
SBC1400

Hardware User Manual



RELEASE NOTES

Version	Date	NOTES
1.00	Nov 1 st , 2011	Initial release
1.01	May, 2012	Correct some errors
1.10	July, 2012	Add new features for new PCB (B300-SC)

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1. Product Features and Specifications

1.1 Overview

SBC1400 is a single board computer board with a rich set of features. It is a flexible, high performance and inexpensive development board designed for multimedia applications especially in 1080p video decoding and 720p video encoding.

Each SBC1400 can be pre-installed with Windows CE 6.0, Linux 2.6 or Android 2.3 OS for immediate evaluation.

SBC1400 main board (Part number: **PCB0B300-SC**) Pictures:

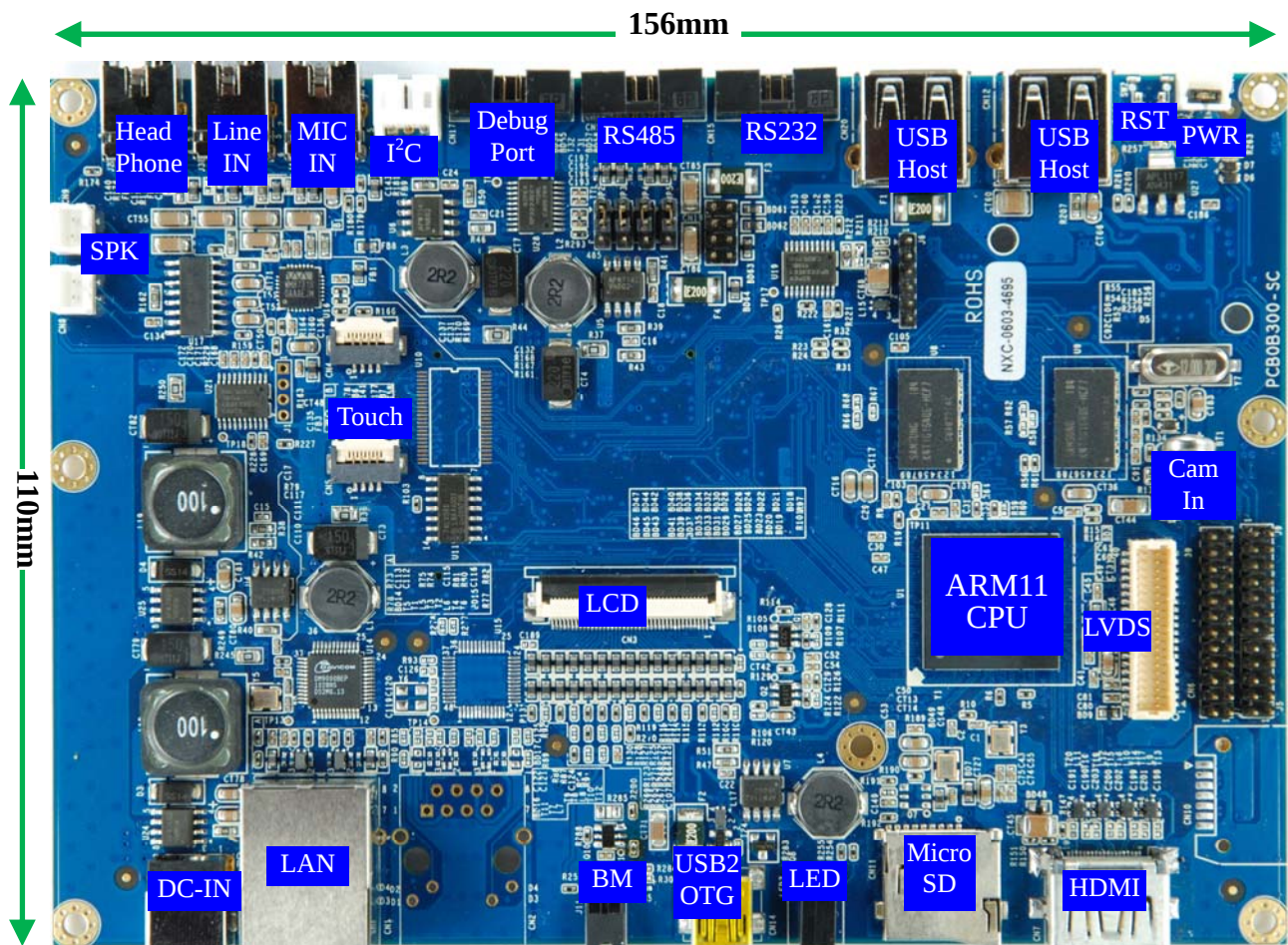


Figure 1- 1 SBC main board (Part number: **PCB0B300-SC**) Picture (Top View)

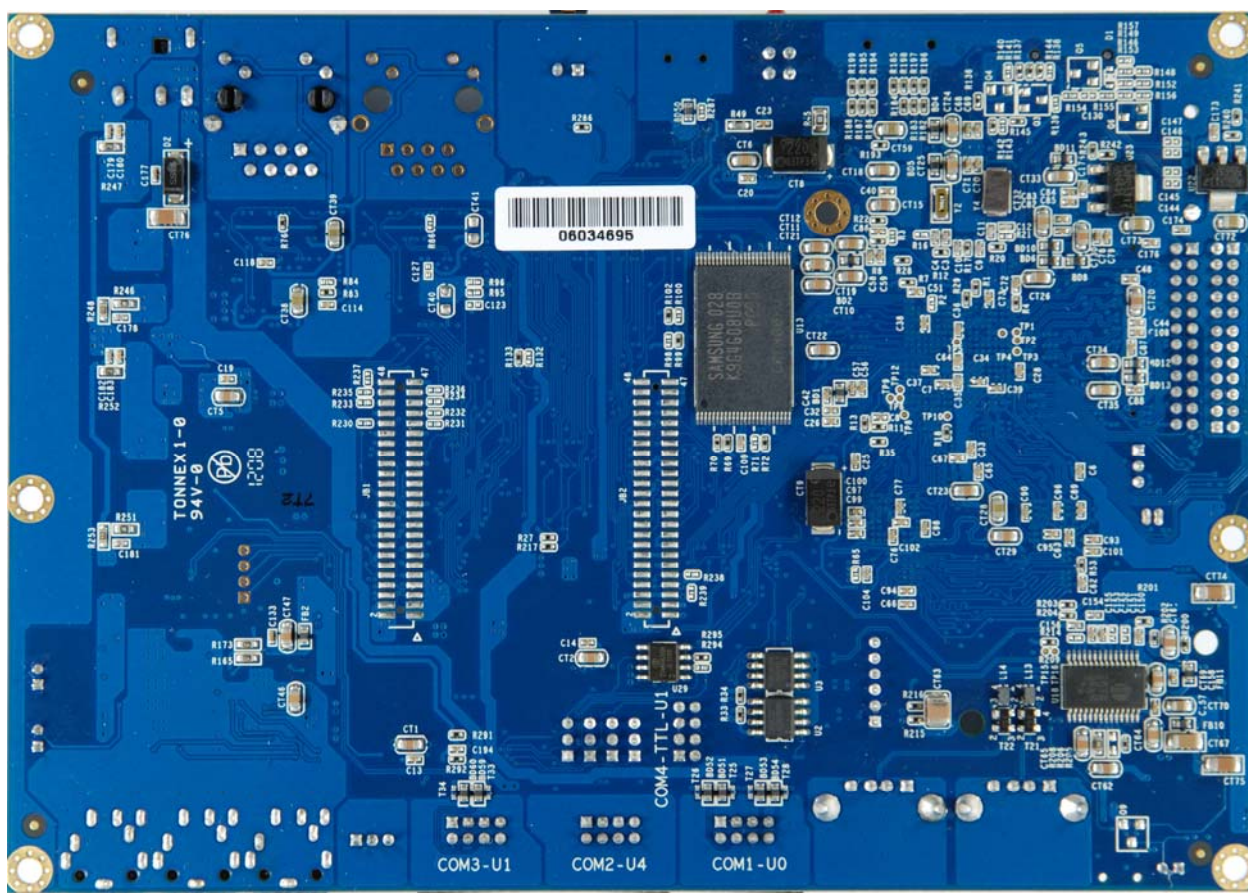
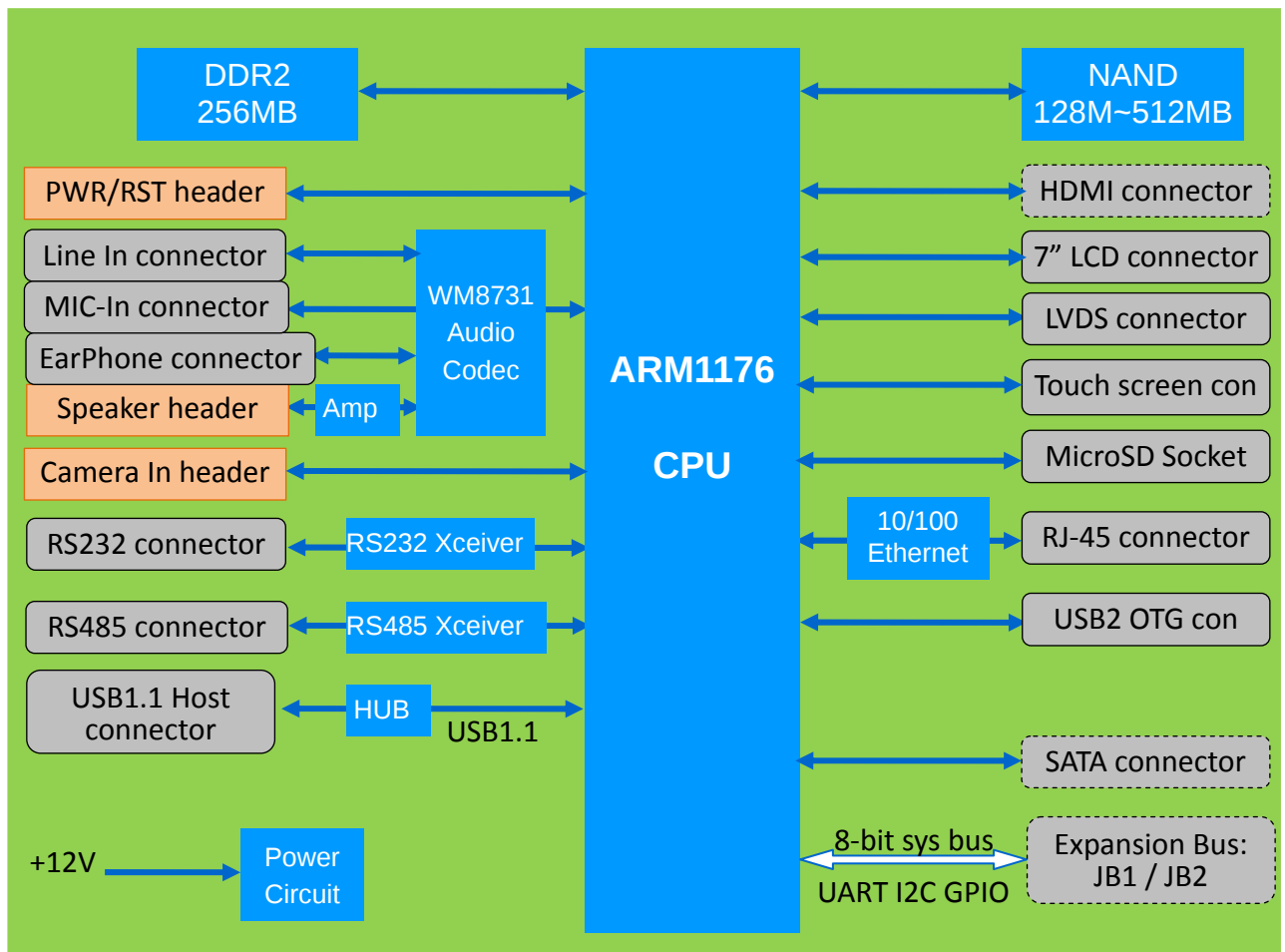


Figure 1- 3 SBC main board block diagram



1.2 Features and Specifications

Features:

- ARM1176JZF processor at high performance (>600Mhz) and low power consumption
- Dedicated hardware MPEG2/4/H.264 1920x1080 Full HD decoder
- Dedicated hardware H.264 1280x720 HD encoder
- Hardware 2D/3D graphic accelerator
- Rich set of peripherals (LCD, USB, HDMI, SATA, ...etc)
- Pre-installed Windows CE 6.0, Linux 2.6 or Android 2.3 OS

SBC Board Specifications:

- ARM1176JZF @ 700Mhz, 16KB/16KB cache, 16KB/16KB TCM
- 256MB DDR2 SDRAM (32-bit)
- 512MB NAND Flash (8-bit)
- Hardware Video Decoder:
 - H.264 HP @ Level 5.0 (up to 25Mbps)
 - MPEG 1/2 MP@HL (up to 40Mbps)
 - MPEG 4 ASP / DivX / Xvid (up to 35Mbps)
- Hardware Video Encoder:
 - H.263, MPEG 4 : up to 1280x720p (30fps)
 - H.264 : up to 1280x720p (24fps)
- 10/100 Mb Ethernet interface RJ-45 connector
- 7" LCD (digital RGB) interface connector x1
- LVDS interface connector x1
- (optional) HDMI 1.3 transmitter interface connector x1
- (optional) SATA (3.0Gbps) interface and connector x1
- +12V DC power input connector x1
- Touch Screen interface connectors x2
- USB1.1 host port x3
- USB2.0 OTG connector x1
- Micro SD card socket x1
- WM8731 Audio Codec , Amplifier circuit
- Line in connector x1, Earphone connector x1, MIC in connector x1
- Camera Input (BT.656) header x1
- RS485 connector x1
- RS232 connector x2 (one for debug port)
- UART TTL pin header x1

1.3 Outline Drawing and Dimension

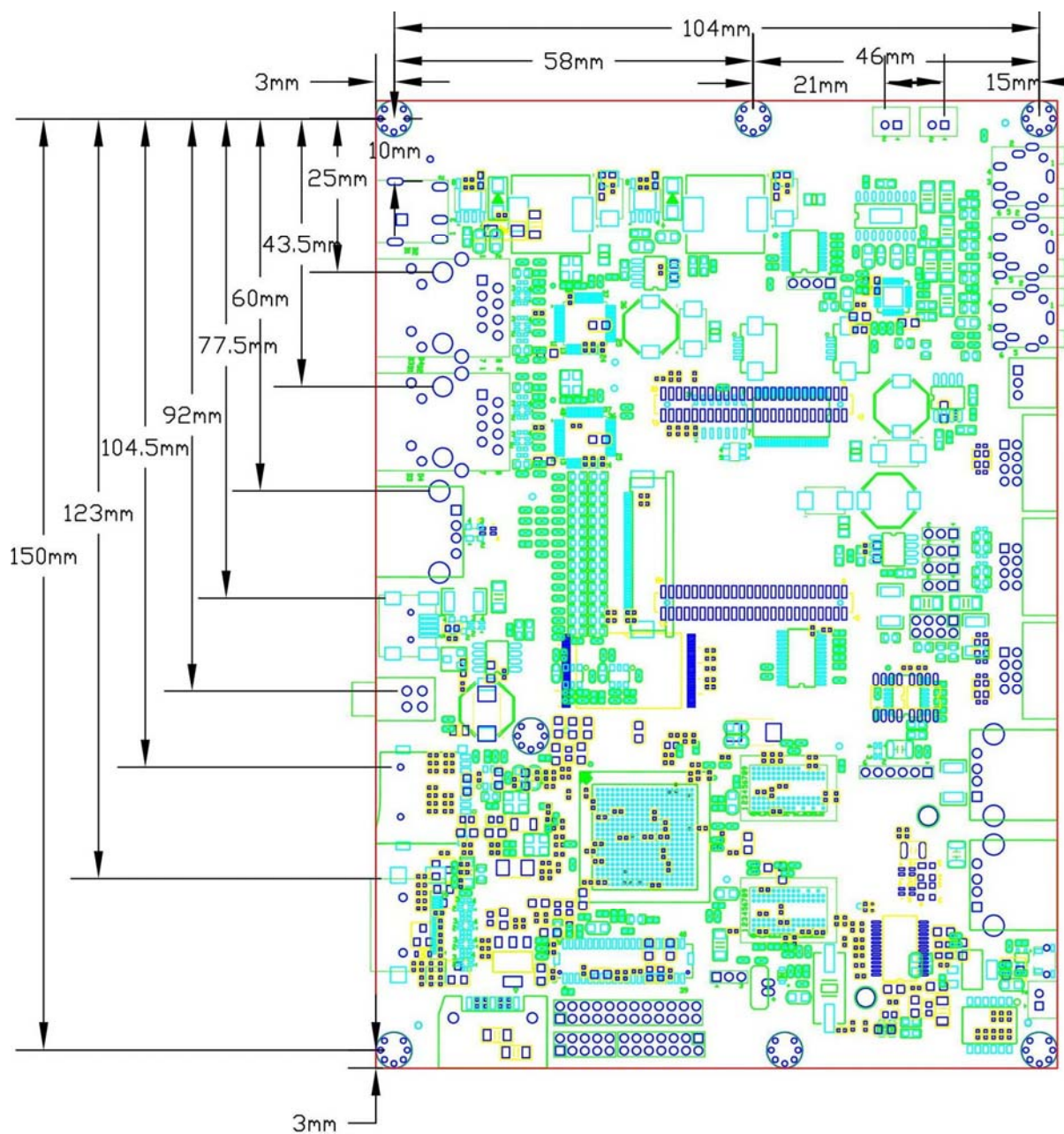


Figure 1- 6 SBC main board outline drawing (I)

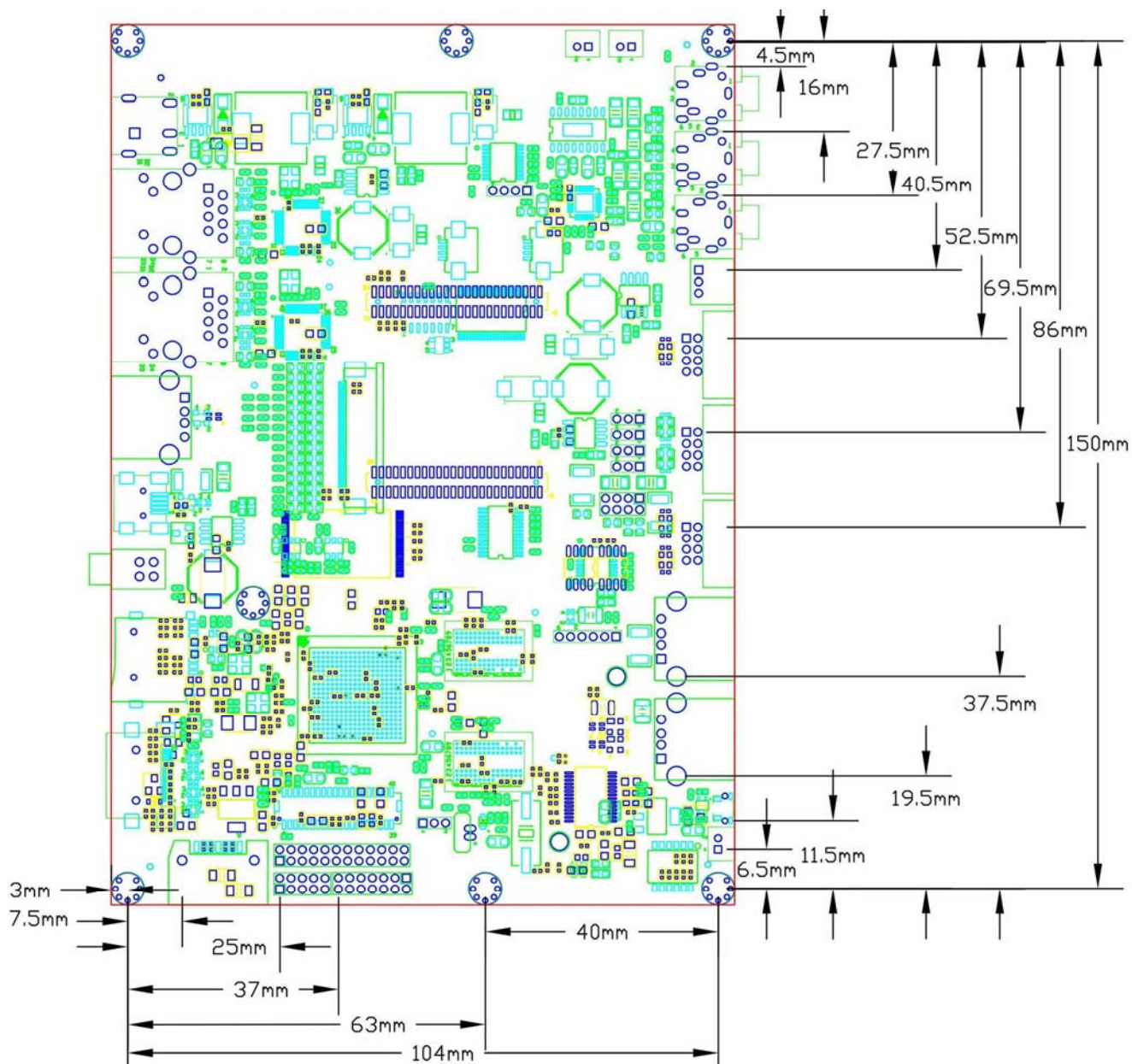
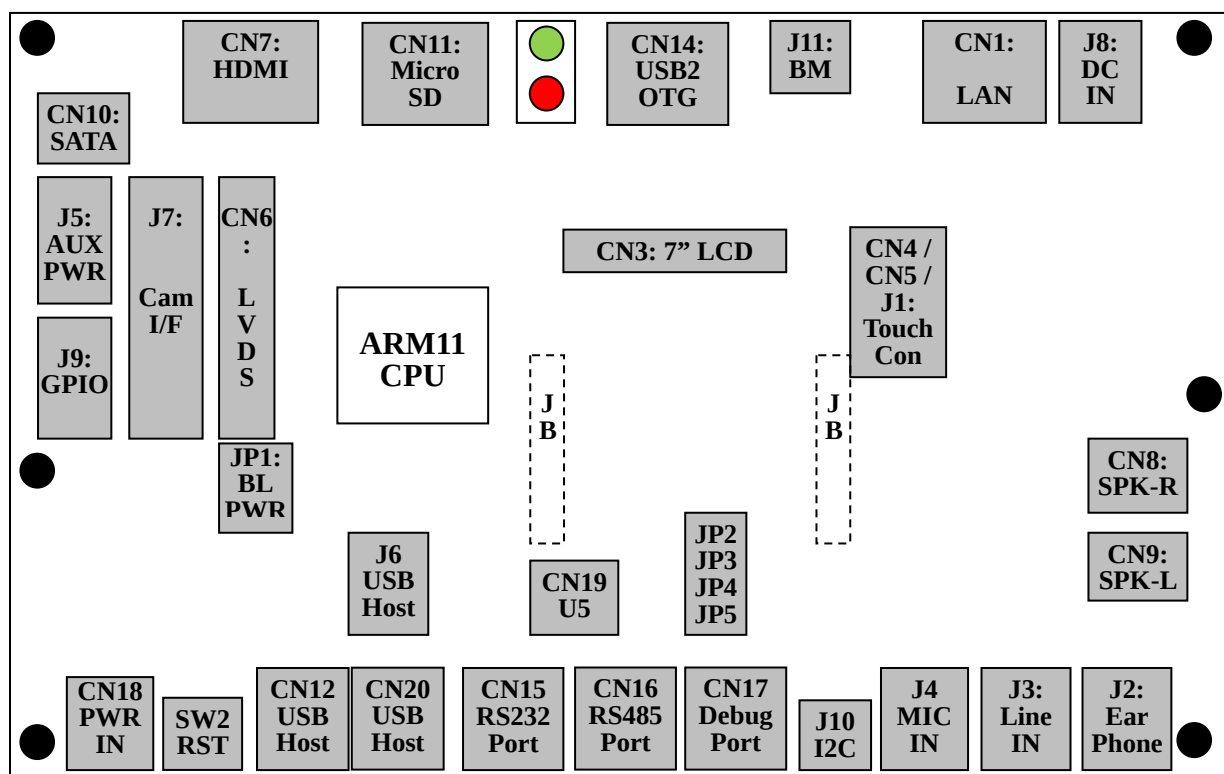


Figure 1- 7 SBC main board outline drawing (II)

2.Function Descriptions

The following diagram shows connector positions on SBC main board. The functional details of the connectors are described in subsequent sections.

SBC main board connector positions: (Top View)



2.1 Expansion Bus Interface

Expansion bus interface is for user to add customized expansion board by using the interfaces connected to JB1 and JB2. JB1 and JB2 are located at the bottom side of baseboard PCB. The following tables describe pin assignment of JB1 and JB2 connectors.

The interfaces connected to JB1/JB2 include: 8-bit SRAM data bus with 6-bit address, +3.3V power, +5V power, GPIOs, Chip Select signals, SD/SDIO interface (SD2), UART5, UART1, SPI, TS, I2C.

JB2 Pin Assignment		JB1 Pin Assignment	
Pin Map	Functions	Pin Map	Functions
1	+3.3V	1	+3.3V
2	+5V	2	+5V
3	+3.3V	3	+3.3V
4	+5V	4	+5V
5	GND	5	D1
6	GND	6	D0
7	SCL1	7	D3
8	GPB0 (GPIO_D23)	8	D2
9	SDA1	9	D5
10	GPB1 (GPIO_D25)	10	D4
11	GND	11	D7
12		12	D6
13	GND	13	GND
14	GND	14	GND
15	GND	15	A1
16	S7_FRM (GPIO_F13)	16	A0
17	GND	17	A3
18	S7_CLK (GPIO_F12)	18	A2
19	S8_FRM (GPIO_F17)	19	A5
20	S7_MOSI (GPIO_F10)	20	A4
21	S8_CLK (GPIO_F16)	21	
22	S7_MISO (GPIO_F11)	22	
23	S8_MOSI (GPIO_F14)	23	GND

24	S7_IRQ (GPIO_D7)	24	GND
25	S8_MISO (GPIO_F15)	25	
26	GND	26	MEM 0 (GPIO_F3)
27	S8_IRQ (GPIO_D8)	27	
28	S9_FRM (GPIO_F27)	28	
29	GND	29	OEn
30	S9_CLK (GPIO_F26)	30	
31	GND	31	CSn_1
32	GND	32	WEN
33	S10_FRM (GPIO_C31)	33	CSn_2
34	S9_MOSI (GPIO_F24)	34	IRQ0 (GPIO_D5)
35	S10_CLK (GPIO_C30)	35	
36	S9_MISO (GPIO_F25)	36	IRQ1 (GPIO_D6)
37	S10_MOSI (GPIO_C28)	37	GND
38	S9_IRQ (GPIO_D9)	38	GND
39	S10_MISO (GPIO_C29)	39	SD1_D0 (GPIO_F21)
40	GND	40	SD1_CLK (GPIO_F23)
41	S10_IRQ (GPIO_D10)	41	SD1_D1 (GPIO_F20)
42	UART5_RXD (GPIO_D18)	42	GND
43	GND	43	SD1_D2 (GPIO_F19)
44	UART5_CTS (GPIO_D19)	44	SD1_CMD (GPIO_F22)
45	GND	45	SD1_D3 (GPIO_F18)
46	UART5_TXD (GPIO_D17)	46	SD1_WP (GPIO_D21)
47	GND	47	GND
48	UART5_RTS (GPIO_D20)	48	SD1_CDn (GPIO_A11)

For more information on the expansion bus signals connection, please contact us.

Note: JB1 and JB2 bus are now reserved for internal use and is no longer available for customer. (for PCB version number PCB0B300-SC and greater).

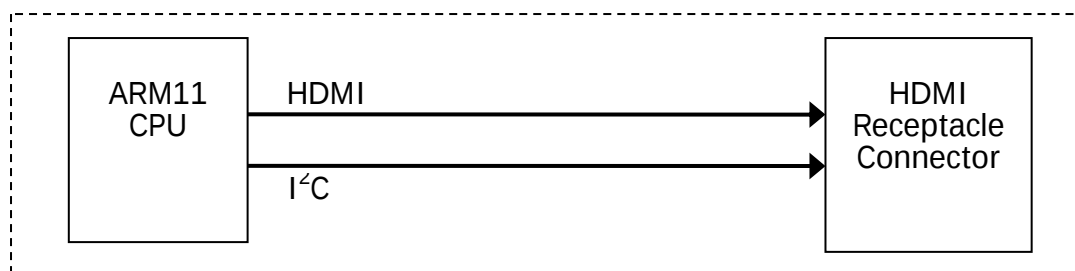
2.2 HDMI Interface

The CN7 is a standard HDMI receptacle connector supporting HDMI interface.

The brief features of the HDMI interface are:

- HDMI 1.3, HDCP 1.1, DVI 1.0 compliant
- Supported video format:
 - 480p @59.94Hz/60Hz, 576p@50Hz
 - 720p @50Hz/59.94Hz/60Hz
 - 1080i @50Hz/59.94Hz/60Hz
 - 1080p @50Hz/59.94Hz/60Hz
- Supported color format: 4:4:4 RGB/YCbCr, 4:2:2 YCbCr 12-bit mode
- Integrated HDCP Encryption Engine for Video/Audio content protection

HDMI:



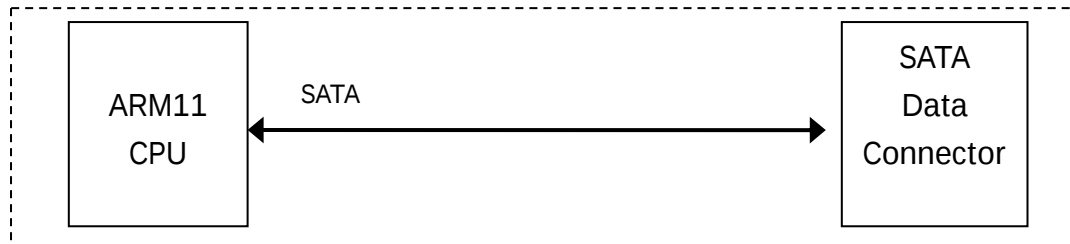
NOTE: HDMI is NOT a standard interface in SBC1400. It is an optional interface. Contact us if you require HDMI.

2.3 SATA Host Interface

The CN10 is a standard SATA data connector supporting SATA Host interface for connecting to a SATA drive.

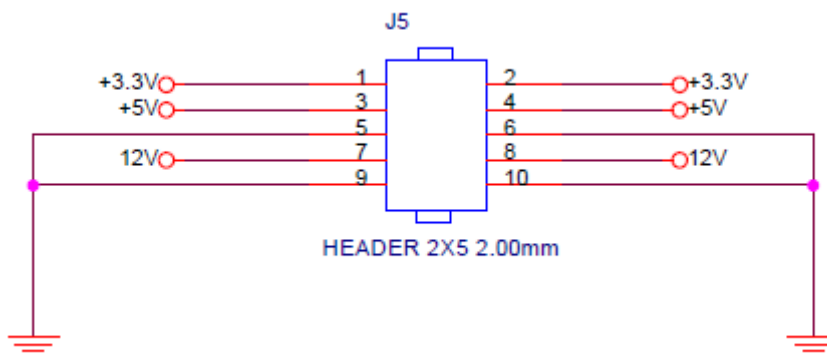
The interface speed is at Gen1 (1.5Gbps) or Gen2 (3.0G).

SATA:



The J5 auxiliary power connector can be used as power supply to SSD SATA device.

Note that SATA HDD is NOT recommended to use with this auxiliary power connector.



2.4 UART Interface & Debug Port

There are 4 UART ports on SBC board. The port connections are available through CN15, CN16, CN17 and CN19 connectors.

Location	Type	UART No	Available Signals	Note
CN15	2x4 box header	UART0	RS232 signal level (TX, RX, RTS, CTS)	Normal RS232 port
CN16	2x4 box header	UART4	RS485 signal level (485+, 485-)	RS485 port. Note: RS485 port works only in HALF Duplex mode.
CN17	2x4 box Header	UART1	RS232 signal level (TX, RX)	RS232 port dedicated as debug port
CN19	2x4 pin header	UART5	TTL signal level (TX, RX, RTS, CTS)	Normal UART port at TTL level or can be as GPIO

One 2x4 box header to DB9 cable is included in SBC product package. See [Appendix A](#) for the detailed info of cable pin assignment.

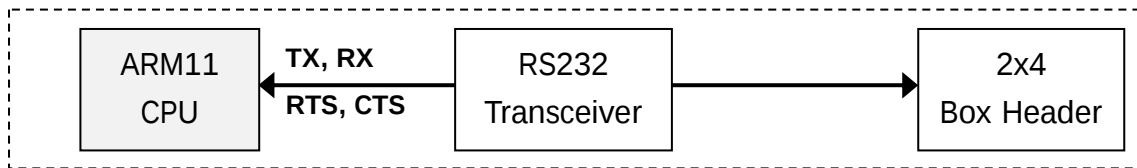
2x4 Box Header:

DB9 Pin	2x4 header	RS232	RS485
1	--	---	---
2	4	RxD	485+
3	6	TxD	485-
4	1	---	---
5	5	GND	GND
6	7	---	---
7	8	RTS	---
8	2	CTS	---
9	--	---	---

DB9 Male Connector

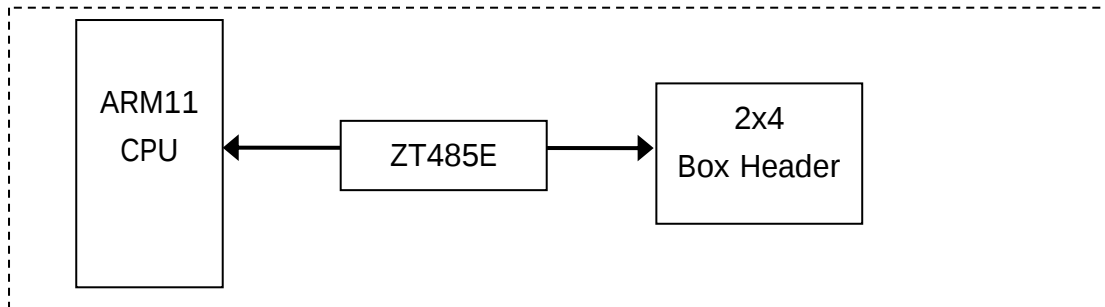
DB9 Female Connector

UART0 connection diagram:



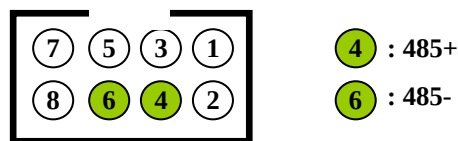
UART0 (with TX, RX, RTS, CTS signals) works as a regular RS232 port.

UART4 connection diagram:

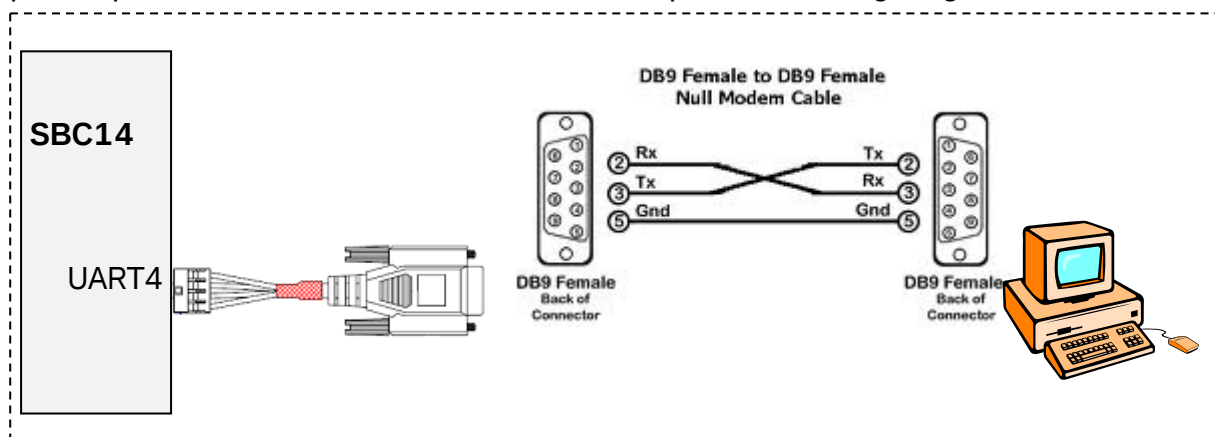


ZT485E: RS485 transceiver. RS485 works in half duplex mode.

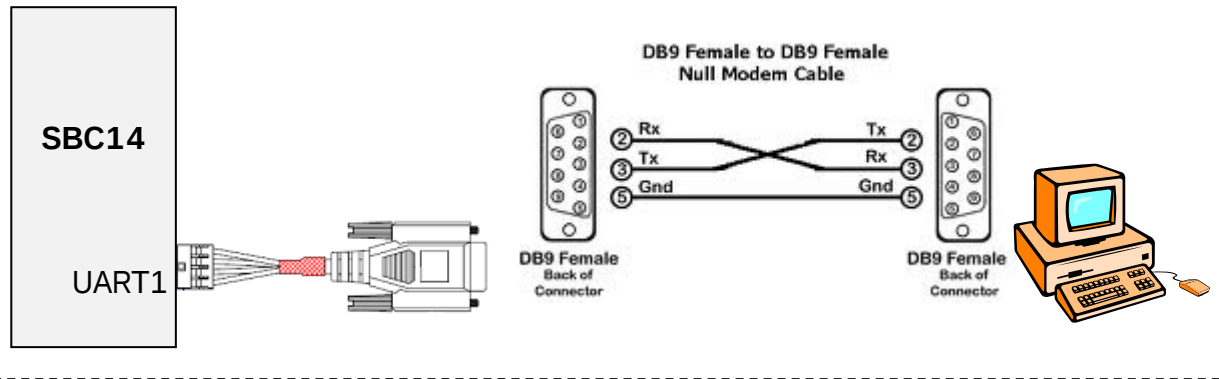
UART Box Header (CN16 on PCB) Pin assignment:



If you are using an RS232 cable in SBC1400 RS485 connection, please make sure the pin2 & pin 3 are cross connected. See the sample cable wiring diagram below:



UART1 connection diagram:

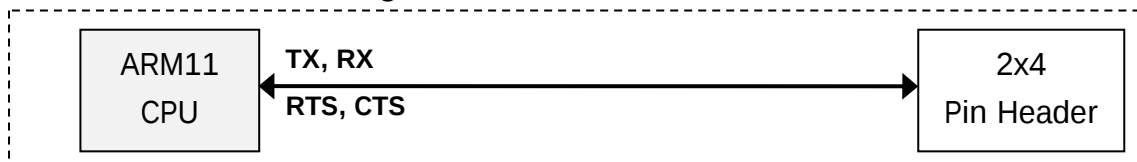


UART1 (only TX, RX signals) is dedicated as a debug port.

The default setting of UART1 is: **115200 baud rate, 8 data bit, no parity, 1 stop bit and no flow control.**

A DB9 **null modem cable** (or adapter) is required when you would like to connect UART1 to a PC that runs terminal emulation software such as TeraTerm.

UART5 connection diagram:



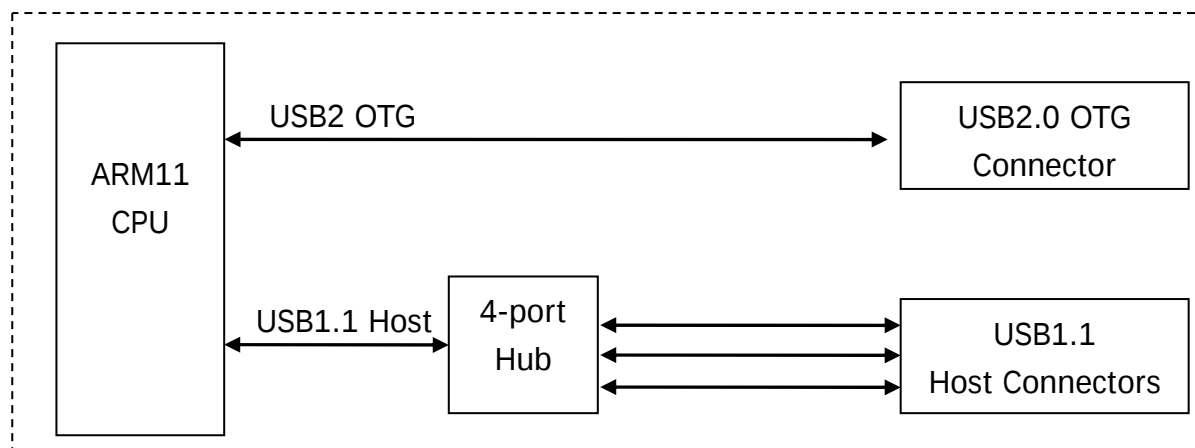
UART5 (with TX, RX, RTS, CTS signals) works as a regular UART port without transceiver.

2.5 USB Interface

The USB interfaces on SBC include a 480Mbps a USB2.0 OTG port (CN14) and 3x USB1.1 host ports (CN12, CN20, J6).

The USB1.1 host interface is connected to a hub controller to extend host ports.

USB Port:



NOTE: The USB2.0 OTG can be used in host mode or device mode. If you would like to use it in host mode, a separate OTG-to-host cable is required.

The USB1.1 host connector is a regular USB type A connector that can be connected to **+5V USB storage device**. This port is mainly used to connect to USB flash drive.

NOTE 3: The J16 connector is reserved for use with **+3.3V USB WiFi module**.

2.6 Audio Interface

The SBC audio interface is implemented by a WM8731 audio codec. The data and control interface between CPU and WM8731 is I²S.

Connectors: Functions

CN8: Speaker-Right

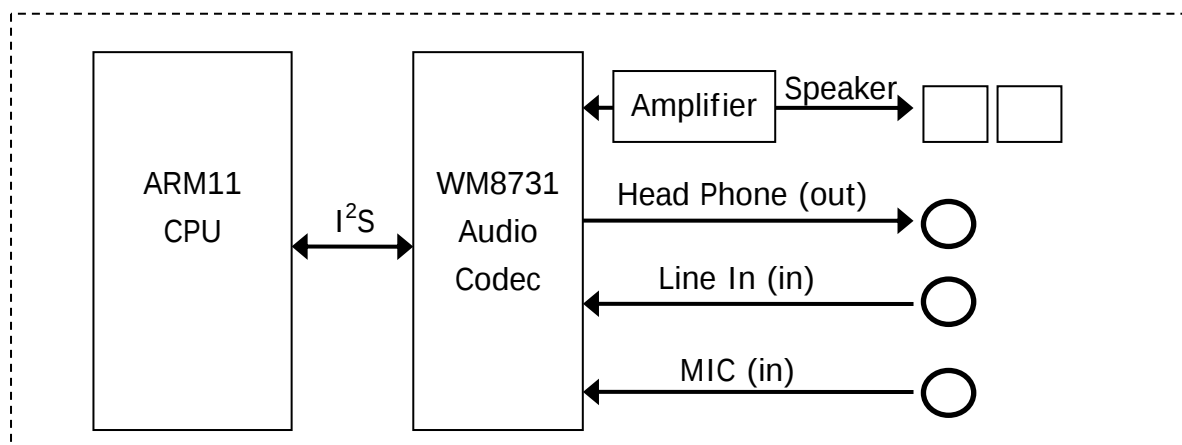
CN9: Speaker-Left

J2: Head Phone

J3: Line-In

J4: MIC-In

Audio Interfaces:



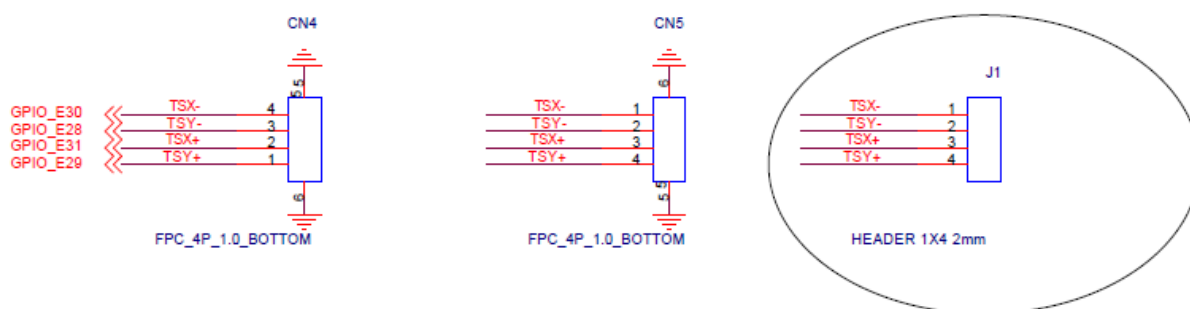
2.7 LCD & Touch Interface

There are 1 LCD connector and 2 touch interface connectors on SBC board:

CN3: for 7-inch TFT LCD module

CN4, CN5: 4-wire resistive type touch interface connector with 2 different pin assignments

J1: 4-wire resistive type touch interface signals on pin header that can be used to implement a converter board for other type of touch connector



2.8 SD Host Interface

The microSD host interface is defined as SD4 port on ARM11 CPU.

The interface complies with the following versions of specifications:

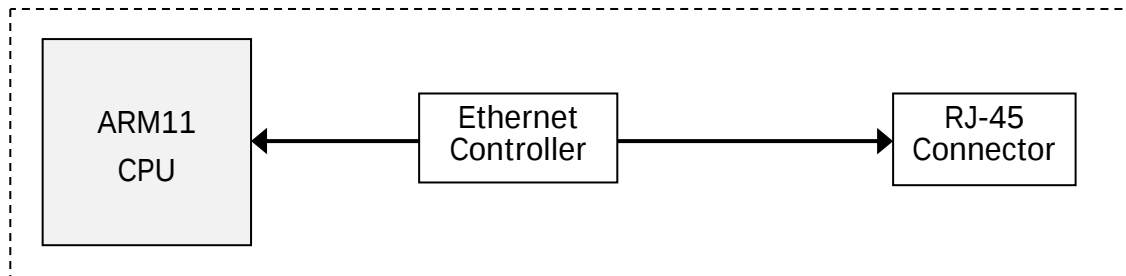
- SD Host Controller Specification Version 2.0
- SDIO Card Specification Version 2.0
- SD Memory Card Specification Draft Version 2.0
- SD Memory Card Security Specification Version 1.0
- MMC Specification Version 3.31, 4.2,,4.3 and MMC Plus and MMC Mobile
- CE-ATA Digital Protocol Revision 1.1

The microSD interface supports 4-bit data bus on CN11 standard microSD card holder.

2.9 Ethernet Interface

The 10/100Mbps Ethernet interface is available at standard RJ-45 connector (CN1).

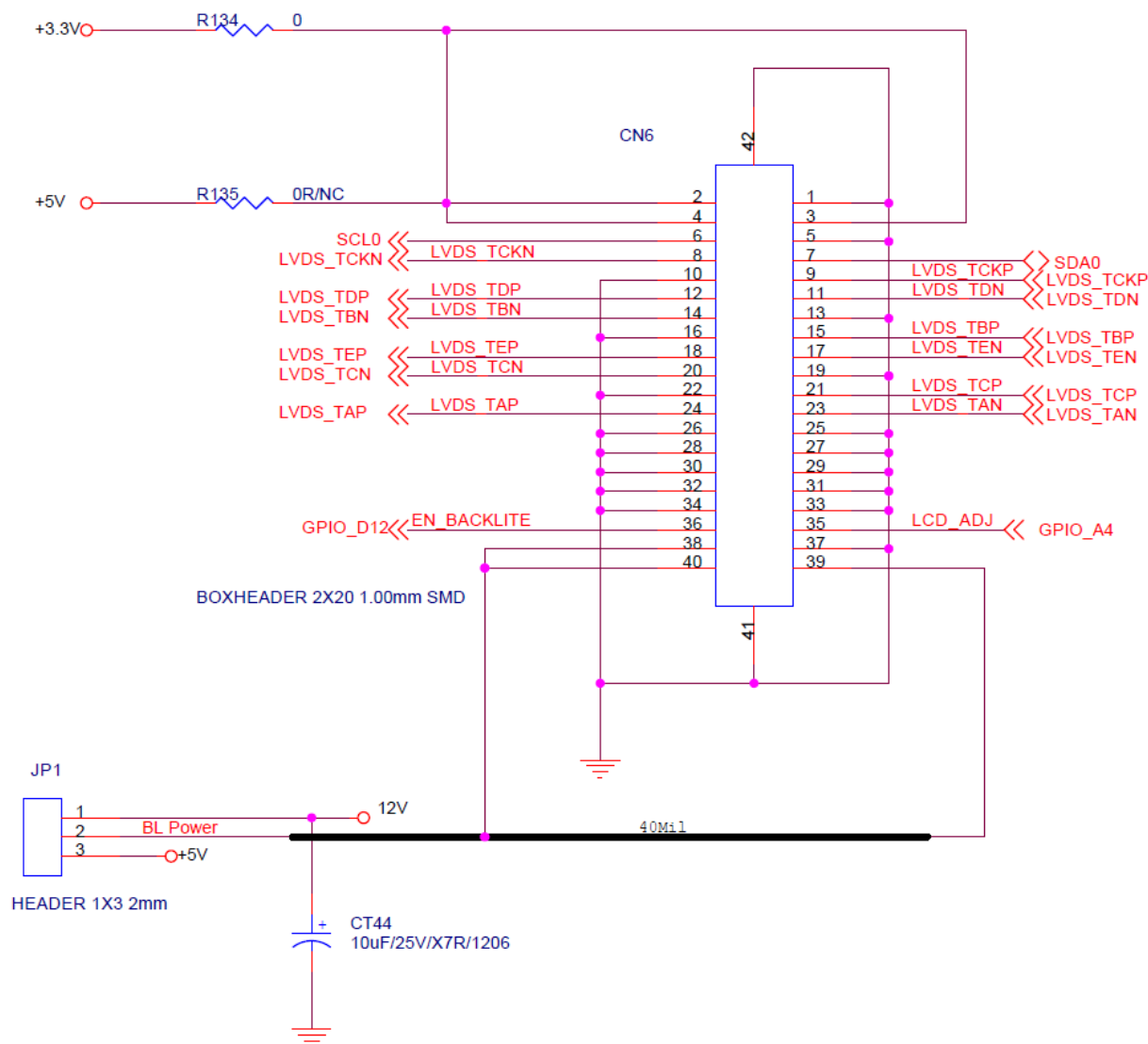
Ethernet:



2.10 LVDS Transmitter Interface (J2, JP5)

The LVDS transmitter converts 35bits of data into 5LVDS data streams.

The signals connection of LVDS interface on CN6 connector is illustrated below:



JP1 header is used to choose either +12V or +5V is to supply to CN6 connector as the backlight power.

Currently, the recommended display resolution supported by LVDS interface is 1366 x 768.

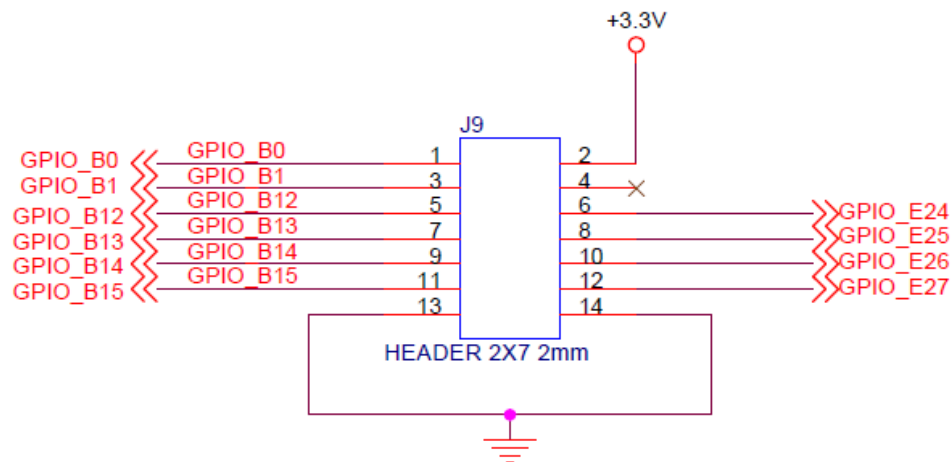
2.11 GPIO, Switch, Key and LED

The GPIO connector, switch and keys on SBC board are:

SW2: Reset switch

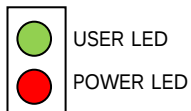
CN18: connector for power key. A On/OFF power switch can be connected to this connector. Short the connector pins will make SBC always ON.

J9: GPIO connector

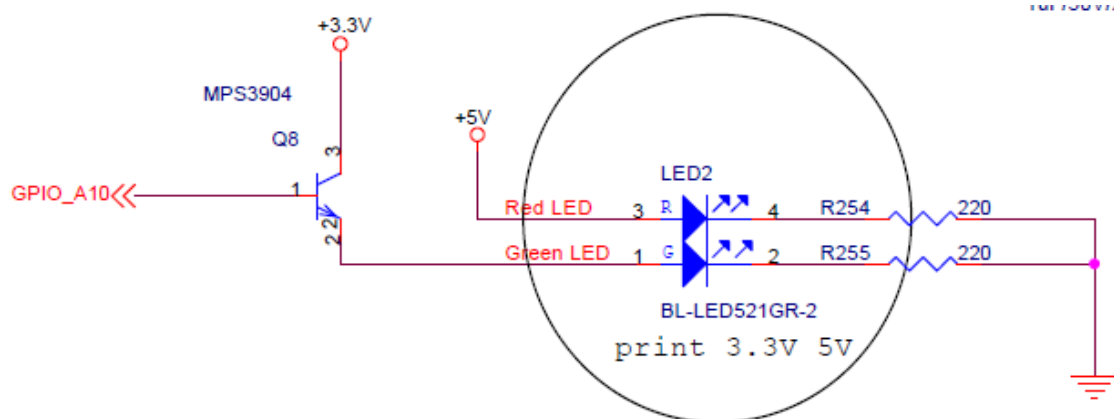


The on-board red LED is connected to 5V power. It is turned on when 5V power is properly supplied.

The green LED is user programmable and can be turned on/off by GPIO_A10.

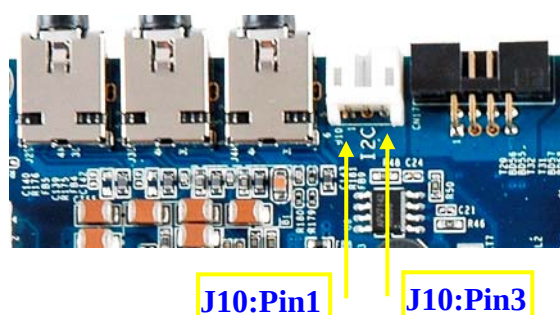
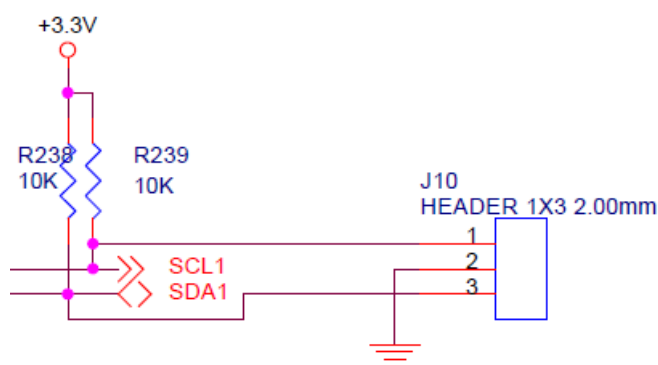


The schematic of LEDs is as below:

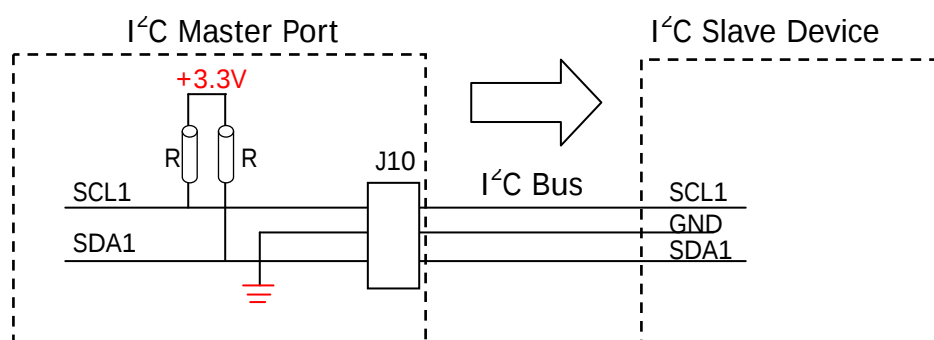


2.12 I²C (J10) Interface

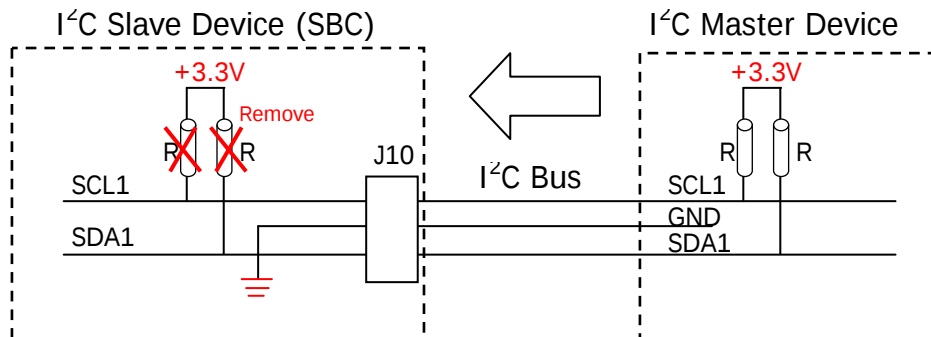
The I²C interface (connector J10) is set to **master mode** by default. The SCL1 (clock) and SDA1 (data) are pulled high to +3.3V by resistors R238 and R239. Please make sure R238/R239 resistors are mounted on PCB by inspecting the PCB location.



(1). SBC1400 as an I²C master port: The master port is pulled high to +3.3V with 2 resistors. The slave devices have to be connected directly without additional power supply on I²C bus.



(2). SBC1400 as an I²C slave device: If the master device is pulled high to +3.3V, the slave device (SBC1400) pull high resistors have to be removed.



2.13 BM (J11) Header

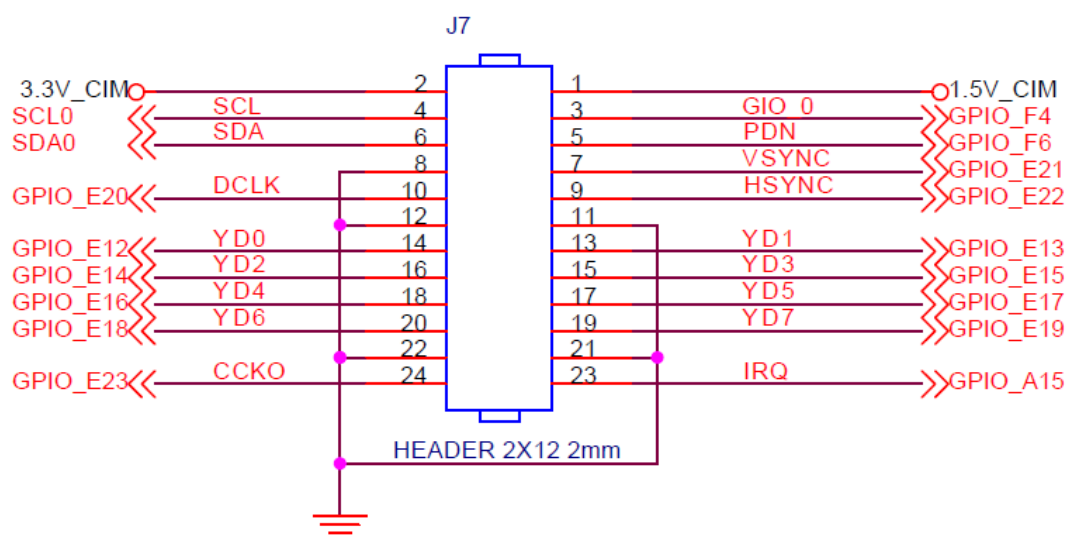
The BM header is a 2-pin jumper to be used in SBC1400 product firmware update. In normal SBC1400 operation, the jumper cap MUST be put on the jumper (that is, 2-pin jumper is short).

In firmware update mode, the jumper cap MUST be removed from the jumper. For further information about firmware update on SBC1400 series product, please refer to a separate firmware update document.

2.14 Camera Input

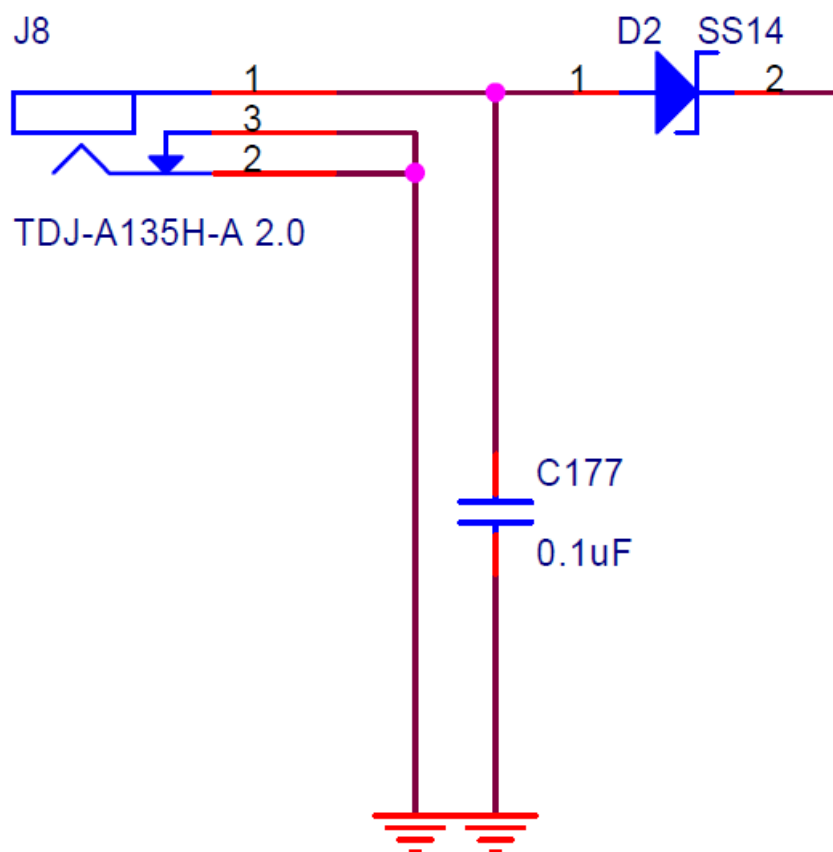
The Camera Input interface on J7 header has following features:

- INPUT FORMATS
 - CCIR 601/656, YUV4:2:2 (8bits)
 - Support Interlace mode
 - RGB555, RGB565 (8 bits)
- OUTPUT FORMATS
 - YUV4:2:2, YUV4:2:0
 - Convert YUV422 to YUV420 mode
- Skip Frame Mode
- 4-level alpha blending/Chroma-Keying (1 overlay image)
- Image effecter
- Image scaler (ratio : original * 256/target)

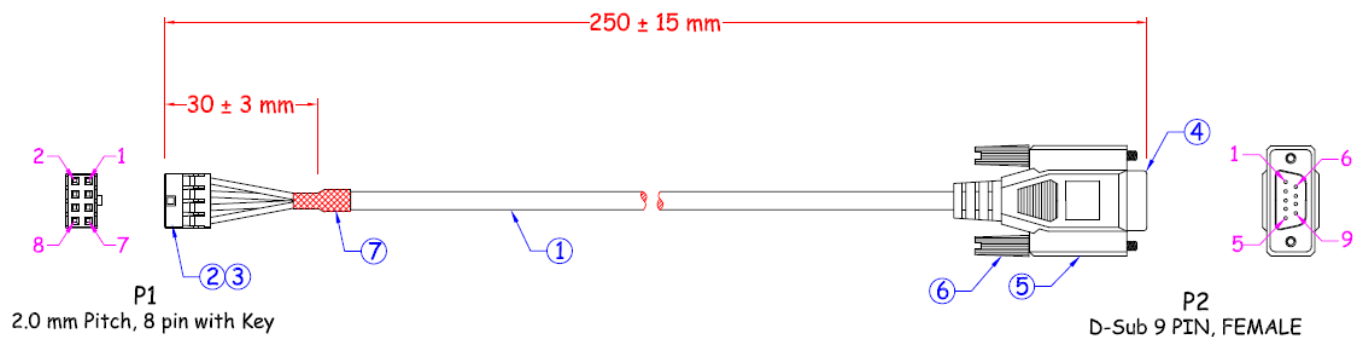


2.15 Power Supply

The standard DC power adapter included with SBC is +12V, 4A or higher.
Power input should be applied to J8 connector.



Appendix A: Box Header to DB9 Cable



WIRE TERMINATIONS

