



## CMV71 USB3/GigE GenICam Integration App Note



| Revision | Date    | Description                   |
|----------|---------|-------------------------------|
| A        | 5/29/20 | Release                       |
| B        | 9/1/20  | Added USB3 compatibility note |
|          |         |                               |
|          |         |                               |
|          |         |                               |

# Introduction

GeniCam integrated features should be compatible with all software that supports GeniCam and has a driver that supports Pleora USB3/GigE, such as Halcon. Device controls may be presented differently depending on the software used. The following guide will use Pleora eBUS Player for illustrative purposes. See the [CMV-71 Manual](#) for cabling and Pleora software installation.

The illunis app is no longer needed for basic camera functions. Settings are now handled through GeniCam integration. If advanced features are needed follow the guide on installing the illunis app and building the serial bridge in the [CMV-71 Manual](#).

**Note:** Building a serial bridge is only available when using Pleora drivers and eBUS player or an eBUS SDK application. If using alternate software or drivers, a serial bridge will not be available and all camera head communication will have to pass through the GeniCam interface.

## Pleora USB3 Compatibility Notes

Pleora has tested and supports the following USB3 Host Controllers:

- NEC Electronics/Renesas Electronics chipset
- Intel® Ivy Bridge chipset

illunis has tested the following USB3 Host Controllers:

- ASMedia chipset
- Intel® Kaby Lake chipset

USB3 hubs are not officially supported by Pleora. illunis has found no issues with high quality powered USB3 hubs. Multiple cameras streaming through a hub will lower framerates due to USB3 bandwidth limitations.

illunis has also found active USB3 extension cables to be compatible and recommends cables marketed for USB3 Vision.

USB3 Host controllers not recommended for Pleora USB3:

- AMD chipsets

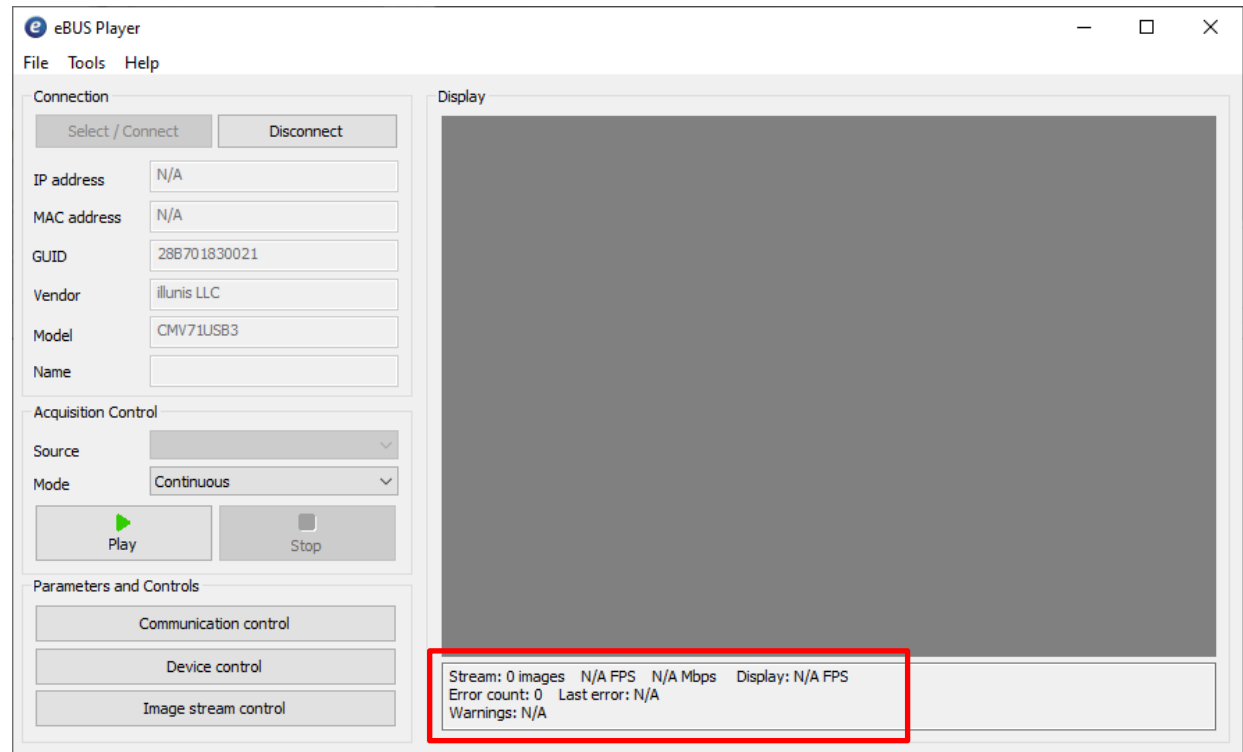
Use of unsupported USB3 hardware may result in:

- Difficulty discovering/connecting to the camera
- Unexpected drop outs of the image stream
- USB3 device disconnects

# Getting Started

Default settings are already configured on the Pleora interface. After connecting a camera with eBUS Player, Click **Play** to see a live image.

Note: Stream information is displayed under the live image window. Errors or warnings may indicate an issue with cables or the computer port the camera is connected to. Check cable length and quality. USB3 is not compatible with passive hubs; high quality active hubs may work but are not recommended. Some USB3/GigE chipsets are not capable of the bandwidth the CMV50 requires and may drop frames.



# Settings

To view and change integrated camera settings click **Device control**.

GenICam Standard Features and Naming Conventions (SFNC) are used wherever possible to access the camera features.

Integrated camera features that are not in the SFNC are implemented as custom features and can be found under the **illunis** category.

All features integrated with the camera will be found under **Visibility: Beginner**. To access more Pleora specific features you may select **Expert** or **Guru** Visibility.

Device Control

Visibility: Beginner

- DeviceControl**
  - DeviceVendorName: **None** (1.0)
  - DeviceModelName: CMV71USB3
  - DeviceFamilyName: CMV
  - DeviceManufacturerInfo: iPORT NTx-U3-PT03-PB0UP0
  - DeviceVersion: Version 1.0
  - DeviceFirmwareVersion: 1.02.02.03
  - DeviceUserID:
  - DeviceSFNCVersionMajor: 2
  - DeviceSFNCVersionMinor: 1
  - DeviceSFNCVersionSubMinor: 0
  - DeviceTLVersionMajor: 1
  - DeviceTLVersionMinor: 0
  - DeviceGenCPVersionMajor: 1
  - DeviceGenCPVersionMinor: 0
  - DeviceLinkSelector**: 0
  - DeviceTemperature: 42 C
  - DeviceClockFrequency: 2e+007 Hz
- ImageFormatControl**
  - Width: 10000
  - Height: 7096
  - OffsetX: 0
  - OffsetY: 0
  - PixelFormat: BayerRG12Packed
  - TestPattern: Off
- AcquisitionControl**
  - AcquisitionMode: Continuous
  - AcquisitionFrameCount: 1
  - AcquisitionFrameToSkip: 0
  - TriggerMode: On
  - TriggerSoftware: {Not available}
  - TriggerSource: Line0
  - TriggerActivation: RisingEdge
  - ExposureMode: Timed
  - ExposureTime: 150000 us
- AnalogControl**
  - Gain: 1 -
- Device Vendor Name**

Name of the manufacturer of the device.

Max Length: 11 bytes

Feature Name: **DeviceVendorName**  
 Type: **String**  
 Name Space: **Standard**  
 Visibility: **Beginner**  
 Streamable: **False**

Device Control

Visibility: Beginner

- UserSetControl**
  - UserSetSelector**: Default
  - UserSetLoad: {Command}
  - UserSetSave: {Not available}
  - UserSetDefault: UserSet1
- illunis**
  - Info**
    - FPGAVersion: 00F0.0061
    - MicroVersion: 00F0.017E
    - SerialNumber: K2519020034
  - Corrections**
    - HotPixel**
      - HotPixelCorrector: False
      - HotPixelCorrectionType: Bayer
      - HotPixelThreshold: 128
      - PixelCorrector: False
      - ColumnCorrector: True
      - RowCorrector: False
      - FormattedCommand:
      - SaveCameraState:
      - OSD: Off
- Device Vendor Name**

Name of the manufacturer of the device.

Max Length: 11 bytes

Feature Name: **DeviceVendorName**  
 Type: **String**  
 Name Space: **Standard**  
 Visibility: **Beginner**  
 Streamable: **False**

# SFNC Settings

Note: Some settings can only be changed when frame acquisition is stopped. These settings will be grayed out in Device Control when images are streaming. Click **Stop** on the main eBUS player to adjust settings as needed.

**DeviceTemperature** – Read only. This is the camera mainboard temperature, updated every 30 seconds.

**DeviceClockFrequency** – Sensor clock frequency in Hz. Valid values are 20MHz (2e+007 Hz), 30MHz (3e+007 Hz), and 40MHz (4e+007 Hz). Invalid entries will be rounded to the nearest valid value. Value must be written in Hz.

20Mhz – Base Mode, allows 8,10,12 bit format. ~2 FPS

30Mhz – Medium Mode, allows 8 bit format. ~3 FPS

40Mhz – Medium Mode (overlocked), allows 8 bit format. ~4 FPS

**PixelFormat** – This changes the camera bit depth and configures the Pleora interface settings to receive the image. Only valid formats based on **DeviceClockFrequency** will be available.

**TestPattern** – Turns on test patterns.

- iPORTTestPattern – Directly from the Pleora interface. Does not test communication with camera head.
- Output – From camera head. Tests image transfer from camera head to Pleora board.
- Input – From camera head. Tests the internal data path of the CMV-71 FPGA.

Device Control

Visibility Beginner

**DeviceControl**

|                           |                          |
|---------------------------|--------------------------|
| DeviceVendorName          | Ams LLC                  |
| DeviceModelName           | CMV71USB3                |
| DeviceFamilyName          | CMV                      |
| DeviceManufacturerInfo    | iPORT NTx-U3-PT03-PB0UP0 |
| DeviceVersion             | Version 1.0              |
| DeviceFirmwareVersion     | 1.02.02.03               |
| DeviceUserID              |                          |
| DeviceSFNCVersionMajor    | 2                        |
| DeviceSFNCVersionMinor    | 1                        |
| DeviceSFNCVersionSubMinor | 0                        |
| DeviceTLVersionMajor      | 1                        |
| DeviceTLVersionMinor      | 0                        |
| DeviceGenCPVersionMajor   | 1                        |
| DeviceGenCPVersionMinor   | 0                        |
| DeviceLinkSelector        | 0                        |
| DeviceTemperature         | 44 C                     |
| DeviceClockFrequency      | 2e+007 Hz                |

**ImageFormatControl**

|             |                 |
|-------------|-----------------|
| Width       | 10000           |
| Height      | 7096            |
| OffsetX     | 0               |
| OffsetY     | 0               |
| PixelFormat | BayerRG12Packed |
| TestPattern | Off             |

**Device Vendor Name**  
Name of the manufacturer of the device.  
Max Length: 11 bytes  
Feature Name: DeviceVendorName  
Type: String  
Name Space: Standard  
Visibility: Beginner  
Streamable: False

# SFNC Settings

## TriggerMode

- Off – Camera **Free Run** mode
- On – Camera **Triggered Programmed Mode (TPE)** or **Triggered Pulse Width (TPW)** based on **ExposureMode** setting below.

**TriggerSoftware** – Sends a software trigger to the camera. Only available when **TriggerSource** is set to Software. Exposure will be the **ExposureTime** value.

## TriggerSource

- Line0 – External trigger through the camera power connector.
- Software – Enables **TriggerSoftware**.

**Note:** When software trigger is enabled the camera will still respond to external triggers from the power connector.

## TriggerActivation

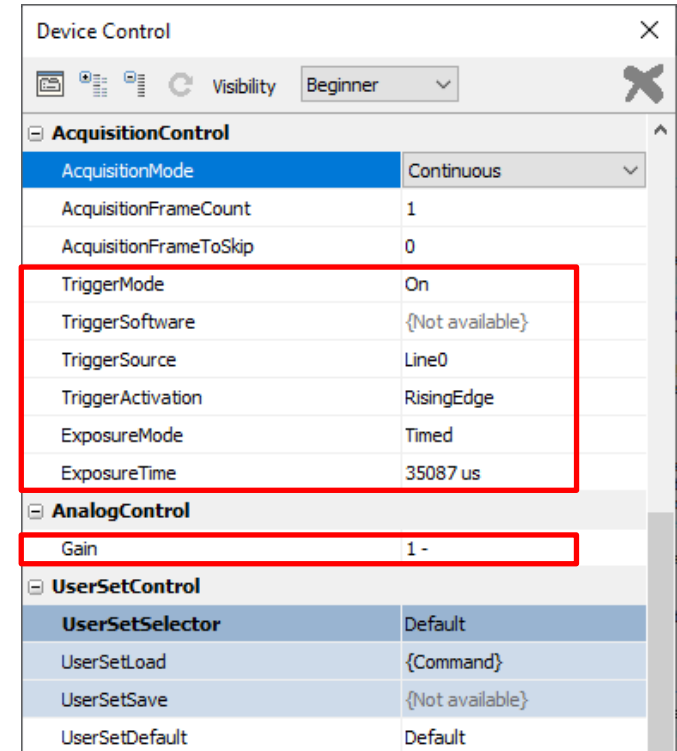
- RisingEdge – Camera trigger on rising edge in TPE and active high in TPW.
- FallingEdge – Camera trigger on falling edge in TPE and active low in TPW.

## ExposureMode

- Timed – Sets **Triggered Programmed Mode (TPE)** in camera. Camera exposure will be the **ExposureTime** setting.
- TriggerWidth – sets **Triggered Pulse Width (TPW)** in camera. **ExposureTime** will be ignored and Line0 pulse width will determine exposure.

**ExposureTime** – Sets the exposure of images in **Free Run** and **Triggered Programmed Mode** in  $\mu$ s. After setting an exposure, the value will update to reflect the actual exposure applied in the camera.

**Gain** – Sets the digital gain of the camera. 1 will apply no digital gain. After setting the Gain, the value will update to reflect the actual gain applied in the camera.



## Custom Settings

Custom features are not part of the GenICam SFNC. Some software may require setting changes to make these settings visible.

**FPGAVersion** – FPGA version loaded into the camera head.

**MicroVersion** – Microcontroller version loaded into the camera head.

**SerialNumber** – Serial number of the camera. This is the serial number that will be requested for illunis technical support. **DeviceSerialNumber** (under Device Control Expert Visibility) and the **Serial Number** shown on the Device Selection screen refer to the Pleora interface board.

**HotPixelCorrector** – Enables and disables hot pixel corrector in the camera.

**HotPixelCorrectionType** - Set to Mono or Bayer depending on sensor type.

**HotPixelThreshold** – Sets the threshold a pixel will be determined as hot and corrected. See the [CMV-71 Manual](#) for details.

**PixelCorrector** - Enables and disables pixel corrections loaded in the camera.

**ColumnCorrector** - Enables and disables column corrections loaded in the camera.

**RowCorrector** - Enables and disables row corrections loaded in the camera.

**OSD** – Enable various on screen displays available in the camera.

Device Control

Visibility Beginner

|                        |                 |
|------------------------|-----------------|
| ExposureMode           | Timed           |
| ExposureTime           | 150000 us       |
| <b>AnalogControl</b>   |                 |
| Gain                   | 1 -             |
| <b>UserSetControl</b>  |                 |
| <b>UserSetSelector</b> | Default         |
| UserSetLoad            | {Command}       |
| UserSetSave            | {Not available} |
| UserSetDefault         | UserSet1        |
| <b>illunis</b>         |                 |
| <b>Info</b>            |                 |
| FPGAVersion            | 00F0.0061       |
| MicroVersion           | 00F0.017E       |
| SerialNumber           | K2519020034     |
| <b>Corrections</b>     |                 |
| <b>HotPixel</b>        |                 |
| HotPixelCorrector      | False           |
| HotPixelCorrectionType | Bayer           |
| HotPixelThreshold      | 128             |
| PixelCorrector         | False           |
| ColumnCorrector        | True            |
| RowCorrector           | False           |
| FormattedCommand       |                 |
| SaveCameraState        | {Not available} |
| OSD                    | Off             |

## Custom Settings

**FormattedCommand** – Sends a formatted serial command to the camera head. This can be used to change camera settings that are not part of the GenICam integration without the need to build a serial bridge. Available settings can be found in the [CMV-71 Manual](#).

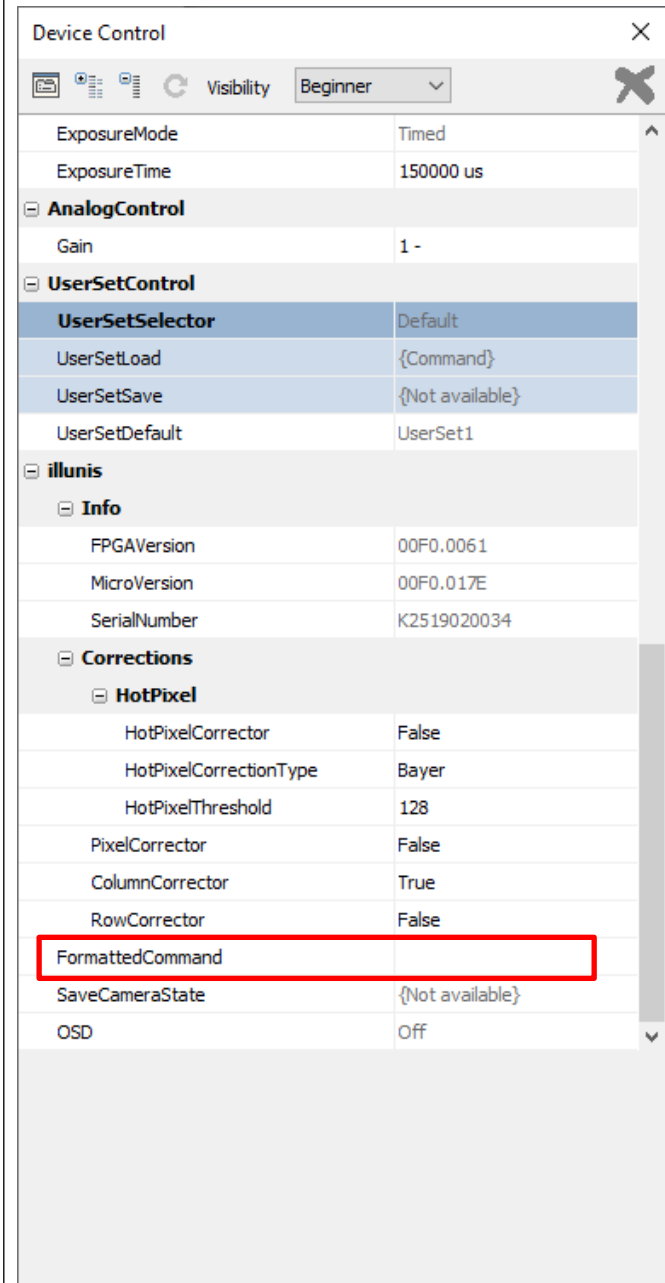
The user must send the full formatted serial command. For example {r0202000000} will read the current exposure in milliseconds. Details on how to format a serial command can be found in the [CMV-71 Manual](#).

After sending a command, the FormattedCommand field will update with the camera response.

- For write commands this will be a '!' to acknowledge the command was received and valid.
- For read commands the response will be a '!' followed by the 4 character data in hex. 

|                  |       |
|------------------|-------|
| FormattedCommand | !946B |
|------------------|-------|
- Invalid commands will respond with '?'

Note: Avoid changing settings with **FormattedCommand** that are integrated into the GenICam (exposure, readout mode, bit depth, etc.). The settings in Pleora Device Control will not update and will be out of sync with the camera.



The screenshot shows the 'Device Control' window with a 'Beginner' visibility level. The settings are organized into several sections:

- ExposureMode**: Timed
- ExposureTime**: 150000 us
- AnalogControl**: Gain: 1 -
- UserSetControl**:
  - UserSetSelector**: Default
  - UserSetLoad**: {Command}
  - UserSetSave**: {Not available}
  - UserSetDefault**: UserSet1
- illunis**:
  - Info**:
    - FPGAVersion**: 00F0.0061
    - MicroVersion**: 00F0.017E
    - SerialNumber**: K2519020034
  - Corrections**:
    - HotPixel**:
      - HotPixelCorrector**: False
      - HotPixelCorrectionType**: Bayer
      - HotPixelThreshold**: 128
    - PixelCorrector**: False
    - ColumnCorrector**: True
    - RowCorrector**: False

- FormattedCommand**: (This field is highlighted with a red box and is currently empty.)
- SaveCameraState**: {Not available}
- OSD**: Off



# Saving Settings

## Camera Settings

Most GenICam integrated settings are stored in the camera head. When the camera is powered up the settings are synced with the Pleora interface board. To make setting changes permanently click the **SaveCameraState** button. Saving state takes approximately 30 seconds to complete. The Device Control interface may appear unresponsive during this time.

## Pleora Interface Settings

Pleora interface settings, **PixelFormat** being the most notable, are saved using **UserSets**. To make changes apply at power up:

1. Set **UserSetSelector** to UserSet1.
2. Click **UserSetSave**.
3. Change **UserSetDefault** to UserSet1.
4. Click **UserSetSave**.

After initially setting up **UserSetsControl**, future changes to Pleora interface setting only require **UserSetSave** to be clicked.

|                        |                 |
|------------------------|-----------------|
| illunis                |                 |
| Info                   |                 |
| FPGAVersion            | 00F0.0061       |
| MicroVersion           | 00F0.017E       |
| SerialNumber           | K2519020034     |
| Corrections            |                 |
| HotPixel               |                 |
| HotPixelCorrector      | False           |
| HotPixelCorrectionType | Bayer           |
| HotPixelThreshold      | 128             |
| PixelCorrector         | False           |
| ColumnCorrector        | True            |
| RowCorrector           | False           |
| FormattedCommand       |                 |
| SaveCameraState        | {Not available} |
| OSD                    | Off             |

|                 |             |
|-----------------|-------------|
| UserSetControl  |             |
| UserSetSelector | UserSet1    |
| UserSetLoad     | {Command}   |
| UserSetSave     | UserSetSave |
| UserSetDefault  | Default     |

|                 |             |
|-----------------|-------------|
| UserSetControl  |             |
| UserSetSelector | UserSet1    |
| UserSetLoad     | {Command}   |
| UserSetSave     | UserSetSave |
| UserSetDefault  | UserSet1    |