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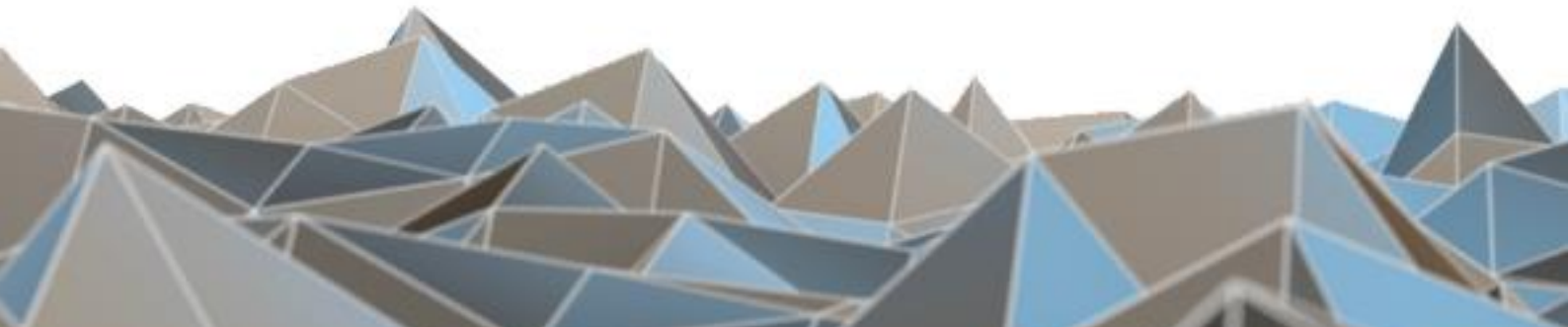
Argos3D-P320

Hardware User Manual

Version 0.4



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Argos3D-P320 – Hardware User Manual

Document No.: 900-308 / A

Publication date: August 31, 2015

Subject to change without notice. Errors excepted.

Table of Contents

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

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Information

For further information on technology, delivery terms and conditions and prices please contact Bluetechnix (http://www.bluetechnix.com).

Warning

Due to technical requirements components may contain dangerous substances.

1 General Information

This guide applies to the Argos3D-P320 camera platform from Bluetechnix GmbH. Follow this guide chapter by chapter to set up and understand your product. If a section of this document only applies to certain camera parts, this is indicated at the beginning of the respective section.

The document applies to X-Grade product from V1.0.

1.1 Symbols Used

This guide makes use of a few symbols and conventions:

Warning

Indicates a situation which, if not avoided, could result in minor or moderate injury and/or property damage or damage to the device.

Caution

Indicates a situation which, if not avoided, may result in minor damage to the device, in malfunction of the device or in data loss.

Note

Notes provide information on special issues related to the device or provide information that will make operation of the device easier.

Procedures

A procedure always starts with a headline

1. The number indicates the step number of a certain procedure you are expected to follow. Steps are numbered sequentially.

This sign ➤ indicates an expected result of your action.

References

This symbol indicates a cross reference to a different chapter of this manual or to an external document.

1.2 Certification

X-Grade Version

X-Grade version of the products are not intended for sale and have therefore no certifications. The user is responsible for a correct usage in order with federal laws.

2 Overview

2.1 Components

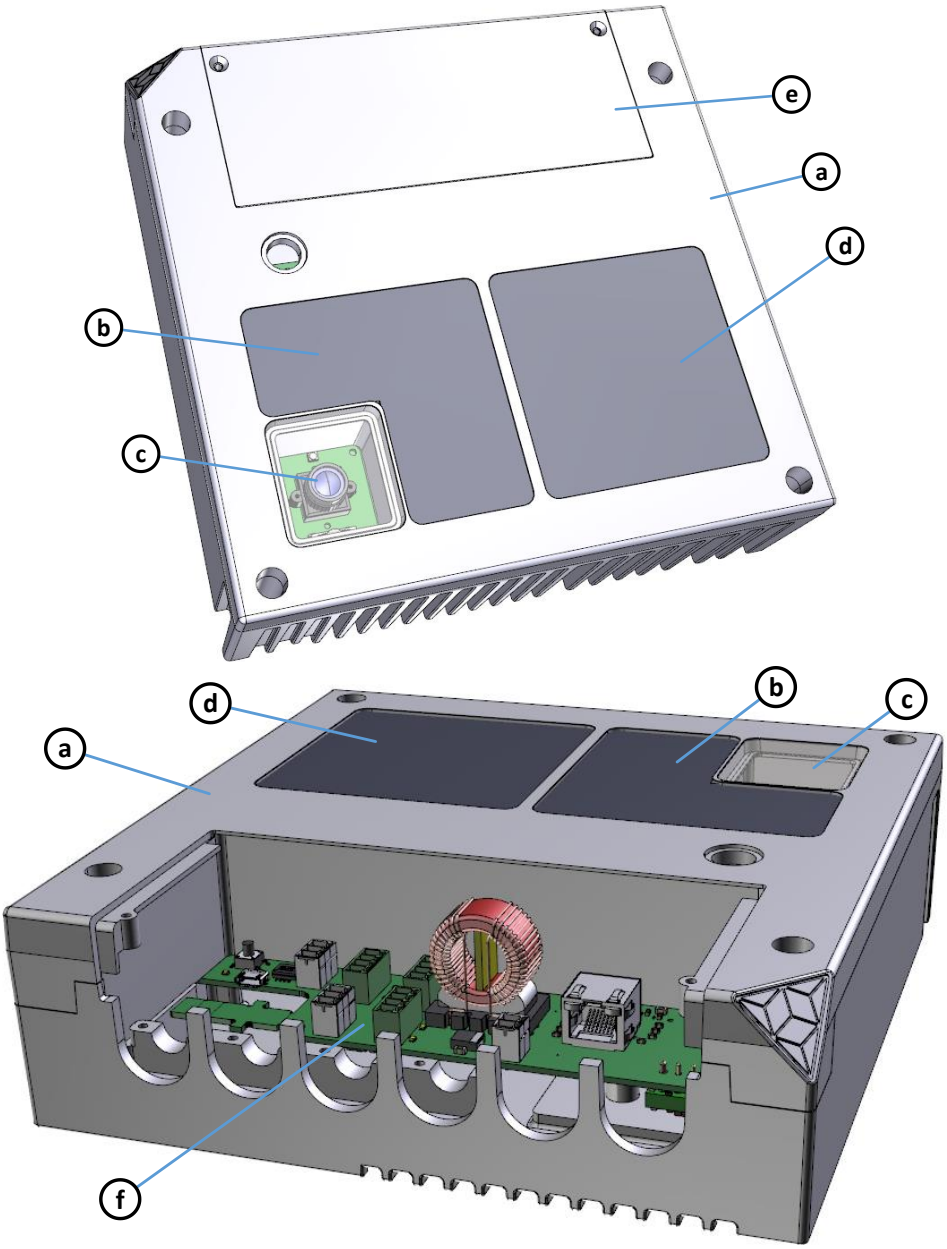

Figure 2-1 Argos3D-P320 components

a. Case
b. Viewing window for 3D sensor
c. Viewing window for 2D sensor
d. Viewing window for illumination module
e. Interface cover
f. Interface board

2.2 Interfaces and Connectors

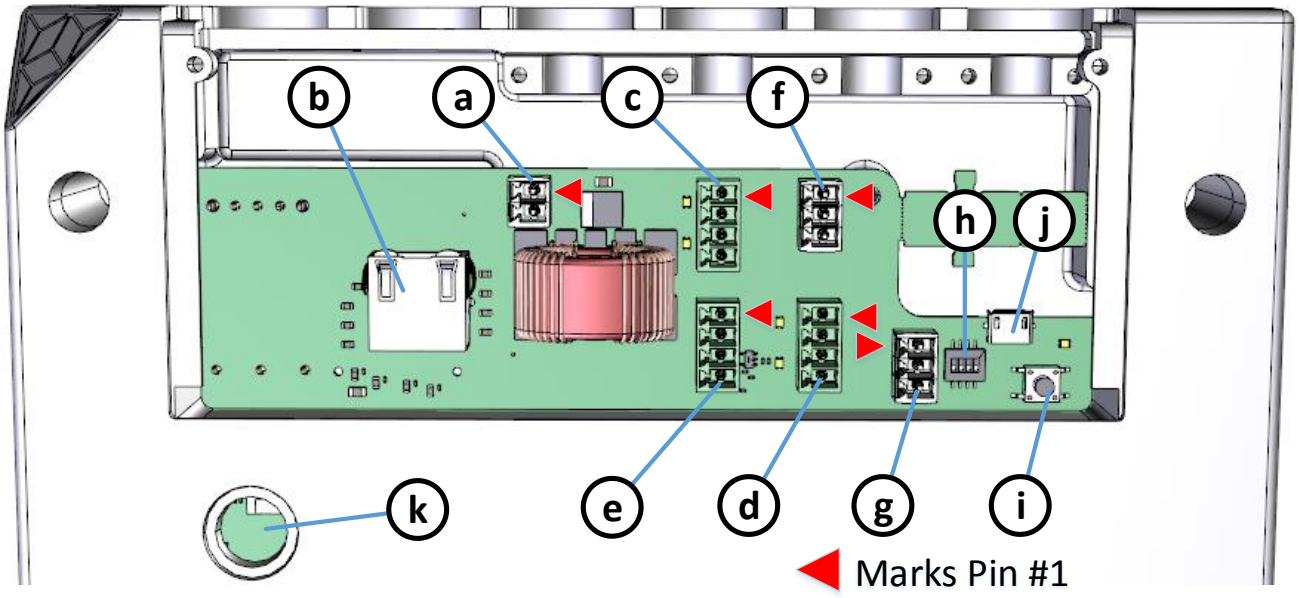

Figure 2-2: Argos3D-P320 connectors and interfaces

a. Power supply
b. Ethernet (RJ45) 10/100/1000Base-T with PoE++
c. General purpose inputs, galvanic isolated
d. General purpose outputs, galvanic isolated
e. Modulation Light Interface
f. Trigger
g. RS232/485
h. DIP-Switch
i. Reset-Button
j. Debug-UART
k. Status LED

3 Hardware Installation

3.1 Mounting

Caution

Case may become hot!

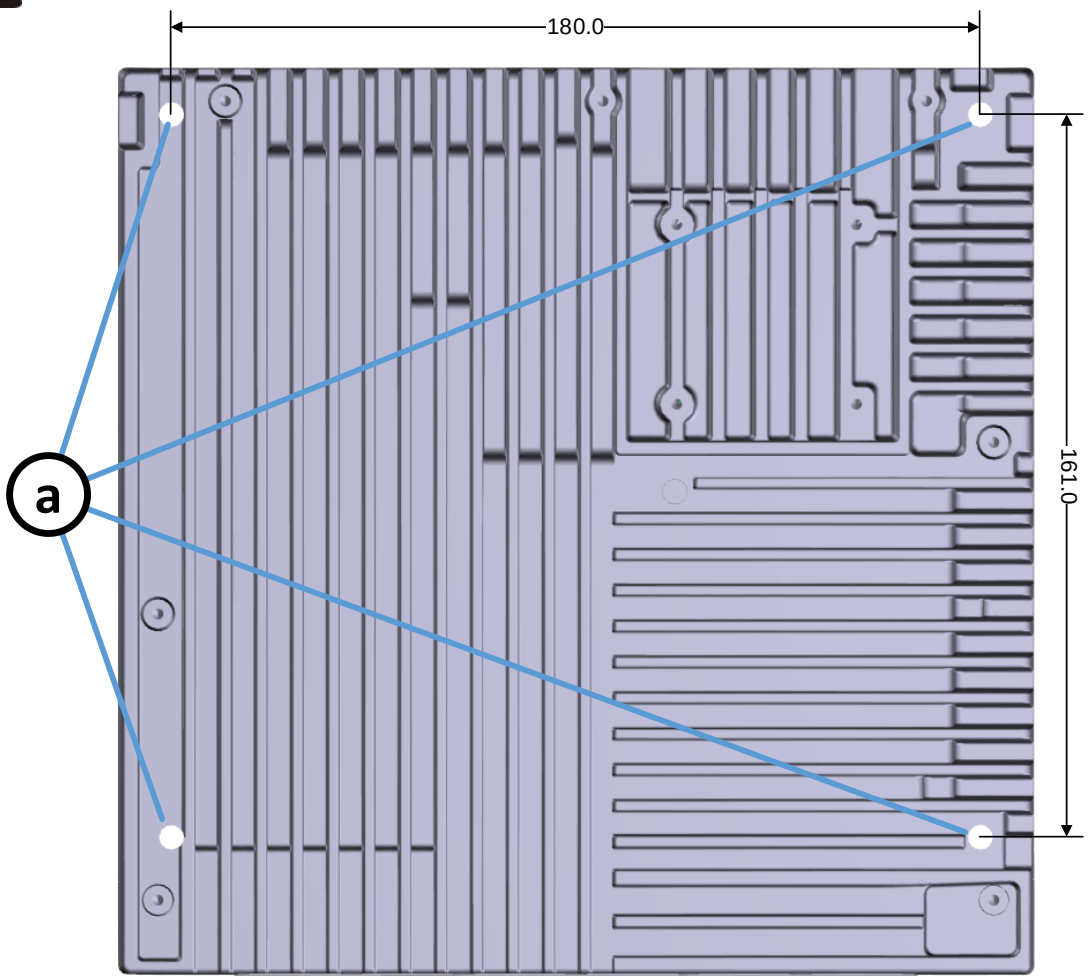

Figure 3-1: Mounting holes for the case

3.1.1 Mounting Holes (a)

The case has four holes for up to M5 screws that allows mounting the Argos3D-P320.

3.1.2 Mount Spacing

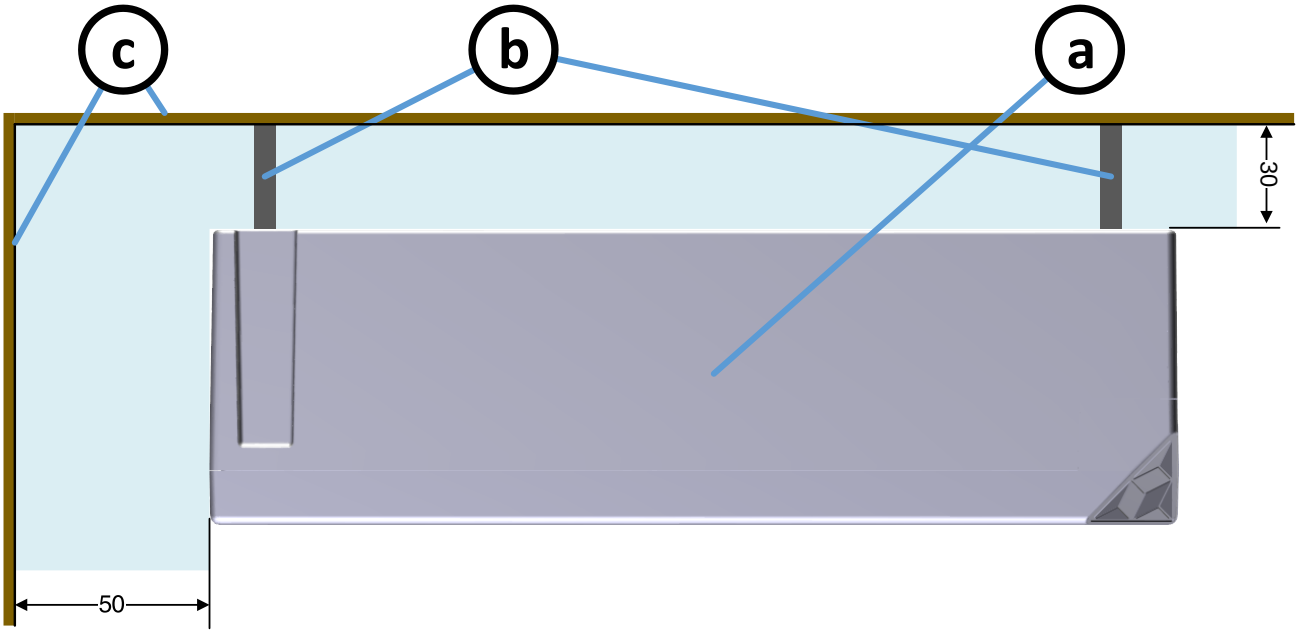

Figure 3-2: Distance to mounted wall

a. Argos-P320
b. Spacers
c. Wall or mounting panel

To maintain a natural air flow behind the Argos-P320, the device should not be mounted closer than 30 mm to the mounting panel. A keep-out area of at least 50 mm on the four small sides must be provided as well.

Caution

The user is responsible to take care for an appropriate cooling.

3.2 Lens and focus

TBD

3.3 External ToF-Flash

In case you want to use the external ToF-Flash or another external light source you can connect them to the Modulation Light Interface (see chapter 4.3.5).

Warning

Before connecting an external ToF-Flash, all internal LIMs must be removed beforehand.

Usage of an external ToF-Flash is only safe under certain conditions. Please contact

Bluetechnix support for more information.

4 Interface Description

4.1 Signal naming

Signal names are usually written in capital letters. They are noted in positive logic (positive asserted). If the signal is negative asserted an “n” will be added as prefix to the signal name.

Type:

The type describes the electrical characteristics of the signal. The following types are available:

- I Input
- O Output
- DN Negative Differential Output
- DP Positive Differential Output
- P Power supply
- 3.3V TTL TTL compatible signal with 3.3V high level and 0V low level
- 5V tolerant Accepts 5V input level

4.2 Connector Numbering

All pins no. 1 of each connector are marked in the figures with a red arrow. The connector numbering always starts at this pin, continuing in this row, and going backwards at the opposite side.

4.3 Interface-Slot

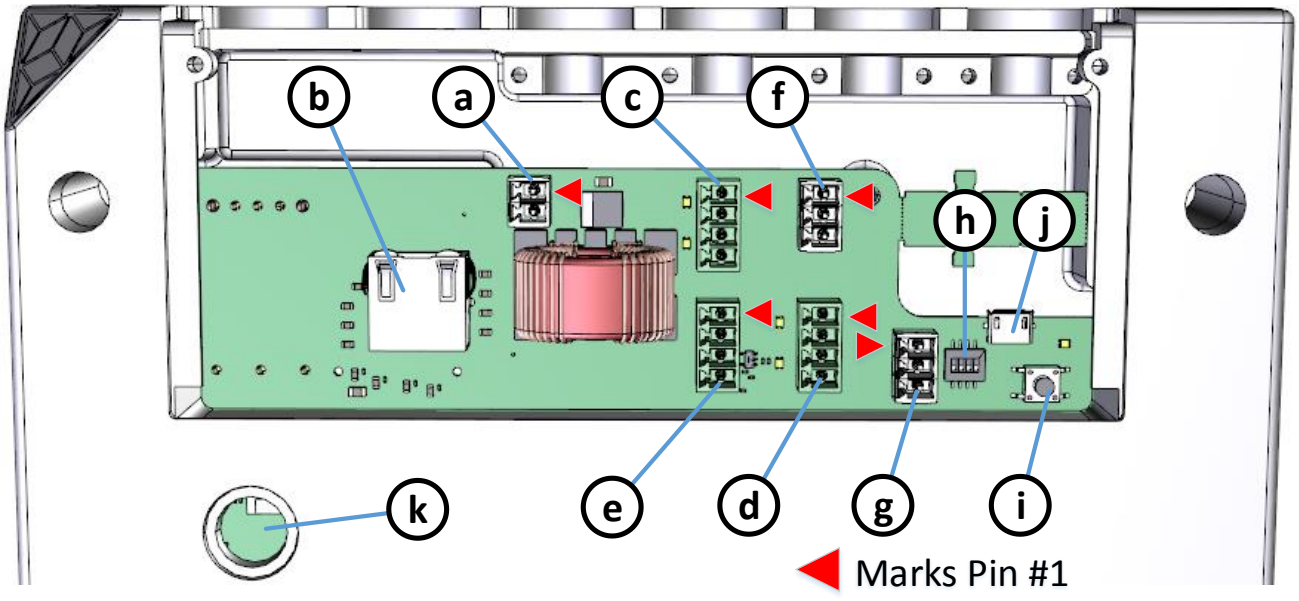

Figure 4-1: Argos3D-P320 connector location

a. Power Connector
b. Ethernet
c. General purpose input 1 & 2
d. General purpose output 1 & 2
e. Modulation Light Interface
f. Trigger
g. RS232 / RS485
h. DIP-Switch
i. Reset-Button
j. Debug-UART
k. Status LED

4.3.1 Power Connector (a)

This 3.5mm terminal connector allows plugging a cable entry plug like **691361100002** from Würth Elektronik. Compatible connectors from other manufacturers may be found as well.

No.	Signal	Type	Description
1	VIN	P	Positive power supply
2	GND	P	Power ground

Table 4-1: Power connector description

The pins of the power connector are protected against wrong polarity.

Voltage range: 18V to 30V.

Note

Use inherently limited power sources only!

4.3.2 Ethernet (b)

This is a standard straight RJ45 10/100/1000 Base-T compatible Ethernet connector.

4.3.3 General purpose input 1 & 2 (c)

This 4 pole 3.5mm terminal connector allows plugging a cable entry plug like **691361100004** from Würth Elektronik.

No.	Signal	Type	Description
1	IN2A	I (0V to 50V)	Relay contact A
2	IN2B	I (0V to 50V)	Relay contact B
3	IN1A	I (0V to 50V)	Relay contact A

No.	Signal	Type	Description
4	IN1B	I (0V to 50V)	Relay contact B

Table 4-2: General purpose input 1 & 2 connector description

An optocoupler SFH6286-2T from Vishay is used for each general purpose input.

OFF-Range: 0V to 2V.
ON-Range: 5V to 50V.

4.3.4 General purpose output 1 & 2 (d)

This 4 pole 3.5mm terminal connector allows plugging a cable entry plug like **691361100004** from Würth Elektronik.

No.	Signal	Type	Description
1	OUT1A	SPST-A	Relay contact A
2	OUT1B	SPST-B	Relay contact B
3	OUT2A	SPST-A	Relay contact A
4	OUT2B	SPST-B	Relay contact B

Table 4-3: General purpose output 1 & 2 connector description

A solid state relay ASSR-3210 from Avago Technologies is used for each general purpose output.

Voltage range: 18V to 30V.
Current range: 0mA to 200mA.

4.3.5 Modulation Light Interface (e)

This 4 pole 3.5mm terminal connector allows plugging a cable entry plug like **691361100004** from Würth Elektronik.

No.	Signal	Type	Description
1	MOD_N	DN	Modulation signal output-
2	MOD_P	DP	Modulation signal output+
3	GND	P	Power ground
4	OWIRE	I/O (3V3 TTL)	1-Wire communication interface

Table 4-4: Modulation Light Interface connector description

The Modulation Light Interface provides the modulation signal for an external illumination module (differential LVDS) as well as a 1-Wire communication interface.

Caution

Overvoltage on the Modulation Light Interface will destroy the Argos3D-P320.

Warning

Before connecting an external ToF-Flash, all internal LIMs must be removed beforehand.

Usage of an external ToF-Flash is only safe under certain conditions. Please contact Bluetechnix support for more information.

4.3.6 Trigger (f)

This 3 pole 3.5mm terminal connector allows plugging a cable entry plug like **691361100003** from "Würth Elektronik".

No.	Signal	Type	Description
1	TriggerOUT	OD (10k pull-up to 5V)	Trigger Output
2	TriggerIN	I (10V to 30V)	Trigger Input
3	GND	P	Power ground

Table 4-5: Trigger connector description

Note

The usage of this interface may depend on the firmware version.

4.3.7 RS232/RS485 (g)

This 3 pole 3.5mm terminal connector allows plugging a cable entry plug like **691361100003** from Würth Elektronik.

No.	Signal	Type	Description
1	GND	P	Signal Ground
2	RS232 RxD[1)] RS485 A/Y	IO DN	RS232 Receive Data RS485 Negative Differential Data
3	RS232 TxD[1)] RS485 B/Z	IO DP	RS232 Transmit Data RS485 Positive Differential Data

Table 4-6: GPIO Connector Description

[1)] The interface mode can be selected with the DIP-Switch (see chapter 4.3.7).

The RS232 interface is running in full duplex mode and the RS485 is running in half duplex mode.

Note

The usage of this interface may depend on the firmware version.

4.3.8 DIP-Switch (h)

The DIP-Switch allows configuring the RS232/RS485 transceiver. The following table shows the functionality of each switch.

No.	Name	Description
1	-	Not used
2	-	Not used
3	RS485 Enable	ON: Transceiver works in RS485 mode OFF: Transceiver works in RS232 mode
4	RS485 Termination	ON: Enables the 120Ω RS485 termination resistor OFF: No termination resistor is active

Table 4-7: DIP-Switch Description

Note

Make sure that the termination resistor is always disabled, if the driver runs in RS232 mode.

4.3.9 Reset-Button (i)

This button can be used to perform a hardware reset and a factory default reset.

For further information about the factory default reset function see Software User Manual of the Argos3D-P320.

4.3.10 Debug-UART (j)

This Micro-USB connector provides a Debug-UART interface to the camera.

A FT234 from FTDI is used as UART-to-USB-Converter.

4.3.11 Status LED (k)

The Status LED indicates whether the power supply is within the specified range (green), or not (red). Additional functionalities may be firmware dependent. Please refer to the Software User Manual for additional information.

5 Software

5.1 Firmware

For a description of the firmware related interfaces, protocol descriptions, register settings, etc. please refer to the Software User Manual.

5.2 Demo Application

For the first evaluation of the camera and to evaluate different settings and configurations a .NET demo application for Microsoft Windows is provided: BLT-ToF-Suite. The demo application can be downloaded from our support web site.

Software and documentation

TBD

5.3 Getting Started Software Development Example

To facilitate the integration of the Argos module in your own application a getting started example will be available on our download site. Please refer to our support site.

Software and documentation

TBD

5.4 Camera Firmware Development KITs

The camera offers the possibility to bring your own application onto the Argos3D-P320. Using the quad core i.MX6 processor from Freescale Inc., one core is reserved for the calculation of the depth data, the other cores can be used by customers for their own applications.

The Argos3D-P320 is based on an embedded Linux system.

6 Appendix

6.1 Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
V_{IN}	Input supply voltage	18	24	30	V
I_{IN}	Input current [1)]	TBD	TBD [1)]	TBD	mA
	Input current without Interface-Board [1)]	TBD	TBD	TBD	mA
	Input current (Mainboard only) [3)]	TBD	TBD	TBD	mA
T	Operating Temperature [2)]	TBD		TBD[2)]	°C
T	Storage Temperature	-40		+125	°C
FITP[4)]	Frame-rate Integration Time Product			TBD	

Table 6-1: Operating Conditions

1) Note

Valid for a frame-rate of 40fps and an integration time of 1500µs. The input current depends on the applied frame-rate and integration time.

2) Note

The maximum operating temperature depends on the frame-rate and integration time.

6.1.1 Input current

The input current depends on the selected frame-rate (fps) and the integration time (t_{INT}). The following figure shows typical values. The values for the x axis shows the FITP which has been calculated with the following equation:

$$FITP = t_{INT}\,[ms] \cdot fps\,\left[\frac{1}{s}\right] \cdot 4$$

TBD

Figure 6-1: Input power depending on frame-rate integration time product

6.2 Optical Characteristics

Symbol	Parameter	Min	Typical	Max	Unit
#LEDs	Nr. of LEDs		12		
$\Lambda_{CENTROID}$	Centroid-Wavelength of Illumination		850		nm
$\Delta\lambda$	Spectral Bandwidth		30		nm
I_e	Radiant intensity				W/sr
FoV_H	Horizontal Field of View		90		Deg
FoV_V	Vertical Field of View		67		Deg

6.3 Measurement Specifications

6.3.1 Measurement Environmental Conditions

All the following measurements have been acquired at the following constant environmental conditions.

Parameter	Value
Temperature	23 °C
Humidity	35 %
Ambient light	2 kLux
Modulation Frequency	20 MHz
Frame-rate	25 fps

Table 6-2: Environmental Specification

6.3.2 Typical Reproducibility

TBD

The following table shows the standard deviation over 100 samples.

Measuring range [mm]	White target (90%) [mm]	Integration time [ms]	Gray target (18%) [mm]	Integration time [ms]
100	TBD		TBD	
300	TBD		TBD	
500	TBD		TBD	
700	TBD		TBD	
900	TBD		TBD	
1100	TBD		TBD	
1300	TBD		TBD	
1500	TBD		TBD	
1700	TBD		TBD	
1900	TBD		TBD	
2100	TBD		TBD	
2300	TBD		TBD	
2500	TBD		TBD	
2700	TBD		TBD	
2900	TBD		TBD	

Table 6-3: Typical Reproducibility

6.3.3 Typical Integration Time

Measuring range [mm]	Integration time for white target (90%) [ms]	Integration time for gray target (18%) [ms]
500	TBD	TBD
1000	TBD	TBD
1500	TBD	TBD
2000	TBD	TBD
2500	TBD	TBD
3000	TBD	TBD

Table 6-4: Typical Integration Time

6.3.4 Typical Range

Integration time [ms]	Minimum distance for white target (90%) [mm]	Maximum distance for white target (90%) [mm]	Minimum distance for gray target (18%) [mm]	Maximum distance for gray target (18%) [mm]
TBD				
TBD				
TBD				
TBD				
TBD				
TBD				
TBD				
TBD				

Table 6-5: Typical Range

6.3.5 Accuracy of Distances

TBD

The following table has been determined by calibrating the device at a distance of 1500mm and an integration time of 1,5ms. For applications with specific environment optimized calibration may improve the error results.

Measuring range [mm]	White target (90%) [mm]	Integration time [ms]	Gray target (18%) [mm]	Integration time [ms]
500	TBD		TBD	
1000	TBD		TBD	
1500	TBD		TBD	
2000	TBD		TBD	
2500	TBD		TBD	
3000	TBD		TBD	

Table 6-6: Accuracy of Distances

6.4 Environmental considerations

TBD

6.4.1 Temperature on the Cooling Plate

The following figure shows the expected case temperature depending on the frame-rate integration time product (FITP) and the ambient temperature. The FITP has been calculated as follow:

$$FITP = t_{INT}\,[ms] \cdot fps\,\left[\frac{1}{s}\right] \cdot 4$$

TBD

Figure 6-2: Expected cooling plate temperature depending on frame-rate integration time product

The temperature on the cooling plate can be reduced by mounting an additional heat sink on the cooling plate.

6.4.2 Integration Time vs. Frame-rate

The following table shows recommended frame-rate integration time combinations depending on the ambient temperature.

Caution

Be careful to not stress the device beyond the limits, otherwise you may damage the device.

TBD

Figure 6-3: Integration time vs. frame-rate

The diagram takes care to limit the FITP in a way that the temperature on the cooling plate doesn't exceed 70°C. Using an appropriate heat sink higher values of the FITP may be applied.

Caution

The user is responsible to take care for an appropriate cooling if the Sentis is mounted into a case.

6.5 Mechanical Outline

All dimensions are given in mm.

Mechanical outline of the 'Bounding Box':

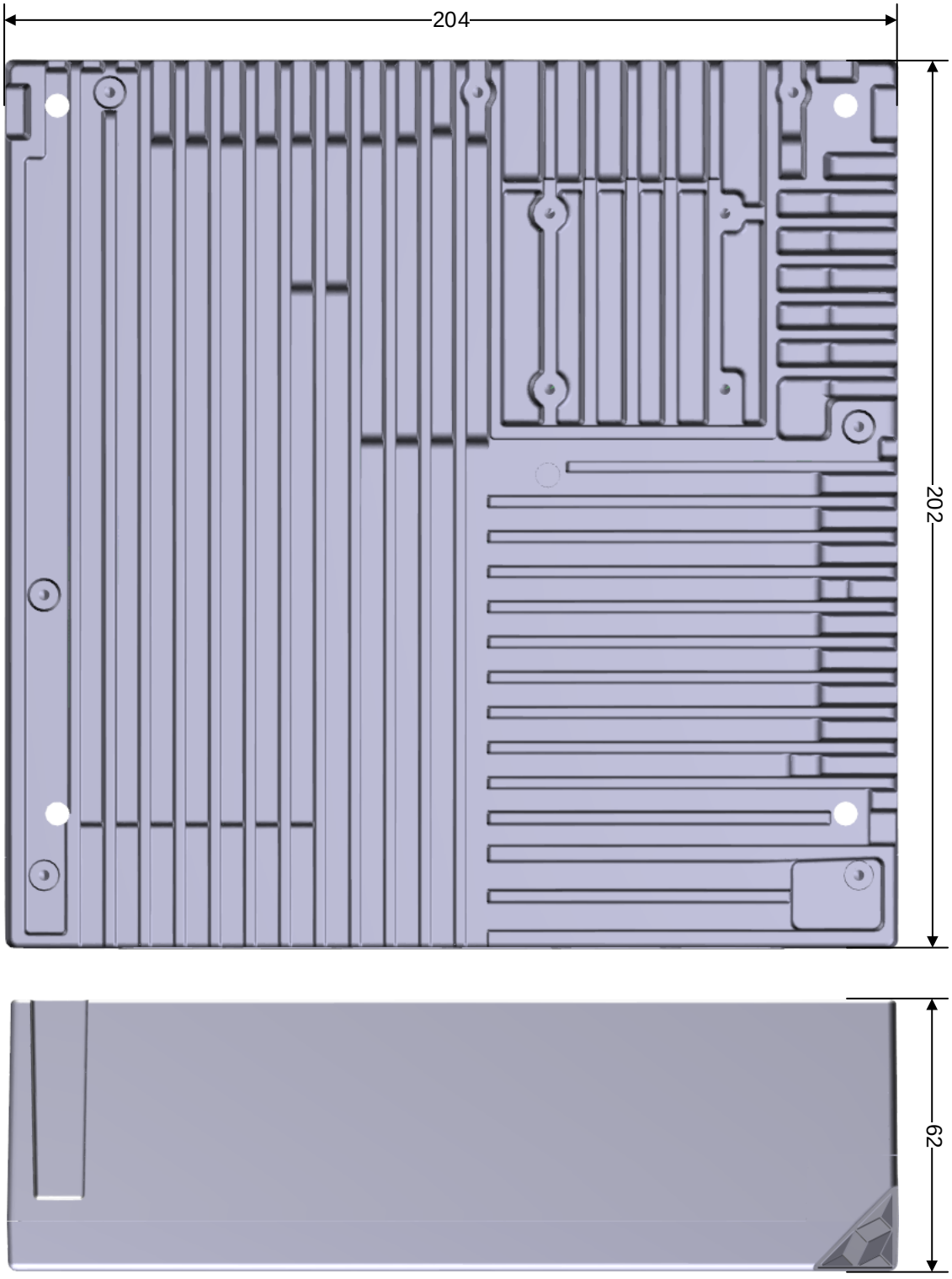

Figure 6-4: Mechanical outline of the bounding box

7 Support

7.1.1 General Support

General support for products can be found at Bluetechnix' support site

Support Link

https://support.bluetechnix.at/wiki/

7.2 Software Packages

Software packages and software downloads are for registered customers only

Software Package

https://support.bluetechnix.at/software/

7.3 Related Products

- TIM^{uP}-19kS3-Spartan6
- LIM^{U}-LED-850

8 Product History

8.1 Version Information

8.1.1 Argos3D-P320

Version	Release date
X-Grade	July 2014
X-Grade	March 2015

Table 8-1: Overview Argos3D-P320 product changes

Note

Please refer to our support site for additional information about product changes.

8.2 Anomalies

Applies to	Date	Description

Table 8-2 – Product anomalies

8.3 Document Revision History

Version	Date	Document Revision
1	2014 06 10	First preliminary of the document
2	2014 07 22	Added ToF-Flash/ext. illumination i/f warning
3	2015 03 19	Update HUM to Argos3D-P320 V2.2 Base
4	2015 08 31	Figure updates with new chassis Status LED added

Table 8-3: Revision history

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