# Product Specification

**Product Model Number:** InnoCAM_DVP_OV2710PDFF

**Product Part Number:** INV-OV2710FF-2MP

**Revision:** Rev 1.1

**Document No:** INV132

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**REVISION HISTORY**

| Revision | Description of change | Changed by | Date |
|---|---|---|---|
| 1.0 | Initial Draft | Jamie Lynn | 04/19/2022 |
| 1.1 | Updated with schematic, new lens, new connector, and new pinout | Jamie Lynn | 08/02/2022 |
| | | | |
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**APPROVAL**

| Company | Name | Signature | Date |
|---|---|---|---|
| InnoWave Design LLC | Jamie Lynn | | 08/09/2022 |
| InnoWave Design LLC | Tony Reed | | 08/11/2022 |

# Contents

INV-OV2710FF-2MP

# 1. General

The INV-OV2710FF-2MP is a color fixed focus 2megapixel 1920x1280 camera module with a 4 element glass lens plus IRCF within a lens holder. The image sensor and image processor in one package is also part of the complete camera module.

## 1.1. Specifications

| | |
|---|---|
| Sensor Make and model number | Omni Vision OV2710-A68A |
| Sensor Type | 68 pin CSP |
| Resolution | 2MP (1920 x 1080) |
| Active array size | 1920x1080 |
| Pixel Size | 3um x 3um |
| Module Size | 12.5x12.5x22.8 mm |
| Optical size | 1/2.7" |
| Output Interfaces | 10-bit parallel / One-lane MIPI |
| Output Format | RGB RAW (10 bit) |
| Chroma | Color |
| Image Area | 5856 um x 3275 um |
| Package dimensions | 7465 um x 5865 um |
| Frame Rate | 15 fps @ 1600 x 12000 |
| Sensor CRA | 23.6 degrees |
| Power Requirements | Active: 350 mW |
| | Power down: 70uA |
| Power Supply | Core: 1.425~1.575V (1.5V typical) |
| | Analog: 3.0~3.6V (3.3V typical) |
| | I/O:1.7V~3.6V (1.8V typical) |
| Input Clock Frequency | 6~27 MHz |
| Maximum image transfer rate | 1080p:30 fps |
| | cropped 720p:60 fps |
| | VGA: 120 fps |
| | QVGA: 240 fps |
| Shutter | Rolling |
| Scan mode | Progressive |
| Maximum Exposure Interval | 1096 tline |
| Operating Temperature Range | -30° C to 85° C junction temperature |
| Stable Image Temperature Range | 0° C to 65° C junction temperature |
| Connector | OK-14-GM030-04 |
| Lens Model | 100-003-650+HZ125 |
| Construction | 4G+IRCF |
| Lens Type | Fixed Focus |
| Max Image | Ø 6.78 |
| Field of View (FOV) | |
| Vertical | 58° |
| Horizontal | 113° |
| Diagonal | 137° |

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| Aperture (F#) | 2.4 |
|---|---|
| EFL | 3.3mm |
| TV Distortion | <-42% |
| Lens CRA | 10.2° |
| Focus Range | 60cm - infinity |
| Thread | M12*P0.5 |
| TTL | 22mm |

**Table 1: Specifications**

## 1.2. Sensor Features

- Programmable controls: gain, exposure, frame rate, image size, horizontal mirror, vertical flip, cropping, windowing, and panning
- Automatic image control functions: automatic exposure (AEC), automatic gain control (AGC), automatic white balance (AWB) and automatic black level calibration (ABLC)
- Serial camera control bus (SCCB)
- Lens correction
- Defect pixel correction (DPC)
- Digital video port (DVP) parallel output interface
- Support for one lane MIPI interface (up to 800 Mbps)
- Support for output formats: 8-/10-bit RAW RGB
- Support for image sizes: 1080p @ 30 fps, cropped 720p @ 60 fps, and VGA @ 60 fps
- Support for black sun cancellation
- Embedded one-time programmable (OTP) memory
- On-chip phase lock loop (PLL)
- Built-in 1.5V regulator for core

**Table 2: Sensor Features**

## 1.3. Applications

- Notebook Computers
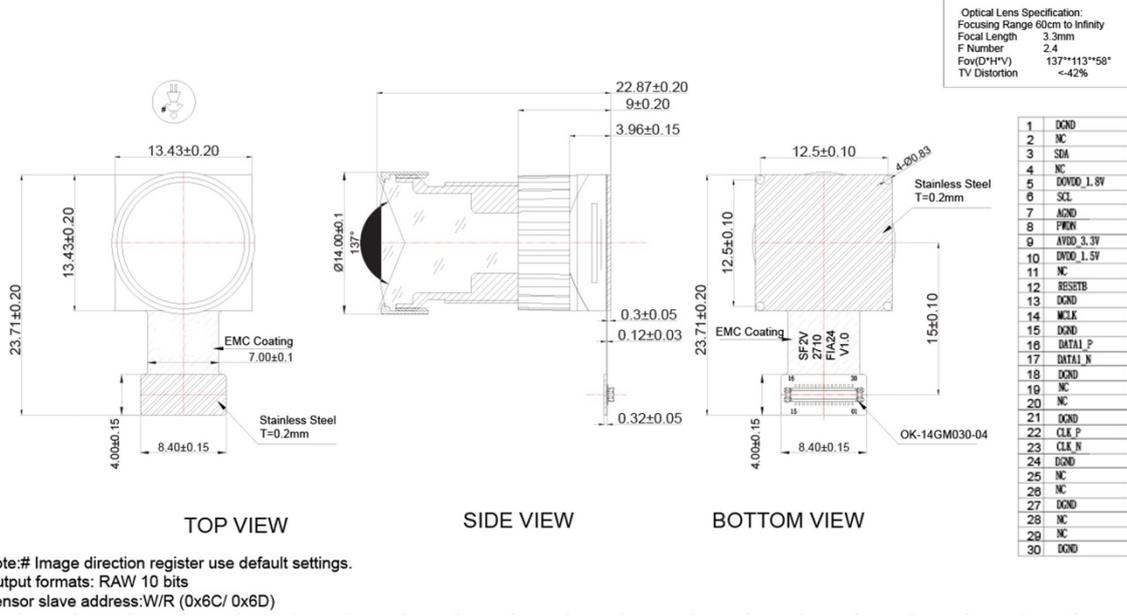- High-end video conferencing
- Security

## 1.4.  Layout



Optical Lens Specification:
Focusing Range 60cm to Infinity
Focal Length    3.3mm
F Number        2.4
Fov(D*H*V)      137**113**58°
TV Distortion   <-42%

TOP VIEW     SIDE VIEW     BOTTOM VIEW

| Pin | Signal |
|-----|--------|
| 1 | DGND |
| 2 | NC |
| 3 | SDA |
| 4 | NC |
| 5 | DOVDD_1.8V |
| 6 | SCL |
| 7 | AGND |
| 8 | PWDN |
| 9 | AVDD_3.3V |
| 10 | DVDD_1.5V |
| 11 | NC |
| 12 | RESETB |
| 13 | DGND |
| 14 | MCLK |
| 15 | DGND |
| 16 | DATA1_P |
| 17 | DATA1_N |
| 18 | DGND |
| 19 | NC |
| 20 | NC |
| 21 | DGND |
| 22 | CLK_P |
| 23 | CLK_N |
| 24 | DGND |
| 25 | NC |
| 26 | NC |
| 27 | DGND |
| 28 | NC |
| 29 | NC |
| 30 | DGND |

Note:# Image direction register use default settings.
Output formats: RAW 10 bits
Sensor slave address:W/R (0x6C/ 0x6D)

**Figure 1:   Camera module assembly layout**

## 1.5. Lens
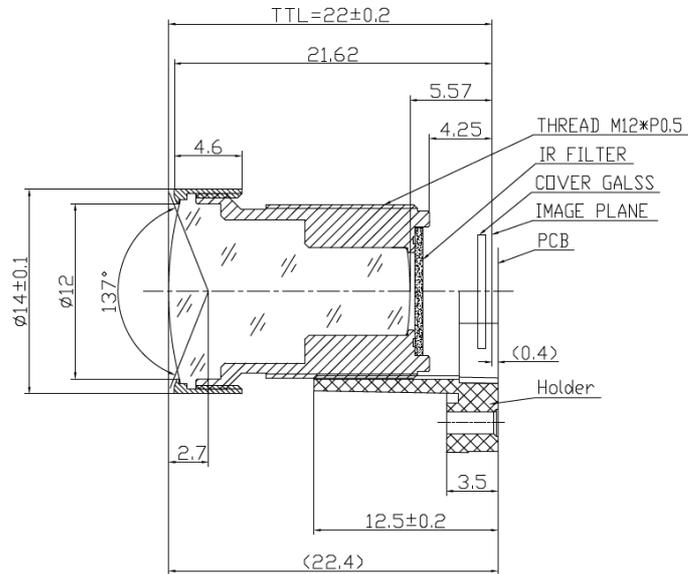


**Figure 3: Lens assembly**

# 2. Electrical
## 2.1. DC characteristics (-30°C < TJ < 85°C)

| Supply | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| VDD-A | supply voltage (analog) | 3.00 | 3.30 | 3.60 | V |
| VDD-D | supply voltage (digital core) | 1.43 | 1.50 | 1.58 | V |
| VDD-IO | supply voltage (digital I/O) | 1.70 | 1.80 | 3.60 | V |
| IDD-A | active (operating) current | | 80 | 90 | mA |
| IDD-IO b, c | | | 50 | 60 | mA |
| IDDS-SCCB | Standby Current | | 0.7 | 1 | mA |
| IDDS-PWDN | | | 50 | 120 | mA |
| **Digital inputs (typical conditions: AVDD = 3.3V, DVDD = 1.5V, DOVDD = 1.8V)** | | | | | |
| VIL | | | | 0.54 | V |
| VIH | input voltage HIGH | 1.26 | | | V |
| CIN | input capacitor | | | 10 | pF |
| **Digital outputs (standard loading 25 pF)** | | | | | |
| VOH | Output Voltage HIGH | 1.62 | | | V |
| VOL | Output Voltage Low | | | 0.18 | V |

| Serial interface inputs | | | | | |
|---|---|---|---|---|---|
| VIL | SIOC and SIOD | -0.5 | 0 | 0.54 | V |
| VIH | SIOC and SIOD | 1.26 | 1.8 | 2.3 | V |

a.    using the internal DVDD regulator is strongly recommended for minimum power down current

b.    active current is based on sensor resolution at full size and at full speed, 25°C

c.    with MIPI function, the active current needs an additional 20mA

d.    standby current is measured at room temperature

e.    based on DOVDD = 1.8V

**Table 3 DC characteristics**

## 2.2.  AC Characteristics

AC characteristics ($T_A$ = 25°C, $V_{DD-A}$ = 2.8V)

| symbol | parameter | min | typ | max | unit |
|---|---|---|---|---|---|
| ADC parameters | | | | | |
| B | analog bandwidth | | 40 | | MHz |
| DLE | DC differential linearity error | | | | LSB |
| ILE | DC integral linearity error | | 1 | | LSB |
| | settling time for hardware reset | | | <1 | ms |
| | settling time for software reset | | | <1 | ms |
| | settling time for resolution mode change | | | <1 | ms |
| | settling time for register setting | | | <300 | ms |

**Table 4: AC Characteristics**

# 3.  Environment Requirements

## 3.1.  Operating Temperature

The camera module shall be fully functional when ambient temperature is between -20°C to 60°C with image quality remaining stable.  Test duration is 24 hours.

## 3.2.  Storage Temperature

The camera module shall withstand storage temperatures between -30°C to 70°C.  Test duration is 48 hours.

## 3.3.  Humidity

The camera module shall withstand humidity at or below 90% RH under non-condensing conditions for 24 hours.

## 3.4.  Thermal Shock

The camera module shall withstand the following temperatures (with humidity off)
-30°C to 70°C
 20 min cycles (10 min dwell, 5 min ramp, 10 min dwell)

## 3.5.  High Temperature Test

60C, humidity off, 24 hours

## 3.6.  Low Temperature Test

-20C, humidly off, 24 hours

Stable image is -30°C to 70°C junction temperature. The sensor functions but image quality may be noticeably different at temperatures outside of stable image range.  Image quality remains stable between 0°C to 50°C.

# 4.  Reliability Requirements

## 4.1.  Drop Test

The camera module shall withstand a 1.2m Drop in packaging onto Concrete (12 drops) Random Positions

## 4.2.  Random Vibration

The camera module shall withstand vibration of the following conditions
 Frequency range：  50Hz

Amplitude：  2mm Duration 10 minutes for each position
Test all 3 axes (X, Y, Z)

## 4.3.  Salt Fog Test

Condition: 5‰nacl solvent Test duration：  24H

## 4.4.  ESD (Electronic Discharge)

The camera module shall withstand Electrostatic Discharge of
 8KV Contact Discharge
12KV Air Discharge
10 Times for a Second

# 5.  Product Performance Verification

To verify the camera module performance, the following tests will be conducted at either the factory during production or as an initial qualification characterization in either the factory laboratory or at the InnoWave laboratory.

## 5.1.  Electrical Parameters

| Parameter | Test Frequency |
|---|---|
| Current consumption – Standby | Initial Qualification |
| Current consumption – Idle | Initial Qualification |
| Current consumption – Viewfinder | Initial Qualification |
| Current consumption – Capture | Initial Qualification |

**Table 5: Electrical parameter measurements**

## 5.2. Mechanical Parameters

| Parameter | Test Frequency |
|---|---|
| X Dimension (mm) | Initial Qualification |
| Y dimension (mm) | Initial Qualification |
| Z Dimension (mm) | Initial Qualification |

**Table 6: Mechanical parameter measurements**

## 5.3. Environmental and Reliability Test Parameters

| Parameter | Test Frequency |
|---|---|
| Thermal Shock | Initial Qualification |
| Humidly | Initial Qualification |
| High Temperature Test | Initial Qualification |
| Low Temperature Test | Initial Qualification |
| Drop Test | Initial Qualification |
| Random Vibration Test | Initial Qualification |
| Salt Fog Test | Initial Qualification |
| ESD Test | Initial Qualification |

**Table 7: Environmental and Reliability parameter measurements**
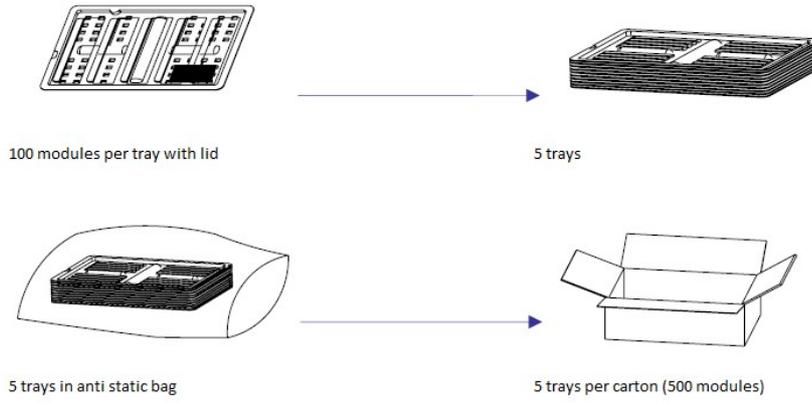
# 6. Product Identification TBD

All modules will be marked with an identification number using laser marking or bar code label.

# 7 Packaging

The package will prevent damage to the components during transport and will be suitable for electrostatic-sensitive devices. The single camera modules shall be delivered in a reusable tray of anti-static plastic material. Several cameras shall be packed in one tray.
The tray has separate holders for each camera module.

100 modules per tray with lid

5 trays

5 trays in anti static bag

5 trays per carton (500 modules)

**Figure 4: Packaging Example**