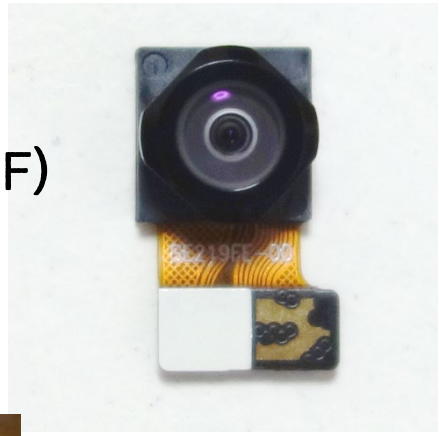
Camera Module Line-up

Sept.2020(Rev.01)

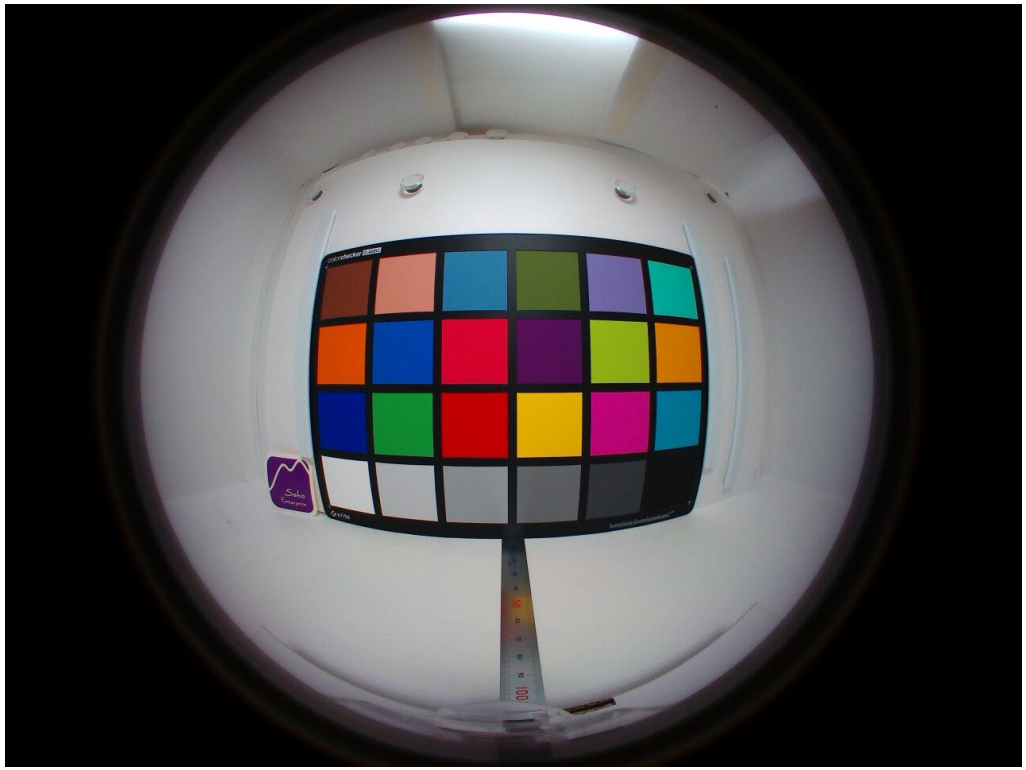
双峰エンタープライズ株式会社

Soho Enterprise Ltd.

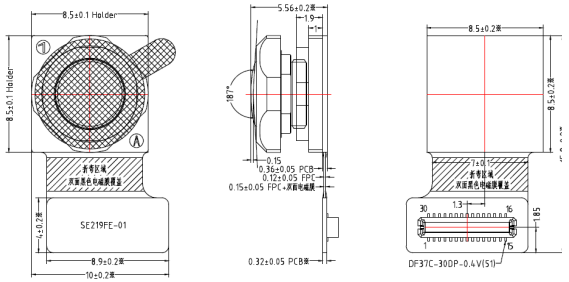
2019年のハイライト



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6㎜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。



chip 1 stop An Arrow Company
Physical Computing Lab by TechShare
にて販売中！

Soho Enterprise Ltd.

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

■SE219FE-00/01-CB

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

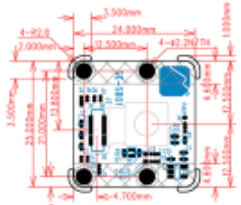
■ **Adopted the most mature image sensor for SBC.**
Sony IMX219PQH5-C

■ **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

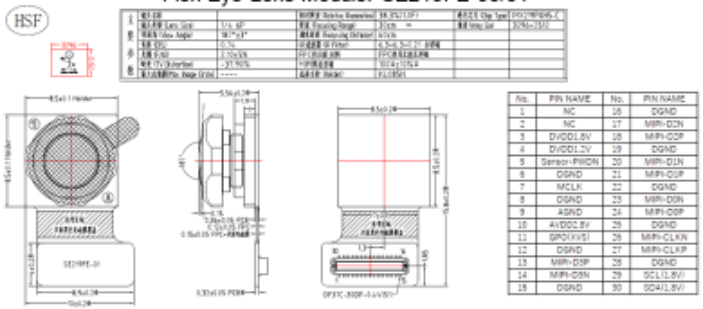


Board Dimension

■**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
- ○360° monitoring on drones, robot cars, etc.
- ○Sports camera for tennis, volleyball, badminton, etc.

Fish Eye Lens Module: SE219FE-00/01



No.	PIN NAME	No.	PIN NAME
1	NC	16	DGND
2	NC	17	MIPI-D2N
3	DVDD1.8V	18	MIPI-D2P
4	DVDD1.2V	19	DGND
5	Sensor-PWDN	20	MIPI-D1N
6	DGND	21	MIPI-D1P
7	MCLK	22	DGND
8	DGND	23	MIPI-D0N
9	AGND	24	MIPI-D0P
10	AVDDC.8V	25	DGND
11	SPO(XVS)	26	MIPI-CLKN
12	DGND	27	MIPI-CLKP
13	MIPI-D3P	28	DGND
14	MIPI-D3N	29	SCL(1.8V)
15	DGND	30	SDA(1.8V)

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
		Storage Temperature	-30~80°C
Module	Lens	Configuration	Type 1/4, 6P
		FoV	187° ±3°
		F No.	2.10±5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.
	Connector	30pin	Compatible w/ Raspi Camera v2.1 module
	Size	8.5mm*8.5mm*5.56mm	Lens Holder size. Same (x, y) size to Raspi module
	Weight	0.4g	
	Power Supply	Analog	2.8V±0.2V
		Digital	1.2V±0.12V
		IO	1.8V±0.18V
Board	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, Raspi compute module, etc.
	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	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?

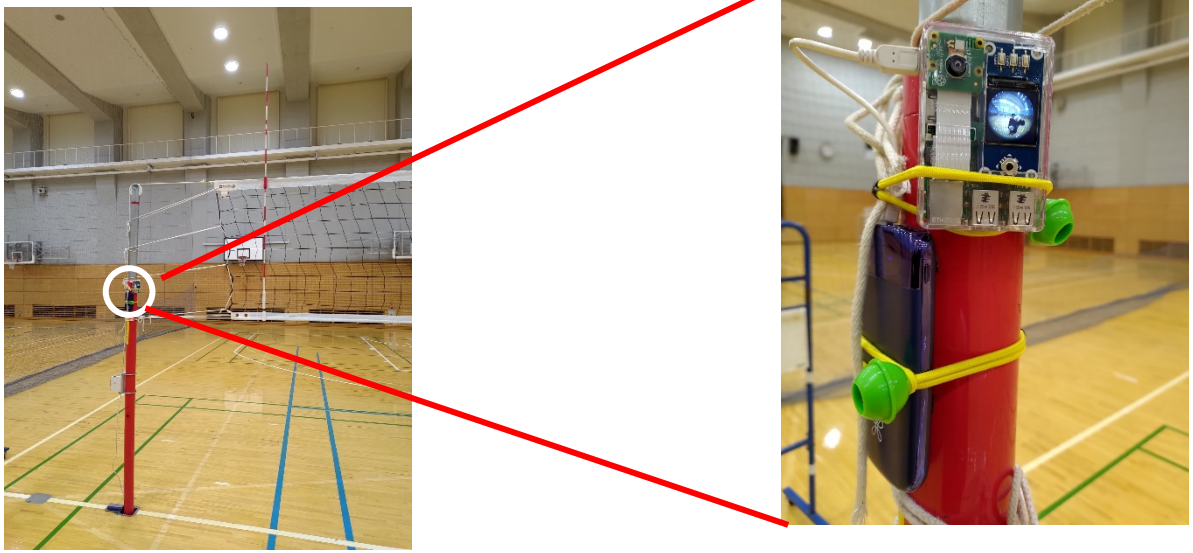
1. ***Good image quality***
   The SE camera series uses a high-quality Sony image sensors of better SNR.
2. ***Ready to use on tinker board and other SBCs***
   Camera drivers are ready. Easy to customize for PoC prototyping
3. ***Variety of Options***
   Wide variety of options for resolution, global 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

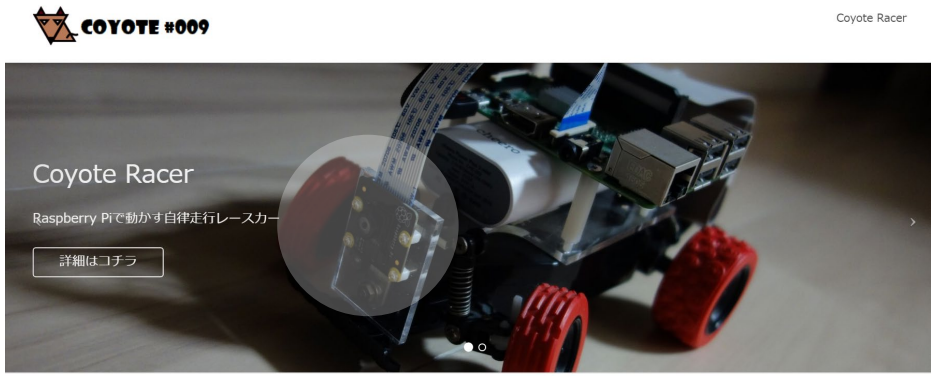
魚眼カメラ応用事例：detect_cat（アプリSW配布中。）

魚眼カメラ応用事例：**魚眼スポーツカム**



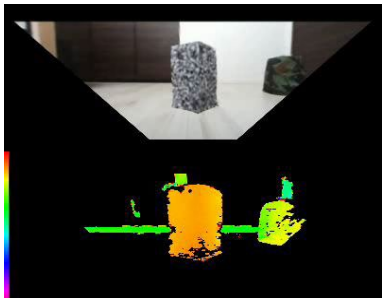
Vision Processing適用事例

認識系アプリ

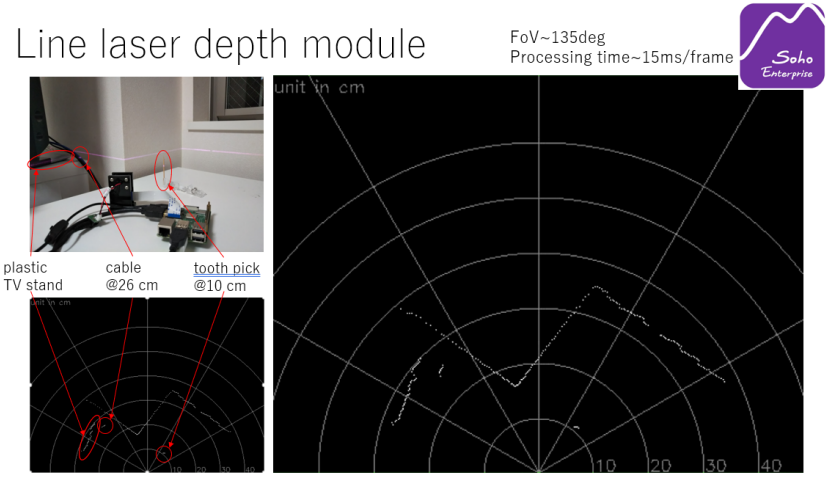


CQ出版社 Interface
2020年3月号に特集記事掲載→

測距系アプリ



超広角応用ステレオ測距



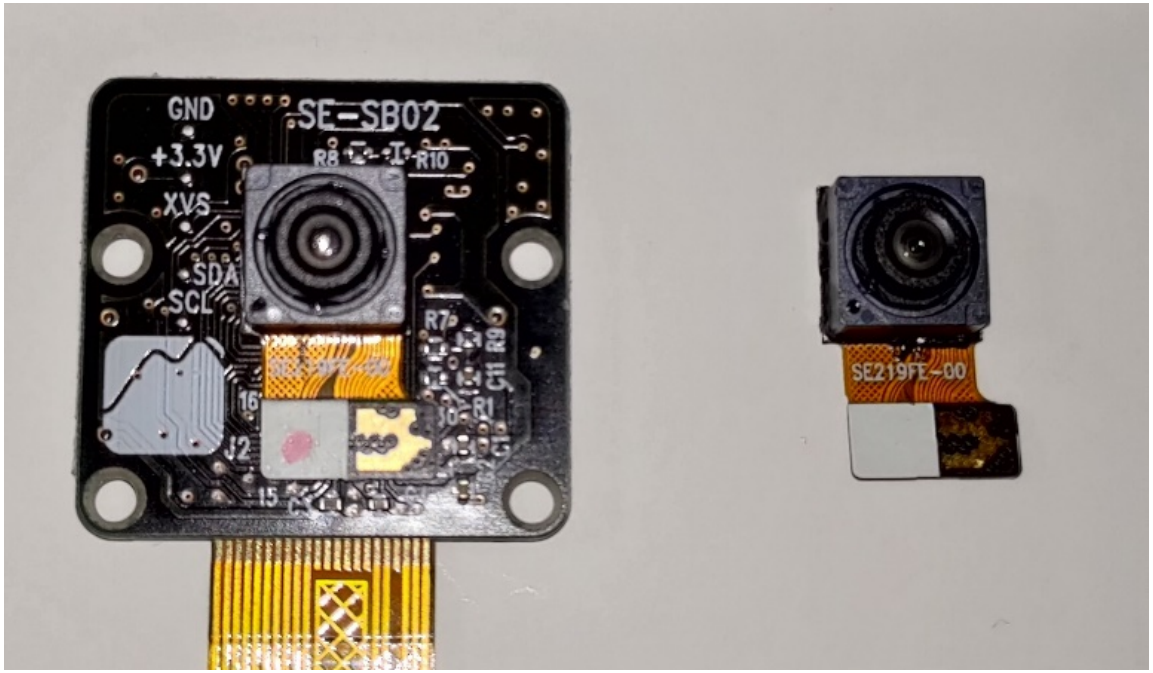
ラインレーザー＋単眼ステレオ測距
132° 広角レーザーとの組み合わせ

サンプル出荷中

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

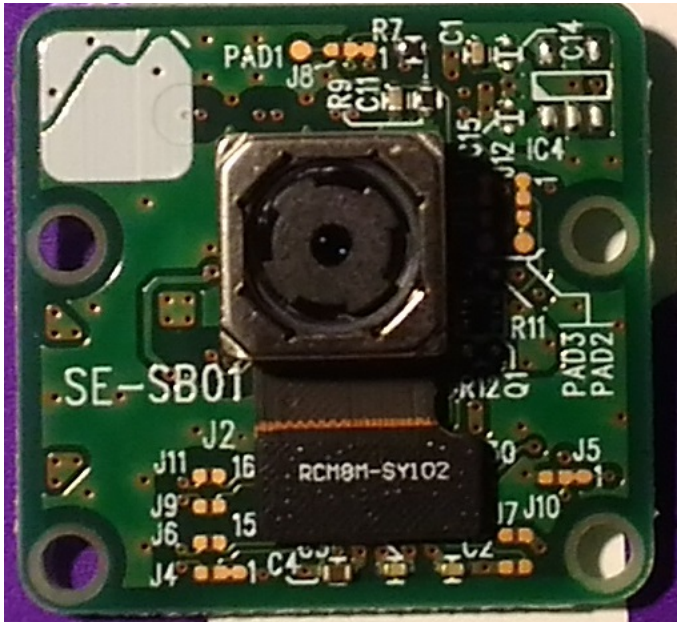


Vision System向けイメージセンサーモジュール

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
3㎝～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=120°品のカスタム製造応談



サンプル出荷中

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。

SE Camera Board Series Product Brochure

Soho Enterprise Ltd.

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

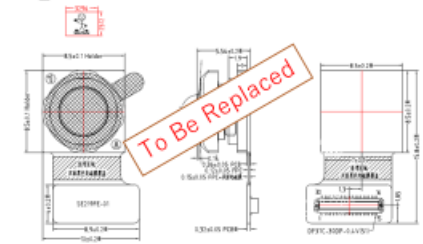
■SE219FE160-00/01

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



Pin Assignment

No.	PIN NAME	No.	PIN NAME
1	NC	16	DGND
2	NC	17	MIPI-D0N
3	DVDD1.8V	18	MIPI-D0P
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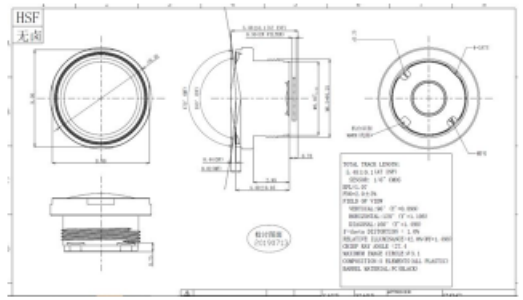
6	DGND	21	MIPI-D1P
7	MCLK	22	DGND
8	DGND	23	MIPI-D2N
9	AGND	24	MIPI-D2P
10	AVDD2.8V	25	DGND
11	GPO1/VSYNC	26	MIPI-CLKN
12	DGND	27	MIPI-CLKP
13	MIPI-D3P	28	DGND
14	MIPI-D3N	29	SCL(1.8V)
15	DGND	30	SDA(1.8V)



Imaging area
&
Image circle

■**Assumed application cases**
- ○Look down monitoring with few blind spots
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- ○Wide vision for Robots, AI speaker, any others
- ○Monitoring wildlife ecology, harm to agriculture
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Ver. 0.1.0

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		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 1/6, 5P
		FoV	160° ±(TBD)°
		F No.	2.0±5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.(TBD)
	Connector	30pin	Compatible w/ Raspi Camera v2.1 module
	Size	8.5mm*8.5mm*TBDmm	Lens Holder size. Same (x, y) size to Raspi module
	Weight	0.4g(Tentative)	
	Power Supply	Analog	2.8V±0.2V
		Digital	1.2V±0.12V
		IO	1.8V±0.18V
Board (option)	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, Raspi compute module, etc.
	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	3.3V±0.3V	Generate Analog 2.8V by on-board LDO
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■**Further Information:**
https://soho-enterprise.com/
https://www.visionproc.org/index.php

Ver. 0.1.0

2018年製品、量産出荷中

Vision System向けイメージセンサーモジュール第一弾
SE397GS-00/01-CB, SE397GSW-00-CB
High speed global shutter camera

画素ピッチ：3.45um (IMX219は1.12um)で高感度
すなわち高速シャッターがきれる。
動被写体を、ボケ、歪みを少なく撮影できる！
FoV=90°および180°品、
90°品はIRCF 有/無　選択可能

SE397GS-01-CB

FoV 90°　NoIR

SE397GSW-00-CB

Diagonal 2.799 mm (Type 1/6.4) 0.32 Mega-Pixel (VGA) CMOS Image Sensor with Square Pixel for B/W Cameras

IMX397CLN-C

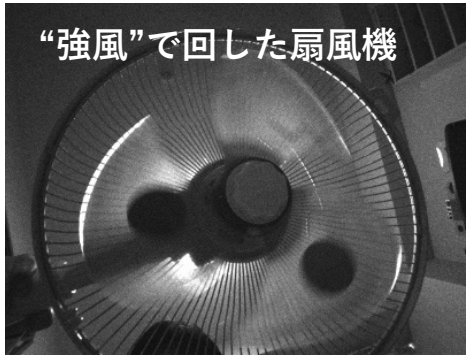
Pregius

Description

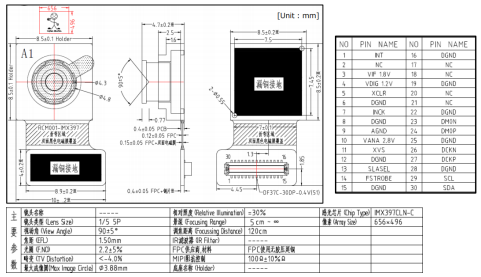
IMX397CLN-C is a diagonal 2.799 mm (Type1/6.4) 0.32 Mega-pixel CMOS active pixel type image sensor with a square pixel array. By introducing Global Shutter technology with low PLS (Parasitic Light Sensitivity), high sensitivity and low noise, motion blur is suppressed. It equips an electronic shutter with variable integration time. It operates with three power supply voltages: analog 2.8 V, digital 1.2 V and 1.8 V for input / output interface and achieves low power consumption.
(Application: FA Cameras, Sensing)

Features

- ◆CSI-2 serial data output (DPHY ver1.1 compliant)
- ◆2-wire serial communication circuit
- ◆10-bit A/D converter
- ◆CDS / PGA (digital 24dB, analog 18dB)
- ◆Automatic optical black clamp circuit
- ◆Variable-speed electronic shutter (1H units)
- ◆Independent flipping and mirroring
- ◆Pixel binning readout and H / V sub-sampling function
- ◆Dual sensor synchronization operation
- ◆Trigger (Internal & External)



IMX397 Camera Lens Module



Rolling Shutter

Motion Blur

Global Shutter

https://www.teledynedalsa.com/en/learn/knowledge-center/global-shutter-imaging/

Soho Enterprise Ltd.

Global Shutter Camera Board w/ VGA CIS for Single Board Computers

■SE397GS-00/01-CB

■ **Adopted Sony Global Shutter Image Sensor**
Sony IMX397CLN-C high sensitivity GS CIS

■**Wide View Angle: FoV(D) –90° ±5°**
Suitable for wide angle image recognition usage in AIoT area

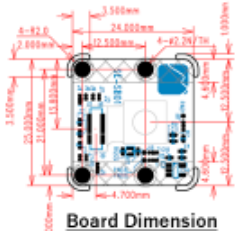
■**High Speed Operation**
Up to 240fps

■ **Camera Driver for "tinker board" is available.**
Tinker board & RaspberryPi in RAW capture mode

■ **Extensivity:**
Synchronization by XVS (GPIO)

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

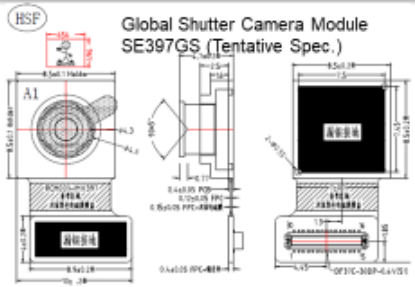
■**Ultra-Wide-Angle Option: FoV(D)–180 ° (Tentative)**



Board Dimension

■**Assumed application cases**
- ○Machine vision for the object in fast motion
- ○Vision analysis in sports training
- ○Biometrics
- ○Measurement device to adjust the mechanical timing
- ○Stereo depth measurement in motion
- ○Motion capture for gesture control in VR game
- ○Motion capture for computer graphic animation

Global Shutter Camera Module
SE397GS (Tentative Spec.)



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

NO	PIN NAME	NO	PIN NAME
1	INT	16	DGND
2	NC	17	NC
3	VIF 1.8V	18	NC
4	VDIG 1.2V	19	DGND
5	XCLR	20	NC
6	DGND	21	NC
7	INCK	22	DGND
8	DGND	23	DMCN
9	AGND	24	DMCP
10	VANA 2.8V	25	DGND
11	XVS	26	DCKN
12	DGND	27	DCKP
13	SLASEL	28	DGND
14	FSTROBE	29	SCL
15	DGND	30	SDA

Key Specifications SE397GS-CB

Image sensor	Product Code: IMX397CLN-C	Manufacturer	Sony Back-side illuminated CMOS image sensor
		Pixel size	3.45um x 3.45um
		Active Image Area	640 x 480 VGA
		Optical Size	Type 1/8.4 Diagonal 2.80mm
		Operation Temperature	-30~75℃ Function guarantee -10~60℃ Performance guarantee
		Storage Temperature	-40~80℃
Module	Lens	Lens configuration	GS: Type 1/5 5P, GSW: Type 1/4 6P
		FoV	GS: 90° ±5° , GSW: 187° ±3° (diagonal)
		F No.	GS: 2.2±5%, GSW: 2.1±5%
		Focus range	5cm – Infinity, Adjusted at 120cm when shipped (GS), TBD for GSW
	Connector	30pin	Compatible w/ Raspi Camera v2.1 module
	Size	8.5mm*8.5mm *4.7mm	Lens Holder size Same (x, y) form factor to Raspi module
	Weight	0.4g	
	Power Supply	Analog	2.8V±0.2V
		Digital	1.2V±0.12V
		IO	1.8V±0.18V
Board	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, Raspi compute module, etc.
	Output	I/O Format	Support MIPI CSI-2 1lane
		Maximum speed	Full size: 240fps
	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

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■**Further Information:**
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https://www.visionproc.org/index.php

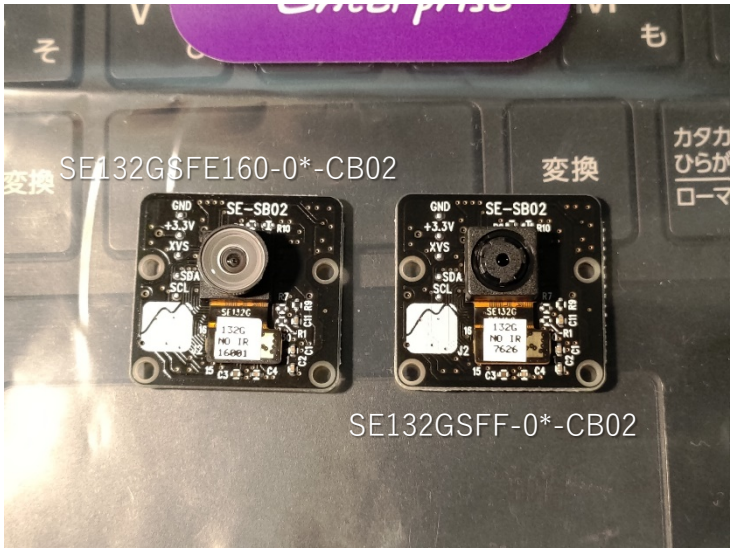
New Release
Vision System向けイメージセンサーモジュール

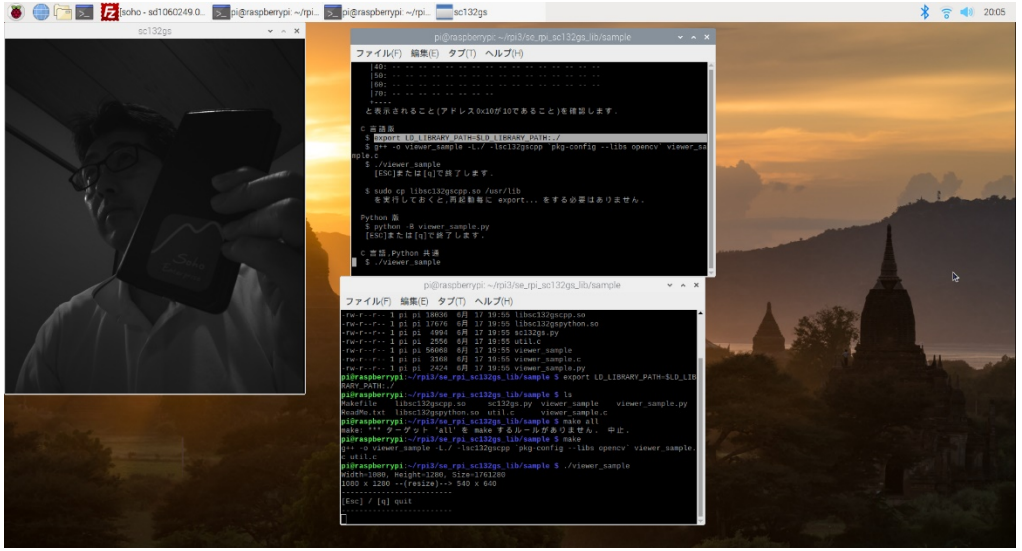
SE132GSFF-00/01-CB02
SE132GSFE160-00/01-CB02

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

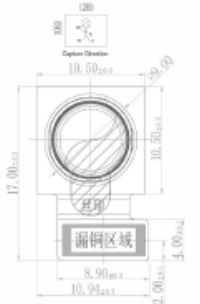
■SE132GSFE160-00/01

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

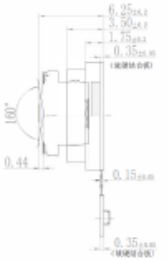
■ Adopted the best in class global shutter CMOS image sensor of BSI.
Smartsens SC132GS

■ w/ IRCF(-00), w/o IRCF(-01) modules are available
Customized Band Path Filters are also available

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

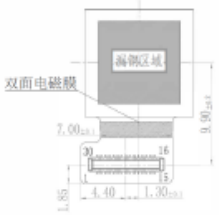


TOP VIEW



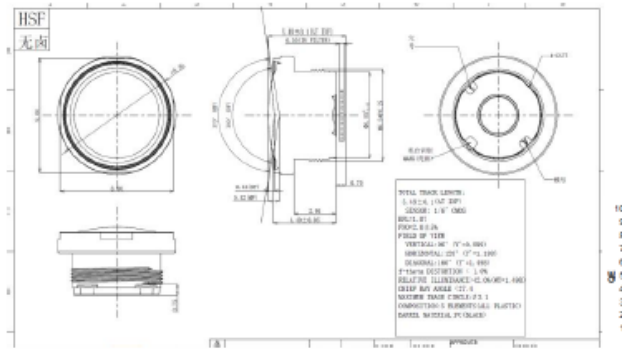
SIDE VIEW

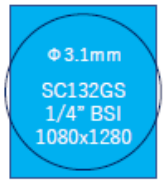
TENTATIVE



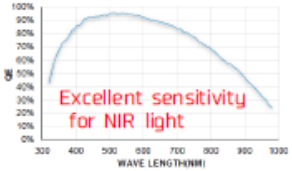
BOTTOM VIEW

No.	PIN NAME	No.	PIN NAME
1	LED-STROBE	16	DGND
2	TRIGS	17	MIPI-D2N
3	DVDD1.8V	18	MIPI-D2P
4	DVDD1.2V	19	DGND
5	SENSOR-PDWN	20	MIPI-D1N
6	DGND	21	MIPI-D1P
7	MCLK	22	DGND
8	DGND	23	MIPI-D0N
9	AGND	24	MIPI-D0P
10	AVDD2.5V	25	DGND
11	TRIGL/FSYNC	26	MIPI-CLKN
12	DGND	27	MIPI-CLKP
13	MIPI-D3P	28	DGND
14	MIPI-D3N	29	SCL(1.8V)
15	DGND	30	SDA(1.8V)





Imaging area
& Image circle



■Assumed application cases
○Wide vision for Robots of autonomous driving
○3D sensing with NIR structured light

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℃ Function guarantee -20~60℃ Performance guarantee
		Maximum Frame Rate	120fps
Module	Lens	Configuration	Type 1/6, 5P
		FoV	160° ±(TBD)°
		F No.	2.0±5%
		Focus range	30cm ~ Infinity, Adjusted at 60cm when shipped.(TBD)
	Connector	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
	Weight	0.4g(Tentative)	
	Power Supply	Analog	2.5V±0.1V
		Digital	1.2V±0.06V
		IO	1.8V±0.1V
Board (option)	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, Raspi 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	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

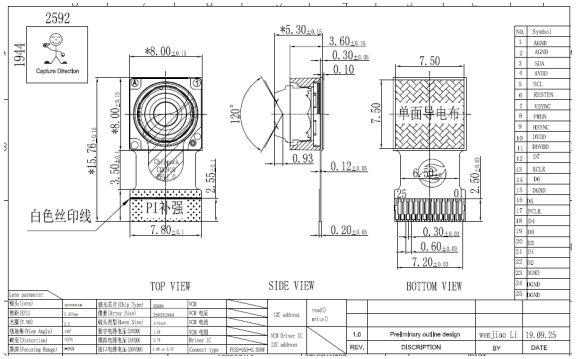
汎用カメラモジュールシリーズ
SEI012FF-D, SEI012FFW-D

ISP内蔵型5Mpixイメージセンサーを使ったレンズモジュール。
DVPインターフェースタイプから順次発売予定

Start Sample Delivery

SEI012FF-00-D　　SEI012FFW-00-D

FoV(diagonal)=76°　　FoV(diagonal)=120°　　Back Side



イメージセンサ	
センサタイプ	1/4型 CMOSイメージセンサ
有効画画素数	511万画素
記録画素数	504万画素
カメラ制御	
ISO感度	ISO 40～800
シーンセレクション	12パターン
露出制御	自動、シャッター優先、ISO感度優先、長時間AEモード
測光モード	マルチパターン、中央重点、画面全体平均、スポット
露出補正	±2EV、 1/3EVステップ
シャッタースピード	1/8 s（長時間AEモード）～1/42000 s
ホワイトバランス設定	オートホワイトバランス、太陽光、曇天、蛍光灯、ランプ
フォーカス制御	オート、 シングルAF、連続AF、マニュアル
画像フォーマット	
出力画像フォーマット	JPEG（4:2:2）、Y/Cb/Cr、YUV、RGB、RAW、JPEG+YUV（サムネイル）
静止画データレート	5M pixel 15 frame/s JPEG output
動画データレート	SVGA 30 frame/s YCbCr output
HDビデオ出力	1080p（1920×1030 30 frame/s）、720p（1208×720 60 frame/s）JPEG output、JPEG+YCbCr output

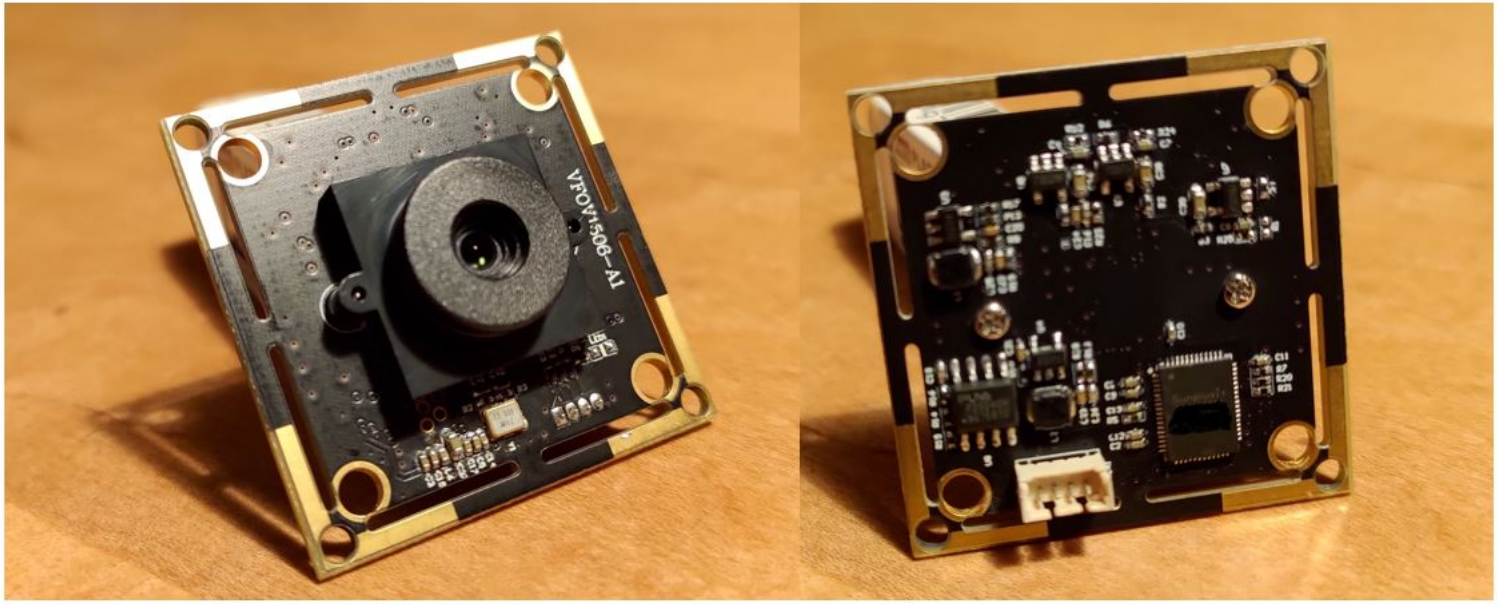
魚眼タイプ：SEI012FE-D（FoV=160°and/or 187°）
AFタイプ：SEI012AF-D(76°), SEI012AFW-D(120°)
ラインアップに追加していきます。

SE-SB02基板に接続可能なMIPI IFバージョンも開発受注可能

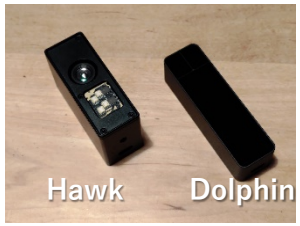
1Mpix UVCカメラ（M12レンズタイプ）

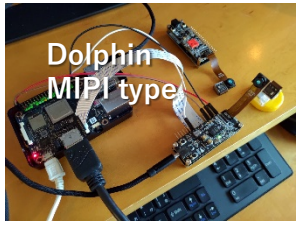
SE9732USB
Omnivision社製イメージセンサーOV9732を採用
1/4”型、3.0um画素、1,280x720の高感度汎用UVCカメラ基板です。
カスタム光学フィルタの取り付け応談
M12マウントで様々なレンズと組み合わせが可能です。

小型モジュール化を検討中。（FoV=76°、120°、150°、160°魚眼）



OPNOUS ToF Camera





ToFシステムプラットフォーム

現在の位置です： トップページ > 製品 > ToFシステムプラットフォーム

Part NO	Category	Resolution	FoV	Range	IR Filter	Interface
OPNCAM8508C/197-1MA-UA	Dolphin	320x240	72x55	1m/2m	940nm	USB 3.0
OPNCAM8506A/58C-1MA-UA	Dolphin	320x40	110x10	5m	850nm	USB3.0
OPNCAM8508C/197-1MA	Dolphin	320x240	72x55	1m/2m	940nm	MIPI
OPNCAM8506A/58C-1MA	Dolphin	320x40	110x10	5m	850nm	MIPI
OPNCAM8008A/588-1MA-UA	Hawk	320*240	86x68	5m	850nm	USB 3.0
OPNCAM8008A/598-1MA-UA	Hawk	320x240	86x68	5m	940nm	USB 3.0
OPNCAM8008A/58B-1MA-UA	Hawk	320x240	110x90	5m	850nm	USB 3.0
OPNCAM8008A/59B-1MA-UA	Hawk	320x240	110x90	5m	940nm	USB 3.0
OPNCAM8008A/A92-1MA-UA	Hawk	320x240	24x18	10m	940nm	USB 3.0

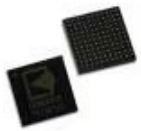
Software

http://www.opnous.com/jp

距離計算ISPチップ
OPN6001

FUNCTIONAL DESCRIPTION

OPN6001 is a high performance, low power, low cost application processor dedicating for ToF sensor. It is embedded with a sophisticated ToF DSP to converting the ToF raw data to easy-use distance and IR data. With a novel self-learning engine, it also automatically tunes lights and sensors to get best image in different scenarios. A 200MHz ARM Cortex-M3 processor is also integrated to handle system controlling and various applications. It can support up to 2 ToF sensors simultaneously with MIPI CSI2 interface, merge different sources and transmit the data to host AP by 12bit DVP, 4bit GSI or MIPI CSI2 interface.

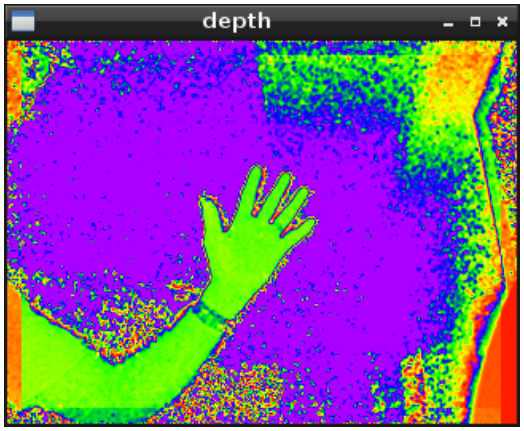


FEATURES

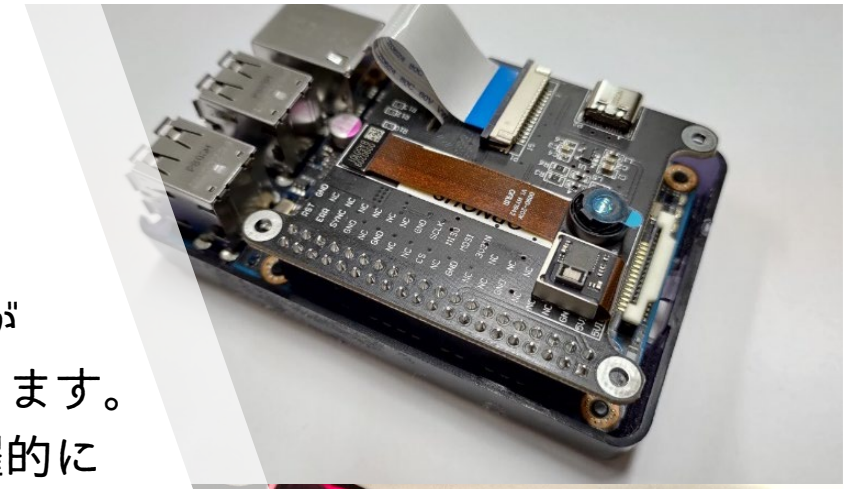
- Support up to 2 QVGA (320x240) TOF sensors
- Support up to 120 fps
- ToF data interface
  - Support up to 2 MIPI CSI2 Receiver @ 800Mbps (2 lane)
- Host data Interface
  - 8~12bit parallel interface with sync signal (DVP)
  - MIPI CSI2 TX interface, up to 3.2G bps max (4 lane)
  - 1~4 data line serial interface(GSI)
- 36-bit Readout Data
  - 14 bit Distance
  - 12 bit IR
  - 8 bit Ambient
  - 2 bit flag
- Real-time ISP for ToF Raw data processing and calibration
  - Region of Interest (ROI)
  - 3x3 Spatial Filter
  - Pixel calibration
  - Distance Non-linearity Correction
  - Temperature Compensation
  - FOV compensation
- Up to 200MHz ARM Cortex M3 MCU for user post processing
  - 128KB Embedded SRAM
  - CRC/ECC
  - JTAG debug interface
- SPI/I2C control interface
- Support boot from SPI flash / I2C EEPROM
- Smart Sensing Engine
  - Auto Exposure
  - HDR
- Sensor/Light Real time control thru I2C master
- 6~30MHz Crystal/Oscillator as clock source
- Clock out for sync operation
- Simple Power Supply
  - IO supply: 1.8V or 3.3V
  - Core supply: 1.1V
- Package BGA 121 pin (7 mm x 7 mm)

FOR MORE INFORMATION: WWW.OPNOUS.COM

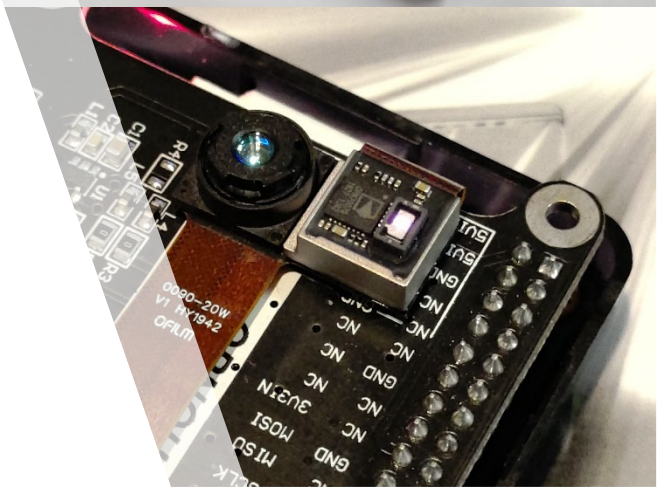
OPNOUS ToF Camera HAT on ASUS tinker board



- SBC対応ToFセンサーモジュール
（OPNOUS社との共同開発品）
SE-OPNM8508C-CB（仮称）



- 自律移動ロボットや自動搬送機で必要な
Depth情報を正確に取得するToFセンサーが
Tinker Boardでも手軽に使えるようになります。
- 顔認識においても3D情報が加わると飛躍的に
精度が高まります。
- 距離によるジェスチャー抽出など



Specification

Depth sensing demo is available now.

#	Parameter	Description
1	Product Name (Tentative)	SE-OPNM8508-HAT
2	ToF camera module	OPNM8508C
3	Image Sensor	OPN8008D
4	Pixel Size	15um
5	Optical Size	1/3”
6	Resolution of Depth Image	320 * 240
7	Module Head Dimension	21.00 mm * 9.50mm * 6.33mm w/ 33.00mm FPC
8	Frame Rate	10 ~ 60 fps
9	Measurement Range	0.15 ~ 5 m
10	Field of View	71.8° (H) * 56.5° (V)
11	Distortion	<2.5%
12	Illumination	940nm, 3W
13	Input Clock	27MHz
14	Power Supply	Sensor: 3.3V Single power supply, >=300mA VCSEL: 4V, >=2A
15	Power Consumption	340mW, Typ.
16	Depth Accuracy	<=1% / <=1cm @1m
17	Interface	MIPI CSI-2, 2lane