b>

# ETPhone Foundation Board

## Tables

Table 1-1: ETPhone RS232 Pinout.....	1-10
--------------------------------------	------

## Figures

Figure 1-1: ETPhone Foundation Board, ETP102 unit Front Panel.....	1-5
Figure 1-2: ETPhone Foundation Board, ETP102 unit Back Panel.....	1-6
Figure 1-3: Audio Connector .....	1-7
Figure 1-4: ETPhone Baseboard Block Diagram.....	1-8

# ETPhone Foundation Board

## 1. ETPhone Foundation Board

### 1.1 ETPhone Foundation Board Overview

ETPhone is a standalone, general-purpose telecom interface unit. ETPhone allows monitoring and manipulation of audio data through analog audio inputs, which can then be transmitted over IP, transmitted via E1 or T1 interface, stored to a MultMedia Card, or saved to a host computer. ETPhone supports the following interfaces: E1/T1, Dual 10/100BT Ethernet, Analog audio (8kHz to 96kHz sampling rates), Microphone In, Stereo Line In, Stereo Line Out, USB slave, and RS232 Serial Port. ETPhone has a small form factor 5.5"x 6.0"x 1.5" enclosure and can also be mounted 3-wide in a 1U Rack space. In addition, the ETPhone has a mezzanine interface for board expansion and future design.



Figure 1-1: ETPhone Foundation Board, ETP102 unit Front Panel

## ETPhone Foundation Board

The front panel provides access to the following:

MMC Card	Additional Mountable File System
Head Phone	Channel 0 (LEFT) and Channel 1 (RIGHT) Output
Line In	Channel 0 (LEFT) and Channel 1 (RIGHT) Input
Microphone In	Mono Input
Control/Volume	Not Yet Supported



Figure 1-2: ETPhone Foundation Board, ETP102 unit Back Panel

12 Volt Power Input	Power Supply Input
RS232	Serial Interface to/from ETPhone Foundation Board
E1/T1	Telecom Interface
USB	Supported in Future Releases as alternative interface
100BT	2-port Ethernet Switch

## ETPhone Foundation Board

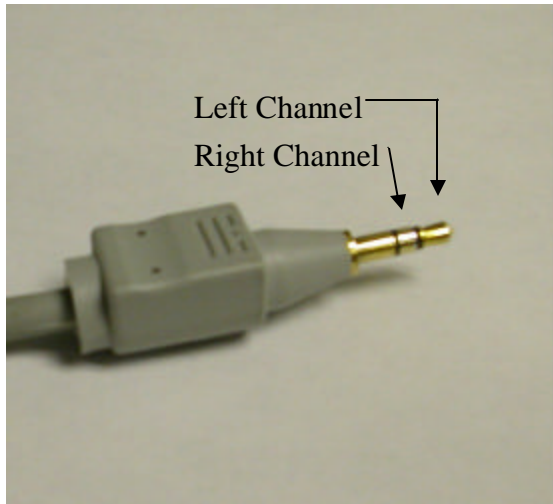


Figure 1-3: Audio Connector

### 1.2 Foundation Board Top Level Description

The ETPhone Foundation Board is the baseboard for the ETPhone systems and consists of the following major function blocks:

- MIPS processor running Linux
  - IDT 32355 at 150 MHz
- 64 MB SDRAM
- 16 MB Flash: Linux kernel and Flash File System
- RS-232 Serial Port
- DSP for T1/ E1 interface and audio processing
  - TI TMS320VC5410A, 160 MIPS
- E1/T1 Framer
- Audio Codec (Stereo Line In, Mono Microphone In, and Stereo Line Out)
- USB Interface (Slave device)
- Dual RJ45 Ethernet Jack
- Front panel rotary shaft encoder for audio volume control
- MMC memory card for removable file storage
- CPLD for MMC memory card control
- Mezzanine Connector for attaching additional boards

# ETPhone Foundation Board

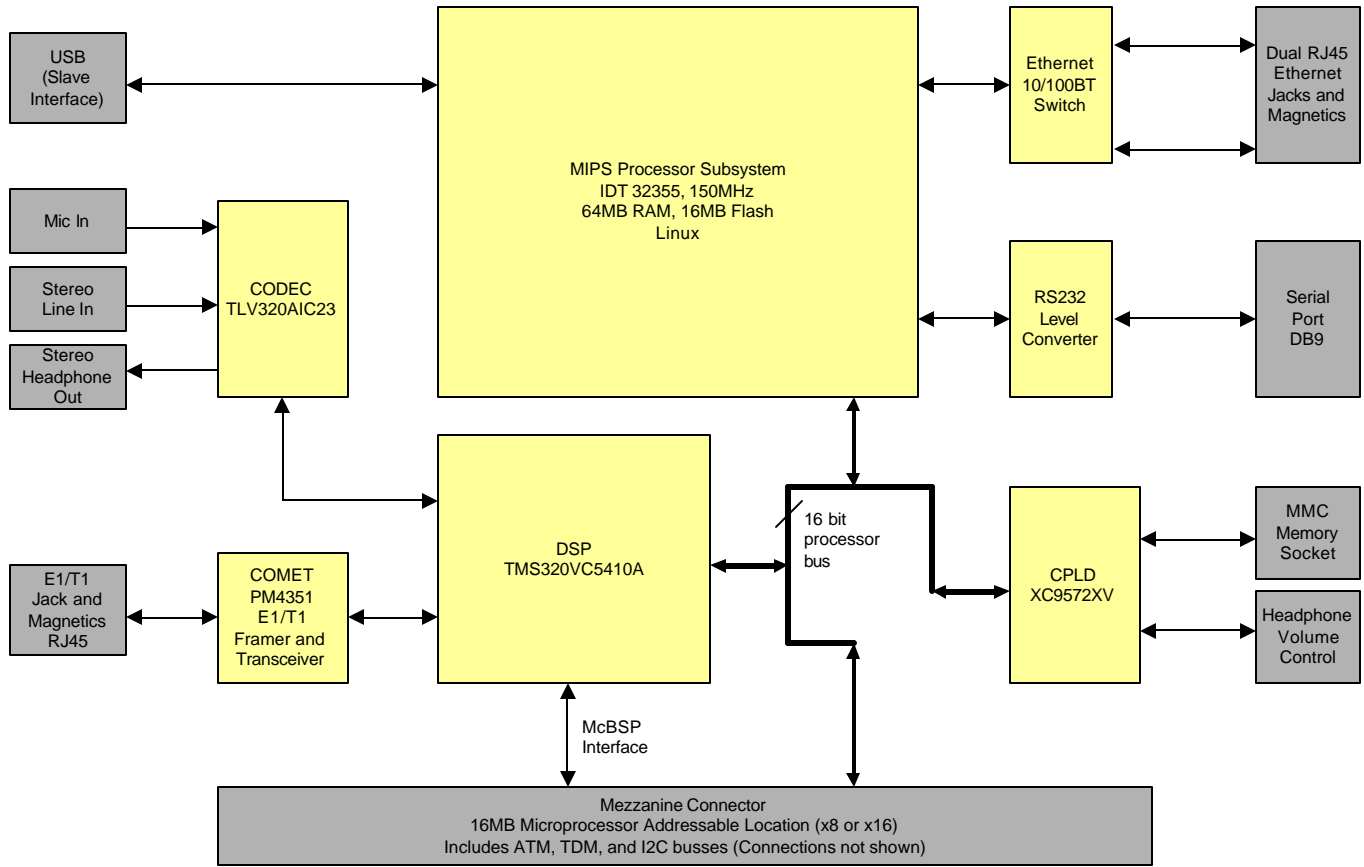


Figure 1-4: ETPhone Baseboard Block Diagram

# ETPhone Foundation Board

## 1.3 Electrical Specification

The major components of the previous block diagrams are described in detail in the following subsections.

### 1.3.1 RISC Processor

ETPhone includes a MIPS processor to initialize, control, and monitor overall operations. This processor is a 150MHz highly integrated device from IDT, the 79RC32355, code-named Banyan. Banyan includes processor core, SDRAM controller, 10/100BT MAC, TDM bus interface, DMA controller, serial ports, USB, and ATM interfaces.

The Banyan processor is equipped with 64MB of SDRAM. This consists of two 16M x 16 devices, operating at 75MHz.

The Banyan includes an Enhanced JTAG (EJTAG) port design for connection to an external emulator. ETPhone provides an appropriate header to allow connection of an EJTAG-based emulator.

### 1.3.2 Processor SDRAM

The ETPhone is equipped with 64MB of SDRAM in the form of two 256 Mb SDRAM chips, which is directly connect to the RISC Processor.

### 1.3.3 Flash

The Banyan sub-system includes 16MB of permanently mounted flash memory. The Banyan bootstraps itself from this memory through the following sequence:

- Copy the flash image into SDRAM for faster execution speed
- Transfer control to the SDRAM image
- Run basic processor subsystem diagnostics
- Initialize and transfer control to a Linux kernel contained in the image
- Initialize the network interface.

# ETPhone Foundation Board

## 1.3.4 RS-232 Serial Port

The Banyan processor's UART interface operates by default at 9600 baud, eight bit data, no parity, single stop bit. The RS232 signals supported include 5 wires interface using a DB9 connector as follows.

Pin	Description	Name	Type
3	Transmit Data	TX	Output
2	Receive Data	RX	Input
7	Request to Send	RTS	Output
8	Clear to Send	CTS	Input
5	Signal Ground	GND	

Table 1-1: ETPhone RS232 Pinout

## 1.3.5 Digital Signal Processor

The TMS320VC5410-A device provides 64K words of on-chip SRAM, 16K words of on-chip ROM, 3 McBSPs, 6-channel DMA controller, a host port interface, and a timer.

The DSP can be used to run user selected algorithms for manipulation of audio data, such as filtering, equalization, etc. The DSP is accessible to the user through a GUI interface on the host PC.

The DSP's 3 McBSPs interface with the Audio Codec, the Comet (E1/T1), and the Mezzanine connector (for future expansion).

## 1.3.6 E1/T1 Framer

The E1/T1 Framer (Comet) allows the ETPhone to comply with both E1 and T1 framing standards for communication through the E1/T1 RJ45 Jack on the back panel. The Comet provides receive equalization, jitter attenuation, clock recovery, and line performance monitoring. The E1 and T1 framers are software selectable.

## 1.3.7 Audio Codec

The ETPhone uses a TI TLV320AIC23 high performance stereo audio codec. The AIC23 is used for Analog-to-Digital and Digital-to-Analog conversion of audio data coming in and out of the audio jacks on the front panel of the ETPhone. It supports sampling rates from 8kHz to 96kHz. The AIC23 interfaces with the DSP through one of the McBSPs for audio manipulation, such as filtering.

# ETPhone Foundation Board

## 1.3.8 Dual RJ-45 Ethernet Jack

The Banyan processor includes a 10/100BT MAC function. ETPhone includes a three-port 10/100BT PHY/switch to interface between the MAC and two physical Ethernet interfaces. This three-port PHY/switch is a Micrel/Kendin KS8993. One of the three ports connects to the Banyan MAC interface, while the remaining two ports are connected to a dual RJ45 jack with integrated magnetics on the ETPhone back panel. The switching capability of the Micrel/Kendin part supports Ethernet traffic between the Banyan and either RJ45, as well as traffic between the two RJ45s. The extra RJ45 on the ETPhone may eliminate the need for an external Ethernet hub when used with a cross over cable.

The 6-byte Ethernet address for the Banyan MAC interface is stored in serial EEROM during initial board test and serialization. The host name, for use with DHCP IP address assignment, is constructed via boot parameters. For applications not using DHCP/bootp, the IP address will also be specified in the boot parameter.

## 1.3.9 Front Panel Rotary Encoder and Push-Button Switch

TBD

## 1.3.10 MMC Card

TBD

## 1.3.11 CPLD

TBD

## 1.3.12 Mezzanine Connector and Interface

The Mezzanine Connector serves as an interface for future add-on expansion boards which would further the capabilities of the ETPhone. An expansion board would snap into the Mezzanine connector and thereby have access to all of the major busses and components on the ETPhone main board, including the RISC processor bus, TDM bus, and the DSP's McBSP bus.

# ETPhone Foundation Board

## **1.4 Input/Output Connection**

The ETPhone has input and output connections on both the front and the rear panel. This section gives a brief description of each of these connections and pinout information if applicable.

### **1.4.1 Front Panel**

The front panel has connection for the ETPhone baseboard audio codec and the MultiMedia card.

#### **1.4.1.1 Audio Codec Connections**

#### **1.4.1.2 MultiMedia Card Socket**

### **1.4.2 Rear Panel**

The rear panel has connection for the Risc serial port, the E1/T1 interface, the slave USB port, and the Ethernet port.

#### **1.4.2.1 Serial Port**

#### **1.4.2.2 E1/T1 Interface**

#### **1.4.2.3 USB Port**

#### **1.4.2.4 Ethernet Connection**

# ETPhone Foundation Board

## **1.5 Mechanical Characteristics**

The ETPhone Foundation Board is mounted on the bottom of the ETPhone enclosure. The overall dimension of the enclosure is 6" long, 5.28" wide, 1.52" high.

## **1.6 Power Consumption**

The ETPhone Foundation Board requires +12V. The power consumption is estimated to be 5 Watts. Power consumption with the ETC12 Mezzanine board is estimated to be 8.4 Watts. The actual power requirement depends on the activity on the board.

## **1.7 Software**

Please refer to the Software manual for more information.