Shenzhen Rakinda Technologies Co.,Ltd

RAKINDA M5 Facial Module

Document Version: V1.3

Secret Level: External Disclosure

Revision History

Revision Date	Version Number	Revision Description
2018/12/06	V1.0	First edition
2019/02/26	V1.1	Refresh working distance range and power consumption data
2019/03/16	V1.2	1) Add interface definition and thermal design guidance
2019/04/08	V1.3	1）1) Size adjustment, thickness direction changed to 10.6mm, schematic diagram updated; 2）The upper limit of the working distance range is optimally adjusted to 1.2m; 3）The working temperature is adjusted to 45 ° C. The embedded design must consider the heat dissipation of the whole machine.

Catalogue

1、Product Description

RAKINDA M5 product is a new generation of miniaturized RGBD cameras independently developed by Rakinda Internet of Things Technology Co., Ltd. The product integrates a 640 × 480 pixel TOF depth camera and a 5 million pixel RGB camera.

The miniaturized and ultra-thin size structure is suitable for various embedded and handheld detection terminals, and realizes functions such as face recognition, living body detection, scene recognition, and gestures. The product provides a complete SDK, and users can perform device integration and secondary development according to their own needs.

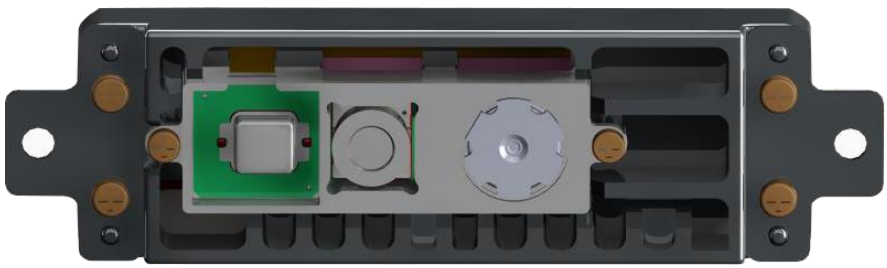


Figure 1： RAKINDA M5 Module

Product Features：

- Design based on TOF principle;
- High resolution, depth map resolution is 640 × 480;
- High accuracy, up to 0.1%;
- Using 940nm VCSEL light source to support outdoor applications;
- Miniaturized and ultra-thin design, the appearance size is 55mm × 18mm × 10.6mm, suitable for various embedded applications;
- Accurate synchronization and alignment between depth, IR and RGB images.

2、Product Introduction

2.1.Product Specifications

Product specifications are shown in Table 1：

Table 1：RAKINDA M5 Product Specifications

Parameter		Specifications
Model		RAKINDA M5
TOF	Resolution (horizontal x vertical)	640×480
	Field of view (horizontal and vertical)	60°× 45°
	Frame Rate (fps)	Maximum 30
RGB	Resolution (horizontal x vertical)	Support 1080P/960P/720P/VGA
	Field of view (horizontal and vertical)	74°× 56° @960P（Default） 63°× 37° @1080P 74°× 42°@720P 74°× 56°@VGA
	Frame Rate (fps)	Maximum 30
	Video Coding	JPEG、RGB
Detection range（unit：m）注1		0.3 - 1.2
Measurement accuracy注2		0.1%
Measurement accuracy注3		1%
Light source		940nm VCSEL
Data transmission interface		Micro USB
Power supply		5V
Typical power consumption（W）		3.4
Operating temperature（℃）		0-45
Operating system		Windows7 and above、Linux、Android
Structure size (length × height × depth, single Bit: mm)		55×18×10.6（Module without mounting steel） 65.8×18×10.6（ Module without mounting steel）

- Note 1: Measurement distance: For white wall test with 90% reflectivity, the detection distance in the center area; reflectance has an impact on measurement distance, accuracy and accuracy.
- Note 2: Measurement accuracy: For the white wall test with 90% reflectance, the root mean square error of the repeated test in the center area.
- Note 3: Measurement accuracy: for the white wall test with 90% reflectivity, the error between the measurement distance and the true distance.

- Note 4: If the board-level power supply USB port 5V power current is greater than 1A, the power can be directly supplied through the USB port; if the current is less than 1A, power is supplied through the dedicated accessory cable.

- Note 5: The module form and embedded design must be used with the whole machine for heat dissipation design; refer to the design guide or contact the manufacturer for heat dissipation scheme.

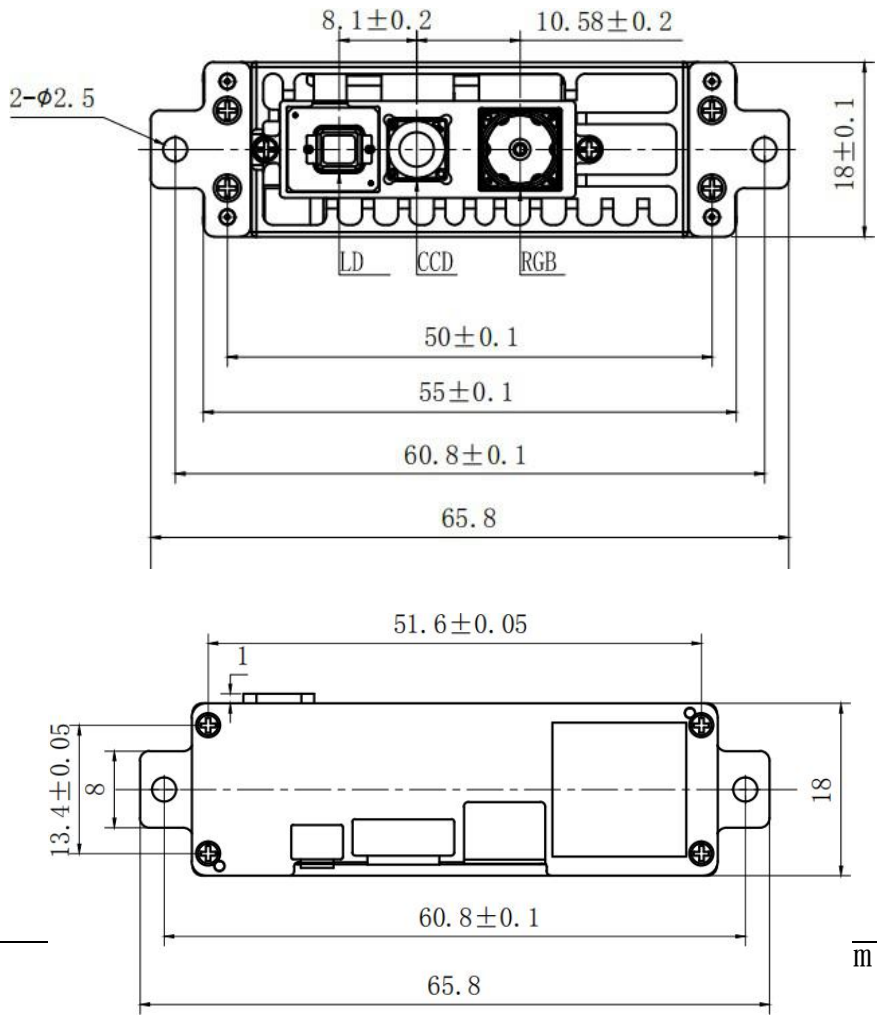
2.2. The Main Components Of The Product Hardware

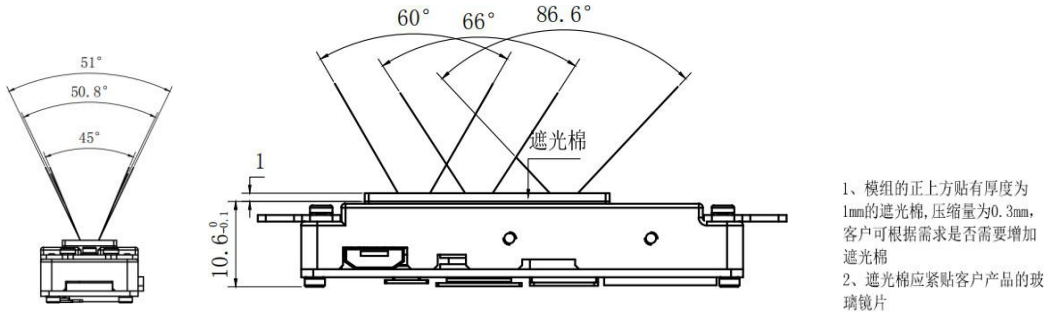
- A TOF camera module;
- A VCSEL laser;
- One RGB camera module
- A dedicated ASIC processing chip;
- A control motherboard (including CPU, FLASH, etc.);Camera module.

2.3. Product Structure Size

（Unit：mm）

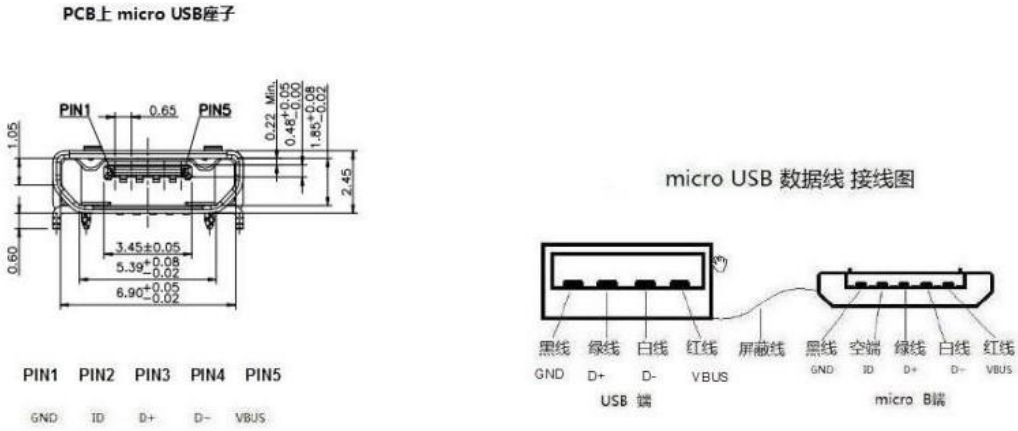
- RAKINDA M5 Module structure size：





2.4.Interface Definition

USB2.0 Interface Pin Definition：



Definition of Micro-USB interface on the motherboard

USB data cable 2-terminal interface definition

Pin	Name	Line color	Description
1	VBUS	Red（red）	5V power supply
2	D-	White（white）	Data line negative
3	D+	Green（green）	Data line is positive
4	ID	None（none）	Divided into A and B interfaces A: Connected to ground; B: Not connected to ground
5	GND	Black（black）	Signal ground

2.5.Module Thermal Design Description

1. Because the product is too small and the chip temperature is relatively

high, heat treatment is required to avoid excessive temperature and reduce product life. A heat sink can be added on the back. The heat sink material is AL6063, aluminum extrusion or machining, and the heat dissipation area is not less than 100cm², the surface treatment is anodized black (increased radiation coefficient), avoid using long strips as much as possible when selecting the radiator;

2. If the back of the customer's product is made of metal, the temperature can be directly guided to the back cover;

3. Direct the entire motherboard to the heat sink through a thermally conductive silicone sheet (without stickiness) (the radiator is a whole). The thermal conductivity of the thermally conductive adhesive is 3W / mk and the thickness is 1mm. However, it should be noted that the pressure should be controlled within the compression range of the thermal conductive adhesive to prevent the chip from being crushed;

4. The ambient temperature of the equipment does not exceed 45 ° C;

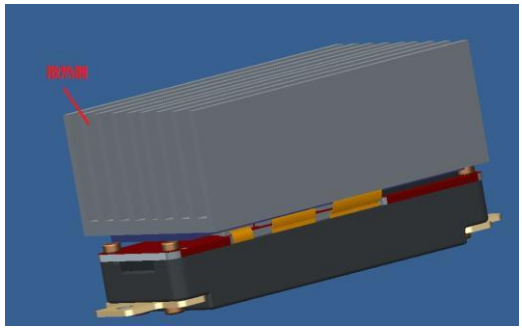
5. When installing the radiator, please be careful not to contact with other components on the motherboard to prevent short circuit from causing damage to the motherboard;

6. It is forbidden to stick tape and other materials that affect heat dissipation on the motherboard and the bracket, so as not to cause the motherboard temperature to be too high to affect the performance of the product.

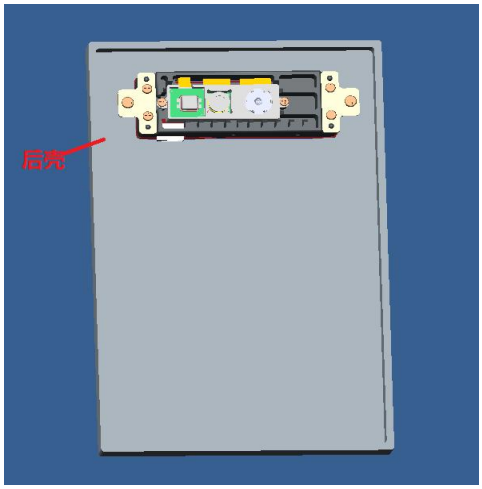
Thermal silica sheet installation position：

Example of fixed method：

Example 1: Back with radiator：



Example 2: directing heat to the rear case：



For the long rear shell in the figure above, a layer of graphene can be affixed inside the shell to quickly and uniformly spread the heat and avoid local overheating of the shell.

3、Implementation Function Introduction

1. Depth data output: output uint16 depth data;
2.IR image data output: output 8-bit infrared intensity map;
3.RGB image output: output JPEG or 24-bit RGB data;
Synchronization and alignment between depth data, IR and RGB data.

4、Instructions For Use

When this product is used, it is connected to the host through a USB cable. When the power supply interface of the motherboard is insufficient, an external DC 5V power supply can be connected. Currently the SDK supports Windows, Linux, and Android platforms. The recommended configuration is as follows：

A. Operating System

Windows:

Windows 7, 8, 10 on x86 (32/64 bit)；

Ubuntu:

Ubuntu 12.04 (32/64/arm)and above；

Android:

Android 5.0 the above；

B. Processor

Pentium 4, 1.4GHz and above；

AMD Athlon 64/FX 1GHz and above；

Arm Cortex A8 and above；

C. RAM

More than 64MB；

D. External storage

More than 250MB；

E. Interface

Micro USB 2.0；

F. Development environment

VS2010，VS2015，Eclipse，Android Studio；

G. Graphics card

Some sample programs need to be higher than ATI RADEON x1300 or NVIDIA GeForce 7300;

For more detailed instructions, please refer to the Developer's Guide after purchasing the RAKINDA M5 device.

After obtaining the RAKINDA M5 prototype, please select the appropriate system platform, read the installation and diagnostic guides of Aisin smart devices, and use the Aisin smart client to develop products according to the "Developer's Guide". If you encounter technical problems, please contact Aisin in time Staff contact.

5、Application scenario

RAKINDA M5 product can be widely used in various types of deep vision

detection scenarios, mainly including：

Industry	Application
Somatosensory entertainment	Somatosensory games, bone extraction, 3D fitting, gesture recognition, etc.
Face Recognition	Face payment, face access control, witness integrated machine, etc.
Robot	Avoidance