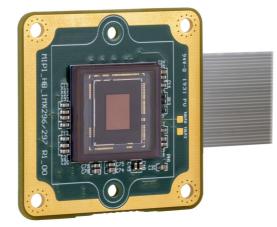


Technical Details



DMM 36MX296-ML



Table of Contents



1.	Quick Facts 3					
2.	Electrical Characteristics	5				
2.:	1 Absolute Maximum Ratings	5				
2.2	2 Recommended Operating Conditions	5				
3.	Dimensional Diagrams	6				
3.:	1 DMM 36MX296-ML Board Camera	6				
4.	Spectral Characteristics	7				
4.:	1 Spectral Sensitivity - IMX296LQR-C	7				
5.	Connector Description	8				
6.	CSI Lane Configurations	11				
7.	I2C Devices	12				
8.	Programming the Image Sensor	13				
8.	1 Input Clock	13				
8.	2 Power-up Sequence	13				
8.	Further Assistance					



1 Quick Facts

General				
Dynamic Range	10 bit			
Resolution	1440x1080			
Frame Rate at Full Resolution	60			
Pixel Formats	10-Bit Monochrome			

Optical Interface				
Sensor Type	Sony IMX296LQR-C			
Shutter Type	Global			
Sensor Format	1/2.9 inch			
Pixel Size	3.45 µm			

Electrical Interface

Interface	The Imaging Source MIPI CSI-2 Sensor Board Connector
Number of active CSI lanes	1
Supply voltage	5V (±10%)
Current consumption	approx 185 mA @ 5 VDC

Mechanical Data	
Dimensions	H: 30 mm, W: 30 mm, L: 5.45 mm
Mass	4 g

Adjustments	
Shutter	1 µs to 1 s
Gain	0 dB to 48 dB

Quick Facts



Environ	mental

Temperature (operating)

Temperature (storage)

Humidity (operating)

Humidity (storage)

-5 °C to 45 °C -20 °C to 60 °C 20 % to 80 % (non-condensing) 20 % to 95 % (non-condensing)



2 Electrical Characteristics

2.1 Absolute Maximum Ratings

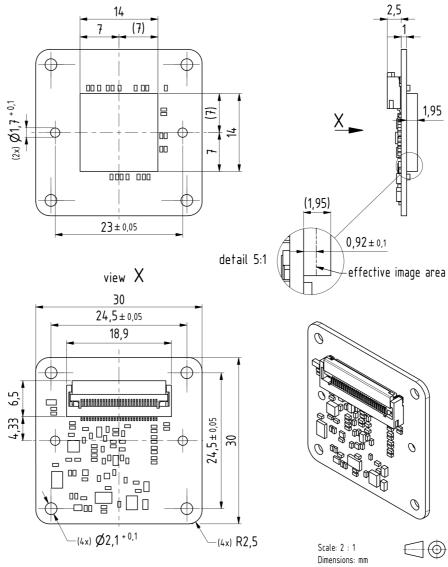
Item	Symbol	Pins	Min	Max	Unit
Supply voltage	V_IN	+5V_VDD	-0.3	+6.0	V
I/O voltage	V_10	CAM_PWR RESET CLK STROBE TRIGGER	-0.3	+2.1	V
I2C voltage	V_12C	I2C_SCL I2C_SDA	-0.3	+2.1	V

2.2 Recommended Operating Conditions

Item	Symbol	Pins	Min	Тур	Max	Unit
Supply voltage	V_IN	+5V_VDD	4.5	5.0	5.5	V
I/O voltage	V_IO	CAM_PWR RESET CLK STROBE TRIGGER	1.7	1.8	1.9	V
I2C voltage	V_12C	I2C_SCL I2C_SDA	1.7	1.8	1.9	V



- **3** Dimensional Diagrams
- 3.1 DMM 36MX296-ML Board Camera



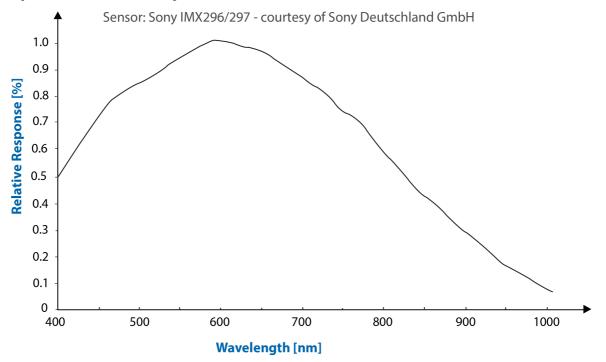
Tolerances: DIN ISO 2768-m 289-20-0-02-00

Spectral Characteristics



4 Spectral Characteristics

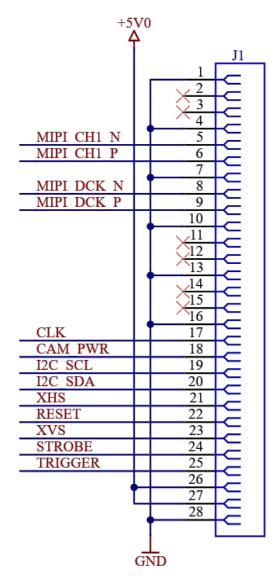
4.1 Spectral Sensitivity - IMX296LQR-C





5 Connector Description

The DMM 36MX296-ML sensor board is connected to the system via the *The Imaging Source MIPI CSI-2 Sensor Board Connector*.





1GNDGNDGround2-NC-3-NC-4GNDGNDGround5MIPLCH1,MOMIPLCSI-2 output6MIPLCH1,MOMIPL CSI-2 output7GNDGNDGround8MIPL,DCK,MOMIPL CSI-2 clock9MIPL,DCK,MOMIPL CSI-2 clock10GNDGNDGround11-NC-12GNDNC-13GNDGNDGround14-NC-15-NC-16GNDGNDGround17CLKNC-18GNDGround19ICLS,CLIDGround10SCSLID-11SCSLID-12SCSLID-13GNDGround14SCSLID-15-NC-16GNDGND-17SCSLID-18CRSLID-19ICLSCLID-10ICLSCLID11SCSLID12SCSLID13RESERVED_2ID14SCRNEID15STROBEID16STROBEID17SCSLID18RESERVED_2 </th <th>#</th> <th>Name</th> <th>Туре</th> <th>Description</th>	#	Name	Туре	Description
3-NC4GNDGNDGround5MIPI_CH1_NOMIPI CSI-2 output6MIPI_CH1_POMIPI CSI-2 output7GNDGNDGround8MIPI_DCK_NOMIPI CSI-2 clock9MIPI_DCK_POMIPI CSI-2 clock10GNDGNDGround11-NC-12-NC-13GNDGNDGround14-NC-15GNDGNDGround16GNDGNDGround17CLKNC-18GNDGNDGround19ICANC-10GNDGNDGround11-NC-12GNDGNDGround13GNDGNDGround14-NC-15GNDGNDGround16GNDGNDGround17CLKINBeference clock input (with 1k pull-down/termination resistor on sensor board)18CAM_PWRINHigh active camera power enable signal (10k pull-down on sensor board)19ICZ_SCLI/OICZ serial clock10ICZ serial clockIDon tu se11SESETVED_1IDon tu se12STROBEIDon tu se13STROBEITingeer input (weak pulldown on sensor board) <td>1</td> <td>GND</td> <td>GND</td> <td>Ground</td>	1	GND	GND	Ground
4GNDGNDGNDGround5MIPI_CH1_NOMIPI CSI-2 output6MIPI_CH1_POMIPI CSI-2 output7GNDGNDGround8MIPI_DCK_NOMIPI CSI-2 clock9MIPI_DCK_POMIPI CSI-2 clock10GNDGNDGround11-NC-12-NC-13GNDGNDGround14-NC-15-NC-16GNDGNDGround17CLKNC-18CAM_PWRIIReference clock input (with 1k pull-down/termination resistor on sensor board)19I2C_SCLI/OI2C serial clock10I2C_SDAI/OI2C serial clock12RESERVED_1ID on ot use13RESERVED_2IO not use14STROBEQStrobe output15ITIGGERID on ot use16STRUBQStrobe output17StridesID on ot use18STROBEQStrobe output19I2C_SDAI/OStrobe output12STROBEQStrobe output13Strobe QIPWR14Strobe QIStrobe output15ID not use16Strobe QIStrobe output17StridesIStr	2	-	NC	
5MIPI_CH1_NOMIPI CSI-2 output6MIPI_CH1_POMIPI CSI-2 output7GNDGNDGround8MIPI_DCK_NOMIPI CSI-2 clock9MIPI_DCK_POMIPI CSI-2 clock10GNDGNDGround11-NC	3	-	NC	
6MIPI_CH1_POMIPI CSI-2 output7GNDGNDGround8MIPI_DCK_NOMIPI CSI-2 clock9MIPI_DCK_POMIPI CSI-2 clock10GNDGNDGround11-NC	4	GND	GND	Ground
7GNDGNDGround8MIPI_DCK_NOMIPI CSI-2 clock9MIPI_DCK_POMIPI CSI-2 clock10GNDGNDGround11-NC-12-NC-13GNDGNDGround14-NC-15-NC-16GNDGNDGround17CLKNC-18CAM_PWRNLReference clock input (with 1k pull-down/termination resistor on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial clock21RESERVED_1IDo not use22RESETIO on tuse23RESERVED_2IDo not use24STROBEQStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	5	MIPI_CH1_N	0	MIPI CSI-2 output
8MIPL_DCK_NOMIPL CSI-2 clock9MIPL_DCK_POMIPL CSI-2 clock10GNDGNDGND11-NC-12-NC-13GNDGNDGround14-NC-15-NC-16GNDGNDGround17CLKGNDGND18CAM_PWRIReference clock input (with 1k pull-down/termination resistor on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial clock21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	6	MIPI_CH1_P	0	MIPI CSI-2 output
9MIPL DCK_POMIPL CSI-2 clock10GNDGNDGND11-NC-12-NC-13GNDGNDGround14-NC-15-NC-16GNDGNDGround17CLKINFerence clock input (with 1k pull-down/termination resistor on sensor board)18CAM_PWRIHigh active camera power enable signal (10k pull-down on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGERITigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	7	GND	GND	Ground
10GNDGNDGround11-NC12-NC13GNDGNDGround14-NC15-NC16GNDGND17GNDGND18GNDGND19CLKIN19I2C,SCLIV10I2C,SCLI/O11I2C,SCLI/O12RESERVED_1I13RESERVED_1I14Do not use15RESERVED_2I16STROBEO17STROBEI18FigGERRI19FigGERI10Not use11I2C,SCL12FIGGER13STROBEO14STROBEI15FIGGERI16FIGGER17FigGER18SV_VDD19PWR19SV_L10%) power supply10FigUNDA17SV_VDD17SV_L10%) power supply	8	MIPI_DCK_N	0	MIPI CSI-2 clock
11-NC12-NC13GNDGNDGround14-NC15-NC16GNDGNDGround17CLKGNDGround18CAM_PWRIReference clock input (with 1k pull-down/termination resistor on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial clock21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+SV_VDDPWRSV (±10%) power supply27+SV_VDDPWRSV (±10%) power supply	9	MIPI_DCK_P	0	MIPI CSI-2 clock
12. NCNC13GNDGNDGround14.NC.15.NC.16GNDGNDGround17CLKGNDGND18CAM_PWRIReference clock input (with 1k pull-down/termination resistor on sensor board)19I2C_SCLI/OI2C serial clock10I2C_SDAI/OI2C serial clock12RESERVED_1IDo not use13RESERVED_2IDo not use14STROBEOStrobe output15TRIGGERITrigger input (weak pulldown on sensor board)16FN_VDDPWRSV (±10%) power supply	10	GND	GND	Ground
13GNDGNDGround14-NC15-NC16GNDGND17GNDGND18CAM_PWRI192C_SCLI/O19I2C_SCLI/O10I2C_SDAI/O11RESERVED_1I12RESERVED_1I13RESERVED_1I14RESERVED_1I15ITROBEI16STROBEI17TIGGERI18STROBEI19STROBEI10Strub power supply11Strub I12FRIGERI13STROBEI14STROBEI15FRIGERI16Strub I17Strub I18Strub I19Strub II19Strub II19Strub II19Strub III19Strub III19Strub III19Strub III19Strub III19Strub IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	11	-	NC	
14-NCImage: Addition of the state of the states of th	12	-	NC	
15-NC16GNDGNDGround17CLKIReference clock input (with 1k pull-down/termination resistor on sensor board)18CAM_PWRIHigh active camera power enable signal (10k pull-down on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	13	GND	GND	Ground
16GNDGNDGround17CLKIReference clock input (with 1k pull-down/termination resistor on sensor board)18CAM_PWRIHigh active camera power enable signal (10k pull-down on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	14	-	NC	
17CLKIReference clock input (with 1k pull-down/termination resistor on sensor board)18CAM_PWRIHigh active camera power enable signal (10k pull-down on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIDo not use23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWR5V (±10%) power supply27+5V_VDDPWR5V (±10%) power supply	15	-	NC	
Image: CAM_PWRImage: resistor on sensor board)18CAM_PWRIHigh active camera power enable signal (10k pull-down on sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETISersor board)23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWR5V (±10%) power supply27+5V_VDDPWR5V (±10%) power supply	16	GND	GND	Ground
Image: Sensor board)19I2C_SCLI/OI2C serial clock20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIReset sensor to default state when low (2.2k pull-down on sensor board)23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	17	CLK	I	
20I2C_SDAI/OI2C serial data21RESERVED_1IDo not use22RESETIReset sensor to default state when low (2.2k pull-down on sensor board)23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	18	CAM_PWR	I	
21RESERVED_1IDo not use22RESETIReset sensor to default state when low (2.2k pull-down on sensor board)23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWR5V (±10%) power supply27+5V_VDDPWR5V (±10%) power supply	19	I2C_SCL	I/O	I2C serial clock
22RESETIReset sensor to default state when low (2.2k pull-down on sensor board)23RESERVED_2IDo not use24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWRSV (±10%) power supply27+5V_VDDPWRSV (±10%) power supply	20	I2C_SDA	I/O	I2C serial data
Image: Sensor board23RESERVED_2I24STROBEO25TRIGGERI26+5V_VDDPWR27+5V_VDDPWR28	21	RESERVED_1	1	Do not use
24STROBEOStrobe output25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWR5V (±10%) power supply27+5V_VDDPWR5V (±10%) power supply	22	RESET	I	
25TRIGGERITrigger input (weak pulldown on sensor board)26+5V_VDDPWR5V (±10%) power supply27+5V_VDDPWR5V (±10%) power supply	23	RESERVED_2	1	Do not use
26 +5V_VDD PWR 5V (±10%) power supply 27 +5V_VDD PWR 5V (±10%) power supply	24	STROBE	0	Strobe output
27 +5V_VDD PWR 5V (±10%) power supply	25	TRIGGER	1	Trigger input (weak pulldown on sensor board)
	26	+5V_VDD	PWR	5V (±10%) power supply
28 GND GND Ground	27	+5V_VDD	PWR	5V (±10%) power supply
	28	GND	GND	Ground



All I/Os have the same I/O voltage of 1.8V. The manufacturer part number of the Hirose connector is FH28D-28S-0.5SH(98).



6 CSI Lane Configurations

The following table shows the relationship between used CSI lanes and maximum frame rate:

No of CSI Lanes	Bits Per Pixel	Maximum Frame Rate at Full Resolution
1	10	120



7 I2C Devices

There are multiple I2C devices on the DMM 36MX296-ML sensor board. The following table describes the parts and their I2C addresses:

Address (7-bit)	Device	Description
0x1A	IMX296LQR-C	Image Sensor
0x50	AT24C256C	EEPROM
0x57	AT24C02C	EEPROM



8 Programming the Image Sensor

The data sheet for the IMX296LQR-C image sensor is not publicly available.

8.1 Input Clock

The CLK pin has to be connected to a clock source. The following table lists the ranges of clock frequencies that are supported by the image sensor:

Minimum	Typical	Maximum	Unit
35.64	37.125	37.867	Hz
51.84	54	55.08	Hz
71.28	74.25	75.735	Hz

The driver provided by The Imaging Source assumes a CLK frequency of **37 MHz**. For quick integration with existing software, using this frequency is recommended.

8.2 Power-up Sequence

Delay	Action
-	Set RESET to Hi-Z
-	Set CAM_PWR to Hi-Z
-	Supply 5V to 5V_VDD
-	Supply sensor clock to CLK
1 µs	Set CAM_PWR to high
20 µs	Set RESET to high
11 ms	Write sensor registers

8.3 Further Assistance

For more detailed information, register settings and assistance integrating the sensor board into your product, please contact The Imaging Source support.



DMM 36MX296-ML

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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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