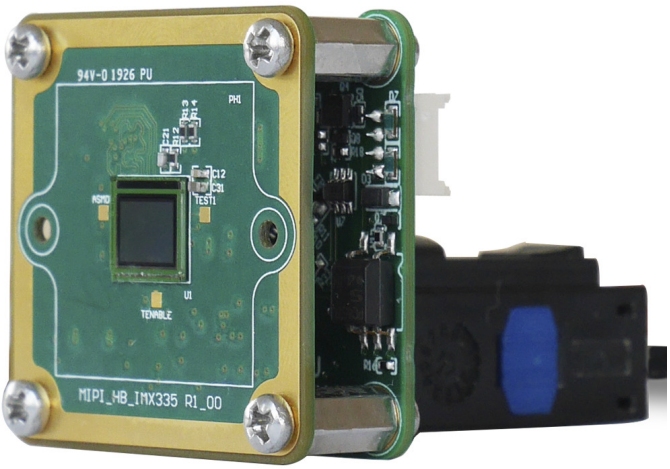
Technical Details



DFM 36CX296-ML

THE IMAGINGSOURCE
TECHNOLOGY BASED ON STANDARDS

Table of Contents

1 Quick Facts

General	
Dynamic Range	10 bit
Resolution	1440x1080
Frame Rate at Full Resolution	60
Pixel Formats	10-Bit Bayer (RG)

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

Electrical Interface	
Interface	FPD-Link III via FAKRA connector
Supply voltage	10-27V
Current consumption	approx 115 mA @ 18 VDC

Mechanical Data	
Dimensions	H: 30 mm, W: 30 mm, L: 27.5 mm
Mass	12 g

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

Environmental	
Temperature (operating)	-5 °C to 45 °C
Temperature (storage)	-20 °C to 60 °C
Humidity (operating)	20 % to 80 % (non-condensing)
Humidity (storage)	20 % to 95 % (non-condensing)

2 Electrical Characteristics

2.1 Absolute Maximum Ratings

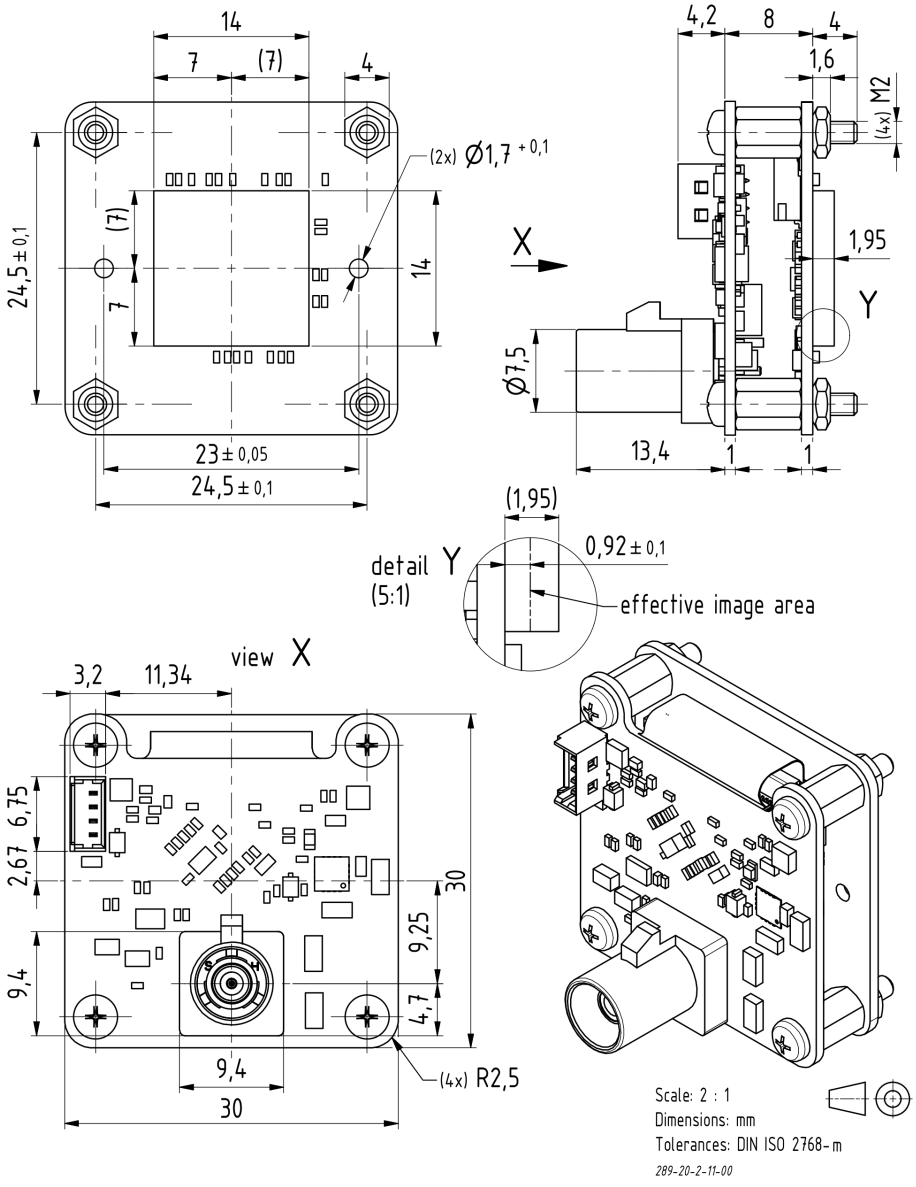
Item	Symbol	Pins	Min	Max	Unit
Supply voltage	V_COAX		-0.3	+27.0	V

2.2 Recommended Operating Conditions

Item	Symbol	Pins	Min	Typ	Max	Unit
Supply voltage	V_COAX		9.0	18.0	24.0	V

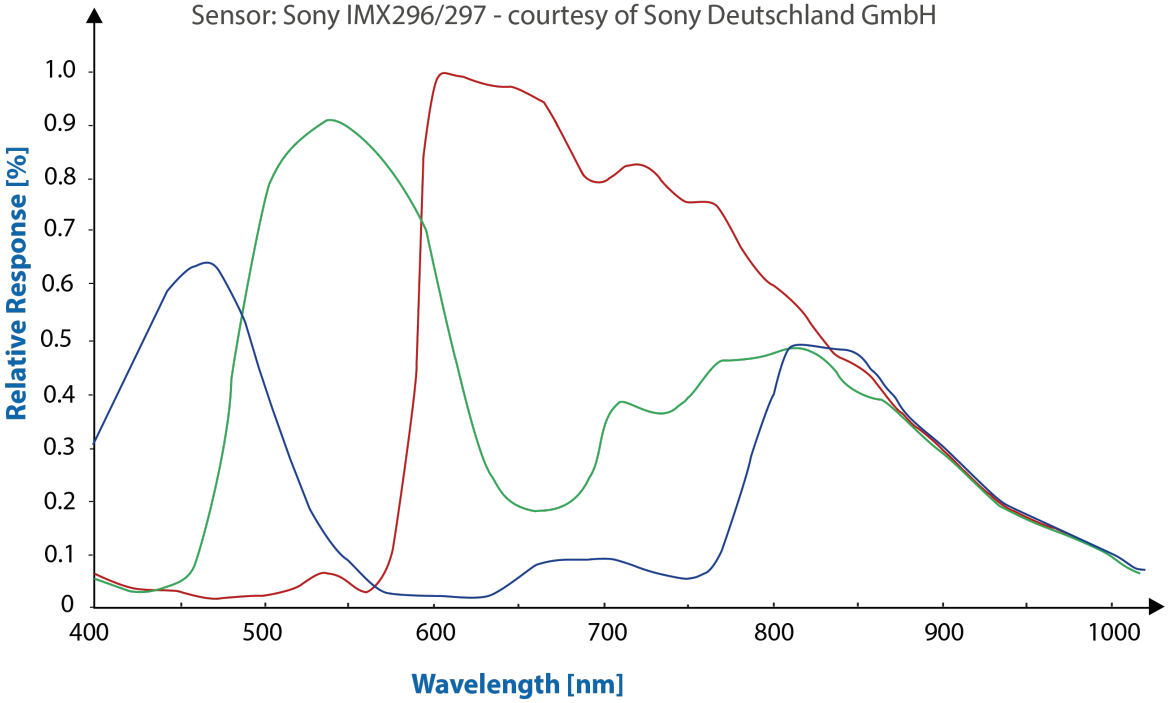
3 Dimensional Diagrams

3.1 DFM 36CX296-ML Board Camera



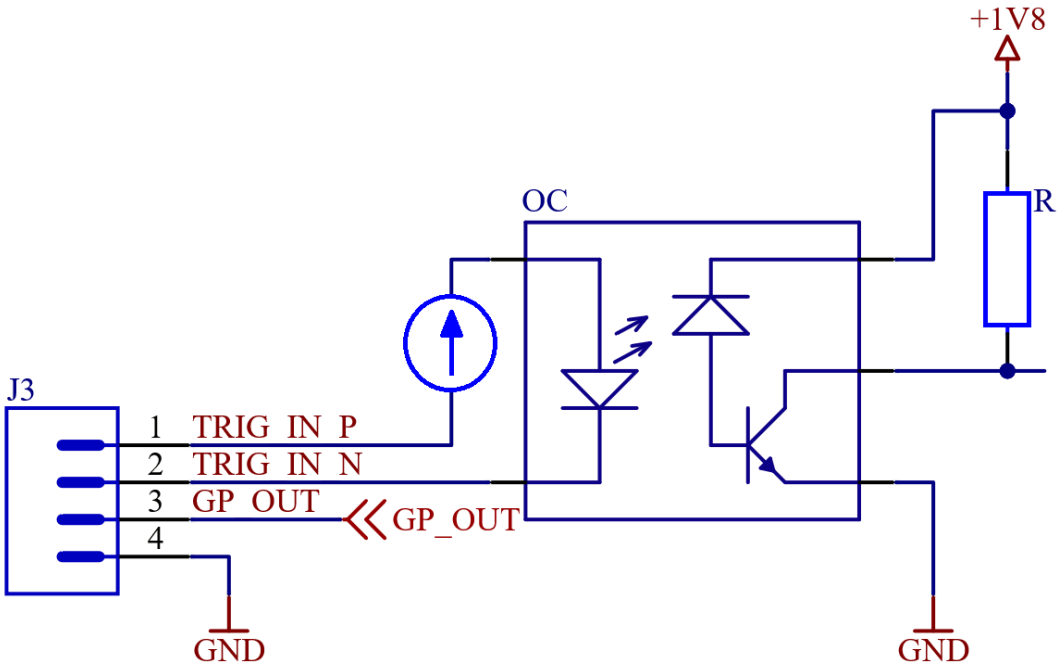
4 Spectral Characteristics

4.1 Spectral Sensitivity - IMX296LQR-C



5 I/O Connector

The DFM 36CX296-ML camera has a user GPIO I/O connector 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 trigger input is opto-decoupled. To drive the trigger input, a 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	3.15V	25.5V

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	-	250mA

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

6 FPD-Link Serializer I/O Signals

The serializer chip DS90UB953-Q1 (Texas Instruments) has 4 GPIO pins. Their purpose is described in the following table:

Pin	Name	Dir	Description
17 (GPIO0)	STROBE	I	Strobe signal from CMOS sensor
18 (GPIO1)	TRIGGER_SER	I	External trigger signal from serializer board
27 (GPOI2)	TRIGGER	O	Trigger signal to the CMOS sensor
28 (GPOI3)	RESERVED1_GPIO3	I/O	Reserved signal

The serializer's CLK_OUT (19) pin is connected to the sensor's clock input. This means that the sensor's clock frequency is controlled through serializer PLL registers.

7 I2C I/O Expander Configuration

Various I/O functionalities of the camera are controlled through a I2C I/O Expander.

The TCA6408A part 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/0 V --->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 CMOS sensor board 1: GPOUT_LEVEL from serializer board
P5	TRIGGER_LEVEL	O	Controls the polarity of the trigger input on the PicoBlade connector. 0: Trigger source level polarity is not inverted 1: Trigger source level polarity is inverted
P6	TRIGGER_SOURCE	O	Controls the source of the trigger signal that is forwarded to the sensor. 0: Sensor is triggered by the trigger signal coming from the FPD-Link / deserializer chip. 1: Sensor is triggered by the trigger signal that is applied to the PicoBlade I/O connector.
P7	RESERVED_7	O	Reserved

8 I2C Devices

There are multiple I2C devices on the DFM 36CX296-ML sensor board. The following table describes the parts and their I2C addresses:

Address (7-bit)	Device	Description
0x1A	IMX296LQR-C	Image Sensor
0x20	TCA6408A	I/O Expander
0x40 (*)	LCMXO3L-1300E	Trigger Control FPGA (configuration)
0x42 (*)	LCMXO3L-1300E	Trigger Control FPGA (control)
0x50	AT24C256C	EEPROM
0x57	AT24C02C	EEPROM

(*) Only present on sensor board revision 2.00 or later.

9 Status LEDs

There are two status LEDs on the serializer board:

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

10 Trigger Control FPGA

In order to handle complex trigger/strobe functions of the image sensor, a FPGA is present on sensor board revision 2.00 and above.

A reference driver implementation is available upon request.

DFM 36CX296-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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