Product Specification

Product: InnoCAM_DCM_OV2640FF-2MP

Part Number: INV-OV2640FF-2MP

Revision: Rev 1.2

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REVISION HISTORY

Revision	Description of change	Changed by	Date
1.0	Initial Draft	Jamie Lynn	12/12/2023
1.1			
1.2			
1.3			

APPROVAL

Company	Name	Signature	Date
InnoWave Design LLC	Tony Reed		02/10/2024
InnoWave Design LLC	Jamie Lyn		03/10/2023

Contents

1. General

The INV-OV2640FF-2MP is a color fixed focus 2-megapixel 1600x1200 camera module with a 4-element glass lens plus IRCF within a lens holder. The OV2640 low voltage sensor provides the full functionality of a single-chip camera and image processor in a small footprint package.

1.1. Specifications

Sensor Make and Model	Omni Vision OV2640
Sensor Type	38 pin CSP
Resolution	2MP (1600x1200)
Active array size	1600x1200
Pixel Size	2.2um x 2.2um
Module Size	38x38x21.0mm
Optical size	1/4"
Output Interfaces	SCCB Interface
Output Formats	YUV(422/420)/YCbCr422 RGB565/555 8-bit compressed data 8-/10-bit Raw RGB data
Chroma	Color
Image Area	3590 µm x 2684 µm
Package dimensions	5725 µm x 6285 µm
Frame Rate	15 fps @ 1600 x 12000
Sensor CRA	25° non-linear
Power Requirements	Core: 1.3VDC + 5%
	Analog:2.5 ~ 3.0VDC
	I/O:1.7V to 3.3V
Maximum image transfer rate UXGA/SXGA SVGA CIF	 15 fps 30 fps 60 fps
Shutter	Rolling
Scan mode	Progressive
Maximum Exposure Interval	1247 x tROW
Temperature Range	0° C to 50° C (Stable image)
Stable Image Temperature Range	0° C to 65° C junction temperature
Lens Model	Y-5062-A4
Structure	4E
Lens Type	Fixed Focus
Field of View (FOV) Vertical Horizontal	 43° 56°

Diagonal	75°
Aperture (F#)	F#2.4
EFL	3.6mm
BFL	4.5mm
FFL	4.25mm
TV Distortion	6%
Relative illumination	>88%
Focus Range	61cm - infinity
Thread	M12*P0.5
IR Filter	940 IR
TTL	21.7mm

Table 1: Specifications

1.2. Sensor Features

- High sensitivity for low-light operation
- Low operating voltage for embedded portable apps
- Standard SCCB interface
- Output support for Raw RGB, RGB (RGB565/555), GRB422, YUV (422/420) and YCbCr (4:2:2) formats
- Supports image sizes: UXGA, SXGA, SVGA, and any size scaling down from SXGA to 40x30
- VarioPixel® method for sub-sampling
- Automatic image control functions including Automatic Exposure Control (AEC), Automatic Gain Control (AGC), Automatic White Balance (AWB), Automatic Band Filter (ABF), and Automatic Black-Level Calibration (ABLC)
- Image quality controls including color saturation, gamma, sharpness (edge enhancement), lens correction, white pixel canceling, noise canceling, and 50/60 Hz luminance detection
- Internal/external frame synchronization
- Variable frame rate control
- Line optical black level output capability
- Video or snapshot operation
- Zooming, panning, and windowing functions
- Supports LED and flash strobe mode
- Supports scaling
- Supports compression
- Embedded microcontroller

Table 2: Sensor Features

1.3. Applications

- Camera Phones
- PC Multimedia

1.4. Layout

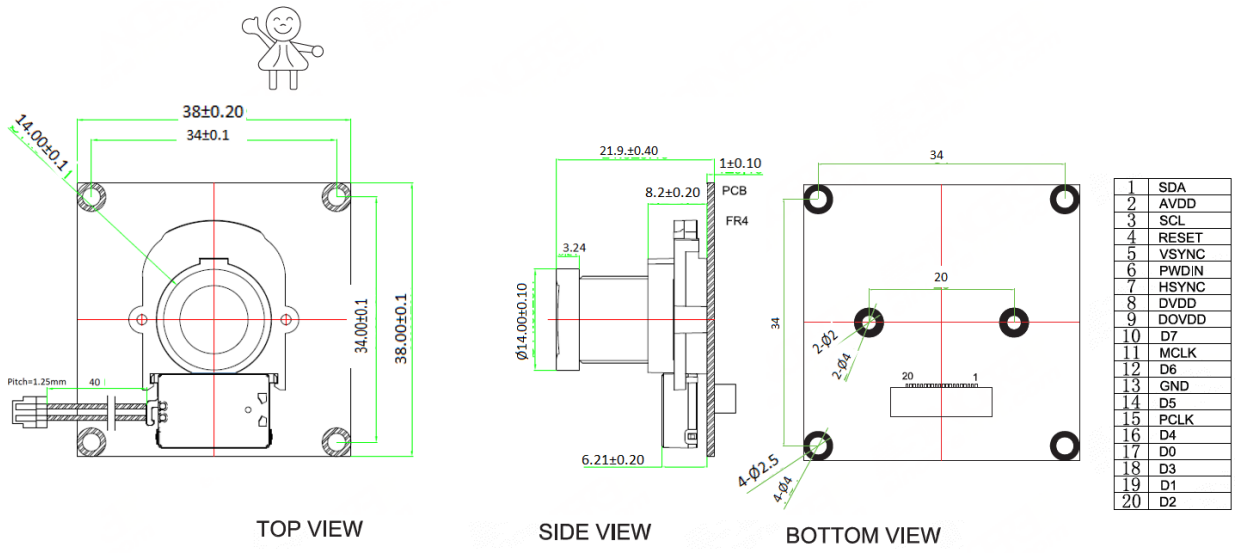

Figure 1: Camera module assembly layout

Figure 2: Lens assembly

2. Electrical

2.1. Absolute Maximum Ratings

Ambient Storage Temperature		-40ºC to +95ºC
Supply Voltages (with respect to Ground)	**VDD-A**	4.5V
	VDD-C	3V
	VDD-IO	4.5V
All Input/Output Voltages (with respect to Ground)		-0.3V to VDD-IO+1V
Lead-free Temperature, Surface-mount process		245ºC

Table 3 Absolute Maximum Ratings

2.2. 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 IDD-IO b, c	active (operating) current		80 50	90 60	mA mA
IDDS-SCCB IDDS-PWDN	Standby Current		0.7 50	1 120	mA 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 4 DC characteristics

2.3. AC Characteristics

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

ADC Parameters					
B	Analog bandwidth		20		MHz
DLE	DC differential linearity error		0.5		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 UXGA/SVGA mode change			<1	ms
	Settling time for register setting			<300	ms

Table 5: AC Characteristics

3. Environment Requirements

3.1. Operating Temperature

The camera module shall be fully functional when ambient temperature is between -20°C to 50°C with image quality remaining stable. Test duration is 24 hours.

3.2. Storage Temperature

The camera module shall withstand storage temperatures between -40°C to 95°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 6: 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 7: 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 8: 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.

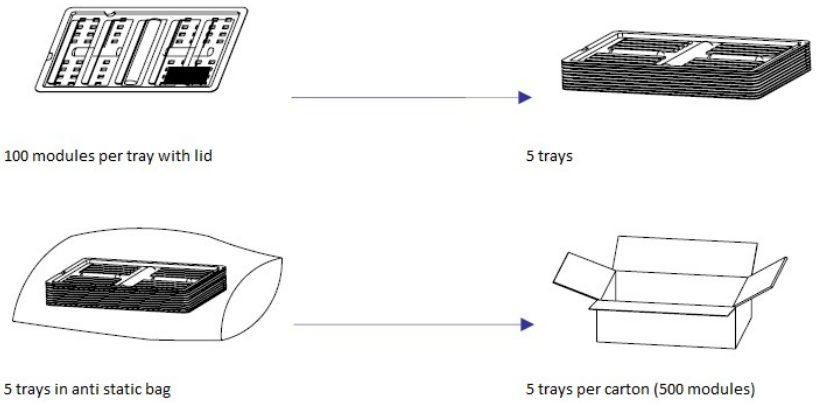

Figure 3: Packaging Example