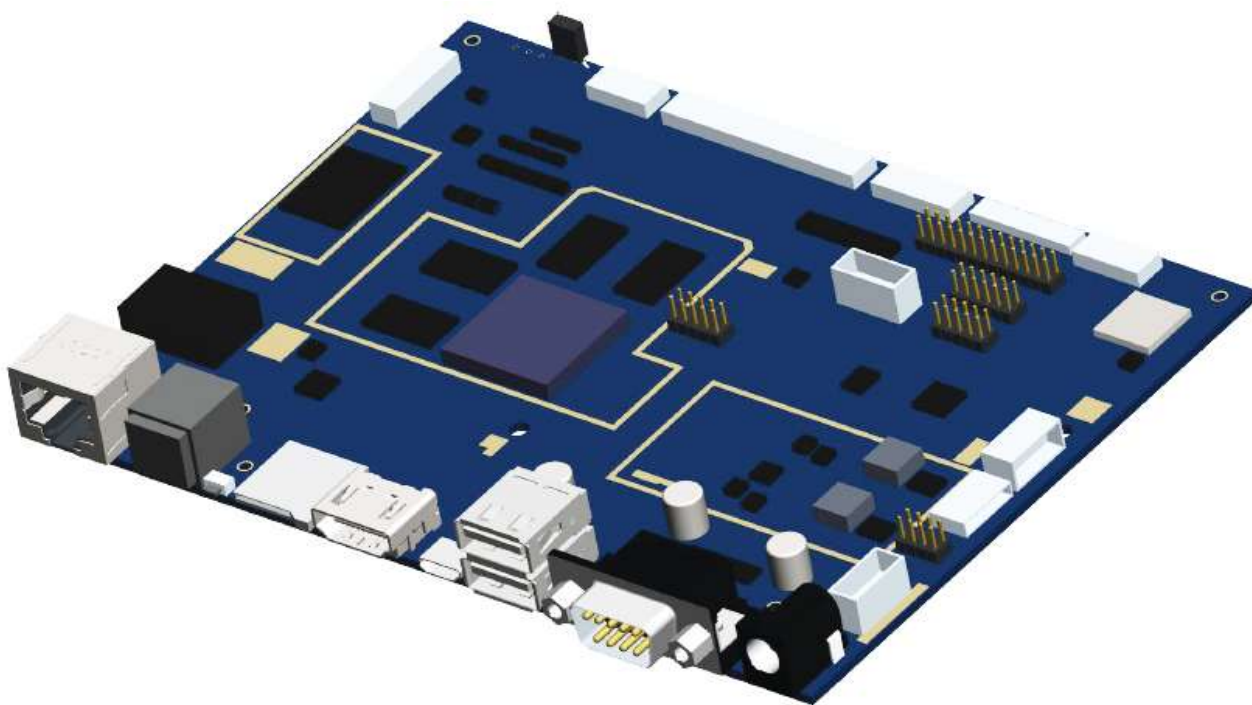


Specification of Cortex Board

(LVDS, HDMI, eDP, MIPI supportable)

Model Name : **Orion RK3288**
Part No. : **ORN-3288- xxx....xxx**
(xxx...xxx : mating LCD part number)



June 2016

Revision History

PCB Version	Rev. date	Revision Details
0.0	Nov. 2014	Initial Version issue
0.0	Dec. 2014	CON3 Pin Map Update
1.0	May. 2015	Update about the supportability of 4k-2k through the HDMI output
1.0	July. 2015	Addition of some Connectors' name & Role Assignment
2.0	Aug. 2015	<ul style="list-style-type: none">- Change the mounting holes : from 1.9 Ø x 5 numbers to 3.4 Ø x 4 numbers- Removal of Optical Audio Port on the PCB Refer to the Appendix from page 15 to page 18
2.0	June. 2016	Addition of all Connectors' name & Role Assignment
2.0	Jan. 2017	Update Spec detail.

Contents

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The information presented in this document may form a part of quotation or contract under the agreement of both parties. Otherwise, this datasheet is subject to change without notice.

1. Spec Summary

- RockChip RK3288 Quadcore
- 2GByte DDR3 Memory (Optional upto 4GByte)
- 16GByte eMMC Memory
- Dual-channels TFT LCD interface with 4-layers, 3840x2160 maximum display size.
- 1CH/2CH LVDS Interface for LCD – 6bits, 8 bits, 10bits
- 1lane/2lane/4lane eDP interface for LCD – 1.62Gbps/2.7Gbps
- HDMI v2.0 Support (4K2K support)
- MIPI DSI Interface
- 3-Port USB – external 2port / internal 1port
- IEEE802.3 10/100/1000Mbps with Twisted-Pair
- IEEE802.11b/g/n WIFI with Bluetooth 4.0(Optional IEEE802.11a/b/g/n/ac)
- MicroSD/SDHC 1 Slot(Max. 32GByte)
- RS-232C : external 1Port
- UART : internal 1port
- External Speaker : 2W + 2W (8Ω), 2.9W + 2.9W(4Ω)
- Headset interface port(stereo headphone with MIC)
- 3G/4G modem interface with daughter board(optional)
- MicroUSB OTG 1port
- Camera Interface : 2port – MIPI CSI, 12bits CCIR Camera I/F(CIF)
- Keypad Interface : ESC, Volume+/-, PowerOn(Optional board)
- IR Remote control interface
- Form factor: 150 x 110 x 20 mm
- I2C Interface for Touch(Optional)
- Operating temperature: 0 to 50 °C
- Power: 12V DC Power adaptor, SMPS (Optional select)

2. General Description

RK3288 is a low power, high performance processor for mobile phones, personal mobile internet device and other digital multimedia applications, and integrates quad-core Cortex-A17 with separately NEON and FPU coprocessor.

Many embedded powerful hardware engines provide optimized performance for high-end application. RK3288 supports almost full-format; include H.265 decoder by 2160p@60fps, H.264 decoder by 2160p@24fps, also support H.264/MVC/VP8 encoder by 1080p@30fps, high-quality JPEG encoder/decoder, and special image preprocessor and postprocessor.

Embedded 3D GPU makes RK3288 completely compatible with OpenGL ES1.1/2.0/3.0, OpenCL 1.1 and DirectX 11. Special 2D hardware engine with MMU will maximize display performance and provide very smoothly operation.

RK3288 has high-performance dual channel external memory interface (DDR3/DDR3L /LPDDR2/LPDDR3) capable of sustaining demanding memory bandwidth, also provides a complete set of peripheral interface to support very flexible applications.

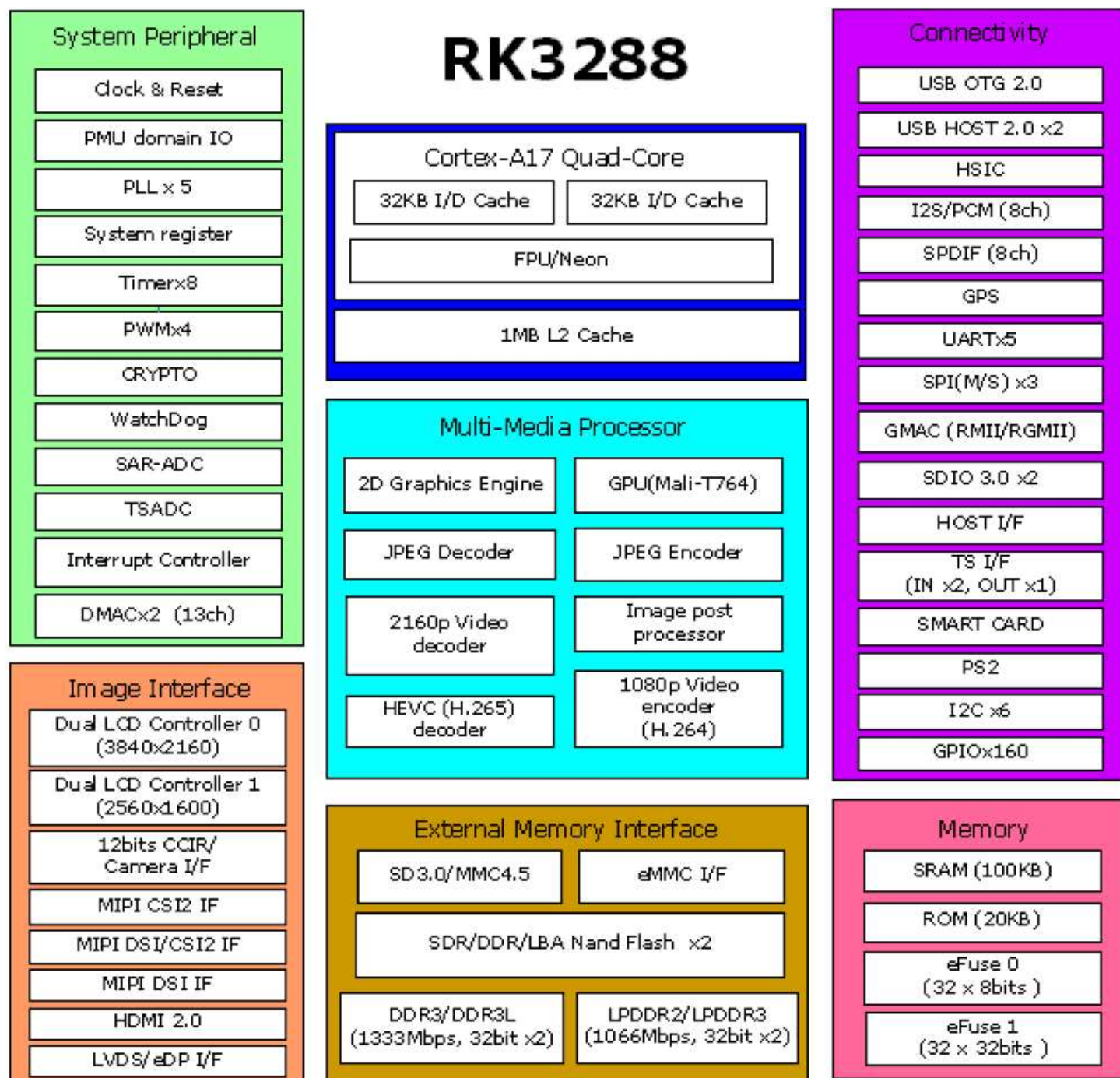
The HDMI quality of this ARM board is real FHD resolution at the true color 30 bit(RGBx10bits) setting

[Special Note] : the reserved firmware status for the GUI / Graphic User Interface

- the first Product Group : for the users of " Digital Signage Monitor "
the adoption of " **Android** " : version **4.4.4** so called " **KitKat** "
Linux Kernel Version : 3.10.49
the adoption of " **Android** " : version **5.1.x** so called " **Lollipop** "
Linux Kernel Version : 3.10.79
the adoption of " **Android** " : version **6.0.x** so called " **Marshmallow** " under development
Linux Kernel Version : 3.10.92
- the second Product Group : for the users of " Industrial ARM based Monitor "
the adoption of " **Ubuntu** " : version **14.04** so called " **LXDE** " Linaro Image
Linux Kernel Version : 3.10.49

The **default type of product** is **Android 4.4.4 KitKat**, so if any user need to adopt others such as Android 5.1.x Lollipop or Ubuntu 14.04 LXDE, the **customers are requested to instruct the demand on the order sheet** correctly.

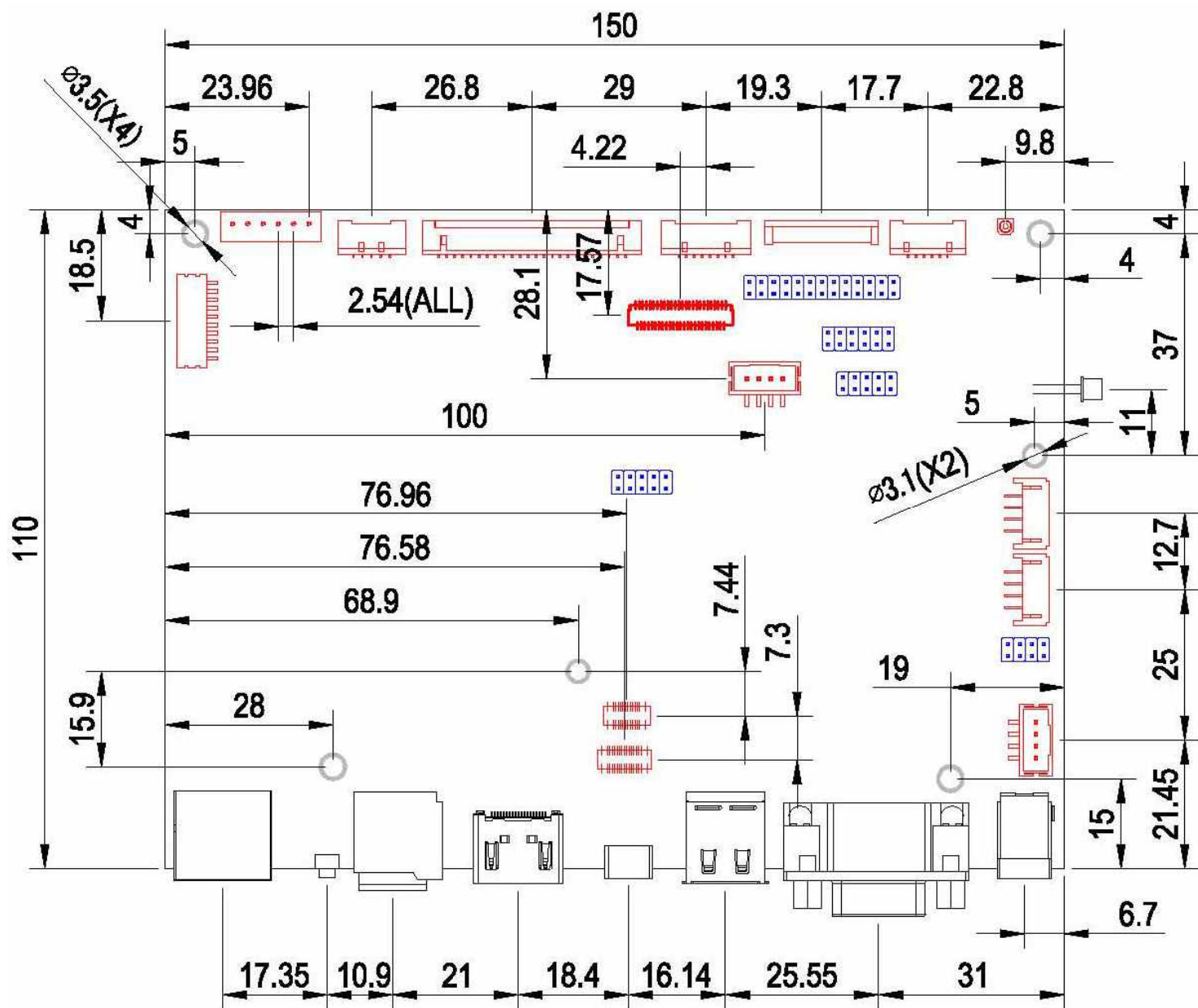
3. RK3288 Block Diagram



Data Sheet

4. Dimension

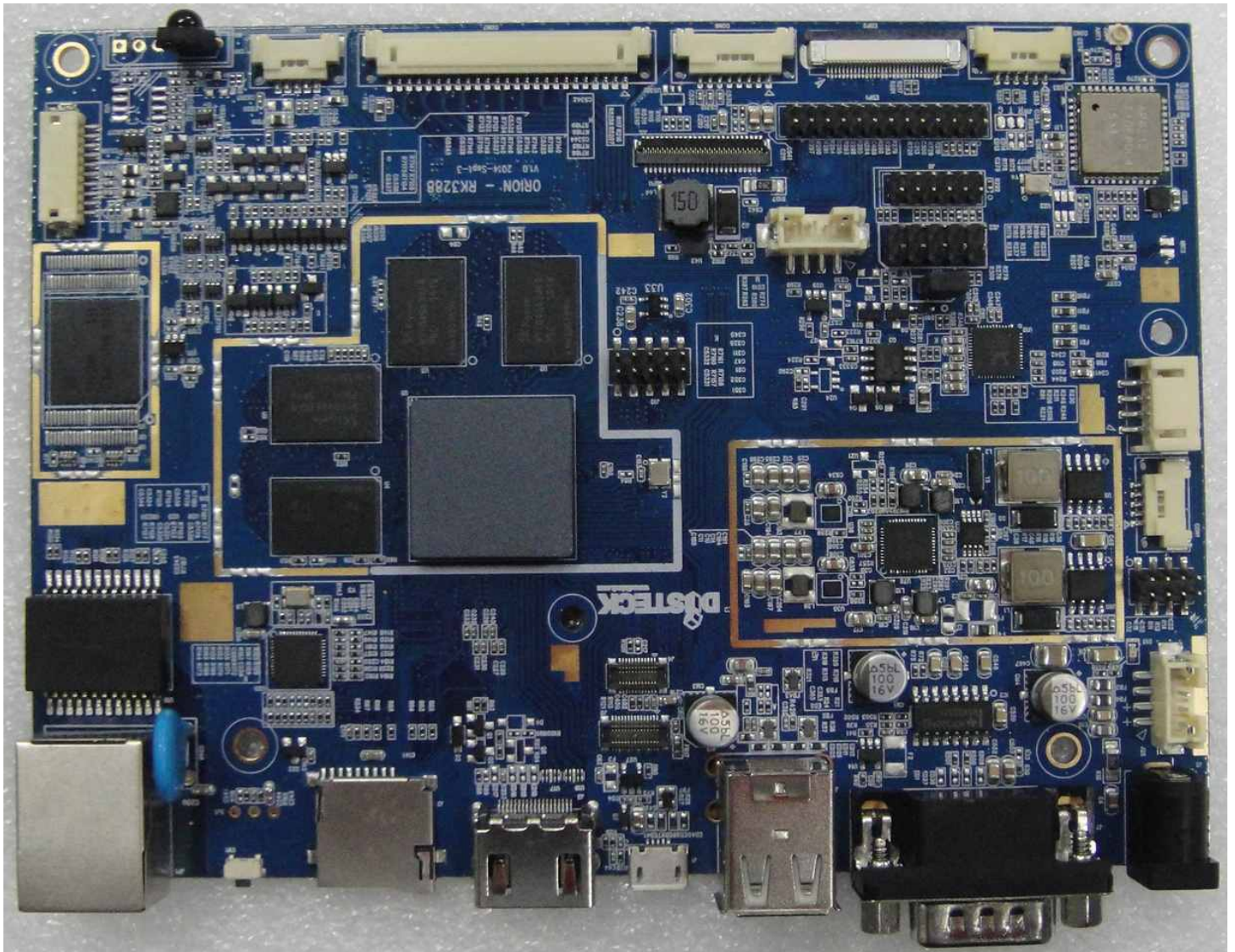
Main Board (150 x 110 mm) - **New PCB version 2.0**



Data Sheet

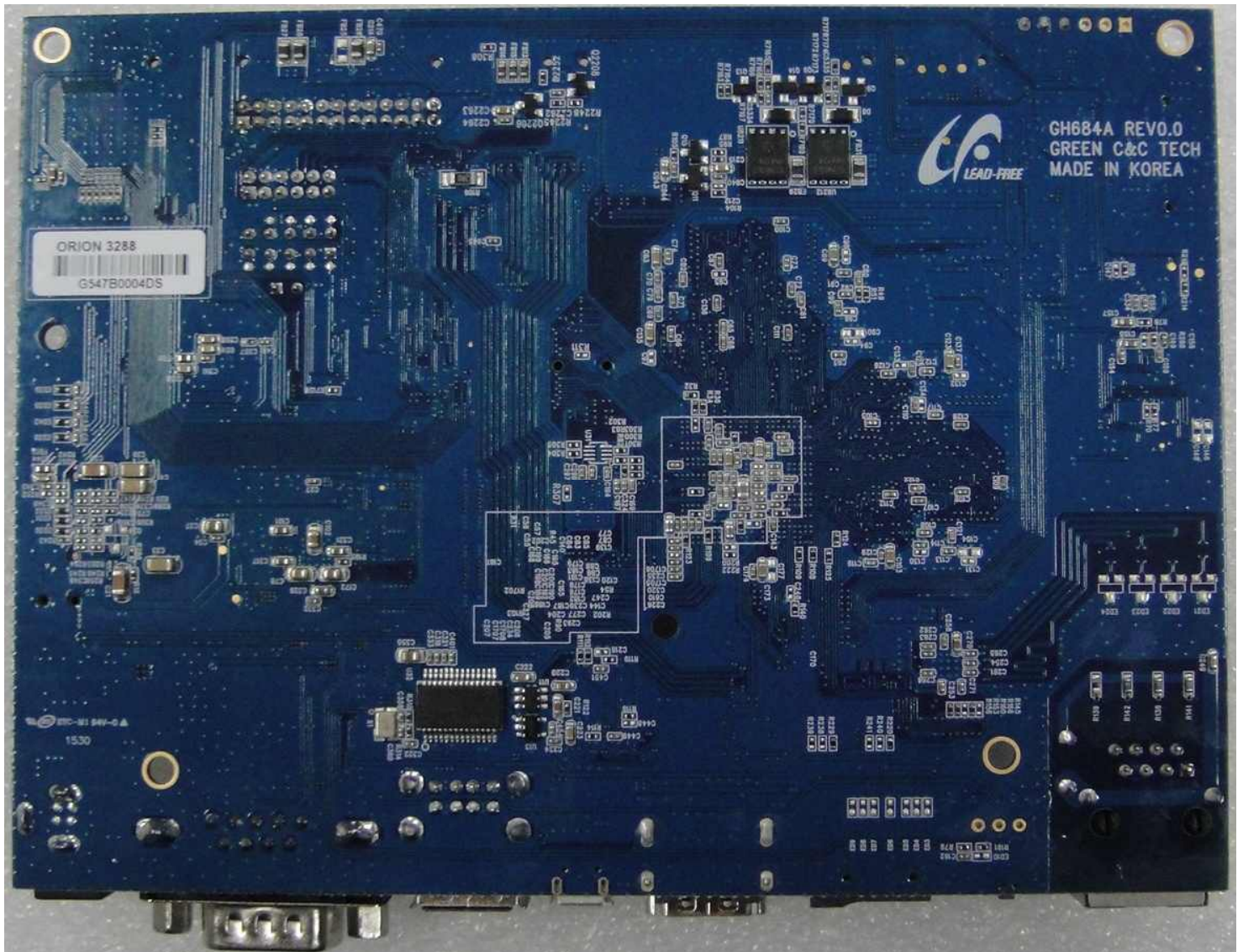
5. Pictures : **New PCB version 2.0**

Top Side View



Data Sheet

Rear Side View



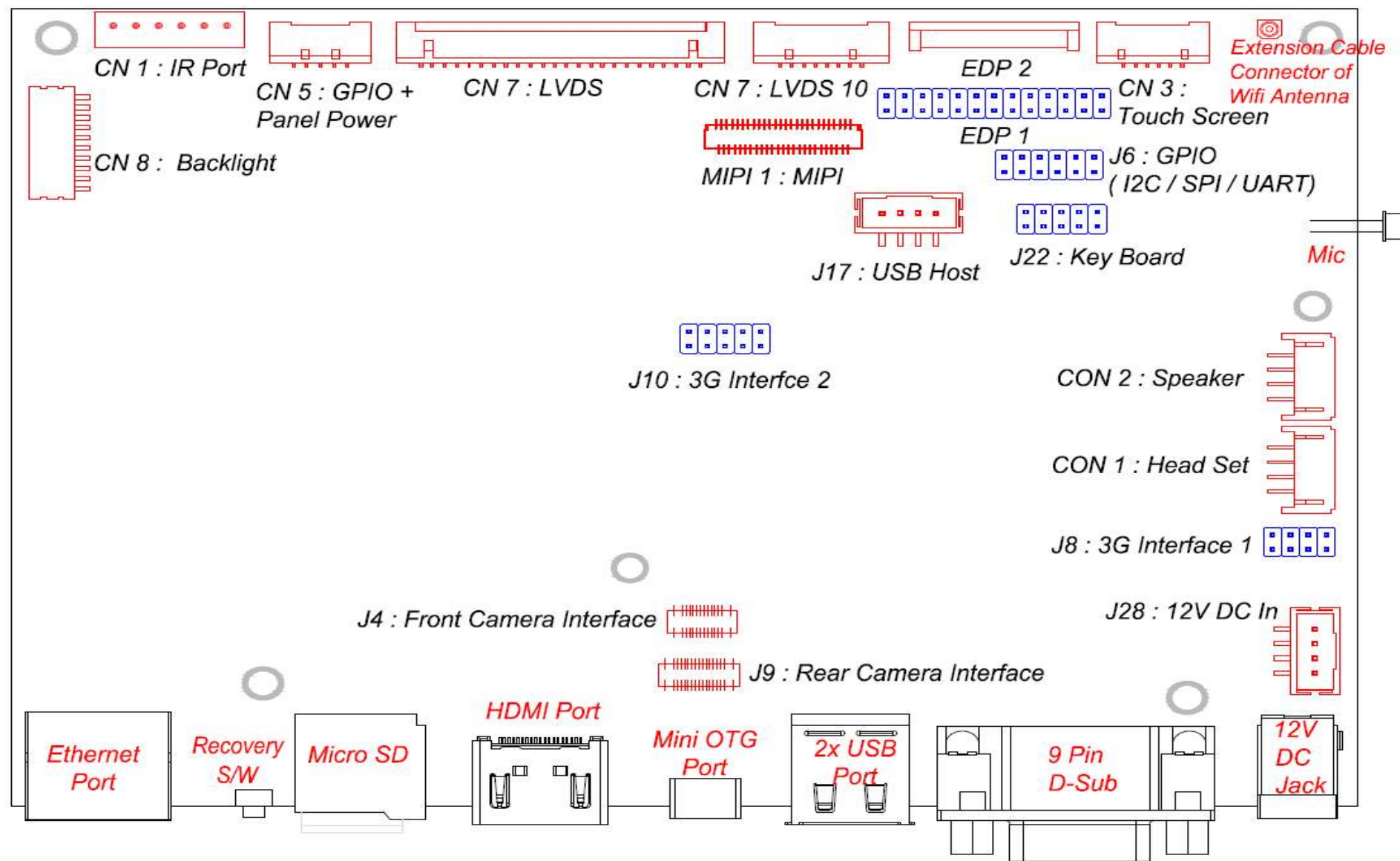
Data Sheet

6. Connectors and Pin information

6.1 Connectors Summary

Connector No	Description	Type	Manufacturer
CON1	Headset Output	DF14-5P-1.25H	Hirose
CON2	Speaker Output	S4B-PH-SM4-TB(LF)(SN)	JST
CON3	Touch Screen Interface	DF14-6P-1.25H	Hirose
CON5	Panel Extra Power	DF14-5P-1.25H	Hirose
CON6	Extra LVDS pair for 10-bit	DF14-8P-1.25H	Hirose
CON7	Dual LVDS	DF14-25P-1.25H	Hirose
CON8	Backlight Power Supply	DF13-10P-1.25H	Hirose
J1	Micro USB	HUM011D-5-S	
J2	Micro SDHC		
J3	HIDMI Output	51L019S-333N	
J4	Front Camera	AXT624124 Female	
J5	DC Power In	DC-005(3.5PAI)	
J6	GPIO - Optional I/O	2.0mm, 2row 6p, S/T Pin Header	12 pin (Hirose)
J7	D-Sub (DB9) for RS-232C	DB09M-A02301	
J8	3G interface - 1	2.0mm, 2row 4p, S/T Pin Header	8 pin (Hirose)
J9	Rear Camera	AXT630124 Female	
J10	3G interface - 2	2.0mm, 2row 5p, S/T Pin Header	10 pin (Hirose)
J17	Internal USB Host	B4B-PH-SM4-TB	JST
J22	Function Keypad	2.54mm 2row 5p Pin Header	10 pin (Hirose)
J26	External USB Host	2 stories, Dual USB Host	
J28	12V DC Extra Power Input	B4B-PH-SM4-TB	
JP1	Ethernet Port	RJ45S 100M	
MIPI1	MIPI DSI Interface	AJ752-B-S-51_B	
eDP 1	0.5mm Bottom contact FFC type	05002HR-H30J05	Yeon-Ho
eDP 2	2.0mm, 2row 13p, S/T Pin Header	87331-13,HEAD	26 pin (Hirose)
CN1	I/R Port (Direct Insert)	2.0mm, 1row 6p,	

Data Sheet



6.2 Pin Information Detail

6.2.1 CON1 : Headset Output : Mating connector - DF14-5S-1.25C

Pin No.	Function	Pin No.	Function
1	GND	4	HPO_L
2	HP Detect	5	MIC
3	HPO_R		

6.2.2 CON2 : Speaker Out : Mating connector – PHR-4

Pin No.	Function	Pin No.	Function
1	SP_RP	3	SP_LN
2	SP_RN	4	SP_LP

- 2W + 2W (8Ω), 2.9W + 2.9W(4Ω)

6.2.3 CON3 : Touch Screen Interface : Mating connector - DF14-6S-1.25C

Pin No.	Function	Pin No.	Function
1	VCC(3.3V)	4	TP_SDA
2	TP_INT	5	TP_SCL
3	TP_Reset	6	GND

6.2.4 CON5 : GPIO function and Panel Extra Power : Mating connector - DF14-5S-1.25C

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	LVDS_OPT_0	2,3	Switched panel power	4,5	GND

[Note] the pin no 1 is for GPIO, then all others are for Panel Extra Power.

6.2.5 CON6 : Extra LVDS pair for 10-bit : Mating connector - DF14-8S-1.25C

Pin No	Function	Pin No	Function	Pin No	Function
1	GND	4	LVDS_D9P	7	LVDS_OPT_2
2	LVDS_D4P	5	LVDS_D9N	8	LVDS_OPT_3
3	LVDS_D4N	6	LVDS_OPT_1		

6.2.6 CON7 : LVDS Connector : Mating connector - DF14-25S-1.25C

Pin No.	Function	Pin No	Function
1*	SVcc	14	LVDS_D0N
2*	SVcc	15	LVDS_D8P
3	GND	16	LVDS_D8N
4	GND	17	LVDS_CLK1P
5	LVDS_D3P	18	LVDS_CLK1N
6	LVDS_D3N	19	LVDS_D7P
7	LVDS_CLK0P	20	LVDS_D7N
8	LVDS_CLK0N	21	LVDS_D6P
9	LVDS_D2P	22	LVDS_D6N
10	LVDS_D2N	23	LVDS_D5P
11	LVDS_D1P	24	LVDS_D5N
12	LVDS_D1N	25	Enable Backlight
13	LVDS_D0P		

[Note] SVcc is the Panel Power, which can be programmable by kernel setting – +3.3V/+5V/+12V

6.2.7 CON8 : Backlight Supply Connector : Mating connector - DF13-10S-1.25C

Pin No.	Function	Pin No.	Function
1	+12V	6	+5V
2	GND	7	+12V
3	BKLT_EN	8	+12V
4	BKLT_CTRL	9	GND
5	+5V	10	GND

6.2.8 J5 : 12V DC In : DC3-3.5 (Barrel Jack type)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	+12V	2	Detect	3	GND

6.2.9 J6 : Optional GPIO : 2.0mm 2x6 Header

Pin No.	Function	Pin No.	Function
1	SPI_CLK	7	UART1_RX
2	SPI_CSN0	8	UART1_TX
3	SPI2_RXD	9	UART1_CTS
4	SPI2_TXD	10	UART1_RTS
5	VCC_OUT	11	I2C1_SDA
6	GND	12	I2C2_SCL

6.2.10 J7 : RS-232C (9 pin D-Sub)

Pin No.	Function	Pin No.	Function
1	NC	6	NC
2	RXD	7	RTS
3	TXD	8	CTS
4	NC	9	NC
5	GND		

6.2.11 J17 Internal USB :

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	+5V	2	DM	3	DP	4	GND

6.2.12 J22 : Function Keypad :

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	VOL+	5	ESC	9	Ground
2	Power LED +	6	Power On Key	10	NC
3	VOL-	7	OPT		
4	Power LED -	8	P KEY_V		

6.2.13 J28 : wire type DC 12V Power Input connector :

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	+12V	2	+12V	3	GND	4	GND

6.2.14 J4 : Camera Port : Front Camera – AXT624124 Female

Pin No	Function	Pin No	Function	Pin No	Function
1	PWDN1	9	PCLK	17	D7
2	SDA	10	D2	18	D8
3	SCL	11	D3	19	D9
4	VS	12	AFVDD	20	DVDD(1.8V)
5	HS	13	GND	21	PWDN0
6	DOVDD(1.8V)	14	D4	22	RST
7	MCLK	15	D5	23	AVDD(2.8V)
8	DGND	16	D6	24	AGND

6.2.15 J9 : Camera Port : Rear Camera – AXT630124 Female

Pin No	Function	Pin No	Function	Pin No	Function
1	AF-GND	11	RST	21	GND
2	AF-VDD(2.8V)	12	PWDN	22	D1P
3	DVDD(1.5V)	13	GND	23	D1N
4	DOVDD(1.8V)	14	MCLK	24	GND
5	NC	15	GND	25	CLK_P
6	AGND	16	D3P	26	CLK_N
7	AVDD(2.8V)	17	D3N	27	GND
8	DGND	18	GND	28	D0P
9	I2C-SDA	19	D2P	29	D0N
10	I2C-SCL	20	D2N	30	GND

**6.2.16 3G Module Board interface – 2.0mm 2x4 pin
J8 : 2.0mm 2x4 pin**

Pin No.	Function	Pin No	Function
1	DC5VB	5	HSIC_STROBE
2	VCC_IO	6	HSIC_DATA
3	GND	7	HUB_RESET_N
4	GND	8	GSSENSOR_INT

**6.2.17 3G Module Board interface – 2.0mm 2x5 pin
J10 : 2.0mm 2x5 pin**

Pin No.	Function	Pin No	Function
1	I2C1_SCL	6	3G_WK_OUT
2	I2C1_SDA	7	3G_RESET
3	VDD_10	8	3G_W_DIS
4	GND	9	3G_PWR_EN
5	SUSPEND	10	VCC_18

6.2.18 CN1 : IR Sensor : Remote Controller Signal – 2.0mm 1x6 pin

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	NC	2	NC	3	NC
4	IR_VCC	5	GND	6	IR_INT

6.2.19 eDP1 : embedded Display Port : 2.0mm 2x13pin header type

Pin No	Function	Pin No	Function	Pin No	Function
1	VIDEO_ON	10	GND	19	eDP_TX0_N
2	HPD	11	eDP_TX2_N	20	eDP_TX0_P
3	eDP_AUX_N	12	eDP_TX2_P	21	GND
4	eDP_AUX_P	13	GND	22	GND
5	GND	14	GND	23	Panel_Power
6	GND	15	eDP_TX1_N	24	Panel_Power
7	eDP_TX3_N	16	eDP_TX1_P	25	NC
8	eDP_TX3_P	17	GND	26	Panel_Power
9	GND	18	GND		

6.2.20 eDP2 : embedded Display Port : 0.5mm 30pin FFC - 05002HR-30

Pin No	Function	Pin No	Function	Pin No	Function
1	NC	11	GND	21	GND(LED)
2	GND	12	VCC(+3.3V)	22	LED_EN
3	LANE1N	13	VCC(+3.3V)	23	PWM
4	LANE1P	14	NC	24	NC
5	GND	15	GND	25	NC
6	LANE0N	16	GND	26	VLED
7	LANE0P	17	HPD	27	VLED
8	GND	18	GND(LED)	28	VLED
9	AUX_P	19	GND(LED)	29	VLED
10	AUX_N	20	GND(LED)	30	NC

6.2.21 MIPI1 : MIPI DSI Interface :

Pin No	Function	Pin No	Function	Pin No	Function
1	TE(NC)	18	MIPI_TX/RX_D2N	35	VCC_LCD(3.3V)
2	MIPI_TX/RX_D3N	19	GND	36	MIPID1+
3	GND	20	MIPI_TX/RX_D2P	37	VCC_LCD(3.3V)
4	MIPI_TX/RX_D3P	21	GND	38	MIPID2-
5	GND	22	MIPID3-	39	HSYNC(NC)
6	MIPI_TX/RX_D0N	23	GND	40	MIPID2+
7	GND	24	MIPID3+	41	LCD_EN_MIPI
8	MIPI_TX/RX_D0P	25	GND	42	GND
9	GND	26	MIPID0-	43	PWM_IN
10	MIPI_TX/RX_CLKN	27	GND	44	LED-
11	GND	28	MIPID0+	45	BL_PWM_OUT
12	MIPI_TX/RX_CLKP	29	GND	46	LED-
13	GND	30	MIPICLK	47	LED+
14	MIPI_TX/RX_D1N	31	VCC_LCD(3.3V)	48	LED-
15	GND	32	MIPICLK+	49	LED+
16	MIPI_TX/RX_D1P	33	VCC_LCD(3.3V)	50	LED-
17	GND	34	MIPID1-	51	LED+

Appendix - A : Old version PCB Data

From Nov 2014 to July 2015, the PCB version was 1/0 which has two different points than the latest version 2.0 as follows.

Different Point - 1 : there were totally 7 numbers Mounting Holes on the old version PCB

1.9 \varnothing x 5 numbers Holes

3.1 \varnothing x 2 numbers Holes

[Note] : there are totally 6 numbers Mounting Holes on the latest version PCB

3.4 \varnothing x 4 numbers Holes

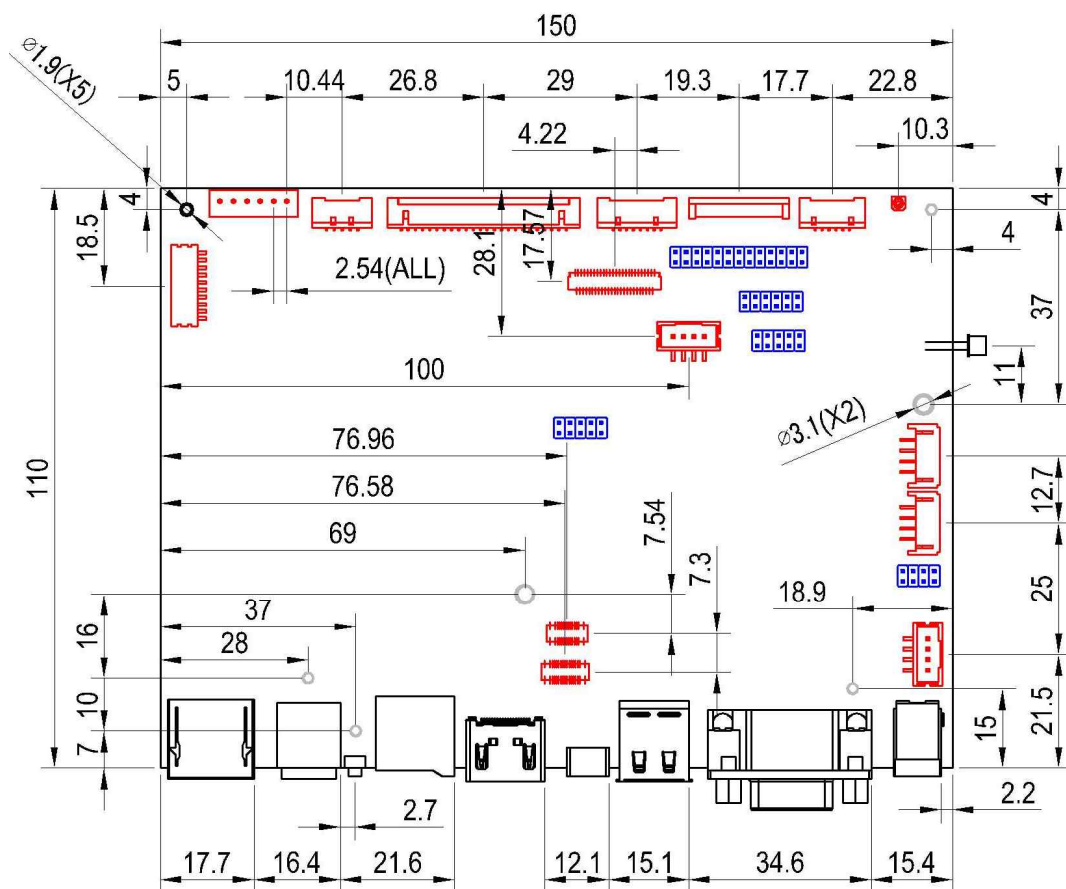
3.1 \varnothing x 2 numbers Holes

Different Point - 2 : there was an Optical Audio Port (SPDIF) on the old version PCB.

It was removed for a suitable plug-in the relevant I/O Input Jacks without interference of each connector header due to the narrow gap issue.

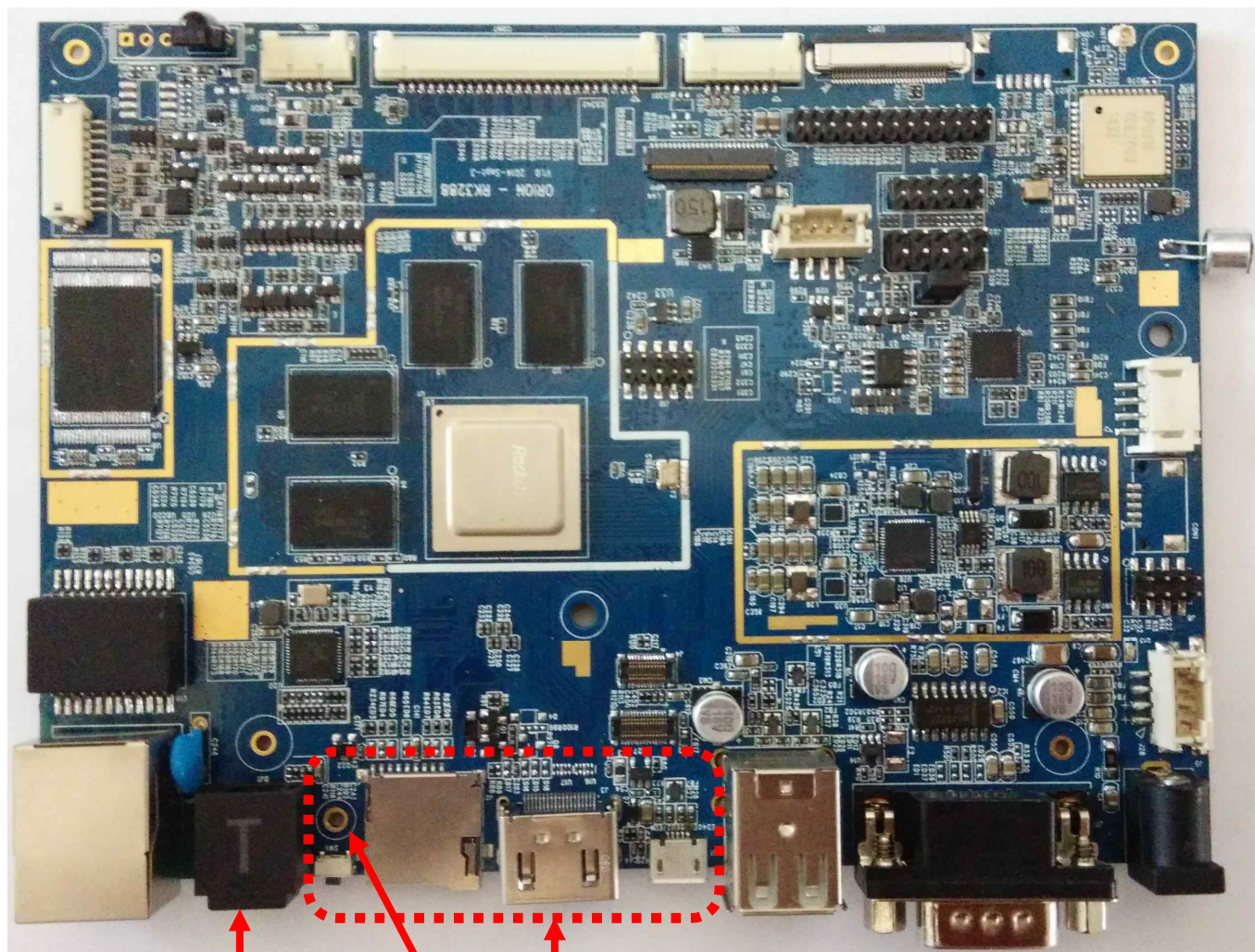
In this regards, the mini OTG, HDMI & micro SD Card Slot were rearranged the positions.

Here is the dimensional drawing of old version PCB



Next 4 pages show the old product version such as pictures of real shape of old PCB board, the Dimensional Drawing & Connectors' positions.

the real shape picture of old PCB board (top side view)



● This Optical Audio Jack was deleted on the new PCB.

● This mounting hole was deleted on the new PCB.

● The mini OTG, HDMI, SD Card Slot, Reset Switch Button move to the left on new PCB.

the real shape picture of old PCB board (bottom side view)

