# RMSL201-1301


## Key features

- Dedicated image DSP enables high precision , and flexible to various requirements.
- One-Stop Face Payment solution, including DSP, AI-Engine, depth algorithm, optics design.
- Optimization for face-imaging, present better portrait under various ambient lighting.
- Support 3rd party anti-spoofing algorithm support converged-payment.
- Support implement algorithm in module, easier deployment.

| Module | Item | Parameter | Comment |
|---|---|---|---|
| Speckle Projector | Laser type | VCSEL | PQCW-BC-4-W0940-S3 |
| | Wavelength | 940 nm(Typ.) | 940±10 nm@50℃ |
| | FOI | 92.1°±3° | H70.8°,V74.2° |
| | Focus Distance | 35cm | |
| | Pins | 16 Pin | B To B |
| IR Camera | Sensor | 1/4" CMOS Sensor | OV9282-GA4A(b&w) |
| | Resolution | 1M | 800H*1280V Pixels |
| | Interface | MIPI | |
| | Sensor ID | OV9282 | |
| | Focus Type | FF | |
| | FOV | 77.00°±3° (OPT) | |
| | | 80.50°±3° (ME) | |
| | Focus Distance | 33cm | |
| | Pins | 20 Pin | B To B |
| RGB Camera | Sensor | 1/4" CMOS Sensor | OV5695-GA4A(color) |
| | Resolution | 5M | 1944H*2592V Pixels |
| | Interface | MIPI | |
| | Sensor ID | OV5695 | |
| | Focus Type | AF | |
| | FOV | DIAGONAL =84.0° | |
| | | HORIZONTAL =56.6° | |
| | | VERTICAL =71.5° | |
| | Pins | 30Pin | B To B |
| Flood | Sensor ID | SFH 4775S | |
| | FOI | 80° | |
| | Wavelength | 940 nm(Typ.) | |
| | Spectral Width （FWHM） | 37nm | |
| Proximity Sensing | IR Emitter ID | LTE-C249 | |
| | Optical Sensor ID | LTR-507ALS-01 | |
| | Peak Wavelength | 850nm(Typ.) | |
| | Spectral Width （FWHM） | 30nm | |
| | FOI | ±15° | |
| | Detection Distance | 0~30cm | |
| | Interface | I2C | |
| | Pins | 16Pin | B To B |
| Module | Baseline | 40mm | |
| | Precision | ±1mm@60cm | |
| | Weight | NA | |
| | Size (L x W x H) | 88.57mm x 18.0mm x 17.1mm | |

# *Rockchip RMSL201-1301* Datasheet



**Revision 1.2**
**Mar. 2020**

| **Revision sheet** 变更单 | | | | |
|---|---|---|---|---|
| **Revision No.**<br>版本号 | **Date**<br>日期 | **Revision**<br>变更内容 | **Reason**<br>变更原因 | **Sig.**<br>签名 |
| V1.2 | 2020-3-13 | UPDATE | 修订标题及图纸说明 | Danny |
| V1.1 | 2020-2-14 | UPDATE | 更新参数 | Danny |
| V1.0 | 2019-12-16 | 初版 | 初次发布 | Team |

目录





# Warranty Disclaimer

Rockchip Electronics Co., Ltd makes no warranty, representation or guarantee (expressed, implied, statutory, or otherwise) by or with respect to anything in this document, and shall not be liable for any implied warranties of non-infringement, merchantability or fitness for a particular purpose or for any indirect, special or consequential damages.

Information furnished is believed to be accurate and reliable. However, Rockchip Electronics Co.,Ltd assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use.

Rockchip Electronics Co., Ltd's products are not designed, intended, or authorized for using as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Rockchip Electronics Co.,Ltd's product could create a situation where personal injury or death may occur, should buyer purchase or use Rockchip Electronics Co.,Ltd's products for any such unintended or unauthorized application, buyers shall indemnify and hold Rockchip Electronics Co.,Ltd and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, expenses, and reasonable attorney fees arising out of, either directly or indirectly, any claim of personal injury or death that may be associated with such unintended or unauthorized use, even if such claim alleges that Rockchip Electronics Co.,Ltd was negligent regarding the design or manufacture of the part.

## Copyright and Patent Right

Information in this document is provided solely to enable system and software implementers to use Rockchip Electronics Co.,Ltd's products. There are no expressed and patent or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

**Rockchip Electronics Co., Ltd does not convey any license under its copyright and patent rights nor the rights of others.**
**All copyright and patent rights referenced in this document belong to their respective owners and shall be subject to corresponding copyright and patent licensing requirements.**

## Trademarks

Rockchip and Rockchip™ logo and the name of Rockchip Electronics Co., Ltd's products are trademarks of Rockchip Electronics Co., Ltd. and are exclusively owned by Rockchip Electronics Co., Ltd. References to other companies and their products use trademarks owned by the respective companies and are for reference purpose only.

## Confidentiality

The information contained herein (including any attachments) is confidential. The recipient hereby acknowledges the confidentiality of this document, and except for the specific purpose, this document shall not be disclosed to any third party.

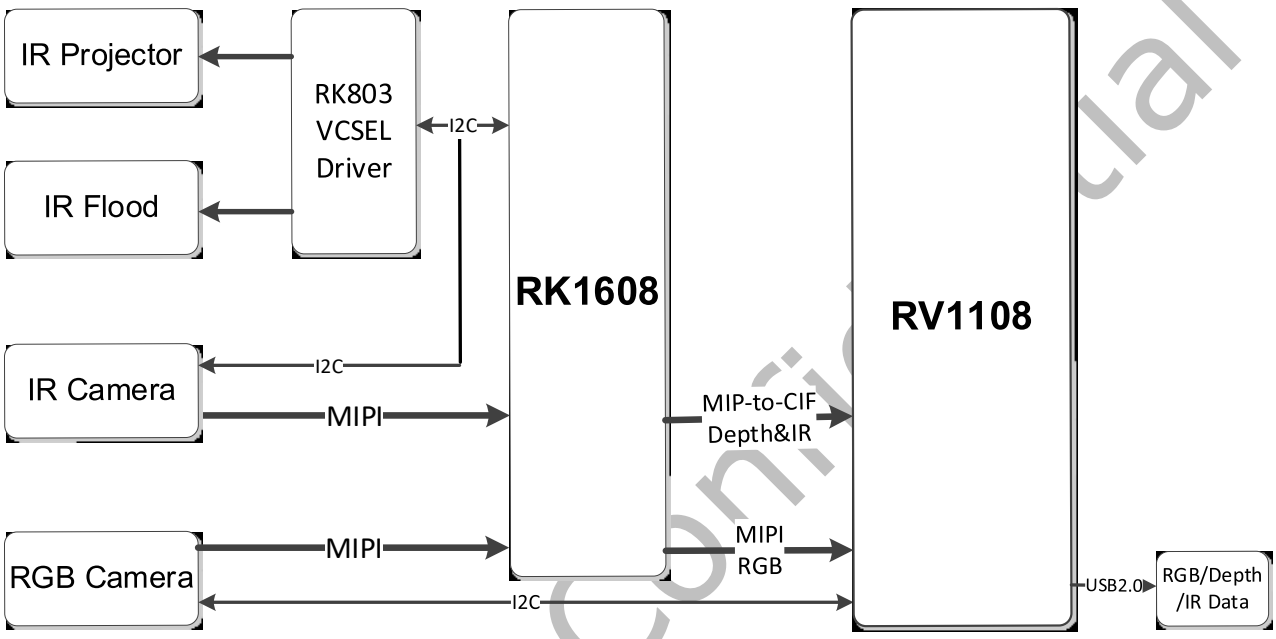
## Reverse engineering or disassembly is prohibited.

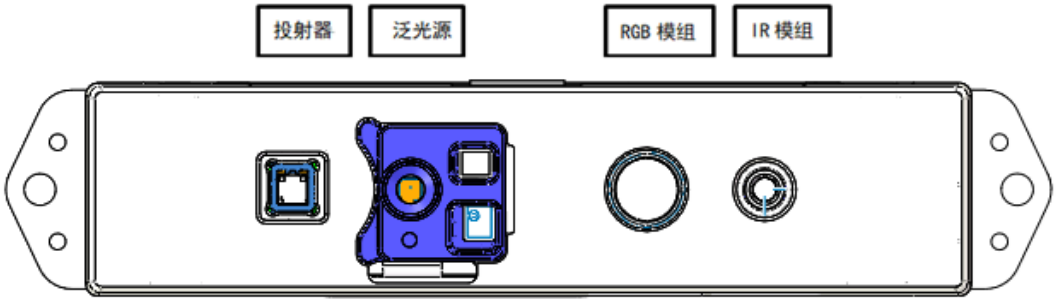
**ROCKCHIP ELECTRONICS CO.,LTD. RESERVES THE RIGHT TO MAKE CHANGES IN ITS PRODUCTS OR PRODUCT SPECIFICATIONS WITH THE INTENT TO IMPROVE FUNCTION OR DESIGN AT ANY TIME AND WITHOUT NOTICE AND IS NOT REQUIRED TO UNDATE THIS DOCUMENTATION TO REFLECT SUCH CHANGES.**

# Chapter 1 模组简介

RMSL201-1301 是一款成熟的全功能的结构光 3D 摄像机模组。内置高达 3 万点的散斑投射器，500 万像素的 RGB 摄像头，100 万像素全局曝光的红外摄像头以及红外照明光源。广泛适用于人脸支付，门禁安防，手势、肢体识别，高精度 3D 建模等产品应用。

## 1.1 3D 摄像机模组结构图




上图中 RK1608 是负责深度计算的 DSP 芯片，同时可以用于串行处理 RGB 相机的 HDR 功能，或根据应用串行承担算法任务，可高效的兼容传统图像算法与人工智能算法。

光学部分由散斑投射器，红外泛光灯，RGB 相机和 IR 相机组成，支持 RGB, DEPTH, IR 三路图像同时输出，可以适应多类工作场景。



## 1.2 3D 摄像机模组基本规格

| 模组 | 项目 | 规格 | 注释 |
|---|---|---|---|
| 散斑投射器 | 激光器类型 | VCSEL | PQCW-BC-4-W0940-S3 |
| | 激光波长 | 940 nm(Typ.) | 940±10 nm@50℃ |
| | 发光角 | 92.1°±3° | H70.8°,V74.2° |
| | 调焦距离 | 35cm | |
| | 输出管脚 | 16 Pin | B To B |
| 红外摄像头模组 | 传感器 | 1/4” CMOS Sensor | OV9282-GA4A(b&w) |
| | 有效像素 | 1M | 800H*1280V Pixels |
| | 接口类型 | MIPI | |
| | 传感器 ID | OV9282 | |
| | 模组类型 | FF | |
| | 可视角 | 77.0°±3° (OPT)<br>80.50°±3° (ME) | H46.0°,V68.2° |
| | 调焦距离 | 33cm | |
| | 输出管脚 | 20 Pin | B To B |
| 彩色摄像头模组 | 传感器 | 1/4” CMOS Sensor | OV5695-GA4A(color) |
| | 有效像素 | 5M | 1944H*2592V Pixels |
| | 接口类型 | MIPI | |
| | 传感器 ID | OV5695 | |
| | 模组类型 | AF | |
| | 可视角 | 84.0°（D） | H56.6°,V71.5° |
| | 调焦距离 | 150cm | |
| | 输出管脚 | 30Pin | B To B |
| 成品 | 基线 | 40mm | |
| | 深度精度 | ±1mm@60mm | |
| | 模组重量 | NA | |
| | 模组尺寸(长 x 宽 x 高) | 88.57mmx18.0mmx17.1mm | 外形尺寸 |



# Chapter 2 部件规格

为了对人像产品更加友好，垂直方向的 FOV 大于水平方向，RMSL201-1301 中的红外模组，投射器，RGB 模组都是纵向放置，下列表格中水平与垂直 FOV 是遵循图像传感器，镜头的习惯填写。

## 2.1 传感器参数

### 2.1.1 VCSEL参数

| | |
|---|---|
| VCSEL 型号 | LMVCSEL-10320665-W0940-V1 |
| 输出功率 | 1.3~1.9W@50℃，2A |
| 波长 | 940±10 nm |
| 光电转换效率 | ≥32.5%@50℃，2A |
| 转换效率测试电流条件 | 0.7~2A |
| 工作电压 | TBD |
| 发散角 | ≤23°@50℃，2A |
| 芯片尺寸 | (1.032±0.1) * (0.665±0.1) mm |
| 工作温度 | 0℃~+70℃ |
| NTC | NCP03WF104F05RL |
| NTC 阻抗@25℃ | 100 KΩ±1% |
| 热阻常数 B | 4308K 25/85℃<br>4250K±1% 25/50℃ |

### 2.1.2 IR传感器参数

| | |
|---|---|
| 器件编号 | OV9282 |
| 封装 | COB Die |
| 传感器尺寸 | 1/4" |
| 像素 | 3um×3um |
| 分辨率 | 800(H)×1280(V) 1 Megapixel CMOS image sensor |
| 输出格式 | 10 bit RAW |
| 最大帧率 | 1M pixel 120fps |
| 工作温度 | -30℃~+85℃ |
| 供电电压 | 2.8V for analog,1.2V for digital,1.8V or 2.8V for I/O |
| 传感器特性 | - Automatic black level calibration(ABLC)<br>- Programmable controls for frame rate, mirror and flip, cropping and windowing<br>- Fast mode switching<br>- Support 2x2 monochrome binning<br>- 2-lane MIPI serial output interface<br>- DVP parallel output interface |

| | |
|---|---|
| | - Supports horizontal and vertical 2:1 and 4:1 monochrome subsampling<br>- Supports for image sizes:1280x800,1280x720,640x480,640x400<br>- Embedded 256 bits of OTP memory for part identification<br>- Two on-chip phase lock loops(PLLs)<br>- LED PWM<br>- Built-in strobe control |

### 2.1.3 RGB传感器参数

| | |
|---|---|
| 器件编号 | OV5695 |
| 封装 | COB Die |
| 光学尺寸 | 1/4" |
| 像素大小 | 1.4um×1.4um |
| 有效分辨率 | 1944（H）×2592（V）5 Megapixel CMOS image sensor |
| 输出格式 | 10 bit RGB RAW |
| 最大帧率 | 30 fps @ Full |
| 工作温度 | -30℃~+70℃ |
| 工作电压 | 2.8V for analog,1.2V for digital,1.8V for I/O |
| 传感器特性 | - MIPI CSI-2-lane MIPI serial output<br>- CCI(Camera Control Interface)High speed I2C-compatible-Two-wire serial communication<br>- Analog gain x16<br>- Vertical and horizontal flip mode<br>- Continuous frame capture mode<br>- Programmable controls for frame rate<br>- Supports images sizes: 5Mp (2592 x 1944), quad HD (2560 x 1440), 1080p (1920 x 1080), 720p (1280 x720),VGA (640 x480)<br>- 16 bytes of embedded one-time programmable (OTP) memory for customer use<br>- Ultra_low power mode (ULPM)<br>- Two-wire serial bus control(SCCB)<br>- MIPI serial output interface(1- or2-lane)<br>- 2x binning support<br>- Image quality control: defect pixel correction and automatic black level calibration |

### 2.1.4 IR LED参数

| | |
|---|---|
| 器件编号 | SFH 4775S |
| Die 尺寸 | 2.75*2.0mm |
| 发散角 | 80° |

| | |
|---|---|
| 波峰波长 | 950nm |
| 质心波长 | 940nm |
| 半波带宽 | 37nm |
| 光功率 | 1.72W@$I_F$ = 1.5 A; $t_p$ = 100 μs |
| 工作温度 | -40℃~+100℃ |
| 工作电压 | 2.95V@$I_F$ = 1.5 A; $t_p$ = 100 μs |

## 2.2 镜头参数

### 2.2.1 投射器镜头参数

| | |
|---|---|
| 编号 | OTAD-0009-02 |
| 镜头结构 | 2P+1G |
| 光圈大小 | 2.73 |
| 有效焦距 | 3.7mm |
| 可视角 | 11.42° |
| 最大像圈 | 0.92mm |
| 主光轴偏角 | N/A |
| 图像失真 | ≤0.6% |
| 光学总长 | 3.45mm |
| 螺纹参数 | N/A |

### 2.2.2 IR镜头参数

| | |
|---|---|
| 器件编号 | CM-C403-F00-V2 |
| 镜头结构 | 5P |
| 光圈大小 | 1.8 |
| 有效焦距 | 2.80 mm |



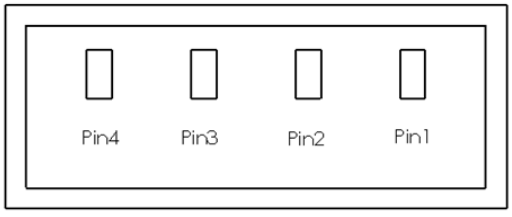
| | |
|---|---|
| 可视角 | 77.0(D), 46.0(H) x 68.2(V) |
| 最大像圈 | ¢4.79 mm |
| 主光线角 | 28.1° |
| 图像失真 | -1% |
| 光学总长 | 3.80 mm |
| 螺纹参数 | NA |

### 2.2.3 RGB镜头参数

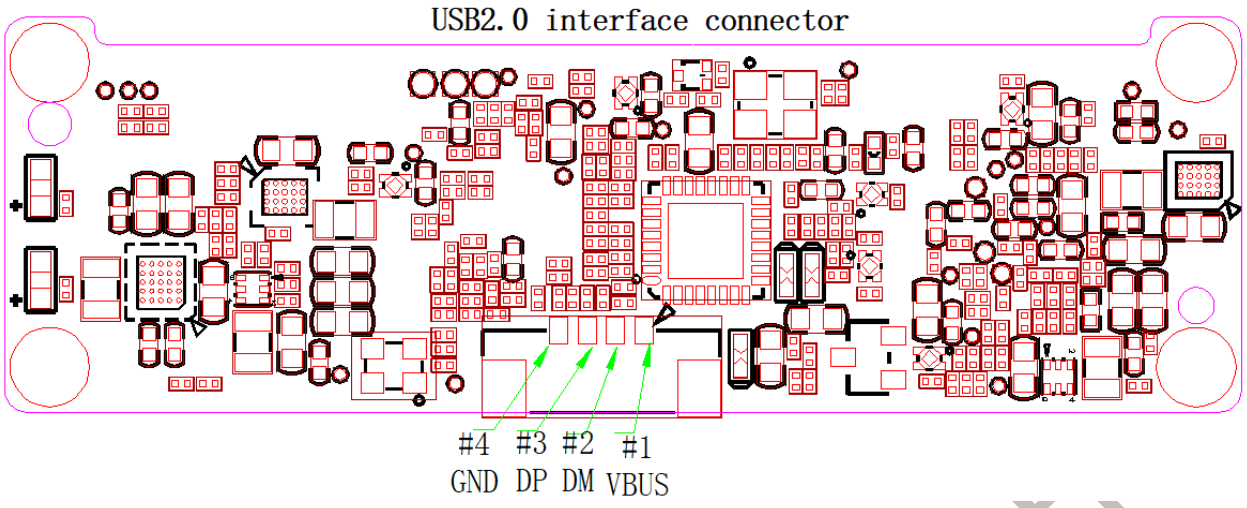
| | |
|---|---|
| 器件编号 | CK8403 |
| 镜头结构 | 4P |
| 光圈大小 | 2.0 |
| 有效焦距 | 2.47mm |
| 视场角 | 84.0(D), 56.6(H) x 71.5(V) |
| 最大像圈 | ¢4.850mm |
| 主光线脚 | <33.6° |
| 图像失真 | ＜1.5% |
| 光学总长 | 3.34mm |
| Barrel Thread | NA |

## 2.3 接口定义

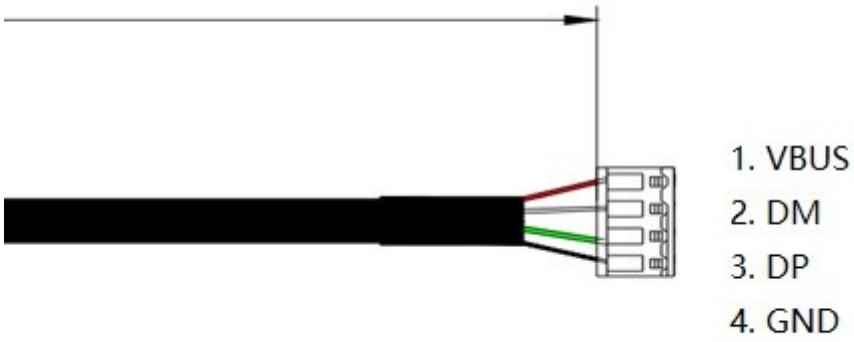
USB 连接器（母座）型号为 CW1.25 4pin 连接器，pin 脚定义如下图所示：




| Pin | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 名称 | VBUS | DM | DP | GND |

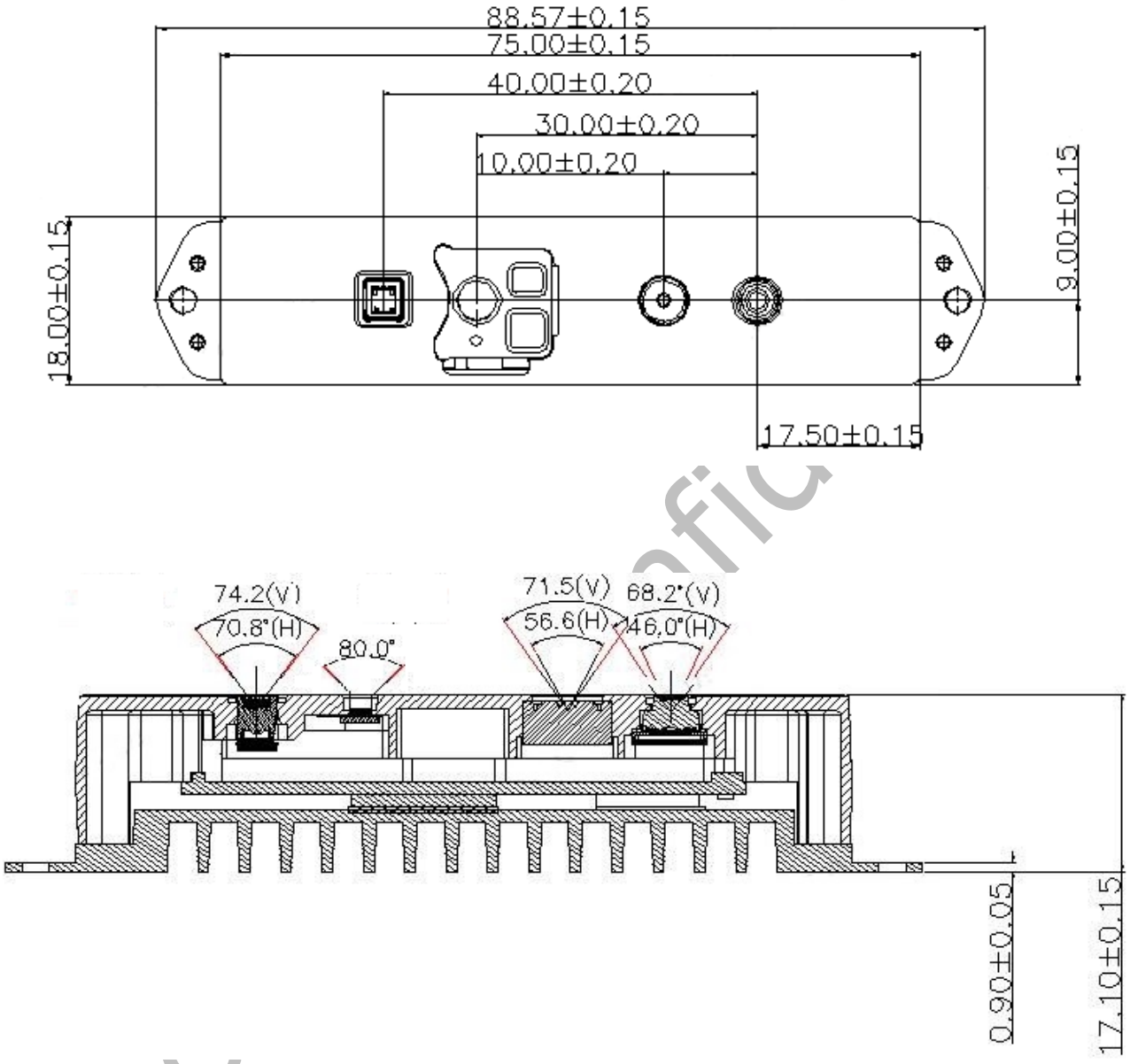



USB 转 1.25mm 端子线缆,PIN 脚定义如下:



# Chapter 3 机构特征

## 3.1 模组结构图



# Chapter 4 电气性能

## 4.1 极限参考值

| 参数 | 符号 | 最小值 | 典型值 | 最大值 | 单位 |
|---|---|---|---|---|---|
| USB 供电 | VBUS | | | 5.5 | V |
| 接口信号 | DP/DM | | | 3.63 | V |
| 存储温度 | TSTR | -40 | | 125 | ℃ |

## 4.2 USB 接口工作条件

| 参数 | 符号 | 测试条件 | 最小值 | 典型值 | 最大值 | 单位 |
|---|---|---|---|---|---|---|
| 发射端 | | | | | | |
| USB 输入电压 | VBUS | | 4.5 | 5 | 5.5 | V |
| 高电平输入电压 | VIH | | NA | 1.0 | NA | V |
| 低电平输入电压 | VIL | | NA | 0 | NA | V |
| 输出电阻 | ROUT | Classic mode (Vout = 0 or 3.3V) | 40.5 | 45 | 49.5 | Ω |
| | | HS mode (Vout = 0 to 800mV) | 40.5 | 45 | 49.5 | Ω |
| 输出共模电压 | VM | Classic (LS/FS) mode | 1.45 | 1.65 | 1.85 | V |
| | | HS mode | 0.175 | 0.2 | 0.225 | V |
| 高电平差分输出电压 | VOH | Classic (LS/FS); Io=0mA | 2.97 | 3.3 | 3.63 | V |
| | | Classic (LS/FS); Io=6mA | 2.2 | 2.7 | NA | V |
| | | HS mode; Io=0mA | 360 | 400 | 440 | mV |
| 低电平差分输出电压 | VOL | Classic (LS/FS); Io=0mA | -0.33 | 0 | 0.33 | V |
| | | Classic (LS/FS); Io=6mA | NA | 0.3 | 0.8 | V |
| | | HS mode; Io=0mA | -40 | 0 | 40 | mV |
| 接收端 | | | | | | |
| 接收电平灵敏度 | RSENS | Classic mode | | ±250 | | mV |
| | | HS mode | | ±25 | | mV |
| 共模接收电平 | RCM | Classic mode | 0.8 | 1.65 | 2.5 | V |
| | | HS mode (differential and squelch comparator) | 0.1 | 0.2 | 0.3 | V |
| | | HS mode (disconnect comparator) | 0.5 | 0.6 | 0.7 | V |

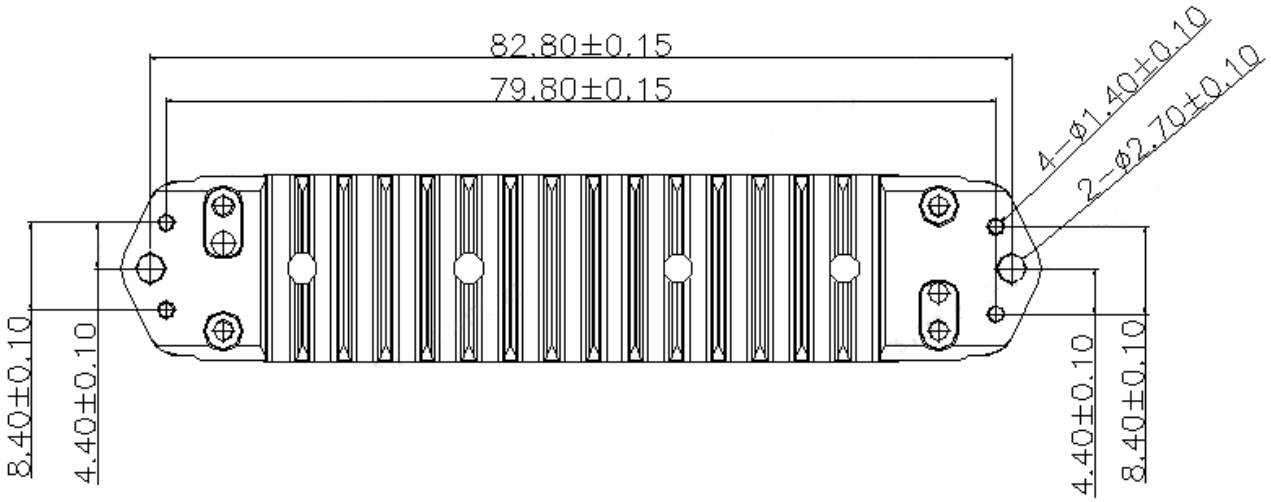


# Chapter 5 应用指南

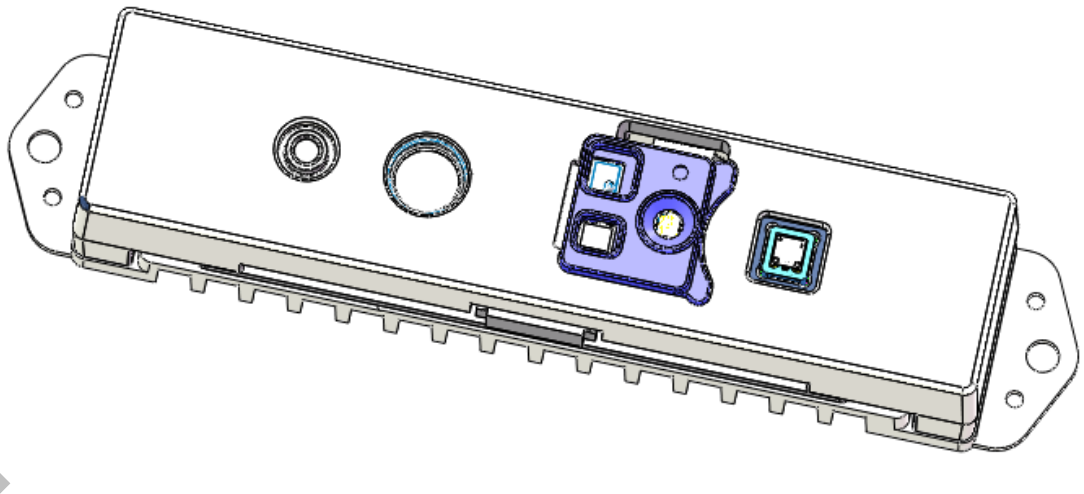
## 5.1 组装与散热

RMSL201-1301 结构光模组的尺寸和组装孔位的示意图：




在上图中，2-Φ2.7mm 孔为螺钉装配孔，使用 M2.5 螺钉；4-Φ1.4mm 孔位为组装定位孔，定位孔尺寸为非对称防反设计，设计组装方式时以实际空间来选择对角一对孔位进行定位。

将模组固定在散热结构上，需要使用导热硅胶垫紧密贴在模组底板和散热结构之间，并用螺钉将模组固定，可以将模组的热量导出。



模组的底板要与散热结构有良好接触。同时，金属支架要远离其他热源，使其能为模组提供良好的散热。为了减少金属支架受到各向外力的影响，在各个连接处建议使用硅胶垫等软性材料，并防止金属支架因为受到外力作用而产生变形。具体产品应根据产品结构做相应的散热和组装设计。

## 5.2 调试工具

请参考《**RKSL_Example_User_Manual**》