

Infineon DAP Active Probe

V1.9

User Manual



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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.

Infineon DAP Active Probe enables the debugging, tracing and testing of Infineon's AURIX™ microcontroller family. It supports the DAP and DAPE debug interface operating at their maximum frequency. Its small and compact hardware size allows for connecting to a target microcontroller in a confined space as far as 5m away.

Complementing our 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 our 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 tasks 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 the Eclipse environment through a plug-in. 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 Infineon DAP Active Probe kit (ordering code IC57163) is delivered with the following components:

Infineon DAP Active Probe	Set of two 10-pin 1.27mm 10 cm long ribbon cables	1m FNET Micro Cable
Ordering code: IC57163	Ordering code: IA10PIN10PIN127-AP	Ordering code: BB-FNETMICRO-100



User manual

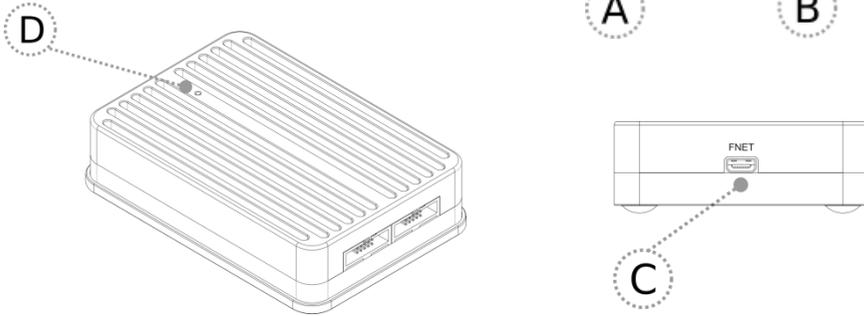


Specifications

GENERAL	
Supply voltage	9.0V DC via 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	3.3V (max. 3.6V)
Power consumption	Max. 1.5W (dependent on operation mode)
PROTECTION	
Debug signals	33Ω series termination/protection resistors, ESD protection devices
DAP1-3 and DAPE1-3	10kΩ pull-down
DAP_RESET	1kΩ pull-up, 33Ω series termination/protection resistor
VREF	1kΩ input impedance

Operation

Device overview



Device description

The front side features:

- **A** – 10-pin DAP connector, with the following pinout:

Signal Direction	Signal Description	Signal	Pin	Pin	Signal	Signal description	Signal Direction
IN	Reference Voltage	VREF	1	2	DAP1	DAP data pin	IN/OUT
	Ground	GND	3	4	DAP0	DAP clock	OUT
	Ground	GND	5	6	DAP2	Optional 2nd Data Pin	IN/OUT
	Not Connected	NC	7	8	DAP3	Optional 3rd Data Pin	IN/OUT
	Ground	GND	9	10	RESET	Target Reset Pin	OUT

Signal direction definition:

OUT - output from the Active Probe to the target microcontroller

IN - input to the Active Probe from the target microcontroller

- **B** – 10-pin DAPE connector, with the following pinout:

Signal Direction	Signal Description	Signal	Pin	Pin	Signal	Signal description	Signal Direction
IN	Reference Voltage	VREF	1	2	DAP1	DAP data pin	IN/OUT
	Ground	GND	3	4	DAP0	DAP clock	OUT
	Ground	GND	5	6	DAP2	Optional 2nd Data Pin	IN/OUT
	Not Connected	NC	7	8	DAP3	Optional 3rd Data Pin	IN/OUT
	Ground	GND	9	10	NC	Not Connected	

The rear side of the Active Probe features:

- **C** – FNET Micro connector, that connects the Active Probe to the iC5700 BlueBox the FNET Micro cable delivered with the Active Probe.

The top side of the Active Probe features:

- **D** – The indicator light provides the status of the Active Probe as follows:
 - Permanently green - Powered On
 - Blinking green – Establishing connection with the BlueBox
 - Permanently blue – Ready for use



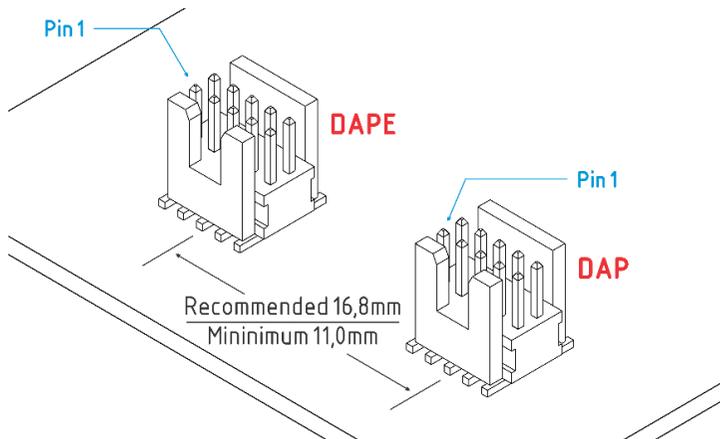
When powering on the system, switch the iC5700 on prior to powering on the target system; when powering down the system, power off the target microcontroller before powering off the iC5700. Use only original iSYSTEM accessories for powering and connecting with the iC5700. Consult with iSYSTEM before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

Recommended Target Debug Connectors and Position

The target debug connector is a 10-pin, 1.27mm, double-row connector, typically a Samtec FTSH-105-01-L-DV or Samtec FTSH-105-01-L-DV-K (with keyed shroud). It is recommended to use the target debug connector(s) with the keyed shroud option since incorrect connection can cause damage to the hardware.

When developing your own hardware to connect the Active Probe to the target through either a single or dual debug interface, pin 1 of the connector should be located toward the PCB's edge in order to prevent the need to twist or fold the debug ribbon cable(s) (see the picture below).

When using both the DAP and the DAPE debug interfaces, the DAPE connector should be placed to the left of the DAP connector when looking from the edge of the PCB. The connectors must be at least 11.0 mm apart, although a distance of 16.8 mm is recommended. The goal should be to link the Active Probe to the target hardware via non-twisted and, when DAPE is used, parallel ribbon cables.



ECU14 DAP 10-pin 1.27mm Adapter



If your target features ECU14 DAP 10-pin 1.27mm connector (defined by Bosch) instead of 10-pin 1.27 mm Infineon DAP connector, use iSYSTEM ECU14 DAP 10-pin 1.27mm Adapter, which acts as a pinout converter. The adapter must be ordered separately under the IADAP10ECU14 ordering code.

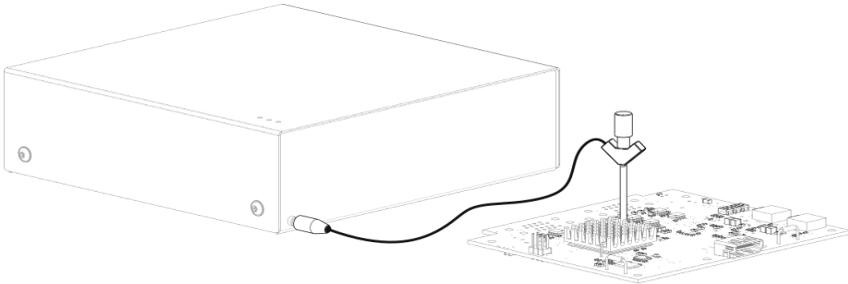


Adapter pinout on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	1	2	DAPO	DAP clock	O
	Not Connected	NC	3	4	DAP2	Bidirectional data	I/O
I/O	Bidirectional data	DAP1	5	6	DAP3/DAPEN	Bidirectional data	I/O
	Not Connected	NC	7	8	Vref	Reference voltage	I
	Not Connected	NC	9	10	~RESET	Power On Reset	O

Active Probe and the iC5700 Connecting Guidelines

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

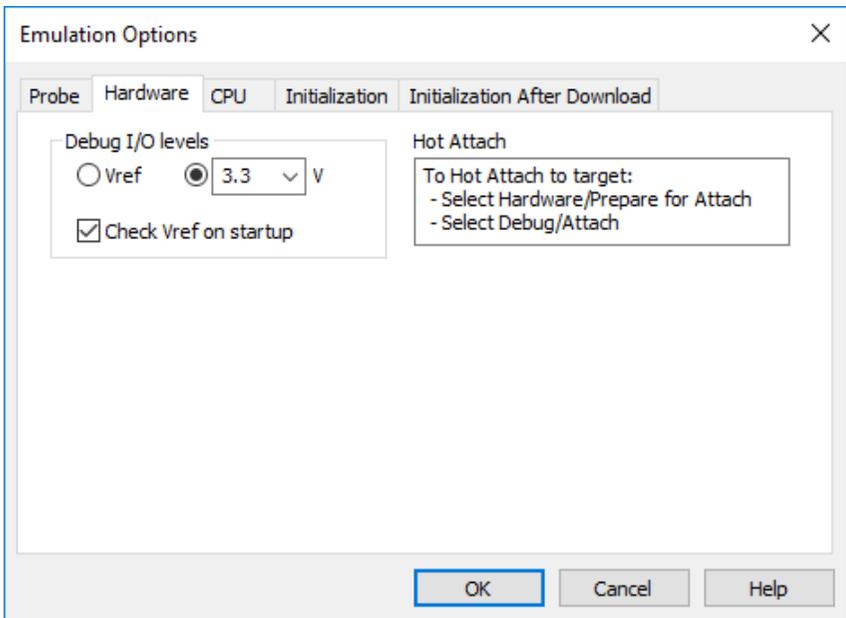
- The Active Probe can be connected to the target in two configurations.

AURIX™ microcontrollers that have only one DAP interface, through which the on-chip debug module and the MCDS trace module can be accessed, should be connected to the Active Probe's DAP connector and the target microcontroller's DAP connector.

Newer AURIX™ devices can have up to two DAP ports; one named DAP, through which on-chip debug module and the MCDS trace module can be accessed, and a second, named DAPE, which provides access only to the on-chip MCDS trace module. The DAPE port has been introduced to increase the bandwidth of the trace channel toward the debugger. In such cases, the supplied 10-cm ribbon cables should be connected to the appropriately marked interface on the Active Probe.

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.



When the VREF signal (pin 1) is 3.3V or less, the debug interface logic should be supplied by the Active Probe (right radio-button selected as shown above), with an appropriate voltage selected from the drop-down list options.

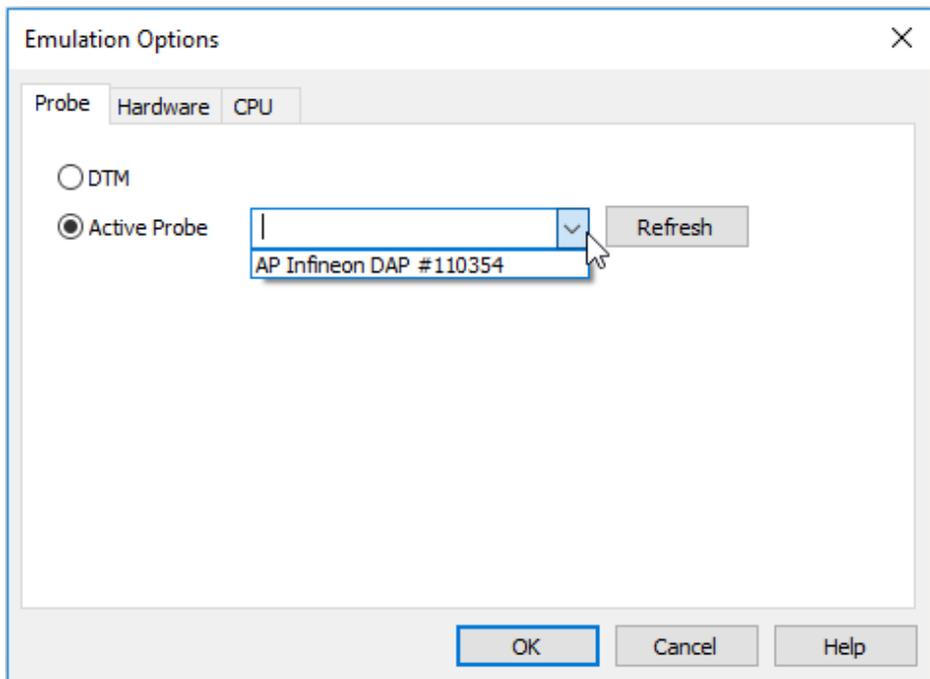
When the microcontroller target supplies 5.0V to the VREF signal (pin 1), use the radio-button selection to choose the 'Vref' option instead.

Further Active Probe Settings

This section describes winIDEA settings distinct to the Infineon DAP Active Probe.

The iC5700 is capable of connecting to AURIX™ target devices through:

- its installed DTM module and an appropriate DAP cable adapter (e.g. IC50163-2).
This debug system has limited maximum DAP frequency and the DAPE debug port is not supported. Alternatively, JTAG debug interface support is also available through a dedicated JTAG cable adapter (e.g. IC50160).
- or the Infineon DAP Active Probe.



In order to switch from the default DTM interface use to the Active Probe use, 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 Infineon DAP Active Probe supports both DAP interface operation or symultaneous DAP and DAPE interface operation at maximum DAP/DAPE frequency. DAP (2-pin DAP with single data line) or DAP2 (3-pin DAP with two data lines) are the two operational modes that can be selected from the debug channel mode drop-down lists. The

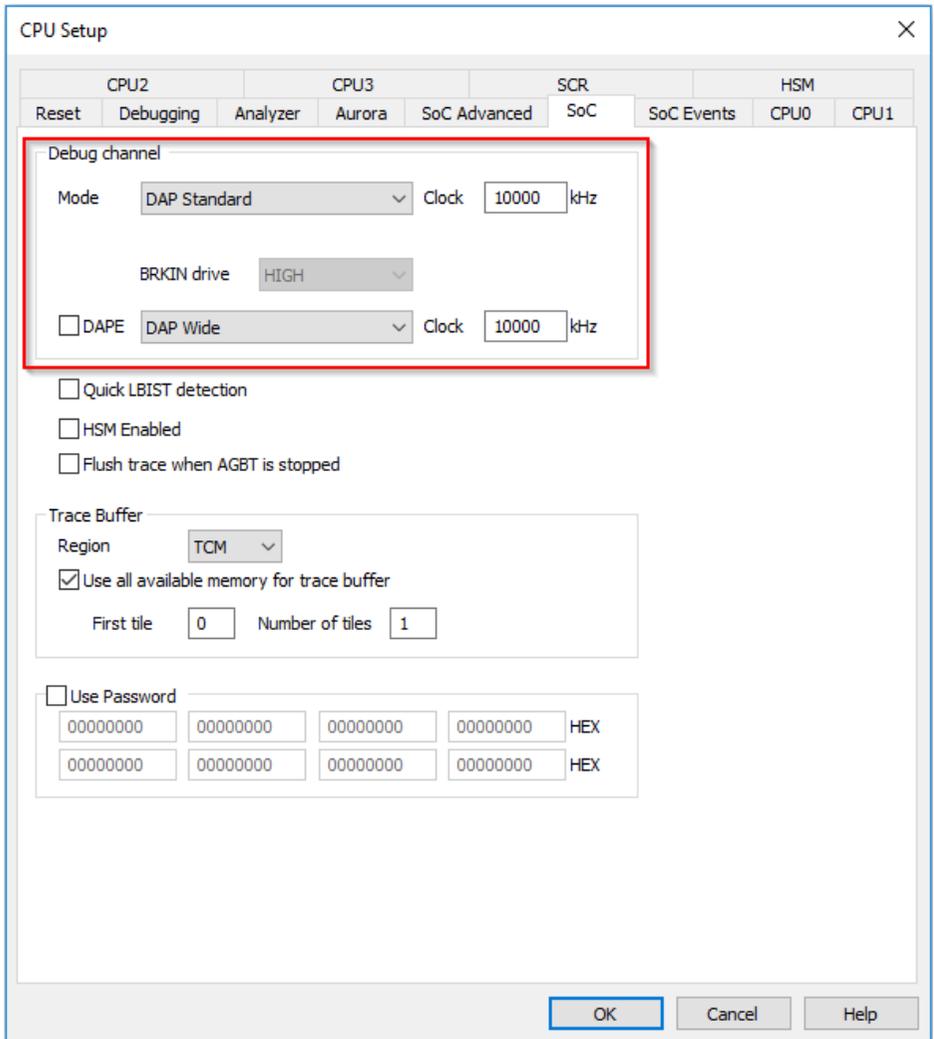
debug channel mode is configured as “DAP” by default.

The DAP frequency set must be configured in the field to the right of the drop-down lists, with the frequency being entered in kHz.

When the DAPE interface is not in use, ensure the 'DAPE' checkbox remains unchecked.

For simultaneous DAP and DAPE operation, the 'DAPE' checkbox should be checked. The debug channel mode should be set appropriately from the drop-down list options and, as before, valid clock frequencies for both interfaces should be entered in kHz.

The configurable options discussed here are highlighted in the screenshot below.



Other, more general Tricore related settings are described within [winIDEA on-line help](#).

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 analog and digital signals.

Ordering Code	Description
IC57031	IOM6-HUB with three extra FNET ports & FBridge
IC57040	CAN/LIN Add-On Module
IC57041	Analog/Digital Input/Output Add-On Module
IC57125	ARM HSSTP Active Probe
IC57163	Infineon DAP Active Probe
IC57164	Infineon AGBT Active probe

Infineon DAP Active Probe Accessories

Ordering Code	Description
IA10PIN10PIN127-AP	Set of two 10-pin, 1.27mm, 10cm long DAP interface ribbon cables
IADAP10ECU14	ECU14 DAP 10-pin 1.27mm Adapter
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)

Please refer to the iC5700 User Manual for all current iC5700 accessories.



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

Technical support

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

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