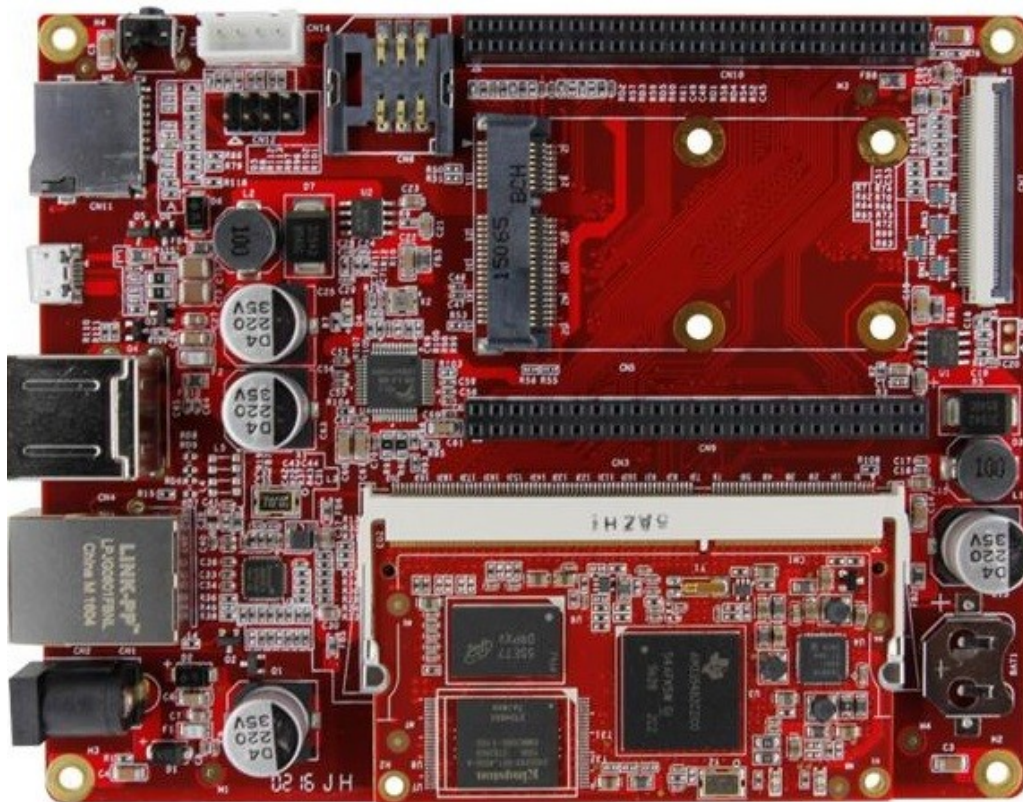


LIA SBC AM335x Hardware Manual

Rev 1.0



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Chapter 1 Product Overview

1.1 Introduction

1.1.1 Hardware

The single board computer LIA which has an expansion board to carry the CM335X is one of our design of the base plate . The flexible design allows the fast and easy way of realizing and upgrading the controller’s capabilities. In addition to those features offered by CM335X, the LIA features 6 serial ports (6 TTL), 2 USB Host, 1 USB OTG, 1 Ethernet ports, CAN, Mini PCIE, LCD, Touch screen, I2S, ADC, PWM, I2C, SPI, GPIOs, RTC and more other peripherals.

The single board targets a wide range of applications, including: HMIs, Digital Signage, POS, Data Terminal, Medical Devices, Navigation, Industrial Automation, Entertainment system, Thin Clients, Robotics, Game Console and much more.

1.1.2 Software

The LIA is a ready-to-run platform to support for Linux 3.x, Android 4.x, Angstrom, Debian, Ubuntu and WinCE 7 operating systems.If you care about other Operating System, For more information contact our support.

1.2 Product Overview

The following sections list out all the product features.

Series	LIA	LIA	LIA
Part Code	LIAS0010	LIAS0020	LIAS0030
CPU Name	TI AM3352	TI AM3354	TI AM3358
CPU Type	ARM Cortex™-A8	ARM Cortex™-A8	ARM Cortex™-A8
CPU Clock	1x	1x	1x
CPU Frequency	800MHz	1GHz	1GHz
RAM DDR3	Micron 512MB@16bit*1	Micron 512MB@16bit*1	Micron 512MB@16bit*1
Flash	eMMC 2/4GB@8bit*1	eMMC 2/4GB@8bit*1	eMMC 2/4GB@8bit*1
PMU	TI TPS65910A3/A31	TI TPS65910A3/A31	TI TPS65910A3/A31
Size	130 x 103.5 x 19mm	130 x 103.5 x 19mm	130 x 103.5 x 19mm

Series	LIA	LIA	LIA
Part Code	LIAS0010	LIAS0020	LIAS0030
Temperature	0° to 70° C	0° to 70° C	0° to 70° C
Support OS	Linux 3.x Android 4.x Wince 7.0	Linux 3.x Android 4.x Wince 7.0	Linux 3.x Android 4.x Wince 7.0

Chapter 2 Hardware System

2.1 Block Diagram

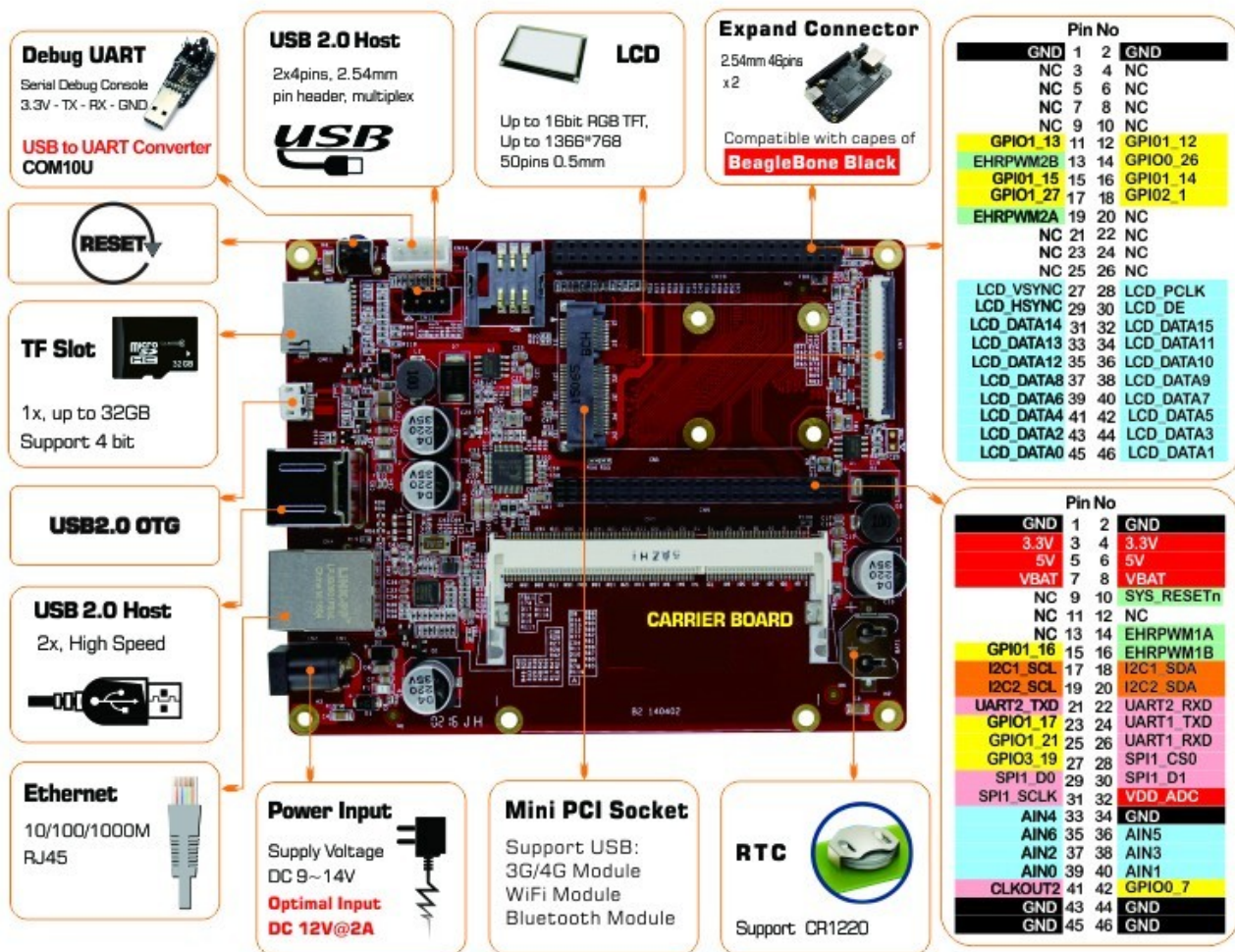


Figure 1 LIA Block Diagram

2.2 Main Features

LIA provides the following features and communication interfaces:

- 1x RJ45 Ethernet (10/100/1000Mbit)
- 2x USB 2.0 port through on board USB HUB
- 1x USB 2.0 OTG Micro-AB connector for host and host/client
- 1x TF 4-bit
- 1x reset key
- 1x Mini PCIe interface for communication module
- 1x SIM interface for 3G/4G module
- 1x DDR3 STD connector
- 1x Digital RGB interface (up to 16 bit colour)
- 2x expansion connector with 4x UART (3.3V TTL), 1x I2C, 2x SPI, 1x CAN, 4x PWM, 7x analog inputs, 1x LCD, 12x GPIOs
- 1x Debug UART (3.3V TTL)
- Real-time clock with battery backup
- 1x DC-IN jack with 9.6~14.4V
- LEDs

2.2.1 RJ45 Ethernet

1x RJ45 Ethernet (10/100/1000Mbit)

- 10BASE-T_e/100BASE-T_x/1000BASE-T IEEE 802.3 compliant
- Supports 1000BASE-T PCS and auto-negotiation with next page support
- Supports RGMII interface to MAC devices with a broad I/O voltage level options including 2.5V, 1.8V and 1.5V, and is compatible with 3.3V I/O
- RGMII timing modes support internal delay and external delay on Rx path
- Error-free operation up to 140 meters of CAT5 cable
- Supports Atheros latest Green Ethos power saving modes with internal
- Supports 802.3az (Energy Efficient Ethernet)
- Fully integrated digital adaptive equalizers, echo cancellers, and near end crosstalk (NEXT) cancellers
- All digital baseline wander correction
- Automatic channel swap (ACS)
- Automatic MDI/MDIX crossover
- IEEE 802.3u compliant Auto-Negotiation
- Software programmable LED modes
- Multiple Loopback modes for diagnostics
- Cable Diagnostic Test (CDT)

2.2.2 USB HOST

4x USB 2.0 port through on board USB HUB (FE1.1)

- Fully compliant with Universal Serial Bus Specification Revision 2.0
- Integrated USB 2.0 Transceivers
- Integrated upstream 1.5Kohm pull-up, downstream 15Kohm pull-down, and serial resistors
- Integrated Power-On-Reset circuit
- Integrated 12MHz Oscillator with feedback resistor, and crystal load capacitance
- Integrated 12MHz-to-480MHz Phase Lock Loop (PLL)
- Multiple Transaction Translators (MTT)
- Automatic self-power status monitoring

2.3 Reference Documents

2.3.1 Ethernet AR8035

AR8035 is a ethernet PHY used on LIA.

If you need more information about AR8035, please refer to <http://www.atheros.com>

2.3.3 USB HUB FE1.1

FE1.1 is a usb hub used on LIA.

If you need more information about the USB HUB, please refer to FE1.1 from <http://www.terminus-tech.com/>

2.4 Hardware Interfaces

2.4.1 Connector Locations

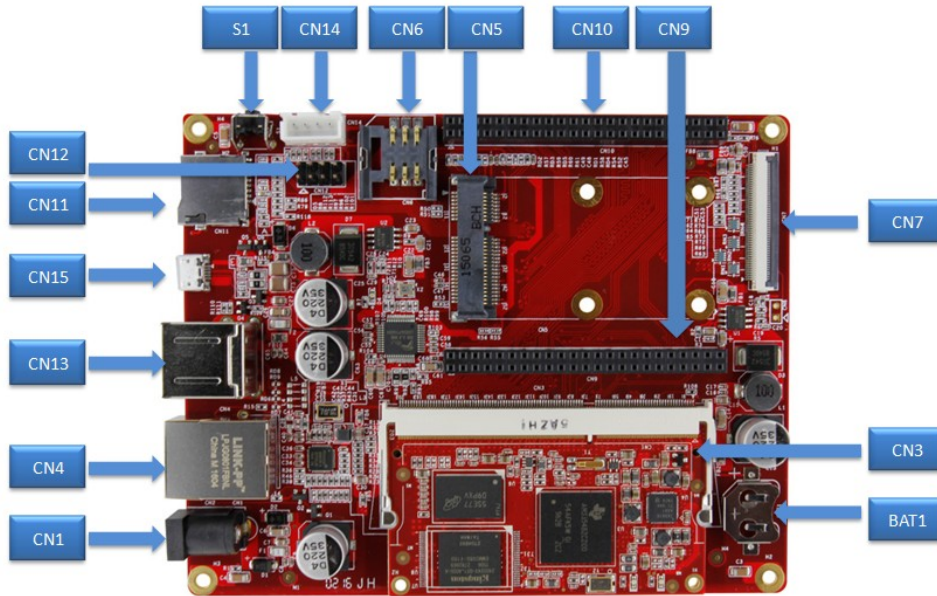


Figure 3 LIA Interface

2.4.2 Core Module Interface (CN3)

Type: DDR3 SO-DIMM

Pin	Signal name	Description	I/O	Power rail	Note
1	VBAT	5V main power supply	P	5V	
2	GND	Digital ground		GND	
3	VBAT	5V main power supply	P	5V	
4	GND	Digital ground		GND	
5	VBAT	5V main power supply	P	5V	
6	GND	Digital ground		GND	
7	VBAT	5V main power supply	P	5V	
8	GND	Digital ground		GND	

Pin	Signal name	Description	I/O	Power rail	Note
9	NC	Not connected			
10	NC	Not connected			
11	NC	Not connected			
12	NC	Not connected			
13	GND	Digital ground		GND	
14	VIO_3V3	3.3V main power supply	P	3.3V	
15	NC	Not connected			
16	VIO_3V3	3.3V main power supply	P	3.3V	
17	NC	Not connected			
18	NC	Not connected			
19	VBATBAKUP	RTC backup power supply	P	3V	
20	GND	Digital ground		GND	
21	NC	Not connected			
22	GND	Digital ground		GND	
23	USB1_VBUS	USB1 power supply	P	5V	
24	NC	Not connected			
25	USB1_ID	Use this pin to detect the ID pin if you use USB OTG.	I	5V	
26	USB_OTG_PWR	USB_OTG power supply	P	5V	
27	USB1_DRVVBUS	USB1 power driver signal	O	5V	
28	USB0_ID	Use this pin to detect the ID pin if you use USB OTG.	I	5V	
29	USB1_DM	Negative differential USB signal	I/O	5V	
30	USB0_DRVVBUS	USB0 power driver signal	O	5V	
31	USB1_DP	Positive differential USB signal	I/O	5V	
32	USB0_DM	Negative differential USB signal	I/O	5V	
33	GND	Digital ground		GND	
34	USB0_DP	Positive differential USB signal	I/O	5V	
35	MII1_GTX_CLK	MII1 transmit clock	I	3.3V	
36	GND	Digital ground		GND	
37	MII1_TXD3	MII transmit data bit 3	O	3.3V	
38	GND	Digital ground		GND	
39	MII1_TXD2	MII transmit data bit 2	O	3.3V	
40	SD_MMC0_DAT0	MMC/SD/SDIO data bus	I/O	3.3V	
41	MII1_TXD1	MII transmit data bit 1	O	3.3V	
42	SD_MMC0_DAT1	MMC/SD/SDIO data bus	I/O	3.3V	
43	MII1_TXD0	MII transmit data bit 0	O	3.3V	
44	SD_MMC0_DAT2	MMC/SD/SDIO data bus	I/O	3.3V	
45	MII1_TX_EN	MII transmit enable	O	3.3V	
46	SD_MMC0_DAT3	MMC/SD/SDIO data bus	I/O	3.3V	
47	MII1_RX_DV	MII receive data valid	I	3.3V	
48	SD_MMC0_CMD	MMC/SD/SDIO command	I/O	3.3V	
49	MII1_RX_ER/UART2_TX	MII receive data error/ UART transmit data	I	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
50	MMC0_CD	SD card detect	I	3.3V	
51	MII1_RXD3	MII receive data bit 3	I	3.3V	
52	SD_MMC0_CLK	MMC/SD/SDIO clock	I/O	3.3V	
53	MII1_RXD2	MII receive data bit 2	I	3.3V	
54	GND	Digital ground		GND	
55	MII1_RXD1	MII receive data bit 1	I	3.3V	
56	SPI0_CLK	SPI clock	I/O	3.3V	
57	MII1_RXD0	MII receive data bit 0	I	3.3V	
58	SPI0_D0	SPI Data	I/O	3.3V	
59	MII1_RX_CLK	MII Receive Clock	I	3.3V	
60	SPI0_D1	SPI data	I/O	3.3V	
61	MII1_COL	MII colision	I	3.3V	
62	SPI0_CS0	SPI chip select	I/O	3.3V	
63	MII1_CRX/UART2_RX	MII carrier sense/ UART receive data	I	3.3V	
64	GND	Digital ground		GND	
65	MII1_MDC	MDIO clock	O	3.3V	
66	SYS_RESET	System reset	I	3.3V	
67	MII1_MDIO	MDIO data	I/O	3.3V	
68	VIO_1V8	1.8V power supply	P	1.8V	
69	MII1_REF_CLK	RMII reference clock	I/O	3.3V	
70	NC	Not connected			
71	GND	Digital ground		GND	
72	VMMC	MMC/SD/SDIO power supply	P	3.3V	
73	GND	Digital ground		GND	
74	GLOBLE_RESET	Reset input	I/O	3.3V	
75	UART1_TX	UART transmit data	O	3.3V	
76	NC	Not connected			
77	UART1_RX	UART receive data	I	3.3V	
78	NC	Not connected			
79	GND	Digital ground		GND	
80	NC	Not connected			
81	NC	Not connected			
82	NC	Not connected			
83	GND	Digital ground		GND	
84	NC	Not connected			
85	DCAN0_TX	DCAN transmit data	O	3.3V	
86	NC	Not connected			
87	DCAN0_RX	DCAN receive data	I	3.3V	
88	NC	Not connected			
89	GND	Digital ground		GND	
90	NC	Not connected			
91	NC	Not connected			

Pin	Signal name	Description	I/O	Power rail	Note
92	GND	Digital ground		GND	
93	GND	Digital ground		GND	
94	UART0_TX	UART transmit data	O	3.3V	
95	UART3_TX	UART transmit data	O	3.3V	
96	UART0_RX	UART receive data	I	3.3V	
97	UART3_RX	UART receive data	I	3.3V	
98	GND	Digital ground		GND	
99	UART4_RX	UART receive data	I	3.3V	
100	NC	Not connected			
101	UART4_TX	UART transmit data	O	3.3V	
102	NC	Not connected			
103	GND	Digital ground		GND	
104	EHRPWM2A/GPIO0_22	eHRPWM2 A output/GPIO	O	3.3V	
105	NC	Not connected			
106	EHRPWM2B/GPIO0_23	eHRPWM2 B output/GPIO	O	3.3V	
107	GND	Digital ground		GND	
108	EHRPWM1A/GPIO1_18	eHRPWM1 A output/GPIO	O	3.3V	
109	WG_D0	Wiegand output data	O	3.3V	
110	EHRPWM1B/GPIO1_19	eHRPWM1 B output/GPIO	O	3.3V	
111	WG_D1	Wiegand output data	O	3.3V	
112	NC	Not connected			
113	GND	Digital ground		GND	
114	NC	Not connected			
115	NC	Not Connected			
116	NC	Not connected			
117	GND	Digital ground		GND	
118	NC	Not connected			
119	I2C0_SCL	I2C clock	I/O	3.3V	
120	NC	Not connected			
121	I2C0_SDA	I2C data	I/O	3.3V	
122	NC	Not connected			
123	GND	Digital ground		GND	
124	NC	Not connected			
125	NC	Not connected			
126	NC	Not connected			
127	GND	Digital ground		GND	
128	NC	Not connected			
129	NC	Not connected			
130	NC	Not connected			
131	ADC6	Analog input/output	I/O	3.3V	
132	NC	Not connected			
133	ADC5	Analog input/output	I/O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
134	GND	Digital ground		GND	
135	ADC4	Analog input/output	I/O	3.3V	
136	MCASP0_AHCLKX	McASP0 transmit master clock	I/O	3.3V	
137	NC	Not connected			
138	MCASP0_ACLKX	McASP0 transmit bit clock	I/O	3.3V	
139	GND	Digital ground		GND	
140	MCASP0_FSX	McASP0 transmit frame sync	I/O	3.3V	
141	ADC0	Analog input/output	I/O	3.3V	
142	MCASP0_AXR0	McASP0 serial data (in/out)	I/O	3.3V	
143	ADC1	Analog input/output	I/O	3.3V	
144	NC	Not connected			
145	ADC2	Analog input/output	I/O	3.3V	
146	GND	Digital ground		GND	
147	ADC3	Analog input/output	I/O	3.3V	
148	NC	Not connected			
149	GND	Digital ground		GND	
150	NC	Not connected			
151	NC	Not connected			
152	NC	Not connected			
153	NC	Not connected			
154	GND	Digital ground		GND	
155	GND	Digital ground		GND	
156	NC	Not connected			
157	LCD_DATA0	LCD data bus	I/O	3.3V	
158	GPIO0_20	GPIO	I/O	3.3V	
159	LCD_DATA1	LCD data bus	I/O	3.3V	
160	GND	Digital ground		GND	
161	LCD_DATA2	LCD data bus	I/O	3.3V	
162	NC	Not connected			
163	LCD_DATA3	LCD data bus	I/O	3.3V	
164	NC	Not connected			
165	LCD_DATA4	LCD data bus	I/O	3.3V	
166	GND	Digital ground		GND	
167	LCD_DATA5	LCD data bus	I/O	3.3V	
168	NC	Not connected			
169	LCD_DATA6	LCD data bus	I/O	3.3V	
170	GPIO2_1	GPIO	I/O	3.3V	
171	LCD_DATA7	LCD data bus	I/O	3.3V	
172	GND	Digital ground		GND	
173	LCD_DATA8	LCD data bus	I/O	3.3V	
174	GPIO0_26	GPIO	I/O	3.3V	
175	LCD_DATA9	LCD data bus	I/O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
176	GPIO0_27	GPIO	I/O	3.3V	
177	LCD_DATA10	LCD data bus	I/O	3.3V	
178	GND	Digital ground		GND	
179	LCD_DATA11	LCD data bus	I/O	3.3V	
180	GPIO1_14	GPIO	I/O	3.3V	
181	LCD_DATA12	LCD data bus	I/O	3.3V	
182	GPIO1_15	GPIO	I/O	3.3V	
183	LCD_DATA13	LCD Data Bus	I/O	3.3V	
184	GPIO1_16	GPIO	I/O	3.3V	
185	LCD_DATA14	LCD data bus	I/O	3.3V	
186	GPIO1_17	GPIO	I/O	3.3V	
187	LCD_DATA15	LCD data bus	I/O	3.3V	
188	GPIO1_20	GPIO	I/O	3.3V	
189	GND	Digital ground		GND	
190	GPIO1_21	GPIO	I/O	3.3V	
191	LCD_PCLK	LCD pixel clock	O	3.3V	
192	NC	Not connected			
193	LCD_VSYNC	LCD vertical sync	O	3.3V	
194	NC	Not connected			
195	LCD_HSYNC	LCD horizontal sync	O	3.3V	
196	NC	Not connected			
197	LCD_EN	LCD enable	O	3.3V	
198	NC	Not connected			
199	GND	Digital ground		GND	
200	NC	Not connected			
201	LED_PWM	LCD PWM Control	O	3.3V	
202	NC	Not connected			
203	GND	Digital ground		GND	
204	GND	Digital ground		GND	

2.4.3 Ethernet Interface (CN4)

Type: RJ45

Pin	Signal name	Description	I/O	Power rail	Note
1	TD1+	Transmit Data1+	I/O		
2	TD1-	Transmit Data1-	I/O		
3	TD2+	Transmit Data2+	I/O		
4	TXD2-	Transmit Data2-	I/O		
5	TCT	Transmit common terminal			
6	RCT	Receive common terminal			
7	RD1+	Receive Data1+	I/O		
8	RD1-	Receive Data1-	I/O		

Pin	Signal name	Description	I/O	Power rail	Note
9	RD2+	Receive Data2+	I/O		
10	RD2-	Receive Data2-	I/O		
11	GRLA	2.5V Power Supply	P	2.5V	
12	GRLC	Link active LED			
13	YELC	100M linked LED			
14	YELA	2.5V Power Supply	P	2.5V	
15	GND	Digital ground		GND	
16	GND	Digital ground		GND	

2.4.4 Mini PCIe Interface (CN5)

Type: Mini PCIe Connector

Pin	Signal name	Description	I/O	Power rail	Note
1	WAKE#/MIC+/NC	Wake up	O	3.3V	
2	3.3V_1	3.3V power supply	P	3.3V	
3	GPIO/MIC-/NC	GPIO	I/O	3.3V	
4	GND	Digital ground		GND	
5	GPIO/SPKP/NC	GPIO	I/O	3.3V	
6	1.5V/NC	1.5V power supply	P	1.5V	
7	CLKREQ#/SPKN/NC	Clock request	I	3.3V	
8	UIM_PWR	SIM card power supply	P	3.3V	
9	GND	Digital ground		GND	
10	UIM_DATA	SIM card data	I/O	3.3V	
11	REFCLK-/NC	Negative differential reference clock	I/O		
12	UIM_CLK	SIM card clock	O	3.3V	
13	REFCLK+/NC	Positive differential reference clock	I/O		
14	UIM_RESET	SIM card reset	O	3.3V	
15	GND	Digital ground		GND	
16	UIM_VPP	SIM card power supply	P	3.3V	
17	MIC-/NC	Microphone input	I		
18	GND	Digital ground		GND	
19	MIC+/NC	Microphone input	I		
20	W_DISABLE	WLAN disable	O	3.3V	
21	GND	Digital ground		GND	
22	PERST#/NC	Functional reset to the card	I	3.3V	
23	PERN0	Negative differential receive signal	I		
24	3.3VAUX	3.3V power supply	P	3.3V	
25	PERP0	Positive differential receive signal	I		
26	GND	Digital ground		GND	
27	GND	Digital ground		GND	
28	1.5V/NC	1.5V power supply	P	1.5V	

Pin	Signal name	Description	I/O	Power rail	Note
29	GND	Digital ground		GND	
30	SMB_CLK/NC	SMBus clock signal	I	3.3V	
31	PETN0/NC	Negative differential transmit signal	O		
32	SMB_DATA/NC	SMBus data signal	I/O	3.3V	
33	PETP0/NC	Positive differential transmit signal	O		
34	GND	Digital ground		GND	
35	GND	Digital ground		GND	
36	USB_D-	Negative differential USB signal	I/O		
37	PCM_CLK/GND	PCM clock	I/O	3.3V	
38	USB_D+	Positive differential USB signal	I/O		
39	PCM_FS/3.3V/NC	PCM sync	O	3.3V	
40	GND	Digital ground		GND	
41	PCM_OUT/3.3V/NC	PCM output	O	3.3V	
42	LED_WWAN#	WWAN LED status signal	O	3.3V	
43	PCM_IN/WAKE#/GND	PCM input	I	3.3V	
44	LED_WLAN#/NC	WLAN LED status signal	O	3.3V	
45	PCMCLK/NC	PCM clock	I/O	3.3V	
46	LED_WPAN#/NC	WPAN LED status signal	O	3.3V	
47	PCM_IN/NC	PCM input	I	3.3V	
48	1.5V/NC	1.5V power supply	P	1.5V	
49	PCM_OUT/NC	PCM output	O	3.3V	
50	GND	Digital ground		GND	
51	PCM_FS/NC	PCM sync	O	3.3V	
52	3.3V	3.3V power supply	P	3.3V	

2.4.5 SIM Interface (CN6)

Type: SIM card connector

Pin	Signal name	Description	I/O	Power rail	Note
1	VCC	SIM card power supply	P	3.3V	
2	RST	SIM card reset	O	3.3V	
3	CLK	SIM card clock	O	3.3V	
4	GND	Digital ground		GND	
5	VPP	SIM card power supply	P	3.3V	
6	I/O	SIM card data	I/O	3.3V	

2.4.6 LCD Interface (CN7)

Type: FPC 50 Pin

Pin	Signal name	Description	I/O	Power rail	Note
1	B0	LCD Pixel data bit 0	O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
2	B	LCD Pixel data bit 1	O	3.3V	
3	B2	LCD Pixel data bit 2	O	3.3V	
4	B3	LCD Pixel data bit 3	O	3.3V	
5	B4	LCD Pixel data bit 4	O	3.3V	
6	B5	LCD Pixel data bit 5	O	3.3V	
7	B6	LCD Pixel data bit 6	O	3.3V	
8	B7	LCD Pixel data bit 7	O	3.3V	
9	GND	Digital ground		GND	
10	G0	LCD Pixel data bit 8	O	3.3V	
11	G1	LCD Pixel data bit 9	O	3.3V	
12	G2	LCD Pixel data bit 10	O	3.3V	
13	G3	LCD Pixel data bit 11	O	3.3V	
14	G4	LCD Pixel data bit 12	O	3.3V	
15	G5	LCD Pixel data bit 13	O	3.3V	
16	G6	LCD Pixel data bit 14	O	3.3V	
17	G7	LCD Pixel data bit 15	O	3.3V	
18	GND	Digital ground		GND	
19	R0	LCD Pixel data bit 16	O	3.3V	
20	R1	LCD Pixel data bit 17	O	3.3V	
21	R2	LCD Pixel data bit 18	O	3.3V	
22	R3	LCD Pixel data bit 19	O	3.3V	
23	R4	LCD Pixel data bit 20	O	3.3V	
24	R5	LCD Pixel data bit 21	O	3.3V	
25	R6	LCD Pixel data bit 22	O	3.3V	
26	R7	LCD Pixel data bit 23	O	3.3V	
27	GND	Digital ground		GND	
28	DEN	AC bias control (STN) or pixel data enable (TFT)	O	3.3V	
29	HSYNC	LCD Horizontal Sync	O	3.3V	
30	VSYNC	LCD Vertical Sync	O	3.3V	
31	GND	Digital ground		GND	
32	CLK	LCD Pixel Clock		3.3V	
33	GND	Digital ground		GND	
34	X+	X+ Position Input		3.3V	
35	X-	X- Position Input		3.3V	
36	Y+	Y+ Position Input		3.3V	
37	Y-	Y- Position Input		3.3V	
38	SPI_CLK/GPIO	SPI Clock/GPIO	I/O	3.3V	
39	SPI_MOSI/GPIO	SPI data 0/GPIO	I/O	3.3V	
40	SPI_MISO/GPIO	SPI data 1/GPIO	I/O	3.3V	
41	SPI_CS/GPIO	SPI chip select/GPIO	I/O	3.3V	
42	GND	Digital ground		GND	

Pin	Signal name	Description	I/O	Power rail	Note
43	I2C_CLK	I2C master serial clock	O	3.3V	
44	I2C_DAT	I2C serial bidirectional data	I/O	3.3V	
45	VDD1	3.3V power supply	P	3.3V	
46	VDD2	3.3V power supply	P	3.3V	
47	RESET	Reset	O	3.3V	
48	PWREN	Backlight enable	O	3.3V	
49	VDD3	5V power supply	P	5V	
50	VDD4	5V power supply	P	5V	

2.4.7 Expansion Interface (CN9)

Type: Header Female 2X23 2.54mm Pitch

Pin	Signal name	Description	I/O	Power rail	Note
1	GND	Digital ground		GND	
2	GND	Digital ground		GND	
3	VIO_3V3	3.3V main power supply	P	3.3V	
4	VIO_3V3	3.3V main power supply	P	3.3V	
5	VCC5V	5V main power supply	P	5V	
6	VCC5V	5V main power supply	P	5V	
7	VBAT	5V main power supply	P	5V	
8	VBAT	5V main power supply	P	5V	
9	PWR_BUT	Not connected			
10	SYS_RESETh	Reset input	I/O	3.3V	
11	UART4_RXD	Not connected			
12	GPIO1_28	Not connected			
13	UART4_TXD	Not connected			
14	EHRPWM1A/GPIO1_18	eHRPWM1 A output/GPIO	O	3.3V	
15	GPIO1_16	GPIO	I/O	3.3V	
16	EHRPWM1B/GPIO1_19	eHRPWM1 B output/GPIO	O	3.3V	
17	I2C1_SCL	I2C clock	I/O	3.3V	
18	I2C1_SDA	I2C data	I/O	3.3V	
19	I2C2_SCL	I2C clock	I/O	3.3V	
20	I2C2_SDA	I2C data	I/O	3.3V	
21	UART2_TXD	UART transmit data	O	3.3V	
22	UART2_RXD	UART receive data	I	3.3V	
23	GPIO1_17	GPIO	I/O	3.3V	
24	UART1_TXD	UART transmit data	O	3.3V	
25	GPIO3_21	GPIO	I/O	3.3V	
26	UART1_RXD	UART receive data	I	3.3V	
27	GPIO3_19	GPIO	I/O	3.3V	
28	SPI1_CS0	SPI chip select	I/O	3.3V	
29	SPI1_D0	SPI Data	I/O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
30	SPI1_D1	SPI Data	I/O	3.3V	
31	SPI1_SCLK	SPI clock	I/O	3.3V	
32	VDDA_ADC	ADC power supply	P	1.8V	
33	AIN4	Analog input/output	I/O	3.3V	
34	GND	Digital ground		GND	
35	AIN6	Analog input/output	I/O	3.3V	
36	AIN5	Analog input/output	I/O	3.3V	
37	AIN2	Analog input/output	I/O	3.3V	
38	AIN3	Analog input/output	I/O	3.3V	
39	AIN0	Analog input/output	I/O	3.3V	
40	AIN1	Analog input/output	I/O	3.3V	
41	CLKOUT2	Clock output	O	3.3V	
42	GPIO0_7	GPIO	I/O	3.3V	
43	GND	Digital ground		GND	
44	GND	Digital ground		GND	
45	GND	Digital ground		GND	
46	GND	Digital ground		GND	

2.4.8 Expansion Interface (CN10)

Type: Header Female 2X23 2.54mm Pitch

Pin	Signal name	Description	I/O	Power rail	Note
1	GND	Digital ground		GND	
2	GND	Digital ground		GND	
3	MMC1_DAT6	Not connected			
4	MMC1_DAT7	Not connected			
5	MMC1_DAT2	Not connected			
6	MMC1_DAT3	Not connected			
7	TIMER4	Not connected			
8	TIMER7	Not connected			
9	TIMER5	Not connected			
10	TIMER6	Not connected			
11	GPIO1_13	GPIO	I/O	3.3V	
12	GPIO1_12	GPIO	I/O	3.3V	
13	EHRPWM2B	EHRPWM2 B output	O	3.3V	
14	GPIO0_26	GPIO	I/O	3.3V	
15	GPIO1_15	GPIO	I/O	3.3V	
16	GPIO1_14	GPIO	I/O	3.3V	
17	GPIO0_27	GPIO	I/O	3.3V	
18	GPIO2_1	GPIO	I/O	3.3V	
19	EHRPWM2A	EHRPWM2 A output	O	3.3V	
20	MMC1_CMD	Not connected			

Pin	Signal name	Description	I/O	Power rail	Note
21	MMC1_CLK	Not connected			
22	MMC1_DAT5	Not connected			
23	MMC1_DAT4	Not connected			
24	MMC1_DAT1	Not connected			
25	MMC1_DAT0	Not connected			
26	GPIO1_29	Not connected			
27	LCD_VSYNC	LCD vertical sync	O	3.3V	
28	LCD_PCLK	LCD pixel clock	O	3.3V	
29	LCD_HSYNC	LCD horizontal sync	O	3.3V	
30	LCD_EN	LCD enable	O	3.3V	
31	LCD_DATA14	LCD data bus	I/O	3.3V	
32	LCD_DATA15	LCD data bus	I/O	3.3V	
33	LCD_DATA13	LCD data bus	I/O	3.3V	
34	LCD_DATA11	LCD data bus	I/O	3.3V	
35	LCD_DATA12	LCD data bus	I/O	3.3V	
36	LCD_DATA10	LCD data bus	I/O	3.3V	
37	LCD_DATA8	LCD data bus	I/O	3.3V	
38	LCD_DATA9	LCD data bus	I/O	3.3V	
39	LCD_DATA6	LCD data bus	I/O	3.3V	
40	LCD_DATA7	LCD data bus	I/O	3.3V	
41	LCD_DATA4	LCD data bus	I/O	3.3V	
42	LCD_DATA5	LCD data bus	I/O	3.3V	
43	LCD_DATA2	LCD data bus	I/O	3.3V	
44	LCD_DATA3	LCD data bus	I/O	3.3V	
45	LCD_DATA0	LCD data bus	I/O	3.3V	
46	LCD_DATA1	LCD data bus	I/O	3.3V	

2.4.9 TF Interface (CN11)

Type: TF Card Connector

Pin	Signal name	Description	I/O	Power rail	Note
1	DAT2	MMC/SD/SDIO data bus	I/O	3.3V	
2	CD/DAT3	MMC/SD/SDIO data bus	I/O	3.3V	
3	CMD	MMC/SD/SDIO command	I/O	3.3V	
4	VDD	3.3V power supply	P	3.3V	
5	CLOCK	MMC/SD/SDIO clock	I/O	3.3V	
6	VSS	Digital ground		GND	
7	DAT0	MMC/SD/SDIO data bus	I/O	3.3V	
8	DAT1	MMC/SD/SDIO data bus	I/O	3.3V	
9	CD	SD card detect	I	3.3V	

2.4.10 USB HOST Interface (CN12)

Type: Pin Header 2x4 2.54mm pitch

Pin	Signal name	Description	I/O	Power rail	Note
1	VCC5V	5V power supply	P	5V	
2	VCC5V	5V power supply	P	5V	
3	DM1	Negative differential USB signal	I/O	5V	
4	DM2	Negative differential USB signal	I/O	5V	
5	DP1	Positive differential USB signal	I/O	5V	
6	DP2	Positive differential USB signal	I/O	5V	
7	GND	Digital ground		GND	
8	GND	Digital ground		GND	

2.4.11 USB HOST Interface (CN13)

Type: Double USB Host Connector

Pin	Signal name	Description	I/O	Power rail	Note
1	APV	5V power supply	P	5V	
2	AD-	Negative differential USB signal	I/O	5V	
3	AD+	Positive differential USB signal	I/O	5V	
4	GND	Digital ground		GND	
5	BPV	5V power supply	P	5V	
6	BD-	Negative differential USB signal	I/O	5V	
7	BD+	Positive differential USB signal	I/O	5V	
8	GND	Digital ground		GND	

2.4.12 Debug Interface (CN14)

Type: Header Male 1x4 2.54mm pitch

Pin	Signal name	Description	I/O	Power rail	Note
1	VIO_3V3	3.3V main power supply	P	3.3V	
2	UART0_TX	UART transmit data	O	3.3V	
3	UART0_RX	UART receive data	I	3.3V	
4	GND	Digital ground		GND	

2.4.13 USB OTG Interface (CN15)

Type: Micro USB AB Connector

Pin	Signal name	Description	I/O	Power rail	Note
1	VB	5V power supply	P	5V	
2	D-	Negative differential USB signal	I/O	5V	
3	D+	Positive differential USB signal	I/O	5V	
4	ID	Use this pin to detect the ID pin if you use USB OTG.	I	5V	

Pin	Signal name	Description	I/O	Power rail	Note
5	GND	Digital ground		GND	

2.4.14 Power In Interface (CN1)

Type: Power DC JACK

Pin	Signal name	Description	I/O	Power rail	Note
1	DC IN	Power DC In	I	9~15V	
2	GND	Digital ground		GND	
3	GND	Digital ground		GND	

2.5 Technical Specifications

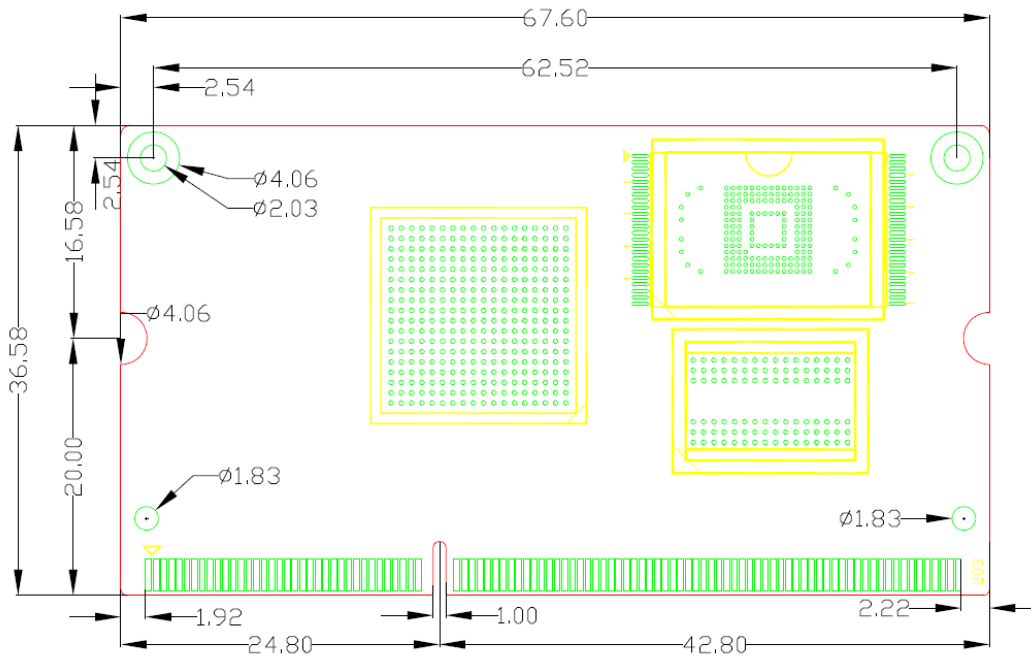
2.5.1 Electrical Characteristics

Table 2.5.1-1 Absolute Maximum Ratings

Symbol	Description	Input/Output	Min	Type	Max	Unit
VSYSTEM	Main power supply	Input	-0.3	12	12.6	V
Ivsystem	Main power current	Input	180	400	2000	mA
VBAT	Main power supply	Input	-0.3	4.7	5	V
VIO_3V3	Digital power supply	Input	-0.3	3.3	3.6	V
VBATBAKUP	RTC power supply	Input	-0.3	3.1	3.3	V
USB1_VBUS	USB HOST power supply	Input	-0.5	5.0	5.25	V
USB_OTG_PWR	USB OTG power supply	Input	-0.5	5.0	5.25	V
VIO_1V8	Digital power supply	Output	-0.3	1.8	1.89	V
VMMC	SD/MMC power supply	Output	-0.3	3.0	3.6	V

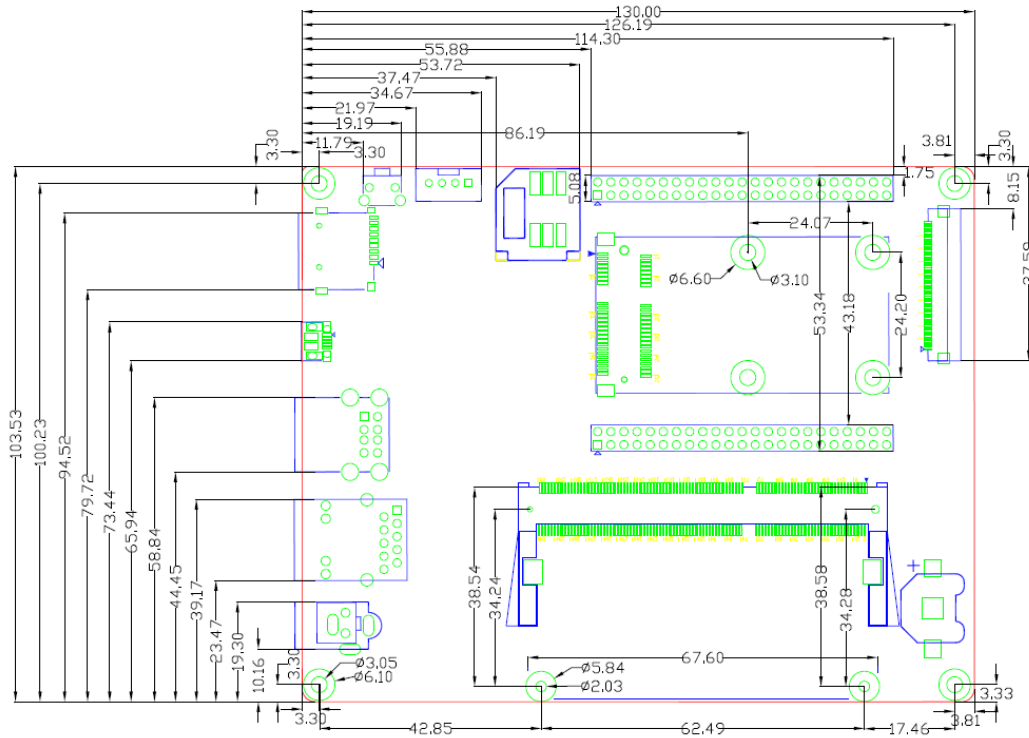
2.5.2 Mechanical Characteristics

MRA52XX Dimension :



Unit : mm

LIA Dimension :



Unit : mm

2.5.3 Thermal Characteristics

Table 2.5.3-1 Thermal Characteristics

Series	LIA	LIA	LIA
Part Code	LIAS0010	LIAS0020	LIAS0030
Storage Temperature	-40° to 85° C	-40° to 85° C	-40° to 85° C
Operating temperature	0° to 70° C	0° to 70° C	0° to 70° C

Technical Support and Warranty

Technical Support

MAS Elettronica provides its product with one-year free technical support including:

- Providing software and hardware resources related to the embedded products of MAS Elettronica;
- Helping customers properly compile and run the source code provided by MAS Elettronica;
- Providing technical support service if the embedded hardware products do not function properly under the circumstance that customers operate according to the instructions in the documents provided by MAS Elettronica;
- Helping customers troubleshoot the products.

⊘ The following conditions will not be covered by our technical support service. We will take appropriate measures accordingly:


- Customers encounter issues related to software or hardware during their development process;
- Customers encounter issues caused by any unauthorized alter to the embedded operating system;
- Customers encounter issues related to their own applications;
- Customers encounter issues caused by any unauthorized alter to the source code provided by MAS Elettronica;

Warranty Conditions

- 1) 12-month free warranty on the PCB under normal conditions of use since the sales of the product;
- 2) The following conditions are not covered by free services; MAS Elettronica will charge accordingly:
 - A. Customers fail to provide valid purchase vouchers or the product identification tag is damaged, unreadable, altered or inconsistent with the products.
 - B. Products are damaged caused by operations inconsistent with the user manual;
 - C. Products are damaged in appearance or function caused by natural disasters (flood, fire, earthquake, lightning strike or typhoon) or natural aging of components or other force majeure;
 - D. Products are damaged in appearance or function caused by power failure, external forces, water, animals or foreign materials;
 - E. Products malfunction caused by disassembly or alter of components by customers or, products disassembled or repaired by persons or organizations unauthorized by MAS Elettronica, or altered in factory specifications, or configured or expanded with the components that are not provided or recognized by MAS Elettronica and the resulted damage in appearance or function;
 - F. Product failures caused by the software or system installed by customers or inappropriate settings of software or computer viruses;
 - G. Products purchased from unauthorized sales;

- H. Warranty (including verbal and written) that is not made by MAS Elettronica and not included in the scope of our warranty should be fulfilled by the party who committed. MAS Elettronica has no any responsibility;
- 3) Within the period of warranty, the freight for sending products from customers to MAS Elettronica should be paid by customers; the freight from MAS Elettronica to customers should be paid by us. The freight in any direction occurs after warranty period should be paid by customers.
- 4) Please contact technical support if there is any repair request.

Note:

 MAS Elettronica will not take any responsibility on the products sent back without the permission of the company.

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