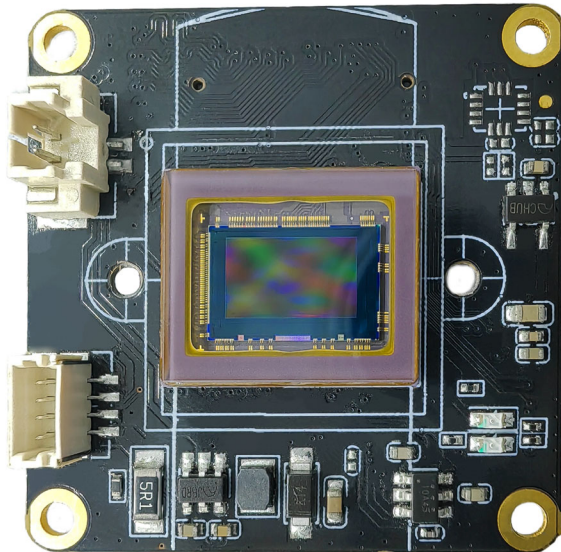
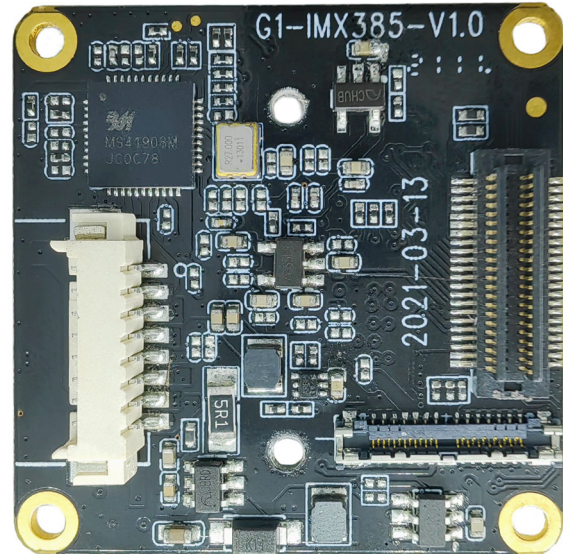


KLT-CMNL-IMX385 V1.0 2.13MP Sony IMX385 No Lens Camera Module



Front View



Back View

Overview

The KLT-CMNL-IMX385 V1.0 camera module No Lens sensor board uses the Sony IMX385 high-quality CMOS sensor, which has a diagonal of 8.35mm (1/2 type) CMOS image sensor, a pixel of 3.75um, a color square pixel arrangement, an effective pixel of 2.13 megapixels, super starlight-level photosensitivity, and a minimum illumination of low light color 0.001LUX, black and white 0.0002LUX. It can be used in low-light environments to even out the brightness of brighter and darker areas of the image.

When used with the master board, it can be used for local storage of low-light video shooting or USB UVC output, with the characteristics of true color restoration and excellent image quality. The board frame size is 32x32mm.



KLT-CMNL-IMX385 V1.0

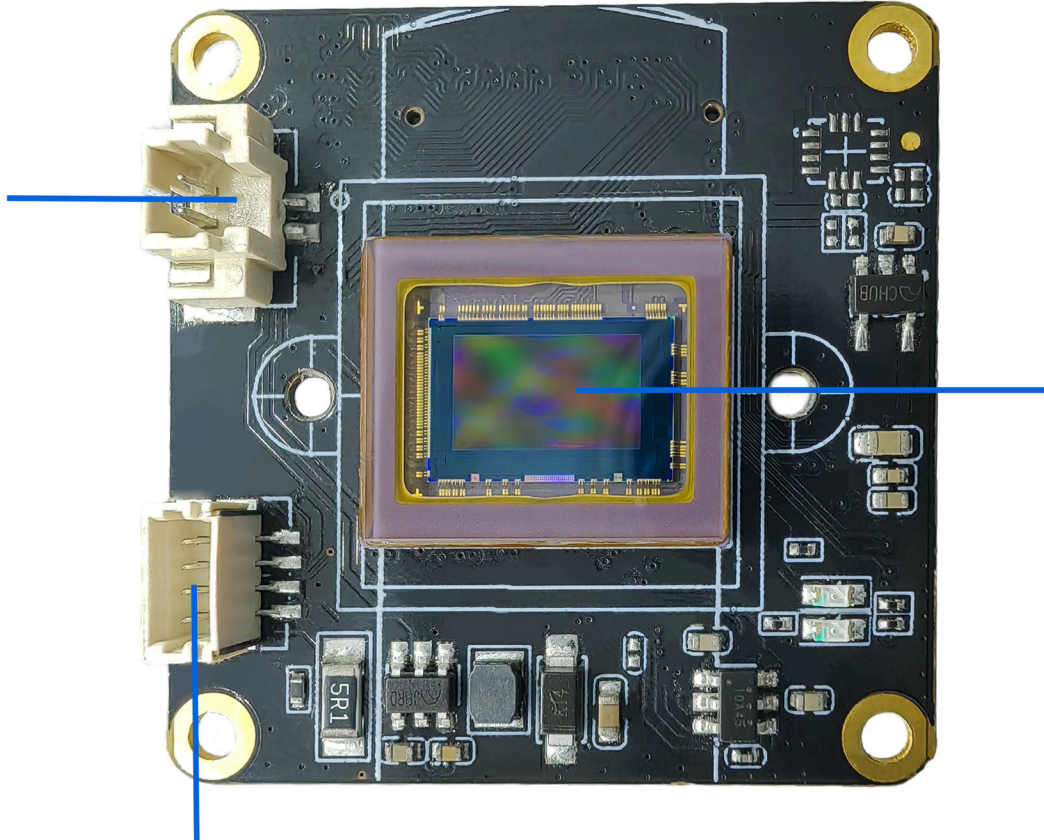
2.13MP Sony IMX385 No Lens Camera Module

Specifications

Model No.	KLT-CMNL-IMX385 V1.0
Image Sensor	IMX385
Image Sensor Type	CMOS
Effective Pixels	2.13 Megapixels
Sensor Size	1/2"
Pixel Size	3.75 um x 3.75 um
Video Frame Rate	1080P@30FPS/60FPS 720P@30FPS/60FPS/120FPS
Photo Resolution (with Master Board)	20MP (5200x3900) (Differential) 13MP (4160x3120) (Differential) 12MP (4000x3000) (Differential) 10MP (3648x2736) (Differential) 8MP (3264x2448) (Differential) 5MP (2592x1944) (Differential) 3MP (2048x1536) (Differential) 2MP (1920x1080)
Operating Temperature	-10°C to +60°C
Storage Temperature	-20°C to +80°C
Humidity	20% to 80%
PCB Dimensions	32 x 32 mm
PCB Screw Hole Spacing	28 x 28 mm
PCB Screw Hole Diameter	2 mm

**KLT-CMNL-IMX385 V1.0****2.13MP Sony IMX385 No Lens Camera Module**

濾光片切换器接口
IR-CUT INTERFACE

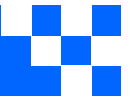
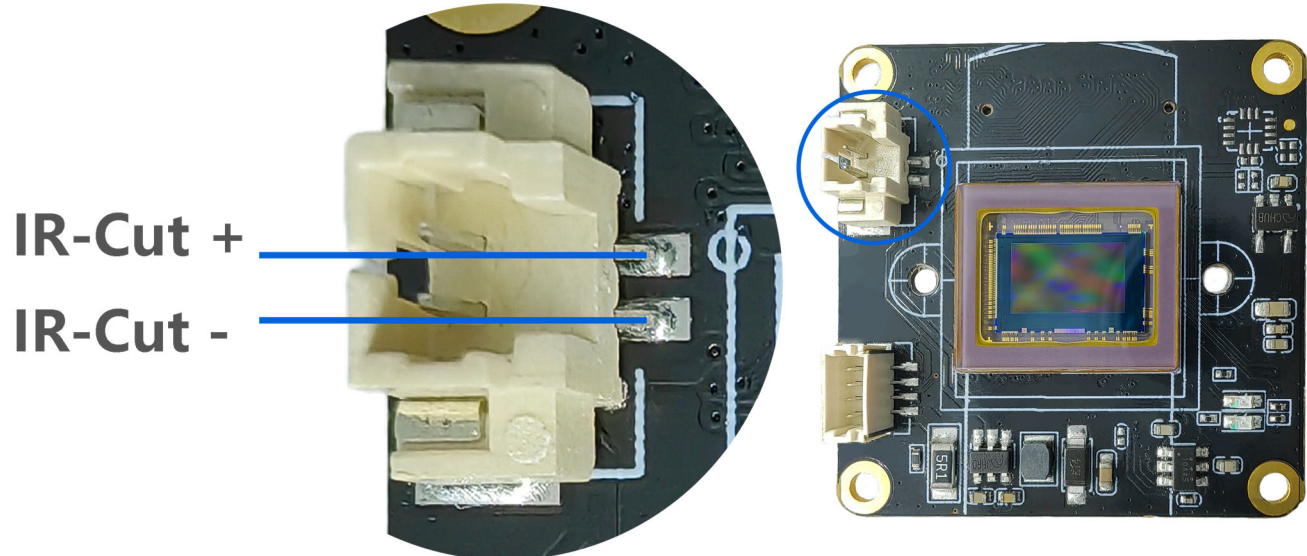


Sony IMX385 sensor

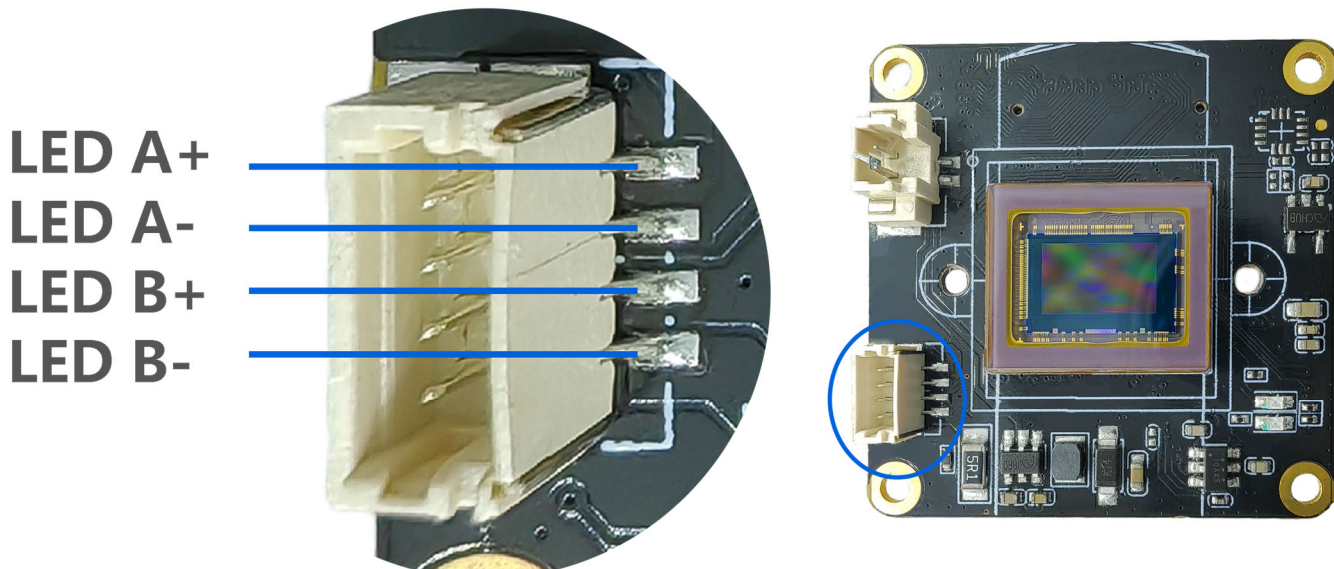
两组LED补光灯接口

LEDS * 2 INTERFACE

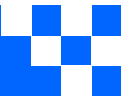
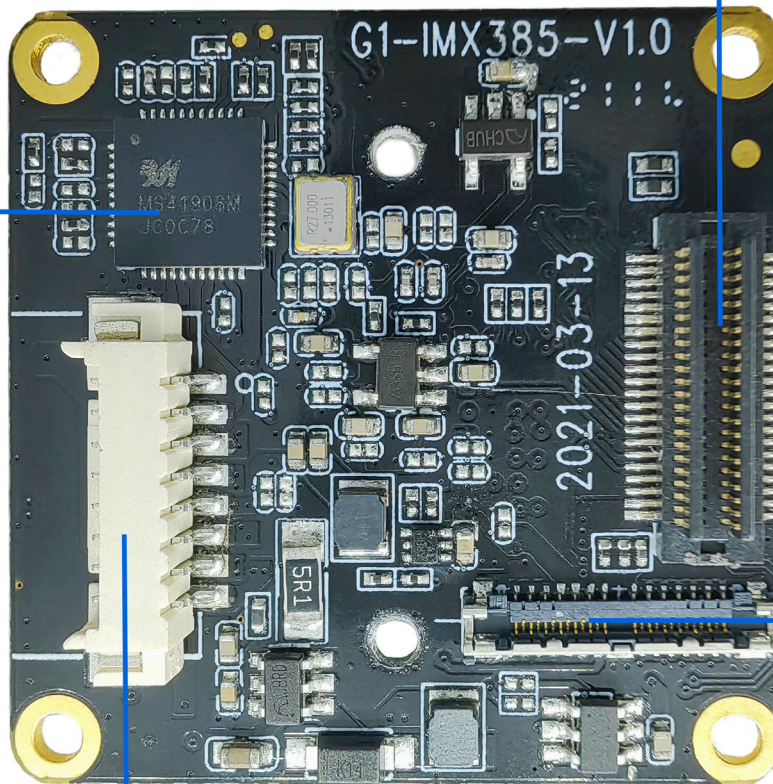
Note: You can choose between TBT board-to-board socket or connecting to the master board via coaxial cable. Users can use them flexibly according to the construction scenarios.

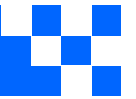
**KLT-CMNL-IMX385 V1.0****2.13MP Sony IMX385 No Lens Camera Module**

The IR-Cut filter switch interface is used by lenses with filters. Users need to match the lens that supports the IR-Cut switch structure in order to support this function.



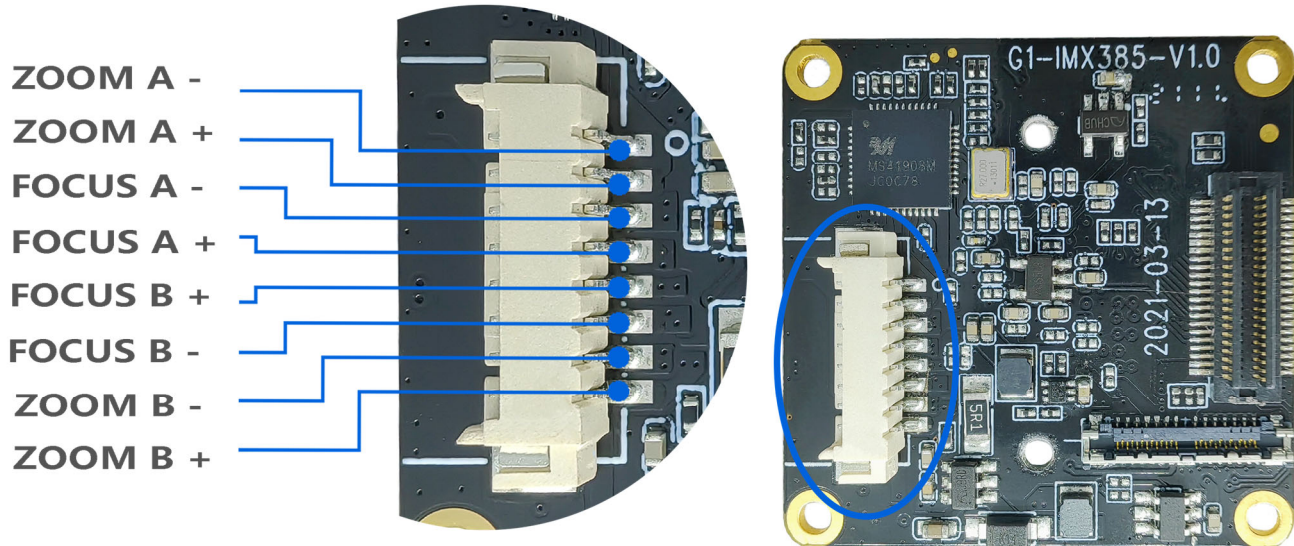
The two sets of fill light interfaces support the expansion of infrared light and white light boards to provide fill light for the device. If you need the fill light function, you need to add the KLT-LEDP V2.0 White and Infrared Light LED Plate.

**KLT-CMNL-IMX385 V1.0****2.13MP Sony IMX385 No Lens Camera Module****通过板对板连接器连接G1主板
支持自动AF变焦镜头****Sensor、IR-CUT、LED等****Connect AF Zoom Lens、Sensor、IR-CUT、Led****变焦镜头驱动芯片**
Zoom lens driver chip**通过同轴线连接**
MIPi Sensor
Mipi Sensor interface**变焦马达接口****Zoom motor interface**



KLT-CMNL-IMX385 V1.0

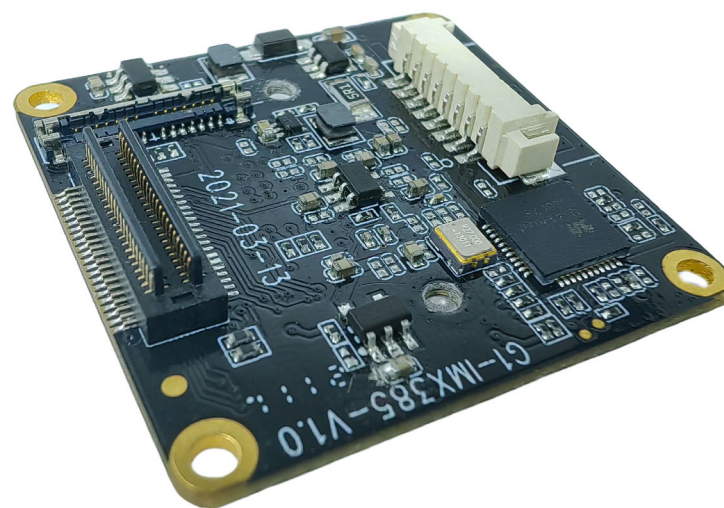
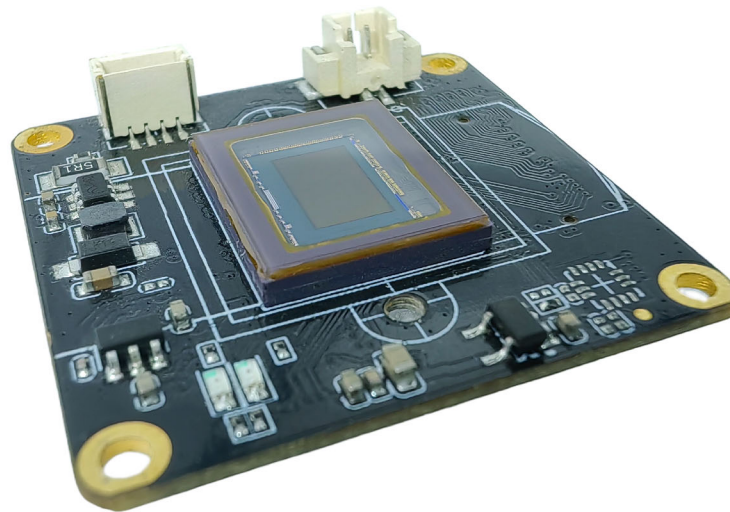
2.13MP Sony IMX385 No Lens Camera Module



Users need to equip with an auto zoom lens, and connect the motor through the zoom interface to achieve the zoom function.



KLT-CMNL-IMX385 V1.0
2.13MP Sony IMX385 No Lens Camera Module



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

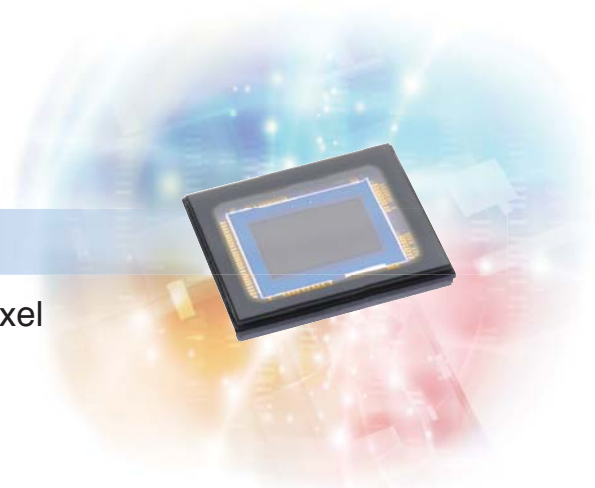
The IMX385LQR supports a DOL (digital overlap) -type HDR function. This function uses a method that outputs the data for three frames with different storage times line by line instead of

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.



Cameras Applications



Automotive Driver Pilot



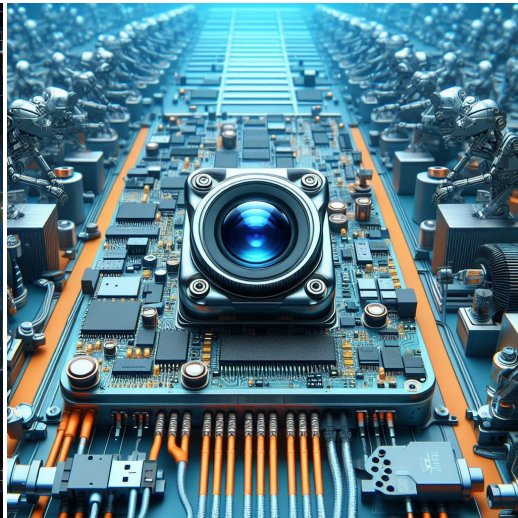
Live Streaming



Video Conference



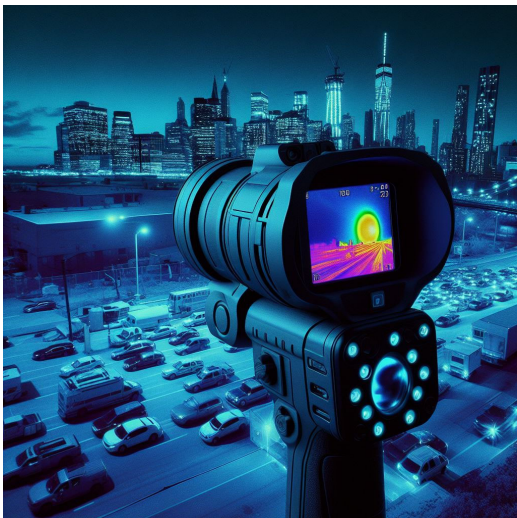
Eye Tracker Biometric Detection



Machine Vision



Agricultural Monitor



Night Vision Security



Drone and Sports Eagle Eyes

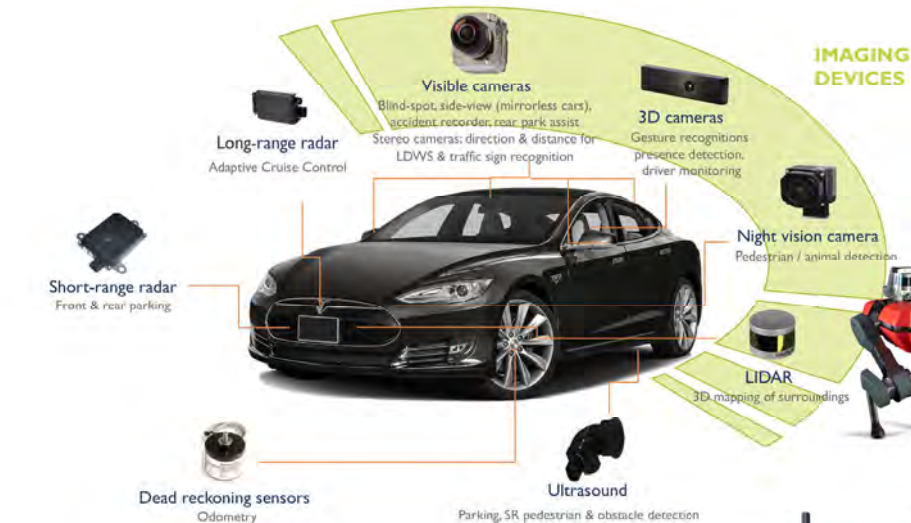


Interactive Pet Camera



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Cameras Applications



IMAGING DEVICES





Camera Module Pinout Definition Reference Chart

OmniVision	Sony	Samsung	On-Semi	Aptina	Himax	GalaxyCore	PixArt	SmartSens	Sensors
Pin Signal		Description							
DGND GND		ground for digital circuit							
AGND		ground for analog circuit							
PCLK DCK		DVP PCLK output							
XCLR PWDN XSHUTDOWN STANDBY		power down active high with internal pull-down resistor							
MCLK XVCLK XCLK INCK		system input clock							
RESET RST		reset active low with internal pull-up resistor							
NC NULL		no connect							
SDA SIO_D SIOD		SCCB data							
SCL SIO_C SIOC		SCCB input clock							
VSYNC XVS FSYNC		DVP VSYNC output							
HREF XHS		DVP HREF output							
DOVDD		power for I/O circuit							
AFVDD		power for VCM circuit							
AVDD		power for analog circuit							
DVDD		power for digital circuit							
STROBE FSTROBE		strobe output							
FSIN		synchronize the VSYNC signal from the other sensor							
SID		SCCB last bit ID input							
ILPWM		mechanical shutter output indicator							
FREQ		frame exposure / mechanical shutter							
GPIO		general purpose inputs							
SLASEL		I2C slave address select							
AFEN		CEN chip enable active high on VCM driver IC							
MIPI Interface									
MDN0 DN0 MD0N DATA_N DMO1N		MIPI 1st data lane negative output							
MDP0 DP0 MD0P DATA_P DMO1P		MIPI 1st data lane positive output							
MDN1 DN1 MD1N DATA2_N DMO2N		MIPI 2nd data lane negative output							
MDP1 DP1 MD1P DATA2_P DMO2P		MIPI 2nd data lane positive output							
MDN2 DN2 MD2N DATA3_N DMO3N		MIPI 3rd data lane negative output							
MDP2 DP2 MD2P DATA3_P DMO3P		MIPI 3rd data lane positive output							
MDN3 DN3 MD3N DATA4_N DMO4N		MIPI 4th data lane negative output							
MDP3 DP3 MD3P DATA4_P DMO4P		MIPI 4th data lane positive output							
MCN CLKN CLK_N DCKN		MIPI clock negative output							
MCP CLKP MCP CLK_P DCKN		MIPI clock positive output							
DVP Parallel Interface									
D0 DO0 Y0		DVP data output port 0							
D1 DO1 Y1		DVP data output port 1							
D2 DO2 Y2		DVP data output port 2							
D3 DO3 Y3		DVP data output port 3							
D4 DO4 Y4		DVP data output port 4							
D5 DO5 Y5		DVP data output port 5							
D6 DO6 Y6		DVP data output port 6							
D7 DO7 Y7		DVP data output port 7							
D8 DO8 Y8		DVP data output port 8							
D9 DO9 Y9		DVP data output port 9							
D10 DO10 Y10		DVP data output port 10							
D11 DO11 Y11		DVP data output port 11							



Camera Reliability Test

Reliability Inspection Item		Testing Method	Acceptance Criteria	
Category	Item			
Environmental	Storage Temperature	High 60°C 96 Hours	Temperature Chamber	No Abnormal Situation
		Low -20°C 96 Hours	Temperature Chamber	No Abnormal Situation
	Operation Temperature	High 60°C 24 Hours	Temperature Chamber	No Abnormal Situation
		Low -20°C 24 Hours	Temperature Chamber	No Abnormal Situation
	Humidity	60°C 80% 24 Hours	Temperature Chamber	No Abnormal Situation
	Thermal Shock	High 60°C 0.5 Hours Low -20°C 0.5 Hours Cycling in 24 Hours	Temperature Chamber	No Abnormal Situation
Physical	Drop Test (Free Falling)	Without Package 60cm	10 Times on Wood Floor	Electrically Functional
		With Package 60cm	10 Times on Wood Floor	Electrically Functional
	Vibration Test	50Hz X-Axis 2mm 30min	Vibration Table	Electrically Functional
		50Hz Y-Axis 2mm 30min	Vibration Table	Electrically Functional
		50Hz Z-Axis 2mm 30min	Vibration Table	Electrically Functional
	Cable Tensile Strength Test	Loading Weight 4 kg 60 Seconds Cycling in 24 Hours	Tensile Testing Machine	Electrically Functional
Electrical	ESD Test	Contact Discharge 2 KV	ESD Testing Machine	Electrically Functional
		Air Discharge 4 KV	ESD Testing Machine	Electrically Functional
	Aging Test	On/Off 30 Seconds Cycling in 24 Hours	Power Switch	Electrically Functional
	USB Connector	On/Off 250 Times	Plug and Unplug	Electrically Functional





Inspection Item		Inspection Method	Standard of Inspection		
Category	Item				
Appearance	FPC/ PCB	Color	The Naked Eye	Major Difference is Not Allowed.	
		Be Torn/Chopped	The Naked Eye	Copper Crack Exposure is Not Allowed.	
		Marking	The Naked Eye	Clear, Recognizable (Within 30cm Distance)	
	Holder	Scratches	The Naked Eye	The Inside Crack Exposure is Not Allowed	
		Gap	The Naked Eye	Meet the Height Standard	
		Screw	The Naked Eye	Make Sure Screws Are Presented (If Any)	
		Damage	The Naked Eye	The Inside Crack Exposure is Not Allowed	
	Lens	Scratch	The Naked Eye	No Effect On Resolution Standard	
		Contamination	The Naked Eye	No Effect On Resolution Standard	
		Oil Film	The Naked Eye	No Effect On Resolution Standard	
		Cover Tape	The Naked Eye	No Issue On Appearance.	
	Function	Image	No Communication	Test Board	Not Allowed
			Bright Pixel	Black Board	Not Allowed In the Image Center
Dark Pixel			White board	Not Allowed In the Image Center	
Blurry			The Naked Eye	Not Allowed	
No Image			The Naked Eye	Not Allowed	
Vertical Line			The Naked Eye	Not Allowed	
Horizontal Line			The Naked Eye	Not Allowed	
Light Leakage			The Naked Eye	Not Allowed	
Blinking Image			The Naked Eye	Not Allowed	
Bruise			Inspection Jig	Not Allowed	
Resolution			Chart	Follows Outgoing Inspection Chart Standard	
Color			The Naked Eye	No Issue	
Noise			The Naked Eye	Not Allowed	
Corner Dark			The Naked Eye	Less Than 100px By 100px	
Color Resolution			The Naked Eye	No Issue	
Dimension	Height	The Naked Eye	Follows Approval Data Sheet		
	Width	The Naked Eye	Follows Approval Data Sheet		
	Length	The Naked Eye	Follows Approval Data Sheet		
	Overall	The Naked Eye	Follows Approval Data Sheet		



KLT Package Solutions

KLT Camera Module



Complete with Lens Protection Film



Tray with Grid and Space



Place Cameras on the Tray





Camera Modules Package Solution

Full Tray of Cameras



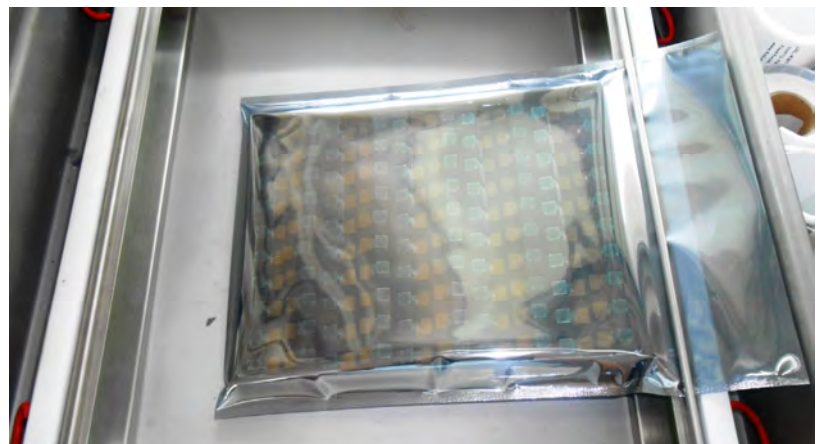
Cover Tray with Lid



Put Tray into Anti-Static Bag



Vacuum the Anti-Static Bag





Camera Modules Package Solution

Sealed Vacuum Bag with Labels

1. Model and Description 2. Quantity 3. Shipping Date 4. Caution





Large Order Package Solution

Place Foam Sheets Between Trays



Foam Sheets are Slightly Larger than Trays



Place Foam Sheets and Trays into Box



Foam Sheets are Tightly Fitting Box





Small Order Package Solution

Place Foam Sheets and Trays into Small Box



Foam Sheets are Nicely Fitting the Small Box



Package in Small Box for Shipment



Place Small Boxes into Larger Box





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Carbon Box Package Solution

Seal the Carbon Box

Final Package Labelled Box



Carbon Box Ready for Shipment

1. Delivery Address and Phone No. 2. Box No. and Ship Date 3. Fragile Caution





Sample Order Package Solution

Place Sample into Small Anti-Static Bag



Place Connectors into Small Ant-Static Bag



Sample Labels on the Small Bag

1. Camera Module or Connector Model
2. Shipping Date and Quantity
3. Caution





Connectors Large Order Package Solution

Connectors in a Wheel



Label Connectors in the Wheel



The Wheel is Perfectly Fitting the Box



Connectors Box Ready for Shipment





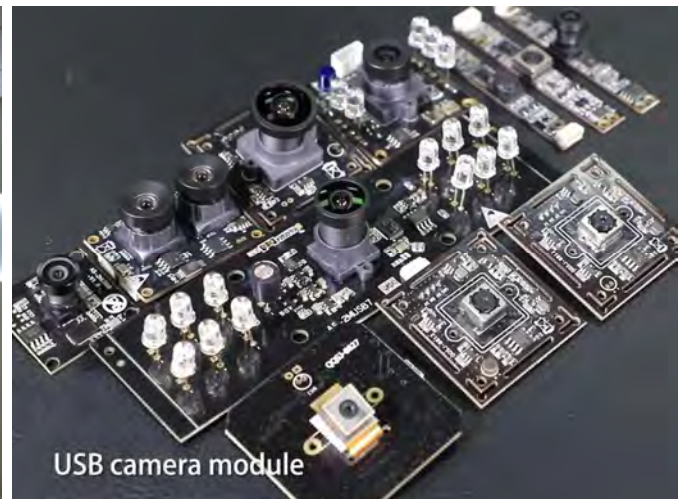
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Company Kai Lap Technologies (KLT)

Kai Lap Technologies Group Limited. (KLT) was established in 2009, a next-generation technology driven manufacturer specialized in research, design, and produce of audio and video products. KLT is occupying 20,000 square feet automated plants with 100 employees of annual throughput 30,000,000 units cameras.

KLT provides OEM, ODM design, contract manufacturing, and builds the camera products. You may provide the requirements to us, even with a hand draft, our sales and engineering work together to meet your needs. We consider ourselves your last-term partner in developing practical and innovative solutions.

Our team covers everything from initial concept development to mass produced product. KLT specializes in customized camera design, raw material, electronic engineering, firmware/software development, product testing, and packing design. Our experienced strategic supply systems offer a robust and dependable manufacturing capacity for orders of various sizes.



Limited Warranty

KLT provides the following limited warranty if you purchased the Product(s) directly from KLT company or from KLT's website, www.KaiLapTech.com. Product(s) purchased from other sellers or sources are not covered by this Limited Warranty. KLT guarantees that the Product(s) will be free from defects in materials and workmanship under normal use for a period of one (1) year from the date you receive the product ("Warranty Period").

For all Product(s) that contain or develop material defects in materials or workmanship during the Warranty Period, KLT will, at its sole option, either: (i) repair the Product(s); (ii) replace the Product(s) with a new or refurbished Product(s) (replacement Product(s) being of identical model or functional equivalent); or (iii) provide you a refund of the price you paid for the Product(s).

This Limited Warranty of KLT is solely limited to repair and/or replacement on the terms set forth above. KLT is not reliable or responsible for any subsequent events.





CMOS CAMERA MODULES



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KLT Strength

Powerful Factory



Professional Service



Promised Delivery



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