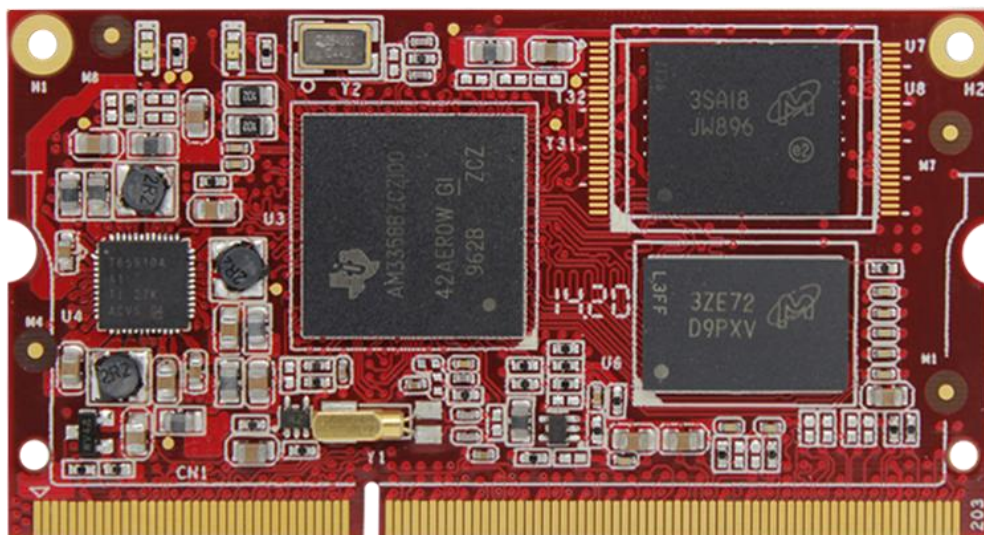


# MIREA AM335x Module Hardware Manual Rev 1.0



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# 1 Chapter 1 Product Overview

## 1.1 Introduction

### 1.2 Hardware

The MIREA is a core module based on the TI's Sitara AM335X Cortex-A8 processor. The core module is Measured only 67.6mm X 36.5mm, integrates 256MB/512MBytes DDR3 SDRAM and up to 8GBytes eMMC flash. It offers a wide range of interfaces from simple GPIOs, industry standard I2C, SPI, CAN, and UART buses through to high speed USB 2.0 interface, and gigabit Ethernet.

The module 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.

### 1.3 Software

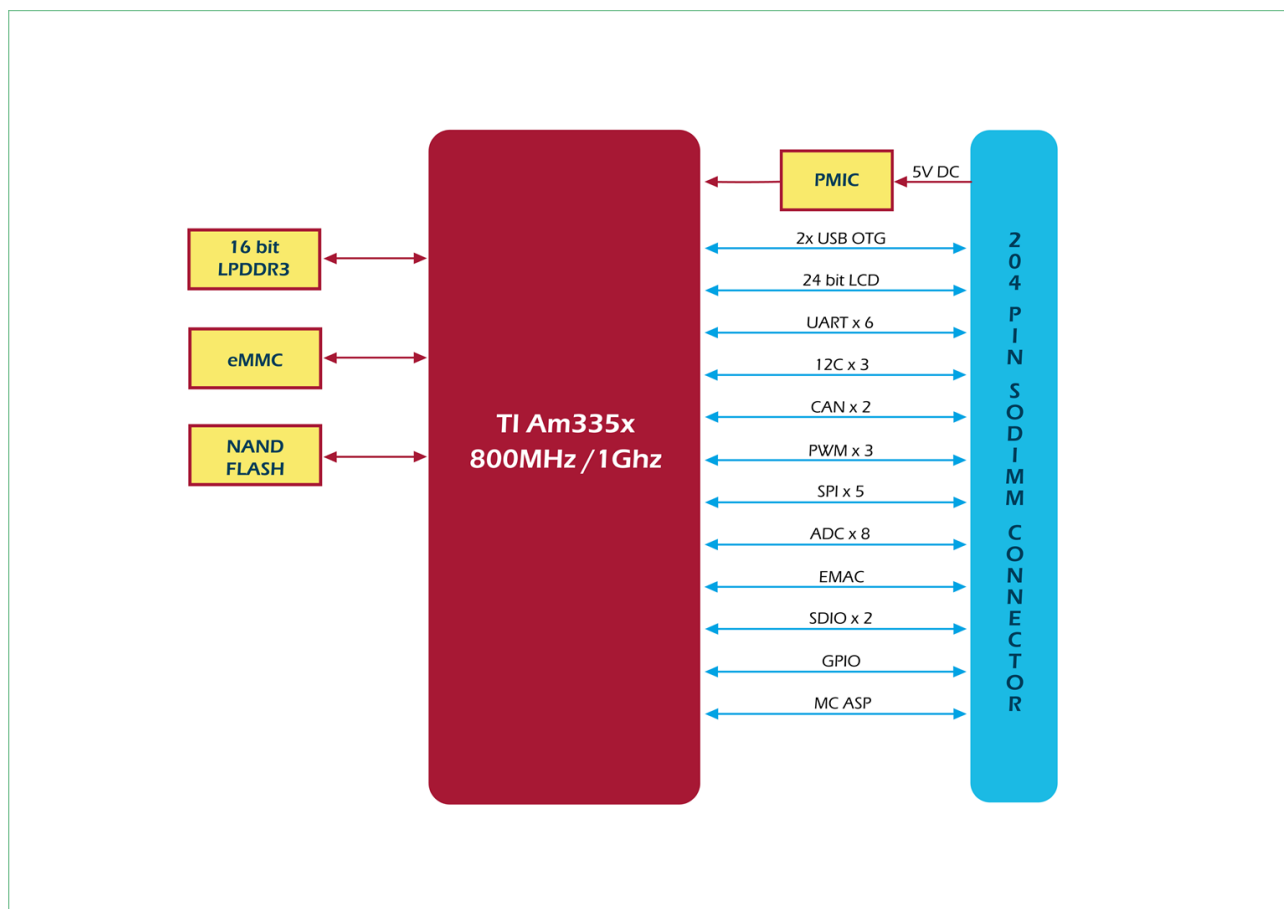
The MIREA is a ready-to-run platform to support for Linux 4.x, Android 5.x operating systems.

If you care about other Operating System, For more information contact our support.

## 1.4 Product Overview

The following sections list out all the product features.

Series	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Part Code	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
CPU Name	TI AM3352/4/8	TI AM3352/4/8	TI AM3352/4/8	TI AM3352/4/8
CPU Type	ARM Cortex™-A8	ARM Cortex™-A8	ARM Cortex™-A8	ARM Cortex™-A8
CPU Clock	1x	1x	1x	1x
CPU Frequency	800MHz/1GHz	800MHz/1GHz	800MHz/1GHz	800MHz/1GHz
RAM DDR3	Micron 256MB/512MB@16bit*1	Micron 256MB/512MB@16bit*1	Micron 256MB/512MB@16bit*1	Micron 256MB/512MB@16bit*1
Flash	eMMC 2/4/8GB@8bit*1	eMMC 2/4/8GB@8bit*1	eMMC 2/4/8GB@8bit*1	eMMC 2/4/8GB@8bit*1
PMU	TI TPS65910A3/A31	TI TPS65910A3/A31	TI TPS65910A3/A31	TI TPS65910A3/A31
Size	67.6 x 36.5 x 6.2mm	67.6 x 36.5 x 6.2mm	67.6 x 36.5 x 6.2mm	67.6 x 36.5 x 6.2mm
Temperature	0° to 70° C	0° to 70° C	-40° to 85° C	-40° to 85° C
Support OS	Linux 4.x Android 4.x Wince 7.0	Linux 4.x Android 4.x Wince 7.0	Linux 4.x Android 4.x Wince 7.0	Linux 4.x Android 4.x Wince 7.0



## 2 Chapter 2 Hardware System

### Block Diagram

Figure 1 MIREA Block Diagram

## 2.1 Main Features

### 2.1.1 CPU

Series	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Part Code	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
CPU Name	TI AM3352/4/8	TI AM3352/4/8	TI AM3352/4/8	TI AM3352/4/8
ARM CPU	ARM Cortex™-A8	ARM Cortex™-A8	ARM Cortex™-A8	ARM Cortex™-A8
CPU Frequency	800MHz/1GHz	800MHz/1GHz	800MHz/1GHz	1GHz
ARM MIPS	1600/2000	1600/2000	1600/2000	1600/2000
Graphics Acceleration	1 3D	1 3D	1 3D	1 3D
Other Hardware Acceleration	2 PRU-ICSS Crypto Accelerator	2 PRU-ICSS Crypto Accelerator	2 PRU-ICSS Crypto Accelerator	2 PRU-ICSS Crypto Accelerator
On-Chip L1 Cache	64KB	64KB	64KB	64KB
On-Chip L2 Cache	256KB	256KB	256KB	256KB
<b>Other On-Chip Memory</b>	128KB	128KB	128KB	128KB
Display Options	LCD	LCD	LCD	LCD
General Purpose Memory	1 16-bit (GPMC, NAND flash, NOR flash, SRAM)	1 16-bit (GPMC, NAND flash, NOR flash, SRAM)	1 16-bit (GPMC, NAND flash, NOR flash, SRAM)	1 16-bit (GPMC, NAND flash, NOR flash, SRAM)
DRAM	1 16-bit (LPDDR-400, DDR2-532, DDR3-800)	1 16-bit (LPDDR-400, DDR2-532, DDR3-800)	1 16-bit (LPDDR-400, DDR2-532, DDR3-800)	1 16-bit (LPDDR-400, DDR2-532, DDR3-800)
USB	2	2	2	2
EMAC	10/100/1000	10/100/1000	10/100/1000	10/100/1000
SDIO	3	3	3	3
CAN	2	2	2	2
UART (SCI)	6	6	6	6
ADC	8-ch 12-bit	8-ch 12-bit	8-ch 12-bit	8-ch 12-bit
PWM	3	3	3	3
eCAP	3	3	3	3
eQEP	3	3	3	3
RTC	1	1	1	1
IIC	3	3	3	3
McASP	2	2	2	2
SPI	2	2	2	2
DMA	64-ch EDMA	64-ch EDMA	64-ch EDMA	64-ch EDMA
IO Supply (V)	1.8/3.3	1.8/3.3	1.8/3.3	1.8/3.3




## 2.1.2 Memory

Series	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Part Code	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
DDR3 RAM Size	512MByte	512MByte	512MByte	512MByte
DDR3 RAM Speed	800MT/S	800MT/S	800MT/S	800MT/S
DDR3 RAM Memory Width	16bit	16bit	16bit	16bit
eMMC (8bit)	2/4/8GByte	2/4/8GByte	2/4/8GByte	2/4/8GByte

## 2.1.3 Interface

Series	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Part Code	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
USB	2	2	2	2
SDIO	1	1	1	1
UART	4+2*	4+2*	4+2*	4+2*
SPI	1+1*	1+1*	1+1*	1+1*
IIC	1+2*	1+2*	1+2*	1+2*
EMAC	1	1	1	1
PWM	2+1*	2+1*	2+1*	2+1*
CAN	1+1*	1+1*	1+1*	1+1*
ADC	8	8	8	8
GPIO	18+73*	18+73*	18+73*	18+73*
JTAG	1	1	1	1
LCD RGB (16 bit)	1	1	1	1
McASP	1+1*	1+1*	1+1*	1+1*
USB	2	2	2	2
SDIO	1	1	1	1
UART	4+2*	4+2*	4+2*	4+2*
SPI	1+1*	1+1*	1+1*	1+1*
IIC	1+2*	1+2*	1+2*	1+2*

 \*These interfaces are available on pins that are not defined as standard interfaces in the core module. Some of the pins are multiplexed for other functions. Please refer to the CPU datasheet and schematics for details.

## 2.2 Reference Documents

### 2.2.1 CPU AM335X

AM335X is a CPU used on MIREA.

If you need more information about the CPU, please refer to <http://www.ti.com>

### 2.2.2 PMU TPS65910A31A1RSL

TPS65910A31A1RSL is a PMU used on MIREA.

If you need more information about the PMU, please refer to <http://www.ti.com>

### 2.2.3 DDR3 MT41K256M16HA-125:E

MT41K256M16HA-125:E is a 512M DDR3 Memory used on MIREA.

If you need more information about the DDR3, please refer to MT41K256M16HA-125:E from <http://www.micron.com>

### 2.2.4 eMMC flash MTFC4GMVEA-0M WT/MTFC8GLVEA-4MIT

MTFC4GMVEA-0M WT/MTFC8GLVEA-4MIT is a 4GB/8GB eMMC flash used on MIREA.

If you need more information about the eMMC, please refer to MTFC4GMVEA-0M WT/MTFC8GLVEA-4MIT from <http://www.micron.com>

## 2.4 Hardware Interfaces

### 2.4.1 CN1 Interface

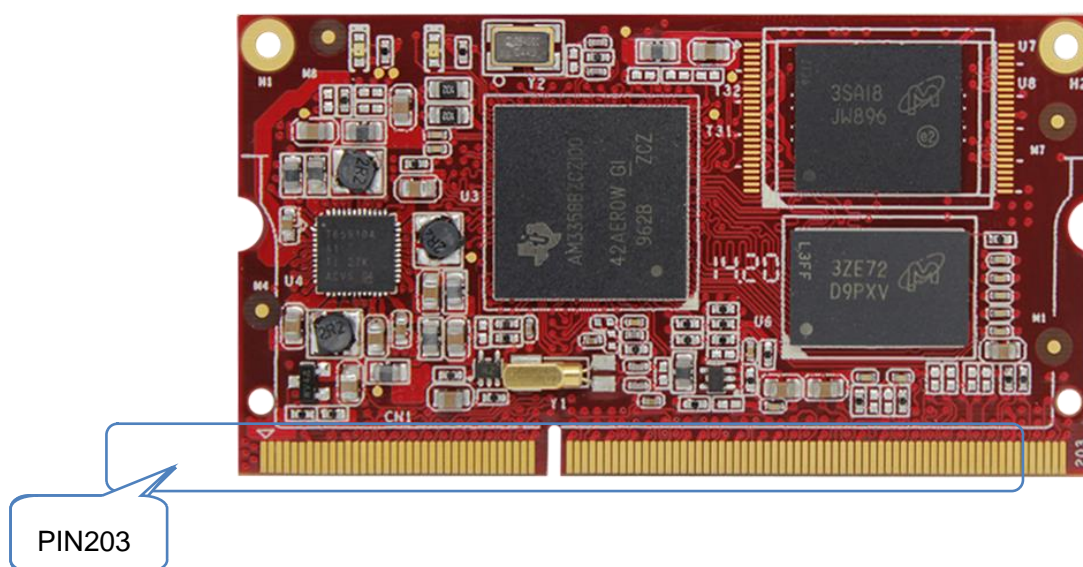


Figure 3 MIREA CN1 Interface

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	
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			

Pin	Signal name	Description	I/O	Power rail	Note
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	MII receive data error	I	3.3V	
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	

Pin	Signal name	Description	I/O	Power rail	Note
61	MII1_COL	MII colision	I	3.3V	
62	SPI0_CS0	SPI chip select	I/O	3.3V	
63	MII1_CRS	MII carrier sense	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	TRSTn	JTAG test reset(active low)	I	3.3V	
79	GND	Digital ground		GND	
80	TMS	JTAG test mode select	I	3.3V	
81	NC	Not connected			
82	TDI	JTAG test data input	I	3.3V	
83	GND	Digital ground		GND	
84	TCK	JTAG test clock	I	3.3V	
85	DCAN0_TX	DCAN transmit data	O	3.3V	
86	TDO	JTAG test data output	O	3.3V	
87	DCAN0_RX	DCAN receive data	I	3.3V	
88	EMU0	MISC emulation pin	I/O	3.3V	
89	GND	Digital ground		GND	
90	EMU1	MISC emulation pin	I/O	3.3V	
91	NC	Not connected			
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	O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
105	NC	Not connected			
106	EHRPWM2B/GPIO0_23	eHRPWM2 B output	O	3.3V	
107	GND	Digital ground		GND	
108	EHRPWM1A/GPIO1_18	eHRPWM1 A output	O	3.3V	
109	WG_D0	Wiegand output data	O	3.3V	
110	EHRPWM1B/GPIO1_19	eHRPWM1 B output	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	ADC7	Analog input/output	I/O	3.3V	
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	
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	MCASP0_AXR1	McASP0 serial data (in/out)	I/O	3.3V	
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			

Pin	Signal name	Description	I/O	Power rail	Note
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	GPIO0_19	GPIO	I/O	3.3V	
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	GPIO2_0	GPIO	I/O	3.3V	
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	
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	GPIO1_22	GPIO	I/O	3.3V	

Pin	Signal name	Description	I/O	Power rail	Note
193	LCD_VSYNC	LCD vertical sync	O	3.3V	
194	GPIO1_23	GPIO	I/O	3.3V	
195	LCD_HSYNC	LCD horizontal sync	O	3.3V	
196	GPIO1_24	GPIO	I/O	3.3V	
197	LCD_EN	LCD enable	O	3.3V	
198	GPIO1_25	GPIO	I/O	3.3V	
199	GND	Digital ground		GND	
200	GPIO1_26	GPIO	I/O	3.3V	
201	LED_PWM	LCD PWM Control	O	3.3V	
202	GPIO1_27	GPIO	I/O	3.3V	
203	GND	Digital ground		GND	
204	GND	Digital ground		GND	

## 2.3 Technical Specifications

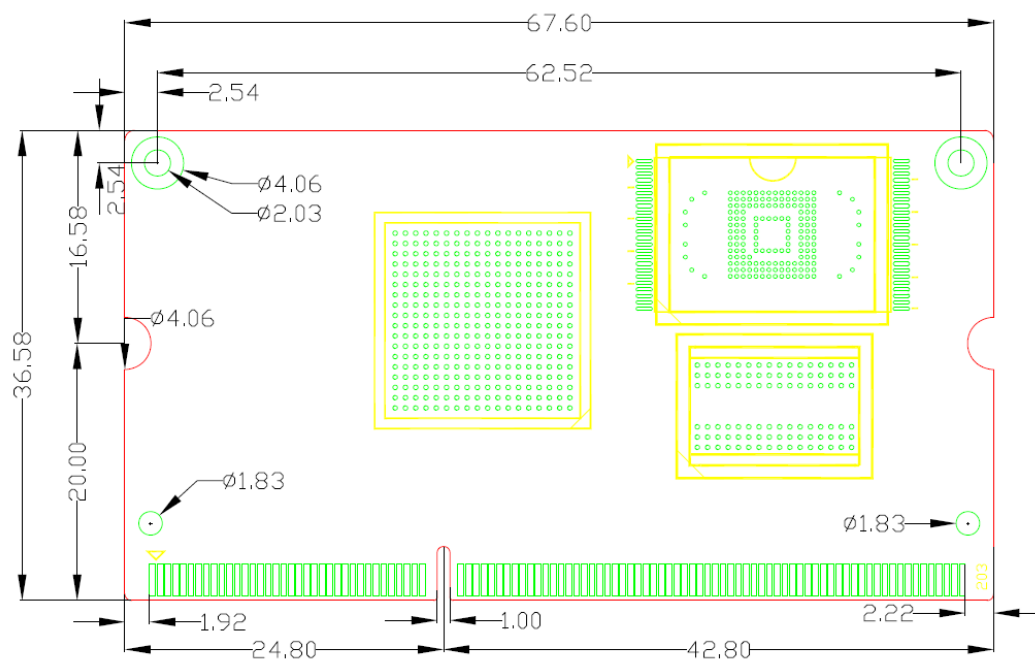
### 2.3.1 Electrical Characteristics

Table 2.5.1-1 Absolute Maximum Ratings

Symbol	Description	Input/Output	Min	Type	Max	Unit
VBAT	Main power supply	Input	-0.3	4.7	5	V
Ivbat	Main power current	input	180	270	400	mA
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



## 2.3.2 Mechanical Characteristics



Unit : mm

### 2.3.3 Thermal Characteristics

Series	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Part Code	MRA5x0x	MRA5x0x	MRA5x0x	MRA5x0x
Storage Temperature	-40° to 85° C	-40° to 85° C	-40° to 85° C	-40° to 85° C
Operating temperature	0° to 70° C	0° to 70° C	-40° to 85° C	-40° to 85° 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.

## Contact Information

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