



Hardware Manual

VisionBox AGE-X⁵

Version 1.4 – July 2020

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1 Handling and Safety Instructions



Depending on the operating conditions, the housing temperature can exceed 60 °C. There is a risk of injury!



Handle with care! The housing, especially heat sinks can have sharp edges. There is a risk of injury!



EMC conformity according to EN/IEC 61000-6-2:2005 is qualified for cable lengths ≤ 30 m.

Electrostatic discharge at unshielded I/O connectors can lead to unexpected events or data errors for the corresponding interface.



Electrical installation should be executed without power applied to the device and connected devices.



Before installing expansion cards, make sure that the VisionBox AGE-X is disconnected from power.

Use appropriate ESD protection when changing components.



Only open if advised by IMAGO!

Warranty void if warranty seal is removed or broken.



Please take special note of the **voltage range** which may be applied to the device. Otherwise, permanent damage to the device may result!



Air Circulation

When mounting the device within an enclosure, adequate space for air circulation is required. The space above, below and at both sides should be at least 5 cm.



Avoid extreme environmental conditions and protect the VisionBox from dust, humidity and heat.



Due to the characteristics and physical principles inside flash memory, **SSDs have a finite lifetime** dictated by the number of write operations.

Therefore, take care of the regular write operations to prevent an early SSD damage. Ask for the technical data of the used SSD and, if necessary, for support to calculate the lifetime.

Inform the user of the system that SSDs are wear parts which must be renewed regularly.

2 Introduction

Thank you very much for your interest in our VisionBox AGE-X. To get the most out of your purchase, please take some time to read all the information given here thoroughly.

This VisionBox is optimized for cameras using the GigE Vision or Camera Link interface. For multi-camera systems, not only several camera ports but also several integrated LED Controllers and digital I/Os allow a compact setup without additional electronics. If you need more connectivity or a specific PCIe board, please take a look at the other VisionBox alternatives.

The integrated Real-Time Communication Controller ensures proper timing between all devices, even when using Windows or Linux operating systems. To avoid complex cabling, the cameras can be connected with standard Ethernet cables. A single cable provides trigger, image data and power for each GigE camera.

Due to its small size, powered by 24V_{DC} and without fan, the AGE-X can be mounted into nearly every machine, also as IP65 version for OEM quantities.

All components are available for several years, to provide continuous delivery without changes. The AGE-X-SDK can be used in C++ and .NET as well as with some third-party machine vision libraries for easy integration into your products and projects.

For series production, IMAGO delivers the AGE-X ready-to-run, including customer-specific SSD image, qualified 3rd-party components and acceptance test.

2.1 Concept

A Real-Time Communication Controller with vision- & automation-specific interfaces combined with an embedded Intel processor, this is the philosophy of the Vision Box AGE-X series:

- 6th and 7th generation Intel x86 processor
- Real-Time Communication Controller *RTCC*:
 - Controls vision- & automation-specific interfaces:
 - Digital I/Os
 - Encoder
 - Camera trigger
 - LED Strobe Controller
 - Contains functional units for controlling I/Os in real time:
 - Trigger unit: Creation of trigger signals, derived from other inputs (e.g. encoder)
 - I/O scheduler: applies values stored in a FIFO to outputs in real time (based on trigger event, encoder position, or timer value)
 - Multiplexer: flexible connection of functional units
 - Operates independently from the OS & the x86 processor
 - Easy-to-use high-level API for C++, .NET and support by 3rd-party software tools
- 3 types of models:
 - 4x 1GigE
 - Four 1GigE Vision cameras can be connected
 - Option PoE: Power-over-Ethernet
 - Option ToE: Trigger-over-Ethernet from RTCC in real time with a microsecond jitter
 - Camera Link
 - Two Camera Link Base cameras can be operated or one Camera Link Medium / Full / Deca camera
 - Support for Power-over-Camera-Link (PoCL)
 - 2x 5GigE and 2x 1GigE
 - Two 5GigE Vision cameras and two 1GigE Vision cameras can be connected. It's also possible to operate four 1GigE Vision cameras.
- Digital I/Os:
 - Opto-isolated
 - Status LEDs
 - Inputs up to 5 MHz with adjustable debouncing in RTCC. Communicated to x86 via interrupt or polling
 - Outputs up to 50 kHz / up to 1 A / up to 48 V
- x86 processor
 - Intel processors
 - Windows 10 IoT Enterprise
 - Debian GNU/Linux, optionally with PREEMPT_RT patch

- Housing
 - Passive cooling
 - All interfaces on front panel
 - 24 VDC power input
 - No moving parts
 - Service hatch for access to USB 2.0 for dongle
- More vision & automation interfaces
 - RS-422 inputs / outputs, e.g. for encoders
 - LED controllers up to 6 A strobe / 0,5 A continuous

2.2 Configurations

The following table shows available features and interfaces for the different models of the VisionBox AGE-X5:

	4x 1GigE	2x 5GigE 2x 1GigE	Camera Link
RAM	up to 32 GB		
Main Storage	30 GB SSD (CFast) optionally 120 GByte optionally 2 nd drive (mSATA)		
USB	4x USB 3.0		
Display	DisplayPort 1.2		
Ethernet	1x 1000 Mbit/s	1x 1000 Mbit/s	1x 1000 Mbit/s
Dig. I/Os	8x IN / 8x OUT optionally 16x IN / 16x OUT		
LED Controller	2x, optionally 4x	2x	-
Camera Trigger	2x, optionally 4x	2x	-
Camera Interface	4x 1GigE	2x 5GigE 2x 1GigE	Camera Link 2x Base or 1x Medium / Full / Deca PoCL support
Encoder / RS-422	Optionally 4x IN	Optionally 4x IN	3x IN / 3x OUT, optionally additional 4x IN
Additional Options	4x PoE, 4xToE		

Table 1: Feature overview

Please also ask for special OEM configurations.

2.3 Block Diagram

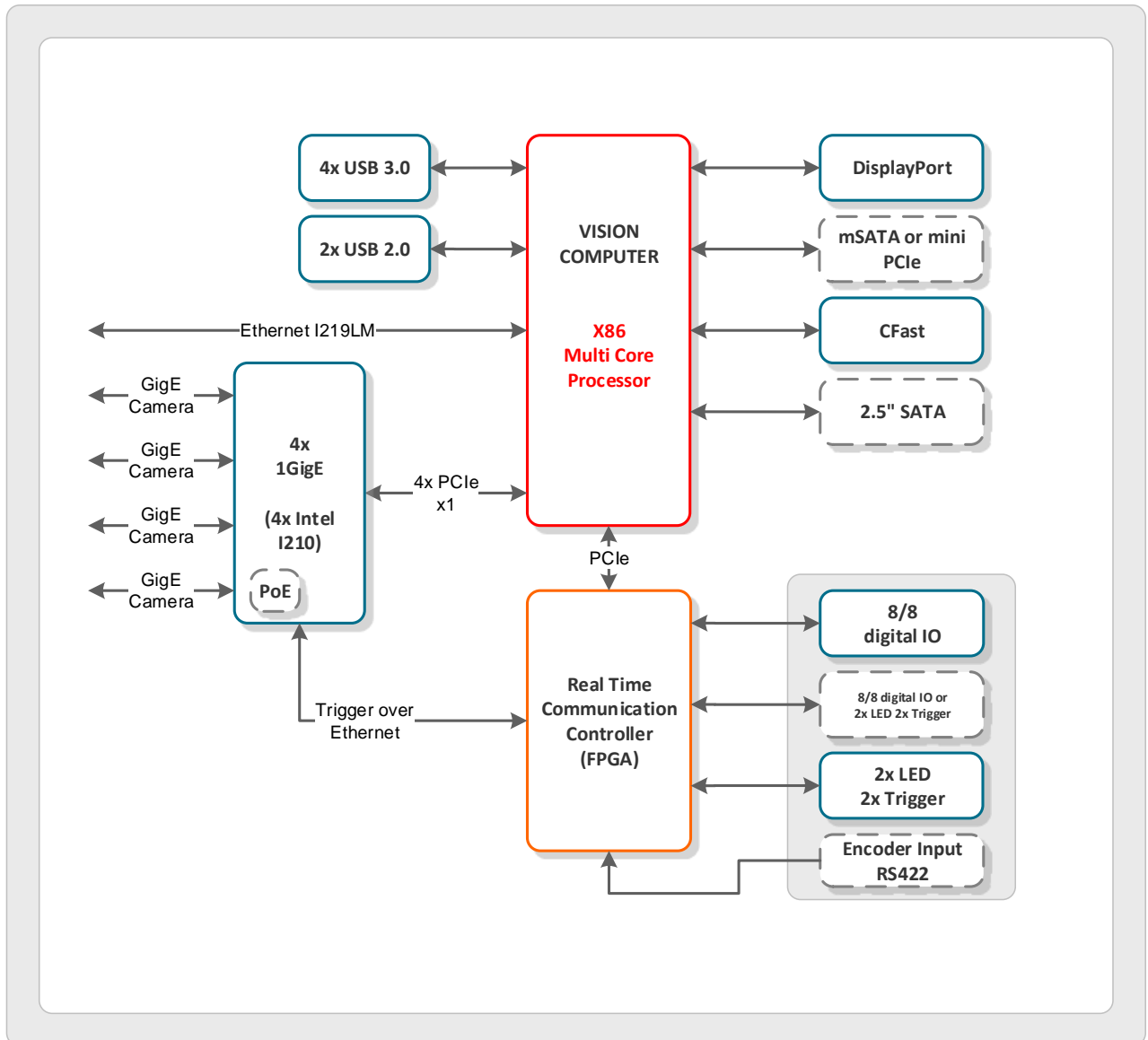


Figure 1: Block diagram AGE-X5 4x 1GigE

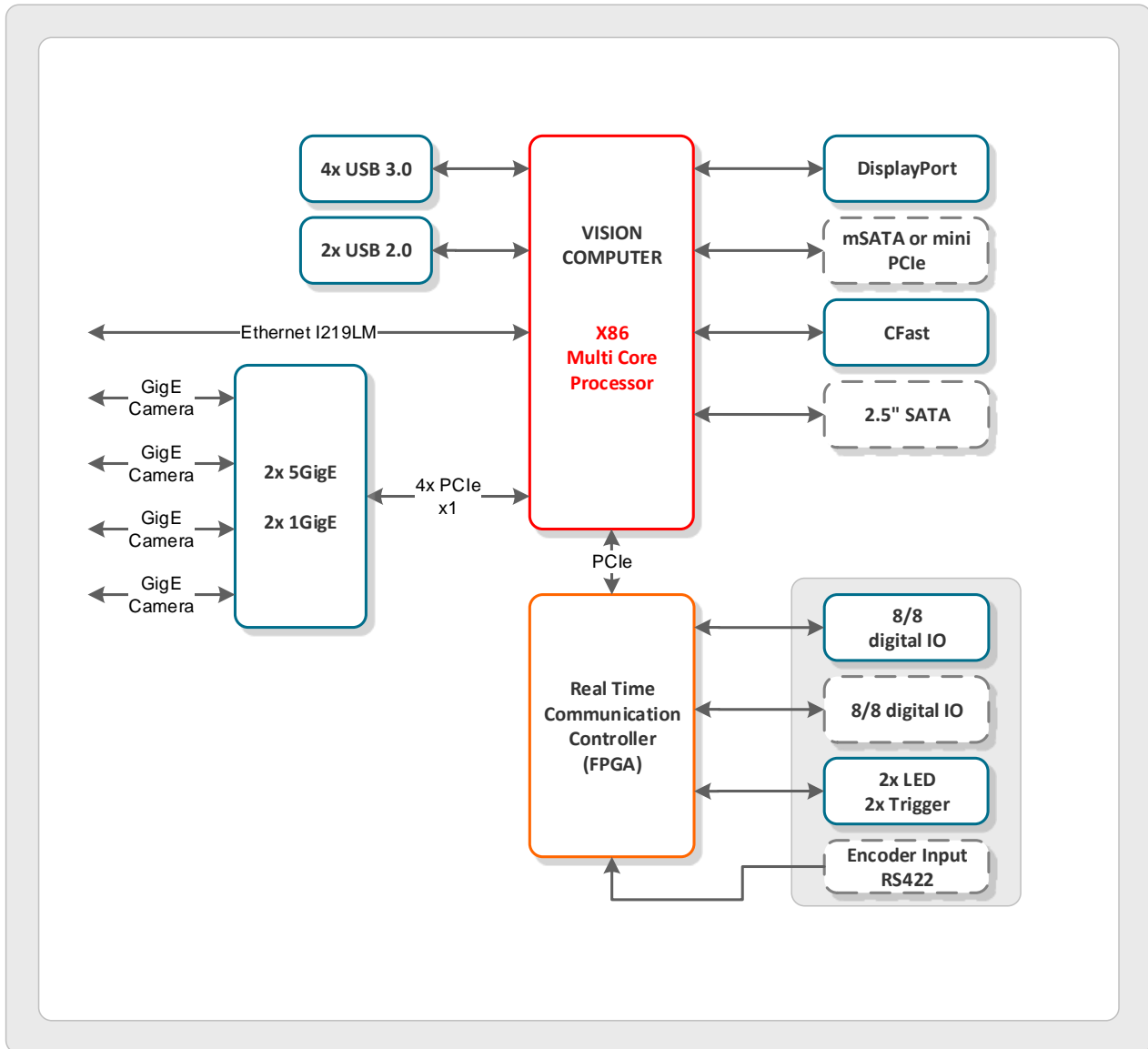


Figure 2: Block diagram AGE-X5 2x 5GigE + 2x 1GigE

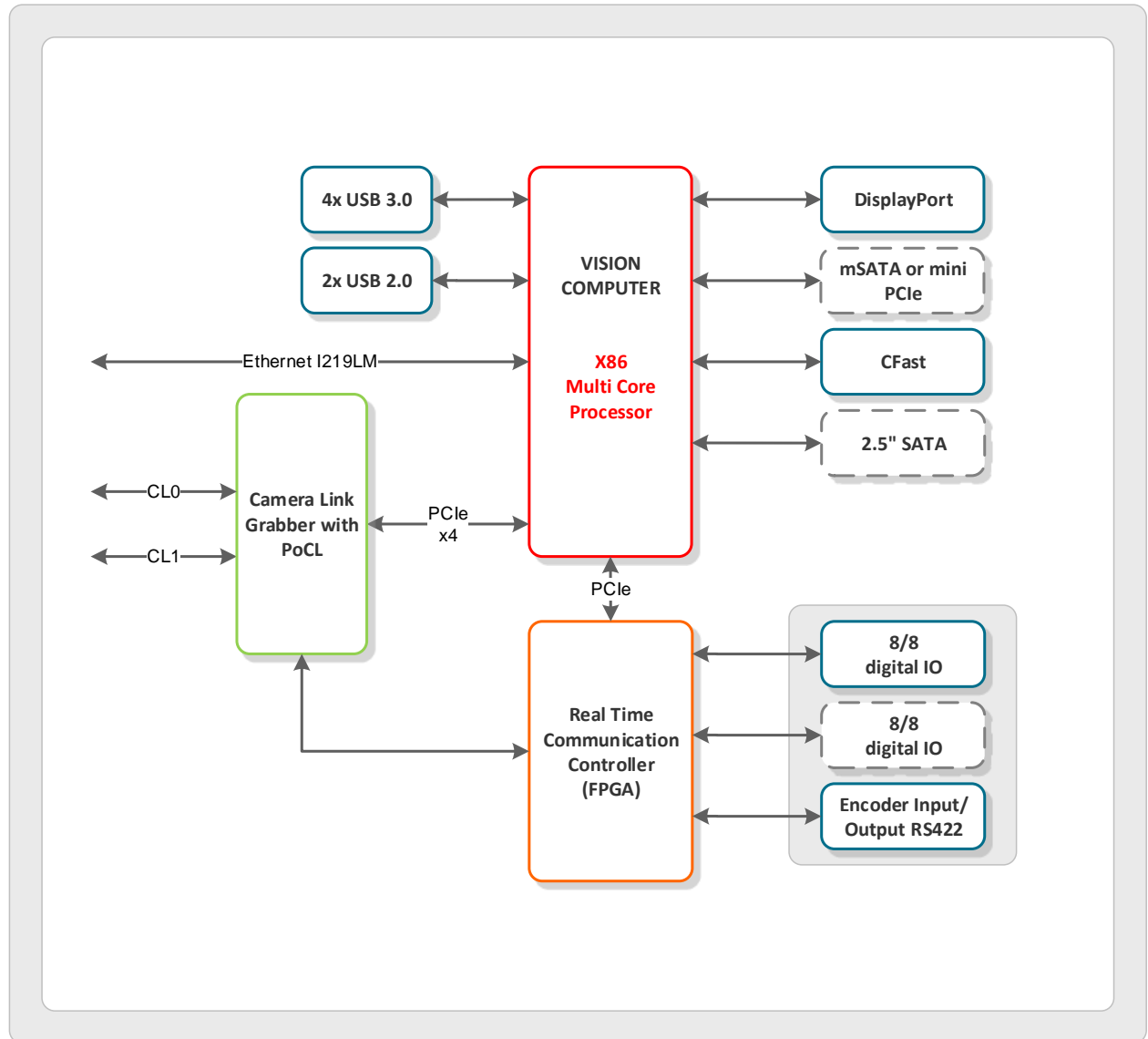


Figure 3: Block diagram AGE-X5 Camera Link

3 Technical Data

3.1 Processors

The following processors are currently supported:

	Intel Celeron G3900	Intel Core i3-6100TE	Intel Core i5-6500TE	Intel Core i7-6700TE
Nominal Frequency	2.8 GHz	2.7 GHz	2.3 GHz	2.4 GHz
Turbo Frequency	---	---	3.3 GHz	3.4 GHz
Cores / Threads	2 / 2	2 / 4	4 / 4	4 / 8
TDP	51 W	35 W	35 W	35 W

Table 2: Processor overview 6th generation

	Intel Core i5-7500T	Intel Core i7-7700T
Nominal Frequency	2.7 GHz	2.9 GHz
Turbo Frequency	3.3 GHz	3.8 GHz
Cores / Threads	4 / 4	4 / 8
TDP	35 W	35 W

Table 3: Processor overview 7th generation

3.2 Operating Conditions

Power Supply:

Parameter	Min.	Typ.	Max.	Unit
Supply Voltage	18	24	30	V
Power Consumption ¹ (at TDP workload)		62		W
Power Supply Current Rating ² (peak current)		2.7		A
Continuous Supply Current Limit ³			8	A

Environment:

Parameter	Value
Operating Temperature / Recommended Temperature [°C] for VisionBoxes equipped with Intel CPU 6 th generation	+5 ... +45 / +20...+30
Operating Temperature / Recommended Temperature [°C] for VisionBoxes equipped with Intel CPU 7 th generation	+5 ... +40 / +20...+30
Operating Humidity [%, relative, non-condensing]	5 ... 85
Storage Temperature [°C]	-10 ... +70
Storage Humidity [%, relative, non-condensing]	5 ... 95
Device Weight [g]	~2500

Note: The maximum allowed temperature is influenced by the actual hardware configuration, the system workload and the mounting situation. The temperature range should be verified for each application.

Note: The heat sink can transfer more heat in upright mounting position.

Note: Due to the lifetime of electronic components, we recommend not to operate the device permanently under the maximum possible temperature and instead use a lower than max temperature. Laws of physics say: if the average operating temperature is increased by 7°C, the lifespan of an electronic component will be divided in half! Following are common scenarios in industrial applications:

- Multiple devices are mounted inside an electrical cabinet
➔ The cabinet itself is equipped with an air conditioner.

¹ Measured with CPU / GPU at TDP workload and without external devices except 1× Ethernet and DP.

² Measured with CPU / GPU at full workload; 24 V supply voltage; no external devices except 1× Ethernet link at 1000 Mbit/s. This value doesn't account for additional current drawn by interfaces like 4× Ethernet or for the supply of LED units and PoE / PoCL / USB devices.

³ Certain possible usage combinations like simultaneous PoE / PoCL / USB device supply and active LED output can lead to continuous excess of this value, which must be avoided by the user.

- In a large electrical cabinet, a single device is mounted with other (low heat-producing) devices
 - ➔ It is enough when a fan provides air circulation inside the cabinet.
- It is recommended that the application software regularly checks internal temperatures.

Digital Input:

Parameter	Min.	Typ.	Max.	Unit
Input Voltage		24	30	V
High-level Current Threshold		1	5	mA
Maximum Current Internal Limited	6		21	mA
Threshold Voltage	Standard	6	11	V
	TTL-compatible (option) ⁴	1.8	2.4	
Signal Frequency			5	MHz

Digital Output, Standard Version:

Parameter	Min.	Typ.	Max.	Unit
Common VCC Supply Voltage			30	V
Output Current, Saturated Operation ($V_{CE} < 1\text{ V}$)	10		20	mA
Turn-On Time (24 V Common VCC, 10 mA)		5		μs
Turn-Off Time (24 V Common VCC, 10 mA)		15		μs

Digital Output, High-Current Option⁵:

Parameter	Min.	Typ.	Max.	Unit
Common VCC Supply Voltage			30	V
Continuous Channel Current			1	A
Peak Channel Current (duty cycle $\leq 25\%$, $t_{on} \leq 1\text{ s}$)			2	A
Total Continuous Output Current ⁶			4	A
Turn-On Time (24 V Common VCC)		5		μs
Turn-Off Time (24 V Common VCC, 10 mA)		60		μs
Turn-Off Time (24 V Common VCC, 1 A)		40		μs

⁴ TTL-compatible option is only available for the second I/O module

⁵ High-current option is only available for the second I/O module

⁶ Measured at common VCC pin; example: $4 \times 1\text{ A} = 8 \times 0.5\text{ A} = 4\text{ A}$

RS-422⁷ (Encoder):

Parameter	Min.	Typ.	Max.	Unit
Receiver Input Hysteresis		45		mV
Receiver Input Offset			3.3	V
Receiver Data Rate			10	Mbps

LED Controller:

Parameter ⁸	Min.	Typ.	Max.	Unit
Strobe Current Range	0.05		6	A
Strobe Current Step Size		30		mA
Maximum Continuous Current ($V_{\text{Supply}}=28\text{ V}$, $V_{\text{Load}}=24\text{ V}$)		0.5		A
Minimum Flash Duration @ 2 A		10		μs
Flash Duration Step Size		1		μs
Turn-on Delay ⁹	3		80	μs
Turn-off Delay		2		μs

Camera Trigger:

Parameter	Min.	Typ.	Max.	Unit
ACQ TRG High Voltage		24		V
ACQ TRG Low Voltage		0.5		V
ACQ TRG High Side Current		20		mA
ACQ TRG Maximum Low Side Sink Current		100		mA

Ethernet with 4× PoE Option (IEEE 802.3af/at):

Parameter	Min.	Typ.	Max.	Unit
PoE Output Voltage		53		V
PoE Class Support	0		4	
Total PoE Supply Power for all Four Ports ¹⁰			55	W

⁷ A "Fail-Safe" circuit is used for the input signals to put unconnected terminals into a defined state.

⁸ The maximum current and strobe timing limits are calculated by the software, depending on the used parameters.

⁹ The actual turn-on delay depends on the output current used. Lower current values result in higher delays → 3 μs at 6 A, 80 μs at 100 mA

¹⁰ For example, two class 4 devices or four class 3 devices can be powered simultaneously.

3.3 Dimensions

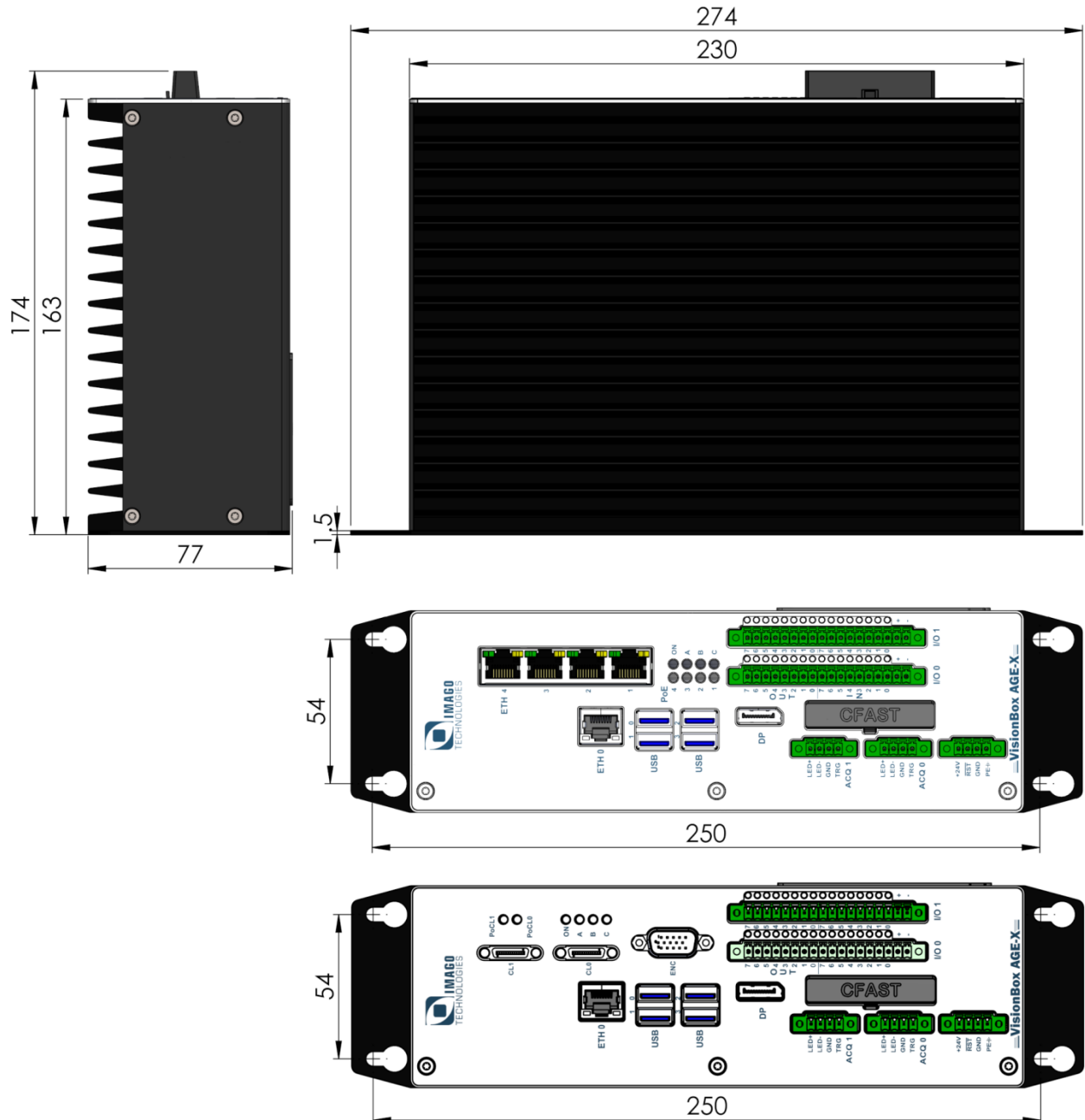


Figure 4: Housing dimensions (in mm)

4 Power Connector and LEDs

4.1 Power Connector

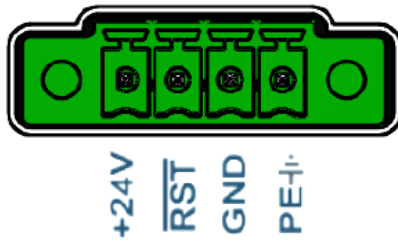


Figure 5: Power plug

Pin	Function
+24V	24 V power supply
RST	Reset input, low active
GND	Ground
PE	Shield / housing connection

Table 4: Power connector

The $\overline{\text{RST}}$ terminal can be pulled to GND to reset the VisionBox during operation. A falling edge will trigger the reset. Leaving the signal floating is the default mode for normal operation.

Phoenix Contact plug component: **MC 1,5/4-STF-3,5** (order no. 1847071)

4.2 System LEDs

The computer has four main system LEDs. These LEDs are dual color (bicolor) types. The functionality of the LED A, B and C can be changed by software.



Figure 6: Status LEDs

LED	Color	Function (green)
On	Green	Power On
	Red	FPGA configuration error
	Orange blinking	Backup firmware is loaded
	Orange	System shutdown or reset
A	Green	User LED 0
	Red	User LED 1
B	Green	User LED 2
	Red	User LED 3
C	Green	User LED 4 (default: SATA activity)
	Red	User LED 5

Table 5: System LED values

4.3 Power-over-Ethernet LED

The optional PoE feature of the VisionBox AGE-X5 with 4x 1GigE provides power to PoE enabled devices. Four additional status LEDs signaling the power state are associated with the four ports:



Figure 7: Ethernet PoE LEDs

LED State	Description
Green blinking	Searching for PoE device
Green on	PoE device found and powered
Red blinking	Error code

Table 6: PoE LED state

4.4 Power-over-Camera-Link LED

The VisionBox AGE-X5 with Camera Link provides two CL connectors. If a PoCL-capable camera and Camera Link cable are used, the powered supply can be provided by the VisionBox through the same cable. PoCL is supported independently for both connectors. An LED is assigned to each Camera Link connector to indicate the PoCL state:

PoCL1



PoCL0

Figure 8: PoCL status LEDs

LED	PoCL State
Red	Connection sensing
Green blinking	Non-PoCL camera detected
Green	PoCL camera detected and power supply active

Table 7: PoCL LED signaling

4.5 5GigE LED

The VisionBox AGE-X5 with 2x 5GigE and 2x 1GigE is equipped with two status LEDs signaling the link state of both 5GigE ports:



Figure 9: 5GigE LEDs

LED State	Description
On	5000Mbit/s link
Off	No link or link speed less than 5000Mbit/s

Table 8: 5GigE LED state

5 Interfaces

This chapter describes the interfaces for the VisionBox AGE-X5.

5.1 Ethernet Interface (single)

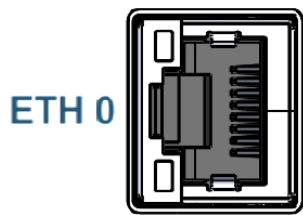


Figure 10: Ethernet Connector (1x)

Lower LED	Link Speed
Orange	1000 Mbit/s
Green	100 Mbit/s
Off	10 Mbit/s

Upper LED	State
Off	Link down
On	Link up, no traffic
Blinking	Traffic (only with 100 or 1000 Mbit/s Link)

Table 9: Ethernet (single) LED state

5.2 Ethernet Interface (4x 1GigE)

The VisionBox AGE-X5 with 4x 1GigE provides four additional Gigabit Ethernet ports.

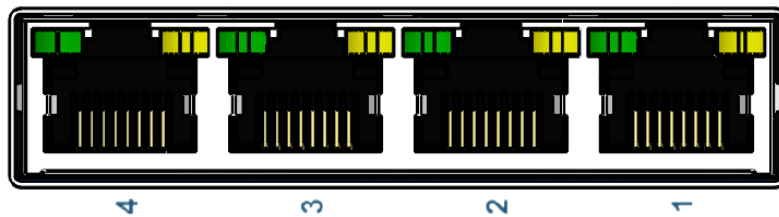


Figure 11: Ethernet connector (4x)

Left LED	Link Speed
Green	1000 Mbit/s
Off	10 or 100 Mbit/s

Right LED	State
Blinking	Traffic (only with 100 or 1000 Mbit/s Link)
Off	No traffic

Table 10: Ethernet (4x 1GigE) LED state

5.2.1 Trigger-over-Ethernet

The optional Trigger-over-Ethernet (ToE) feature for 4x 1GigE adds support for the GigE Vision Action Command on the quad Ethernet interface. It can be used to trigger cameras over Ethernet in real time. The GigE specification allows sending these messages by a different device, distinct from the primary application, which normally runs on the main CPU. A sideband interface allows the Real-Time Communication Controller to introduce packets into the network:

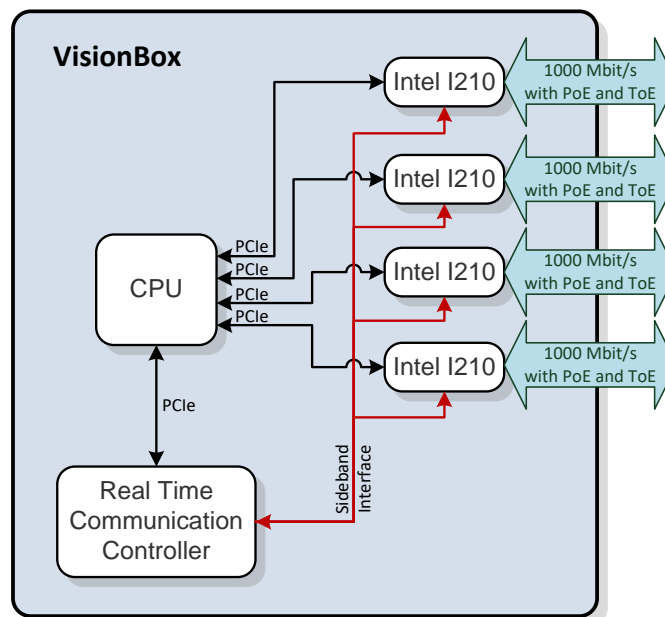


Figure 12: GigE real-time trigger diagram

Up to four different Action Commands can be defined by the application.

The PoE state LEDs described previously are also used for Action Commands: each LED is associated with one of these Action Commands. When an Action Command packet is transmitted, the respective LED will flash red very shortly. The PoE state will still be shown for each port by the green LED.

Please note that Action Commands don't belong to any port. All Action Commands are broadcast on all four ports.

5.3 Ethernet Interface (2x 5GigE, 2x 1GigE)

The VisionBox AGE-X5 with 2x 5GigE and 2x 1GigE provides two additional 5GigE and two 1GigE ports.

- Ports labeled with “1” and “2” provide 5GigE.
- Ports labeled with “3” and “4” provide 1GigE.

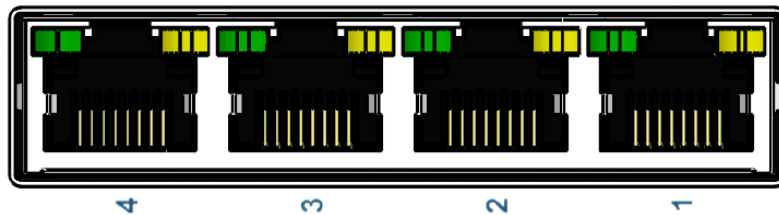


Figure 13: Ethernet connector (2x 5GigE, 2x1GigE)

LED states for port 1 and 2:

Left LED	Link Speed
Green	100 Mbit/s or 1000 Mbit/s or 2500 Mbit/s
Off	Disconnected or 5000Mbit/s if right LED is on

Right LED	State
Blinking	Traffic
On	5000Mbit/s
Off	No traffic

Table 11: Ethernet (4x 1GigE) LED state for ports 1 and 2

LED states for port 3 and 4:

Left LED	Link Speed
Green	1000 Mbit/s
Off	10 or 100 Mbit/s

Right LED	State
Blinking	Traffic (only with 100 or 1000 Mbit/s Link)
Off	No traffic

Table 12: Ethernet (4x 1GigE) LED state for ports 3 and 4

5.4 DisplayPort Monitor Interface



Figure 14: DP connector

The DisplayPort interface supports version 1.2 with a data rate of 17.28 Gbit/s. The maximum supported resolution is 3840 × 2160 pixels. To connect the DP Port with a DVI or VGA monitor, an active adapter is required.

5.5 CFast

The slot supports cards up to the CFast 2.0 specification with interface speeds of 6 GB/s, 3 GB/s and 1.5 GB/s. The BIOS can boot from this device, but a card hot swap is not supported. The card edge is behind a service flap which can be removed tool-free.



Figure 15: CFast with dust protection flap

5.6 Digital I/O

The digital I/O interface provides two input and two output groups. Each group has eight signals and all groups are electrically isolated from each other, as well as from other VisionBox circuits and interfaces.

The following illustration shows the corresponding electrical equivalent circuit for one input and one output group:

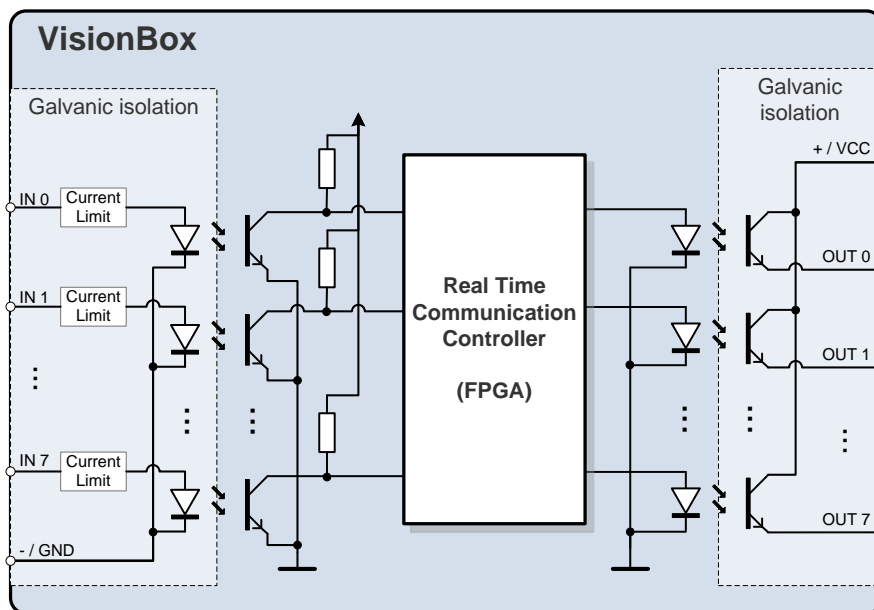


Figure 16: Simplified digital I/O circuit

The input group requires external connection of a shared GND reference. For the output group, the user must provide a supply voltage to the VCC pin which is used by all output signals. Every input and output has an LED to show the current state of each channel.

The connector arrangement is shown below:

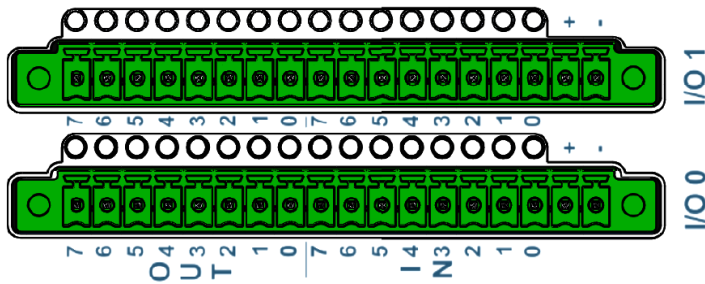


Figure 17: Digital I/O connectors

Pin	Function
+	Common VCC of outputs
-	Common GND of inputs
IN 0...7	Input 0...7
OUT 0...7	Output 0...7

Table 13: Pin assignment I/O connector

External plug component: Phoenix contact **MC 1,5/18-STF-3,5** (order no. 1847288)

The standard version of the digital output interface allows high-speed signaling, but with limited current ability. The output current can be increased by connecting multiple output terminals with each other. Software must configure the Real-Time Communication Controller to use the same signal source for these outputs.

A high-current hardware option for the digital outputs is also available. See section 3.2 Operating Conditions for electrical specifications.

Example 1: Connecting multiple cameras to a single output with high-current option.

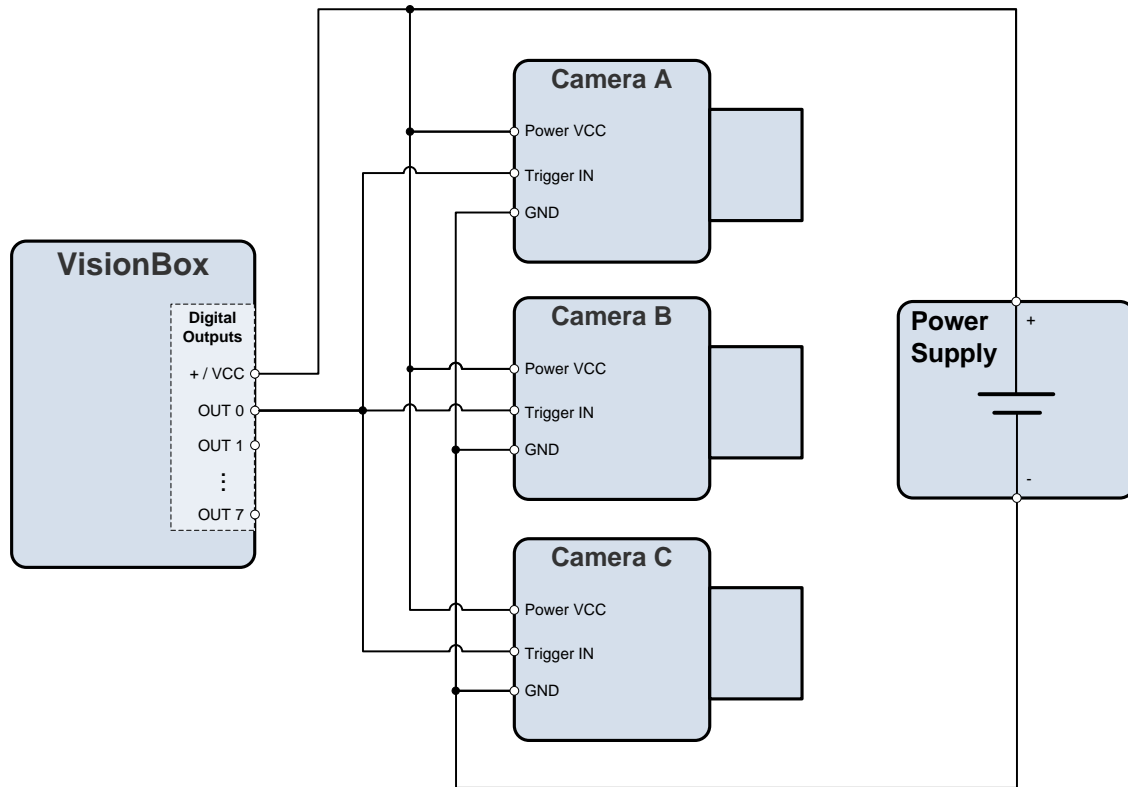


Figure 18: Digital I/O example 1

Depending on the voltage and isolation requirements of the application, the VisionBox can be powered from the same or from a different power supply.

Example 2: Connecting a relay to an output with high-current option.

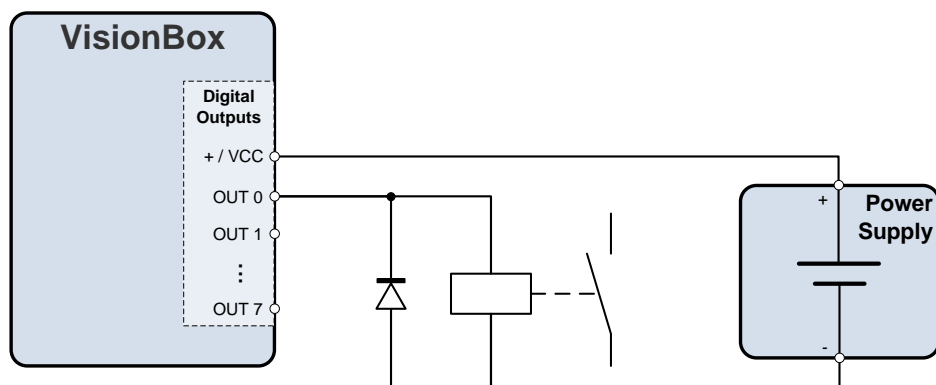


Figure 19: Digital I/O example 2

Please note that a flyback diode as shown in the drawing should be used to protect the output circuit from voltage spikes at deactivation.

5.7 RS-422 Interface

The RS-422 interface can be used to connect additional devices like encoders, sensors and cameras. The behavior is controlled by the Real-Time Communication Controller.

D-Sub 15-HD Connector:

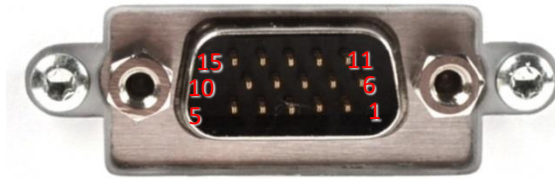


Figure 20: Encoder connector (D-Sub 15-HD)

For example, the AMPHENOL connector **L77HDE15SOL2** can be used to make a connection to the VisionBox.

The optional RS-422 connector is available for all configurations and it provides four input signals:

Pin	Function	Pin	Function
1	In1-	9	In3+
2	In2-	10	N/C
3	In3-	11	In0+
4	N/C	12	In0-
5	+5 V	13	N/C
6	GND	14	N/C
7	In1+	15	+12 V
8	In2+		

Table 14: RS-422 pin assignment for GigE versions

Pins #5 and #15 provide a 5 V / 12 V power supply for RS-422 encoders. They are protected internally by a 2 A fuse.

The Camera Link version always provides a RS-422 connector with three input and three output signals:

Pin	Function	Pin	Function
1	In1-	9	Out2+
2	In2-	10	Out1+
3	Out2-	11	In0+
4	Out1-	12	In0-
5	+5 V	13	Out0+
6	GND	14	Out0-
7	In1+	15	+12 V
8	In2+		

Table 15: RS-422 pin assignment for Camera Link version

5.8 LED Controller and Camera Trigger

The VisionBox provides two LED Controller channels and two Camera Trigger channels. Each connector shares one LED Controller and one Camera Trigger channel.

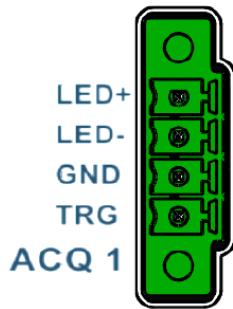


Figure 21: LED / Camera Trigger connector

Name	Function
LED+	Positive output / current source
LED-	Negative output / current sink
GND	Ground reference
TRG	Trigger output

Table 16: Pin assignment LED / Camera Trigger

Phoenix contact plug component: **MC 1,5/4-STF-3,5** (order no. 1847071)

5.8.1 LED Controller

The LED Flash Controller is designed as a current source. Output current, flash duration and other parameters can be set via software.

The following diagram shows the internal structure for the LED Controller:

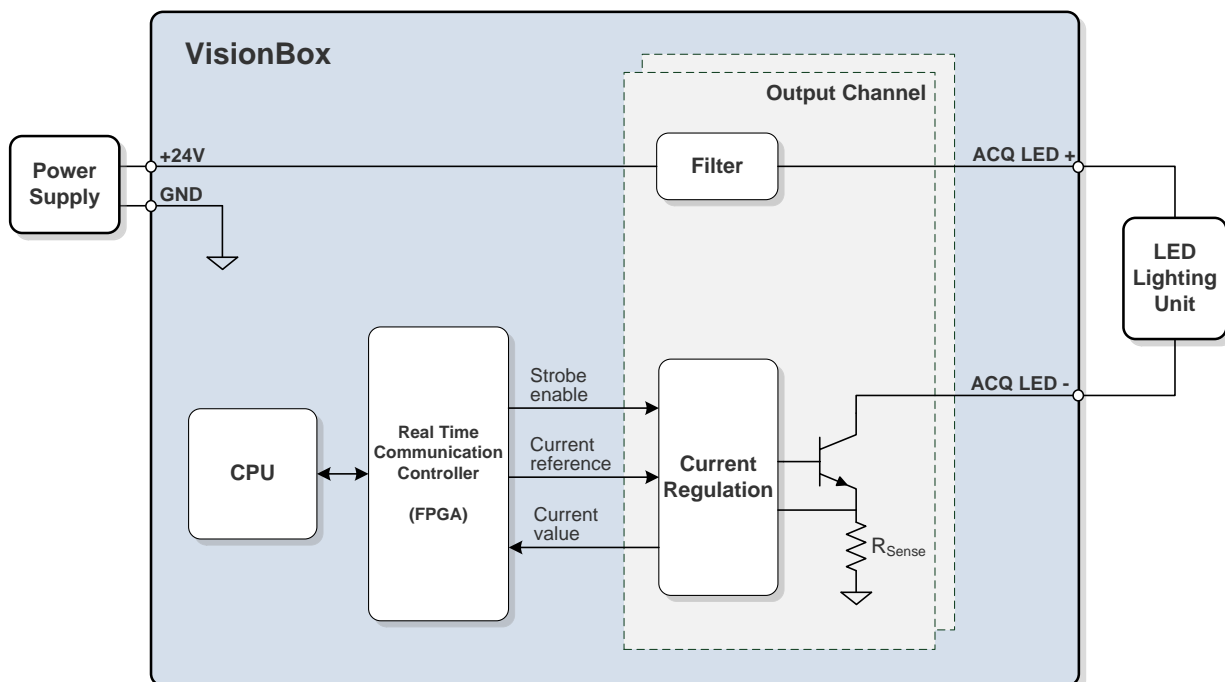


Figure 22: LED Controller structure

5.8.2 Camera Trigger

The electrical behavior of the camera trigger output can be controlled via software. Each output has two transistors, one for the positive and one for the negative side. Both transistors can be programmed independently. Therefore, the output can be configured in push-pull, open-collector or emitter-follower configuration:

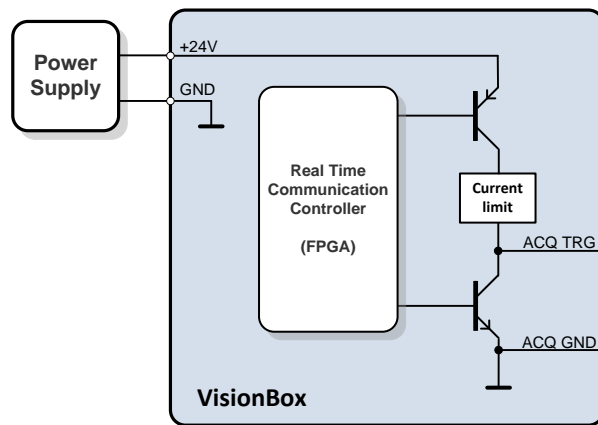


Figure 23: Simplified camera trigger diagram

The high-side switch is connected to the power supply voltage of the VisionBox and has a current-limiting circuit.

5.9 Camera Link

The VisionBox AGE-X5 with Camera Link has two Mini Camera Link connectors.



Figure 24: Mini Camera Link connectors

The Camera Link interface supports the following features:

- Camera Link Dual-Base configuration:
 - 2x Base / 1x Medium Camera Input
 - 2x Serial communication interface
- Camera Link Full / Deca configuration:
 - 1x Base / 1x Medium / 1x Full / 1x Deca Camera Input
 - 1x Serial communication interface
- Camera Control signals (CC) can be controlled by software or by the RTCC.
- Providing power to the camera using *Power-over-Camera-Link*.

A different FPGA firmware is used to select between Dual-Base and Full configuration.

6 Internal Connectors

A service hatch enables access to the internal USB2 ports.



When opening the service hatch, make sure that the VisionBox has been completely disconnected (power, interfaces) and your environment is protected against ESD.

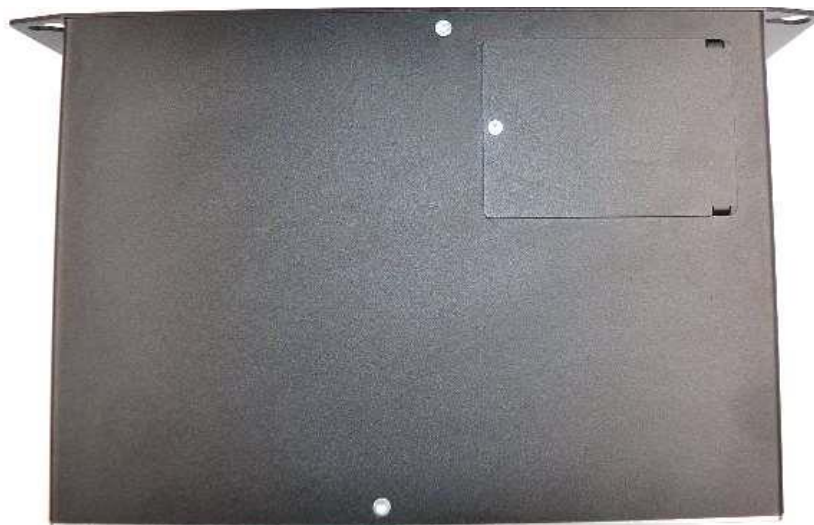


Figure 25: Service hatch (option)

6.1 USB 2.0

There are two USB 2.0 type A sockets inside the VisionBox. Please note that no current-limiting circuit is provided on these ports.



Figure 26: USB 2.0 connectors

6.2 SATA

Optionally, there is a place for a 2.5" HDD/SSD at the bottom of all VisionBoxes AGE-X. The drive can have a maximum height of 9.5 mm and can use a SATA link with a maximum speed of 6 Gbit/s. If the customer chooses this option, both cables (data and power) are pre-installed.

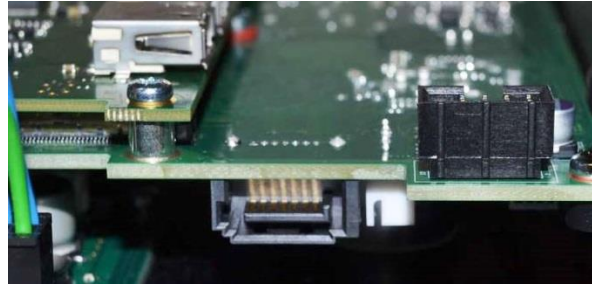


Figure 27: SATA and power connector

6.3 CMOS Battery

The CMOS battery (type CR2032) is not accessible via the service hatch. If necessary, the battery can be replaced by carefully removing the housing cover, taking out the old battery and inserting a new one.

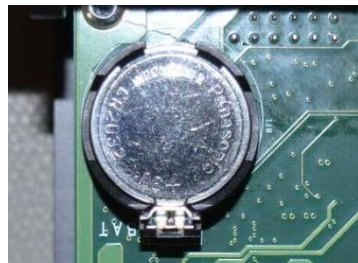


Figure 28 : Location of the battery holder

7 Accessories

This list shows some compatible connectors, shells and plugs to support the device interfaces. Typically, the plugs are not included in the device package.

7.1 Third-party Components

Vendor:	Type:	Part Number:	Usage:
Phoenix	MC 1,5 / 4-STF-3,5	1847071	Power connector / camera trigger & LED interface
Phoenix	MC 1,5 / 18-STF-3,5	1847288	Digital In / Out

There is also a connector set with plugs available. Please refer to the following table or ask for more details.

7.2 IMAGO Accessories

Order Number	Description
10100071	Connector set: 1x 4 Pin power connector, 2x 18 Pin I/O
10005154	Connector set: 1x 4 Pin power connector, 1x 18 Pin I/O
10100069	Connector set: 2x 4 Pin LED/Trigger

More accessories and upgrades are available upon request.

8 History

Revision	Date	Changes	Initials
1.0	12.2017	First version	rg / mb
1.0	02.2018	Text revision	vm / av
1.0	02.2018	Text revision; PDF	cs
1.1	04.2019	Information added Digital In-/Outputs; Add Camera Link model "Leopard+"	vm / rg
1.2	04.2019	New block diagram for GigE and CL, new drawings, general update of all chapters, text revision	av / vm
1.3	04.2020	Added KBL processors, added 5GigE, updated IMAGO ac- cessories, added 5GigE block diagram, new pictures of status LED PoE, CL.	av
1.4	07.2020	Add RS-422 IN/OUT description for the Camera Link ver- sion	Rg