RAK5270 (1080P) Video Module

Datasheet V1.5

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Content

1. Overview

1.1 Module overview

RAK5270 is an low power consumption intelligent video module and fully support IEEE802.11a/b/g/n wireless protocol. It has small foot print to include the ARM CPU and low-power consumption WIFI connectivity.The Module support the H.264 codec and Audio codec. is specially designed for accelerating video/audio streaming performance.

RAK5270 intelligent video module integrate the P2P cloud server who has a strong NAT, firewall traversing skill.The viewer will watch the streaming in anywhere and anytime. RAK provide the technical support, allows customers to get started quickly, shorten the development cycle. It also provides various types of customized development, such as user WEB Webpage, production configuration tool and mobile Apps etc.

1.2 Application field

- Portable products
- Smart toys
- Intelligent monitoring
- Building automation
- Household appliances and electrical
- Logistics and freight management
- Family safety and automation

1.3 Product Feature

- High TX Power WIFI

- Support 802.11a/b/g/n protocol
- Support STA/Soft AP mode
- 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

- Video Encode

- Support H.264/VGA/QVGA/RTSP Stream
- Up to 1080P@30fps video encode
- Separate H.264 + Audio Stream

- Audio Encode
  - 16KHz Mono
- I/O Resources
  - Multiple GPIO resources
  - 1 serial port

1.4 Specifications

Parameters	Description
Video	1080P(1920*1080) @30FPS Record+720P(1280*720) @20FPS transmit; 1080P(1920*1080) @25FPSRecord+720P(1280*720) @25FPS transmit; 1080P(1920*1080) @30FPS Record+960*576@30FPS transmit;
Audio	32KHz Mono
Video Transmission Delay	IOS：Around 200-300ms。 Android: Average 300ms
Camera Pixel	200W
APP	Android & IOS，Provide SDK for UI purpose
Transmission Distance	Effective distance160m， 120 video run smoothly
Size	45.4mm*45.9mm
UART Bound Rate	115200bps（Default），can be changed by AT command
Wireless Parameters	5.8GWIFI，Compliant to 802.11b/g/n protocol，sopport STA/Soft AP Net work types
Power Supply	12V power supply with 200mA.
Video record	Support 32G TF card; the default is 1080P 30FPS video, 8Mbps frame rate.

2. Hardware Description

2.1 Module View

Figure2-1 RAK5270 Top View

Figure 2-2 RAK5270 Back View

2.2 Module Size

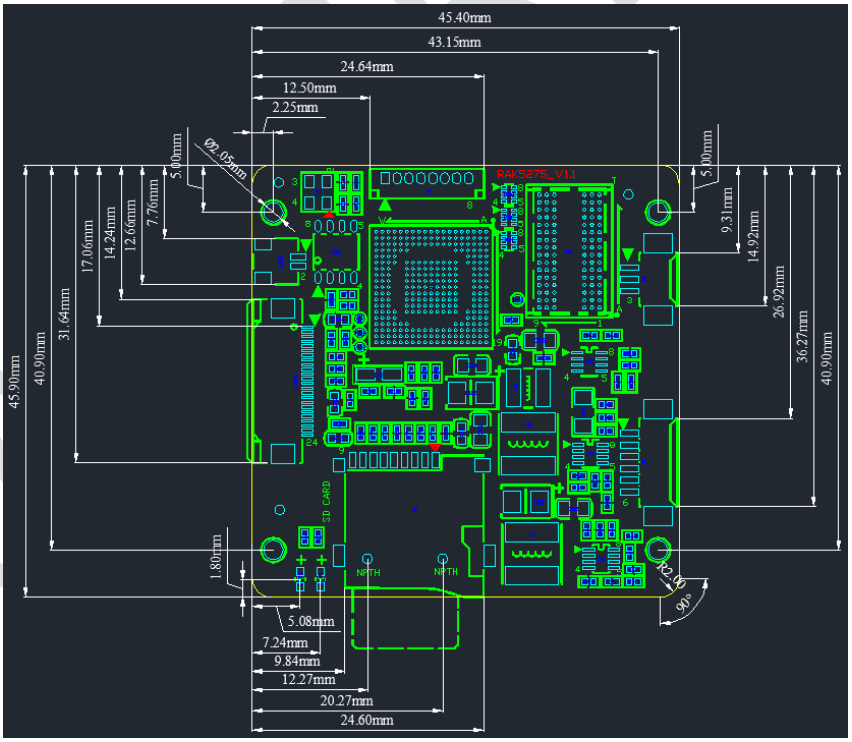


Figure2-3 Module Size (Top)

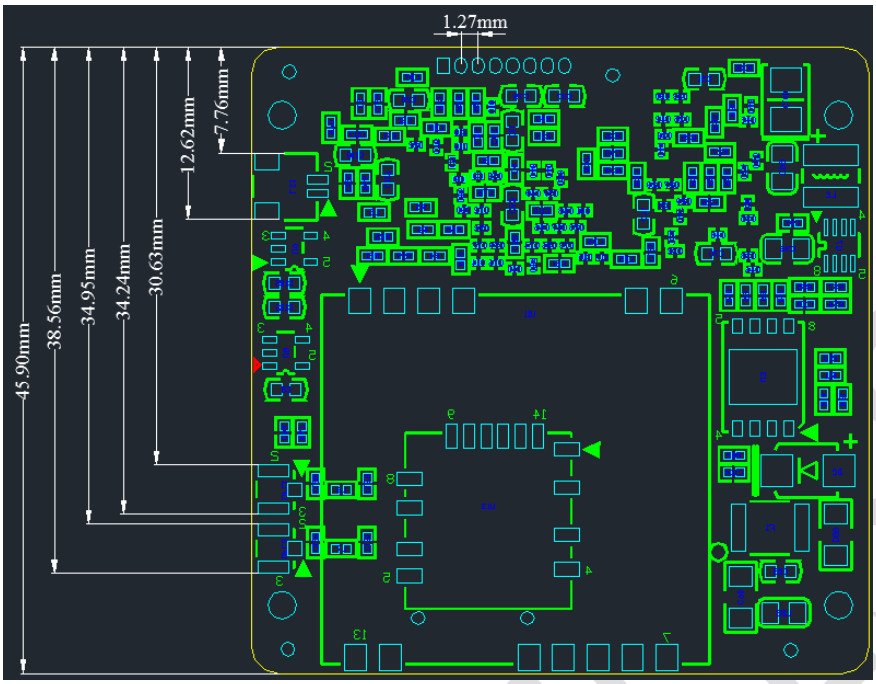
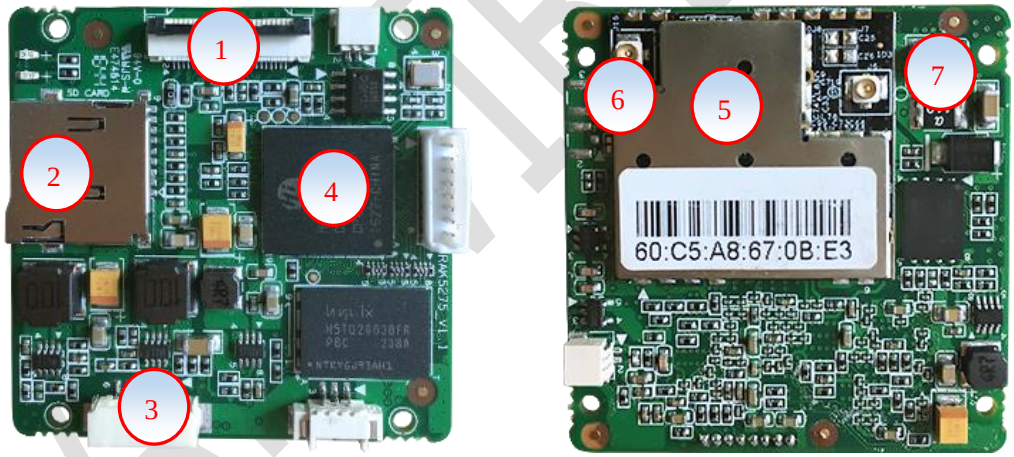


Figure 2-4 Module Size(Bottom)

2.3 Pin definition



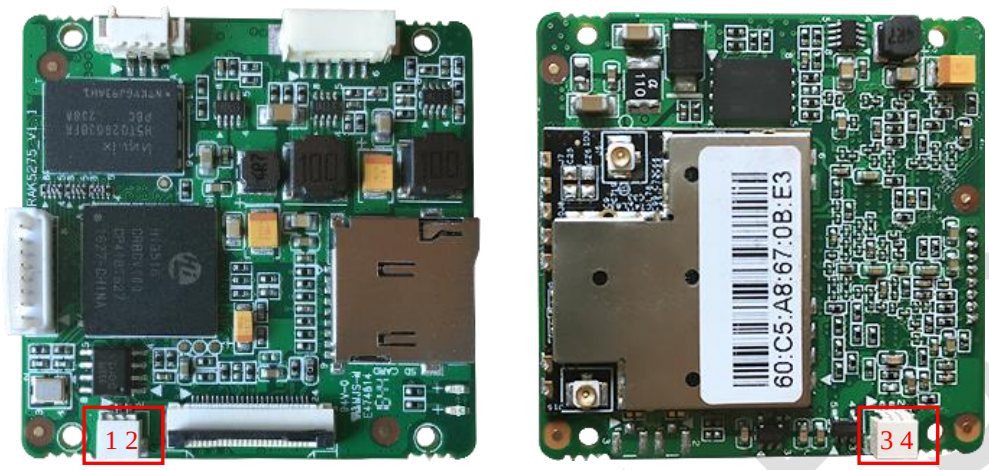
Item	Name	Description
1	Camera Interface	CMOS camera module
2	TF Holder	Micro SD holder
3	Power Supply Interface And UART Interface	DC power connector ,input range 5V~16V(12V@200mA), UART TTL Signal, using for transparent More details refer to: **Label 3 interface**
4	CPU	CPU
5	RAK535	High TX power 5.8G WIFI module , 20dB TX Power
6	IPEX/U.fl	RAK535 WIFI module antenna interface *2
7	Hole	M2 location hole

Label 3 interface (Right to Left)

Label	Name	Description
1	DC VDD_12V	12V DC power (5V~16V)
2	DC VDD_12V	12V DC power (5V~16V)
3	DGND	GND
4	DGND	GND
5	UART_TXD	Serial TX for transparent
6	UART_RXD	Serial RXfor transparent

PIN	Name	CPU GPIO	Description
1,8	DGND	DGND	GND
3	Module status indication pin	PWM_OUT1/GPIO5_3	Synchronize the status of the blue status indicator
5	Pin 6 status indicator	IR_IN/GPIO7_5	When Pin6 switches between AP and STA mode, Pin5 outputs 50ms low level. Pin6 to restore the factory settings, Pin5 output 200ms low level.
6	Mode switch & restore factory	PWM_OUT1/GPIO5_3	Set low-Level more than 2s, blue will blight,then set high-level, the mode will be switched from AP to STA or from STA to AP; And Set low-Level more than 5s, blue light off, restore the factory settings to AP mode.
2	NC	VDAC_IOUT	Reserved

4	NC	ADC_CH0	Reserved
7	NC	ADC_CH1	Reserved



PIN	Name	Description
1	Speaker_P+	Speaker positive
2	Speaker_N-	Speaker negative
3	MIC+	MIC positive
4	MIC-	MIC negative

2.4 SSID and Password Characters

Our module will support a lot of characters . but for some protocol ,we can only support the following characters in our module.if you use other characters ,the module can not connect the router well .please note that .

./abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ_-+=&1234567890@[]?%#

3. RF Feature

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_12V	5~16	V
IO maximum input voltage	$3V3V_{in}IOMax$	3.6	V
IO minimum input voltage	$3V3V_{in}IOMin$	-0.3	V
The storage environment temperature	T_{store}	-40 ~ +125	℃
Operating temperature	T_{oper}	-10~+70	℃

4.2 Recommended operating parameters

Table 4-2: Recommended operating parameter range

parameters	Symbol	minimum	Typical values	maximum	unit
The external power supply voltage	VDD_12V	**5**	**12**	**16**	**V**

5. Order information

Table 5-1：Order model

Product	Description	Packaging	MPQ
RAK5270	Long range Video transmission module	10PCS/tray	50PCS

6. Contact information

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7. Revision&History

Version	Modification content	Author	Date
V1.0	1．Initial Draft	Steven	2016-09-01
V1.1	1．Update sales and Technical Support. 2．Update module picture.	Steven	2016-11-10
V1.2	1．update the power supply range. 2．fix audio description error.	Steven	2016-11-20
V1.3	1．add the factory reset config mode pin description.	Steven	2016-11-29
V1.4	1．Update the document format 2．Update module pictures and module size pictures 3．Add 2 pin definitions 4．Add the video recording parameters 5．update the picture. 6．fix some mistake . 7．Add audio parameters and audio interface .	lampo	2016-12-21
V1.5	Add the ssid and password characters information.	Steven	2017-02-28