

LIPSFace™ HW120/HW125 Face Recognition 3D Camera

Technical Specification

LIPS® LIPSFace™ Series – Face Recognition 3D Camera



HW120
Module



HW125
With Enclosure

Oct 2022

Revision 1.0

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Revision History

Revision	Description	Date
1.0	Initial Public Release	Oct 2022

1. Overview

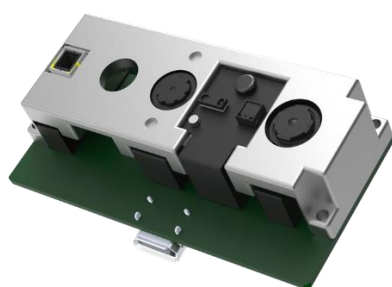
LIPSFace™ [HW120/HW125](#) is a 3D depth camera designed for 3D face recognition applications. The camera supports face anti-counterfeiting recognition to achieve local real-time accurate face recognition; with a depth accuracy of 0.3% @100cm, it effectively blocks mask attacks, making user control access and management more efficient and intelligent. Paired with an infrared active lighting, it is also suitable for environments with harsh light conditions.

LIPSFace™ HW120/HW125 enables you to build a facial authentication solution that prevents unauthorized access with a less than 0.001% Spoof Acceptance Rate, 99.00% True Acceptance Rate and a one in one million False Acceptance Rate.

With a fast and easy enrollment, only registered users are authenticated — and Face Recognition speed takes less than a second. On-device 3D facial recognition & anti-spoofing authentication could store up to 1000 IDs.

Key Features:

- 1) Structured-Light technology
- 2) On-device 3D facial recognition & anti-spoofing authentication
- 3) True Acceptance Rate – 99 %
- 4) False Acceptance Rate – 1:1 Million
- 5) Spoof Acceptance Rate – 0.001%
- 6) FR speed is less than a second
- 7) The depth accuracy is 0.3% @100cm
- 8) Allow indoor and outdoor operation (VCSEL @ 940nm)
- 9) Sunlight resistance 80K Lux @100cm
- 10) Tiny size (Case: 63.0mm x 30.2mm x 17.0mm)
- 11) Power Performance Optimized (1.7W)



HW120 (Module)



HW125 (with Enclosure)

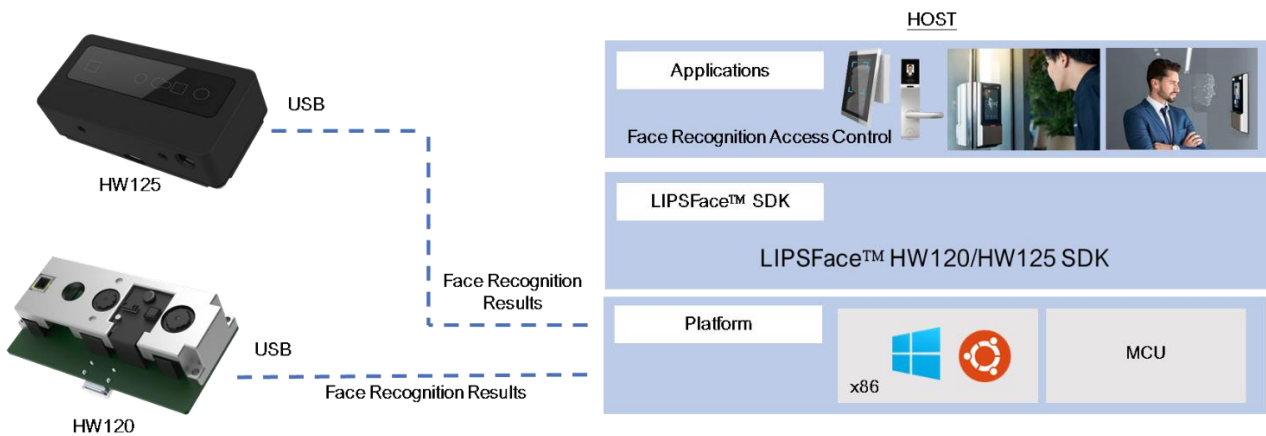
2. Specifications

Facial Recognition	
Technology	Structured-Light
Baseline (TX to RX)	40.0mm
Operating range	0.4 ~ 1.2 m
Sunlight resistance	80K Lux @100cm
Number of users	1000 people
FR speed	~1sec
True Acceptance Rate	99% *1
False Acceptance Rate	1:1M*1
Spoof Acceptance Rate	< 0.001%
Security	SHA256
General	
Dimension (mm)	HW120 Module: 54.0mm x 25.0mm x 11.3mm HW125 with Enclosure: 63.0mm x 30.2mm x 17.0mm
Weight(g)	HW125 with Enclosure: Approximately 85 g (module: 16.4 g)
Ambient Temperature (° C)	0 – 40 (Device); 0 - 60 (Module)
Storage Temperature (° C)	-20 - 60
Host Interface	USB 2.0, Micro USB
Power Supply	USB power-in, DC 5V/1A
Hardware Mount	1/4" camera screw compatible (1/4–20 UNC)
Software	
Supported OS	Windows 10, Linux Ubuntu 18.04/20.04 LTS Android (will support in the future) Jetson x64 (will support in the future)
Supported SDK	Open NI , Open CV
Supported Program Language	C++

3. Description and Application Architecture

The LIPSFace™ HW120/HW125 is a 3D Depth Camera which uses an USB 2.0 connection interface to transmit the captured face from the Near-Infrared sensor and the RGB image sensor to conduct face recognition. Based on the built-in algorithm of the camera, it would output the result as an “Pass” or “Not-Good” to the Host, for which it would enact to take further steps (example: open the door if the result is “Pass”).

The LIPSFace™ HW120/HW125 is a powerful camera which includes built-in face recognition algorithms avoiding the need for additional use of powerful MCU-based devices or high-cost systems for the Face Recognition task.



4. Hardware Details

4.1 General Characteristics



#	Key Component	Description
1	Face Recognition Camera	Receives the IR image
2	Micro USB port	Power input and data output to host
3	M3x4mm	Total 2 major mounting holes
4	Tripod hole	Extra for tripod to hold camera

4.2 Host Connectivity

The LIPSFace™ [HW120/HW125](#) requires a single USB cable to provide power to the camera from the host; whilst the USB cable delivers data between the camera and the host with a data rate up to 480Mbps.

4.2.1 Data and Power Interface (Micro USB pin connector)

Pin no.	Signal	Description
1	Vcc	In, +5V power supply
2	D-	In/Out, Data -
3	D+	In/Out, Data +

4	N.C.	No connection pin. It should be floating.
5	GND	In, Grounding

4.3 Thermal

4.3.1 HW120 (Module) Temperature Specification

Items	MIN	NOM	MAX	UNIT
Storage Temp.	-30	-	+70	°C
Ambient Operation Temperature	0	-	+60	°C

4.3.2 HW125 (with Enclosure) Temperature Specification

Items	MIN	NOM	MAX	UNIT
Storage Temp.	-30	-	+70	°C
Ambient Operation Temperature	0	-	+40	°C

4.3.3 Power Consumption and Current

Items	Values
Average Power Consumption	1.7W (typical)
Continuous current	0.34A (typical)
Peak current	1.68A

5. Optical System

5.1 Cameras

[HW120/HW125](#) utilizes 2(two) camera sensors to capture NIR/Depth images and RGB color images.

Table: Camera sensor table

Items	Camera 1 (sensor)	Camera 2 (sensor)
Position	Right	Center
Image	NIR/Depth	RGB
Lens Field-of-View	50.7° x 74.2° (+/- 2°)	H:45.89°@UXGA, 38.86°@720p, 45.89°@VGA V: 58.89°

5.2 Illuminators

HW120/HW125 optical system consists of a dot illuminator (VCSEL) for structured light and a flood projector for uniform NIR image.

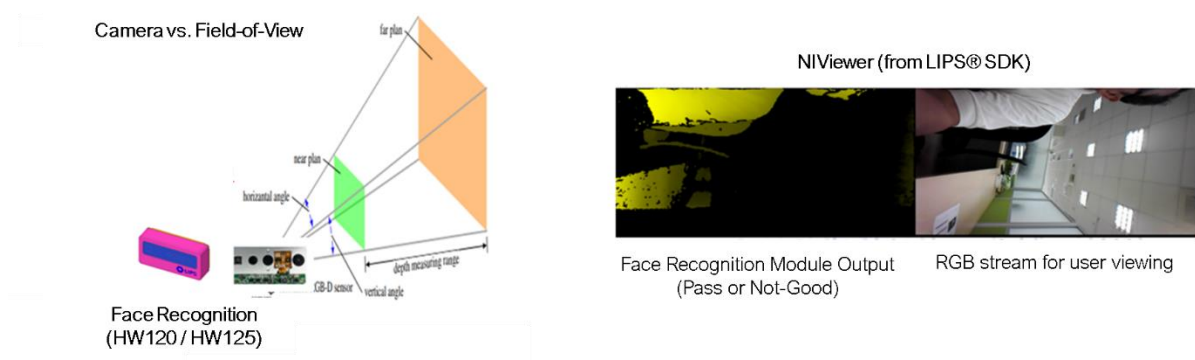
Table: Illuminator parameters

Items	Dot Projector	Flood Projector
Purpose	Structured Light 3D, total 30K dots	Enhance NIR image lightness
Wavelength	940nm	940nm

5.3 Image and Field-of-View to Orientation

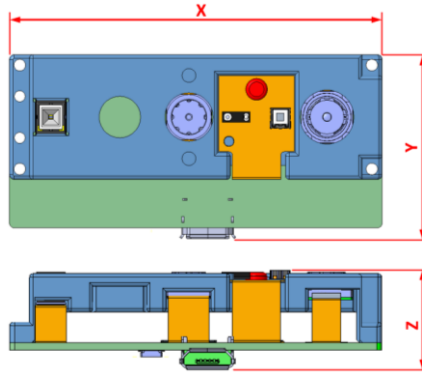
LIPSFace™ **HW120/HW125** will capture scene images based on the field-of-view specifications of its sensors.

Refer to figures below for the Camera vs. Field-of-View orientation and camera's image output.



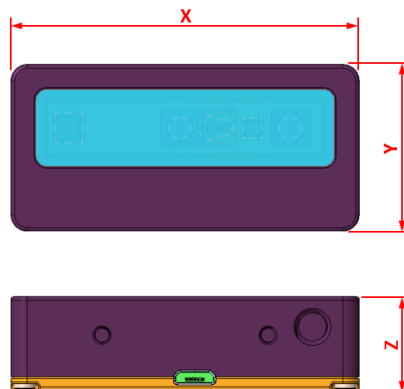
6. Mechanical

6.1 Mechanical Dimension of HW120



Dimension	MIN	NOM	MAX	TOLERANCE	UNIT
X	53.8	54	54.2	±0.2	mm
Y	26.3	26.6	26.9	±0.3	mm
Z	13.9	14.3	14.7	±0.4	mm

6.2 Mechanical Dimension of HW125 with Enclosure



Dimension	MIN	NOM	MAX	TOLERANCE	UNIT
X	57.7	63	63.3	±0.3	mm
Y	29.9	30.2	30.5	±0.3	mm
Z	16.7	17	17.3	±0.3	mm

6.3 Cover Glass

6.3.1 Transmissivity Requirement

To ensure either NIR or RGB light may pass through window without negative impact on the captured image quality and the light emitting, the transmissivity for Dot/flood projectors, NIR/RGB sensors need consideration

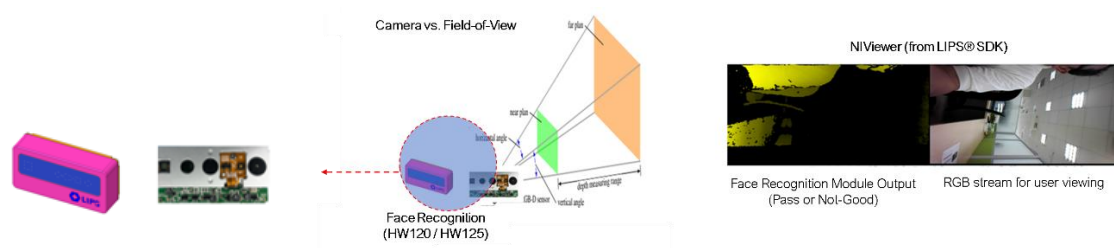
THROUGH HOLE	TRANSMISSIVITY
1, 2, 3 and 4	>98% @ 400 nm to 700 nm >98% @ 940±50 nm

When integrating the HW120 Module into devices such as pads, for considerations regarding the cover glass, refer to the document “**HW120 Module Design Guide**” for details. Note: Contact LIPS for inquiring the document.

6.4 Installation and Mounting Orientation of Camera

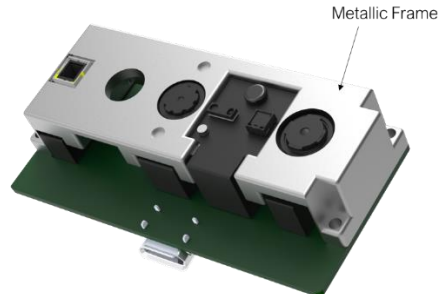
As the image output referred in section 5.3 (Image output and Field-of-View to orientation), it is recommended the mounting orientation be Horizontal.

Horizontal Orientation



6.5 Heat Sink

LIPSPace™ HW120 is designed with an optimized thermal solution using a metal frame as heatsink. All optical components and physical parts are attached to the metal frame with a robust physical placement.

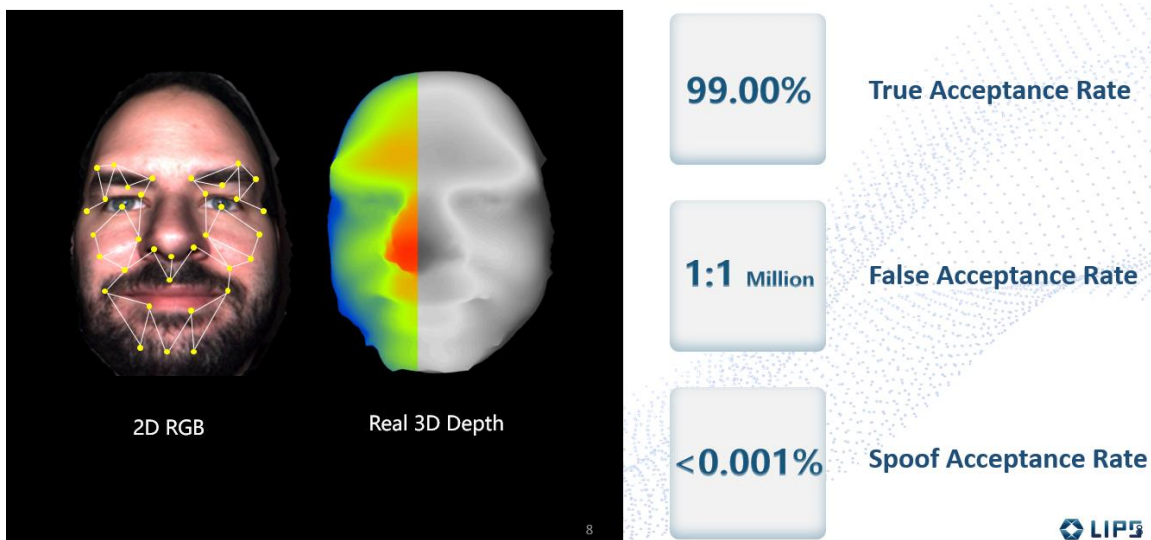


When integrating the HW120 Module into devices such as pads, for considerations regarding the cover glass, refer to the document “**HW120 Module Design Guide**” for details. Note: Contact LIPS for inquiring the document.

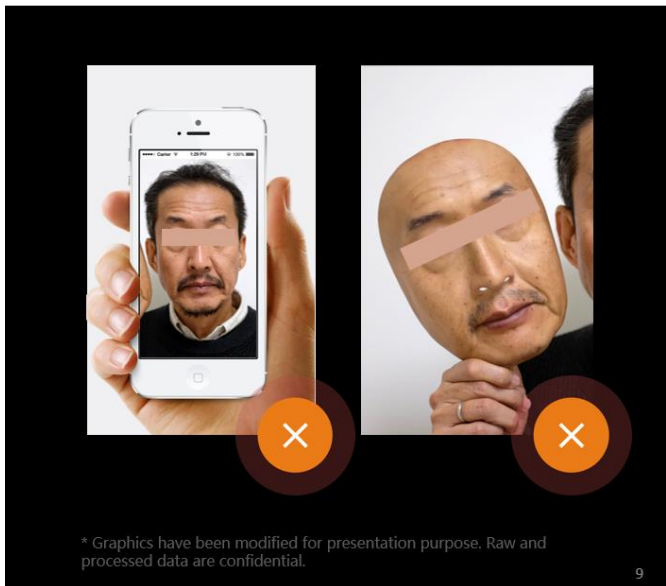
7. Face Recognition Performance and Application

Refer to the below section for LIPSPace™ [HW120/HW125](#) quality and performance for Facial Recognition applications.

7.1 On-Device 3D Facial Recognition



7.2 Anti-Spoofing authentication



Fast and effective* anti-spoofing protection against:

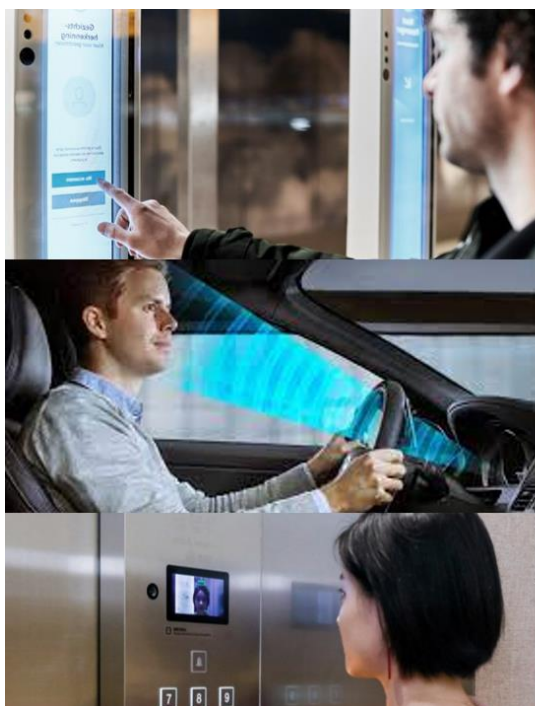
- Photos (still / moving / twisting)
- Videos
- Hard / Soft masks
- 3D color-printed faces

* Traditional 2D anti-spoofing processes are either time-consuming, with lower accuracy, or easy to be misled, due to the fact that the image source is 2-dimensional data.

* Technically, real 3D depth solved the liveness detection in a total different way than 2D processing, the accuracy is greatly enhanced by having 1 extra dimension of depth and processing time can also be reduced.



7.3 Application of HW120/HW125



Application Scenarios

Applicable scenarios:

- Access Control
- Authentication/Login
- Customer / VIP notification
- Check-in
- Blacklist alarm

Viable applications:

- Automobile
- ATM
- Restricted areas
- Vending machines
- Elevators
- Hotel
- Smart Lock

8. LIPSFace™ SDK, Middleware and SW Architecture

LIPSFace™ includes a comprehensive support for development including LIPS® SDK and worldwide industry Frameworks and Wrappers libraries implementation. Please refer to our homepage and related links for more information.

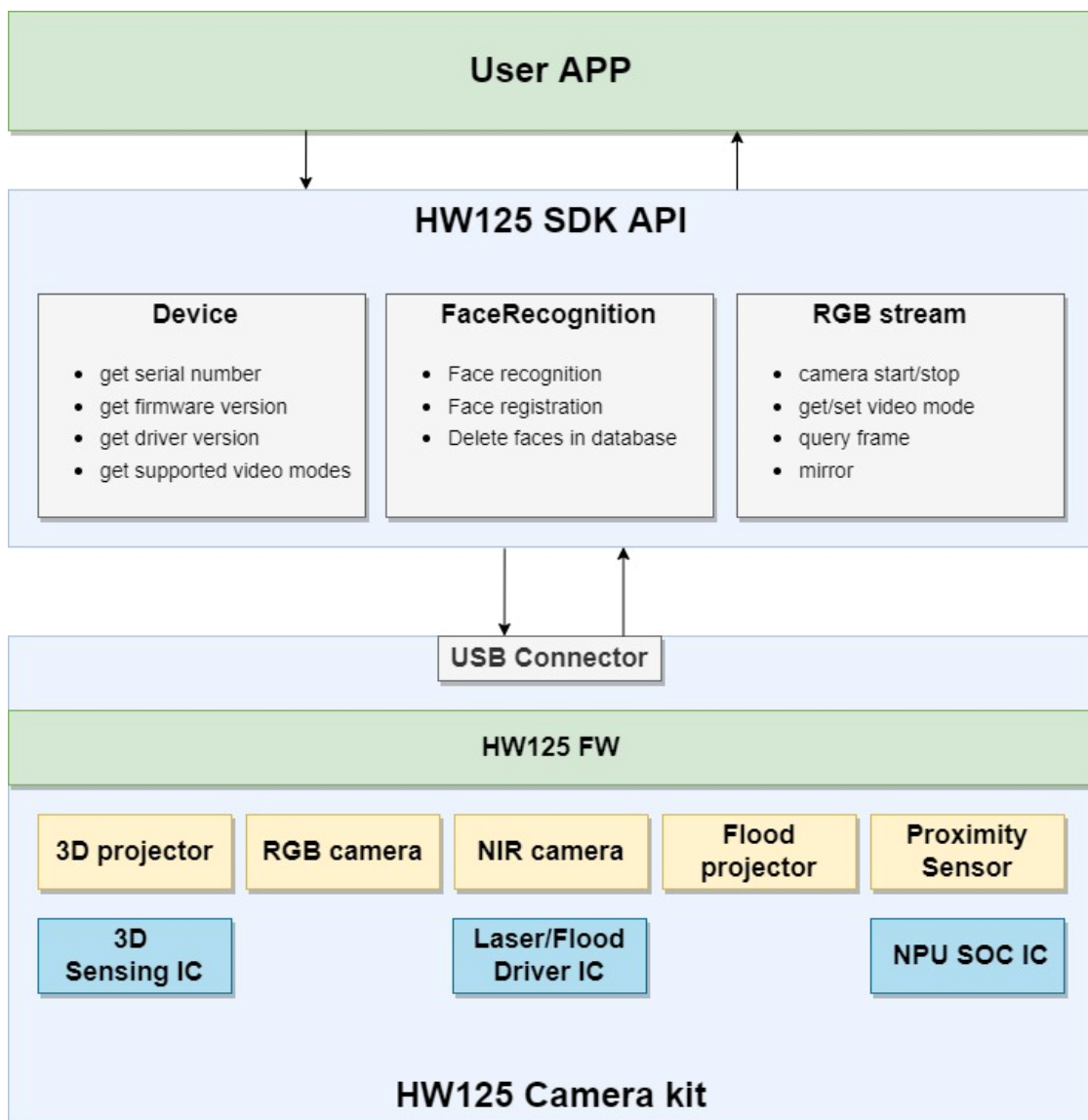
8.1 SDK, Middleware and Sample Codes

LIPS-Developer: <https://www.lips-hci.com/developer-documentation>

LIPS-GitHub: <https://github.com/lips-hci>

LIPS User manual: <https://www.lips-hci.com/lipssdk>

8.2 Software Architecture



9. Regulatory Compliance

LIPSFace™ [HW120/HW125](#) is classified as a Class 1 Laser Product under EN/IEC 60825-1.



"Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019"

The product is being certified with FCC, CE, KCC (Korea) and BSMI (Taiwan).

FCC Part 15:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.



European Directives:



Korean EMC Certification:

The product to be sent to Koera for final certification by KCC authorized lab.



Taiwan Comoditate Certification:





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