User manual

Drone 5.8GHz wireless video transmission

Product introduction

This product is a drone video transmission system.
After the drone collects images, it passes through the Air of this product Unit transmits the image to the ground at 5.8 Ghz RF, and then passes through the Ground of this product station output screen.
Table 1-1 shows the main functions of this product.

Table 1-1

serial number	project	content	Remark
1	Frequency Range	Data transmission: -US: 5725MHz-5850MHz - JP: 5650MHz-5750MHz	Data transmission: - US: Compliant with FCC standards - JP: No video transmission: - US: Compliant with FCC standards - JP: Compliant with TELEC standards
2	communication direction	Data transmission: two-way communication Video transmission: one-way communication	
3	Communication distance	More than 5km	The following conditions need to be met: - No obstruction - Maximum power - GS uses at least two directional antennas
4	Image Resolution	1920x1080P30 1280x720P601280x720P301920x1080P60 (downsample to 1920x1080P30 and then transmit)	The image will be downsampled during actual transmission and upsampled to restore the resolution when the transmission is completed.
5	Image input interface	Micro HDMI	
6	Image delay	Transmission delay <1ms	Does not include the delay caused by upsampling and downsampling. UVC delay is affected by PC performance.
7	Remote control data delay	15ms~30ms	From remote control input to GS to AU output to flight controller
8	Image output interface	HDMI Type-C USB (UVC protocol)	
9	OSD	Built-in OSD supports user-defined OSD	
10	Mavlink transfer	Support basic data transmission between Flight controller and PC	
11	Video	The video format is TS, and the video files will not be damaged when there is a sudden power outage. The SD card format is FAT32, and the recommended capacity is 32GB.	
12	Flight control interface	SBUS (15ms cycle) Mavlink serial port	
13	encryption	Images and data are AES128 encrypted during transmission	

Product Features

AU

Table 2-1 is the function list of AU.

<p align="center">table 2-1</p>

type	Function	illustrate	Remark
interface	Power	DC 12V	12V recommended
	Mavlink	Serial port, baud rate 115200	
	S.Bus	15ms period, can provide 5.5V output	The factory default does not provide 5.5V output
	Host	Serial port, baud rate 115200 is used with the command defined by Futaba	
	Micro USB	Cooperate with Futaba Configurator to update firmware or set basic parameters	Virtual serial port
	Button	Modify channel and pairing actions	
	Micro HDMI	input image	
	LED x 6	Indicates the working status of the AU	
	U.FL x 2	Antenna interface for video transmission and data transmission	JP specification does not have data transmission U.FL
Video transmission RF	10MH bandwidth	US specification channel: - 5740MHz- 5750MHz- 5760MHz- 5770MHz- 5780MHz- 5790MHz- 5800MHz- 5810MHz- 5820MHz- 5830MHzJP specification channel: - 5655MHz- 5665MHz- 5675MHz- 5685MHz- 5695MHz- 5705MHz- 5715MHz- 5725MHz- 5740MHz- 5750MHz	
	20MHz bandwidth	US specification channel: - 5750MHz- 5770MHz- 57 9 0MHz - 5810MHz- 5830MHz JP specification channel: - 5660MHz- 5680MHz- 5700MHz- 5720MHz- 5745MHz	
	Power level	Configurable RF power: - 10dBm	
HDMI IN	resolution	1280x720P60 1280x720P301920x1080P601920x1080P30	

Antenna installation

Please use a 5.8 GHz antenna for video transmission , and the interface is U. FL .
Notice:
1. **When using a feeder connection, it may have an impact on RF performance (power or signal quality) , please choose an appropriate feeder.**

power supply

The power supply range of AU is power supply voltage is 12V .video transmission power is set to 10dBm . When both walking the typical power consumption is 12V@0.64A, mavlink and sbus are working, the typical power consumption is 12V@0.64A . There may be a difference of about ± 0.2 A between different devices or different channels .
NOTE: Please make sure the antenna is installed correctly before plugging in the power source.

video source

AU supports Micro HDMI interface to input video sources.
AU supports the following resolution input:
- 720P60
- 720P50
- 720P30
- 1080P30
- 1080P60

AU will downsample the image before RF transmission based on the video resolution and current channel bandwidth, please refer to Table 2-2 . Downsampling does not affect the output resolution of the GS side.

Table 2-2

Bandwidth	HDMI In	Downsample
20MHz	1080P30	1440x720P30
	1080P60	1440x720P30
	720P30	960x720P30
	720P60	960x480P60
10MHz	1080P30	960x480P30
	1080P60	960x480P30
	720P30	960x480P30
	720P60	960x480P30

Note: When no HDMI video source is detected, AU will automatically output a blue screen with a

resolution of 1 080 P 30 .

Video transmission

AU video transmission supports a total of 15 channels, of which 5 HD channels have a bandwidth of 20 MHz, and 10 SD channels have a bandwidth of 10 MHz . Please see Table 2-1 for the specific center frequency points .

Users can switch in the following three ways:

Button : Each time the button is pressed briefly, the channel increases by 1.
- When the channel is HD 5 , short press the button to switch to SD 1 channel;
- When the channel is SD 10 , short pressing the button will switch to HD 1 .

Futaba Configurator : via micro Connect the AU to the F utaba Con figurator software on the PC with a usb cable , select the target channel in the settings menu and save it.

Host Command: Please refer to Futaba command related documents.

data transmission

The number of AUs transmitted is 23 dBm, which cannot be set by the user.(US) module FCC ID: NS913P900

pair

AU should be paired with GS before it can be used normally . Otherwise, communication will be impossible even if the channels match each other. AU and GS only need to be paired once to confirm each other's identities, and there is no need to pair again after powering on again.

Pairing process:
- The user controls AU and GS to enter pairing mode respectively.
- PAIR between AU and GS The LED starts to flash and the GS screen displays PAIRING G.
- Waiting for AU to pair with GS.
- The GS displays the AU screen and the PAIR LED of the GS no longer flashes, indicating that the GS pairing is completed.
- The AU's PAIR LED no longer flashes, and the AU pairing is completed.

AU can pass Futaba Host command or press and hold the button for 5 seconds to enter pairing mode.

Note: Before pairing, the AU and GS do not need to be on the same channel. The GS will automatically adapt to the AU's channel during pairing.

SBUS

AU supports SBUS signal output to the flight controller, and the SBUS output period is 15ms .

Notice:
1. When the AU receives the SBUS data from the GS, the SBUS starts outputting data.
2. AU When GS data cannot be received after SBUS starts output, AU will keep the last received data for output.
3. The SBUS interface has a power line for providing 5.5 V voltage, but it is not available by default at the factory.

MAVLINK

AU supports transmitting flight control mavlink data to the ground station. The baud rate is 1 15200 , please connect the mavlink interface to the flight controller.

Firmware update

- Use Micro Connect the AU to the PC (windows) side with a USB cable .
- Open Futaba on PC Configurator software.
- Select the corresponding serial port in the software and open it.
- Update DM5680 , STM32 , and fpga respectively in the firmware .
- RemoveMicro USBRemove the USB cable and power cycle. update completed.

led

Table 2-3

led name	function
PWR	Lights up after power on
PAIR	Flashes at 1HZ during pairing and lights up after correctly receiving p900 data from GS for more than 1 second. Turns off when no p900 data from GS is received.
RUN	The flashing period is 2 seconds when ARM is working and flashes quickly when updating firmware.
RF_V	Lights up when the LNA is on, otherwise off
RF_D	p900 sends data (mavlink), and goes out when no data is sent after timeout (1 second).
VOUT	None

Communication specifications

Video transmission

AU _

Table 3-1

area	channel	bandwidth	Center frequency point	Transmit power
US	HD1	20MHz	5750MHz	
	HD2		5770MHz	
	HD3		5790MHz	
	HD4		5810MHz	
	HD5		5830MHz	
	SD1	10MHz	5740MHz	
	SD2		5750MHz	
	SD3		5760MHz	
	SD4		5770MHz	
	SD5		5780MHz	
	SD6		5790MHz	
	SD7		5800MHz	
	SD8		5810MHz	
	SD9		5820MHz	14dBm 23dBm27dBm
	SD10		5830MHz	
JP	HD1	20MHz	5660MHz	
	HD2		5680MHz	
	HD3		5700MHz	
	HD4		5720MHz	
	HD5		5745MHz	
	SD1	10MHz	5655MHz	
	SD2		5665MHz	
	SD3		5675MHz	
	SD4		5685MHz	
	SD5		5695MHz	
	SD6		5705MHz	
	SD7		5715MHz	

SD8		5720MHz	
SD9		5740MHz	
SD10		5750MHz	

Note: RF power will decrease when the AU is at high temperature, please ensure that the AU dissipates heat.

Radio wave certification

Table 4-1

area	module	Radio standard	FCC ID
US	Video transmission	FCC SDOC (PART 15B)	
		FCC ID (PART 15C)	
	data transmission	FCC DSS (PART 15)	NS913P900
JP	Video transmission	TELEC-260	

Factory settings

AU

Table 5-1

project	parameter	Remark
area	U/J	If there is a P900 module, it is U, otherwise it is J.
serial number	xxxxxxxxx	The serial number must be consistent with the label on the back of the PCB
firmware	xx	Since the firmware is not updated regularly, please refer to the actual situation.
Video transmission channel	Channel 1	
Video transmission bandwidth	20MHz	
Video transmission power	27dBm	
Video transmission PA	ON	
Data Zone	1	Center frequency 902.4MHz-916.68MHz
Data transmission power	23dBm	

Figure 5-1

```
AT&V
p900
900MHz Mesh Radio Microhard Systems, Inc.
v1.33 build 1.2232 Sep 27 2017 11:50:19
MAC: 00:F0:49:00:F0:CE

E1  Q0  DCD &C1  DTR &D0  Handshaking &K0  DSR &S1
Unit Address            S105=2
Destination Address     S140=1
Reverse RSSI leds       S88=0            Operating Mode        S101=2
Serial Baud Rate        S102=1           Wireless Link Rate    S103=1
Network Address         S104=989898989   Hop Pattern           S106=0
Hop Zone                S180=1           Output Power(dBm)     S108=23
Hop Interval            S109=8           Data Format           S110=1
Packet Min Size         S111=1           Packet Max Size       S112=256
Packet Retransmissions  S113=3           Repeat Interval       S115=3
Character Timeout       S116=10          Roaming               S118=1
RSSI from Uplink(dBm)   S123=N/A         Network Type          S133=1
Serial Channel Mode     S142=0           Sleep mode            S143=0
Address Tag             S153=0           FEC Mode              S158=7
Protocol Type           S217=0           Input Framing         S218=0
Sync timeout            S248=512
OK
```
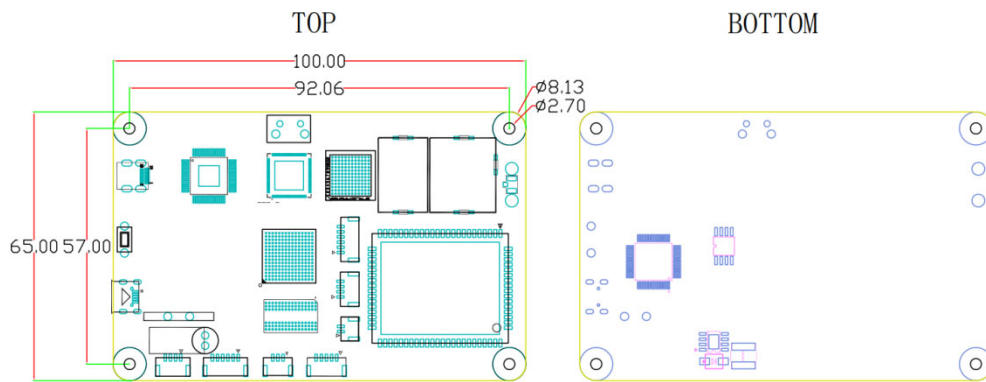
Figure 5-1 is AU P900 configuration, only available in US specification. The Network Address will be consistent with the GS ID after pairing.
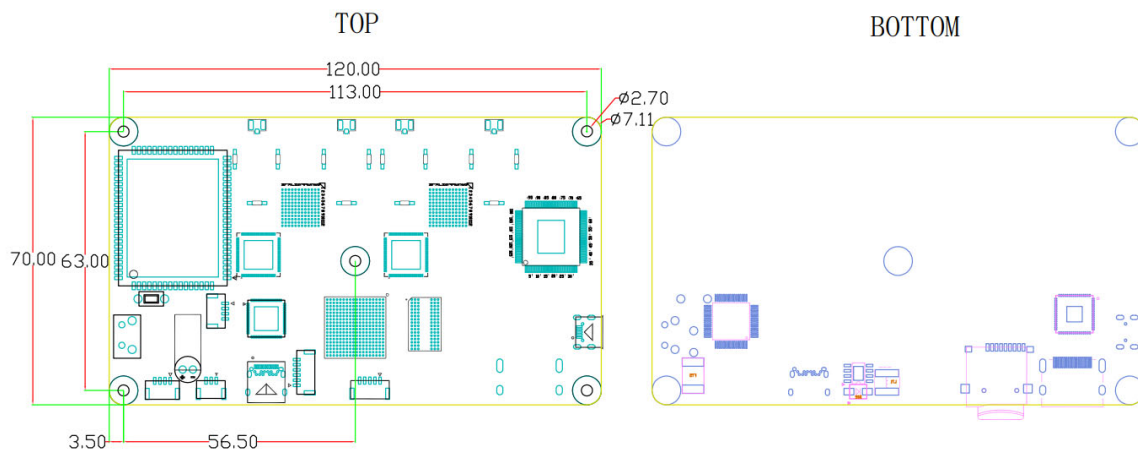
Dimensions

Unit:mm.

AU

Figure 8-1

TOP

BOTTOM

100.00
92.06
Ø8.13
Ø2.70
65.00 57.00

GS

Figure 8-1

TOP

BOTTOM

120.00
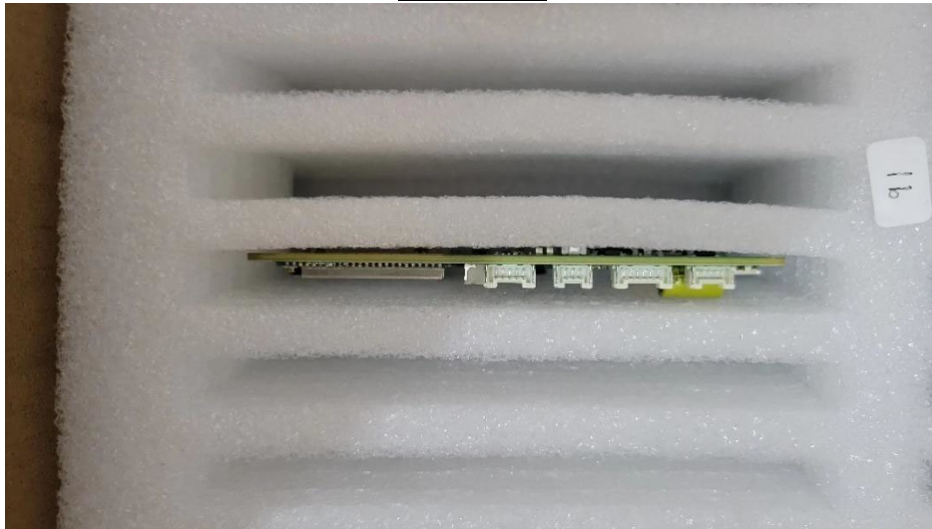113.00
Ø2.70
Ø7.11
70.00 63.00
3.50
56.50

type of packaging

Cushion cotton

Use pearl cotton to make slots, and place an AU or GS circuit board in each slot. The picture below is for reference only and is not the actual product.

Figure 1 3-1

The top is covered with a thicker layer of pearl cotton.

Figure 1 3-2

carton

The thickness of the carton is approximately 5mm.

There is almost no gap between the carton and the cushioning cotton.

Each box contains 50 AU or GS, divided into two rows. The picture below is for reference only and is not the actual product.

Figure 1 3-3

Delivery details

AU

- AU circuit board
- Antenna spacer
- Gasket fixing screw x 2
- Shield
- Shipping list

Precautions

Before powering on

Please make sure all antennas are securely installed before powering on.

HDMI in

Please make sure the HDMI in connection is secure, otherwise the picture may be lost due to vibration.

UVC

When using UVC on the PC, the correct resolution should be set manually.

FCC compliance statement:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

RF Exposure Information

The device has been evaluated to meet general RF exposure requirements. The device can be used in fixed exposure condition. The min separation distance is 20cm.

Changes or modifications not expressly approved by the party responsible for compliance could void the

user's authority to operate the equipment

Antenna installation

Please use 5.8 GHz antenna for video transmission , the interface is U. FL are required. It is recommended to use 2 omnidirectional antennas and two flat panel antennas. Max antenna gain should be less than 5.9dBi

For a host using a certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent Abel referring to the enclosed module: AZP-FMR-05VTX: "Contains Transmitter Module FCC ID: AZP-FMR-05VTX" The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.