

# GREEN HILLS SOFTWARE HARDWARE DEBUG DEVICE FAMILY



**T**he Green Hills Probe™ and Slingshot™ are advanced, high-performance, low-cost hardware debug devices that enable the MULTI® debugger to interact with and control target devices under test.

**THE MOST ADVANCED  
HARDWARE DEBUG DEVICES**

The Green Hills Probe™ and Slingshot™ are advanced hardware debug devices that enable the MULTI® debugger to load, control, debug and test a target system without the need for prior board initialization, an RTOS, or even a ROM monitor.

The Green Hills Probe offers high-speed downloads of up to 500 KBps and three host interfaces. Slingshot is low-cost with a single USB interface. Both debug devices provide a complete range of capabilities and are ideal for all stages of product development—from board bring up with nothing running on your target, to full blown application debugging, and on to manufacturing test and programming.

With their on-board 32-bit processors and reconfigurable logic, Probe and Slingshot offer a dramatic advance in debugger technology. By offloading many debugger functions onto a faster, dedicated processor, the Probe and Slingshot are able to:

- free up the host
- minimize intrusiveness
- speed up responsiveness



*The Green Hills Probe and Slingshot mark a dramatic advance in debug technology by offloading many debugger functions onto faster, dedicated hardware.*

**GREEN HILLS PROBE & SLINGSHOT FEATURE COMPARISON**



- High-speed downloads of up to 500 KBps
- Easy configuration & setup
- USB, Ethernet, or RS-232 host interfaces
- Supports a variety of targets via OCD/JTAG interface
- Full MULTI integration
- Multicore debugging
- On-board processor
- Enables source-level debugging
- Flash programmable

- High-speed downloads of up to 150 KBps
- Easy configuration & setup
- USB host interface
- Supports a variety of targets via OCD/JTAG interface
- Full MULTI integration
- Low-cost, compact unit
- On-board processor
- Enables source-level debugging
- Flash programmable

**SHARED DEBUGGING CAPABILITIES**

Using either a JTAG or BDM test port, the Green Hills Probe and Slingshot can debug and control the core state (such as CPU internal registers) as well as the system state (external RAM and flash memory). Both devices enable developers to view the state and provide run control and conditional and complex breakpoints in both volatile and nonvolatile memory.

**MULTI INTEGRATION**

Combined with the MULTI Integrated Development Environment, Probe and Slingshot support:

- source level debugging
- real-time event viewing
- application run-time error checking
- memory leak detection

Array bounds, assignment bounds, NULL deference, case/switch statement, and divide by zero run-time exception conditions can be quickly identified and reported before their effects are masked by other events. Green Hills debug devices will also quickly read the target's state to positively identify memory leaks at any point during your debug session. This will report not only the address of the memory leak, but also the call stack of the allocating function.

**OCD/JTAG TARGET CONTROL**

Both the Probe and Slingshot support industry standard OCD target connections, including IEEE 1149.1 (JTAG), EJTAG, COP, and BDM.

**FLASH DEBUGGING & PROGRAMMING**

With Green Hills debug devices, you can write application code to your target's flash from within the same graphical debugger used to debug the application. The Probe and Slingshot support stepping and execution breakpoints in flash memory in addition to other debugging techniques.

## DIRECT TARGET INTERFACE

The MULTI target window supports direct entry of user commands to both Probe and Slingshot that bypass the MULTI debugger. This interface can be used to run a setup script that can initialize the target for an application program or read/write registers and memory.

## HARDWARE DIAGNOSTICS

Green Hills debug devices offer the following diagnostics:

- Target Memory Test to support memory accesses of 8, 16, 32, and 64 bits (on supported targets).
- Target Control Tests to ensure custom targets support all capabilities.

Probe supports JTAG clocks ranging from 10 kHz to 30 MHz in 0.10% increments.

- Signal-Pin diagnostics to enable you to quickly identify problems on any pin in the target connection.
- Test data sequences to the JTAG chain to support custom test operations, including boundary scan.

## REGISTER VIEW & BOARD CUSTOMIZATION

All standard, special, and debug CPU registers are exposed to give full target visibility and control. Unlimited memory mapped peripheral registers can be graphically viewed and customized during your debug session, giving detailed information down to the bit level for the entire system.

In addition, the Green Hills Probe can enforce custom memory regions, filtering all debug memory operations by alignment, size, and read/write access. This interface can also restrict the probe to only access portions of the targets memory.

## THE HIGH-PERFORMANCE GREEN HILLS PROBE

Green Hills Software's most advanced hardware debug device, the Probe, supports download speeds of up to 500 KBps, enabling rapid debug/fix/reload cycles and dramatically boosting productivity. The Probe supports heterogeneous and homogeneous multicore debugging with a single host connection and a single target JTAG interface.

The Probe can communicate with targets from MULTI hosts systems running Windows 2000/9x/NT/ME/XP, Linux, Solaris, or HP-UX through three flexible host interfaces:

- RS-232 serial (DB9P connector)
- 10/100 Ethernet (RJ45 connector)
- USB v1.1 (type B connector)

The Ethernet connection supports remote debugging for targets that may be in different location. The USB port's plug-and-play setup lets you start debugging quickly.

## EASY CONFIGURATION & SETUP

The Green Hill Probe is easy to use. Simply choose one of the available host interfaces, connect the probe and you're ready to download to the target.

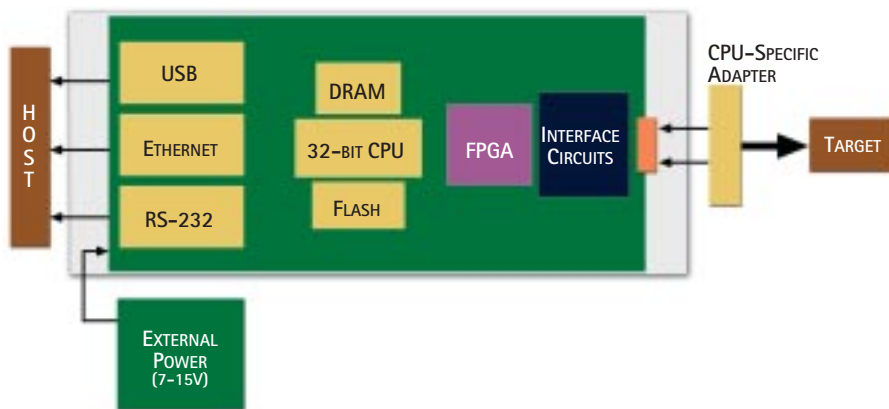
## SUPPORT FOR MANY TARGETS

The Green Hills Probe supports most 32-bit and 64-bit processor targets, and is re-flashable for use with different targets should your CPU change from project to project.

To switch to a different CPU, all that is needed is an external CPU Adapter and a firmware update. The extensive list of supported Probe targets includes PowerPC, ColdFire, MIPS, ARM, XScale, StareCore, Lexra, as well as custom DSPs. The target system can be a simple single processor with only internal memory or a complex heterogeneous multicore system on a chip (SoC).

With the Green Hills Probe, the same familiar piece of test equipment can be used from project to project with little or no learning curve.

### GREEN HILLS PROBE CONFIGURATION

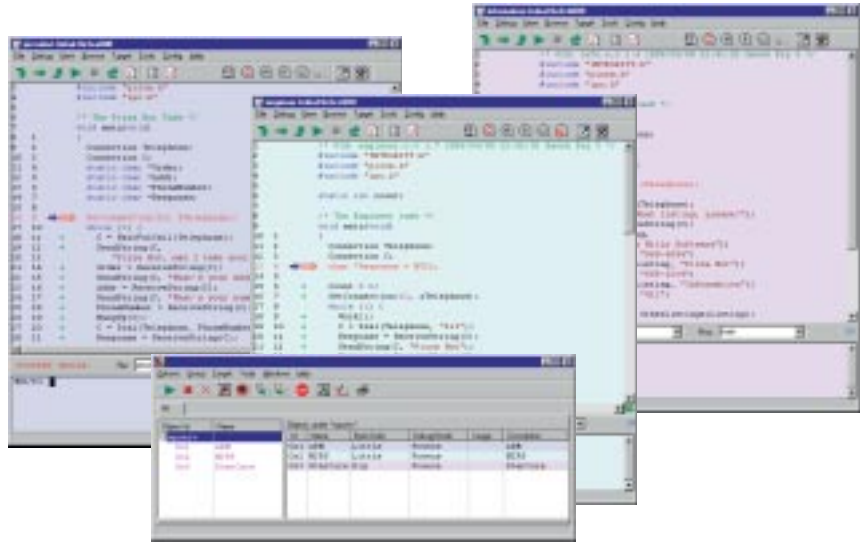


*Green Hills Software's most advanced hardware debug device, the Probe, offers maximum flexibility by supporting three host interfaces, multicore debugging, ultra-high download speeds, as well as an on-board 32-bit CPU that can be reconfigured for different targets.*

## MULTICORE DEBUGGING

Through its single JTAG interface, the Probe can control multiple targets on a single chip, reducing the number of external pins required. Through one debug connection, synchronous operations such as run, halt, step, or breakpoint can be executed seamlessly on supported CPU types.

Separate color-coded debugger windows can be easily launched to individually debug each core. All special debug features, such as kernel and task-aware debugging, are available for all the cores as if they were standalone processors.



*Multicore debugging is easy with MULTI and the Green Hills Probe. Each core can have its own color-keyed debug window to track tasks running on that core. Multiple cores can be debugged simultaneously to verify correct program operation across processor boundaries.*

## USER I/O PINS

The Probe features a set of user-programmable I/O pins that can be used for controlling external devices or monitoring signals such as triggers from a logic analyzer.

Configured as an output, these pins can control target signals such as reset, interrupts, or device inputs for fully interactive debugging. Configured as an input, these pins can monitor target signals or triggers from logic analyzers and take actions such as halting the CPU. The I/O pins are individually programmable.

## DHCP SUPPORT

The Green Hills Probe will connect to your network and automatically obtain an IP address through the Dynamic Host Configuration Protocol (DHCP). This will enable you to spend less time configuring the network interface to your hardware debug connection.

## TERMINAL INTERFACE

The Probe provides a command window through a serial or telnet terminal to allow direct commands like run, halt, breakpoint, and memory operations.

## LOCAL INTELLIGENCE

The Probe is powered by a dedicated 32-bit processor and reconfigurable logic that offloads the host by implementing many debugger functions locally. The on-board processor also enables the Probe to be easily reconfigured either for alternate targets (via CPU-specific adapters) or to add capabilities to meet custom requirements.

## WEB INTERFACE

The Probe also exports to a web interface to enable remote configuration and viewing of Probe and target status. This web interface can be accessed via any host browser connected to the same network as the Probe.



*The Probe's web interface is accessible through an Ethernet connection and viewable with most any web browser. With it, you can configure debugging options as well as display information about the Probe, connection, and target.*

The Green Hills Probe supports most mainstream 32-bit and 64-bit targets.

Because we are constantly adding new targets, contact Green Hills to inquire about specific targets not on this list.

▪ **PowerPC**

- PPC 8240
- PPC 8245
- PPC 8260
- PPC 8250
- PPC 8255
- PPC 8264
- PPC 8265
- PPC 8266
- PPC 860
- PPC 8xx
- PPC 821
- PPC 823
- PPC 823e
- PPC 850
- PPC 855t
- PPC 857t
- PPC 862
- PPC 5xx
- PPC 555
- PPC 556
- PPC 560
- PPC 561
- PPC 562
- PPC 563
- PPC 564
- PPC 565
- PPC 566
- PPC 740
- PPC 750
- PPC 745
- PPC 755
- PPC 405
- PPC 405gp
- PPC 405gpr
- PPC 440
- PPC 440gp
- PPC 7400
- PPC 7410
- PPC 7455
- PPC 7445
- PPC 7451
- PPC 7450
- PPC 7441



▪ **MIPS & MIPS Licensees**

- MIPS Technologies
- MIPS EJTAG
- MIPS 32 4Kc
- MIPS 32 4Kp
- MIPS 32 4Km
- MIPS 32 4KEc
- MIPS 32 4KEp
- MIPS 32 4KEm
- MIPS 32 4KSc
- MIPS 64 5Kc
- MIPS 64 5Kf
- MIPS 64 20Kc



IDT

- IDT 32332
- IDT 32334
- IDT 32344
- IDT 32364



AMD/Alchemy

- Au1000
- Au1500



Broadcom

- BCM1250A
- BCM6352
- BCM3345
- BCM7320
- BCM7115

Philips

- PR3940
- PR 1900



Wintegra

- WinPath



LSI Logic

- LSI4102



Lexra

- LX4189
- LX4280

Intrinsity

- FastMATH
- FastMIPS



NEC

- VR4122
- VR4131
- VR5432
- VR5500



▪ **ARM & ARM Licensees\***

ARM

- ARM7TDMI
- ARM720
- ARM9TDMI
- ARM920
- ARM922
- ARM925
- ARM940
- ARM946
- ARM966



XScale

- IOP 200
- IOP 320
- IOP 321
- PXA210
- PXA250



Atmel

- AT91M42800A Series
- AT91M43300/M63200 Series
- AT91M55800A Series
- AT91RM9200 Series
- AT91x408xx Series

Cirrus Logic

- CS89712
- EP7309
- EP7311
- EP7312



NetSilicon

- NS7520
- NET+50



Samsung

- KS32C50100

Sharp

- LH79520
- LH7A400
- LH7A405



▪ **StarCore**

- MSC8101
- MSC8102



▪ **ZSP**

- LSI402zx
- 403lp



▪ **ColdFire**

- CFV4e
- CFV5407
- 5307
- 5272
- 5249
- 5206e



\* Note that the Probe supports many other ARM-licensee targets. Check with Green Hills for more information.

## LOW-COST SLINGSHOT

Slingshot is Green Hills Software's high-performance, low-cost microprocessor debug probe with a single USB host interface and a compact (2 7/16" x 2 3/4" x 3/4") package. Slingshot outperforms other probes three to four times its cost.

Slingshot shares most of the debugging capabilities as the Green Hills Probe, including:

- MULTI integration
- OCD/JTAG target control
- Flash debugging and programming
- Direct target interface
- Hardware diagnostics
- Register view and board customization

### USB HOST INTERFACE

Slingshot uses a bus-powered USB connection from MULTI host systems running Windows 9x/2000/ME/XP.

### DEDICATED PROCESSOR

Slingshot's 32-bit processor speeds up debug operations by reducing latencies of the debug connection. This translates into rapid single instruction steps, quick memory and register view refreshes, and fast application downloads while debugging through MULTI.



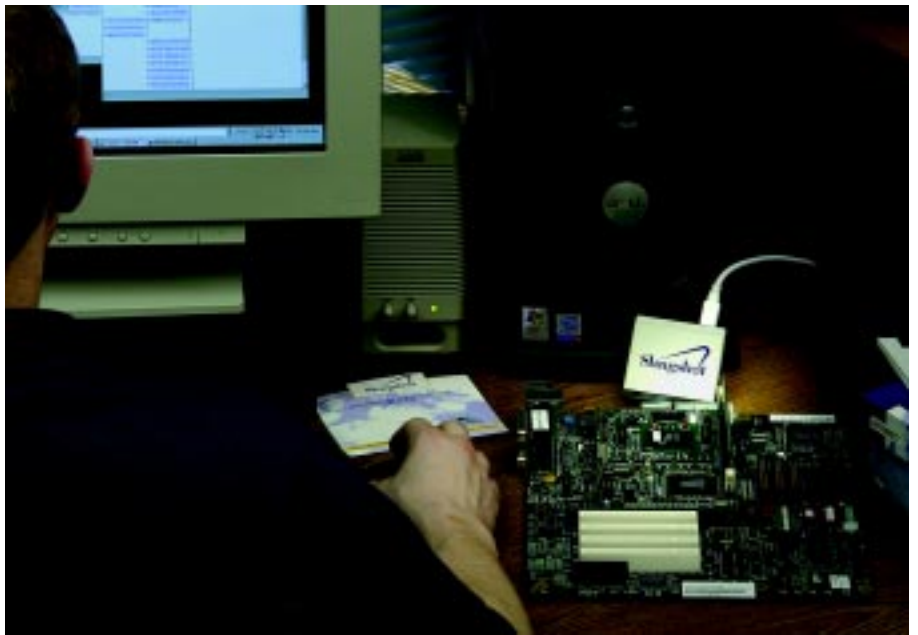
*Green Hills Software's Slingshot offers high-performance, low-cost debugging capabilities in a compact package that features a single USB interface.*

### EASY SETUP & CONFIGURATION

Slingshot's USB host interface provides a simple plug-and-play setup, so you'll be up and running fast. Simply connect Slingshot to your workstation's USB port and you're ready to start.

### HIGH-SPEED DOWNLOAD

Quickly download large applications through Slingshot's USB v1.1 (type B connector). Download speeds are target dependent, generally running up to 150 KBps, significantly faster than comparably-priced alternatives.



*With its low cost, compact size, and plug-and-play USB interface, it's easy to be up and running fast with Slingshot.*

## SLINGSHOT SUPPORTED PROCESSORS

Slingshot supports most mainstream 32-bit and 64-bit targets.

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 PPC 560  
 PPC 561  
 PPC 562  
 PPC 563  
 PPC 564  
 PPC 565  
 PPC 566  
 PPC 740  
 PPC 750  
 PPC 745  
 PPC 755  
 PPC 405  
 PPC 405gp  
 PPC 405gpr  
 PPC 440  
 PPC 440gp  
 PPC 7400  
 PPC 7410  
 PPC 7455  
 PPC 7445  
 PPC 7451  
 PPC 7450  
 PPC 7441



### MIPS & MIPS Licensees

MIPS Technologies  
 MIPS EJTAG  
 MIPS 32 4Kc  
 MIPS 32 4Kp  
 MIPS 32 4Km  
 MIPS 32 4KEc  
 MIPS 32 4KEp  
 MIPS 32 4KEm  
 MIPS 32 4KSc  
 MIPS 64 5Kc  
 MIPS 64 5Kf  
 MIPS 64 20Kc



### IDT

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 IDT 32334  
 IDT 32344  
 IDT 32364



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 Au1500



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#### NetSilicon

NS7520  
 NET+50



#### Samsung

KS32C50100

#### Sharp

LH79520  
 LH7A400  
 LH7A405



\* Note that Slingshot supports many other ARM-licensee targets. Check with Green Hills for more information.

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