



# 96Boards Consumer Edition

## *Camera Module Interface Addendum*

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# Introduction

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This document details the recommended size and pinout information for connection of a MIPI Camera Serial Interface (CSI) camera module to 96Boards Consumer Edition hardware. The document lists the signals that shall be on the connector, but it leave the actual selection of connector open.

## Available Camera Interface Support

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In the current 96Boards CE specification up to two MIPI-CSI2 interfaces may be provided on the high speed expansion bus via the 60 Pin High Speed Expansion Connector with 0.8mm 50ohm high speed receptacle. This is listed in Table 1 below.

One or two MIPI CSI-2 ports may be provided on the expansion bus interface. If one port is provided, it shall be located on the CSI0 port interface. From 1-4 lanes may be implemented on the CSI0 port interface. From 1-2 lanes may be implemented on the CSI1 port interface.

An implementation may support dual (stereo) cameras through the CSI interface(s) if the SoC provides the necessary functionality.

Cameras/Sensors can require additional control signals including RST, PWRDN and MCLK. Separate signals are available for these functions.

Signal	Description	V	Type	Spec.	If not used
CSI[0-1]_C[+-]	Differential CSI Clock	1.2V	Output	Optional	NC
CSI[0-1]_D[0-1][+-]	Differential CSI data channel	1.2V	IO	Optional	NC
CSI0_D[2-3][+-]	Differential CSI data channel	1.2V	IO	Optional	NC

**Table 1: MIPI-CSI2 Pins on High Speed Expansion Connector**

## Constraints

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The signal through the MIPI-CSI2 is a low-level signal (100mV at 1.5GHz) and has tight impedance and length matching requirements.

For the intended camera module, a flexible cable is often required as developers need to be able to direct the camera field of view to where it is required in the system.

A high resolution MIPI camera supporting up to four data lanes is supported.

# Recommendations for Camera Connector

If a direct camera cable connection is supported on a 96Boards product, including on mezzanines and modules, it is **strongly recommended** that the connector meet the following specifications. This will enable interoperability of camera modules designed for the 96Boards ecosystem. Note that software support will be required for any particular 96Boards processor product and camera module.

- Connection type - the connection **shall** be made using a 30 pin FFC with a 0.5mm pin pitch. The board designer is free to choose the actual connector, but should ensure that technical requirements for impedance, speed etc. required by the board design are met. An example connector is: [Omron XF3M-3015-1B](#). Many other options are available from multiple manufacturers.
- The FPC finger location shall follow definition (PIN 1 location) specified in below drawing

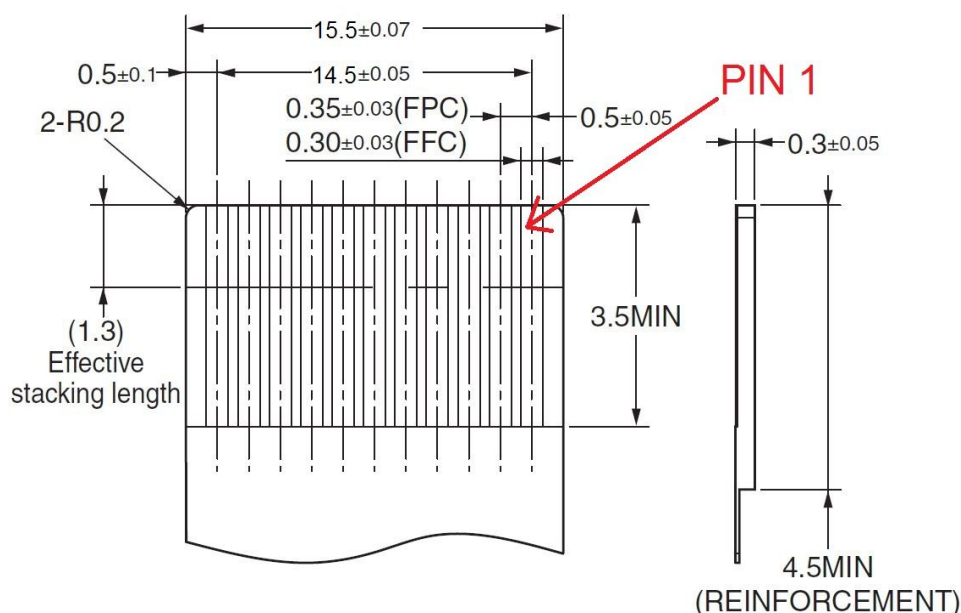


Table 2 below shows the required pinout for the connector.

- All logic signals are specified as 1.8V levels
- CSI signals are at MIPI PHY levels

CSI Connector Pin	CSI Connector Pin name	96Boards H.S. Connector Interface (for reference only)	Notes
1	GND	GND (crosstalk isolation)	
2	CSI0_CN0	CSI0_C-	
3	CSI0_CP0	CSI0_C+	

4	GND	GND (crosstalk isolation)	
5	CSI0_DN1	CSI0_D1-	Used by 2+ lane cameras
6	CSI0_DP1	CSI0_D1+	
7	GND	GND (crosstalk isolation)	
8	CSI0_DN0	CSI0_D0-	
9	CSI0_DP0	CSI0_D0+	
10	GND	GND (crosstalk isolation)	
11	CSI0_MCLK	CSI0_MCLK	
12	VGND	GND (SCL/MCLK isolation)	Or 3.3V*
13	CSI0_SCL	I2C2_SCL	
14	CSI0_SDA	I2C2_SDA	
15	CSI0_STANDBY	GPIO_J(for CSI0, camera 0)/GPIO_L(for CSI1, camera 1)	
16	GND	GND	
17	5.0V	5.0V	Max 200mA
18	GND	GND (return for 5.0V)	
19	LED_FLASH	GPIO_A	LED Flash
20	CSI0_RESET	GPIO_I (for CSI0, camera 0)/GPIO_K(for CSI1, camera 1)	
21	1.8V	1.8V	Max 50mA
22	DC_IN	12V ** Supply for LED Flash or IR LEDs	96Boards DC_IN, nominal +12V
23	GND	GND (return for 12V)	
24	GND	GND (crosstalk isolation)	
25	CSI0_DP2	CSI0_D2+	Used by 3 lane cameras
26	CSI0_DN2	CSI0_D2-	
27	GND	GND (crosstalk isolation)	
28	CSI0_DP3	CSI0_D3+	



29	CSI0_DN3	CSI0_D3-	Used by 4 lane cameras
30	GND	GND (crosstalk isolation)	

**Table 2: CSI Connector Pinout for 1 to 4-lane interface to camera modules**

- \* Virtual ground pin, optional 3.3V supply. Please note this PIN is not to be connected directly to GND on the camera Mezzanine board to prevent possibility of shorting of a power supply to GND.
- \*\* Flash consumes a high current for a very short amount of time, resulting in noise on the power line. Additional filtering is recommended.
- \*\* On board DC\_IN provides voltage ranges from 6.5 - 18V (may vary from boards). In cases the range is not supported, DC-DC converter might be required to produce regulated 12V supply.

-----SPECIFICATION ADDENDUM ENDS-----