

Rockchip

RMSL312-3104

Datasheet

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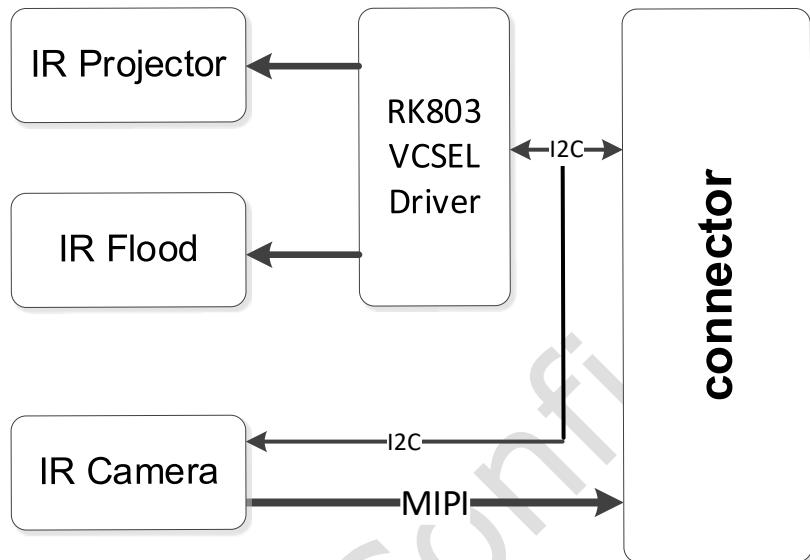
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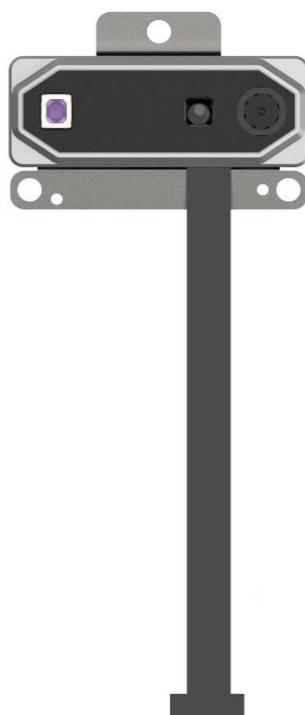
Chapter 1 模组简介

RMSL312-3104 是一款成熟的全功能 3D 结构光 MIPI 模组。内置 940nm 红外散斑投射器，30 万像素全局曝光的红外摄像头以及红外照明光源。可广泛适用于门锁、门禁安防，刷脸支付等产品应用。

1.1 3D 摄像机模组结构图



光学部分由散斑投射器，红外泛光灯和红外摄像头组成，支持 DEPTH, IR 图像同时输出，可以适应多类工作场景。RK803 是 VCSEL 驱动 IC，可高效驱动泛光源和投射器。



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 | |
| | 激光波长 | 940 nm(Typ.) | 940±10 nm@50°C |
| | 发光角 | H78°,V76° | |
| | 输出管脚 | 16 Pin | B To B |
| 红外摄像头 模组 | 传感器 | 1/6" CMOS Sensor | |
| | 有效像素 | 0.3M | 480H*640V Pixels |
| | 接口类型 | MIPI | |
| | 模组类型 | FF | |
| | 可视角 | 80.1° ±3° (OPT) | H54°,V68° |
| | 输出管脚 | 20 Pin | B To B |
| 成品 | 基线 | 28mm | |
| | 推荐工作温度 | 0°C-60°C | |
| | 工作湿度 | 0~90%RH | |
| | 对外接口 | MIPI | |
| | 输入电源电气 要求 | 3.6V@1A | |
| | 模组尺寸 (长 x 宽 x 高) | 41mmx15.2mmx8.24mm | |

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，RMSL312-3104 中的红外摄像头是纵向放置，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 关键器件参数

2.1.1 VCSEL参数

| | |
|--------|-----------|
| 波长 | 940±10 nm |
| 工作电压 | 1.6V-2.3V |
| 推荐工作温度 | 0°C~+60°C |
| NTC | YES |

2.1.2 IR传感器参数

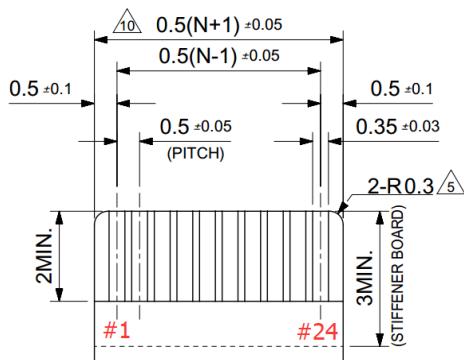
| | |
|-------|-----------------------------------------------|
| 传感器尺寸 | 1/6" |
| 分辨率 | 480(H)×640(V) 0.3 Megapixel CMOS image sensor |
| 工作温度 | -40°C~+85°C |

2.2 接口定义

模组对外接口为 MIPI，连接座为通用 0.5mm 单排金手指。PIN 脚定义如下图：

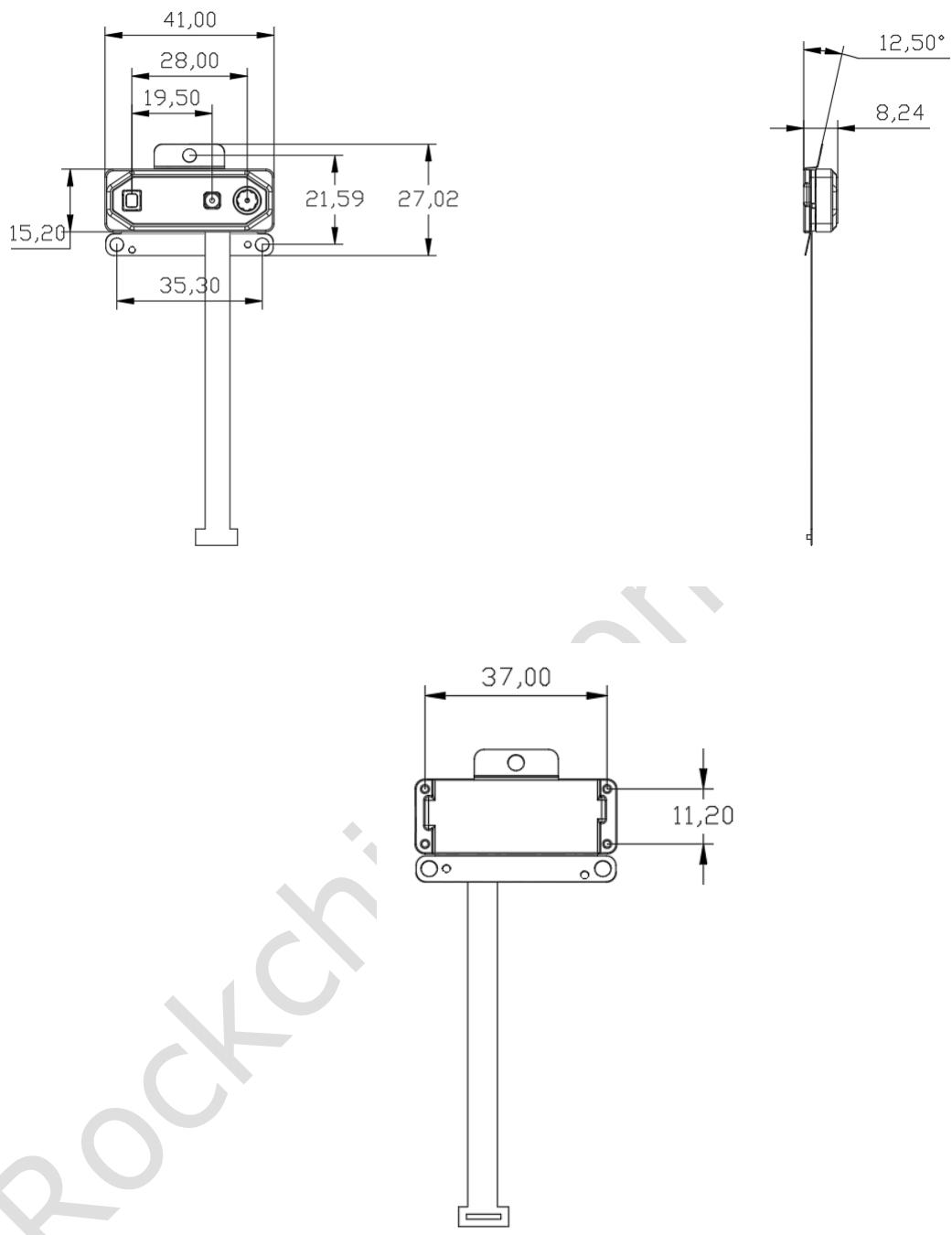
| Pin | Pin Name | Power domain | Type | Description |
|-----|-------------------|--------------|------|-------------------------------------------|
| 1 | MIPI_D0N_IR | — | O | MIPI data lane 0 negative output |
| 2 | MIPI_D0P_IR | — | O | MIPI data lane 0 positive output |
| 3 | MIPI_D1N_IR | — | O | MIPI data lane 1 negative output |
| 4 | MIPI_D1P_IR | — | O | MIPI data lane 1 positive output |
| 5 | MIPI_CLKN_IR | — | O | MIPI clock lane negative output |
| 6 | MIPI_CLKP_IR | — | O | MIPI clock lane positive output |
| 7 | GND | — | — | Ground |
| 8 | IR_CAM_MCLK | 1.8V | I | Sensor Referenced Clock input |
| 9 | PRO_C_ITO_STATE | 1.8V | I/O | ITO protection status detection(GPIO) |
| 10 | I2C_SCL_AP | 1.8V | I/O | I2C clock (for IR camera&RK803&EEPROM) |
| 11 | I2C_SDA_AP | 1.8V | I/O | I2C data (for IR camera&RK803&EEPROM) |
| 12 | CAM_PWREN | 1.8V/3.3V | I | Camera Power enable |
| 13 | IR_CAM_FSIN/VSYNC | 1.8V | I/O | Frame sync input/vertical sync output |
| 14 | IR_CAM_STROBE_AP | 1.8V | O | IR Camera frame exposure output indicator |
| 15 | IR_CAM_RST_AP | 1.8V | I | IR camera reset |
| 16 | RK803_EN2_PRO | 1.8V | I | RK803 CC2(Projector) power enable |
| 17 | RK803_EN1_Flood | 1.8V | I | RK803 CC1(Flood) power enable |
| 18 | GND | — | — | Ground |
| 19 | GND | — | — | Ground |
| 20 | GND | — | — | Ground |
| 21 | VCC_SYSIN | — | P | Power Input (3.3V~5.5V typ=3.6V@1A) |
| 22 | VCC_SYSIN | — | P | |
| 23 | VCC_SYSIN | — | P | |
| 24 | VCC_SYSIN | — | P | |

通用 0.5mm 单排金手指脚位顺序和尺寸如下：(Top Layer)



Chapter 3 机构特征

3.1 模组结构图



Chapter 4 电气性能

4.1 推荐工作条件

| 参数 | 符号 | 最小值 | 典型值 | 最大值 | 单位 |
|---------------|--------|-----|-----|-----|----|
| VCC_IN 供电电压范围 | VCC_IN | 3.3 | 3.6 | 5.5 | V |
| VCC_IN 峰值电流 | | | TBD | 1 | A |

4.2 MIPI 接口电气特性

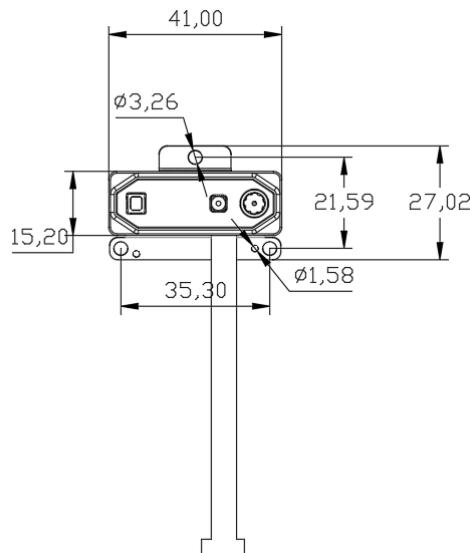
| Parameters | Symbol | Min | Typ | Max | Units |
|------------------------------------------------------------------------|--------------|-------|-----|------|-------|
| Input signal voltage range | Vi | -50 | NA | 1350 | mV |
| Input leakage current | Ileak | -10 | NA | 10 | uA |
| Ground | Vgndsh | -50 | NA | 50 | mV |
| Maximum transient output voltage level | Voh(absmax) | -0.15 | NA | 1.45 | V |
| Maximum transient time above Voh(absmax) | tVoh(absmax) | NA | NA | 20 | ns |
| HS transmit differential output voltage magnitude | Vod | 140 | 200 | 270 | mV |
| Change in differential output voltage magnitude between logic states | Δ Vod | NA | NA | 14 | mV |
| Steady-state common-mode output voltage | Vcmtx | 150 | 200 | 250 | mV |
| Change in steady-state common-mode output voltage between logic states | ΔVcmtx(1,0) | NA | NA | 5 | mV |
| HS output high voltage | Vohhs | NA | NA | 360 | mV |
| Single-ended output impedance | Zos | 40 | 50 | 62.5 | Ω |
| Single-ended output impedance mismatch | ΔZos | NA | NA | 10 | Ω |
| Output low-level SE output | Vol | -50 | NA | 50 | mV |
| Output high-level SE output | Voh | 1.1 | 1.2 | 1.3 | V |
| Single-ended output impedance | Zolp | 110 | NA | NA | Ω |
| Single-ended output impedance mismatch driving opposite level | ΔZolp(01,10) | NA | NA | 20 | % |
| Single-ended output impedance mismatch driving same level | ΔZolp(00,11) | NA | NA | 5 | % |
| Differential input high volvtage threshold | Vidht | NA | NA | 70 | mV |
| Differential input low volvtage | Vidl | -70 | NA | NA | mV |

| Parameters | Symbol | Min | Typ | Max | Units |
|---------------------------------|---------|-----|-----|-----|----------|
| threshold | | | | | |
| Single ended input high voltage | Vihhs | NA | NA | 460 | mV |
| Single ended input low voltage | Vilhs | -40 | NA | NA | mV |
| Input common mode voltage | Vcmrxdc | 70 | NA | 330 | mV |
| Differential input impedance | Zid | 80 | NA | 125 | Ω |
| Input low voltage | Vil | NA | NA | 550 | mV |
| Input high voltage | Vih | 880 | NA | NA | mV |
| Input hysteresis | Vhyst | 25 | NA | NA | mV |
| Input low fault threshold | Vilf | NA | NA | 200 | mV |
| Input high fault threshold | Vihf | 450 | NA | NA | mV |

Chapter 5 应用指南

5.1 组装建议

RMSL312-3104 结构光模组的尺寸和组装孔位的示意图：



在上图中， $\Phi 3.26\text{mm}$ 孔为螺钉装配孔，可使用 M3.0 螺钉进行装配定位。其余要求如下：

1. 镜片要求：
 - a. 波长 900-1000nm 透过率大于 92%，入射角 0-35 度（这是假定模组与保护镜片平行放置，如果模组与 TP 镜片有倾斜角度，该角度需要小于 20 度，最好 TP 镜片可以镀该波段增透膜）。
 - b. 材料可为 PMMA 或者光学玻璃。
 - c. 透过波前要求：小于 $1/4 \lambda$ @任意 $\Phi 5\text{mm}$ 通光区域。
2. 密封要求：模组与锁体外壳之间采用防水泡棉密封。
3. 安装建议：按照上图 3 个孔位安装，接口朝下，安装过程尽可能减少对模组前盖的受力，防止壳体变形。建议增加垫圈并控制安装扭力。
4. 散热建议：模组为间歇式工作，依靠模组结构散热即可，需保证无其他热源对模组进行加热。