ROC-RK3566-PC
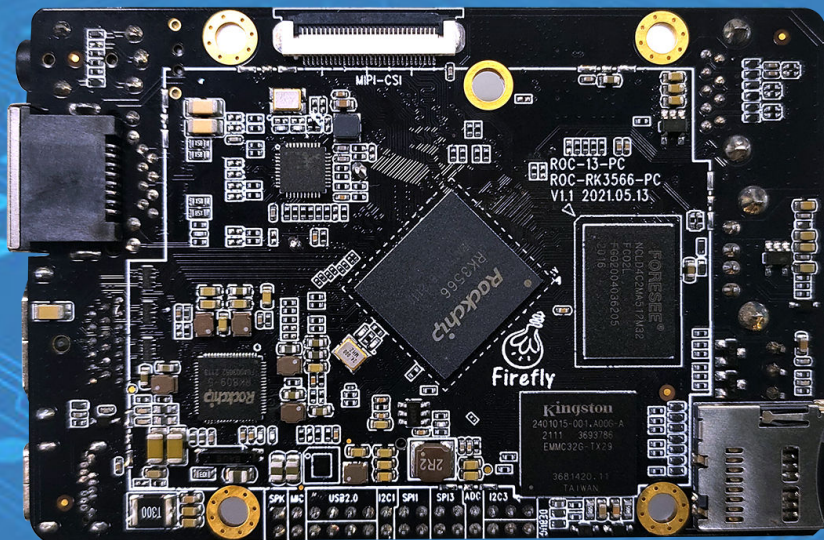
Quad-Core High-Performance Mainboard

V1.1

T-CHIP INTELLIGENCE TECHNOLOGY CO.,LTD.

www.t-firefly.com

# Update history

Version	Date	Details
V1.0	2021-4-25	initial version
V1.1	2022-1-13	Interface definition update

Directory

Equipped with RK3566 quad-core 64-bit processor, the mini computer supports 8G large RAM. M.2 interface enables expansion with large hard drive. Various systems and boot ways are supported — with the dedicated application programs and forums, geek fun is endless.
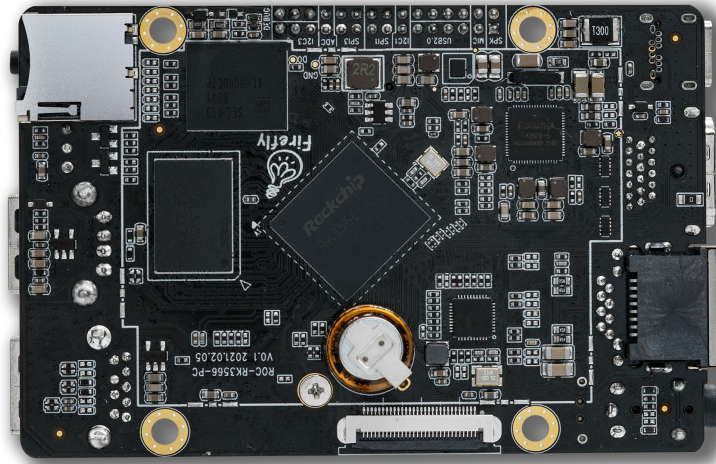
1.RK3566 quad-core 64-bit processor

RK3566 quad-core 64-bit Cortex-A55 processor has frequency up to 1.8GHz — the efficiency is greatly improved. With 22nm lithography process, it features low power consumption and high performance.

2.8GB large RAM, all-data-link ECC

It supports up to 8GB RAM with up to 32Bit width, and supports all-data-link ECC, making data safer and more reliable, and meeting the requirements of running large-memory products application.

3.Integrated co-processors

It is integrated with dual-core GPU, high-performance VPU and high-efficiency NPU. The GPU supports OpenGL ES3.2/2.0/1.1, Vulkan1.1. The VPU can achieve 4K 60fps H.265/H.264/VP9 video decoding and 1080P@60fps H.265/ H.264 video encoding. The NPU supports one-click switching of mainstream frameworks like Caffe/TensorFlow.

4.M.2 interface to expand

The onboard M.2 PCIe2.0 interface can be connected with NVMe SSD, owning the advantages of high-speed reading and writing and large storage.

5.Configured with Geek System

Station OS (Firefly Geek System) brings you living room playing experience. Just connect the TV or display at home to build a home entertainment center to enjoy movies and games with high-definition and big-screen viewing.

6.Various systems and boot ways supported

It supports to upgrade to Android, Ubuntu, Buildroot + QT, Station OS and other systems, and supports to boot the system via TF card, U disk, EMMC, etc. Diverse supporting systems make entertainment, work, programming learning, creative development all easy.

7.A variety of interfaces

With HDMI2.0, USB3.0, USB2.0, MIPI DSI, MIPI CSI, I2C, SPI, UART, ADC, PWM, GPIO, PCIe, I2S and other interfaces, it can be directly used for external device control and expansion.

8.Abundant resources for customization

A complete SDK, development documents, examples, technology documents, tutorials and other resources are provided for the users to make a further customization.

Specification

Basic

SOC	RK3566
CPU	Quad-core 64-bit Cortex-A55, 22nm lithography process, frequency up to 1.8GHz
GPU	ARM G52 2EE, Supports OpenGL ES 1.1/2.0/3.2. OpenCL 2.0. Vulkan 1.1 Embedded high-performance 2D acceleration hardware
NPU	1Tops@INT8, integrated high-performance AI accelerator RKNN NPU Supports one-click switching of Caffe/TensorFlow/TFLite/ONNX/PyTorch/Keras/Darknet
Video	Supports 4K 60fps H.265/H.264/VP9 video decoding Supports 1080P@60fps H.265/H.264 video encoding
RAM	2GB/4GB/8GB LPDDR4
Storage	32GB/64GB/128GB eMMC
Extended Storage	Support M.2 PCIe 2.0 NVMe SSD (2242) Support TF Card Slot

Hardware

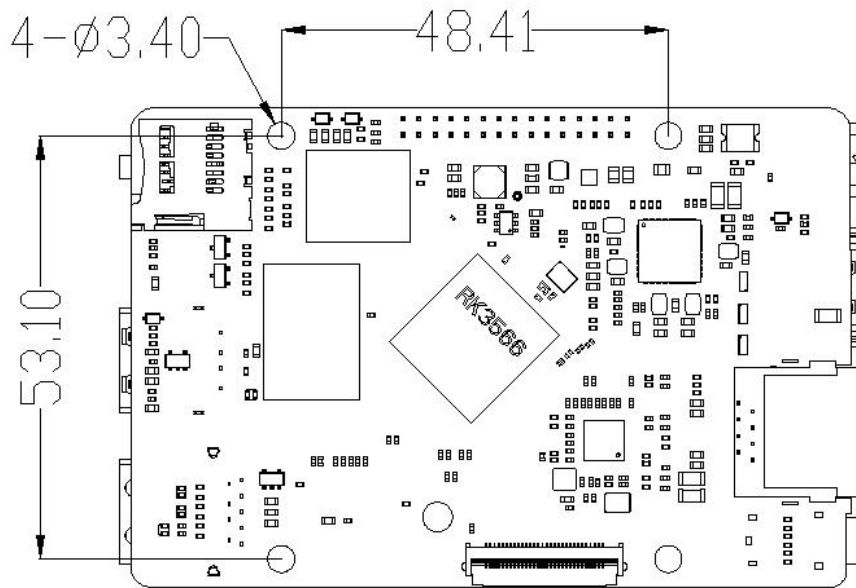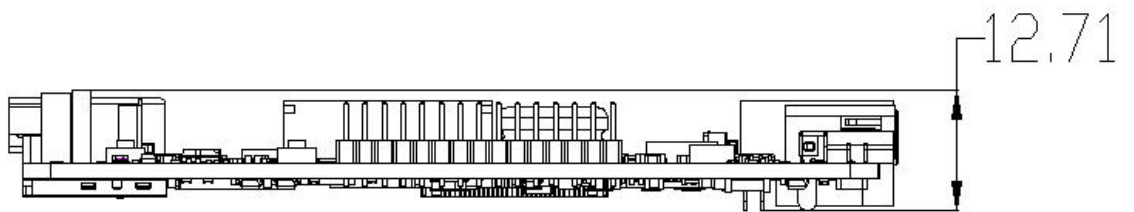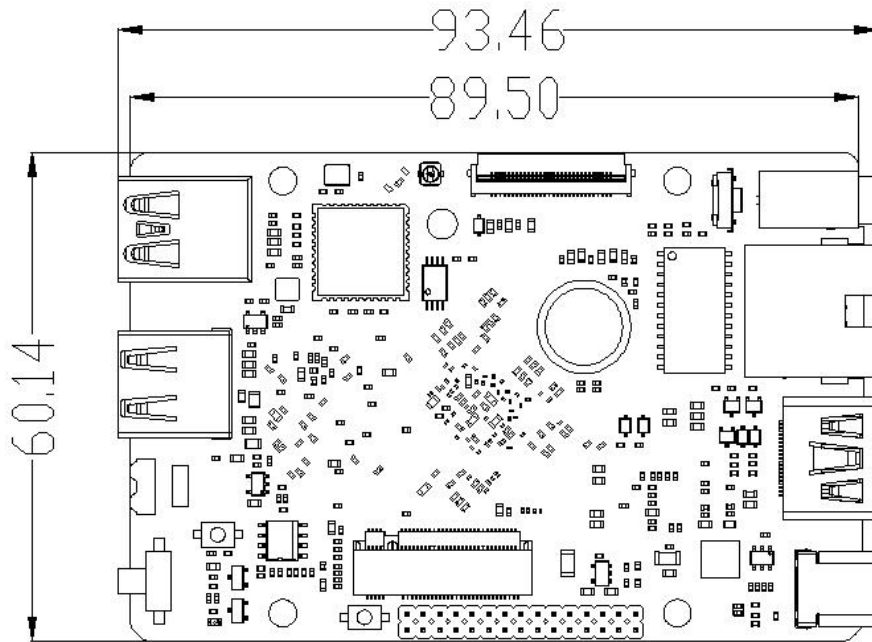|	
Ethernet	1 × RJ45 (1000Mbps)
WiFi	2.4GHz/5GHz Dual band WiFi, 802.11a/b/g/n/ac, Bluetooth5.0
Display	1 × HDMI2.0, 4K@60Hz 1 × MIPI DSI, 1920*1080@60fps (or Dual channel 2560*1440@60fps)
Audio	1 × HDMI Audio 1 × Phone 1 × Speaker (1.5W/8Ω or 2.5W/4Ω) 1 × Mic Audio input
Camera	1 × MIPI-CSI camera interface
Power	5V (via USB-C)
USB	1 × USB3.0 (Max：1000mA) 1 × USB2.0 (Max：500mA) 1 × USB-C (OTG)
Other	I2C、SPI、UART、ADC、PWM、GPIO、I2S

Software

OS	Android11、Ubuntu、Buildroot+QT、OpenWRT、Debian

Other

Size	93.46mm × 60.14mm
Heat Dissipation	Heat sink installation：19×19mm, heat sink is recommended (click to see)
Power Consumption	Idle：0.03W(5V/6mA) Normal：2.5W(5V/500mA) Max：5.25W(5V/1005mA)
Environment	Operating Temperature: -20℃-60℃ Storage Temperature: -20℃-70℃ Storage Humidity: 10%-90%RH(non-condensing)

93.46

89.50

60.14

12.71

4-ø3.40

48.41

53.10

RK3566

WiFi
BT5.0

MIPI-DSI
30P-0.5mm

Recovery

USB3.0

Audio

RJ45
1000 Mbps

USB2.0

IR

Reset

Power

HDMI2.0
4K@60Hz

USB-C
OTG
DC 5V

M.2 PCle 2.1

30P-2.0mm
SPK、MIC、USB HOST、I2S、I2C
SPI、GPIO、DEBUG

MIPI-CSI
30P-0.5mm

TF Card Slot
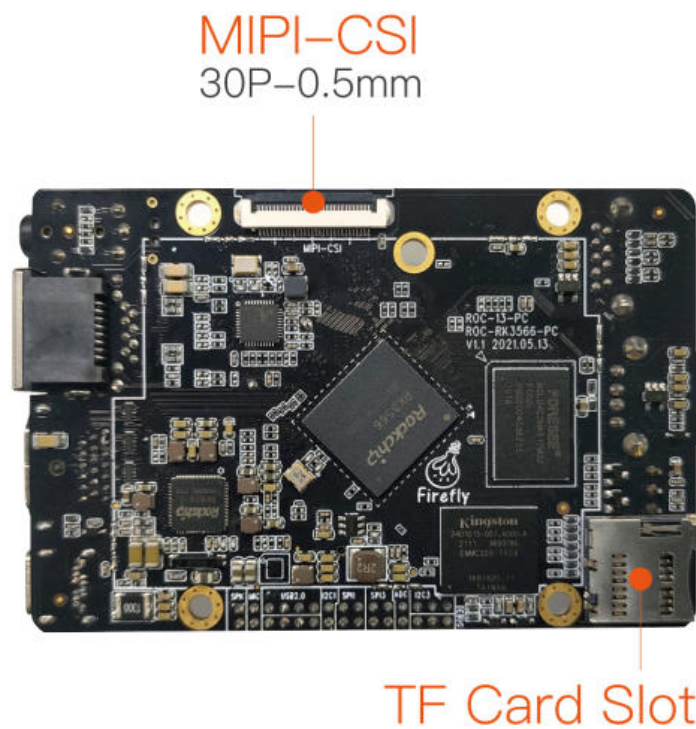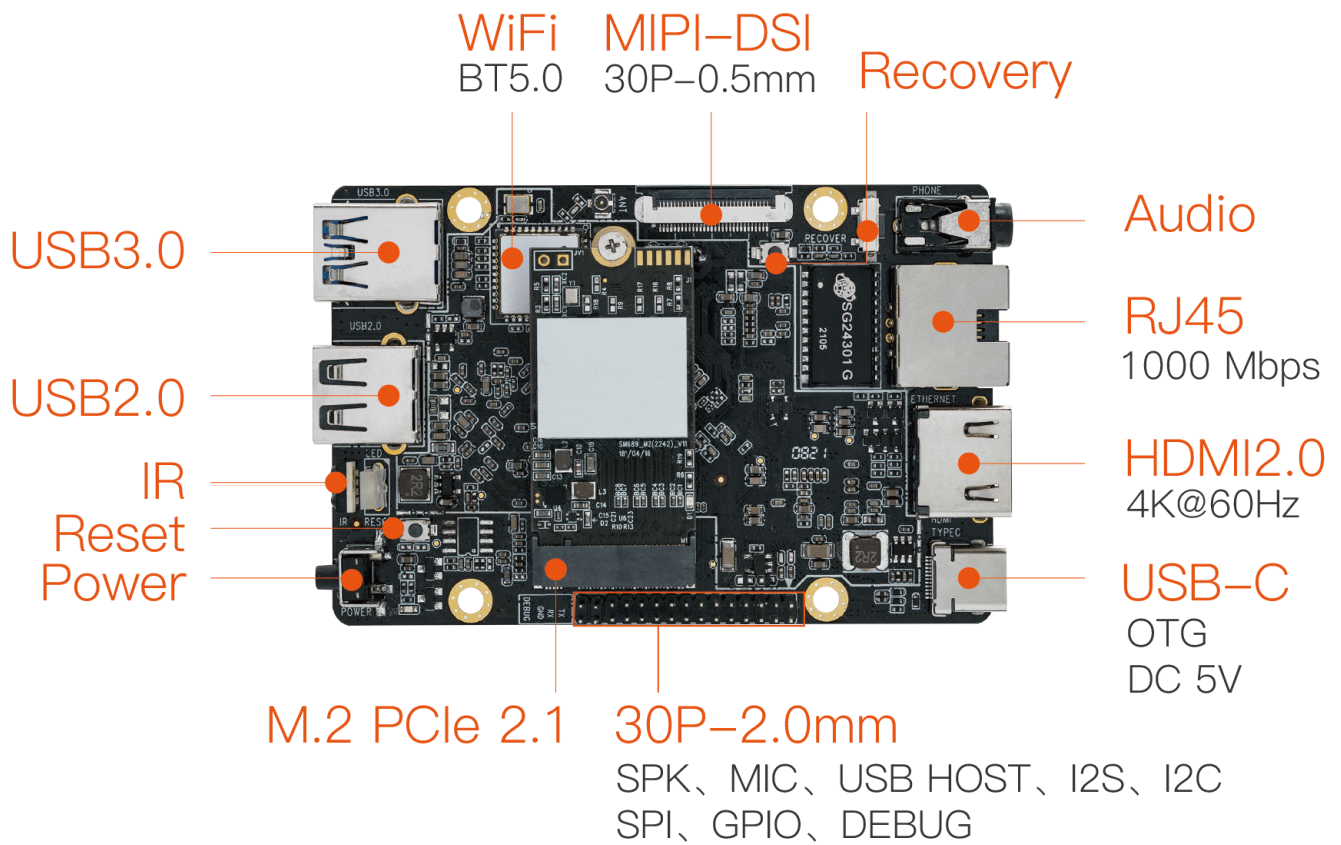
Interface Definition

1. (J1) Dual-row（15X2）30 PIN 2.0 Pitch Interface
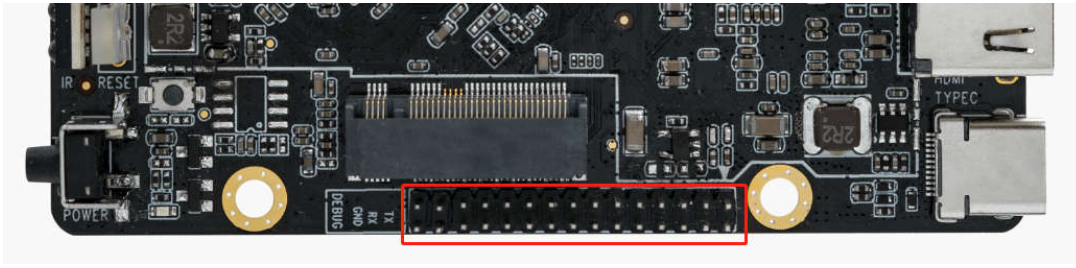
NO.	Definition	Voltage	NO.	Definition	Voltage
1	SPK_MINI_P【Amplifier output】	5.0	2	SPK_MINI_N【Amplifier output】	5
3	MIC1n(MIC_R)【MIC input】	3.3	4	MIC1p(MIC_L) 【MIC input】	3.3
5	GND		6	3.3V Power Output	3.3
7	USB_HOST3_DP	3.3	8	GND	
9	USB_HOST3_DM	3.3	10	I2S3_LRCK_M1 (EDP_HPDIN_M0/SPDIF_TX_M2/SATA2_ACT_LED/GPIO4_C4_d)	3.3
11	5V Power Output	5.0	12	POWER_KEY【connect RK809】	3.3
13	I2C1_SCL 2.2K resistor has been pulled up on the board (MCU_JTAG_TDO/GPIO0_B3_u)	3.3	14	I2C1_SDA 2.2K resistor has been pulled up on the board (PCIE20_BUTTONRSTn/ MCU_JTAG_TCK/GPIO0_B4_u)	3.3
15	SPI1_MISO_M1 (UART5_TX_M1/ I2S1_SDO3_M2/VOP_BT1120_D14/ GPIO3_C2_d)	3.3	16	SPI1_MOSI_M1 (PCIE20_PERSTn_M1 /I2S1_SDO2_M2/VOP_BT1120_D13/ GPIO3_C1_d)	3.3
17	SPI1_CS0_M1 (SDMMC2_D0_M1/ VOP_BT1120_D0/GPIO3_A1_d)	3.3	18	SPI1_CLK_M1 (VOP_BT1120_D15/UART5_RX_M1/I2S1_SCLK_RX_M2/GPIO3_C3_d)	3.3
19	SPI3_MISO_M1 (SATA1_ACT_LED/ UART9_TX_M1/I2S3_SDO_M1/ PWM12_M1/GPIO4_C5_d)	3.3	20	SPI3_CS0_M1 (PWM13_M1/SATA0_ACT_LED/ UART9_RX_M1/I2S3_SDI_M1/GPIO4_C6_d)	3.3
21	SPI3_CLK_M1 (I2S3_MCLK_M1/ PWM14_M1/GPIO4_C2_d)	3.3	22	SPI3_MOSI_M1 (PWM15_IR_M1 /I2S3_SCLK_M1/GPIO4_C3_d)	3.3
23	SARADC_VIN3 10K resistor has been pulled up on the board	1.8	24	GPIO0_D5_D	1.8
25	I2C3_SDA_M0 2.2K resistor has been pulled up on the board (UART3_RX_M0/ AUDIOPWM_LOUT_P/GPIO1_A0_u)	3.3	26	DEBUG_RX (UART2_RX_M0/GPIO0_D0_u Debug port)	3.3
27	I2C3_SCL_M0 2.2K resistor has been pulled up on the board (UART3_TX_M0/ AUDIOPWM_LOUT_N/GPIO1_A1_u)	3.3	28	DEBUG_TX (UART2_TX_M0/GPIO0_D1_u(Debug port))	3.3
29	GND	3.3	30	GND	3.3

2. (J12) M-KEY PCIE (PCIe2.1 x 1)
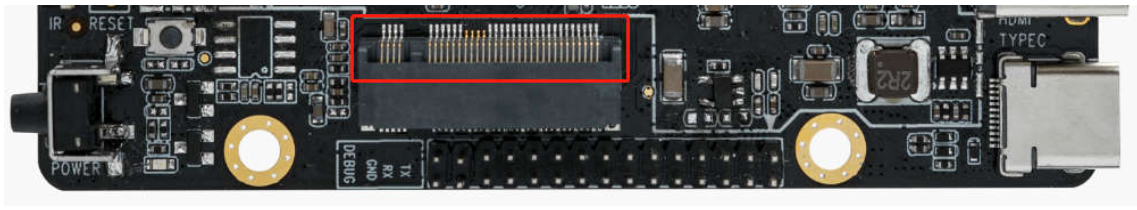
NO.	Definition	Voltage	NO.	Definition	Voltage
1	GND		2	3.3V Power Output	3.3
3	GND		4	3.3V Power Output	3.3
5	NC		6	NC	
7	NC	5.0	8	NC	
9	GND	5.0	10	DAS/DSS	3.3
11	NC	1.8	12	3.3V Power Output	3.3
13	NC	1.8	14	3.3V Power Output	3.3
15	GND	1.8	16	3.3V Power Output	3.3
17	NC	1.8	18	3.3V Power Output	3.3
19	NC		20	NC	
21	GND		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	DEVSLP	3.3
39	GND		40	NC	
41	PCIE20_RXN/SATA2_RXN	1.8	42	NC	
43	PCIE20_RXP/SATA2_RXP	1.8	44	NC	
45	GND		46	NC	
47	PCIE20_TXN/SATA2_TXN (series capacitance 0.1uF)	1.8	48	NC	
49	PCIE20_TXP/SATA2_TXP (series capacitance 0.1uF)	1.8	50	PCIE20_PERSTn_M2 (I2S1_SDO3_M0/I2S1_SDI1_M0/PDM_SDI1_M0/ GPIO1_B2_d)	3.3
51	GND		52	PCIE20_CLKREQn_M2 (I2S1_SDO1_M0/I2S1_SDI3_M0/PDM_SDI3_M0/ GPIO1_B0_d)	3.3
53	PCIE20_REFCLKN	1.8	54	PCIE20_WAKEn_M2 (I2S1_SDO2_M0/I2S1_SDI2_M0/PDM_SDI2_M0/ GPIO1_B1_d)	3.3

55	PCIE20_REFCLKP	1.8	56	NC	
57	GND		58	NC	
59	**NC**		**60**	**NC**	
61	NC		62	**NC**	3.3
63	NC		64	**NC**	3.3
65	NC		66	**NC**	3.3
67	NC		68	PCIE_32KHZ	
69	NC		70	3.3V Power Output	3.3
71	GND		72	3.3V Power Output	3.3
73	GND		74	3.3V Power Output	3.3
75	GND				

3. (J10) MIPI CAMERA   30 PIN 0.5mm pitch
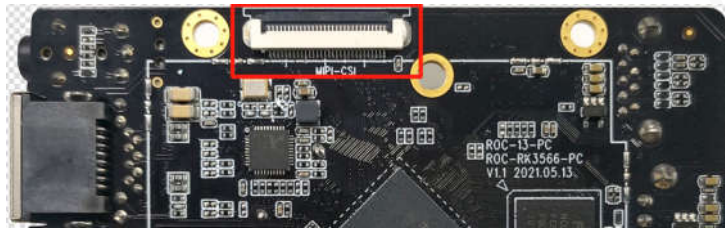
NO.	Definition	Voltage	NO.	Definition	Voltage
1	I2C2_SDA_M1 2.2K resistor has been pulled up on the board	1.8	16	GND	
2	I2C2_SCL_M1 2.2K resistor has been pulled up on the board	1.8	17	MIPI_CSI_RX_CLK0P	1.8
3	MIPI_PDN0_CAM (CIF_VSYNC/EBC_SDOE/GMAC1_MDIO_M1/I2S2_SCLK_TX_M1/GPIO4_B7_d)	1.8	18	MIPI_CSI_RX_CLK0N	1.8
4	MIPI_RESET0_CAM (CAM_CLKOUT1/EBC_SDCE2/GMAC1_RXD1_M1/SPI3_MISO_M0/I2S1_SDO1_M1/GPIO4_B0_d)	1.8	19	GND	
5	GND		20	MIPI_CSI_RX_D2P	1.8
6	MIPI_MCLK0 (CIF_CLKOUT/EBC_GDCLK/PWM11_IR_M1/GPIO4_C0_d)	1.8	21	MIPI_CSI_RX_D2N	1.8
7	MIPI_PDN1_CAM (CIF_HREF/EBC_SDLE/GMAC1_MDC_M1/UART1_RTSn_M1/I2S2_MCLK_M1/GPIO4_B6_d)	1.8	22	GND	
8	MIPI_RESET1_CAM (CIF_CLKIN/EBC_SDCLK/GMAC1_MCLKINOUT_M1/UART1_CTSn_M1/I2S2_SCLK_RX_M1/GPIO4_C1_d)	1.8	23	MIPI_CSI_RX_D3P	1.8
9	MIPI_MCLK1 (CAM_CLKOUT0/EBC_SDCE1/GMAC1_RXD0_M1/SPI3_CS1_M0/I2S1_LRCK_RX_M1/GPIO4_A7_d)	1.8	24	MIPI_CSI_RX_D3N	1.8
10	GND		25	GND	

11	MIPI_CSI_RX_D0P	1.8	26	MIPI_CSI_RX_CLK1P	1.8
12	MIPI_CSI_RX_D0N	1.8	27	MIPI_CSI_RX_CLK1N	1.8
13	GND		28	GND	
14	MIPI_CSI_RX_D1P	1.8	29	5V Power Output	5.0
15	MIPI_CSI_RX_D1N	1.8	30	5V Power Output	5.0

4. (J6) MIPI_Display_Interface 30 PIN 0.5mm Pitch
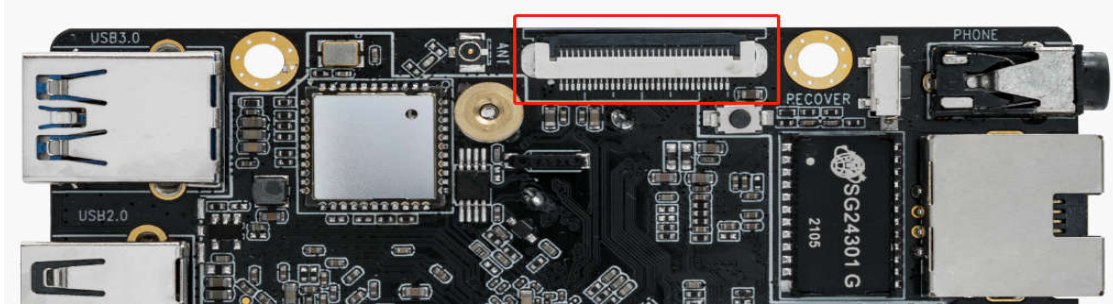
NO.	Definition	Voltage	NO.	Definition	Voltage
1	5V Power Output	5.0	16	MIPI_DSI_TX0_D0P	1.8
2	5V Power Output	5.0	17	MIPI_DSI_TX0_D0N	1.8
3	5V Power Output	5.0	18	GND	
4	GND		19	MIPI_DSI_TX0_D1P	1.8
5	GPIO0_A0_d	3.3	20	MIPI_DSI_TX0_D1N	1.8
6	3.3V Power Output	3.3	21	GND	
7	I2C2_SDA_M0_T 2.2K resistor has been pulled up on the board	3.3	22	MIPI_DSI_TX0_CLKP	1.8
8	I2C2_SCL_M0_TP 2.2K resistor has been pulled up on the board	3.3	23	MIPI_DSI_TX0_CLKN	1.8
9	LCD_EN (HDMITX_CEC_M1/PWM0_M1/UART0_CTSn/GPIO0_C7_d)	3.3	24	GND	
10	TP_INT (SDMMC0_PWREN/SATA_MP_SWITCH/PCIE20_CLKREQn_M0/GPIO0_A5_d)	3.3	25	MIPI_DSI_TX0_D2P	1.8
11	BL_EN (PWM1_M0/GPUAVS/UART0_RX/GPIO0_C0_d)	3.3	26	MIPI_DSI_TX0_D2N	1.8
12	LCD_BL (PWM4/VOP_PWM_M0/MCU_JTAG_TRSTn/GPIO0_C3_d)	3.3	27	GND	
13	LCD_RST_L (PWM3_IR/EDP_HPDIN_M1/MCU_JTAG_TMS/GPIO0_C2_d)	3.3	28	MIPI_DSI_TX0_D3P	1.8
14	TP_RST_L (PWM6/SPI0_MISO_M0/GPIO0_C5_d)	3.3	29	MIPI_DSI_TX0_D3N	1.8
15	GND		30	GND	

About us

T-Chip Intelligent Technology (Zhongshan) Co., Ltd. , established in 2005, has more than ten years of technological product research and development capabilities, and has nearly 100 patents and software copyrights. As a national high-tech enterprise, we focus on the research and development, production and sales of open source smart hardware, Internet of Things, and digital audio products, while also provide overall solutions with smart hardware products.

T-Chip is an IDH (Independent Design House) officially authorized by Rockchip in Fuzhou, and also a strategic partner of Rockchip, with a close cooperative relationship for more than 10 years.

Firefly is a brand established by T-Chip, with open source community and online store. Firefly products include core boards, mainboards, embedded computers, cluster servers, development kits and other products. Currently, we have more than 100,000 users, including more than 10,000 enterprise users such as Arm, Google, Baidu, Tencent and Alibaba.

Firefly team has more than 70 R&D members, with excellent research and development capabilities of schematic design, PCB layout, board mass production, embedded development, system development, application development and so on. We accelerate the research and development process for many technology entrepreneurs and start-ups, and provide professional technical services.

Make technology simpler, Make life smarter - is the idea of Firefly team. We hope that through Firefly's open source products and technical services, the research and development of various technological products will become efficient and simple, and intelligent technology can be integrated into life.

Firefly is committed to providing enterprise customers with long-term stable and reliable industrial products and services, and continuously creating value for customers.

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