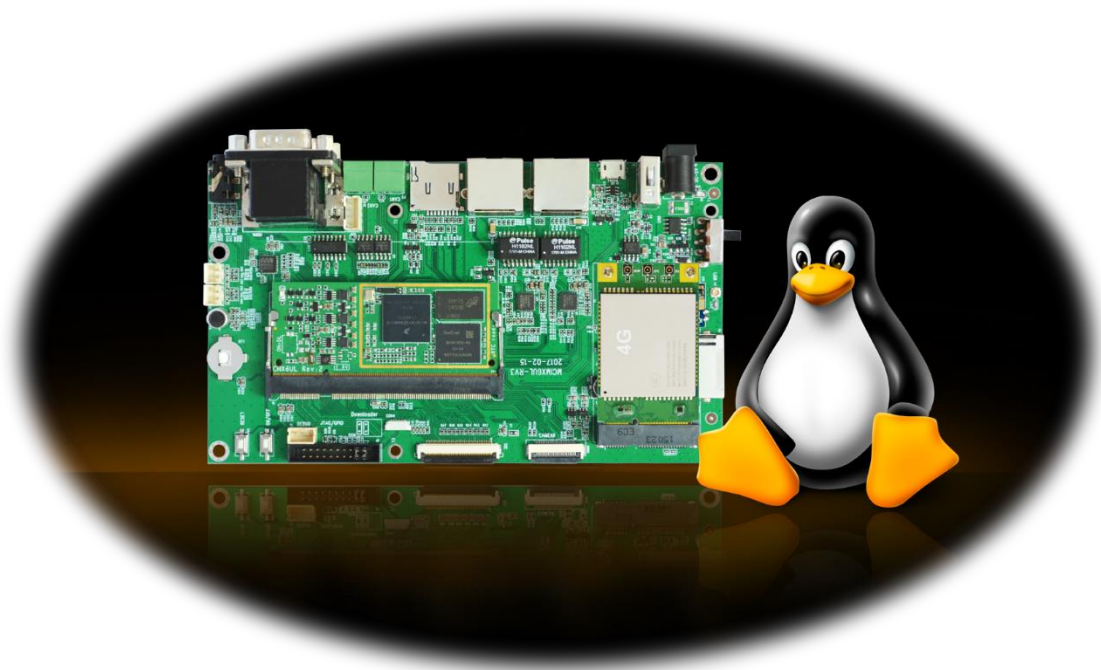


# *EM6ull Reference User Manual*

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V3. 2



**Boardcon Embedded Design**

[www.boardcon.com](http://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](http://www.boardcon.com) , [www.armdesigner.com](http://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](mailto: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 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.

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# 1 EM6ull Introduction

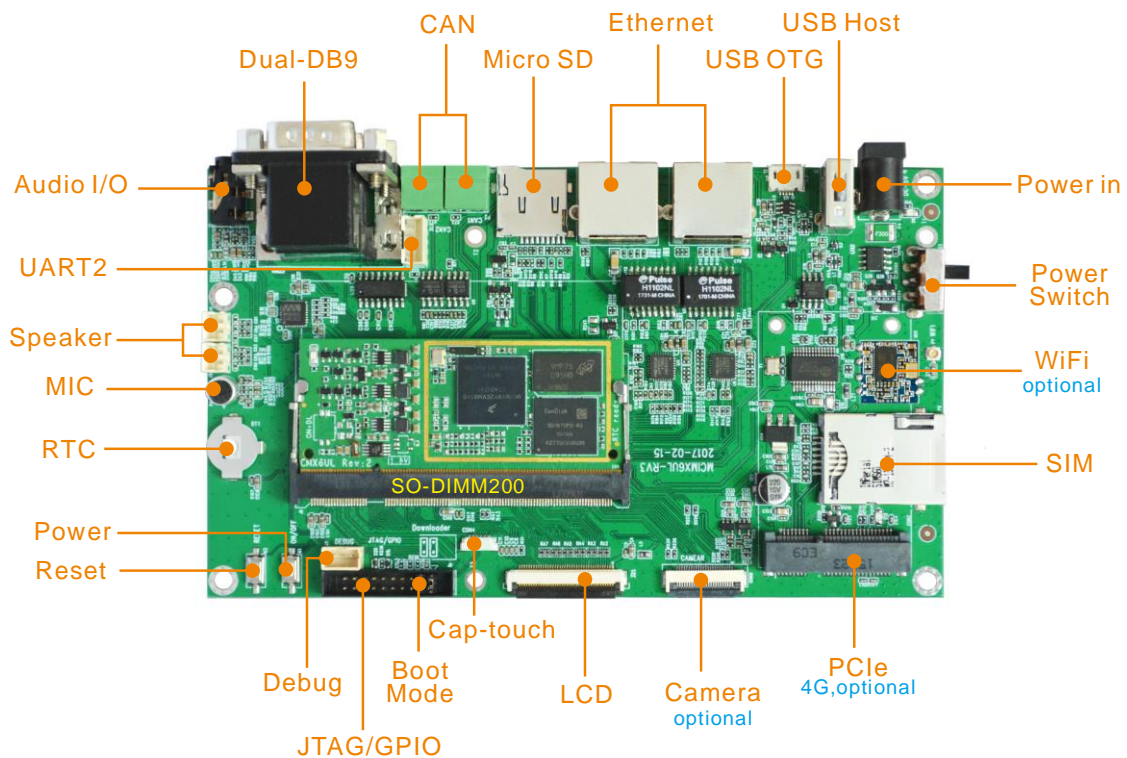
This document (V3.2) is based on EM6ull V3 (CPU module - CM6ULL)

## 1.1 Summary

The EM6ull is based on NXP i.MX 6 Series Applications Processor, which is the smallest and most energy-efficient ARM-based processor, providing maximum performance in low-power, space constrained embedded environments.

The i.MX6 board offers a rich set of peripherals and interfaces including Ethernet, USB Host & OTG, Camera, Serial ports, Audio, LCD, T-Flash, CAN, etc. It brings a flexible array of communications options including Wi-Fi, WCDMA and camera. The EM6ull can deliver a variety of features and APIs that allow developers to highly customize their system designs in the low-profile and fully-configured embedded devices.

## 1.2 Specifications



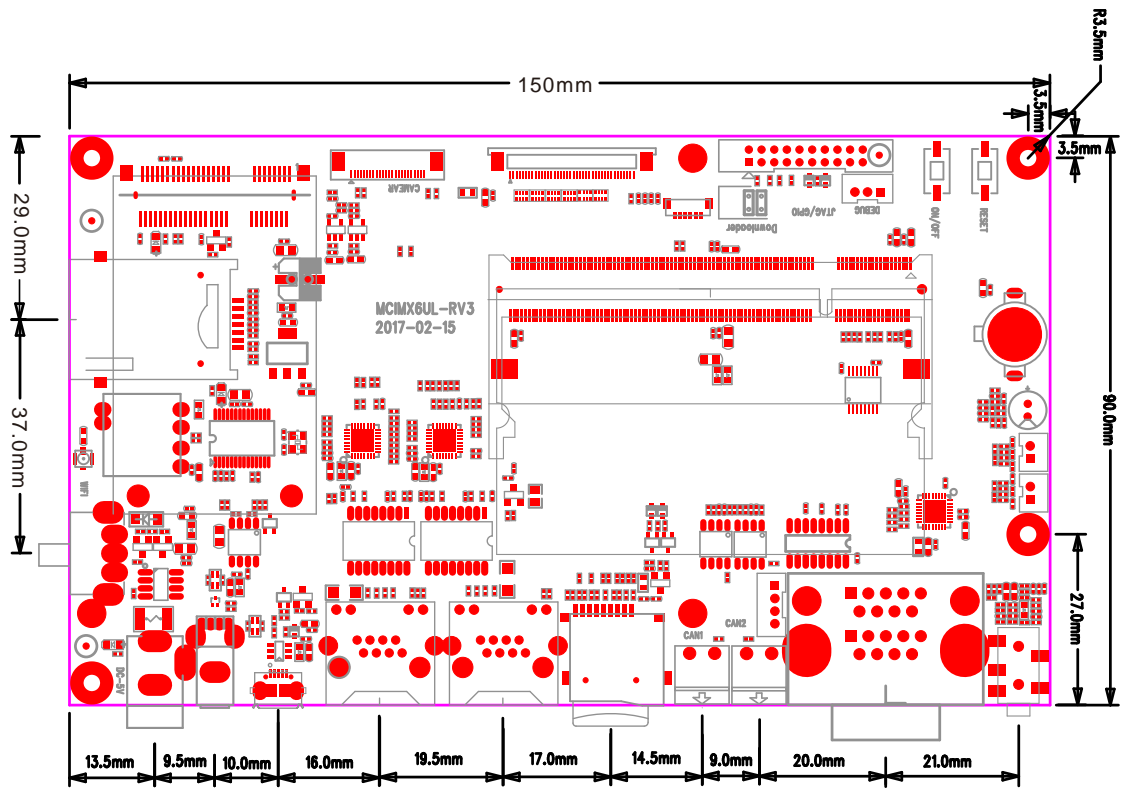
Feature	Specifications
CPU	NXP i.MX 6ULL Cortex-A7 @528 MHz
RAM	512MB DDR3L
storage	4GB eMMC



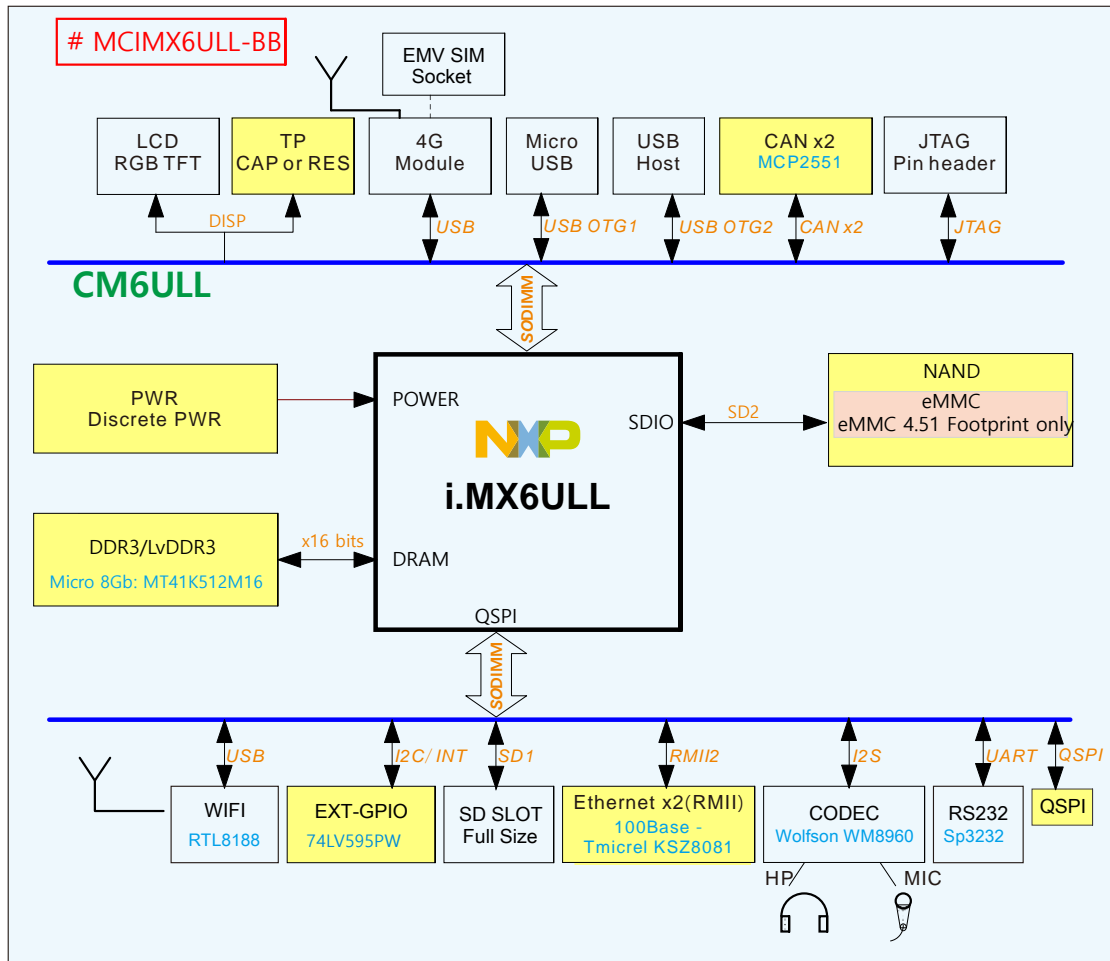
Serial Port	1x 3Pin debug serial port; 1x 4Pin UART; 2x DB9 UARTs.
LCD	40pin FPC, 6pin Capacitive touch screen connector. Support 4.3-/7-inch Res-touch screen, 4.3-inch Cap-touch screen.
USB	1x USB2.0 OTG, 1x USB2.0 Host
GPIO	1x 20Pin header. The functions include JTAG, QSPI and Boot mode selection.
Audio	<a href="#">WM8960G</a> chip. 3.5 mm audio stereo headset, support Audio in/out; L/R speaker connectors; Board-mounted microphone
SD	On-board 1x Micro SD card slot(baseboard)
Ethernet	2x 10/100 Mbit/s Ethernet, RJ45 connector. <a href="#">KSZ8081RNBCA</a> controller
WiFi	On-board WiFi module(optional), Realtek RTL8188EUS.
Camera	24Pin FPC connector
3G/4G	MINI PCI-E connector.
Switch	1x Power switch
Buttons	Reset, ON/OFF (software)
Dimension	Baseboard - 90 mm x 155mm; CPU board - 67.7mm x 30.0mm



### 1.3 PCB Dimension



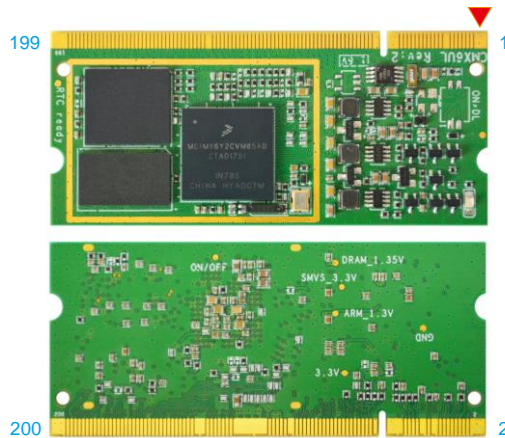
## 1.4 Block Diagram



## 1.5 Power Meter

Power	OS	Operation Temperature °C	Connected Devices	Electric Current (A)
5V/2A	Linux 4.1.15	Room Temperature (22°C -27°C)	5V power	0.24
			Power, 4.3-inch resistive screen	0.34
			Power, SD card, play audio, U-disk, Debug serial, Ethernet, 4.3-inch LCD, Headphone, MIC, CAN, 1x Speaker	0.46

## 1.6 CPU Introduction



The small and energy-efficient ARM-based module CM6ULL provides maximum performance in low-power, space constrained embedded environments. It is designed specifically for Electronics Point-of-Sale device, Telematics, IoT Gateway, Access control panels, Human Machine Interfaces (HMI) and Smart appliances.

### CM6ULL specifications

**Pin number** – 200 pins

**Dimension** – 67.7mm x 30.0mm

**Layer** – 4 Layers

**Power supply** – DC 5V

**Connector** – SO-DIMM200 card edge interface

### B2B Connector Specification



### Pin Definition

□ Front side    ■ Back side

Pin	Signal	Description	IO Voltage
1	GND	Ground	0V
2	GND	Ground	0V





3	PMIC_STBY_REQ	When the processor enters SUSPEND mode, it will assert this signal.	3.3V
4	MX6_POR_B	Processor reset single	3.3V
5	PMIC_ON_REQ	Active high power-up request output from iMX6UL SoC	3.3V
6	NC		
7	BOOT_MODE1	BOOT MODE1	3.3V
8	VDD_COIN_3V	COIN battery power	3.0V
9	BOOT_MODE0	BOOT MODE0	3.3V
10	SNVS_TAMPER9	Secure Non-Volatile Storage tamper	3.3V
11	USB_OTG2_VBUS	USB2 OTG VBUS	5.0V
12	SNVS_TAMPER5	Secure Non-Volatile Storage tamper	3.3V
13	USB_OTG1_VBUS	USB1 OTG VBUS	3.3V
14	ON/OFF	PMC ON/OFF switch	3.3V
15	GND	Ground	0V
16	POR_B	Power on reset	3.3V
17	GND	Ground	0V
18	SNVS_TAMPER8	Secure Non-Volatile Storage tamper	3.3V
19	USB_OTG2_DP	USB2 data positive	3.3V
20	GND	Ground	0V
21	USB_OTG2_DN	USB2 data negative	3.3V
22	GND	Ground	0V
23	GND	Ground	0V
24	SNVS_TAMPER7	Secure Non-Volatile Storage tamper	3.3V
25	USB_OTG1_DP	USB1 data positive	3.3V
26	GND	Ground	0V
27	USB_OTG1_DN	USB1 data negative	3.3V
28	GND	Ground	0V
29	GND	Ground	0V
30	SNVS_TAMPER4	Secure Non-Volatile Storage tamper	3.3V
31	NC		
32	SNVS_TAMPER1	Secure Non-Volatile Storage tamper	3.3V
33	SPDIF_TX/ spdif.OUT	Sony/Philips Digital Interface OUT	3.3V
34	SNVS_TAMPER3	Secure Non-Volatile Storage tamper	3.3V
35	GND	Ground	0V
36	SNVS_TAMPER0	Secure Non-Volatile Storage tamper	3.3V
37	NC		
38	GND	Ground	0V
39	RTC_CLKOUT	RTC clock output	3.3V
40	GND	Ground	0V
41	GND	Ground	0V
42	SNVS_TAMPER6	Secure Non-Volatile Storage tamper	3.3V



43	JTAG_TDI	JTAG data in	3.3V
44	SNVS_TAMPER2	Secure Non-Volatile Storage tamper	3.3V
45	BLT_PWM	Backlight PWM	3.3V
46	JTAG_TMS	JTAG mode select	3.3V
47	USB_OTG1_PWR	USB OTG power	3.3V
48	JTAG_nTRST	JTAG reset	3.3V
49	SD1_VSELECT	SD Voltage select	3.3V
50	GND	Ground	0V
51	GND	Ground	0V
52	JTAG_TDO	JTAG data output	3.3V
53	ENET_MDC	Ethernet Management Clock Reference	3.3V
54	JTAG_TCK	JTAG clock	3.3V
55	USB_OTG2_OC	USB OTG over-current	3.3V
56	SD1_nRST	SD1 card reset	3.3V
57	UART1_TXD	UART1 output	3.3V
58	USB_OTG2_PWR	USB OTG power	3.3V
59	GND	Ground	0V
60	GND	Ground	0V
61	ENET_MDIO	Ethernet Management Data I/O	3.3V
62	USB_OTG1_OC	USB OTG over-current	3.3V
63	UART1_RXD	UART1 input	3.3V
64	USB_OTG1_ID	USB1_OTG_ID	3.3V
65	UART2_TXD	UART2 output	3.3V
66	UART1_CTS	UART1 Clear to Send	
67	UART2_RXD	UART2 input	3.3V
68	UART5_RXD	UART5 input	3.3V
69	UART3_TXD	UART3 output	3.3V
70	GND	Ground	0V
71	GND	Ground	0V
72	UART2_CTS	UART2 Clear to Send	3.3V
73	UART3_RXD	UART3 input	3.3V
74	UART1_RTS	UART1 Request to Send	3.3V
75	UART4_TXD	UART4 output	3.3V
76	UART3_CTS	UART3 Clear to Send	3.3V
77	UART4_RXD	UART4 input	3.3V
78	UART2_RTS	UART2 Request to Send	3.3V
79	UART5_TXD	UART5 output	3.3V
80	UART3_RTS	UART3 Request to Send	3.3V
81	GND	Ground	0V
82	GND	Ground	0V
83	NC		
84	GND	Ground	0V



85	VEXT_3V3	Output to baseboard 3.3V	3.3V
86	NC		
87	VEXT_3V3	Output to baseboard 3.3V	3.3V
88	VEXT_3V3	Output to baseboard 3.3V	3.3V
89	VEXT_3V3	Output to baseboard 3.3V	3.3V
90	VEXT_3V3	Output to baseboard 3.3V	3.3V
91	VEXT_3V3	Output to baseboard 3.3V	3.3V
92	VEXT_3V3	Output to baseboard 3.3V	3.3V
93	VEXT_3V3	Output to baseboard 3.3V	3.3V
94	NC		
95	NC		
96	VSYS	POWER input	5V
97	ENET1_RXD0	Ethernet1 input data0	3.3V
98	VSYS	POWER input	5V
99	ENET1_RXD1	Ethernet1 input data1	3.3V
100	VSYS	POWER input	5V
101	ENET1_CRSDV	Ethernet1 input enable	3.3V
102	VSYS	POWER input	5V
103	GND	Ground	0V
104	VSYS	POWER input	5V
105	ENET2_TX_CLK	Ethernet2 output clock	3.3V
106	VSYS	POWER input	5V
107	GND	Ground	0V
108	VSYS	POWER input	5V
109	ENET2_RXER	Ethernet2 input enable	3.3V
110	VSYS	POWER input	5V
111	ENET2_RXD0	Ethernet2 input data0	3.3V
112	VSYS	POWER input	5V
113	ENET2_RXD1	Ethernet2 input data1	3.3V
114	ENET1_TXEN	Ethernet1 output enable	3.3V
115	GND	Ground	0V
116	GND	Ground	0V
117	ENET2_CRSDV	Ethernet2 input enable	3.3V
118	ENET1_TX_CLK	Ethernet1 output clock	3.3V
119	ENET2_TXD1	Ethernet2 output data1	3.3V
120	GND	Ground	0V
121	ENET2_TXEN	Ethernet2 output enable	0V
122	ENET1_TXD0	Ethernet1 output data0	3.3V
123	ENET2_TXD0	Ethernet2 output data0	3.3V
124	ENET1_TXD1	Ethernet1 output data1	3.3V
125	GND	Ground	0V
126	ENET1_RXER	Ethernet1 input enable	3.3V
127	GND	Ground	0V



128	GND	Ground	0V
129	LCD_DATA21	LCD DATA21	3.3V
130	GND	Ground	0V
131	LCD_DATA22	LCD DATA22	3.3V
132	GND	Ground	0V
133	LCD_DATA17	LCD DATA17	3.3V
134	LCD_DATA23	LCD DATA23	3.3V
135	GND	Ground	0V
136	GND	Ground	0V
137	LCD_DATA18	LCD DATA18	3.3V
138	LCD_DATA19	LCD DATA19	3.3V
139	LCD_DATA13	LCD DATA13	3.3V
140	LCD_DATA20	LCD DATA20	3.3V
141	LCD_DATA14	LCD DATA14	3.3V
142	LCD_DATA15	LCD DATA15	3.3V
143	LCD_DATA8	LCD DATA8	3.3V
144	LCD_DATA16	LCD DATA16	3.3V
145	LCD_DATA9	LCD DATA9	3.3V
146	GND	Ground	0V
147	GND	Ground	0V
148	LCD_DATA11	LCD DATA11	3.3V
149	LCD_DATA5	LCD DATA5	3.3V
150	LCD_DATA12	LCD DATA12	3.3V
151	LCD_DATA6	LCD DATA6	3.3V
152	LCD_DATA10	LCD DATA10	3.3V
153	LCD_DATA0	LCD DATA0	3.3V
154	LCD_DATA3	LCD DATA3	3.3V
155	LCD_DATA1	LCD DATA1	3.3V
156	GND	Ground	0V
157	LCD_RST	LCD reset	3.3V
158	LCD_DATA4	LCD DATA4	3.3V
159	GND	Ground	0V
160	LCD_HSYNC	LCD Horizontal Sync	3.3V
161	LCD_PCLK	LCD Pixel Clock	3.3V
162	LCD_VSYNC	LCD Vertical Sync	3.3V
163	LCD_DE	LCD Data Enable	3.3V
164	LCD_DATA2	LCD DATA2	3.3V
165	GND	Ground	0V
166	LCD_DATA7	LCD DATA7	3.3V
167	SD1_DATA0	SD1 DATA0	3.3V
168	GND	Ground	0V
169	SD1_DATA3	SD1 DATA3	3.3V
170	QSPIA_nSS0	QSPIA chip select0	3.3V

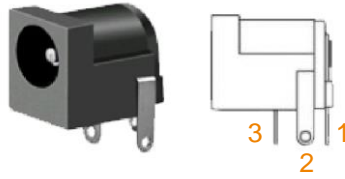


171	SD1_DATA1	SD1 DATA1	3.3V
172	QSPIA_DATA0	QSPIA DATA0	3.3V
173	SD1_CMD	SD1 command	3.3V
174	QSPIA_DATA3	QSPIA DATA3	3.3V
175	SD1_DATA2	SD1 DATA2	3.3V
176	QSPIA_DATA2	QSPIA DATA2	3.3V
177	GND	Ground	0V
178	QSPIA_DATA1	QSPIA DATA1	3.3V
179	SD1_CLK	SD1 clock	3.3V
180	GND	Ground	0V
181	GND	Ground	0V
182	QSPIA_SCLK	QSPIA clock	3.3V
183	CSI_PIXCLK	CSI Pixel Clock	3.3V
184	GND	Ground	0V
185	GND	Ground	0V
186	CSI_DATA6	CSI DATA6	3.3V
187	CSI_MCLK	CSI Main clock	3.3V
188	CSI_DATA7	CSI DATA7	3.3V
189	GND	Ground	0V
190	CSI_DATA5	CSI DATA5	3.3V
191	CSI_DATA4	CSI DATA4	3.3V
192	CSI_DATA3	CSI DATA3	3.3V
193	CSI_DATA1	CSI DATA1	3.3V
194	CSI_DATA2	CSI DATA2	3.3V
195	CSI_DATA0	CSI DATA0	3.3V
196	NVCC_CSI	CSI interface power	3.3V
197	CSI_HSYNC	CSI Horizontal Sync	3.3V
198	CSI_VSYNC	CSI Vertical Hold	3.3V
199	GND	Ground	0V
200	GND	Ground	0V

## 2 Peripherals Introduction

### 2.1 Power (J6)

DC 5V/2A power input.



Pin	Signal	Description	Pin	Signal	Description
1	VDD 5V	5V power in	2	GND	Ground
3	GND	Ground			

## 2.2 RTC (BT1)



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

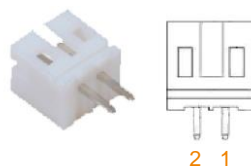
## 2.3 Audio (J3, J4, J5, P4)

The EM6ull adopts Wolfson audio codec WM8960, which is a low power, high quality stereo codec designed for portable digital audio applications. The 3.5mm Headphone (PJ327F) supports two-channel audio output.



Headphone (J3)					
Pin	Signal	Description	Pin	Signal	Description
2	MIC	Microphone Input	3	GND	Ground
4	HP_DET	Headphone Detection	5	LOUT	Left Channel Output
6	ROUT	Right Channel Output			

EM6ull features 2x 2-Pin connectors (white) for Speakers. The SPK and headphone sync output is supported.



Speaker Right (J4)					
Pin	Signal	Description	Pin	Signal	Description
1	SPK_RN	Speaker output negative, right channel	2	SPK_RP	Speaker output positive, right channel
Speaker Left (J5)					
Pin	Signal	Description	Pin	Signal	Description
1	SPK_LN	Speaker output negative, left channel	2	SPK_LP	Speaker output positive, left channel

The MIC model is EM6022P. It is used for recording.



MIC (P4)					
Pin	Signal	Description	Pin	Signal	Description
1	MICBIAS	Microphone Bias, MIC in	2	GND	Ground

#### Note

If recording via Headset (J3), it supports 2-channels output, but only one channel output recording through MIC (Channel Right). This is limited by audio chip.

## 2.4 CAN (P2, P3)

EM6ull supports 2x CAN connectors for data exchange.

#### Features

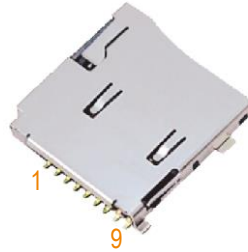
- Compliant with the CAN 2.0B protocol specification
- Programmable bit rate up to 1 Mb/sec



CAN1(P2)					
Pin	Signal	Description	Pin	Signal	Description
1	CAN1_L	CAN1 Low	2	CAN1_H	CAN1 High
CAN2(P3)					
Pin	Signal	Description	Pin	Signal	Description
1	CAN2_L	CAN2 Low	2	CAN2_H	CAN2 High

## 2.5 Micro SD (J10)

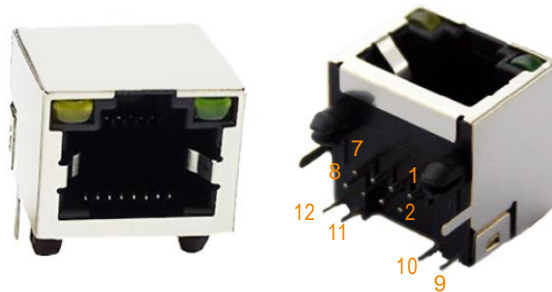
The Micro SD card is used as an external storage device. The MMC controller interface supports 4-bit transfer modes.



Pin	Signal	Description	Pin	Signal	Description
1	SD1_DATA2	Data 2	2	SD1_DATA3	Data 3
3	SD1_CMD	Command signal	4	VSD_3V3	DC 3.3V
5	SD1_CLK	Interface Clock	6	GND	Power Ground
7	SD1_DATA0	Data 0	8	SD1_DATA1	Data 1
9	SD1_CD	Card Detect			

## 2.6 Ethernet (P5, P6)

EM6ull incorporates 2x full-featured 10/100M Ethernet ports for network connection using KSZ8081RNB PHY.



### Features

- 10/100 BASE-T IEEE 802.3 compliant
- IEEE 802.3u compliant Auto-Negotiation
- Automatic channel swap (ACS)
- Full- and Half-duplex
- Automatic MDI/MDIX crossover
- Automatic polarity correction
- Activity and speed indicator LED controls

P5					
Pin	Signal	Description	Pin	Signal	Description
1	TXP	Transmit signal +	2	TXN	Transmit signal -
3	RXP	Receive signal +	4	RXC	Bi-directional Data



5	RXC	Bi-directional Data	6	RXN	Receive signal -
7	RXC	Bi-directional Data	8	RXC	Bi-directional Data
9	ENET1_LED0/NWAYEN	Link activity	10	VENET_3V3	DC 3.3V
11	ENET1_LED1/SPEED	Network speed	12	VENET_3V3	DC 3.3V
P6					
Pin	Signal	Description	Pin	Signal	Description
1	TXP	Data send +	2	TXN	Data send -
3	RXP	Data receive +	4	RXC	Bi-directional Data
5	RXC	Bi-directional Data	6	RXN	Data receive -
7	RXC	Bi-directional Data	8	RXC	Bi-directional Data
9	ENET2_LED0/NWAYEN	Link activity	10	VENET_3V3	DC 3.3V
11	ENET2_LED1/SPEED	Network speed	12	VENET_3V3	DC 3.3V

## 2.7 USB OTG (J2)

The OTG is used to download image.

### Features

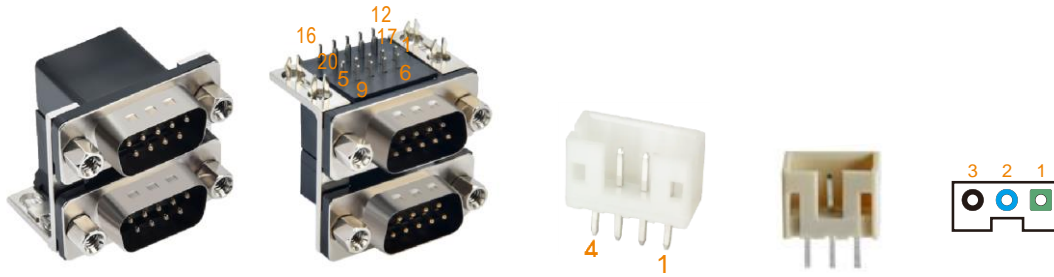
- Supports USB 2.0 High Speed (480 Mbps) and Full Speed (12 Mbps) modes.
- Hardware support for OTG signaling, session request protocol.



Pin	Signal	Description	Pin	Signal	Description
1	USB_OTG_VBUS	5V power supply	2	USB_OTG1_DN	OTG data -
3	USB_OTG1_DP	OTG data+	4	USB_OTG1_ID	OTG detect
5	GND	Ground			

## 2.8 UART

EM6ull features 3x UART (Universal Asynchronous Receiver/Transmitter). COM1 is a Dual-DB9 connector for UART2&UART3(via an RS-232 Transceiver). J11 shares signal (UART2) with COM1. And UART1 is designated as the Debug signals.

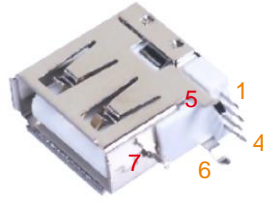


Pin	Signal	Description	Pin	Signal	Description
1			2		
3			4		

COM1			
Signal	Description	Pin	Defaults Function
UART1_TXD	UART1 output	57	UART1_TXD
UART1_RXD	UART1 input	63	UART1_RXD
UART1_CTS	UART1 Clear to Send	66	UART1_CTS
UART1_RTS	UART1 Request to Send	74	UART1_RTS
UART2_TXD	UART2 output	65	UART2_TXD
UART2_RXD	UART2 input	67	UART2_RXD
UART2_CTS	UART2 Clear to Send	72	UART2_CTS
UART2_RTS	UART2 Request to Send	78	UART2_RTS
UART3_TXD	UART3 output	69	UART3_TXD
UART3_RXD	UART3 input	73	UART3_RXD
UART3_CTS	UART3 Clear to Send	76	UART3_CTS
UART3_RTS	UART3 Request to Send	80	UART3_RTS
UART4_TXD	UART4 output	75	UART4_TXD
UART4_RXD	UART4 input	77	UART4_RXD
uart4.RTS_B	UART4 Request to Send	162	LCD_VSYNC
uart4.CTS_B	UART4 Clear to Send	160	LCD_HSYNC

## 2.9 USB Host (P1)

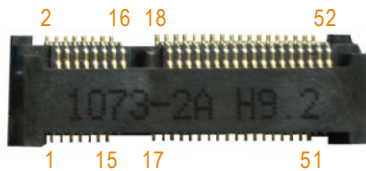
The EM6ull implements one USB 2.0 interfaces and supports High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) modes.



Pin	Signal	Description	Pin	Signal	Description
1	USB_HOST_VBUS	DC 5V	2	USB_HOST_DN	USB data-
3	USB_HOST_DP	USB Data+	4	GND	Ground
5	GND	Ground	6	GND	Ground
7	GND	Ground			

## 2.10 PCIe & SIM Slot (CON2, P8)

CON2(MINI PCI-E) is an on-board 3G/4G module connector.



PCIe (CON2)							
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	NC	2	3GVCC	3	NC	4	GND
5	NC	6	NC	7	NC	8	SIM_VCC
9	GND	10	SIM_DATA	11	NC	12	SIM_CLK
13	NC	14	SIM_RST	15	GND	16	NC
17	NC	18	GND	19	NC	20	3GVCC
21	GND	22	3G_PWEN	23	NC	24	3GVCC
25	NC	26	GND	27	GND	28	NC
29	GND	30	NC	31	NC	32	NC
33	NC	34	GND	35	GND	36	USB_DM2
37	GND	38	USB_DP2	39	3GVCC	40	GND
41	3GVCC	42	LED_WWAN	43	GND	44	NC
45	NC	46	NC	47	NC	48	NC
49	NC	50	GND	51	NC	52	3GVCC

P8 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.



SIM Card slot (P4)					
Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	Clock	2	SIM_DATA	Send/Receive data
3	SIM_RST	Reset	4	SIM_VCC	Power supply
5	SIM_VCC	Power supply	6	GND	Ground
7	GND	Ground	8	GND	Ground
9	NC	Not connect			

## 2.11 Camera (CON3)

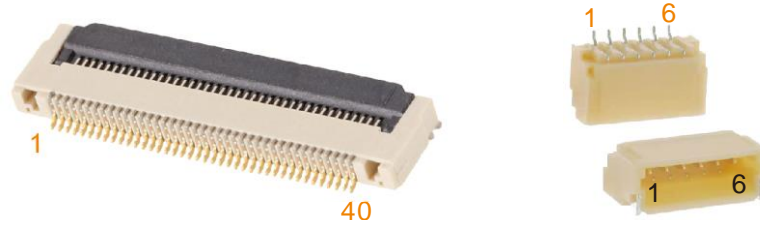
EM6ull adopts a 24-pin FPC as the camera connector. It can be connected to CMOS camera module.



Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	GND	Ground
3	I2C2_SDA	I2C Serial data	4	AVDD_2V8	Analog power supply for CSI
5	I2C2_SCL	I2C Serial clock	6	CSI_RST	CSI reset
7	CSI_VSYNC	CSI vertical SYNC	8	CSI_PWDN	CSI power down input, active high
9	CSI_HSYNC	CSI Horizontal SYNC	10	CAM_CORE	1.8V Voltage for camera
11	DVDD_1V8	Power supply for CSI	12	CSI_DATA7	CSI data bit 7
13	CSI_MCLK	CSI Master clock	14	CSI_CATA6	CSI data bit 6
15	GND	Ground	16	CSI_DATA5	CSI data bit 5
17	CSI_PIXCLK	CSI pixel clock	18	CSI_DATA4	CSI data bit 4
19	CSI_DATA0	CSI data bit 4	20	CSI_DATA3	CSI data bit 3
21	CSI_DATA1	CSI data bit 1	22	CSI_DATA2	CSI data bit 2
23	NC	Not connect	24	NC	Not connect

## 2.12 LCD & TP (J21/CON4)

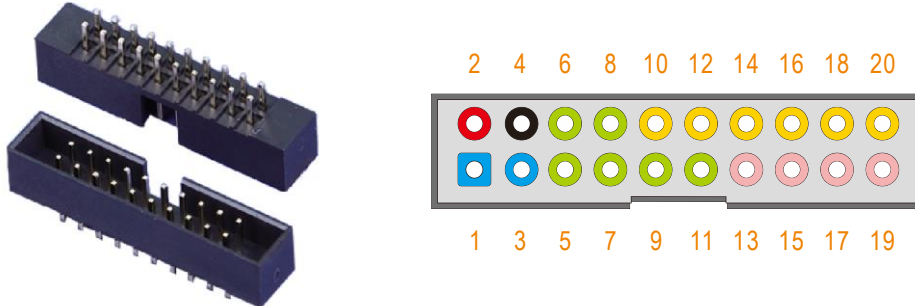
On-board 40pin FPC connector for LCD and 6pin connector for Capacitive touch panel. The development board comes with drivers for 4.3" and 7" resistive LCD.



J21					
Pin	Signal	Description	Pin	Signal	Description
1	LCD5V	Supply voltage for LCD	2	LCD5V	Supply voltage for LCD
3	B0	Blue Data signal 0	4	B1	Blue Data signal 1
5	B2	Blue Data signal 2	6	B3	Blue Data signal 3
7	B4	Blue Data signal 4	8	B5	Blue Data signal 5
9	B6	Blue Data signal 6	10	B7	Blue Data signal 7
11	GND	Ground	12	G0	Green Data signal 0
13	G1	Green Data signal 1	14	G2	Green Data signal 2
15	G3	Green Data signal 3	16	G4	Green Data signal 4
17	G5	Green Data signal 5	18	G6	Green Data signal 6
19	G7	Green Data signal 7	20	GND	Ground
21	R0	Red Data signal 0	22	R1	Red Data signal 1
23	R2	Red Data signal 2	24	R3	Red Data signal 3
25	R4	Red Data signal 4	26	R5	Red Data signal 5
27	R6	Red Data signal 6	28	R7	Red Data signal 7
29	GND	Ground	30	BLT_PWM	PWM control backlight
31	GND	Ground	32	GND	Ground
33	LCD_DE	Data Enable signal	34	LCD_VSYNC	Vertical Sync
35	LCD_HSYNC	Horizontal Sync	36	LCD_PCLK	Pixel Clock
37	xnur	Touch Signal. X-axis right -	38	xpul	Touch Signal. X-axis left +
39	ynlr	Touch Signal. Y-axis right -	40	ypll	Touch Signal Y-axis left +
CON4					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	I2C1_SCL	I2C Serial clock
3	CTP_RST	Cap-touch reset	4	I2C1_SDA	I2C Serial data
5	LCD_INT	LCD interrupt	6	DCDC_3V3	3.3V power supply

## 2.13 JTAG/GPIO (J8)

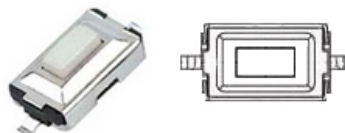
The JTAG/GPIO is a 20-pin header connector. The pins can be defined as data input/output or Interrupt.



Pin	Signal	Description	Pin	Signal	Description
1	BOOT_MODE0/ SHIFT_SDI	Boot mode0/ shift serial data input	2	DCDC_3V3	Supply voltage. DC 3.3V
3	BOOT_MODE1/ SHIFT_SHCP	Boot mode1/ shift register clock input	4	GND	Ground
5	JTAG_TDI	Test data input	6	JTAG_nTRST	Test Reset
7	JTAG_TMS	Test mode select	8	JTAG_nSRST	System Reset
9	JTAG_TCK	Test Clock	10	NAND_nWP/ QSPIA_SCLK	Nand Write Protect / QSPIA Serial Clock
11	JTAG_TDO	Test data output	12	NAND_Nready/ QSPIA_DATA0	Nand Ready/ QSPIA data 0
13	UART2_RXD	Receive data	14	NAND_nCE0/ QSPIA_DATA1	Nand Chip select bit 0 / QSPIA data1
15	UART2_TXD	Transmit Data	16	NAND_nCE1/ QSPIA_DATA2	Nand Chip select bit 1 / QSPIA data2
17	UART2_RTS_BB	Request to Send	18	NAND_CLE/ QSPIA_DATA3	Command Latch Enable / QSPIA data3
19	UART2_CTS_BB	Clear to Send	20	NAND_DQS/ QSPIA_nSS0	Nand DDR clock signal/ QSPIA slave select0

## 2.14 Buttons (K1, K2)

On-board 2x buttons.



Button	Function	Button	Function
K1	Power ON/OFF	K2	Reset

## 2.15 Serial Port – Debug (J7)

EM6ull provides a serial port for debugging. It is a USB to serial connector, the serial model is PL2302.



Pin	Signal	Description	Pin	Signal	Description
1	UART1_RXD	Receive Data	2	UART1_TXD	Transmit Data
3	GND	Ground			

## 2.16 WiFi (MU1)

The WiFi module is RTL8188EUS.

### Features

WLAN Standards: IEEE 802 Part 11b/g (802.11b/g)

Antenna Port: One antenna port support 802.11b/g

Coexistence: Hardware signaling

Frequency Band: 2.400 ~ 2.484 GHz



Pin	Signal	Description	Pin	Signal	Description
1	DCDC_3V3	WiFi Power Supply	2	USB_DM4	USB Device Data -
3	USB_DP4	USB Device Data +	4	GND	Ground
5	GND	Ground	6	RF	Receive Frame Sync

## 3 Product Configurations

### 3.1 Standard Contents

NO.	Item	Qty. (PCS)	Description
1	EM6ull board	1	Standard Content (512MB RAM, 4GB eMMC)
2	CD-ROM	1	Linux BSP, Documents, tools, Schematic Drawing, datasheets
3	Ethernet cable	1	
4	Serial Cable	1	CP2102
5	USB Cable	1	Micro USB
6	Power adaptor	1	5V/2A DC

### 3.2 Optional Parts

NO.	Item	Description
1	WiFi Module	RTL8188EUS
2	3G/4G Module	3G – MU709S-2, 4G – EC20
3	LCD	4.3-, 7-inch resistive touch panel, 4.3-inch capacitive touch panel