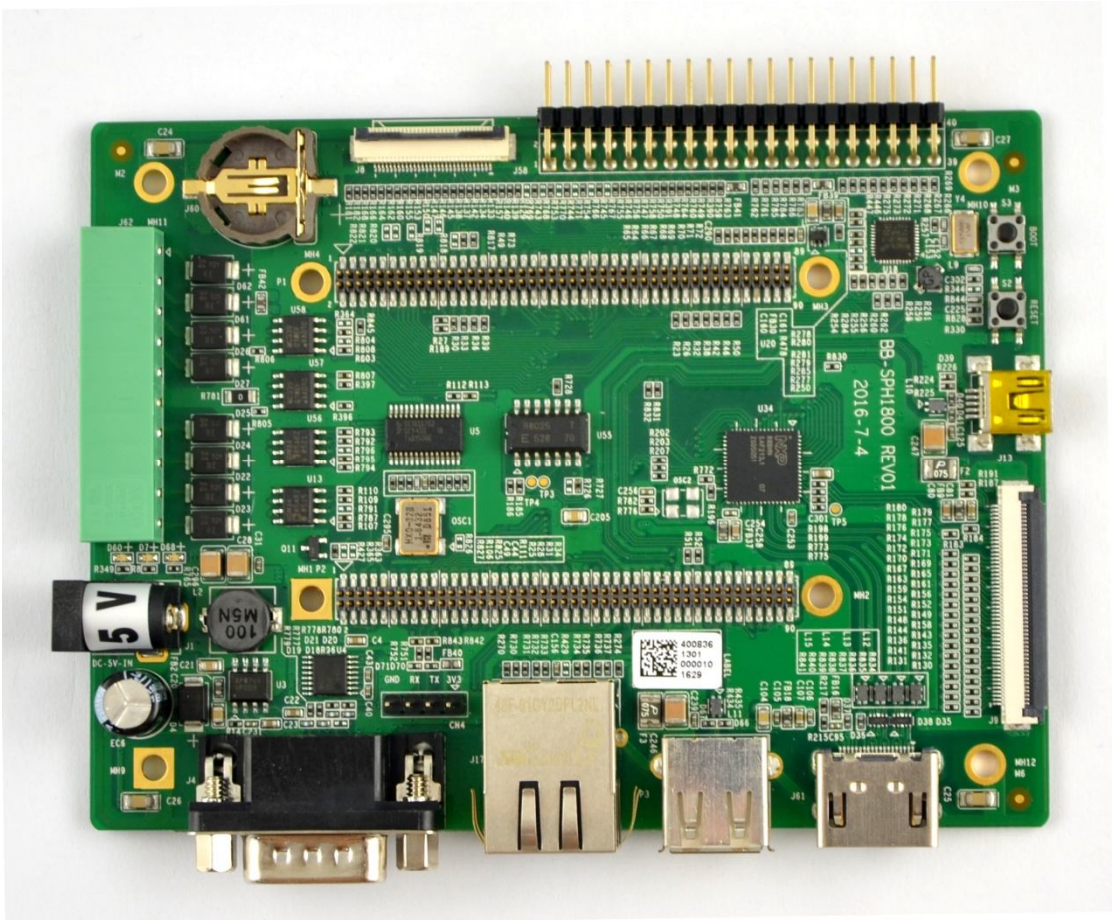
User Manual

[BB-SPH1800]



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Revision History

Rev.	Note	Author
Rev1.0	Initial	Tony Guan

Catalog

Chapter 1 Product Overview

1.1 Brief Introduction

BB-SPH1800 is the simplified version base board of SOM-PH8700/PH8800 Designed by Embest for PH180 related SOM modules for areas such as medical instruments, video surveillance and industrial control. In the compact body size design, BB-SPH1800 provide lots of external interfaces for SOM-PH8700/PH8800(Gigabit Ethernet interface, USB interfaces, a 24-bit LCD interface, a 12-bit camera interface, a HDMI interface, a TF card slot , RS232 , CAN, Rs485 and so on). Meanwhile, it has a 40Pin on-board DIP connector which include I2C，I2S，UART，MMC, Gigabit Ethernet and so on used to do the function extension.

1.1.1 Packing List

- SOM-PH8700/SOM-PH8800 Core Board X1 （option one of two)
- BB-SPH1800 base board X1
- 4.3 inch LCD or 7 inch LCD Panel X1 （option）
- Desiccant X1
- Antistatic Bag X1
- Generic Safety Leaflet X1
- Quick Start Guide X1
- Packing Box X1

1.1.2 Product Features

- **Electrical Features**
  - Operating Temperature: 0~70°C（Commercial）
  - Power Supply: 5V/4A (The power adapter with short circuit current limit)
  - Operating Humidity: 20% ~ 90%（no condensation）
  - Main Board Size: 120 mm × 90 mm

- PCB Specification: 4 layer design

- **Data Transfer Interfaces：**
  - A DB9 RS232 Uart interface
  - A 12 bit Digital Camera interface
  - A Gigabit Ethernet interface
  - Two RS485 interface
  - Two CAN interface
  - A high-speed USB2.0 Host interface
  - A USB OTG
  - A TF Card
  - A 40 Pin Extended Interface（I2C,I2S,UART,MMC, Gigabit Ethernet and so on ）

- **Debugging Interfaces**
  - A 4Pin Uart serial debugging interface.
- **Audio/Video Interfaces**
  - A 24-bit true-color LCD interface (supporting 4-wire touchscreen)
  - A HDMI interface

- **Other Interfaces & Buttons：**
  - A power Jack (+5V round DC power jack)
  - A system Reset Button，a boot Button
  - A RTC

1.2 Interfaces & Buttons

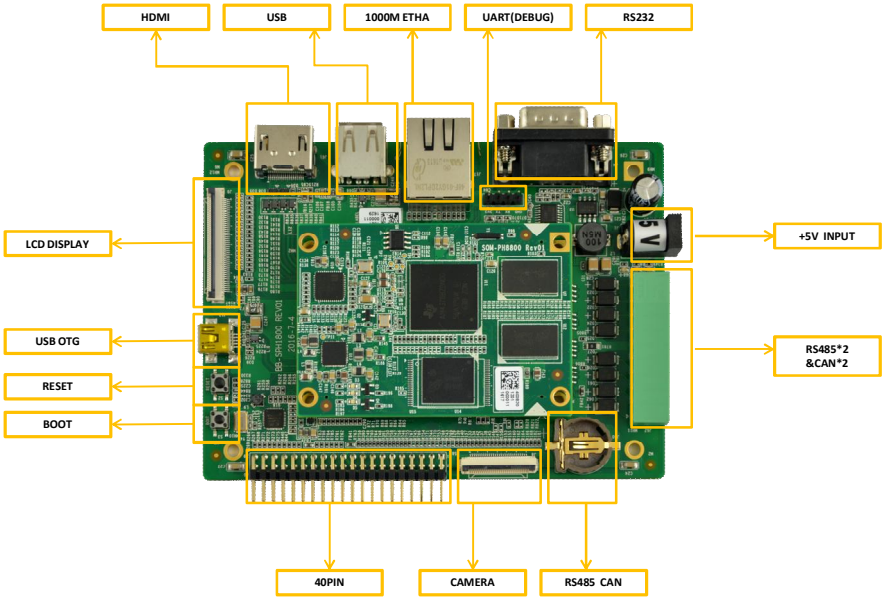

Figure 1-1 BB-SPH1800 Top

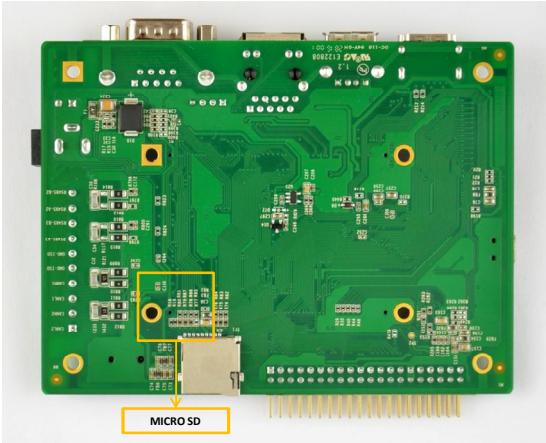

Figure 1-2 BB-SPH1800 Bottom

1.3 System Block Diagram

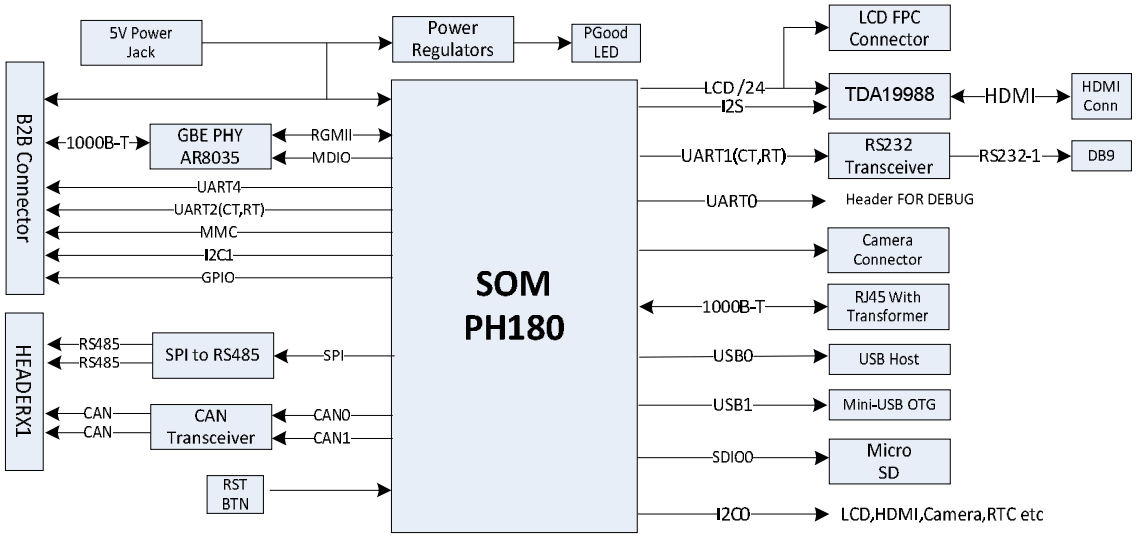

Figure 1-3 BB-SPH1800 System Block Diagram

1.4 Product Dimensions(mm)

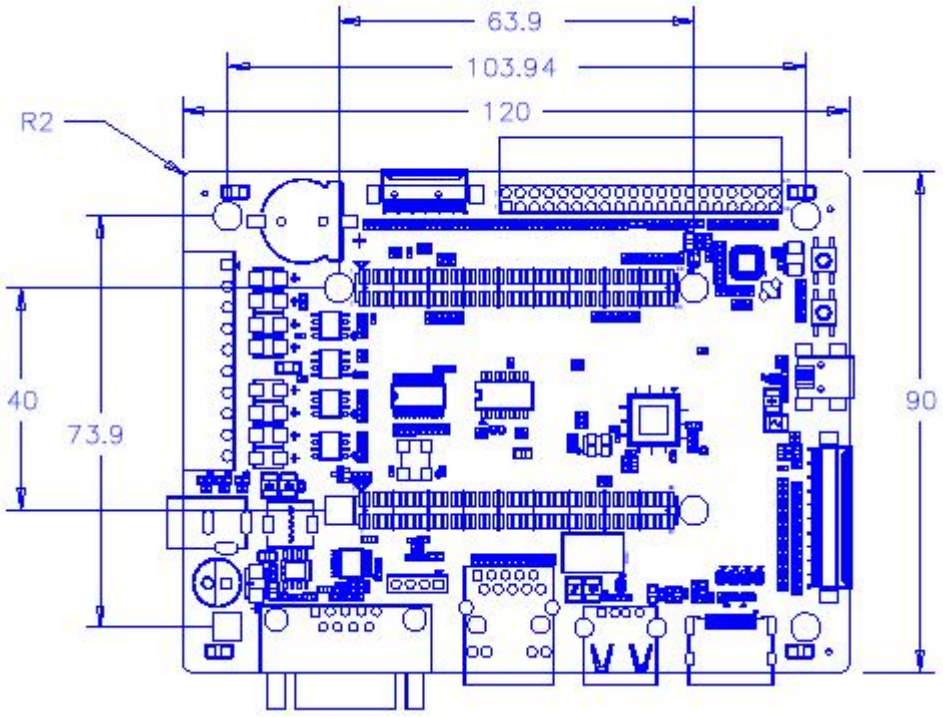

Figure 1-4 Product Dimensions

Chapter 2 Introduction to Hardware System

This chapter will introduce in detail the structure, expansion and peripheral interfaces of BB-SPH1800 hardware system.

1.5 BB-SPH1800 introduction

BB-SPH1800 is the simplified version base board of SOM-PH8700/PH8800 Designed by Embest, That make a precise presentation of the AM335X/AM437X Soc feature，The customs can free replace each other with SOM-PH8700/PH8800 ，Provide a perfect solution for the resource extension.

1.6 Introduction to Peripheral Chips

1.6.1 TDA19988

TDA19988 is a video encoder designed to drive high-resolution displays through HDMI. It is suited for mobile Internet devices, laptops, tablet computers, portable e-books and smart phones.

This chip possesses advanced scaling engine that supports 1080P HDTV. The integrated frequency shifting engine can provide 60fps under 1080p mode. Additionally, TDA19988 supports IIS digital audio input.

1.6.2 AR8035

AR8035 is a low-power and low-cost Ethernet PHY chip and integrated with a 10/100/1000Mb transceiver. It is a single-port tri-speed Ethernet PHY and supports MAC.TM RGMII interfaces.

AR8035 is compliant with the IEEE 802.3az Energy Efficiency Ethernet Standard and the Atheros's proprietary SmartEEE standard, which allows traditional MAC/SoC devices incompatible with 802.3az to

function as a complete 802.3az system.

1.7 Details of Interfaces

This section will introduce in detail the constructions, principles, interface definitions and considerations of use of peripherals , so that users may have a deep understanding of the hardware circuitry of the board

1.7.1 PH180 interfaces

BB-SPH1800 connect with the core board with the PH180 Interfaces defined by Embest.

P1，P2 of PH180 interfaces defined as below

PIN-OUT for P2

Pin	Signal Name	Function		Signal Description	Pin
2	VRTC	PWR	CTL	PWRON_RESETn	1
4	MMC0_DAT0			WARM_RESETn	3
6	MMC0_DAT1	SD/MMC		MMC0_CMD	5
8	MMC0_DAT2			MMC0_CD	7
10	MMC0_DAT3			MMC0_CLK	9
12	GND1	GND		SPI0_CS0	11
14	SPI0_SCLK	SPI		SPI0_D1	13
16	SPI0_D0			UART2_RXD	15
18	UART0_RXD	UART		UART2_TXD	17
20	UART0_TXD			UART2_RTS	19
22	UART3_RXD			UART2_CTS	21
24	UART3_TXD			UART1_RXD	23
26	CAN0_RX	CAN		UART1_TXD	25
28	CAN0_TX			UART1_RTS	27

30	I2C0_SDA	I2C		UART1_CTS	29
32	I2C0_SCL		GND	GND3	31
34	GND2	GND		CAM_D1	33
36	CAM_D0	CSI		CAM_D3	35
38	CAM_D2			CAM_D5	37
40	CAM_D4			CAM_D7	39
42	CAM_D6			CAM_D9	41
44	CAM_D8			CAM_D10	43
46	GND4	GND		CAM_D11	45
48	CAM_FIELD		GND	GND5	47
50	CAM_WEN			CAM_PCLK	49
52	GBE_GREEN		GND	GND6	51
54	GBE_YELLOW			CAM_HD	53
56	GND8	GND		CAM_VD	55
58	GBE_TRP2		GND	GND7	57
60	GBE_TRN2	ETH		GBE_TRP0	59
62	GBE_TRP3			GBE_TRN0	61
64	GBE_TRN3			GBE_TRP1	63
66	GND9	GND		GBE_TRN1	65
68	USB0_DM		GND	GND10	67
70	USB0_DP			GBE_MDC	69
72	GND11	GND		GBE_MDIO	71
74	USB1_DM	USB		USB0_ID	73
76	USB1_DP			USB0_VBUS	75
78	GND12	GND		USB1_VBUS	77
80	SPI1_SCLK	SPI	CTL	LCD_PWM	79
82	SPI1_D0			BOOT0_SEL	81
84	SPI1_D1			BOOT1_SEL	83

86	SPI1_CS0		BOOT2_SEL	85
88	GND13	GND	GND14	87
90	5V_VDD1	PWR	5V_VDD2	89

PIN-OUT for P1

Pin	Signal Name	Function	Signal Name	Pin
2	WAKE_UP	CTL	PWR_GOOD	1
4	MCASP0_AHCLKX		RESET_OUTn	3
6	MCASP0_FSX	I2S	MCASP0_ACLKX	5
8	MCASP0_AHCLKR		MCASP0_ACLKR	7
10	MCASP0_FSR		MCASP0_AXR0	9
12	VDDA_ADC		MCASP0_AXR1	11
14	ADC0	ADC	ADC1	13
16	ADC2		ADC3	15
18	GNDA_ADC		HDMI_CEC/ADC4	17
20	HDMI_HPD/ADC5		HDMI_TX2-/ADC6	19
22	HDMI_DSCL/IO1		HDMI_TX2+/ADC7	21
24	HDMI_DSDA/IO2	GND	GND2	23
26	HDMI_TX1-/IO3	HDMI/GPIO	HDMI_TXC-/IO7	25
28	HDMI_TX1+/IO4		HDMI_TXC+/IO8	27
30	HDMI_TX0-/IO5	GND	GND3	29
32	HDMI_TX0+/IO6		LCD_D11	31
34	GND4	GND	LCD_D12	33
36	LCD_D0		LCD_D13	35
38	LCD_D1		LCD_D14	37
40	LCD_D2		LCD_D15	39
42	LCD_D3	GND	GND6	41
44	LCD_D4	LCD	LCD_DE	43

46	LCD_D5			LCD_D16	45
48	LCD_D6			LCD_D17	47
50	LCD_D7			LCD_D18	49
52	LCD_D8			LCD_D19	51
54	LCD_D9			LCD_D20	53
56	LCD_D10			LCD_D21	55
58	LCD_HSYNC			LCD_D22	57
60	LCD_VSYNC			LCD_D23	59
62	GND5	GND	CAN	CAN1_RX	61
64	LCD_PCLK			CAN1_TX	63
66	GND7	GND	I2C	I2C_SCL	65
68	IO1/ETH_TXEN			I2C_SDA	67
70	IO2/ETH_RXDV	GPIO/ETH		IO3/ETH_TXD3	69
72	IO4/ETH_TXD2			IO5/ETH_TXD1	71
74	IO6/ETH_TXD0			IO7/ETH_TXCK	73
76	IO8/ETH_RXCK			IO9/ETH_RXD3	75
78	IO10/ETH_RXD2			IO11/ETH_RXD1	77
80	IO12/ETH_RXD0			RVD1/MMC2_CLK	79
82	RVD2/MMC2_CMD	RVD/MMC		RVD3/MMC2_D0	81
84	RVD4/MMC2_D1			RVD5/MMC2_D2	83
86	RVD6/MMC2_D3			RVD7/MMC2_D4	85
88	RVD5/MMC2_D5			RVD9/MMC2_D6	87
90	GND8	GND		GND9	89

P1，P2 of BB-SPH1800 Signal Description as below

P2 for BB- SPH1800					
Pin	Signal Name	INPUT/OUTPUT	ACTIVE	Power	Description

			H/L	level	
1	PWRON_RESETn	O	L	3.3V	POWER_RESET
2	VRTC	O		3.3V	NC
3	WARM_RESETn	O	L	3.3V	RESET
4	MMC0_DAT0	I/O		3.3V	MMC0
5	MMC0_CMD	I		3.3V	MMC0
6	MMC0_DAT1	I/O		3.3V	MMC0
7	MMC0_CD	O		3.3V	MMC0
8	MMC0_DAT2	I/O		3.3V	MMC0
9	MMC0_CLK	I		3.3V	MMC0
10	MMC0_DAT3	I/O		3.3V	MMC0
11	SPI0_CS0	I		3.3V	SPI0
12	GND1	G		0V	GND
13	SPI0_D1	O		3.3V	SPI0
14	SPI0_SCLK	I		3.3V	SPI0
15	UART2_RXD	I		3.3V	UART2
16	SPI0_D0	I		3.3V	SPI0
17	UART2_TXD	O		3.3V	UART2
18	UART0_RXD	O		3.3V	UART0
19	UART2_RTS	I		3.3V	UART2
20	UART0_TXD	I		3.3V	UART0
21	UART2_CTS	O		3.3V	UART2
22	UART3_RXD	O		3.3V	UART3
23	UART1_RXD	I		3.3V	UART1
24	UART3_TXD	I		3.3V	UART3

25	UART1_TXD	O		3.3V	UART1
26	CAN0_RX	O		3.3V	CAN0_UART
27	UART1_RTS	I		3.3V	UART1
28	CAN0_TX	I		3.3V	CAN0_UART
29	UART1_CTS	O		3.3V	UART1
30	I2C0_SDA	I/O		3.3V	I2C0
31	GND3	G		0V	GND
32	I2C0_SCL	I		3.3V	I2C0
33	CAM_D1	O		3.3V	CAM
34	GND2	G		0V	GND
35	CAM_D3	O		3.3V	CAM
36	CAM_D0	I		3.3V	CAM
37	CAM_D5	O		3.3V	CAM
38	CAM_D2	I		3.3V	CAM
39	CAM_D7	O		3.3V	CAM
40	CAM_D4	I		3.3V	CAM
41	CAM_D9	O		3.3V	CAM
42	CAM_D6	I		3.3V	CAM
43	CAM_D10	O		3.3V	CAM
44	CAM_D8	I		3.3V	CAM
45	CAM_D11	O		3.3V	CAM
46	GND4	G		0V	GND
47	GND5	G		0V	CAM
48	CAM_FIELD	O		3.3V	CAM
49	CAM_PCLK	O		3.3V	CAM
50	CAM_WEN	O		3.3V	CAM
51	GND6	G		0V	GND

52	GBE_GREEN	I	L	3.3V	MIIA_LED_LINK
53	CAM_HD	O		3.3V	CAM
54	GBE_YELLOW	I	L	3.3V	MIIA_LED_ACT
55	CAM_VD	O		3.3V	CAM
56	GND8	G		0V	GND
57	GND7	G		0V	GND
58	GBE_TRP2	O			GBE Data
59	GBE_TRP0	I			GBE Data
60	GBE_TRN2	O			GBE Data
61	GBE_TRN0	I			GBE Data
62	GBE_TRP3	O			GBE Data
63	GBE_TRP1	I			GBE Data
64	GBE_TRN3	O			GBE Data
65	GBE_TRN1	I			GBE Data
66	GND9	G		0V	GND
67	GND10	G		0V	GND
68	USB0_DM				USB0
69	GBE_MDC	I		3.3V	MDIO Clk
70	USB0_DP				USB0
71	GBE_MDIO	I/O		3.3V	MDIO DATA
72	GND11	G		0V	GND
73	USB0_ID	O			USB0
74	USB1_DM				USB1
75	USB0_VBUS	I		5V	POWER 5V for USB0
76	USB1_DP				USB1

77	USB1_VBUS	I		5V	POWER 5V for USB0
78	GND12	G		0V	GND
79	LCD_PWM	I		3.3V	PWM for LCD
80	SPI1_SCLK	I		3.3V	SPI1
81	BOOT0_SEL	O		3.3V	BOOT0
82	SPI1_D0	I		3.3V	SPI1
83	BOOT1_SEL	O		3.3V	BOOT1
84	SPI1_D1	O		3.3V	SPI1
85	BOOT2_SEL	O		3.3V	BOOT2
86	SPI1_CS0	I		3.3V	SPI1
87	GND14	G		0V	GND
88	GND13	G		0V	GND
89	5V_VDD2	O		5V	POWER 5v for core board
90	5V_VDD1	O		5V	POWER 5v for core board
P1 for BB- SPH1800					
Pin	Signal Name	INPUT/OUTPUT	ACTIVE H/L	Power level	Description
1	PWR_GOOD	I	H	3.3V	Core board power good
2	WAKE_UP	O		1.8V	NC
3	RESET_OUTn	I	L	3.3V	RESET
4	MCASP0_AHCLKX	I		3.3V	I2S_mclk
5	MCASP0_ACLKX	I		3.3V	I2S_BCLK

6	MCASP0_FSX	I		3.3V	I2S_LRCLK
7	MCASP0_ACLKR	O		3.3V	I2S_BCLK
8	MCASP0_AHCLKR	O		3.3V	I2S_mclk
9	MCASP0_AXR0	I/O		3.3V	I2S_DATA0
10	MCASP0_FSR	O		3.3V	I2S_LRCLK
11	MCASP0_AXR1	I/O		3.3V	I2S_DATA1
12	VDDA_ADC	I		1.8V	NC
13	ADC1	O		1.8V	TOUCH SCREEN X-
14	ADC0	O		1.8V	TOUCH SCREEN X+
15	ADC3	O		1.8V	TOUCH SCREEN Y-
16	ADC2	O		1.8V	TOUCH SCREEN Y+
17	HDMI_CEC/ADC4	O		1.8V	NC
18	GNDA_ADC	G		0V	GND
19	HDMI_TX2-/ADC6	O	L	1.8V	NC
20	HDMI_HPD/ADC5	O		1.8V	NC
21	HDMI_TX2+/ADC7	O	L	1.8V	NC
22	HDMI_DSCL/IO1	O	L	3.3V	IO_SPI0_IRQ
23	GND2	GND		0V	GND
24	HDMI_DSDA/IO2	I	L	3.3V	IO_RTC_INTn
25	HDMI_TXC-/IO7	O		3.3V	IO_CAM_CLK(CAM_CLK)
26	HDMI_TX1-/IO3	O	H	3.3V	IO_HDMI_HPD
27	HDMI_TXC+/IO8	I		3.3V	IO_CAM_STROBE

28	HDMI_TX1+/IO4	O	L	3.3V	IO_ETH2_INT
29	GND3	O		0V	GND
30	HDMI_TX0-/IO5	O	L	3.3V	GPIO_LED1
31	LCD_D11	I		3.3V	LCD
32	HDMI_TX0+/IO6	I	H	3.3V	NC
33	LCD_D12	I		3.3V	LCD
34	GND4	G		0V	GND
35	LCD_D13	I		3.3V	LCD
36	LCD_D0	I		3.3V	LCD
37	LCD_D14	I		3.3V	LCD
38	LCD_D1	I		3.3V	LCD
39	LCD_D15	I		3.3V	LCD
40	LCD_D2	I		3.3V	LCD
41	GND6	G		0V	GND
42	LCD_D3	I		3.3V	LCD
43	LCD_DE	I		3.3V	LCD
44	LCD_D4	I		3.3V	LCD
45	LCD_D16	I		3.3V	LCD
46	LCD_D5	I		3.3V	LCD
47	LCD_D17	I		3.3V	LCD
48	LCD_D6	I		3.3V	LCD
49	LCD_D18	I		3.3V	LCD
50	LCD_D7	I		3.3V	LCD
51	LCD_D19	I		3.3V	LCD
52	LCD_D8	I		3.3V	LCD
53	LCD_D20	I		3.3V	LCD
54	LCD_D9	I		3.3V	LCD

55	LCD_D21	I		3.3V	LCD
56	LCD_D10	I		3.3V	LCD
57	LCD_D22	I		3.3V	LCD
58	LCD_HSYNC	I		3.3V	LCD
59	LCD_D23	I		3.3V	LCD
60	LCD_VSYNC	I		3.3V	LCD
61	CAN1_RX	O		3.3V	CAN1_UART
62	GND5	O		0V	GND
63	CAN1_TX	O		3.3V	CAN1_UART
64	LCD_PCLK	I		3.3V	LCD
65	I2C_SCL	I		3.3V	I2C1
66	GND7	G		0V	GND
67	I2C_SDA	G		3.3V	I2C1
68	IO1/ETH_TXEN	I		3.3V	ETH
69	IO3/ETH_TXD3	I		3.3V	ETH
70	IO2/ETH_RXDV	O		3.3V	ETH
71	IO5/ETH_TXD1	I		3.3V	ETH
72	IO4/ETH_TXD2	I		3.3V	ETH
73	IO7/ETH_TXCK	I		3.3V	ETH
74	IO6/ETH_TXD0	I		3.3V	ETH
75	IO9/ETH_RXD3	O		3.3V	ETH
76	IO8/ETH_RXCK	O		3.3V	ETH
77	IO11/ETH_RXD1	O		3.3V	ETH
78	IO10/ETH_RXD2	O		3.3V	ETH
79	RVD1/MMC2_CLK	I		3.3V	MMC1

80	IO12/ETH_RXD0	O		3.3V	ETH
81	RVD3/MMC2_D0	I/O		3.3V	MMC1
82	RVD2/MMC2_CMD	I		3.3V	MMC1
83	RVD5/MMC2_D2	I/O		3.3V	MMC1
84	RVD4/MMC2_D1	I/O		3.3V	MMC1
85	RVD7/MMC2_D4	I/O		3.3V	MMC1
86	RVD6/MMC2_D3	I/O		3.3V	MMC1
87	RVD9/MMC2_D6	I/O		3.3V	MMC1
88	RVD5/MMC2_D5	I/O		3.3V	MMC1
89	GND9	G		0V	GND
90	GND8	G		0V	GND

1.7.2 LCD/HDMI

The powerful video performance is one of the important features of BB-SPH1800. It supports multiple types of displays including 50-pin medium-/small-sized LCD modules, HDMI monitors. LCD/HDMI shares the same video data source. Now let's take a deep look at the hardware implementation of the display function of LCD/HDMI interfaces.

- **LCD**

The LCD interface (J9) of BB-SPH1800 is implemented with a 50-pin FPC connector which connects LCD module to the board. Currently LCD8000-43T (4.3 inch), LCD8000-70T (7 inch) and VGA8000 conversion module are supported by the board. The following table contains pin definitions of LCD interface (including the fixed pins of the connector).

chart 1-1 LCD Display

LCD Display: J9

LCD Display: J9			
Pin	Signal Description	Device	Signal Type
1	DSS_D0		Data Blue
2	DSS_D1		
3	DSS_D2		
4	DSS_D3		
5	DSS_D4		
6	DSS_D5		
7	DSS_D6		
8	DSS_D7		
9	GND		Ground
10	DSS_D8		Data Green
11	DSS_D9		
12	DSS_D10		
13	DSS_D11		
14	DSS_D12		
15	DSS_D13		
16	DSS_D14		
17	DSS_D15		
18	GND		Ground
19	DSS_D16		Data Red
20	DSS_D17		
21	DSS_D18		
22	DSS_D19		
23	DSS_D20		
24	DSS_D21		
25	DSS_D22		
26	DSS_D23		

LCD Display: J9			
27	GND		Ground
28	DSS_DEN		Data Sync
29	DSS_HSYNC		
30	DSS_VSYNC		
31	GND		Ground
32	DSS_PCLK		Clock
33	GND		Ground
34	TOUCH_X+		Touch Panel
35	TOUCH_X-		
36	TOUCH_Y+		
37	TOUCH_Y-		
38	SPI0_CLK		SPI
39	SPI0_MOSI		
40	SPI0_MISO		
41	SPI0_CSn		
42	LCD_I2C_SCL		I2C
43	LCD_I2C_SDA		
44	GND		Ground
45	3.3V_LCD_VDD		Power 3.3V
46	3.3V_LCD_VDD		
47	5V_LCD_VDD		Power 5V
48	5V_LCD_VDD		
49	LCD_RESETn		Reset
50	LCD_PWM		Control
51	GND		Ground
52	GND		

- **HDMI**

The HDMI interface on BB-SPH1800 is named as J61, which is a standard 19-pin HDMI connector. The following table contains pin definitions of the interface (including the fixed pins of the connector).

chart 1-2 HDMI Display

HDMI Display: J12			
Pin	Signal Name	Device	Signal Type
1	HDMI_TX2+	TDA19988	Differential Data & Clock, GND as reference for signal
2	GND	TDA19988	
3	HDMI_TX2-	TDA19988	
4	HDMI_TX1+	TDA19988	
5	GND	TDA19988	
6	HDMI_TX1-	TDA19988	
7	HDMI_TX0+	TDA19988	
8	GND	TDA19988	
9	HDMI_TX0-	TDA19988	
10	HDMI_CLK+	TDA19988	
11	GND	TDA19988	
12	HDMI_CLK-	TDA19988	
13	NC		Other
14	NC		
15	HDMICONN_I2CSCL	TDA19988	I2C
16	HDMICONN_I2CSDA	TDA19988	
17	GND		Ground
18	5V_VDD		Power 5V
19	HDMICONN_HPLG		Status
20	GND_SHELDS		Ground

HDMI Display: J12			
21	GND_SHELDS		
22	GND_SHELDS		
23	GND_SHELDS		

1.7.3 Camera

The 30-pin FPC connector (J8) on BB-SPH1800 is used to support 12-bit input of digital cameras. The following table contains pin definitions of the FPC connector;

chart 1-3 Camera

Camera(J8)			
Pin	Signal Description	Device	Signal Type
1	GND		Ground
2	CAM_D0		Data
3	CAM_D1		
4	CAM_D2		
5	CAM_D3		
6	CAM_D4		
7	CAM_D5		
8	CAM_D6		
9	CAM_D7		
10	CAM_D8		
11	CAM_D9		
12	CAM_D10		
13	CAM_D11		
14	GND		Ground

Camera(J8)			
15	PCLK		Clock
16	GND		Ground
17	CAM_HS		SYNC
18	VDD_5V		Power 5V
19	CAM_VS		SYNC
20	3.3V_CAMERA		Power 3.3V
21	CAM_CLK		Clock
22	CAM_CLK1		
23	GND		Ground
24	CAM_FLD		Status
25	CAM_WEN		
26	CAM_STROBE		
27	CAM_SDA		I2C
28	CAM_SCL		
29	GND		Ground
30	VDDIO		Power for IO
31	GND		Power
32	GND		

1.7.4 Gigabit Ethernet

BB-SPH1800 can provide two relatively high network performance of gigabit Ethernet. A Ethernet is implemented by utilizing part of the EMAC controller integrated in Core Board and the PHY on core board. Another AR8035 is added on BB-SPH1800 to realize connections between the extended interface and the EMAC. The RJ-45 interface is named as J17 to provide connection to network devices.

- **RJ-45**

The following table contains pin definitions of RJ-45 (J17) Ethernet interface;

chart 1-4 Ethernet Interface

RJ45 Ethernet: J17			
Pin	Signal Description	Device	Signal Type
1	MIIA_TRP0	AR8035	Data
2	MIIA_TRN0		
3	MIIA_TRP1		
4	MiIA_TRN1		
5	NC		
6	NC		
7	MIIA_TRP2	AR8035	Data
8	MIIA_TRN2		
9	MIIA_TRP3		
10	MIIA_TRN3		
11	MIIA_LED_LINK/ Pull-up	LED Control	LED
12	Pull-down/ MIIA_LED_LINK		
13	MIIA_LED_ACT		
14	Pull-up		
15	GND		GND
16	GND		
17	NC		
18	NC		

1.7.5 TFCard

TF card are used to provide solid storage of boot code and system. MMC Interface

- **TF card Interface**

The following table contains pin definitions of TF Card interface

chart 1-5 TF Card interface

TF card connector: TF1			
Pin	Signal Description	Device	Signal Type
1	MMC_DAT2		Data
2	MMC_DAT3		
3	MMC_CMD		Command
4	3.3V_VDD		Power 3.3V
5	MMC_CLK		Clock
6	GND		Ground
7	MMC_DAT0		Data
8	MMC_DAT1		
9	MMC_CD		Detect
10	NC		
11	NC		Fixed
12	GND_SHIELDS		
13	GND_SHIELDS		

1.7.6 USB

To satisfy diverse applications involving USB interfaces, BB-SPH1800 provides 2 USB ports. However, there is only one USB controller in HPS, one is used to USB OTG .The following table contains pin definitions of USB.

- **USB HOST**

chart 1-6 USB interface

USB Connector: P3			
Pin	Signal Description	Device	Signal Type
1	VBUS1		USB1 HOST
2	DN1		
3	DP1		

USB Connector: P3			
4	GND		
5	GND_SHIELDS		Fixed
6	GND_SHIELDS		

- **USB OTG**

chart 1-7 USB interface

USB Connector: J13			
Pin	Signal Description	Device	Signal Type
1	VBUS1		USB0 OTG
2	DN1		
3	DP1		
4	ID		
5	GND		
6	NC		Fixed
7	GND_SHIELDS		
8	NC		
9	GND_SHIELDS		

1.7.7 RS485&CAN

J62 of BB-SPH1800 is RS485&CAN Interface，The following table contains pin definitions of RS485&CAN

chart 1-8 RS485&CAN interface

RS485&CAN:J62			
Pin	Signal Description	Device	Signal Type
1	CANL2		CAN
2	CANH2		

RS485&CAN:J62			
3	CANL1		
4	CANH1		
5	GND_ISO		Ground
6	GND_ISO		
7	GND_SHIELDS		RS485
8	RS485_B3		
9	RS485_A2		
10	RS485_B2		

1.7.8 Button

There are 2 buttons on BB-SPH1800. S2 button can reset the system. S3 button can set where the board boot from.

1.7.9 UART

J4 and CN4 are two uart connectors specially provided on BB-SPH1800. A RS232 interface J4 is defined by the customs to do the communication ,a UART interface CN4 (TTL) is used to debug with the PC,.

chart 1-9 RS232 interface

RS232 Connector: J4			
Pin	Signal Description	Device	Signal Type
1	NC		RS232
2	RXD		
3	TXD		
4	NC		
5	GND		Ground
6	NC		RS232
7	RTS		

RS232 Connector: J4			
8	CTS		
9	NC		
10	GND_SHIELDS		Fixed
11	GND_SHIELDS		

chart 1-10 UART interface

UART Connector: CN4			
Pin	Signal Description	Device	Signal Type
1	3.3V		3.3V output
2	UART0_TXD		UART
3	UART0_RXD		
4	GND		Ground

1.7.10 LED

The LEDs on BB-SPH1800 can be used to indicate board status.

The following table contains the LEDs function define.

chart 1-11 LED

LED Ref	Signal Name	LED Function
D7		Bright indicate 3.3V good
D60		Bright indicate core board power good
D68		User defined

1.7.11 RTC

There is a RTC circuitry on BB-SPH1800. When a battery is inserted in J60, the board can keep a proper clock after power supply is turned off. A CR1220 battery and a RTC chip are involved in the implementation of RTC circuitry. Please refer to schematics and datasheet for its working principle and detailed circuit.

1.7.12 Extended interface

To facilitate users' function expansion, part of resources of BB-SPH1800 has been extended by using one 40-pin connectors.

The following table contains pin definitions of extended interface.

chart 1-12 Extended interface

Extended interface: J58			
Pin	Signal Description	Device	Signal Type
1	MMC1_CLK		MMC
2	MMC1_CMD		
3	MMC1_DAT0		
4	MMC1_DAT1		
5	MMC1_DAT2		
6	MMC1_DAT3		
7	MMC1_DAT4		
8	MMC1_DAT5		
9	MMC1_DAT6		
10	GND		Ground
11	GND		
12	I2C1_SDA		I2C
13	I2C1_SCL		
14	UART4_TXD		UART
15	UART4_RXD		
16	UART2_TXD		
17	UART2_RXD		
18	GND		Ground
19	GND		
20	5V_EX		5V output

Extended interface: J58			
21	5V_EX		
22	UART2_RTS		UART
23	UART2_CTS		
24	MCASP0_ACLKR		I2S
25	MCASP0_AHCLKR		
26	MCASP0_AXR1		
27	MCASP0_FSR		
28	3.3V_EX		3.3V output
29	GND		Ground
30	GND		
31	MIIB_LED_LINK	AR8035	Gigabit Ethernet
32	MIIB_LED_ACT		
33	MIIB_TRP3		
34	MIIB_TRN3		
35	MIIB_TRP2		
36	MIIB_TRN2		
37	MIIB_TRP1		
38	MIIB_TRN1		
39	MIIB_TRP0		
40	MIIB_TRN0		

Technical Support and Warranty

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