# S4K Video Encoder/Decoder Module

-- Low latency H.265/H.264 video encoder and decoder, full HD resolution, maximum 3840*2160P@30

-- Audio codec with audio input and output

-- Working as video encoder: HDMI input, Ethernet RTSP/TS stream output, TCP/UDP protocol

-- Working as video decoder: Ethernet RTSP/TS stream input (TCP/UDP protocol), HDMI output

-- Web UI or uart for management

-- S4K encoder paired with S4K decoder in low latency mode, the 1080P60 H.265 video latency is about 100ms
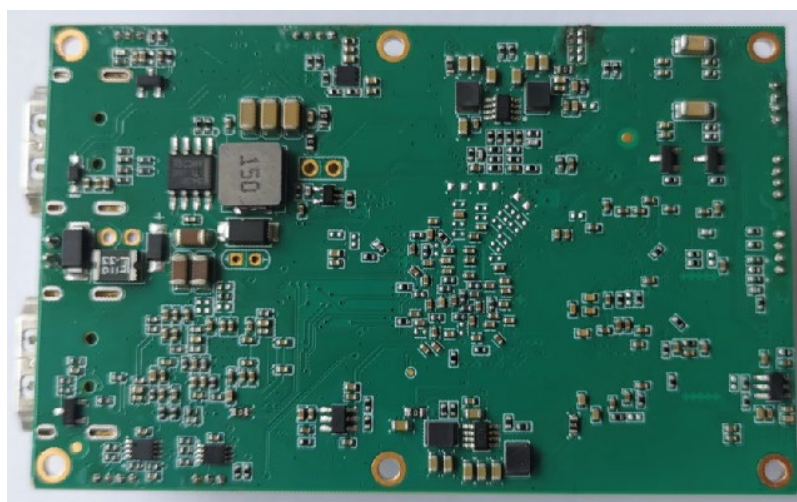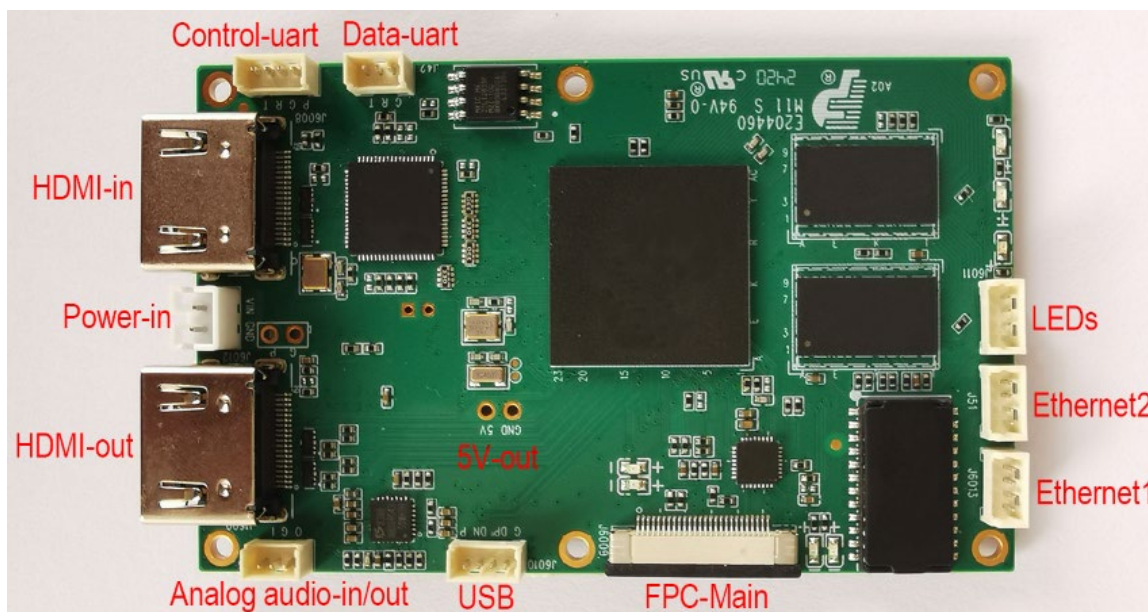
When S4K module works as video encoder, it implements H.265/H.264 video encoding and audio codec, the stream will output via Ethernet after encoding. One channel uart data can also be packed with the stream and output to the Ethernet. The video encoding bitrates is controlled via control uart or web UI. S4K supports maximum 3840*2160P@30 video encoding, and is downward compatibility for 3840P25/ 1080P60 / 1080P50 / … video encoding.

When S4K module works as video decoder, it implements H.265/H.264 video decoding and audio codec, the video stream input via Ethernet is decoded and sent to display via HDMI interface. The S4K decoder board features a range of comprehensive signal outputs including HD video at 4K/1080P/720P, uart data,

and analog audio is also supported. S4K board also supports decoding maximum 4 channel 1080P videos at the same time and display via split screen mode(optional firmware). S4K board includes DVR record functionality with USB disk. Additionally, the S4K board supports a built-in RTSP sever that enables video streaming over Ethernet for remote software or hardware decoders.

The S4K module is in compact size and suitable for embedded application and real time live video monitor via wireless link or Ethernet.

Specification:

IO

HD video input	HDMI, type A connector.
HD video output	HDMI, type A connector.
Analog audio input / output	3PIN PH1.25mm connector.
Data uart	3PIN PH1.25mm connector, TTL 3.3V, baud rate adjustable.
Control-uart	4PIN PH1.25mm connector, TTL 3.3V, baud rate adjustable.
USB Host	4PIN PH1.25mm connector, for software upgrading and USB disk recording When works as video decoder.
Power in	2PIN PH2.0mm connector.
Ethernet1	4PIN PH1.25mm connector.
Ethernet2	4PIN PH1.25mm connector.
FPC_main	For connecting with Sihid COFDM modulator.

Video and Audio

Video input / output	HDMI
Video formats	3840P30, 3840P25, 3840P24, 1080P60, 1080P50, 1080I60, 1080I50, 1080P30, 1080P25, 720P60, 720P50, 720P30, ······
Video encoding or decoding	H.265/H.264, setup via control uart or Web UI; Bitrates adjustable; Supports proprietary H.265/H.264 video compression only used p-frames for lowest latency(the S4K encoding plus S4K decoding latency is about 100ms for 1080P60 video) .
Audio input / output	Embedded HDMI or analog audio.
Audio Coding	AAC, 16bit, mono, 48Kbps
Encryption	AES256
Ethernet stream protocol	UDP TS stream, RTSP stream, UDP TS stream + RTSP stream

Monitoring and control
Comprehensive setup via web UI or AT command via control uart.

Temperature range
Full specification: 0° to +70°C Ambient (Optional: -40° to +85°C)
Storage: –40° to +85°C

Physical Characteristics
Dimensions: 80*50mm(not including connectors out of the board)
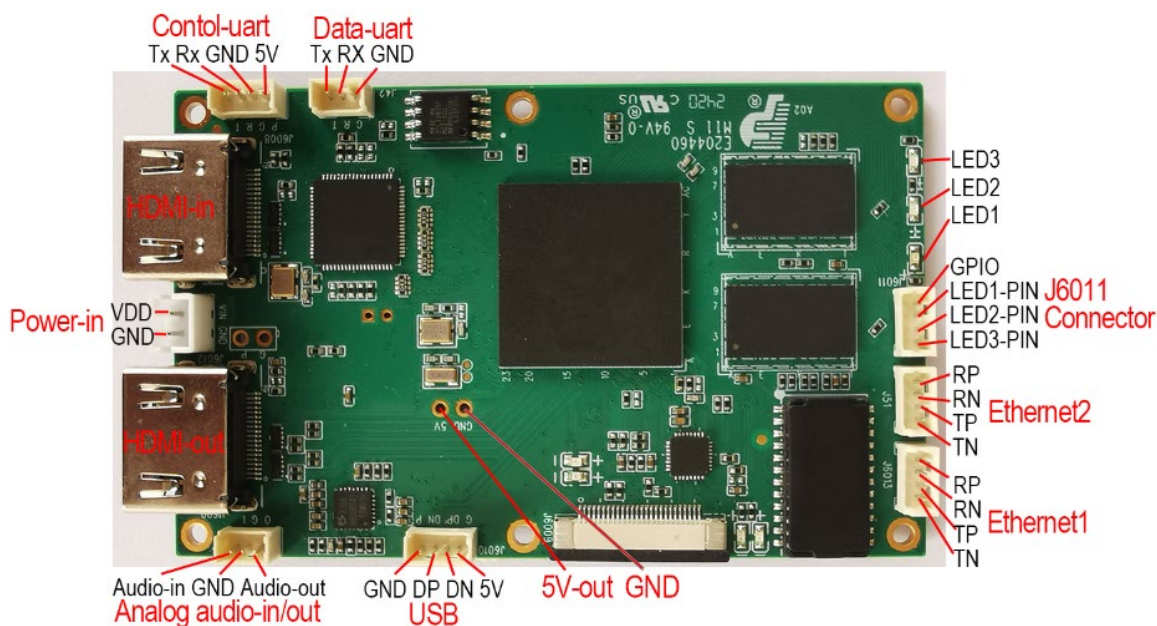Weight: 27g

Power requirements
Input range: 7~30VDC
Power consumption: <250mA@12V

I/O signals:

The power input interface is a 2PIN PH2.0mm connector. The module board also provides a 5V power

output for fan that it may be required when the module is integrated with wireless modules.

Data uart

The S4K module supports one channel uart data packed with the stream and transmitted via the Ethernet. When S4K encoder works paired with S4K decoder and Ethernet linker (wireless or wire), the data to this uart will be transferred to the remote S4K uart.

Control uart

4PIN PH1.25mm connector, TTL 3.3V. The S4K board system can be set-up via this control uart with AT command.

Audio in and Audio out

3PIN PH1.25mm connector. When S4K encoder board works paired with S4K decoder board and Ethernet linker (wireless or wire), it supports bidirectional voice communication. The analog audio input can be line in or Mic in, the analog audio out is designed to output to earphone or audio amplifier.

Ethernet1 and Ethernet2

Two 4PIN PH1.25mm connector, 100M ethernet port.

When the S4K board is shipped as an independent encoding or decoding board, Ethernet1 and Ethernet2 are internally set to bridge, with the same IP addresses for both network ports. The input or output of video data is through the Ethernet1 interface, and Web UI access is through the Ethernet2 interface; Ethernet1 supports connecting with Sihid bidirectional wireless transmission modules or other third-party bidirectional linkers. Ethernet1 supports UDP TS stream, RTSP stream and UDP TS stream + RTSP stream.

When using the S4K board with Sihid RCB COFDM wireless module (connected through FPC-Main interface via flat cable), Ethernet1 and Ethernet2 are internally set as two independent network ports, with different IP addresses.For this application, the Ethernet1 interface cannot be used externally because network signals are multiplexed to the FPC-Main interface.The Ethernet2 interface can be used as an access network port for the Web UI, or can be used to connect to the IP camera through the Ethernet2 network port. The IP camera video signal can be transmitted through the RCB COFDM wireless module. The below picture shows S4K module conencting with Sihid RCB COFDM module.
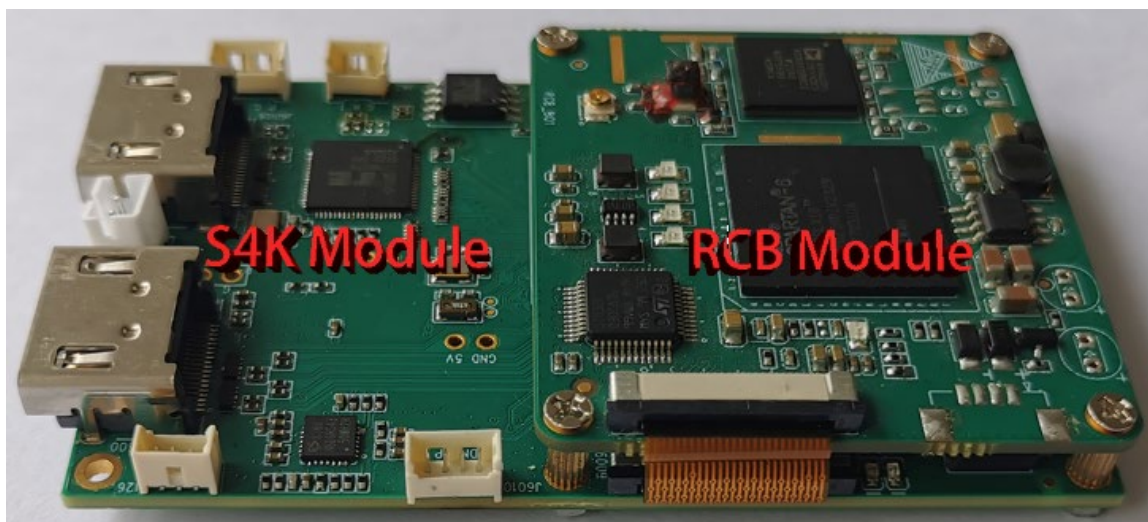
S4K&RCB COFDM transmitter module

LEDs and GPIO

There are three signal indicator lights (LED1/LED2/LED3) on the right side of the S4K module board, and the indicator light signals are simultaneously connected to the J6011 connector PINs (4PIN 1.25mm connector). Some customers may need to assemble indicator LEDs on their housing case, then they can use J6011 connector PINs to add indicator LEDs on their housing case.

When the S4K works as encoding board, the corresponding signals of the indicator lights are as follows:

LEDs	Description	Corresponding J6011 PIN
LED1	Power-LED: red color, constant light when the board is normal powered.	LED1-PIN
LED2	Green color, constant light when the input video is detected successfully, otherwise it will not light.	LED2-PIN
LED3	Encoding-LED: green color, blinks when video encoding normally.	LED3-PIN

When the S4K works as decoding board, the corresponding signals of the indicator lights are as follows:

LEDs	Description	Corresponding J6011 PIN
LED1	Power-LED: red color, constant light when the board is normal powered.	LED1-PIN
LED2	Green color, constant light when video is being recorded with USB disk, otherwise it will not light.	LED2-PIN
LED3	Decoding-LED, green color, blinks when video stream is normal received and decoding	LED3-PIN

When using J6011 PIN signal to connect LED indicator lights externally, the "positive pin" of the external LED2 and LED3 indicator lights should be connected to the corresponding J6011 PIN pin, and the "negative pin" should be connected to any GND on the S4K board; When connecting the external LED1 power indicator light, connect the "positive pin" to the J6011 LED1-PIN and the "negative pin" to any GND on the S4K board.

GPIO signal on J6011 connector: reserved GPIO for using as special customized software.