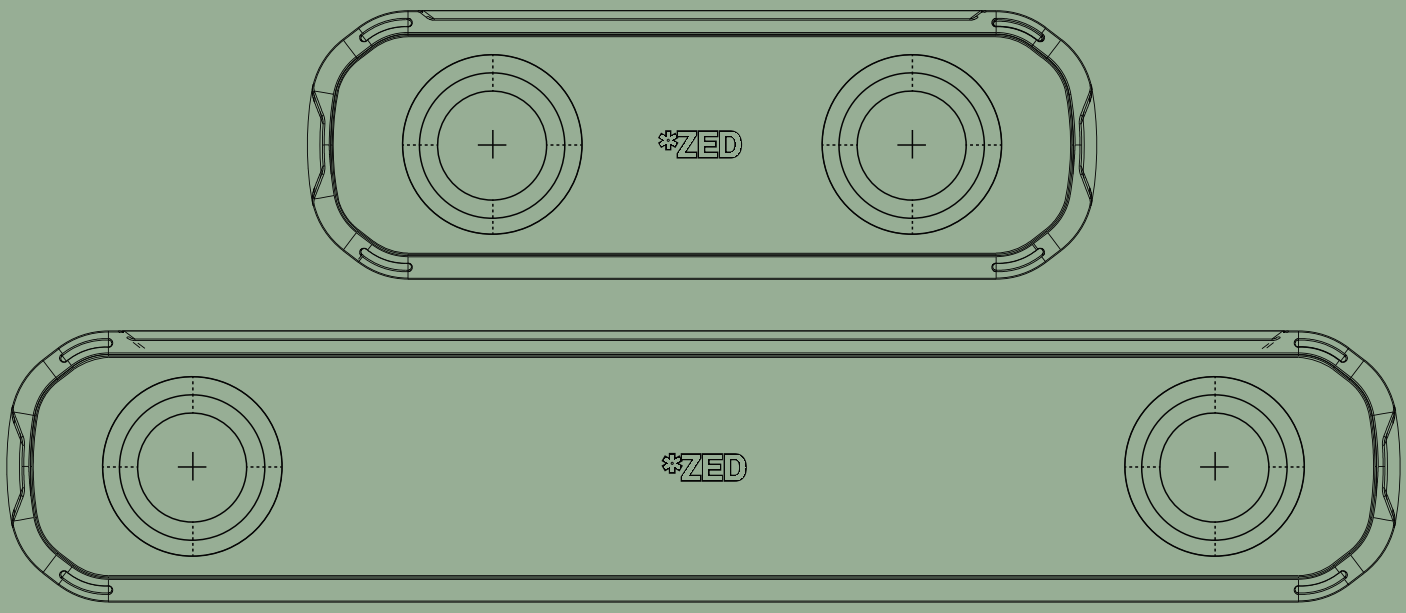
*ZED X | ZED X Mini

Stereo Camera & SDK Overview

The ZED X stereo camera combines powerful hardware and intelligent software to create an unrivalled solution for obstacle detection, navigation and process automation.

Built to function efficiently in harsh environments, the IP67-rated ZED X and ZED X Mini stereo cameras' robust aluminium body can withstand outdoor conditions, making it ideal for robots deployed in various sectors including agriculture, manufacturing, logistics.



*ZED X | ZED X Mini Datasheet Revision History

Document Version	Description	Revision Date
1.0	• Initial release	December 2022
1.1	• Added: Functional diagram • Added: Sensors specifications	August 2023
1.2	• Added: ZED X Accessories	May 2025
1.3	• Added: ZED X Accessories	October 2025
1.4	• Added: ZED X Part Numbers	March 2026
1.5	• Added: Tiltable mount mounting guide	June 2026
1.6	Added: Compliance and certificates • Added: I2C address map	July 2026

*ZED X | ZED X Mini General Specifications

Wide-angle 3D AI camera
Combine long-range depth perception with AI to perceive your environment in 3D with up to a 120° wide-angle field of view.

IP67-rated enclosure
Resistant to dust, water and humidity, the new ZED X is designed for outdoor applications and challenging medical, industrial, agricultural environments, and more.

Multi-camera synchronization
Hardware synchronisation for multiple connected cameras at frame-level within 100 microseconds. Capture RGB and depth images of the same scene with multiple cameras all triggered at the same time.

High quality lenses
Wide-angle 9-element all-glass dual lens with optically corrected distortion, and optional polarizing filter.

High-performance IMU
The all-new IMU combines a 16-bit triaxial accelerometer and gyroscope with vibration resistance, ultra low noise and bias for exceptional motion tracking

Secure GMSL2 connection
GMSL2 connectivity is ideal for robotics. Transmit video without EMI and high data rate through a lockable interface to a Jetson Orin over a distance of up to 15m with low latency.

Technical Specifications

Output Resolution	Side by Side
1200p	2x (1920x1200) @60fps
1080p	2x (1920x1080) @60fps
600p	2x (960x600) @120fps
Interface	GMSL2
Baseline	
ZED X	12cm (4.72”)
ZED X Mini	5cm (1.97”)
Image Sensors	
Size	1/2.6” sensors
Resolution	Dual 2.3M pixels sensors with 3-micron pixels
Format	16:10
Shutter Sync	Electronically Synchronized Global Shutter
Motion Sensors	200 Hz 16-bits Accelerometer (up to 12g) 200 Hz 16-bits Gyroscope (up to 1000°/s)
Warranty	2-year warranty

System Requirements

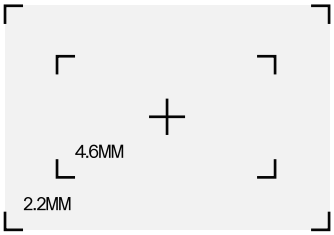
System	NVIDIA Jetson AGX Orin NVIDIA Jetson AGX Xavier NVIDIA Jetson Orin NX, Xavier NX
OS	Jetson Linux (L4T) v35.1 or newer

Physical Specifications

Dimensions	
ZED X	163.4 x 31.8 x 36.7mm (6.44 x 1.26 x 1.45”)
ZED X Mini	93.6 x 31.8 x 36.7mm (3.69 x 1.26 x 1.45”)
Weight	
ZED X	239g (0.53lb)
ZED X Mini	151g (0.34lb)
Connector	Serial Coax GMSL2 connector - FAKRA Z type
Mounting Options	1/4”-20 UNC thread mount 2x M3 threads (bottom) 4x M4 threads (back)
Environment	
Operating Temp.	-20°C to +60°C (-4°F to 140°F)
Relative Humidity	90% at 40°C
Vibrations	2g RMS @ 3-500Hz, 1h/axis
Power	Power via GMSL2 (PoC) Typical consumption: 1.46W (0.122A 12V)
Power Supply Ratings	5V to 20V

*ZED X | ZED X Mini Lens Options

Focal Lengths Available



2.2mm

2.2mm fixed focal lens offers an exceptionally wide field of view while also providing optically corrected distortion for enhanced image quality.

4.6mm

The 4.6mm focal length lens is perfect for an enhanced resolution and depth accuracy at longer ranges.

No More Reflections with Polarizing Filters

Experience the highest image quality possible outdoors with the built-in polarizing filter. This filter effectively minimizes glare and reflections while enhancing color depth and overall quality.



ZED X Available Models

Model	ZED X 4.6mm	ZED X Mini 4.6mm	ZED X 2.2mm	ZED X Mini 2.2mm
SKU Polarizer SKU No Polarizer	ZED-312120 ZED-312110	ZED-312220 ZED-312210	ZED-311120 ZED-311110	ZED-311220 ZED-311210
Depth Range Max	1.0m to 35m (3.3ft to 114.8ft)	0.15m to 12m (0.5ft to 39.4ft)	0.3m to 20m (0.98ft to 65.6ft)	0.1m to 8m (0.3ft to 26.2ft)
Ideal Range	1.0m to 20m (3.3ft to 65.6ft)	0.15m to 6m (0.5ft to 19.7ft)	0.3m to 12m (0.98ft to 39.4ft)	0.1m to 4m (0.3ft to 13.1ft)
Depth Accuracy	< 0.4% to 2m (6.6ft) < 7% at 20m (65.6ft)	< 1.0% at 2m (6.6ft) < 3% at 6m (19.7ft)	< 0.8% at 2m (6.6ft) < 4% at 12m (39.4ft)	< 1.6% at 2m (6.6ft) < 3% at 4m (13.1ft)
Body Tracking	Up to 15m	Up to 12m	Up to 8m	Up to 6m
Focal Length	4.6mm (0.18")		2.2mm (0.087")	
Field of View	Max. 73°(H) x 45°(V) x 87°(D)		Max. 110°(H) x 80°(V) x 120°(D)	
Aperture	f/2.0		f/2.2	
TV Distortion	-6.7% <		< 5.7%	
Object Detection	Up to Max Depth (3D)			
Connector	FAKRA Z Connector Type			

*ZED X | ZED X Mini Sensors Specifications

ZED X seamlessly fuses visual and inertial data to enhance spatial awareness, position tracking, and motion-related tasks. Robotics application require the ability to sense, decide, and act. The ZED X fulfil the necessary sensing technology for successful deployment.

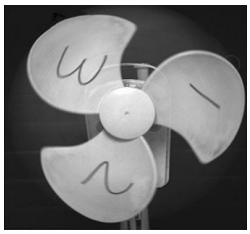
Dual Image Sensors

Sensors	
Sensor Type	1/2.6” 2.3MP RGB
Array Size	1928 x 1208 pixels
Pixel Size	3µm x 3µm
Shutter	Electronically Synchronized Global Shutter
Output Resolution (Side by side)	1920x1200 @60fps 1920x1080 @60fps cropping mode 960x600 @120fps binning mode
Output Format	RAW10 (v4l2) / NV21 (Argus)
Max S/N Ration	38 dB
Dynamic Range	71.4 dB
Sensitivity	22.3Ke/Lux*s
Camera Control	Exposure, analog & digital gain, gamma, white balance, saturation, sharpness, denoising, brightness, contrast

Distortion free images of fast moving objects



Rolling Shutter



Global Shutter

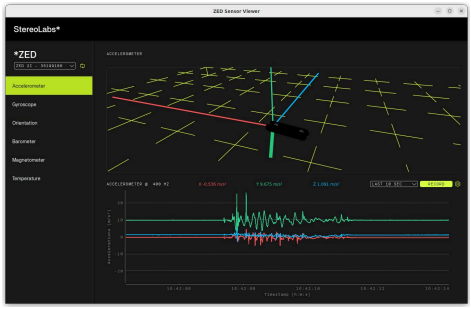
Motion Sensors

Accelerometer Range	± 12G
Accelerometer Resolution	0.36 mg
Accelerometer Noise Density	2.3 mg
Gyroscope Range	± 1000 dps
Gyroscope Resolution	0.03 dps
Gyroscope Noise Density	0.20 dps
Sensitivity Error	± 0.5%
Output Data Rate	200 Hz

Sensors API

You can access these sensors and acquire sensor data by using the Sensors API.

Please visit stereolabs.com/docs for tutorials.

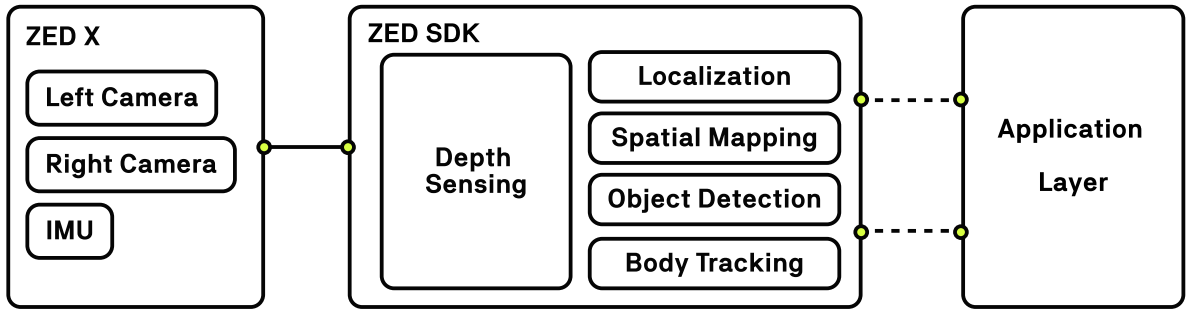


*ZED SDK

SDK Modules

Stereo Capture	The ZED X features dual lenses for capturing high-definition 3D video with an expansive field of view. It delivers two synchronized left and right video streams, processed by the integrated ISP, and provides images in RGB format on the host.
Depth Sensing	
Depth Map	Depth maps captured by the ZED X store a distance value (Z) for each pixel (X, Y) in the image. The distance is expressed in metric units (meters for example) and calculated from the back of the left eye of the camera to the scene object.
3D Point Cloud	A point cloud can be seen as a depth map in three dimensions. While a depth map only contains the distance or Z information for each pixel, a point cloud is a collection of 3D points (X,Y,Z) that represent the external surface of the scene and can contain color information.
SLAM Localization	
Positional Tracking	The ZED X uses visual tracking of its surroundings to understand the movement of the user or system holding it. As the camera moves in the real-world, it reports its new position and orientation. This information is called the camera 6DoF pose. Pose information is output at the frame rate of the camera, up to 100 times per second in WVGA mode.
Spatial Mapping	The ZED continually scans its environment, generating a 3D map in real-time. This map is updated as the device moves and captures new scene elements. Thanks to its ability to perceive distances beyond the capabilities of conventional RGB-D sensors, the camera can rapidly reconstruct 3D maps for both expansive indoor and outdoor spaces.
Object Detection	Object detection involves identifying objects within an image. Leveraging depth sensing and 3D data, the ZED camera offers both 2D and 3D positional information for objects within the scene. Starting with ZED SDK 3.6, users can employ custom detectors via the API, with 2D detections being processed alongside 3D information, including object position and 3D bounding boxes. More informations in the documentation.
Body Tracking	Body tracking module focuses on skeleton bone detection and tracking. A detected bone is represented by its two end points also called keypoints. The ZED camera provides 2D and 3D information for each keypoint as well as local rotation. The ZED SDK supports four body formats: 18 or 34, 38 keypoints.

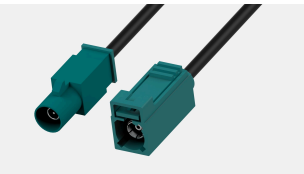
Functional SDK Diagram



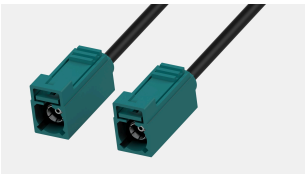
*ZED X | ZED X Mini Accessories

FAKRA Z Cables

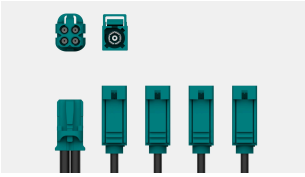
A wide range of camera cables are readily available, tailored to diverse requirements and applications, offered in varying lengths to suit both compact and expansive setups.



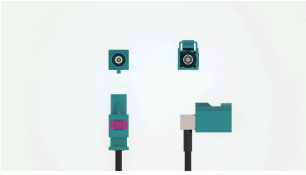
Male to Female	
0.5m (1.6ft)	CBL-310800
1.5m (4.93ft)	CBL-310100
5m (16.4ft)	CBL-310200
10m (32.8ft)	CBL-310300
15m (49.2ft)	CBL-310400



Female to Female	
0.3m (0.98ft)	CBL-320100
1.5m (4.93ft)	CBL-320200
5m (16.4ft)	CBL-320300
10m (32.8ft)	CBL-320400



Female to Female 1-to-4	
0.5m (1.64ft)	CBL-320510



Right-Angle Extension	
0.3m (0.98ft)	CBL-310500
0.5m (1.6ft)	CBL-310900

ZED Box Embedded Computers

Stereolabs ZED Boxes are powered with NVIDIA Jetson Orin modules and serves as a robust AI embedded computers for autonomous robotics and AI applications.



Model	ZED Box Orin NX
Jetson Modules	Orin NX 8GB, NX 16GB
I/Os	3x USB 3.2 Gen2 (10 Gbps) 1x Gigabit Ethernet 1x HDMI 4x GMSL2 ** WiFi 6 connectivity 1x RTK GNSS GPS Ublox ZED F9P**



Model	ZED Box Mini
Jetson Modules	Orin Nano 4GB, Nano 8GB, NX 8GB
I/Os	2x GMSL2 1x USB 3.0 (5 Gbps) 1x Gigabit Ethernet 1x HDMI WiFi 6 connectivity**

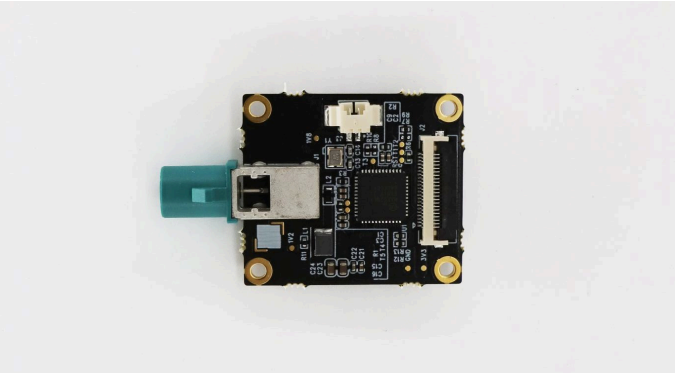
** Available as options.

The Multiband GNSS antenna ANN-MB-00 is an additional accessory.

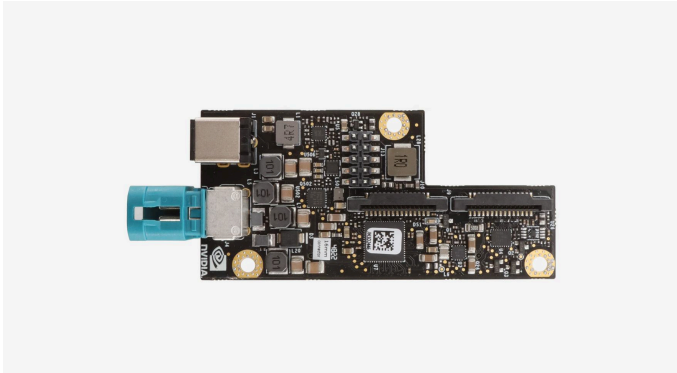
*ZED X | ZED X Mini Accessories

Capture Cards

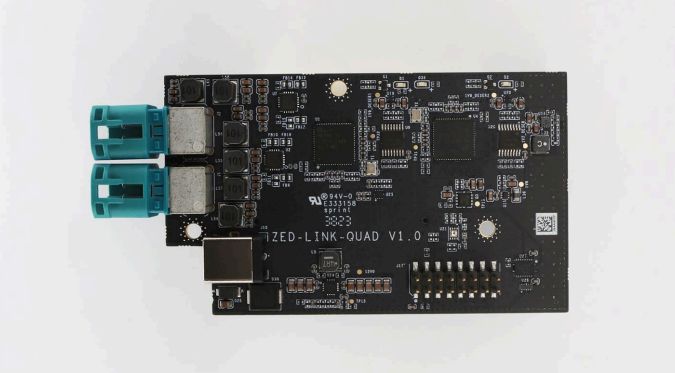
To capture the ZED X cameras on the NVIDIA Jetson AGX platform, one solution is to utilize a GMSL2 capture card that directly connects to the Jetson's CSI port.



Model	ZED Link Mono Capture Card
Compatibility	NVIDIA Jetson Orin Platform (NX/Nano) NVIDIA Jetson Xavier Platform (NX)
Max. number of cameras	Capture 1x GMSL2 camera input in SD/HD, up to 1920x1200@60fps
Deserializer	MAX9296A
Power	Requires external 9-14V power supply.



Model	ZED Link Duo Capture Card
Compatibility	NVIDIA Jetson Orin Platform (AGX/NX/Nano) NVIDIA Jetson Xavier Platform (AGX/NX)
Max. Number of cameras	Capture 4x GMSL2 camera input in SD/HD, up to 1920x1200@30fps
Deserializer	MAX96712
Power	Connects to and is powered by the Samtec port of the Orin/Xavier AGX Developer Kit. Requires external power supply for NX/Nano (9V-19V) when using MIPI port



Model	ZED Link Quad Capture Card
Compatibility	NVIDIA Jetson Orin Platform (AGX) NVIDIA Jetson Xavier Platform (AGX)
Max. number of cameras	Capture 8x GMSL2 camera input in SD/HD, up to 1920x1200@30fps
Deserializer	2 x MAX96712
Power	Requires external 9-19V power supply.

*ZED X | ZED X Mini Accessories

Tiltable Camera Mount

Adjustable tilt mount engineered for precise angle positioning.

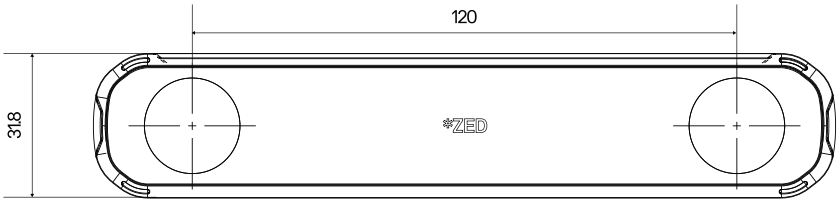


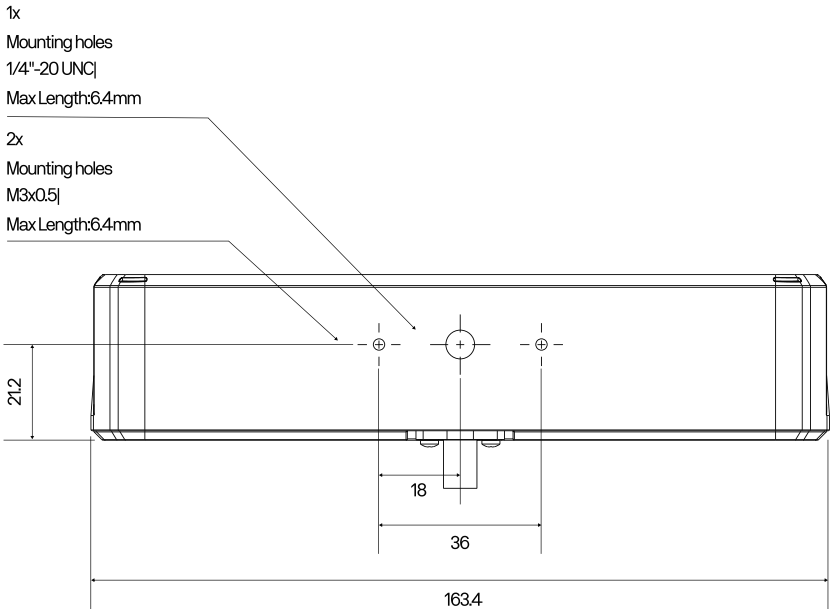
Tiltable Camera Mount

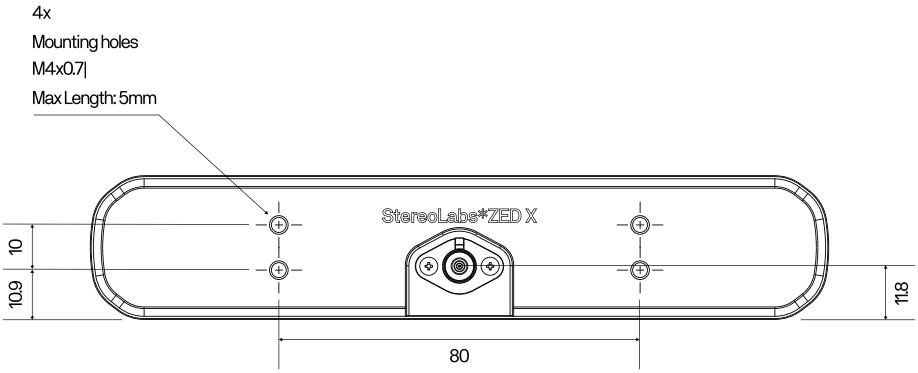
ACC-150000

*ZED X
Technical Drawings

ZED X - 2.2mm

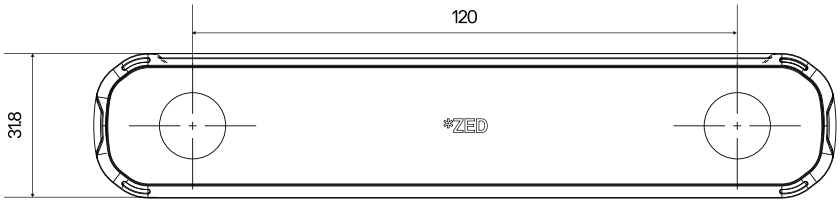


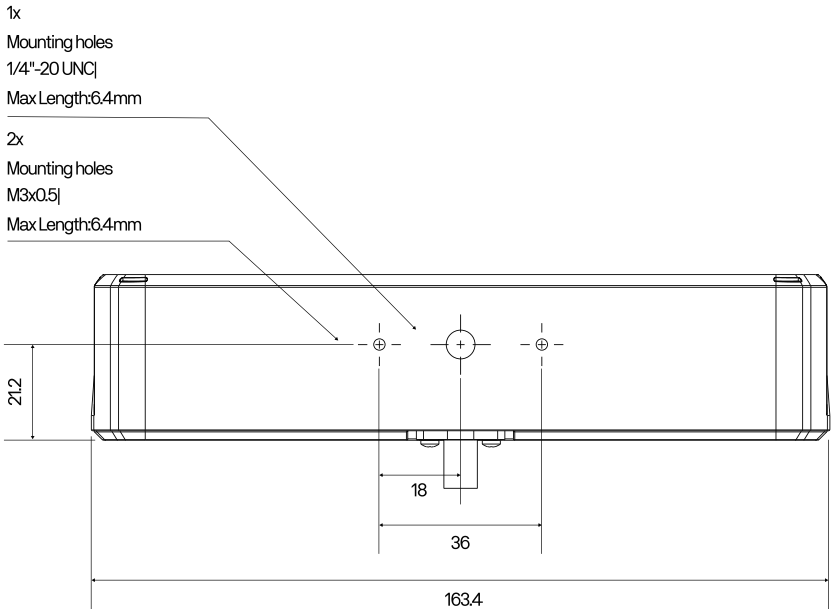


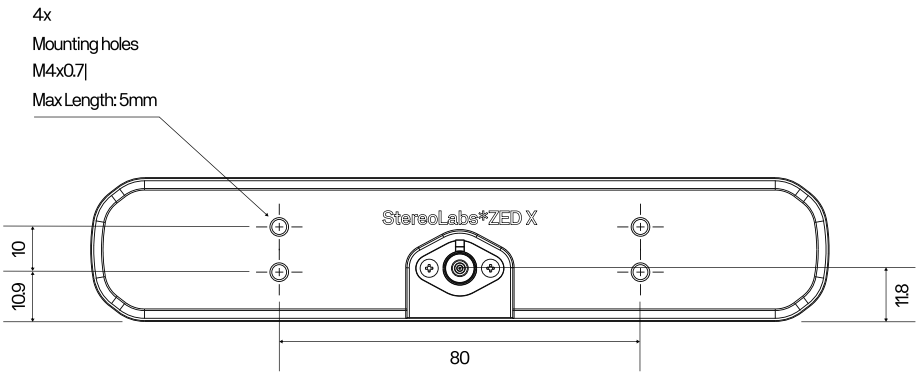


*ZED X
Technical Drawings

ZED X - 4.6mm

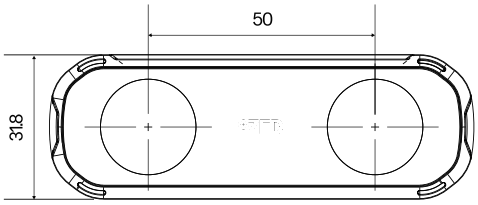


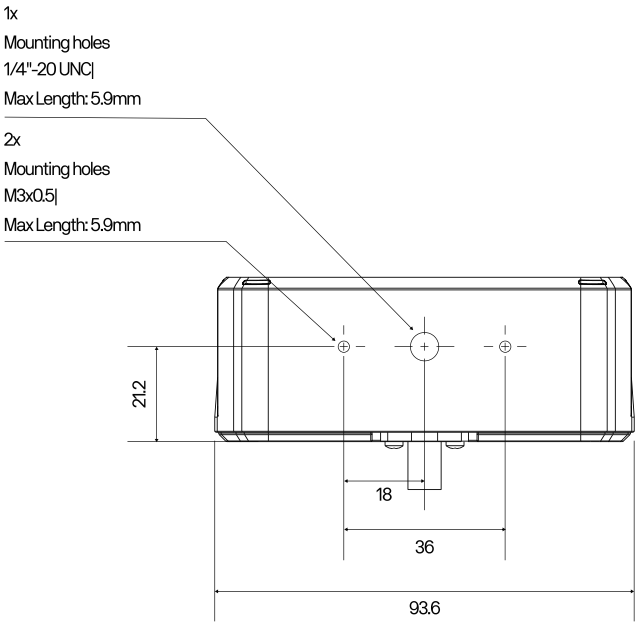


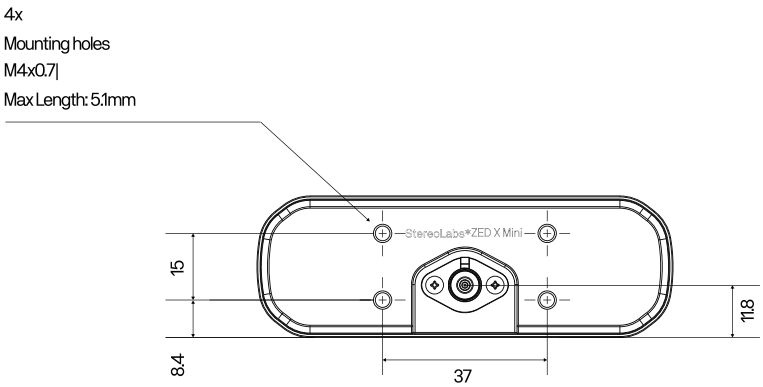


*ZED X Mini
Technical Drawings

ZED X MINI - 2.2mm

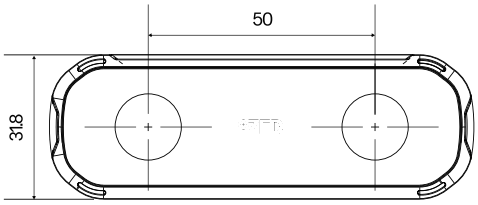


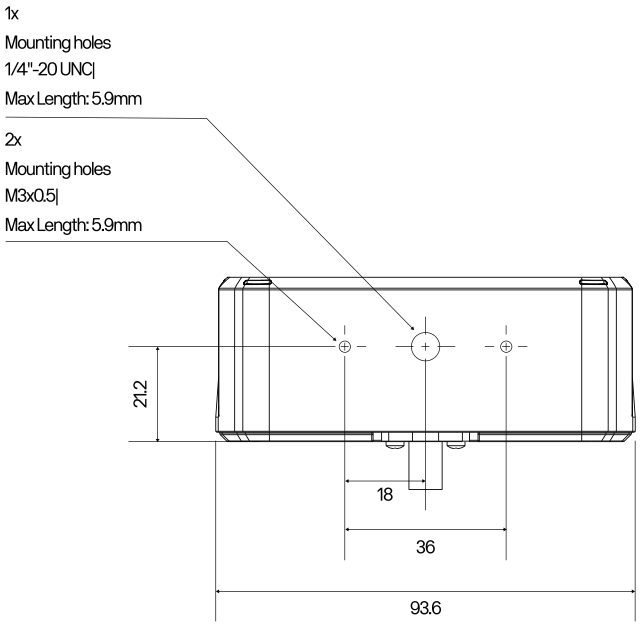


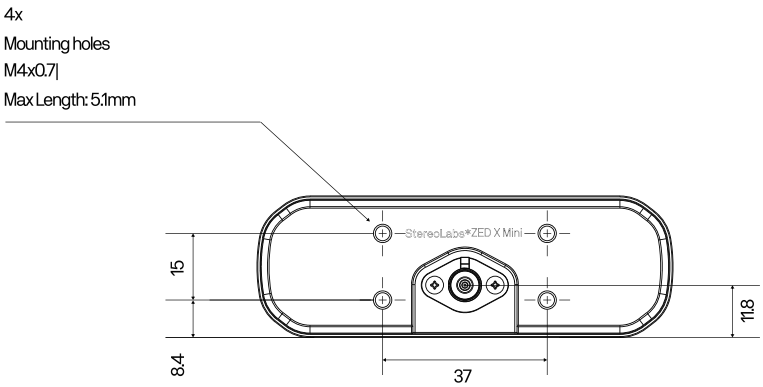


*ZED X Mini
Technical Drawings

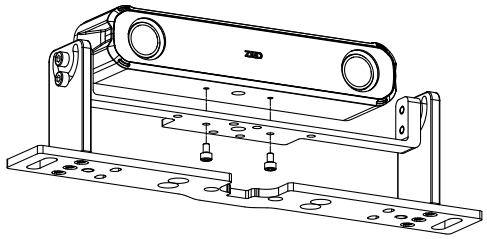
ZED X MINI - 4.6mm

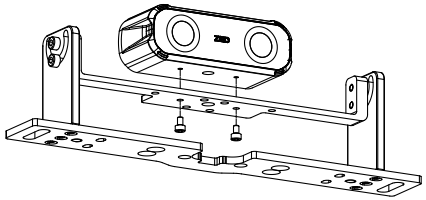


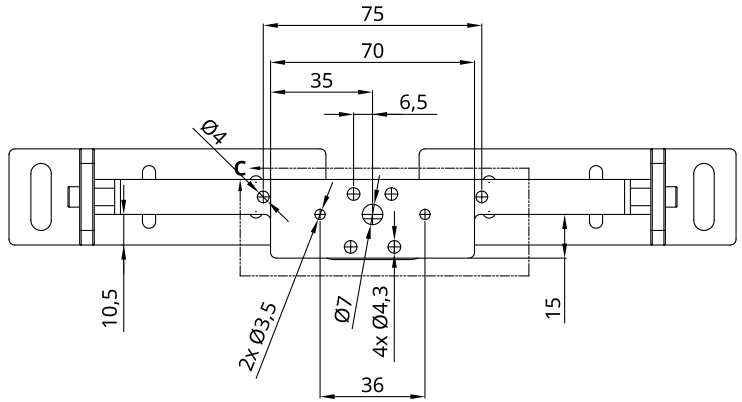




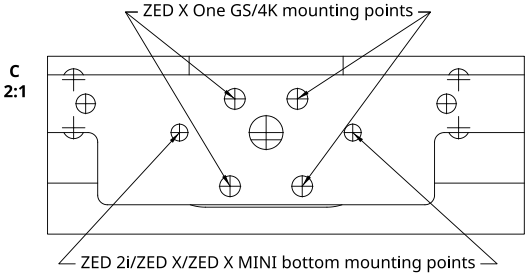
*ZED X | ZED X Mini Tiltable Mount Mounting Guide

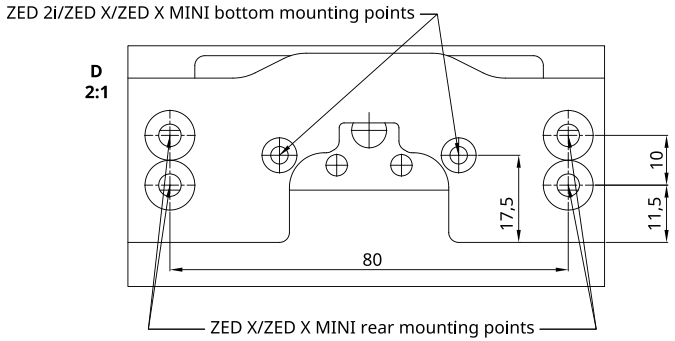


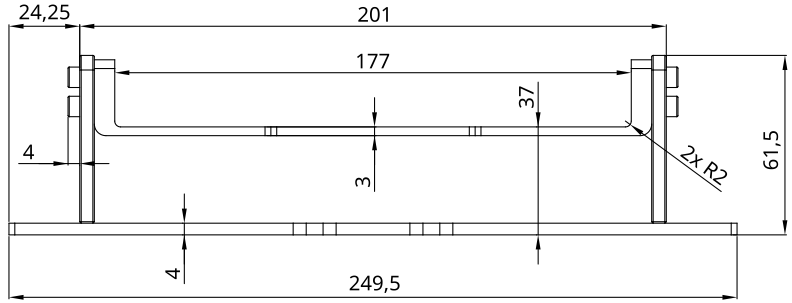




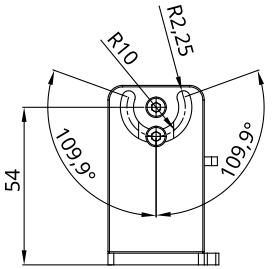
Top



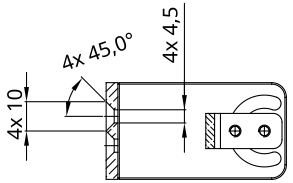




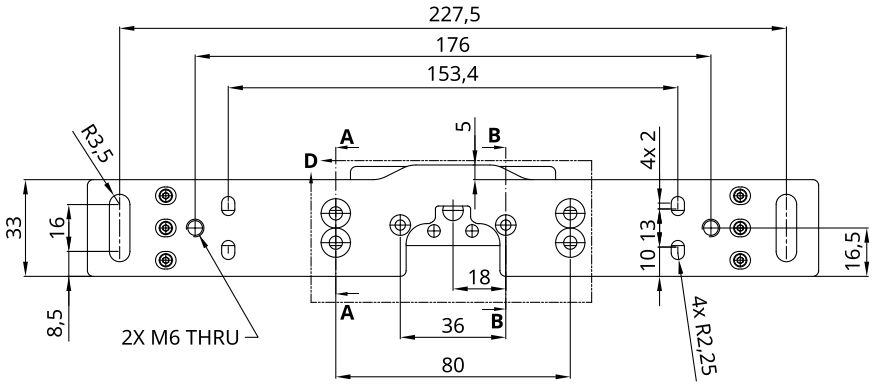
Front



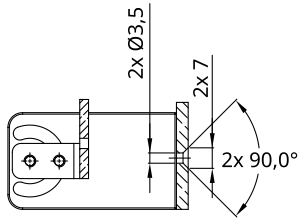
Left



A - A



Bottom



B - B

*ZED X | ZED X Mini Interfaces

ZED X | ZED X Mini - I2C Address Map

Address (7-bit)	Device
0x10	AR0234 Image Sensor
0x18	AR0234 Image Sensor
0x62	Serializer
0x69	BMI IMU — Accelerometer
0x19	BMI IMU — Gyroscope
0x54	EEPROM
0x55	EEPROM
0x49	TMP102 — Temperature Sensor

Notes

AR0234 Image Sensor	The address can be reassigned by the driver to another value via the sensor's internal registers.
BMI IMU	Usually translated to a different address, specified in the device tree, via the serializer.
EEPROM	Usually read only once, at driver probe time, by opening each link one by one.

*ZED X | ZED X Mini
Part Numbers & Compliance

ZED X Part Numbers

	ZED X Mini Narrow lens (4.6mm)	ZED X Mini Wide lens (2.2mm)	ZED X Narrow lens (4.6mm)	ZED X Wide lens (2.2mm)
No Polarizer	ZED-312210	ZED-311210	ZED-312110	ZED-311110
With Polarizer	ZED-312220	ZED-311220	ZED-312120	ZED-311120

Standards & Compliance

Certificate	Region
CE Declaration of Conformity	European Union
REACH	European Union
RoHS Compliance	European Union
TSCA	United States
EMC	European Union
FCC	United States
ICES-0003	Canada
IP67	Global
Certificate of Origin	Global