

# **RAK567 Video HMDI Output**

## **Datasheet V1.6**



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## 1 Overview

#### 1.1 Module overview

RAK567 supports IEEE802.111a/b/g/n wireless protocol ,it is an intelligent image transmission module which support the CVBS,WIFI,HDMI,USB and SDI video output.It has small foot print and the easy using feature. The Module support the H.264 codec and the sound processor and it is specially designed for accelerating video/audio streaming performance with 300Mbps data rate WIFI module. To fast the evaluation, the user can get the demo Apps on Android, iPhone and HDMI,CVBS,SDI input equipment to complete the play and display of audio and video. RAK567 integrates the high-speed serial port to use for transparent data interaction.

RAK567 integrates the WIFI Module ,which support IEEE 802.11a/b/g/n 2x2 MIMO.The data rate is up to 300Mbps and it have 22dbm TX power.The module support the remote image transmission.

### 1.2 Application Field

- Air vehicle
- Smart Robot
- Underwater Robot
- Oceanographers
- Building Automation
- Logistics and freight management
- Family safety and automation
- Safety Inspection

#### 1.3 Product Features

#### Powerful WIFI

- ➤ Support IEEE 802.11a/b/g/n protocol
- ightharpoonup TX Power  $\leq 22 dBm$
- 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 Encode

- ➤ Support Encode Frame 1 fps~60fps
- ➤ Support 2x1080p Real time video input
- ➤ Support 4x720P Real time video input
- ➤ Support H.264 video encode
- ➤ Support AAC-LC audio input

#### • Efficient Video Decode

- ➤ Up to 6x720p video Real time decode
- ➤ Up to 3x1080p video Real time decode
- ➤ HDMI output up to1080P@60fps
- > 1 x GMAC Interface, Up to 1000M Full Duplex
- ➤ Support HDMI 1080P@60fps+CVBS output
- > Support 1080P@60FPS SDI Video output
- > Support H.264 video decode

### Video Input interface

- > RTSP steam input via WIFI channel
- > Support multichannel 1080P/720P/D1 H.264 video steam input
- ➤ High-speed UART serial port input for data

### Extensions Function

- ➤ Hardware encryption algorithm with AES/DES/3DES
- ➤ Digital watermarking
- > Support add watermarking before decode up to 8 sector.
- > Support I2S, UART, I2C, GPIO interface



### Module Size

120mm\*100mm

## 1.4 Parameters

Parameters		Description
		1080P(1920*1080) @60FPS,
	HDMI Output	1080P(1920*1080) @30FPS,
	TIDIMI Output	720P(1280*720) @60FPS,
		720P(1280*720) @30FPS;
	Ethernet output	1080P(1920*1080) @30FPS,
	Ethernet output	720P(1280*720) @30FPS;
Video Output	CVBS Output	640*480@30FPS;
	WIEL Output	1080P(1920*1080) @30FPS,
	WIFI Output	720P(1280*720) @30FPS;
		1080P(1920*1080) @60FPS,
	SDI Output *	1080P(1920*1080) @30FPS,
	SDI Output *	720P(1280*720) @60FPS,
		720P(1280*720) @30FPS;
HDMI version	HDMI 1.4a	
Audio Input	Audio sample rate onl	y support 48KHz.
Video Iutput	Support mutlichannel	steam input with High TX power wifi.
Video Delay	IOS phone: 200-300m	s. Android Phone:about 300ms.HDMI Output: 150-200ms.
RTMP stream	Support to push RTMI	P stream to cloud server with audio and video
Transmission	600m -1000m	
distance		
Baud rate	115200bps (default) for	transparent transmission, customers can modify it by command
Wireless	5.8GWIFI, support	Infra/Soft AP network type
parameters		
Power Supply	9-23V power supply, the n	nax current :500mA(Typical Power Value:12V);
Platform	Linux-3.x + ARM Cor	rtex A9

 $<sup>\ ^{*}</sup>$  : Under development or Customization for customer .



## **2 Hardware Overview**

## 2.1 Module overview



Figure 2-1 RAK567 Top view

## 2.2 Module size

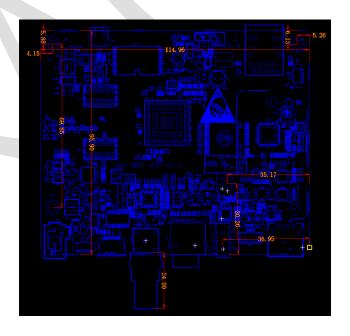


图2-3 模块平面尺寸图



## 2.3 Interface

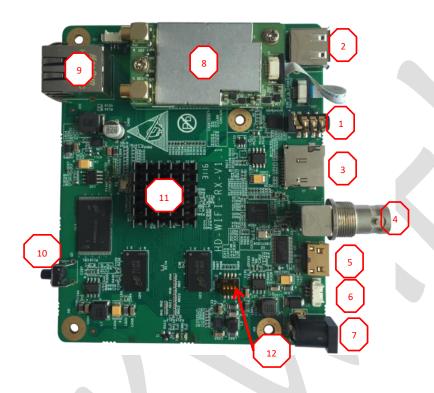


Figure 2-4 Hardware Interface



Label	Name	Description	Note
1	CVBS	CVBS output interface	HDMI and WIFI output work at
			the same time
2	USB	USB output interface (developing)	developing
3	TF card	TFcard.	
4	SDI	Suopport 3G-SDI video output (developing)	
5	Mini-HDMI	Support high definition vedio HDMI output	CVBS work with WIFI output at
			the same time
6	UART	High speed UART transparent transmission	Defult Bound rate 115200.
7	DC power	9-24V DC power supply	
8	WIFI module	5.8G high-power WIFI module, double antenna	Highest Transmit power:23dB
9	Ethernet	1000M full-duplex Ethernet Interface	
10	Button	Functional button, WPS Configuration, restore	If you press it more than 3s and
		factory etc.	less than 5s, the module will run
			into WPS mode .
			If you press more than 5s, the
			module will reset to the factory
			mode .
11	CPU	CPU	
12	DIP switch	Function selector switch, exchange channel	



## **3 Radio Feature**

Fraguency	GHz, 5.15 ~ 5.25GHz, 5.725 ~ 5.85GHz 83GHz, 5.15 ~ 5.25GHz							
USA: 2.400 ~ 2.483								
Fraguency								
range								
O Japan: 2.400 ~ 2.49	7GHz, 5.15 ~ 5.25GHz,							
O 802.11 Legacy a/b/g DSSS (DBPSK, DQ								
	SK, 16-QAM, 64-QAM)							
, , ,	nce Spread Spectrum) with							
DBPSK (Differentia	al Binary Phase Shift Keying 1Mbps),							
Modulation technique DQPSK (Differential	al Quaternary Phase Shift Keying 2Mbps), and							
CCK (Complement	ary Code Keying 5.5&11Mbps), and							
OFDM (Orthogona	l Frequency Division Multiplexing with BPSK for 6,9Mbps QPSK							
for 12,18Mbps	16QAM for 24,36Mbps 64QAM							
for 48,54Mbps)								
Host interface O USB 2.0								
O 802.11n b/g								
US/Canada: 11 (1 ~	11)							
Major European co	untry: 13 (1 ~ 13)							
<b>Channels France:</b> 4 (10 ~ 13)								
_	3 or $14^{th}$ ), 11g: 13 (1 ~ 13)							
O 802.11n a								
1). US/Canada: cha	1). US/Canada: channels (36,40,44,48,52, 149,153,157,161,165)							
2). Europe: channel	2). Europe: channel (36,40,44,48,52)							
3). Japan: channels	( 36,40,44,48,52)							
Operation voltage O 5V +/- 5%								
Power 802 11ng N	ACS8(40MHz) 802.11na MCS8(40MHz)							
consumption (mA)	Avg Avg							
@25°C 5V	350 756							



	O 802.1	1a							
	Te	st Frequenci	es 6	-24_Target	36_Targ	get 48_T	arget	54_Target	
		5180		21	20	_	19	17	
Output Power		5320		21	20		19	17	
_		5500		21	20		19	17	
(Typical-for		5600		21	20		19	17	
each chain;		5700		21	20		19	17	
with ±2dB		5825		21	20		19	17	
tolerance).	0001	41							
This power	0 802.1		_						
table bases on	Те	st Frequenci	es 1	/2_Target	5.5_Targ		arget		
the maximum		2412		16	16	16			
HW capability		2437		16	16	16			
complying		2472		16	16	16			
with IEEE		_							
	0 802.1		_		*				
spec regardless the	Te	st Frequenci	es 6	-24_Target	36_Targ			54_Target	
regulatory		2412		16	16	15		14	
limitation		2437		16	16	15		14	
mintativii		2472		16	16	15		14	
		_							
	O 802.1	ln							
	- n	TTTO							
	Freq. Ran								
		q MCS 0/8 N							
	5180	21	21	21	21	20	20	19	17
	5240	21	21	21	21	20	20	19	17
	5320	21	21	21	21	20	20	19	17
	5500	21	21	21	21	20	20	19	17
	5700	21	21	21	21	20	20	19	17
	5745	21	21	21	21	20	20	19	17
	5825	21	21	21	21	20	20	19	17
	E D	TTT:40							
	Freq. Ran		T C C 1 11	NACC AMA	MGG 2/11	NEGG 4/10	NEGO EHO	N T C C C C I A	NECCO EME
		MCS 0/8 N							
	5190 5220	21	21	21	21	20	20	19	17
	5230 5210	21	21	21	21	20	20	19	17
	5310	21	21	21 21	21	20	20	19	17 17
	5510 5670	21 21	21 21	21 21	21 21	20 20	20	19	17 17
	5755	21	21	21	21 21	20	20 20	19	17 17
	5795	21	21	21	21	20	20 20	19 19	17 17
	3193	21	21	21	21	20	20	19	17
	Freq. Ran	ge: HT20							
		MCS 0/8 N	ACS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	8 MCS 6/14	MCS 7/15
	2412	16	16	16	16	15	15	14	14
	2437	16	16	16	16	15	15	14	14
	2472	16	16	16	16	15	15	14	14
	24,2	10	10	10	10	13	13	17	17
	Freq. Ran	ge: HT40							
		ge. 11140 g MCS 0/8 N	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	8 MCS 6/14	MCS 7/15
	2412	16	16	16	16	15	15	14	14
	2437	16	16	16	16	15	15	14	14
	2472	16	16	16	16	15	15	14	14
	24,2	10	10	10	10	10	1.0	47	47



The transmit modulation accuracy is measured using error vector magnitude (EVM). EVM is the magnitude of the phase difference as a function of time between an ideal reference signal and the measured transmitted signal.

Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
BPSK	1/2	-5	-25
BPSK	3/4	-8	-25
QPSK	1/2	-10	-25
QPSK	3/4	-13	-25
<b>16-QAM</b>	1/2	-16	-25
<b>16-QAM</b>	3/4	-19	-28
64-QAM	2/3	-22	-30
64-OAM	3/4	-25	-31

EVM

#### O 802.11b

Modulation	Code Rate	Relative constellation error (dB)	Relative constellation error (dB)
		IEEE Spec (1Tx dB)	Typical (1Tx dB)
DBPSK		-10	-28
DQPSK		-10	-28
CCK		-10	-28

#### O 802.11g

VI	odulation	Code Rate	Relative constellation error (dB)	Relative constellation error (dB)
			IEEE Spec (1Tx dB)	Typical (1Tx dB)
	BPSK	1/2	-5	-28
	BPSK	3/4	-8	-28
	QPSK	1/2	-10	-28
	QPSK	3/4	-13	-28
	16-QAM	1/2	-16	-28
	16-QAM	3/4	-19	-29
	64-QAM	2/3	-22	-29
	64-OAM	3/4	-25	-29

O 802.11ng

Modulation Code Rate Relative constellation error (dB) Relative constellation error (dB)

HT20			IEEE Spec (1Tx dB)	Typical (1Tx dB)	
(MCS0)	BPSK	1/2	-5	-25	
(MCS1)	<b>QPSK</b>	1/2	-10	-26	
(MCS2)	QPSK	3/4	-13	-26	
(MCS3)	16-QAM	1/2	-16	-26	
(MCS4)	16-QAM	3/4	-19	-29	
(MCS5)	64-QAM	2/3	-22	-30	
(MCS6)	64-QAM	3/4	-25	-30	
(MCS7)	64-QAM	5/6	-27	-31	
(MCS8)	<b>BPSK</b>	1/2	-5	-25	
(MCS9)	<b>QPSK</b>	1/2	-10	-26	
(MCS10)	OPSK	3/4	-13	-26	



	(MCS11)	16-QAM	1/2	-16	-26
		16-QAM		-19	-29
		64-QAM		-22	-30
	` ,	_		-25	-30
	(MCS14)	_			
	(MCS15)	64-QAM	5/6	-27	-31
	HT40				
	(MCS0)	BPSK	1/2	-5	-26
	(MCS1)	QPSK	1/2	-10	-27
	(MCS2)	QPSK	3/4	-13	-27
	(MCS3)	16-QAM		-16	-27
	(MCS4)	16-QAM		-19	-29
	(MCS4) (MCS5)	64-QAM		-15	-30
	` ′	_			
	(MCS6)	64-QAM		-25	-30
	(MCS7)	64-QAM		-27	-31
	(MCS8)		1/2	-5	-26
	(MCS9)	•	1/2	-10	-27
	(MCS10)	QPSK	3/4	-13	-27
	(MCS11)	<b>16-QAM</b>	1/2	-16	-27
	(MCS12)	-		-19	-29
	(MCS13)	-		-22	-30
	(MCS14)	-		-25	-30
	, ,	-			
	(MCS15)	64-QAM	5/6	-27	-31
	O 802.11na				
EVM			Rate ]	Relative constellation error (dB)	Relative constellation error (dB)
2 7 1.2	1,100,000		1		` ′
	HT20			IEEE Spec (1Tx dB)	Typical (1Tx dB)
	(MCS0)	BPSK	1/2	-5	-25
	(MCSI)	QPSK	1/2	-10	-23 -26
	` /	_			
	(MCS2)	QPSK	3/4	-13	-26
	(MACCO)				26
	(MCS3)	16-QAM		-16	-26
	(MCS4)	<b>16-QAM</b>	3/4	-19	-29
	(MCS4) (MCS5)	16-QAM 64-QAM	3/4 2/3	-19 -22	-29 -30
	(MCS4) (MCS5) (MCS6)	<b>16-QAM</b>	3/4 2/3	-19	-29
	(MCS4) (MCS5)	16-QAM 64-QAM	3/4 2/3 3/4	-19 -22	-29 -30
	(MCS4) (MCS5) (MCS6)	16-QAM 64-QAM 64-QAM	3/4 2/3 3/4	-19 -22 -25	-29 -30 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8)	16-QAM 64-QAM 64-QAM 64-QAM BPSK	3/4 2/3 3/4 5/6 1/2	-19 -22 -25 -27 -5	-29 -30 -30 -31 -25
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9)	16-QAM 64-QAM 64-QAM 64-QAM BPSK QPSK	3/4 2/3 3/4 5/6 1/2 1/2	-19 -22 -25 -27 -5 -10	-29 -30 -30 -31 -25 -26
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10)	16-QAM 64-QAM 64-QAM 64-QAM BPSK QPSK QPSK	3/4 2/3 3/4 5/6 1/2 1/2 3/4	-19 -22 -25 -27 -5 -10 -13	-29 -30 -30 -31 -25 -26
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2	-19 -22 -25 -27 -5 -10 -13 -16	-29 -30 -30 -31 -25 -26 -26
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19	-29 -30 -30 -31 -25 -26 -26 -26 -29
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3	-19 -22 -25 -27 -5 -10 -13 -16 -19	-29 -30 -30 -31 -25 -26 -26 -26 -29
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -30 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS0)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS0) (MCS1)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS0)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS0) (MCS1)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS0) (MCS1) (MCS2) (MCS3) (MCS4)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 64-QAM 64-QAM 64-QAM BPSK QPSK QPSK QPSK 16-QAM 16-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 5/6 1/2 3/4 1/2 3/4 1/2 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27 -27 -27
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS4) (MCS5)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM 16-QAM 16-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 1/2 3/4 5/6 1/2 3/4 1/2 3/4 1/2 3/4 2/3	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -13 -16 -19 -22	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27 -27 -29 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS4) (MCS5) (MCS6)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 2/3 3/4 2/3 3/4	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27 -27 -27 -29 -30 -30 -30
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15) HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS3) (MCS4) (MCS5) (MCS6) (MCS7)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 1/2 3/4 2/3 3/4 5/6	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -22 -25 -27	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27 -27 -27 -27 -29 -30 -30 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)  HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS4) (MCS5) (MCS6) (MCS7) (MCS8)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 16-QAM 64-QAM 16-QAM 16-QAM 16-QAM	3/4 2/3 3/4 5/6 1/2 3/4 1/2 3/4 5/6 1/2 3/4 1/2 3/4 1/2 3/4 5/6 1/2	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -22 -25 -27 -5	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31 -31  -26 -27 -27 -27 -27 -29 -30 -30 -31 -31
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)  HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 3/4 1/2 3/4 5/6 1/2 3/4 2/3 3/4 5/6 1/2 1/2 1/2	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -22 -25 -27 -5 -10	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31  -26 -27 -27 -27 -27 -29 -30 -30 -31 -26 -27
	(MCS4) (MCS5) (MCS6) (MCS7) (MCS8) (MCS9) (MCS10) (MCS11) (MCS12) (MCS13) (MCS14) (MCS15)  HT40 (MCS0) (MCS1) (MCS2) (MCS3) (MCS4) (MCS5) (MCS6) (MCS7) (MCS8)	16-QAM 64-QAM 64-QAM BPSK QPSK QPSK 16-QAM 16-QAM 64-QAM 64-QAM 64-QAM 64-QAM 16-QAM 64-QAM 64-QAM	3/4 2/3 3/4 5/6 1/2 3/4 1/2 3/4 5/6 1/2 3/4 1/2 3/4 1/2 3/4 5/6 1/2	-19 -22 -25 -27 -5 -10 -13 -16 -19 -22 -25 -27  -5 -10 -13 -16 -19 -22 -25 -27 -5	-29 -30 -30 -31 -25 -26 -26 -26 -29 -30 -31 -31  -26 -27 -27 -27 -27 -29 -30 -30 -31 -31



	(MCS11) 16-QAM	I 1/2	-16	-27
	(MCS12) 16-QAM	I 3/4	-19	-29
	(MCS13) 64-QAM	I 2/3	-22	-30
	(MCS14) 64-QAM		-25	-30
	(MCS15) 64-QAM		-27	-31
	(MCS13) 04-QAN	1 3/0	-21	-31
	O 802.11a			
	Modulation		IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	BPSK	1/2	-82	-88
	BPSK	3/4	-81	-86
	QPSK	1/2	-79	-85
	QPSK	3/4	-77	-83
	16-QAM	1/2	-74	-79
	16-QAM	3/4	-70	-77
	64-QAM	2/3	-66	-73
	64-QAM	3/4	-65	-70
	04-QAIVI	3/4	-05	-70
	O 802.11b			
	Modulation	IEI	EE Spec (1Rx dBm)	Typical (1Rx dBm)
	DBPSK		not specified	-93
	DQPSK		not specified	-91
	ССК		not specified	-87
	O 802.11g			
	Modulation	Code Rate		Typical (1Rx dBm)
	BPSK	1/2	-82	-93
	BPSK	3/4	-81	-91
	QPSK	1/2	-79	-89
	QPSK	3/4	-77	-86
ensitivity	16-QAM	1/2	-74	-83
1RX with	16-QAM	3/4	-70	-80
+4/-2dB	64-QAM	2/3	-66	-75
olerance,	_			
dBm)	64-QAM	3/4	-65	-70
	O 802.11ng			
	Modulation	Code Ra	te IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	TITTO O			
	HT20 (MCS0) BPSK	1/2	-82	-90
	(MCS1) QPSK	1/2	-79	-90 -87
	(MCS2) QPSK	3/4	-77 - 1	-86
	(MCS3) 16-QAM	1/2	-74 0	-84
	(MCS4) 16-QAM	3/4	-70	-80
	(MCS5) 64-QAM	2/3	-66	-77
	(MCS6) 64-QAM	3/4	-65	-72
	(MCS7) 64-QAM	5/6	-64	-67
	(1.1001) 01 Q111.1			
	HT40	1/2	70	00
	HT40 (MCS0) BPSK	1/2	-79 76	-88 94
	HT40 (MCS0) BPSK (MCS1) QPSK	1/2	-76	-86
	HT40 (MCS0) BPSK (MCS1) QPSK (MCS2) QPSK	1/2 3/4	-76 -74	-86 -84
	HT40 (MCS0) BPSK (MCS1) QPSK (MCS2) QPSK (MCS3) 16-QAM	1/2 3/4 1/2	-76 -74 -71	-86 -84 -80
	HT40 (MCS0) BPSK (MCS1) QPSK (MCS2) QPSK (MCS3) 16-QAM (MCS4) 16-QAM	1/2 3/4 1/2 3/4	-76 -74 -71 -67	-86 -84 -80 -78
	HT40 (MCS0) BPSK (MCS1) QPSK (MCS2) QPSK (MCS3) 16-QAM (MCS4) 16-QAM (MCS5) 64-QAM	1/2 3/4 1/2 3/4 2/3	-76 -74 -71 -67 -63	-86 -84 -80 -78 -73
	HT40 (MCS0) BPSK (MCS1) QPSK (MCS2) QPSK (MCS3) 16-QAM (MCS4) 16-QAM	1/2 3/4 1/2 3/4	-76 -74 -71 -67	-86 -84 -80 -78



	O 802.11na									
	HT20	Modulation		Code Rate		IFF	F Sne	c (1Rx	dRm)	
	(MCS0) BPSK	1/2		-82		1121	_	e (1104 ) 89	uDiii)	
	(MCS1) QPSK	1/2		-79				87		
	(MCS2) QPSK	3/4		-77				84		
	(MCS3) 16-QAM	1/2		-74				80		
	(MCS4) 16-QAM	3/4		-70				77		
	(MCS5) 64-QAM	2/3		-66				7 <b>2</b>		
	(MCS6) 64-QAM	3/4		-65				<u>71</u>		
	(MCS7) 64-QAM	5/6		-64			-	67		
Sensitivity	HT40									
(1RX with	(MCS0) BPSK	1/2		-79				84		
+4/-2dB	(MCS1) QPSK	1/2		-76				81		
tolerance,	(MCS2) QPSK	3/4		-74				<del>7</del> 9		
dBm)	(MCS3) 16-QAM	1/2		-71				76		
. ,	(MCS4) 16-QAM	3/4		-67				72		
	(MCS5) 64-QAM	2/3		-63				70		
	(MCS6) 64-QAM	3/4		-62				67		
	(MCS7) 64-QAM	5/6		-61				64		
	<b>②</b> For transmitted	spectral	mask	for 11a	shall	be	less	than	-40dBr	for
Transmit	fc-30MHz <f<fc+30mi< td=""><td>Hz.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></f<fc+30mi<>	Hz.								
spectrum	① For transmitted fc-22MHz <f<fc+22mh< td=""><td>-</td><td>mask</td><td>for 11b</td><td>shall</td><td>be</td><td>less</td><td>than</td><td>-50dBr</td><td>for</td></f<fc+22mh<>	-	mask	for 11b	shall	be	less	than	-50dBr	for
mask	<b>©</b> For transmitted		mask	for 11g	shall	be	less	than	-40dBr	for
	fc-30MHz <f<fc+30mi< td=""><td>Hz.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></f<fc+30mi<>	Hz.								
	② For transmitted sp	pectral mask	for 11n 2	20MHz sha	ll be less	s than	-45	dBr for	•	
	fc-30MHz <f<fc+30mh< td=""><td>Hz.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></f<fc+30mh<>	Hz.								
	② For transmitted sp		for 11n 4	40MHz sha	ll be less	s than	<b>-45</b>	dBr for	•	
	_fc-60MHz <f<fc+60mh< td=""><td>Iz.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></f<fc+60mh<>	Iz.								
Transmit	<b>②</b> For 802.11a/g the							ral lines	s –161	and
	+1+16 will deviate no									
spectrum	For 802.11n 40MHz m									
flatness	lines -422 and +2+			re than +/_	2dR from	m tha	ir avei	age end	arav	
	② The transmitted sp	natual flatmoss					ii avci	age em	ugy.	
	o in transmitted sp	ectrai matness	should					uge en	ugy.	
Transmit	- In the same of	ectral fratiless	should				ii avei	uge en	ugy.	
Transmit center				be with in +	-2/- 4dB.				ugy.	
	② The transmitted c			be with in +	-2/- 4dB.				ugy.	
center				be with in +	-2/- 4dB.				irgy.	
center frequency tolerance				be with in +	-2/- 4dB.				irgy.	
center frequency tolerance	② The transmitted c	enter frequen	icy toler	be with in +	-2/- 4dB. oe ±20 p	pm m			Ligy.	
center frequency tolerance	② The transmitted c		icy toler	be with in +	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance	② The transmitted c	enter frequen	icy toler	be with in +	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	② The transmitted c	enter frequen	icy toler	be with in + ance shall t	-2/- 4dB. oe ±20 p	pm m			Ligy.	
center frequency tolerance Receiver maximum	② The transmitted c  Modulation ©	enter frequen	icy toler	be with in + ance shall b E Spec (1R >-30	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	② The transmitted c  Modulation C  3 802.11b  Modulation	enter frequen	icy toler	be with in + ance shall b E Spec (1R >-30	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	<ul> <li>The transmitted c</li> <li>Modulation</li> <li>802.11b</li> <li>Modulation</li> <li>DBPSK</li> </ul>	enter frequen	icy toler	te Spec (1R >-30  E Spec (1R >-10	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	<ul> <li>The transmitted c</li> <li>Modulation</li> <li>802.11b         Modulation         DBPSK         DQPSK     </li> </ul>	enter frequen	icy toler	E Spec (1R >-30 E Spec (1R >-10 >-10	-2/- 4dB. oe ±20 p	pm m			igy.	
center frequency tolerance Receiver maximum	<ul> <li>The transmitted c</li> <li>Modulation</li> <li>802.11b</li> <li>Modulation</li> <li>DBPSK</li> </ul>	enter frequen	icy toler	te Spec (1R >-30  E Spec (1R >-10	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	<ul> <li>The transmitted c</li> <li>Modulation</li> <li>802.11b         Modulation         DBPSK         DQPSK     </li> </ul>	enter frequen	icy toler	E Spec (1R >-30 E Spec (1R >-10 >-10	-2/- 4dB. oe ±20 p	pm m			ilgy.	
center frequency tolerance Receiver maximum	<ul> <li>The transmitted c</li> <li>Modulation</li> <li>802.11b</li> <li>Modulation</li> <li>DBPSK</li> <li>DQPSK</li> <li>CCK</li> <li>802.11g</li> </ul>	enter frequen	IEE	E Spec (1R >-30 E Spec (1R >-10 >-10	-2/- 4dB. oe ±20 p ax dBm)	pm m			igy.	



② 802.11na Modulation	Code Rate	IEEE Spec (1Rx dBm)		
		>-30		
② 802.11ng				
Modulation	<b>Code Rate</b>	IEEE Spec (1Rx dBm)		
		>-20		
		54Mbps		
② 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps				
z 2	0MHz BW			
1 Nss: 65(72.2) Mbps maximal				
	, ,	.444) Mbps maximal		
z 4	,	, 1		
1 Nss: 135(150) Mbps maximal				
	,			
	Modulation  ② 802.11ng Modulation  ② 802.11a: 6, 9, 1 ② 802.11b: 1, 2, 5 ② 802.11g: 6, 9, 1 ② 802.11n: @800 z 2	Modulation Code Rate  ② 802.11ng Modulation Code Rate  ② 802.11a: 6, 9, 12, 18, 24, 36, 48, 3 ② 802.11b: 1, 2, 5.5, 11Mbps ② 802.11g: 6, 9, 12, 18, 24, 36, 48, 3 ② 802.11n: @800GI(400GI)  z 20MHz BW 1 Nss: 65(72.2) 2 Nss: 130(144) z 40MHz BW		



## **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	9~25	V
IO maximum input voltage	3V3V <sub>in</sub> IOMax	3.6	V
IO minimum input voltage	3V3V <sub>in</sub> IOMin	-0.3	V
Storage temperature	Tstore	-40~+125	°C
Operation temperature	Toper	-20 <sup>~</sup> +85	°C

### 4.2 Recommended operating parameters

Figure 4-2 Power supply range

parameters	Symbol	minimum	Typical values	maximum	unit
Power supply	VDD	9.0	12.0	25.0	V



## **5** Order Information

Table 5-1: Product Models

PART NO.	Description	Volume/tray	MPQ
RAK567	Image transmission,plug and play,AP Mode	12PCS/tray	60PCS





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# 7 Revision&History

Revision	Update	Date
V1.0	Modify the document Format.	2016-06-09
V1.1	Fix some bug in the document.	2016-07-09
V1.2	1, Update the module size.	2016-08-20
	2, Add Ethernet interface video output and RTMP stream.	
V1.3	1, Delete the USB video function.	2016-10-20
V1.4	1, Delete the TF card error description.	2016-10-31
V1.5	Update sales and Technical Support.	2016-11-10
V1.6	Update the audio parameters.	2017-2-28