Gemini E

Datasheet v1.1

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1. Product Brief

Product Overview

Gemini E is a high-performance, wide field of view 3D camera based on Active Stereo IR technology. It is equipped with Orbbec's custom ASIC for high quality depth processing and single cable USB 2.0 power + connectivity. The wide FOV and the optimal close sensing range makes Gemini E more flexible to use in any solutions especially for robotics.

Gemini E is easy to set up and operate with the Orbbec/OpenNI SDK, and the camera delivers highly accurate and reliable data in various lighting conditions.

Product Features:

- Wide Field of View at 79° Horizontal and 62° Vertical
- High quality depth data output from 0.2m to 2.5m
- Up to 30 fps at 640X480 resolution
- Up to 30 fps at 1920X1080 RGB resolution
- USB 2.0 for power and data connectivity

2. Product Specifications

Parameter	Specifications
Model	G102200000
VID/PID	0x2BC5/0x065C
Technology	Active Stereo IR
Shutter Type	IR: Global Shutter; Color: Rolling Shutter
Wavelength	940nm

Mode	Resolution	FoV	FPS	Range	Format
Depth	1024×768	H79° x V62°	5, 10	0.2m - 2.5m	Y11/Y12
	512×384		5, 10, 15, 30		
	640×480		5, 10, 15, 30		
	320×240		5, 10, 15, 30		
	160×120		5, 10, 15, 30		
	480×360		5, 10, 15, 30		
	240×180		5, 10, 15, 30		
Depth precision: ≤ 1% @ 1m, 1.1% @ 2m (81% ROI).					

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Product Specifications (continued from previous page):

Mode	Resolution	FoV	FPS	Format
IR	1024×768	H79° x V62°	5, 10	Y10
	512×384		5, 10, 15, 30	
	640×480		5, 10, 15, 30	
	320×240		5, 10, 15, 30	
	160×120		5, 10, 15, 30	
	480×360		5, 10, 15, 30	
	240×180		5, 10, 15, 30	
RGB	1920×1080	16:9 H84.3° x V53.6° 4:3 H67° x V53.6°	5, 10, 15, 30	MJPEG YUYV
	1280×720		5, 10, 15, 30	
	640×360		5, 10, 15, 30	
	320×180		5, 10, 15, 30	
	1440×1080		5, 10, 15, 30	
	1280×960		5, 10, 15, 30	
	640×480		5, 10, 15, 30	
	320×240		5, 10, 15, 30	
	1920×1080		5	YUYV
	1280×720		5, 10,	
	640×360		5, 10, 15, 20, 30	
	320×180		5, 10, 15, 20, 30	
	1440×1080		5	
	1280×960		5	
	640×480		5, 10, 15, 20, 30	
	320×240		5, 10, 15, 20, 30	
Depth precision: ≤ 1% @ 1m, 1.1% @ 2m (81% ROI).				

Parameter	Specifications
IMU	N/A
Mirror Mode	Supported, non-mirror by default
Processing	Internal processing using Orbbec MX6000 ASIC
Data + Power Connection	USB 2.0 Type-C Data + Power
Power Consumption	Average <2.3W, (Peak 5W)
Operating Environment	10° – 40°, 5% RH – 95 % RH (non-condensing), Indoor/Semi-Outdoor
Anti-flicker	50Hz & 60Hz
Supported Functions	D2C
Dimensions	89.82 × 25.10 × 25.10 mm
Weight	Gemini E: 88.3g
Certifications	Class 1/CE/FCC/RoHS 2.0/KC
Installation	Bottom: M3 Rear: 2 x M3

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3. Product Information

3.1 Product Images

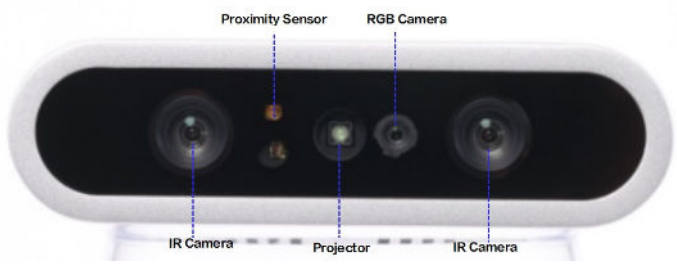


Product Picture



Rear View

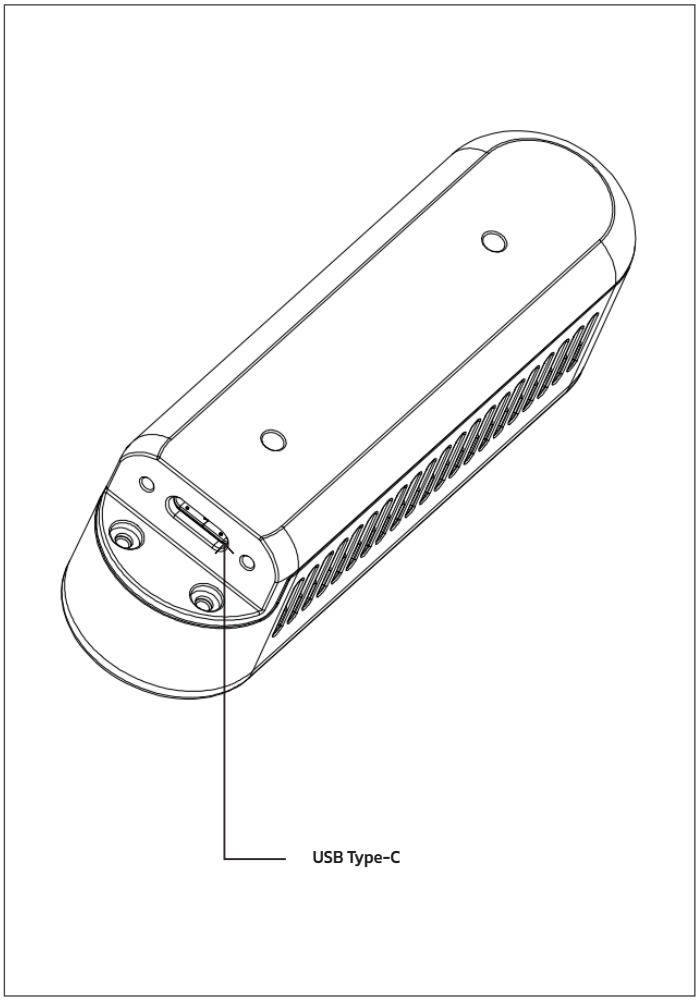
3.2 Product Components



Gemini E Components

3.3 Product Interfaces

The hardware interfaces of Gemini E camera are shown in the figure below.



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4. Software Development Kit (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.

Included functions:

- 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/ for the latest SDK.

Case Temperature Limits

- Metal case: Lower than 41°C (environment temperature 25°C)

5. Camera Setup and Operation

Packing List

- Orbbec Gemini E Camera

Initialization and Operation

- Connect Gemini E via a USB Type-C cable to the host PC.
- Validate that all cameras enumerate correctly in Windows device manager.
- Download Orbbec SDK from https://orbbec3d.com/developers/
- Use Orbbec Viewer to validate that images can be streamed from all sensors with the following settings:
  - Depth camera:640x360@30fps Y11
  - RGB Camera:640x360@30fps MJPG
- If for any reason that the camera is not responding or not being detected, please unplug all cables from the camera and replug to the host PC to reset the camera state.

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.

a. Installation Recommendations

1. 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.
2. Avoid the application of external forces to the camera chassis during the installation process.
3. Disassembling chassis and mounting brackets will void the warranty.

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Installation Guide (continued from previous page):

b. Heat Dissipation

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

c. Transmittance Requirements

The current light transmission of the Gemini E front cover glass lens is as follows:

1. RGB (420~650nm) transmittance rate ≥91%
2. IR, LDM (858 ±20nm) transmittance rate ≥92%
3. LDP (940nm±30) transmittance rate ≥92%

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

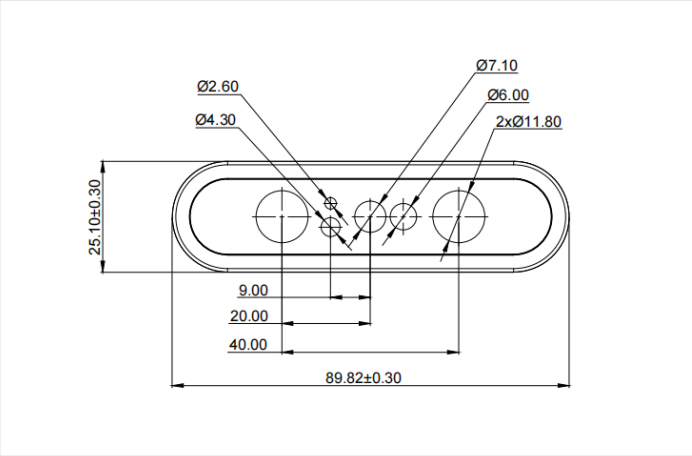
d. Cable Design Guide

If a longer cable is needed, please select a USB certified cable that supports both power and data (Maximum 1-1.5m length is recommended).

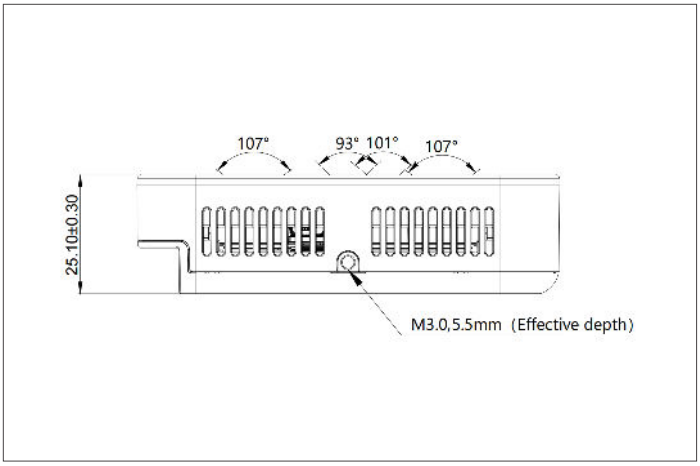
7. Safety and Handling

1. Follow the instructions to operate the camera. 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 as such modifications may cause permanent damage or inaccuracy.
4. The temperature of the camera may increase during long periods of continuous usage.
5. Do not touch the lens. Fingerprints on the lens may affect image 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 if the cable meets the power/data transfer requirements and reinsert the USB cable for reconnection.
8. This product uses a Class 1 laser. Looking at the laser for more than 20s is not recommended.

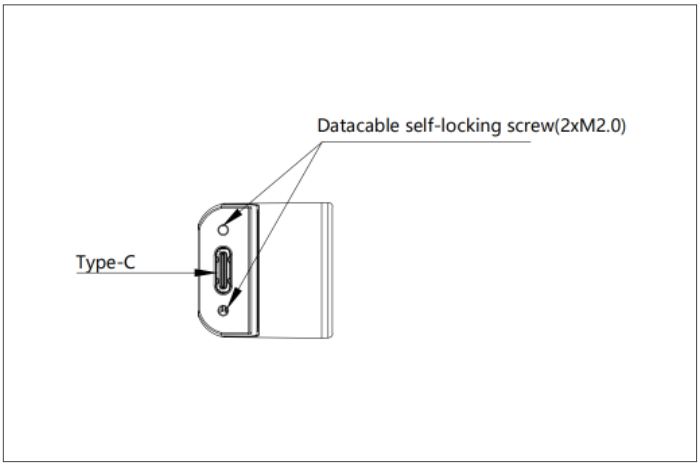
8. Product Drawings



Front View



Bottom View

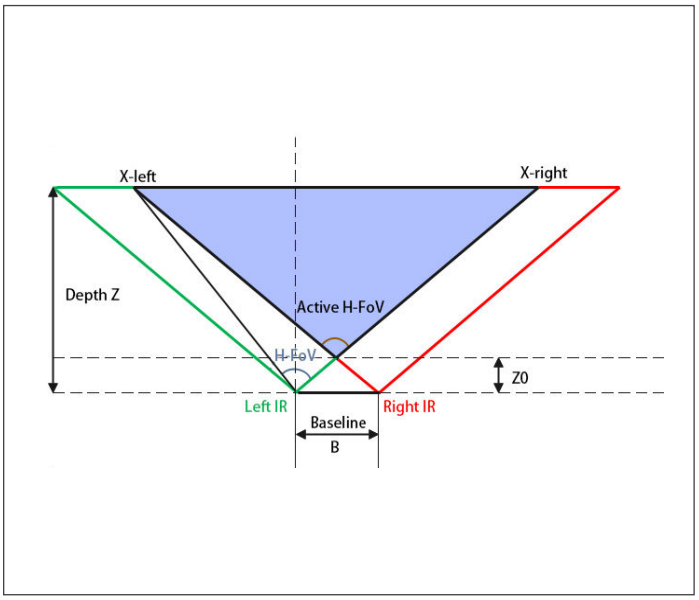


Side View

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9. Principles of Depth Field of View

The image below shows the depth camera field-of-view, or the angles that the sensors "see". This diagram shows the IR camera.



Depth Field of View (Depth FOV) at any distance (Z) can be calculated using the following equation:

Z0 = (B/2) / tan(ActiveH-FoV / 2)
H-FoV = arc tan(cx/fx - B/Z) + arc tan((width- 1 - cx)/fx)
Active H-FoV = arc tan(cx/fx) + arc tan((width- 1 - cx)/fx)

Definitions:

1. cx = X-direction image coordinates of the main point of the depth image
2. fx = Depth camera focal length
3. width= Depth image width
4. Active H-FoV = IR H-FoV

Note: cx, fx, and width parameters are obtained through the SDK. Depth Intrinsic for the relevant camera parameters, and each 3D camera parameters are not the same.

10. Glossary of Terms

Term	Definition
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	Mobile Industry Processor Interface (MIPI) is an open standard and specification formulated by the 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.

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