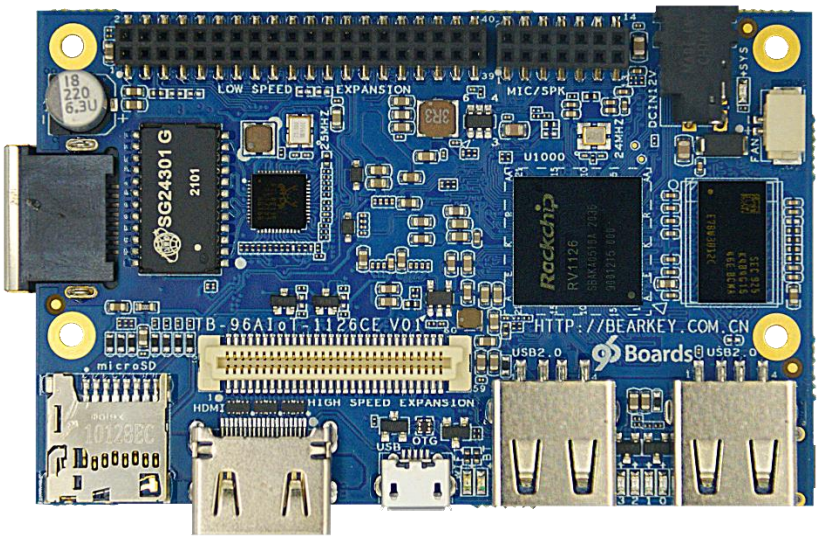
96Boards CE RV1126 Development board product user manual

V1.0



Revision History

Version Number	Revision Time	Revised Content	Reviser
V1.0	20210320	Create for the first time	Kewf

1. Product Overview

TB-96AIoT-1126CE Development Board is a 96Boards CE HW Specification V2.0 Development Board based on Rockchip artificial intelligence chip RV1126 developed by BeiQi Technology。

RV1126 is manufactured by 14nm process with built-in NPU and self-developed ISP.With multi-level noise reduction,3-frame HDR, Smart AE smart auto-exposure, white balance, distortion correction and other technologies, it can not only ensure the dynamic range of the scene, but also meet the needs of black full-color and complex light environment to maintain clarity. At the same time,Smart H.265 coding technology can save half of the back-end storage space;with its own AI algorithm,2.0Tops is powerful,Compatibility,support TensorFlow/MXNet/PyTorch/Caffe and other network models;support MIPI CIS,USB and other camera multi-interface input at the same time,is very suitable for IPC smart webcam products,face recognition gate/access/attendance products and battery IPC/smart doorbell/cat-eye products.

TB-96AIoT-1126CE development board is only 85mm x 54mm in size. It is very compact and can be easily embedded in various products.

1.1. Hardware Parameters

CPU ● RV1126 of Rockchip ● Quad-Core ARM Cortex-A7 and RISC-V MCU **NPU** ● 2.0Tops, support INT8/ INT16 **2D Graphics Acceleration Engine**	**M.2 Connector** ● 4G LTE/5G Module on M.2 connector **External Connector** ● Gigabit Ethernet×1（RJ45） ● USB2.0 HOST×2（TypeA） ● USB2.0 OTG×1（MicroUSB）

- Supports rotation, x/y mirroring
- Supports alpha layer blending
- Supports zooming in and out

Video Codec

- Support multi-stream encoding/decoding

(1)3840 x 2160@30fps + 720p@30 fps encoding

(2)3840 x 2160@30fps encoding + 3840 x 2160@30fps decoding

Memory

- RAM
  1GB DDR3
- Storage
  16GB eMMC
  Support micro SD extension

WIFI/BT

- 2.4GHz&5GHz
  IEEE802.11a/b/g/n/ac
- Bluetooth V5.0
- WIFI/BT ANT×1

FAN Connector

- FAN connector×1

Key

- Power ON/OFF
- HDMI1.4 OUT×1
- Micro SD×1
- DC12V IN×1（4.0mm*1.7mm）
- SIM CARD×1

LEDs

- 4×User LEDs
- WiFi LED
- BT LED

Debug

- Debug MicroUSB

Row Connectors

- One 40-pin Low Speed (LS1) expansion connector(UARTx2, SPI, I2S, I2Cx2, GPIO x12, DC power (12V, 5V, 1.8V))
- One 14-pin LOW Speed(LS2)expansion connector （SPK,MIC,PHONE）
- One 60-pin High Speed (HS) expansion connector(2L+4L-MIPI CSI,USB2.0, I2C x2)

Physical & Operating Characteristics

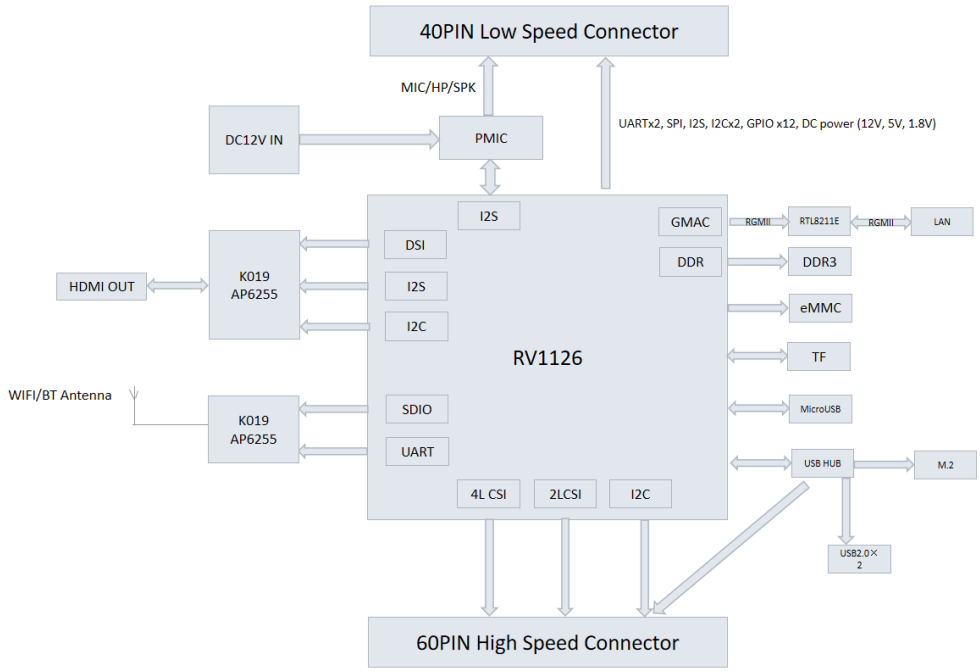
- Dimension:85mm*54mm
- Numder of Layers:8 Layers

● RESET ● Recovery	● Operating Temperature:0℃ to +55℃ ● Qualification certification:NA

1.2. Software Parameters

System Support Linux(Buildroot or Debian9)	**AI Application Development** ● Supports 8bit/16bit operations with AI up to 2.0TOPs; ● High computing power at full load and low power consumption at light load; ● Compatible with Caffe/Mxnet/TensorFlow model, supports multiple frameworks, supports mainstream layer types, and is easy to add custom layers; ● The AI application development SDK supports C/C++ and Python, facilitates the conversion and debugging of floating-point to fixed-point network for customers, and is extremely convenient for development.
DEMO ● IPC Smart Webcam Class Application ● Battery IPC, Smart Door Bell, Cat Eye Applications ● Gate Lock/Access Control/Attendance Application	

1.3. Hardware Block Diagram



1.4. RV1126 SoC Introduction

Rockchip RV1126 is a high performance processor SoC dedicated to visual processing. It can be widely used in intelligent upgrade related industries such as smart door lock, smart doorbell, webcam, driving recorder, game interaction, webcast, etc.

RV1126 is based on a quad-core arm Cortex A7 32-bit kernel. Each of the integrated NEON and FPU cores has a 32KB I cache and 32KB D cache, as well as a 512KB shared secondary cache.The built-in NPU supports INT8/INT16 hybrid operations and is computationally powerful.Many network models, such as TensorFlow/MXNet/PyTorch/Caffe, can be easily converted due to their strong compatibility.

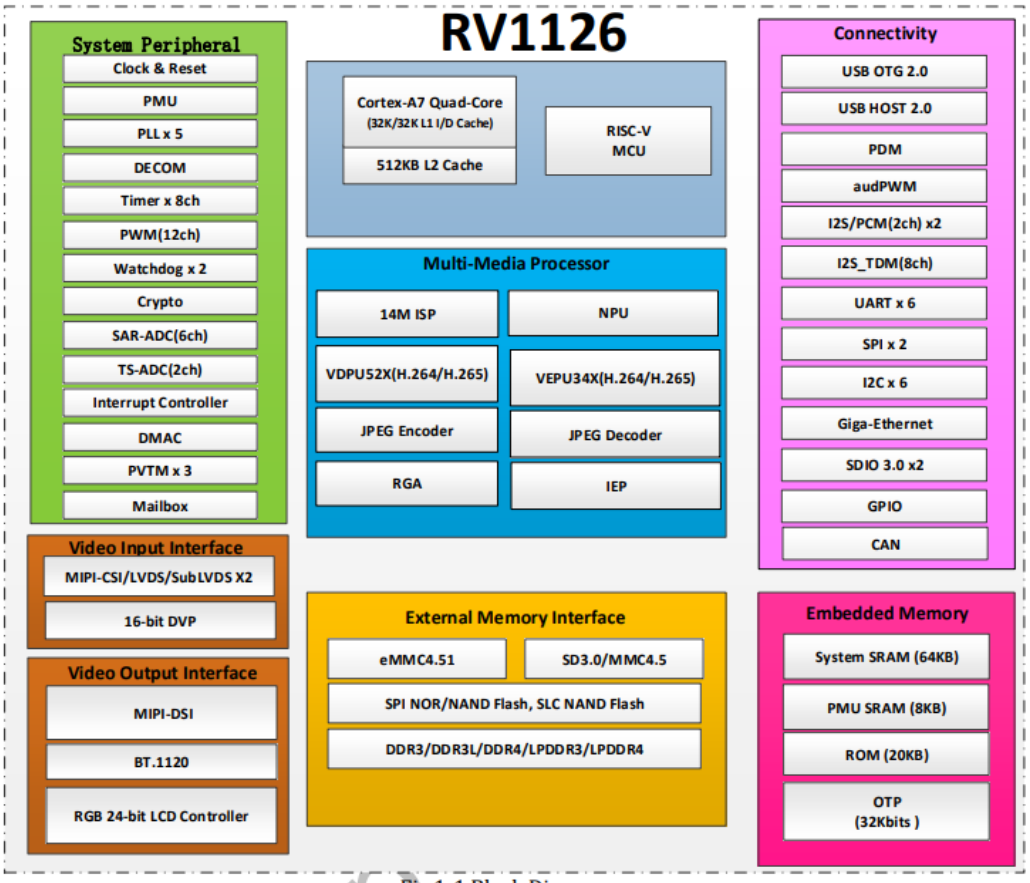
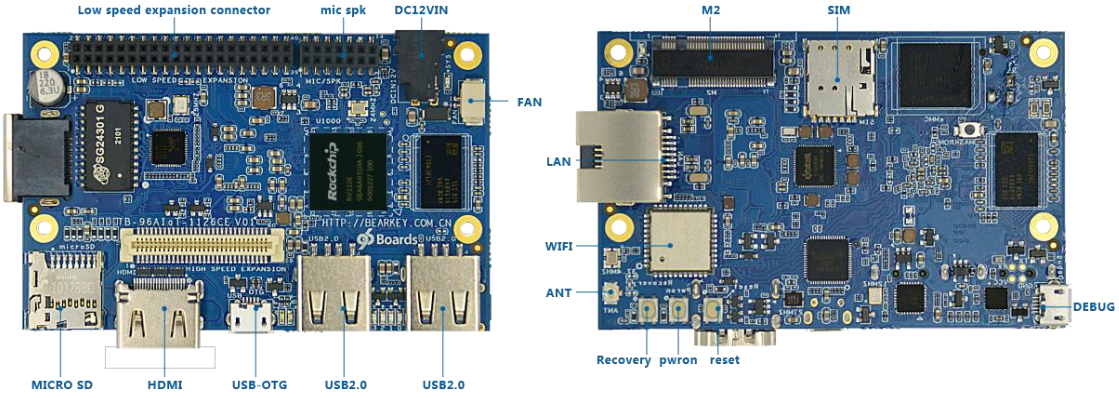


Fig.1-1 Block Diagram

1.5. Interface Description



40-pin Low Speed (LS1) expansion connector			
PIN NO.	Signal Name	PIN NO.	Signal Name
1	GND	2	GND
3	UART3_CTSN_M0	4	PWRON

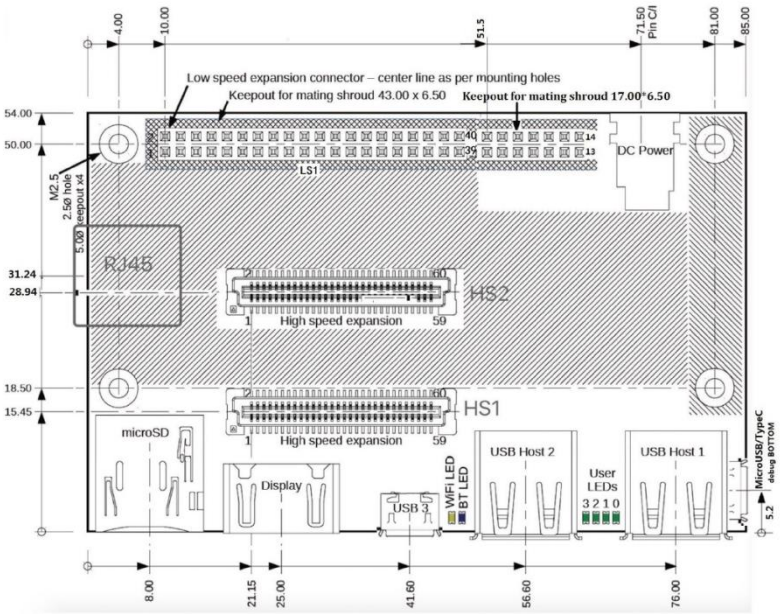
5	UART3_TX_M0	6	RESET
7	UART3_RX_M0	8	SPI1_CLK_M0
9	UART3_RTSN_M0	10	SPI1_MISO_M0
11	UART4_TX_M2	12	SPI1_CS0n_M0
13	UART4_RX_M2	14	SPI1_MOSI_M0
15	I2C3_SCL_M0	16	I2S1_LRCK_M0
17	I2C3_SDA_M0	18	I2S1_SCLK_M0
19	I2C5_SCL_M1	20	I2S1_SDO_M0
21	I2C5_SDA_M1	22	I2S1_SDI_M0
23	GPIO3_C3_d	24	GPIO1_D6_d
25	GPIO3_C2_d	26	GPIO1_D7_d
27	GPIO3_C1_d	28	GPIO2_A0_d
29	GPIO3_B4_d	30	GPIO2_A1_d
31	GPIO3_B3_d	32	CSI0_PWREN_H
33	GPIO3_B2_d	34	CSI1_PWREN_H
35	VCC1V8_EXT	36	VCC12V_DCIN
37	VCC5V0_SYS	38	VCC12V_DCIN
39	GND	40	GND

14-pin Low Speed (LS2) expansion connector			
PIN NO.	Signal Name	PIN NO.	Signal Name
1	SPK_OUTP	2	HPR_OUT
3	SPK_OUTN	4	HPL_OUT
5	GND	6	HP_DET_H
7	MIC_L	8	VCC5V0_SYS
9	MIC_R	10	VCC12V_DCIN
11	MiC_BIAS	12	VCC12V_DCIN
13	GND	14	GND

60-pin High Speed (HS) expansion connector			
PIN NO.	Signal Name	PIN NO.	Signal Name
1	NA	2	MIPI_CSI_RX0_CLKP
3	NA	4	MIPI_CSI_RX0_CLKN
5	NA	6	GND
7	NA	8	MIPI_CSI_RX0_D0P
9	NA	10	MIPI_CSI_RX0_D0N
11	NA	12	GND
13	GND	14	MIPI_CSI_RX0_D1P
15	MIPI_CSI_MCLK1	16	MIPI_CSI_RX0_D1N
17	MIPI_CSI_MCLK0	18	GND
19	GND	20	MIPI_CSI_RX0_D2P
21	NA	22	MIPI_CSI_RX0_D2N
23	NA	24	GND
25	GND	26	MIPI_CSI_RX0_D3P
27	NA	28	MIPI_CSI_RX0_D3N
29	NA	30	GND
31	GND	32	I2C1_SCL
33	NA	34	I2C1_SDA
35	NA	36	I2C2_SCL1
37	GND	38	I2C2_SDA1
39	NA	40	GND
41	NA	42	MIPI_CSI_RX1_D0P
43	GND	44	MIPI_CSI_RX1_D0N
45	NA	46	GND
47	NA	48	MIPI_CSI_RX1_D1P

49	GND	50	MIPI_CSI_RX1_D1N
51	HUB2_DP3	52	GND
53	HUB2_DM3	54	MIPI_CSI_RX1_CLKP
55	GND	56	MIPI_CSI_RX1_CLKN
57	NA	58	GND
59	NA	60	NA

1.6. Assembly Dimensions



1.7. Scenarios

TB-96AIoT-1126CE development boards can be widely used in different fields, typical applications include:

- IPC Smart Webcam Product
- Battery IPC, Smart Door Bell, Cat Eye Products
- Gate Lock/Access Control/Attendance Products
- Education and Training Industry
- Internet of Things Artificial Intelligence Other Application Fields

2. Instructions for use

<table>
<tr>
<td>1 USB cable to Dubug
➢ Connect the Micro-USB end of the USB cable to the debug port and TypeA-USB to the computer host.
➢ Open the serial port tool of the host computer and apply the following configuration:
baud rate: 1500000
Data bits: 8
Stop Bit: 1
Parity Check: None
flow control: None</td>
<td>4 Connect mouse and keyboard (optional)
➢ Insert a USB mouse and USB keyboard to the USB port of the development board
➢ Mouse and keyboard to watch/track on HDMI display

5 Connect LTE module (optional)
➢ Insert LTE/5G module into M.2 port
➢ Insert SIM card at the same time</td>
</tr>
<tr>
<td>2 Connect HDMI cable (optional)
Connect one end of the HDMI cable to the development board HDMI port and the other end to a display that supports HDMI.</td>
<td>6 Connect a USB-OTG cable (optional)
When firmware needs to be re burned, plug micro USB port of USB data cable into USB OTG port of development board, and typea USB at the other end to computer host</td>
</tr>
<tr>
<td>3 Connect to Ethernet (optional)
Plug wired Ethernet into RJ45 ports of the development board</td>
<td>7 Connect DC12V power cord (power on)
Connect the 12V power plug, and when the power supply is connected, the development board starts automatically.</td>
</tr>
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