

RK1108HX Specification

V1.1



Version	Date	Remark
V1.0	2019-12-20	Initial
V1.1	2020-4-27	Update

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1、 About product

RK1108HX core board is a development board based on Rockchip1108. Rockchip1108 is the first high-performance single-core A7 application processor for video camera industry, and the chip cost is competitive. RK1108HX can meet the requirement of most camera industry.

RK1108HX core board is designed with stamp hole, which can be matched with the bottom board and liquid crystal board for product level design. The core board adopts 6-layer board with gold deposition process design to ensure stability and reliability. RK1108HX can be used in many fields such as low-cost tablet, monitoring, video acquisition, cabinet machine, game machine, industry monitoring, etc.

Interface: On board 100M Ethernet interface, CSI interface, DSI interface, RGB interface, CVBS interface, OTG interface, USB2.0 interface, audio interface.

RK1108HX core board is applicable to industrial control, power, communication, medical treatment, media, security, vehicle, finance, consumer electronics, handheld equipment, game machine, display control, teaching instrument, POS, multimedia terminal, PDA, ordering machine, advertising machine etc.



RK1108HX core board

2. Specification

2.1 RK1108HX General list

CPU	single-core Cortex-A7, 1G Hz
DSP	CEVA XM4 DSP, 600 MHz
	Application for algorithm development
Characteristics of multimedia codec	Multi 1080P 30fps, Video decoding (H.264, MPEG-1/2/4)
	1080P 30fps video coding, support H.264
Display	Support HDMI1.4, MIPI DSI, Parallel RGB,CVBS OUT, Highest resolution 1080p
	Dual screen display is not supported
Memory	16Bit DDR3/DDR3L; 1Gb/2Gb/4Gb DDR3, General 1Gb DDR3;
	Serial Nor FLASH, General 1Gb SPI NAND
Interface	Support Parallel CIF, MIPI CSI,CVBS In camera interface, Built-in:8M ISP with WDR
	Support 1x8ch I2S, 2x2ch I2S/PCM
	Support 100M RMII
	Support 1 SDIO3.0, 2 USB2.0 HOST&OTG, 4 I2C, 3 UART, 1 SPI, 8 PWM

2.2 Function features

- ✓ 1 USB HOST2.0 interface ;
- ✓ 1 OTG interfce ;
- ✓ 3 Serial port ;
- ✓ 1 TF port ;
- ✓ Reset key ; SW power on/off key ;
- ✓ MIC input ;
- ✓ Audio output interface ;
- ✓ Support MPEG, H.264, Vedio decoding ;
- ✓ Support H.264 vedio coding ;
- ✓ Support RTC clock can be real time saving ;
- ✓ Support 100M wired Ethernet ;
- ✓ Support CSI camera interface ;

2.3 Core board characteristics

RK1108HX core board main characteristics :

- ✓ Good dimension (45mm*45mm) and place enough GPIO port;
- ✓ Use RK816-2 , Support charge with Lithium battery ;
- ✓ Support multiple brands and capacities of SPI NAND flash , Default use 1Gb SPI NAND FLASH ;
- ✓ Use single channel DDR3 design, support 1GB capacity by default, and can customize 2GB / 4GB capacity;
- ✓ Support power sleep wake-up ;
- ✓ Support Linux OS ;
- ✓ Support 100m wired Ethernet ;
- ✓ Lead out 160PIN, including all PINs of CPU ;

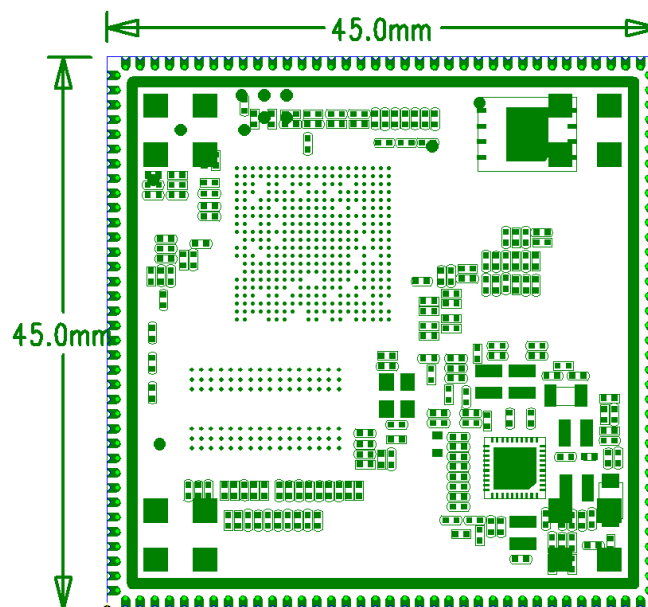
2.4 Details Characteristic Parameter

System config	
CPU	RV1108
Main frequency	single-core Cortex-A7
RAM	Default 1Gb, customize 2Gb
ROM	1Gb/4Gb SPI NAND FLASH option, default 1Gb
Power IC	RK816-2
Interface parameter	
LCD	Support MIPI-DSI、RGB interface
Audio	IIS /PCM、ANALOG
SD card interface	1 SDIO output
Ethernet interface	Support 100m wired Ethernet (use LCD-RGB interface)
USB	1 HOST2.0, 1 OTG
UART	3 serial port, Support serial port with flow control
PWM	8 PWM output
IIC	3 IIC output
SPI	1 SPI output
ADC	6 ADC output

Camera	1 CSI input
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Electrical characteristics	
5V power input	5V/2A
RTC voltage input	2.5~3V/5uA
Voltage output	1.8V、2.2V、3.3V、5V
Operation temperature	-20~80 centigrade
Storage temperature	-40~125 centigrade

3、Demension



Mechanical size	
Edge	designed with stamp hole
Size	45mm*45mm*2.2mm
PIN gap	1.2mm
PIN pad size	1.0mm*0.7mm
PIN number	160PIN
Layer	6

4、Interface definition

4.1 PIN sequence



1、2、3、4、5.....

4.2 PIN description

RK1108HK PIN Description			
PIN	Definition	Description	Remark
1	GPIO0_C4/PWM1/I2C3_SDA/U	GPIO or PWM1output PIN Or I2C3 SDA PIN	
2	GPIO0_C1/HDMI_HPD1/CVBS_CLK_I N/D	GPIO Or HDMI Input Test PIN Or CVBS CLOCK INPUT PIN	
3	GPIO0_B0/SPI_RXD/D	GPIO Or SPI data input PIN	
4	GPIO0_A1/SDMMC0_DET/U	GPIO Or SD card PIN	
5	GPIO0_C3/PMU_DEBUG2/D	GPIO	
6	GPIO0_B7/TSADC_SHUT/U	GPIO (share RESET PIN , not recommend)	
7	LCD_D0	LCD Driver Interface	
8	LCD_D1	LCD Driver interface	
9	LCD_D2	LCD Driver interface	
10	LCD_D3	LCD Driver interface	
11	LCD_D4	LCD Driver interface	
12	LCD_D5	LCD Driver interface	
13	LCD_D6	LCD Driver interface	
14	LCD_D7	LCD Driver interface	

15	LCD_D8	LCD Driver interface	
16	LCD_D9	LCD Driver interface	
17	GPIO0_B3/U	GPIO	
18	GPIO0_C5/PWM0/PMU_DEBUG3/D	GPIO Or PWM0 output PIN	
19	GPIO0_C2/I2C2_SDA/PMU_DEBUG1/D	GPIO Or I2C2 SDA PIN	
20	GPIO0_A2/SDMMC1_PWR/D	GPIO Or SD power enable PIN	
21	VDAC_OUT	CVBS OUT	
22	VDAC_EXTR	Connect 2K resistance to GND	
23	RESET	PMU reset PIN	Low level whole power reset
24	CLK32K	32768Hz Precise clock output	
25	BAT_TS	Battery TS PIN	
26	PWR_KEY	Power key	
27	GPIO0_A5/CLK_WIFI_OUT/U	GPIO	
28	GPIO0_A6/PMU_DEBUG0/D	GPIO	
29	CIF_D7	GPIO Or Parallel camera Or I2S_SDI PIN	
30	CIF_D3	GPIO Or Parallel camera Or I2S_SDIO PIN	
31	CIF_D2	GPIO Or Parallel camera Or I2S_MCLK PIN	
32	CIF_D10	GPIO Or Parallel camera Or FLASH_TRIG_OUT PIN	
33	CIF_D0	GPIO Or Parallel camera Or I2S_SDO PIN	
34	CIF_D1	GPIO Or Parallel camera Or I2S_SCLK PIN	
35	CIF_D9	GPIO Or Parallel camera Or FLASH_TRIG_IN PIN	
36	CIF_HREF	GPIO Or Parallel camera	
37	CIF_CLKIN	GPIO Or Parallel camera	
38	CIF_PDN	GPIO Or Parallel camera	
39	CIF_VSYNC	GPIO Or Parallel camera	
40	CAM_CLKOUT	GPIO Or Parallel camera	
41	CIF_D6	GPIO Or Parallel camera Or I2S_LRCLKRX PIN	
42	CIF_D8	GPIO Or Parallel camera Or I2S_SDIO3 PIN	
43	CIF_D11	GPIO Or Parallel camera Or PRELIGHT_TRIG_OUT PIN	
44	CIF_D4	GPIO Or Parallel camera Or I2S_LRCLKTX PIN	
45	CIF_D5	GPIO Or Parallel camera Or	

		I2S_SDIO2 PIN	
46	GND	GND	
47	HDMI_TX_C-	HDMI output interface	
48	HDMI_TX_C+	HDMI output interface	
49	HDMI_TX_D0-	HDMI output interface	
50	HDMI_TX_D0+	HDMI output interface	
51	HDMI_TX_D1-	HDMI output interface	
52	HDMI_TX_D1+	HDMI output interface	
53	HDMI_TX_D2+	HDMI output interface	
54	HDMI_TX_D2-	HDMI output interface	
55	USB0_DP	OTG USB interface	
56	USB0_DM	OTG USB interface	
57	USB1_DP	HOST USB interface	
58	USB1_DM	HOST USB interface	
59	USB0_OTG_ID	OTG USB interface	
60	USB0_DET	OTG USB interface	
61	MIPI_CSI_EXTR	MIPI_CSI interface (connect 2K resistance to GND)	
62	MIPI_CSI_D0P	MIPI_CSI interface	
63	MIPI_CSI_D0N	MIPI_CSI interface	
64	MIPI_CSI_D1P	MIPI_CSI interface	
65	MIPI_CSI_D1N	MIPI_CSI interface	
66	MIPI_CSI_CLKN	MIPI_CSI interface	
67	MIPI_CSI_CLKP	MIPI_CSI interface	
68	MIPI_CSI_D2P	MIPI_CSI interface	
69	MIPI_CSI_D2N	MIPI_CSI interface	
70	MIPI_CSI_D3N	MIPI_CSI interface	
71	MIPI_CSI_D3P	MIPI_CSI interface	
72	GND	GND	
73	GPIO2_D3/I2C1_SDA/U	GPIO Or I2C1 SDA PIN	
74	GPIO2_D4/I2C1_SCL/U	GPIO Or I2C1 SCL PIN	
75	GPIO3_B0/D	GPIO	
76	GPIO3_A4/UART0_CTSN/U	GPIO Or UART0 flow control PIN	
77	GPIO3_A6/UART0_TX/U	GPIO Or UART0 TXD PIN	
78	GPIO3_B2/PCM_IN/FLASH_TRIG_IN/D	GPIO Or PCM PIN Or FLASH PIN	
79	GPIO3_B3/PCM_CLK/D	GPIO Or PCM PIN	
80	GPIO3_A3/UART0_RTSEN/U	GPIO Or UART0 flow control PIN	
81	GPIO3_B1/PCM_OUT/FLASH_TRIG_OUT/D	GPIO Or PCM PIN Or FLASH PIN	
82	GPIO3_A5/UART0_RX/U	GPIO Or UART0 RXD PIN	
83	GPIO3_A0/SDIO_D1/U	GPIO Or SDIO PIN	
84	GPIO3_B6/D	GPIO	

85	GPIO3_B4/PCM_SYNC/PRELIGHT_TRIG_OUT/D	GPIO Or PCM PIN Or PRELIGHT_TRIG_OUT PIN	
86	GPIO3_A7/D	GPIO	
87	GPIO3_B5/MIPI_CSI_MCLK/D	GPIO Or MIPI CSI interface	
88	GPIO3_A2/SDIO_D3/U	GPIO Or SDIO PIN	
89	GPIO2_D5/SDIO_CLKO/D	GPIO Or SDIO PIN	
90	GPIO3_A1/SDIO_D2/U	GPIO Or SDIO PIN	
91	GPIO2_D7/SDIO_D0/U	GPIO Or SDIO PIN	
92	GPIO2_D6/SDIO_CMD/U	GPIO Or SDIO PIN	
93	GND	GND	
94	LCD_D12	LCD Driver interface	
95	LCD_CLK	LCD Driver interface	
96	LCD_D17	LCD Driver interface	
97	LCD_D14	LCD Driver interface	
98	LCD_HSYNC	LCD Driver interface	
99	LCD_VSYNC	LCD Driver interface	
100	LCD_D10	LCD Driver interface	
101	LCD_DEN	LCD Driver interface	
102	LCD_D11	LCD Driver interface	
103	LCD_D13	LCD Driver interface	
104	LCD_D15	LCD Driver interface	
105	LCD_D16	LCD Driver interface	
106	GPIO2_D1/UART2_RX/JTAG_TMS/U	GPIO Or UART2 RXD PIN(调试 interface)	
107	GPIO1_D7/HDMI_CEC/DSP_RTCK/U	GPIO Or HDMI interface Or DSP_RTCK PIN	
108	GPIO1_D1/UART1_RTSN/SPI_CSN0/DSP_TMS/U	GPIO Or UART1 流控 PIN Or SPI interface Or DSP_TMS PIN	
109	GPIO1_D3/UART1_TX/SPI_TXD/D	GPIO Or UART1 TXD PIN Or SPI interface	
110	GPIO1_D0/UART1_CTSN/SPI_CLK/DSP_TCK/D	GPIO Or UART1 流控 PIN Or SPI interface Or DSP_TCK PIN	
111	GPIO1_D2/UART1_RX/SPI_RXD/U	GPIO Or UART1 RXD PIN Or SPI interface	
112	GND	GND	
113	GPIO2_D2/UART2_TX/JTAG_TCK/U	GPIO Or UART2 TXD PIN(调试 interface)	
114	GND	GND	
115	CODEC_MICBIAS	MIC Bias power output	
116	CODEC_MICL	MIC input L	
117	CODEC_MICR	MIC input R	
118	GND	GND	

119	CODEC_VCM	CODEC Reference power supply, connect to GND via 4.7uF	
120	CODEC_AOR	Simulation ADUIO output R	
121	CODEC_AOL	Simulation ADUIO output L	
122	GND	GND	
123	VIDEO_INP	CVBS input +	
124	VIDEO_INN	CVBS input -	
125	GND	GND	
126	GPIO3_C5/SDMMC0_CMD/U	GPIO Or SDIO interface	
127	GPIO3_C4/SDMMC0_CLKO/U	GPIO Or SDIO interface	
128	GPIO3_C2/SDMMC0_D1/UART2_RX/U	GPIO Or SDIO interface Or UART2 RXD PIN	
129	GPIO3_C3/SDMMC0_D0/UART2_TX/U	GPIO Or SDIO interface Or UART2 TXD PIN	
130	ADC_IN1	ADC PIN	
131	ADC_IN0	ADC PIN	
132	GPIO3_C1/SDMMC0_D2/U	GPIO OrSDIO interface	
133	GPIO3_C0/SDMMC0_D3/U	GPIO OrSDIO interface	
134	ADC_IN2	ADC PIN	
135	GPIO3_B7/SDMMC0_PWR/D	GPIO OrSDIO interface	
136	ADC_IN5	ADC PIN	
137	ADC_IN4	ADC PIN	
138	ADC_IN3	ADC PIN	
139	GPIO0_A7/SPI_TXD/D	GPIO Or SPI interface	
140	GPIO0_B6/I2C3_SCL/U	GPIO Or I2C3 SCL PIN	
141	GPIO0_C0/PWM3/IR/D	GPIO Or PWM3 output PIN Or IR PIN	
142	GPIO0_A3/SPI_CLK/D	GPIO Or SPI interface	
143	GPIO0_A4/SPI_CSN0/D	GPIO Or SPI interface	
144	GPIO0_C6/PWM2/I2C2_SCL/PMU_DE BUG4/D	GPIO Or PWM2 output PIN Or I2C2 SCL PIN	
145	VCC_18	1.8V power output	
146	GND	GND	
147	GND	GND	
148	VCC_IO	3.3V power output	
149	VCC_BAT	Power input	
150	VCC_BAT	Power input	
151	GND	GND	
152	VCC_22	2.2V power output	Voltage adjustable, program controlled
153	SNSP	Battery input PIN	
154	AVDD_CAM	CAM power output (Programming controllable)	Voltage adjustable, program controlled

155	VCC_RTC	RTC power input	
156	DOVDD_CAM	CAM power output (Programming voltage adjustable, controllable)	program controlled
157	VCC_SYS	5V power output	
158	VCC50_SYST	5V power input	
159	VCC_SYS	5V power output	
160	VCC50_SYST	5V power input	

5、HW design

5.1 power design

Only need to provide 5V / 2A power PIN158 , PIN160 ; or charge to PIN149 and PIN150 with lithium batteries to RK1108HX core board, the core board can running normally. The detailed definition of power PIN as follows:

- ✓ PIN 145: core board PMU LDO2 output, voltage 1.8V, maximum current 300mA;
- ✓ PIN 146, PIN147 and PIN151: core board public GND;
- ✓ PIN 148: core board PMU DC power output, voltage 3.3V, maximum current 1A;
- ✓ PIN149, PIN150: 3.7V lithium battery power input interface, core board main power input;
- ✓ PIN 152: core board PMU DC power output, voltage 2.2V, maximum current 2A;
- ✓ PIN 154: core board PMU LDO6 output, voltage 1.8V, maximum current 300mA;
- ✓ PIN 156: core board PMU LDO5 output, voltage 2.8V, maximum current 300mA;
- ✓ PIN 157 and PIN159: core board PMU DC output, Voltage 5V, maximum current 800mA;
- ✓ PIN 158 and PIN160: 5V / 2A USB power input interface, core board main power input;

5.2 USB design

RK1108HX has one host port and one OTG port. Default USB2.0 interface can meet 480Mbps. OTG and host are both high-speed signal lines. The following is the corresponding differential pair signal:

Different PIN No	Different PIN
55、 56	OTG_DP、 OTG_DM
57、 58	USB_HOST_DM、 USB_HOST_DP

5.3 MIPI design

RK1108HX support DSI & CSI , DSI (core board PIN7-PIN16) can be used to connect MIPI interface display; CSI(core board PIN61-PIN71) can be used to connect MIPI interface camera. The data transmission rate of MIPI interface is much higher than that of LVDS interface. It is necessary to walk the same length differential line and the impedance matching is 100 ohm.