



EyecLOUD OpenNCC

User Manual

June 2021

Revision 1.0.0

Technical Support

You can contact us through the channel on the official website.

<https://www.openncc.com/contact>

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Revision History

| Version | Date | Editor | Description |
|---------|-----------|--------|-------------|
| 1.0.0 | June 2021 | Zed | |
| | | | |

Directory

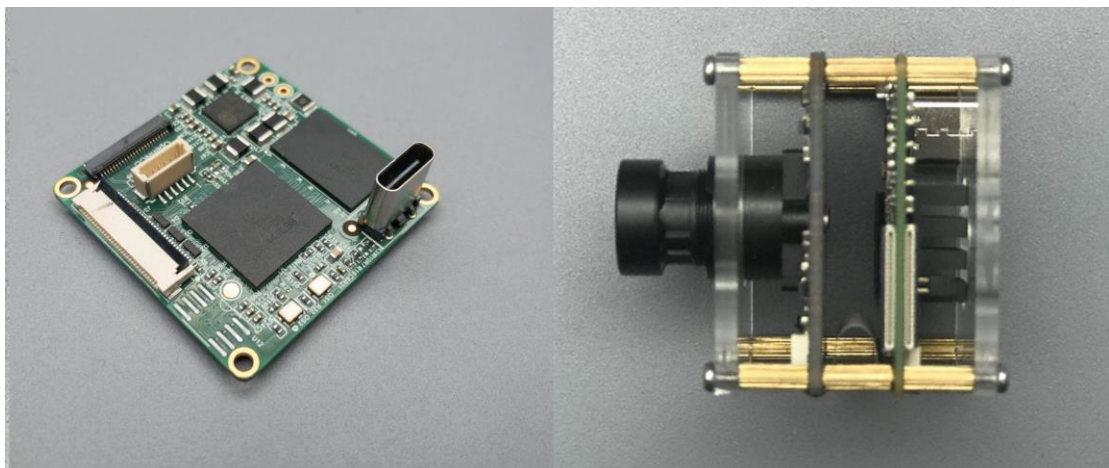
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1 Introduction

1.1 Overview

OpenNCC is an open-source programmable AI camera. It is powered by the Intel Movidius Myriad X Vision Processing Unit (VPU). It is a low-power System-on-Chip (SoC). It can be used for drones, smart cameras, VR/AR headsets and other devices for deep learning and other AI vision application acceleration. Myriad X will deliver ten times the deep neural network (DNN) performance compared to Myriad 2 at the same power consumption. Myriad X reaches over trillion times per second (TOPS) peak DNN throughput based on a theoretical computational power of 4+ TOPS.

OpenNCC is composed of a SENSOR board and a CORE board, while it is equipped with a 2 or 8 megapixel sensor. The OpenNCC core board uses CSI_MIPI_RX 4lane interface. It supports sensor resolution up to 20M@30fps, and also supports 3D module and IR module. CORE board output interface is USB2.0/3.0, can be equipped with 4G/8G/16G LPDDR4, 16M SPI FLASH.



1.2 Functions

- Plug & Play

OpenNCC uses the USB-C data interface, just plug it into your computer and start developing, and it's as short as 30s to create your own versatile AI camera.

- **Openvino Standard Model Ready-to-Use**

It has the advantage of the Intel VPU chip included in OpenNCC, which is compatible with the OpenVINO model.

- **Support for multiple deep learning frameworks**

It supports Caffe, ONNX, TensorFlow, MX Net and other deep learning frameworks for user-friendly development and use.

- **High-quality image output**

It has been factory video debugging, can support 1920x1080 or 4K resolution picture quality, as well as support YUV420, H.264, MJPEG and other video formats output.

- **Support secondary development**

OpenNCC provides dedicated OpenNCC SDK development kit and related technical documentation, which supports C/C++/Python language, users can easily call the relevant API interface to realize camera parameter setting, model download, output video parameter setting, and quickly realize algorithm deployment of smart cameras. openNCC models support official models provided by openvino, and also support the deployment of custom algorithm models for rapid productization.

1.3 OpenNCC Series

According to different application scenarios, OpenNCC has launched different product series, among which there are mainly OpenNCC Lite series for developers, OpenNCC USB and OpenNCC IPC series for industrial application scenarios.

1.3.1 OpenNCC Lite Series



1.3.1.1 Introduction

OpenNCC Lite is mainly for developers, using USB interface, plug-and-play, convenient for developers to carry out rapid deployment of algorithm models.

OpenNCC Lite has built-in Intel Movidius Myriad X VPU with powerful arithmetic power to meet the computing needs of embedded AI. It is suitable for AI algorithm engineers, system integration engineers, and product managers for program pre-research, and for students, teachers, and researchers in the AI direction for research and study.

1.3.1.2 Technical Specification

| Technical Parameters | Basic Information |
|---------------------------------|---|
| Product Name | OpenNCC Lite Programmable AI Camera |
| Dimensions | LxHxD::40 mm x 40 mm x 35 mm |
| Weight | Net weight of the camera is about 80 grams |
| Standard Certifications | CE,FCC,RoHS,PSE |
| | AI Performance and Features |
| Inference Engine | 1/ 2 |
| Supported Models | OpenVINO compatible models |
| Support Frameworks | ONNX, TensorFlow, Caffe, MX Net, Kaldi, PaddlePaddle |
| | Software Functions |
| Image Signal Processing | √ |
| Open Source Materials | Camera development kit OpenNCC SDK, development technical documentation, configuration tool OpenNCC View |
| Supported Development languages | C/C++/Python |
| SDK Support Features | <ol style="list-style-type: none"> 1. get video stream 2. AI model download and replacement 3. get model calculation results 4. camera photography, reset, etc. |
| OpenView Function | Configure camera parameters, configure camera local AI model |
| OpenNCC SDK Supported OS | Linux, Windows, RaspberryPi OS, etc. |
| | Hardware specification parameters |
| Operating Temperature | 0-50°C |
| VPU | Intel Movidius Myriad X MV2085 |
| Memory | 4Gb / 8Gb |
| Data Interface | USB Type-C 2.0/3.0 |
| Power Supply | 5V / 2A |
| Camera Module | 2MP / 8MP |
| Resolution | 1920 x 1080(2K) / 3872 × 2180 (4K) |
| Frame Rate | 30Hz |
| Horizontal Field of View | 60° |

1.3.2 OpenNCC USB

1.3.2.1 Introduction



 **OpenNCC**

OpenNCC USB is a series of endpoint AI cameras for industrial application scenarios with a plug-and-play USB interface to facilitate field deployment of commercial AI vision solutions by deep learning vision system developers.


OpenNCC USB series cameras are developed based on the Intel Movidius Myriad X VPU and support the Intel® OpenVINO toolbox.

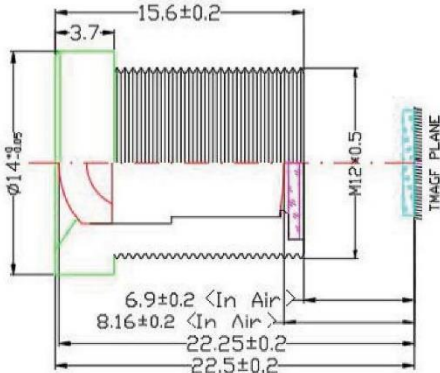
1.3.2.2 Technical Specifications

| | Basic Information |
|---------------------------------|---|
| Product Name | OpenNCC USB Programmable AI Camera |
| Dimensions | 50 mm*50 mm*50 mm |
| Weight | Net weight of the camera is 150g |
| Standard Certifications | CE,FCC,RoHS,PSE |
| | AI Performance and Features |
| Inference Engine | 2 |
| Supported Models | OpenVINO compatible models |
| Support Frameworks | ONNX, TensorFlow, Caffe, MX Net, Kaldi, PaddlePaddle |
| | Software Features |
| Image Signal Processing | √ |
| Open Source Materials | Camera development kit OpenNCC SDK, development technical documentation, configuration tool OpenNCC View |
| Supported Development Languages | C/C++/Python |
| SDK Support Features | <ol style="list-style-type: none"> 1. get video stream 2. AI model download and replacement 3. get model calculation results 4. camera photography, reset, etc. |
| OpenView Function | Configure camera parameters, configure camera local AI model |
| OpenNCC SDK Supported OS | Linux, Windows, Raspberry Pi OS |
| OpenNCC View Supported OS | Linux, Windows |
| | Hardware specification parameters |
| Operating Temperature | 0-50℃ |
| VPU | Intel Movidius Myriad X MV2085 |
| Memory | 8Gb |
| Data Interface | USB Type-C 2.0/3.0 |
| Power Supply | 5V / 2A |
| Camera Module | 2MP / 8MP roll-up exposure camera;2MP global exposure camera |
| Resolution | 1920 x 1080(2K);3840 × 2160 (4K) |
| Frame Rate | 30Hz;120Hz |
| Lens | C-Mount, diagonal FOV: 50 - 115° / 45 - 125° |

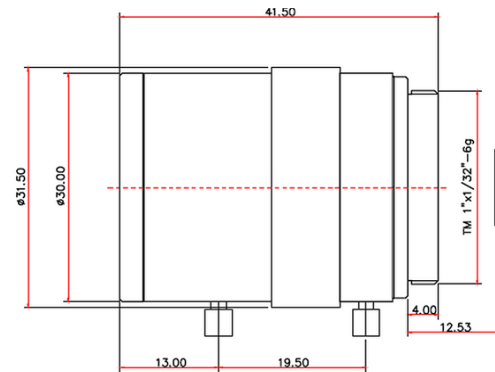
1.4 Hardware Specification

1.4.1 Fixed focus lenses 6mm

| 镜头参数 (Parameter of Lens) | | | | |
|--|-------------------------------|--------------|---------|-----|
| 型号 (Model) : | M12-6IR(3MP)-C2 | | | |
|  | 分辨率 (Resolution) | 3 Megapixel | | |
| | 像面尺寸 (Image format) | 1/2.7" | | |
| | 焦距 (Focal length) | 6mm | | |
| | 通光孔径 (Aperture) | F2.2 | | |
| | 接口 (Mount) | M12 | | |
| | 视场角 (Field Angle) D×H×V(°) | | 1/2.7 | 1/3 |
| | | D | 63 | 58 |
| | | H | 50 | 43 |
| | | V | 36 | 30 |
| | 畸变 (Optical Distortion) | -19.50% | -13.70% | |
| | 最近物距 (M.O.D.) | 0.3m | | |
| | 外形尺寸 (Dimension) | Φ14×15.6mm | | |
| | 重量 (Weight) | / | | |
| | 法兰后焦距 (Flange BFL) | / | | |
| 光学后焦距 (BFL) | 8.16mm | | | |
| 机械后焦距 (MBF) | | | | |
| 日夜共焦 (IR Correction) | Yes | | | |
| 操作方法 (Operation) | 光圈 (Iris) | 固定光圈 (Fixed) | | |
| | 聚焦 (Focus) | / | | |
| | 变焦 (Zoom) | / | | |
| 工作温度 (Operating temperature) | | -20℃~+60℃ | | |

| 尺寸 (Size) | | | |
|--|-----------|------------|-------------|
|  | | | |
| 尺寸公差Size tolerance (mm) : | 0-10±0.05 | 10-30±0.10 | 30-120±0.20 |
| 角度公差Angle tolerance | ±2° | | |

1.4.2 Zoom lenses 2.8 – 12mm

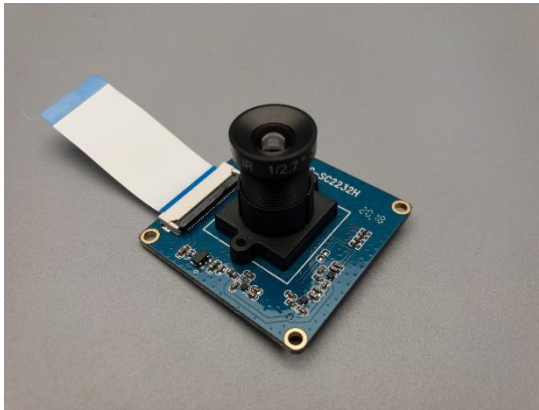


| 类 别 (Category) | | 规格参数 (Parameters) |
|----------------------------------|--------|-------------------|
| 1. 型号 (Model No) | | CW-VM2812-3MP |
| 2. 焦距 (Focal Length) | | 2.8-12mm |
| 3. 像面规格 (Format) | | 1/2.5" |
| 4. 相对孔径 (D/f') | | 1:1.4 |
| 5. 接口 (Mount) | | CS |
| 6. 视场角 (F.O.V) (H/V) | 1/2.5" | 112° x 34° |
| 7. 后截距 (BFL) | | 12.53mm |
| 8. 光圈 (iris) | | 手动/锁紧 (W/Lock) |
| 9. 变焦 (Zoom) | | 手动/锁紧 (W/Lock) |
| 10. 分辨率 (MTF) | | 3Mega Pixel |
| 11. 近摄距 (M.O.D) (m) | | 0.2m |
| 12. 外形尺寸 (Dimension) | | Φ30x41.50mm |
| 13. 重量 (Weight) (g) | | 55g |
| 14. 产品构成 (Structure) | | 铝合金+9G |
| 15. 工作温度 (Operating temperature) | | -20℃~+60℃ |

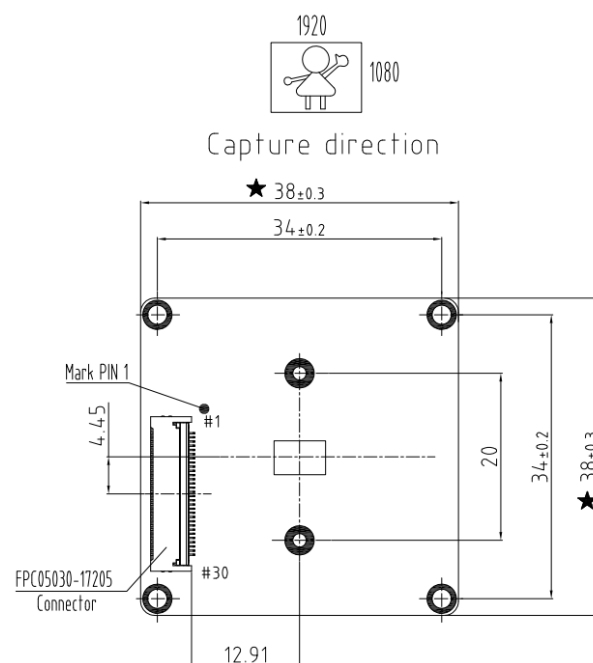
1.4.3 Module Board SC2232H(Discontinued)

1.4.3.1 Basic parameters

SENSOR Model: SC2232H
Resolution: 1920*1080(2MP)
Frame rate: 30fps
Image element: 2.8um
Imaging size: 1/2.9



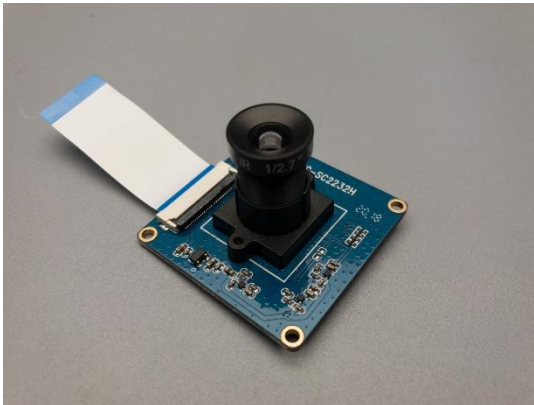
1.4.3.2 Structure size



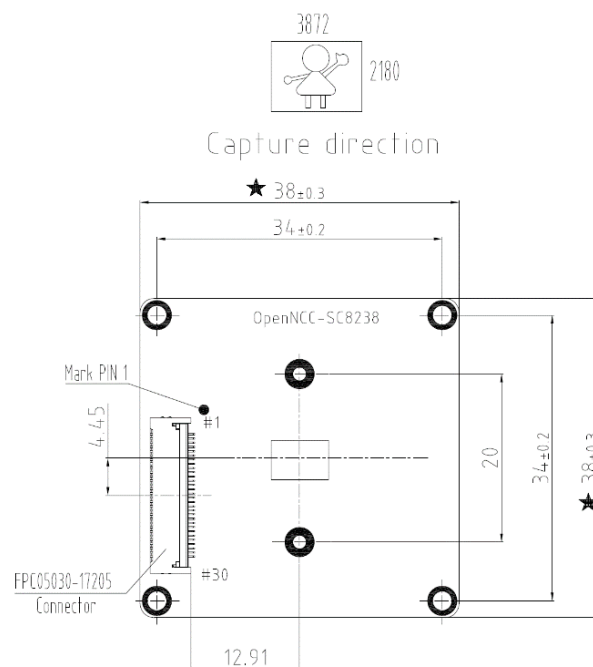
1.4.4 Module Board SC8238

1.4.4.1 Basic parameters

SENSOR Model: SC8238
 Resolution: 3872*2180(8MP)
 Frame rate: 30fps
 Image element: 1.5um
 Optical size: 1/2.7inch



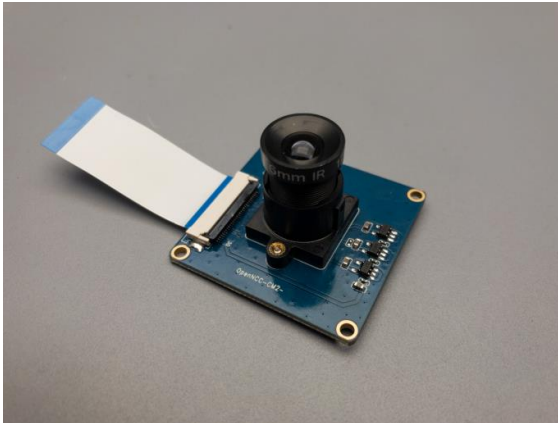
1.4.4.2 Structure size



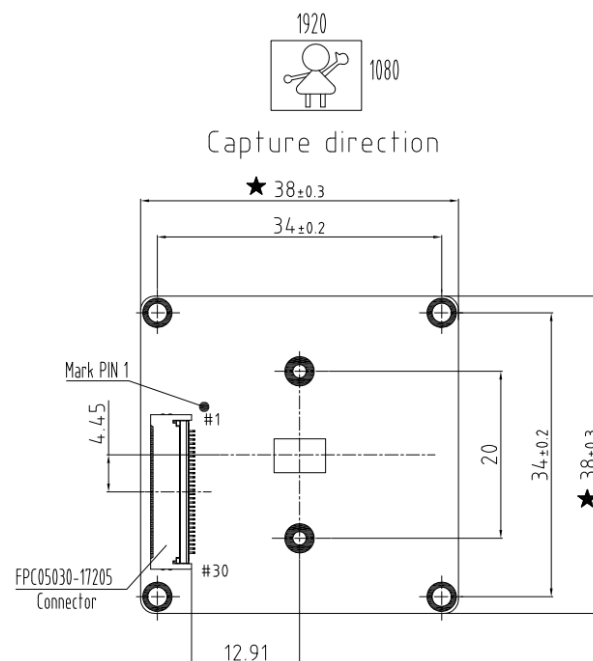
1.4.5 Module Board AR0234

1.4.5.1 Basic parameters

SENSOR Model: AR0234CS
 Resolution: 1920*1080(2MP)Global shutter
 Frame rate: 30fps
 Image element: 3um
 Imaging size: 1/2.6



1.4.5.2 Structure size



1.4.7 Core Board SoM

1.4.7.1 Basic parameters

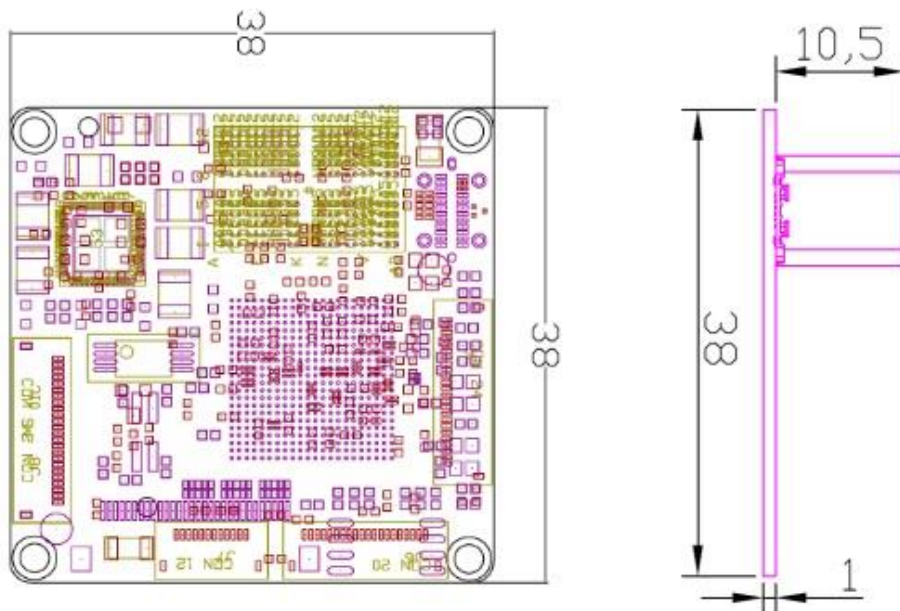
Size: 38mm*38mm

Interface: MIPI, USB3.1 TYPE-C



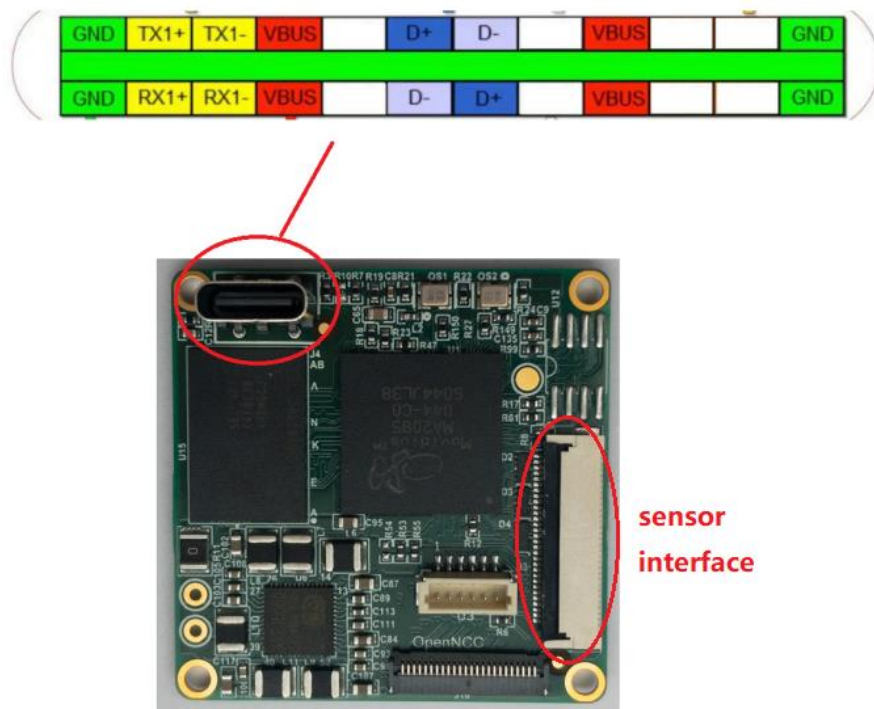
1.4.7.2 Structure size

38mm*38mm (Standard 38 board, space spacing 34mm)



1.4.7.3 Interface Definition

USB interface: TYPE C (the direction of the picture supports USB3.0, when the reverse is inserted to identify as USB2.0)



FPC connector J3

| Serial number | Pin Definitions | Description | Electrical Characteristics |
|---------------|-----------------|----------------------------|----------------------------|
| 1 | VDD_5V | 5V power output | Output current $\leq 1A$ |
| 2 | VDD_5V | 5V power output | 2 |
| 3 | VDD_5V | 5V power output | 3 |
| 4 | GND | Reference ground | / |
| 5 | GND | Reference ground | / |
| 6 | GND | Reference ground | / |
| 7 | CAM_A_AUX | General Purpose GPIO | 1.8V |
| 8 | CAM_A_RST | General purpose GPIO/reset | 1.8V |

| Serial number | Pin Definitions | Description | Electrical Characteristics |
|---------------|-----------------|---|----------------------------|
| 9 | I2C1_SCL | I2C clock line | 1.8V |
| 10 | COM_IO1 | General Purpose GPIO | 1.8V |
| 11 | CAM_A_CLK | General Purpose GPIO/Clock | 1.8V |
| 12 | CAM_B_AUX | General Purpose GPIO/Breakdown | 1.8V |
| 13 | COM_IO2 | General Purpose GPIO | 1.8V |
| 14 | CAM_A_PWM/RST | Universal GPIO | 1.8V |
| 15 | I2C1_SDA | I2C Data Line | 1.8V |
| 16 | GND | Reference ground | / |
| 17 | CAM_A_D1_P | MIPI data pair 1 Differential signal + | / |
| 18 | CAM_A_D1_N | MIPI data pair 1 Differential signal - | / |
| 19 | GND | Reference ground | / |
| 20 | CAM_A_D0_P | MIPI data pair 0 Differential signal + | / |
| 21 | CAM_A_D0_N | MIPI data to 0 differential signal - | / |
| 22 | GND | Reference ground | / |
| 23 | CAM_A_L_C_P | MIPI clock line Differential signal + | / |
| 24 | CAM_A_L_C_N | MIPI clock line Differential signal - | / |
| 25 | GND | Reference ground | / |
| 26 | CAM_A_D2_P | MIPI data pair 2 | / |

| Serial number | Pin Definitions | Description | Electrical Characteristics |
|---------------|-----------------|---|----------------------------|
| | | Differential signal + | |
| 27 | CAM_A_D2_N | MIPI data pair 2 Differential signal- | / |
| 28 | GND | Reference ground | / |
| 29 | CAM_A_D3_P | MIPI data pair 3 differential signal + | / |
| 30 | CAM_A_D3_N | MIPI data pair 3 Differential signal - | / |

2 Getting Started Guide

This chapter describes how to use OpenNCC and download the official OpenNCC software development kit.

2.1 Unboxing show

The sticker on the box provides the official website address of OpenNCC (www.openncc.com.cn) for downloading relevant technical documentation and development kits.



When you open the box, you can see OpenNCC and the standard USB TPYE-C interface data cable.



2.2 Start-up hardware

Use the official USB cable provided by OpenNCC to connect the computer to the OpenNCC's USB 3.0 port. As shown in the figure below.



Tip: How to distinguish between computer USB ports.



2.2 Download Software Development Kit(SDK)

- Go to official website <http://www.openncc.com>.
- Click Documentation.

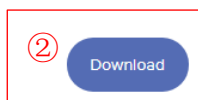


Home Solution Shop Documentation ^① Members Contact

- Click Download to access the SDK repository at <https://github.com/EyecloudAi/openncc>.

OpenNCC SDK - Open Source

This document introduces the basic concepts of OpenNCC deployment, OpenNCC CDK and OpenVINO, and the method of using OpenNCC CDK to develop and deploy OpenNCC DK independent operation mode and mixed mode with OpenVINO.



- Download the zip file or copy the address and use Git to clone it

2.3 Running software

Details of how to run the software can be found in [OpenNCC_Getting_Started.pdf](#) in the SDK.