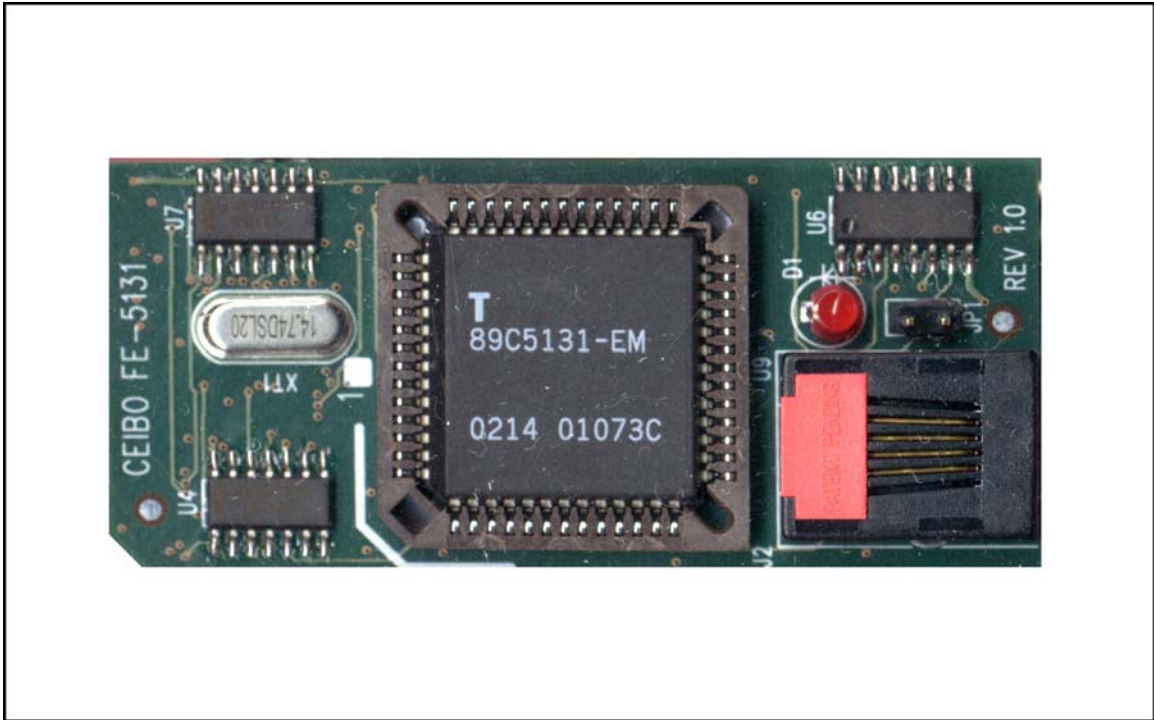# CEIBO FE-5131A
Development System

Development System for Atmel AT89C5131A Microcontrollers

FEATURES

- **Emulates AT89C5131/AT89C5131A with 6/12 Clocks/Cycle**

- **31K Code Memory**

- **Software Trace**

- **Real-Time Emulation**

- **Frequency up to 40MHz with Programmable Clock Generator**

- **MS-Windows Debugger for C and Assembler**

- **Keil μVision2 Debugger Compatible**

- **PLCC, SOIC and QFP Emulation Headers**

- **Serially Linked to PC at 115Kbaud**

DESCRIPTION

Ceibo FE-5131A is a development system that supports ATMEL AT89C5131 and AT89C5131A microcontrollers with 6/12 clocks/cycle at any frequency allowed by the devices. It is serially linked to a PC or compatible systems and can emulate the microcontrollers using the built-in clock generator. Emulation is carried out by loading the system with the user software and an embedded monitor program. FE-5131A locates the monitor in the upper 1K of the code memory space. Two working modes are available: real-time and simulator. In the **real-time mode** the user software is executed transparently and without interfering with the microcontroller speed. Breakpoints can be added to stop program execution at a specific address. Real time trace is available. The **simulation mode does not implement all the chip options** and it is intended only for software debugging of the basic 8051 functions. **Use the system in emulation mode.** The simulation mode is used to debug the software without any hardware. FE-5131A may be disconnected while using the simulation mode. The software includes C and Assembler Source Level Debugger, On-line Assembler and Disassembler, Trace, Conditional Breakpoints and many other features. The system is supplied with Windows debugger software, RS-232 cable and a power supply.

The system includes 2 main hardware boards:

1. FE-5131A - In-circuit Emulator

2. ADP-5131/T - Termination Board

SPECIFICATIONS

System Memory
FE-5131 provides 31K of code memory. This is all the available memory for the AT89C5131/A microcontroller, less 1K used by the emulator.

Software Trace
Trace can be used to display the last executed instructions in real time. Trace is variable in depth and shows backward all the sequential instructions until the last branch instruction occurred (LJMP, ACALL, DJNZ, etc.).

Breakpoints
Breakpoints allow real-time program execution until an opcode is executed at a specified address.

Windows Debugger
The FE-5131A software includes a source level debugger for Assembler and high-level languages C and others with the capability of executing lines of the program while displaying the state of any variable. The debugger uses symbols contained in the absolute file generated by the most commonly used Assemblers and High Level Language Compilers. The CEIBO Windows Debugger runs only under Windows 98 or later and also under Windows XP.

Keil μVision2 Debugger
This debugger may also be used to operate the emulator. Some files have to be added to the original Keils package and those can be downloaded from www.ceibo.com.

Supported Microcontrollers
The system supports ATMEL AT89C5131/A microcontrollers. The standard supported package for emulation is PLCC-52. Other packages need mechanical adapters available from Ceibo: PLCC-44, SOIC-28, QFN-32 and QFP-64.

Frequency
FE-5131A runs from programmable clock generator, which can be set under software control. The minimum and maximum frequencies are determined by the emulated chip characteristics, up to fmax=40MHz for the current silicon version.

Host Characteristics
PC or compatible systems with 8 MByte of RAM, one RS-232C interface card for the PC, Windows 98 or later.

Input Power
5V, 1.5A power supply supplied.

Mechanical Dimensions
3cm x 7cm.

Items Supplied as Standard
Development system including emulator, termination board, PLCC-52 emulation header, Windows software with source level debugger, on-line assembler and disassembler, user's manual, power supply and RS-232 cable. Power cord is not included. Other mechanical adapters are optional: PLCC-44, SOIC-28, QFN-32 and QFP-64.

HARDWARE DESCRIPTION - FE-5131A EMULATOR
The first step required to work with the FE-5131A board is to be able to identify its different parts and to understand how the electronics function. This will help you to take full advantage of all the FE-5131A capabilities. On the bottom side of the FE-5131A you will see a phone jack. It is used to serially link the FE-5131A to your computer and to utilize the software in emulation mode instead of just the simulator. The emulation mode is used to interact with the hardware while the simulator is independent of any hardware connection. The RS-232 cable connections are given separately. A POWER LED indicates whether or not the power is applied to the system. It is localed beside the RS-232 jack (D1). U9 is the microcontroller used for your emulation. It is placed on a 52-PLCC socket. The chip is a standard T89C5131. On the other bottom side of the emulator board there is a PLCC-52 plug that you may connect to a target board or the termination board supplied with the system. *Make sure that pin #1 of the PLCC plug is to pin #1 of your target*. The emulator and plug are clearly marked (see emulator left upper corner). JP1 is a connector necessary only for firmware updates. It is on the left bottom side. Make sure that the cap is *not placed on it* to work properly. If any firmware update will be necessary, follow the instructions that will come with it in **www.ceibo.com**.

FIGURE 1.1: FE-5131 Emulator

HARDWARE DESCRIPTION - ADP-5131/T TERMINATION BOARD

This board is supplied to be used as a possible target and to test your software. The emulator must be connected to a target to work as power supply is provided only through the target. Therefore, if you do not have a target board, connect the emulator to ADP-5131/T and only then you will be able to start working with it. On the right bottom side of the board you will see the power jack. You need to connect the 5V power supply to this jack. Use the power supply that comes with the system. ADP-5131/T has several testpoints to check microcontroller signals.

The available signals on J501 are:
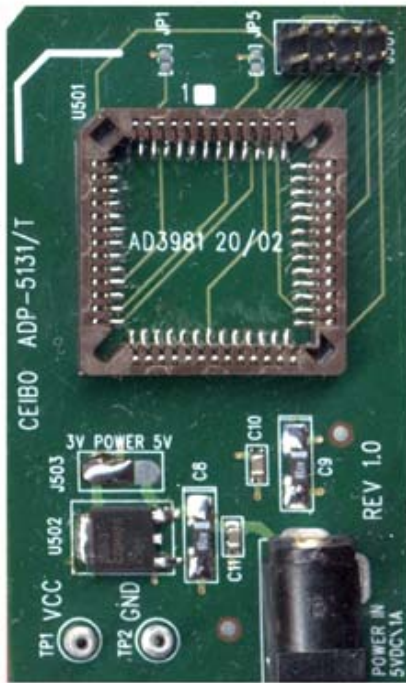
P1.0, P1.1, ALE, X2, P3.0, P3.1, P3.6, P3.7.
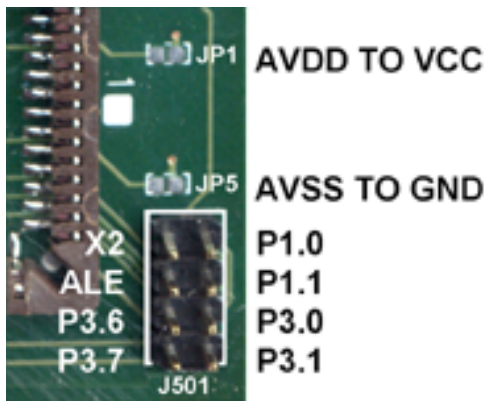
FIGURE 1.2: ADP-5131/T Board

FIGURE 1.3: ADP-5131/T Testpoints

JP1 and JP5 are the analog supply connections. If you leave them open, the signals are disconnected from the microcontroller. Soldering JP1 and JP2 will connect analog to the digital supplies.

FIGURE 1.4: ADP-5131/T Power Selection

J503 selects the operating voltage that can be 3.3V or 5V. A built in DC to DC converter (U502) provides the 3.3V, as the power supply is 5V only.

EMULATION RESTRICTIONS

The following restrictions are valid for FE-5131A:

1. FE-5131A Monitor Program shares 1 KByte of the 32K memory code space. Therefore, only 31K are available for user's programs while emulating because the system comes with an embedded monitor program that uses this 1K of the memory space, from 7C00h to 7FFFh.

2. Code memory cannot be mapped external and always belongs to the emulator system.

3. The program also uses 4 Bytes of the internal stack memory.

4. The stack pointer may not be defined below address 7.

5. The first instruction (address 0000h) must be 3-bytes long. For example: use LJMP and not SJMP or AJMP as the first instruction.

6. The UART is shared with the system and interrupts should not be disabled. Also the related timer to the serial port must not be stopped. The Halt Mechanism in the Options Menu offers other solutions in case you need these resources in your application.

7. TxD line can be used as Output Port or UART line. It cannot be used as Input Port.

8. RxD line can be used only as UART line. It cannot be used as generic I/O Port.

9. Breakpoints cannot be set to the Reset Vector (address 0000h-0002h), Serial Interrupt (address 0023h-0025h) or to the 1K of the reserved memory space (address 7C00h-7FFFh). Any other location is allowed, included inside interrupt service routines.

10. The Simulator can simulate timers only in Timer Mode and while the Gate control is 0. The simulator may not support specific hardware and real-time functions. Emulation mode is always recommended.

11. The simulation mode supports only the basic functions of the 8051 microcontrollers. Special registers and functions of some derivatives may be not supported in the simulation modes. Use the real-time mode for fully support of dedicated functions.

FE-5131A - ORDERING INFORMATION

Item	Description
FE-5131A	Emulator for AT89C5131/A / PLCC-52
ADP-5131/T	Termination Board
ADP-44P/5131	PLCC-52 To PLCC-44 Adapter
ADP-28S/5131	PLCC-52 To Soic-28 Adapter
ADP-32Q/5131	PLCC-52 To QFN-32 Adapter
ADP-60Q/5131	PLCC-52 To QFP-64 Adapter