iSecus SDR Counter UAV Digital Module User Manual

iSecus SDR Counter UAV Digital Module User Manual

Software Radio Architecture

SDR

June 2024

Counter UAV Digital Module

Contents

Overview

SDR CounterUAV Digital Module is a general-purpose digital RF module based on software radio architecture, which contains two major parts: digital source and power amplifier unit. The digital source part of the FPGA can

generate UAV jamming code signals with different digital modulation methods, which are converted into RF signals through the SDR platform and amplified by the power amplifier. The digital source meets the frequency range of 100MHz~6000MHz output, the bandwidth of 200MHz arbitrary configuration, with accurate frequency characteristics. The module can select the corresponding digital modulation jamming code for different UAV types to achieve the best counter effect, supporting ELRS, Crossfire, Flysky, Ocusync, Lightbridge, skyleas and other common protocols for effective jamming. Small form factor, flexible port, simple integration.
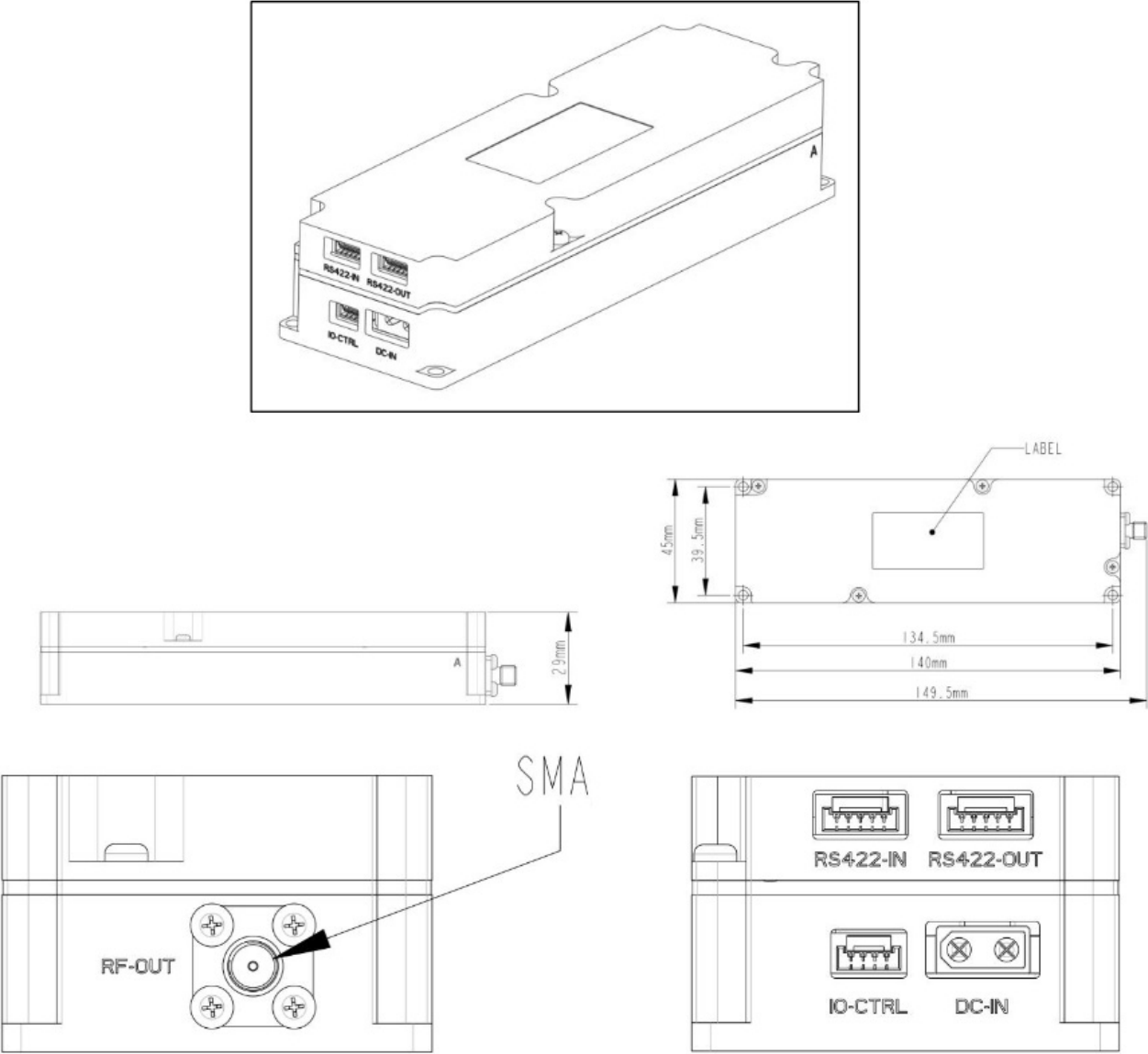
Appearance and Dimensions

Figure 1

Parameters

Table 1: Product parameters

Item	Parameter	Remarks
Input Voltage	DC: 28-32 V	DC_IN (XT30 connector)
Input Current	4.5A Max	
Output Power (CW)	P25: 25W Max（44dBm） P50: 50W Max（47dBm）	10 dB dynamic adjustment range (422 port mode)
Output Dynamic Range	10dB	
RF Output Port	SMA	RF output
RF Port Impedance	50Ω	
Standby Power Consumption	5W	
Communication Control Port	RS422 / GPIO	Two control modes
Module Dimensions	45*140*29mm	without connectors
Module Weight	275g±10g	Without external cables
Operating Temperature	-40℃+55℃	

Performance Features

Table 2: Performance features

Module Name	Maximum Bandwidth	Maximum Output Power (CW*)	Efficiency (CW*)	Remarks
MS0400P25	100 MHz	25W	>50%	
MS0868P50	200 MHz	50W	>50%	Default output 860-885M jamming signal
MS0900P50	200 MHz	50W	>50%	Default output 860-930M jamming signal
MS0915P50	200 MHz	50W	>50%	Default output 902-930M jamming signal
MS1200P25	200 MHz	25W	>50%	
MS1400P25	200 MHz	25W	>50%	
MS1600P25	200 MHz	25W	>50%	
MS2400P50	200 MHz	50W	>45%	
MS5200P50	200 MHz	50W	>45%	
MS5800P50	200 MHz	50W	>45%	
* CW:CONTINUE WAVE				

Naming Convention

MS 0400 P25

Signal Source Type:
MS:SDR Digital Signal Source

Supported Frequency Band Range:
0400: 400-500MHz
0868: 800~1000MHz
0900: 800~1000MHz
0915: 800~1000MHz
1200: 1100~1300MHz
1400: 1300~1500MHz
1600: 1500~1700MHz
2400: 2350~2550MHz
5200: 5150~5350MHz
5800: 5700~5900MHz

Power Capacity:
P25: 25W
P50: 50W

Functionality

Basic Functions

After the module is powered on, wait for the initialization of the module to be completed, and after the Ready signal goes high, the amplifier switch can be controlled through the PA_EN pin.

The module has two control ports, IO enable port and RS-422 communication port; IO enable control is simple and convenient for users to integrate and use; RS-422 port in addition to controlling the amplifier.Besides there is access to the module temperature, current and other state parameters, as well as configuration of the digital interference code, so that the product is more flexible and more intelligent. Each module has 2 RS-422 ports, which are used to connect the modules in series and reduce the ports and wiring harness.
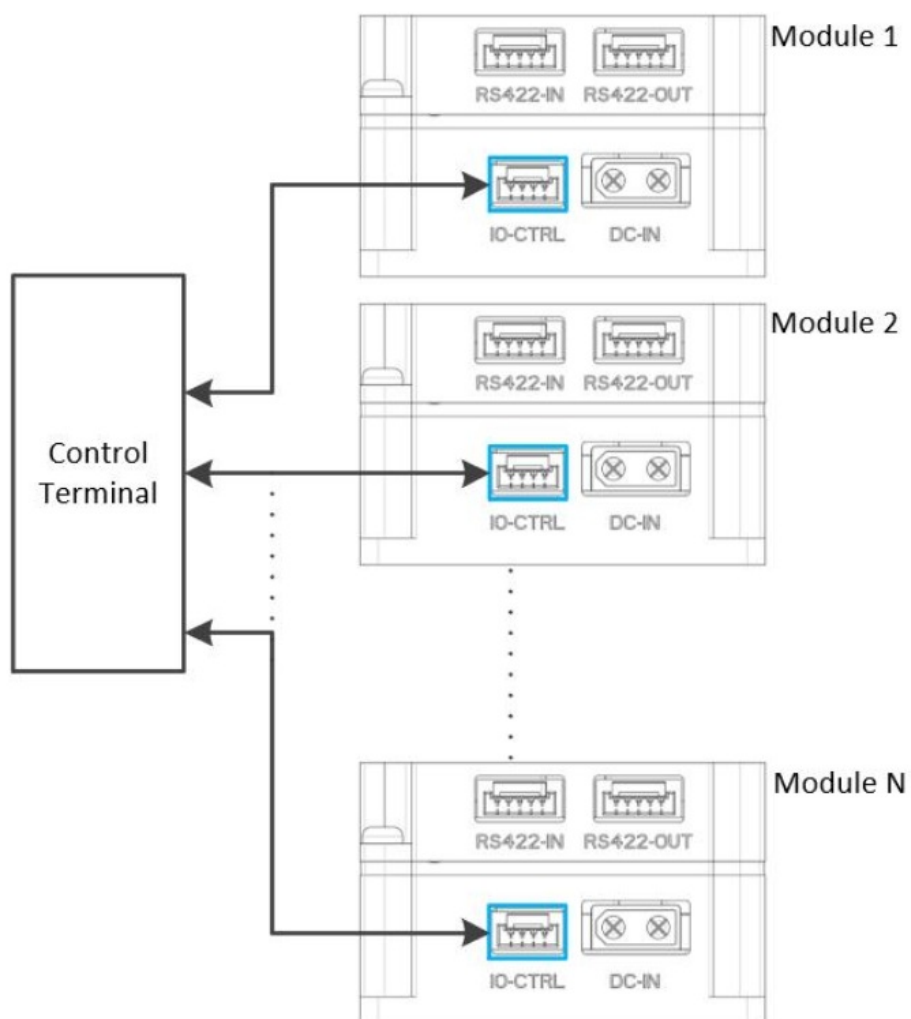
(1) IO enable mode wiring diagram

Figure 2
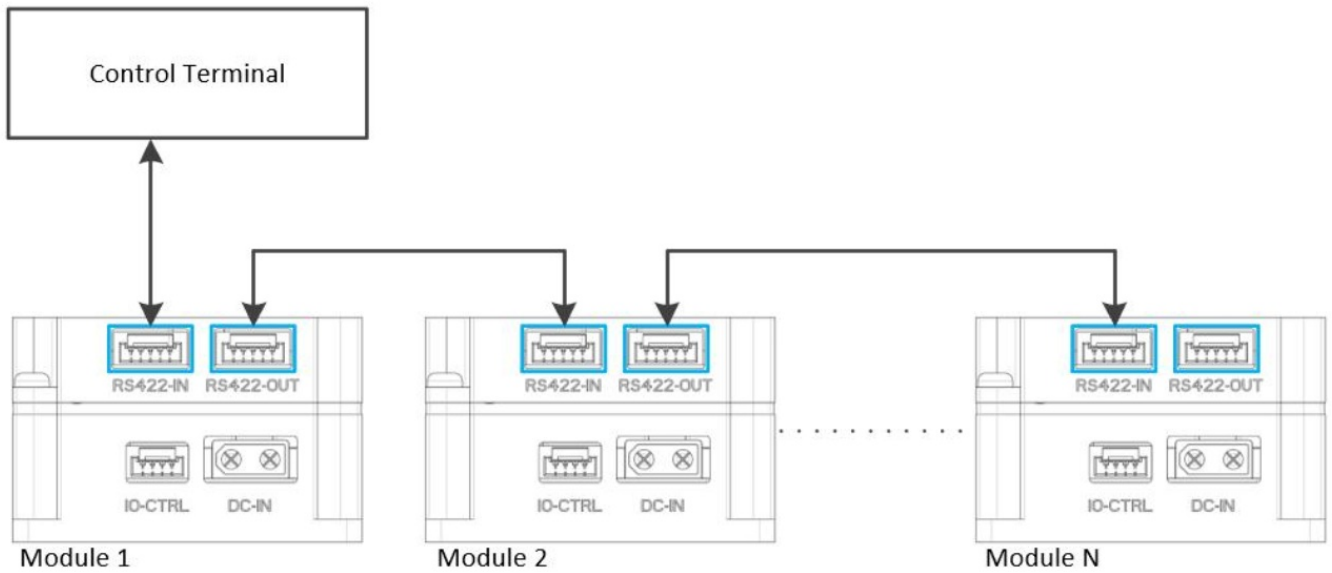
(2) RS-422 port mode wiring diagram

Figure 3

Port Definitions

(1) IO Enable Port: Use GH series 4P connector, the port definition is shown below.
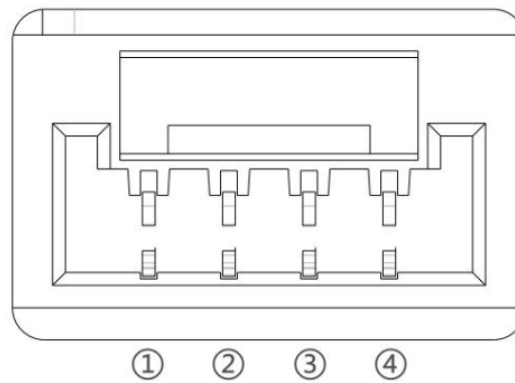

Figure 4

Table 3: IO enable port definition

Pin	Name	Input/Output	Descriptions
1	PA_EN	Input	Amplifier enable, active low
2	RUN	Output	Output high level (3.3V) after power amplifier is enabled
3	Ready	Output	Output high (3.3V) after amplifier initialization is complete
4	GND	/	Ground network

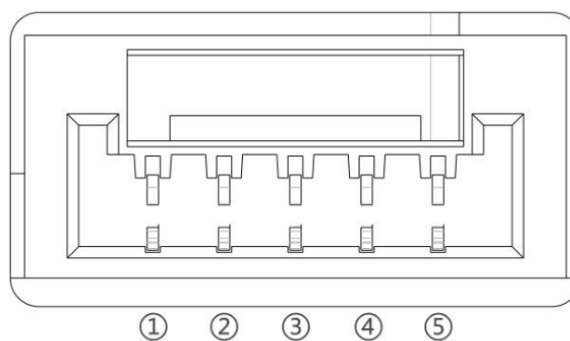(2) RS-422 Port: Use GH series 5P connector, the port definition is shown below.

Figure 5

Table 4: RS422 port definition

Pin	Name	Input/Output	Descriptions
1	Y	Output	Driver in-phase output
2	Z	Output	Driver inverting output
3	GND	/	Ground network
4	B	Input	Receiver inverting input
5	A	Input	Receiver in-phase input

(3) Power Supply Port: use XT30 air model port to ensure stable and reliable power supply, the port definition is as follows.
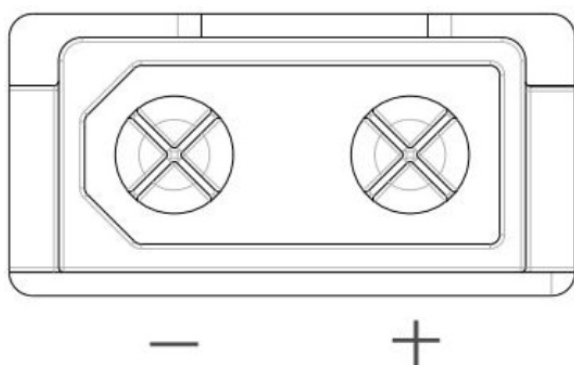

Figure 6

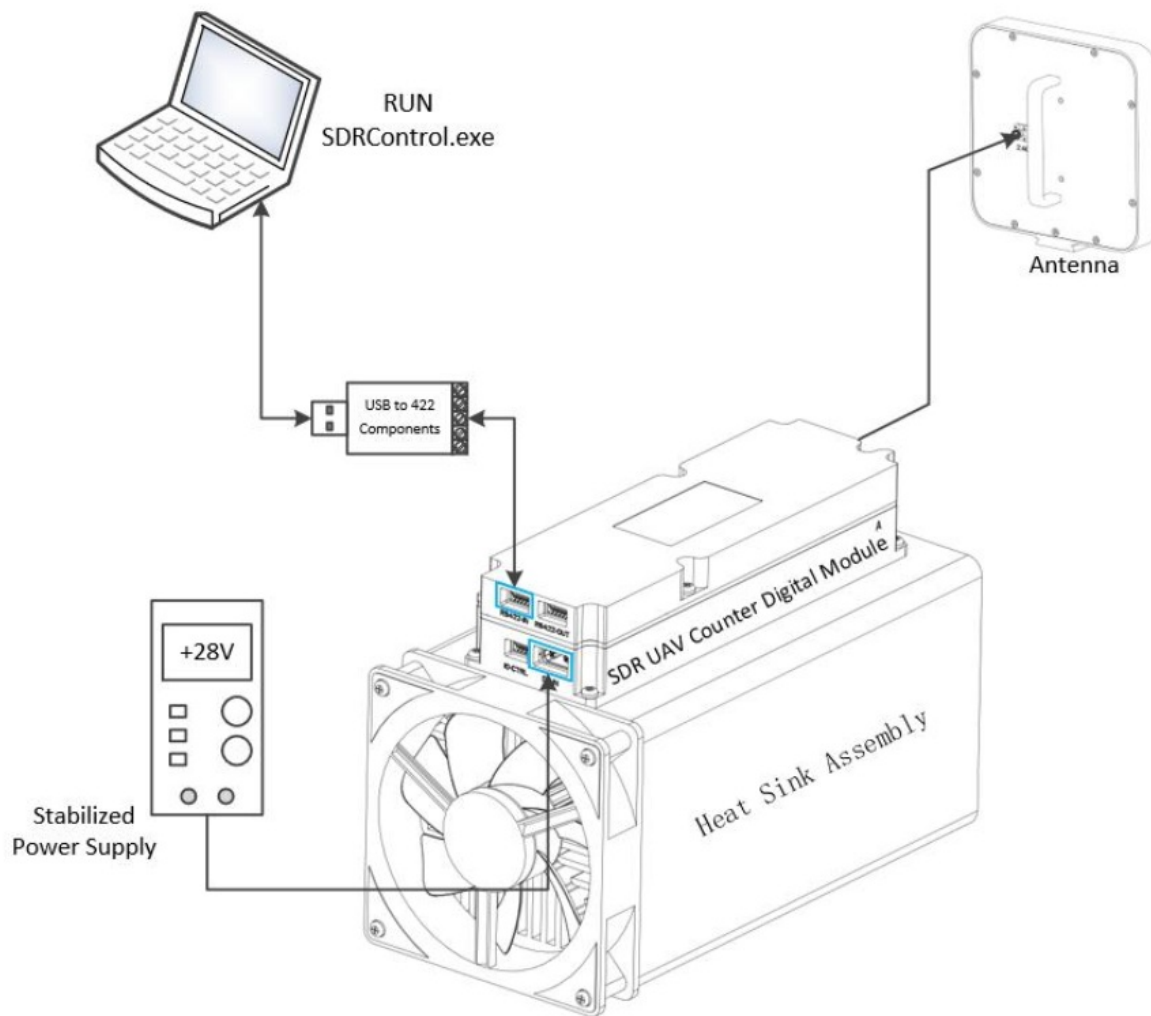**SDR Digital Module Evaluation Kit**

RUN
SDRControl.exe

Antenna

USB to 422
Components

+28V

Stabilized
Power Supply

SDR UAV Counter Digital Module

Heat Sink Assembly

Figure 7

Evaluation Kit Instructions

(1) Preparation
1. DC power supply: 28V/5A
2. A computer: win10 and above system
3. SDR digital module evaluation kit

(2) Procedure
1 Connect the module to the computer according to Figure 7
2 Turn on the +28V power supply
3 Open the upper computer software: SDRControl.exe, the port is as following Figure 8
4 Select the corresponding port, configure the jamming code, and turn on/off the jamming.

Figure 8

Software Ports

1. Port selection: Connected to the serial port after the port appears on the left side of the red indicator dots.
2. Jamming code selection: You can select different interference codes corresponding to jam with different targets (optional when the module communication is normal, otherwise the option is blank), the relevant instructions in Table 5.
3. Gain Selection: Support 1~15 gain selections, power-on default is the highest 15, step ≤ 1dB, after modifying the gain, press the Configure button to take effect.
4. Configuration button: Send the current gain configuration to the module.
5. Jamming On button: Turn on jamming.

Jamming Code Loading Instructions

Table 5: Jamming code loading instructions

Jamming Code	Applicable Modules	Jamming Target
TBS_868	MS0868/MS0900/MS0915	Black Sheep 868M band traverser(FPV)
TBS_915	MS0868/MS0900/MS0915	Black Sheep 915M band rover(FPV)
ELRS_915	MS0868/MS0900/MS0915	915M ELRS Protocol DIY rover(FPV)
TBS_868+TBS_915	MS0868/MS0900/MS0915	Black Sheep 868M and 915M band traverser(FPV)
TBS+ELRS	MS0868/MS0900/MS0915	Black Sheep + ELRS protocol 868M and 915M band traverser(FPV)
ELRS 2450	MS2400	2.4G ELRS protocol DIY traverser(FPV)
ELRS 2450A	MS2400	2.4G ELRS protocol DIY traverser (FPV)
OFDM	MS0400/MS1200/MS1400/ MS1600/MS2400/MS5200/ MS5800	Conventional low-slow-small UAV
LFM	MS0400/MS1200/MS1400/ MS1600/MS2400/MS5200/ MS5800	VCO jamming mode

Suggestions for Selection

Table 6: Suggestions for selection

Module Model	Target of counteraction	Evaluation kit antenna selection*
MS0400P25	FPV flight control (RC) links	ANT-400-D
MS0868P50	FPV flight control (RC) link (TBS, ELRS)	ANT-868-D
MS0900P50	FPV flight control (RC) link (TBS, ELRS)	ANT-900-D
MS0915P50	FPV flight control (RC) link (TBS, ELRS)	ANT-915-D
MS1200P25	Graph link	ANT-1200-D
MS1400P25	Graph link	ANT-1400-D
MS1600P25	GNSS	ANT-1600-D
MS2400P50	FPV flight control (RC) link (ELRS), DJI, etc.	ANT-2400-D
MS5200P50	DJI, etc. (graph link)	ANT-5200-D
MS5800P50	DJI, etc. (graph link)	ANT-5800-D
* Evaluation kit antenna is only used for module testing, user integration needs to design their own antenna according to their own product form.		

Evaluation Kit Checklist

Table 7: Evaluation kit checklist

No.	Name	Quantity
1	SDR Digital Modules	1
2	Evaluation Antenna	1
3	Heat Sink Assembly (with fan)	1
4	USB to RS422 Assembly	1
5	Cables (RF cables, power cables)	1
6	SDRControl.exe Upper Computer Software	1

Caveats

1. The frequency range of the output antenna should be the same as the frequency range of the module, and the non-correspondence of the frequency will lead to the damage of the module.
2. The power supply wiring should meet the current requirements and be connected reliably.
3. When the module is used, good heat dissipation should be ensured, so as to avoid overheating and causing damage to the module.
4. After purchasing the module, please ask for the RS-422 protocol from the professional sales.

Documents / Resources

———	**iSecus SDR Counter UAV Digital Module** [pdf] User Manual SDR Counter UAV Digital Module, SDR, Counter UAV Digital Module, UAV Digital Module, Digital Module, Module

References

- **User Manual**