

KLT-Q4MF-AR0521 V3.0

5MP OnSemi AR0521 MIPI Interface M12 Fixed Focus Camera Module



Front View



Back View

Specifications

| Camera Module No. | KLT-Q4MF-AR0521 V3.0 |
|--------------------------|---------------------------------------|
| Resolution | 5MP |
| Image Sensor | AR0521 |
| Sensor Type | 1/2.5" |
| Pixel Size | 2.2 um x 2.2 um |
| EFL | 3.51 mm |
| F.NO | 2.70 |
| Pixel | 2592 x 1944 |
| View Angle | 127.0°(DFOV) 102.0°(HFOV) 60.0°(VFOV) |
| Lens Dimensions | 15.30 x 15.30 x 16.90 mm |
| Module Size | 47.65 x 16.90 mm |
| Module Type | Fixed Focus |
| Interface | MIPI |
| Auto Focus VCM Driver IC | None |
| Lens Type | 650nm IR Cut |
| Operating Temperature | -40°C to +85°C |
| Mating Connector | DF30FC-30DS-0.4V |

KLT-Q4MF-AR0521 V3.0**5MP OnSemi AR0521 MIPI Interface M12 Fixed Focus Camera Module**

Top View



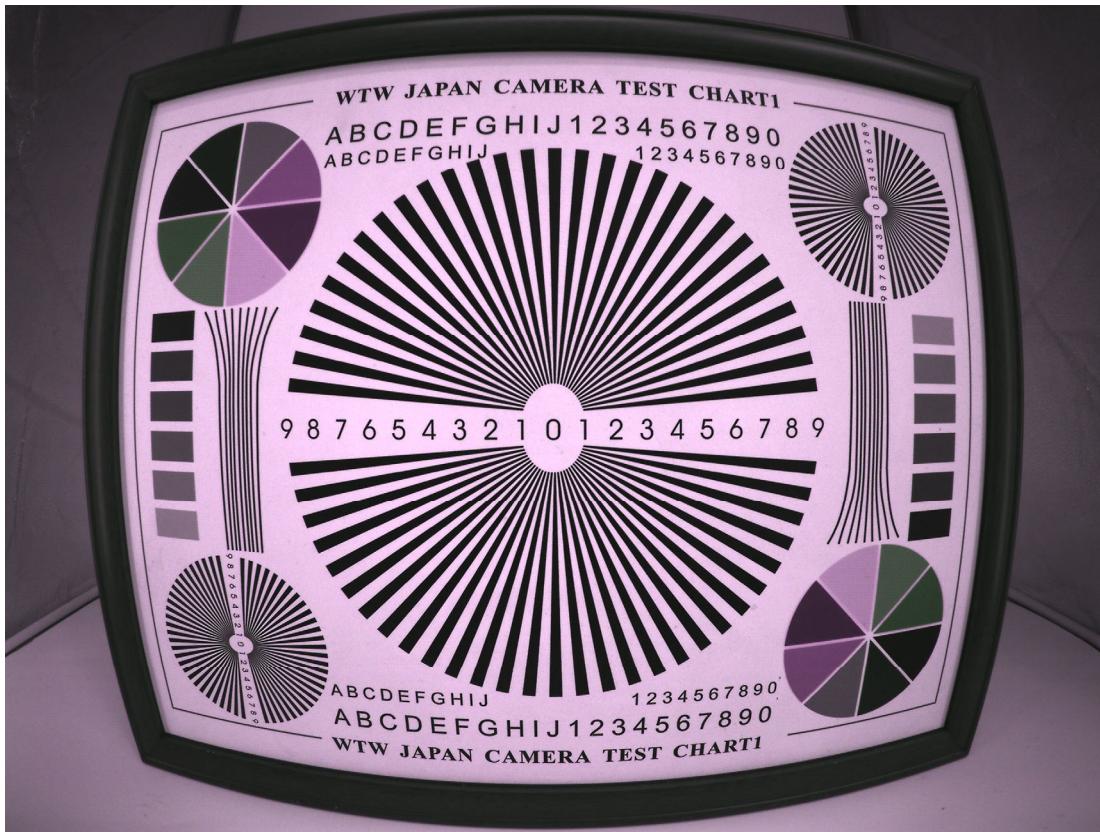
Side View



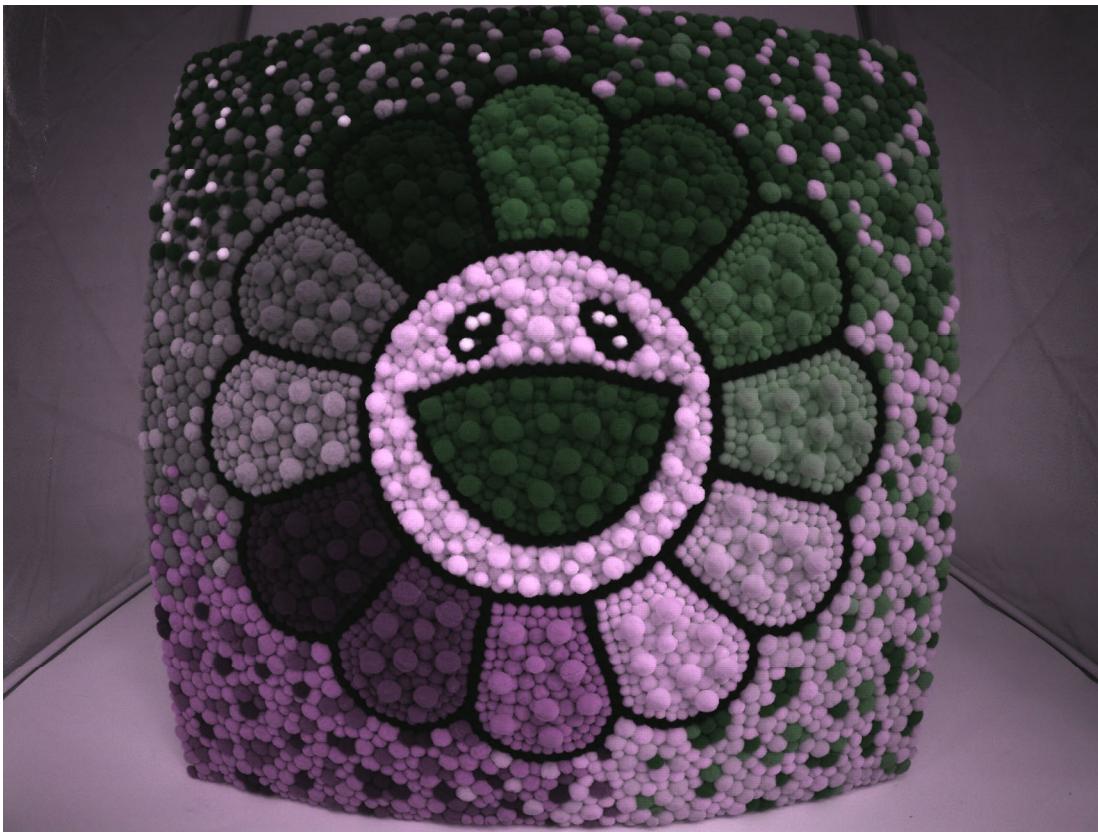
Bottom View



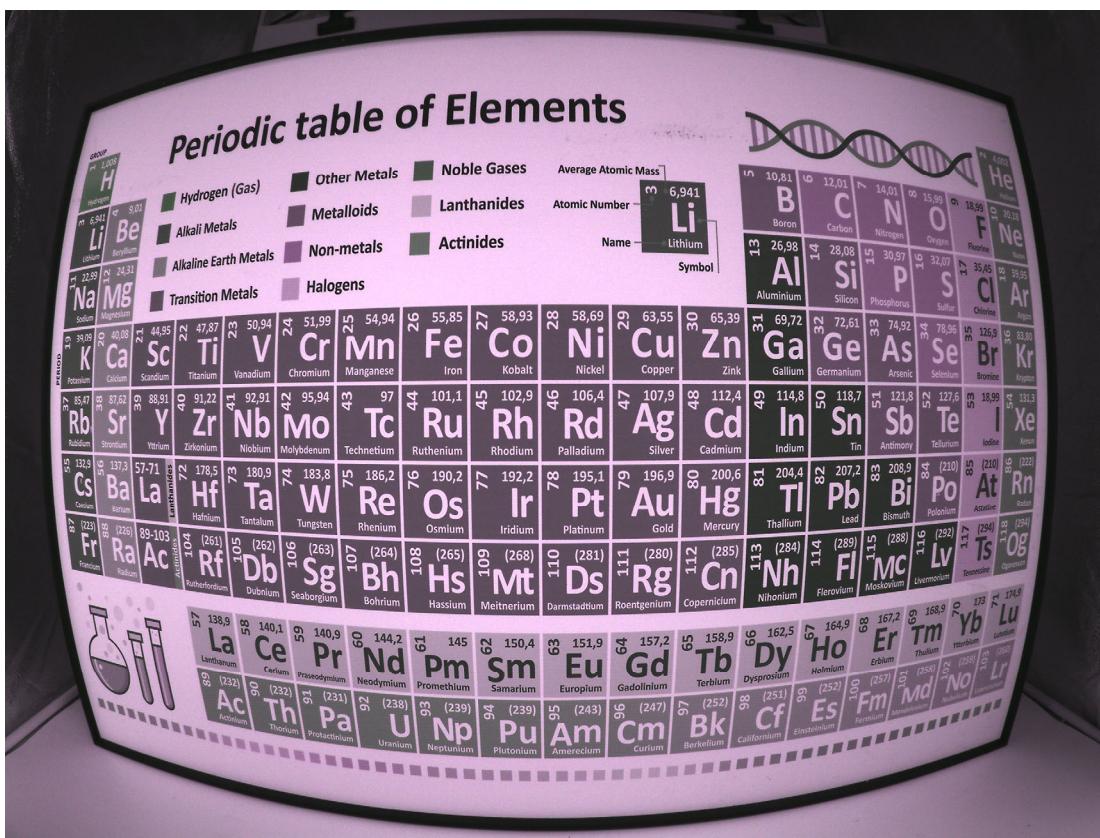
Mating Connector

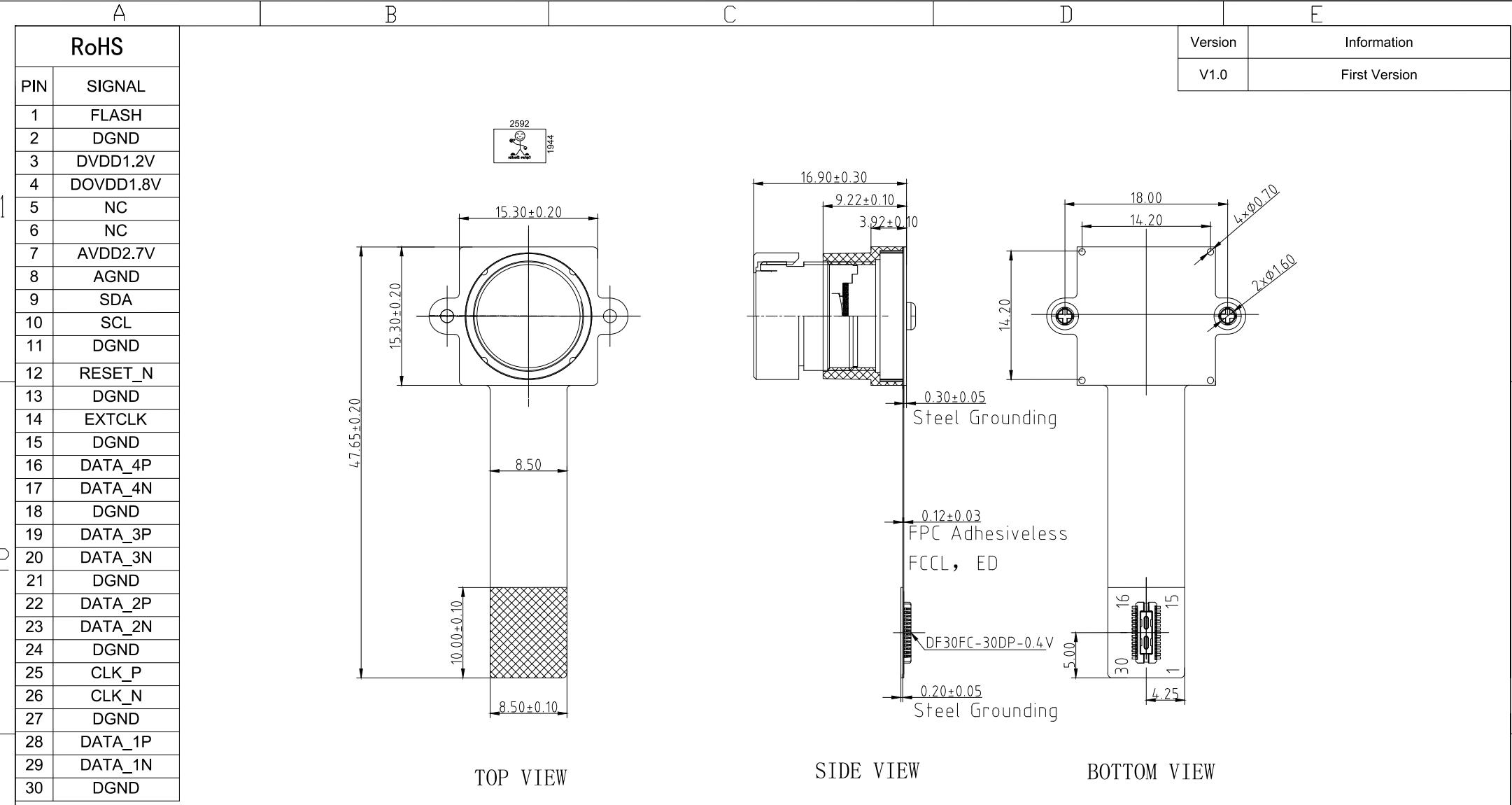


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Parameters:

1、Sensor specification:

Image Sensor: AR0521SR2C09SURA0-DR

Pixel: 2.2um×2.2um

Lens Type: 1/2.5

Important Voltage Description: DVDD1.2V
(external power supply);

2、Lens specification:

FOV: 127°(D);102°(H);60°(V)

F/NO.: 2.7

TV distortion: <-11%

Focal length: 3.51mm

Composition: 4G+IR FILTER

IR Cut Coating: 650nm±10nm@50%

Kai Lap Technologies Group Ltd

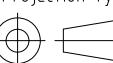
Designed By

Kevin

Model Name: KLT-Q4MF-AR0521 V3.0

Checked By

Jacky

Projection Type:  Unit: mm Date: 9/3/2025
Scale: 1:1 Sheet: 1 of 1 Version: 1/0

Product Overview

AR0521: Image Sensor, CMOS, 1/2.5" 5.1 MP High Performance

For complete documentation, see the data sheet.

The AR0521 is a 1/2.5-inch CMOS digital image sensor with an active-pixel array of 2592 (H) x 1944 (V). It captures images in either linear or high dynamic range modes with a rolling-shutter readout, and includes sophisticated camera functions such as binning, windowing and both video and single frame modes. It is designed for both low light and high dynamic range performance, with line interleaved T1/T2 read out to support off chip HDR in an ISP chip. The AR0521 produces extraordinarily clear, sharp digital pictures, and its ability to capture both continuous video and single frames makes it the perfect choice for a security applications.

Features

- 5 Mp at 60 fps for Excellent Video Performance
- Small Optical Format (1/2.5-inch)
- 1440p Mode for 16:9 Video
- Superior Low-light Performance
- 2.2 m Back Side Illuminated Pixel Technology
- Supports Line Interleaved T1/T2 Readout to Enable HDR Processing in ISP Chip
- Support for External Mechanical Shutter
- On-chip Phase-locked Loop (PLL) Oscillator
- Integrated Color and Lens Shading Correction
- Slave Mode for Precise Frame-rate Control

For more features, see the data sheet

Applications

- Video Surveillance
- High Dynamic Range Imaging

End Products

- Security Camera
- Action camera
- Car DVR

Part Electrical Specifications

| Product | Compliance | Status | Type | Megapixels | Frame Rate (fps) | Optical Format | Shutter Type | Pixel Size (µm) | Output Interface | Color | Package Type |
|----------------------------|------------------------|-----------------|------|------------|------------------|----------------|---|-----------------|------------------|-------|--------------|
| AR0521SR2C09SURA 0-DP | Pb-free Halide free | Product Preview | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | RGB | PLCC-52 |
| AR0521SR2C09SURA 0-DP-E | Pb-free Halide free | Active | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | RGB | PLCC-52 |
| AR0521SR2C09SURA 0-DR | Pb-free Halide free | NEW | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | RGB | PLCC-52 |
| AR0521SR2C09SURA 0-DR-E | Pb-free Halide free | Active | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | RGB | PLCC-48 |
| AR0521SR2M09SURA 0-DP | Pb-free Halide free | Product Preview | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | Mono | PLCC-52 |
| AR0521SR2M09SURA 0-DP-E | Pb-free Halide free | Active | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | Mono | PLCC-52 |
| AR0521SR2M09SURA 0-DR | Pb-free Halide free | Product Preview | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | Mono | PLCC-52 |
| AR0521SR2M09SURA 0-DR-E | Pb-free Halide free | Active | CMOS | 5.1 | 60 | 1/2.5 inch | Electronic Rolling and Global Reset Release | 2.2 x 2.2 | Multi | Mono | PLCC-52 |

For more information please contact your local sales support at www.onsemi.com.

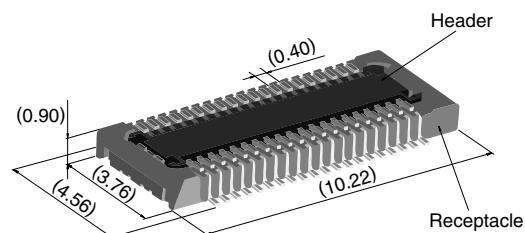
Created on: 9/30/2017

0.4 mm Pitch, 0.9 mm Height, Board-to-Board / Board-to-FPC Connectors

DF30 Series



Extremely small size



40 positions shown

Overview

Continuous miniaturization and increased component density on PCB created demand for extremely low profile connectors. This series is addition of a new extremely low profile connectors to Hirose's wide range of high reliability board-to-board/board-to-FPC connection solutions.

Features

1. Contact reliability

Concentration of the contact's normal forces at the single point assures good contact wipe and electrical reliability, while confirming the fully mated condition with a definite tactile click.

2. Self alignment

Recognizing the difficulties of mating extremely small connectors in limited spaces the connectors will self align in horizontal axis within 0.3 mm.

3. Automatic board placement

Packaged on tape-and-reel the plug and headers have sufficiently large flat areas to allow pick-up with vacuum nozzles of automatic placement equipment.

4. Variety of contact positions and styles

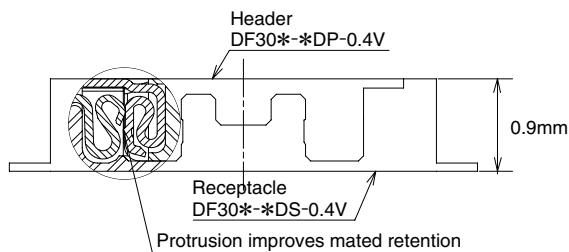
Available in standard contact positions of: 20, 22, 24, 30, 34, 40, 50, 60, 70 and 80 with and without metal fittings. Addition of metal fittings does not affect external dimensions of the connectors.

Smaller contact positions are also available.

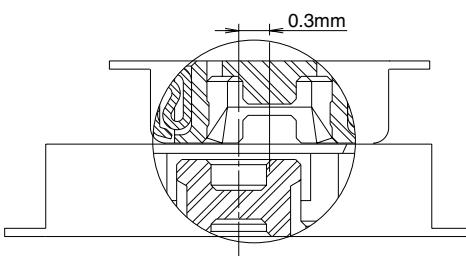
5. Support for continuity test connector

Connectors which have increased insertion and removal durability are available for continuity tests. Contact your Hirose sales representative for details.

- Low profile
- Increased mated retention
- High contact reliability



Self alignment



Applications

Cellular phones, PDA's, mobile computers, digital cameras, digital video cameras, and other devices demanding high reliability connections in extremely limited spaces.

■Product Specifications

| | | | |
|--------|--|---|--|
| Rating | Rated current 0.3A Rated voltage 30V AC | Operating temperature range : -35°C to 85°C (Note 1) Operating humidity range : Relative humidity 20% to 80% | Storage temperature range -10°C to 60°C (Note 2) Storage humidity range Relative humidity 40% to 70% (Note 2) |
|--------|--|---|--|

| Item | Specification | Conditions |
|---|--|--|
| 1. Insulation resistance | 50 MΩ min. | 100V DC |
| 2. Withstanding voltage | No flashover or insulation breakdown. | 100V AC / one minute |
| 3. Contact resistance | 100 mΩ max. | 100 mA |
| 4. Vibration | No electrical discontinuity of 1 μs or more | Frequency: 10 to 55 Hz, single amplitude of 0.75mm, 2 hours, 3 axis |
| 5. Humidity | Contact resistance: 100 mΩ max. Insulation resistance: 25 MΩ min. | 96 hours at temperature of 40°C±2°C and RH of 90% to 95% |
| 6. Temperature cycle | Contact resistance: 100 mΩ max. Insulation resistance: 50 MΩ min. | Temperature: -55°C→+5°C to +35°C→+85°C→+5°C to +35°C Duration: 30→10→30→10(Minutes) 5 cycles |
| 7. Durability (insertions/withdrawals) | Contact resistance: 100 mΩ max. | 50 cycles(Connector for conductivity tests: 500 cycles) |
| 8. Resistance to soldering heat | No deformation of components affecting performance. | Reflow: At the recommended temperature profile Manual soldering: 300°C for 3 seconds |

Note 1: Includes temperature rise caused by current flow.

Note 2: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating temperature range and humidity range covers non-conducting condition of installed connectors in storage, shipment or during transportation.

■Materials and Finishes

| Connectors | Component | Material | Finish | Remarks |
|-------------------------------|----------------|-----------------|-------------------|---------|
| Receptacles and Headers | Insulator | LCP | Color : Black | UL94V-0 |
| | Contacts | Phosphor bronze | Gold plated | _____ |
| | Metal fittings | Phosphor bronze | Tin-copper plated | _____ |

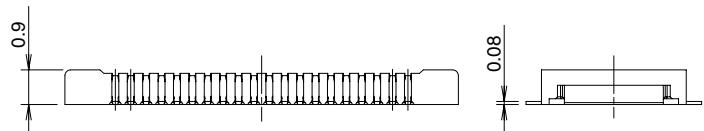
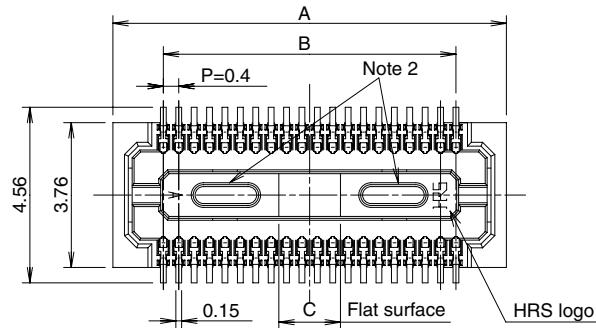
■Ordering information

●Receptacles and Headers

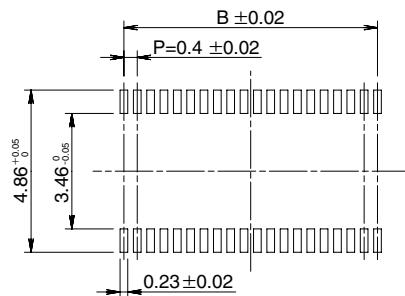
DF30 FC - * DS - 0.4 V ()**

| | |
|---|--|
| ① Series name: DF30 | ⑤ Contact pitch: 0.4 mm |
| ② Configuration FB: With metal fittings, without bosses FC: Without metal fittings, without bosses CJ: Connector for conductivity tests | ⑥ Termination section V: Straight SMT |
| ③ Number of positions: 20, 22, 24, 30, 34, 40, 50, 60, 70, 80 | ⑦ Packaging (81): Embossed tape packaging (5,000 pieces per reel) (82): Embossed tape packaging (1,000 pieces per reel) |
| ④ Connector type DS: Double row receptacle DP: Double row header | |

■ Receptacles (without metal fittings)



◆ Recommended PCB mounting pattern



Recommended solder paste thickness: 120 μm

[Specification number] -**, (**)
(81): Embossed tape packaging (5,000 pieces per reel)

* Tolerances non- accumulative.

Unit: mm

| Part Number | CL No. | Number of contacts | A | B | C |
|----------------------|-----------------|--------------------|-------|------|------|
| DF30FC-20DS-0.4V(**) | CL684-1109-8-** | 20 | 6.22 | 3.6 | 1.2 |
| DF30FC-22DS-0.4V(**) | CL684-1110-7-** | 22 | 6.62 | 4.0 | 1.2 |
| DF30FC-24DS-0.4V(**) | CL684-1111-0-** | 24 | 7.02 | 4.4 | 1.2 |
| DF30FC-30DS-0.4V(**) | CL684-1112-2-** | 30 | 8.22 | 5.6 | 1.2 |
| DF30FC-34DS-0.4V(**) | CL684-1113-5-** | 34 | 9.02 | 6.4 | 1.36 |
| DF30FC-40DS-0.4V(**) | CL684-1078-6-** | 40 | 10.22 | 7.6 | 1.6 |
| DF30FC-50DS-0.4V(**) | CL684-1114-8-** | 50 | 12.22 | 9.6 | 2.0 |
| DF30FC-60DS-0.4V(**) | CL684-1082-3-** | 60 | 14.22 | 11.6 | 2.4 |
| DF30FC-70DS-0.4V(**) | CL684-1115-0-** | 70 | 16.22 | 13.6 | 2.8 |
| DF30FC-80DS-0.4V(**) | CL684-1116-3-** | 80 | 18.22 | 15.6 | 3.2 |

Note 1: Order by number of reels.

Note 2: Receptacles with 24 or fewer contacts positions will not have recessed areas.

Cameras Applications



Automotive Driver Pilot



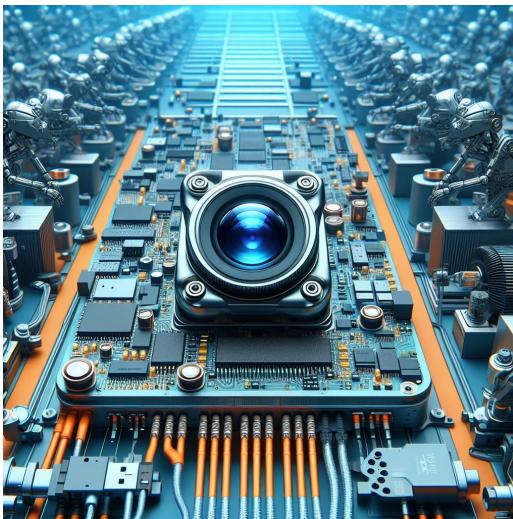
Live Streaming



Video Conference



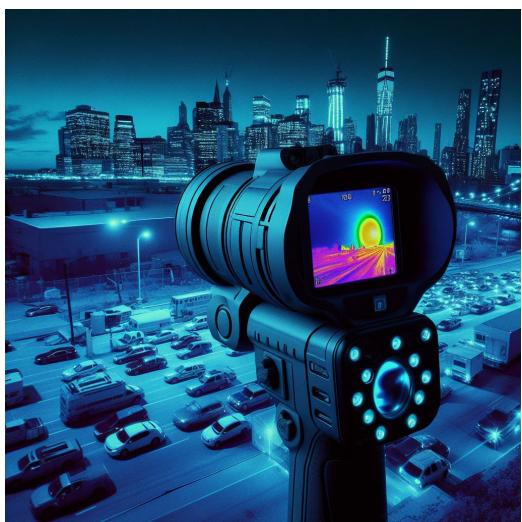
Eye Tracker Biometric Detection



Machine Vision



Agricultural Monitor



Night Vision Security



Drone and Sports Eagle Eyes



Interactive Pet Camera

Cameras Applications



Camera Module Pinout Definition Reference Chart

| 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 |



| Inspection Item | | Inspection Method | Standard of Inspection |
|-----------------|-----------|-------------------|--------------------------|
| Category | Item | | |
| Appearance | FPC/ PCB | Color | The Naked Eye |
| | | Be Torn/Chopped | The Naked Eye |
| | | Marking | The Naked Eye |
| | Holder | Scratches | The Naked Eye |
| | | Gap | The Naked Eye |
| | | Screw | The Naked Eye |
| | | Damage | The Naked Eye |
| | Lens | Scratch | The Naked Eye |
| | | Contamination | The Naked Eye |
| | | Oil Film | The Naked Eye |
| | | Cover Tape | The Naked Eye |
| Function | Image | No Communication | Test Board |
| | | Bright Pixel | Black Board |
| | | Dark Pixel | White board |
| | | Blurry | The Naked Eye |
| | | No Image | The Naked Eye |
| | | Vertical Line | The Naked Eye |
| | | Horizontal Line | The Naked Eye |
| | | Light Leakage | The Naked Eye |
| | | Blinking Image | The Naked Eye |
| | | Bruise | Inspection Jig |
| | | Resolution | Chart |
| | | Color | The Naked Eye |
| | | Noise | The Naked Eye |
| | | Corner Dark | Less Than 100px By 100px |
| Dimension | Dimension | Color Resolution | The Naked Eye |
| | | Height | The Naked Eye |
| | | Width | The Naked Eye |
| | | Length | The Naked Eye |
| | | Overall | The Naked Eye |

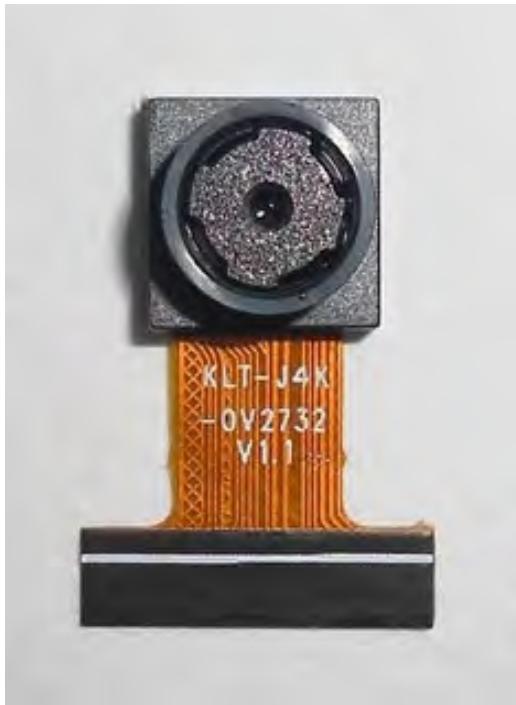


CMOS CAMERA MODULES

your *BEST* camera module partner

KLT Package Solutions

KLT Camera Module



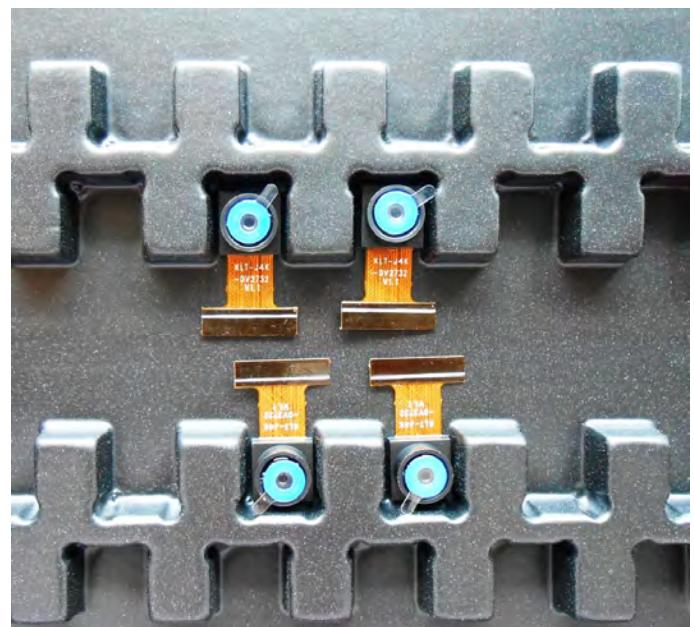
Complete with Lens Protection Film



Tray with Grid and Space



Place Cameras on the Tray



Camera Modules Package Solution

Full Tray of Cameras



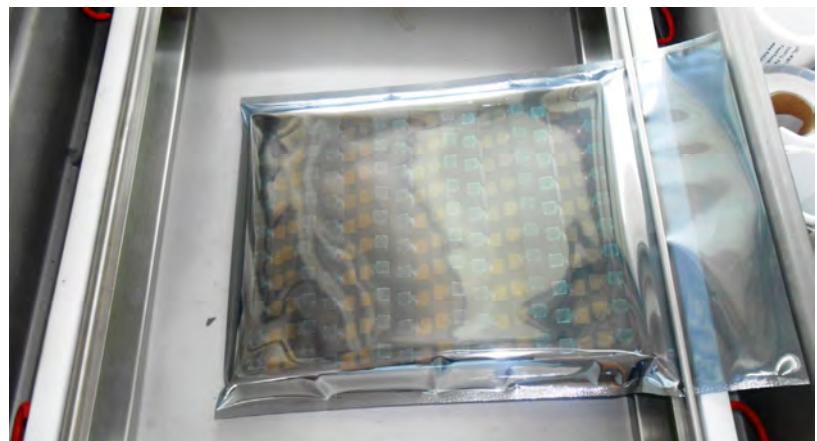
Cover Tray with Lid



Put Tray into Anti-Static Bag



Vacuum the Anti-Static Bag





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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





CMOS CAMERA MODULES

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Small Order Package Solution

Place Foam Sheets and Trays into Small Box



Foam Sheets are Nicely Fitting the Small Box



Package in Small Box for Shipment

Place Small Boxes into Larger Box



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Carbon Box Package Solution

Seal the Carbon Box

Final Package Labelled Box



Carbon Box Ready for Shipment

1. Delivery Address and Phone No. 2. Box No. and Ship Date 3. Fragile Caution



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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

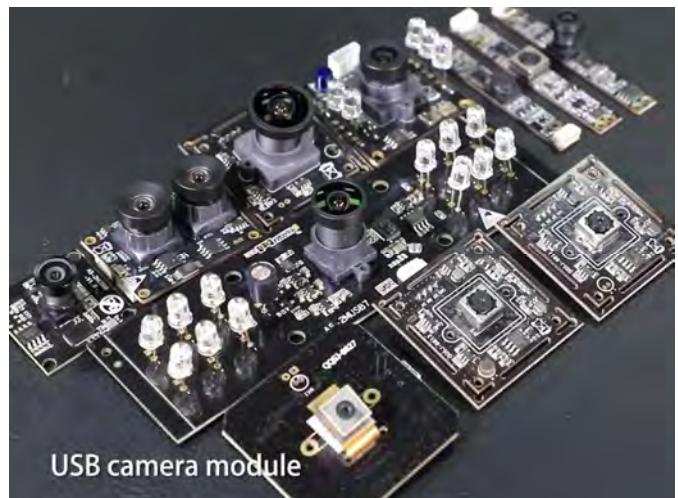


Company Kai Lap Technologies (KLT)

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. 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.



KLT Strength

Powerful Factory



Professional Service



Promised Delivery

