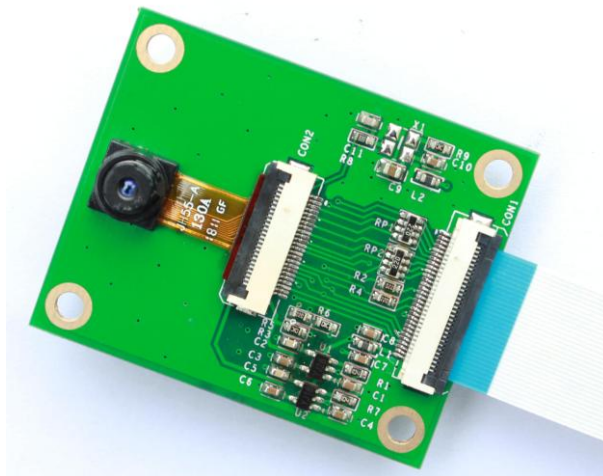


DM-CAM130 User Manual



DM-CAM130 Camera module

- ◆ A CMOS image sensor which is a 1.3 Megapixel Digital Camera
- ◆ Supports STM32F2x and STM32F4x series micro controller
- ◆ Supports image preview, photos taking, and photo storage



Declaration

element14/Embest and ST have launched the STM32F4DIS-BB, a low cost development platform based on STM32F4DISCOVERY. The platform also supports two modules STM32F4DIS-LCD, STM32F4DIS-CAM.

Glossary

Term	Meaning
STM32F4DIS-BB, DM-STF4BB	the Base Board for the STM32F4DISCOVERY
STM32F4DIS-LCD,DM-LCD35RT	the LCD module for the STM32F4DIS-BB
STM32F4DIS-CAM,DM-CAM130	the Camera module for the STM32F4DIS-BB
Devkit407	STM32F4DIS-BB and STM32F4DISCOVERY
Devkit1207	DevKit1207 Target Board

STM32F4DIS-BB, STM32F4DIS-LCD,STM32F4DIS-CAM are the ST part numbers.

DM-STF4BB, DM-LCD35RT, DM-CAM130 are the Embest part numbers.

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- ✧ is trademark of Element14.

- ✧ Microsoft, MS-DOS, Windows XP are trademarks of Microsoft Corporation.

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Contact:

If you want to order products from Embest, please contact the Marketing Department:

Tel: +86-755-25635656 / 25636285

Fax: +86-755-25616057

E-mail: market@embedinfo.com

If you need technical assistance from Embest, please contact the Technical Assistance Department:

Tel: +86-755-25503401

E-mail: support@embedinfo.com

URL: <http://www.embest-tech.com>

Address: Room 509, Luohu Science & Technology Building, #85 Taining Road, Shenzhen, Guangdong, China (518020)

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Charter 1 Overview

1.1 Product Introduction

DM-CAM130 Digital Camera Module designed by Embest, can be used on DevKit1207 DevKit407 evaluation board. This module contains an OV9655, which is a 1.3megapixel CMOS SXGA image sensor. This module supports image preview, photo taking and photo storage. It is suitable for applications such as Portable Digital Terminal, Gaming and Home Automation.

1.2 Definition

SCCB: Serial Camera Control Bus (I2C like protocol).

SXGA: Super eXtended Graphics Array (Resolution: 1280x1024).

1.3 Feature

Table 1-1 Hardware feature

Dimension	47.8mm*37.6mm*6mm
Signal System	CMOS 1.3 Mega Pixel
Resolution	Up to 1280*1024
Frame Rate	15fps for SXGA
	30fps for VGA,CIF
Interface	30-pin FPC connector
Power Supply	From board
Operating Temp.	-10°C~70°C

Table 1-2 Software feature

Photo Taking	Support
Photo Storage	Support, BMP format

1.4 ESD Precautions and Proper Handling Procedures

Please note that the DM-CAM130 board come without any case/box and all components are exposed for finger touches. – and therefore extra attention must be paid to ESD (electrostatic discharge) precaution. Make sure there is no static interference when using the boards. Appropriate ESD protections must be taken and wearing electrostatic equipment is recommended, such as anti-static wrist.



ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Warning:

This is a class A product. In a domestic this product may cause radio interference in which case the user may be required to take adequate measures.

Charter 2 Hardware System

2.1 Hardware Interface

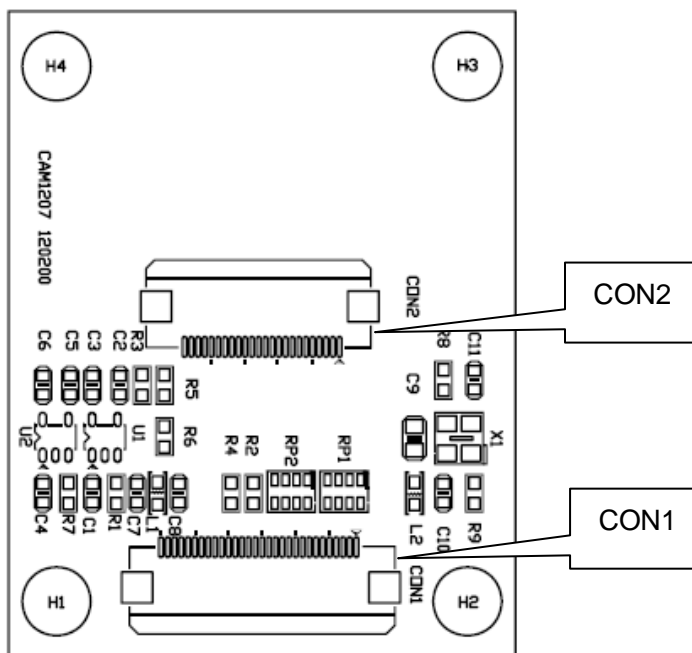


Figure 2-1 Hardware interface

2.1.1 FPC Interface CON2

Table 2-1 OV9655 FPC Connector CON2

CON2		
Pin	Signal	Description
1	Y0	Output bit[0] - LSB for 10-bit RAW RGB data only
2	Y1	Output bit[1] - for 10-bit RGB only
3	Y4	Output bit[4]
4	Y3	Output bit[3]
5	Y5	Output bit[5]
6	Y2	Output bit[2] - LSB for 8-bit YUV

7	Y6	Output bit[6]
8	PCLK	Pixel clock output
9	Y7	Output bit[7]
10	DGND	Digital ground
11	Y8	Output bit[8]
12	XCLK	Crystal clock input
13	Y9	Output bit[9] - MSB for 10-bit RGB and 8-bit YUV
14	DOVDD28	Digital power supply (VDD-IO= 2.5 to 3.3 VDC)
15	DVDD18	Power supply (VDD-C= 1.8 VDC + 10%) for digital output drive
16	HREF	HREF output
17	PWDN	Power Down Mode Selection 0: Normal mode 1: Power down mode
18	VSYNC	Vertical sync output
19	RESET	Clears all registers and resets them to their default values. 0: Reset mode 1: Normal down mode
20	SIO_C	SCCB serial interface clock input
21	AVDD	Analog power supply (VDD-A= 2.45 to 2.8 VDC)
22	SIO_D	SCCB serial interface data I/O
23	AGND	Analog ground
24	NC	No connect

2.1.2 FPC Interface CON1

Table 2-2 FPC Connector CON1

CON1		
Pin	Signal	Description
1	GND	GND
2	D0	No connect
3	D1	No connect
4	D2	Digital image data bit 0
5	D3	Digital image data bit 1
6	D4	Digital image data bit 2
7	D5	Digital image data bit 3
8	D6	Digital image data bit 4
9	D7	Digital image data bit 5
10	D8	Digital image data bit 6
11	D9	Digital image data bit 7
12	D10	No connect
13	D11	No connect
14	GND	GND
15	PCLK	Pixel clock
16	GND	GND
17	HS	Horizontal synchronization
18	VDD50	No connect
19	VS	Vertical synchronization
20	VDD33	+3.3V
21	XCLKA	Clock output
22	XCLKB	No connect
23	GND	GND
24	FLD	No connect
25	PWR_EN	Power Enable (Default=0)
26	RST	Reset the camera (Default=1)

27	SDA	I2C master serial clock
28	SCL	I2C serial bidirectional data
29	GND	GND
30	VDDIO	+3.3V

2.2 Hardware Dimensions

The hardware dimensions of DM-CAM130 (Units: mm):

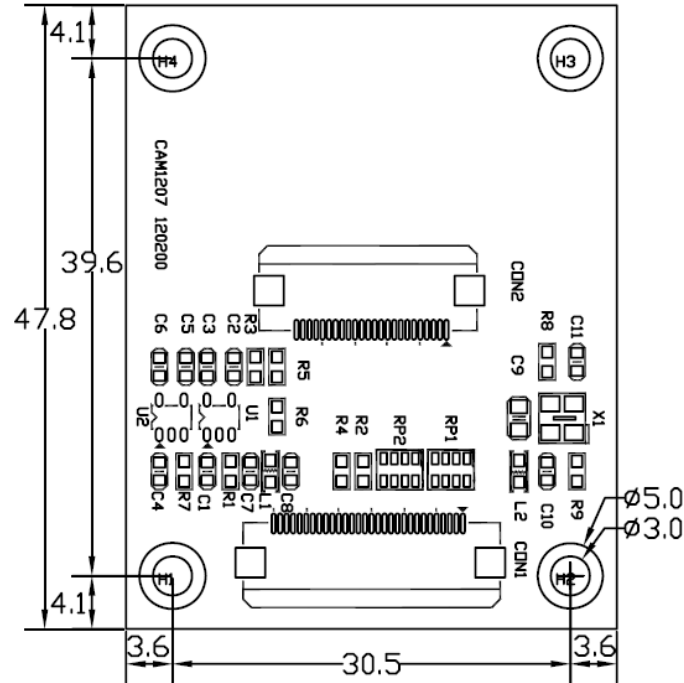


Figure 2-2 Hardware Dimensions Diagram

Charter 3 Getting Started

3.1 How to work with DevKit1207

3.1.1 Preparation

Hardware:

- DevKit1207 Target Board
- DM-CAM130 Module
- 5V power adapter
- TF card (2GB or less than 2GB Kingston or SanDisk TF Card is recommended. It should be formatted before using)

Software:

- DCMI demo

The demo project is located in following folder:

```
DCMI_OV9655\Project\STM32F2xx_StdPeriph_Examples\DCMI
```

3.1.2 Testing

In order to run DCMI demo, please follow steps below:

- 1) Connect DM-CAM130 CON1 to DevKit1207 CON6 via FFC soft cable. Please make sure that DM-CAM130 module is mounted correctly as following

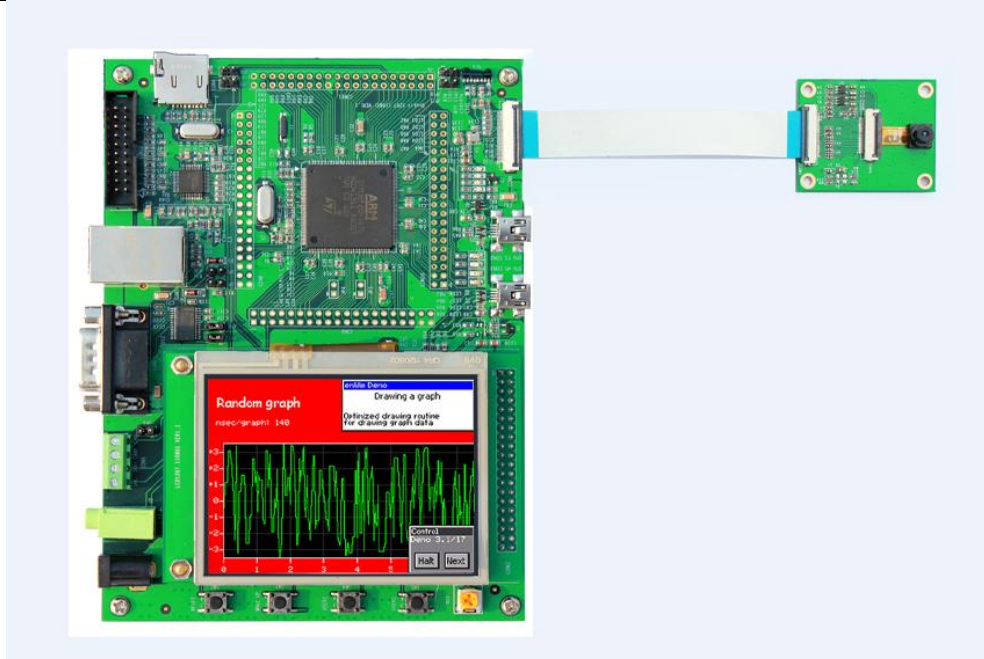


Figure 3-1 Connect DM-CAM130 to DevKit1207 via FFC soft cable

- 2) Insert TF card into DevKit1207 CON4, and make sure that JP5&JP6 are fitted; JP7&JP8 and JP10&JP11 are not fitted.
- 3) Plug in +5V power supply to the DevKit1207.
- 4) Rebuild the demo, and then download the program into Flash.
- 5) Press RESET button to reset MCU. It will start to run automatically.
- 6) Images collected by the module will be show on LCD. If LCD display “Camera Init ... fails”, please make sure that DM-CAM130 module is mounted correctly and try again follow by step1) to step 5).
- 7) Press USER2 button 2 ~ 3 second to take a photograph. The photograph will be stored into TF card automatically and named as “PICxx.BMP”. “xx” is picture’s number; “BMP” is picture’s format.

Note: If one of the following situations appear, please check whether DM-CAM130 module is well-connected to DevKit1207 via FFC soft cable. Then try again following step 1) to step 5).

- *LCD display “Camera Init ...fails”*
- *LCD display all white*
- *Images collected by the module is color difference*

3.2 How to work with DevKit407

3.1.1 Preparation

Hardware:

- DevKit407 Target Board
- DM-CAM130 Module
- DM-LCD35RT Module
- USB type A (Male) to Mini-B (Male) cable
- TF card (2GB or less than 2GB Kingston or SanDisk TF Card is recommended. It should be formatted before using)

Software:

- DCMI demo

The demo project is located in following folder:

```
\Codes\STM32F4xx_Camera_Example\Project\OV9655_Camera
```

3.1.2 Testing

In order to run the example, please follow the steps below:

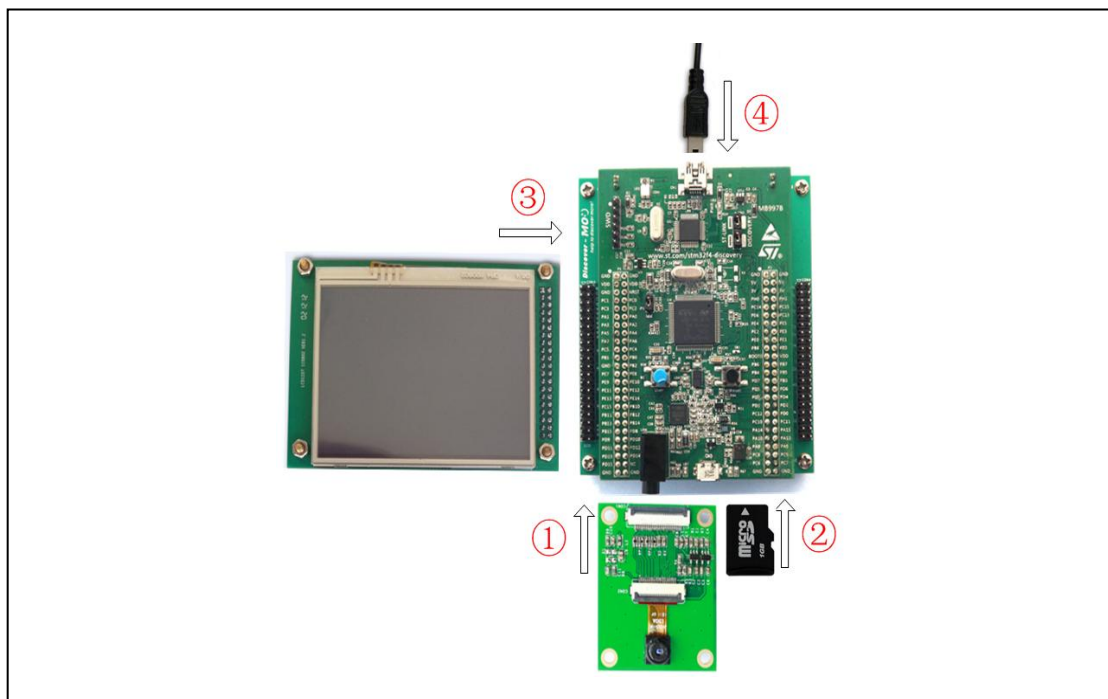


Figure 3-2 Steps for running DCMI example

- 1) Connect DM-CAM130 CON1 to DevKit407 CON7 via FFC soft cable when the power is turned off. Please make sure that DM-CAM130 module is mounted correctly.
Note: Make sure that JP1 and JP2 are not fitted.
- 2) Insert a TF card into microSD slot CON6.
- 3) Connect DM-LCD35RT module onto DevKit407 board through CON3
- 4) Connect the STM32F4DISCOVERY board to a PC with a 'USB type A to Mini-B' cable through USB connector CN1 to power the board.
- 5) Open the MDK project, rebuild all files, load project image and then run program.
- 6) When the program is running, images collected by the module is shown on LCD. Press User button to take a photograph. The photograph will be stored into TF card automatically and named as "PICxx.BMP". "xx" is picture's number; "BMP" is picture's format.

Note: If one of the following situations appear, please check whether DM-CAM130 module is well-connected to DevKit1207 via FFC soft cable. Then try again following step 1) to step 6).

- *LCD display "Camera Init ...fails"*
- *LCD display all white*
- *Images collected by the module is color difference*

Technical Support & Warranty Service

Embest Technology Co.,LTD., established in March of 2000, is a global provider of embedded hardware and software. Embest aims to help customers to reduce time to market with improved quality by providing the most effective total solutions for the embedded industry. In the rapidly growing market of high end embedded systems, Embest provides comprehensive services to specify develop and produce products and help customers to implement innovative technology and product features. Progressing from prototyping to the final product within a short time frame and thus shorten the time to market, and to achieve the lowest production costs possible. Embest insists on a simple business model to offer customers high-performance, low-cost products with the best quality and service. The content below is important information for our products technical support and warranty service:

Technical support service

Embest provides one year free technical support service for all products. Technical support service covers:

- Embest embedded platform products software/hardware materials
- Assist customers in compiling and running the source code we offer.
- Assist in troubleshooting on our embedded software/hardware platforms given that the customer has followed the documentation that we offer.
- Judge whether the product failure exists.

The services listed below are not included in the range of our free technical support service, and Embest will handle each situation with discretion:

- Software/Hardware issues a user meets during the development process

- Issues which occur when users compile/run the embedded OS which has been modified by users themselves.
- User's own applications.
- Problems which occur during the modification of our software source code

Maintenance Service Clause

- 1) The products except LCD, which are not used properly, will take the warranty since the day of the sale:

PCB: Provide 12 months free maintenance service.

- 2) The situations listed below are not included in the range of our free maintenance service, Embest will charge the service fees with discretion:

- a) Can't provide valid Proof-of-Purchase, the identification label is torn up or illegible, the identification label is altered or doesn't accord with the actual products;
- b) Don't follow the instruction of the manual in order to damage the product;
- c) Due to the natural disasters (unexpected matters), or natural attrition of the components, or unexpected matters leads to the defects of appearance/function;
- d) Due to the power supply, bump, leaking of the roof, pets, moisture, impurities into the boards, all those reasons which lead the defects of appearance/function;
- e) User unauthorized weld or dismantle parts leads the product's bad condition, or let other people or institution which are not authorized by Embest to dismantle, repair, change the product leads the product bad connection or defects of appearance/function;
- f) User unauthorized install the software, system or incorrect configuration or computer virus leads the defects;
- g) Purchase the products through unauthorized channel;

- h) Those commitments which is committed by other institutions should be responsible by the institutions, Embest has nothing to do with that;
- 3) During the warranty period, the delivery fee which delivery to Embest should be covered by user, Embest will pay for the return delivery fee to users when the product is repaired. If the warranty period is expired, all the delivery fees will be charged by users.
- 4) When the board needs repair, please contact technical support department.

Note: *Those products are returned without the permission of our technician, we will not take any responsibility for them.*

Basic Notice for Protecting LCD Screen

- 1) Do not use finger nails or hard/sharp objects to touch the surface of the LCD, otherwise the above services will be void.
- 2) Embest recommend user to purchase a screen wipe to wipe the LCD after long time use, please avoid cleaning the surface with fingers or hands to leave fingerprint.
- 3) Do not clean the surface of the screen with chemicals, otherwise user can not enjoy above service.

Note: *Embest do not supply maintenance service to LCD. We suggest the customer first check the LCD after getting the goods. In case the LCD cannot run or show display, customer should inform Embest within 7 business days from the moment of getting the goods.*

Value Added Services

We will provide following value added services:

- Provide services of driver development based on Embest's embedded platforms, like serial port, USB interface devices, LCD screen.
- Provide the services of control system transplant, BSP driver development, API software development.
- Other value added services like power adapter, LCD parts.
- Other OEM/ODM services.
- Technical training.

Please contact Embest to get technical support:

- Support Tel:+86-755-25503401
- Fax:+86-755-25616057
- Pre-Sale consultation: market@embedinfo.com
- After-Sale consultation: support@embedinfo.com