

**KLT-MPAA54-OV5640-1B V2.1****5MP OmniVision OV5640-1B MIPI and DVP Parallel Interface  
Auto Focus Camera Module**

Front View



Back View

**Specifications**

<b>Camera Module No.</b>	<b>KLT-MPAA54-OV5640-1B V2.1</b>
<b>Resolution</b>	5MP
<b>Image Sensor</b>	OV5640-1B
<b>Sensor Type</b>	1/4"
<b>Pixel Size</b>	1.4 $\mu\text{m}$ x 1.4 $\mu\text{m}$
<b>EFL</b>	3.29 mm
<b>F.NO</b>	2.80
<b>Pixel</b>	2592 x 1944
<b>View Angle</b>	68.7°(DFOV) 58.1°(HFOV) 45.0°(VFOV)
<b>Lens Dimensions</b>	8.50 x 8.50 x 5.22 mm
<b>Module Size</b>	50.00 x 8.50 mm
<b>Module Type</b>	Auto Focus
<b>Interface</b>	MIPI and DVP Parallel
<b>Auto Focus VCM Driver IC</b>	Embedded
<b>Lens Type</b>	650nm IR Cut
<b>Operating Temperature</b>	-30°C to +70°C
<b>Mating Connector</b>	FH12-24S-0.5SH

**KLT-MPAA54-OV5640-1B V2.1**

**5MP OmniVision OV5640-1B MIPI and DVP Parallel Interface  
Auto Focus Camera Module**



Top View



Side View



Bottom View



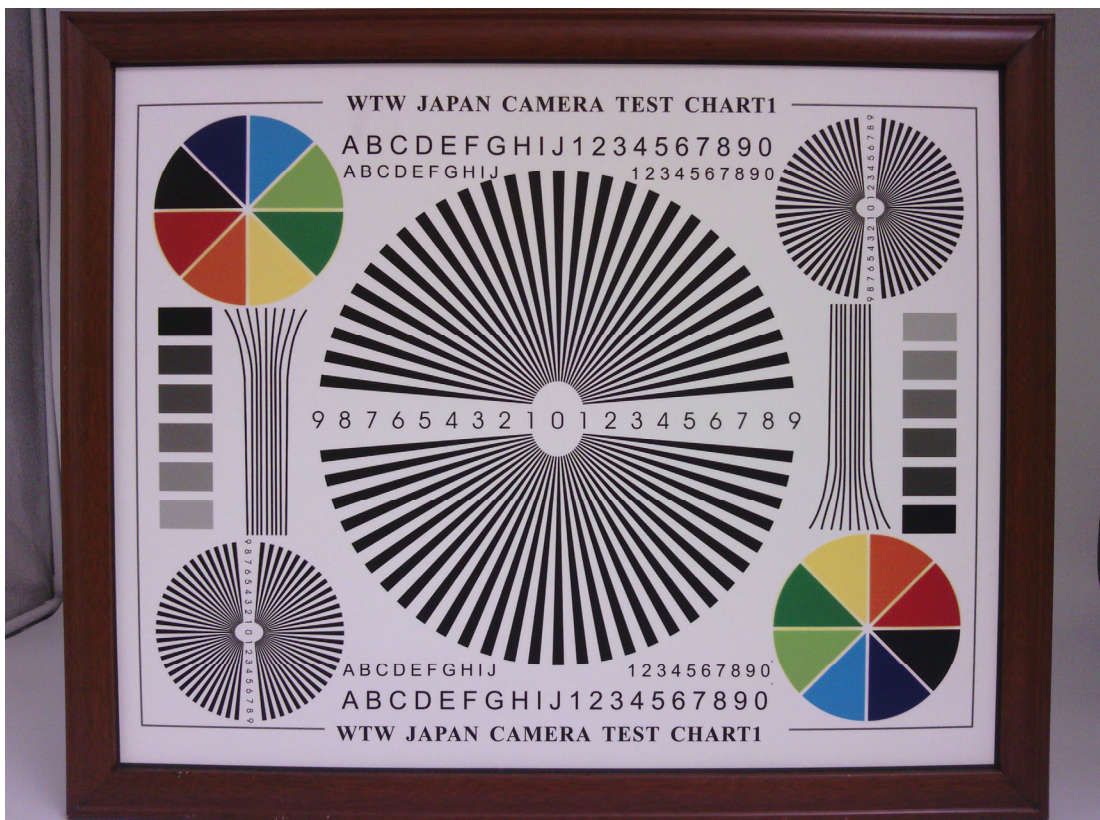
Mating Connector



# CMOS CAMERA MODULES



*your BEST camera module partner*



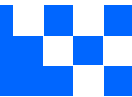
[www.KaiLapTech.com](http://www.KaiLapTech.com) [sales@KaiLapTech.com](mailto:sales@KaiLapTech.com) Tel: (852) 6908 1256 Fax: (852) 3017 6778

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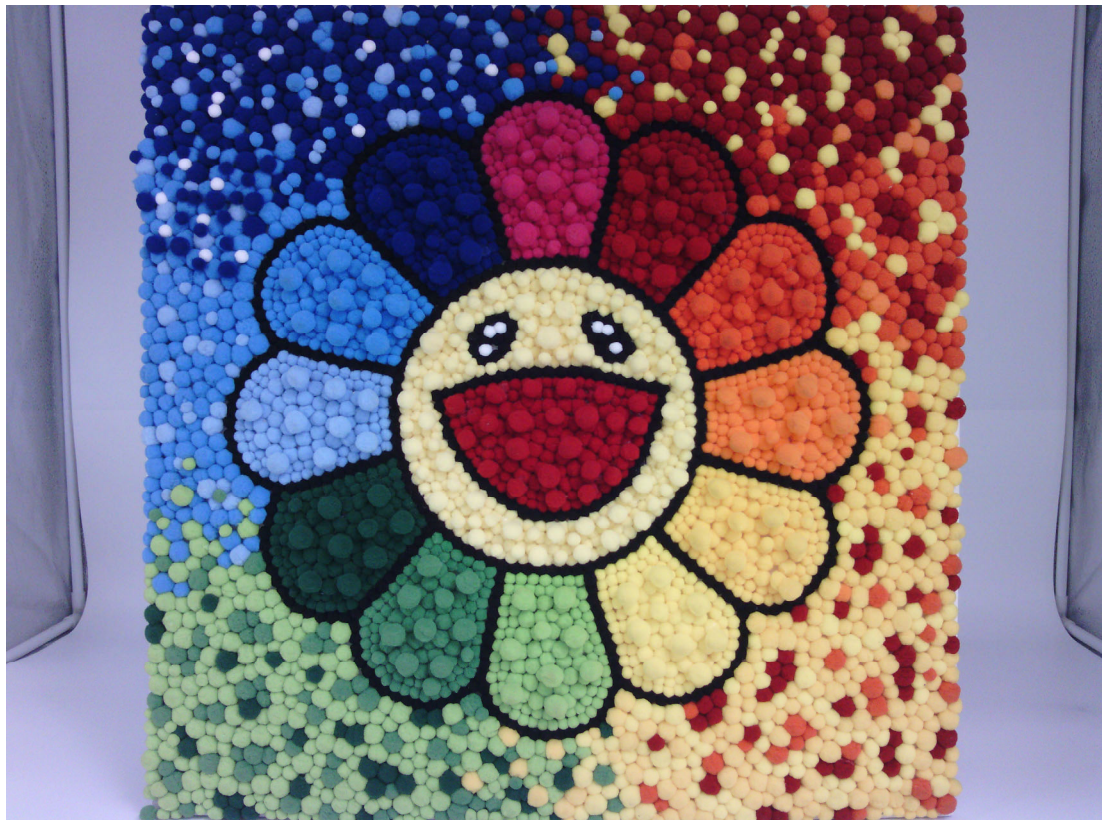




# CMOS CAMERA MODULES



*your BEST camera module partner*



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GROUP

1 1,008  
**H**  
Hydrogen

3 6,941  
**Li** **Be**  
Lithium Beryllium

11 22,99  
**Na** **Mg**  
Sodium Magnesium

Hydrogen (Gas)

Alkali Metals

Alkaline Earth Metals

Transition Metals

Other Metals

Metalloids

Non-metals

Halogens

Noble Gases

Lanthanides

Actinides

Average Atomic Mass

Atomic Number

Name

Symbol

2 4,002  
**He**  
Helium

PERIOD

19 39,09  
**K**  
Potassium

37 85,47  
**Rb**  
Rubidium

55 132,9  
**Cs**  
Cesium

87 (223)  
**Fr**  
Francium

20 40,08  
**Ca**  
Calcium

38 87,62  
**Sr**  
Strontium

56 137,3  
**Ba**  
Barium

88 (226)  
**Ra**  
Radium

21 44,95  
**Sc**  
Scandium

39 88,91  
**Y**  
Yttrium

57 (71)  
**La**  
Lanthanum

89 (103)  
**Ac**  
Actinium

22 47,87  
**Ti**  
Titanium

40 91,22  
**Zr**  
Zirconium

58 (91)  
**Hf**  
Hafnium

104 (261)  
**Rf**  
Rutherfordium

23 50,94  
**V**  
Vanadium

41 92,91  
**Nb**  
Niobium

59 (93)  
**Ta**  
Tantalum

105 (262)  
**Db**  
Dubnium

24 51,99  
**Cr**  
Chromium

42 95,94  
**Mo**  
Molybdenum

60 (96)  
**W**  
Tungsten

106 (263)  
**Sg**  
Seaborgium

25 54,94  
**Mn**  
Manganese

43 97  
**Tc**  
Technetium

61 (98)  
**Re**  
Rhenium

107 (264)  
**Bh**  
Bohrium

26 55,85  
**Fe**  
Iron

44 101,1  
**Ru**  
Ruthenium

62 (101)  
**Os**  
Osmium

108 (265)  
**Hs**  
Hassium

27 58,93  
**Co**  
Cobalt

45 102,9  
**Rh**  
Rhodium

63 (102)  
**Ir**  
Iridium

110 (266)  
**Mt**  
Meitnerium

28 58,69  
**Ni**  
Nickel

46 106,4  
**Pd**  
Palladium

64 (106)  
**Pt**  
Platinum

112 (281)  
**Ds**  
Darmstadtium

57 138,9  
**La**  
Lanthanum

89 (232)  
**Ac**  
Actinium

58 140,1  
**Ce**  
Cerium

90 (232)  
**Th**  
Thorium

59 140,9  
**Pr**  
Praseodymium

91 (231)  
**Pa**  
Protactinium

60 144,2  
**Nd**  
Neodymium

92 (238)  
**U**  
Uranium

61 145  
**Pm**  
Promethium

93 (239)  
**Np**  
Neptunium

62 150,4  
**Sm**  
Samarium

94 (243)  
**Pu**  
Plutonium

63 151,9  
**Eu**  
Europium

95 (247)  
**Am**  
Americium

64 157,2  
**Gd**  
Gadolinium

96 (251)  
**Cm**  
Curium

65 158,9  
**Tb**  
Terbium

97 (252)  
**Bk**  
Berkelium

66 162,5  
**Dy**  
Dysprosium

98 (251)  
**Cf**  
Californium

67 164,9  
**Ho**  
Holmium

99 (257)  
**Es**  
Einsteinium

68 167,2  
**Er**  
Erbium

100 (257)  
**Fm**  
Fermium

101 168,9  
**Tm**  
Thulium

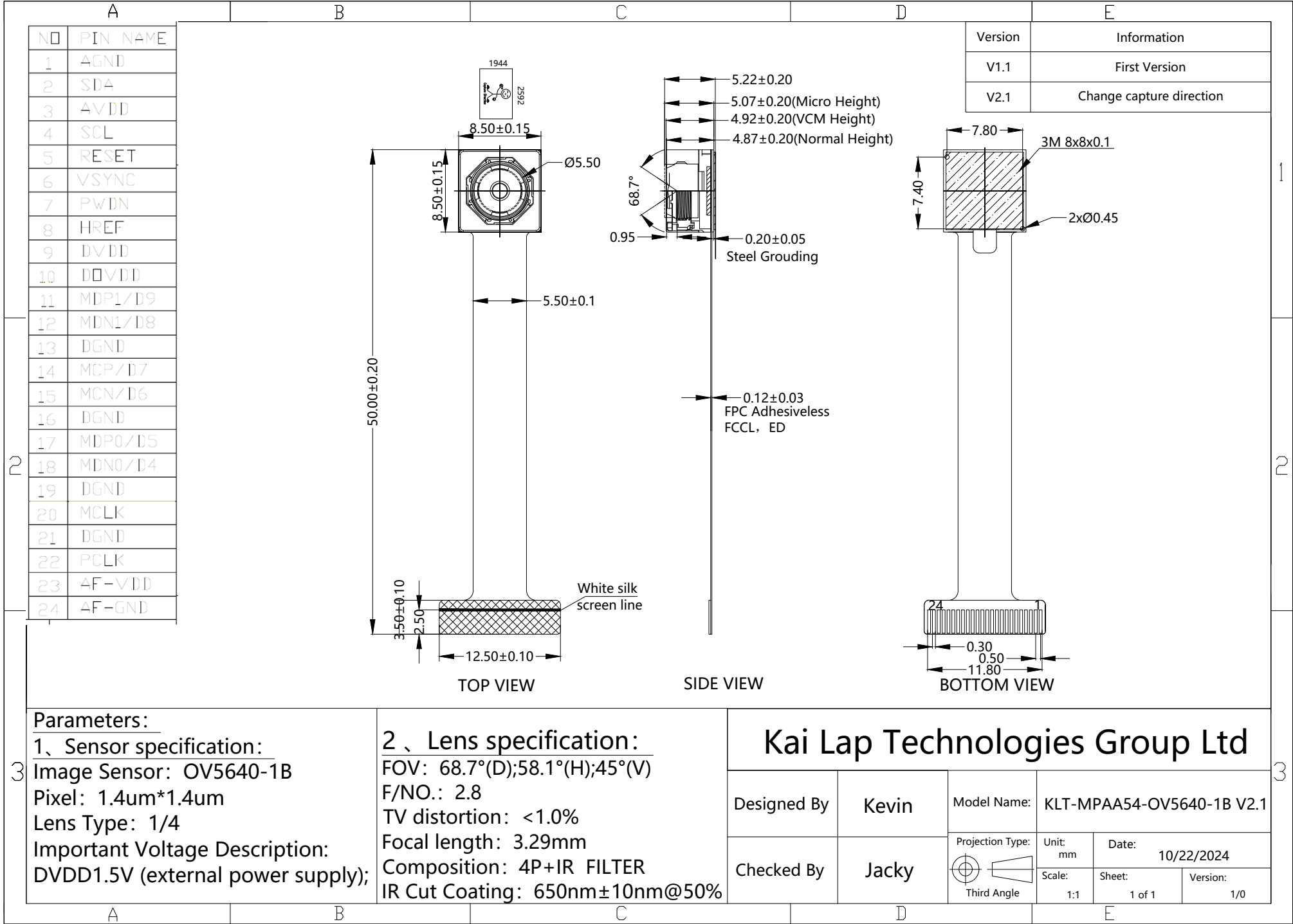
102 (260)  
**No**  
Nobelium

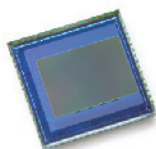
103 173  
**Yb**  
Ytterbium

104 (260)  
**Lr**  
Lawrencium

105 174,9  
**Lu**  
Lutetium

106 (260)  
**Lr**  
Lawrencium





# OV5640 5-megapixel product brief



available in  
a lead-free  
package

## 1/4-inch, 5-Megapixel SOC Image Sensor Optimized for High-Volume Mobile Markets

The OV5640 delivers a complete 5-megapixel camera solution on a single chip, aimed at offering cost efficiencies that serve the high-volume autofocus (AF) camera phone market. The system-on-a-chip (SOC) sensor features OmniVision's 1.4 micron OmniBSI™ backside illumination architecture to deliver excellent pixel performance and best-in-class low-light sensitivity, while enabling ultra compact camera module designs of 8.5 mm x 8.5 mm with <6 mm z-height. The OV5640 provides the full functionality of a complete camera, including anti-shake technology, AF control, and MIPI while being easier to tune than two-chip solutions, making it an ideal choice in terms of cost, time-to-market and ease of platform integration.

The OV5640 enables 720p HD video at 60 frames per second (fps) and 1080p HD video at 30 fps with complete user control over formatting and output data transfer. The 720p/60 HD video is captured in full field of view (FOV) with 2 x 2 binning, which doubles the sensitivity and improves the signal-to-noise ratio (SNR). Additionally, a unique post-binning re-sampling filter function removes zigzag artifacts around slant edges and minimizes spatial artifacts to deliver even sharper, crisper

color images. To further improve camera performance and user experience, the OV5640 features an internal anti-shake engine for image stabilization, and it supports Scalado™ tagging for faster image preview and zoom.

The OV5640 offers a digital video port (DVP) parallel interface and a high-speed dual lane MIPI interface, supporting multiple output formats. An integrated JPEG compression engine simplifies data transfer for bandwidth-limited interfaces. The sensor's automatic image control functions include automatic exposure control (AEC), automatic white balance (AWB), automatic band filter (ABF), 50/60 Hz automatic luminance detection, and automatic black level calibration (ABLC). The OV5640 delivers programmable controls for frame rate, AEC/AGC 16-zone size/position/weight control, mirror and flip, cropping, windowing, and panning. It also offers color saturation, hue, gamma, sharpness (edge enhancement), lens correction, defective pixel canceling, and noise canceling to improve image quality.

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





## applications

- cellular phones
- toys
- PC multimedia
- digital still cameras

## ordering information

- **OV05640-A71A-1B** (color, lead-free)  
71-pin CSP

## 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, improved quantum efficiency)
- 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, and automatic black level calibration (ABLC)
- programmable controls for frame rate, AEC/AGC 16-zone size/position/weight control, mirror and flip, cropping, windowing, and panning
- image quality controls: color saturation, hue, gamma, sharpness (edge enhancement), lens correction, defective pixel canceling, and noise canceling
- support for output formats: RAW RGB, RGB565/555/444, CCIR656, YUV422/420, YCbCr422, and compression
- support for video or snapshot operations
- support for internal and external frame synchronization for frame exposure mode
- support for LED and flash strobe mode
- support for horizontal and vertical sub-sampling, binning
- support for minimizing artifacts on binned image
- support for data compression output
- support for anti-shake
- standard serial SCCB interface
- digital video port (DVP) parallel output interface and dual lane MIPI output interface
- embedded 1.5V regulator for core power
- programmable I/O drive capability, I/O tri-state configurability
- support for black sun cancellation
- support for images sizes: 5 megapixel, and any arbitrary size scaling down from 5 megapixel
- support for auto focus control (AFC) with embedded AF VCM driver
- embedded microcontroller
- suitable for module size of 8.5 x 8.5 x <6mm with both CSP and RW packaging

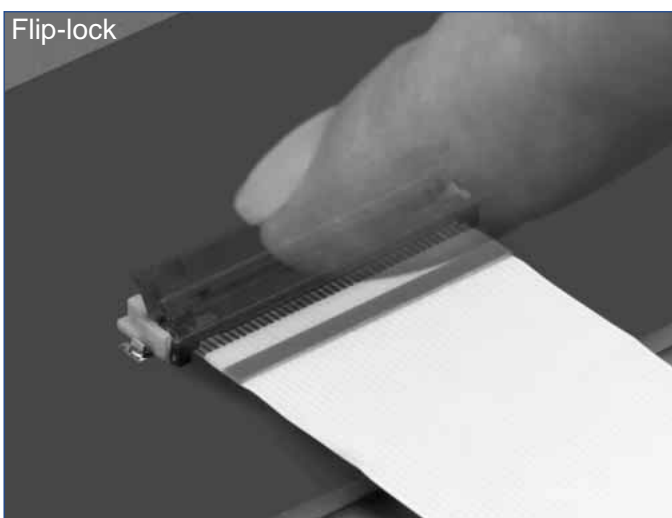
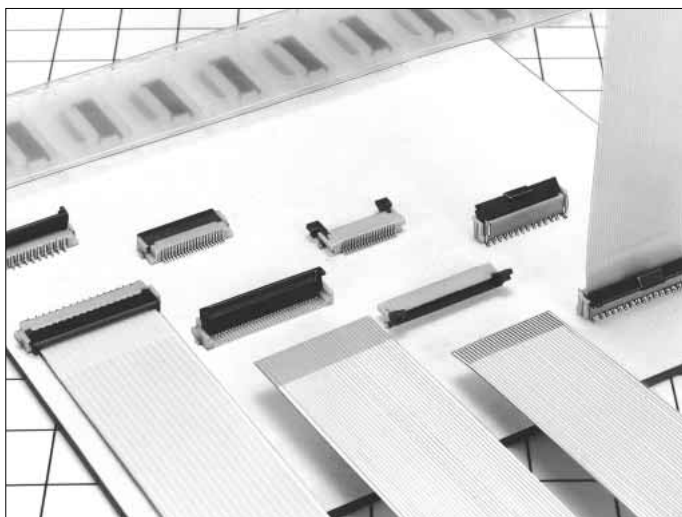
## key specifications (typical)

- **active array size:** 2592 x 1944
- **power supply:**
  - core: 1.425 ~ 1.675V (with embedded 1.5V regulator)
  - analog: 2.6 ~ 3.0V (2.8V typical)
  - I/O: 1.8V / 2.8V
- **power requirements:**
  - active: 140 mA
  - standby: 20  $\mu\text{A}$
- **temperature range:**
  - operating: -30°C to 70°C junction temperature (see [table 8-2](#))
  - stable image: 0°C to 50°C junction temperature (see [table 8-2](#))
- **output formats:** 8-/10-bit RGB RAW output
- **lens size:** 1/4"
- **lens chief ray angle:** 24° (see [figure 10-2](#))
- **input clock frequency:** 6~27 MHz
- **max S/N ratio:** 36 dB
- **dynamic range:** 68 dB @ 8x gain
- **maximum image transfer rate:**
  - QSXGA (2592x1944): 15 fps
  - 1080p: 30 fps
  - 1280x960: 45 fps
  - 720p: 60 fps
  - VGA (640x480): 90 fps
- **sensitivity:** 600 mV/Lux-sec
- **shutter:** rolling shutter / frame exposure
- **maximum exposure interval:** 1964 x  $t_{\text{ROW}}$
- **pixel size:** 1.4  $\mu\text{m}$  x 1.4  $\mu\text{m}$
- **dark current:** 8 mV/s @ 60°C junction temperature
- **image area:** 3673.6  $\mu\text{m}$  x 2738.4  $\mu\text{m}$
- **package dimensions:** 5985  $\mu\text{m}$  x 5835  $\mu\text{m}$



# 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

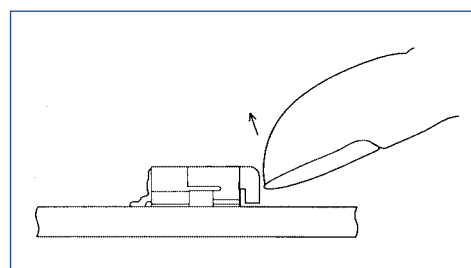
Excess solder cavity absorbs excessive solder and avoids solder bridging.

#### 6. Three different assembly types

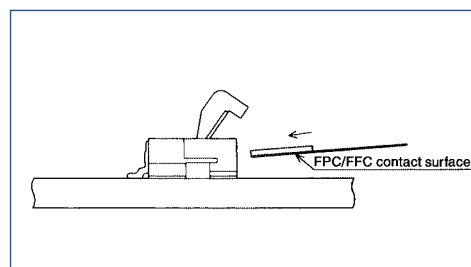
FH12 is offered in Top & Bottom Contact and Vertical Mount and offered in both a 0.5mm contact pitch as well as a 1.0mm contact pitch (bottom contact only).

### Rotating One-touch Mechanism

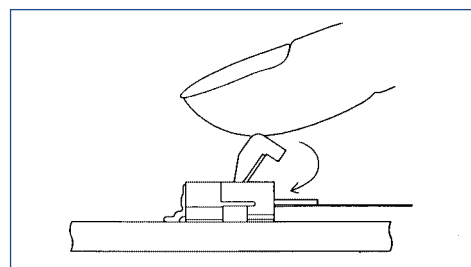
①



②



③



### ■ 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

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

Applicable FPC	t=0.3±0.05 Gold plated	t=0.18 ± 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
5. Vibration	No electrical discontinuity of 1μs or more 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 1μs or more Contact resistance: 50m ohms maximum. No damage, cracks, or parts dislocation.	Acceleration of 490 m/s <sup>2</sup> , 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°C → 15 to 35°C → 85°C → 15 to 35°C, Time: 30 → 5 max. → 30 → 5 max.(minutes) 5 cycles
9. Resistance to Soldering heat	No deformation of components affecting performance.	Reflow: At the recommended temperature profile Manual soldering: 350±5°C for 3 seconds

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.

## Material

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

## Ordering Information

**FH12   A - 10 (4) - S A - 0.5 SH (55)**

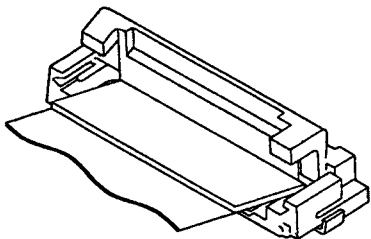
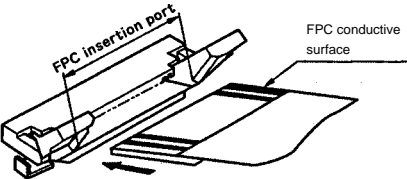
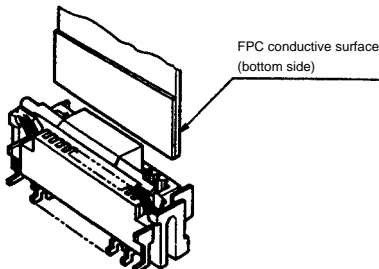
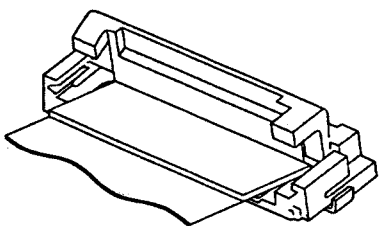
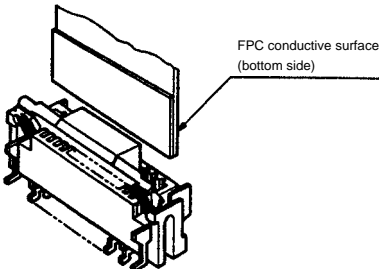
①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧   ⑨

① Series Name : FH12	⑤ Contact alignment: Single
② Blank : standard type A : Top contact type S : Type with strengthened flip-lock actuator F : Type with 0.18mm FPC End Thickness	⑥ Eccentric direction: Blank : standard type A : Eccentric type
③ Standard type : Number of contacts Eccentric type : Number of contacts in 0.5mm housing	⑦ Contacts Pitch : 0.5mm, 1mm
④ Standard type : Blank Eccentric type : Number of contacts	⑧ Contact type SH : SMT horizontal mounting type SV : SMT vertical mounting type
	⑨ Plating specification (55) : Gold plated

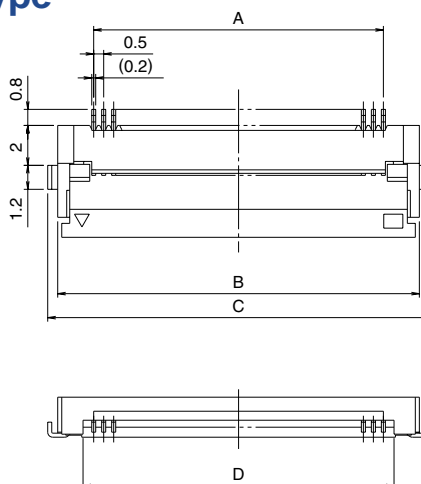


## FH12 Series 0.5mm and 1mm Pitch Connectors For FPC/FPC

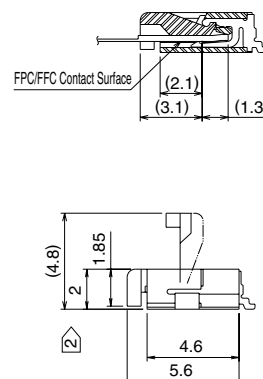
### Series Configuration

Pitch	Bottom Contact Type	Top Contact Type	Vertical mounting Type
0.5mm	 <p><b>FH12- ** S-0.5SH</b> <b>P.12</b></p> <p>Number of contacts 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 33, 34, 35, 36, 40, 45, 50, 53</p>		
	Type with Strengthened Lock Lever		
	<p><b>FH12S- ** S-0.5SH</b> <b>P.13</b></p> <p>Number of contacts 30, 40, 45, 50, 53</p>		
	Type with 0.18mm FPC End Thickness		
1mm	<p><b>FH12F- ** S-0.5SH</b> <b>P.14</b></p> <p>Number of contacts 6, 8, 10, 12, 13, 14, 15, 16, 18, 20, 22, 24, 25, 26, 28, 30, 32, 34, 36, 40</p>	<p><b>FH12A- ** S-0.5SH</b> <b>P.15</b></p> <p>Number of contacts 10, 12, 15, 16, 18, 20, 22, 24, 26, 28, 29, 30, 32, 33, 34, 36, 40, 42, 45, 50</p>	<p><b>FH12- ** S-0.5SV</b> <b>P.16</b></p> <p>Number of contacts 10, 12, 13, 15, 16, 17, 18, 20, 22, 24, 26, 30, 32, 33, 34, 36, 40, 45, 49, 50, 60</p>
	 <p>Standard <b>FH12- ** S-1SH</b> <b>P.18</b></p> <p>Eccentric <b>FH12- ** (**) SA-1SH</b></p> <p>Standard</p> <p>Number of contacts 5, 6, 7, 8, 9, 11, 12, 16, 17, 22, 26</p> <p>Eccentric</p> <p>Number of contacts 4, 6, 8, 10, 11, 14, 19, 24</p>		 <p><b>FH12- ** S-1SV</b> <b>P.19</b></p> <p>Number of contacts 6, 7, 8, 16, 20, 22, 24</p>

## 0.5mm Pitch Bottom Contact Type



Mated Cross-sectional Diagram



Unit:mm

Part Number	CL No.	Number of Contacts	A	B	C	D	RoHS
FH12- 6S-0.5SH(55)	586-0582-5-55	6	2.5	6.1	7.1	3.57	YES
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	
FH12-24S-0.5SH(55)	586-0521-0-55	24	11.5	15.1	16.1	12.57	
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



## 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	Major Difference is Not Allowed.
		Be Torn/Chopped	Copper Crack Exposure is Not Allowed.
		Marking	Clear, Recognizable (Within 30cm Distance)
	Holder	Scratches	The Inside Crack Exposure is Not Allowed
		Gap	Meet the Height Standard
		Screw	Make Sure Screws Are Presented (If Any)
		Damage	The Inside Crack Exposure is Not Allowed
	Lens	Scratch	No Effect On Resolution Standard
		Contamination	No Effect On Resolution Standard
		Oil Film	No Effect On Resolution Standard
		Cover Tape	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



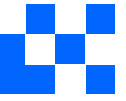
Place Small Boxes into Larger Box







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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



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## 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



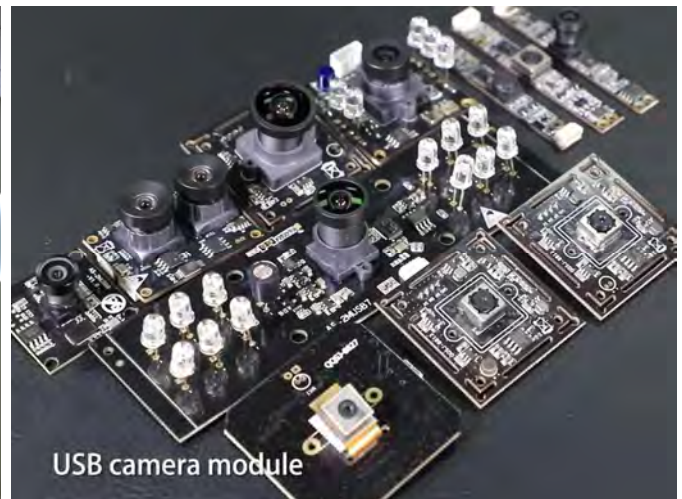


**Company Kai Lap Technologies (KLT)**

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.

**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.





# CMOS CAMERA MODULES



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## KLT Strength

### Powerful Factory



### Professional Service



### Promised Delivery



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