

DIA-Flex

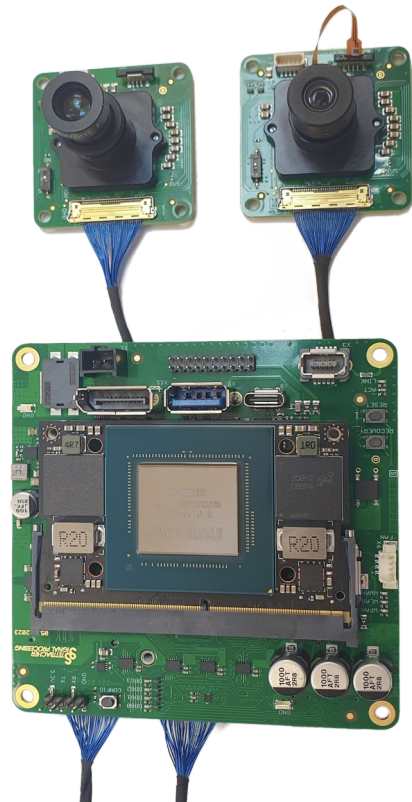
All-in-One Image Processing System

Key Features

- 2 x 5 MP global shutter camera
- 8-Core ARM processor
- 1024-Core GPU
- 16 GB RAM
- 500 GB SSD
- Auto-focus capabilities
- High performance 6-axis IMU
- Ethernet or LTE
- Display port, USB, Mini PCIe, GPIO, I²C, UART, SPI

Applications

- Surveillance
- Machine vision
- Autonomous driving
- Augmented reality
- Industrial robotics
- Drone
- Process monitoring and measurement



CPU Module				
Module Family	NVIDIA Jetson Orin Series			
Module Type	Orin Nano 4 GB	Orin Nano 8 GB	Orin NX 8 GB	Orin NX 16 GB
AI Performance	20 TOPS	40 TOPS	70 TOPS	100 TOPS
CPU	Type	ARM Cortex-A78AE ARMv8.2 64-bit		
	Cores	6	6	8
	Freq. (max)	1500 MHz	1500 MHz	2000 MHz
GPU	Type	NVIDIA Ampere		
	Cores	512	1024/32	1024/32
	Freq. (max)	625 MHz	625 MHz	765 MHz
RAM	Type	LPDDR5		
	Size	4 GB	8 GB	16 GB
	Bus	64-bit	128-bit	128-bit
	Peak	34 GB/s	68 GB/s	102 GB/s
Storage	500 GByte (NVMe), PCIe x2, M.2 Key M			
Display port	DP 1.2 (+MST), 1x4K30		DP 1.4a (+MST), 1x8K30	
Video	Decode	H.265, H.264, VP9, AV1		
	Encode	1-2 CPU cores		H.265, H.264, AV1

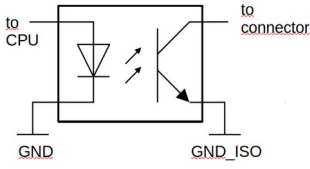
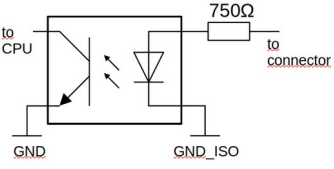
Camera Module - Sony IMX568		
Sensor type	Sony IMX568	
Mono/Color	Color	
Optical format	1/1.8" CMOS	
Shutter type	Global	
Resolution	2448 x 2048 pixel	
Bit-depth	12-bit	
Pixel size	2.74 x 2.74 μm	
Exposure time	0.03 to 27.9 ms	
Gain	0 to 48 dB	
Frame rate	All-pixel 8-bit	96.2 fps
	All-pixel 10-bit	79.1 fps
	All-pixel 12-bit	67.2 fps
Mount	S-Mount (M12)	
Cable length	29 cm	

Inertial Measurement Unit (IMU)		
Sensor type	Bosch BMI088	
Accelerometer	16-bit triaxial with configurable measuring range	
	$\pm 3, \pm 6, \pm 12, \pm 24\text{g}$	
Gyroscope	16-bit triaxial with configurable measuring range	
	125, 250, 500, 1000, 2000 $^{\circ}/\text{s}$	

Network	
Ethernet	10/100/1000 BASE-T
LTE	Cat 4 modules (150 Mbit/s DL, 50 Mbit/s UL) for: <ul style="list-style-type: none"> • North America • Europe and APAC • Japan • APAC and South America

Power Supply ¹	
External Power	9 - 36 VDC, max. 40W
Ethernet	PoE++ Type 3 (802.3bt)
Power consumption	depends on selected power model
	approx. 10W to 30W

1 Use either PoE or external power supply.

Opto-isolated I/O lines		
	Number of outputs	4
	Collector current (max)	50mA
	Emitter-collector volatge (max)	80V
	Number of inputs	4
	Input Voltage (min)	2.5V
	Input Voltage (max)	8V

GPIO	
Type	3.3V logic level with 5V tolerant I/O to support TTL Open-drain configuration with 10kΩ pull-up
Number of I/Os	4
Sink current (max)	1mA

SPI	
Type	3.3V logic level
Number of interfaces	2
Number of chip-select	2 per interface

I ² C	
Type	3.3V logic level (10kΩ pull-up)
Number of interfaces	2

UART	
Type	3.3V logic level
Number of interfaces	2

Mechanical data		
Sensor module Sony IMX568	Width	40 mm
	Height	40 mm
	Weight	17 g (incl. cable and lens holder, without lens)
Mainboard	Width	90 mm
	Height	90 mm
	Weight	112 g (incl. CPU module, without cooling solution)

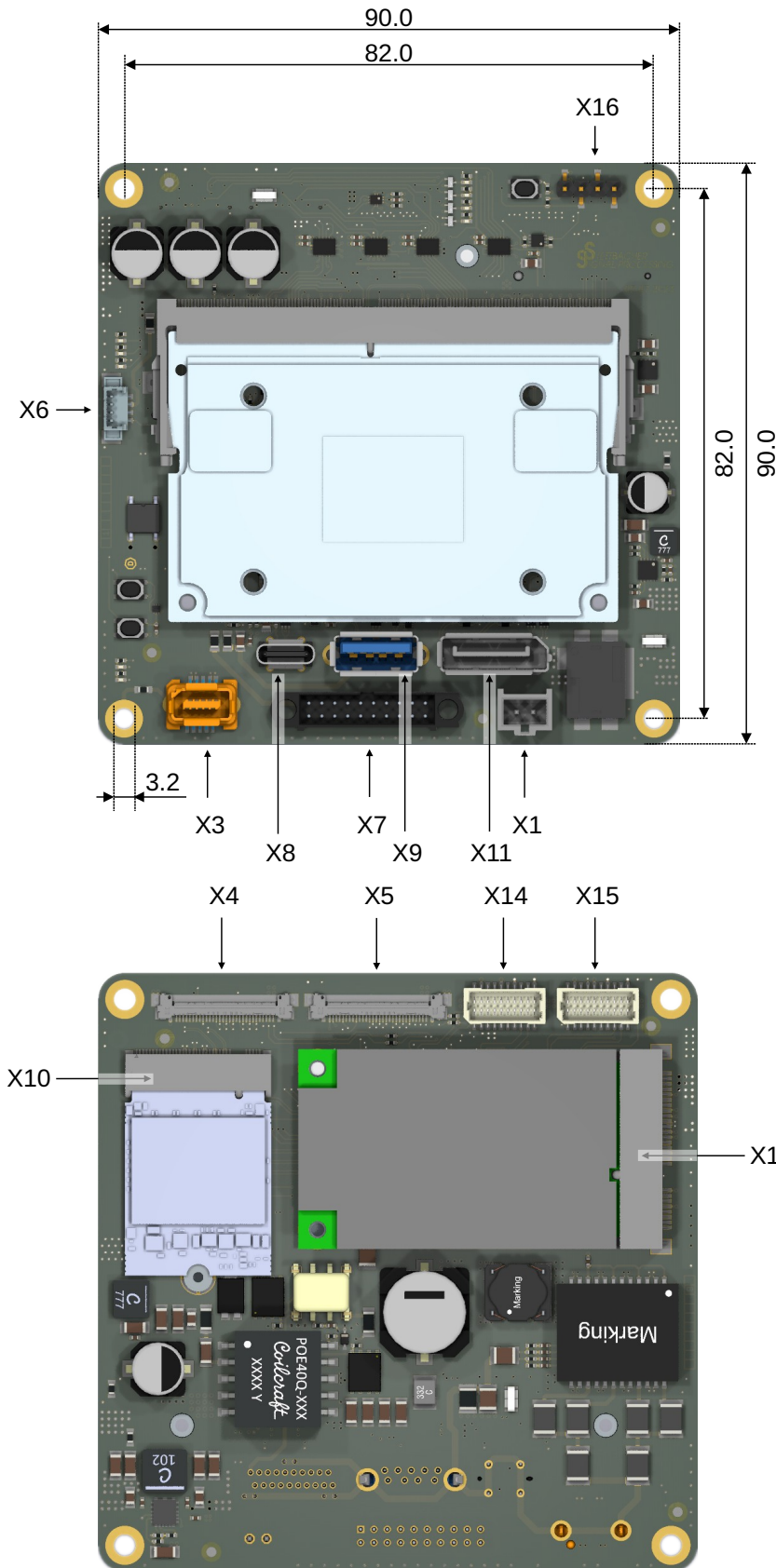
Environment condition		
Temperature	Operating	0°C to +60°C
	Storage	-40°C to +80°C

Special Features

The smart camera is an independent all-in-one image processing system. At its heart is a powerful computer module from NVIDIA. The system provides everything you need to develop your vision project and bringing it to production status.

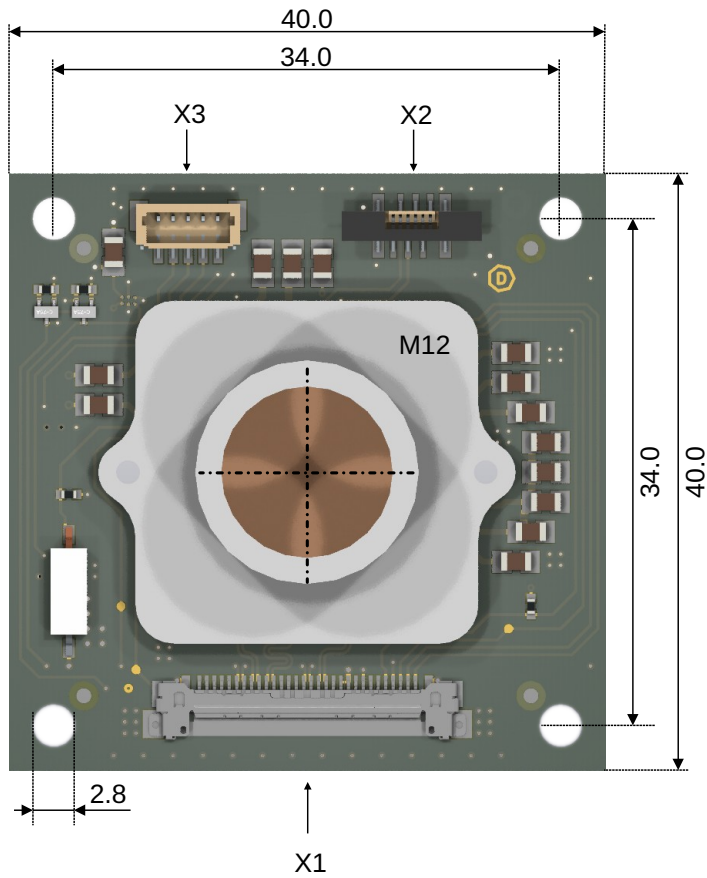
- **Free positioning of the camera modules.** As the cameras are connected to the mainboard by cable, they can be positioned flexibly. The small modules can also be installed in places where space is limited.
- **Linux operating system.** The out-of-the-box ready system runs on Linux Ubuntu. Simply connect your monitor, keyboard and mouse to the camera and start developing your project - no additional hardware such as a computer is required.
- **Image processing on the edge.** The high-performance computer module enables image processing directly on the camera near the originating source. No need to stream raw images to an external server for further processing, improving latency and reducing complexity.
- **Energy efficient AI system.** The camera has a powerful graphics processor on which neural networks can be calculated for object recognition, localization or similar.
- **High-precision 6-axis IMU.** The integrated inertial measurement unit (IMU), including 3D accelerometer and gyroscope, provides measurements which can be fused with the vision data for pose estimation and map generation tasks.
- **Auto-focus capabilities.** The bi-directional constant current driver enables liquid lenses to be connected in order to focus on objects and produce razor-sharp images. The connector is compatible with Optotune lenses.
- **I/O Lines.** The smart camera can be easily integrated into existing systems thanks to the freely programmable I/O lines. Opto-isolated or fast GPIOs are available, which can be connected to programmable logic controllers, relays and light barriers, for example.
- **Serial Communication Interfaces.** Further communication interfaces such as I²C, SPI and UART are available. This allows the user to control their own hardware such as sensor or actuator boards. This means that the image processing system can be expanded as required and adapted to individual needs.

Mainboard



- X1 External power
- X3 ix Industrial Ethernet
- X4 1st camera
- X5 2nd camera
- X6 FAN
- X7 Opto-isolated I/O lines
- X8 USB-C
- X9 USB Host A
- X10 M.2 Key M
- X11 Display port
- X12 Mini PCIe
- X13 Micro-SIM²
- X14 GPIO, I2C, SPI, UART
- X15 GPIO, I2C, SPI, UART
- X16 Debugging UART

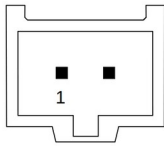
Camera Module



- X1 Mainboard
- X2 Current driver
- X3 reserved

2 Micro-SIM card holder is located under X12

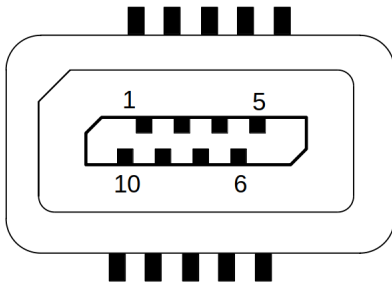
Mainboard Connectors



Molex 901361202

X1 - ix Industrial Ethernet 1 Gbit/s

1	+9 to +36 VDC, max. 40 W	
	Current @ 12V supply (max)	3.4 A
	Current @24 V supply (max)	1.7 A
2	GND	



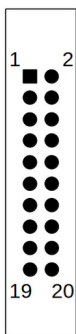
Harting 09452812562333

X3 - ix Industrial Ethernet 1 Gbit/s

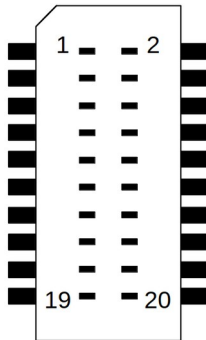
1	BI DA+
2	BI DA-
3	GND
4	BI DC+
5	BI DC-
6	BI DB+
7	BI DB-
8	GND
9	BI DD+
10	BI DD-

X7 - Opto-isolated I/O Lines

1	OUT0	2	GND
3	OUT1	4	GND
5	OUT2	6	GND
7	OUT3	8	GND
9	IN0	10	GND
11	IN1	12	GND
13	IN2	14	GND
15	IN3	16	GND
17	+5 VDC / max. 1.5 A	18	GND
19		20	GND



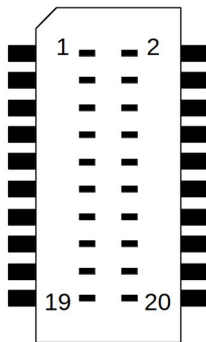
Harwin M225-5202046



Harwin M40-3021046R

X14 - GPIO, I²C, SPI, UART

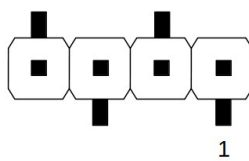
1	I2C0 SCL	2	I2C0 SDA
3	GND	4	+3.3 VDC
5	SPI0 MISO	6	SPI0 MOSI
7	SPI0 SCK	8	SPI0 CS0
9	SPI0 CS1	10	+3.3 VDC
11	UART0 RXD	12	UART0 TXD
13	GND	14	+5 VDC
15	GPIO0	16	GPIO1
17	GPIO2	18	GPIO3
19	GND	20	+5 VDC



Harwin M40-3021046R

X15 - GPIO, I²C, SPI, UART

1	I2C1 SCL	2	I2C1 SDA
3	GND	4	+3.3 VDC
5	SPI1 MISO	6	SPI1 MOSI
7	SPI1 SCK	8	SPI1 CS0
9	SPI1 CS1	10	+3.3 VDC
11	UART1 RXD	12	UART1 TXD
13	GND	14	+5 VDC
15	reserved	16	reserved
17	reserved	18	reserved
19	GND	20	+5 VDC

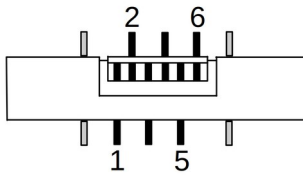


Würth 61000418321

X16 - Debugging UART

1	+3.3 VDC
2	TX Output
3	RX Input
4	GND

Camera Module Connectors



Würth 687306124422

Compatible connector for focus tunable lenses from Optotune³.

X2 - Current Driver for Liquid Lens

1	nc	
2	I-	±100 mA (max)
3	I+	
4	nc	
5	nc	
6	nc	

³ Please contact sales@optotune.com for further information.

Order Information

Mainboard		
Order No.	CPU Module	Cooling
SSP1000-4100-001	Orin NX 16 GB	active heatsink
SSP1000-4101-001	Orin NX 16 GB	heatspreader
SSP1000-4110-001	Orin NX 8 GB	active heatsink
SSP1000-4111-001	Orin NX 8 GB	heatspreader
SSP1000-4120-001	Orin Nano 8 GB	active heatsink
SSP1000-4121-001	Orin Nano 8 GB	heatspreader
SSP1000-4120-001	Orin Nano 4 GB	passive heatsink
SSP1000-4121-001	Orin Nano 4 GB	heatspreader

Camera Module	
Order No.	Sensor type
SSP1000-4110-001	Sony IMX568 incl. camera cable

Accessories	
Order No.	Description
SSP5120-0501-005	Industrial ethernet cable, RJ45 to ix Industrial Type A, 5.0m, Cat6A
SSP5050-1003-XXX	LTE module. <ul style="list-style-type: none"> • XXX: 000 Europe and Asia • XXX: 010 North America • XXX: 020 Japan • XXX: 030 APAC and South America

Revision History

Revision	Date	Changes
0.1	2024-01-09	Initial preliminary release
0.2	2024-01-12	Updated <ul style="list-style-type: none">Serial communication interfaces descriptionSystem-on-module description
1.0	2024-01-18	<ul style="list-style-type: none">Added CPU module variants incl. order codeChange to final version
1.1	2024-02-01	<ul style="list-style-type: none">product name added
1.2	2024-02-21	<ul style="list-style-type: none">Added mechanical data