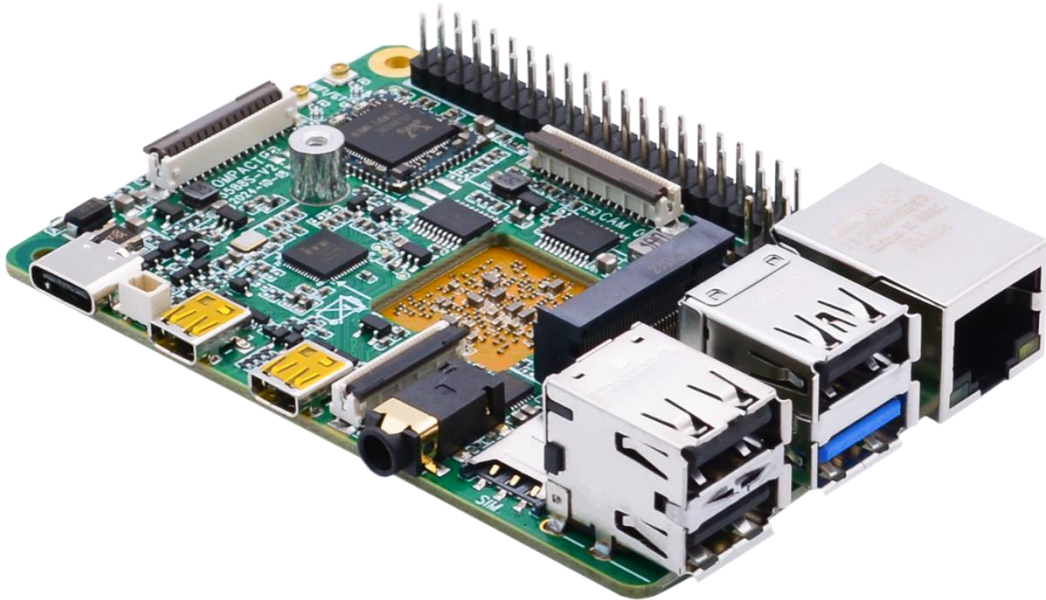


# *Compact3588S*

## *Reference User Manual*

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**V2. 20250128**



**Boardcon Embedded Design**

**[www.armdesigner.com](http://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](http://www.boardcon.com), [www.armdesigner.com](http://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 do not hesitate to contact us at [support@armdesigner.com](mailto: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 lightning 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 made 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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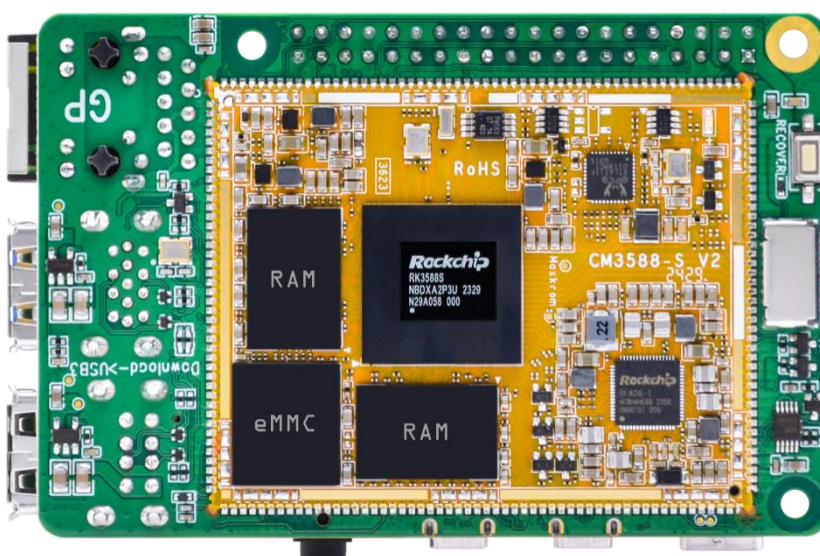
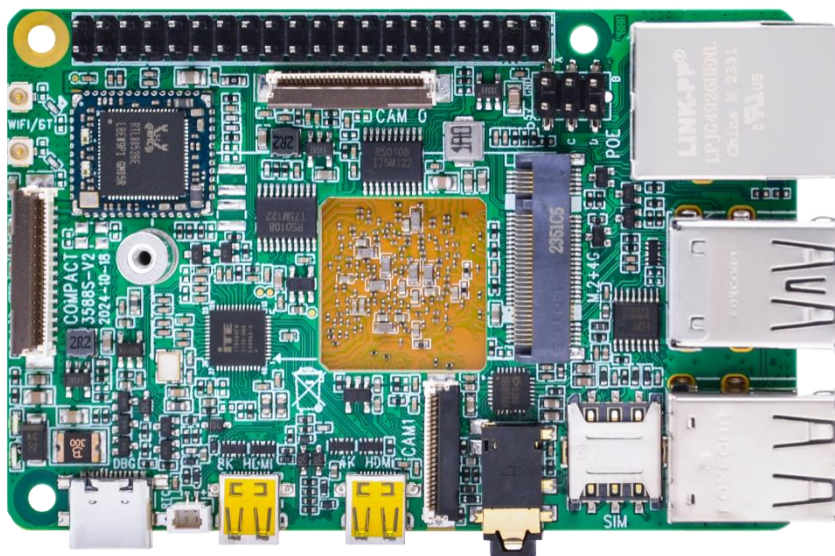
# 1 Compact3588S Introduction

## 1.1 Summary

The Compact3588s is equipped with Rockchip's RK3588S it has a quad-core Cortex-A76 and a quad-core Cortex-A55 processor, Embedded Mali-G610 MP4 GPU and 6.0 TOPs NPU.

It can be used for the high-performance devices such as 8K TV box or recorder, VI devices, intelligent interactive devices, personal computers and robots.

The Compact3588s is a Raspberry Pi 4 compatible product.



## 1.2 Features

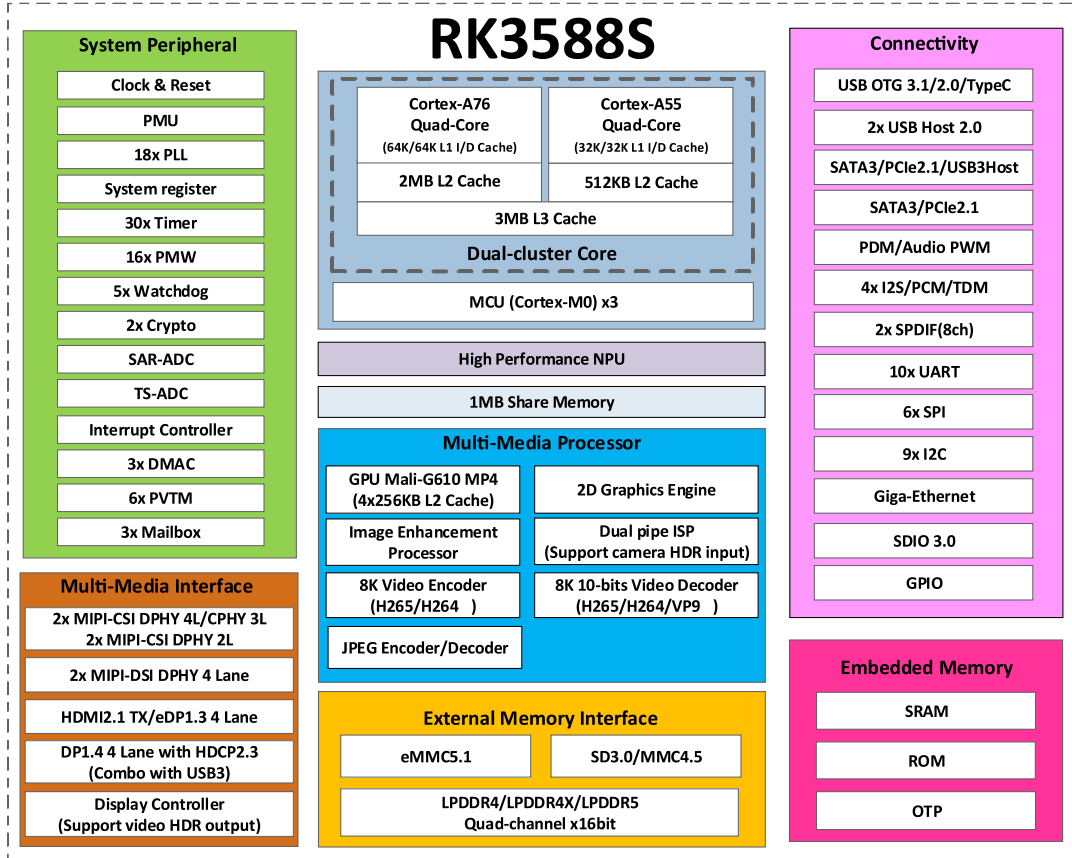
- **Microprocessor**
  - Quad-core Cortex-A76 up to 2.4GHz
  - Quad-core Cortex-A55 up to 1.8GHz
  - 64KB I-cache 64KB D-cache and 512KB L2 for A76 each core, 32KB I-cache 32KB D-cache and 512KB L2 for A55 each core, 3MB L3 cache
  - 6.0 TOPS Neural Process Unit, Embedded 384KB\*3 internal buffer
  - 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 HDMI 2.1 TX, up to 8K@60fps  
Supports HDMI 2.0 TX, up to 4K@30Hz  
Supports 4 lanes MIPI DSI up to 4K@60Hz
  - **Video/Image Input**  
Supports 1-CH MIPI 4lanes CSI interfaces  
Supports 1-CH MIPI 2lanes CSI interfaces
- **Audio**
  - Headphone stereo output and MIC input
  - Support MIC array Up to 4ch PDM/TDM interface
- **USB / PCIE**
  - Three USB2.0 Host and One USB3.0 Host interfaces
  - One Type-C Power in with UART debug interface
  - One M.2 connector with USB2.0 for 4G/5G module.
  - M.2 support PCIe interface for 5G or AI module



- **Ethernet**
  - Support 10/100/1000Mbit/s with PoE
- **I2C**
  - Up to 4-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 Two SPI controllers,
  - Full-duplex synchronous serial interface
- **UART**
  - Support up to 5 UARTs
  - Embedded two 64byte FIFO
- **CAN**
  - Support One CAN controller
  - Support CAN 2.0B protocol
- **PWM**
  - Up to 6 PWMs with interrupt-based operation
  - Support 32bit time/counter facility
  - IR option on PWM3/11/15
- **Power**
  - PMU RK806 on board
  - 5V main power input
  - PoE PD 5V input
  - Support RTC button Cell.

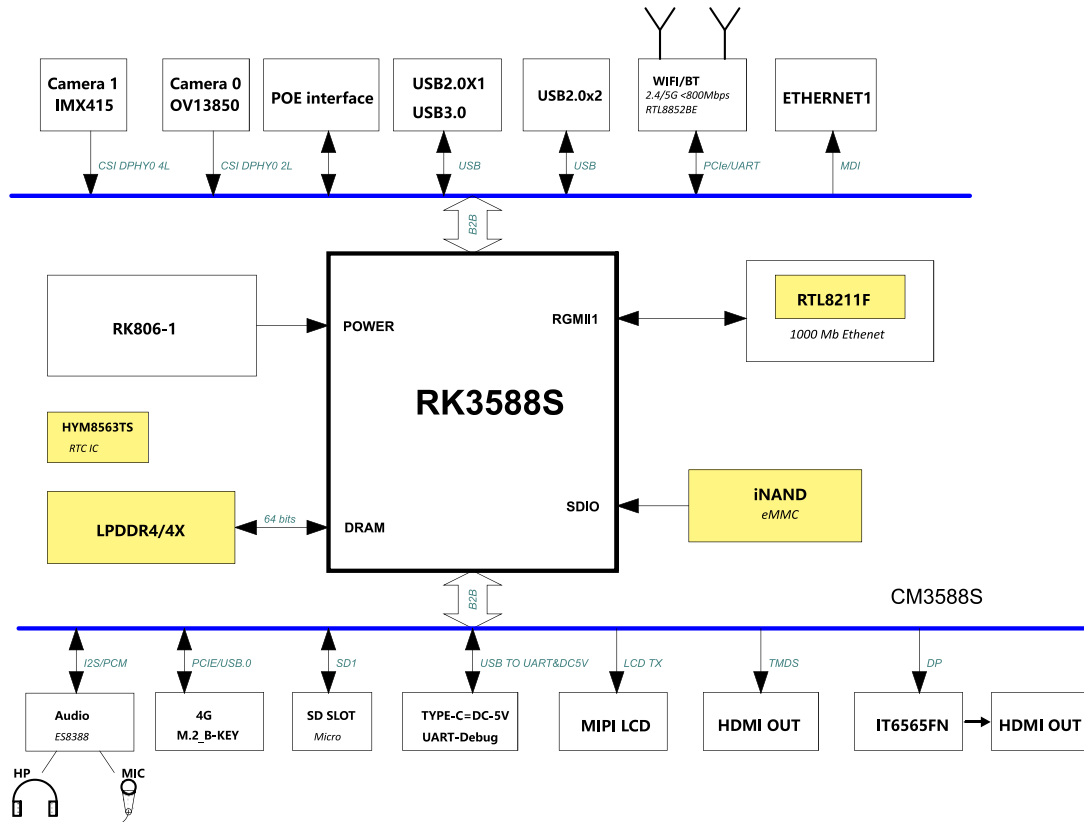
# 1.3 Block Diagram

## 1.3.1 RK3588S Block Diagram





### 1.3.2 Compact3588s Block Diagram



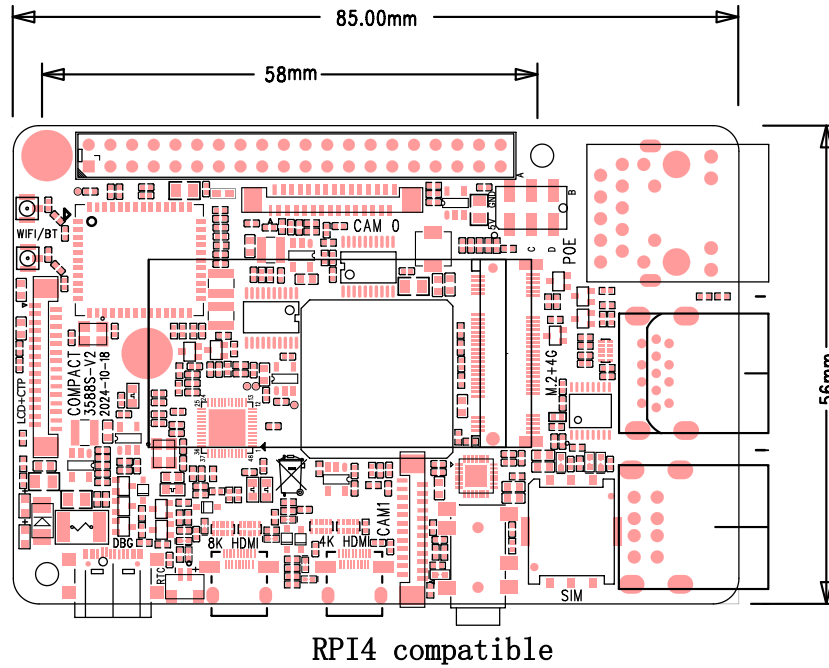
### 1.4 Compact3588S specifications

Feature	Specifications
CPU	Quad-core Cortex-A72 and quad-core Cortex-A55
DDR	4GB LPDDR4x (up to 16GB)
eMMC FLASH	32GB (up to 256GB)
Power	DC 5V
EDP/MIPI DSI	1-CH MIPI DSI
MIPI CSI	1-CH 4-Lane + 1-CH 2-Lane CSI Cameras
HDMI out	2-CH
CAN	1-CH
USB	3-CH USB Host2.0 + 1-CH USB Host3.0
Ethernet	1-ch 1 GB PHY
SDMMC	1-CH
I2C	4-CH
SPI	2-CH
UART	5-CH, 1-CH(DEBUG)
PWM	6-CH





## 1.5 Compact3588S PCB Dimension



## 1.6 Compact3588S Pin Definition

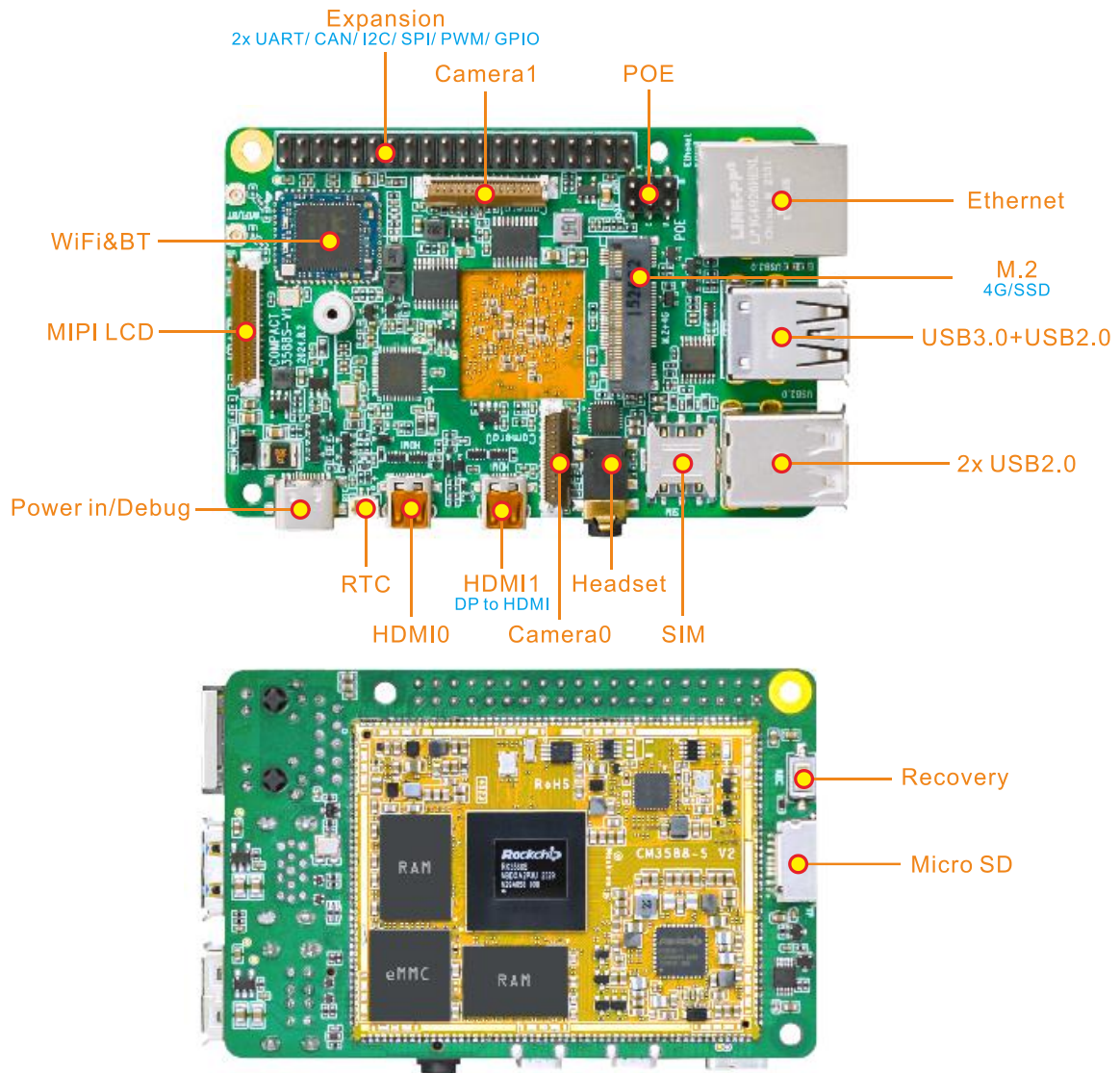
Pin	Signal	Description or functions	GPIO serial	IO Voltage
1	VCC_3V3_S0	3.3V IO Power out(Max:0.5A)		3.3V
2	VDD5V	5V Main Power input		5V
3	I2C3_SDA_M0	PU 10K/ UART3_RX_M0	GPIO1_C0_u	3.3V
4	VDD5V	5V Main Power input		5V
5	I2C3_SCL_M0	PU 10K/ UART3_TX_M0	GPIO1_C1_u	3.3V
6	GND	Ground		0V
7	PWM11_IR_M3		GPIO3_D5_d	3.3V
8	UART7_TX_M1	SPI1_MISO_M1	GPIO3_C0_d	3.3V
9	GND	Ground		0V
10	UART7_RX_M1	SPI1_CLK_M1	GPIO3_C1_d	3.3V
11	GPIO4_A6_d	I2C5_SCL_M2	GPIO4_A6_d	3.3V
12	GPIO4_B5_d	PWM12_M1	GPIO4_B5_d	3.3V
13	UART0_RX_M2		GPIO4_A4_d	3.3V
14	GND	Ground		0V
15	UART0_TX_M2		GPIO4_A3_d	3.3V
16	GPIO1_A2_d	I2C4_SDA_M3/PWM0_M2	GPIO1_A2_d	3.3V
17	VCC_3V3_S0	3.3V IO Power out(Max:0.5A)		3.3V
18	GPIO1_A3_d	I2C4_SCL_M3/PWM1_M2	GPIO1_A3_d	3.3V
19	SPI0_MOSI_M2	UART4_RX_M2 /PDM1_SDI3_M1	GPIO1_B2_d	3.3V



Pin	Signal	Description or functions	GPIO serial	IO Voltage
20	GND	Ground		0V
21	SPI0_MISO_M2	PDM1_SDI2_M1	GPIO1_B1_d	3.3V
22	GPIO1_D0_d		GPIO1_D0_d	3.3V
23	SPI0_CLK_M2	UART4_TX_M2 /PDM1_CLK1_M1	GPIO1_B3_d	3.3V
24	SPI0_CS0_M2	UART7_RX_M2 /PDM1_CLK0_M1	GPIO1_B4_u	3.3V
25	GND	Ground		0V
26	SPI0_CS1_M2	UART7_TX_M2	GPIO1_B5_u	3.3V
27	I2C7_SDA_M2	PU 2.2K		3.3V
28	I2C7_SCL_M2	PU 2.2K		3.3V
29	CAN2_RX_M0	UART5_TX_M1	GPIO3_C4_u	3.3V
30	GND	Ground		0V
31	CAN2_TX_M0	UART5_RX_M1	GPIO3_C5_u	3.3V
32	GPIO3_C6_u		GPIO3_C6_u	3.3V
33	GPIO1_C6_d	PDM0_CLK0_M0 /PWM15_IR_M2	GPIO1_C6_d	3.3V
34	GND	Ground		0V
35	GPIO1_D5_d	PDM0_SDI0_M0	GPIO1_D5_d	3.3V
36	GPIO3_B7_d	SPI1_MOSI_M1	GPIO3_B7_d	3.3V
37	GPIO1_B0_u	PDM1_SDI1_M1	GPIO1_B0_u	3.3V
38	GPIO1_C2_d	PWM3_IR_M2	GPIO1_C2_d	3.3V
39	GND	Ground		0V
40	GPIO4_A7_d	I2C5_SDA_M2	GPIO4_A7_d	3.3V



## 1.7 Compact3588S Functions Marker

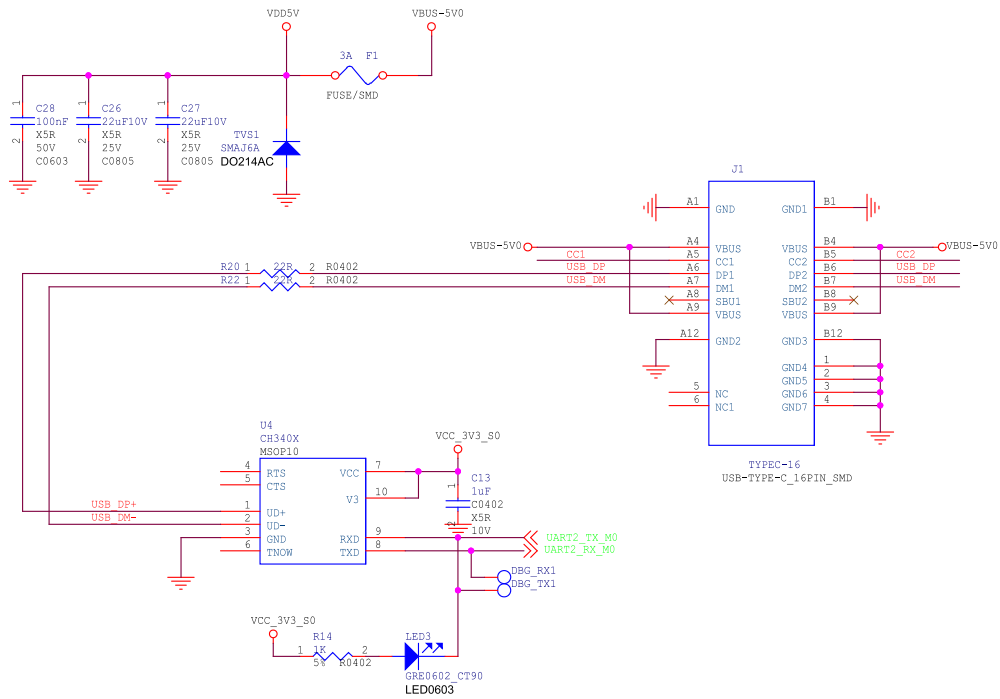




# 2 Hardware Design Guide

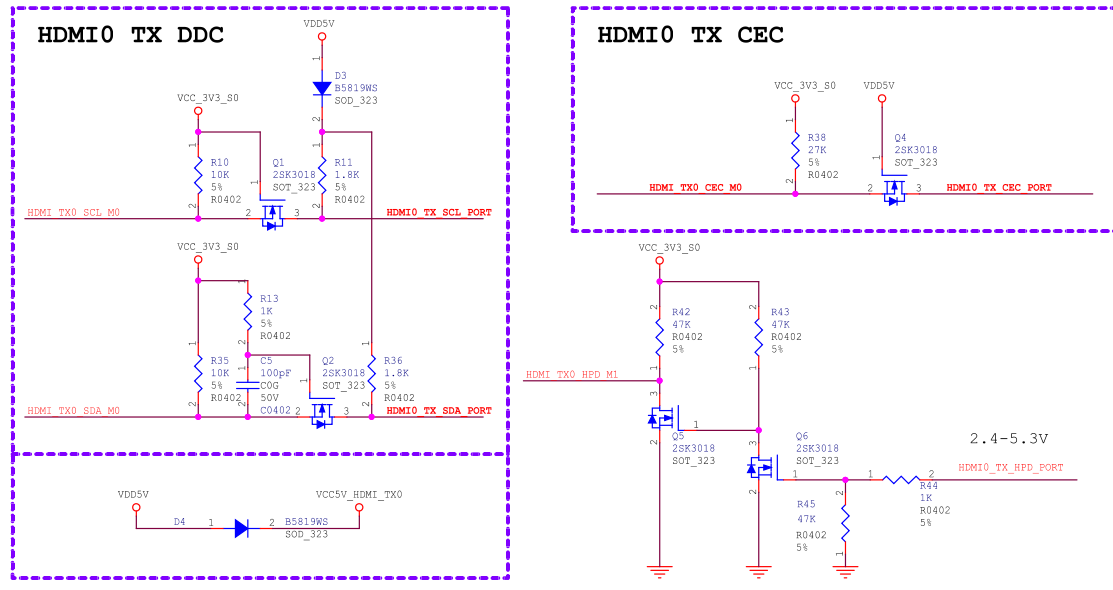
## 2.1 Peripheral Circuit Reference

### 2.1.1 DC IN & Debug circuit

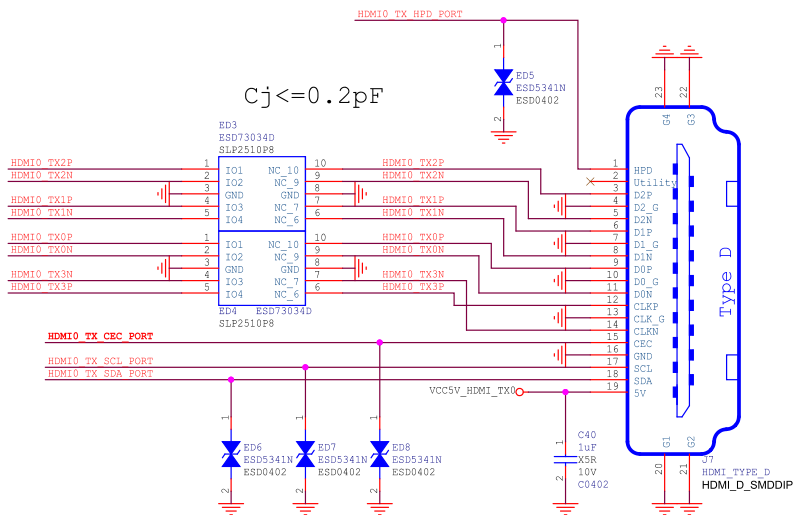




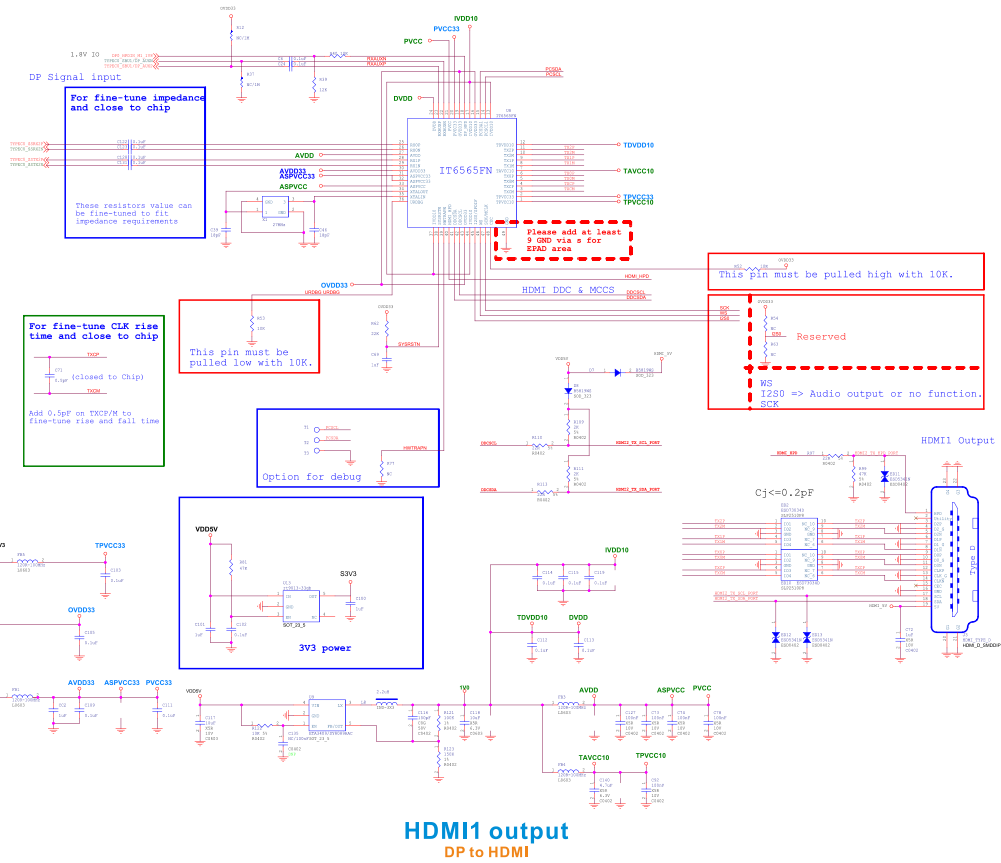
### 2.1.2 HDMI TX Circuit



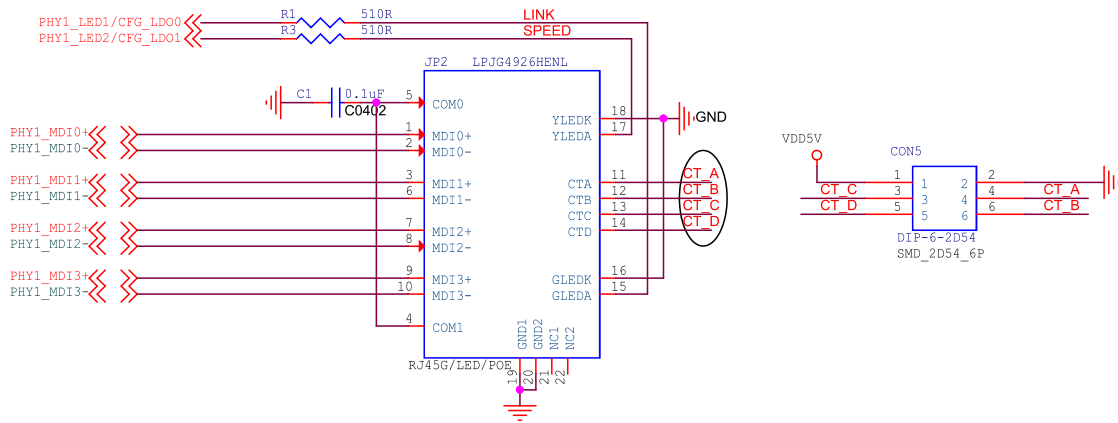
HDMI TX HPD



### HDMI0 output

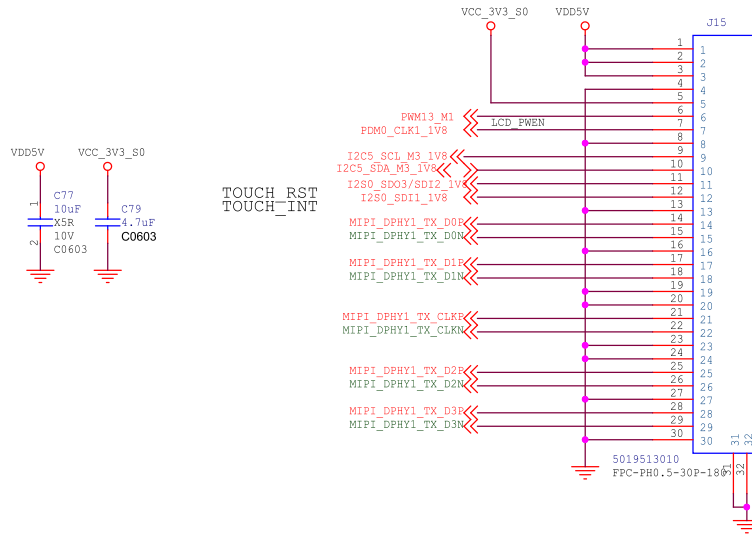


### 2.1.3 POE Circuit

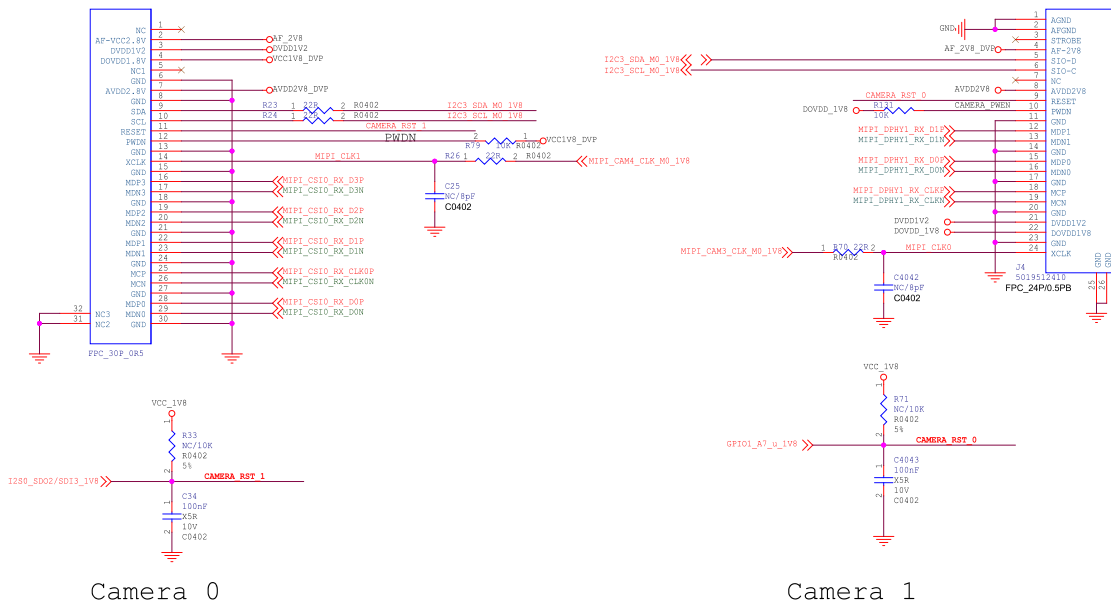




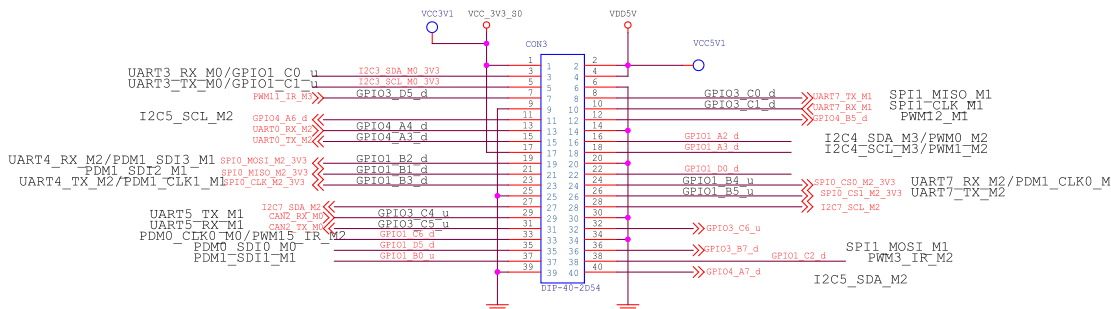
### 2.1.4 LCD Circuit



### 2.1.5 Camera Circuit



### 2.1.6 GPIO Circuit





## 3 Product Electrical Characteristics

### 3.1 Dissipation and Temperature

Symbol	Parameter	Min	Typ	Max	Unit
VDD5V	System Voltage	4.8V	5	5.5	V
I <sub>sys_in</sub>	VDD5V input Current		1350		mA
VCC_RTC	RTC Voltage	1.8	3	3.4	V
I <sub>rtc</sub>	RTC input Current		5	8	uA
T <sub>a</sub>	Operating Temperature	0		70	°C
T <sub>stg</sub>	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	TBD	

Operating Life Test		
Contents	Operating in room	120h
Result	TBD	