	Subject:	ATMEL AVIIVA M2LV with mvTITAN-DIG	Created	Last change
			01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.1	

Overview

Camera ATMEL AVIIVA M2LV

Running modes

Freerunning [X]
 Restart/Reset []
 Ext. Synchronized [X]
 Trigger Shutter []
 Flash & Reset []

Resolution

Horizontal 512-4096 pixel
 Vertical 1 pixel
 Bits per Pixel 8-12 bpp
 Binning []
 Partial Scan []

Timings

Pixel clock Up to 60 MHz
 Horizontal Up to 98 kHz
 Vertical - fps

MATRIX VISION GmbH Frame Grabber

Type	mvTITAN-DIG					
Line Enable by	camera	<input checked="" type="checkbox"/> [X]	Frame Grabber	<input checked="" type="checkbox"/> [X]	external	<input checked="" type="checkbox"/> [X]
Frame Enable by	camera	<input type="checkbox"/> []	Frame Grabber	<input checked="" type="checkbox"/> [X]	external	<input type="checkbox"/> []
Trigger by	external	<input type="checkbox"/> []	Frame Grabber	<input type="checkbox"/> []		
Flash by	camera	<input type="checkbox"/> []	Frame Grabber	<input type="checkbox"/> []	external	<input type="checkbox"/> []

Software

mvAcquireControl [X]
 mvIMPACT Go! []
 Other []

Imprint

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This document requires the general knowledge of the usage and the technical data of the used frame grabber, camera and application.

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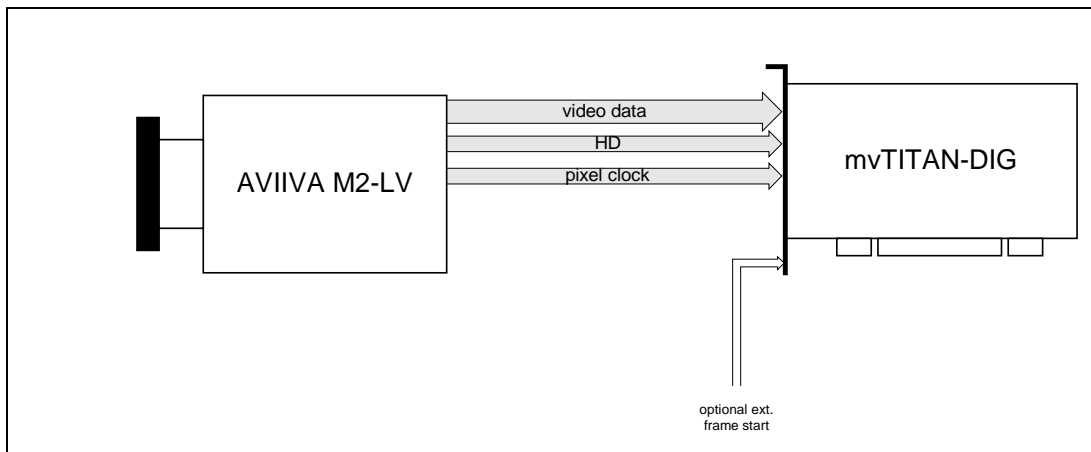
Windows95™, Windows98™, Windows98se™, WindowsNT4.0™, Windows2000™, WindowsXP™ are trademarks of Microsoft, Corp. All other trademarks are the property of their respective holders.

	Subject:	[camera name with frame Grabber]	Created	Last change
			01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.0	

Freerunning Mode



Camera runs free, line start signal is generated in the camera and sent to mvTITAN-DIG. mvTITAN-DIG can generate the needed frame start signal itself or it can be supplied by external.

Signal map



Camera settings set by software

For setting up the camera use the configuration tool *CommCam* supplied with the camera.

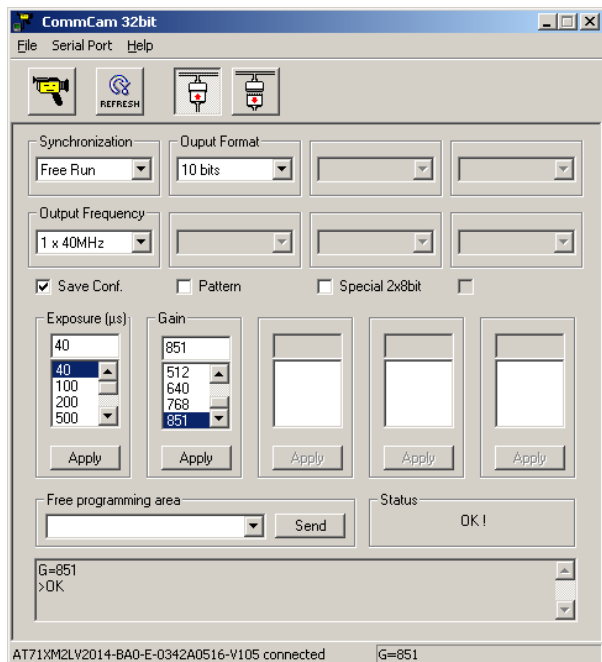
In the tool choose *Com Port /COM1 or COM2*. Open the connection with , press  and choose the camera setting *Aviiva_M2_LV.cam* in the following dialog.


Now the camera's features are visible and can be modified in the main dialog.

Important settings:

- Synchronization: *Free Run*
- Output Format: *8 – 12 bits*
- Output Frequency: *1x20 MHz, 1x30 MHz* or *1x40 MHz*


Please note that the chosen exposure time sets the line start frequency.



	Subject: [camera name with frame Grabber]	Created	Last change
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Pin connection

mvTITAN-DIG SCSI2 68pin male		Atmel AVIIVA M2 LV HD44 male			Additional cable Label: 'External LVAL'	
Pin	Signal	Pin	Signal	Color	Signal	Color
1	Ground	1	GND	1 w/b		
2	MSB(+)	10	ODD-11 +	2 w/b		
3	MSB -1 (+)	40	ODD-10 +	3 w/b		
4	MSB -2 (+)	39	ODD-09 +	4 w/b		
5	MSB -3 (+)	24	ODD-08 +	5 w/b		
6	MSB -4 (+)	35	ODD-07 +	6 b/w		
7	MSB -5 (+)	20	ODD-06 +	7 b/w		
8	MSB -6 (+)	19	ODD-05 +	8 b/w		
9	MSB -7 (+)	33	ODD-04 +	9 b/w		
10	MSB -8 (+)	23	ODD-03 +	10 b/w		
11	MSB -9 (+)	37	ODD-02 +	11 grey		
12	Ground					
13	MSB -10 (+)	36	ODD-01 +	12 grey		
14	MSB -11 (+)	6	ODD-00 +	13 grey		
15	MSB -12 (+)					
16	MSB -13 (+)					
17	DigOut0 (+)					
18	DigOut1 (+)					
19	MSB -14 (+)					
20	MSB -15 (+)					
21	Reserved					
22	Trigger In / Field In (+)					
23	12 V (Option P)					
24	Frame Ena. Out (+)					
25	Frame Ena. In (+)					
26	Line Ena. In (+)	14	LVAL +	14 grey		
27	Line Ena. Out (+)					
28	Pixel Clock Out (+)					
29	Pixel Clock In (+)	15	STROBE +	15 grey		
30	DigOut 2 (+) / Expose (+)					
31	DigIn0 (+)					
32	DigIn1 (+)					
33	DigIn2 (+)					
34	Ground					
35	Ground	1	GND	1 red		
36	MSB (-)	26	ODD-11 -	2 green		
37	MSB -1 (-)	25	ODD-10 -	3 blue		
38	MSB -2 (-)	9	ODD-09 -	4 yellow		
39	MSB -3 (-)	8	ODD-08 -	5 pink		
40	MSB -4 (-)	5	ODD-07 -	6 red		
41	MSB -5 (-)	34	ODD-06 -	7 green		
42	MSB -6 (-)	4	ODD-05 -	8 blue		
43	MSB -7 (-)	3	ODD-04 -	9 yellow		
44	MSB -8 (-)	38	ODD-03 -	10 pink		
45	MSB -9 (-)	7	ODD-02 -	11 red		
46	Ground					
47	MSB -10 (-)	22	ODD-01 -	12 green		
48	MSB -11 (-)	21	ODD-00 -	13 blue		
49	MSB -12 (-)					
50	MSB -13 (-)					
51	DigOut0 (-)					
52	DigOut1 (-)					

	Subject:	[camera name with frame Grabber]	Created	Last change
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Application Note	Project:	Camera adaption	Version 1.0	

53	MSB -14 (-)					
54	MSB -15 (-)					
55	Reserved					
56	Trigger In / Field In (-)					
57	Not connected					
58	Frame Ena. Out (-)					
59	Frame Ena. In (-)					
60	Line Ena. In (-)	29	LVAL -	14 yellow		
61	Line Ena. Out (-)					
62	Pixel Clock Out (-)					
63	Pixel Clock In (-)	30	STROBE -	15 pink		
64	DigOut 2 (-) / Expose (-)					
65	DigIn0 (-)					
66	DigIn1 (-)					
67	DigIn2 (-)					
68	Ground					
		17	TRIG 1 +		Ext. LVAL +	w/b
		18	TRIG 1 -		Ext. LVAL -	brown
		44	GND		Shield	green

Recommended cable for this mode from MATRIX VISION GmbH: KS55-0241

Camera definition

```

/* ----- AVIIVA-M2-LV2014 -----
DefCamType           "AVIIVA-M2-LV2014" VM_DIG10 NONINTERLACED 25 29000 40000
PCLK_EXTERN
DefCamAcquireSetup   "AVIIVA-M2-LV2014" VSCANH INV_HSYNC&PCLK NEXT_FIELD
DefCamAnalogParam    "AVIIVA-M2-LV2014" AC 1 0 0 1200
DefHorizontalUnit    "AVIIVA-M2-LV2014" PIXEL
DefVerticalUnit       "AVIIVA-M2-LV2014" LINES
DefCamHorizontalAcquire "AVIIVA-M2-LV2014" 0L 2048L 1
DefCamVerticalAcquire "AVIIVA-M2-LV2014" 0L 512L 1
DefCamGenerateVSync  "AVIIVA-M2-LV2014" 0L 1L

```

Image acquisition with the mvAcquireControl

Using camera with single output 8 bit

Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG8* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 8 bit.

In the *CommCam* tool in the listbox output select 8 bit.

Using camera with single output 10 bit

Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG10* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 10 bit.

In the *CommCam* tool in the listbox output select 10 bit.

Using camera with single output 12 bit


Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG12* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 12 bit.

In the *CommCam* tool in the listbox output select 12 bit.

Remarks to programming with the mv-SDK

Single output 8 bit:

	Subject: [camera name with frame Grabber]	Created	Last change
		01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.0

Set videomode to Dig8 with `mvSetVideoMode(dev, VM_DIG8)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY)`;

With these settings you will get images with a resolution of 8bpp in memory.

Single output 10 bit:

Set videomode to Dig10 with `mvSetVideoMode(dev, VM_DIG10)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY16)`;

With these settings you will get images with a resolution of 16bpp in memory. If nothing special is set the 10bpp are stored LSB aligned in the 16 bit. This means LSB is bit 0 and MSB is bit 9. The remaining bits are undefined.

Single output 12 bit:

Set videomode to Dig12 with `mvSetVideoMode(dev, VM_DIG12)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY16)`;

With these settings you will get images with a resolution of 16bpp in memory. If nothing special is set the 10bpp are stored LSB aligned in the 16 bit. This means LSB is bit 0 and MSB is bit 11. The remaining bits are undefined.

Frame start signal

For one image the mvTITAN-DIG acquires as much lines as given in the used camera definition and stores them in the memory of the PC. In the example camera definition 1024 per image are set. You can vary this value if you need more or less number of lines per image.

For acquiring one image the mvTITAN-DIG needs a frame start signal. Each time a frame start signal is recognized the mvTITAN-DIG acquires one image.

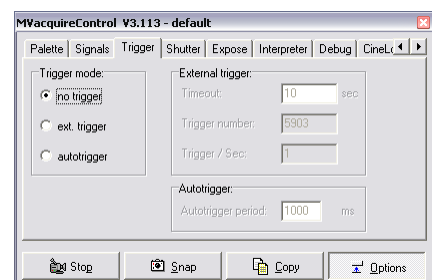
There are two possibilities where the signal can come from:


1. the mvTITAN-DIG generates the frame start signal itself (like free running mode)

Use the camera definition printed above and be sure that the external trigger input is deactivated. The external input is deactivated by default.

In this mode the mvTITAN-DIG generates automatically a frame start signal right after the last line was acquired so that no line is lost.

Using mvAcquireControl switch to register *Trigger* and be sure the *Trigger mode* is set to *no trigger*.



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Restart-Reset mode

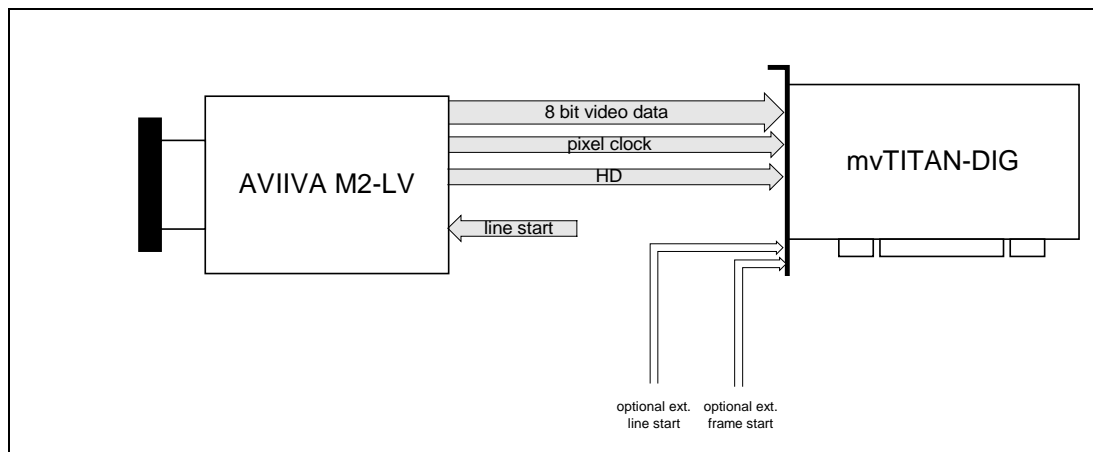
Camera gets line start signal from mvTITAN-CL and sends image data, pixel clock and HD to the mvTITAN-CL.

The line start signal doesn't influence the exposure time. The exposure time must be set by the camera configuration tool supplied with the camera.

The mvTITAN-CL can generate the line start signal itself or an external line start signal can be passed through to the camera.

mvTITAN-CL can generate the needed frame start signal itself or it can be supplied by external.

Signal map



Camera settings set by software

For setting up the camera use the configuration tool *CommCam* supplied with the camera.

In the tool choose *Com Port /COM1 or COM2*. Open the connection with , press  and choose the camera setting *Aviiva_M2_LV.cam* in the following dialog.

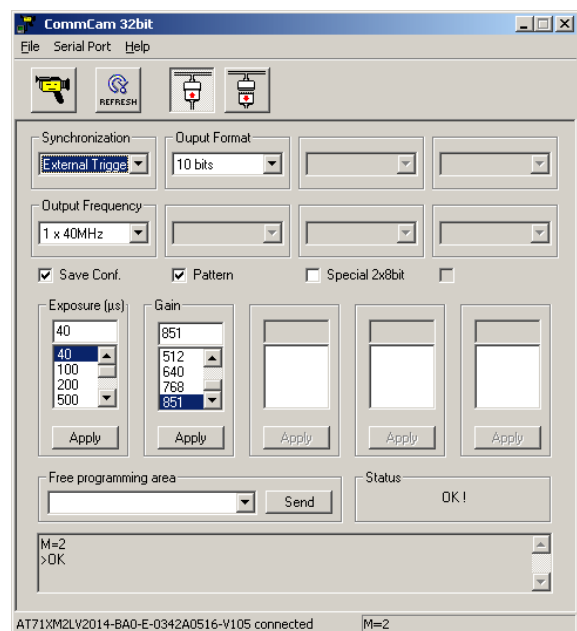
Now the camera's features are visible and can be modified in the main dialog.


Important settings:

- Synchronization: *Free Run*
- Output Format: *8 – 12 bits*
- Output Frequency: *1x20 MHz, 1x30 MHz* or *1x40 MHz*

Please note that the chosen exposure time sets the line start frequency.


The line trigger signal has to be supplied directly to the camera via the external cables connected to the camera jack pin 17 and 18.



	Subject: [camera name with frame Grabber]	Created	Last change
		01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.0

Pin connection

mvTITAN-DIG SCSI2 68pin male		Atmel AVIIVA M2 LV HD44 male			Additional cable Label: 'External LVAL'	
Pin	Signal	Pin	Signal	Color	Signal	Color
1	Ground	1	GND	1 w/b		
2	MSB(+)	10	ODD-11 +	2 w/b		
3	MSB -1 (+)	40	ODD-10 +	3 w/b		
4	MSB -2 (+)	39	ODD-09 +	4 w/b		
5	MSB -3 (+)	24	ODD-08 +	5 w/b		
6	MSB -4 (+)	35	ODD-07 +	6 b/w		
7	MSB -5 (+)	20	ODD-06 +	7 b/w		
8	MSB -6 (+)	19	ODD-05 +	8 b/w		
9	MSB -7 (+)	33	ODD-04 +	9 b/w		
10	MSB -8 (+)	23	ODD-03 +	10 b/w		
11	MSB -9 (+)	37	ODD-02 +	11 grey		
12	Ground					
13	MSB -10 (+)	36	ODD-01 +	12 grey		
14	MSB -11 (+)	6	ODD-00 +	13 grey		
15	MSB -12 (+)					
16	MSB -13 (+)					
17	DigOut0 (+)					
18	DigOut1 (+)					
19	MSB -14 (+)					
20	MSB -15 (+)					
21	Reserved					
22	Trigger In / Field In (+)					
23	12 V (Option P)					
24	Frame Ena. Out (+)					
25	Frame Ena. In (+)					
26	Line Ena. In (+)	14	LVAL +	14 grey		
27	Line Ena. Out (+)					
28	Pixel Clock Out (+)					
29	Pixel Clock In (+)	15	STROBE +	15 grey		
30	DigOut 2 (+) / Expose (+)					
31	DigIn0 (+)					
32	DigIn1 (+)					
33	DigIn2 (+)					
34	Ground					
35	Ground	1	GND	1 red		
36	MSB (-)	26	ODD-11 -	2 green		
37	MSB -1 (-)	25	ODD-10 -	3 blue		
38	MSB -2 (-)	9	ODD-09 -	4 yellow		
39	MSB -3 (-)	8	ODD-08 -	5 pink		
40	MSB -4 (-)	5	ODD-07 -	6 red		
41	MSB -5 (-)	34	ODD-06 -	7 green		
42	MSB -6 (-)	4	ODD-05 -	8 blue		
43	MSB -7 (-)	3	ODD-04 -	9 yellow		
44	MSB -8 (-)	38	ODD-03 -	10 pink		
45	MSB -9 (-)	7	ODD-02 -	11 red		
46	Ground					
47	MSB -10 (-)	22	ODD-01 -	12 green		
48	MSB -11 (-)	21	ODD-00 -	13 blue		
49	MSB -12 (-)					

	Subject: [camera name with frame Grabber]	Created	Last change
		01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.0

50	MSB -13 (-)					
51	DigOut0 (-)					
52	DigOut1 (-)					
53	MSB -14 (-)					
54	MSB -15 (-)					
55	Reserved					
56	Trigger In / Field In (-)					
57	Not connected					
58	Frame Ena. Out (-)					
59	Frame Ena. In (-)					
60	Line Ena. In (-)	29	LVAL -	14 yellow		
61	Line Ena. Out (-)					
62	Pixel Clock Out (-)					
63	Pixel Clock In (-)	30	STROBE -	15 pink		
64	DigOut 2 (-) / Expose (-)					
65	DigIn0 (-)					
66	DigIn1 (-)					
67	DigIn2 (-)					
68	Ground					
		17	TRIG 1 +		Ext. LVAL +	w/b
		18	TRIG 1 -		Ext. LVAL -	brown
		44	GND		Shield	green

Recommended cable for this mode from MATRIX VISION GmbH: KS55-0241

Camera definition

```

/* ----- AVIIVA-M2-LV2014 -----
DefCamType           "AVIIVA-M2-LV2014" VM_DIG10 NONINTERLACED 25 29000 40000
PCLK_EXTERN
DefCamAcquireSetup   "AVIIVA-M2-LV2014" VSCANH INV_HSYNC&PCLK NEXT_FIELD
DefCamAnalogParam    "AVIIVA-M2-LV2014" AC 1 0 0 1200
DefHorizontalUnit    "AVIIVA-M2-LV2014" PIXEL
DefVerticalUnit       "AVIIVA-M2-LV2014" LINES
DefCamHorizontalAcquire "AVIIVA-M2-LV2014" 0L 2048L 1
DefCamVerticalAcquire "AVIIVA-M2-LV2014" 0L 512L 1
DefCamGenerateVSync  "AVIIVA-M2-LV2014" 0L 1L

```

Image acquisition with the mvAcquireControl

Using camera with single output 8 bit

Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG8* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 8 bit.

In the *CommCam* tool in the listbox output select 8 bit.

Using camera with single output 10 bit

Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG10* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 10 bit.


In the *CommCam* tool in the listbox output select 10 bit.

Using camera with single output 12 bit

Load camera definition *AVIIVA-M2-LV2014* in register *camera* and switch to videomode *VM_DIG12* in dialog *advanced feature settings* of *Select Camera*.

Activate *Greyscale* in register *Acquire* and set it to 12 bit.

In the *CommCam* tool in the listbox output select 12 bit.

	Subject: [camera name with frame Grabber]	Created	Last change
		01.12.03	02.12.03
Application Note	Project:	Camera adaption	Version 1.0

Remarks to programming with the mv-SDK

Single output 8 bit:

Set videomode to Dig8 with `mvSetVideoMode(dev, VM_DIG8)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY)`;

With these settings you will get images with a resolution of 8bpp in memory.

Single output 10 bit:

Set videomode to Dig10 with `mvSetVideoMode(dev, VM_DIG10)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY16)`;

With these settings you will get images with a resolution of 16bpp in memory. If nothing special is set the 10bpp are stored LSB aligned in the 16 bit. This means LSB is bit 0 and MSB is bit 9. The remaining bits are undefined.

Single output 12 bit:

Set videomode to Dig12 with `mvSetVideoMode(dev, VM_DIG12)`; or when you are working with a camera definition file change the video mode in the camera definition. After that switch to colormode greyscale 8bit with `mvSetColorMode(dev, COL_GREY16)`;

With these settings you will get images with a resolution of 16bpp in memory. If nothing special is set the 10bpp are stored LSB aligned in the 16 bit. This means LSB is bit 0 and MSB is bit 11. The remaining bits are undefined.

Frame start signal

For one image the mvTITAN-DIG acquires as much lines as given in the used camera definition and stores them in the memory of the PC. In the example camera definition 1024 per image are set. You can vary this value if you need more or less number of lines per image.

For acquiring one image the mvTITAN-DIG needs a frame start signal. Each time a frame start signal is recognized the mvTITAN-DIG acquires one image.

There are two possibilities where the signal can come from:

1. the mvTITAN-DIG generates the frame start signal itself (like free running mode)

Use the camera definition printed above and be sure that the external trigger input is deactivated. The external input is deactivated by default.

In this mode the mvTITAN-DIG generates automatically a frame start signal right after the last line was acquired so that no line is lost.

Using mvAcquireControl switch to register *Trigger* and be sure the *Trigger mode* is set to *no trigger*.

