

# ADM-51 In-Circuit Debuggers



## ADM-51 Features

- Non-intrusive, real-time support for **Teridian (TDK) 8051 devices**:
  - ☐ **71M65xx** Power Meters
  - ☐ **73S12xx** Smart Card devices
  - ☐ **71M640x** Circuit Breakers
  - ☐ **71M8100** Scale controllers.
- Optional **Real-Time Trace Buffer** with time-stamp and visibility into all **IRAM**, **XDATA** and peripheral (**SFR**) activity
- Real-time access to Program Counter with **Execution Profiling** display to identify frequently executed procedures
- Fast code downloads
- Two hardware breakpoints
- Unlimited software breakpoints
- **Low cost** - replaces cumbersome conventional In-Circuit Emulators at a fraction of their cost
- **USB 2.0** High-Speed (480 Mbps) interface to host PC
- Because the target CPU stays on target board, ADM-51 does not introduce any noise to the sensitive 21-bit AD converter
- Compatible with the following **8051 C compilers**:
  - ☐ **Raisonance S.A.**
  - ☐ **Keil Software**
  - ☐ **IAR Systems**
  - ☐ **Intel** and others
- Only **2-pin** (RxTx, TCLK) high-speed debug interface
- **Hot-plug activation** of the on-chip debug resources allows to inspect and debug hung up target boards even if the debug channel was disabled to conserve power
- **De-activation** of the on-chip debug resources may be done at any time to conserve power and minimize EMI
- Built-in **Flash Programmer** for the on-chip 64K of program memory with **automatic script programming** for production environment
- Extra long debug cables are available to allow debugging inside environmental chambers
- **Windows XP, 2000, ME & 98SE** compatible

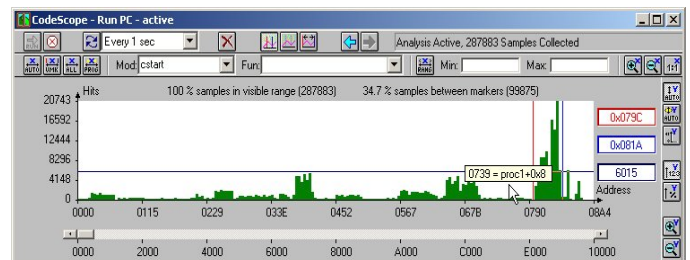
## USB 2.0 PC Host Interface

ADM-51 is a small, palm-sized emulator based on a 2-pin, synchronous debug channel. It is equipped with USB 2.0 port that runs at **480 Mb/sec** and fully compatible with the older USB 1.1 ports at slower speeds. For the best performance, a PC with the USB 2.0 port is highly recommended.

ADM-51 is very portable and does not require any external power adapters. All power is taken from the USB port that allows it to be used in the field when connected to a notebook PC.

## Embedded ICE Like no Other!

Unlike JTAG debug interfaces that use 5 or more device pins, Signum Systems developed a custom 2-pin debug interface for the Teridian 8051 devices. With over 25 years of experience in building In-Circuit Emulators Signum Systems created an unprecedented On-Chip Debug System (OCDS). Not only this OCDS contains breakpoint registers and allow reading and modifying all memory, flash and SFRs, but in addition it can access the PC and flags in real-time (while the CPU is running) allowing to perform statistical **Execution Profiling**.



*The Execution Profile graph allows to identify procedures that are executed frequently so that they can be optimized to gain system performance.*

## Real-Time Trace

The real advantage of Signum Systems' On-Chip Debug System comes from the capability of tracing program execution in real-time on devices equipped with the 5-pin trace port. The trace data is transmitted by the device in real-time and stored in the emulator's memory, decompressed and displayed in the Trace window for detailed execution analysis.

The trace packets contain full details of the executing application, including not only the **Program Counter** but in addition all **XDATA**, **IRAM** and **SFR activity**.

## ADM51 Trace Features:

- Only 5-pin interface to the CPU
- Shows complete program execution path
- Shows RD/WR transactions in IRAM, XDATA and SFRs
- 50,000 instructions deep, real-time execution trace memory
- Execution time is shown for each instruction in absolute, delta and relative modes (CPU cycles or  $\mu$ s)
- Trace correlation to the source window highlights the executed instructions in trace and in source window
- Trace filtering to hide unwanted information for easy viewing
- Complex triggering events

# ADM51, ADM51-Trace & ADM51-Trace-CE

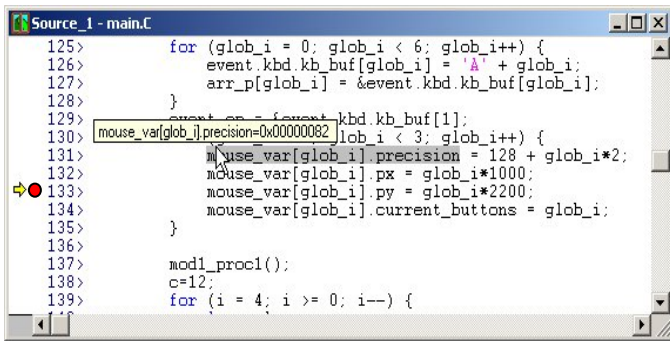
## Chameleon Debugger for ADM51

Each ADM51 emulator is bundled with our high-end, full featured **Chameleon Debugger for 8051 devices** which offers all the latest debug features needed to quickly and efficiently debug the most complex embedded projects.

Newly compiled programs are downloaded into the device's Flash memory with just one click of the mouse.

Their corresponding source code (in C or Assembly) is shown in one or more Source Windows from which the program can be executed at full speed or single stepped by ASM or C-level instructions.

Any variable may be easily inspected simply by flying-over the variable and watching its value automatically pop-up.

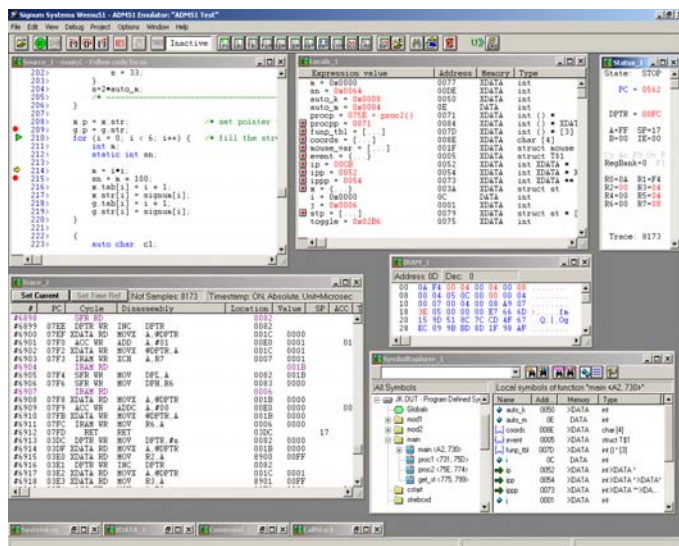


```
125> for (glob_i = 0; glob_i < 6; glob_i++) {
126>     event_kbd_kb_buf[glob_i] = 'A' + glob_i;
127>     arr_p[glob_i] = &event_kbd_kb_buf[glob_i];
128> }
129> mouse_var[glob_i].precision = 0x00000082; glob_i < 3; glob_i++) {
130>     use_var[glob_i].precision = 128 + glob_i*2;
131>     mouse_var[glob_i].px = glob_i*1000;
132>     mouse_var[glob_i].py = glob_i*2200;
133>     mouse_var[glob_i].current_buttons = glob_i;
134> }
135>
136>
137> mod1_procl();
138> c=12;
139> for (i = 4; i >= 0; i--) {
```

H/W breakpoints and S/W breakpoints (identified by red dots) may be used to stop execution in the critical code sections to allow detailed inspection of the embedded system.

An array of other windows is available to display the CPU status, registers, IRAM, XDATA, SFRs, global and local variables, C-level call stack and CPU stack. All application symbols, procedure names and variables are displayed in the Symbol Explorer window where they are nicely grouped by a module name.

Chameleon Debugger also includes **macros** for automated board initialization and production testing. The macro language executes all debugger commands, has compare commands and allows C-like conditional branching.

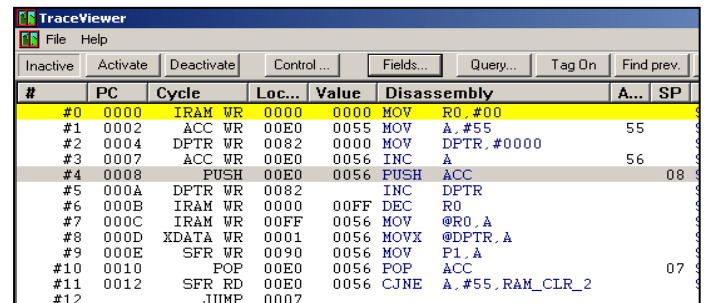


## Chameleon Debugger Features:

- Source level debugging for ASM & C compilers from Raisonance, Keil, tasking, IAR and others.
- Automatic switching between H/W and S/W breakpoints
- Statistical Execution Profiler identifies frequently executed code with direct link to source code
- In-line symbolic assembler and dis-assembler
- Step-into, step-over and step-out of functions in C and ASM level
- Command mode window with macros (scripts) for automated testing
- Built-in diagnostic tests to ensure system integrity
- Symbol Explorer browser to locate variables in modules and functions
- Drag and Drop variables and addresses between windows for easier and faster viewing
- Automatic variable value pop-ups in Source window
- Locals and Global variable Watch windows with all complex types support (arrays, structures, unions, etc.)
- C-level Call Stack and CPU Stack windows
- Special Function Register window with bit field names and descriptions
- Trace window with back-correlation to source windows
- Memory windows for Program, XDATA and IRAM with byte, word, hex, binary, octal, decimal, float and ASCII formats.

## Trace Window

The Trace Window displays data captured in real-time by the emulators with trace module. It contains columns with detailed information about the last **50,000 of executed instructions** along with disassembly information, C or ASM source code and time stamp information. The columns may be moved around, duplicated and deleted as needed.



| #   | PC   | Cycle    | Loc... | Value | Disassembly            | A... | SP |
|-----|------|----------|--------|-------|------------------------|------|----|
| #0  | 0000 | IRAM WR  | 0000   | 0000  | MOV R0, #00            |      |    |
| #1  | 0002 | ACC WR   | 00E0   | 0055  | MOV A, #55             | 55   |    |
| #2  | 0004 | DPTR WR  | 0082   | 0000  | MOV DPTR, #0000        |      |    |
| #3  | 0007 | ACC WR   | 00E0   | 0056  | INC A                  | 56   |    |
| #4  | 0008 | FUSH     | 00E0   | 0056  | PUSH ACC               |      | 08 |
| #5  | 000A | DPTR WR  | 0082   | INC   | DPTR                   |      |    |
| #6  | 000B | IRAM WR  | 0000   | 00FF  | DEC R0                 |      |    |
| #7  | 000C | IRAM WR  | 00FF   | 0056  | MOV @R0, A             |      |    |
| #8  | 000D | XDATA WR | 0001   | 0056  | MOVX @DPTR, A          |      |    |
| #9  | 000E | SFR WR   | 0090   | 0056  | MOV P1, A              |      |    |
| #10 | 0010 | POP      | 00E0   | 0056  | POP ACC                |      | 07 |
| #11 | 0012 | SFR RD   | 00E0   | 0056  | CJNE A, #55, RAM_CLR_2 |      |    |
| #12 |      | JUMP     | 0007   |       |                        |      |    |

All IRAM, XFR and XDATA transactions in trace contain the **Value** read or written and the **address**. A separate columns for **Accumulator (A)** and **Stack Pointer (SP)** show the exact values as soon as they are changed.

Order on-line at [www.signum.com/adm51.htm](http://www.signum.com/adm51.htm)

| Part #         | Ordering Information                                                |
|----------------|---------------------------------------------------------------------|
| ADM51          | In-Circuit Debugger                                                 |
| ADM51-Trace    | In-Circuit Debugger with trace buffer                               |
| ADM51-Trace-CE | In-Circuit Debugger with trace buffer and complex triggering events |
| CA-51          | Keil 8051 C compiler, ASM, Linker, IDE                              |
| PK-51          | Keil 8051 C, ASM, Linker, IDE, Simulator                            |



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