T-CHIP TECHNOLOGY

AI Main Board

Face-RK3399

V2.3

Update history
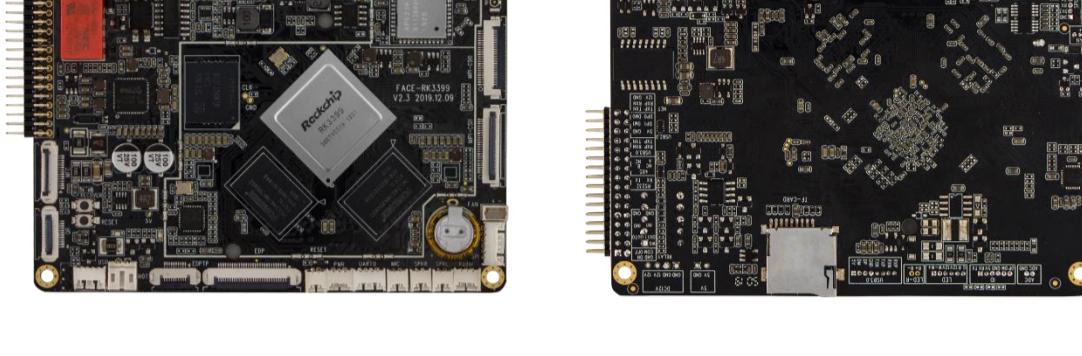
Version	Date	Details
V2.2	2019-11-13	Original version
V2.3	2020-04-23	Add interface definition, Hardware version 2.3

Directory

1. Overview

Face-RK3399 is small-scale and with strong face recognition performance,supports multiple face recognition algorithms and various recognition modes. Its rich peripheral interfaces can carry all kinds of peripheral equipment of gate, and meets the application needs of access control, attendance and paying with faces. It also can provide one-stop solution service to help projects land quickly.

1."Server-level"Strong Processor

Uses Rockchip six-core 64-bit "server-level" processor, frequency up to 1.8 GHz, integrates quad-core Mali-T860 GPU. It supports multi-format video coding and decoding, and has better processing performance.

2.Efficient Identification And High Accuracy

Supports various face recognition algorithms smoothly, and the response to detection speed is efficient. Recognition speed is less than 200 ms and recognition accuracy is more than 99.77%.

3.Support Multiple Recognition Modes

Maximum supports identify 100,000 face database and multiple recognition modes(1:1, 1: N, M: N) to realize multi-person recognition and detection at the same time easily.

4.ID Recognition, High Accuracy

It supports NFC/IC and ID card reading module, which can identify IC card and ID card accurately. It can easily realize the functions of face verification, access control, time attendance and others.

5.QR Code Recognition, High Efficiency

It supports the function of QR Code, one-dimensional (1D bar code) identification, which can quickly identify all kinds of QR code and 1D bar code to meet various application needs. It is suitable for scanning mobile payment, commodity barcode, express delivery,warehousing, etc.

6.Carry Mainstream Equipment

Face-RK3399 AI main board can be equipped with a variety of peripherals, as well as the industry's mainstream cameras (binocular, structured light, monocular), the MIPI/eDP display (5 " / 7" / 8 " / 9.7" / 10.1" / 13.3" / 15.6"), ID/IC card reader, barcode scanner, fingerprint reader, radar distance sensor, condenser microphone, dual-channel speaker, 4G/3G LTE module, light sensor module, etc.

7. Small-scale And High-performance

Face-RK3399 with beautiful and compact layout, the size is only 103mm x 74mm. It saves more valuable space to be embedded in various devices easily.

8.Form Face Recognition Machine

Equipped with mainstream cameras of industry (binocular, structured light, monocular), enclosure, display screen and so on, which can form a high-performance face recognition machine quickly.

9.Support For Multiple OS

It supports Android, Ubuntu multiple operating system, the performance is stable and reliable.

10.Equipped with Management System

Equipped with face recognition program (APK), PC background management software and mobile phone management software (WeChat APP). They can be directly applied to the project by matching the whole machine.

11.Open Source

Open supporting SDK secondary development source code, face recognition API, development tutorials, development tools, and other materials to meet user's self-exploitation needs.

12.Rich Extension Interfaces

Face-RK3399 AI main board with rich extension interfaces, such as Wiegand interface(26bit)/ RS485(switching via relay), LED driver interface, 100M Ethernet, USB 3.0, MIPI, etc. , which is convenient for connecting various external devices.
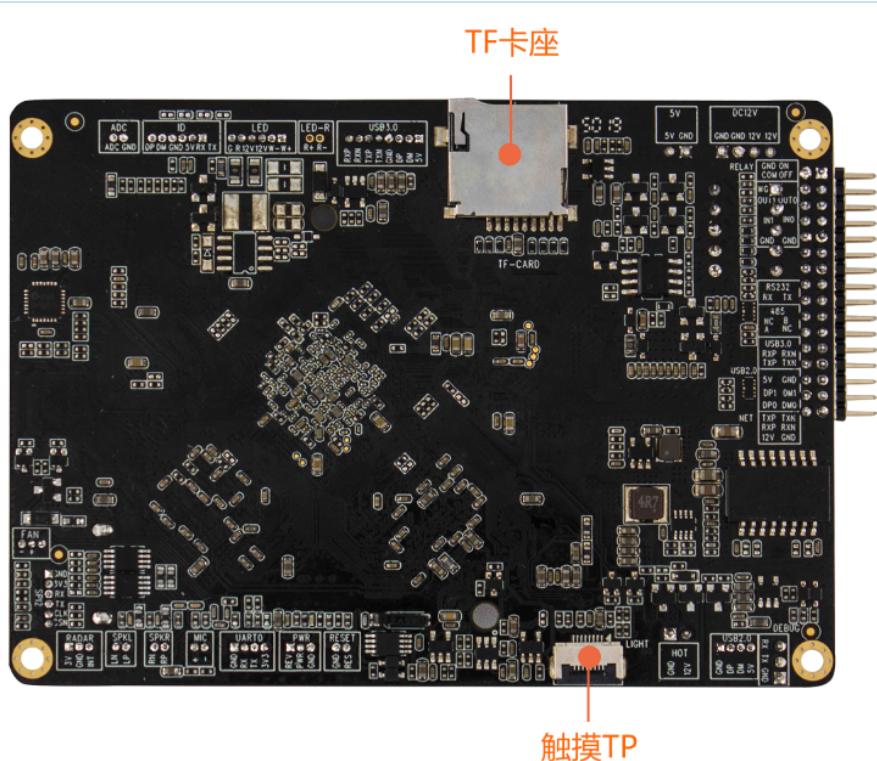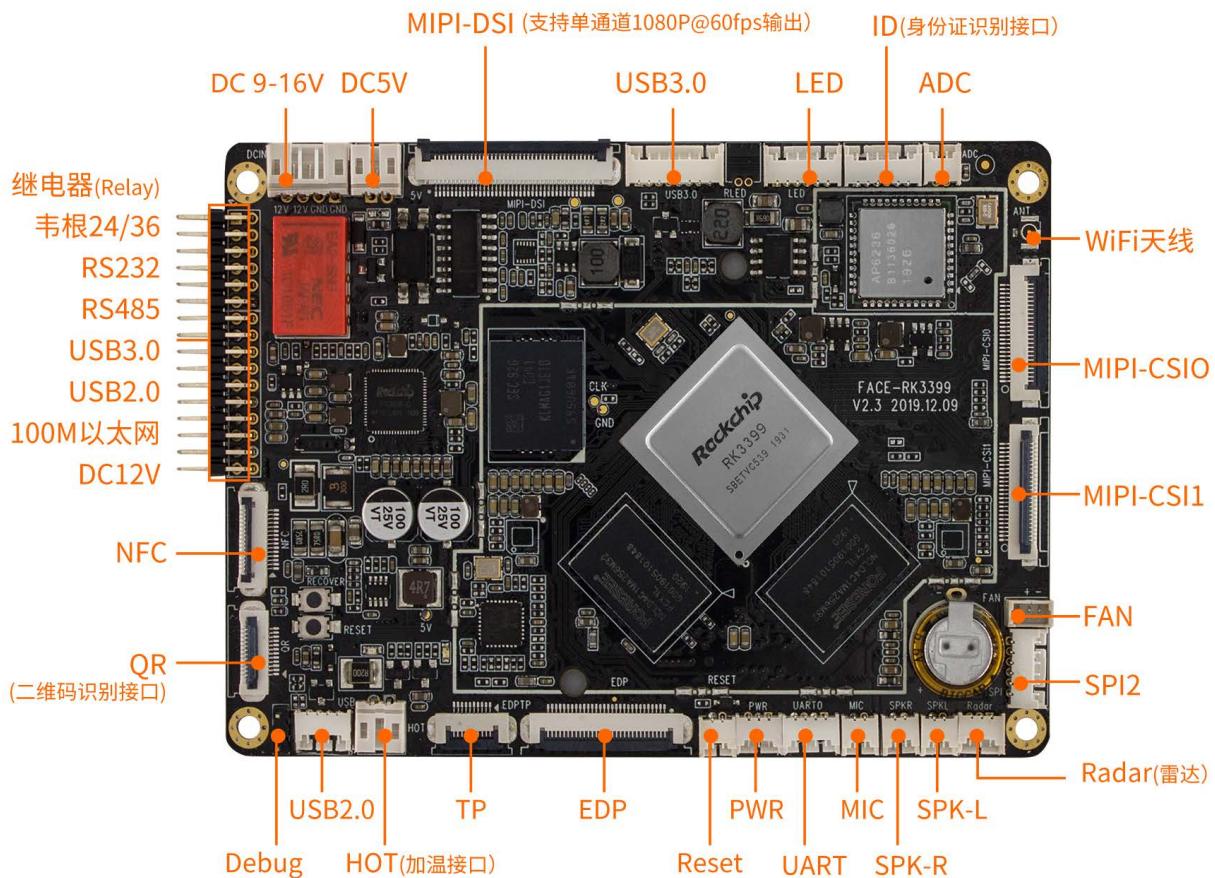
13.Applications

It can be used in Face recognition security gate, Industry PC, Smart robot, Industry computer, commercial display equipment, vending machine, etc
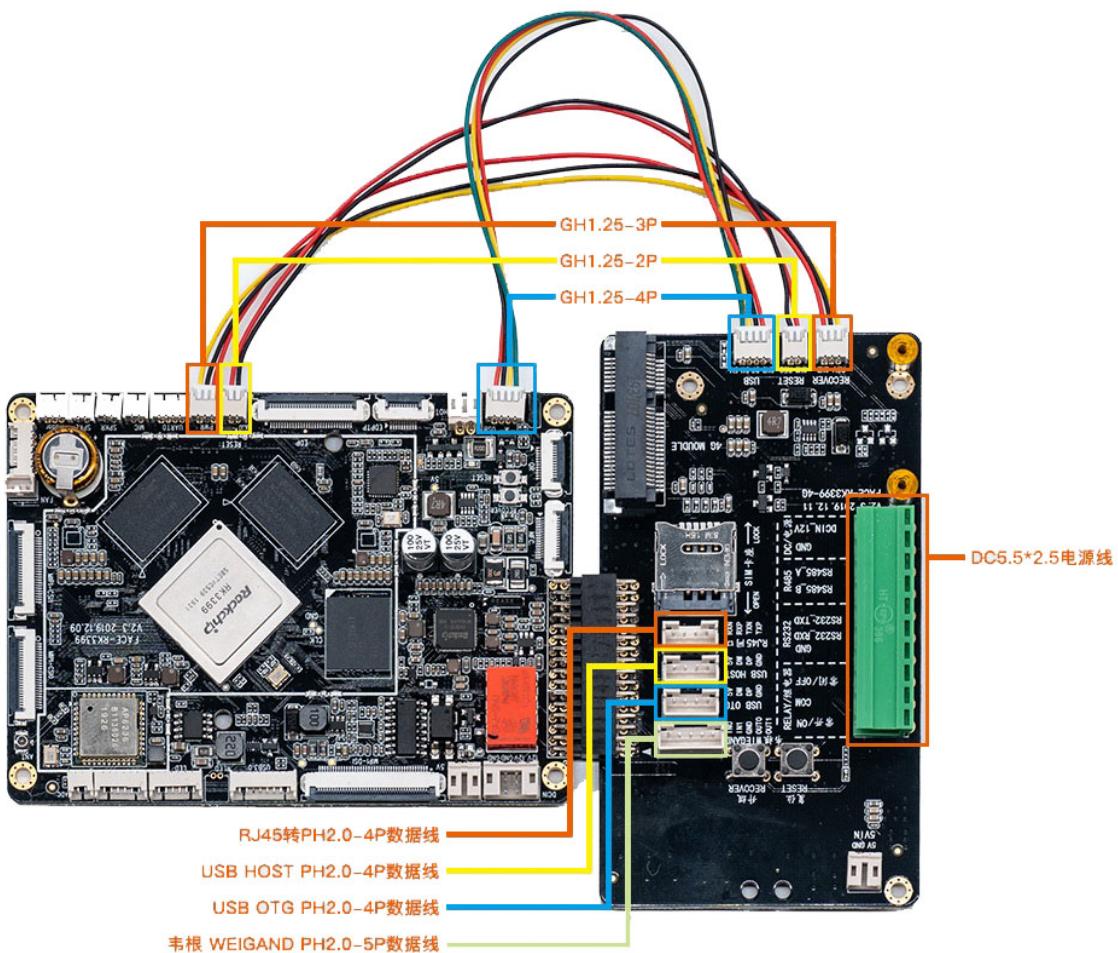
2. Technical Parameter

Specification	
SOC	Rockchip RK3399 (28nm HKMG Process)
CPU	Six-core 64-bit processor (dual-core Cortex-A72+quad-core Cortex-A53), frequency up to 1.8GHz
GPU	Mali-T860 quad-core GPU, Support OpenGL ES1.1/2.0/3.0/3.1, OpenVG1.1, OpenCL, DX11
VPU	Support 4K and 1080P H.265/H.264 video decoding, up to 60fps
RAM	2GB LPDDR4 (2GB / 4GB)
Storage	16GB eMMC 5.1 (16GB/32GB/128GB), Support TF card expansion
Hardware Features	
Ethernet	10/100M Ethernet interface
WiFi	2.4GHZ single frequency WiFi, support 802.11 b/g/n
Display	1 x MIPI-DSI, Single channel supports up to 1080P@60fps output (support 5"/7"/8"/9.7"/ 10.1" //13.3" /15.6" display) 1 x EDP, support eDP 1.3(4 lanes, 10.8Gbps),
Audio	2ch x Speaker audio output (4Ω 2.7W) 1 x MIC audio input
Camera	Support monocular camera, binocular camera, Structured light camera MIPI camera: Supports 2-way MIPI camera (built-in dual hardware ISP, up to single 13Mpixel or dual 8Mpixel) USB camera:Supports 2-way USB 2.0 camera
USB	USB3.0 × 2(a pigtail OTG, An internal USB 3.0 wafer socket, 8Pin leads) USB2.0 × 2(a pigtail, An internal USB 2.0 Wafer socket, 4Pin leads)
Fill Light	3 x LED drive interface (white fill light), infrared fill light
Socket	MIPI touch screen×1, RTC×1(super-capacitor power supply), ADC×1, Debug×1, 5V power output x1, 9-16V power input x1, USB3.0 x 1, USB2.0 x 1, NFC x 1 LEDx3, Driver interface x1, ID card module x1, Heating module x1, EDP display x1, EDP touch x1, RESET key x1, Power key x1, TTL serial port x1, Radar x1, Audio output x2, IR fill light x1
Key	Reset×1, Power×1, Recovery×1
External Interface	1) Realy 2) Wiegand send x 1, Wiegand accept x 1 3) RS232 4) RS485 5) USB3.0 6) USB2.0 7) 10/100M Ethernet 8) DC 9-16V
Power	DC 9-16V 2A
OS / Software	
OS	Android,, Ubuntu
Software	1) Provide complete face recognition, background and mobile management program 2) Provide USB/MIPI monocular, binocular, structured light camera (optional) 3) Provide 8 inch/ 10.1 inch IPS screen (optional, support capacitive touch) 4) Provide aluminum alloy case (based on 8-inch display, binocular camera)
Open Source	Android SDK source code, face recognition API
Features	
Accuracy	Recognition Accuracy > 99.77%
Detection	Support up to 32 simultaneous detection (monocular camera)
Distance	Recognition Distance : 1.5m
Face-Anti-Spoofing	Support
Mode	Support 1:1, 1:N, M:N multiple modes
Face Database	Support up to 100,000
Appearance	
Size	103 mm × 74 mm
Temperature	0℃ - 60℃
PCB	6-layer board design

3. Interface Describe

MIPI-DSI (支持单通道1080P@60fps输出)
ID(身份证识别接口)
DC 9-16V   DC5V
USB3.0
LED   ADC
继电器(Relay)
韦根24/36
RS232
RS485
USB3.0
USB2.0
100M以太网
DC12V
WiFi天线
MIPI-CSIO
MIPI-CSI1
NFC
QR
(二维码识别接口)
FAN
SPI2
Radar(雷达)
USB2.0   TP   EDP   PWR   MIC   SPK-L
Debug   HOT(加温接口)   Reset   UART   SPK-R

TF卡座

触摸TP

Expansion Board

GH1.25-3P
GH1.25-2P
GH1.25-4P

DC5.5*2.5电源线

RJ45转PH2.0-4P数据线
USB HOST PH2.0-4P数据线
USB OTG PH2.0-4P数据线
韦根 WEIGAND PH2.0-5P数据线
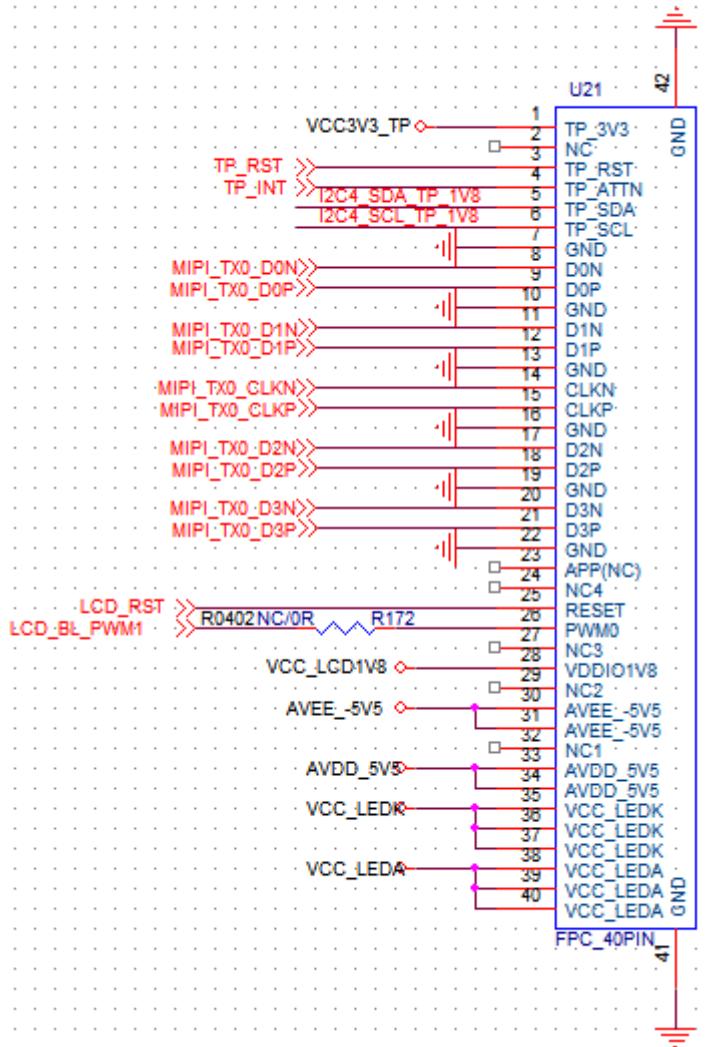
4. Expansion Interface

1. MIPI-DSI 40PIN 0.5 Pitch Interface (GPIO)
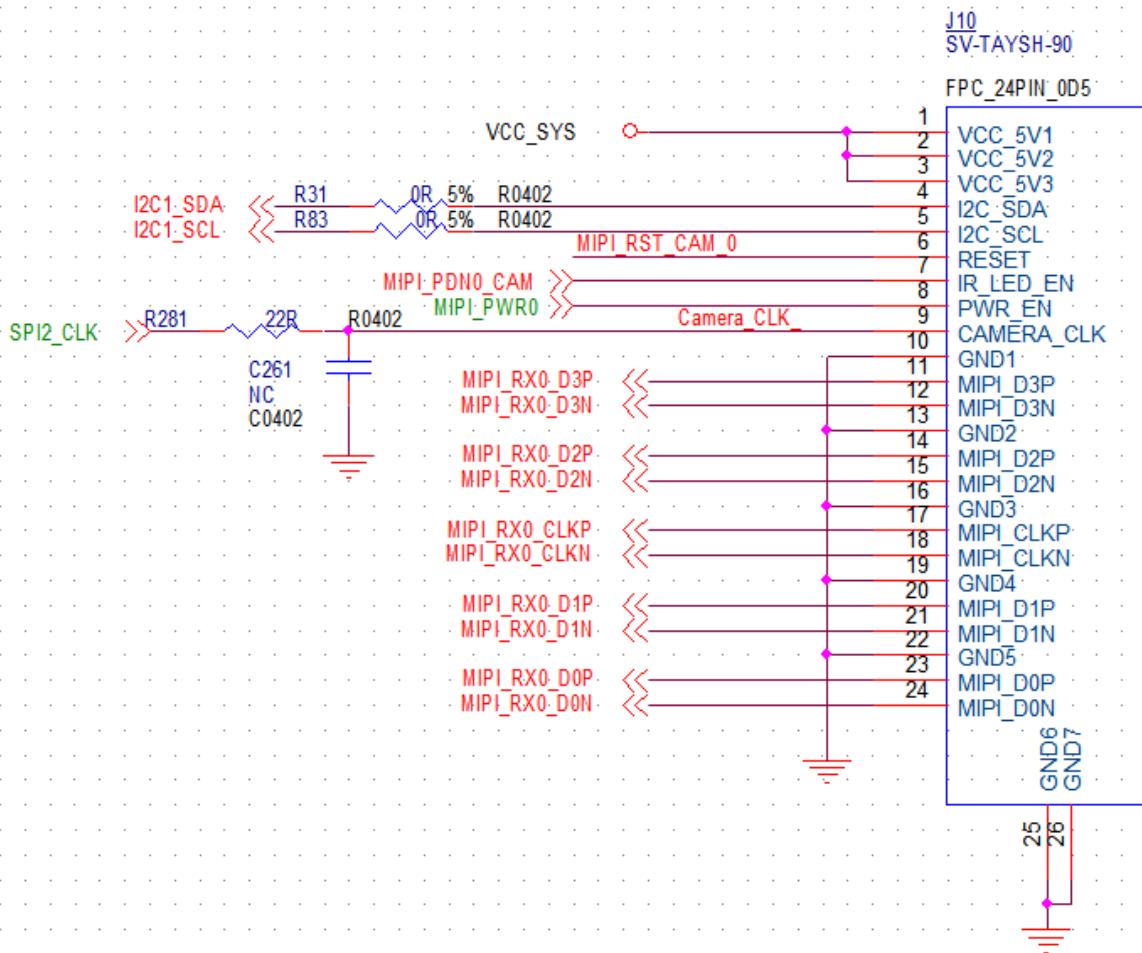
NO.	Definition	Describe
1	TP_3V3	VCC3V3_TP
2	NC	NC
3	TP_RST	GPIO4_C5/SPDIF_TX
4	TP_ATTN	GPIO4_D4
5	TP_SDA	GPIO1_B3/I2C4_SDA（1.8V）
6	TP_SCL	GPIO1_B4/I2C4_SCL （1.8V）
7	GND	GND
8	D0N	MIPI_TX0_D0N
9	D0P	MIPI_TX0_D0P

10	GND	GND
11	D1N	MIPI_TX0_D1N
12	D1P	MIPI_TX0_D1P
13	GND	GND
14	CLKN	MIPI_TX0_CLKN
15	CLKP	MIPI_TX0_CLKP
16	GND	GND
17	D2N	MIPI_TX0_D2N
18	D2P	MIPI_TX0_D2P
19	GND	GND
20	D3N	MIPI_TX0_D3N
21	D3P	MIPI_TX0_D3P
22	GND	GND
23	APP(NC)	NC
24	NC4	NC
25	RESET	GPIO2_D4/SDIO0_BKPWR
26	PWM0	GPIO4_C6/PWM1
27	NC3	NC
28	VDDIO1V8	VCC_LCD1V8
29	NC2	NC
30	AVEE_-5V5	AVEE_-5V5
31	AVEE_-5V5	AVEE_-5V5
32	NC1	NC
33	AVDD_5V5	AVDD_5V5
34	AVDD_5V5	AVDD_5V5
35	VCC_LEDK	VCC_LEDK
36	VCC_LEDK	VCC_LEDK
37	VCC_LEDK	VCC_LEDK
38	VCC_LEDA	VCC_LEDA
39	VCC_LEDA	VCC_LEDA
40	VCC_LEDA	VCC_LEDA
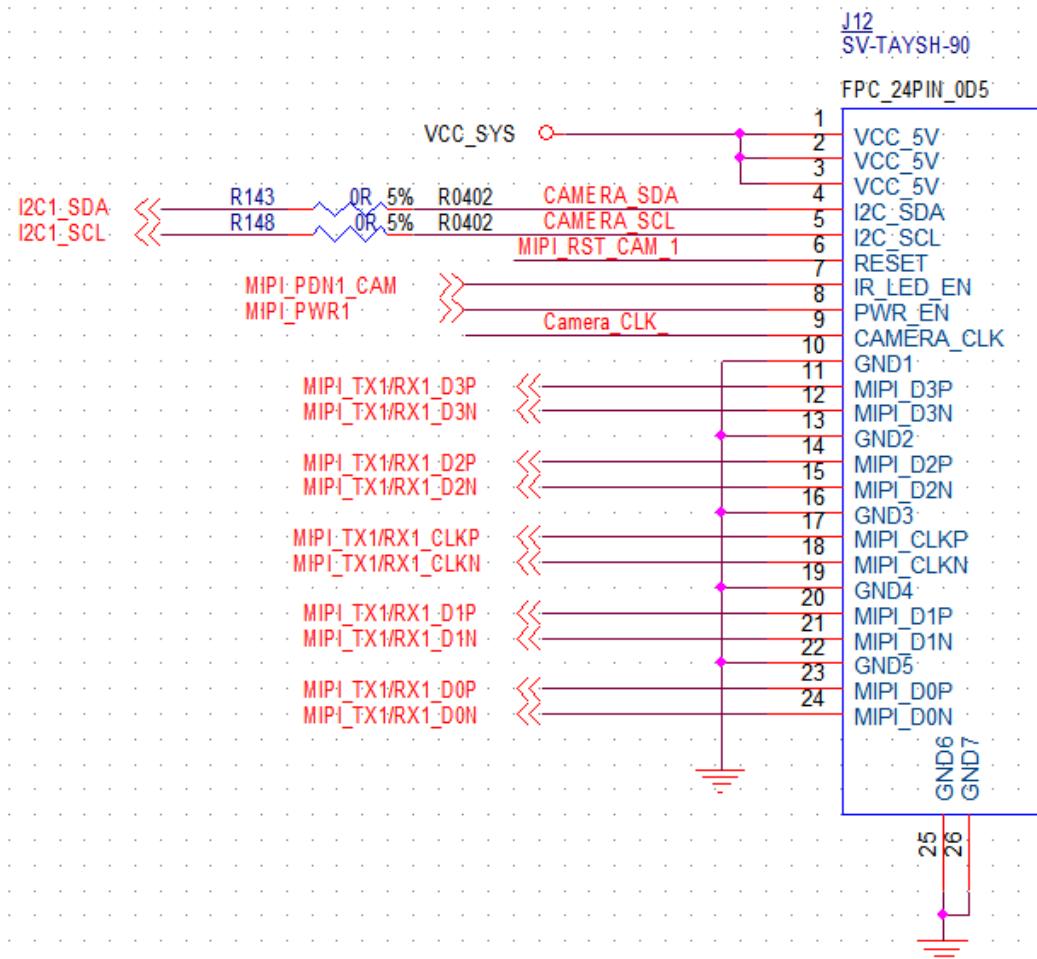
2. MIPI-CSI0 24 Pin 0.5 Pitch Camera Interface (GPIO)

NO.	Definition	Describe
1	VCC_5V1	VCC_SYS
2	VCC_5V2	VCC_SYS
3	VCC_5V3	VCC_SYS
4	I2C1_SDA	GPIO4_A1/I2C1_SDA
5	I2C1_SCL	GPIO4_A2/I2C1_SCL
6	RESET	GPIO1_C6/TCPD_VBUS_SOURCE0
7	IR_LED_EN	GPIO0_B4/TCPD_VBUS_BDIS
8	PWR_EN	GPIO3_A3/MAC_RXD3/SPI4_CSN0
9	CAMERA_CLK	GPIO2_B3/SPI2_CLK/VOP_DEN/CIF_CLKOUTA
10	GND1	GND
11	MIPI_D3P	MIPI_RX0_D3P
12	MIPI_D3N	MIPI_RX0_D3N
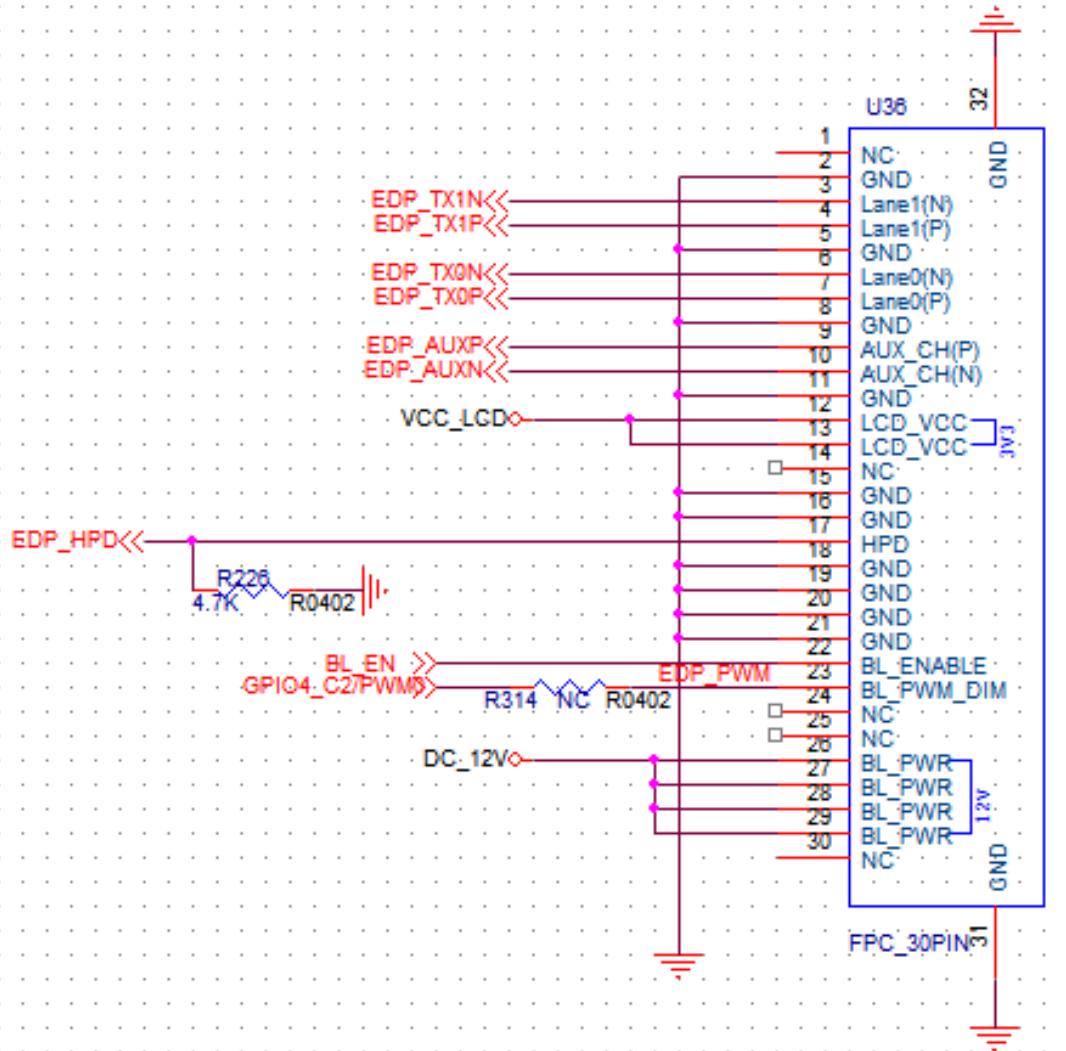
13	GND2	GND
14	MIPI_D2P	MIPI_RX0_D2P
15	MIPI_D2N	MIPI_RX0_D2N
16	GND3	GND
17	MIPI_CLKP	MIPI_RX0_CLKP
18	MIPI_CLKN	MIPI_RX0_CLKN
19	GND4	GND
20	MIPI_D1P	MIPI_RX0_D1P
21	MIPI_D1N	MIPI_RX0_D1N
22	GND5	GND
23	MIPI_D0P	MIPI_RX0_D0P
24	MIPI_D0N	MIPI_RX0_D0N

3. MIPI-CSI1 24PIN 0.5 Pitch Camera Interface (GPIO)

NO.	Definition	Describe
1	VCC_5V	VCC_SYS
2	VCC_5V	VCC_SYS
3	VCC_5V	VCC_SYS
4	I2C1_SDA	GPIO4_A1/I2C1_SDA
5	I2C1_SCL	GPIO4_A2/I2C1_SCL
6	RESET	GPIO1_C7/TCPD_VBUS_SOURCE1
7	IR_LED_EN	GPIO0_B3
8	PWR_EN	GPIO2_A5/VOP_D5/CIF_D5
9	CAMERA_CLK	GPIO2_B3/SPI2_CLK/VOP_DEN/CIF_CLKOUTA
10	GND1	GND
11	MIPI_D3P	MIPI_TX1/RX1_D3P
12	MIPI_D3N	MIPI_TX1/RX1_D3N
13	GND2	GND
14	MIPI_D2P	MIPI_TX1/RX1_D2P
15	MIPI_D2N	MIPI_TX1/RX1_D2N
16	GND3	GND
17	MIPI_CLKP	MIPI_TX1/RX1_CLKP
18	MIPI_CLKN	MIPI_TX1/RX1_CLKN
19	GND4	GND
20	MIPI_D1P	MIPI_TX1/RX1_D1P
21	MIPI_D1N	MIPI_TX1/RX1_D1N
22	GND5	GND
23	MIPI_D0P	MIPI_TX1/RX1_D0P
24	MIPI_D0N	MIPI_TX1/RX1_D0N
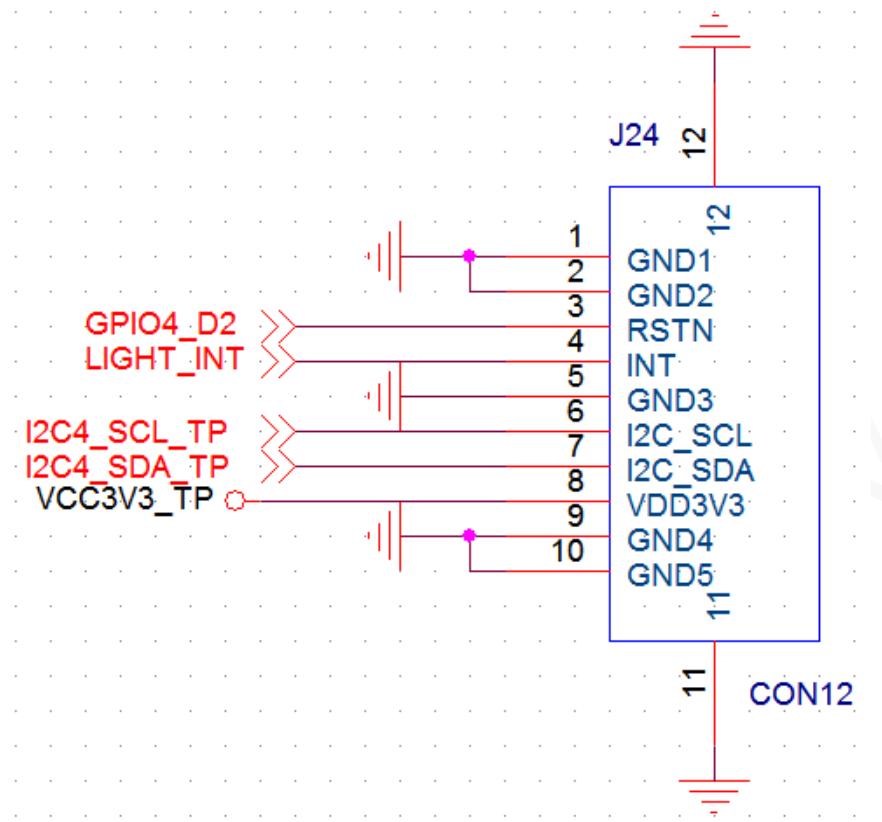
4. 30PIN 0.5 Pitch EDPInterface (GPIO)

NO.	Definition	Describe
1	NC	NC
2	GND	GND
3	Lane1（N）	EDP_TX1N
4	Lane1（P）	EDP_TX1P
5	GND	GND
6	Lane0（N）	EDP_TX0N
7	Lane0（P）	EDP_TX0P
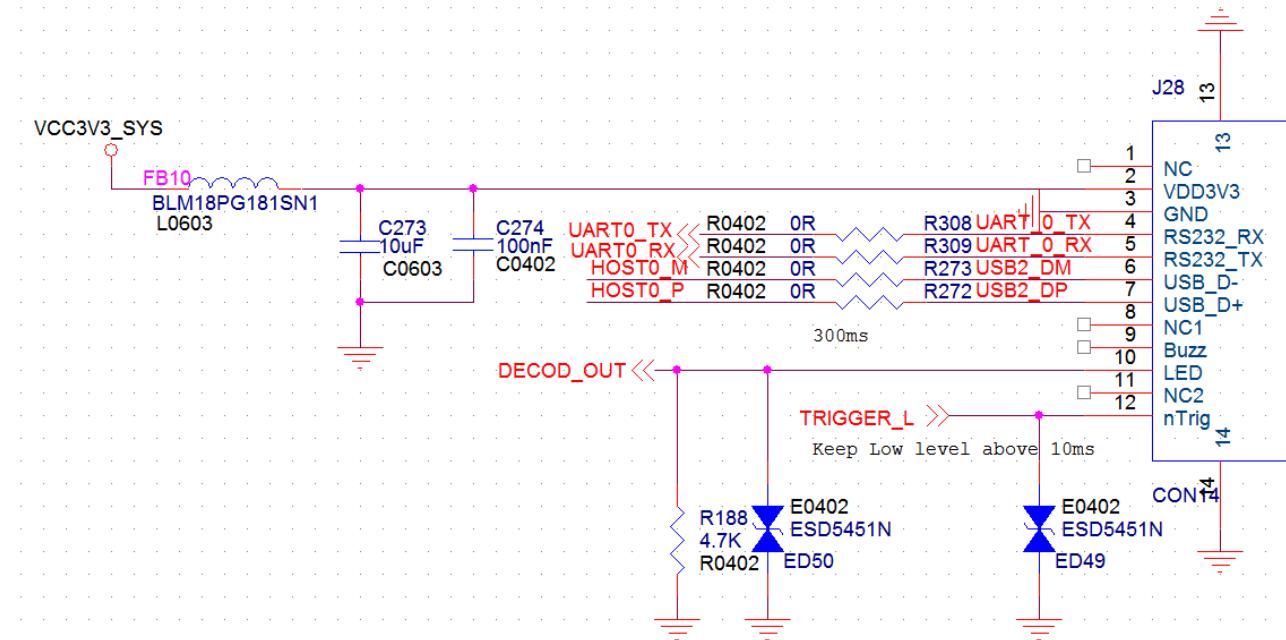
8	GND	GND
9	AUX_CH（P）	EDP_AUXP
10	AUX_CH（N）	EDP_AUXN
11	GND	GND
12	LCD_VCC	VCC_LCD (3.3V)
13	LCD_VCC	VCC_LCD (3.3V)
14	NC	NC
15	GND	GND
16	GND	GND
17	HPD	GPIO4_C0/I2C3_SDA/UART2B_RX
18	GND	GND
19	GND	GND
20	GND	GND
21	GND	GND
22	BL_ENABLE	GPIO1_A1/ISP0_SHUTTER_TRIG/ISP1_SHUTTER_TRIG/
23	BL_PWM_DIM	GPIO4_C2/PWM0/VOP0_PWM/VOP1_PWM
24	NC	NC
25	NC	NC
26	BL_PWR	DC_12V
27	BL_PWR	DC_12V
28	BL_PWR	DC_12V
29	BL_PWR	DC_12V
30	NC	NC

5. CON12 10PIN 0.5 Pitch EDP/TP Interface (GPIO)
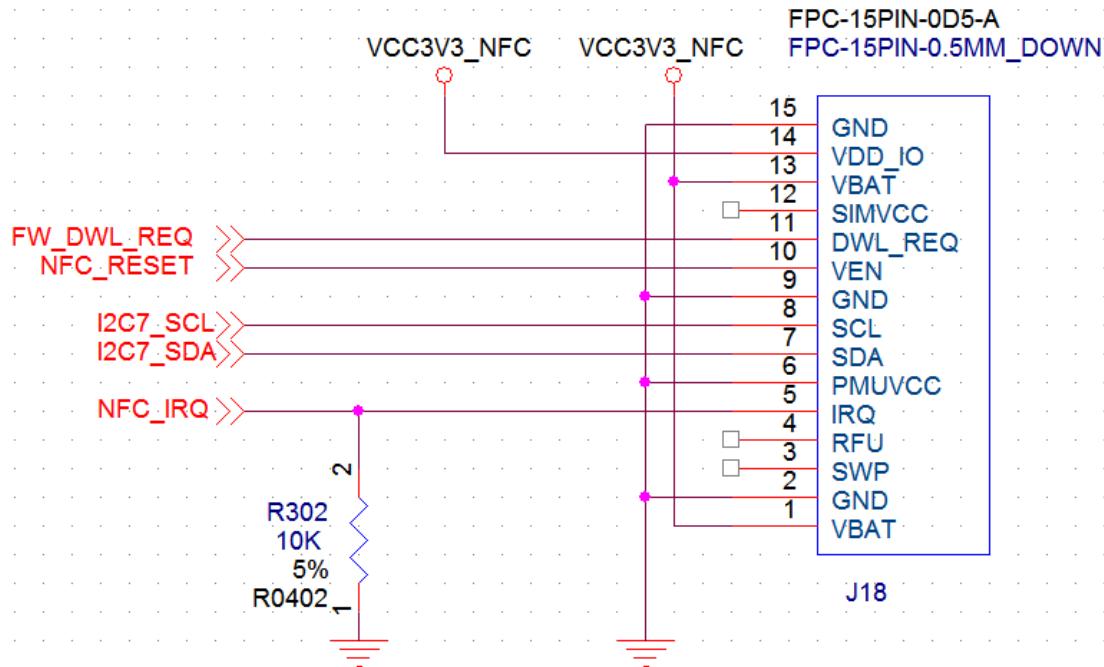
NO.	Definition	Describe
1	GND1	GND
2	GND2	GND
3	RSTN	GPIO4_D2
4	INT	GPIO4_D1/DP_HOTPLUG
5	GND3	GND
6	I2C_SCL	GPIO1_B4/I2C4_SCL
7	I2C_SDA	GPIO1_B3/I2C4_SDA
8	VDD3V3	VCC3V3_TP
9	GND4	GND
10	GND5	GND

6. CON14 12PIN 0.5 Pitch QR Interface (GPIO)
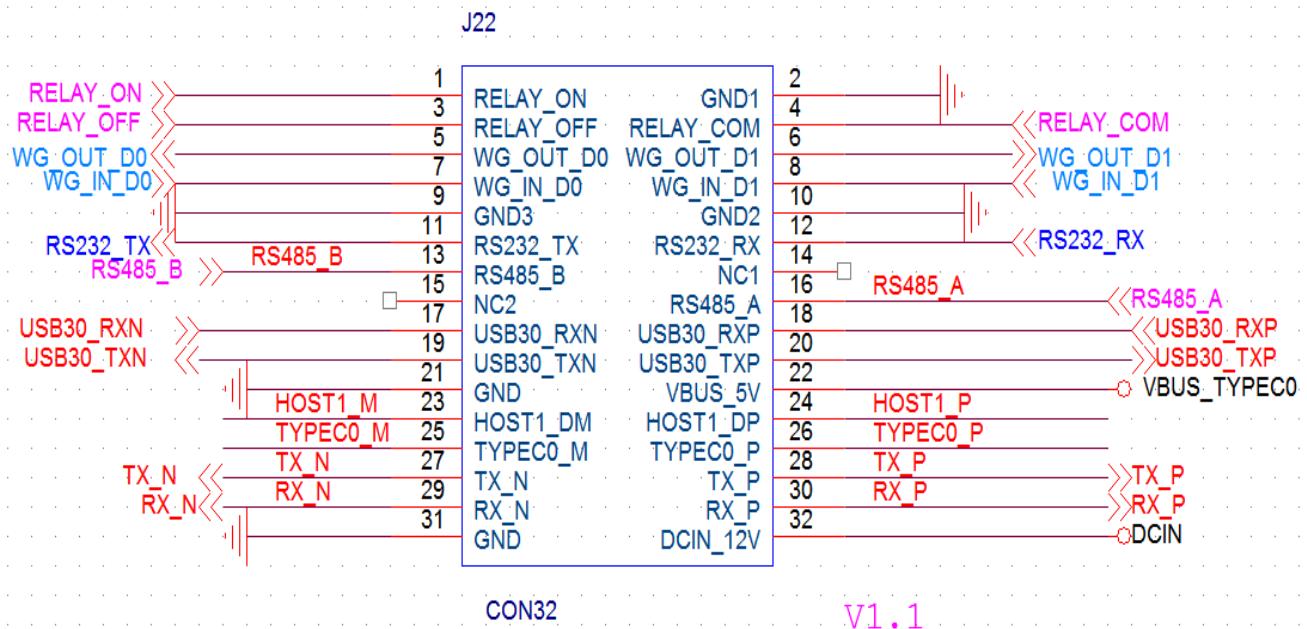
NO.	Definition	Describe
1	NC	NC
2	VDD3V3	VCC3V3_SYS
3	GND	GND
4	RS232_RX	GPIO2_C1/UART0_TX
5	RS232_TX	GPIO2_C0/UART0_RX
6	USB_D-	USB0_DN
7	USB_D+	USB0_DP
8	NC1	NC
9	Buzz	NC
10	LED	GPIO1_C4/I2C8_SDA
11	NC2	NC
12	nTrig	GPIO4_C1/I2C3_SCL/UART2B_TX

7. 15PIN 0.5 Pitch NFC Interface GPIO)

NO.	Definition	Describe
15	GND	GND
14	VDD_IO	VCC3V3_NFC
13	VBAT	VCC3V3_NFC
12	SIMVCC	NC
11	DWL_REQ	GPIO3_C1/MAC_TXCLK/UART3_RTSN
10	VEN	GPIO2_A2/VOP_D2/CIF_D2
9	GND	GND
8	SCL	GPIO2_B0/VOP_CLK/CIF_VSYNC/I2C7_SCL
7	SDA	GPIO2_A7/VOP_D7/CIF_D7/I2C7_SDA
6	PMUVCC	GND
5	IRQ	GPIO2_A3/VOP_D3/CIF_D3
4	RFU	NC
3	SWP	NC
2	GND	GND
1	VBAT	VCC3V3_NFC
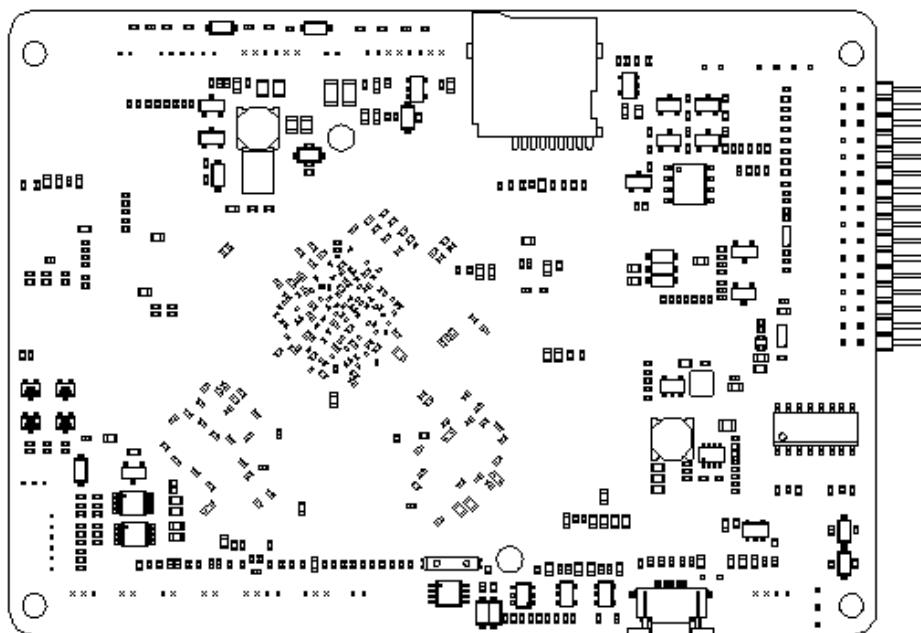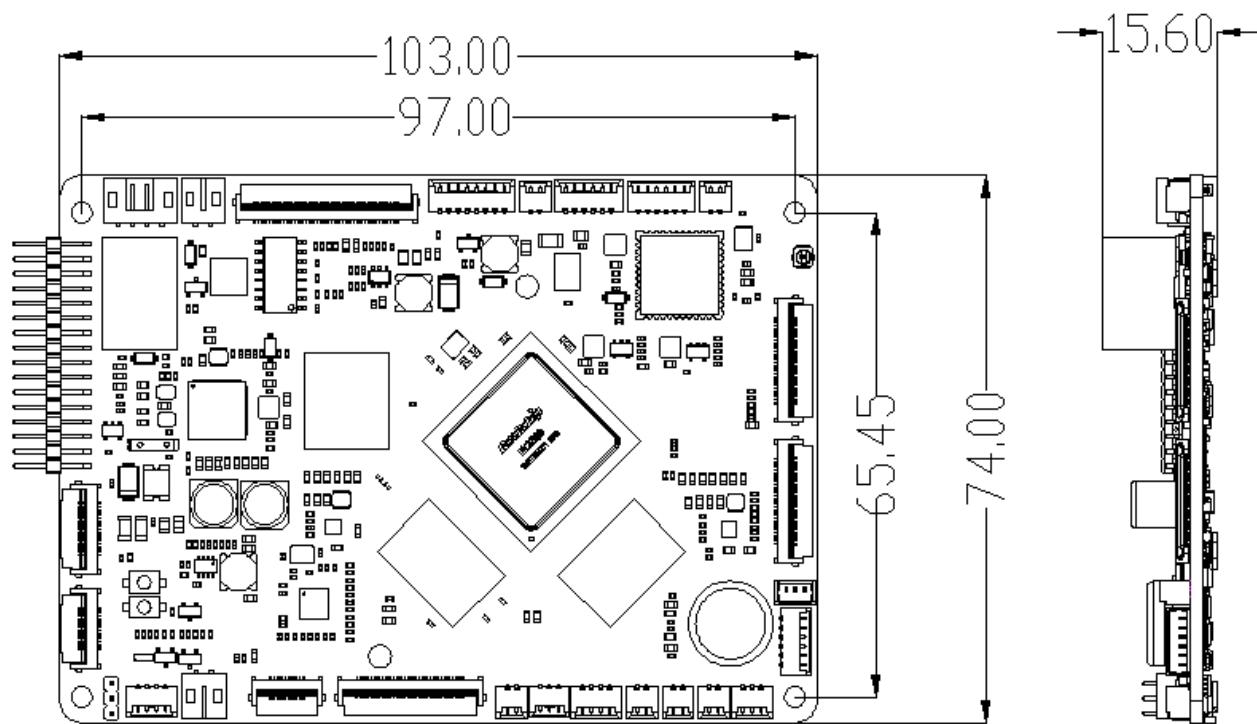
8. Tail Line Dual Row 32PIN 2.0 Pitch Interface (GPIO)

NO.	Definition	Describe
1	RELAY_NO	RELAY_NO
3	RELAY_OFF	RELAY_OFF
5	WG_OUT_DO	GPIO1_B1/SPI1_CLK/PMCU_JTAG_TCK
7	WG_IN_DO	GPIO1_A2/ISP0_FLASHTRIGIN/ISP1_FLASHTRIGIN/T
9	GND3	GND
11	RS232_TX	RS232_TX
13	RS485_B	GPIO1_B0/SPI1_TXD/UART4_TX
15	NC2	NC
17	USB30_RXN	TYPEC0_RX1M
19	USB30_TXN	TYPEC0_TX1M
21	GND	GND
23	HOST1_DM	USB1_DN
25	TYPEC0_M	TYPEC0_DN
27	TX_N	TX_N
29	RX_N	RX_N
31	GND	GND

| NO.	Definition	- 18 - Describe
2	GND1	GND
4	RELAY_COM	RELAY_COM
6	WG_OUT_D1	GPIO1_B2/SPI1_CSN0/PMCU_JTAG_TMS
8	WG_IN_D1	GPIO1_A4/ISP0_PRELIGHT_TRIG/ISP1_PRELIGHT_TRIG
10	GND2	GND
12	RS232_RX	RS232_RX
14	NC1	NC
16	RS485_A	GPIO1_A7/SPI1_RXD/UART4_RX
18	USB30_RXP	TYPEC0_RX1P
20	USB30_TXP	TYPEC0_TX1P
22	VBUS_5V	VBUS_TYPEC0
24	HOST1_DP	USB1_DP
26	TYPEC0_P	TYPEC0_DP
28	TX_P	TX_P
30	RX_P	RX_P
32	DCIN_12V	DCIN

## 5. PCB Size
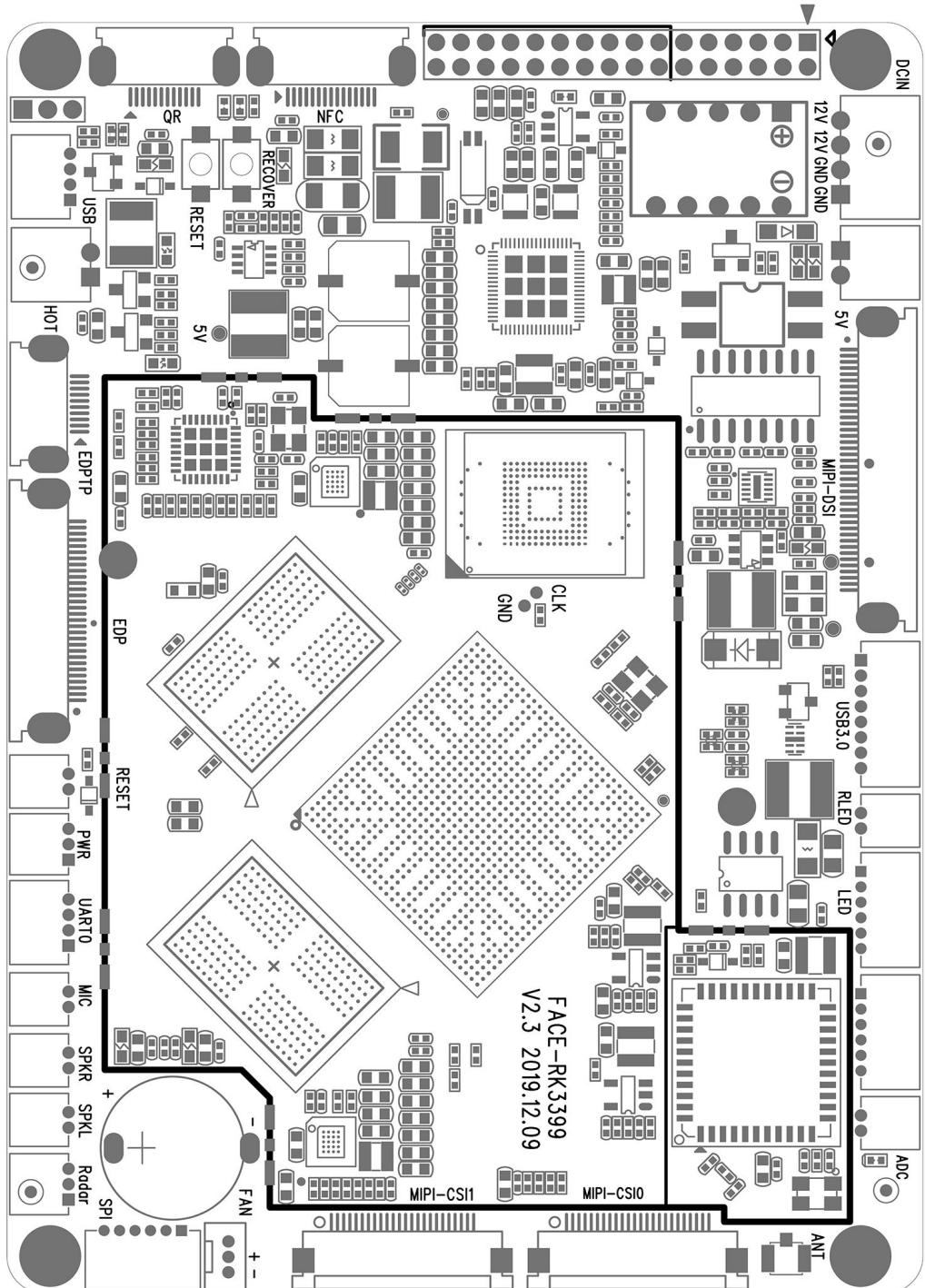
6. Face Recognition All-In-One PC
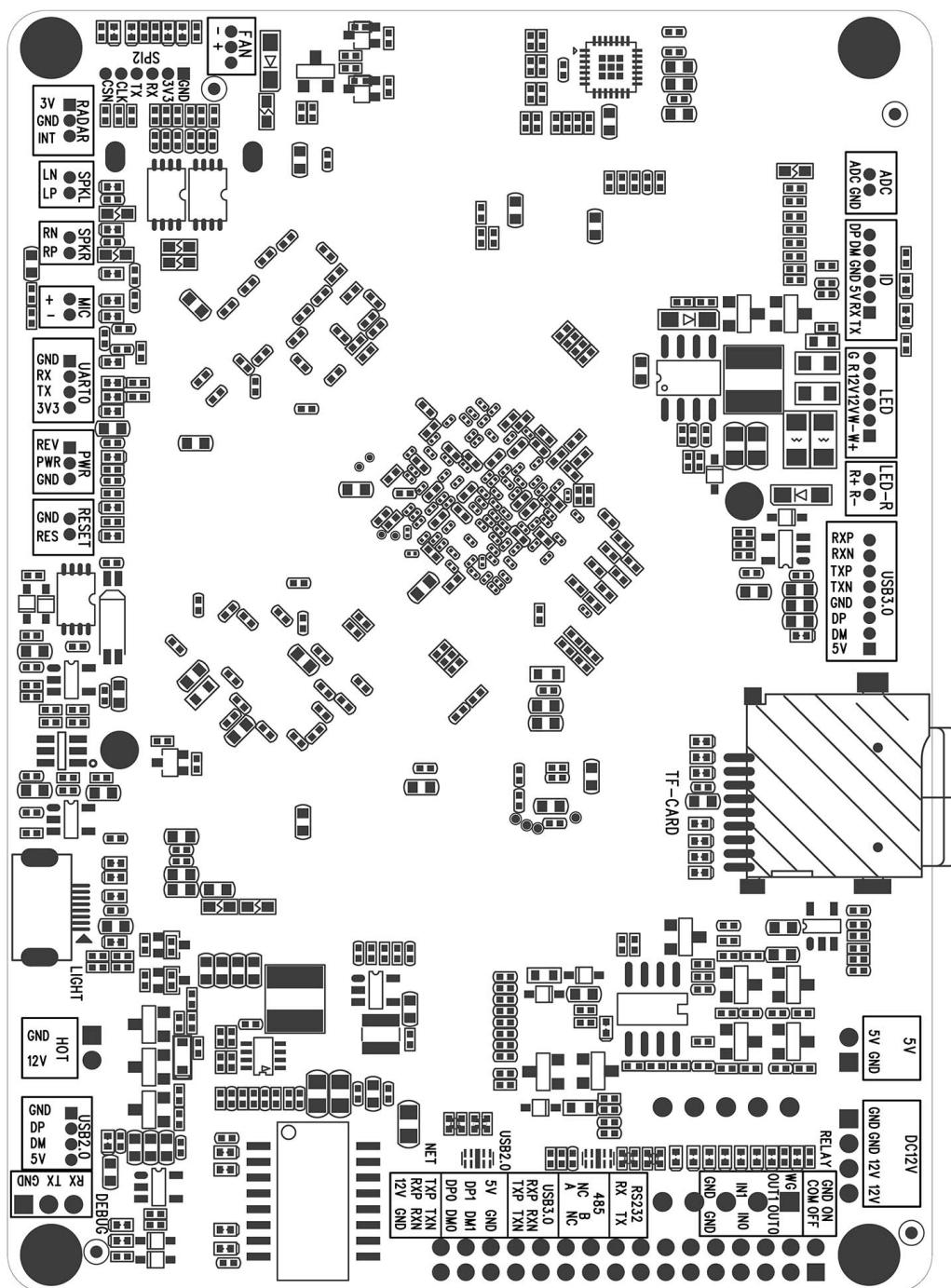
7. SMT

Bottom

BOTTOM SIDE SILKSCREEN

Company introduction

T-Chip Intelligent Technology Co., Ltd. was founded in 2005. It is a national high-tech enterprise. We focus on the research and development, design, production and sales of open source intelligent hardware, internet of things and digital audio products, and provide the overall solution for intelligent hardware products meanwhile.

The open-source brand "firefly" has an open-source community and online shopping mall on the Internet. At present, it has more than 200000 users and more than 5000 enterprise users, accelerating the R & D process for many technology entrepreneurs and start-ups, and providing professional technical services.

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