ARM HSSTP Active Probe

V1.6

User Manual

i SYSTEM

Enabling Safer Embedded Systems

Contents

Introduction

The iC5700 BlueBox On-Chip Analyzer is a hardware platform designed for debugging and testing a wide range of embedded microcontroller platforms that are based on a variety of processor architectures.

Functionality can be further extended with the addition of our IOM6 Accessories, enabling the synchronous capture of analog and digital signals in parallel to trace information. Such capability is used for advanced debugging of complex applications together with our winIDEA Integration Development Environment (IDE), as well as for thorough testing in conjunction with our testing environment testIDEA.

ARM HSSTP Active Probe allows debugging, tracing and testing ARM® Cortex™ architectures. It supports both the JTAG debug interface and ARM High-Speed Trace Port (HSSTP). Its small and compact hardware size allows for connecting to a target microcontroller in a confined space as far as 5m away. The Active Probe supports up to 4 parallel HSSTP lanes, running at a maximum bitrate of 5Gbps.

Complementing the hardware is a range of software which target three key areas of embedded development: debugging, timing-analysis and testing.

winIDEA – The winIDEA Integration Development Environment (IDE) delivers the visual insights required to debug your embedded application. At the simplest level, winIDEA provides all the usual functionality of an IDE, such as breakpoints, stepping and device programming. When supported by the target microcontroller, winIDEA can also visualize the timing and code coverage of the application via the trace interface, as well as combine data captured by the IOM Accessories. Various third-parties also provide software tools to perform advanced worst-time-execution analysis based upon the data winIDEA can export. When a Real-Time Operating System (RTOS) is in use, the state of the RTOS and its task can also be visualized.

testIDEA – The testIDEA environment simplifies the development of unit tests for embedded applications. By making use of the winIDEA environment, this application makes it easy to locate source code functions and generate test cases for them. Tests are then executed using the Original Binary Code (OBC) method, testing the object code running on the target microcontroller. The tests, which are stored as YAML files, can easily be added to a project, maintained in a repository, and then automatically executed together with Continuous Integration (CI) tools such as Jenkins.

isystem.connect – There are times where it is much more efficient to write a script to execute a task that requires many clicks within a visual development environment. This is where our Software Development Kit (SDK) isystem.connect comes in. The well documented interface provides access to Python, Java, C++ and other languages so that any action available within winIDEA and testIDEA can be scripted. Scripts can also be executed directly from within winIDEA, thereby allowing the developer to extend its functionality.

iSYSTEM's solutions run under the Microsoft® Windows® operating system or optionally within a Wine emulation under the Linux operating system. All our software can be downloaded from the Downloads page at http://www.isystem.com.

Important safety notice

General safety instructions

Please read the following safety precautions carefully before putting this device to use to avoid any personal injuries, damage to the instrument, or to the target system.

Use this instrument only for its intended purpose as specified by this manual to prevent potential hazards.

Use included power cord and power supply

The enclosed power supply has been approved for use by iSYSTEM. Please contact iSYSTEM if you need to consider an alternative power.

Use grounding wire

Prior to applying power to either the BlueBox or the target, connect the device and the target system together with the included grounding wire. This is to avoid potential damage caused by any voltage difference between the device and the target system.

Use proper overvoltage protection

Please ensure proper protection to avoid exposing the BlueBox device or the operator to overvoltage surges (e.g. caused by thunderstorm, mains power).

Do not operate without cover

Do not operate the device with cover removed.

Avoid circuit and wire exposure

Do not touch exposed components or wires when the device is powered.

Do not operate with suspected damage

If you suspect damage may have occurred, the BlueBox device must be inspected by qualified service personnel before further operation.

Do not operate the device outside its rated supply voltage or environmental range

Consult with iSYSTEM before using equipment outside of the parameters provided in this manual.
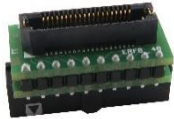
This symbol indicates further safety notices within this manual.

Package content

The standard ARM HSSTP Active Probe kit (ordering code IC57125) is delivered with the following components:

ARM HSSTP Active Probe	1m FNET Micro Cable	Samtec40 -> 20-pin JTAG ARM Adapter
Ordering code: IC57125	Ordering code: BB-FNETMICRO-100	Ordering code: IASAM40ARMPIN20

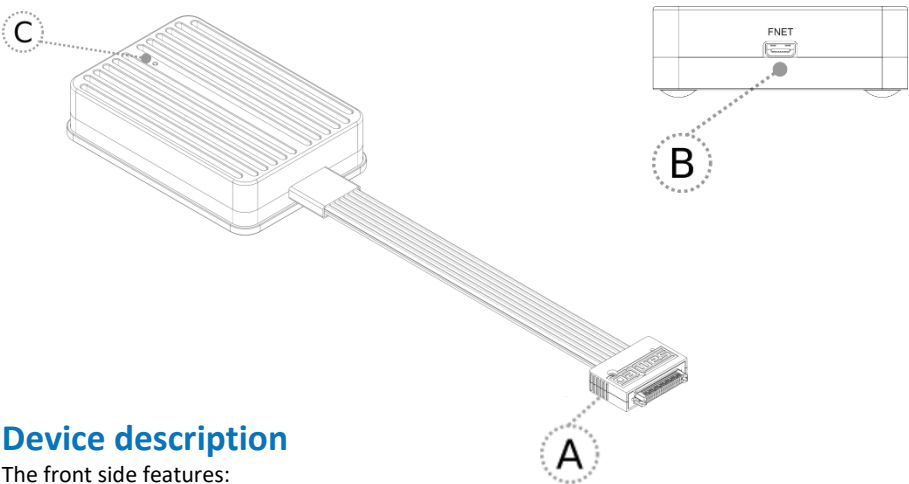| User manual |
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Specifications

GENERAL	
Supply voltage	9.0V DC via the FNET cable
Operating temperature	10°C to 40°C
Storage temperature	-10°C to 60°C
Humidity	5% to 80% RH
MECHANICAL	
Size	80 x 55 x 18 mm
Weight	0.125 kg
OPERATION	
Communication interface to Blue Box	iSYSTEM proprietary FNET
Debug signal valid input voltage range	1.8V to 3.6V
Power consumption	Max. 2W (dependent on operation mode)
Number of supported HSSTP lanes	Up to 4
Maximum HSSTP bitrate	5Gbps
HSSTP clock source options	Target or Active Probe
Supported event/trigger signals	DGBREQ/DBGACK or TRIGIN/TRIGOUT
PROTECTION	
Debug signals	33Ω series termination/protection resistors, ESD protection devices
Debug signals w/o clock	Configurable 4k7Ω pull-down / pull-up
RESET	1kΩ pull-up
VREF	10kΩ input impedance

Operation

Device overview

Device description

The front side features:

- **A** – 40-pin HSSTP connector with 20cm high-speed cable and the following pinout:

Signal Direction	Signal Description	Signal	Pin	Pin	Signal	Signal description	Signal Direction
OUT	HSSTP Lane 4	Tx4_P	1	2	VREF	Reference Voltage	IN
OUT	HSSTP Lane 4	Tx4_N	3	4	TCK/SWCLK	JTAG / SWD	OUT
		GND	5	6	GND	Ground	
OUT	HSSTP Lane 2	Tx2_P	7	8	TMS/SWDIO	JTAG / SWD	IN/OUT
OUT	HSSTP Lane 2	Tx2_N	9	10	nTRST	JTAG	OUT
		GND	11	12	GND	Ground	
OUT	HSSTP Lane 0	Tx0_P	13	14	TDI	JTAG	OUT
OUT	HSSTP Lane 0	Tx0_N	15	16	TDO	JTAG	IN
		GND	17	18	GND	Ground	
OUT	HSSTP Clock	CLK_P	19	20	nSRST	RESET	OUT
OUT	HSSTP Clock	CLK_N	21	22	DBGREQ	Debug Request	OUT
		GND	23	24	GND	Ground	
OUT	HSSTP Lane 1	Tx1_P	25	26	DBGACK	Debug Acknowledge	IN
OUT	HSSTP Lane 1	Tx1_N	27	28	RTCK	Return TCK	IN
		GND	29	30	GND	Ground	
OUT	HSSTP Lane 3	Tx3_P	31	32	TRIGIN	CTI Trigger Input	IN
OUT	HSSTP Lane 3	Tx3_N	33	34	TRIGOUT	CTI Trigger Output	OUT
	Ground	GND	35	36	GND	Ground	
OUT	HSSTP Lane 5	Tx5_P	37	38	GND	Ground	
OUT	HSSTP Lane 5	Tx5_N	39	40	GND	Ground	

Signal direction definition:
OUT - output from the Active Probe to the target microcontroller
 IN - input to the Active Probe from the target microcontroller

The target microcontroller connector is a Samtec ERF8 series, rugged high-speed socket, part number ASP-130367-01.

The rear side features:

- **B** – FNET Micro connector, which connects the Active Probe to the iC5700 BlueBox through the FNET Micro cable delivered with the Active Probe.
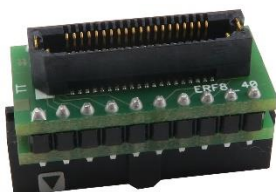
The top side features:

- **C** – The indicator light provides the status of the Active Probe as follows:

    o Permanently green - Powered On

    o Blinking green – Establishing connection with the Blue Box

    o Permanently blue – Ready for use

When powering on the system, switch the iC5700 on prior to powering on the target system; when powering down the system, power off the target microcontroller before powering off the iC5700.
Use only original iSYSTEM accessories for powering and connecting with the iC5700.
Consult with iSYSTEM before attempting to use any other accessory.

IASAM40ARMPIN20

In conjunction with this Samtec40 to 20-pin JTAG ARM adapter delivered in the package, the Active Probe can be also connected to target development boards featuring a 20-pin, 2.54 mm pitch, ARM JTAG debug connector.
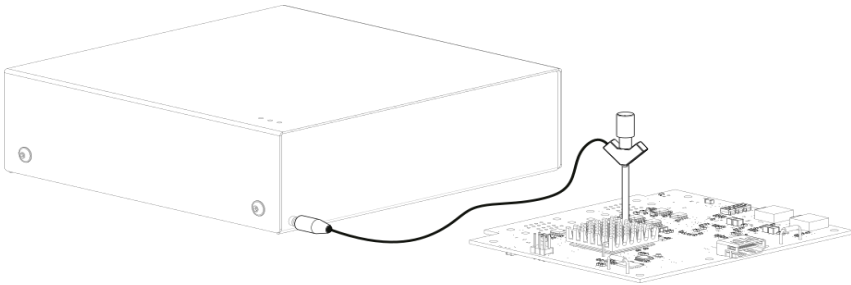

Samtec40 to 20-pin JTAG ARM Adapter

The adapter has the following pinout:

Signal Direction	Signal Description	Signal	Pin	Pin	Signal	Signal description	Signal Direction
IN	Reference voltage	VTref	1	2	VTref	Reference voltage	IN
OUT	JTAG	nTRST	3	4	GND	Ground	
OUT	JTAG	TDI	5	6	GND	Ground	
IN/OUT	JTAG / SWD	TMS/SWDIO	7	8	GND	Ground	
OUT	JTAG / SWD	TCK/SWCLK	9	10	GND	Ground	
IN	Return TCK	RTCK	11	12	GND	Ground	
IN	JTAG	TDO	13	14	GND	Ground	
I/O	RESET	nSRST	15	16	GND	Ground	
OUT	Debug Request	DBGRQ	17	18	GND	Ground	
IN	Debug Acknowledge	DBACK	19	20	GND	Ground	

Active Probe and the iC5700 Connecting Guidelines

- Always start by connecting the iC5700 GND and the target GND using grounding wire delivered along the iC5700.

> ⚠️ If the grounding wire is not connected, the ground potential difference between the BlueBox hardware and the target can exceed well over 1000V even before any of the devices are powered up. This voltage difference is discharged over the BlueBox hardware and the target system, leading to the possible destruction of electronic components within the BlueBox hardware, the target or both.

- Connect the iC5700 Power Supply to the mains outlet and the iC5700.
- Connect the iC5700 to the PC via the supplied Ethernet or USB 3.0 cable
- Connect the Active Probe to the iC5700 FNET Port through the supplied FNET Micro Cable.
  If a cable longer than 1.0m is required (for example when debugging an ECU in a vehicle or a confined space), optional 3.0m and 5.0m FNET Micro cables are available from iSYSTEM.
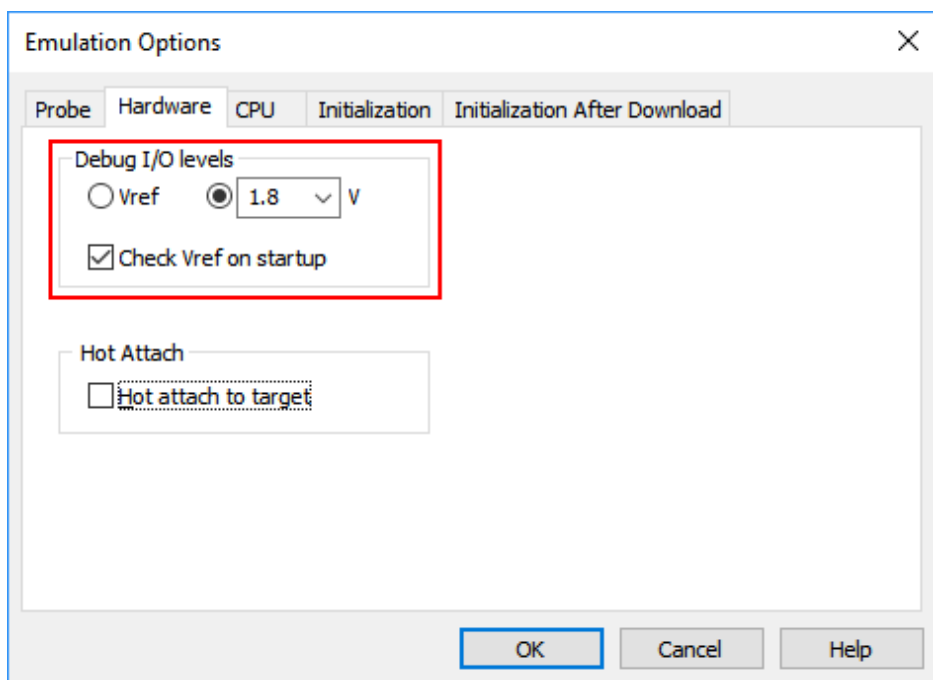
> ⚠️ Although it looks similar to the HDMI interface, the FNET Port is **not compatible** with HDMI or any HDMI accessories.
>
> Connecting iSYSTEM hardware to HDMI accessories will damage the hardware and will render the iSYSTEM hardware warranty void.

- Connect the 40-pin HSSTP Active Probe connector to the target. If the target provides a 20-pin, 2.54mm pitch, ARM JTAG debug connector, use the IASAM40ARMPIN20 adapter in between.

Setting Debug Interface Voltage Levels

The voltage levels for the debug interface are configured within winIDEA via the menu option "Hardware -> Emulation Options", selecting the "Hardware" tab in the "Emulations Options" dialog window, as shown below.

The logic for the debug interface can be powered directly from the Active Probe (recommended setting) by selecting the right radio-button (as shown above) and choosing an appropriate voltage from the drop-down list.
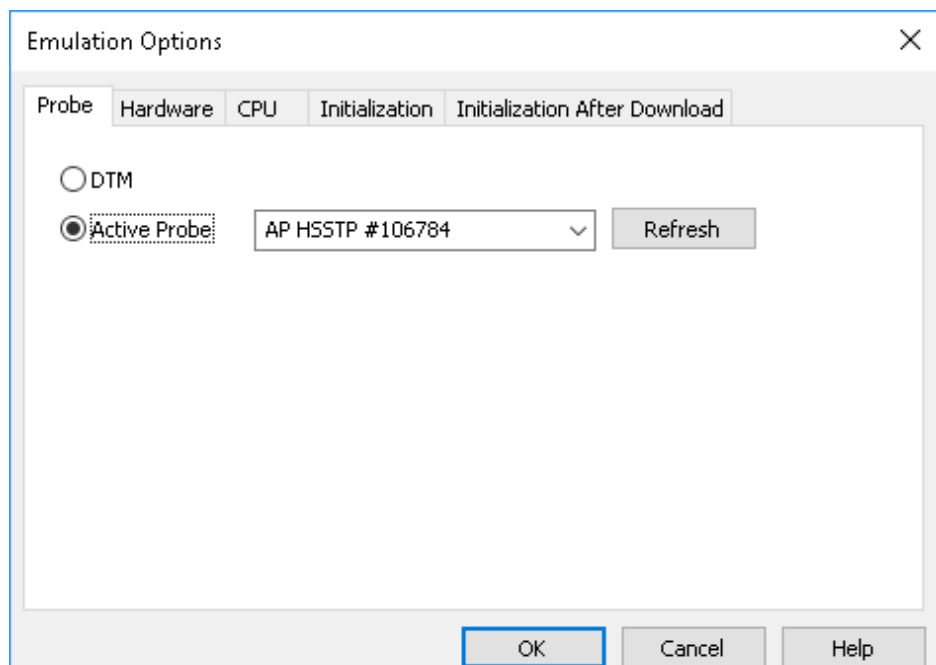
Alternatively, the voltage supplied by the target microcontroller development board via pin 2 of the debug connector can be used. In this case, the 'Vref' option should be selected.
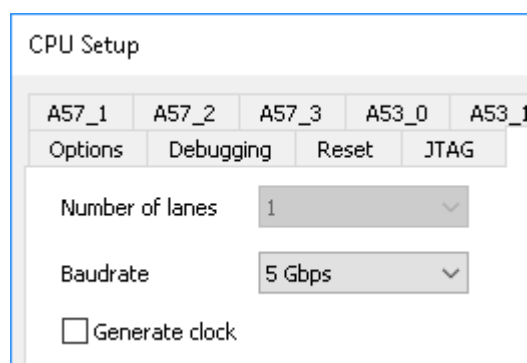
Further Active Probe Settings

This section describes winIDEA settings distinct to the HSSTP Active Probe.

The iC5700 is capable of connecting to ARM target devices through its installed DTM module and an appropriate JTAG cable adapter. This interface supports both the JTAG and SWD debug interfaces.

In order to switch from the default DTM interface to the Active Probe, the "Emulation Options" dialog needs to be opened from the menu option "Hardware -> Emulation Options". By switching to the tab "Probe", the 'Active Probe' option can be selected.

The detailed configuration settings for the ARM HSSTP Active Probe can be selected via the menu option »Hardware -> CPU Options...«, selecting the "Aurora" tab in the "CPU Setup" dialog window, as shown below.

Accessories

IOM6 product line

Expand the iC5700 operation with modules from the IOM6 product line to enable parallel debugging and testing of multiple different target systems, monitoring of network traffic (e.g. LIN/CAN/CAN FD) and manipulation of the analog and digital signals.

Ordering Code	Description
IC57030	IOM6-HUB with three extra FNET ports
IC57040	CAN/LIN Add-On Module
IC57041	Analog/Digital Input/Output Add-On Module
IC57163	Infineon DAP Active Probe
IC57125	ARM HSSTP Active Probe

ARM HSSTP Active Probe Accessories

Ordering Code	Description
BB-FNETMICRO-100	1.0m FNET Micro Cable (Active Probe)
BB-FNETMICRO-300	3.0m FNET Micro Cable (Active Probe)
BB-FNETMICRO-500	5.0m FNET Micro Cable (Active Probe)
IATETSICA20I2P	TET SICA20I2P Adapter

Refer to the iC5700 User Manual for all iC5700 accessories.

Find more information on www.isystem.com or contact sales@isystem.com

User notes

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Technical support

To reach for technical support please visit www.isystem.com/support.