

# MPC5x/SPC5x Aurora Active Probe v1.0

## User Manual



Enabling Safer Embedded Systems

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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.

**MPC5x/SPC5x Aurora Active Probe** enables the debugging, tracing and testing of NXP Qorivva (MPC5xxx) and ST SPC5 microcontroller families. Besides the JTAG debug interface it supports Aurora trace interface operating at its maximum frequency. 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 Aurora lanes, running at a maximum bitrate of 5Gbps.

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 MPC5x/SPC5x Aurora Active Probe (ordering code IC57150) is delivered with the following components:

Infinion AGBT Active Probe	1 m FNET Cable	User manual
Ordering code: IC57150	Ordering code: BB-FNET-100	

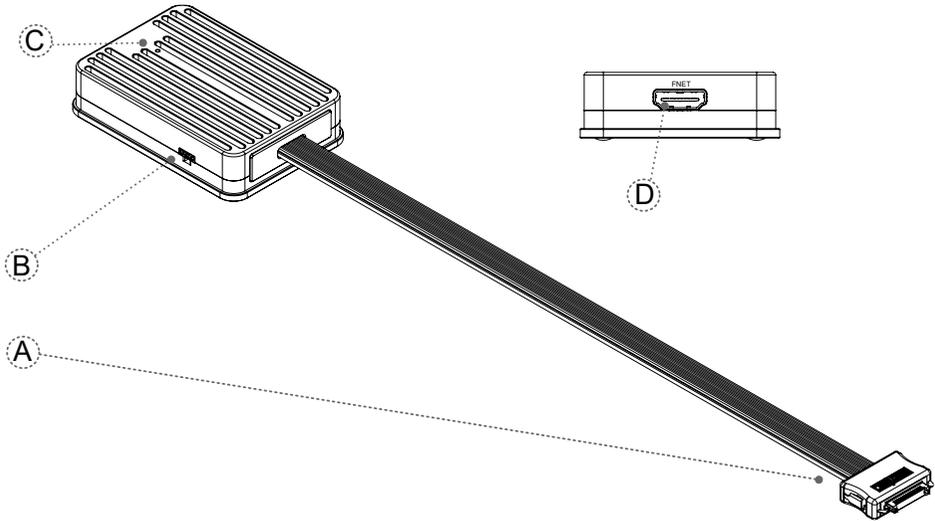


# Specifications

<b>GENERAL</b>	
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
<b>MECHANICAL</b>	
Size	80 x 55 x 18 mm
Weight	0.125 kg
<b>OPERATION</b>	
Communication interface to BlueBox	iSYSTEM proprietary FNET
Debug signal valid input voltage range	3.3V (max. 3.6V)
Power consumption	Max. 3W (dependent on operation mode)
Number of supported AGBT lanes	Up to 4
Maximum AGBT bitrate	5Gbps
AGBT clock source options	Active Probe
<b>PROTECTION</b>	
Debug signals	33Ω series termination/protection resistors, ESD protection devices
VREF	1kΩ input impedance

# Operation

## Device overview



## Device description

- A – 34-pin ERF8 MPC5xxx/SPC5 target pinout

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	AGBT TX_P0	1	2	VREF	I
I	AGBT TX_N0	3	4	TCK	O
Ground	GND	5	6	TMS	O
	AGBT TX_P1	7	8	TDI	O
	AGBT TX_N1	9	10	TDO	I
Ground	GND	11	12	~JCOMP	O
	AGBT TX_P2	13	14	Not Connected	
	AGBT TX_N2	15	16	~EVTIO	O (not used)
Ground	GND	17	18	~EVT00	I
	AGBT TX_P3	19	20	~PORST	O
	AGBT TX_N3	21	22	ESR0	IO
Ground	GND	23	24	GND	Ground
	Not Connected	25	26	AGBT CLK_P	O
	Not Connected	27	28	AGBT CLK_N	O
Ground	GND	29	30	GND	Ground
	Not Connected	31	32	Connected	
	Not Connected	33	34	Connected	

34-pin ERF8 MPC5x/SPC5x target pinout

Blue colored signals are Aurora trace signals.

~JCOMP is an optional pin. Some microcontrollers don't have this pin. Internally, this is actually the JTAG TRST which resets the JTAG TAP state machine. Because the JTAG TAP state machine can be reset also by the TMS and the TCK, this pin is optional also for the debugger. If the microcontroller has the JCOMP pin but it is not connected to the target debug connector, it must be set to the non-active state in the target via a pull-up resistor. If not, then the JTAG TAP state machine remains in reset and debugging is not possible.

Signal direction definition:

O - output from the Active Probe to the target microcontroller

I - input to the Active Probe from the target microcontroller

- **B** – Trigger connector – provision for future functional extensions. No functionality at the moment.
- **C** – The indicator light provides the status of the Active Probe as follows:
  - Permanently green - Powered On and ready to use
  - Blinking green – Establishing connection with the BlueBox
  - Blinking blue – Reprogramming SPLASH
  - Permanently magenta – Golden image loaded and ready to use
- **D** – FNET connector, that connects the Active Probe to the iC5700 BlueBox. The FNET cable is delivered with the Active Probe.



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.

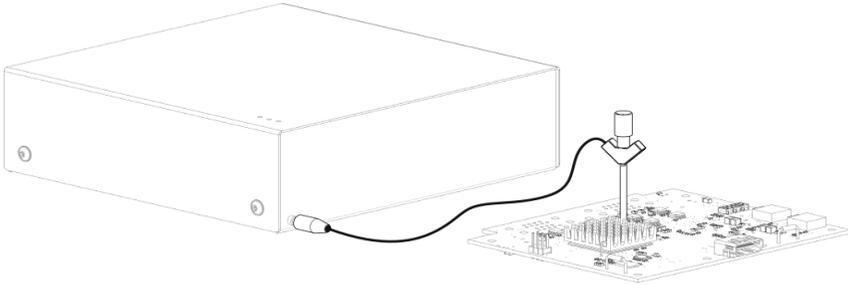
Use only original iSYSTEM accessories for powering and connecting with the iC5700. Consult with iSYSTEM before attempting to use any other accessory.

### ***Target connector***

The target should feature a matching part, for example, Samtec part number: ASP-137973-01.

## 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 the USB 3.0 cable.
- Connect the Active Probe to the iC5700 FNET Port through the supplied FNET Cable. If a cable longer than 1.0m is required (for example when debugging an ECU in a vehicle or a confined space), optional 3m and 5m FNET cables are available from iSYSTEM.



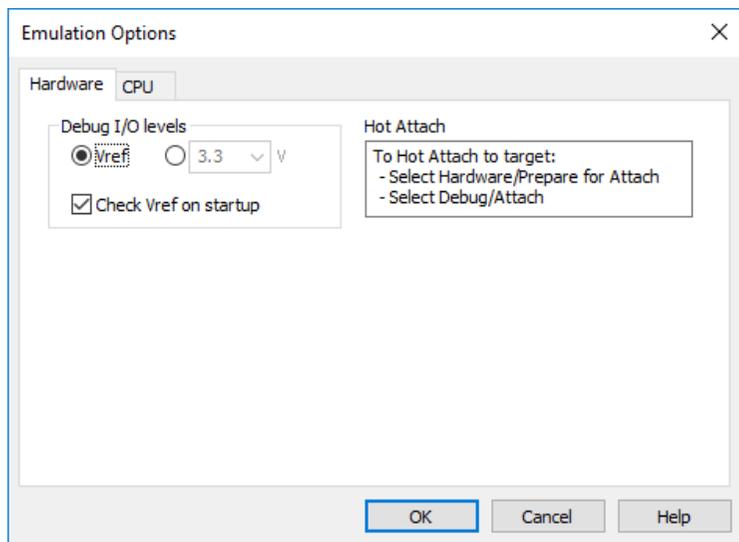
Although it looks similar to the HDMI interface, the FNET Port is **not compatible** with HDMI or any HDMI accessories.

Connecting iSYSTEM hardware to HDMI accessories will damage the hardware and will render the iSYSTEM hardware warranty void.

- Connect the Active Probe 34-pin High-Speed Aurora cable to the target.

## Setting Debug Interface Voltage Levels

The voltage levels for the debug interface are configured within winIDEA via the menu option Hardware menu/Emulation Options/Hardware as shown below.



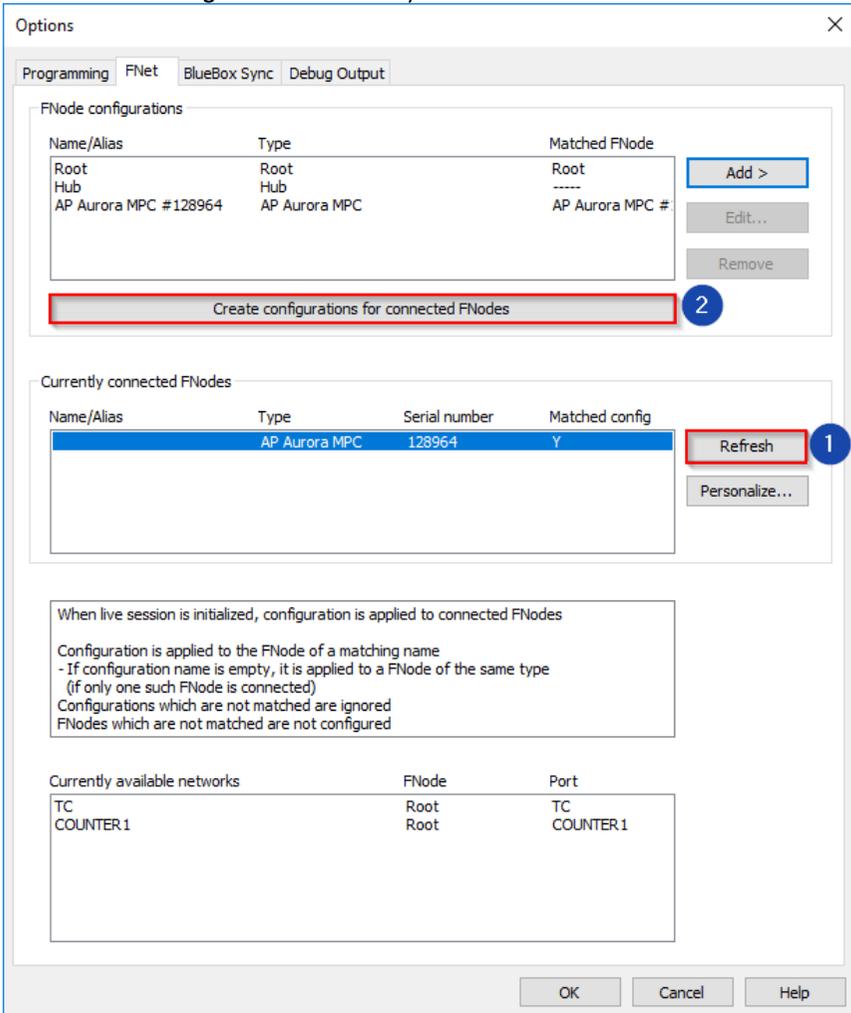
# Further Active Probe Settings

This section describes winIDEA settings distinct to the MPC5x/SPC5x Active Probe.

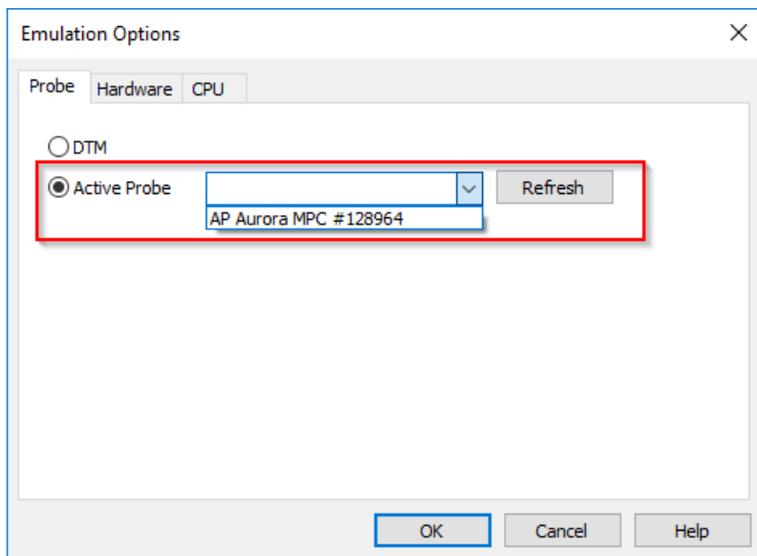
Alternatively, the iC5700 is capable of connecting to MPC5xxx and SPC5 target devices through its installed DTM module and an appropriate cable adapter (IC50150 or IC50152).

In order to switch from the default DTM interface use to the Active Probe use, open **Hardware** menu/**Options/FNet** tab:

1. In Currently connected FNodes click **Refresh**, select AP Aurora MPC (with Serial number) when displayed.
2. Click **Create configurations for connected FNodes**, chosen AP Aurora MPC is displayed in **FNode configurations**. Confirm by selection OK.



In the **Hardware** menu/**Emulation Options** dialog/**Probe** tab the **Active Probe** option must be selected. Click Refresh and select the displayed AP Aurora MPC.



Other, more general PowerPC 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 and an FBridge port
IC57040	CAN/LIN Add-On Module
IC57041	Analog/Digital Input/Output Add-On Module
IC57125	ARM HSSTP Active Probe
IC57163	Infineon DAP/DAPE Active Probe
IC57164	Infineon AGBT Active Probe

## MPC5x/SPC5x Active Probe Accessories

Ordering Code	Description
BB-FNET-100	1.0m FNET Cable
BB-FNET-300	3.0m FNET Cable
BB-FNET-500	5.0m FNET Cable

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



Find more information on [www.isystem.com](http://www.isystem.com) or contact [sales@isystem.com](mailto:sales@isystem.com)

# Technical support

To reach for technical support please visit [www.isystem.com/support](http://www.isystem.com/support).

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