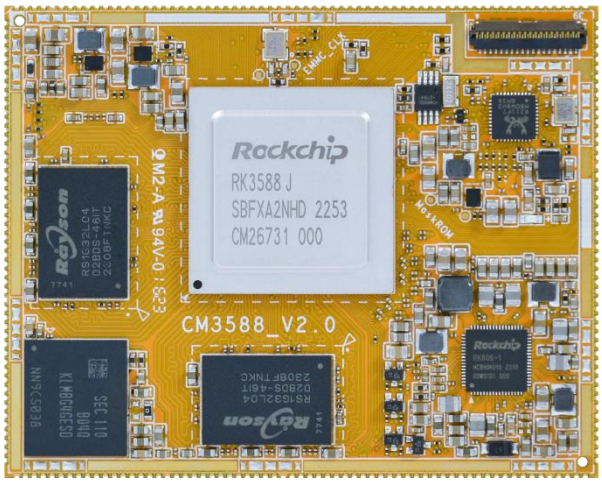
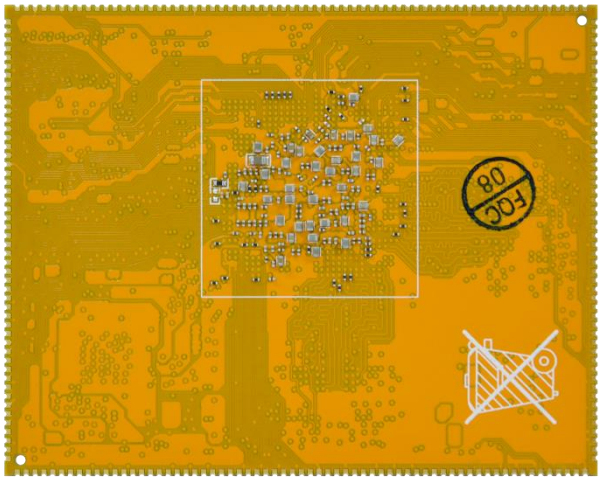
CM3588J Reference User Manual

V2. 20250305





Boardcon Embedded Design

www. armdesigner. com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com).

These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, if you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

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1 CM3588J Introduction

1.1 Summary

The CM3588J system-on-module is equipped with Rockchip's RK3588J, which features a quad-core Cortex-A76 and quad-core Cortex-A55 processor, an Embedded Mali-G610 MP4 GPU, and a 6.0 TOPs NPU.

It is designed specifically for high-performance devices such as 8K TV boxes or recorders, VI devices, intelligent interactive devices, personal computers, and robots. The high-performance multimedia processing and acceleration engine solution can help customers introduce new technologies more quickly and enhance the overall solution efficiency.

In particular, CM3588J is the industry version, with other specifications the same as CM3588.

1.2 Features

- **Microprocessor**
  - Quad-core Cortex-A76 up to 2.3GHz
  - Quad-core Cortex-A55 up to 1.8GHz
  - 64KB I-cache 64KB D-cache and 512KB L2 for A76 each core, 32KB I-cache 32KB D-cache and 512KB L2 for A55 each core, 3MB L3 cache
  - 6.0 TOPS Neural Process Unit, Embedded 384KB*3 internal buffer
  - Mali-G610 MP4 up to 0.8GHz
- **Memory Organization**
  - LPDDR4 or LPDDR4X RAM up to 16GB
  - eMMC up to 256GB
- **Boot ROM**
  - Supports system code download through USB OTG
- **Secure system**
  - Embedded two cipher engine
  -Support key ladder to guarantee key secure
  -Support secure OS and data scrambling
  -Support OTP
- **Video Decoder/Encoder**
  - Supports video decoding up to 8K@60fps
  - Supports H.264/265 encode up to 8K@30fps
  - H.264 HP encoding up to 1080p@100fps
  - Picture size up to 8192x8192
- **NPU**
  - Include Triple NPU core
  - Support deep learning frameworks
- **Display Subsystem**
  - **Video Output**

Supports 2-CH HDMI 2.1 TX with ARC, up to 8K@60fps
or EDP TX interface up to 4K@60Hz
HDMI 2.1 support FRL mode
Supports 4 lanes MIPI DSI up to 4K@60Hz
Supports 2-CH PD1.4a interface up to 8K@30Hz
Supports BT-1120 16bit output

- **Video/Image Input**

Supports 3-CH MIPI 4lanes CSI interfaces
Or 4-CH MIPI 2lanes + 1-CH 4lanes CSI interfaces
Supports HDMI 2.0 RX interface up to 4K@30Hz
Supports DVP 8/16-bit input

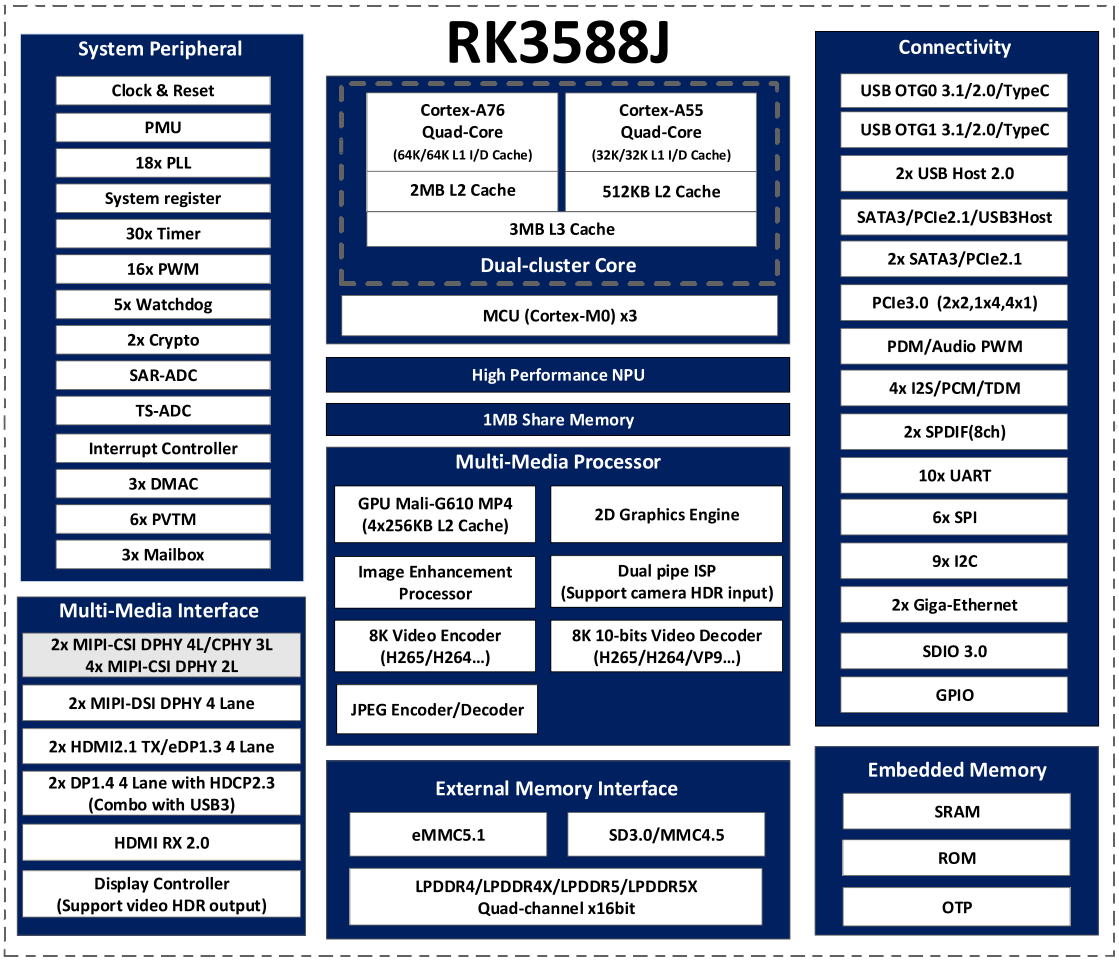
- **Audio**
  - Three I2S/PCM interfaces
  - Support 8-ch TX/RX on I2S0/1
  - Support Mic array Up to 8ch PDM/TDM interface
  - Two SPDIF output
  - Support voice activity detection
- **USB / PCIE/SATA3**
  - Two USB2.0 OTG/Host and two USB2.0 Host interfaces
  - Two USB3.0 OTG/Host or DP interfaces
  - One USB3.0 Host or SATA3 interface.
  - One PCIE2.1x1 or SATA3 interface.
  - One SATA3 interface.
  - One PCIE3.0x2 interface
  - Not support USB3.0/USB2.0 OTG SRP, HNP and RSP
  - SATA3 support five device each port via PM switch
- **Ethernet**
  - On board RTL8211F
  - Support up to 2-CH 1GB Ethernet
  - Support RMII/RGMII PHY interface
- **I2C**
  - Up to 7-CH I2C
  - Support standard mode and fast mode(up to 400kbit/s)
- **SDIO / SDMMC**
  - Support SDIO 3.0 protocol
  - Support SD3.0 card
- **SPI**
  - Up to four SPI controllers,
  - Full-duplex synchronous serial interface
- **UART**
  - Support up to 10 UARTs
  - UART2 with 2 wires for debug
  - Embedded two 64byte FIFO
- **CAN**

- Support up to three CAN controller
- Support CAN 2.0B protocol

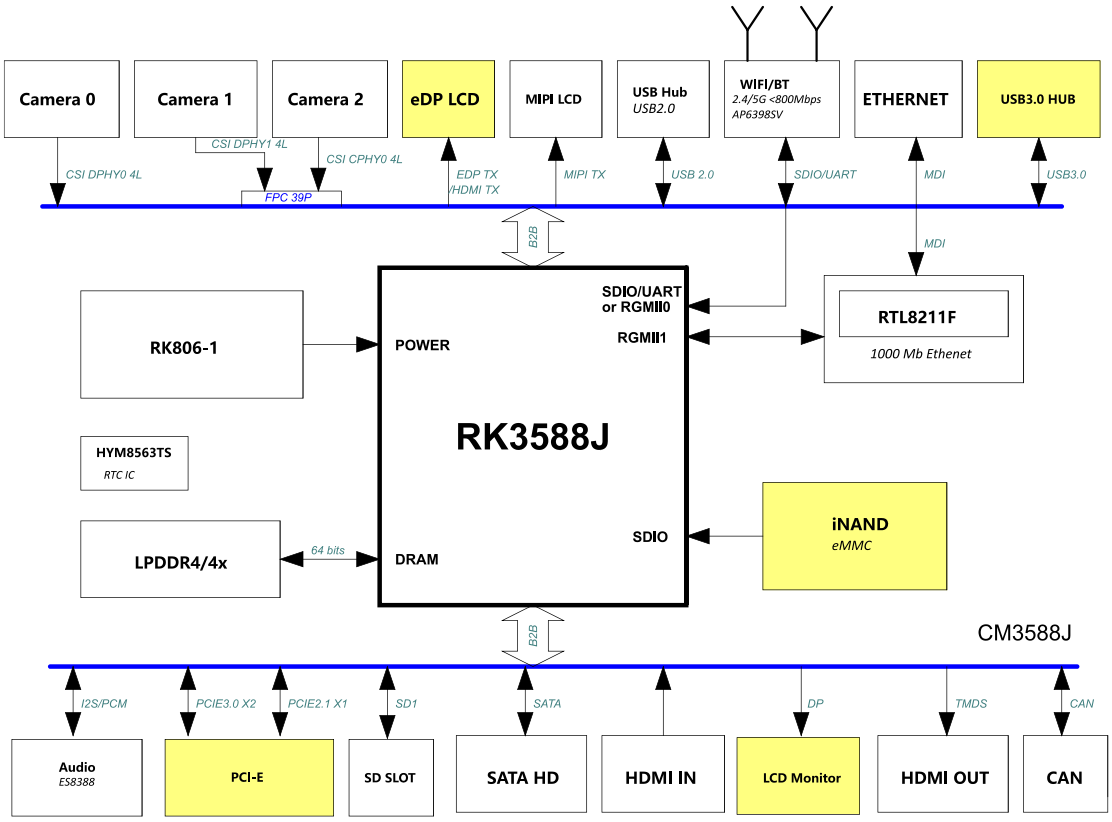
- **ADC**
  - Up to Two ADC channels
  - 12-bit resolution up to 1MS/s sampling rate
  - Voltage input range between 0V to 1.8V
- **PWM**
  - Up to15 PWMs with interrupt-based operation
  - Support 32bit time/counter facility
  - IR option on PWM3/7/11/15
- **Power unit**
  - PMU RK806 on board
  - 3.3 ~ 4.2V Power input up to 4A current
  - 1.8V and 3.3V max 500mA output
  - Very low RTC consume current, less 5uA at 3V button Cell.

1.3 CM3588J Block Diagram

1.3.1 RK3588J Block Diagram



1.3.2 Development board (Idea3588) Block Diagram

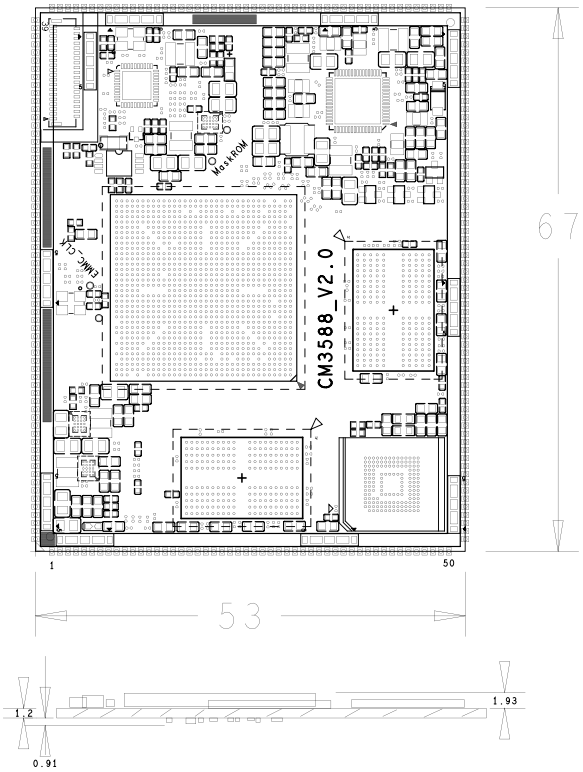


1.4 CM3588J Specifications

Feature	Specifications
CPU	Quad-core Cortex-A72 and quad-core Cortex-A55
DDR	8GB LPDDR4X (up to 16GB)
eMMC FLASH	32GB (up to 256GB)
Power	DC 3.3 ~ 4.5V
EDP/MIPI DSI	1-CH EDP, 1-CH MIPI DSI
I2S	3-CH
MIPI CSI	3-CH 4-Lane or 4-CH 2-Lane + 1-CH 4-Lan CSI (up to 5 Cameras)
SATA	3-CH
HDMI out	2-CH (EDP option)
HDMI in	1-CH
DP out	2-CH
CAN	3-CH
USB	1-CH USB Host2.0 + 1-CH Type C and 2-CH USB Host3.0
Ethernet	1-ch 1 GB PHY + 1-ch RGMII/RMII If RGMII0 is not needed, can be set to SDIO, UART and PCM for WIFI/BT

SDMMC	2-CH
SPDIF TX	2-CH
I2C	7-CH
SPI	4-CH
CAN	3-CH
UART	9-CH, 1-CH(DEBUG)
PWM	15-CH
ADC IN	2-CH
Board Dimension	67 x 53mm

1.5 CM3588J PCB Dimension



1.6 CM3588J Pin Definition

Pin	Signal	Description or functions	GPIO serial	IO Voltage
1	GPIO4_B0_d	BT1120_CLKOUT/CIF_CLKIN /PCIE30X2_PERSTn_M1	SPI2_CS1_M1	3.3V
2	DP1_HPDIN_M0	UART9_TX_M2/SPI0_CS1_M3/ PWM11_IR_M3	GPIO3_D5_d	3.3V
3	I2C6_SDA_M0	SPI0_MISO_M0/PWM6_M0 /PCIE30X4_WAKEn_M0	GPIO0_C7_d (PU2.2K)	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
4	I2C6_SCL_M0	PWM7_IR_M0 /PCIE30X4_PERSTn_M0	GPIO0_D0_d (PU2.2K)	3.3V
5	GPIO3_D4_d	UART9_RX_M2/SPI0_CS0_ M3/ PCIE30X2_PERSTn_M2	HDMI_TX0HPD_M1 /HDMI_RXHPDO_M1	3.3V
6	VCC_1V8	1.8V IO power output (PMU_Buck10)	(Max:500mA)	1.8V
7	SATA30_0_RXN	SATA3 CH0 RXN		0.5V
8	SATA30_0_RXP	SATA3 CH0 RXP		0.5V
9	SATA30_0_TXN	SATA3 CH0 TXN		0.5V
10	SATA30_0_TXP	SATA3 CH0 TXP		0.5V
11	USB30_2_SSRXP	SATA3/USB30 CH2 RXP		0.5V
12	USB30_2_SSRXN	SATA3/USB30 CH2 RXN		0.5V
13	USB30_2_SSTXP	SATA3/USB30 CH2 TXP		0.5V
14	USB30_2_SSTXN	SATA3/USB30 CH2 TXN		0.5V
15	GND	Ground		0V
16	I2S0_SDO2_SDI3_1V8	UART6_RX_M2/I2C7_SDA_ M0/SPI1_MOSI_M2	GPIO1_D1_d /PDM0_SDI1_M0	1.8V
17	I2S0_SDO3_SDI2_1V8	UART4_TX_M0/PWM0_M1/ SPI1_CLK_M2	GPIO1_D2_d /PDM0_SDI2_M0	1.8V
18	I2S0_SDI1_1V8	UART4_RX_M0/PWM1_M1/ SPI1_CS0_M2	GPIO1_D3_d /PDM0_SDI3_M0	1.8V
19	I2S0_SDI0_1V8		GPIO1_D4_d	1.8V
20	I2S0_MCLK_1V8	UART3_RTS_M0/PWM3_IR _M2/SPI4_CLK_M0	GPIO1_C2_d	1.8V
21	I2S0_SCLK_TX_1V8	UART3_CTS_M0/PWM7_IR _M2/SPI4_CS0_M0	GPIO1_C3_d	1.8V
22	I2S0_SCLK_RX_1V8	PWM11_IR_M2/SPI4_CS1_ M0/I2C2_SDA_M3	GPIO1_C4_d /PDM0_CLK1_M0	1.8V
23	I2S0_LRCK_TX_1V8	UART4_RTS_M0 /I2C2_SCL_M3	GPIO1_C5_d	1.8V
24	I2S0_LRCK_RX_1V8	PWM15_IR_M2 /I2C4_SDA_M4	GPIO1_C6_d /PDM0_CLK0_M0	1.8V
25	I2S0_SDO1_1V8	UART6_TX_M2/I2C7_SCL_ M0/SPI1_MISO_M2	GPIO1_D0_d	1.8V
26	I2S0_SDO0_1V8	UART4_CTS_M0 /I2C4_SCL_M4	GPIO1_C7_d	1.8V
27	I2C4_SDA_M3_1V8	UART6_RTS_M1/PWM0_M2 /SPI4_CLK_M2	GPIO1_A2_d (PU2.2K)	1.8V
28	I2C4_SCL_M3_1V8	UART6_CTS_M1/PWM1_M2 /SPI4_CS0_M2	GPIO1_A3_d (PU2.2K)	1.8V
29	I2C2_SDA_M4_1V8	UART6_RX_M1/PD0_HPDIN _M2/SPI4_MISO_M2	GPIO1_A0_d (PU2.2K)	1.8V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
30	I2C2_SCL_M4_1V8	UART6_TX_M1/PD1_HPDIN _M2/SPI4_MOSI_M2	GPIO1_A1_d (PU2.2K)	1.8V
31	MIPI_CAM2_CLKO_M0 _1V8	UART1_RX_M1/SPDIF1_TX _M0/PWM13_M2/	GPIO1_B7_u	1.8V
32	GND	Ground		0V
33	PDM1_CLK0_M1_1V8	SPI0_CS0_M2	GPIO1_B4_u	1.8V
34	PDM1_SDI3_M1_1V8	SPI0_MOSI_M2/UART4_RX _M2/PCIE30X4_PERST_M3	GPIO1_B2_d	1.8V
35	PDM1_SDI2_M1_1V8	SPI0_MISO_M2 /PCIE30X4_WAKE_M3	GPIO1_B1_d	1.8V
36	PDM1_SDI1_M1_1V8	SPI2_CS1_M0 /PCIE30X4_CLKREQn_M3	GPIO1_B0_u	1.8V
37	PDM1_SDI0_M1_1V8	SPI2_CS0_M0/PWM3_IR_M 3/PCIE30X1_1_PERST_M2	GPIO1_A7_u	1.8V
38	PDM1_CLK1_M1_1V8	UART4_TX_M2/SPI0_CLK_ M2/PCIE30X1_0_WAKE_M2	GPIO1_B3_d	1.8V
39	HDMIIRX_HPDOUT_M 2_1V8	UART1_TX_M1/SPDIF0_TX _M0/PCIE30x2_WAKE_M3	GPIO1_B6_u	1.8V
40	HDMITX1_HPDIN_M0_ 1V8	SPI2_CLK_M0	GPIO1_A6_d	1.8V
41	HDMITX0_HPDIN_M0_ 1V8	SPI2_MOSI_M0	GPIO1_A5_d	1.8V
42	TYPEC0_SBU2_DC		GPIO0_D3_u	3.3V
43	TYPEC0_SBU1_DC	SPI0_CLK_M0/PWM5_M1 /PCIE30x4_CLKREQ_M0	GPIO0_C6_u	3.3V
44	PWM2_M0	DP0_HPDIN_M1/PDM0_CLK _M1/PCIE30x1_0_Wake_M0	GPIO0_C4_d	3.3V
45	UART2_TX_M0_DEBU G	PCIE30x1_1_CLKREQ_M0 /JTAG_TCK_M2	GPIO0_B5_d (Debug UART)	3.3V
46	UART2_RX_M0_DEBU G	PCIE30x1_1_WAKE_M0 /JTAG_TMS_M2	GPIO0_B6_d (Debug UART)	3.3V
47	CAN0_RX_M0	SPI0_MOSI_M0/PDM0_CLK 0_M1/I2C2_SDA_M0	GPIO0_C0_d /PWM1_M0	3.3V
48	CAN0_TX_M0	SPI0_CS1_M0/I2C2_SCL_M 0/PCIE30x1_PERST_M0	GPIO0_B7_d /PWM0_M0	3.3V
49	UART7_TX_M1		GPIO3_C0_d	3.3V
50	UART7_RX_M1		GPIO3_C1_d	3.3V
51	GND	Ground		0V
52	HDMITX0_SCL_M0	SPI3_CLK_M1/I2C5_SDA_M 1/BT1120_D13	GPIO4_B7_u	3.3V
53	SATA1_ACT_LED_M0	UART9RX_M1/SPI3MISO_M 1/BT1120-D11/HDMIRx_cec0	GPIO4_B5_d /PWM12_M1	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
54	SATA0_ACT_LED_M0	I2C5SCL_M1/SPI3MOSI_M1 /BT1120_D12/HDMIRx_hpd0	GPIO4_B6_d /PWM13_M1	3.3V
55	HDMITX0_SDA_M0	SPI3_CS0_M1/I2C8_SCL_M 3/BT1120_D14	GPIO4_C0_u	3.3V
56	PCIE30X4_WAKEn_M 2_L	UART5Rx_M1/CAN2_Tx_M0 /SPI3_CS1_M3 /CIF_D9 /HDMI_TX1_SDA_M1	GPIO3_C5_u	3.3V
57	PCIE30X4_PERSTn_M 2_L	SPI3_MISO_M3 /CIF_D10 /HDMI_TX1_SCL_M1	GPIO3_C6_u	3.3V
58	PCIE30X4_CLKREQn_ M2_L	UART5Tx_M1/CAN2_Rx_M0 /SPI3_CS0_M3 /CIF_D8 /HDMI_TX1_CEC_M1	GPIO3_C4_u	3.3V
59	HDMI_RX_SDA_M1	UART9CTS_M2/SPI0CLK_M 3 /I2C7SDA_M2/CIF_D15	GPIO3_D3_d /PWM10_M2	3.3V
60	HDMI_RX_SCL_M1	UART9RTS_M2/SPI0MOSI_ M3 /I2C7SCL_M2/CIF_D14	GPIO3_D2_d/ PCIe30x2_clkreq_M2	3.3V
61	HDMI_RX_CEC	UART4_TX_M1/SPI0_MISO _M3 /CIF_D13	GPIO3_D1_d /PWM9_M2	3.3V
62	I2C5_SDA_M0	UART4_RX_M1/SPI3_CLK_ M3/CIF_D12/HDMI_TX0_SD A_M2	GPIO3_D0_u /PWM8_M2	3.3V
63	I2C5_SCL_M0	SPI0_MOSI_M3/CIF_D11/H DMI_TX0_SCL_M2	GPIO3_C7_u/PCIE2 0X1_2_CLKREQ_M0	3.3V
64	HDMITX0_CEC_M0	SPI3_CS1_M1/I2C8SDA_M3 /SPDIF1TX_M2/BT1120_D15	GPIO4_C1_d	3.3V
65	GPIO4_B2_U	CAN1RX_M1/UART8RTS_M 0/SPI0CS0_M0/BT1120_D8	PWM14_M1/CIF_HR EF/I2C7_SCL_M3	3.3V
66	PWM15_IR_M1	CAN1TX_M1/UART8CTS_M 0/I2C7_SDA_M3/BT1120_D9	GPIO4_B3_u /CIF_VSYNC	3.3V
67	USB_OTG_PWREN_H _GPIO4_A7	SPI2_CS0_M1/I2C5_SDA_M 2/BT1120_D7/CIF_D7	GPIO4_A7_d	3.3V
68	GND	Ground		0V
69	USB20_HOST0_DM			1.8V
70	USB20_HOST0_DP			1.8V
71	USB20_HOST1_DM			1.8V
72	USB20_HOST1_DP			1.8V
73	TYPEC1_USB20_OTG _DM			1.8V
74	TYPEC1_USB20_OTG _DP			1.8V
75	SDMMC0_CMD	CAN0_TX_M1/UART5_RX_ M0/PDM1_CLK1_M0	GPIO4_D4_u /PWM7_IR_M1	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
76	SDMMC0_D3	UART5_RTS_M0/PDM1_SDI0_M0/I2C8_SDA_M0	GPIO4_D3_u /PWM10_M1	3.3V
77	SDMMC0_D2	UART5_CTS_M0/PDM1_SDI1_M0/I2C8_SCL_M0	GPIO4_D2_u	3.3V
78	SDMMC0_D1	UART2_RX_M1/PDM1_SDI2_M0/I2C3_SDA_M4	GPIO4_D1_u /PWM9_M1	3.3V
79	SDMMC0_D0	UART2_TX_M1/PDM1_SDI3_M0/I2C3_SCL_M4	GPIO4_D0_u /PWM8_M1	3.3V
80	SDMMC0_CLK	CAN0_RX_M1/UART5_TX_M0/PDM1_CLK0_M0	GPIO4_D5_d	3.3V
81	GND	Ground		0V
82	HDMI_RX_CLKP			0.5V
83	HDMI_RX_CLKN			0.5V
84	HDMI_RX_D0N			0.5V
85	HDMI_RX_D0P			0.5V
86	HDMI_RX_D2N			0.5V
87	HDMI_RX_D2P			0.5V
88	HDMI_RX_D1N			0.5V
89	HDMI_RX_D1P			0.5V
90	HDMI0_TX_SBDP/eDP0_TX_AUXP	HDMI0_TX_eARC+ /eDP0_TX_AUXP	(Default HDMI)	0.5V
91	HDMI0_TX_SBDN/eDP0_TX_AUXN	HDMI0_TX_eARC- /eDP0_TX_AUXN	(Default HDMI)	0.5V
92	HDMI0_TX3P_PORT	HDMI0TX_CLKP/eDP0TX3P	(Default HDMI)	0.5V
93	HDMI0_TX3N_PORT	HDMI0TX_CLKN/eDP0TX3N	(Default HDMI)	0.5V
94	HDMI0_TX2P_PORT	HDMI0_TX /eDP0_TX2P	(Default HDMI)	0.5V
95	HDMI0_TX2N_PORT	HDMI0_TX /eDP0_TX2N	(Default HDMI)	0.5V
96	HDMI0_TX1P_PORT	HDMI0_TX /eDP0_TX1P	(Default HDMI)	0.5V
97	HDMI0_TX1N_PORT	HDMI0_TX /eDP0_TX1N	(Default HDMI)	0.5V
98	HDMI0_TX0P_PORT	HDMI0_TX /eDP0_TX0P	(Default HDMI)	0.5V
99	HDMI0_TX0N_PORT	HDMI0_TX /eDP0_TX0N	(Default HDMI)	0.5V
100	VCC_3V3	3.3V IO power output (PMU_Buck8)	(Max:500mA)	3.3V
101	HDMI1_TX_SBDP/eDP1_TX_AUXP	HDMI1_TX_eARC+ /eDP1_TX_AUXP	(Default EDP)	0.5V
102	HDMI1_TX_SBDN/eDP1_TX_AUXN	HDMI1_TX_eARC- /eDP1_TX_AUXN	(Default EDP)	0.5V
103	HDMI1_TX3P_PORT	HDMI1TX_CLKP/eDP1TX3P	(Default EDP)	0.5V
104	HDMI1_TX3N_PORT	HDMI1TX_CLKN/eDP1TX3N	(Default EDP)	0.5V
105	HDMI1_TX0N_PORT	HDMI1_TX /eDP1_TX0N	(Default EDP)	0.5V
106	HDMI1_TX0P_PORT	HDMI1_TX /eDP1_TX0P	(Default EDP)	0.5V
107	HDMI1_TX1N_PORT	HDMI1_TX /eDP1_TX1N	(Default EDP)	0.5V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
108	HDMI1_TX1P_PORT	HDMI1_TX /eDP1_TX1P	(Default EDP)	0.5V
109	HDMI1_TX2N_PORT	HDMI1_TX /eDP1_TX2N	(Default EDP)	0.5V
110	HDMI1_TX2P_PORT	HDMI1_TX /eDP1_TX2P	(Default EDP)	0.5V
111	GND	Ground		0V
112	DP1_TX0N	TYPEC1_RX1N/DP1_TX0N	(Default DP)	0.5V
113	DP1_TX0P	TYPEC1_RX1P/DP1_TX0P	(Default DP)	0.5V
114	DP1_TX1N	TYPEC1_TX1N/DP1_TX1N	(Default DP)	0.5V
115	DP1_TX1P	TYPEC1_TX1P/DP1_TX1P	(Default DP)	0.5V
116	DP1_TX2N	TYPEC1_RX2N/DP1_TX2N	(Default DP)	0.5V
117	DP1_TX2P	TYPEC1_RX2P/DP1_TX2P	(Default DP)	0.5V
118	DP1_TX3P	TYPEC1_TX2P/DP1_TX3P	(Default DP)	0.5V
119	DP1_TX3N	TYPEC1_TX2N/DP1_TX3N	(Default DP)	0.5V
120	DP1_AUXP	TYPEC1_SBU1/DP1_AUXP	(Default DP)	0.5V
121	DP1_AUXN	TYPEC1_SBU2/DP1_AUXN	(Default DP)	0.5V
122	GND	Ground		0V
123	TYPEC0_USB20_OTG_DP	USB download Port		1.8V
124	TYPEC0_USB20_OTG_DM	USB download Port		1.8V
125	TYPEC0_SBU1/DP0_AUXP	TYPEC0_SBU1/DP0_AUXP	(Default TYPE-C)	0.5V
126	TYPEC0_SBU2/DP0_AUXN	TYPEC0_SBU2/DP0_AUXN	(Default TYPE-C)	0.5V
127	PWR_EN	Power Key input		3.3~4.5V
128	TYPEC0_USB20_OTG_ID	USB20 OTG ID input		1.8V
129	TYPEC0_USB20_VBUSDET	USB OTG VBUS detect input		3.3V
130	MIPI_DPHY1_TX_D0P			0.5V
131	MIPI_DPHY1_TX_D0N			0.5V
132	MIPI_DPHY1_TX_D1P			0.5V
133	MIPI_DPHY1_TX_D1N			0.5V
134	MIPI_DPHY1_TX_CLKP			0.5V
135	MIPI_DPHY1_TX_CLKN			0.5V
136	MIPI_DPHY1_TX_D2P			0.5V
137	MIPI_DPHY1_TX_D2N			0.5V
138	MIPI_DPHY1_TX_D3P			0.5V
139	MIPI_DPHY1_TX_D3N			0.5V
140	GND	Ground		0V
141	TYPEC0_SSRX1N	TYPEC0_RX1N/DP0_TX0N	(Default TYPE-C)	0.5V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
142	TYPEC0_SSRX1P	TYPEC0_RX1P/DP0_TX0P	(Default TYPE-C)	0.5V
143	TYPEC0_SSTX1P	TYPEC0_TX1P/DP0_TX1P	(Default TYPE-C)	0.5V
144	TYPEC0_SSTX1N	TYPEC0_TX1N/DP0_TX1N	(Default TYPE-C)	0.5V
145	TYPEC0_SSRX2N	TYPEC0_RX2N/DP0_TX2N	(Default TYPE-C)	0.5V
146	TYPEC0_SSRX2P	TYPEC0_RX2P/DP0_TX2P	(Default TYPE-C)	0.5V
147	TYPEC0_SSTX2P	TYPEC0_TX2P/DP0_TX3P	(Default TYPE-C)	0.5V
148	TYPEC0_SSTX2N	TYPEC0_TX2N/DP0_TX3N	(Default TYPE-C)	0.5V
149	GND	Ground		0V
150	SPDIF0_TX_M1	UART9TX_M1/BT1120_D10/ PCIE30X4_CLKREQ_M1 /DP0_HPDIN_M0	GPIO4_B4_u /PWM11_IR_M1	3.3V
151	PCIE30X1_1_PERSTn _M1_L	SPI0_CLK_M1 /BT1120_D2/CIF_D2	GPIO4_A2_d	3.3V
152	UART3_RX_M2	SPI2_CLK_M1/I2C5_SCL_M 2/BT1120_D6/CIF_D6/ PCIE30X2_CLKREQ_M1	GPIO4_A6_d	3.3V
153	UART3_TX_M2	SPI2_MOSI_M1/I2C3_SDA_ M2/BT1120_D5/CIF_D5 / PCIE30X1_0_PERST_M1	GPIO4_A5_d	3.3V
154	UART0_RX_M2	SPI2_MISO_M1/I2C3_SCL_ M2/BT1120_D4/CIF_D4 / PCIE30X1_0_WAKE_M1	GPIO4_A4_d	3.3V
155	UART0_TX_M2	BT1120_D3/CIF_D3 / PCIE30X1_0_CLKREQ_M1	GPIO4_A3_d	3.3V
156	PCIE30x1_1_CLKREQ n_M1_L	SPI0_MISO_M1/UART9_RT S_M1/BT1120_D0/CIF_D0	GPIO4_A0_d	3.3V
157	PCIE30X1_1_WAKEn_ M1_L	SPI0_MOSI_M1/UART9_CT S_M1/BT1120_D1/CIF_D1	GPIO4_A1_d	3.3V
158	PHY1_MDI0+			0.5V
159	PHY1_MDI0-			0.5V
160	PHY1_MDI1+			0.5V
161	PHY1_MDI1-			0.5V
162	PHY1_MDI2+			0.5V
163	PHY1_MDI2-			0.5V
164	PHY1_MDI3+			0.5V
165	PHY1_MDI3-			0.5V
166	PHY1_LED2/CFG_LD O1	Ethernet Speed LED	(PD 10K)	3.3V
167	PHY1_LED1/CFG_LD O0	Ethernet Link LED	(PD 10K)	3.3V
168	GND	Ground		0V
169	RECOVERY_SARADC	Program need short to GND	(PU 10K)	1.8V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
	_VIN1	when power on.		
170	SARADC_VIN5			1.8V
171	VCC_RTC	RTC button Cell power input		1.8~3.3V
172	RTC32KOUT_WIFI	32.768kHz output	(PU 10K)	1.8V
173	SDMMC_DET_1V8	SD Card Detection	(Need pull up)	1.8V
174	MIPI_CSI0_RX_CLK1P	CSI0_RX1_CLKP		0.5V
175	MIPI_CSI0_RX_CLK1N	CSI0_RX1_CLKN		0.5V
176	MIPI_CSI0_RX_D3P	CSI0_RX0_D3P / RX1_D1P		0.5V
177	MIPI_CSI0_RX_D3N	CSI0_RX0_D3N / RX1_D1N		0.5V
178	MIPI_CSI0_RX_D2P	CSI0_RX0_D2P / RX1_D0P		0.5V
179	MIPI_CSI0_RX_D2N	CSI0_RX0_D2N / RX1_D0N		0.5V
180	MIPI_CSI0_RX_CLK0P	CSI0_RX0_CLKP		0.5V
181	MIPI_CSI0_RX_CLK0N	CSI0_RX0_CLKN		0.5V
182	MIPI_CSI0_RX_D1P	CSI0_RX0_D1P		0.5V
183	MIPI_CSI0_RX_D1N	CSI0_RX0_D1N		0.5V
184	MIPI_CSI0_RX_D0P	CSI0_RX0_D0P		0.5V
185	MIPI_CSI0_RX_D0N	CSI0_RX0_D0N		0.5V
186	GND	Ground		0V
187	I2S2_SDO_M0_GMAC0-MCK_1V8	SPI3_CS1_M0 /I2C7_SCL_M1	GPIO4_C3_d /PWM4_M1	1.8V
188	SDIO_CLK_M0_GMAC0-TCK_1V8	I2C3_SDA_M3 /FSPI_CLK_M1	GPIO2_B3_d	1.8V
189	I2S2_LRCK_M0_GMAC0-TE_1V8	UART1_RTS_M0/SPI1_CLK_M0 /I2C2_SDA_M1	GPIO2_C0_d	1.8V
190	GMAC0-TD0_1V8	UART1_RX_M0/I2S2_MCLK_M0 /I2C5_SCL_M4	GPIO2_B6_d	1.8V
191	I2S2_SCLK_M0_GMAC0-TD1_1V8	UART1_TX_M0 /I2C5_SDA_M4	GPIO2_B7_d	1.8V
192	SDIO_D3_M0_GMAC0-TD2_1V8	UART6_CTS_M0/FSPI_D3_M1 /I2C8_SDA_M1	GPIO2_B1_u	1.8V
193	SDIO_CMD_M0_GMAC0-TD3_1V8	I2C3_SCL_M3	GPIO2_B2_u	1.8V
194	SDIO_D2_M0_GMAC0-RCK_1V8	UART6_RTS_M0/FSPI_D2_M1 /I2C8_SCL_M1	GPIO2_B0_u	1.8V
195	GMAC0-RV_1V8	UART7_RTS_M0 /SPI3_CS0_M0	GPIO4_C2_d /PWM2 _M2	1.8V
196	GMAC0-RD0_1V8	UART1_CTS_M0/SPI1_MISO_M0/I2C2_SCL_M1	GPIO2_C1_d	1.8V
197	UART9_TX_M0_GMAC0-RD1_1V8	SPI1_MOSI_M0 /I2C6_SDA_M2	GPIO2_C2_d	1.8V
198	SDIO_D0_M0_GMAC0-RD2_1V8	UART6_RX_M0 /FSPI_D0_M1	GPIO2_A6_u	1.8V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
199	SDIO_D1_M0_GMAC0 -RD3_1V8	UART6_TX_M0 /FSPI_D1_M1	GPIO2_A7_u	1.8V
200	GND	Ground		0V
201	PCIE20_1_TXP/SATA3 0_1_TXP	PCIE or SATA interface		0.5V
202	PCIE20_1_TXN/SATA3 0_1_TXN	PCIE or SATA interface		0.5V
203	PCIE20_1_RXP/SATA3 0_1_RXP	PCIE or SATA interface		0.5V
204	PCIE20_1_RXN/SATA3 0_1_RXN	PCIE or SATA interface		0.5V
205	PCIE20_1_REFCLKP			0.5V
206	PCIE20_1_REFCLKN			0.5V
207	PCIE30_PORT0_RX0P			0.5V
208	PCIE30_PORT0_RX0N			0.5V
209	PCIE30_PORT0_RX1P			0.5V
210	PCIE30_PORT0_RX1N			0.5V
211	PCIE30_PORT0_REFC LKP_IN			0.5V
212	PCIE30_PORT0_REFC LKN_IN			0.5V
213	PCIE30_PORT0_TX0P			0.5V
214	PCIE30_PORT0_TX0N			0.5V
215	PCIE30_PORT0_TX1P			0.5V
216	PCIE30_PORT0_TX1N			0.5V
217	GND	Ground		0V
218	UART9_RX_M0_1V8	SPI1_CS1_M0 /HDMI_TX1_CEC_M0	GPIO2_C4_d	1.8V
219	UART9_CTSn_M0_GM AC0-MDI_1V8	SPI3_MOSI_M0	GPIO4_C5_d /PWM6_M2	1.8V
220	UART9_RTSn_M0_GM AC0-MDC_1V8	SPI3_MISO_M0 /I2C7_SDA_M1	GPIO4_C4_d /PWM5_M2	1.8V
221	SPI3_CLK_MO_1V8	UART_7CTS_M0 /GMAC0_TXER	GPIO4_C6_d /PWM7_IR_M3	1.8V
222	I2S2_SDI_M0_1V8	SPI1_CS0_M0/I2C6_SCL_M 2/ETH0_REFCLKO_25M	GPIO2_C3_d	1.8V
223	I2C3_SDA_M0_1V8	UART3_RX_M0 /SPI4_MISO_M0	GPIO1_C0_z (PU2.2K)	1.8V
224	I2C3_SCL_M0_1V8	UART3_TX_M0 /SPI4_MOSI_M0	GPIO1_C1_z (PU2.2K)	1.8V
225	RESET_L	System Reset (to RST_KEY)		1.8V
226	GND	Ground		0V

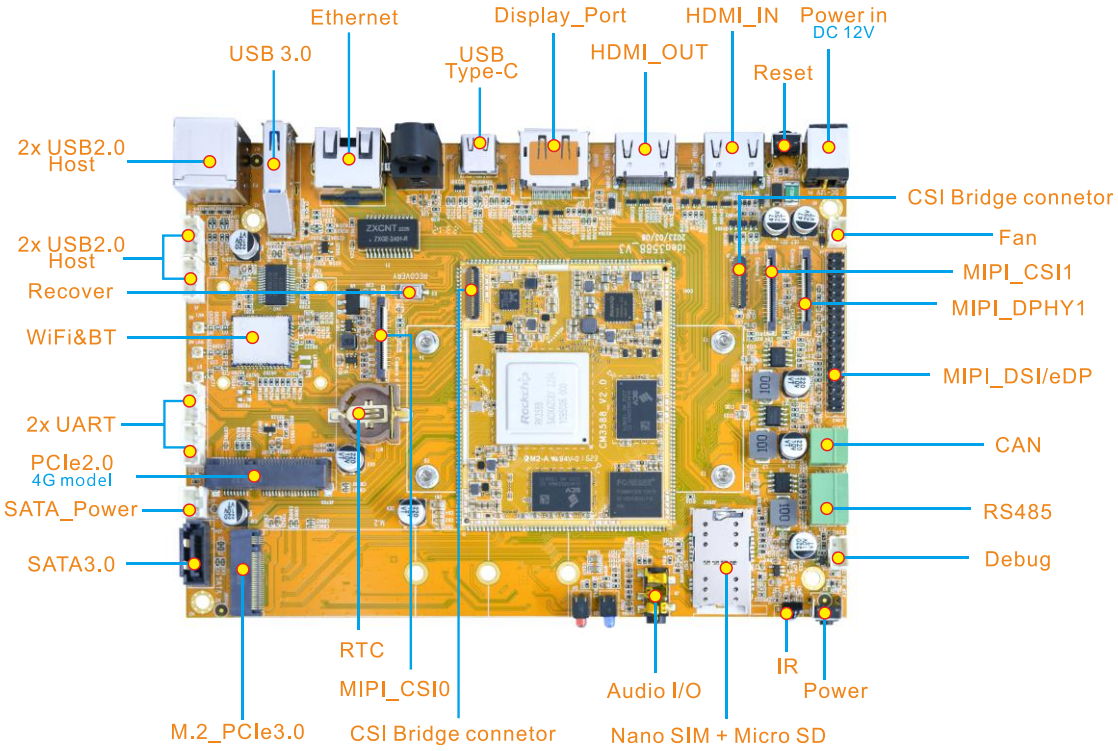
Pin	Signal	Description or functions	GPIO serial	IO Voltage
227	VCC_SYS	System Power Input		3.3~4.5V
228	VCC_SYS	System Power Input		3.3~4.5V
229	VCC_SYS	System Power Input		3.3~4.5V
230	VCC_SYS	System Power Input		3.3~4.5V
Note: *Could be add DC common resistor for level shift circuit when HDMI1 used.* *When DP1 exchange to TYPE C or USB3.0 need change some parts. Connect to me please.*				

Camera Bridge connector

J1	Signal	Description or functions	GPIO serial	IO Voltage
1	MIPI_CAM4_CLKO_M0_1V8	UART1_CTS_M1/I2C8_SDA_M2/HDMI_RX_SDA_M2	GPIO1_D7_u PWM15_IR_M3	1.8V
2	GND	Ground		0V
3	MIPI_CAM3_CLKO_M0_1V8	UART1_RTS_M1/I2C8_SCL_M2/HDMI_RX_SCL_M2	GPIO1_D6_u PWM14_M2	1.8V
4	GND	Ground		0V
5	GND	Ground		0V
6	MIPI_CSI1_RX_D0N	CSI1_RX0_D0N		0.5V
7	MIPI_CSI1_RX_D0P	CSI1_RX0_D0P		0.5V
8	GND	Ground		0V
9	MIPI_CSI1_RX_D1N	CSI1_RX0_D1N		0.5V
10	MIPI_CSI1_RX_D1P	CSI1_RX0_D1P		0.5V
11	GND	Ground		0V
12	MIPI_CSI1_RX_CLK0N	CSI1_RX0_CLKN		0.5V
13	MIPI_CSI1_RX_CLK0P	CSI1_RX0_CLKP		0.5V
14	GND	Ground		0V
15	MIPI_CSI1_RX_D2N	CSI1_RX0_D2N / RX1_D0N		0.5V
16	MIPI_CSI1_RX_D2P	CSI1_RX0_D2P / RX1_D0P		0.5V
17	GND	Ground		0V
18	MIPI_CSI1_RX_D3N	CSI1_RX0_D3N / RX1_D1N		0.5V
19	MIPI_CSI1_RX_D3P	CSI1_RX0_D3P / RX1_D1P		0.5V
20	GND	Ground		0V
21	MIPI_CSI1_RX_CLK1N	CSI1_RX1_CLKN		0.5V
22	MIPI_CSI1_RX_CLK1P	CSI1_RX1_CLKP		0.5V
23	GND	Ground		0V
24	GND	Ground		0V
25	MIPI_DPHY1_RX_D3N			0.5V
26	MIPI_DPHY1_RX_D3P			0.5V
27	GND	Ground		0V
28	MIPI_DPHY1_RX_D2N			0.5V
29	MIPI_DPHY1_RX_D2P			0.5V

J1	Signal	Description or functions	GPIO serial	IO Voltage
30	GND	Ground		0V
31	MIPI_DPHY1_RX_CLKN			0.5V
32	MIPI_DPHY1_RX_CLKP			0.5V
33	GND	Ground		0V
34	MIPI_DPHY1_RX_D1N			0.5V
35	MIPI_DPHY1_RX_D1P			0.5V
36	GND	Ground		0V
37	MIPI_DPHY1_RX_D0N			0.5V
38	MIPI_DPHY1_RX_D0P			0.5V
39	GND	Ground		0V
Note: *J1 is bridge connector used for MIPI camera via 39 pins FPC.*				

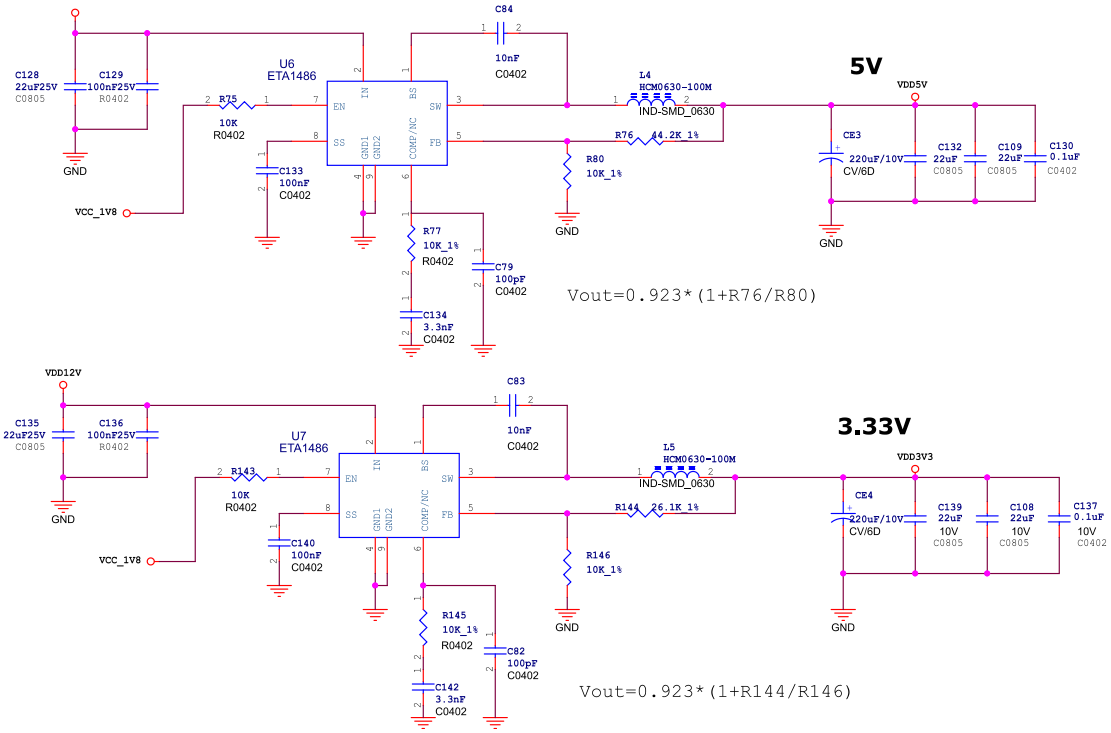
1.7 Development Kit (Idea3588)



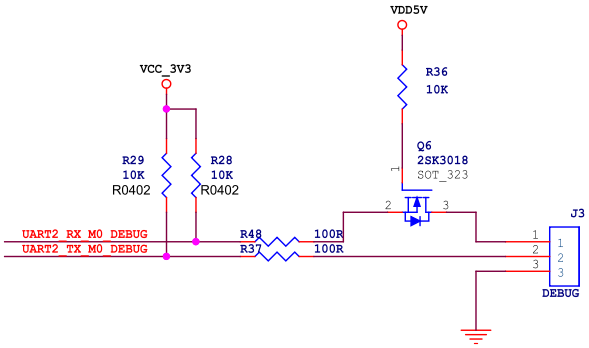
2 Hardware Design Guide

2.1 Peripheral Circuit Reference

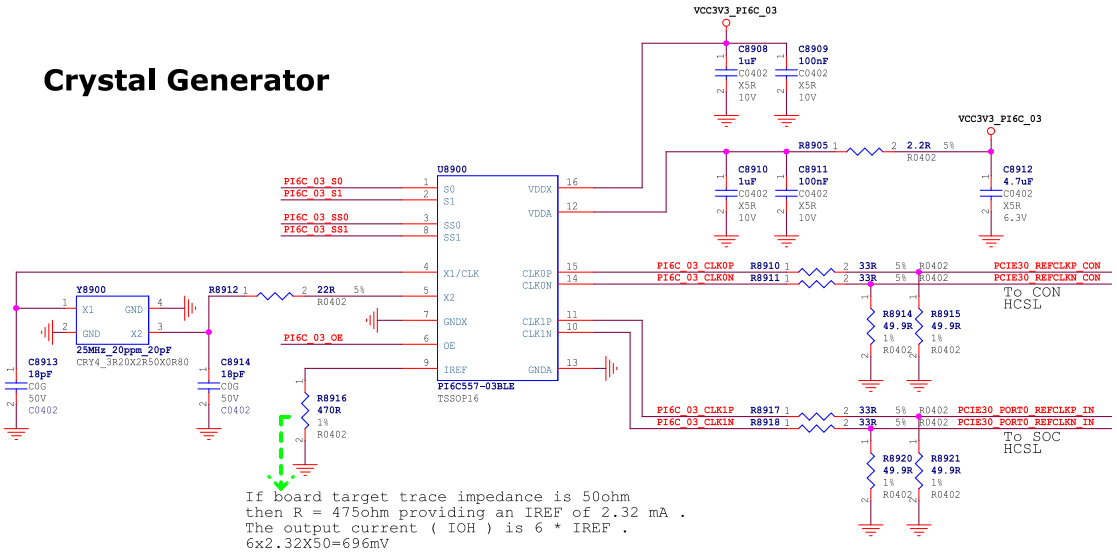
2.1.1 External Power



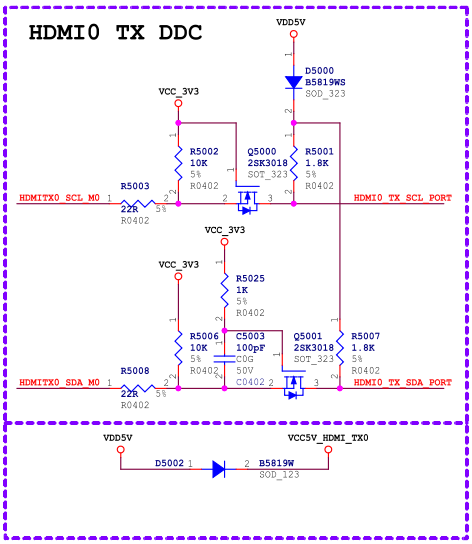
2.1.2 Debug Circuit

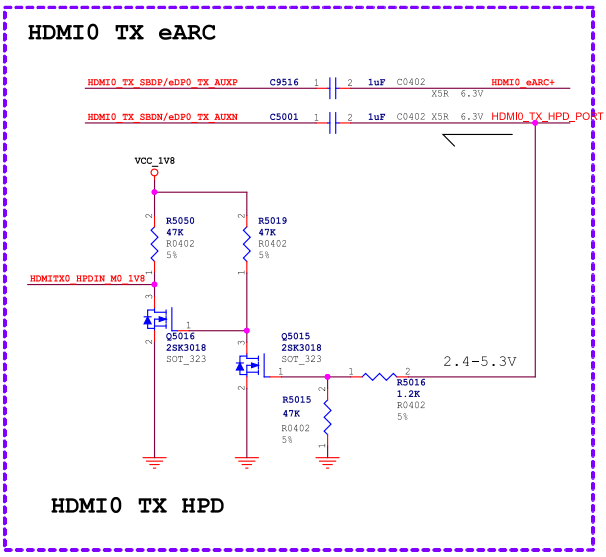


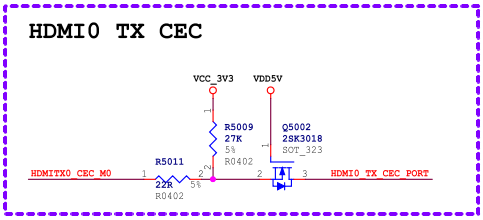
2.1.3 PCIE30 CLK Circuit

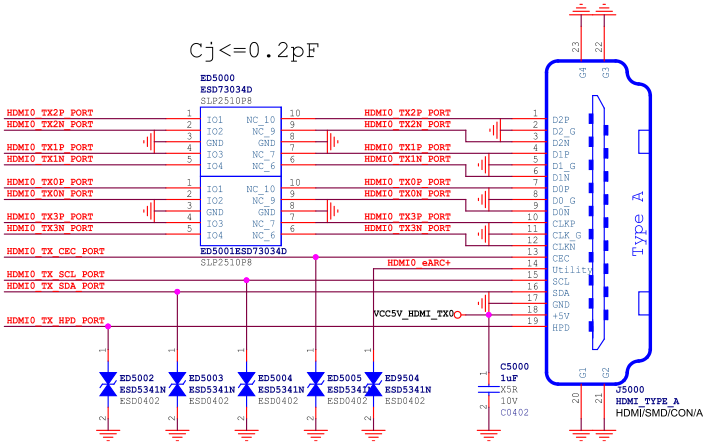


2.1.4 HDMI0 TX Circuit









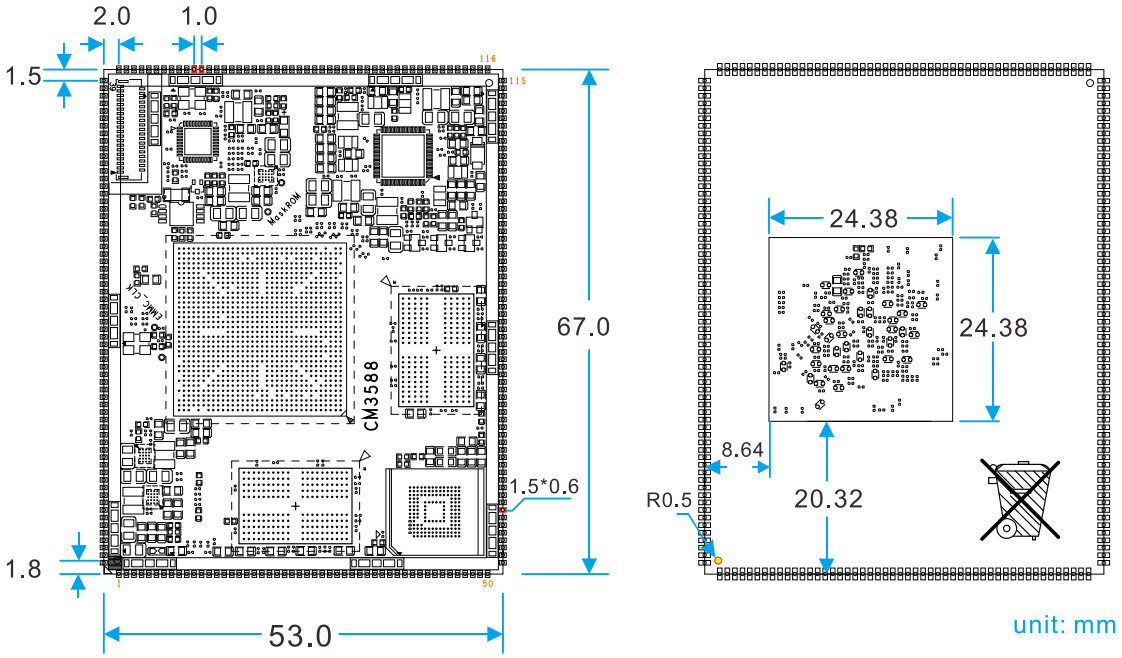
2.2 Mother Board Length Offset

MIPI CSI0 4-Lane Interface length offset

MIPI_CSI0_RX0_CLKP	MIPI_CSI0_RX0_D0P	(-2.321)	
	MIPI_CSI0_RX0_D1P	(-1.89)	
	MIPI_CSI0_RX0_D2P	(-82.46)	(-50)
	MIPI_CSI0_RX0_D3P	(-74.926)	(-50)

Yellow block is CM3588 CSI0 group length difference. Unit: mil

2.3 PCB Footprint



3 Product Electrical Characteristics

3.1 Dissipation and Temperature

Symbol	Parameter	Min	Typ	Max	Unit
VCC_SYS	System IO Voltage	3.3V	4	4.5	V
Isys_in	VCC_SYS input Current		3100		mA
VCC_RTC	RTC Voltage	1.8	3	3.4	V
Iirtc	RTC input Current		5	8	uA
I3v3_out	VCC_3V3 output Current			500	mA
I1v8_out	VCC_1V8 output Current			500	mA
Ta	Operating Temperature	-40		85	°C
Tstg	Storage Temperature	-40		85	°C

3.2 Reliability of Test

High Temperature Operating Test		
Contents	Operating 8h in high temperature	55°C±2°C
Result	PASS	

Operating Life Test		
Contents	Operating in room	120h
Result	PASS	