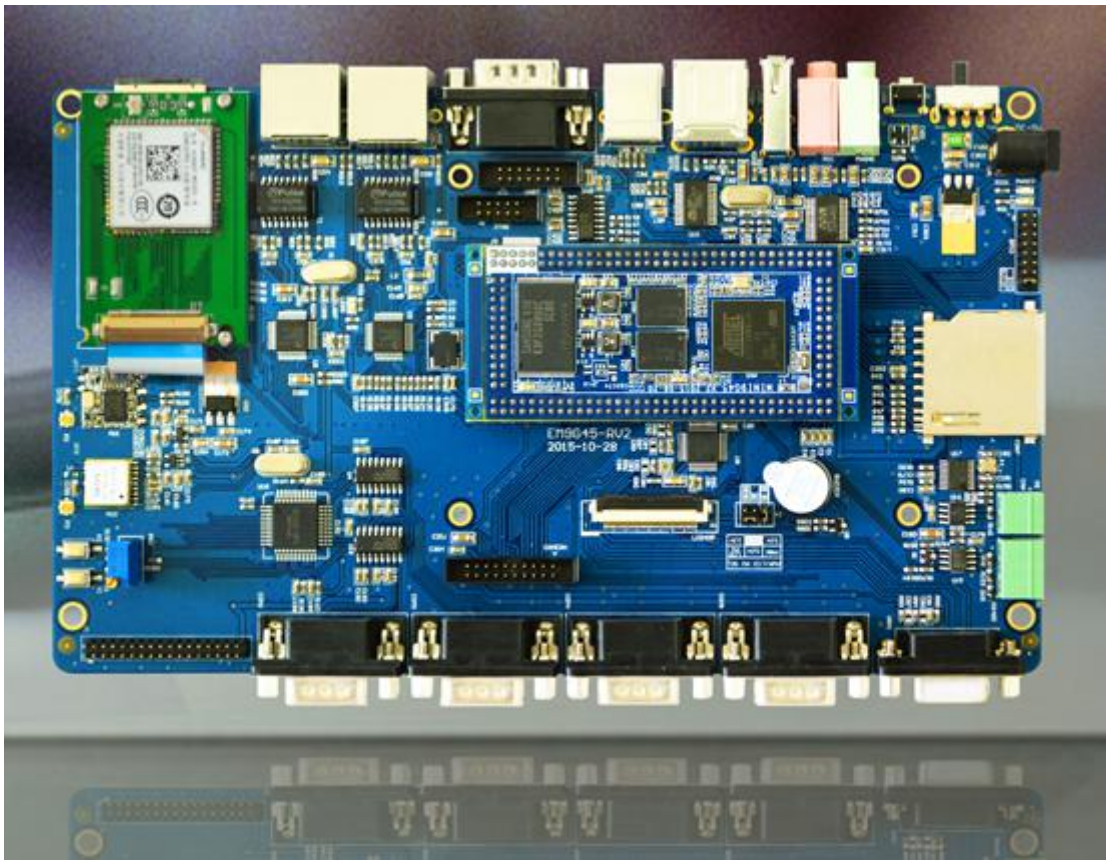
EM9G45-I Hardware Manual



Boardcon Technology Limited
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 products.

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.

Content

1 EM9G45-I Introduction

1.1 Summary

EM9G45-I is a Linux-ready single board computer (SBC) mixes a COM with a Atmel SAM9G45 ARM9 soc and 128MB RAM, 256MB, 512MB or 1GB flash depending on model, and a baseboard featuring optional displays and wireless modules.
EM9G45-I SBC is an updated version with VGA, 2x Ethernet, 3x USB Host, GPRS, GPS, and WiFi.
The company also released embedded software for EM9G45-I which includes low level drivers, USB, File system and more.

1.2 Atmel SAM9G45 Features

- 400 MHz ARM926EJ-S™ ARM®Thumb®Processor
  - 32 KBytes Data Cache, 32 KBytes Instruction Cache, MMU
- Memories
  - Dual External Bus Interface supporting 4-bank DDR2/LPDDR, SDRAM/LPSDR, Static Memories, Compact Flash, SLC NAND Flash with ECC
  - One 64-kbyte internal SRAM, single-cycle access at system speed or processor speed through TCM interface
  - One 64-kbyte internal ROM, embedding bootstrap routine
- Peripherals
  - LCD Controller supporting STN and TFT displays up to 1280*860
  - ITU-R BT. 601/656 Image Sensor Interface
  - USB Device High Speed, USB Host High Speed and USB Host Full Speed with OnChip Transceiver
  - 10/100 Mbps Ethernet MAC Controller
  - Two High Speed Memory Card Hosts (SDIO, SDCard, MMC)
  - AC'97 controller
  - Two Master/Slave Serial Peripheral Interfaces
  - Two Three-channel 32-bit Timer/Counters
  - Two Synchronous Serial Controllers (I2S mode)
  - Four-channel 16-bit PWM Controller
  - Two Two-wire Interfaces
  - Four USARTs with ISO7816, IrDA, Manchester and SPI modes
  - 8-channel 10-bit ADC with 4-wire Touch Screen support
- System
  - 133 MHz twelve 32-bit layer AHB Bus Matrix
  - 37 DMA Channels
  - Boot from NAND Flash, SDCard, DataFlash® or serial DataFlash
  - Reset Controller with on-chip Power-on Reset
  - Selectable 32768 Hz Low-power and 12 MHz Crystal Oscillators

- Internal Low-power 32kHz RC Oscillator
- One PLL for the system and one 480 MHz PLL optimized for USB High Speed
- Two Programmable External Clock Signals
- Advanced Interrupt Controller and Debug Unit
- Periodic Interval Timer, Watchdog Timer, Real Time Timer and Real Time Clock

• I/O

- Five 32-bit Parallel Input/Output Controllers
- 160 Programmable I/O Lines Multiplexed with up to Two Peripheral I/Os with Schmitt trigger input

• Package

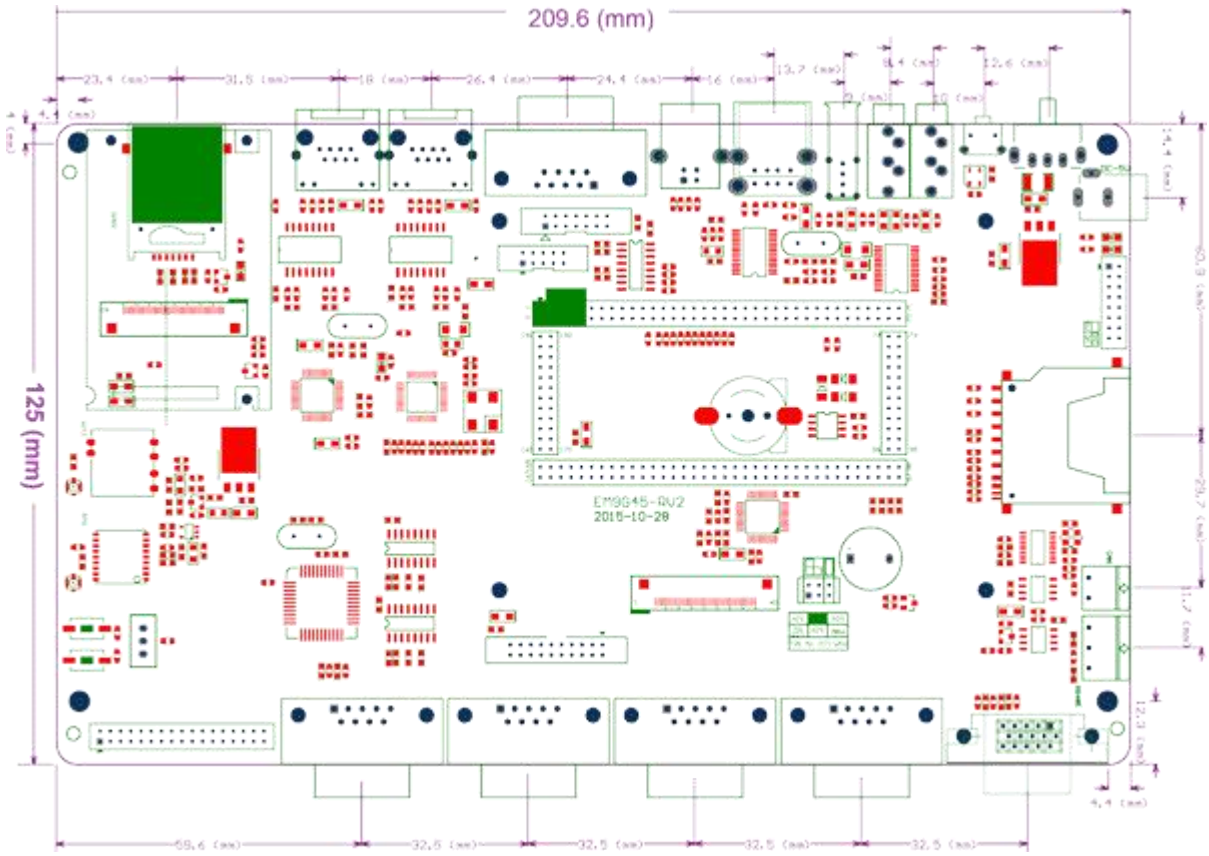
- 324-ball LFBGA, pitch 0.8 mm

1.3 EM9G45-I Specifications

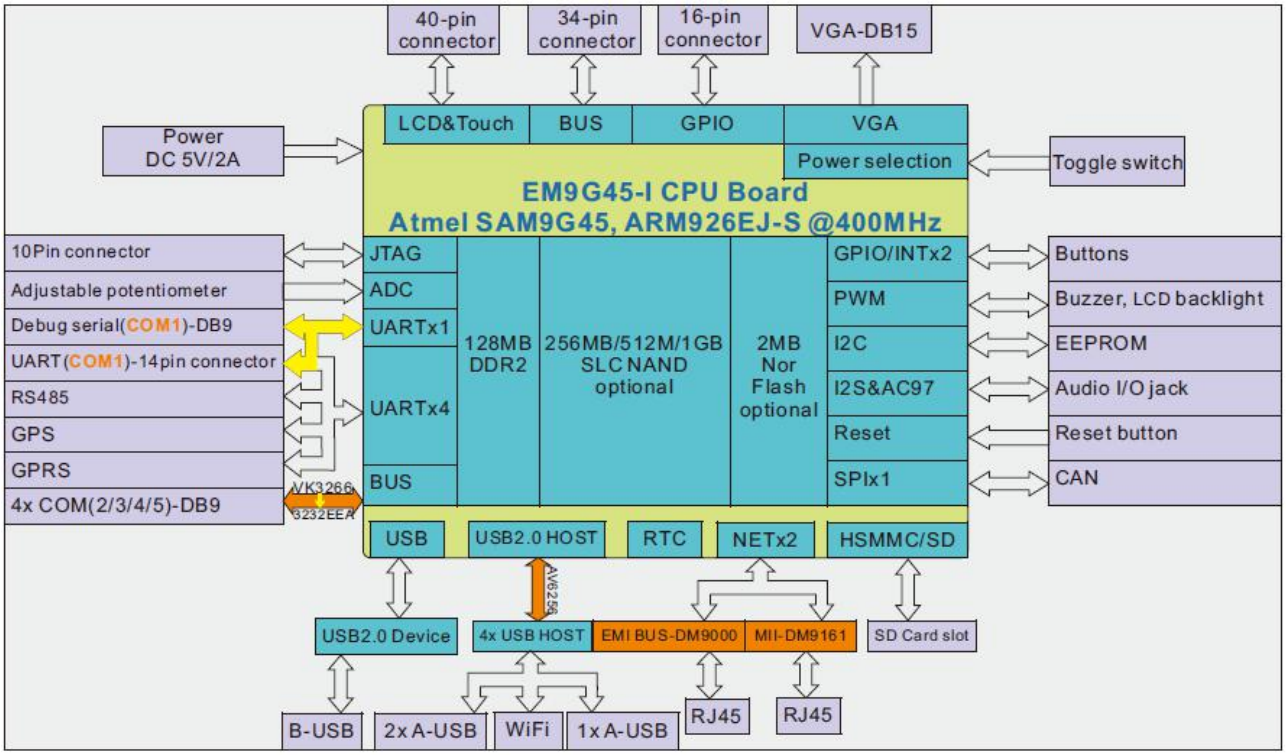
Feature	Specifications
CPU	Atmel SAM9G45, ARM926EJ-S @400MHz
RAM	On-board 128MB DDR2-RAM
NAND Flash	Default mounted 256MB, 512MB/1GB optional
NOR Flash (optional)	2MB
Connector	DC-2.0mm pitch board-to-board connectors
CPU Dimension	37mm x 74mm
Serial Ports (UARTs)	COM1/2/3/4/5 - DB9 serial port. COM1 is used as the debug port by default. UART(COM0/1) - 14pin header connector
RS485	1x RS485 connector
CAN	1x CAN connector
LCD	The LCD port integrated 4-wire resistor touch screen port. The board comes with driver for 4.3-, 7- inch TFT LCD
Ethernet	2x Ethernet port (RJ45), Davicom DM9000CEP, DM9161AEP
USB	1x USB2.0 device, 3x USB2.0 host
VGA	VGA output
GPRS (Optional)	1x 40-pin connector, HUAWEI MG323-B module
WiFi (Optional)	On-board WiFi module, Realtek RTL8188EUS, supports IEEE 802.11n/b/g
GPS (Optional)	On-board GPS module, SATES ST-91-U7
JTAG	1x 2mm pitch 10-pin JTAG Port
Audio codec	Adopt WM8731 Audio chip, Audio input and output slot
ADC	Adjustable resistor is connected with pins of ADC to check analog/digital change
RTC	Real Time Clock, powered by external lithium battery
Buzzer	On-board PWM function test unit
SIM	1x SIM card slot
SD	1x SD/MMC card slot
GPIO	1x 16-pin GPIO Expansion Connector

BUS	1x 34-pin BUS extended interface
Buttons	2x Programmable User Buttons
Base board Dimension	209.6mm x 125mm

1.4 PCB Dimension



1.5 Block Diagram

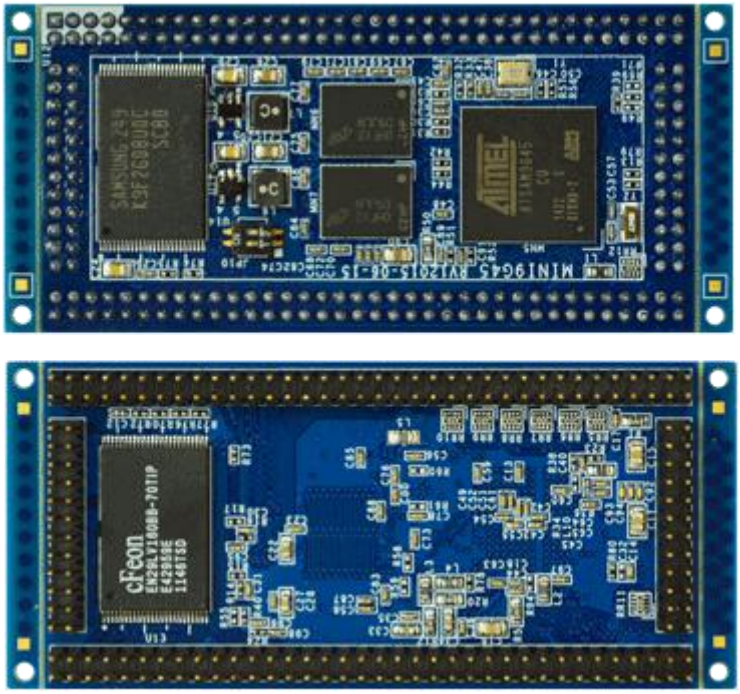


1.6 Motherboard Power meter

Support voltage	5V/2A				
System	Connected devices	Electric current(A)	System	Connected devices	Electric current(A)
Linux (7” image)	5v power	0.36	Linux (7” image)	Power, 7 inch resistive screen	0.82
Linux (7” image)	Power, sd card, play mp3, three U disk, debug serial, Ethernet 0, 7inch LCD, headphone	1.13			

1.7 CPU Introduction

The ARM9 CPU module MINI9G45 lets designers quickly evaluate and develop code for applications running on the Atmel SAM9G45.



Board Dimension

* Board size: 74mm x 37mm

* Pin to Pin space: 2mm

* Pin number: (J1A +J1C) x 24 + (J1B+J1D) x 72, total 192 pins

Feature

* MINI9G45 Development Board: EM9G45, EM9G45-I

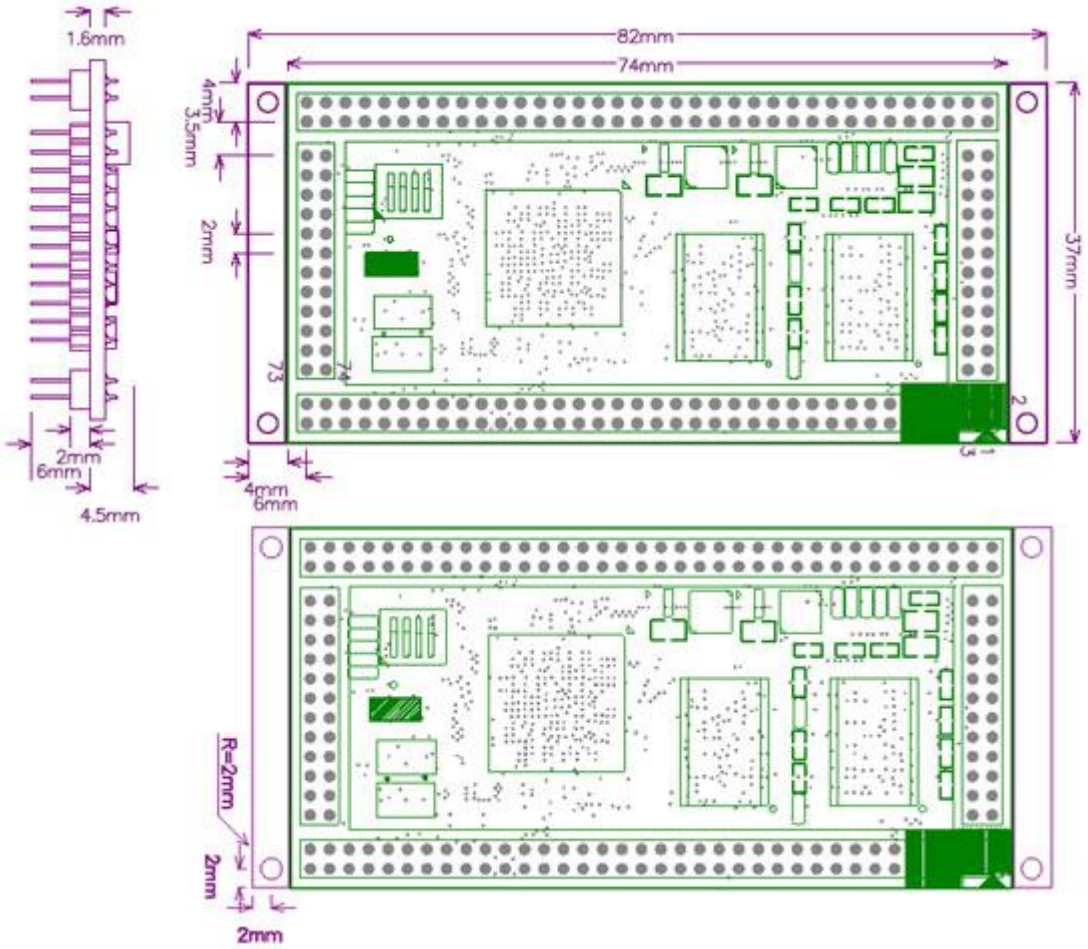
* Power supply: 3.3V

* Pin out: 10/100 Ethernet port, USB HOST, USB device, UART, GPIO, RTC, JTAG, audio codec and speaker, watchdog, I2C, HS-ISP BUS, SDIO, ADC, PWM, etc.

* Application: POS terminals, security, industrial control, medical, handheld devices, etc.

* Compatible module: MINI2440, MINI2416-III, MINI210-III

PCB Dimension



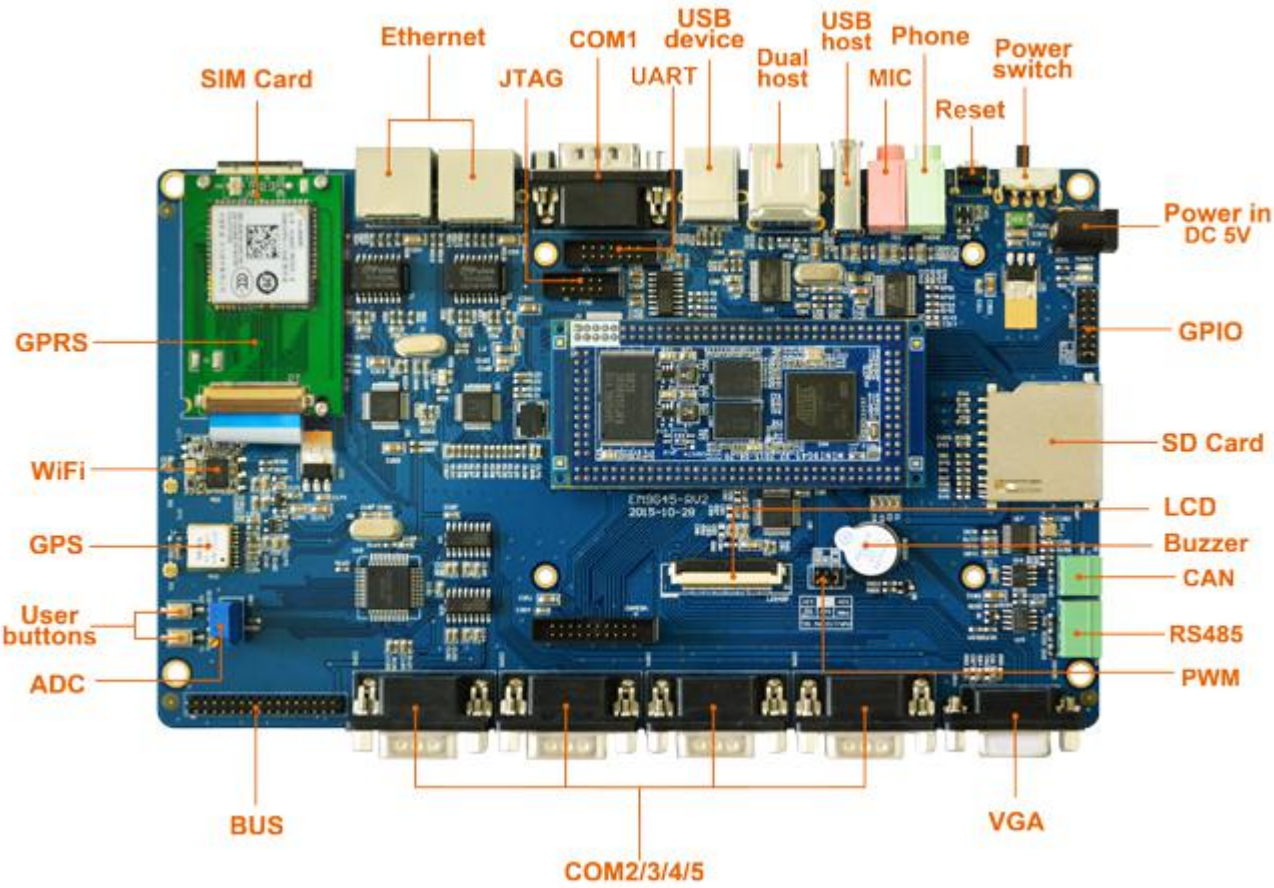
Pin Definition

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	EBI1_D6	49	ETX0	97	TSXM	145	ISI_D2
2	EBI1_D7	50	ETX1	98	TSYP	146	ISI_D3
3	EBI1_A7	51	ETXEN	99	TSYM	147	ISI_D4
4	EBI1_A8	52	ERXDV	100	LCDDOTCLK	148	ISI_D5
5	EBI1_A5	53	PD4	101	LCDHSYNC	149	ISI_D6
6	EBI1_A6	54	ERX0	102	LCDVSYNC	150	ISI_D7
7	EBI1_A3	55	ERX1	103	LCDDEN	151	NWAIT

8	EBI1_A4	56	ERXER	104	TWCK0	152	EBI1_NCS1
9	EBI1_A1	57	PD28	105	TWD0	153	NCS2
10	EBI1_A2	58	VDDBU	106	LCDD23	154	NCS3
11	EBI1_D30	59	HDPB	107	LCDD22	155	NCS4
12	EBI1_D31	60	PD2	108	LCDD21	156	NCS5
13	EBI1_D28	61	HDMB	109	LCDD20	157	EBI1_NBS1
14	EBI1_D29	62	GPAD6	110	LCDD19	158	EBI1_NBS3
15	EBI1_D26	63	HDMA	111	LCDD18	159	GND
16	EBI1_D27	64	GPAD5	112	LCDD17	160	GND
17	EBI1_D24	65	HDPA	113	LCDD16	161	P3V3_IO
18	EBI1_D25	66	GPAD4	114	LCDD15	162	P3V3_IO
19	EBI1_D22	67	SPI0_MISO	115	LCDD14	163	EBI1_D8
20	EBI1_D23	68	SPI0_NCS	116	LCDD13	164	EBI1_D 9
21	EBI1_D20	69	SPI0_SPCK	117	LCDD12	165	EBI1_D10
22	EBI1_D21	70	SPI0_MOSI	118	LCDD11	166	EBI1_D11
23	EBI1_D18	71	EMDC	119	LCDD10	167	EBI1_D12
24	EBI1_D19	72	EMDIO	120	LCDD9	168	EBI1_D13
25	EBI1_D16	73	PA31	121	LCDD8	169	EBI1_D14
26	EBI1_D17	74	PD5	122	LCDD7	170	EBI1_D15
27	NTRST	75	ETX2 /WAKE_UP	123	LCDD6	171	FIQ
28	NRST	76	ETX3	124	LCDD5	172	IRQ
29	TDO	77	ERX2/BOOT_SEL	125	LCDD4	173	EBI1_NWE
30	TDI	78	ERX3	126	LCDD3	174	EBI1_NRD
31	TCK	79	PD29(SD_CD)	127	LCDD2	175	EBI1_A20
32	TMS	80	MCI0_DA2	128	LCDD1	176	EBI1_A19
33	RXD2	81	MCI0_DA3	129	LCDD0	177	EBI1_A18
34	TXD2	82	MCI0_CDA	130	PD6	178	EBI1_A17
35	RXD1	83	MCI0_CK	131	PD7	179	EBI1_A16
36	TXD1	84	MCI0_DA0	132	PD8	180	EBI1_A15
37	DRXD	85	MCI0_DA1	133	PD9	181	EBI1_A14
38	DTXD	86	PA27 (SD_WP)	134	PD0	182	EBI1_A13
39	TXD0	87	PD1	135	PWM3	183	EBI1_A12
40	RXD0	88	PCK1	136	PWM1	184	EBI1_A11
41	RTS1	89	LRCK	137	PWM2	185	EBI1_A10
42	CTS1	90	BCK	138	PA22	186	EBI1_A9
43	RXD3	91	TWD1	139	ISI_VSYNC	187	EBI1_D0
44	TXD3	92	TWCK1	140	ISI_HSYNC	188	EBI1_D1
45	CTS0	93	ADCDAT	141	ISI_PCLK	189	EBI1_D2
46	ETXCK	94	DACDAT	142	ISI_MCLK	190	EBI1_D3

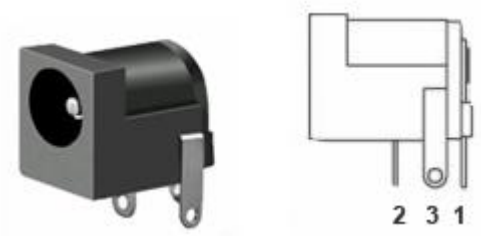
47	RTS0	95	LCDPWR	143	ISI_D0	191	EBI1_D4
48	PD3	96	TSXP	144	ISI_D1	192	EBI1_D5

2 Hardware Introduction



2.1 Power (CN1)

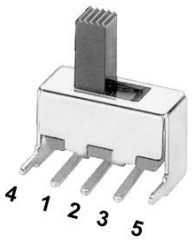
Power supply: DC 5V/2A



Pin	Signal	Description	Pin	Signal	Description
1	DC5V	Main power. DC5V power in	2	GND	Ground
3	GND	Ground			

2.2 Power switch (S1)

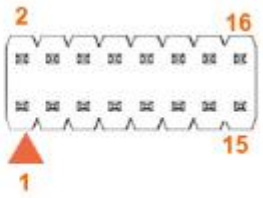
The power switch is a toggle switch, controlling the evaluation board power ON/OFF.



Pin	Signal	Description	Pin	Signal	Description
1	DC5V	DC5V power. Connect to pin1 of Power supply	2	DC5V	DC5V. Connect to FUSE
3	NC	Not connect	4	GND	Ground
5	GND	Ground			

2.3 GPIO

The GPIO is a 16-pin header connector. The pins can be defined as data input / output.
EM9G45-I only supports boot from NAND Flash (connect pin15&16 with Jumper).



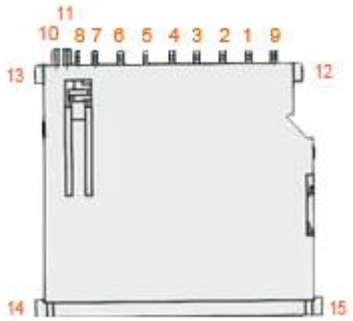
Pin	Signal	Description	Pin	Signal	Description
1	VDD33V	3.3V voltage	2	VDD33V	3.3v voltage
3	GND	Ground	4	GND	Ground
5	GPAD4	Analog Inputs 4	6	PWM3	Pulse Width Modulation Output 3
7	PWM1	Pulse Width Modulation Output 1	8	ETX3	Transmit Signal 3
9	ETX2	Transmit Signal 2	10	ERX3	Receive Signal 3
11	TWCK1	Two-wire Serial Clock 1	12	TWD1	Two-wire Serial Data 1
13	VDD5V	5V voltage	14	VDD5V	5V voltage
15	ERX2/OM	Receive Signal 3/OM select	16	GND	Ground

2.4 SD Card (CON7)

The SD card is used as an external storage device. It also can be used as bootable card and download image. The MMC controller interface supports up to 4-bit transfer modes. MMC is always accessible through the carrier board interface.

Features

- Low voltage consumption.
- Support hot-plug.
- Support SD mode and SPI mode.



Pin	Signal	Description	Pin	Signal	Description
1	MCI0_DA3	Multimedia Card 0 Slot A Data 3	2	MCI0_CDA	Multimedia Card 0 Slot A Command
3	GND	Ground	4	VDD33V	Power Positive 3.3V
5	MCI0_CK	Multimedia Card 0 Clock	6	GND	Ground
7	MCI0_DA0	Multimedia Card 0 Slot A Data 0	8	MCI0_DA1	Multimedia Card 0 Slot A Data 1
9	MCI0_DA2	Multimedia Card 0 Slot A Data 2	10	WP_SD_1	SD Write Protect
11	SD_CD	SD Card Detect	12	GND	Ground
13	GND	Ground	14	GND	Ground
15	GND	Ground			

2.5 LCD (LCD40P)

EM9G45-I on-board a 40P FPC connector as the LCD interface.

The board comes with driver for 4.3", 7" resistive LCD, user also can choose other size of LCD&touchscreen.

The LCD back light brightness controlled by PWM single.

Pin	Signal	Description	Pin	Signal	Description
1	VDD_IN	Voltage input	2	VDD_IN	Voltage input
3	LCDD0	LCD Data Bus 0	4	LCDD1	LCD Data Bus 1
5	LCDD2	LCD Data Bus 2	6	LCDD3	LCD Data Bus 3
7	LCDD4	LCD Data Bus 4	8	LCDD5	LCD Data Bus 5
9	LCDD6	LCD Data Bus 6	10	LCDD7	LCD Data Bus 7
11	GND	Ground	12	LCDD8	LCD Data Bus 8
13	LCDD9	LCD Data Bus 9	14	LCDD10	LCD Data Bus 10
15	LCDD11	LCD Data Bus 11	16	LCDD12	LCD Data Bus 12
17	LCDD13	LCD Data Bus 13	18	LCDD14	LCD Data Bus 14
19	LCDD15	LCD Data Bus 15	20	GND	Ground
21	LCDD16	LCD Data Bus 16	22	LCDD17	LCD Data Bus 17
23	LCDD18	LCD Data Bus 18	24	LCDD19	LCD Data Bus 19
25	LCDD20	LCD Data Bus 20	26	LCDD21	LCD Data Bus 21
27	LCDD22	LCD Data Bus 22	28	LCDD23	LCD Data Bus 23
29	GND	Ground	30	LCDPWR	LCD panel Power enable control
31	NC	Not connect	32	NC	Not connect
33	LCDDEN	LCD Data Enable	34	LCDVSYNC	LCD Vertical Synchronization
35	LCDHSYNC	LCD Horizontal Synchronization	36	LCDDOTCLK	LCD Dot Clock
37	TSXM	Touch Panel Left side	38	TSXP	Touch Panel Right side
39	TSYM	Touch Panel Bottom side	40	TSYP	Touch Panel Top side

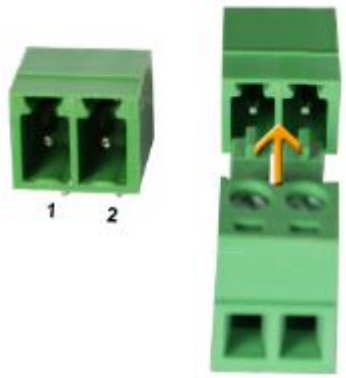
2.6 CAN (P5)

The CAN is used for data transformation.

Features:s

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

CAN signal is transformed by SPI.



Pin	Signal	Description	Pin	Signal	Description
1	CANL	CAN Receive serial data pin	2	CANH	CAN Transmit serial data pin

2.7 RS485 (P1)

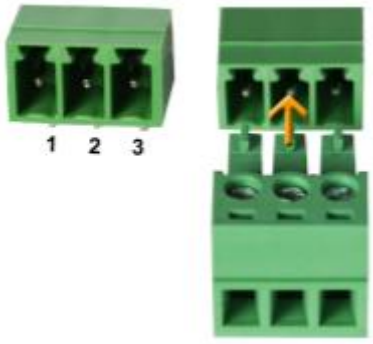
RS485 uses differential mode to transmit signals, without checking the signal just check potential difference to send / receiver data.

Features:

• 9-bit or Multidrop mode (RS-485) support (automatic slave address detection).

• RXD input and TXD output can be inverted respectively in RS-485 mode

• RS-485 driver direction control via CTS signal



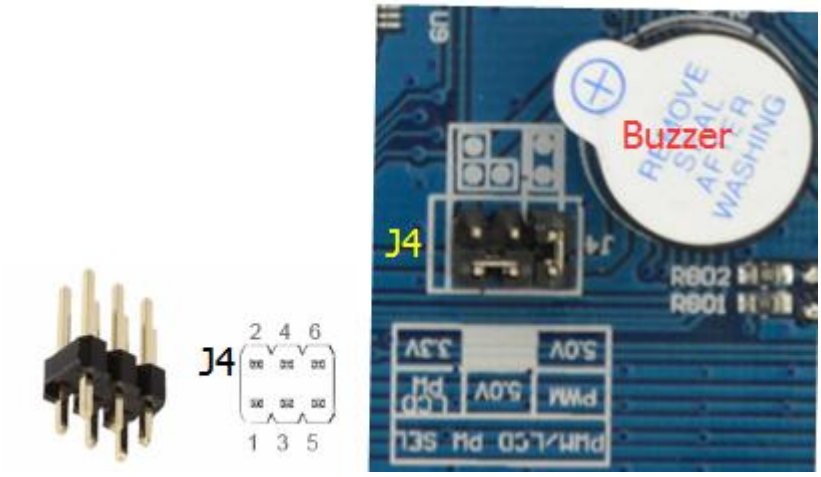
Pin	Signal	Description	Pin	Signal	Description
1	RS1_A	Connect to SN75176B/Send drive A	2	RS1_B	Connect to SN75176B/Send drive B
3	GND	Ground			

2.8 PWM (J4)

EM9G45-I provides 2-channel PWM signals, one of which control the buzzer, while the other controls the LCD backlight brightness .

The buzzer is active and will sound when a DC voltage is applied. Connect Pin 5 and 6 with Jumper to

control PWM out.



Pin1&3 and Pin1&2 are used to power LCD . Default connects Pin1&3.

J4

Pin	Signal	Description	Pin	Signal	Description
1	VDD_IN	Voltage input	2	VDD33V	3.3V voltage
3	VDD5V	5V voltage	4	NC	Not connect
5	BUZZER	Connect to buzzer +	6	VDD5V	5V voltage

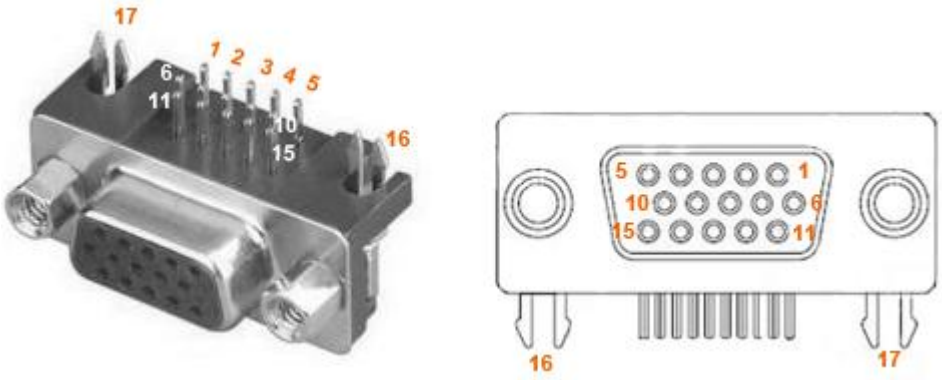
Buzzer

Pin	Signal	Description	Pin	Signal	Description
1	NetJ4_5	Voltage in. Connect to pin 5 of J4	2	NetU8_C	Control PWM. Connect to U8_ Collector

2.9 VGA (VGA1)

The VGA is a DB15 port and it is analog signal, support synchronous output with LCD.

The VGA is not supported in the software at present, but will be available near future.



Pin	Signal	Description	Pin	Signal	Description
1	VRP	Red Video	2	VGP	Green Video
3	VBP	Blue Video	4	NC	Not connect
5	GND	Ground	6	GND	Ground

7	GND	Ground	8	GND	Ground
9	VDD5V	5V voltage	10	GND	Ground
11	NC	Not connect	12	NC	Not connect
13	LCDHSYNC	LCD Horizontal Synchronization	14	LCDVSYNC	LCD Vertical Synchronization
15	NC	Not connect	16	GND	Ground
17	GND	Ground			

2.10 COM & UART (COM1/2/3/4/5, UART)

EM9G45-I on-board 5x RS232 serial ports (DB9).

Features:

• 32-entry FIFO for receiver and 32-entry FIFO for transmitter

• Programmable baud rate of up to 250K bit/s

• The serial port operates at RS232 voltage levels.

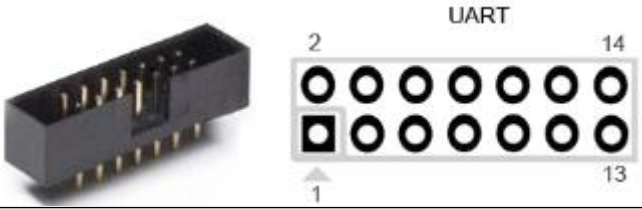
The COM1 is used for debugging. It is used to input and display interactive command, view system boot information and transfer files between the platform and PC.

COM2, COM3, COM4 and COM5 are used to transmitter and receiver data.

COM1					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	RSTXDD	Debug Transmit Data
3	RSRXDD	Debug 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	10	GND	Ground
11	GND	Ground			
COM2					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	T2OUT	Transmit Data 2 output
3	R2IN	Receive Data 2 input	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect

9	NC	Not connect	10	GND	Ground
11	GND	Ground			
COM3					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	T3OUT	Transmit Data 3 output
3	R3IN	Receive Data 3 input	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect	10	GND	Ground
11	GND	Ground			
COM4					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	T4OUT	Transmit Data 4 output
3	R4IN	Receive Data 4 input	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect	10	GND	Ground
11	GND	Ground			
COM5					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	T5OUT	Transmit Data 5 output
3	R5IN	Transmit Data 5 output	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	NC	Not connect	8	NC	Not connect
9	NC	Not connect	10	GND	Ground
11	GND	Ground			

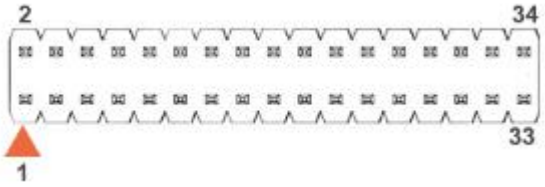
The UART is a 14-pin connector. It can be extended to 3x serial ports. The signal DTXD/DRXD shared with COM1 (DB9). If it is used as debug, DTXD/DRXD in UART is disabled.



UART					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	GND	Ground
3	VDD5V	5V voltage	4	VDD5V	5V voltage
5	RSTXD1	RS Transmit Data 1	6	RSRXD1	RS Receive Data 1
7	TXD1	Transmit Data 1	8	RXD1	Receive Data 1
9	DTXD	Debug Transmit Data	10	DRXD	Debug Receive Data
11	CTS1	Clear to Send 1	12	RTS1	Request to Send 1
13	VDD33V	3.3V voltage	14	VDD33V	3.3V voltage

2.11 BUS (J1)

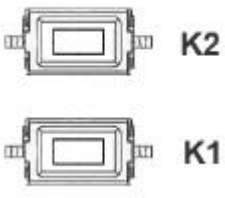
The BUS is a 34pin header connector. There are 8 address lines (address 0-6 and address 24), 16 data lines (data 0-15), 3 chip_select signals. The BUS can be extended functionality.



Pin	Signal	Description	Pin	Signal	Description
1	EBI1_A1	Address Bus 1	2	IRQ/LADDR0	External Interrupt Input/Address Bus 0
3	EBI1_A3	Address Bus 3	4	EBI1_A2	Address Bus 2
5	EBI1_A5	Address Bus 5	6	EBI1_A4	Address Bus 4
7	FIQ/LADDR24	Fast Interrupt Input/Address Bus 24	8	EBI1_A6	Address Bus 6
9	EBI1_D6	Data Bus 6	10	EBI1_D7	Data Bus 7
11	EBI1_D4	Data Bus 4	12	EBI1_D5	Data Bus 5
13	EBI1_D2	Data Bus 2	14	EBI1_D3	Data Bus 3
15	EBI1_D0	Data Bus 0	16	EBI1_D1	Data Bus 1
17	NRST	Microcontroller Reset	18	NWAIT	External Wait Signal
19	EBI1_NRD	Read Signal	20	EBI1_NEW	Write Enable
21	EBI1_D14	Data Bus 14	22	EBI1_D15	Data Bus 15
23	EBI1_D12	Data Bus 12	24	EBI1_D13	Data Bus 13
25	EBI1_D10	Data Bus 10	26	EBI1_D11	Data Bus 11
27	EBI1_D8	Data Bus 8	28	EBI1_D9	Data Bus 9
29	NCS2	Chip Select Lines 2	30	NCS3	Chip Select Lines 3
31	GND	Ground	32	EBI1_NCS1	Chip Select Lines 1
33	VDD5V	5V voltage	34	VDD5V	5V voltage

2.12 Buttons (K1, K2, RST)

On-board 2x user buttons (User-Defined) and 1 reset button.



Button	Description	Button	Description

K1	Connect to PWM 3	K2	Connect to PD8

RST

The RST button is a Side Tact Switch. The board adopts MAX811 as the Reset chip.

Pin	Signal	Description	Pin	Signal	Description
1	$\overline{MR}$/NetU6_3	Connect to pin3 of MAX811	2	GND	Ground
3	NC	Not connect	4	NC	Not connect

2.13 GPS

The GPS module is SATES ST-91-U7.

Features:

- Ublox 7 high performance and low power consumption GPS Chipset
- Very high sensitivity (Tracking Sensitivity: -162dBm)
- Extremely fast TTFF (Time To First Fix) at low signal level
- Two serial ports :UART,I2C
- Built-in LNA
- A-GPS Support
- Compact size (9.7mm * 10.1 mm * 2.4mm) suitable for space-sensitive application
- Exceptional jamming immunity
- Support NMEA 0183 and ublox binary protocol. Default: GGA, GSA, GSV, RMC; Support: VTG, GLL, TXT ublox binary and NMEA Command
- Available Baud: 9,600 bps

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	RXD3	USART3 Receive Data
3	TXD3	USART3 Transmit Data	4	NC	Not connect

5	NC	Not connect	6	VDDBU	Backup voltage
7	VCC_IO	IO supply voltage Input must be always supplied.	8	VDD_GPS	GPS Power Supply
9	GPSRST	GPS Reset	10	GND	Ground
11	RF_IN	Matched RF-Input, DC block inside.	12	GND	Ground
13	NC	Not connect	14	VCC_RF	Active antenna or external LNA supply.
15	NC	Not connect	16	NC	Not connect
17	NC	Not connect	18	NC	Not connect

2.14 WiFi

The WIFI module is RTL8188EUS.

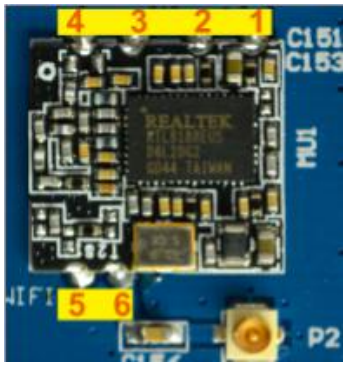
Features:

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

Antenna Port: One antenna port support 802.11b/g

Coexistence: Hardware signaling

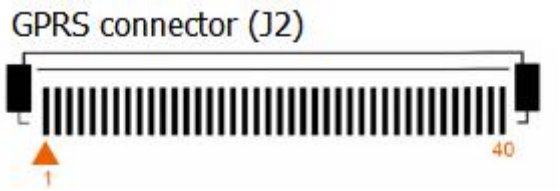
Frequency Band: 2.400 ~ 2.484 GHz



Pin	Signal	Description	Pin	Signal	Description
1	VDD_WIFI	WIFI Power Supply	2	USB1_DM	USB Device 1 Data -
3	USB1_DP	USB Device 1 Data +	4	GND	Ground
5	GND	Ground	6	RF	Receive Frame Sync

2.15 GPRS & SIM Card

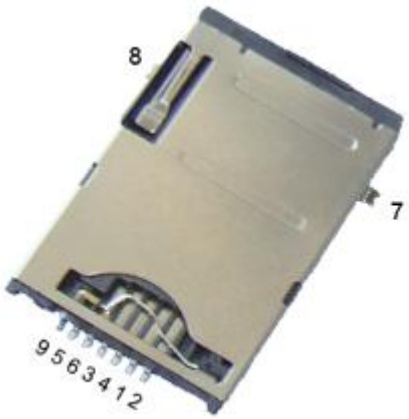
It is HUAWEI MG323 GPRS MODEL, support calls and dial-up Internet access.



J2

Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	NC	Not connect
3	NC	Not connect	4	NC	Not connect
5	NC	Not connect	6	NC	Not connect
7	GND	Ground	8	NC	Not connect
9	LPG	Connect to Transistor base	10	GSMRST	GSM Reset
11	VDDBU	Backup voltage	12	GND	Ground
13	SIM_VCC	SIM Voltage	14	SIM_CLK	SIM Clock
15	SIM_DATA	SIM Data	16	SIM_RST	SIM Reset
17	NC	Not connect	18	NC	Not connect
19	NC	Not connect	20	RTS0	USART0 Request To Send
21	CTS0	USART0 Clear To Send	22	TXD0	USART0 Transmit Data
23	RXD0	USART0 Receive Data 0	24	NC	Not connect
25	NC	Not connect	26	PD1/VDD_GPRS	Parallel IO Controller D 1/GPRS Power Supply
27	NC	Not connect	28	NC	Not connect
29	NC	Not connect	30	NC	Not connect
31	GND	Ground	32	GND	Ground
33	GND	Ground	34	GND	Ground
35	GND	Ground	36	VDD_GPRS	GPRS Power Supply
37	VDD_GPRS	GPRS Power Supply	38	VDD_GPRS	GPRS Power Supply
39	VDD_GPRS	GPRS Power Supply	40	VDD_GPRS	GPRS Power Supply

P4 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 GPRS module.



P8

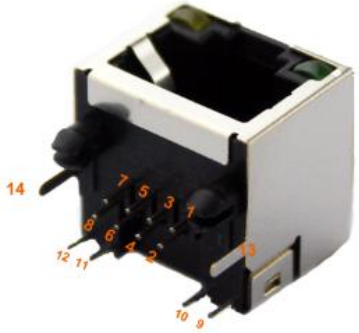
Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	SIM Clock	2	SIM_DATA	SIM data
3	SIM_RST	SIM Reset	4	SIM_VCC	SIM Voltage
5	SIM_VCC	SIM Voltage	6	GND	Ground
7	GND	Ground	8	GND	Ground
9	NC	Not connect			

2.16 Ethernet (LAN1&LAN2)

EM9G45-I incorporates 2x 10/100M Ethernet interface. The LAN1 adopts DM9000CEP as the Ethernet chip, and LAN2 adopts DM9161AEP.

Features:

- 10/100 BASE-T IEEE 802.3 compliant
- IEEE 802.3u compliant Auto-Negotiation
- Integrated IEEE 1588 time stamping module (inside the MAC).
- Automatic channel swap (ACS)
- Full- and Half-duplex
- Automatic MDI/MDIX crossover
- Automatic polarity correction
- Activity and speed indicator LED controls



LAN1

Pin	Signal	Description	Pin	Signal	Description
1	TD1+	Data send +	2	TD1-	Data send -
3	RD1+	Data receive +	4	NC	Connect to Ground
5	NC	Connect to Ground	6	RD1-	Data receive -
7	NC	Connect to Ground	8	NC	Connect to Ground
9	LAN1_LNK	Detect link	10	VDD33V	3.3V voltage
11	LAN1_SPD	Detect speed	12	VDD33V	3.3V voltage
13	GND	Ground	14	GND	Ground

LAN2

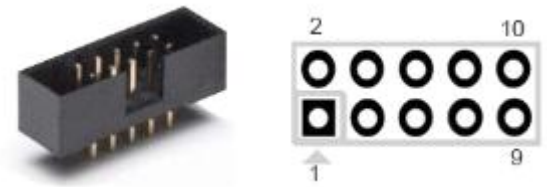
Pin	Signal	Description	Pin	Signal	Description
1	TD2+	Data send +	2	TD2-	Data send -
3	RD2+	Data receive +	4	NC	Connect to Ground
5	NC	Connect to Ground	6	RD2-	Data receive -
7	NC	Connect to Ground	8	NC	Connect to Ground
9	LAN2_LNK	Detect link	10	VDD33V	3.3V voltage
11	LAN2_SPD	Detect speed	12	VDD33V	3.3V voltage
13	GND	Ground	14	GND	Ground

2.17 JTAG

The JTAG is a 2mm pitch 10-pin connector.

Features

- IEEE P1149.1, 1149.6 (standard JTAG) interface to off-chip test and development equipment
- Debug-related control and status



Pin	Signal	Description	Pin	Signal	Description
1	VDD33V	3.3V Voltage	2	VDD33V	3.3V Voltage
3	NTRST	Test Reset Signal	4	NRST	Microcontroller Reset
5	TDI	Test Data In	6	TDO	Test Data Out
7	TMS	Test Mode Select	8	GND	Ground
9	TCK	Test Clock	10	GND	Ground

2.18 USB device

The USB2.0 device is a type-B USB. It is use to download image.

Features:

• Supports USB 2.0 High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) operation in host mode

• Supports USB 2.0 High Speed (480 Mbps) and Full Speed (12 Mbps) operation in peripheral mode.

Pin	Signal	Description	Pin	Signal	Description
1	USB_5V	USB Power Supply 5v	2	HDMB	USB Device port B Data -
3	HDPB	USB Device port B Data +	4	GND	Ground
5	GND	Ground	6	GND	Ground

2.19 USB host (USBH, USB1)

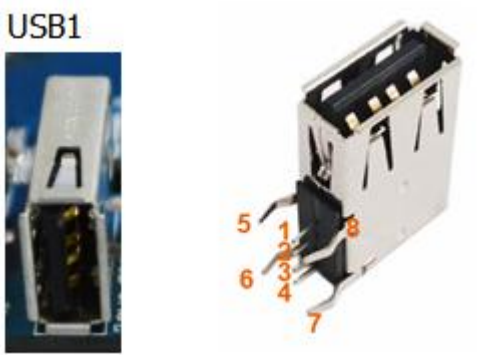
USBH and USB1 are type A USB2.0 Host. They support low speed (1.5Mbps), full speed (12Mbps) and high speed (480Mbps).

The USB Hosts are used to connect U disk and other USB storage devices.

USBH

Pin	Signal	Description	Pin	Signal	Description
1	VBUS	BUS Voltage	2	USB3_DM	USB3 Data -
3	USB3_DP	USB 3 Data +	4	GND	Ground

5	VBUS	BUS Voltage	6	USB2_DM	USB 2 Data -
7	USB2_DP	USB 2 Data +	8	GND	Ground
9	GND	Ground	10	GND	Ground
11	GND	Ground	12	GND	Ground



USB1

Pin	Signal	Description	Pin	Signal	Description
1	VBUS	BUS Voltage	2	USB4_DM	USB4 Data -
3	USB4_DP	USB 4 Data +	4	GND	Ground
5	GND	Ground	6	GND	Ground
7	GND	Ground	8	GND	Ground

2.20 Audio I/O

The development board adopts IIS interface chip WM8731, supports stereo audio output (Green, 3.5mm audio jack) and MIC recording (Pink, 33.5mm audio jack).

Features:

- Low power
- Integrated ADC and DAC
- IIS transfer audio data
- Stereo output, support recording

MIC					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	MICIN	MIC input
3	MICIN	MIC input	10	MICIN	MIC input
11	MICIN	MIC input			
PHONE					

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	LHPOUT	Left Channel Headphone Output
3	RHPOUT	Right Channel Headphone Output	10	LHPOUT	Left Channel Headphone Output
11	RHPOUT	Right Channel Headphone Output			

2.21 RTC (BAT1)

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

3 Product Configurations

3.1 Standard Contents

• EM9G45-I Single board computer x1
• CD-ROM (Linux BSP, Documents, tools, Schematic Drawing, datasheets) x1
• Ethernet cable x1
• Serial Cable x1
• USB Cable x1
• 5V/2A DC power adaptor x1

3.2 Optional Parts

• LCD Module (4.3-, 7-inch)
• WiFi Module
• GPS Module
• GPRS Module