

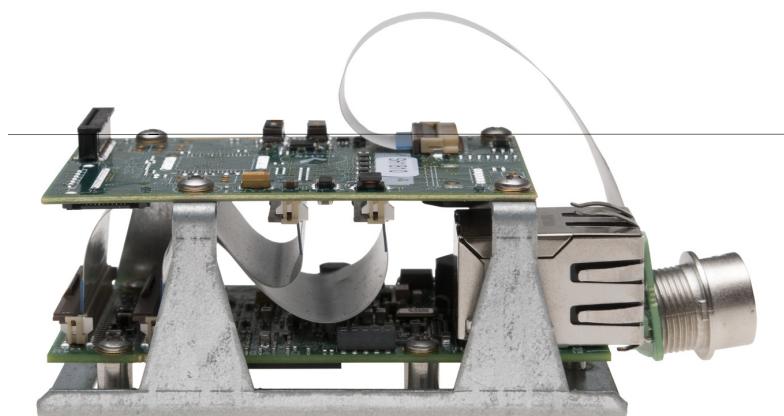


# iPORT

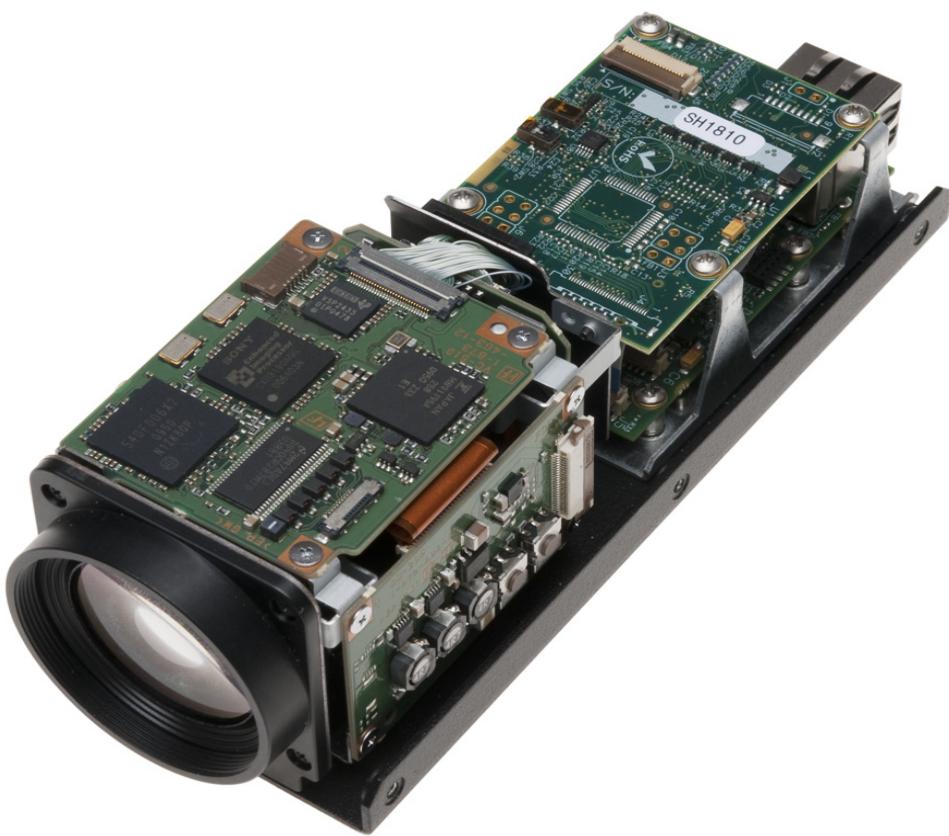
## SB-Pro IP Engine

For Sony FCB-H11 Block Cameras

User Guide







...High-Performance Imaging Data and Video Over Ethernet

Firmware 1.0.0 and later

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# About the iPORT SB-Pro IP Engine

## Introduction

### About the Sony Block Camera FCB-H11

The FCB-H11 is an industrial high definition camera from Sony® with Day and Night functionality that enables the camera to capture high-quality color images during the day and clear, black-and-white images at night. In addition, the Sony FCB-H11 camera achieves a minimum illumination of 1.0 lux by dynamically removing the infrared cut filter and allows the spectral response to extend into the near infrared range. The FCB-H11 incorporates an HD CMOS image sensor with close to two million effective pixels, and provides a 16 x 9 aspect ratio. This camera includes multi-format video outputs for high-definition applications, and both 1080i and 720p signal formats are supported. Consult the Sony website at [www.sony.com](http://www.sony.com) for more information about the FCB-H11 block camera.

### The iPORT SB-Pro IP Engine

The iPORT SB-Pro IP engine transforms a Sony FCB-H11 block camera into a GigE Vision® and GenICam™ compliant camera. The iPORT SB-Pro IP engine transmits high-definition video with low, predictable latency and has applications in military avionics, medical imaging, and industrial inspection systems. Future variants of the iPORT SB-Pro IP engine will be compatible with other Sony HD and EX/E series cameras. However, this guide is restricted to the features and operation of the iPORT SB-Pro IP engine as it applies to the Sony FCB-H11 camera.

With the implementation of both GigE Vision and GenICam communication standards over a Gigabit Ethernet link, the iPORT SB-Pro IP engine expands interoperability between products. This operating flexibility lowers both system cost and complexity. The Gigabit Ethernet protocol provides cabling distances of up to 100m using standard CAT5e/6 cabling; you can incorporate off-the-shelf switches to provide even further distances. Decreased cable size and increased flexibility are realized when using Gigabit Ethernet for video transfer.

The iPORT SB-Pro IP engine is built with connectors for power, general purpose inputs and outputs (GPIO) and serial communication.

The iPORT SB-Pro is compatible with the Pleora Technologies vDisplay HDMI-Pro video receiver, and the eBUSTM SDK. The iPORT SB-Pro IP engine enables the Sony FCB-H11 block camera to become part of a complete networked video connectivity solution.

Key features of the Sony FCB-H11 camera features are mapped to the GenICam interface, and allow system integrators to easily differentiate their offerings; increase interoperability; and, introduce networking capabilities. The iPORT SB-Pro IP engine performs deserialization of LVDS 24-bit colour from the Sony FCB-H11 on the daughter card and sends this serialized data to the main board. The main board performs optional de-interlacing of all interlaced video.

## 8 About the iPORT SB-Pro IP Engine

iPORT SB-Pro IP engines translate the Sony VISCA™ protocol into an industry-standard GenICam™ interface over Ethernet. Video and control signals exist on a single cable to further reduce system cost and complexity. In addition, you can use GenICam compliant off-the-shelf software packages to control zoom, focus, and exposure settings of the camera, in addition to other features. The iPORT SB-Pro IP engine can transmit video up to 1080i resolution at 30 frames per second with low, consistent latency and are available as compact, low-power OEM board sets designed for use in a variety of housings.

### Model Variants

The iPORT SB-Pro IP engine is supplied in these variants and is equipped with these accessories as shown in the table below:

#### iPORT SB-Pro IP Engine Checklist

##### iPORT SB-Pro IP Engine Package Variants<sup>a</sup>

<b>iPORT SB-Pro H11 OEM Board Set</b>	<b>Quantity</b>
iPORT SB-Pro H11 Board Set	1
<b>iPORT SB-Pro H11 OEM Kit</b>	<b>Quantity</b>
iPORT SB-Pro H11 Board Set	1
Circular connector for power and GPIO connector	1
Circuit board for power and GPIO connector	1
Flat Flex cable, 20-pin	1
Fine pitch coax cable, 10-pin	1
Flat Flex cable, 24-pin	1
<b>iPORT SB-Pro H11 Evaluation Kit</b>	<b>Quantity</b>
iPORT SB-Pro H11 Board Set	1
Circular connector for power and GPIO connector, soldered onto circuit board	1
Flat Flex cable, 20-pin	1
Fine pitch coax cable, 10-pin	1
Flat Flex cable, 24-pin	1
Gigabit Ethernet NIC	1
CAT5 Ethernet cable	1
Power supply	1

a. Before assembly, ensure that all components are included in the selected package.

## Related Documents

The iPORT SB-Pro IP Engine User Guide is complemented by these related Pleora Technologies publications:

- GEVPlayer Quick Start Guide
- eBUS SDK Programmer's Guide
- Sony HD Color Camera Module, Technical Manual (FCB-H11)
- vDisplay HDMI-Pro User Guide
- vDisplay HDMI-Pro Hardware Guide

The documents listed above are complementary and are not required reading.

## Feature Set

The iPORT SB-Pro IP engine provides these features and functions listed in the table below:

### iPORT SB-Pro IP Engine Feature Summary

Key Features	
Support for Sony FCB-H11	
RS-232 Bidirectional Serial Connection	
Deserialization of LVDS signals	
4 TTL General Purpose Inputs	
3 TTL General Purpose Outputs	
GenICam integration of key camera controls	
De-Interlacing: Field Insertion (Weaving); Line Duplication	
Chroma 4:4:4 to 4:2:2 Resampling	
Image Rescaling of width from 1440 to 1920	
<b>Environmental</b>	
Storage Temperature: -40 to 85 C	
Operating Temperature: 0 to 50 C (higher if using thermal pads between FPGA/PHY/DDR and camera chassis)	
<b>Key Camera Interface Features</b>	
Focus/Auto-Focus	
White balance	
Exposure	
Gain	
Backlight compensation	
Shutter	
Gamma	
Resolution and Frame Rate	
Zoom	

## Hardware De-interlacing

De-interlacing requires a receiver to buffer one or more fields and recombine them into full frames. The iPORT SB-Pro IP engine supports field-type combination de-interlacing for video captured from the Sony Block FCB-H11 camera. Two types of field-type de-interlacing are line insertion (weaving) and line duplication.

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### Weaving

Weaving is a method of de-interlacing that inserts the odd horizontal scanning lines of one field between the even horizontal scanning lines of another field. Artifacts associated with this video de-interlacing method are combing and for this reason it is recommended for images with restricted motion.

### Line Duplication

Line duplication is a method of de-interlacing that adds repeated horizontal lines of both the odd and even horizontal scanning fields. For example, Lines 1 and 3 of one field are duplicated, and produce Lines 2 and 4, respectively. There is a loss of vertical resolution associated with this de-interlacing method and it can introduce the video artifact referred to as “bobbing”. This method is suitable for images with larger amounts of motion. Due to the bandwidth requirements, the de-interlacing methods explained above are restricted to these video formats shown in the table below.

#### De-interlacing Options and Supported Bandwidths

Video Mode	Width	Height	Frame Rate	Pixel Format	Supported De-Interlacing Options
1080i@59.94 Hz	1440		29.97	YUV444Packed	Weave
1080i@59.94 Hz	1440		29.97	YUV422Packed	Line Duplication, Weave
1080i@59.94 Hz	1440		29.97	YUV411Packed	Line Duplication, Weave
1080i@59.94 Hz	1440		29.97	Mono8	Line Duplication, Weave
1080i@59.94 Hz	1920		29.97	YUV444Packed	Weave
1080i@59.94 Hz	1920		29.97	YUV422Packed	Line Duplication, Weave
1080i@59.94 Hz	1920		29.97	YUV411Packed	Line Duplication, Weave
1080i@59.94 Hz	1920		29.97	Mono8	Line Duplication, Weave
1080i@50 Hz	1440		25	YUV444Packed	Line Duplication, Weave
1080i@50 Hz	1440		25	YUV422Packed	Line Duplication, Weave
1080i@50 Hz	1440		25	YUV411Packed	Line Duplication, Weave
1080i@50 Hz	1440		25	Mono8	Line Duplication, Weave
1080i@50 Hz	1920		25	YUV444Packed	Line Duplication, Weave
1080i@50 Hz	1920		25	YUV422Packed	Line Duplication, Weave
1080i@50 Hz	1920		25	YUV411Packed	Line Duplication, Weave
1080i@50 Hz	1920		25	Mono8	Line Duplication, Weave

*NOTE!* YUV444Packed pixel format is not recommended for production use due to high bandwidth requirements.

# Assembling the iPORT SB-Pro IP Engine

You can install the iPORT SB-Pro IP engine to the Sony FCB-H11 block camera in one of these configurations:

- Rear mounted orientation (recommended configuration)
- Top-Mounted
- Side Mounted

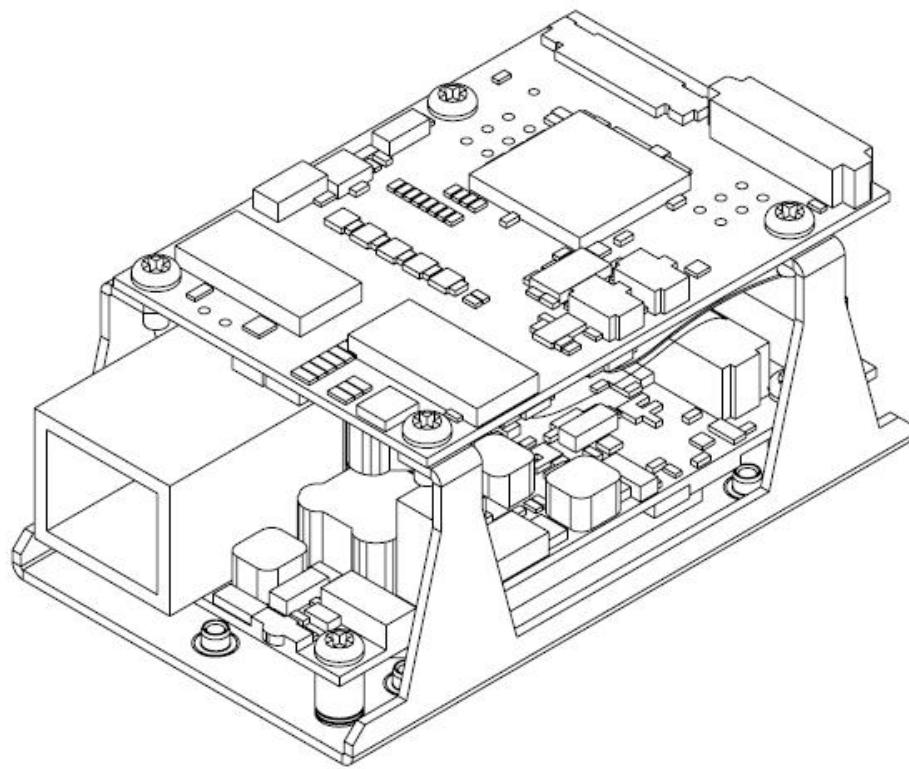
## Mechanical Drawings

The mechanical drawings that follow for the iPORT SB-Pro IP engine highlight its dimensions, features, and attributes. All dimensions are in millimeters (mm), unless otherwise stated.

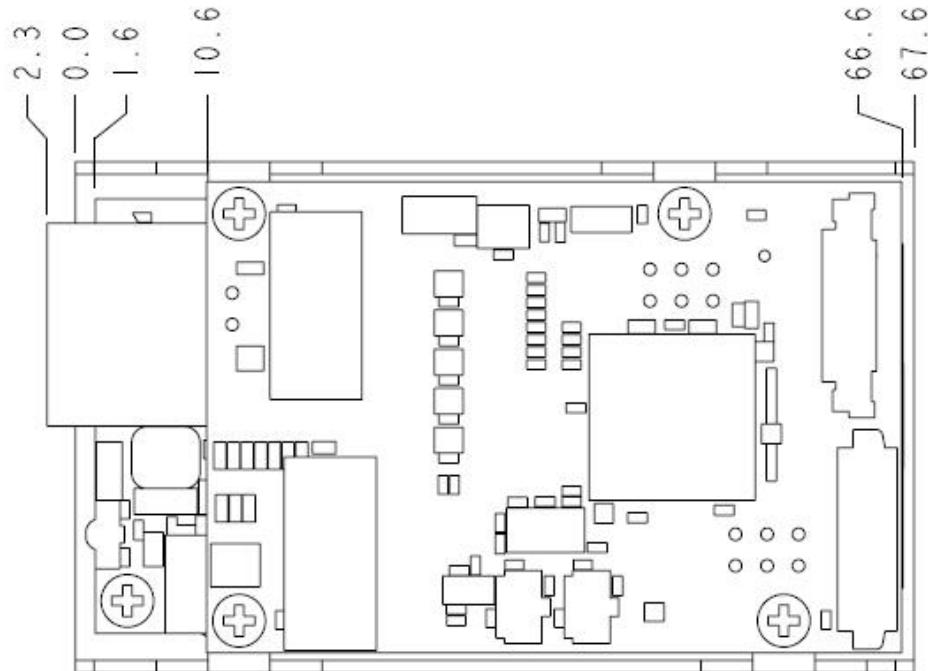
*NOTE!* The drawings in this section include all connectors which will could be present on an iPORT SB-Pro IP engine. An iPORT SB-Pro IP engine designed to be configured to an Sony FCB-H11 block camera will have fewer connectors than shown in the drawings below.

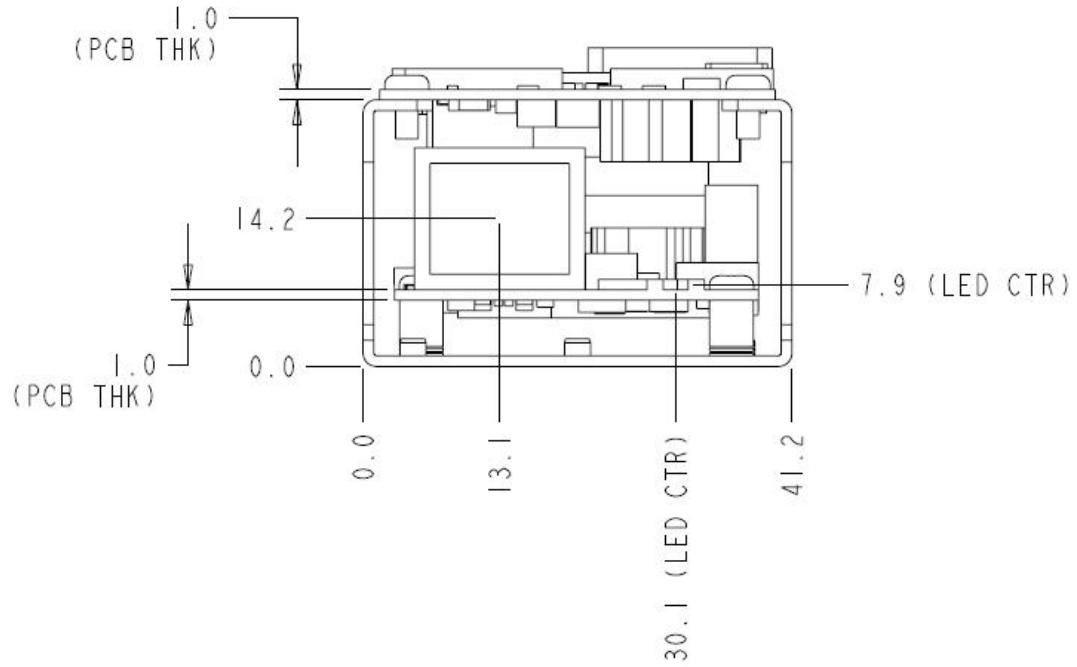
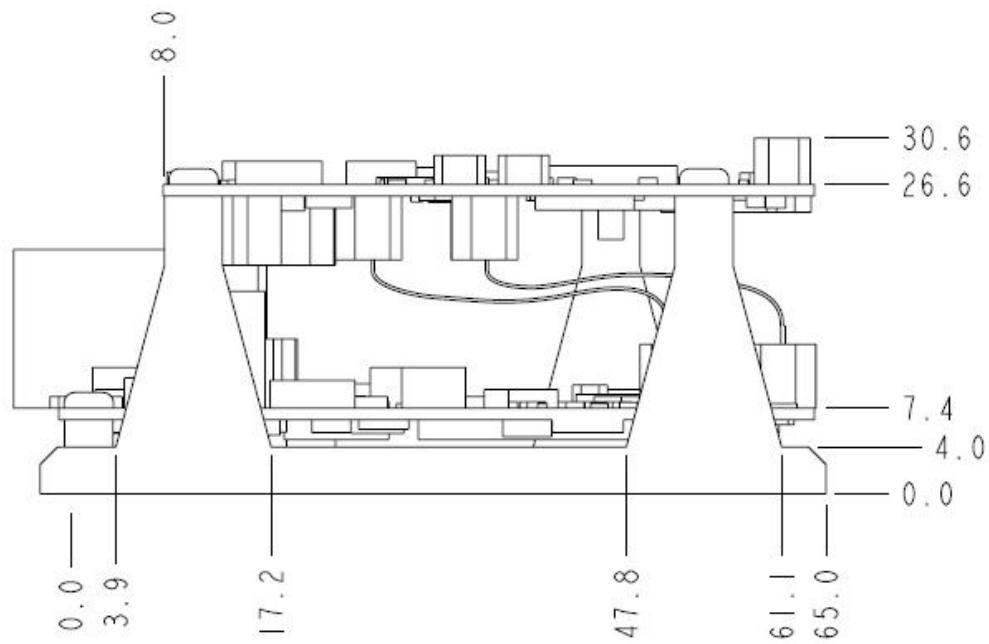
## 12 Assembling the iPORT SB-Pro IP Engine

**PCB Stack - A: Figure 1**



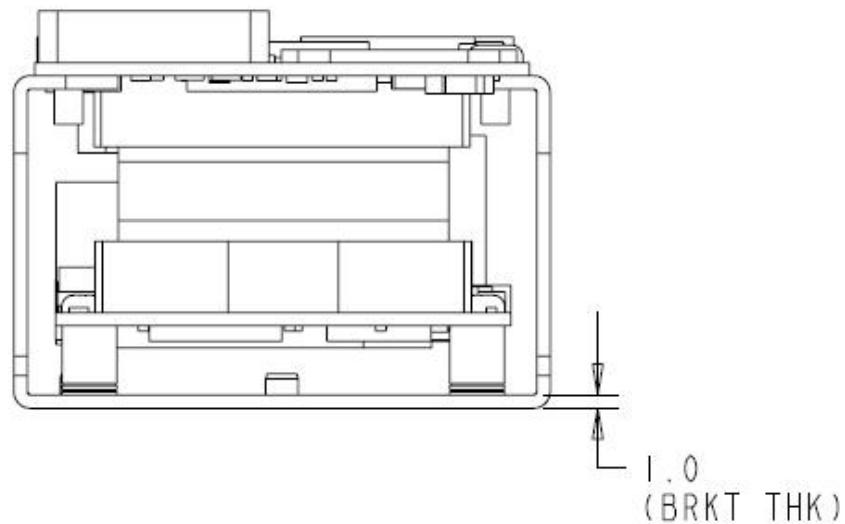
**PCB Stack - B: Figure 2**



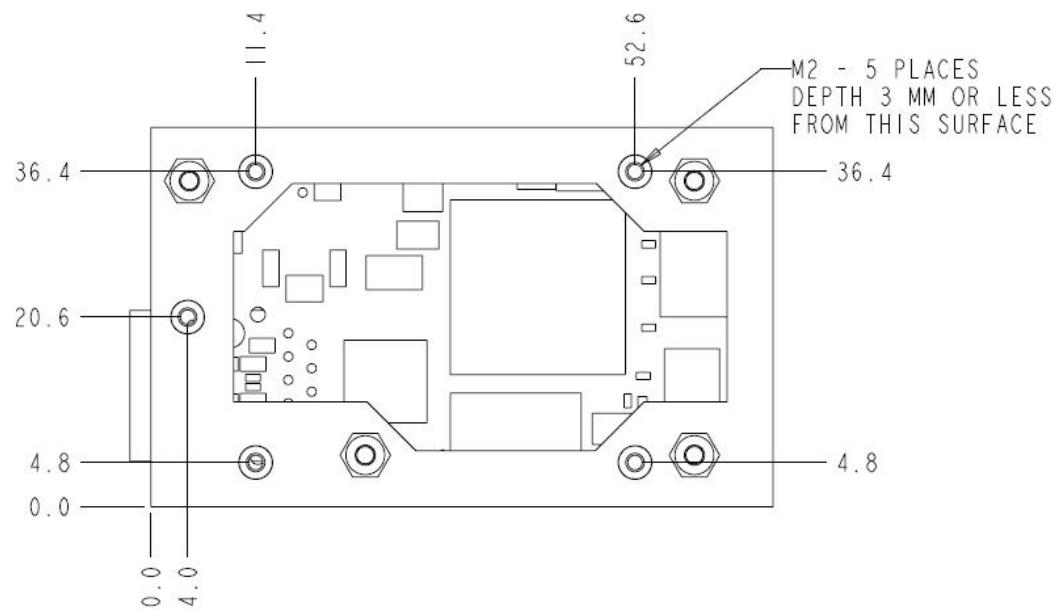
**PCB Stack - C: Figure 3****PCB Stack - D: Figure 4**

## 14 Assembling the iPORT SB-Pro IP Engine

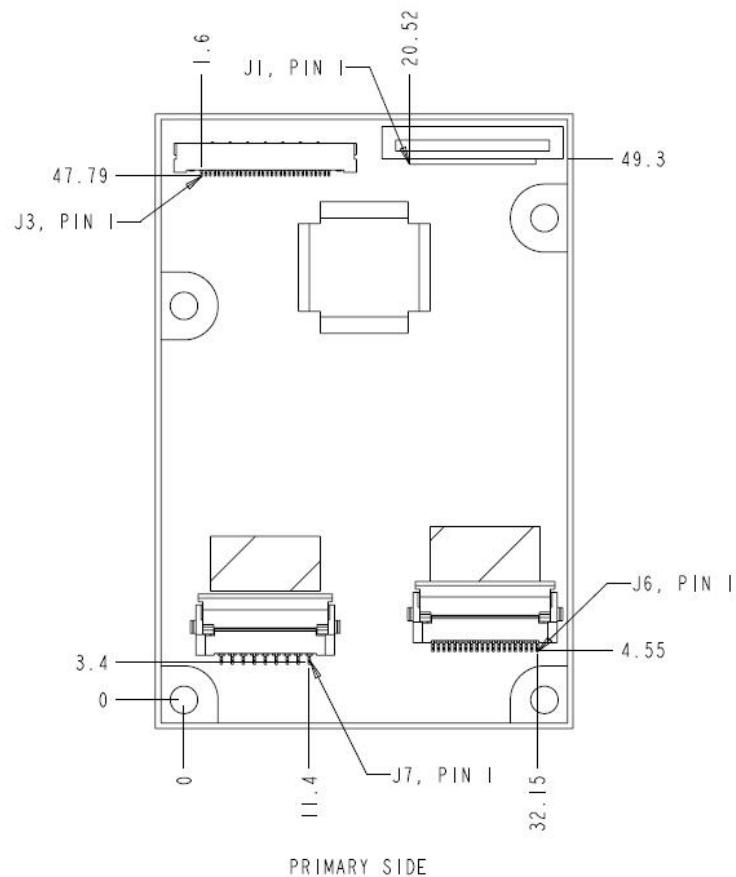
**PCB Stack - E: Figure 5**



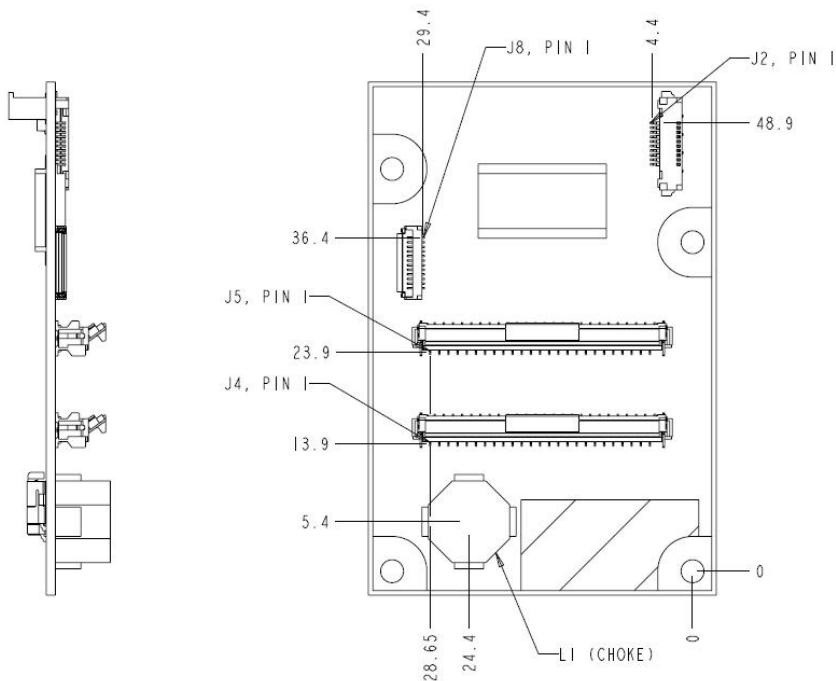
**PCB Stack - F: Figure 6**



### Daughter Card Layout - A: Figure 7

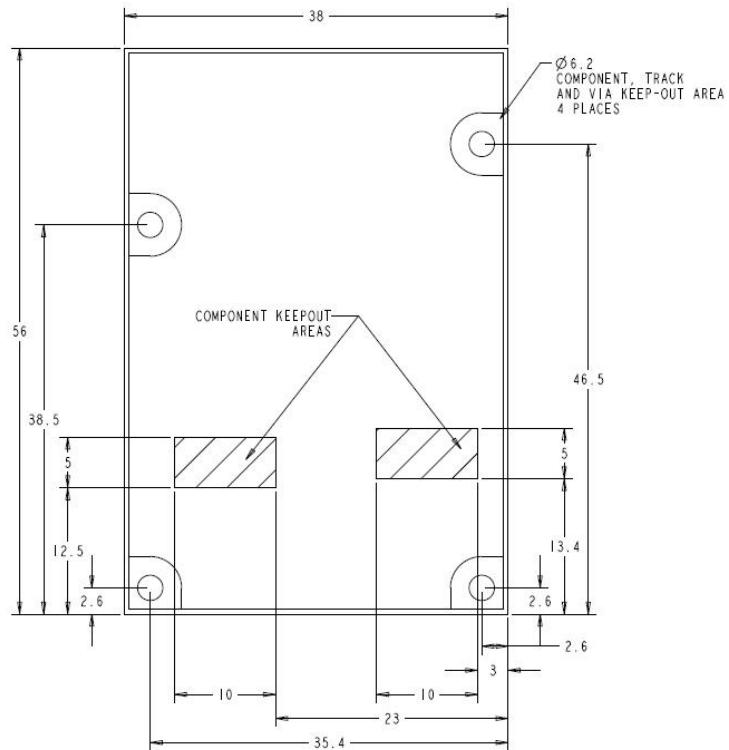


### Daughter Card Layout - B: Figure 8

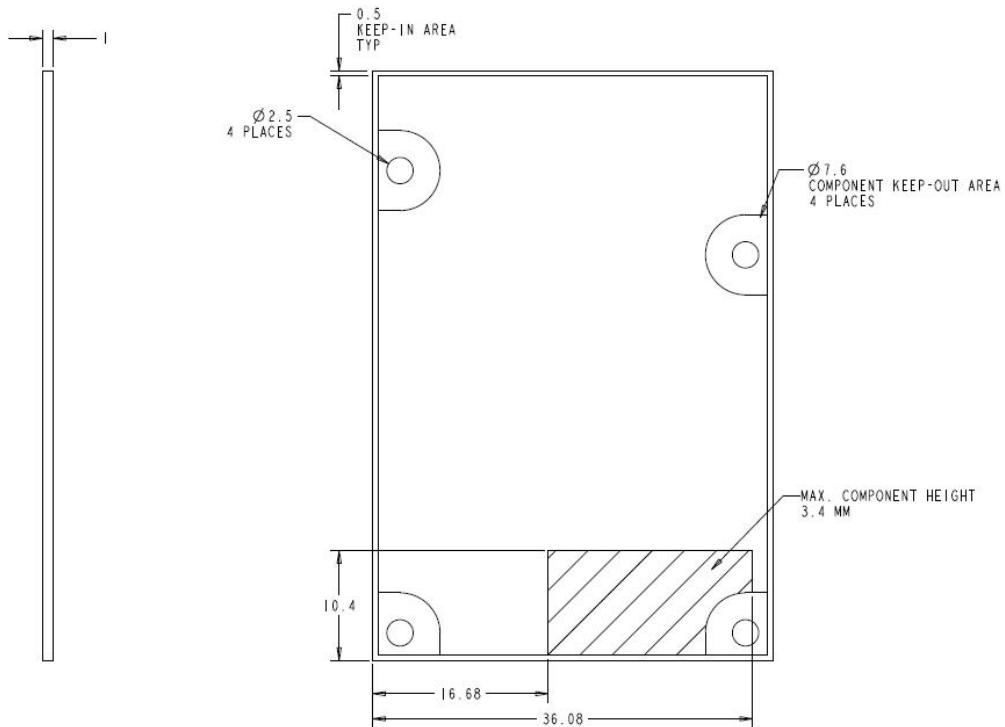


## 16 Assembling the iPORT SB-Pro IP Engine

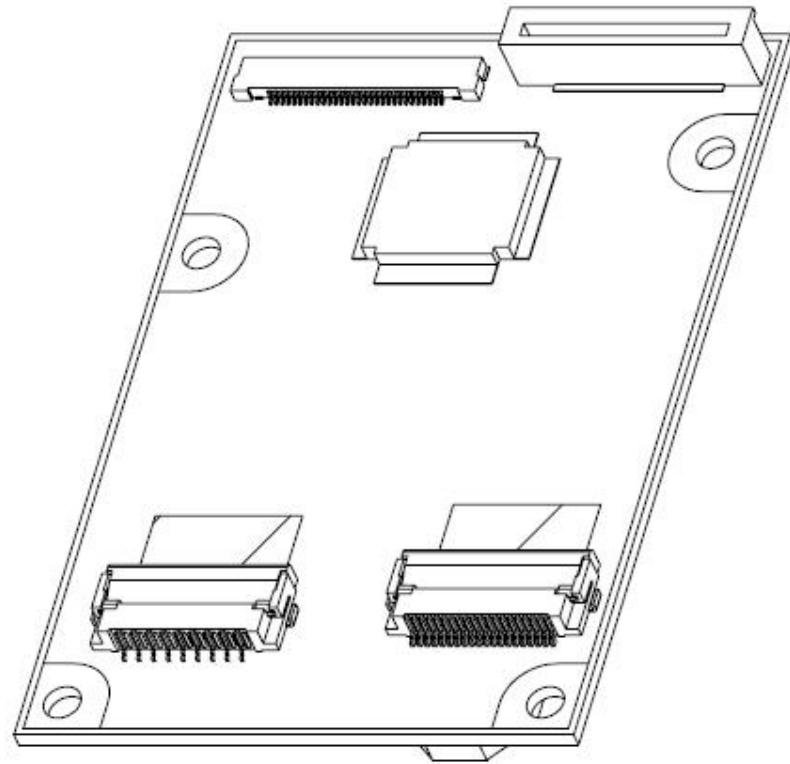
**Daughter Card Component View A: Figure 9**



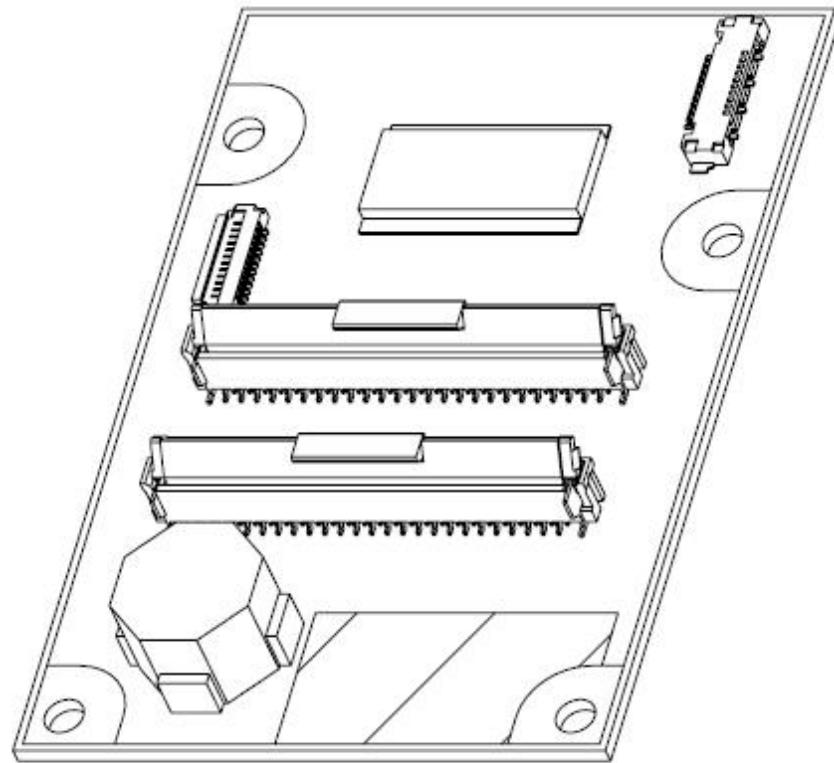
**Daughter Card Component View B: Figure 10**



**Daughter Card Primary Side: Figure 11**

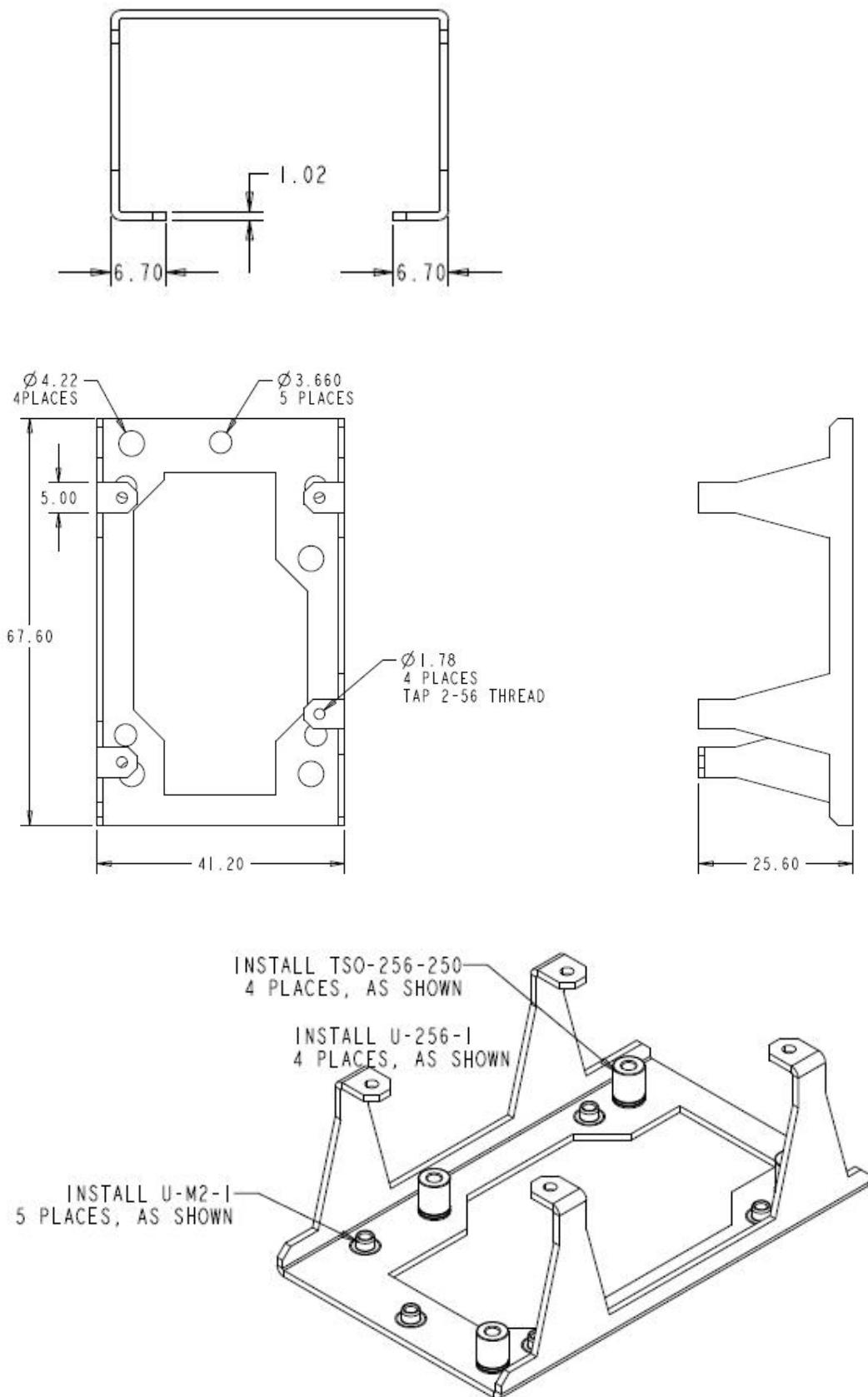


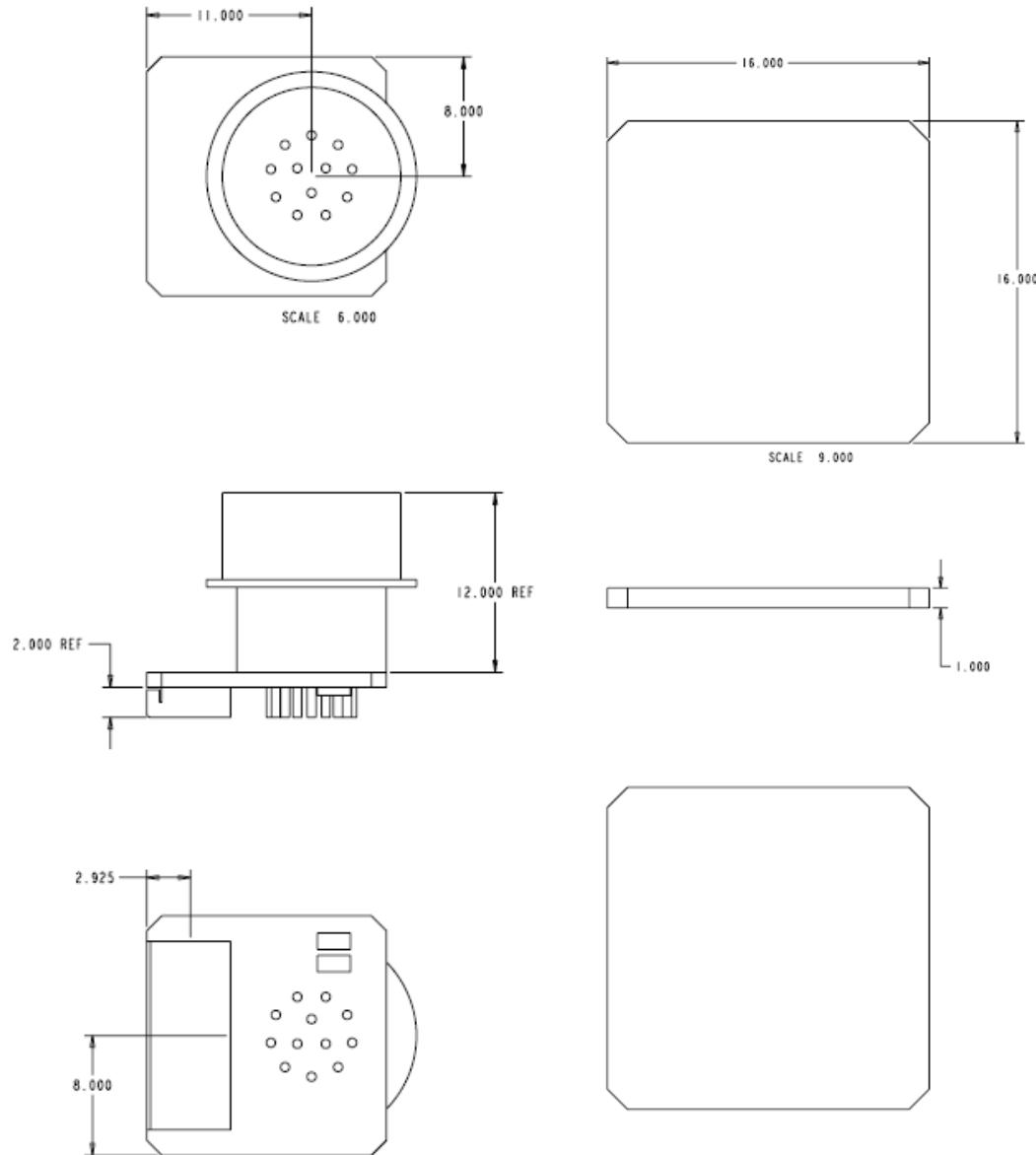
**Daughter Card Secondary Side: Figure 12**



## 18 Assembling the iPORT SB-Pro IP Engine

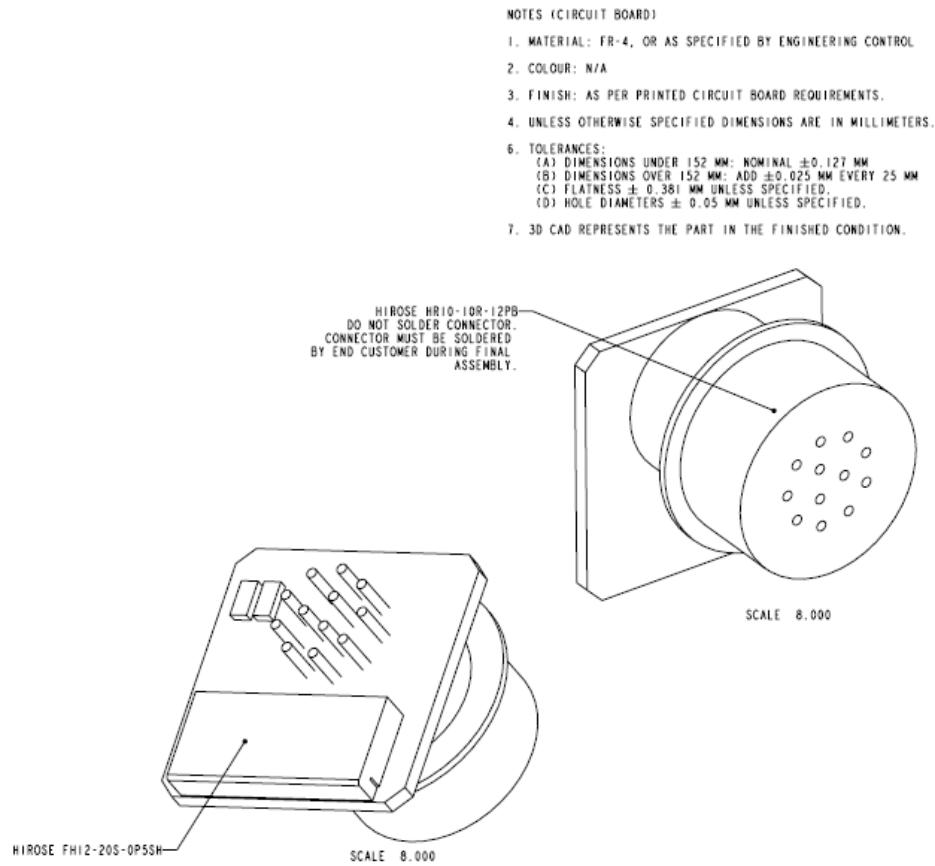
**Bracket: Figure 13**



**12-Pin GPIO and Power Connector - A: Figure 14**

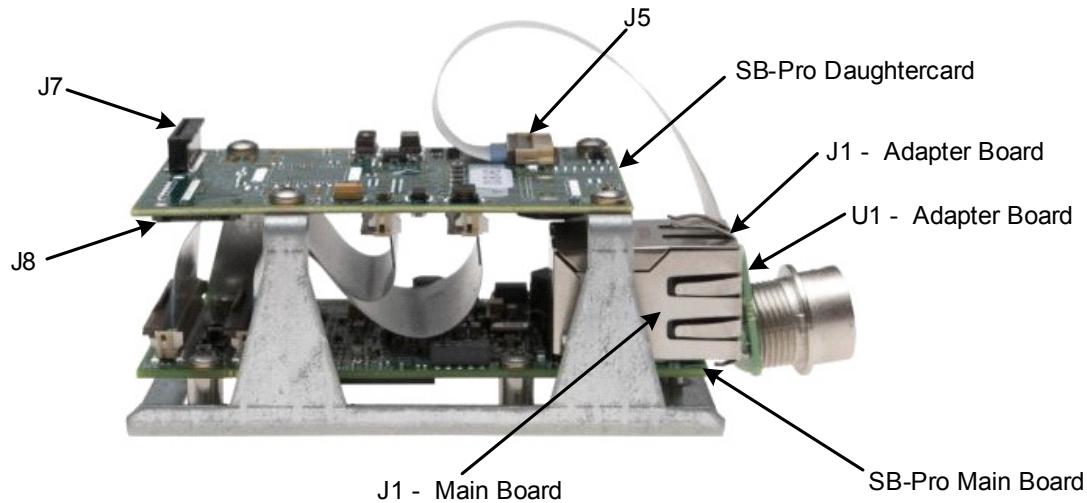
## 20 Assembling the iPORT SB-Pro IP Engine

### 12-Pin GPIO and Power Connector - B: Figure 15



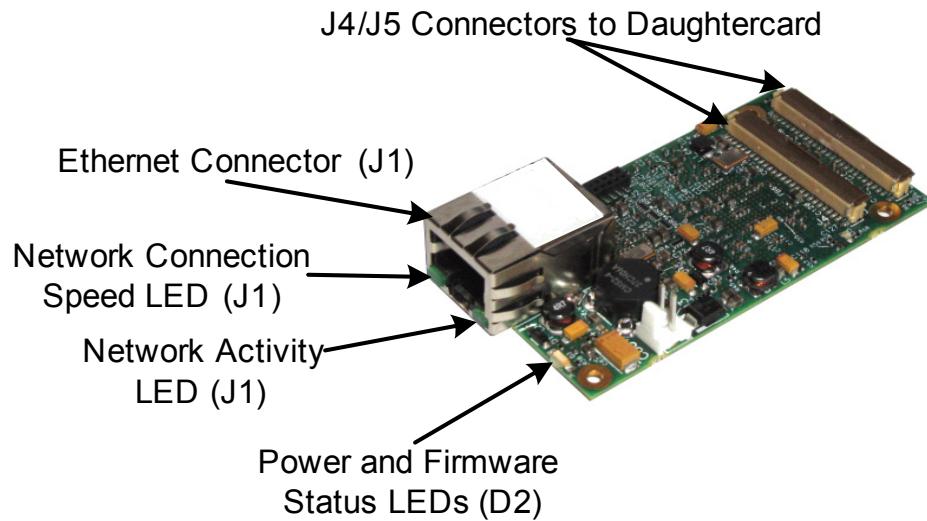
## IP Engine Connector Locations

The image below indicates the location of basic connectors on the iPORT SB-Pro IP engine.



## IP Engine Connectors and LEDs

The image below illustrates the location of basic connectors and LEDs for the iPORT SB-Pro IP engine main board.



# Hardware Interfaces

The iPORT SB-Pro IP engine contains a number of hardware interfaces explained in the sections below.

## Ethernet Connector

The Ethernet RJ-45 connector interfaces the iPORT SB-Pro IP engine to local area networks (LANs) as specified in IEEE 802.3.

## Power, Serial, and GPIO Connector (12-Pin)

The Power, Serial, and GPIO 12-pin connector provides power and external signals (like serial communication and GPIO) to the iPORT SB-Pro IP engine.

## Power, Serial, and GPIO Connector (20-Pin)

The Power, Serial, and GPIO 20-pin flat flexible cable (FFC) connector connects the iPORT SB-Pro IP engine to the 12-Pin connector.

## Video Connector (10-Pin)

The Video Connector transmits 5-pairs of serialized low voltage digital signals (LVDS) from the Sony FCB-H11 to the iPORT SB-Pro IP engine over coaxial cable. Here, these signals are deserialized to 24-bit colour external horizontal sync (HD), vertical sync (VD), field sync (FLD), and CLK signals.

## Serial and Power Connector (24-Pin)

This bidirectional serial communications connector is a UART based control interface to the serial communication port of the Sony FCB-H11. This connector also provides power to the FCB-H11.

*NOTE!* The iPORT SB-Pro IP engine also has two 50-pin FFC cables between its main board and daughter card. These connections are not described in this document, as they are not interfaces which are external to the IP engine.

# Assembling the iPORT SB-Pro IP Engine

The iPORT SB-Pro IP engine parts list and assembly procedure follow.

## System Parts List

The required parts for assembly of the Sony Block FCB-H11 camera to the iPORT SB-Pro IP engine are listed below. Additional information about the components of the IP engine can be found under “[Model Variants](#)” on page 8 of the section, “[About the iPORT SB-Pro IP Engine](#)”.

You require these components to connect the IP engine to the Sony FCB-H11 camera:

- IP engine with integrated main board, daughter card and bracket
- 10-Pin coax cable
- 24-pin FFC cable
- 20-pin FFC cable
- 12-pin GPIO connector with adapter board

## Connecting the iPORT SB-Pro IP Engine to the FCB-H11

The procedure below explains the assembly of the iPORT SB-Pro IP engine to the Sony Block FCB-H11 camera.

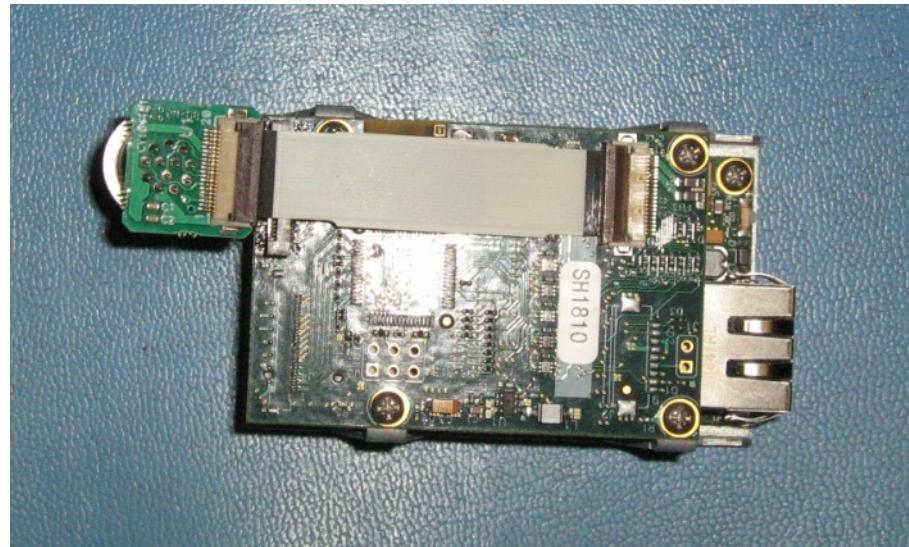
*NOTE!* Do not connect power to the iPORT SB-Pro IP engine until all cable connections are secure and verified.

### Connecting the Hardware to Power/GPIO Connector

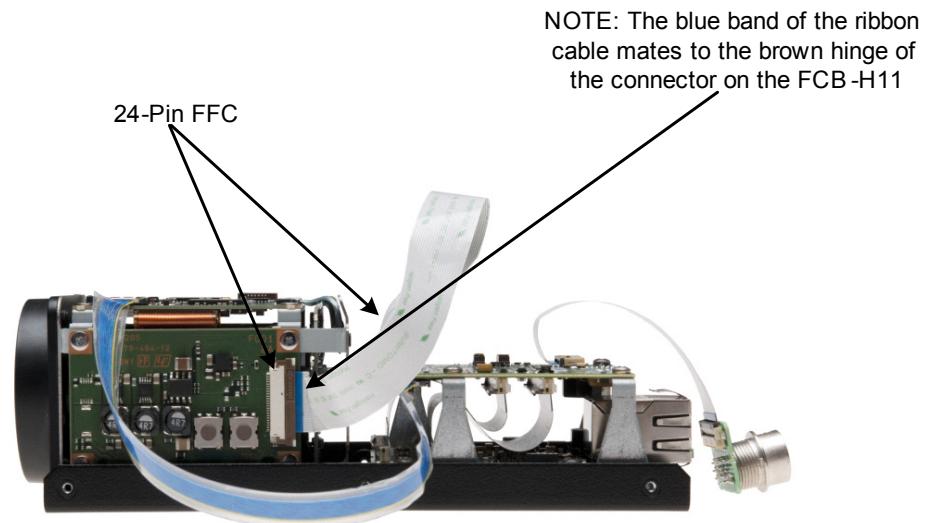
Power to the assembled Sony Block and iPORT SB-Pro IP engine is provided through the 12-Pin Hirose circular connector as shown in the figure below.

*NOTE!* A chassis is supplied only as part of the iPORT SB-Pro IP engine evaluation kit.

1. Connect the 20-Pin FFC cable at J5 of the IP engine's daughter card to the GPIO connector adapter board. The metallic side of the cable ends should be oriented towards the circuit board in both cases.

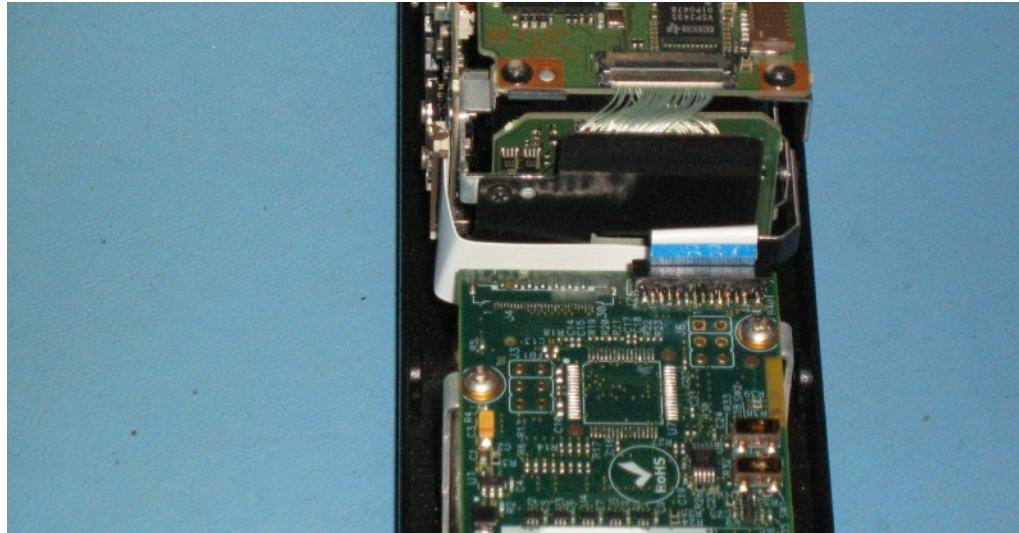


2. Connect the 24-Pin FFC from the connector on the side of the Sony Block to the daughter card at J7. Lift up gently on the daughter card connector before inserting the cable. Push down on the connector to secure the cable. The metallic side of the cable ends should be oriented towards the FCB-H11 circuit board, and away from the Ethernet connector of the iPORT SB-Pro IP engine.

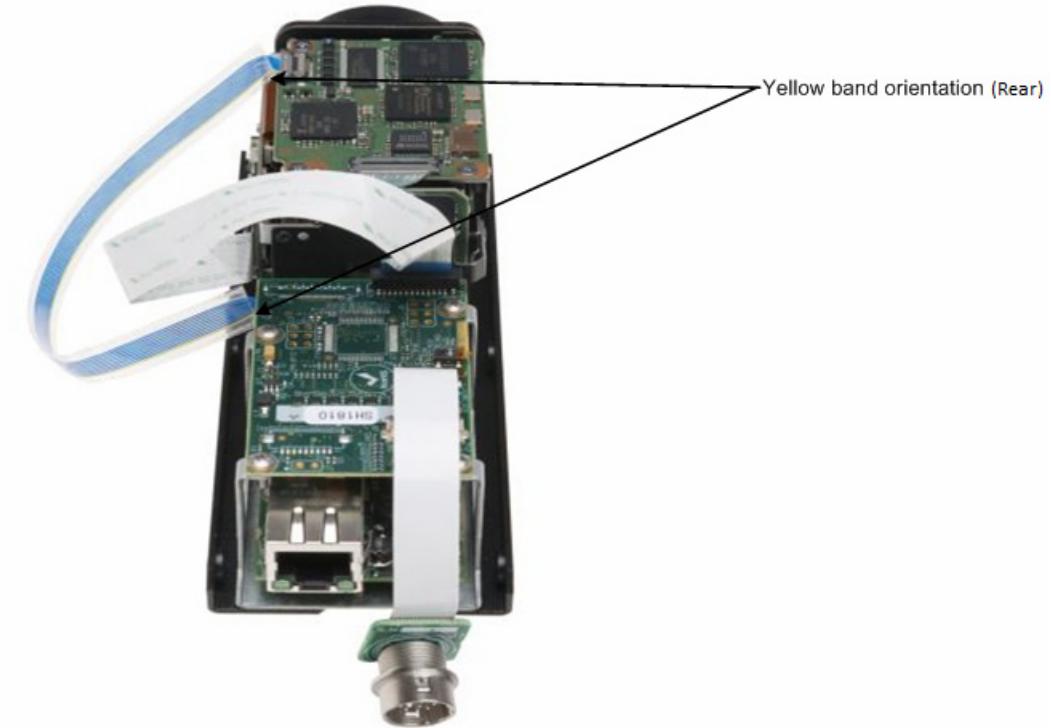


## 24 Assembling the iPORT SB-Pro IP Engine

The top view of the 24-Pin connector is shown in the figure below.



3. Connect the 10-Pin coax cable at J8 of the daughter card to the connector on the top of the Sony FCB-H11 camera. The yellow band of the connector indicates pin 1, and should face the rear of the assembled unit..



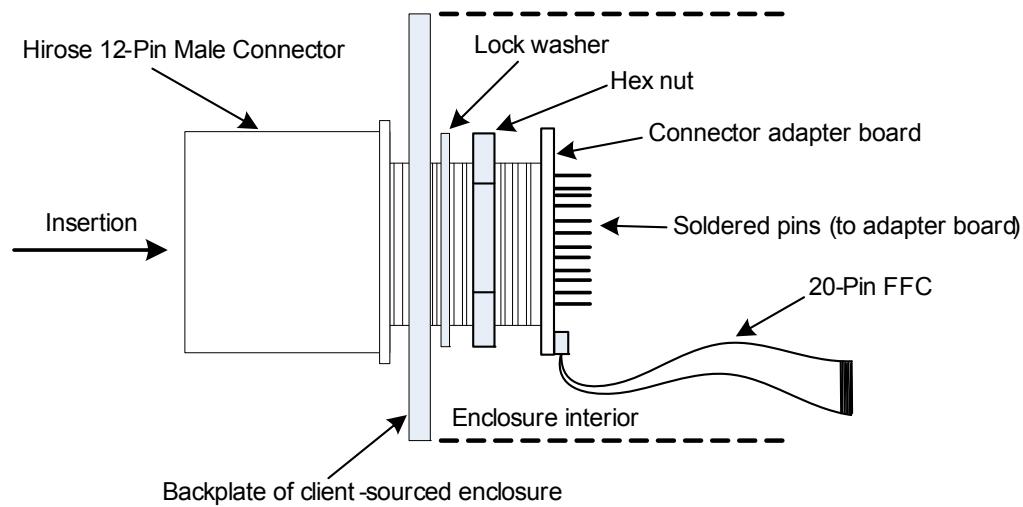
## 12-Pin Circular Connector Orientation and Mounting

The removable 12-pin GPIO/Power circular connector and the corresponding adapter board is suitable for mounting to a client-sourced enclosure. Take care to mount the 12-Pin connector to the connector adapter board within the enclosure backplate in the correct orientation; Pins 1-12 on the connector must mate to holes 1-12 on the connector adapter board within the enclosure, after soldering.

***To mount the 12-pin GPIO/Power connector to the enclosure backplate:***

1. Insert the 12-pin connector through the external side of the backplate.
2. Secure with washer and hex nut.
3. Insert the adapter board (12-holes) with the proper orientation, to the base pins of the 12-Pin connector through the internal side of the backplate. Refer to the figures under “[Orienting the 12-Pin Connector/Adapter Board](#)” on page 26 below.
4. Solder the pins of the connector to the adapter board for a secure connection.

HIROSE 12-Pin Circular Connector Backplate Mounting

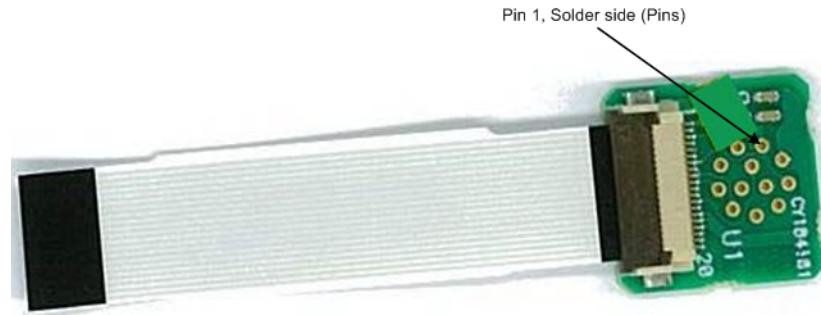


## 26 Assembling the iPORT SB-Pro IP Engine

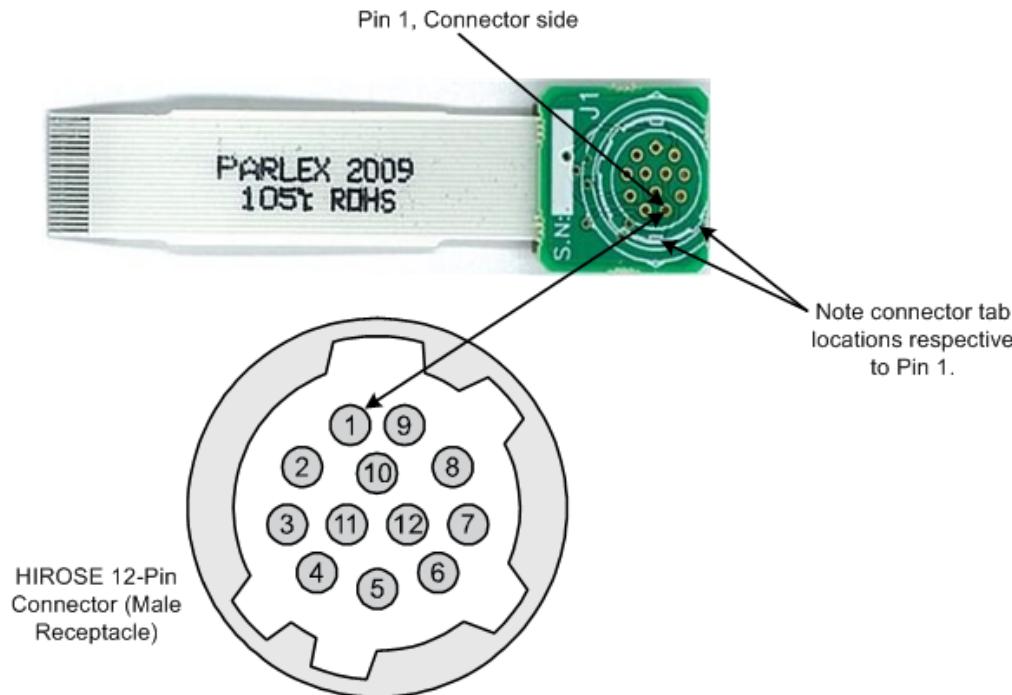
### Orienting the 12-Pin Connector/Adapter Board

You must orient the Hirose 12-Pin GPIO/Power circular connector correctly, prior to soldering the connector to the adapter board. The figures below illustrate the correct pin layout on the adapter board side.

The Pin 1 location of the Hirose 12-Pin connector pins on the adapter board is shown in the figure below (solder side).



The silkscreen location for Pin 1 of the Hirose 12-Pin connector on the adapter board is shown in the figure below (connector side).



## Ethernet Interface

The Ethernet interface of the SB-Pro IP engine can operate at 10, 100 or 1000 Mbps. The IP engine supports Internet Protocol IPv4, which is the fourth iteration of this IP communication standard. It is the dominant network layer protocol on the Internet.

## IP Engine Connector Summary

The connector and cable summaries for the iPORT SB-Pro IP engine are listed below.

### Connector Summary

<b>Component ID</b>	<b>Location</b>	<b>Description</b>	<b>Mfr. Part Number</b>	<b>Mfr.</b>
J1	Main board	RJ-45 jack, green/green LED, horizontal	HFJ11-1G11E-L11RL	Halo
J8	Daughter card	10-pin fine pitch coax connector, 0.5mm pitch, SMD	SSL00-10L3-0500	Kel
J1	Adapter board	12-pin circular connector, male	HR10A-10R-12PB(71)	Hirose
UI	Adapter board	20-pin FPC/FFC connector, 0.5mm pitch, horizontal, SMD	FH12-20S-0.5SH(55)	Hirose
J5	Daughter card	20-pin FPC/FFC connector, 0.5mm pitch, horizontal, SMD	FH12-20S-0.5SH(55)	Hirose
J7	Daughter card	24-pin FPC/FFC connector, 0.5mm pitch, SMD	62674-241121ALF	FCI

*NOTE!* The iPORT SB-Pro IP engine also has 50-pin FFC connectors between its main board and daughter card. These connections are not described in this document, as they are not interfaces which are external to the IP engine.

*NOTE!* Source manufacturer, description and identification may vary for each component.

## 28 Assembling the iPORT SB-Pro IP Engine

*NOTE!* The iPORT SB-Pro IP engine does not require a crossover cable to adjust the pinout signals to communicate through a switch, or directly to a host PC. It also adjusts the data rate automatically to transmit at 10 Mbps, 100 Mbps, or 1 Gbps.

### Cable Summary

<b>Cable From</b>	<b>Cable To</b>	<b>Description</b>	<b>Mfr. Part Number</b>	<b>Mfr.</b>
J5 (daughter card)	J1 (adapter board)	20-pin FFC, 2" length, 0.5mm pitch	050R20-51B A	Parlex
J8 (daughter card)	Sony FCB-H11	10-pin fine pitch coax, 150mm length, 0.5mm pitch	SSL20-10SSB-015-CH	Kel
J7 (daughter card)	Sony FCB-H11	24-pin FFC, 3" length, 0.5mm pitch	21021-0253	Molex
Main board (x2)	Daughter card (x2)	50-pin FFC, 0.5mm pitch	050R50-XXXXB A, where XXXX is the length of 0001 to 9999 in mm	Parlex <sup>a</sup>

a. Compatible with Hirose connector FH12-50S-0.5SV to MIL-STD-810F, Method 514.6: 5-2000 Hz. 7.7 gs.

*NOTE!* Source manufacturer, description and identification may vary for each component.

## Power and GPIO Connector

The iPORT SB-Pro IP engine power and GPIO pinout descriptions (connector J1 on the adapter board) are shown in the table below.

**Power and GPIO Connector Pinout**

Pin	Name	Function	Type	Line	Notes
1	RET	RET	Power Return	n/a	
2	VIN	PWR	Power Input	n/a	Protected by 600W @ 1.0 ms PP Zener TVS, +/- 16 kV per HBM.
3	GPIO_IN3	TTL_IN3	GPIO Input	Line3	Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/-8 kV Contact, +/-15 kV Air Discharge).
4	GPIO_OUT2	TTL_OUT2	GPIO Output	Line6	ESD information is the same as for Pin 3.
5	GND	Ground	Ground	n/a	Ferrite Bead 0.2A, 600 Ohm @ 100 MHz to DGND of the Daughter Card.
6	GPIO_IN2	TTL_IN2	GPIO Input	Line2	ESD information is the same as for Pin 3.
7	GPIO_OUT1	TTL_OUT1	GPIO Output	Line5	ESD information is the same as for Pin 3.
8	GPIO_IN1	TTL_IN1	GPIO Input	Line1	ESD information is the same as for Pin 3.
9	GPIO_OUT0	TTL_OUT0	GPIO Output	Line4	ESD information is same as Note for Pin 3.
10	GPIO_IN0	TTL_IN0	GPIO Input	Line0	ESD information is the same as for Pin 3.
11	RS232_TX	RS232	Output	n/a	Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/-15 kV Air Discharge).
12	RS232_RX	RS232	Input	n/a	ESD information is the same as for Pin 11.
Shell	GND_CHASSIS	Chassis Ground	Ground	n/a	For the purpose of EMI prevention, provide good electrical contact between the connector shell and the enclosure box.

**NOTE!** The GPIO pins on the 12-Pin connector are mapped to Line0 through Line6 of the DigitalIOControl\LineSelector feature in the *GEV Device Control* dialog of the GEVPlayer sample application. Line 7 is not used in the iPORT SB-Pro IP engine.

### GPIO/Power/Serial Cable

The power and GPIO pinout descriptions of the 20-PIN FFC (J5 of the daughter card) are shown in the table below.

**Power and GPIO Connector Pinout**

Pin No.	Name	Function	Type
1	RET	RET	Power
2	RET	RET	Power
3	RET	RET	Power
4	POWER	PWR	Power
5	POWER	PWR	Power
6	POWER	PWR	Power
7	GND	Ground	Ground
8	GPIO_IN0	GPIO	Input
9	GPIO_OUT0	GPIO	Output
10	GPIO_IN1	GPIO	Input
11	GPIO_OUT1	GPIO	Output
12	GPIO_IN2	GPIO	Input
13	GPIO_OUT2	GPIO	Output
14	GPIO_IN3	GPIO	Input
15	GPIO_OUT3	GPIO	Output
16	N/C	No Connect	N/A
17	N/C	No Connect	N/A
18	RS232_TX	RS232	Output
19	RS232_RX	RS232	Input
20	GND	Ground	Ground

### Mapping of the 20-Pin FFC to the 12-Pin GPIO/Power Connector

The mapping of the signals from the 20-Pin FFC connector of the SB-Pro daughter card (J5) to the 12-Pin GPIO and power connector on the adapter board (J1) are listed in the table below.

**Power and GPIO Connector Pinout, 10-Pin (J8)**

Pin No. for J1	Pin No. for U1	Name	Function	Type	Notes
1	20	RET	Power Return	Power Return	
1	19	RET	Power Return	Power Return	
1	18	RET	Power Return	Power Return	
2	17	VIN/PWR	Power Input	Power Input	See Note <sup>a</sup> .
2	16	VIN/PWR	Power Input	Power Input	See Note <sup>a</sup> .
2	15	VIN/PWR	Power Input	Power Input	See Note <sup>a</sup> .
5	14	GND/EMI_GND	Ground	Ground	Ferrite 0.2A, 600 Ohm @ 100 MHz to DGND of daughter card.
10	13	GPIO_IN0	TTL_IN0	GPIO Input	See Note <sup>b</sup> .
9	12	GPIO_OUT0	TTL_OUT0	GPIO Output	See Note <sup>b</sup> .
8	11	GPIO_IN1	TTL_IN1	GPIO Input	See Note <sup>b</sup> .
7	10	GPIO_OUT1	TTL_OUT1	GPIO Output	See Note <sup>b</sup> .

### Power and GPIO Connector Pinout, 10-Pin (J8)

Pin No. for J1	Pin No. for U1	Name	Function	Type	Notes
6	9	GPIO_IN2	TTL_IN2	GPIO Input	See Note <sup>b</sup> .
4	8	GPIO_OUT2	TTL_OUT2	GPIO Output	See Note <sup>b</sup> .
3	7	GPIO_IN3	TTL_IN3	GPIO Input	See Note <sup>b</sup> .
N/C	6	GPIO_OUT3	TTL_OUT3	GPIO Output	See Note <sup>b</sup> .
N/C	5	N/C	No Connect	N/A	Not applicable
N/C	4	N/C	No Connect	N/A	Not applicable
11	3	RS232_TX	RS232 TX	Output	See Note <sup>b</sup> .
12	2	RS232_RX	RS232 RX	Input	See Note <sup>b</sup> .
5	1	GND/EMI_GND	Ground	Ground	Ferrite 0.2A, 600 Ohm @ 100 MHz to DGND of daughter card.

- a. Protected by 600W @ 1.0 ms PP Zener TVS, +/- 16 kV per HBM.
- b. Protected by ESD suppressors to IEC61000-4-2, Level 4 (+/- 8kV contact, +/- kV air discharge).

## **32 Assembling the iPORT SB-Pro IP Engine**

# Configuring the iPORT SB-Pro IP Engine

You can configure the iPORT SB-Pro IP engine in these configurations:

- Unicast network configuration
- Multicast network configuration

## Setting up the iPORT SB-Pro IP Engine

You will set up the iPORT SB-Pro IP engine for Unicast or Multicast operation with the GEVPlayer sample application installed as part of the eBUS SDK.

## Installing the eBUS SDK

You must install the eBUS SDK with GEVPlayer on your PC to configure and control your GigE Vision camera and the images. Consult the GEVPlayer Quick Start Guide for information about setting up and configuring your camera for connection to the SB-Pro IP engine. The Pleora eBUS SDK contains an extensive library of sample applications, with source code, to create working applications for device configuration and control; image and data acquisition; and, image display and diagnostics.

Sample code is also offered for advanced networking capabilities, like video multicasting and simultaneous connections to multiple devices.

The eBUS SDK operates with products from other vendors that comply with the GigE Vision standard. The SDK is offered in a package with eBUS drivers.

## Driver and NIC Installation

You must install the correct driver and set up your network interface card (NIC) prior to installation and configuration of the iPORT SB-Pro IP engine. There are 3 choices of driver selection depending on your particular NIC installation:

- Driver Manufacturer
- eBUS Universal Pro (for most NICs)
- eBUS Optimal (limited to some Intel® specific NICs)

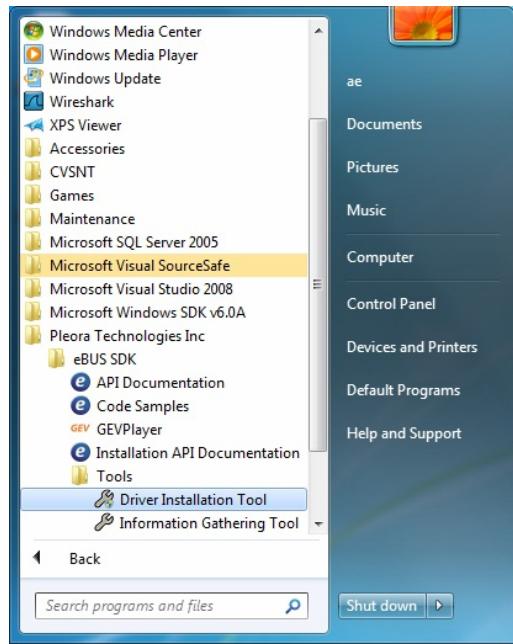
*NOTE!* To use the Driver Installation Tool, you will need administrative privileges for your PC. Consult Windows documentation for specific details.

*NOTE!* The instructions below demonstrate the procedure under the Windows 7 operating system. Procedures under other operating systems will vary.

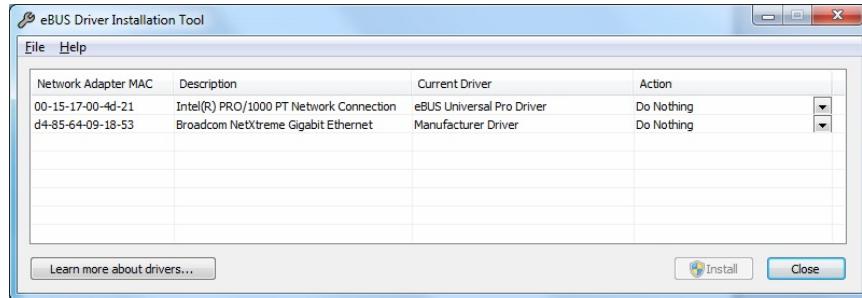
## 34 Configuring the iPORT SB-Pro IP Engine

To launch the Device Installation Tool that allows you to install the desired eBUS driver:

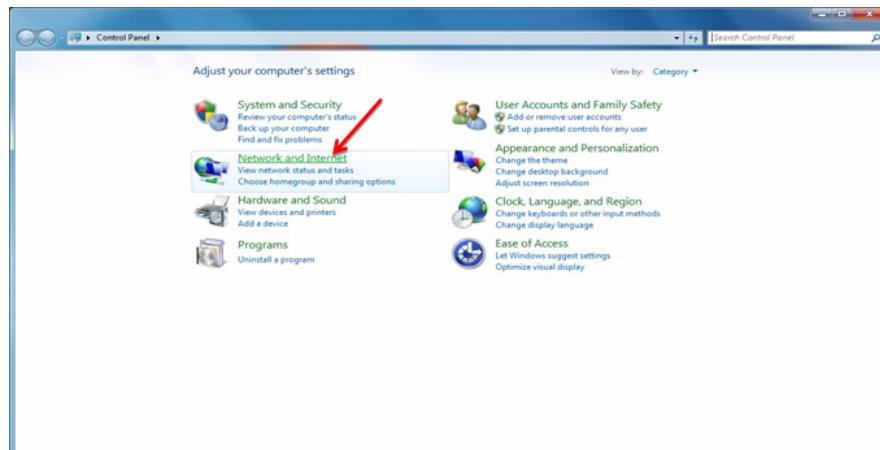
1. Click Start> Pleora Technologies> eBUS SDK> Tools> Driver Installation Tool.



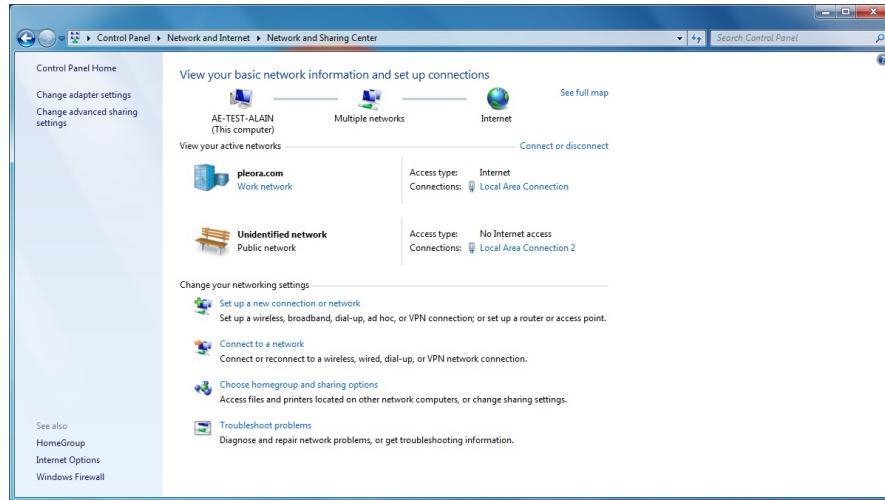
2. Select a suitable driver, depending on the NIC in your PC. If you require additional help, click **Learn more about drivers**. Once you have chosen a suitable driver, click **Install** and follow the prompts (which may vary depending on specific Windows configuration) to complete the driver installation.



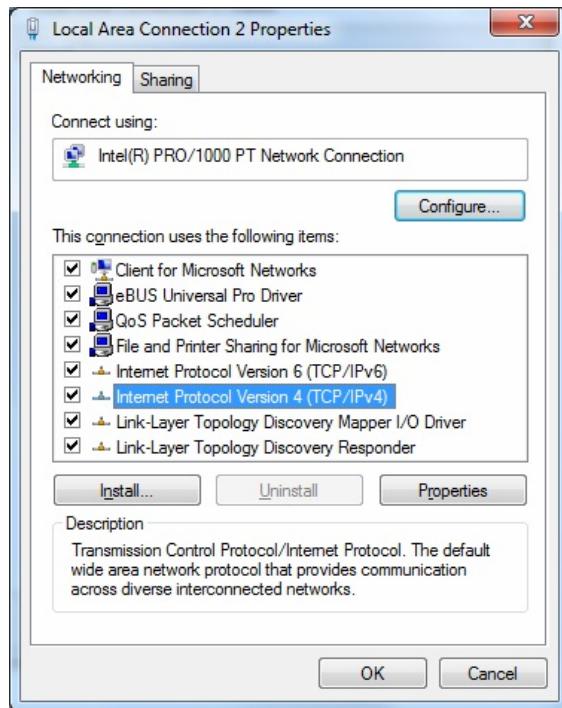
3. From the Windows Control Panel, select the Network and Internet Page.



4. Right click on the desired Network Interface Card (NIC). Choose **Properties**.

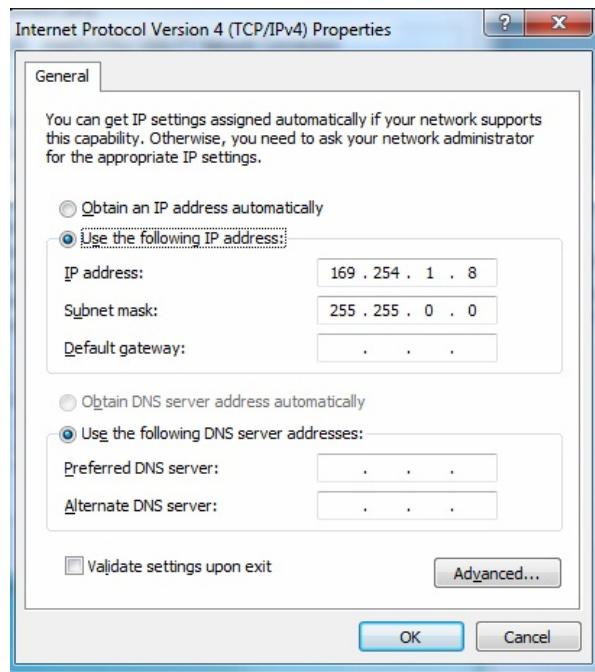


5. Set up the NIC properties by selecting Internet Protocol Version 4 (IPv4) and clicking **Properties**.

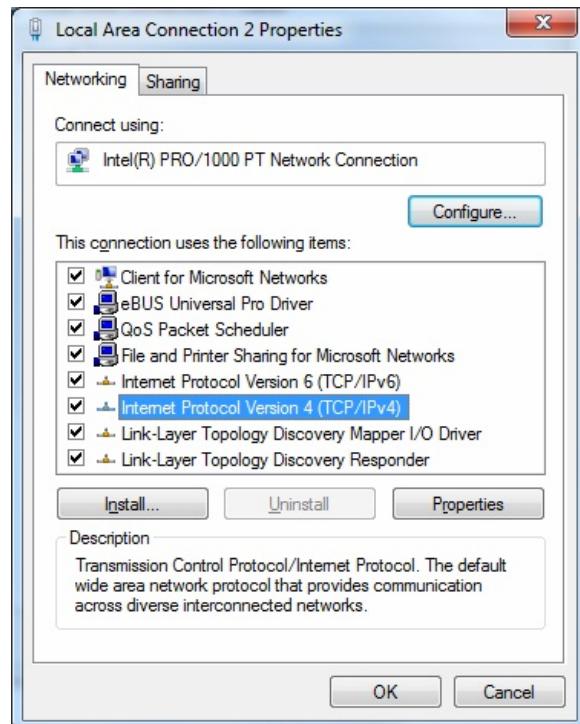


## 36 Configuring the iPORT SB-Pro IP Engine

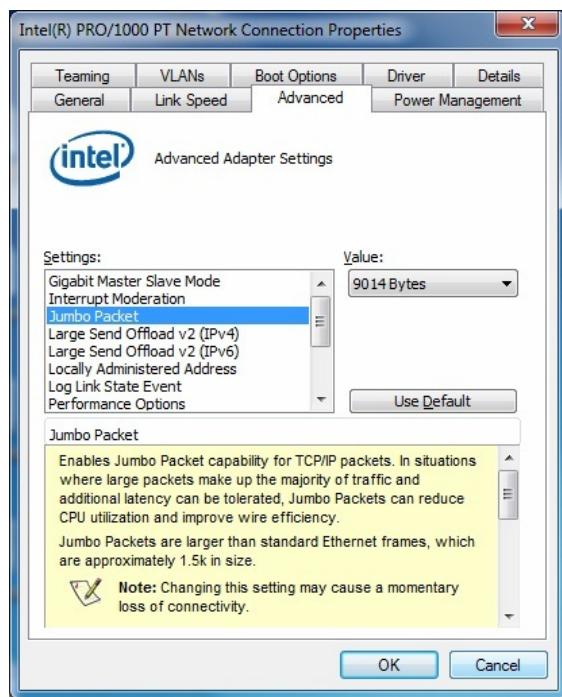
- Set up the IPv4 Properties; choose either **Obtain an IP address automatically**, or **Use the following IP address** as a static IP address for faster performance.



- Click **OK**.
- Click the **Configure** button.



9. Configure your NIC for jumbo packets. The exact configuration procedure, as well as the limit of the jumbo packet size depends on your NIC vendor.



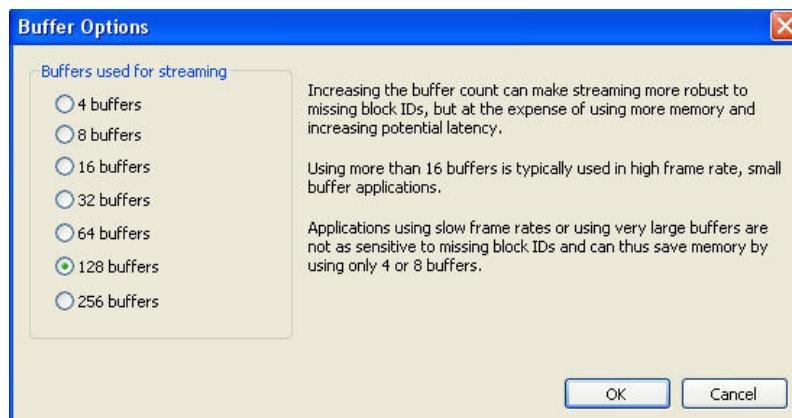
10. Click **OK**.

*NOTE!* You may want to both disable the network firewall and anti-virus software to improve system performance. Additionally, certain default settings on the NIC may not be appropriate for reception of a high-throughput image stream, for example, the number of Rx Descriptors. Refer to the *Network Adapters Knowledge Base Technical Note*, available on the Pleora Support Center.

## Setting the Buffer Options

You can increase the buffer count in the GEVPlayer application to reduce the number of lost packets and make streaming more robust. More buffers are used in high frame rate applications while a small number of buffers are needed for lower frame rates. Applications using a high number of buffers might experience greater latency.

After you have connected to the iPORT SB-Pro IP engine, you can click **Tools>Buffer Options** to configure the desired buffer count for your application.



*NOTE!* Default size for streaming is 16 buffers.

### Implementing the eBUS SDK

You can create your own image acquisition software for the iPORT SB-Pro IP engine. Consult the eBUS SDK Programmer's Guide and the eBUS SDK C++ Reference for information about creating custom image acquisition software.

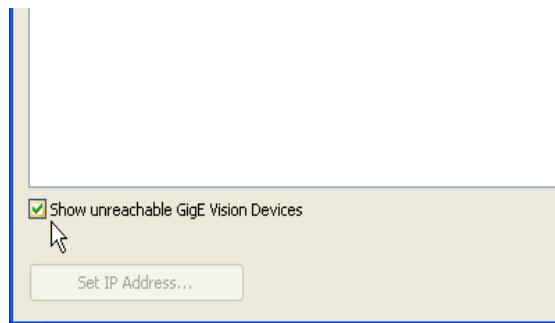
### IP Address Configuration

#### Initial Selection and Connection

The iPORT SB-Pro IP engine requires an IP address to function on a video network. This address must be on the same subnet as the PC performing the configuration and receiving the image stream.

##### **To set an initial IP address for the IP engine:**

1. Open **GEVPlayer** and click **Select/Connect**.
2. If your device does not appear in the list, click the checkbox, **Show Unreachable GigE Vision Devices** to show all available devices.



3. Click to select the SB-Pro IP engine in the **Available GigE Vision Devices** window.
4. Click Set IP Address. Provide a valid IP address and subnet mask. You may also optionally provide a default gateway. Click **OK** to close this window.
5. Click **OK** in the bottom right corner to finish connecting to the IP engine.

#### Configuring an Automatic/Persistent IP Address

The **GEV Device Control** dialog box allows you to configure a persistent IP address for your iPORT SB-Pro IP engine. Alternatively, the IP engine can be configured to automatically acquire an IP address using Dynamic Host Configuration Protocol (DHCP) or Link Local Addressing (LLA). The IP engine uses its persistent IP address first, but if this option is set to **False**, it can be configured to attempt to acquire an address from a DHCP server. If this fails, it will use LLA to find an available IP address. LLA cannot be disabled and is **True** by default.

##### **To automatically configure an IP address:**

1. Connect to the iPORT SB-Pro IP engine. Click **GEV Device Control** in the **Parameters and Controls** section.
2. In the **TransportLayerControl** category, set the **GevCurrentIPConfigurationPersistentIP** feature to **False**.
3. Set the **GevCurrentIPConfigurationLLA** and/or **GevCurrentIPConfigurationDHCP** values to true, depending on the type of automatic addressing you require.
4. Close the **GEV Device Control** dialog box.

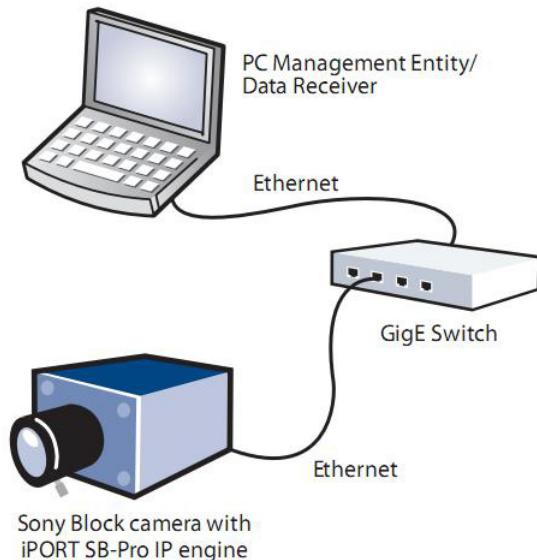
**To configure a persistent IP address:**

1. Connect to the iPORT SB-Pro IP engine. Click **GEV Device Control** in the **Parameters and Controls** section.
2. In the **TransportLayerControl** category, set the **GevCurrentIPConfigurationPersistentIP** feature to **True**.
3. Set the **GevPersistentIPAddress** feature to a valid IP address in the **GevPersistentIPAddress** field.
4. Set the **GevPersistentSubnetMask** feature to a valid subnet mask address.
5. Optionally, enter a valid default gateway next to **GevPersistentDefaultGateway**.
6. Close the **GEV Device Control** dialog box.

## Unicast Network Configuration

You can set up the iPORT SB-Pro IP engine in a simple unicast network configuration. The IP engine can be connected to a PC either directly, or through a GigE switch. The PC is configured as both a data receiver and controller. The PC serves as a management entity for the IP engine. The figure below illustrates the iPORT SB-Pro IP engine in a unicast network configuration.

**Unicast Network Configuration: Figure 16.**



## Overview

For a unicast configuration, an integrated Sony® Block FCB-H11 with the iPORT SB-Pro IP engine is connected to a GigE switch that sends a stream of video over Ethernet to the PC. Alternatively, the IP engine can be connected directly to the PC.

## System Requirements

You require the following components to set up a unicast network configuration:

- Sony® Block FCB-H11 Camera with iPORT SB-Pro IP engine
- 6 - 12V power supply
- Cat5e or Cat6 Ethernet cables (2)
- GigE Switch (optional)
- PC or Laptop with eBUS SDK, version 2.0.0 (or higher) installed

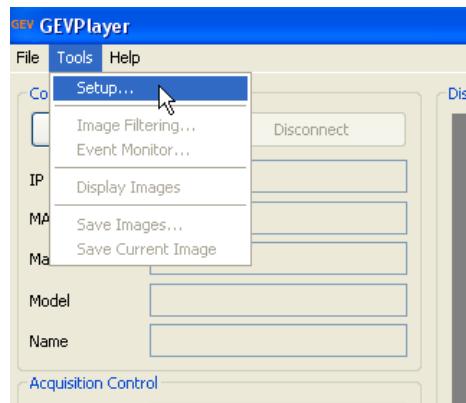
### iPORT SB-Pro IP Engine Video Source Configuration

After you have assembled and powered up the hardware components, you must configure the iPORT SB-Pro IP engine with the GEVPlayer application.

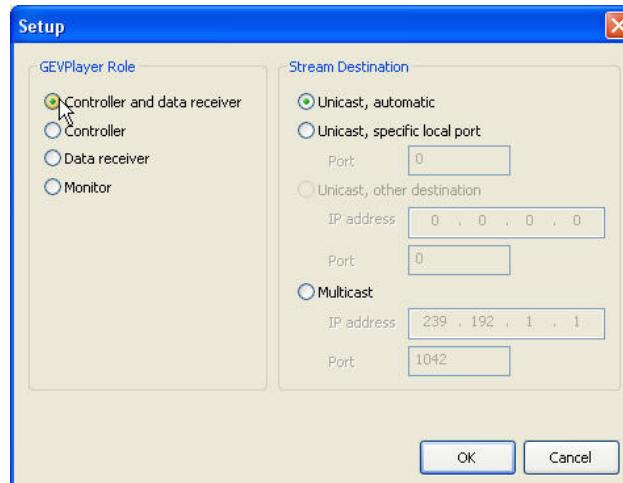
**NOTE!** The current implementation of the firmware for the SB-Pro H11 IP engine requires that the AnswerTimeout parameter be set to equal or greater than 5000 ms. Access this parameter through the main menu of the GEVPlayer application: **Communication Control >Communication >AnswerTimeout**.

#### Configuring the iPORT SB-Pro IP Engine

1. Start the **GEVPlayer** application.
2. Click **Tools>Setup** in the GEVPlayer main window.

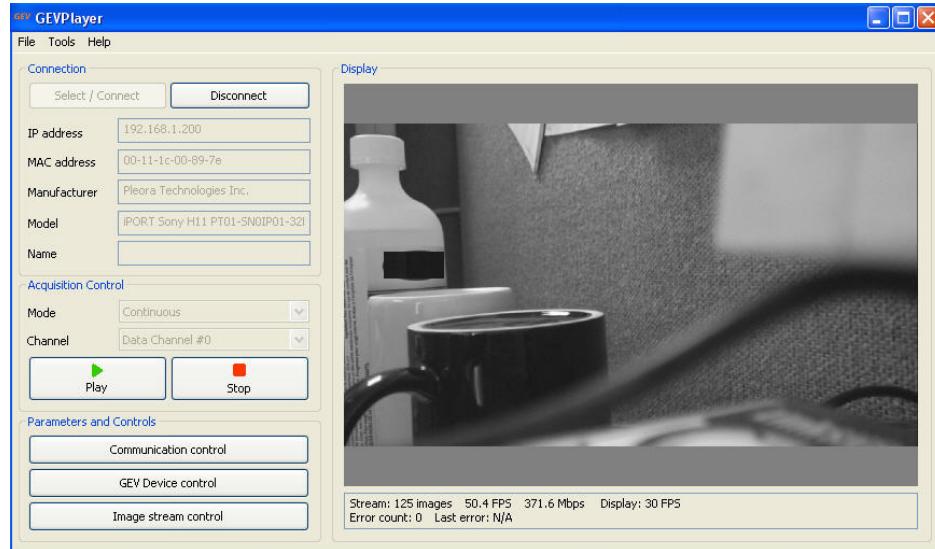


The **Setup** pop-up window appears.



3. Click the **Controller and data receiver** radio button in the **GEVPlayer Role** group of the **Setup** pop-up.
4. Click the **Unicast, automatic** radio button in the **Stream Destination** group of the **Setup** pop-up.
5. Click **OK**.
6. Select and connect to the IP engine. For details on this procedure, see "[Initial Selection and Connection](#)" on page 38.

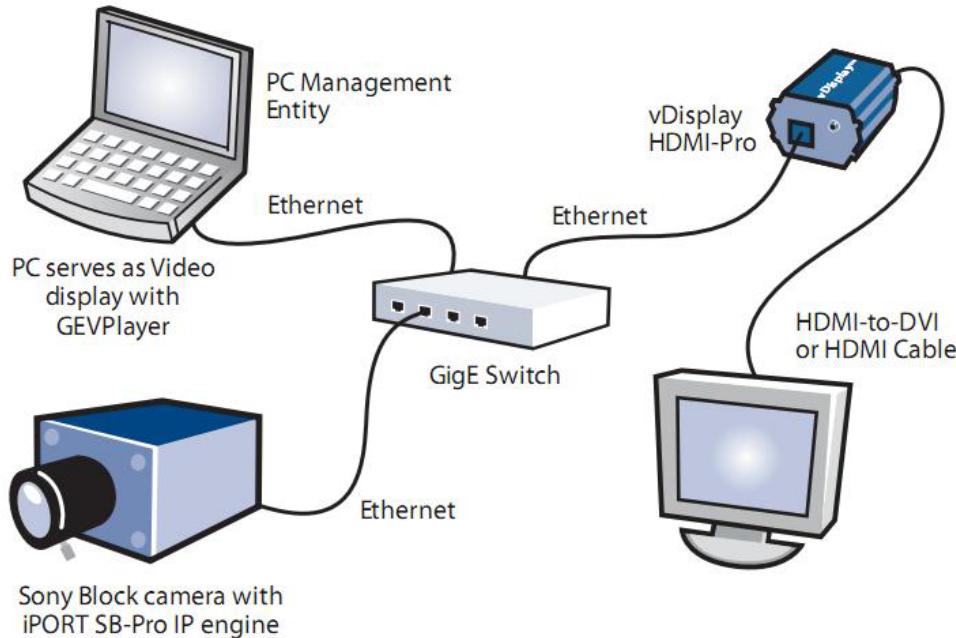
- Click **Play** in the GEVPlayer window to view the live video.



## Multicast Network Configuration

You can set up the iPORT SB-Pro IP engine in a multicast network configuration. In this section, you can configure the IP engine to transmit video simultaneously to both a PC running GEVPlayer and another receiver, such as a vDisplay HDMI-Pro IP engine

**Multicast Network Configuration: Figure 17.**



## Overview

In a multicast configuration, the iPORT SB-Pro IP engine is connected to a GigE switch, and sends a stream of video over Ethernet simultaneously to both the PC and to the vDisplay IP engine. Then, the vDisplay IP engine converts it to video for display on the monitor.

### System Requirements

You require the following components to set up a multi-cast network configuration:

- Sony® Block FCB-H11 Camera with iPORT SB-Pro IP engine
- vDisplay HDMI-Pro
- Compatible display monitor
- Cable to connect the vDisplay IP engine to the display monitor
- Cat5e or Cat6 Ethernet cables (3)
- GigE Switch (IGMP v2-compatible)
- PC or Laptop with the eBUS SDK version 2.0.0 (or higher) installed

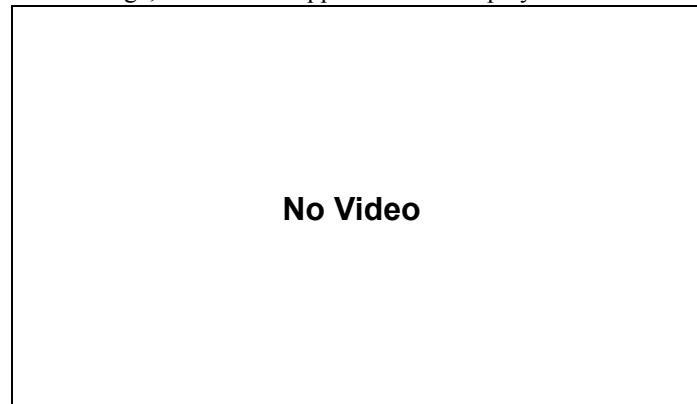
### Connecting the Hardware and Power

The procedure below explains how to connect the power, network, and data cables to the vDisplay HDMI-Pro and iPORT SB-Pro IP engines.

To set up the configuration, perform an un-powered connection of the hardware components:

1. Connect one end of a Cat5/Cat6 cable into the RJ-45 jack of the vDisplay HDMI-Pro IP engine; attach the other end to an available port of the GigE Switch.
2. Connect one end of a Cat5/Cat6 cable into the RJ-45 jack of the iPORT SB-Pro IP engine; attach the other end to an available port of the GigE Switch.
3. Attach one end of video cable to the display monitor; attach the other end to the HDMI receptacle of the vDisplay HDMI-Pro IP engine.
4. Apply power to the vDisplay HDMI-Pro IP engine.

The message, “No Video” appears on the display monitor.



5. Apply power to the iPORT SB-Pro IP engine.

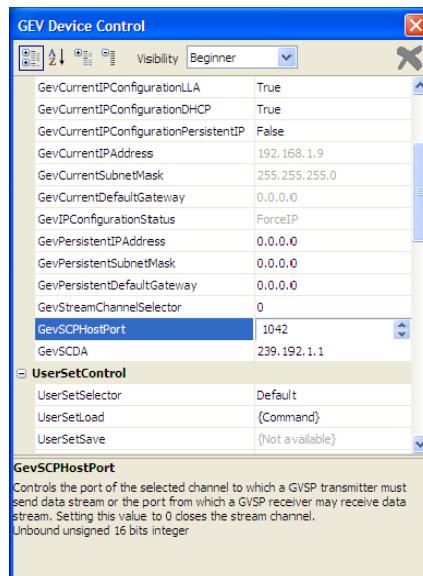
### IP Engine Configuration

After you have connected and powered up the hardware components, you must configure the vDisplay HDMI-Pro and iPORT SB-Pro IP engines for multicast configuration using the GEVPlayer application. It is preferable to launch 2 copies of GEVPlayer to perform both configurations. Configure the vDisplay IP engine first.

#### Configuring the vDisplay IP Engine

1. Start the **GEVPlayer** application.
2. In the section, “[Unicast Network Configuration](#)” on page 39, follow Steps 2 to 6 to connect to the vDisplay HDMI-Pro IP engine. Choose to connect as a controller (the value chosen in the Stream Destination group is unimportant).

- Click **GEV Device control**. In the **TransportLayerControl** category, set **GEVSCPHostPort** to a streaming channel port (for example, 1042).



- Set **GEVSCDA** to a multicast address; for example, 239.192.1.1.
- Close the **GEV Control Device** window.
- Proceed to configure the iPORT SB-Pro IP engine.

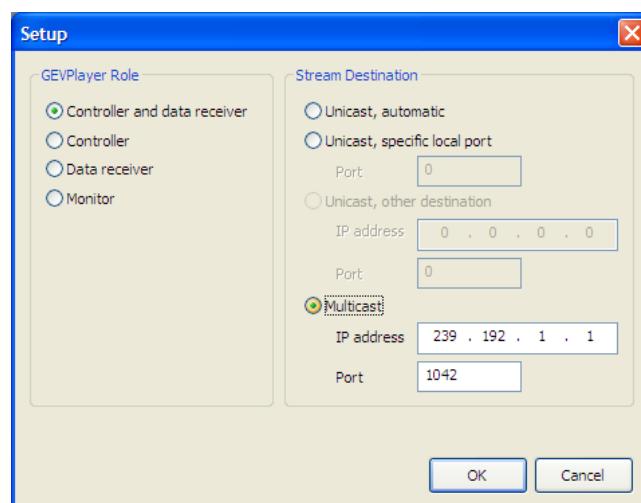
*NOTE!* When configured for multicast operation, both GEVPlayer and the vDisplay HDMI-Pro IP engine will use, by default, a multicast address of 239.192.1.1, port 1042. To ease in the setup of a multicast system, that multicast group is used in this document's procedures.

## Configuring the iPORT SB-Pro IP Engine

To configure the iPORT SB-Pro IP engine, launch a second instance of GEVPlayer.

- Start the **GEVPlayer** application..
- Click **Tools>Setup** in the GEVPlayer main window.

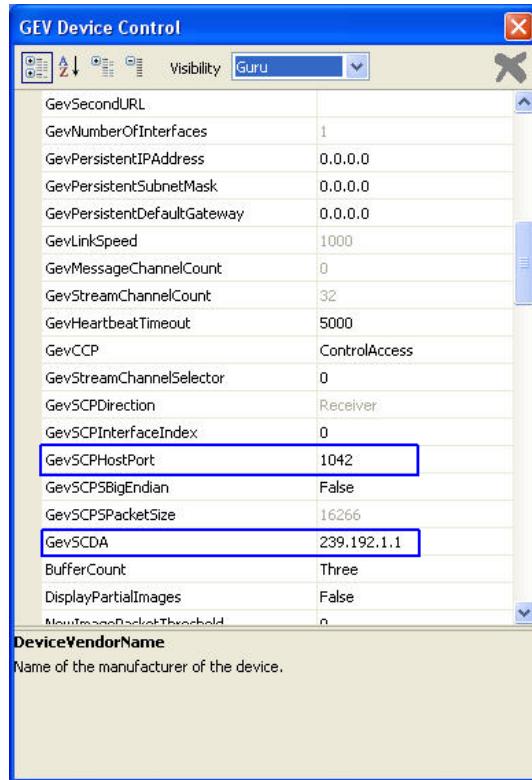
The **Setup** pop-up window appears.



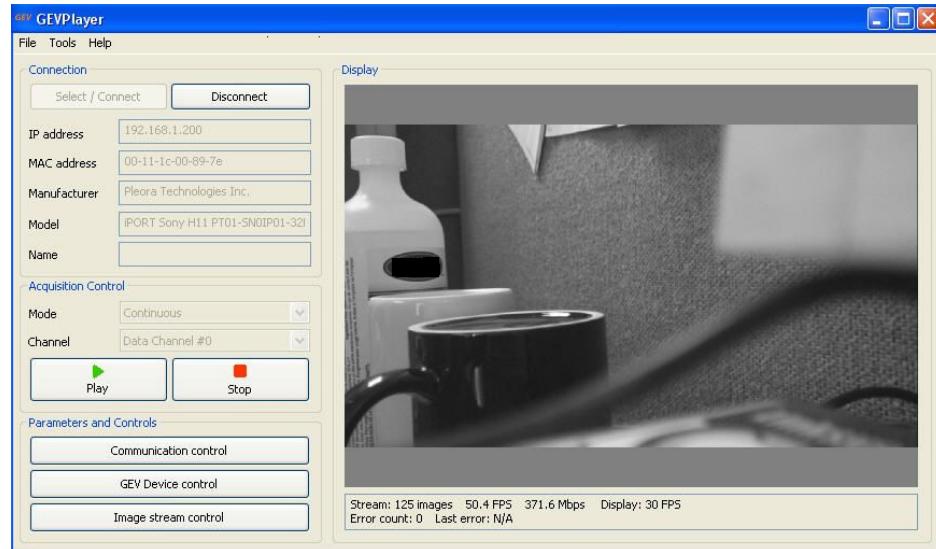
- Click the **Controller and data receiver** radio button in the GEVPlayer Role group of the **Setup** pop-up.
- Click the **Multicast** radio button in the **Stream Destination** group and enter a valid **IP Address** and the **Port** number. This address and port must be identical to that configured in the vDisplay IP engine in the previous section.

## 44 Configuring the iPORT SB-Pro IP Engine

5. Click **OK**.
6. Select and connect to the IP engine. For details on this procedure, see “[Initial Selection and Connection](#)” on page 38.
7. Click **GEV Device control**. In the **TransportLayerControl** category, ensure that the multicast IP address in the **GevSCDA** field, and the port in the **GevSCPHostPort** field are correct. They are configured automatically to the values set in steps 3-5 above.



8. Click **Play** to view the source video both on the PC display and the display monitor;



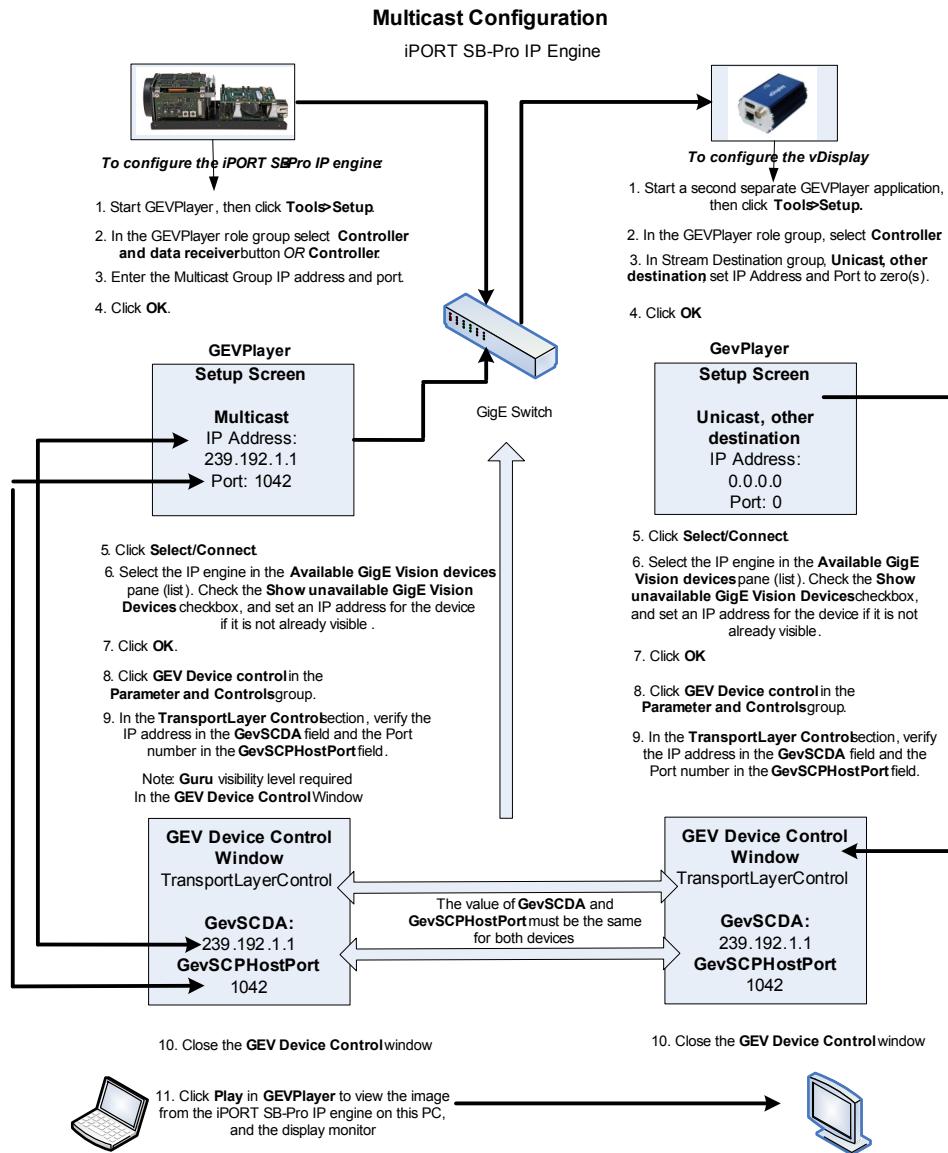
The multicast image is shown in the display monitor, below.



## 46 Configuring the iPORT SB-Pro IP Engine

An overview of steps for the simple multicasting of the iPORT SB-Pro IP engine in conjunction with the vDisplay HDMI-Pro IP engine is shown in the figure below:

**Multicast Configuration: Figure 18**



# iPORT SB-Pro IP Engine Feature Settings

## Introduction

The iPORT SB-Pro IP engine is compatible with the Automated Imaging Association (AIA) GigE Vision specification 1.2, and operates with GigE Vision and GenICam compatible applications.

## Table of Key Sony Block Features

The key Sony Block features are listed in the table below.

## Key GenICam Settings

In addition to the seven mandatory GenICam features for any compliant GigE Vision device, the iPORT SB-Pro IP engine exposes a number of additional features. Key GenICam features are listed in the table below:

### Key GenICam Settings - Standard Libraries

Feature	Description
VideoMode	Defines the video mode of the camera. This feature controls the video signal register of the camera head through the Sony VISCA protocol. 1920x1080i @ 59.94Hz 1920x1080i @ 50Hz 1440x1080i @ 59.94Hz 1440x1080i @ 50Hz 1280x720p @ 59.94Hz 1280x720p @ 50Hz (This resolution is the default)
Width	Width of the image
Height	Height of the image
OffsetX	Horizontal image offset. This feature varies for different resolutions.
OffsetY	Vertical image offset
PixelFormat	Available pixel formats are: Mono 8 YUV422Packed YUV444Packed <sup>a</sup> Not all pixel formats are available for all de-interlacing modes.
Deinterlacing	Performed by Line Duplication or Weaving. Not applicable to progressive video formats.

a. YUV444Packed pixel format is not recommended for production use due to high bandwidth requirements.

## Key Sony Block Features

These key Sony block features are incorporated into the iPORT SB-Pro IP engine, and exposed in the IP engine's GenICam XML file. More information about these commands can be found in the "[Sony HD Color Camera Module, Technical Manual \(FCB-H11\)](#)".

### Key Sony Block Features

Feature Name	Attributes	Sony VISCA Feature Commands	Description
Mute		CAM_MuteModelInq; CAM_Mute (On, Off);	Blanks the video output of Sony Block camera.
Freeze		CAM_FreezeModeInq; CAM Freeze (On;Off)	Freezes the current image
PictureEffect	Off; NegReversal; BlackandWhite	CAM_PictureEffect- ModeInq; CAM PictureEffect (Off, Neg.Art, B&W)	Enables the Sony Block camera to perform positive/negative reversal of acquired images, or output the images in monochrome 8.
EdgeEnhancement		CAM_ApertureInq; CAM Aperture Direct	Up to 16 levels of edge enhancement to images. Default is no enhancement.
InfraredFilterAuto		CAM AutoICRAuto- Inq; CAM_AutoICR (On, Off)	Controls the auto ICR auto function of the Sony Block camera. Automatically switches the settings for enabling or disabling the infrared cut filter.
InfraredFilter		CAM AutoICRInq; CAM AutoICR (On, Off)	Controls the Infrared Cut Filter function of the Sony Block camera.
InfraredCutFilter- DarknessLevel		CAM_AutoICRThresh- oldInq; CAM_AutoICR Threshold	Determines the low light threshold for enable/disable of the infrared cut filter in Auto ICR mode.
ZoomButtonsLock		CAM_KeyLockInq; CAM_KeyLock (On, Off)	Disables the on-board zoom buttons of the Sony block camera.
ZoomDigitalLimit	x1; x1p5; x2; x4; x8; x12	CAM_DZoomLimit- Inq; CAM_Dzoom (D- Zoom Limit)	Controls digital zoom limit of the Sony Block camera; decimal points are denoted by “p”.
ZoomInSpeed	Standard (default); Speed1 Speed2 Speed3 Speed4 Speed5 Speed6 Speed7 Speed8	(No direct mapping)	Controls the Zoom In speed of the Sony Block camera.
ZoomIn		CAM_ZoomTele	Performs an optical zoom in. When enabled, this feature starts from the current focal position and continues to the maximum zoom in position. The ZoomStop command stops the ZoomIn function.

### Key Sony Block Features

Feature Name	Attributes	Sony VISCA Feature Commands	Description
ZoomOutSpeed	Standard (default); Speed1 Speed2 Speed3 Speed4 Speed5 Speed6 Speed7 Speed8		Controls the Zoom Out speed of the Sony Block camera.
ZoomOut		CAM_ZoomWide	Performs an optical zoom out. When enabled, this feature starts from the current focal position and continues to the maximum zoom out position. The ZoomStop command stops the ZoomOut function.
ZoomStop		CAM_ZoomStop	Cancels a ZoomIn or ZoomOut command .



# Status LEDs

The status LEDs indicate the operating status of the iPORT SB-Pro IP engine.

## LED and Component IDs

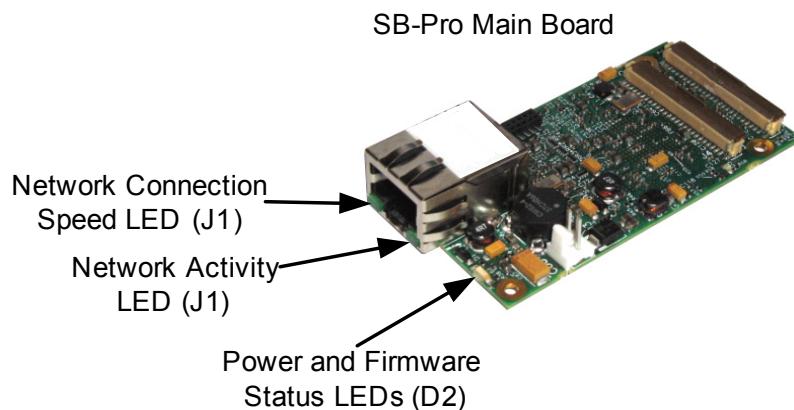
The locations and status of the indicator LEDs are listed in the table below:

### LEDs and Component IDs

LED	Component ID	Status
Power/FPGA LED	D2	Off: no power Green: power on Orange: Main firmware load is corrupted, or a dip switch is set incorrectly, forcing the IP engine to use the backup load.
Network activity LED	J1	Green; network connection; blinking green; data receive/transmit; Off; no connection
Network connection speed	J1	Green; 1 Gbps connection; Off; No connection, 10 Mbps connection, or 100 Mbps connection.

## LED Locations

The LED locations on the main board of the iPORT SB-Pro IP engine are shown in the figure below:



## 52 Status LEDs

# System Troubleshooting

## Introduction

This section provides you with troubleshooting tips and recommended solutions for issues that can occur during configuration, setup, and operation of the iPORT SB-Pro with the Sony FCB-H11 camera.

Not all problem scenarios and solutions are listed here. You can refer to the Pleora Support Center at [www.pleora.com](http://www.pleora.com) for additional support and assistance.

The Help & Support Center can help you learn more about implementing Pleora products. Use keywords to search the Pleora knowledge database for solutions and suggestions to optimize and troubleshoot Pleora Technologies products. The knowledge database includes a description of the issue and the suggested solution for your search results.

Details for creating a customer account are available in the Pleora Help & Support Center.

*NOTE!* Refer to the product release notes that are available on the Pleora Help & Support Center for known issues and other product features.

## Troubleshooting Tips

The scenarios and known problems listed below are those that you might encounter during the setup and operation of your iPORT SB-Pro IP engine. Not all possible scenarios and errors are presented and depend upon your particular network, setup, and operation.

### Symptom - Cannot Detect or Connect to iPORT SB-Pro IP Engine

The causes listed below might cause the SDK to fail to connect to the iPORT SB-Pro IP engine.

#### Power Not Supplied to iPORT SB-Pro IP Engine

Both the detection and connection to the iPORT SB-Pro IP engine will fail if power is not supplied to the device. Verify that the Network Activity LED at J1 on the main board of the IP engine, is either green (power on), or orange (data streaming). Refer to the figure under “[LED Locations](#)” in the section “[LED and Component IDs](#)” on page 51 for the location of this LED. Verify the power cable connection and a minimum of 6 volts at the connector (Maximum: 12V). Re-try connection to the IP Engine with the GEVPlayer application.

### iPORT SB-Pro IP Engine Not Connected to Network

Verify that the Network Connection Speed LED and the Network Activity LED are active at J1 (RJ-45 connector) on the main board of the IP engine. Refer to the figure under “[LED Locations](#)” in the section “[LED and Component IDs](#)” on page 51 for the location of these LEDs. If these LEDs are illuminated, check the LEDs on your network switch. If the problem persists, connect the iPORT SB-Pro IP engine directly to the PC to verify its operation.

### Symptom - Able to Connect, but No Video Appears in GEVPlayer.

The issues listed below might result in no display of video in GEVPlayer from the iPORT SB-Pro IP engine.

#### IP Engine and PC Not on Same Subnet

Video might not appear in GEVPlayer if the iPORT SB-Pro IP engine and the PC running GEVPlayer are not on the same subnet. Ensure that these two elements are on the same subnet. In addition, ensure that these devices are connected using valid gateway and subnet mask information. You can view the IP Engine IP address information in the **Available GigE Vision Devices** window in GEVPlayer. A red icon appears beside the GigE Vision device if there is a problem with the IP configuration.

#### Anti-Virus Software or Firewalls Blocking Transmission

Video might not appear in GEVPlayer because of anti-virus software or firewalls in your network. Disable all virus scanning software and firewalls, and re-attempt a connection to the iPORT SB-Pro IP engine with the GEVPlayer application.

#### Camera Not Configured Correctly to Support Multicast Configuration

Video might not appear on the display if you have not configured the iPORT SB-Pro IP engine for a multicast video network configuration. The iPORT SB-Pro IP engine and all multicast receivers (for example, a vDisplay IP engine) must have identical values for both the **GevSCDA** and **GevSCPHost-Port** attributes in the **TransportLayerControl** section. See “[Multicast Network Configuration: Figure 17.](#)” on page 41 for more information.

#### 10-Pin Coax Improperly Connected

Video does not appear on the display/PC after connecting the iPORT SB-Pro to GEVPlayer and clicking **Play**. Checking **Image Stream Control** group in GEVPlayer indicates **AcquisitionRate = 0**.

Remedy this condition by clicking **Stop** in the GEVplayer main window. Click **GEV Device Control** and choose the **Expert** visibility threshold; select **TestImageSelector** to indicate **IPEngineTestPattern**. Click **Start**; if the test pattern is displayed, click **Stop** and verify that the 10-Pin blue mini-coax cable is properly and securely connected. Retry video streaming (**Play**). If this fails, replace the coax cable.

### Symptom - Not All Features Operational

In the GEVPlayer application, GenICam node tree, some features may be denoted with a red exclamation point. Features expressed in this manner are not configurable.

#### Sony Block H11 Not Properly Connected to iPORT SB-Pro IP engine

Ensure a secure connection of the iPORT SB-Pro IP engine to the Sony Block FCB-H11 camera, replace the cables, or retry the connection with a different Sony® Block FCB-H11.

## Symptom - "Connection Lost" Message in GEVPlayer Application

During operation, the iPORT SB-Pro IP engine can lose connection to the GEVPlayer application,

### Heartbeat Timeout Too Restrictive

In the GEVPlayer application, the "Connection Lost" message can indicate restrictive settings for the heartbeat synchronization between the network PC and the iPORT SB-Pro IP engine. In the GEVPlayer application, check the heartbeat settings in the **HeartbeatInterval** parameter under the Communication Control option (button) for the PC heartbeat interval. Then, verify the **GevHeartbeatTimeout** parameter under the GEV Device Control option (button) for the IP engine's heartbeat interval.

The **HeartbeatInterval** parameter setting for the network PC must be at least double (2x) the **GevHeartbeatTimeout** parameter setting for the iPORT SB-Pro IP engine to avoid a timeout.

## Symptom - Dropped Packets

During operation, GEVPlayer, NetCommand, or another application created using the eBUS SDK may drop packets from the iPORT SB-Pro IP engine

### Insufficient PC performance

The PC being used to receive images from the IP engine may not perform well enough to handle the data rate of the image stream. The eBUS Universal Pro driver reduces the amount of PC resources required to receive images, and is recommended for those applications which require high throughput. Should the application continue to drop packets even after the installation of the eBUS Universal Pro driver, a PC with better performance may be required.

### Insufficient NIC performance

The Network Interface Card (NIC) being used to receive images from the IP engine may not perform well enough to handle the data rate of the image stream. For example, the bus connecting the NIC to the CPU may not be fast enough, or certain default settings on the NIC may not be appropriate for reception of a high-throughput image stream. Examples of NIC settings which may need to be reconfigured include the number of Rx Descriptors, and the maximum size of Ethernet packets (Jumbo Packets). Additionally, your NIC may be known not to work well in high-throughput applications. Refer to the *Network Adapters Knowledge Base Technical Note*, available on the Pleora Support Center.