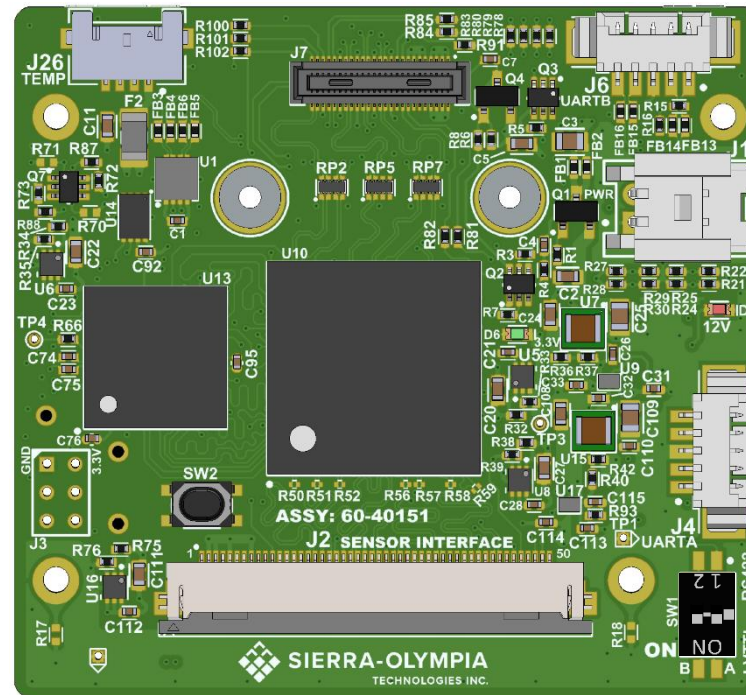



REVISIONS				
REV	DESCRIPTION	ECO	DATE	Eng.
A	Initial Release	1942	2026-02-13	GO

MIPI-USB Adapter Mezzanine Header Electrical ICD

The MIPI-USB Adapter (or MUAD) converts Parallel CMOS video from a sensor to either MIPI CSI-2 or USB UVC video. Additionally, it provides a variety of ways to communicate with the Sensor, Lens, and Shutter over UART or I2C. The MUAD Base Board has a 50 pin Mezzanine Header that allows custom boards to break out the desired output formats.

SOTI has developed a variety of Mezzanine Boards but also offers a base Altium Project to help customers to quickly develop their own custom Mezzanine Boards; contact SOTI Engineering for access to Altium Project. This document outlines the available options for Mezzanine boards from SOTI, as well as a guide to aid in designing a custom Mezzanine board.




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	20-70108 EICD, MUAD Mezzanine Header	
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SOTI Mezzanine Board Offerings

SOTI offers a variety of Mezzanine board to meet different standard compatibility interfaces.

SOTI will also design mezzanine boards to meet customer needs and will offer them as custom, or as standard products that will be added to this table.

Mezzanine Board Part Number	Description	Pinout Compatibility	Status
60-40152	4-Lane MIPI 28-Pin Bottom Contact FFC	Basler MIPI Interface, same-side cable contacts	In Production
60-40160	2-Lane MIPI 15-Pin Bottom Contact FFC	Rasp. Pi, Jetson Nano, Jetson Xavier NX, etc. using same-side cable contacts	In Production
60-40174	2-Lane MIPI 15-Pin Top Contact FFC	Rasp. Pi, Jetson Nano, Jetson Xavier NX, etc. using opposite-side cable contacts . Compatible with 15-pin to 22-pin FPC adapters (Rasp. Pi to Pi-zero/Pi 5 adapter pinouts).	In Production

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Basler 4-Lane MIPI Interface

60-40152 28-Pin Bottom Contact FFC

J13 - 28-Pin Bottom Contact FFC

Molex 525592852, 28-pos, 0.5mm pitch, FFC connector, Au plating

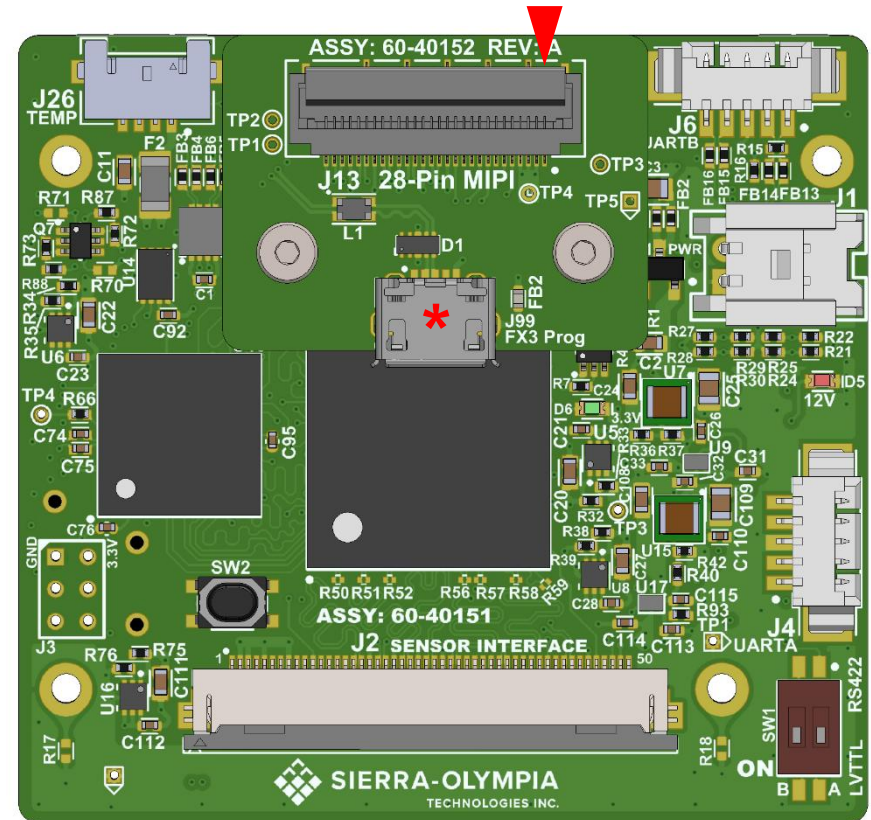
cam_rst and **mipi_gpio** signals include 100Ω series isolation.

cam_rst includes an internal 20kΩ pull-down resistor.

I2C lines do NOT have pullup resistors.


Position	Name	Direction	Level / Rating
1	GND	-	-
2	5V MEZ Power Input	Power Input	4.5 - 5.5V
3			Reverse Polarity
4			Protected
5	mipi_gpio2 - 1.8V	I/O	1.8V
6	mipi_gpio1 - 1.8V	I/O	(-0.3 - 2.1V)
7	GND	-	-
8	i2c_sda - 1.8V	I/O	1.8V
9	i2c_scl - 1.8V	Input	(-0.3 - 2.1V)
10	GND	-	-
11	mipi_gpio0 - 1.8V	I/O	1.8V
12	cam_rst - 1.8V	Input (pd)	(-0.3 - 2.1V)
13	GND	-	-
14	mipi_data0_n	Output	1.8V
15	mipi_data0_p		(-0.3 - 2.1V)
16	GND	-	-
17	mipi_data1_n	Output	1.8V
18	mipi_data1_p		(-0.3 - 2.1V)
19	GND	-	-
20	mipi_clk_n	Output	1.8V
21	mipi_clk_p		(-0.3 - 2.1V)
22	GND	-	-
23	mipi_data2_n	Output	1.8V
24	mipi_data2_p		(-0.3 - 2.1V)
25	GND	-	-
26	mipi_data3_n	Output	1.8V
27	mipi_data3_p		(-0.3 - 2.1V)
28	GND	-	-

Caution: Exceeding Max Ratings could cause damage to components.



LEGEND: ► Position 1 indicator.

* J99 USB2 Micro is for programming FX3 and will not provide power to the system.

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2-Lane MIPI Interface

60-40160 15-Pin Bottom Contact FFC

J13 - 15-Pin Bottom Contact FFC

Molex 0522711569, 15-pos Bottom Contact, 1mm pitch, FFC connector

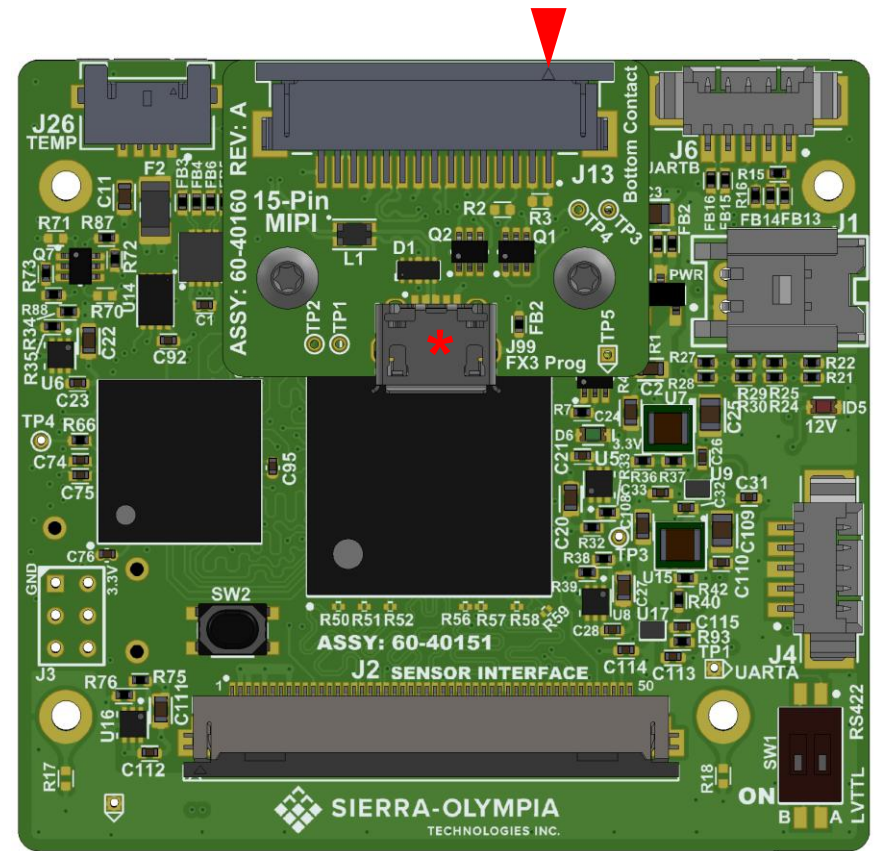
3.3V Power Input is required for level shifting of IO on pins 2-5.

FFC options: Molex 0150390842, 6" Opposite Side Contacts
Molex 0150390843, 6" Same Side Contacts

CAUTION: Use of Same Side or Opposite Side FFC is up to the user to determine. Check FFC pinout on Camera and Host side prior to applying power. Ensure that 3.3V and GND are not shorted.


Position	Name	Direction	Level / Rating
1	3.3V Power Input	Input	3.3V +/-5%
2	i2c_sda - 3.3V	I/O	3.3V
3	i2c_scl - 3.3V	Input	(-0.3 - 3.6V)
4	mipi_gpio0 - 3.3V	I/O	3.3V
5	cam_rst - 3.3V	Input	(-0.3 - 3.6V)
6	GND	-	-
7	mipi_clk_p	Output	1.8V
8	mipi_clk_p		(-0.3 - 2.1V)
9	GND	-	-
10	mipi_data1_p	Output	1.8V
11	mipi_data1_n		(-0.3 - 2.1V)
12	GND	-	-
13	mipi_data0_p	Output	1.8V
14	mipi_data0_n		(-0.3 - 2.1V)
15	GND	-	-

Caution: Exceeding Max Ratings could cause damage to components.



LEGEND: ► Position 1 indicator.

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2-Lane MIPI Interface

60-40174 15-Pin Top Contact FFC

J13 - 15-Pin Top Contact FFC

TE 1-84953-5, 15-pos Top Contact, 1mm pitch, FFC connector

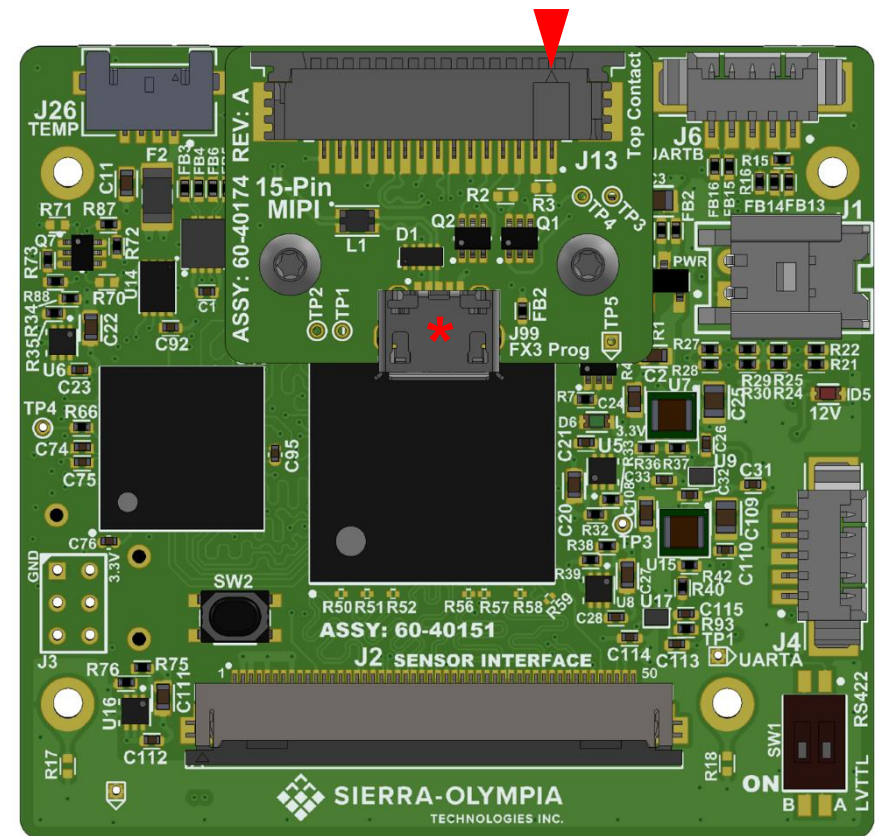
3.3V Power Input is required for level shifting of IO on pins 2-5.

FFC options: Molex 0150390842, 6" Opposite Side Contacts
Molex 0150390843, 6" Same Side Contacts

CAUTION: Use of Same Side or Opposite Side FFC is up to the user to determine. Check FFC pinout on Camera and Host side prior to applying power. Ensure that 3.3V and GND are not shorted.


Position	Name	Direction	Level / Rating
1	3.3V Power Input	Input	3.3V +/-5%
2	i2c_sda - 3.3V	I/O	3.3V
3	i2c_scl - 3.3V	Input	(-0.3 - 3.6V)
4	mipi_gpio0 - 3.3V	I/O	3.3V
5	cam_rst - 3.3V	Input	(-0.3 - 3.6V)
6	GND	-	-
7	mipi_clk_p	Output	1.8V
8	mipi_clk_p		(-0.3 - 2.1V)
9	GND	-	-
10	mipi_data1_p	Output	1.8V
11	mipi_data1_n		(-0.3 - 2.1V)
12	GND	-	-
13	mipi_data0_p	Output	1.8V
14	mipi_data0_n		(-0.3 - 2.1V)
15	GND	-	-

Caution: Exceeding Max Ratings could cause damage to components.



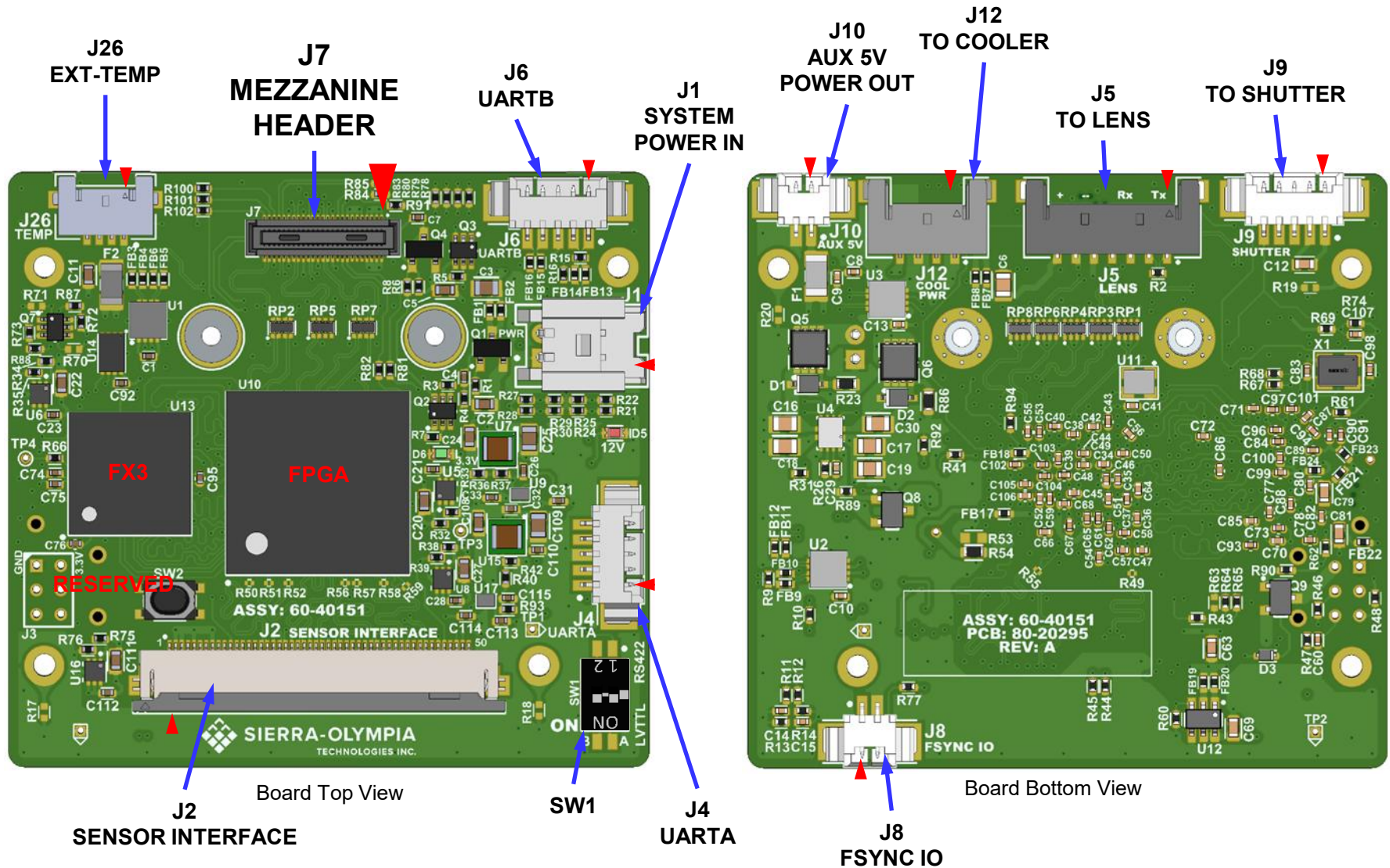
LEGEND: ► Position 1 indicator.

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MUAD Connectors

LEGEND: ▶ Position 1 indicator.



This ICD only covers the J7 Mezzanine Header. Usage of other connectors on the MUAD board is outlined in EICDs for each camera assembly. This image is intended for reference only.

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Mezzanine Header Pinout


J7 - MEZZANINE HEADER

Connector: Hirose DF40C(2.0)-50DS-0.4V(51)

Mating Connector: Hirose DF40C-50DP-0.4V(51)

Pin#	Name	Direction	Level / Rating	Pin#	Name	Direction	Level / Rating
1	12V_MEZ_IN	Input	12.0V (9.0V - 14.0V) Reverse Polarity Protected	2	5V_MEZ_IN	Input	5.0V (4.5V - 5.5V) Reverse Polarity Protected
3	12V_MEZ_IN			4	5V_MEZ_IN		
5	12V_MEZ_IN			6	5V_MEZ_IN		
7	12V_MEZ_IN			8	5V_MEZ_IN		
9	MEZ_PWR_RETURN	-	GND	10	GPIO0	IO	1.8V (-0.3 - 2.1V)
11	MEZ_PWR_RETURN			12	GPIO1	IO	
13	MEZ_PWR_RETURN			14	GPIO2	IO	
15	MEZ_PWR_RETURN			16	I2C_SDA	IO	
17	USB_VBUS	Input	5.0V / (4.0V - 6.0V)	18	I2C_SCL	Output	
19	GPIO4	IO	1.8V / (-0.3 - 2.1V)	20	GPIO3	IO	
21	GND	-	-	22	GND	-	-
23	USB_HS_N	IO	Max DC 3.6V	24	MIPI_CSIO_LANE0_N	Output	1.8V (-0.3 - 2.1V)
25	USB_HS_P			26	MIPI_CSIO_LANE0_P		
27	GND	-	-	28	GND	-	-
29	USB_SSRx_N	Input	Max DC 1.2V AC coupled	30	MIPI_CSIO_LANE1_N	Output	1.8V (-0.3 - 2.1V)
31	USB_SSRx_P			32	MIPI_CSIO_LANE1_P		
33	GND	-	-	34	GND	-	-
35	USB_SSTx_N	Output	Max DC 1.2V AC coupled	36	MIPI_CSIO_CLK_N	Output	1.8V (-0.3 - 2.1V)
37	USB_SSTx_P			38	MIPI_CSIO_CLK_P		
39	GND	-	-	40	GND	-	-
41	Lens_UART_Tx	Output	3.3V (-0.3 - 3.6V)	42	MIPI_CSIO_LANE2_N	Output	1.8V (-0.3 - 2.1V)
43	Lens_UART_Rx	Input		44	MIPI_CSIO_LANE2_P		
45	BOARD_ID_0	Input	Do not connect	46	GND	-	-
47	BOARD_ID_1			48	MIPI_CSIO_LANE3_N	Output	1.8V (-0.3 - 2.1V)
49	BOARD_ID_2			50	MIPI_CSIO_LANE3_P		

- MIPI output format is configurable through the I2C interface.
- UART on pins 41/43 and GPIO functions are configurable through the I2C interface.
- Refer to SOTI Document 10-80217 for all I2C configuration options.

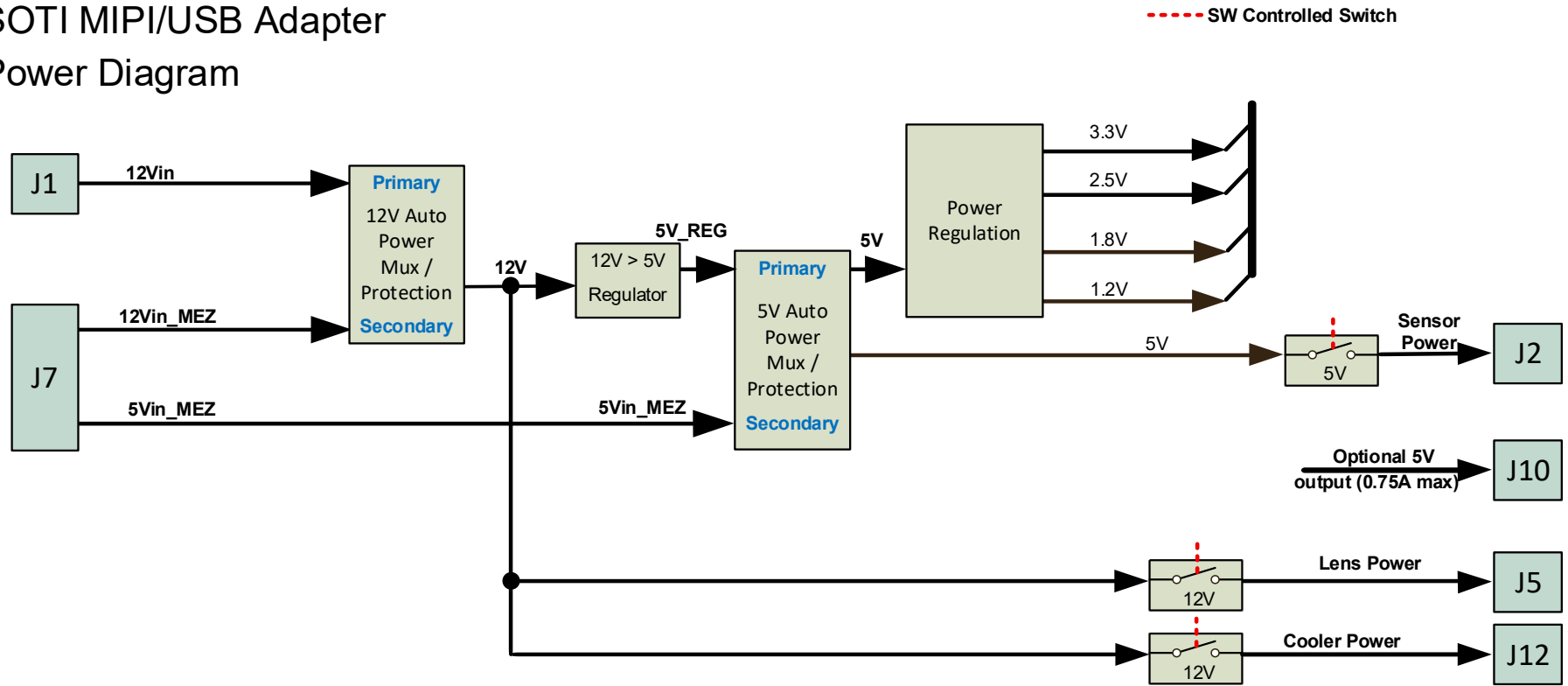
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Caution: Exceeding Max Ratings could cause damage to components.

MUAD Power Architecture

- The MUAD board is designed to run from one single supply, either 12V or 5V, depending on the sensor attached.
 - For example, the Ventus Micro requires a 12V supply as the lens and cooler require 12V.
 - Sensors with no lens motors or cooler could use either a 12V or 5V supply.
- Additionally, power can be supplied at multiple locations. The picture below illustrates the power architecture.
- Power switching to the Sensor, Lens, and Cooler are individually controlled through I2C commands.

SOTI MIPI/USB Adapter Power Diagram



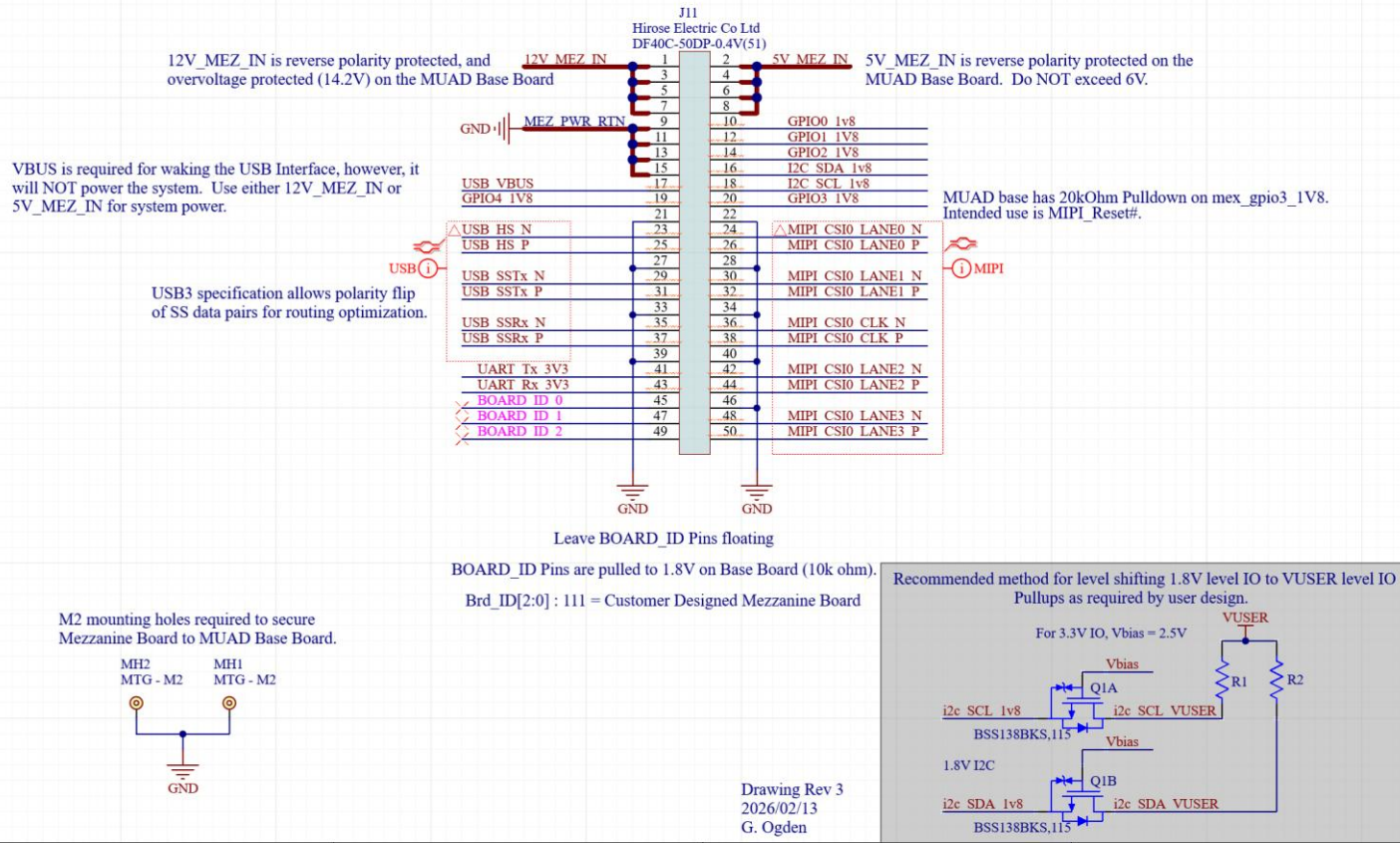
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Mezzanine Board Schematic Guide

The MIPI-USB Adapter (or MUAD) is a SOTI designed system to convert Parallel CMOS or Camera Link LVDS video from a sensor to either MIPI CSI-2 or USB UVC video. Additionally it provides a variety of ways to communicate with the Sensor, Lens, and Shutter over UART or I2C. The MUAD Base Board has a 50 pin Mezzanine Header that allows custom boards to break out the desired output formats. SOTI has developed a variety of Mezzanine Boards, but also offers this base Altium Project to help customers to quickly develop their own custom Mezzanine Boards.

Mezzanine Header

J11, MH1, and MH2 locations are fixed in the layout.



Schematic from Altium Project.
Contact SOTI Engineering for access to Altium Project.

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EICD, MUAD Mezzanine Header

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