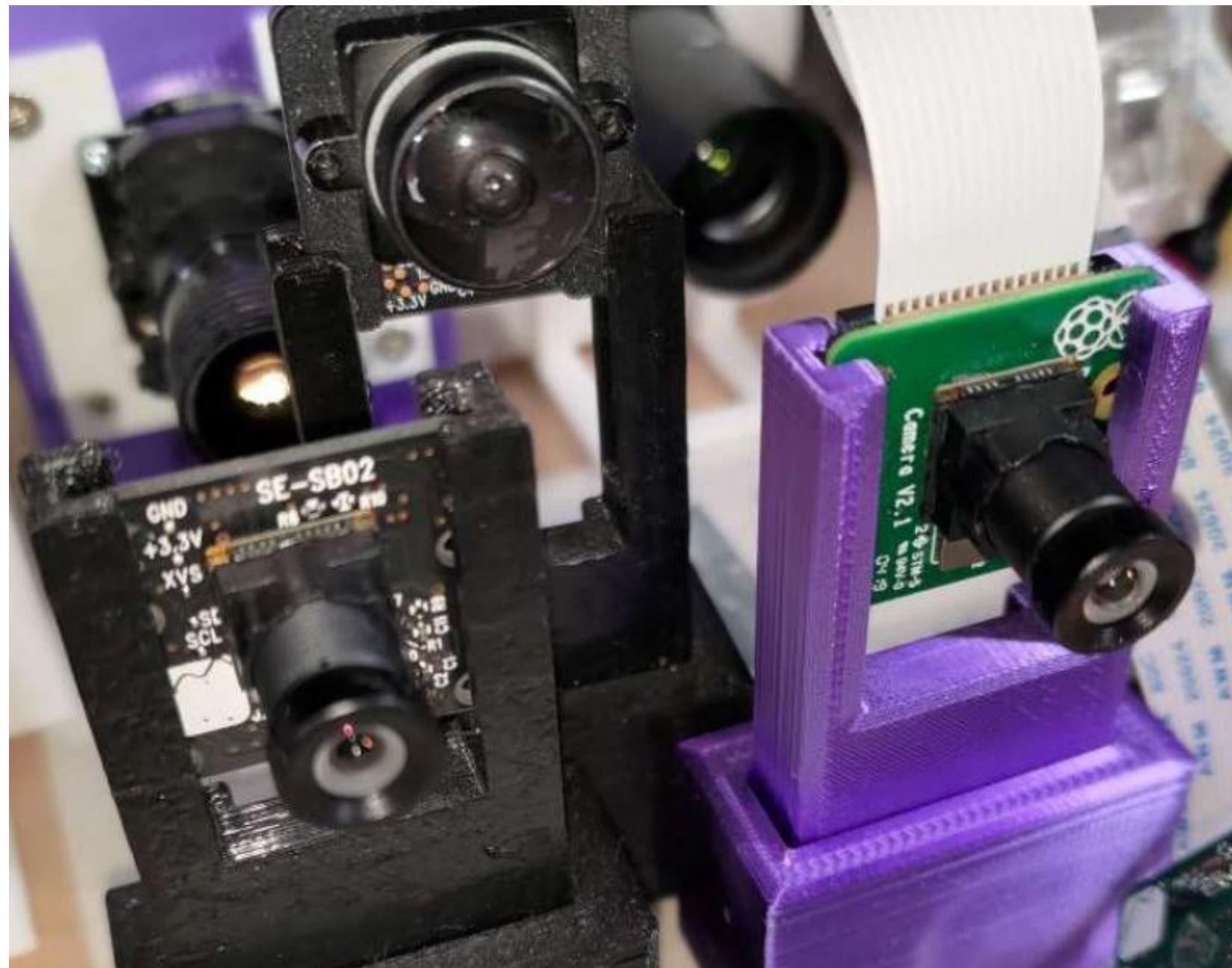


High Sensitivity Camera Module w/ Sony IMX678(STARVIS2)

SE678FF91 and SE678PKG Product Brief



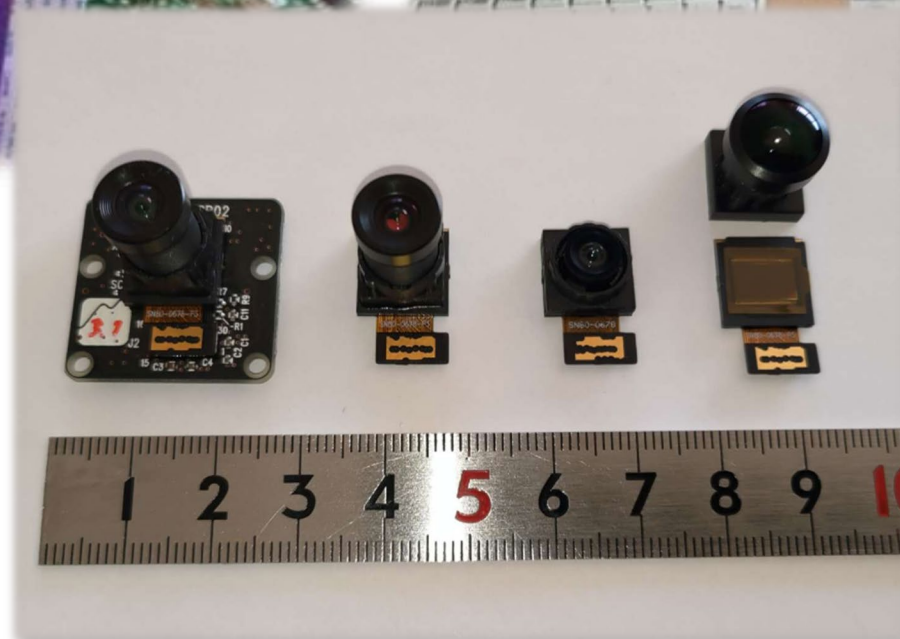
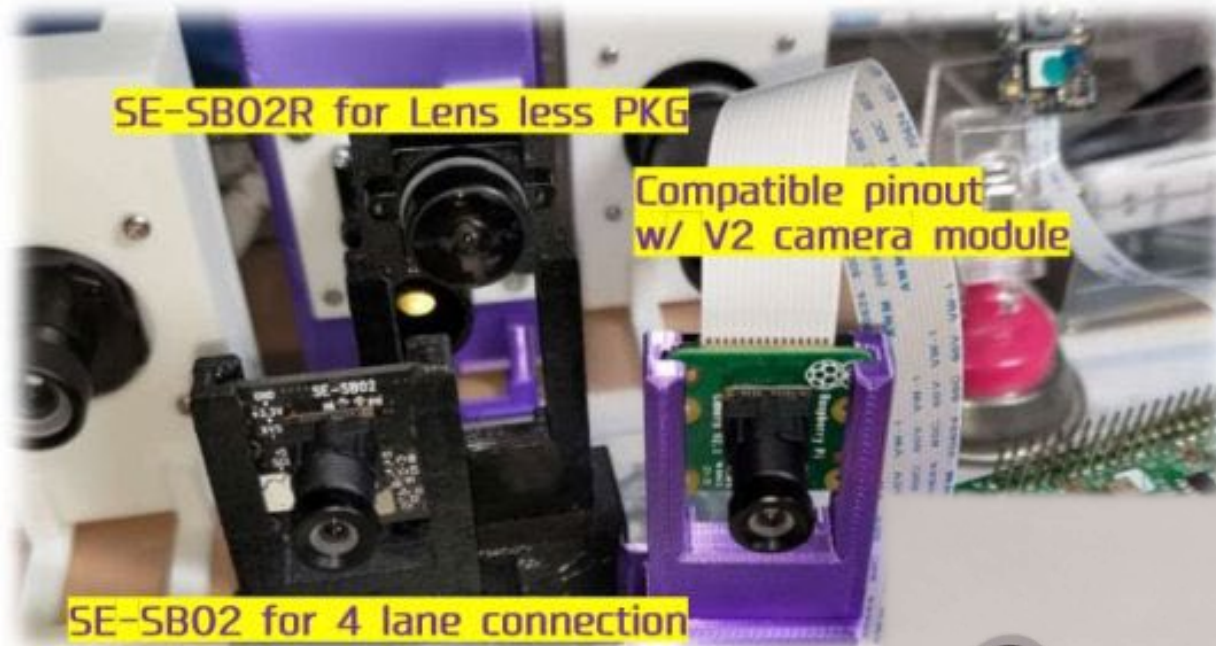
Soho Enterprise Ltd.

SE678FF91 lens module & SE678PKG for Generic Lenses.

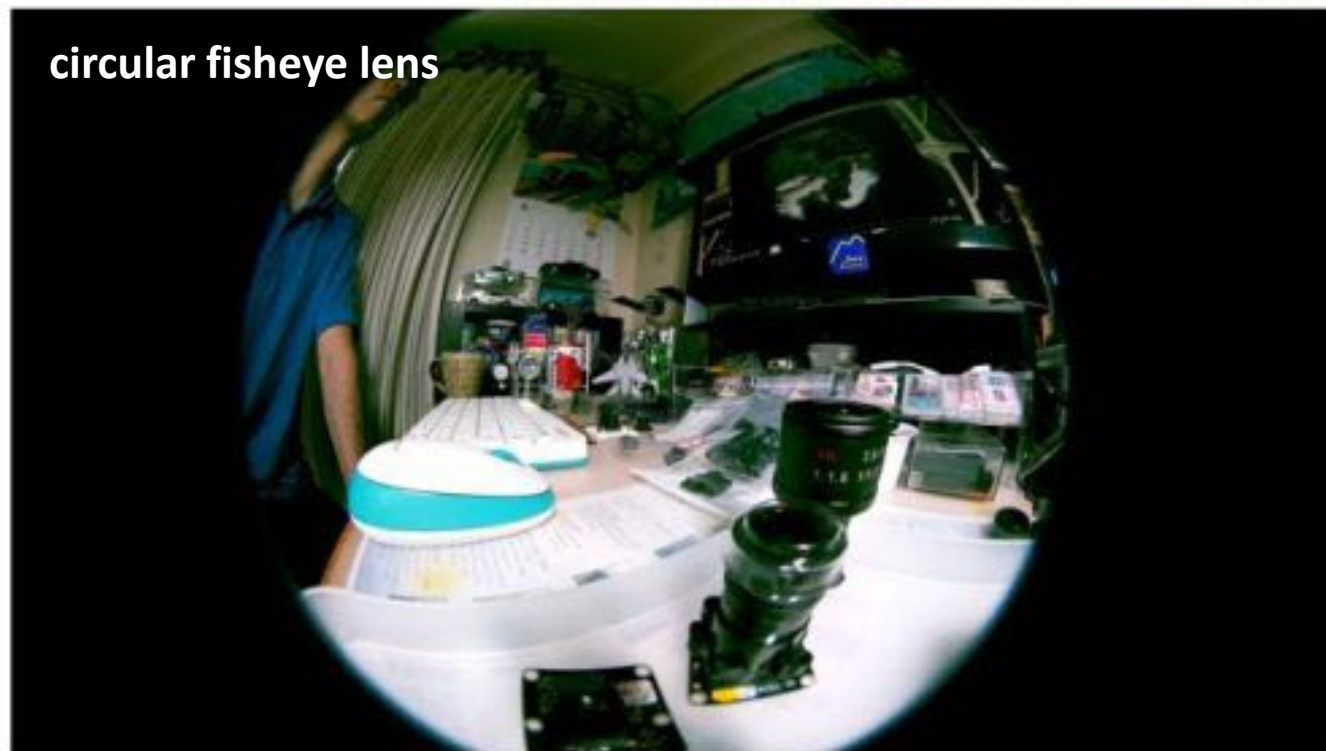
Suitable to the applications which require higher sensitivity and small form factor at the same time.



Extension FPC



SE678FF91 lens module & SE678PKG for Generic Lenses.



circular fisheye lens



Standard lens

Captured and developed by libcamera on RPi4

Raspi V2 Camera (IMX219) vs. SE678FF91-V3



Raspi v2 camera(IMX219)
1.12um pixel, 3280x2464, FoV(D)=76°

Theoretically x2~ SNR is expected under the same optical condition!

Upgrade-able from Raspi V2 camera (IMX219)
To IMX678 STARVIS2 image sensor.

(*)When replaced with the IMX219 module,
Noise immunity is slightly reduced due to the
AVDD voltage being below the specified level.”

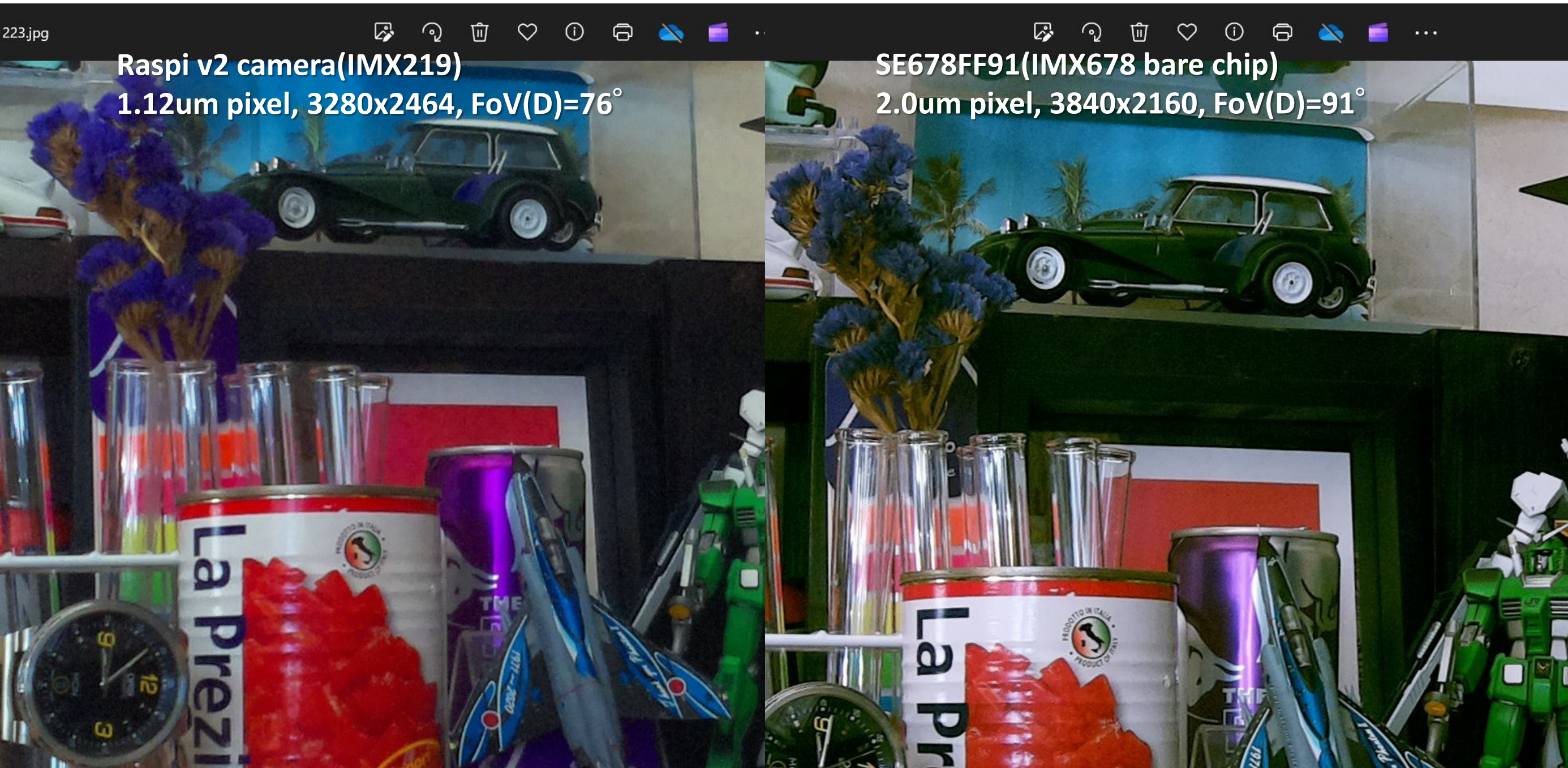
(*)IQ tuning for SE678FF91 has not been optimized,
color saturation can be enhanced.



SE678FF91(IMX678 bare chip)
2.0um pixel, 3840x2160, FoV(D)=91°

Raspi V2 Camera (IMX219) vs. SE678FF91-V3

Zoom:100%



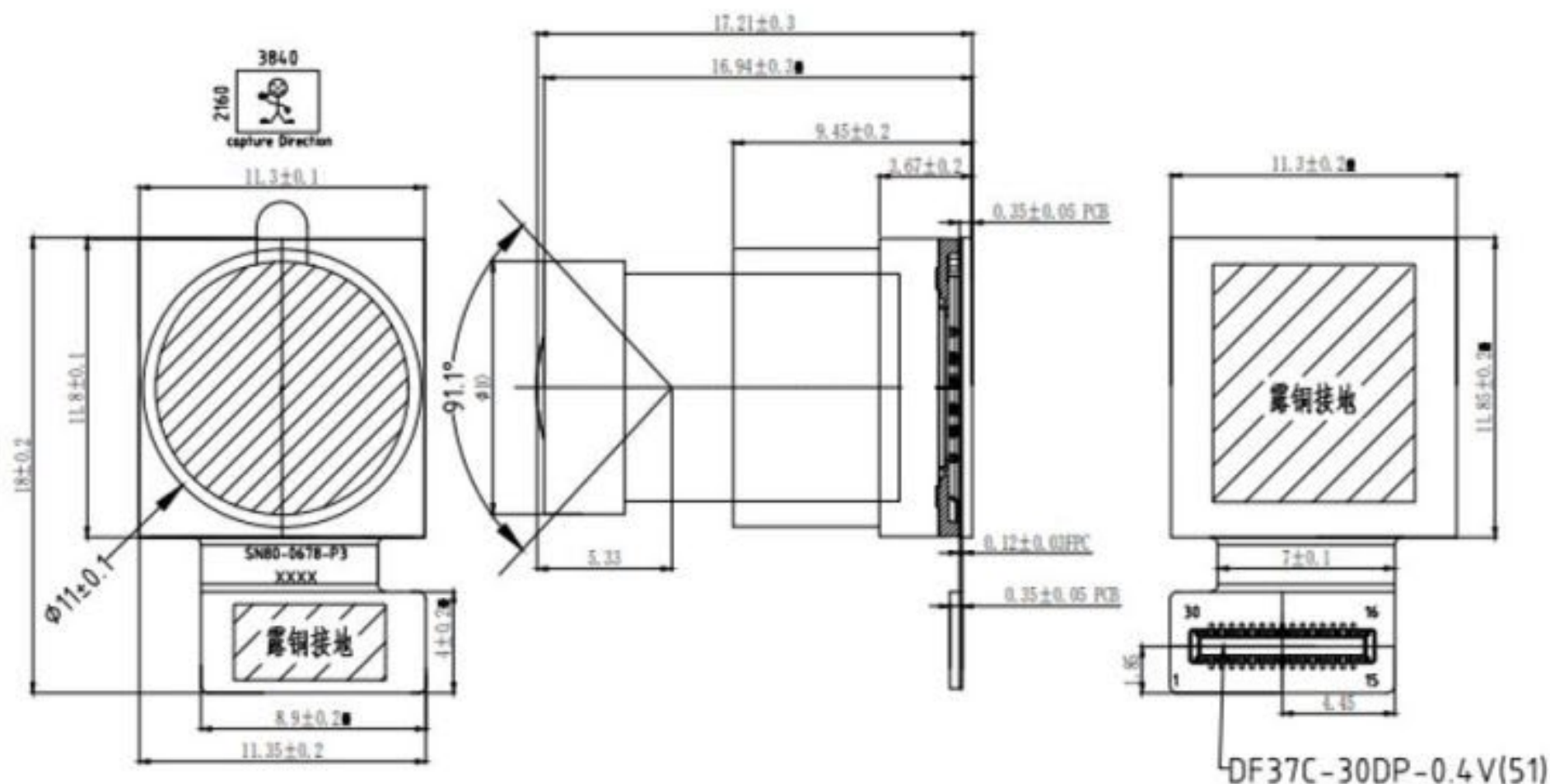
Theoretically x2~ SNR is expected under the same optical condition!

HSF

REV.	ECN. NO. / Description
A0	First Released



NO	PIN NAME	NO	PIN NAME
1	AFVDD(NC)	16	DGND
2	AFGND(NC)	17	D2N
3	DOVDD	18	D2P
4	DVDD	19	DGND
5	PWDN	20	D1N
6	DGND	21	D1P
7	MCLK	22	DGND
8	DGND	23	D0N
9	AGND	24	D0P
10	AVDD	25	DGND
11	GPIO	26	MCN
12	DGND	27	MCP
13	D3P	28	DGND
14	D3N	29	SCL
15	DGND	30	SDA



注: 标有※为重点尺寸

OVDD 1.8V
AVDD 3.3V
DVDD 1.1V

主要参数	镜头名称	--	相对照度 (Relative Illumination)	>39%	感光芯片 (Chip Type)	IMX678
	镜头类型 (Lens Size)	1/1.8 6G+IR	景深 (Focusing Range)	35.3cm-46cm	像素 (Array Size)	3840×2160
	视场角 (View Angle)	D:91.1°\H:80°\V45.6°	调焦距离 (Focussing Distance)	40cm	IC地址	0x34
	焦距 (EFL)	5.4	IR滤波器 (IR Filter)	8.7×6.7×0.21 650 IR	Driver IC	PE918
	光圈 (F.NO)	2.4	FPC供应商,材料	FPC使用无胶压延铜	Driver IC地址	0x18
	畸变 (TV Distortion)	<-14%	MIPI阻抗控制	100Ω±10%Ω		
	最大成像圆 (Max Image Circle)	φ9.7	底座名称 (Holder)	FTMGNOQA		

INTENDED USE		TITLE	
SN80-0678-F0		成品图	
CHD:		DWG NO:	
		SN800678F004	
DR:		SCALE:1:1	PAGE:1/1
		UNT: mm	REV: A0

Application Examples #1

SE678FF91 on Waveshare CM4-DISP-BASE-2.8A



Since the IMX678 driver is based on the IMX585, it allows for a more compact and higher-performance camera implementation using the CinePi software.

SE-NATURE-CAM on RPi Zero 2W



Low power consumption and small form factor Nature Cam.
Timelapse shooting and image file server supporting STA and AP mode

IMX678-AAQR/AAQR1

Diagonal 8.86 mm (Type 1/1.8) CMOS Solid-state Image Sensor with Square Pixel for Color Cameras

Description

The IMX678-AAQR/AAQR1 is a diagonal 8.86 mm (Type 1/1.8) CMOS active pixel type solid-state image sensor with a square pixel array and 8.40 M effective pixels. This chip operates with analog 3.3 V, digital 1.1 V, and interface 1.8 V triple power supply, and has low power consumption. High sensitivity, low dark current and no smear are achieved through the adoption of R, G and B primary color mosaic filters. This chip features an electronic shutter with variable charge-integration time.
(Applications: Security cameras)

Features

- ◆ CMOS active pixel type dots
- ◆ Built-in timing adjustment circuit, H/V driver and serial communication circuit
- ◆ Input frequency: 13.5MHz / 18MHz / 24MHz / 27MHz / 36MHz / 37.125 MHz / 72 MHz / 74.25 MHz
- ◆ Number of recommended recording pixels: 3840 (H) × 2160 (V) approx. 8.29M pixel
- ◆ Readout mode
 - All-pixel scan mode
 - Horizontal / Vertical 2/2-line binning mode
 - Window cropping mode
 - Horizontal / Vertical direction - Normal / Inverted readout mode
- ◆ Readout rate
 - Maximum frame rate in All-pixel scan mode: 12 bit: 60 frame/s, 10 bit: 72 frame/s
- ◆ High dynamic range (HDR) function
 - Digital overlap HDR
 - Clear HDR
- ◆ Synchronizing sensors function
- ◆ Variable-speed shutter function (resolution 1H units)
- ◆ CDS / PGA function
 - 0 dB to 30 dB: Analog Gain 30 dB (step pitch 0.3 dB)
 - 30.3 dB to 72 dB: Analog Gain 30 dB + Digital Gain 0.3 dB to 42 dB (step pitch 0.3 dB)
- ◆ Supports I/O
 - CSI-2 serial data output (2 Lane / 4 Lane / 8Lane / 4Lane × 2ch)
 - RAW10 / RAW12 output
- ◆ Anti-reflective coating glass on both sides (IMX678-AAQR1)
- ◆ Non anti-reflective coating glass (IMX678-AAQR)

STARVIS 2

* STARVIS 2 and its logo are registered trademarks or trademarks of Sony Group Corporation or its affiliates. The STARVIS 2 is back-illuminated pixel technology used in CMOS image sensors for security camera applications. It features a sensitivity of 2000 mV or more per 1 μm^2 (color product, when imaging with a 706 cd/m² light source, F5.6 in 1 s accumulation equivalent). It also has a wide dynamic range (AD 12 bit) of more than 8 dB compared to STARVIS for the same pixel size in a single exposure, and achieves high picture quality in the visible-light and near infrared light regions.

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Device Structure

◆ CMOS image sensor	
◆ Image size	Diagonal 8.86 mm (Type 1/1.8) approx. 8.40 M pixels, All pixels
◆ Total number of pixels	3856 (H) × 2200 (V) approx. 8.48 M pixels
◆ Number of effective pixels	3856 (H) × 2180 (V) approx. 8.40 M pixels
◆ Number of active pixels	3856 (H) × 2176 (V) approx. 8.39 M pixels
◆ Number of recommended recording pixels	3840 (H) × 2160 (V) approx. 8.29 M pixels
◆ Unit cell size	2.0 μm (H) × 2.0 μm (V)
◆ Optical black	Horizontal (H) direction: Front 0 pixels, rear 0 pixels Vertical (V) direction: Front 20 pixels, rear 0 pixels
◆ Package	132 pin LGA

Image Sensor Characteristics

(T_j = 60 °C)

Item		Value	Remarks
Sensitivity	Typ.	14815 Digit/lx/s (IMX678-AAQR) 16309 Digit/lx/s (IMX678-AAQR1)	12 bit converted value
Saturation signal	Min.	3895 Digit	12 bit converted value

Basic Drive Mode

Drive mode	Recommended number of recording pixels	Maximum frame rate [frame/s]	Output interface	ADC [bit]
All-pixel	3840 (H) × 2160 (V) approx. 8.29 M pixels	72	CSI-2	10
Horizontal/ Vertical 2/2-line binning	1920 (H) × 1080 (V) approx. 2.07 M pixels	72	CSI-2	10