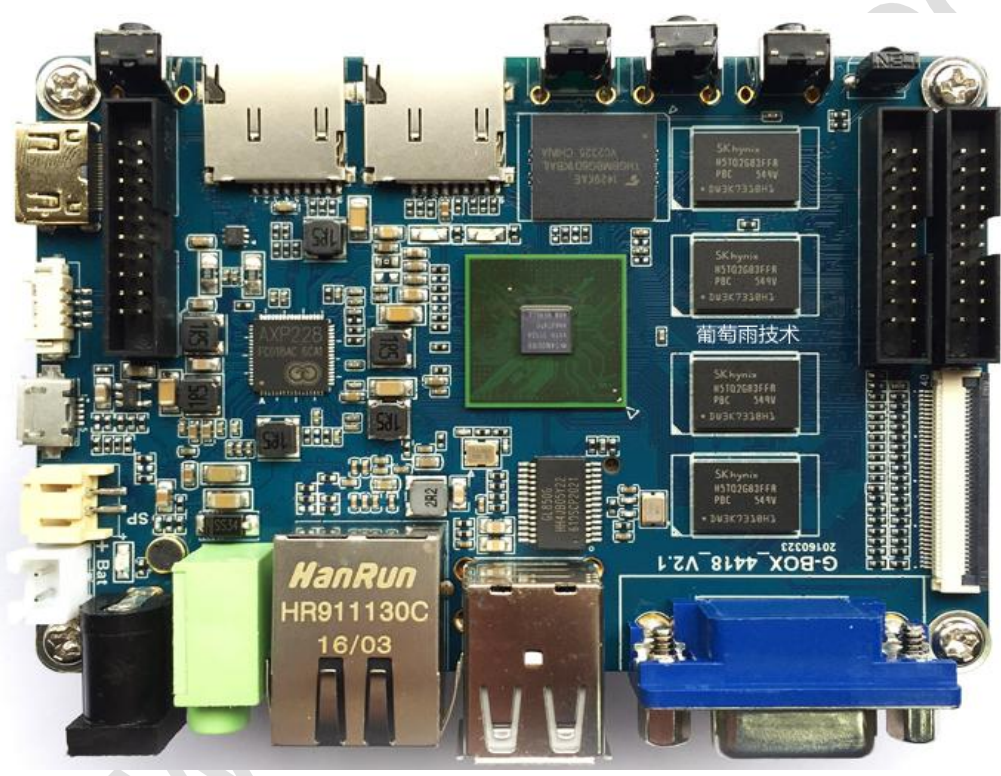


## G6818 Single Board Computer Introduction



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**Release Notes**

Version	Release Date	Author	Description
Rev.01	2016-4-19	David	Revision

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## Chapter 1 G6818 Single Board Computer Introduction

G6818 Single Board Computer is upgrade version from G4418 single board computer. It is compatible with G4418 single board computer in hardware totally, no matter peripheral, size. In performance, it has been updated from A9 quad core to A53 octa core.

G6818 Single Board Computer size is only one third of G6818 development board, but its functions go farther. It includes all peripheral of G6818 development board, and more VGA, USB WIFI/BT onboard etc.

In software, G6818 Single Board Computer and G6818 development board is compatible each other well, no more modification.

This chapter here introduce G6818 Single Board Computer hardware resource, circuitry and interfaces details.

G6818 Single Board Computer takes Samsung S5P6818 chip, and it compatible S5P4418 PIN totally, and its ARM kernel upgrade from A9 quad core to A53 octa core and all peripherals same.

Following table shows differences between them:

	S5P6818	S5P4418
Availability	2014	2014
Technological Process	28nm	28nm
CPU Frequency	1.4G+	1.4G
Package Dimensions	0.65mm PIN space, 17*17mm2 513-FCBGA Package	0.65mm PIN space, 17*17mm2 513-FCBGA Package
CPU Architecture	Cortex-A53 octa core	Cortex-A9 quad core
Cache Capacity	32KB*4 I/D cache , 1MB the second level cache	32KB*4 I/D cache , 1MB the second level cache
DDR3	Single Channel 32 bits , 800MHz	Single Channel 32 bits , 800MHz
Multimedia Decoding	H.263 , H.264 , MPEG1 ,  MPEG2 , MPEG4 , VC1 ,  VP8 ,Theora ,AVS ,RV8/9/10 , MJPEG(all formats mostly)	H.263 , H.264 , MPEG1 ,  MPEG2 , MPEG4 , VC1 ,  VP8 ,Theora ,AVS ,RV8/9/10 , MJPEG(all formats mostly)
Multimedia encoding	H.263 , H.264 , MPEG4 ,  MJPEG	H.263 , H.264 , MPEG4 ,  MJPEG
Display Port	RGB , MIPI , LVDS	RGB , MIPI , LVDS
Max Resolution	2048*1280	2048*1280
Ethernet	Integrate gigabit Ethernet control	Integrate gigabit Ethernet control

GPIO	3.3V	3.3V
ADC	8 channels 12bit 0-1.8V	8 channels 12bit 0-1.8V
USB	1 channel HSIC , 1 channel HSIC , 1 channel OTG	1 channel HSIC , 1 channel HSIC , 1 channel OTG
Chip ID	128bit unique ID	128bit unique ID

### 1.1 G6818 Single Board Computer Introduction

G6818 Single Board Computer can be used widely without peripheral extended, such as industrial control, electricity, Communications, medical, media, security, automotive, financial, consumer electronics, advertising machine, set-top boxes, hand-held devices, game consoles, display control and so on. The user can embed it into products directly, and no secondary development. More embedded engineers can take it into studying and DIY in university.

G6818 Single Board Computer, it supports 1GB RAM, 2GB DDR3 and Android/ Linux/ Ubuntu operating systems.

The size of G6818 Single Board Computer is 100.66mm \* 68.8mm

### 1.2 G6818 Single Board Computer Features:

Kernel: ARM Cortex-A53 octa core;

CPU : 1.4G+Hz\*8 ;

RAM : 1GB DDR3 , 2GB DDR3 optional ;

Flash : 4GB/8GB/16GB eMMC optional , standard 8GB eMMC ;

24 bits RGB ;

8 bits LVDS ;

VGA ;

MIPI DSI

2 channels USB HOST , it supports more usb device run in same time;

USB OTG ;

2 channels TTL UART ;



2 channels TF ;

2 channels LED ;

Reset Button ;

Software Switch Button ;

Speakers ;

MIC Input ;

Headphone Output ;

the launch configuration switch design ;

Backlight Stepless Adjustment ;

HDMI ;

Five points touch capacitive screen ;

Onboard USB of WIFI/Bluetooth two-in-one module ;

SPI , I2C , UART , and other periphery extended ;

MPEG4 , H.263 , H.264 , MJPEG Video coding ;

All format video decoding mostly. ;

2D , 3D High-performance graphics acceleration ;

RTC ;

Gigabit Ethernet RTL8211E ;

BT656/BT601 Camera ;

GPS ;

GPRS ;

USB 3G ;

USB mouse and keyboard ;

Infrared receiving head ;

### 1.3 G6818 Single Board Computer Software Supports

G6818 Single Board Computer supports Android5.1.1 OS , Linux3.4.39 + QT5.4 OS and

Ubuntu12.04. And their drives shows in following stable:

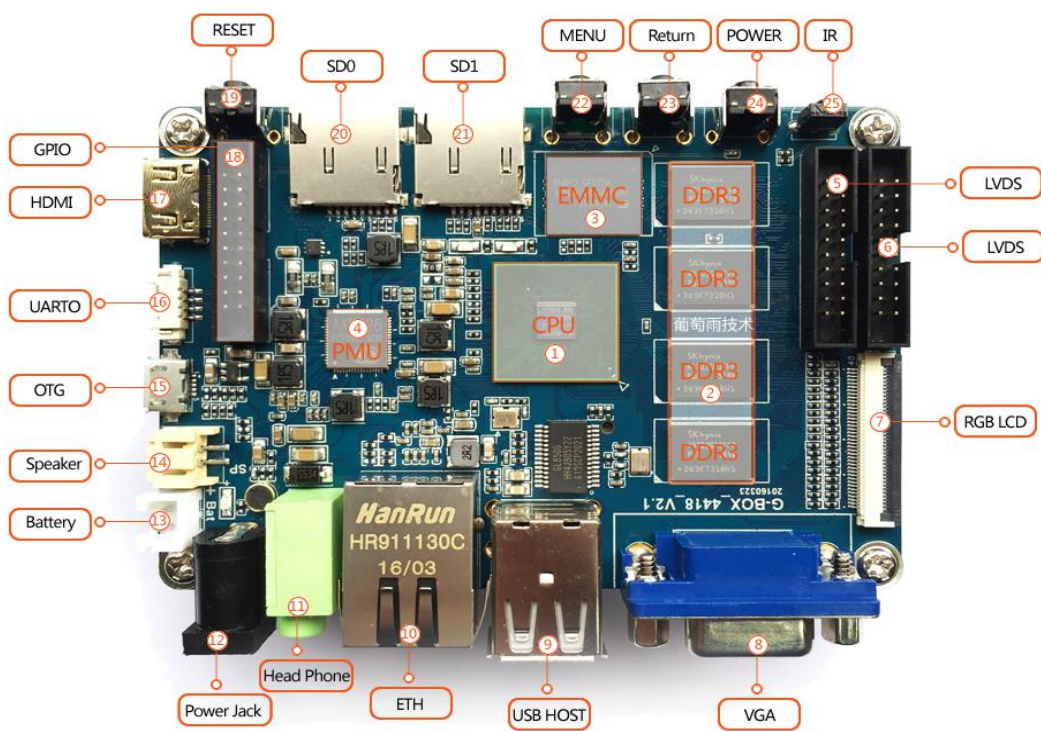
G6818 Single Board Computer Platforms List			
Systems Drive	Linux3.4.39 Android5.1.1	Linux3.4.39 QT5.4	Linux3.4.39 Ubuntu12.04
7 inch LCD(1024*600)	√	√	√
4.3 inch LCD(480*272)	√	√	√
5 inch LCD(800*480)	√	√	√
LVDS Screen 10.1 inch	√	√	√
LVDS Screen 8 inch	√	√	√
MIPI Screen 7 inch	√	√	√
MIPI Screen 5.5 inch	√	√	√
PMIC Drive (AXP228)	√	√	√
Capacitive Touch	√	√	√
Resistive Touch	√	√	√
EMMC Drive	√	√	√
SD Drive	√	√	√
Separate Buttons	√	√	√
LED	√	√	√
Buzzer Drive	√	√	√
Ir Remote Control	√	Application development required	Application development required
On/Off	√	√	√
Dormancy Awakening	√	√	√
2 channels USB HOST drive	√	√	√
1 channel USB OTG drive	√	√	√
Audio ( ALC5621 )	√	√	√
Record ( ALC5621 )	√	√	√
USB WIFI/BT4.0	√	√	√
Parallel port camera driver	√	Application development required	Application development required
Macro camera	√	Application development required	Application development required

Dual lane parallel port camera	Application development required	Application development required	Application development required
USB Camera	√	Application development required	√
Dual USB Camera	Application development required	Application development required	√
Serial Port	√	√	√
HDMI	√	√	√
3G Module ( USB 3G dongle )	√	Application development required	√
GPS Module	√	Application development required	Application development required
GBE	√	√	√
USB Keyboard	√	√	√
TVIN Module ( TVP5150 )	√	Application development required	Application development required
VGA Drive ( SDA7123 )	√	√	√

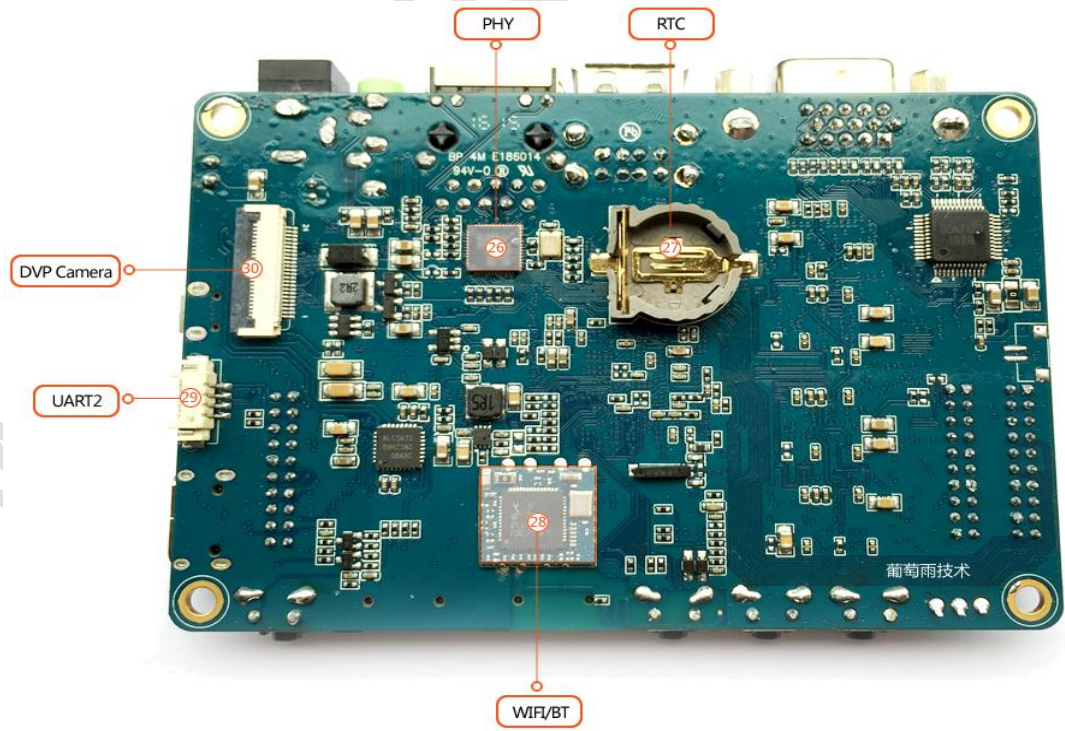
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## Chapter 2 Hardware Resource

### 2.1 Hardware Interfaces Details



G6818 Single Board Computer Front View



G6818 Single Board Computer Rear View

<b>G6818 Single Board Computer Front View Hardware Interfaces</b>		
Tab	Name	State
<b>【1】</b>	CPU	S5P6818,ARM Cortex A53,8*1.4G+Hz
<b>【2】</b>	RAM	DDR3,1GB , 2GB Optional
<b>【3】</b>	ROM	8GB , eMMC
<b>【4】</b>	PMU	PMIC , AXP228
<b>【5】</b>	LVDS Interface	LVDS Screen
<b>【6】</b>	MIPI Interface	MIPI Screen
<b>【7】</b>	RGB Interface	RGB Output Interface
<b>【8】</b>	VGA Interface	SDA7123 VGA Interface
<b>【9】</b>	USB HOST	Two channels HOST
<b>【10】</b>	GbE	RJ45
<b>【11】</b>	Headphone	Headphone Output
<b>【12】</b>	5V Input Jack	DC power Input Jack
<b>【13】</b>	Battery	Single 4.2V Li- Battery Interface
<b>【14】</b>	Speak	External Speaker Output
<b>【15】</b>	USB OTG	USB OTG
<b>【16】</b>	UART0	Serial Port0 , Debug Serial Port
<b>【17】</b>	HDMI	HDMI Output Interface
<b>【18】</b>	Extend GPIO	UART , SPI,I2C,ADC Extend
<b>【19】</b>	Hard Reset Button	Hard Reset
<b>【20】</b>	TF Card , SD0	TF Card , Channel 0



【21】	TF Card , SD1	TF Card , Channel 1
【22】	Key , User-defined	Separate Key , Defined as MENU
【23】	Key , User-defined	Separate Key , Defined as Return
【24】	Soft Switch Machine Key	On/Off , Sleep Wake Up Button
【25】	IR module	HS0038B , IR port

G6818 Single Board Computer Rear View Interfaces		
Tab	Name	State
【26】	GBE PHY	RT8211E
【27】	RTC	RTC Backup Battery
【28】	Wifi/Bluetooth	RT8723BU,Wifi/Bluetooth Two-in-one Module
【29】	UART2	Serial 2 , TTL Level
【30】	Camera	BT601 , BT656 camera

## 2.2 G6818 Single Board Computer Boot Guide

G6818 SBC supports the non-configuration mode of startup, when the development board starts, it will search for bootloader from SD0, SD2 and USB device successively till it gets started. The default SD0 leads to the external TF card, SD2 to EMMC on the SoM. USB device can be connected to PC by OTG cable, we can take the online programming through fastboot.

When there is nothing in EMMC, we can program by an external TF card. Program uboot to TF card, then plug the TF card to the SD0 channel of the development board, start by SD card. Then we can use micro USB extension cable to upgrade the complete img through fastboot. In either way, we can take an off-line upgrade by TF card(boot card), the specific steps can be referred to the document *G6818(G6818 SBC) Upgrade(Programming) Manual.pdf*

The development board with normally programmed img can get started after POWER on.

## 2.3 Extension Interface Definition

### 2.3.1 J11(UART2 Interface)

J11 PIN Definition			
PIN #	Signal	PIN #	Signal
1	GND	3	UARTTXD2
2	UARTRXD2	4	VCC3P3_SYS

### 2.3.2 J10(UART0 Interface)

J10 PIN Definition			
PIN #	Signal	PIN #	Signal
1	GND	3	UARTTXD0
2	UARTRXD0	4	VCC3P3_SYS

### 2.3.3 J15(GPIO Interface)

J15 PIN Definition			
PIN #	Signal	PIN #	Signal
1	GND	11	UARTRXD1
2	VBAT_SYS	12	MCU_SPIFRM0
3	PWM2	13	UARTTXD3
4	MCU_SCL_2	14	MCU_SPITXD0
5	GPIOE13	15	UARTRXD3
6	MCU_SDA_2	16	MCU_SPIRXD0
7	GPIOC11	17	MCU_SEN0_INT
8	MCU_SPI_WP	18	ADC0
9	UARTTXD1	19	GPIOB9
10	MCU_SPICLK0	20	ADC1

### 2.3.4 J14(LVDS Extension Interface)

J14 PIN Definition			
PIN #	Signal	PIN #	Signal
1	VCC3P3_SYS	11	MCU_LVDS_Y2M
2	LCD_5V	12	MCU_LVDS_Y2P
3	MCU_SCL_1	13	GND
4	BL_PWM	14	GND
5	MCU_SDA_1	15	MCU_LVDS_CLKM
6	MCU_TOUCH_INT	16	MCU_LVDS_CLKP
7	MCU_LVDS_Y0M	17	MCU_LVDS_Y3M
8	MCU_LVDS_Y0P	18	MCU_LVDS_Y3P
9	MCU_LVDS_Y1M	19	MCU_NRESETOUT
10	MCU_LVDS_Y1P	20	GND

**2.3.5 J13(MIPI Extension Interface)**

J13 PIN Definitions			
PIN #	Signal	PIN #	Signal
1	VCC3P3_SYS	11	MIPIDSI_DN2
2	LCD_5V	12	MIPIDSI_DP2
3	MCU_SCL_1	13	GND
4	BL_PWM	14	GND
5	MCU_SDA_1	15	MIPIDSI_DNCLK
6	MCU_TOUCH_INT	16	MIPIDSI_DPCLK
7	MIPIDSI_DN0	17	MCU_NRESETOUT
8	MIPIDSI_DP0	18	GND
9	MIPIDSI_DN1	19	MIPIDSI_DN3
10	MIPIDSI_DP1	20	MIPIDSI_DP3

**2.3.6 LCD1(LCD&VGA Interface)**

LCD1 PIN Definitions			
PIN #	Signal	PIN #	Signal
1	MCU_BACKLIGHT_PWM	21	L_B0
2	LCD_5V	22	L_B1
3	GND	23	L_B2
4	VCC3P3_SYS	24	L_B3
5	L_R0	25	L_B4
6	L_R1	26	L_B5
7	L_R2	27	L_B6
8	L_R3	28	L_B7
9	L_R4	29	GND
10	L_R5	30	L_DCLK
11	L_R6	31	LCD_EN
12	L_R7	32	LCD_HSYNC
13	L_G0	33	LCD_VSYNC
14	L_G1	34	DE
15	L_G2	35	NC
16	L_G3	36	GND
17	L_G4	37	MCU_SCL_1
18	L_G5	38	MCU_SDA_1
19	L_G6	39	MCU_NRESETOUT
20	L_G7	40	MCU_TOUCH_INT

**2.3.7 U451(Camera Interface)**

U451 PIN Definitions			
PIN #	Signal	PIN #	Signal
1	CAM_PN	13	MCU_CAM1_MCLK
2	GND	14	CAM_D6



3	MCU_SDA_0	15	GND
4	VCC2P8_CAM	16	CAM_D5
5	MCU_SCL_0	17	CAM_CLK
6	CAM_RST	18	CAM_D4
7	CAM_V	19	CAM_D0
8	CAM_PD	20	CAM_D3
9	CAM_H	21	CAM_D1
10	VPP1P8_CAM	22	CAM_D2
11	VPP2P8_CAM	23	NC
12	CAM_D7	24	CAM_PN

## 2.4 Hardware Interfaces

### 2.4.1 Power On/Off and Sockets



G6818 Single Board Computer takes 5V/2A DC power supply. In above picture shows socket for 5V DC power socket.

### 2.4.2 Debug Serials Port



G6818 Single Board Computer pin out TTL level of serial port, no RS232. There is one 4PIN, 1.25 spacing patch connection seat which matching UART0, and same connection UART2 in rear of the board. When debug serial port, it ask for matching serial adapter connect with UART0 through 4PIN connecting line. Surely the user could modify the program to adjust debug serial port.

### 2.4.3 HDMI Interface



G6818 Single Board Computer takes mini HDMI interface, matching with mini HDMI extension cord , which could make A/V signal HDMI 1.4 shows perfect. Such as TV, display and so on.

#### 2.4.4 Camera Interface



Camera Interface in rear of G6818 Single Board Computer.

This interface is universal 24 PIN camera interface, and it supports OV, Himix camera well and no pin board needed. Just adjust output voltage for different camera specifications. Meanwhile, this interface is compatible with TVIN module, such as TVP5150.

#### 2.4.5 Ethernet Interface



G6818 supports gigabit Ethernet interface and RTL8211E onboard. The user could connect with Internet by LAN.

#### 2.4.6 Headphone Interface



Plug the headphone in and realize the audio output. Certainly it can be directly connected to the power amplifier input, such as audio input of the home theater to show the audio signal.

#### 2.4.7 Speaker Interface



G6818 Single Board Computer supports speaker output directly, just connect speaker with interface as above picture shows, it could work then.

#### 2.4.8 Recording Interface



G6818 Single Board Computer supports recording input. The microphone is soldered onboard, so an external microphone input will not be needed.

#### 2.4.9 TF Card Slot



G6818 Single Board Computer exposes two external TF card slots, matches the channel 0 and 1 of SoC, we can upgrade or store some media files by the channels.

Notice : Left TF card slot corresponding with channel 0, and right one channel 1.

#### 2.4.10 Independent Keys



G6818 Single Board Computer is of two independent keys and their details goes as following table shows.

Switch	Function	Switch	Function
SW1	MEMU ( 1 <sup>st</sup> key )	SW2	Return (2 <sup>nd</sup> key)

The above two independent keys function can be user defined.

The 3<sup>rd</sup> (on the right) is POWER key, not a programmable independent key.

#### 2.4.11 Debug LED Light



G6818 Single Board Computer is of two debugging LED light onboard, which could be controlled by IO port program.

#### 2.4.12 Power Indicator



There is a power indicator under the power socket. When the power is plugged, system gets started and the indicator turns on.

#### 2.4.13 USB OTG Interface



The interface is used for programming, sync, etc, also can be functioned as HOST by a OTG cable.

#### 2.4.14 USB HOST Interface



S5P6818 SBC comes with USB HOST interface. It expands to 4 channel of USB HOST2.0 interfaces via it, one of them connects to the onboard USB WIFI Bluetooth 2-in-1 module, two channels are exported and reserved via double-layer USB interface, the last one is left hanging.

#### 2.4.15 Power On/Off Key



When plugged the external power adapter, system get started automatically. After entering Android system, press POWER button to sleep, awake by pressing again. Then press and hold the POWER button and it will show the power off interface, user can shut down according to the display.

The left key in the picture above is the POWER.

#### 2.4.16 Reset Key



When system is on, press the RESET button to reboot the G6818 SBC, it's a hard reset. The RESET key is on the right side of the TF card slot.

#### 2.4.17 LCD Interface



G6818 SBC reserves one 40PIN LCD interface in default, it connects relevant RGB signal to the LCD controller via flexible flat cable, in this way the LCD is controlled. At the same time, the first pin of this 40PIN interface is PWM pin, it's used for controlling the LCD back light and get multi-level light adjust. VGA and LVDS interface are functioned by the interface.

#### 2.4.18 Backup Battery



The backup battery is used for keep the RTC working when G6818 SBC power is off, and system time won't lose. When G6818 single board computer is connected to the lithium ion battery, the RTC will get powered by the lithium ion battery, as long as the lithium ion battery is working, RTC won't lose, so the G6818 does not offer a RTC backup battery in default.

#### 2.4.19 Integrated Infrared Receiver Module



Here HS0038B integrative infrared receiver module is used, featured high sensitivity, convenient to use. Through this module users can realize the wireless remote control.

#### 2.4.20 LVDS Interface



S5P6818 chip has LVDS controller onboard, when connected to a LVDS display, it's not needed to add LVDS converter IC. So Gbox6818 SBC has LVDS interface onboard, LCD with LVDS interface can be driven directly.

#### 2.4.21 MIPI Interface



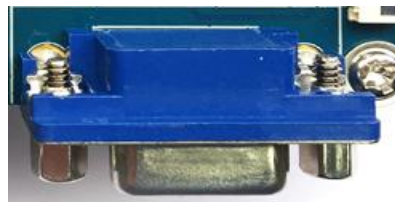
S5P6818 chip has MIPI controller onboard, G6818 SBC has MIPI interface onboard already, LCD with MIPI interface can be driven directly.

#### 2.4.22 Battery Interface



G6818 SoM has onboard PMU AXP228 from x-powers, charging and discharging function is supported, and battery interface is reserved for the single board computer power supply. At the same time when connected to a external power adapter, the battery will get charged. The battery socket is located beside the power socket.

#### 2.4.23 VGA Interface



G6818 SBC has onboard VGA interface, which supports 1024x768, 1280x1024, 1920x1080.



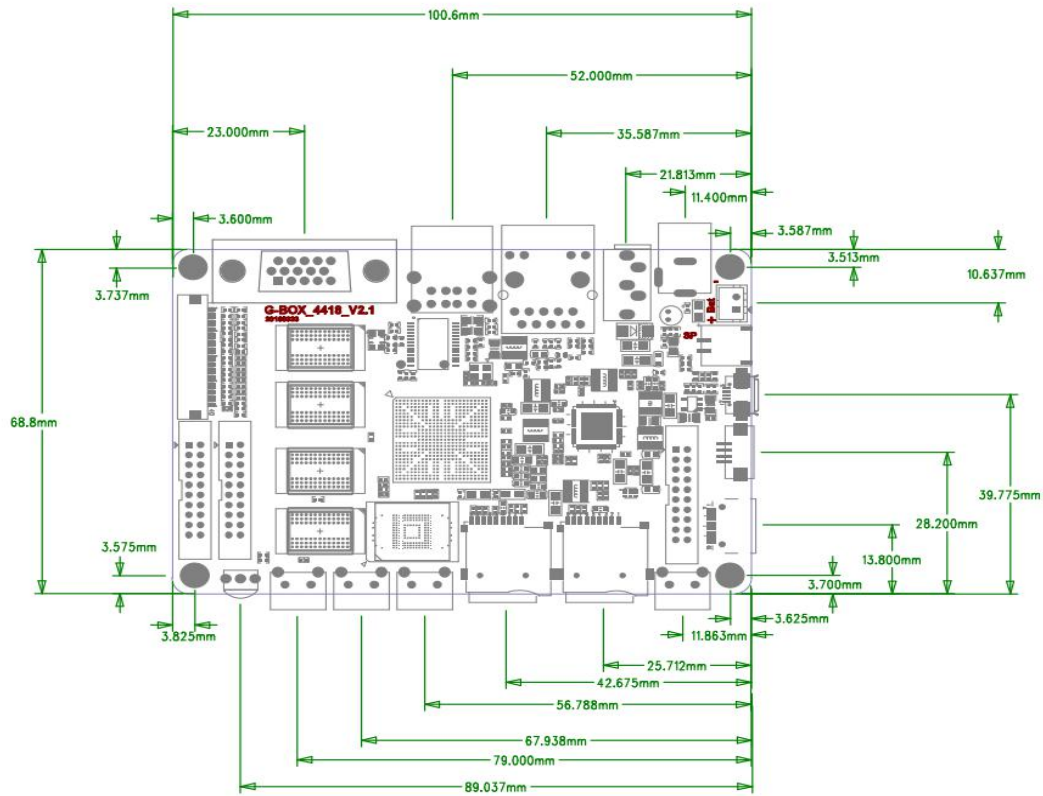
### 2.4.24 WIFI/BT4.0 Module



G6818 SBC has onboard WiFi Bluetooth two-in-one module with default PCB antenna, fair average performance in ordinary situation.

## 2.5 Hardware Dimensions

G6818 SBC size as following:



## Chapter 3 Packing list

### 3.1 Standard packing list

Please refer to our website or contact Graperaïin for details.

### 3.2 Optional packing list

Please refer to our website or contact Graperaïin for details.

### 3.3 Cloud files list

All relevant development data are stored on specified cloud disc, clients can contact Graperaïin for download links.

The files include complete source codes, building environment, user manuals, detailed step-by-step tutorial, circuit schematics for SoM and development board, programming tools, etc.

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## Chapter 4 Product Portfolio

### 4.1 System on Modules

G4418 SoM (SoC is Samsung S5P4418)  
G6818 SoM (SoC is Samsung S5P6818)  
G210 SoM (SoC is Samsung S5PV210)  
M9 SoM (SoC is Qualcomm MSM8916)

### 4.2 Development Boards

G4418 development board (SoC is Samsung S5P4418)  
G6818 development board (SoC is Samsung S5P6818)  
G210 development board (SoC is Samsung S5PV210)  
M9 development board (SoC is Qualcomm MSM8916)

### 4.3 Single Board Computers

G4418 SBC (SoC is Samsung S5P4418)  
G6818 SBC (SoC is Samsung S5P6818)  
G3188 SBC (SoC is Rockchip RK3188)

Instructions: For more detailed specifications and other products, please pay attention to [www.graperain.com](http://www.graperain.com) or contact us directly.