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

Contact information

Tel: +1-408-219-6489

E-mail: service@eyecloud.tech

Copyright statement

Revision History

Version	Date	Editor	Description
1.0.0	June 2021	Zed	

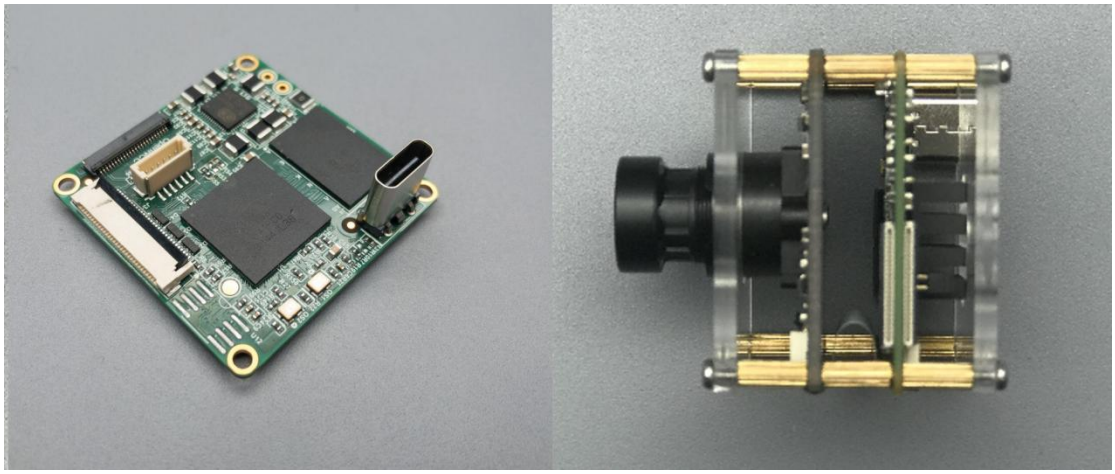
Directory

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	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℃
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

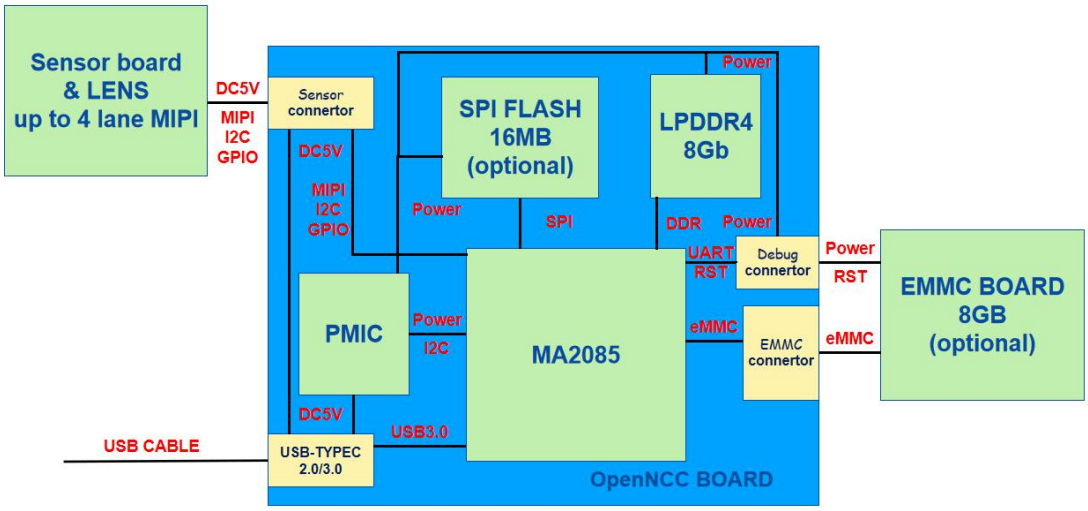
OpenNCC USB is a series of endpoint AI cameras for industrial application scenarios with a plug-and-play USB interface to facilitate field deployment of commercial AI vision solutions by deep learning vision system developers.

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	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 block diagram

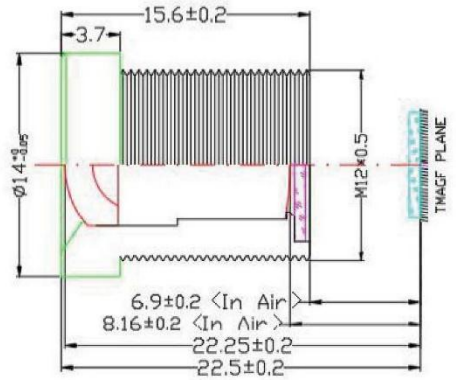


1.5 Hardware Specification

1.5.1 Fixed focus lenses 6mm

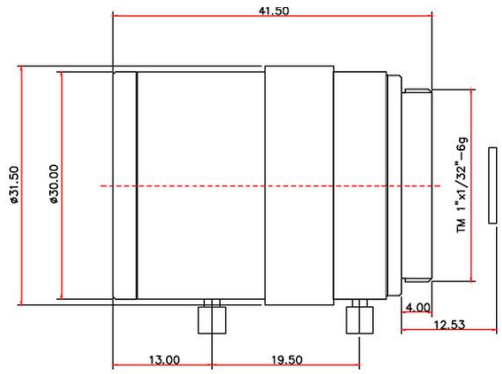
镜头参数（Parameter of Lens）				
型号（Model）：	M12-6IR(3MP)-C2			
	分辨率（Resolution）	3 Megapixel		
	像面尺寸（Image format）	1/2.7″		
	焦距（Focal length）	6mm		
	通光孔径（Aperture）	F2.2		
	接口（Mount）	M12		
	视场角（Field Angle）D×H×V(°)	1/2.7	1/3	
		D 63	58	
		H 50	43	
		V 36	30	
	畸变(Optical Distortion)	-19.50%	-13.70%	
	最近物距(M.O.D.)	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°		

1.5.2 Zoom lenses 2.8 – 12mm

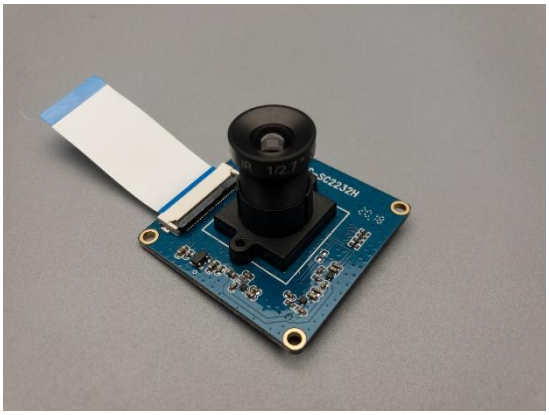


类　别（Category）		规 格 参 数(Parameters)
1. 型号（Model No）		CW-VM2812-3MP
2. 焦距（Focal Length）		2.8-12mm
3. 像面规格（Format）		1/2.5″
4. 相对孔径（D/f′）		1:1.4
5. 接口（Mount）		CS
6. 视场角（F.O.V）（H/V）	1/2.5″	112° x 34°
7. 后截距（BFL）		12.53mm
8. 光圈（iris）		手动/锁紧(W/Lock)
9. 变焦（Zoom）		手动/锁紧(W/Lock)
10. 分辨率（MTF）		3Mega Pixel
11. 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℃

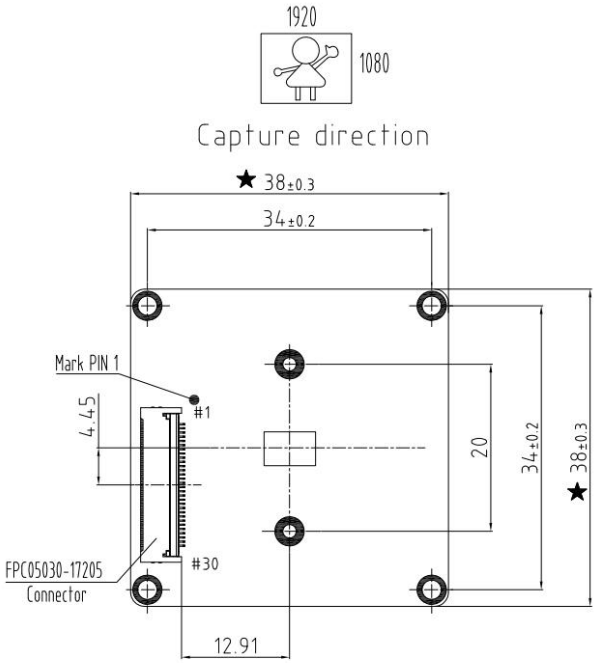
1.5.3 Module Board SC2232H(Discontinued)

1.5.3.1 Basic parameters

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



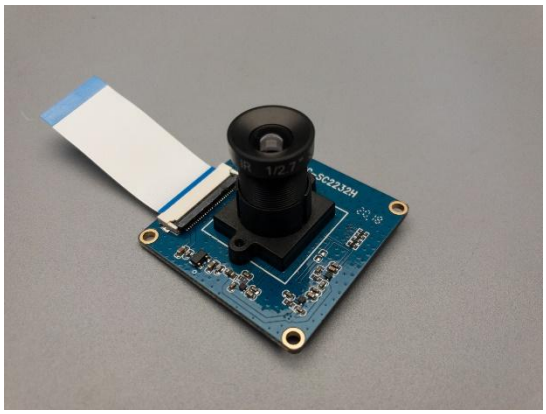
1.5.3.2 Structure size



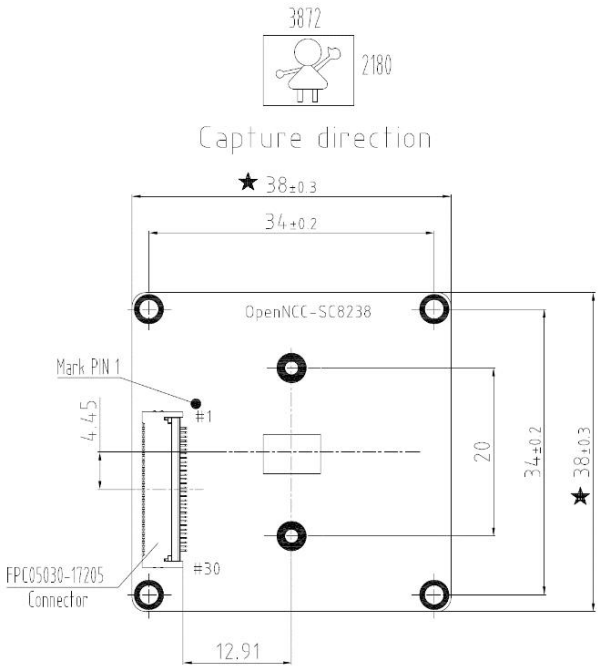
1.5.4 Module Board SC8238

1.5.4.1 Basic parameters

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



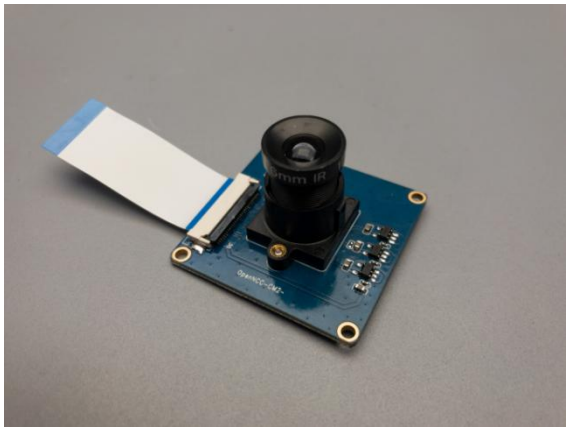
1.5.4.2 Structure size



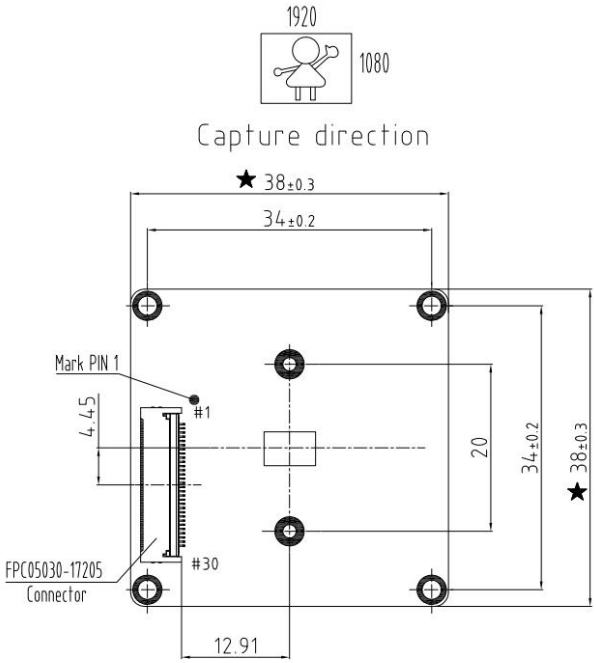
1.5.5 Module Board AR0234

1.5.5.1 Basic parameters

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



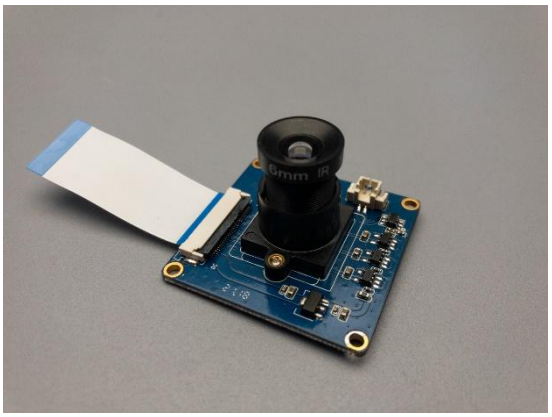
1.5.5.2 Structure size



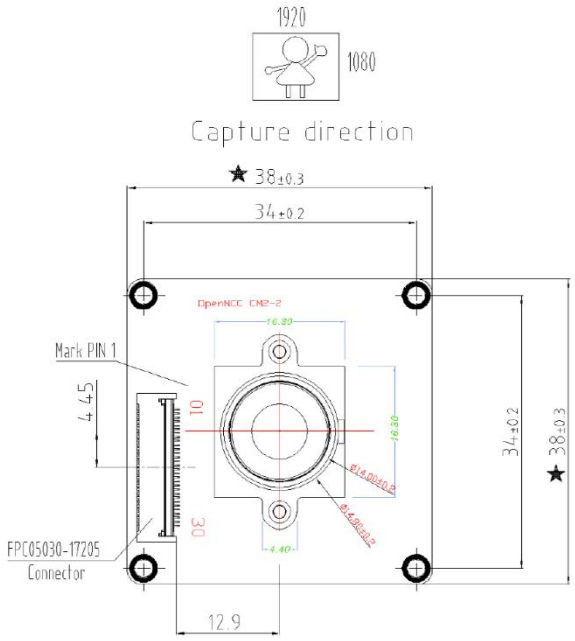
1.5.6 Module Board SC200AI

1.5.6.1 Basic parameters

SENSOR Model: SC200AI
Resolution: 1920*1080(2MP)
Frame rate: 30fps
Image element: 3um
Imaging size: 1/2.6inch



1.5.6.2 Structure size



1.5.7 Core Board SoM

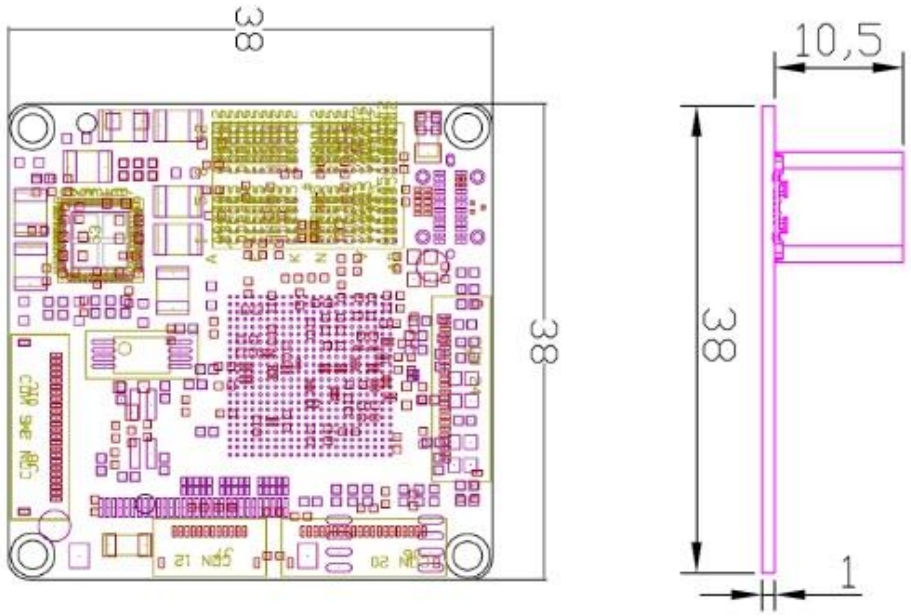
1.5.7.1 Basic parameters

Size:38mm*38mm

Interface: MIPI, USB3.1 TYPE-C

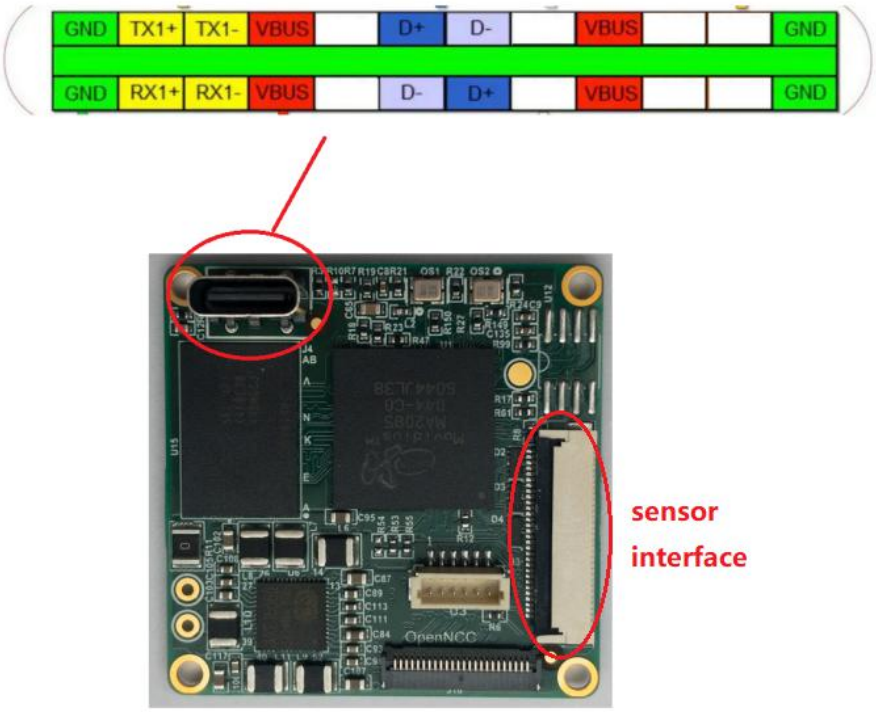
1.5.7.2 Structure size

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



1.5.7.3 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 ≤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	/

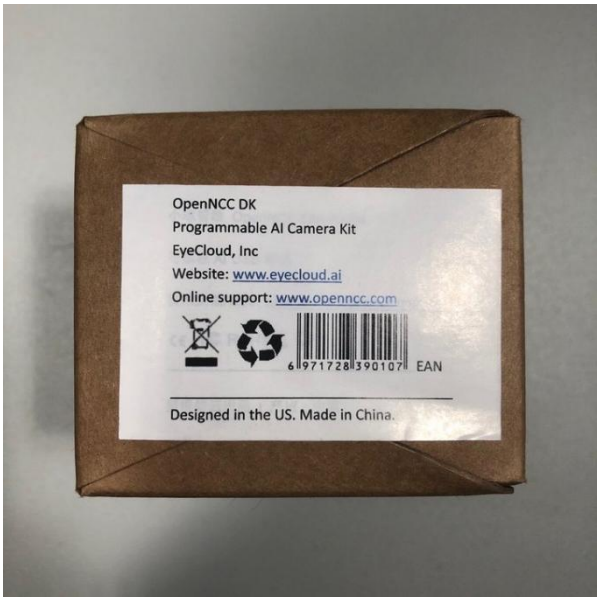
Serial number	Pin Definitions	Description	Electrical Characteristics
		Differential signal +	
27	CAM_A_D2_N	MIPI data pair 2 Differential signal-	/
28	GND	Reference ground	/
29	CAM_A_D3_P	MIPI data pair 3 differential signal +	/
30	CAM_A_D3_N	MIPI data pair 3 Differential signal -	/

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.

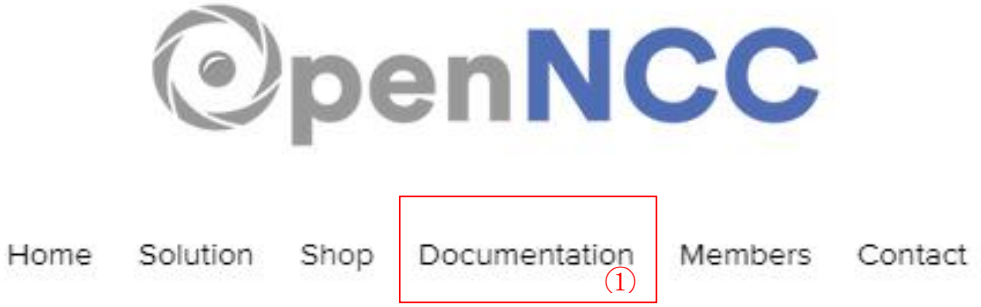
2.2 Start-up hardware

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.

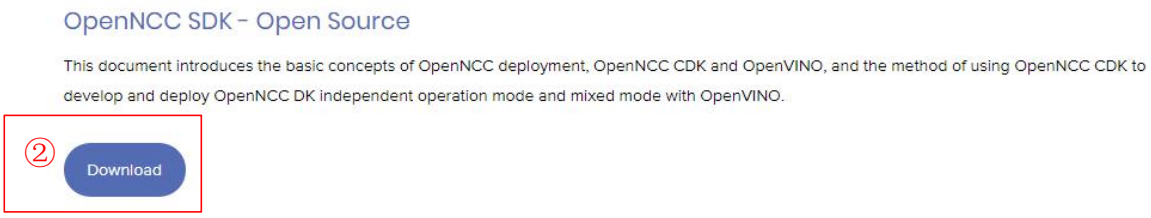
Tip: How to distinguish between computer USB ports.

2.2 Download Software Development Kit(SDK)

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



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



- 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.