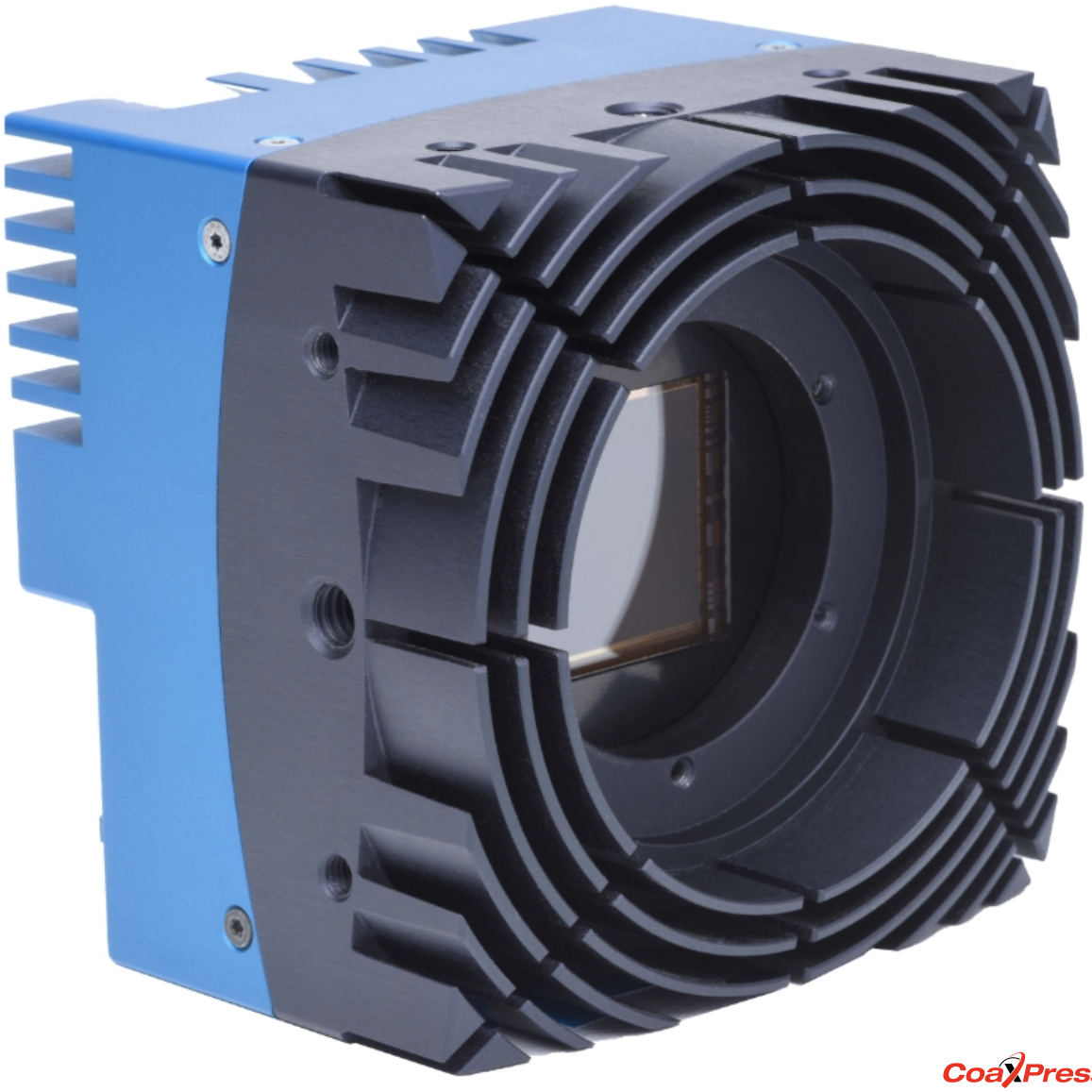
SVS-VISTEK



CoaXPress®

EoSens® 21CXP2

Reference Guide

A TKH TECHNOLOGY COMPANY

Contents

1 Before you start

1.1 About this manual

This manual contains helpful information to install and operate the described camera. It has been produced with care. Nevertheless, information might be erroneous or incomplete. SVS-Vistek GmbH cannot be held responsible for any problems resulting from incomplete or erroneous information.

Read this manual carefully.

NOTICE **This manual is subject to change without notice.**

It is intended for staff with technical qualifications who have been specially trained and have the appropriate knowledge in the field of automation technology, electrical and optical devices.

INFO *Keep this manual for future use.*

1.1.1 Tips and notes

This manual contains notes that help to avoid data loss or camera damage, and tips that provide information to improve handling the camera. They are marked as follows:

Tips

INFO *Provides information that may help to improve camera handling or avoid data loss.*

Notes

NOTICE **Provides information to avoid damage to the system.**

1.1.2 Registered trademarks

In this manual the following registered trademarks may be used:

- MotionBLITZ®
- ImageBLITZ®
- EoSens®
- GenICam®
- Microsoft® and Windows®
- Intel®

Throughout the manual, these trademarks are not specifically marked as registered trademarks. This in no way implies that these trademarks can be used in another context without the trademark sign.

1.1.3 Conformity and use

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions given in this guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will have to correct the interference at its own expense.

NOTICE You are herewith cautioned that any changes or modifications not expressly approved in this description could void your authority to operate this equipment.

制造说明

此设备的生产与测试依照FCC条例第15条条例，符合A类电子设备标准。产品提供在商用使用环境中的合理保护，以防止使用过程中可能涉及到的损害。

此设备会产生、使用并可发射出无线电波，如果未按照本手册中所述安装和使用，可能会对无线通信设备产生干扰。如本设备在居民区操作出现干扰等情况，用户需要自费处理。

备注：请注意，如未按照此使用说明操作而自行更改设备，那么您将无权使用本设备。

規制適合宣言とご使用について(米国FCC)

この機器は、FCC規則のパート15に定められたクラスAデジタル装置に関する規制要件に基づいて所定の試験が実施され、その適合が認証されています。これらの規制要件は、商業環境において機器を使用する際、有害な干渉に対する妥当な保護を提供するために設けられています。この機器は、無線周波数エネルギーを生成かつ利用するとともに、放射することもあります。このリファレンスガイドの指示に従って設置および使用が行われない場合は、無線通信に有害な干渉を引き起こす恐れがあります。この機器を住宅地で利用すると有害な干渉を起こすこともあり、その場合、使用者は自己負担において適切な対策を講じる必要があります。

注意事項：このリファレンスガイドに明示的に承認していない変更や修正を行った場合には、本製品を使用する権利が無効となることがあります。

1.1.4 Supplements

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

Life support applications

The products described in this manual are not designed for use in life support appliances or devices and systems where malfunction of these products can reasonably be expected to result in personal injury.

NOTICE

SVS-Vistek GmbH customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify SVS-Vistek GmbH for any damages resulting from such improper use or sale.

1.2 Warranty and non-warranty clause

NOTICE

The camera does not contain serviceable parts. Do not open the body of the camera. If the camera has been opened, the warranty will be void.

NOTICE

The camera has to be used with a supply voltage according to the camera's specification. Connecting a lower or higher supply voltage, AC voltage, reversal polarity or using wrong pins of the power connector may damage the camera. Doing so will void warranty.

Our warranty does not protect against accidental damage, loss, or acts of nature.

INFO

SVS-Vistek GmbH cannot be held responsible for the loss of data. We recommend a backup plan.

1.3 Support

1. In case of support or a warranty claim, make a note of the camera type and its serial number (S/N). You find all necessary information on the identification plate of the camera.
2. Contact us by visiting our support website
   https://www.svs-vistek.com/de/support/svs-support-anfrage.php

2 Introduction

2.1 Configuring the camera

All CXP cameras are compliant to the CoaXPress specification. CoaXPress standardizes downlink and uplink protocols, interfaces, cables, and connectors used by CoaXPress compliant cameras and frame grabbers.

All cameras use GenICam, a standardized generic programming interface. It is used to configure and control the camera and supports five main features:

- Camera configuration
- Frame acquisition
- Graphical User Interface (GUI)
- Transfer of camera data but also time stamps, region of interest (ROI) and histogram data
- Transfer of events like a trigger

GenICam for CXP cameras consists of four parts:

- GenAPI: GenAPI is the application programming interface. It is used to configure and control a camera. All features are written in an XML file. The API is available for several operating systems.
- Standard Features Naming Convention (SFNC): SFNC provides standardized names and types for common device features.
- Pixel Format Naming Convention: PFNC is a pixel format naming convention.
- GenTL: The GenTL transport layer is supported by CoaXPress compliant frame grabbers and cameras. It allows to read and write into registers and to grab frames.

According to GenICam the camera uses registers for configuration. To change a value, e.g. the exposure time, the hexadecimal value must be written into the camera register representing the exposure time (e.g. 0x1100).

2.2 Reading the XML file

All features of the camera are described in the GenICam XML file. Extensible Markup Language (XML) is used to describe each feature as a XML feature knot. Feature knots are displayed in a tree structure.

A knot consists of a feature knot and a register knot. The feature knot contains the description of the command whereas the register knot shows how it is implemented in the camera. For example, the type of the feature (command, string, integer,...), its access mode (R/W), a descriptive name (friendly name), the corresponding register address, and a short description of the feature in plain ASCII text. Some features have min. and max. values or a default value. Each feature corresponds to a camera setting.

Example

```
<Command Name="AcquisitionStart">
            <ToolTip>Starts the Acquisition of
the device.</ToolTip>
            <Description>Starts the Acquisition
of the device.</Description>
            <DisplayName>Acquisition Start</Dis-
playName>
            <Visibility>Beginner</Visibility>
            <pValue>AcquisitionStartReg</pValue>
            <CommandValue>0</CommandValue>
</Command>
<IntReg Name="AcquisitionStartReg">
            <Address>0x8204</Address>
            <Length>4</Length>
            <AccessMode>WO</AccessMode>
            <pPort>Device</pPort>
            <Endianess>BigEndian</Endianess>
</IntReg>
</Group>
    <Port Name="Device">
        <ToolTip>Port giving access to the
device.</ToolTip>
    </Port>
```

INFO *All integer values are interpreted as 32 bit unsigned integers, if not other mentioned. All strings are NULL terminated and consist of 8 bit characters.*

The port knot allows the connection to the device.

The features in the XML file or the camera are grouped according to their meaning.

The XML file is an ASCII file which is to be found on the USB storage device delivered with the camera. It can either be saved (compressed or uncompressed) in the camera or saved as an external file on a local computer or a remote host. The path (URL) of the file can be read from the camera using the feature XmlUrlAddress.

Use the Software delivered by the frame grabber's manufacturer to configure camera and frame grabber.

INFO *Refer to www.emva.org/standards-technology/genicam for further details on the GenICam standard.*

3 Acquisition control

3.1 Overview

NOTICE **Some settings can only be changed if image acquisition is stopped.**

The following commands allow to make settings required for image acquisition and to control an external trigger.

Display name	Access	Length [Bytes]	Register Interface
Acquisition Mode	R/W	4	Enumeration
Acquisition Start	W	4	Command
Acquisition Stop	W	4	Command
Trigger Selector	R/W	4	Enumeration
Trigger Mode	R/W	4	Enumeration
Trigger Source	R/W	4	Enumeration
Trigger Activation	R/W	4	Enumeration
Trigger Count	R/W	4	Integer
Trigger Debouncer	R/W	4	Integer
Software Trigger	WO	4	Integer
Test-Image Selector	R/W	4	Enumeration
Exposure Mode	R/W	4	Enumeration
Exposure Time	R/W	4	Integer
Acquisition Frame Rate	R/W	4	Integer
Max. Acquisition Frame Rate	R	4	Integer

3.2 Controls

3.2.1 AcquisitionMode

Sets the acquisition mode of the device. It defines mainly the number of frames to capture during an acquisition and the way the acquisition stops.

Access	Read / write
Type	Enumeration
In	■ Continuous: Frames are captured continuously until stopped with the AcquisitionStop command.
Out	Selected mode
Remark	**Frame acquisition can be stopped with the feature AcquisitionStop**

3.2.2 AcquisitionStart

Starts the Acquisition of the device. The number of frames captured is specified by AcquisitionMode.

Access	Write
Type	Command
In	0x00000001
Out	-
Remark	**AcquisitionMode defines how frames will be acquired**

3.2.3 AcquisitionStop

This feature stops acquiring frames after the acquisition of the current frame has been completed.

Access	Write
Type	Command
In	x000000001
Out	-

3.2.4 TriggerSelector

This feature is used to select the type of trigger to be configured.

Access	Read / write
Type	Enumeration
In	■ FrameStart: The camera will take one picture per trigger signal
Out	Trigger selector type

3.2.5 TriggerMode

This feature activates or deactivates the trigger type selected by the feature TriggerSelector.

Access	Read / write
Type	Enumeration
In	■ ON: Enables the selected trigger type; the camera waits for a trigger signal before acquiring a frame. The trigger signal can be a signal from the frame grabber, the 12-pin Hirose connector input, or a software trigger initiated by a software command. The trigger source has to be set in the feature TriggerSource. In trigger mode, the frame rate of the camera depends on the frequency of the trigger signals ■ OFF: Disables the selected trigger type; all trigger signals will be ignored. The camera is set into the current acquisition mode
Out	Active mode
Remark	When a frame is initiated with a trigger, the exposure is started after a shutter delay of 8 µs. If a trigger is active, ExposureMode defines whether the exposure of an image is defined by the feature ExposureTime (fixed exposure time) or by the duration of the trigger signal itself (variable exposure time). The settings in ExposureMode will only become effective if triggered mode is ON.

3.2.6 TriggerSource

This feature defines the source of the trigger signal.

Access	Read / write
Type	Enumeration
In	■ line0 / line1: CXP cameras offer one trigger input with two physical lines via the 12-pin Hirose connector; the trigger signal can either be sent via line 0 or line 1. ■ Software: if TriggerSoftware is set, the trigger will be generated by the software using the feature Trigger- Software; no external (hardware) trigger signal is needed. ■ Trigger: if Trigger is set, the camera will wait for an external trigger signal from the frame grabber before acquiring another frame; exposure time for the next image is the time defined in the feature ExposureTime.
Out	Active source
Remark	Only one trigger source can be active.

3.2.7 TriggerActivation

This feature defines the activation mode for a trigger signal defined in TriggerSelector.

INFO	*If AnyEdge is selected, a fixed exposure time (ExposureMode = Timed) has to be set.*

Access	Read / write
Type	Enumeration
In	■ RisingEdge: The camera will start acquiringe frames on the arrival of a CXP 'trigger rising edge' trigger packet; this activator expects a subsequent 'trigger falling edge' trigger packet to finish the trigger sequence. ■ FallingEdge: The camera will start acquiring frames on the arrival of a CXP 'trigger falling edge' trigger packet; this activator expects a subsequent 'trigger rising edge' trigger packet to finish the trigger sequence. ■ AnyEdge: The camera will start acquiring frames on the arrival of a CXP 'trigger falling edge' as well as a 'trigger rising edge' trigger packet.
Out	Selected activator
Remarks	**Using the activator AnyEdge doubles the maximal trigger frequency.**

3.2.8 TriggerCount

This feature counts the incoming trigger signals after a trigger debounce. It allows e.g. to compare the number of frames transferred to the frame grabber with the number of triggers.

Access	Read / Write
Type	Integer
In	■ Min: "0" ■ Max: "0"
Out	The number of counted trigger signals
Remarks	Zero is the only value accepted and is used to reset the trigger counter.

3.2.9 TriggerDebouncer

In TriggerDebouncer the debounce period is defined. This period starts with the occurrence of a trigger edge. Within the debounce period, a new trigger signal will be ignored. Debouncing might e.g. be necessary if the trigger signal jitters.

INFO	*The best way to find the appropriate value for the debounce period is to measure it with an oscilloscope.*

Access	Read / write
Type	Integer
In	■ min.: 0 s ■ max.: 430 µs
Out	The set debounce period
Remark	The default value amounts to 1 µs.

3.2.10 TriggerSoftware

This feature generates an internal trigger.

INFO	*When using TriggerSoftware, the exposure time of the next frame cannot be defined by TriggerWidth of the feature ExposureMode. Instead, it has to be defined by the feature ExposureTime.*

Access	Write
Type	Command
In	0x00000001
Out	-
Remark	To generate a software trigger signal, “Software” has to be set in TriggerSource.

3.2.11 ExposureMode

This feature sets the operation mode of the shutter. It defines how long a picture will be exposed if TriggerMode is activated.

Access	Read / write
Type	Enumeration
In	■ Timed: The exposure time is defined in the feature ExposureTime. ■ Trigger Width: The width of the current trigger signal pulse is used to control the exposure time; if TriggerActivation is set to RisingEdge, it will be the time the trigger stays high, if TriggerActivation is set to FallingEdge it will last as long as the trigger stays low.
Out	Set exposure mode
Remark	ExposureMode is enabled in trigger mode only. When AnyEdge in TriggerActivator is selected, "Timed" has to be set.

3.2.12 ExposureTime

If the exposure mode is set to "Timed" or no hardware trigger is defined, this feature defines the duration of exposure [µs].

Access	Read / write
Type	Unsigned integer
In	1 … highest possible exposure time
Out	Current exposure time
Remark	Incremented by 1

3.2.13 AcquisitionFrameRate

This feature defines the acquisition rate in [Hz] when TriggerMode is OFF.

INFO	*If TriggerMode = ON, AcquisitionFrameRate will be disabled.*

Access	Read / write
Type	Unsigned integer
In	Lowest to highest possible frame rate *For frame rates, refer to the technical data sheet in the User Guide.*
Out	AcquisitionFrameRate
Remark	Incremented by 1; min. 1

3.2.14 AcquisitionFrameRateMax

This feature returns the highest possible frame rate in [Hz].

NOTICE **This feature will soon expire. Switch to AcquisitionFrameRate to get the highest possible frame rate.**

Access	Read
Type	Unsigned integer
In	—
Out	Max. frame rate
Remark	The max. frame rate depends on the defined frame size, the used link speed, and the number of CoaXPress lines used for image streaming.

4 User set control

4.1 Overview

User sets can be saved into the camera's internal Flash memory. A user set can be loaded at runtime. If a user set is defined as default, it will be loaded during the start-up of the camera.

Display name	Access	Length [Bytes]	Interface
User Set Selector	R/W	4	Enumeration
User Set Load	W	4	Command
User Set Save	W	4	Command
User Set Default Selector	R/W	4	Enumeration

4.2 Controls

4.2.1 UserSetSelector

This feature selects which user set will be loaded, saved, or configured.

Access	Read / write
Type	Enumeration
In	■ Default: selects the factory settings ■ UserSet1: selects the first user set ■ UserSet2: selects the second user set ■ UserSet3: selects the third user set
Out	Active user set
Remark	Set the UserSetSelector first to select a user set for further operations.

4.2.2 UserSetLoad

Loads the user set specified in UserSetSelector from the camera flash memory to the camera registers and activates it.

Access	Write
Type	Command
In	
Out	
Remark	If the selected User Set has not been defined previously an error message occurs. The default user set is a set of factory settings.

4.2.3 UserSetSave

This feature saves the user set specified in UserSetSelector into the non-volatile memory of the device.

Access	Write
Type	Command
In	
Out	
Remark	A previously saved user set will be overwritten. The user set “Default” is a set of factory settings and cannot be overwritten.

4.2.4 UserSetDefaultSelector

This feature selects the user set which will be loaded and activated after a device reset.

Access	Read / write
Type	Enumeration
In	■ Default: selects the factory setting user set ■ UserSet1: selects the first user set ■ UserSet2: selects the second user set ■ UserSet3: selects the third user set
Out	Active default user set
Remark	The user set selector "Default" is preselected.

5 File access control

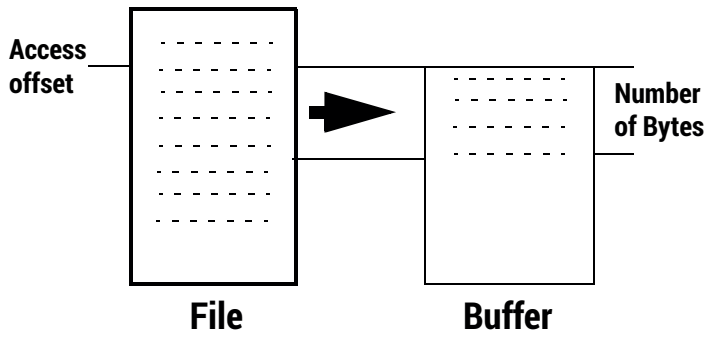
5.1 Overview

Display name	Access	Length [Bytes]	Interface
File Selector	R/W	4	Enumeration
File Operation Selector	R/W	4	Enumeration
File Operation Execute	W	4	Command
File Open Mode	R/W	4	Enumeration
File Access Buffer	R	4	Integer
File Access Offset	R/W	4	Integer
File Access Length	R/W	4	Integer
File Operation Status	R	4	Enumeration
File Operation Result	R	4	Integer
File Size	R	4	Integer

Defining the access

When reading or writing data into or from the camera, the following options must be defined:

- Where the access buffer gets mapped to the file
- The length of the file by the number of bytes to be read or written



1. Select the file to be accessed.
2. Call the "open" command.
3. Execute the "open" command.
4. Define the data section that will be loaded into the buffer (the file length is displayed in "file size").
5. Define the operation ("write", "read", "delete", ...).

6. Execute the operation.
7. Close the file.

Starting with the access offset, the defined number of bytes will be written into the buffer.

5.2 Controls

5.2.1 FileSelector

This command selects one of the available files stored in the camera flash memory.

Access	Read / write
Type	Enumeration
In	File name: DefectPixelMap
Out	-
Remark	**Only the file "defect pixel map" is available.**

5.2.2 FileOperationSelector

This feature selects the target operation for the selected file.

Access	Read / write
Type	Unsigned integer
In	■ Open: Opens the file, 0x00000004 ■ Close: Closes the file, 0x00000008 ■ Read: Reads from the file, 0x00000001 ■ Write: Writes into the file, 0x00000002 ■ Delete: Deletes the file, 0x00000020
Out	-

5.2.3 FileOperationExecute

This feature executes the operation selected by the „File Operation Selector“ on the selected file.

Access	Write only
Type	Unsigned integer
In	0
Out	-
Remark	**Each operation has to be executed.**

5.2.4 FileOpenMode

This feature selects the access mode in which a file is opened.

Access	Read / write
Type	Unsigned integer
In	■ Read: Reads from the file, 0x00000001 ■ Write: Writes into the file, 0x00000002 ■ ReadWrite: Reads from and writes into the file, 0x00000010
Out	-

5.2.5 FileAccessBuffer

Address of the access buffer Byte array.

Access	Read
Type	Integer
In	Any existing file
Out	**-**
Remark	The buffer size amounts to up to 0x40000 Bytes. ■ Start address: 0x30000000 ■ End address: 0x30040000 or max. file length

5.2.6 FileAccessOffset

Defines where the start of the access buffer gets mapped to the file.

Access	Read / write
Type	Integer
In	Start address in the selected file
Out	-
Remark	■ Min.: 0 ■ Max.: file length

5.2.7 FileAccessLength

Defines the number of bytes to be read from the selected file in the buffer.

Access	Read / write
Type	Integer
In	Number of Bytes to be read/written to or from the file
Out	-
Remark	**access length ≤ file length - access offset**

5.2.8 FileOperationStatus

This feature displays the file operation execution status of the selected file.

Access	Read
Type	Integer
In	-
Out	■ Success: File operation was completed ■ Failure: File operation was not completed
Remarks	A failure is displayed when e.g. the length and offset of the file or the file operation have not been defined.

5.2.9 FileOperationResult

Displays the number of bytes successfully read and written.

Access	Read
Type	Integer
In	-
Out	Number of successfully operated Bytes
Remarks	The number of successfully written bytes is only displayed when the file operation is successful.

5.2.10 FileSize

Displays the size of the selected file after the file is opened.

Access	Read
Type	Integer
In	-
Out	File size in bytes
Remarks	The number of successfully written bytes is only displayed when the values for file length and file offset have been defined.

6 Bootstrap CoaXPress control

6.1 Overview

CoaXPress compliant devices have to support a number of bootstrap registers. In contrast to other camera features each bootstrap register is assigned to a fixed camera address as it is defined in the CoaXPress specification.

Bootstrap registers are defined for device information and allow frame grabbers to establish and maintain the connection between host and camera in a standardized way. Usually, the connection between camera and frame grabber is running in the background.

Manufacturer-specific addresses allow non-GenICam applications or blackbox format converters to support the standard use case and allow continuous acquisition and display of images

Display name	Address	Access	Length [Bytes]	Register interface
Feature Width Address	0x00003000	R	4	Integer
Feature Height Address	0x00003004	R	4	Integer
Feature AcquisitionMode Address	0x00003008	R	4	Integer
Feature AcquisitionStart Address	0x0000300C	R	4	Integer
Feature AcquisitionStop Address	0x00003010	R	4	Integer
Feature PixelFormat Address	0x00003014	R	4	Integer
Feature DeviceTapGeometry Address	0x00003018	R	4	Integer
Feature Image1StreamIDAddress	0x0000301C	R	4	Integer
Max. Control Packet Size	0x0000400C	R	4	Integer
Device Connection-ID	0x00004004	R	4	Integer
LIDC2 Address	0x0000001C	R	4	Integer
Connection Configuration	0x00004014	R/W	4	Enumerate
Default Connection Configuration	0x00004018	R	4	Integer
Connection Reset	0x00004000	W/(R)	4	Integer
Master Host Connection-ID	0x00004008	R/W	4	Integer
Revision	0x00000004	R	4	Integer
Standard	0x00000000	R	4	Integer
Max. Stream Packet Size	0x00004010	R/W	4	Integer
Test Error Count Selector	0x00004020	R/W	4	Integer

Display name	Address	Access	Length [Bytes]	Register interface
Test Error Count	0x00004024	R/W	4	Integer
Test Packet Counter Tx	0x00004028	R/W	8	Integer
Test Packet Counter Rx	0x00004030	R/W	8	Integer
Capability Register	0x0000403C	R	4	Integer
Feature Control Register	0x00004040	R/W	4	Integer
Versions Supported	0x00004044	R	4	Integer
Version Used	0x00004048	R/W	4	Enumeration
Test Mode	0x0000401C	R/W	4	Integer
XML Manifest Selector	0x0000000C	R/W	4	Integer
XML Manifest Size	0x00000008	R	4	Integer
XML Scheme Version	0x00000014	R	4	Integer
XML URL-Address	0x00000018	R	4	Integer
XML Version	0x00000010	R	4	Integer
Device Serial Number	0x000020B0	R	16	String
Device Manufacturer Info	0x00002040	R	48	String
Device Model Name	0x00002020	R	32	String
Device User-ID	0x000020C0	R/W	16	String
Device Vendor Name	0x00002000	R	32	String
Device Version	0x00002070	R	32	String

6.2 Controls

6.2.1 WidthAddress

Manufacturer-specific address of the ROI width.

Access	Read
Type	Integer
In	-
Out	-

6.2.2 HeightAddress

Manufacturer-specific address of the ROI height.

Access	Read
Type	Integer
In	-
Out	-

6.2.3 AcquisitionModeAddress

Manufacturer-specific address of the feature AcquisitionMode.

Access	Read
Type	Integer
In	-
Out	-

6.2.4 AcquisitionStartAddress

Manufacturer-specific address of the feature AcquisitionStart.

Access	Read
Type	Integer
In	-
Out	-

6.2.5 AcquisitionStopAddress

Manufacturer-specific address of the feature AcquisitionStop.

Access	Read
Type	Integer
In	-
Out	-

6.2.6 PixelFormatAddress

Manufacturer-specific address of the feature PixelFormat.

Access	Read
Type	Integer
In	-
Out	-

6.2.7 DeviceTapGeometryAddress

Manufacturer-specific address of the feature DeviceTapGeometry.

Access	Read
Type	Integer
In	-
Out	-

6.2.8 Image1StreamIDAddress

Manufacturer-specific address of the feature Image1StreamID.

Access	Read
Type	Integer
In	-
Out	-

6.2.9 ControlPacketSizeMax

Provides the maximum control packet size the host can read from the device or write to the device. The size is defined in Bytes and will be a multiple of 4 Bytes. The defined size is that of the entire packet, not only the payload.

Access	Read
Type	Unsigned integer
In	-
Out	The control packet size in multiples of 4 Bytes
Remark	The control packet size is at least 128 Bytes.

6.2.10 DeviceConnectionID

This control provides the ID of the device connection via which this register is read.

Access	Read
Type	Unsigned integer
In	-
Out	Connection ID
Remark	A connection ID of zero means that the connection is a master connection. This is a static register, but with a different value depending from which connection it is read.

6.2.11 Iidc2Address

This control is meant for devices supporting the IIDC2 protocol (section 2.2 ref. 6) and provides the starting address of the IIDC2 register space.

INFO	*This feature is currently not supported.*

Access	Read
Type	Unsigned integer
In	-
Out	0x00000000

6.2.12 ConnectionConfig

Holds a valid combination of the device link speed and the number of active down connections. Writing into this register sets the connection speeds on the specified connections.

Access	read / write
Type	Enumeration
In	Connection configuration examples: ■ CONNECTION1SPEED3125: One connection of 3.125 Gb/s per connection ■ CONNECTION2SPEED3125: Two connections of 3.125 Gb/s per connection ■ ... ■ CONNECTION4SPEED12500: Four connections of 12.5 Gb/s per connection (default)
Out	Connection configuration

6.2.13 ConnectionConfigDefault

This control provides the value of the ConnectionConfig register that allows the Device to operate in default mode. This feature is used to start the camera with the default configuration that is stored in the custom profiles.

Access	Read
Type	Unsigned integer
In	-
Out	0x00000000

6.2.14 ConnectionReset

Writing 0x00000001 into this register will reset the connection of the device.

NOTE It is not possible to read this register while it has the value 0x00000001.

Access	Read / write
Type	Unsigned integer
In	0x00000001
Out	0x00000000
Remark	A link reset will stop a running image acquisition. A connection reset command via the master connection (no. 0) will reset a connection and activate its discovery connection configuration within 200 ms. The camera resets the register to 0x00000000 when it has activated its discovery connection configuration. Writing by the host should be regarded as “fire and forget” without waiting for acknowledgment.

6.2.15 MasterHostConnectionID

Holds the host connection ID of the host connected to the device master connection.

Access	Read / write
Type	Unsigned integer
In	Host link ID
Out	Host link ID
Remark	The value 0x00000000 is reserved to indicate an unknown Host ID. All writings to device extension connection will be ignored.

6.2.16 Revision

This control returns the revision of the CoaXPress specification implemented by this device.

Access	Read
Type	Unsigned integer
In	-
Out	■ Bits 31 - 16: major revision ■ Bits 15 - 00: minor revision
Remark	Example: Devices compliant to revision 1.1 of the specification shall return the value 0x00010001.

6.2.17 Standard

This register provides a magic number indicating that the device implements the CoaXPress standard.

Access	Read
Type	Unsigned integer
In	—
Out	0xC0A79AE5
Remark	The magic number is an approximation of CoaXPress.

6.2.18 StreamPacketSizeMax

This control holds the maximum stream packet size the host can accept. The size is defined in Bytes and will be a multiple of 4 Bytes. The defined size is that of the entire packet, not only the payload.

Access	Read / write
Type	Unsigned integer
In	Stream packet data size in multiples of 4 Bytes
Out	Stream packet data size in multiples of 4 Bytes
Remark	The device can use any packet size it wants to up to this size. A connection reset sets the value to 0x00000000.

6.2.19 TestErrorCountSelector

This control selects the required test count [TestErrorCount] register. It holds a valid device connection ID 0 … n-1, or n for the optional high-speed up-connection.

Access	Read / write
Type	Unsigned integer
In	0x00000000 ... 0x00000003
Out	0x00000000 ... 0x00000003
Remark	A connection reset sets the value to 0x00000000.

6.2.20 TestErrorCount

This register provides the current connection error count for the connection referred to by the register TestErrorCountSelector.

Access	Read / write
Type	Unsigned integer
In	0x00000000
Out	Error count
Remarks	Writing 0x00000000 to this register resets the error count for the connector referred to by the register TestErrorCountSelector to zero. A connection reset sets all connection test counters to zero. The error count is the number of incorrect words that have been received in test packets.

6.2.21 TestPacketCountTx

Provides the current transmitted connection test packet count for the connection referred to by the register TestErrorCountSelector.

Access	Read / write
Type	Integer
In	0x0000000000000000
Out	Packet count
Remark	Writing 0x0000000000000000 into this register will reset to zero the transmitted connection packet count for the connection referred to by the register TestErrorCountSelector. A connection reset sets all connection test counters to zero.

6.2.22 TestPacketCountRx

Provides the currently received connection test packet count for the connection referred to by the register TestErrorCountSelector.

Access	Read / write
Type	Integer
In	0x0000000000000000
Out	Packet count
Remark	Writing 0x0000000000000000 to this register shall reset to zero the received connection packet count for the connection referred to by register TestErrorCountSelector. A connection reset sets all connection test counters to zero.

6.2.23 CapabilityRegister

Indicates which optional features are supported.

Access	read
Type	Integer
In	-
Out	-

6.2.24 FeatureControlRegister

Enables and disables optional device features.

Access	read / write
Type	Integer
In	-
Out	-

6.2.25 VersionsSupported

Indicates which CXP versions are supported.

Access	read
Type	Integer
In	-
Out	-

6.2.26 VersionUsed

Indicates the version of the CoaXPress specification used for communication between device and host.

Access	read
Type	Enumeration
In	
Out	
Remark	CXP_Version_1_1: 0x00010001 CXP_Version_2_0: 0x00020000

6.2.27 TestMode

Writing the value 0x00000001 into this register enables a test packet transmission from the camera to the host.

Access	Read / write
Type	Integer
In	■ "0x00000000": Normal operation ■ "0x00000001": Sending test packets to host
Out	Same as above
Remark	A connection reset sets the value to 0x00000000. If the value is changed from 0x00000001 to 0x00000000, the device will complete the packet of 1024 test words currently being transmitted.

6.2.28 XmlManifestSelector

This control selects the required XML manifest registers. It holds a number between zero and XmlManifestSize – 1.

Access	Read / write
Type	Unsigned integer
In	0 … XmlManifestSize-1
Out	0 … XmlManifestSize-1
Remark	A connection reset sets the value to 0x00000000.

6.2.29 XmlManifestSize

This control returns the number of available XML manifests. At least one manifest must be available.

Access	Read
Type	Unsigned integer
In	-
Out	1

6.2.30 XmlSchemeVersion

This control provides the GenICam schema version for the XML file given in the manifest referenced by the register XmlManifestSelector.

Access	Read
Type	Unsigned integer
In	-
Out	■ Bits 31 - 24: reserved; shall be 0 ■ Bits 23 - 16: SchemaMajorVersion; major version number of the schema used by the XML file ■ Bits 15 - 8: SchemaMinorVersion; minor version number of the schema used by the XML file ■ Bits 7 - 0: SchemaSubMinorVersion; sub-minor version number of the schema used by the XML file

6.2.31 XmlUrlAddress

This control indicates the start of the URL string referenced by the register XmlManifestSelector.

INFO — *SVS-Vistek GmbH does not support strings that reference a XML file located on the vendor's homepage.*

Access	Read
Type	Unsigned integer
In	—
Out	Register address
Remarks	Reading the returned register returns the name, register address, and the length of the GenICam XML file stored in the flash memory of the camera. The format of the address string of the following fields is: ■ Local: Indicates the XML file is stored in the non-volatile memory in the device ■ <Filename>: Name of the XML file ■ <Extension>: ■ xml: uncompressed XML file ■ zip: compressed ZIP file ■ <Address>: Address of the file in the device memory map, given in hexadecimal notation without the first to characters "0x" ■ <Length>: Length of the file in Bytes, given in hexadecimal without the first to characters "0x" **Example:** *"Local:Mikrotron_GmbH_MC258xS11 _Rev1_15_0.xml; 8001000;16C34?SchemaVersion=1.1.0"* This expression indicates a GenICam XML file in the flash memory of the camera. The file can be read starting at address 8001000 and has a length of 16C34 Bytes.

6.2.32 XmlVersion

This control provides the version number for the XML file given in the manifest referenced by the register XmlManifestSelector.

Access	Read
Type	Unsigned integer
In	-
Out	■ Bits 31 - 24: reserved; shall be 0 ■ Bits 23 - 16: SchemaMajorVersion; major version number of the XML file ■ Bits 15 - 8: SchemaMinorVersion; minor version number of the XML file ■ Bits 7 - 0: SchemaSubMinorVersion; sub-minor version number of the XML file

6.2.33 DeviceSerialNumber

This control provides the serial number for the device as a NULL-terminated string.

Access	Read
Type	String [0 ... 16]
In	-
Out	Serial number of the camera
Remark	Example: 000000000000157

6.2.34 DeviceManufacturerInfo

This control provides extended manufacturer-specific information about the device as a string.

Access	Read
Type	String [0 ... 48]
In	
Out	Manufacturer information
Remark	Example: SVS-Vistek GmbH

6.2.35 DeviceModelName

This control provides the model name of the device as a string.

Access	Read
Type	string [0 ... 32]
In	-
Out	Model name
Remark	Example: MC2166

6.2.36 DeviceUserID

This control provides a user-programmable identifier for the camera as a string.

Access	Read / write
Type	String [0 ... 16]
In	User ID
Out	User ID
Remark	The User ID can be freely defined by the user. It will be saved in the flash memory of the camera. As a result, it will be preserved if the camera is switched off.

6.2.37 DeviceVendorName

This control provides the name of the manufacturer of the device as a string.

Access	Read
Type	String [0 ... 32]
In	-
Out	Vendor name
Remark	Example: SVS-Vistek GmbH

6.2.38 DeviceVersion

This register contains the string with the version number of the connected device.

Access	read
Type	string
In	—
Out	version number of the device
Offset	hex C4

7 Transport layer control

7.1 Overview

User sets can be saved into the camera's internal Flash memory. A user set can be loaded at runtime. If a user set is defined as default, it will be loaded during the start-up of the camera.

Display name	Access	Length [Bytes]	Interface
TLParamsLocked	R/W	4	Integer
CXP Link Configuration Status	R	4	Enumeration
CXP Link Configuration Preferred			Enumeration
CXP Link Configuration			Enumeration
CXP Connection Selector			Integer
CXP Connection Test Mode			Enumeration
CXP Connection Test Error Count			Integer
CXP Connection Test Packet Count			Integer

7.2 Controls

7.2.1 TLParamsLocked

Access	Read/write
Type	Integer
In	-
Out	-

7.2.2 CxpLinkConfigurationStatus

Current and active link configuration of the device.

Access	read
Type	enumeration
In	■ CXP3_X1 ■ CXP3_X2 ■ CXP3_X4 ■ CXP6_X1 ■ CXP6_X2 ■ CXP6_X4 ■ CXP12_X1 ■ CXP12_X2 ■ CXP12_X4
Out	-

7.2.3 CxpLinkConfigurationPreferred

Provides the default link configuration of the device.

Access	
Type	enumeration
In	■ CXP3_X1 ■ CXP3_X2 ■ CXP3_X4 ■ CXP6_X1 ■ CXP6_X2 ■ CXP6_X4 ■ CXP12_X1 ■ CXP12_X2 ■ CXP12_X4
Out	-

7.2.4 CxpLinkConfiguration

Specifies the link configuration of the device.

Access	
Type	enumeration
In	■ CXP3_X1 ■ CXP3_X2 ■ CXP3_X4 ■ CXP6_X1 ■ CXP6_X2 ■ CXP6_X4 ■ CXP12_X1 ■ CXP12_X2 ■ CXP12_X4
Out	-

7.2.5 CxpConnectionSelector

Selects the CoaXPress physical connection to the control.

Access	
Type	integer
In	0 ... 3, increment by 1
Out	-

7.2.6 CxpConnectionTestMode

Enables the test mode.

Access	
Type	enumeration
In	Off Mode1
Out	-

7.2.7 CxpConnectionTestErrorCount

Current connection error count selected by the CxpConnectionSelector.

Access	
Type	integer
In	Min: 0, representation: linear
Out	-

7.2.8 CxpConnectionTestPacketCount

Returns the 64bit test packet receive counter, selected by CxpConnectionSelector.

Access	
Type	integer
In	Min: 0, representation: linear
Out	-

8 Device control

8.1 Overview

Display name	Access	Length [Bytes]	Interface
Device Reset	WO	4	Integer

8.2 Controls

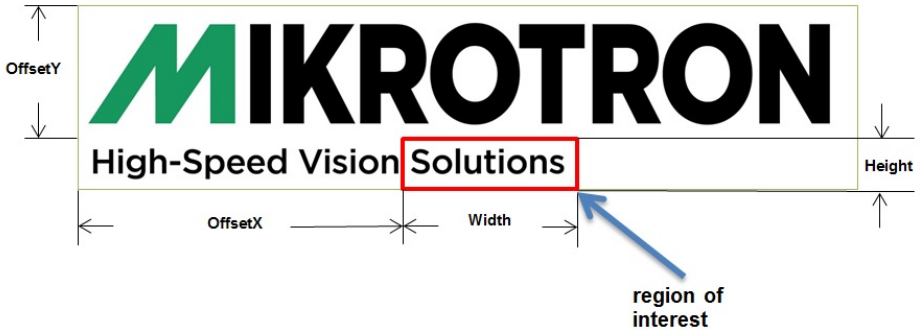
8.2.1 DeviceReset

This feature resets the device into power-up state.

Access	Write
Type	Unsigned integer
In	0x00000001
Out	-
Remark	Length of 4 Bytes

9 Image format control

9.1 Overview



These commands allow to set the size of the image, the so called region of interest (ROI). A ROI - like the red field in the figure below - defines the part of an image to be scanned. It is defined by its width, height, offset X, and offset Y.

Display name	Access	Length [Bytes]	Interface
Width	R/W	4	Integer
Offset X	R/W	4	Integer
Height	R/W	4	Integer
Offset Y	R/W	4	Integer
Max. Height	R	4	Integer
Image 1 Stream-ID	R	4	Integer
Binning	R/W	4	Enumeration
Pixel Format	R/W	4	Enumeration
Tap Geometry	R	4	Enumeration
Device Scan Type	R	4	Enumeration
Sensor Height	R	4	Integer
Sensor Width	R	4	Integer
Region Destination	R/W	4	Enumeration
Max. Width	R	4	Integer

9.2 Controls

9.2.1 Width

This feature provides the image width in pixels.

Access	Read / write
Type	Unsigned integer
In	■ Min: 128 px ■ Max: Sensor width
Out	Image width
Remark	Incremented by 32 px

9.2.2 OffsetX

Horizontal offset from the origin to the region of interest in pixels.

Access	Read / write
Type	Unsigned integer
In	■ Min.: 0 px ■ Max.: Sensor width -128 px
Out	Horizontal offset
Remark	Incremented by 32 px

9.2.3 Height

This feature provides the image height in pixels.

Access	Read / write
Type	Unsigned integer
In	■ Min: 32 px ■ Max: sensor height
Out	Image height
Remark	Incremented by 32 px

9.2.4 OffsetY

Vertical offset from the origin to the region of interest in pixels.

Access	Read / write
Type	Unsigned integer
In	■ Min.: 0 px ■ Max.: Sensor height -32 px
Out	Vertical offset
Remark	Incremented by 32 px

9.2.5 HeightMax

Maximum height (in pixels) of the image.

Access	Read only
Type	Unsigned integer
In	-
Out	Maximum usable sensor height

9.2.6 Image1StreamID

This feature returns the stream ID of the primary image stream of the device.

Access	Read only
Type	Unsigned integer
In	-
Out	0x00000000

9.2.7 Binning

Enables or disables horizontal and vertical pixel binning of the sensor.

Access	read / write
Type	Boolean
In	0 = OFF 1 = ON
Out	
Remarks	**Expert feature**

9.2.8 PixelFormat

This feature returns the bit format the camera uses for acquisition. The default format is 8 bit. It can be changed to 10 bit or 12 bit, respectively. For colourcameras, the order of the Bayer pattern can be selected.

Access	Read / write
Type	Enumeration
In	Mono8 ■ monochrome, 8 bit/pixel (default) ■ monochrome, colourcamera Mono10 ■ monochrome, 10 bit/pixel packed ■ monochrome, colourcamera Mono12 ■ monochrome, 12 bit/pixel packed ■ monochrome, colourcamera Bayerxx8 / Bayerxx10 / Bayerxx12 ■ order of the Bayer pattern in a colourimage ■ colourcamera
Out	See above
Remark	The available pixel formats depend on the camera connected (monochrome or color)

9.2.9 TapGeometry

This feature describes the format of the image data that is transferred from the camera to the host.

Access	Read
Type	Enumeration
In	■ Geometry 1X-1Y: single pixel scanning from left to right
Out	See above
Remark	Sensor is read out in 1X-2YE[1], but the CXP transmission is done in 1X-1Y with lines of the upper and lower image part interleaved. The user must use a frame grabber that supports a software-based sorting on the host or must implement a line sorting in the software.

[1] Dual line scanning, tab1 scanning from top to middle.

9.2.10 DeviceScanType

This feature returns the value of the camera type (area scan).

Access	Read only
Type	Enumeration
In	-
Out	Areascan (0x00000000)

9.2.11 SensorHeight

Effective height of the sensor in pixels.

Access	Read only
Type	Unsigned integer
In	-
Out	Sensor height

9.2.12 SensorWidth

Effective width of the sensor in pixels.

Access	Read only
Type	Unsigned integer
In	-
Out	Sensor width

9.2.13 RegionDestination

This control selects the destination of the image stream.

Access	Read / write
Type	Enumeration
In	stream0
Out	Region destination

9.2.14 WidthMax

Maximum width (in pixels) of the image.

Access	Read only
Type	Unsigned integer
In	-
Out	Maximum usable sensor width

10 Analog control

10.1 Overview

Display name	Access	Length [Bytes]	Interface
Gain Selector	R/W	4	Enumeration
Gain	**R/W**	**4**	**Float**
Black Level	R/W	4	Integer

10.2 Controls

10.2.1 GainSelector

Selects which gain is controlled by the various gain features. After selecting, the settings for the corresponding gain can be defined.

Access	Read / write
Type	Enumeration
In	0: Analog gain 1: Digital gain
Out	**Selected gain**

10.2.2 Gain

Gain is used to increase the brightness of the image. When gain is increased, all pixel values of the image will be increased, i.e. the whole image becomes brighter.

Access	Read / write
Type	Float
In	■ Analog gain ◦ 0 (= 1x) ◦ 1 (= 1.2x) ◦ 2 (= 1.6x - default gain) ◦ 3 (= 3.9x) ◦ 4 (= 8.2x) ■ Digital gain - The values are incremented by "0.25". ◦ 1 ... 4
Out	**The current gain value**

10.2.3 BlackLevel

Black level defines the brightness in the darkest part of the image. Possible black level settings are values between 0 and 255. If the setting is correct, the sensor will deliver the pixel value 0 for a completely black image. If it is too high, the sensor will deliver a pixel value greater than 0 for black which means a shade of gray. If the value is too small, the sensor will deliver a pixel value of 0 for gray shades.

Access	Read / write
Type	Integer
In	0 ... 255
Out	The current black level value
Remark	The values are incremented by "1"

11 Digital I/O control

11.1 Overview

Display name	Access	Length [Bytes]	Interface
Line Selector	R/W	4	**Enumeration**
Line Source	R/W	4	**Enumeration**
Line Inverter	R/W	4	**Enumeration**
User Output Selector	R/W	4	**Enumeration**
User Output Value	R/W	4	**Boolean**

11.2 Controls

11.2.1 LineSelector

This feature selects the physical output line to be configured with the commands LineSource and LineInverter.

Access	Read / write
Type	Enumeration
In	■ OUT0 ■ OUT1
Out	Selected output of the Hirose connector
Remark	**Expert feature**

11.2.2 LineSource

This feature defines which signal will apply at the output selected with LineSelector.

Access	Read / write
Type	Enumeration
In	■ ExposureActive: STRB (0) ■ StreamTransferActive: data transmission state (1) ■ ExtTriggerSignalState: state of the external trigger (2) ■ UserOutput0: state of the user output bit 0 ■ UserOutput1: state of the user output bit 1
Out	Selected signal
Remark	Expert feature

11.2.3 LineInverter

Controls the inversion of the signal of the selected line.

Access	Read / write
Type	Enumeration
In	■ ON: inverted = 1 ■ OFF: not inverted = 0
Out	According to setting
Remark	Default is 0 (not inverted); expert feature

11.2.4 UserOutputSelector

This feature selects the variable UserOutput0 or UserOutput1. The level of the selected variable can be defined by the feature UserOutputValue.

Access	Read / write
Type	Enumeration
In	■ UserOutput1 = 1 ■ UserOutput0 = 0
Out	Status of the variable
Remark	Expert feature

11.2.5 UserOutputValue

This feature allows to define the output level of the variable selected by UserOutputSelector. This static output level can be routed to a physical output with the feature LineSource.

Access	Read / write
Type	Boolean
In	■ high = 1 ■ low = 0
Out	Status of the bit
Remark	**Expert feature**

12 Digital control

12.1 Overview

Display name	Access	Length [Bytes]	Interface
Gamma	R/W	4	Integer
Digital Gain (obsolete)	R/W	4	Float

12.2 Controls

12.2.1 Gamma

Gamma correction adjusts the brightness of an image non-linearly which means it does not increase the brightness of all pixels but comes close to the manner the human eye perceives light and color.

Access	Read / write
Type	Integer
In	■ min: 0.1 ■ max: 3.0
Out	The current gamma value
Remark	Incremented by "0.1"

12.2.2 DigitalGain

NOTE	This feature is obsolete and is replaced by the "GainSelector".

When using digital gain the all pixels values of the image will be increased. As a result, the whole image becomes brighter, the dynamic range is decreased, and noise will be increased.

INFO	*It is recommended to be used for 8-bit-images only.*

Access	Read / write
Type	Float
In	■ min: 1 ■ max: 4
Out	The current gain value
Remark	Incremented by "0.25"

13 Custom features

13.1 Overview

Custom features are manufacturer specific camera functions and therefore are not defined in the standard naming convention.

Display name	Access	Length [Bytes]	Interface
Logical Connection Reset	W	4	Command
Device Information	RO	4	Integer
Device Information Selector	R/W	4	Enumeration
Analog Register Selector	R/W	4	Enumeration
Analog Register Set Selector	R/W	4	Integer
Analog Value [mV]	R/W	4	Integer
Frame Counter Info Enable	R/W	4	Boolean
Time Stamp Enable	R/W	4	Boolean
ROI Info Enable	R/W	4	Boolean
Fixed Pattern Noise Reduction	R/W	4	Enumeration
Fan Speed	R/W	4	Integer
Fan RPM	RO	4	Integer

13.2 Controls

13.2.1 TxLogicalConnectionReset

This feature resets the next packet transmission to connection „0“.

Access	Write
Type	Command
In	-
Out	-
Remark	Guru feature

13.2.2 DeviceInformation

This feature returns a value of the device information list selected by feature DeviceInfoSelector.

Access	Read / write
Type	Unsigned integer
In	-
Out	Device information values: ■ InfoSnr: serial number of the camera (same as feature DeviceID); e.g. 0x00000132 ■ InfoType: camera type/model; e.g.: 0x00002166 for camera model MC2166 ■ InfoSubType: sub type number of the camera model; this number describes models with special features or a customized version; e.g. 0x00000001 ■ InfoHwRevision: describes the revision of the camera hardware, e.g. 0x0103000B for revision 1.3 Build 11 ◦ bits 31-24: major revision number ◦ bits 23-16: minor revision number ◦ bits 15-00: build number ■ InfoFpgaVersion: version of the FPGA program of the camera, e.g. 0x02050001 for Version 2.5 Build 1 ◦ bits 31-24: major version number ◦ bits 23-16: minor version number ◦ bits 15-00: build number ■ InfoSwVersion: version of the microcontroller software, e.g. 0x020F0011 for Version 2.15 Build 17 ◦ bits 31-24: major version number ◦ bits 23-16: minor version number ◦ bits 15-00: 15-00 ■ InfoPwrSource: returns the source of the camera power supply with value 0: external power supply ■ InfoPwrConsumption: returns the actual power consumption of the camera in [µA]; e.g: 0x00066580 for 419200 µA = 0.4192 A ■ InfoPwrVoltage: returns the actual voltage of the camera power supply in [mV]; e.g.: 0x2E4A for 11850 mV = 11.85 Volt ■ InfoTemperature: returns the current camera temperature in degrees Celsius; the value returned is a signed integer; e.g. 0x00000040 for 32 degree Celsius and 0xFFFFFF2C for -2 degree Celsius
Remark	Model number, hardware revision, FPGA version, and firmware version are also included in the string of the 'DeviceVersion' Bootstrap feature.

13.2.3 DeviceInformationSelector

This feature selects one of the elements from the device information list.

Access	Read / write
Type	Enumeration
In	■ InfoSnr: serial number of the camera (same as feature DeviceID) ■ InfoType: camera type / model ■ InfoSubType: camera sub type ■ InfoHwRevision: camera hardware revision ■ InfoFpgaVersion: camera FPGA program version ■ InfoSwVersion: microcontroller software version ■ InfoPwrSource: returns the source of the camera power supply (external power supply or PoC) ■ InfoPwrConsumption: actual power consumption of the camera in [µA] ■ InfoPwrVoltage: actual voltage of the camera power supply in [mV] ■ InfoTemperature: sensor temperature in degrees Celsius
Out	See above
Remark	First set the selector to define the data you want to read, then read the data by reading the register DeviceInformation.

13.2.4 AnalogRegisterSetSelector

This feature selects one of the analog registers sets for read / write access.

Access	Read / write
Type	Enumeration
In	■ Analog Register Set 0: “0” ■ Analog Register Set 1: “1”
Out	Active clock rate

13.2.5 AnalogRegisterSelector

Selects one of the analog registers for access.

Access	Read / write
Type	Integer
In	0 ... 15
Out	Active register
Remark	**Incremented by "1"**

13.2.6 AnalogValue

This feature holds the analog value [mV] to read / write.

Access	Read / write
Type	Integer
In	0 ... 1023
Out	Active value
Remark	**Incremented by "1"**

13.2.7 InfoFieldFrameCounterEnable

This feature enables or disables the Frame Counter that can be added to the info field in the image. If this option is enabled, a frame counter will be superimposed upon each captured frame or ROI.

The frame counter occupies 4 pixels in the upper left corner of each frame starting with pixel number "0". After each activation, the counter starts with "0". When reaching the maximal value or after each acquisition start command it will restart with "0".

Access	Read / write
Type	Boolean
In	■ ON: 1 ■ OFF: 0
Out	■ Pixel 0: frame counter LSB part (counter bits 7 ... 0). The values of pixel 0 and 1 are used to build a consecutive running bit frame counter in little endian notation. If the 24 bit counter overruns, it restarts with "0". ■ Pixel 1: frame counter, bits 15 ... 8 ■ Pixel 2: frame counter, bits 16 ... 23 ■ Pixel 3: ROI number - For cameras with the Multi-ROI feature the frame counter is inserted into each ROI. This starts with 1 for ROI 1. Because a set of ROIs always belongs to one frame the frame counter in each ROI is the same. For cameras without the Multi-ROI feature or if only one ROI is defined, this value is always "1".
Remark	**In 10 bit mode the bits 1 ... 0 in each pixel will be set to "0"; guru feature.**

13.2.8 InfoFieldTimeStampEnable

This feature enables or disables the time stamp filed in the image. If this feature is enabled, a 32 bit time stamp will be superimposed on each captured frame or ROI. The frequency of the time stamp counter amounts to 25 MHz (period = 40 nanoseconds). The frame counter occupies 4 pixels in the upper left corner of each frame, starting with pixel number 4.

Access	Read / write
Type	Boolean
In	■ ON: time stamp is enabled (1) ■ OFF: time stamp is disabled (0)
Out	■ Pixel 4: counter bits 0 ... 7 (LSB) ■ Pixel 5: counter bits 8 ... 15 ■ Pixel 6: counter bits 16 ... 23 ■ Pixel 7: counter bits 24 ... 31 (MSB)
Remark	**Guru feature**

13.2.9 InfoFieldRoiEnable

This feature enables or disables the ROI info field in the image. If this option is enabled, ROI info data will be superimposed upon each captured frame or ROI. The ROI info occupies 8 pixels in the upper left corner of each frame, starting with pixel number 8.

Access	Read / write
Type	Boolean
In	■ ON: ROI info field is enabled (1) ■ OFF: ROI info field is disabled (0)
Out	■ Pixel 8: horizontal offset, LSB, bits 0 … 7 ■ Pixel 9: horizontal offset, MSB, bits 8 … 15 ■ Pixel 10: width, LSB, bits 0 … 7 ■ Pixel 11: width, MSB, bits 8 … 15 ■ Pixel 12: vertical offset, LSB, bits 0 … 7 ■ Pixel 13: vertical offset, MSB, bits 8 … 15 ■ Pixel 14: height, LSB, bits 0 … 7 ■ Pixel 15: height, MSB, bits 8 … 15
Remark	Guru feature; to get the value for one of the ROI parameters, multiply its MSB with 256 and add the LSB to the multiplied HSB. Example ROI width = pixel 10 and 11; value of pixel 10 = 224, value of pixel 11 = 1 ROI width = 1 x 256 + 224 = 640

13.2.10 FixedPatternNoiseReduction

Digital sensors have a noise signature, the so called “Fixed Pattern Noise”. This feature can be used to switch the fixed pattern noise (FPN) reduction ON or OFF. This feature reduces FPN by subtracting the dark current of pixels.

Access	Read / write
Type	Enumeration
In	■ ON: FPN reduction is activated to improve the quality of the image ■ OFF: FPN is deactivated
Out	Status (ON/OFF)

13.2.11 FanSpeed

This feature defines the speed of the camera fan in percent. The default setting is 100%.

INFO	*This setting only applies to cameras with an attached fan, i.e cameras with an "F" in the model name ("MC2166F").*

Access	Read / write
Interface	Integer
Range	50% … 100%
Out	The current fan speed
Remark	The values are incremented by "1"

13.2.12 FanRpm

This feature displays the speed of the camera fan in rotations per minute.

INFO	*This setting only applies to cameras with an attached fan, i.e cameras with an "F" in the model name ("MC2166F").*

Access	Read
Interface	Integer
Range	**0 … 12000**
Out	The current fan speed in rpm

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