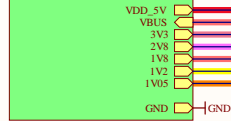


Project: *BW1098OAK*
Current Revision: *R0M0E0*

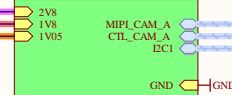
BW1098OAK Revision History:

Date	Revision	Reason for Change	Changes Implemented
10/21/2019	Initial release		
11/27/2019	BW1098OBC_R0M0E0 -> BW1098OBC_R1M0E1	1) Decoupling capacitors too close to OV9282 camera module body 2) Overlay on OV9282 camera module body too wide and should match outline of module body 3) Left/Right camera convention doesn't match verbiage in schematic	1) Moved C7, C8, C9 and C12 a bit farther from the J3 (Left) camera module. Moved C23 and C25 a bit farther away from J9 (Right) camera module. 2) Updated the overlay for right and left OV9282 camera modules so that it outlined the 3D Body layer. This should match the camera module body outline and make it easier to mount and align the modules. 3) Corrected wording
06/04/2020	BW1098OBC_R1M0E1 -> BW1098OBC_R2M0E2	1) Add ideal diodes to USB and barrel jack for OR power 2) Shutter sync config needs to be FSIN1/FSIN2 3) Need more room for labeling	1) Removed R5 and R6 0ohm 0603 resistors from barrel jack and USB power inputs and added 2x LM66100 ideal diodes to USB side and 1uF C40. 2) Removed R23 and R28 from BOM and added R24 and R26 (same PN) 3) Reduced labeling on front side to allow for stickers and future labeling
09/17/2020	BW1098OBC_R2M0E2 -> BW1098OAK_R0M0E0	1) Add IMU circuitry, configured for SPI 2) Improve ESD protection on USB 3) Aux RST circuit pads no longer needed 4) Some users accidentally plug in >5V barrel jack 5) Adjust mechanical features to fit enclosure design	1) BNO085 circuitry added, configured for 1.8V IO SPI interface w/ SPI0 bus 2) Added ESD protection on USB 3) Removed Aux RST circuit from design 4) Added 3W, 5.6V zener to design for ESD and input protection 5) Added 2.1mm locating holes on each arm, and used board-edge mounting slots rather than the existing screw mounts. These slots are board-outline-defined, so the mounting holes were deleted from the schematic.

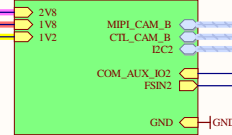
U_BW1098OAK_Power_Supply
BW1098OAK_Power_Supply.SchDoc



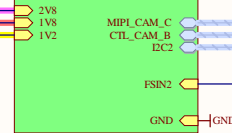
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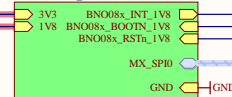
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U_BW1098OAK_RIGHT_OV9282
BW1098OAK_RIGHT_OV9282.SchDoc



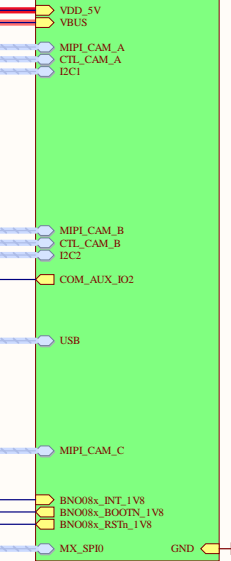
U_BW1098OAK_IMU
BW1098OAK_IMU.SchDoc



U_BW1098OAK_USB
BW1098OAK_USB.SchDoc



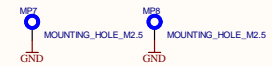
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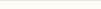


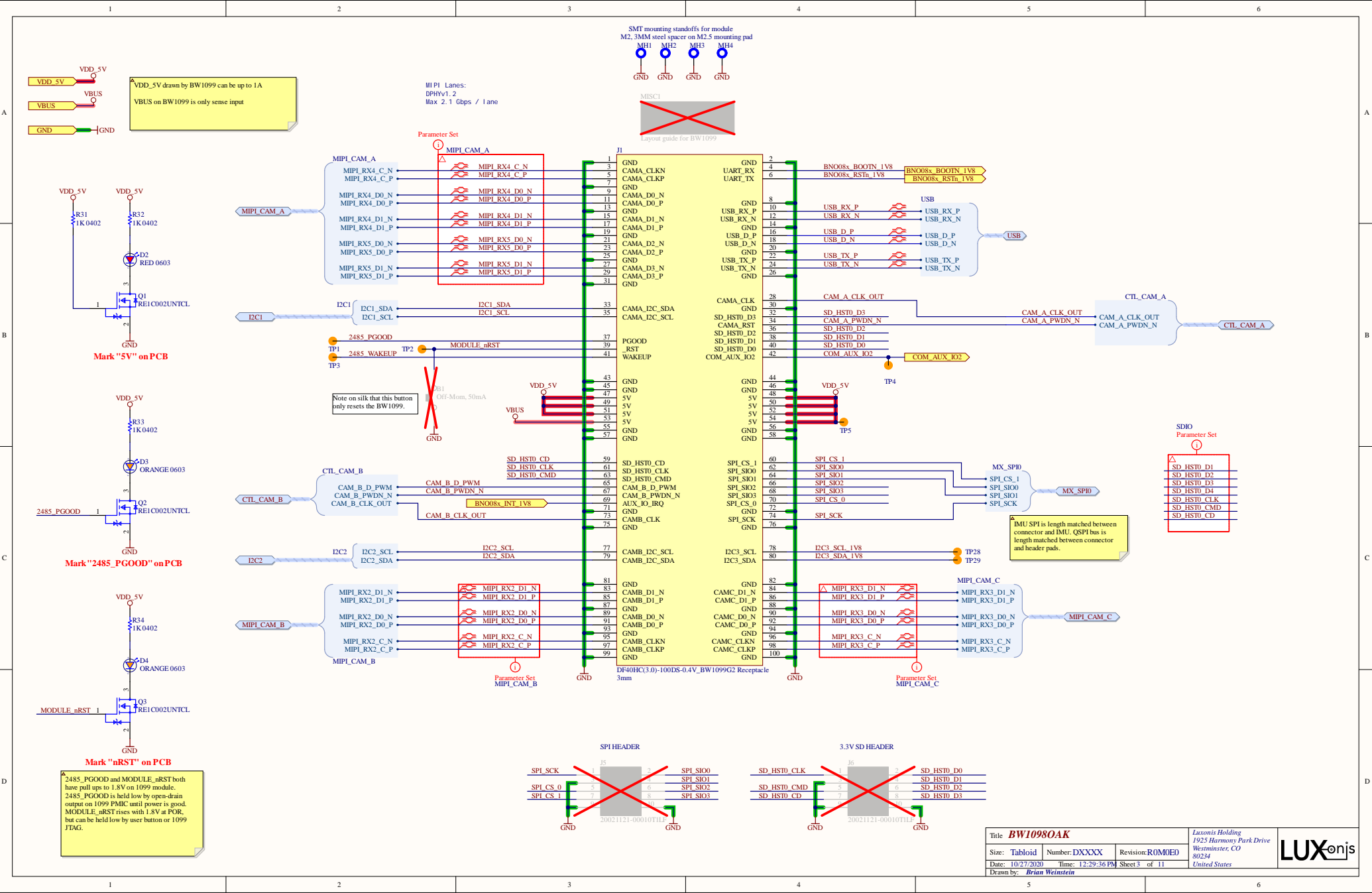
U_BW1098OAK_Project_Information
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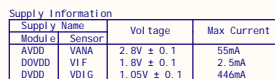
Mounting slots created on PCB
w/ primitives.



Title BW1098OAK			Luxonis Holding 1925 Harmony Park Drive Westminster, CO 80234 United States		
Size: Tabloid	Number: DXXXX	Revision: R0M0E0			
Date: 10/27/2020	Time: 12:29:36 PM	Sheet 2 of 11			
Drawn by: Brian Weinstein					



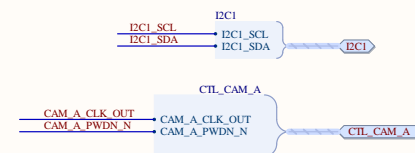
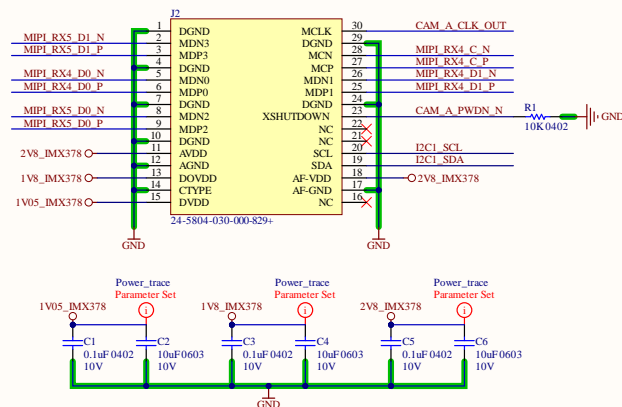


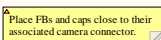


Note: It is still a limitation that the clock source for the cameras must be shared between CAMA/C and CAMB/D.

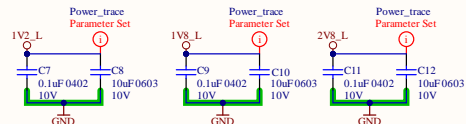
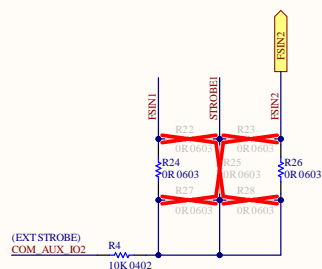
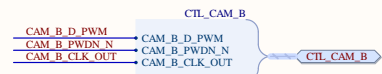
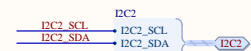
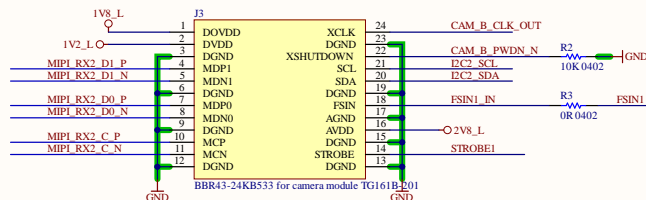


MODULE & SENSOR INFORMATION			
MODULE	A12N02A-201	12C Clock Rate	1000 kHz Max
SENSOR	1MX378-AA0H5-C	12C Address (8 bits)	0x34 (Sensor)
	12.3 Mega pixel CMOS		0x18 (VCM driver)
	1/2.3 inch		0xA0 (EEPROM driver)
MAX RESOLUTION	4056x3040	Sensor Clock Input	6 ~ 27 MHz

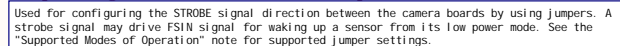




Supply Name		Voltage	Max Current
Module	Sensor		
DOVDD	VDD-I/O	1.8V	2.5mA
DVDD	VDD-D	1.2V	52mA
AVDD	VDD-A	2.8V	24mA




Jumper configuration for FSIN and STROBE pins



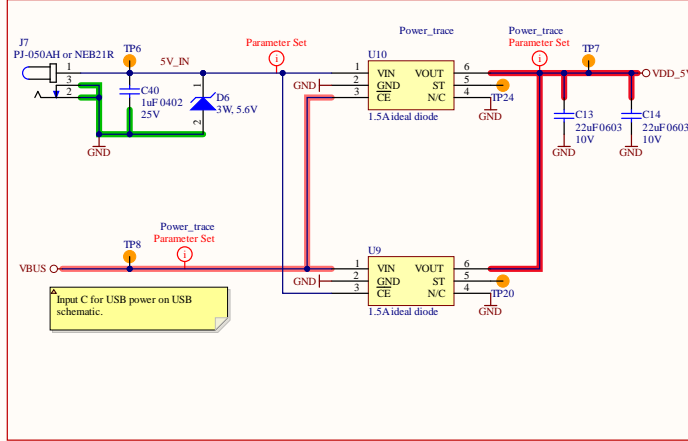
- "NO SYNC" is the mode in which none of the camera modules is excited by any strobe signal.
- "NORMAL" mode means STROBE mechanism works only among the stereo cameras themselves. In this mode, CAM1 strobe is connected to the CAM2 FSIN input.
- "TIMING CONTROLLER" mode means CAM1 STROBE signal drives the EXT_STROBE signal as well as the CAM2 FSIN input. EXT_STROBE signal circulates among the other camera ports so that one camera module can manage the timing of all cameras within the system.
- "TIMING PERIPHERAL" mode uses external strobe signal which is driven externally by another camera. In this mode, CAM1 and CAM2 are excited by the EXT_STROBE signal.

Note that, at most only one camera can be in the "TIMING CONTROLLER" mode at a time. STROBE generation and FSIN reception should be configured via software.

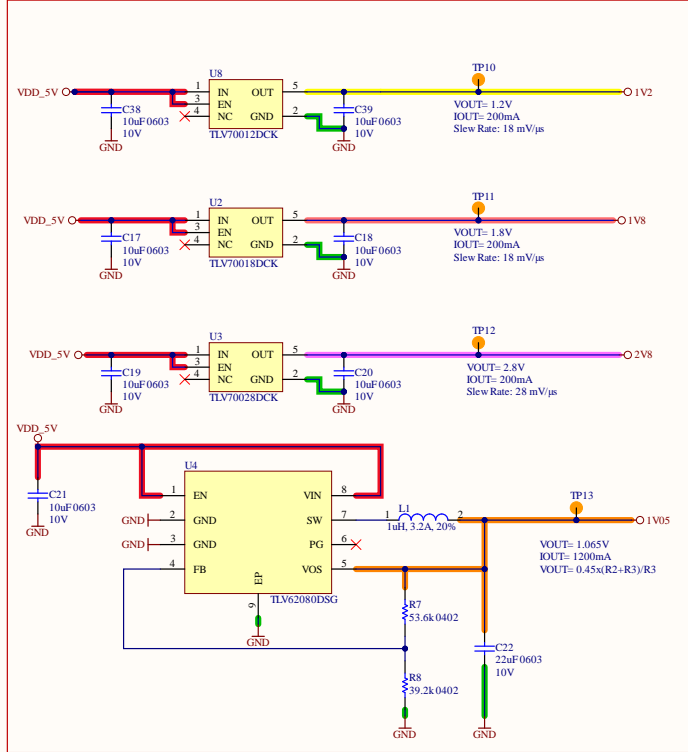
Title: BW1098OAK			<i>Luxonis Holding</i> 1925 Harmony Park Drive Westminster, CO 80234 <i>United States</i>	
Size: Tabloid	Number: DXXXX	Revision: R0M0E0		
Date: 10/27/2020	Time: 12:29:37 PM	Sheet 6 of 11		
Drawn by: Brian Weinstein				

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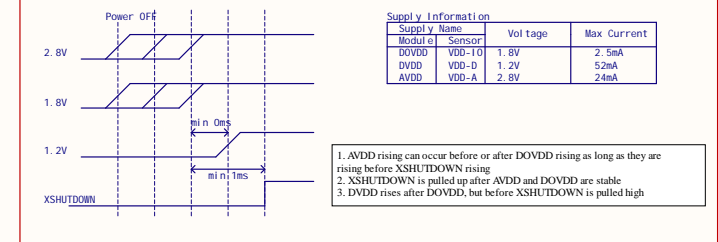
POWER INPUT



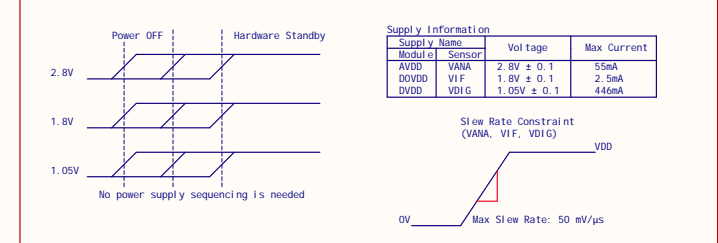
POWER SUPPLIES FOR CAMERA MODULES



OV9282 POWER REQUIREMENTS



IMX378 POWER REQUIREMENTS

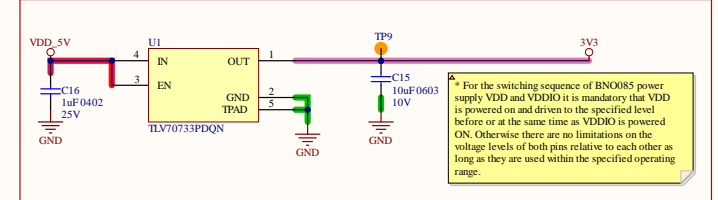


POWER SEQUENCING REQUIREMENTS:

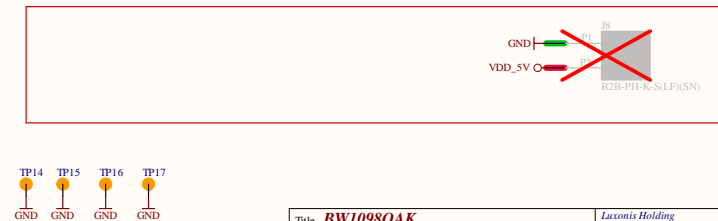
The BW1099 module handles its own power sequencing on-board.

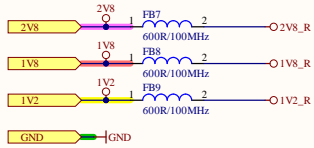
The camera modules have their own power sequencing requirements. The OV9282 have requirements for sequencing, and the IMX378 has a max slew rate requirement. See above.

3.3V USB SW POWER



FAN CONTROLLER

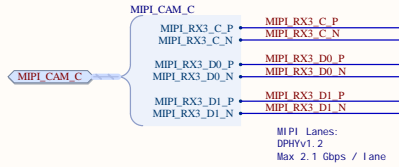




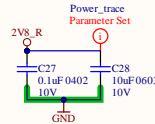
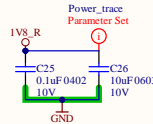
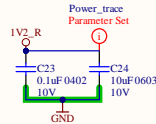
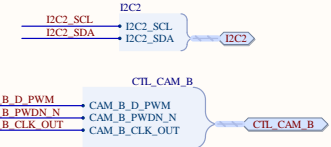
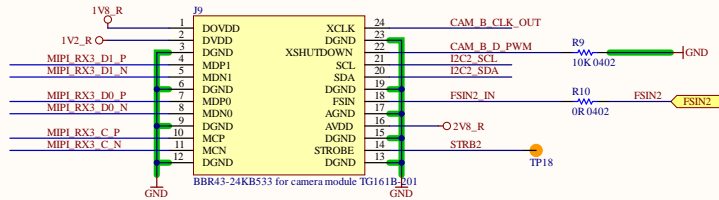
Place FBs and caps close to their associated camera connector.

MODULE & SENSOR INFORMATION			
MODULE	TG161B-201 OR AN01V32-0JG	I2C Clock Rate	400 kHz Max
SENSOR	OV9282-GA4A 8M 1 Mega pixel CMOS 1/4 inch	I2C Address (8 bits)	0xC0(W) 0xC1(R)
MAX RESOLUTION	1280X800	Sensor Clock Input	6 - 64 MHz (24 MHz typ.)

Supply Information			
Supply Name	Module	Sensor	
DOVDD	VDD-10	1.8V	2.5mA
DVDD	VDD-D	1.2V	52mA
AVDD	VDD-A	2.8V	24mA



Mark "RIGHT" on PCB.
Place so that this is the module's right camera.



Because the stereo pair of OV9282 modules hard wired to CAM_B (below) no additional reset circuitry is required to account for different conditions. This means that "CAM1" (Left) is reset via CAM_PWDN, and "CAM2" (Right), is reset via CAM_PWM. This also means that the signal CAM_AUX_101 is no longer required here, as that was only possible if the stereo pair were connected to CAM_C or CAM_D

OV9282 sensor I2C address may be changed via I2C protocol. Therefore, in order to assign different I2C address to the sensors on the same I2C bus, one needs to hold the reset the all sensors except one and assign a unique I2C address to the active sensor. This routine should be applied for all sensors in the initialization routine.

CAMERA CONNECTOR RESET CONNECTION TABLE				
CAM NO	CAMERA CONNECTOR			
	CAM_A	CAM_B	CAM_C	CAM_D
CAM 1	CAM_PWDN	CAM_PWDN	CAM_PWDN	CAM_PWDN
CAM 2	CAM_PWM	CAM_PWM	CAM_AUX_101	CAM_AUX_101

