# FALCON-821CRS

8MP Color HDR UVC USB 3.0 Camera based on Onsemi AR0821 Sensor

Vadzo Falcon-821CRS is a 4K HDR USB Camera based on Onsemi AR0821 Sensor coupled with high-performance ISP that supports features such as Auto Exposure etc. The camera delivers max resolution of 8.3MP and Video streaming of 4K, 1080p and 720p. The camera comes with a M12/S-Mount lens holder that supports a 75DFOV lens by default. You shall be able to stream video in UYVY and MJPEG format and capture images in BMP and JPEG format.

**Key Features**

- Sensor Model: AR0821 Onsemi Sensor
- Max Resolution: 8MP
- Pixel Size: 2.1 µm x 2.1 µm
- Shutter: Rolling Shutter
- Lens FOV: 75 DFOV
- Compliance: UVC, RoHS 3, REACH



**Applications**

- **Warehouse Robotics:** Object Scanning, Document Scanning, OCR, Obstacle Detection.
- **Automation & Robotics:** Outdoor AGVs, Outdoor Drones, Last-Mile Delivery AGVs.
- **Smart Surveillance Camera:** Facial Recognition, Day/Night Video Recording, Smart Parking, Pedestrian Safety.
- **Telematics & Fleet Management:** Dashcam, Cargo Monitoring, Pedestrian Safety, Fleet Monitoring, eMirror Cameras.

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# 1. Introduction

Falcon-821CRS is a UVC Compliant USB 3.0 Fixed-Focus color camera based on Onsemi AR0821 sensor. The sensor supports 120+dB Dynamic Range. The camera is designed to be backward compatible with USB 2.0 as well. The camera incorporates the AR0821 sensor from Onsemi integrated with an on-board Image Signal Processor (ISP) to perform functions such as debayering, demosaicing, color correction, contrast correction, gamma correction, denoising, lens corrections and so on. In addition to this, the ISP also supports Auto functions such as Auto-Exposure and Auto-White Balance.

The Image Signal Processor is integrated with the USB 3.0 controller to provide UVC Compliant USB 3.0 camera. The USB controller is also programmed to support HID Pipeline that shall support UVC extension functions that are not supported in the standard UVC drivers.

# 2. Camera Specifications

| **General Information** | |
|---|---|
| Product Family | Falcon series |
| Camera Model | Vadzo Falcon-821CRS |
| **Sensor** | |
| Sensor | AR0821 Sensor from Onsemi |
| Sensor Format | 1/1.7” |
| Pixel Size | 2.1 µm x 2.1 µm |
| Max Resolution | 8MP – 3848(H) x 2168(V) |
| Shutter | Rolling Shutter |
| Chroma | Color |
| **Camera Data** | |
| Interface | USB 3.0 Gen1 Backward compatible to USB 2.0 |
| Pixel Depth | 8bit |
| Output Format | UYVY and MJPEG |

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| | |
|---|---|
| Exposure Control | Manual Control via software & Auto-Exposure |
| GPIO | 6 pins. 1x Digital Input, 1x Digital Output, 3x NC and GND |
| **Camera Hardware** | |
| Lens | S Mount (M12 Standard) |
| USB connector | Type C |
| GPIO connector | Connector on-board: Wurth 665306124022<br>Mating connector: Wurth 665006113322 |
| Power Supply | USB powered |
| Power Requirement | Max: 1.75 W at 5VDC<br>Min: 1.05 W at 5VDC |
| Operating Temperature | -30$^{0}$C to 70$^{0}$C |
| Dimension | 38mm (L) x 38mm (B) convertible to 32mm (L) x 32mm (B) |
| Weight | 13 Grams (Without Lens) |
| **Camera Software** | |
| Video Resolutions | VGA, HD, Full HD and 4K |
| Video formats | UYVY and MJPEG |
| Still Image Resolutions | VGA, HD, Full HD and 4K |
| Image Capture formats | BMP and JPEG |
| Image Capture Modes | Software Trigger |
| UVC Camera Controls | Brightness, Exposure, Contrast, Sharpness, Saturation, Gamma, Gain, White Balance |
| OS Supported | Windows, Linux, Android (need additional SDK) |
| **Conformity** | |
| Conformity | UVC Compliant, RoHS 3, REACH |

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# 3. Supported Resolutions

| Resolution | Frame Rates (FPS) in USB 3.0 Mode | |
|---|---|---|
| | UYVY | MJPEG |
| **640 x 480 (VGA)** | 120 | 120 |
| **1280 x 720 (HD)** | 120 | 120 |
| **1920 x 1080 (FHD)** | 60 | 60 |
| **2592 x 1944 (5MP)** | 30 | 60 |
| **3840 x 2160 (4K)** | 15 | 60 |

# 4. Supported Camera Functions

The List of functions supported by the Falcon-821CRS camera are:

- Resolution Control
- Image Format Setting- UYVY and MJPEG
- Video Format Setting - UYVY and MJPEG
- Image Capture Software Trigger
- Exposure - Auto & Manual
- White Balance - Auto & Manual
- Anti Flicker - Auto and 50Hz/60Hz
- Contrast, Gamma and Gain Control
- Saturation Control and Sharpness Control
- Pan, Tilt and Zoom control
- HDR control and ROI based Auto exposure

# 5. USB 3.0 Interface

The camera module's USB 3.0 connector is a standard USB Type C connector. It provides a nominal 5 Gbit/s SuperSpeed data transfer connection to supply power to the device and to transmit video data and control signals. The power supply must comply with the Universal Serial Bus 3.0 Specification. The nominal operating voltage is 5 VDC, effective on the camera module's connector. Connection assignments and numbering adhere to the Universal Serial Bus 3.0 standard. USB Certified 3.0 Gen 1 or higher cables to be used. Vadzo does not recommend non-certified USB cables.

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# 6. Status LED

Status LED's indicate the below:

- Red color indicates Device is powered ON with no Streaming.
- Yellow color indicates: Camera is currently Streaming.

# 7. General Purpose I/O Lines

GPIO lines are terminated through Six (6) pin socket connector from Würth Elektronik part number 665306124022.Refer to the below table for GPIO Connector Pin Numbering and Assignments.

| Pin No | Signal Name | (Min) | (Typ) | (Max) |
|---|---|---|---|---|
| **Pin 1** | +5V | 4.75 V | 5.0 V | 5.25 V |
| **Pin 2** | GPIO | 1.71 V | 1.8 V | 1.98 V |
| **Pin 3** | SEN_FLASH | 1.71 V | 1.8 V | 1.98 V |
| **Pin 4** | External Trigger | 1.71 V | 1.8 V | 1.98 V |
| **Pin 5** | NC | - | - | - |
| **Pin 6** | GND | - | - | - |

**Vadzo engineering team shall be able to enable the IOs on the firmware level as per the end user technical requirements under the purview of Vadzo Imaging customisation program*. Recommended mating connector from Würth Elektronik part number 665006113322.

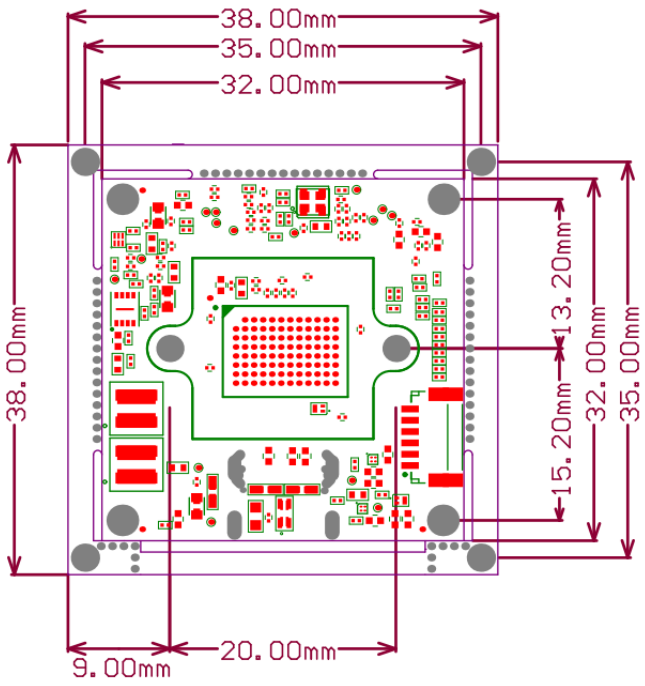
# 8. Temperature and Humidity Specifications

| Description | Specification |
|---|---|
| Operating Temperature | -30$^0$C to 70$^0$C |
| Storage Temperature | -30$^0$C to 70$^0$C |
| Humidity | 20% to 80%, Relative, non-condensing. |

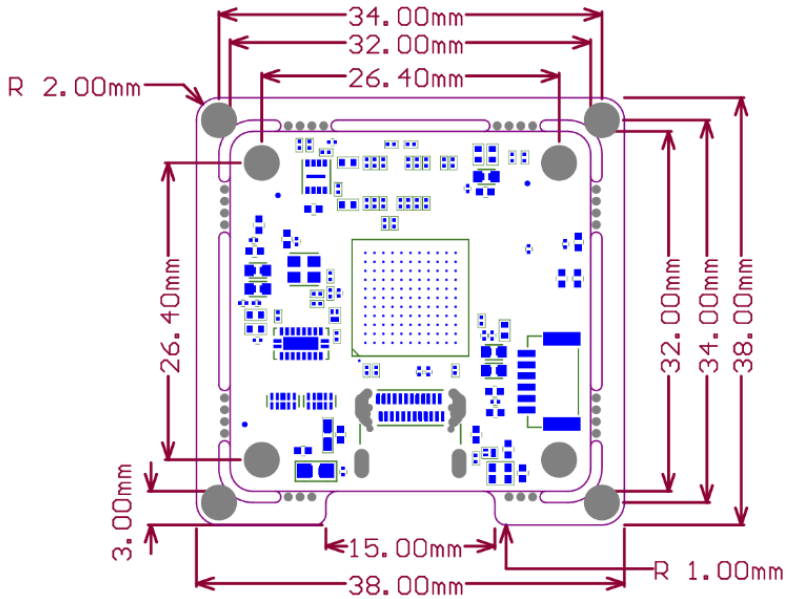
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# 9. Dimensions

## Board Top Side – 2D




## Board Bottom Side - 2D




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