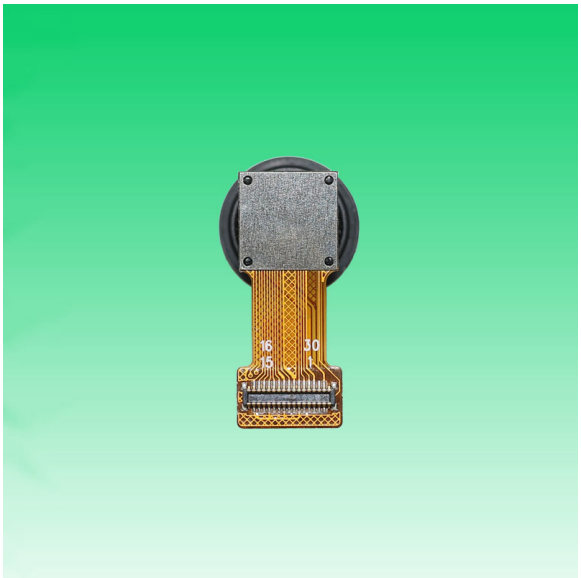
KLT-Y3MF-OV9281 V3.0

1MP OmniVision OV9281 Global Shutter M7 MIPI Interface Fixed Focus Camera Module

Front View



Back View

Specifications

Camera Module No.	KLT-Y3MF-OV9281 V3.0
Resolution	1MP
Image Sensor	OV9281 Monochrome Global Shutter
Sensor Type	1/4"
Pixel Size	3.0 um x 3.0 um
EFL	1.75 mm
F.NO	2.00
Pixel	1296 x 816
View Angle	160.0°(DFOV) 131.0°(HFOV) 80.0°(VFOV)
Lens Dimensions	8.00 x 8.00 x 12.82 mm
Module Size	20.60 x 8.50 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	BM20B(0.8)-30DS-0.4V(51)

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KLT-Y3MF-OV9281 V3.0

1MP OmniVision OV9281 Global Shutter M7 MIPI Interface Fixed Focus Camera Module

Top View

Side View

Bottom View

Mating Connector

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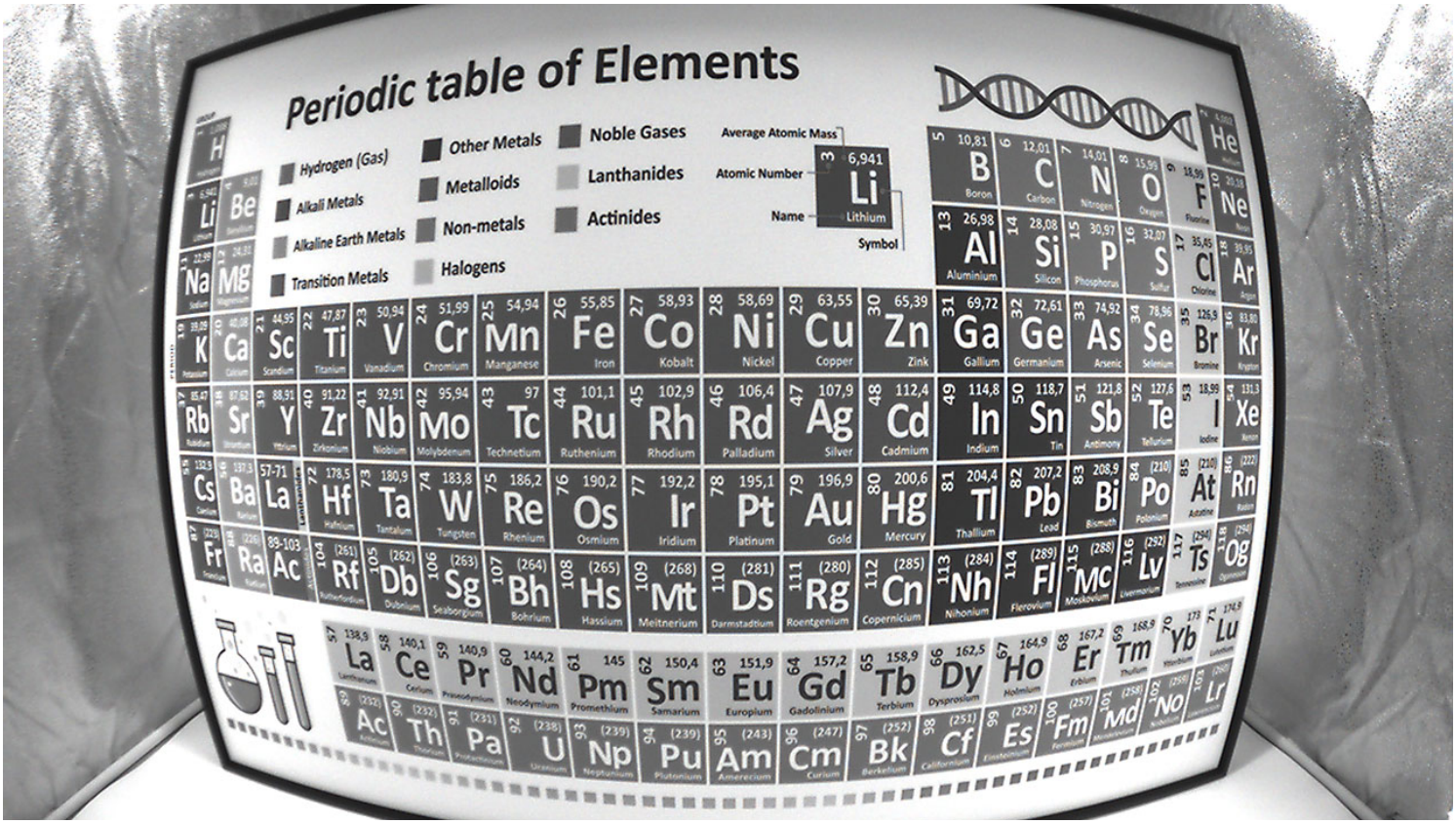

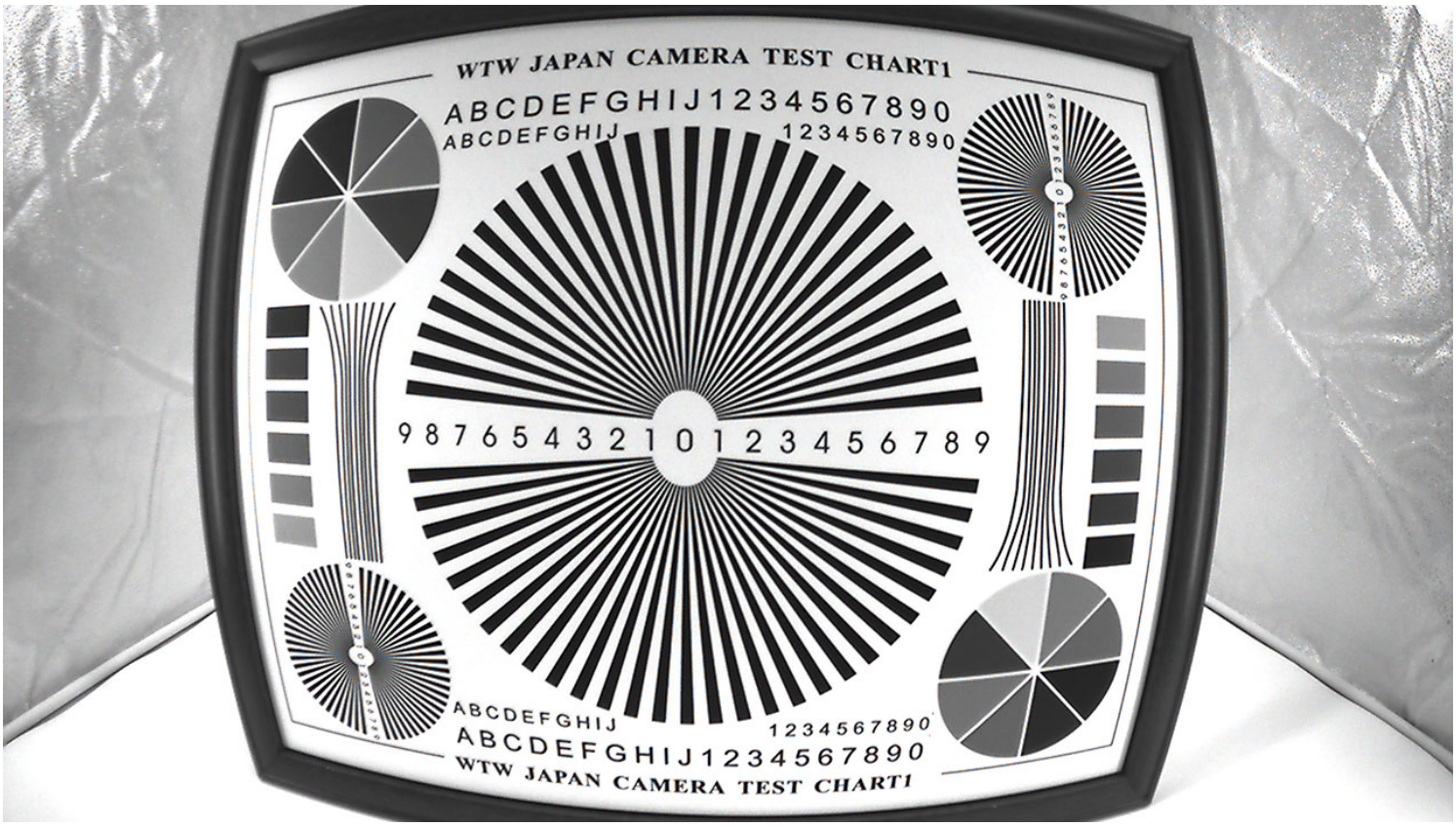

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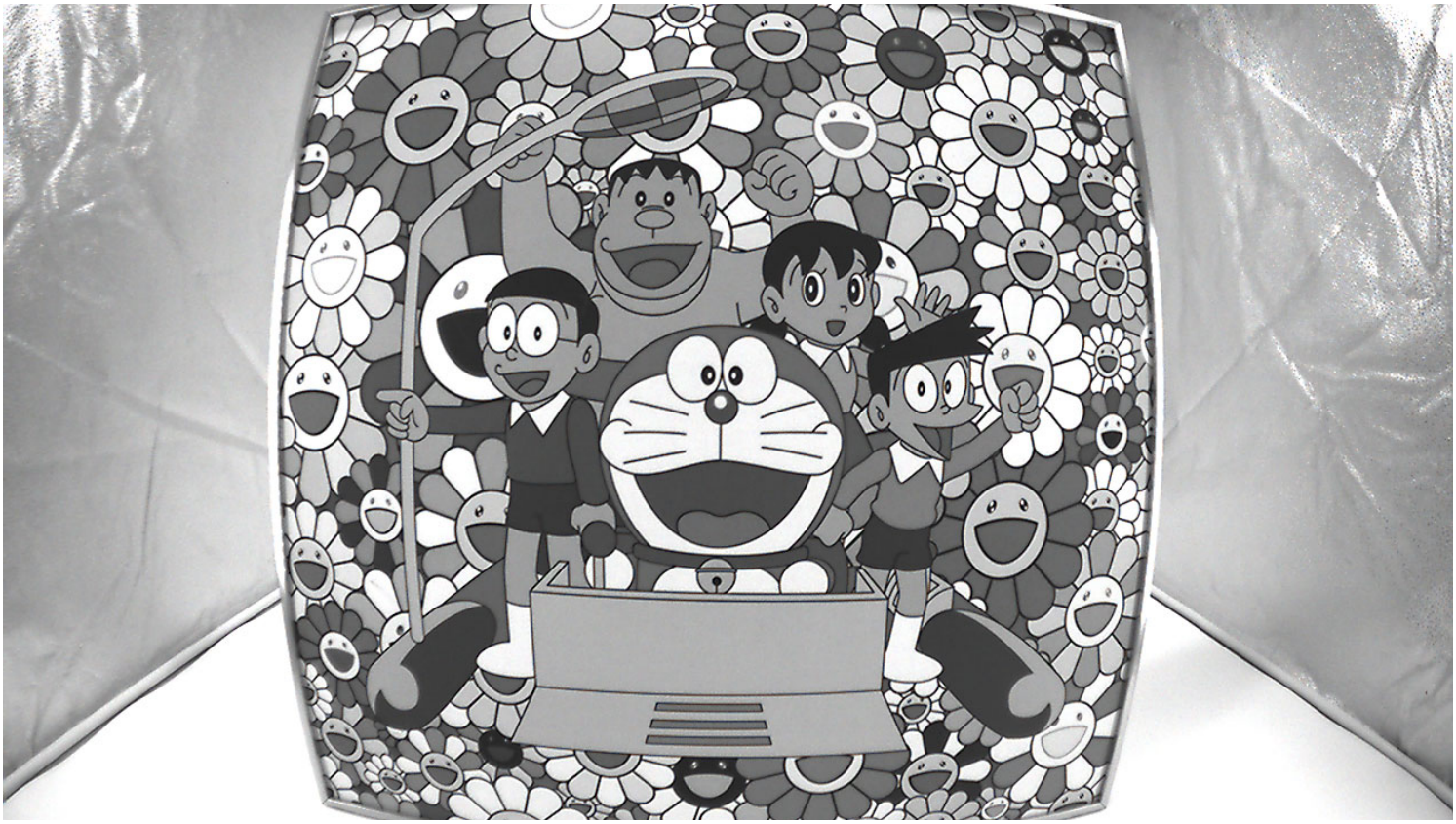

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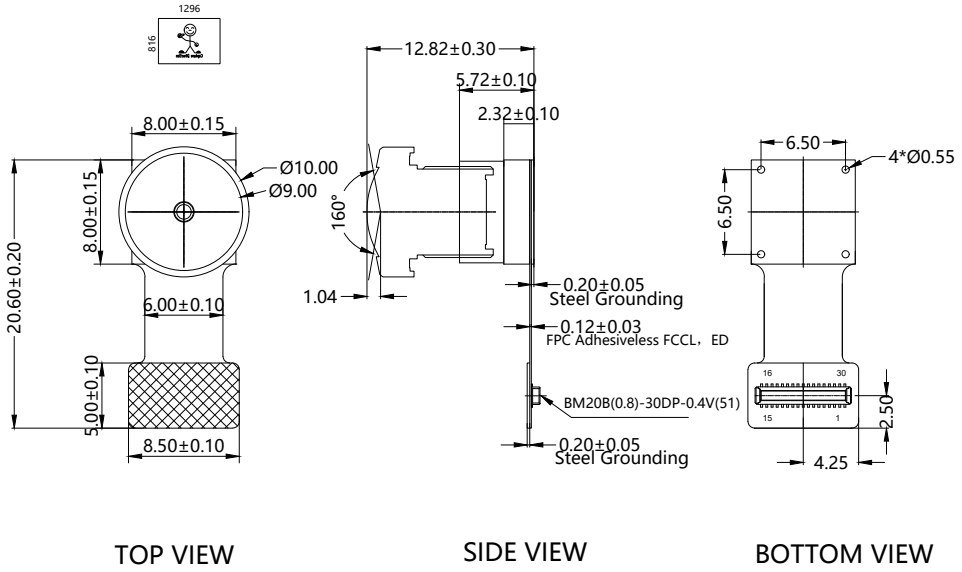
PIN #	KLT-Y3MF-OV9281 (Proposed)
1	STROBE
2	NO CONNECT
3	AVDD2.8V
4	SID
5	NO CONNECT
6	GND
7	NO CONNECT
8	NO CONNECT
9	GND
10	MDP0
11	MDN0
12	GND
13	NO CONNECT
14	NO CONNECT
15	GND
16	GND
17	MDN1
18	MDP1
19	GND
20	MCN
21	MCP
22	GND
23	XVCLK
24	GND
25	SCL
26	SDA
27	XSHUTDOWN
28	DOVDD 1.8V
29	GND
30	DVDD 1.2V

Version	Information
V1.0	First Version
V2.0	The Sencond Version
V3.0	Update pin signal



TOP VIEW SIDE VIEW BOTTOM VIEW

NOTE:
1.Sensor I2C slave address:
0xC0 If SID=0; or 0x20 If SID=1

Parameters:

1、Sensor specification:

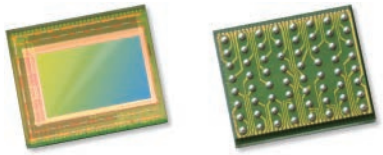
Image Sensor：OV9281
Pixel：3um*3um
Lens Type：1/4
Important Voltage Description:
DVDD1.2V (external power supply);

2、Lens specification:

FOV：160°(D);131°(H);80°(V)
F/NO.：2.0
TV distortion：<-21%
Focal length：1.75mm
Composition：2G+4P+IR FILTER
IR Cut Coating：650nm±10nm@50%

Kai Lap Technologies Group Ltd

Designed By	Kevin	Model Name:	KLT-Y3MF-OV9281 V3.0
Checked By	Jacky	Projection Type: Third Angle	Unit: mm / Date: 8/16/2024 / Scale: 1:1 / Sheet: 1 of 1 / Version: 1/0



OV9281-OV9282 1-megapixel product brief

1-Megapixel OmniPixel®3-GS Sensors for Computer Vision Applications

lead free

available in a lead-free package

OmniVision's OV9281 and OV9282 are high-speed global shutter image sensors that bring 1-megapixel resolution to a wide range of consumer and industrial computer vision applications, including augmented reality (AR), virtual reality (VR), collision avoidance in drones, bar code scanning and factory automation. Built on OmniVision's OmniPixel®3-GS pixel technology, the OV9281 and OV9282 feature a high-speed global shutter pixel with best-in-class near-infrared (NIR) quantum efficiency (QE) to meet high-resolution and low-latency requirements.

Special features of the OV9281 and OV9282 include region of interest (ROI) selection and context switching. This allows some of the camera settings to change dynamically as fast as alternating frames. The sensors are available in both narrow and wide chief ray angle (CRA) settings.

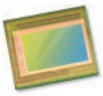
The 1/4-inch OV9281 and OV9282 capture 1280 x 800 resolution images at 120 frames per second (fps) and VGA resolution at 180 fps with 2-lane MIPI and DVP output. The OV9281 and OV9282 also feature support for frame synchronization and dynamic defective pixel correction.

The OV9281 has a chief ray angle (CRA) of 9 degrees and comes in a chip scale package (CSP). The OV9282 features a CRA of 27 degrees and is available in a reconstructed wafer (RW) format. Both sensors are currently available in volume production.

Find out more at www.ovt.com.

OmniVision

OV9281-OV9282



Applications

- Consumer HMD
- Drones
- Machine Vision
- PCNB

Product Features

- 3 µm x 3 µm pixel with OmniPixel®3-GS technology
- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- support output formats: 8/10-bit RAW
- fast mode switching
- supports 2x2 monochrome binning
- two-lane MIPI serial output interface
- DVP parallel output interface
- supports horizontal and vertical 2:1 and 4:1 monochrome subsampling
- support for image sizes:
  - 1280 x 800
  - 1280 x 720
  - 640 x 480
  - 640 x 400
- embedded 256 bits of one-time programmable (OTP) memory for part identification
- two on-chip phase lock loops (PLLs)
- LED PWM
- built-in strobe control

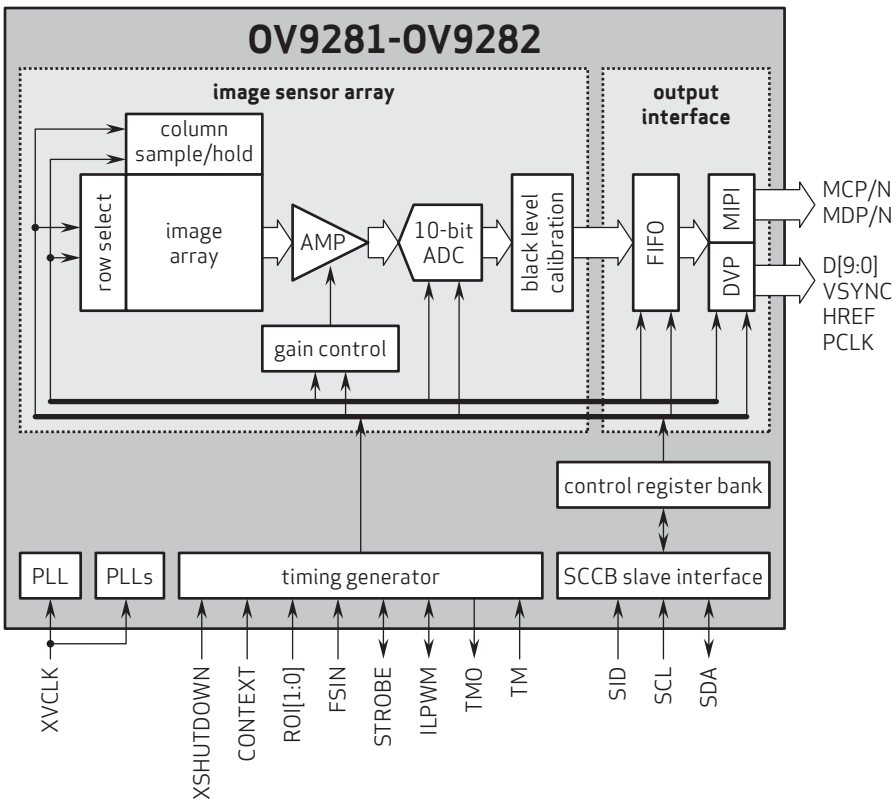
Ordering Information

- **OV09281-H64A**
  (b&w, lead-free) 64-pin CSP
- **OV09282-GA4A**
  (b&w, lead-free, 200 µm backgrinding, reconstructed wafer with good die)

Technical Specifications

- **active array size:** 1296 x 816
- **maximum image transfer rate:**
  - **1280 x 800:** 120 fps
- **power supply:**
  - **analog:** 2.8V (nominal)
  - **core:** 1.2V (nominal)
  - **I/O:** 1.8V (nominal)
- **power requirements:**
  - **active:** 156 mW
  - **standby:** 150 µA
  - **XSHUTDOWN:** 150 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +50°C junction temperature
- **output interfaces:** 2-lane MIPI serial output and DVP parallel output
- **output formats:** 8/10-bit RAW
- **lens size:** 1/4"
- **lens chief ray angle:**
  - **OV9281:** 9° linear
  - **OV9282:** 26.78° non-linear
- **scan mode:** progressive
- **pixel size:** 3 µm x 3 µm
- **image area:** 3896 µm x 2453 µm

Functional Block Diagram



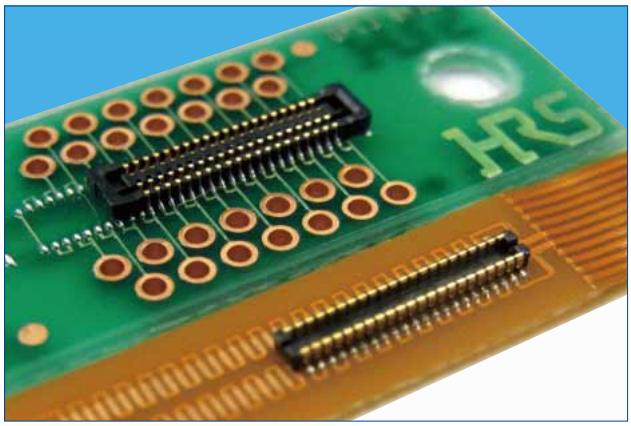
4275 Burton Drive
Santa Clara, CA 95054
USA

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

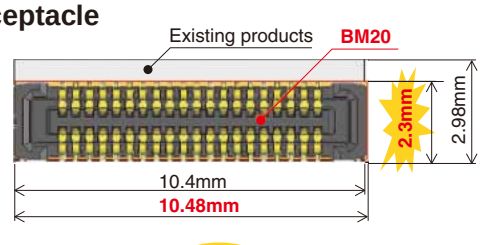
Version 1.3, June 2021

0.4mm Pitch, 0.6 and 0.8mm Height, Board-to-Board and Board-to-FPC Connectors

BM20 Series



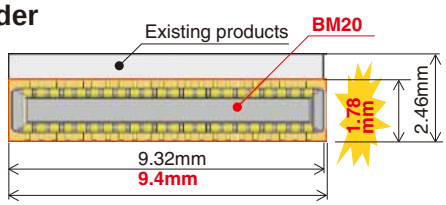
■Receptacle



A 22.3% reduction in size!

Existing products	BM20
2.98 × 10.4 =About 31.0mm²	2.3 × 10.48 = About 24.1mm²

■Header

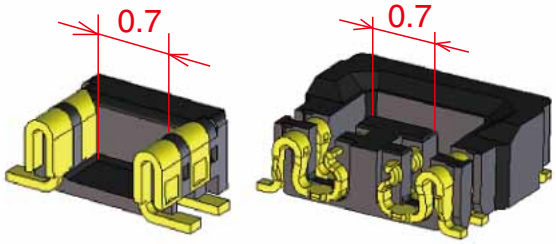


Board occupied area

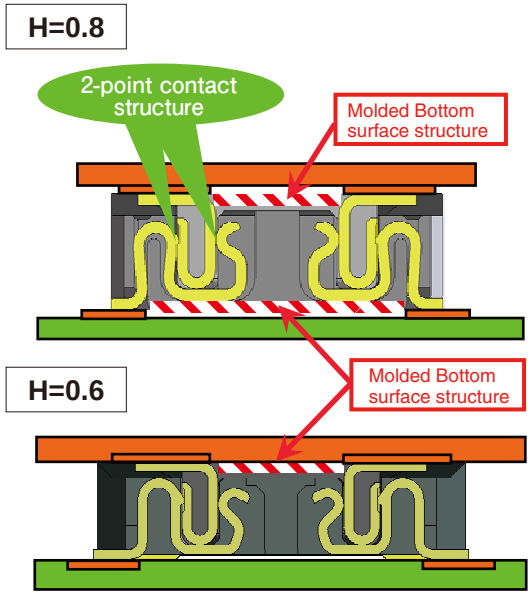
A 27.1% reduction in size!

Existing products	BM20
2.46 × 9.32 = About 22.9mm²	1.78 × 9.4 = About 16.7mm²

Vaccum pick-up



Mating diagram (cross section)



■Features

1. High density mounting capability

A space saving design that keeps the connector compact, but still maintains an adequate vacuum area (no less than 0.7mm wide).
Depth DS : 2.3mm DP : 1.78mm

2. Reliable contact performance

Even though the mated height is low, the BM20 still leads it class in maximum effective mating lengths for each mating height.
<Effective Mating Length>
Height 0.8mm : 0.2mm
Height 0.6mm : 0.15mm
The addition of the two point contact system adds more reliability to the contacts.

3. No restrictions to PCB pattern design for the 0.8 mm height connector *1

This series utilizes a thin wall to insulate the bottom surface of the connector and maintains an effective mating length of 0.2mm. This removes any restriction for PCB pattern layout design under the connector.
Note *1: There are some restrictions for the 0.6 mm height style.

4. Enhanced mating operations

The structure uses guide ribs to ease the mating process and offers a self alignment range of up to 0.3mm. A clear tactile click is used as an indicator to the user that the mating process was completed.

5. Drop and shock resistant structure

Dimples were designed into the contacts to increase their retention force and to absorb the shock delivered from a drop or other impact.

6. Debris resisting design

When mated, the connector's design covers the contacts which help to keep dust and other debris away from the contacts. The SMT leads are kept very close to the connector housing which also helps to prevent shorts caused by debris on the exposed contacts

■Product Specifications

Ratings	Rated Current	0.3A	Operating Temperature Range	- 35 ～ 85°C (Note 1)	Storage Temperature Range	- 10 ～ 60°C (Note 2)
	Rated Voltage	AC, DC 30V	Operating Humidity Range	20 ～ 80%	Storage Humidity Range	40 ～ 70% (Note 2)

Items	Specifications	Conditions
1. Insulation Resistance	Minimum of 50MΩ	Measured with DC 100V
2. Withstanding Voltage	No flashover or breakdown	Apply AC 100V for 1 minute
3. Contact Resistance	Maximum of 100mΩ	Measured with AC 20 mV, 1 kHz and 1 mA
4. Vibration Resistance	No electrical discontinuity of 1μs or greater	Frequency 10-55 Hz, half amplitude 0.75mm, 3 directions for 2 hours
5. Humidity Resistance	Contact resistance Maximum of 100mΩ Insulation resistance Minimum of 25mΩ	Left at temperature 40±2℃, humidity 90 to 95%, 96 hours
6. Temperature Cycles	Contact resistance Maximum of 100mΩ Insulation resistance Minimum of 50mΩ	(-55°C : 30 minutes → 5～35℃ : 10 minutes → 85°C : 30 minutes → 5～35℃ : 10 minutes) 5 cycles
7. Durability	Contact Resistance: maximum of 100mΩ	10 mating cycles
8. Soldering Heat Resistance	Should be no melting of resin parts that affects its performance	Reflow : according to the Recommended Solder Profile Hand solder : Soldering iron temperature 350°C, no more than 3 seconds.

Note 1 : Includes temperature rise caused by current flow.

Note 2 : The term "storage" here refers to products stored for a long period prior to board mounting and use. The operating temperature and humidity range covers the non-energized condition of connectors after board mounting and the temporary storage conditions during transportation, etc.

■Materials

Product	Component	Materials	Finish	UL Regulation
Receptacle	Insulator	LCP	Black	UL94V-0
Header	Contact	Phosphorous bronze	Gold plating	————

■Product Number Structure

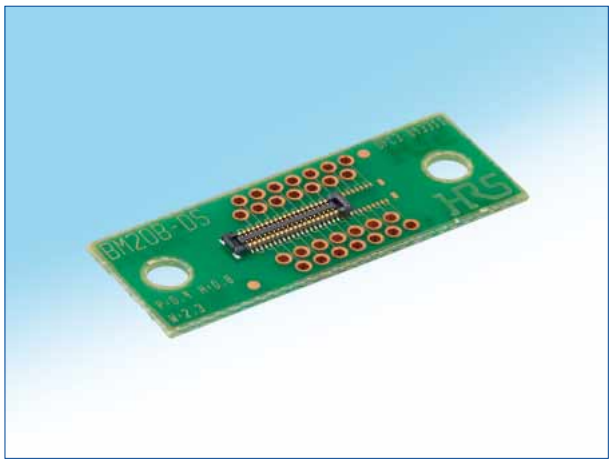
Refer to this page when determining product specifications by model types. Please place orders with part numbers listed in this catalog. The characteristics and specifications of the product described in this catalog are reference values. Please make sure to check the latest delivery specifications at the time of product use.

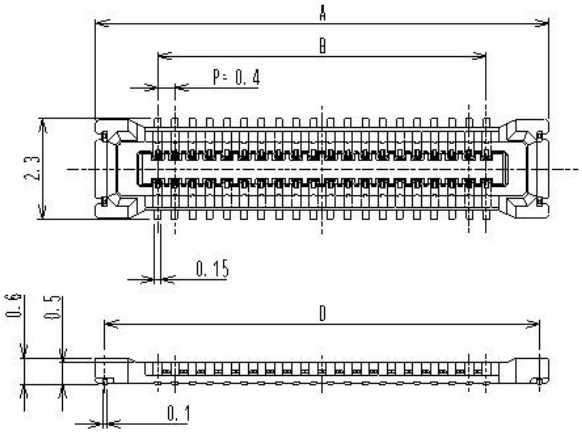
●Receptacle/Header

BM ❶ 20 ❷ # ❸ (**) ❹ - * ❺ DS ❻ - 0.4 ❼ V ❽ (51) ❾

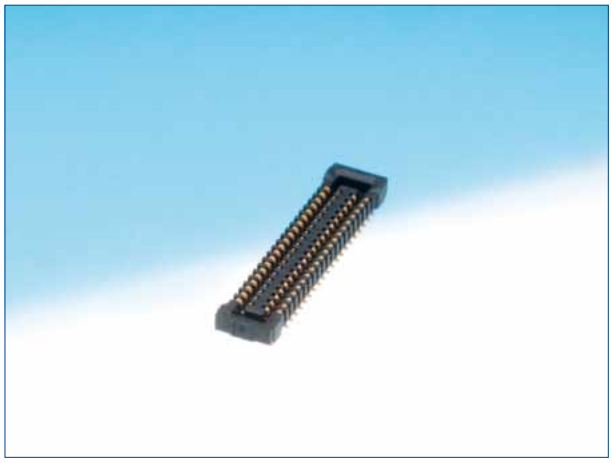
❶ Series Name : BM	❻ Connector Type DS : Double row receptacle DP : Double row header
❷ Series No. : 20	
❸ Shape Symbols B : With reinforcing metal fitting	❼ Contact Pitch : 0.4mm
❹ Stack height : 0.6mm, 0.8mm	❽ Terminal Shape V : Vertical SMT
❺ No. of Contacts : Please refer to page 3 and after.	❾ Packaging (51) : Embossed tape package (8,000 pieces per reel)

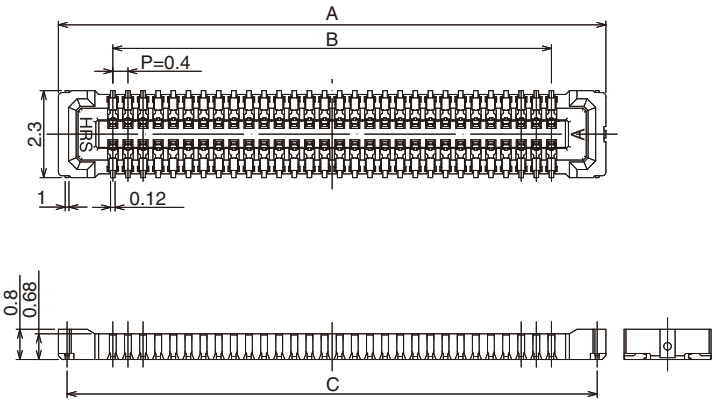
■H=0.6mm receptacle



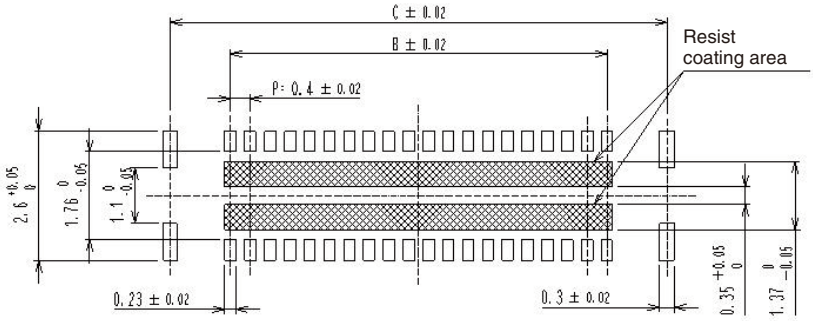


■H=0.8mm receptacle

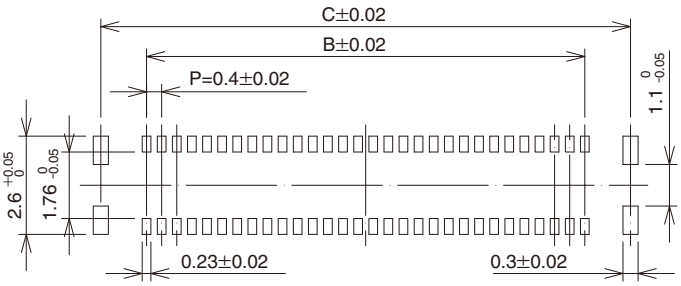




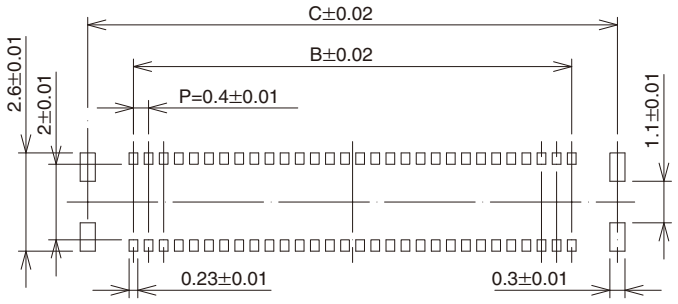
◆Recommended PCB layout【H= 0.6mm】



◆Recommended PCB layout【H= 0.8mm】



◆Recommended metal mask size (Mask thickness 100 µm)【0.6 mm and 0.8 mm common】



Unit : mm

Part No.	HRS No.	No. of Contacts	A	B	C	D
BM20B(0.6)-10DS-0.4V(51)	0684-9308-8 51	10	4.48	1.6	4.02	4.06
BM20B(0.6)-20DS-0.4V(51)	0684-9309-0 51	20	6.48	3.6	6.02	6.06
BM20B(0.6)-24DS-0.4V(51)	0684-9310-0 51	24	7.28	4.4	6.82	6.86
BM20B(0.6)-30DS-0.4V(51)	0684-9311-2 51	30	8.48	5.6	8.02	8.06
BM20B(0.6)-34DS-0.4V(51)	0684-9312-5 51	34	9.28	6.4	8.82	8.86
BM20B(0.6)-40DS-0.4V(51)	0684-9313-8 51	40	10.48	7.6	10.02	10.06
BM20B(0.6)-50DS-0.4V(51)	0684-9314-0 51	50	12.48	9.6	12.02	12.06
BM20B(0.6)-60DS-0.4V(51)	0684-9315-3 51	60	14.48	11.6	14.02	14.06

Part No.	HRS No.	No. of Contacts	A	B	C
BM20B(0.8)-10DS-0.4V(51)	0684-9008-4 51	10	4.48	1.6	4.02
BM20B(0.8)-16DS-0.4V(51)	0684-9041-0 51	16	5.68	2.8	5.22
BM20B(0.8)-20DS-0.4V(51)	0684-9009-7 51	20	6.48	3.6	6.02
BM20B(0.8)-24DS-0.4V(51)	0684-9010-6 51	24	7.28	4.4	6.82
BM20B(0.8)-30DS-0.4V(51)	0684-9011-9 51	30	8.48	5.6	8.02
BM20B(0.8)-34DS-0.4V(51)	0684-9020-0 51	34	9.28	6.4	8.82
BM20B(0.8)-40DS-0.4V(51)	0684-9012-1 51	40	10.48	7.6	10.02
BM20B(0.8)-50DS-0.4V(51)	0684-9013-4 51	50	12.48	9.6	12.02

Note 1 : This product is sold by full reel quantities of 8,000 pieces per reel. Please place orders in full reel quantities.
Note 2 : This connector is NOT polarized.

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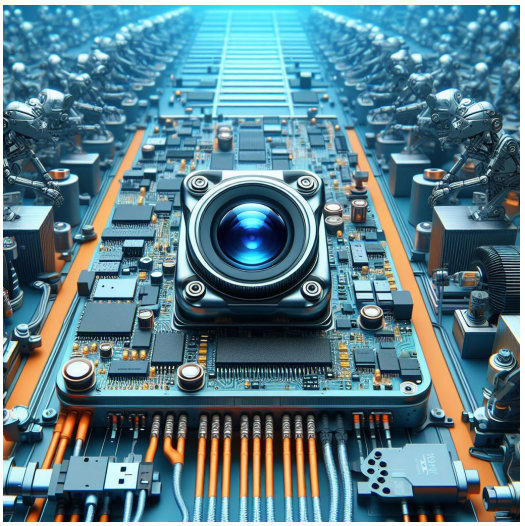
Cameras Applications

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

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CMOS CAMERA MODULES

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Cameras Applications

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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
MIPI Interface	
MDN0 DN0 MD0N DATA_N DMO1N	MIPI 1st data lane negative output
MDP0 DP0 MD0P DATA_P DMO1P	MIPI 1st data lane positive output
MDN1 DN1 MD1N DATA2_N DMO2N	MIPI 2nd data lane negative output
MDP1 DP1 MD1P DATA2_P DMO2P	MIPI 2nd data lane positive output
MDN2 DN2 MD2N DATA3_N DMO3N	MIPI 3rd data lane negative output
MDP2 DP2 MD2P DATA3_P DMO3P	MIPI 3rd data lane positive output
MDN3 DN3 MD3N DATA4_N DMO4N	MIPI 4th data lane negative output
MDP3 DP3 MD3P DATA4_P DMO4P	MIPI 4th data lane positive output
MCN CLKN CLK_N DCKN	MIPI clock negative output
MCP CLKP MCP CLK_P DCKN	MIPI clock positive output
DVP Parallel Interface	
D0 DO0 Y0	DVP data output port 0
D1 DO1 Y1	DVP data output port 1
D2 DO2 Y2	DVP data output port 2
D3 DO3 Y3	DVP data output port 3
D4 DO4 Y4	DVP data output port 4
D5 DO5 Y5	DVP data output port 5
D6 DO6 Y6	DVP data output port 6
D7 DO7 Y7	DVP data output port 7
D8 DO8 Y8	DVP data output port 8
D9 DO9 Y9	DVP data output port 9
D10 DO10 Y10	DVP data output port 10
D11 DO11 Y11	DVP data output port 11

Camera Reliability Test

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




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Camera Inspection Standard

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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

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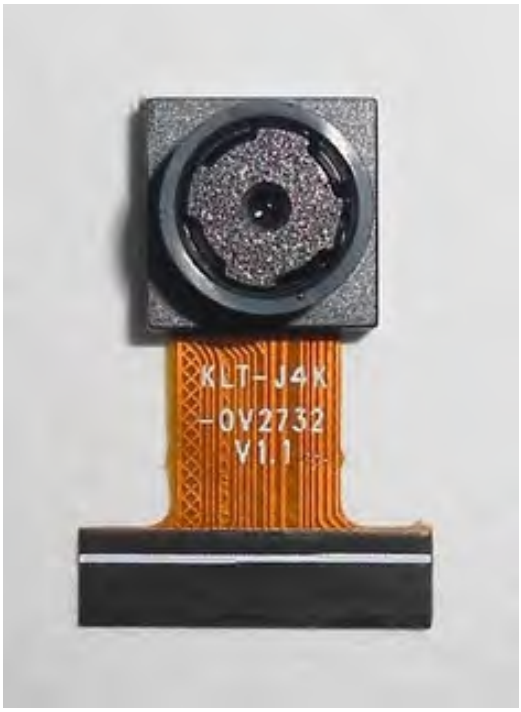
KLT Package Solutions

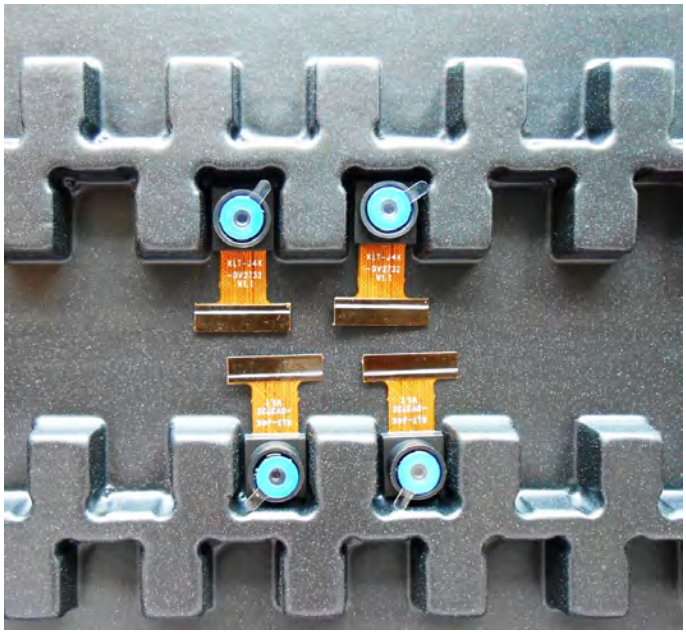
KLT Camera Module



Complete with Lens Protection Film

Tray with Grid and Space

Place Cameras on the Tray



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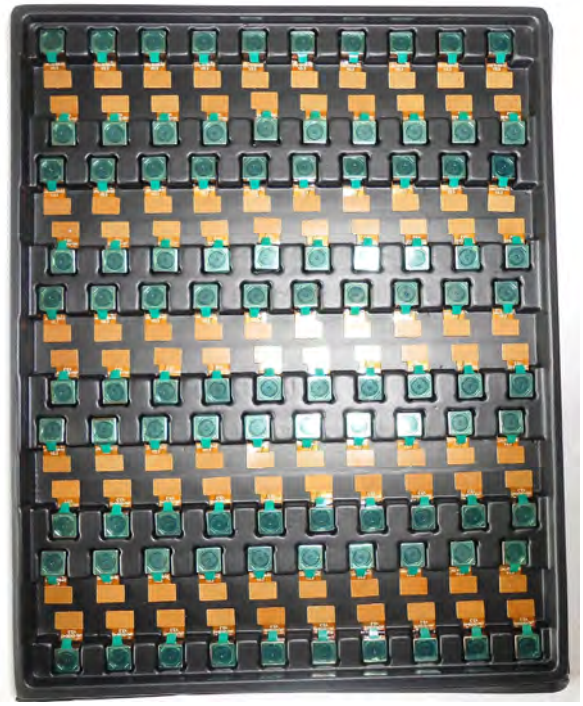
Camera Modules Package Solution

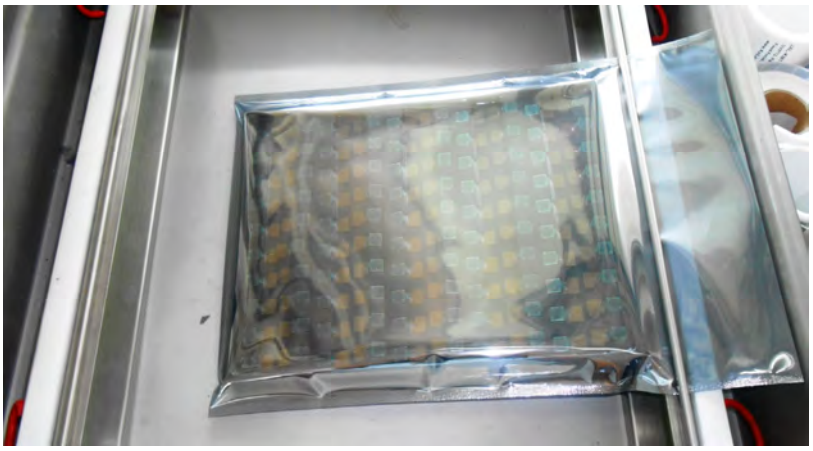
Full Tray of Cameras



Cover Tray with Lid

Put Tray into Anti-Static Bag

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

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

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Connectors Large Order Package Solution

Connectors in a Wheel

Label Connectors in the Wheel

The Wheel is Perfectly Fitting the Box

Connectors Box Ready for Shipment

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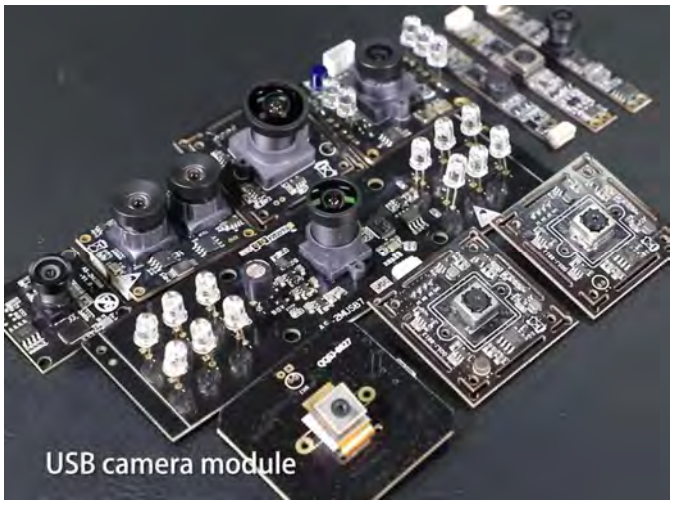
Company Kai Lap Technologies (KLT)

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

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

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



Limited Warranty

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

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

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

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KLT Strength

Powerful Factory

Professional Service

Promised Delivery

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