

EMA40i Reference User Manual

V1.1 202205



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.

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1 EMA40i Introduction

1.1 Summary

EMA40i is a single board computer featuring an Allwinner A40i Processor, comes with 1GB DDR3 RAM, 8GB eMMC, and other rich interfaces specifically designed for intelligent industrial control applications such as industrial control, communications and measurement.

EMA40i provides a standard Gigabit Ethernet port and a 10-pin Extra GbE port. Supports HDMI 1.4, RGB, MIPI SDI and dual-LVDS output. The SBC is equipped with a microSD slot and a M.2 slot with NVME SSD support. A mini-PCIe slot supports 4G module and is accompanied by a Nano-SIM slot. Other features include 2x dual-USB 2.0 host ports, USB2.0 OTG, RS232 DB9 port, 4x 4-pin headers for RS232, UART(TTL) and USB host.

EMA40i is equipped with WiFi 802.11b/g/n and Bluetooth 4.0, as well as optional support for GPS, 4G LTE connectivity.

1.2 A40i Features

- **CPU**

Quad-core ARM Cortex-A7 CPU Architecture, the most power efficient CPU core ARM's ever developed.

- **GPU**

Mali400 MP2

- **Video Engine**

Supports mainstream high-definition video decoding including H.264, H.263, MPEG1/2/4, xvid, Sorenson Spark, VP6/8, AVS/AVS+, WMV7, WMV8 by 1080p@60fps. In the aspect of video encoding, the A40i supports 1080p@45fps H.264 encoding ability.

- **Camera**

Supports dual COMS sensor parallel interfaces and 4-channel TVIN, which can easily finish multi channel video recording.

- **Display**

Content can be display on 4-lane MIPI DSI display, or RGB panel, or LVDS panel. TV-out on HDMI V1.4 is also supported.

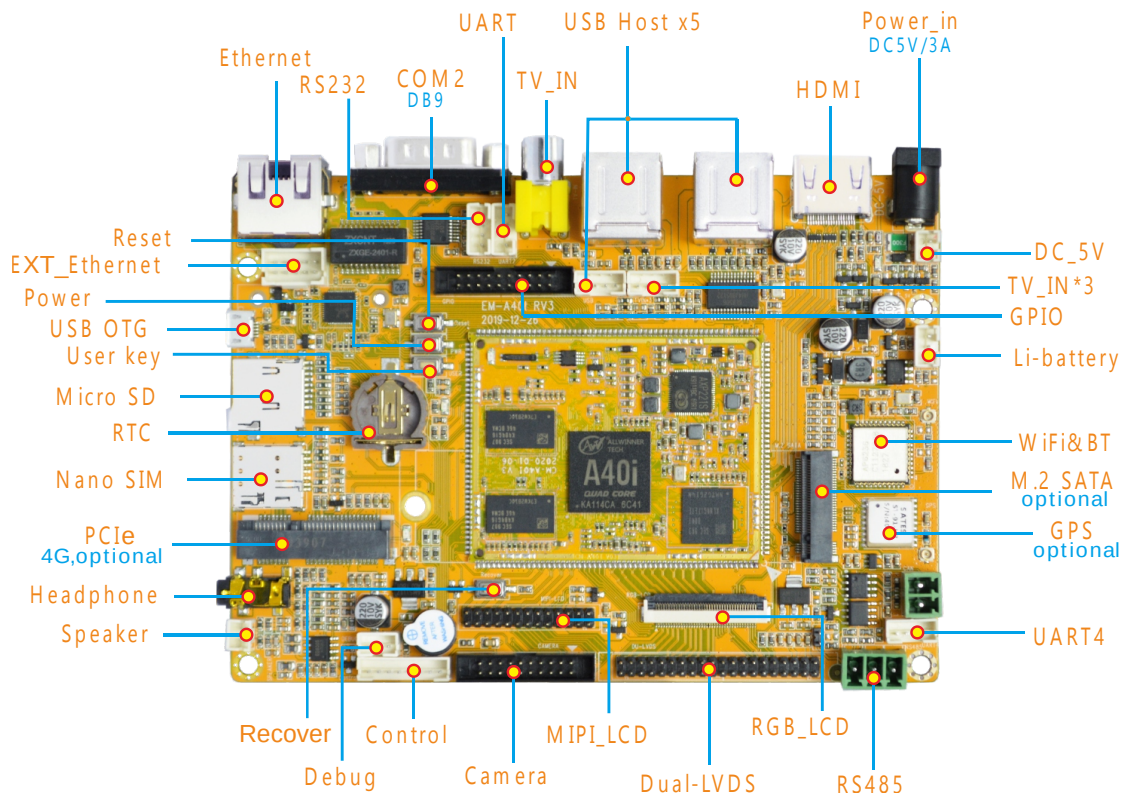
- **Audio**

Integrated audio codec with 24 bit/192kHz DAC playback, and supports I2S/PCM interface for Connecting to an external audio codec. I2C/PCM interface includes eight channels of TDM with sampling precision up to 32 bit/192kHz.

- **Memory**

Supports external memory interface to NAND Flash, SD/EMMC, Nor Flash and SDRAM port. SDRAM. port can be configured to support LPDDR2, LPDDR3, DDR2, DDR3, and DDR3L.

1.3 EMA40i Specifications

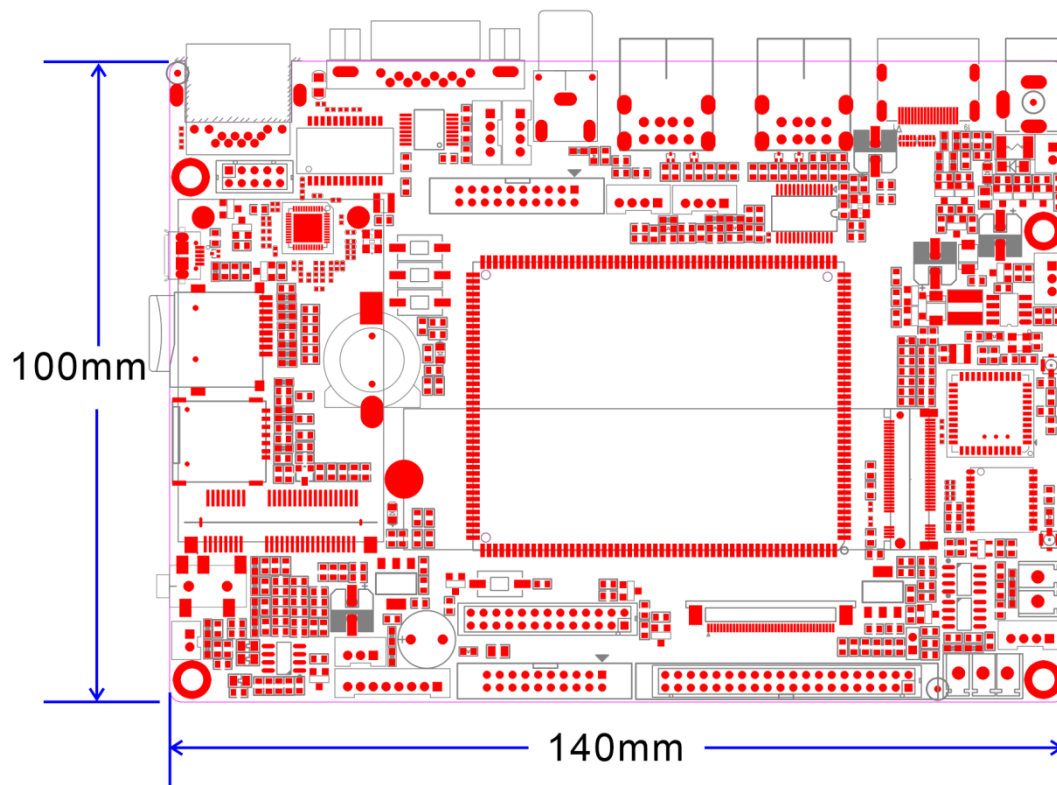


Feature	Specifications
CPU	Quad-core ARM Cortex-A7 MPCore Processor
GPU	- Mali400 MP2 GPU - Support OpenGL ES 2.0 / OpenVG 1.1 standard
Memory	1GB DDR3/DDR3L
iNAND	8GB eMMC
Power	DC 5V or 3.7V Li-Battery
Ethernet	1000M Ethernet (RTL8211E), RJ45/10-pin header interface
UART	5x UARTs, include 2x RS232 (DB9&4-pin header), 2x TTL(4-pin headers), 1x UART for Debug
TV-IN	4-ch TV in. 1-ch via RCA 3-ch via 4-pin header
USB	4 Channel x USB2.0 Host (2x dual-USB Host, 1x 4-pin header), 1x USB2.0 OTG
HDMI	HDMI 1.4
RS485	1x 3-pin header
SD	Micro SD slot
Audio	Support Audio I/O.



	1x 3.5mm jack for headphone; 1x 2-pin header for Speaker.
LCD	1x 40pin Dual-channel LVDS; 1x 40pin RGB; 1x MIPI DSI
RTC	3V battery, CR1220
WiFi&BT	Wireless-2.4GHz IEEE 802.11b/g/n, Bluetooth4.0
SATA(optional)	M.2 slot. NVME SSD
4G(optional)	52pins MINI PCI-E Socket
GPS(optional)	Ublox 7 GPS Chipset
Camera(optional)	20-pin header
Others	20-pin GPIO, 8-pin control
Dimension	140mm x 100mm

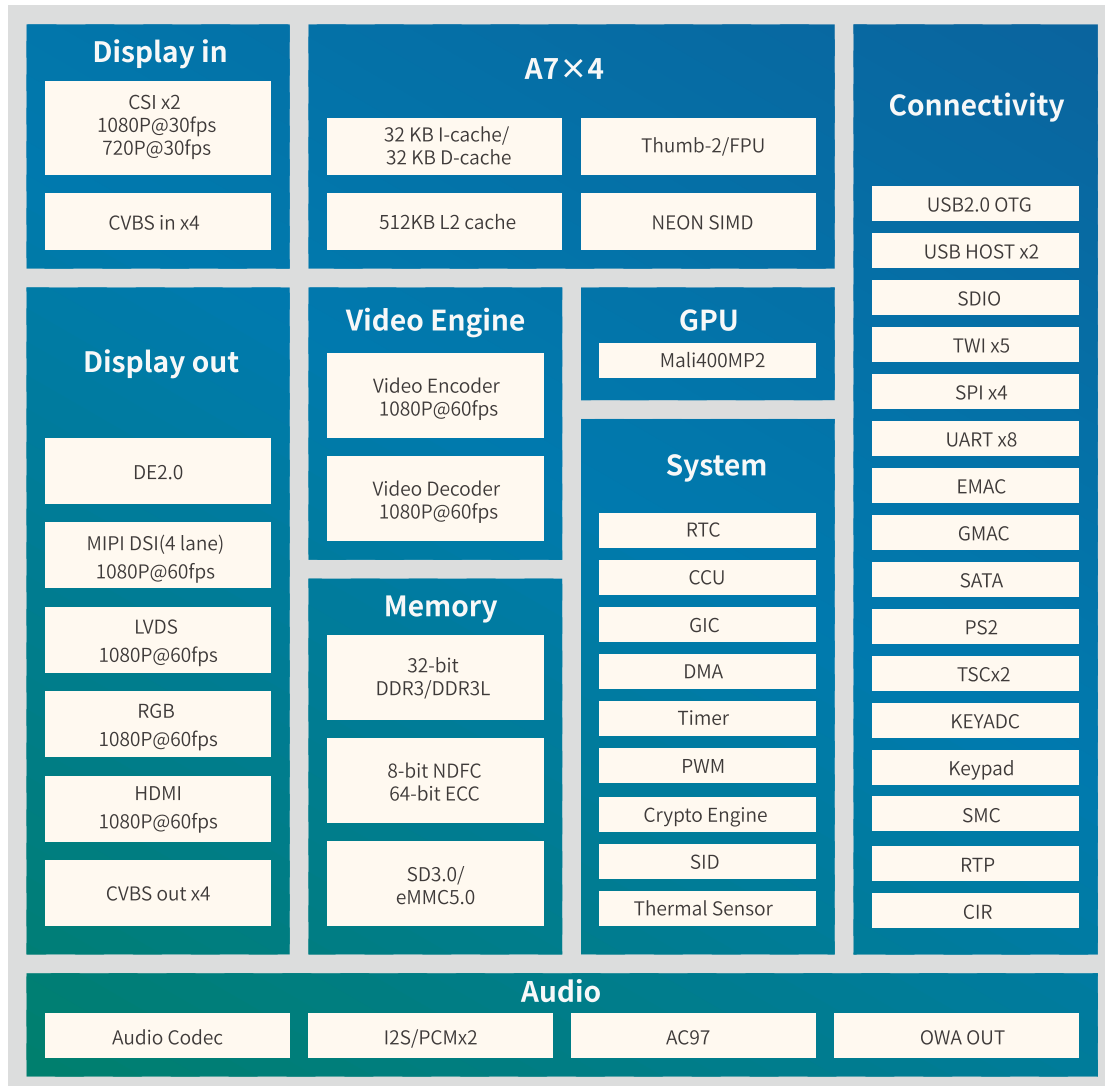
1.4 PCB Dimension



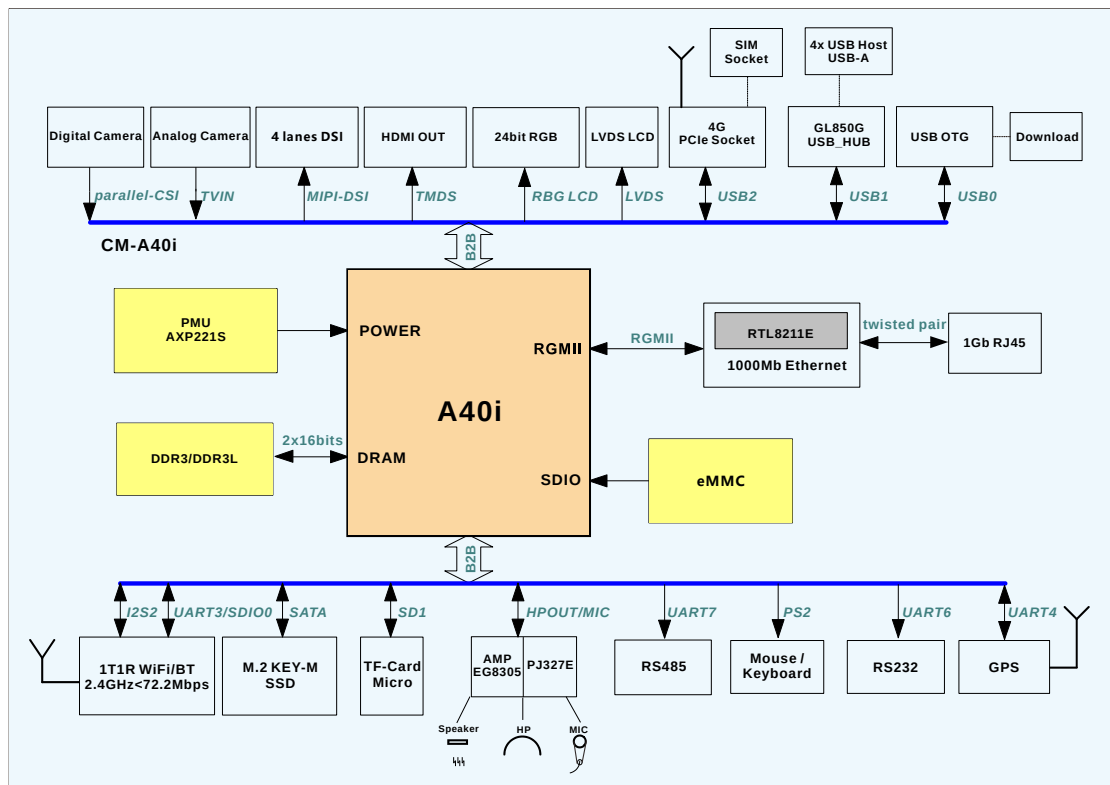


1.5 Block Diagram

A40i Block Diagram



EMA40I Block Diagram



1.6 Power Meter

Power	OS	Operation Temperature °C	Connected Devices	Electric Current (mA)
5V@3A	Android7.1.1	Normal	5V power, serial cable	300
			5V power, serial cable, 10.1" LVDS	710
			5V power, serial cable, 10.1" LVDS, ethernet, 4x USB, HDMI, SD, 4G, WIFI, GPS. Play 4K video	1140
5V@3A	Linux 3.10	Normal	5V power, serial cable	430
			5V power, serial cable, 10.1" LVDS	870
			5V power, serial cable, 10.1" LVDS, ethernet, 4x USB, HDMI, SD, 4G, WIFI, GPS. Play 4K video	1300

1.7 CPU Introduction



CM-A40I specifications

Pin number – 196pins

Dimension – 45 x 58mm

Layer – 8 Layers, complying with EMS/EMI

Preinstalled OS – Linux3.10 or Android7.1

Power supply – DC 5V or 3.7V Battery

Application – Industrial control, communications and measurement, etc.

CM-A40I Pin Definition

Pin	Signal	Description	Alternate functions	IO Voltage
1	KEYADC1	6bit ADC channel1		3.3V
2	KEYADC0	6bit ADC channel0		3.3V
3	FEL	Boot mode select: Low: download from USB, High: fast boot		3.3V
4	PD26/LCD0_HSYN C	LCD0 horizontal sync	GPIOD26/SMC_SL K	3.3V
5	PD27/LCD0_VSYN C	LCD0 vertical sync	GPIOD27/SMC_SD A	3.3V
6	USB-DP2	USB2 data +		3.3V
7	USB-DM2	USB2 data -		3.3V
8	USB-DP1	USB1 data +		3.3V
9	USB-DM1	USB1 data -		3.3V
10	USB-DP0	USB0 data +		3.3V
11	USB-DM0	USB0 data -		3.3V
12	PI4/SDC3_CMD	SDC3 command signal	GPIOI4	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
13	HTXCN	HDMI Clock -		1.8V
14	HTXCP	HDMI Clock +		1.8V
15	HTX0N	HDMI output data0-		1.8V
16	HTX0P	HDMI output data0+		1.8V
17	HTX1P	HDMI output data1+		1.8V
18	HTX1N	HDMI output data1-		1.8V
19	HTX2P	HDMI output data2+		1.8V
20	HTX2N	HDMI output data2-		1.8V
21	GND	Ground		0V
22	SATA-RXP	SATA input data+		2.5V
23	SATA-RXM	SATA input data-		2.5V
24	SATA-TXM	SATA output data-		2.5V
25	SATA-TXP	SATA output data+		2.5V
26	HHPD	HDMI hot plug detect		3.3V
27	HSDA	HDMI serial data(Need pull H)		3.3V
28	HSCL	HDMI serial clock(Need pull H)		3.3V
29	HCEC	HDMI consumer electronics control		3.3V
30	PC1/SPI0_MISO	SPI0 master data in, slave data out	GPIOC1	3.3V
31	PC2/SPI0_CLK	SPI0 clock signal	GPIOC2	3.3V
32	PC0/SPI0_MOSI	SPI0 master data out, slave data in	GPIOC0	3.3V
33	PC23/SPI0_CS0	SPI0 chip select signal 0(active low)	GPIOC23	3.3V
34	VCC_IO	Power 3.3V output(500mA limit)		3.3V
35	PF4/SDC0-D3	SDC0 DATA3	GPIOF4	3.3V
36	PF5/SDC0-D2	SDC0 DATA2	GPIOF5	3.3V
37	PF0/SDC0-D1	SDC0 DATA1	GPIOF0	3.3V
38	PF1/SDC0-D0	SDC0 DATA0	GPIOF1	3.3V
39	PF3/SDC0-CMD	SDC0 command signal	GPIOF3	3.3V
40	PF2/SDC0-CLK	SDC0 clock	GPIOF2	3.3V
41	RESET	System RESETn	For WD used	3.3V
42	BAT_TS	Battery temperature sensor input		3.5~4.2V
43	VBAT	Battery power input		3.5~4.2V
44	VBAT	Battery power input		3.5~4.2V
45	GND	Ground		0V
46	GND	Ground		0V
47	USBVBUS	USB VBUS power input		5V
48	VSYS	System power input 5V		4~5V



Pin	Signal	Description	Alternate functions	IO Voltage
49	VSYS	System power input 5V		4~5V
50	PE1/CSI0_MLCK	CSI0 master clock output	GPIOE1	3.3V
51	PE2/CSI0_HSYNC	CSI0 horizontal sync	GPIOE2	3.3V
52	PE3/CSI0_VSYNC	CSI0 vertical sync	GPIOE3	3.3V
53	PE0/CSI0_PCLK	CSI0 pixel clock input	GPIOE0	3.3V
54	PE11/CSI0_D7	CSI0 DATA7	GPIOE11	3.3V
55	PE10/CSI0_D6	CSI0 DATA6	GPIOE10	3.3V
56	PE9/CSI0_D5	CSI0 DATA5	GPIOE9	3.3V
57	PE8/CSI0_D4	CSI0 DATA4	GPIOE8	3.3V
58	PE7/CSI0_D3	CSI0 DATA3	GPIOE7	3.3V
59	PE6/CSI0_D2	CSI0 DATA2	GPIOE6	3.3V
60	PE5/CSI0_D1	CSI0 DATA1	GPIOE5	3.3V
61	PE4/CSI0_D0	CSI0 DATA0	GPIOE4	3.3V
62	PG3/CSI1_VSYNC		GPIOG3	3.3V
63	PG2/CSI1_HSYNC		GPIOG2	3.3V
64	PG0/CSI1_PCLK		GPIOG0	3.3V
65	PG1/CSI1_MLCK		GPIOG1	3.3V
66	PI13/UART6_RX	UART6 input data	GPIOI13	3.3V
67	PI12/UART6_TX	UART6 output data	GPIOI12	3.3V
68	PI11/UART5_RX	UART5 input data	GPIOI11	3.3V
69	PI10/UART5_TX	UART5 output data	GPIOI10	3.3V
70	PI16/SPI1_CS0	SPI1 chip select signal(active low)	GPIOI16	3.3V
71	PI14/EINT26	SPI0 chip select signal 1(active low)	GPIOI14	3.3V
72	PI17/SPI1_CLK	SPI1 clock signal	GPIOI17	3.3V
73	PI18/SPI1_MOSI	SPI1 master data out, slave data in	GPIOI18	3.3V
74	PI19/SPI1_MISO	SPI1 master data in, slave data out	GPIOI19	3.3V
75	PI20/UART7_TX/PWM2	UART7 output data or PS2_CLK0	GPIOI20/PWM2	3.3V
76	PI21/UART7_RX/PWM3	UART7 input data or PS2_DAT0	GPIOI21/PWM3	3.3V
77	VCC-RTC	RTC power output		1.8V~3.3V
78	RTC_CLKOUT	RTC clock(32.768khz) output		3.3V
79	POWER-KEY	Power on-off key input(active low)		3.3V
80	PI2/TWI4-SCK	I2C4 clock(Pull H 2K)	GPIOI2	3.3V
81	PI3/TWI4-SDA	I2C4 data(Pull H 2K)	GPIOI3	3.3V
82	PA17/ETXERR/I2S	MII ETXERR signal	GPIOA17 /I2S1_DI	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
	1_DI			
83	GCLKIN/PA16/ECOL/I2S1_DO	RGMII reference clock input(125Mhz)	GPIOA16/I2S1_DO/ECOL	3.3V
84	PA14/ETXCK/UART7_TX/I2S1_BCLK	MII transmit clock	UART7/I2S1 bit clock	3.3V
85	GTXCK	RGMII transmit clock	PA15/ECRS/UART7_RX/I2S1_LRCK	3.3V
86	GRXCK	RGMII receive clock or SPI3_MISO	ERXCK/SPI3_MISO/GPIOA8	3.3V
87	GMDIO	RGMII management data input/output	UART6_TX/UART1_RTS/GPIOA12	3.3V
88	GMDC	RGMII management data clock	UART1_RX/GPIOA11	3.3V
89	GRXD3	RGMII receive data3	UART2_RTS/SPI1_CS0/GPIOA0	3.3V
90	GRXD2	RGMII receive data2	UART2_CTS/SPI1_CLK/GPIOA1	3.3V
91	GRXD1	RGMII receive data1	UART2_TX/SPI1_MOSI/GPIOA2	3.3V
92	GRXD0	RGMII receive data0	UART2_RX/SPI1_MISO/GPIOA3	3.3V
93	GRXDV	RGMII receive control	UART1_TX/GPIOA10	3.3V
94	GTXD3	RGMII transmit data3	SPI1_CS1/GPIOA3	3.3V
95	GTXD2	RGMII TX data2 or SPI3CS0	SPI3_CS0/GPIOA5	3.3V
96	GTXD1	RGMII TX data1 or SPI3CLK	SPI3_CLK/GPIOA6	3.3V
97	GTXD0	RGMII TX data0 or SPI3MOSI	SPI3_MOSI/GPIOA7	3.3V
98	GTXEN	RGMII transmit control	UART6_RX/UART1_CTS/GPIOA13	3.3V
99	PB15/SPI2_CLK	SPI2 clock signal	GPIOB15/JTAG_CK0	3.3V
100	PB14/SPI2_CS0	SPI2 chip select signal(active low)	GPIOB14/JTAG_MS0	3.3V
101	PB17/SPI2_MISO	SPI2 master data in, slave data out	GPIOB17/JTAG_DI0	3.3V
102	PB16/SPI2_MOSI	SPI1 master data out, slave data in	GPIOB16/JTAG_DO0	3.3V
103	PB19/TWI1_SDA	I2C1_data(Need pull H)	GPIOB19	3.3V
104	PB18/TWI1_SCK	I2C1_clock(Need pull H)	GPIOB18	3.3V
105	PB20/TWI2_SCK/P	I2C2 clock(Need pull H)	GPIOB20/PWM4	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
	WM4			
106	PB21/TWI2_SDA/PWM5	I2C2 data(Need pull H)	GPIOB21/PWM5	3.3V
107	PH20/EINT20		GPIOH20(INT)/LCD1_D20/CSI1_D20	3.3V
108	PH21/EINT21		GPIOH21(INT)/LCD1_D21	3.3V
109	PH19/EINT19/KP_OUT1	SD1 detect signal(Need pull H)	GPIOH19(INT)/KP_OUT1	3.3V
110	PB3/PWM1	PWM1 output	GPIOB3	3.3V
111	PB2/PWM0	PWM0 output	GPIOB2	3.3V
112	PB4/IR0_RX	IR data input (Need pull H)	GPIOB4	3.3V
113	PB8/I2S_DO0	I2S data0 output	GPIOB8	3.3V
114	PB9/I2S_DO1	I2S data1 output	GPIOB9	3.3V
115	PB10/I2S_DO2	I2S data2 output	GPIOB10	3.3V
116	PB11/I2S_DO3	I2S data3 output	GPIOB11	3.3V
117	PB6/I2S_BCLK	I2S bit clock	GPIOB6	3.3V
118	PB7/I2S_LRCK	I2S left/right channel select clock	GPIOB7	3.3V
119	PB12/I2S_DI	I2S data3 input	GPIOB12/SPDIF_DO	3.3V
120	PB5/I2S_MCLK	I2S master clock	GPIOB5	3.3V
121	GND	Ground		0V
122	PB13/SPDIF_DO	SPDIF data output	SPI2_CS1/GPIOB13	3.3V
123	PH12/EINT12	TOUCH_INT	PS2_SCK1/CSI1_D12/LCD1_D12/GPIOH12(INT)	3.3V
124	PH13/EINT13	GPIOH13(INT)	PS2_SDA1/CSI1_D13/SMC_RST/LCD1_D13/GPIOH13	3.3V
125	PH7/EINT7	GPIOH7(INT)	CSI1_D7/MS_CLK/UART5_RX/LCD1_D7/GPIOH7	3.3V
126	PH6/EINT6	LCD back-light enable control	CSI1_D6/MS_BS/UART5_TX/LCD1_D6/GPIOH6	3.3V
127	PH5/UART4_RX/EINT5	UART4 receive	CSI1_D6/LCD1_D5/GPIOH5(INT)	3.3V
128	PH4/UART4_TX/EINT4	UART4 transmit	CSI1_D4/LCD1_D4/GPIOH4(INT)	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
129	PH3/UART3_CTS/ EINT3	UART3 CTS(Clear To Send)	CSI1_D3/LCD1_D3/ GPIOH3(INT)	3.3V
130	PH2/UART3_RTS/ EINT2	UART3 RTS(Require To Send)	CSI1_D2/LCD1_D2/ GPIOH2(INT)	3.3V
131	PH1/UART3_RX/EI NT1	UART3 receive	CSI1_D1/LCD1_D1/ GPIOH1(INT)	3.3V
132	PH0/UART3_TX/EI NT0	UART transmit	CSI1_D0/LCD1_D0/ GPIOH0(INT)	3.3V
133	PB23/UART0_RX	UART0 receive (for debug)	IR1_RX/GPIOH23(I NT)	3.3V
134	PB22/UART0_TX	UART0 transmit (for debug)	GPIOH22(INT)	3.3V
135	PH8/EINT8/KP_IN 0	GPIOH8(INT)	CSI1_D8/MS_D0/K P_IN0/LCD1_D8	3.3V
136	PH9/EINT9/KP_IN 1	GPIOH9(INT)	CIS1_D9/MS_D1/K P_IN1/LCD1_D9	3.3V
137	PH16/EINT16/KP_I N6	GPIOH16(INT)	CSI1_D16/SMC_DE T/KP_IN6/LCD1_D1 6	3.3V
138	PH11/EINT11/KP_I N3	GPIOP11(INT)	CSI1_D11/MS_D3/K P_IN3/LCD1_D11	3.3V
139	PH10/EINT10/KP_I N2	GPIOH10(INT)	CSI1_D10/MS_D2/ KP_IN2/LCD1_D10	3.3V
140	PH14/EINT14/KP_I N4	GPIOH14(INT)	CSI1_D14/SMC_VP PEN/KP_IN4/LCD1 _D14	3.3V
141	PH15/EINT15/KP_I N5	GPIOH15(INT)	CSI1_D15/SMC_VP PPP/KP_IN5/LCD1_ D15	3.3V
142	PH17/EINT17/KP_I N7	GPIOH17(INT)	CSI1_D17/SMC_VC CEN/KP_IN7/LCD1 _D17	3.3V
143	PH18/EINT18/KP_ OUT0	GPIOH18(INT)	CSI1_D18/SMC_SL K/KP_OUT0/LCD1_ D18	3.3V
144	PH23/SDC1_CLK	SDC1 clock	CSI1_D23/KP_OUT 3/LCD1_D23/GPIO H23	3.3V
145	PH27/SDC1_D3	SDC1 data3	CSI1_VSYNC/KP_ OUT7/LCD1_VSYN C/GPIOH27	3.3V
146	PH26/SDC1_D2	SDC1 data2	CSI1_HSYNC/KP_	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
			OUT6/LCD1_HSYN C/GPIOH26	
147	PH25/SDC1_D1	SDC1 data1	CSI1_FIELD/KP_O UT5/LCD1_DE/GPI OH25	3.3V
148	PH24/SDC1_D0	SDC1 data0	CSI1_PCLK/KP_OU T4/LCD1_CLK/GPI OH24	3.3V
149	PH22/SDC1_CMD	SDC1 command signal	CSI1_D22/KP_OUT 2/LCD1_D22/GPIO H22	3.3V
150	GND	Ground		0V
151	MIPI-DSI-D3N	MIPI DSI differential data3 negative		3.3V
152	MIPI-DSI-D3P	MIPI DSI differential data3 positive		3.3V
153	MIPI-DSI-D2N	MIPI DSI differential data2 negative		3.3V
154	MIPI-DSI-D2P	MIPI DSI differential data2 positive		3.3V
155	MIPI-DSI-D1N	MIPI DSI differential data1 negative		3.3V
156	MIPI-DSI-D1P	MIPI DSI differential data1 positive		3.3V
157	MIPI-DSI-D0N	MIPI DSI differential data0 negative		3.3V
158	MIPI-DSI-D0P	MIPI DSI differential data0 positive		3.3V
159	MIPI-DSI-CKN	MIPI DSI differential clock negative		3.3V
160	MIPI-DSI-CKP	MIPI DSI differential clock positive		3.3V
161	PD20/LCD0_D20	LCD0 data20	CSI1_MCLK/GPIOD 20	3.3V
162	PD21/LCD0_D21	LCD0 data21	SMC_VPPEN/GPIO D21	3.3V
163	PD22/LCD0_D22	LCD0 data22	SMC_VPPPP/GPIO D22	3.3V
164	PD23/LCD0_D23	LCD0 data23	SMC_DET/GPIOD2 3	3.3V
165	PD24/LCD0_CLK	LCD0 clock	SMC_VCCEN/GPIO D24	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
166	PD25/LCD0_DE	LCD0 data enable	SMC_RST/GPIOD25	3.3V
167	PD0/LVDS0_VP0/LCD0_D0	LCD0 data0/LVDS0 data0 positive signal output((only one function work at same time)	GPIOD0	3.3V
168	PD1/LVDS0_VN0/LCD0_D1	LCD0 data1/LVDS0 data0 negative signal output((only one function work at same time)	GPIOD1	3.3V
169	PD2/LVDS0_VP1/LCD0_D2	LCD0 data2/LVDS0 data1 positive signal output((only one function work at same time)	GPIOD2	3.3V
170	PD3/LVDS0_VN1//LCD0_D3	LCD0 data3/LVDS0 data1 negative signal output((only one function work at same time)	GPIOD3	3.3V
171	PD4/LVDS0_VP2/LCD0_D4	LCD0 data4/LVDS0 data2 positive signal output((only one function work at same time)	GPIOD4	3.3V
172	PD5/LVDS0_VN2/LCD0_D5	LCD0 data5/LVDS0 data2 negative signal output((only one function work at same time)	GPIOD5	3.3V
173	PD6/LVDS0_VPC//LCD0_D6	LCD0 data6/LVDS0 clock positive signal output((only one function work at same time)	GPIOD6	3.3V
174	PD7/LVDS0_VNC//LCD0_D7	LCD0 data7/LVDS0 clock negative signal output((only one function work at same time)	GPIOD7	3.3V
175	PD8/LVDS0_VP3//LCD0_D8	LCD0 data8/LVDS0 data3 positive signal output((only one function work at same time)	GPIOD8	3.3V
176	PD9/LVDS0_VN3//LCD0_D9	LCD0 data9/LVDS0 data3 negative signal output((only one function work at same time)	GPIOD9	3.3V



Pin	Signal	Description	Alternate functions	IO Voltage
177	PD10/LVDS1_VP0/ LCD0_D10	LCD0 data10/LVDS1 data0 positive signal output((only one function work at same time)	GPIOD10	3.3V
178	PD11/LVDS1_VN0/ LCD0_D11	LCD0 data11/LVDS1 data0 negative signal output((only one function work at same time)	GPIOD11	3.3V
179	PD12/LVDS1_VP1/ LCD0_D12	LCD0 data12/LVDS1 data1 positive signal output((only one function work at same time)	GPIOD12	3.3V
180	PD13/LVDS1_VN1/ LCD0_D13	LCD0 data13/LVDS1 data1 negative signal output((only one function work at same time)	GPIOD13	3.3V
181	PD14/LVDS1_VP2/ LCD0_D14	LCD0 data14/LVDS1 data2 positive signal output((only one function work at same time)	GPIOD14	3.3V
182	PD15/LVDS1_VN2/ LCD0_D15	LCD0 data15/LVDS1 data2 negative signal output((only one function work at same time)	GPIOD15	3.3V
183	PD16/LVDS1_VPC /LCD0_D16	LCD0 data16/LVDS1 clock positive signal output((only one function work at same time)	GPIOD16	3.3V
184	PD17/LVDS1_VNC /LCD0_D17	LCD0 data17/LVDS1 clock negative signal output((only one function work at same time)	GPIOD17	3.3V
185	PD18/LVDS1_VP3/ LCD0_D18	LCD0 data18/LVDS1 data3 positive signal output((only one function work at same time)	GPIOD18	3.3V
186	PD19/LVDS1_VN3/ LCD0_D19	LCD0 data19/LVDS1 data3 negative signal output((only one function work at same time)	GPIOD19	3.3V
187	HPOUTR	Headphone right channel output		0V

Pin	Signal	Description	Alternate functions	IO Voltage
188	HPOUTL	Headphone left channel output		0V
189	AGND	Audio analog ground		0V
190	MICIN1	microphone input1		0V
191	VMIC	Bias voltage output for main microphone		3.3V
192	GND-TVIN	CVBS-IN analog ground		0V
193	TVIN0	CVBS input0	YUV input	0V
194	TVIN1	CVBS input1	When TVIN0 input YUV, this pin can't be used	0V
195	TVIN2	CVBS input2	When TVIN0 input YUV, this pin can't be used	0V
196	TVIN3	CVBS input3		0V
Note <i>GPIOx(INT) or EINTx means the pin has interrupt function.</i>				

2 Peripherals Introduction

2.1 Power

- 5V Power (P1)



The DC JACK is 5.5 x 2.1mm, 3-pin plug Type. Typical 5V/3A DC adapter.

Pin	Signal	Description	Pin	Signal	Description
1	VDD5V	Main power supply. DC 5V power in	2	GND	Ground
3	GND	Ground			

- Li-Battery (J1)



Pin	Signal	Description	Pin	Signal	Description
-----	--------	-------------	-----	--------	-------------

1	VBAT	3.7V battery	2	BAT_TS	Battery Temperature Sensor Input or External ADC Input
3	GND	Ground			

• RTC (BT1)



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

Pin	Signal	Description	Pin	Signal	Description
1	VCC-RTC	3V battery	2	GND	Ground

2.2 HDMI



EMA40i HDMI 1.4 transmitter with HDCP up to 1080p@60fps. The board enables HDMI/LCD audio and video synchronization output.

The HDMI interface is the regular 19pins HDMI type A, with width 13.9mm and thickness 4.45mm.

Pin	Signal	Description	Pin	Signal	Description
1	HTX2P	HDMI Data Positive	2	GND	Ground
3	HTX2N	HDMI Data Negative	4	HTX1P	HDMI Data Positive
5	GND	Ground	6	HTX1N	HDMI Data Negative
7	HTX0P	HDMI Data Positive	8	GND	Ground
9	HTX0N	HDMI Data Negative	10	HTXCP	HDMI Clock Positive
11	GND	Ground	12	HTXCN	HDMI Clock Negative
13	CEC	Consumer electronics control	14	NC	Not connect
15	HDMI_SCL	HDMI serial clock	16	HDMI_SDA	HDMI serial data
17	GND	Ground	18	HDMI_VCC	HDMI Power Supply
19	HPD	Hot Plug Detect			

2.3 USB Host

EMA40i supports 4 channel USB2.0 Host (2x Dual-USB, 1x 4pin connector multiplexing with one of the 2x Dual-USB).

Compatible with Enhanced Host Controller Interface (EHCI) Specification (Version 1.0), and the Open Host Controller Interface (OHCI) Specification (Version 1.0a).

					
P7					
Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	USB_DM3	USB D- Signal
3	USB_DP3	USB D+ Signal	4	GND	Ground
5	VDD_5V	5V power supply	6	USB_DM4	USB D- Signal
7	USB_DP4	USB D+ Signal	8	GND	Ground
P8					
Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	USB_DM2	USB D- Signal
3	USB_DP2	USB D+ Signal	4	GND	Ground
5	VDD_5V	5V power supply	6	USB_DM1	USB D- Signal
7	USB_DP1	USB D+ Signal	8	GND	Ground

					
J16					
Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	USB_DM2	USB D- Signal
3	USB_DP2	USB D+ Signal	4	GND	Ground

2.4 USB OTG

The USB2.0 OTG is used to upgrade Firmware or transmit files.

- Compatible with USB2.0 Specification
- Support High-Speed (HS,480 Mbit/s), Full-Speed (FS,12 Mbit/s), and Low-Speed (LS,1.5 Mbit/s) in host mode

- Supports High-Speed (HS, 480 Mbit/s), Full-Speed (FS, 12 Mbit/s) in device mode
- Up to 8 user-configurable endpoints for Bulk, Isochronous, Control and Interrupt (Endpoint1, Endpoint2, Endpoint3, Endpoint4)



Pin	Signal	Description	Pin	Signal	Description
1	USBVBUS	5V power supply	2	USB-DM0	USB D-
3	USB-DP0	USB D+	4	USB_ID	USB detect
5	GND	Ground			

2.5 AV_IN

TV decoder supports 4-ch analog CVBS or 1-ch YPbPr(480i/576i/480p/576p) signal input.



J9 (RCA)

Pin	Signal	Description	Pin	Signal	Description
1	GND-TVIN	TV-in Ground	2	TVIN3	TV-in input
3	GND-TVIN	TV-in Ground			



J12 (pin header)

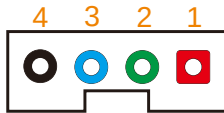
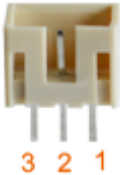
Pin	Signal	Description	Pin	Signal	Description
1	TVIN2	TV-in input	2	TVIN1	TV-in input
3	TVIN0	TV-in input	4	GND-TVIN	TV-in Ground

2.6 UART

- Up to 8 UART controllers
- 64-Bytes Transmit and receive data FIFOs for all UART
- Compliant with industry-standard 16550 UARTs

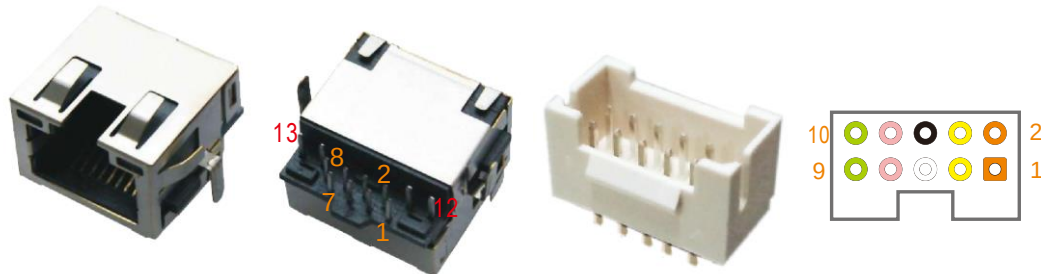
- Support Infrared Data Association(IrDA) 1.0 SIRR

DB9/J11 is RS232 signal, and J8/J13/J14 is TTL signal. The signal of J13 is multiplexed with GPS, J8 for debug, and J14 is multiplexed with RS485.

					
COM2 (DB9, RS232)					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	RS232_TX5	Transmit Data
3	RS232_RX5	Receive Data	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect			
 					
J11 (pin header, RS232)					
Pin	Signal	Description	Pin	Signal	Description
1	RS232_TX6	Transmit Data	2	RS232_RX6	Receive Data
3	GND	Ground	4	VCC_IO	3.3V power supply
J13/UART4 (pin header, TTL)					
Pin	Signal	Description	Pin	Signal	Description
1	PH4/UART4_TX/EINT4	Transmit Data	2	PH5/UART4_RX/EINT5	Receive Data
3	GND	Ground	4	VCC_IO	3.3V power supply
J14/UART7 (pin header, TTL)					
Pin	Signal	Description	Pin	Signal	Description
1	PI20/UART7_TX/PWM2	Transmit Data	2	PI21/UART7_RX/PWM3	Receive Data
3	GND	Ground	4	VCC_IO	3.3V power supply
					
J8/Debug (pin header, TTL)					

Pin	Signal	Description	Pin	Signal	Description
1	PB23/UART0_RX	Receive Data	2	PB22/UART0_TX	Transmit Data
3	GND	Ground			

2.7 Ethernet



EMA40i adopts RTL8211E as the Ethernet chip. RJ45 connector (offset). A 10-pin connector is also available for expansion.

Feature

Ethernet Access Controller (**EMAC**)

- Support 10/100Mbps MII PHY interface
- Comply with the IEEE 802.3-2002 standard

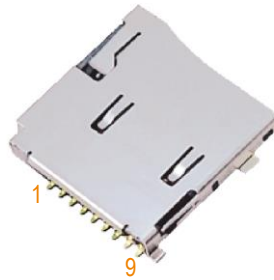
Gigabit Ethernet Media Access Controller (**GMAC**)

- Support 10/100/1000Mbps RGMII/MII PHY interface
- Comply with the IEEE 802.3-2002 standard

JP2 (RJ45)					
Pin	Signal	Description	Pin	Signal	Description
1	DA+	Bi-directional transmit/receive pair A	2	DA-	Bi-directional transmit/receive pair A
3	DB+	Bi-directional transmit/receive pair B	4	DC+	Bi-directional transmit/receive pair C
5	DC-	Bi-directional transmit/receive pair C	6	DB-	Bi-directional transmit/receive pair B
7	DD+	Bi-directional transmit/receive pair D	8	DD-	Bi-directional transmit/receive pair D
9	GND	Ground	10	GND	Ground
11	SPEED	Detect speed	12	GND	Ground
13	VCC_IO	DC 3.3V power supply	14	LINK	Detect link
CON6					
Pin	Signal	Description	Pin	Signal	Description
1	DA+	Bi-directional transmit/receive pair A	2	DA-	Bi-directional transmit/receive pair A
3	DB+	Bi-directional transmit/receive pair B	4	DB-	Bi-directional transmit/receive pair B

5	NC	Not connect	6	GND	Ground
7	DC+	Bi-directional transmit/receive pair C	8	DC-	Bi-directional transmit/receive pair C
9	DD+	Bi-directional transmit/receive pair D	10	DD-	Bi-directional transmit/receive pair D

2.8 Micro SD



- Up to four SMHC controllers
- Comply with eMMC standard specification V5.0
- Comply with SDIO card specification V3.0
- 1/4/8-bits bus width

Pin	Signal	Description	Pin	Signal	Description
1	PH26/SDC1_D2	SDC1 Data Bit	2	PH27/SDC1_D3	SDC1 Data Bit
3	PH22/SDC1_CMD	SDC1 Command Signal	4	VCC_IO	3.3V power supply
5	PH23/SDC1_CLK	SDC1 Clock	6	GND	Ground
7	PH24/SDC1_D0	SDC1 Data Bit	8	PH25/SDC1_D1	SDC1 Data Bit
9	PH19/EINT19/KP_OUT1	Detect signal /Keypad Data Output			

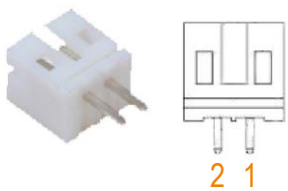
2.9 Audio (Headphone/Speaker)

The Audio Codec supports stereo audio ADC/DAC, four analog audio inputs and one low-noise analog microphone bias. Channels support mono or stereo samples of 16(standard),18(optional) and 20(optional) bit wide.



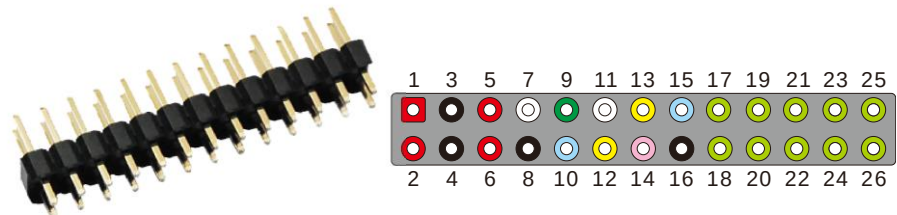
J2(Headphone)

Pin	Signal	Description	Pin	Signal	Description
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1	AGND	Analog Ground	2	HPOUTR	Headphone Right Channel Output
3	HPOUTL	Headphone Left Channel Output	4	PHE_DET	Headphone Detect
5	MICIN1	Microphone Input			
					
CON2(Speaker)					
Pin	Signal	Description	Pin	Signal	Description
1	VON	Speaker -	2	VOP	Speaker +

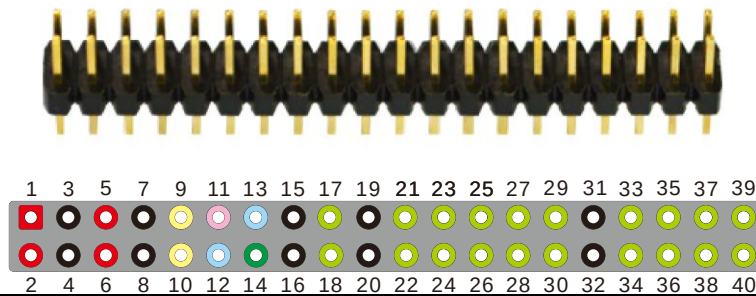
2.10 LCD(MIPI/RGB/LVDS)

- Supports 4 lanes MIPI DSI up to 1080p@60fps
- Supports RGB interface up to 1920 x 1080@60fps
- Supports LVDS interface up to 1920 x 1080@60fps

					
MIPI					
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_LCD	3.3 V power supply	6	VCC_LCD	3.3V power supply
7	NC	Not connect	8	GND	Ground
9	PB2/PWM0	Pulse Width Modulation Channel	10	PH6/EINT6	External Interrupt Input
11	NC	Not connect	12	PB18/TWI1_SCK	TWI Clock
13	PB19/TWI1_SDA	TWI Data/Address	14	PG1/CSI1_MCLK	CSI Master Clock
15	PH12/EINT12	External Interrupt Input	16	GND	Ground
17	MIPI-DSI-D0N	MIPI DSI Differential Data0 Negative	18	MIPI-DSI-D0P	MIPI DSI Differential Data0 Positive

19	MIPI-DSI-D1N	MIPI DSI Differential Data1 Negative	20	MIPI-DSI-D1P	MIPI DSI Differential Data1 Positive
21	MIPI-DSI-CKN	MIPI DSI Differential Clock Negative	22	MIPI-DSI-CKP	MIPI DSI Differential Clock Positive
23	MIPI-DSI-D2N	MIPI DSI Differential Data2 Negative	24	MIPI-DSI-D2P	MIPI DSI Differential Data2 Positive
25	MIPI-DSI-D3N	MIPI DSI Differential Data3 Negative	26	MIPI-DSI-D3P	MIPI DSI Differential Data3 Positive
					
RGB					
Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V power supply	2	VDD_5V	5V power supply
3	PD0/LVDS0_VP0/ LCD0_D0	LCD Data Bit	4	PD1/LVDS0_VN0/LCD0_D1	LCD Data Bit
5	PD2/LVDS0_VP1/ LCD0_D2	LCD Data Bit	6	PD3/LVDS0_VN1/LCD0_D3	LCD Data Bit
7	PD4/LVDS0_VP2/ LCD0_D4	LCD Data Bit	8	PD5/LVDS0_VN2/LCD0_D5	LCD Data Bit
9	PD6/LVDS0_VPC/ LCD0_D6	LCD Data Bit	10	PD7/LVDS0_VNC/LCD0_D7	LCD Data Bit
11	GND	Ground	12	PD8/LVDS0_VP3/ LCD0_D8	LCD Data Bit
13	PD9/LVDS0_VN3/LCD0_D9	LCD Data Bit	14	PD10/LVDS1_VP0/LCD0_D10	LCD Data Bit
15	PD11/LVDS1_VN0/ LCD0_D11	LCD Data Bit	16	PD12/LVDS1_VP1/LCD0_D12	LCD Data Bit
17	PD13/LVDS1_VN1/ LCD0_D13	LCD Data Bit	18	PD14/LVDS1_VP2/LCD0_D14	LCD Data Bit
19	PD15/LVDS1_VN2/ LCD0_D15	LCD Data Bit	20	GND	Ground
21	PD16/LVDS1_VPC/ LCD0_D16	LCD Data Bit	22	PD17/LVDS1_VNC/LCD0_D17	LCD Data Bit
23	PD18/LVDS1_VP3/ LCD0_D18	LCD Data Bit	24	PD19/LVDS1_VN3/LCD0_D19	LCD Data Bit
25	PD20/LCD0_D20	LCD Data Bit	26	PD21/LCD0_D21	LCD Data Bit

27	PD22/LCD0_D2 2	LCD Data Bit	28	PD23/LCD0_D23	LCD Data Bit
29	GND	Ground	30	PB2/PWM0	Pulse Width Modulation Channel
31	PG1/CSI1_MLC K	CSI Master Clock	32	GND	Ground
33	PD25/LCD0_D E	LCD Data Enable	34	PD27/LCD0_VS YNC	LCD Vertical Sync
35	PD26/ LCD0_HSYNC	LCD Horizontal Sync	36	PD24/LCD0_CL K	LCD Clock Signal
37	GND	Ground	38	PH12/EINT12	External Interrupt Input
39	PB18/TWI1_SC K	TWI Clock	40	PB19/TWI1_SDA	TWI Data/Address



LVDS

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_LCD	3.3 V power supply	6	VCC_LCD	3.3 V power supply
7	GND	Ground	8	GND	Ground
9	PB18/TWI1_SC K	TWI Clock	10	PB19/TWI1_SDA	TWI Data/Address
11	PG1/CSI1_MLC K	CSI Master Clock	12	PH12/EINT12	External Interrupt Input
13	PH6/EINT6	External Interrupt Input	14	PB2/PWM0	Pulse Width Modulation Channel
15	GND	Ground	16	GND	Ground
17	PD16/LVDS1_V PC/ LCD0_D16	LVDS1 Clock Positive Output	18	PD17/LVDS1_V NC/LCD0_D17	LVDS1 Clock Negative Output
19	GND	Ground	20	GND	Ground
21	PD18/LVDS1_V P3/ LCD0_D18	LVDS1 Data Positive Signal Output	22	PD19/LVDS1_V N3/LCD0_D19	LVDS1 Data Negative Signal Output
23	PD14/LVDS1_V P2/ LCD0_D14	LVDS1 Data Positive Signal Output	24	PD15/LVDS1_V N2/LCD0_D15	LVDS1 Data Negative Signal Output

25	PD12/LVDS1_V P1/ LCD0_D12	LVDS1 Data Positive Signal Output	26	PD13/LVDS1_V N1/LCD0_D13	LVDS1 Data Negative Signal Output
27	PD10/LVDS1_V P0/ LCD0_D10	LVDS1 Data Positive Signal Output	28	PD11/LVDS1_VN 0/LCD0_D11	LVDS1 Data Negative Signal Output
29	PD6/LVDS0_VP C/LCD0_D6	LVDS0 Clock Positive Output	30	PD7/LVDS0_VN C/LCD0_D7	LVDS0 Clock Negative Output
31	GND	Ground	32	GND	Ground
33	PD8/LVDS0_VP 3/LCD0_D8	LVDS0 Data Positive Signal Output	34	PD9/LVDS0_VN 3/LCD0_D9	LVDS0 Data Negative Signal Output
35	PD4/LVDS0_VP 2/LCD0_D4	LVDS0 Data Positive Signal Output	36	PD5/LVDS0_VN 2/LCD0_D5	LVDS0 Data Negative Signal Output
37	PD2/LVDS0_VP 1/LCD0_D2	LVDS0 Data Positive Signal Output	38	PD3/LVDS0_VN 1/LCD0_D3	LVDS0 Data Negative Signal Output
39	PD0/LVDS0_VP 0/LCD0_D0	LVDS0 Data Positive Signal Output	40	PD1/LVDS0_VN 0/LCD0_D1	LVDS0 Data Negative Signal Output

2.11 RS485

SN75176B Differential bus transceiver.

- Bidirectional Transceivers
- $\pm 200\text{mV}$ Receiver Input Sensitivity
- 50mV Type Receiver Input Hysteresis



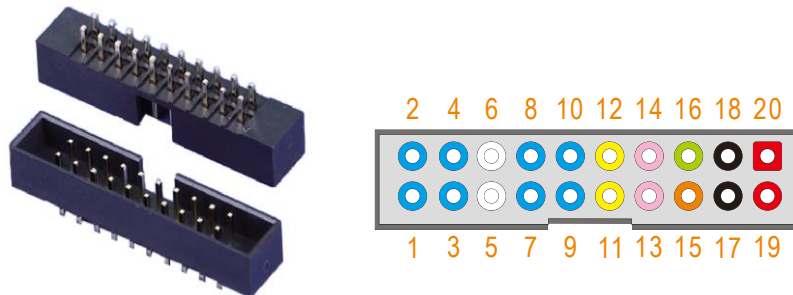
JP3					
Pin	Signal	Description	Pin	Signal	Description
1	RS485_A	Receive Data	2	RS485_B	Transmit Data



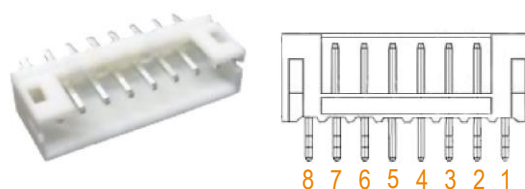
P9					
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Pin	Signal	Description	Pin	Signal	Description
1	RS485_B	Transmit Data	2	RS485_A	Receive Data
3	GND	Ground			

2.12 GPIO&Control



GPIO					
Pin	Signal	Description	Pin	Signal	Description
1	PI19/SPI1_MISO	SPI Master Data In, Slave Data Out	2	PI17/SPI1_CLK	SPI Clock Signal
3	PI18/SPI1_MOSI	SPI Master Data Out, Slave Data In	4	PI16/SPI1_CS0	SPI Chip Select Signal (active low)
5	NC	Not connect	6	NC	Not connect
7	PC1/SPI0_MISO	SPI Master Data In, Slave Data Out	8	PC2/SPI0_CLK	SPI Clock Signal
9	PC0/SPI0_MOSI	SPI Master Data Out, Slave Data In	10	PC23/SPI0_CS0	SPI Chip Select Signal (active low)
11	PH13/EINT13	External Interrupt Input	12	PH7/EINT7	External Interrupt Input
13	PI2/TWI4-SCK	TWI Clock	14	PI3/TWI4-SDA	TWI Data/Address
15	KEYADC1	ADC Input for Key	16	PB13/SPDIF_DO	SPDIF Data Output
17	GND	Ground	18	GND	Ground
19	VCC_IO	3.3V power supply	20	VDD_5V	5V power supply



Control					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_IO	3.3V power supply	2	GND	Ground
3	KEYADC0	ADC Input for Key	4	POWER-KEY	Power key

5	GND	Ground	6	PB4/IR0_RX	IR Data Receive
7	PB11/I2S_DO3	I2S Data Output	8	PB10/I2S_DO2	I2S Data Output

2.13 4G Module

EMA40i 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.



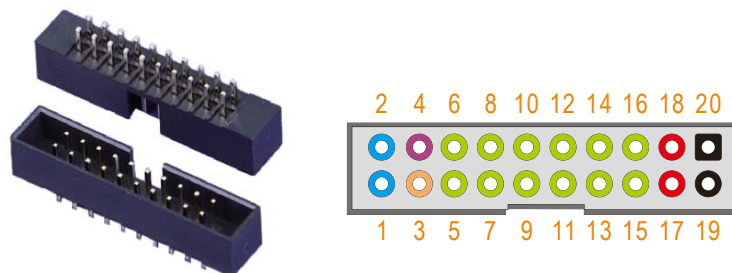
PCIE (for 4G module)					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	3GVCC	3.3V power supply
3	NC	Not connect	4	GND	Ground
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	SIM_VCC	1.8V power supply
9	GND	Ground	10	SIM_DATA	Send/Receiver data I/O control
11	NC	Not connect	12	SIM_CLK	Clock signal
13	NC	Not connect	14	SIM_RST	Reset signal
15	GND	Ground	16	NC	Not connect
17	NC	Not connect	18	GND	Ground
19	NC	Not connect	20	3GVCC	3.3V power supply
21	GND	Ground	22	PH16/EINT16/KP_IN6	External Interrupt Input / Keypad Data Input
23	NC	Not connect	24	3GVCC	3.3V power supply
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	USB-DM2	USB D- Signal
37	GND	Ground	38	USB-DP2	USB D+ Signal
39	3GVCC	3.3V power supply	40	GND	Ground
41	3GVCC	3.3V power supply	42	LED_RED	Network status indication
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	3GVCC	3.3V power supply




Nano SIM Slot					
Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	Clock signal	2	SIM_DATA	Send/Receiver data I/O control
3	SIM_RST	Reset signal	4	SIM_VCC	Power supply
5	SIM_VCC	1.8V power supply	6	GND	Ground
7	GND	Ground			

2.14 Camera



1.3 Mega Pixel camera module.

- Active Array Size: 1300 x 1028
- Maximum Image/Transfer Rate:
 SXGA 15 fps
 VGA 30 fps
 QVGA, QQVGA, CIF 60 fps
 QCIF, QQCIF 120 fps
- Sensitivity: 0.9 v/Lux-sec
- S/N Ratio: 40 dB
- Dynamic Range: 62 dB
- Maximum Exposure Interval: 1050 x tROW
- Pixel Size 3.18 μm x 3.18 μm
- Image Area 4.13 mm x 3.28 mm

Pin	Signal	Description	Pin	Signal	Description
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1	PB21/TWI2_SDA/ PWM5	TWI Data/Address / Pulse Width Modulation Channel	2	PB20/TWI2_SCK /PWM4	TWI Clock / Pulse Width Modulation Channel
3	PB9/I2S_DO1	I2S Data Output	4	PA14	
5	PE0/CSI0_PCLK	CSI Pixel Clock	6	PE2/CSI0_HSYN C	CSI Horizontal Sync
7	PE3/CSI0_VSYN C	CSI Vertical Sync	8	PE1/CSI0_MLCK	CSI Master Clock
9	PE11/CSI0_D7	CSI0 Data Bit	10	PE10/CSI0_D6	CSI0 Data Bit
11	PE9/CSI0_D5	CSI0 Data Bit	12	PE8/CSI0_D4	CSI0 Data Bit
13	PE7/CSI0_D3	CSI0 Data Bit	14	PE6/CSI0_D2	CSI0 Data Bit
15	PE5/CSI0_D1	CSI0 Data Bit	16	PE4/CSI0_D0	CSI0 Data Bit
17	VDD_5V	5V power supply	18	VCC_IO	3.3V power supply
19	GND	Ground	20	GND	Ground

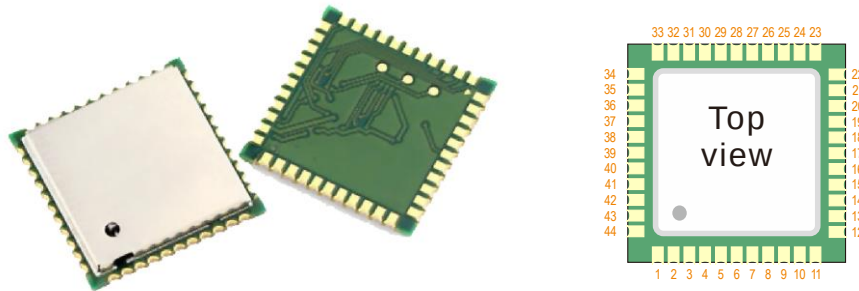
2.15 GPS



- Ublox 7 low power consumption GPS Chipset
- Tracking Sensitivity: -162dBm
- Extremely fast TTFF (Time to First Fix) at low signal level
- Built-in LNA
- Exceptional jamming immunity
- Support NMEA 0183 and ublox binary protocol

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	PH5/UART4_RX/ EINT5	Receive
3	PH4/UART4_TX/EINT4	Transmit	4	NC	Not connect
5	NC	Not connect	6	VDD_GPS	Power supply
7	VDD_GPS	Power supply	8	VDD_GPS	Power supply
9	GPSRST	GPS reset	10	GND	Ground
11	GPS_RFIN	Matched RF- Input	12	GND	Ground
13	NC	Not connect	14	RFVCC	Active antenna or external LNA supply
15	NC	Not connect	16	NC	Not connect
17	NC	Not connect	18	NC	Not connect

2.16 WiFi&Bluetooth



WiFi + Bluetooth4.0 module.

- 802.11b/g/n single-band radio
- Bluetooth V4.0(HS) with integrated Class 1.5 PA and Low Energy (BLE) support
- Concurrent Bluetooth, WLAN operation
- Simultaneous BT/WLAN receive with single antenna
- WLAN host interface options:
 - SDIO v2.0 — up to 50 MHz clock rate
- BT host digital interface:
 - UART (up to 4 Mbps)
- IEEE Co-existence technologies are integrated die solution
- ECI — enhanced coexistence support, ability to coordinate BT SCO transmissions around WLAN receives

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	WL_BT_ANT	RF I/O
3	GND	Ground	4	NC	Not connect
5	NC	Not connect	6	BT_WAKE	HOST wake-up Bluetooth device
7	BT_HOST_WAKE	Bluetooth device to wake-up HOST	8	NC	Not connect
9	VBAT_WL	Main power voltage source input	10	XTAL_IN	Crystal input
11	XTAL_OUT	Crystal output	12	PG0/CSI1_PCLK	Internal regulators power enable/disable
13	PH15/EINT15/KP_IN5	External Interrupt Input / Keypad input	14	WIFI_D2	WiFi data
15	WIFI_D3	WiFi data	16	WIFI_CMD	WiFi command
17	WIFI_CLK	WiFi clock	18	WIFI_D0	WiFi data
19	WIFI_D1	WiFi data	20	GND	Ground
21	VIN_LDO_OUT	Internal Buck voltage generation pin	22	VCCIO_WL	I/O Voltage supply input
23	VIN_LDO	Internal Buck voltage	24	RTC_CLKOUT	External Low

		generation pin			Power Clock input (32.768KHz)
25	PB12/I2S_DI	PCM Data output	26	PB6/I2S_BCLK	PCM clock
27	PB8/I2S_DO0	PCM data input	28	PB7/I2S_LRCK	PCM sync signal
29	VDD_TCXO	Not connect	30	NC	Not connect
31	GND	Ground	32	NC	Not connect
33	GND	Ground	34	PG2/CSI1_HSYNC	Low asserting reset for Bluetooth core
35	NC	Not connect	36	GND	Ground
37	NC	Not connect	38	NC	Not connect
39	NC	Not connect	40	NC	Not connect
41	PH3/UART3_CTS/ EINT3	Bluetooth UART interface	42	PH1/UART3_RX/ EINT1	Bluetooth UART interface
43	PH0/UART3_TX/ EINT0	Bluetooth UART interface	44	PH2/UART3_RTS/ EINT2	Bluetooth UART interface

2.17 SATA

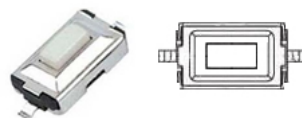


- 67-pin, 8.5mm height M.2 connector
- Support SATA 1.5Gb/s and SATA 3.0Gb/s,
- Compliant with SATA spec 2.6 and AHCI Revision 1.3 specifications
- Supports power management features including automatic Partial to Slumber transition

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	VCC_M2_3V3	3.3V power supply
3	GND	Ground	4	VCC_M2_3V3	3.3V power supply
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	GND	Ground	10	GND	Ground
11	NC	Not connect	12	VCC_M2_3V3	3.3V power supply
13	NC	Not connect	14	VCC_M2_3V3	3.3V power supply
15	GND	Ground	16	VCC_M2_3V3	3.3V power supply

17	NC	Not connect	18	VCC_M2_3V3	3.3V power supply
19	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	NC	Not connect	30	NC	Not connect
31	NC	Not connect	32	NC	Not connect
33	GND	Ground	34	NC	Not connect
35	NC	Not connect	36	NC	Not connect
37	NC	Not connect	38	NC	Not connect
39	GND	Ground	40	NC	Not connect
41	SATA-RXP	SATA Positive Data Receive	42	NC	Not connect
43	SATA-RXM	SATA Negative Data Receive	44	NC	Not connect
45	GND	Ground	46	NC	Not connect
47	SATA-TXM	SATA Negative Data Transmit	48	NC	Not connect
49	SATA-TXP	SATA Positive Data Transmit	50	NC	Not connect
51	GND	Ground	52	NC	Not connect
53	NC	Not connect	54	NC	Not connect
55	NC	Not connect	56	NC	Not connect
57	GND	Ground	58	NC	Not connect
67	NC	Not connect	68	RTC_CLKOUT	RTC Clock out
69	PH10/EINT10/ KP_IN2	External Interrupt Input / Keypad Data Input	70	VCC_M2_3V3	3.3V power supply
71	GND	Ground	72	VCC_M2_3V3	3.3V power supply
73	GND	Ground	74	VCC_M2_3V3	3.3V power supply
75	GND	Ground			

2.18 Keys



Key	Signal	Description	Key	Signal	Description
K1	POWER-KEY	Power key. Sleep/Wake_up	K2	PH14/EINT14/ KP_IN4	User key
K3	Reset_KEY	Reset	K4	FEL	Boot Mode Select (Recover)



3 Product Configurations

3.1 Standard Contents

NO.	Item	Qty. (PCS)	Description
1	EMA40i board	1	Standard Content (1GB RAM, 8GB eMMC, WiFi&BT)
2	TF Card / CD-ROM	1	Android BSP, 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/3A DC

3.2 Optional Parts

NO.	Item	Description
1	Camera	1.3 Mega Pixel camera module
2	4G Module	LTE/UMTS/ GSM/GPRS networks. mPCIe connect.
3	GPS	Ublox 7 low power consumption GPS Chipset
4	SATA	M.2 connector
5	LCD	10.1 inch LVDS, 1280 x 800