PX30 MINI EVB
User Manual

Release version: V1.1
Date: 2019.07.18

Disclaimer

The products, services, or characteristics you purchase shall be subject to the commercial contract and terms of Rockchip. All or part of the products, services or characteristics described in this document may not be within your purchase or use. Unless otherwise agreed in the contract, Rockchip does not make any express or implied warranty of the content of this document.

This document will be updated periodically due to product version upgrades or other reasons. Unless otherwise agreed, this document serves only as usage guidance, and all statements, information and recommendations in this document do not constitute any express or implied warranties.

Brand Statement

Rockchip, Rockchip™ icon, Rockchip and other Rockchip trademarks are trademarks of Fuzhou Rockchip Electronics co., ltd., and are owned by Fuzhou Rockchip Electronics co., ltd.

All other trademarks or registered trademarks mentioned in this document are owned by their respective owners.

Copyright © 2018 Fuzhou Rockchip Electronics Co., Ltd.

Fuzhou Rockchip Electronics Co., Ltd.
Address: No. 18 Building, A District, No.89, software Boulevard Fuzhou, Fujian, PRC
Website: www.rock-chips.com
Customer service tel.: +86-591-83991906
Customer service fax: +86-591-83951833
Customer service e-mail: fae@rock-chips.com

Rockchip™ 瑞芯微电子™

Preface

Overview

This document mainly describes PX30 MINI EVB single board basic function and hardware characteristics, multi-function hardware configuration and software debugging operation method, aiming to help developers use PX30 MINI EVB more quickly and correctly, and familiar with PX30 chip solution.

Product version

The corresponding product version of the document is as below:

Product name	Product version
PX30 MINI EVB	PX30_Mini_EVB_V10_20180528
PX30 MINI EVB	PX30_Mini_EVB_V11_20190507

Applicable object

This document is mainly suitable for below engineers:

- Field application engineers
- Single board hardware development engineers
- Embedded software development engineers
- Test engineers

Revision History

The revision history accumulates instructions for each update of the document and the latest version contains updates of all previous versions.

Revision date	Version no.	Author	Revision description
2018-09-28	V1.0	XHF	Initial Release
2019-07-18	V1.1	XHF	Initial Release

Acronym

Acronym includes the abbreviations of commonly used phrases in this document.

DDR	Double Data Rate	双倍速率同步动态随机存储器
eMMC	Embedded Multi Media Card	内嵌式多媒体存储卡
I²C	Inter-Integrated Circuit	内部整合电路(两线式串行通讯总线)
JTAG	Joint Test Action Group	联合测试行为组织定义的一种国际标准测试协议（IEEE 1149.1兼容）
LDO	Low Drop Out Linear Regulator	低压差线性稳压器
LVDS	Low-Voltage Differential Signaling	低电压差分信号
MIPI	Mobile Industry Processor Interface	移动产业处理器接口
PMIC	Power Management IC	电源管理芯片
PMU	Power Management Unit	电源管理单元
RK	Rockchip Electronics Co.,Ltd.	瑞芯微电子股份有限公司
SD Card	Secure Digital Memory Card	安全数码卡
SDIO	Secure Digital Input and Output	安全数字输入输出接口
SDMMC	Secure DigitalMulti Media Card	安全数字多媒体存储卡
TF Card	Micro SDCard(Trans-flash Card)	外置记忆卡
USB	Universal Serial Bus	通用串行总线

Contents

Picture Contents

Table Contents

1. Overview

1.1 EVB brief introduction

PX30 MINI EVB is the hardware development board integrated with reference design, chip debugging and testing, and chip verification for Rockchip PX30 multimedia processing chip (hereinafter referred to as PX30 chip). It is used to demo PX30 powerful multimedia interfaces and rich peripheral interfaces, and also provide hardware reference design based on PX30 for customers, so that customers can finish the product hardware development without modification or only simply modify the module circuit of the reference design. PX30 MINI EVB supports EVB development of PX30 chip, application software development and running and so on. Considering the different usage environments and chip full function verification, the interfaces are complete and the design is relatively complex.

PX30 MINI EVB can be used as a USB DEVICE to download and update the program by connecting with PC via USB cable, or to implement more complete developing system or demo environment by connecting with below devices or components:

- Power supply
- LCM MIPI panel
- TF Card memory device
- Earphone or speaker box
- Camera module

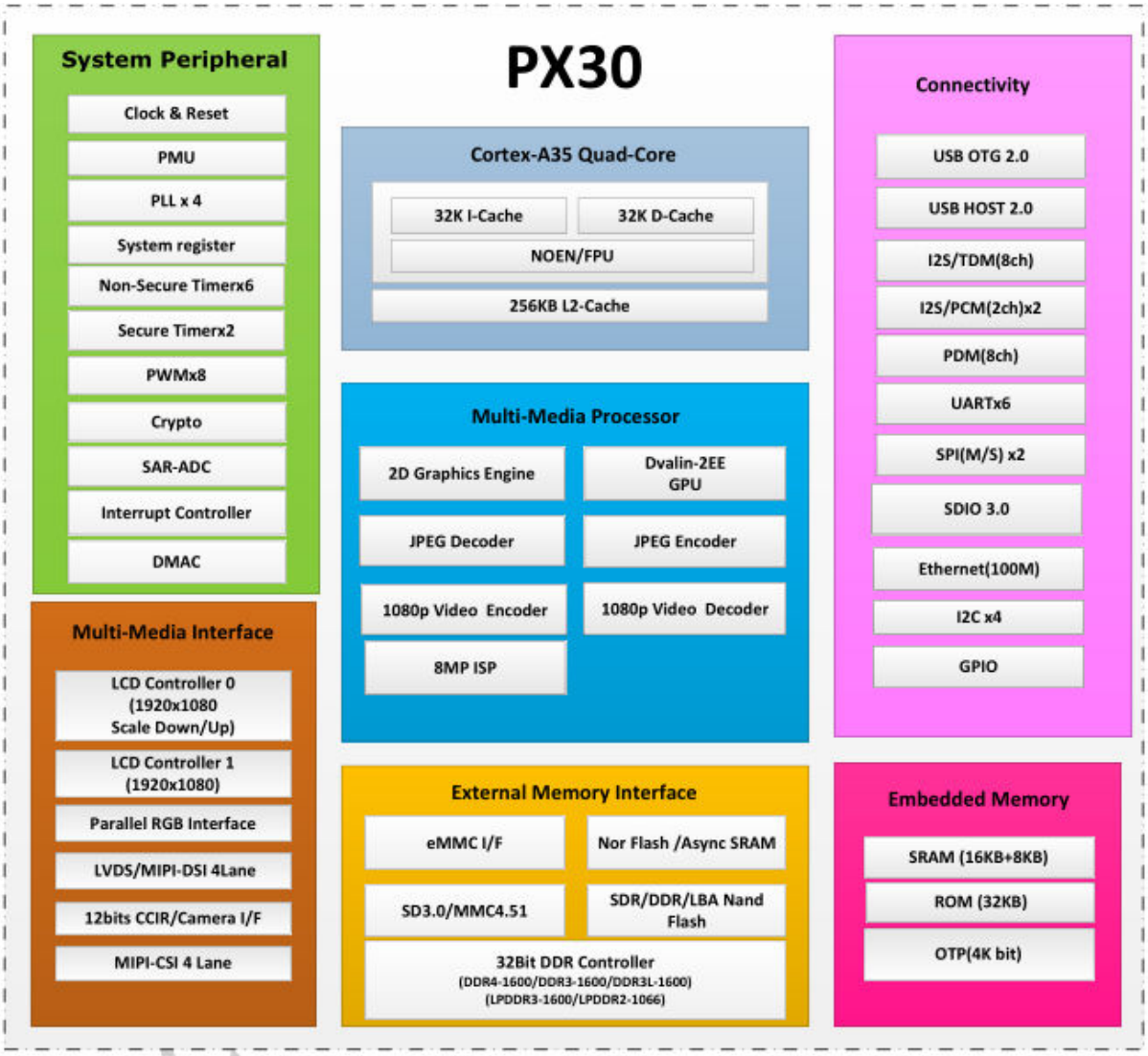


Figure 1-1 PX30 Chip architecture

1.2 EVB system block diagram

The system block diagram allows developers to have an intuitive understanding of the architecture and principle of the whole system. The whole system is powered by power adapter or battery, and debugging through UART serial port to verify each function module. The development board has most interfaces, and is equipped with Camera input, WIFI+BT module, USB OTG, TF card, audio interface, video interface, 100M Ethernet port, and can meet the different applications requirements in most cases, which is beneficial to the deep development of the chip solution and rapid productization.

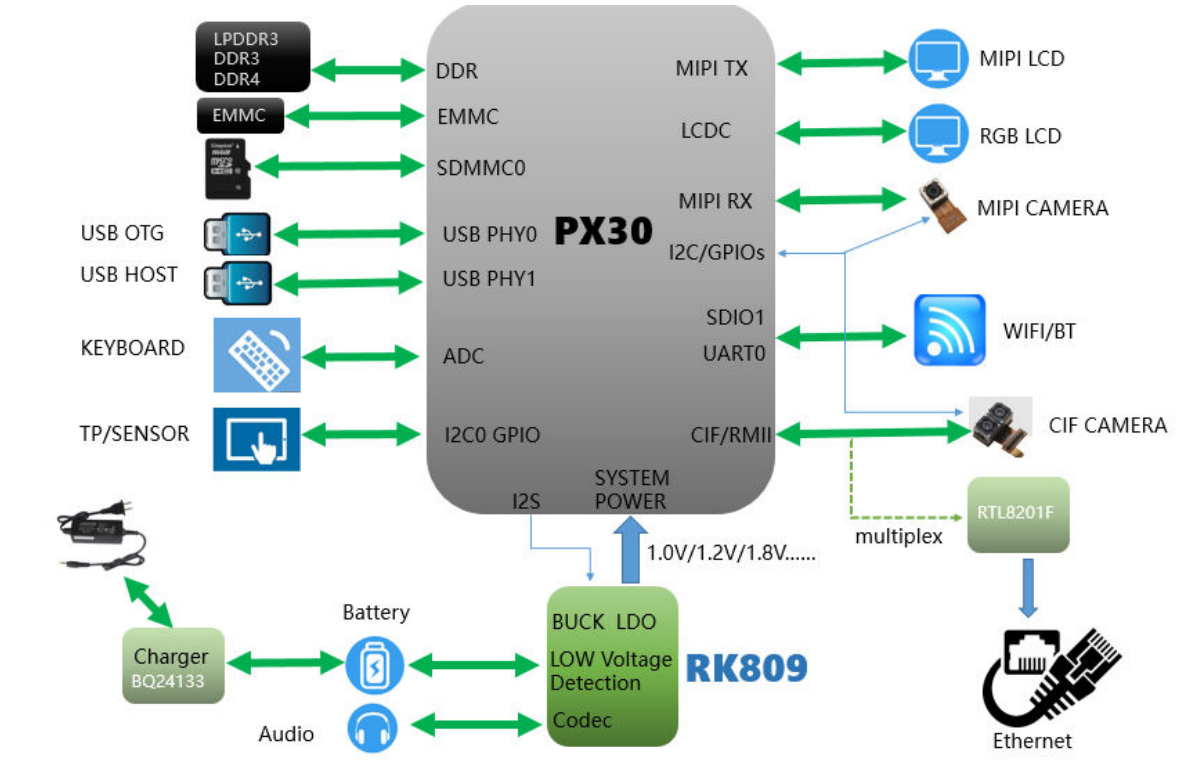


Figure 1-2 EVB system block diagram

1.3 Function overview

PX30 MINI EVB includes the following functions:

- RK809-1 power path management system
- 4 * 256M * 16bit DDR3, total size 2GByte
- 8bit eMMC, total size 16GByte
- TF Card: support to extend external memory
- USB OTG: used for system upgrading, can support Host/Device switch
- USB HOST: support various USB devices
- System button: Power, VOL+, VOL-, RESET, Maskrom
- SDIO Wifi (AP6212): support wireless internet function
- Audio out: support earphone, loudspeaker
- Audio in: support audio recording
- RMII: support 100M network
- Uart Debug: used for the development board debugging
- Sensor：G-sensor MMA7660FC
- MIPI Camera: OV5695, 500W pixels
- Extended interfaces include: CIF, RGB24bit, Raspberry Pi

1.4 EVB default functions

The development board which is already flashed images covers all the default functions shown as below table:

Processor	Rockchip PX30 ❑ Quad-core ARM Cortex-A35 CPU ❑ Embedded 3D GPU, compatible with OpenGL ES 1.1/2.0/3.2, DirectX 11 FL9_3, OpenCL 2.0 and Vulkan 1.0
Memory	DDR3, ❑ 4 * 256M * 16bit
Storage	❑ 16GB eMMC ❑ External SD card
Power/PMIC	Power: ❑ 12V(2.0A) PMIC: ❑ RK809-1
Buttons	Five buttons on board: ❑ Reset ❑ Recovery/VOL+ ❑ Maskrom ❑ VOL- ❑ PWRON
USB	One stander-A plug: ❑ USB host 2.0 Two micro-USB plugs: ❑ USB OTG 2.0, uses as USB device ❑ Debug, uses as serial debug port
MIPI_DSI interface	❑ Compatible with MIPI Alliance Interface specification v1.0 ❑ Up to 1080p@60fps display output ❑ Support 4 data lane, 1.0Gbps maximum data rate per lane
MIPI_CSI interface	❑ Compatible with the MIPI Alliance Interface specification v1.0 ❑ Up to 4 data lane, 1.0Gbps maximum data rate per lane ❑ Support MIPI-HS, MIPI-LP mode
Audio	❑ RK809 integrates Audio codec and Class D power amplifier ❑ Exteral Micphone ❑ Headphone

Ethernet	One RJ45 Ethernet that supports: ❑ IEEE802.3u compliant ❑ Support only RMII(Reduced MII) mode ❑ 10Mbps and 100Mbps compatible
Wireless Bluetooth	Integrated with AP6212 module, which is a solution for a combination of WiFi + BT: ❑ Complies with IEEE 802.11 b/g/n ❑ Bluetooth V4.0(HS) with integrated Class 1.5 PA and Low Energy (BLE) support ❑ On-board BT and WLAN antenna
Switch Extension connector	Two switch chips (including one toggle S9500) ❑ U9500，U9501 ❑ Switch between CIF and RMII functions Three extension connectors: ❑ GPIO ❑ I2C ❑ I2S ❑ Power, VCC12V/VCC5V/GND ❑ PWM ❑ SPI ❑ RGB24Bit/MIPI/CIF ❑ UART ❑ 1.8V/3.3V controlled by PMIC

1.5 EVB components

PX30 MINI EVB mainly includes the following components:

- PX30 MINI EVB
- Power adapter, spec: input 100V AC~240V AC, 50Hz; output 12V DC, 2.0A
- Panel, spec: MIPI; size: 5.5 inch/portrait; resolution: 720*1280

The development board has below extension component which is optional:

- Extended function board, includes CVBS IN/OUT function and RGB to HDMI dual display function.

2. EVB hardware introduction

2.1 Overall effect picture

EVB overall physical picture

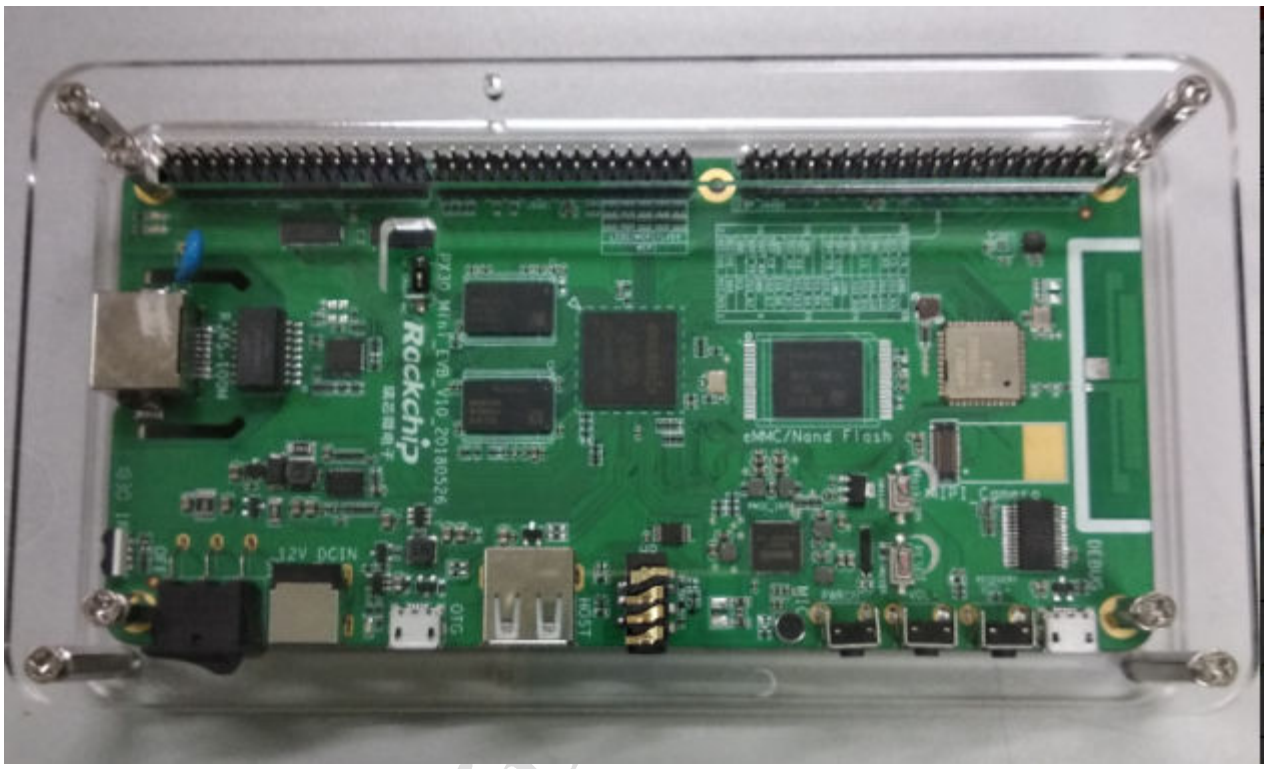


Figure 2-1 EVB overall physical picture

2.2 Structure and interface view

EVB PCB structure view:

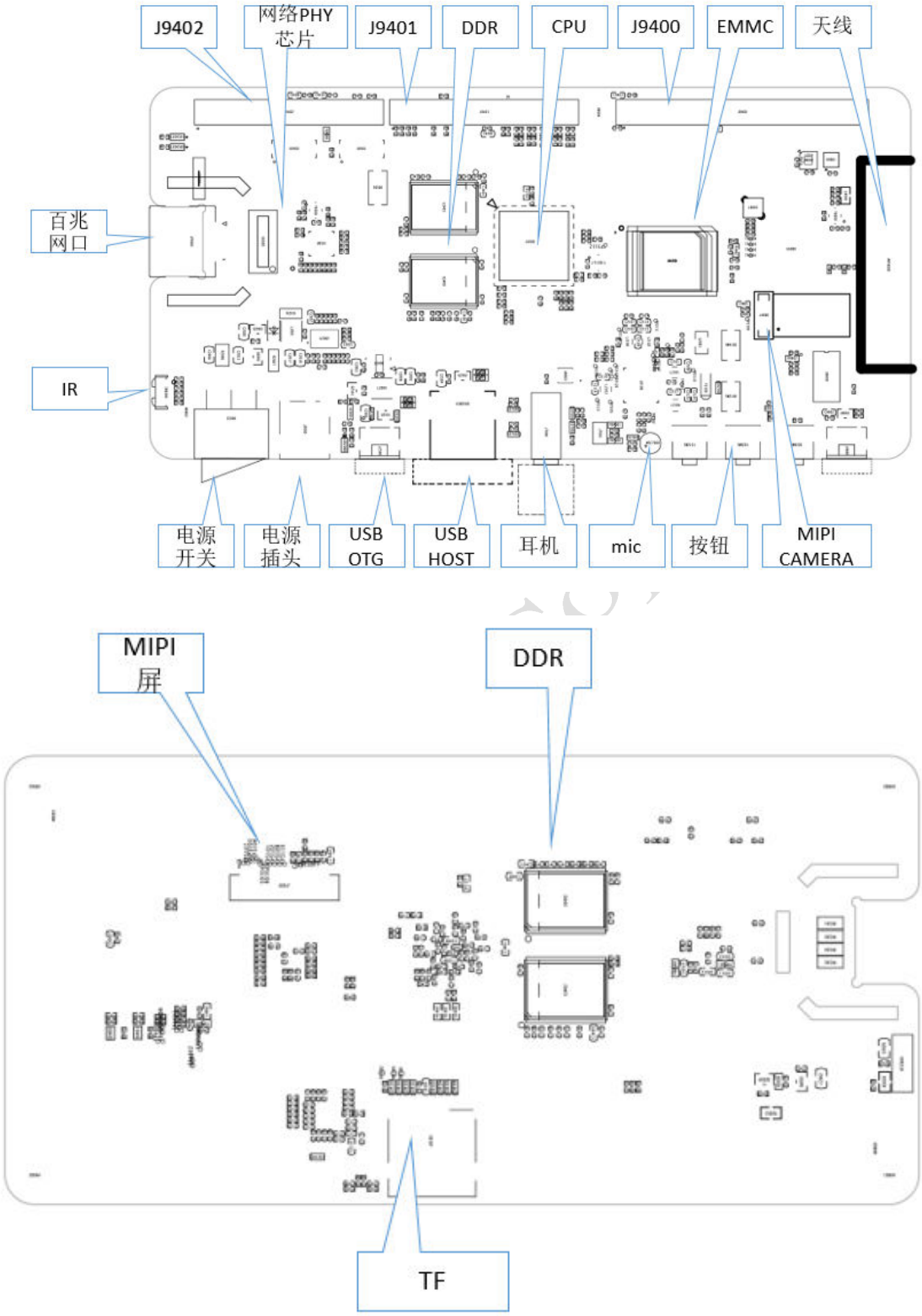


Figure 2-2 EVB PCB structure view

PX30 MINI EVB physical picture is as below:

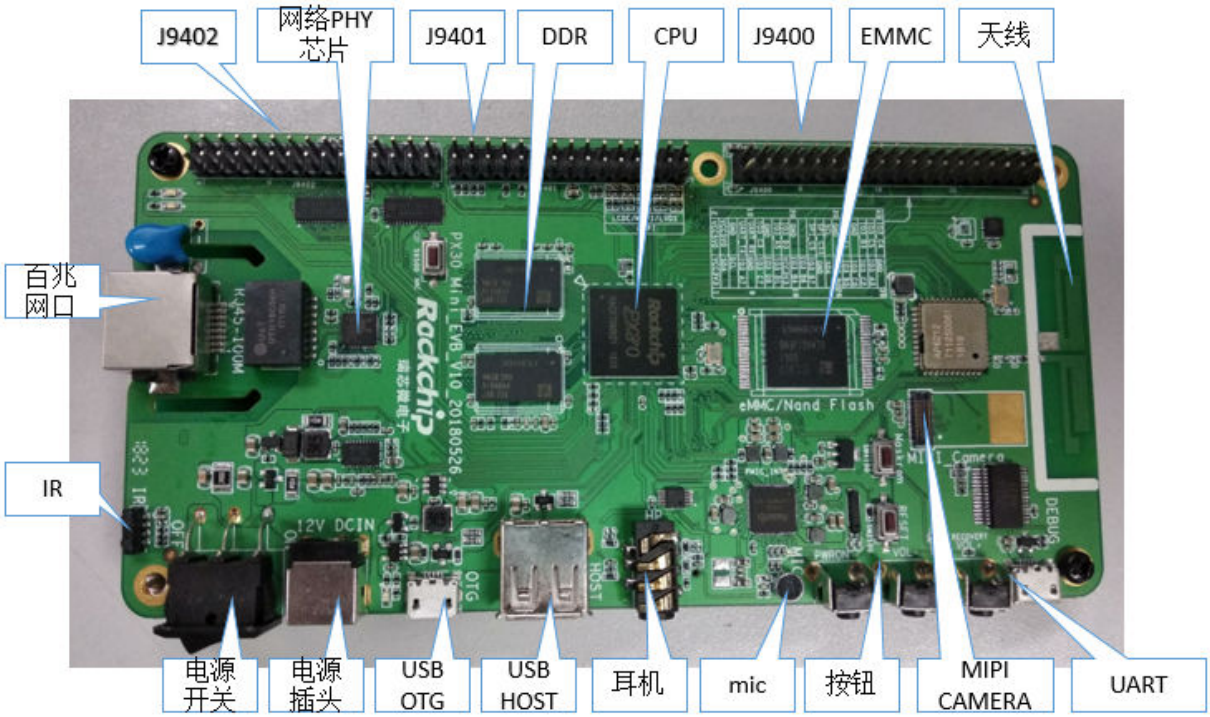


Figure 2-3 EVB physical front view

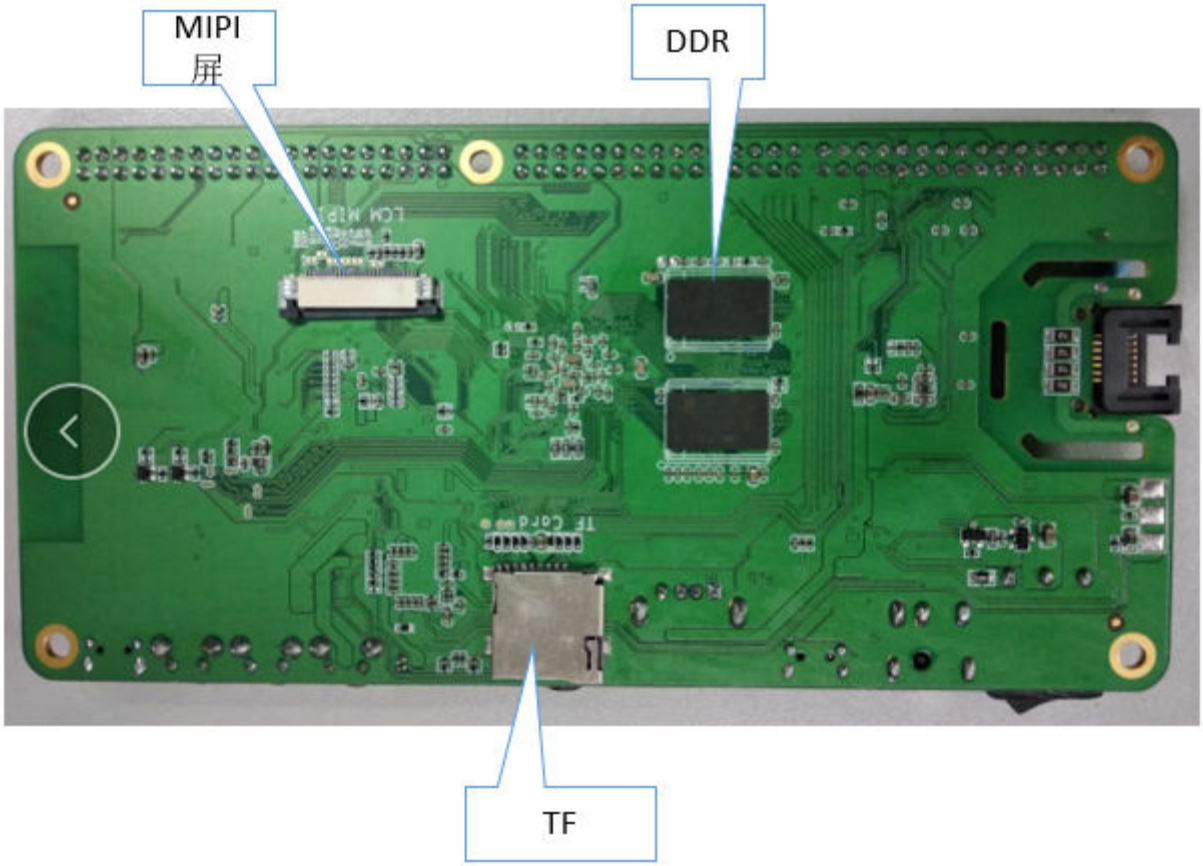


Figure 2-4 EVB physical back view

2.3 Power block diagram

PX30 MINI EVB power uses RK809-1 as PMIC. The power block diagram is as below:

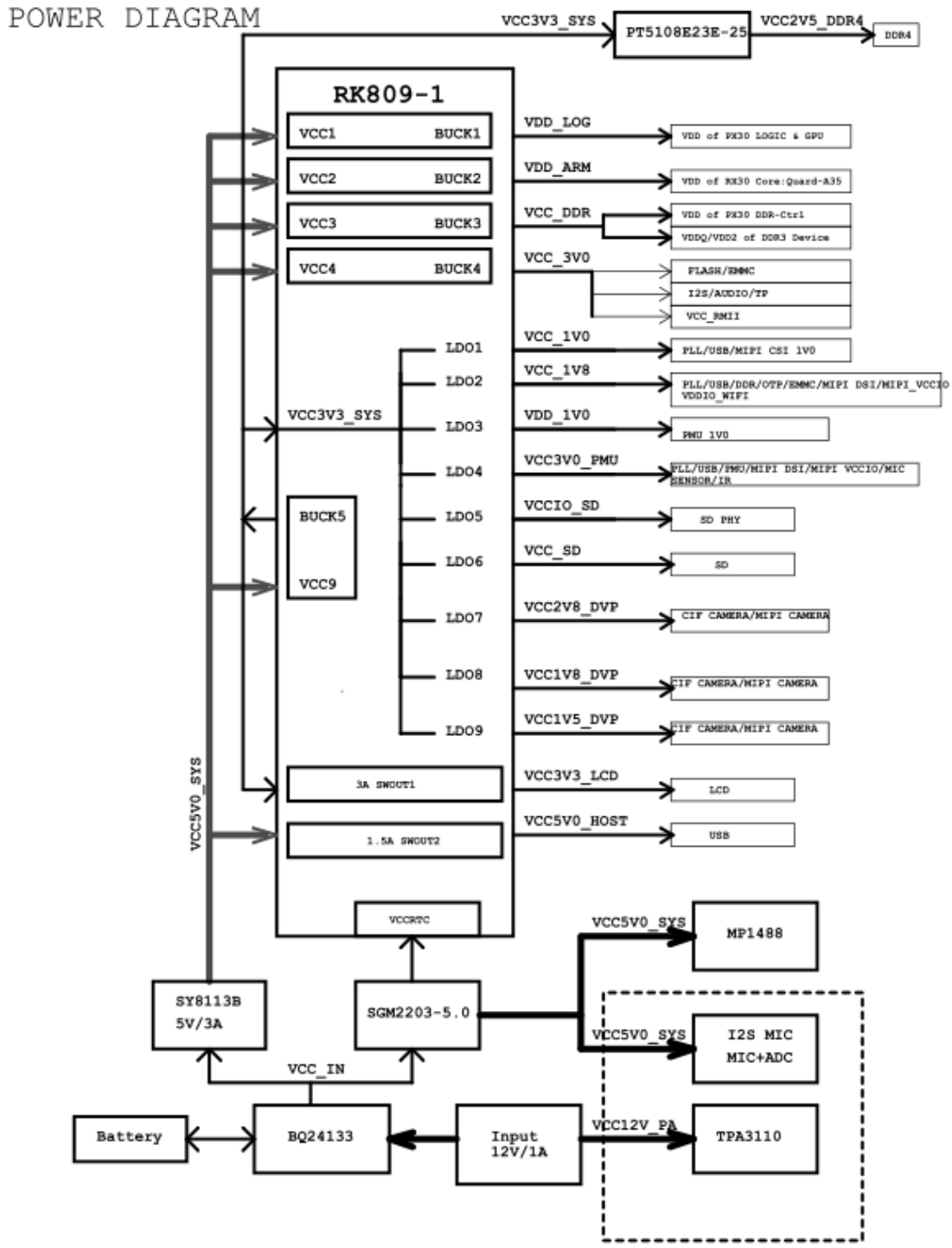


Figure 2-5 EVB power block diagram

2.4 I²C address

I²C (7bit) address configurations of PX30 MINI EVB peripheral component are shown as below table:

Table 2-1 EVB component I2C address table

	设备Device	地址Address
I²C0	RK809	0x20
	RK618	0x50
I²C1	MMA8452Q	0x1d
	LIS3DH	0x19
	LSM303D	0x1d
	GSL1680	0x40
	GSL3676	0x40
I²C2	OV5695	0x36

Note: when using the extension board, need to ensure that the I²C address of the extension board not conflict with the I²C address of the development board.

2.5 Reference design of the development board

Please contact with RK FAE to get the corresponding reference design of PX30 MINI EVB if needed.

《PX30_MINI_EVB_V10_20180528.DSN》

《PX30_Mini_EVB_V10_20180528.brd》

3. EVB Main Board module brief introduction

3.1 Power input

The 12V/2A power supply input by the power adapter can be used to control the power ON/OFF through the power switch.

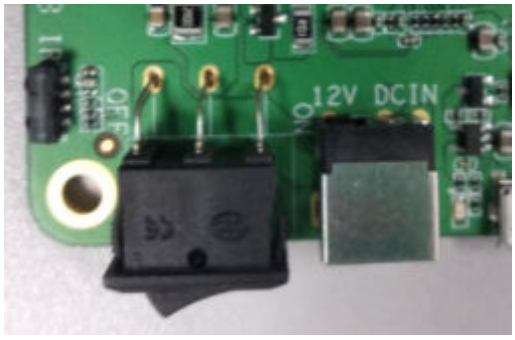


Figure 3-1 EVB power input

3.2 Memory

3.2.1 EMMC

1. The default memory of the development board is 16GByte eMMC FLASH, and the development also reserves location for Nand Flash, which can support 8bit Nand Flash.

2. There is Update button on the back side of Flash, in order to upgrade image of the development board conveniently. Connect USB, press and hold SW4100 to power on or reset, and then the system will enter MaskRom image flashing mode.

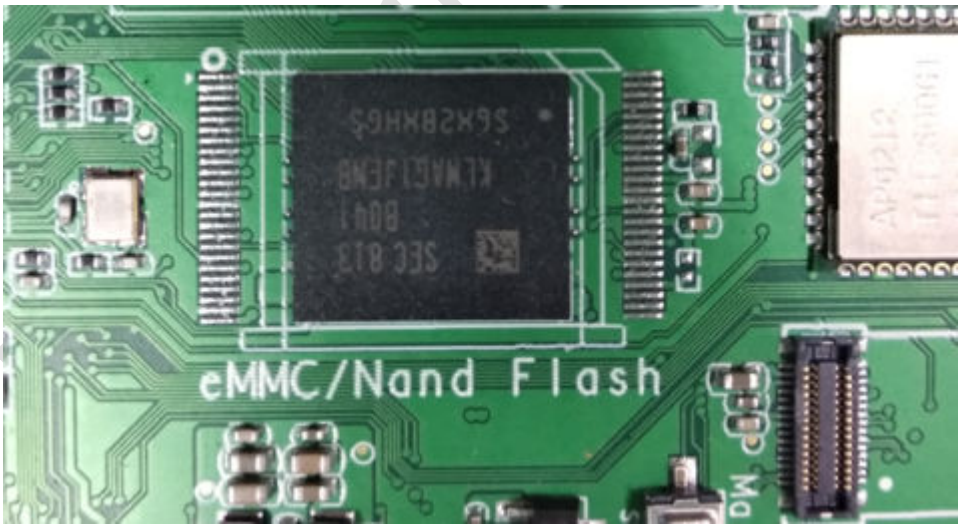


Figure 3-2 EVB Memory eMMC

3.2.2 DDR

PX30 supports single channel 32bit DDR. EVB uses 4pcs 16bit DDR3, and the default total size is 2GByte.

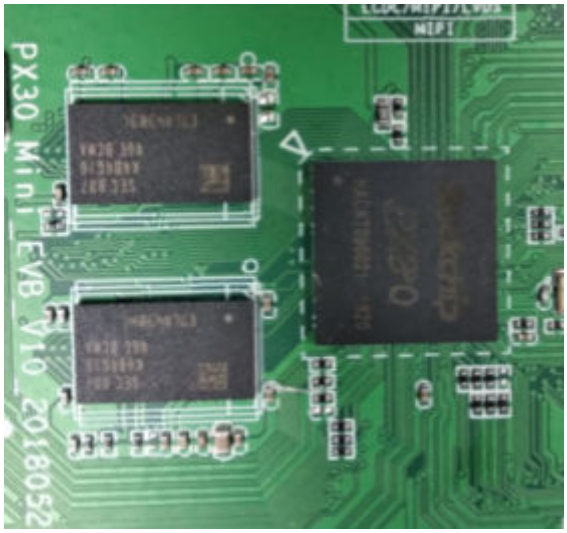


Figure 3-3 DDR3 location and physical picture

3.3 Button input

1. The development board provides button group application, uses PX30 ADC_IN2 as detection port, and supports 10bit resolution.

2. ADC power supply voltage is provided by VCC_1V8.

3. The development board defines several commonly used buttons: VOL+/VOL-.

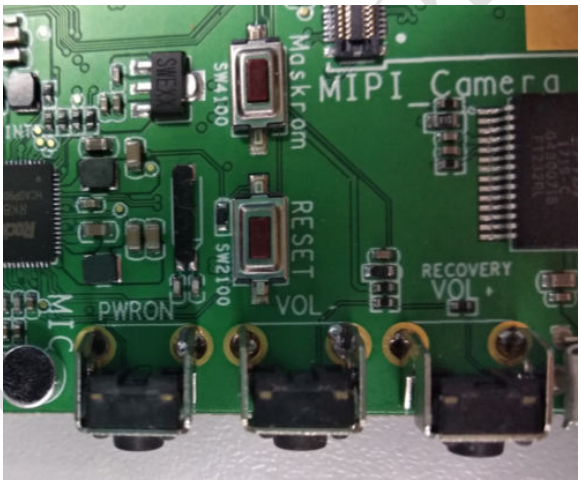


Figure 3-4 EVB buttons

3.4 G-Sensor output

The gravity acceleration sensor MMA7660FC used on the development board is the compact capacitive micromotor accelerometer with I2C output by ±1.5g three-axis digital and ultra low power consumption.

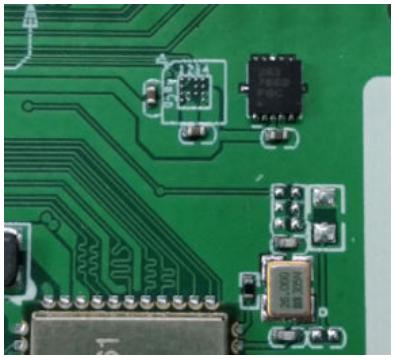


Figure 3-5 EVB gravity acceleration sensor

3.5 Audio input/output：

The development board audio uses the embedded Codec of RK809-1. It has the following features:

- Embedded Charge Pump, support stereo earphone output without capacitive coupling.
- Embedded Class-D power amplifier, can drive 1.3W/8ohm speaker output and have over-current protection.
- Microphone supports single end/differential input.

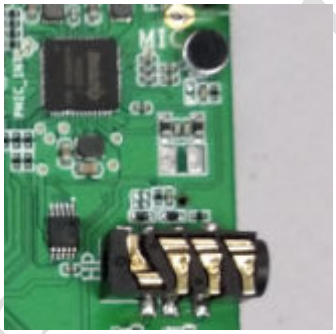


Figure 3-6 EVB audio input/output

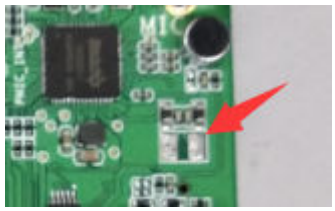


Figure 3-7 EVB speaker output

3.6 USB OTG socket

The development board has USB OTG interface, as below picture, which is USB OTG Micro-B type socket and compatible with USB 2.0/1.1 standard. By detecting VBUS, USB ID signal input, it can be configured as standalone USB HOST or USB DEVICE. In flashing mode, OTG is used as the input port for image flashing.

Figure 3-8 EVB USB OTG socket

3.7 USB HOST socket

The development board has USB HOST interface, as below picture, which can be used to connect peripheral USB device.

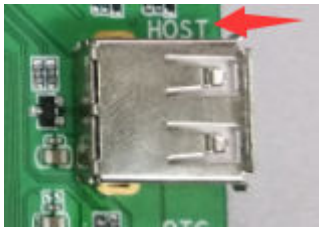


Figure 3-9 EVB USB HOST socket

3.8 TF Card socket

The development board has TF card interface, as below picture, which supports SDMMC 2.0/3.0, and the data bus width is 4bits.

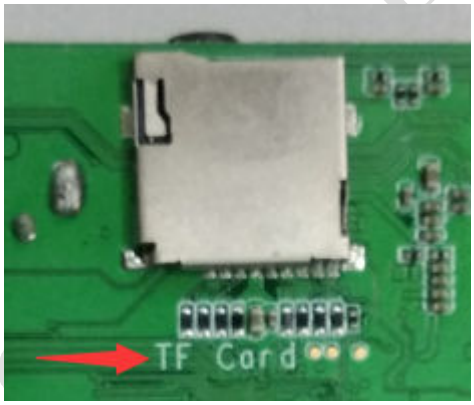


Figure 3-10 EVB TF socket

3.9 Camera socket

The camera socket of the development board supports MIPI CSI camera module. The socket is shown as picture 3-11.

Figure 3-11 EVB Camera socket

The signal table:

Pin no.	Network name	Pin no.	Network name
Pin1	GND	Pin2	MIPI_CSI_D0P
Pin3	MIPI_CSI_D0N	Pin4	GND
Pin5	MIPI_CSI_D2P	Pin6	MIPI_CSI_D2N
Pin7	GND	Pin8	MIPI_CSI_D3P
Pin9	MIPI_CSI_D3N	Pin10	GND
Pin11	MIPI_MCLK	Pin12	MIPI_RST
Pin13	GND	Pin14	MIPI_PDN
Pin15	GND	Pin16	GND
Pin17	VCC2V8_DVP	Pin19	VCC2V8_AF
Pin19	GND	Pin20	I2C2_SCL_CAM
Pin21	I2C2_SDA_CAM	Pin22	VDD1V5_DVP
Pin23	GND	Pin24	VCC1V8_DVP
Pin25	GND	Pin26	MIPI_CSI_D1N
Pin27	MIPI_CSI_D1P	Pin28	GND
Pin29	MIPI_CSI_CLKP	Pin30	MIPI_CSI_CLKN

3.10 WIFI+BT module

The WIFI+BT module of the development board is Taiwan AMPAK AP6212 module, shown as picture 3-12. It has the following features:

- Support WIFI((802.11 b/g/n), BT4.1, FM function.
- BT data adopts UART communication.
- BT voice is transmitted through PCM interface.
- WIFI data supports 4bits SDIO 3.0 data bus.

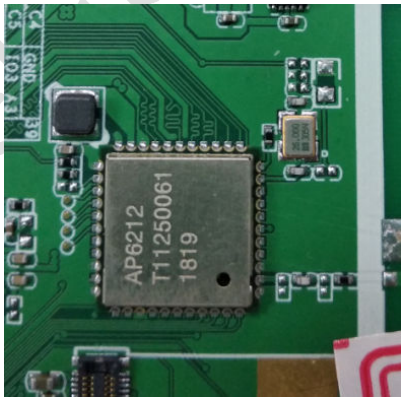


Figure 3-12 EVB WIFI+BT module

3.11 LCM MIPI interface

The development board uses MIPI panel to output video by default.

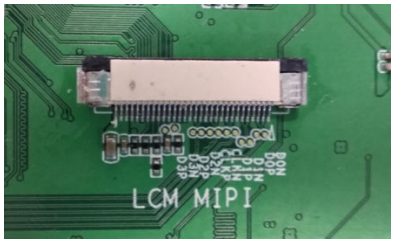


Figure 3-13 LCM-MIPI interface

The signal table:

Pin no.	Network name	Pin no.	Network name
Pin1	GND	Pin2	LCDC_D11_M1/LVDS_TX0N/MIPI_TX_D0N
Pin3	LCDC_D8_M1/LVDS_TX0P/MIPI_TX_D0P	Pin4	GND
Pin5	LCDC_D1_M1/LVDS_TX1N/MIPI_TX_D1N	Pin6	LCDC_D10_M1/LVDS_TX1P/MIPI_TX_D1P
Pin7	GND	Pin8	LCDC_D4_M1/LVDS_CLKN/MIPI_TX_CLKN
Pin9	LCDC_D3_M1/LVDS_CLKP/MIPI_TX_CLKP	Pin10	GND
Pin11	LCDC_VSYNC_M1/LVDS_TX2N/MIPI_TX_D2N	Pin12	LCDC_D5_M1/LVDS_TX2P/MIPI_TX_D2P
Pin13	GND	Pin14	LCDC_HSYNC_M1/LVDS_TX3N/MIPI_TX_D3N
Pin15	LCDC_DEN_M1/LVDS_TX3P/MIPI_TX_D3P	Pin16	GND
Pin17	LCDC_BL_PWM	Pin19	NC
Pin19	NC	Pin20	NC
Pin21	ADC0_HW_ID	Pin22	LED_EN
Pin23	I2C1_SCL	Pin24	I2C1_SDA
Pin25	TP_INT	Pin26	TP_RST
Pin27	GND	Pin28	VCC5V0_SYS
Pin29	VCC5V0_SYS	Pin30	VCC5V0_SYS

3.12 Extension connector

There are three extension connectors on EVB board. Customers can use them according to the actual requirement.

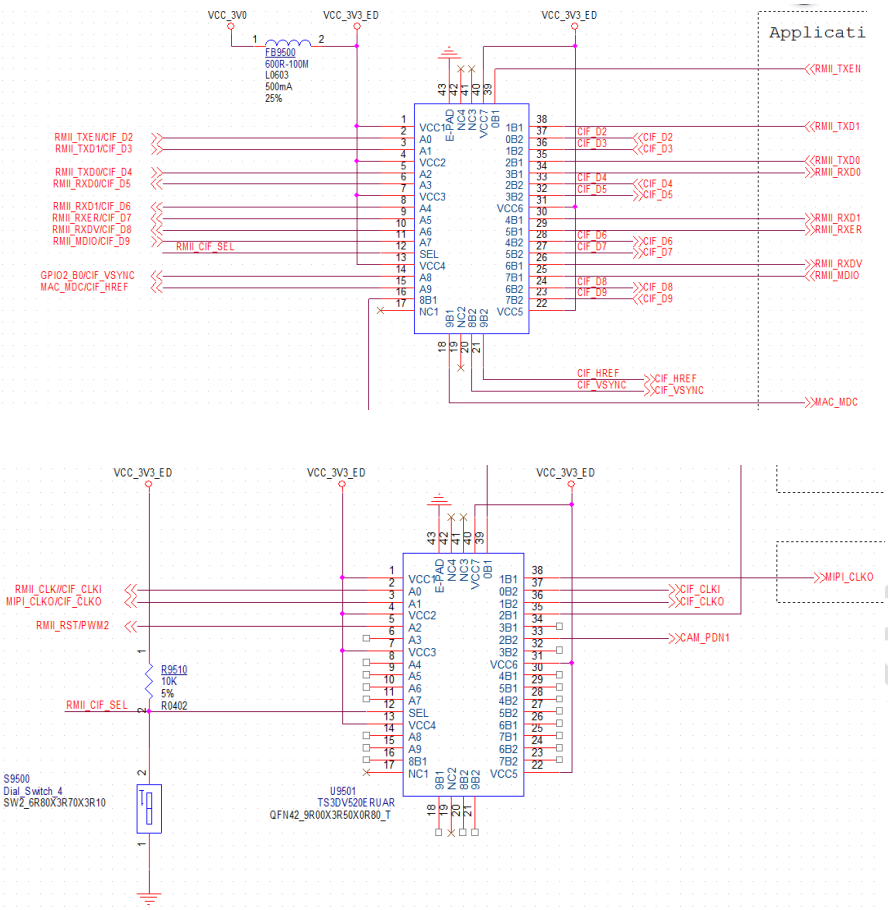
RMII signal on EVB board is reused with CIF signal. Here the functions are switched through the switch chip. EVB board uses RMII function, and CIF input function is connected to the extension connector.

3.12.1 Function switch chip

TS3DV520ERUAR switches the functions as below:

FUNCTION TABLE

INPUT SEL	INPUT/OUTPUT An	FUNCTION	
L	nB_1	$A_n = nB_1$	nB_2 high-impedance mode
H	nB_2	$A_n = nB_2$	nB_1 high-impedance mode



The definition of function reuse pin:

Table 3-1 Reuse relationship table of the function pin

Location no.	Pin name	Function 1	Function 2
AA5	GPIO2_A0/CIF_D2_M0/RMII_TXEN	RMII_TXEN	CIF_D2
AA8	GPIO2_A1/CIF_D3_M0/RMII_TXD1	RMII_TXD1	CIF_D3
AA7	GPIO2_A2/CIF_D4_M0/RMII_TXD0	RMII_TXD0	CIF_D4
Y6	GPIO2_A3/CIF_D5_M0/RMII_RXD0	RMII_RXD0	CIF_D5
Y8	GPIO2_A4/CIF_D6_M0/RMII_RXD1	RMII_RXD1	CIF_D6
Y7	GPIO2_A5/CIF_D7_M0/RMII_RXER	RMII_RXER	CIF_D7
W5	GPIO2_A6/CIF_D8_M0/RMII_RXDV	RMII_RXDV	CIF_D8
W7	GPIO2_A7/CIF_D9_M0/RMII_MDIO	RMII_MDIO	CIF_D9
U7	GPIO2_B7/CIF_D10_M0/I2C2_SCL	I2C2_SCL	I2C2_SCL
V6	GPIO2_C0/CIF_D11_M0/I2C2_SDA	I2C2_SDA	I2C2_SDA
Y4	GPIO2_B0/CIF_VSYNC_M0	HOST_WAKE_BT	CIF_VSYNC
AA4	GPIO2_B1/CIF_HREF_M0/RMII_MDC	RMII_MDC	CIF_HREF
AA6	GPIO2_B2/CIF_CLKI_M0/RMII_CLK	RMII_CLK	CIF_CLKI
Y5	GPIO2_B3/CIF_CLKO_M0/CLK_OUT_ETHERNET	MIPI_CLKO	CVBS_RST
V12	GPIO2_B4/CIF_D0_M0/UART2_TX_M1	GPIO2_B4	HDMI_INT
V7	GPIO2_B5/PWM2	RMII_RST	CVBS_MODU

			LE_EN
W6	GPIO2_B6/CIF_D1_M0/UART2_RX_M1	CIF_PDN0	CVBS_INT

CIF function and RMII function are switched by toggle. The functions are marked on PCB board.

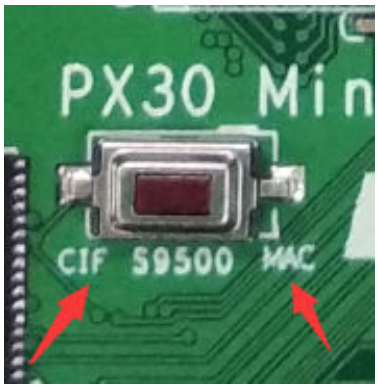


Figure 3-14 EVB CIF/RMII function switch picture

3.12.2 Raspberry Pi interface

The pins of the connector on the board are defined as below:

J9400 Connector			
VCC3V3_SYS	PIN 1	2	VCC5V0_SYS
I2C2_SDA	3	4	VCC5V0_SYS
I2C2_SCL	5	6	GND
LCDC_D3_M0/I2S2_2CH_SDO/CIF_D4_M1/GPIO3_A7	7	8	LCDC_VSYNC_M0/I2S2_2CH_SCLK/CIF_D1_M1/UART5_TX/GPIO3_A2
GND	9	10	LCDC_HSYNC_M0/I2S2_2CH_MCLK/CIF_D0_M1/UART5_RX/GPIO3_A1
LCDC_D19/PDM_CLK1/CIF_D11_M1/GPIO3_C7	11	12	LCDC_D15/I2S0_8CH_SCLKTX/PWM5/TDM_SCLK/TDM_SCLK/GPIO3_C3
LCDC_D20/PDM_SDI1/CIF_CLKOUT_M1/GPIO3_D0	13	14	GND
LCDC_D21/PDM_SDI2/CIF_VSYNC_M1/ISP_PRELIGHT_TRIG/GPIO3_D1	15	16	LCDC_D1_M0/I2S2_2CH_SDI/CIF_D3_M1/UART5_RTS/GPIO3_A5
VCC3V3_SYS	17	18	LCDC_D23/PDM_SDI0_M0/CIF_CLKIN_M1/ISP_FL_TRIG/GPIO3_D3
LCDC_D8_M0/I2S0_8CH_SCLKRX/CIF_D7_M1/SPI1_TXD/GPIO3_B4	19	20	GND
LCDC_D10_M0/I2S0_8CH_SDO3/CIF_D8_M1/SPI1_RXD/GPIO3_B6	21	22	
LCDC_D11_M0/I2S0_8CH_SDO2/CIF_D9_M1/SPI1_CLK/GPIO3_B7	23	24	LCDC_D5_M0/I2S0_8CH_SDI2/CIF_D6_M1/SPI1_CSN/GPIO3_B1
GND	25	26	LCDC_D6/SPI1_CSN1/GPIO3_B2
I2C1_SDA	27	28	I2C1_SCL
LCDC_D4_M0/I2S0_8CH_SDI3/CIF_D5_M1/GPIO3_B0	29	30	GND
LCDC_D9_M0/I2S0_8CH_LRCKRX/GPIO3_B5	31	32	LCDC_D13/I2S0_8CH_MCLK/GPIO3_C1
LCDC_D12/I2S0_8CH_SDO1/GPIO3_C0	33	34	GND
LCDC_D14/I2S0_8CH_LRCKTX/PWM4/TDM_LRCK/TDM_FSYNC/GPIO3_C2	35	36	LCDC_D7/I2S0_8CH_SDI1/GPIO3_B3
LCDC_DEN_M0/I2S2_2CH_LRCK/CIF_D2_M1/UART5_CTS/GPIO3_A3	37	38	LCDC_D17/I2S0_8CH_SDI0/PWM7/TDM_SDI/TDM_SDI/GPIO3_C5
GND	39	40	LCDC_D16/I2S0_8CH_SDO0/PWM6/TDM_SDO/TDM_SDO/GPIO3_C4

Version B standard interface socket of Raspberri Pi 2 is shown as below:

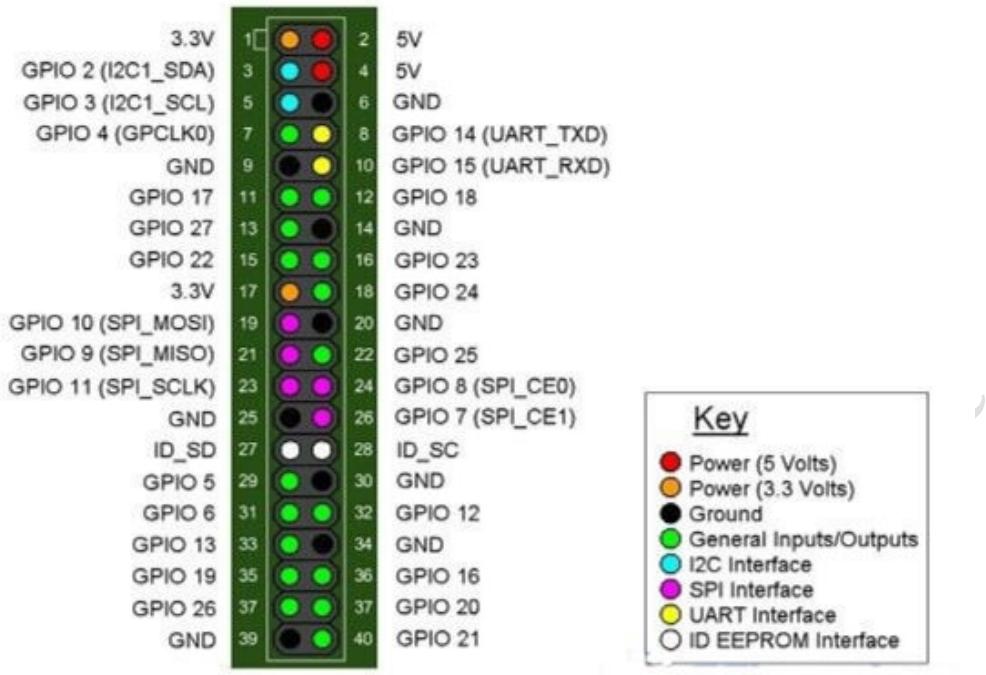


Figure 3-15 Raspberry Pi version B interface picture

3.12.3 Signal definition of extension connector J9401

J9401 Connector

I2S1_LRCK_TXRX	PIN 1	2	GND
I2S1_SDI	3	4	I2S1_MCLK
LCDC_D22/PDM_SDI3/CIF_HREF_M1/ISP_FLASH_TRIG/GPIO3_D2	5	6	PDM_CLK0
I2S1_SCLK	7	8	LCDC_D18/PDM_CLK0_M0/CIF_D10_M1/GPIO3_C6
I2S1_SDO	9	10	LCDC_D0/GPIO3_A4
LCDC_CLK/GPIO3_A0	11	12	LCDC_D2/GPIO3_A6
GND	13	14	GND
VCC12V_DCIN	15	16	VCC12V_DCIN
GND	17	18	GND
SDMMC0_DET	19	20	GPIO2_B4
LCDC_HSYNC_M1/LVDS_TX3N/MIPI_TX_D3N	21	22	LCDC_DEN_M1/LVDS_TX3P/MIPI_TX_D3P
LCDC_VSYNC_M1/LVDS_TX2N/MIPI_TX_D2N	23	24	LCDC_D5_M1/LVDS_TX2P/MIPI_TX_D2P
LCDC_D4_M1/LVDS_CLKN/MIPI_TX_CLKN	25	26	LCDC_D3_M1/LVDS_CLKP/MIPI_TX_CLKP

LCDC_D10_M1/LVDS_TX1P/MIPI_TX_D1P	27	28	LCDC_D1_M1/LVDS_TX1N/MIPI_TX_D1N
LCDC_D8_M1/LVDS_TX0P/MIPI_TX_D0P	29	30	LCDC_D11_M1/LVDS_TX0N/MIPI_TX_D0N

3.12.4 Signal definition of extension connector J9402

J9402 Connector

CIF_D2	PIN 1	2	REF_CLKO/GPIO0_A0
CIF_D3	3	4	GND
CIF_D4	5	6	LCDC_BL_PWM
CIF_D5	7	8	TP_INT
CIF_D6	9	10	TP_RST
CIF_D7	11	12	LCD_EN
CIF_D8	13	14	ADC2_KEY_IN
CIF_D9	15	16	GND
CIF_VSYNC	17	18	VCC_1V8
CIF_HREF	19	20	GND
CIF_CLKI	21	22	VCC_3V0
CIF_CLKO	23	24	GND
CAM_PDN0	25	26	VCC1V8_DVP
CAM_PDN1	27	28	GND
GND	29	30	VCC2V8_DVP

3.13 100M Ethernet port

CIF/RMII functions can be switched through S9500 toggle. EVB board supports 100M network.

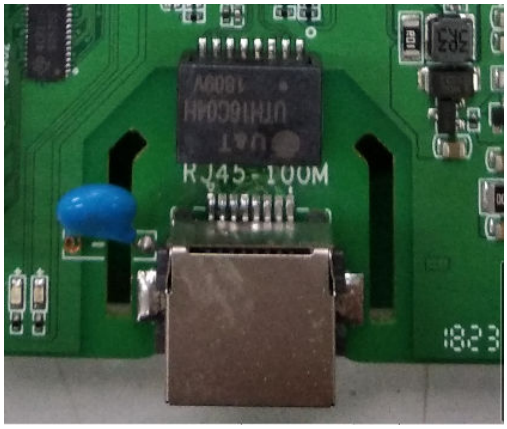


Figure 3-16 100M network port

3.14 UART Debug socket

The development board provides serial port for debugging during development as shown below. The board uses highly integrated FT232RL interface conversion chip.

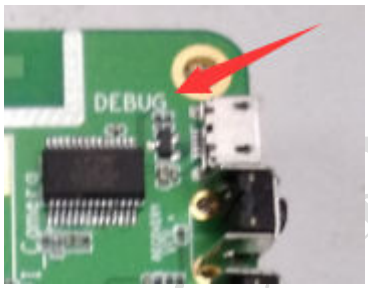
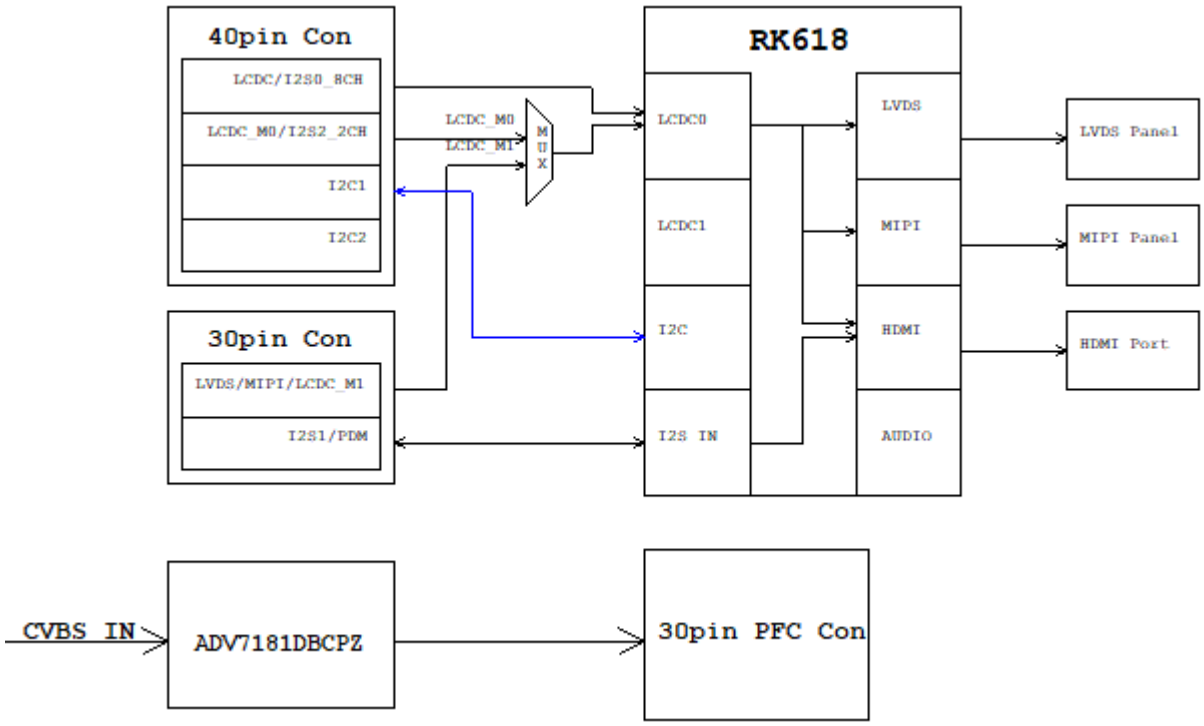


Figure 3-17 EVB UART Debug socket (Mini USB)

4. Function extension board(optional)

4.1 Block diagram of function extension board

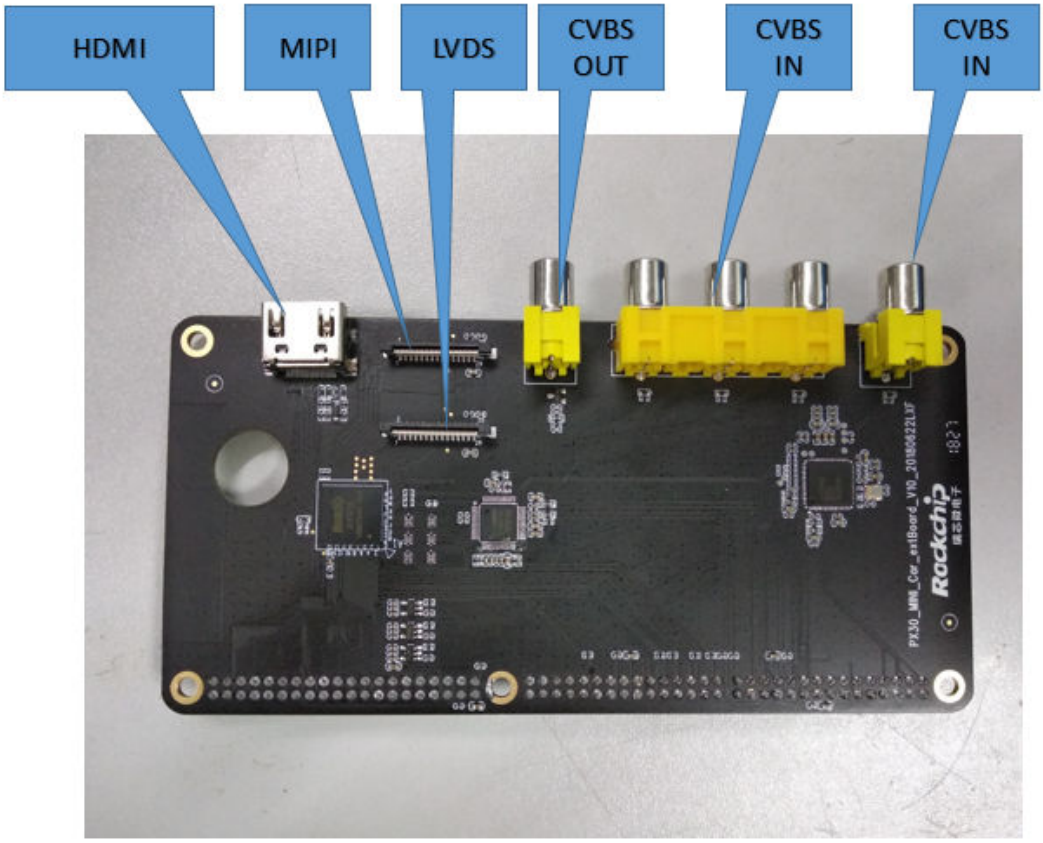


4.2 Function overview

PX30 extension board includes the following functions:

1. CVBS IN to CIF input function.
2. RGB to LVDS/MIPI/HDMI, implement dual display function with MINI EVB board.

4.3 Structure and interface picture



4.4. Connect with EVB main board

The extension board is connected with main board through J9400, J9401, J9402, to extend CVBS IN/CVBS OUT/HDMI OUT/MIPI OUT/LVDS OUT functions.

The pins of LCM-LVDS Panel interface are as below:

Pin no.	Network name	Pin no.	Network name
Pin1	GND	Pin2	LVDS_D0N
Pin3	LVDS_D0P	Pin4	GND
Pin5	LVDS_D1N	Pin6	LVDS_D1P
Pin7	GND	Pin8	LVDS_CLKN
Pin9	LVDS_CLKP	Pin10	GND
Pin11	LVDS_D2N	Pin12	LVDS_D2P
Pin13	GND	Pin14	LVDS_D3N
Pin15	LVDS_D3P	Pin16	GND
Pin17	LCDC_BL_PWM	Pin19	NC
Pin19	NC	Pin20	NC
Pin21	ADC0_HW_ID	Pin22	LED_EN
Pin23	I2C1_SCL	Pin24	I2C1_SDA
Pin25	TP_INT	Pin26	TP_RST
Pin27	GND	Pin28	VCC5V0_SYS
Pin29	VCC5V0_SYS	Pin30	VCC5V0_SYS

The pins of LCM-MIPI Panel interface are as below:

Pin no.	Network name	Pin no.	Network name
Pin1	GND	Pin2	MIPI_D0N
Pin3	MIPI _D0P	Pin4	GND
Pin5	MIPI _D1N	Pin6	MIPI _D1P
Pin7	GND	Pin8	MIPI _CLKN
Pin9	MIPI _CLKP	Pin10	GND
Pin11	MIPI _D2N	Pin12	MIPI _D2P
Pin13	GND	Pin14	MIPI _D3N
Pin15	MIPI _D3P	Pin16	GND
Pin17	LCDC_BL_PWM	Pin19	NC
Pin19	NC	Pin20	NC
Pin21	ADC0_HW_ID	Pin22	LED_EN
Pin23	I2C1_SCL	Pin24	I2C1_SDA
Pin25	TP_INT	Pin26	TP_RST
Pin27	GND	Pin28	VCC5V0_SYS
Pin29	VCC5V0_SYS	Pin30	VCC5V0_SYS

5. Development board usage

5.1 EVB power on/off and standby

EVB power on and power off method is described as below:

1、Power on method:

（1） Use DC 12V as power supply, open the power switch, and it will power on. Later power on/off can be achieved through PWRON button.

2、Power off method:

Long press Power button for 2s, and then click power off displayed on the screen.

3、Abnormal power off method:

Use DC 12V as power supply, in abnormal case, shutting down the power of the boat switch can shut down the power of the development board.

4、Standby method:

In desk or application case, press Power button, the system will enter standby mode. If not connecting with USB, without any operation, the system will enter deepsleep mode after a while.

5.2 USB driver installation

EVB needs to install USB driver program before image flashing, driver upgrading and ADB connection. The driver tool path is:

Open “DriverInstall.exe” in the directory of SDK\RKTools\windows\Release_DriverAssitant, click “driver install”, and then waiting for it prompts “driver install successfully”. If there is old driver installed, please click “driver uninstall”, and re-install the driver.

Currently the driver file only supports Windows.

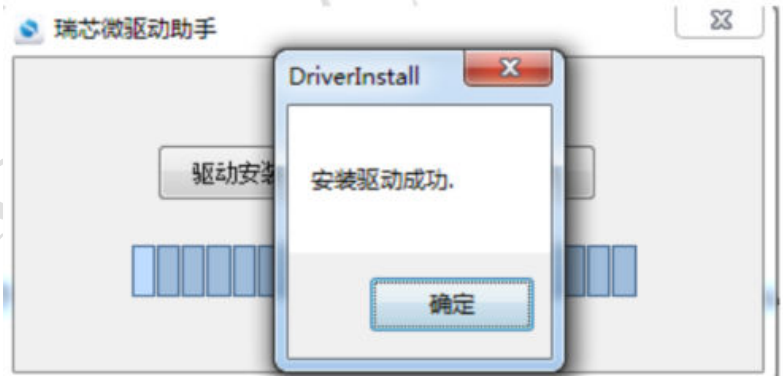


Figure 5-0-1 Driver install successfully

5.3 EVB image flashing

PX30 MINI EVB has two kinds of image flashing methods:

5.3.1 Maskrom flashing mode

The basic principle is to short connect FLASH_ D0 with GND before the system is powered up, to make Flash fail to load, and then enter Maskrom mode. It is applicable for the case when

the system cannot be powered up normally due to flashing the wrong bootloader file.

The detailed steps are as below:

1、Connect USB to PC, press and hold the Maskrom button of the development board.

2、Supply 12V for EVB, and open the boat switch. Please press the reset button if it is already powered up.

3、Wait for a while, the development tool will display “find a Maskrom device”. Need to note that in Maskrom mode the corresponding Loader should be selected at the same time for upgrading.

4、Select the corresponding image files in the development tool.

5、Click execute to enter the upgrading state, there is the progress bar in the right box of the tool to display the download and verification status.

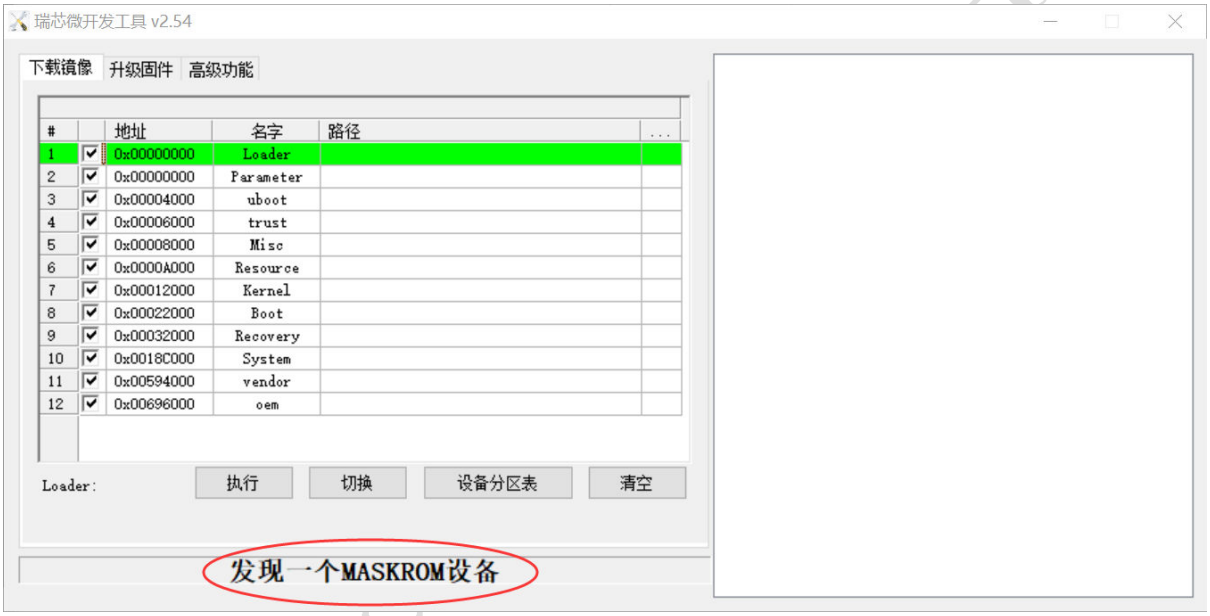


Figure 5-0-2 Tool display after entering Maskrom flashing mode

5.3.2 Loader flashing mode

The basic principle is to ensure ADC2_KEY_IN is low level before the system is powered up or reset, and the system will enter Loader mode after power up or reset. It is applicable for updating some part or whole of the image in normal cases.

The detailed steps are as below:

1、 Connect USB to PC, press and hold the Vol+/RECOVER button of the development board.

2、 Supply 12V for EVB, and open the boat switch. Please press the reset button if it is already powered up.

3、 Wait for a while, the development tool will display “find a Loader device”. Need to note that in Loader mode there is no need to flash the whole image, you can only select the image file to be updated.

4、 Select the corresponding image file in the development tool.

5、 Click execute to enter the upgrading state, there is the progress bar in the right box of

the tool to display the download and verification status.

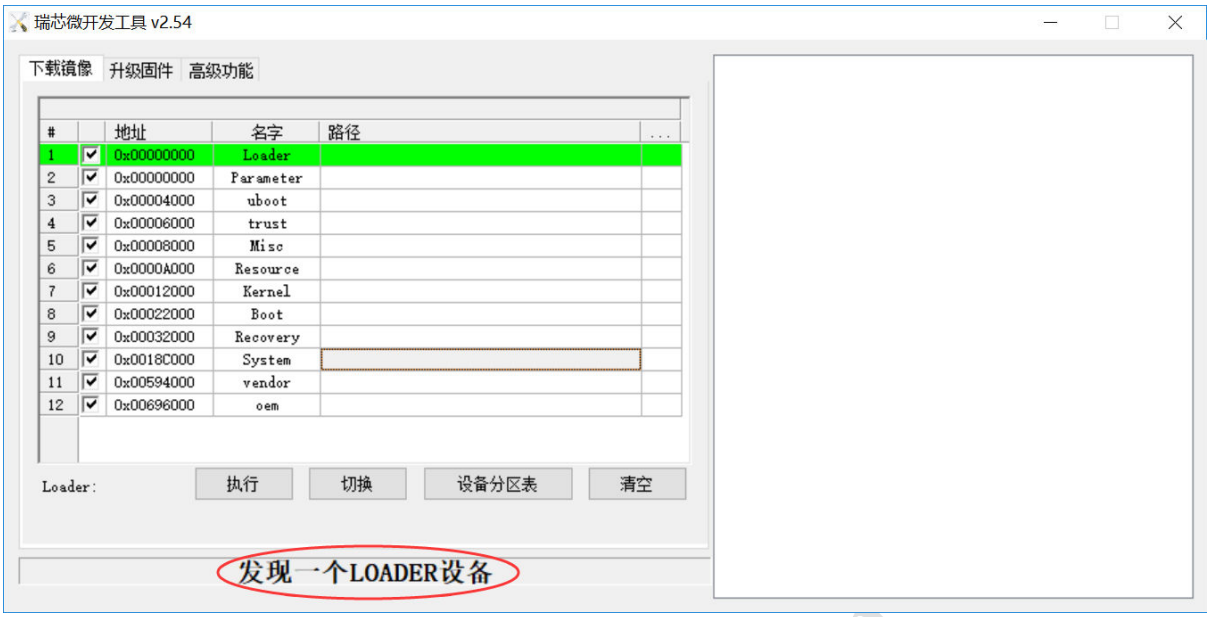


Figure 5-0-3 Tool display after entering Loader flashing mode

5.4 Serial port debugging

5.4.1 Connect serial port

Connect USB Debug of EVB board to PC, and obtain the COM number of current port in the device manager of PC.

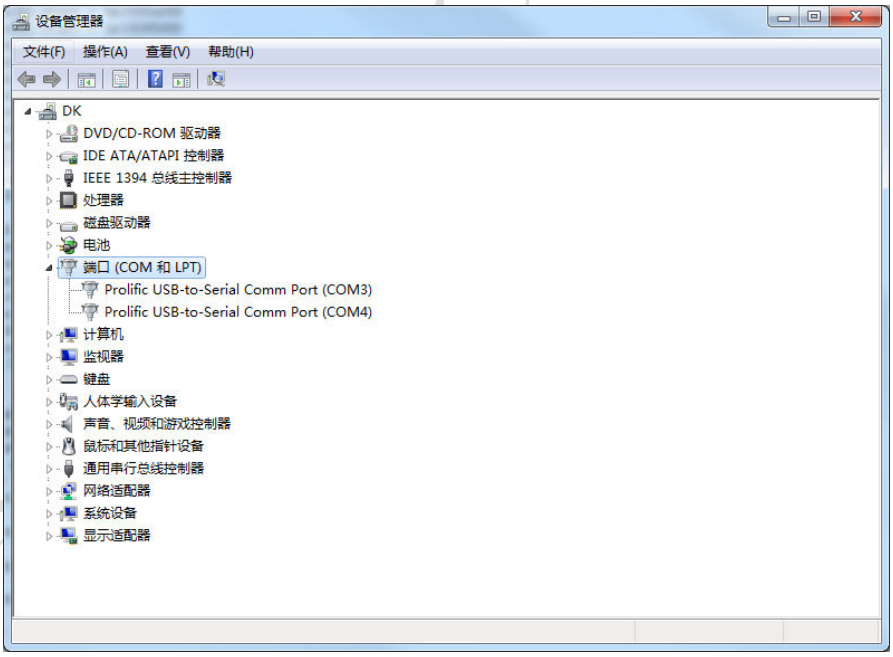


Figure 5-0-4 Obtain COM number of current port

Open serial port tool “SecureCRT”, and click “quick connection” button.

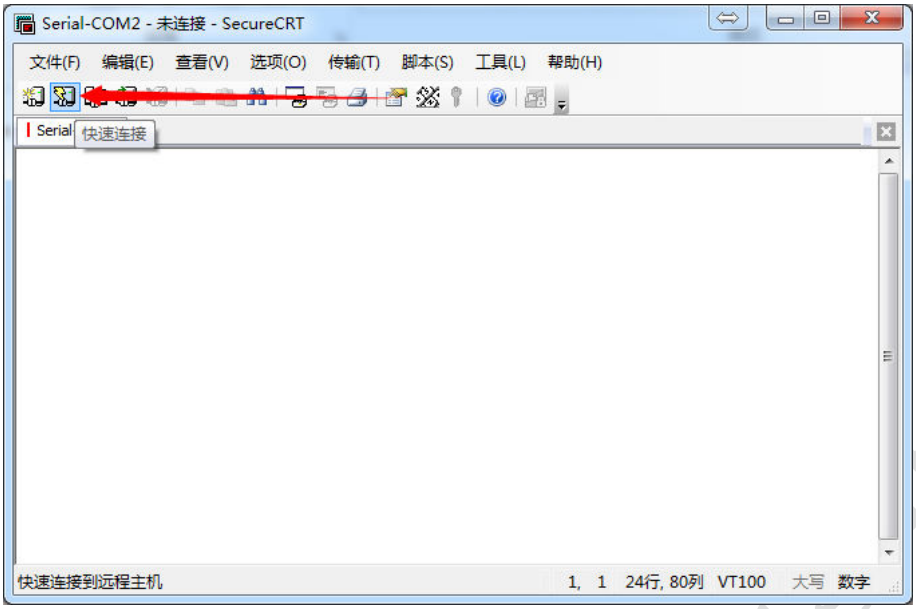


Figure 5-0-5 Serial port tool SecureCRT interface

Configure the serial port as shown below, the port selects the port number connected with the development board, baud rate selects 1.5M, flow control RTS/CTS doesn't need to select.

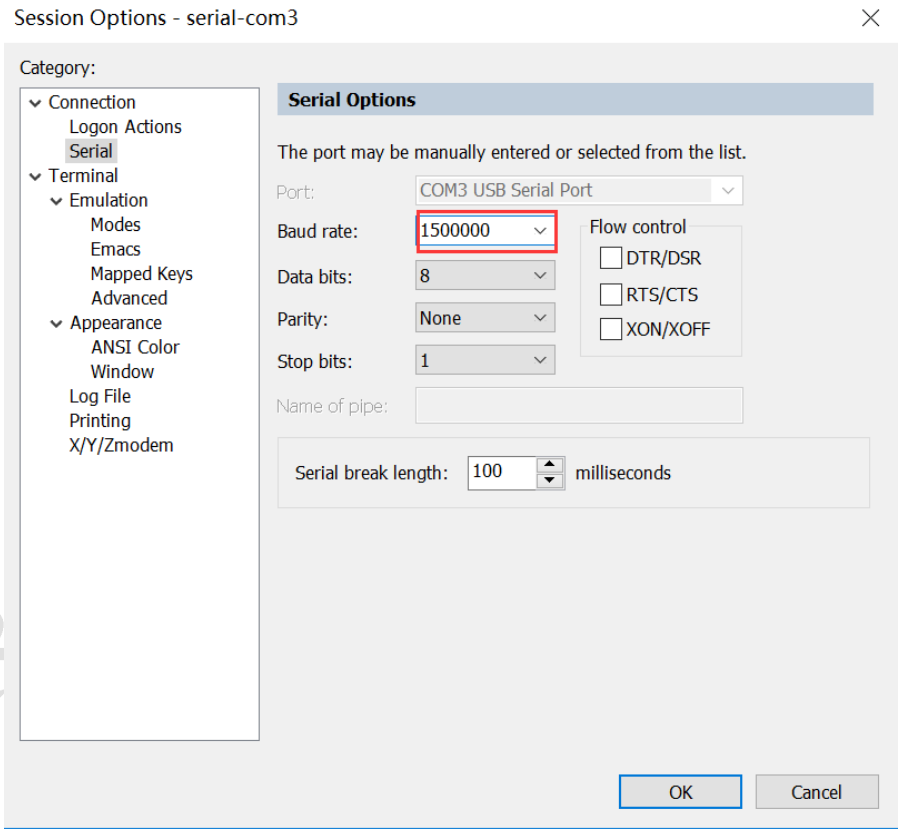


Figure5-0-6 Configure the information of serial port

Click connection, and then it will connect the device normally. Configure session option to make debugging convenient, click "Session Option" of the tool bar, it can save more log information if Scrollback buffer is set with bigger value.

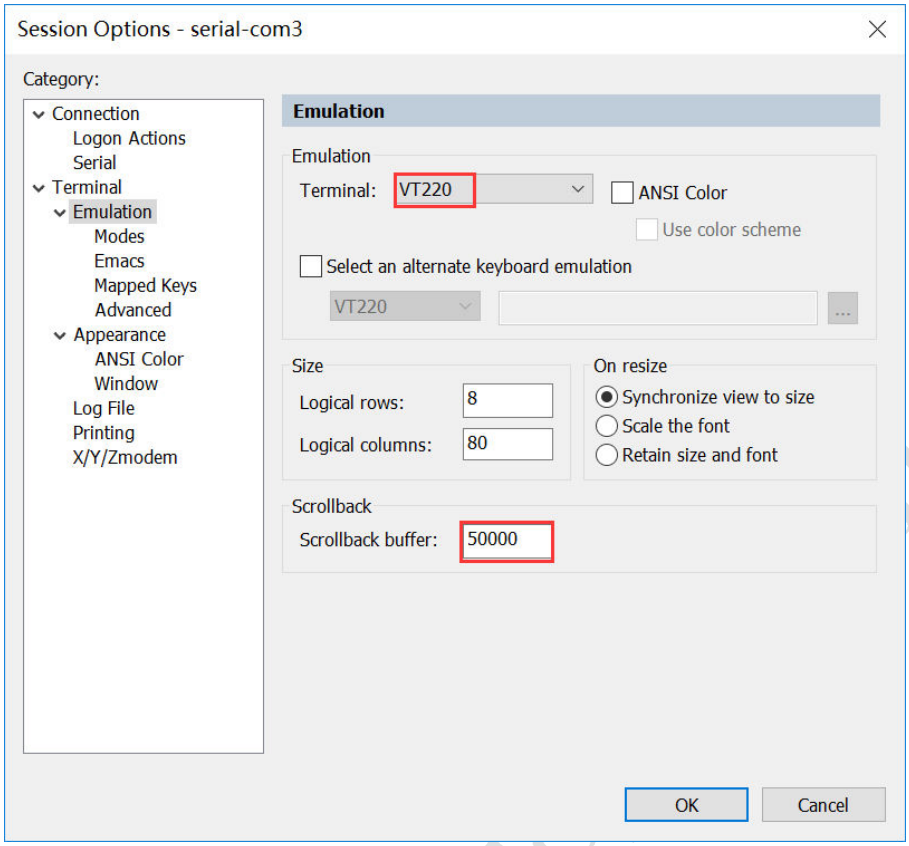


Figure5-7 Configure serial port tool option

5.4.2 ADB debugging

1.Make sure the driver is installed successfully, and PC connects with USB OTG port of the development board.

2.The development board is powered up, enter the system, then enter setting option, select “developer options”, and select “USB debugging”.

3.； In PC side, click “start---run”, input cmd, enter the directory of adb.exe tool, input “adb devices”, it means the connection is normal if the connected device can be inquired.

4.Input “adb shell”, enter ADB debugging.

6. Notice

6.1 Notice

PX30 MINI EVB is suitable for lab or engineering development environment. Please read the following notices carefully before operation:

- Under no circumstance can the panel interface of the development board and the extension board be hot-plugged.
- Before unpacking and installing the development board, please take the necessary anti-static measures to avoid the damage to the hardware of the development board caused by ESD.
- Please hold the edge of the development board, and do not touch the exposed metal part of the development board, so as to avoid the electrostatic damage to the components of the development board.
- Please place PX30 development board on the dry plane surface to keep them away from heat source, electromagnetic interference source and radiation source, electromagnetic radiation sensitive equipment (such as medical equipment) and so on.