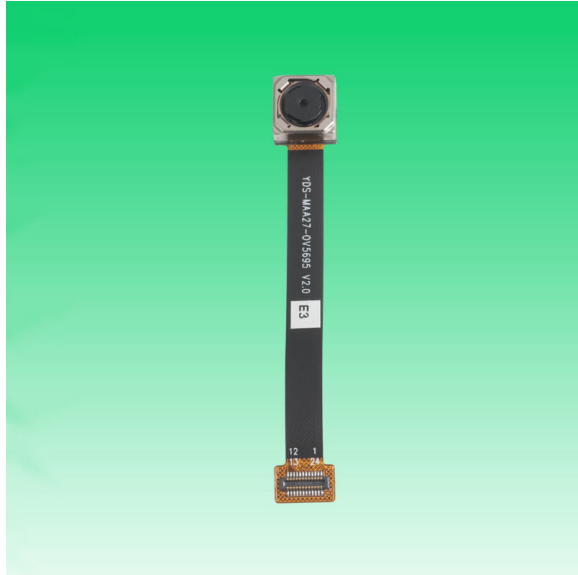
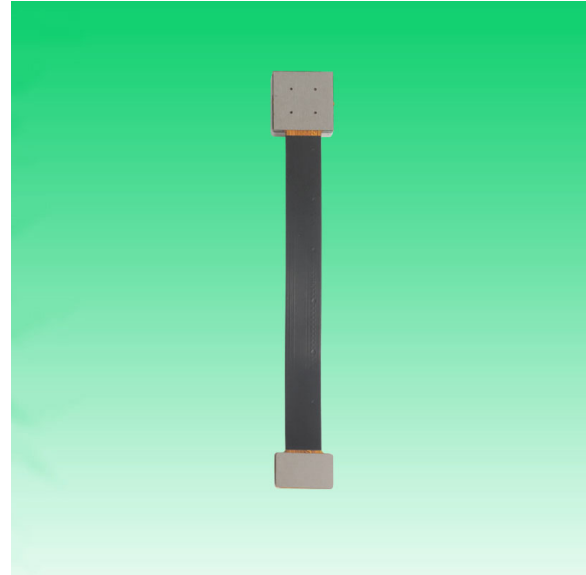


**KLT-MAA27-OV5695 V2.0****5MP OmniVision OV5695 MIPI Interface Auto Focus Camera Module**

Front View



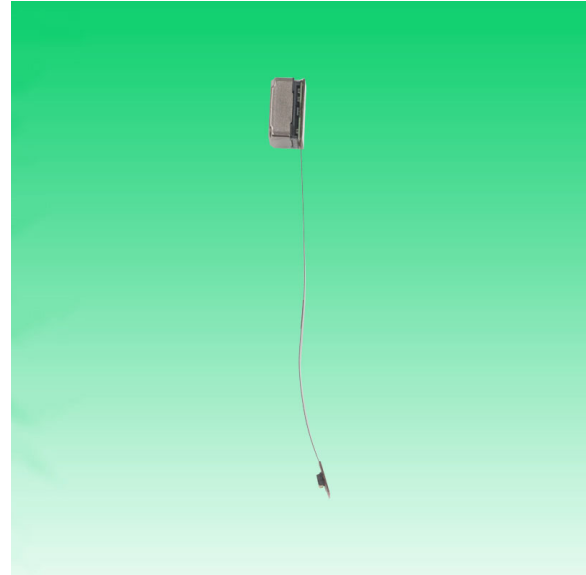
Back View

**Specifications**

<b>Camera Module No.</b>	<b>KLT-MAA27-OV5695 V2.0</b>
<b>Resolution</b>	5 MP
<b>Image Sensor</b>	OV5695
<b>Sensor Type</b>	1/4"
<b>Pixel Size</b>	1.4 um x 1.4 um
<b>EFL</b>	3.20 mm
<b>F.NO</b>	2.8
<b>Pixel</b>	2592 x 1944
<b>View Angle</b>	70.0°(DFOV) 58.6°(HFOV) 45.3°(VFOV)
<b>Lens Dimensions</b>	8.50 x 8.50 x 4.82 mm
<b>Module Size</b>	58.50 x 8.50 mm
<b>Module Type</b>	Auto Focus
<b>Interface</b>	MIPI
<b>Auto Focus VCM Driver IC</b>	DW9714P
<b>Lens Type</b>	650nm IR Cut
<b>Operating Temperature</b>	-30°C to +70°C
<b>Mating Connector</b>	BBR43-24KB533

**KLT-MAA27-OV5695 V2.0****5MP OmniVision OV5695 MIPI Interface Auto Focus Camera Module**

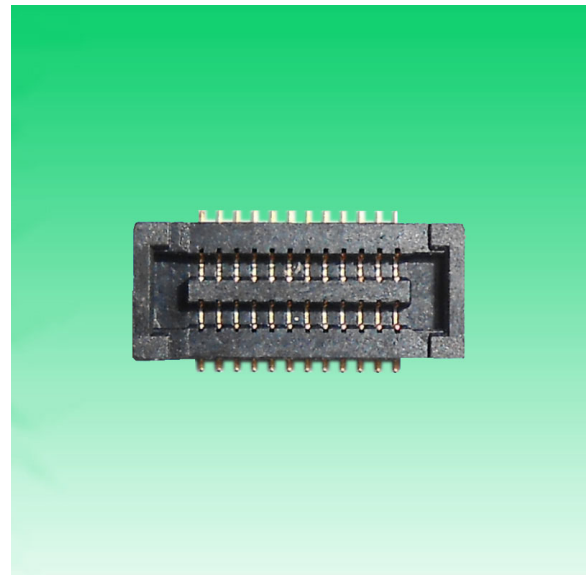
Top View



Side View



Bottom View



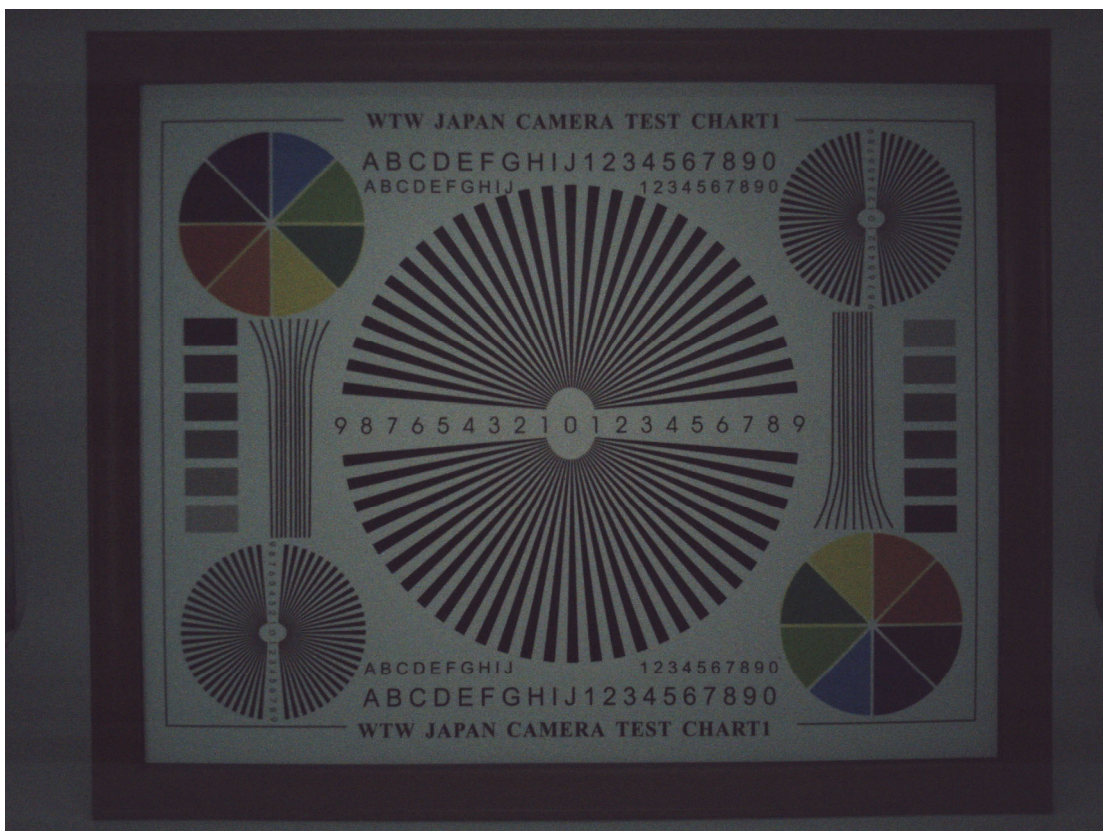
Mating Connector



# CMOS CAMERA MODULES



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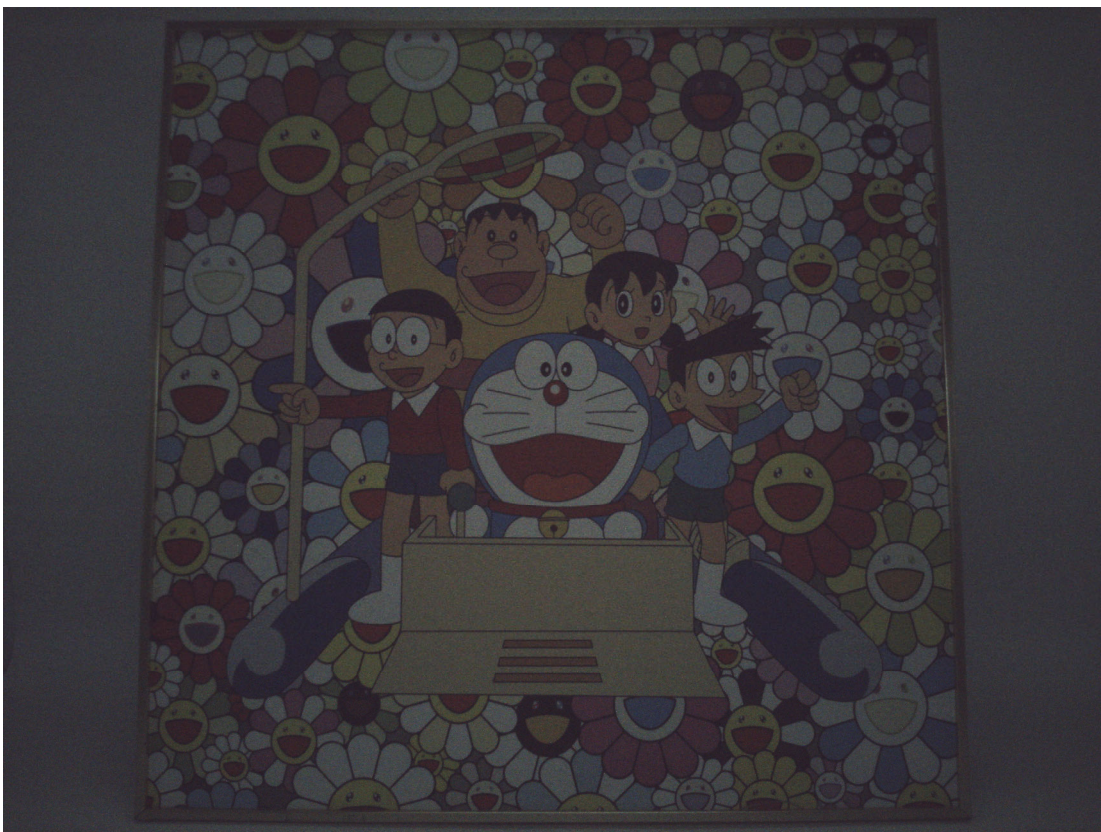
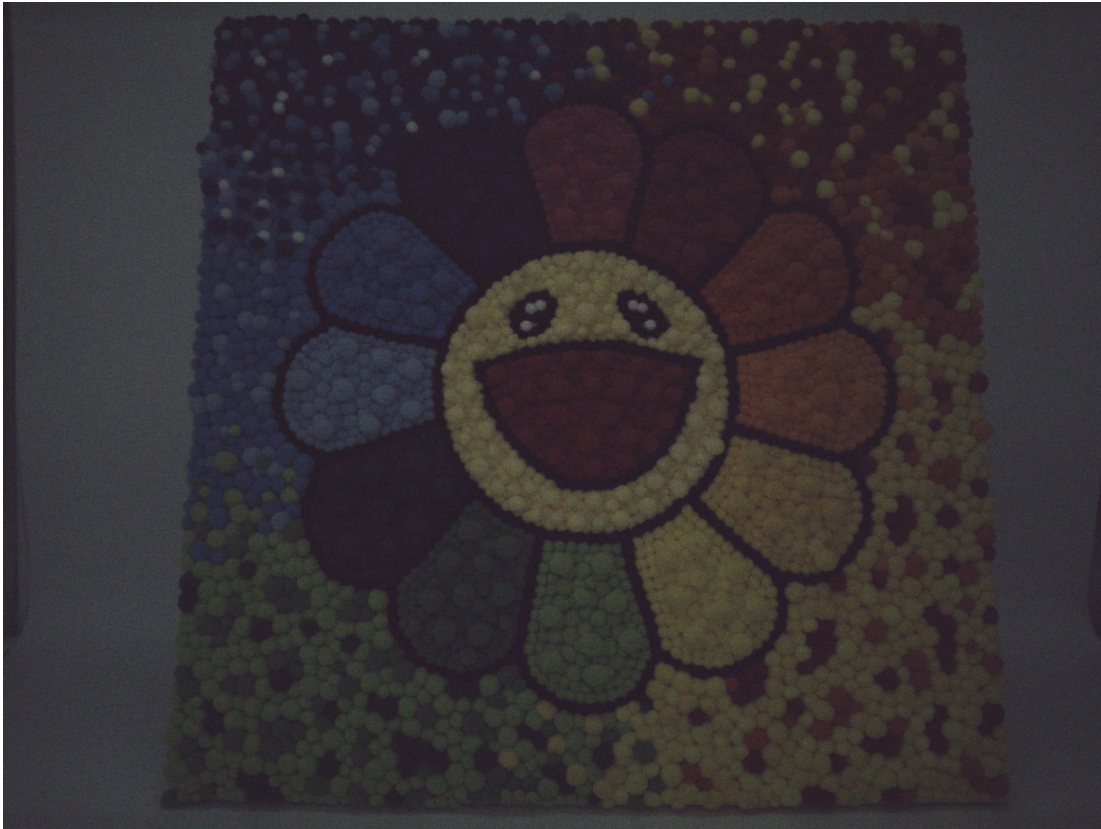
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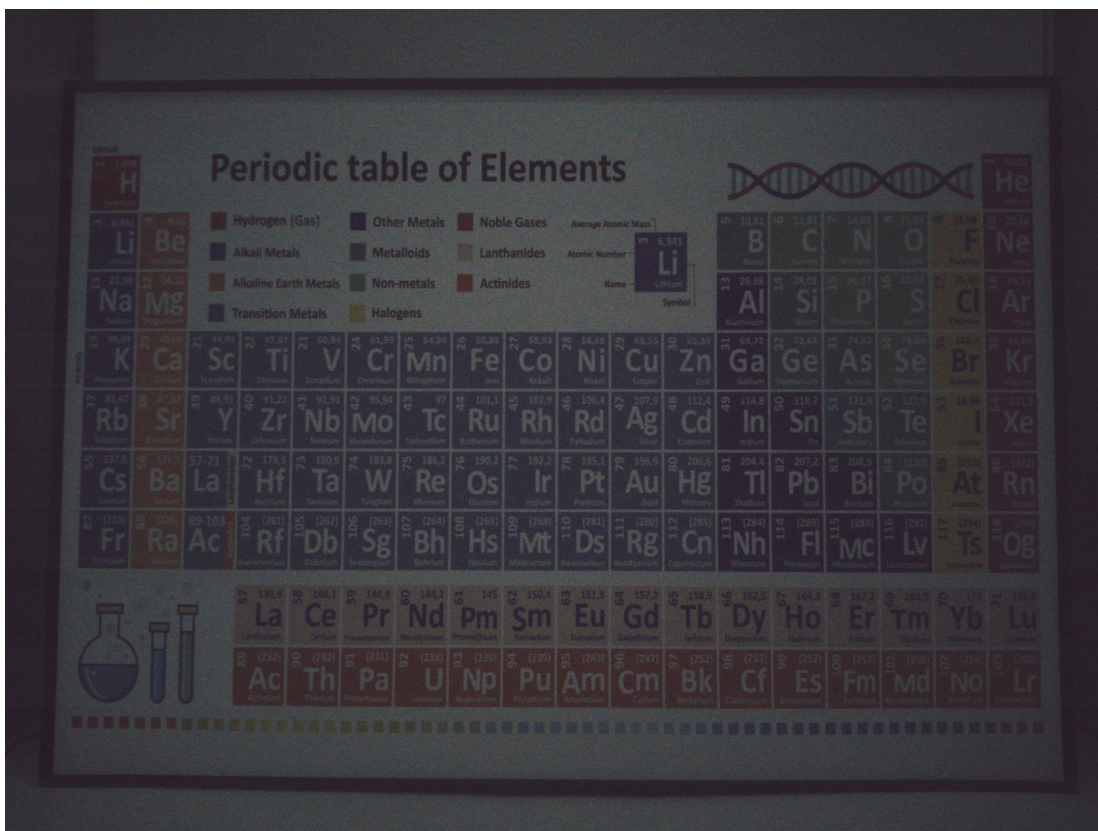
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# CMOS CAMERA MODULES

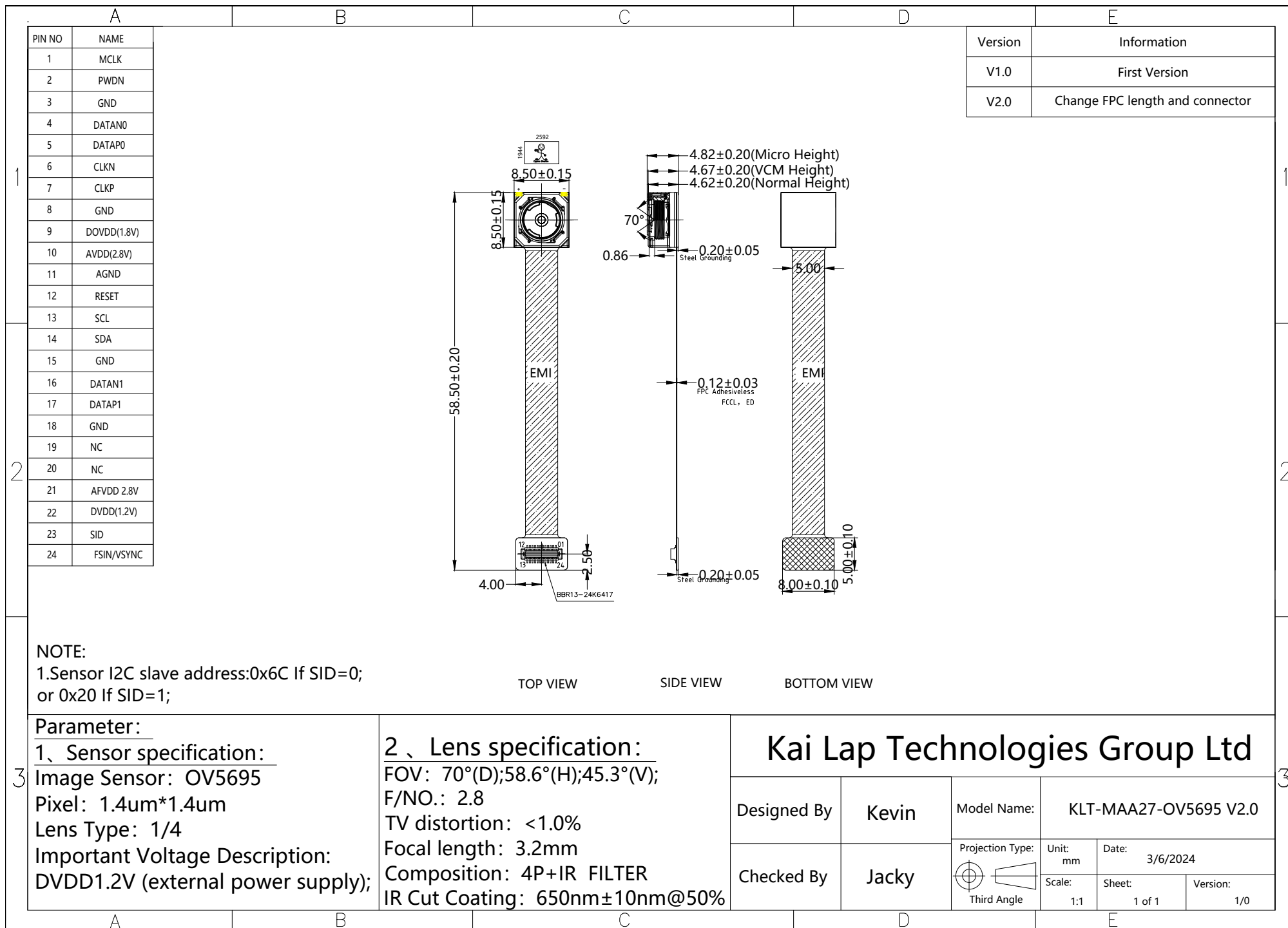


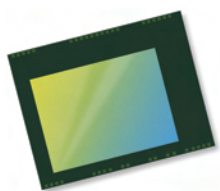
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# OV5695 5-megapixel product brief



## High Quality 1/4-inch 5-Megapixel Selfies for Next-Generation Smartphones and Tablets



available in  
a lead-free  
package

OmniVision's new 1/4-inch OV5695 is a high performance and cost-effective 5-megapixel OmniBSI™ sensor designed to be a cost-competitive camera solution for both front- and rear-facing camera applications in smartphones and tablets. The OV5695 features an improved design that offers superior image and video quality in a more compact, power-efficient package.

The OV5695 utilizes 1.4-micron OmniBSI+ pixel architecture to capture full resolution video in a native 4:3 aspect ratio at 30 fps or 1080p video at 60 fps with support for interleave row high dynamic range (iHDR).

The sensor's exceptional low-light sensitivity enhances image and video quality when recording in low-light conditions, and reduces user dependence on the device's front-facing flash functionality.

The OV5695 fits into an 8.5 x 8.5 mm module with a z-height of approximately 4.4 mm.

Find out more at [www.ovt.com](http://www.ovt.com).



## Applications

- Smartphones and Feature Phones
- Tablets
- PC Multimedia
- Wearables

## Product Features

- 1.4  $\mu\text{m}$  x 1.4  $\mu\text{m}$  pixel
- 5MP at 30 fps
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports image sizes:
  - 5MP (2592x1944)
  - quad HD (2560x1440)
  - 1080p (1920x1080)
  - 720p (1280x720)
  - VGA (640 x 480), and more
- 16 bytes of embedded one-time programmable (OTP) memory for customer use
- ultra low power mode (ULPM)
- support for output formats: 10-bit RGB RAW
- interleave row HDR output
- two-wire serial bus control (SCCB)
- MIPI serial output interface (1- or 2-lane)
- 2x binning support
- image quality control:
  - defect pixel correction
  - automatic black level calibration

# OV5695



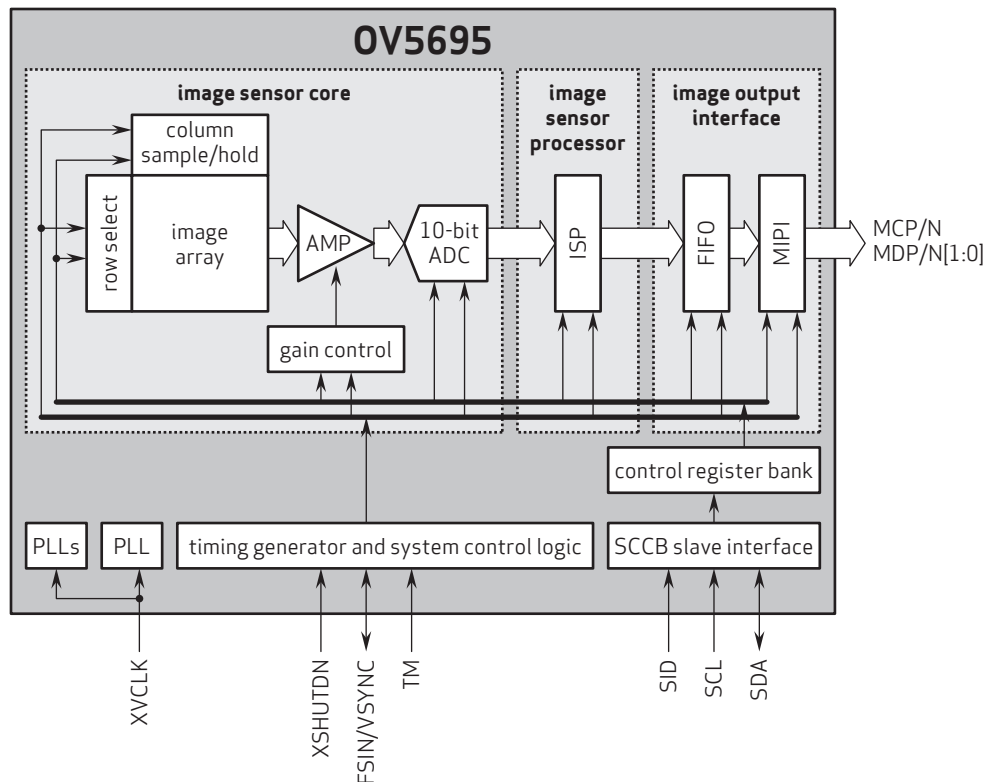
## Ordering Information

- OV5695-GA4A-1B**  
(color, chip probing, 200  $\mu\text{m}$  backgrinding, rev 1B, reconstructed wafer)

## Product Specifications

- active array size:** 2592 x 1944
- lens size:** 1/4"
- power supply:**
  - core: 1.14 - 1.26V (1.2V nominal)
  - analog: 2.7 - 3.0V (2.8V nominal)
  - I/O: 1.7 - 1.9V (1.8V nominal)
- lens chief ray angle:** 31.08° non-linear
- input clock frequency:** 6 - 27 MHz
- power requirements:**
  - active: 155 mW
  - standby: 61  $\mu\text{W}$
  - XSHUTDN: 36  $\mu\text{W}$
- maximum image transfer rate:**
  - 5MP (2592x1944): 30 fps
  - quad HD (2560x1440): 30 fps
  - 1080p (1920x1080): 60 fps
  - 720p (1280x720): 60 fps
  - VGA (640x480): 120 fps
- temperature range:**
  - operating: -30°C to +70°C junction temperature
  - stable image: -20°C to +60°C junction temperature
- pixel size:** 1.4  $\mu\text{m}$  x 1.4  $\mu\text{m}$
- output interface:** 2-lane MIPI serial output
- dark current:** 15 e<sup>-</sup>/sec @ 60°C junction temperature
- output formats:** 10-bit RGB RAW
- image area:** 3684  $\mu\text{m}$  x 2763  $\mu\text{m}$
- dimensions:**
  - COB: 5022  $\mu\text{m}$  x 3933  $\mu\text{m}$
  - RW: 5072  $\mu\text{m}$  x 3983  $\mu\text{m}$

## Functional Block Diagram



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Santa Clara, CA 95054  
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www.ovt.com

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**OmniVision**

## FEATURES

120mA output driver with 10-bit resolution DAC  
Smart Actuator Control (SAC™) modes  
Supply voltage ( $V_{DD}$ ): 2.3V to 4.3V  
I/O voltage ( $V_{IN}$ ): 1.8V to  $V_{DD}$   
Fast mode and Fast mode plus I<sup>2</sup>C interface compatible  
Power On Reset (POR)  
Power Down (PD) mode current consumption less than 1uA  
Package: 6-pin WLCSP (0.77mm x 1.14mm x 0.30mm)

## APPLICATIONS

Mobile camera  
Digital still camera  
Camcorder  
Web camera  
Action camera

## GENERAL DESCRIPTION

The DW9714P designed for linear control of Voice Coil Motors (VCM). This device is compatible with DW9714. The DW9714P has a single 10-bit DAC with 120mA output current sink capability. This device features SAC™ mode which can minimize the mechanical vibration and achieve very fast mechanical settling time. The SAC™ is protected by patent and registered trademark of DONGWOON ANATECH.

The DW9714P operates from a single 2.3V to 4.3V supply. The internal DAC is controlled via an I<sup>2</sup>C serial interface that operates at clock rate up to 1MHz. The I<sup>2</sup>C address for the DW9714P is 0x18. The DW9714P offers PD mode with current consumption less than 1uA.

The DW9714P can be used for auto focus applications in mobile cameras, digital still cameras, camcorders, web cameras and action cameras.

## TYPICAL APPLICATION CIRCUIT

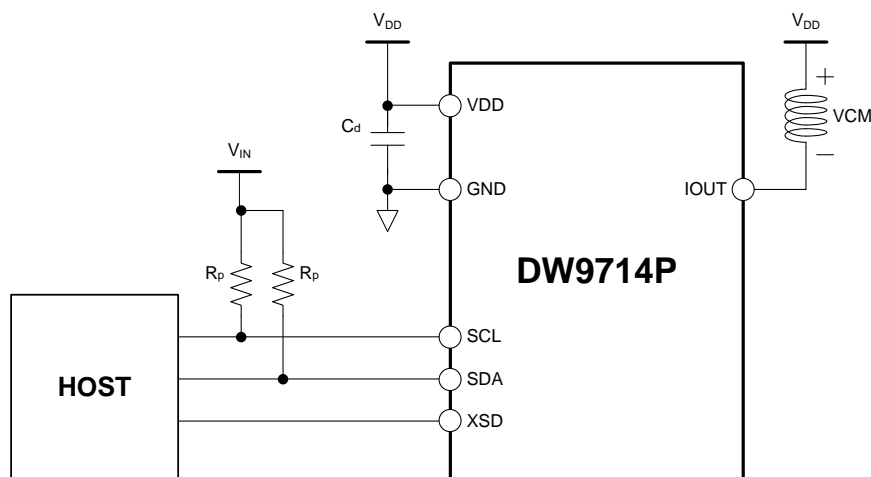
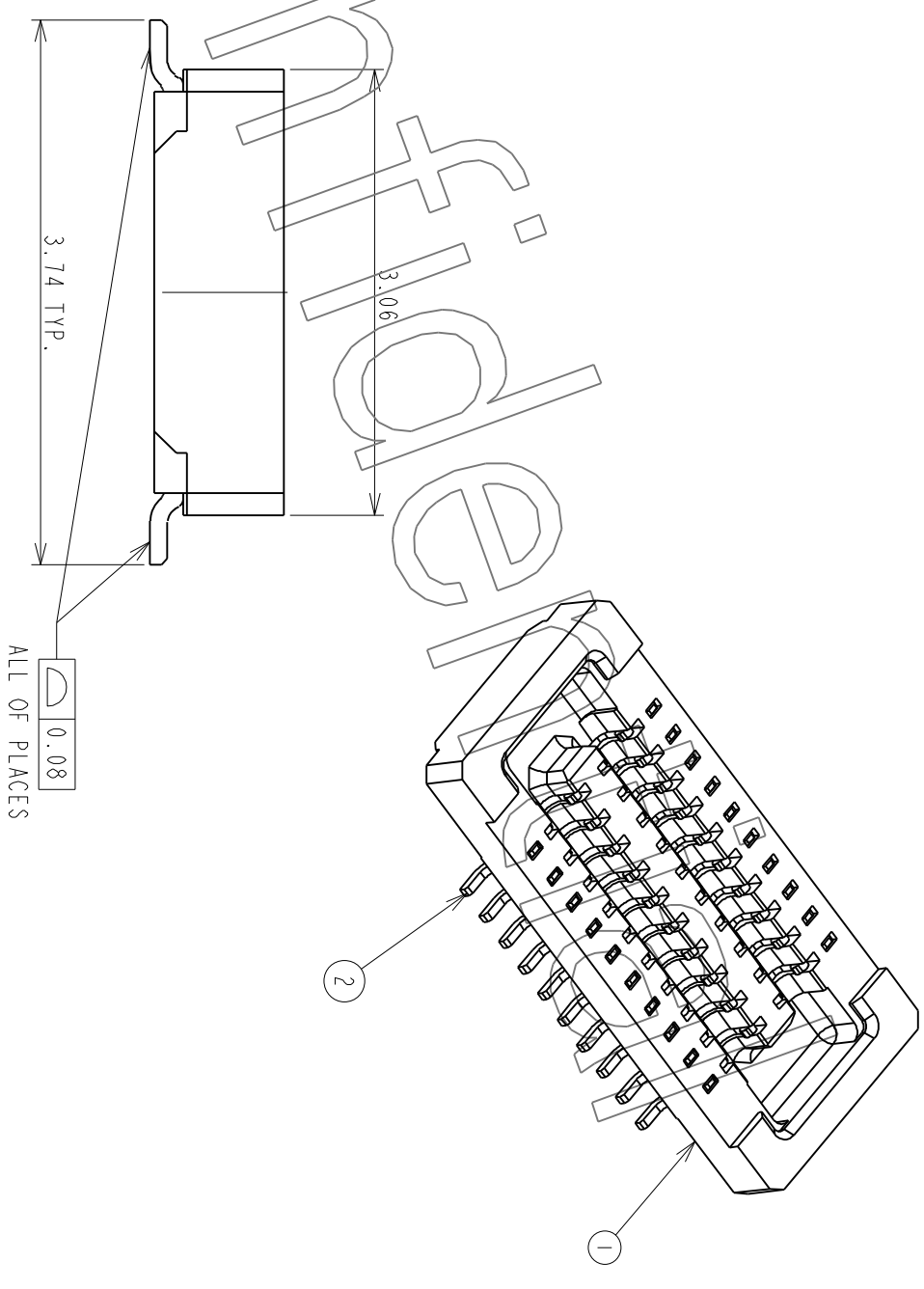
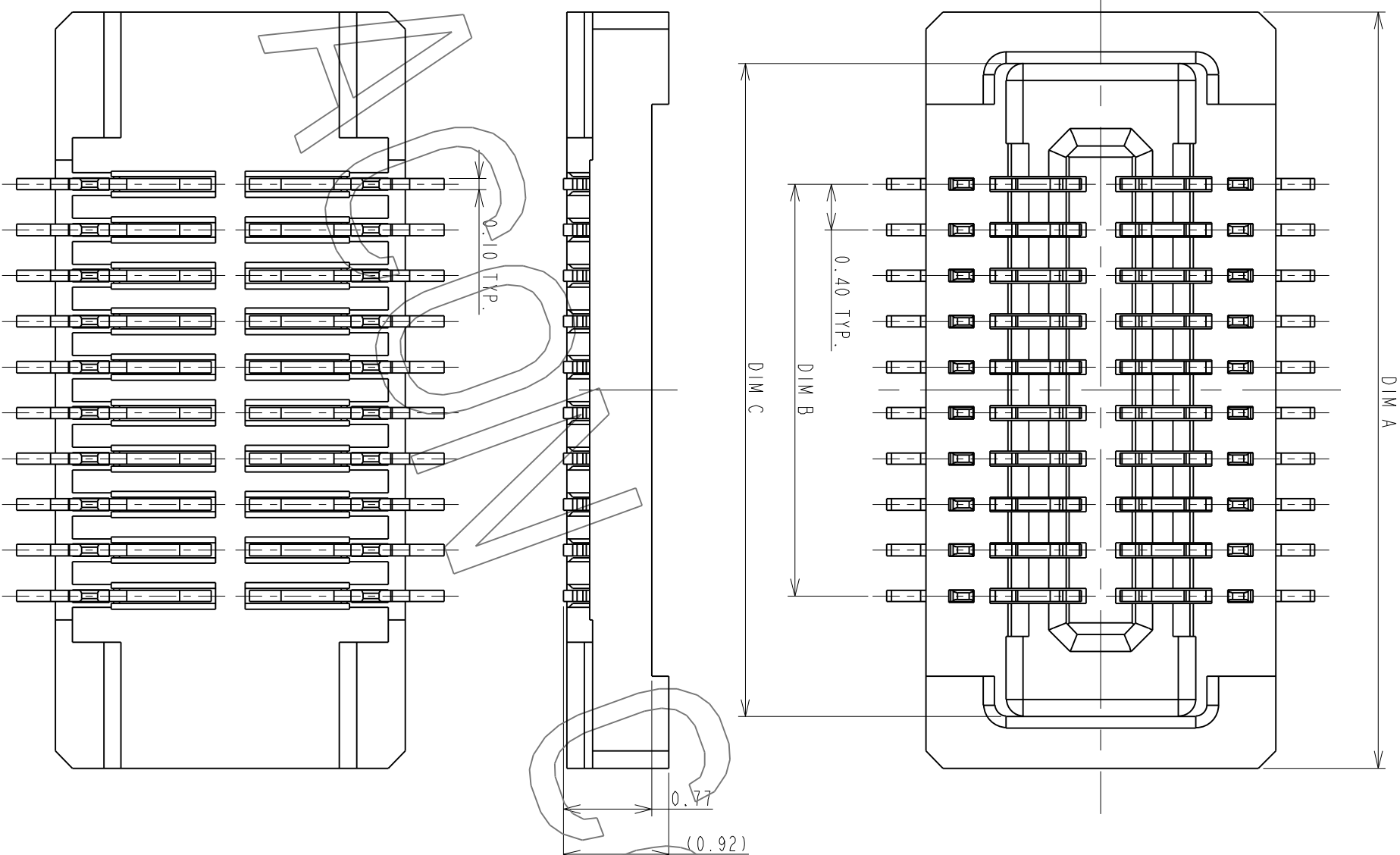

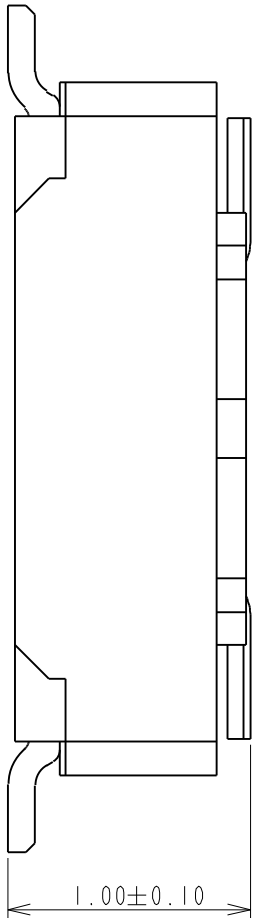


Figure 1. Typical application circuit

REV.	EC#	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
A	TJECR10018-02	NEW RELEASE PER NPRI0009	11/05/10'	RAIN	DICK, SON	HARDWARE
B	TJECR13014	△ XI, AXI	05/13/13'	RAIN	Steven M. eng	Jeff



2	CONTACT	XX	T-BBR43-100X30	COPPER ALLOY/PLATING GOLD
1	HOUSING	I	I-BBR43-1XXX33	HIGH TEMP RESIN/UL 94 V-0
ITEM	NAME	Q'TY	PART #	MATERIAL / FINISH
TOLERANCES UNLESS OTHERWISE SPECIFIED		DRAWN		
GENERAL X <sub>1</sub>	±0.38	RAIN	04/15/10'	
.XX	±0.25	DESIGN	DATE	
.XXX	±0.05	RAIN	04/15/10'	
ANGLES X° ±.3° .XX' ±1.0'	CHECKED	DATE	TITLE	
SCALE 20:1	HARDWARE	04/24/10'	P.O.#411, 0mm BOARD TO BOARD CONN. RECEPTACLE WITHOUT HOLD DOWN	
SHEET 1 OF 2	APPROVED	DATE		
UNIT MM	DICK. LEE	04/24/10'		
	CUSTOMER DRAWING			
DWG NO.		SERIES	SIZE	
C-BBR43-04-01		BBR	A3	
REV. B				



PRODUCT NUMBERING CODE:

BBR43	-	XX	K	X	5	X	X
1	2	3	4	5	6	7	

1. PRODUCTION CODE:

BBR43: BOARD TO BOARD 0.4 PITCH RECEPTACLE

2. POSITIONS:

XX: POSITIONS(SEE TABLE A

3. INSULATOR COLOR:

K: BLACK

4. CONTACT PLATING:

- 1: GOLD 1u" MIN  
2: GOLD 5u" MIN  
3: GOLD 10u" MIN  
B: GOLD 4u" MIN FOR SPOT PLATING  
ALL OVER: Ni 50~100u"

5. TYPE OF HEIGHT:

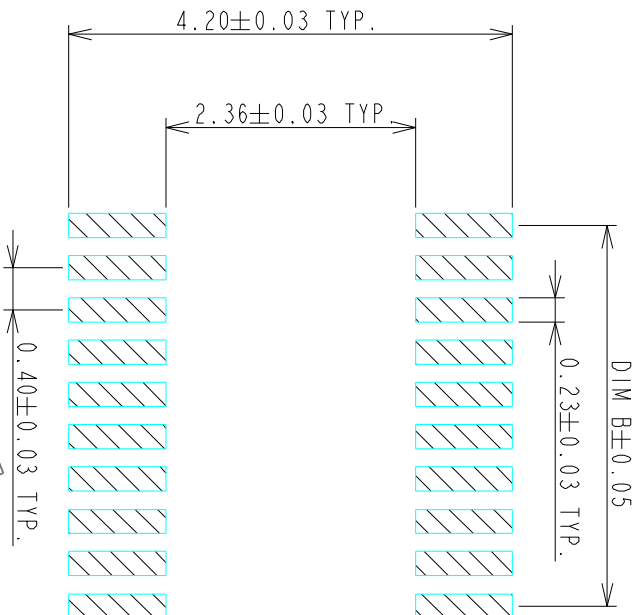
5: H=0.77mm

6. TYPE OF HOLD DOWN:

3: WITHOUT HOLD DOWN

7. OTHER

- 2: WITH POST, FINISHED PRODUCTS  
3: WITHOUT POST, FINISHED PRODUCTS



RECOMMENDED P.C. BOARD PATTERN DIMENSION (WITHOUT HOLD DOWN)

NOTES:

- 1.0: RATING:  
1.1: VOLTAGE: 60V AC/DC  
1.2: CURRENT: 0.5 AMPS  
1.3: OPERATION TEMPERATURE: -40°C TO +85°C  
2.0: ELECTRICAL CHARACTERISTIC:  
2.1: CONTACT RESISTANCE: 50 mΩ MAX INITIAL  
2.2: INSULATION RESISTANCE: 1000 MΩ MIN INITIAL  
2.3: DIELECTIC WITHSTANDING VOLTAGE: 250V AC FOR ONE MINUTE  
3.0 TOLERANCES UNLESS OTHERWISE SPECIFIED

GENERAL:	DIMENSION >10.00	±0.13
	DIMENSION 5.00~10.00	±0.10
	DIMENSION <5.00	±0.05

4.0 ALL COPLANARITY IS 0.08mm MAX. BEFORE REFLOW

ALL COPLANARITY IS 0.10mm MAX. AFTER REFLOW

TABLE A:

POSITIONS	DIM A	DIM B	DIM C
10	4.61	1.60	3.71
14	5.41	2.40	4.51
16	5.81	2.80	4.91
18	6.21	3.20	5.31
20	6.61	3.60	5.71
22	7.01	4.00	6.11
24	7.41	4.40	6.51
26	7.81	4.80	6.91
30	8.61	5.60	7.71
32	9.01	6.00	8.11
34	9.41	6.40	8.51
40	10.61	7.60	9.71
44	11.41	8.4	10.51
48	12.21	9.20	11.31
50	12.61	9.60	11.71
54	13.41	10.40	12.51
60	14.61	11.60	13.71
70	16.61	13.60	15.71
80	18.61	15.60	17.71

TOLERANCES UNLESS OTHERWISE SPECIFIED		DRAWN	DATE
GENERAL X <sub>1</sub>	±0.38	RAIN	04/15/10
XX	±0.13	DESIGN	DATE
XXX	±0.05	RAIN	04/15/10
ANGLES X°	±3.0°	CHECKED	DATE
XX	±2.0°		
XXX	±1.0°		
SCALE 20:1		HARDWARE	04/24/10
SHEET 2 OF 2		APPROVED	DATE
UNIT mm		DICK. LEE	04/24/10
CUSTOMER DRAWING		TITLE	
		P0.4*11.0mm BOARD TO BOARD CONN. RECEPTACLE WITHOUT HOLD DOWN	
		SERIES	SIZE
		BBR	A3
		DWG NO. C-BBR43-04-01	REV. B



## Cameras Applications



Automotive Driver Pilot



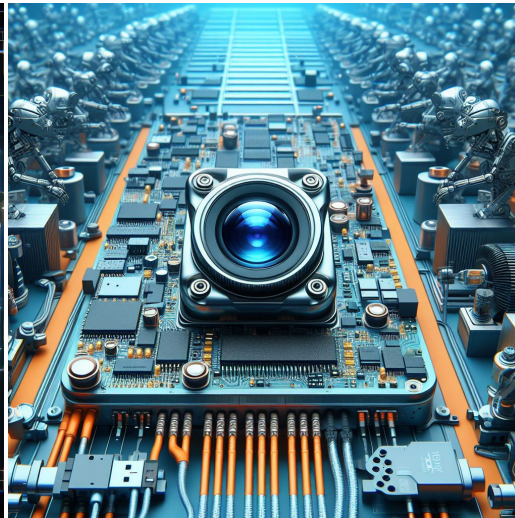
Live Streaming



Video Conference



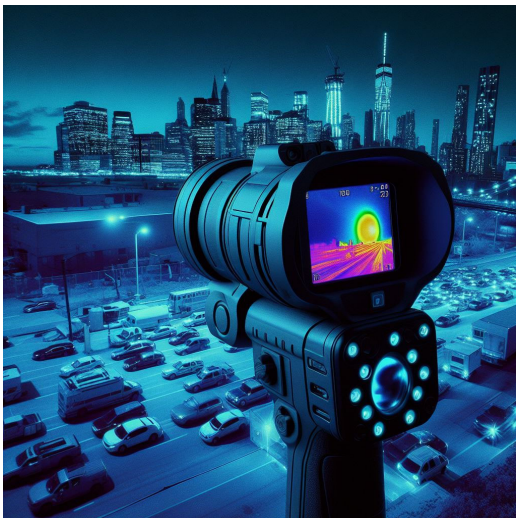
Eye Tracker Biometric Detection



Machine Vision



Agricultural Monitor



Night Vision Security



Drone and Sports Eagle Eyes



Interactive Pet Camera

## Cameras Applications

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## 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
FREX	frame exposure / mechanical shutter
GPIO	general purpose inputs
SLASEL	I2C slave address select
AFEN	CEN chip enable active high on VCM driver IC
<b>MIPI Interface</b>	
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
<b>DVP Parallel Interface</b>	
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

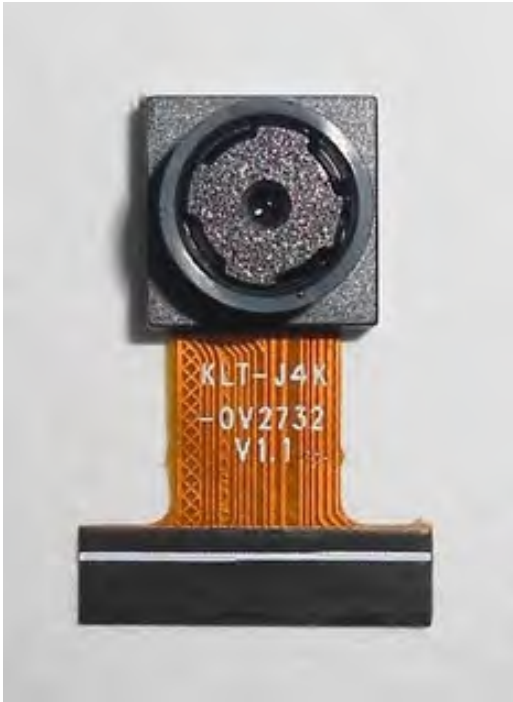
Reliability Inspection Item			Testing Method	Acceptance Criteria
Category		Item		
Environmental	Storage Temperature	High 60°C 96 Hours	Temperature Chamber	No Abnormal Situation
		Low -20°C 96 Hours	Temperature Chamber	No Abnormal Situation
	Operation Temperature	High 60°C 24 Hours	Temperature Chamber	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



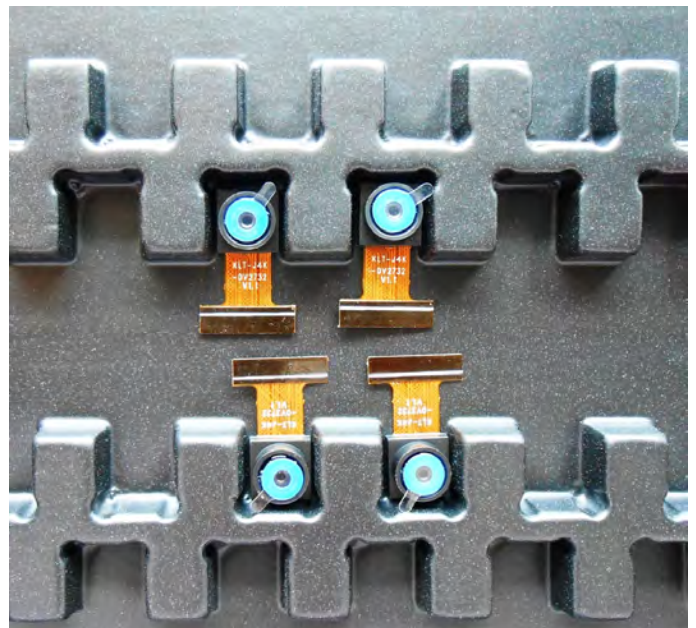
Complete with Lens Protection Film



Tray with Grid and Space

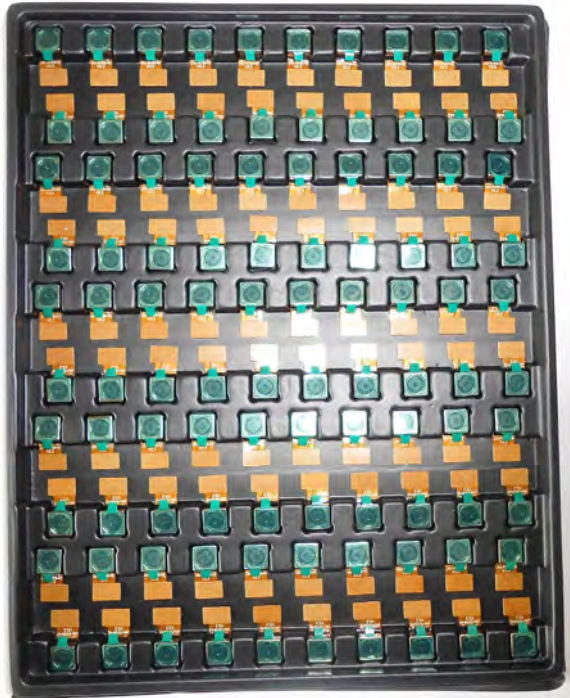


Place Cameras on the Tray



## Camera Modules Package Solution

Full Tray of Cameras



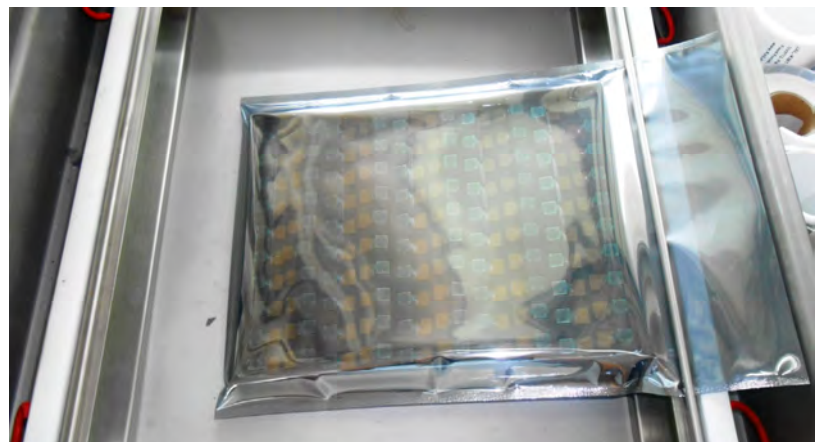
Cover Tray with Lid



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

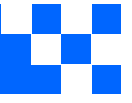


Foam Sheets are Tightly Fitting Box





# CMOS CAMERA MODULES



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## 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

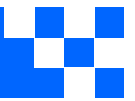


Connectors Box Ready for Shipment





# CMOS CAMERA MODULES



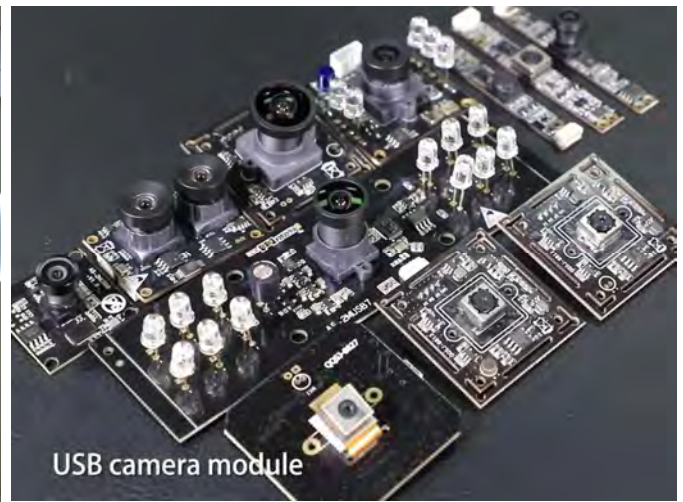
*your BEST camera module partner*

## 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](http://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.



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# CMOS CAMERA MODULES



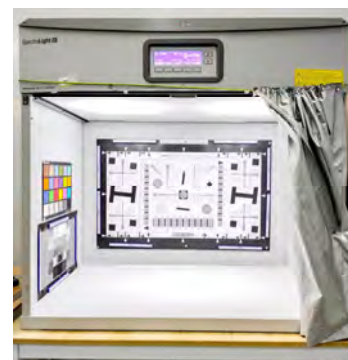
*your BEST camera module partner*

## KLT Strength

### Powerful Factory



### Professional Service



### Promised Delivery



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