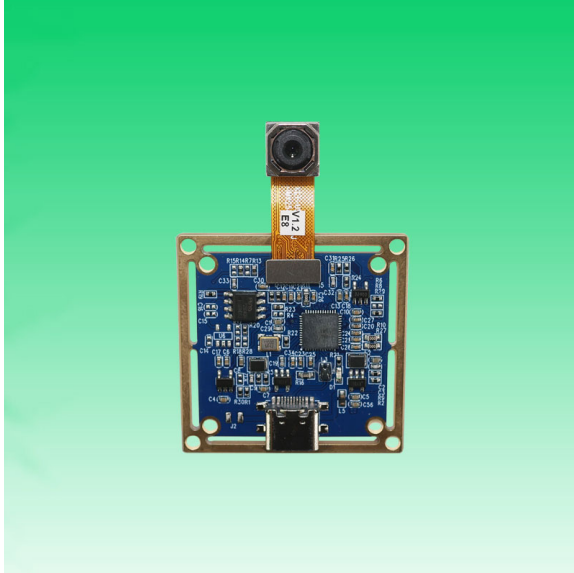


KLT-USB3A-AF-IMX258BW V1.2**13MP Sony IMX258 Monochrome Auto Focus USB 2.0 Camera Module**

KLT-USB3A-AF-IMX258BW V1.2 is a 13MP Auto Focus USB camera module based on 1/3.06" IMX258 monochrome (black & white) image sensor. Auto Focus captures images clearly at different distances. It delivers high-speed, 4K resolution ultra sharp image.

The camera has a dedicated, high-performance auto focus function providing best-in-class image and video output. This camera module is ideal solution for drones, automotive, agriculture farming, medical equipment, and traffic monitoring.

Key Features

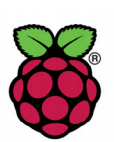
- 4K resolution (4224 x 3192) Sony IMX258 monochrome (B&W) sensor
- High speed USB 2.0 Plug and Play
- MJPG output format
- Low power consumption
- Compact size
- UVC compliant to Windows, Linux, OS with UVC driver
- USB OTG (On-The-Go) support

KLT-USB3A-AF-IMX258BW V1.2

13MP Sony IMX258 Monochrome Auto Focus USB 2.0 Camera Module

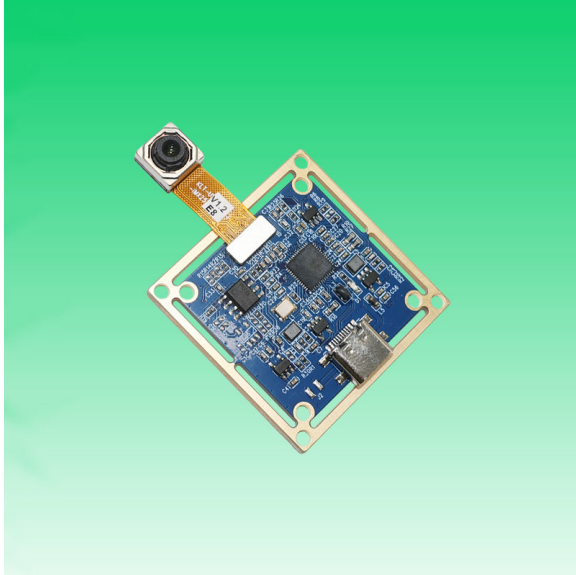
Camera Module No.	KLT-USB3A-AF-IMX258BW V1.2
Resolution	13MP
Image Sensor	IMX258 Monochrome (Black & White)
Sensor Type	1/3.06"
Pixel Size	1.12 um x 1.12 um
EFL	6.00 mm
F.NO	2.60
Pixel	4224 x 3136
View Angle	47.3°(DFOV) 38.8°(HFOV) 29.5°(VFOV)
Lens Dimensions	8.50 x 8.50 x 6.44 mm
Module Type	Auto Focus
Interface	USB 2.0
Output Format	MJPEG
Auto Control	Saturation, Contrast, Acutance White Balance, Exposure
Audio	None
Input Voltage	DC 5V
Working Current	Max 500mA
PCB Size	38mm x 38mm / 32mm x 32mm
System Compatibility	Windows XP (SP2, SP3), Vista, 7, 8, 10, 11 Android, Mac OS, Linux or OS with UVC Driver Raspberry Pi by USB Port
Software for USB Camera	AMCAP, Webcam Viewer, V4L2 Controls Contacam, VLC Player, MotionEye OS iSpy, ZoneMider, Yawcam
Lens Type	650nm IR Cut
Operating Temperature	-20°C to +70°C
USB Cable	USB Cable

Wide Compatibility with Windows, Android, Mac OS, Linux, or Raspberry Pi

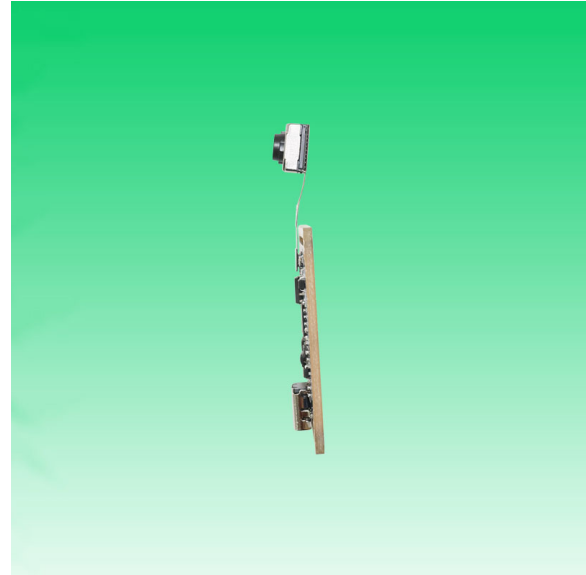


Raspberry Pi

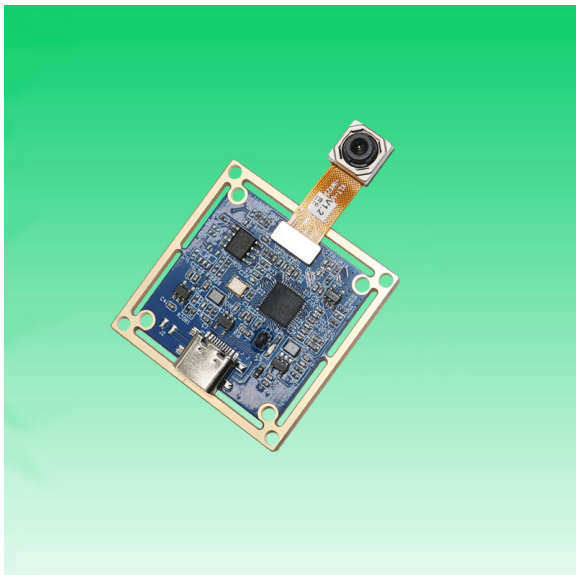
www.KaiLapTech.com sales@KaiLapTech.com Tel: (852) 6908 1256 Fax: (852) 3017 6778

KLT-USB3A-AF-IMX258BW V1.2**13MP Sony IMX258 Monochrome Auto Focus USB 2.0 Camera Module**

Top View



Side View



Bottom View

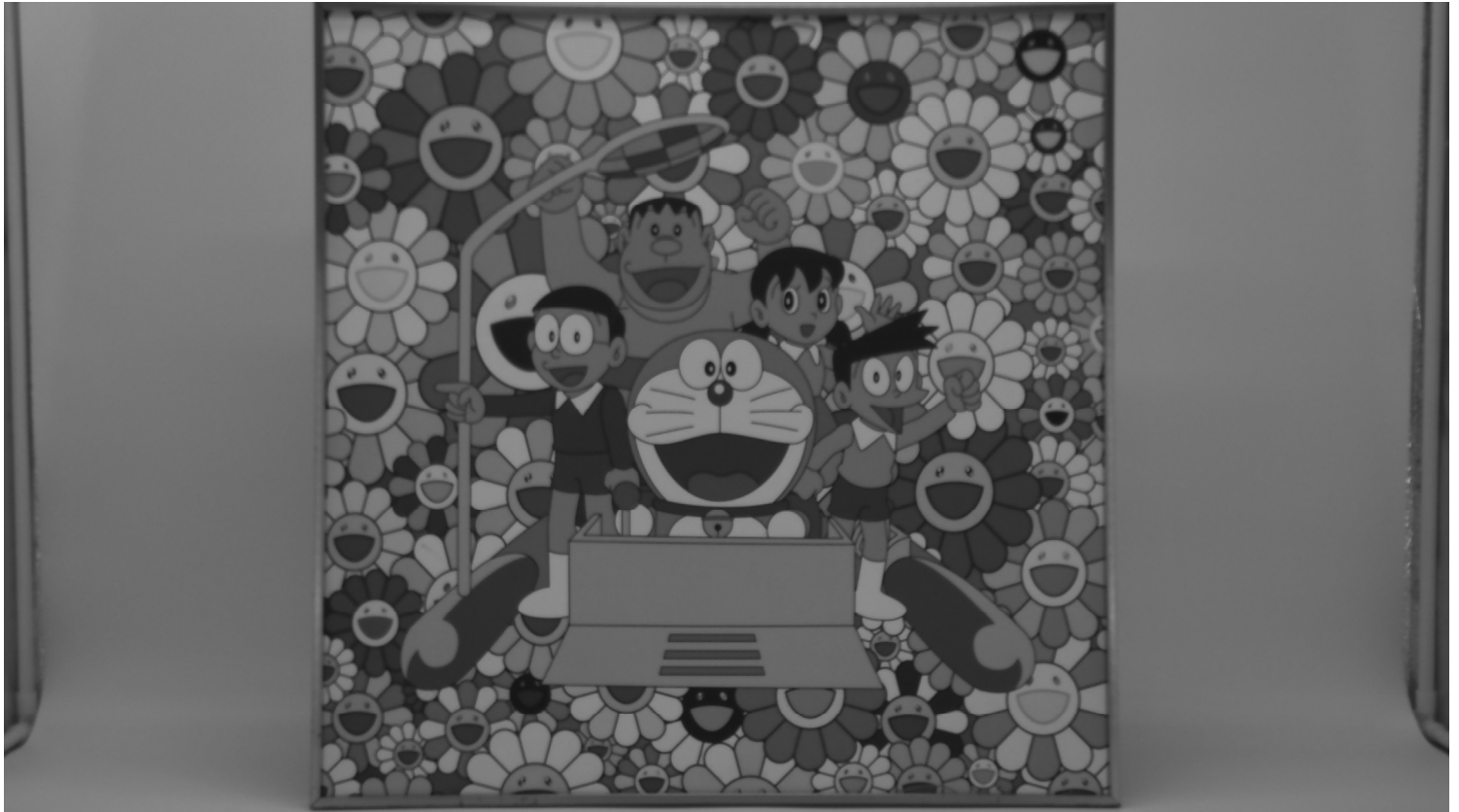


Mating Connector

KLT-USB3A-AF-IMX258BW V1.2**13MP Sony IMX258 Monochrome Auto Focus USB 2.0 Camera Module**

FORMAT	RESOLUTION	FRAME RATE
		USB 2.0
MJPEG	640 x 480 (VGA)	30 FPS
	1280 x 720 (720P)	30 FPS
	1920 x 1080 (1080P)	30 FPS
	2592 x 1944 (5MP)	30 FPS
	3840 x 2160 (8MP)	15 FPS
	4208 x 3120 (13MP)	10 FPS





GROUP

1 H
Hydrogen

3 Li
Lithium

11 Na
Sodium

19 K
Potassium

37 Rb
Rubidium

55 Cs
Cesium

87 Fr
Francium

4 Be
Beryllium

12 Mg
Magnesium

20 Ca
Calcium

38 Sr
Strontium

56 Ba
Barium

88 Ra
Radium

5 B
Boron

13 Al
Aluminum

21 Ga
Gallium

39 In
Indium

57 La
Lanthanum

89 Ac
Actinium

6 C
Carbon

14 Si
Silicon

22 Ti
Titanium

40 Zr
Zirconium

58 Ce
Cerium

90 Th
Thorium

7 N
Nitrogen

15 P
Phosphorus

23 V
Vanadium

41 Nb
Niobium

59 Pr
Praseodymium

91 Pa
Protactinium

8 O
Oxygen

16 S
Sulfur

24 Cr
Chromium

42 Mo
Molybdenum

60 Nd
Neodymium

92 U
Uranium

9 F
Fluorine

17 Cl
Chlorine

25 Mn
Manganese

43 Tc
Technetium

61 Pm
Promethium

93 Np
Neptunium

10 Ne
Neon

18 Ar
Argon

26 Fe
Iron

44 Ru
Ruthenium

62 Sm
Samarium

94 Pu
Plutonium

11 Ni
Nickel

19 Cu
Copper

27 Co
Cobalt

45 Rh
Rhodium

63 Eu
Europium

95 Am
Americium

12 Zn
Zinc

20 Cd
Cadmium

28 Ni
Nickel

46 Pd
Palladium

64 Gd
Gadolinium

96 Cm
Curium

13 Ga
Gallium

21 In
Indium

29 Cu
Copper

47 Ag
Silver

65 Tb
Terbium

97 Bk
Berkelium

14 Ge
Germanium

22 Sn
Tin

30 Zn
Zinc

48 Cd
Cadmium

66 Dy
Dysprosium

98 Cf
Californium

15 As
Arsenic

23 Sb
Antimony

31 Ga
Gallium

49 In
Indium

67 Er
Erbium

99 Es
Einsteinium

16 Se
Selenium

24 Te
Tellurium

32 Ge
Germanium

50 Sn
Tin

68 Yb
Ytterbium

100 Fm
Fermium

17 Br
Bromine

25 I
Iodine

33 As
Arsenic

51 Sb
Antimony

69 Tm
Thulium

101 Md
Mendelevium

18 Kr
Krypton

26 Xe
Xenon

34 Se
Selenium

52 Te
Tellurium

70 Yb
Ytterbium

102 No
Nobelium

19 Ar
Argon

27 Kr
Krypton

35 Br
Bromine

53 I
Iodine

71 Lu
Lutetium

103 Lr
Lawrencium

20 Ca
Calcium

28 Ni
Nickel

36 Kr
Krypton

54 Xe
Xenon

72 Hf
Hafnium

104 Rf
Rutherfordium

57 La
Lanthanum

89 Ac
Actinium

58 Ce
Cerium

90 Th
Thorium

59 Pr
Praseodymium

91 Pa
Protactinium

60 Nd
Neodymium

92 U
Uranium

61 Pm
Promethium

93 Np
Neptunium

62 Sm
Samarium

94 Pu
Plutonium

63 Eu
Europium

95 Am
Americium

64 Gd
Gadolinium

96 Cm
Curium

65 Tb
Terbium

97 Bk
Berkelium

66 Dy
Dysprosium

98 Cf
Californium

67 Ho
Holmium

99 Es
Einsteinium

68 Er
Erbium

100 Fm
Fermium

69 Tm
Thulium

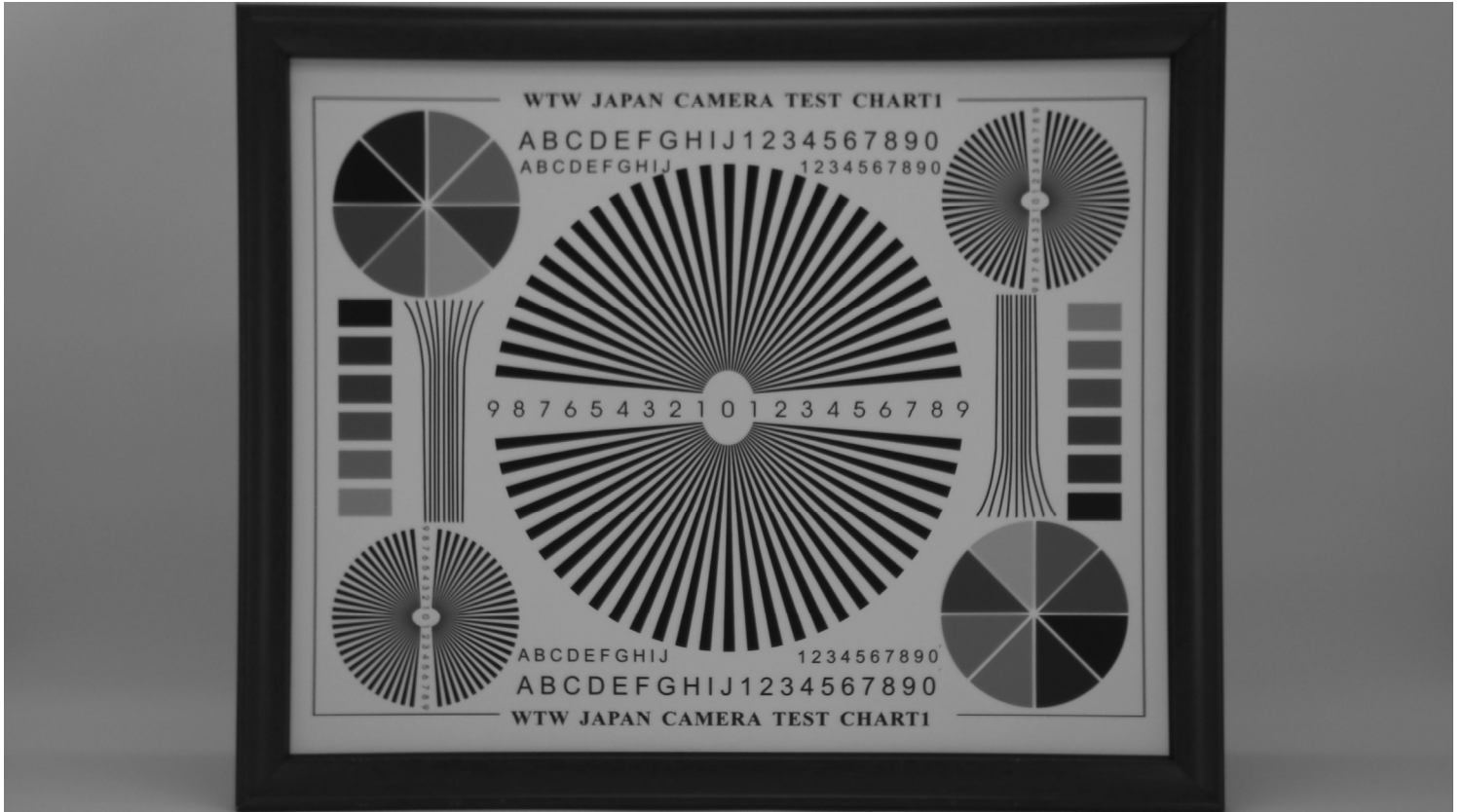
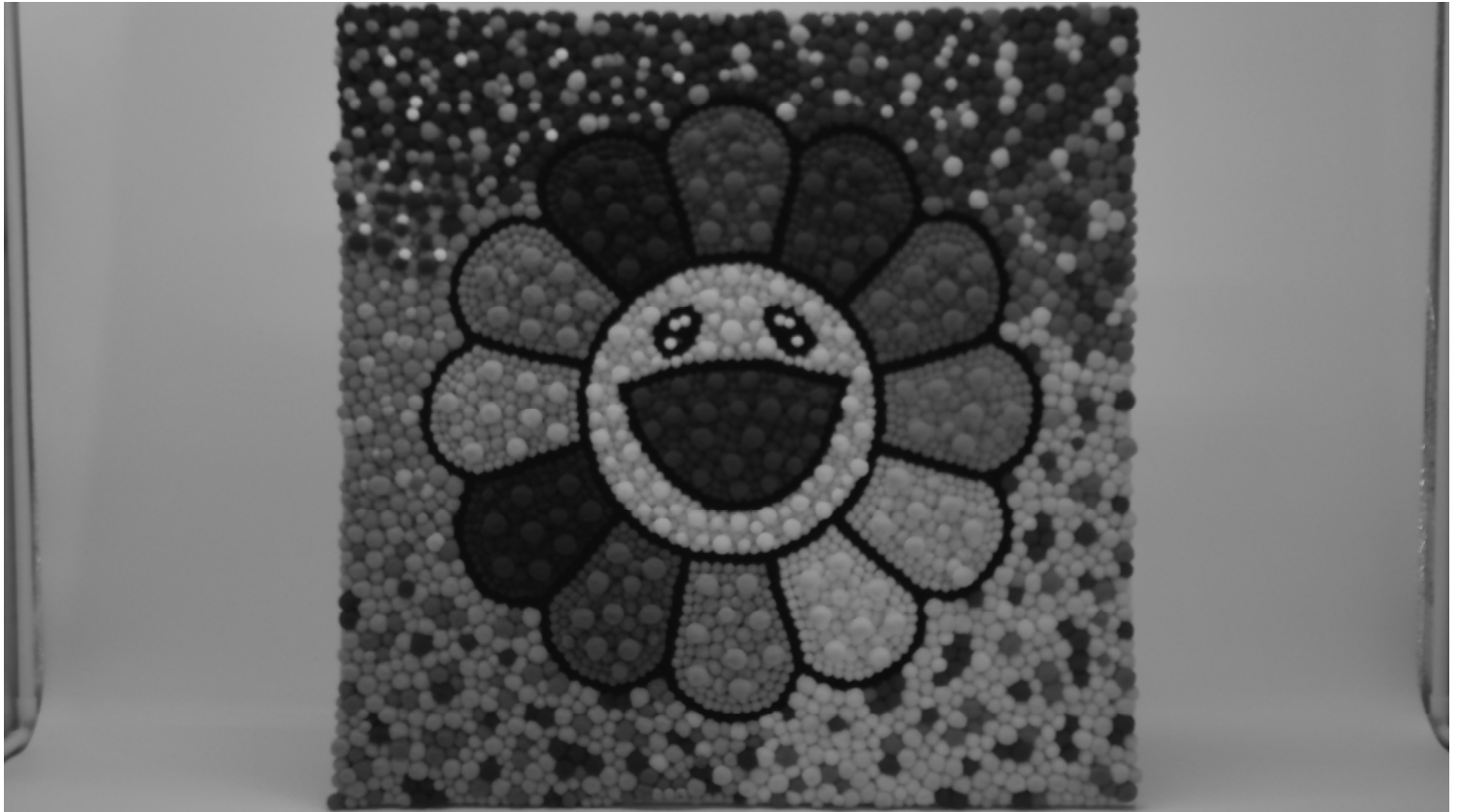
101 Md
Mendelevium

70 Yb
Ytterbium

102 No
Nobelium

71 Lu
Lutetium

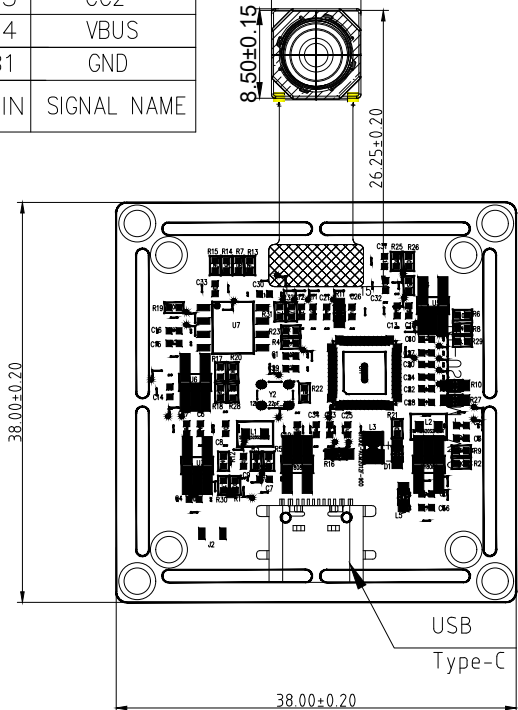
103 Lr
Lawrencium



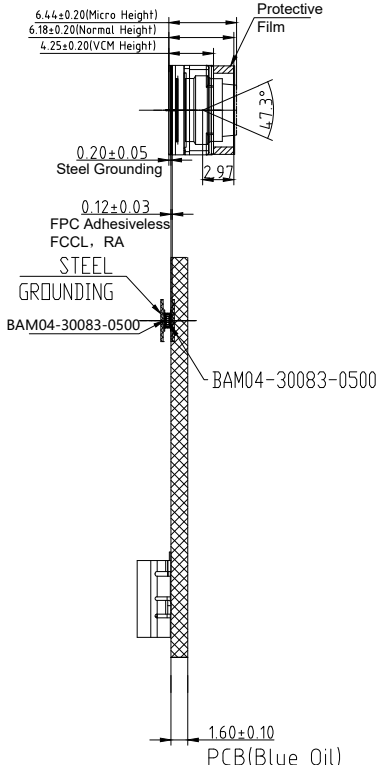
ROHS

A1	GND	B12	GND
A4	VBUS	B9	VBUS
A5	CC1	B8	SBU2
A6	DP1	B7	DN2
A7	DN1	B6	DP2
A8	SBU1	B5	CC2
A9	VBUS	B4	VBUS
A12	GND	B1	GND
PIN	SIGNAL NAME	PIN	SIGNAL NAME

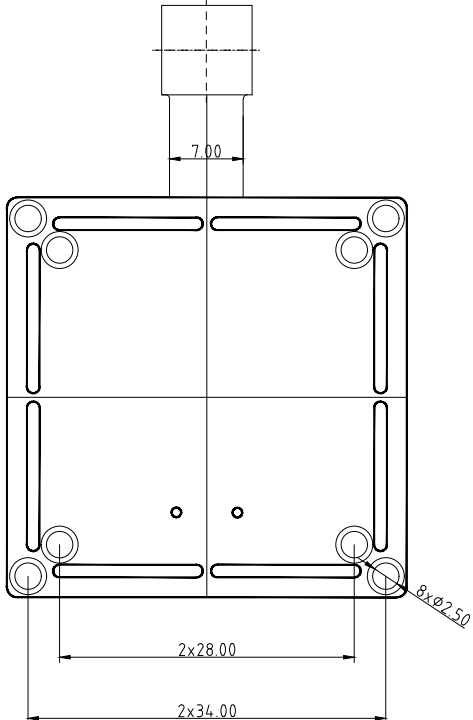
Version	Information
V1.0	First Version
V1.2	Change lens



TOP VIEW



SIDE VIEW



BOTTOM VIEW

Parameters:

1、 Sensor specification:

Image Sensor: IMX258BW

Pixel: 1.12um*1.12um

Lens Type: 1/3.06

Important Voltage Description:

USB DC 5V

2、 Lens specification:

FOV: 47.3°(D);38.8°(H);29.5°(V)±3°

F/NO.: 2.6

TV distortion: $<1.5\%$

Focal length: 6mm

Composition: 6P+IR FILTER

IR Cut Coating: 650nm±10nm@50%

Kai Lap Technologies Group Ltd.

Designed By	Kevin	Model Name:	KLT-USB3A-AF-IMX258BW V1.2		
Checked By	Jacky	Projection Type:	Unit:	Date:	
		 Third Angle	mm	8/19/2024	
			Scale:	Sheet:	Version:
			1:1	1 of 1	1/0

[Product Brief]

Ver.1.0

IMX258

Diagonal 5.867 mm (Type 1/3.06) 13Mega-Pixel CMOS Image Sensor with Square Pixel for Color Cameras

Description

IMX258 is a diagonal 5.867mm (Type 1/3.06) 13 Mega-pixel CMOS active pixel type stacked image sensor with a square pixel array. It adopts Exmor RS™ technology to achieve high speed image capturing by column parallel A/D converter circuits and high sensitivity and low noise image (comparing with conventional CMOS image sensor) through the backside illuminated imaging pixel structure. R, G, and B pigment primary color mosaic filter is employed. By introducing spatially multiplexed exposure technology, high dynamic range still pictures and movies are achievable. It

equips an electronic shutter with variable integration time. It operates with three power supply voltages: analog 2.7 V, digital 1.2 V and 1.8 V for input/output interface and achieves low power consumption.

In addition, this product is designed for use in cellular phone and tablet pc. When using this for another application, Sony does not guarantee the quality and reliability of product. Therefore, don't use this for applications other than cellular phone and tablet pc. Consult your Sony sales representative if you have any questions.

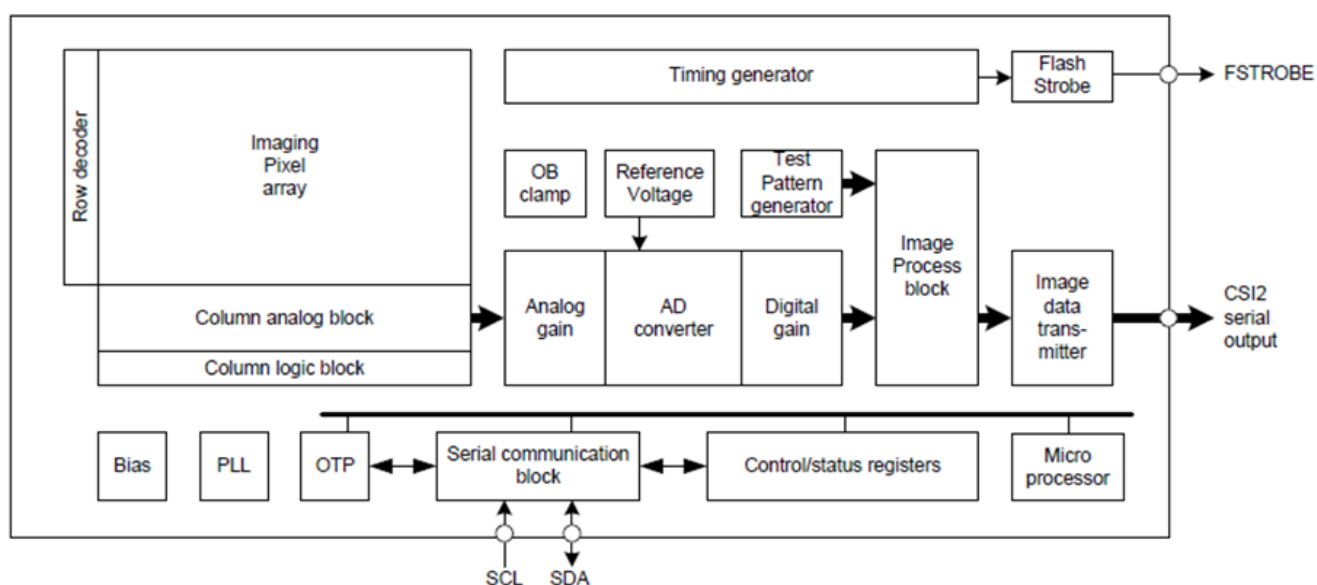
Functions and Features

- ◆ Back-illuminated and stacked CMOS image sensor Exmor RSTM
- ◆ Phase Detection pixel data output for Phase Detection Auto Focus
- ◆ High Dynamic Range (HDR) mode with raw data output.
- ◆ High signal to noise ratio (SNR).
- ◆ Full resolution @30fps (Normal / HDR). 4K2K @30fps (Normal / HDR) 1080p @60fps (Normal)
- ◆ Output video format of RAW10/8.
- ◆ Pixel binning readout and V sub-sampling function.
- ◆ Independent flipping and mirroring.
- ◆ CSI-2 serial data output (MIPI 2lane/4lane, Max. 1.3Gbps/lane, D-PHY spec. ver. 1.1 compliant)
- ◆ 2-wire serial communication.
- ◆ Two PLLs for independent clock generation for pixel control and data output interface.
- ◆ Dynamic Defect Pixel Correction.
- ◆ Fast mode transition. (on the fly)
- ◆ Dual sensor synchronization operation.
- ◆ 4K bit of OTP ROM for users.
- ◆ Built-in temperature sensor.

Device Structure

- ◆ CMOS image sensor
- ◆ Image size : Diagonal 5.867 mm (Type 1/3.06)
- ◆ Total number of pixels : 4224 (H) × 3192 (V) approx. 13.48 M pixels
- ◆ Number of effective pixels : 4224 (H) × 3144 (V) approx. 13.28 M pixels
- ◆ Number of active pixels : 4208 (H) × 3120 (V) approx. 13.13 M pixels
- ◆ Chip size : 5.990 mm (H) × 3.908 mm (V)
- ◆ Unit cell size : 1.12 μm (H) × 1.12 μm (V)
- ◆ Substrate material : Silicon

System block diagram

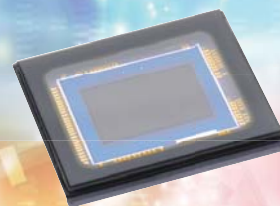


Exmor RS

* Exmor RS is a trademark of Sony Corporation. The Exmor RS is a Sony's CMOS image sensor with high-resolution, high-performance and compact size by replacing a supporting substrate in Exmor R™ which changed fundamental structure of Exmor™ pixel adopted column parallel A/D converter to back-illuminated type, with layered chips formed signal processing circuits.

IMX385LQR

Diagonal 8.35 mm (Type 1/2) Approx. 2.13M-Effective Pixel
Color CMOS Image Sensor



CMOS Image Sensor for Industrial Applications that Realizes High Sensitivity Approximately Twice That of the Existing Product

Sony Semiconductor Solutions Corporation has developed the CMOS image sensor "IMX385LQR" for industrial applications. This new image sensor realizes high sensitivity approximately twice that of the existing product (IMX185LQJ)*¹.

The IMX385LQR pursues picture quality at low illuminance most needed by cameras for industrial applications and mounts pixels with a sensitivity of 2350 mV, which is the highest sensitivity among Sony image sensors for industrial applications*². In addition, SNR1s of 0.13 lx*³, which is the highest performance among Sony Full HD-compatible image

sensors for industrial applications, is achieved by mounting an internal programmable gain amplifier and high conversion gain pixels. Superior performance as an image sensor for industrial applications is further achieved by combining HDR (High Dynamic Range) technology with technology that improves sensitivity in the near-infrared light region.

*1: See the New Product Information released in August 2013.

*2: As of January 2017 (based on in-house research)

*3: Low illuminance performance index advocated by Sony for image sensors for industrial applications

- High sensitivity characteristics using a new-generation 3.75 μm pixel (Sensitivity improved to approximately twice that of the existing product)
- Overwhelming low illuminance performance of SNR1s: 0.13 lx
- DOL-HDR function
- Versatile interface (Low-voltage LVDS serial, MIPI CSI-2)

Exmor

*Exmor is a trademark of Sony Corporation. The Exmor is a version of Sony's high performance CMOS image sensor with high-speed processing, low noise and low power dissipation by using column-parallel A/D conversion.

Overwhelming low illuminance performance

Cameras for industrial applications are required to produce color images with high picture quality even in dark conditions. High sensitivity characteristics of 2350 mV, which is approximately twice that of the existing Type 1/2 Full HD product (IMX185LQJ) with the same 3.75 μm pixel size have been achieved by mounting a new pixel with the highest sensitivity among Sony image sensors for industrial applications.

In addition, mounting high conversion rate pixels achieved SNR1s of 0.13 lx, which is the highest performance among Sony Full HD-compatible image sensors for industrial applications.

Furthermore, combination with technology for improving sensitivity in the near infrared light region also improves picture quality under near-infrared LED lighting.

DOL-HDR function

The IMX385LQR supports a DOL (digital overlap) -type HDR function. This function uses a method that outputs the data for three frames with different storage times line by line instead of

frame by frame, enabling improvement of picture quality especially under low illuminance when compared to the existing multiple exposure HDR function.

Versatile interface

The IMX385LQR is equipped with two different types of output interface (low-voltage LVDS serial, MIPI CSI-2) to meet the diverse needs of customers. The low-voltage LVDS serial interface has a maximum output data rate of 445.5 Mbps/ch,

and the number of output channels can be selected from 1 ch, 2 ch, or 4 ch. The MIPI CSI-2 interface has a maximum output data rate of 742.5 Mbps/lane, and the number of output lanes can be selected from 1 lane, 2 lanes, or 4 lanes.

<Photograph 1> Sample Images at high illuminance

Condition: 450 lx F2.0 (ADC12 bit mode, 30 frame/s, Internal gain: 0 dB)



<Photograph 2> Sample Images at low illuminance

Condition: 1 lx F2.0 (ADC12 bit mode, 30 frame/s, Internal gain 30 dB + High conversion efficiency mode)



<Table 1> Device Structure

Item		IMX385LQR
Output image size		Diagonal 8.35 mm (Type 1/2) aspect ratio 16:9
Number of effective pixels		1945 (H) × 1097 (V) approx. 2.13M pixels
Unit cell size		3.75 μm (H) × 3.75 μm (V)
Optical blacks	Horizontal	Front: 4 pixels, rear: 0 pixels
	Vertical	Front: 16 pixels, rear: 0 pixels
Input drive frequency		37.125 MHz, 74.25 MHz
Output Interface		Sub-LVDS (444.5 Mbps / ch, Max. 4 ch) MIPI CSI-2 (742.5 Mbps / lane Max. 4 lane)
Package		128-pin LGA
Supply voltage V _{DD} (Typ.)		3.3 V / 1.8 V / 1.2 V

<Table 2> Image Sensor Characteristics

Item		Value	Remarks
Sensitivity (F5.6)	Typ.	2350 mV	1/30s accumulation
Saturation signal	Min.	1210 mV	T _j = 60 °C

<Table 3> Basic Drive Mode

Drive mode	Recommended number of recording pixels	Frame rate [frame/s]	ADC [bit]
All-pixel scan (12 bit)	1920 (H) × 1080 (V)	60	12
All-pixel scan (12 bit)	1920 (H) × 1080 (V)	30	12
All-pixel scan (10 bit)	1920 (H) × 1080 (V)	120	10
All-pixel scan (10 bit)	1920 (H) × 1080 (V)	60	10
All-pixel scan (10 bit)	1920 (H) × 1080 (V)	30	10

<Table 4> HDR Drive Mode

Drive mode	Recommended number of recording pixels	Frame rate (through synthesis) [frame/s]	ADC [bit]
All-pixel scan (12 bit) DOL *1 2F sequential control	1920 (H) × 1080 (V)	30	12
All-pixel scan (10 bit) DOL *1 3F sequential control	1920 (H) × 1080 (V)	30	10

*1 There are restrictions on the storage time setting values when using DOL.

*Sony reserves the right to change products and specifications without prior notice.