Milesight

Milesight Field Tester FT101

User Guide



Safety Precautions

Milesight

Milesight will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

- The device must not be disassembled or remodeled in any way.
- Do not remove the battery of the device.
- Do not place the device and its accessories where the temperature or humidity is below/above the operating range.
- ***** Do not place the device close to objects with naked flames, otherwise it will explode.
- The device must never be subjected to drops, shocks or impacts.
- Do not pull the antenna, detach them by holding the connectors.

Copyright © 2011-2025 Milesight. All rights reserved.

All information in this guide is protected by copyright law. Whereby, no organization or individual shall copy or reproduce the whole or part of this user guide by any means without written authorization from Xiamen Milesight IoT Co., Ltd.



For assistance, please contact Milesight technical support: Email: <u>iot.support@milesight.com</u> Support Portal: <u>support.milesight-iot.com</u> Tel: 86-592-5085280 Fax: 86-592-5023065 Address: Building C09, Software Park III, Xiamen 361024, China

Revision History

Date	Doc Version	Description
July 19, 2024	V 1.0	Initial version
		1. Add noise scan, pingpong and signal strength
		evaluation features
Jan. 20, 2025	V 1.1	2. Update real-time testing feature
		3. Add upgrade feature
		4. Add real-time testing report packet

Contents

1. Product Introduction	4
1.1 Overview	4
1.2 Features	4
2. Hardware Introduction	4
2.1 Packing List	4
2.2 Hardware Overview	5
2.3 Dimensions (mm)	5
3. SIM/SD Card Installation (Optional)	6
4. Operation Guide	7
4.1 Basic Gestures and Shortcuts	7
Button Shortcuts	7
Basic Gestures	7
4.2 Signal Test	8
4.2.1 LoRaWAN Setting	9
4.2.2 Noise Scan	11
4.2.3 PingPong Test	13
4.2.4 Signal Evaluation	15
4.2.5 Real-time Testing	20
4.3 Upgrade	25
Firmware Upgrade	25
App Upgrade	26
5. Maintenance	26
6. Communication Protocol	27
Appendix: Signal Quality Guidelines	28

1. Product Introduction

1.1 Overview

Milesight

Milesight Field Tester is a portable LoRaWAN[®] network testing device. With different kinds of antennas, it can support global LoRaWAN[®] frequencies to record the signal status and packet loss rate to monitor the network status from the field and verify the coverage of different LoRaWAN[®] gateways, to optimize the best places to deploy LoRaWAN[®] devices.

Equipped with a 5.72-inch touchscreen display, users are able to operate the signal test procedure and monitor the real-time network status friendly. With a built-in battery and type-C port, it can work for 8 hours and supports type-C power bank charge to bring the device everywhere easily.

1.2 Features

- Octa-core processor with Android system and big memory for flexible integration
- Built-in one-channel SX1262 LoRaWAN[®] module for signal test
- Support global LoRaWAN[®] frequencies with different antennas
- Compatible with any standard LoRaWAN[®] gateways and global mainstream network servers
- Compatible Milesight ToolBox App to configure Milesight sensors via NFC or Bluetooth
- Support noise scan to optimize the locations and configurations of gateways
- Support signal evaluation to optimize the locations and configurations of devices
- Support to simulate the parameters of Milesight devices for accurate results
- Support to get RSSI and SNR of the gateway and statistics of packet loss rate between gateway and devices
- Support GNSS positioning to record the location of the test field
- Straightforward user interfaces presented on a 5.72-inch touchable LCD screen
- With a built-in rechargeable lithium battery that works for 8 hours
- Support real-time data backup and charge through a USB type-C port

2. Hardware Introduction

2.1 Packing List





If any of the above items is missing or damaged, please contact your sales representative.





2.3 Dimensions (mm)



3. SIM/SD Card Installation (Optional)

1. Remove the rubber plug of the slot, and use an ejector tool to push the contact point to pop up the card slot.

2. Insert the nano SIM card (4FF) or micro SD card, then turn the slot over and restore it back to the device.

3. Restore the rubber plug of the slot.





6

4. Operation Guide

4.1 Basic Gestures and Shortcuts

Button Shortcuts

ltem	Description
	Power On : press and hold on the Power button for 3s until the screen lights.
	Power Off or Restart : press and hold on the Power button for 3s until the phone displays the Power off and Restart menu.
	Turn up the volume : press the Volume up button.
	Turn down the volume : press the Volume down button.
	Take a screenshot : press the Volume down and Power buttons simultaneously.

Basic Gestures

ltem	Description
	Back to home screen: tap the Home button once.
:≡ ŵ ∰	Return to the previous screen: tap Return button once.
·請 ·	Access home screen edit mode: tap Menu button once.



4.2 Signal Test

Milesight field tester is equipped with a dedicated Field Tester App for LoRaWAN[®] signal testing. Please launch the Field Tester App and select below features according to the testing conditions on the spot:

Feature	Description
No LoRaWAN	[®] gateway on the spot
	Scan the noise of every frequency channel and provide a diagram for users to
Noise Scan	analyze the environmental interference condition, and select best installation
	locations and channel configuration for LoRaWAN [®] gateways.
PingPong	Simulate the uplink and downlink communication between end devices and the
Test	LoRaWAN [®] gateway. This requires at least 2 field tester devices.

Has LoRaWAN [®] gateway on the spot		
	Simulate the end device to evaluate the signal strength quality of every spreading	
Signal	factor (datarate) by sending packets to the LoRaWAN® gateway. This is suitable for	
Evaluation	the situation which users do not know which spreading factor is the best option for	
Evaluation	end devices.	
Dealting	Simulate the end device to evaluate the signal strength quality by sending packets	
Real-time	to the LoRaWAN® gateway. This is suitable for the situation which users already	
Testing	know which spreading factor or ADR will be used for end devices.	

4.2.1 LoRaWAN Setting

Before starting all tests, it is necessary to launch the Field Tester App to configure the LoRaWAN[®] settings.

Note: after changing any parameters, the device will rejoin the network.

E LoRaWAN settings	>
品 Basic Information	>
🗟 Historical Reports	>
Hanguage	English >
🖰 Guide	>
Signal Test	Settings

Ensure that the frequency channels match the testing gateway and configure the related parameters as required.

Band		
US915		~
Enable the Cha	nnol	
8-15		
Index	Frequency/MHz	
0 - 15	902.3 - 905.3	
16 - 31	905.5 - 908.5	
SF		
SF10-DR2		~
TX Power		
Native transr	nit power	~
Native transmit	t power	
TXPower0-1	9.15 dBm	~
Packet Dispatc	h Interval (seconds)	
10	, , ,	
Application key	/	
888888888888	888888888888888888888888888888888888888	8

Parameters	Description		
Band	Select the frequency plan to send packets. If the band is one of CN470/AU915/US915, enter the index of the channel to enable in the input box, making them separated by commas. Examples: 1, 40: Enabling Channel 1 and Channel 40 1-40: Enabling Channel 1 to Channel 40 1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60		
	All: Enabling all channels Null: Indicate that all channels are disabled		
SF (Spreading	Select a fixed spreading factor or select ADR to allow network server to adjust		
Factor)	the spreading factor. This is used on Real-time Testing feature.		
Tx Power	Select the transmit power mode of the device. This is used on Signal Evaluation and Real-time Testing features.		

	Native transmit power: select the Tx power directly.	
Mock sensor: select the Milesight LoRaWAN device model. The tester		
	simulate the capability of this model to send packets.	
Packet Dispatch	Set the interval to report the packets. This is also the timeout when not	
Interval	receiving replies from LoRaWAN [®] gateway. Range: 6-60s, default: 10s.	
	Set the Appkey for OTAA mode as required, the default value is	
Application Key	888888888888888888888888888888888888888	

4.2.2 Noise Scan

Milesight

The field tester supports to simulate the gateway to scan the noise of specific LoRaWAN frequencies and give a diagram for users to analyze the environmental interference condition and select best frequencies.

- 1. Ensure the frequency plan of LoRaWAN settings is selected.
- 2. Place the field tester to the target location of LoRaWAN gateway.
- 3. Select **Noise Scan** button to configure related parameters, then click **Start** to scan. **Note:** it is suggested to scan at least 1 hour for accurate results.

<	Noise Scan
Location	Location1 >
Longitude	118.031117°E
Latitude	24.624808°N
Scan Freq	General Freq >

Star

11

Parameters	Description
Location	Customize a name to indicate the test location.
Longitude	Show the coordinates of devices. It only works when placed outdoors. Note:
Latitude	 Ensure the Location is turned on in the Settings page of this device. Download and launch App GPS Test if still not getting the coordinates.
Scan Freq	Set the frequency to scan the noise. General Freq: use the channels enabled in <u>LoRaWAN Settings</u> . If the band is one of CN470/AU915/US915, the device will scan all channels. Custom Freq: set the start and end frequency of a range, and the frequency interval.

4. Click **Stop** to stop the scanning. The tester will display the RSSI result as graph or table. RSSI indicates the sensitivity for every frequency channel. The lower the RSSI value, the better the signal.

No	ise Scan	<	Noise Scan	
Scan results	Graph Table	Scan results	Gi	raph Table
-50		Frequency	Currant (RSSI/dBm)	Average (RSSI/dBm)
-60	A	902.3	-68	-68
-70	A mar a second as p	902.5	-68	-68
-80		902.7	-69	-68
-90	0.5 908.7 910.9 912.9	902.9	-68	-68
: Frequency/MHz Y: R	SSI/dBm	903	-68	-68
		903.1	-69	-68
ocation	Location1 >	903.3	-68	-67
ongitude	118.031117°E	903.5	-68	-68
		903.7	-70	-70
atitude	24.624808°N	903.9	-68	-68
can Freq	General Freq >	904.1	-69	-69
1		904.3	-68	-68
Start	Export	Start		Export

5. Click Export to save the test results as a CSV log file to the tester. You can also click Start to

Frequency	Current Scan (dBm)	Weighted Average Scan (dBm)	Location	Longitude	Latitude
902.3	-65	-66	Location1	118.03069° E	24.624923° N
902.5	-67	-67	Location1	118.03069° E	24.624923° N
902.7	-68	-67	Location1	118.03069° E	24.624923° N
902.9	-67	-67	Location1	118.03069° E	24.624923° N
903.1	-68	-67	Location1	118.03069° E	24.624923° N
903.3	-66	-66	Location1	118.03069° E	24.624923° N
903.5	-67	-67	Location1	118.03069° E	24.624923° N
903.7	-67	-67	Location1	118.03069° E	24.624923° N
903.9	-68	-67	Location1	118.03069° E	24.624923° N
904.1	-67	-67	Location1	118.03069° E	24.624923° N
904.3	-67	-67	Location1	118.03069° E	24.624923° N
904.5	-67	-66	Location1	118.03069° E	24.624923° N

start a new scanning.

4.2.3 PingPong Test

Two field testers support PingPong test feature to simulate the communication between end devices and gateway if there is not gateway on the spot.

1. Ensure the frequency plan of <u>LoRaWAN Settings</u> of both testers are the same.

2. Place one tester to the target location of end device, and the other to the target location of LoRaWAN gateway.

3. Select **PingPong** button of both testers to configure related parameters, then click **Start** of both devices.



Parameters	Description
Location	Customize a name to indicate the test locations.
SF	Select the spread factor to send packets. This parameter of both devices must be the same.
Tx Power	Select the transmit power of both devices. This parameter of both devices must be the same.
Frequency	Set the frequency to send packets. This parameter of both devices must be the same.
Longitude	Show the coordinates of devices. It only works when placed outdoors. Note:
Latitude	 Ensure the Location is turned on in the Settings page of this device. Download and launch App GPS Test if still not getting the coordinates.
Role	Set one device as Slave and the other one as Master.
Kit ID	Only the devices with the same kit ID can communicate with each other.

4. Click **Stop** to stop the scanning. The tester will display the result including uplink/downlink sending/receiving amounts, average RSSI/SNR, and packet loss rate.

	PingPong		< 1	PingPong	
Pairing resul	ts		Pairing results		
Item	Uplink Packet	Downlink Packet	ltem U		vnlink cket
Packet	5	5	Packet	6	5
ОК	5	4	ОК	5	5
RSSI	-49	-41	RSSI	-48 -	41
SNR	12	13	SNR	12	13
PER	0%	20%	PER	17% ()%
Location		Device >	Location	Gate	eway
SF ①		SF7-DR3 >	SF ①	SF7-	-DR3
TX Power ①	TXPower	0-30 dBm >	TX Power ①	TXPower0-30	dBm
Frequency ()	902.3 >	Frequency ①	9	02.3
Start		Export	Start	Expo	ort

5. Click **Export** to save the test results as CSV log files to both testers. You can also click **Start** to start a new testing.

Time	Tx Power	(dBm)	SF	Total	Packets	(Master)	Successful	Packets	(RSSI	(dBm,	Master)	SNR (dl	B, Master)	Packet	Loss	Rate	Longitude	Latitude	(Ma
2024/12/30 17:5	1 TXPower0-	30 dB	SF7-DR3			5			5		-49		12	1			0 118. 03069	24. 624923	° N

4.2.4 Signal Evaluation

The field tester supports to evaluate the signal strength quality of every spreading factor (datarate) by sending packets to gateway. This guide will take the Milesight UG65 gateway as an example to operate the signal strength evaluation. Users can also connect this device to any standard LoRaWAN[®] network server.

1. Launch the Field Tester App, and find the device EUI and application key information. **Note:** the app EUI (join EUI) is fixed as 24E124C0002A0001.

Device EUI	24E124
Application EUI	24E124C0002A0001
Application key	88888888888888888888888888888888888888
LoRaWAN Versio	n V1.0.3
Work Mode	Class A
Join Type	OTAA

2. Configure the <u>LoRaWAN[®] settings</u> of this field tester, and ensure the frequency band matches the settings of gateway.

3.	Navigate to	the web	GUI of	Milesight	gateway to	o enable	embedded	NS mode.

Status	General F	Radios Advanced	Custom Traffic			
Packet Forwarder	General Setting					
Network Server	Gateway EUI Gateway ID	24E124FFFE				
Protocol Integration		Disabled	~			
Network	Data Retransmission Multi-Destination					
System	ID	Enable	Туре	Server Address	Connect Status	Operation
Maintenance)	0	Enabled	Embedded NS	localhost	Connected	
Status		General	Applications	Payload Codec	Profiles	Device
Packet Forwarder		General Setti	ng			
Network Server		Enable Platform Mode				
Protocol Integration	•	NetID		010203		
		Join Delay		5	sec	
Network	•	RX1 Delay		1	sec	
Sustam	•	Lease Time		8760-0-0	hh-mr	n-ss
System		Log Level		info	~	

4. Navigate to **Network Server > Device** page to add the field tester to the gateway. The device profile type should be set as **OTAA-Class A**.

Device Name	FT101
Description	test
Device EUI	24e124
Device-Profile	ClassA-OTAA
Application	cloud
Payload Codec	None
fPort	1
Frame-counter Validation	
Application Key	888888888888888888888888888888888888888
Device Address	
Network Session Key	
Application Session Key	
Uplink Frame-counter	0
Downlink Frame-counter	0
	Save & Apply

After adding, the field tester will show network status is connected.

5. Place the field tester to the target location of end devices.

6. Select **Signal Evaluation** button, customize a name to record the detection location and click **Start** to test.

Note: Signal Evaluation button only displays when the device joins the network.



Parameters	Description
Location	Customize a name to indicate the test locations.
Tx Power	Show the tx power used in this evaluation. This can be set in LoRaWAN Settings.
Longitudo	Show the coordinates of devices. It only works when placed outdoors.
Longitude	Note:
l atituda	1) Ensure the Location is turned on in the Settings page of this device.
Latitude	2) Download and launch App GPS Test if still not getting the coordinates.

7. After 1 minute, the tester will display the results and suggest the most recommended spreading factor (datarate). After evaluation, click **Apply** to change the SF of LoRaWAN setting to the most recommended value if required.

SF9-DR1 🔗 Recomm	end
Signal Strength	Strong
RSSI/SNR	-34 dBm/11 dB
RSSIS	-34
Packet Loss Rate	0%
SF7-DR3 🥑	
Signal Strength	Abnormal
RSSI/SNR	-48 dBm/8 dB
RSSIS	-48
Packet Loss Rate	100%
C Export	Apply

8. Click **Export** to save the test results as a CSV log file to the tester.

Time	RSSI (d	dBm) RSSIS	(dBn	SNR (dB)	Signal	Packet Loss (%)	Longitude	Latitude	Location	SF	TX Power
2024/12/31 11:32		-43	-43	11	Strong	0	118.03076° E	24.625017° N	2	SF9-DR1	AM102
2024/12/30 20:43		-34	-34	11	Strong	0	118.03076° E	24.625017° N	Location4	SF9-DR1	12 dBm

Users can also click the button at the top right corner of testing result or go to **Settings > Historical Reports** to check and export the test results.

< Historical	Reports
Real-Time Testing	Signal Evaluation
2025-02	
SF7 Location2 118.03095°E 24.624	Weak 02-10 09:53 883°N
Expan	d ~
SF7 Location4	Strong 02-10 09:32
Expan	d ~
Start date – End dat	te 🛱 Export

4.2.5 Real-time Testing

This guide will take the Milesight UG65 gateway as an example to operate the real-time signal testing. Users can also connect this device to any standard LoRaWAN[®] network server.

1. Launch the Field Tester App, and go to **Settings > Basic Information** menu to find the device EUI and application key information.

Note: the app EUI (join EUI) is fixed as 24E124C0002A0001.

Device EUI	24E124
Application EUI	24E124C0002A0001
Application key	88888888888888888888888888888888888888
LoRaWAN Versio	n V1.0.3
Work Mode	Class A
Join Type	OTAA

- 2. Configure the $\underline{LoRaWAN^{(n)}}$ settings of this field tester.
- 3. Navigate to the web GUI of Milesight gateway to enable embedded NS mode.

Status	General	Radios Advanced	Custom Traffic			
Packet Forwarder	General Setting					
Network Server	Gateway EUI Gateway ID	24E124FFFE				
Protocol Integration	Frequency-Sync	Disabled	~			
Network	Data Retransmissio Multi-Destination					
System	ID	Enable	Туре	Server Address	Connect Status	Operation
Maintenance	• 0	Enabled	Embedded NS	localhost	Connected	
Status		General	Applications	Payload Codec	Profiles	Device
Packet Forwarder		General Se	etting			
Network Server		Enable Platform Mo	ode			
Protocol Integration	•	NetID		010203		
		Join Delay		5	se	2
Network	•	RX1 Delay		1	se	2
System	•	Lease Time		8760-0-0	hh	-mm-ss
- Jacin-		Log Level		info	~	

4. Navigate to **Network Server > Device** page to add the field tester to the gateway. The device profile type should be set as **OTAA-Class A**.

test 24e124 ClassA-OTAA Cloud
ClassA-OTAA
cloud 🗸
None 💌
1
0
888888888888888888888888888888888888888
0
0

After adding, the field tester will show network status is connected.

5. Place the field tester to the target location of end devices.

6. Select **Real-time Testing** button, customize a name to record the detection location and click **Start** to start the test, then the device will send the confirmed packets to the network server and record the testing results.

Note: Real-time Testing button only displays when the device joins to the network.

< Real-Tir	ne Testing 🛛 🗟
Location	Location4 >
SF	SF9-DR1
TX Power	12 dBm
Record Location4	Location
Cancel	Confirm
Packet Loss Rate	-
Longitude	
Latitude	-
S	Start

7. Click **Stop** to stop the test. The tester will display the signal test results and details. **Note:** only after 1 minute the test can be stopped.

< Real-Time	Testing 🕞
Location	Location4 >
SF	SF9-DR1
TX Power	12 dBm
Signal Strength	Strong
RSSI/SNR	-50 dBm/11 dB
Uplink Packet	7
Confirm the package	7
Packet Loss Rate	0%
Longitude	
Latitude	
C Go on	Export

8. Click **Export** to save the test results as a CSV log file to the tester.

fx Cnt	Time	RSSI	(dBm) RSSIS	(dBn SNR	(dB)	Signal	UPlink Packet	Confirm Packet	Packet Loss (%)	Longitude	Latitude	Location	SF	TX Power
	1 2024/12/31 13:31		-94	-94	9	Middle	1	1	ι (118.03076	[°] 24. 625017 [°]	Location4	SF9-DR1	12 dBm
	2 2024/12/31 13:31		-88	-88	10	Middle	2	2 2	2 (118.03076	°24. 625017°	Location4	SF9-DR1	12 dBm
	3 2024/12/31 13:31		-90	-90	9	Middle	3	3 3	3 (118.03076	° 24. 625017°	Location4	SF9-DR1	12 dBm
	4 2024/12/31 13:32		-94	-94	8	Middle	4	4	1 (118.03076	[°] 24. 625017 [°]	Location4	SF9-DR1	12 dBm
	5 2024/12/31 13:32		-94	-94	9	Middle	E	5 5	5 (118.03076	°24. 625017°	Location4	SF9-DR1	12 dBm
	6 2024/12/31 13:32		-92	-92	9	Middle	6	6 6	6 (118.03076	°24. 625017°	Location4	SF9-DR1	12 dBm
	7 2024/12/31 13:32		-85	-85	10	Middle	1	7	7 (118.03076	[°] 24. 625017 [°]	Location4	SF9-DR1	12 dBm
	8 2024/12/31 13:32		-84	-84	11	Middle	8	8 8	3 (118.03076	24. 625017°	Location4	SF9-DR1	12 dBm

Users can also click the button at the top right corner of testing result or go to **Settings > Historical Reports** to check and export the test results.

< Historical Reports								
Real-Time Testing Signal Evaluation								
2025-02								
Location3 118.030988°E 2	Middle 02-10 09:59 24.624862°N							
SF	SF7-DR5							
RSSI/SNR	-92.42 dBm/9.08 dB							
RSSIS	-92.42 dBm							
TX Power	16 dBm							
Uplink Packet	12							
Confirm the package 12								
Packet Loss Rate 0%								
Start date – Er	nd date 📋 Export							

4.3 Upgrade

Field Tester supports to upgrade the device firmware or Field Tester App as required.

Firmware Upgrade

- 1. Download FT101 device firmware from Milesight official website.
- 2. Connect the FT101 to the computer via type-C port.
- 3. Import the device firmware to the file folder of FT101 device.
- 4. Launch Field Test App, and navigate to **Settings > Basic Information** page.
- 5. Click **Select file** to select the firmware file and click **Upgrade** to upgrade the device.

Firmv	vare upgrade
	Select file
	Upgrade

App Upgrade

Milesight

- 1. Ensure the FT101 device is able to access the Internet.
- 2. Launch Field Test App, and navigate to **Settings > Basic Information** page.
- 3. Click **App Upgrade** to download the latest App apk file from the Internet. You can also import the file to the device by connecting device to computer via type-C port if there is no Internet.

< Basic Information

	JU120-00703000
LoRaWAN Version	V1.0.3
Work Mode	Class A
Join Type	ΟΤΑΑ
App version	V1.0.4
Firmware Version	V1.3
Hardware Version	V1.0
App Upgrade	>

4. Open the apk file on the device folder to install it.



5. Maintenance

- Keep the device and its accessories dry. If the device sprayed the water, clean the surface with a dry soft cloth. Do not use an external heating device (such as a microwave oven) to dry it.
- Power off the device and disconnect the power adapter when cleaning the device.
- Do not clean the device and its accessories with strong chemicals, strong detergents or

26



solvents. To clean the device, wipe it with a soft moistened cloth. Use another soft, dry cloth to wipe dry.

- When installing a SIM card or micro SD card, keep the device clean to prevent impurities from entering the device.
- The response speed of the screen will become slow at a low temperature, which is a normal phenomenon and does not affect the performance.
- It is not suggested to charge the device when the environment temperature is over 45°C or below -10°C.
- Charge the device every 3 months if it is not used for an extended period.

6. Communication Protocol

The data are based on the following format (HEX), the Data field should follow little-endian:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	

For decoder examples please find files on <u>https://github.com/Milesight-IoT/SensorDecoders</u>.

ltem	Channel	Туре	Description
Protocol Version		01	01=>V1
Hardware Version		09	01 40 => V1.4
Firmware Version		0a	01 14 => V1.14
Power On	ff	0b	Device is on
Device Type		Of	00: Class A, 01: Class B, 02: Class C
Device SN		16	16 digits
Coordinate	03	a1	Byte 1-4: Longitude, INT32/1000000 Byte 5-8: Latitude, INT32/1000000
Signal Strength	04	a2	Byte 1-2: RSSI, INT16/10, Unit: dBm Byte 3-4: SNR, INT16/10, Unit: dB
SF (Spreading Factor)	05	a3	UINT8, range: 7-12 Note: when SF is set to ADR, the device will report this value as FF.
Tx Power	06	a4	INT16/100, Unit: dBm

Examples:

1. Basic Information: reports whenever it joins the network.

ff0bff ff0101 ff166746d48016300014 ff090110 ff0a0101			
Channel	Туре	Value	
ff	0b (Power On)	ff	

ff	01(Protocol Version)	01=V1
ff	16 (Device SN)	6746d48016300014
ff	09 (Hardware Version)	0100=>V1.0
ff	0a (Firmware Version)	0101=>V1.1

2. Signal test packet: reports when starting signal testing.

•	1	5	3	3
			££	
			11	

3. Real-time Testing packet: reports everytime Real-time Testing stops.

03a1a801090779bf7701 04a279fc5d00 05a309 06a4b004				
Channel	nel Type Value			
		Longitude: a8 01 09 07=>07 09 01		
03	a1	a8=118030760/10^6=118.030760		
	(Coordinate)	Latitude: 79 bf 77 01=>01 77 bf		
		79=24625017/10^6=24.625017		
04	a2	RSSI: 79fc=>fc79= -903/10=-90.3dBm		
	(Signal Strength)	SNR: 5d 00=> 00 5d=93/10=9.3dB		
05	a3(Spreading Factor)	09=SF9		
06	a4 (Tx Power)	b0 04=>04 b0=1200/100=12 dBm		

Appendix: Signal Quality Guidelines

Signal Quality	Packet Loss Rate	SF	RSSIS
	≤ 5%	SF7	- - ≥ 60dBm
		SF8	
Strong		SF9	
Strong		SF10	
		SF11	
		SF12	
	5% < Rate ≤ 10%	SF7	-100dBm ≤ RSSIS <60dBm
		SF8	
Madiuma		SF9	
Medium		SF10	
		SF11	
		SF12	
	10% < Rate < 50%	SF7	-115dBm ≤ RSSIS < -100dBm
		SF8	-120dBm ≤ RSSIS < -100dBm
Maak		SF9	-125dBm ≤ RSSIS < -100dBm
Weak		SF10	-130dBm ≤ RSSIS < -100dBm
		SF11	-135dBm ≤ RSSIS < -100dBm
		SF12	-141dBm ≤ RSSIS < -100dBm

	≥ 50%	SF7	< -110dBm
Abnormal		SF8	< -120dBm
		SF9	< -125dBm
		SF10	< -130dBm
		SF11	< -135dBm
		SF12	< -141dBm

-END-