



your BEST camera module partner

KLT-MFH01-OS04C10 V1.0

4MP OmniVision OS04C10 MIPI Interface M12 Fixed Focus Camera Module







Back View

Specifications

Camera Module No.	KLT-MFH01-OS04C10 V1.0
Resolution	4MP
Image Sensor	OS04C10
Sensor Type	1/3"
Pixel Size	1.998 um x 1.998 um
EFL	2.95 mm
F.NO	2.00
Pixel	2688 x 1520
View Angle	125.0°(DFOV)
Lens Dimensions	14.00 x 14.00 x 23.30 mm
Module Size	46.00 x 22.00 mm
Module Type	Fixed Focus
Interface	MIPI
Auto Focus VCM Driver IC	None
Lens Type	650nm IR Cut
Operating Temperature	-30°C to +85°C
Mating Connector	FH12-24S-0.5SH





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KLT-MFH01-OS04C10 V1.0 4MP OmniVision OS04C10 MIPI Interface M12 Fixed Focus Camera Module



Top View



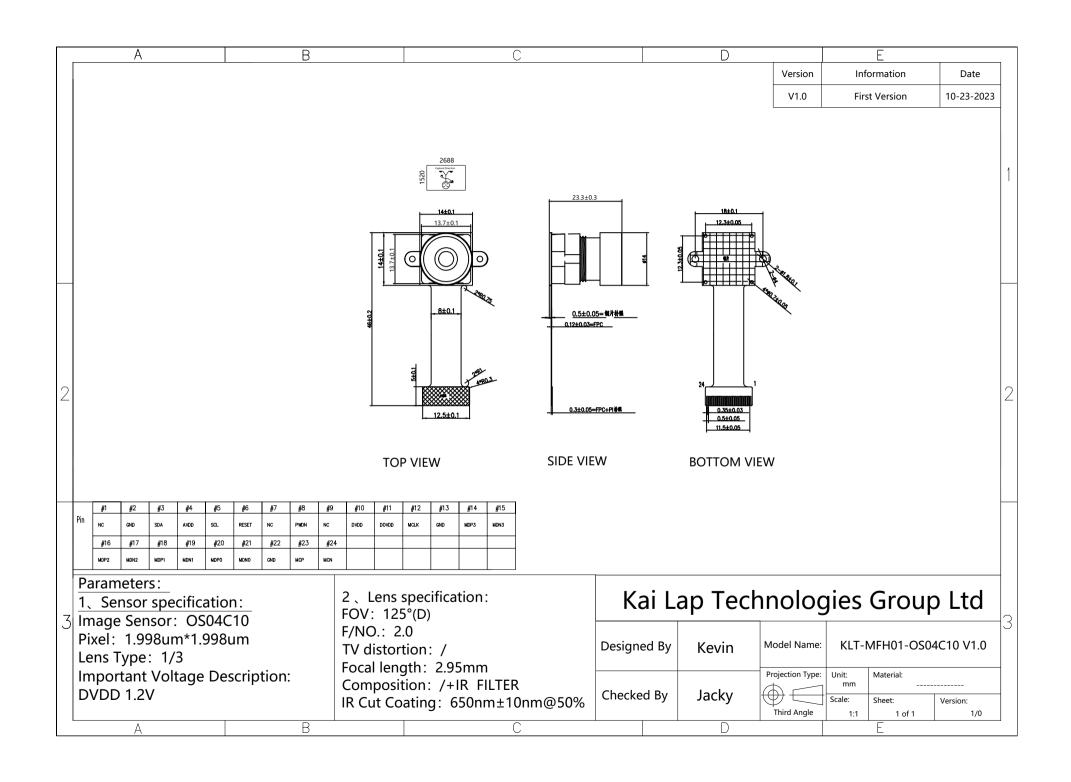
Side View



Bottom View



Mating Connector









4MP, 2 Micron Image Sensor for IoT and Home Security Cameras with Nyxel® NIR and PureCel® Plus Ultra Low Light Technologies

OmniVision's OS04C10 is a 2.0 micron pixel, 4 megapixel (MP) resolution image sensor for both loT and home security cameras. When paired with the designer's selected platform, the OS04C10 can enable a system ultra low power mode for battery-powered cameras with AI functionality. Additionally, it provides high 2688 x 1520 resolution with a 16:9 aspect ratio, while adding the premium near-infrared (NIR) and ultra low light, SNR1 performance of its Nyxel" and PureCel*Plus technologies. This sensor also offers multiple high dynamic range (HDR) options for the highest quality 4MP still and video captures of fast-moving objects at 60 frames per second.

The OSO4C10 is built on the PureCel*Plus pixel architecture to achieve a superior low-noise design, providing an SNR1 that is 150% better than OmniVision's prior-generation OV4689 4MP mainstream security sensor. This new sensor maintains the same high 4MP resolution as the popular OV4689, while adding improved NIR, ultra low light and HDR performance for these IoT and home security cameras, along with a new ultra low power mode that consumes 98.9% less power than the normal mode for longer battery life.

OmniVision's industry-leading NIR Nyxel* technology, combined with its PureCel*Plus technology and multiple HDR options, enables the OS04C10 to work equally well in all lighting conditions. It can detect incident light in both the visible and NIR wavelengths, while producing precise color and monochrome images for security applications.

The OSO4C10 is infused with Nyxel* technology, which provides exceptional quantum efficiency (QE), enabling the sensor to see better and farther at both the 850 nm and 940 nm NIR wavelengths. Such excellent QE also enables the use of lower power IR illumination in total darkness, resulting in significantly reduced system-level power consumption. Additionally, 940 nm NIR lighting cannot be detected by the human eye in dark indoor settings, while 850 nm light is ideal for outdoor security cameras. The OSO4C10's ability to capture crisp, clear images using undetectable 940 nm NIR light means that indoor security cameras will not disturb sleeping residents and can be easily concealed from unwanted prowlers.

Find out more at www.ovt.com.





Applications

- Security Camera
- High Resolution Consumer Camera
- Action Camera

■ 0S04C10-A43A

(color, lead-free) 43-pin CSP

Product Features

- programmable controls for:
 - frame rate mirror and flip
 - cropping
 - windowing
- supports output formats: - 12-bit/10-bit RAW RGB
- supports images sizes: full (2688x1520) 1080p (1920x1080)

 - -720p (1280x720) -A0_720p (1280x720) -A0_360p (640x360)
- supports 2x2 binning

- standard serial SCCB interface
- up to 4-lane MIPI serial output interface (supports maximum speed up to 1500 Mbps/lane)
- add staggered HDR RAW data output
- programmable I/O drive capability
- built-in temperature sensor
- MIPI serial output interface (1-lane, 2-lane, or 4-lane)
- image quality controls:defect pixel correction
- automatic black level calibration

Technical Specifications

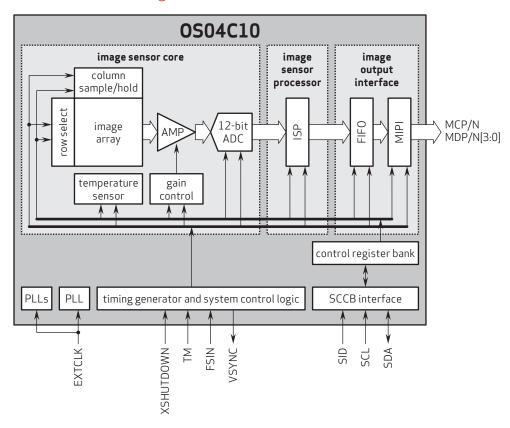
- active array size: 2688 x 1520
- maximum image transfer rate:
- **2688** x **1520**: 60 fps
- **1920 x 1080**: 80 fps - 1280 x 720: 240 fps
- power supply: core: 1.2V
- analog: 2.8V I/0: 1.8V
- power requirements:
- active: 155 mW XSHUTDOWN: <10 µA

- temperature range:
 operating: -30°C to +85°C junction temperature
- stable image: -10°C to +60°C junction temperature

0S04C10 1

- lens size: 1/3"
- lens chief ray angle: 12° non-linear
- output formats: 10/12-bit RGB RAW
- pixel size: 1.998 µm x 1.998 µm
- image area: 5402.592 µm x 3068.928 µm

Functional Block Diagram



4275 Burton Drive Santa Clara, CA 95054

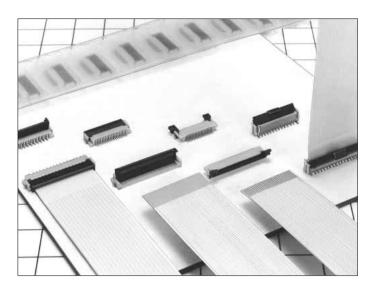
Tel: +1 408 567 3000 Fax: +1 408 567 3001 www.ovt.com

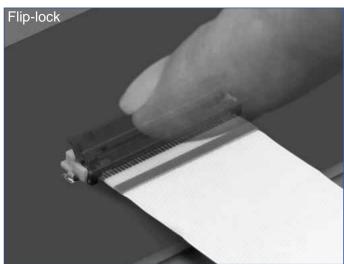
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0.5mm and 1mm Pitch Connectors For FPC/FFC

FH12 Series





■Features

1. Ease of Use and Space Savings

Only one finger or 6.9N (Newtons) of force is required to lock Hirose's rotational actuator (flip-lock) as compared to using 2 fingers and 39.2N to close a FFC/FPC connector from our competition.

The Flip-Lock design also allows customers to place 2 or more connectors side by side as there is no need to waste additional board space for a side latch.

2. Strengthened Flip-lock Actuator

The standard Flip-Lock requires only 2.0mm height above the board. A strengthened lock lever is available which only requires an additional 0.4mm.

3. Supports Thin FPC (0.18mm)

Hirose does not require double-sided FPC to have any additional strengthening plate or stiffener and can therefore support a thickness of as little as 0.18mm +/- 0.05.

4. Hirose Ensures Reliability

Hirose's patented half tuning fork contacts maintain the required normal force without relying on the connector housing. With our competitor's conventional products the housing walls support the contact force, which does not provide for long-term reliability.

5. Prevention of Solder Bridge

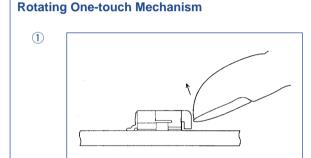
Excess solder cavity absorbs excessive solder and avoids solder bridging.

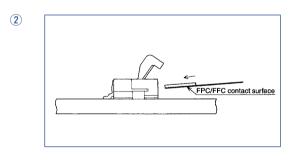
6. Three different assembly types

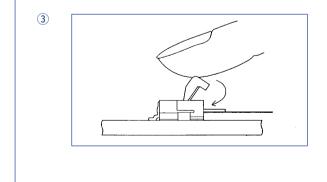
FH12 is offered in Top & Bottom Contact and Vertical Mount and offered in both a 0.5mm contact pitch as well as a 1.0mm contact pitch (bottom contact only).

■Applications

Notebook computers, printers, PDAs, digital cameras and other compact devices for interconnecting the main circuit board with the LCD, HDD or other device.







■Product Specifications

	Current rating: 0.5A DC(Note 1)	Operating Temperature Range:-40 to +70°C (Note 2)	Storage Temperature Range:-10 to +50℃ (Note 3)
Rating	Voltage rating: 50V AC	Operating Humidity Range:Relative humidity, 90% max.	Storage Humidity Range:Relative humidity, 90% max.
		(Not dewed)	(Not dewed)

Applicable FPC t=0.3±0.05 Gold plated		t =0.18 \pm 0.05 for FH12F- $*$ S-0.5SH			
Item	Specification	Conditions			
1. Insulation resistance	500M ohms minimum	100V DC			
2. Withstanding voltage	No flashover or insulation breakdown.	150V AC/1 minute			
3. Contact resistance	50m ohms maximum	1mA			
4. Durability (Insertion/withdrawal)	Contact resistance: 50m ohms maximum No damage, cracks, or parts dislocation.	20 cycles			
No electrical discontinuity of 1μs or more 5. Vibration Contact resistance: 50m ohms maximum. No damage, cracks, or parts dislocation.		Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 2 hours in each of the 3 directions.			
6. Shock	No electrical discontinuity of $1\mu s$ or more Contact resistance: 50m ohms maximum. No damage, cracks, or parts dislocation.	Acceleration of 490 m/s², 11 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis.			
7. Humidity(Steady state)	Contact resistance: 50m ohms maximum. Insulation resistance: 50M ohms minimum. No damage, cracks, or parts dislocation.	96 hours at 40°C and humidity of 90% to 95%			
8. Temperature Cycle	Contact resistance: 50m ohms maximum. Insulation resistance: 50M ohms minimum. No damage, cracks, or parts dislocation.	Temperature: $-40^{\circ}C \rightarrow 15$ to $35^{\circ}C \rightarrow 85^{\circ}C \rightarrow 15$ to $35^{\circ}C$, Time: $30 \rightarrow 5$ max. $\rightarrow 30 \rightarrow 5$ max.(minutes) 5 cycles			
9.Resistance to Soldering heat	No deformation of	Reflow: At the recommended temperature profile			

components affecting performance. Note 1: When passing the current through all of the contacts, use 70% of the current rating.

Note 2: Includes temperature rise caused by current flow.

Note 3: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating Temperature Range and Humidity range covers nonconducting condition of installed connectors in storage, shipment or during transportation.

Manual soldering: 350±5℃ for 3 seconds

■Material

9. Resistance to Soldering heat

Part	Material	Finish	Remarks
Insulator	Polyamide, LCP(60 pos.)	Color : Beige	UL94V-0
Actuator	PPS	Color : Dark brown	0L94V-0
Contact	Phosphor bronze	Gold plated	
Metal Fittings	Brass	Tin plated	

■Ordering Information

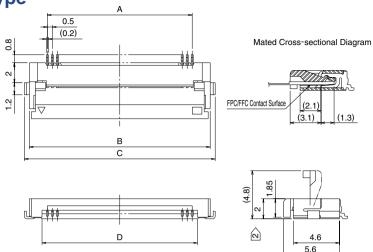
Series Name : FH12	Contact alignment: Single	
2 Blank : standard type	6 Eccentric direction:	
A : Top contact type	Blank : standard type	
S : Type with strengthed flip-lock actuator	A : Eccentric type	
F: Type with 0.18mm FPC End Thickness	Contacts Pitch : 0.5mm, 1mm	
3 Standard type : Number of contacts	Contact type	
Eccentric type : Number of contacts in 0.5mm housing	SH: SMT horizontal mounting type	
Standard type : Blank	SV : SMT vertical mounting type	
Eccentric type : Number of contacts	Plating specification	
	(55) : Gold plated	

◆ Series Configuration

Top Contact Type	Vertical mounting Type
non part. FPC conductive	FPC conductive surface (bottom side)
FPC insertion to surface	
EU12A ** C 0 5 CU	FH12- ** S-0.5SV P.16
FH12A- ** S-0.5SH P.15 Number of contacts 10, 12,15, 16, 18, 20, 22, 24, 26, 28, 29, 30, 32, 33, 34, 36, 40, 42, 45, 50	FH12- ** S-0.5SV Number of contacts 10, 12, 13, 15, 16, 17, 18, 20, 22, 24, 26, 30, 32, 33, 34, 36, 40, 45, 49, 50, 60
	FPC conductive surface (bottom side)
	FH12- ** S-1SV Number of contacts 6, 7, 8, 16, 20, 22, 24

■0.5mm Pitch Bottom Contact Type





Unit:mm

	Part Number	CL No.	Number of Contacts	Α	В	С	D	RoHS
	FH12- 6S-0.5SH(55)	586-0582-5-55	6	2.5	6.1	7.1	3.57	
	FH12- 8S-0.5SH(55)	586-0744-5-55	8	3.5	7.1	8.1	4.57	
	FH12-10S-0.5SH(55)	586-0522-3-55	10	4.5	8.1	9.1	5.57	
	FH12-11S-0.5SH(55)	586-0600-5-55	11	5	8.6	9.6	6.07	
	FH12-12S-0.5SH(55)	586-0704-0-55	12	5.5	9.1	10.1	6.57	
	FH12-13S-0.5SH(55)	586-0549-0-55	13	6	9.6	10.6	7.07	
	FH12-14S-0.5SH(55)	586-0533-0-55	14	6.5	10.1	11.1	7.57	
	FH12-15S-0.5SH(55)	586-0523-6-55	15	7	10.6	11.6	8.07	
	FH12-16S-0.5SH(55)	586-0531-4-55	16	7.5	11.1	12.1	8.57	
	FH12-17S-0.5SH(55)	586-0606-1-55	17	8	11.6	12.6	9.07	
	FH12-18S-0.5SH(55)	586-0530-1-55	18	8.5	12.1	13.1	9.57	
	FH12-19S-0.5SH(55)	586-0534-2-55	19	9	12.6	13.6	10.07	
	FH12-20S-0.5SH(55)	586-0524-9-55	20	9.5	13.1	14.1	10.57	
	FH12-22S-0.5SH(55)	586-0532-7-55	22	10.5	14.1	15.1	11.57	YES
	FH12-24S-0.5SH(55)	586-0521-0-55	24	11.5	15.1	16.1	12.57	IES
	FH12-25S-0.5SH(55)	586-0692-3-55	25	12	15.6	16.6	13.07	
	FH12-26S-0.5SH(55)	586-0576-2-55	26	12.5	16.1	17.1	13.57	
	FH12-28S-0.5SH(55)	586-0612-4-55	28	13.5	17.1	18.1	14.57	
Note 2	FH12-30S-0.5SH(55)	586-0525-1-55	30	14.5	18.1	19.1	15.57	
	FH12-32S-0.5SH(55)	586-0681-7-55	32	15.5	19.1	20.1	16.57	
	FH12-33S-0.5SH(55)	586-0520-8-55	33	16	19.6	20.6	17.07	
	FH12-34S-0.5SH(55)	586-0617-8-55	34	16.5	20.1	21.1	17.57	
	FH12-35S-0.5SH(55)	586-0740-4-55	35	17.0	20.6	21.6	18.07	
	FH12-36S-0.5SH(55)	586-0526-4-55	36	17.5	21.1	22.1	18.57	
Note 2	FH12-40S-0.5SH(55)	586-0527-7-55	40	19.5	23.1	24.1	20.57	
Note 2	FH12-45S-0.5SH(55)	586-0528-0-55	45	22	25.6	26.6	23.07	
Note 2	FH12-50S-0.5SH(55)	586-0529-2-55	50	24.5	28.1	29.1	25.57	
Note 2	FH12-53S-0.5SH(55)	586-0595-7-55	53	26	29.6	30.6	27.07	

Note 1 : Embossed tape reel packaging (2,000 pieces/reel). Order by number of reels.

Note 2: If there is no problem with the connector height, we recommend the type with the strengthened Flip-lock actuator (FH12S-*S-0.5SH).

Standard type connector height: 2 mm

Connector height of type with strengthened Flip-lock actuator: 2.4 mm





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Cameras Applications





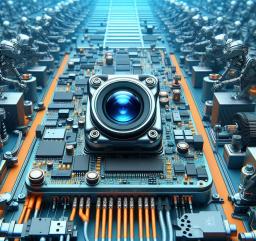


Automotive Driver Pilot

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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Camera Module Pinout Definition Reference Chart

OmniVision Sony Samsung On-Semi Ap	otina 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		
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 D00 Y0	DVP data output port 0		
D1 D01 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 D06 Y6	DVP data output port 6		
D7 D07 Y7	DVP data output port 7		
D8 D08 Y8	DVP data output port 8		
D9 DO9 Y9	DVP data output port 9		
D10 DO10 Y10	DVP data output port 9		
D11 D011 Y11	DVP data output port 10		
ווו ווטע ווע	port data output port i i		





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Camera Reliability Test

Reliability Inspection Item Category Item		Tanting Mathad	A cooptoned Critoria		
		Item	Testing Method	Acceptance Criteria	
	Storage	High 60°C 96 Hours	Temperature Chamber	No Abnormal Situation	
	Temperature	Low -20°C 96 Hours	Temperature Chamber	No Abnormal Situation	
	Operation	High 60°C 24 Hours	Temperature Chamber	No Abnormal Situation	
Environmental	Temperature	Low -20°C 24 Hours	Temperature Chamber	No Abnormal Situation	
Environmental	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	
	Drop Test	Without Package 60cm	10 Times on Wood Floor	Electrically Functional	
	(Free Falling)	With Package 60cm	10 Times on Wood Floor	Electrically Functional	
	Vibration Test	50Hz X-Axis 2mm 30min	Vibration Table	Electrically Functional	
Physical		50Hz Y-Axis 2mm 30min	Vibration Table	Electrically Functional	
Filysical		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	
	ESD Test	Contact Discharge 2 KV	ESD Testing Machine	Electrically Functional	
	ESD Test	Air Discharge 4 KV	ESD Testing Machine	Electrically Functional	
Electrical	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	













Camera Inspection Standard

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Inspection Category		n Item	Lanca Cara Madha d	Oten level of leave of the
		Item	Inspection Method	Standard of Inspection
	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)
		Scratches	The Naked Eye	The Inside Crack Exposure is Not Allowed
	Holder	Gap	The Naked Eye	Meet the Height Standard
Appearance	Holdel	Screw	The Naked Eye	Make Sure Screws Are Presented (If Any)
		Damage	The Naked Eye	The Inside Crack Exposure is Not Allowed
		Scratch	The Naked Eye	No Effect On Resolution Standard
	Long	Contamination	The Naked Eye	No Effect On Resolution Standard
	Lens	Oil Film	The Naked Eye	No Effect On Resolution Standard
		Cover Tape	The Naked Eye	No Issue On Appearance.
		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
	Image	Horizontal Line	The Naked Eye	Not Allowed
Function		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
		Height	The Naked Eye	Follows Approval Data Sheet
Dimer	neion	Width	The Naked Eye	Follows Approval Data Sheet
Dillel	131011	Length	The Naked Eye	Follows Approval Data Sheet
		Overall	The Naked Eye	Follows Approval Data Sheet

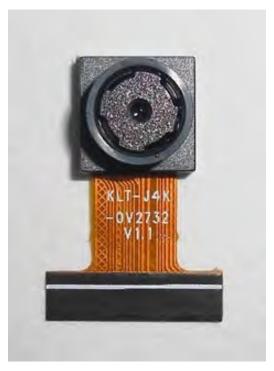




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KLT Package Solutions

KLT Camera Module



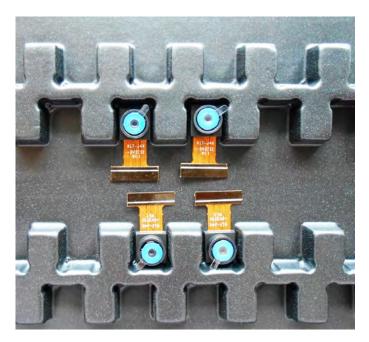
Tray with Grid and Space



Complete with Lens Protection Film



Place Cameras on the Tray







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Camera Modules Package Solution

Full Tray of Cameras



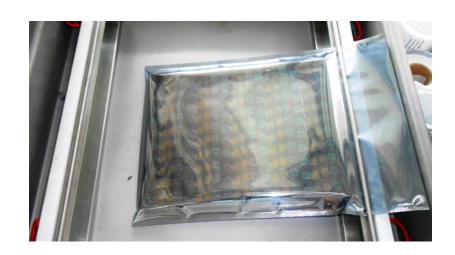
Put Tray into Anti-Static Bag



Cover Tray with Lid



Vacuum the Anti-Static Bag







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Camera Modules Package Solution

Sealed Vacuum Bag with Labels 1. Model and Description 2. Quantity 3. Shipping Date 4. Caution







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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









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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



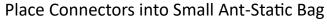




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Sample Order Package Solution

Place Sample into Small Anti-Static Bag









Sample Labels on the Small Bag 1. Camera Module or Connector Model 2. Shipping Date and Quantity 3. Caution







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Connectors Large Order Package Solution

Connectors in a 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 subsequential events.

















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