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# P33-MINI-Dual User Manual (Dual- Band)

Model 1: 600MHz & 1.4GHz

Model 2: 900MHz & 1.4GHz

Version: 20250501V3.2



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## Version history

Date	Version	Modification instructions
20240826	V1.0	Initial version
20250107	V2.0	Modified the pin definition
20250207	V3.0	Modified the structural size of the product
20250211	V3.1	Multiple groups coexistence has been removed
20250501	V3.2	900M dual frequency has been added

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## Catalogue

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# 1.Product Overview

P33-MINI-DUAL is a self-developed TDD bidirectional dual-band image and data integrated wireless transmission device. There are two models of dual-frequency devices. Model 1 supports 600M&1.4G frequency bands, and Model 2 supports 900M&1.4G frequency bands. The two models are of the same size. Dual-frequency products have stronger anti-interference ability. Support independent frequency hopping for uplink and downlink.

This product is suitable for scenarios such as emergency firefighting, unmanned aerial vehicle inspection, and monitoring. Under good environmental conditions with air-to-ground visibility, it can transmit over more than 30 kilometers.

## 2.Product Features

- Support PHCT: Support independent frequency hopping for transmission at each uplink and downlink frequency point
- Support long-distance transmission: With a 4M code flow, the transmission distance can reach over 30km depending on the situation
- Support for high bandwidth transmission: Maximum support 23.9Mbps@20MHz
- Support for automatic relay transmission: Support relay mode
- Support automatic frequency selection: Automatically detect interference signals and select the optimal frequency in real time
- Support for automatic retransmission: Automatically retransmit sudden error data to enhance data reliability

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- Support adaptive bit stream: Automatically adjust the channel modulation mode in real time according to the signal quality
  - Support for automatic power control: Automatically adjust the transmission power at short range to reduce power consumption
  - Support for automatic antenna selection: Select the optimal antenna for transmission in real time based on the occlusion situation
  - Support dynamic allocation of uplink and downlink: The bandwidth proportion of the master and slave uplink and downlink can be automatically allocated according to the actual data volume
  - Support frequency synchronization function: Frequency synchronization can be configured through software and through hardware keys

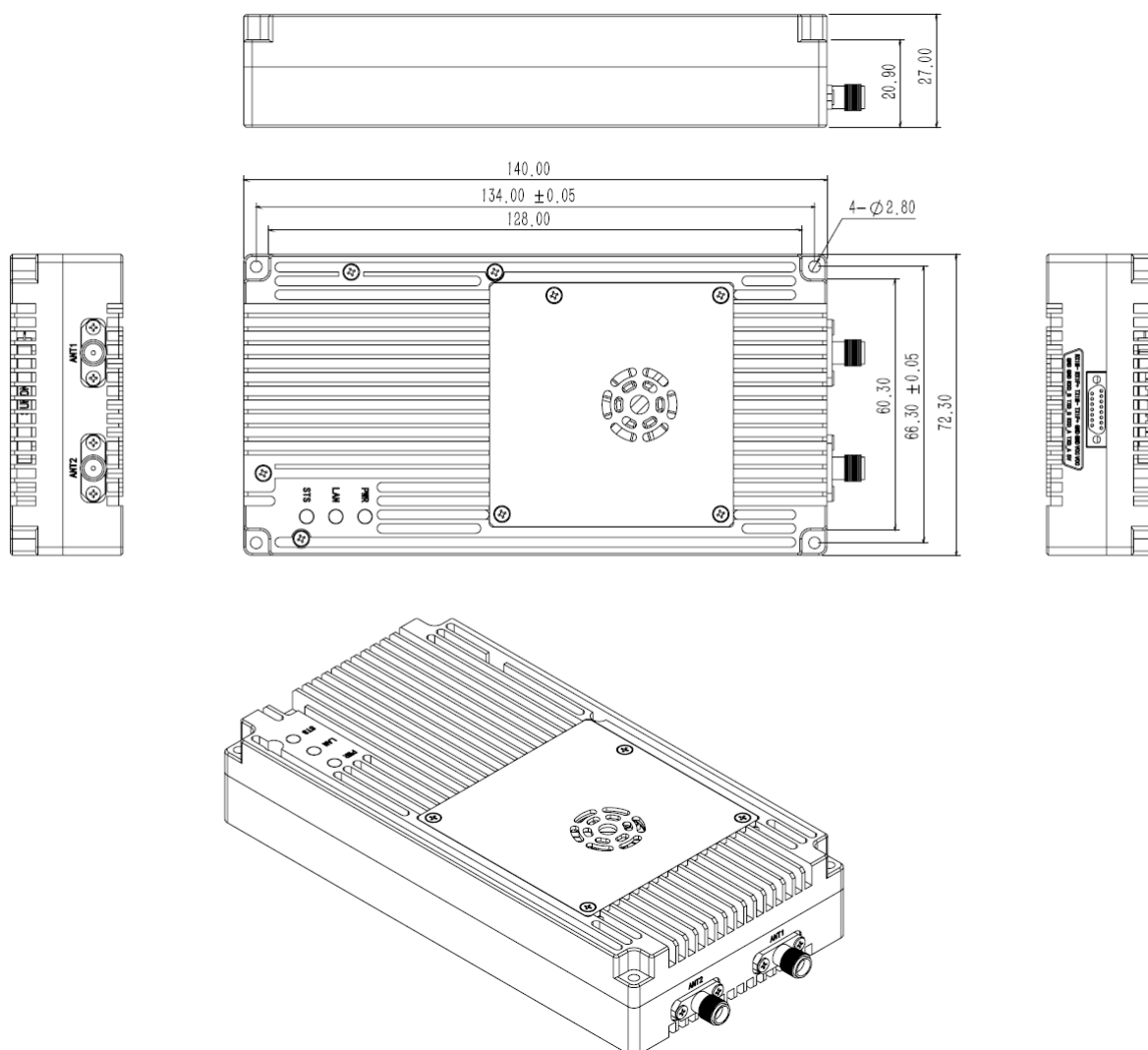
### 3.Product specifications

System parameters	Technical indicators
Equipment model	P33-MINI-DUAL-X
Working frequency	Model 1: 566-678MHz&&1350-1470MHz Model 2: 840-930MHz&&1350-1470MHz
RF channel	2T2R
Transmission power	33dBm (2W)
Transmission distance	Air to ground 30KM+(LOS)
Channel bandwidth	10MHz/20MHz
Modulation mode	QPSK/16QAM
Maximum rate	23.9Mbps@20M
Encryption	AES256
Transmission delay	≤10ms
RF interface	SMA x2
Equipment interface	Network port 1: Ethernet *1
	Serial port 1: TTL/RS232 *1
	Serial port 2: TTL*1/RS232*1/SBUS*2
Consumption	≤ 25W@4Mbps Air unit
	≤ 10W@1Mbps Ground unit
Dimensions(L*W*H)	150mm*72.3mm*27mm
Weight	340g
Working voltage	DC 9~26V,Typical value: +12V@3A
Working temperature	-40~+70°C

Table 2 MCS and Total Throughput (10/20 MHZ bandwidth)			
No	MCS	10M Total throughput (Mbps)	20M Total throughput (Mbps)
1	BPSK1/3	Not supported	3.5
2	BPSK1/2	Not supported	4.8
3	BPSK2/3	Not supported	5.9
4	BPSK3/4	Not supported	6.8
5	QPSK1/3	4.0	7.0
6	QPSK1/2	5.8	9.7
7	QPSK2/3	7.1	11.9
8	QPSK3/4	8.1	13.7
9	16QAM1/3	8.0	11.7
10	16QAM1/2	11.6	16.9
11	16QAM2/3	14.2	20.8
12	16QAM3/4	16.4	23.9

## 4.Product Dimensions and Weight

### 4.1 Schematic diagram of dimensions

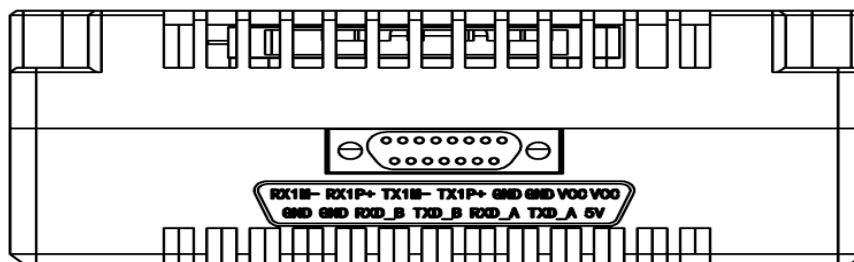


### 4.2 Dimensions and Weight

- ◆ Dimensions: 150mm\*72.3mm\*27mm (Including SMA 10mm)
- ◆ Weight: 340g

## 5.Product interface definition

### 5.1 Interface schematic diagram



The interface of the P33-MINI-DUAL device adopts J30J-15pin, with a total of 1 power supply, 1 network port and 2 serial ports. One of the serial ports is fixed as RS232/TTL, and the other serial port can be modified for RS232/TTL/SBUS. The serial port level is determined by the factory hardware and cannot be modified by the customers themselves.

### 5.2 Interface definition

Linear order	Pin Name	Interface definition	Interface description	Signal direction
1	VCC	power DC 9~26V	Power Positive	I
2	VCC		Power Positive	I
3	GND		Power Negative	I
4	GND		Power Negative	I
5	TX1P+	Ethernet*1	TX+	O
6	TX1M-		TX-	O
7	RX1P+		RX+	I
8	RX1M-		RX-	I
9	Reserve	Reserve	Reserve	IO
10	TXD_A	Serial port 1	Serial port 1 TX	O
11	RXD_A	RS232/TTL	Serial port 1 RX	I
12	SBUS /TXD_B	Serial port 2	SBUS output(air unit)	IO
13	SBUS /RXD-B	SBUS/TTL/RS232	SBUS input(ground unit)	IO
14	GND	(note 2,3)	Serial port 2 ground	O
15	GND	ground	Serial port 1 ground	O

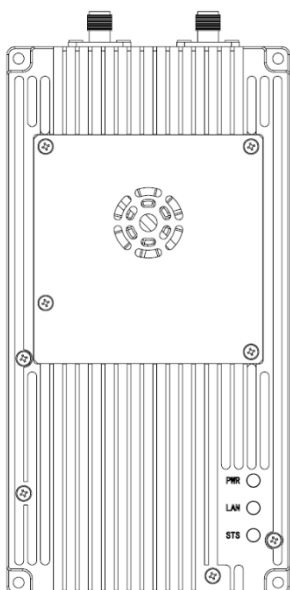
Note 1: Signal direction I indicates radio input, and direction O indicates radio output.

Note 4: On the ground end, both pins 12 and 13 of SBUS are in, while on the sky end, both pins 12 and 13 of SBUS are out.

Note 5: When using dual serial ports, configure the Air Unit SBUS to Line12->Line12; line13->line13.



## 6.The meaning of the product status light



### **PWR (green)**

When the device is powered on, the PWR remains on.

### **LAN (green)**

When there is data transmission and reception at the network port, the network port light flashes.

### **STS (Four colour light)**

Lights of different colours indicate the current signal quality.

The STS lamp represents the size of the SNR of the received signal	
STS colour	Received signal quality SNR
Blue (not synchronized)	Failed connection
Green (Good quality)	$SNR > 10\text{dBm}$
Yellow (Medium quality)	$6\text{dBm} < SNR < 10\text{dBm}$
Red (Poor quality)	$SNR < 6\text{dBm}$

Module type	Mode	PWR	LAN	STS
master	Out of sync	The green light is always on when power on	Data transceiver, flashing	The blue light is always on
master	After synchronization	The green light is always on when power on	Data transceiver, flashing	(Green/yellow/red) It is proportional to the received signal strength
slave	Out of sync	The green light is always on when power on	Data transceiver, flashing	The blue light is flashing.
slave	After synchronization	The green light is always on when power on	Data transceiver, flashing	(Green/yellow/red) It is proportional to the received signal strength

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When the master and slave devices are not synchronized, the power PWR light of the master and slave devices remains on constantly, while the STS blue light of the master device stays on all the time. The STS blue light of the device is flashing. When the master and slave are synchronized, the STS lights of the master and slave change to three-color lights. If the signal quality is good, a green light will be displayed. A yellow light indicates that the communication quality is average. A red light indicates poor communication quality. When the network port is transmitting and receiving data, the LAN lights corresponding to the master and slave devices will flash accordingly.