



# QY-RK3288S Hardware Manual

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**Qiyang Intelligent Technology Co., Ltd**  
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## Version Update

Version	Hardware	Description	Date	Reviser
1.0	QY-RK3288S	Internal release	2017-10	wwx



# Catalogue

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Notice: This manual mainly introduce hardware interface of the mainboard

## I. Preface

### 1.1 Company Profile

Zhejiang Qiyang Intelligent Technology Co., Ltd. locates at the bank of the beautiful West Lake. It is a high and new technology enterprise which is specializing in R&D, manufacture and sell embedded computer main board with high performance, low power consumption, low cost, small volume, and provides embedded hardware solutions.

We Offer:

- ◆ Research & develop, manufacture and sell embedded module products which have independent intellectual property rights, and cooperate with TI, ATMEL, Cirrus Logic, Freescale, and other famous processor manufacturers. It has launched a series of hardware products, such as ARM development board, ARM core module, ARM industrial board, sound/video decoding transmission platform, supporting tools and software resources which support user for their next embedded design.

- ◆ We give full play to the technical accumulation in ARM platform and Windows CE, Linux, Android operating system for many users providing custom service (OEM/ODM), to realize embedded products into the market stably, reliably and quickly.

### 1.2 Suggestion for using QY-RK3288S mainboard

1. Please read the instructions firstly before using the single board computer;
2. Before using, please check the packing list and see whether there is a missing

file in the CD;

3. Please understand the basic structure and composition of QY-RK3288S, including the hardware resource allocation etc.;
4. If you need to develop on Android system and burn program into the development board, in addition to this document, we also suggest reading another document *QY-RK3288S Android User Manual*;
5. QY-RK3288S is available for batch order.

## II. System Composition

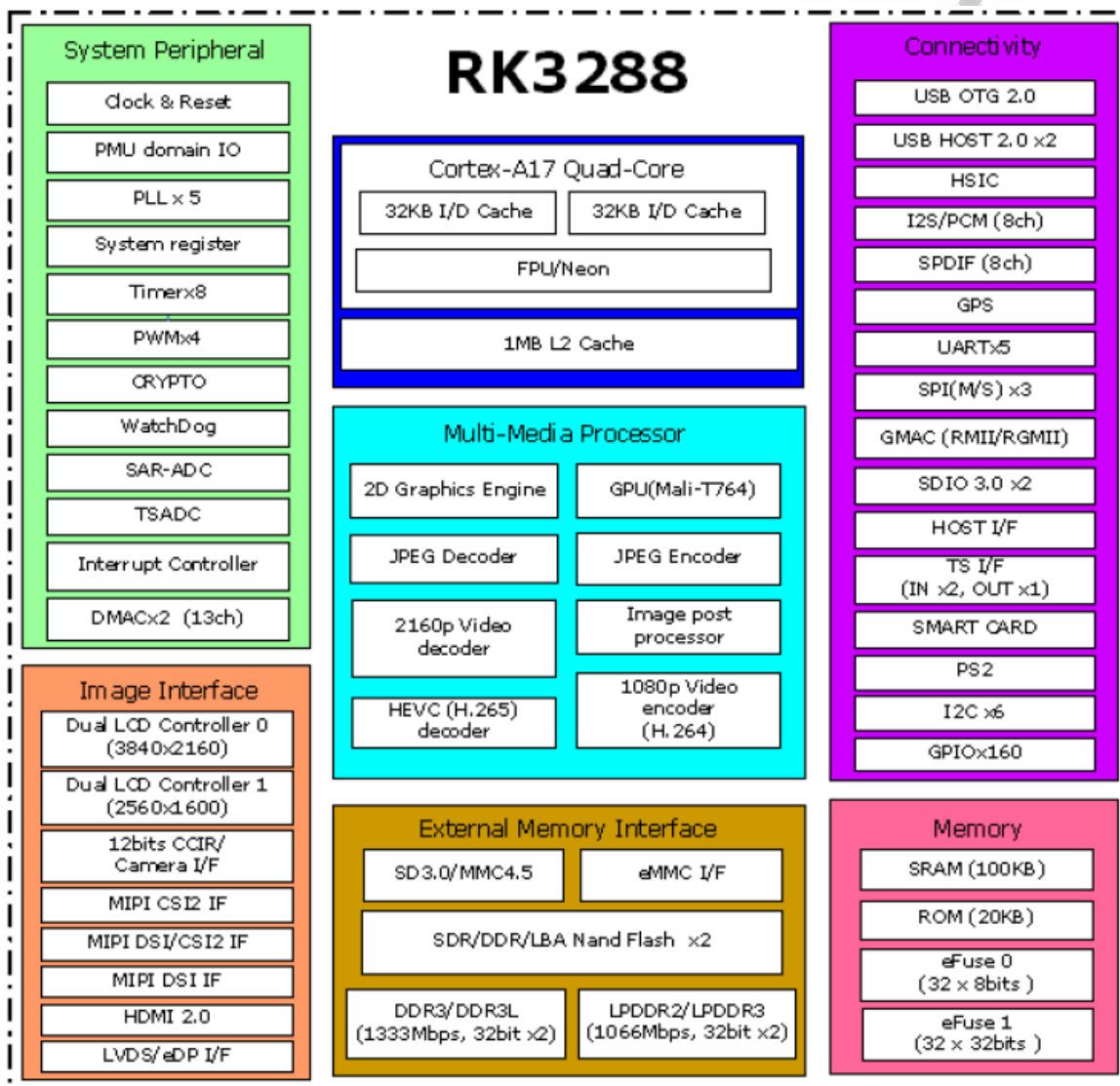
### 2.1 Chip Summary

QY-RK3288S embedded mainboard, adopts RockChip RK3288 processor, Cortex-A17 Quad Core with 1.8G Hz and integrates Mali-T764 GPU to support AFBC(Frame Buffer Compression). And also support OpenGL ES1.1/2.0/3.0; OpenVG1.1; OpenCL; Directx11, which could achieve the Video Hard Decoding for H.264(4K\*2K) and H.265(10 bits) Videos.

QY-RK3288S embedded mainboard not only has the powerful RockChip RK3288 processor with 1.8GHz, but also has the high-speed storage of 2GB DDR3 and 8GB eMMC. Meanwhile, QY-RK3288S adopts the independent power management unit; has the rich display interface; and completely support Android 5.1 OS.

QY-RK3288S embedded mainboard has abundant extended interfaces, and the PCB adopts 8-layer immersion gold processor, with excellent electrical characteristics, antijamming capability and well stability.

Function diagram is as shown:



Picture1

◆Quad Core Cortex-A17, CPU frequency reaches 1.8GHz;

◆Mali-T764 GPU, support AFBC(Frame Buffer Compression);

- ◆Support OpenGL ES 1.1/2.0/3.1, OpenCL, DirectX9.3;
- ◆Built-in the high-performance 2D acceleration hardware;
- ◆Dual-channel 64bit DDR3-1333/DDR3L-1333/LPDDR2-1066;
- ◆Support MLC NAND Flash, eMMC 4.51;
- ◆Support 4K 10bits VP9/H265/H264 video decoding, speed reaches 60fps;
- ◆1080P Multi-format video decoding (VC-1, MPEG-1/2/4, VP8);
- ◆1080P video coding, support H.264, VP8 format;
- ◆Video post-processor: anti-cross, de-noising, edge/detail/color optimization;
- ◆Support RGB, Dual LVDS, Dual MIPI-DSI, eDP display interfaces, resolution reaches 3840\*2160;
- ◆ARM TrustZone (TEE), Secure Video Path, Cipher Engine, Secure boot;
- ◆Built-in 13M ISP, support MIPI CSI-2 and DVP interface;
- ◆Dual-channel SDIO 3.0 interface;
- ◆TS in/CSA2.0, support DTV function;
- ◆Integrate with HDMI、 Ethernet MAC 、 S/PDIF、 USB,I2C,I2S ,UART,SPI,PS2;
- ◆28nm integrated circuits technology;
- ◆Independent power management unit;

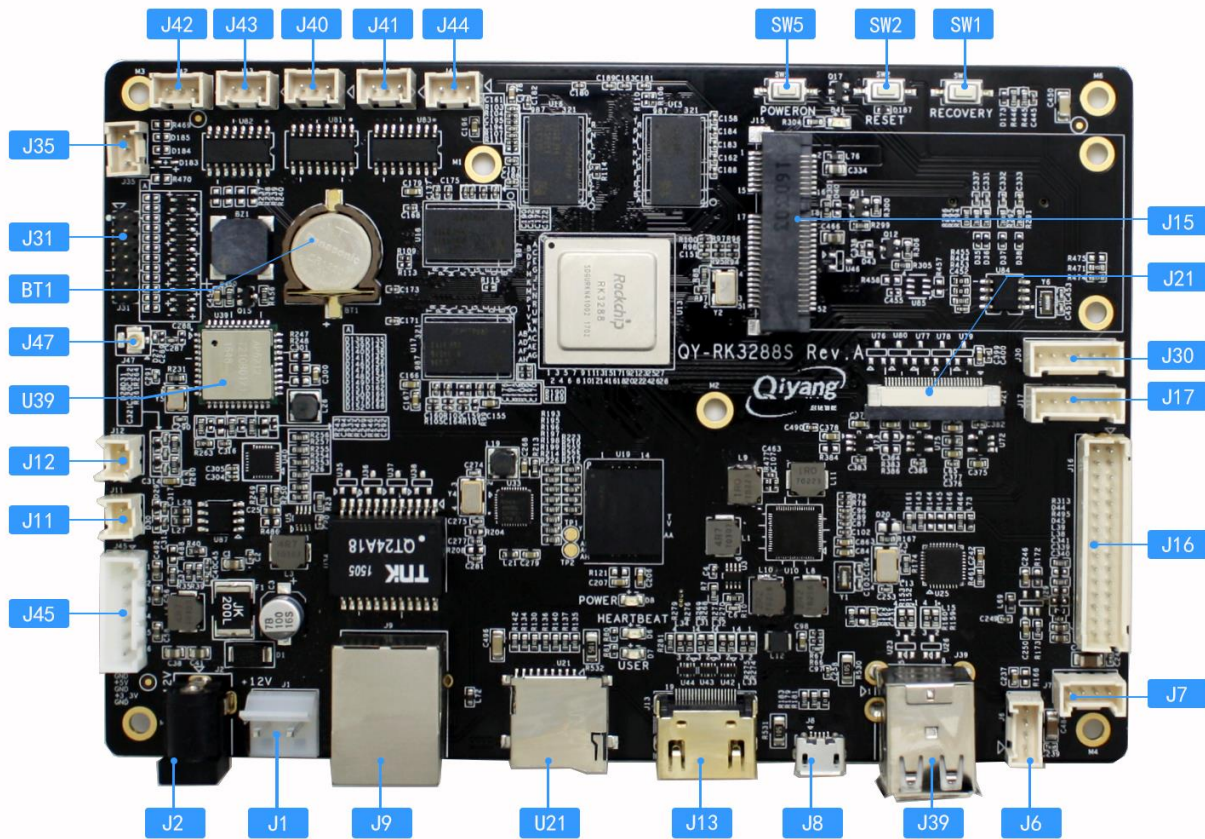
## 2.2 Mainboard Resource

Hardware Resources	CPU	RockChip RK3288 processor, Cortex-A17 Quad Core, Frequency reaches 1.8GHz	
	GPU	Mali-T764 GPU, Support AFBC(Frame Buffer Compression)	
	RAM	DDR3 SDRAM, 4*256MB, Total 2GB.	
	Flash	8GB EMMC	
	Network	AR8035 Network Chip, adopts RGMII mode, perfectly support 10M/100M/1000M, ethernet interface adaptable	
	Communication	5-ch RS232, 1 port as the debug UART, 4 ports as RS232	
		1-ch high speed USB OTG, 4-ch USB HOST	
		1-ch 10/100/1000Mbps industrial Ethernet port, with ACT/LINK indicator	
		onboard WIFI&BT module	
	Display	1-ch dual channel LVDS interface, support 30Bit HDMI interface,	
		support HDMI2.0, resolution reaches 4Kx2K@60Hz	
	Input	Standard I2C Capacitive panel interface	
	Expansion Interface	SIM card slot	
Memory Interface	1-ch TF card slot		
Others	Reset circuit, RTC		
Power Input	+12V power supply, can support +9V~+16V wide range voltage supply		
Resources	Development Tools	Development environment: Virtual Machine VM9.0.2+ubuntu14.04	
		Application layer development debug tool	
		Cross-compiler	
		Common terminal development debugging tool	
	Image File	Provide OS image burning file, support multiple resolution display	
	Test Program	Interface using demo test program APK	
	Source Code	Android 5.1 source code, test APP source code	
	Manual	Mainboard User Manual, mainboard Device Manual	
Mechanical	mainboard's Structure & Size		



Electrical specification	Chart	
	Size	156mm*106mm
	Layer	8-layer high precision immersion gold process
	Power Consumption	≤3W
	Operation Temperature	-20 °C ~ +70 °C (Could be customized to industrial level temperature)
	Operation Humidity	5%~95%, Non-Condensing

### III. Interface Functions



Picture 2

### 3.1 Basic Interface Function Description:

Lable	Function
J1	Power switch interface
J2	+12V power input interface
J6	4pin USB
J7	4pin USB
J8	mini USB
J9	Gigabit Ethernet
J11	Loudspeaker output
J12	MIC audio input
J13	standard HDMI
J15	MINI-PCIE
J16	LVDS
J17	Backlight power supply interface
J21	MIPI camera interface
J30	Capacitive touch(I2C&GPIO)
J31	2*6 GPIO
J35	KEY
J40	UART 3 (3PIin RS232)
J41	UART 1 (3PIin RS232)
J42	UART 0 (3PIin RS232)
J43	UART 4 (3PIin RS232)
J44	Debug UART (3PIin RS232)
J45	Reserved power supply interface

J47	Antenna interface
U21	TF card slot
BT1	RTC power supply(+3.0V)
SW1	Restore( for burning)
SW2	System reset button
SW5	Power reset button

### 3.2 Interface pin definition

J6: 4Pin USB interface

PIN	Signal Name
1	+5.0VD
2	USB3_D-
3	USB3_D+
4	GND

J7: 4Pin USB interface

PIN	Signal Name
1	+5.0VD
2	USB4_D-
3	USB4_D+
4	GND

J11: Loudspeaker output

PIN	Signal Name
1	VO-
2	VO+

## J12: MIC audio input

PIN	Signal Name
1	MIC_IN1P
2	MIC_IN1N

## J15: MINI\_PCIE interface

Signal Name	PIN	PIN	Signal Name
4G_WAKEUP_HOST	1	2	VCC_PCIE
NC	3	4	GND
NC	5	6	NC
NC	7	8	SIM_VDD
GND	9	10	SIM_DATA
NC	11	12	SIM_CLK
NC	13	14	SIM_RST
GND	15	16	NC
NC	17	18	GND
NC	19	20	PCIE_DISEN
GND	21	22	PCIE_RST
NC	23	24	VCC_PCIE
NC	25	26	GND
GND	27	28	NC
GND	29	30	NC
NC	31	32	NC
NC	33	34	GND
GND	35	36	HOST1_DM

GND	37	38	HOST1_DP
VCC_PCIE	39	40	GND
VCC_PCIE	41	42	GLED
GND	43	44	NC
NC	45	46	NC
NC	47	48	NC
NC	49	50	GND
NC	51	52	VCC_PCIE

## J16: LVDS

Signal Name	PIN	PIN	Signal Name
LVDS_D0-	1	2	LVDS_D0+
LVDS_D1-	3	4	LVDS_D1+
LVDS_D2-	5	6	LVDS_D2+
GND	7	8	VDS_CLK0-
LVDS_CLK0+	9	10	LVDS_D3+
LVDS_D3+	11	12	GND
LVDS_D5-	1	2	LVDS_D5+
LVDS_D6-	3	4	LVDS_D6+
LVDS_D7-	5	6	LVDS_D7+
GND	19	20	LVDS_CLK1-
LVDS_CLK1+	21	22	LVDS_D8-
LVDS_D8+	23	24	GND
LVDS_PWM	25	26	LVDS_BLEN
VCC_LVDS	27	28	GND
VCC_LVDS	29	30	VCC_LVDS

J17: Backlight power supply interface

PIN	Signal Name
1	VCC_12V0
2	VCC_12V0
3	GDN
4	GND
5	VCC_5V0
6	BL_PWM

J21: MIPI camera interface (30Pin FPC)

PIN	Signal Name
1	NC
2	VCC_28_DVP
3	VCC_12_DVP
4	VCC_18_DVP
5	NC
6	GND
7	AVDD28_DVP
8	GND
9	MIPI_SDA
10	MIPI_SCL
11	MIPI_RST
12	MIPI_PDN
13	GND
14	MIPI_MCLK0

15	GND
16	MIPI_RX_D3P
17	MIPI_RX_D3N
18	GND
19	MIPI_RX_D2P
20	MIPI_RX_D2N
21	GND
22	MIPI_RX_D1P
23	MIPI_RX_D1N
24	GND
25	MIPI_RX_CLKP
26	MIPI_RX_CLKN
27	GND
28	MIPI_RX_D0P
29	MIPI_RX_D0N
30	GND

J30: Capacitive touch interface

PIN	Signal Name
1	VCC_IO
2	I2C4_SDA_TP
3	I2C4_SCL_TP
4	TP_RST
5	TP_INT
6	BL_PWM

## J31: 2\*6 GPIO

Signal Name	PIN	PIN	Signal Name
GPIO5_B2_U	1	2	GPIO5_B3_U
GPIO5_B4_U	3	4	GPIO5_B5_U
GPIO5_C0_U	5	6	GPIO5_C1_U
GPIO5_C2_U	7	8	GPIO5_C3_U
GPIO8_A0_U	9	10	GPIO8_A1_U
GPIO8_A2_U	11	12	GPIO8_A3_U
GND	13	14	GND

## J35: KEYIO interface

PIN	Signal Name
1	SWLED_PWR
2	KEY_IO
3	GND

## J40: UART3 (3Pin RS232)

PIN	Signal Name
1	COM3_TXD
2	COM3_RXD
3	GND

## J41: UART1 (3Pin RS232)

PIN	Signal Name
1	COM1_TXD



2	COM1_RXD
3	GND

J42: UART0 (3Pin RS232)

PIN	Signal Name
1	COM0_TXD
2	COM0_RXD
3	GND

J43: UART4 (3Pin RS232)

PIN	Signal Name
1	COM4_TXD
2	COM4_RXD
3	GND

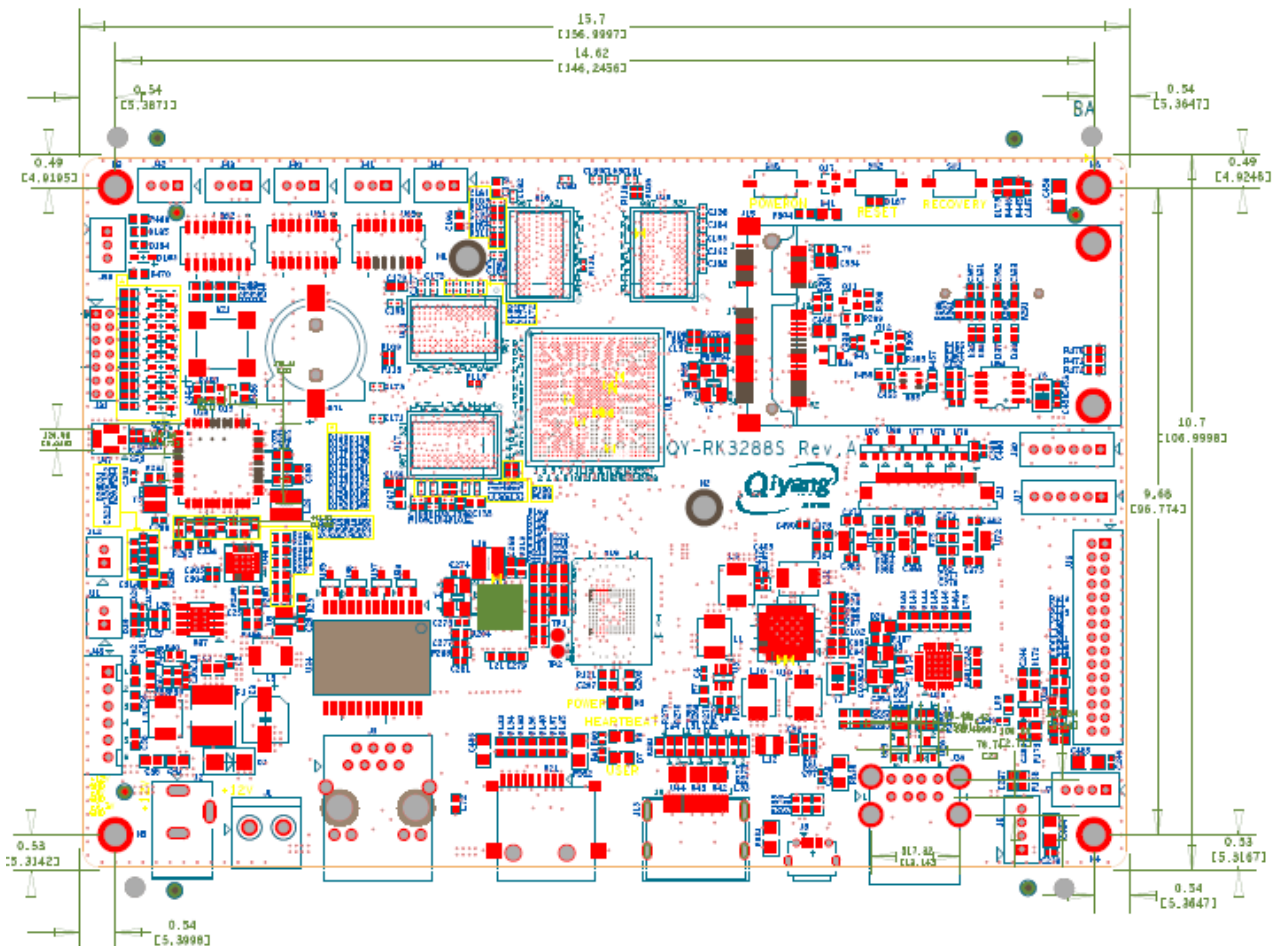
J44: Debug UART (3Pin RS232)

PIN	Signal Name
1	DBG_TXD
2	DBG_RXD
3	GND

## IV. Mainboard Function Illustration

To be completed later.

## V. Structure & Size Chart



## VI. Software Description

QY-RK3288S provides the software support for Android OS.

The *QY-RK3288S User Manual* will introduce the QY-RK3288S mainboard's setting up and using in Android developing environment. The detailed content could refer to the relative documentation.

## VII. Remark

1. Before connecting to LCD, please confirm the power specification of LCD module.
2. Please use the original connecting accessories to avoid damaging the main board.
3. We ensure offering communication technology support through E-mail, telephone for lifelong technical support service.
4. We ensure offering 6 months repair service for free, if malfunction occurs in warranty because of quality problem, contact our retailer or our company with purchase receipt in warranty period, we will repair or replace it.
5. Under these circumstances, we do not offer repair for free:
  - Over warranty time;
  - Do not have purchase receipt;

- Liquid inlet, Damp or Mold;

- Malfunction and damage is not due to product quality but drops, intense sharking, arbitrarily modify, disoperation after purchase;

- Damage of force majeure.

6. We reserve intellectual property for the software and hardware technical data of QY-RK3288S; users can only use them for teaching, testing, researching. Shall not be engaged in any commercial purpose. Shall not distribute them on the Internet. Shall not intercept, modify them to tamper copyright.

7. We accept batch order; we can offer comprehensive technical support and service.

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