RAK566 HDMI-in Video Module

Specification V1.5

Shenzhen Rakwireless Technology Co.,Ltd www.rakwireless.com

Mail：info@rakwireless.com

Content

1 Overview

1.1 Module overview

RAK566 supports IEEE802.111a/n wireless protocol and is an ultra-low power consumption intelligent image transmission module which support the HDMI input.It has small foot print and the easy using feature. The Module support the H.264 codec and the sound processor and is specially designed for accelerating video/audio streaming performance. To fast the evaluation, the user can get the demo Apps on Android, iPhone and other equipment to complete the play and display of audio and video. RAK566 integrates the high-speed serial port to use for transparent in interaction.

RAK566 integrates the WIFI Module ,which support IEEE 802.11a/n 2x2 MIMO.

1.2 Application Field

- Air vehicle
- Smart toys
- Building Automation
- Logistics and freight management
- Family safety and automation
- Safety Inspection

1.3 Product Features

- Powerful WIFI
  - Support IEEE 802.11a/n protocol
  - TX Power ≤ 22dBm
  - Soft AP Mode
  - 2x2 300M PHY Rate
  - support Infra/Soft AP network type
  - support multiple security authentication mechanism: WEP64/WEP128/ TKIP/CCMP (AES) / WEP/WPA-PSK/WPA2-PSK
  - supporting many network protocol: TCP/UDP/ICMP/DHCP/DNS/HTTP

- Efficient video processing
  - support H.264 Base/Main/High Profile
  - Supports up to the 1080p @ 30fps and VGA@30FPS video resolution
  - Supports RTSP video stream
  - Supports CBR/VBR,and the bitrate can be configured from 128Kbit/s to 16Mbit/s
  - Supports RTSP video stream
  - Support HTTP command to configure
- Input Interface
  - 1 UART for transparent and 1 high- speed UART
  - Micro HDMI Video input Interface
- Module size

  55mm*30mm*16.3(±0.2)mm

1.4 Parameters

Parameters	Description
Video Input	1080P(1920*1080) 60FPS-30FPS; 720P(1280*720) 60FPS-30FPS; 1080i(1920*1080) 60FPS; (Not Recommended) 720i(1280*720) 60FPS; (Not Recommended)
Video Output	1080P(1920*1080) 30FPS; 720P(1280*720) 30FPS; VGA(640*480) 30FPS H.264Format, Powerful hard-coding technique
Audio Input	Only support 48KHz sample rate
Transmission distance	Effective distance: 1000m; Smooth video transmission: 500m.
Size	55mm*30mm*16.3(±0.2)mm
Baud rate	115200bps (default) for transparent transmission, customers can modify it by command
Wireless parameters	Support IEEE 802.11a/n protocol,and Infra / Soft AP network; Support Soft AP connect.
power	7-23V power supply, the max current :500mA(Typical Power Value:12V)；
CPU	ARM Cortex-A7
OS	Linux-3.4.8

2 Hardware Overview

2.1 Modules view

Figure 2-1 RAK566 module Top view

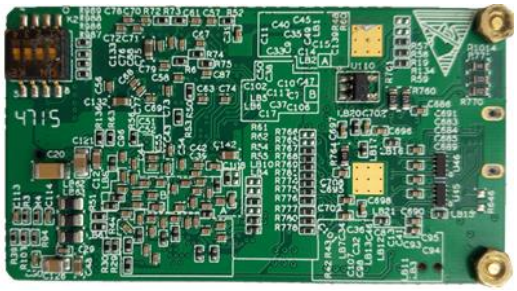


Figure 2-2 RAK566 module Bottom view

2.2 Module size

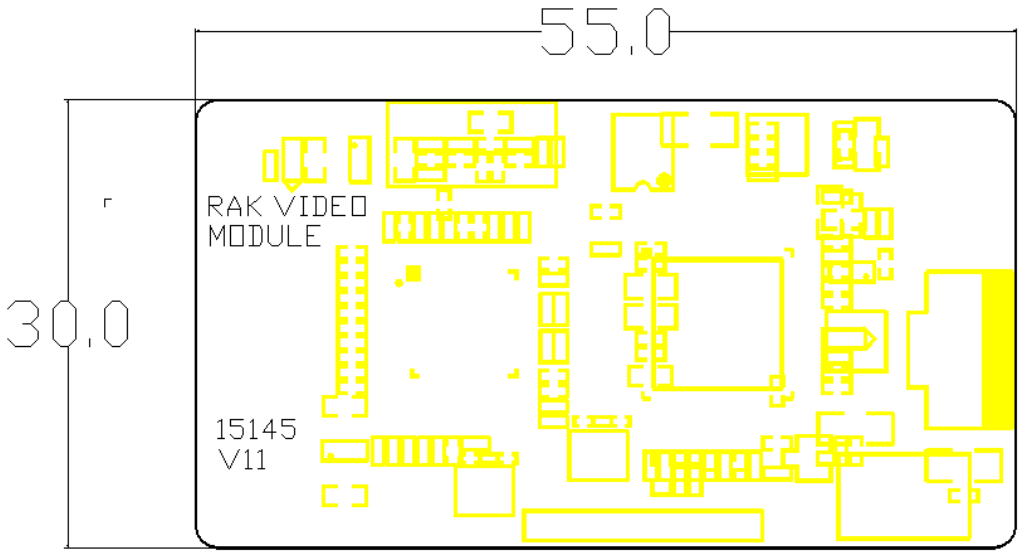


Figure 2-3 RAK566 Plane size

2.3 Pin definition

Figure 2-4 power supply

Pin	Name	Description	Remark
1	VDDIN	12V VCC	12V power input
2	VDDIN	12V VCC	12V power input
3	GND	GND	GND
4	GND	GND	GND

- Notes: the power interface strictly prohibit to connect other connector . Or that must damage the module .

Figure 2-5 UART1 interface

Pin	Name	Description	Remark
1	NC		
2	UART1_TXD	UART1 TX , DATA	TTL LEVEL
3	UART1_RXD	UART1 RX , DATA	TTL LEVEL
4	GND	GND	

- Notes: the power interface strictly prohibit to connect other connector . Or that must damage the module .
- Label 2 have been removed from Hardware V1.2.

DATA INTERFACE :

This UART is using for TRANSPARENT DATA .The socket will use UDP protocol .The IP address is the module' s valid IP address , and the UDP port is 1008 .

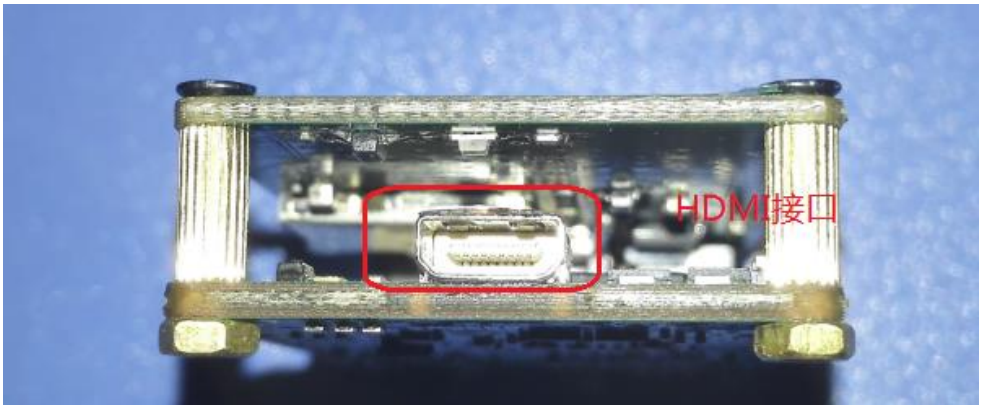
When the wifi device(smart phone) connect the softAP , the wifi device(smart phone APP) must open the UDP socket , and then send data to RAK566 module firstly . Once the module get the data , the data will be send out via UART and the module will remember the wifi device' s IP and UDP PORT. After that the module can send data back once the module receive data via UART .

Before Sending data to the module , you must add the protocol head (0x01 0x55) before the valid data . The module will cut off the protocol head and send the valid data via UART to the host MCU . The host MCU send the valid data to the module via UART . The module will add the protocol head(0x01 0x55) again before sending to wifi device .so the smart phone APP will get the data including protocol head.

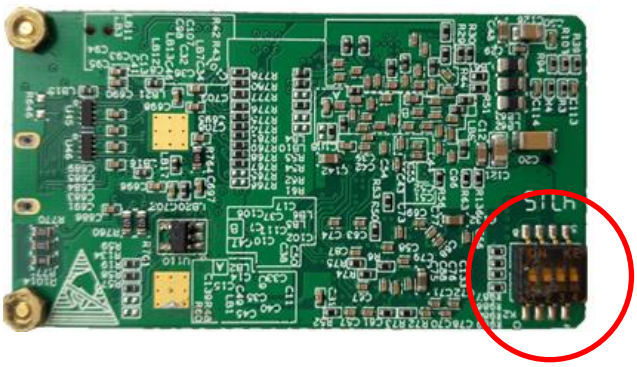
Such as, all data is HEX data .

sending : 01 55 66 88 99 00 44(5bytes valid data)

ACK: 01 55 88 99 00 44 33(5bytes valid data)



2.4 DIP Switch definition



Notes :

The DIP Switch is using for some new function . Must keep the lebel 3 and lebel 4 localing in OFF position. Or willl make the module abnormal .

3 RF Characteristic

3.1 IEEE 802.11a

Items	Contents			
Specification	IEEE 802.11a			
Modulation technique	OFDM			
Channel	5180 ~ 5825MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
1. Power Levels(SISO)				
1)Target Power@6Mbps	18	20	22	dBm
2)Target Power@9Mbps	18	20	22	dBm
3)Target Power@12Mbps	18	20	22	dBm
4)Target Power@18Mbps	18	20	22	dBm
5)Target Power@24Mbps	18	20	22	dBm
6)Target Power@36Mbps	15	17	19	dBm
7)Target Power@48Mbps	14	16	18	dBm
8)Target Power@54Mbps	13	15	17	dBm
2. Spectrum Mask@Target Power				
1) at fc ±11MHz	-	-	-20	dBr
2) at fc ±20MHz	-	-	-28	dBr
3) at fc > ±30MHz	-	-	-40	dBr
3. Frequence Error	-20	-	+20	ppm

4. Modulation Accuracy(EVM)@Target Power				
1) 6Mbps	**-**		**-5**	**dB**
2) 9Mbps	**-**		**-8**	**dB**
3) 12Mbps	**-**		**-10**	**dB**
4) 18Mbps	**-**		**-13**	**dB**
5) 24Mbps	**-**		**-16**	**dB**
6) 36Mbps	**-**		**-19**	**dB**
7) 48Mbps	**-**		**-22**	**dB**
8) 54Mbps	**-**	**-30**	**-25**	**dB**
RX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
5. Minimum Input Level Sensitivity				
1) 6Mbps(PER < 10%)	**-**	**-94**	**-90**	**dBm**
2) 9Mbps(PER < 10%)	**-**	**-93**	**-89**	**dBm**
3) 12Mbps(PER < 10%)	**-**	**-92**	**-88**	**dBm**
4) 18Mbps(PER < 10%)	**-**	**-89**	**-85**	**dBm**
5) 24Mbps(PER < 10%)	**-**	**-86**	**-82**	**dBm**
6) 36Mbps(PER < 10%)	**-**	**-82**	**-78**	**dBm**
7) 48Mbps(PER < 10%)	**-**	**-78**	**-74**	**dBm**
8) 54Mbps(PER < 10%)	**-**	**-77**	**-72**	**dBm**
6. Maximum Input Level (PER < 10%)	**-30**	**-**	**-**	**dBm**

3.2 IEEE 802.11n HT20(5G)

Items	Contents			
Specification	IEEE 802.11a/n HT20			
Modulation technique	OFDM			
Channel	5180 ~ 5825MHz			
Data rate	MCS0 ~ MCS15			
TX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
1. Power Levels				
1)Target Power@MCS0	18	20	22	dBm
2)Target Power@MCS1	16	18	20	dBm
3)Target Power@MCS2	16	18	20	dBm
4)Target Power@MCS3	16	18	20	dBm
5)Target Power@MCS4	15	17	19	dBm
6)Target Power@MCS5	14	16	18	dBm
7)Target Power@MCS6	13	15	17	dBm
8)Target Power@MCS7	12	14	16	dBm
2. Spectrum Mask@14dBm				
1) at fc ±11MHz	-	-	-20	dBr
2) at fc ±20MHz	-	-	-28	dBr
3) at fc > ±30MHz	-	-	-45	dBr
3. Frequence Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				

1) MCS0	**-**		**-5**	**dB**
2) MCS1	**-**		**-10**	**dB**
3) MCS2	**-**		**-13**	**dB**
4) MCS3	**-**		**-16**	**dB**
5) MCS4	**-**		**-19**	**dB**
6) MCS5	**-**		**-22**	**dB**
7) MCS6	**-**		**-25**	**dB**
8) MCS7	**-**	**-30**	**-28**	**dB**
RX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	**-**	**-93**	**-89**	**dBm**
2) MCS1(PER < 10%)	**-**	**-91**	**-87**	**dBm**
3) MCS2(PER < 10%)	**-**	**-88**	**-84**	**dBm**
4) MCS3(PER < 10%)	**-**	**-83**	**-79**	**dBm**
5) MCS4(PER < 10%)	**-**	**-80**	**-76**	**dBm**
6) MCS5(PER < 10%)	**-**	**-76**	**-72**	**dBm**
7) MCS6(PER < 10%)	**-**	**-75**	**-70**	**dBm**
8) MCS7(PER < 10%)	**-**	**-73**	**-67**	**dBm**
6. Maximum Input Level (PER < 10%)	**-30**	**-**	**-**	**dBm**

3.3 IEEE 802.11n HT40(5G)

Items	Contents			
Specification	IEEE 802.11a/n HT40			
Modulation technique	OFDM			
Channel	5190 ~ 5815MHz			
Data rate	MCS0 ~ MCS15			
TX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
1. Power Levels				
1)Target Power@MCS0	16	18	20	dBm
2)Target Power@MCS1	15	17	19	dBm
3)Target Power@MCS2	15	17	19	dBm
4)Target Power@MCS3	15	17	19	dBm
5)Target Power@MCS4	14	16	18	dBm
6)Target Power@MCS5	13	15	17	dBm
7)Target Power@MCS6	12	14	16	dBm
8)Target Power@MCS7	11	13	15	dBm
2. Spectrum Mask@14dBm				
1) at fc ±11MHz	-	-	-20	dBr
2) at fc ±20MHz	-	-	-28	dBr
3) at fc > ±30MHz	-	-	-45	dBr
3. Frequence Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				

1) MCS0	**-**		**-5**	**dB**
2) MCS1	**-**		**-10**	**dB**
3) MCS2	**-**		**-13**	**dB**
4) MCS3	**-**		**-16**	**dB**
5) MCS4	**-**		**-19**	**dB**
6) MCS5	**-**		**-22**	**dB**
7) MCS6	**-**		**-25**	**dB**
8) MCS7	**-**	**-31**	**-28**	**dB**
RX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	**-**	**-89**	**-85**	**dBm**
2) MCS1(PER < 10%)	**-**	**-87**	**-83**	**dBm**
3) MCS2(PER < 10%)	**-**	**-84**	**-80**	**dBm**
4) MCS3(PER < 10%)	**-**	**-80**	**-76**	**dBm**
5) MCS4(PER < 10%)	**-**	**-77**	**-73**	**dBm**
6) MCS5(PER < 10%)	**-**	**-73**	**-69**	**dBm**
7) MCS6(PER < 10%)	**-**	**-71**	**-67**	**dBm**
8) MCS7(PER < 10%)	**-**	**-70**	**-64**	**dBm**
6. Maximum Input Level (PER < 10%)	**-30**	**-**	**-**	**dBm**

4 Electrical Characteristics

4.1 Absolute maximum

The table below gives the absolute maximum value, exceed the maximum range may make the module device damaged. In order to avoid the modules and devices damaged please operate under specified conditions.

Table 4-1: parameter and range

parameters	Symbol	value	uint
The external power supply voltage	VDD	7~23	V
IO maximum input voltage	$3V3V_{in}IOMax$	3.6	V
IO minimum input voltage	$3V3V_{in}IOMin$	-0.3	V
Storage temperature	T_{store}	-40~+125	℃
Operation temperature	T_{oper}	-20~+85	℃

4.2 Recommended operating parameters

Figure 4-2 Power supply range

parameters	Symbol	minimum	Typical values	maximum	unit
Power supply	VDD	7.0	12.0	23.0	V

5 Order Information

Table 5-1: Product Models

PART NO.	Description	Volume/tray	MPQ
RAK566	Image transmission,plug and play,STA Mode	12PCS/tray	60PCS

6 Sales and Technical Support

Shenzhen Headquarters

Room 1007, Hangsheng Technology Building, South Four Road, Science and Technology Park, Nanshan District, Shenzhen

Email: ken.yu@rakwireless.com

TEL: 0755-86108311

Shanghai R&D Center

B205 Lvliang Technology Pioneer Park, 2588 Hongmei South Road, Minhang District, Shanghai

Email: steven.tang@rakwireless.com

TEL: 021-61553990

Beijing Office

Tencent Zhongchang Zone, Huilongguan, Changping District, Beijing

Email: allan.jin@rakwireless.com

7 Revision&History

Revision	Update	Date
V1.0	Update picture and format.	2015-12-10
V1.1	1,add the DIP switch definition . 2,add the UART interface definiton and the socket parameters.	2016-2-15
V1.2	Delete 2.4G RF parameters.	2016-8-15
V1.3	Update sales and Technical Support.	2016-11-10
V1.4	Update video input parameters.	2016-12-13
V1.5	Update the power input paramters.	2017-7-13