Shenzhen Runicc Wireless Technology Co., Ltd.

Antenna Specification

Customer/ Project Name	Shenzhen Xtooltech Intelligent Co., Ltd./TS200	Frequency band	315MHz&433MHZ
RF	Steven	Edition	A
ME	Li Guodong	Confirm	
P/N	SRN_34_03		
Date	2024-08-19		
Customer confirmation			
Customer project name / Part number	Customer project name： **TS200 315/433dual-band antenna** Customer project part number：		

Customer satisfaction survey for R&D projects（Dear customer, please provide a review regarding the work of our R&D or PM management staff to encourage us to serve you better）			
RF	□Satisfied	☐Basically satisfied	□Unsatisfied
ME	□Satisfied	☐Basically satisfied	□Unsatisfied
PM	□Satisfied	☐Basically satisfied	□Unsatisfied
Suggestion Explanation:			

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1、Antenna photograph

The report mainly presents the testing status of various electrical performance parameters of the TS200 antenna. The TS200 antenna is a dual-band antenna with frequencies of 315MHz and 433MHz. The antenna diagram is shown in Figure 1 below.

图一：Antenna photograph

2、Antenna Test Equipment

Agilent E5071C vector network analyzer is used for antenna input characteristic test; Satimo starlab 3D near-field microwave darkroom is used for antenna radiation characteristic test. And RS CMW500 comprehensive tester is used. The OTA coordinates are as follows:

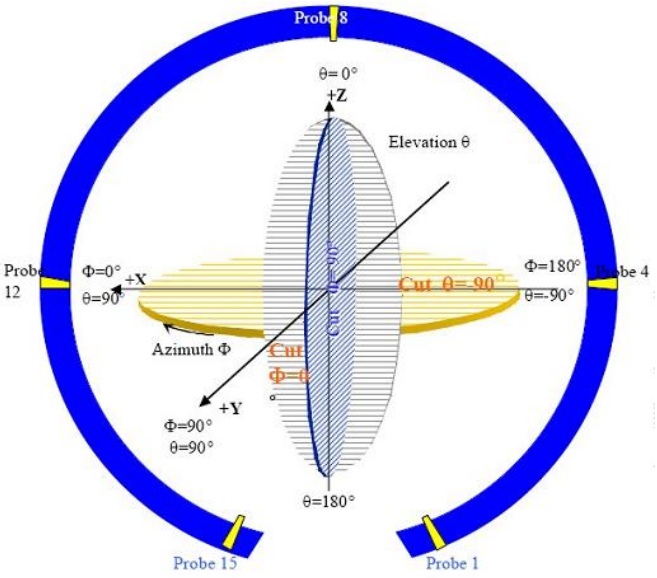


图 4 3D 微波暗室测试坐标系(back view)

3、Electrical performance

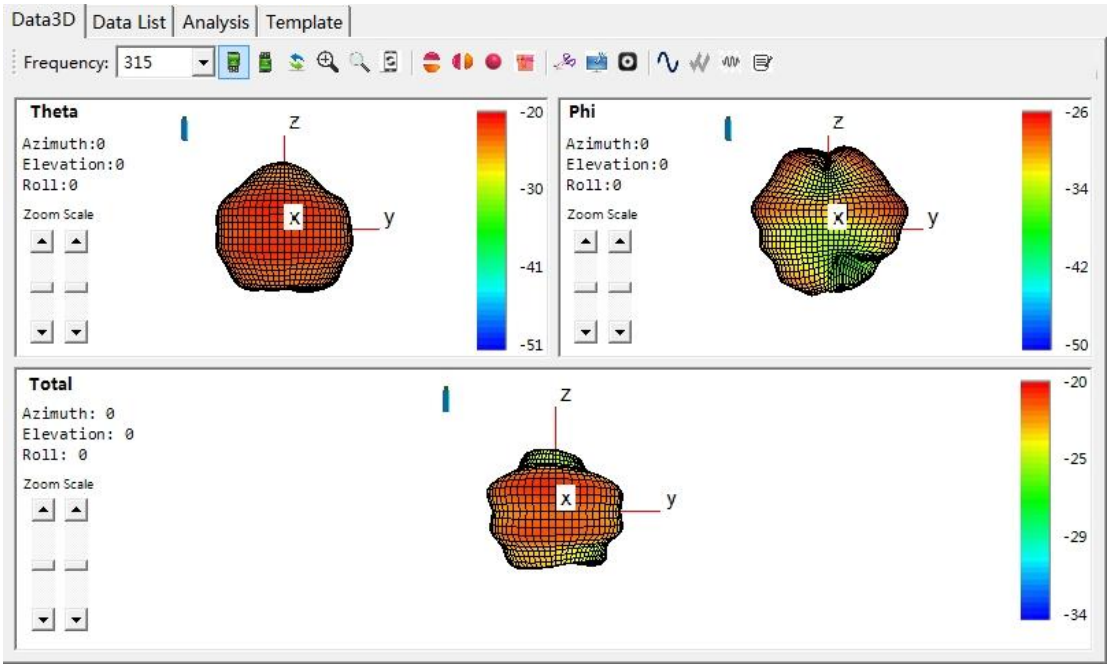
3.1 TS200 antenna S11 parameters

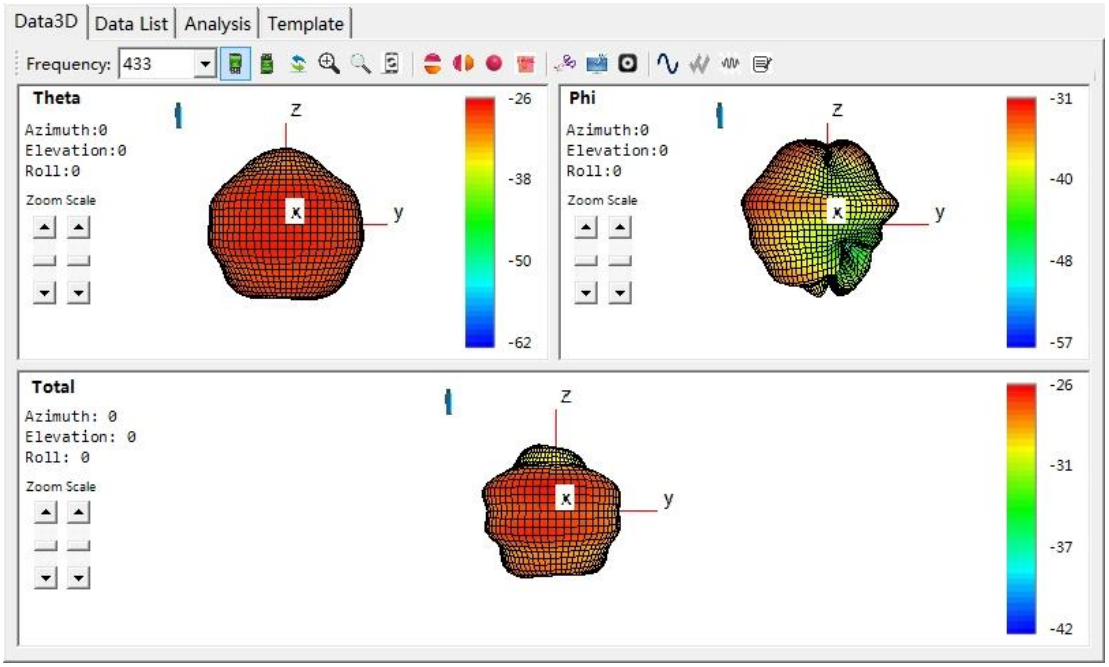
Note: This product is an antenna within a non-50-ohm system. The S11 parameter metric measured herein is provided solely for reference purposes and shall not be regarded as the standard for evaluating the performance or quality of the antenna.

3.3 TS200 315/433 **Dual-band antenna Gain&Efficiency**

Frequency(MHz)	Gain (dBi)	Efficiency(dB)	Efficiency (%)
314	-20.65	-25.40	0.30
315	-20.67	-25.46	0.30
316	-20.81	-25.28	0.29
317	-20.79	-25.27	0.29
318	-20.82	-25.29	0.29
432	-20.20	-24.47	0.32
433	-20.06	-24.59	0.34
434	-20.50	-24.64	0.34
435	-20.57	-24.65	0.34
436	-20.05	-24.70	0.34

3.4 TS200 antenna 3D pattern





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4、Results of Sample Examination

Shenzhen Runicc Wireless Techenology Co.,LTD

Sample Inspection Report

Customer Name: Shenzhen Ytooltech Intelligent Co., Ltd.

Project Name: TS200

Dimension Test: 5pcs

2024.4.15

1.Data

Test content	Dimensional Inspection										
Test size	size1	size2	size3	size4	size5	size6	size7	size8	size9	Pin installation
Testing device	caliper	caliper	caliper	caliper	caliper	caliper	caliper	caliper	caliper	TS200PCB
SPEC	9.9±0.1	10.2±0.3	9.6±0.3	11.4±0.3	1.5±0.3	19.0±0.3	12.85±0.3	10.3±0.3	6.4±0.1	The installation alignment went smoothly
1#	9.93	10.24	19.15	11.47	1.47	19.11	12.87	10.31	6.41	OK
2#	9.94	10.27	19.11	11.45	1.58	19.02	12.84	10.37	6.44	OK
3#	9.88	10.19	19.06	11.35	1.52	19.08	12.82	10.34	6.43	OK
4#	9.96	10.22	19.05	11.47	1.55	19.07	12.86	10.33	6.45	OK
5#	9.89	10.31	19.01	11.56	1.56	19.12	12.88	10.27	6.42	OK
max	9.96	10.31	19.15	11.56	1.58	19.12	12.88	10.37	6.65	
min	9.88	10.19	19.01	11.35	1.47	19.02	12.82	10.27	6.41	
mean	9.92	10.25	19.08	11.46	1.54	19.08	12.85	10.32	6.43	

2.Result:
PASS

Table Producer：Yuyang Approval: **Luna** Form Number: RN-QC-0411

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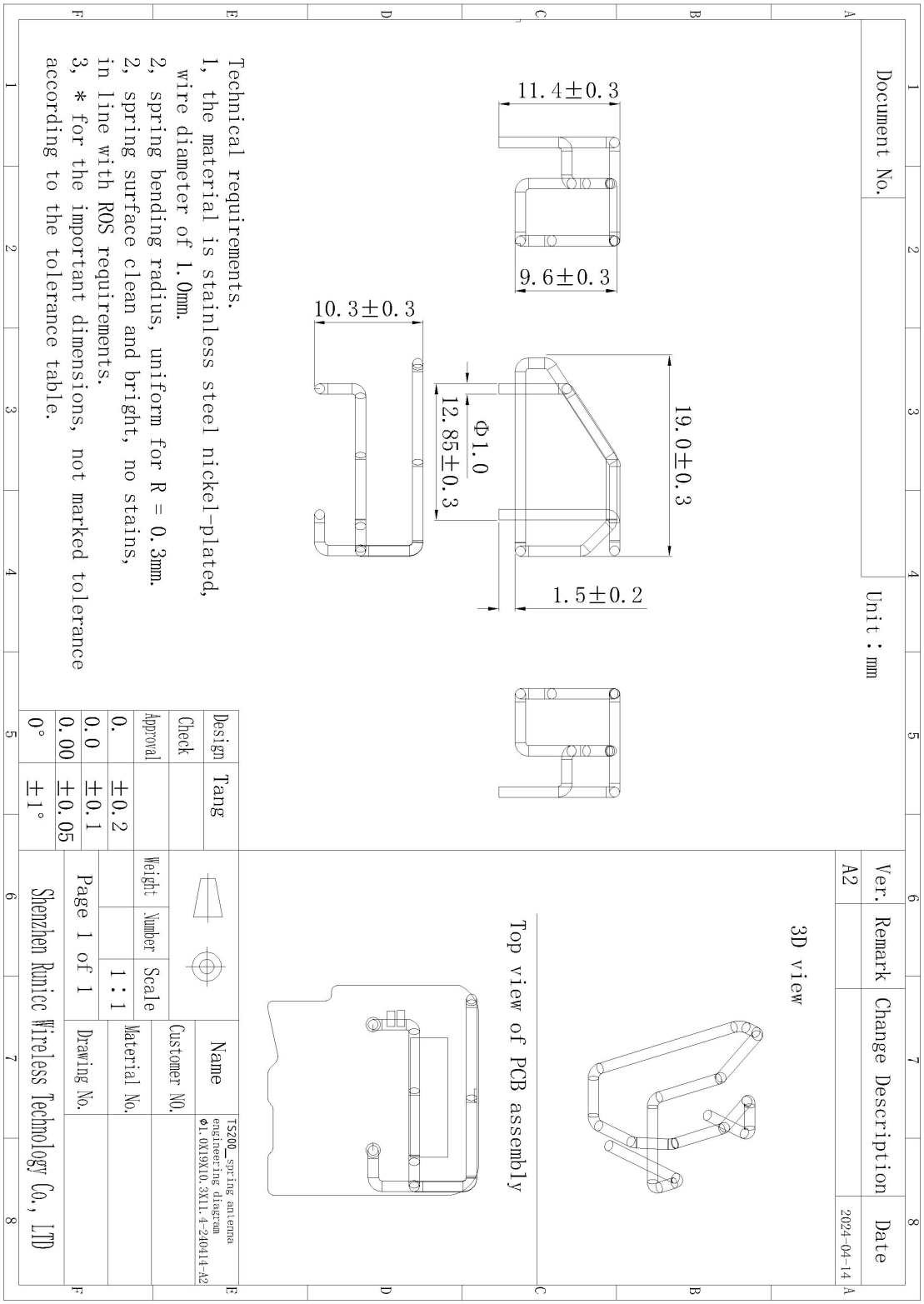
5、TS200 QC Engineering Drawing



6.Salt Spray Test Report

Test method	Salt Spray Corrosion Test Method	Reference material	MIL-STD-1344A
Customer		Starting date of the experiment	Starting from 8:00 am on May 10, 2024
		DATE	Until 8:00 PM on May 10, 2024
Sample name	TS200 315/433 dual band antenna	Number of experiments	5PCS
P/N	SRN_34_03	QTY	

TEST CONDDITION
1、Salt water dissolution（SALT SOLUTION：concentration 50±10g/L，PH6.5-7.2.
2、Laboratory temperature（TEMP.IT THE SPRAY DHAMBR):35±1℃.
3、Salt bucket temperature（TEMP.OF SALE SOL′N TANK): 35±1℃.
4、Pressure bucket temperature （TEMP.OF SAR SUPPLIERY）：47±1℃.
5、Relative humidity in the laboratory（R.H IN THE CHAMBER ）85%.
6、Compressed air pressure（COMPRESSED AIR PRESSURE）：1.00±0.01Kg/cm^2.
7、Sample placement location（SPECIMEN SUPPORTED ANGLE ）：Nylon rope hanging70° -90°.
8、Collection volume of spray（COLLECT RATE OF SALT SOL′N）1-2mL/(8 cm^2hr).
9、Salt spray testing time： 24H
ADFUSGD METHOD
Inspext the ecimen at 20 xmagnification no blue or green corrosion products are acceptable

Sample Number	Phenomenon after the experiment	Judge
	PHENOMENON AFTER TEST	COMMENT
1	There is no phenomenon of blue or green corrosive substances.	OK
2	There is no phenomenon of blue or green corrosive substances.	OK
3	There is no phenomenon of blue or green corrosive substances.	OK
4	There is no phenomenon of blue or green corrosive substances.	OK
5	There is no phenomenon of blue or green corrosive substances.	OK

Approved by:CHEN Reviewed by:HE Tester: Li Heming Retention period: One year
Department in charge of preservation: Quality Department Form number: QR-PZ-031

7. Package Spec

PACKING CRITERION

Customer P/N：

Project ： TS200 antenna

一、Label SPEC

Inner Box label 10 X6cm

customer	**********		
Supplier			
Material NO.	**********		
Lot NO.	**********		
Material Name	********	QC	**
QTY	*****	Date	****.**.**
Code	********	Remark	**

Out BOX label 10X6cm

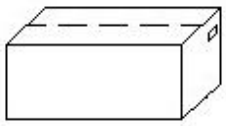
customer	**********		
Supplier			
Material NO.	**********		
Lot NO.	**********		
Material Name	********	QC	**
QTY	*****	Date	****.**.**
Code	********	Remark	**

二、Package detail:

Assignment instructions:

1. Inner packaging: vacuum formed tray
2. TS200 antenna product 1 PCS/cavity,
   100 PCS/disk

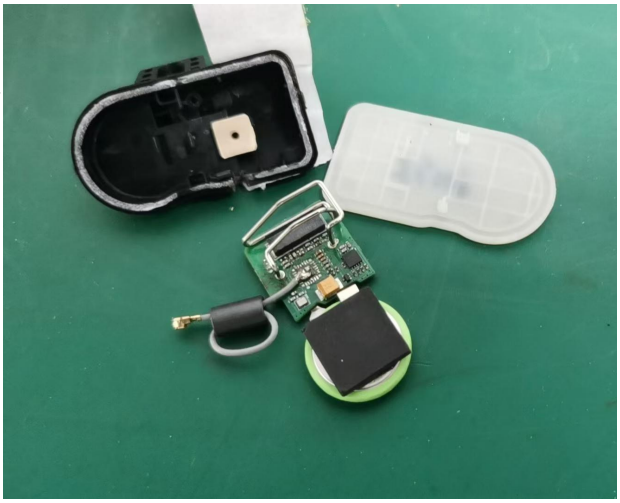
2. Outer packaging: cardboard box length 43.5CM, width 21CM, height 27.5CM or so
   2500 PCS/box



matters needing attention:

1. Do we need to add partitions and pearl cotton;
2. Labeling, such as ROHS, etc;

Photos of PCBA and shell materials.



Pictures of actual measurement scenes.

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TS200 mounted tires pulling away 3m distance test

Test Date: 4/19/24

Test method: the sensor is installed in the tire, and placed 3 meters away from the spectrometer, rotate the tire angle according to 0 °, 90 ° 180 °, 270 ° test and record three sets of power data.

1: Test data

	azimuth			0°			90°			180°			270°			Mean value (maximum average of each peak)				Average of each angle	remark
	Sample No.			Left peak	center peak	right peak	Left peak	center peak	right peak	Left peak	center peak	right peak	Left peak	center peak	right peak	0	90	180	270		
Benz E-315 protocol	Comparator	1	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025	-63.58	-58.34	-67.56	-63.32	-63.20	
			power (output)	-63.58		-63.28	-58.37		-58.69	-67.58		-67.86	-63.43		-64.18						
		2	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-64.28		-64.59	-58.69		-58.47	-67.68		-67.69	-63.3		-63.89						
		3	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-63.18		-63.59	-58.17		-58.64	-67.69		-67.42	-63.23		-63.78						
	RN#1	1	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025	-65.66	-59.20	-67.22	-65.24	-64.33	
			power (output)	-66.59		-66.13	-59.68		-59.42	-67.2		-67.43	-65.17		-65.29						
		2	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-65.38		-65.37	-59.3		-59.13	-67.53		-67.34	-65.28		-65.47						
		3	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-66.49		-65.48	-59.07		-59.04	-67.12		-67.35	-65.34		-65.26						
	RN#2	1	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025	-65.32	-58.67	-67.18	-65.26	-64.11	
			power (output)	-65.29		-65.37	-58.24		-59.3	-67.23		-67.15	-65.39		-65.27						
		2	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-65.37		-65.28	-58.37		-59.86	-67.24		-67.43	-65.43		-65.34						
		3	Frequency	314.975		315.025	314.975		315.025	314.975		315.025	314.975		315.025						
			power (output)	-65.39		-65.47	-59.41		-59.47	-67.15		-67.53	-65.18		-65.26						
Benz E - 433 protocol	Comparator	1	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98	-63.88	-69.29	-57.53	-61.84	-63.13	
			power (output)	-64.29		-64.73	-69.43		-69.73	-57.42		-57.42	-61.23		-61.89						
		2	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-63.23		-64.87	-69.18		-69.76	-57.53		-57.86	-62.45		-62.11						
		3	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-64.56		-64.13	-69.48		-69.25	-57.63		-57.63	-62.28		-62.18						
	RN#1	1	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98	-63.30	-68.66	-57.20	-62.30	-62.87	
			power (output)	-63.29		-63.08	-68.3		-68.23	-57.36		-57.23	-62.39		-62.38						
		2	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-64.28		-63.19	-69.37		-69.42	-57.2		-57.43	-62.3		-62.18						
		3	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-63.64		-64.13	-68.39		-68.53	-57.31		-57.15	-63.03		-62.34						
	RN#2	1	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98	-63.28	-68.23	-58.01	-62.31	-62.96	
			power (output)	-64.26		-63.18	-69.52		-68.17	-57.58		-58.46	-62.17		-62.86						
		2	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-63.49		-64.53	-68.19		-68.4	-58.23		-58.37	-62.38		-62.53						
		3	Frequency	433.925		433.98	433.925		433.98	433.925		433.98	433.925		433.98						
			power (output)	-63.18		-64.26	-68.34		-69.53	-58.22		-58.24	-62.43		-62.39						
Benz B - 433protocol	Comparator		Frequency		433.925			433.925			433.925			433.925		-64.27	-69.00	-58.37	-63.45	-63.77	
			power (output)		-64.28			-68.33			-58.39			-63.76							
		2	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-64.23			-69.37			-58.3			-63.48							
		3	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-64.29			-69.29			-58.42			-63.1							
	RN#1	1	Frequency		433.925			433.925			433.925			433.925		-63.31	-68.39	-58.36	-63.32	-63.35	
			power (output)		-63.18			-68.43			-58.63			-63.56							
		2	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-63.29			-68.29			-58.27			-63.23							
		3	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-63.47			-68.46			-58.19			-63.18							
	RN#2	1	Frequency		433.925			433.925			433.925			433.925		-63.35	-68.35	-58.72	-63.34	-63.44	
			power (output)		-63.19			-68.39			-58.34			-63.19							
		2	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-63.39			-68.49			-59.36			-63.53							
		3	Frequency		433.925			433.925			433.925			433.925							
			power (output)		-63.48			-68.18			-58.46			-63.29							