Camera Module with OV2735

This first production batch will be:

15 pcs of Camera Module ver RGB 15 pcs of Camera Module ver IR

The two version uses the same FPC design with different components mounted.

Version RGB components:

- OV2735 in Portrait slot
- DF40C-34DP-0.4V
- VL53L1
- CMM-4030D-261-I2S-TR

Version IR components:

- OV2735 in Landscape slot
- DF40C-34DP-0.4V
- APDS-9960
- CMM-4030D-261-I2S-TR

A precise drawing of the module is provided. It is essential that the module is shaped and laid out according to the drawing. A 3D Model is also provided. These should be used for precise reference for placing the components.

Recent changes

I realised that the misunderstanding on connector layout was the numbering scheme. It has now been corrected to match the commonly used one.

- Extra ground pins added
- The pin numbers corrected to make connector layout clear
- I2S is 1.8V, the microphone must connect to 1.8V
- No need to use 3.3V in the design

**Just to be clear**: All CSI lanes are laid out on one side of the connector with GND between.

Bill of Materials

- Omnivision OV2735
- Hirose DF40C-34DP-0.4V B2B Plug (header, standard, non-shielded)
- Broadcom APDS-9960 Proximity Light and Gesture Sensors
- ToF sensor VL53L1
- CUI MEMS microphone CMM-4030D-261-I2S-TR
- Additional resistors and capacitors

Camera mounting

Two versions of the camera module exists. They look nearly the same. They differ in the orientation of the image sensor and type of secondary sensor mounted.

The image sensor is placed centered with mounting holes for an M7 housing and M12 housing in the corners. To enable different types of housing mounts the FFC edges in the Image Sensor section must not conduct signal, see drawing.
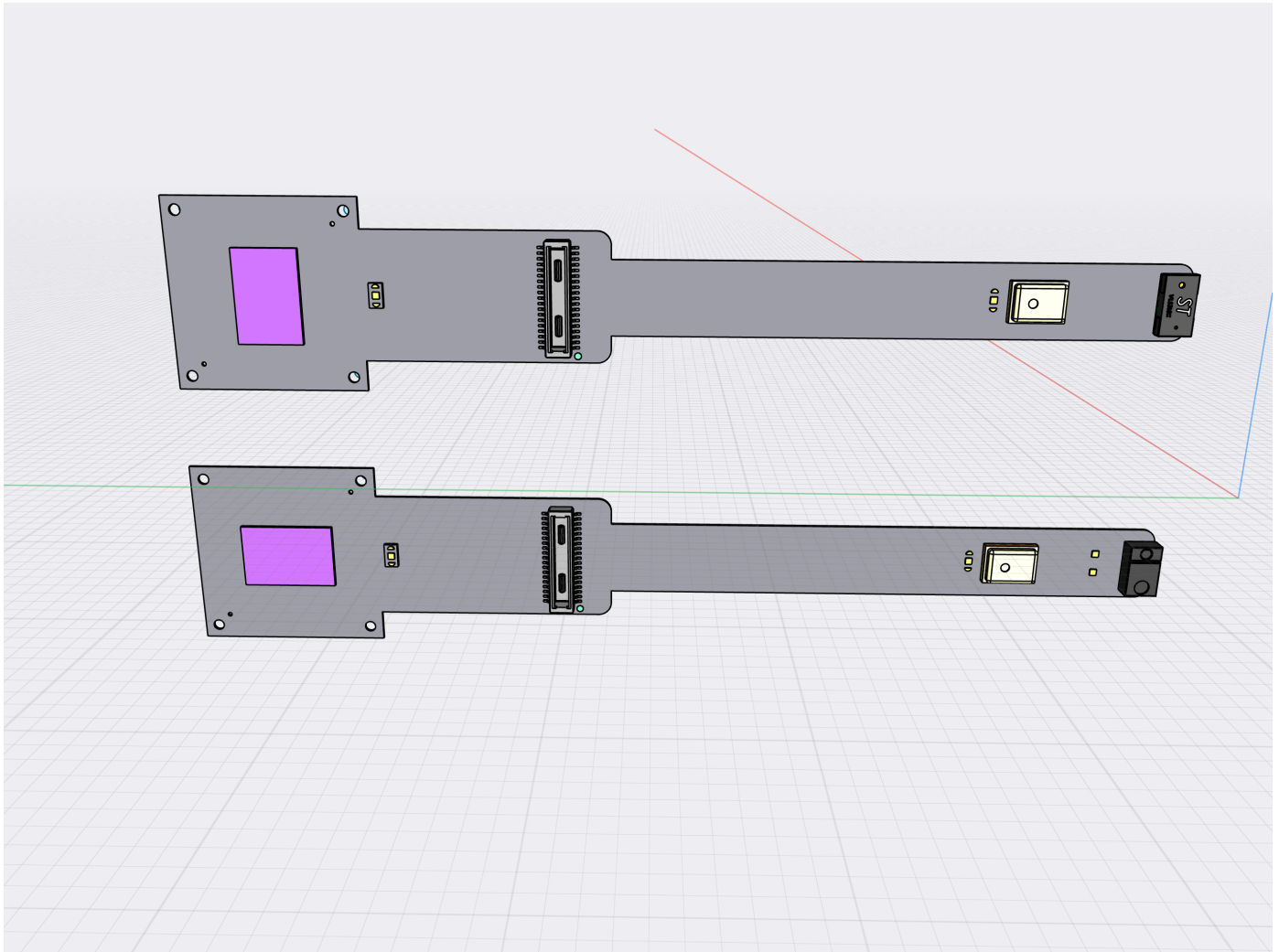
Time-of-Flight + Ambient sensor

The layout include two additional sensors. Only one will be mounted at a time

VL53L1 will be combined with image sensor oriented in portrait mode going across the FFC in the RGB version. APDS-9960 will be combined with image sensor oriented in landscape mode going along the FFC in the IR version.

3a. On the RGB version only VL53L1 is mounted, hence connections are: 2.8V, GND, I2C_SDA, I2C_SCL, ATT_INT, ATT_XSHUT. I'm assuming that The OV2735 and VL53L1 can be on the same I2C bus.

3b. On the IR version only APDS-9960 is mounted, hence connections are 2.8V, GND, I2C_SDA, I2C_SCL, ATT_INT. I understand LDR, LED A, LED K as for external IR LED. This sensor is just intended for ambient light measurement. If additional functionality is needed I would introduce it through revisions to this sensor module. I'm assuming that The OV2735 and APDS-9960 can be on the same I2C bus.

Diagram

Drawing & 3D Model bundled with this spec

- Drawing
- Mounting intructions RGB vs IR (in drawing)
- Portrait/Landscape slots pointed out (drawing)
- 3D rendering

Notations printed on the FFC

- Pin 1 Dot by the connector
- Text: "OV2735" between the two image sensor locations
- Text: "Ziloo 201" in empty area between microphone and connector
- Text: "CAM ID" by the I2CID isles
- Text: "MIC SEL" by the MIC SEL isles
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Layout Schematic

- All sensors are connected to either I2S or I2S bus
- ATT_XSHUT connected to VL53L1

- ATT_INT connected to VL53L1 GPIO1 & APDS-9960 INT
- VL53L1 and APDS-9960 uses 2.8V
- Isles added to allow Mic. Select to be soldered to HIGH(1.8V) or LOW(GND)
- Isles added to allow I2CID. Select to be soldered to HIGH(1.8V) or LOW(GND)
- LED connections for APDS-9960 are accessble by pads(soldering isles) near the sensor
- The edges around image sensors must not carry signal to allow punching extra holes for lens alignment

Pinouts: Hirose DF40 single eye connector 34 pins
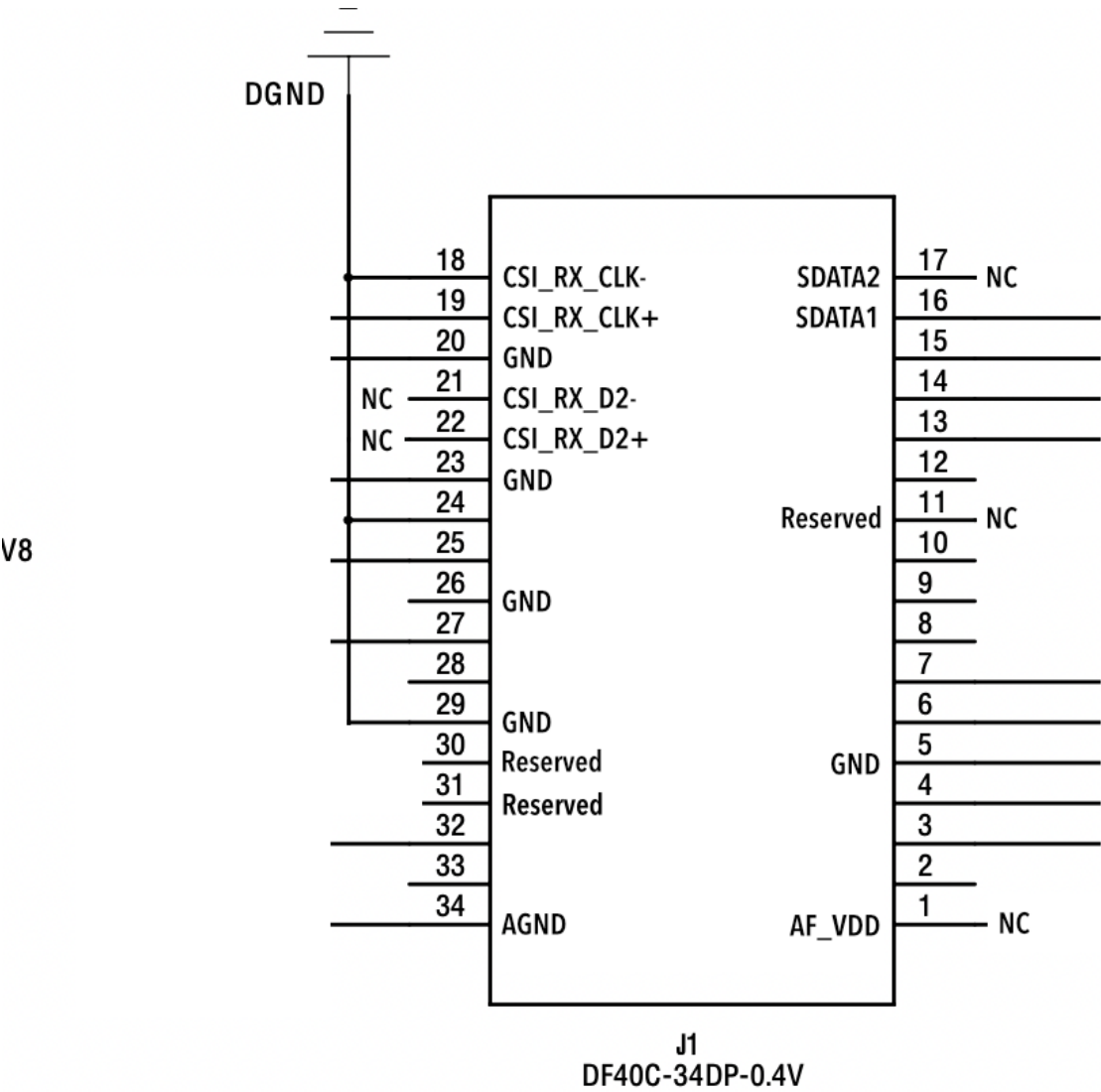
Pin 1 is indicated on the board by a dot.

Toward thin part with microphone and other sensors

Pin	Code	Type	Details	Voltage
1	AF_VDD	Power	Reserved for Autofocus	3.3V
2	AVDD_2V8	Power	Analog, Max 500mA	2.8V
3	DOVDD	Power	Power for I/O circuit, Max 500mA	1.8V
4	VCC_1V8	Power	1.8V ,MAX 200mA	1.8V
5	GND	Power	GND	
6	CAM_FSIN	I/O	Frame sync input	
7	CAM_STROBE	I/O	Frame sync output	
8	EXTCLK	Input	External Clock Input (MCLK)	

Pin	Code	Type	Details	Voltage
9	ATT_INT	Output	Interrupt Attached Sensor, Active L	1.8V?
10	ATT_XSHUT	Input	Attached Sensor XSHUTDOWN	1.8V
11	Reserved	AF/PWM	PWM Motor control (NC)	
12	I2C_SCL	I/O	I2C1_SCL(pullup resistor 2.2K)	1.8V
13	I2C_SDA	I/O	I2C1_SDA(pullup resistor 2.2K)	1.8V
14	BCLK / SCK	I2S	Bit clock line	1.8V
15	WS / LRCLK	I2S	Word clock line	1.8V
16	SDATA1	I2S	Input data 1	1.8V
17	SDATA2	I2S	Input data 2 (NC)	1.8V

Towards image sensors

Pin	Code	Type	Details	Voltage
34	AGND	Power	Analog ground	
33	RESET	Input	Camera Reset, Active Low (RSTB)	
32	PWRDN	Input	Camera Power Down	
31	Reserved			
30	Reserved			
29	-		GND	
28	CSI_RX_D0P	Camera	MIPI_CSI_RX_D0+	1.8V
27	CSI_RX_D0N	Camera	MIPI_CSI_RX_D0-	1.8V
26	-		GND	
25	CSI_RX_D1P	Camera	MIPI_CSI_RX_D1+	1.8V
24	CSI_RX_D1N	Camera	MIPI_CSI_RX_D1-	1.8V
23	-		GND	
22	CSI_RX_D2P	Camera	MIPI_CSI_RX_D2+	1.8V
21	CSI_RX_D2N	Camera	MIPI_CSI_RX_D2-	1.8V
20	-		GND	
19	CSI_RX_CLKP	Camera	MIPI_CSI_RX_CLK+	1.8V
18	CSI_RX_CLKN	Camera	MIPI_CSI_RX_CLK-	1.8V

Lenses for testing

We plan to test the following lenses

Model	Manufactur.	Res.	Type	Mount	Sensor	HFoV	Aperture	Focal	Bk Focal	Optcl ln	M.O.D	Dimensions / Weight
M12-1.56MM-5MP	TREEYE	5.0MP	Fisheye	M12x0.5	1 / 2.5"	185°	F2.0	1.56mm	4.3mm	20.7mm	0.1m	Dia. 20* 16mm, 12g, $5, IR
M12-2.1MM-5MP-B	TREEYE	5.0MP	Fisheye	M12	1 / 2.5"	160°	F2.0	2.1mm	6.9mm	20.7mm	0.2m	Φ17.517.5, 8g, $4.2
	AIRFORTH	? MP	Wide	M8	1 / 3"	160°		2.1mm				Racing Drone $3.75
MTV-0368BF127M7	Lenspro	2 MP	Semi Wide	M7	1 / 2.7"	97°	F2.8	3.68mm	2.01mm		0.3m	TTL 9.9mm, Φ10x8.6mm, ~9%, FoV 97°/86.5°/50.5°
CCL127028PMP	TOWIN	3 MP	Pinhole	M12x0.5	1 / 2.7"	108°	F2.4	2.8mm			0.2m	TTL 12, F.O.V. 140°(D)
CA1308C	ChuangAn	MP	Wide	M8x0.5	1 / 4"	115°	F2.4	2mm	4.10mm			87° *115° *170° *12*L10.57mm

Model	Manufactur.	Res.	Type	Mount	Sensor	HFoV	Aperture	Focal	Bk Focal	Optcl In	M.O.D	Dimensions / Weight
CA1300I	ChuangAn		Wide	M7*P0.35	1 / 2.5"	115°	F2.4	2.92mm	5.26mm		0.1m	TTL:13.97mm, 71° *115° *145°, *10*L10.33mm, 5G+IR
FS2328B13M8	Focusafe	MP	Wide	M8*0.5	1 / 3"	115°	F2.8	2.3mm	5.09mm			Flange back 4.5mm, max image circle 6.4mm
HK-8244-1042-1	Guangtongd.	MP	Wide	M12*P0.5	1 / 2.7"	120°	F1.8	3.0mm	6.04mm			Flange back 5.2mm, 6G+IR
JSD2157	JSD	MP	Wide	M12x0.5	1 / 2.7"	148°	F2.0	2.35mm				6G, TTL 22mm, Lens diameter 17mm
JSD1529-A1	JSD	MP	Wide	M7*P0.35	1 / 2.7"	124°	F2.0	2.8mm	2.61mm			Diameter 10mm, TTL 11.51mm

- https://www.lensprocctv.com/3-68mm-M7-CCTV-Lens-Low-Distortion-OV2710-p.html
- https://chancctv.en.alibaba.com/product/60534477516-804927292/1_4_2mm_Board_Lens_with_DFOV_170_degree_Miniature_M8_Lens.html
- https://www.alibaba.com/product-detail/Element-6G-IR-aluminum-glass-plastic_60857424830.html?spm=a2700.wholesale.0.0.55ba6f04EWTHa0
- https://www.alibaba.com/product-detail/m12-mount-OV2735-hd-wide-angle_62351098002.html?spm=a2756.order-detail-ta-bn-b.0.0.486a2fc23vZisF
- https://www.alibaba.com/product-detail/m7-lens-camera-F2-0-diagonal_60302931327.html?spm=a2700.wholesale.0.0.2edffc19WUBCbz