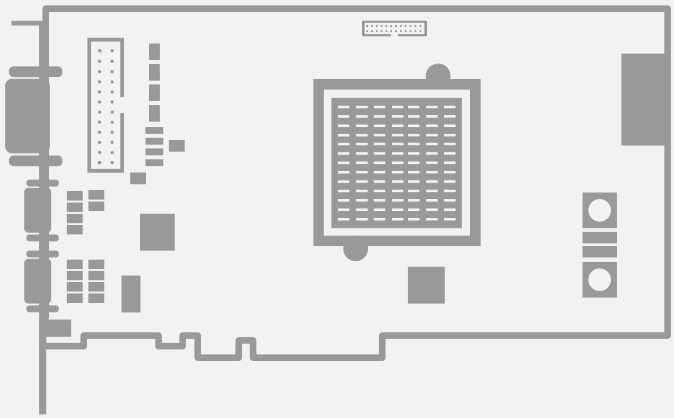
euresys
Empowering Computer Vision

RELEASE NOTES

MultiCam

MultiCam 6.18.2 Release Notes

1191 Grablink Value
1621 Grablink Express
1622 Grablink Full
1161 Domino Alpha 2
1167 Domino Melody
1155 Picolo
1157 Picolo Pro 2
1401 Picolo Junior 4
1623 Grablink DualBase
1624 Grablink Base
1626 Grablink Full XR
1168 Domino Harmony
1601 Domino Symphony PCIe
1641 Picolo Alert PCIe
1685 Picolo PCIe
1687 Picolo Pro 2 PCIe



This documentation is provided with MultiCam 6.18.2 (doc build 4044).
www.euresys.com

Contents

1. Release Benefits

Dynamic Kernel Module Support (DKMS) for Linux

The Linux drivers in this release comply with Dynamic Kernel Module Support (DKMS).

DKMS allows the installation of a new Linux kernel without any need for the re-installation of the Grablink drivers.

Memento Analyzer Probes

The Grablink drivers in this release provide new probes for **1624 Grablink Base**, **1623 Grablink DualBase**, **1622 Grablink Full** and **1626 Grablink Full XR**. When displayed in the Memento Analyzer, the `Sequence`, `Waiting`, `Acquisition` and `TimeCode` probes provide a detailed time plot of the image acquisition sequence.

New 14-bit and 16-bit Camera Link configurations

Six new Camera Link MEDIUM tap configurations extend the support of high dynamic range 14- or 16-bit cameras.

This allows **1622 Grablink Full** and **1626 Grablink Full XR** to acquire images from 2- or 3- tap 14- and 16-bit monochrome cameras and 3 x 14-bit and 3 x 16-bit color RGB cameras.

2. Release Specification

2.1. MultiCam Products

Grablink main products

Product	S/N Prefix	Icon
1191 Grablink Value	GLV	Value
1621 Grablink Express	GEX	Express
1622 Grablink Full	FM1	Full
1623 Grablink DualBase	GDB	DualBase
1624 Grablink Base	GBA	Base
1626 Grablink Full XR	FXR	FullXR

Grablink accessories

Product	S/N Prefix	Icon
1625 DB25F I/O Adapter Cable	DBC	1625
3304 HD26F I/O Adapter Cable		3304
3305 C2C SyncBus Cable		3305

Domino main products

Product	S/N Prefix	Icon
1161 Domino Alpha 2	DA2	Alpha2
1167 Domino Melody	DML	Melody
1168 Domino Harmony	DHM	Harmony
1601 Domino Symphony PCIe	DSE	Symphony

Picolo main products

Product	S/N Prefix	Icon
1155 Picolo	PIC	Picolo
1157 Picolo Pro 2	PP2	Pro2
1401 Picolo Junior 4	JR4	Junior4
1641 Picolo Alert PCIe	PAX	Alert-e
1685 Picolo PCIe	PIE	Picolo-e
1687 Picolo Pro 2 PCIe	P2E	Pro2-e

2.2. Supported Operating Systems

Windows

The MultiCam drivers are designed to support all Windows versions from 7 SP1 to 10, including the server versions, on x86 (32-bit) and x86_64 (64-bit) platforms.

This release has been validated with the following Windows versions:

OS Name & Version	Platform	Notes
Microsoft Windows 7	x86 (32-bit)	Service Pack 1 with the latest updates
	x86-64 (64-bit)	
Microsoft Windows 8.1	x86 (32-bit)	-
	x86-64 (64-bit)	
Microsoft Windows 10	x86 (32-bit)	Version 1903, a.k.a. May 2019 Update
	x86-64 (64-bit)	

NOTE
The MultiCam drivers for Windows 10 are signed by Microsoft.

WARNING
Power saving modes of the operating systems (StandBy, Sleep, Suspend...) are not supported. The PCI Express Active-State Power Management (ASPM) must be disabled!

Linux

The MultiCam drivers are designed to be distribution-independent on x86 and x86_64 platforms. They are expected to work with a wide range of distributions.

This release has been validated with the following distribution(s):

OS Name & Version	Platform	Notes
Linux Debian Lenny 5.0.1	x86 (32-bit)	Kernel version 2.6.32
Linux Ubuntu 10.04 LTS	x86_64 (64-bit)	Kernel version 2.6.32
Linux Ubuntu 18.04 LTS	x86_64 (64-bit)	Kernel version 4.15.0

WARNING
Power saving modes of the operating systems (StandBy, Sleep, Suspend...) are not supported. The PCI Express Active-State Power Management (ASPM) must be disabled!

2.3. Memento

MultiCam (version 6.12 and later) supports Memento (version 4.5 or later).

2.4. Development Tools

MultiCam 6.18.2 is supplied as:

- A **32-bit binary library** (Windows and Linux) designed to be used with ISO-compliant C/C++ compilers for the development of 32-bit (x86) applications.
- A **64-bit binary library** (Windows and Linux) designed to be used with ISO-compliant C/C++ compilers for the development of 64-bit (x86-64) applications.
- **32-bit and 64-bit .NET assemblies**, based on the `MultiCam.cs` interface file provided with the C# sample programs, designed to be used with development environments compatible with .NET frameworks version 2.0 or higher. You can find more information on this API in the sample programs source code.
- **DirectShow 32-bit filters** (Windows and Picolo series only) designed to be used with 32-bit (x86) Microsoft Visual C++ compilers for the development of 32-bit (x86) applications.
- **DirectShow 64-bit filters** (Windows and Picolo series only) designed to be used with 64-bit (x86-64) Microsoft Visual C++ compilers for the development of 64-bit (x86-64) applications.
- **32-bit and 64-bit dynamic libraries** (Windows and Linux on **Grablink series** only) designed to be used for the serial communication with Camera Link cameras.

MultiCam 6.18.2 should be usable with any development tool that supports at least one of these interfaces.

NOTE
Please note that these programming interfaces also cover most of the available development tools used with other languages.

NOTE
The previously available **ActiveX controls library** and **.NET assembly** are now deprecated and have been removed from the MultiCam package. MultiCam can still be used with Microsoft Visual Basic 6 or a .NET language provided that the C API is called directly. Sample programs are available beside the driver in the MultiCam download area of the Euresys website.

2.5. Software Tools

Tool Name	Tool Description
MultiCam Studio (64-bit)	64-bit version of the GUI tool giving access to all the MultiCam features including image acquisition and display
MultiCam Studio	32-bit version of MultiCam Studio
Camera Link Validation Tool (64-bit)	64-bit version of the Euresys tool used to validate the operational parameters of a Camera Link installation
Camera Link Validation Tool	32-bit version of the Camera Link Validation Tool

2.6. MultiCam Distribution

MultiCam is distributed on the "Software, Drivers & Installers" pages of the Grablink, Domino and Picolo products series on the Euresys web site: https://www.euresys.com/Embedded-Vision-Software-Drivers-and-Documentation

NOTE
The first time access requires a profile creation to obtain a user ID and a password.

The MultiCam panel contains 4 sections:

- Release Notes
- Documentation
- Setup Files
- Sample Programs

Release Notes section

The "Release Notes" section provides the MultiCam Release Notes in PDF format.

Documentation section

The "Documentation" section provides:

- `View MultiCam <ma.mi> online documentation (including PDFs)`: a direct link to the online MultiCam Documentation
- `multicam-win-offline-documentation-<ma.mi.re.bu>.exe`: a Windows installer for the offline MultiCam Documentation
- `multicam-linux-offline-documentation-<ma.mi.re.bu>.tar.gz`: a compressed archive of the MultiCam Documentation

The Windows installer installs locally the MultiCam Documentation and creates shortcuts in the Windows Start menu.

The compressed archive can be unpacked anywhere.

Setup Files section

The "Setup Files" section provides four MultiCam drivers setup files:

- MultiCam for Windows 10 32-bit and 64-bit
- MultiCam for Windows 32-bit and 64-bit
- MultiCam for Linux 64-bit

- MultiCam for Linux 32-bit

MultiCam driver setup files for Windows

Two Windows installers are available:

- `multicam-win10-<ma.mi.re.bu>.exe` for **32-bit x86** and **64-bit x86-64** processor architectures on Windows 10
- `multicam-win-<ma.mi.re.bu>.exe` for **32-bit x86** and **64-bit x86-64** processor architectures on other Windows editions

NOTE
The win10 package is signed by Microsoft for installation on Windows 10 platforms.

The Windows installers install the following components on 64-bit x86-64 Host PC's:

- 32-bit and 64-bit variants of "Development Tools" on page 9
- 32-bit and 64-bit variants of "Software Tools" on page 10

The Windows installers install the following components on 32-bit x86 Host PC's:

- 32-bit and 64-bit variants of "Development Tools" on page 9
- 32-bit variant of "Software Tools" on page 10

MultiCam driver setup files for Linux

Two compressed tar.gz archives are available for each type of MultiCam for Linux:

- `multicam-linux-x86_64-<ma.mi.re.bu>.tar.gz` for **64-bit x86-64** processor architecture
- `multicam-linux-x86-<ma.mi.re.bu>.tar.gz` for **32-bit x86** processor architecture

The 64-bit archive includes the 64-bit variants of "Development Tools" on page 9 and "Software Tools" on page 10. The 32-bit archive includes the 32-bit variants of "Development Tools" on page 9 and "Software Tools" on page 10.

Sample Programs section

The "Sample Programs" section provides two sample programs packages that demonstrate how to interface a frame grabber, acquire images and activate various functions on Grablink, Domino and Picolo products:

- `multicam-win-sample-programs-<ma.mi.re.bu>.zip` compressed archive for Windows
- `multicam-linux-sample-programs-<ma.mi.re.bu>.tar.gz` compressed archive for Linux

NOTE
For a short description of each program, refer to the D404EN-MultiCam Sample Programs PDF document available on PDF Guides page of the MultiCam Documentation:
https://documentation.euresys.com/Products/MultiCam/MultiCam/Content/00_Home/PDF_Guides.htm

3. Important Notices

Important notifications to be read before installing and/or using the product on your PC!

3.1. Notices Overview

This topic summarizes all the notices applicable to MultiCam products.

Global notices

- Power saving modes of the operating systems (StandBy, Sleep, Suspend...) are not supported.
- Despite the support of 64-bit OS, the physical memory addressable by a frame grabber is determined by the hardware capabilities. Refer to "DMA Addressing Capability" on page 21 for a list a products supporting 64-bit DMA transfers.
- For boards having only a 32-bit physical addressing capability, it is mandatory to allocate the image buffer into the lowest 4 GB of the physical memory. For systems having more than 4 GB of physical memory, it is mandatory to use the automatic memory allocation mode of MultiCam. For more information, refer to "Memory Allocation" on page 21.

Notices for Grablink

- 4-lane PCI Express Grablink cards support only the x4 link width. Refer to "PCI Express Compatibility Issue" on page 22 for more information.
- To operate latest generation of Grablink boards with a Camera Link clock rate lower than 30 MHz, refer to "Low Camera Link Clock Rate" on page 22 for more information.
- Restrictions apply on allowed values for the Camera and CamConfig parameters. Refer to "Camera and CamConfig Parameters" on page 23 for more information.
- There are configuration switches on the latest generation of Grablink products. Refer to"Configuration Switches" on page 23 for more information.
- PoCL mode control is only effective when the MultiCam channel is in the Ready state. Refer to "PoCL Mode Control" on page 24 for more information.

Notices for Picolo

- Picolo cards based on the Conexant Fusion 878a have specific PCI and PCI Express bus requirements . Refer to "PCI and PCI Express Compatibility Note " on page 25 for more information.

Notices for Windows

- Before installing the Windows driver, refer to "Driver Installation on Windows" on page 18 for more information.
- MultiCam Service must be started before opening the driver. On Windows operating systems, MultiCam relies on a service named "MultiCam Service". This service is automatically started when the computer boots. Software should only access MultiCam when this service is started. `McOpenDriver` will return MC_SERVICE_ERROR if the MultiCam service is not started when called.
- Windows *Fast Startup* feature is not supported. Refer to "Turning-off Windows Fast Startup" on page 20 for more information.
- The Maximum buffer size is 4 GB. Refer to "Buffer Size Limits" on page 20 for more information.

Notices for Windows 32-bit

- When PAE —Physical Address Extension— is activated, it is mandatory to use the automatic memory allocation mode of MultiCam.
- The development of 64-bit applications with MultiCam is also possible on a 32-bit Windows installation, providing that the x86-64 development tools are properly installed. Both the 32-bit and 64-bit versions of `MultiCam.lib` import libraries are installed when the import libraries installation option is checked.

Notices for Linux 64-bit

- It is allowed to allocate memory anywhere in the available physical memory addressing space. When memory is allocated beyond the lowest 4 GB of the physical memory addressing space, the OS performs automatically a buffer copy.
- For systems with more than 2GB of RAM:
  - The kernel reserves `swiotlb` memory for DMA transfers with devices that do not support 64-bit addressing.
  - Usually, the default is 64MB for the whole system. This may be insufficient for the total amount of memory used by your surfaces. To increase the amount of memory that can be used for acquisitions, you can use the `swiotlb` boot option `swiotlb = n` where n is the desired number of `swiotlb` slabs (1 slab = 2KB).
  - Refer to "DMA Addressing Capability" on page 21 for a list a products supporting 64-bit DMA transfers.

Notices for Linux 32-bit

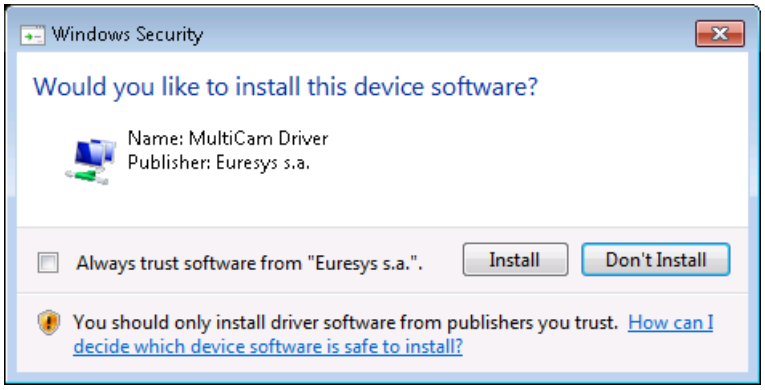
- PAE —Physical Address Extension— is not supported. The memory allocated for MultiCam must be below 4 GB in the physical memory addressing space.
- For systems with more than 2GB of RAM:
  - Devices that do not support 64-bit addressing must use memory below 4GB for DMA transfers.
  - The `mem` kernel boot option can be used to restrict the amount of memory used by the OS. For example: `mem = 3000M`
  - Refer to "DMA Addressing Capability" on page 21 for a list a products supporting 64-bit DMA transfers.

3.2. Driver Installation on Windows

WARNING
Important notification to be read before installing the driver on your Windows PC!

Always trust Euresys code-signing certificate

The following Windows Security warning message may occur at driver installation on Microsoft Windows:

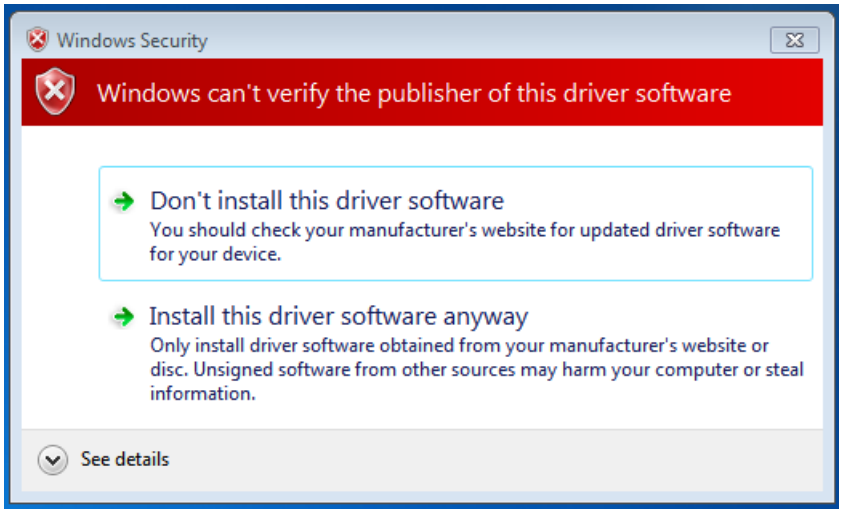


This Windows security warning message occurs when the Euresys code-signing certificate is missing from the "Trusted Publishers" Windows Certificate store. This happens, for instance, when the Euresys code-signing certificate must be renewed.

Follow the instructions to install the current Euresys code-signing certificate into the "Trusted Publishers" Windows certificate store.

Missing time-stamping certificate

The following Windows Security warning message may occur at driver installation on Microsoft Windows:



This Windows security warning occurs when the **GlobalSign Root CA - R6** certificate is missing from the Windows certificate store.

This issue can be solved by installing this missing certificate which can be downloaded here on the GlobalSign website then installed in the Trusted Root Certification Authorities (local computer) certificate store.

Support of SHA-256 certificates for Windows 7

Microsoft Windows 7 and Microsoft Windows Server 2008 R2 now require at least SP1 as well as some specific Windows updates in order to support SHA-256 certificates.

The following Windows update is required and must be installed before using Euresys drivers on Microsoft Windows 7 and Microsoft Windows Server 2008 R2:

- KB3033929 (provides support for SHA-256 certificates which are required by Microsoft): without this one, a “Windows cannot verify the digital signature for the drivers required for this device” (code 52) error will prevent the Euresys drivers from loading.

3.3. Turning-off Windows Fast Startup

Microsoft Windows Fast Startup feature turn-off procedure

The Microsoft Windows *Fast Startup* feature which is available since Windows 8 is not supported by the MultiCam driver. Please make sure to turn it off before using MultiCam.

To turn off the *Fast Startup* feature, perform the following few steps:

1. Go to the *Control Panel* then click on the *Power Options* icon.
2. Click on the "*Choose what the power buttons do*" link on the left side.
3. Click on the "*Change settings that are currently unavailable*" link at the top.
4. If prompted by UAC, then click on "*Yes*".
5. Under *Shutdown settings*, uncheck the "*Turn on fast startup*" checkbox if it is listed, then click on the "*Save changes*" button.

The *Fast Startup* feature is now disabled.

WARNING
After a Windows 10 upgrade, the Fast Startup feature can be enabled automatically again. Please, re-apply the procedure after any Windows 10 upgrade.

3.4. Buffer Size Limits

Buffer size limits for MultiCam surfaces

In Windows, the maximum buffer size allowed per MultiCam surface is about 4 GB.

If a MultiCam surface exceeds this limit, MultiCam returns *MC_IO_ERROR at channel activation.*

3.5. Memory Allocation

Allocating memory for MultiCam surfaces

The recommended method allocating memory to the surfaces of MultiCam is the "Automatic method" since this is the only method that is always applicable.

The usage of the "manual" memory allocation method" is restricted to the following cases:

- On "Windows 32-bit without PAE" systems, without any further restrictions
- On boards having 64-bit DMA addressing capability, without any further restrictions
- On Linux operating systems, without any further restrictions: The Linux kernel provides a buffering system ensuring that the DMA operates always in the lowest 4 GB of physical addressing space.

The "manual" method is prohibited when:

- The board has no 64-bit DMA capability and…
- The system has physical memory beyond the 4 GB address boundary and…
- The operating systems is "Windows x86 with PAE" or "Windows x86-64"

Since MultiCam 6.5.1, MultiCam returns the "MC_INVALID_SURFACE" error on channel activation if the manual memory allocation method is used in a prohibited case.

3.6. DMA Addressing Capability

The following products have a 64-bit DMA engine allowing the MultiCam surfaces to be allocated anywhere in the user memory space:

Grablink Products

Product	S/N Prefix	Icon
1622 Grablink Full	FM1	Full
1623 Grablink DualBase	GDB	DualBase
1624 Grablink Base	GBA	Base
1626 Grablink Full XR	FXR	FullXR

Other MultiCam products have a 32-bit DMA engine. The MultiCam surfaces must be allocated in the lowest 4 Gigabytes of the memory space.

3.7. PCI Express Compatibility Issue

PCI Express Compatibility Issue

Applies to: DualBase Full FullXR

Since version 138 (0x8A) of the PCI Express endpoint interface, **1623 Grablink DualBase**, **1622 Grablink Full** and **1626 Grablink Full XR** support exclusively the x4 link width.

WARNING
The x1 link width is no longer supported!

NOTE
The version of the PCI Express endpoint interface is given by the PCIeEndpointRevisionID board parameter

3.8. Low Camera Link Clock Rate

Operating latest generation of Grablink boards with a Camera Link clock rate lower than 30 MHz

Applies to: Base Full

Since MultiCam 6.7.2.1677, to be able to use cameras with a Camera Link clock rate lower than 30 MHz, an application must set the BoardTopology board parameter value to MONO_SLOW.

Applies to: DualBase

Since MultiCam 6.7.2.1677, to be able to use cameras with a Camera Link clock rate lower than 30 MHz, an application must set the BoardTopology board parameter value to DUO_SLOW.

NOTE
Both channels are configured for low speed operation. It is not possible to configure only one channel for low-speed operation.

Applies to: FullXR

WARNING
1626 Grablink Full XR doesn't operate with a Camera Link clock rate lower than 30 MHz!

3.9. Camera and CamConfig Parameters

Restriction on allowed values for the Camera and CamConfig parameters

Applies to: Base DualBase Full FullXR

The allowed values for the CamConfig parameters are PxxSC, PxxRC, PxxRG, LxxxxSC, LxxxxSP, LxxxxRC, LxxxxRP, LxxxxRG and LxxxxRG2.

All CamFiles have been adapted accordingly and can be downloaded from the support pages of the Euresys website using the following URL: https://www.euresys.com/Frame-Grabeers-Supported-Cameras

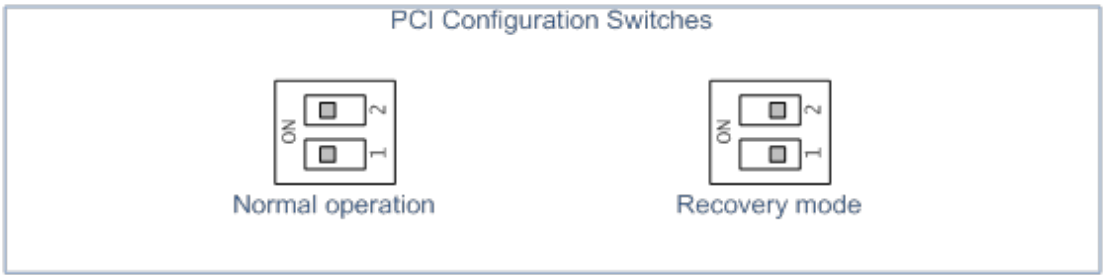
Other boards are not concerned but it is however recommended to use the latest available CamFiles in each case.

3.10. Configuration Switches

Configuration switches on latest generation of Grablink products

Applies to: Base DualBase Full FullXR

These boards feature a set of configuration switches. For normal operation, both switches must be in the ON position.



Should recovery mode be enabled by error, the Grablink board appear respectively as "GRABLINK Base (Recovery)", "GRABLINK DualBase (Recovery)", "GRABLINK Full (Recovery)" and "GRABLINK Full XR (Recovery)" in Windows Device Manager and is not functional.

To restore normal operation, power off the PC, change the switches to normal position and then reboot.

3.11. PoCL Mode Control

Applies to: Express Base DualBase Full FullXR

Any modification of the PoCL_Mode parameter is only effective when the MultiCam channel is in the Ready state.

Specifically, to turn off the power of the camera:

1. Set the PoCL_Mode parameter to value OFF.
2. Set the ChannelState parameter to value READY.

3.12. PCI and PCI Express Compatibility Note

PCI and PCI Express bus requirements for Picolo cards based on the Conexant Fusion 878a

Applies to: Picolo Picolo-e Junior4 Pro2 Pro2-e

WARNING
This notice applies only to Picolo cards based on the Conexant Fusion 878a chip.

These cards do not have a large on-board frame buffer and in order to ensure correct image/video transfer, the response time (also called latency) of the PCI or PCIe bus of the motherboard must be low enough. The latency of the PCI or PCIe bus primarily depends on the architecture of the motherboard. It may also depend on the operating system, the BIOS version and BIOS settings. We have observed that the latency of the PCIe bus of many motherboards using the latest generation CPUs (for example Intel Core CPU 6th and 7th generations) is too long and causes issues with these Picolo cards. If the latency of the bus is too long, randomly distributed black lines may appear in the image acquired. They are caused by the long response time of the PCI or PCIe bus, leading to FIFO overruns. The acquisition may also eventually stop.

The requirements for correct operation depend on the color format and the buffer pitch used. Both are set by the application using the Picolo through MultiCam parameters:

- When the color format is RGB24 (this is the default setting in MultiCam Studio), the maximum allowed bus latency is 11 us. (This is the least favorable case.)
- When the color format is RGB24 and the MultiCam buffer pitch is set to 4096, the maximum allowed bus latency is 17 us.
- When the color format is YUV422 (packed) or RGB16 and the MultiCam buffer pitch is set to 4096, the maximum allowed bus latency is 29 us.
- When the color format is YUV411 (packed) and the MultiCam buffer pitch is set to 4096, the maximum allowed bus latency is 37 us. (This is the most favorable case.)

If you experience this problem, try changing these parameters towards a more favorable case. If this is not possible or if this does not solve the problem, this Picolo card may not be compatible with your motherboard. We recommend you use the **1641 Picolo Alert PCIe** instead.

4. Release Details

4.1. Added/Improved Features

New 14- and 16-bit tap configurations

Applies to: Full FullXR

This release of MultiCam adds the support for 6 new 14- and 16-bit tap configurations:

For 3 x 14-bit and 3 x 16-bit RGB cameras

- MEDIUM_1T42 (3 x 14-bit, 1 tap)
- MEDIUM_1T48 (3 x 16-bit, 1 tap)

For 14-bit and 16-bit monochrome cameras

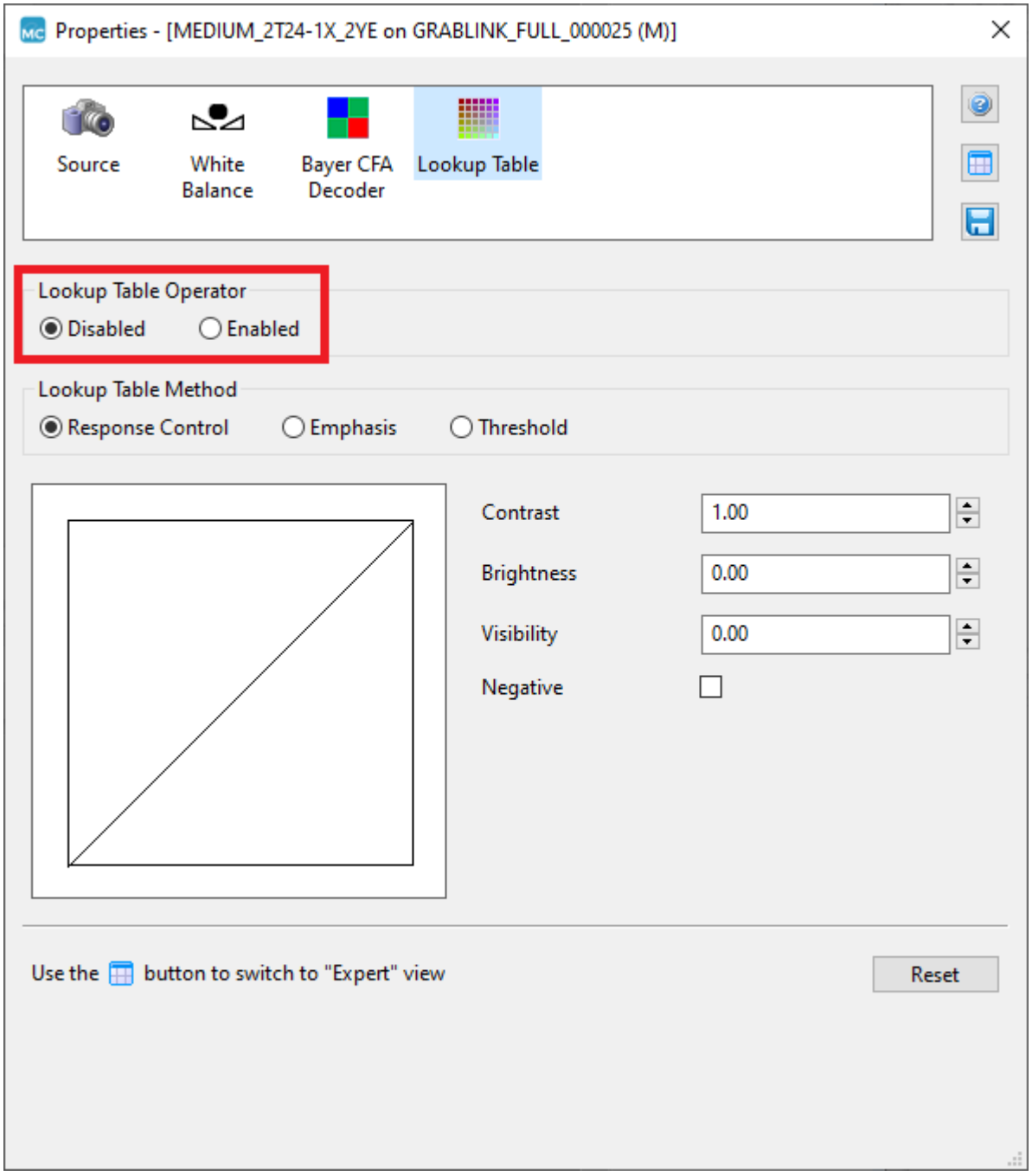
- MEDIUM_2T14 (14-bit, 2 taps)
- MEDIUM_2T16 (16-bit, 2 taps)
- MEDIUM_3T14 (14-bit, 3 taps)
- MEDIUM_3T16 (16-bit, 3 taps)

New combinations tap configurations and tap geometries that allows the reconstruction of the image

Tap Configuration	Line-scan	Bilinear line-scan	Area-scan, 1 YTap	Area-scan, 2 YTap
MEDIUM_1T42 MEDIUM_1T48	1X	-	1X_1Y	-
MEDIUM_2T14 MEDIUM_2T16	1X2 2X 2XE 2XM 2XR	1X_1Y2	1X2_1Y 2X_1Y 2XE_1Y 2XM_1Y 2XR_ 1Y	1X_1Y2 1X_2YE
MEDIUM_3T14 MEDIUM_3T16	1X3 3X	-	1X3_1Y 3X_1Y	-

New control in the Lookup Table panel of MultiCam Studio

Since this release of MultiCam, the LUT Operator is disabled by default in MultiCam Studio. A new Lookup Table Operator control has been added in the Lookup Table panel of MultiCam Studio to enable or disable the LUT Operator.



NOTE The maximum input bit-depth of the LUT Operator is 12-bit. The Lookup Table Operator should remain disabled when acquiring 14-bit and 16-bit pixels in MultiCam Studio.

New GrablinkSerialCommunication Microsoft Visual C++ sample program

Applies to: Value Express Base DualBase Full FullXR

This release of MultiCam adds the Microsoft Visual C++ version of the `GrablinkSerialCommunication` sample program.

See also: Refer to Grablink Sample Programs in the MultiCam Sample Programs manual for an exhaustive list of sample programs for Grablink.

Improved GrablinkSerialCommunication Microsoft Visual C# sample program

Applies to: Value Express Base DualBase Full FullXR

This release of MultiCam adds the baud rate configuration support in the the Microsoft Visual C# version of the `GrablinkSerialCommunication` sample program.

Support of N-line multi-spectral line-scan cameras

Applies to: Base DualBase Full FullXR

This release of MultiCam adds NYTAP value for FifoOrdering and new FifoOrderingYTapCount parameter.

FifoOrderingYTapCount allows selecting the number of Y taps when FifoOrdering=NYTAP. When FifoOrdering has another value, FifoOrderingYTapCount is unused but configured accordingly.

FifoOrderingYTapCount ranges from 1 to ImageSizeY.

Linux Dynamic Kernel Module Support

This release of MultiCam adds Dynamic Kernel Module Support (DKMS) to the MultiCam Linux driver package.

DKMS automatically re-compiles MultiCam software modules when a new kernel version is installed. This avoids the need for the re-installation of the MultiCam drivers.

Memento Analyzer probes

Applies to: Base DualBase Full FullXR

This release of MultiCam adds Memento analyzer probes related to acquisition: `Sequence`, `Waiting`, `Acquisition` and `TimeCode`.

These probes feed the Memento Analyzer Tool.

Periodic Generator timer synchronization control

Applies to: Base DualBase Full FullXR

This release of MultiCam adds a new SynchronizedPeriodicGenerator parameter to synchronize the Periodic Generator timer with page triggers.

When set to OFF (default value), the Periodic Generator timer delivers pulses continuously while the channel is in the ACTIVE state.

When set to PAGETRIGGER, the Periodic Generator timer is synchronized on page triggers. It starts delivering pulses when receiving a page trigger and stops delivering pulses after acquiring the last line of the corresponding page.

Linux installers

This release of MultiCam improves the Linux installers:

- Added INSTALL file documenting installation steps.
- Added option `-m` to `install.sh`. This allows to use a previously built driver (e.g. `glfm1.ko` for Grablink Full).
- Improved MultiCam modules `Makefile`. This allows targeting a specific kernel using the variable `KDIR`.
- Improved the installation script. The script suggests system-dependent instructions to install the missing tools or libraries.

Revision 1 of this release further improves Linux installation scripts:

- Warn when kernel build tools are either missing or built for an inadequate architecture
- Warn when `allow_unsupported_modules 0` is defined (SUSE Linux)

Documentation

Release 6.18.1 improves the MultiCam documentation

- New home page and top-level in the HTML documentation, new logo, latest Euresys corporate styling
- Revised sections in the Grablink Functional Guide: Acquisition , Input/Output Ports, Triggers, Line-Scan Synchronization
- Numerous corrections in other sections

4.2. Solved Issues

Missing MC_SIG_START_EXPOSURE and MC_SIG_START_EXPOSURE MultiCam signals

Applies to: Value Express Base DualBase Full FullXR Alpha2 Melody Harmony Symphony

Symptoms

MC_SIG_START_EXPOSURE and MC_SIG_START_EXPOSURE MultiCam signals are missing, lost between the kernel drivers and MultiCam.dll's events handler.

Conditions of occurrence

High system load conditions.

This malfunction is solved since MultiCam 6.18.2

Broken acquisition when changing LUT_UseIndex

Applies to: Base DualBase Full FullXR

Symptoms

Broken acquisition.

There is either an horizontal shift in the image or data loss resulting in a timeout when trying to stop acquisition.

Conditions of occurrence

Changing LUT_UseIndex parameter value between 0 (LUT bypass) and {1, 2, 3, 4} during live acquisition.

This malfunction is solved since MultiCam 6.18.2

Compilation issue with MulticamAdvancedWaitEvent Microsoft Visual C# sample program

Symptoms

Unable to compile the Microsoft Visual C# sample program.

This malfunction is solved since MultiCam 6.18.2

Inoperative ColorRegistrationControl FVAL setting

Applies to: Base DualBase Full FullXR

Symptoms

Since MultiCam 6.17, setting ColorRegistrationControl to FVAL has no effect. Consequently, acquired pages not always start with an A line and Bayer decoding fails.

Conditions of occurrence

- MultiCam 6.17
- Area-scan Basler Sprint camera configured in Raw Dual Line mode.

This malfunction is solved since MultiCam 6.18

Installation issue on Linux kernel 5.0

Symptoms

Unable to install MultiCam on Linux kernel 5.0.

Conditions of occurrence

- Linux 5.0
- MultiCam 6.17 or earlier

This malfunction is solved since MultiCam 6.18

Corrupted BMP files saved by MultiCam Studio

Symptoms

On 64-bit Linux, the BMP files saved by MultiCam Studio are corrupted.

Conditions of occurrence

- Linux 64-bit
- MultiCam Studio 6.17 or earlier

This malfunction is solved since MultiCam 6.18

Context menu not displayed by MultiCam Studio

Symptoms

On Linux, the context menu is not displayed when right-clicking on an image acquired by MultiCam Studio.

Conditions of occurrence

- Linux
- MultiCam Studio 6.17 or earlier

This malfunction is solved since MultiCam 6.18

CAM files downloading issue

Symptoms

MultiCam Studio could crash under specific circumstances when downloading corrupted CAM file packages.

Conditions of occurrence

- MultiCam Studio 6.18.0 or earlier

This malfunction is solved since MultiCam 6.18.1

Linux Installation on Linux kernels 5.6, 5.7, 5.8, 5.9

Symptoms

MultiCam kernel modules failed to compile on Linux kernels 5.6, 5.7, 5.8 and 5.9.

Conditions of occurrence

- MultiCam Studio 6.18.0 or earlier

This malfunction is solved since MultiCam 6.18.1

Linux Installation on RHEL/CentOS 8.1, 8.2, 8.3

Symptoms

MultiCam kernel modules failed to compile on Linux RHEL/CentOS 8.1, 8.2 and 8.3.

Conditions of occurrence

- MultiCam Studio 6.18.0 or earlier

This malfunction is solved since MultiCam 6.18.1

5. Known Issues

Unsupported padding when using McConvertSurface for pixel format conversion

The `McConvertSurface` conversion does not work as expected when there is padding in the input surface, i.e. when image width is not a multiple of 8 bytes.

Missing image format filter when saving images with MultiCam Studio

The user has the possibility to select three different file formats for saving images (BMP, TIFF and JPEG). However, none of these formats support all available image formats (e.g.: BMP does not support 16-bit images). The user should always choose himself an appropriate file format to save images. The user should also not use the “All” option when not all displayed images are compatible with the chosen file format. If the user chooses the wrong format, no image will be saved on the hard disk.

Maximum buffer size limited to 2 GB

Applies to all products.

Due to internal arithmetic issues in the MultiCam driver, the effective limit of the MultiCam buffer size is 2 GB.

Invalid "0x00" character sent on Camera Link serial port at FPGA initialization

Applies to: Base DualBase Full FullXR

These boards send a spurious "0x00" character on Camera Link serial port at FPGA initialization.

Please contact Euresys support when this cause troubles with your camera.

MultiCam Studio is unable to display 30-bit and 40-bit MultiCam Packed Pixel Formats

Applies to: Full FullXR

MultiCam Studio does not support display of RGB30P and RGBI40P color formats.

Acquisition settings restrictions on Picolo Alert

Applies to: Alert-e

These boards provide 16 channels grouped by 4. Channel 1, 5, 9, 13 belong to the first group; channels 2, 6, 10, 14 belong to the second group and so on.

Within a group, all channels must be configured with the same video standard and the same resolution. Other settings are free.

Infrequent device start failure after cold boot

Applies to: Base DualBase Full FullXR

Some cards may infrequently fail to start properly after power up (PC cold boot) and are not detected by the PC. The card operates properly again, after a power down / power up cycle of the PC.

The cards with the following version numbers may exhibit this issue: v128 (0x80), v129 (0x81), v130 (0x82), v131 (0x83), v132 (0x84), v133 (0x85), v134 (0x86), v135 (0x87), v136 (0x88), v160 (0xA0), v161 (0xA1). Cards with other version numbers do not present this issue.

Refer to "Reading PCIe Endpoint Version Number" on page 39.

MC_SIG_END_ACQUISITION_SEQUENCE sometimes occurs before last MC_SIG_SURFACE_PROCESSING

Applies to: Base DualBase Full FullXR

When using AcquisitionMode = LONGPAGE, the `MC_SIG_END_ACQUISITION_SEQUENCE` signal is sometimes issued before the last `MC_SIG_SURFACE_PROCESSING` signal of a sequence.

Invalid image borders when using Cropping with a Bayer CFA camera

Applies to: Base DualBase Full FullXR

When using a cropped window with a Bayer CFA camera, the 4 borders of acquired images (i.e. the first and last lines as well as the first and last columns) contain invalid data.

Line-scan acquisitions with PageLength_Ln = 1 may lead to segmentation fault or kernel panic under Linux

Applies to: Base DualBase Full FullXR

When performing line-scan acquisitions with PageLength_Ln set to 1, some segmentation fault or kernel panic issues have been observed in rare cases, depending on the Linux distribution used.

As a workaround, if the problem occurs, setting PageLength_Ln to a value greater than 1 will make it disappear.

MC_SIG_END_ACQUISITION_SEQUENCE signal is generated twice when EndTrigEffect = FOLLOWINGLINE

Applies to: Base DualBase Full FullXR

When using the LONGPAGE acquisition mode with EndTrigMode = HARD and EndTrigEffect = FOLLOWINGLINE, the `MC_SIG_END_ACQUISITION_SEQUENCE` signal is generated twice when enabled.

As a workaround, you can either use EndTrigEffect = PRECEDINGLINE or handle the `MC_SIG_END_ACQUISITION_SEQUENCE` signal twice.

Misbehaviour of the trigger decimation unit when using both software and hardware triggers together

Applies to: Base DualBase Full FullXR

The trigger decimation unit does not take the occurrence of software triggers into account for the decimation counter. This may lead to misbehavior especially when the first acquisition phase has been software triggered. In this case the trigger decimation unit is still continuing to consider the value of TrigDelay_Pls parameter instead of NextTrigDelay_Pls parameter. The NextTrigDelay_Pls parameter is only taken into account from the second hardware initiated trigger event.

As a workaround you can either avoid using software triggers with this feature or use the same value for both TrigDelay_Pls and NextTrigDelay_Pls parameters.

Synchronized acquisition broken on slave channels for AcquisitionMode = LONGPAGE, BreakEffect = FINISH and EndTrigMode = HARD when master channel is stopped before hardware end trigger

Applies to: Base DualBase Full FullXR

Synchronized acquisition using two or more line-scan cameras connected on several boards is broken on slaves when channels are restarted in the following conditions:

- AcquisitionMode = LONGPAGE;
- BreakEffect = FINISH;
- EndTrigMode = HARD;
- The master channel is set to the IDLE state before receiving the hardware end trigger and before setting the slave channels to the IDLE state.

As a workaround, this problem can be avoided by setting all slave channels to IDLE before setting the master channel to IDLE.

LineTriggerViolation wrongly incremented at channel (de)activation when using the rate converter

Applies to: Express Base DualBase Full FullXR

The LineTriggerViolation parameter is wrongly incremented when a channel is activated or deactivated if LineRateMode is set to CONVERT.

The upper limit of Hactive_Px is 65504 instead of 65535

Applies to: Base DualBase Full FullXR

The upper limit for the Hactive_Px parameter is currently 65504 instead of 65535 (this value depends on the TapConfiguration parameter value). When setting a value greater than 65504, MultiCam returns MC_RANGE_ERROR.

Cannot change connector for a camera without creating the channel again

Applies to: DualBase

If a channel is first created on the A connector, no acquisition will be performed by just setting the Connector parameter to the B value when changing the camera from the A connector to the B connector. In that case, the channel must be created again using the B connector.

Inoperative timeout for clSerialRead and clSerialWrite functions of the Camera Link serial Linux library

Applies to: 1625 3304 3305 Value Express Base DualBase Full FullXR

Under Linux, the `clSerialRead` and `clSerialWrite` functions of the `libclseremc.so` library do not take the timeout passed as fourth argument into account. These functions simply return `CL_ERR_NO_ERR` immediately instead of `CL_ERR_TIMEOUT` when no data could be read or written within the specified timeout.

Inoperative VIDEO acquisition mode when ActivityLength is not equal to 1

Applies to: Express

If ActivityLength is not equal to 1 when AcquisitionMode = VIDEO, the frame grabber only acquires the first sequence of images (i.e. the number of images defined by the SeqLength_Fr parameter) then remains in the ACTIVE state without acquiring any additional image.

Bad behaviour of WindowX_Px

Applies to: Express

When changing the WindowX_Px parameter more than once, the system has to be rebooted to be able to activate the channel.

As a workaround, don't change the WindowX_Px parameter more than once.

Wrong serial port ID returned by Camera Link serial library

Applies to: Express

The "Grablink Avenue" port ID is returned instead of "Grablink Express" when calling the `clGetSerialPortIdentifier` function of the Camera Link serial library with a Grablink Express.

There is no workaround.

Inoperative StartExposure signal for subsequent images in a sequence

Applies to: 1625 3304 3305 Value Express Base DualBase Full FullXR

When acquiring a sequence of 2 or more images, the MC_SIG_ACQUISITION_FAILURE signal is only issued for the first acquired image.

There is no workaround.

Invalid strobe pulse when using PreStrobe_us parameter

Applies to: Melody Harmony

The pre-strobe function is not functional.

There is no workaround.

MULTIPLE_IRP_COMPLETE_REQUESTS Blue Screen occasionally occurs on some systems

Applies to: Picolo Picolo-e Junior4 Pro2 Pro2-e

On some systems a MULTIPLE_IRP_COMPLETE_REQUESTS Blue Screen might occasionally occur.

ImageSizeX is 702 instead of 704 when Standard = PAL and PixelTiming = BROADCAST

Applies to: Picolo Picolo-e Junior4 Pro2 Pro2-e

When Standard = PAL and PixelTiming = BROADCAST, ImageSizeX is wrongly set to 702 pixels instead of 704.

As a workaround, manually set ImageSizeX to the correct value.

Left-over binaries after uninstalling MultiCam from Windows 7

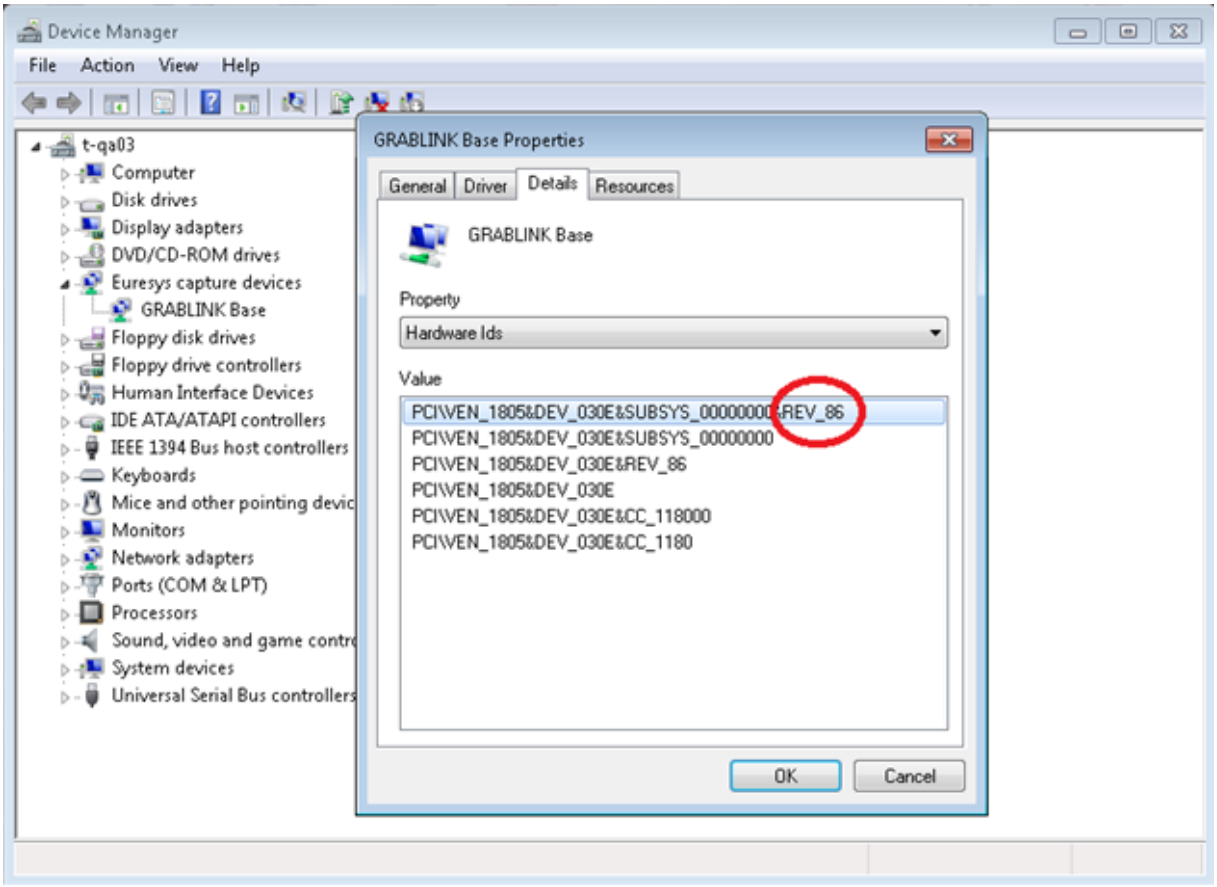
Since Windows 7, some MultiCam driver binaries located in `C:\Windows\system\euresys\multicam` are left on the system after uninstalling MultiCam. Deleting them manually is allowed once MultiCam has been uninstalled.

6. Appendix

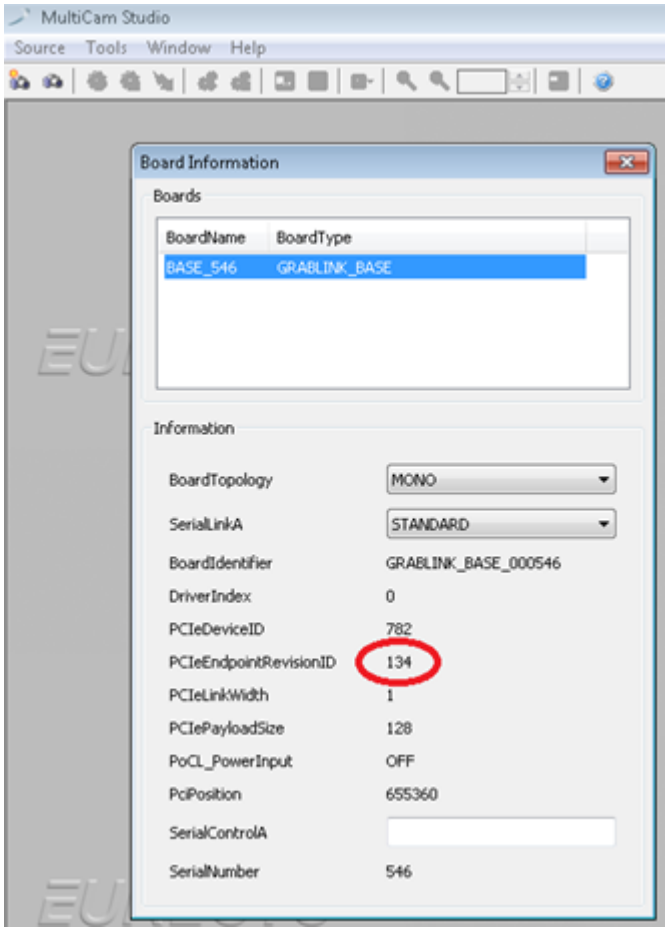
6.1. Reading PCIe Endpoint Version Number

There are two methods to read the PCIe endpoint version number of a Grablink card:

1. Using Windows Device Manager – Properties Dialog
2. Using MultiCam Studio – Board Information Dialog



Windows Device Manager – Properties Dialog showing the PCIe endpoint version number in hexadecimal format



MultiCam Studio – Board Information Dialog showing the PCIe endpoint version number in decimal format