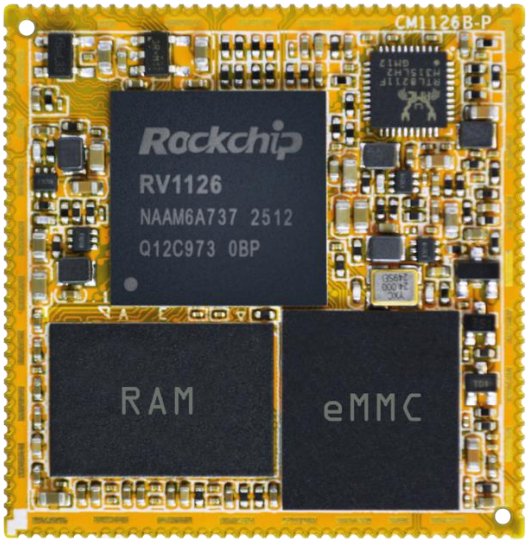
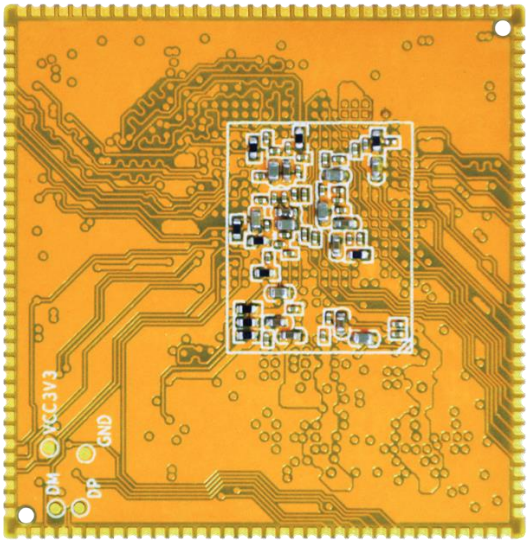
CM1126B-P
Reference User Manual

V2. 20250422





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 CM1126B-P Introduction

1.1 Summary

The CM1126B-P system-on-module is equipped with Rockchip's RV1126B-P build in quad-core Cortex-A53, 3.0 TOPs NPU and RISC-V MCU.

It is designed specifically for the IPC/CVR devices, AI Camera devices, intelligent interactive devices, and mini robots. The high performance and low power solution can help customers to introduce new technologies more quickly and enhance the overall solution efficiency.

The least size can put on 38board.

Please note CM1126B-P V1 change to V2 then CPU exchange to RV1126B-P, the Reset & OTG_VBUS signal and WIFI/BT module's GPIO voltage must be change to 3.3V.

1.2 Features

- **Microprocessor**
  - Quad-core Cortex-A53 up to 1.6G
  - 32KB I-cache and 32KB D-cache for each core, 512KB L3 cache
  - 3.0 TOPS Neural Process Unit
  - RISC-V MCU to support 250mS fast boot
  - Max 12M ISP

  Memory Organization
  - LPDDR4 RAM up to 4GB
  - EMMC 4.51 up to 256GB
- **Video Decoder/Encoder**
  - Supports video decode/encode up to 4K@30fps
  - Supports real-time decoding of H.264/265
  - Supports real-time UHD H.264/265 video encoding
  - Picture size up to 8192x8192
- **Display Subsystem**
  - **Video Output**

    Supports 4 lanes MIPI DSI up to 2560x1440@60fps

    Supports 24bit RGB parallel output
  - **Image in**

    Supports up to 16bit DVP interface

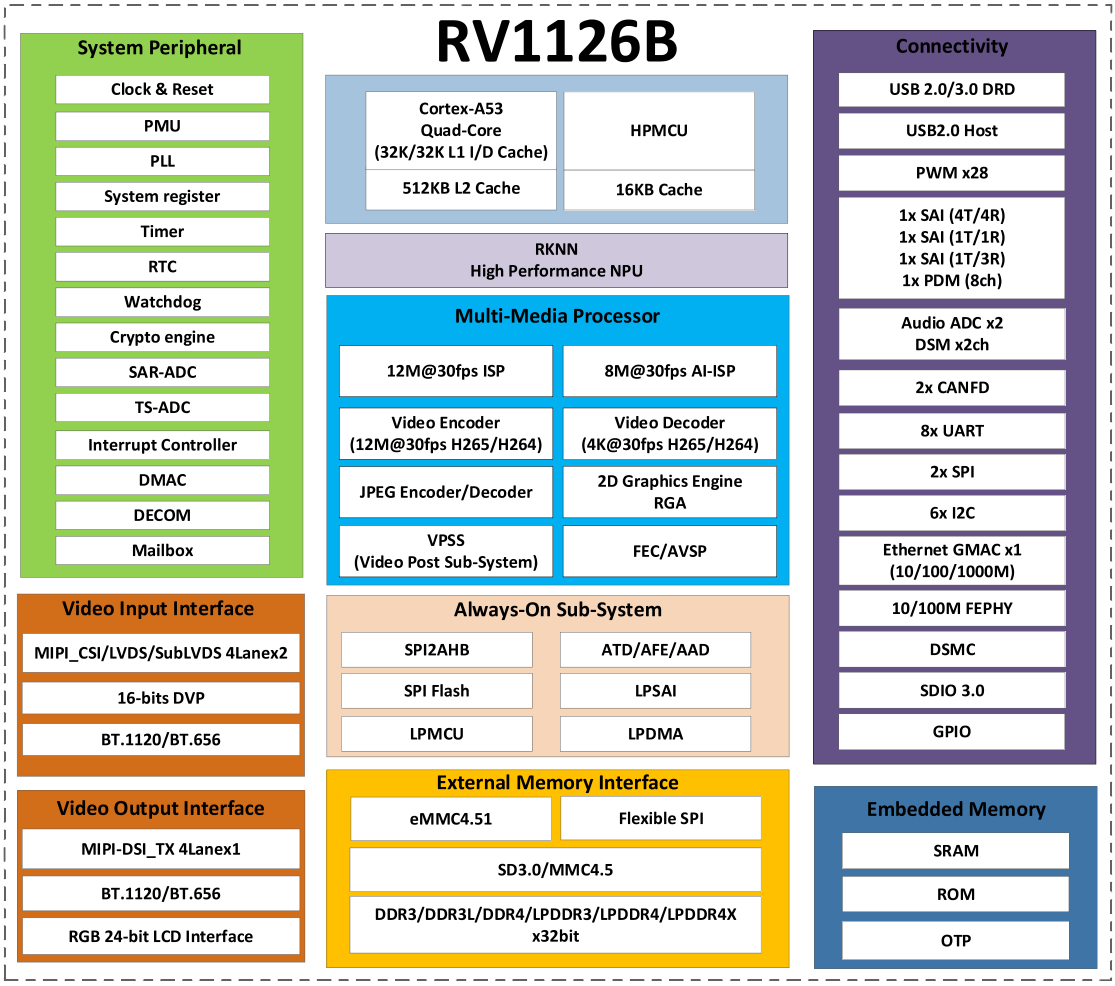
    Supports 2ch MIPI CSI 4lanes interface
- **SAI**
  - Three I2S/PCM/TDM interface
  - Support Mic array Up to 8ch PDM/TDM interface
  - Support PWM audio output
- **USB**
  - Two 2.0 USB interfaces

- One USB 2.0 OTG, and one 2.0 USB hosts

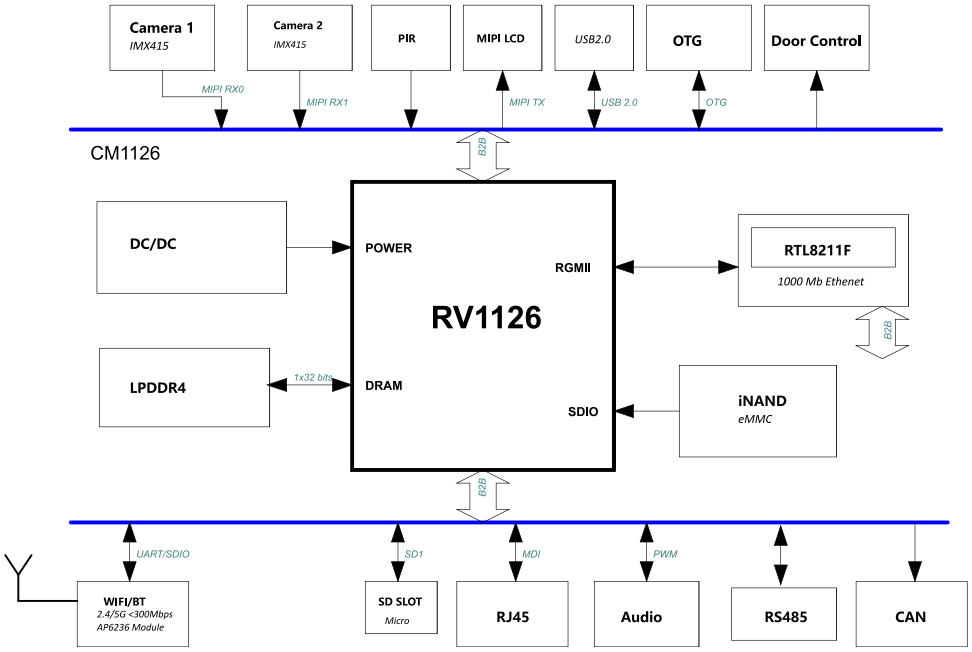
- **Ethernet**
  - RTL8211F onboard
  - Support 10/100/1000M
- **I2C**
  - Up to six I2Cs
  - Support standard mode and fast mode(up to 400kbit/s)
- **SDIO**
  - Support SDIO 3.0 protocol
  - Up to 2-CH SDMMC
- **CAN**
  - Support CAN FD protocol
  - Up to 2-CH CAN
- **SPI**
  - Up to two SPI controllers,
  - Full-duplex synchronous serial interface
- **UART**
  - Support up to 8 UARTs
  - UART0 with 2 wires for debug tools
  - Embedded two 64byte FIFO
  - Support RS485 for UART1~7
- **DSMC**
  - Achieve low cost FPGA connection
  - Support 8-16 wire serial transfer mode
  - Support up to select 4 chips, and signals configured to be valid simultaneously in transaction
- **ADC**
  - Up to four ADC channels
  - 13-bit resolution
  - Voltage input range between 0V to 1.8V
  - Support up to 2MS/s sampling rate
- **PWM**
  - Total 28-ch with 4 PWMs interface
  - Only PWM2 can generates waveform through lookup table
  - Support continuous mode and one-shot output mode
  - Support input caption mode
- **Power unit**
  - Discrete Power on board
  - Single 3.3V input

1.3 CM1126B-P Block Diagram

1.3.1 RV1126B-P Block Diagram



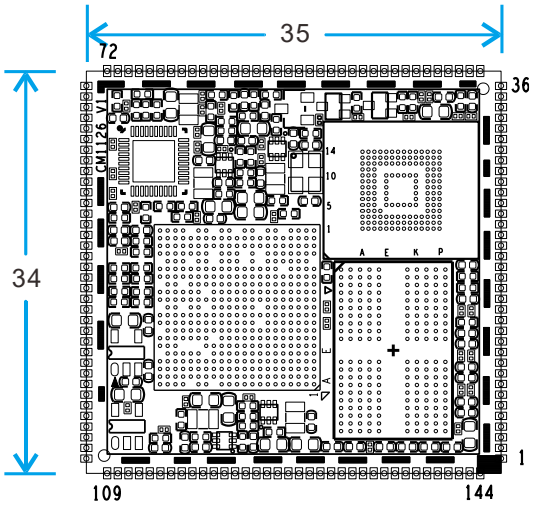
1.3.2 Development board (Idea1126) Block Diagram



1.4 CM1126B-P Specifications

Feature	Specifications
CPU	Quad-core Cortex-A53
DDR	2GB LPDDR4 (up to 4GB)
eMMC FLASH	8GB (up to 256GB)
Power	DC 3.3V
MIPI DSI	4-Lane
I2S	3-CH
I2C	6-CH
MIPI CSI	2-CH 4-Lane
RGB LCD	24bit
Camera	1-CH(DVP) and 2-CH(CSI)
USB	2-CH (USB HOST2.0 and OTG 2.0)
Ethernet	1000M GMAC
SDMMC	2-CH
CAN	2-CH
SPI	2-CH
UART	7-CH, 1-CH(DEBUG)
PWM	11-CH
ADC IN	4-CH
Board Dimension	34 x 35mm

1.5 CM1126B-P PCB Dimension



1.6 CM1126B-P Pin Definition

Pin	Signal	Description or functions	GPIO serial	IO Voltage
1	LCDC_D19_3V3	VI_CIF_D15_M1/SAI1_MCLK_M2/PWM3_CH3_M1	GPIO5_C3_d	3.3V
2	LCDC_D20_3V3	VI_CIF_VSYNC_M1/SAI1_SDO_M2/PWM3_CH4_M1	GPIO5_C4_d	3.3V
3	LCDC_D21_3V3	VI_CIF_CLKOUT_M1/SAI1_SCLK_M2/PWM3_CH5_M1	GPIO5_C5_d	3.3V
4	LCDC_D22_3V3	VI_CIF_CLKIN_M1/SAI1_LRCK_M2/PWM3_CH6_M1	GPIO5_C6_d	3.3V
5	LCDC_D23_3V3	VI_CIF_HSYNC_M1/SAI1_SDI_M2/PWM3_CH7_M1	GPIO5_C7_d	3.3V
6	GND	Ground		0V
7	GPIO3_B7_d_3V3	UART1_RX_M1/I2C5_SDA_M1/SAI2_SDI1_M0	GPIO3_B7_d	3.3V(V2)
8	BT_WAKE	SPI1_CSN1_M1/SAI2_MCLK_M0/SDMMC1_DETN/UART1_TX_M1/I2C5_SCL_M1	GPIO3_B6_d	3.3V(V2)
9	WIFI_REG_ON	SPI0_MOSI_M0	GPIO0_B0_d	3.3V(V2)
10	BT_RST	SPI0_MISO_M0	GPIO0_B1_d	3.3V(V2)
11	WIFI_WAKE_HOST	SPI0_CLK_M0	GPIO0_B2_d	3.3V(V2)
12	BT_WAKE_HOST	SPI0_CS0n_M0	GPIO0_A7_u	3.3V(V2)
13	PWM0_CH7_M0	I2C3_SCL_M0	GPIO0_C0_d	3.3V
14	PWM0_CH6_M0	I2C3_SDA_M0	GPIO0_C1_d	3.3V
15	UART0_TX_M1	JTAG_TCK_M2/CAN1_RXD_M0/PWM2_CH6_M0(For debug)	GPIO5_D6_u	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
16	UART0_RX_M1	JTAG_TMS_M2/CAN1_TXD_M0 /PWM2_CH7_M0 (For debug)	GPIO5_D7_u	3.3V
17	SAI0_MCLK_M0_3V3	PWM2_CH6_M1	GPIO7_A2_d	3.3V
18	SAI0_SCLK_M0_3V3	PWM2_CH4_M1	GPIO7_A0_d	3.3V
19	SAI0_SDI3_M0_3V3	SAI0_SDO1_M0/PDM_SDI3_M0/UART2_RTSN_M1	GPIO7_A7_d	3.3V
20	SAI0_SDO0_M0_3V3	DSM_AUD_LP	GPIO7_A5_d	3.3V
21	SAI0_LRCK_M0_3V3	DSM_AUD_LN/PWM2_CH7_M1	GPIO7_A3_d	3.3V
22	PDM_SDI1_3V3	SAI0_SDI1_M0/SAI0_SDO3_M0/DSM_AUD_RP/I2C1_SDA_M3/UART2_TX_M1	GPIO7_B1_d	3.3V
23	PDM_CLK1_3V3	I2C4_SCL_M3 /PWM2_CH5_M1	GPIO7_A1_d	3.3V
24	PDM_SDI2_3V3	SAI0_SDI2_M0/SAI0_SDO2_M0/DSM_AUD_RN/I2C1_SCL_M3/UART2_RX_M1	GPIO7_B0_d	3.3V
25	PDM_SDI0_3V3	SAI0_SDI0_M0	GPIO7_A6_d	3.3V
26	PDM_CLK_3V3	I2C4_SDA_M3 /UART2_CTSN_M1	GPIO7_A4_d	3.3V
27	I2C2_SDA_3V3	PWM0_CH5_M0	GPIO0_D1_d	3.3V
28	I2C2_SCL_3V3	PWM0_CH4_M0	GPIO0_D0_d	3.3V
29	USB_HOST_DP			1.8V
30	USB_HOST_DM			1.8V
31	GND	Ground		0V
32	OTG_DP	Can use for download		1.8V
33	OTG_DM	Can use for download		1.8V
34	OTG_DET(V2)	OTG VBUS DET IN		3.3V(V2)
35	OTG_ID			1.8V
36	SPI0_CS1n_M1	SAI1_MCLK_M1 /UART4_TX_M0	GPIO4_A3_d	1.8V
37	VCC3V3_SYS	3.3V Main Power input		3.3V
38	VCC3V3_SYS	3.3V Main Power input		3.3V
39	USB_CTRL_3V3	PWM0_CH3_M0 /UART1_CTSN_M0	GPIO0_C7_d	3.3V
40	SDMMC0_DET	PWM1_CH0_M0	GPIO0_A5_u	3.3V(V2)
41	CLKO_32K	RTC clock output	GPIO0_A2_z	3.3V(V2)
42	nRESET	Reset key input		3.3V(V2)

Pin	Signal	Description or functions	GPIO serial	IO Voltage
43	MIPI_CSI_RX0_CLKP	MIPI CSI0 or LVDS0 input		1.8V
44	MIPI_CSI_RX0_CLKN	MIPI CSI0 or LVDS0 input		1.8V
45	MIPI_CSI_RX0_D2P	MIPI CSI0 or LVDS0 input		1.8V
46	MIPI_CSI_RX0_D2N	MIPI CSI0 or LVDS0 input		1.8V
47	MIPI_CSI_RX0_D3P	MIPI CSI0 or LVDS0 input		1.8V
48	MIPI_CSI_RX0_D3N	MIPI CSI0 or LVDS0 input		1.8V
49	MIPI_CSI_RX0_D1P	MIPI CSI0 or LVDS0 input		1.8V
50	MIPI_CSI_RX0_D1N	MIPI CSI0 or LVDS0 input		1.8V
51	MIPI_CSI_RX0_D0P	MIPI CSI0 or LVDS0 input		1.8V
52	MIPI_CSI_RX0_D0N	MIPI CSI0 or LVDS0 input		1.8V
53	GND	Ground		0V
54	MIPI_CSI_RX1_D3P	MIPI CSI1 or LVDS1 input		1.8V
55	MIPI_CSI_RX1_D3N	MIPI CSI1 or LVDS1 input		1.8V
56	MIPI_CSI_RX1_CLKP	MIPI CSI1 or LVDS1 input		1.8V
57	MIPI_CSI_RX1_CLKN	MIPI CSI1 or LVDS1 input		1.8V
58	MIPI_CSI_RX1_D2P	MIPI CSI1 or LVDS1 input		1.8V
59	MIPI_CSI_RX1_D2N	MIPI CSI1 or LVDS1 input		1.8V
60	MIPI_CSI_RX1_D1P	MIPI CSI1 or LVDS1 input		1.8V
61	MIPI_CSI_RX1_D1N	MIPI CSI1 or LVDS1 input		1.8V
62	MIPI_CSI_RX1_D0P	MIPI CSI1 or LVDS1 input		1.8V
63	MIPI_CSI_RX1_D0n	MIPI CSI1 or LVDS1 input		1.8V
64	SDMMC0_D3_3V3	UART3_TX_M0/UART4_CTSN_M3/JTAG_TMS_M1	GPIO2_A3_d	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
65	SDMMC0_D2_3V3	UART3_RX_M0/UART4_RTSN_M3/JTAG_TCK_M1	GPIO2_A2_d	3.3V
66	SDMMC0_D1_3V3	UART0_TX_M0/I2C0_SCL_M1	GPIO2_A1_d	3.3V
67	SDMMC0_D0_3V3	UART0_RX_M0/I2C0_SDA_M1	GPIO2_A0_d	3.3V
68	SDMMC0_CMD_3V3	UART3_CTSN_M0 /UART4_TX_M3	GPIO2_A5_d	3.3V
69	SDMMC0_CLK_3V3	UART3_RTSN_M0 /UART4_RX_M3	GPIO2_A4_d	3.3V
70	GND	Ground		0V
71	LED1/CFG_LDO0	Ethernet LINK LED		3.3V
72	LED2/CFG_LDO1	Ethernet SPEED LED		3.3V
73	MDI0+	Ethernet MDI signal		1.8V
74	MDI0-	Ethernet MDI signal		1.8V
75	MDI1+	Ethernet MDI signal		1.8V
76	MDI1-	Ethernet MDI signal		1.8V
77	MDI2+	Ethernet MDI signal		1.8V
78	MDI2-	Ethernet MDI signal		1.8V
79	MDI3+	Ethernet MDI signal		1.8V
80	MDI3-	Ethernet MDI signal		1.8V
81	I2C1_SCL_M2	UART4_CTSN_M0	GPIO4_A1_u	1.8V
82	I2C1_SDA_M2	UART4_RTSN_M0	GPIO4_A0_u	1.8V
83	MIPI_CSI_PWDN0	UART4_RX_M0	GPIO4_A2_d	1.8V
84	SPI0_CLK_M1	SAI1_SDO_M1/UART5_RX_M0/I2C4_SCL_M2	GPIO4_A7_d	1.8V
85	SPI0_MOSI_M1	SAI1_SCLK_M1/I2C3_SCL_M1	GPIO4_A4_d	1.8V
86	SPI0_CS0n_M1	SAI1_SDI_M1/UART5_TX_M0/I2C4_SDA_M2	GPIO4_A6_d	1.8V
87	SPI0_MISO_M1	SAI1_LRCK_M1/I2C3_SDA_M1	GPIO4_A5_d	1.8V
88	MIPI_CSI_CLK1	UART5_RTSn_M0	GPIO4_B0_d	1.8V
89	MIPI_CSI_CLK0	UART5_CTSn_M0	GPIO4_B1_d	1.8V
90	GND	Ground		0V
91	LCDC_D0_3V3	VI_CIF_D0_M1/PWM2_CH4_M0/UART4_RTSN_M1	GPIO5_A0_d	3.3V
92	LCDC_D1_3V3	I2C5_SCL_M2/VI_CIF_D1_M1/SAI2_SDI2_M1/PWM2_CH5_M0/UART4_CTSN_M1	GPIO5_A1_d	3.3V
93	LCDC_D2_3V3	VI_CIF_D2_M1/SAI2_SDI1_M1/PWM0_CH5_M2/UART4_TX_M1	GPIO5_A2_d	3.3V
94	LCDC_D3_3V3	SPI0_CSN0_M2/SAI2_MCLK_M1/PWM0_CH4_M2/UART4_RX_M1	GPIO5_A3_d	3.3V

Pin	Signal	Description or functions	GPIO serial	IO Voltage
95	LCDC_D4_3V3	SPI0_MOSI_M2/SAI2_SDO_M1 /PWM0_CH3_M1/UART5TX_M1	GPIO5_A4_d	3.3V
96	LCDC_D5_3V3	SPI0_MISO_M2/SAI2_SCLK_M 1/PWM0_CH2_M1/UART5_RX_ M1	GPIO5_A5_d	3.3V
97	LCDC_D6_3V3	SPI0_CLK_M2/SAI2_SDI0_M1/ PWM0_CH1_M1/UART5_RTSN _M1	GPIO5_A6_d	3.3V
98	LCDC_D7_3V3	SPI0_CSN1_M2/VI_CIF_D3_M1 /SAI2_LRCK_M1/I2C5_SDA_M 2/PWM0_CH0_M1/UART5_CTS N_M1	GPIO5_A7_d	3.3V
99	CAN_RX_3V3	SPI1_CSN1_M2/I2C2_SCL_M1/ PWM0_CH7_M2/UART3TX_M1	GPIO5_D4_u	3.3V
100	CAN_TX_3V3	I2C2_SDA_M1/PWM1_CH3_M1 /UART3_RX_M1	GPIO5_D5_u	3.3V
101	LCDC_CLK_3V3	SPI1_MISO_M2/PWM1_CH0_M 1/UART3_CTSN_M1	GPIO5_D3_d	3.3V
102	LCDC_VSYNC_3V3	SPI1_MOSI_M2/PWM1_CH1_M 1/UART3_RTSN_M1	GPIO5_D2_d	3.3V
103	MIPI_DSI_D2P			1.8V
104	MIPI_DSI_D2N			1.8V
105	MIPI_DSI_D1P			1.8V
106	MIPI_DSI_D1N			1.8V
107	MIPI_DSI_D0P			1.8V
108	MIPI_DSI_D0N			1.8V
109	MIPI_DSI_D3P			1.8V
110	MIPI_DSI_D3N			1.8V
111	MIPI_DSI_CLKP			1.8V
112	MIPI_DSI_CLKN			1.8V
113	ADCIN3	ADC input		1.8V
114	ADCIN2	ADC input		1.8V
115	ADCIN1	ADC input		1.8V
116	ADKEY_IN0	Recovery mode set(PU 10K)		1.8V
117	GND	Ground		0V
118	SDIO_CLK		GPIO3_A0_d	3.3V(V2)
119	SDIO_CMD		GPIO3_A1_d	3.3V(V2)
120	SDIO_D0	I2C1_SCL_M1	GPIO3_A2_d	3.3V(V2)
121	SDIO_D1	I2C1_SDA_M1	GPIO3_A3_d	3.3V(V2)
122	SDIO_D2		GPIO3_A4_d	3.3V(V2)
123	SDIO_D3		GPIO3_A5_d	3.3V(V2)
124	UART0_RX		GPIO3_B0_d	3.3V(V2)

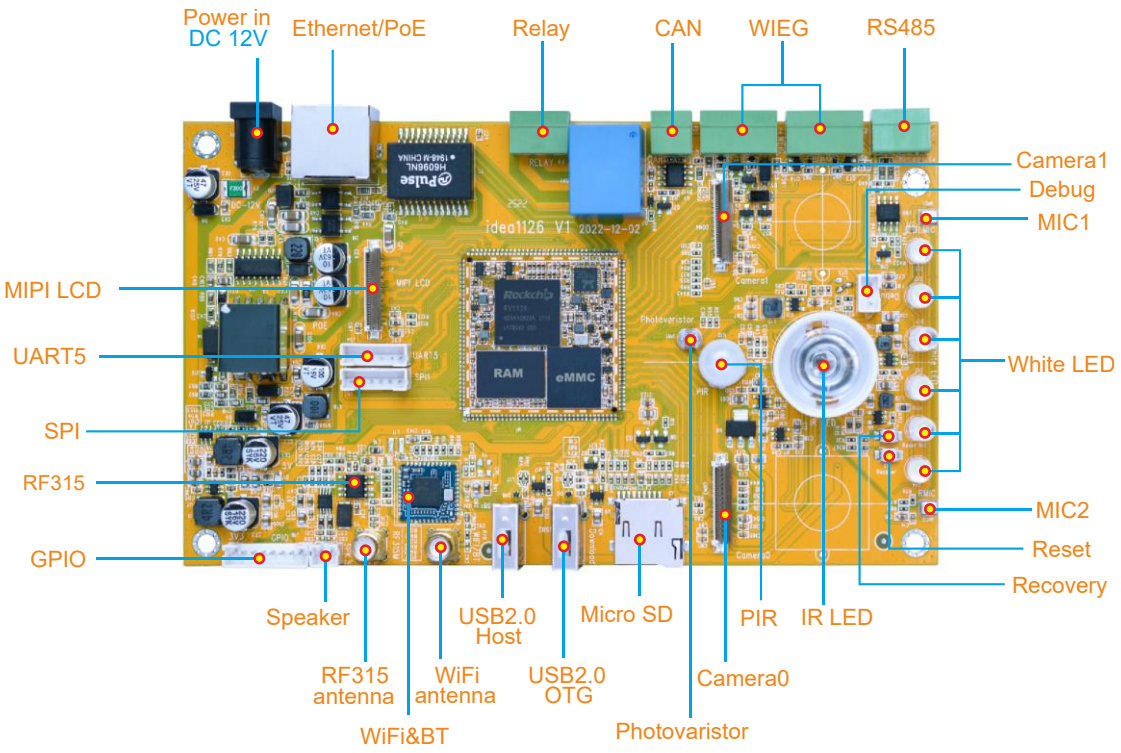
Pin	Signal	Description or functions	GPIO serial	IO Voltage
125	UART0_TX	SAI2_SDI2_M0	GPIO3_B1_d	3.3V(V2)
126	UART0_CTSN		GPIO3_A7_d	3.3V(V2)
127	UART0_RTSN		GPIO3_A6_d	3.3V(V2)
128	PCM_TX	SPI1_MOSI_M1/SAI2_SDO_M0 /PWM2_CH0_M0	GPIO3_B2_d	3.3V(V2)
129	PCM_SYNC	SPI1_CSN0_M1/SAI2_LRCK_M 0/PWM2_CH3_M0/UART1_CTS N_M1/I2C4_SDA_M0	GPIO3_B5_d	3.3V(V2)
130	PCM_CLK	SPI1_CLK_M1/SAI2_SCLK_M0/ PWM2_CH2_M0/UART1_RTSN _M1/I2C4_SCL_M0	GPIO3_B4_d	3.3V(V2)
131	PCM_RX	SPI1_MISO_M1/SAI2_SDI0_M0 /PWM2_CH1_M0	GPIO3_B3_d	3.3V(V2)
132	LCDC_D15_3V3	VI_CIF_D11_M1/PWM2_CH3_ M1/UART7_CTSN_M0	GPIO5_B7_d	3.3V
133	LCDC_D14_3V3	VI_CIF_D10_M1/PWM2_CH2_ M1/UART7_RTSN_M0	GPIO5_B6_d	3.3V
134	LCDC_D13_3V3	VI_CIF_D9_M1/UART7_RX_M0	GPIO5_B5_d	3.3V
135	LCDC_D12_3V3	VI_CIF_D8_M1/UART7_TX_M0	GPIO5_B4_d	3.3V
136	LCDC_DEN_3V3	SPI1_CSN0_M2/I2C3_SCL_M2/ PWM0_CH6_M2	GPIO5_D0_d	3.3V
137	LCDC_D10_3V3	VI_CIF_D6_M1/PWM2_CH0_M 1/UART6_RTSN_M0	GPIO5_B2_d	3.3V
138	LCDC_D9_3V3	VI_CIF_D5_M1/UART6_RX_M0	GPIO5_B1_d	3.3V
139	LCDC_D8_3V3	VI_CIF_D4_M1/UART6_TX_M0	GPIO5_B0_d	3.3V
140	LCDC_D11_3V3	VI_CIF_D7_M1/PWM2_CH1_M 1/UART6_CTSN_M0	GPIO5_B3_d	3.3V
141	LCDC_HSYNC_3V3	SPI1_CLK_M2/I2C3_SDA_M2/P WM1_CH2_M1	GPIO5_D1_d	3.3V
142	LCDC_D16_3V3	VI_CIF_D12_M1 /PWM3_CH0_M1	GPIO5_C0_d	3.3V
143	LCDC_D17_3V3	VI_CIF_D13_M1 /PWM3_CH1_M1	GPIO5_C1_d	3.3V
144	LCDC_D18_3V3	VI_CIF_D14_M1 /PWM3_CH2_M1	GPIO5_C2_d	3.3V

Note:

1. Most GPIO voltage is 1.8V, but some pins marked 3.3V.

2. GPIO voltage change to 3.3V for marked (V2).

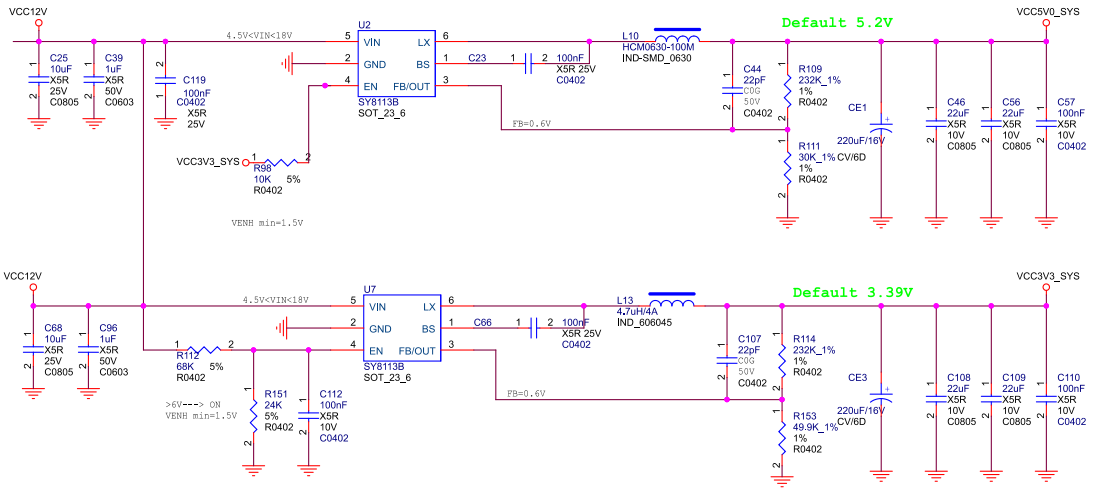
1.7 Development Kit (Idea1126)



2 Hardware Design Guide

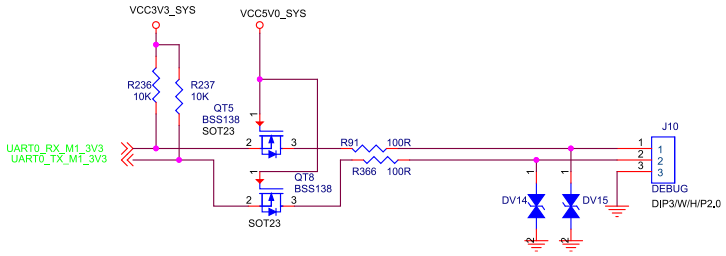
2.1 Peripheral Circuit Reference

2.1.1 Main Power Circuit

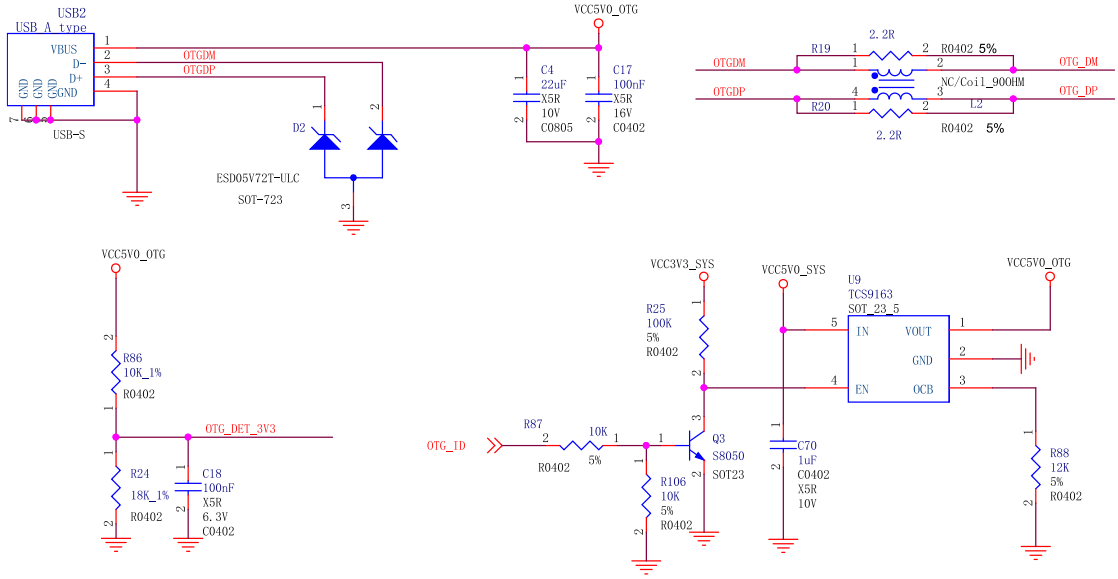


Vout=0.6*(1+R114/R153)

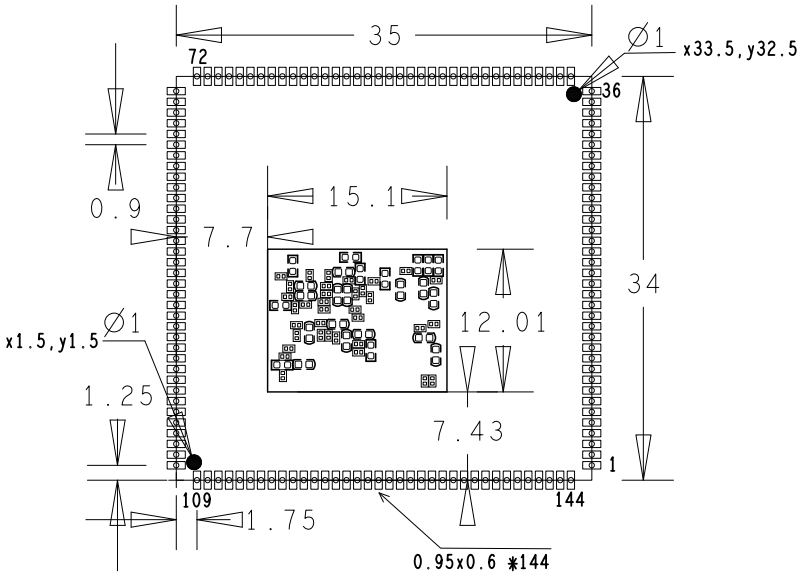
2.1.2 Debug Circuit



2.1.3 USB OTG Interface Circuit



2.2 PCB Footprint



3 Product Electrical Characteristics

3.1 Dissipation and Temperature

Symbol	Parameter	Min	Typ	Max	Unit
VCC3V3_SYS	System IO Voltage	3.3-5%	3.3	3.3+5%	V
Isys_in	VCC3V3_SYS input Current		850		mA
Ta	Operating Temperature	-20		70	°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	TBD	

Operating Life Test		
Contents	Operating in room	120h
Result	TBD	