# Analysis of Wifi used in UAV

Leema Rachel Mathew
SECM
Mangalore, India

Varsha Doshetty
SCEM
Mangalore, India

Kavyashree J
SCEM
Mangalore, India

*Abstract:* **Wi-Fi is a technology which uses microwaves, that makes an electronic device to connect to the internet wirelessly in 2.4GHz and 5GHz bands or to exchange data between devices. Use of Wi-Fi facilitates cheaper distribution over Local Area Networks (LANs) and can also be used in a place where cables cannot be extended, such as outdoor areas. In this paper we have analyzed two Wi-Fi which differ in their specifications and applications. Boscam has two famous FPV systems, one is TS352 with 500mw output and next one is TS832 which have 600mw output with 32 channels, based on the project done on UAV Wi-Fi plays a major role in transmitting the images captured by the camera to the ground station.**

## 1.1 INTRODUCTION:

The emerging technology of wireless local area networks (WLAN) is enumerated by a brand Wi-Fi which is licensed by the Wi-Fi Alliance based on IEEE 802.11 specifications. In the earlier days Wi-Fi was prominent in applications such as mobile computing devices like laptops, LANs, but is now flourishing due to its wide range of applications that includes Internet, VoIP phone access, gaming and also in consumer electronics such as televisions, DVD players and digital cameras. Due to more standards in the development, Wi-fi has enabled mobile commerce IEEE 802.11p by allowing it to be used by cars in highways in support of an Intelligent Transportation System to increase safety and gather statistics.

A minimum proximity between a person with a Wi-Fi device and access point has to be maintained to connect to the Internet .This minimum proximity can range from a single room to many square miles of overlapping the region of several access points. The region covered by one or several access points is called a Hotspot. Wi-Fi can also be used to create a Wireless mesh network and it also allows connectivity in peer-to-peer mode, which enables devices to connect directly with each other.

## 1.2 DESCRIPTION:

Here we analyse two newly emerged Wi-Fi which differ in their specifications and applications. The two Wi-Fi we analyzed are TS352+RC305, new generation FPV system for smaller distance and TS832+RC832 FPV system for denser area and longer distance of Boscam.

The TS352 FPV system with 5.8Ghz Transmitter and Receiver has the best reliability and image quality. It is manufactured with high grade IC Chips and well made integrated circuit. The good material and soldering are the key factors to generate clean radio waves and to broadcast long range without effecting the quality of the image. This system will not emit any wave that will jam the Radio Control or GPS Signal. The TS352 Transmitter has 500mw output, in open field with nothing blocking the way and with original antenna, came with Aluminium heat sink and cooling fan onboard.
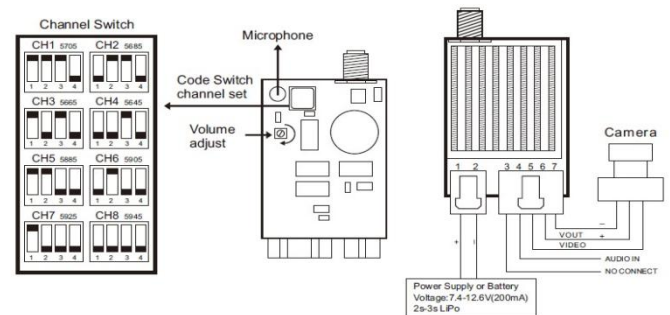


Fig 1 Frequency selection and application example



Fig 2 Frequency chart of TS352

| CH | 1 | 2 | 3 | Frequency |
|---|---|---|---|---|
| CH1 | off | off | off | 5860MHz |
| CH2 | on | off | on | 5860MHz |
| CH3 | on | on | off | 5820MHz |
| CH4 | on | on | on | 5740MHz |
| CH5 | off | off | on | 5800MHz |
| CH6 | off | on | on | 5760MHz |
| CH7 | on | off | on | 5780MHz |
| CH8 | off | on | off | 5840MHz |

TS352 5.8Ghz FPV Transmitter specifications :
- 5.8Ghz Video and Audio
- Power Output : 500mw
- Channel : 8 Channels selectable thru DIP Switch
- Video output : 1Vp-p 75Ω
- Audio output : 1Vp-p 600Ω
- Power supply : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po)
- Working current : 550mA
- Video : PAL / NTSC
- Dimension : 5.2cm x 6.8cm x 1.3cm
- Weight: 55g (with antenna)

RC305 5.8Ghz FPV Receiver Specifications
- Receiving frequency : 5725-5865MHz; 8channels
- Receiving sensitivity : -90dBm
- Frequency control : built-in frequency and phase lock loop

- Double lines AV output : analog AV signal output
- Antenna connector : SMA (Inside the needle)
- Power supply voltage : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po)
- Working current : 150mA
- Dimension : 61 x 52 x 13mm (aluminum alloy extrusion profiles)
- Weight: 52g (with antenna)

In a dense populated area , the necessity to select the best channel to avoid jamming with other frequencies in air  can be done by TS832 + RC832. TS832+RC832 is a 32 channel FPV system with 600mw output in which swapping the channel can be done easily  by pressing the button. This sytem output of 600mw is  higher than TS352 + RC305 FPV system with 8 channels and DIP switch whose output is 500mw.  Both Transmitter and Receiver works on 12V (3S Li-Po). The TS832 is transmitting a full range of 32 channels and uses an easy to use 2 button interface, it also comes with a clean pre-wired harness, it's perfect for a wide range of aircraft.
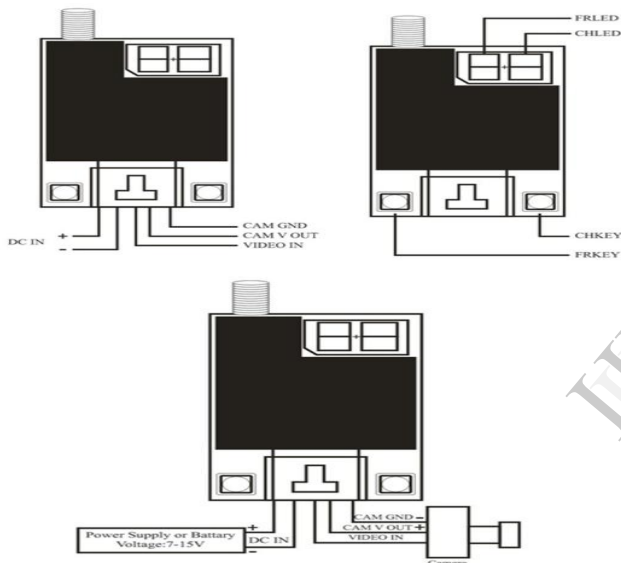


Fig 3. Pin description of TS832 and application example



Fig 4 Frequency  and channel frequency chart of TS832

TS832 5.8Ghz FPV Transmitter Specifications
- 5.8Ghz Video and Audio
- Power Output : 600mw
- Channel : 4 bands / 8 channel each = 32 frequencies
- Power supply : DC 12V (11.1V 3S Li-Po)
- Current Consumption : 220mA
- Video : PAL / NTSC
- ANT connector : SMA (needle inside)
- Dimension : 54 x 32 x 10mm
- Weight : 22g

RC832 5.8Ghz FPV Receiver Specifications
- Receiving Frequency: 4 bands / 8 channel each = 32 frequencies
- Receiving sensitivity: -90dBm
- Frequency control : built-in frequency and phase lock loop
- Double lines AV output : analog AV signal output
- Antenna connector : SMA (Needle inside)
- Power supply voltage : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po)
- Supply current: 200mA max.
- Dimension : 80 x 65 x 15mm
- Weight : 85g

Features of RC832
- 32 channels: Cover A, B, E bands and F band (Airwave band), 4 bands and all frequencies compatible
- Two switching buttons: CH button for frequencies channels switching, FR button for frequencies bands switching
- Two digital display: One for CH and the other for FR, real-time positioning which frequency band and which channel received
- Power off memory: Replay the very last frequency band and channel
- Independent video and audio signal outputs.

| TS352 5.8Ghz FPV Transmitter | TS832 5.8GHz FPV Transmitter |
|---|---|
| Power Output : 500mw | Power Output : 600mw |
| Channel : 8 Channels selectable through DIP     Switch | Channel : 4 bands / 8 channel each = 32 frequencies |
| Power supply : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po) | Power supply : DC 12V (11.1V 3S Li-Po) |
| Working current : 550mA | Current Consumption : 220mA |
| Dimension : 5.2cm x 6.8cm x 1.3cm | Dimension : 54 x 32 x 10mm |
| Weight: 55g (with antenna) | Weight : 22g |

| RC305 5.8Ghz FPV Receiver | RC832 5.8GHz FPV Receiver |
|---|---|
| Receiving frequency : 5725-5865MHz;  8channels | Receiving Frequency: 4 bands / 8 channel each =  32 frequencies |
| Receiving sensitivity : -90dBm | Receiving sensitivity: -90dBm |
| Working current : 150mA | Supply current: 200mA max. |
| Frequency control : built-in frequency and phase lock loop | Frequency control : built-in frequency and phase lock loop |
| Dimension : 61 x 52 x 13mm (aluminum alloy extrusion profiles) | Dimension : 80 x 65 x 15mm |
| Weight: 52g (with antenna) | Weight : 85g |
| Power supply voltage : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po) | Power supply voltage : DC 7.4V~13V (7.4V 2S to 11.1V 3S Li-Po) |

CONCLUSION:

As per the analysis made in this paper, it concludes that both TS352+RC305 and TS832+RC832 5.8GHz FPV system differ in their specifications and can be used widely in UAV based on the applications.

REFERENCES:

1. Shivakumar A, Robust airborne wireless backbone using low-cost UAVs and commodity WiFi technology.
2. Part 11: Wireless LAN MAC and PHY Specifications: Amendment 8: MAC Quality of Service Enhancements, IEEE Standard 802.11e, 2005
3. Datasheet of Boscam TS352 and TS832 system
4. www.helipal.com
5. www.hobbyking.com