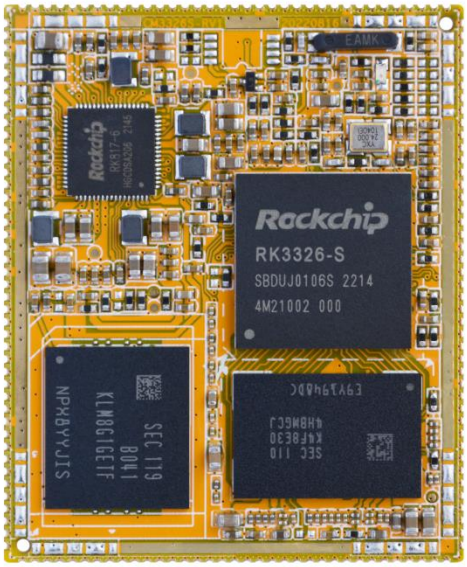
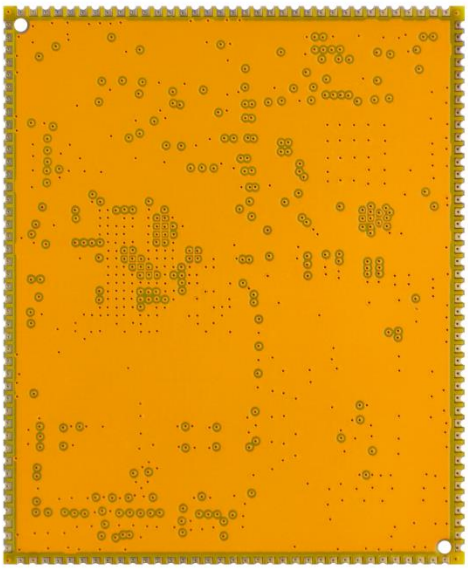
CM3326S Reference User Manual

V1. 20230326





Boardcon Embedded Design

www. boardcon. com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com).

These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

Content

1 CM3326S Introduction

1.1 Summary

The CM3326S system-on-module is equipped with Rockchip's RK3326S it has quad-core Cortex-A35, Mali-G31MP2 GPU. It's good choose for low-cost multimedia module.
It is designed specifically for the multimedia devices such as MID, HMI devices, intelligent interactive devices, and robots. The high performance and low power solution can help customers to introduce new technologies more quickly and enhance the overall solution efficiency.

1.2 Features

- **Microprocessor**
  - Quad-core Cortex-A35 up to 1.5G
  - 32KB I-cache and 32KB D-cache for each core, 512KB L2 cache
  - Mali-G31MP2 GPU

  Memory Organization
  - LPDDR4 RAM up to 4GB
  - EMMC up to 128GB
- **Boot ROM**
  - Supports system code download through USB OTG or SD
- **Trust Execution Environment system**
  - Supports secure OTP and multiple cipher engine
- **Video Decoder/Encoder**
  - Supports video decoding up to 1080P@60fps
  - Supports H.264 encode
  - H.264 HP encoding up to 1920x1080@30fps
  - Picture size up to 8192x8192
- **Display Subsystem**
  - **Video Output**

  Supports 24bits RGB parallel display interface
  Supports 4 lanes MIPI DSI up to 1080p@60fps
  Or LVDS interface up to 1280x800@60fps
  - **Image in**

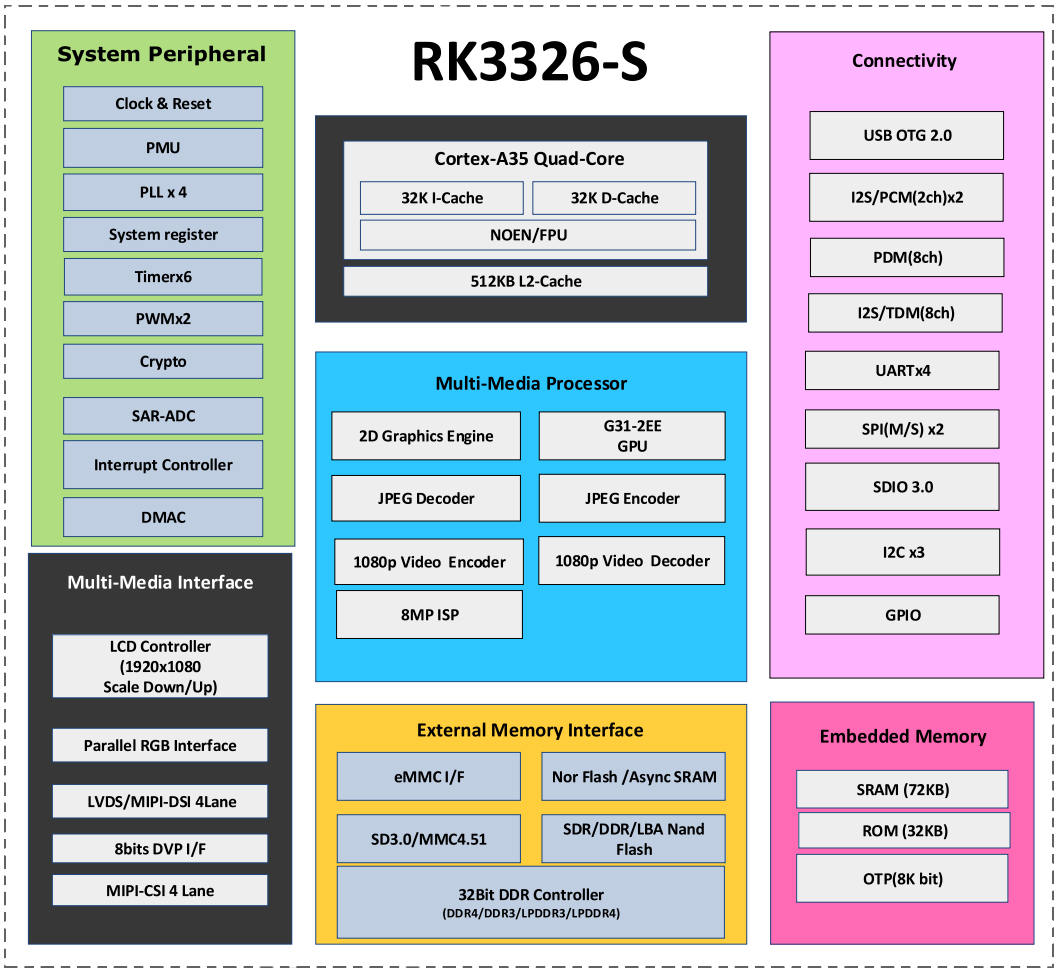
  Supports 8bit DVP interface
  Supports MIPI CSI 4lanes interface
- **I2S/PCM**
  - Three I2S/PCM interface
  - Support Mic array Up to 8ch PDM/TDM interface
- **USB**
  - Only USB 2.0 OTG
- **I2C**

- Up to three I2C
- Support standard mode and fast mode(up to 400kbit/s)

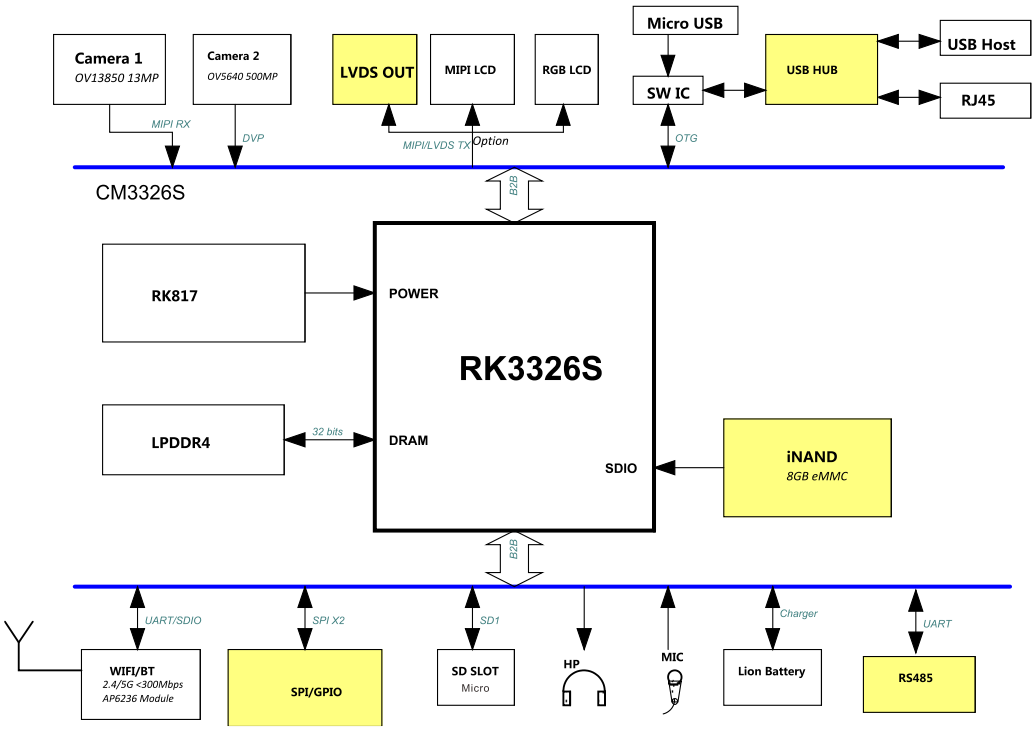
- **SDIO**
  - Support SDIO 3.0 protocol
- **SPI**
  - Up to two SPI controllers,
  - Full-duplex synchronous serial interface
- **UART**
  - Support up to four UARTs(0/1/2/5)
  - UART2 with 2 wires for debug tools
  - Embedded two 64byte FIFO
  - Support auto flow control mode for UART0/1/5
- **ADC**
  - Up to Three ADC channels
  - 10-bit resolution
  - Voltage input range between 0V to 1.8V
  - Support up to 1MS/s sampling rate
- **PWM**
  - 9 on-chip PWMs with interrupt-based operation
  - Support 32bit time/counter facility
  - IR option on PWM3/7
- **Audio**
  - RK817 audio codec
  - Support 1W@8R Speaker AMP, Headphone driver and 2-ch MIC input
- **Power unit**
  - RK817 on board
  - Support Lion battery charger and 5V input
  - Option Ext-RTC IC, less 5uA at 3V button Cell

1.3 CM3326S Block Diagram

1.3.1 RK3326S Block Diagram



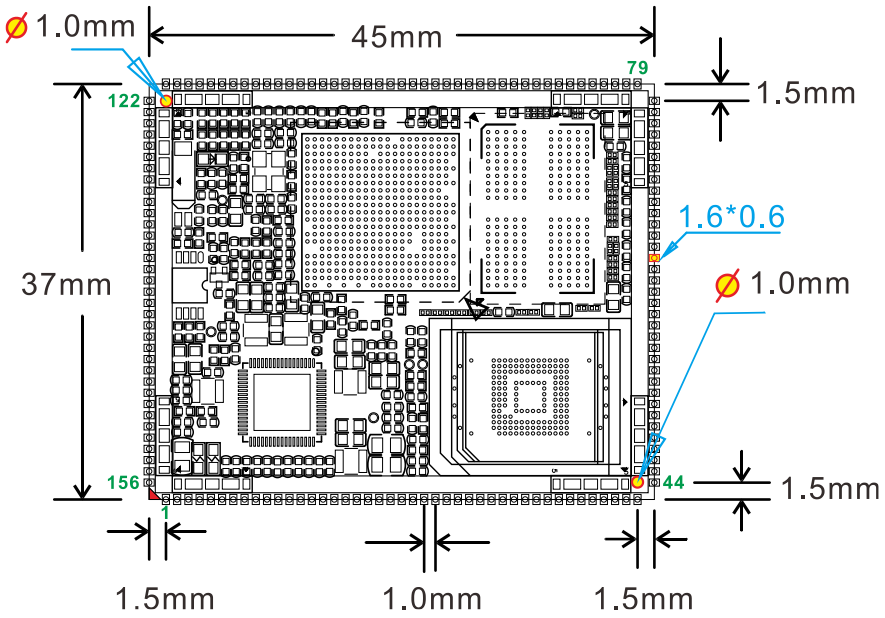
1.3.2 Development board (EM3326S) Block Diagram



1.4 CM3326S specifications

Feature	Specifications
CPU	Quad-core Cortex-A35
DDR	2GB LPDDR4 (up to 4GB)
eMMC FLASH	4GB (up to 128GB)
Power	3.8V (Battery)+5V
LVDS/MIPI DSI	4-Lane
I2S	2-CH
MIPI CSI	4-Lane
Camera	1-CH(DVP) and 1-CH(CSI)
USB	1-CH(OTG 2.0)
SDMMC	2-CH
I2C	3-CH
SPI	2-CH
UART	4-CH, 1-CH(DEBUG)
PWM	9-CH
ADC IN	3-CH
Analog Audio	Speaker and Headphone output, two MIC input.
Board Dimension	37 x 45mm

1.5 CM3326S PCB Dimension



1.6 CM3326S Pin Definition

Pin	Signal	Description or functions	GPIO serial	IO Voltage
1	VCC_SYS	System Power input or output		4.2-3.3V
2	VCC5V0_MIDU	5V Power output		5V
3	GND	Ground		0V
4	SPKP_OUT	8R/1W Speaker driver out		0V
5	SPKN_OUT	8R/1W Speaker driver out		0V
6	HPL	L output for headphone		0V
7	HPR	R output for headphone		0V
8	HP_SNS	Reference GND for headphone		0V
9	MIC2_IN	Negative input for MIC		0V
10	MIC1_IN	Positive input for MIC		0V
11	GND	Ground		0V
12	PMIC_PWRON	Power ON/OFF	30KR pull up	5.5-3.0V
13	VBUS	Battery charge input		5.5-4.7V
14	VBUS	Battery charge input		5.5-4.7V
15	GND	Ground		0V
16	VCC_BAT+	Main power in or Battery input		4.2-3.4V
17	VCC_BAT+	Main power in or Battery input		4.2-3.4V
18	GND	Ground		0V
19	SNSN	Charge sense positive input		0V
20	SNSP	Charge sense negative input		0V
21	GND	Ground		0V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
22	TS	BATT temperature sense input	Connect to NTC	
23	LCDC_BL_PWM	PWM1	GPIO0_C0_d	3.3V
24	LCD_PWREN		GPIO0_B5_u	3.3V
25	SPI0_CLK		GPIO1_B7_d	3.3V
26	SPI0_MISO		GPIO1_B5_d	3.3V
27	SPI0_MOSI		GPIO1_B4_d	3.3V
28	SPI0_CSN		GPIO1_B6_d	3.3V
29	SPI1_MISO	I2S0_SDO3/CIF_D8_M1/ LCD_D10_M0	GPIO3_B6_d	3.3V
30	SPI1_CLK	I2S0_SDO2/CIF_D9_M1/ LCD_D11_M0	GPIO3_B7_d	3.3V
31	SPI1_MOSI	I2S0_SCLK_RX/CIF_D7_M1/ LCD_D8_M0	GPIO3_B4_d	3.3V
32	SPI1_CSN0	I2S0_SDI2/CIF_D6_M1/ LCD_D5_M0	GPIO3_B1_d	3.3V
33	GND	Ground		0V
34	LVDS/MIPI_TX0N		LCDC_D11_M1	1.8/3.3V
35	LVDS/MIPI_TX0P		LCDC_D8_M1	1.8/3.3V
36	LVDS/MIPI_CLKN		LCDC_D4_M1	1.8/3.3V
37	LVDS/MIPI_CLKP		LCDC_D3_M1	1.8/3.3V
38	LVDS/MIPI_TX2N		LCDC_VSYNC_M1	1.8/3.3V
39	LVDS/MIPI_TX2P		LCDC_D5_M1	1.8/3.3V
40	LVDS/MIPI_TX3N		LCDC_HSYNC_M1	1.8/3.3V
41	LVDS/MIPI_TX3P		LCDC_DEN_M1	1.8/3.3V
42	LVDS/MIPI_TX1N		LCDC_D1_M1	1.8/3.3V
43	LVDS/MIPI_TX1P		LCDC_D10_M1	1.8/3.3V
44	LCDC_CLK			3.3V
45	LCD_RST	I2S0_SDI3/CIF_D5/ LCD_D4_M0	GPIO3_B0_d	3.3V
46	LCDC_D23	CIF_CLKI_M1/PDM_SDI0_M0	GPIO3_D3_d	3.3V
47	LCDC_D22	CIF_HS_M1/PDM_SDI3	GPIO3_D2_d	3.3V
48	LCDC_D21	CIF_VS_M1/PDM_SDI2	GPIO3_D1_d	3.3V
49	LCDC_D20	CIF_CLKO_M1/PDM_SDI1	GPIO3_D0_d	3.3V
50	LCDC_D19	PDM_CLK1_M0	GPIO3_C7_d	3.3V
51	LCDC_D18	PDM_CLK0_M0	GPIO3_C6_d	3.3V
52	LCDC_D17	I2S0_SDI0/TDM_SDI	GPIO3_C5_d	3.3V
53	LCDC_D16	I2S0_SDO0/TDM_SDO	GPIO3_C4_d	3.3V
54	LCDC_D15	I2S0_SCK_TX/TDM_SCLK	GPIO3_C3_d	3.3V
55	LCDC_D14	I2S0_LRCK_TX/TDM_FSYNC	GPIO3_C2_d	3.3V
56	LCDC_D13	I2S0_MCLK	GPIO3_C1_d	3.3V
57	LCDC_D12	I2S0_SDO1	GPIO3_C0_d	3.3V
58	LCDC_D9	I2S0_LRCK_RX	GPIO3_B5_d	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
59	LCDC_D7	I2S0_SDI1	GPIO3_B3_d	3.3V
60	LCDC_D6	SPI1_CSN1	GPIO3_B2_d	3.3V
61	LCDC_D2		GPIO3_A6_d	3.3V
62	LCDC_D0		GPIO3_A4_d	3.3V
63	BT_PCM_IN	LCDC_D3_M0/I2S2_SDO	GPIO3_A7_d	3.3V
64	BT_PCM_OUT /UART5_RTS	LCDC_D1_M0/I2S2_SDI /CIF_D3_M1	GPIO3_A5_d	3.3V
65	BT_PCM_SYNC /UART5_CTS	LCDC_DE_M0/I2S2_LRCK /CIF_D2_M1	GPIO3_A3_d	3.3V
66	BT_PCM_CLK /UART5_TX	LCDC_VS_M0/I2S2_SCLK	GPIO3_A2_d	3.3V
67	UART1_CTS		GPIO1_C2_u	3.3V
68	UART1_RTS		GPIO1_C3_u	3.3V
69	UART1_RXD		GPIO1_C0_u	3.3V
70	UART1_TXD		GPIO1_C1_u	3.3V
71	UART0_TX		GPIO0_B2_d	3.3V
72	UART0_RX		GPIO0_B3_d	3.3V
73	UART5_RX	LCDC_HS_M0/ I2S2_MCLK	GPIO3_A1_d	3.3V
74	GND	Ground		0V
75	CAM_CLKO	Camera MCLK 24MHz output	GPIO2_B3_d	1.8V
76	CIF_VSYNC		GPIO2_B0_d	1.8V
77	I2C2_SDA_CAM		GPIO2_C0_u	1.8V
78	I2C2_SCL_CAM		GPIO2_B7_u	1.8V
79	CAM_PDN1		GPIO2_B5_d	1.8V
80	UART2_TX_M1		GPIO2_B4_d	1.8V
81	UART2_RX_M1		GPIO2_B6_d	1.8V
82	CIF_CLKI		GPIO2_B2_d	1.8V
83	CIF_HREF		GPIO2_B1_d	1.8V
84	CIF_D2		GPIO2_A0_d	1.8V
85	CIF_D3		GPIO2_A1_d	1.8V
86	CIF_D4		GPIO2_A2_d	1.8V
87	CIF_D5		GPIO2_A3_d	1.8V
88	CIF_D6		GPIO2_A4_d	1.8V
89	CIF_D7		GPIO2_A5_d	1.8V
90	CIF_D8		GPIO2_A6_d	1.8V
91	CIF_D9		GPIO2_A7_d	1.8V
92	GND	Ground		0V
93	MIPI_CSI_D3P			1.8V
94	MIPI_CSI_D3N			1.8V
95	MIPI_CSI_D2P			1.8V
96	MIPI_CSI_D2N			1.8V
97	MIPI_CSI_D1P			1.8V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
98	MIPI_CSI_D1N			1.8V
99	MIPI_CSI_D0P			1.8V
100	MIPI_CSI_D0N			1.8V
101	MIPI_CSI_CLKP			1.8V
102	MIPI_CSI_CLKN			1.8V
103	GND	Ground		0V
104	USB_OTG_DM	5V Power output		1.8V
105	USB_OTG_DP	Ground		1.8V
106	USB_DET	USB VBUS detect input		3.3V
107	USB_OTG_ID	Not need pull H		1.8V
108	GND	Ground		0V
109	SDMMC0_D3		GPIO1_D5_u	3.3V
110	SDMMC0_D2		GPIO1_D4_u	3.3V
111	SDMMC0_CMD		GPIO1_D7_u	3.3V
112	SDMMC0_D1	UART2_RX_M0	GPIO1_D3_u	3.3V
113	SDMMC0_D0	UART2_TX_M0	GPIO1_D2_u	3.3V
114	SDMMC0_CLK		GPIO1_D6_d	3.3V
115	SDMMC0_DET		GPIO0_A3_u	3.3V
116	I2S_LRCK_TXRX	Option no used PMU Codec	GPIO2_C1_d	NC/3.3V
117	I2S_SCLK	Option no used PMU Codec	GPIO2_C2_d	NC/3.3V
118	I2S_MCLK	Option no used PMU Codec	GPIO2_C3_d	NC/3.3V
119	I2S_SDO	Option no used PMU Codec	GPIO2_C4_d	NC/3.3V
120	I2S_SDI	Option no used PMU Codec	PDM_SDI0_M1	NC/3.3V
121	GND	Ground		0V
122	ADC1_HP_HOOK			1.8V
123	ADC2_KEY_IN	Pull up 10KR(Recover Key)		1.8V
124	ADC0			1.8V
125	GND	Ground		0V
126	REF_CLKO		GPIO0_A0_d	3.3V
127	PDM_CLK0_M1		GPIO2_C6_d	3.3V
128	RESET	System Reset(Connect Key)		3.3V
129	PWM0		GPIO0_B7_d	
130	GND	Ground		0V
131	SDIO_D3		GPIO1_C1_u	3.3V
132	SDIO_D2		GPIO1_D0_u	3.3V
133	SDIO_D1		GPIO1_C7_u	3.3V
134	SDIO_D0		GPIO1_C6_u	3.3V
135	SDIO_CMD		GPIO1_C4_u	3.3V
136	SDIO_CLK		GPIO1_C5_d	3.3V
137	GND	Ground		0V
138	VCC_RTC	RTC button Cell Power input		1.8-3.3V
139	HOST_WAKE_BT		GPIO0_A1_d	3.3V

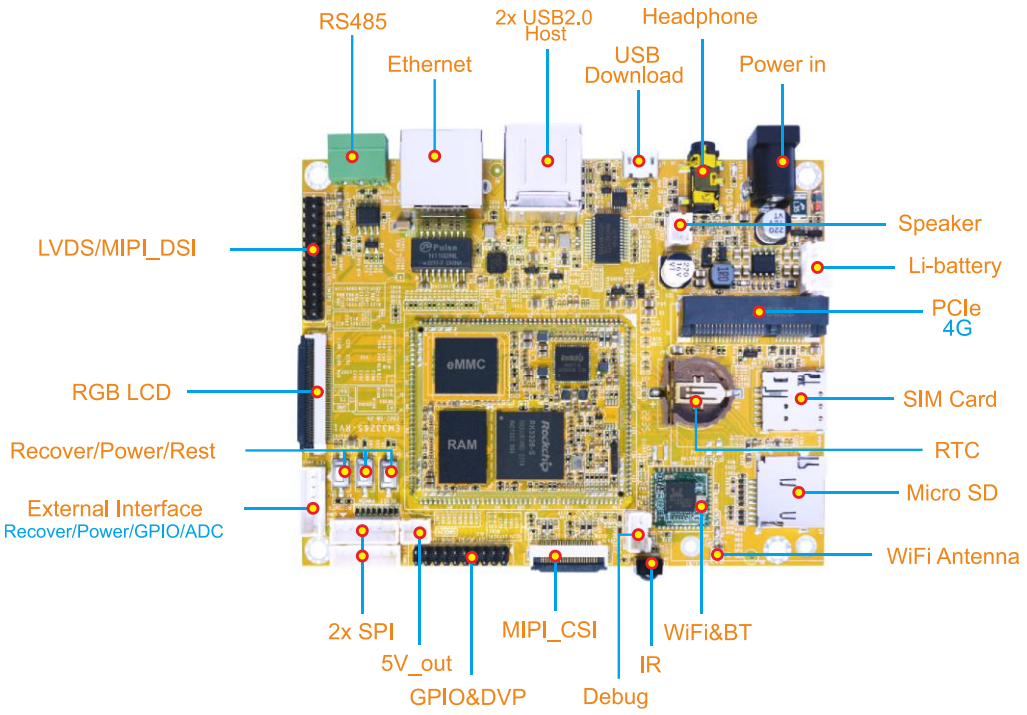
Pin	Signal	Description or functions	GPIO serial	IO Voltage
140	BT_WAKE_HOST		GPIO0_A7_u	3.3V
141	WIFI_REG_ON		GPIO0_A2_d	3.3V
142	WIFI_Wake_HOST		GPIO0_A5_u	3.3V
143	BT_REG_ON	PWM3	GPIO0_C1_d	3.3V
144	I2C1_SDA	Pull up 2.2KR(RTC IC reserve)	GPIO0_C3_d	3.3V
145	I2C1_SCL	Pull up 2.2KR(RTC IC reserve)	GPIO0_C2_d	3.3V
146	GPIO1_B0_u	Option use RTC IC interrupt		3.3V
147	CLKOUT_32K	RTC Clock output for WIFI		3.3V
148	VCC_3V0	GPIO 3V output(Max 0.5A)		3.3V
149	VCC_SD	PMU LDO6 output(Max 0.4A)		
150	GND	Ground		0V
151	VCC2V8_DVP	PMU LDO7 output(Max 0.4A)		
152	GND	Ground		0V
153	LDO1_1V8	GPIO 1V8 output(Max 0.4A)		1.8V
154	VCC1V8_DVP	Camera Power 1V8 output		
155	GND	Ground		0V
156	VDD1V5_DVP	PMU LDO9 output(Max 0.4A)		

Note:

I2S1(Pin116-120) is used for PMU, default is no connected.

Pin146 can used when have not Ext-RTC IC on board.

1.7 Development Kit (EM3326S)

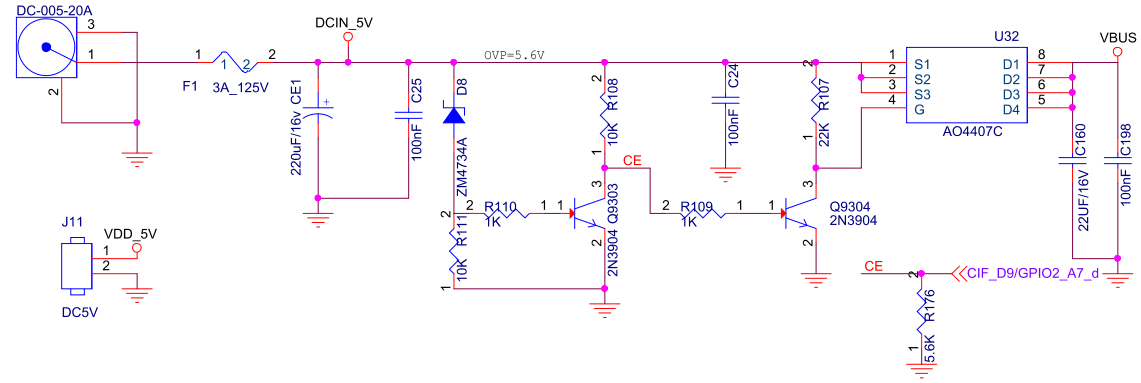


2 Hardware Design Guide

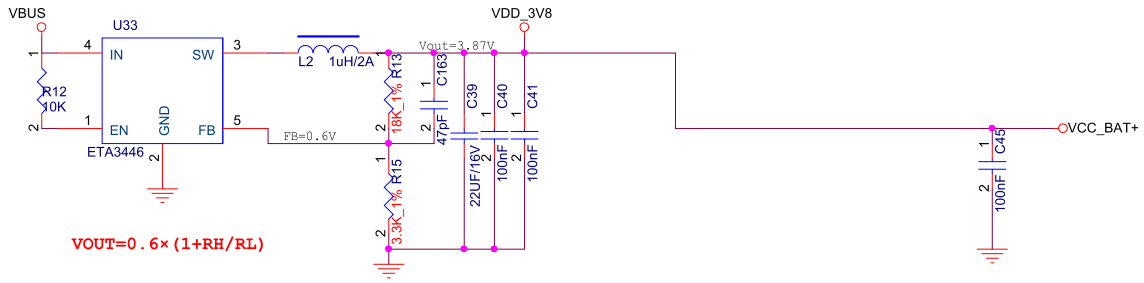
2.1 Peripheral Circuit Reference

2.1.1 External Power (No battery)

Main DC5V

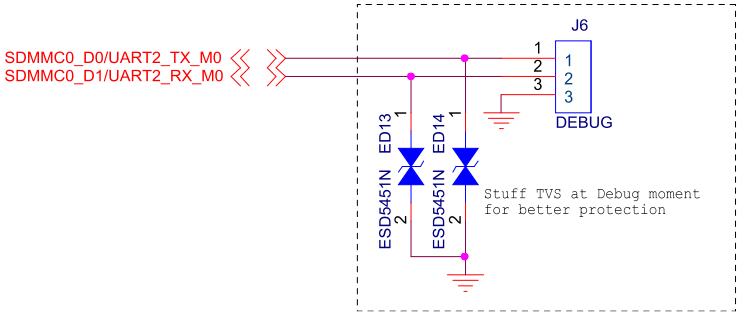


Main 3V8

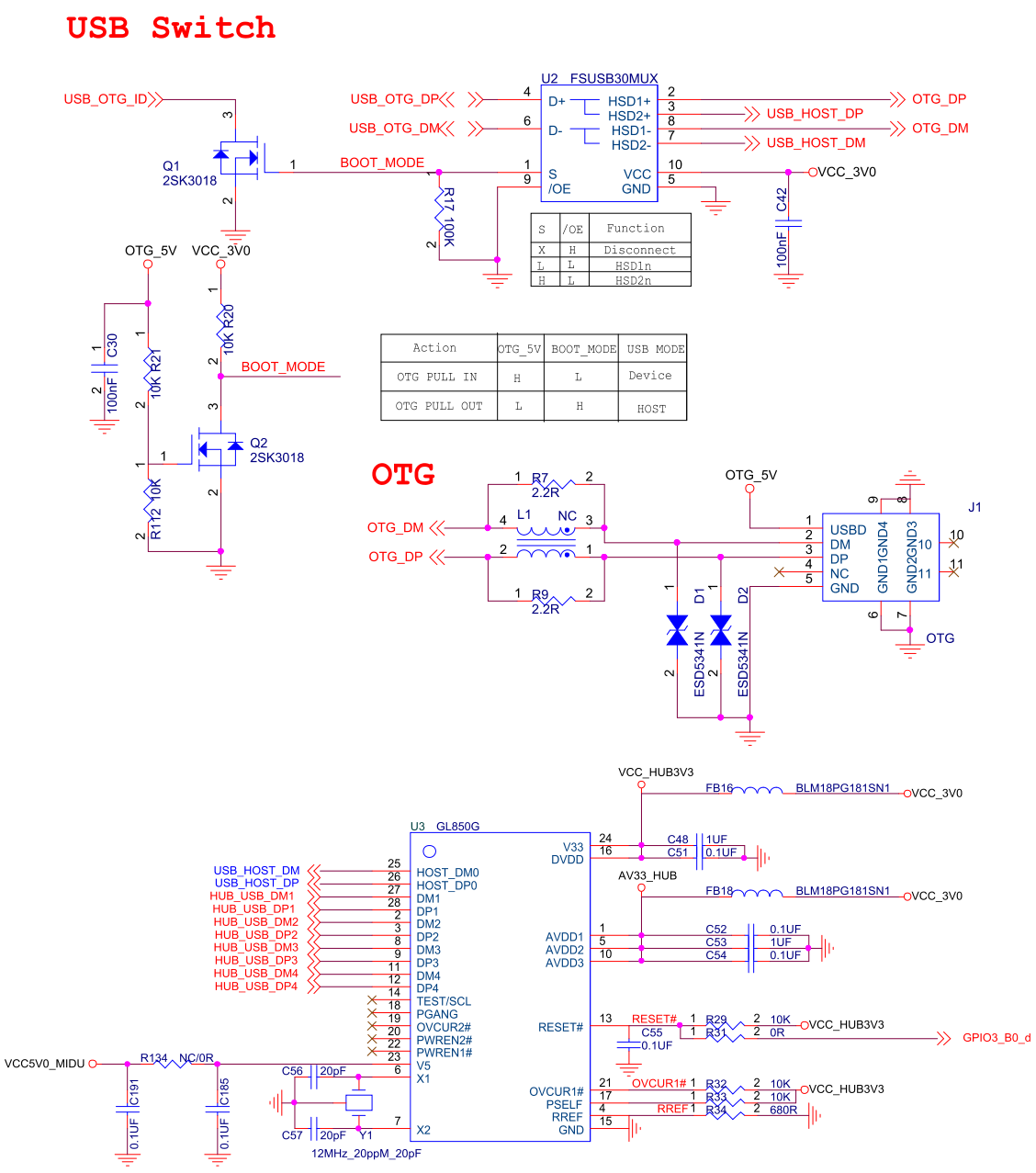


2.1.2 Debug Circuit

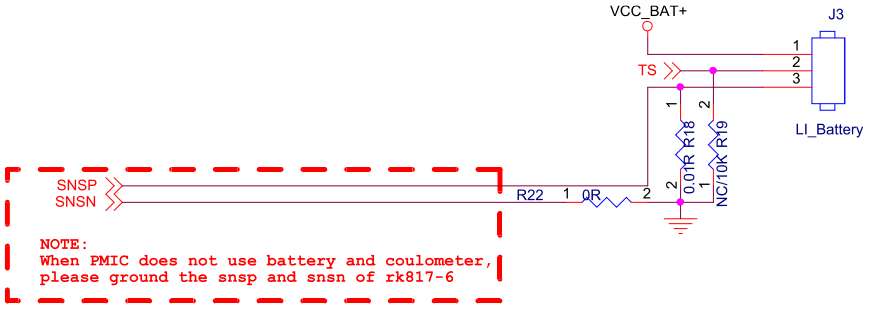
NOTE:When using debug, you must pull out the SD card.



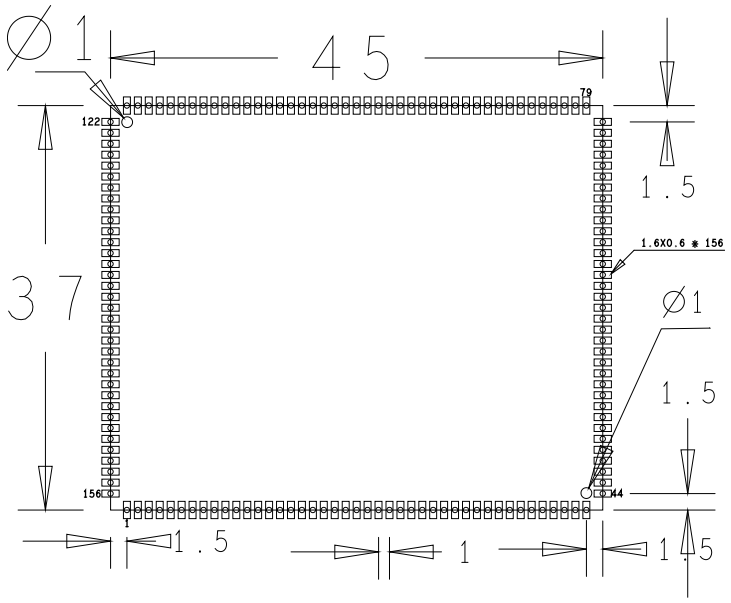
2.1.3 USB OTG Interface Circuit



2.1.4 Battery Circuit



2.2 PCB Footprint



3 Product Electrical Characteristics

3.1 Dissipation and Temperature

Symbol	Parameter	Min	Typ	Max	Unit
VBUS	Charger Input Voltage		5	5.5	V
Ibatt	Lion Battery input Current		TBD		mA
VCC_RTC	RTC input Voltage	3	3.3		V
Iirtc	RTC input Current		TBD		uA
Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Unit**
VCC5V0_MIDU	PMU boost 5V output Current		500		mA
VCC_SYS	System output Current		1500		mA
VCC_3V0	System 3.3V IO output Current		600		mA

VCC_SD	For SD Card output Current		400		mA
LDO1_1V8	System 1.8V IO output Current		300		mA
VCC2V8_DVP	Camera AVDD output Current		400		mA
VCC1V8_DVP	Camera IOVDD output Current		400		mA
VDD1V5_DVP	Camera Core output Current		400		mA
Ta	Operating Temperature	-0		70	°C
Tstg	Storage Temperature	-40		85	°C

3.2 Reliability of Test

Low Temperature Operating Test		
Contents	Operating 4h in Low temperature	-10°C±2°C
Result	TBD	
High Temperature Operating Test		
Contents	Operating 8h in high temperature	65°C±2°C
Result	TBD	

Operating Life Test		
Contents	Operating in room	120h
Result	TBD	

3.3 Certifications