User's Manual

The iPORT™ PT2000-CLM IP Engine

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1.0 Introduction

1.1 The Scope of this User's Manual

This User's Manual describes how to access and use features specific to Pleora's iPORT PT2000-CLM IP Engine. The engine is sold as a boxed unit. A custom OEM board set is also available for qualified customers. Contact Pleora for details.

1.2 Related Documents

The iPORT PT2000-CLM IP Engine is a member of Pleora's growing family of iPORT IP Engines. For information about other available models, visit www.pleora.com. All the engines share one set of core features, described in a document entitled "User's Manual, Shared Features of iPORT IP Engines."

The iPORT PT2000-CLM IP Engine is one element of the iPORT Connectivity Solution. As such, it is shipped with two PC applications: the iPORT IP Device Driver; and the iPORT Software Development Kit (SDK – available in C++ or Visual Basic). These software applications have their own documentation.

The iPORT Connectivity Solution also includes the iPORT High Memory Manager, which is described in the iPORT IP Device Drivers manual. As an option, the solution can also include iPORT Hydra™ PC Communications Software, described in the SDK C++ manual.

In summary, this User's Manual complements, and should be used in conjunction with, up to four other documents:

- User's Manual, Shared Features of iPORT IP Engines;
- User's Manual, iPORT IP Device Drivers;
- Reference Manual, The iPORT C++ Software Development Kit; and
- Reference Manual, The iPORT Visual Basic Software Development Kit.

2.0 Overview of the iPORT PT2000-CLM

2.1 Highlights

Traditionally, applications based on Medium Camera Link® cameras have been limited by:

- *Distance:* camera-to-PC connections extend only 10 meters;
- *Cost:* camera-to-PC links must run over costly specialized cable and terminate on frame grabbers; and
- *Networking:* connections are point-to-point, with no options for interconnecting multiple cameras or centralizing control and maintenance.

Pleora's iPORT PT2000-CLM IP Engine overcomes these limitations by allowing Medium-configuration Camera Link cameras to stream imaging data in real time over standard Gigabit Ethernet (GigE) links or LANs.

The engine delivers long-distance, high-performance, bi-directional links between medium Camera Link cameras and PCs. Two synchronized GigE links transport data at 2 Gb/s over 100 meters of low-cost Cat-5 (Category-5) copper LAN cable. At the PC, the GigE cables plug into standard NICs (network interface cards/chips). These NICs are inexpensive and readily available in single, dual, and quad configurations.

The engine has a built-in Camera Link frame grabber that removes horizontal and vertical blank times, which helps maximize bandwidth usage in the GigE link.

The iPORT PT2000-CLM also handles control signals from the PC and other system elements. These signals are routed through a Programmable Logic Controller that allows users to precisely measure and control the operation of conveyors, encoders, cameras, and other components – either independently from or in conjunction with the host PC on the network.

As one element of Pleora's end-to-end iPORT Connectivity Solution, the iPORT PT2000-CLM is shipped with two powerful PC applications. The iPORT IP Device Driver streams data to PC memory using minimal CPU capacity. Users can choose from two versions: the iPORT High-Performance IP Device Driver or the iPORT Universal IP Filter Driver. The iPORT SDK gives users the building blocks needed to quickly and easily enable third-party or custom video applications. For more information about the iPORT Connectivity Solution, see the "User's Manual, Shared Features of iPORT IP Engines."

2.2 Characteristics and Features

Table 1 lists key characteristics and features of the iPORT PT2000-CLM.

Hardware	
Available as OEM	Yes
Available as Boxed	Yes
Onboard Memory	16 MB (Std) 64 MB (Opt) 128 MB (Opt)
Inputs/Outputs	
TTL Inputs	2
TTL Outputs	2
LVDS Inputs	1
Optically Isolated Inputs	1
Optically Isolated Outputs	1
Camera Control Outputs	8 x LVDS
Programmable Logic Control	
Pulse Generators (timers)	8
Rescaler (16-bit)	2
Delayers	2
General Purpose Counters	2
Input Debouncing	Yes
Timestamp Generator	Yes
Timestamp Trigger	Yes
Software Controlled IO	8
GPIO Interrupts FIFO	Yes
Other	
Serial Ports (UART)	Base: 2 x LVDS (CL) Med: 1 x LVDS (CL) 1 x TTL (GPIO) (3.66)
PT2000-CLM Supply Voltage	Min: 4.5 V Typ: 5 V Max: 16 V
Power Consumption (measured at 10V)	Typ: 5.8 W Max: 5.8 W
Operating Temperature	Min: 0 °C Max: 70 °C
Storage Temperature	Min: -40 °C Max: 125 °C

Notes:
(x.xx) - Available since firmware version x.xx
NA - Not applicable
* All features supported by iPORT S/W 2.2.0
1 - RGB supported as single-tap, 24 bits
4 - NRE or other charges may apply. Contact Pleora.

Frame Grabber	
Ethernet Bandwidth	2 x 1 Gb/s
Unicast	Yes
Multicast	Yes
Static Configuration	Yes (4.01)
BOOTP	Yes
DHCP	Yes (4.06)
Number of Data Channels	Base: 2 Medium: 1
Video Sources per Data Channel	Up to 3
Video Input	Base Camera Link Medium Camera Link
Interlaced	Yes (SPARE must be used as FID)
Progressive Scan	Yes
Area Scan	Yes
Line Scan	Yes
Color	RGB Bayer
Monochrome	Yes
PT2000-CLM Data Output Formats	Grayscale Bayer RGB
Pixel Depth (bits)	8, 10, 12, 14, 16, 24
Pixel Clock	Min: 20 MHz Max: 66 MHz
Taps per Data Channel	Medium: 4 (Note 1)
Image Width (pixels) (must be multiple of 4)	Min: 4 Default: 640 Max: 32,760
Image Height (pixels)	Min: 1 Default: 480 Max: 16,383
Windowing	Base: Yes Medium: No
Decimation	Base: Yes Medium: No
Decimation by Block	Base: Yes Medium: No
Tap Reconstruction	Yes (Note 4)
Data Port Mapping	Yes
Pixel Shifting	Yes
Pixel Inversion	Yes
Recording	Yes

Table 1: iPORT PT2000-CLM Characteristics and Features

2.3 Supported Medium Modes

The iPORT PT2000-CLM interfaces to most cameras that are compatible with the Medium-configuration Camera Link standard. The camera's output taps must be balanced between the engine's Camera Link 1 connector and Camera Link 2 connector. For example, the camera must send 2 taps on the Camera Link 1 connector and the other 2 taps on the Camera Link 2 connector.[1] A camera cannot send 3 taps on one connector and 1 tap on the other connector.

Most Medium Camera Link models have a selectable output mode (see the documentation for your camera for more details). The iPORT PT2000-CLM supports the following modes:

- **Half-line**: the camera sends the first half of a line on the first connector and the rest on the second connector;
- **Half-Frame**: the camera sends the top half of an image on the first connector and the rest on the second connector; and
- **Interlaced**: The camera sends the fields of interlaced data on separate connectors.

To set up your camera in balanced mode, you must first check the camera's documentation and locate the command to send to the camera. Then, you can use that command with the Port Communication Dialog described in the "User's Manual, Shared Features of iPORT IP Engines."

[1] In 10-bit and 12-bit modes, the camera must output tap 1 and 2 on the Camera Link 1 connector and tap 3 and 4 on the Camera Link 2 connector. It is then possible to send 8-bit data by using the pixel shifting capability of iPORT to shift the data by 2 bits.

3.0 Installation

3.1 System Requirements

Please refer to the "User's Manual, Shared Features of iPORT IP Engines" for the PC configuration and network equipment recommended for use with the iPORT PT2000-CLM. Note that two GigE NICs (network interface cards/chips) are required on the host PC. One option for these two NICs is the Intel® PRO/1000 MT Dual Port Server Network Adapter.

3.2 Hardware Installation

To connect the PT2000-CLM, the following is required:

- A Camera Link base cable and Camera Link medium cable to connect to the camera (both cables should be the same length);
- Two Cat-5 or Cat-6 LAN cables to connect the PT2000-CLM to two GigE Ethernet ports on the host PC;
- A power connector (see Section 6.2 for more information); and
- Cabling for the I/O connector (if required, see Section 6.3 for more information).

Inside the iPORT PT2000-CLM are two protocol engines with consecutive MAC addresses. These connect the inputs "Camera Link 1" and "Camera Link 2" to the corresponding LAN sockets on the opposite side of the box. "Camera Link 1" connects to the LAN socket closest to the power supply and IO connector. It has the lower MAC address.

Connect the Camera Link base cable (with camera control) to the Camera Link 1 connector. Connect the Camera Link medium cable to the Camera Link 2 connector.

Connect the two Ethernet ports on the PT2000-CLM to the Ethernet ports on the host PC using the two LAN cables (or alternatively through a suitable GigE switch).

Please refer to Section 6.3 for information about the IO connector. The "User's Manual, Shared Features of iPORT IP Engines" describes how to program the internal PLC. Power is supplied to the iPORT PT2000-CLM through the power connector.

3.3 Software Installation

The iPORT PT2000-CLM is supported by Release 2.2.0 or higher of the iPORT SDK. The software included with each engine contains a self-starting installation that installs the SDK, utilities, and drivers.

Once installation is complete, the system should be tested and configured using Pleora's Coyote camera interface application. Section 4.0 describes a few extra steps and considerations relating to the use of the Coyote application with the iPORT PT2000-CLM.

To continue development, please refer to the following manuals in particular: “User’s Manual, Shared Features of iPORT IP Engines” and “iPORT C++ SDK Reference Manual.”

4.0 Camera Configuration and Control

To acquire images from the camera using the Coyote application, follow the steps outlined below. Keep in mind that many parameters related to application requirements and camera configuration settings can be changed, as outlined in the "User's Manual, Shared Features of iPORT IP Engines."

The main steps are:

1. Make sure Coyote is set up in Camera Link medium mode and has been restarted.
2. Detect devices on the network and select them. This connects the iPORT IP Engine through the GigE links.
3. Select the camera type that is connected to the engine. Coyote provides a list of known manufacturers' cameras and a generic camera type.
4. Set up the image dimensions and pixel type desired for capture and the particular mode of operation in which the camera will be used.
5. Acquire images.

The Coyote application provides a convenient tool for initial setup and testing. It also gives users access to the full set of features provided in the iPORT C++ SDK. Once familiar with these features, developers can incorporate them into custom applications using the SDK.

4.1 Setting Up Coyote for Camera Link Medium

Start the Coyote application**.** The first time you start it, the Application Options Panel shown in Figure 1 will appear. Make sure the "Camera Link medium Mode" box is checked. Now restart the application.

When the application restarts, uncheck the "Display this dialog at application startup" box.

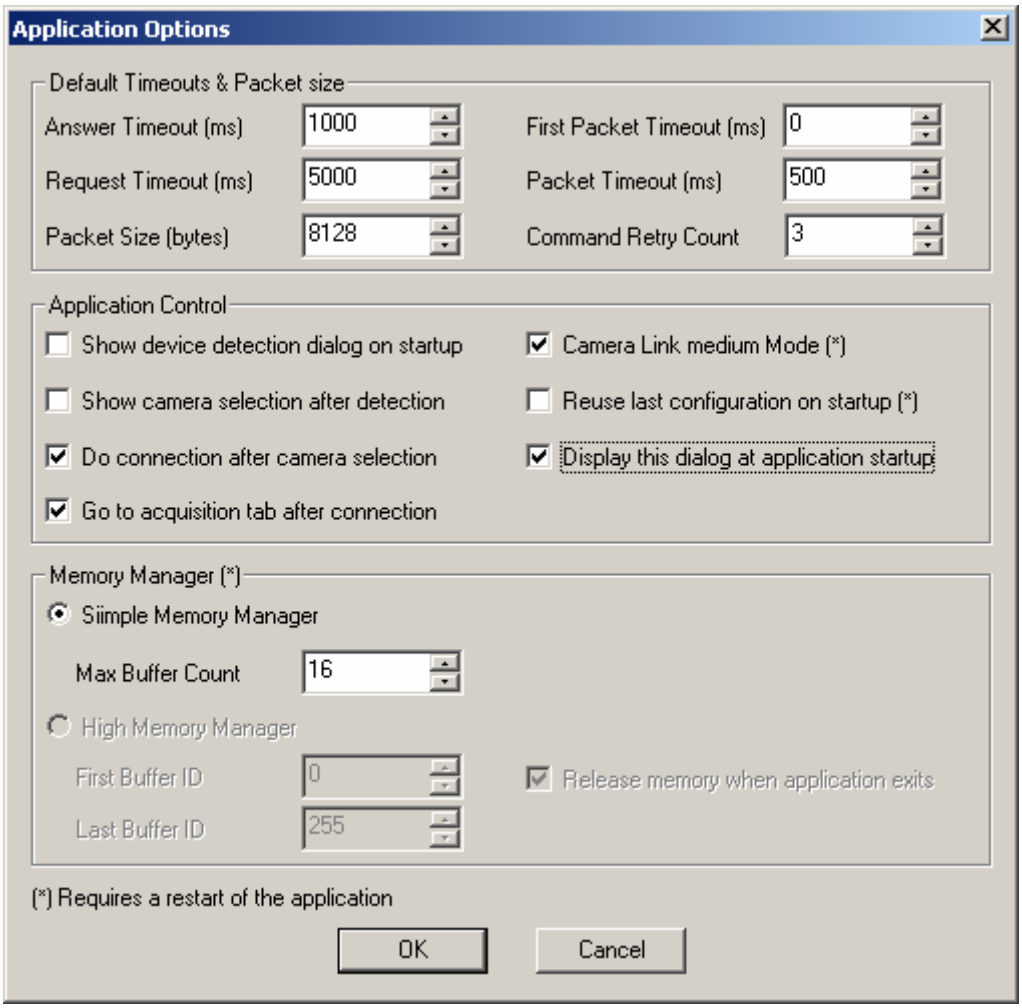


Figure 1: Application Options Panel

4.2 Selecting the Device

After restarting the Coyote application and unchecking the "Display this dialog at application startup" box, the first step is to detect and select the iPORT IP engines on the network. In medium mode, Coyote will display the detection dialog twice, once for each of the two internal engines that process the medium link.

Coyote will assume that its first device is the one that performs the following tasks:

- Serial port communication with the camera;
- Acquisition triggering; and
- GPIO signal handling;

Therefore it is important to select the first unit correctly. The two engines inside the iPORT PT2000-CLM have consecutive MAC addresses. You must always select the engine with the lowest MAC address first. This engine is always the one closest to the power and GPIO connectors.

In the example in Figure 2, the MAC addresses are 00-50-C2-1D-78-87 and 00-50-C2-1D-78-88. In this case, you would select the engine with the lower MAC address (the one ending in 87) first.

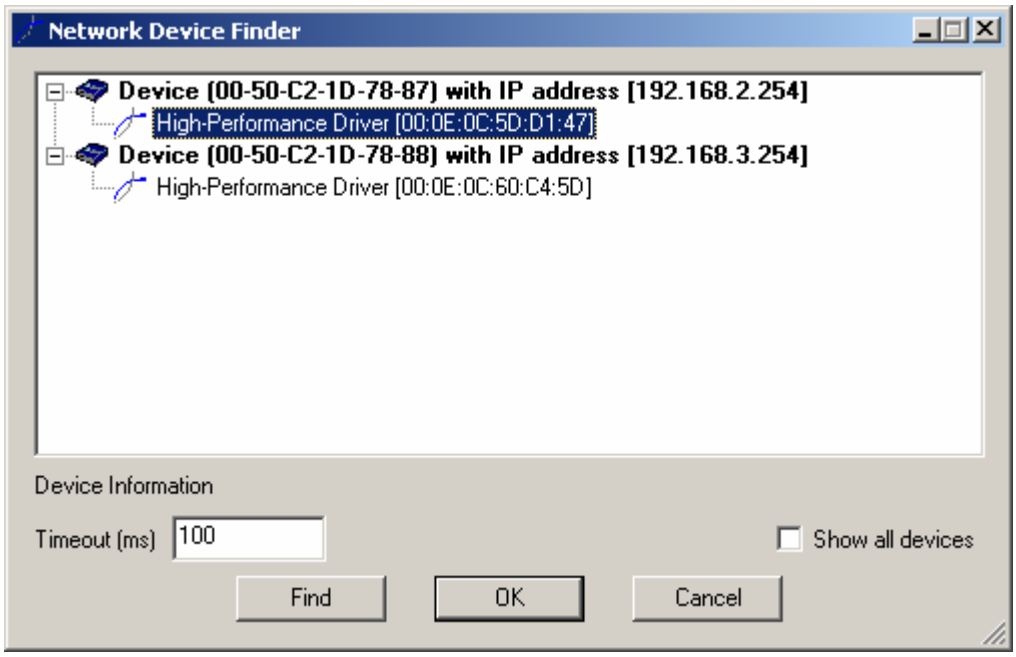


Figure 2: Network Device Finder Panel

From this point on, with minor exceptions, the Coyote Application treats a Medium Camera Link camera in exactly the same way it treats a Base Camera Link camera.

4.3 Selecting the Camera

The next step is to select the type of camera being used. On the main applications window, click **Select camera.** The screen shown in Figure 3 will appear. Select the camera model you are using. If there is no entry for your camera, select "Standard CameraLink Camera."

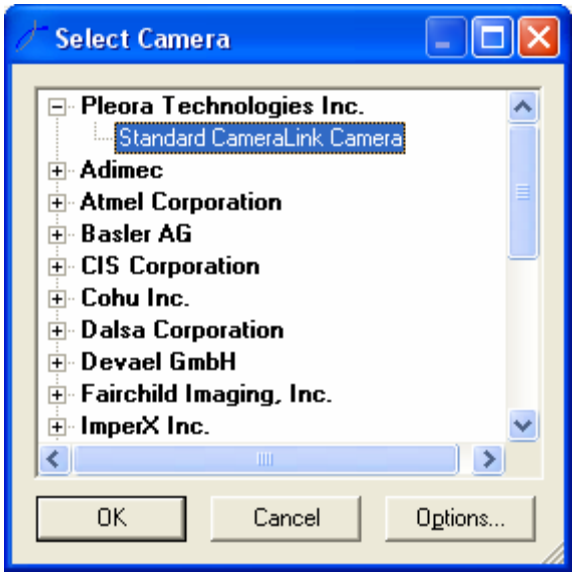


Figure 3: Select Camera Panel

4.4 Camera Configuration and Settings

The next step is to configure settings for the camera selected. Click **Configure…** to bring up the Image Settings Panel of the Camera Configuration Dialog. This panel is shown in Figure 4.

4.4.1 Image Settings

In the Image Settings Panel, define the image width and height of your camera. The image settings shown in Figure 4, for example, are for a camera capturing images that are 8,192 pixels wide with 800 lines per frame. In the Image Type dialog box, select the type of camera you are using. There are two options: line scan camera and area scan camera.

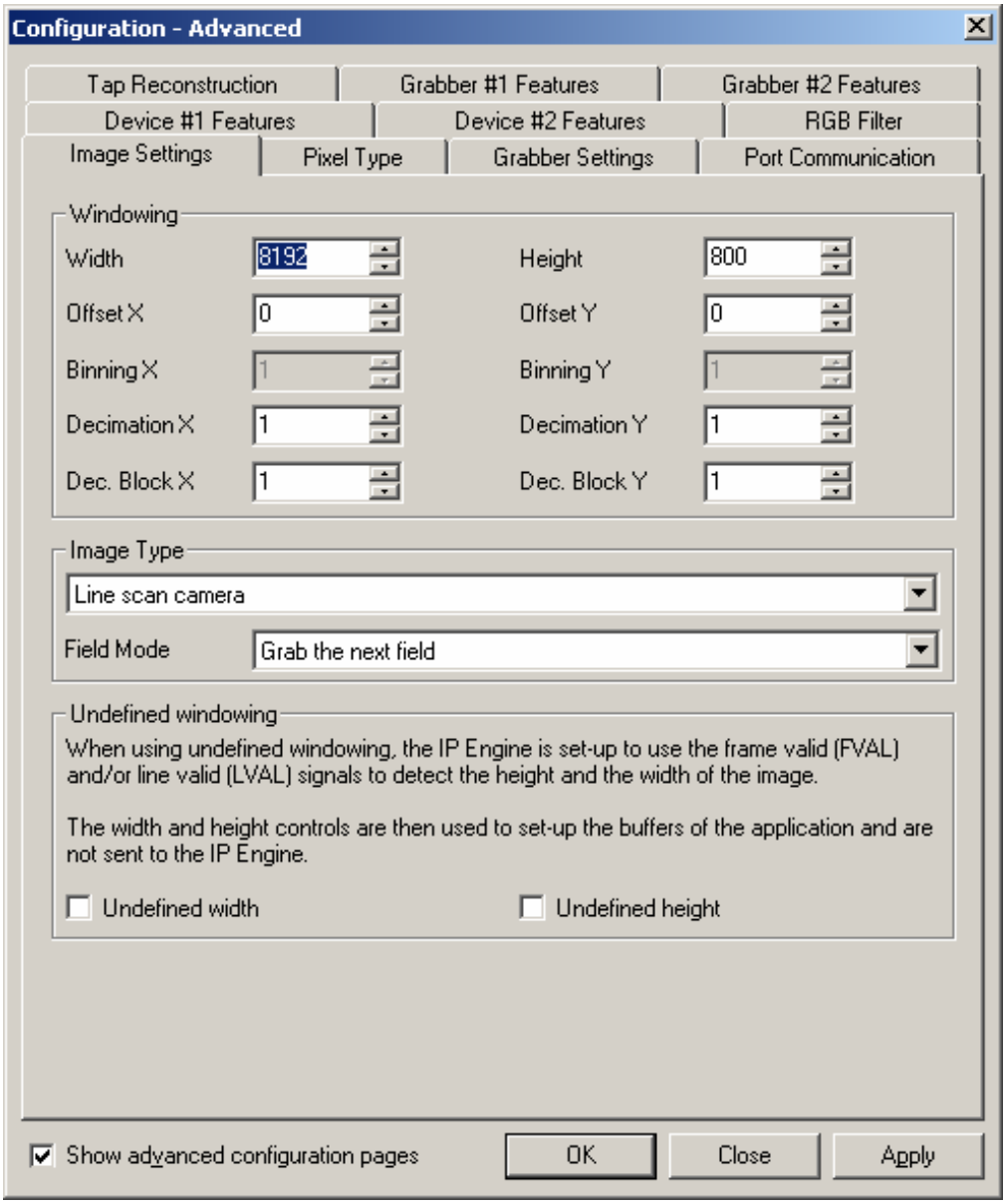


Figure 4: Image Settings Panel

4.4.2 Pixel Type

Once the basic camera settings are configured, use the Pixel Type Panel shown in Figure 5 to set the pixel type for the mode that the camera will use.

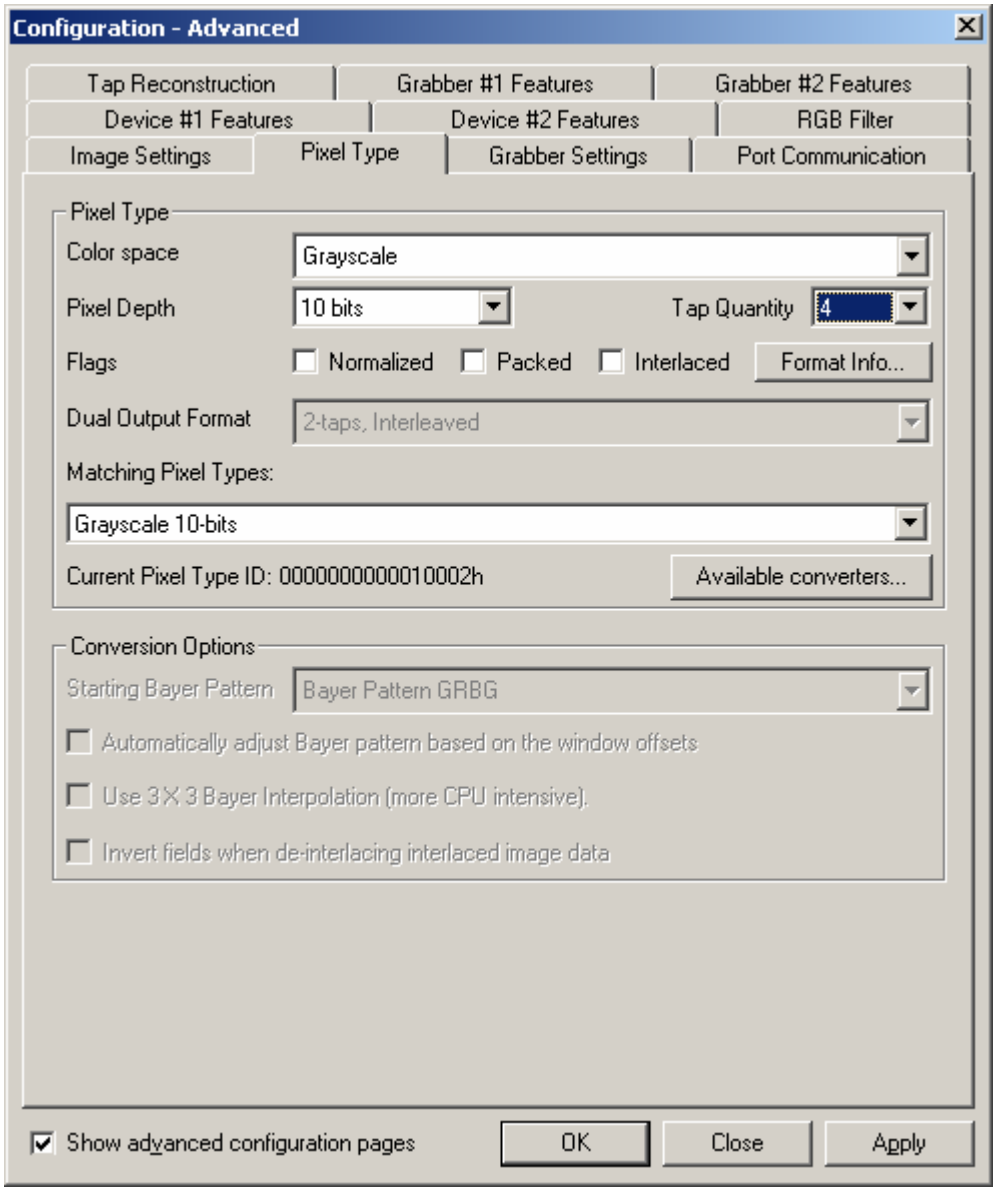


Figure 5: Pixel Type Panel

The following parameters need to be set:

Color Space: Select the color space that the pixel values represent. As shown in Figure 6, the options are: Grayscale (monochrome), Bayer RGB (camera's sensor uses a Bayer pattern matrix), RGB Color (pixel contains discrete values for RGB components), and YUV color (pixel contains discrete values for YUV components).

Pixel Depth: Set the number of bits per pixel. The options are 8, 10, 12, 14, 16, or 24 bits per pixel.

Flags: Select whether the pixels are packed, unpacked, or interlaced. For pixel depths greater than 8 bits per pixel, data may be presented either packed to fill bytes, or unpacked as contiguous bytes with unused bits to keep pixels on byte boundaries (for example, three 12-bit pixels may be packed into 2 bytes or one 12-bit pixel may be presented in two bytes).

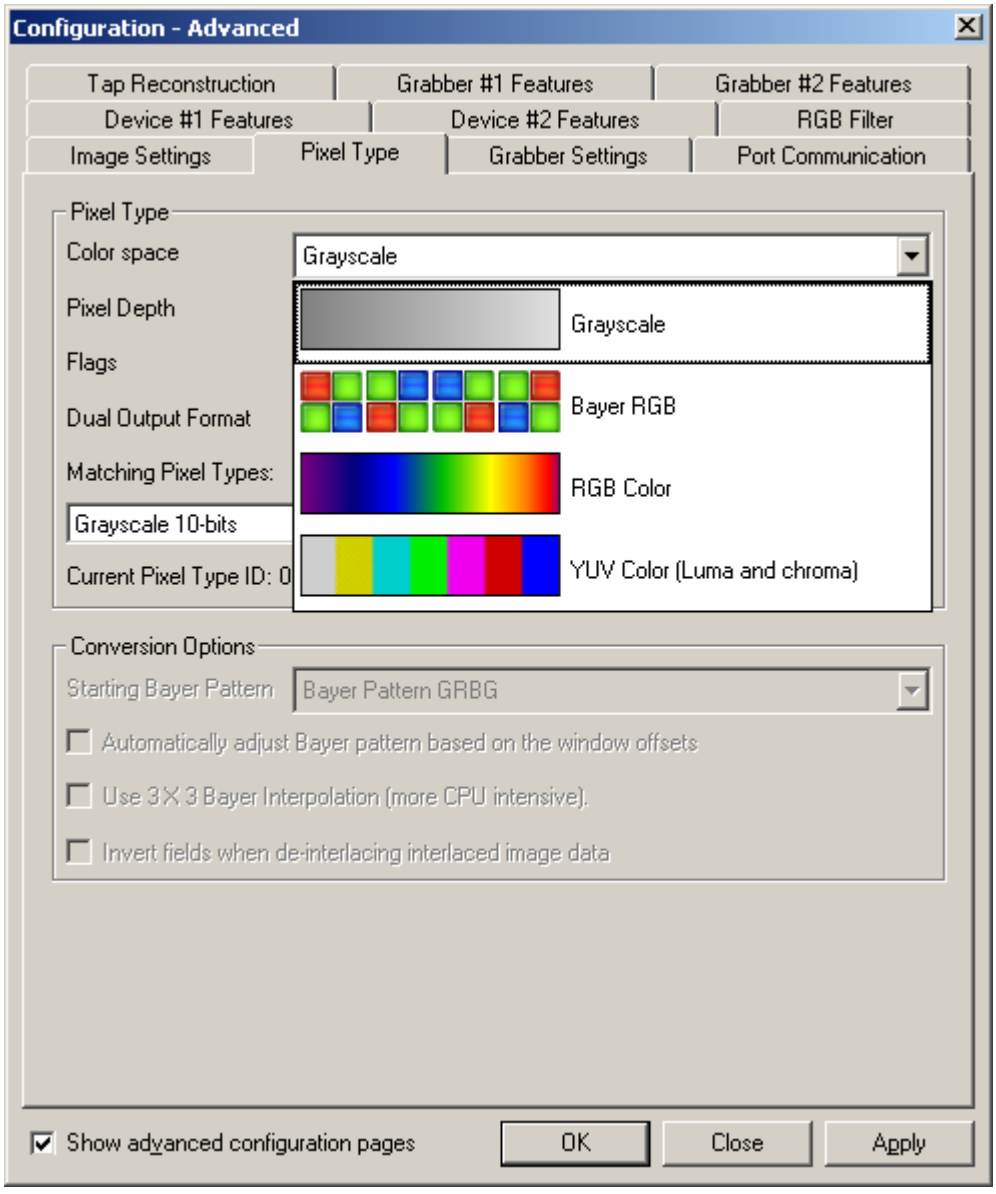


Figure 6: Pixel Type Color Space Options

Tap Quantity: Camera Link medium cameras output multiple taps over the 2 channels. Set the number of taps for the camera you are using in this box.

Dual Output Format: This combo box is not applicable to the iPORT PT2000-CLM. Any setting you apply here will be over-ruled by the hardware-based tap reconstruction feature of the engine. See Section 4.4.3 for more information.

4.4.3 Tap Reconstruction

The iPORT PT2000-CLM offers hardware-based, onboard tap construction as a standard feature. Once you have set the pixel type mode, you must set up the tap reconstruction mode. This is done from the Tap Reconstruction Panel in the Camera Configuration Dialog. To configure the Tap Reconstruction Panel, refer to the "User's Manual, Shared Features of iPORT IP Engines."

Not all tap reconstruction modes described in the Shared Features manual are supported by the iPORT PT2000-CLM. Contact Pleora if you are unsure which tap reconstruction modes are supported by your engine.

As noted in Section 4.4.2 the settings in the Tap Reconstruction Panel over-ride settings in the Dual Output Format combo box of the Pixel Type Panel.

Note: For tap reconstruction to work, the camera MUST be configured in one of the balanced Medium modes described in Section 2.2 of this manual.

4.4.4 Grabber Settings

This section describes grabber settings in the Coyote application that are specific to the iPORT PT2000-CLM. For descriptions of features that are not included in this section, see "User's Manual, Shared Features of iPORT IP Engines."

The Grabber Settings Panel, shown in Figure 7, allows you to accommodate different Camera Link medium data formats.

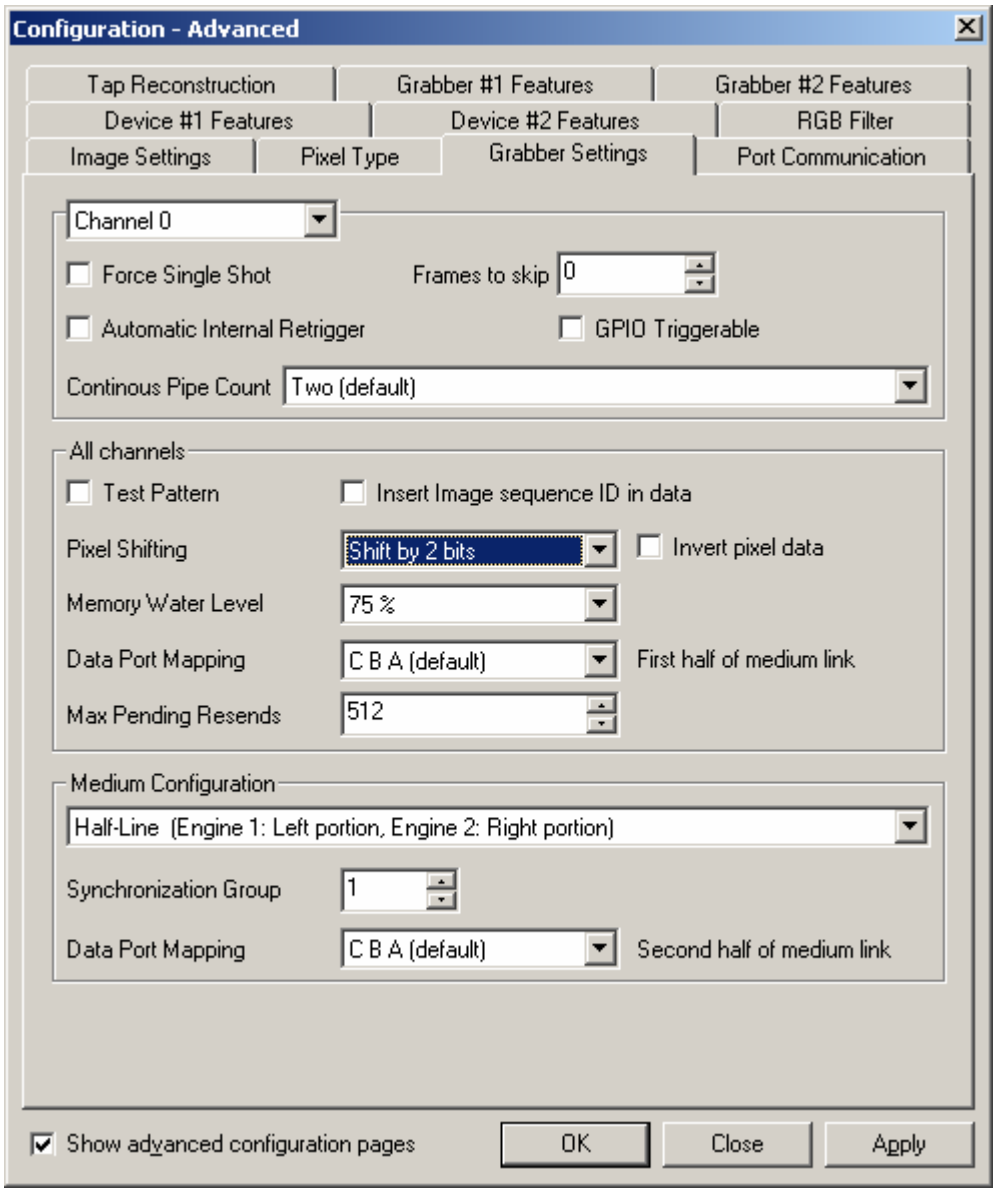


Figure 7: Grabber Settings Panel for Camera Link Medium

The settings under **All channels** define parameters for **Pixel Shifting** on both channels. For example, if the camera provides 10-bit data, the grabber can be set to shift the data by 2 bits. In this case, the images transferred to the PC are the 8 most significant bits. The **Memory Water Level** and **Max Pending Resends** settings also apply to both channels. However, note that the **Data Port Mapping** dialog box in this section applies ONLY to the base Camera Link port, or the first half of the camera output. A second Data Port Mapping box, located in the Medium Configuration section of the panel, is used to set the medium Camera Link port. See the description three paragraphs down.

The **Medium Configuration** dialog box sets the readout format based on how the camera operates in the desired mode. For example "Half-Line (Engine1: Left portion, Engine 2: Right portion)" is used if the camera outputs the first half (left) of each line on Camera Link 1 and the right half on Camera Link 2.

The **Synchronization Group** dialog box is an advanced setting for systems that have more than one iPORT PT2000-CLM connected to the host PC. When setting up subsequent IP engines, a unique number must be selected (this may be 2 for the second, 3 for the third, etc.).

The **Data Port Mapping** dialog box allows you to set the data port mapping settings for the medium Camera Link port (the second half of output). The default mapping is CBA, but other configurations are also possible.

4.4.5 Grabber Features

This section describes the panels in the Camera Configuration Dialog of the iPORT SDK that are used to configure grabbers for Camera Link cameras. Click on the Grabber #1 Features tab to bring up the panel shown in Figure 8.

There is another panel, labeled “Grabber #2 Features,” which represents the features for the second unit of the medium Camera Link connection.

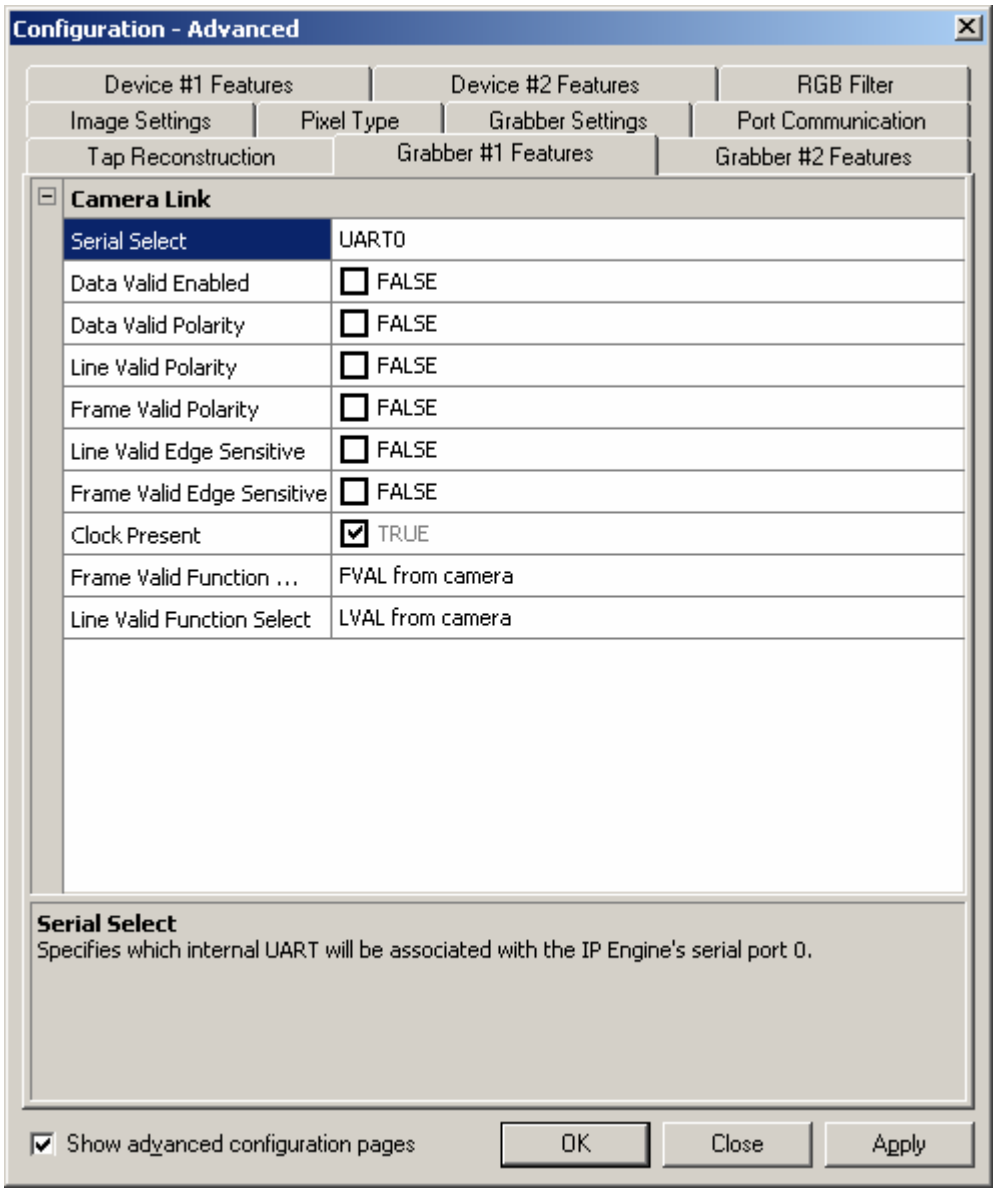


Figure 8: Grabber Features Panel

Serial Select: Indicates which UART is used for serial communications with the camera. Only UART0 is currently supported.

Data Valid Enabled: If enabled, the iPORT PT2000-CLM will handle the Camera Link Data Valid signal from the camera.

Data Valid Low Polarity: When enabled, the DVAL signal from the camera will be valid when it is low. Otherwise, the signal will be valid when it is high.

Line Valid Low Polarity: When enabled, the LVAL signal from the camera will be valid when it is low. Otherwise, the signal will be valid when it is high.

Line Valid Edge Sensitive: When enabled, the device will be sensitive to the edges of the LVAL signal. Otherwise, it will be sensitive to the level of the signal.

Frame Valid Low Polarity: When enabled, the FVAL signal from the camera will be valid when it is low. Otherwise, the signal will be valid when it is high.

Frame Valid Edge Sensitive: When enabled, the device will be sensitive to the edges of the FVAL signal. Otherwise, it will be sensitive to the level of the signal.

Camera Clock Detected: This control indicates if a clock from a camera was detected.

FVAL Function: Selects the function used as Frame Valid inside the device. The possible values are:

- Frame Valid from camera (default);
- Frame Valid from camera **AND** GPIO (Q12) from GPIO Control Block;
- Frame Valid from camera **OR** GPIO (Q12) from GPIO Control Block; and
- GPIO (Q12) from GPIO Control Block.

LVAL Function: Selects the function used as Line Valid inside the device. The possible values are:

- Line Valid from camera (default);
- Line Valid from camera **AND** GPIO (Q13) from GPIO Control Block;
- Line Valid from camera **OR** GPIO (Q13) from GPIO Control Block; and
- GPIO (Q12) from GPIO Control Block.

4.5 Acquiring an Image

Once the settings are correct for the camera and desired configuration, you are ready to acquire images from the camera. This can be achieved using the Coyote Acquisition Panel shown in Figure 9. To start acquiring images, simply click on the **Start** button. By default Coyote will start acquiring images continuously into a separate window. Optionally, the application can be configured to acquire a single frame at a time or save a sequence of frames.

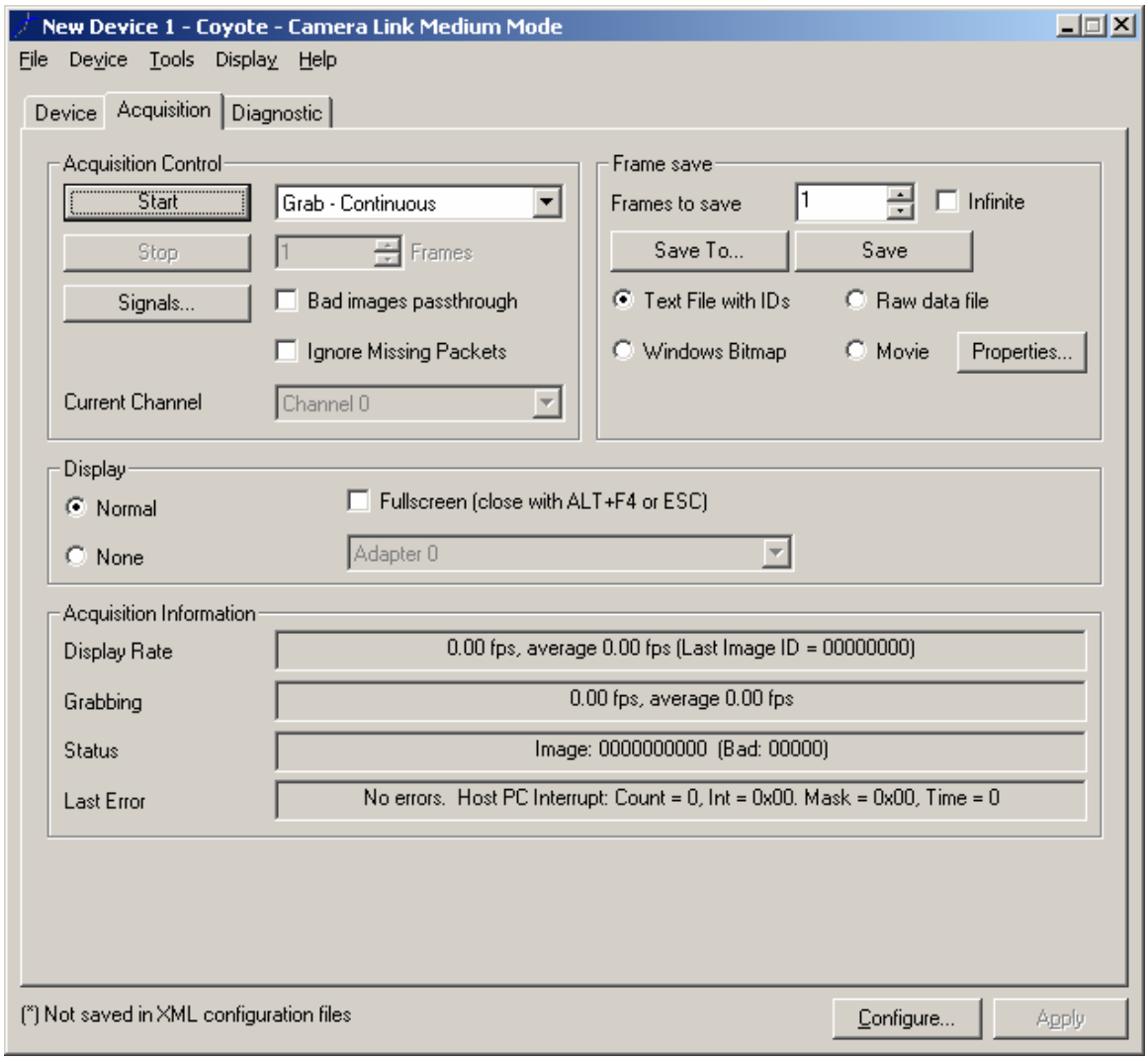


Figure 9: Acquisition Panel

For color cameras, the display window can be configured to support an RGB Bayer pattern using the Display menu. Pixels will be formatted to display properly in the window.

5.0 Signal Handling

The iPORT PT2000-CLM engine handles signals in much the same way as other iPORT IP engine models. There are a few minor differences, which are described in this section.

5.1 GPIO Control Block

The Programmable Logic Controller (PLC) in the iPORT PT2000-CLM routes signals through a sophisticated GPIO Control Block. The iPORT PT2000-CLM has two GPIO Control Blocks, one for each internal engine. Figure 10 is the GPIO Control Block diagram. Note that only the engine connected to the Camera Link 1 input has an IO connector.

For triggering purposes, there are three GPIO connections between the two engines, which are shown in Table 2. If, for example, an external trigger is used to start an acquisition, this trigger has to be provided to both of the internal engines so that images are acquired from both the Camera Link 1 and 2 connections. This can be achieved by programming the GPIO as outlined in the following sections.

IP Engine 1	IP Engine 2
TTL_IN[0]	TTL_IN[0]
Q2	TTL_IN[1]
Q7	LVDS_IN

Table 2: Internal GPIO Connections

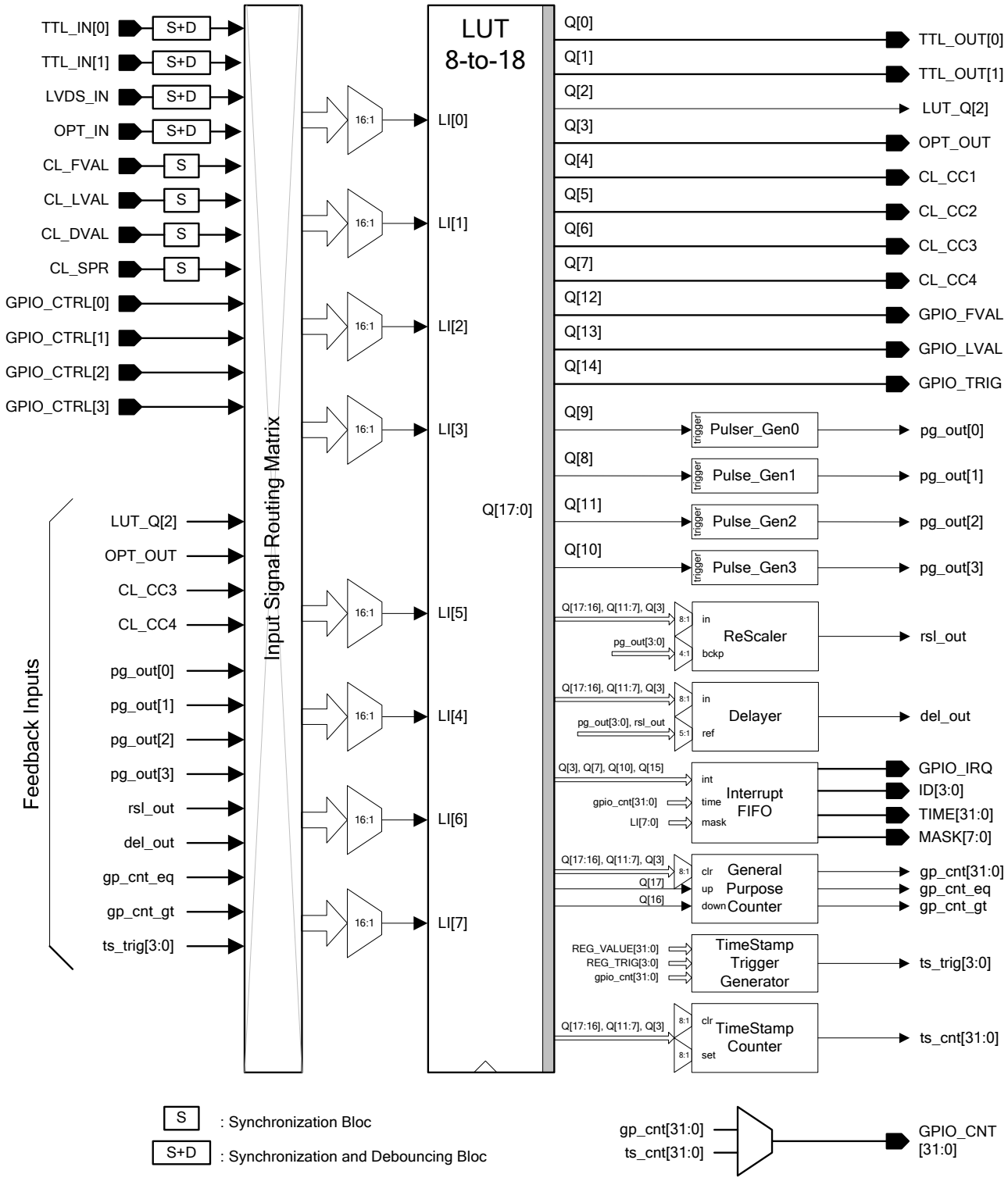


Figure 10: iPORT PT2000-CLM GPIO Control Block

5.2 GPIO Programming Signals

Table 3 lists the GPIO programming signals for inputs specific to the iPORT PT2000-CLM IP engine. The labels used for these inputs in the GPIO Look-up Table depend on the input configured in the GPIO Look-Up Table dialog. Refer to the "User's Manual, Shared Features of iPORT IP Engines" for further details.

Table 4 lists the GPIO programming signals for outputs specific to the iPORT PT2000-CLM, as well as the labels for the outputs in the GPIO Look-Up Table.

Input Signal	Description
TTL_IN[0]	TTL input 0
TTL_IN[1]	TTL input 1
LVDS_IN	LVDS input
OPTO_IN	Optically isolated input
CL_FVAL	Camera Link Frame Valid signal. Refer to camera documentation to find out how specific cameras handle this signal.
CL_LVAL	Camera Link Line Valid signal. Refer to camera documentation to find out how specific cameras handle this signal.
CL_DVAL	Camera Link Data Valid signal. Refer to camera documentation to find out how specific cameras handle this signal.
CL_SPR	Camera Link spare signal. Refer to camera documentation to find out how specific cameras handle this signal

Table 3: iPORT PT2000-CLM GPIO Input Signals

Output Signal	Label	Description
TTL_OUT[0]	Q0	TTL output 0
TTL_OUT[1]	Q1	TTL output 1
LUT_Q[2]	Q2	Feedback signal into GPIO Look-Up Table
OPT_OUT	Q3	Optically isolated output
CL_CC1	Q4	Camera Link control 1. Refer to camera documentation to find out how specific cameras handle this signal.
CL_CC2	Q5	Camera Link control 2. Refer to camera documentation to find out how specific cameras handle this signal.
CL_CC3	Q6	Camera Link control 3. Refer to camera documentation to find out how specific cameras handle this signal.
CL_CC4	Q7	Camera Link control 4. Refer to camera documentation to find out how specific cameras handle this signal.

Table 4: iPORT PT2000-CLM GPIO Output Signals

5.3 Camera Interface

5.3.1 Camera Inputs

All Camera Link cameras have four standard signals: Camera Link Frame Valid (FVAL), Camera Link Line Valid (LVAL), Camera Link Data Valid (DVAL) and Camera Link Spare (SPARE). FVAL and LVAL can be activated by positive or negative signal edges or high or low levels, and DVAL can be activated by high or low levels. For information on the polarity and type of the signals required to support specific camera models, refer to camera documentation.

The labels for Camera Link input signals in the GPIO Control Block programming language depend on the input configured in the GPIO Look-Up Table dialog. Refer to "User's Manual, Shared Features of iPORT IP Engines" for more details.

5.3.2 Camera Controls

The iPORT PT2000-CLM can send commands to cameras through the Camera Link Camera Control signals. The Camera Link specification provides four camera control signals, which can be used in a variety of ways. For information on how your camera uses them, refer to its documentation.

The labels of the control outputs to the camera in the GPIO Control Block programming language are:

- Q4, for Camera Link CC1
- Q5, for Camera Link CC2
- Q6, for Camera Link CC3
- Q7, for Camera Link CC4

5.3.3 Camera Link Serial API

This serial API is an implementation of the standard Camera Link API for serial communications. Refer to Annex B of the Camera Link specification for more information about this API.

The API dynamic-linked library (DLL) is named as dictated by the Camera Link standard: *(format: clser*.dll): clserptk.dll*. The file is installed in the C:\WINNT\system32 directory.[2]

The functions in the DLL are:

- `clSerialInit`: Initialize the serial communication for a specific board.
- `clSerialRead`: Read bytes from the camera.
- `clSerialWrite`: Write bytes to the camera.

[2] Some applications may try to search for the *clser*.dll* files elsewhere than from C:\WINNT\System32. Please refer to that application's documentation to find where to copy the *clserptk.dll* file.

- `clSerialClose`: Close the serial communication.
- `clFlushPort`: Flush all the data available on a port.
- `clGetErrorText`: Return a human readable version of an error code.
- `clGetManufacturerInfo`: Return the name of the manufacturer.
- `clGetNumBytesAvail`: Return the number of bytes available for reading.
- `clGetNumSerialPorts`: Return the number of serial ports available on the system.
- `clGetSupportedBaudRates`: Return the supported baud rates.
- `clSetBaudRate`: Change the baud rate when opening the next port.

5.3.4 CL Serial API Usage

When an application loads the Camera Link DLL, the DLL will search for and list all IP engines currently on the network. The list is compiled from a zero-based index in the order that the IP engines are found. Note that the order may change, depending on the available engines. IP engines that are dynamically discovered on the network will be named using the following format:

> MODE #INDEX IP_ADDRESS
> MODE: Either Driver or UDP.
> INDEX: The index of the network adapter (if there is more that one adapter)
> IP_ADDRESS: The IP address of the device, or "Direct" (if the device is directly connected to a High-Performance Driver card).

When loading, the Camera Link DLL will also attempt to load a file named *Config.xml* from the current directory of the application using the DLL. If the file is present, the IP engine information it contains will be added before the IP engines that are discovered on the network. The *Config.xml* file can be created using Pleora's Coyote application and must be saved in the directory of the application using the DLL. For more information about the Coyote application, see the "User's Manual, Shared Features of iPORT IP Engines."

Each configuration is then accessible with a zero-based index corresponding to the available IP engine configurations of the Configuration file.

6.0 Connectors

This section provides information about the Camera Link connectors, power connector, and IO connector on the iPORT PT2000-CLM. The Ethernet connectors are standard RJ-45 plugs.

6.1 Camera Link Connector

The iPORT PT2000-CLM uses two high-density, 26-pin MDR26 standard female Camera Link connectors (Camera Link 1 and Camera Link 2). The mating part number is the "3M 224-31 series." The connectors use the "3M 14X26-SZLB-XXX-0LC" cable, or equivalent. The pin-out is the same on both connectors. Table 5 lists the 26 pins on the connector and describes the function of each.

Pin	Camera Link Signal
1	Inner Shield
14	Inner Shield
2	X0-
15	X0+
3	X1-
16	X1+
4	X2-
17	X2+
5	Xclk-
18	Xclk+
6	X3-
19	X3+
7	SerTC+
20	SerTC-
8	SerTFG-
21	SerTFG+
9	CC1-
22	CC1+
10	CC2+
23	CC2-
11	CC3+
24	CC3-
12	CC4+
25	CC4-
13	Inner Shield
26	Inner Shield

Table 5: Camera Link Connector Pin-Out

6.2 Power Connector

The iPORT PT2000-CLM uses a Hirose 6-pin power connector, as shown in Figure 11. The part number for this connector is HR10A-7R-6P; its mating part number is HR10A-7P-6S. Table 6 lists the six pins in the connector and describes the function of each.

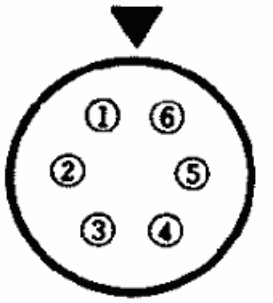


Figure 11: Power Connector for the iPORT PT2000-CLM

Pin	Description
1	VIN 4.5 V to 16 V regulated
2	VIN 4.5 V to 16 V regulated
3	VIN 4.5 V to 16 V regulated
4	Ground
5	Ground
6	Ground

Table 6: Power Connector Pin-Out for the iPORT PT2000-CLM

6.3 IO Connector

The iPORT PT2000-CLM use the Hirose 12-pin IO connector shown in Figure 12. The part number for this connector is HR10A-10R-12S; the mating part number is HR10A-10P-12P. Table 7 lists the 12 pins in the connector and describes the function of each.

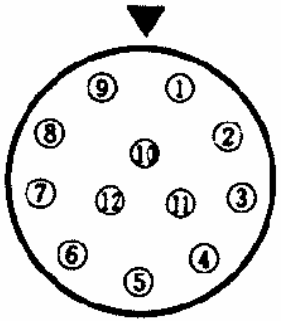


Figure 12: IO Connector for the iPORT PT2000-CLM

Pin	Signal Name	Description
1	OPT0_OUT-	Optically isolated negative output
2	OPT0_OUT+	Optically isolated positive output
3	TTL_IN[0]	TTL input 0
4	TTL_OUT[0]	TTL output 0
5	TTL_OUT[1]	TTL output 1
6	TTL_IN[1]	TTL input 1
7	OPT0_IN-	Optically isolated negative input
8	OPT0_IN+	Optically isolated positive input
9	LVDS_IN-	Low-voltage differential signal negative input
10	LVDS_IN+	Low-voltage differential signal positive input
11	GND	Ground
12	VCC	3.3 V at 100 mA max

Table 7: IO Connector Pin-Out for iPORT PT2000-CLM

7.0 Mechanical Drawings

Figure 13 to Figure 16 are mechanical drawings of different views of the PT2000-CLM. The enclosure is made from anodized aluminum and provides four mounting holes. The mounting hole diameter and the slot width are both 0.17 +/- 0.01 inches. All measurements are in inches unless otherwise specified. The measurements have the following tolerances, depending on the number of significant digits provided:

.X	±0.1
.XX	±0.01
.XXX	±0.005

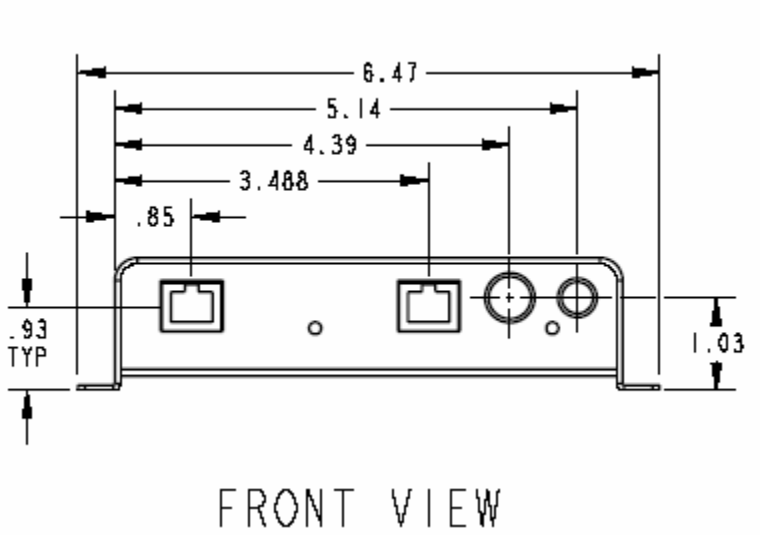


Figure 13: Front View of the iPORT PT2000-CLM

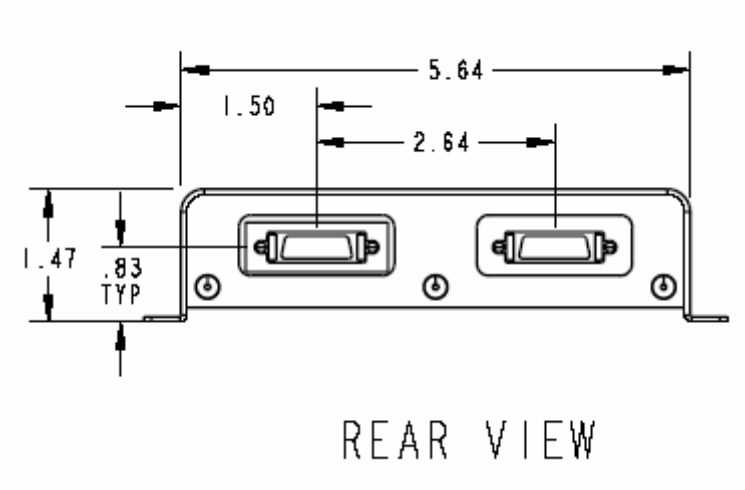
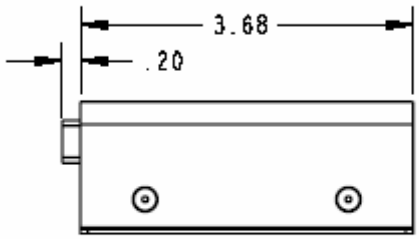
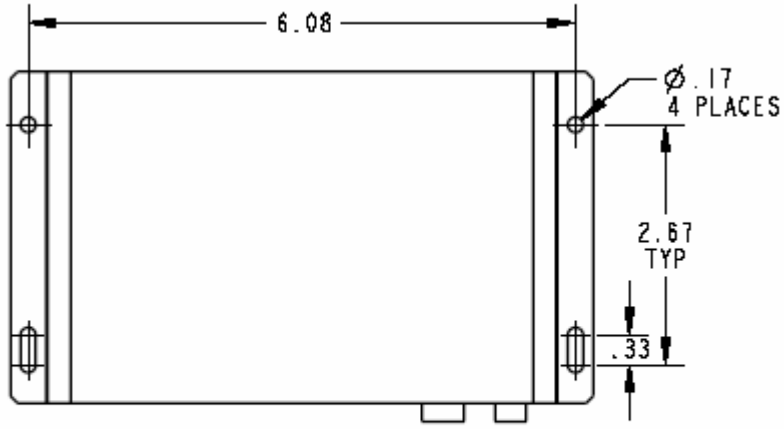


Figure 14: Rear View of the iPORT PT2000-CLM



SIDE VIEW

Figure 15: Side View of the iPORT PT2000-CLM



TOP VIEW

Figure 16: Top View of the iPORT PT2000-CLM

8.0 Additional Support

For further technical support, contact Applications Support at Pleora Technologies Inc. by calling +(613) 270-0625 or sending an email to support@pleora.com.

8.1 Revision History

Revision	Date	Description
2.1.4	June 2005	Creation
060206	February 2006	- Modified text to reflect iPORT Software V2.2.0 - Added Characteristics and Features table - Reordered sections - Updated formatting to comply with new Pleora template