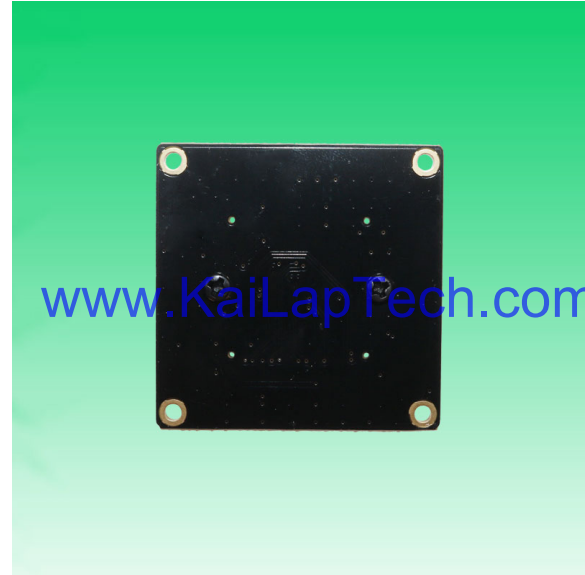


## KLT-Raspberry-Pi-OV5647 V2.0

### 5MP OmniVision OV5647 Raspberry Pi MIPI Interface M12 Fixed Focus Camera Module



Front View



Back View

#### Specifications

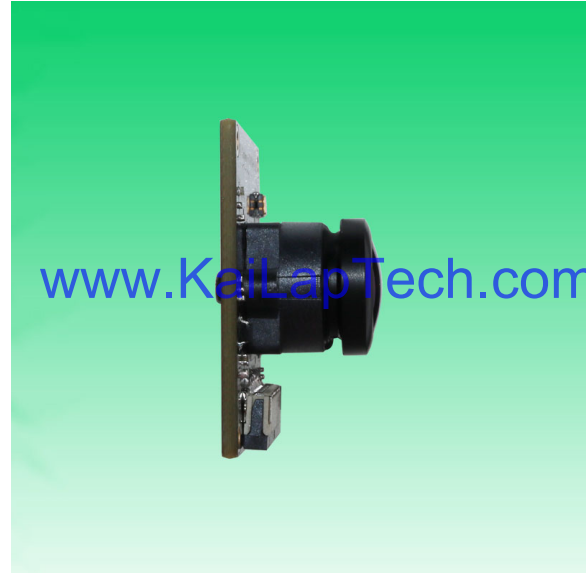
Camera Module No.	KLT-Raspberry-Pi-OV5647 V2.0
Resolution	5MP
Image Sensor	OV5647
Sensor Type	1/4"
Pixel Size	1.4 um x 1.4 um
EFL	1.80 mm
F.NO	2.00
Pixel	2592 x 1944
View Angle	177.0°(DFOV)
Lens Dimensions	13.60 x 13.60 x 16.00 mm
Module Size	32.00 x 32.00 mm
Module Type	Fixed Focus
Interface	MIPI
Auto Focus VCM Driver IC	None
Lens Model	KLT-LENS-SHG101-001-650
Lens Type	650nm IR Cut
Operating Temperature	-30°C to +70°C
Mating Connector	Raspberry Pi Cable



## KLT-Raspberry-Pi-OV5647 V2.0 5MP OmniVision OV5647 Raspberry Pi MIPI Interface M12 Fixed Focus Camera Module



Top View



Side View

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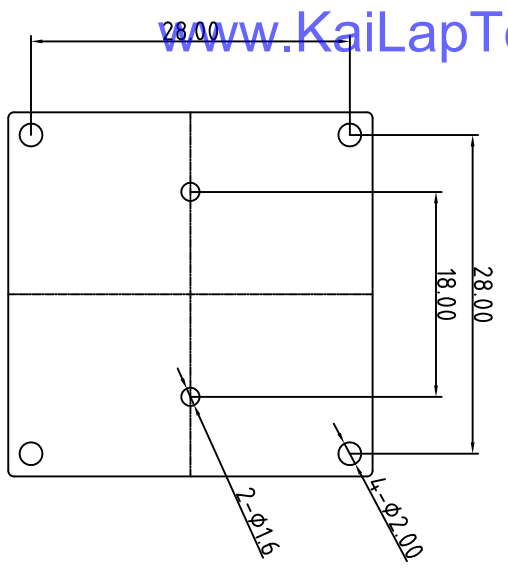
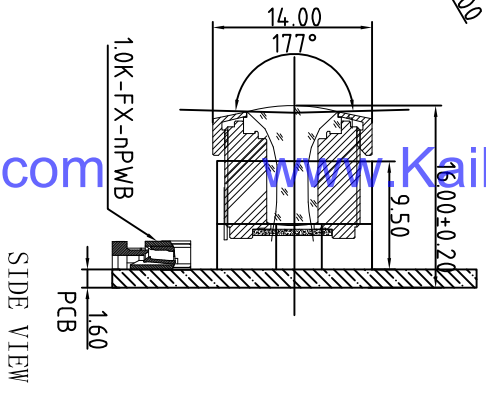
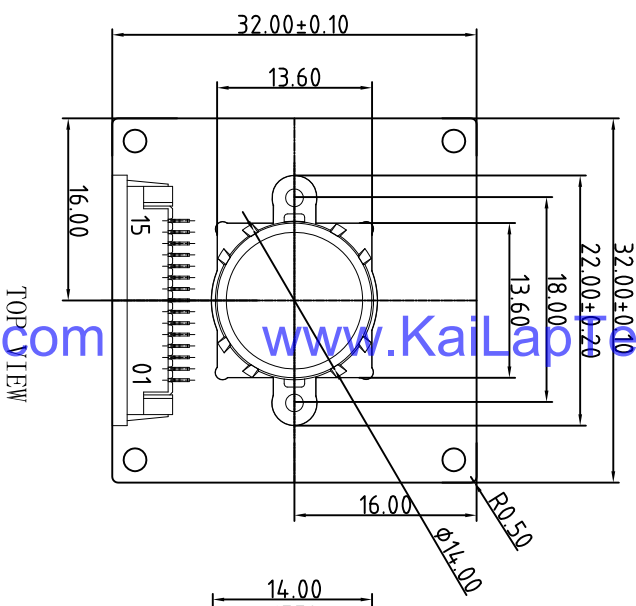
Bottom View



Mating Connector

# ROHS

NO	SIGNAL
1	GND
2	DN0
3	DP0
4	GND
5	DN1
6	DP1
7	GND
8	MCPN
9	MCP
10	GND
11	GPIO
12	MCLK
13	SCL
14	SDA
15	AVDD3.3V



## Parameters:

### 1、Sensor specification:

Image Sensor: OV5647  
 Pixel: 1.4umx1.4um  
 Lens Type: 1/4  
 Important Voltage Description: DVDD1.5V  
 (Internal power supply);

### 2、Lens specification:

FOV: 177°  
 F/NO: 2.0  
 TV distortion: <-56.7%  
 Focal length: 1.8mm  
 Composition: 6G  
 IR Cut Coating: 650nm±10nm@50%

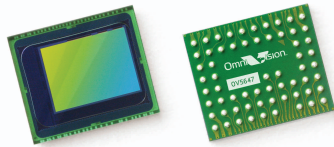
Kai Lap Technologies Group Ltd

Designed By	Kevin	Model Name:	KLT-Raspberry-Pi-OV5647 V2.0		
Checked By	Aouly_Yan	Projection Type:	Unit:	Material:	Version:
		Third Angle	mm	-----	1/0
			Scale:	Sheet:	Version:
			1:1	1 of 1	1/0

Version	Mark	Information	Date
V1.0	PD	First Version	2016-05-17
V2.0	△	Change lens	2016-08-20
	△		







# OV5647 5-megapixel product brief



## 5-megapixel 1/4" Image Sensor with 1.4 $\mu\text{m}$ OmniBSI Technology Offering HD Video



available in  
a lead free  
package

The OV5647 is a 5-megapixel CMOS image sensor built on OmniVision's proprietary 1.4-micron OmniBSI™ backside illumination pixel architecture. The OV5647 delivers 5-megapixel photography in addition to high frame rate of 720p/60 and 1080p/30 high-definition (HD) video capture in an industry standard camera module size of 8.5 x 8.5 x 5 mm, making it an ideal solution for the mainstream mobile phone market.

The 720p/60 HD video is captured in full field of view (FOV) with 2x2 binning to double the sensitivity and improve signal-to-noise ratio (SNR). The post binning re-sampling filter helps minimize spatial and aliasing artifacts to provide superior image quality.

OmniBSI technology offers significant performance benefits over front-side illumination technology, such as increased sensitivity per unit area, improved quantum efficiency,

reduced crosstalk and photo response non-uniformity, which all contribute to significant improvements in image quality and color reproduction. Additionally, OmniVision CMOS image sensors use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical sources of image contamination, such as fixed pattern noise and smearing to produce a clean, fully stable color image.

The low power OV5647 supports a digital video parallel port or high-speed two-lane MIPI interface, and provides full-frame, windowed or binned 10-bit images in RAW RGB format. It offers all required automatic image control functions, including automatic exposure control, automatic white balance, automatic band filter, automatic 50/60 Hz luminance detection, and automatic black level calibration.

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

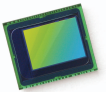
## Applications

- Mobile Phones
- PC Multimedia
- Digital Still Cameras

## Product Features

- 1.4  $\mu\text{m}$  x 1.4  $\mu\text{m}$  pixel with OmniBSI technology for high performance (high sensitivity, low crosstalk, low noise)
- optical size of 1/4"
- automatic image control functions:
  - automatic exposure control (AEC)
  - automatic white balance (AWB)
  - automatic band filter (ABF)
  - automatic 50/60 Hz luminance detection
  - automatic black level calibration (ABLC)
- programmable controls for frame rate, AEC/AGC 1-zone size, position, weight control, mirror and flip, cropping, windowing, and panning
- image quality controls: lens correction, defective pixel canceling
- support for output formats: 8-/10-bit raw RGB data
- support for video or snapshot operations
- support for LED and flash strobe mode
- support for internal and external frame synchronization for frame exposure mode
- support for 2x2 binning for better SNR in low light conditions
- post binning resampling filter to minimize spatial/aliasing artifacts on 2x2 binned image
- support for horizontal and vertical sub-sampling
- standard serial SCCB interface
- digital video port (DVP) parallel output interface
- MIPI interface (two lanes)
- 32 bytes of embedded one-time programmable (OTP) memory
- on-chip phase lock loop (PLL)
- embedded 1.5V regulator for core power
- programmable I/O drive capability, I/O tri-state configurability
- support for black sun cancellation

# OV5647



## Ordering Information

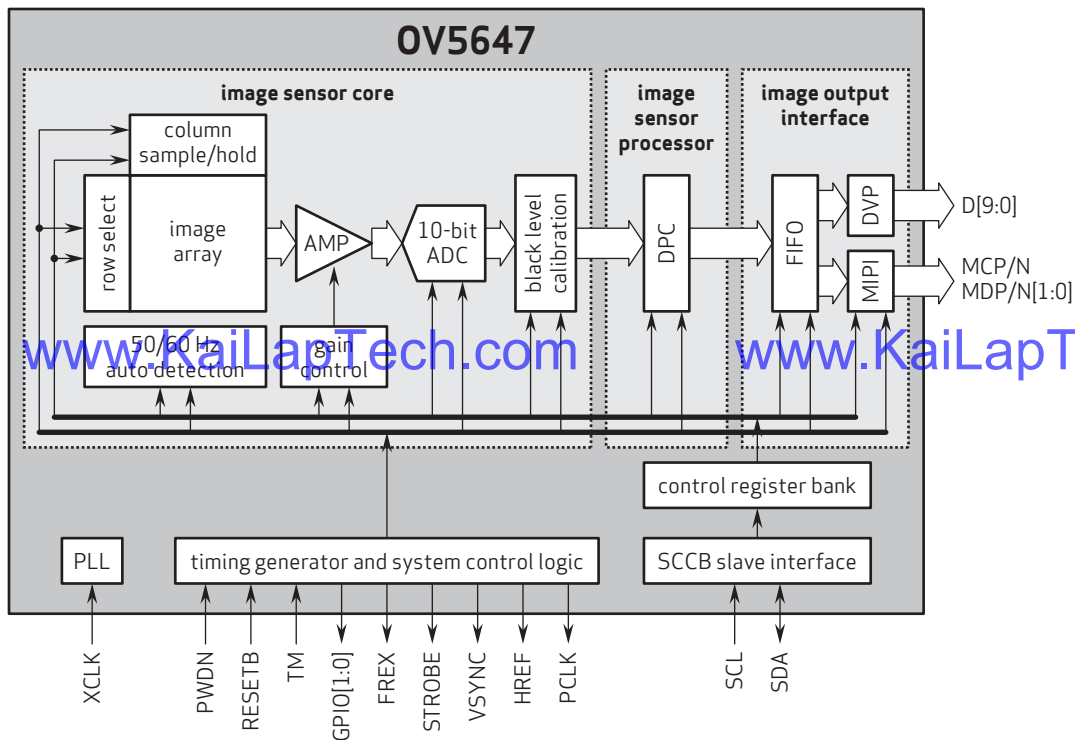
- OV05647-G04A**  
(color, chip probing, 200  $\mu\text{m}$  backgrinding, reconstructed wafer)

## Product Specifications

- active array size:** 2592 x 1944
- max S/N ratio:** 34 dB
- power supply:**
  - core: 1.5V  $\pm$ 5% (with embedded 1.5V regulator)
  - analog: 2.6 - 3.0V (2.8V typical)
  - I/O: 1.7 - 3.0V
- dynamic range:** 67 dB @ 8x gain
- maximum image transfer rate:**
  - QSXGA (2592x1944): 15 fps
  - 1080p: 30 fps
  - 960p: 45 fps
  - 720p: 60 fps
  - VGA (640x480): 90 fps
- power requirements:**
  - active: 96 mA
  - standby: 20  $\mu\text{A}$
- temperature range:**
  - operating: -30°C to 70°C junction temperature
  - stable image: 0°C to 50°C junction temperature
- sensitivity:** 600 mV/lux-sec
- shutter:** rolling shutter
- maximum exposure interval:** 1968 x  $t_{\text{row}}$
- output formats:** 8-/10-bit RGB RAW data
- pixel size:** 1.4  $\mu\text{m}$  x 1.4  $\mu\text{m}$
- dark current:** 8 mV/sec @ 50°C junction temperature
- lens size:** 1/4"
- image area:** 3673.6  $\mu\text{m}$  x 2738.4  $\mu\text{m}$
- lens chief ray angle:** 24°
- die dimensions:** 5520  $\mu\text{m}$  x 4700  $\mu\text{m}$
- input clock frequency:** 6 - 27 MHz

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Functional Block Diagram

www.KaiLapTech.com



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OmniVision



## 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							
<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							





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## Cameras Applications



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## 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
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**





# CMOS CAMERA MODULES



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## Large Order Package Solution

Place Foam Sheets Between Trays

Foam Sheets are Slightly Larger than Trays

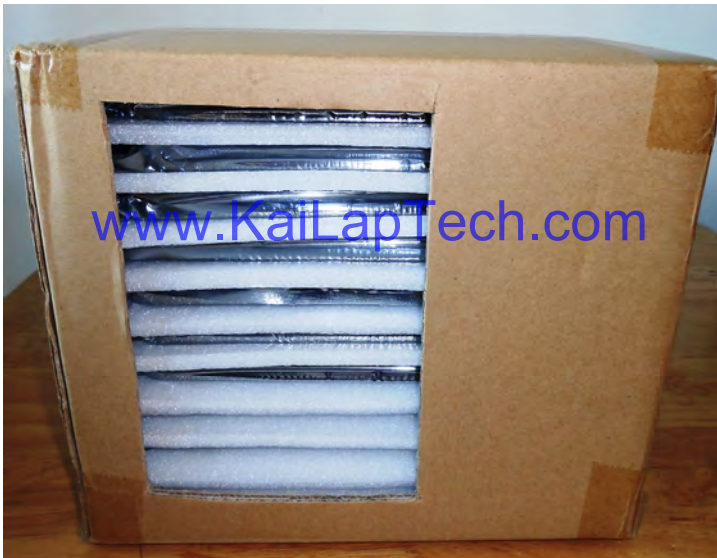


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Place Foam Sheets and Trays into Box

Foam Sheets are Tightly Fitting Box



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# CMOS CAMERA MODULES



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## Small Order Package Solution

Place Foam Sheets and Trays into Small Box



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Package in Small Box for Shipment

Foam Sheets are Nicely Fitting the Small Box



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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





## 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.

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## 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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## KLT Strength

### Powerful Factory



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