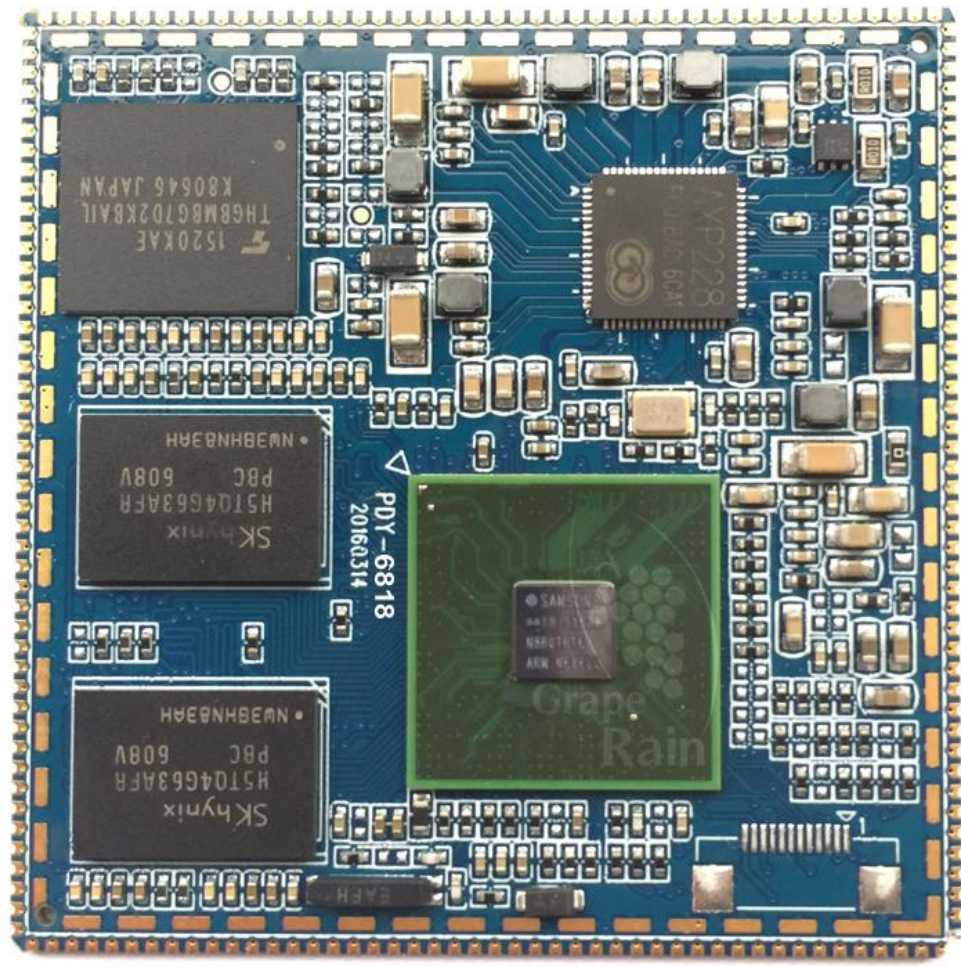


## G6818 System on Module Brief Introduction



Shenzhen Graperain Technology Co., Ltd.

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**Technical Support**

Any questions about the manuals, you can call our landline or email us.

Website: <http://www.graperrain.com>

Landline: +86 755 23025312

E-mail: [supports@graperrain.com](mailto:supports@graperrain.com)

**Sales and service network**

Shenzhen Graperrain Technology Co., Ltd.

Website: <http://www.graperrain.com>

Landline: +86 755 23025312

E-mail: [sales@graperrain.com](mailto:sales@graperrain.com)

Address: Building D, Huafeng Tech. & Innov. Park Baoan Wisdom Valley, Xixiang, Baoan  
Dist. Shenzhen, Guangdong. Post code 518101.

[www.graperrain.com](http://www.graperrain.com)

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## Chapter 1 G6818 System on Module Brief Introduction

### 1.1 Product Brief Introduction

G6818 System on Module is a new product platform based on Samsung S5P6818 (A53 octa core) chip that designed by Shenzhen Graperain Technology Co., Ltd.

The G6818 takes stamp hole System on Module and carrier board. It is so strong expandability, supports at most 184PIN, running 1.4G+Hz. PCB designed 8 layers in immersion gold, and is of best electrical specification and anti-interference characteristic, and work stable. It onboard PMU, and with coulombmeter charging, integrating the gigabit Ethernet firstly. The System on Module could be used in MID, POS, PDA, PND, smart home, phone, learning machine, game machine and other kinds of industrial control filed.

S5P6818 takes 28nm craftsmanship, built-in high performance A53 ARM octa core architecture. It supports mostly format video decoding, and onboard LVDS and RGB double channels display control interface. Its resolution ratio is 2048\*1280@60Hz. Meanwhile it integrates the Gigabit Ethernet controller inside. About electrical level, G6818 is 3.3V GPIO, G6818 is convenient to develop products.

The size, pin definitions, corresponding carrier board of G6818 and G4418 SOM are the same. It's easy to develop and upgrade if customers used G4418 before.

G6818 SOM features are as following:

- The best size: Ensure its bulk and size for GPIO interface, only 52mm\*52mm;
- Taking AXP228PMU of X-power to ensure its stable and low cost;
- Supports so many Emmc, and default Toshiba 8GB Emmc ( 19nmMLC technology );
- Perform single channel DDR3, default 1GB, and 2GB optional;
- Supports power sleep wake up;
- Supports Android 5.1, Linux+qt, Ubuntu operating system;
- Onboard the Gigabit Ethernet;
- Stable, and it could stay 7days working.

### 1.2 Parameters

Parameters	
Appearance	Stamp hole
System on Module dimensions	52mm*52mm*3mm
Pin pitch	1.1mm
Pin pad dimensions	1.3mm*0.7mm
Pin quantity	184 PIN
Layer	8 layer

System Configuration	
CPU	S5P6818
Frequency	64 bit octa core 1.4GHz
RAM	1G(Default)/2GB(Optional)

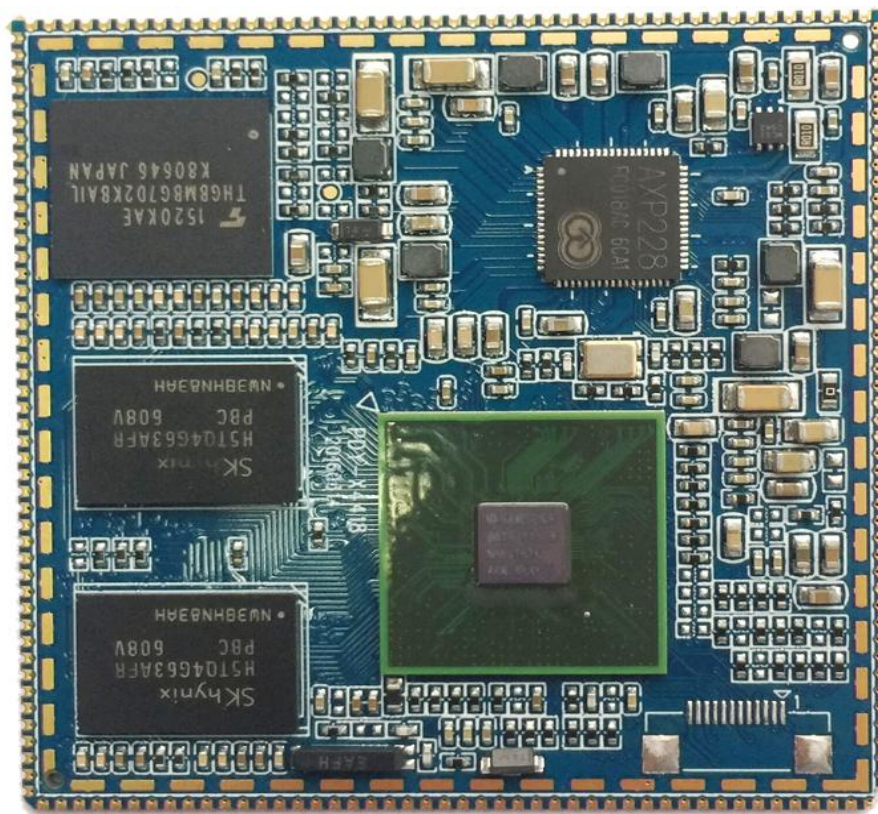
Flash	4GB/8GB(Default)/16GB emmc
Power IC	AXP228, DVFS, coulombmeter
Ethernet	RTL8211E, the gigabit Ethernet PHY

Interface parameters	
LCD	TTL, LVDS, MIPI
Touch	Capacitive screen, USB or serial port expansion resistive screen
Audio	AC97/IIS, supports record and play
SD card	2 Channel SDIO output channel
Nand	Obsolete technology, did not lead to
Emmc	Onboard emmc, no extra pin leaded
Ethernet	The Gigabit Ethernet PHY
USB host	1 Channel HOST2.0, 1 Channel HSIC
USB OTG	1 Channel OTG2.0
UART	3 Channel serial ports, Flow control
PWM	4 Channel PWM output
IIC	2 Channel IIC output
SPI	1 Channel SPI output
ADC	2 Channel ADC output
Camera	1 Channel BT656/BT601, 1 Channel MIPI input
HDMI	HD audio and video output interface, audio and video synchronization output
VGA	LCD output
Boot config.	No, the System on Module boot automatically

Electrical Features	
Input voltage	3.7V~5.5V (suggest 5V input)
Output voltage	3.3V/4.2V (power supply for carrier board and charging battery)
Storage temperature	-40~80 °C
Working temperature	-30~70 °C



### 1.3 System on Module Real View



System on Module front view



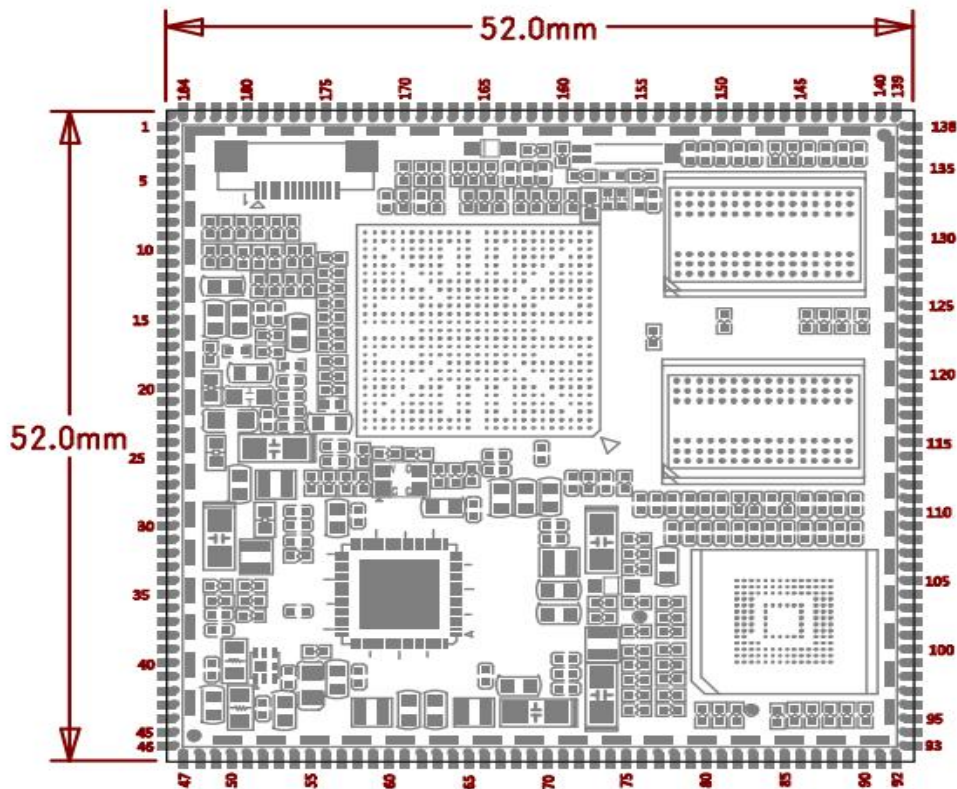
System on Module back view





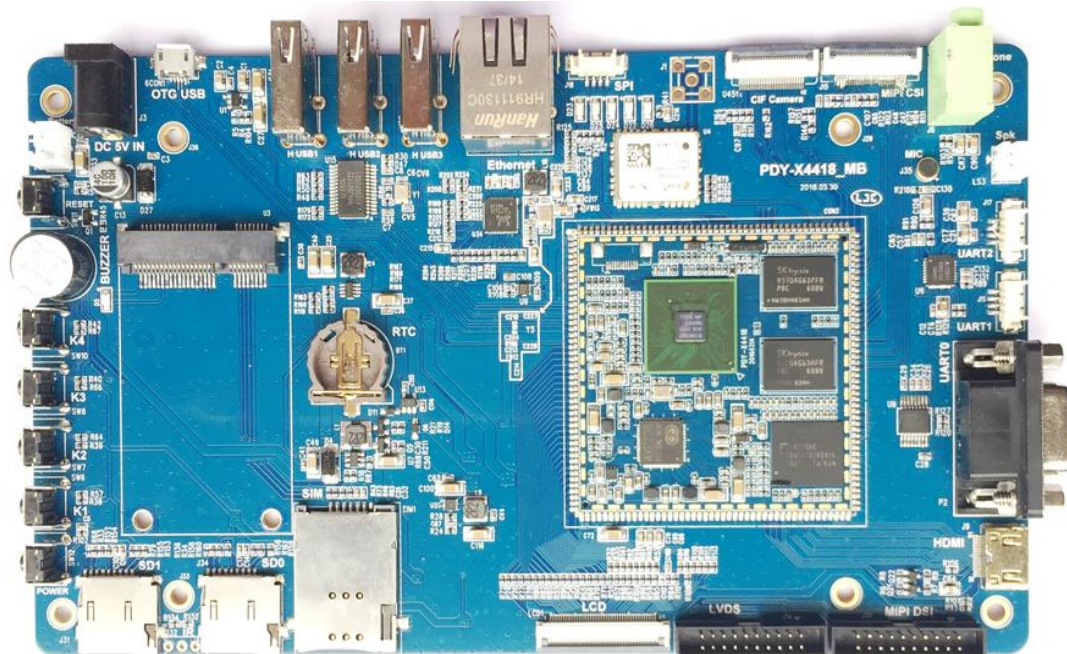
### 1.4 System on Module structure

System on Module structure and dimensions:

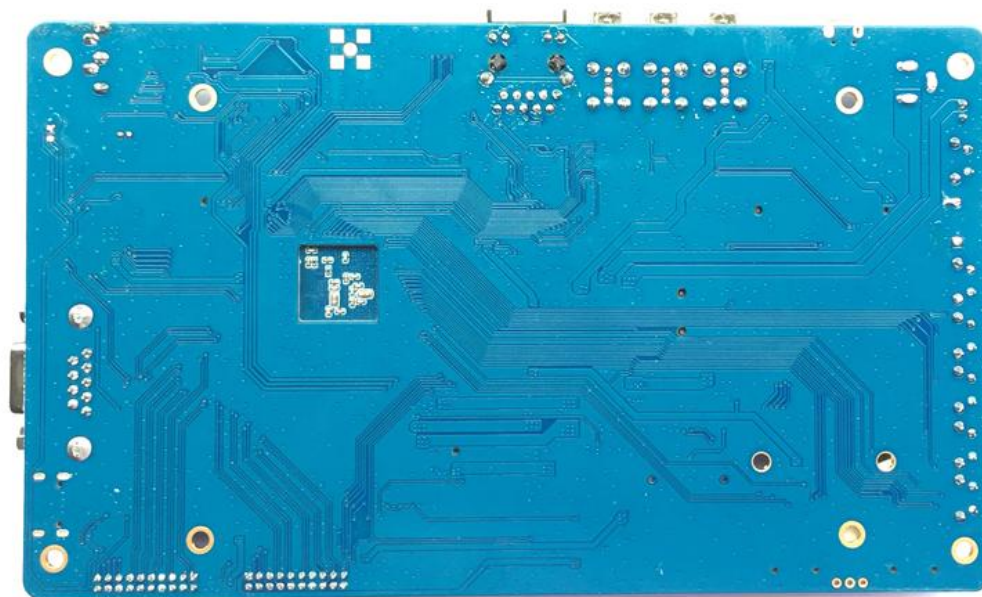


### 1.5 Carrier Board Real View

Please see G6818 development board files for detailed features.



Front view(G6818 and G4418 takes the same carrier board)





## Chapter 2 PIN Definitions

### 2.1 PIN Definitions 1

PIN Definitions			
Pin#	Signal	Pin#	Signal
1	VCC3P3 SYS	24	LCD R5
2	MCU BACKLIGHT PWM	25	LCD R6
3	MCU TOUCH INT	26	LCD R7
4	MCU NRESETOUT	27	LCD G0
5	MCU_VG_EN	28	LCD_G1
6	MCU_SDA_2	29	LCD_G2
7	MCU_SCL_2	30	LCD_G3
8	MCU_SDA_1	31	LCD_G4
9	MCU_SCL_1	32	LCD_G5
10	USBHSIC DATA	33	LCD_G6
11	USBHSIC STROBE	34	LCD_G7
12	MCU_USB_HOST_D-	35	LCD_B0
13	MCU_USB_HOST_D+	36	LCD_B1
14	MCU_OTG_PWRON	37	LCD_B2
15	MCU_USB-	38	LCD_B3
16	MCU_USB+	39	LCD_B4
17	DC5V_OTG	40	LCD_B5
18	MCU_USB_ID	41	LCD_B6
19	LCD_R0	42	LCD_B7
20	LCD_R1	43	LCD_DE
21	LCD_R2	44	LCD_HSYNC
22	LCD_R3	45	LCD_VSYNC
23	LCD_R4	46	LCD_CLK

### 2.2 PIN Definitions 2

PIN Definitions			
Pin#	Signal	Pin#	Signal
47	VCC1P0 CORE DC	70	GMAC MDIO
48	VCC1P0 CORE DC	71	PHY INT
49	VBAT	72	GMAC TXD3
50	VBAT	73	GMAC TXD2
51	GND	74	GMAC TXD1
52	GND	75	GMAC TXD0
53	VBAT SYS	76	GMAC TXEN

54	VBAT SYS	77	GMAC TXER
55	DCIN	78	MCU SCL 0
56	DCIN	79	MCU SDA 0
57	MCU PWREN SYS	80	MCU HDMI CEC
58	DLDO3	81	MCU HDMI HPD
59	DLDO2	82	MCU HDMI TXCN
60	ELDO3	83	MCU HDMI TXCP
61	GMAC RXCLK	84	MCU HDMI TX0N
62	GMAC TXCLK	85	MCU HDMI TX0P
63	GMAC RXD0	86	MCU HDMI TX1N
64	GMAC RXD1	87	MCU HDMI TX1P
65	GMAC RXD2	88	MCU HDMI TX2N
66	GMAC RXD3	89	MCU HDMI TX2P
67	GMAC RXDV	90	GND
68	GMAC MDC	91	MCU LVDS CLKM
69	PHY RST	92	MCU LVDS CLKP

### 2.3 PIN Definitions 3

PIN Definitions			
Pin#	Signal	Pin#	Signal
93	MCU_LVDS_Y3M	116	MIPIDSI_DN1
94	MCU_LVDS_Y3P	117	MIPIDSI_DP1
95	MCU_LVDS_Y2M	118	MIPIDSI_DN0
96	MCU_LVDS_Y2P	119	MIPIDSI_DP0
97	MCU_LVDS_Y1M	120	MIPIDSI_DNCLK
98	MCU_LVDS_Y1P	121	MIPIDSI_DPCLK
99	MCU_LVDS_Y0M	122	MCU_I2S_MCLK
100	MCU_LVDS_Y0P	123	MCU_I2S_BCK
101	GND	124	MCU_I2S_SDIN
102	MIPIDSI_DP3	125	MCU_I2S_SDOUT
103	MIPIDSI_DN3	126	MCU_I2S_LRCK
104	MIPIDSI_DP2	127	MCU_HP_DET
105	MIPIDSI_DN2	128	CAM_H
106	MIPIDSI_DP1	129	CAM_V
107	MIPIDSI_DN1	130	CAM_CLK
108	MIPIDSI_DP0	131	CAM_D0
109	MIPIDSI_DN0	132	CAM_D1
110	MIPIDSI_DPCLK	133	CAM_D2
111	MIPIDSI_DNCLK	134	CAM_D3
112	MIPIDSI_DN3	135	CAM_D4
113	MIPIDSI_DP3	136	CAM_D5
114	MIPIDSI_DN2	137	CAM_D6

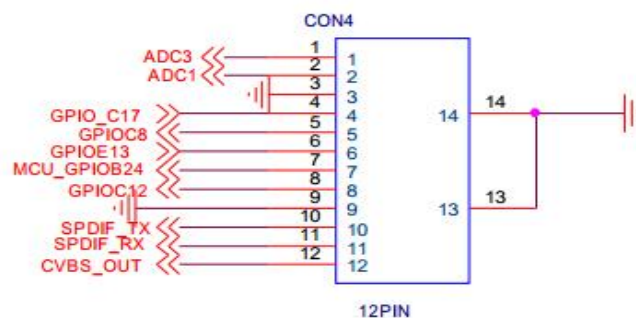
115	MIPIDSI DP2	138	CAM D7
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## 2.4 PIN Definitions 4

PIN Definitions			
Pin#	Signal	Pin#	Signal
139	CAM_PD	162	GPIOC7
140	CAM_RST	163	GPIOB8
141	CAM_PN	164	GPIOB9
142	MCU_CAM1_MCLK	165	GPIOC11
143	UARTRXD3	166	GPIOA28
144	UARTTXD3	167	PWM2
145	UARTRXD2	168	IR
146	UARTTXD2	169	VCC1P8_RTC
147	UARTRXD1	170	MCU_SD1_CD
148	UARTTXD1	171	MCU_SD1_CLK
149	UARTRXD0	172	MCU_SD1_CMD
150	UARTTXD0	173	MCU_SD1_D0
151	MCU_SPITXD0	174	MCU_SD1_D1
152	MCU_SPIFRM0	175	MCU_SD1_D2
153	MCU_SPICLK0	176	MCU_SD1_D3
154	MCU_SPIRXD0	177	MCU_SD0_CD
155	MCU_SPI_WP	178	MCU_SD0_D3
156	MCU_KEY_VOLDN	179	MCU_SD0_D2
157	MCU_KEY_VOLUP	180	MCU_SD0_D1
158	MCU_SEN0_INT	181	MCU_SD0_D0
159	MCU_NRSETIN	182	MCU_SD0_CMD
160	MCU_PWRKEY	183	MCU_SD0_CLK
161	ADC0	184	GND

## 2.5 PIN Definitions 5

Extended IO, the following part of G6818 System on Module: 9 Available IO. (There is no CVBS\_OUT on G6818, leads on G6818 System on Module )





## Chapter 3 Hardware Design

### 3.1 Power Design

G6818 System on Module PMU uses AXP228 launched by x-powers.

G6818 System on Module provides two ways of power input, one is through 5V/2A power input to power up to #55PIN and #56PIN; the other is 3.5 to 4.2 lithium battery power up to #49 PIN and #50 PIN. Both two ways could power up in same time, there is onboard battery charge chip which play as controller of the power in/off. If taking power adapter power up, the electricity have to insure 1A as chip working peak. More, #53 PIN and #54 PIN are communal electrical level output interface for power adapter and battery, and its electrical level about 3.5V to 5V, and changes with peripherals power electrical level, and it could used to power up to its carrier board. #1 PIN is output interface for 3.3V power which could used to power up to its carrier board too, but when the System on Module is in dormancy, 3.3V will power off, and its wake up voltage will return to normal. #169 PIN is power input interface, and its could connect with the backup battery, and to insure CPU clock not lose.

Kinds of voltages and corresponding PIN distribution as following:

#49 and 50PIN: Battery input interface, connect with 4.2V lithium battery, and it could be suspend when no battery.

#55 and 56 PIN: Power adapter input interface, 4.5 V to 5.5V input.

#53 PIN and 54 PIN: Battery and power adapter communal electrical level output interface, and its voltages based on battery and power adapter, which could be used to power up to its base board.

#169 PIN: The backup battery input, and if need RTC, the PIN will external connect with backup battery, and its voltages is 1.8V; Default the System on Module power up to the PIN, but no keeping function when power off/ If no RTC needs, please suspend the PIN.

#1 PIN: 3.3V output interface, which could be used power up to carrier board. When System on Module dormancy, the electrical level will off, and recover when wake up.

### 3.2 USB Design

G6818 supports one HOST, one HSIC and one OTG. OTG could be used as HOST and DEVICE, it is a standard OTG. HOST could connect with USB peripheral, HSIC could bridging chip, such as USB3503, USB4640 and then transform it as standard HOST interface.

#12 and 13 PIN used through PCB, that USB\_HOST\_D, USB\_HOST\_D+ PIN is a differential pairs. #15 and 16 PIN too, and they are equolong differential pairs as its impedance matching is 90, if not, its USB transmission will not stable.

### 3.3 HDMI Design

S5P6818 chip is with HDMI controller itself, and supports HDMI1.4. There is four differential pairs from #82 to #89 PIN total eight Pins, 4 pairs of differential lines, as its impedance matching is 100Ω , if not, HDMI pictures will lost color, and off and on etc.

### 3.4 LVDS Design

S5P6818 chip is of LCD controller for GRB and LVDS interface. LVDS is a differential signal line, which drive high resolution LCD panel. It includes five sets transmission lines, and four sets data line in, its match #93 to #100 PIN; the other set is RTC line, match #91 and #92 PIN. LVDS interface could provide high transmissibility, meanwhile low power consumption. Its transmission rate could reach hundreds of Mbps to 2Gbps. And they are equolong differential lines as its impedance matching is  $100\Omega$ .

### 3.5 MIPI Design

S5P6818 supports DSI and CSI, DSI match from #102 to #111PIN, which used to connect with its MIPI display screen. CSI match from #112 to #121 PIN, which used to connect with MIPI interface Camera. The transmission rate of MIPI is higher than LVDS interface, and they are equolong differential lines as its impedance matching is  $100\Omega$ .

## Chapter 4 Product Portfolio

### 4.1 System on Modules

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

### 4.2 Development Boards

G6818 development board (SoC is Samsung S5P6818)  
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

G6818 SBC (SoC is Samsung S5P6818)  
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.