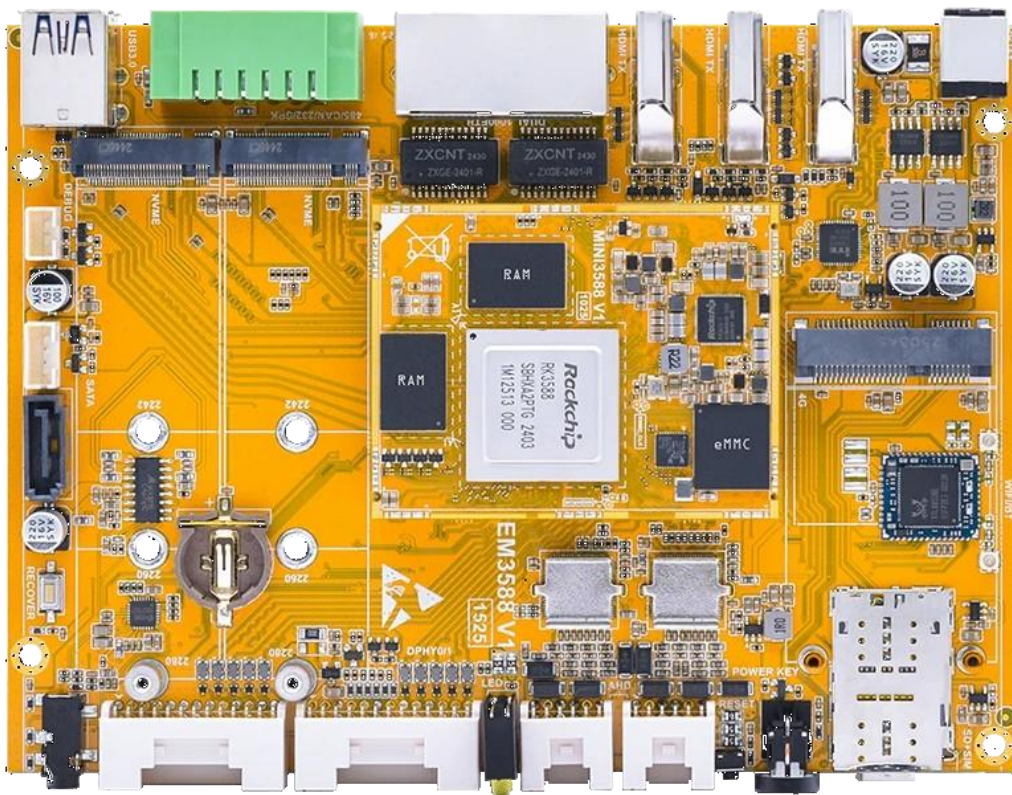


V1.202508



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 do not 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 lightning 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 made 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 EM3588 Introduction	1
1.1 Summary	1
1.2 Rockchip RK3588 Features	1
1.3 EM3588 Specifications	2
1.4 PCB Dimension	4
1.5 Block Diagram	5
1.6 CPU Introduction	5
2 Peripherals Introduction	12
2.1 Power in(P1)	12
2.2 Headset(J9)	12
2.3 MIPI DSI(CON3,CON4)	13
2.4 HDMI(J12, J13, J14)	14
2.5 Type-C(J7)	16
2.6 USB 3.0(J8)	18
2.7 Ethernet(JP1)	19
2.9 User Buttons (SW1, K1,K2)	20
2.10 WiFi&Bluetooth(U24)	20
2.11 4G(J10)	22
2.12 NANO_SIM+TF(J11)	23
2.13 SATA(J5, J4)	24
2.14 SSD(J15, J16)	25
2.15 RTC(J3)	27
2.16 Camera(J17, J18)	28
2.17 debug(J6)	28
2.18 RS485/CAN/RS232/SPK (U9)	29
3 Product Configurations	30



3.1 Standard Contents	30
3.2 Optional Parts	30

1 EM3588 Introduction

1.1 Summary

The EM3588 adopts the Rockchip RK3588 SoC, which integrates a quad-core Cortex-A76 processor and a quad-core Cortex-A55 processor. The SoC also features a dedicated NPU with computing power up to 6 TOPS, enabling efficient AI processing for various AI scenarios. It supports 8K video decoding and 4K video encoding, providing ultra-high-definition rendering and superior image processing capabilities. The RK3588 also offers powerful network communication functions, including support for 4G, 2.4G/5G Wi-Fi, Bluetooth 5.2 and two Gigabit Ethernet. The EM3588 is equipped with a variety of interfaces, such as HDMI OUT, DP, MIPI_LCD, making it ideal for edge computing, intelligent vision systems, industrial control, and other embedded AI applications.

EM3588 is implemented with a MINI3588 computer-on-module providing most of the functions and interfaces, and EM3588 carrier board providing connectors and several additional functions. The rich feature set of EM3588 is customizable according to the price / performance needs of the target application. EM3588 contains expansion connectors which accommodate a wide range of standard peripheral devices. EM3588 is provided with full ready-to-run Android 14, Debian 12, Buildroot SW packages and comprehensive user manual and designing guide.

1.2 Rockchip RK3588 Features

- **Microprocessor**

- Quad-core Cortex-A76 up to 2.4G. Each Cortex-A76 is equipped with 64KB L1 instruction cache, 64KB L1 data cache and 512KB L2 cache.

- Quad-core Cortex-A55 up to 1.8G. Each Cortex-A55 is equipped with 32KB L1 instruction cache, 32KB L1 data cache and 128KB L2 cache.

- Quad-core Cortex-A76 and Quad-core Cortex-A55 share 3MB L3 cache.

- **Memory Organization**

- 8GB LPDDR4X (up to 16GB).

- **PWM**

- Supports 16 on-chip PWMs with interrupt-based operation.

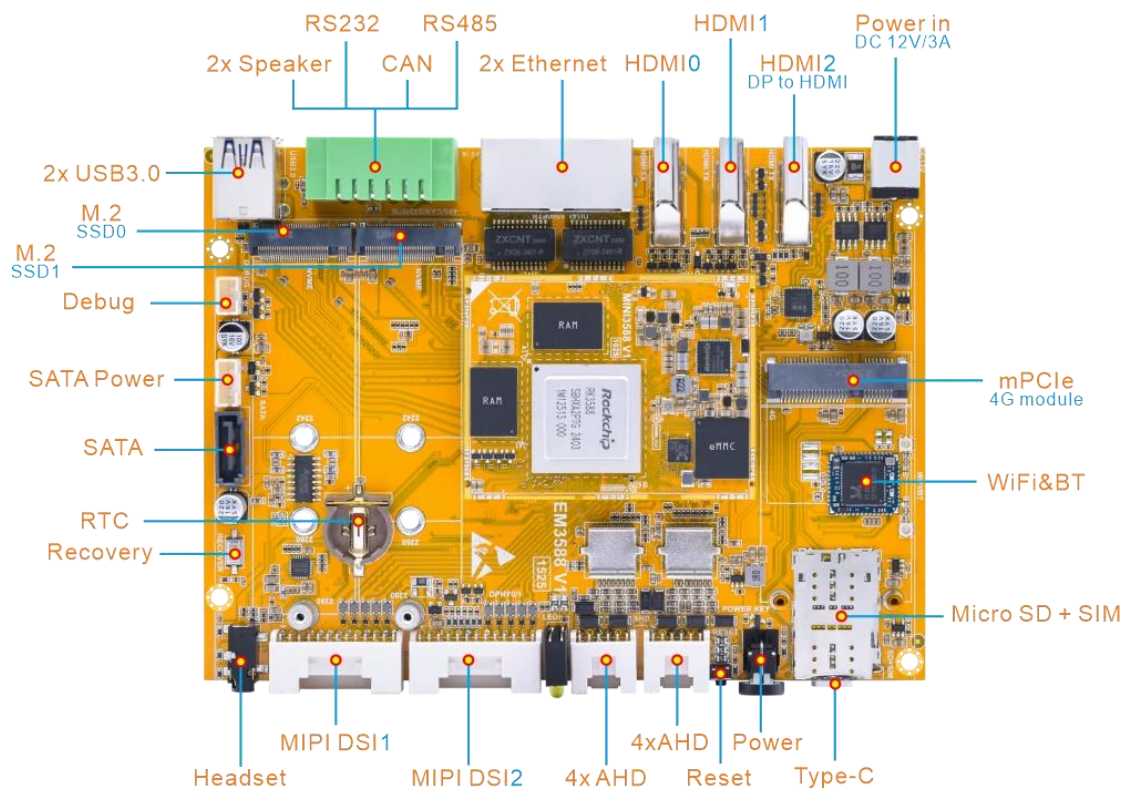
- Support capture mode.

- Support continuous mode and one-shot output mode.

- **Watchdog**

- Totally five Watchdog for CPU and MCU.
- 32-bit watchdog counter.
- **Interrupt Controller**
 - Support 12PPI interrupt source and 480 SPI interrupt sources input from different components inside RK3588.
 - Support 16 software-triggered interrupts.
- **Temperature**
 - 40~125°C temperature range.

1.3 EM3588 Specifications

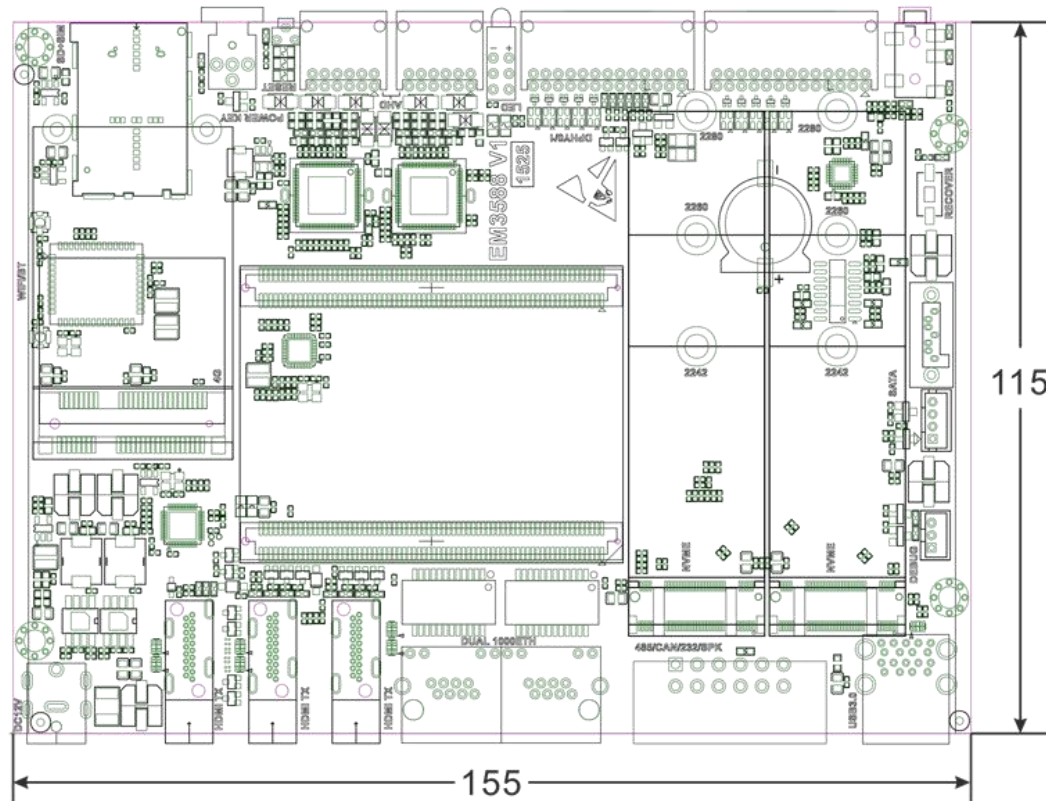


Feature	Specifications
CPU	Octa-core 64-bit architecture: Quad-core Cortex-A76 + Quad-core Cortex-A55
Memory	8GB LPDDR4X
Power	12V/3A DC input jack
USB	1x Type-C, 2x USB3.0 Host

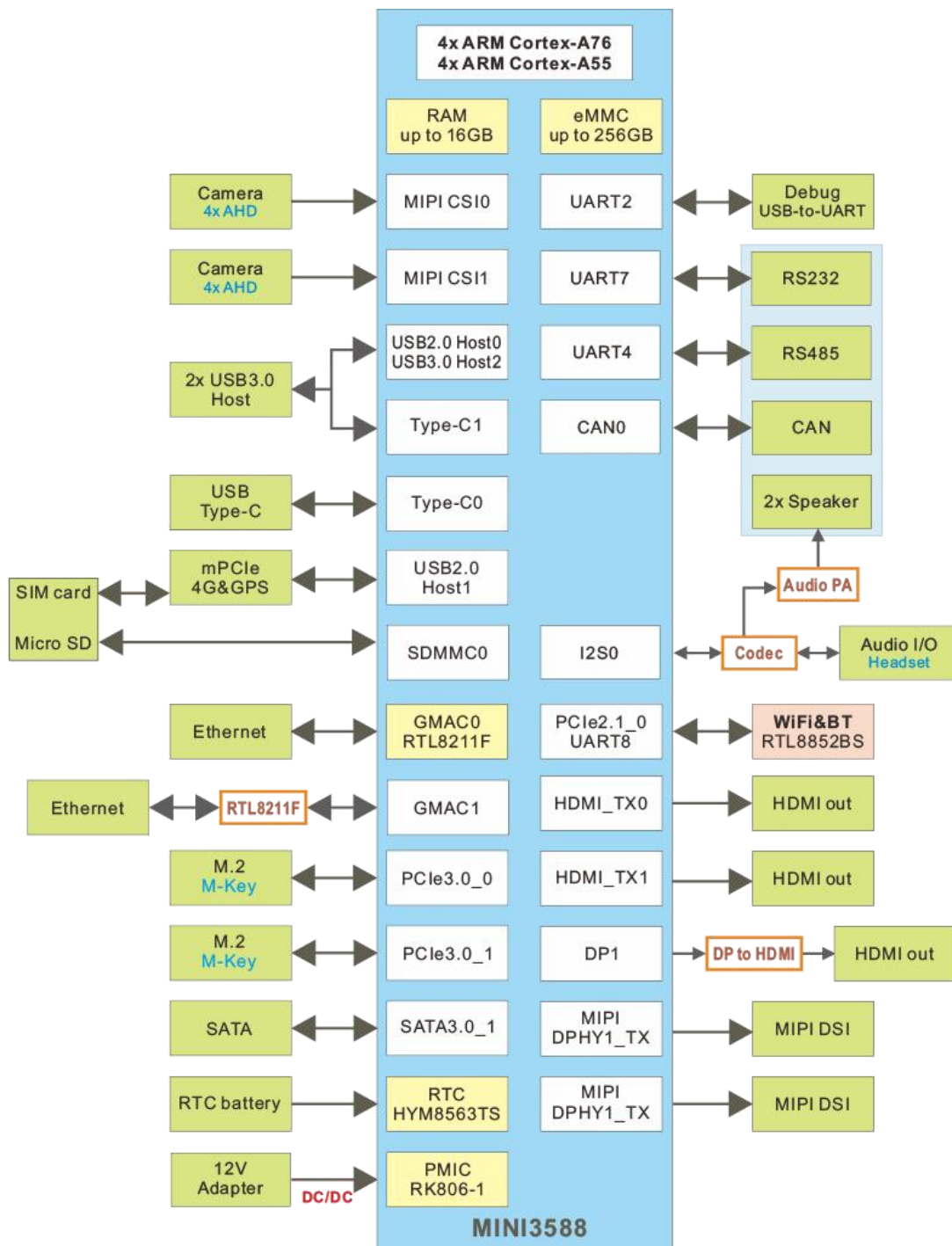
Storage	• 32GB eMMC flash (up to 256GB) • MicroSD card slot • 1x SATA3.0 socket • 2x M.2 SSD socket (M-Key)
Serial Port	• 1x Serial port for debug, 3-pin connector • 1x RS232, 12-pin pluggable terminal block • 1x RS485, 12-pin pluggable terminal block
Ethernet	2x Gigabit Ethernet RJ45 port via Realtek RTL8211F-CG controller
Display	• Support 2x HDMI2.1 TX, up to 8K@60fps • Support 1x DP to HDMI2.0, up to 4K@60fps • Support 2x DSI MIPI, up to 4K@60fps • Support 1x DP Alt mode, up to 4K@60fps
Camera	Support 8xAHD
Audio	• Support 2x HDMI TX audio output • Support 2x DP audio output • Support 2x Speaker via 12-pin pluggable terminal block • Support 1x Headphone output/input
Keys&Switch	1x Recovery key, 1x Power key, 1x Reset key
4G	Mini PCIe socket with Nano SIM card port to support 4G LTE module
WIFI&BT	WIFI&Bluetooth module, support 2.4/5G 2T2R WiFi (802.11a/b/g/n/ac/ax) with Bluetooth 5.2
Other features	RTC, CAN
Dimension	155 x 115 mm



1.4 PCB Dimension



1.5 Block Diagram



1.6 CPU Introduction

The CPU module RK3588 is equipped with 8GB (up to 16GB) of LPDDR4X RAM and offers 32GB (up to 256GB) of eMMC Flash storage.

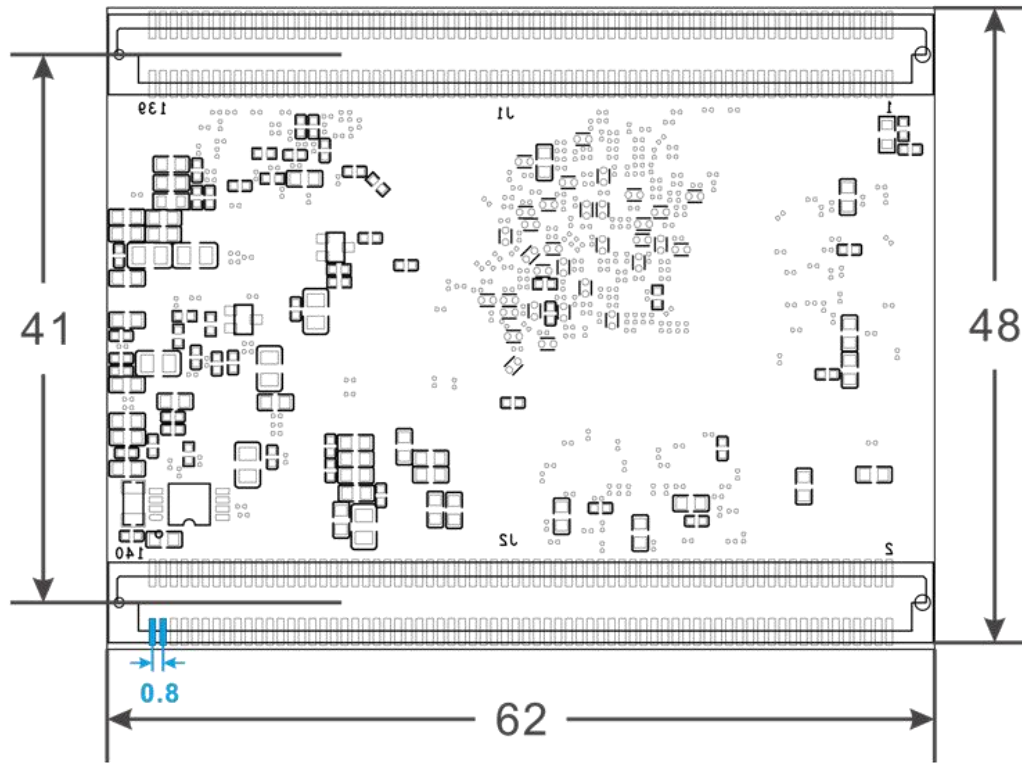


MINI3588 specifications

Pin number– 2x 140-pin, 0.8mm pitch

Dimension–62 x 48 mm

Application–Smart cameras, Robotics, Digital signage, IoT gateways



Pin Definition

Pin J1	Signal	Pin J1	Signal
1	SDMMC0_D1	2	GND
3	SDMMC0_D0	4	eDP1_TX_AUXN
5	SDMMC0_CLK	6	eDP1_TX_AUXP
7	SDMMC0_CMD	8	eDP1_TX3N
9	SDMMC0_D3	10	eDP1_TX3P
11	SDMMC0_D2	12	eDP1_TX0N
13	TYPEC1_USB20_OTG_DP	14	eDP1_TX0P
15	TYPEC1_USB20_OTG_DM	16	eDP1_TX1N
17	USB20_HOST1_DP	18	eDP1_TX1P



Pin J1	Signal	Pin J1	Signal
19	USB20_HOST1_DM	20	eDP1_TX2N
21	USB20_HOST0_DP	22	eDP1_TX2P
23	USB20_HOST0_DM	24	GND
25	GND	26	TYPEC0_SSRX1N
27	DP1_TX3P	28	TYPEC0_SSRX1P
29	DP1_TX3N	30	TYPEC0_SSTX1N
31	DP1_TX2P	32	TYPEC0_SSTX1P
33	DP1_TX2N	34	TYPEC0_SSRX2N
35	DP1_TX1P	36	TYPEC0_SSRX2P
37	DP1_TX1N	38	TYPEC0_SSTX2N
39	DP1_TX0P	40	TYPEC0_SSTX2P
41	DP1_TX0N	42	GND
43	DP1_AUXP	44	MIPI_DPHY1_TX_D0N
45	DP1_AUXN	46	MIPI_DPHY1_TX_D0P
47	TYPEC0_USB20_OTG_DM	48	MIPI_DPHY1_TX_D1N
49	TYPEC0_USB20_OTG_DP	50	MIPI_DPHY1_TX_D1P
51	TYPEC0_USB20_OTG_ID	52	MIPI_DPHY1_TX_D2N
53	TYPEC0_USB20_VBUSDET	54	MIPI_DPHY1_TX_D2P
55	TYPEC0_SBU1/DP0_AUXP	56	MIPI_DPHY1_TX_CLKN
57	TYPEC0_SBU2/DP0_AUXN	58	MIPI_DPHY1_TX_CLKP
59	MIPI_DPHY1_RX_D0N	60	MIPI_DPHY1_TX_D3N
61	MIPI_DPHY1_RX_D0P	62	MIPI_DPHY1_TX_D3P
63	MIPI_DPHY1_RX_D1N	64	MIPI_DPHY0_TX_D0P
65	MIPI_DPHY1_RX_D1P	66	MIPI_DPHY0_TX_D0N
67	GND	68	MIPI_DPHY0_TX_D1P
69	MIPI_DPHY1_RX_CLKN	70	MIPI_DPHY0_TX_D1N
71	MIPI_DPHY1_RX_CLKP	72	MIPI_DPHY0_TX_CLKP
73	MIPI_DPHY0_RX_D0P	74	MIPI_DPHY0_TX_CLKN



Pin J1	Signal	Pin J1	Signal
75	MIPI_DPHY0_RX_D0N	76	MIPI_DPHY0_TX_D2P
77	MIPI_DPHY0_RX_D1P	78	MIPI_DPHY0_TX_D2N
79	MIPI_DPHY0_RX_D1N	80	MIPI_DPHY0_TX_D3P
81	MIPI_DPHY0_RX_CLKP	82	MIPI_DPHY0_TX_D3N
83	MIPI_DPHY0_RX_CLKN	84	GND
85	GND	86	MIPI_CSI1_RX_CLK1P
87	MIPI_CSI1_RX_CLK0P	88	MIPI_CSI1_RX_CLK1N
89	MIPI_CSI1_RX_CLK0N	90	MIPI_CSI1_RX_D3P
91	MIPI_CSI1_RX_D1P	92	MIPI_CSI1_RX_D3N
93	MIPI_CSI1_RX_D1N	94	MIPI_CSI1_RX_D2P
95	MIPI_CSI1_RX_D0P	96	MIPI_CSI1_RX_D2N
97	MIPI_CSI1_RX_D0N	98	MIPI_CSI0_RX_CLK1P
99	GND	100	MIPI_CSI0_RX_CLK1N
101	PHY_MDI3-	102	MIPI_CSI0_RX_D3P
103	PHY_MDI3+	104	MIPI_CSI0_RX_D3N
105	PHY_MDI2-	106	MIPI_CSI0_RX_D2P
107	PHY_MDI2+	108	MIPI_CSI0_RX_D2N
109	PHY_MDI1-	110	MIPI_CSI0_RX_CLK0P
111	PHY_MDI1+	112	MIPI_CSI0_RX_CLK0N
113	PHY_MDI0-	114	MIPI_CSI0_RX_D1P
115	PHY_MDI0+	116	MIPI_CSI0_RX_D1N
117	PHY_LED1/CFG_LDO0	118	MIPI_CSI0_RX_D0P
119	PHY_LED2/CFG_LDO1	120	MIPI_CSI0_RX_D0N
121	GND	122	GND
123	GMAC1_TXCLK	124	GMAC1_RXDV_CRS
125	GMAC1_TXEN	126	GMAC1_RXCLK
127	GMAC1_TXD0	128	GMAC1_RXD0
129	GMAC1_TXD1	130	GMAC1_RXD1



Pin J1	Signal	Pin J1	Signal
131	GMAC1_TXD2	132	GMAC1_RXD2
133	GMAC1_TXD3	134	GMAC1_RXD3
135	GMAC1_MDIO	136	GMAC1_MCLKINOUT
137	GMAC1_MDC	138	UART3_RX_M2

Pin J2	Signal	Pin J2	Signal
1	GND	2	HDMI0_TX2P
3	HDMI0_TX1P	4	HDMI0_TX2N
5	HDMI0_TX1N	6	HDMI0_CLKP
7	HDMI0_TX0P	8	HDMI0_CLKN
9	HDMI0_TX0N	10	GND
11	PCIE30X1_1_WAKEn_M1_L	12	HDMITX0_CEC_M0
13	PCIE30X1_1_PERSTn_M1_L	14	HDMITX0_SDA_M0
15	PCIE30x1_1_CLKREQn_M1_L	16	HDMITX0_SCL_M0
17	SPDIF0_TX_M1	18	SPDIF1_TX_M1
19	SATA0_ACT_LED_M0	20	SATA1_ACT_LED_M0
21	USB_OTG_PWREN_H_GPIO4_A7	22	PWM9_M2
23	GPIO4_B0_d	24	GPIO3_A6_d
25	RECOVERY_SARADC_VIN1	26	UART0_RX_M2
27	SARADC_VIN5	28	UART0_TX_M2
29	GND	30	I2C5_SCL_M0
31	PWM15_IR_M1	32	I2C5_SDA_M0
33	GPIO4_B2_U	34	GND
35	PCIE30X4_WAKEn_M2_L	36	PCIE30X2_PERSTn_M2
37	PCIE30X4_CLKREQn_M2_L	38	PCIE30x2_CLKREQn_M2
39	PCIE30X4_PERSTn_M2_L	40	PCIE30X2_WAKEn_M2
41	UART7_RX_M1	42	GPIO3_B2_d



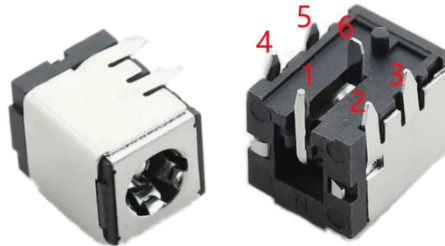
Pin J2	Signal	Pin J2	Signal
43	UART7_TX_M1	44	SATA_CP_POD
45	CAN0_TX_M0	46	GPIO3_B7_d
47	CAN0_RX_M0	48	GPIO3_B7_d
49	GND	50	UART2_RX_M0_DEBUG
51	MIPI_CAM3_CLKO_M0_1V8	52	UART2_TX_M0_DEBUG
53	MIPI_CAM4_CLKO_M0_1V8	54	I2C6_SDA_M0
55	MIPI_CAM2_CLKO_M0_1V8	56	I2C6_SCL_M0
57	PDM1_CLK0_M1_1V8	58	DP1_HPDIN_M0
59	PDM1_SDI0_M1_1V8	60	SDMMC_DET_1V8
61	PDM1_SDI1_M1_1V8	62	HDMITX1_HPDIN_M0_1V8
63	PDM1_SDI2_M1_1V8	64	HDMITX0_HPDIN_M0_1V8
65	PDM1_SDI3_M1_1V8	66	I2S0_SDI0_1V8
67	PDM1_CLK1_M1_1V8	68	I2S0_SDO2_SDI3_1V8
69	I2C2_SDA_M4_1V8	70	I2S0_SDI1_1V8
71	I2C2_SCL_M4_1V8	72	I2S0_SDO0_1V8
73	I2C4_SDA_M3_1V8	74	I2S0_SDO3_SDI2_1V8
75	I2C4_SCL_M3_1V8	76	I2S0_SDO1_1V8
77	I2C3_SCL_M0_1V8	78	I2S0_LRCK_RX_1V8
79	I2C3_SDA_M0_1V8	80	I2S0_LRCK_TX_1V8
81	GND	82	I2S0_MCLK_1V8
83	PCIE30_PORT1_REFCLKN_IN	84	I2S0_SCLK_TX_1V8
85	PCIE30_PORT1_REFCLKP_IN	86	I2S0_SCLK_RX_1V8
87	PCIE30_PORT1_TX1N	88	GND
89	PCIE30_PORT1_TX1P	90	PCIE20_2_REFCLKN
91	PCIE30_PORT1_TX0N	92	PCIE20_2_REFCLKP
93	PCIE30_PORT1_TX0P	94	USB30_2_SSTXN
95	PCIE30_PORT1_RX1N	96	USB30_2_SSTXP
97	PCIE30_PORT1_RX1P	98	USB30_2_SSRXN



Pin J2	Signal	Pin J2	Signal
99	PCIE30_PORT1_RX0N	100	USB30_2_SSRXP
101	PCIE30_PORT1_RX0P	102	PCIE20_1_REFCLKN
103	GND	104	PCIE20_1_REFCLKP
105	PCIE30_PORT0_REFCLKN_IN	106	PCIE20_1_RXN/SATA30_1_RXN
107	PCIE30_PORT0_REFCLKP_IN	108	PCIE20_1_RXP/SATA30_1_RXP
109	PCIE30_PORT0_TX1N	110	PCIE20_1_TXN/SATA30_1_TXN
111	PCIE30_PORT0_TX1P	112	PCIE20_1_TXP/SATA30_1_TXP
113	PCIE30_PORT0_TX0N	114	PCIE20_0_REFCLKN
115	PCIE30_PORT0_TX0P	116	PCIE20_0_REFCLKP
117	PCIE30_PORT0_RX1N	118	PCIE20_0_TXN/SATA30_0_TXN
119	PCIE30_PORT0_RX1P	120	PCIE20_0_TXP/SATA30_0_TXP
121	PCIE30_PORT0_RX0N	122	PCIE20_0_RXN/SATA30_0_RXN
123	PCIE30_PORT0_RX0P	124	PCIE20_0_RXP/SATA30_0_RXP
125	GND	126	GND
127	RESET_L	128	VCC_1V8
129	VCC_RTC	130	RTC32KOUT_WIFI
131	VCC_3V3	132	PWR_EN
133	GND	134	GND
135	VCC_SYS	136	VCC_SYS
137	VCC_SYS	138	VCC_SYS

2 Peripherals Introduction

2.1 Power in(P1)



The DC JACK is metal enclosure full package, 6-pin plug Type. Typical 12V/3A DC adapter.

Pin	Signal	Description	Pin	Signal	Description
1	VIN_12V	12V Power Input	2	GND	Ground
3	GND	Ground	4	GND	Ground
5	GND	Ground	6	GND	Ground

2.2 Headset(J9)



The Idea3576 adopts audio codec ES8388, provides stereo audio output / input.

Feature

- Low power.
- IIS transfer audio data.
- Stereo output, support recording.

Pin	Signal	Description	Pin	Signal	Description
1	HP_GND	Headphone Ground	2	ROUT2	Right Output Channel 2
3	LOUT2	Left Output Channel 2	4	HP_DET	Headphone Detect
5	INP_PHONE_MIC	Input for Phone Microphone			

2.3 MIPI DSI(CON3,CON4)



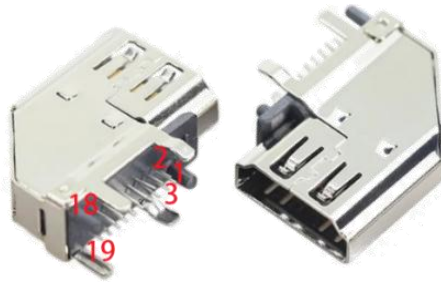
EM3588 MIPI supports up to 4K@60fps output. It is a 26-pin connector.

CON3					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_LCD	LCD Power Supply	2	VCC_LCD	LCD Power Supply
3	GND	Ground	4	GND	Ground
5	LCD_3V3	LCD 3.3V Power Supply	6	LCD_3V3	LCD 3.3V Power Supply
7	LCD_1V8	LCD 1.8V Power Supply	8	GND	Ground
9	PWM	Pulse Width Modulation Signal	10	LCD_EN	LCD Enable Signal
11	NC	Not connect	12	TP0_SCL	Touch Panel I2C Clock Line
13	TP0_SDA	Touch Panel I2C Data Line	14	TP0_RST	Touch Panel Reset Signal
15	TP0_INT	Touch Panel Interrupt Signal	16	GND	Ground
17	DPHY0_TX_D0N	MIPI D-PHY Lane 0 Differential Negative	18	DPHY0_TX_D0P	MIPI D-PHY Lane 0 Differential Positive
19	DPHY0_TX_D1N	MIPI D-PHY Lane 1 Differential Negative	20	DPHY0_TX_D1P	MIPI D-PHY Lane 1 Differential Positive
21	DPHY0_TX_CLK N	MIPI D-PHY Clock Lane Differential Negative	22	DPHY0_TX_CLK P	MIPI D-PHY Clock Lane Differential Positive
23	DPHY0_TX_D2N	MIPI D-PHY Lane 2 Differential Negative	24	DPHY0_TX_D2P	MIPI D-PHY Lane 2 Differential Positive
25	DPHY0_TX_D3N	MIPI D-PHY Lane 3 Differential Negative	26	DPHY0_TX_D3P	MIPI D-PHY Lane 3 Differential Positive

CON4					
Pin	Signal	Description	Pin	Signal	Description

1	VCC_LCD	LCD Power Supply	2	VCC_LCD	LCD Power Supply
3	GND	Ground	4	GND	Ground
5	LCD_3V3	LCD 3.3V Power Supply	6	LCD_3V3	LCD 3.3V Power Supply
7	LCD_1V8	LCD 1.8V Power Supply	8	GND	Ground
9	PWM	Pulse Width Modulation Signal	10	LCD_EN	LCD Enable Signal
11	NC	Not connect	12	TP1_SCL	Touch Panel I2C Clock Line
13	TP1_SDA	Touch Panel I2C Data Line	14	TP1_RST	Touch Panel Reset Signal
15	TP1_INT	Touch Panel Interrupt Signal	16	GND	Ground
17	DPHY1_TX_D0N	MIPI D-PHY Lane 0 Differential Negative	18	DPHY1_TX_D0P	MIPI D-PHY Lane 0 Differential Positive
19	DPHY1_TX_D1N	MIPI D-PHY Lane 1 Differential Negative	20	DPHY1_TX_D1P	MIPI D-PHY Lane 1 Differential Positive
21	DPHY1_TX_CLK N	MIPI D-PHY Clock Lane Differential Negative	22	DPHY1_TX_CLK P	MIPI D-PHY Clock Lane Differential Positive
23	DPHY1_TX_D2N	MIPI D-PHY Lane 2 Differential Negative	24	DPHY1_TX_D2P	MIPI D-PHY Lane 2 Differential Positive
25	DPHY1_TX_D3N	MIPI D-PHY Lane 3 Differential Negative	26	DPHY1_TX_D3P	MIPI D-PHY Lane 3 Differential Positive

2.4 HDMI(J12, J13, J14)



EM3588 HDMI (J12,J13) supports up to 8Kp60 output, HDMI2(J14) is DP to HDMI, supports 4Kp60 output. regular 19pins HDMI type A, with high 14.00mm and thickness 4.55mm.

Features

- Transmits high-quality audio signals, including support for various audio formats and audio synchronization.
- Features a nickel-plated copper shell for enhanced durability and corrosion resistance.

- Compatible with a wide range of HDMI-enabled devices, including smart TVs, gaming consoles and more.
- Side (side insertion) type, making it easy to integrate into various devices.

J12					
Pin	Signal	Description	Pin	Signal	Description
1	HDMI_TX1_D2P	HDMI Differential Data 2 Positive	2	GND	Ground
3	HDMI_TX1_D2N	HDMI Differential Data 2 Negative	4	HDMI_TX1_D1P	HDMI Differential Data 1 Positive
5	GND	Ground	6	HDMI_TX1_D1N	HDMI Differential Data 1 Negative
7	HDMI_TX1_D0P	HDMI Differential Data 0 Positive	8	GND	Ground
9	HDMI_TX1_D0N	HDMI Differential Data 0 Negative	10	HDMI_TX1_D3P	HDMI Differential Data 3 Positive
11	GND	Ground	12	HDMI_TX1_D3N	HDMI Differential Data 3 Negative
13	HDMI1_TX_CEC_PORT	HDMI Consumer Electronics Control	14	HDMI1_eARC+	HDMI Enhanced Audio Return Channel Positive
15	HDMI1_TX_SCL_PORT	HDMI I2C Clock Line	16	HDMI1_TX_SDA_PORT	HDMI I2C Data Line
17	GND	Ground	18	VCC5V_HDMI1_TX0	5V Power Supply for HDMI
19	HDMI1_eARC-	HDMI Enhanced Audio Return Channel Negative			

J13					
Pin	Signal	Description	Pin	Signal	Description
1	HDMI0_TX2P	HDMI Differential Data 2 Positive	2	GND	Ground
3	HDMI0_TX2N	HDMI Differential Data 2 Negative	4	HDMI0_TX1P	HDMI Differential Data 1 Positive
5	GND	Ground	6	HDMI0_TX1N	HDMI Differential Data 1 Negative
7	HDMI0_TX0P	HDMI Differential Data 0 Positive	8	GND	Ground
9	HDMI0_TX0N	HDMI Differential Data 0 Negative	10	HDMI0_CLKP	HDMI Differential Clock Positive
11	GND	Ground	12	HDMI0_CLKN	HDMI Differential Clock Negative



13	HDMI0_TX_CEC_PORT	HDMI Consumer Electronics Control	14	NC	Not Connect
15	HDMI0_TX_SCL_PORT	HDMI I2C Clock Line	16	HDMI0_TX_SDA_PORT	HDMI I2C Data Line
17	GND	Ground	18	VCC5V_HDMI0_TX0	5V Power Supply for HDMI
19	HDMI0_HPD	HDMI Hot Plug Detect			

J14					
Pin	Signal	Description	Pin	Signal	Description
1	TX2P	Differential Data 2 Positive	2	GND	Ground
3	TX2M	Differential Data 2 Negative	4	TX1P	Differential Data 1 Positive
5	GND	Ground	6	TX1M	Differential Data 1 Negative
7	TX0P	Differential Data 0 Positive	8	GND	Ground
9	TX0M	Differential Data 0 Negative	10	TXCP	Differential Clock Positive
11	GND	Ground	12	TXCM	Differential Clock Negative
13	NC	Not Connect	14	NC	Not Connect
15	HDMI2_TX_SCL_PORT	HDMI I2C Clock Line	16	HDMI2_TX_SDA_PORT	HDMI I2C Data Line
17	GND	Ground	18	HDMI_5V	5V Power Supply for HDMI
19	HDMI2_TX_HPD_PORT	HDMI Hot Plug Detect			

2.5 Type-C(J7)

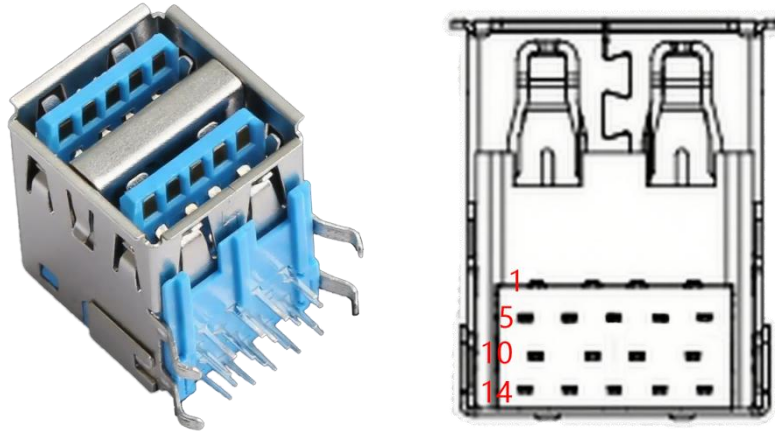
The Type-C interface supports download mode, supports transfer between USB and DP display (multiplexed with DP TX support RGB/YUV (Up to 10bit) format, the maximum output resolution can reach 4Kp60), and supports ADB mode.



Pin	Signal	Description	Pin	Signal	Description
A1	GND	Ground	A2	TYPEC0_TX1P	USB Type-C Differential Data 1 Positive
A3	TYPEC0_TX1N	USB Type-C Differential Data 1 Negative	A4	VBUS5V0_TYPEC0	5V Power Supply for USB Type-C
A5	TYPEC0_CC1	USB Type-C Configuration Channel 1	A6	TYPEC0_DP	USB Type-C DisplayPort Data
A7	TYPEC0_DM	USB Type-C Differential Data Minus	A8	TYPEC0_SBU1	USB Type-C Side Band 1
A9	VBUS5V0_TYPEC0	5V Power Supply for USB Type-C	A10	TYPEC0_RX2N	USB Type-C Differential Data 2 Negative
A11	TYPEC0_RX2P	USB Type-C Differential Data 2 Positive	A12	GND	Ground
B1	GND	Ground	B2	TYPEC0_TX2P	USB Type-C Differential Data 2 Positive
B3	TYPEC0_TX2N	USB Type-C Differential Data 2 Negative	B4	VBUS5V0_TYPEC0	5V Power Supply for USB Type-C
B5	TYPEC0_CC2	USB Type-C Configuration Channel 2	B6	TYPEC0_DP	USB Type-C DisplayPort Data
B7	TYPEC0_DM	USB Type-C Differential Data Minus	B8	TYPEC0_SBU2	USB Type-C Side Band 2
B9	VBUS5V0_TYPEC0	5V Power Supply for USB Type-C	B10	TYPEC0_RX1N	USB Type-C Differential Data 1 Negative
B11	TYPEC0_RX1P	USB Type-C Differential Data 1	B12	GND	Ground

		Positive			
--	--	----------	--	--	--

2.6 USB 3.0(J8)



EM3588 USB3.0 port, it is 18-pin, used to docking station to connect USB device. It is used to connect a wide range of USB devices, such as external hard drives, USB flash drives, USB hubs, and other peripherals and supports hot-plug functionality.

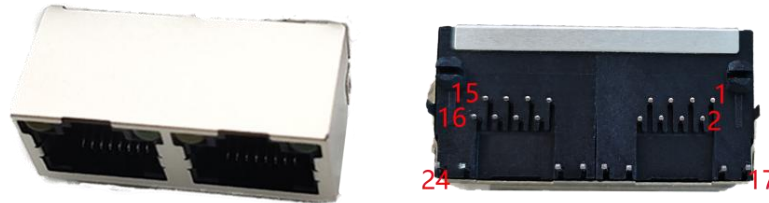
Feature

- Providing super speed data transfer capabilities.
- Backward compatible with USB 2.0 devices.
- Compliant with USB 3.0 specifications.
- The connector adopts the through-hole design, which is convenient for plugging and unplugging as well as connecting devices.

Pin	Signal	Description	Pin	Signal	Description
1	VCC5V0_USB30_HOST0	5V Power Supply for USB 3.0 Host	2	USB20_HOST0-DN	USB 2.0 Host Differential Negative
3	USB20_HOST0-DP	USB 2.0 Host Differential Positive	4	GND	Ground
5	USB30_2-SSRXN	USB 3.0 SuperSpeed Receive Negative	6	USB30_2-SSRX P	USB 3.0 SuperSpeed Receive Positive
7	GND	Ground	8	USB30_2-SSTXN	USB 3.0 SuperSpeed Transmit Negative
9	USB30_2-SSTX P	USB 3.0 SuperSpeed Transmit Positive	10	VCC5V0_USB30_HOST0	5V Power Supply for USB 3.0 Host
11	TYPEC1_USB20_OTG-DM	USB 2.0 OTG Differential Minus	12	TYPEC1_USB20_OTG-DP	USB 2.0 OTG Differential Positive
13	GND	Ground	14	TYPEC1-SSRX1N	Type-C SuperSpeed Receive 1 Negative
15	TYPEC1-SSRX1P	Type-C SuperSpeed Receive 1 Positive	16	GND	Ground

17	TYPEC1-SSTX 1N	Type-C SuperSpeed Transmit 1 Negative	18	TYPEC1-SSTX 1P	Type-C SuperSpeed Transmit 1 Positive
----	----------------	---------------------------------------	----	----------------	---------------------------------------

2.7 Ethernet(JP1)



EM3588 adopts an RJ45-1X2 connector as its Ethernet interface.

Feature

- Supports 10/100/1000-Mbps data transfer rates with the RGMII interfaces.
- It adopts an integrated design, integrating two standard RJ45 interfaces on the same base, saving installation space on the equipment panel or PCB board.
- The two interfaces are independent of each other and can be connected to different network devices respectively.

Pin	Signal	Description	Pin	Signal	Description
1	DA1+	Bi-directional transmit/receive pair A	2	DA1-	Bi-directional transmit/receive pair A
3	DB1+	Bi-directional transmit/receive pair B	4	DC1+	Bi-directional transmit/receive pair C
5	DC1-	Bi-directional transmit/receive pair C	6	DB1-	Bi-directional transmit/receive pair B
7	DD1+	Bi-directional transmit/receive pair D	8	DD1-	Bi-directional transmit/receive pair D
9	DA+	Bi-directional transmit/receive pair A	10	DA-	Bi-directional transmit/receive pair A
11	DB+	Bi-directional transmit/receive pair B	12	DC+	Bi-directional transmit/receive pair C
13	DC-	Bi-directional transmit/receive pair C	14	DB-	Bi-directional transmit/receive pair B
15	DD+	Bi-directional transmit/receive pair D	16	DD-	Bi-directional transmit/receive pair D
17	PHY_LED2/ CFG_LDO1	PHY LED 2 or Configuration LDO 1	18	VCC_3V3	3.3V Power Supply
19	GND	Ground	20	PHY_LED1/ CFG_LDO0	PHY LED 1 or Configuration LDO 0

21	GND	Ground	22	PHY0_LED2/ CFG_LDO1	PHY LED 2 or Configuration LDO 1
23	GND	Ground	24	PHY0_LED1/ CFG_LDO0	PHY LED 1 or Configuration LDO 0

2.9 User Buttons (SW1, K1,K2)

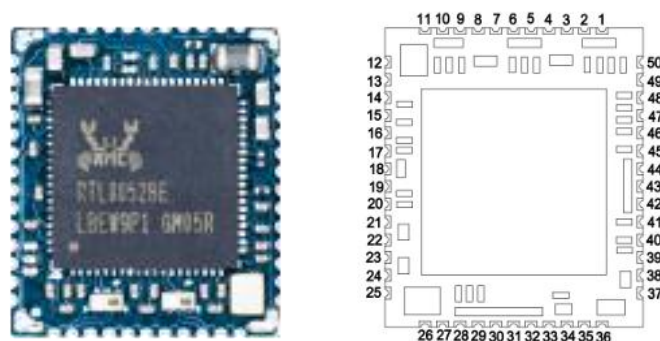


Key	Signal	Description	Key	Signal	Description
SW1	RECOVER	Recover key	K1	Power KEY+ Green LED	Power key with Green LED indicator
K2	Reset	Reset key			

The K1 is POWER key+Green LED.

K1					
Key	Signal	Description	Key	Signal	Description
1	GND	Ground	2	PWRON_EN	Power Enable
3	POWER-LED- LOCK	Control signal for LED lock	4	VCC_3V3	3V3 Power

2.10 WiFi&Bluetooth(U24)



The BL-M8852BS2 is a highly integrated Module that support 2-stream 802.11ax solutions with Multi-user MIMO (Multiple-input, Multiple-output) with Wireless LAN(WLAN) SDIO (SDIO1.1/2.0/3.0) interface controller with integrated Bluetooth 5 HS-UART interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a Module. The BL-M8852BS2 provides a complete solution for a high-performance integrated wireless and Bluetooth device.

Features

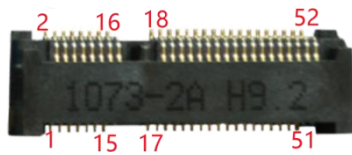
- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz.
- Host Interface: SDIO for WLAN,UART for BT.
- Wireless data rate can reach up to 1201Mbps.

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	WL_ANT0	Wireless LAN Antenna 0
3	GND	Ground	4	GND	Ground
5	GND	Ground	6	GND	Ground
7	GND	Ground	8	GND	Ground
9	WL_ANT1	WiFi Antenna 1	10	GND	Ground
11	GND	Ground	12	PCIE20X1_2_PER STN_M0	PCIe 2.0 x1 Lane 2 Perstn M0
13	XIN_WIFI	WiFi Crystal Input	14	XOUT_WIFI	WiFi Crystal Output
15	WIFI_REG_ON	WiFi Regulator On	16	WIFI_WAKE_HOS T_H	WiFi Wake Host High
17	NC	Not Connect	18	NC	Not Connect
19	NC	Not Connect	20	NC	Not Connect
21	NC	Not Connect	22	NC	Not Connect
23	GND	Ground	24	PCIE20X1_2_WA KEN_M0	PCIe 2.0 x1 Lane 2 Waken M0
25	CBUCK_0P9	Buck Converter 0.9V	26	CSR_VLX	CSR Voltage Level X
27	GND	Ground	28	ASR_VLX	ASR Voltage Level X
29	ABUCK_1P12	Buck Converter 1.12V	30	GND	Ground
31	LPO	Low Power Oscillator	32	GND	Ground
33	PCIE20_0_REFC LKN	PCIe 2.0 Lane 0 Reference Clock Negative	34	VDDIO	I/O Power Supply
35	PCIE20_0_REFC LKP	PCIe 2.0 Lane 0 Reference Clock Positive	36	VCC3V3_PCIEWL _VBAT	3.3V Power Supply for PCIe/WL
37	PCIE20X1_2_CL KREQN_M0	PCIe 2.0 x1 Lane 2 Clock Request M0	38	BT_REG_ON	Bluetooth Regulator On
39	GND	Ground	40	UART8_RX_M0	UART 8 Receive M0
41	UART8_TX_M0	UART 8 Transmit	42	UART8_CTSN_M0	UART 8 Clear To

		M0			Send M0
43	UART8_RTSN_M0	UART 8 Request To Send M0	44	PCIE_RXN	PCle Receive Negative
45	PCIE_RXP	PCle Receive Positive	46	PCIE_TXN	PCle Transmit Negative
47	PCIE_TXP	PCle Transmit Positive	48	NC	Not Connect
49	HOST_WAKE_BT	Host Wake Bluetooth	50	BT_WAKE_HOST_H	Bluetooth Wake Host High

2.11 4G(J10)

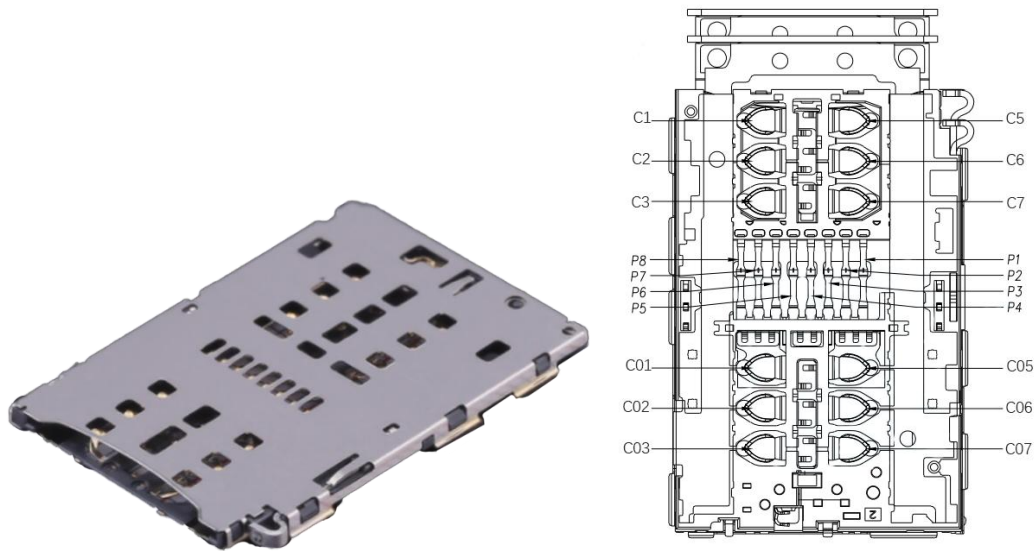
EM3588 adopts the standard PCI Express®MiniCard form factor (MiniPCle) and provides global network coverage on the connectivity of LTE. It delivers 50Mbps-up and 100Mbps-down data rates on LTE FDD networks and can also be fully backward compatible with existing UMTS and GSM/GPRS networks. The 4G model is EC20.



Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	VCC3V3_MINIP CIE	3.3V Power Supply for Mini PCle
3	NC	Not connect	4	GND	Ground
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	SIM_VCC	SIM Card Power Supply
9	GND	Ground	10	SIM_DATA	SIM Card Data Line
11	NC	Not connect	12	SIM_CLK	SIM Card Clock Line
13	NC	Not connect	14	SIM_RST	SIM Card Reset Line
15	GND	Ground	16	NC	Not connect
17	NC	Not connect	18	GND	Ground
19	NC	Not connect	20	VCC3V3_MINIP CIE	3.3V Power Supply for Mini PCle
21	GND	Ground	22	MINIP CIE20_PE RSTn	Mini PCle Reset Line
23	NC	Not connect	24	VCC3V3_MINIP CIE	3.3V Power Supply for Mini PCle
25	NC	Not connect	26	GND	Ground

27	GND	Ground	28	NC	Not connect
29	GND	Ground	30	NC	Not connect
31	NC	Not connect	32	NC	Not connect
33	NC	Not connect	34	GND	Ground
35	GND	Ground	36	MINIPCIE_USB_DM	Mini PCIe USB Differential Minus
37	GND	Ground	38	MINIPCIE_USB_DP	Mini PCIe USB Differential Plus
39	VCC3V3_MINI_PCIE	3.3V Power Supply for Mini PCIe	40	GND	Ground
41	VCC3V3_MINI_PCIE	3.3V Power Supply for Mini PCIe	42	4G_LED	4G Indicator LED
43	GND	Ground	44	NC	Not connect
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_MINIP_CIE	3.3V Power Supply for Mini PCIe

2.12 NANO_SIM+TF(J11)



The MCS-302-C1 card slot supports a combination of Nano SIM and TF card, providing flexible storage and communication options for wireless communication devices. It is compatible with 3G/4G modules to ensure efficient wireless transmission, while expanding storage through the TF card to enhance data portability.

Pin	Signal	Description	Pin	Signal	Description
P1	SDMMC0_D2	SDMMC0 Data Line 2	P2	SDMMC0_D3	SDMMC0 Data Line 3

P3	SDMMC0_CMD	SDMMC0 Command Signal	P4	SD_3V3	3.3V Power Supply
P5	SDMMC0_CLK	SDMMC0 Clock Signal	P6	GND	Ground
P7	SDMMC0_D0	SDMMC0 Data Line 0	P8	SDMMC0_D1	SDMMC0 Data Line 1
C1	SIM_VCC	SIM Power Supply	C2	SIM_RST	SIM Reset Signal
C3	SIM_CLK	SIM Clock Signal	C5	GND	Ground
C6	SIM_VCC	SIM Power Supply	C7	SIM_DATA	SIM Data Signal
C01	SIM_VCC	SIM Power Supply	C02	SIM_RST	SIM Reset Signal
C03	SIM_CLK	SIM Clock Signal	C05	GND	Ground
C06	SIM_VCC	SIM Power Supply	C07	SIM_DATA	SIM Data Signal

2.13 SATA(J5, J4)



The SATA is a 7-pin DIP vertical hard disk interface, used for connecting SATA data and SATA power.

J5					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	PCIE20_1_TX P/SATA30_1_ TXP	PCIe 2.0 Lane 1 Transmit Positive / SATA 3.0 Lane 1 Transmit Positive
3	PCIE20_1_TX N/SATA30_1_ TXN	PCIe 2.0 Lane 1 Transmit Negative / SATA 3.0 Lane 1 Transmit Negative	4	GND	Ground
5	PCIE20_1_R XN/SATA30_1_ RXN	PCIe 2.0 Lane 1 Receive Negative / SATA 3.0 Lane 1 Receive Negative	6	PCIE20_1_R XP/SATA30_1_ RXP	PCIe 2.0 Lane 1 Receive Positive / SATA 3.0 Lane 1 Receive Positive
7	GND	Ground			

Connect the SATA power connector to the power supply, the red wire is connected to the +5V line and the black wires are connected to the ground.

J4

Pin	Signal	Description	Pin	Signal	Description
1	VSYS_5V	System 5V Power Supply	2	GND	Ground
3	GND	Ground	4	12V_OVP	12V Over Voltage Protection

2.14 SSD(J15, J16)



M.2 M key socket (PCIe) for NVMe SSD.

J15					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	VCC3V3_MINI PCIE	Power Supply 3.3V
3	GND	Ground	4	VCC3V3_MINI PCIE	Power Supply 3.3V
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect	10	DAS	Direct Attached Storage
11	NC	Not connect	20	NC	Not connect
21	GND	Ground	22	NC	Not connect
23	NC	Not connect	24	NC	Not connect
25	NC	Not connect	26	NC	Not connect
27	GND	Ground	28	NC	Not connect
29	PCIE30_PORT1 _RX1N	PCIe 3.0 Port 1 RX1 Negative	30	NC	Not connect
31	PCIE30_PORT1 _RX1P	PCIe 3.0 Port 1 RX1 Positive	32	NC	Not connect
33	GND	Ground	34	NC	Not connect
35	PCIE30_PORT1 _TX1N	PCIe 3.0 Port 1 TX1 Negative	36	NC	Not connect
37	PCIE30_PORT1 _TX1P	PCIe 3.0 Port 1 TX1 Positive	38	NC	Not connect
39	GND	Ground	40	NC	Not connect
41	PCIE30_PORT1 _RX0N	PCIe 3.0 Port 1 RX0 Negative	42	NC	Not connect
43	PCIE30_PORT1 _RX0P	PCIe 3.0 Port 1 RX0 Positive	44	NC	Not connect
45	GND	Ground	46	NC	Not connect



47	PCIE30_PORT1_TX0N	PCIe 3.0 Port 1 TX0 Negative	48	NC	Not connect
49	PCIE30_PORT1_TX0P	PCIe 3.0 Port 1 TX0 Positive	50	PCIE30X2_PE_RSTn_M2	PCIe 3.0 x2 Perstn M2
51	GND	Ground	52	PCIE30x2_CL_KREQn_M2	PCIe 3.0 x2 Clkreqln M2
53	PCIE30_PORT1_REFCLKN_IN_SOLT	PCIe 3.0 Port 1 Ref Clk Negative	54	PCIE30X2_W_AKEEn_M2	PCIe 3.0 x2 Wake M2
55	PCIE30_PORT1_REFCLKP_IN_SOLT	PCIe 3.0 Port 1 Ref Clk Positive	56	NC	Not connect
57	GND	Ground	58	NC	Not connect
67	NC	Not connect	68	NC	Not connect
69	NC	Not connect	70	VCC3V3_MINI_PCIE	Power Supply 3.3V
71	GND	Ground	72	VCC3V3_MINI_PCIE	Power Supply 3.3V
73	GND	Ground	74	VCC3V3_MINI_PCIE	Power Supply 3.3V
75	GND	Ground			

J16					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	VCC3V3_MINI_PCIE	Power Supply 3.3V
3	GND	Ground	4	VCC3V3_MINI_PCIE	Power Supply 3.3V
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect	10	NC	Not connect
11	NC	Not connect	20	NC	Not connect
21	GND	Ground	22	NC	Not connect
23	NC	Not connect	24	NC	Not connect
25	NC	Not connect	26	NC	Not connect
27	GND	Ground	28	NC	Not connect
29	PCIE30_PORT0_RX1N	PCIe 3.0 Port 0 RX1 Negative	30	NC	Not connect
31	PCIE30_PORT0_RX1P	PCIe 3.0 Port 0 RX1 Positive	32	NC	Not connect
33	GND	Ground	34	NC	Not connect
35	PCIE30_PORT0_TX1N	PCIe 3.0 Port 0 TX1 Negative	36	NC	Not connect

37	PCIE30_PORT0_TX1P	PCIe 3.0 Port 0 TX1 Positive	38	NC	Not connect
39	GND	Ground	40	NC	Not connect
41	PCIE30_PORT0_RX0N	PCIe 3.0 Port 0 RX0 Negative	42	NC	Not connect
43	PCIE30_PORT0_RX0P	PCIe 3.0 Port 0 RX0 Positive	44	NC	Not connect
45	GND	Ground	46	NC	Not connect
47	PCIE30_PORT0_TX0N	PCIe 3.0 Port 0 TX0 Negative	48	NC	Not connect
49	PCIE30_PORT0_TX0P	PCIe 3.0 Port 0 TX0 Positive	50	PCIE30X4_PE_RSTn_M3	PCIe 3.0 x4 Perstn M3
51	GND	Ground	52	PCIE30x4_CL_KREQn_M3	PCIe 3.0 x4 Clkreqn M3
53	PCIE30_PORT0_REFCLKN_IN_SOLT	PCIe 3.0 Port 0 Ref Clk Negative	54	PCIE30X4_W_AKEEn_M3	PCIe 3.0 x4 Wake M3
55	PCIE30_PORT0_REFCLKP_IN_SOLT	PCIe 3.0 Port 0 Ref Clk Positive	56	NC	Not connect
57	GND	Ground	58	NC	Not connect
67	NC	Not connect	68	NC	Not connect
69	NC	Not connect	70	VCC3V3_MINI_PCIE	Power Supply 3.3V
71	GND	Ground	72	VCC3V3_MINI_PCIE	Power Supply 3.3V
73	GND	Ground	74	VCC3V3_MINI_PCIE	Power Supply 3.3V
75	GND	Ground			

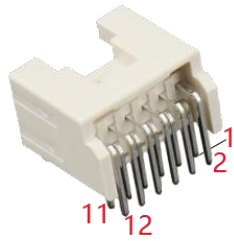
2.15 RTC(J3)

The backup battery (3V) is used to ensure the RTC (frequency 32.768KHz) is still able to work after power off. Lithium cell model:CR1220.



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

2.16 Camera(J17, J18)



S12B-PUDSS-1 is a dual-row straight-through bent-pin connector with 2x6 pins. One interface can be connected to 4 AHD camera devices via a DC & BNC connector.

J17					
Pin	Signal	Description	Pin	Signal	Description
1	TP2855-1_IN2	Input 2 for TP2855-1	2	TP2855-1_IN1	Input 1 for TP2855-1
3	GND	Ground	4	GND	Ground
5	AHD1-VIDEO2_12V	12V Power for AHD Video 2	6	AHD1-VIDEO1_12V	12V Power for AHD Video 1
7	AHD1-VIDEO3_12V	12V Power for AHD Video 3	8	AHD1-VIDEO4_12V	12V Power for AHD Video 4
9	GND	Ground	10	GND	Ground
11	TP2855-1_IN3	Input 3 for TP2855-1	12	TP2855-1_IN4	Input 4 for TP2855-1

J18					
Pin	Signal	Description	Pin	Signal	Description
1	TP2855-2_IN2	Input 2 for TP2855-2	2	TP2855-2_IN1	Input 1 for TP2855-2
3	GND	Ground	4	GND	Ground
5	AHD2-VIDEO2_12V	12V Power for AHD Video 2	6	AHD2-VIDEO1_12V	12V Power for AHD Video 1
7	AHD2-VIDEO3_12V	12V Power for AHD Video 3	8	AHD2-VIDEO4_12V	12V Power for AHD Video 4
9	GND	Ground	10	GND	Ground
11	TP2855-2_IN3	Input 3 for TP2855-2	12	TP2855-2_IN4	Input 4 for TP2855-2

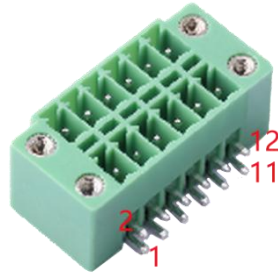
2.17 debug(J6)



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

Pin	Signal	Description	Pin	Signal	Description
1	DEBUG_RX	Debug Receive Signal	2	DEBUG_TX	Debug Transmit Signal
3	GND	Ground			

2.18 RS485/CAN/RS232/SPK (U9)



This 12-pin terminal block integrates RS485, CAN, UART and speaker signals into a single connector, saving space.

Pin	Signal	Description	Pin	Signal	Description
1	RS485_A	RS-485 bus A	2	RS485_B	RS-485 bus B
3	CANH	CAN bus High	4	CANL	CAN bus Low
5	RS232-TX1	RS-232 Transmit Data – Port 1	6	RS232-RX1	RS-232 Receive Data – Port 1
7	GND	Ground	8	GND	Ground
9	LOUTP	Left-channel Audio Output +	10	LOUTN	Left-channel Audio Output –
11	ROUTP	Right-channel Audio Output +	12	ROUTN	Right-channel Audio Output –

3 Product Configurations

3.1 Standard Contents

NO.	Item	Qty.(PCS)	Description
1	EM3588 board	1	Standard Content(8GB RAM, 32GB eMMC)
2	U-disk/CD-ROM	1	Android SDK, Debian SDK, Buildroot SDK, Documents, tools, Schematic Drawing, datasheets, etc.
3	Ethernet cable	1	1.5m Crossover cable
4	Serial Cable	1	CH9102X
5	USB Cable	1	Type-C
6	Power adaptor	1	12V/3A DC
7	Antenna	1	2x WIFI antenna

3.2 Optional Parts

- LCD Module (10.1-inch MIPI panel)
- SW-MA2024HP model, 2-Megapixel
- DC & BNC connector
- 4G Module
- SATA
- SSD