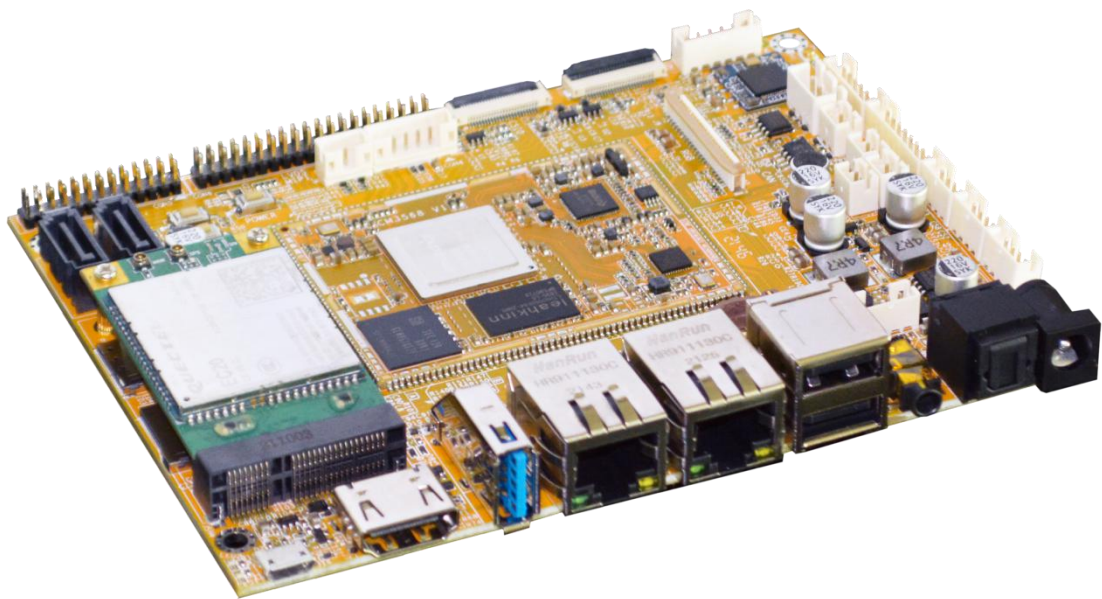


EM3568 Hardware Manual

V2.20220705



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 EM3568 Introduction.....	3
1.1 EM3568 Summary.....	3
1.2 EM3568 Specifications.....	3
1.3 EM3568 Features.....	4
1.4 PCB Dimension.....	5
1.5 Block Diagram.....	5
1.6 CM3568 PCB Dimension.....	6
1.7 CM3568 Introduction.....	6
1.8 CM3568 Pin Definition.....	7
2 Peripherals Introduction.....	15
2.1 Power (P1, CON2).....	15
2.2 Audio I/O.....	15
2.3 USB HOST (P6, J11).....	16
2.4 Ethernet (JP1/JP2).....	17
2.5 USB3.0 (J25).....	18
2.6 HDMI OUT (J7).....	18
2.7 USB OTG (J16).....	19
2.8 4G Module (J5, P2).....	20
2.9 Micro SD (J7).....	21
2.10 SATA 3.0(J26/J3).....	22
2.11 EDP(CON5).....	23
2.12 MIPI_DSI_TX0&LVDS (CON6).....	23
2.13 MIPI Camera (J1, J2).....	25
2.14 SPI (CON10, CON11).....	26
2.15 Button (SW1,SW2,SW3).....	27
2.16 UART (J6, J13, J14, J15).....	28
2.17 KEY CON (CON4).....	29
2.18 WiFi&Bluetooth (U15).....	29
2.19 GPIO(CON9).....	30
2.20 RS485 (P3).....	30
2.21 CAN (P4).....	31
2.22 RTC (J4).....	31
2.23 LCD(J9).....	31
3 Product Configurations.....	33
3.1 Standard Contents.....	33
3.2 Optional Parts.....	33

1 EM3568 Introduction

1.1 EM3568 Summary

Rockchip RK3568 is a low power quad-core application processor. It made in 22nm process technology, integrated 4-core ARM architecture A55 processor and Mali G52 2EE graphics processor, supporting 4K decoding and 1080P encoding. In addition, it is also equipped with a third-generation AI processor to effectively meet the performance requirements of smart vision, industrial control, and IoT gateway applications

Boardcon EM3568 single board computer is based on RK3568 and designed specifically for AIoT and industrial applications with 2GB RAM (up to 8GB), 8GB storage (up to 128GB), optional WiFi and Bluetooth, Camera and 4G modules.

The SBC features two Gigabit Ethernet port to meet the high-speed network requirements, as well as High-speed expansion interface such as SATA3.0, USB3.0 port. Multi-screen different display is also supported, and EM3568 integrates eDP/MIPI/LVDS/RGB interfaces.

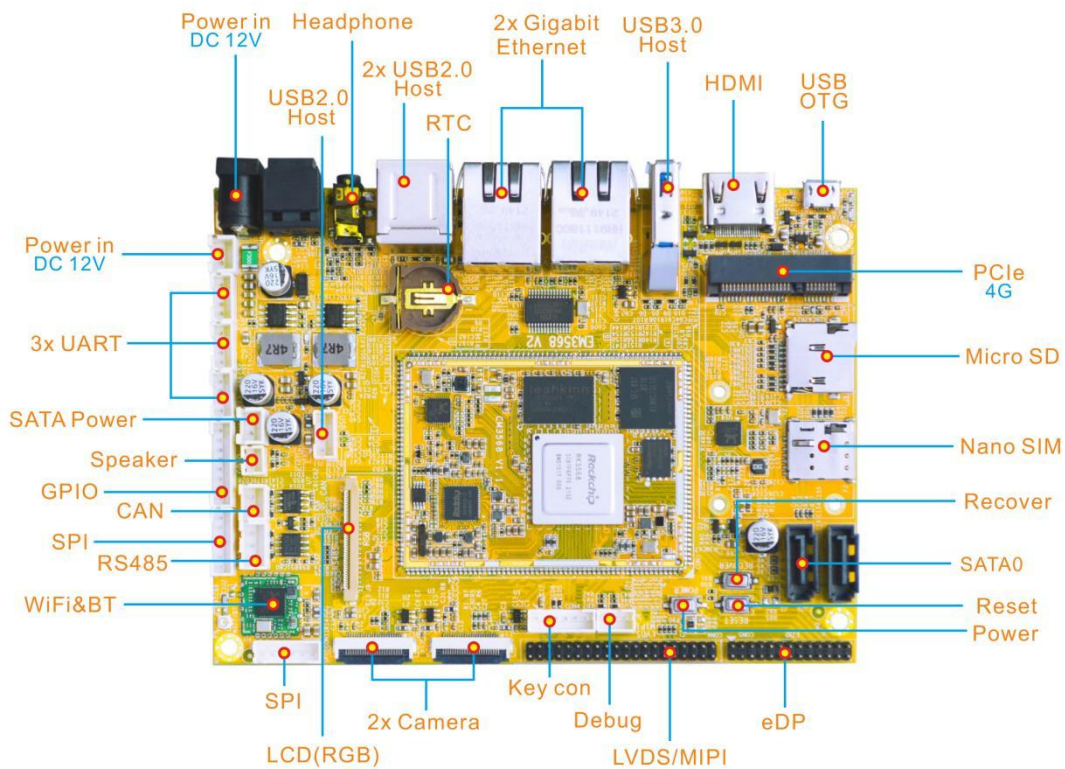
In addition, the SBC provides some general data interfaces such as UART(TTL), RS485, and CAN.

1.2 EM3568 Specifications

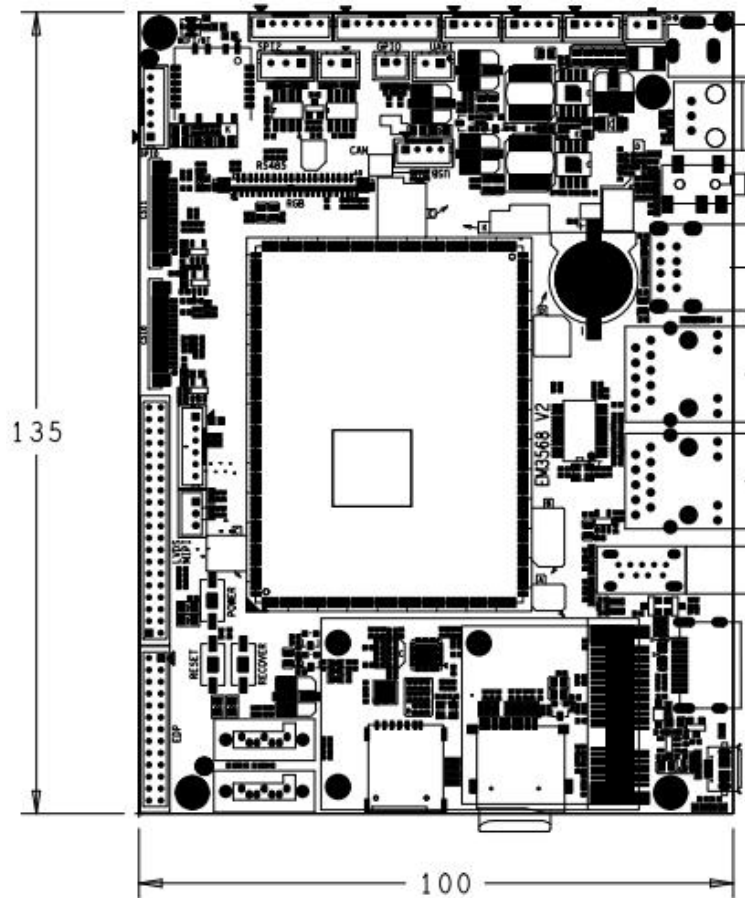
Specifications	
CPU	Rockchip RK3568 Quad-core Cortex-A55 @ up to 2.0 GHz
GPU	ARM Mali-G52 GPU with support for OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1
NPU	0.8 TOPS
Memory	2GB, 4GB, or 8GB LPDDR4
Storage	8GB eMMC flash (up to 128GB) MicroSD card slot SATA3.0
Power Supply	12V/3A DC input jack
USB	1x USB OTG 2.0 3x USB Host 2.0 (USB-AF or 4-pin connector) 1x USB 3.0
Connectivity	2x Gigabit Ethernet RJ45 ports via Realtek RTC8211F-CG controller 2.4G WiFi (802.11b/g/n) with Bluetooth 4.0 PCIe socket with Nano SIM card port to support 4G modules
Serial	1x Serial port for debug, 3-pin connector 3x UART, 4-pin connectors 1x RS485, 3-pin connector

Video	HDMI 2.0, 4Kp60 MIPI DSI/LVDS, 1080p60 (40-pin header) EDP 1.3, 2560x1600@60Hz (30-pin header) RGB, up to 1920x1080@60Hz (40-pin FPC connector)
Audio	3.5mm audio I/O jack 8-channel audio via HDMI Speaker (2-pin connector)
Camera(optional)	2x MIPI Cameras, 24-pin FPC connector.
Keys	Recover, Reset, Power
Other features	RTC with battery connector; GPIO&I2C; CAN; KEY connector(PWM3_IR/Reset / Recover /Power); SPI
Dimension	Based board - 135mm x 100mm; CPU module - 45mm x 60mm

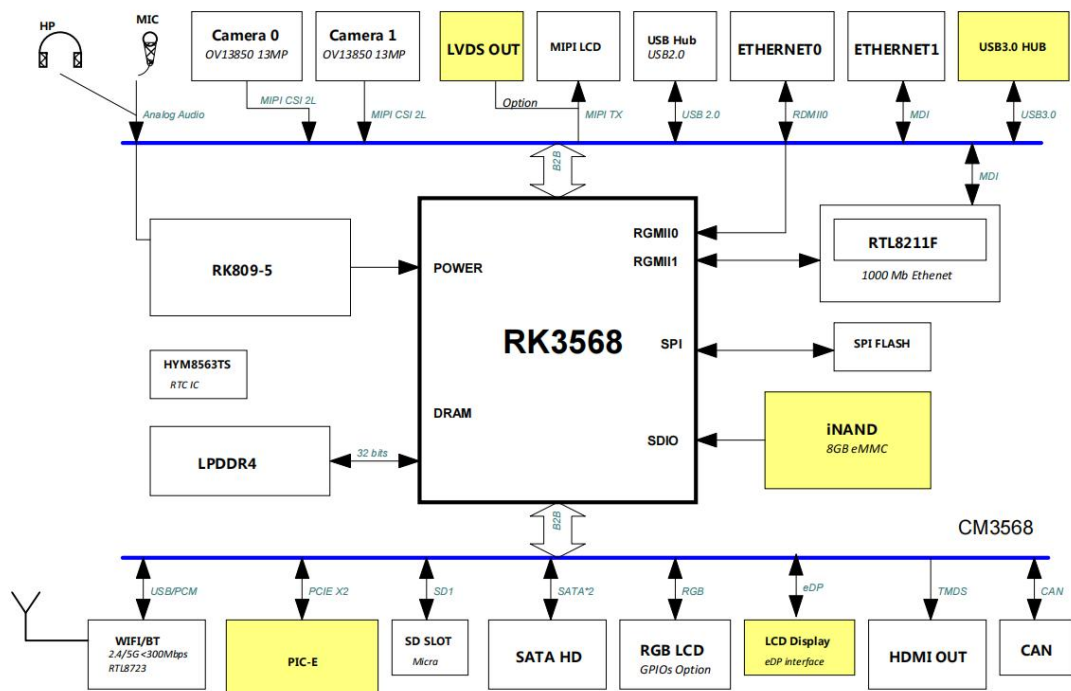
1.3 EM3568 Features



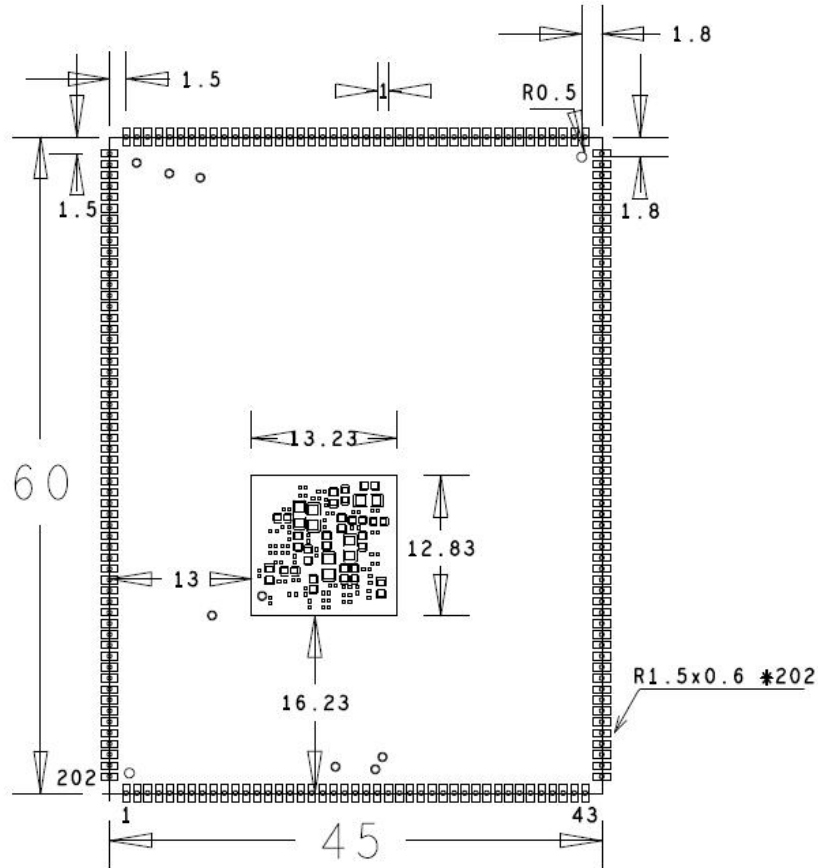
1.4 PCB Dimension



1.5 Block Diagram

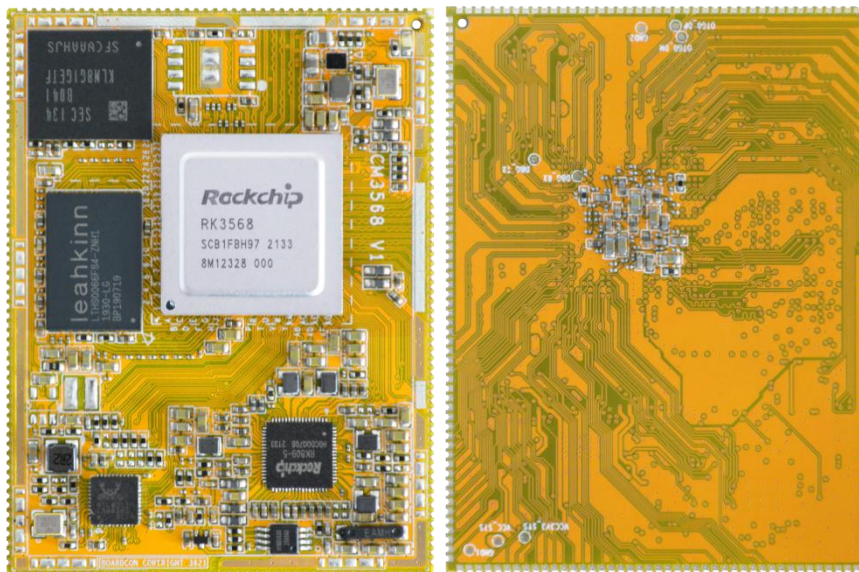


1.6 CM3568 PCB Dimension



1.7 CM3568 Introduction

The CPU module is Quad-core Cortex-A55, frequency up to 2.0GHz, has features 2GB LPDDR4 RAM and 8GB eMMC Flash.



CM3568 specifications

Pin number – 202 pins, 1.0mm pitch

Dimension – 45mm x 60mm

Layer – 6 Layers, complying with EMS/EMI

Power supply – DC 3.3V~5V

Application – AI devices such as industrial controller, IoT devices, intelligent interactive devices, personal computers and robots.

1.8 CM3568 Pin Definition

Pin	Signal	Description or functions	GPIO serial	IO Voltage
1	HDMI_TX0N_PORT			0.5V
2	HDMI_TX0P_PORT			0.5V
3	HDMI_TX1N_PORT			0.5V
4	HDMI_TX1P_PORT			0.5V
5	HDMI_TX2N_PORT			0.5V
6	HDMI_TX2P_PORT			0.5V
7	HDMI_TX_HPDIN	HDMI hot plug detect signal		3.3V
8	PCIE20_REFCLKP	PCIE2 reference clock output		0.5V
9	PCIE20_REFCLKN	PCIE2 reference clock output		0.5V
10	PCIE20_RXP	PCIE2/SATA/QSGMII RXP		0.5V
11	PCIE20_RXN	PCIE2/SATA/QSGMII RXN		0.5V
12	PCIE20_TXP	PCIE2/SATA/QSGMII TXP		0.5V
13	PCIE20_TXN	PCIE2/SATA/QSGMII TXN		0.5V
14	USB3_HOST1_SSTX N	USB3/SATA/QSGMII TXN		0.5V
15	USB3_HOST1_SSTX P	USB3/SATA/QSGMII TXP		0.5V
16	USB3_HOST1_SSRX N	USB3/SATA/QSGMII RXN		0.5V
17	USB3_HOST1_SSRX P	USB3/SATA/QSGMII RXP		0.5V
18	USB3_OTG0_SSTXN	USB3 OTG or SATA TXN		0.5V
19	USB3_OTG0_SSTXP	USB3 OTG or SATA TXP		0.5V
20	USB3_OTG0_SSRXN	USB3 OTG or SATA RXN		0.5V
21	USB3_OTG0_SSRXP	USB3 OTG or SATA RXP		0.5V
22	GND	Ground		0V
23	USB3_HOST1_DM	USB3 Host1 DM		0.5V
24	USB3_HOST1_DP	USB3 Host1 DP		0.5V
25	USB3_OTG0_DP	USB3 OTG0 DP		0.5V
26	USB3_OTG0_DM	USB3 OTG0 DM		0.5V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
27	UART1_RTSn_M0/G MAC0_TXEN	GMAC0_TXEN /UART1_RTS or SPI1_CLK_M0	GPIO2_B5_u	1.8V
28	UART1_TX_M0/GMA C0_TXD1	GMAC0_TXD1 or UART1_TXD	GPIO2_B4_u	1.8V
29	UART1_RX_M0/GMA C0_TXD0	GMAC0_TXD0 or UART1_RXD	GPIO2_B3_u	1.8V
30	BT_REG_ON_H_GPI O2_B7/GMAC0_RXD 1	GMAC0_RXD1/I2S2_SCK_ RX_M0 or SPI1_MOSI_M0	GPIO2_B7_d	1.8V
31	UART1_CTSn_M0/G MAC0_RXD0	GMAC0_RXD0/ UART1_CTS or SPI1_MISO_M0	GPIO2_B6_u	1.8V
32	SDMMC1_D1/GMAC0 _RXD3	GMAC0_RXD3/SDMMC1_ D1 or UART6_TX_M0	GPIO2_A4_u	1.8V
33	SDMMC1_D0/GMAC0 _RXD2	GMAC0_RXD2/SDMMC1_ D0 or UART6_RX_M0	GPIO2_A3_u	1.8V
34	SDMMC1_CLK/GMA C0_TXCLK	GMAC0_TXCLK/SDMMC1 _CLK or UART9_TX_M0	GPIO2_B0_d	1.8V
35	SDMMC1_CMD/GMA C0_TXD3	GMAC0_TXD3/SDMMC1_ CMD or UART9_RX_M0	GPIO2_A7_u	1.8V
36	SDMMC1_D3/GMAC0 _TXD2	GMAC0_TXD2/SDMMC1_ D3 or UART7_TX_M0	GPIO2_A6_u	1.8V
37	SDMMC1_D2/GMAC0 _RXCLK	GMAC0_RXCLK/SDMMC1 _D2 or UART7_RX_M0	GPIO2_A5_u	1.8V
38	GND	Ground		0V
39	SOC_PCM_CLK/GMA C0_MCLKINOUT	GMAC0_MCLK/I2S2_SCK Tx/UART7CTS/SPI2_MISO _M0	GPIO2_C2_d	1.8V
40	SOC_PCM_SYNC/G MAC0_MDC	GMAC0_MDC/I2S2_LRCK Tx/UART7RTS/SPI2_MOSI _M0	GPIO2_C3_d	1.8V
41	SOC_PCM_OUT/GM AC0_MDIO	GMAC0_MDIO/I2S2_SDO /UART9CTS/SPI2_CS0_M0	GPIO2_C4_d	1.8V
42	BT_WAKE_HOST_H/ GMAC0_RXDV_CRS	GMAC0_RXDV/I2S2_LRC KRx/UART6CTS/SPI1CS0_ M0	GPIO2_C0_d	1.8V
43	HOST_WAKE_BT_H_ GPIO2_C1	I2S2_MCLK/UART7_RTS/S PI2_CLK_M0	GPIO2_C1_d	1.8V
44	EDP_TX_D3N			0.5V
45	EDP_TX_D3P			0.5V
46	EDP_TX_D2N			0.5V
47	EDP_TX_D2P			0.5V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
48	EDP_TX_D1N			0.5V
49	EDP_TX_D1P			0.5V
50	EDP_TX_D0N			0.5V
51	EDP_TX_D0P			0.5V
52	EDP_TX_AUXN			0.5V
53	EDP_TX_AUXP			0.5V
54	USB3_OTG0_VBUSDET	USB OTG VBUS detect input		3.3V
55	USB3_OTG0_ID	USB OTG ID input		3.3V
56	SDMMC0_CLK	UART5Tx_M0/CAN0_Rx_M1	GPIO2_A2_d	3.3V
57	SDMMC0_CMD	UART5Rx_M0/CAN0_Tx_M1	GPIO2_A1_u	3.3V
58	SDMMC0_D0	UART6_Tx_M1/PWM8_M1	GPIO1_D5_u	3.3V
59	SDMMC0_D1	UART6_Rx_M1/PWM9_M1	GPIO1_D6_u	3.3V
60	SDMMC0_D2	UART5CTS_M0/JTAG_TCK	GPIO1_D7_u	3.3V
61	SDMMC0_D3	UART5RTS_M0/JTAG_TMS	GPIO2_A0_u	3.3V
62	GND	Ground		0V
63	SARADC_VIN3			1.8V
64	SARADC_VIN2_HP_HOOK			1.8V
65	SARADC_VIN0_KEY/RECOVERY	Program need short to GND when power on.(Pull up 10K)		1.8V
66	GND	Ground		0V
67	GPIO2_C6	UART8_Rx/SPI1_CS1_M0	GPIO2_C6_d	1.8V
68	WIFI_REG_ON_H_GPIO2_B1	UART8_RTS_M0/CAN2_Rx_M1	GPIO2_B1_d	1.8V
69	WIFI_WAKE_HOST_H_GPIO2_B2	UART8_CTS_M0/CAN2_Tx_M1/SD1_DET	GPIO2_B2_u	1.8V
70	SOC_PCM_IN	UART8Tx_M0/I2S2_SDI_M0	GPIO2_C5_d	1.8V
71	UART0_TX/GPIO0_C1	PWM2_M0/MCU_JTAG_TDI	GPIO0_C1_d	3.3V
72	UART0_RX/PWM1_M0		GPIO0_C0_d	3.3V
73	I2C1_SCL/CAN0_TX_M0	PCIE30X1_ButtonRSTn /MCU_JTAG_TDO	GPIO0_B3_u (Pull up 2.2K onboard)	3.3V
74	I2C1_SDA/CAN0_RX_M0	PCIE20_ButtonRSTn /MCU_JTAG_TCK	GPIO0_B4_u (Pull up 2.2K onboard)	3.3V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
75	UART2_TX_M0_DEB UG	Debug UART	GPIO0_D1_u	3.3V
76	UART2_RX_M0_DEB UG	Debug UART	GPIO0_D0_u	3.3V
77	TP_INT_L_PWM1_M 1	SPI0_CLK_M0	GPIO0_B5_u	3.3V
78	LCD0_BL_PWM4	PCIE30X1_PERSTn_M0	GPIO0_C3_d	3.3V
79	PCIE20_CLKREQn_ M0/GPIO0_A5	SDMMC0_PWREN /SATA_MP_SWITCH	GPIO0_A5_d	3.3V
80	PWM3_IR	PCIE30X1_Wake/EDP_HP D	GPIO0_C2_d	3.3V
81	LCD1_PWREN_H_G PIO0_C5	PCIE30X2_WAKEn_M0 /PWM6 /SPI0_MISO_M0	GPIO0_C5_d	3.3V
82	SDMMC0_DET_L	PCIE30X1_CLKREQn_M0	GPIO0_A4_u	3.3V
83	LCD1_BL_PWM5	UART0_RTS/SPI0_CS1_M 0	GPIO0_C4_d	3.3V
84	TP_RST_L_PWM2_M 1	SPI0_MOSI_M0	GPIO0_B6_u	3.3V
85	I2C4_SCL_M0	SPI3CLK_M0/I2S2_SDO_ M1 (Pull up 2.2K onboard)	GPIO4_B3_d	1.8V
86	I2C4_SDA_M0	SPI3MOSI_M0 /I2S2SDI_M1 (Pull up 2.2K onboard)	GPIO4_B2_d	1.8V
87	I2C2_SCL_M1	CAN2Tx_M0 /I2S1SDO3_M1 (Pull up 2.2K onboard)	GPIO4_B5_d	1.8V
88	I2C2_SDA_M1	CAN2Rx_M0/ISP_Flash_Tri g (Pull up 2.2K onboard)	GPIO4_B4_d	1.8V
89	PDM_CLK1_M0_ADC	SPDIF_M0/UART4_Rx_M0	GPIO1_A4_d	3.3V
90	PDM_SDI1_M0_ADC	PCIE20_PERSTn_M2	GPIO1_B2_d	3.3V
91	PDM_SDI2_M0_ADC	PCIE20_WAKEn_M2	GPIO1_B1_d	3.3V
92	PDM_SDI3_M0_ADC	PCIE20_CLKREQn_M2	GPIO1_B0_d	3.3V
93	I2C3_SCL_M0	(Pull up 2.2K onboard)		3.3V
94	I2C3_SDA_M0	(Pull up 2.2K onboard)		3.3V
95	GND	Ground		0V
96	USB2_HOST2_DM			1.8V
97	USB2_HOST2_DP			1.8V
98	USB2_HOST3_DM			1.8V
99	USB2_HOST3_DP			1.8V
100	PHY1_LED2/CFG_LD	Ethernet Speed LED(PU		3.3V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
	O1	4.7K)		
101	PHY1_LED1/CFG_LD O0	Ethernet Link LED(PD 4.7K)		3.3V
102	PHY1_MDI0+			0.5V
103	PHY1_MDI0-			0.5V
104	PHY1_MDI1+			0.5V
105	PHY1_MDI1-			0.5V
106	PHY1_MDI2+			0.5V
107	PHY1_MDI2-			0.5V
108	PHY1_MDI3+			0.5V
109	PHY1_MDI3-			0.5V
110	GND	Ground		0V
111	CIF_CLKOUT/PWM11 _IR_M1/GPIO4_C0_d		GPIO4_C0_d	1.8V
112	UART7_TX_M1	PDM_CLK1_M2/PWM14_ M0	GPIO3_C4_d	3.3V
113	UART7_RX_M1	SPDIFO_M1/PWM15_IR_ M0	GPIO3_C5_d	3.3V
114	LCDC_VSYNC/UART 5_TX_M1	SPI1_MISO_M1 /VOP_BT1120_D14	GPIO3_C2_d	3.3V
115	LCDC_HSYNC/PCIE2 0_PERSTn_M1	SPI1_MOSI_M1 /VOP_BT1120_D13	GPIO3_C1_d	3.3V
116	LCDC_DEN/UART5_ RX_M1	SPI1_CLK_M1 /VOP_BT1120_D15	GPIO3_C3_d	3.3V
117	RTC32KOUT_WIFI	32.768khz output(PU 10K)	Open Drain	3.3V
118	SPKP_OUT	1.3W@8Ohm Speaker output		1.8V
119	SPKN_OUT	1.3W@8Ohm Speaker output		1.8V
120	HPL_OUT	Headphone L-CH output		1.8V
121	HPR_OUT	Headphone R-CH output		1.8V
122	MIC1_INN	MIC1 P or MIC_L input		1.8V
123	MIC1_INP	MIC1 N or MIC_R input		1.8V
124	VRTC	RTC button Cell Power input		3.0V
125	LCDC_D23/UART3_R X_M1	PDM_SDI3_M2 /PWM13_M0	GPIO3_C0_d	3.3V
126	LCDC_D22/UART3_T X_M1	PDM_SDI2_M2 /PWM12_M0	GPIO3_C0_d	3.3V
127	LCDC_D21/PWM11_I R_M0	VOP_BT1120_D12	GPIO3_B6_d	3.3V
128	LCDC_D20/GPIO3_B	VOP_BT1120_D11/PWM10	GPIO3_B5_d	3.3V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
	5	_M0		
129	LCDC_D19/I2C5_SD A_M0	VOP_BT1120_D10/PDM_S D11_M2	GPIO3_B4_d	3.3V
130	LCDC_D18/I2C5_SCL _M0	VOP_BT1120_D9/PDM_SD I0_M2	GPIO3_B3_d	3.3V
131	LCDC_D17/UART4_T X_M1	VOP_BT1120_D8/PWM9_ M0	GPIO3_B2_d	3.3V
132	LCDC_D16/UART4_R X_M1	VOP_BT1120_D7/PWM8_ M0	GPIO3_B1_d	3.3V
133	LCDC_D15/GPIO3_B 0	VOP_BT1120_D6	GPIO3_B0_d	3.3V
134	LCDC_D14/GPIO3_A 7	VOP_BT1120_D5/SD2_DE T	GPIO3_A7_d	3.3V
135	LCDC_D13/I2S3_SDI _M0	VOP_BT1120_CLK /SDMMC2_CLK_M1	GPIO3_A6_d	3.3V
136	LCDC_D12/I2S3_SD O_M0	VOP_BT1120_D4 /SDMMC2_CMD_M1	GPIO3_A5_d	3.3V
137	LCDC_D11/I2S3_LRC K_M0	VOP_BT1120_D3 /SDMMC2_D3_M1	GPIO3_A4_d	3.3V
138	LCDC_D10/I2S3_SCL K_M0	VOP_BT1120_D2 /SDMMC2_D2_M1	GPIO3_A3_d	3.3V
139	LCDC_D9/I2S3_MCL K_M0	VOP_BT1120_D1 /SDMMC2_D1_M1	GPIO3_A2_d	3.3V
140	GND	Ground		0V
141	RK809_PWRON	Connect to Power Button		3.3V
142	VCC3V3_SYS	3.3V System Power Output (Need 3.3V input if used V1)	(Max out: 400mA)	3.3V
143	VCC_SYS	3.3-5V Main Power input		3.3-5V
144	VCC_SYS	3.3-5V Main Power input		3.3-5V
145	RESETn	Connect to Reset Button		3.3V
146	VCC_1V8	1.8V IO Power output	(Max out: 400mA)	1.8V
147	LCDC_D8/GPIO3_A1	VOP_BT1120_D0 /SPI1_CS0	GPIO3_A1_d	3.3V
148	LCDC_D7/SPI2_MIS O_M1/I2S1_SDO0_M 2/UART8_TX_M1	VOP_BT656_D7_M0	GPIO2_D7_d	3.3V
149	LCDC_D6/SPI2_MOS I_M1/I2S1_SDI3_M2	VOP_BT656_D6_M0 /PCIE30X2_PERSTn_M1	GPIO2_D6_d	3.3V
150	LCDC_D5/SPI2_CS0 _M1/I2S1_SDI2_M2	VOP_BT656_D5_M0 /PCIE30X2_WAKEn_M1	GPIO2_D5_d	3.3V
151	LCDC_D4/SPI0_CS1 _M1/I2S1_SDI1_M2	VOP_BT656_D4_M0 /PCIE30X2_CLKREQn_M1	GPIO2_D4_d	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
152	LCDC_D3/SPI0_CLK_M1/I2S1_SDI0_M2	VOP_BT656_D3_M0 /PCIE30X1_WAKEn_M1	GPIO2_D3_d	3.3V
153	LCDC_D2/SPI0_CS0_M1/I2S1_LRCKTx_M2	VOP_BT656_D2_M0 /PCIE30X1_CLKREQn_M1	GPIO2_D2_d	3.3V
154	LCDC_D1/SPI0_MOSI_M1/I2S1_SCLKTx_M2	VOP_BT656_D1_M0 /PCIE20_WAKEn_M1	GPIO2_D1_d	3.3V
155	LCDC_D0/SPI0_MISO_M1/I2S1_MCLK_M2	VOP_BT656_D0_M0 /PCIE20_CLKREQn_M1	GPIO2_D0_d	3.3V
156	SATA1_ACT_LED/UART9_TX_M1	SPI3_MISO_M1/I2S3_SDO_M1 /PWM12_M1	GPIO4_C5_d	3.3V
157	SATA0_ACT_LED/UART9_RX_M1	SPI3_CS0_M1/I2S3_SDI_M1 /PWM13_M1	GPIO4_C6_d	3.3V
158	CAN1_RX_M1 /PWM14_M1	SPI3_CLK_M1/I2S3_MCLK_M1/PCIE3X2_CLKREQn_M2	GPIO4_C2_d	3.3V
159	CAN1_TX_M1//PWM15_IR_M1	SPI3_MOSI_M1/I2S3_SCLK_M1/PCIE3X2_WAKEn_M2	GPIO4_C3_d	3.3V
160	LCDC_CLK/SPI2_CLK_M1/I2S1_SDO1_M2/UART8_RX_M1	VOP_BT656_CLK_M0	GPIO3_A0_d	3.3V
161	GND	Ground		0V
162	HDMITX_CEC_M0	SPI3_CS1_M1	GPIO4_D1_u	3.3V
163	HDMITX_SDA	I2C5_SDA_M1	GPIO4_D0_u	3.3V
164	HDMITX_SCL	I2C5_SCL_M1	GPIO4_C7_u	3.3V
165	SPDIF_TX_M2/SATA2_ACT_LED	I2S3_LRCK_M1/PCIE30X2_PERSTn_M2/EDP_HPD_M0	GPIO4_C4_d	3.3V
166	MIPI_CSI_RX_D3N	MIPI_CSI_RX1_D1N		0.5V
167	MIPI_CSI_RX_D3P	MIPI_CSI_RX1_D1P		0.5V
168	MIPI_CSI_RX_D2P	MIPI_CSI_RX1_D0P		0.5V
169	MIPI_CSI_RX_D2N	MIPI_CSI_RX1_D0N		0.5V
170	MIPI_CSI_RX_CLK1N	MIPI_CSI_RX1_CLKN		0.5V
171	MIPI_CSI_RX_CLK1P	MIPI_CSI_RX1_CLKP		0.5V
172	MIPI_CSI_RX_CLK0N			0.5V
173	MIPI_CSI_RX_CLK0P			0.5V
174	MIPI_CSI_RX_D1N			0.5V
175	MIPI_CSI_RX_D1P			0.5V
176	MIPI_CSI_RX_D0N			0.5V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
177	MIPI_CSI_RX_D0P			0.5V
178	MIPI_DSI_TX0_D3P/L VDS_TX0_D3P			0.5V
179	MIPI_DSI_TX0_D3N/L VDS_TX0_D3N			0.5V
180	MIPI_DSI_TX0_D2P/L VDS_TX0_D2P			0.5V
181	MIPI_DSI_TX0_D2N/L VDS_TX0_D2N			0.5V
182	MIPI_DSI_TX0_CLKP /LVDS_TX0_CLKP			0.5V
183	MIPI_DSI_TX0_CLKN /LVDS_TX0_CLKN			0.5V
184	MIPI_DSI_TX0_D1P/L VDS_TX0_D1P			0.5V
185	MIPI_DSI_TX0_D1N/L VDS_TX0_D1N			0.5V
186	MIPI_DSI_TX0_D0P/L VDS_TX0_D0P			0.5V
187	MIPI_DSI_TX0_D0N/L VDS_TX0_D0N			0.5V
188	LCD0_PWREN_H_G PIO0_C7	UART0_CTSn /PWM0_M1	GPIO0_C7_d	3.3V
189	REFCLK_OUT		GPIO0_A0_d	3.3V
190	GND	Ground		0V
191	MIPI_DSI_TX1_D3P			0.5V
192	MIPI_DSI_TX1_D3N			0.5V
193	MIPI_DSI_TX1_D2P			0.5V
194	MIPI_DSI_TX1_D2N			0.5V
195	MIPI_DSI_TX1_CLKP			0.5V
196	MIPI_DSI_TX1_CLKN			0.5V
197	MIPI_DSI_TX1_D1P			0.5V
198	MIPI_DSI_TX1_D1N			0.5V
199	MIPI_DSI_TX1_D0P			0.5V
200	MIPI_DSI_TX1_D0N			0.5V
201	HDMI_TXCLKN_POR T			0.5V
202	HDMI_TXCLKP_POR T			0.5V

Note:

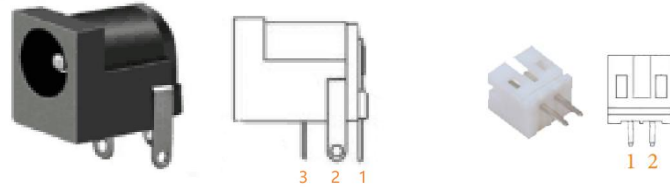
I2C3 can't be used for exclusive bus, Such as CTP.

RGMIIO(Pin27-43,Pin67-70) default is 1.8V IO, but can change to 3.3V.

2 Peripherals Introduction

2.1 Power (P1, CON2)

The DC JACK(P1) is 5.5 x 2.1mm, 3-pin plug Type. Typical 12V/3A DC adapter. Also provides 2-pin(CON2) connector for DC power input.

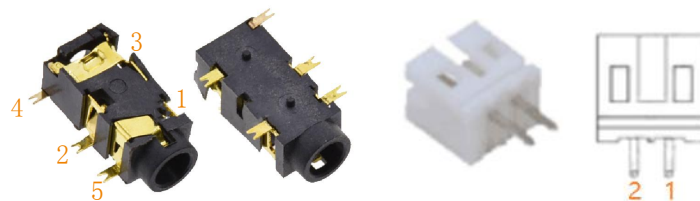


P1(DC JACK)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC12V_DCIN	Main power supply. DC 12V power in	2	GND	Ground
3	GND	Ground			
CON2(2-pin connector)					
Pin	Signal	Description	Pin	Signal	Description
1	VIN_12V	Main power supply. DC 12V power in	2	GND	Ground

2.2 Audio I/O

Headphone/Speaker(J2/CON8)

The EM3568 adopts RK809 built-in high performance audio codec to provide audio output /input. Input and output through headphones, as well as Speaker output.



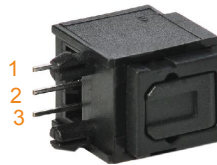
Feature

- One internal PLL
- Support microphone input
- Support I2S as the digital signal interface for both DAC and ADC
- Support Automatic Level Control(ALC),limiter and noise gating
- Support programmable digital and analog gains
- Audio resolution from 16bits to 32bits
- Sample rate up to 192KHz
- Provides master and slave work mode, software configurable
- Support 3 I2S formats (normal, left-justified, right-justified)
- Support PDM mode(external input PCLK)

J2(Headphone)					
Pin	Signal	Description	Pin	Signal	Description
1	AGND	Ground	2	HPR_OUT	Headphone amplifier output _Right channel
3	HPL_OUT	Headphone amplifier output _Left channel	4	GPIO4_C4_d(HP_DET)	Headphone Detect
5	HEARD_MIC	Single-end input for microphone			
CON8(Speaker,2-pin connector)					
Pin	Signal	Description	Pin	Signal	Description
1	SPKN_OUT	Speaker -	2	SPKP_OUT	Speaker +

SPDIF-OUT (DJ1)

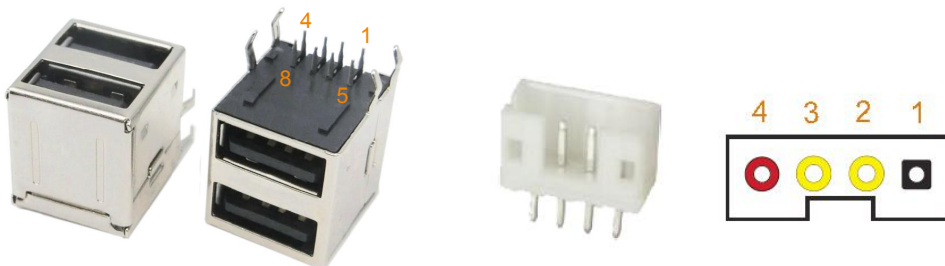
The Optical Adaptor DLT1120 is used for S/PDIF data output.



Pin	Signal	Description	Pin	Signal	Description
1	PDM_CLK1_M0_ ADC/SPDIF_TX_M0	SPDIF signal	2	VCC_3V3	3.3V power supply
3	GND	Ground			

2.3 USB HOST (P6, J11)

EM3568 provides 3x USB2.0 - one dual-USB (P6) and 4-pin connector (J11). The 4-ch USB HOST interfaces are extended by GL850G which is a fully compliant with the USB 2.0 hub specification and is designed to work with USB host as a high-speed hub. It is used to connect USB mouse, U disk, USB camera, and other USB devices. Support hot-plug.



Feature

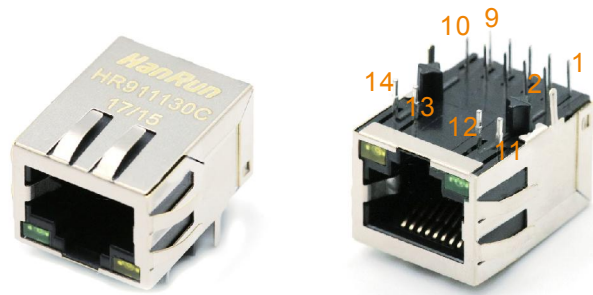
- Supports high-speed (480Mbps), full-speed (12Mbps) and low-speed (1.5Mbps) mode
- Supports automatic switching between bus-powered and self-powered modes
- Compatible with USB 2.0 specification
- Support Enhanced Host and Open Host Controller Interface Specification

P6 (dual-USB)

Pin	Signal	Description	Pin	Signal	Description
1	USB_5V	USB Power. DC 5V	2	HUB_USB_DM3	USB data-
3	HUB_USB_DP3	USB Data+	4	GND	Ground
5	USB_5V	USB Power. DC 5V	6	HUB_USB_DM2	USB data-
7	HUB_USB_DP2	USB Data+	8	GND	Ground
J11 (4-pin connector)					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	HUB_USB_DP1	USB data-
3	HUB_USB_DM1	USB Data+	4	VDD_5V	5V power supply

2.4 Ethernet (JP1/JP2)

EM3568 provides two Gigabit Ethernet Interface, adopts Realtek RTL8211F-CG as the Ethernet chip. RJ45 connector.



Feature

- Supports 10/100/1000-Mbps data transfer rates with the RMII/RGMII interfaces
- Supports both full-duplex and half-duplex operation
- Implements the full 802.3 specification

Ethernet0 (JP1)					
Pin	Signal	Description	Pin	Signal	Description
1	COM	Common	2	PHY1_MDI0+	Bi-directional transmit/receive pair 0
3	PHY1_MDI0-	Bi-directional transmit/receive pair 0	4	PHY1_MDI1+	Bi-directional transmit/receive pair 1
5	PHY1_MDI2+	Bi-directional transmit/receive pair2	6	PHY1_MDI2-	Bi-directional transmit/receive pair2
7	PHY1_MDI1-	Bi-directional transmit/receive pair 1	8	PHY1_MDI3+	Bi-directional transmit/receive pair 3
9	PHY1_MDI3-	Bi-directional transmit/receive pair 3	10	GND	Ground
11	VCC_3V3	3.3V power supply	12	LINK1	Detect link
13	GND	Ground	14	SPEED1	Detect speed
15	GND	Ground	16	GND	Ground
Ethernet1 (JP2)					
Pin	Signal	Description	Pin	Signal	Description

1	COM	Common	2	PHY0_MDI0+	Bi-directional transmit/receive pair 0
3	PHY0_MDI0-	Bi-directional transmit/receive pair 0	4	PHY0_MDI1+	Bi-directional transmit/receive pair 1
5	PHY0_MDI2+	Bi-directional transmit/receive pair2	6	PHY0_MDI2-	Bi-directional transmit/receive pair2
7	PHY0_MDI1-	Bi-directional transmit/receive pair 1	8	PHY0_MDI3+	Bi-directional transmit/receive pair 3
9	PHY0_MDI3-	Bi-directional transmit/receive pair 3	10	GND	Ground
11	VCC_3V3	3.3V power supply	12	LINK0	Detect link
13	GND	Ground	14	SPEED0	Detect speed
15	GND	Ground	16	GND	Ground

2.5 USB3.0 (J25)



Feature

- The maximum transmission rate can reach 5Gbps
- Super-Speed

Pin	Signal	Description	Pin	Signal	Description
1	VCC5V0_USB_H OST1	USB Power. DC 5V	2	USB3_HOST1DM	USB data-
3	USB3_HOST1DP	USB Data+	4	GND	Ground
5	USB3_HOST1SS RXN	USB SSRX Data-	6	USB3_HOST1SSR XP	USB SSRX Data+
7	GND	Ground	8	USB3_HOST1SST XN	USB SSTX Data-
9	USB3_HOST1SST XP	USB SSTX Data+			

2.6 HDMI OUT (J7)

EM3568 supports HDMI 2.0 transmitter with HDCP 1.4/2.2, up to 4K@60fps.



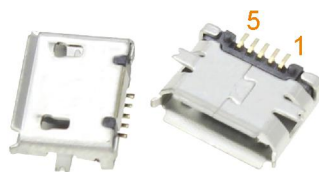
Feature

- Up to 10-bit Deep Color modes
- Up to 1080p at 120Hz and 4kx2k at 60Hz HDTV display resolutions and up to QXGA graphic display resolutions
- 3-D video formats

Pin	Signal	Description	Pin	Signal	Description
1	HDMI_TX2P_PORT	HDMI data 2 pair	2	GND	Ground
3	HDMI_TX2N_PORT		4	HDMI_TX1P_PORT	HDMI data 1 pair
5	GND	Ground	6	HDMI_TX1N_PORT	
7	HDMI_TX0P_PORT	HDMI data 0 pair	8	GND	Ground
9	HDMI_TX0N_PORT		10	HDMI_TXCLKP_PORT	HDMI clock pair
11	GND	Ground	12	HDMI_TXCLKN_PORT	
13	HDMI_TX_CEC_PORT	Consumer electronics control	14	NC	Not connect
15	HDMI_TXDDC_SCL_PORT	HDMI serial clock	16	HDMI_TXDDC_SDA_PORT	HDMI serial data
17	GND	Ground	18	VCC5V_HDMI_TX	5V power supply
19	HDMI_TX_HPD_PORT	Hot Plug Detect			

2.7 USB OTG (J16)

EM3568 OTG is a Micro USB2.0 port, it is used to download image and ADB transfer file.



Feature

- Compatible with USB OTG2.0 specification
- Supports USB 2.0 High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) operation in host mode
- Supports USB 2.0 High Speed (480 Mbps) and Full Speed (12 Mbps) operation in peripheral mode.
- Hardware support for OTG signaling, session request protocol, and host negotiation protocol.

Pin	Signal	Description	Pin	Signal	Description
1	VCC5V0_USB_OTG0	USB OTG Power	2	USB3_OTG0DM	USB OTG0 data -

3	USB3_OTG0DP	USB OTG0 data+	4	USB3_OTG0ID	USB OTG0 ID indicator
5	GND	Ground			

2.8 4G Module (J5, P2)

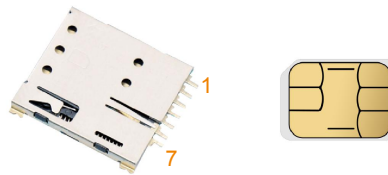
EM3568 adopts the standard PCI Express® MiniCard form factor (MiniPCle) and provides global network coverage on the connectivity of 4G. It delivers 50Mbps-up and 100Mbps-down data rates on 4G FDD networks and can also be fully backward compatible with existing UMTS and GSM/GPRS networks.



J5(MiniPCle)					
Pin	Signal	Description	Pin	Signal	Description
1	PDM_SDI2_M0_A DC/PCIE20_WAK En_M2	WAKE#	2	VCC3V3_MINIPC IE	3.3V power supply
3	NC	Not connect	4	GND	Ground
5	NC	Not connect	6	NC	Not connect
7	PDM_SDI3_M0_A DC/PCIE20_CLKR EQn_M2	CLKPEQ#	8	SIM_VCC	SIM power
9	GND	Ground	10	SIM_DATA	SIM data
11	PCIE20_REFCLK N	REFCLK-	12	SIM_CLK	SIM Clock
13	PCIE20_REFCLK P	REFCLK+	14	SIM_RST	SIM Reset
15	GND	Ground	16	NC	Not connect
17	NC	Not connect	18	GND	Ground
19	NC	Not connect	20	VCC3V3_MINIPC IE	3.3V power supply
21	GND	Ground	22	MINIPCIE20_PE RSTn	PDM_SDI1_M0_A DC/PCIE20_PER STn_M2
23	PCIE20_RXN	PERn0	24	VCC3V3_MINIPC IE	3.3V power supply
25	PCIE20_RXP	PERp0	26	GND	Ground
27	GND	Ground	28	NC	Not connect

29	GND	Ground	30	NC	Not connect
31	MINIPCIE20_TX_N	PETn0	32	NC	Not connect
33	MINIPCIE20_TX_P	PETp0	34	GND	Ground
35	GND	Ground	36	MINIPCIE_USB_DM	Host data DN
37	GND	Ground	38	MINIPCIE_USB_DP	Host data DP
39	VCC3V3_MINIPCI E	3.3V power supply	40	GND	Ground
41	VCC3V3_MINIPCI E	3.3V power supply	42	LED1	LED
43	GND	Ground	44	LED2	LED
45	NC	Not connect	46	NC	Not connect
47	NC	Not connect	48	NC	Not connect
49	NC	Not connect	50	GND	Ground
51	NC	Not connect	52	VCC3V3_MINIPCI E	3.3V power supply

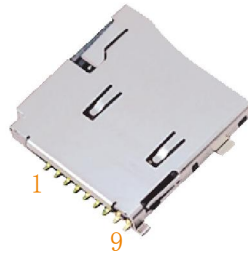
P2 is an auto pop-up SIM card slot which is compatible to the standard SIM Card and can be used for wireless transmission with a 3G/4G module.



P2(SIM Card slot)					
Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	Clock	2	SIM_DATA	send/receiver data I/O control
3	SIM_RST	Reset	4	SIM_VCC	SIM power supply
5	SIM_VCC	SIM power supply	6	GND	Ground
7	NC	Not connect			

2.9 Micro SD (J7)

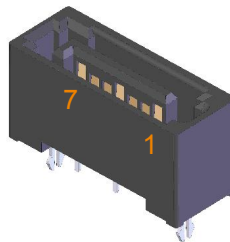
The Micro SD card is used as an external storage device. The MMC controller interface supports up to 4-bit transfer modes. MMC is always accessible through the carrier board interface.



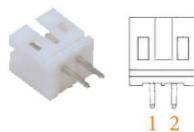
Pin	Signal	Description	Pin	Signal	Description
1	SDMMC0_D2	SD/MMC data2	2	SDMMC0_D3	SD/MMC data3
3	SDMMC0_CMD	SD/MMC command signal	4	VCC_3V3	3.3V power supply
5	SDMMC0_CLK	SD/MMC clock	6	GND	Ground
7	SDMMC0_D0	SD/MMC data0	8	SDMMC0_D1	SD/MMC data1
9	SDMMC0_DET_L	SD/MMC detect signal			

2.10 SATA 3.0(J26/J3)

EM3568 provides two on-board 7-pin SATA Interface. It requires 5V power supply.



J26(SATA2)					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	SATA2TXP	PCIE20_TXP
3	SATA2TXN	PCIE20_TXN	4	GND	Ground
5	SATA2RXN	PCIE20_RXN	6	SATA2RXP	PCIE20_RXP
7	GND	Ground			
J3(SATA0)					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	SATA0TXP	SATA0TX+
3	SATA0TXN	SATA0TX-	4	GND	Ground
5	SATA0RXN	SATA0RX-	6	SATA0RXP	SATA0RX+
7	GND	Ground			

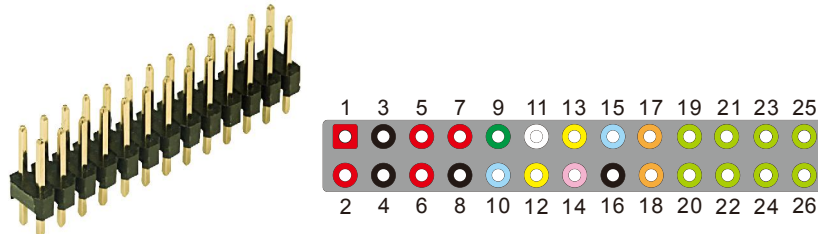


CON3(SATA_Power,2-pin connector)					
Pin	Signal	Description	Pin	Signal	Description

1	SATA_5V	SATA power. DC 5V	2	GND	Ground
---	---------	-------------------	---	-----	--------

J26(SATA2) and J5(MiniPCIe) function multiplexing, J5(MiniPCIe) is supported by default. EM3568 support J3(SATA0).

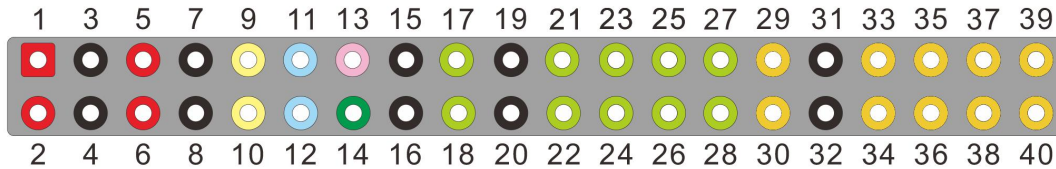
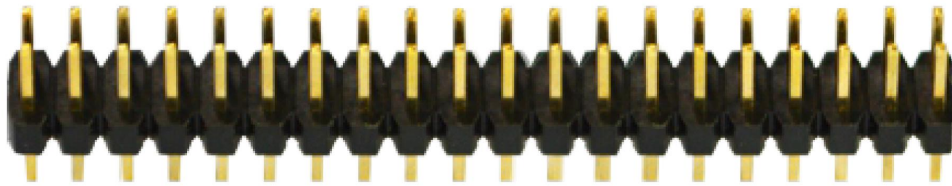
2.11 EDP(CON5)



Pin	Signal	Description	Pin	Signal	Description
1	VIN_12V	DC 12V	2	VIN_12V	DC 12V
3	GND	Ground	4	GND	Ground
5	VCC_3V3	DC 3.3V	6	VCC_3V3	DC 3.3V
7	VCC_1V8	DC 1.8V	8	GND	Ground
9	LCD1_BL_PWM5	LCD Backlight PWM output	10	LCD_EN	LCD Power enable
11	NC	Not connect	12	I2C1_SCL/CAN0_TX_M0	I2C clock line
13	I2C1_SDA/CAN0_RX_M0	I2C data line	14	TP_RST_L_GPIO0_B6	Touch screen reset
15	TP_INT_L_GPIO0_B5	Touch screen Interrupt	16	GND	Ground
17	EDP_TX_AUXN	eDP CH-AUX negative differential output	18	EDP_TX_AUXP	eDP CH-AUX positive differential output
19	EDP_TX_D0N	eDP data lane negative output	20	EDP_TX_D0P	DP data lane positive output
21	EDP_TX_D1N	eDP data lane negative output	22	EDP_TX_D1P	DP data lane positive output
23	EDP_TX_D2N	eDP data lane negative output	24	EDP_TX_D2P	DP data lane positive output
25	EDP_TX_D3N	eDP data lane negative output	26	EDP_TX_D3P	DP data lane positive output

2.12 MIPI_DSI_TX0&LVDS (CON6)

EM3568 supports 10.1-inch HD capacitive LCD, up to 1280 x 800 resolution.

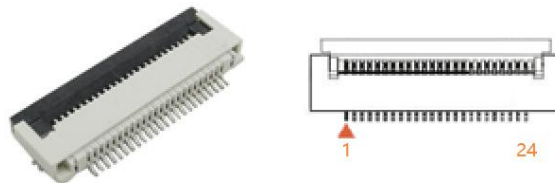


Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	VDD_5V	5V power supply
3	GND	Ground	4	GND	Ground
5	VCC_3V3	3.3V power supply	6	VCC_3V3	3.3V power supply
7	GND	Ground	8	GND	Ground
9	I2C1_SCL/CAN0_TX_M0	TP I2C serial clock line	10	I2C1_SDA/CAN0_RX_M0	TP I2C data line
11	TP_RST_L_GPI_O0_B6	Touch screen reset	12	TP_INT_L_GPI_O0_B5	Touch screen Interrupt
13	UART0_TX/GPI_O0_C1	LCD Power enable	14	LCD0_BL_PWM4	LCD Backlight PWM output
15	GND	Ground	16	GND	GND
17	MIPI_DSI_TX1_CLKP	MIPI CH-AUX positive differential output	18	MIPI_DSI_TX1_CLKN	MIPI CH-AUX negative differential output
19	GND	Ground	20	GND	Ground
21	MIPI_DSI_TX1_D3P	MIPI/LVDS data lane positive output	22	MIPI_DSI_TX1_D3N	MIPI/LVDS data lane negative output
23	MIPI_DSI_TX1_D2P	MIPI data lane positive output	24	MIPI_DSI_TX1_D2N	MIPI data lane negative output
25	MIPI_DSI_TX1_D1P	MIPI data lane positive output	26	MIPI_DSI_TX1_D1N	MIPI data lane negative output
27	MIPI_DSI_TX1_D0P	MIPI data lane positive output	28	MIPI_DSI_TX1_D0N	MIPI data lane negative output
29	MIPI_DSI_TX0_CLKP/LVDS_TX0_CLKP	MIPI/LVDS clock positive	30	MIPI_DSI_TX0_CLKN/LVDS_TX0_CLKN	MIPI/LVDS clock negative
31	GND	Ground	32	GND	Ground
33	MIPI_DSI_TX0_D3P/LVDS_TX0_D3P	MIPI/LVDS data lane positive output	34	MIPI_DSI_TX0_D3N/LVDS_TX0_D3N	MIPI/LVDS data lane negative output

Pin	Signal	Description	Pin	Signal	Description
35	MIPI_DSI_TX0_D2P/LVDS_TX0_D2P	MIPI/LVDS data lane positive output	36	MIPI_DSI_TX0_D2N/LVDS_TX0_D2N	MIPI/LVDS data lane negative output
37	MIPI_DSI_TX0_D1P/LVDS_TX0_D1P	MIPI/LVDS data lane positive output	38	MIPI_DSI_TX0_D1N/LVDS_TX0_D1N	MIPI/LVDS data lane negative output
39	MIPI_DSI_TX0_D0P/LVDS_TX0_D0P	MIPI/LVDS data lane positive output	40	MIPI_DSI_TX0_D0N/LVDS_TX0_D0N	MIPI/LVDS data lane negative output

2.13 MIPI Camera (J1, J2)

The EM3568 provides two 26-pin MIPI connectors, both using the OV13850 camera, which can be set up as front camera and back camera respectively.



Features

- Support 4 data lane, providing up to 2.5Gbps data rate
- Support 13.2MP at 30 fps output

J1					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	GND	Ground
3	NC	Not connect	4	CAM0_AF_2V8	AF 2.8V power supply
5	I2C2_SDA_M1	I2C data line	6	I2C2_SCL_M1	I2C clock line
7	NC	Not connect	8	CAM0_AVDD2.8V	DVP 2.8V power supply
9	CAM0_RESET	Camera reset	10	CAM0_PWDN	VCC_1V8
11	GND	Ground	12	MIPI_CSI_RX_D1P	MIPI CSI positive differential data line transceiver output
13	MIPI_CSI_RX_D1N	MIPI CSI negative differential data line transceiver output	14	GND	Ground
15	MIPI_CSI_RX_D0P	MIPI CSI positive differential data line transceiver output	16	MIPI_CSI_RX_D0N	MIPI CSI negative differential data line transceiver output
17	GND	Ground	18	MIPI_CSI_RX_CLK0P	MIPI CSI positive differential clock line transceiver output
19	MIPI_CSI_RX_C	MIPI CSI negative	20	GND	Ground

	LK0N	differential clock line transceiver output			
21	CAM0_DVDD1.2 V	VDD 1.2V	22	CAM0_DOVDD 1.8V	VDD 1.8V
23	GND	Ground	24	CIF_CLKOUT/ PWM11_IR_M1 /GPIO4_C0_d	MIPI clock
J2					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	GND	Ground
3	NC	Not connect	4	CAM1_AF_2V8	AF 2.8V power supply
5	I2C4_SDA_M0	I2C data line	6	I2C4_SCL_M0	I2C clock line
7	NC	Not connect	8	CAM1_AVDD2. 8V	DVP 2.8V power supply
9	CAM1_RESET	Camera reset	10	CAM1_PWDN	VCC_1V8
11	GND	Ground	12	MIPI_CSI_RX_ D3P	MIPI CSI positive differential data line transceiver output
13	MIPI_CSI_RX_D 3N	MIPI CSI negative differential data line transceiver output	14	GND	Ground
15	MIPI_CSI_RX_D 2P	MIPI CSI positive differential data line transceiver output	16	MIPI_CSI_RX_ D2N	MIPI CSI negative differential data line transceiver output
17	GND	Ground	18	MIPI_CSI_RX_ CLK1P	MIPI CSI positive differential clock line transceiver output
19	MIPI_CSI_RX_C LK1N	MIPI CSI negative differential clock line transceiver output	20	GND	Ground
21	CAM1_DVDD1.2 V	VDD 1.2V	22	CAM1_DOVDD 1.8V	VDD 1.8V
23	GND	Ground	24	CIF_CLKOUT/ PWM11_IR_M1 /GPIO4_C0_d	MIPI clock

2.14 SPI (CON10, CON11)

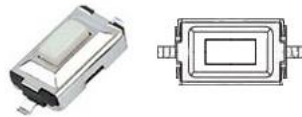


Features

- Motorola SPI protocol is used by default
- Supports 8-bit and 16-bit
- Software programmable clock frequency and transfer rate up to 50MHz
- Support 4 transfer mode configurations of SPI
- One or two chips selects per SPI controller
- Support both slave and master mode

CON10					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	GND	Ground
3	LCDC_D7/SPI2_MISO_M1/I2S1_SDO0_M2/UART8_TX_M1	Master device data input, slave device data output	4	LCDC_D6/SPI2_MOSI_M1/I2S1_SDI3_M2	master device data output, slave device data input
5	LCDC_D5/SPI2_CS0_M1/I2S1_SDI2_M2	Signal selection from the device, controlled by the master device	6	LCDC_CLK/SPI2_CLK_M1/I2S1_SDO1_M2/UART8_RX_M1	clock signal sent by the master device
CON11					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	GND	Ground
3	LCDC_D0/SPI0_MISO_M1	Master device data input, slave device data output	4	LCDC_D1/SPI0_MOSI_M1	master device data output, slave device data input
5	LCDC_D2/SPI0_CS0_M1	Signal selection from the device, controlled by the master device	6	LCDC_D3/SPI0_CLK_M1	clock signal sent by the master device

2.15 Button (SW1,SW2,SW3)



Features

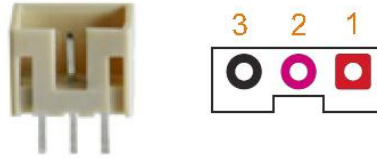
- The SW1(recovery key) is used for download combined with OTG
- Short press SW2(power key) is sleep/wake up and long press is shutdown/power on
- Short press the SW3(reset key) is reboot

Pin	Signal	Description	Pin	Signal	Description
SW1	SARADC_VIN0_KEY/RECOVERY	RECOVERY button	SW2	RK809_PWRON	POWER button

SW3	RESETn	RESET button	
-----	--------	--------------	--

2.16 UART (J6, J13, J14, J15)

The J6 is 3-pin connector. The debug serial port baud rate is 1500000.



Features

- UART2 with 2 wires for debug tools
- Embedded two 64byte FIFO
- Support auto flow control mode for UART0/UART1/UART3/UART4/UART5

J6(Debug)					
Pin	Signal	Description	Pin	Signal	Description
1	UART2_RX_M0_DEBUG	Serial data input	2	UART2_TX_M0_DEBUG	Serial data output
3	GND	Ground			

The J13, J14, J15 are TTL232 serial ports.



J13(UART4)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	LCDC_D16/UART4_RX_M1	Receive Data
3	LCDC_D17/UART4_TX_M1	Transmit Data	4	GND	Ground
J14 (UART5)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	LCDC_DEN/UART5_RX_M1	Receive Data
3	LCDC_VSYNC/UART5_TX_M1	Transmit Data	4	GND	Ground
J15(UART3)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	LCDC_D23/UART3_RX_M1	Receive Data
3	LCDC_D22/UART	Transmit Data	4	GND	Ground

3_TX_M1				
---------	--	--	--	--

2.17 KEY CON (CON4)

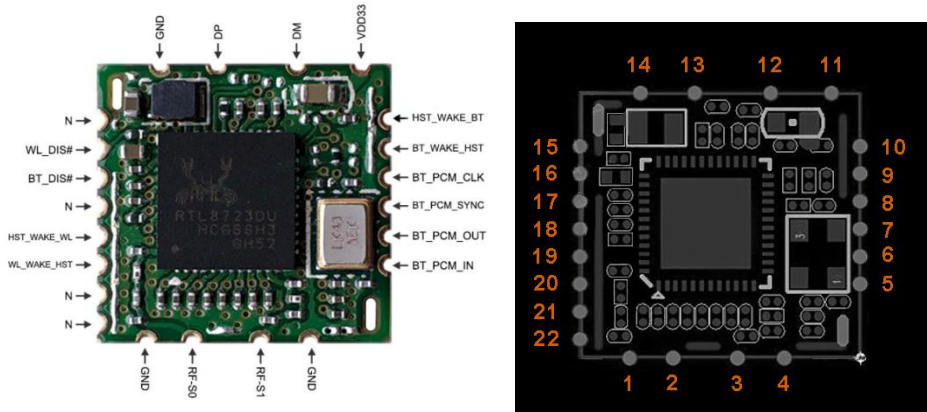
The CON4 pin3, pin4 and pin5 are separately connected to the power button, reset button and recovery button. The pin6 is IR_IN, supports IR data receiver.



Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	GND	Ground
3	RK809_PWRON	POWER	4	RESETn	RESET
5	SARADC_VIN0 _KEY/RECOVER RY	RECOVERY	6	PWM3_IR	IR_IN

2.18 WiFi&Bluetooth (U15)

The Realtek RTL8723DU is a low-power consumption module which has incorporated Wi-Fi and Bluetooth into one chip. The integrated module provides USB2.0 interface for WiFi and Bluetooth.



Feature

- 802.11b/g/n 1T1R WLAN and Bluetooth single chip
- USB Multi-Function for both BT (USB function 0) and WLAN (USB function 1)
- RTL8723DU with shared antenna between WLAN and Bluetooth

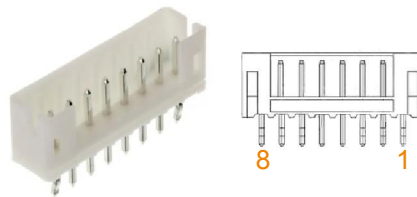
RTL8723DU Module Specifications

Standard	WiFi: IEEE 802.11b/g/n BT: V2.1 and V4.2
Host Interface	USB2.0
Frequency Range	2.4GHz
Channel frequency	2412-2484MHz

Dimension	12.9x12.2x1.6mm
Working Temp.	0°C to +70°C
Power supply	DC 3.3V (±0.2V)

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	RF	RF I/O (Connect to IPEX)
3	NC	Not connect	4	GND	Ground
5	I2S3_SDO_M0	BT_PCM_IN	6	I2S3_SDI_M0	BT_PCM_OUT
7	I2S3_LRCK_M0	BT_PCM_SYNC	8	I2S3_SCLK_M0	BT_PCM_CLK
9	NC	Not connect	10	NC	Not connect
11	VCC_3V3	3.3V power supply	12	HUB_USB_DM4	HSDM
13	HUB_USB_DP4	HSDP	14	GND	Ground
15	NC	Not connect	16	NC	Not connect
17	NC	Not connect	18	NC	Not connect
19	NC	Not connect	20	NC	Not connect

2.19 GPIO(CON9)



Pin	Signal	Description	Pin	Signal	Description
1	VCC_3V3	3.3V power supply	2	GND	Ground
3	LCDC_D18/I2C5_SCL_M0	I2C5 clock line	4	LCDC_D19/I2C5_SDA_M0	I2C5 data line
5	LCDC_D8/GPIO3_A1	GPIO3_A1	6	LCDC_D20/GPIO3_B5	GPIO3_B5
7	LCDC_D14/GPIO3_A7	GPIO3_A7	8	LCDC_D15/GPIO3_B0	GPIO3_B0

2.20 RS485 (P3)

SN75176B Differential bus transceiver.



Feature

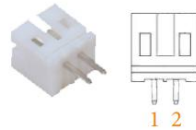
- Bidirectional Transceivers

- The maximum data transmission rate of RS-485 is 10Mbps
- 50mV Type Receiver Input Hysteresis

Pin	Signal	Description	Pin	Signal	Description
1	RS485_A	RS-485 Data Line	2	RS485_B	RS-485 Data Line
3	GND	Ground			

2.21 CAN (P4)

MCP2551 transceiver.



Feature

- Supports 1 Mb/s operation
- Low current standby operation
- Suitable for 12V and 24V systems
- High noise immunity due to differential bus implementation

Pin	Signal	Description	Pin	Signal	Description
1	CANL	CAN Low-Level Voltage I/O	2	CANH	CAN High-Level Voltage I/O

2.22 RTC (J4)

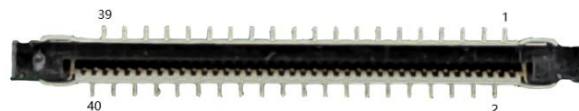
The backup battery (3V) is used to ensure the RTC is still able to work after power off. Lithium cell model: CR1220.



Pin	Signal	Description	Pin	Signal	Description
1	VRTC	3V battery	2	GND	Ground

2.23 LCD(J9)

The J9 is used to connect TTL LCD.



Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	VDD_5V	5V power supply
3	LCDC_D0/SPI0_	LCD Data Bit	4	LCDC_D1/SPI0	LCD Data Bit

	MISO_M1			_MOSI_M1	
5	LCDC_D2/SPI0_CS0_M1	LCD Data Bit	6	LCDC_D3/SPI0_CLK_M1	LCD Data Bit
7	LCDC_D4/SPI0_CS1_M1	LCD Data Bit	8	LCDC_D5/SPI2_CS0_M1/I2S1_SDI2_M2	LCD Data Bit
9	LCDC_D6/SPI2_MOSI_M1/I2S1_SDI3_M2	LCD Data Bit	10	LCDC_D7/SPI2_MISO_M1/I2S1_SDO0_M2/UART8_TX_M1	LCD Data Bit
11	GND	Ground	12	LCDC_D8/GPIO3_A1	Ground
13	LCDC_D9/I2S3_MCLK_M0	LCD Data Bit	14	LCDC_D10/I2S3_SCLK_M0	LCD Data Bit
15	LCDC_D11/I2S3_LRCK_M0	LCD Data Bit	16	LCDC_D12/I2S3_SDO_M0	LCD Data Bit
17	LCDC_D13/I2S3_SDI_M0	LCD Data Bit	18	LCDC_D14/GPIO3_A7	LCD Data Bit
19	LCDC_D15/GPIO3_B0	LCD Data Bit	20	GND	Ground
21	LCDC_D16/UART4_RX_M1	LCD Data Bit	22	LCDC_D17/UART4_TX_M1	LCD Data Bit
23	LCDC_D18/I2C5_SCL_M0	LCD Data Bit	24	LCDC_D19/I2C5_SDA_M0	LCD Data Bit
25	LCDC_D20/GPIO3_B5	LCD Data Bit	26	LCDC_D21/PWM11_IR_M0	LCD Data Bit
27	LCDC_D22/UART3_TX_M1	LCD Data Bit	28	LCDC_D23/UART3_RX_M1	LCD Data Bit
29	GND	Ground	30	TP_RST_L_GPIO0_B6	Touch screen reset
31	GND	Ground	32	GND	Ground
33	LCDC_DEN/UART5_RX_M1	LCD Data Enable	34	LCDC_VSYNC/UART5_TX_M1	LCD Vertical Sync
35	LCDC_HSYNC/PIC1E20_PERSTn_M1	LCD Horizontal Sync	36	LCDC_CLK/SPI2_CLK_M1/I2S1_SDO1_M2/UART8_RX_M1	LCD Clock Signal
37	NC	Not connect	38	TP_INT_L_GPIO0_B5	Touch screen Interrupt
39	I2C1_SCL/CAN0_TX_M0	I2C1 Clock	40	I2C1_SDA/CAN0_RX_M0	I2C1 Data

3 Product Configurations

3.1 Standard Contents

NO.	Item	Qty. (PCS)	Description
1	EM3568 board	1	Standard Content (2GB RAM, 8GB eMMC)
2	TF card / CD-ROM	1	Android/Debian BSP, Documents, tools, Schematic Drawing, datasheets
3	Ethernet cable	1	1.5m Crossover cable
4	Serial Cable	1	CP2102
5	USB Cable	1	USB OTG
6	Power adaptor	1	12V/3A DC
7	Antenna	1	WIFI&Bluetooth antenna

3.2 Optional Parts

- MIPI camera Module (OV13850)
- LCD Module (10.1-inch MIPI panel or 10.1-inch LVDS panel)
- 4G Module(EC20)
- Sata