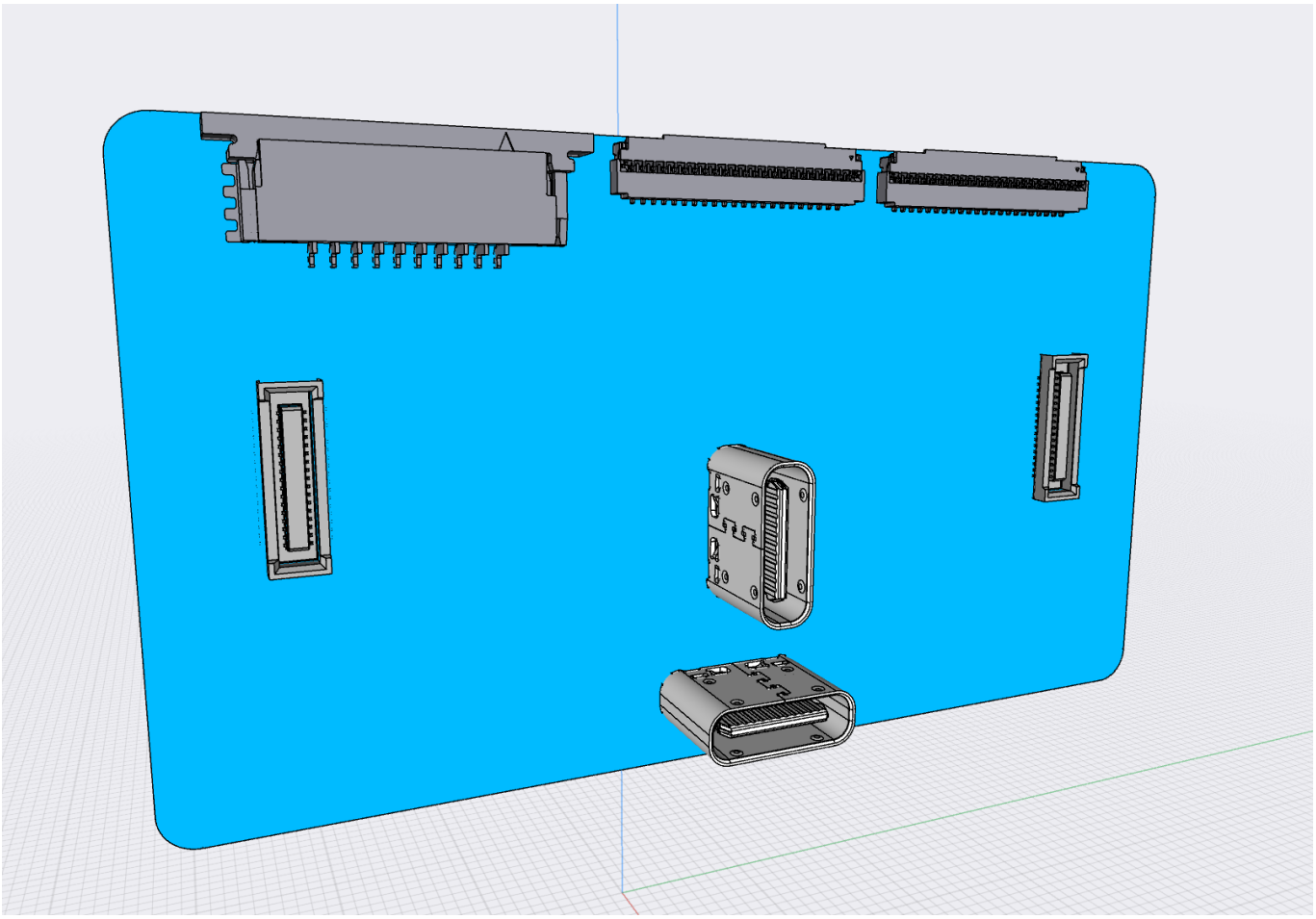
Bridge Board 909

The 909 is a Bridge Board version made for testing and experiementation with the Ziloo attachments without attaching the i.MX8 board. The setup enables connecting a Compulab SB-UCM-iMX8PLUS development board. Alternately a board like Raspberry Pi can be connected to test components via development connectors. Not all the 909 connectors will be mounted on the 801 production bridge board that mounts the i.MX8 board.

TODO

- CSI connector pin orientation
- Check if the 22 pin connectors can be bidirectional
- Extras pinouts I2S I2C
- Desiding Soldering isles
- Signal pin voltage 1.8 / 3.3
-



USB Power

If one of the USB-C connectors supplies power it is managed by the USB PD Controller circuit and routed to the 10-pin Power Connnector as VIN. The bridge board is powered via 5V and 3V3 from the 10-pin Power connector. The power connector sends the power from USB-C connectors away from the board to be used

and sent back as regulated voltages. The regulated 3V3 is downregulated to supply camera modules. The regulated 5V is used to supply attached USB devices that do not themselves provide power.

Power supply TI chipset

TPS65982 USB Type-C® and USB PD Controller, Power Switch, and High-Speed Multiplexer

The TPS65982 device is a stand-alone USB Type-C and Power Delivery (PD) controller providing cable-plug and orientation detection at the USB Type- C connector. Upon cable detection, the TPS65982 device communicates on the CC wire using the USB PD protocol. After successful USB PD negotiation is complete, the TPS65982 enables the appropriate power path and configures alternate mode settings for internal and (optional) external multiplexers.

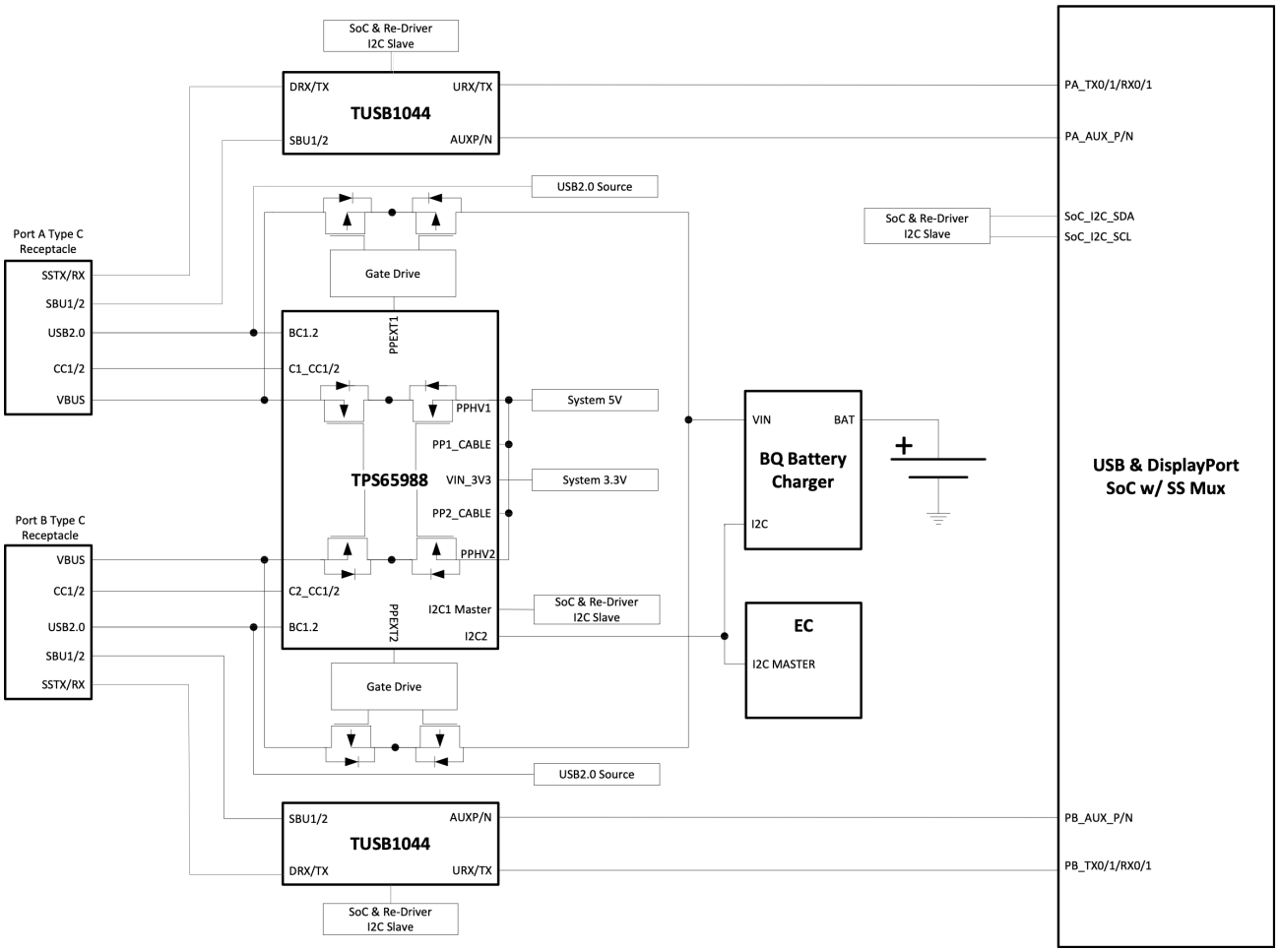


Figure 9-10. TPS65988 and SoC & Redriver I2C

A minimal version of this setup should be placed on the 909 to handle power. I.E. No TUSB1044

Handling USB Connectors

The two USB ports may power the board. The powering is negotiated and handled by by TPS65988 (in future TPS65994AE). They also deliver data lanes

Power regulators receive power from USB connectors and supply the 12V & 5V power for development carrier board. The USB-C connectors can power the carrier board 12V by upregulating, which would be done on the In-Between board.

Connectors

Connectors placed on the board are,

- 2 * Molex 22PIN 0.5mm pitch 54548-2271
- 2 * I-PEX 30PIN 0.4mm pitch 20525-030E-02
- 2 * Hirose USB-C CX80B1-24P
- 2 * TE Connectivity 45PIN 0.3MM 571-4-2328724-5 FPC 3-2328724-5 $0.41
- 2 * Hirose DF40C-34DS-0.4V (Mouser)
- 1 * TE 10PIN 1mm pitch power 84952-0

The two 100 pin Hirose connectors are not mounted but are in 3D design for reference. It will connect the MCU board on the 801.

Wiring the connectors within the board

The 22 pin connectors are connected directly to the equivalent lines on the 30 pins. The CSI lanes on 34 pins connector is connected directly to the equivalent lines on the 30 pins. This assumes that a camera is connected to either a 34 pins connector or a 22 pins connector, not both.

The data lines from the two USB-C connectors are connected to the equivalent lines on the T-USB direct connector. The Power pins on USB-C connectors go to the TPS65988 as well as VIN on 10 pins Connector. TPS65988 is fed 5V and 3V3 from the 10 pins Connector.

GND connected from everywhere as normal.

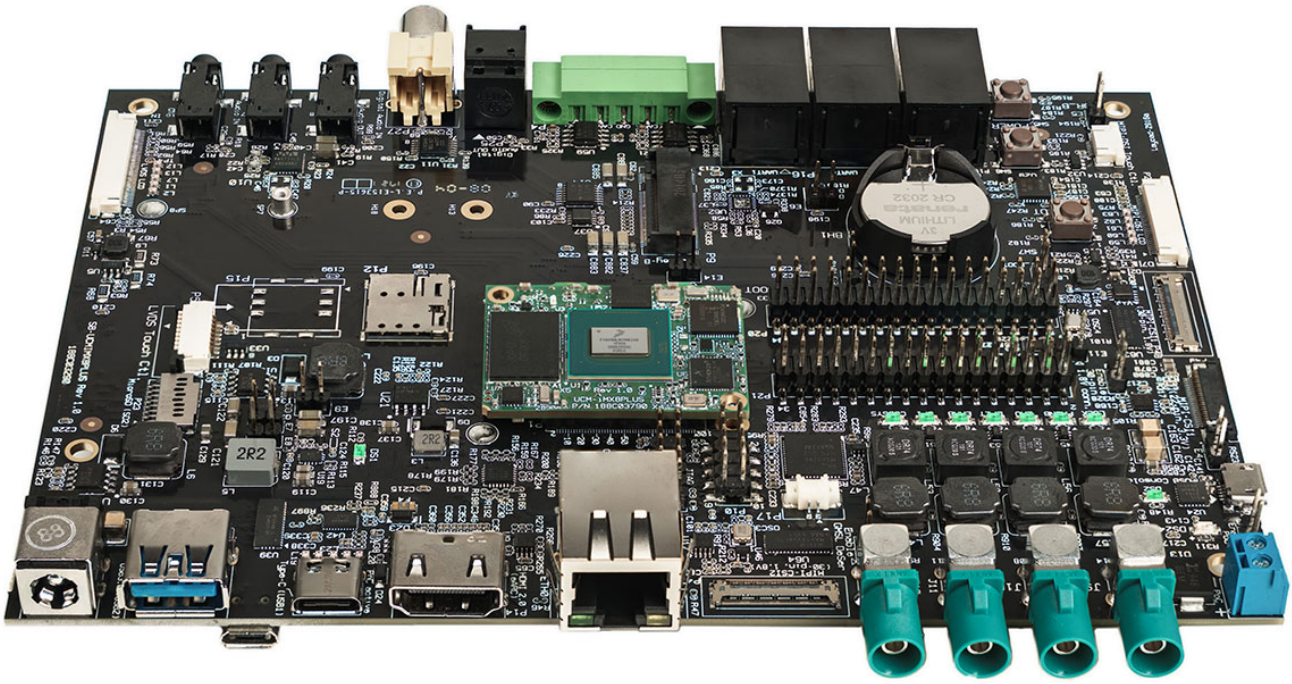
If power isn't connected over the USB-C plugs, and is power is not supplied by the 10-pin Power connector, the camera modules should be powered over the MIPI CSI connectors. In this case it should be possible to use either the 22 pin connectors or the 30 pin connectors for inputting the signal and power. This means that the 22 pin connectors can be used to input or output MIPI CSI lanes.

Soldering isles

Soldering iles allows the board connections to be tweaked by,

- Connecting I2C busses together
- Connecting I2S busses to alternate DATAx pins.

Conencting the SB-UCM-iMX8PLUS carrier board



For further details see Product Page.

- 2 * I-PEX connector directly between the two
- 2 * 45 pins connected to Inbetween-board
- 10 pins power connector to 101 Inbetween-board
- USB-C connector to model 101 Inbetween-board
- USB-A connector to model 101 Inbetween-board
- HDMI female to Inbetween-board

101 board breaks up 45 pins to be bridged to Misc connector and USB-C connectors

In revision B the Host connector is alternately used to carry HDMI instead of connecting to Bluetooth/Wifi connectivity.

(801 Board will have V_SYS power input of 3.6V - 4.4V potentially from battery)

USB-C to USB-C connector mapping

Two USB-C connectors are arranged in a T shape and the normal way to use it is with a combined connector attached. This means that the wires will normally be connected in a particular orientation. The system takes advantage of this by detecting when both USBs are connected in the normal arrangement.

The USB connectors are named H (Host) and O (OTG). Host is the top of the T, OTG is the vertical base. To specify a specific pin H or O is prefixed I.E. OTX1+, HSBU2.

Where possible data pins are not combine but carried through individually.

The GND/VBUS pins are connected to the power charging circuit as normal. The system should accept charging power from either connector.

No.	Pin	Description	To
1	A1	GND	
2	A2	TX1+	T-USB direct, do not combine
3	A3	TX1-	T-USB direct, do not combine
4	A4	VBUS	
5	A5	CC1	TPS65988
6	A6	D+	TPS65988 & T-USB direct
7	A7	D-	TPS65988 & T-USB direct
8	A8	SBU1	T-USB direct
9	A9	VBUS	TPS65988 & Power regulators
10	A10	RX2-	T-USB direct, do not combine
11	A11	RX2+	T-USB direct, do not combine
12	A12	GND	
13	B1	GND	
14	B2	TX2+	T-USB direct, do not combine
15	B3	TX2-	T-USB direct, do not combine
16	B4	VBUS	TPS65988 & Power regulators
17	B5	CC2	TPS65988
18	B6	DX+	TPS65988 & T-USB direct, do not combine
19	B7	DX-	TPS65988 & T-USB direct, do not combine
20	B8	SBU2	T-USB direct
21	B9	VBUS	TPS65988 & Power regulators
22	B10	RX1-	T-USB direct, do not combine
23	B11	RX1+	T-USB direct, do not combine
24	B12	GND	

The USB Type-C connector has 24 pins. Figures 1 and 2, respectively, show the pins for the USB Type-C receptacle and plug.

 USB-C Receptacle Figure 1. The USB Type-C receptacle. Image courtesy of Microchip.

 USB-C Plug Figure 1. The USB Type-C plug. Image courtesy of Microchip.

For later revision

Only **one side** of the connectors are connected to the matching USB connector that leads to the Dev Board.

The following pins are connected to the extras connector: TX2+, TX2-, SBU1, SBU2, RX-, RX1+, DX+, DX-

The following pins are treated as normally USB-C connection pins: A1-A7, A9-A12, B5.

Board Power 10 pins Connector

No.	Pin	Description
1		Reserved
2	5V	Board Power 5V
3		Reserved
4	3V3	Board Power 3.3V
5	GND	GND
6	GND	GND
7	GND	GND
8	VIN	VIN
9	VIN	Voltage Input from USB-C
10	VIN	VIN

T-USB direct connector

This connector(only on the 909 model) enables experimentation with alternate modes and directional pins.

Pin	Code	Description
1	GND	
2	HSBU1	Host alt SBU1
3	HSBU2	Host alt SBU2
4	GND	
5	HD+	Host alt D+
6	HD-	Host alt D-
7	GND	
8	HDX+	Host alt DX+
9	HDX-	Host alt DX-
10	GND	
11	HTX1+	Host alt TX1+

Pin	Code	Description
12	HTX1-	Host alt TX1-
13	GND	
14	HTX2+	Host alt TX2+
15	HTX2-	Host alt TX2-
16	GND	
17	HRX2-	Host alt RX2-
18	HRX2+	Host alt RX2+
19	GND	
20	HRX1-	Host alt RX1-
21	HRX1+	Host alt RX1+
22	GND	
23	OSBU1	OTG alt SBU1
24	OSBU2	OTG alt SBU2
25	GND	
26	OD+	OTG alt D+
27	OD-	OTG alt D-
28	GND	
29	ODX+	OTG alt DX+
30	ODX-	OTG alt DX-
31	GND	
32	OTX1+	OTG alt TX1+
33	OTX1-	OTG alt TX1-
34	GND	
35	OTX2+	OTG alt TX2+
36	OTX2-	OTG alt TX2-
37	GND	
38	ORX2-	OTG alt RX2-
39	ORX2+	OTG alt RX2+
40	GND	
41	ORX1-	OTG alt RX1-

Pin	Code	Description
42	ORX1+	OTG alt RX1+
43	GND	

Extras connector

Pin	Code	Description
1	LCAM_FSIN	Left Frame sync input
2	LCAM_STROBE	Left Frame sync output
3	LCAM_RESET	Camera Reset, Active Low (RSTB)
4	LCAM_PWRDN	Camera Power Down
5	LCAM_EXTCLK	Left External Clock Input (MCLK)
6	LATT_INT	Left Interrupt Attached Sensor, Active L
7	LATT_XSHUT	Left Attached Sensor XSHUTDOWN
8	L_AF_PWM	PWM Motor control
9		Reserved
10		Reserved
11	LCAM_FSIN	Left Frame sync input
12	LCAM_STROBE	Left Frame sync output
13	LCAM_RESET	Camera Reset, Active Low (RSTB)
14	LCAM_PWRDN	Camera Power Down
15	LCAM_EXTCLK	Left External Clock Input (MCLK)
16	LATT_INT	Left Interrupt Attached Sensor, Active L
17	LATT_XSHUT	Left Attached Sensor XSHUTDOWN
18	L_AF_PWM	PWM Motor control
19		Reserved
20		Reserved
21	BCLK / SCK	Bit clock line
22	WS / LRCLK	Word clock line
23	SDATA1	Input data 1
24	SDATA2	Input data 2 (NC)
25	SDATA3	Input data 3 (NC)

Pin	Code	Description
26	SDATA4	Input data 4 (NC)
27	PD_I2C1_SCL	I2C1_SCL(pullup resistor 2.2K)
28	PD_I2C1_SDA	I2C1_SDA(pullup resistor 2.2K)
29	PD_I2C2_SCL	I2C2_SCL(pullup resistor 2.2K)
30	PD_I2C2_SDA	I2C2_SDA(pullup resistor 2.2K)
31	GND	
34	GND	
37	GND	
40	GND	
43	GND	

HDMI connector mapping (future rev B)

The HDMI signal from the i.MX8 board is mapped to USB-C. While providing HDMI Ziloo cannot be connected to

USB4 support (future rev C)

- Use Texas Instruments TPS65994AD to route thunderbolt

USB Interface IC Dual port USB Type-C and USB PD controller with integrated source power switches 48-VQFN -40 to 125

Temporary stop for Thunderbolt 4 and USB 4 on Intel's Tiger Lake?

RPI FPC 22 pins

Raspberry Pi connectors

- 1-7342485-5 TE Connectivity 15 pins vertical Pi Board A/B
- 54548-2271 Molex 22 pins Right angle Pi Zero & Compute module
- SFW15R-2STE1LF Amphenol FCI 15 pins Right angle Camera Module

Pin	Code	Type	Details	Voltage
1	GND	Power	Ground	
2	CAM_D0_N	Data	MIPI Data Lane 0 Negative	
3	CAM_D0_P	Data	MIPI Data Lane 0 Positive	
4	GND	Power	Ground	
5	CAM_D1_N	Data	MIPI Data Lane 1 Negative	

Pin	Code	Type	Details	Voltage
6	CAM_D1_P	Data	MIPI Data Lane 1 Positive	
7	GND	Power	Ground	
8	CAM_CK_N	Data	MIPI Clock Lane Negative	
9	CAM_CK_P	Data	MIPI Clock Lane Positive	
10	GND	Power	Ground	
11	CAM_D2_N	Data	MIPI Data Lane 2 Negative	
12	CAM_D2_P	Data	MIPI Data Lane 2 Positive	
13	GND	Power	Ground	
14	CAM_D3_N	Data	MIPI Data Lane 3 Negative	
15	CAM_D3_P	Data	MIPI Data Lane 3 Positive	
16	GND	Power	Ground	
17	CAM_IO0	Power	Power Enable	
18	CAM_IO1	LED	LED Indicator	
19	GND	Power	Ground	
20	SCL	I2C	I2C SCL	
21	SDA	I2C	SCCB serial Interface data IO	
22	VCC	Power	3.3V Power Supply	

NVIDIA FPC 30 pins

The connector is an I-PEX type 20525-030E-02 with 0.4mm pitch & 30 pins. Data pins are 1.8V level.

Pin	Code	Details
1	CAM_3V3	3.3V Power Input
2	CAM_3V3	
3	CAM_1V8	1.8V Power Input
4	GND	
5	GND	
6	PWR DWN	
7	I2C SCL	
8	I2C SDA	
9	GND	

Pin	Code	Details
10	CSI D2-	
11	CSI D2+	
12	TRIGGER	
13	MCLK	
14	Reserved	
15	CSI D1-	
16	CSI D1+	
17	GND	
18	GND	
19	CSI D0-	
20	CSI D0+	
21	RESET	
22	GND	
23	Reserved	
24	CSI CLK-	
25	CSI CLK+	
26	GND	
27	CSI D3-	
28	CSI D3+	
29	Flash	
30	Reserved	

Refs

- https://www.leopardimaging.com/product/accessories/cables/faw-1233-03/
- https://www.mouser.com/datasheet/2/233/LI-TX1-CB-6CAM_datasheet-1395894.pdf
- https://connecttech.com/ftp/pdf/ASG006_Spacely.pdf
- https://www.i-pex.com/product/cabline-ca

Ziloo Camera Module 34 pin connector

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

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)	
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

Pin	Code	Type	Details	Voltage
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