ORBBEC

Femto W

Datasheet v1.0

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1. Product Brief

Product Overview

Femto W is a wide field of view, indirect time-of-flight depth sensor and high resolution RGB camera equipped with in-camera depth and RGB processing, IMU and easy to use data connectivity with the USB 3.0 interface. Femto W comes with multi-camera synchronization support and can be used in complete darkness from 0.2 to 5 meters.

Product Features:

- Wide Field of View at 101°Horizontal and 66° Vertical
- Up to 30 fps at 640X480 depth resolution
- Up to 30 fps at 3840X2160 RGB resolution
- Multi-camera synchronization supported
- IMU supported

2. Product Specifications

Parameter	Specifications
Model	F1BB01U3SFHZ
VID/PID	0x2BC5/0x0638
Technology	iToF
Shutter Type	IR: Global Shutter; Color: Rolling Shutter
Wavelength	940nm

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Product Specifications: Continued from previous page

Mode	Resolution	FoV	FPS	Range	Format
Depth	640 x 480	H 90° V 74°	5, 10, 15, 20, 25, 30	0.2m – 2.5m	Y16
	320 x 240		5, 10, 15, 20, 25, 30		
RGB	3840 x 2160	16:9 H 98.6° V 64.2° 4:3 H 78.4° V 63.4°	5, 10, 15, 20, 25, 30	N/A	MJPG, H.264, H.265, I420
	1920 x 1080		5, 10, 15, 20, 25, 30	N/A	
	1280 x 960		5, 10, 15, 20, 25, 30	N/A	
	1280 x 720		5, 10, 15, 20, 25, 30	N/A	
	1024 x 768		5, 10, 15, 20, 25, 30	N/A	
	640 x 480		5, 10, 15, 20, 25, 30	N/A	
Depth precision: 0.35% @1m (81% FoV), 0.3% @2m (81% FoV)					

Parameter	Specifications
IMU	6 DoF; Frequency range: 50–2,000Hz; Data format: float
Mirror Mode	Supported, non-mirror by default
Processing	In-camera processing
Data Connection	Type-C USB 3.0 6 Pin-Connector*[1] *[1] for multi-device sync
Power Mode	USB Type-C
Power Input	DC 5V 3A
Operating Modes	DC Power + USB Type-C Data
Power Consumption	Average: 6.7W Peak: 10.2W
Operating Environment	0°C - 40°C; 10% - 95%RH (non-condensing) Indoor
Supported Functions	D2C, Multi-Camera Sync
Dimensions	108 mm × 91 mm × 28.5 mm
Weight	380g
Certifications	ROHS, CE-EMC, FCC, Class 1 Laser Product
Installation	Bottom: 1 x ¼-20unc Sides: 4 x M2.5

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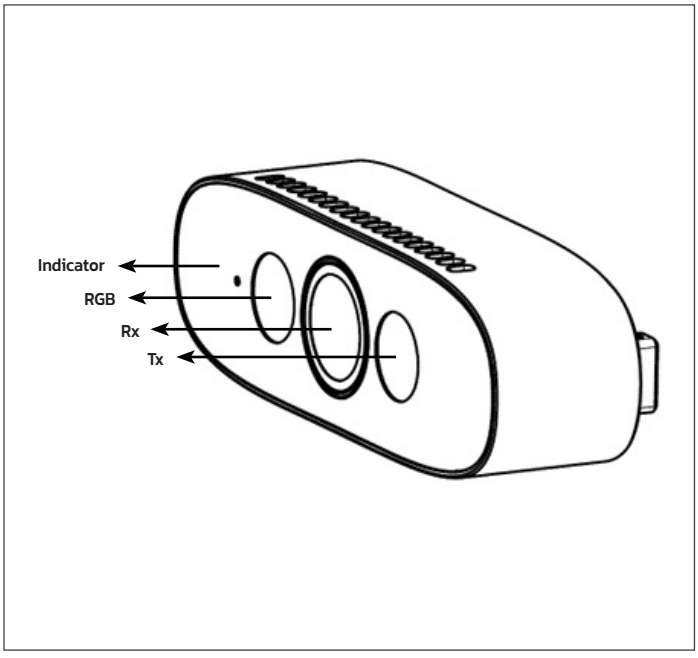
3. Product Information

3.1 Product Images

Product Picture

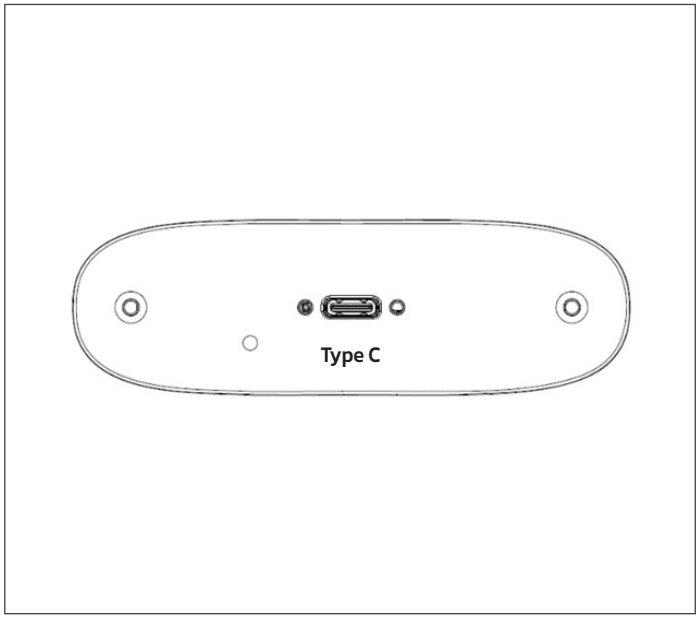
3.2 Product Components



Femto Components

3.3 Product Interfaces

The hardware interfaces of Femto W camera are shown in the figure below.



4. SDK

Orbbec SDK is a flexible and modular platform for easy camera setup and runs on multiple platforms with a rich set of APIs. It supports camera access, device setup and configuration, data stream reading, processing, and viewing, RGB-D registration and frame synchronization.

Functions include:

- Access and control of camera devices.
- Control of frame synchronization and alignment.
- Acquisition of point cloud data.
- Orbbec Viewer for camera testing.

Please check https://orbbec3d.com/developers/orbbec-sdk/ for the latest SDK.

5. Camera Setup and Operation

Packing List

- Orbbec Femto W device
- USB Type-C Y-cable for power + data
- AC to DC Power Supply/Adapter

Initialization and operation

- Connect Femto W to the host PC using the USB cable.
- Check that all cameras enumerate correctly in Windows device manager.
- Download Orbbec SDK
- Validate that cable can stream reliably on all sensors in the Orbbec Viewer, with the following settings:
    - Depth camera: 640x480
    - RGB Camera: 1920x1080
    - IMU enabled
- If the camera is not responding or is not being detected for any reason, please remove all cables from the camera and replug to the host PC to reset the camera state.

Indicators

State of Indicators	Meaning	Next Steps
Solid White	Powered ON and working correctly	Use the device.
Fast Blink	The device is initializing	Wait for the device to finish initialization
Breathing	Standby	Device is on standby and ready to use
Random Blink	Error	Unplug from the host and power and plug it back in
Slow Blink	Synchronization mode	Ready for synchronization

Temperature sensor and recording

The temperature of the camera's core components — including the laser temperature, IR sensor temperature, and IMU sensor temperature — can be obtained through API commands.

6. Installation Guide

Use outside of the specified conditions could cause the device to fail and/or function incorrectly. These conditions are applicable for the environment immediately around the device under all operational conditions. When used with an external enclosure, active temperature control and/or other cooling solutions are recommended to ensure the device is maintained within these ranges. The device design features a cooling channel in between the front section and rear sleeve. When you implement the device, make sure this cooling channel is not obstructed.

6.1 Installation Recommendations

1. Camera is active cooled, please do not cover the venting holes of the fan.
2. When using external housing around the camera for dust proofing, use foam inserts or rubber gaskets between the front of the camera and the external housing.
3. Avoid the application of external forces to the camera chassis during the installation process.
4. Disassembling chassis and mounting brackets voids the warranty.

Installation Guide: Continued from previous page

6.2 Heat Dissipation

1. Avoid direct heat sources around the camera.
2. Maximizing the space inside the external housing may help lower operating temperature.

6.3 Transmittance Requirements

Transmittance requirements for front cover protection lens of Femto 3D camera are listed as follows:

1. Optical transmittance: 400-1050nm, ≥95% transmittance of each point
2. Blue-violet area, 50% transmittance, corresponding wavelength is less than 395nm; Transmitted wavefront difference: PVλ or less
3. Flatness of front cover lens material: < 0.005mm.
4. Glass is recommended.

Before changing the structural design of camera, the protective lens in front of the camera lens must meet the requirements above.

6.4 Cable Design Guide

It is recommended to use included USB Type-C Y-cable. If a longer cable is needed, please select a USB certified cable that supports both power and data (1-1.5m length is recommended).

7. Safety and Handling

1. Please follow the camera operating instructions. Improper operation may cause damage to internal components.
2. Do not drop or hit the camera with external force.
3. Do not attempt to modify the camera in any way. Modification may cause permanent damage or inaccuracy.
4. The camera temperature may increase after it has been in use for a period of time. This is to be expected.
5. Do not touch the lens. Finger prints or smudges left on the lens may affect output quality.
6. Keep the product beyond the reach of children or animals to avoid accidents.
7. If the camera is not recognized by the computer, check whether the cable meets the power/data transfer requirements and reinsert the USB for inspection.
8. This product uses a Class 1 laser, but it is not recommended to look at the laser for more than 20 s to avoid discomfort.

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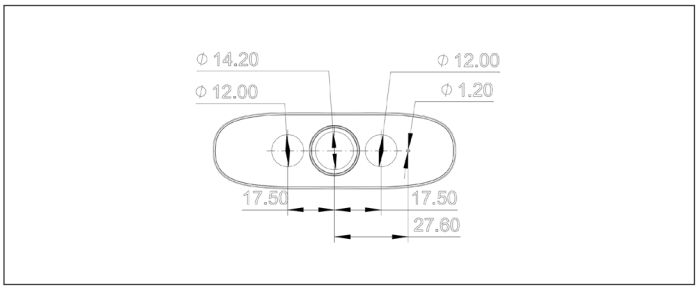
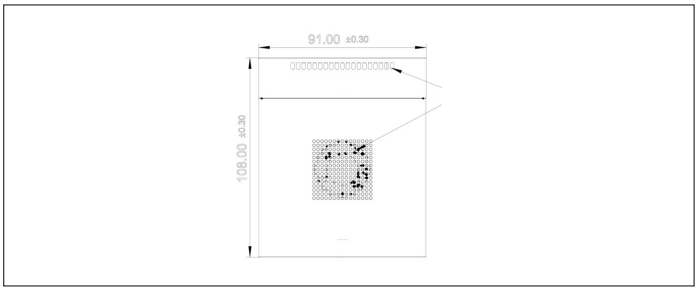
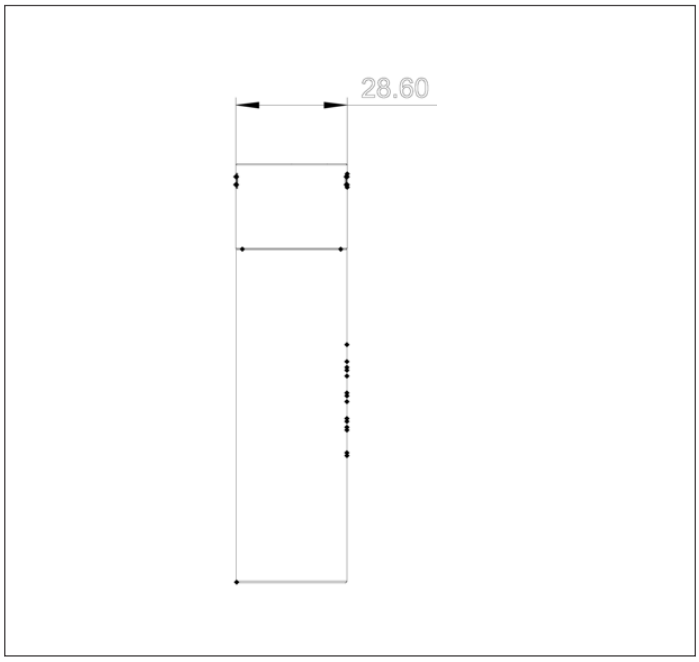
8. Product Drawings



Front View



Top View



Side View

9. Multi-Camera Synchronization

Advantages of multi-camera setup

- Increase camera coverage in a given space and fill in the occlusions where a single camera may have blind spots.
- Capture multiple images of the same scene and scan objects from different angles.
- Increase the effective frame rate to greater than 30 frames per second (FPS).

Using a 6-pin connector and matching cable, a multi-camera and multi-sensor network can be designed. (please follow the instructions in the SDK)

Pin	Definitions	Description
Pin_1	SYNC_OUT	Sync signal out
Pin_2	SYNC_IN	Sync signal Input
Pin_3	GND	Ground
Pin_4	UART_TX	UART transmitter
Pin_5	UART_RX	UART receiver
Pin_6	GND	Ground

11. Glossary of Terms

Term	Description
D2C	Depth to Color function maps each pixel on depth map to the corresponding color image according to the intrinsic and extrinsic parameters of depth camera and color camera.
Depth	Depth video streams are like color video streams except each pixel has a value representing the distance away from the sensor instead of color information
Depth Camera	Includes depth imaging module and external interface only, of which the former is generally composed of infrared projector, infrared camera and depth computing processor
FOV	Field of View (FoV) describes the angular extent of a given scene that is captured by a camera, which can be measured in horizontal, vertical, or diagonal
I2C	I2C bus refers to a kind of simple bidirectional two-wire synchronous serial bus developed by Philips. It can be used for transferring information among devices connected to the bus with two wires
IR Camera	Infrared camera
IR Flood	IR floodlights are used to illuminate the environment
ISP	Image signal processor, which is used for image post-processing
MIPI	MIPI alliance, i.e., Mobile Industry Processor Interface (MIPI) Alliance. MIPI is an open standard and specification formulated by MIPI Alliance for mobile application processors
PCBA	Circuit board consists of depth computing processor, memory, and other electronic devices
Point Cloud	A point cloud is a discrete set of data points in space.
SoC	System on Chip, integrated circuit (IC) that integrates all components of a computing system
TBD	To Be Determined. In the context of this document, information will be available in a later revision.