

APPLICATION NOTE

Multiple Regions of Interest for Goldeye and Goldeye Pro

V2.1.0
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Scope

A region of interest (ROI) is used to reduce the image resolution when only a section of the sensor image is needed and to increase maximum frame rates.

Goldeye and Goldeye Pro cameras support **MultipleRegions** features for multiple ROIs that are non-overlapping. This document explains how to use these features.

Required firmware version		Supported camera models	Supported number of ROIs
Goldeye Pro G5	Goldeye G/CL		
-	$\geq V04.04.x$	-008 SWIR models	Maximum 32
-	$\geq V02.26.x$	-030 VSWIR TEC1	Maximum 8
-	$\geq V06.04.x$	-032/033 SWIR models	Maximum 32
-	$\geq V03.06.x$	-034 SWIR models	Maximum 32
$\geq V00.03.00.361abc93$	$\geq V02.26.x$	-130 VSWIR TEC1	Maximum 8
$\geq V00.03.00.361abc93$	-	-320, 530 VSWIR TEC1	Maximum 8

Table 1: Supported camera models, number of ROIs and required firmware version

Single ROI

With ROI features, you can configure a single ROI by **Height**, **Width**, **OffsetX**, and **OffsetY**:

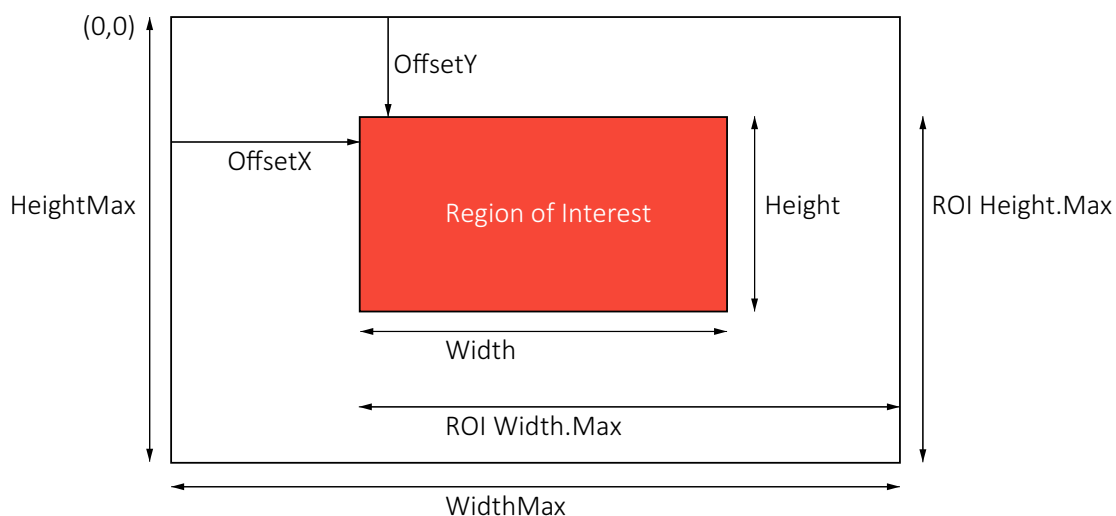


Figure 1: Features to configure a single ROI

Multiple ROIs

Note: With Goldeye Pro cameras, Multiple ROIs cannot be used along with binning.

Multiple ROIs merged to a common image

With Multiple ROI, you can configure several ROIs, named subregions. The maximum number of supported subregions depends on the camera model. [Figure 2](#) shows an example with 3 ROIs.

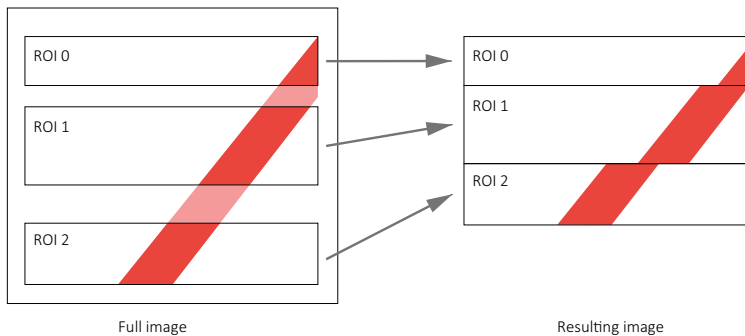


Figure 2: Multiple ROIs merged to a common image

All active ROIs are transmitted in a single frame. For each ROI, you can configure **Height** and **OffsetY**. In contrast, **Width** and the **OffsetX** are common for all regions, as shown in [Figure 3](#).

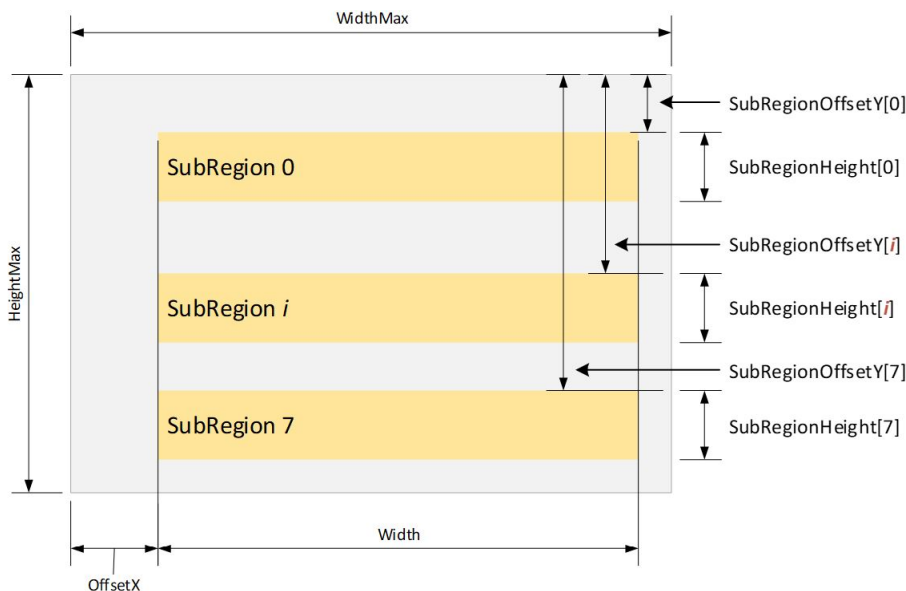


Figure 3: Subregion parameters and ROI order

Rules for configuring subregions

- ROIs must not overlap.
- Keep the order for ROIs as defined in [Equation 1](#) on page 3 and [Equation 2](#) on page 3.
- NUC (non uniformity correction) and DPC (defect pixel correction) are disabled for multiple ROIs.

The **SubRegionHeight** and **SubRegionOffsetY** parameters must meet the conditions shown in [Equation 1](#) and [Equation 2](#) (see [Figure 3](#) on page 2 for reference).

$$\text{SubRegionOffsetY}[i + 1] \geq \text{SubRegionOffsetY}[i] + \text{SubRegionHeight}[i]$$

with i as SubRegionSelector

Equation 1: Rule 1 for the start position of the next subregion

$$\text{SubRegionOffsetY}[i] + \text{SubRegionOffsetHeight}[i] \leq \text{HeightMax}$$

with i as SubRegionSelector

Equation 2: Rule 2 for the maximum height of the next subregion

Therefore, **SubRegion 1** must start after **SubRegion 0**, **SubRegion 2** after **SubRegion 1**, and so on.

[Table 2](#) gives examples of valid and invalid settings for subregions.

Note: With Goldeye Pro cameras, **SubRegion 0** must always be active.

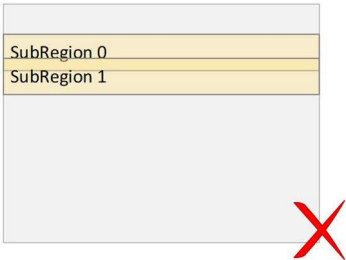
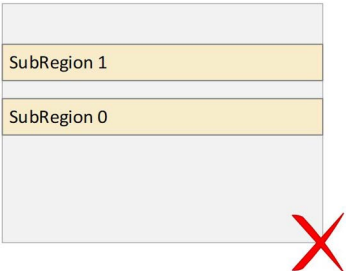
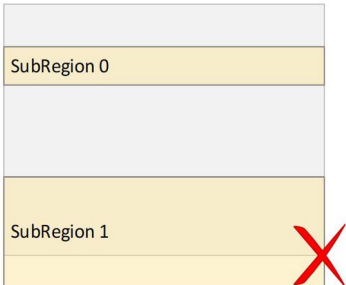
Example	Description
	Subregions are overlapping.
	Wrong order of subregions. Subregion indices must be increasing.
	SubRegion 1 exceeds the maximum height. See Equation 2 .

Table 2: Valid and invalid conditions for subregions (sheet 1 of 2)

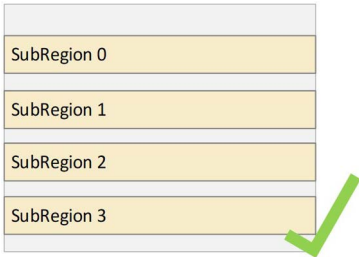
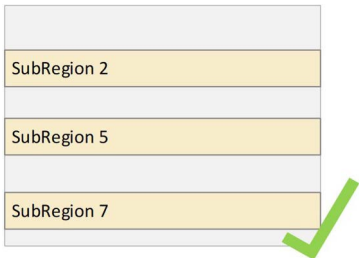
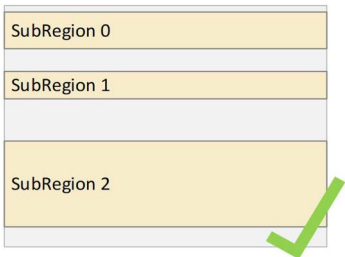
Example	Description
	Correct order of subregions
	Subregions may be omitted as long as the indices are increasing.
	Subregions may have different height values.

Table 2: Valid and invalid conditions for subregions (sheet 2 of 2)

Application workflow

We recommend you to configure the [Multiple region features](#) as follows:

1. Stop the acquisition.
2. Set **MultipleRegionsEnable** to *True* to enable multiple regions. (If this feature is set to *False*, only a single region is active that can be configured as usual by **Width**, **Height**, **OffsetX**, and **OffsetY**.)
3. Select a subregion through **SubRegionSelector**.
4. Set **SubRegionMode** to *On* to activate the selected subregion.
5. Set the subregion's height by **SubRegionHeight**.
6. Set the subregions's vertical offset by **SubRegionOffsetY**.
7. Check the subregion's status by **SubRegionStatus**. The feature must be shown as *Valid*. Otherwise continue the configuration from [Step 5](#) again.
8. Continue with [Step 3](#) to set up further subregions.
9. Adjust width and horizontal offset for all subregions by **Width** and **OffsetX** features if desired.
10. Start the acquisition.

Result: The frames are merged from the subregions.

Multiple region features



Features References

This is an excerpt of the Goldeye and Goldeye Pro feature descriptions.

- Goldeye G/CL Features Reference: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.
- Goldeye Pro Features Reference: www.alliedvision.com/en/support/technical-documentation/goldeye-pro-documentation.



Descriptions for Goldeye and Goldeye Pro

The following descriptions apply to Goldeye **and** Goldeye Pro cameras, unless otherwise stated. **Differences are marked red.**

Goldeye | MultipleRegions (subcategory)

This subcategory holds the features to configure and control the multiple regions of the camera.

Notes

- Features in the **NonUniformityCorrection** and **DefectPixelCorrection** subcategories are not supported when **MultipleRegionsEnable** is set **True**.
- Enabling **NonUniformityCorrection** and **DefectPixelCorrection** features disables **MultipleRegions** features and vice versa.

Goldeye G/CL	-008 SWIR, -030 VSWIR TEC1, -034 SWIR, -130 VSWIR TEC1
Display name	MultipleRegions
Origin of feature	Camera
Feature type	(Subcategory)
Category	/ImageFormatControl

Goldeye Pro | MultipleRegionControl (subcategory)

This subcategory holds the features to configure and control the multiple regions of the camera.

Notes

- Features in the **NonUniformityCorrection** and **DefectPixelCorrection** subcategories are not supported when **MultipleRegionEnable** is set **True**.
- Enabling **NonUniformityCorrection** and **DefectPixelCorrection** features disables **MultipleRegionControl** features and vice versa.

Goldeye Pro G5	-130 VSWIR TEC1, -320 VSWIR TEC1, -530 VSWIR TEC1
Display name	MultipleRegions
Origin of feature	Camera
Feature type	(Subcategory)
Category	/ImageFormatControl

Goldeye | MultipleRegionsEnable

Selects between single region and multiple regions mode. The number of subregions to be configured depends on the camera model.

Note: The height and Y-offset for each active subregion can be configured individually, but the horizontal dimensions are commonly set by **Width** and **OffsetX** for all subregions.

Display name	MultipleRegionsEnable
Origin of feature	Camera
Feature type	Boolean
Access	R/W
Affected features	Height, OffsetY
Category Goldeye	/ImageFormatControl/MultipleRegions

Values	Description
<i>False</i>	Single region mode is enabled, subregions mode is disabled (default). Height and OffsetY can be used as usual.
<i>True</i>	Subregions mode is enabled. Height and OffsetY features are locked and are automatically aligned with the values set for subregions.

Goldeye Pro | MultipleRegionEnable

Selects between single region and multiple regions mode. The number of subregions to be configured depends on the camera model.

Note: The height and Y-offset for each active subregion can be configured individually, but the horizontal dimensions are commonly set by **Width** and **OffsetX** for all subregions.

Display name	MultipleRegionEnable
Origin of feature	Camera
Feature type	Boolean
Access	R/W
Affected features	Height, OffsetY
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
<i>False</i>	Single region mode is enabled, subregions mode is disabled (default). Height and OffsetY can be used as usual.
<i>True</i>	Subregions mode is enabled. Height and OffsetY features are locked and are automatically aligned with the values set for subregions.

SubRegionMode

[SubRegionSelector]

Enables or disables the selected subregion.

Display name	SubRegionMode
Origin of feature	Camera
Feature type	Boolean
Access	R/W
Affected features	Height, OffsetY, SubRegionStatus
Category Goldeye	/ImageFormatControl/MultipleRegions
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
<i>On</i>	The selected subregion is enabled.
<i>Off</i>	The selected subregion is disabled.

SubRegionHeight

[SubRegionSelector]

Height of the selected subregion.

Goldeye G/CL-030/130 VSWIR TEC1, Goldeye Pro G5-130/320/530 VSWIR TEC1:

If values are entered that are not dividable by 8, **SubRegionHeight** is increased automatically to the next higher available value. For example, if **9** is entered, the value is increased to **16**.

Goldeye G/CL-008 SWIR, G/CL-034 SWIR and XSWIR:

The total sum of all active SubRegionsHeights must be ≥ 4 .

Display name	SubRegionHeight
Origin of feature	Camera
Feature type	Integer
Access	R/W
Unit	Pixels
Affected features	Height, SubRegionStatus
Category Goldeye	/ImageFormatControl/MultipleRegions
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
<i>8 ; 1</i>	Minimum
(Height max)	Maximum, depending on the height of other subregions
<i>8 ; 1</i>	Increment

SubRegionOffsetY

[SubRegionSelector]

Y-offset of the selected subregion.

Goldeye G/CL-030/130 VSWIR TEC1, Goldeye Pro G5-130/320/530 VSWIR TEC1:

If values are entered that are not dividable by 8, SubRegionOffsetY is increased automatically to the next higher available value. For example, if **9** is entered, the value is increased to **16**.

Display name	SubRegionOffsetY
Origin of feature	Camera
Feature type	Integer
Access	R/W
Unit	Pixels
Affected features	OffsetY, SubRegionStatus
Category Goldeye	/ImageFormatControl/MultipleRegions
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
8 ; 1	Minimum
(Height max)	Maximum, depending on the height of other subregions
8 ; 1	Increment

Goldeye | SubRegionSelector

Selects the subregion in a range from **0** to **n**, where **0** is the index of the first subregion and **n** is the index of the last one.

Display name	SubRegionSelector
Origin of feature	Camera
Feature type	Enumeration
Access	R/W
Affected features	SubRegionHeight, SubRegionMode, SubRegionOffsetY, SubRegionStatus
Category Goldeye	/ImageFormatControl/MultipleRegions

Values	Description
0 ; 0	Minimum
7 ; 31	Maximum

Goldeye Pro | SubRegionSelector

Selects the subregion in a range from *Region0* to *RegionN*, where *Region0* is the index of the first subregion and *RegionN* is the index of the last one.

Display name	SubRegionSelector
Origin of feature	Camera
Feature type	Enumeration
Access	R/W
Affected features	SubRegionHeight, SubRegionMode, SubRegionOffsetY, SubRegionStatus
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
<i>Region0</i>	Minimum
<i>Region7</i>	Maximum

SubRegionStatus

[SubRegionSelector]

Displays the status of the selected subregion.

Note: The *SubRegionStatus* is updated only if *MultipleRegionsEnable* (Goldeye) or if *MultipleRegionEnable* (Goldeye Pro) is *True* and the corresponding *SubRegionMode* is set to *On*.

Display name	SubRegionStatus
Origin of feature	Camera
Feature type	Enumeration
Access	R
Affected features	(None)
Category Goldeye	/ImageFormatControl/MultipleRegions
Category Goldeye Pro	/ImageFormatControl/MultipleRegionControl

Values	Description
<i>Disabled</i>	The selected subregion is disabled.
<i>Valid</i>	The selected subregion is enabled, it has a valid configuration.
<i>OverlapError¹</i>	The selected subregion is enabled, but it has an invalid configuration.

¹ Invalid subregions are excluded automatically from the resulting frame.

Additional features for Goldeye Pro

In addition to the features described above, Goldeye Pro cameras support

- *MultipleRegionArrangement*: *Vertical* (only value)
- *SubRegionOffsetX*: Displays the status, cannot be configured.
- *SubRegionWidth*: Displays the status, cannot be configured.

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