User Manual

![iSYSTEM logo]

i SYSTEM

Enabling Safer Embedded Systems

Contents

Introduction

IOM6 CAN/LIN Accessory is part of the IOM6 product line and extends the functionality of the iC5700 BlueBox, enabling the monitoring of CAN, CAN-FD and LIN interfaces synchronous to program execution information. This allows network activity and code execution to be examined side-by-side within our development software winIDEA.

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 IOM6 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 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.

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 and its accessories 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 is used within the manual to highlight further safety notices.

Package content

The standard IOM6 CAN/LIN Accessory order is delivered with the following components:

CAN/LIN Add-On module	1 m FNET Cable	Grounding wire
Ordering code: IC570040	Ordering code: BB-FNET-100	Ordering code: BB-WIRE

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Specifications

GENERAL	
Operating temperature	10°C to 40°C
Storage temperature	-10°C to 60°C
Humidity	5% to 80% RH
MECHANICAL	
Size (L x W x H)	100 x 125 x 55 mm
Weight	ca. 440 g (without cables)
ELECTRICAL	
Supply voltage	Powered through the FNET
CAN Channels	2 x Microchip MCP2562FD (galvanic isolation)
LIN Channels	2 x NXP TJA1027 (galvanic isolation)

Operation

Device overview

Device description

The front face of the IOM6-CAN/LIN features:

- **A** – The indicator light provide the status of the iC57040 hardware as follows:

  At power on the LED will blink 5 times with a frequency of 1Hz, then it will stay ON continuously. If LED remains blinking or it doesn't blink on after power ON, please contact support.

- **B** – The grounding socket (marked GND). It represents the GND potential of the BlueBox On-Chip Analyser system and its usage is optional. By default no connection to this socket is required.

  The grounding socket is suitable for a 2mm Multi Contact Plug (also known as a Banana Plug).

  Note that the grounding connection between the BlueBox system and the target microcontroller development baord must be established through the iC5700 grounding socket. Refer to the iC5700 user manual for more details on this grounding.

- **C** –LIN1 and LIN2 connector

  The two connectors allow up to two target LIN bus networks to be monitored**.**

Pin	Signal
1	NC
2	NC
3	**LIN_GND**
4	NC
5	SHIELD
6	NC
7	**LIN**
8	NC
9	**LIN_VBAT***
SHIELD	GND

  * The target must always provide power to the LIN VBAT connection.

- **D** –CAN1 and CAN2 connectors

  The two connectors allow up to two CAN/CAN-FD bus networks to be monitored**.**

Pin	Signal
1	NC
2	**CAN_L**
3	**CAN_GND**
4	NC
5	SHIELD
6	NC
7	**CAN_H**
8	NC
9	NC
SHIELD	GND

All CAN and LIN signals are isolated from the GND

The rear face of the IOM6-CAN/LIN features the remaining connector:

- **E** – The FNET Port.

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

Connecting iSYSTEM hardware to the HDMI devices will damage the hardware and will render the iSYSTEM hardware warranty void.
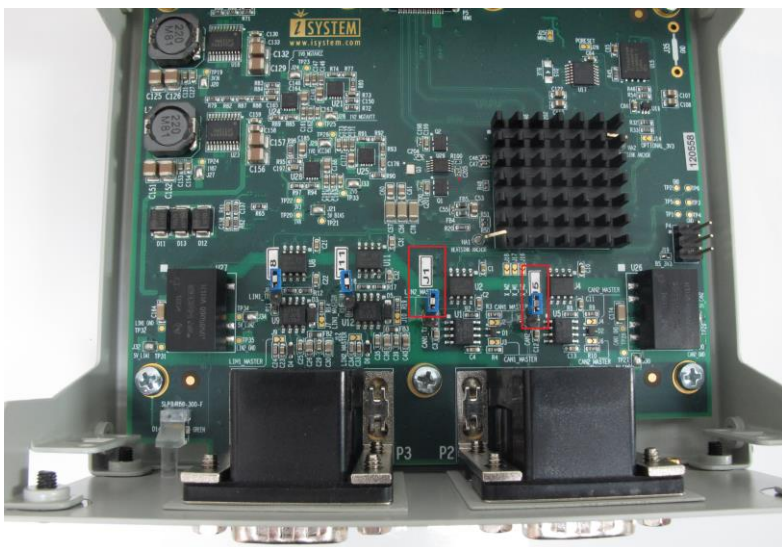
Connecting the IOM6-CAN/LIN to the IC5700 Base Unit

Make sure that the iC5700 BlueBox is powered off. Connect the iC5700 FNET port to the FNET port of the IOM6 CAN/LIN Accessory using the supplied, certified, iSYSTEM FNET cable.

CAN message injection

CAN message injection is physically disabled by default. To enable injection remove the cover on your powered-down AOM CAN/LIN device and place jumpers on J1 for CAN1 and J5 for CAN2.
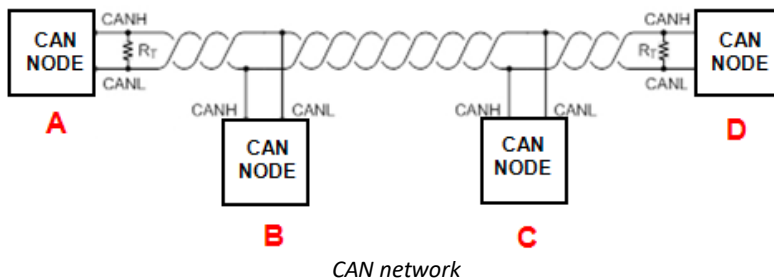
Accessories

The following accessories are available to connect the IOM6 CAN/LIN Accessory to the target CAN, CAN-FD or LIN interface(s).

Ordering Code	Description
IC57040-CAN-DB9	1m CAN cable DB9
IC57040-CAN-JACK	CAN cable banana jacks
IC57040-CAN-PIN	CAN cable pin wires
IC57040-CAN-T	CAN BUS T adapter
IC57040-LIN-JACK	LIN cable banana jacks
IC57040-LIN-PIN	LIN cable pin wires
BB-FNET-100	1 m FNET Cable (for use with AOM accessories)
BB-FNET-300	3 m FNET Cable (for use with AOM accessories)
BB-FNET-500	5 m FNET Cable (for use with AOM accessories)

The topology of a CAN network is shown in the diagram below. The ends of the network require termination using a 120 Ohm impedance, connected between the CAN_H and CAN_L signals.

iSYSTEM accessories provide the termination impedance via a switch on the DB9 connector. In the default switch position the termination impedance is not connected.

CAN network

If the IOM6 CAN/LIN Accessory is connected at one of the ends of the network (node A or D in the diagram above) the 120 Ohm termination impedance can be enabled using the switch on the iSYSTEM connector accessories. If connected to the CAN bus at the position of nodes B and C, no termination is required.

● CAN cable DB9

Ordering code	IC57040-CAN-DB9

The IC57040-CAN-DB9 is used to connect the IOM6-CAN/LIN to an existing CAN network through the DB9 connector. 120 Ohm termination is selected with the switch located on one of the DB9 connectors. The cable length is 1m.

Note: The DB9 connector with the termination switch must be connected to the IOM6 CAN/LIN Accessory (CAN1 or CAN2).

The pinout of the target side DB9 connector is as follows:

DB9 pin	Signal
1	NC
2	CAN_L
3	CAN_GND
4	NC
5	SHIELD
6	NC
7	CAN_H
8	NC
9	NC
SHIELD	GND

● CAN cable banana jacks
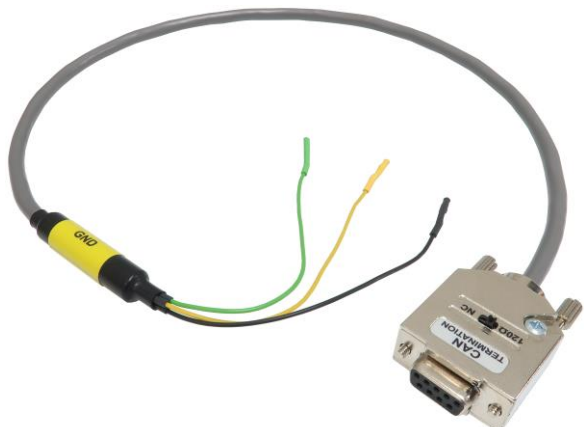
Ordering code	IC57040-CAN-JACK

The IC57040-CAN-DB9 is used to connect the IOM6 CAN/LIN Accessory to an existing CAN network through the banana jacks. The 120 Ohm termination impedance is selected using the switch located on the cable DB9 connector. Cable length is 0.65m.

Note: The DB9 connector with the termination switch must be always connected to the IOM6 CAN/LIN Accessory (CAN1 or CAN2).

Cable and pin color	Signal
BLACK	CAN_GND
YELLOW	CAN_H
GREEN	CAN_L

● CAN cable pin wires

Ordering code	IC57040-CAN-PIN

The IC57040-CAN-DB9 is used to connect the IOM6 CAN/LIN Accessory to an existing CAN network to the pins typically found on a 2.54mm pitch header (0.63mm square pins). The 120 Ohm termination impedance is selected using the switch located on the cable DB9 connector. Cable length is 0.65m.

Note: The DB9 connector with the termination switch must be always connected to the IOM6-CAN/LIN Accessory (CAN1 or CAN2).
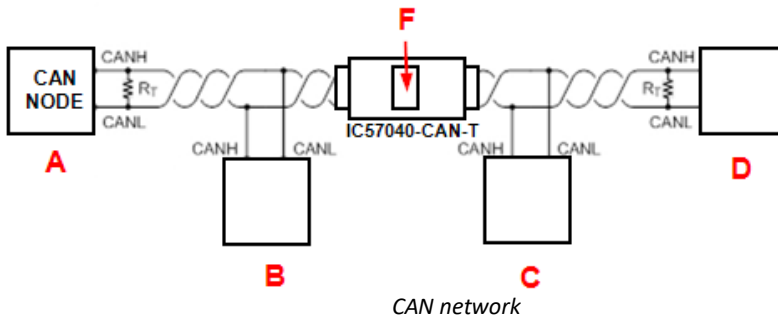
Cable and pin color	Signal
BLACK	GND
YELLOW	CAN_H
GREEN	CAN_L

● CAN BUS T adapter

Ordering code	IC57040-CAN-T

The IC57040-CAN-T is used to connect the IOM6 CAN/LIN Accessory to a CAN bus by splitting the existing bus connection – position F on the diagram below. The existing CAN bus connection is split using the IC57040-CAN-T allowing the IOM6 CAN/LIN Accessory to connect to it using an IC57040-CAN-DB9 cable (no termination required).

CAN network

● LIN cable banana jacks
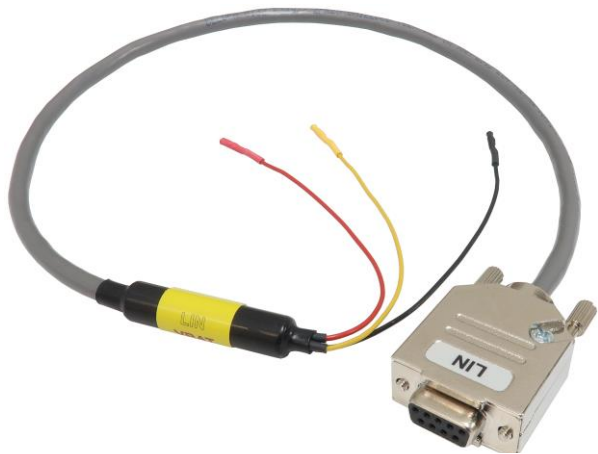
Ordering code	IC57040-LIN-JACK

The IC57040-LIN-JACK cable is used to connect the IOM6 CAN/LIN Accessory to an existing LIN network via banana jack connectors. The cable length is 0.65m. The cable connects to the LIN1 or LIN2 connector.

Cable and pin color	Signal
RED	VBAT
BLACK	GND
YELLOW	LIN

● LIN cable pin wires

Ordering code	IC57040-LIN-PIN

The IC57040-LIN-PIN cable is used to connect the IOM6-CAN/LIN to an existing LIN network to the pins typically found on a 2.54mm pitch header (0.63mm square pins). The cable length is 0.65m. The cable connects to the LIN1 or LIN2.

Cable and pin color	Signal
RED	VBAT
BLACK	GND
YELLOW	LIN

winIDEA Configuration and Usage

IOM6 CAN/LIN Accessory winIDEA configuration and usage is described in the winIDEA on-line help. We recommend starting with the Network and AUX profiling chapter to get familiar with the configuration options and usage.

More information can be found on our website at www.isystem.com or simply contact our sales team via sales@isystem.com

Technical support

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