



Technical Details

# MIPI Adapter Board 1.30

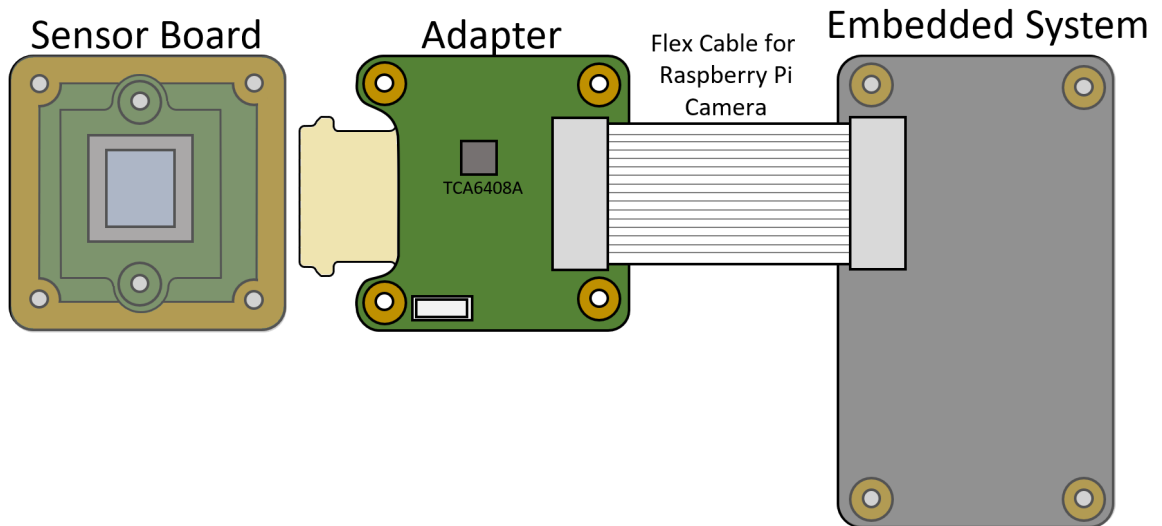


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## 1 Introduction

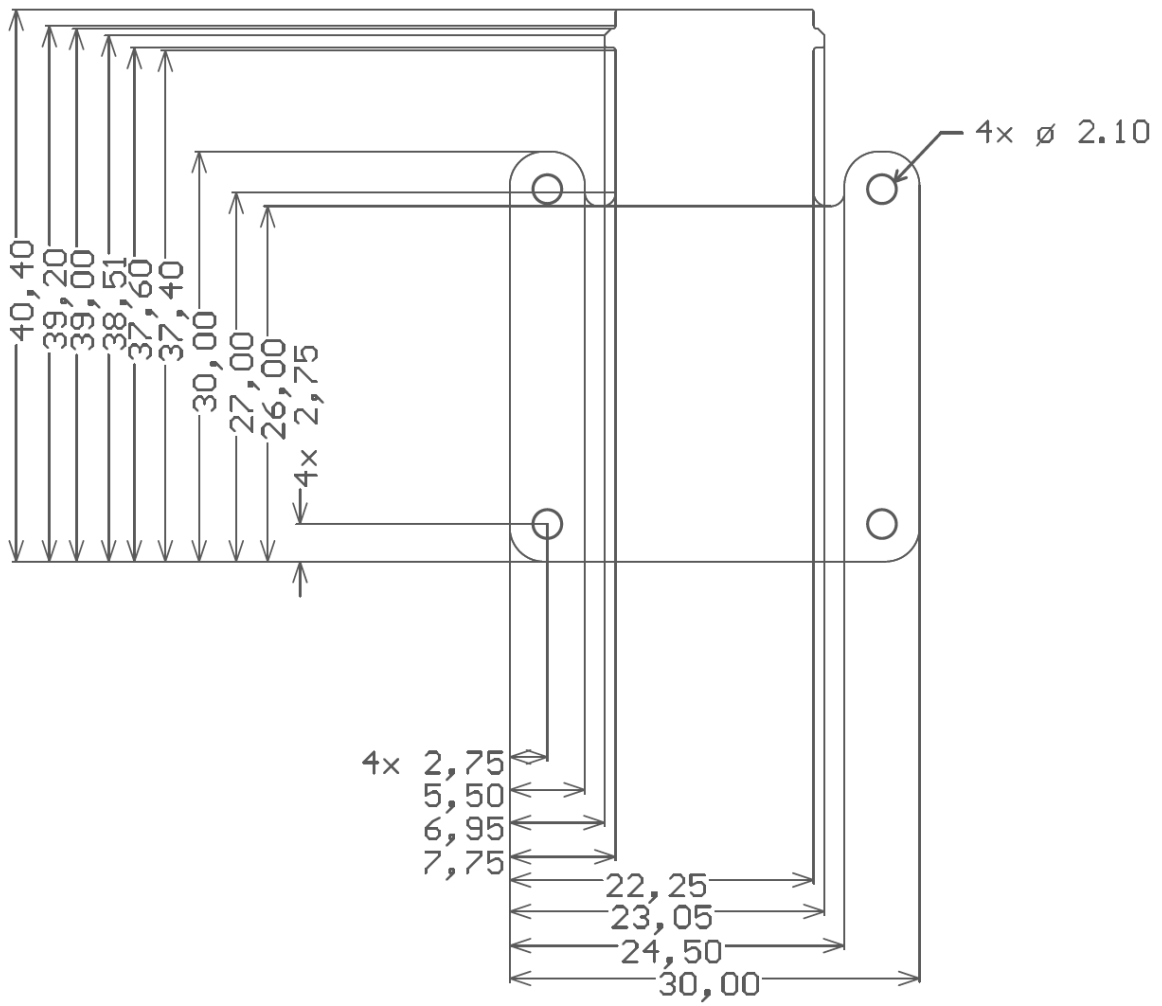
The TISMIPI sensor adapter can be used to connect any TISMIPI sensor board (camera-side FH28D connector) to the Development Kits for NVIDIA® Jetson Nano™ or Raspberry Pi (platform-side FPC Connector 1-1734248-5). The adapter's aspect ratio is based on the TISMIPI serializer board. The connection of these components is shown below:





## 2 TISMIPI Sensor Adapter Rev 1.30

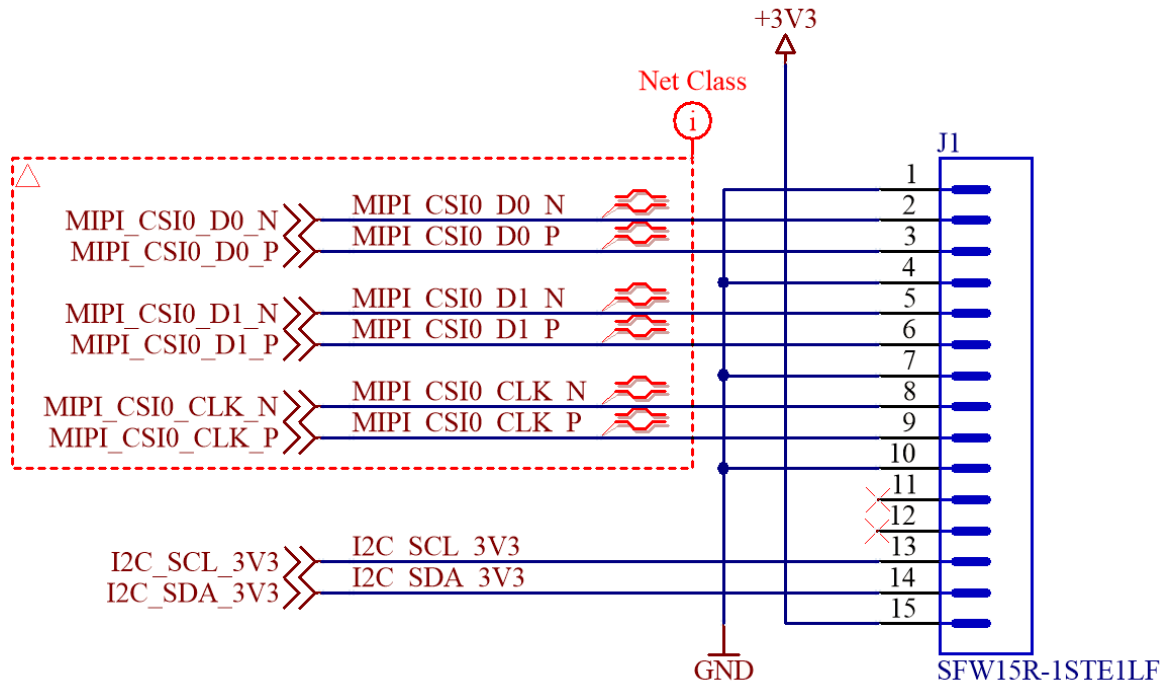
The dimensions of the TISMIPI sensor adapter board are shown below:





## 2.1 Connectors Pinout

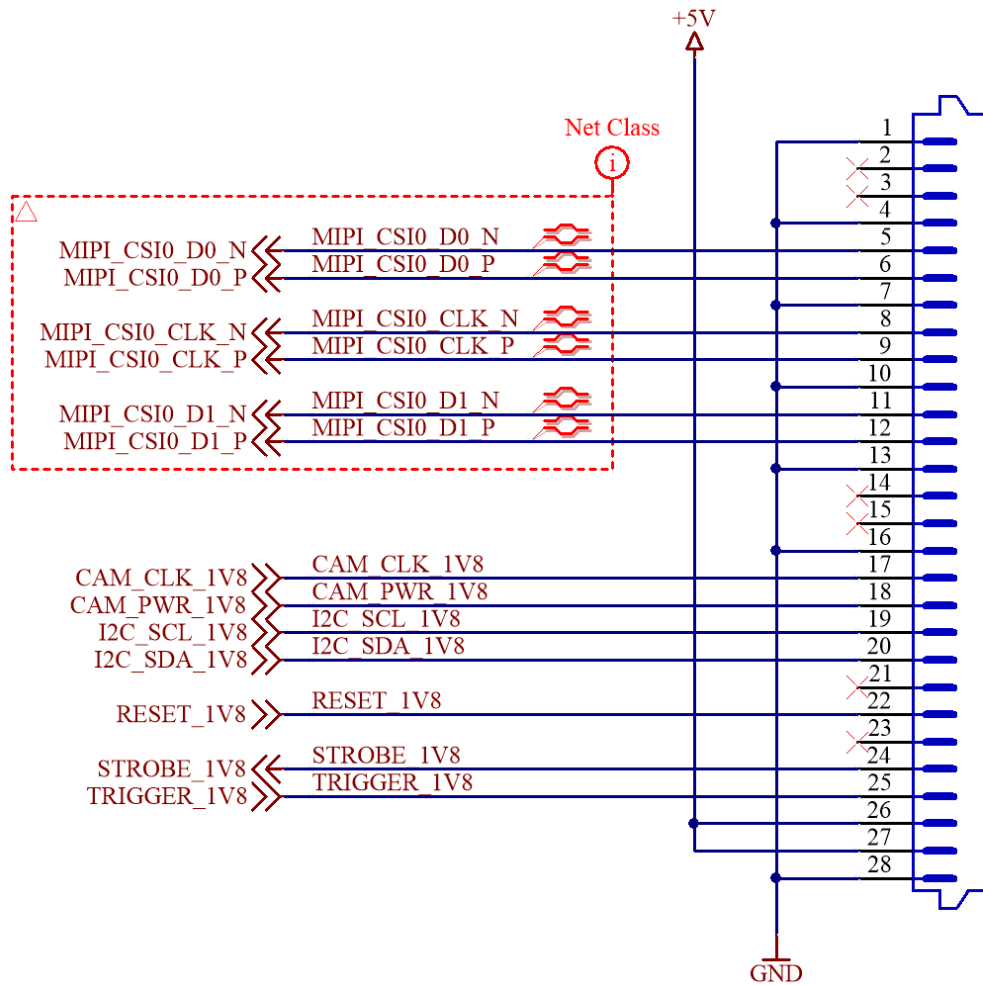
The connector J1 (SFW15R-1STE1LF) has the same pinout as the NVIDIA Jetson Nano camera interface:



The I2C-bus signals have the I/O voltage of 3.3V.



The flex cable connection with stiffener has the same pinout as the TISMIPI serializer board:



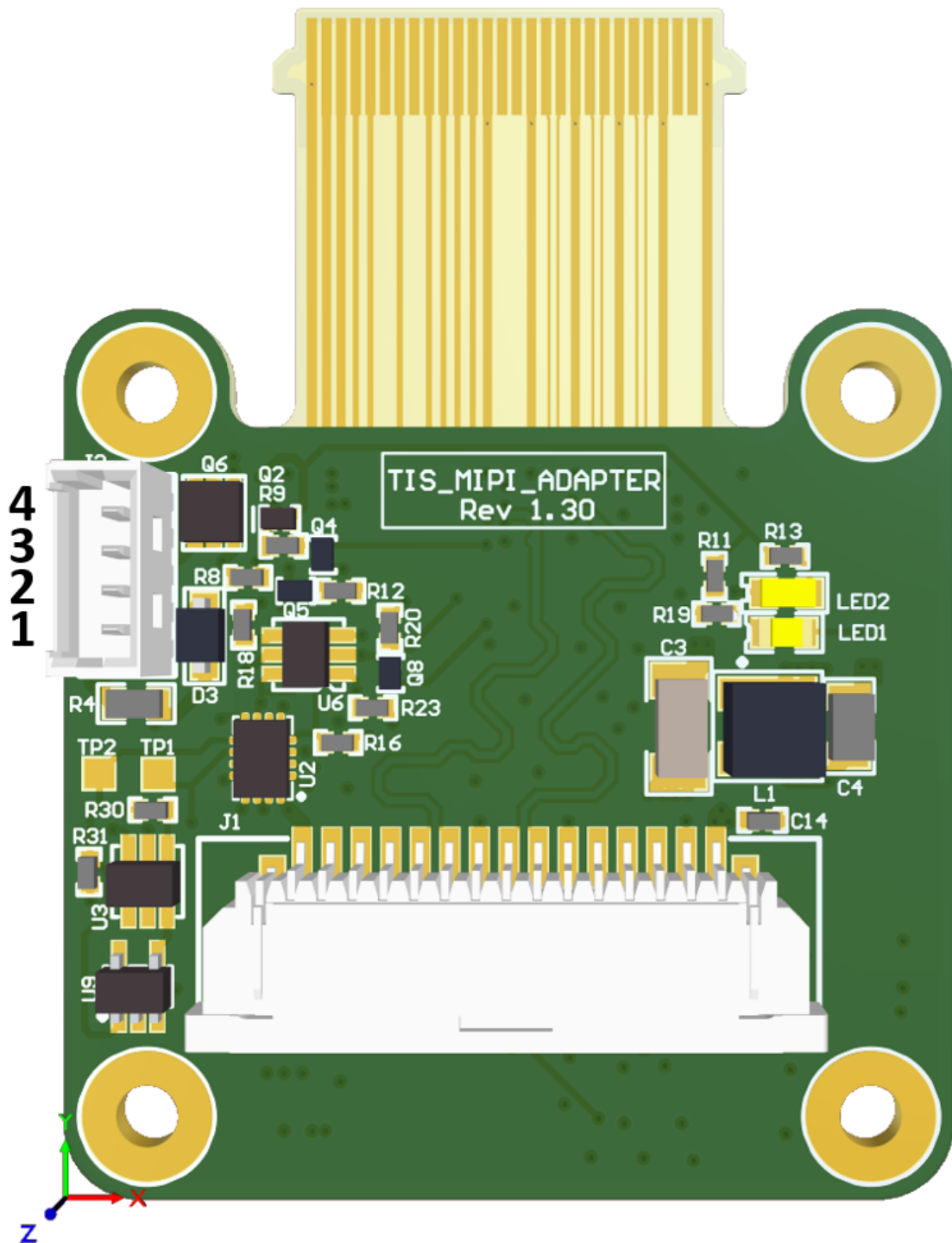
#	Name	Type	Description
1	GND	GND	Ground
2	NC	-	---
3	NC	-	---
4	GND	GND	Ground
5	MIPI_CSIO_D0_N	I	MIPI CSI-2 input
6	MIPI_CSIO_D0_P	I	MIPI CSI-2 input
7	GND	GND	Ground



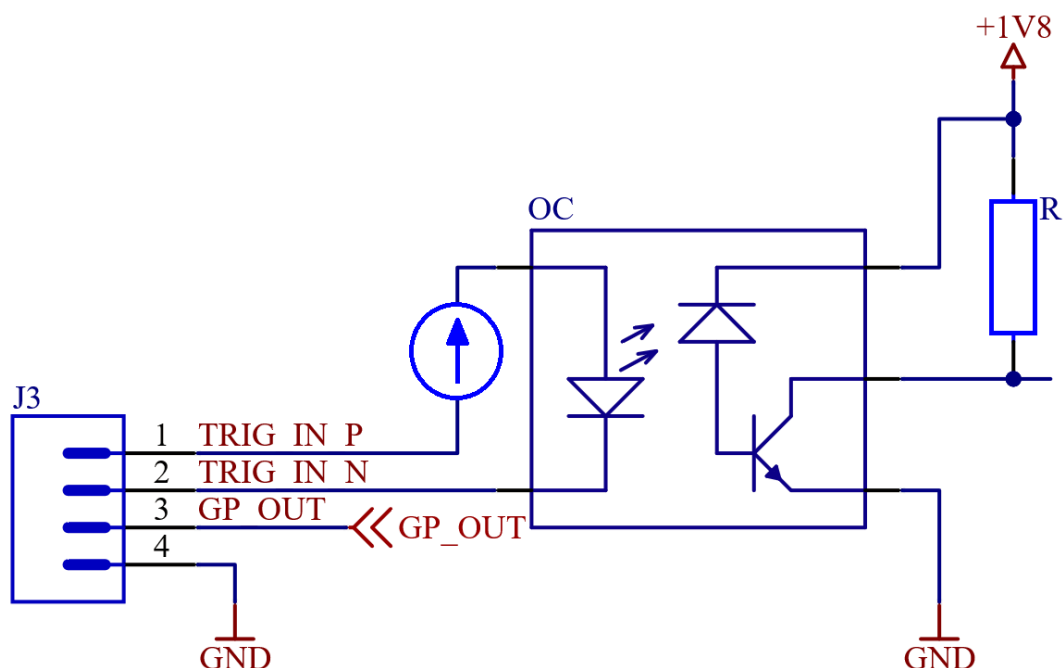
#	Name	Type	Description
8	MIPI_CSI0_CLK_N	I	MIPI CSI-2 input
9	MIPI_CSI0_CLK_P	I	MIPI CSI-2 input
10	GND	GND	Ground
11	MIPI_CSI0_D1_N	I	MIPI CSI-2 input
12	MIPI_CSI0_D1_P	I	MIPI CSI-2 input
13	GND	GND	Ground
14	NC	-	---
15	NC	-	---
16	GND	GND	Ground
17	CAM_CLK_1V8	O	Reference clock output
18	CAM_PWR_1V8	O	High active camera power enable signal
19	I2C_SCL_1V8	I/O	I2C serial clock
20	I2C_SDA_1V8	I/O	I2C serial data
21	NC	-	---
22	RESET_1V8	O	Reset sensor to default state when low
23	NC	-	---
24	STROBE_1V8	I	CMOS sensor strobe signal input
25	TRIGGER_1V8	O	Trigger signal output
26	+5V_VDD	PWR	5V ( $\pm 10\%$ ) power supply
27	+5V_VDD	PWR	5V ( $\pm 10\%$ ) power supply
28	GND	GND	Ground



The serializer also has a user GPIO connector J3 with the following pinout:







Pin	Name	Description
1	TRIGGER_IN_P	Opto-decoupled trigger input, anode of IR-LED
2	TRIGGER_IN_N	Opto-decoupled trigger input, cathode of IR-LED
3	GP_OUT	General purpose output, referenced to GND
4	GND	System ground

The user GPIO connector is a Molex PicoBlade connector 53047-0410. The mating part for cable assembly is 510210400.

The trigger input is opto-decoupled. To drive the trigger input, voltage must be applied to pins 1 and 2. Note: pin 1 is the positive input; pin 2 is the negative input.

Pin 3 is a general-purpose output pin that can be controlled via software. The pin can be configured for TTL mode output or open drain output. LED2 indicates a possible overcurrent.

The recommended operating conditions of the user GPIO connector J3 are displayed in the following tables. CAUTION: Functional operation beyond the recommended operating conditions is not assumed.

Parameter	Min	Max
Trigger input voltage	3.3V ± 5%	24V ± 5%

Parameter	Min	Max
TTL-mode high voltage	-	250mA @ 4V
TTL-mode low voltage	-	250mA @ 0.05V



Parameter	Min	Max
Open-drain-mode voltage	-	24V
Open-drain-mode current	-	200mA

Please ensure that enough additional power is provided via the embedded system to operate the connected devices at the user GPIO connector (J3).



## 2.2 I/O Signals on Flex Cable Connection

Because the camera interface of NVIDIA Jetson Nano/Raspberry Pi do not have enough I/Os, the control signals are connected on the I2C I/O expander TCA6408A (Texas Instruments). The following table shows the I/O signals on the flex cable connection and their description:

Pin	Name	Dir	Description	Pin at TCA6408A
18	CAM_PWR	O	Camera power enable, active high	Pin 2 (P0)
19	I2C_SCL	I/O	I2C-Bus, Clock	Pin 12
20	I2C_SDA	I/O	I2C-Bus, Data	Pin 13
21	NC	---	---	---
22	RESET	O	Sensor reset signal, active low	Pin3 (P1)
23	NC	---	---	---
24	STROBE	I	Sensor strobe signal	Pin 10 (P7)
25	TRIGGER	O	Sensor trigger signal	---

All I/Os have the same I/O voltage of 1.8V.



## 2.3 I2C I/O Expander Configuration

The I/O expander TCA6408A has the 7-bit I2C-address 0x20. The table below depicts which signals can be controlled through this expander:

I/O Pin	Name	Dir	Description
P0	CAM_PWR	O	Enable CMOS sensor power supply 0: Sensor power disabled 1: Sensor power enabled
P1	RESET	O	CMOS sensor reset signal 0: Sensor is in reset state 1: Sensor is in operational state
P2	GPOUT_LEVEL	O	If GPOUT_SELECT = 0: --->0: LED1 off --->1: LED1 on If GPOUT_SELECT = 1: --->0: GPOUT is low/0V --->1: GPOUT is tri-stated or high/+5V (depends on the setting of P3)
P3	GPOUT_PUSHPULL	O	GPOUT (PicoBlade) type selection 0: GPOUT is configured as open-drain-output 1: GPOUT is configured as TTL/push-pull-output
P4	GPOUT_SELECT	O	Function of GPOUT (PicoBlade) Pin 0: STROBE from sensor board 1: GPOUT_LEVEL value
P5	TRIGGER_LEVEL_SELECT	O	Controls the polarity of the trigger input on the PicoBlade connector. 0: Trigger signal is not inverted 1: Trigger signal is inverted
P6	TRIGGER_SOURCE_SELECT	O	Trigger signal selection 0: Software trigger mode --->If TRIGGER_LEVEL_SELECT = 0: ----->Trigger signal is high --->If TRIGGER_LEVEL_SELECT = 1: ----->Trigger signal is low 1: External trigger mode Trigger input from PicoBlade connector is used
P7	STROBE	I	Strobe signal from CMOS sensor



## 2.4 On-board LEDs

There are two, status LEDs on the adapter board:

Name	Color	Description
LED1	Green	Controlled through GPOUT_LEVEL (P2) on the I/O expander
LED2	Red	Indicates overcurrent flowing out of GP_OUT in TTL/push-pull mode.

## 2.5 Sensor Clock Configuration

The frequency of sensor clock can be configured through the clock generator Si5356A with the I2C address 0x70 (7-bit). The input clock of Si5356A is originally connected on CLKIN (pin 4) with the crystal OSC SG-210STF (25MHz). The generated frequency is output at CLKA0 (pin 25). The manufacturer's Clock Builder software tool can be used to generate the required settings.

For more information about Si5356A, please refer to the datasheet:

<https://www.silabs.com/documents/public/data-sheets/si5356a-datasheet.pdf>



## MIPI Adapter Board

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All weights and dimensions are approximate. Unless otherwise specified, the lenses shown in the context of cameras are not shipped with these cameras.

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