



Polyhex Technology Company Limited

DEBIX Camera Module User Guide

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DEBIX Camera Module is a miniature camera used with DEBIX computer products, which can better reproduce the real scene and achieve the fastest image acquisition.



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REVISION HISTORY

Rev.	Date	Description
1.0	2022.03.27	First edition
1.1	2023.08.15	Added a link to the DEBIX User Manual.
1.2	2025.04.18	Optimized the content and added <u>the focusing method of camera modules</u>



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Chapter 1 DEBIX Camera Module Introduction

DEBIX Camera Module is a camera module designed for DEBIX. There are currently 3 camera modules available: DEBIX Camera 200A Module, DEBIX Camera 500A Module and DEBIX Camera 1300A Module.

Main features:

- DEBIX Camera 200A Module
 - 2 megapixels still resolution, 1600 x 1200/20fps video mode
 - 76 degrees diagonal FOV, 60 degrees horizontal FOV, 50 degrees vertical FOV
 - Fixed focus
- DEBIX Camera 500A Module
 - 5 megapixels still resolution, three video modes: 2592 x 1944/15fps, 1920 x 1080/30fps, 1280 x 960/45fps
 - 72 degrees diagonal FOV, 58 degrees horizontal FOV, 45 degrees vertical FOV
 - Focusing for default, and it could be changed to fixed focus
- DEBIX Camera 1300A Module
 - 13 megapixels still resolution, three video modes: 4208 x 3120/30fps, 3840 x 2160/30fps, 1920 x 1080/60fps
 - 80 degrees diagonal FOV, 68 degrees horizontal FOV, 54 degrees vertical FOV
 - Focusing for default, and it could be changed to fixed focus

1.1. Overview



Figure 1 DEBIX Camera 200A Module



Figure 2 DEBIX Camera 500A Module



Figure 3 DEBIX Camera 1300A Module

DEBIX Camera Modules are compatible with DEBIX Model A/B/C and DEBIX Infinity of the DEBIX N series, and can be connected to DEBIX SOM A I/O board via an add-on board; the specific specifications are as follows:

Table 1 DEBIX Camera Module specification

Module Parameter	Camera 200A	Camera 500A	Camera 1300A
Still Resolution	2 megapixels	5 megapixels	13 megapixels



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Video Mode	1600 x 1200/20fps	<ul style="list-style-type: none">● 2592 x 1944/15fps● 1920 x 1080/30fps● 1280 x 960/45fps	<ul style="list-style-type: none">● 4208 x 3120/30fps● 3840 x 2160/30fps● 1920 x 1080/60fps		
Sensor	GC2145	OV5640	AR1335		
Sensor Resolution	1616 x 1232 pixels	2592 x 1944 pixels	4208 x 3120 pixels		
Sensor Image Area	2.83mm x 2.16mm	3.67mm x 2.74mm	4.629mm x 3.432mm		
Pixel Size	1.75um x 1.75um	1.4um x 1.4um	1.1um x 1.1um		
Optical Size	1/5"	1/4"	1/3"		
Depth of Field	Approx 30cm to ∞	Approx 10cm to ∞	Approx 10cm to ∞		
Diagonal FOV	76°	72°	80°		
Horizontal FOV	60°	58°	68°		
Vertical FOV	50°	45°	54°		
Focus	Fixed	Focusing (default, can be changed to fixed)	Focusing (default, can be changed to fixed)		
Focal Length	2.27mm	3.25mm	3.52mm		
Focal Ratio (F-Stop)	2.2	2.8	2.2		
Maximum Exposure Time (seconds)	/	390	/		
Size	25 x 24 x 8.85mm	25 x 24 x 7.5mm	25 x 24 x 7.7mm		
Flexible Flat Cable	15cm				
Camera Lens					
Output Formats	Raw/YCbCr4:2:2/RGB565				



Lens Construction	3P + 1IR	3P + 1IR	5P + 1IR
TV Distortion	<1.5%	<1%	<1%
Thread	M5 x 0.35P	M6.0 x 0.35P	M6.5 x 0.25P
IR Filter	650±10nm		
S/N Ratio	TBD	36dB	37dB
Dynamic Range	TBD	68dB	69dB
Power Supply	<ul style="list-style-type: none">● Core: 1.8VDC● Analog: 2.8VDC● I/O: 3.3VDC	<ul style="list-style-type: none">● Core: 1.5VDC● Analog: 2.8VDC● I/O: 3.3VDC	<ul style="list-style-type: none">● Core: 1.2VDC● Analog: 2.7VDC● I/O: 3.3VDC
Power Consumption (Operating)	100mW	160mW	270mW
Temperature Range	<ul style="list-style-type: none">● Operating Temp.: -30°C~ 70°C● Storage Temp: -40°C~ 85°C		

1.2. Composition

DEBIX Camera Module is composed of camera chip and lens.

- Camera 200A and Camera 500A lenses both contain 1 IR filter and 3 plastic lenses,
- While Camera 1300A lens consists of 1 IR filter and 5 plastic lenses.

1.3. Interface

DEBIX Camera Module's 24-pin connection interface can be used to connect to the CSI interface of DEBIX Model A/B/C and DEBIX Infinity, or the 24-pin connection interface of camera adapter board for DEBIX SOM A I/O Board. The pin sequence is as shown in the

figure:

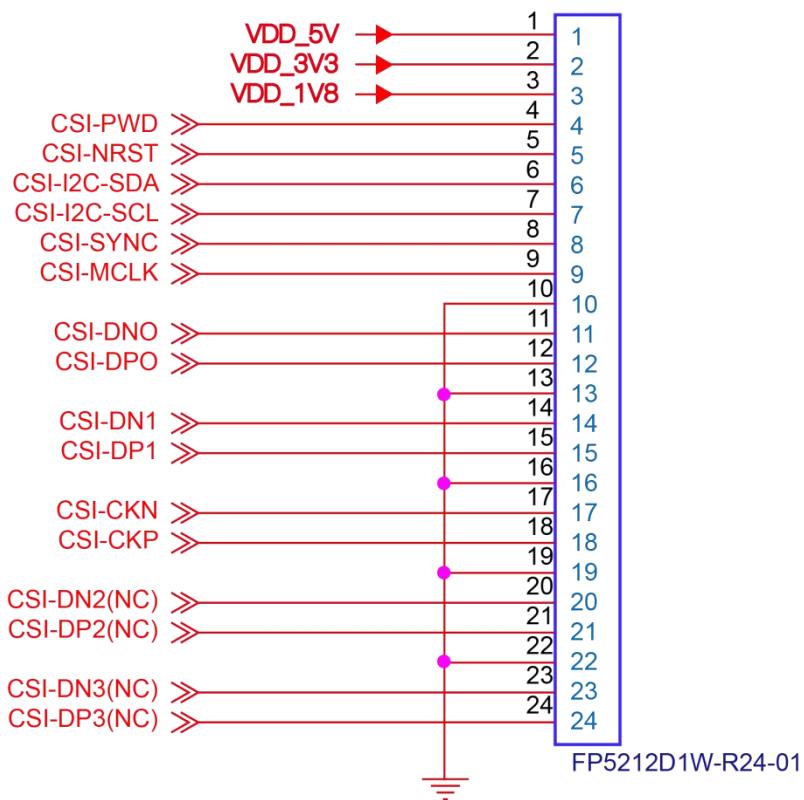


Figure 4

The interface is defined as follows:

Table 2 Pin definition of 24Pin interface

Pins	Definition	Description
1	VDD_5V	5V input
2	VDD_3V3	3.3V input
3	VDD_1V8	1.8V input
4	CSI_PWD	Power Control
5	CSI_NRST	Reset control
6	CSI_I2C_SDA	I2C data signal (controlled by I2C2)
7	CSI_I2C_SCL	I2C clock signal (controlled by I2C2)
8	CSI_SYNC	Synchronization signal
9	CSI_MCLK	Master clock input



10	GND	Ground terminal
11	CSI_DN0	CSI Differential data channel 0 (-)
12	CSI_DP0	CSI Differential data channel 0 (+)
13	GND	Ground terminal
14	CSI_DN1	CSI Differential data channel 1 (-)
15	CSI_DP1	CSI Differential data channel 1 (+)
16	GND	Ground terminal
17	CSI_CKN	CSI Differential Clock Channels (-)
18	CSI_CKP	CSI Differential Clock Channels (+)
19	GND	Ground terminal
20	CSI_DN2	CSI Differential data channel 2 (-)
21	CSI_DP2	CSI Differential data channel 2 (+)
22	GND	Ground terminal
23	CSI_DN3	CSI Differential data channel 3 (-)
24	CSI_DP3	CSI Differential data channel 3 (+)

1.4. Packing List

DEBIX Camera Module packing list:

- 1 x DEBIX Camera Module
- 1 x 24Pin/0.5mm Pitch FPC cable

Chapter 2 DEBIX Camera Module Installation Guide

DEBIX Camera 200A Module, Camera 500A Module and Camera 1300A Module have the same installation connection, so here is an example of Camera 500A Module and DEBIX Model A.

- If you have DEBIX Model B/C or DEBIX Infinity, the installation method is the same, except for boot mode. Please refer to the “System Boot” chapter in User Manual for the boot mode.
- If you have DEBIX SOM A I/O Board, you need to install it through an add-on board, please refer to [Camera Adapter Board for DEBIX SOM A I/O Board User Manual](#) for details.

WARNING:

Cameras are sensitive to static. Earth yourself prior to handling the PCB. A sink tap or similar should suffice if you don't have an earthing strap.

2.1. Connect Hardware

● Component Preparation

- ✓ DEBIX Model A
- ✓ 24Pin 0.5mm Pitch FPC cable
- ✓ DEBIX Camera 500A Module

● Hardware Connection

1. Pull up the black rubber snap of the connection interface on the back of Camera 500A Module, insert the FPC cable (note the direction of the gold finger, gold finger facing

down), and press the snap as shown in the figure:

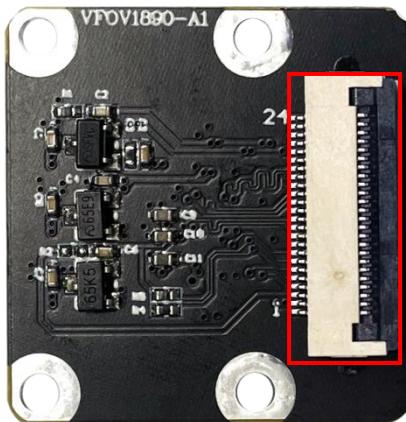


Figure 5 Rubber snap being pressed

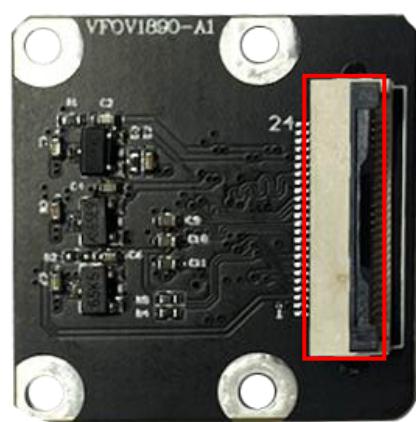


Figure 6 Rubber Button being pulled up



Figure 7



Figure 8

2. Then pull up the snap of the CSI interface on DEBIX Model A/B, insert the other end of the FPC cable (with the gold finger facing the OTG interface), and press the snap to fix it, as shown below:

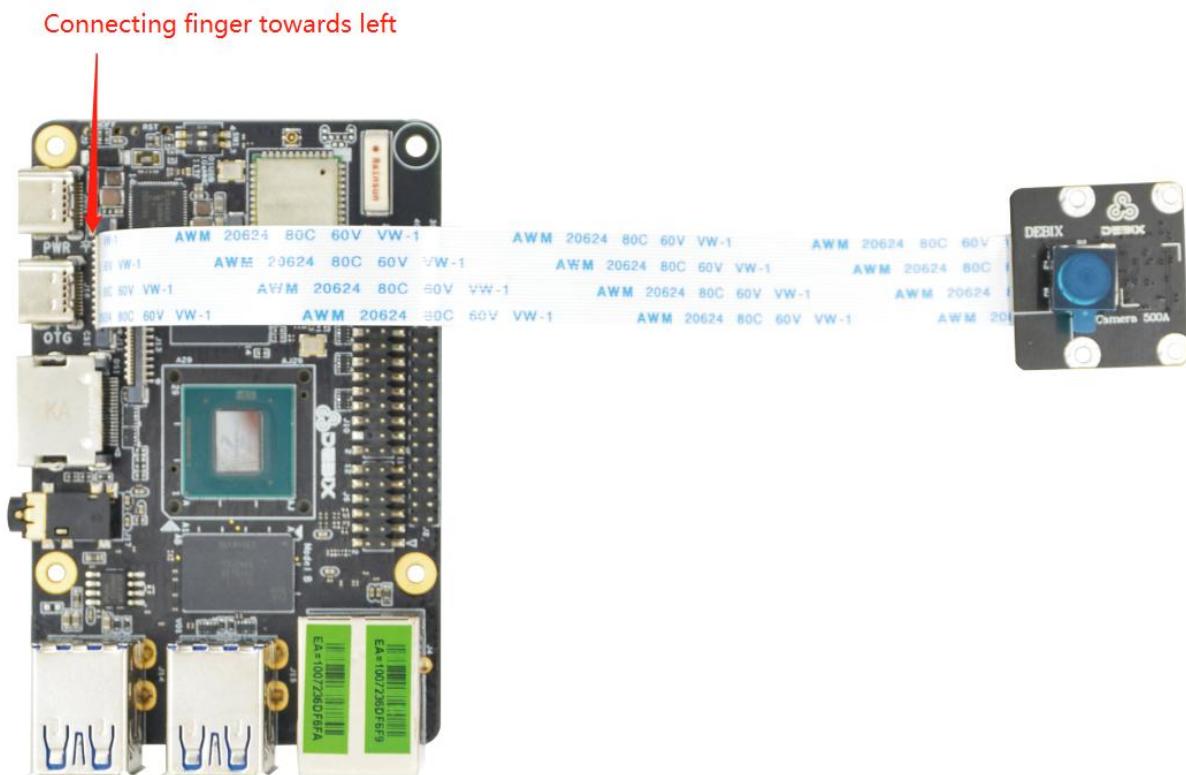


Figure 9

Depending on the model, the camera may come with a small piece of translucent blue plastic film covering the lens. This is only present to protect the lens while it is being mailed to you, and needs to be removed by gently peeling it off after installation.

2.2. Power on

Warning

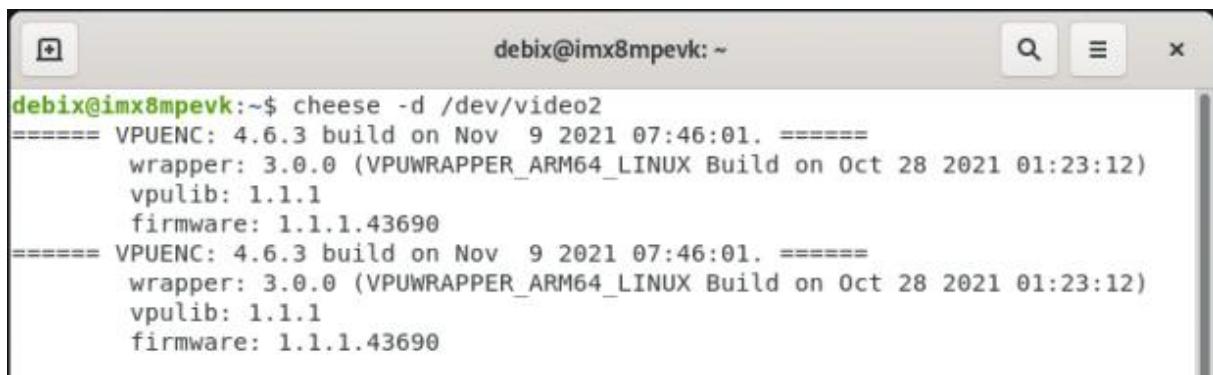
The device can be powered on only after the camera accessories are completely connected; and the accessories cannot be inserted or removed at will during the working process.

1. After connecting DEBIX Camera Module to DEBIX Model A, connect DEBIX Model A to peripherals (keyboard, mouse, monitor), insert a Micro SD card with the latest system of DEBIX Model A, power up DEBIX Model A, then open terminal and run the command:

```
sudo cp /boot/imx8mp-debix-core-ov5640.dtb /boot/imx8mp-evk.dtb      #boot camera  
sudo reboot                                         #reboot DEBIX  
cheese -d /dev/video2                            #open camera
```

Important

Running the Cheese tool with an administrator (`sudo su`), camera boot will fail, so it is not necessary to run as administrator.



The screenshot shows a terminal window titled "debix@imx8mpevk: ~". The command entered is "cheese -d /dev/video2". The output displays two sets of device information:

```
debix@imx8mpevk:~$ cheese -d /dev/video2
===== VPUENC: 4.6.3 build on Nov  9 2021 07:46:01. =====
    wrapper: 3.0.0 (VPUWRAPPER_ARM64_LINUX Build on Oct 28 2021 01:23:12)
    vpulib: 1.1.1
    firmware: 1.1.1.43690
===== VPUENC: 4.6.3 build on Nov  9 2021 07:46:01. =====
    wrapper: 3.0.0 (VPUWRAPPER_ARM64_LINUX Build on Oct 28 2021 01:23:12)
    vpulib: 1.1.1
    firmware: 1.1.1.43690
```

2. In the "Take a Photo" window of Cheese tool, you can see the image, press the button



to take a picture, and the photo is saved in the path of `/home/Pictures`; at the same time, you can choose "Effects" to adjust the image window background. As shown in the figure below:

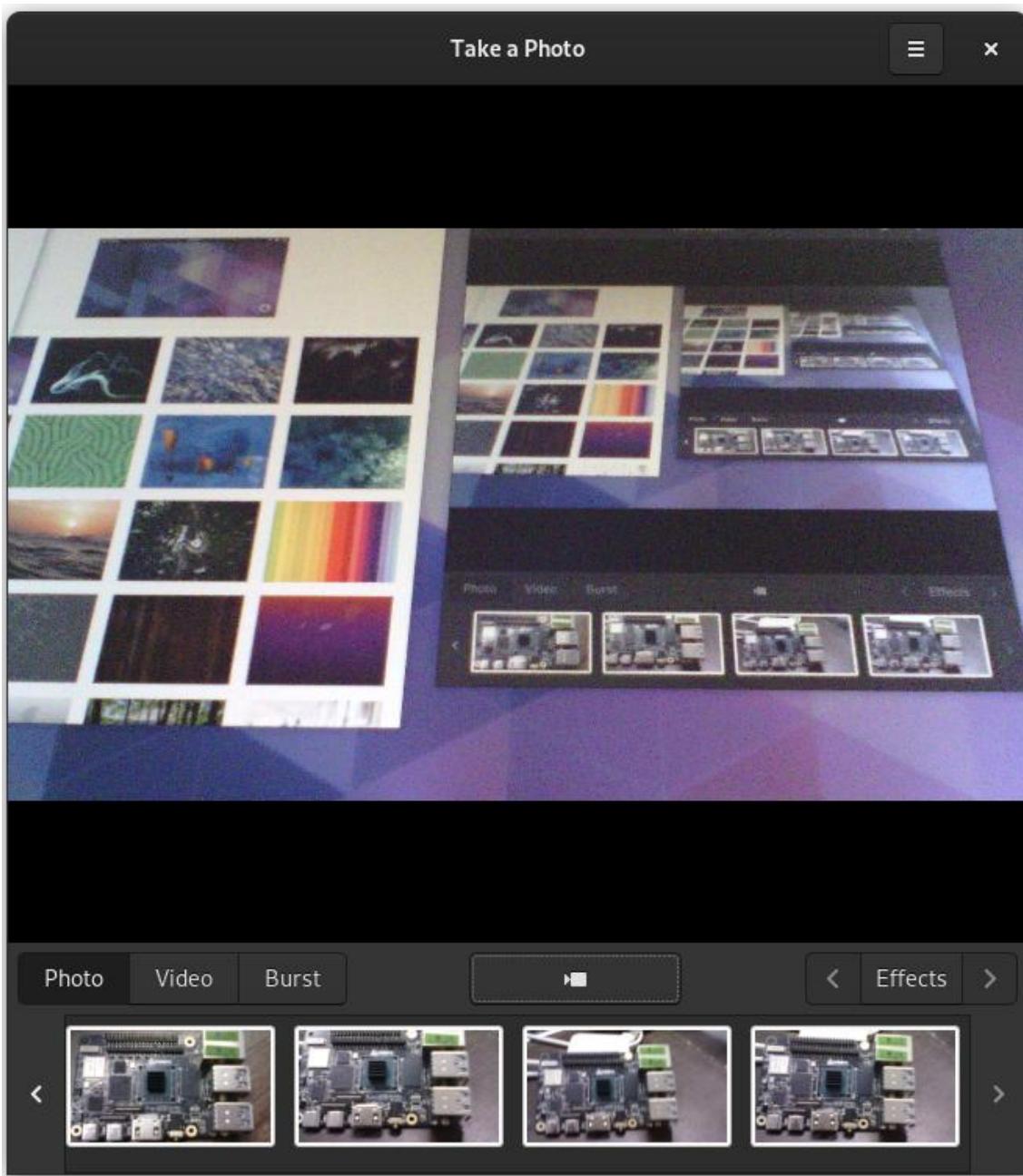


Figure 10

Select "Video" to take a video, select "Burst" to take multiple photos, and click the picture taken below to preview.



Click the icon in the upper right corner of the window and select **Preferences** to set the resolution of Photo/Video to take photos or videos.



2.3. Focusing Methods

The Camera 500A and Camera 1300A support focusing functionality. The focusing procedures are as follows:

Important

- For Ubuntu systems, use the latest OS version from DEBIX official website: **Ubuntu 22.04 V3.12**.
- DEBIX OS Download Center: <https://debix.io/Software/downloadn.html>

● Camera 500A Module

1. Open the terminal and enter the focusing command:

```
echo 1 > /sys/devices/platform/soc@0/30800000.bus/30a30000.i2c/i2c-1/1-003c/ov5640_
autofocus
```

● Camera 1300A Module

1. Switch the device tree by entering the following command. Reboot the device after successful switching:

```
#cp /boot/imx8mp-debix-core-ar1335.dtb /boot/imx8mp-evk.dtb
```

2. Start the camera by entering the command:

```
cheese -d /dev/video2
```

3. I2C Motor Control Example:

```
#apt-get update
#apt-get install i2c-tools
#DebixAr1335Focus
```