



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

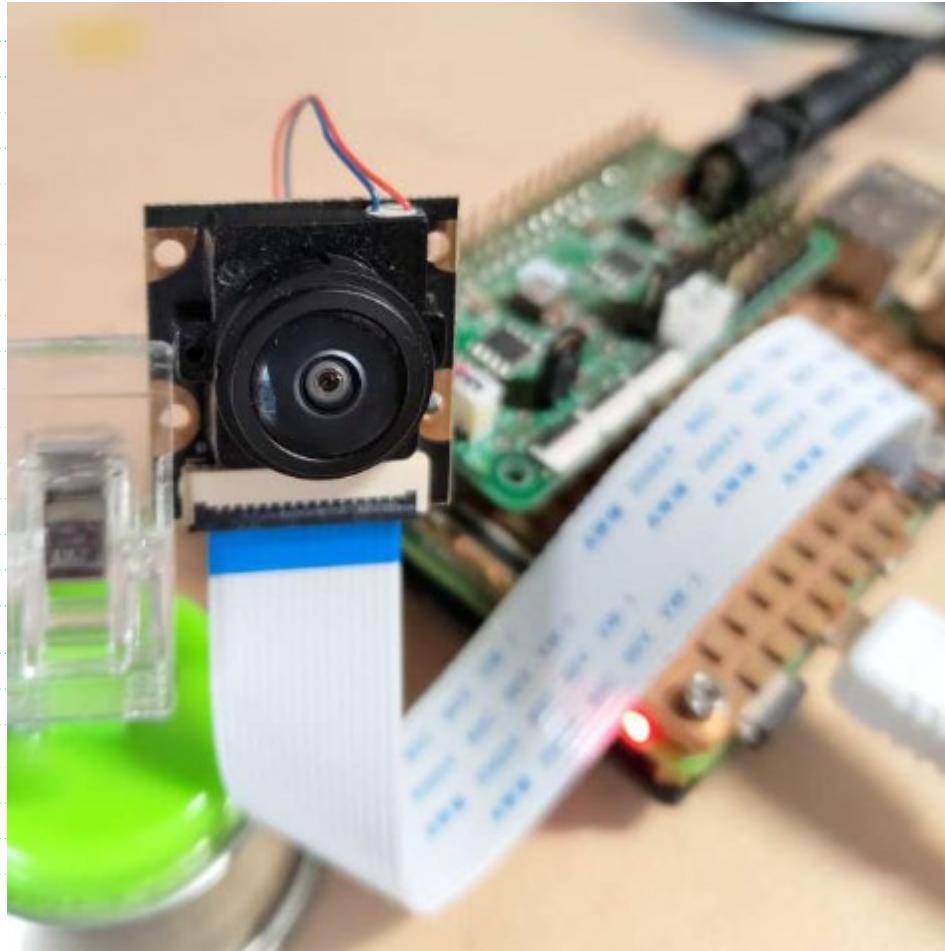
Product Number	Pix Size, Optical size /Resolution/Shutter	I/F	Board	Libcamera (Raspi)	Note
SE219 series (Sony IMX219)	1.12um, 1/4" /8Mpix/RS	MIPI	SE-SB02 SE-SB02R	Yes	FoV=76,88,120,150, FE160, FE187° , lens less module (FE=Fish-Eye)
SE258 series (Sony IMX258)	1.12um, 1/3" /13Mpx/RS	MIPI	SE-SB02 SE-SB02R	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	Soho Enterprise Ltd.
Product Type	MIPi Camera Board
Sensor	Sony IMX219
Resolution [MP]	8
Max. Frame Rate [fps]	22.5 (Full Resolution) 60 (2x2 binning mode)
Chromatics	Color
Shutter Type	Rolling Shutter
Sensor Technology	CMOS
Horizontal Resolution [pix]	3840
Vertical Resolution [pix]	2464
Data Interface	MIPi CSI-2
Data Lanes [#]	2
Pixel Depth(s) [bit]	10
Pixel Size x [um]	1.12
Pixel Size y [um]	1.12
Interface Connector	1.0mm pitch 15pin
Optical Size [inch]	1/4 inch
Min. Operating Temp. [° C]	-20
Max. Operating Temp. [° C]	60
Min. Storage Temp. [° C]	-30
Max. Storage Temp. [° C]	80
Lens FoV(D)	160 degree
IRCF Insertion/extraction	Yes



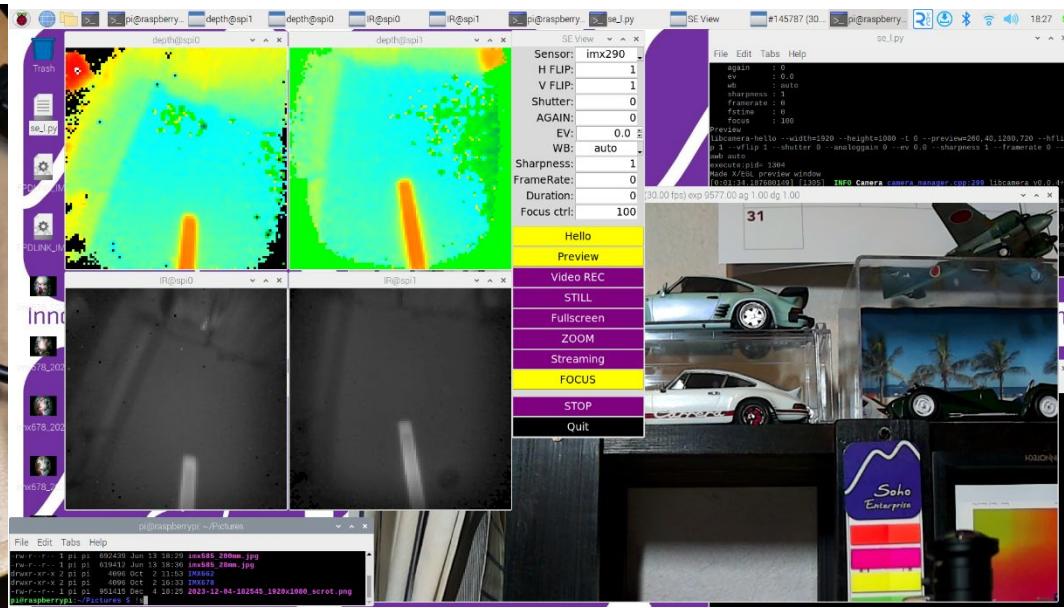
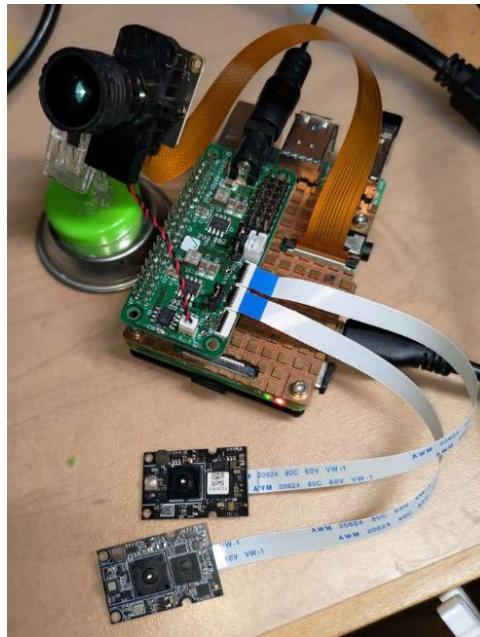
SE-SERVO-HAT01 for Autonomous Movement Control

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

IRCF insertion control

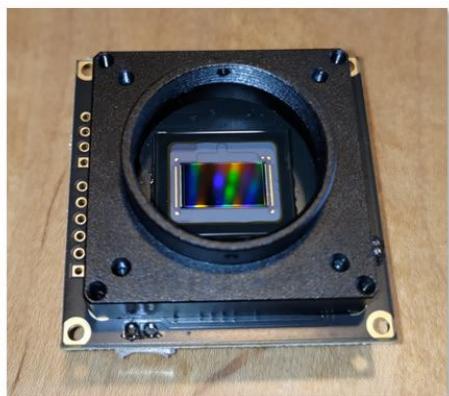
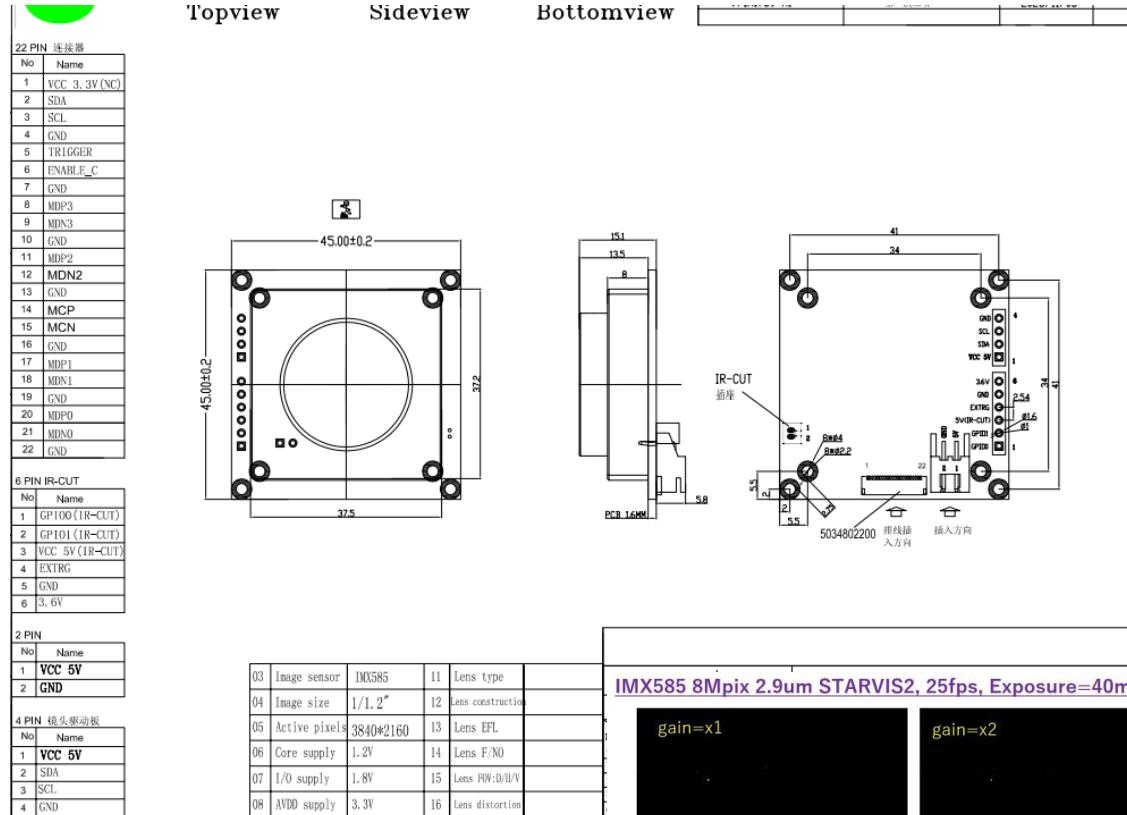
SERVO用IF x 8(PWM from GPIO)

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 RPi4

Lens Option



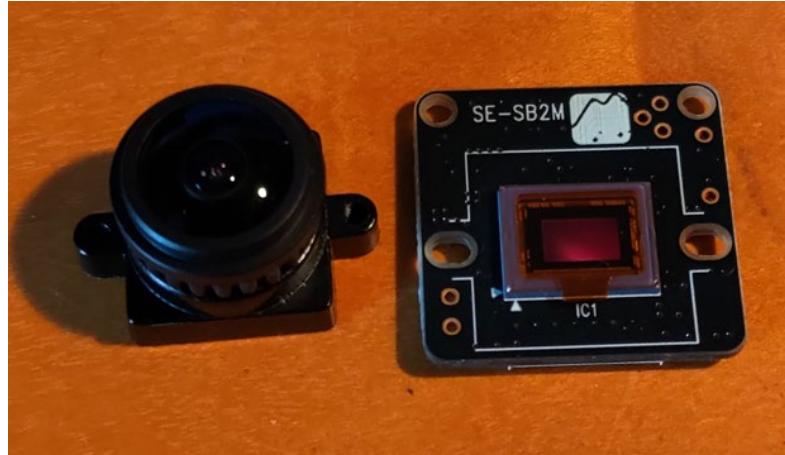
NO.	项目 (Items)	具体规格 (Specification)		
1	F No.	1.0±10%		
2	焦距(Focal-Length)	6.93 ±5%		
3	光学后焦 (Optical Back Focal Length)	5.10±0.2 (in air)		
4	机械后焦 (Mechanical Back Focal Length)	4.13±0.2 (in air)		
5	镜头总长(ITAL)	51.8±0.2 (in air)		
6	像面大小 (Image circle)	Φ13.2 (MAX)		
7	镜片构成 (Lens structure)	5G4P		
8	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 1/1.2" 11.136*6.264*12.777	H(水平) 102.1°	V(垂直) 52.9°
				D(对角) 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) 光圈 (Iris)	手动 (Manual) 固定 (Fixed)	
20	环保&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(ITAL)	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 1/1.2" 11.136*6.264*12.777	H(水平) 54.7°	V(垂直) 30.7°
				D(对角) 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) 光圈 (Iris)	手动 (Manual) 固定 (Fixed)	
20	环保&安全 (HSF&Safety)	RoHS		

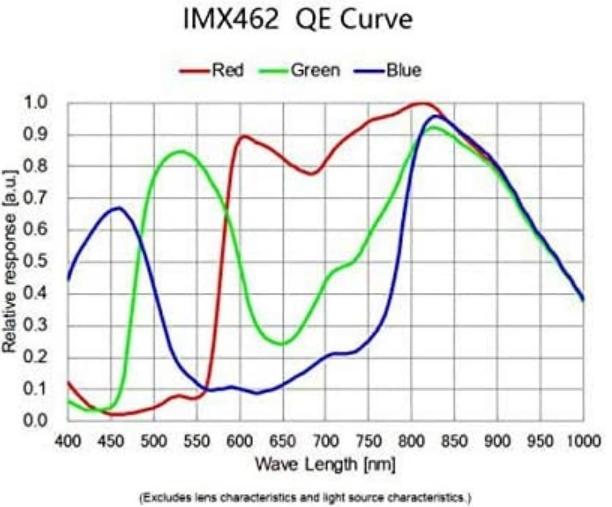
NO.	项目 (Items)	具体规格 (Specification)		
1	F No.	1.0±10%		
2	焦距(Focal-Length)	7.68 ±5%		
3	光学后焦 (Optical Back Focal Length)	6.54±0.2 (in air)		
4	机械后焦 (Mechanical Back Focal Length)	4.43±0.2 (in air)		
5	镜头总长(ITAL)	51.8±0.2 (in air)		
6	像面大小 (Image circle)	Φ13.1 (MAX)		
7	镜片构成 (Lens structure)	5G4P		
8	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 1/1.2" 11.136*6.264*12.777	H(水平) 88.0°	V(垂直) 47.5°
				D(对角) 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) 光圈 (Iris)	手动 (Manual) 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)



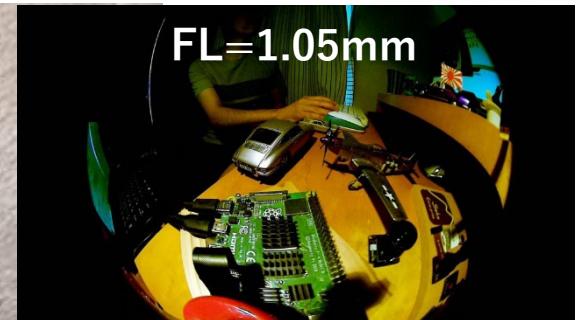
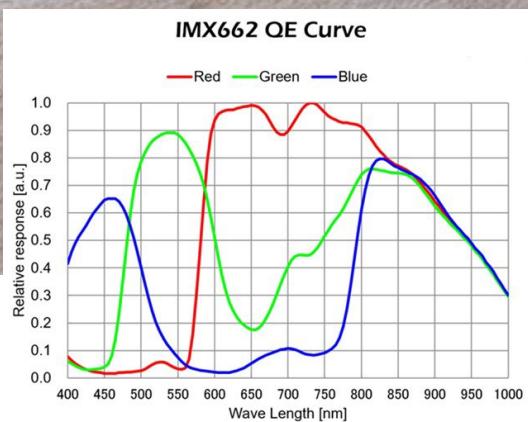
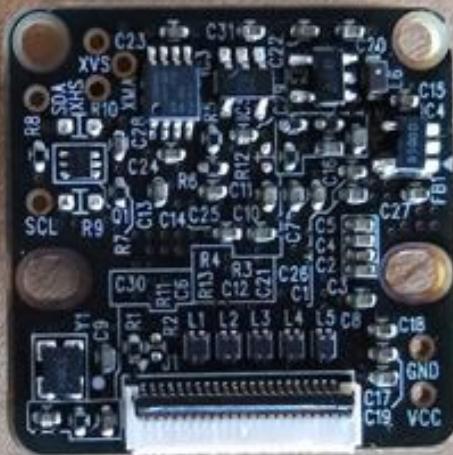
Better sensitivity than IMX290



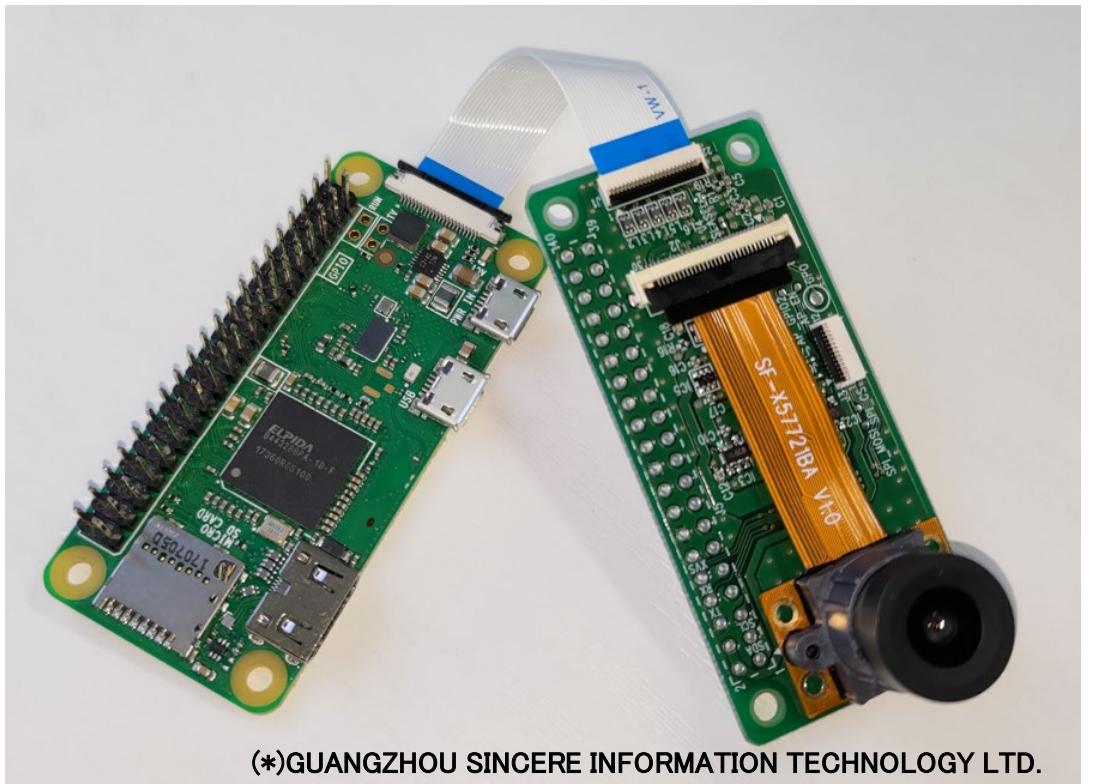
High Sensitivity Camera w/ Sony IMX662AAQR/AAMR (STARVIS2)



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

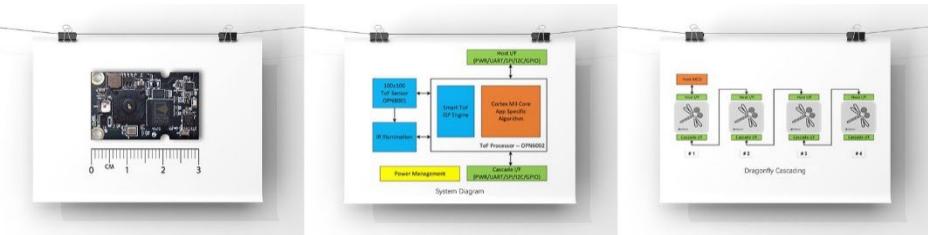
<http://www.opnous.com/jp>

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

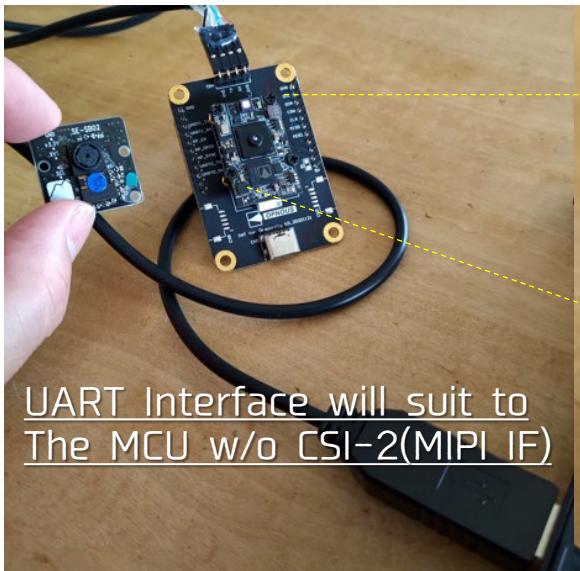
RGBカメラは弊社SEカメラボードのラインアップから選択可能です。
Ex. SE219FFW, SE219FE160, SE327MBD, ...

2021.5 New Release ③

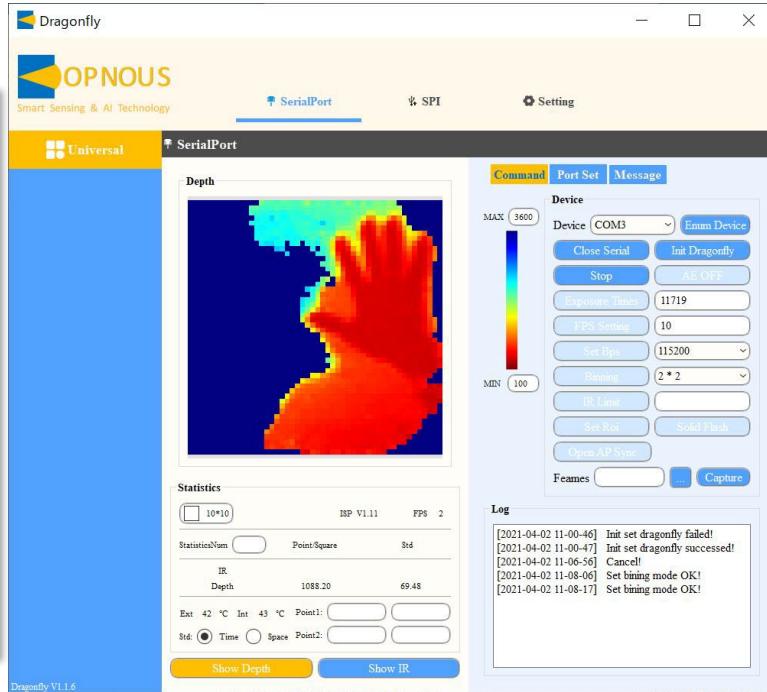
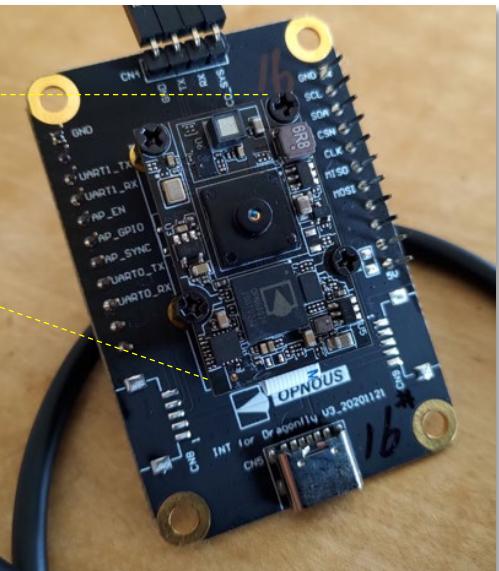
OPNOUS Dragonfly Demo Kit Stand alone depth solution



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

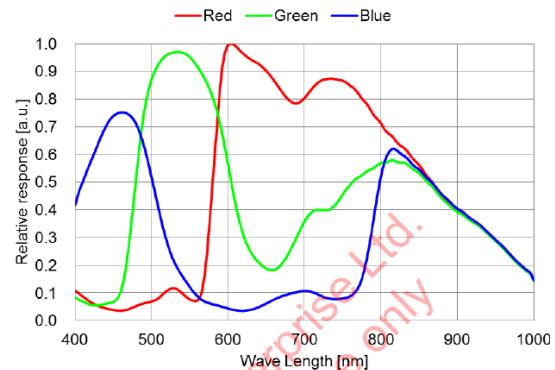
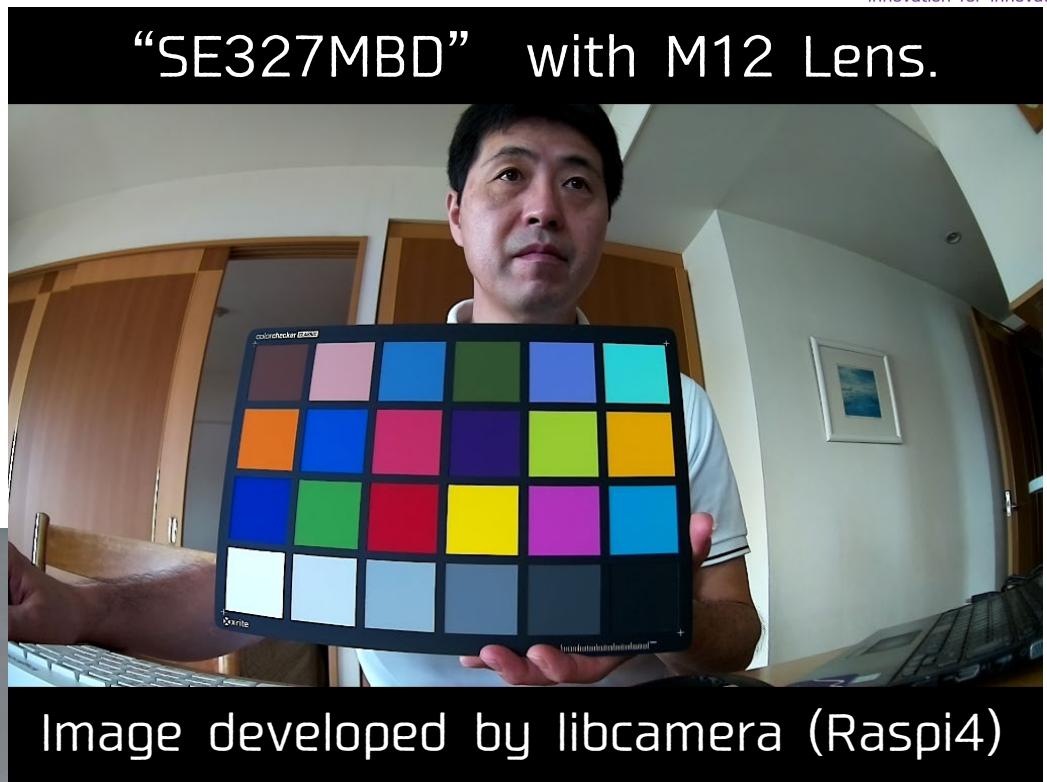
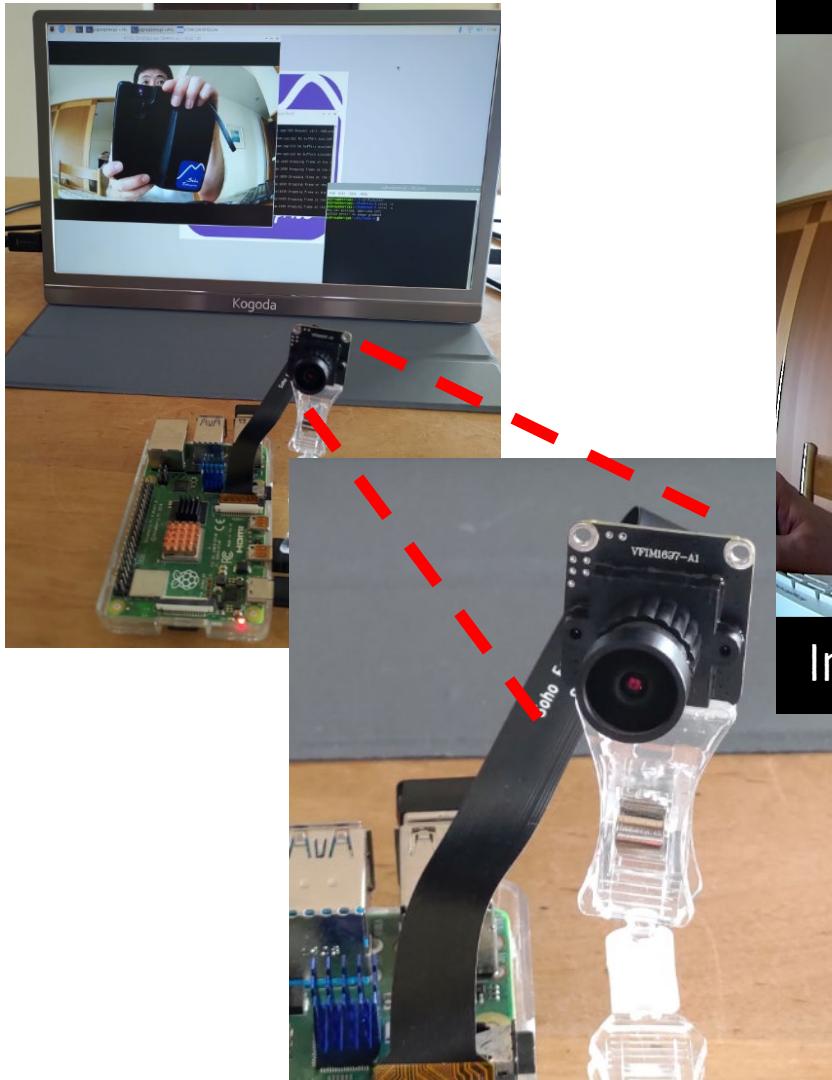


UART Interface will suit to
The MCU w/o CSI-2(MIPI IF)



2021.6 New Release ④

Full HD High Sensitivity Camera w/ Sony IMX327



Sony IMX327 Camera Board w/ M12 Lens Mount : SE327MBD



Now ready for Sample delivery!



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

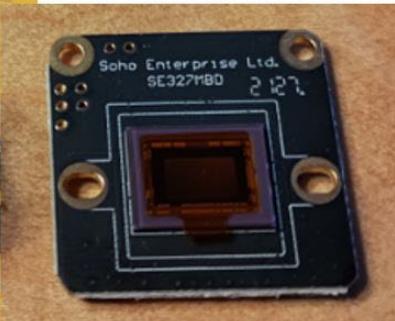
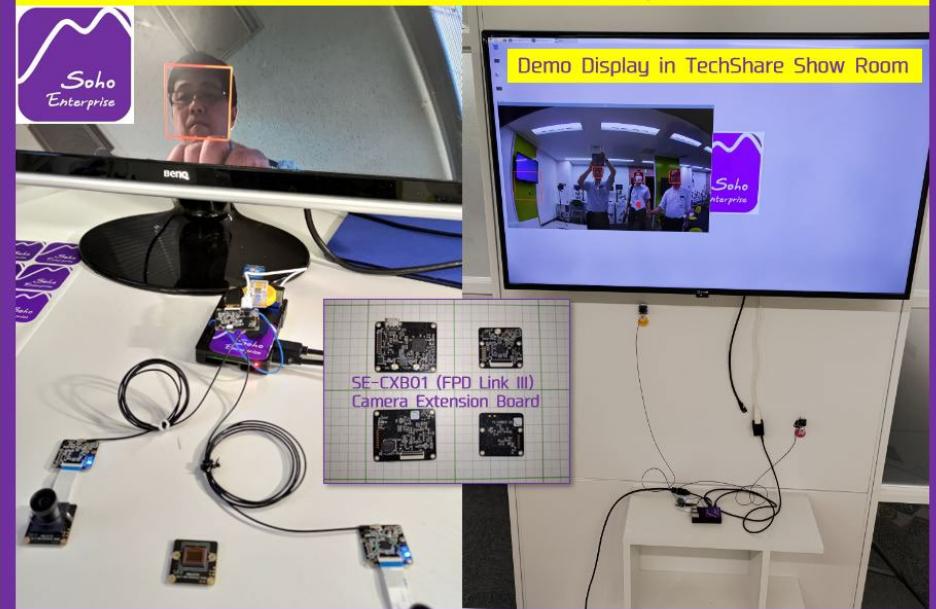


Image developed by libcamera



Full HD 30fps, FoV(D)=140°

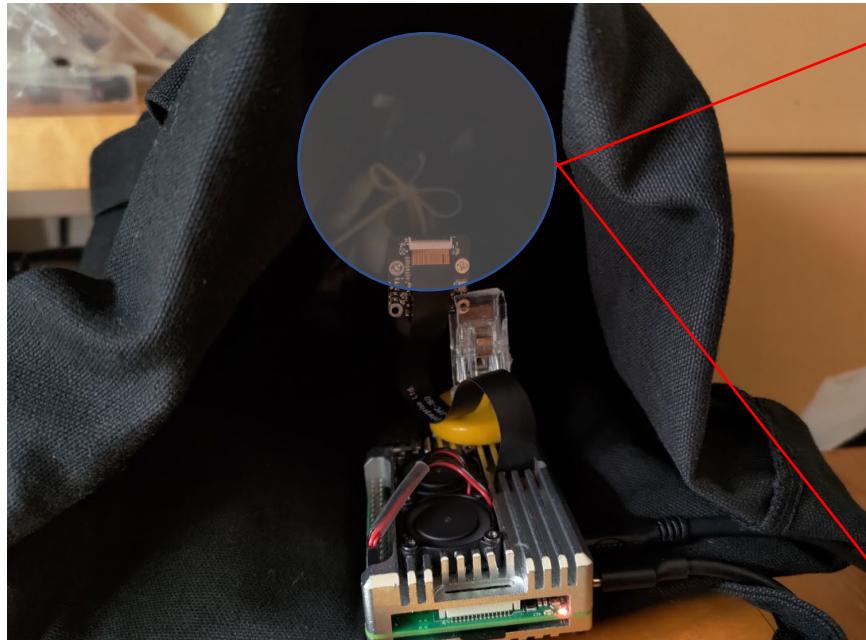
SE327MBD + SE-CXB01(FPD Link III) + libcamera + OpenCV(face detection)



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

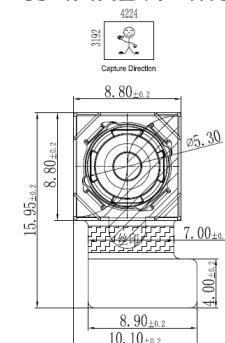
“SE258AF120” Lens Module of FoV(D)=120° with VCM Focus Driver

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.

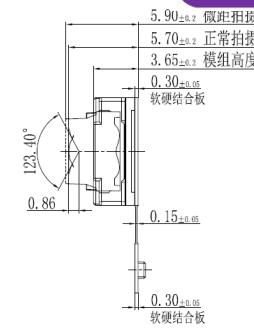
We will implement the focus driver command soon.

Many lens option including SE258PKG will be launched soon.
SE258AF120-00-CB02

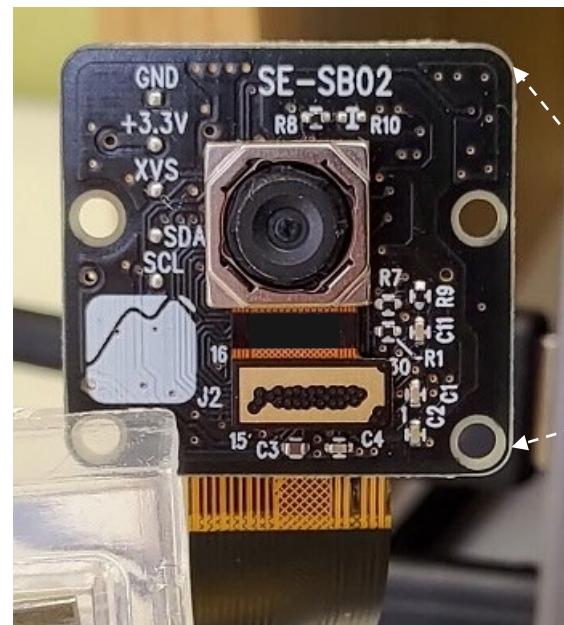
Almost the same size to IMX219 module



TOP VIEW



SIDE VIEW



2021.6 New Release ②

Tiny 4K camera on RaspberryPi



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



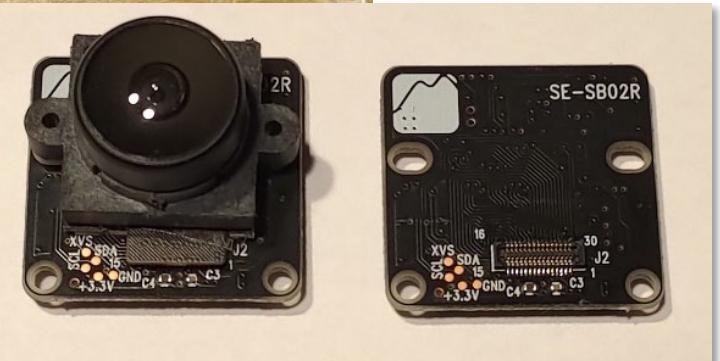
Many of M12(or other size) lens option can be attached by SE-SB02R

2021.6 New Release ③

1.3Mpix Global Shutter sensor module



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



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

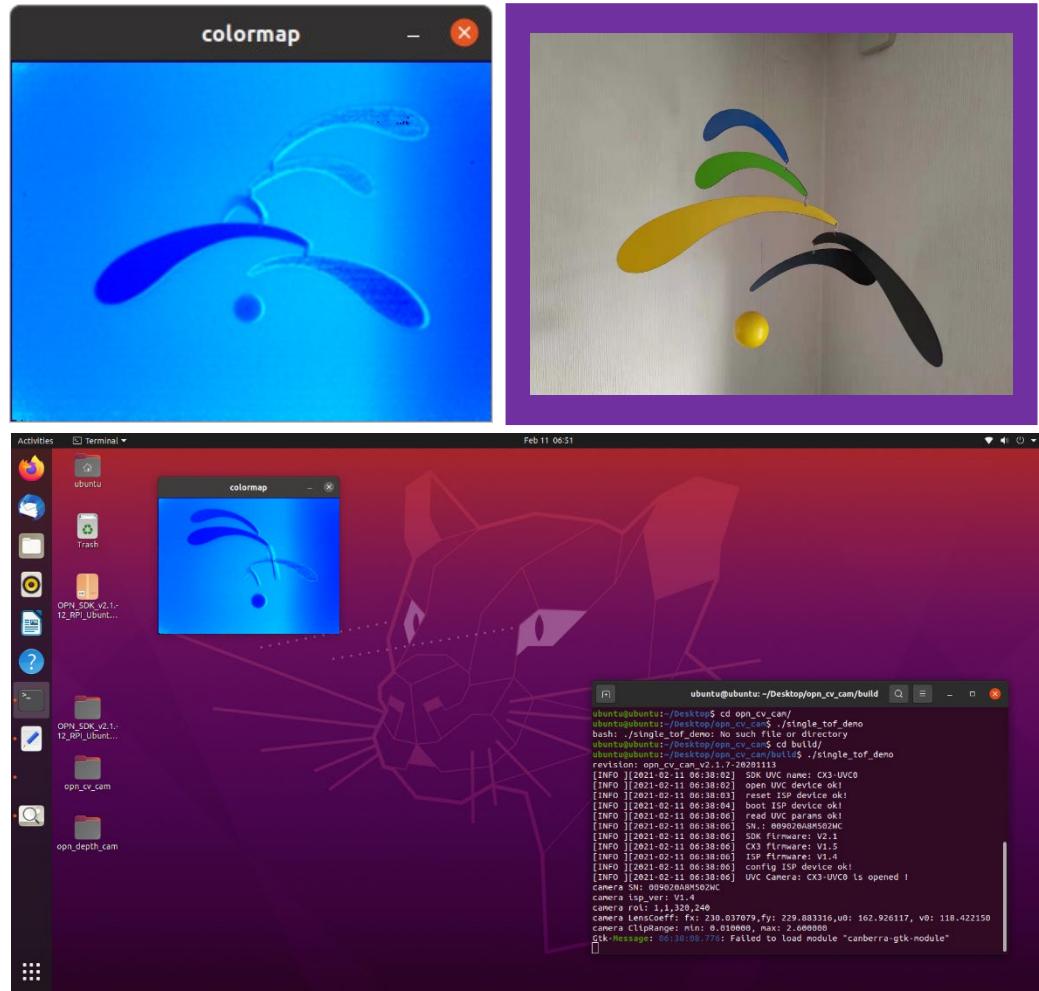
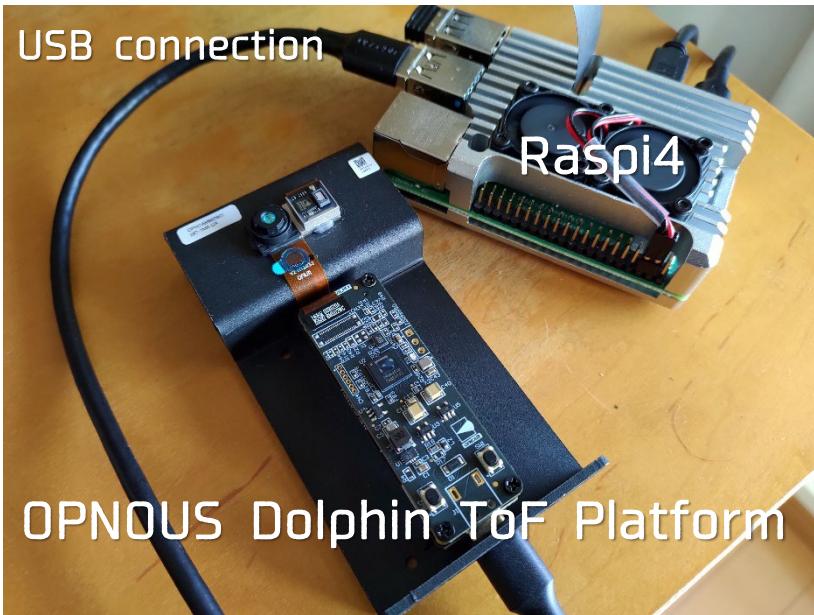
OPNOUS ToF Solution with high-speed ISP ASIC on Raspi4 Ubuntu20.04



Dolphin ToF Platform is working on RaspberryPi4 (OS: Ubuntu20.04)

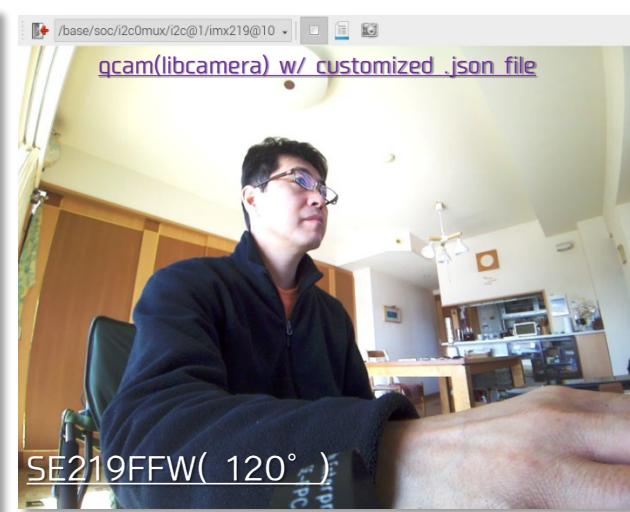
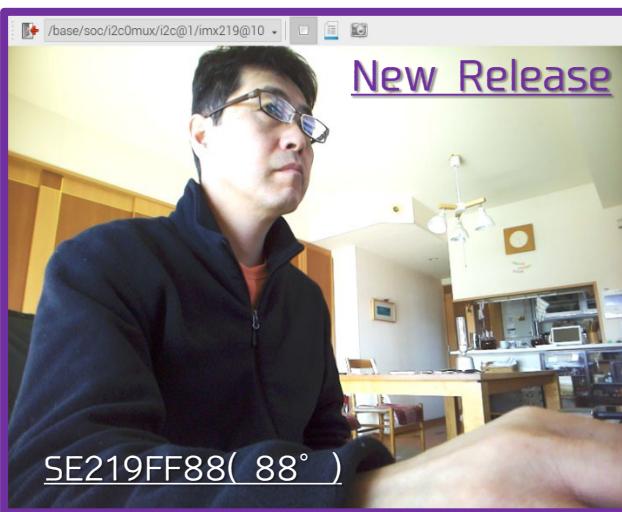
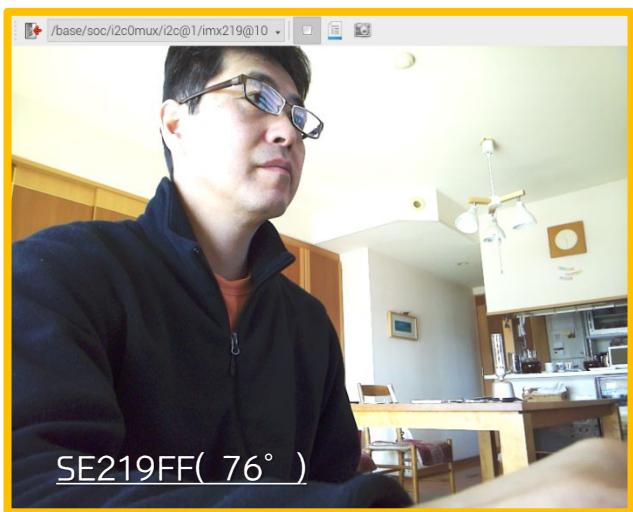
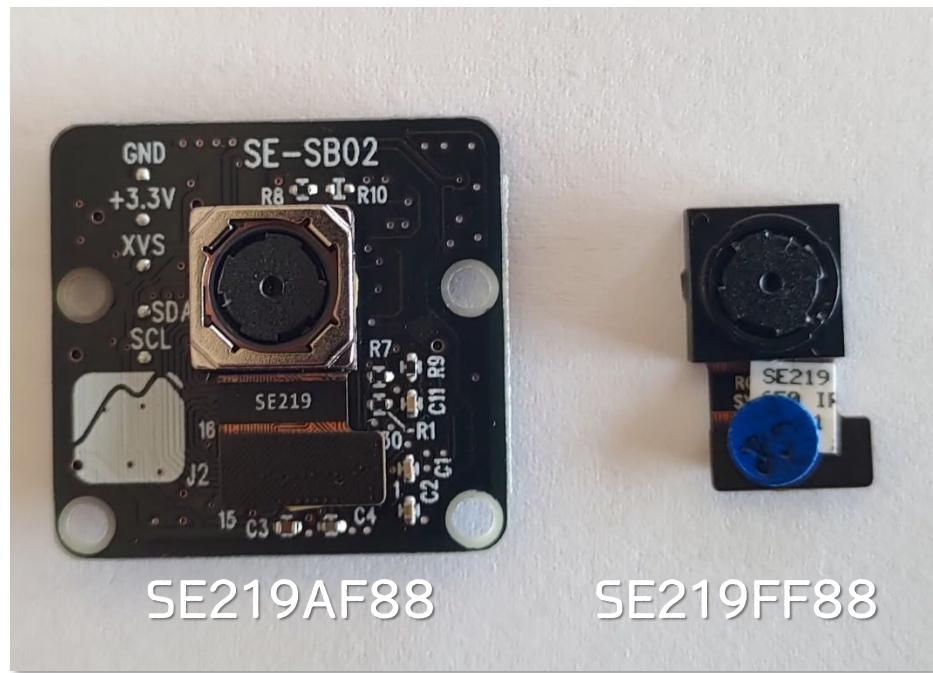
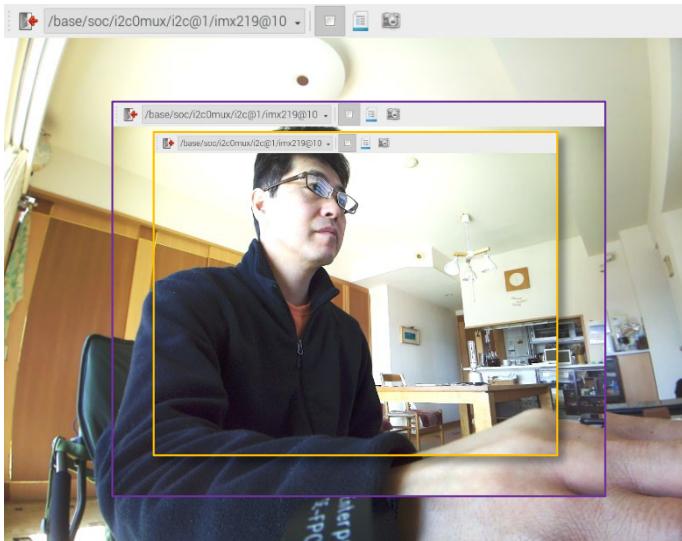
On board ISP realizes “easy to launch the ToF solution” on the most popular SBC.

MIPI camera version is also available.



2021.2 New Release ①

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

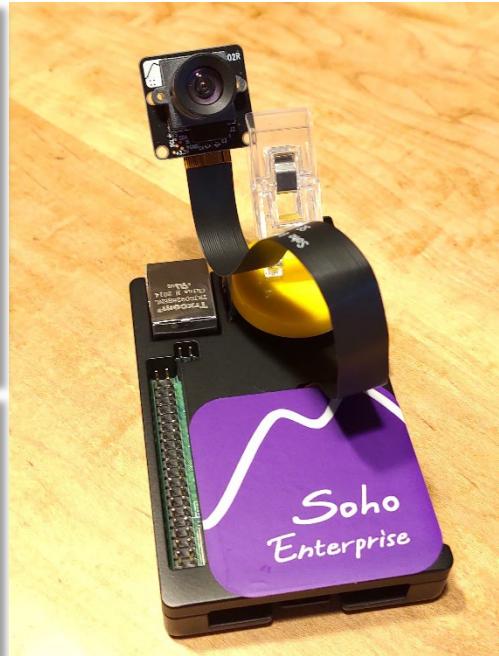
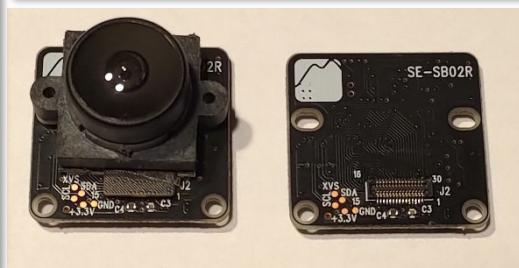


2021.2 New Release ②



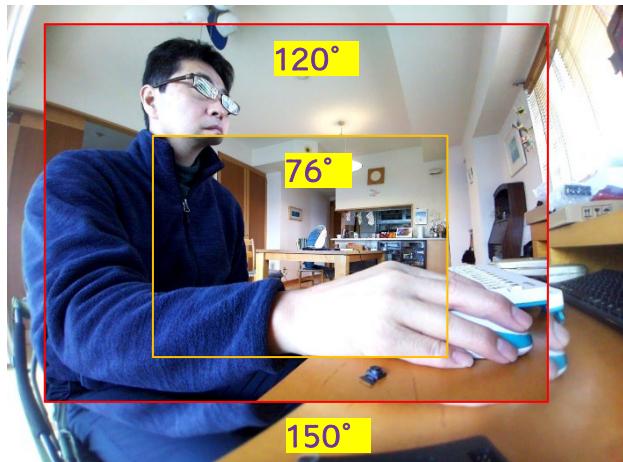
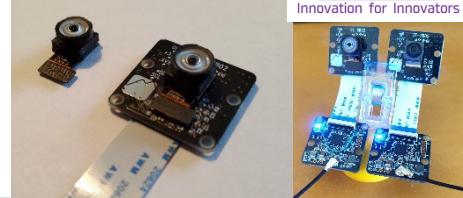
SE219PKG-00/01

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
ラインアップに加わりました。



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

120°

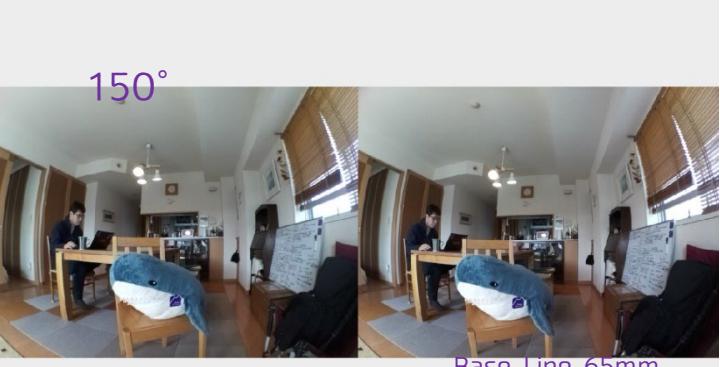


Base Line 65mm



Base Line 85mm

150°



Base Line 65mm



Base Line 85mm

160°



Base Line 65mm



Base Line 85mm

187°

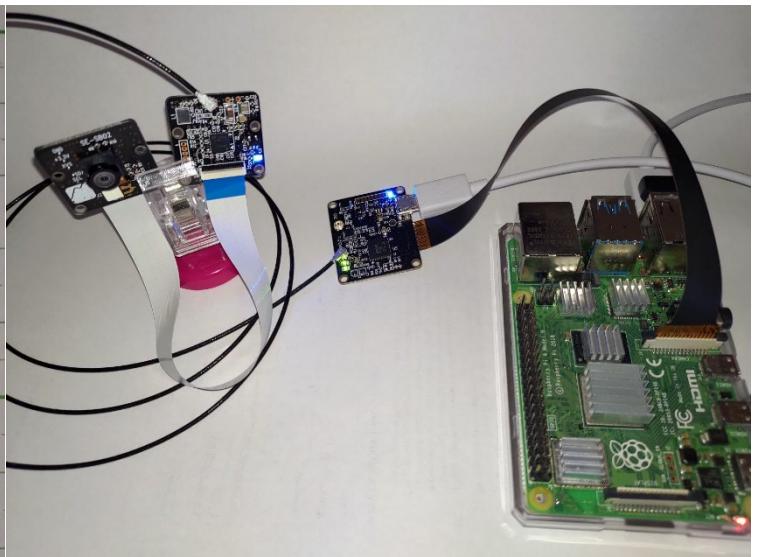
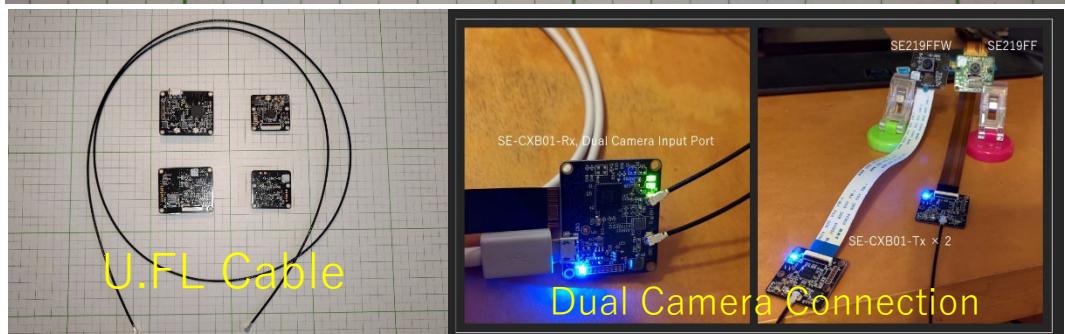
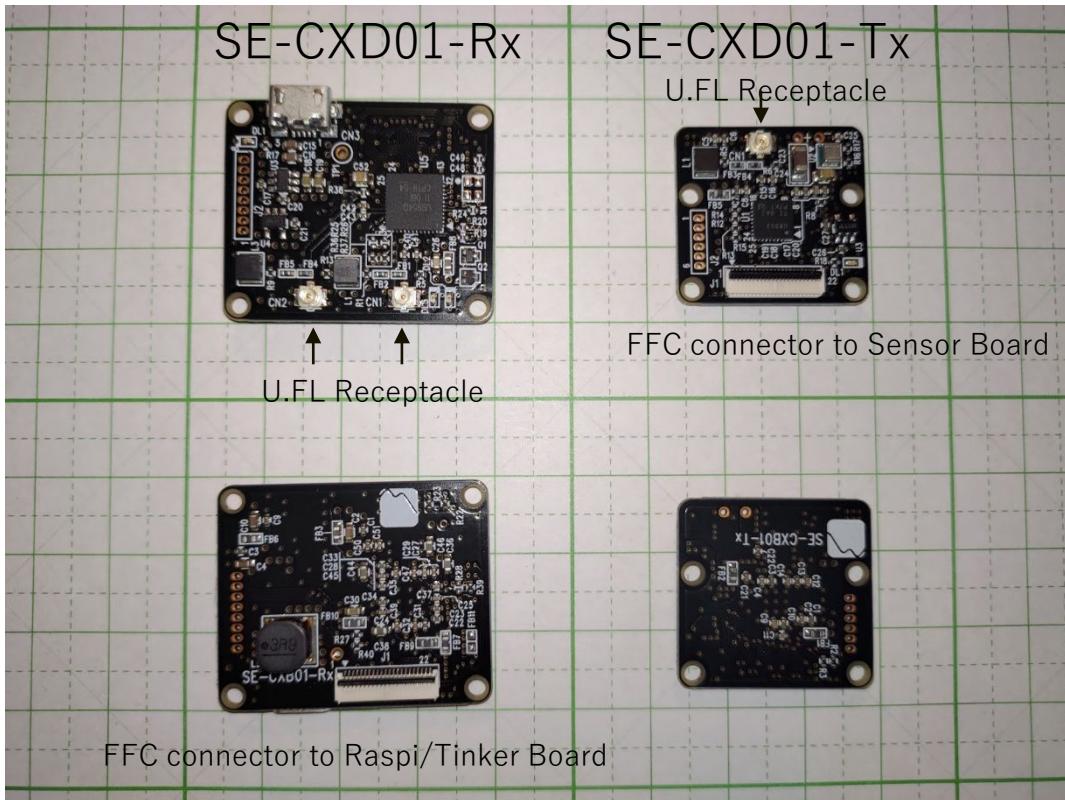


Base Line 65mm

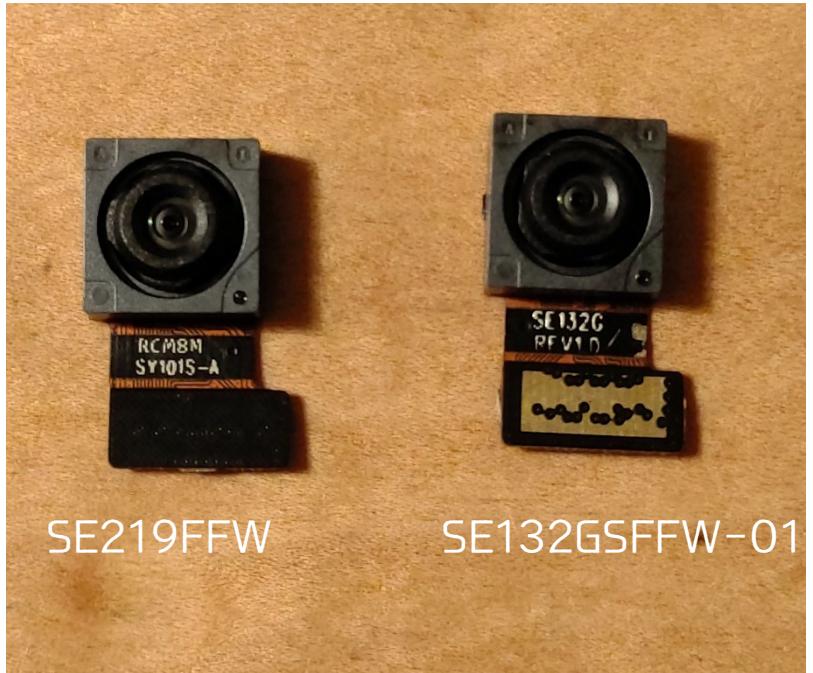


Base Line 85mm

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

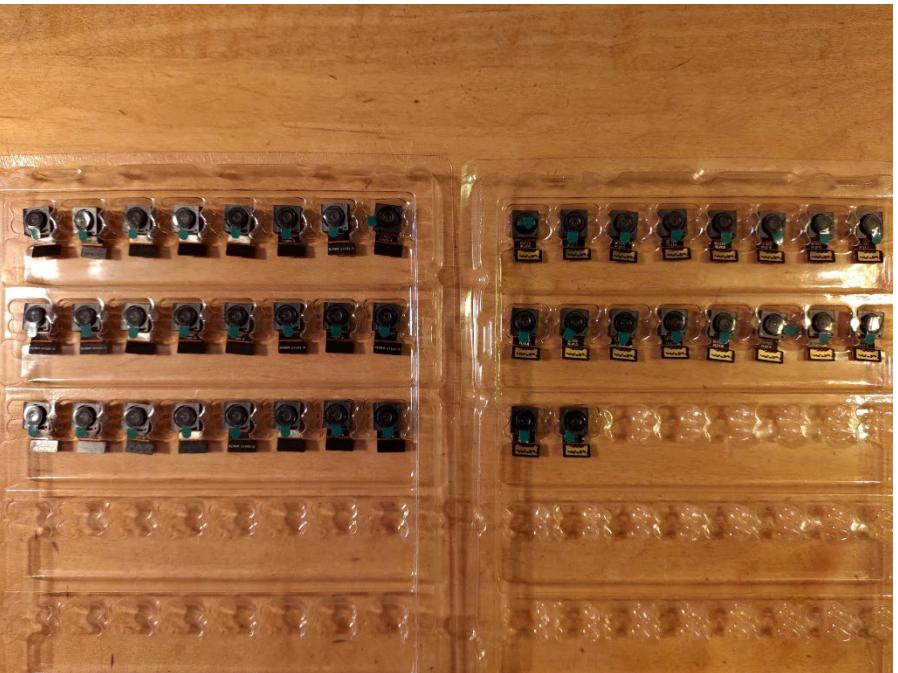


SE219FFW-00/01 and SE132GSW-01 FoV=120° 品のサンプル出荷開始



SE219FFW

SE132GSFW-01



FoV(Field of View) comparison SE219FF & FE219FFW



SE219FFW



SE219FF

→
重ねて
比較



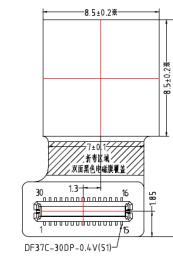
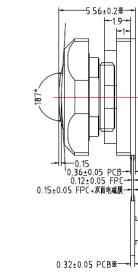
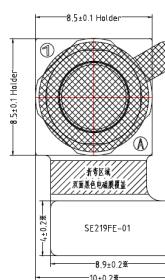
Vision System向けイメージセンサモジュール SE219FE-00-CB (w/ IRCF), SE219FE-01-CB (w/o IRCF)

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。

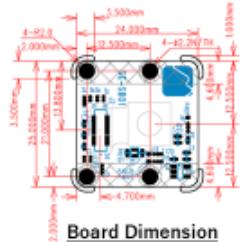




Soho Enterprise Ltd.

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

○ Monitoring wildlife ecology, harm to agriculture

○ VR Stereo Vision

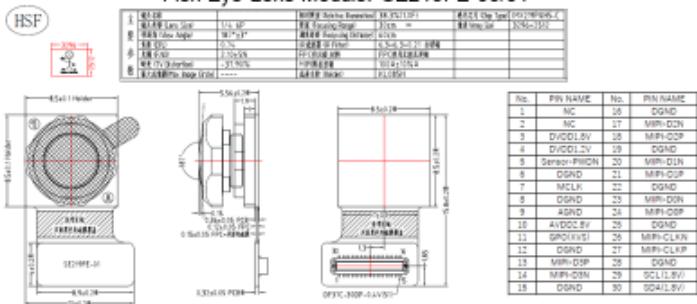
○ Home-use video monitoring & recording

○ Wide vision for Robots, AI speaker, any others

○ 360° monitoring on drones, robot cars, etc.

○ Sports camera for tennis, volleyball, badminton, etc.

Fish Eye Lens Module: SE219FE-00/01



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

Ver. 1.1.0

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	-20~60°C Function guarantee -20~60°C Performance guarantee
Module		Storage Temperature	-30~80°C
		Configuration	Type 1/4, 6P
		FoV	187° ± 3°
		F No.	2.10 ± 5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.
		Connector	30pin
		Size	8.5mm*8.5mm*5.56mm
Power Supply		Lens Holder size	Same (x, y) size to Raspi module
		Weight	0.4g
		Analog	2.8V ± 0.2V
		Digital	1.2V ± 0.12V
		IO	1.8V ± 0.18V
Board		Size	25mm*24mm
		Connector	1.0mm pitch 15pin 0.5mm pitch 22pin
		I/O Format	Support MIPI CSI-2 2lane and 4 lane
		Output	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 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 Sony 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>

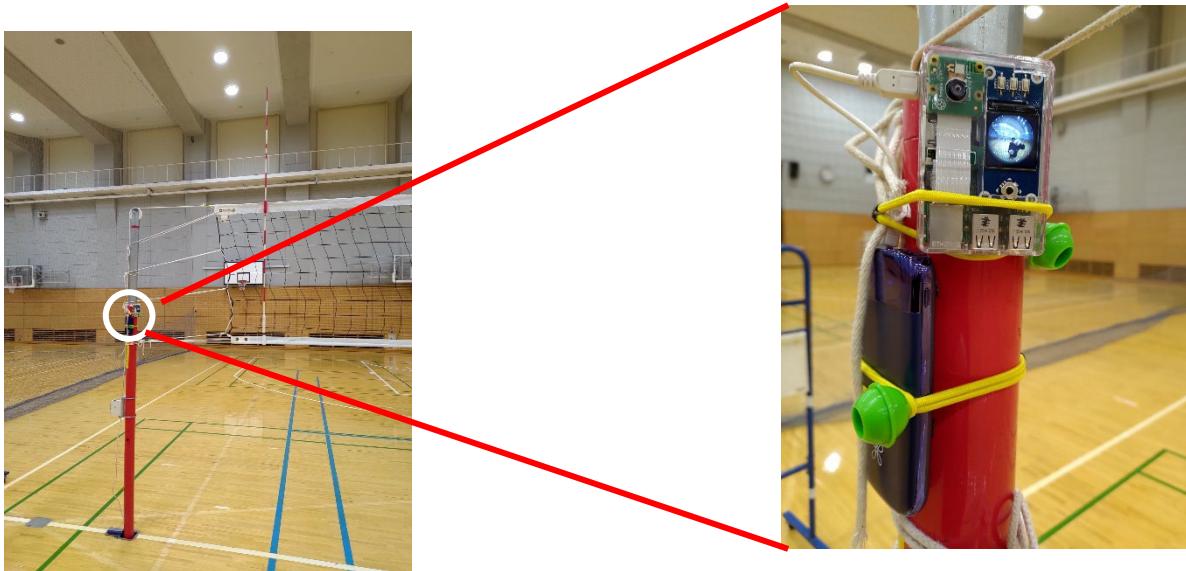
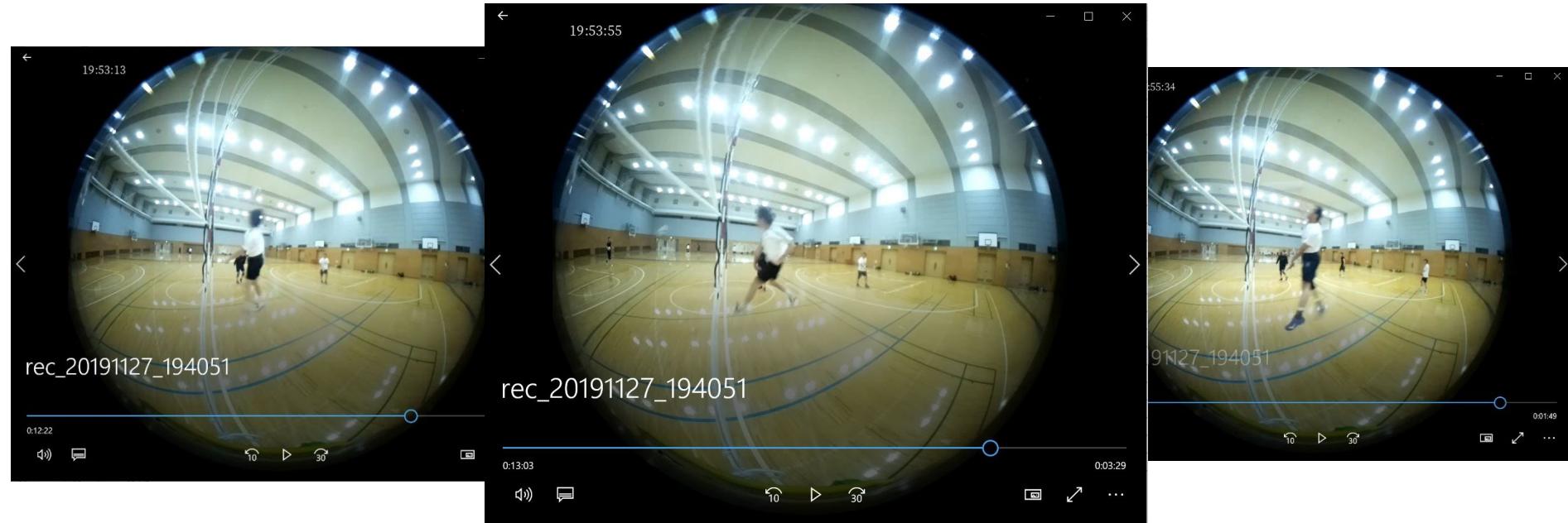


Ver. 1.1.0

魚眼カメラ応用事例：detect_cat（アプリSW配布中。）

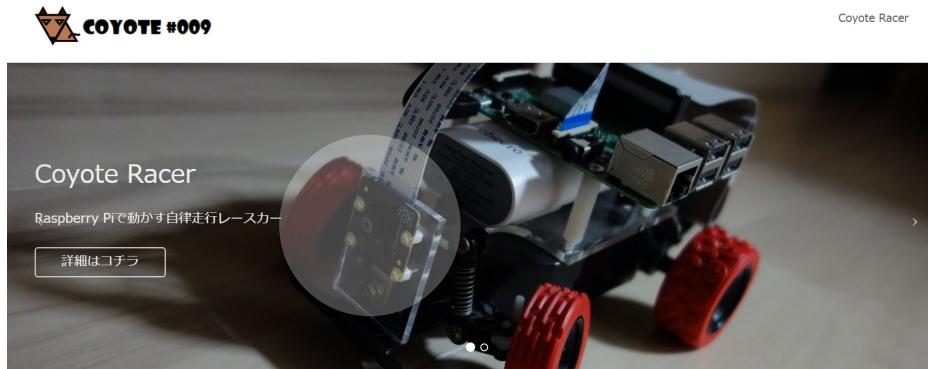


魚眼カメラ応用事例：魚眼スポーツカム

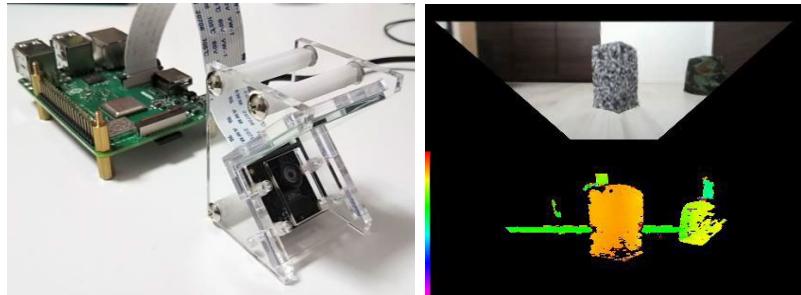


広角レンズモジュールのVision Processing適用事例

認識系アプリ



測距系アプリ

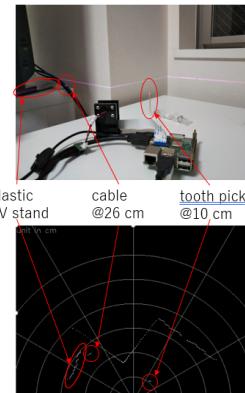


CQ出版社 Interface
2020年3月号に特集記事掲載→



超広角応用ステレオ測距

Line laser depth module



FoV~135deg
Processing time~15ms/frame

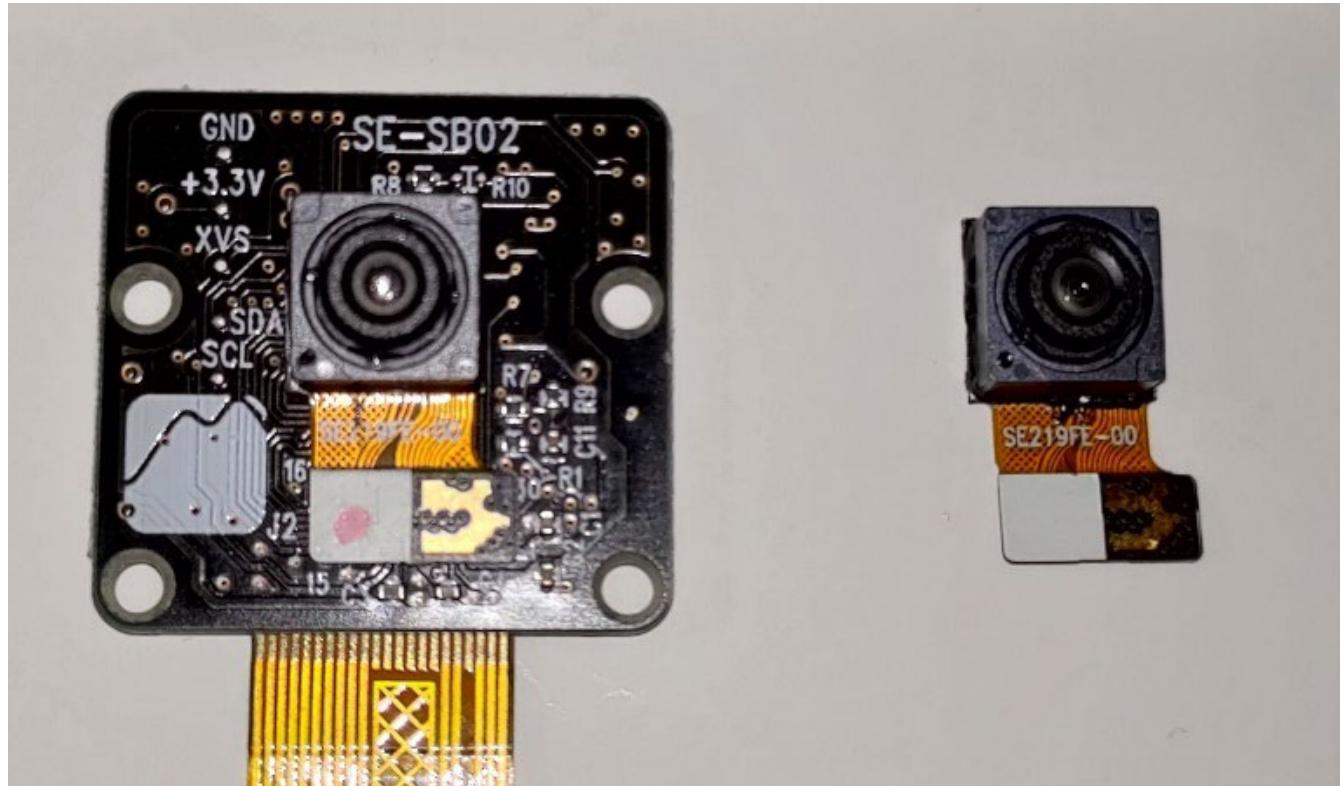


ラインレーザー+単眼ステレオ測距
132° 広角レーザーとの組み合わせ

FoV=120° 固定フォーカスカメラ

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

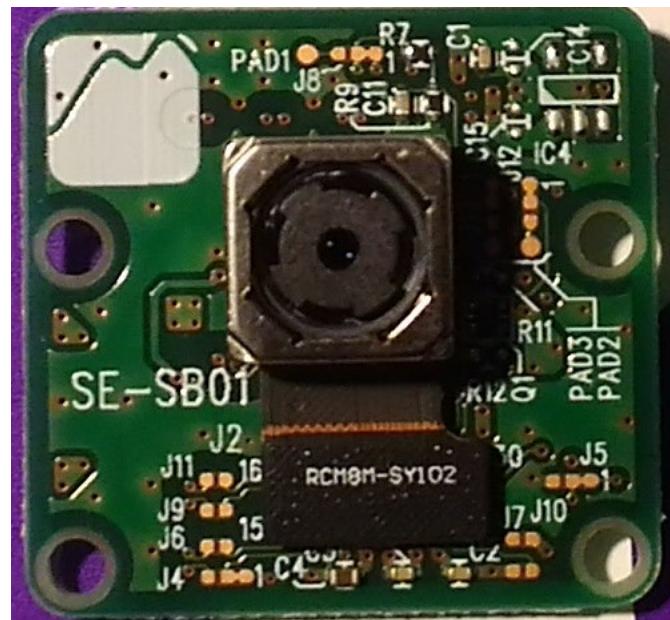
想定適用例：広角3D動画、顔認識、ドアホン、見守り監視、自律移動ロボットのセンシングなど



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 nodule 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

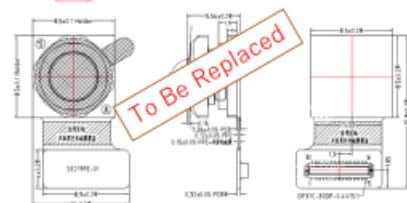
■ w/ IRCF(-00), w/o IRCF(-01) modules are available

■ Extensivity:

FC connector for MIPI CSI-24 lane connection for faster fps.

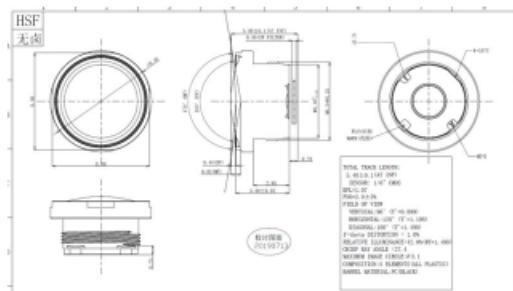
(HSF)

To Be Replaced



Pin Assignment

No.	PIN NAME	No.	PIN NAME
1	NC	26	DQND
2	NC	27	MIPI-DIN
3	DVDD1.8V	28	MIPI-DSP
4	DVDD1.2V	29	DQND
5	Sensor-PIN1CN	30	MIPI-DIN
6	DSDN	31	MIPI-DSP
7	VDD1.8V	32	SOA4
8	DQDN	33	MIPI-DIN
9	ASND	34	MIPI-DSP
10	AVDDC.8V	35	DQND
11	DQDN	36	MIPI-CLKN
12	DSRD	37	MIPI-DSP
13	MIPI-DIP	38	DQND
14	MIPI-DIN	39	SCLL1.8V
15	DQND	40	SOA1.8V



IMX219
D=4.6mm

Imaging area
&
Image circle

■ Assumed application cases

- Look down monitoring with few blind spots
- VR/Stereo Vision
- Wide vision for Robots, AI speaker, any others

- Monitoring wildlife ecology, harm to agriculture
- Home-use video monitoring & recording

Ver.0.10

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 4.6mm
		Operation Temperature	-20~60°C Function guarantee -20~60°C Performance guarantee
		Storage Temperature	-30~80°C
Lens		Configuration	Type 1/6, 5P
		FoV	160° ±(TBD)*
		F No.	2.0 ± 5%
		Focus range	30cm ~ infinity, Adjusted at 60cm when shipped.(TBD)
Module	30pin	Connector	Compatible w/ Raspi Camera v2.1 module
	8.5mm×8.5mm*TBDmm	Size	Lens Holder size. Same (x, y) size to Raspi module
	0.4g(Tentative)	Weight	
Power Supply		Analog	2.8V ± 0.2V
		Digital	1.2V ± 0.12V
		IO	1.8V ± 0.18V
		Size	25mm*24mm Almost same size and compatible position for screw holes with RaspberryPi camera V2.1.
Board (option)		Connector	1.0mm pitch 15pin For Tinker board, RaspberryPi
		0.5mm pitch 22pin	RaspberryPi0, Raspi compute module, etc.
		I/O Format	Support MIPI CSI-2 2lane and 4 lane
		Output	Maximum speed Full size: 30fps, FHD: 60fps, 720P: 180fps (MIPI 4 lane mode)
Power Supply		Power Supply	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 Sony 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. 0.10

New Release

Vision System向けイメージセンサモジュール

SE132GSFF-00/01-CB02

SE132GSFE160-00/01-CB02

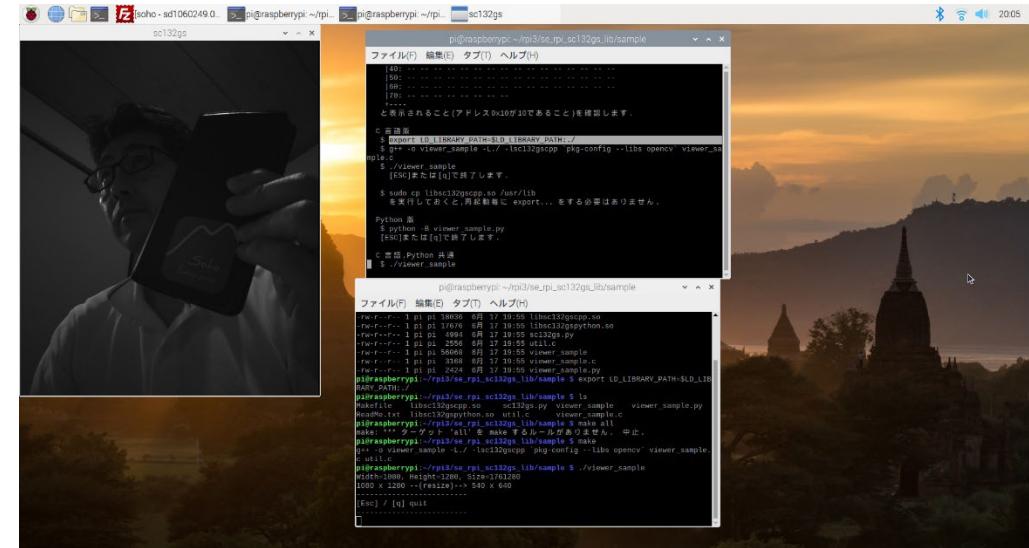
中国SMARTSENS TECHNOLOGY社の最新Global Shutter Image Sensorをモジュール化しました。

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



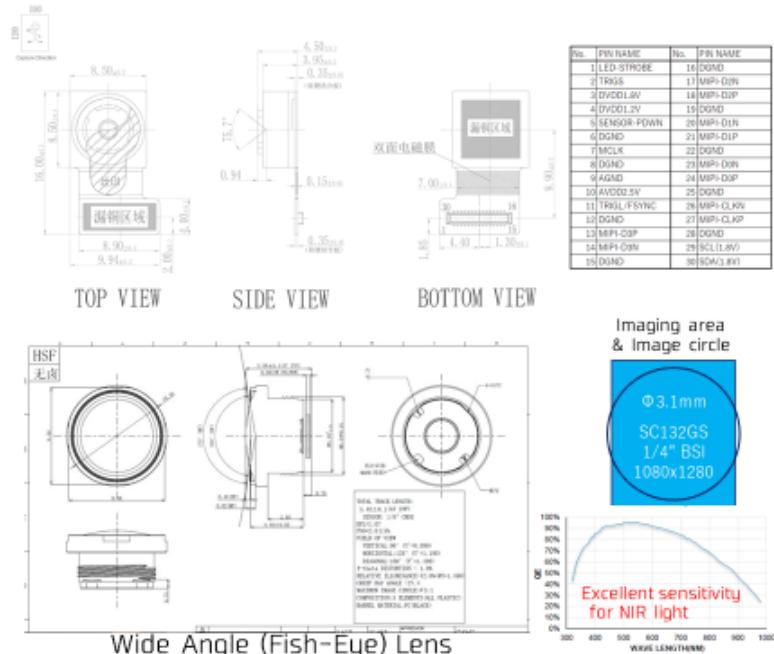


Soho Enterprise Ltd.

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.



■ 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

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)°
	Connector	F No.	2.0±5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.(TBD)
	30pin	Compatible w/ Raspi Camera v2.1 module	
	Size	10.5*10.5*6.3mm(TBD)	Lens Holder size. 8.5 * 8.5 * 6.3mm by COB
Board (option)	Weight	0.4g(Tentative)	
	Power Supply	Analog	2.5V±0.1V
		Digital	1.2V±0.08V
	I/O	IO	1.8V±0.1V
		Size	25mm* 24mm
		Connector	1.0mm pitch 15pin For Tinker board, RaspberryPi
	Output	0.5mm pitch 22pin	RaspberryPi0, Raspi compute module, etc.
		I/O Format	Support MIPI CSI-2 2lane and 4 lane
	Power Supply	Maximum speed	Full size: 120fps (MIPI 4 lane mode)
		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
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■ 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 120x120 mm² QVGA (256x240) / VGA (640x480) pixel matrix sensing module. It has 3D depth sensing function, which can be used for depth sensing, depth-aware camera, 3D scanning, 3D mapping, 3D reconstruction, etc. These sensors have been won in industry leading accuracy. The power consumption achieves the lowest power level in the industry, which benefit 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-bits ADC is also integrated for eye protection and temperature monitoring. The OPN7007 supports FC-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 processing the ToF raw data to easy-use distance and depth data. With a novel self-learning engine, it also automatically tunes the sensor parameters. The built-in high performance ARM Cortex-A7 processor is also integrated to handle system controlling and various applications. It can support up to 2 ToF sensors simultaneously with MIPI CS2 interface, merge different sensor raw data to form a depth map by 3D-DTOF, and do 3D SLAM/3D reconstruction.



FUNCTIONAL DESCRIPTION

The OPNE8008B is our Evaluation Kit for the QVGA OPNB008D Time-of-Flight (ToF) Sensor. This Evaluation Kit is fully assembled and tested camera system designed for the evaluation of the OPNB008D QVGA ToF Sensor, which provides all necessary hardware to operate OPNB008D, 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

Opnous provides a series of Time-of-Flight (ToF) imaging modules, fitting for most kinds 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 benefit many portable and energy saving applications.



GENERAL DESCRIPTION

Hawk 3D ToF platform consists of OPNOUS ToF sensor OPNB008, 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 can connect to host computer to integrate ToF 3D vision solution for mid and long range applications.



GENERAL DESCRIPTION

Dolphin 3D ToF platform consists of OPNOUS ToF sensor module and ToF 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.

