Firefly-RK3399

Product

Specifications

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V1.0	2017-09-29	Original version

Company Profile

T-Chip Intelligent Technology Co., Ltd. was founded in 2005. It has more than 10 years of research and development experience in scientific and technological products, has 6 invention patents and more than 30 computer software copyrights, and 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.

Firefly is a brand owned by T-chip Technology. It operates open source products, open source communities and online stores. It has a large number of enterprise users and developer users, and its products are well received by users. Firefly open source products include open source boards, core boards, industry mainboards, etc. The open-source board series is the recommended board card by chip original factory Rockchip and obtain the support of native SDK. The core boards and industrial mainboards are widely used in commercial displays, advertisement integrated machines, intelligent POS, face recognition terminals, internet of things, intelligent cities, etc. At present, there are more than 100,000 users, including over 2,000 enterprise users. And well-known users include ARM, Google, Baidu, Tencent, Alibaba, etc.

Firefly team has more than 60 research and development members and has the research and development capabilities in schematic design, PCB layout, mainboard production, embedded development, system development, application program development, etc., which accelerates the research and development process for many technology entrepreneurs and start-ups, and provides professional technical services..

" Make technology more simple, Make life more intelligent " is the idea of Firefly team. We hope to make the research and development of various technology products efficient and simple, and let intelligent technology integrate in our lives through the open source products and technical services of Firefly.

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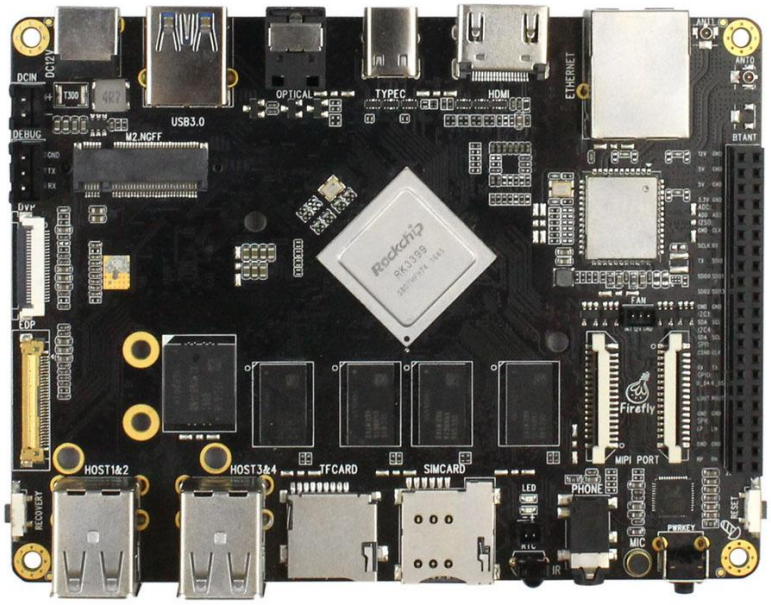
1. Product Overview

1.1 Overview

Firefly-RK3399 is an open source high-performance platform that is elaborately created by the Firefly team. It uses RockChip RK3399 six core chip, with 2.0GHz main frequency. It has 3G, 4G data communication interfaces, USB3.0, high-performance PCIE ports, and supports commonly used external devices. It has multiple ports, with stable performance.



It also supports Android\Linux\Ubuntu systems, and software support is perfect. The open source code is suitable for secondary development of enterprises, high-definition commercial advertising machines, VEMs, education terminals, etc..It lowers the barrier for research and development, and shortens the product development cycle.

1.2 Application scenarios

VR equipment	3D Camera	Robot	IOT	PC
Network Attached Storage（NAS）	Home audio equipment	Vehicle equipment	Cluster server	Intelligent interaction

1.3 Features

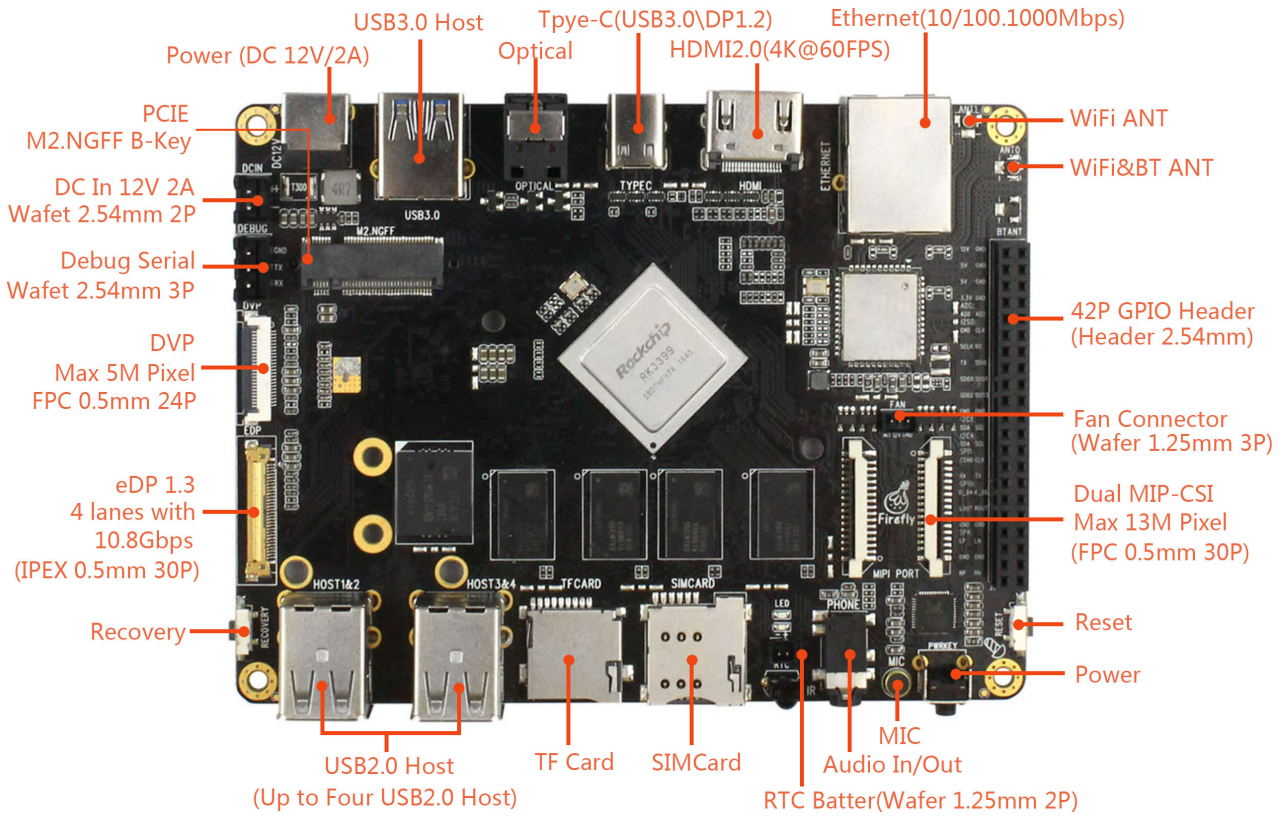
- Multiple display interface: It supports dual MIPI multiple display output interfaces. It also Support dual-screen identical display/dual-screen differential display.

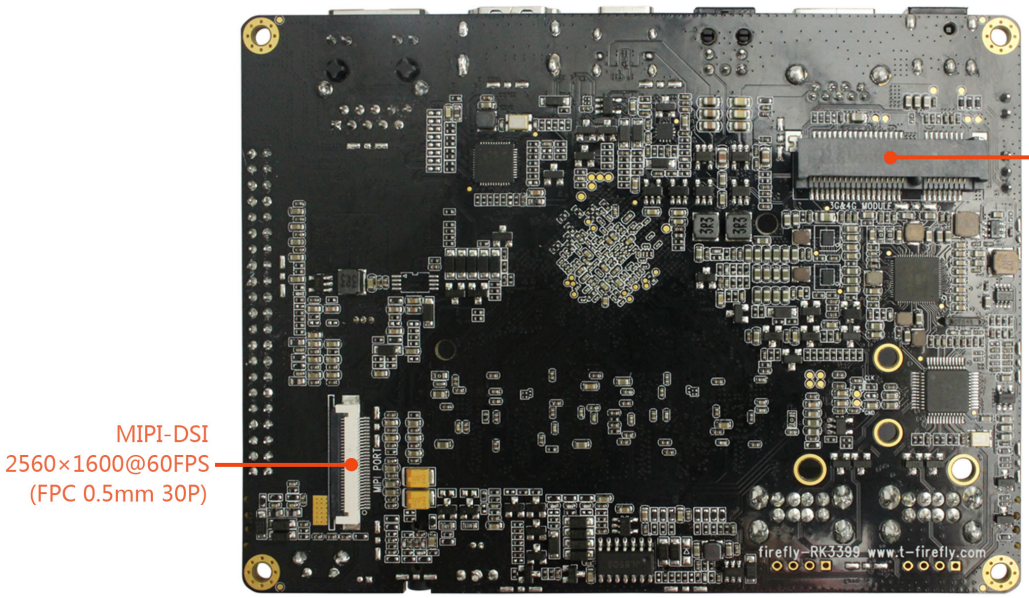
- High-performance serial peripheral interface: 1×USB 3.0 port, 1×PCIE port, extensible high-speed SSD memory, suitable for servers and other scenarios

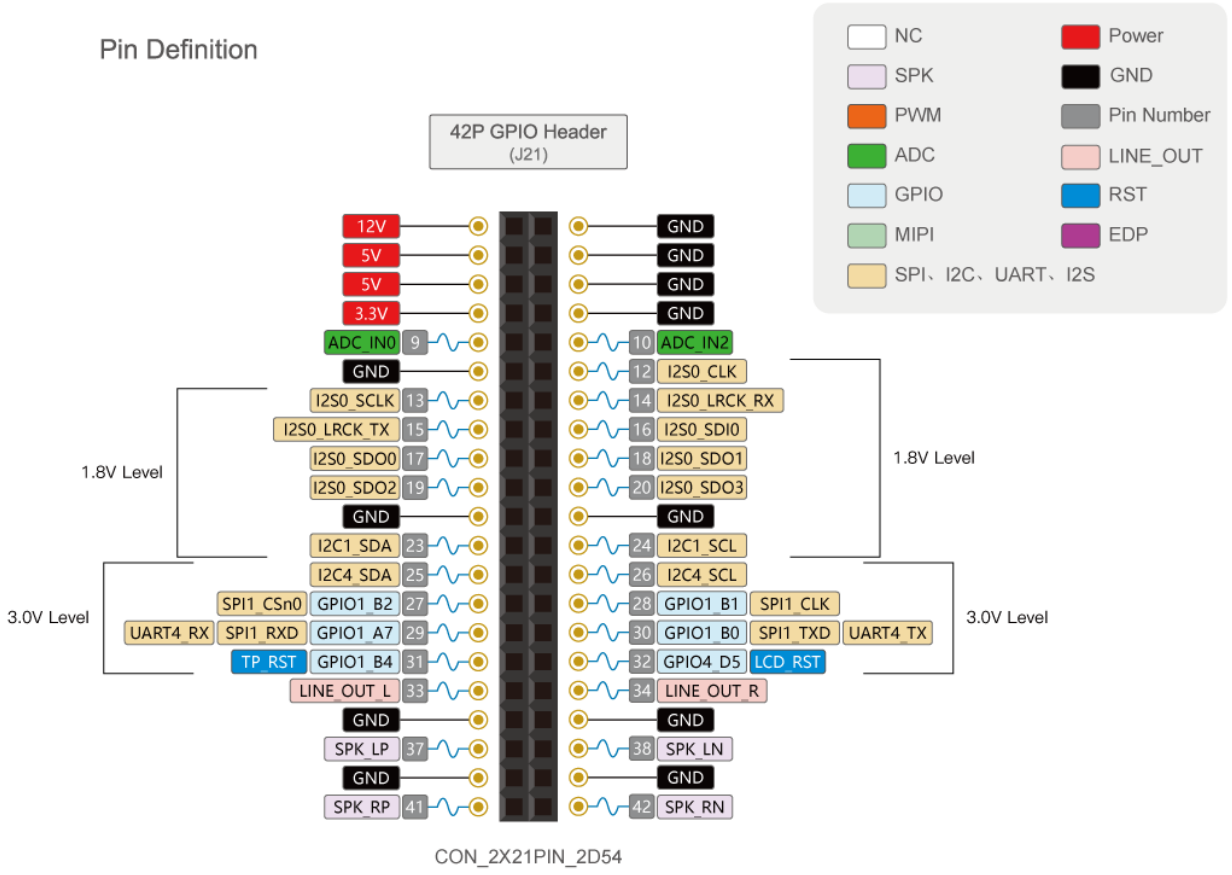
- A variety of network interfaces: 2.4GHz/5GHz dual-band WIFI, Bluetooth4.1, Gigabit Ethernet, Onboard Mini PCIe interface, extensible 3G/4G communication module

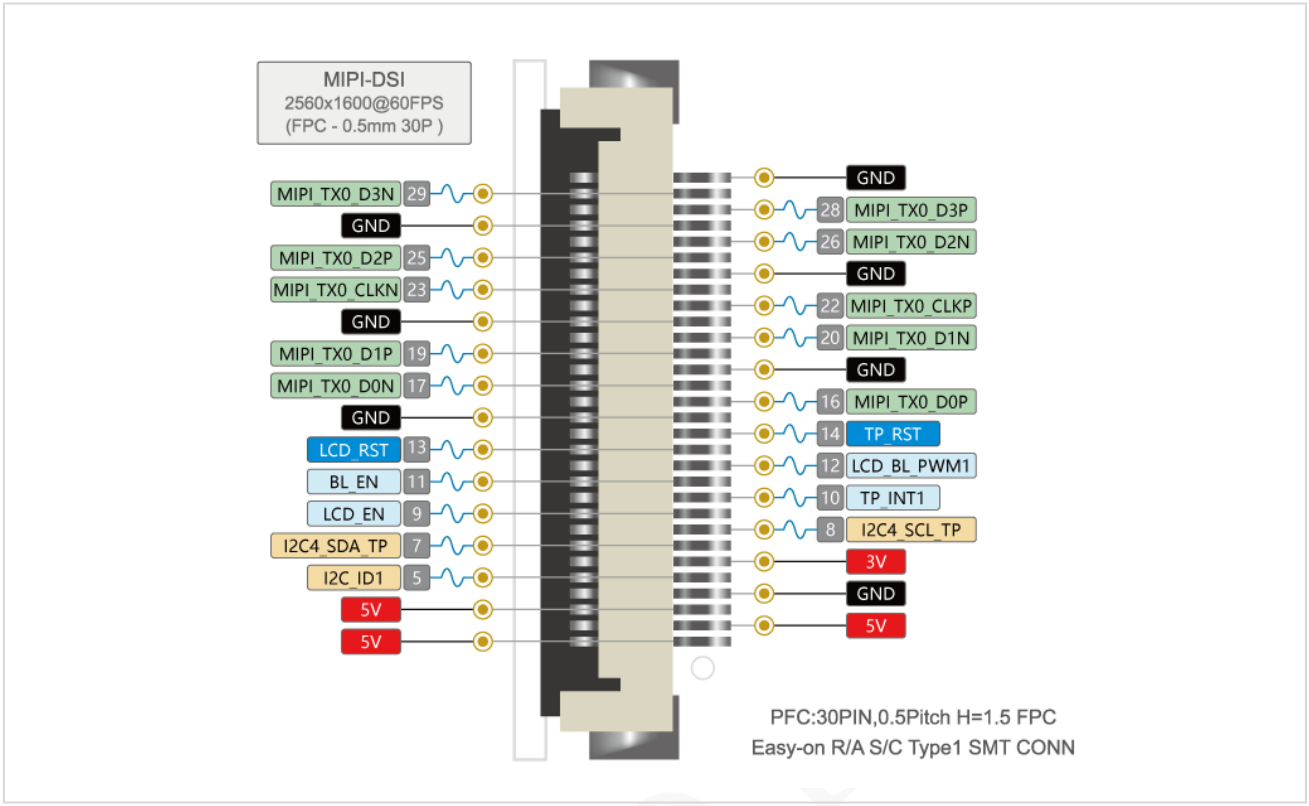
- Perfect system software: It supports open source operating systems such as Android, Phoenix , Flint OS Desktop Office Automation System

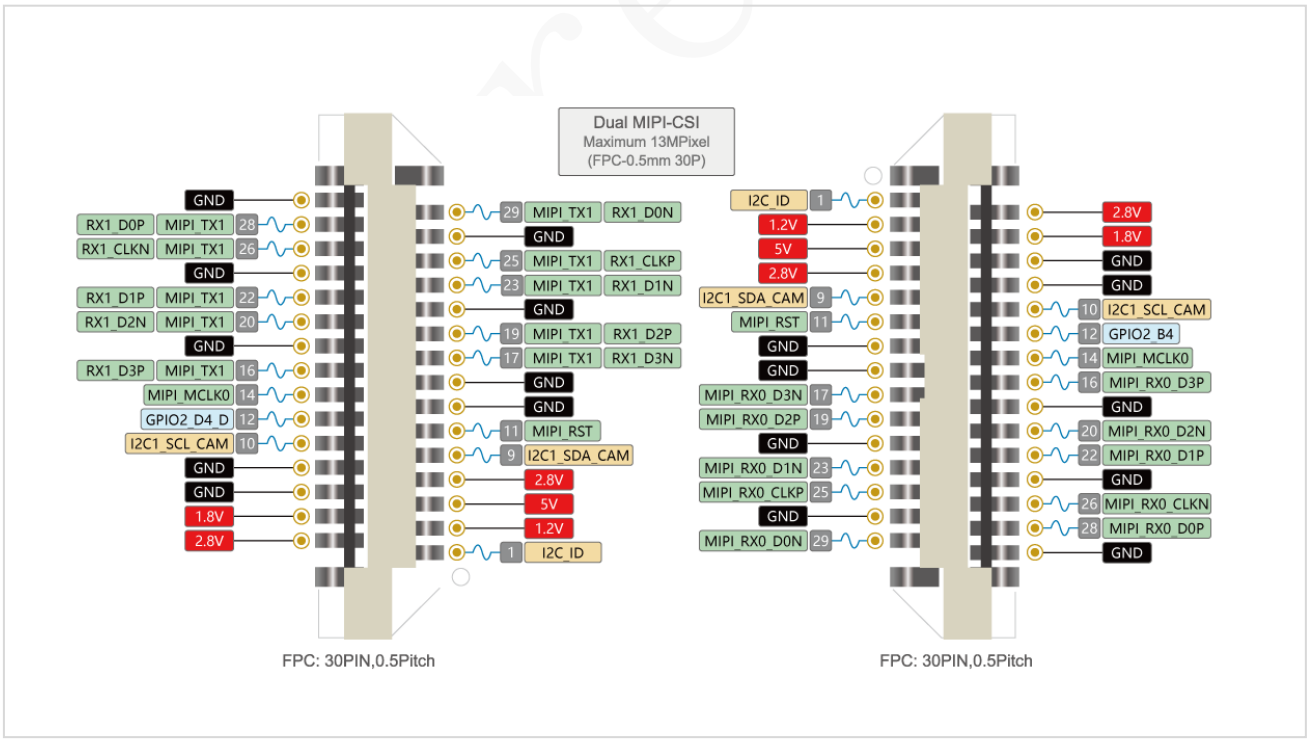
1.4 The mainboard appearance

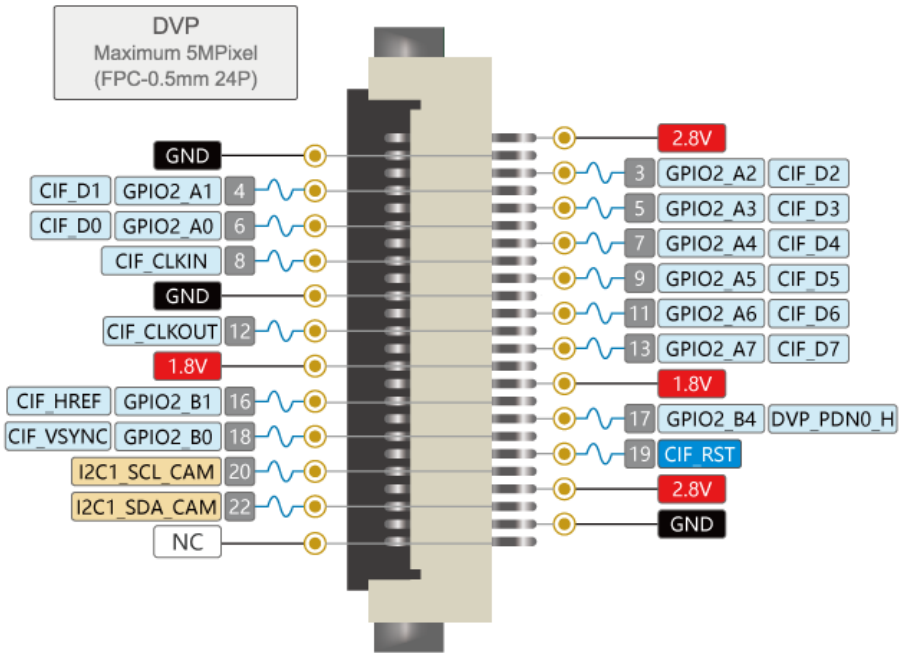



Mini-PCIe
3G&4G Module
MIPI-DSI
2560×1600@60FPS
(FPC 0.5mm 30P)
firefly-RK3399 www.t-firefly.com

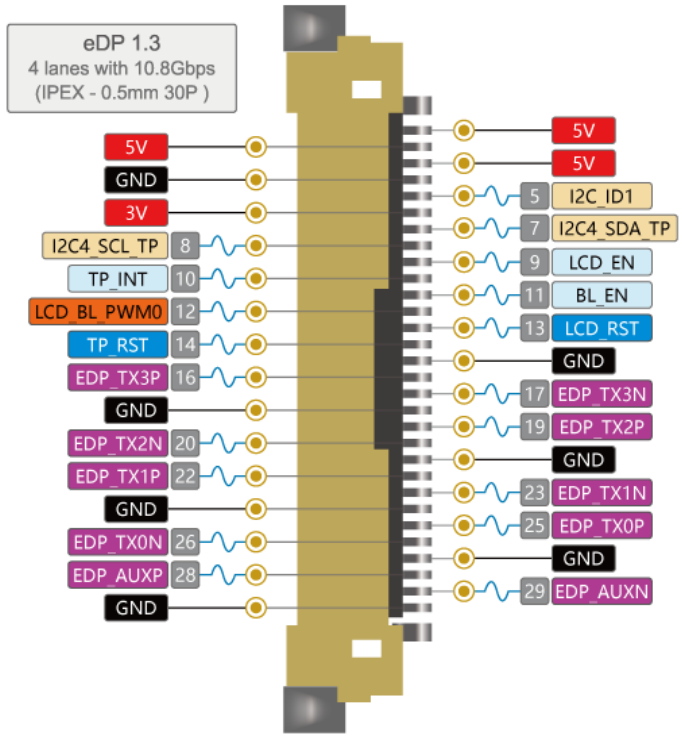

Pin Definition
42P GPIO Header
(J21)
NC
SPK
PWM
ADC
GPIO
MIPI
SPI、I2C、UART、I2S
Power
GND
Pin Number
LINE_OUT
RST
EDP
1.8V Level
3.0V Level
12V
5V
5V
3.3V
ADC_IN0
GND
I2S0_SCLK
I2S0_LRCK_TX
I2S0_SDO0
I2S0_SDO2
GND
I2C1_SDA
I2C4_SDA
SPI1_CSn0
UART4_RX
SPI1_RXD
TP_RST
GPIO1_B4
LINE_OUT_L
GND
SPK_LP
GND
SPK_RP
GND
GND
GND
ADC_IN2
I2S0_CLK
I2S0_LRCK_RX
I2S0_SDI0
I2S0_SDO1
I2S0_SDO3
GND
I2C1_SCL
I2C4_SCL
GPIO1_B1
SPI1_CLK
GPIO1_B0
SPI1_TXD
UART4_TX
GPIO4_D5
LCD_RST
LINE_OUT_R
GND
SPK_LN
GND
SPK_RN
CON_2X21PIN_2D54


MIPI-DSI
2560x1600@60FPS
(FPC - 0.5mm 30P)
MIPI_TX0_D3N 29
GND
MIPI_TX0_D2P 25
MIPI_TX0_CLKN 23
GND
MIPI_TX0_D1P 19
MIPI_TX0_D0N 17
GND
LCD_RST 13
BL_EN 11
LCD_EN 9
I2C4_SDA_TP 7
I2C_ID1 5
5V
5V
GND
28 MIPI_TX0_D3P
26 MIPI_TX0_D2N
GND
22 MIPI_TX0_CLKP
20 MIPI_TX0_D1N
GND
16 MIPI_TX0_D0P
14 TP_RST
12 LCD_BL_PWM1
10 TP_INT1
8 I2C4_SCL_TP
3V
GND
5V
PFC:30PIN,0.5Pitch H=1.5 FPC
Easy-on R/A S/C Type1 SMT CONN


Dual MIPI-CSI
Maximum 13MPixel
(FPC-0.5mm 30P)
GND
RX1_D0P MIPI_TX1 28
RX1_CLKN MIPI_TX1 26
GND
RX1_D1P MIPI_TX1 22
RX1_D2N MIPI_TX1 20
GND
RX1_D3P MIPI_TX1 16
MIPI_MCLK0 14
GPIO2_D4_D 12
I2C1_SCL_CAM 10
GND
GND
1.8V
2.8V
29 MIPI_TX1 RX1_D0N
GND
25 MIPI_TX1 RX1_CLKP
23 MIPI_TX1 RX1_D1N
GND
19 MIPI_TX1 RX1_D2P
17 MIPI_TX1 RX1_D3N
GND
GND
11 MIPI_RST
9 I2C1_SDA_CAM
2.8V
5V
1.2V
1 I2C_ID
FPC: 30PIN,0.5Pitch
I2C_ID 1
1.2V
5V
2.8V
I2C1_SDA_CAM 9
MIPI_RST 11
GND
GND
MIPI_RX0_D3N 17
MIPI_RX0_D2P 19
GND
MIPI_RX0_D1N 23
MIPI_RX0_CLKP 25
GND
MIPI_RX0_D0N 29
2.8V
1.8V
GND
GND
10 I2C1_SCL_CAM
12 GPIO2_B4
14 MIPI_MCLK0
16 MIPI_RX0_D3P
GND
20 MIPI_RX0_D2N
22 MIPI_RX0_D1P
GND
26 MIPI_RX0_CLKN
28 MIPI_RX0_D0P
GND
FPC: 30PIN,0.5Pitch



FPC:24PIN,0.5Pitch H=1.5 FPC
Easy-on R/A S/C Type1 SMT CONN

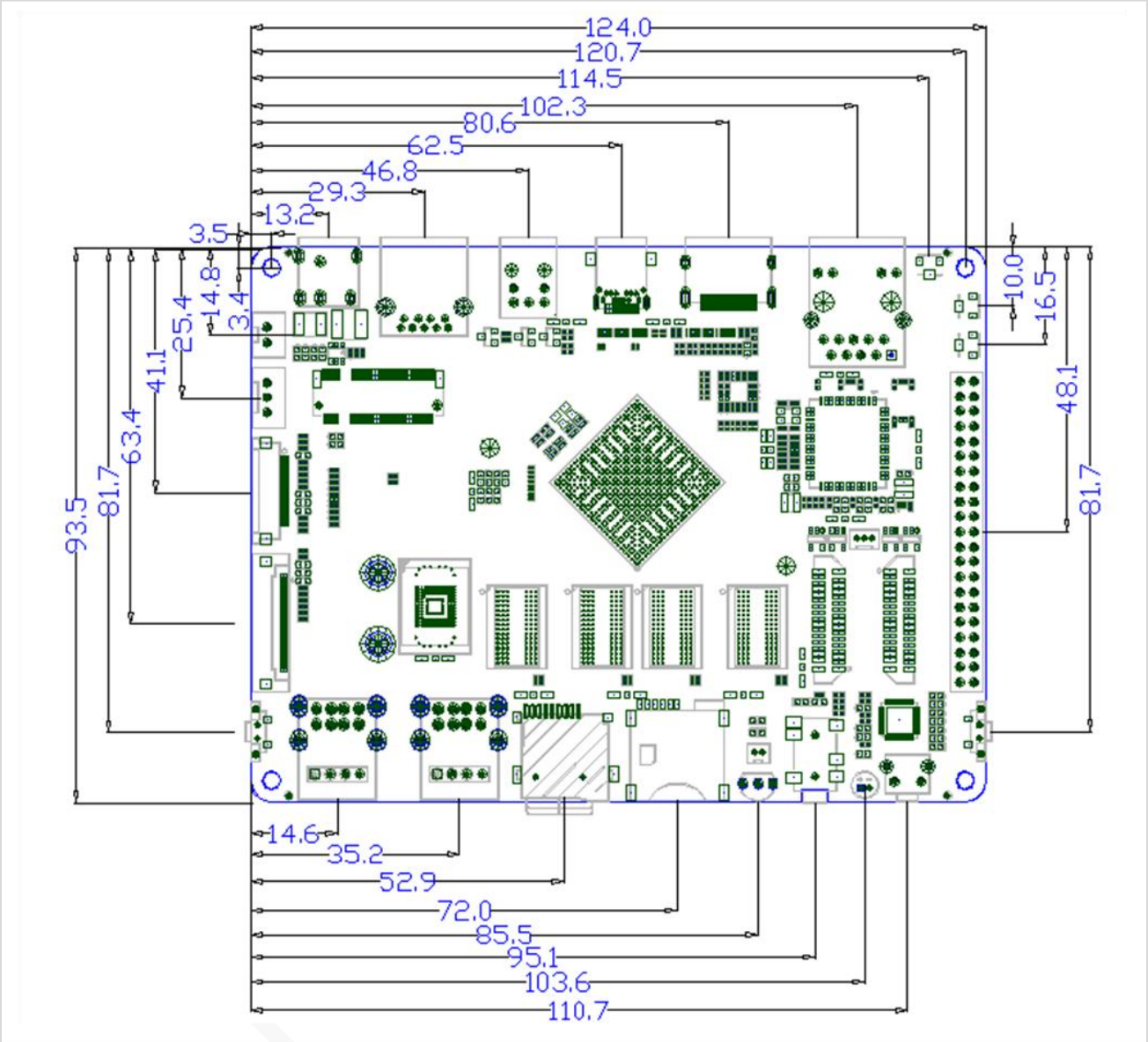


IPEX Connector:20455-030E-12,0.5Pitch

2. Hardware specifications

Type	Specifications
CPU	RK3399, dual Cortex-A72 big core + quad Cortex-A53 small core. The highest basic frequency is 2.0 GHz.
GUP	Quad core ARM Mali-T860 Support OpenGL ES 1.1/2.0 /3.0, OpenVG1.1, OpenCL, Directx11
DDR	2GB / 4GB (Optional) DDR-1866/DDR3L-1866/LPDDR3-1866/LPDR4
Memory	Support eMMC5.1，SDIO3.0 8GB/16GB/32GB/64G/128G (Optional)
Decoding resolution / Multimedia	Support 4K video decoding up to 60fps
	1080P multi-format video decoding
	Support the encoding of 1080P videos with H.264 and VP8 formats
Display	Dual VOP display: It respectively supports 4096X2160 and 2560X1600 resolutions.
	Support dual channel MIPI-DSI (4 wires per channel)
	HDMI2.0 supports 4K 60Hz display, and HDCP 1.4/2.2
	Support DisplayPort 1.2 (4 wires, up to 4K 60Hz)
	Support eDP 1.3 (4 wires, 10.8 G bps)
	Support gamut mappings of Rec.2020 and Rec.709.
Ports	The dual ISP pixel processing capability is up to 13MPix/s, and it supports simultaneous data acquisition of dual cameras
	Support dual USB3.0 Type-C port
	Support PCIe 2.1（4 full-duplex lanes）
	Built-in MCU of low power consumption
	Supports 8-channel digital microphone array input
Network	RJ45 interface gigabit ethernet Support 2.4GHz/5GHz dual-frequency WiFi, support 802.11a/b/g/n/ac protocols, Support Bluetooth 4.0
USB	2 x USB2.0 HOST，1 x USB2.0 OTG，2xUSB3.0
Infrared receiver	With a one-way infrared receiver, it has the function of infrared remote control.
Power Input	12/2A
Size	124mm x 93.5mm

3. PCB Size



- Thickness：1.6mm
- Size：124mm * 93.5mm
- Top surface height permitted：14mm
- Undersurface height permitted：5.5mm
- Screw hole size: 3mm

4. Extended interfaces

4.1 42PIN 2.54 spacing extension port

No.	Definition	No.	Definition
1	DC_12V	22	GND
2	GND	23	I2C1_SDA
3	VCC_SYS	24	I2C1_SCL
4	GND	25	I2C4_SDA
5	VCC_SYS	26	I2C4_SCL
6	GND	27	SPI1_CSN0/GPIO1_B2_U
7	VCC3V3_SYS	28	SPI1_CLK/GPIO1_B1_U
8	GND	29	SPI1_RXD/GPIO1_A7_U
9	ADC_IN0	30	SPI1_TXD/GPIO1_B0_U
10	ADC_IN2	31	TP_RST
11	GND	32	LCD_RST
12	I2S0_CLK	33	LINE_OUT_L
13	I2S0_SCLK	34	LINE_OUT_R
14	I2S0_LRCK_RX	35	GND
15	I2S0_LRCK_TX	36	GND
16	I2S0_SDI0	37	SPK_LP
17	I2S0_SDO0	38	SPK_LN
18	I2S0_SDO1	39	GND
19	I2S0_SDO2	40	GND
20	I2S0_SDO3	41	SPK_RP
21	GND	42	SPK_RN

4.2 port 1 for MIPI camera

No.	Definition	No.	Definition
1	VCC18_MIPI	18	GND
2	AF_28	19	MIPI_RX0_D2P
3	DVDD_1V2	20	MIPI_RX0_D2N
4	VCC18_MIPI	21	GND
5	VCC_SYS	22	MIPI_RX0_D1P
6	GND	23	MIPI_RX0_D1N
7	VCC28_MIPI	24	GND
8	GND	25	MIPI_RX0_CLKP
9	I2C1_SDA_CAM	26	MIPI_RX0_CLKN
10	I2C1_SCL_CAM	27	GND
11	MIPI_RST	28	MIPI_RX0_D0P
12	GPIO2_B4/DVP_PDN0_H	29	MIPI_RX0_D0N
13	GND	30	GND
14	MIPI_MCLK0	31	GND
15	GND	32	GND
16	MIPI_RX0_D3P	33	GND
17	MIPI_RX0_D3X	34	GND

4.3 port 2 for MIPI camera

No.	Definition	No.	Definition
1	10K pull-down resistor	18	GND
2	AF_28	19	MIPI_TX1/RX_D2P
3	DVDD_1V2	20	MIPI_TX1/RX_D2N
4	VCC18_MIPI	21	GND
5	VCC_SYS	22	MIPI_TX1/RX_D1P
6	GND	23	MIPI_TX1/RX_D1N
7	VCC28_MIPI	24	GND

8	GND	25	MIPI_TX1/RX_CLKP
9	I2C1_SDA_CAM	26	MIPI_TX1/RX_CLKN
10	I2C1_SCL_CAM	27	GND
11	MIPI_RST	28	MIPI_TX1/RX_D0P
12	GPIO2_D4_D/DVP_PDN1	29	MIPI_TX1/RX_D0N
13	GND	30	GND
14	MIPI_MCLK0	31	GND
15	GND	32	GND
16	MIPI_TX1/RX_D3P	33	GND
17	MIPI_TX1/RX_D3N	34	GND

4.4 CIF camera port

No.	Definition	No.	Definition
1	AF_28	13	GPIO2_A7/CIF_D7
2	GND	14	VCC1V8_DVP
3	GPIO2_A2/CIF_D2	15	VCC1V8_DVP
4	GPIO2_A1/CIF_D1	16	GPIO2_B1/CIF_HREF
5	GPIO2_A3/CIF_D3	17	GPIO2_B4/DVP_PDN0_H
6	GPIO2_A0/CIF_D0	18	GPIO2_B0/CIF_VSYNC
7	GPIO2_A4/CIF_D4	19	CIF_RST
8	CIF_CLKIN	20	I2C1_SCL_CAM
9	GPIO2_A5/CIF_D5	21	VCC2V8_DVP
10	GND	22	I2C1_SDA_CAM
11	GPIO2_A6/CIF_D6	23	GND
12	CIF_CLKOUT	24	NC

4.5 EDP display port

No.	Definition	No.	Definition
1	VCC_SYS	16	EDP_TX3P
2	VCC_SYS	17	EDP_TX3N
3	VCC_SYS	18	GND
4	GND	19	EDP_TX2P
5	VCC_3V0	20	EDP_TX2N
6	VCC_3V0	21	GND
7	I2C4_SDA_TP	22	EDP_TX1P
8	I2C4_SCL_TP	23	EDP_TX1N
9	LCD_EN	24	GND
10	TP_INT	25	EDP_TX0P
11	BL_EN	26	EDP_TX0N
12	LCD_BL_PWM0	27	GND
13	LCD_RST	28	EDP_AUXP
14	TP_RST	29	EDP_AUXN
15	GND	30	GND

4.6 PCIe M.2 B-Key port

No.	Definition	No.	Definition
1	Low efficiency	35	PCIE_TX0P
2	PCIE_3V3	36	PCIE_TX2N
3	GND	37	GND
4	PCIE_3V3	38	PCIE_TX2P
5	GND	39	PCIE_RX0_N
6	NC	40	GND
7	USB_DP	41	PCIE_RX0_P
8	PCIE_DISABLE	42	PCIE_RST
9	USB_DM	43	GND

10	NC	44	PCIE_CLKREQ
11	GND	45	PCIE_REF_CLKN
12	NC	46	PCIE_WAKE
13	GND	47	PCIE_REF_CLKP
14	NC	48	VCC_SYS
15	DC_12V	49	GND
16	GND	50	VCC_SYS
17	DC_12V	51	I2C1_SDA_PCIE
18	PCIE_RX3_N	52	NC
19	GND	53	NC
20	PCIE_RX3_P	54	NC
21	PCIE_TX1N	55	NC
22	GND	56	NC
23	PCIE_TX1P	57	NC
24	PCIE_TX3N	58	NC
25	GND	59	PCIE_RESET
26	PCIE_TX3P	60	RTC_CLK_OUT
27	PCIE_RX1_N	61	GND
28	GND	62	PCIE_3V3
29	PCIE_RX1_P	63	GND
30	PCIE_RX2_N	64	PCIE_3V3
31	GND	65	GND
32	PCIE_RX2_P	66	PCIE_3V3
33	PCIE_TX0N	67	GND
34	GND		

4.7 Mini PCIE port

No.	Definition	No.	Definition
1	NC	27	GND
2	VCC3V3_3G	28	NC
3	NC	29	GND
4	GND	30	NC
5	NC	31	NC
6	NV	32	NC
7	NC	33	NC
8	UIM_PWR	34	GND
9	GND	35	GND
10	UIM_DAT	36	3G_USB_DM
11	NC	37	GND
12	UIM_CLK	38	3G_USB_DP
13	NC	39	VCC3V3_3G
14	UIM_RST	40	GND
15	GND	41	VCC3V3_3G
16	NC	42	NC
17	GND	43	GND
18	GND	44	NC
19	NC	45	NC
20	NC	46	NC
21	GND	47	NC
22	PE_RST	48	NC
23	NC	49	NC
24	NC	50	GND
25	NC	51	NC
26	GND	52	VCC3V3_3G

5. System software

Type	Description
Operating system	Android 7.1、Android 6.0、Linux、Ubuntu 16.04、u-boot
Programming language	Java、C、C++、Kotlin、Shell、Python
Getting sources	Android: https://gitlab.com/TeeFirefly/FireNow-Marshmallow Linux: https://gitlab.com/TeeFirefly/linux-kernel

6. Electrical Performance

Items		Minimum	Typical	Maximum
Power supply voltage	Voltage	---	12V	---
	Power ripple	---	72mV	---
Supply current (HDMI output only)	Operating current	---	228mA	671mA
	Stand-by current	---	174mA	---
Supply current (Only Firefly EDP screen is connected.)	Operating current	---	390mA	920mA
	Stand-by current	---	268mA	---
RTC shutdown power consumption	Operating current	2uA		
Operating temperature	Celsius	-20 ℃	---	60 ℃

Appendix

1 Source code acquisition

Please visit the official website "Resource Download": (please click here)

or call the national service hotline of **4001-511-533** for consultation and acquisition.

2 Contact us

	Company	T-chip Intelligent Technology Co.,Ltd.
	Address	Room 2101,No.1Hongyu Building, #57 Zhongshan 4Rd, East District, Zhongshan, Guangdong
	Mobile	(+86) 186 8811 7175
	National service hotline	4001-511-533
	Telephone	0760-89881218
	Zip code	528400
	Business	sales@t-firefly.com
	Website	www.t-firefly.com