



Innovation for Innovators

Camera Module Product Line-up Feb.2024(Rev.1.0)

双峰エンタープライズ株式会社
Soho Enterprise Ltd.

Camera Product Line-up Table

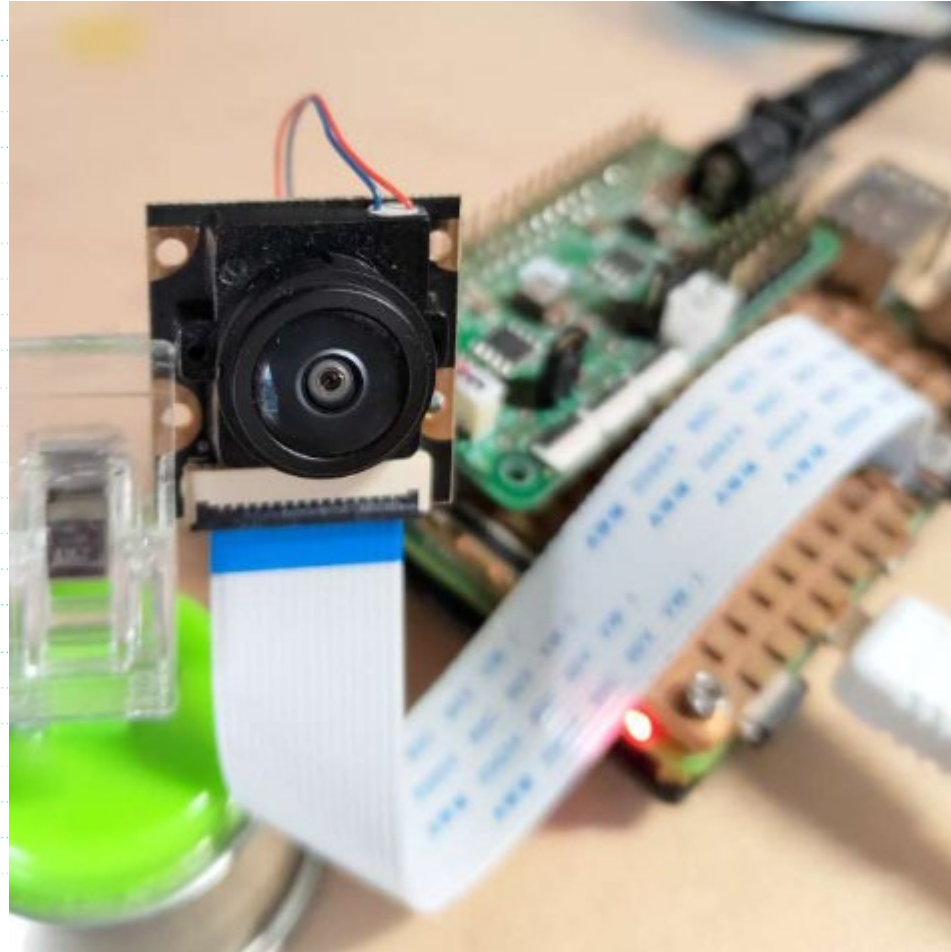
Product Number	Pix Size, Optical size /Resolution/Shutter	I/F	Board	Libcamera (Raspi)	Note
SE219 series (Sony IMX219)	1.12um, 1/4" /8Mpix/RS	MIPI	SE-SB02 SE- SB02R	Yes	FoV=76,88,120,150, FE160, FE187° , lens less module (FE=Fish-Eye)
SE258 series (Sony IMX258)	1.12um, 1/3" /13Mpx/RS	MIPI	SE-SB02 SE- SB02R	Yes	120° AF Lens less module
SE397GSFF (Sony IMX397)	3.45um, 1/6" /VGA/GS	MIPI	SE-SB02 SE- SB02R	Not yet	FoV(D)=88°
SE132GS series (Smartsens SC132GS)	2.7um, 1/4" 1080x1280/GS	MIPI	SE-SB02 SE- SB02R	Not yet	76, 88, 120, FE160° NoIR/940nmBPF
SEI012 (ISX012)	1.4um, 1/4" 5Mpix/RS	parallel	SPRESE NSE	-	76, 120° Embedded ISP
SE327MBD (Sony IMX327)	2.9um, 1/2.8" /2Mpix/RS	MIPI	OnePiece	Yes	M12 lens STARVIS
SE-SB2M- IMX462LQR/LLR (Sony IMX462)	2.9um, 1/2.8" /2Mpix/RS RGB/MONO	MIPI	OnePiece	Yes	M12 lens STARVIS RGB/MONO
SE-SB2M -IMX662AAQR/AAMR (Sony IMX662)	2.9um, 1/2.8" /2Mpix/RS RGB/MONO	MIPI	OnePiece	Yes	M12 lens STARVIS2
SE-SB2M-IMX675 (Sony IMX675)	2.0um, 1/2.8" /5Mpix/RS	MIPI	OnePiece	Yes	M12 lens STARVIS2
SE-SB8M-IMX585 (Sony IMX585)	2.9um, 1/1.2" /8Mpix/RS	MIPI	OnePiece	Yes	C/CS lens STARVIS2

SE219S01 160° Wide Angle Camera board(w/ IRCF insertion control)

Operated by libcamera on Raspberrypi. Dedicated tuning file available.



Retailer	<i>Soho Enterprise Ltd.</i>
Product Type	<i>MIPI Camera Board</i>
Sensor	<i>Sony IMX219</i>
Resolution [MP]	<i>8</i>
Max. Frame Rate [fps]	<i>22.5 (Full Resolution) 60 (2x2 binning mode)</i>
Chromatics	<i>Color</i>
Shutter Type	<i>Rolling Shutter</i>
Sensor Technology	<i>CMOS</i>
Horizontal Resolution [pix]	<i>3840</i>
Vertical Resolution [pix]	<i>2464</i>
Data Interface	<i>MIPI CSI-2</i>
Data Lanes [#]	<i>2</i>
Pixel Depth(s) [bit]	<i>10</i>
Pixel Size x [um]	<i>1.12</i>
Pixel Size y [um]	<i>1.12</i>
Interface Connector	<i>1.0mm pitch 15pin</i>
Optical Size [inch]	<i>1/4 inch</i>
Min. Operating Temp. [° C]	<i>-20</i>
Max. Operating Temp. [° C]	<i>60</i>
Min. Storage Temp. [° C]	<i>-30</i>
Max. Storage Temp. [° C]	<i>80</i>
Lens FoV(D)	<i>160 degree</i>
IRCF Insertion/extraction	<i>Yes</i>



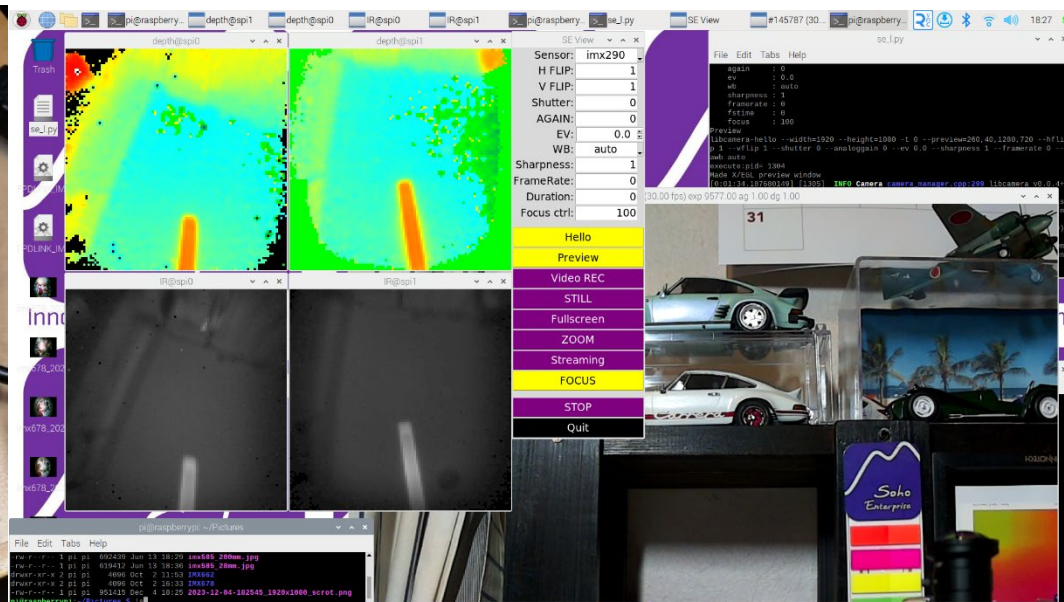
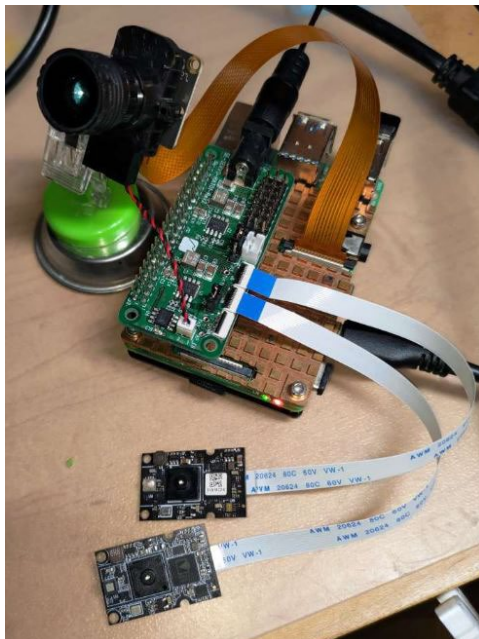
SE-SERVO-HAT01 for Autonomous Movement Control

OPNOUS Dragonfly ToF camera module IF: SPI x 2, UART x 1

IRCF insertion control

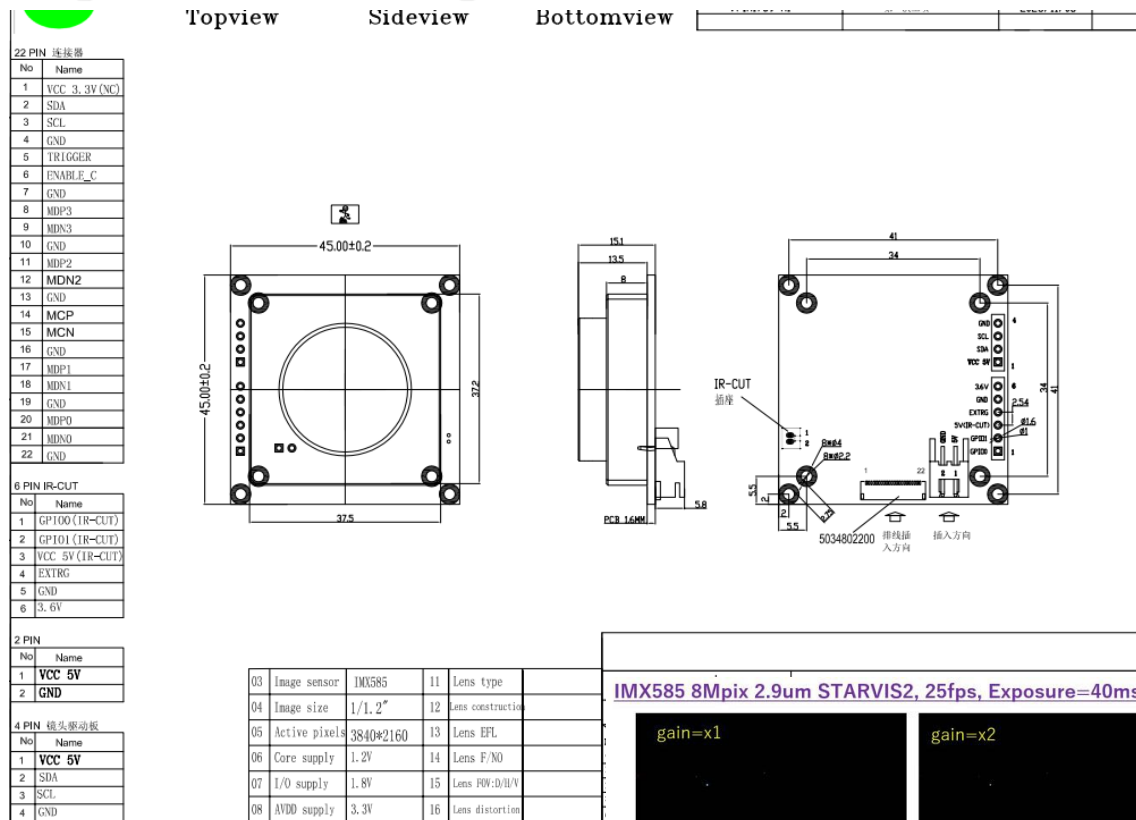
SERVO用IF x 8(PWM from GPIO)

Independent power supply to Raspi and SERVO Motor from DC12V



2023.8 New Release

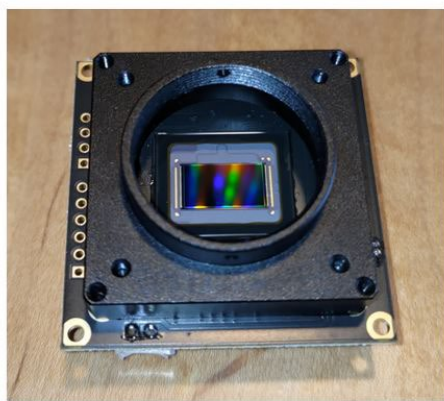
High Sensitivity Camera w/ Sony IMX585 (STARVIS2)



IMX585 8Mpix 2.9um STARVIS2, 25fps, Exposure=40msec



Captured and developed by libcamera on RP14



Lens Option

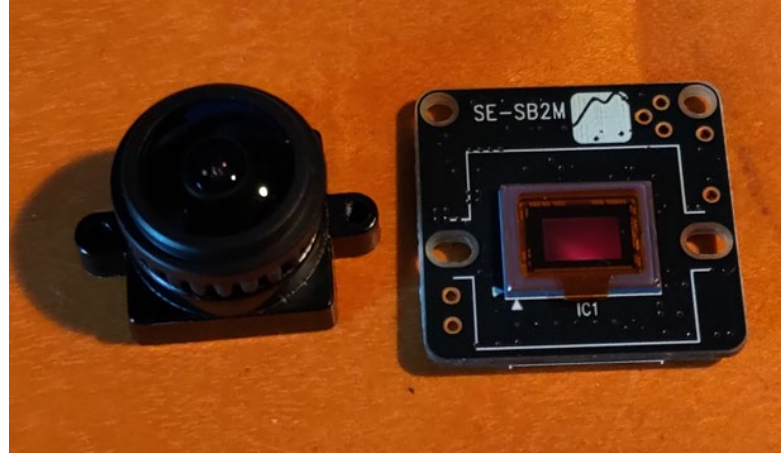


NO.	项目 (Items)	具体规格 (Specification)			
1	F No.	1.0±10%			
2	焦距(Focal-Length)	6.93 ±5%			
3	光学后焦 (Optical Back Focal Length)	5.10±0.2 (in air)			
4	机械后焦 (Mechanical Back Focal Length)	4.13±0.2 (in air)			
5	镜头总长(TTL)	51.8±0.2 (in air)			
6	像面大小 (Image circle)	Φ13.2 (MAX)			
7	镜片构成 (Lens structure)	5G4P			
8	接口 (Mount)	M22*P0.5			
9	镜头与底座螺纹配合扭力 (Clamp Force)	待定(Undetermined)			
10	视场角 (FOV)	sensor型号	H(水平)	V(垂直)	D(对角)
	1/1.2"	11.136*6.264*12.777	102.1°	52.9°	125.3°
11	光学畸变 (Optical Distortion)	-52.0%			
12	TV畸变 (TV Distortion)	-15.9%			
13	相对亮度 (Relative Illumination)	44%			
14	最大主光线夹角 (CRA)	10.0°			
15	近摄距 (M.O.D)	5m			
16	解像标准 (Resolution)	分辨率 (Resolution):		3840×2160 (8MP)	
17	建议芯片封装倾斜规格 (tilt tolerance of sensor packaging)	≤3°			
18	重量 (Weight)	/			
19	操作方法 (Operation)	聚焦 (Focus)		手动 (Manual)	
		光圈 (Iris)		固定 (Fixed)	
20	环保及安全 (HSF&Safety)	RoHS			

NO.	项目 (Items)	具体规格 (Specification)			
1	F No.	1.0±10%			
2	焦距(Focal-Length)	11.7±5%			
3	光学后焦 (Optical Back Focal Length)	5.18±0.1 (in air)			
4	机械后焦 (Mechanical Back Focal Length)	4.01±0.2 (in air)			
5	镜头总长(TTL)	51.8±0.2 (in air)			
6	像面大小 (Image circle)	Φ13.2 (MAX)			
7	镜片构成 (Lens structure)	5G4P			
8	接口 (Mount)	M22*P0.5			
9	镜头与底座螺纹配合扭力 (Clamp Force)	550-1300gf.cm			
10	视场角(FOV)	sensor(型号)	H(水平)	V(垂直)	D(对角)
		1/1.2" (11.136*6.624*12.777)	54.7°	30.7°	63°
11	光学畸变 (Optical Distortion)	1/1.2" (16: 9)		-10.6%	
12	TV畸变 (TV Distortion)	1/1.2" (16: 9)		-4.0%	
13	相对亮度 (Relative Illumination)	1/1.2" (16: 9)		45.0%	
14	最大主光线夹角 (CRA)	1/1.2" (16: 9)		14°	
15	近摄距 (M.O.D)	4.0m			
16	解像标准 (Resolution)	分辨率 (Resolution): 3840*2160 (8MP)			
17	建议芯片封装倾斜规格 (tilt tolerance of sensor packaging)	≤3'			
18	重量 (Weight)	/			
19	操作方法 (Operation)	聚焦 (Focus)	手动 (Manual)		
		光圈 (Iris)	固定 (Fixed)		
20	环保及安全 (HSF&Safety)	RoHS			

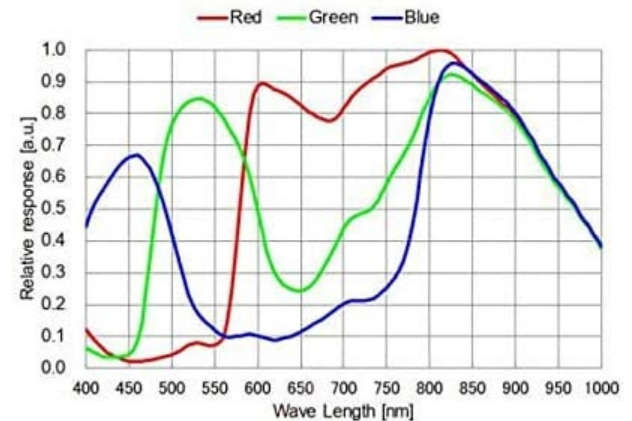
NO	项目 (Items)		具体规格 (Specification)		
1	F No.		1.0±10%		
2	焦距(Focal-Length)		7.68 ±5%		
3	光学后焦 (Optical Back Focal Length)		6.54±0.2 (in air)		
4	机械后焦 (Mechanical Back Focal Length)		4.43±0.2 (in air)		
5	镜头总长(TTL)		51.8±0.2 (in air)		
6	像面大小 (Image circle)		Φ13.1 (MAX)		
7	镜片构成 (Lens structure)		5G4P		
8	接口 (Mount)		M22*P0.5		
9	镜头与底座螺纹配合扭力 (Clamp Force)		550-1300gf. cm		
10	视场角 (FOV)	sensor型号	H(水平)	V(垂直)	D(对角)
	1/1.2"	11.136*6.264*12.777	88.0°	47.5°	103.5°
11	光学畸变 (Optical Distortion)		-34%		
12	TV畸变 (TV Distortion)		-11.20%		
13	相对亮度 (Relative Illumination)		40.30%		
14	最大主光线夹角 (CRA)		12.1°		
15	近摄距 (M.O.D)		4m		
16	解像标准 (Resolution)		分辨率 (Resolution): 3840*2160 (8MP)		
17	建议芯片封装倾斜规格 (tilt tolerance of sensor packaging)		/		
18	重量 (Weight)		/		
19	操作方法 (Operation)		聚焦 (Focus)	手动 (Manual)	
			光阑 (Iris)	固定 (Fixed)	
20	环保 & 安全 (HSF&Safety)		RoHS		

High Sensitivity Camera w/ Sony IMX462LQR/LLR (STARVIS) Compatible to IMX290 (officially supported by libcamera)



Better sensitivity than IMX290

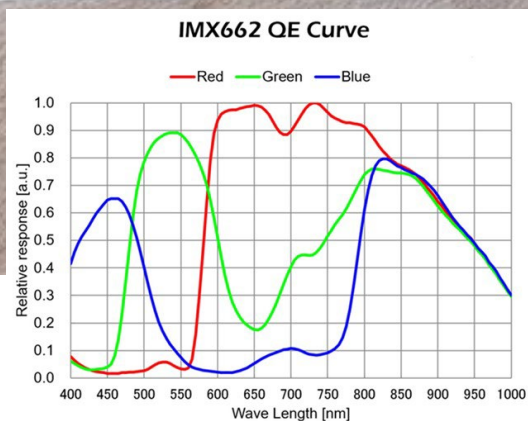
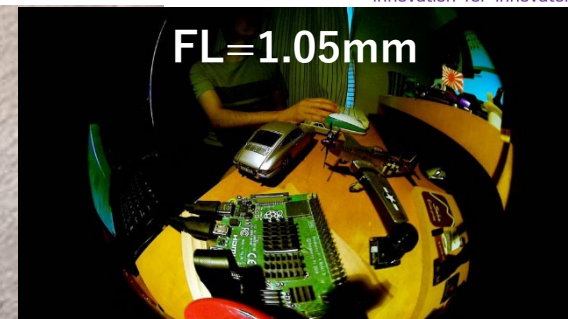
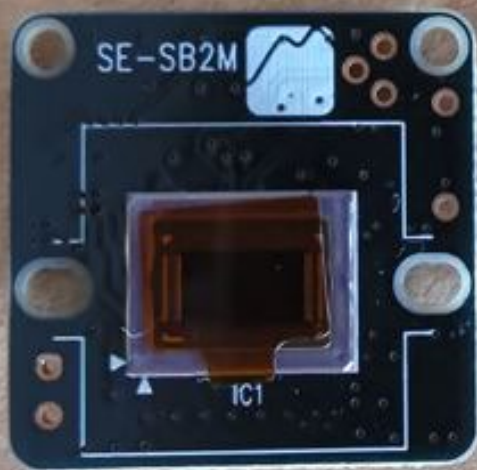
IMX462 QE Curve



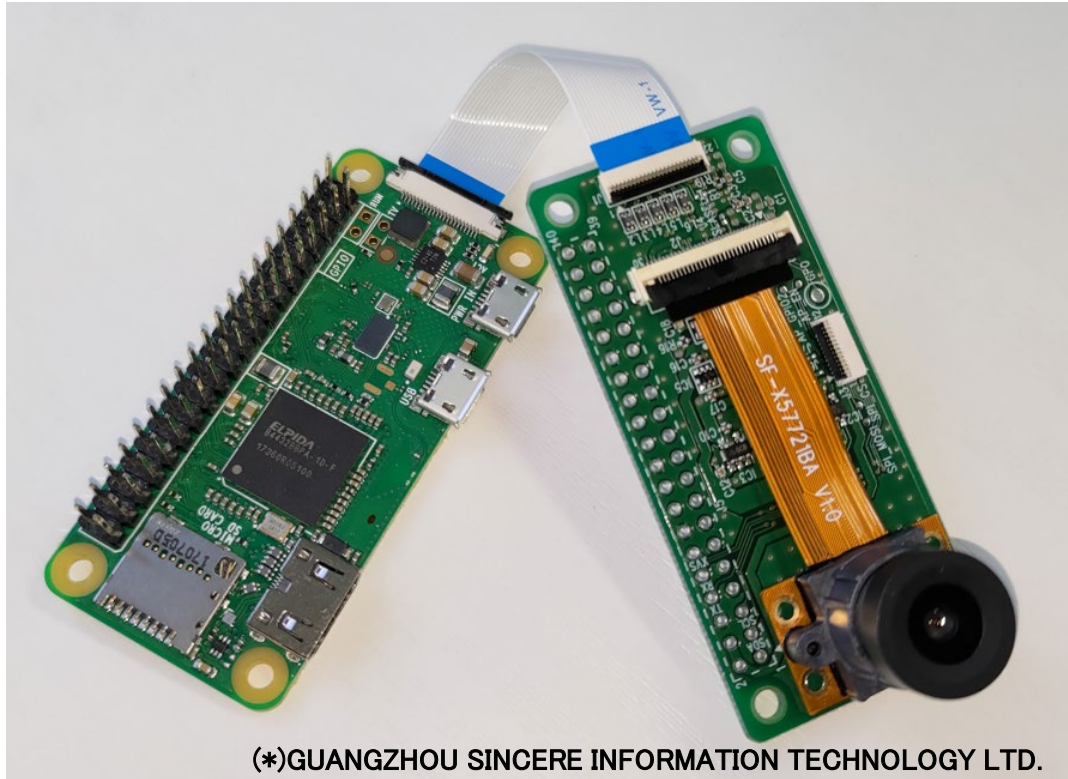
(Excludes lens characteristics and light source characteristics.)

High Sensitivity Camera w/ Sony IMX662AAQR/AAMR (STARVIS2)

SE-SB2M-IMX662



SE-SB03 board for 12Mpix IMX477/577 camera module



(*)GUANGZHOU SINCERE INFORMATION TECHNOLOGY LTD.

Connection board for
SF-X47721BA/SF-X57721BA
camera module(*)

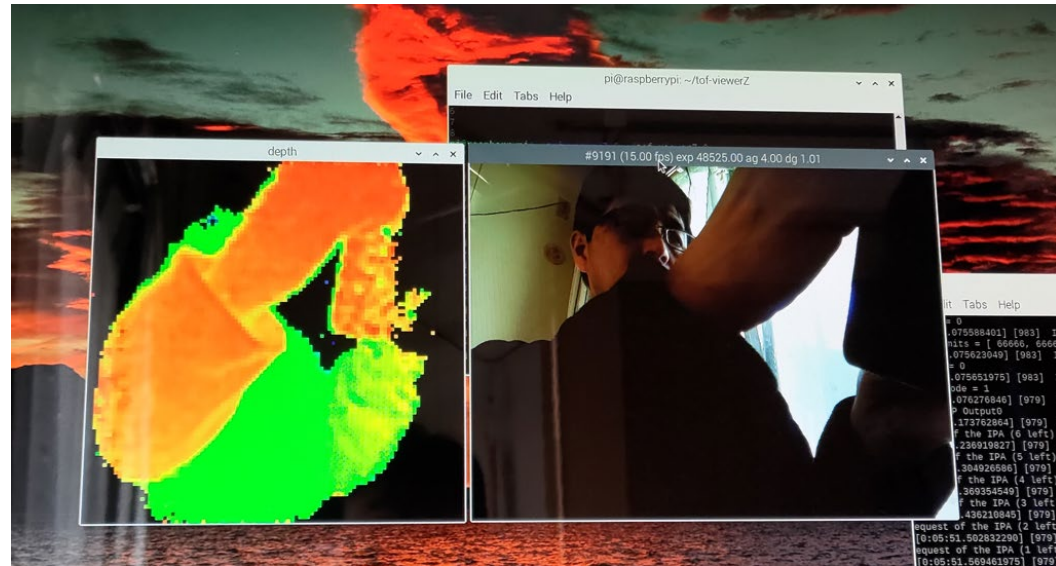
Expecting the HQ-camera
equivalent performance
With small form factor.



Dual camera on CM4 to realize
Stereo camera and Spherical camera

RGB-D evaluation Kit “SE-RGBD-EVK”

OPNOUS ToF system=OPNS3031A + SE camera board



OPNOUS社製品情報

<http://www.opnous.com/jp>

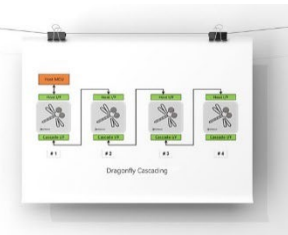
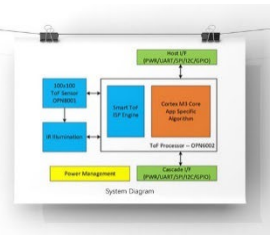
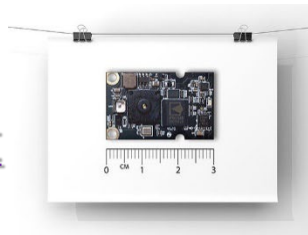
<http://www.opnous.com/jp/product/index/id/142.html>

RGBカメラは弊社SEカメラボードのラインアップから選択可能です。

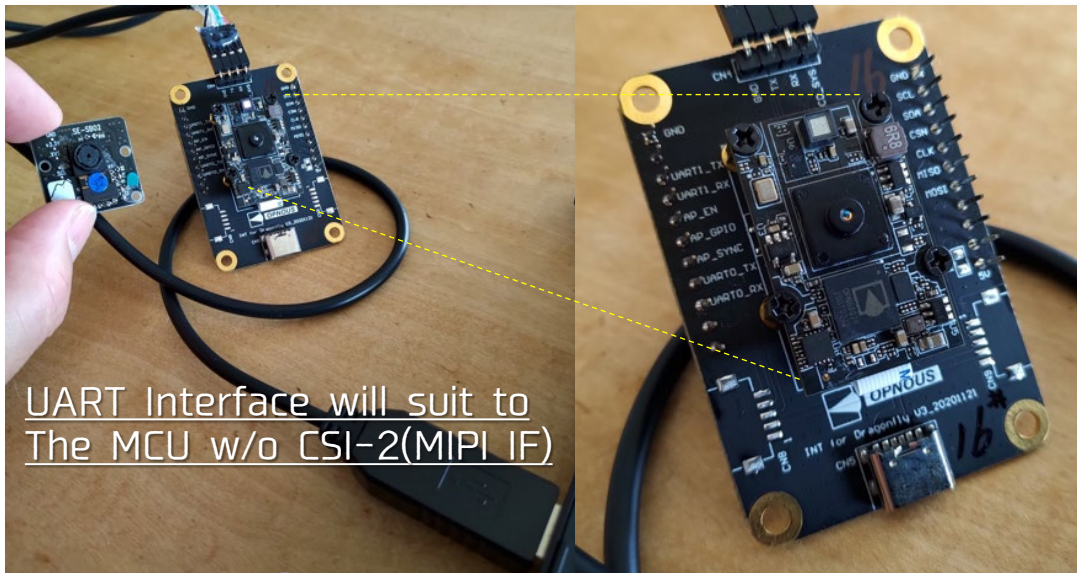
Ex. SE219FFW, SE219FE160, SE327MBD, ...

2021.5 New Release ③

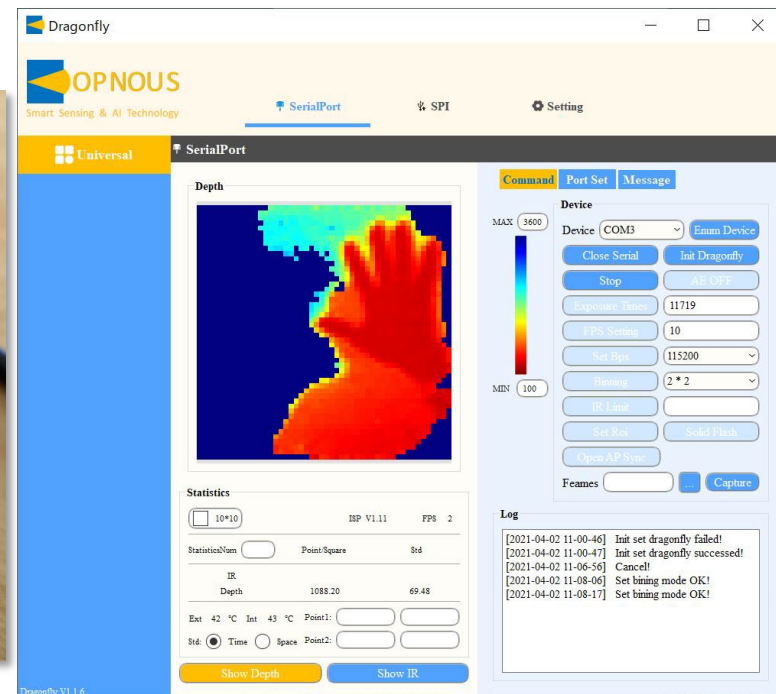
OPNOUS Dragonfly Demo Kit Stand alone depth solution



IR wave length (nm)	850 or 940
ToF resolution	Max 100 x 100
FoV (degree, H x V)	70 x 70
Accuracy	2%, typical
Frame rate (FPS)	up to 60
Power supply (V)	5
Communication Interface	UART/I2C/SPI/GPIO
Size (mm^3)	30 x 19 x 3.98

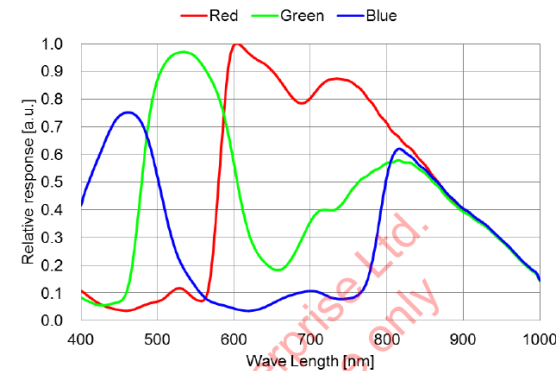
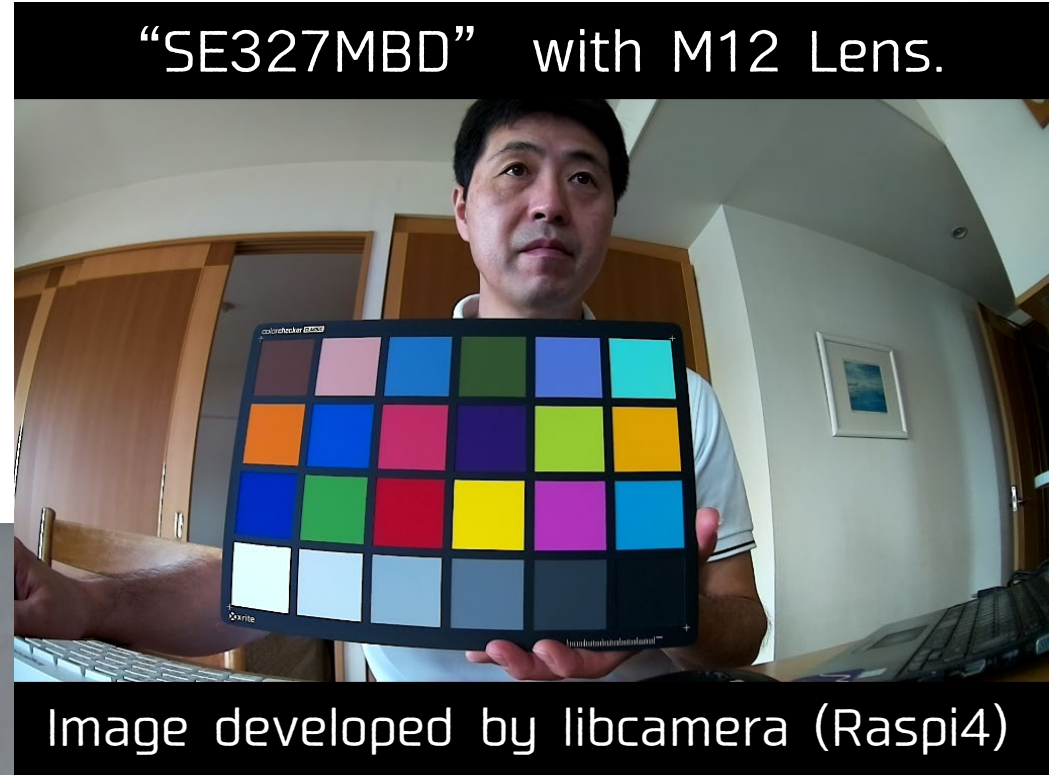
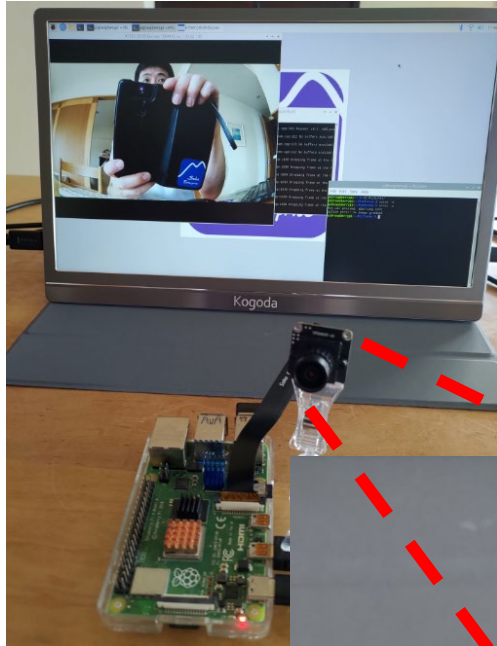


UART Interface will suit to
The MCU w/o CSI-2(MIPI IF)



2021.6 New Release ④

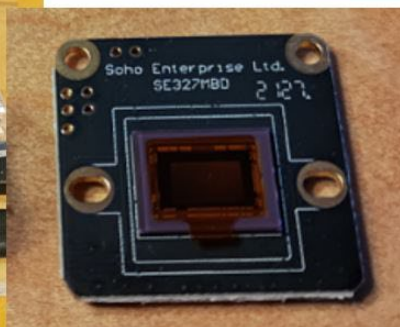
Full HD High Sensitivity Camera w/ Sony IMX327



Now ready for Sample delivery!



Driven on RaspberryPi
w/ libcamera-apps.



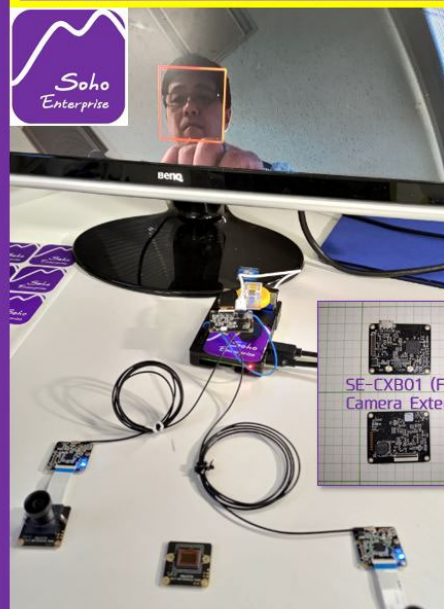
- 1920x1080 Full HD with 30fps on Raspi.
- Excellent Image Quality by 2.9um $\square$ pixel
- Various Lens can be applied



Image developed by libcamera



Full HD 30fps, FoV(D)=140°

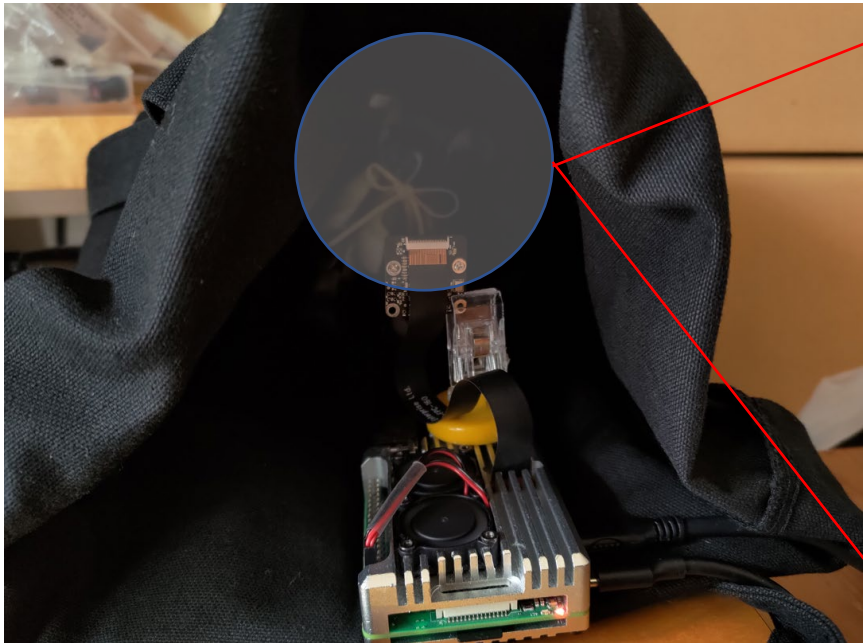


SE-CXB01 (FPD Link III)
Camera Extension Board

SE327MBD High Conversion Gain Mode

Captured by in-house RAW capture App.

(※Short exposure time, No gain applied to see the difference.)



2021.6 New Release ①

Tiny 4K camera on RaspberryPi

“SE258AF120” Lens Module of FoV(D)=120° with VCM Focus Driver

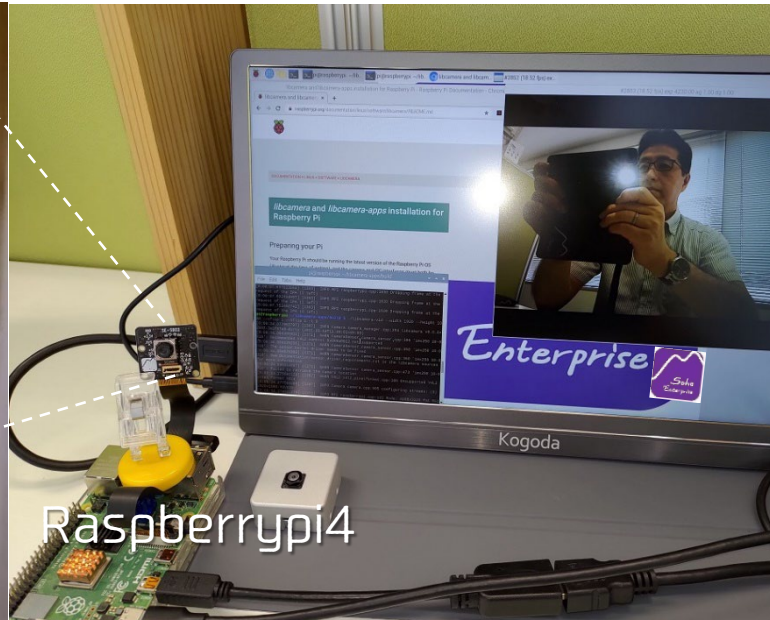
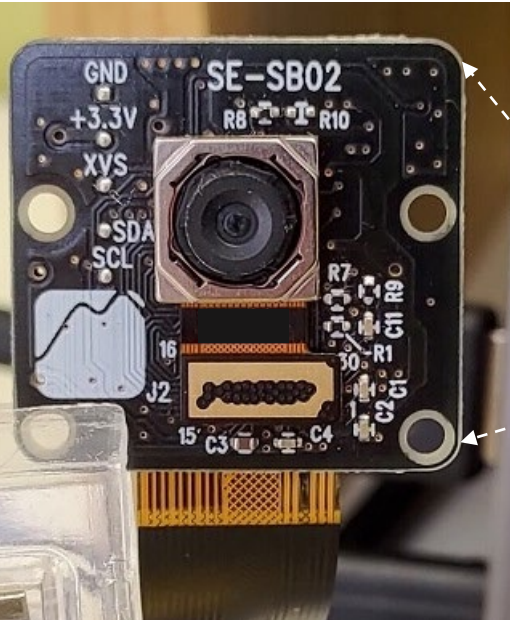
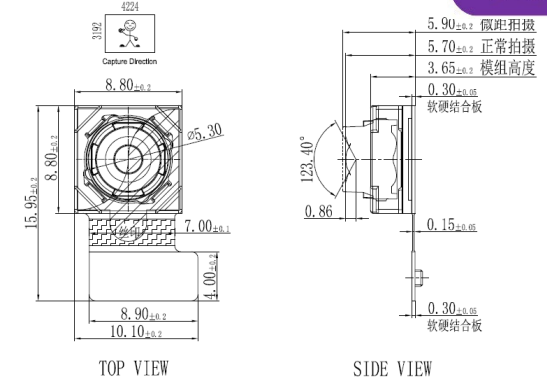
IMX258 is the 13Mpix 1.12um pixel Sensor from Sony.
We have made the imx258.c camera driver, libcamera
related files, and now we can see the image processed
by ISP.

We will implement the focus driver command soon.

Many lens option including SE258PKG will be launched
soon.

SE258AF120-00-CB02

Almost the same size
to IMX219 module

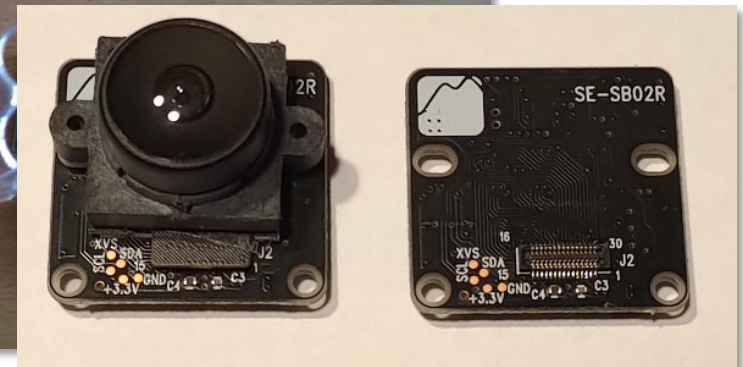
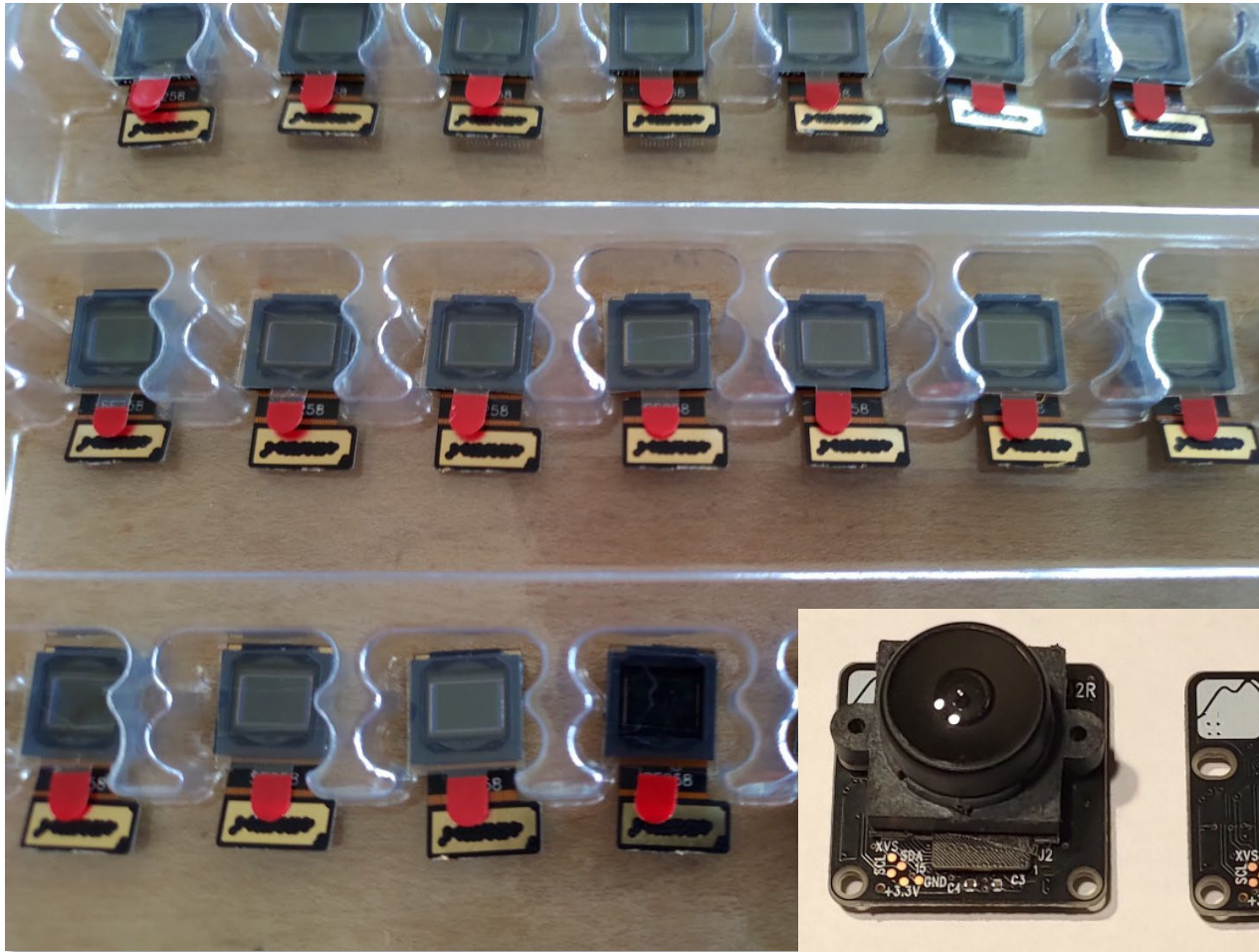


2021.6 New Release ②

Tiny 4K camera on RaspberryPi

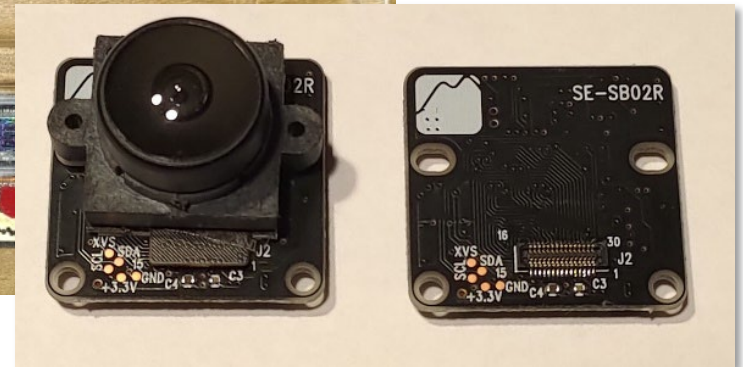


“SE258PKG-01” Lens-less module w/ cover glass



Many of M12(or other size) lens option can be attached by SE-SB02R

“SE132GSPKG-01” Lens-less module w/ cover glass



Many of M12(or other size) lens option can be attached by SE-SB02R

OPNOUS ToF Solution with high-speed ISP ASIC on Raspi4 Ubuntu20.04



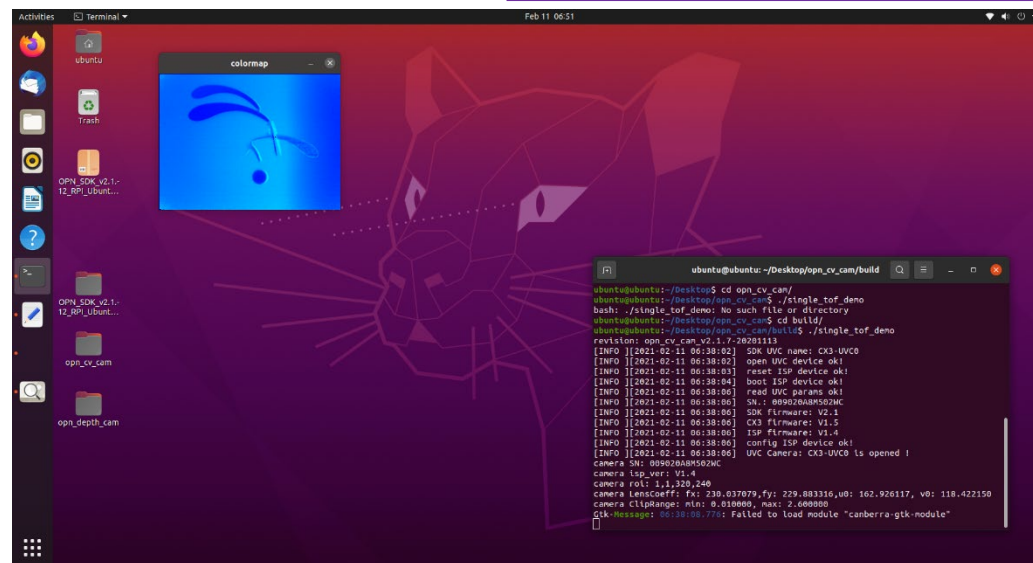
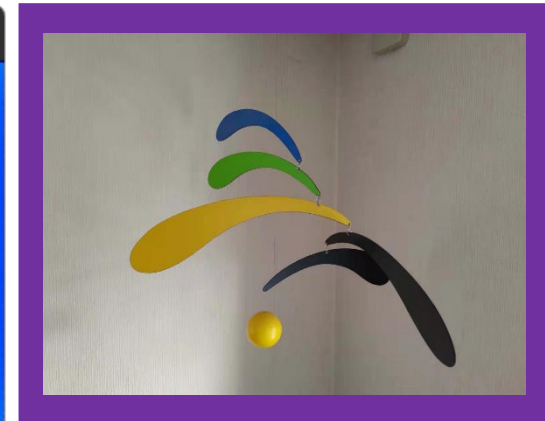
Dolphin ToF Platform is working on RaspberryPi4 (OS: Ubuntu20.04)
On board ISP realizes “easy to launch the ToF solution” on the most popular SBC.

MIPI camera version is also available.

USB connection

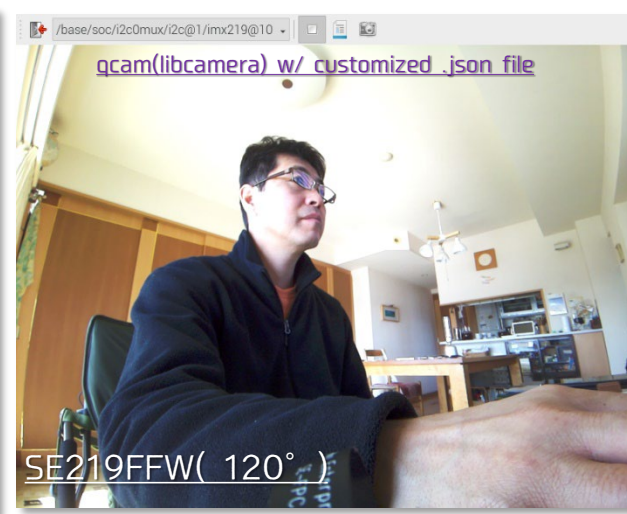
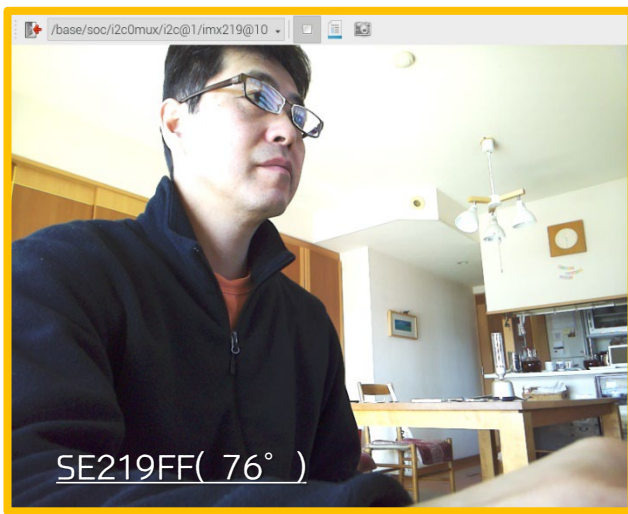
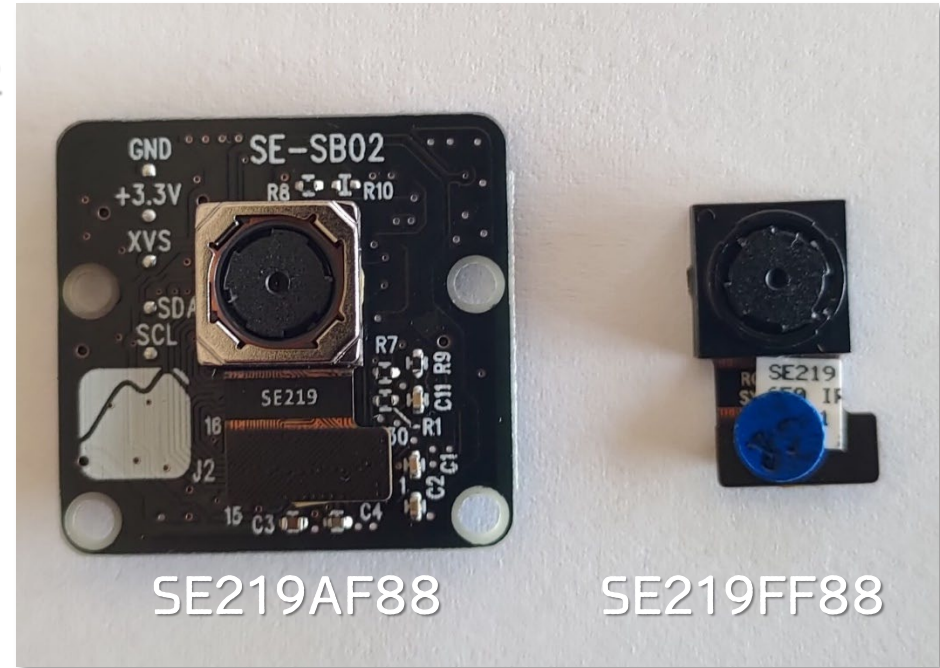
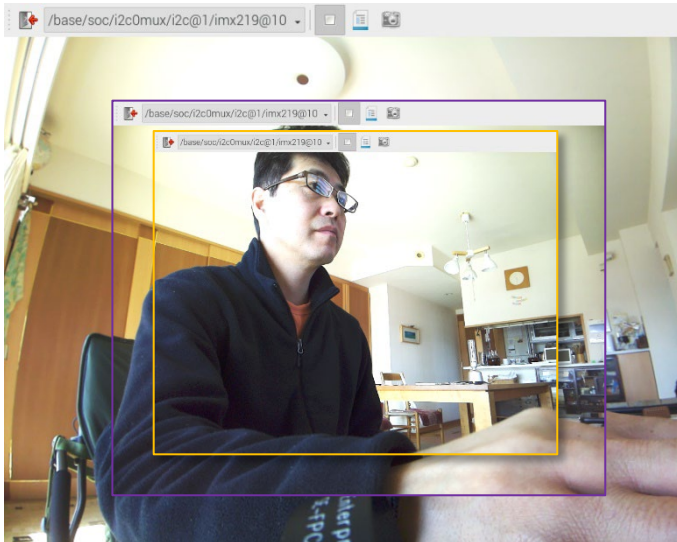
Raspi4

OPNOUS Dolphin ToF Platform

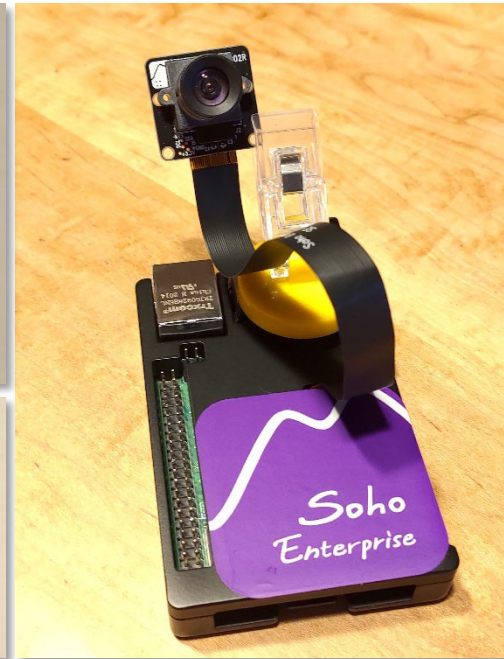


2021.2 New Release ①

SE219FF88 & SE219AF88 FoV(D)=88degree wide angle module

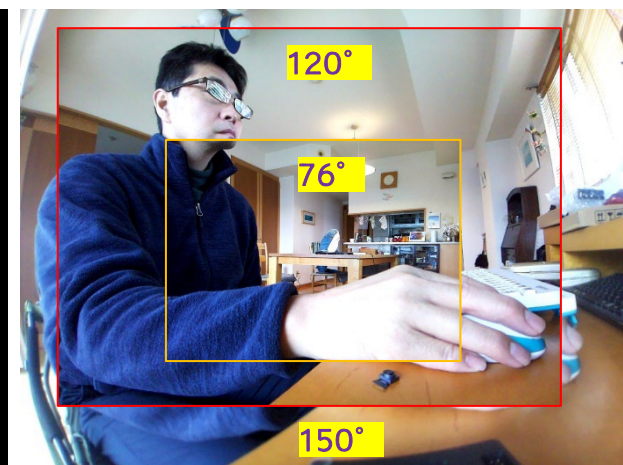
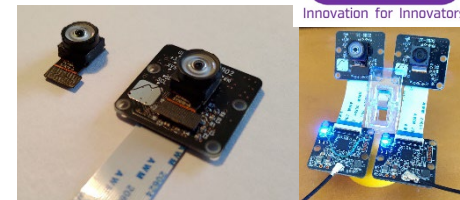


SE219PKG-00/01
and SE-SB02R M12 lens holder attachable camera board



SBC向け小型レンズモジュール：SE219シリーズ 画角比較

新たに対角150°の広角モジュール「SE219FF150-00」が
ラインアップに加まりました。



SBC向け小型レンズモジュール：SE219シリーズ ステレオ3Dカメラ応用例

76°



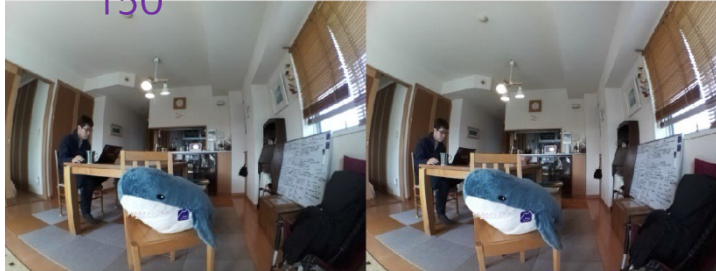
Base Line 65mm



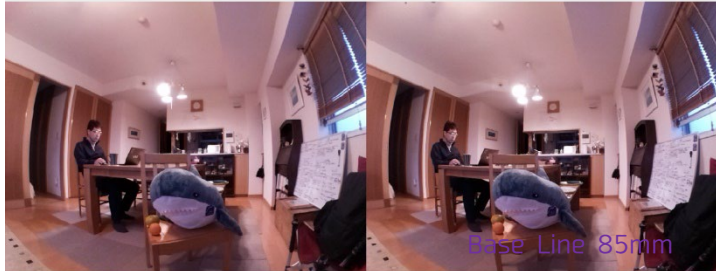
Base Line 85mm

fx:1777 vx:565 u:0.145 G:1.118 R:1.192

150°



Base Line 65mm



Base Line 85mm

fx:967 vx:161 u:0.182 G:1.149 R:1.151

160°



Base Line 65mm



Base Line 85mm

fx:1088 vx:620 u:0.155 G:1.114 R:1.177

187°



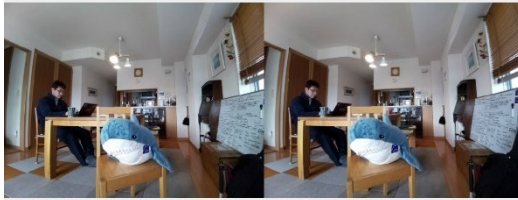
Base Line 65mm



Base Line 85mm

fx:947 vx:576 u:0.181 G:1.110

120°



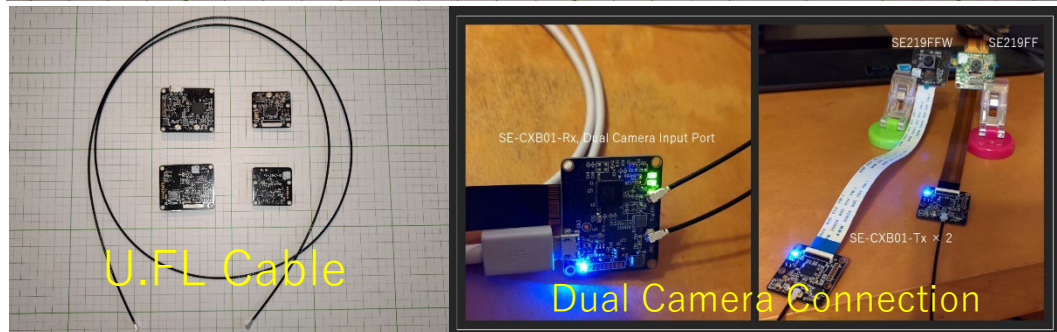
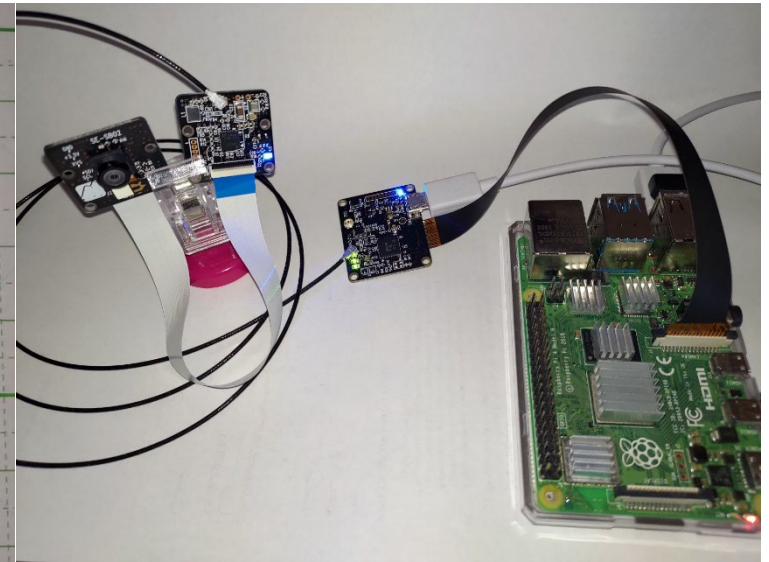
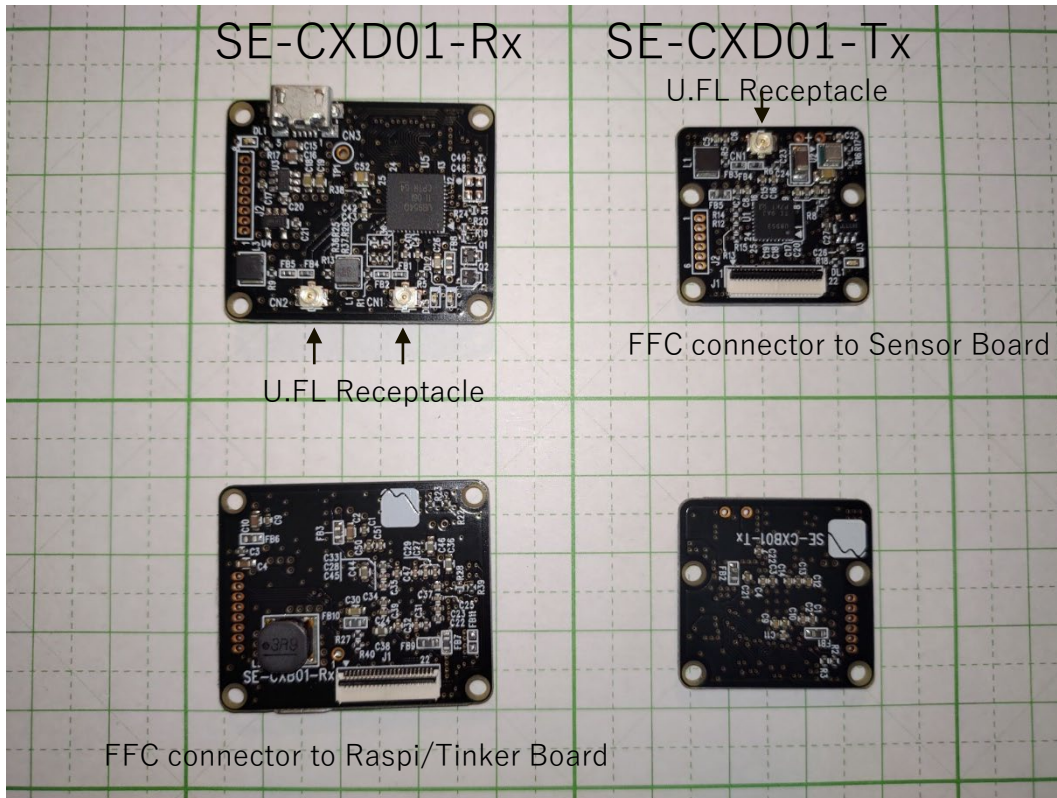
Base Line 65mm



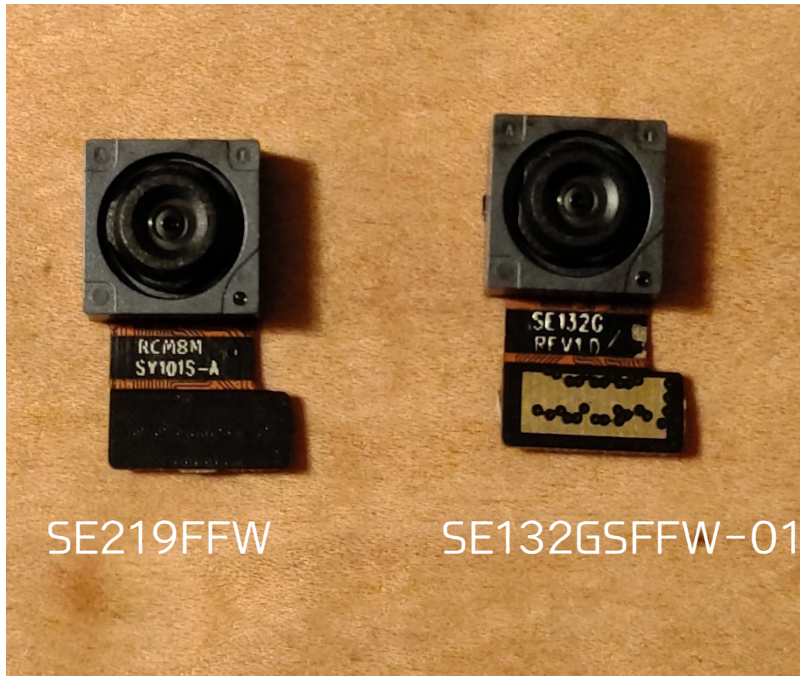
Base Line 85mm

fx:1708 vx:578 u:0.181 G:1.118 R:1.192

SE-CXB01-Tx/Rx FPD LINK III MIPI EXTENTION BOARD

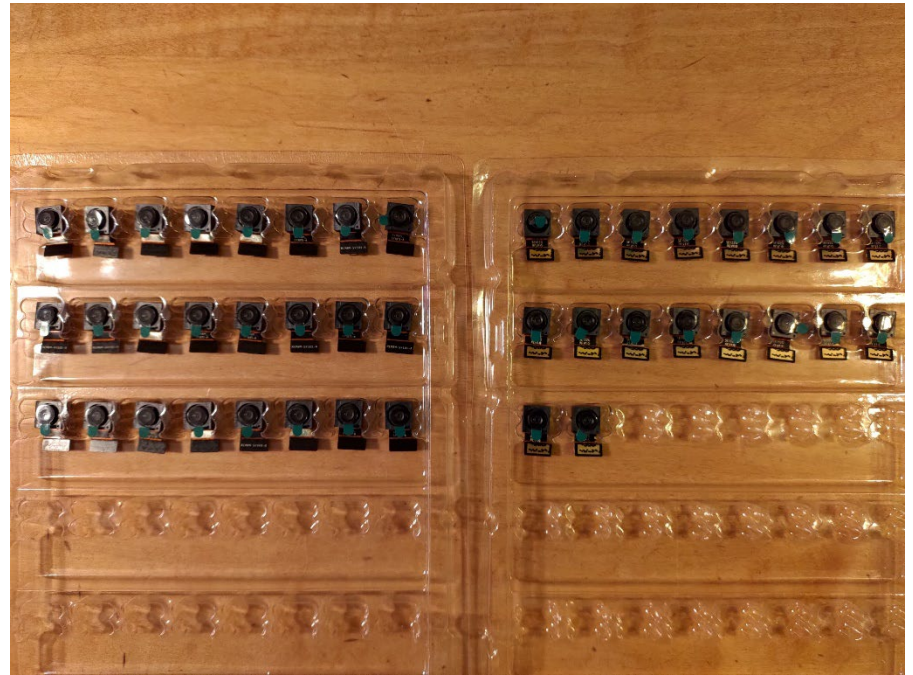


SE219FFW-00/01 and SE132GSW-01 FoV=120° 品のサンプル出荷開始



SE219FFW

SE132GSFFW-01



FoV(Field of View) comparison SE219FF & FE219FFW



SE219FFW



SE219FF



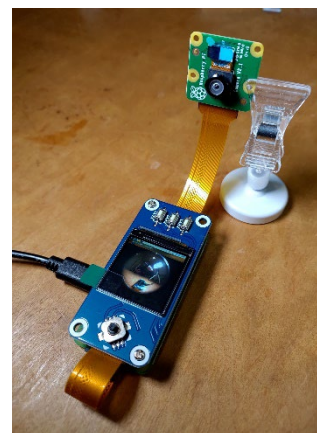
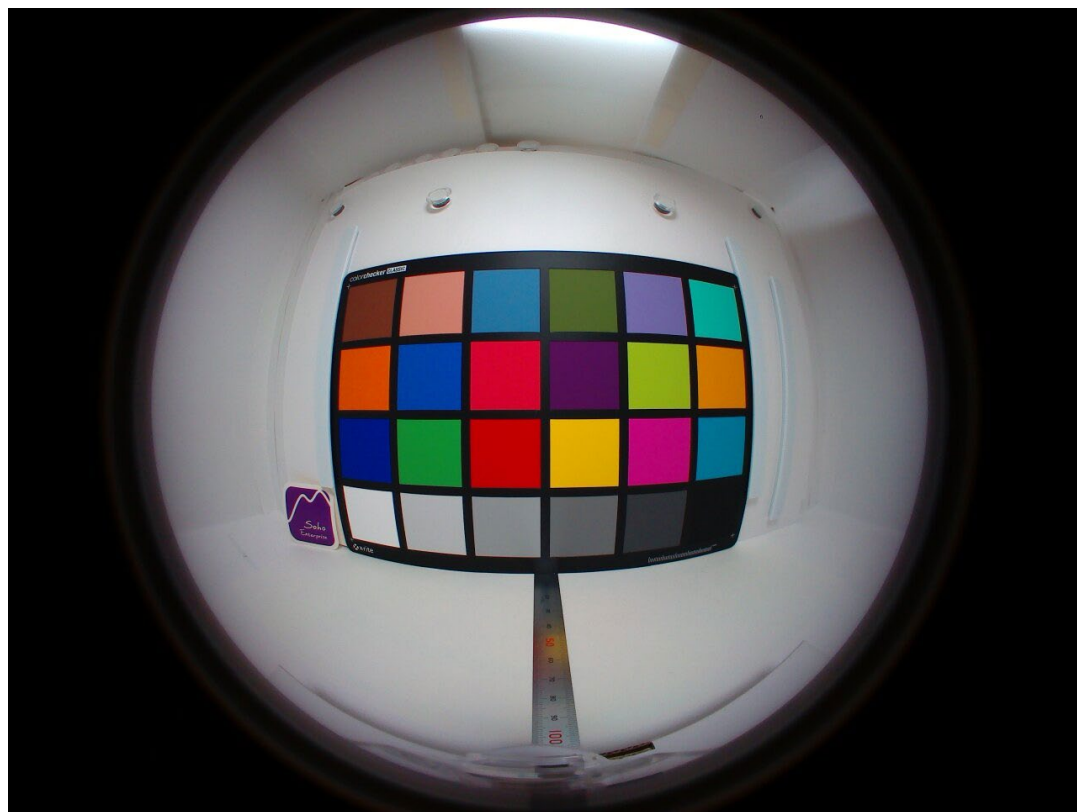
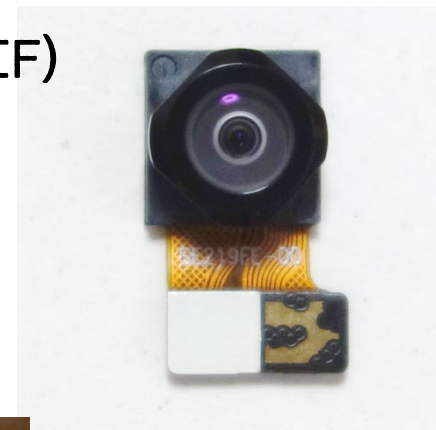
重ねて
比較



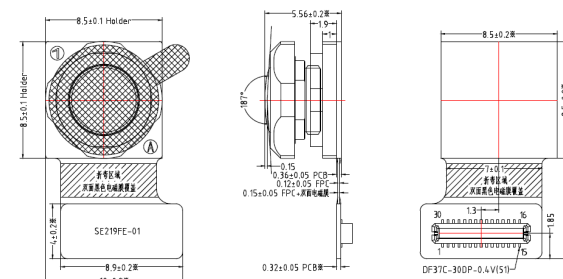
Vision System向けイメージセンサーモジュール SE219FE-00-CB (w/ IRCF), SE219FE-01-CB (w/o IRCF)

あのIMX219が(x, y)投影サイズそのままにFoV=187°の
魚眼カメラになりました。

しかも厚みは6mm以下。狭い場所に仕込むことができます。
従来製品(対角76°)に対し圧倒的な情報量の画像取得が可能です。



バンダイ様の人気商品
ガシャポンのザクヘッドに
ぴったり収まります。

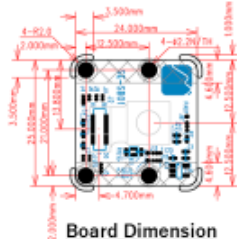




Soho Enterprise Ltd.

Fish Eye Camera Board w/ 8Mpix CIS for Single Board Computers

SE219FE-00/01-CB



Board Dimension

■ **Ultra Wide View Angle: FoV = 187° ± 3°**
Suitable for wide angle image recognition usage in AIoT area.

■ **Adopted the most mature image sensor for SBC.**
Sony IMX219PQH5-C

■ **Camera Driver with AE/AWB functions for "tinker board" is available.**
Processed in Embedded HW ISP, Full Size 20fps/FHD 30fps

■ **w/ IRCF(-00), w/o IRCF(-01) modules are available**

■ **Extensivity:**
FFC connector for MIPI CSI-2 4 lane connection for faster fps.

■ **Ready for use**
No need remodeling the module to get wide FoV



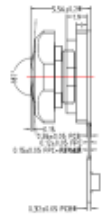
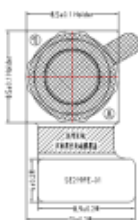
Assumed application cases

- Look down monitoring with few blind spots
- VR Stereo Vision
- Wide vision for Robots, AI speaker, any others
- Monitoring wildlife ecology, ham to agriculture
- Home-use video monitoring & recording
- 360° monitoring on drones, robot cars, etc.
- Sports camera for tennis, volleyball, badminton, etc.

Fish Eye Lens Module: SE219FE-00/01

HSF

Item	Model	Part No.	Part Name	Part No.	Part Name
1	SE219FE-00	1.0mm pitch 15pin FFC connector	1.0mm pitch 15pin FFC connector	1.0mm pitch 15pin FFC connector	1.0mm pitch 15pin FFC connector
2	SE219FE-01	0.5mm pitch 22pin FFC connector	0.5mm pitch 22pin FFC connector	0.5mm pitch 22pin FFC connector	0.5mm pitch 22pin FFC connector



No.	PIN NAME	No.	PIN NAME
1	NC	16	DSND
2	NC	17	MIPI-D0N
3	DVDD1.8V	18	MIPI-D0P
4	DVDD1.8V	19	DQND
5	Sensor-PWDN	20	MIPI-CLKN
6	DQND	21	MIPI-D0P
7	MLCK	22	DQND
8	DQND	23	MIPI-D0N
9	AVDD1.8V	24	MIPI-D0P
10	AVDD1.8V	25	DQND
11	GPIO1.VDD	26	MIPI-CLKN
12	DQND	27	MIPI-CLKP
13	MIPI-D0P	28	DQND
14	MIPI-D0N	29	GPIO1.VDD
15	DQND	30	GPIO1.VDD

Same (x, y) form factor & compatible pin assignment w/ the module on Raspberry Camera V2.1

Ver. 1.1.0

SE Camera Board Series Product Brochure

Key Specifications SE219FE-00/01-CB

Image Sensor	Product Code: IMX219PQH5-C	Manufacturer	Sony
		Pixel size	1.12um x 1.12um
		Active Image Area	3280 x 2464 8Mpix
		Optical Size	Type 1/4 Diagonal 4.60mm
		Operation Temperature	-20~60°C Function guarantee -20~60°C Performance guarantee
		Storage Temperature	-30~80°C
Module	Lens	Configuration	Type 1/4, 6P
		FoV	187° ± 3°
		F No.	2.10 ± 5%
	Connector	Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.
		Size	Compatible w/ Raspi Camera v2.1 module
	Weight		0.4g
Board	Power Supply	Analog	2.8V ± 0.2V
		Digital	1.2V ± 0.12V
	IO	IO	1.8V ± 0.18V
	Size	25mm*24mm	Almost same size and compatible position for screw holes with RaspberryPi camera V2.1.
	Connector	1.0mm pitch 15pin 0.5mm pitch 22pin	For Tinker board, RaspberryPi RaspberryPi0, Raspi compute module, etc.
Board	Output	I/O Format	Support MIPI CSI-2 2lane and 4 lane
		Maximum speed	Full size: 30fps, FHD: 60fps, 720P: 180fps (MIPI 4 lane mode)
	Power Supply		Generate Analog 2.8V by on-board LDO
			Generate Digital 1.2V by on-board DO-converter. Generate Analog 1.8V by on-board LDO Generate AF 2.8V by on-board optional LDO

Why are the SE camera boards suitable for AIoT vision processing applications?

- Good image quality**
The SE camera series uses a high-quality Sony image sensors of better SNR.
- Ready to use on tinker board and other SBCs**
Camera drivers are ready. Easy to customize for PoC prototyping
- Variety of Options**
Wide variety of options for resolution, global shutter, wide FoV lens, focus driver, etc.
- Low Latency, RAW image**
Suitable for real-time autonomous control system
- Affordable for everyone**
Pricing that individuals can purchase from a single item in line with the corporate philosophy of *helping to create open innovation.*

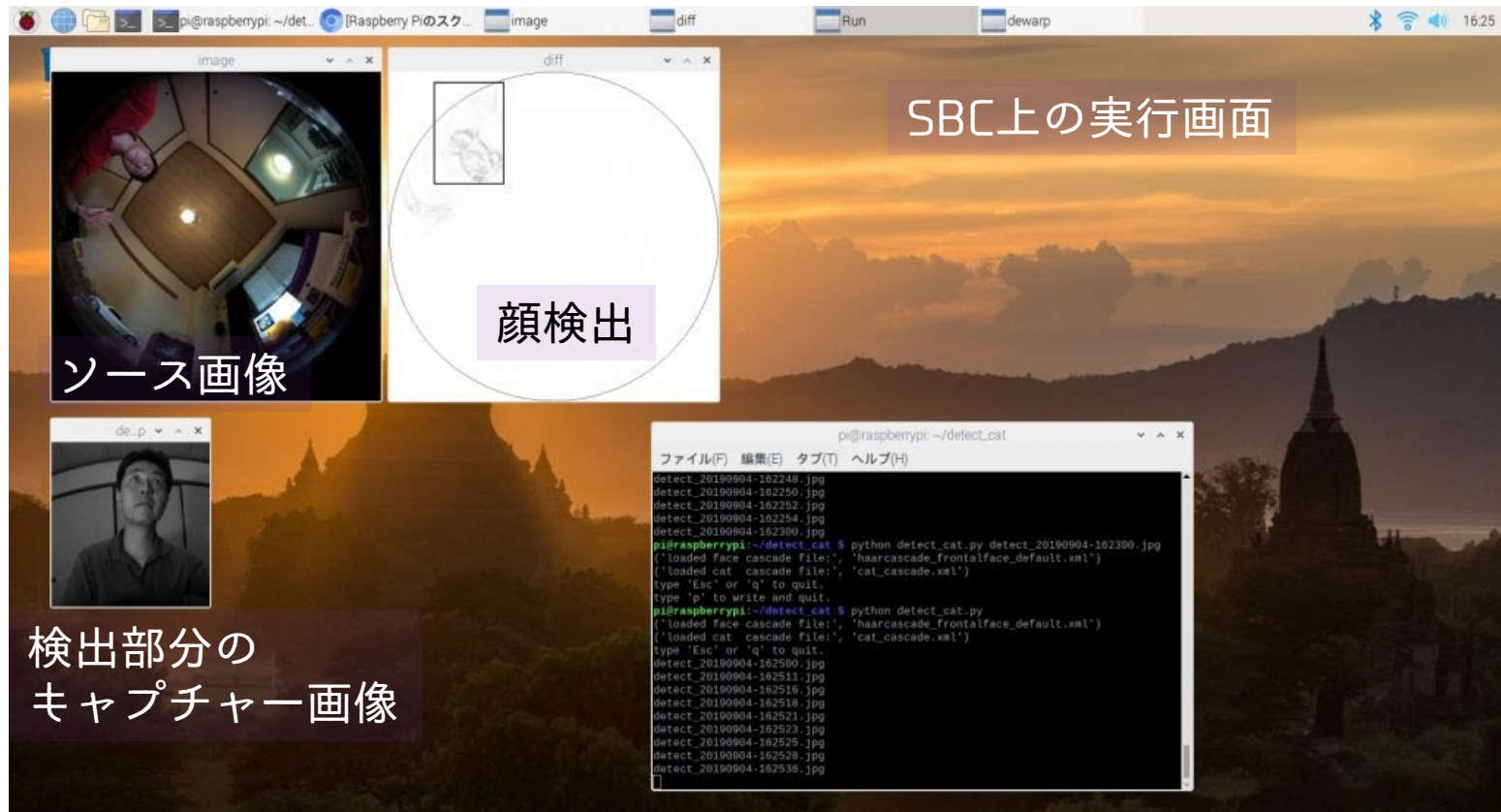
Further Information:

<https://soho-enterprise.com/>
<https://www.visionproc.org/index.php>

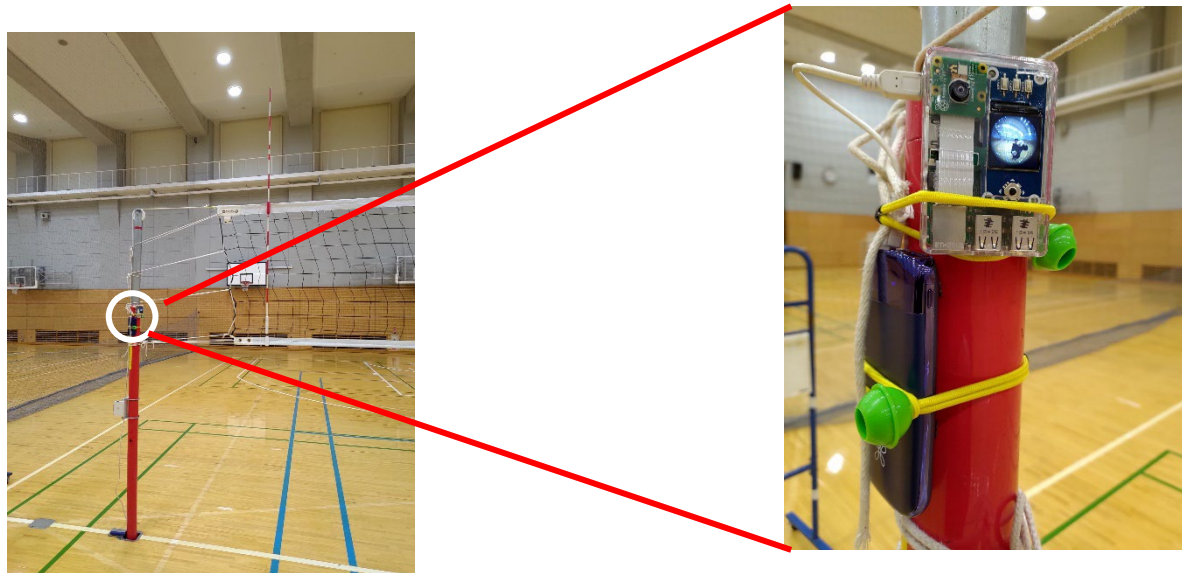
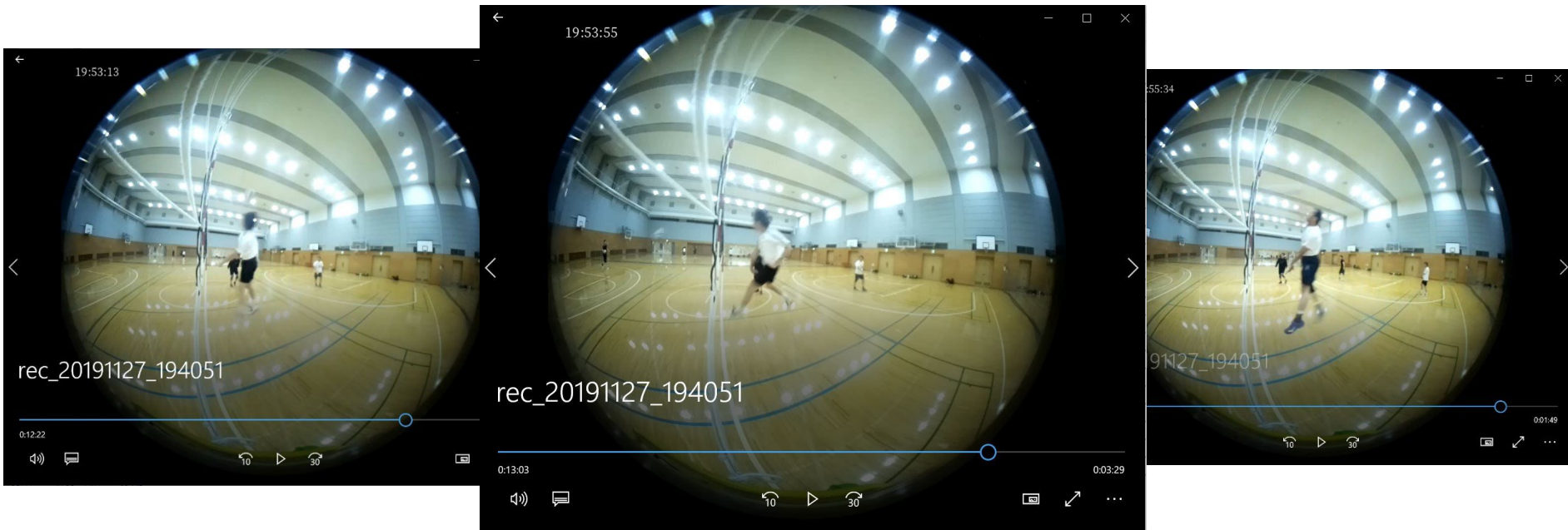


Ver. 1.1.0

魚眼カメラ応用事例：detect_cat（アプリSW配布中。）



魚眼カメラ応用事例：魚眼スポーツカム

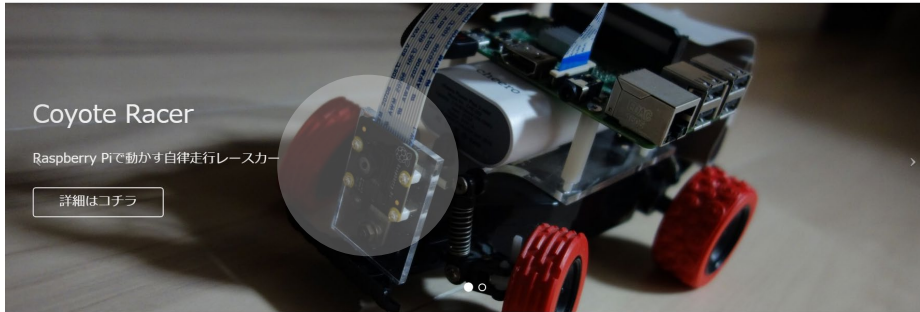


広角レンズモジュールのVision Processing適用事例

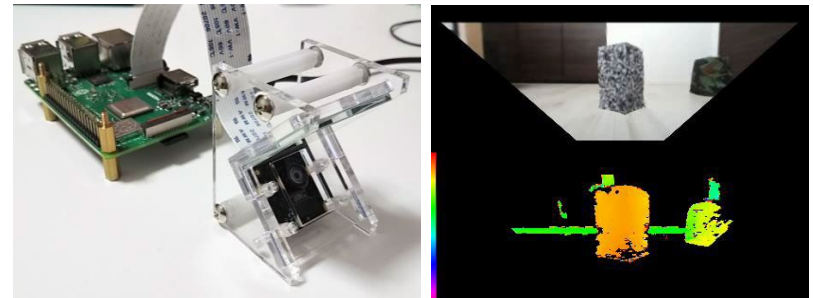
認識系アプリ



Coyote Racer



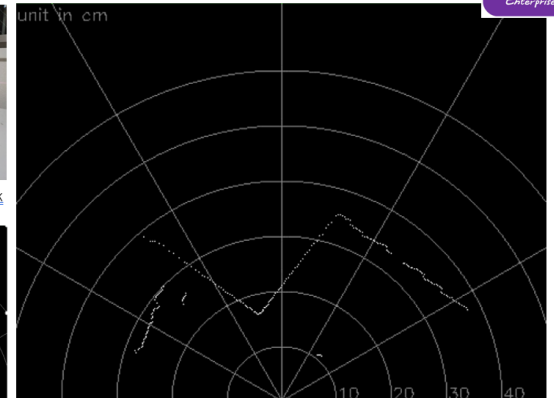
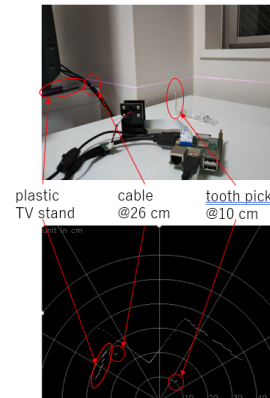
測距系アプリ



超広角応用ステレオ測距

Line laser depth module

FoV~135deg
Processing time~15ms/frame



CQ出版社 Interface
2020年3月号に特集記事掲載→

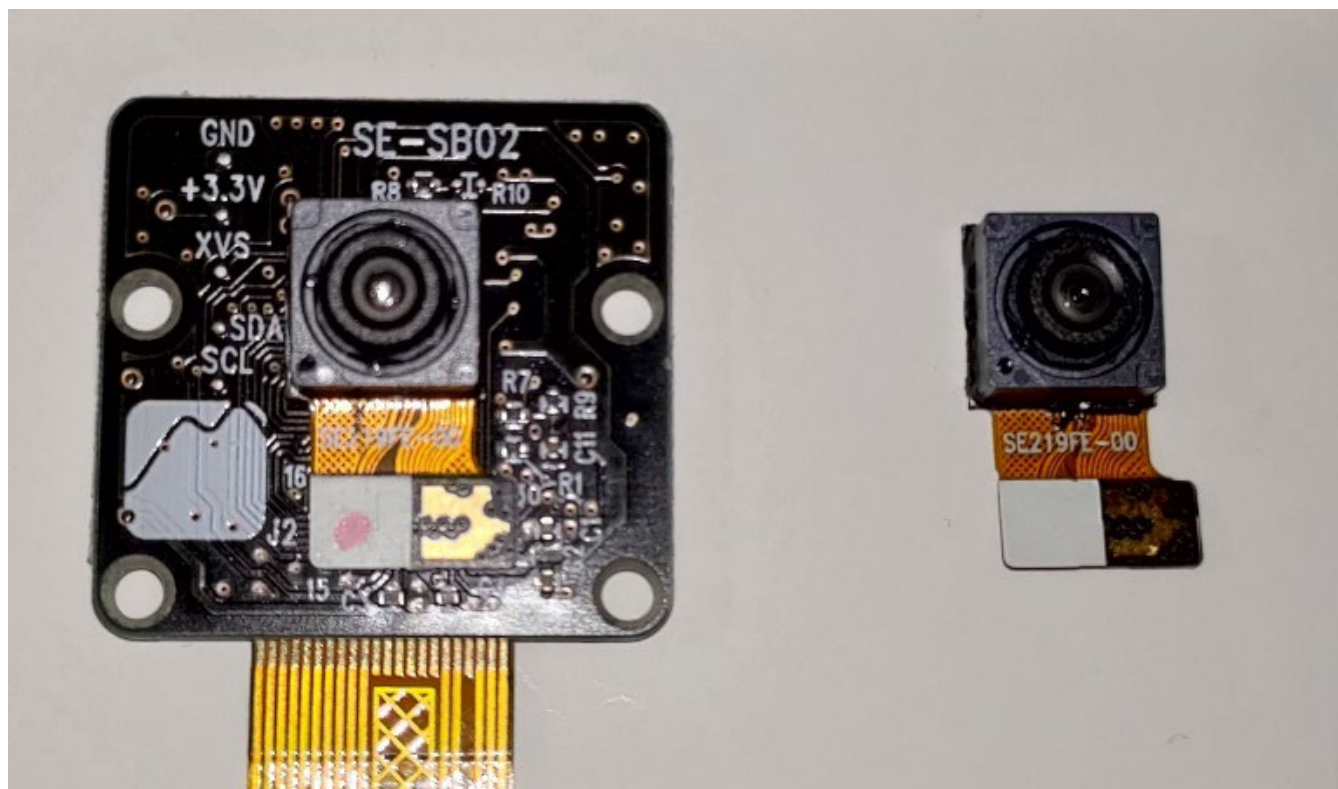


ラインレーザー+単眼ステレオ測距
132° 広角レーザーとの組み合わせ

FoV=120° 固定フォーカスカメラ

SE219FFW-00-CB (w/ IRCF), SE219FFW-01-CB (w/o IRCF)

想定適用例：広角3D動画、顔認識、ドアホン、見守り監視、自律移動ロボットのセンシングなど

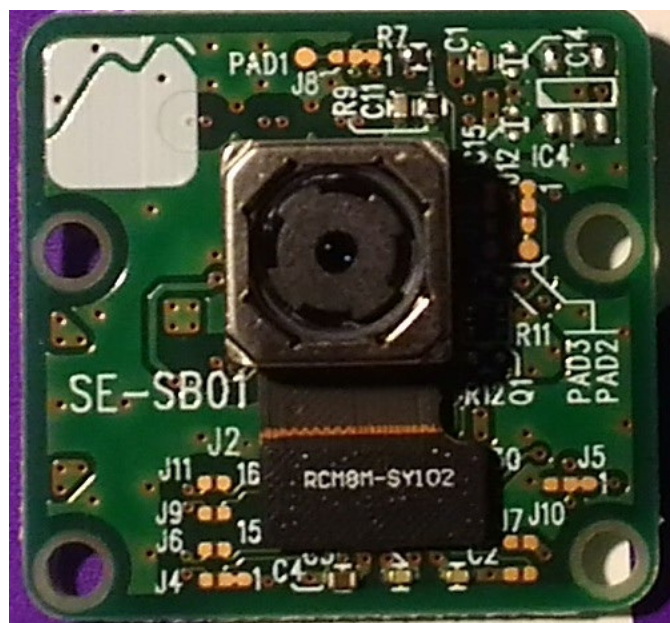


Vision System向けイメージセンサーモジュール SE219AF-00-CB (w/ IRCF), SE219AF-01-CB (w/o IRCF)

想定適用例：AR/VRゴーグル用カメラ、スマートグラス、ウェアラブルカメラ

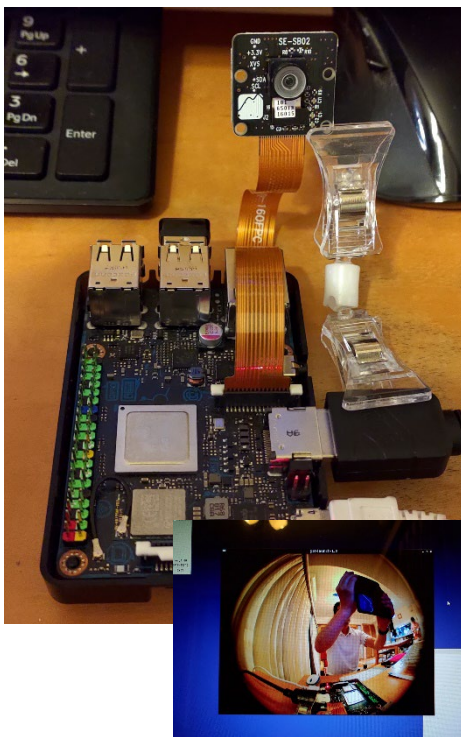
FoV=76°、待望のフォーカスドライバ内蔵のIMX219カメラモジュール
3cm～無限遠(要調整)でフォーカス合わせが可能。

シャープなイメージのマクロ撮影において特に性能を発揮
Tinker BoardのカメラドライバーにAF機能実装検討中



FoV=160° 魚眼カメラ SE219FE160-00-CB (w/ IRCF), SE219FE160-01-CB (w/o IRCF)

想定適用例：広角3D動画、ドアホン、見守り監視、自律移動ロボットのセンシングなど。



Soho Enterprise Ltd.

Fish-Eye lens module w/ 8Mpix CIS for Single Board Computers

SE219FE160-00/01

■ Ultra Wide View Angle: FoV = 160° ± TBD°
Suitable for wide angle image recognition usage in AIoT area.

■ Adopted the most mature image sensor for SBC.
Sony IMX219PQH5-C

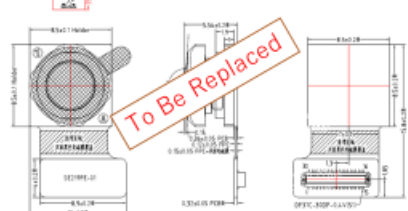
■ w/ IRCF (-00), w/o IRCF (-01) modules are available

■ Extensivity:
FFC connector for MIPI CSI-2 4 lane connection for faster fps.

HSF

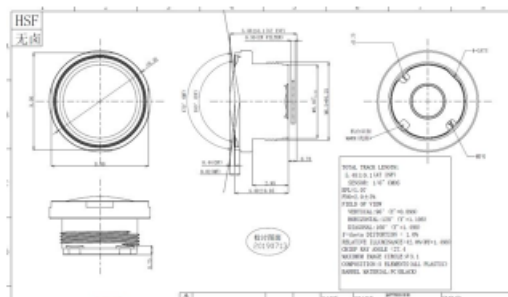


To Be Replaced



Pin Assignment

No.	Pin Name	No.	Pin Name
1	NC	16	DQAD
2	NC	17	MIPI-D0N
3	DVDD1.2V	18	MIPI-D0P
4	DVDD1.2V	19	DQAD
5	Sensor-PWDN	20	MIPI-D1N
6	DQAD	21	MIPI-D1P
7	MIPI	22	DQAD
8	DQAD	23	MIPI-D2N
9	AGND	24	MIPI-D2P
10	AVDD1.8V	25	DQAD
11	SPD-VDD1	26	MIPI-CLKN
12	DQAD	27	MIPI-CLKP
13	MIPI-D3N	28	DQAD
14	MIPI-D3P	29	SCL1.8V
15	DQAD	30	SCAL1.8V



IMX219
D=4.6mm

Imaging area
&
Image circle

Assumed application cases

- Look down monitoring with few blind spots
- Monitoring wildlife ecology, harm to agriculture
- VR Stereo Vision
- Home-use video monitoring & recording
- Wide vision for Robots, AI speaker, any others

SE Camera Board Series Product Brochure

SE Camera Board Series Product Brochure

Key Specifications		SE219FE-00/01-CB	
Image Sensor	Product Code: IMX219PQH5-C	Manufacturer	Sony Back-side illuminated CMOS image sensor
		Pixel size	1.12um x 1.12um
		Active Image Area	3280 x 2464 8Mpix
		Optical Size	Type 1/4 Diagonal 4.60mm
		Operation Temperature	-20~80°C Function guarantee -20~80°C Performance guarantee
Module	Lens	Storage Temperature	-30~80°C
		Configuration	Type 1/8, 5P
		FoV	160° ± (TBD)°
		F No.	2.0 ± 5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped (TBD)
Board (option)	Connector	30pin	Compatible w/ Raspi Camera v2.1 module
		Size	8.5mm*8.5mm*TBDmm
		Weight	0.4g(Tentative)
		Power Supply	2.8V ± 0.2V
		IO	1.2V ± 0.12V 1.8V ± 0.18V
Board (option)	Output	Size	25mm*24mm
		Connector	1.0mm pitch 15pin
		I/O Format	For Tinker board, RaspberryPi
		Maximum speed	RaspberryPi0, Raspi compute module, etc. Support MIPI CSI-2 2lane and 4 lane
		Power Supply	Full size: 30fps, FHD: 60fps, 720P: 180fps (MIPI 4 lane mode) Generate Analog 2.8V by on-board LDO Generate Digital 1.2V by on-board DO-converter. Generate Analog 1.8V by on-board LDO Generate AF 2.8V by on-board optional LDO

Why are the SE camera boards suitable for AIoT vision processing applications?

- Good image quality**
The SE camera series uses a high-quality Sony image sensors of better SNR.
- Ready to use on tinker board and other SBCs**
Camera drivers are ready. Easy to customize for PoC prototyping
- Variety of Options**
Wide variety of options for resolution, global shutter, wide FoV lens, focus driver, etc.
- Low Latency, RAW image**
Suitable for real-time autonomous control system
- Affordable for everyone**
Pricing that individuals can purchase from a single item in line with the corporate philosophy of *helping to create open innovation*.

Further Information:

<https://soho-enterprise.com/>
<https://www.visionproc.org/index.php>



Ver. 0.1.0

New Release

Vision System向けイメージセンサーモジュール

SE132GSFF-00/01-CB02

SE132GSFE160-00/01-CB02

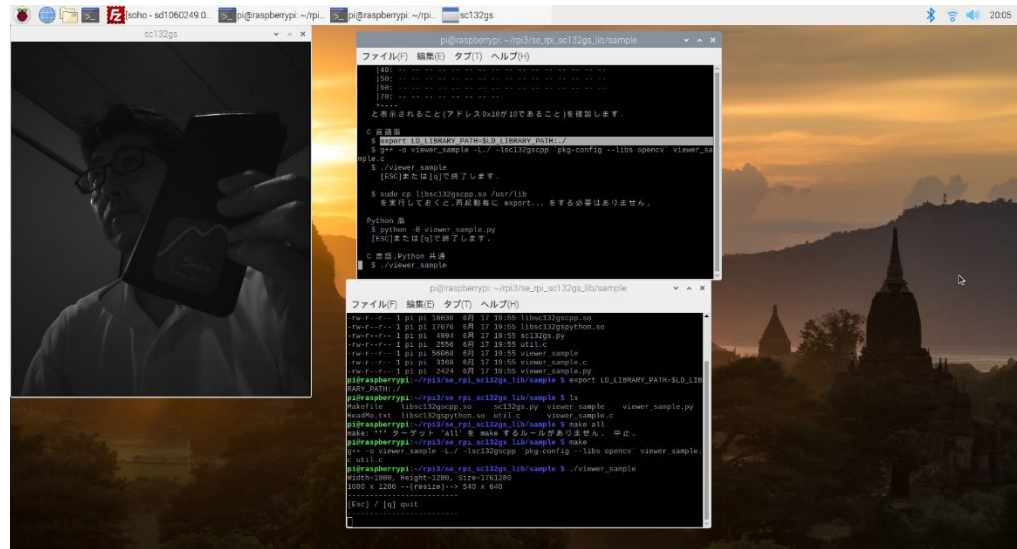
中国SMARTSENS TECHNOLOGY社の最新Global Shutter Image Sensorをモジュール化しました。

最高品質の台湾TSMC社で製造される裏面照射型イメージセンサーです。

画素サイズ2.7um, 1,080x1,280=1.3Mpixel

SE219シリーズと同じ光学サイズ1/4” 型で豊富なレンズバリエーションが用意できます。

- ・ 120fpsの高速撮像
- ・ 赤外領域の感度が向上
- ・ RaspberryPiとの接続を確認済み
- ・ FoV=120°、150度° 187° 等計画中





Soho Enterprise Ltd.

Fish-Eye lens module w/ 1.3Mpix Global Shutter CIS for SBCs

■ SE132GSFF/FFW/FE160/PKG-01

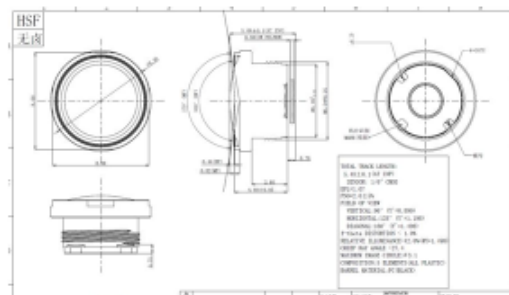
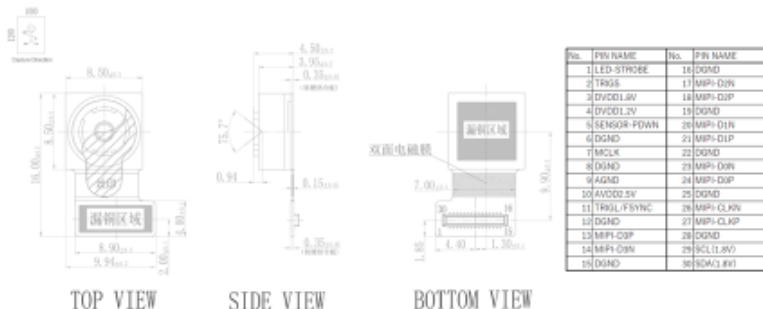
■ Many of lens option

■ Adopted the best-in-class global shutter CMOS image sensor of BSI. Smartsens SC132GS

■ Customized Optical Filters (IRCF, BPF) will be available

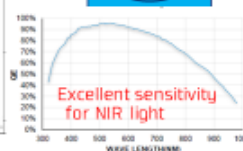
■ Extensivity:

MIPI CSI-2 4 lane connection for faster fps.



Wide Angle (Fish-Eye) Lens

Imaging area & Image circle



■ Assumed application cases

- Wide vision for Robots of autonomous driving
- 3D sensing with NIR structured light

Ver. 0.9.3

SE Camera Board Series Product Brochure

Key Specifications SE132GSFE160-00/01

Image Sensor	Product Code: SC132GS	Manufacturer	Smartsens Back-side illuminated, Global Shutter
		Pixel size	2.7um x 2.7um
		Active Image Area	1080 x 1280 1.3Mpix
		Optical Size	Type 1/4 Diagonal 4.53mm
		Operation Temperature	-40~85°C Function guarantee -20~60°C Performance guarantee
Module	Lens	Maximum Frame Rate	120fps
		Configuration	Type 1/6, 5P
		FoV	160° ±(TBD)°
		F No.	2.0±5%
	Connector	Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.(TBD)
		Size	Compatible w/ Raspai Camera v2.1 module
		Weight	Lens Holder size: 8.5 * 8.5 * 6.3mm by COB
Board (option)	Power Supply	Size	0.4g(Tentative)
		Analog	2.5V±0.1V
	Power Supply	Digital	1.2V±0.06V
		IO	1.8V±0.1V
	Connector	Size	25mm* 24mm
		Almost same size and compatible position for screw holes with RaspberryPi camera V2.1.	
	Connector	1.0mm pitch 15pin	For Tinker board, RaspberryPi
		0.5mm pitch 22pin	RaspberryPi0, Raspai compute module, etc.
	Output	I/O Format	Support MIPI CSI-2 2lane and 4 lane
		Maximum speed	Full size: 120fps (MIPI 4 lane mode)
Power Supply	Power Supply	3.3V±0.3V	Generate Analog 2.8V by on-board LDO
			Generate Digital 1.2V by on-board DD-converter.
			Generate Analog 1.8V by on-board LDO
			Generate AF 2.8V by on-board optional LDO

Why are the SE camera boards suitable for AIoT vision processing applications?

1. **Good image quality**
The SE camera series uses a high-quality image sensors of better SNR.
2. **Ready to use on tinker board and other SBCs**
Camera drivers are ready. Easy to customize for PoC prototyping
3. **Variety of Options**
Wide variety of options for resolution, global shutter, wide FoV lens, focus driver, etc.
4. **Low Latency, RAW image**
Suitable for real-time autonomous control system
5. **Affordable for everyone**
Pricing that individuals can purchase from a single item in line with the corporate philosophy of *helping to create open innovation*.

■ Further Information:

<https://soho-enterprise.com/>
<https://www.visionproc.org/index.php>



Ver. 0.9.3

OPNOUS Full Product



GENERAL DESCRIPTION

OPN8001/8008/8018 are Time-of-Flight (ToF) imaging sensors for 3D sensing covering 100x100 / QVGA (256x80) / VGA (640x480) level native sensing resolution. The 3D sensing is realized upon 850 nm and 940 nm ToF wave length with an industry leading accuracy. The power consumption achieves the lowest power level in the industry, which benefits many portable and energy saving applications. OPN8001/8008/8018 are developed as key products of OPNOUS ToF solutions for a broad range of applications.



GENERAL DESCRIPTION

The OPN7007 is a smart VCSEL laser diode driver with high performance and high efficiency, which is optimized for Time of Flight (ToF) camera application. It is embedded with configurable current limit function to output specific peak current for illumination. A 12-bit ADC is also integrated for eye protection and temperature monitoring. The OPN7007 supports I2C interface configuration.



FUNCTIONAL DESCRIPTION

OPN6001 is a high performance, low power, low cost application processor (dedicated for ToF sensor). It is embedded with a sophisticated ToF ISP converting the ToF raw data to easy use distance and 4K data. With a novel self-heating engine, it also automatically saves lights and sensors to get best image with different scenarios. A 200Ma ARM Cortex-M0 processor is also integrated to handle system controlling and various applications. It can support up to 3 ToF sensors simultaneously with both I2C interface, merge different sources and transmit the data to host AP by USB 2.0, the USB or SPI/UART interface.



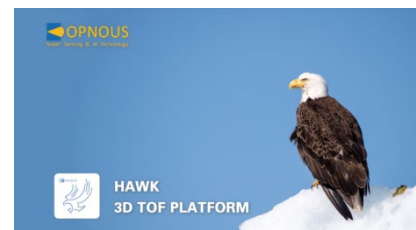
FUNCTIONAL DESCRIPTION

The OPN8008B is our Evaluation Kit for the QVGA OPN8008B Time-of-Flight (ToF) Sensor. This Evaluation Kit is fully assembled and tested camera system designed for the evaluation of the OPN8008B QVGA ToF Sensor, which provides all necessary hardware to operate OPN8008B, including both the camera lens and illumination. It can be directly connected to a PC for real-time visualization and recording of depth map data, while allowing direct access to many configuration settings. The system is fully controllable by an intuitive GUI on a PC.



GENERAL DESCRIPTION

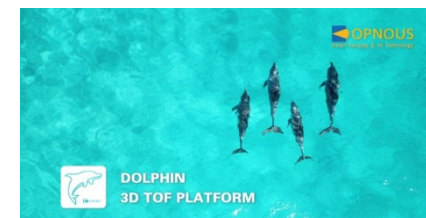
Opnus provides a series of Time-of-Flight (ToF) imaging modules fitting for a broad range of 3D sensing applications. These 3D sensing modules are realized upon 850 nm and 940 nm NIR wave length with an industry leading accuracy. The power consumption achieves the lowest power level in the industry, which benefits many portable and energy saving applications.



GENERAL DESCRIPTION

Hawk 3D ToF platform consists of OPNOUS ToF sensor OPN8008, VCSEL driver OPN7007 and ToF ISP OPN6001. It has built-in high performance, low power consumption ToF signal processing features -- auto-exposure(AE), high dynamic range(HDR), spatial and temporal de-noise and multi-device interference immunity. Hawk 3D ToF platform provides an easy-to-integrate ToF 3D vision solution for mid and long range applications.

Hawk 3D ToF platform can connect to host computer via USB 3.0 UVC protocol. Its SDK supports Windows and Ubuntu on x86 architecture.



GENERAL DESCRIPTION

Dolphin 3D ToF platform consists of OPNOUS ToF camera module and ToF ISP (ISP chip OPN6001). Dolphin has built-in high performance, low power consumption ToF signal processing features -- auto-exposure(AE), high dynamic range(HDR), spatial and temporal de-noise and multi-device interference immunity.

Dolphin 3D ToF platform can connect to embedded application processor via MIPI interface or to computer via USB 3.0 UVC protocol. Dolphin SDK supports Windows and Ubuntu on x86 architecture and embedded Linux on embedded ARM processors.

Dolphin 3D ToF platform provides an easy-to-integrate ToF 3D vision solution for 3D applications within 5-meter range, such as facial recognition, machine vision, SLAM, 3D re-construction, AR/VR, etc.

