

# RAK5270 ( 1080P ) Video Module

## Specification v1.4

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# 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, PWM 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	16KHz 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 , support 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 / s, recording an hour about 3.6Gbytes of storage space

## 2. Hardware Description

### 2.1 Module View

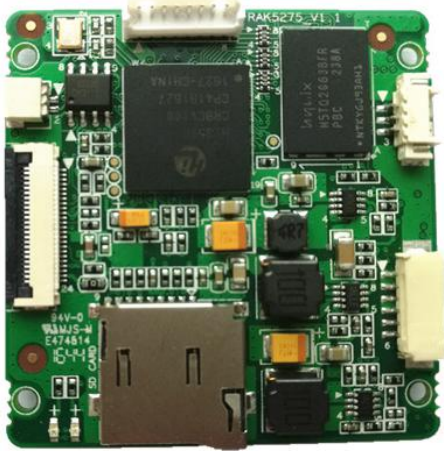


Figure2-1 RAK5270 Top View



Figure 2-2 RAK5270 Back View

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## 2.2 Module Size

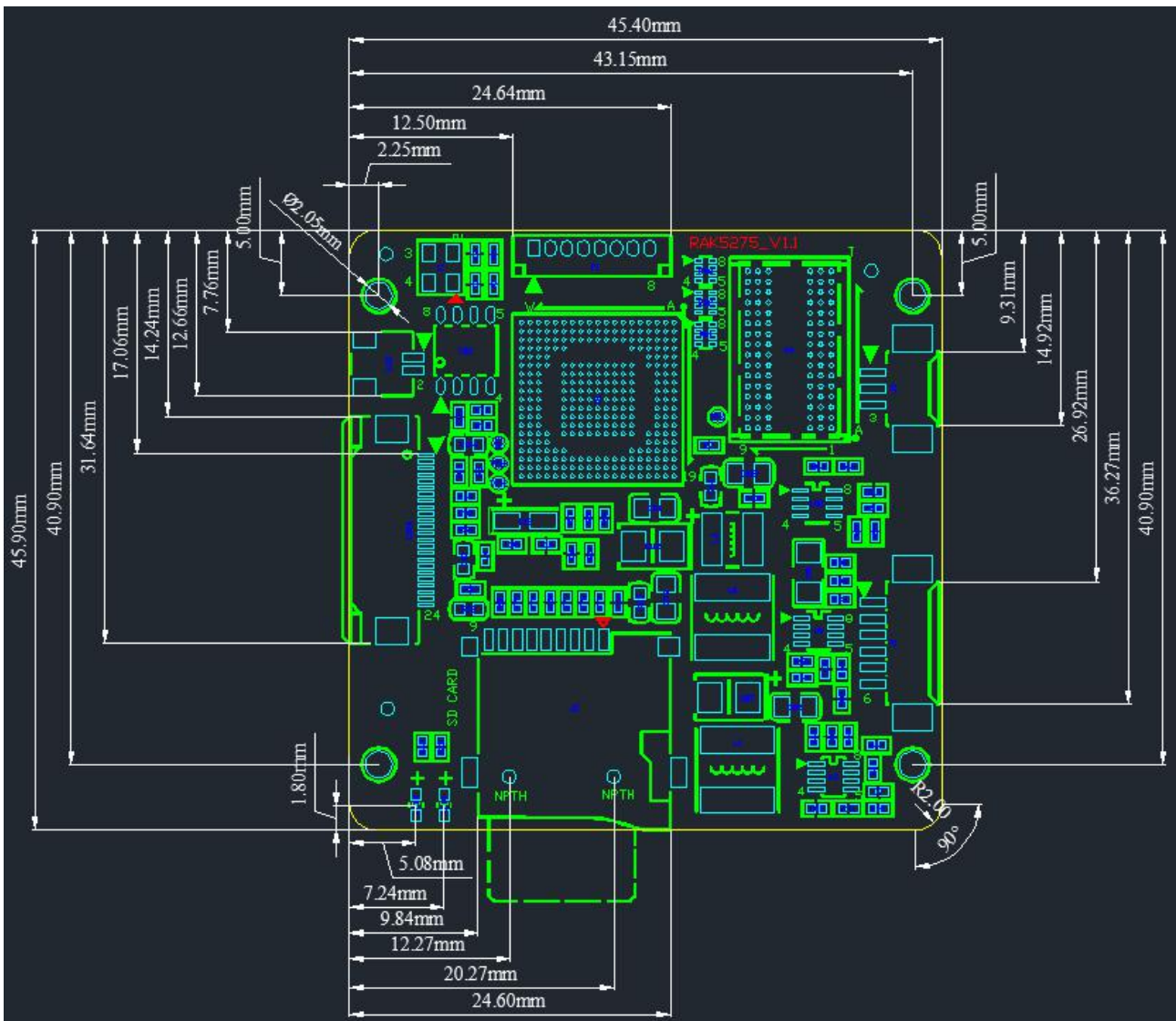


Figure2-3 Module Size ( Top )

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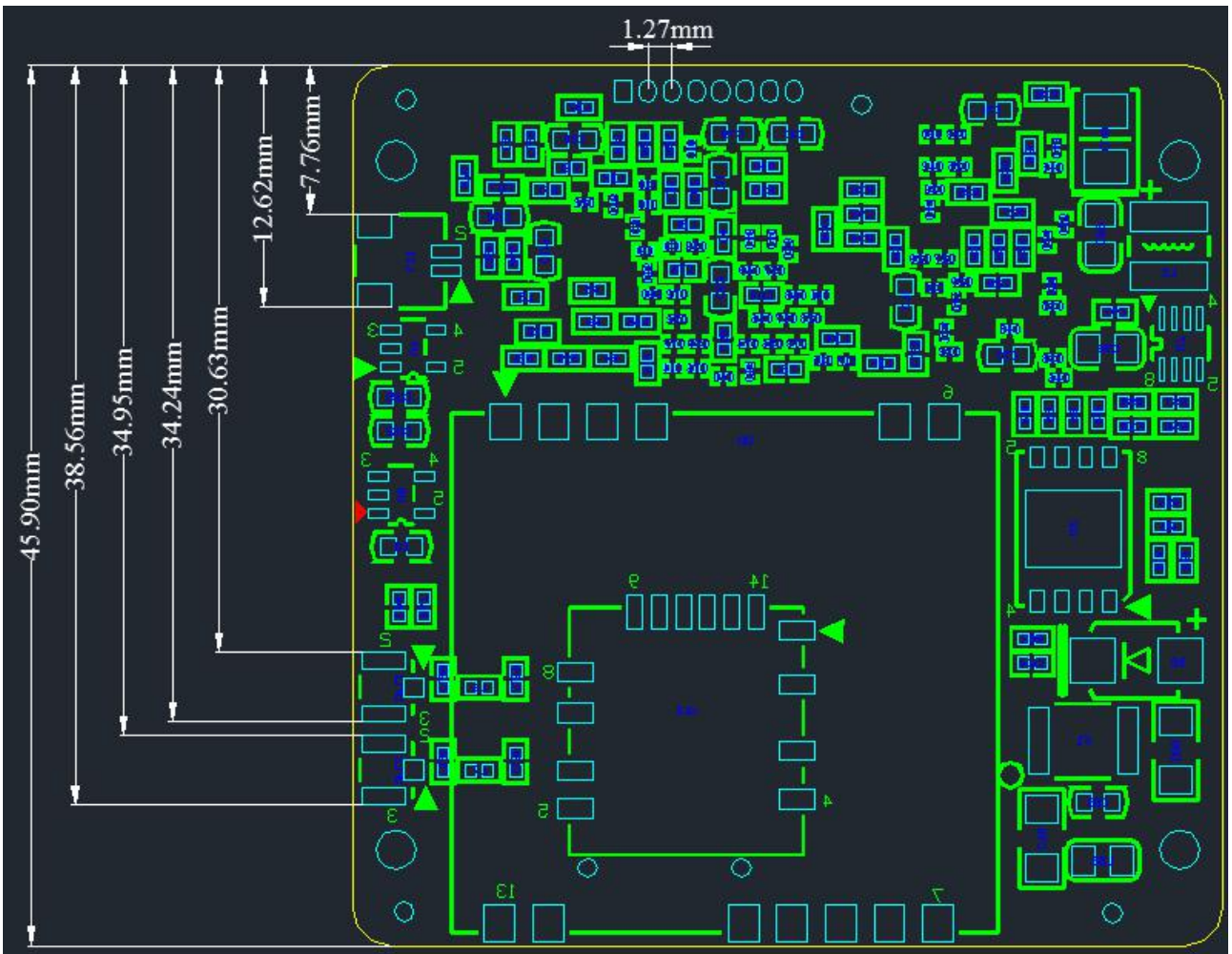
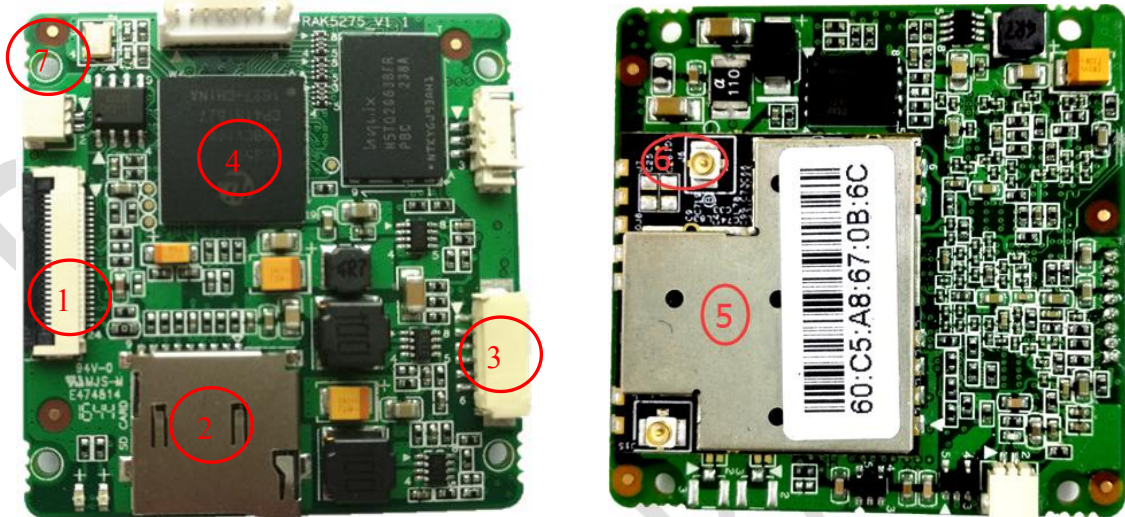


Figure 2-4 Module Size(Bottom )

### 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: <b>Label 3 interface</b>
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	Description
1,8	DGND	GND
3	Module status indication pin	Synchronize the status of the blue status indicator
5	Pin 6 action indicator	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	Level pulled down 2s, blue light flashes, AP and STA mode switch; Level pulled down 5s, blue light off, restore the factory settings to AP mode.
2,4,7	NC	Reserved



### 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
<b>1. Power Levels(SISO)</b>				
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
<b>2. Spectrum Mask@Target Power</b>				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
3) at $f_c > \pm 30\text{MHz}$	-	-	-40	dBr
<b>3. Frequence Error</b>	-20	-	+20	ppm
<b>4. Modulation Accuracy(EVM)@Target Power</b>				
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
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ</b>	<b>Max.</b>	<b>Unit</b>
<b>5. Minimum Input Level Sensitivity</b>				
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
<b>6. Maximum Input Level (PER &lt; 10%)</b>	<b>-30</b>	<b>-</b>	<b>-</b>	<b>dBm</b>

### 3.2 IEEE 802.11n HT20(5G)

Items	Contents
Specification	IEEE 802.11a/n HT20

<b>Modulation technique</b>	<b>OFDM</b>			
<b>Channel</b>	<b>5180 ~ 5825MHz</b>			
<b>Data rate</b>	<b>MCS0 ~ MCS15</b>			
<b>TX Characteristics</b>	<b>Min.</b>	<b>Typ</b>	<b>Max.</b>	<b>Unit</b>
<b>1. Power Levels</b>				
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
<b>2. Spectrum Mask@14dBm</b>				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dB

2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
3) at $f_c > \pm 30\text{MHz}$	-	-	-45	dBr
3. Frequency Error	-20	-	+20	ppm
<b>4. Modulation Accuracy(EVM)@Target Power</b>				
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
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ</b>	<b>Max.</b>	<b>Unit</b>
<b>5. Minimum Input Level Sensitivity</b>				
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

<b>1. Power Levels</b>				
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
<b>2. Spectrum Mask@14dBm</b>				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
3) at $f_c > \pm 30\text{MHz}$	-	-	-45	dBr
<b>3. Frequence Error</b>	-20	-	+20	ppm
<b>4. Modulation Accuracy(EVM)@Target Power</b>				

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
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ</b>	<b>Max.</b>	<b>Unit</b>
<b>5. Minimum Input Level Sensitivity</b>				
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



<b>6) MCS5(PER &lt; 10%)</b>	-	<b>-73</b>	<b>-69</b>	<b>dBm</b>
<b>7) MCS6(PER &lt; 10%)</b>	-	<b>-71</b>	<b>-67</b>	<b>dBm</b>
<b>8) MCS7(PER &lt; 10%)</b>	-	<b>-70</b>	<b>-64</b>	<b>dBm</b>
<b>6. Maximum Input Level (PER &lt; 10%)</b>	<b>-30</b>	-	-	<b>dBm</b>

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## 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 <sub>in</sub> IOMax	3.6	V
IO minimum input voltage	3V3V <sub>in</sub> IOMin	-0.3	V
The storage environment temperature	T <sub>store</sub>	-40 ~ +125	°C
Operating temperature	T <sub>oper</sub>	-10~+70	°C

### 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

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## 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	lampo	2016-12-21

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