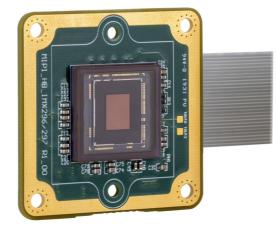


Technical Details



DMM 36MX296-ML



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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

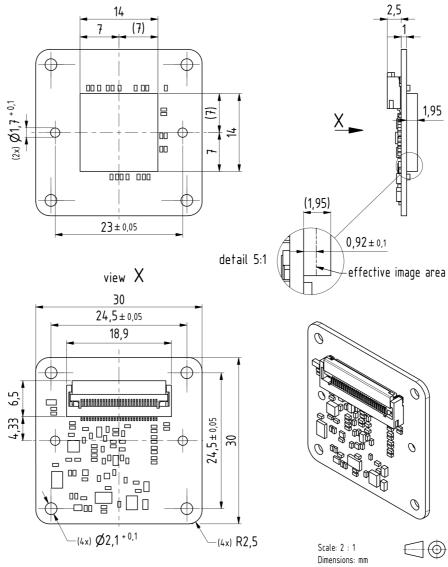
| Item | Symbol | Pins | Min | Max | Unit |
|----------------|--------|---|------|------|------|
| Supply voltage | V_IN | +5V_VDD | -0.3 | +6.0 | V |
| I/O voltage | V_10 | CAM_PWR RESET CLK STROBE TRIGGER | -0.3 | +2.1 | V |
| I2C voltage | V_12C | I2C_SCL I2C_SDA | -0.3 | +2.1 | V |

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



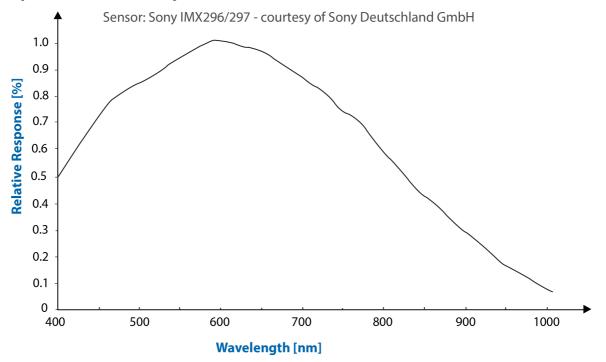
Tolerances: DIN ISO 2768-m 289-20-0-02-00

Spectral Characteristics



4 Spectral Characteristics

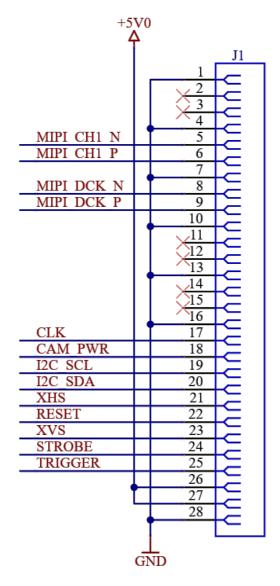
4.1 Spectral Sensitivity - IMX296LQR-C





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.

Headquarters:

The Imaging Source Europe GmbH Überseetor 18, D-28217 Bremen, Germany Phone: +49 421 33591-0

North & South America:

The Imaging Source, LLC 6926 Shannon Willow Rd, S 400, Charlotte, NC 28226, USA Phone: +1 704-370-0110

Asia Pacific:

The Imaging Source Asia Co., Ltd. 2F., No.8, Xinhu 1st Road Taipei City 114, Neihu District, Taiwan Phone: +886 2-2792-3153

www.theimagingsource.com