EM210 Hardware User 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.

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1 EM210 Introduction

1.1 Summary

The Boardcon EM210 integrates a high-performance, low-power 1GHz Samsung ARM Cortex-A8 S5PV210AH with Samsung K4T1G164QF chipsets and Samsung K9F2G08, delivering best performance-per-watt for communication, healthcare, automation, transportation, multimedia advertising, high performance POS machine, and surveillance applications.

The compact EM210 offers a rich set of peripherals and interfaces including Ethernet, USB Host &OTG, Camera, HDMI, Serial ports, Audio, LCD, Keypad, T-Flash, Buttons and etc. It brings a flexible array of communications options including Wi-Fi, WCDMA and RFID. A SIM card slot is also included. Supporting Linux 2.6.32, WinCE6.0 and Android 4.0, the EM210 can deliver a variety of features and APIs that allow developers to highly customize their system designs in the low-profile and fully-configured embedded devices.

The single board computer has complete electronic documentation, schematics, demo applications, and third party industry-standard C compilers and embedded development environments for evaluation. We are sure to have the right single board computer for your applications.

1.2 S5PV210 Features

• ARM CortexTM-A8 based CPU Subsystem with NEON

− 32/ 32 KB I/D Cache, 512 KB L2 Cache

− Operating frequency up to 800 MHz or 1 GHz

• 64-bit Multi-layer bus architecture

− MSYS domain for ARM CortexTM-A8, 3D engine, Multi Format Codec and Interrupt Controller

• Operating frequency up to 200 MHz

− DSYS domain mainly for Display IPs (such as LCD controller, Camera interface, and TV out), and MDMA

• Operating frequency up to 166 MHz

− PSYS domain mainly for other system component such as system peripherals, external memory interface, peri DMAs, connectivity IPs, and Audio interfaces.

• Operating frequency up to 133 MHz

− Audio domain for low power audio play

• Advanced power management for mobile applications

• 64 KB ROM for secure booting and 96 KB RAM for security function

• 8-bit ITU 601/656 Camera Interface supports horizontal size up to 4224 pixels for scaled and 8192 pixels for un-scaled resolution

• Multi Format Codec provides encoding and decoding of MPEG-4/H.263/H.264 up to 1080p@30fps and decoding of MPEG-2/VC1 video up to 1080p@30 fps

• 3D Graphics Acceleration with Programmable Shader up to 20M triangles/s and 1000 Mpixels/s

- 2D Graphics Acceleration up to 160Mpixels/s
- 1/ 2/ 4/ 8 bpp Palletized or 8/ 16/ 24 bpp Non-Palletized Color TFT recommend up to XGA resolution
- TV-out and HDMI interface support for NTSC and PAL mode with image enhancer
- MIPI-DSI and MIPI-CSI interface support
- One AC-97 audio codec interface and 3-channel PCM serial audio interface
- Three 24-bit I2S interface support
- One TX only S/PDIF interface support for digital audio
- Three I2C interface support
- Two SPI support
- Four UART supports three Mbps ports for Bluetooth 2.0
- On-chip USB 2.0 OTG supports high-speed (480 Mbps, on-chip transceiver)
- On-chip USB 2.0 Host support
- Asynchronous Modem Interface support
- Four SD/ SDIO/ HS-MMC interface support
- ATA/ ATAPI-6 standard interface support

1-3

S5PV210_UM 1 OVERVIEW OF S5PV210

- 24-channel DMA controller (8 channels for Memory-to-memory DMA, 16 channels for Peripheral DMA)
- Supports 14x8 key matrix
- 10-channel 12-bit multiplexed ADC

•Configurable GPIOs

- Real time clock, PLL, timer with PWM and watch dog timer
- System timer support for accurate tick time in power down mode (except sleep mode)

•Memory Subsystem

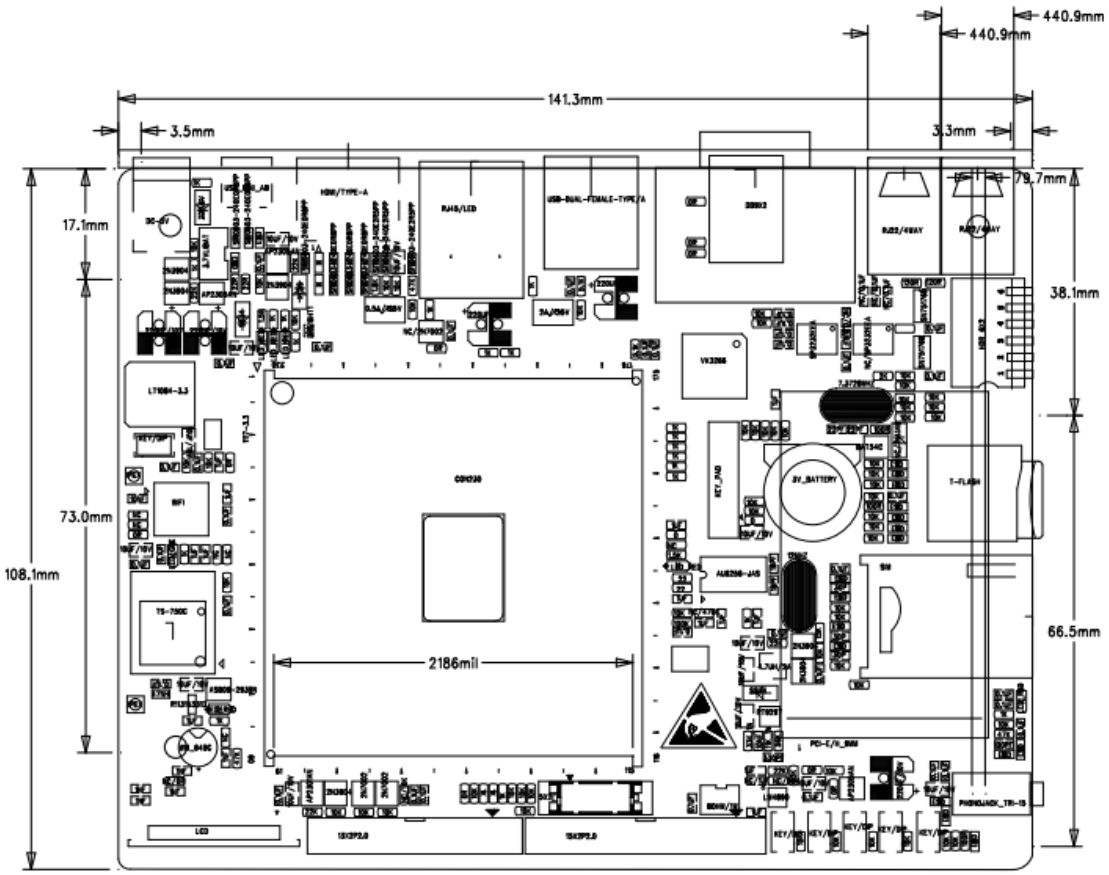
− Asynchronous SRAM/ ROM/ NOR Interface with x8 or x16 data bus
− NAND Interface with x8 data bus
− Muxed/ Demuxed OneNAND Interface with x16 data bus
− LPDDR1 Interface with x16 or x32 data bus (up to 400 Mbps/ pin DDR)
− DDR2 interface with x16 or x32 data bus (up to 400 Mbps/ pin DDR)
− LPDDR2 interface (up to 400 Mbps/ pin DDR)

1.3 EM210 Features

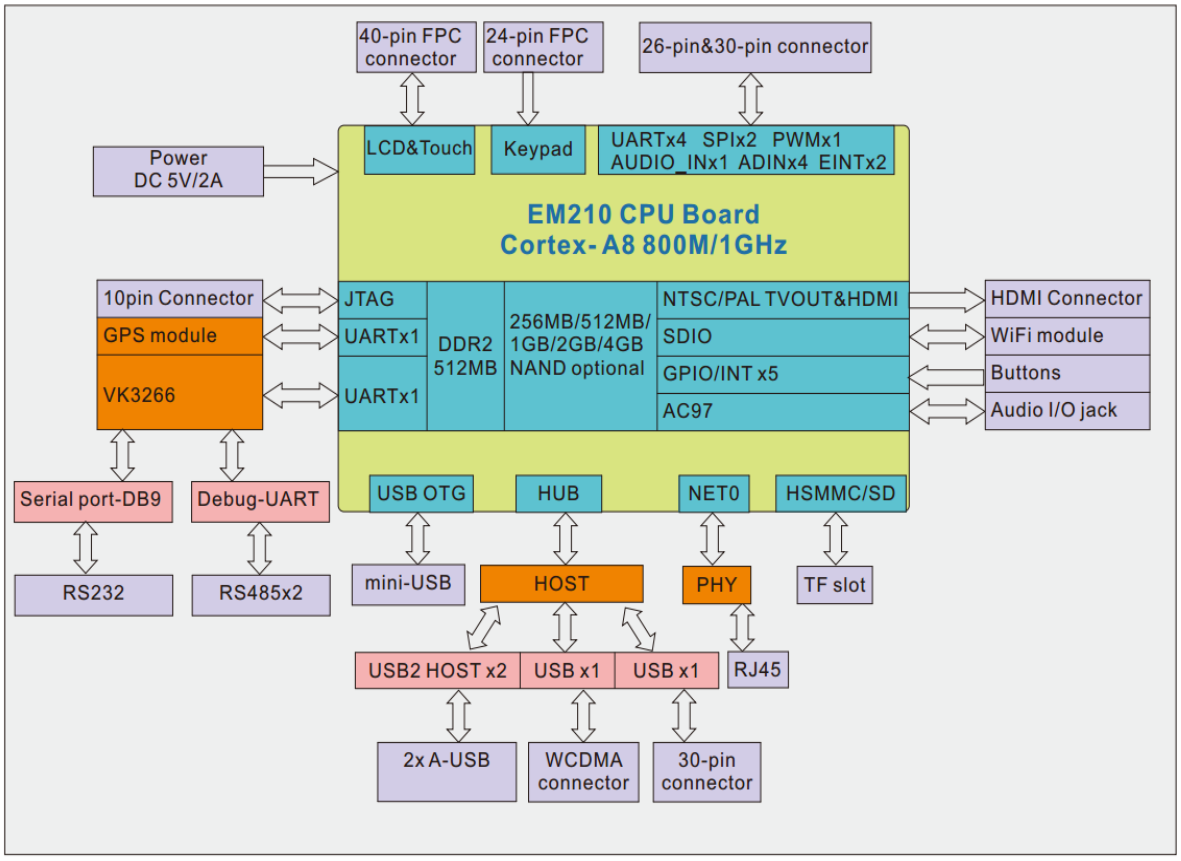
Feature	Specifications
CPU	Samsung ARM Cortex-A8 S5PV210AH, 1GHz System Clock Supporting NEON instruction Supporting MPEG-4, MPEG2, H.264/H263, VC-1 and DivX video codec Supporting 2D graphics acceleration, maximum resolution 8000*8000 Supporting 3D graphics acceleration(Power VR SGX540)
GPU	PowerVR SGX540@200MHz
Memory	Default mounted 512MB DDR2
NAND Flash	Default 256MB SLC NAND Flash. 512MB~4GB SLC/MLC/eMMC NAND Flash optional

Power	DC 5V/2A power supply
CPU Dimension	60mm x 60mm
Serial Ports (UARTs)	COM-0, five-wire DB9 RS232 serial port COM-1, four-wire RJ11 serial port (RS232/RS485) COM-2, four-wire RJ11 serial port (RS232/RS485)
LCD	The LCD port integrated 4-wire resistor touch screen port. The board comes with driver for 4.3", 7", 10.1", 15"(1024*768) TFT LCD
Ethernet	10M/100M High performance Ethernet, RJ45 interface
HDMI	HDMI V1.3, 1080p@30fps
USB	2x USB2.0 Host, 1x USB2.0 OTG
Camera(optional)	1x 20-pin 3.1Mega pixels CMOS camera interface
JTAG	1x 10-pin JTAG Port
Mouse	Mouse working via USB
Keyboard	6*7 Keypad interface
Audio codec	Adopt WM9713 Audio chip, Audio I / O interface
RTC	Real Time Clock, powered by external lithium battery
SD card	1x T-Flash card, 1x SIM card slot
General Purpose I/O	1x 30-pin SPI Expansion Connector
Buttons	6 Programmable User Buttons
WIFI(optional)	802.11 b/g/n
WCDMA(optional)	Supporting GSM card make calls, send messages
GPS(optional)	thinkstar GPS
Carrier board Dimension	108mm x 141mm

1.4 PCB Dimension



1.5 Block Diagram

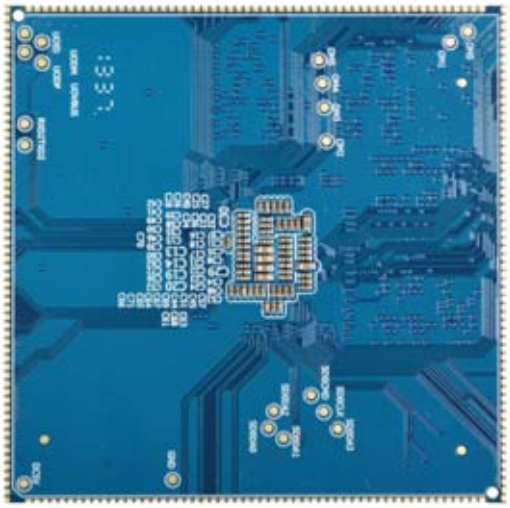


1.6 Motherboard Power meter

Supply Voltage	5V/2A				
System	Connected devices	Electric current(A)	System	Connected devices	Electric current(A)
Android 4.0	5V power	0.373	Android 4.0	7 inch resistive screen	1.037
Android 4.0	sd card, play 1080p video, U disk, serial, Ethernet, LCD, HDMI, headphone	1.351	Android 4.0	sleep	0.584
Wince 6.0	5V power	1.875	Wince 6.0	7 inch resistive screen	0.585
Wince 6.0	sd card, play 1080p video, U disk, serial, Ethernet, LCD, HDMI, headphone	0.742			

1.7 CPU Module Introduction

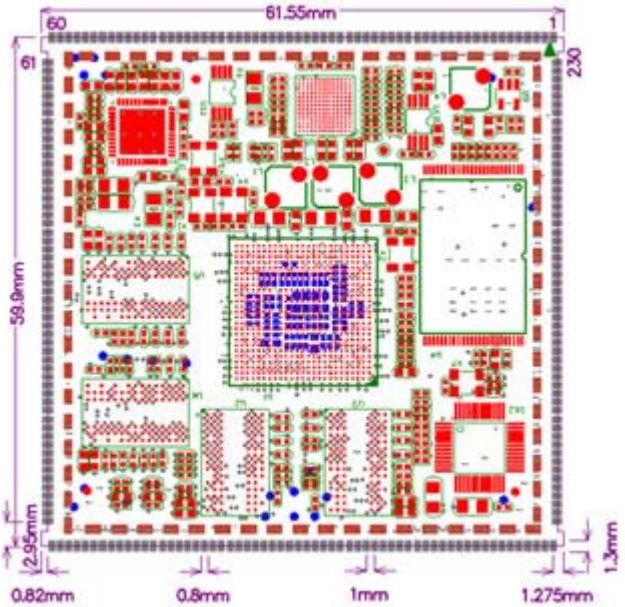
The EM210 CPU board – CM210-III is a full function Computer-on-Module based on S5PV210AH processor in small size and designed for embedded applications with a Custom base board.

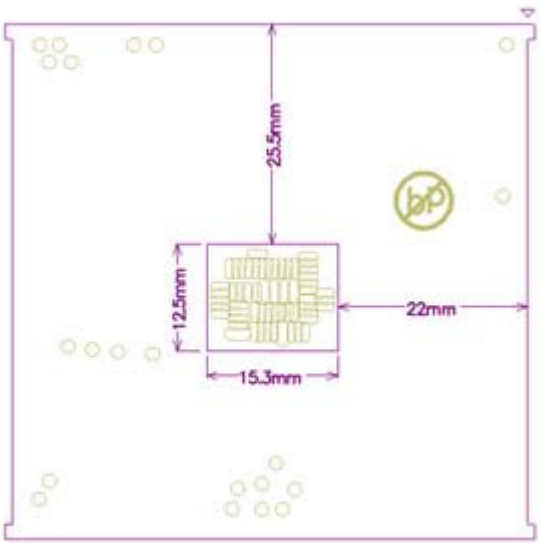


Board Dimension

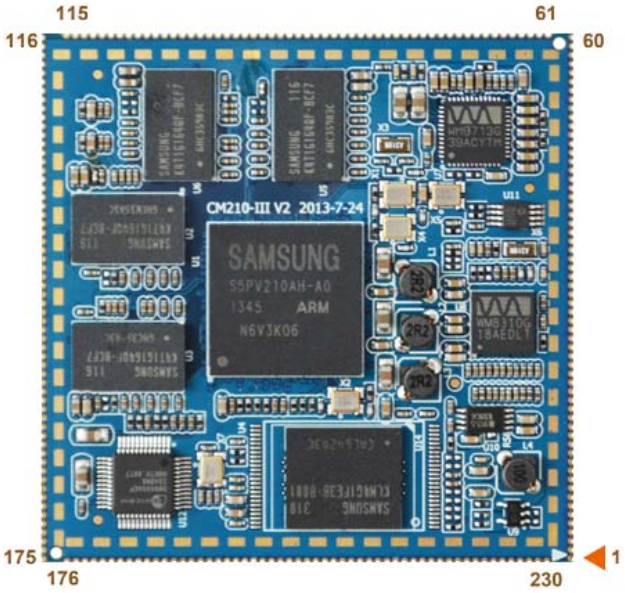
* Board size: 59.9mm x 61.55mm
* Pin to Pin space: 1mm
* Stamp Hole: 0.8mm
* Pin number: 230pins
* Layer: 8 Layers, complying with EMS/EMI

CM210-III PCB Dimension





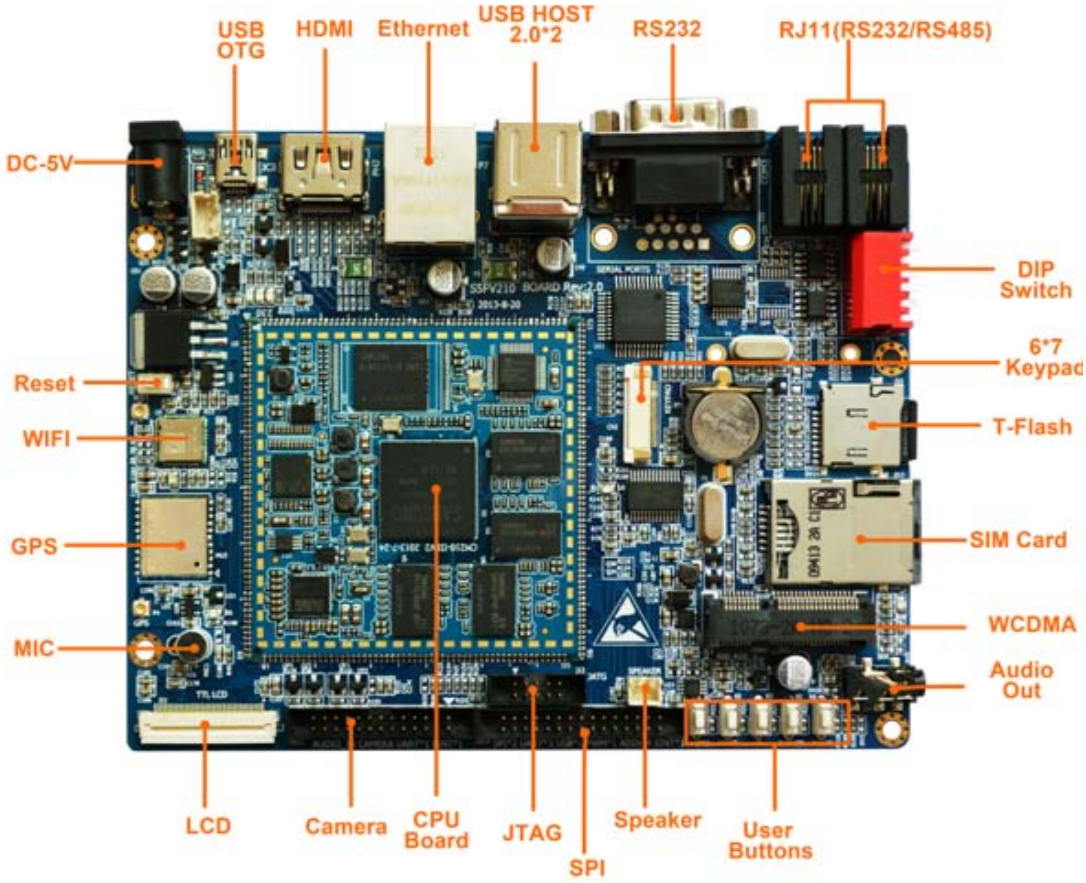
Pin Definition



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	DC5V	61	MIC1	116	SPIMOSI1	176	DATA15
2	DC5V	62	MICN	117	SPIMISO1	177	DATA14
3	VBAT	63	MICP	118	SPICS1	178	DATA13
4	VBAT -	64	LINEL	119	SPICLK1	179	DATA12
5	USBVDD	65	LINER	120	I2C_SDA0	180	DATA11
6	USBVDD	66	GSM_MIC-	121	I2C_SCL0	181	DATA10
7	VDD_RTC	67	GSM_MIC+	122	RTSn1	182	DATA9
8	GND	68	SPKL	123	CTSn1	183	DATA8
9	XVVD23	69	SPKR	124	RXD1	184	DATA7
10	XVVD22	70	LOUT	125	TXD1	185	DATA6
11	XVVD21	71	ROUT	126	RTSn0	186	DATA5
12	XVVD20	72	HS_DET	127	CTSn0	187	DATA4
13	XVVD19	73	AUGND	128	RXD0	188	DATA3
14	XVVD18	74	I2C_SCL1	129	TXD0	189	DATA2
15	XVVD17	75	I2C_SDA1	130	TOUT1	190	DATA1
16	XVVD16	76	HDMI_CEC	131	TOUT0	191	DATA0
17	XVVD15	77	HDMI_HPD	132	SPIMOSI0	192	CSn0
18	XVVD14	78	XCIPCLK	133	SPIMISO0	193	WEn
19	XVVD13	79	XCIVSYNC	134	SPICS0	194	OEn
20	XVVD12	80	XCIHREF	135	SPICLK0	195	BE0
21	XVVD11	81	XCIMCLK	136	MMC0CLK	196	BE1
22	XVVD10	82	XCIFIELD	137	MMC0CMD	197	GND
23	XVVD9	83	XCIDATA0	138	MMC0CDn	198	XJTRSTN
24	XVVD8	84	XCIDATA1	139	MMC0DAT0	199	XJTMS
25	XVVD7	85	XCIDATA2	140	MMC0DAT1	200	XJTCK
26	XVVD6	86	XCIDATA3	141	MMC0DAT2	201	XJTDI

27	XVVD5	87	XCIDATA4	142	MMC0DAT3	202	XJTDO
28	XVVD4	88	XCIDATA5	143	KP_COL7	203	DACOUT0
29	XVVD3	89	XCIDATA6	144	KP_COL6	204	GND
30	XVVD2	90	XCIDATA7	145	KP_COL5	205	HDMITXCN
31	XVVD1	91	GND	146	KP_COL4	206	HDMITXCP
32	XVVD0	92	EINT0	147	KP_COL3	207	HDMITXN0
33	XVVCLK	93	EINT1	148	KP_COL2	208	HDMITXP0
34	XVHSYNC	94	EINT3	149	KP_COL1	209	HDMITXN1
35	XVVSYNC	95	EINT4	150	KP_COL0	210	HDMITXP1
36	XVVDEN	96	EINT5	151	KP_ROW7	211	HDMITXN2
37	TSXN	97	EINT6	152	KP_ROW6	212	HDMITXP2
38	TSXP	98	EINT7	153	KP_ROW5	213	GND
39	TSYN	99	EINT10	154	KP_ROW4	214	NET_RX+
40	TSYP	100	EINT11	155	KP_ROW3	215	NET_RX-
41	ADCIN0	101	EINT16	156	KP_ROW2	216	NET_TX+
42	ADCIN1	102	EINT17	157	KP_ROW1	217	NET_TX-
43	ADCIN6	103	EINT18	158	KP_ROW0	218	NET_LINK
44	ADCIN7	104	EINT19	159	GND	219	NET_SPD
45	TXD2	105	EINT20	160	ADDR15	220	AVDD25
46	RXD2	106	ENIT21	161	ADDR14	221	MMC2CLK
47	TXD3	107	EINT22	162	ADDR13	222	MMC2CMD
48	RXD3	108	EINT23	163	ADDR12	223	MMC2CDn
49	GND	109	RTCCLKO	164	ADDR11	224	MMC2DAT0
50	XUHDP	110	OM5	165	ADDR10	225	MMC2DAT1
51	XUHDN	111	OM4	166	ADDR9	226	MMC2DAT2
52	GND	112	OM3	167	ADDR8	227	MMC2DAT3
53	UDRVVBUS	113	OM2	168	ADDR7	228	PWRON
54	VBUS	114	OM1	169	ADDR6	229	nRESET
55	XUODM	115	OM0	170	ADDR5	230	BAT_NTC
56	XUODP			171	ADDR4		
57	XUOID			172	ADDR3		
58	GND			173	ADDR2		
59	GSM_SPK+			174	ADDR1		
60	GSM_SPK-			175	ADDR0		

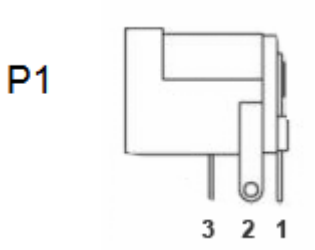
2 EM210 Peripherals Introduction



2.1 Power input

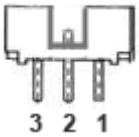
The EM210 supports two kinds of power input:

- Regulated DC supply (5V/2A Typical).
- Lithium-ion polymer battery



Pin	Signal	Description	Pin	Signal	Description
1	VDD 5V	Main power supply. 5V Adapter power in	2	GND	Ground
3	GND	Ground			

BT2



Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	BAT_NTC	Power detection
3	VBAT	3.7V LI BAT Power in			

2.2 Backup battery

BT1

The backup battery(3V) is used to ensure that the RTC(frequency 32.768KHz) is still able to work after power off. And to ensure that the system time is not lost. Battery model: CR1220

2.3 USB-OTG

The USB2.0 OTG interface is implemented with the USB controller.

Features:

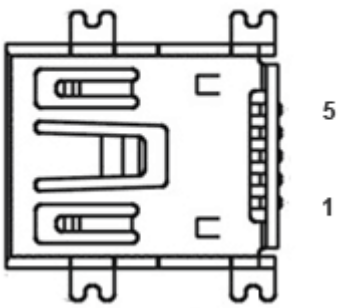
• Supports USB 2.0 High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) operation in host mode

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

• Hardware support for OTG signaling, session request protocol, and host negotiation protocol

The OTG use for download image and ADB transfer file.

JC2

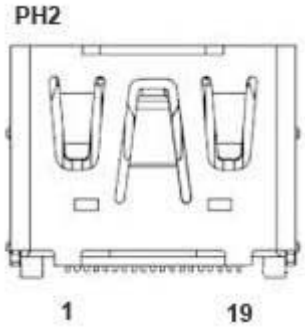


Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	ID	USB OTG ID signal
3	D+	USB OTG positive data	4	D-	USB OTG negative data
5	VCC	EM210 does not supply VBUS power. This pin must be connected to the 5V VBUS rail. VBUS can either be supplied by an external system or generated on-board the carrier board. EM210 can draw up to 50mA from this pin	6	SHGND	Ground
7	SHGND	Ground	8	SHGND	Ground
9	SHGND	Ground			

2.4 High-Definition Multimedia Interface (HDMI)

The HDMI interface available is based on the “HDMI transmitter” & “HDMI 3D Tx PHY” integrated into the EM210 SoC. The “HDMI transmitter” combines video/display data from the IPU, Audio data from EM210 memory & control/status data from the ARM complex, into Xhdmi data & clock channels. The “HDMI 3D Tx PHY” transmits the combined data by means of 3 Xhdmi data pairs and an Xhdmi clock pair to the EM210 carrier board interface.

It supports HDMI v1.4,1080p@30fps at 60Hz high-definition digital output and also can realize 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	XhdmiTXP2	Xhdmi data 2 pair	2	GND	Ground
3	XhdmiTXN2		4	XhdmiTXP1	Xhdmi data 1 pair
5	GND	Common ground.	6	XhdmiTXN1	
7	XhdmiTXP0	Xhdmi data 0 pair	8	GND	Common ground.
9	XhdmiTXN0		10	XhdmiTXCP	Xhdmi clock pair
11	GND	Common ground.	12	XhdmiTXCN	
13	HDMI_CEC	Consumer Electronics Control signal	14	NULL	NULL
15	HDMI_SCL	VESA Data Display	16	HDMI_SDA	VESA Data Display

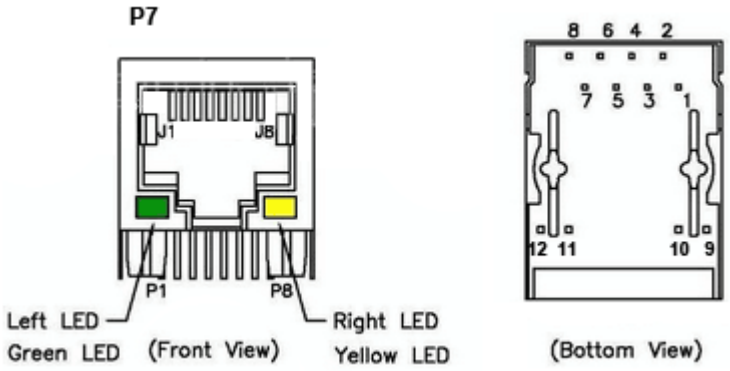
		Channel clock signal			Channel data signal
17	GND	Common ground.	18	HDMI_VCC	VDD 5V
19	HPD	Hot Plug Detect signal, 5V tolerant.			

2.5 Ethernet

EM210 incorporates a full-featured 10/100M Ethernet interface. The platform adopts DM9000AEP as the Ethernet chip.

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



Pin	Signal	Description	Pin	Signal	Description
1	NET_TX+	Data send +	2	NET_TX-	Data send -
3	NET_RX+	Data receive +	4	AVDD25	AVDD25
5	AVDD25	AVDD25	6	NET_RX-	Data receive +
7	NC	NULL	8	NC	NULL
9	DV3V3	3.3v power	10	NET_SPEED	Detect speed
11	NET_LINK	Detect link	12	DV3V3	3.3v power

2.6 Double-USB

The EM210 supports USB 2.0 High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) modes. It enables up to 4x USB Host ports by utilizing an optional on-board USB2.0 hub. It is used to connect USB mouse, U disk and other USB devices, supports hot-plug.

Pin	Signal	Description	Pin	Signal	Description
1	VCC_USB	USB 5V power directly from the system power supply	2	USB_DM3	USB host port 3 negative data
3	USB_DP3	USB host port 3 positive data	4	GND	Ground
5	VCC_USB	USB 5V power directly from the system power supply	6	USB_DM4	USB host port 4 negative
7	USB_DP4	USB host port 4 positive data	8	GND	Ground
9	GND	Ground	10	GND	
11	GND		12	GND	

2.7 Serial port (RS232/RS485)

The EM210 incorporates a single RS232 port.

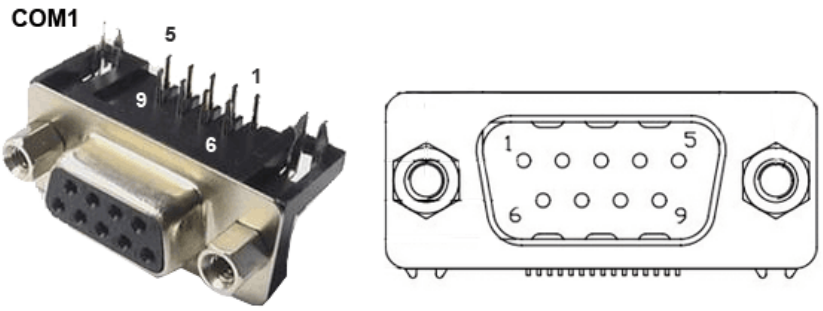
Features:

• 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 RS232 is used for debugging. It is used to input and display interactive command, view system boot information and transfer files.



COM1

Pin	Signal	Description	Pin	Signal	Description
1	NC	NULL	2	MTXD2	RS232 serial data out

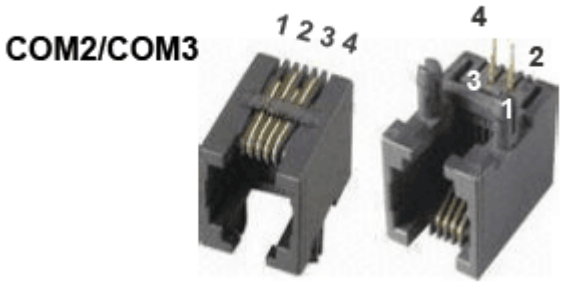
3	MRXD2	RS232 serial data in	4	NC	NULL
5	GND	Ground	6	NC	
7	NC	NULL	8	NC	
9	NC				

The RS485 supports 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



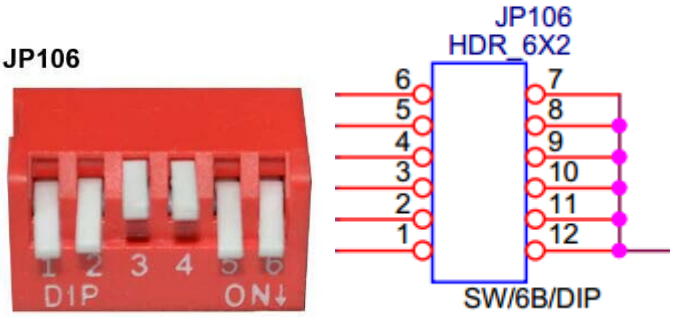
COM2/COM3

Pin	Signal	Description	Pin	Signal	Description
1	STXA	RS485 serial data out	2	GND	Ground
3	GND	Ground	4	SRXB	RS485 serial data in

2.8 Boot Switch

EM210 supports booting from USB or iNAND. CPU will boot in corresponding way automatically after getting the OM signal set by DIP switch JP106.

Pin / Boot mode	J1	J2	J3	J4	J5	J6
iNAND	ON	ON	OFF	OFF	ON	ON
USB	OFF	ON	ON	ON	OFF	ON



Pin	Signal	Description	Pin	Signal	Description
1	XOM5	XOM select	2	XOM4	XOM select
3	XOM3		4	XOM2	
5	XOM1		6	XOM0	
7	GND	Ground	8	GND	Ground
9			10		
11			12		

2.9 Keypad

The Keypad is a 24-Pin 0.5mm connector.

Features:

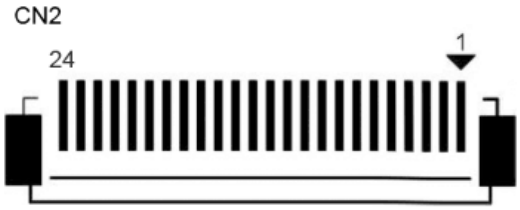
• Open drain design

• Glitch suppression circuit design

• Multiple-key detection

• Long key-press detection

• Supports a 2-point and 3-point contact key matrix



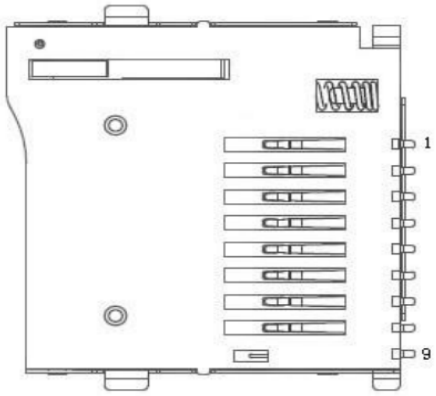
Pin	Signal	Description	Pin	Signal	Description
1	NC	NULL	2	KP_ROW6	Row 6
3	KP_ROW5	Row 5	4	KP_ROW4	Row 4
5	KP_ROW3	Row 3	6	KP_ROW2	Row 2
7	KP_ROW1	Row 1	8	KP_ROW0	Row 0
9	NC	NULL	10	NC	NULL
11	NC		12	NC	

13	KP_COL5	Column 5	14	KP_COL4	Column 4
15	KP_COL3	Column 3	16	KP_COL2	Column 2
17	KP_COL1	Column 1	18	KP_COL0	Column 0
19	GND	Ground	20	GND	Ground
21			22	DV3V3	3.3V POWER IN
23	DV3V3	3.3V POWER IN	24	DV3V3	

2.10 Micro SD

The Micro card is used as an external storage device. The MMC controller interface supports up to 4-bit transfer modes. MMC is always accessible through the carrier board interface.

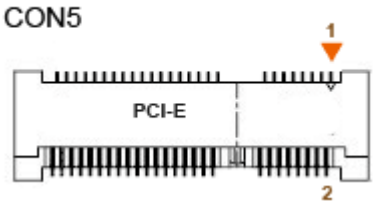
J16



Pin	Signal	Description	Pin	Signal	Description
1	DAT2	Card data bit 2	2	DAT3	Card data bit 3
3	CMD	Command signal	4	VDD	Power Positive 3.3V
5	CLK	Interface clock	6	VSS	Power Ground
7	DAT0	Card data bit 0	8	DAT1	Card data bit 1
9	DET	Card Detection			

2.11 3G connector (MINI PCI-E)

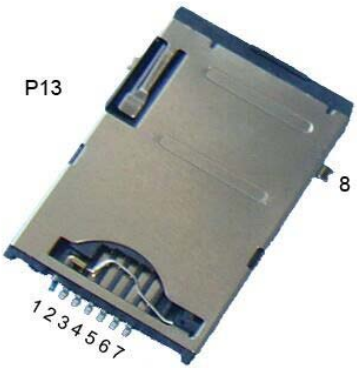
MINI PCI-E is a on-board 3G module connector. we use MF210 3G module in EM210. The EM210 is also equipped with a SIM card slot.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GSM_MIC+	2	3GVCC	3	GSM_MIC-	4	GND
5	GSM_SPK+	6	null	7	GSM_SPK-	8	SIM_VCC
9	GND	10	SIM_DATA	11	null	12	SIM_CLK
13	null	14	SIM_RST	15	GND	16	null
17	null	18	GND	19	null	20	3GVCC
21	GND	22	PERST	23	null	24	3.3VauxB
25	null	26	GND	27	GND	28	null
29	GND	30	null	31	null	32	null
33	null	34	GND	35	GND	36	USB_DM2
37	GND	38	USB_DP2	39	3GVCC	40	GND
41	3GVCC	42	LED_WWAN	43	GND	44	null
45	null	46	null	47	null	48	null
49	null	50	GND	51	null	52	3GVCC
53	GND	54	GND	55	GND	56	GND

2.12 SIM Card

It's an auto pop-up SIM card slot which is compatible to the standard SIM Card and can be used for wireless transmission with a 3G module. It can Support WCDMA, CDMA2000, TD-SDCDMA and WiMax SIM card.

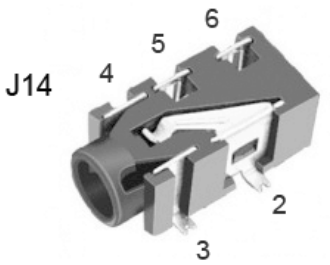


Pin	Signal	Description	Pin	Signal	Description

1	GND	Ground	2	SIM_VCC	Connect to CON5
3	GND	Ground	4	SIM_RST	Reset
5	SIM_VCC	Connect to CON5	6	SIM_CLK	Interface clock
7	SIM_DATA	send/receiver data I/O control	8	GND	Ground

2.13 Audio I/O(audio out, speak, MIC)

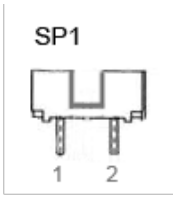
Audio Circuit adopts Wolfson Microelectronics audio converter chip -- WM9713G, which is a low power, high quality stereo coder-decoder, especially designed for portable digital audio applications. The 3.5mm Headphone supports two-channel audio output.



J14

Pin	Signal	Description	Pin	Signal	Description
2	MIC2/XEINT9/AU_GND	Command signal	3	AU_GND	Ground
4	XEINT6/VDDIO_18	Command signal	5	LOUT	Left output
6	ROUT	Right output			

SPK interface is a 2.00mm pitch 2-Pin interface (white). It can directly connect to the speaker (8Ω/1W). EM210 supports SPK and headphone sync output.



SP1

Pin	Signal	Description	Pin	Signal	Description
1	OUT-	Speaker out-	2	OUT+	Speaker out+

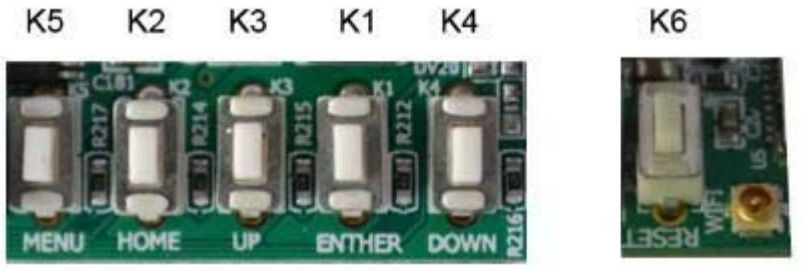
The MIC1 model is WM_64BC MIC/F6/DIP. It is used for recording.

MC1

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	MICN	Command signal

2.14 Buttons (user button, reset)

On-board 5 user buttons and 1 reset key.



Button functions

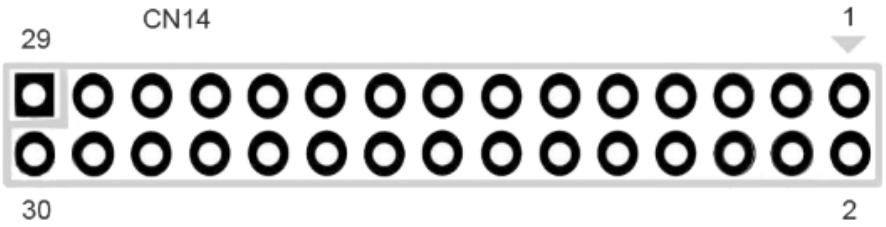
button	function	button	function	button	function
K1	ENTHER	K2	HOME	K3	Volume UP
K4	Volume DOWN	K5	MENU	K6	RESET

2.15 SPI

The 2x SPI led out from a 30-pin Expansion Connector.

Features

- Full-duplex synchronous serial interface.
- Transfer continuation function allows unlimited length data transfers.
- Polarity and phase of the Chip Select (SS) and SPI Clock (SCLK) are configurable Direct Memory Access (DMA) support.



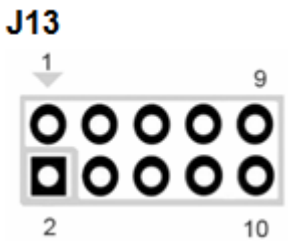
Pin	Signal	Description	Pin	Signal	Description
1	USB_DM1	USB host port 1 negative data	2	USB_DP1	USB host port 1 positive data
3	GND	Ground	4	VDD5V	Power 5v
5	XPWMTOUT 1	PWM OUT	6	XSPICLK0	SPI clock 0
7	GND	Ground	8	XSPIC50	SPI C50
9	XADCAIN7	ADC AIN7	10	XSPIMISO0	SPI Master data in; slave data out 0
11	XADCAIN6	ADC AIN6	12	XSPIMOSI0	SPI Master data out; slave data in 0
13	XADCAIN1	ADC AIN1	14	DV3V3	Power 3.3v
15	XADCQIN0	ADC QIN0	16	XSPICLK1	SPI-1 clock
17	GND	Ground	18	XSPICS1	SPI Chip select 1
19	XUTXD1	UART data out 1	20	XSPIMISO1	SPI Master data in; slave data out 1
21	XURXD1	UART data in 1	22	XSPIMOSI1	SPI Master data out; slave data in 1
23	XUCTSN1	XUCTSN1	24	XURTSN1	XURTSN1
25	GTXD4	G data out 4	26	GTXD0	G data out 0
27	GRXD4	G data in 4	28	GRXD1	G data out 0
29	GND	Ground	30	XEINT18	EINT 18

2.16 JTAG

The JTAG is a 2mm pitch 20-pin connector.

Features

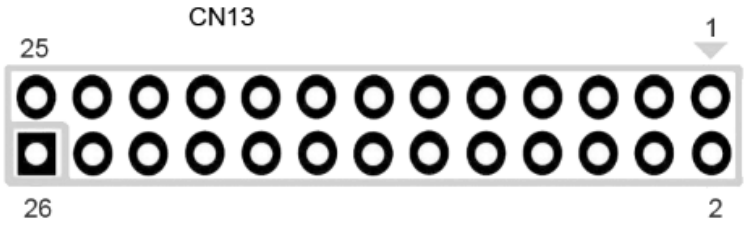
- IEEE P1149.1, 1149.6 (standard JTAG) interface to off-chip test and development equipment
- Debug-related control and status



Pin	Signal	Description	Pin	Signal	Description
1	XjTCK	Test clock	2	GND	Ground
3	XjTMS	Test mode select	4	GND	Ground
5	XjTDI	Test data input	6	XjTDO	Test data output
7	XjTRSTn	Test logic reset	8	XnRESET	Test logic reset
9	DV3V3	DV 3.3V	10	DV3V3	DV 3.3V

2.17 Camera

EM210 adopts a 2mm pitch 26-pin camera connector. It can be connected to the OV3640 module combined with an adapter plate. OV3640 is a 3.1Mega pixels CMOS camera module.



Pin	Signal	Pin	Signal
1	XI2CCSDA0	2	XI2CSCL0
3	XEINT20	4	XCIFIELD
5	XCIPCLK	6	XCIHREF
7	XCIVSYNC	8	XCIMCLK
9	XCIDATA7	10	XCIDATA 6
11	XCIDATA 5	12	XCIDATA 4
13	XCIDATA 3	14	XCIDATA 2
15	XCIDATA 1	16	XCIDATA 0
17	VDD5V	18	DV3 V 3
19	GND	20	GND
21	LINEL	22	LINER
23	XUCTSN0	24	XURTSN0
25	XURXD0	26	XUTXD0

2.18 LCD

On-board 40pin LCD interface and the board comes with driver for 4.3", 7", 10.1" resistive /capacitive

LCD. The user can choose other size of LCD and touch screen.

There are some differences on the baseboard between the resistive /capacitive screen selections:

Resistive screen:

Soldering: resistive (0R 0603) -- R31

NC: R32

Capacitive screen:

Soldering: resistive (0R 0603) -- R32

NC: R31

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	PVCC	2	PVCC	3	XVVD0	4	XVVD1
5	XVVD2	6	XVVD3	7	XVVD4	8	XVVD5
9	XVVD6	10	XVVD7	11	GND	12	XVVD8
13	XVVD9	14	XVVD10	15	XVVD11	16	XVVD12
17	XVVD13	18	XVVD14	19	XVVD15	20	GND
21	XVVD16	22	XVVD17	23	XVVD18	24	XVVD19
25	XVVD20	26	XVVD21	27	XVVD22	28	XVVD23
29	GND	30	XPWMTOUTO	31	MP02_1	32	MP02_0
33	XVVDEN	34	XVVSYNC	35	XVHSYNC	36	XVVCLK
37	TSXM	38	N16760323	39	TSYM	40	TSYP

3 Product Configurations

3.1 Standard Contents

• EM210 Single board computer x1

• CD-ROM (Linux BSP, Android BSP, Wince BSP, Documents, tools, Schematic Drawing, datasheets) x1

• Ethernet cable x1

• Serial Cable x1

• USB Cable x1

• 5V/2A DC power supply x1

3.2 Optional Parts

- WiFi Module x1
- GPS Module x1
- GPRS Module x1
- 3G Module x1
- Camera Module x1
- LCD Module x1