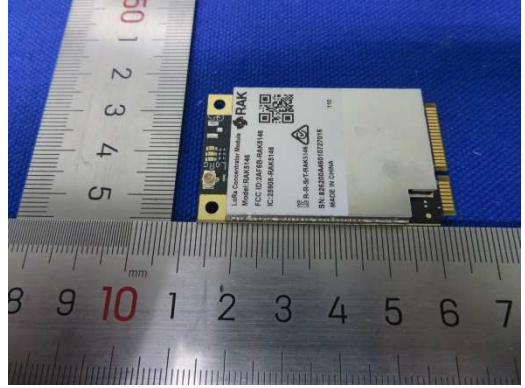


Prüfbericht-Nr.: <i>Test report no.:</i>	CN21DFQ7 001	Auftrags-Nr.: <i>Order no.:</i>	168345328	Seite 1 von 24 <i>Page 1 of 24</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-11-26	
Auftraggeber: <i>Client:</i>	Shenzhen RAKwireless Technology Co.,Ltd. Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China			
Prüfgegenstand: <i>Test item:</i>	WisLink LPWAN Concentrator			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	RAK5146 (Trademark: RAK)			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	AS/NZS 4268:2017 AS/NZS CISPR 32:2015			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-12-03			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003107075			
Prüfzeitraum: <i>Testing period:</i>	2021-12-06 - 2021-12-30			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2022-01-11	 Signed by: Alex Lan		 Signed by: Winnie Hou	
Stellung / Position	Senior Project Engineer	Stellung / Position	Reviewer	
Sonstiges / Other:	According to clause 6 & 7 of AS/NZS 4268:2017, testing of transmitter / receiver parameters shall be conducted using the appropriate generic product standard for either FCC or ETSI unless a specific product standard in table 1 for Australia, and in this test report, FCC standard using for demonstration compliance.			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>			
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 2 von 24
Page 2 of 24

Test Summary

5.1.1 MAXIMUM EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P)

RESULT: Pass

5.1.2 MAXIMUM POWER SPECTRAL DENSITY

RESULT: Pass

5.1.3 99% EMISSION BANDWIDTH

RESULT: Pass

5.1.4 OPERATING FREQUENCIES

RESULT: Pass

5.1.5 TRANSMITTER SPURIOUS EMISSIONS

RESULT: Pass

5.2.1 RECEIVER SPURIOUS EMISSIONS

RESULT: Pass

5.3.1 RADIATED EMISSIONS

RESULT: Pass

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 3 von 24
Page 3 of 24

Contents

1	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS.....	4
2	TEST SITES.....	4
2.1	TEST FACILITIES	4
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
2.3	UNCERTAINTY OF MEASUREMENT	6
3	GENERAL PRODUCT INFORMATION	7
3.1	PRODUCT FUNCTION AND INTENDED USE	7
3.2	RATINGS AND SYSTEM DETAILS.....	8
3.3	INDEPENDENT OPERATION MODES.....	9
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	9
3.5	SUBMITTED DOCUMENTS.....	9
4	TEST SET-UP AND OPERATION MODES.....	10
4.1	PRINCIPLE OF CONFIGURATION SELECTION	10
4.2	TEST OPERATION AND TEST SOFTWARE	10
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	10
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	10
5	TEST RESULTS ERM.....	11
5.1	TRANSMITTER REQUIREMENT & TEST SUITES.....	11
5.1.1	Maximum Equivalent Isotropically Radiated Power (E.I.R.P).....	11
5.1.2	Maximum Power Spectral Density.....	14
5.1.3	99% Emission Bandwidth.....	17
5.1.4	Operating Frequencies.....	18
5.1.5	Transmitter Spurious Emissions.....	19
5.2	RECEIVER REQUIREMENT & TEST SUITES	20
5.2.1	Receiver Spurious Emissions.....	20
5.3	EMC REQUIREMENT & TEST SUITES.....	21
5.3.1	Radiated Emissions.....	21
6	PHOTOGRAPHS OF THE TEST SET-UP	22
7	LIST OF TABLES.....	24
8	LIST OF PHOTOGRAPHS.....	24

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 4 von 24
Page 4 of 24

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix A: Test Results.

2 Test Sites

2.1 Test Facilities

1. TÜV Rheinland (Shenzhen) Co., Ltd.
No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 5 von 24
Page 5 of 24

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Radio Spectrum Test				
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	28.09.2022
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	28.09.2022
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	28.09.2022
DC Power Supply	Keysight	E3642A	MY61276100	28.09.2022
Wireless Connectivity Tester	R&S	CMW270	102505	28.09.2022
Power Control Unit	Tonscend	JS0806-4ADC	N/A	28.09.2022
Automation Control Unit	Tonscend	JS0806-2	21C8060396	28.09.2022
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	Y LX23JMF	N/A
Spurious Emission				
EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
Signal Analyzer	R&S	FSV 40	101439	09.08.2022
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	09.08.2022
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
Amplifier	R&S	SCU-18F	180070	09.08.2022
Amplifier	R&S	SCU40A	100475	09.08.2022
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 6 von 24
Page 6 of 24

Radiated Emissions				
3m SAC	ETS-Lindgren	SAC3	CT001632-Q1362	26.04.2024
EMI Test Receiver	R&S	ESR7	102111	01.12.2022
Horn Antenna	R&S	HF907	102706	07.08.2022
Preamplifier (1-18GHz)	FIT	SCU-18F	180077	13.08.2022
Trilog-Broadband antenna	SCHWARZBECK	VULB9168	0945	12.12.2022
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 Uncertainty of Measurement

Table 2: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF Output Power, Conducted	±1,5 dB
Power Spectral Density, Conducted	±3 dB
Unwanted Emission, Conducted	±3 dB
All Emissions, Radiated	±6 dB
Temperature	±3 °C
Supply voltages	±3%
Time	±5 %

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a WisLink LPWAN Concentrator which supports Lora and GNSS technologies.

This product has two construction, one has an additional baseboard and other doesn't have, the baseboard is the extension of I/O.

This module has six different antennas, the details specifications for these antennas as below:

Antenna #	Model	Antenna Gain	Antenna Type	Connector Type
1#	RAKARG15	8dBi	Fiber Glass Antenna	N-type male connector
2#	RAKARG14	5.8dBi	Fiber Glass Antenna	N-type male connector
3#	RAKARG19	5.1dBi	Fiber Glass Antenna	N-type male connector
4#	RAKARJ14	2.3 dBi	Dipole Antenna	RPSMA connector
5#	RAKARJ16	2.3 dBi	Dipole Antenna	RPSMA connector
6#	ANT-916-CW-HWR	1.2 dBi	Dipole Antenna	RPSMA connector

Note:

1. When connecting to the module, all antennas listed above need to transfer to an **IPEX connector**.
2. Antennas 1#, 2# and 3# have the same type and similar in-band and out-of-band characteristics, they are considered as equivalent antennas. Thus, the antenna 1# with highest gain was selected to be tested.
3. Antennas 4#, 5# and 6# have the same type and similar in-band and out-of-band characteristics, they are considered as equivalent antennas. Thus, the antenna 4# with highest gain was selected to be tested. Antenna 4# RAKARJ14 is identical with Antenna 5# RAKARJ16 except the color of enclosure different.

This product supports two configurations defined in the Lora Protocol:

First configurations AU915-928:

Data Rate	Configuration	Indicative physical bit rate [bit/sec]
8	LoRa Modulation: SF12 / Bandwidth 500 kHz	980
9	LoRa Modulation: SF11 / Bandwidth 500 kHz	1760
10	LoRa Modulation: SF10 / Bandwidth 500 kHz	3900
11	LoRa Modulation: SF9 / Bandwidth 500 kHz	7000
12	LoRa Modulation: SF8 / Bandwidth 500 kHz	12500
13	LoRa Modulation: SF7 / Bandwidth 500 kHz	21900

Second configurations AS923-1:

Data Rate	Configuration	Indicative physical bit rate [bit/sec]
0	LoRa Modulation: SF12 / Bandwidth 125 kHz	250
1	LoRa Modulation: SF11 / Bandwidth 125 kHz	440
2	LoRa Modulation: SF10 / Bandwidth 125 kHz	980
3	LoRa Modulation: SF9 / Bandwidth 125 kHz	1760
4	LoRa: Modulation: SF8 / Bandwidth 125 kHz	3125
5	LoRa: Modulation: SF7 / Bandwidth 125 kHz	5470
6	LoRa: Modulation: SF7 / Bandwidth 250 kHz	11000
7	FSK Modulation (50 kbps) / Bandwidth 100 kHz	50000

For details refer to the User Manual, Technical Description and Circuit Diagram.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 8 von 24
Page 8 of 24

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT		Value		
Kind of Equipment		WisLink LPWAN Concentrator		
Type Designation		RAK5146		
Trade Mark		RAK		
Extreme Temperature Range		-40 °C ~ +85℃		
Input Voltage		DC 3.0V to DC 3.6V (Supplied by socket of PCB board)		
Testing Voltage		DC 5V via USB interface		
Technical Specification of DTS (AU915-928)				
Operating Frequency		923.3 -927.5MHz		
Type of Modulation		Lora		
Data Rate		SF7 – SF12 / DR8 – DR13		
Channel Number		8 channels		
Channel Separation		600 KHz		
Occupied Bandwidth		500 KHz		
Technical Specification of DTS (AS923-1)				
Operating Frequency		915 - 928MHz		
Type of Modulation		Lora	Lora	FSK
Data Rate		SF7 – SF12 DR0 – DR5	SF7 / DR6	DR7
Occupied Bandwidth (KHz)		125	250	100
Test Channel (MHz)	Low	915.1	915.2	915.1
	Middle	921.1	921.2	921.1
	High	927.9	927.8	927.9

Table 4: RF Channel and Frequency of DTS (AU915-928)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	923.3	2	924.5	4	925.7	6	926.9
1	923.9	3	925.1	5	926.3	7	927.5

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth Low Energy or ZigBee mode
 - 1. Transmitting
 - a) Low Channel
 - b) Middle Channel
 - c) High Channel
 - 2. Receiving
 - a) Low Channel
 - b) Middle Channel
 - c) High Channel
- B. On, Operating with wireless + GNSS
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

For details refer to the Circuit Diagram.

3.5 Submitted Documents

- | | |
|--------------------|-------------------|
| - Bill of Material | - Circuit Diagram |
| - Rating Label | - User Manual |

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5 and chapter 6.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
PC	Lenovo	ThinkPad T480	N/A
PC adapter	Lenovo	ADLX65YDC3A	01FR030

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 11 von 24
Page 11 of 24

5 Test Results ERM

5.1 Transmitter Requirement & Test Suites

5.1.1 Maximum Equivalent Isotropically Radiated Power (E.I.R.P)

RESULT:

Pass

Test Specification

Test standard : AS/NZS 4268:2017
Test requirement : Clause 6.3 of AS/NZS 4268:2017
Limit : Clause 6.3.1 of AS/NZS 4268:2017
Test suites : Clause 6.2.1 of AS/NZS 4268:2017

Test Setup

Test Date : 2021-12-06 to 2021-12-30
Test voltage : DC 5V
Test environment : Normal and extreme conditions
Operation mode : A.1
Ambient temperature : 25°C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

For details refer to following test result, all test were performed under normal and extreme conditions and only the normal conditions test data recorded.

For Antenna Gain 8dBi

Table 6: Test Result of Maximum e.i.r.p., Lora DTS AS923-1

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 125KHz	915.1	19.37	27.37	< 1.0 W (30 dBm)
	921.1	19.97	27.97	
	927.9	19.73	27.73	
Lora DTS SF12, OCW 125KHz	915.1	20.03	28.03	
	921.1	20.06	28.06	
	927.9	20.42	28.42	
Lora DTS SF7, OCW 250KHz	915.2	21.51	29.51	
	921.2	21.22	29.22	
	927.8	21.18	29.18	
FSK, 50Kbps	915.1	11.80	19.80	
	921.2	12.53	20.53	
	927.9	12.30	20.30	

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 12 von 24
Page 12 of 24

Table 7: Test Result of Maximum e.i.r.p., Lora DTS AU915-928

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 500KHz	923.3	21.17	29.17	< 1.0 W (30 dBm)
	925.1	21.36	29.36	
	927.5	21.28	29.28	
Lora DTS SF12, OCW 500KHz	923.3	21.15	29.15	
	925.1	21.33	29.33	
	927.5	21.32	29.32	

For Antenna Gain 5.1dBi

Table 8: Test Result of Maximum e.i.r.p., Lora DTS AS923-1

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 125KHz	915.1	22.87	27.97	< 1.0 W (30 dBm)
	921.1	22.56	27.66	
	927.9	22.30	27.40	
Lora DTS SF12, OCW 125KHz	915.1	22.76	27.86	
	921.1	22.33	27.43	
	927.9	22.17	27.27	
Lora DTS SF7, OCW 250KHz	915.2	24.53	29.63	
	921.2	24.77	29.87	
	927.8	24.45	29.55	
FSK, 50Kbps	915.1	15.30	20.40	
	921.2	15.98	21.08	
	927.9	15.88	20.98	

Table 9: Test Result of Maximum e.i.r.p., Lora DTS AU915-928

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 500KHz	923.3	24.41	29.51	< 1.0 W (30 dBm)
	925.1	24.44	29.54	
	927.5	24.42	29.52	
Lora DTS SF12, OCW 500KHz	923.3	24.46	29.56	
	925.1	24.46	29.56	
	927.5	24.47	29.57	

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 13 von 24
Page 13 of 24

For Antenna Gain 2.3dBi

Table 10: Test Result of Maximum e.i.r.p., Lora DTS AS923-1

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 125KHz	915.1	27.14	29.44	< 1.0 W (30 dBm)
	921.1	27.21	29.51	
	927.9	27.12	29.42	
Lora DTS SF12, OCW 125KHz	915.1	27.10	29.40	
	921.1	27.16	29.46	
	927.9	27.07	29.37	
Lora DTS SF7, OCW 250KHz	915.2	27.11	29.41	
	921.2	27.19	29.49	
	927.8	27.13	29.43	
FSK, 50Kbps	915.1	17.81	20.11	
	921.2	18.16	20.46	
	927.9	18.28	20.58	

Table 11: Test Result of Maximum e.i.r.p., Lora DTS AU915-928

Test Mode	Test Channel (MHz)	Measured Conducted Power	Measured e.i.r.p.	Limit (e.i.r.p.)
		(dBm)	(dBm)	
Lora DTS SF7, OCW 500KHz	923.3	27.15	29.45	< 1.0 W (30 dBm)
	925.1	27.11	29.41	
	927.5	27.09	29.39	
Lora DTS SF12, OCW 500KHz	923.3	27.12	29.42	
	925.1	27.14	29.44	
	927.5	27.06	29.36	

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 14 von 24
Page 14 of 24

5.1.2 Maximum Power Spectral Density

RESULT:

Pass

Test Specification

Test standard : AS/NZS 4268:2017
Test requirement : Note 2 of Table 1 of AS/NZS 4268:2017
Limit : < 25 mW / 3 kHz $\approx$ 14 dBm / 3 kHz (Radiated Peak PSD)

Test Setup

Test Date : 2021-12-06 to 2021-12-30
Test voltage : DC 5V
Test environment : Normal conditions
Operation mode : A.1
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

For Antenna Gain 8dBi

Table 12: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 125KHz	915.1	7.67	Pass
	921.1	7.92	
	927.9	7.78	
Lora DTS SF12, OCW 125KHz	915.1	7.46	
	921.1	7.79	
	927.9	8.10	
Lora DTS SF7, OCW 250KHz	915.2	4.81	
	921.2	4.56	
	927.8	4.83	
FSK, 50Kbps	915.1	7.90	
	921.2	7.98	
	927.9	8.10	

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 15 von 24
Page 15 of 24

Table 13: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 500KHz	915.1	1.29	Pass
	921.1	1.78	
	927.9	1.65	
Lora DTS SF12, OCW 500KHz	915.1	2.47	
	921.1	3.16	
	927.9	3.70	

For Antenna Gain 5.1dBi

Table 14: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 125KHz	915.1	10.63	Pass
	921.1	10.62	
	927.9	10.72	
Lora DTS SF12, OCW 125KHz	915.1	10.77	
	921.1	10.55	
	927.9	10.39	
Lora DTS SF7, OCW 250KHz	915.2	8.51	
	921.2	8.82	
	927.8	8.90	
FSK, 50Kbps	915.1	10.53	
	921.2	10.82	
	927.9	10.80	

Table 15: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 500KHz	915.1	4.85	Pass
	921.1	5.03	
	927.9	5.03	
Lora DTS SF12, OCW 500KHz	915.1	6.07	
	921.1	7.06	
	927.9	6.45	

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 16 von 24
Page 16 of 24

For Antenna Gain 2.3dBi

Table 16: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 125KHz	915.1	13.49	Pass
	921.1	13.58	
	927.9	13.48	
Lora DTS SF12, OCW 125KHz	915.1	13.56	
	921.1	13.66	
	927.9	13.62	
Lora DTS SF7, OCW 250KHz	915.2	11.31	
	921.2	10.70	
	927.8	11.54	
FSK, 50Kbps	915.1	13.02	
	921.2	8.26	
	927.9	8.44	

Table 17: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928

Test Mode	Frequency (MHz)	Power Spectrum Density (dBm / 3kHz)	Verdict
Lora DTS SF7, OCW 500KHz	915.1	7.47	Pass
	921.1	7.52	
	927.9	7.60	
Lora DTS SF12, OCW 500KHz	915.1	8.61	
	921.1	8.98	
	927.9	8.96	

Note: The above test data were obtained by conducted method, and considered with antenna gain, it also complies with radiated peak PSD limit.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 17 von 24
Page 17 of 24

5.1.3 99% Emission Bandwidth

RESULT:

Pass

Test Specification

Test standard : AS/NZS 4268:2017
Test requirement : Clause 6.5 of AS/NZS 4268:2017
Limit : Clause 6.5 of AS/NZS 4268:2017
Test suites : Clause 6.2.1 of AS/NZS 4268:2017

Test Setup

Test Date : 2021-12-06 to 2021-12-30
Test voltage : DC 5V
Test environment : Normal conditions
Operation mode : A.1
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa
For details refer to following test result.

Table 18: Test result of 99% Bandwidth, Lora DTS AS923-1

Test Mode	Frequency (MHz)	Low Frequency (MHz)		High Frequency (MHz)		Measure result (OBW/99%, KHz)	Verdict
		Measure result	Limit	Measure result	Limit		
Lora DTS SF7, OCW 125KHz	915.1	915.042836	fL > 915	915.163676	fH < 928	120.84	PASS
	921.1	921.042113	fL > 915	921.163676	fH < 928	121.56	PASS
	927.9	927.842836	fL > 915	927.963676	fH < 928	120.84	PASS
Lora DTS SF12, OCW 125KHz	915.1	915.037771	fL > 915	915.164399	fH < 928	126.63	PASS
	921.1	921.037771	fL > 915	921.164399	fH < 928	126.63	PASS
	927.9	927.837771	fL > 915	927.964399	fH < 928	126.63	PASS
Lora DTS SF7, OCW 250KHz	915.2	915.082780	fL > 915	915.325900	fH < 928	243.13	PASS
	921.2	921.079880	fL > 915	921.325900	fH < 928	246.02	PASS
	927.8	927.682780	fL > 915	927.927350	fH < 928	244.57	PASS
FSK, 50Kbps	915.1	915.051809	fL > 915	915.149059	fH < 928	97.25	PASS
	921.2	921.052243	fL > 915	921.148191	fH < 928	95.95	PASS
	927.9	927.850941	fL > 915	927.949493	fH < 928	98.55	PASS

Table 19: Test result of 99% Bandwidth, Lora DTS AU915-928

Test Mode	Frequency (MHz)	Low Frequency (MHz)		High Frequency (MHz)		Measure result (OBW/99%, KHz)	Verdict
		Measure result	Limit	Measure result	Limit		
Lora DTS SF7, OCW 500KHz	915.1	923.01925	fL > 915	923.55181	fH < 928	532.56	PASS
	921.1	924.81056	fL > 915	925.35181	fH < 928	541.24	PASS
	927.9	927.25109	fL > 915	927.75181	fH < 928	500.72	PASS
Lora DTS SF12, OCW 500KHz	915.1	923.05109	fL > 915	923.55181	fH < 928	500.72	PASS
	921.1	924.85109	fL > 915	925.25181	fH < 928	500.72	PASS
	927.9	927.25109	fL > 915	927.75181	fH < 928	500.72	PASS

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 18 von 24
Page 18 of 24

5.1.4 Operating Frequencies

RESULT:

Pass

Test Specification

Test standard : AS/NZS 4268:2017
Test requirement : Clause 6.6 of AS/NZS 4268:2017
Limit : Clause 6.6.1 of AS/NZS 4268:2017
Test suites : Clause 6.2.1 of AS/NZS 4268:2017

Test Setup

Test Date : 2021-12-06 to 2021-12-30
Test voltage : DC 5V
Test environment : Normal and extreme conditions
Operation mode : A.1
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 20: Test Results of Operating Frequency

Technical Specification	Value
Assigned Frequency Bands	915 – 928MHz
Product Operating frequencies	Refer to table 18 & 19, clause 5.1.3
Operating Channel Width(s)	100KHz, 125KHz, 250KHz

Note: The manufacturer declare the product operating frequencies and operating channels within assigned frequency bands.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 19 von 24
Page 19 of 24

5.1.5 Transmitter Spurious Emissions

RESULT:

Pass

Test Specification

Test standard	: AS/NZS 4268:2017
Test requirement	: Clause 6.4 of AS/NZS 4268:2017
Limit	: Clause 6.4.1 table 1 of AS/NZS 4268:2017 Refer to 15.209(a)
Test suites	: Clause 6.2.1 of AS/NZS 4268:2017

Test Setup

Test Date	: 2021-12-06 to 2021-12-30
Test voltage	: DC 5V
Test environment	: Normal conditions
Operation mode	: A.1
Ambient temperature	: 23 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

For details refer to Appendix A.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 20 von 24
Page 20 of 24

5.2 Receiver Requirement & Test Suites

5.2.1 Receiver Spurious Emissions

RESULT:

Pass

Test Specification

Test standard	: AS/NZS 4268:2017
Test requirement	: Clause 7.2 of AS/NZS 4268:2017
Limit	: Refer to 15.109(a)
Test suites	: Clause 7.2.1 of AS/NZS 4268:2017

Test Setup

Test Date	: 2021-12-06 to 2021-12-30
Test voltage	: DC 5V
Test environment	: Normal conditions
Operation mode	: A.2
Ambient temperature	: 23 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

For details refer to Appendix A.

Prüfbericht - Nr.: CN21DFQ7 001
Test report no.

Seite 21 von 24
Page 21 of 24

5.3 EMC Requirement & Test Suites

5.3.1 Radiated Emissions

RESULT:

Pass

Test Specification

Test standard	: AS/NZS CISPR 32:2015
Test requirement	: Appendix A.2 of AS/NZS CISPR 32:2015
Frequency range	: 30 MHz – 6000 MHz
Kind of test site	: Shielded Room
Limit	: Table A.4 & A.5 of AS/NZS CISPR 32:2015

Test Setup

Date of testing	: 2021-12-06 to 2021-12-30
Test voltage	: DC 5V
Operation mode	: B
Earthing	: Not connected
Test configuration	: Table-top
Ambient temperature	: 23 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

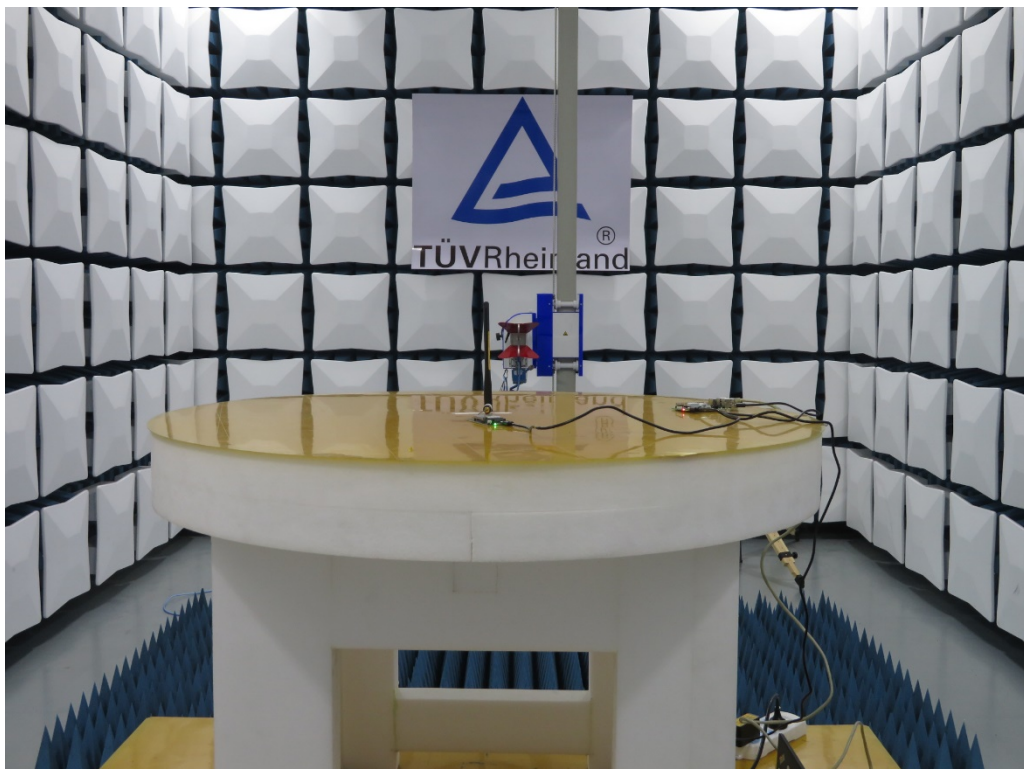
For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

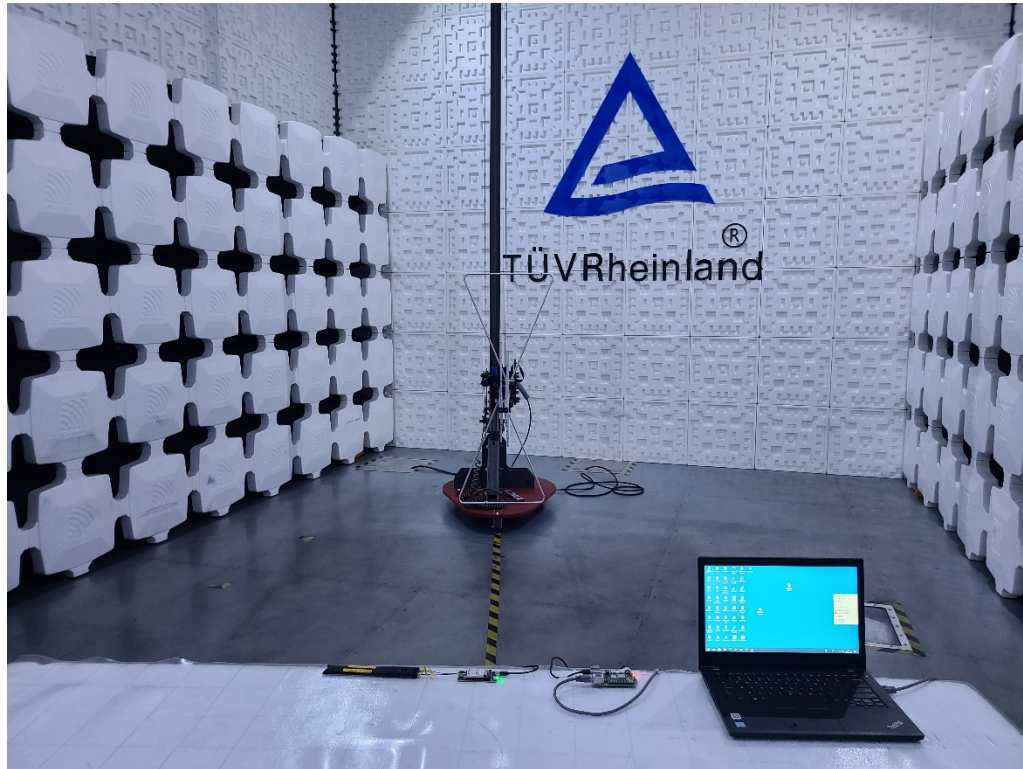
Photograph 1: Set-up for Transmitter & Receiver Spurious Emissions, Below 1GHz



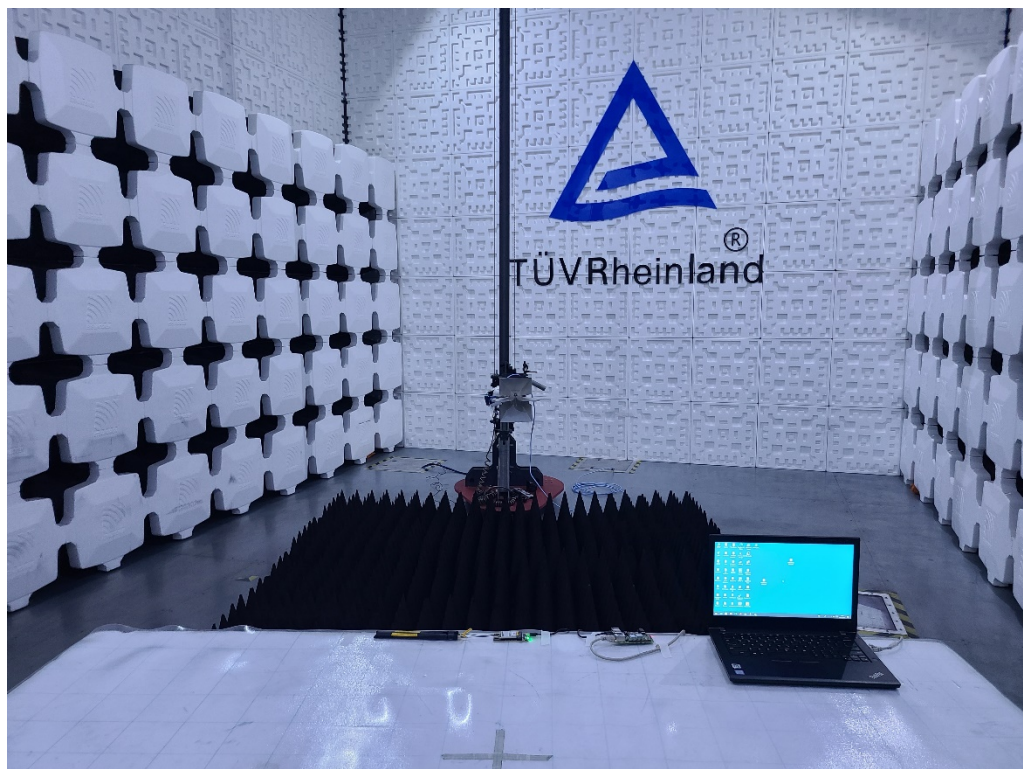
Photograph 2: Set-up for Transmitter & Receiver Spurious Emissions Above 1GHz



Photograph 3: Set-up for Radiated Emissions, Below 1GHz



Photograph 4: Set-up for Radiated Emissions, Above 1GHz



7 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Measurement Uncertainty	6
Table 3: Technical Specification of EUT.....	8
Table 4: RF Channel and Frequency of DTS (AU915-928).....	8
Table 5: List of Accessories and Auxiliary Equipment.....	10
Table 6: Test Result of Maximum e.i.r.p., Lora DTS AS923-1	11
Table 7: Test Result of Maximum e.i.r.p., Lora DTS AU915-928	12
Table 8: Test Result of Maximum e.i.r.p., Lora DTS AS923-1	12
Table 9: Test Result of Maximum e.i.r.p., Lora DTS AU915-928	12
Table 10: Test Result of Maximum e.i.r.p., Lora DTS AS923-1	13
Table 11: Test Result of Maximum e.i.r.p., Lora DTS AU915-928	13
Table 12: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1	14
Table 13: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928.....	15
Table 14: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1	15
Table 15: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928.....	15
Table 16: Test Result of Maximum Power Spectral Density, Lora DTS AS923-1	16
Table 17: Test Result of Maximum Power Spectral Density, Lora DTS AU915-928.....	16
Table 18: Test result of 99% Bandwidth, Lora DTS AS923-1	17
Table 19: Test result of 99% Bandwidth, Lora DTS AU915-928	17
Table 20: Test Results of Operating Frequency.....	18

8 List of Photographs

Photograph 1: Set-up for Transmitter & Receiver Spurious Emissions, Below 1GHz.....	22
Photograph 2: Set-up for Transmitter & Receiver Spurious Emissions Above 1GHz	22
Photograph 3: Set-up for Radiated Emissions, Below 1GHz	23
Photograph 4: Set-up for Radiated Emissions, Above 1GHz.....	23

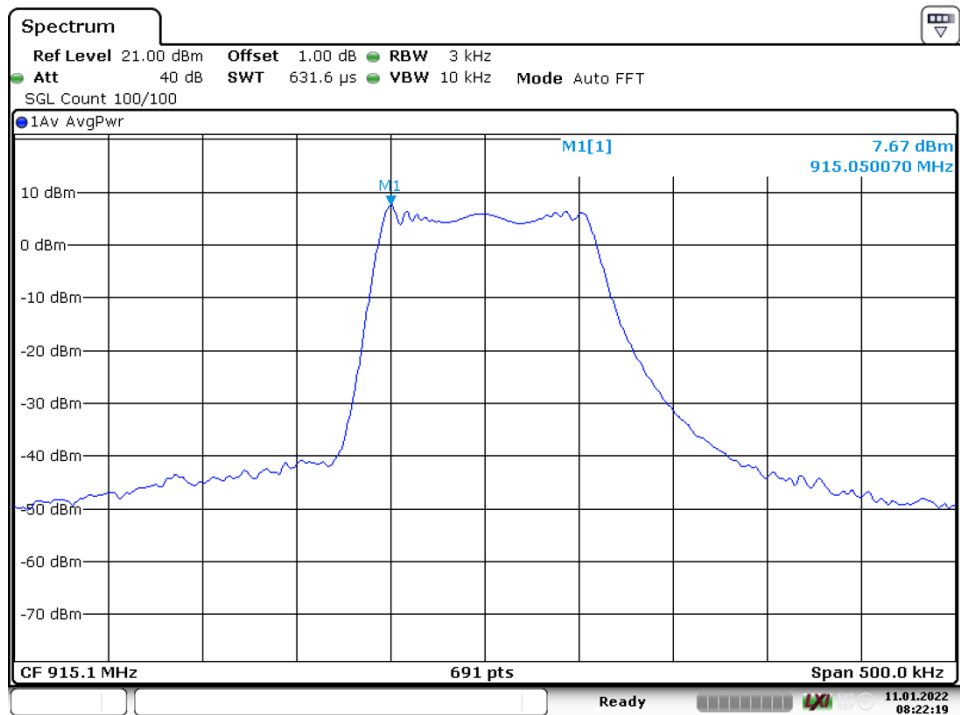
Appendix A: Test Results

APPENDIX A: TEST RESULTS	1
APPENDIX A.1: TEST RESULTS OF CONDUCTED POWER SPECTRAL DENSITY, ANTENNA GAIN 8dBi	2
Lora DTS SF7, OCW 125KHz	2
Lora DTS SF12, OCW 125KHz	3
Lora DTS SF7, OCW 250KHz	5
FSK, 50Kbps	6
Lora DTS SF7, OCW 500KHz	8
Lora DTS SF12, OCW 500KHz	9
APPENDIX A.2: TEST RESULTS OF CONDUCTED POWER SPECTRAL DENSITY, ANTENNA GAIN 5.1dBi	11
Lora DTS SF7, OCW 125KHz	11
Lora DTS SF12, OCW 125KHz	12
Lora DTS SF7, OCW 250KHz	14
FSK, 50Kbps	15
Lora DTS SF7, OCW 500KHz	17
Lora DTS SF12, OCW 500KHz	18
APPENDIX A.3: TEST RESULTS OF CONDUCTED POWER SPECTRAL DENSITY, ANTENNA GAIN 2.3dBi	20
Lora DTS SF7, OCW 125KHz	20
Lora DTS SF12, OCW 125KHz	21
Lora DTS SF7, OCW 250KHz	23
FSK, 50Kbps	24
Lora DTS SF7, OCW 500KHz	26
Lora DTS SF12, OCW 500KHz	27
APPENDIX A.4: TEST RESULTS OF 99% BANDWIDTH	29
Lora DTS SF7, OCW 125KHz	29
Lora DTS SF12, OCW 125KHz	30
Lora DTS SF7, OCW 250KHz	32
FSK, 50Kbps	33
Lora DTS SF7, OCW 500KHz	35
Lora DTS SF12, OCW 500KHz	36
APPENDIX A.5: TEST RESULTS OF TRANSMITTER RADIATED SPURIOUS EMISSIONS	38
Lora DTS SF7 with 8dBi antenna, OCW 125KHz	38
Lora DTS SF7 with 8dBi antenna, OCW 250KHz	50
FSK, 50Kbps with 8dBi antenna	62
FSK, 50Kbps with 2.3dBi antenna	76
Lora DTS SF7 with 8dBi antenna, OCW 500KHz	82
Lora DTS SF12 with 2.3dBi antenna, OCW 500KHz	88
APPENDIX A.6: TEST RESULTS OF RECEIVER RADIATED SPURIOUS EMISSIONS	100
APPENDIX A.7: TEST RESULTS OF RADIATED EMISSION	112

Appendix A.1: Test Results of Conducted Power Spectral Density, Antenna Gain 8dBi

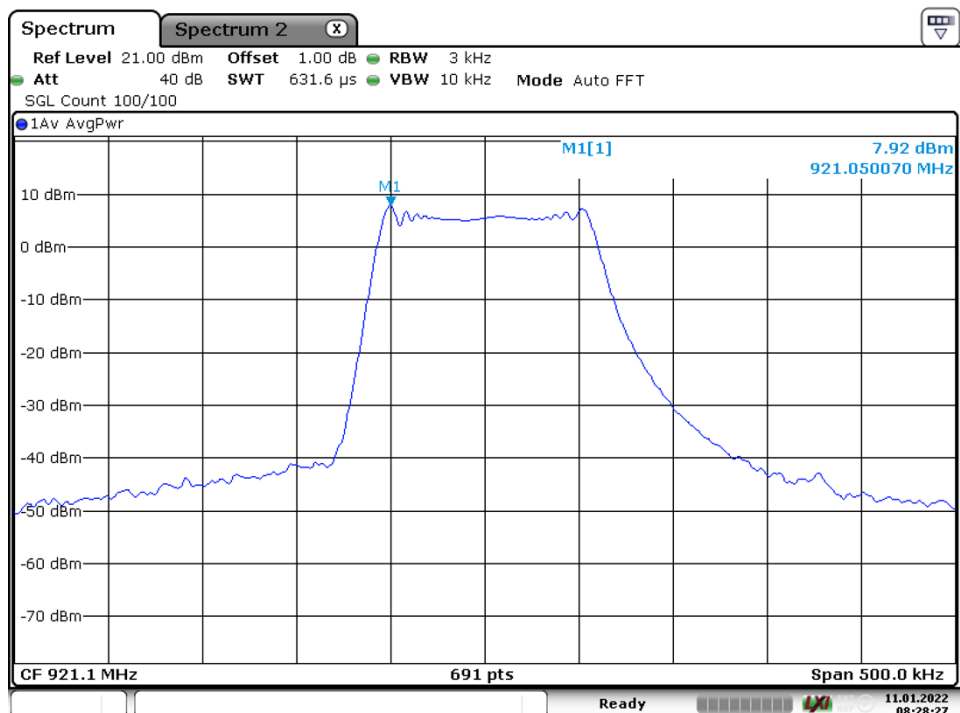
Lora DTS SF7, OCW 125KHz

Low Channel



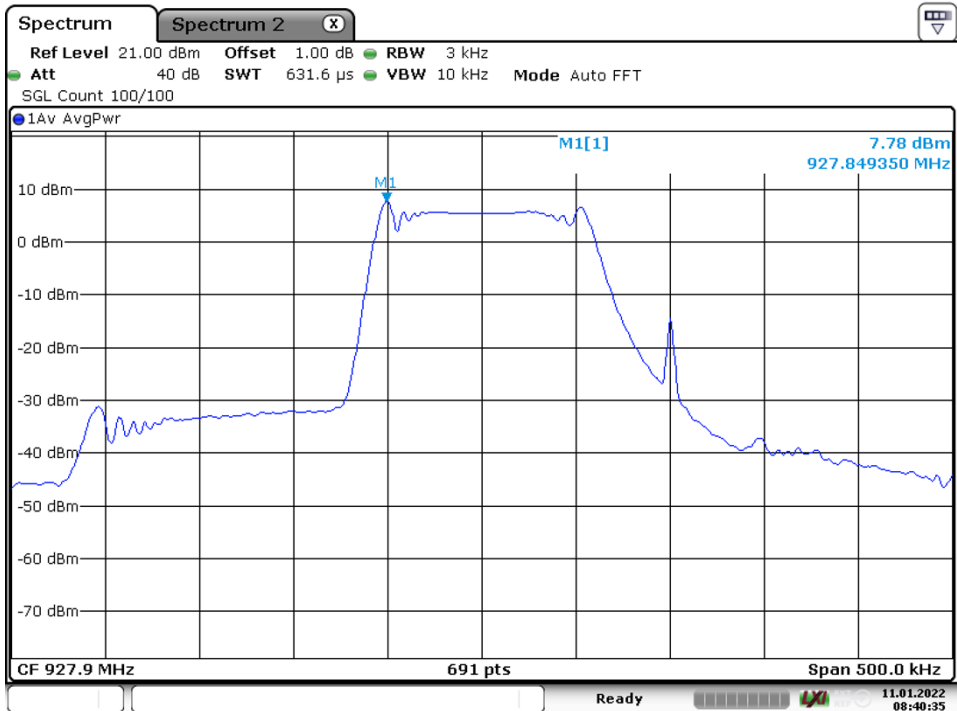
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Middle Channel



Date: 11.JAN.2022 08:28:27

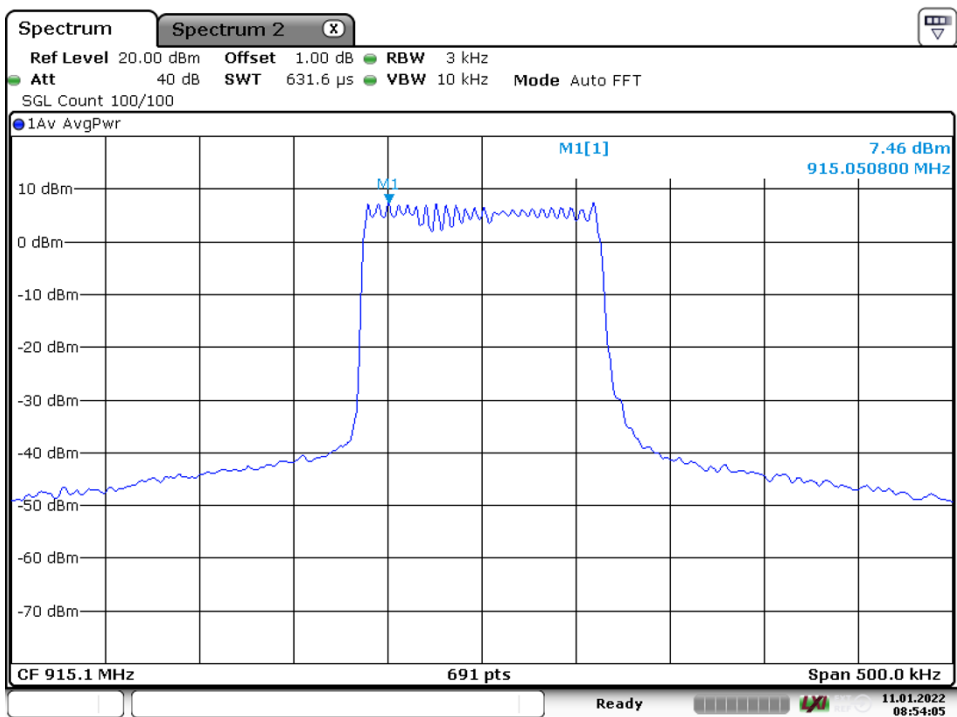
High Channel



Date: 11.JAN.2022 08:40:35

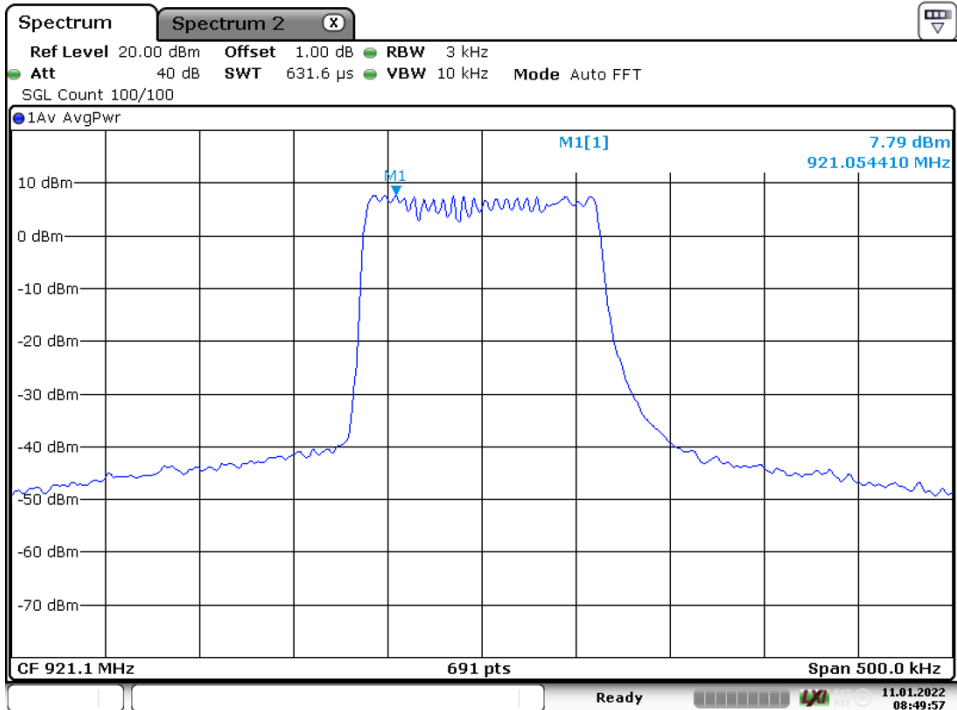
Lora DTS SF12, OCW 125KHz

Low Channel



Date: 11.JAN.2022 08:54:05

Middle Channel



Date: 11.JAN.2022 08:49:57

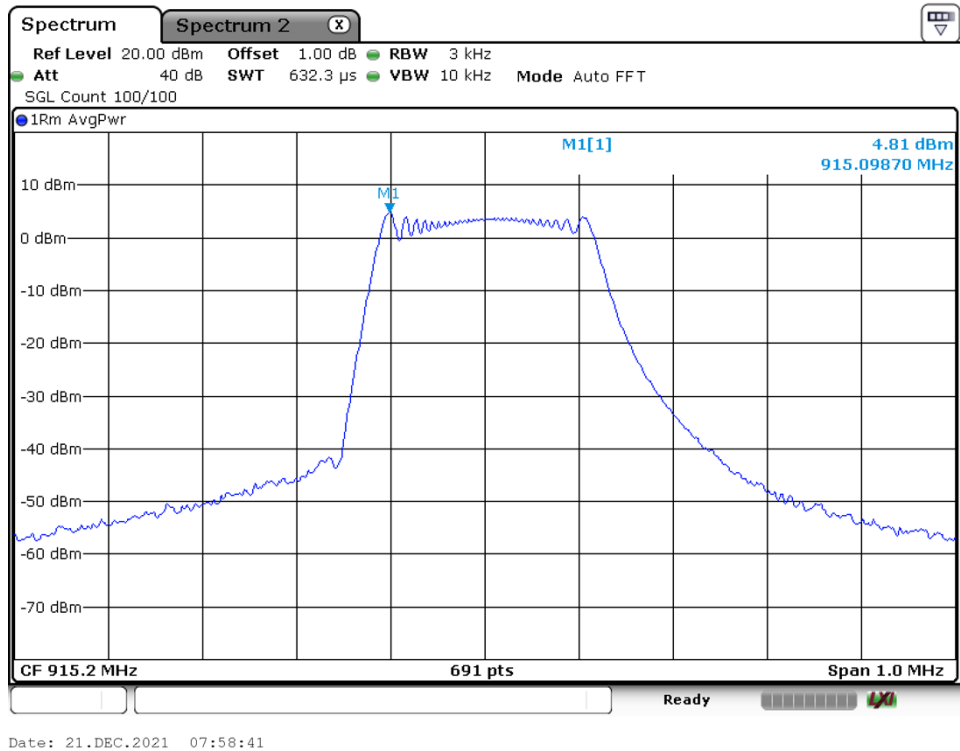
High Channel



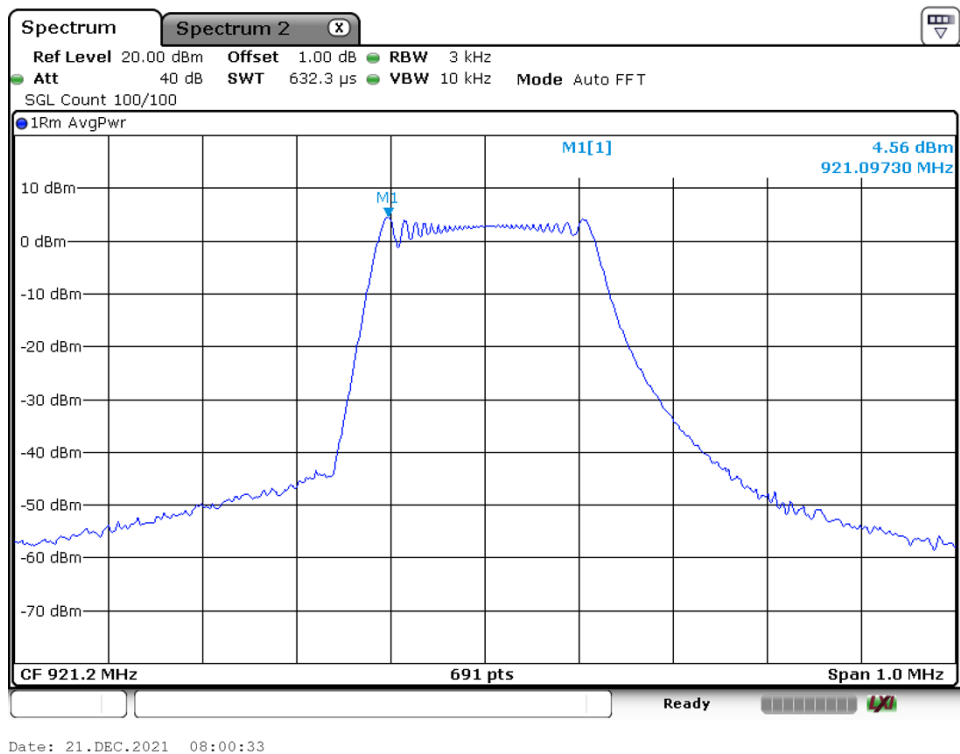
Date: 11.JAN.2022 09:07:39

Lora DTS SF7, OCW 250KHz

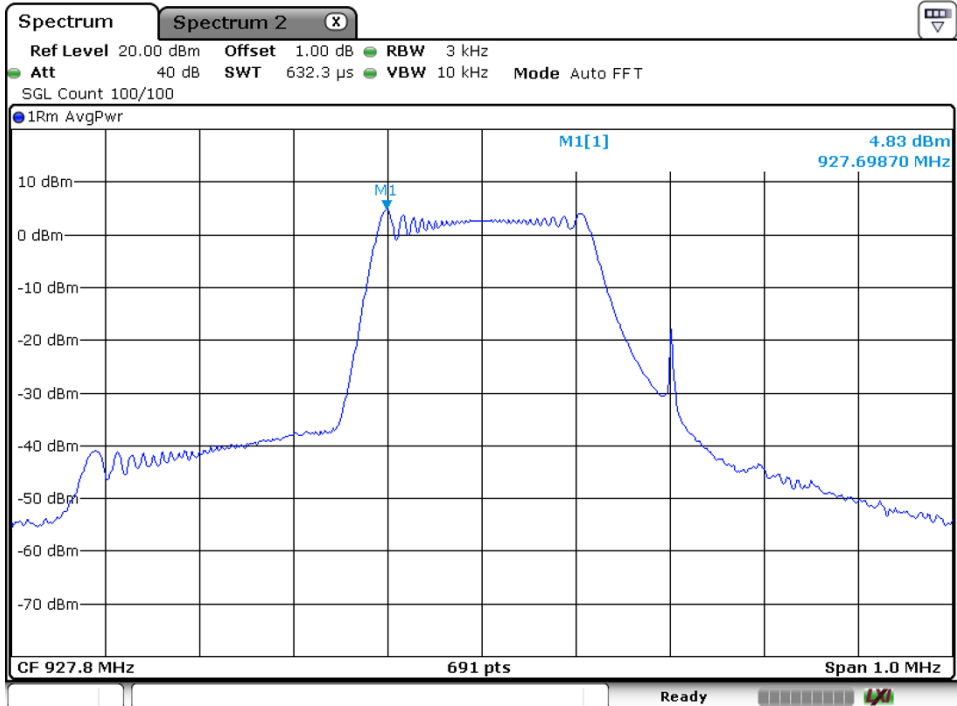
Low Channel



Middle Channel



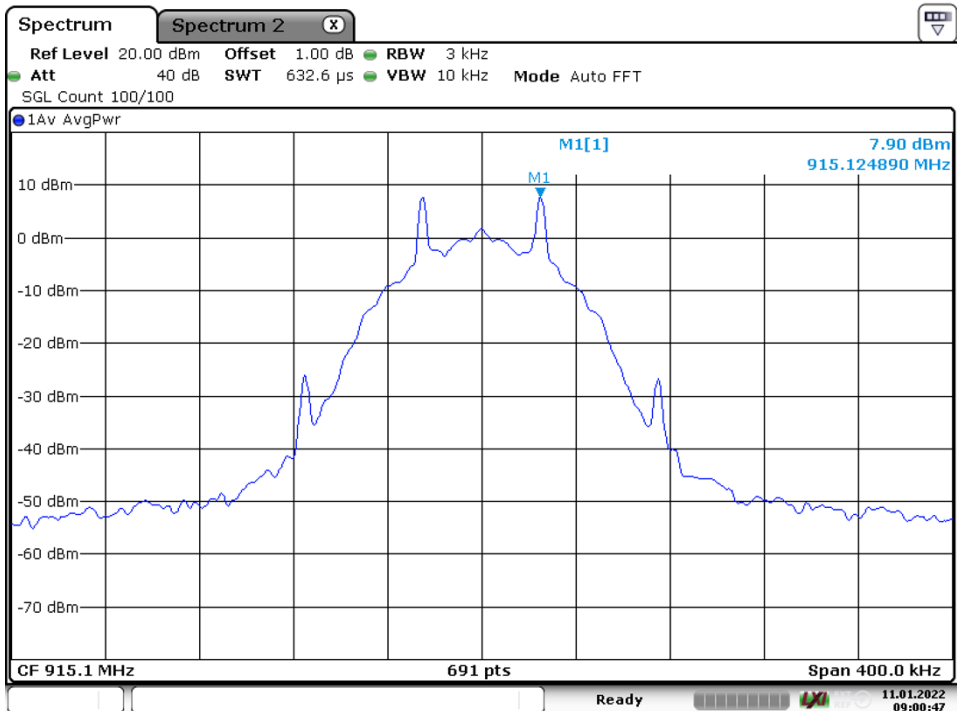
High Channel



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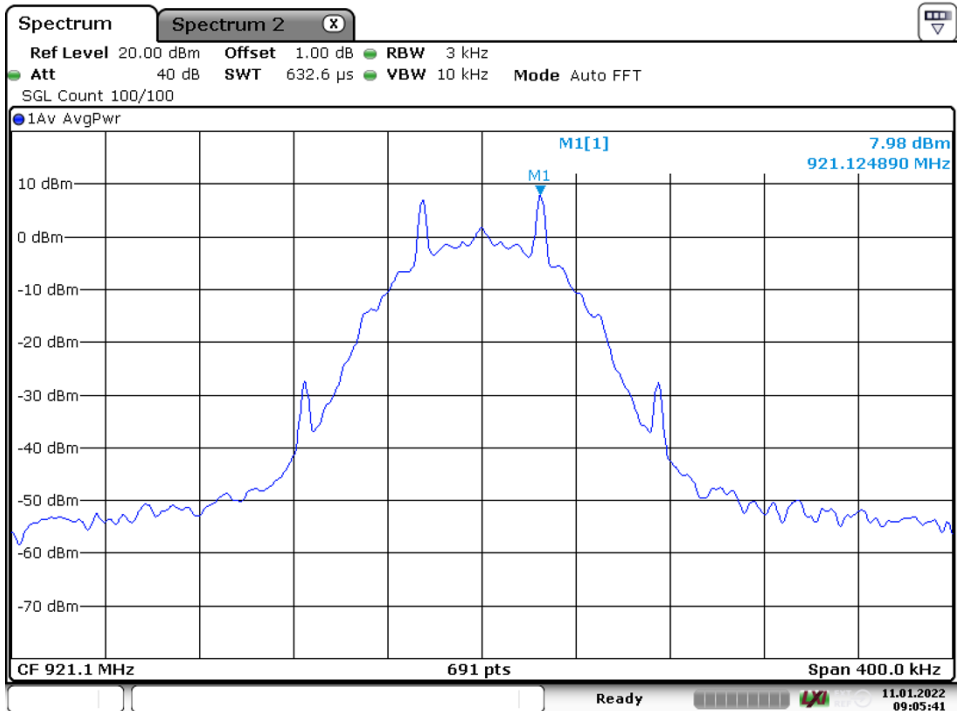
FSK, 50Kbps

Low Channel



Date: 11.JAN.2022 09:00:47

Middle Channel



Date: 11.JAN.2022 09:05:41

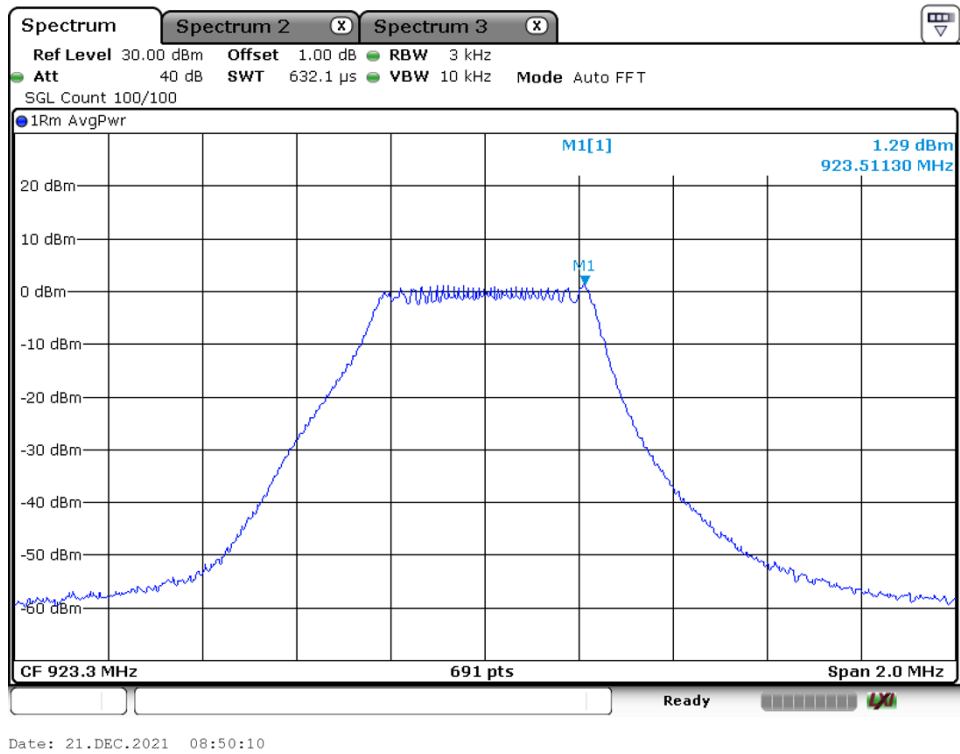
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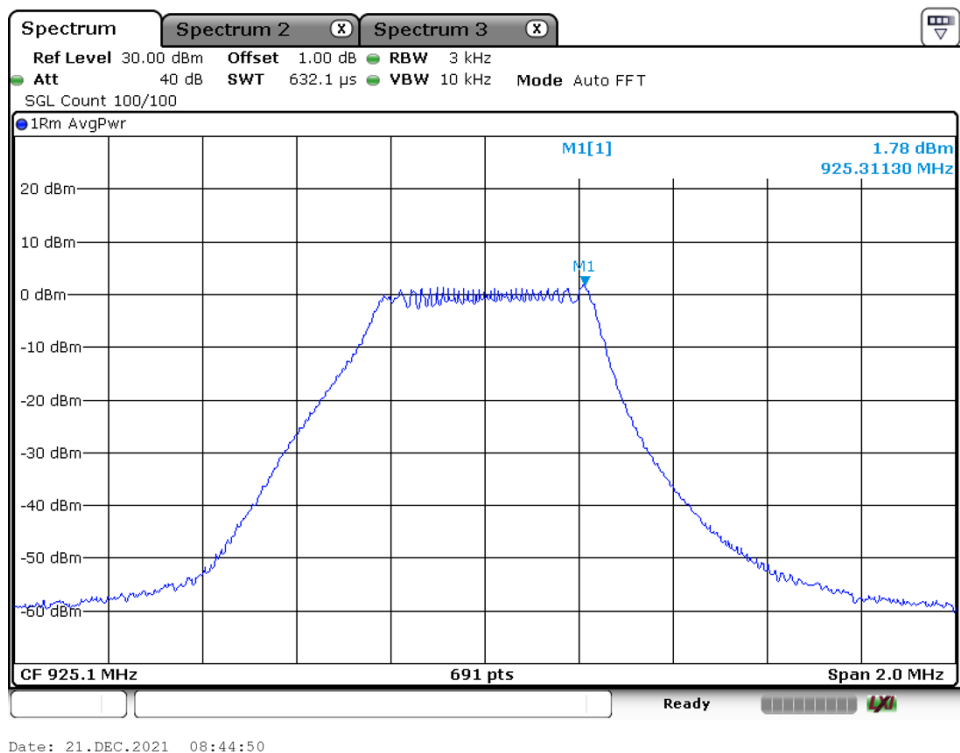
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Lora DTS SF7, OCW 500KHz

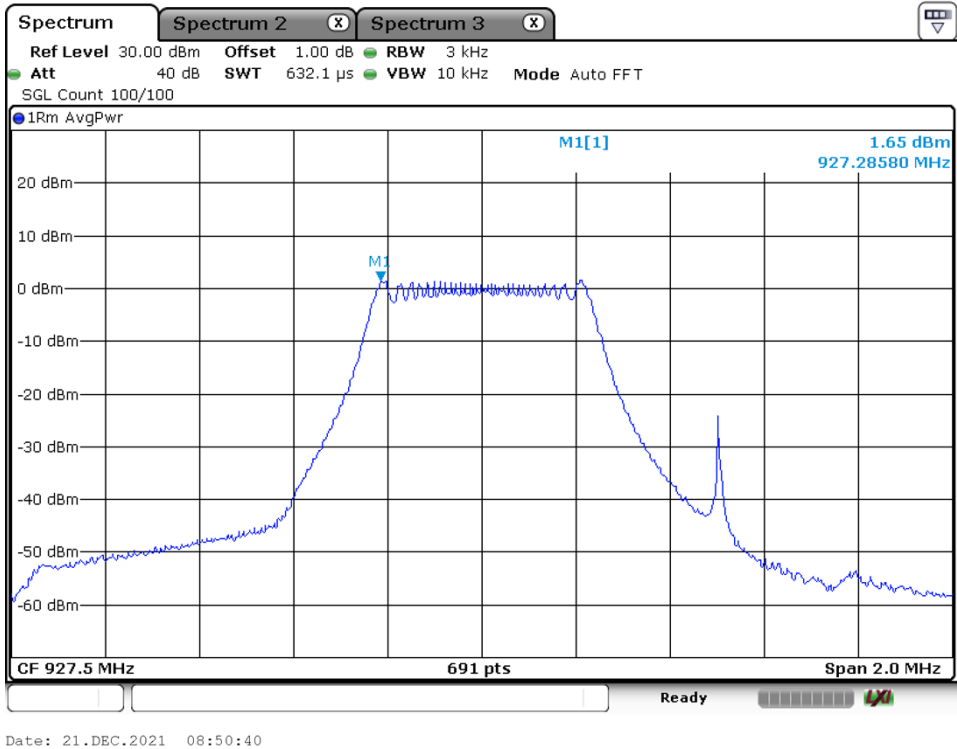
Low Channel



Middle Channel

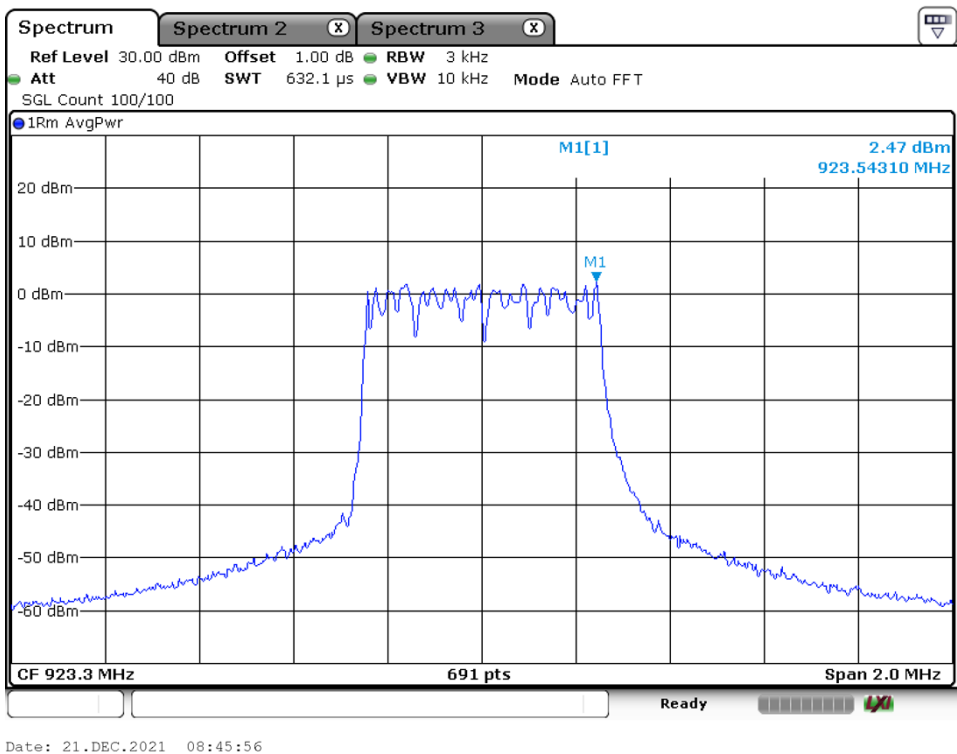


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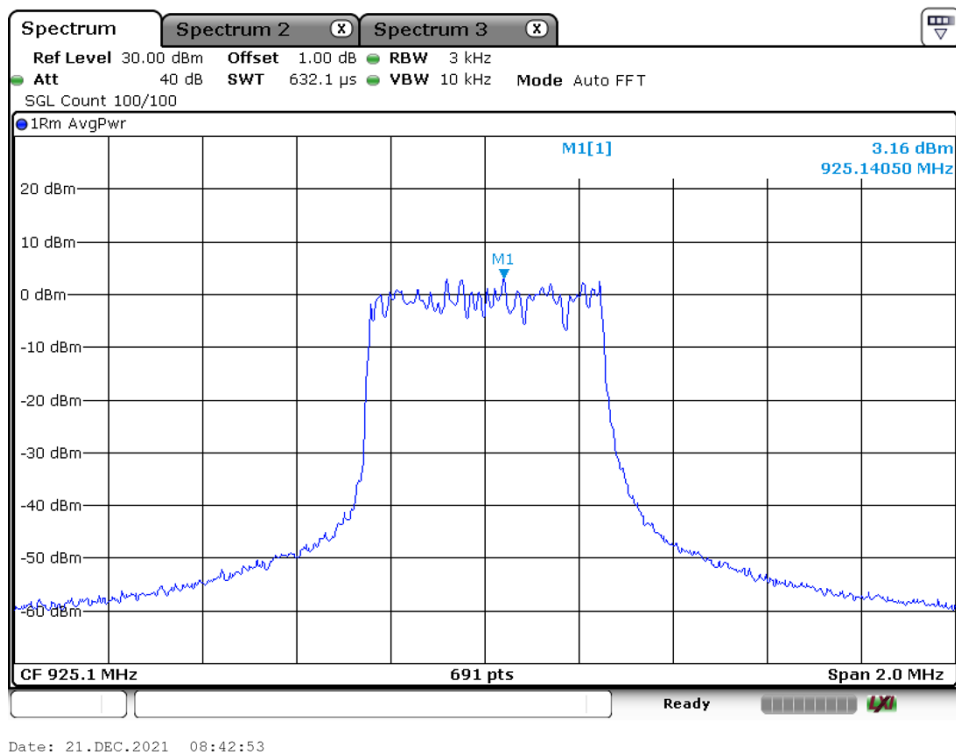


Lora DTS SF12, OCW 500KHz

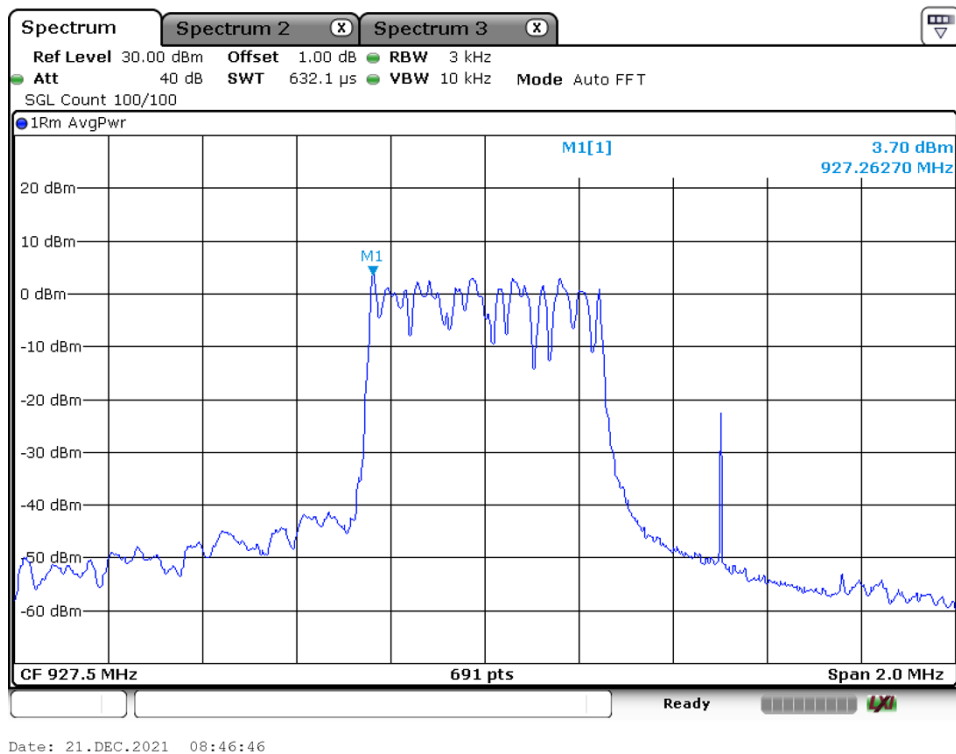
Low Channel



Middle Channel



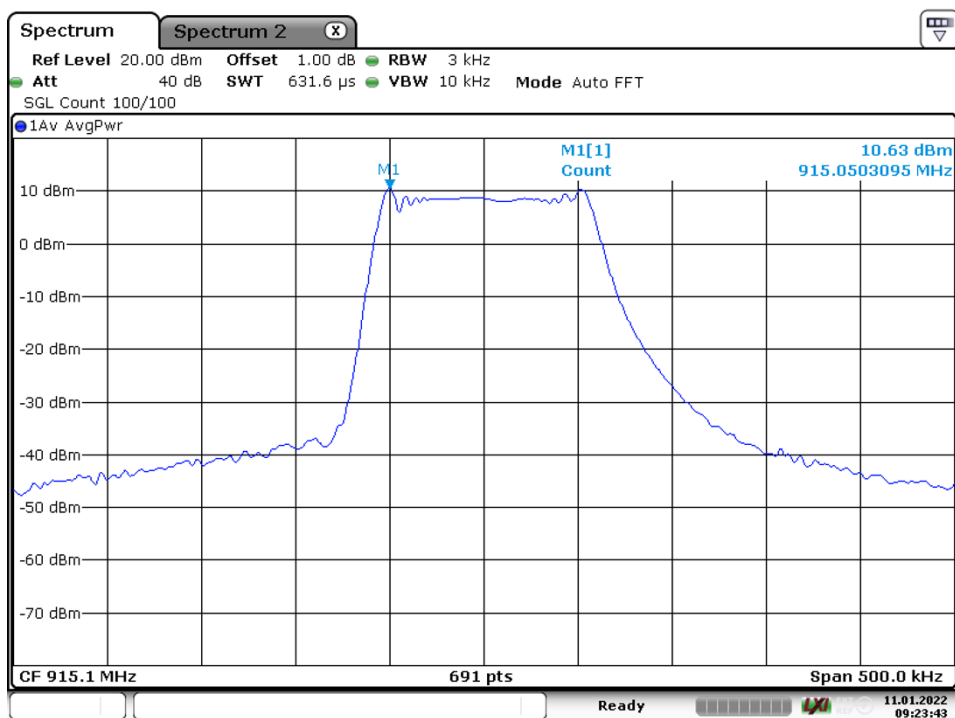
High Channel



Appendix A.2: Test Results of Conducted Power Spectral Density, Antenna Gain 5.1dBi

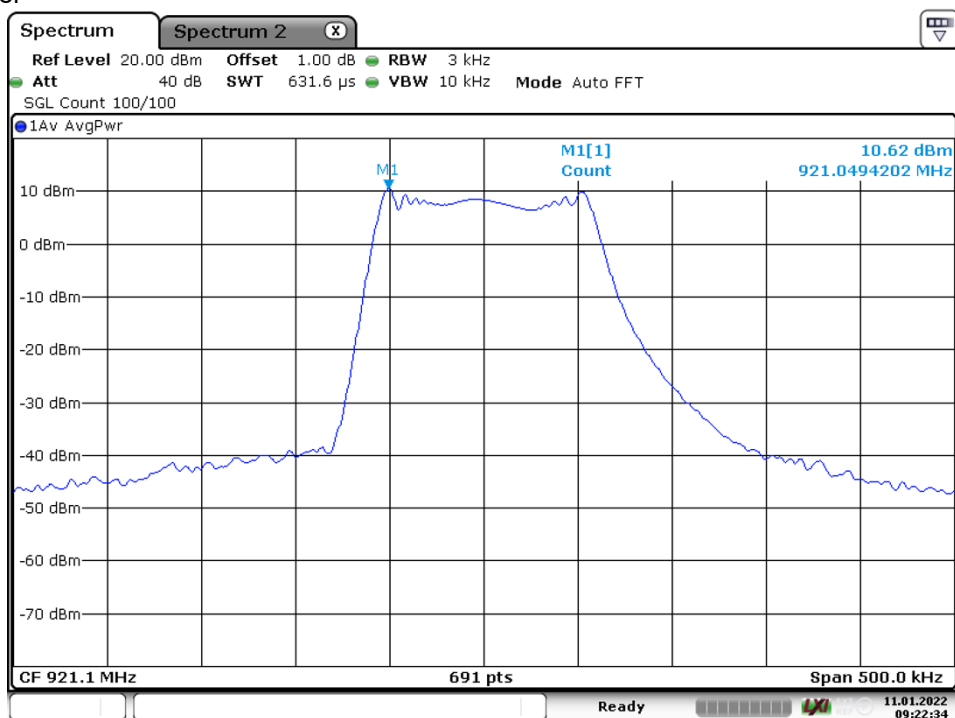
Lora DTS SF7, OCW 125KHz

Low Channel



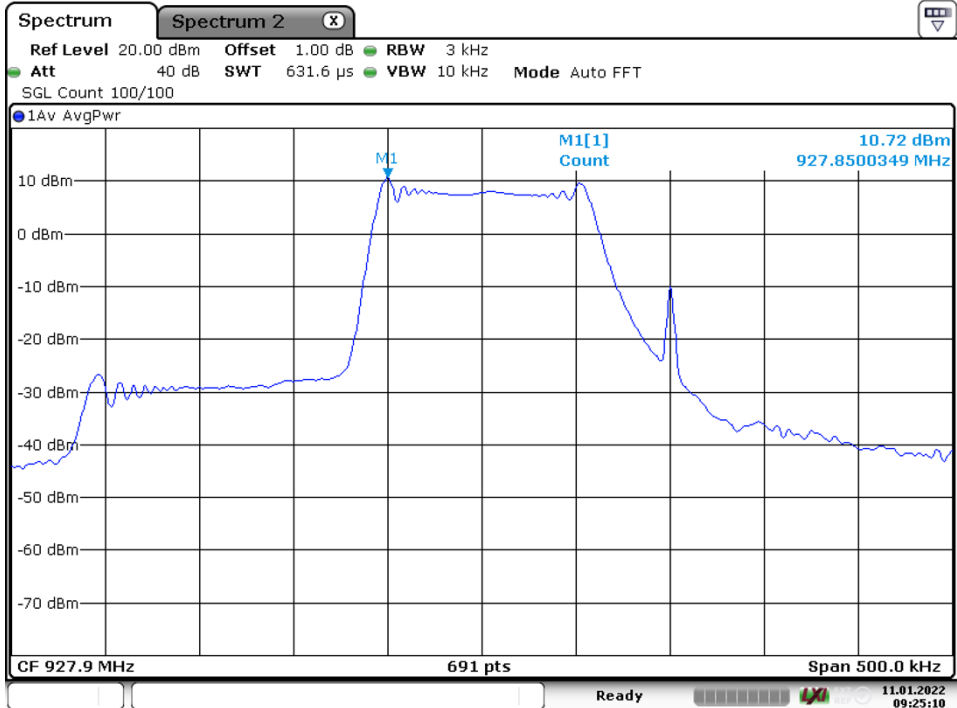
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Middle Channel



Date: 11.JAN.2022 09:22:34

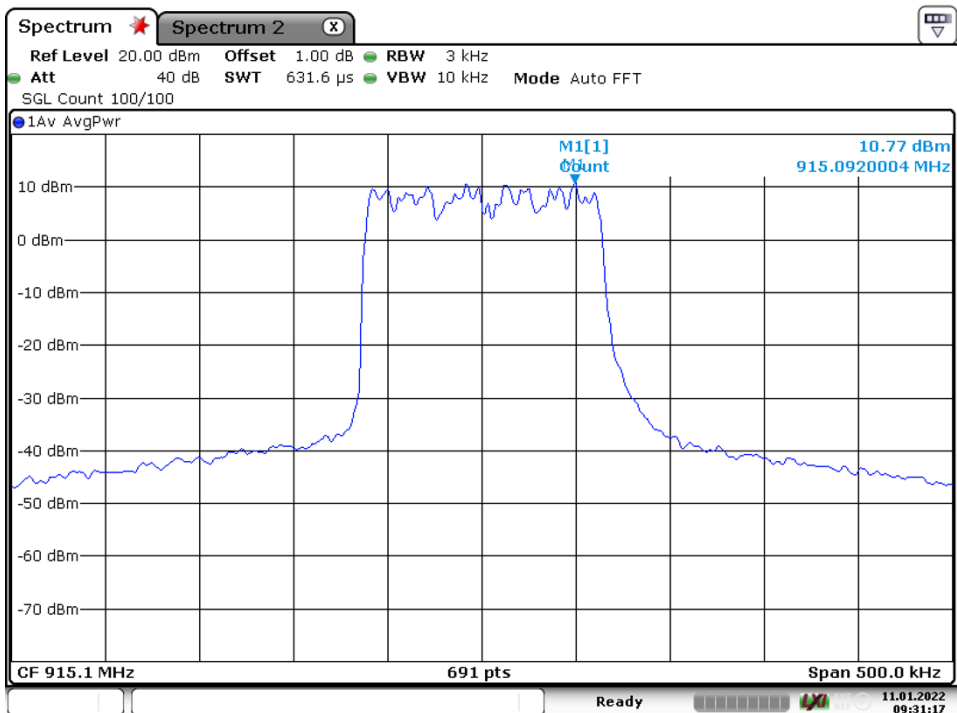
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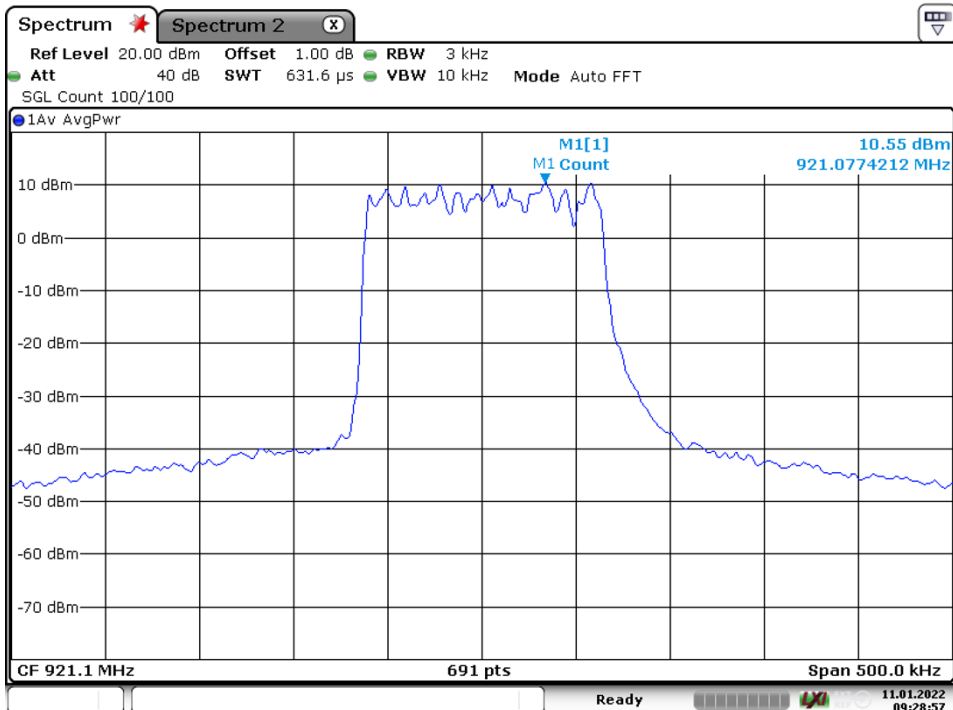
Lora DTS SF12, OCW 125KHz

Low Channel



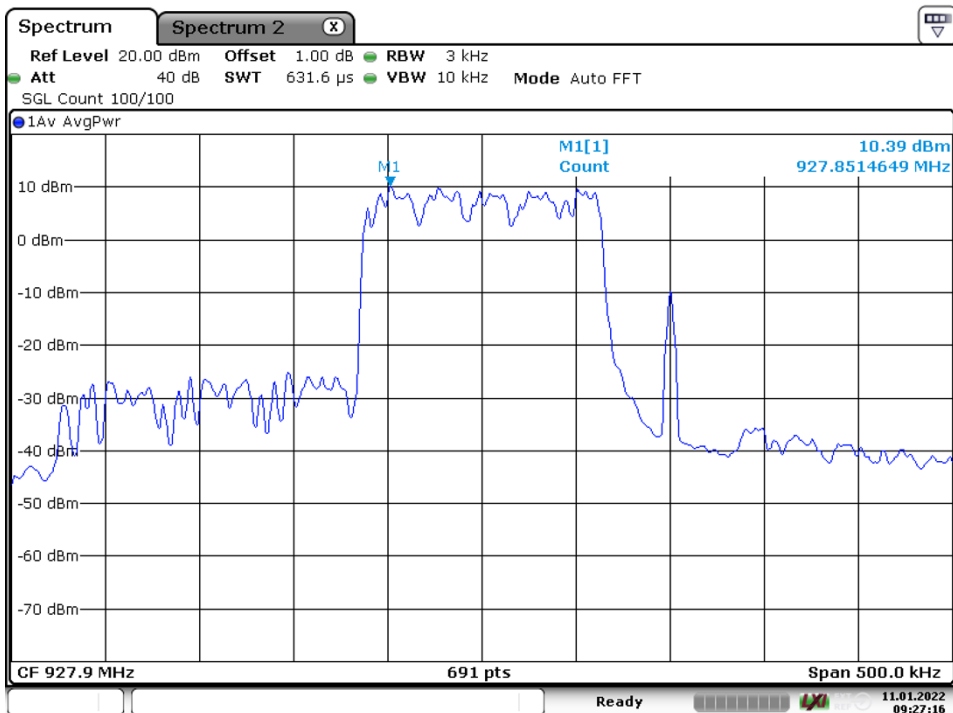
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Middle Channel



Date: 11.JAN.2022 09:28:57

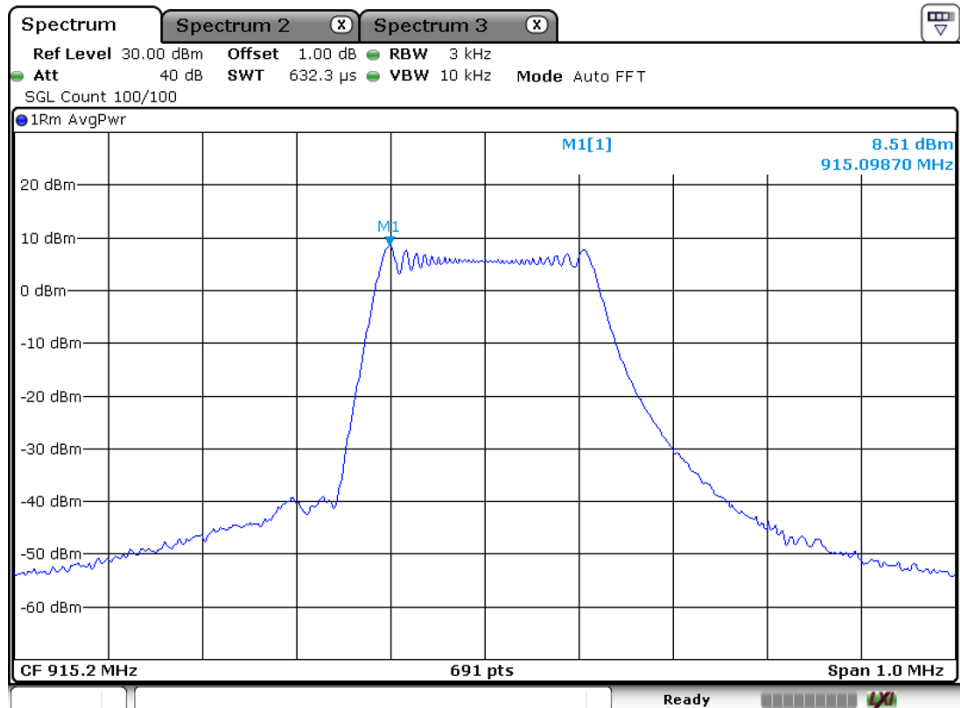
High Channel



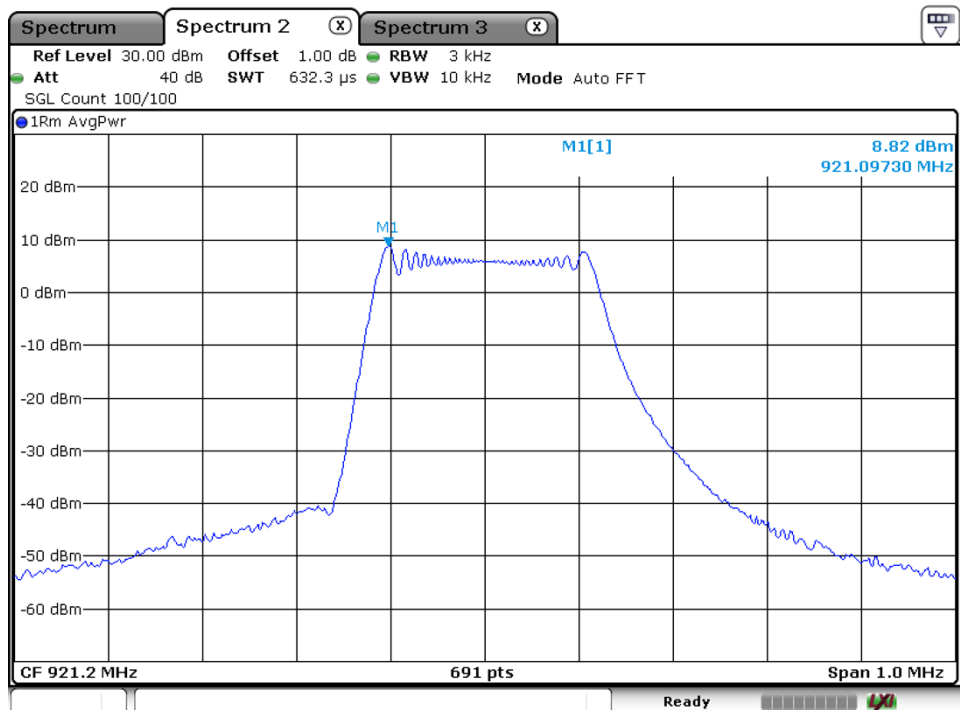
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Lora DTS SF7, OCW 250KHz

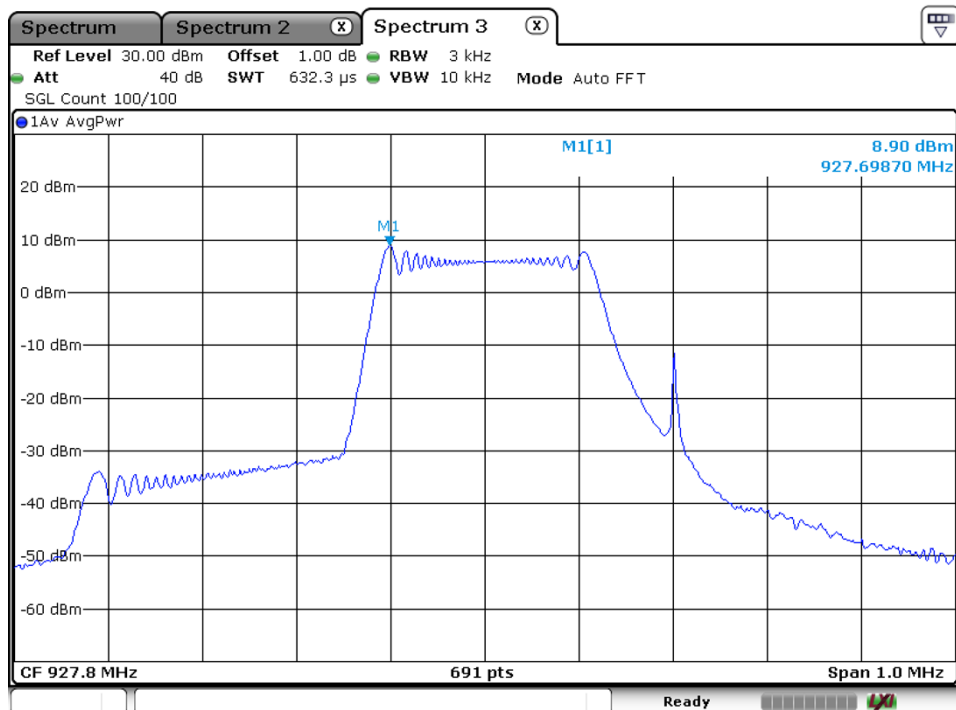
Low Channel



Middle Channel



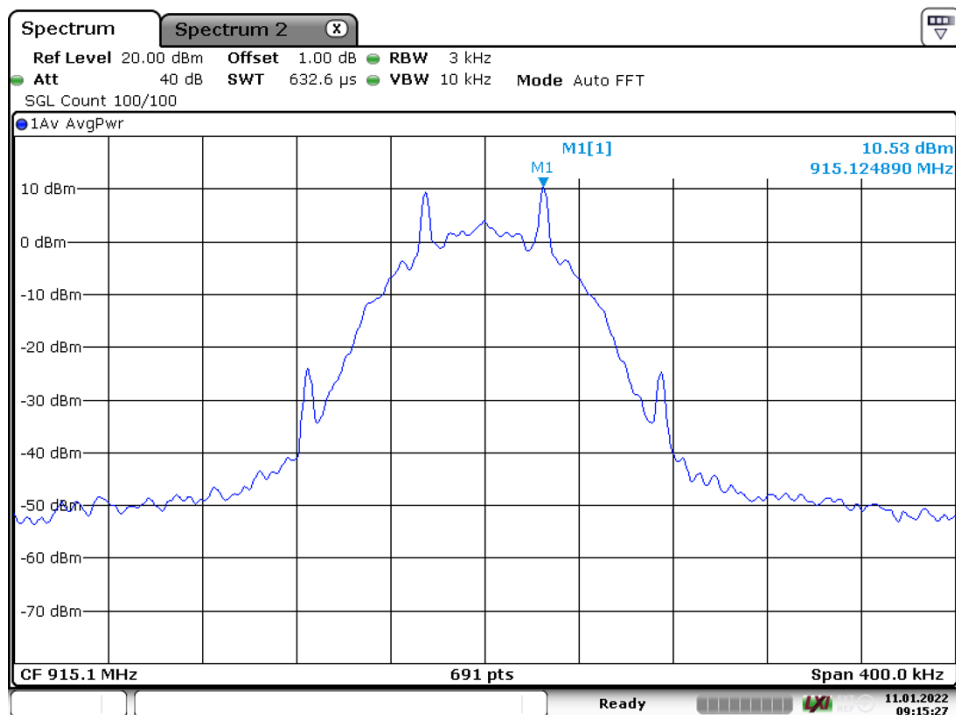
High Channel



Date: 21.DEC.2021 11:25:52

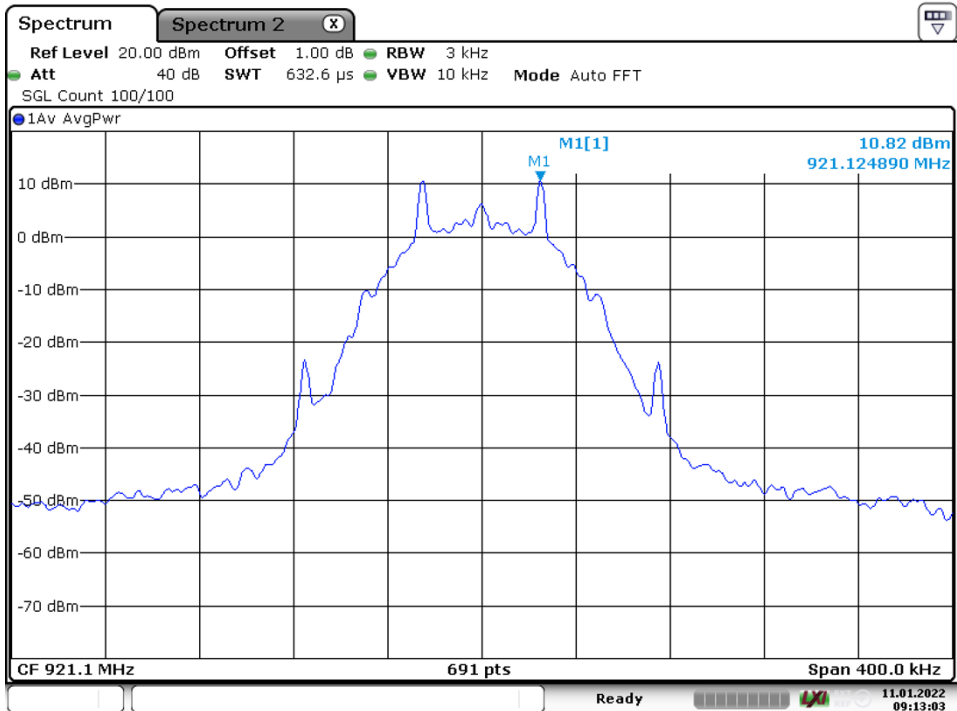
FSK, 50Kbps

Low Channel



Date: 11.JAN.2022 09:15:27

Middle Channel



Date: 11.JAN.2022 09:13:03

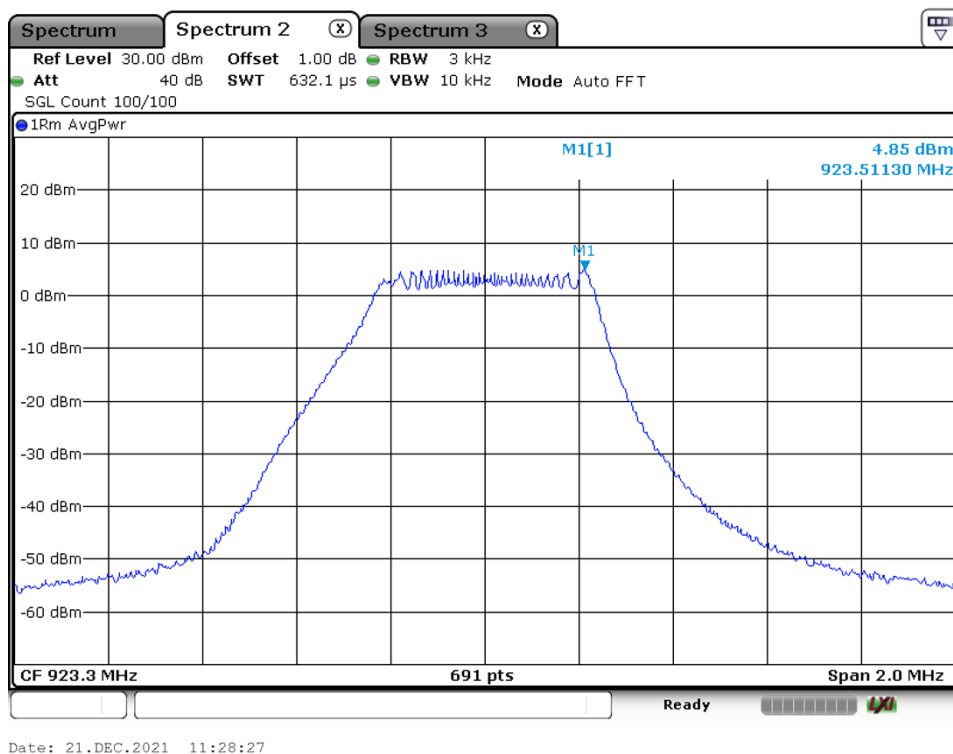
High Channel



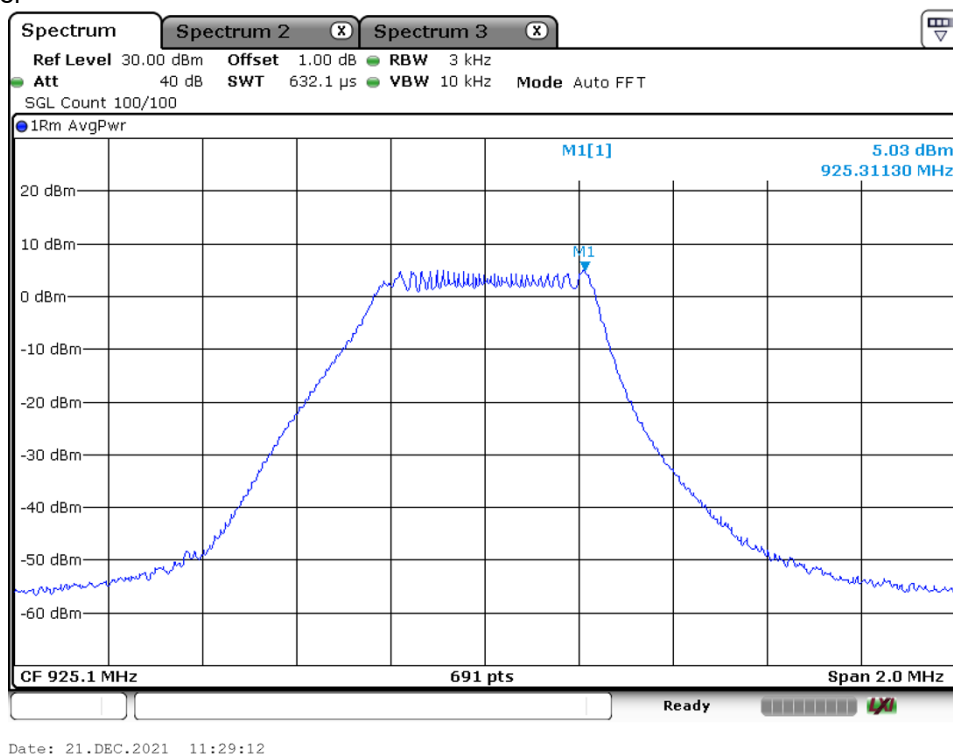
Date: 11.JAN.2022 09:10:33

Lora DTS SF7, OCW 500KHz

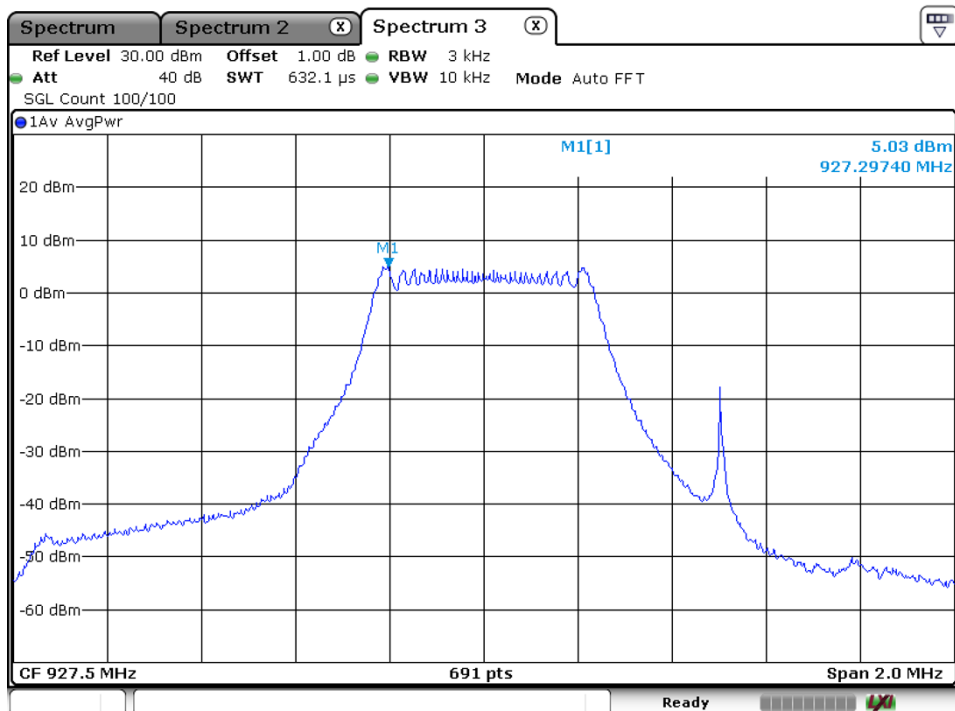
Low Channel



Middle Channel



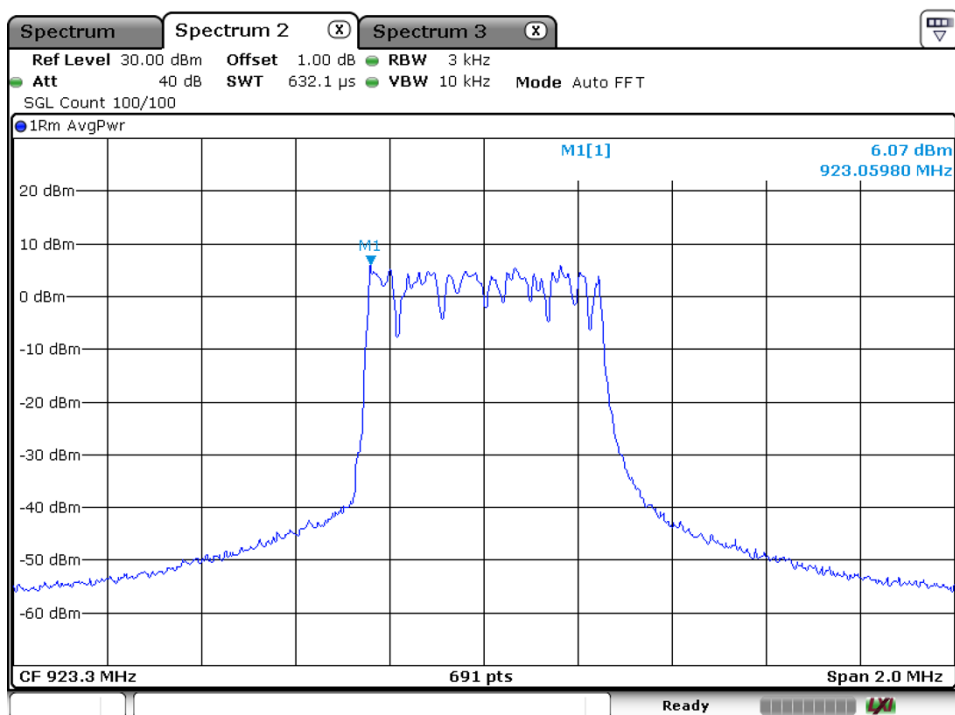
High Channel



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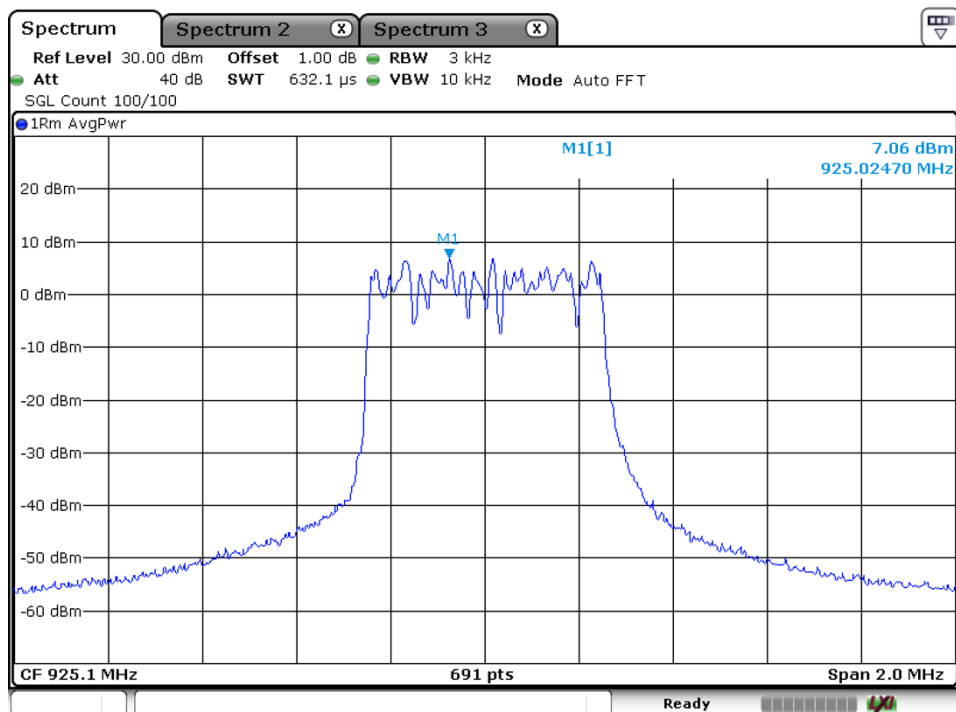
Lora DTS SF12, OCW 500KHz

Low Channel



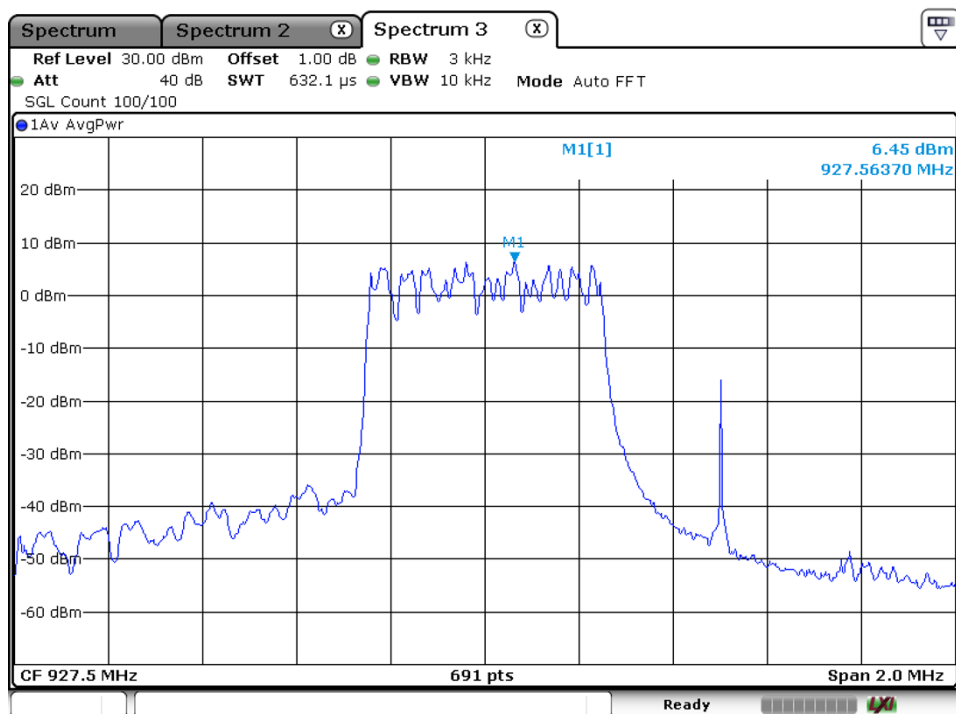
Date: 21.DEC.2021 11:31:50

Middle Channel



Date: 21.DEC.2021 11:30:57

High Channel

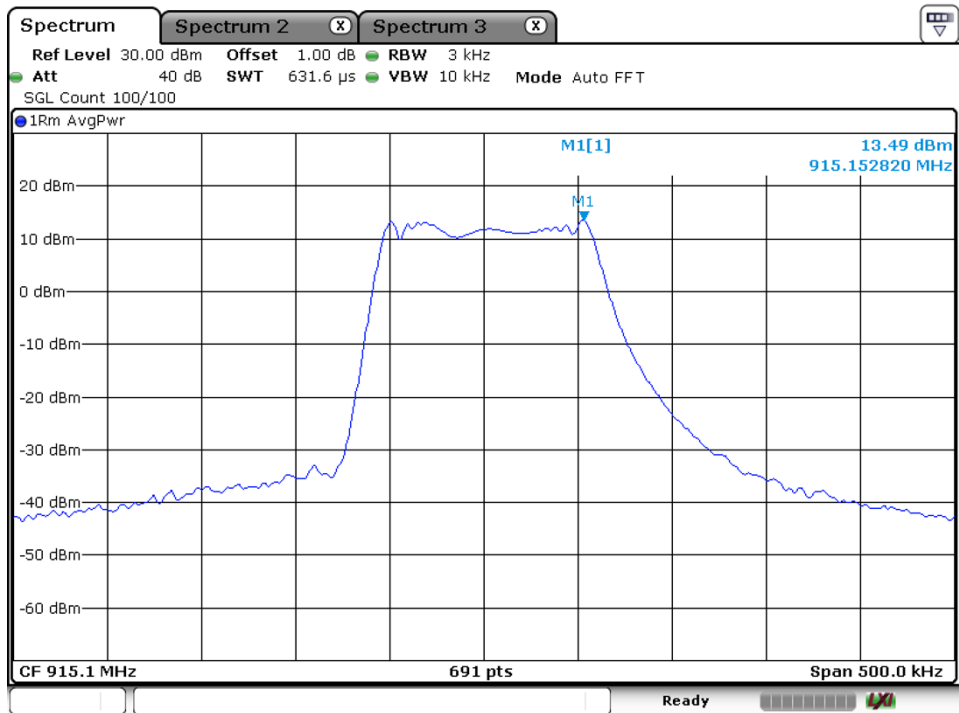


Date: 21.DEC.2021 11:32:39

Appendix A.3: Test Results of Conducted Power Spectral Density, Antenna Gain 2.3dBi

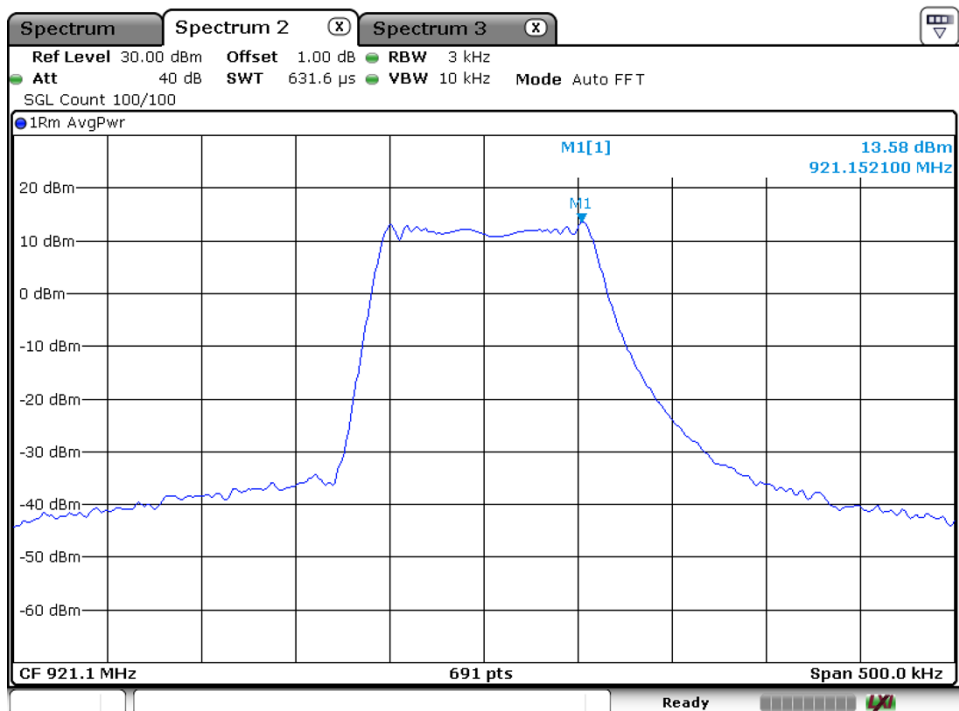
Lora DTS SF7, OCW 125KHz

Low Channel



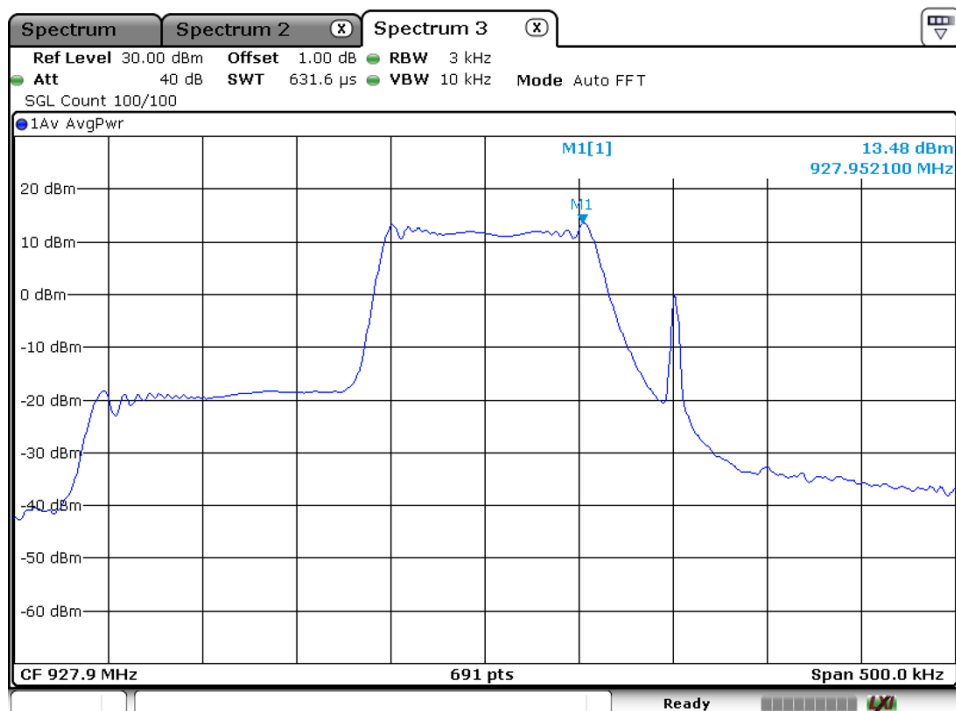
Date: 21.DEC.2021 11:06:53

Middle Channel



Date: 21.DEC.2021 11:08:32

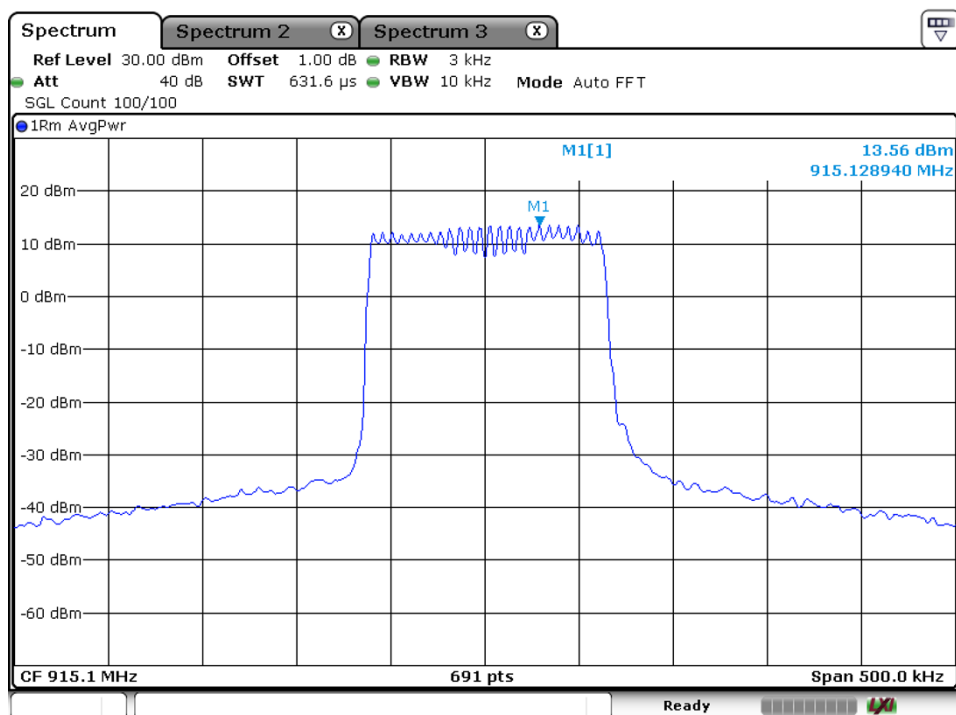
High Channel



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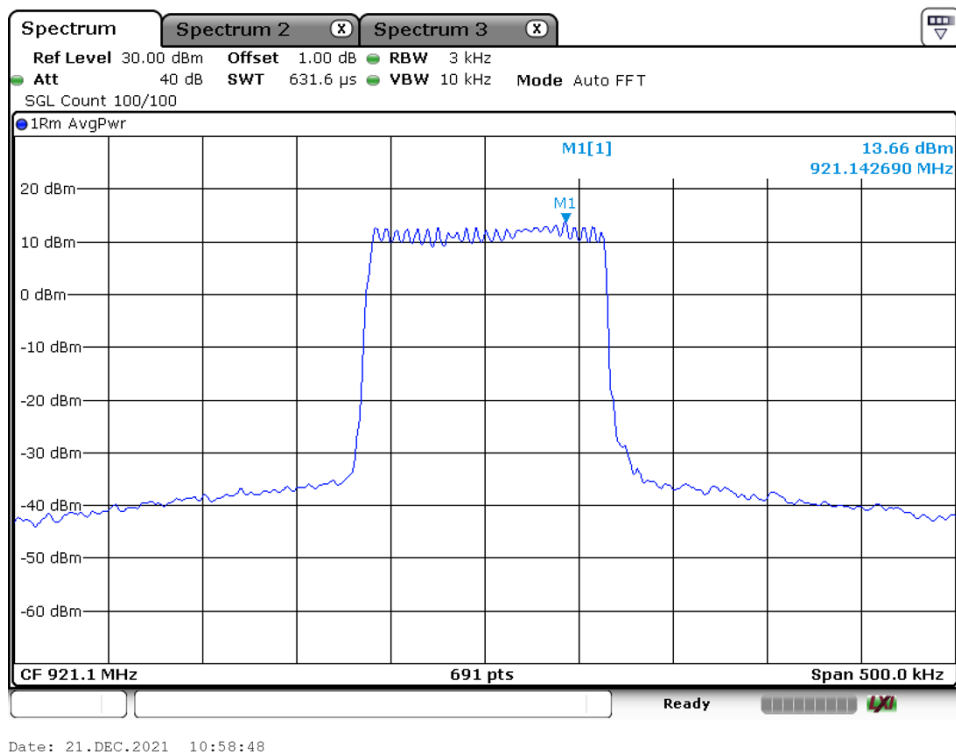
Lora DTS SF12, OCW 125KHz

Low Channel

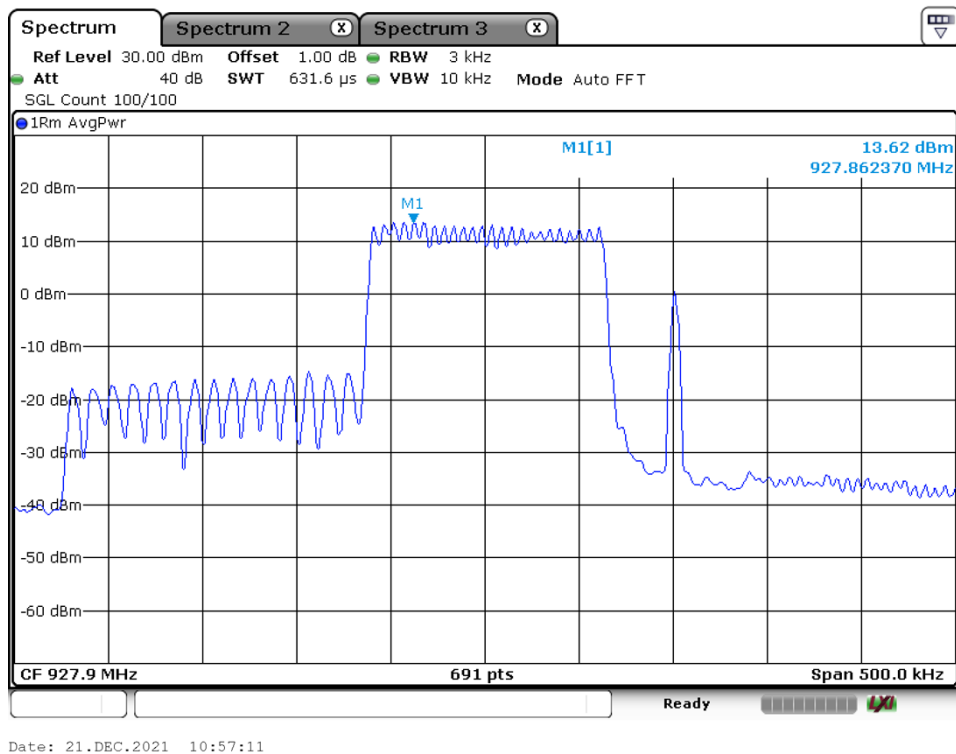


Date: 21.DEC.2021 10:59:28

Middle Channel

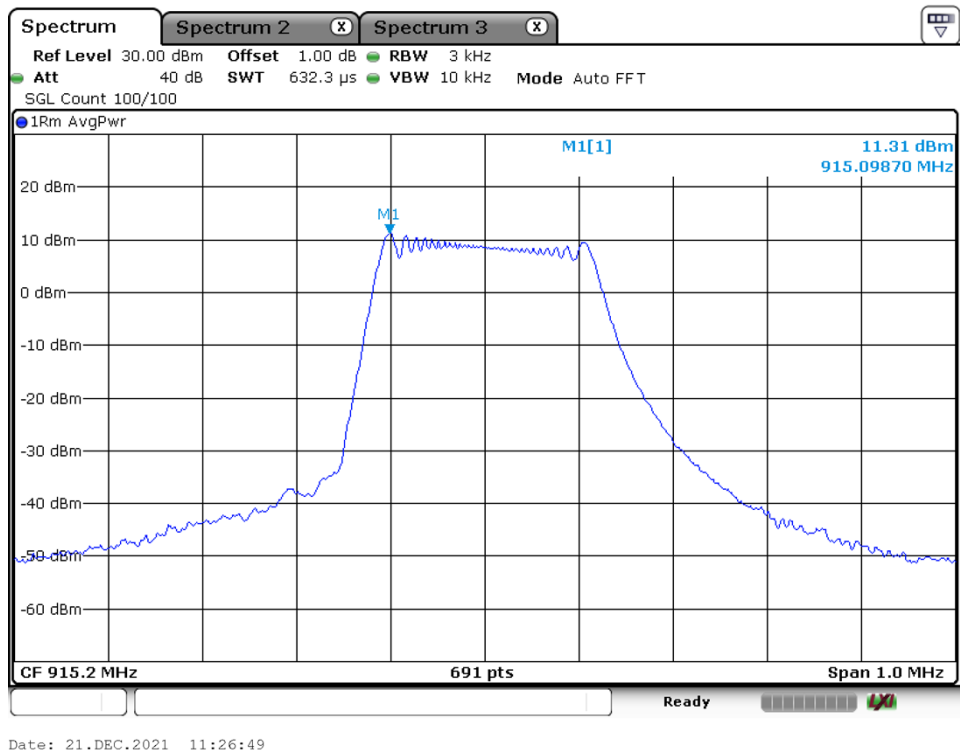


High Channel

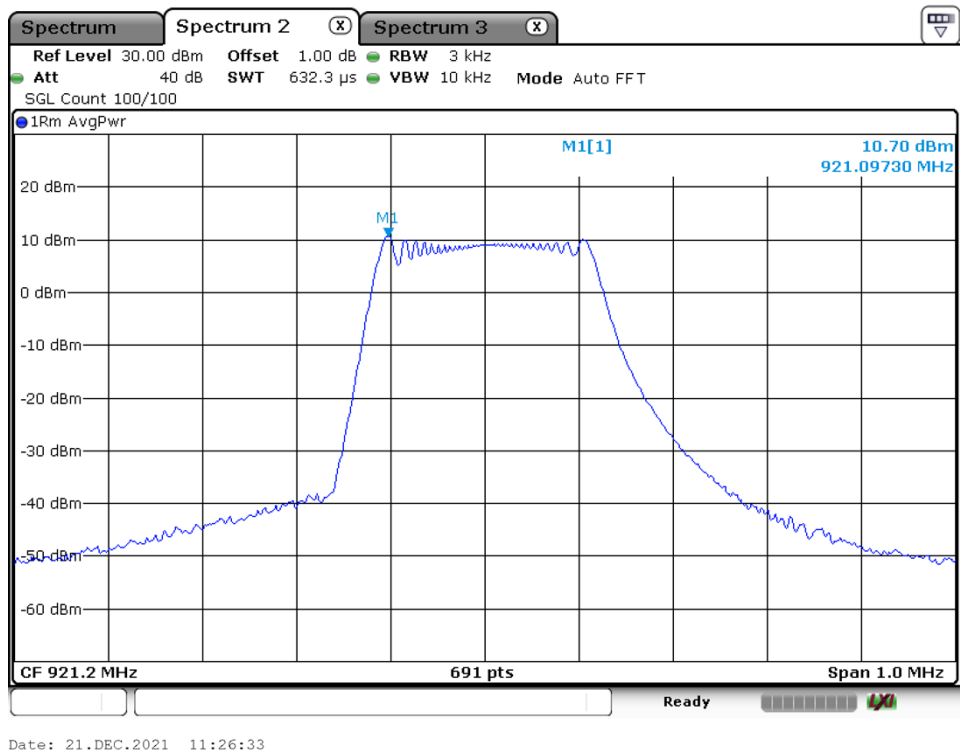


Lora DTS SF7, OCW 250KHz

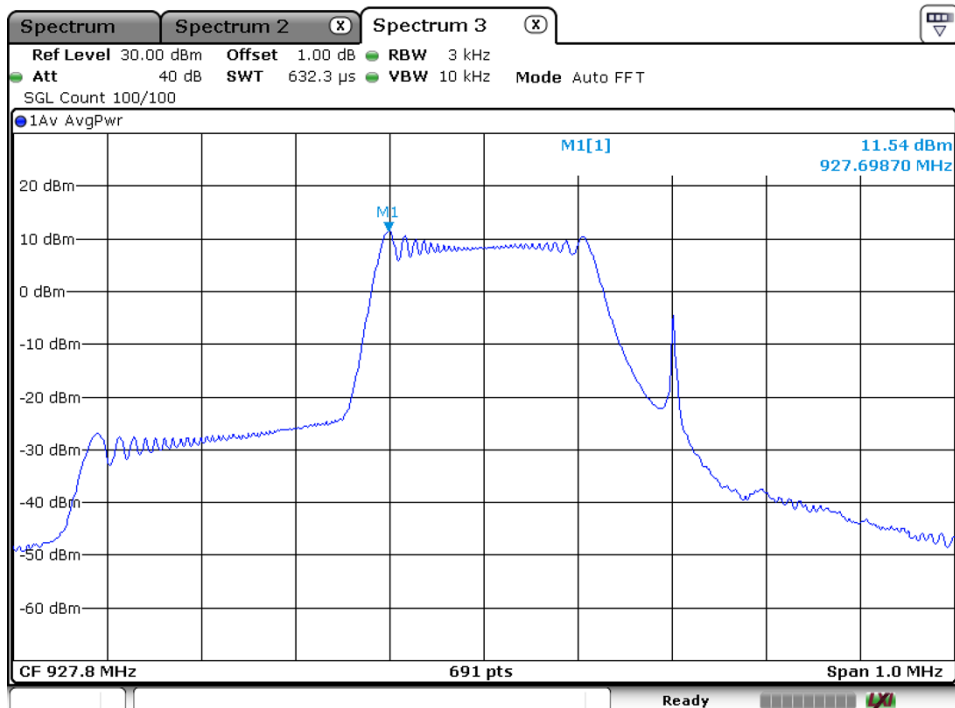
Low Channel



Middle Channel



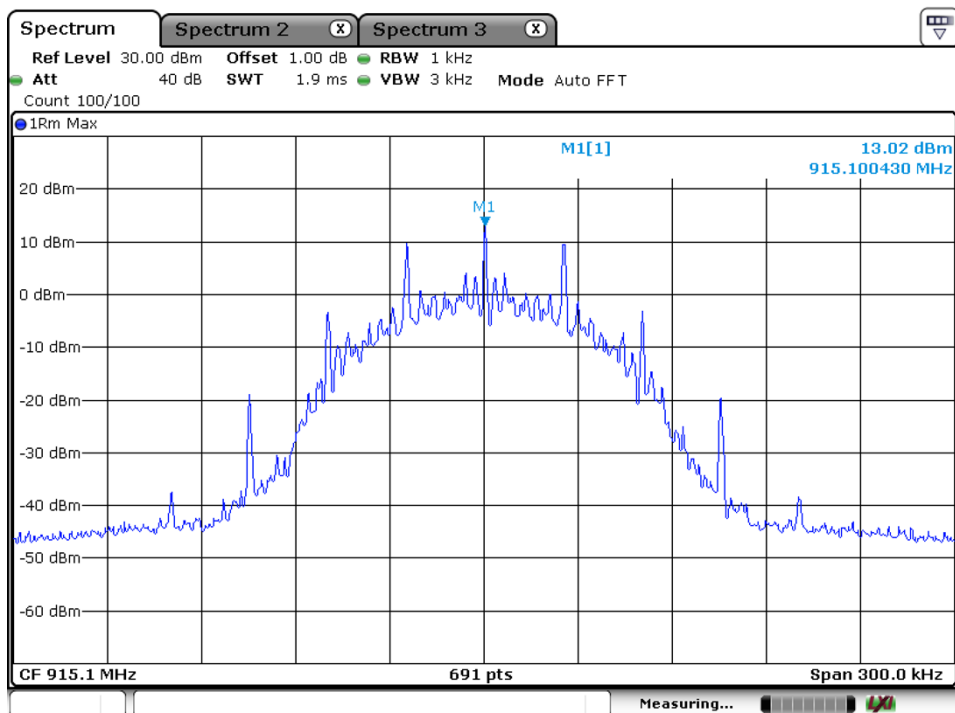
High Channel



Date: 21.DEC.2021 11:26:10

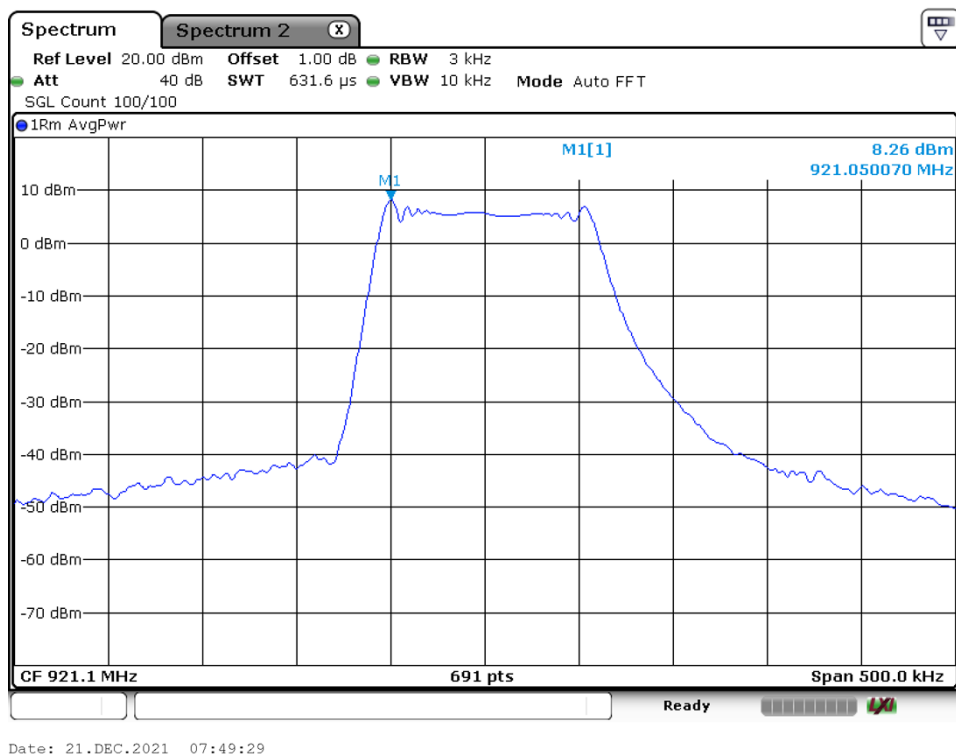
FSK, 50Kbps

Low Channel

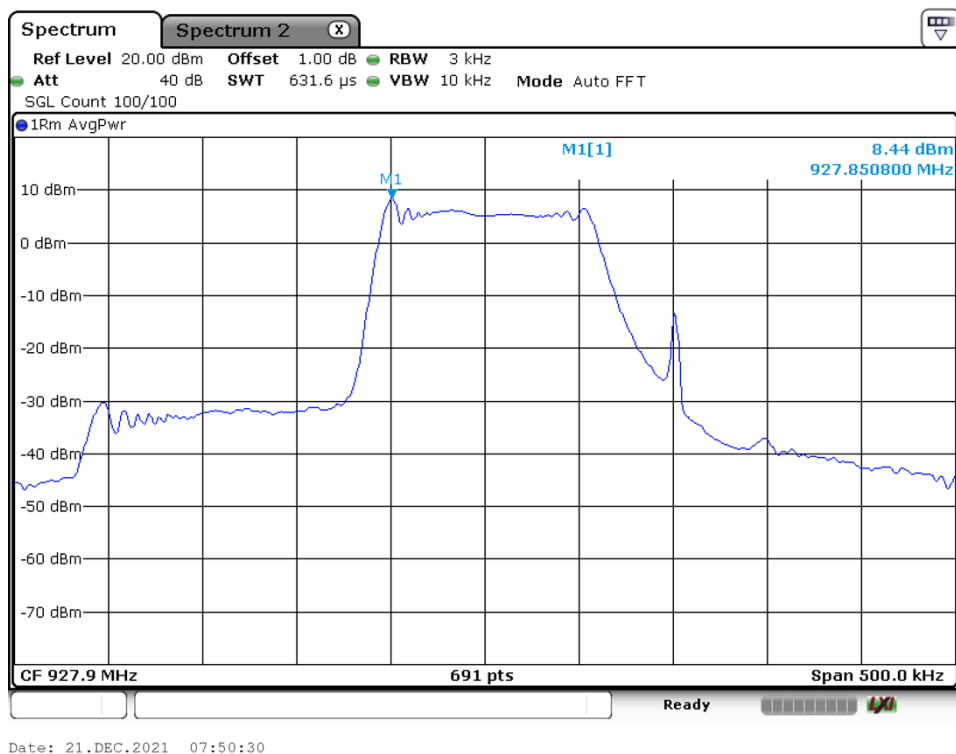


Date: 21.DEC.2021 08:25:03

Middle Channel

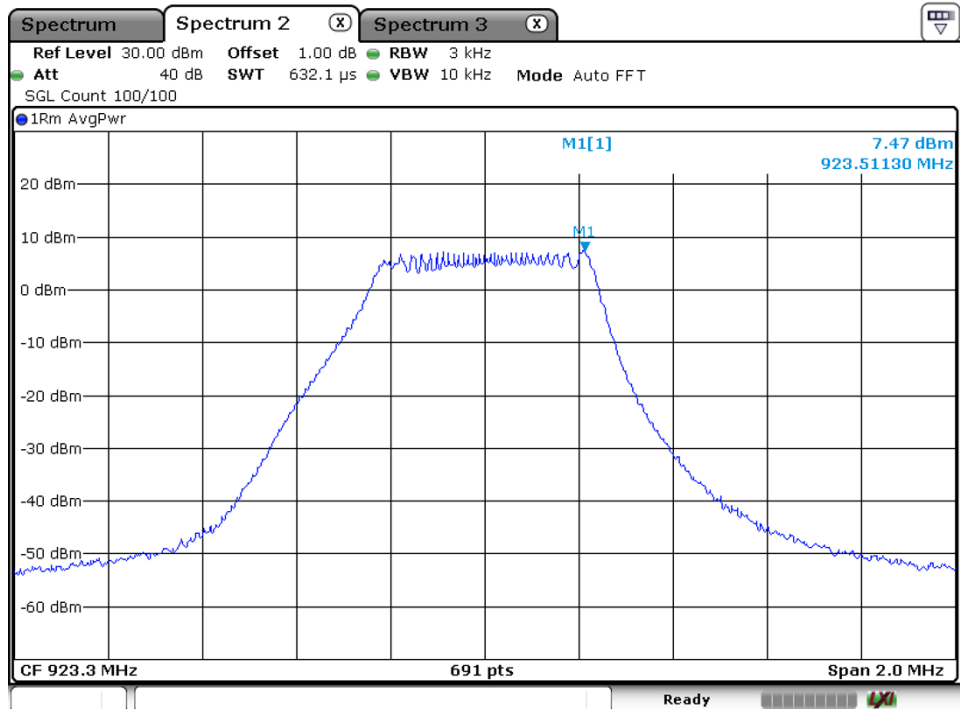


High Channel



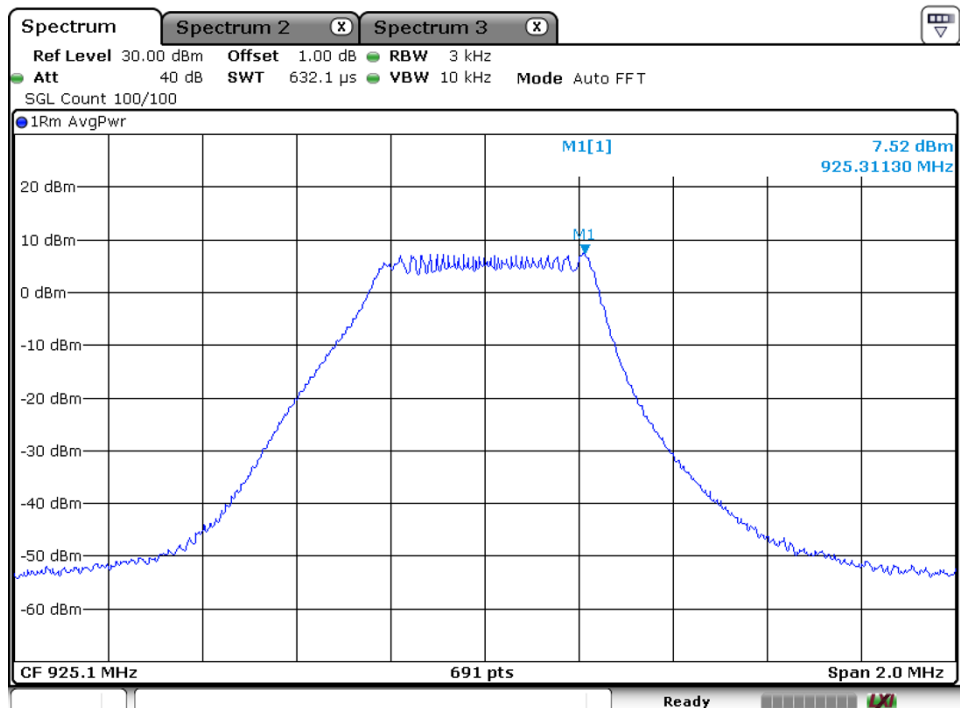
Lora DTS SF7, OCW 500KHz

Low Channel



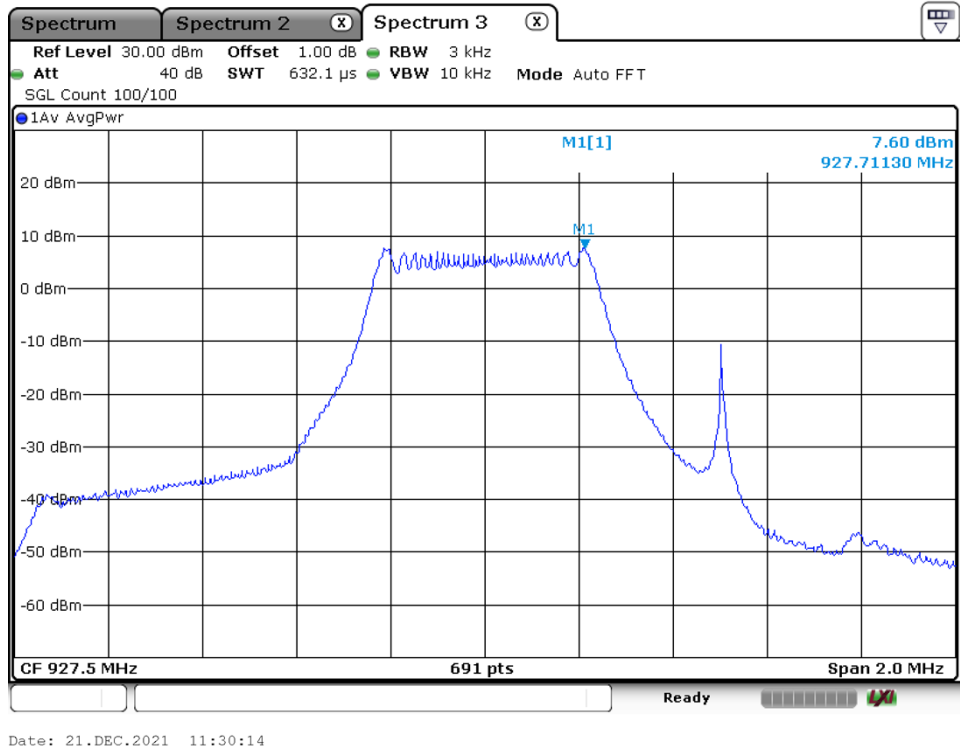
Date: 21.DEC.2021 11:29:52

Middle Channel



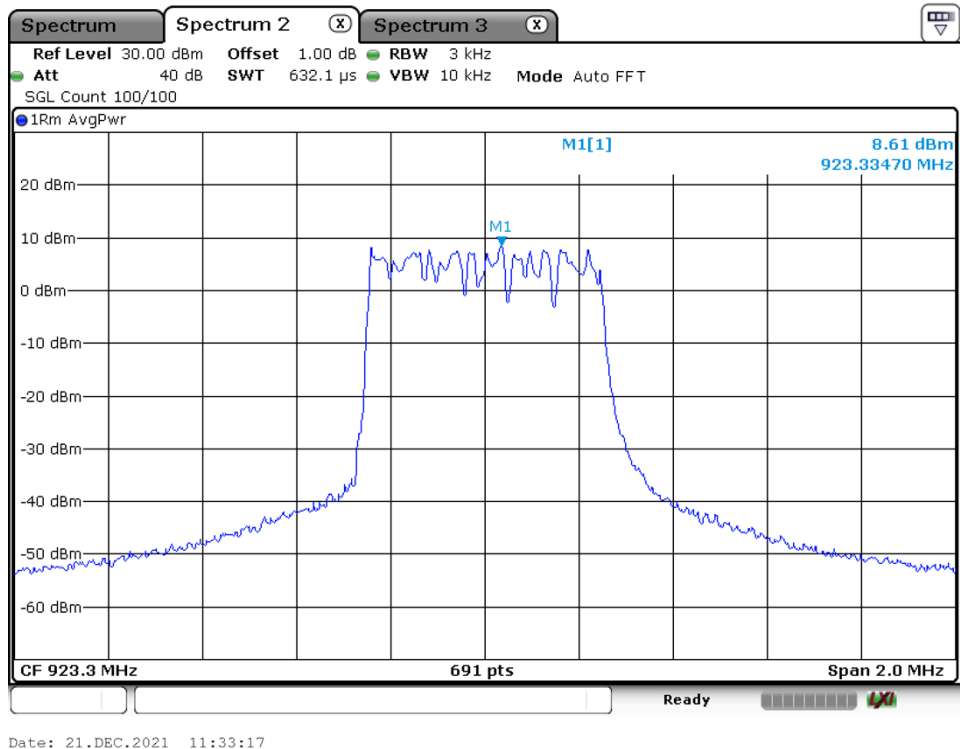
Date: 21.DEC.2021 11:29:29

High Channel

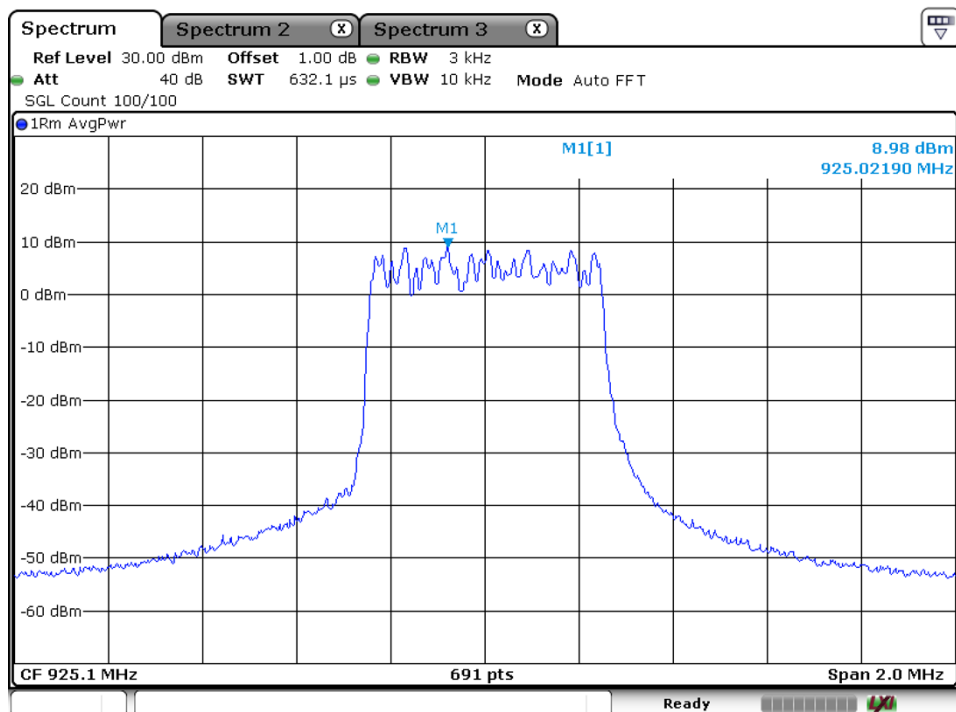


Lora DTS SF12, OCW 500KHz

Low Channel

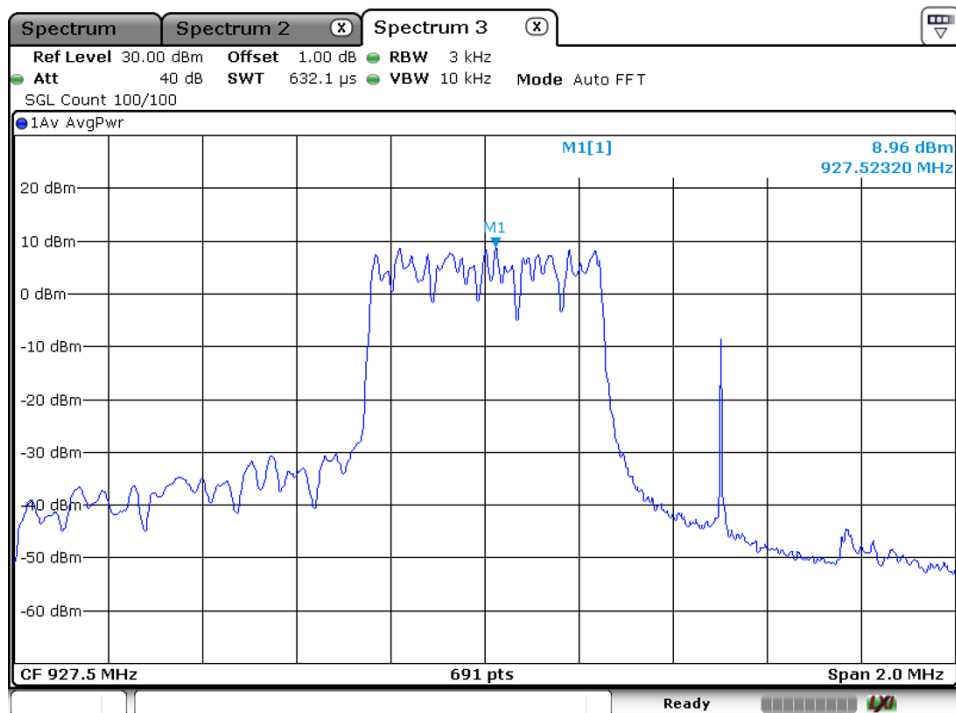


Middle Channel



Date: 21.DEC.2021 11:33:42

High Channel

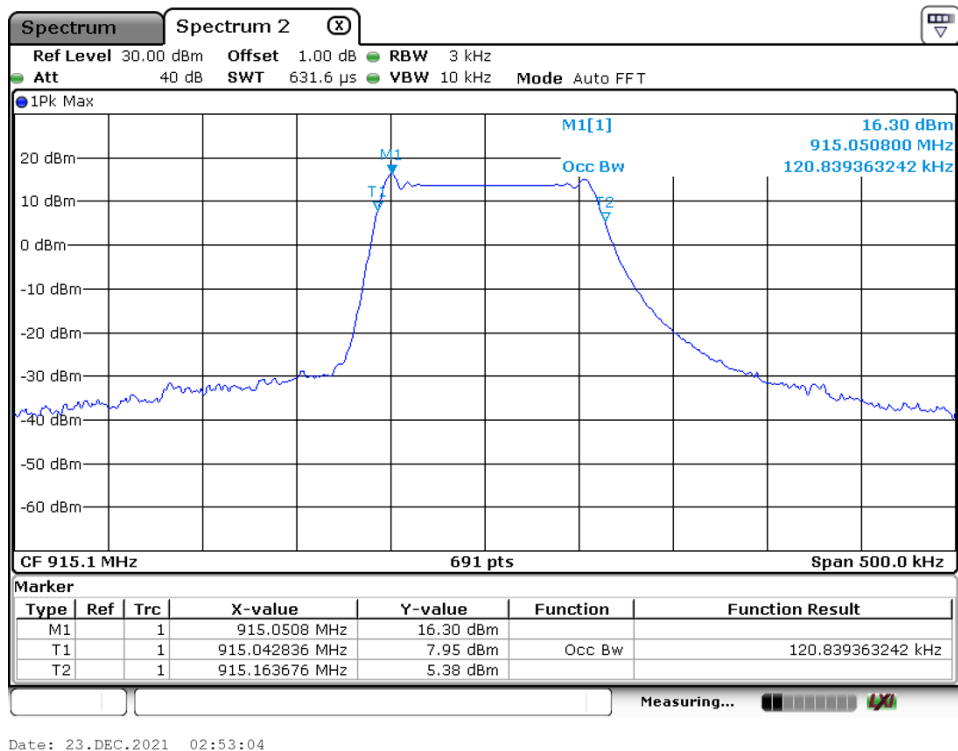


Date: 21.DEC.2021 11:32:56

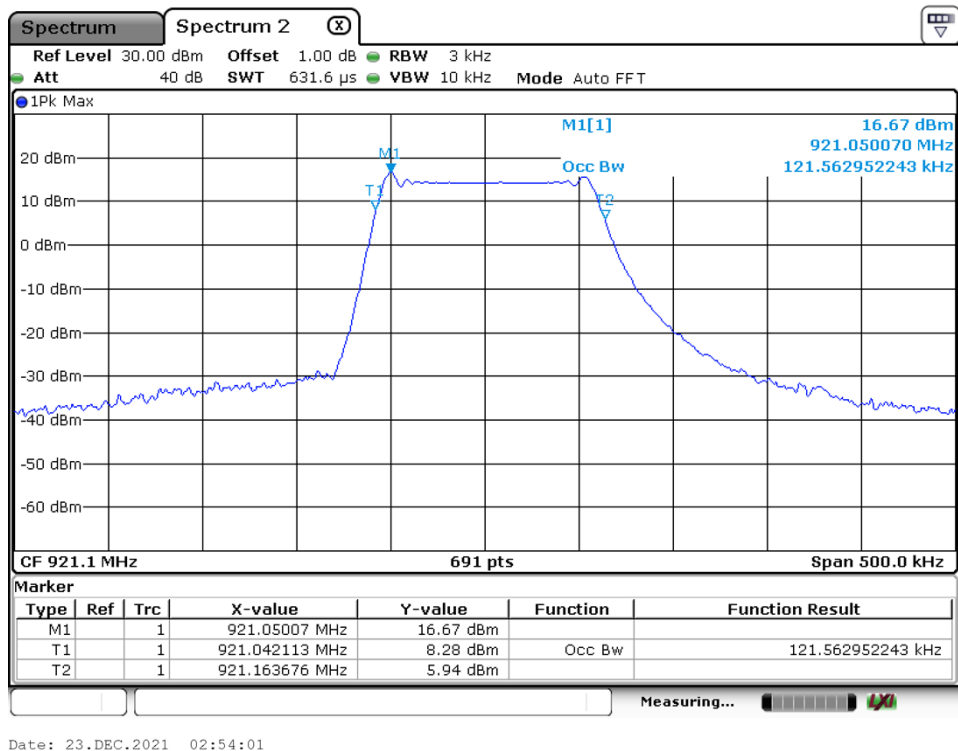
Appendix A.4: Test Results of 99% Bandwidth

Lora DTS SF7, OCW 125KHz

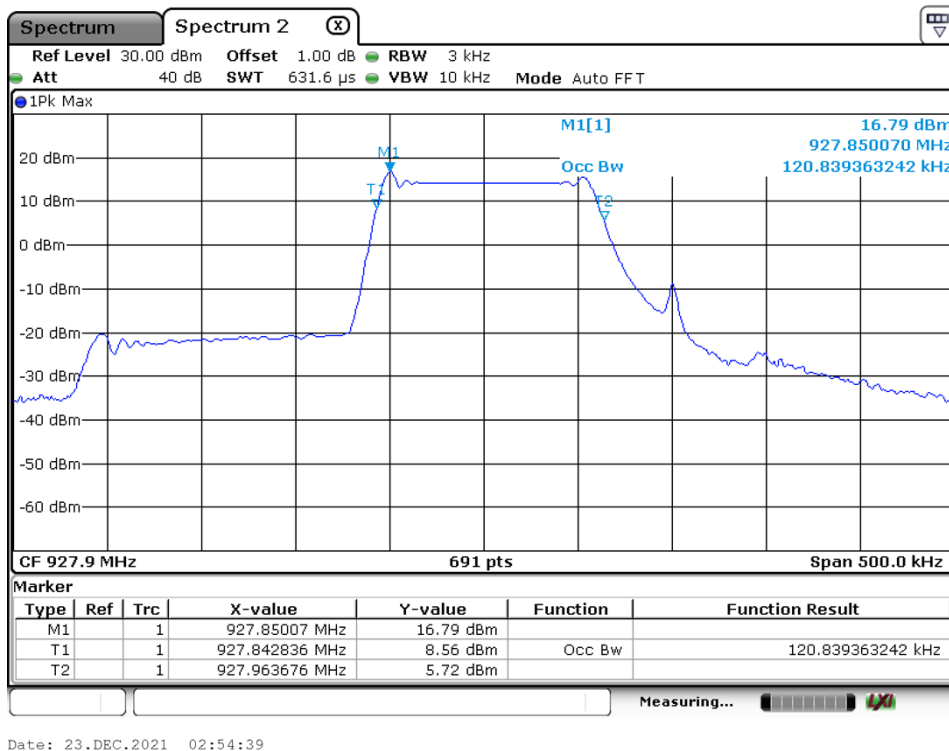
Low Channel



Middle Channel

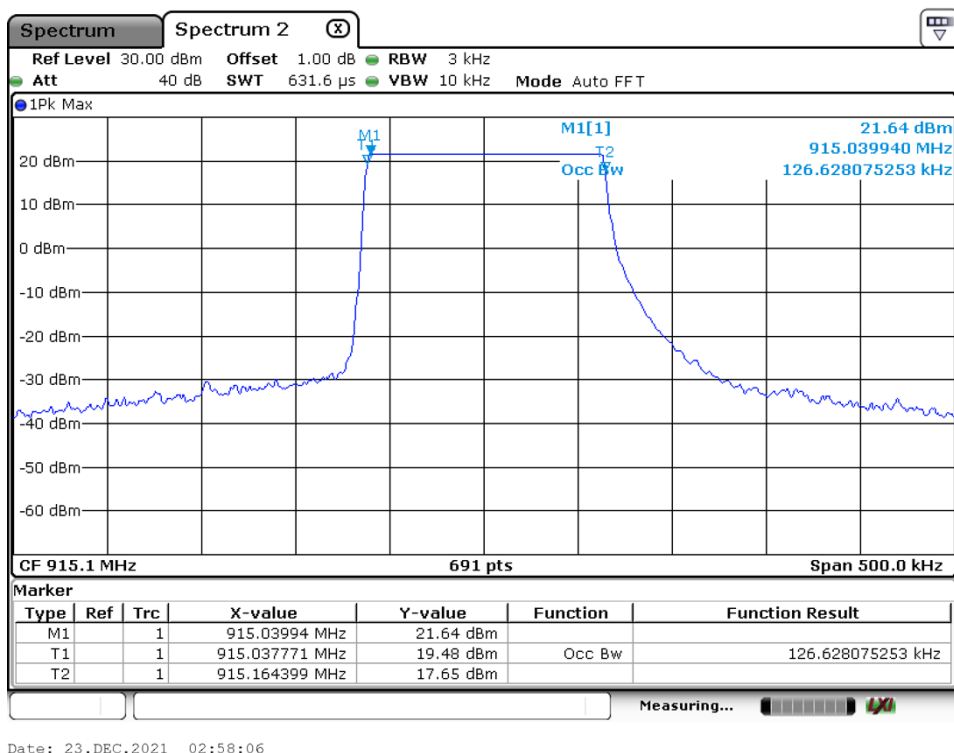


High Channel

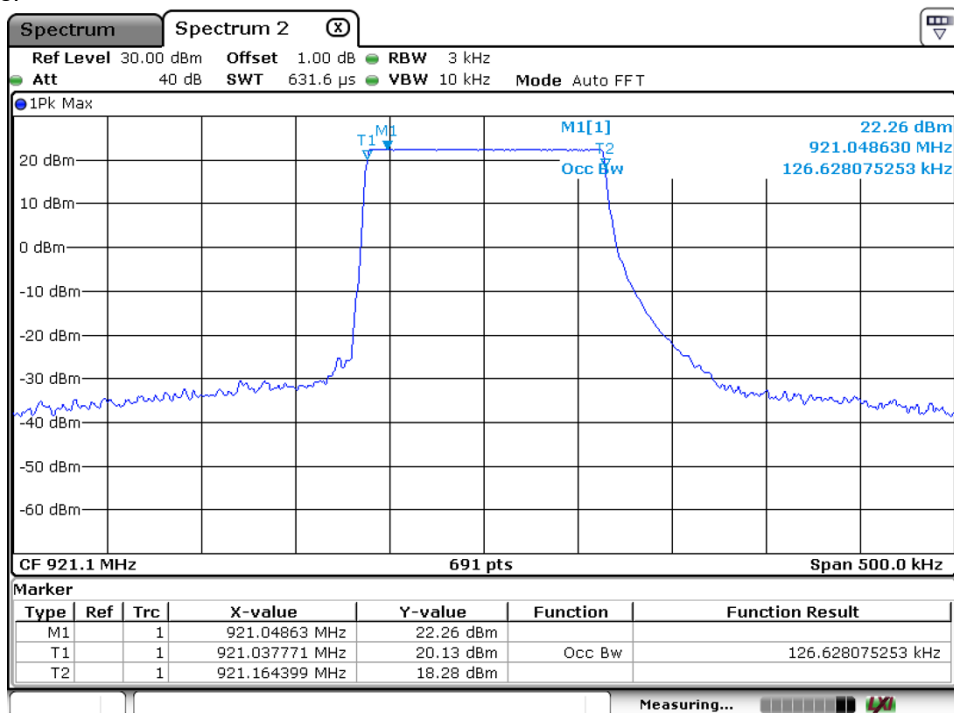


Lora DTS SF12, OCW 125KHz

Low Channel

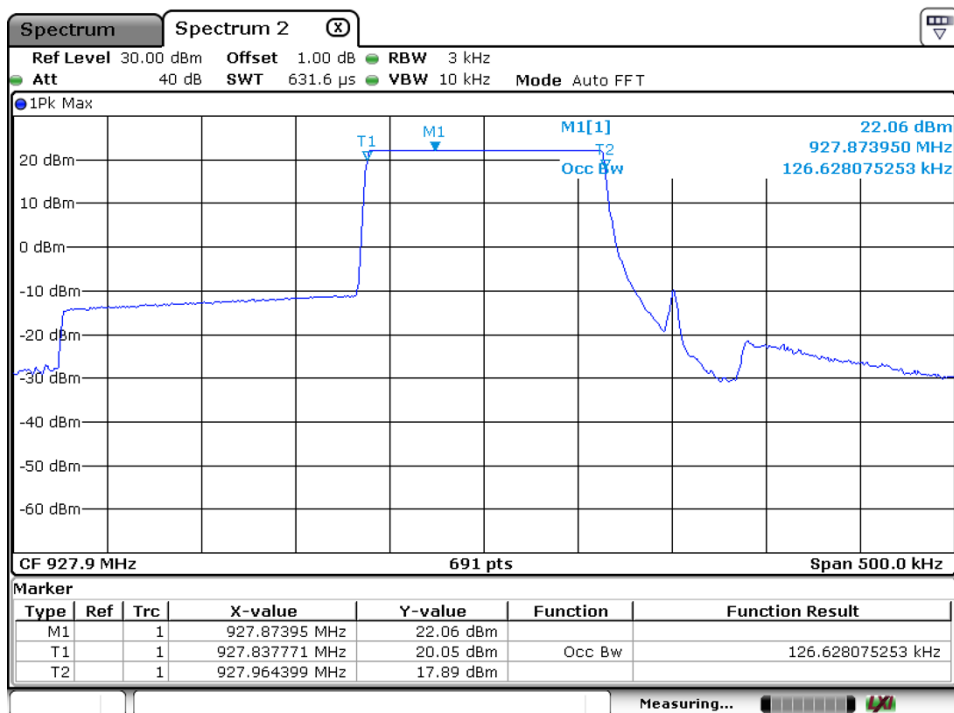


Middle Channel



Date: 23.DEC.2021 02:57:02

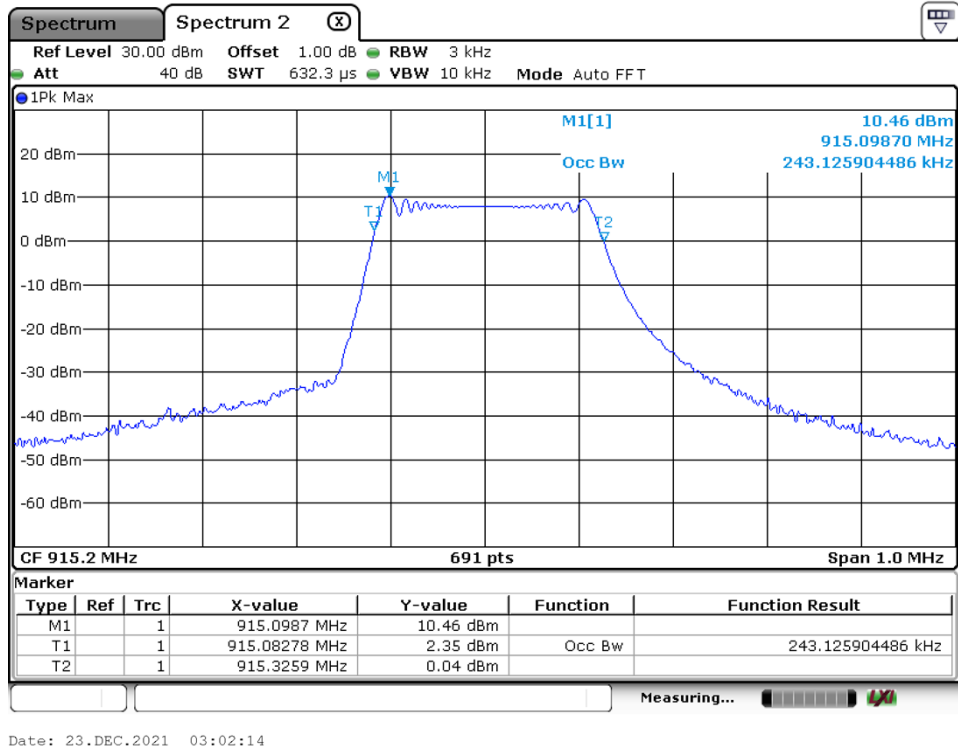
High Channel



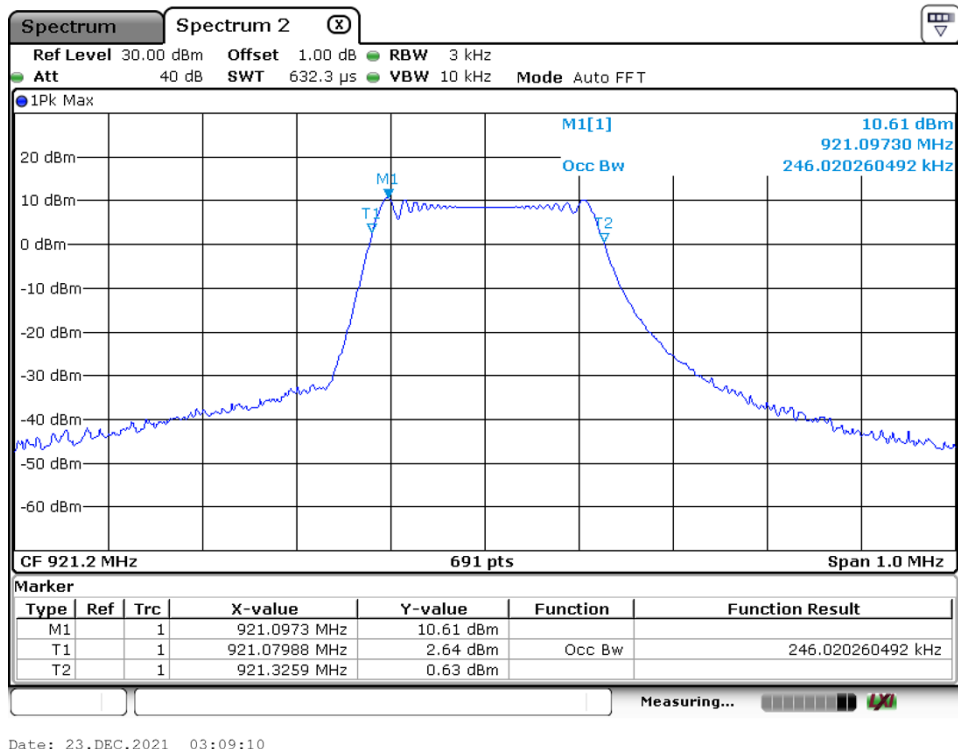
Date: 23.DEC.2021 02:56:16

Lora DTS SF7, OCW 250KHz

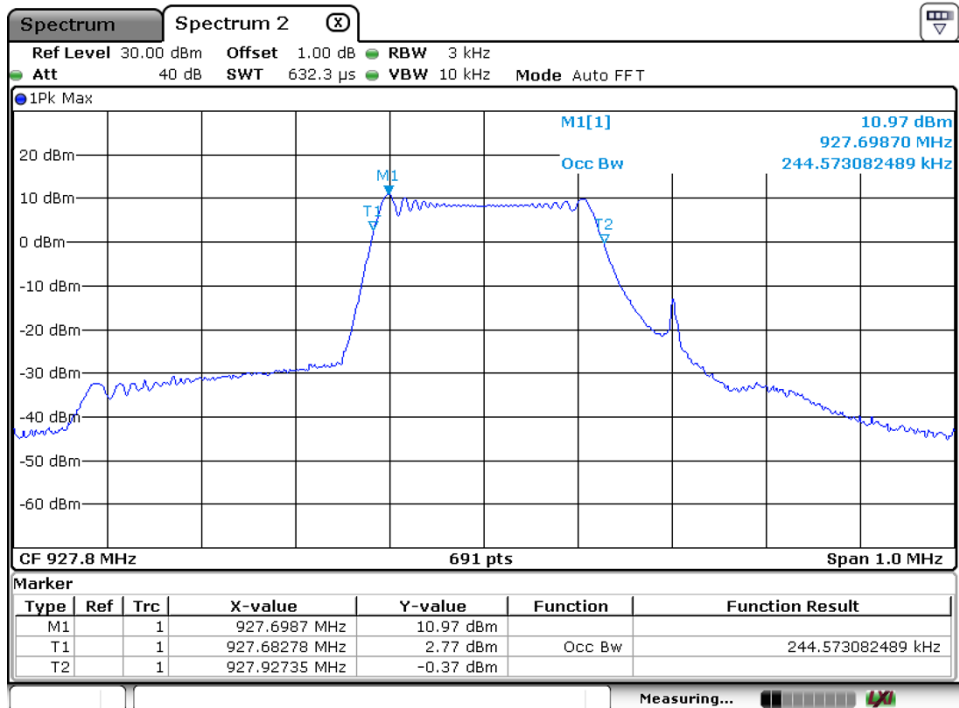
Low Channel



Middle Channel



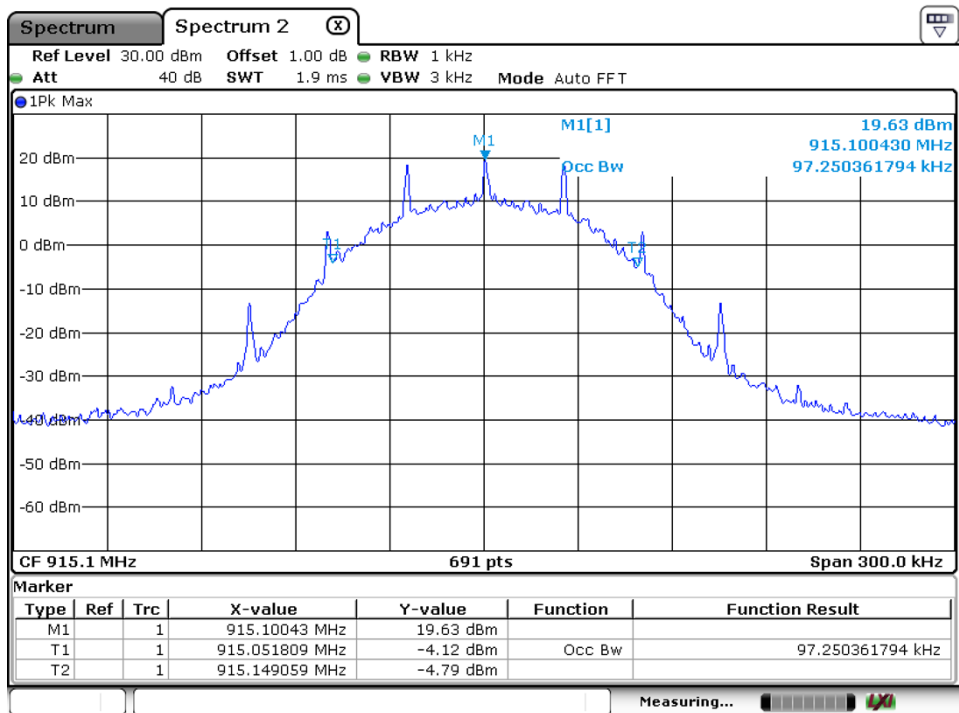
High Channel



Date: 23.DEC.2021 03:10:11

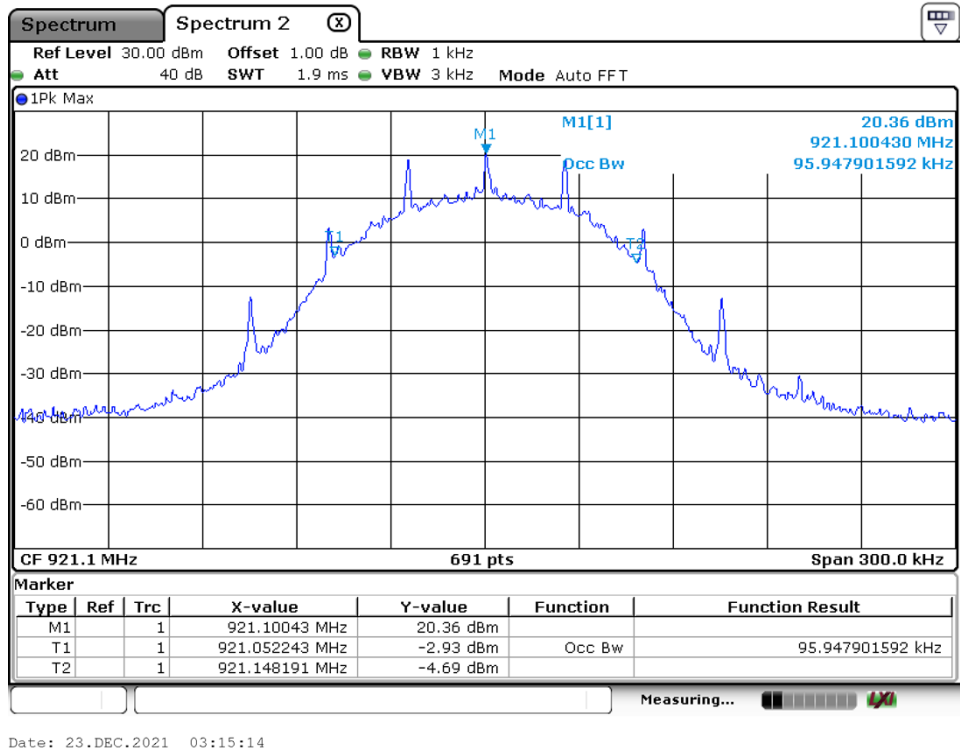
FSK, 50Kbps

Low Channel

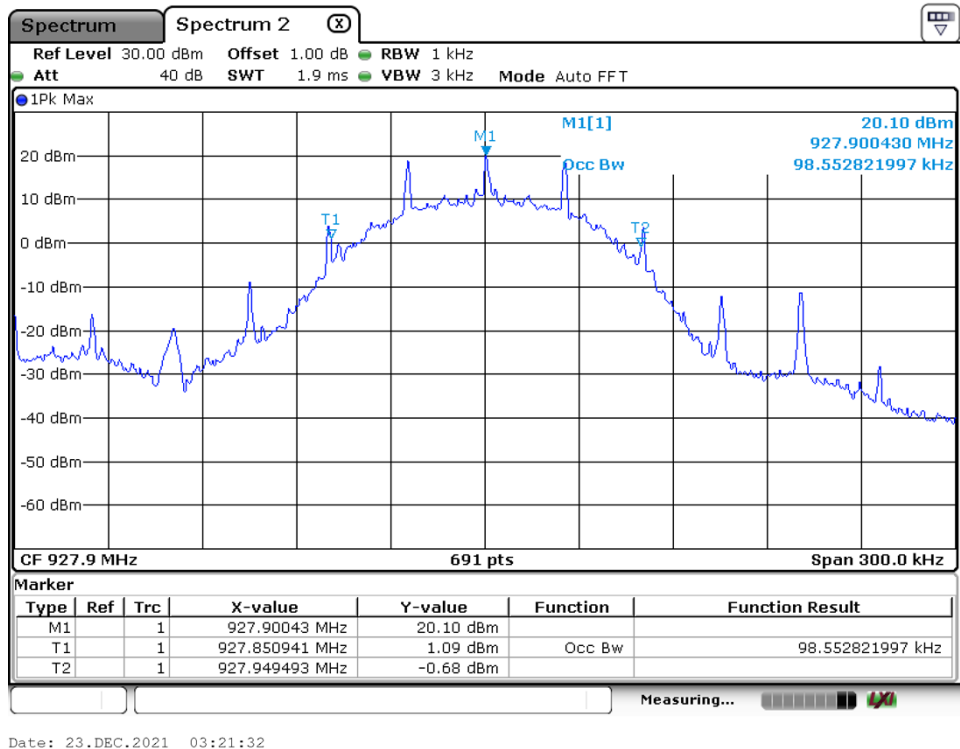


Date: 23.DEC.2021 03:19:47

Middle Channel

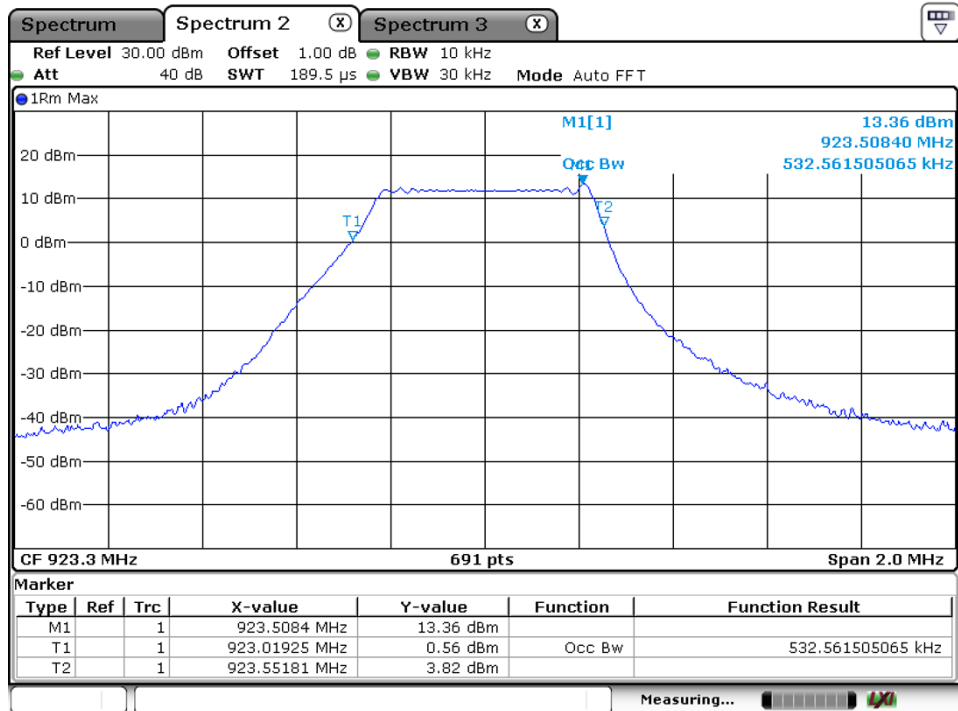


High Channel



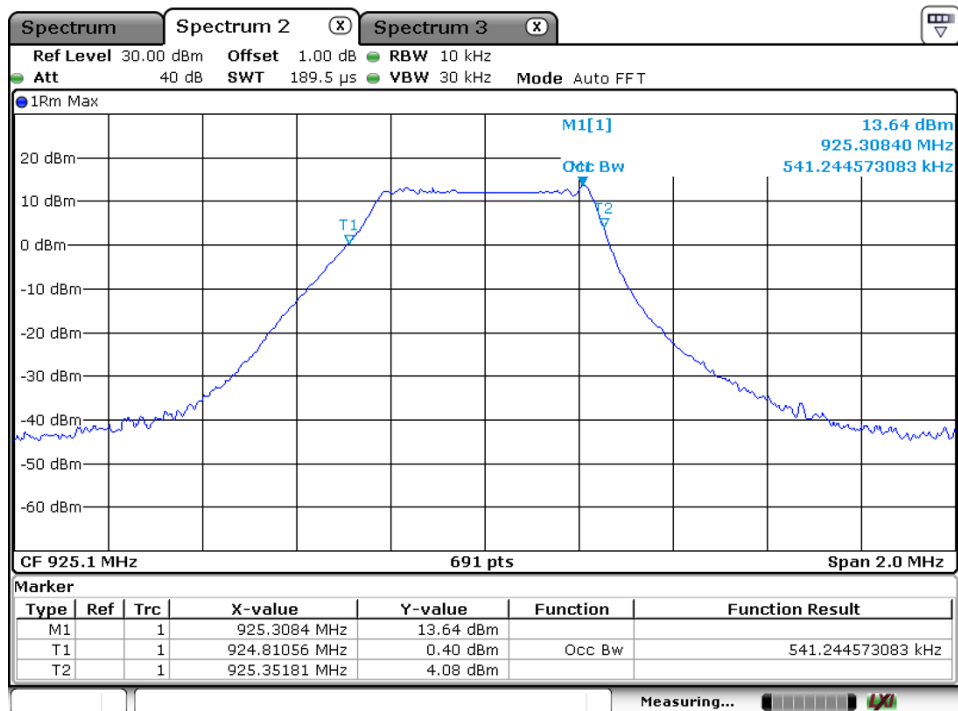
Lora DTS SF7, OCW 500KHz

Low Channel



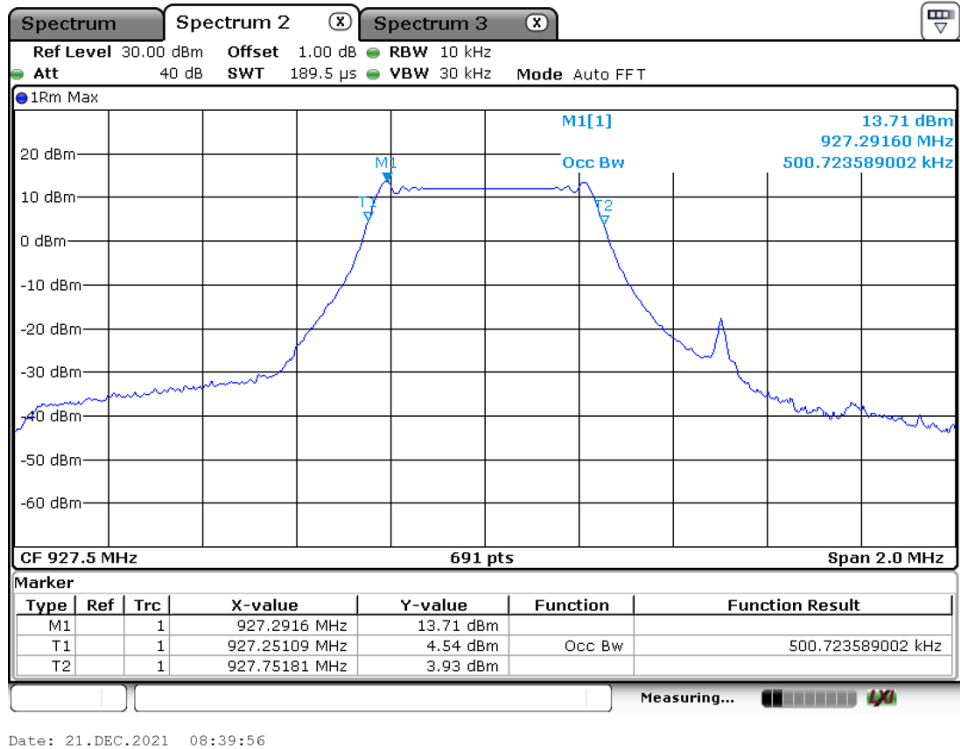
Date: 21.DEC.2021 08:38:11

Middle Channel



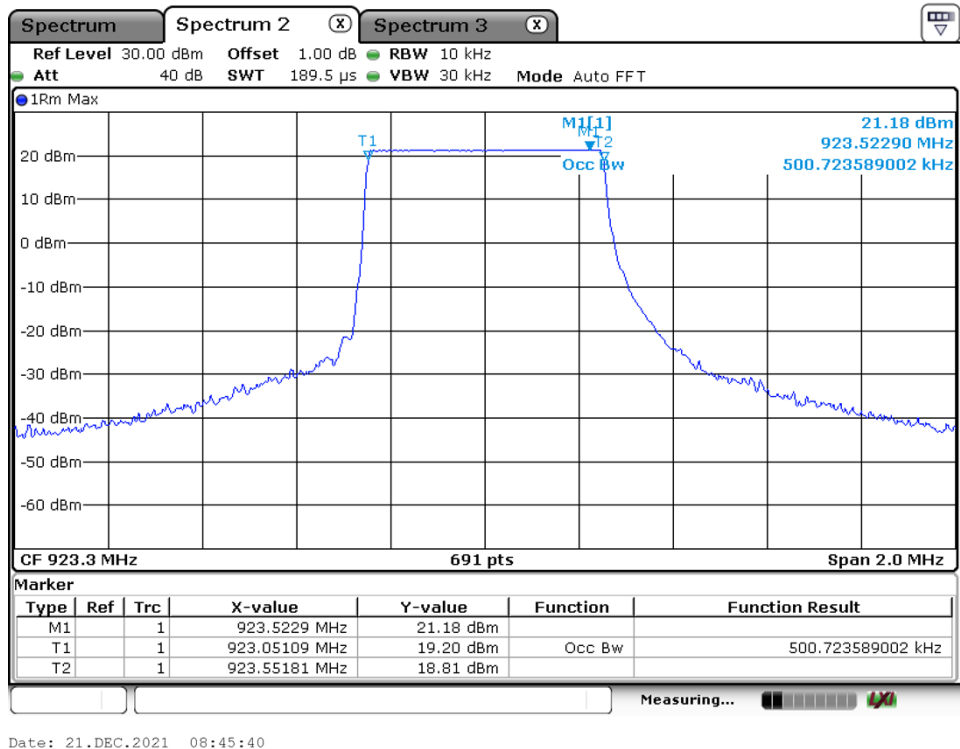
Date: 21.DEC.2021 08:34:38

High Channel

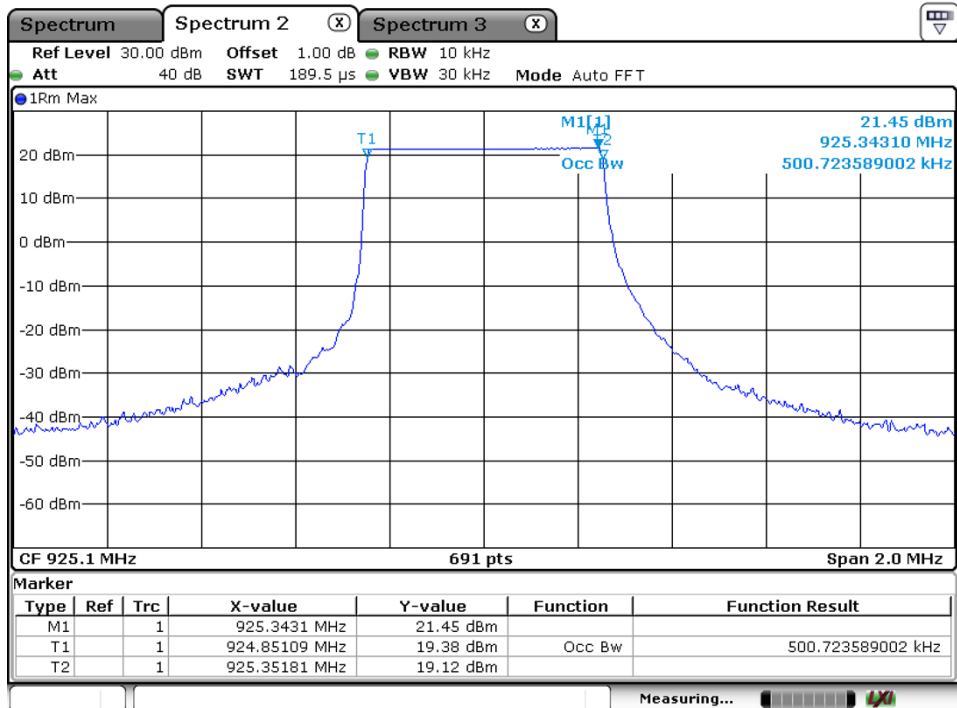


Lora DTS SF12, OCW 500KHz

Low Channel

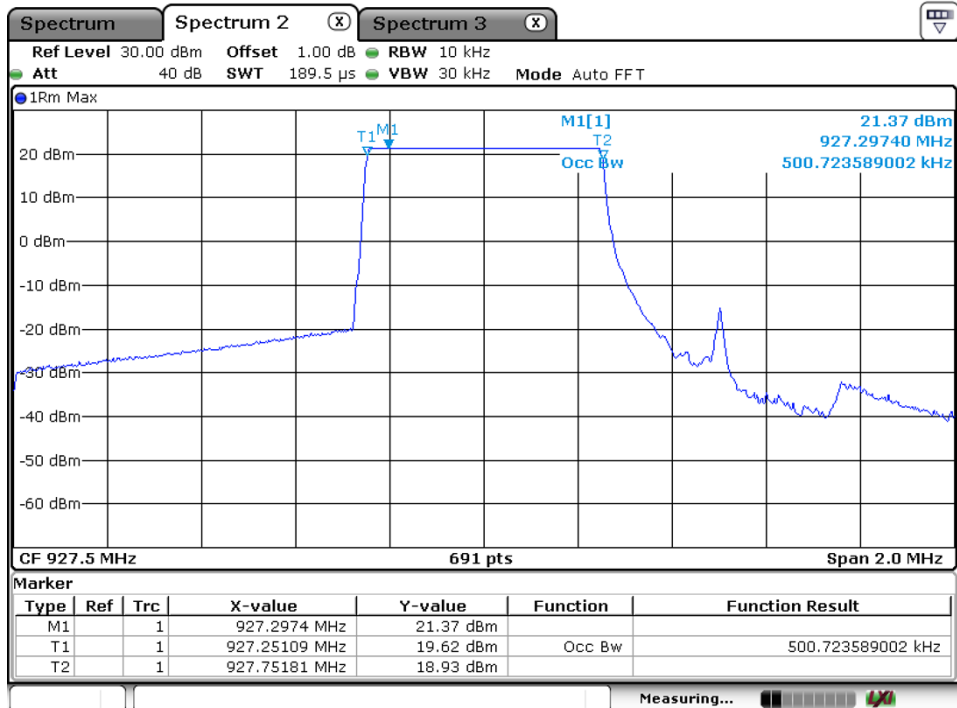


Middle Channel



Date: 21.DEC.2021 08:41:13

High Channel



Date: 21.DEC.2021 08:47:02

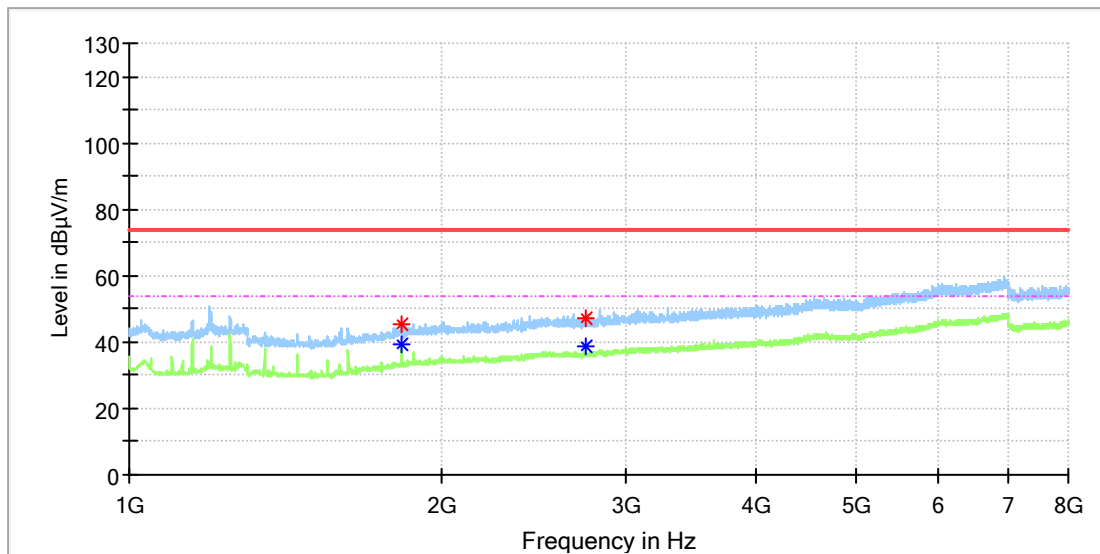
Note 1: Testing was carried out within frequency range 9 kHz to the tenth harmonics. The measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

Appendix A.5: Test Results of Transmitter Radiated Spurious Emissions

Lora DTS SF7 with 8dBi antenna, OCW 125KHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

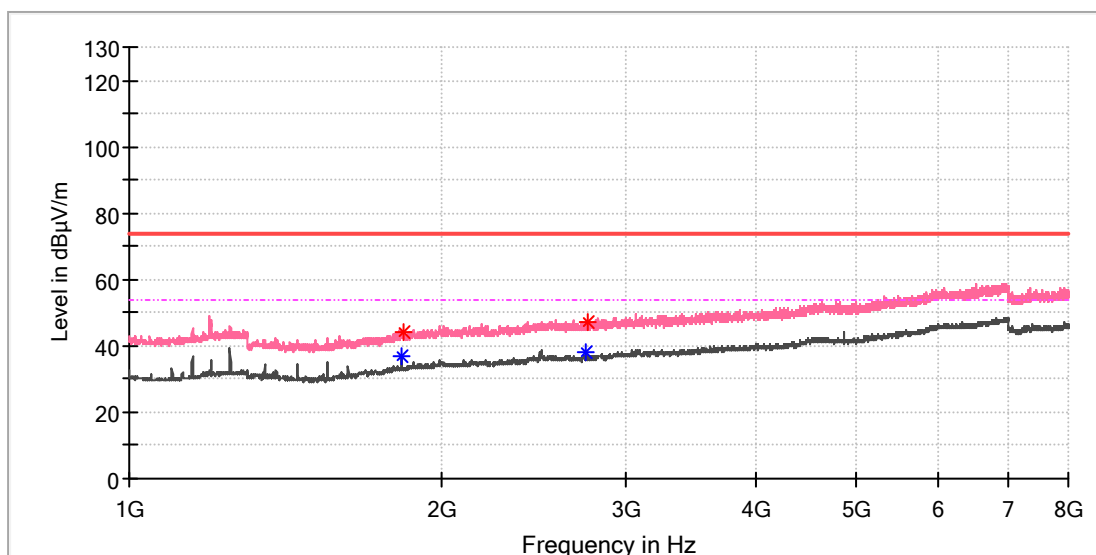


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.137500	45.11	---	74.00	28.89	100.0	H	217.0	4.9
1830.137500	---	39.42	54.00	14.58	100.0	H	217.0	4.9
2744.687500	47.43	---	74.00	26.57	100.0	H	205.0	7.8
2745.525000	---	38.94	54.00	15.06	100.0	H	296.0	7.8

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 125K_SF7_915.1MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 22 Humi:52%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

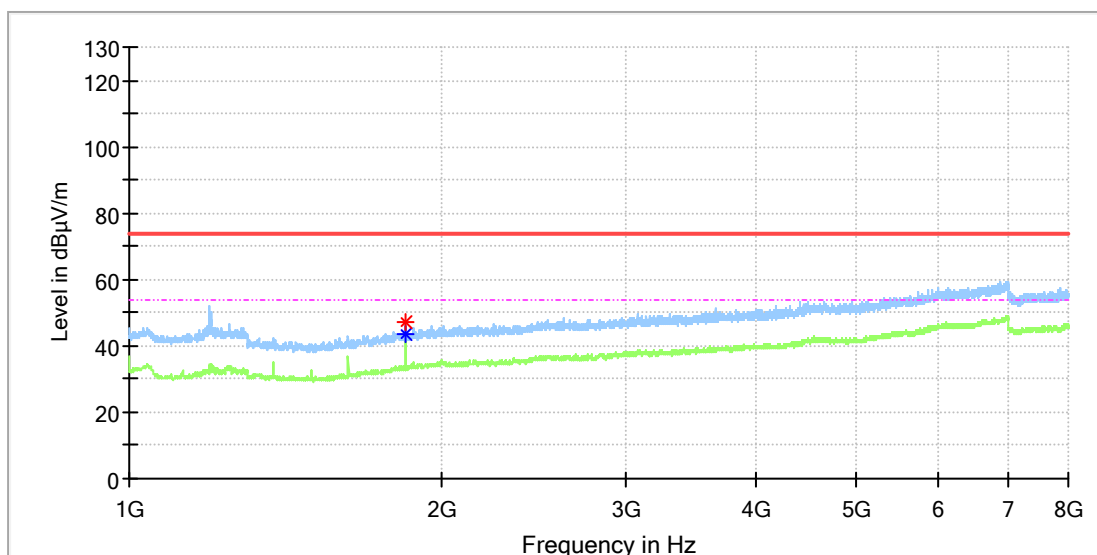


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.137500	---	37.07	54.00	16.93	100.0	V	92.0	4.9
1835.162500	44.37	---	74.00	29.63	100.0	V	285.0	4.9
2744.687500	---	38.12	54.00	15.88	100.0	V	274.0	7.8
2754.737500	47.45	---	74.00	26.55	100.0	V	45.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_921.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

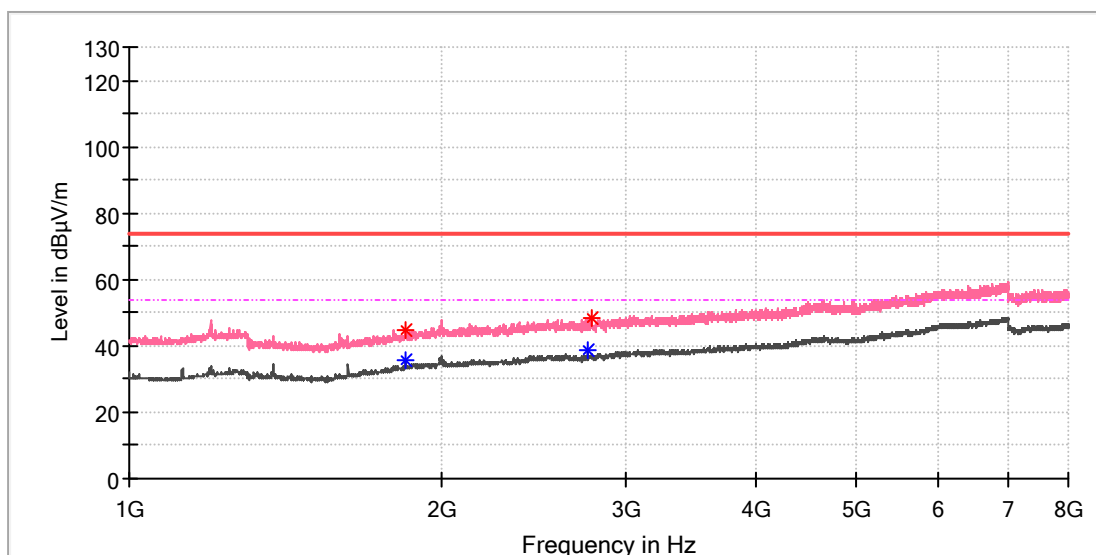


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.862500	47.30	---	74.00	26.70	100.0	H	310.0	4.9
1841.862500	---	43.37	54.00	10.63	100.0	H	310.0	4.9

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 125K_SF7_921.1MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

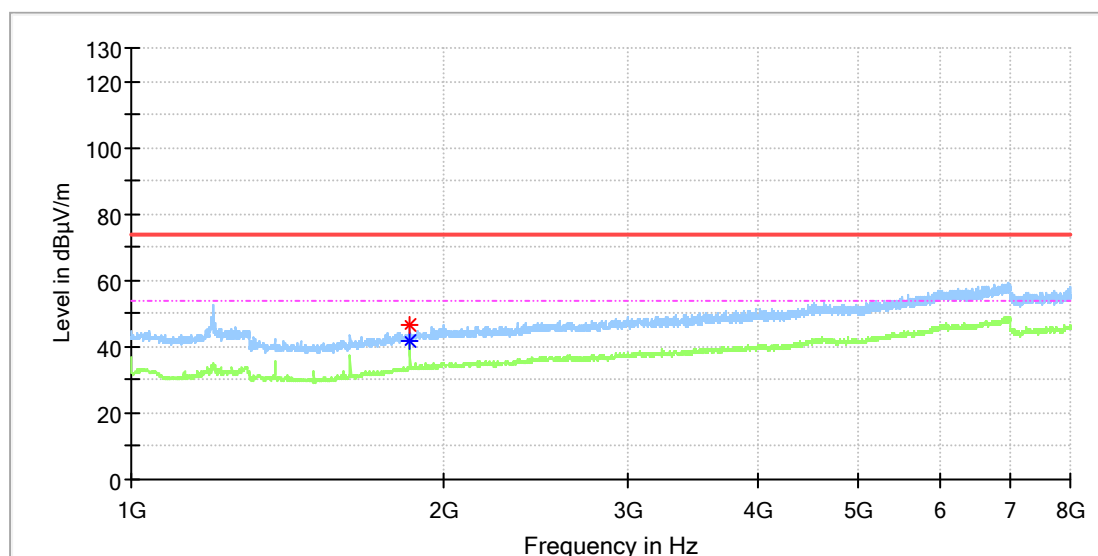


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.862500	---	35.93	54.00	18.07	100.0	V	78.0	4.9
1845.212500	44.88	---	74.00	29.12	100.0	V	249.0	5.0
2763.112500	---	38.70	54.00	15.30	100.0	V	286.0	7.9
2783.212500	48.15	---	74.00	25.85	100.0	V	33.0	7.9

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 125K_SF7_927.9MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

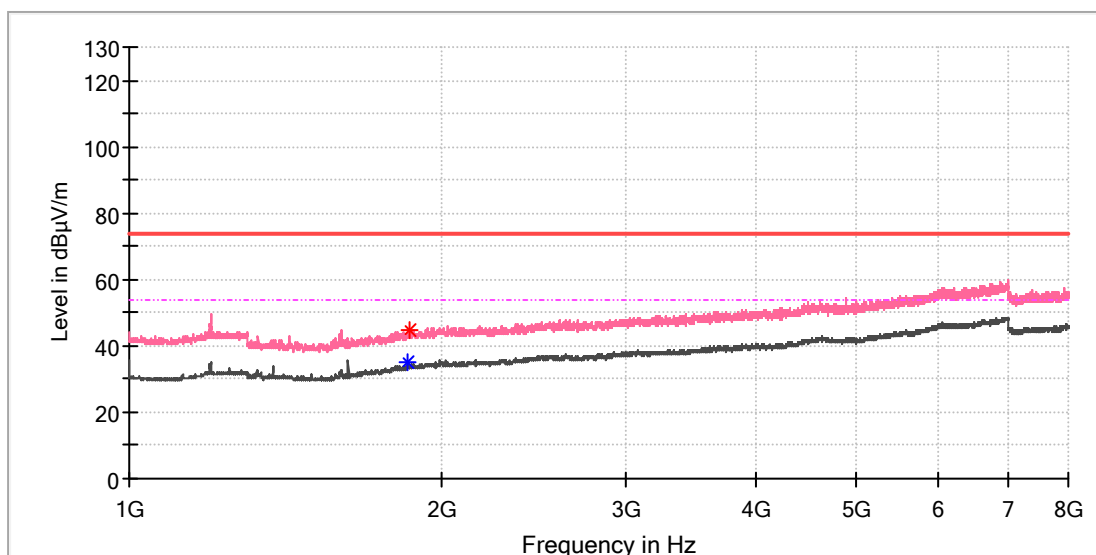


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.262500	46.35	---	74.00	27.65	100.0	H	314.0	5.0
1855.262500	---	41.88	54.00	12.12	100.0	H	314.0	5.0

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

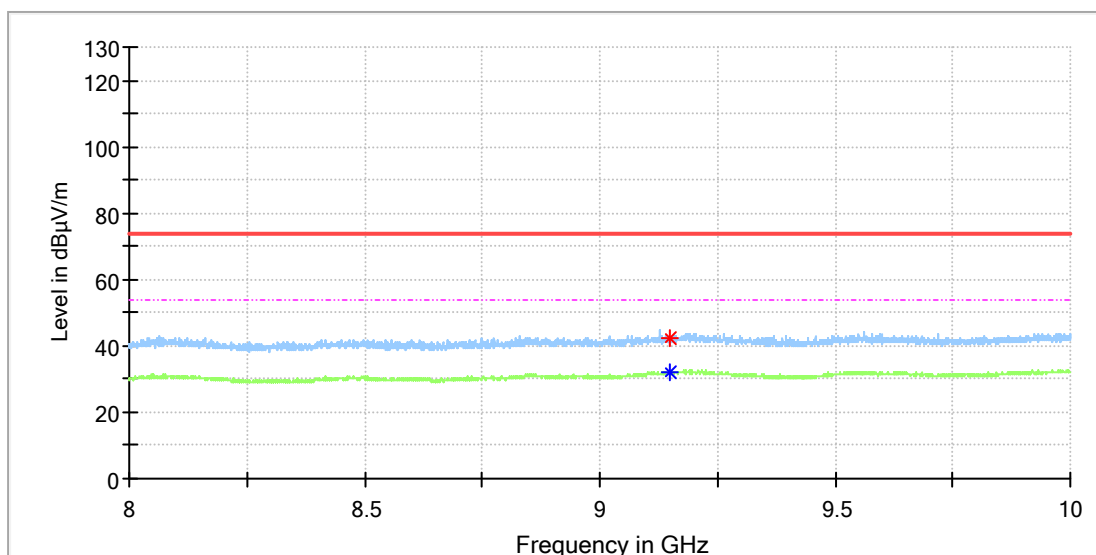


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.262500	---	35.17	54.00	18.83	100.0	V	59.0	5.0
1858.612500	44.55	---	74.00	29.45	100.0	V	164.0	5.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

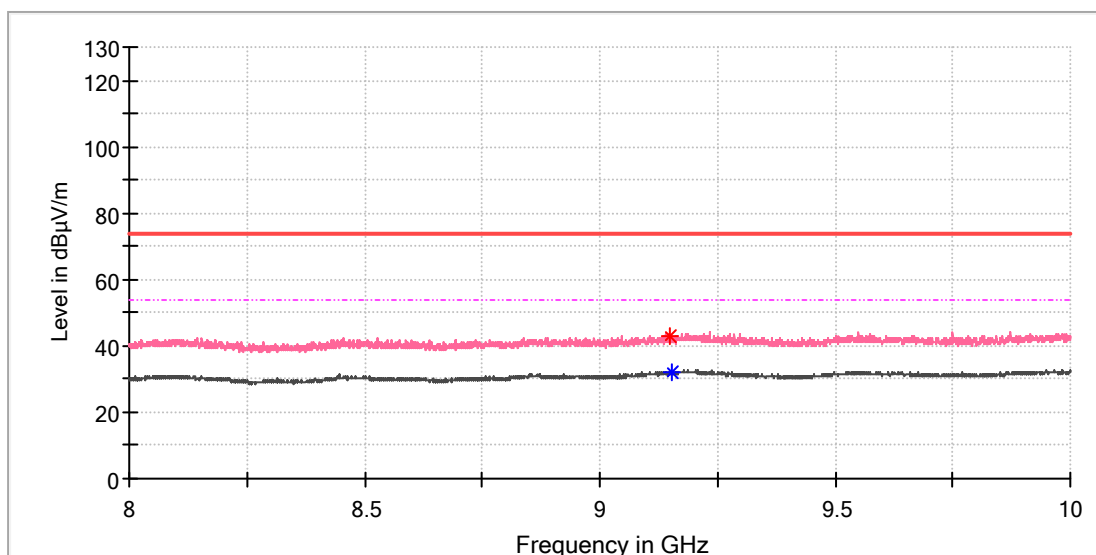


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9148.500000	42.40	---	74.00	31.60	100.0	H	356.0	10.1
9151.000000	---	31.95	54.00	22.05	100.0	H	268.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

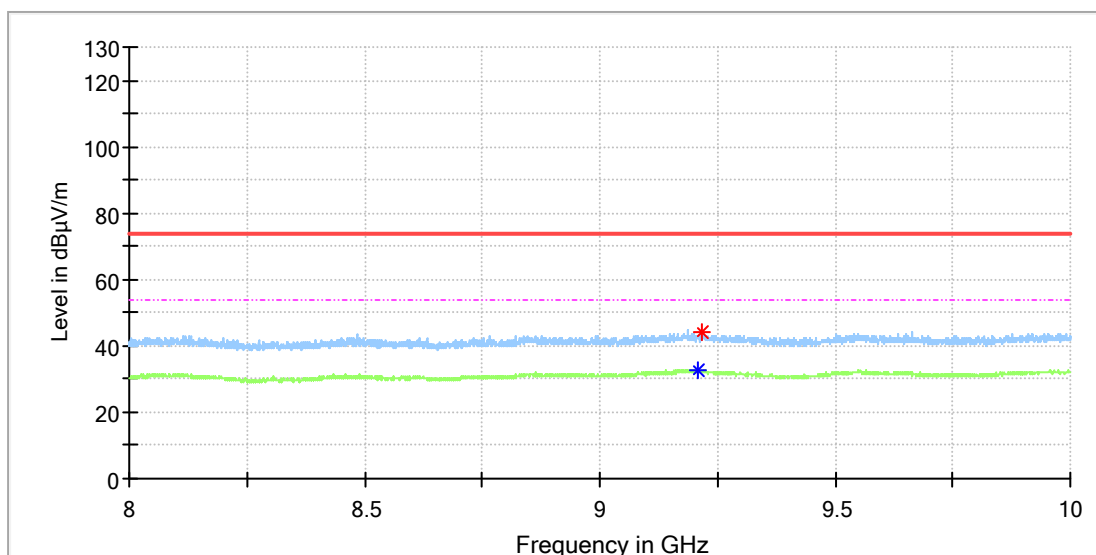


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9147.500000	42.96	---	74.00	31.04	100.0	V	318.0	10.1
9153.000000	---	32.10	54.00	21.90	100.0	V	53.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_921.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

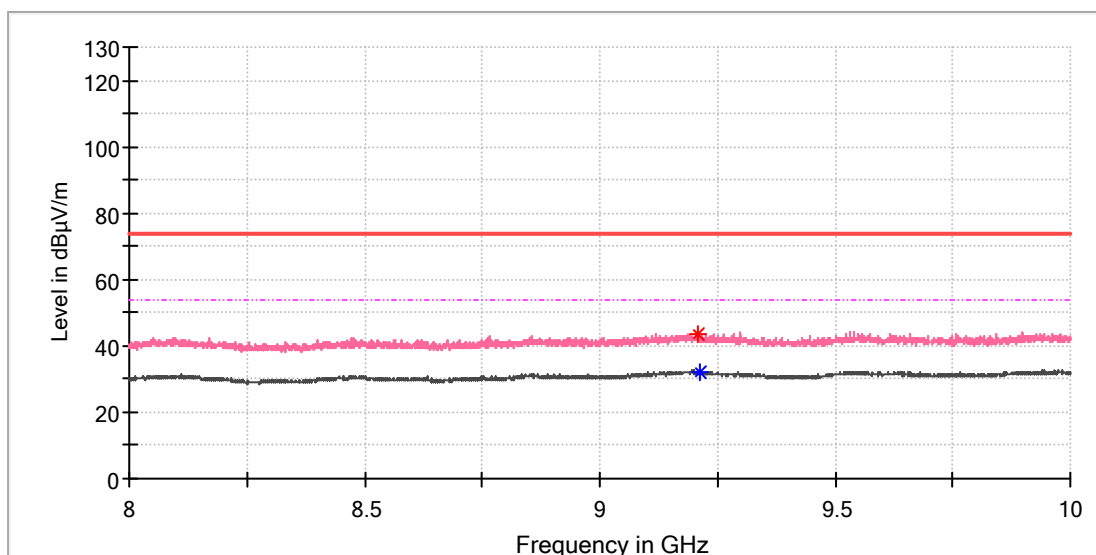


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9209.000000	---	32.78	54.00	21.22	100.0	H	231.0	10.3
9215.000000	43.84	---	74.00	30.16	100.0	H	221.0	10.3

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 125K_SF7_921.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

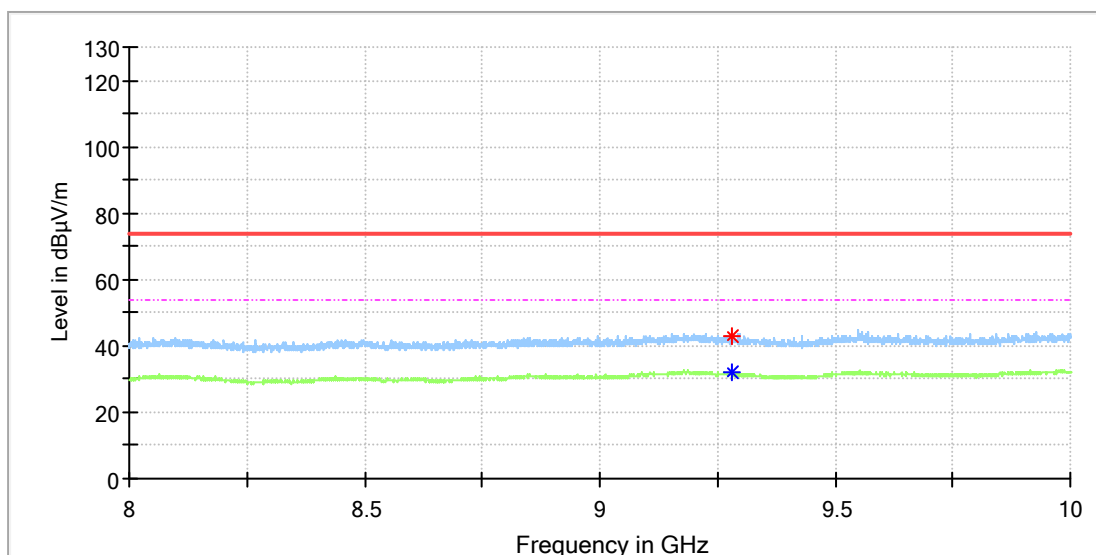


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9210.500000	43.42	---	74.00	30.58	100.0	V	26.0	10.3
9214.500000	---	32.05	54.00	21.95	100.0	V	9.0	10.3

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 125K_SF7_927.9MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

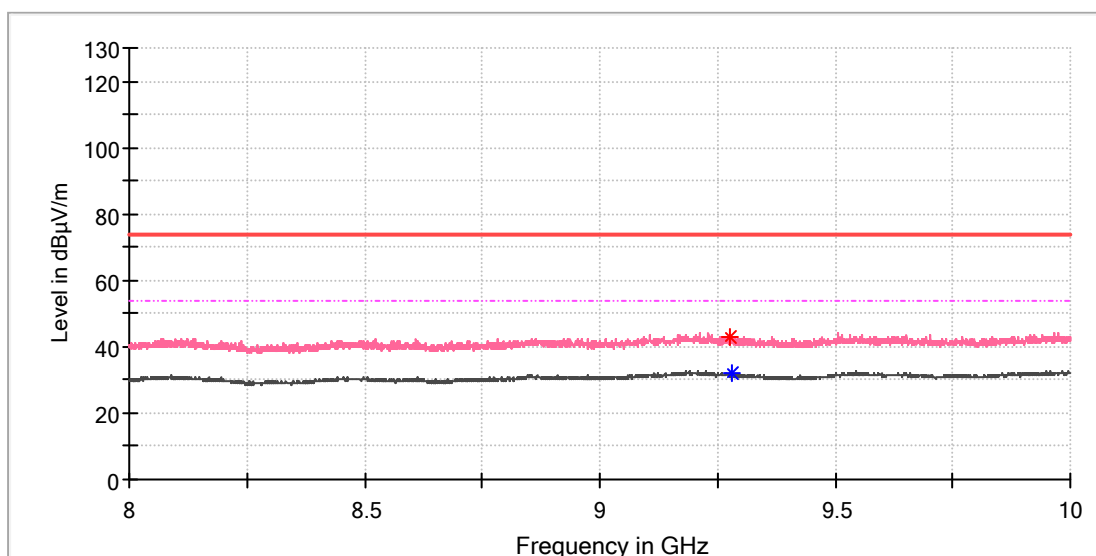


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9279.500000	42.67	---	74.00	31.33	100.0	H	72.0	10.1
9279.500000	---	31.77	54.00	22.23	100.0	H	72.0	10.1

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 125K_SF7_927.9MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



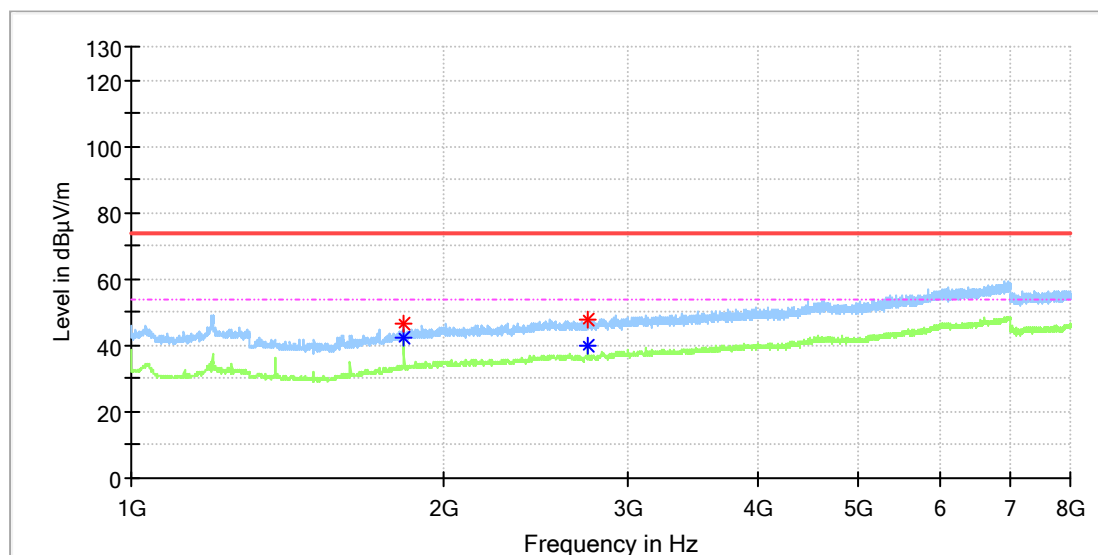
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9275.000000	43.15	---	74.00	30.85	100.0	V	152.0	10.2
9279.000000	---	31.85	54.00	22.15	100.0	V	293.0	10.1

Lora DTS SF7 with 8dBi antenna, OCW 250KHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_915.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

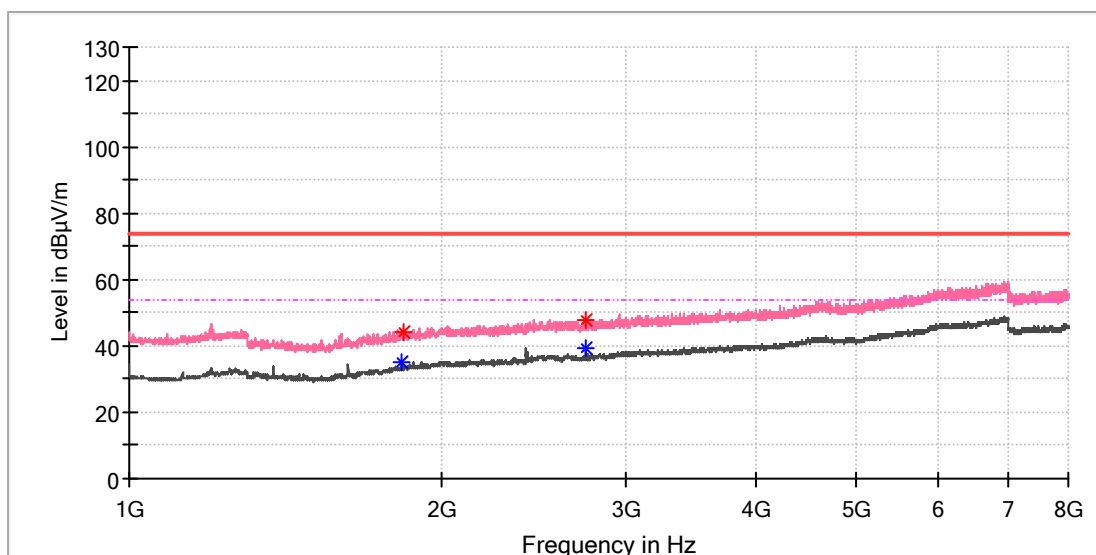


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.137500	46.59	---	74.00	27.41	100.0	H	34.0	4.9
1830.137500	---	42.62	54.00	11.38	100.0	H	34.0	4.9
2743.850000	48.03	---	74.00	25.97	100.0	H	0.0	7.8
2745.525000	---	39.86	54.00	14.14	100.0	H	13.0	7.8

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 250K_SF7_915.2MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

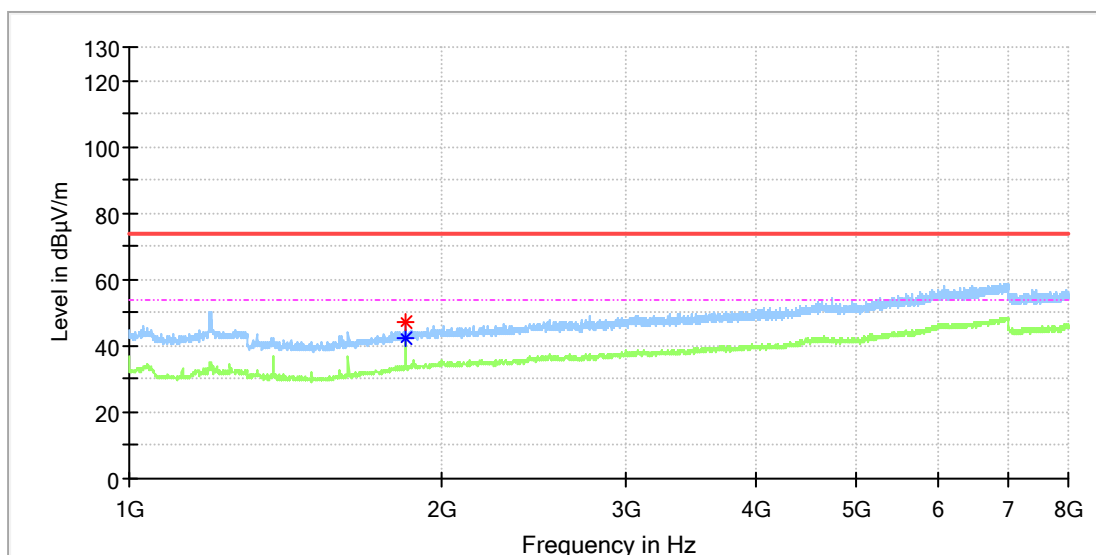


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.137500	---	35.13	54.00	18.87	100.0	V	5.0	4.9
1832.650000	43.87	---	74.00	30.13	100.0	V	24.0	4.9
2744.687500	48.06	---	74.00	25.94	100.0	V	140.0	7.8
2744.687500	---	39.53	54.00	14.47	100.0	V	140.0	7.8

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

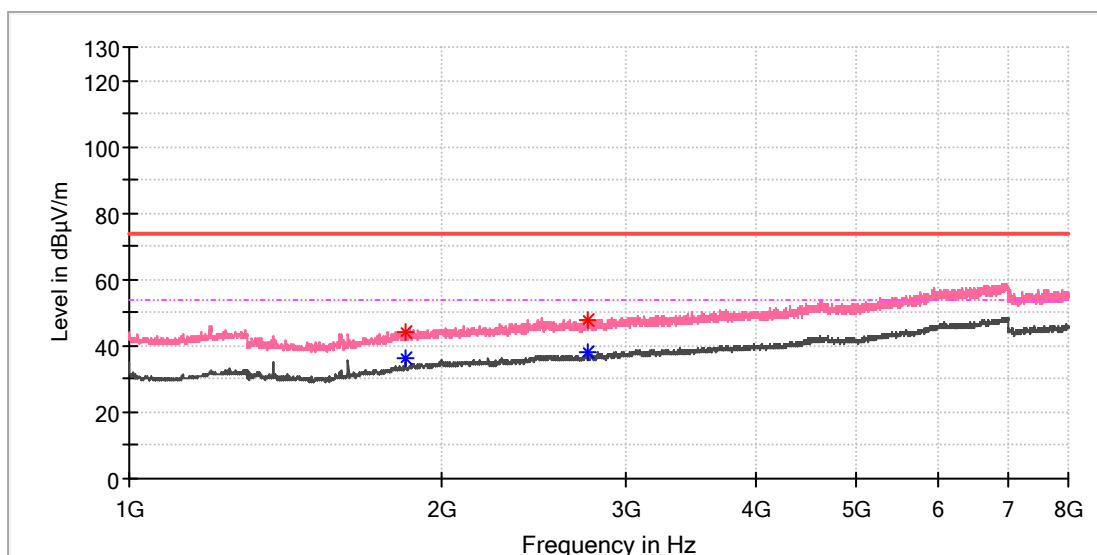


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.862500	---	42.20	54.00	11.80	100.0	H	42.0	4.9
1842.700000	47.23	---	74.00	26.77	100.0	H	310.0	4.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

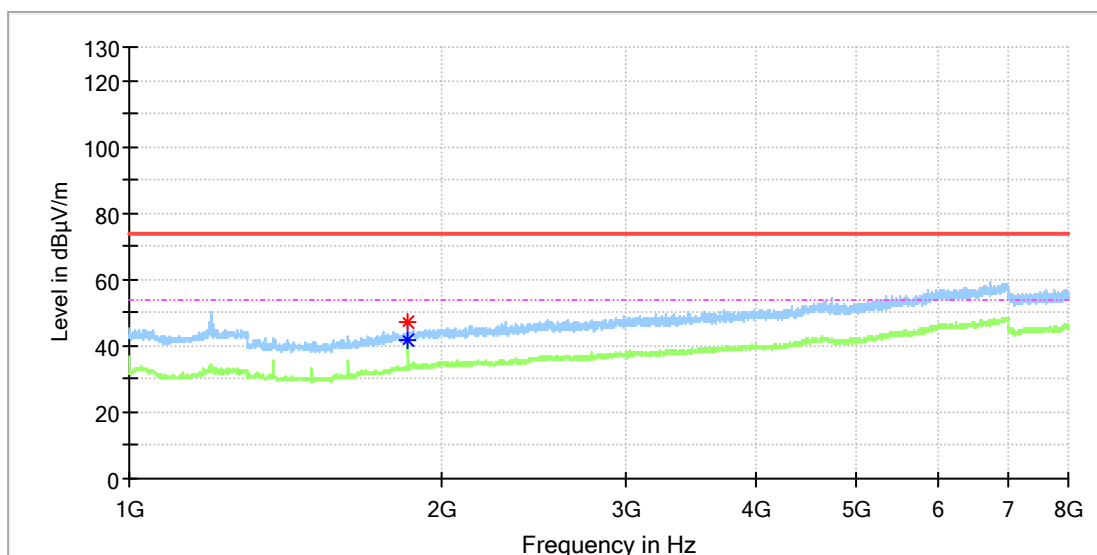


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.025000	43.90	---	74.00	30.10	100.0	V	79.0	4.9
1841.862500	---	36.25	54.00	17.75	100.0	V	9.0	4.9
2755.575000	47.81	---	74.00	26.19	100.0	V	57.0	7.9
2763.950000	---	37.98	54.00	16.02	100.0	V	137.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_927.8MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

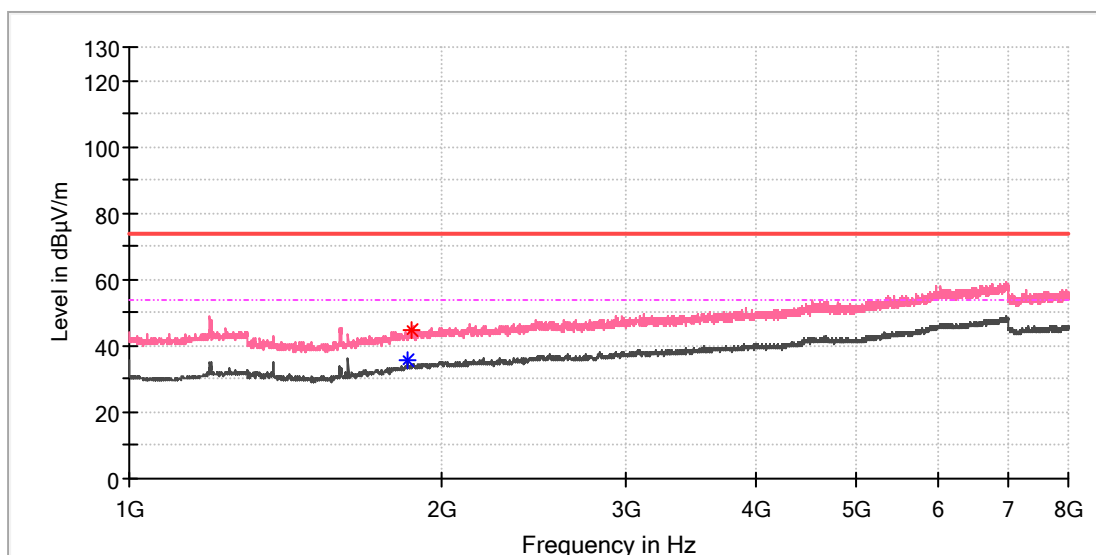


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.262500	47.33	---	74.00	26.67	100.0	H	36.0	5.0
1855.262500	---	41.97	54.00	12.03	100.0	H	36.0	5.0

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_927.8MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

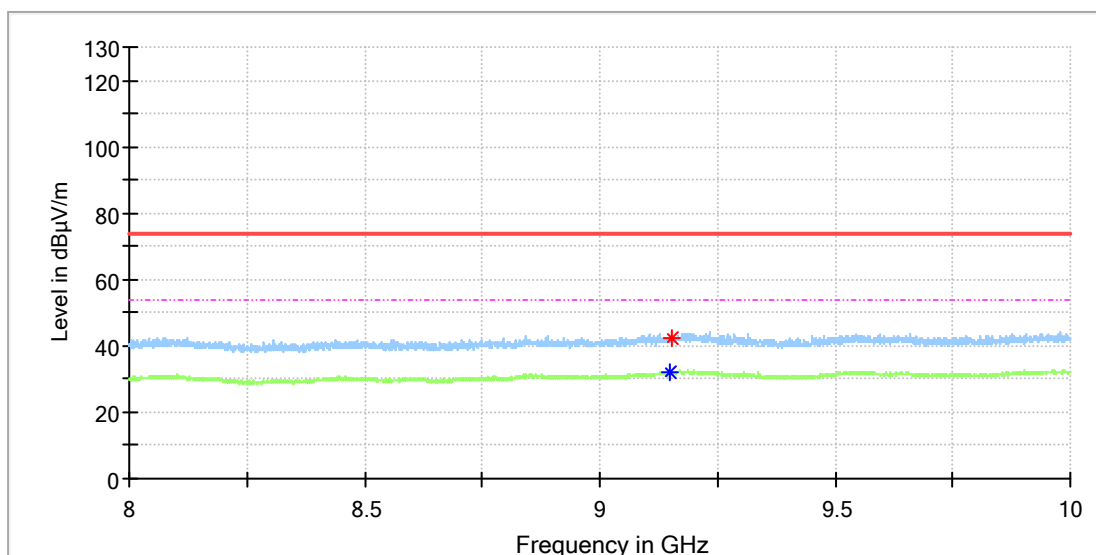


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.262500	---	35.43	54.00	18.57	100.0	V	306.0	5.0
1865.312500	44.82	---	74.00	29.18	100.0	V	15.0	5.2

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_915.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

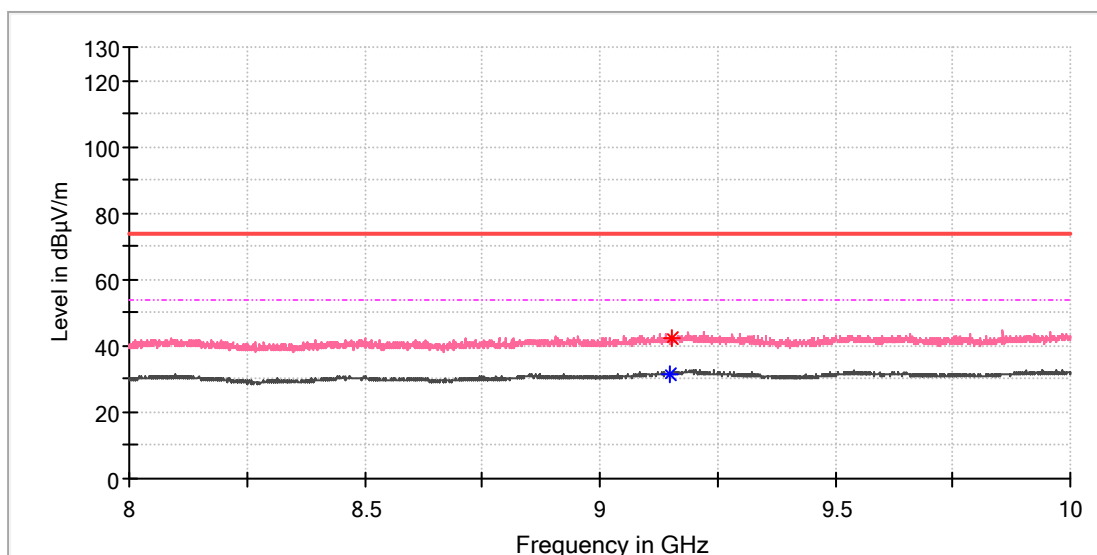


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9150.000000	---	32.34	54.00	21.66	100.0	H	217.0	10.1
9153.000000	42.42	---	74.00	31.58	100.0	H	200.0	10.1

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 250K_SF7_915.2MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

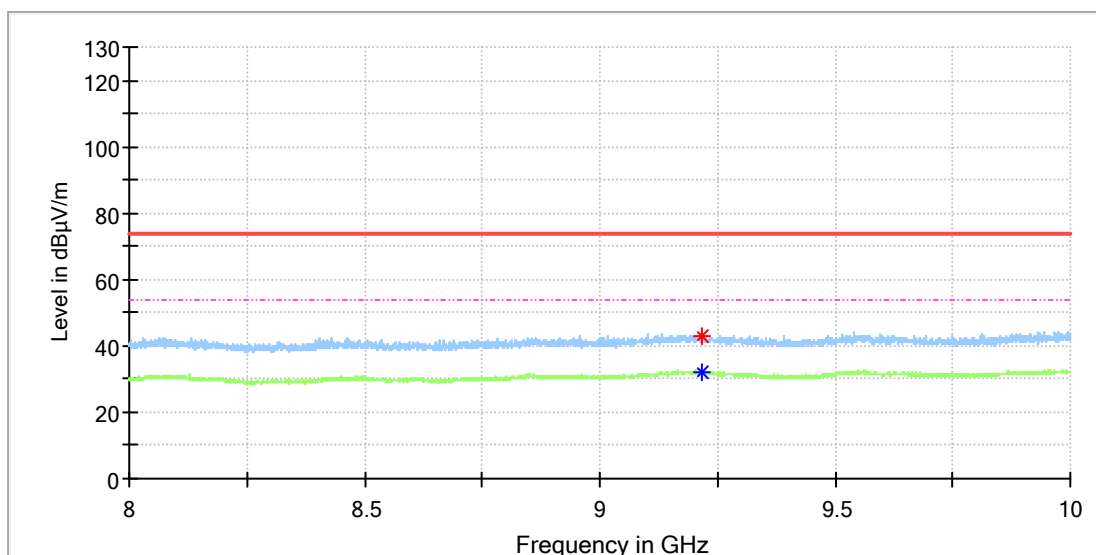


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9150.500000	---	31.62	54.00	22.38	100.0	V	11.0	10.1
9154.000000	42.61	---	74.00	31.39	100.0	V	187.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

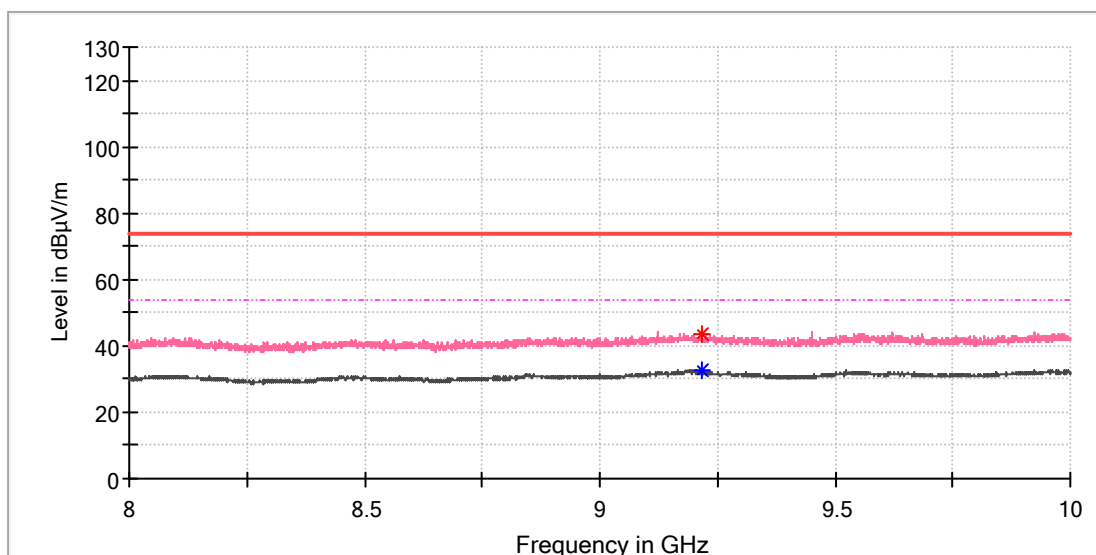


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9215.000000	43.11	---	74.00	30.89	100.0	H	120.0	10.3
9215.500000	---	32.21	54.00	21.79	100.0	H	264.0	10.3

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

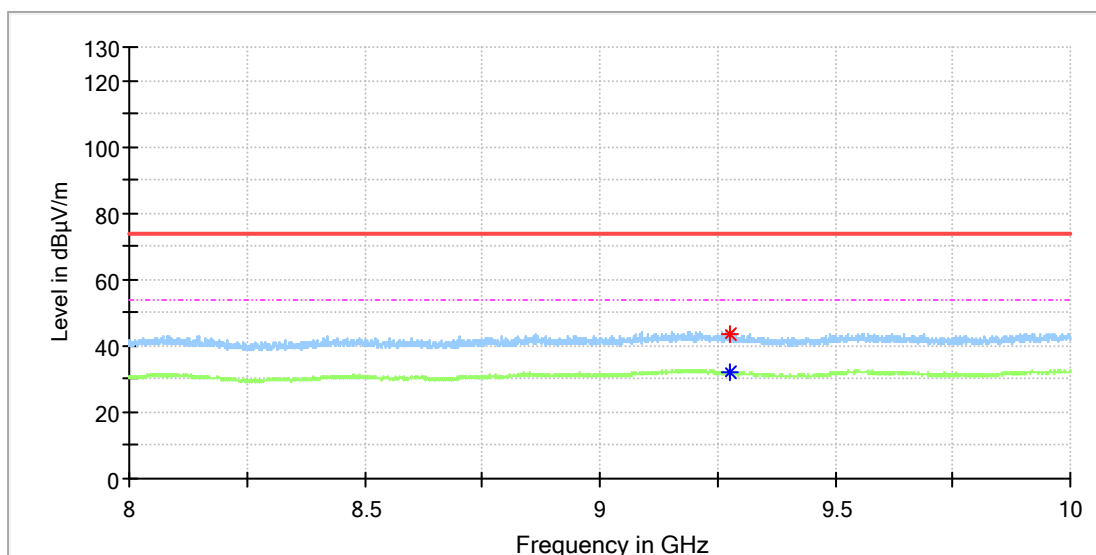


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9216.000000	---	32.39	54.00	21.61	100.0	V	182.0	10.3
9217.500000	43.40	---	74.00	30.60	100.0	V	171.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 250K_SF7_927.8MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

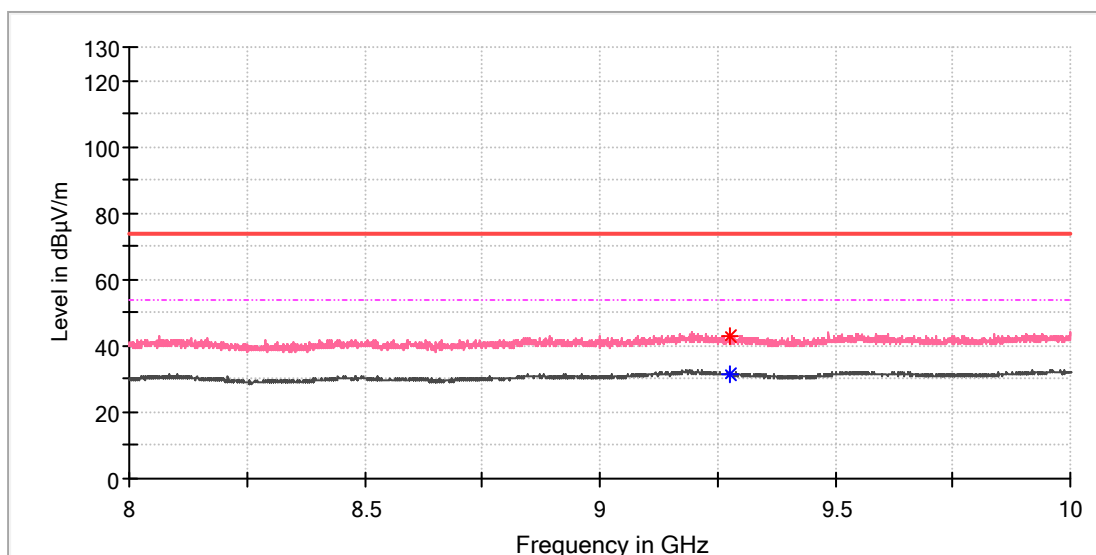


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9274.500000	43.29	---	74.00	30.71	100.0	H	149.0	10.2
9278.000000	---	32.17	54.00	21.83	100.0	H	159.0	10.2

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 250K_SF7_927.8MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



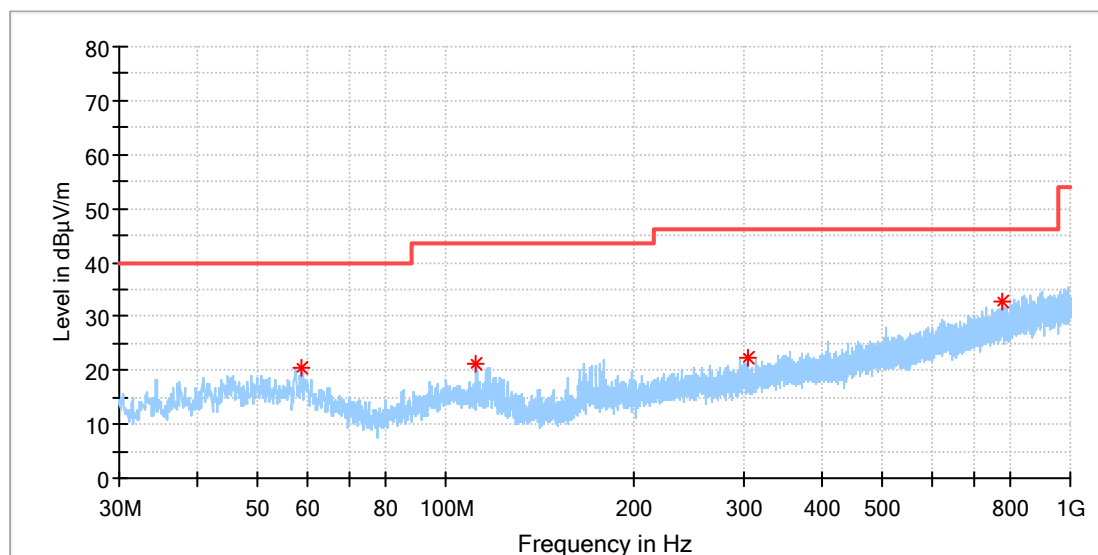
Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9275.500000	42.98	---	74.00	31.02	100.0	V	193.0	10.2
9277.000000	---	31.59	54.00	22.41	100.0	V	243.0	10.2

FSK, 50Kbps with 8dBi antenna

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

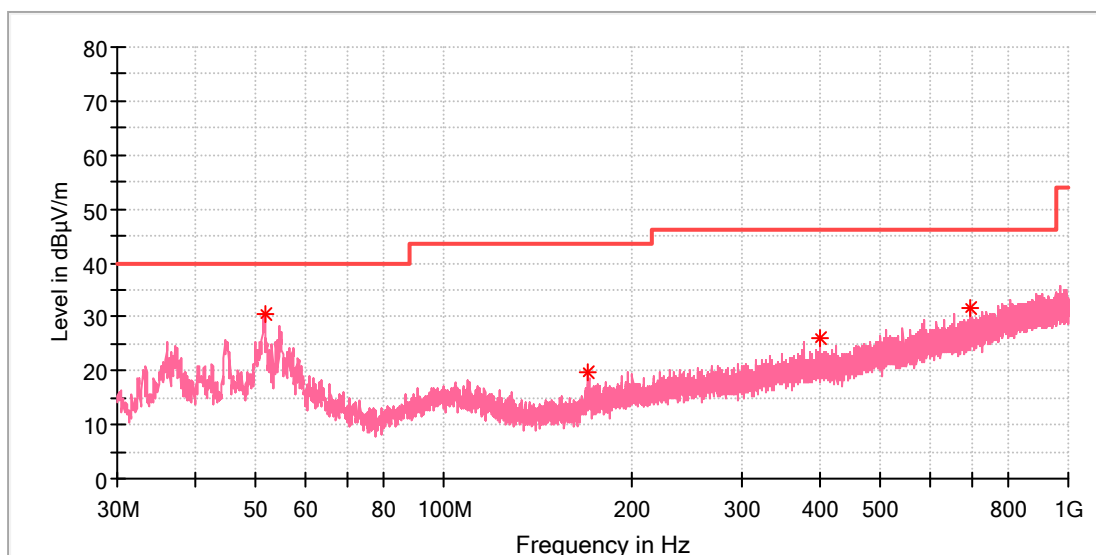


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
58.760500	20.47	40.00	19.53	100.0	H	265.0	-18.8
111.965000	21.35	43.50	22.15	100.0	H	168.0	-19.3
304.316000	22.42	46.00	23.58	100.0	H	121.0	-16.2
776.366500	32.86	46.00	13.14	100.0	H	0.0	-6.7

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

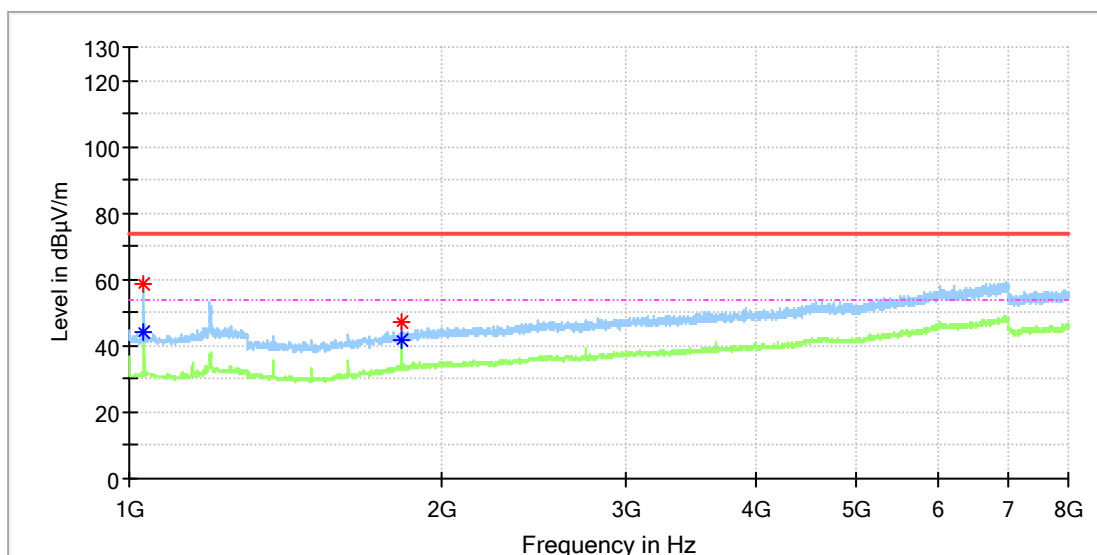


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.679500	30.69	40.00	9.31	100.0	V	205.0	-18.4
170.262000	19.79	43.50	23.71	100.0	V	188.0	-21.2
400.006500	26.10	46.00	19.90	100.0	V	307.0	-13.6
696.099000	31.54	46.00	14.46	100.0	V	115.0	-8.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

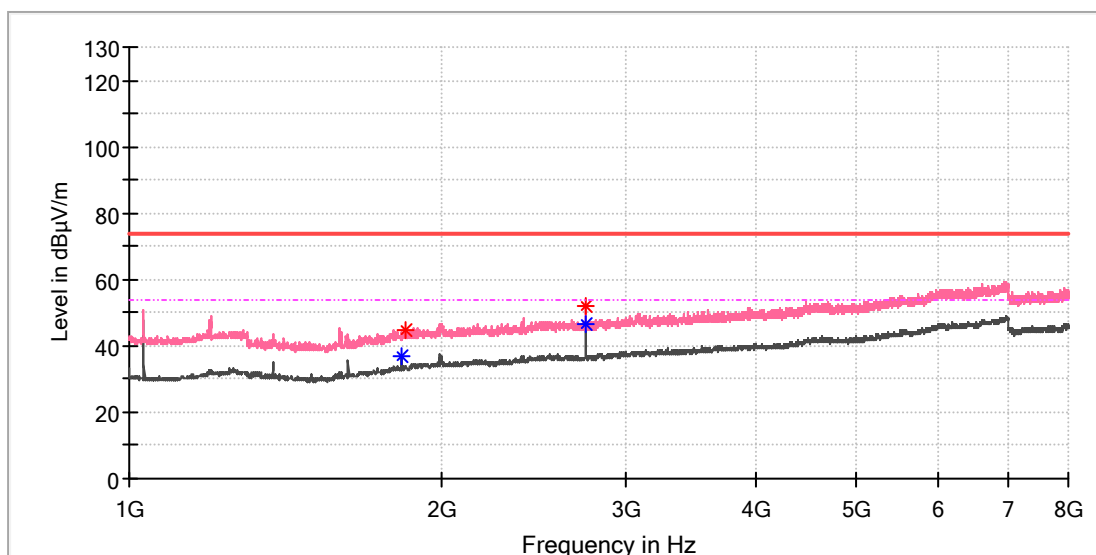


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1032.500000	58.59	---	74.00	15.41	100.0	H	190.0	-0.2
1033.500000	---	44.27	54.00	9.73	100.0	H	190.0	-0.2
1830.137500	---	41.43	54.00	12.57	100.0	H	73.0	4.9
1830.137500	46.88	---	74.00	27.12	100.0	H	73.0	4.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

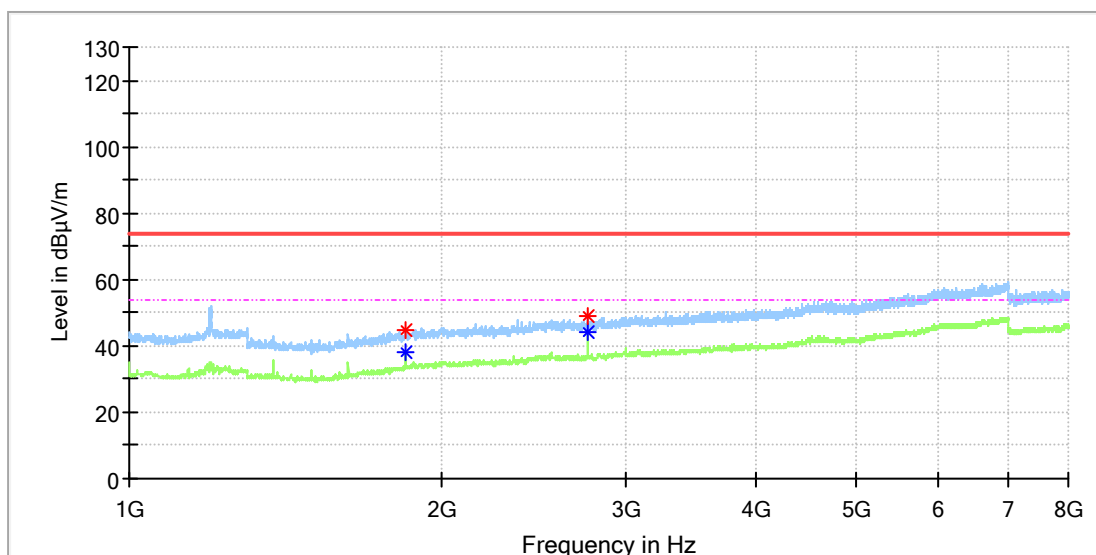


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.137500	---	36.95	54.00	17.05	100.0	V	281.0	4.9
1842.700000	44.48	---	74.00	29.52	100.0	V	113.0	4.9
2744.687500	---	46.74	54.00	7.26	100.0	V	146.0	7.8
2745.525000	52.20	---	74.00	21.80	100.0	V	146.0	7.8

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: FSK 50K_921.2MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

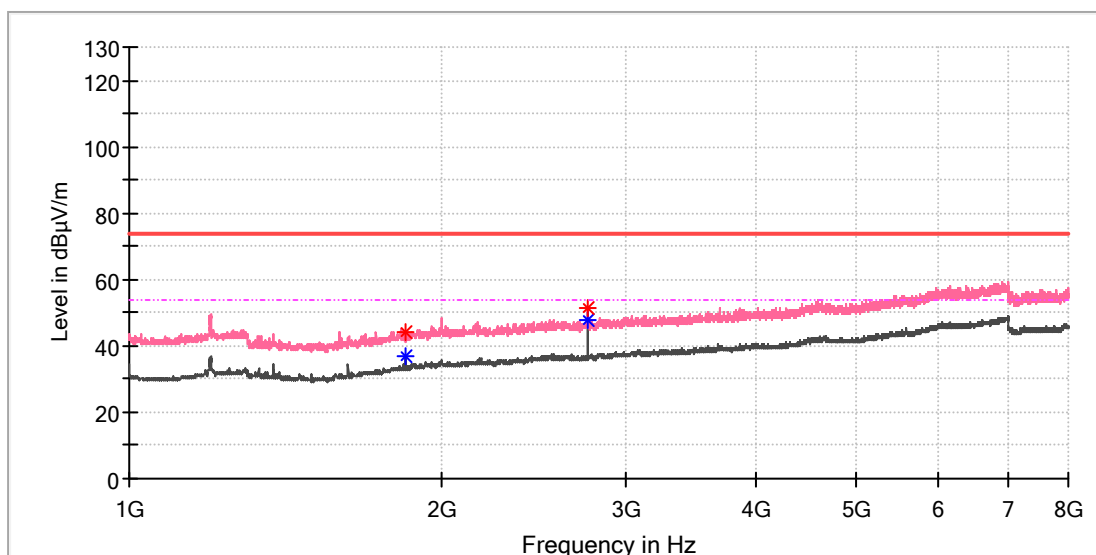


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.862500	---	38.38	54.00	15.62	100.0	H	217.0	4.9
1842.700000	44.85	---	74.00	29.15	100.0	H	217.0	4.9
2763.112500	49.06	---	74.00	24.94	100.0	H	90.0	7.9
2763.112500	---	44.12	54.00	9.88	100.0	H	90.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

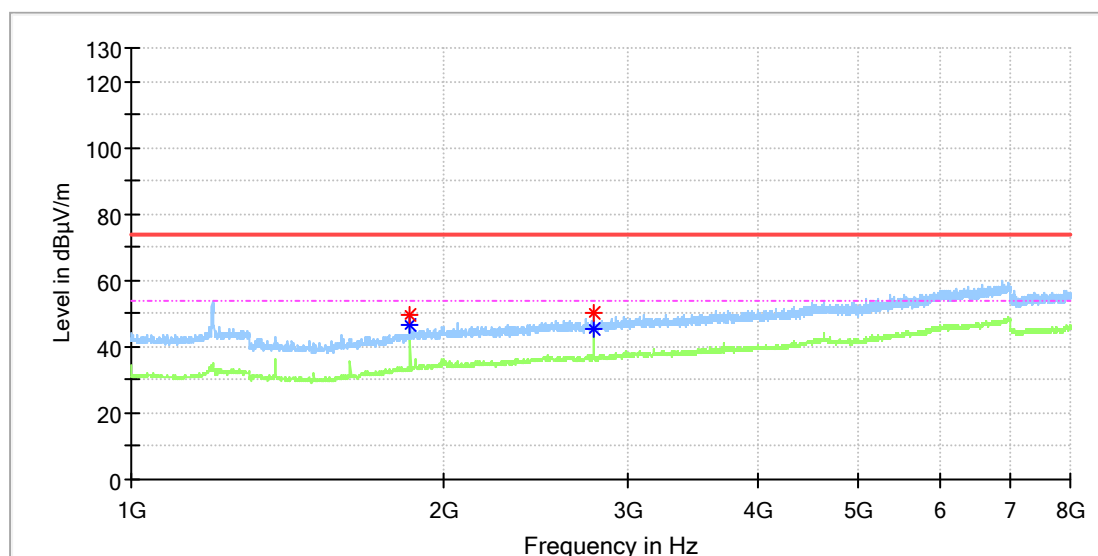


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1841.025000	44.07	---	74.00	29.94	100.0	V	29.0	4.9
1841.862500	---	37.08	54.00	16.92	100.0	V	248.0	4.9
2763.112500	---	47.57	54.00	6.43	100.0	V	157.0	7.9
2763.950000	51.23	---	74.00	22.77	100.0	V	308.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

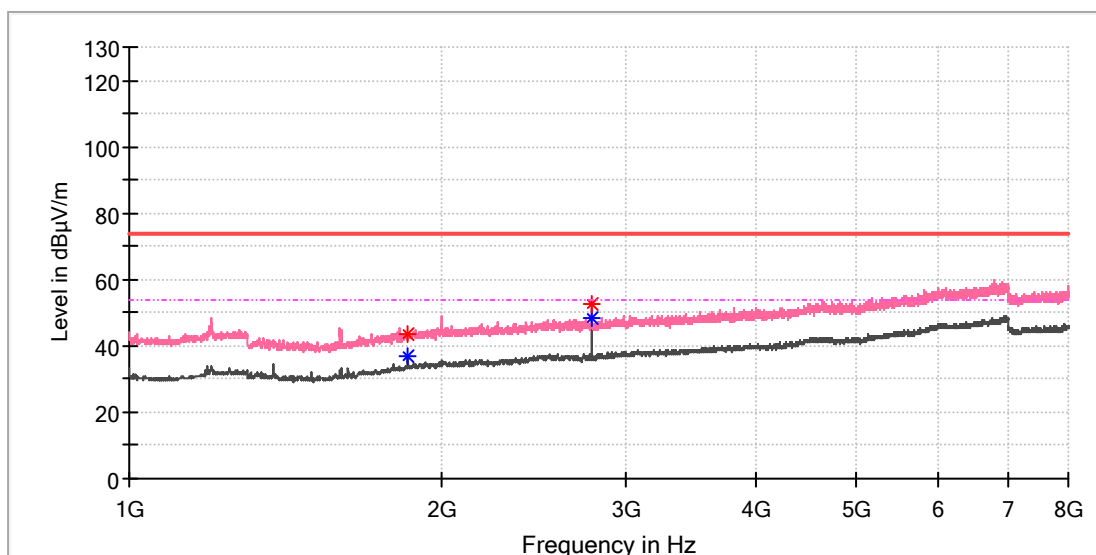


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.262500	49.51	---	74.00	24.49	100.0	H	310.0	5.0
1855.262500	---	46.76	54.00	7.24	100.0	H	310.0	5.0
2783.212500	---	45.41	54.00	8.59	100.0	H	76.0	7.9
2784.050000	50.37	---	74.00	23.63	100.0	H	54.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

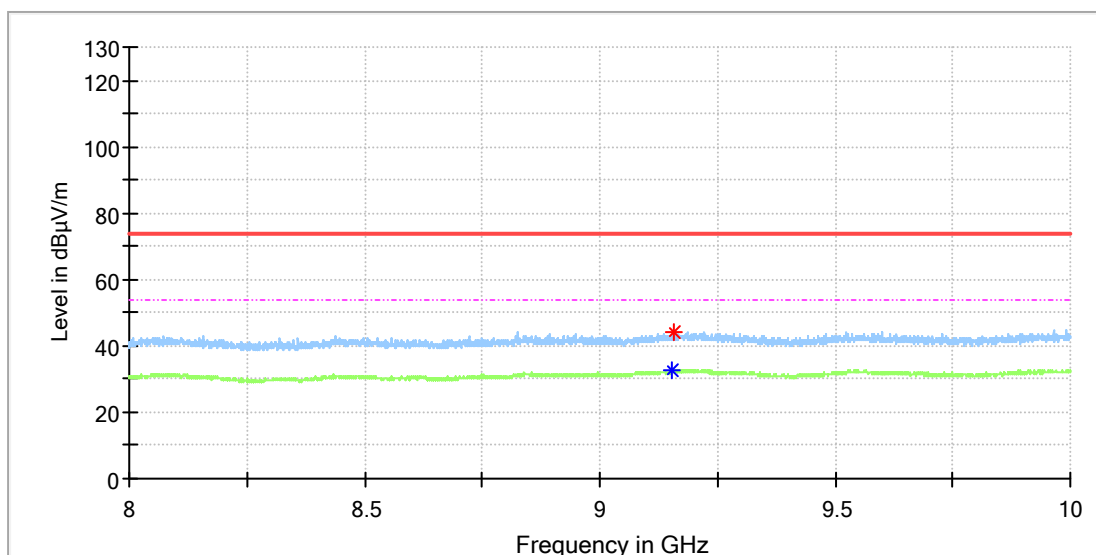


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1851.075000	43.69	---	74.00	30.31	100.0	V	58.0	5.0
1855.262500	---	37.05	54.00	16.95	100.0	V	58.0	5.0
2783.212500	52.70	---	74.00	21.30	100.0	V	103.0	7.9
2783.212500	---	48.12	54.00	5.88	100.0	V	103.0	7.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

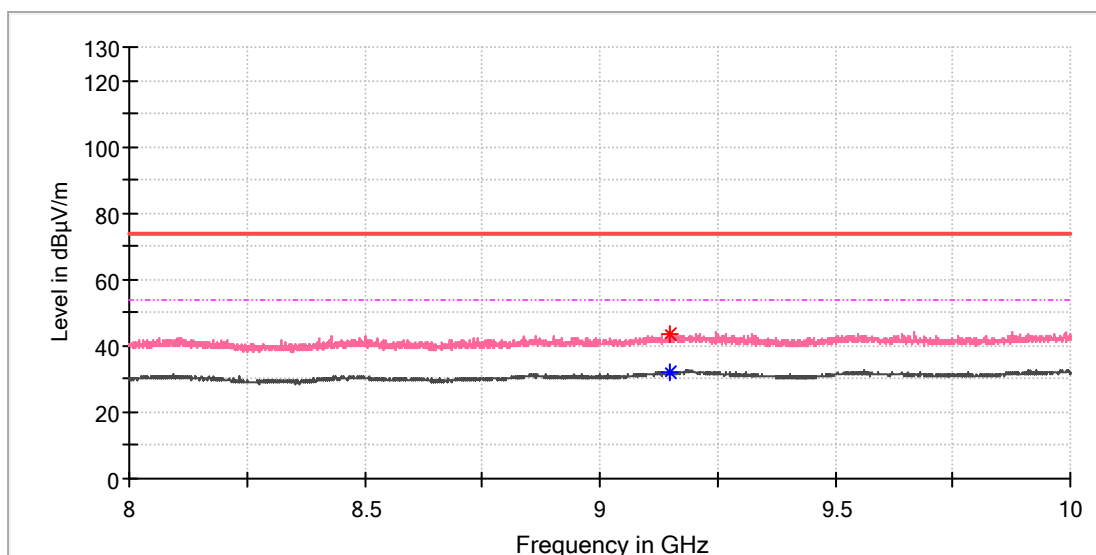


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9154.000000	---	32.44	54.00	21.56	100.0	H	47.0	10.1
9158.000000	44.24	---	74.00	29.76	100.0	H	0.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_915.1MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

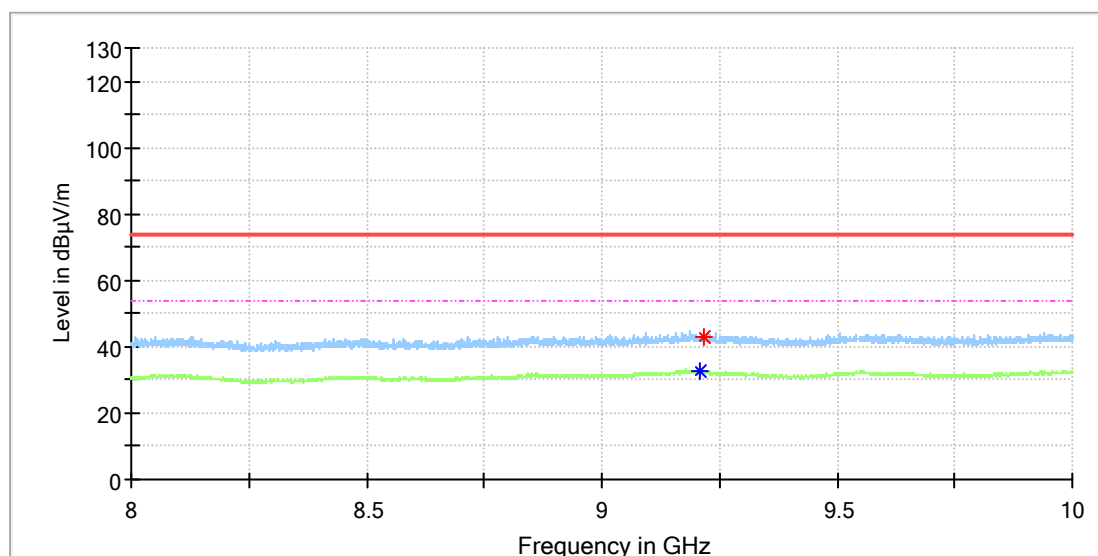


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9149.000000	43.32	---	74.00	30.68	100.0	V	181.0	10.1
9151.000000	---	31.88	54.00	22.12	100.0	V	320.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

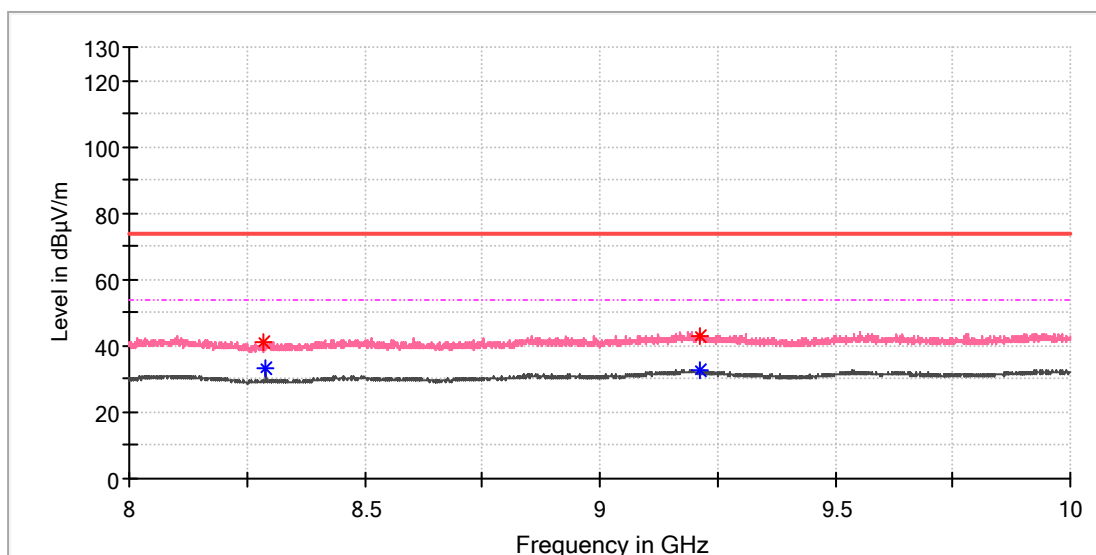


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9210.500000	---	32.63	54.00	21.37	100.0	H	100.0	10.3
9215.000000	43.20	---	74.00	30.80	100.0	H	162.0	10.3

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_921.2MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

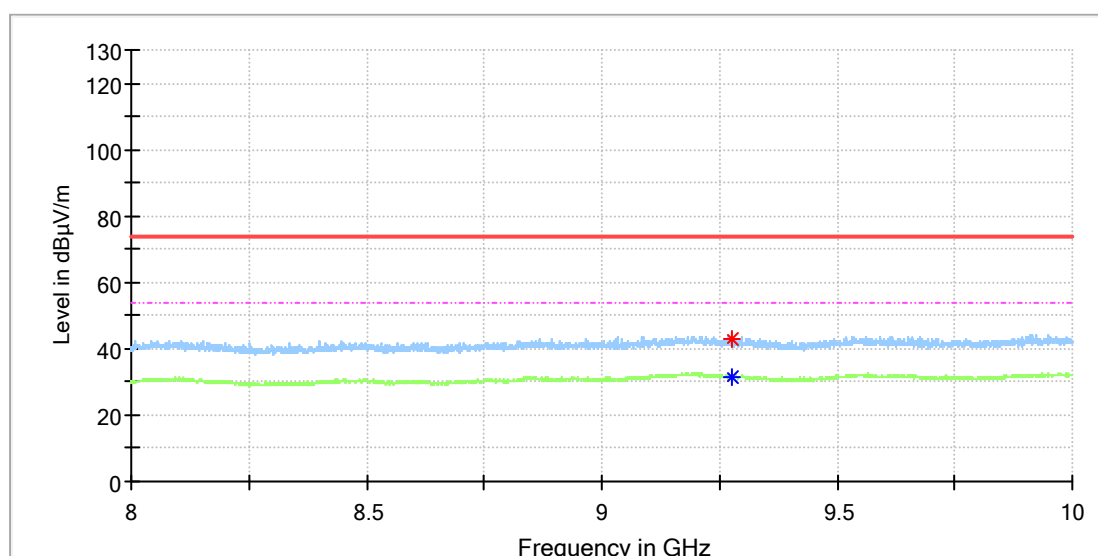


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
8283.500000	41.03	---	74.00	32.97	100.0	V	228.0	8.3
8290.500000	---	33.27	54.00	20.73	100.0	V	170.0	8.3
9212.000000	43.12	---	74.00	30.88	100.0	V	35.0	10.3
9212.000000	---	32.72	54.00	21.28	100.0	V	35.0	10.3

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: FSK 50K_927.9MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

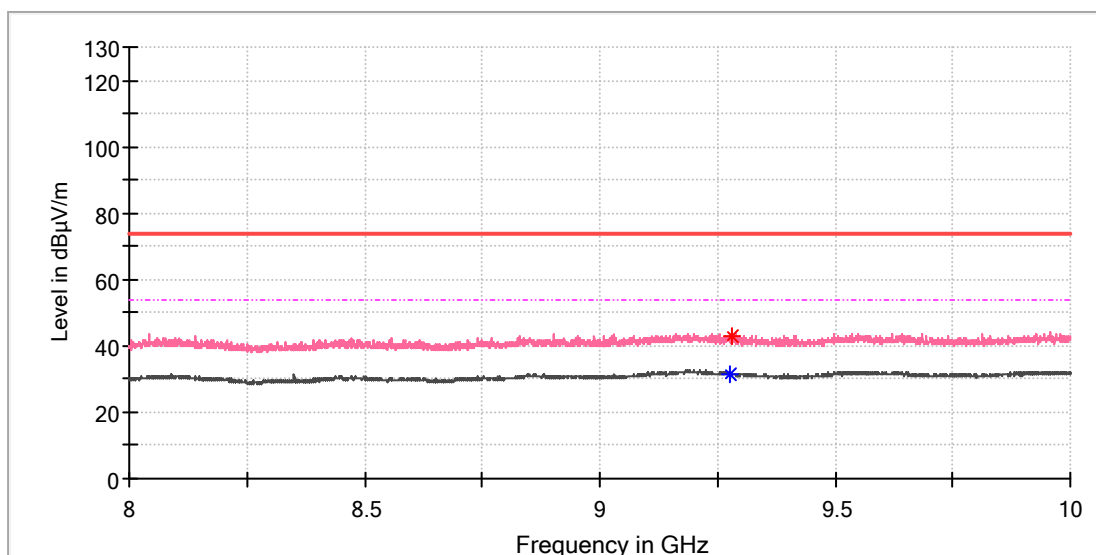


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9275.000000	42.90	---	74.00	31.10	100.0	H	226.0	10.2
9277.000000	---	31.62	54.00	22.38	100.0	H	0.0	10.2

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



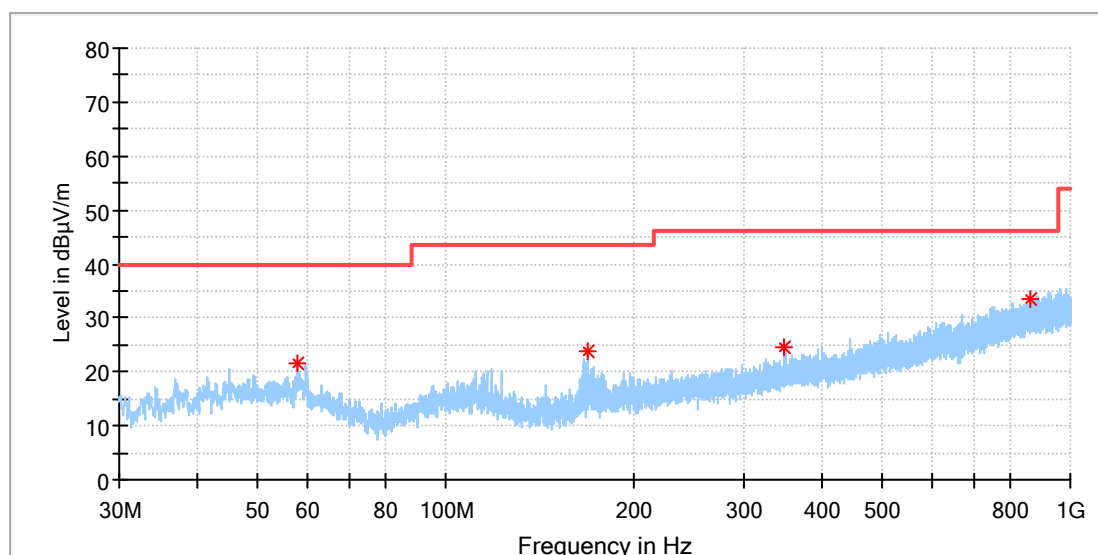
Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9277.500000	---	31.67	54.00	22.33	100.0	V	346.0	10.2
9281.500000	42.68	---	74.00	31.32	100.0	V	337.0	10.1

FSK, 50Kbps with 2.3dBi antenna

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

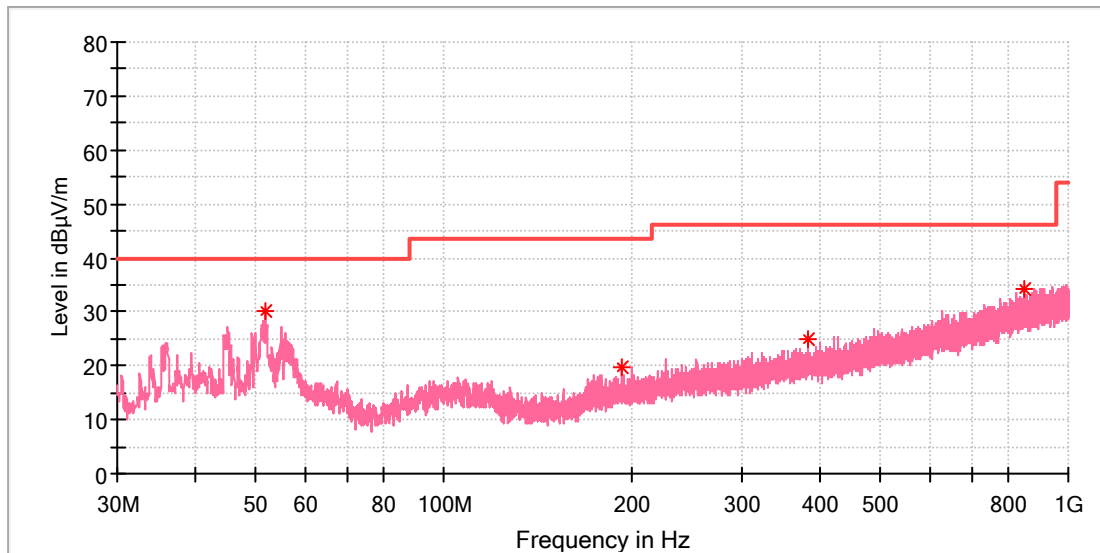


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
57.839000	21.70	40.00	18.30	100.0	H	0.0	-18.7
169.195000	23.63	43.50	19.87	100.0	H	125.0	-21.2
348.839000	24.61	46.00	21.39	100.0	H	341.0	-14.8
864.685000	33.55	46.00	12.45	100.0	H	41.0	-5.3

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

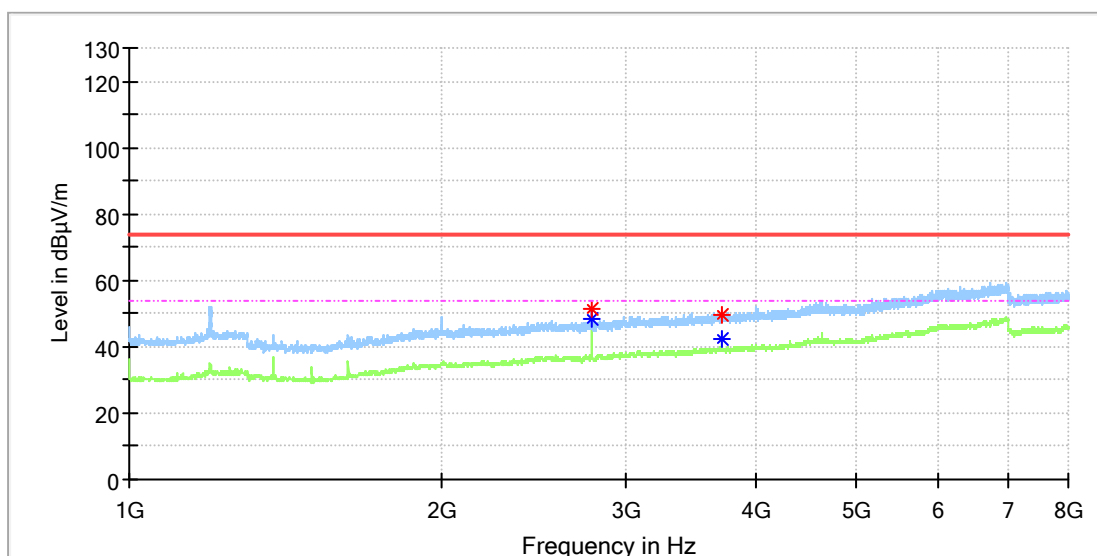


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.825000	30.09	40.00	9.91	100.0	V	262.0	-18.4
193.348000	19.81	43.50	23.69	100.0	V	144.0	-19.3
382.789000	25.02	46.00	20.98	100.0	V	312.0	-14.1
851.735500	34.35	46.00	11.65	100.0	V	247.0	-5.5

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

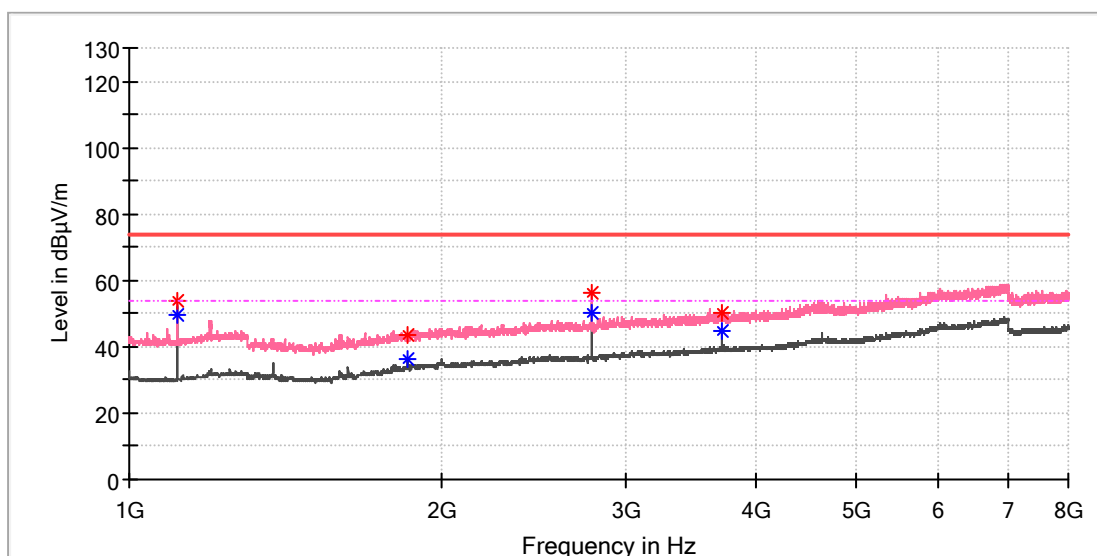


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2783.212500	51.52	---	74.00	22.48	100.0	H	351.0	7.9
2783.212500	---	48.42	54.00	5.58	100.0	H	351.0	7.9
3711.162500	49.84	---	74.00	24.16	100.0	H	82.0	9.6
3711.162500	---	42.13	54.00	11.87	100.0	H	82.0	9.6

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: FSK 50K_927.9MHz
Order No/Sample No: 168345328/A003106787-015
Test Voltage:: DC 5V
Remark: Temp 23 Humi:58%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

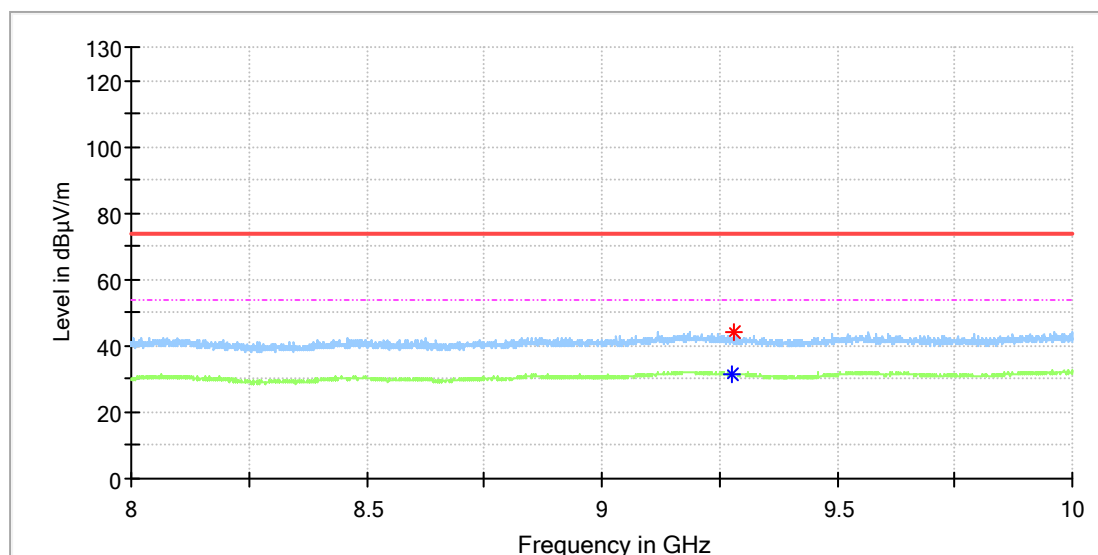


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1112.000000	---	49.42	54.00	4.58	100.0	V	349.0	0.0
1112.500000	53.82	---	74.00	20.18	100.0	V	349.0	0.0
1855.262500	---	36.20	54.00	17.80	100.0	V	2.0	5.0
1856.100000	43.84	---	74.00	30.16	100.0	V	2.0	5.1
2783.212500	56.52	---	74.00	17.48	100.0	V	333.0	7.9
2784.050000	---	50.19	54.00	3.81	100.0	V	333.0	7.9
3711.162500	50.49	---	74.00	23.51	100.0	V	322.0	9.6
3711.162500	---	44.75	54.00	9.25	100.0	V	322.0	9.6

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

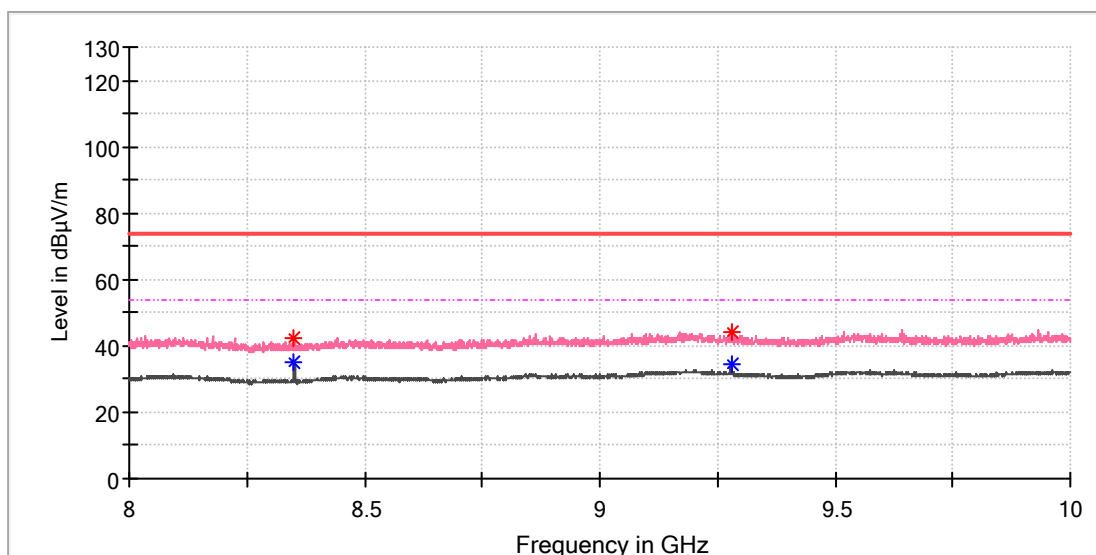


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9276.500000	---	31.72	54.00	22.28	100.0	H	12.0	10.2
9279.500000	43.84	---	74.00	30.16	100.0	H	113.0	10.1

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	FSK 50K_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

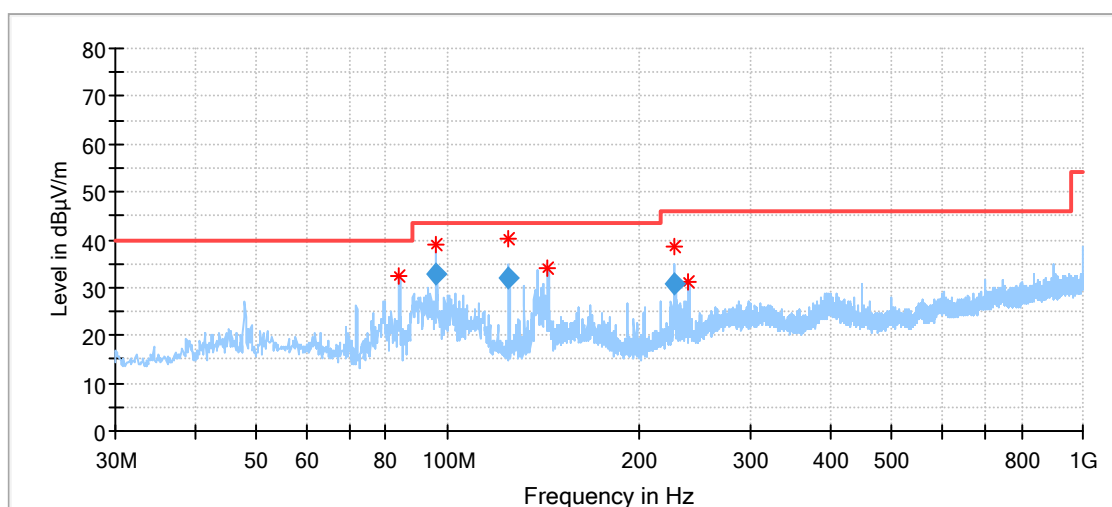
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
8350.500000	---	34.77	54.00	19.23	100.0	V	306.0	8.5
8351.000000	42.58	---	74.00	31.42	100.0	V	306.0	8.5
9279.500000	43.90	---	74.00	30.10	100.0	V	0.0	10.1
9279.500000	---	34.70	54.00	19.30	100.0	V	0.0	10.1

Lora DTS SF7 with 8dBi antenna, OCW 500KHz

30MHz - 1GHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model	RAK5146
Test Mode:	ON, normal working
Test Voltage:	DC 5V
Test By:	Steve Lan
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

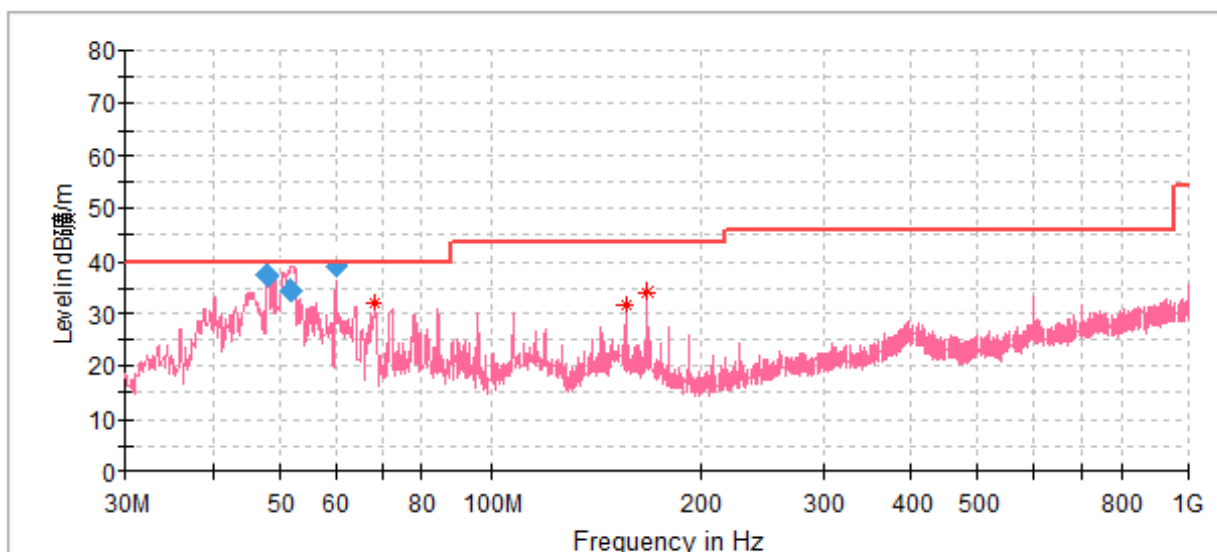
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
83.932000	32.58	40.00	7.42	200.0	H	243.0	15.3
95.980000	39.15	43.50	4.35	200.0	H	218.0	16.5
124.983000	40.32	43.50	3.18	100.0	H	226.0	19.1
143.975000	34.11	43.50	9.39	200.0	H	53.0	20.2
228.037000	38.65	46.00	7.35	200.0	H	171.0	18.8
239.908000	31.20	46.00	14.80	200.0	H	184.0	18.7

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
95.980000	32.81	43.50	10.69	1000.0	120.000	200.0	H	218.0	16.5
124.983000	32.09	43.50	11.41	1000.0	120.000	100.0	H	226.0	19.1
228.037000	30.80	46.00	15.20	1000.0	120.000	200.0	H	171.0	18.8

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model	RAK5146
Test Mode:	ON, normal working
Test Voltage:	DC 5V
Test By:	Steve Lan
Review By:	Gary Chen
Remark:	3m Chamber



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
68.315000	32.03	40.00	7.97	200.0	V	231.0	19.0
155.906000	31.76	43.50	11.74	100.0	V	4.0	21.5
168.031000	34.07	43.50	9.43	200.0	V	338.0	21.5

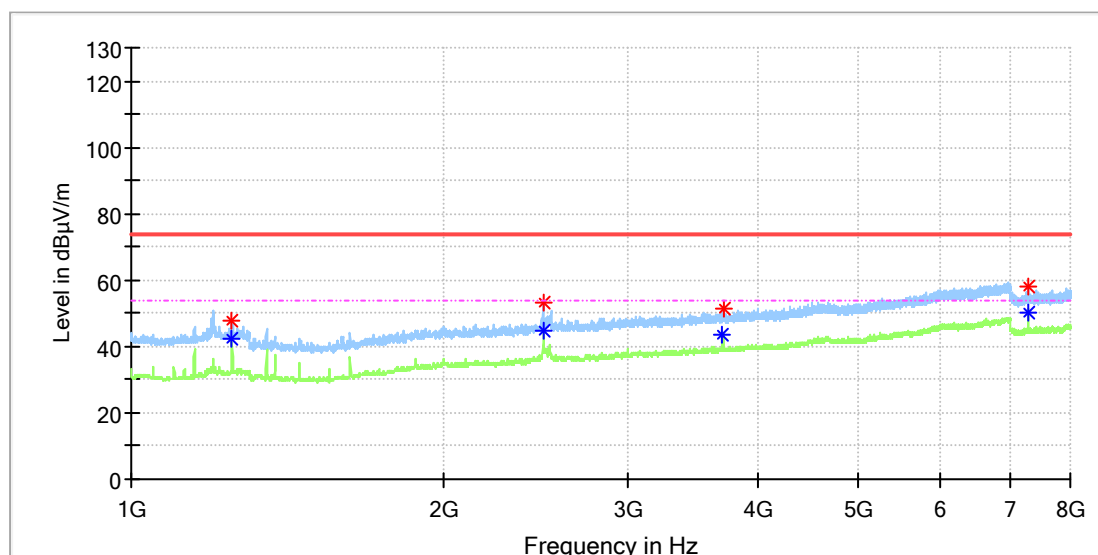
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
48.005000	37.49	40.00	2.51	1000.0	120.000	100.0	V	103.0	21.4
51.805000	34.46	40.00	5.54	1000.0	120.000	100.0	V	339.0	20.8
60.033000	38.91	40.00	1.09	1000.0	120.000	100.0	V	261.0	20.9

1GHz - 8GHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 500K_SF7_925.1MHz
Test Voltage::	DC 5V
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

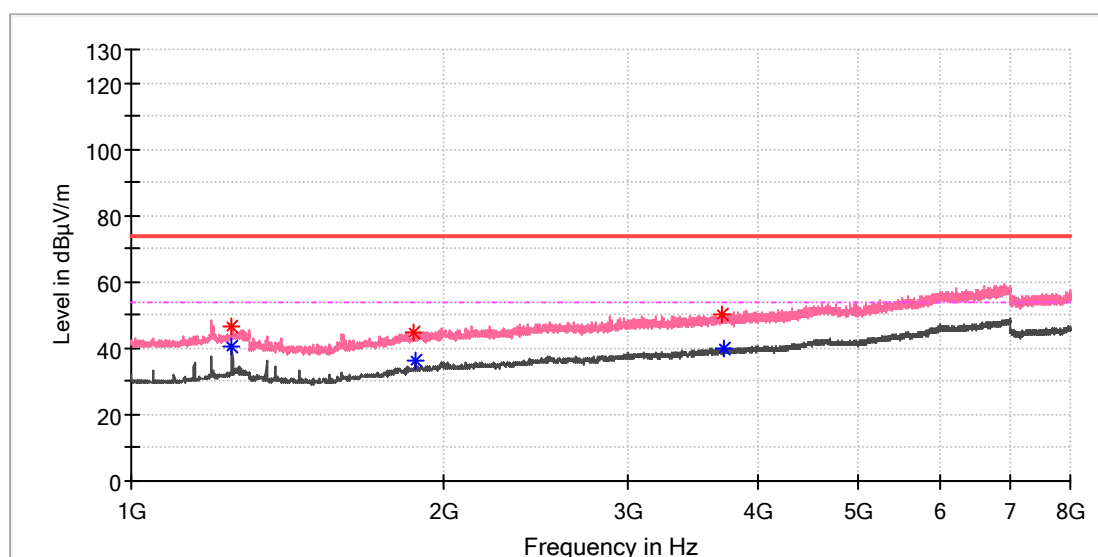


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	---	42.25	54.00	11.75	100.0	H	0.0	1.9
1250.000000	48.05	---	74.00	25.95	100.0	H	0.0	1.9
2487.575000	52.95	---	74.00	21.05	100.0	H	103.0	7.4
2488.412500	---	44.74	54.00	9.26	100.0	H	103.0	7.4
3706.137500	---	43.56	54.00	10.44	100.0	H	103.0	9.6
3709.487500	51.11	---	74.00	22.89	100.0	H	103.0	9.6
7278.912500	---	50.46	54.00	3.54	100.0	H	162.0	17.9
7278.912500	58.32	---	74.00	15.68	100.0	H	162.0	17.9

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 500K_SF7_925.1MHz
Test Voltage::	DC 5V
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



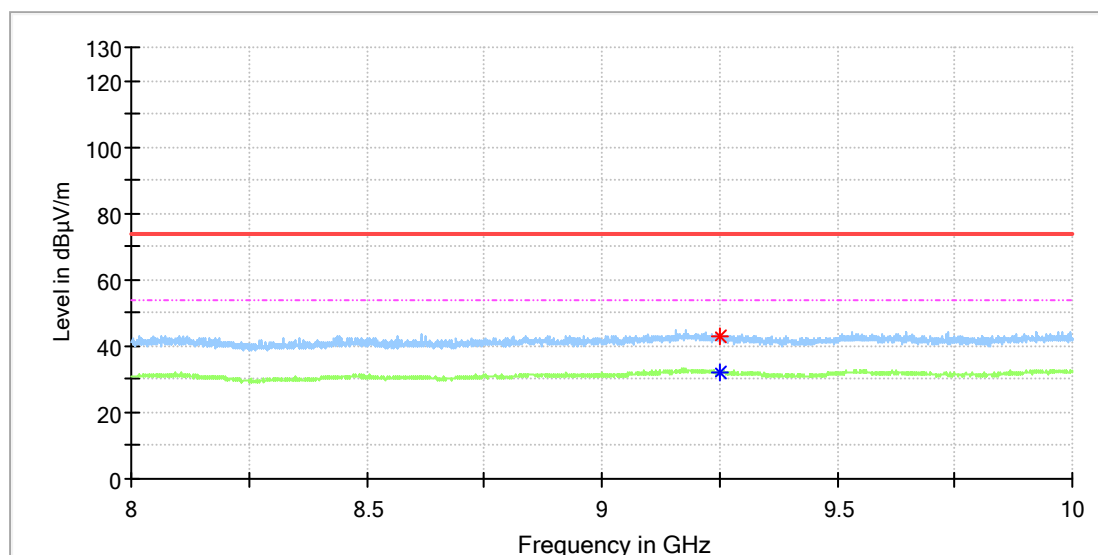
Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	46.82	---	74.00	27.18	100.0	V	348.0	1.9
1250.500000	---	40.57	54.00	13.43	100.0	V	294.0	1.9
1872.012500	44.82	---	74.00	29.18	100.0	V	1.0	5.3
1874.525000	---	36.46	54.00	17.54	100.0	V	62.0	5.3
3705.300000	50.16	---	74.00	23.84	100.0	V	132.0	9.6
3712.000000	---	39.63	54.00	14.37	100.0	V	62.0	9.6

8GHz - 10GHz

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF7_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

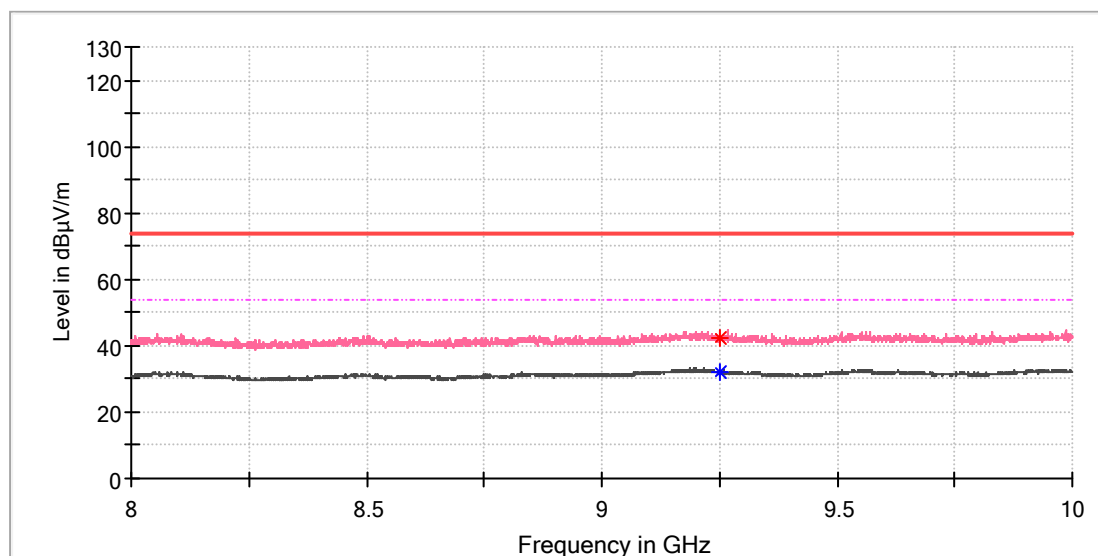


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9249.000000	---	32.28	54.00	21.72	100.0	H	359.0	10.4
9252.000000	43.18	---	74.00	30.82	100.0	H	359.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF7_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical_Freqs

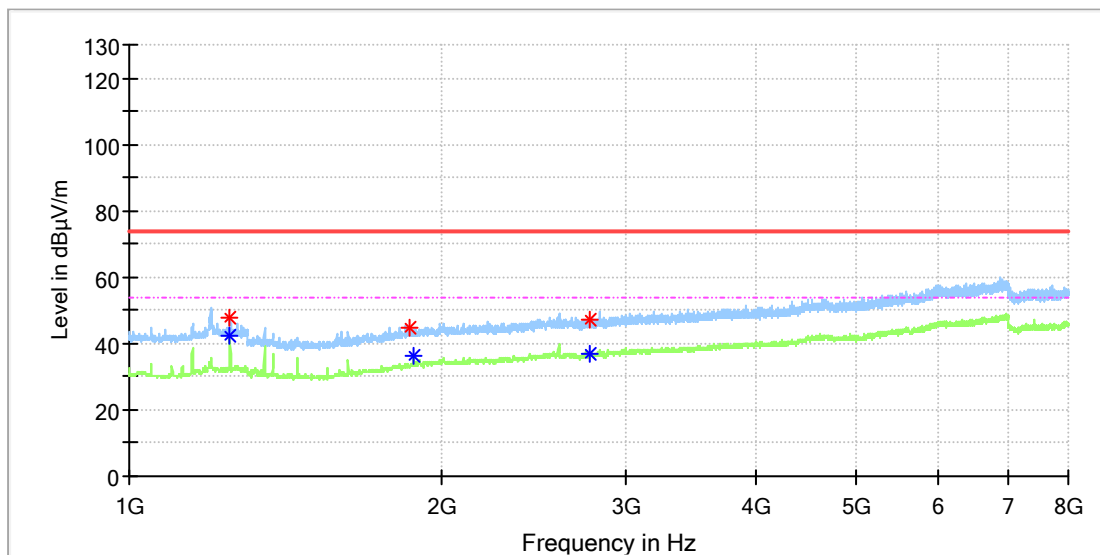
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9250.500000	42.13	---	74.00	31.87	100.0	V	2.0	10.4
9251.000000	---	31.99	54.00	22.01	100.0	V	195.0	10.4

Lora DTS SF12 with 2.3dBi antenna, OCW 500KHz

1GHz - 8GHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 500K_SF12_923.3MHz
Test Voltage::	DC 5V
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

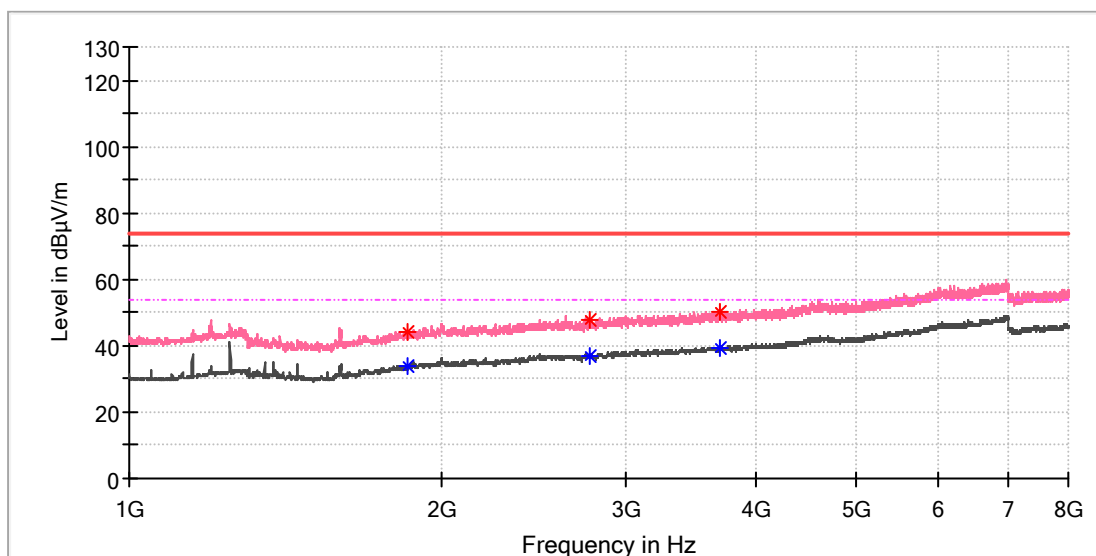


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	---	42.24	54.00	11.76	100.0	H	6.0	1.9
1250.000000	47.77	---	74.00	26.23	100.0	H	6.0	1.9
1859.450000	44.48	---	74.00	29.52	100.0	H	54.0	5.1
1874.525000	---	36.45	54.00	17.55	100.0	H	64.0	5.3
2769.812500	47.15	---	74.00	26.85	100.0	H	0.0	7.9
2772.325000	---	37.03	54.00	16.97	100.0	H	31.0	7.9

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_923.3MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

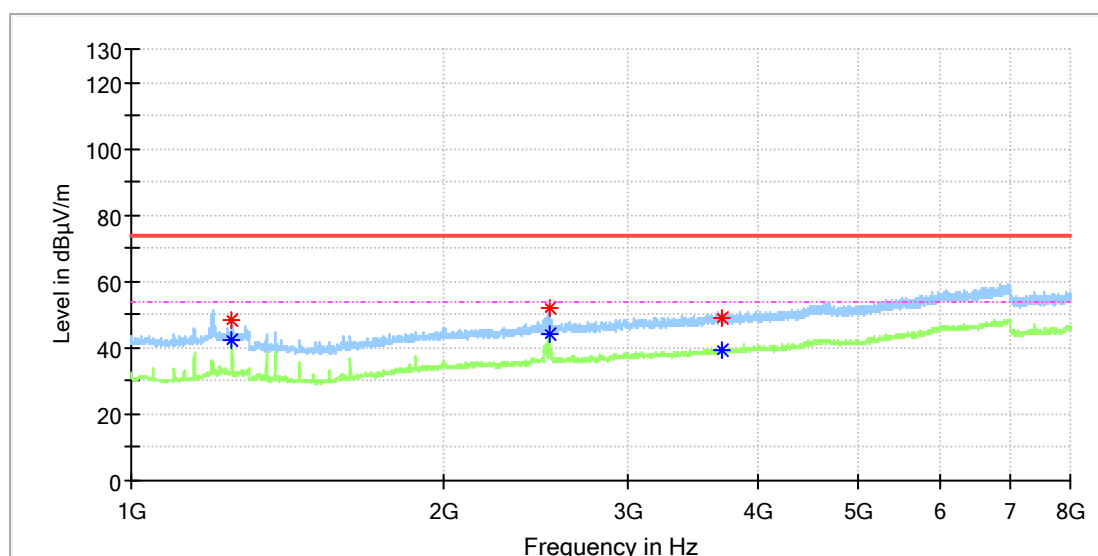


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1852.750000	---	33.84	54.00	20.16	100.0	V	296.0	5.0
1853.587500	44.18	---	74.00	29.82	100.0	V	274.0	5.0
2771.487500	---	37.08	54.00	16.92	100.0	V	0.0	7.9
2772.325000	47.93	---	74.00	26.07	100.0	V	221.0	7.9
3696.925000	---	39.55	54.00	14.45	100.0	V	285.0	9.6
3702.787500	50.20	---	74.00	23.80	100.0	V	317.0	9.6

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

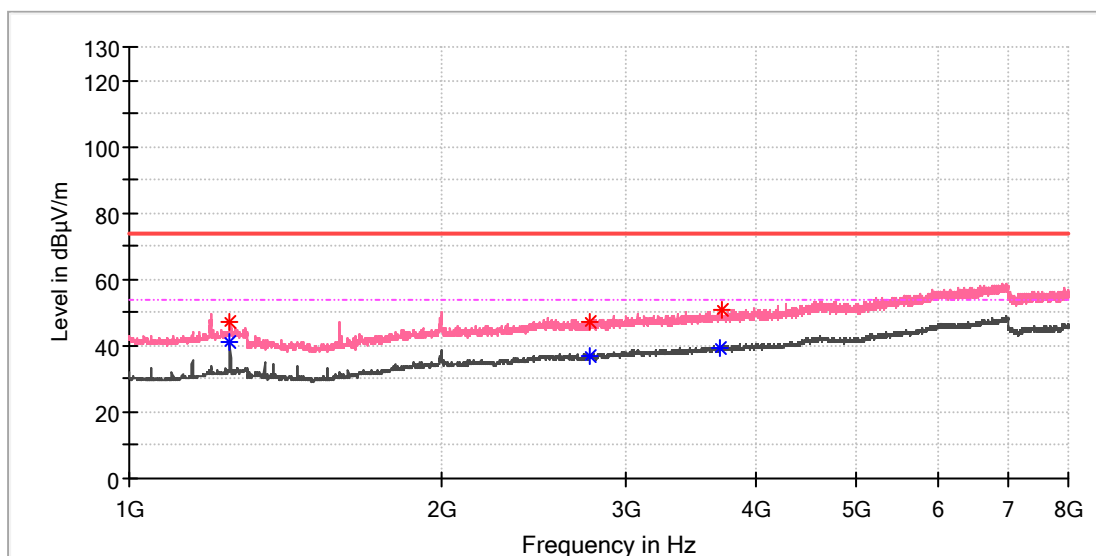


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	---	42.10	54.00	11.90	100.0	H	10.0	1.9
1250.500000	48.67	---	74.00	25.33	100.0	H	10.0	1.9
2522.750000	---	44.16	54.00	9.84	100.0	H	210.0	7.5
2522.750000	52.06	---	74.00	21.94	100.0	H	210.0	7.5
3703.625000	49.22	---	74.00	24.78	100.0	H	44.0	9.6
3706.137500	---	39.50	54.00	14.50	100.0	H	67.0	9.6

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

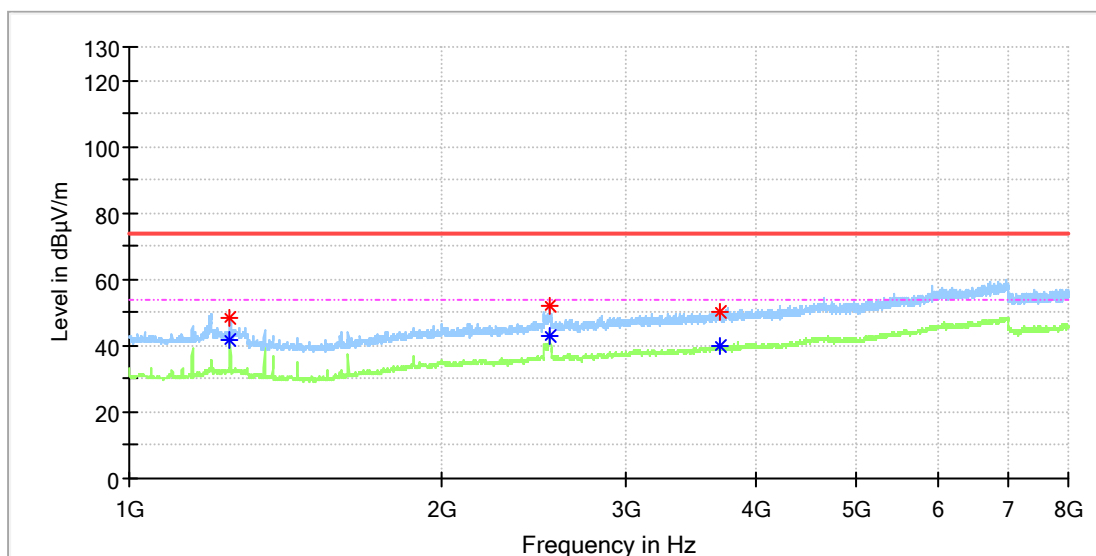


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	---	40.89	54.00	13.11	100.0	V	345.0	1.9
1250.500000	46.92	---	74.00	27.08	100.0	V	292.0	1.9
2776.512500	47.03	---	74.00	26.97	100.0	V	103.0	7.9
2776.512500	---	37.10	54.00	16.90	100.0	V	103.0	7.9
3701.112500	---	39.40	54.00	14.60	100.0	V	1.0	9.6
3706.975000	50.52	---	74.00	23.48	100.0	V	79.0	9.6

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_927.5MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

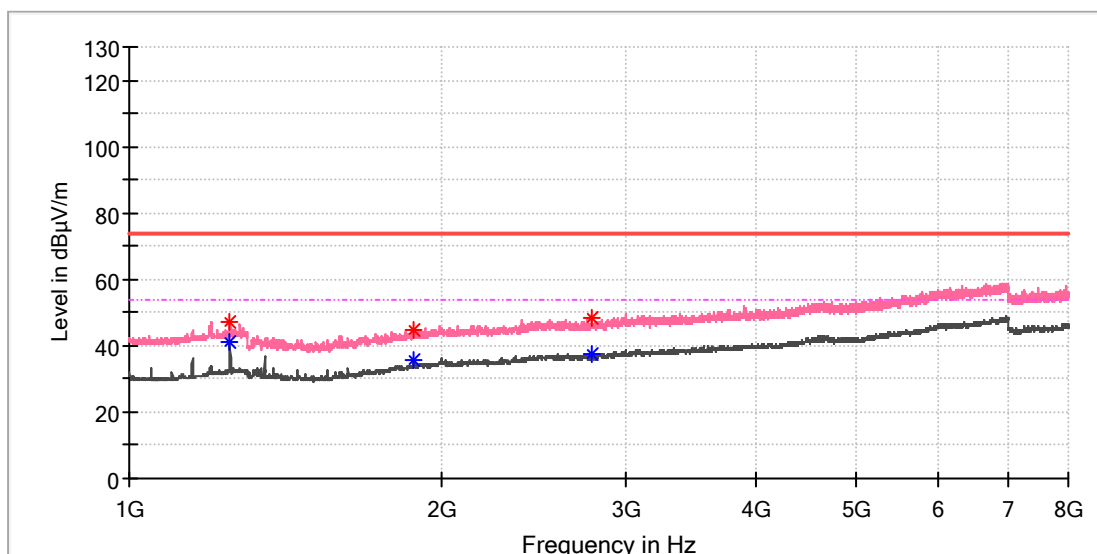


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	---	41.95	54.00	12.05	100.0	H	296.0	1.9
1250.000000	48.17	---	74.00	25.83	100.0	H	296.0	1.9
2536.150000	---	43.18	54.00	10.82	100.0	H	311.0	7.6
2536.150000	52.27	---	74.00	21.73	100.0	H	311.0	7.6
3701.950000	50.30	---	74.00	23.70	100.0	H	134.0	9.6
3706.137500	---	39.79	54.00	14.21	100.0	H	14.0	9.6

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_927.5MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



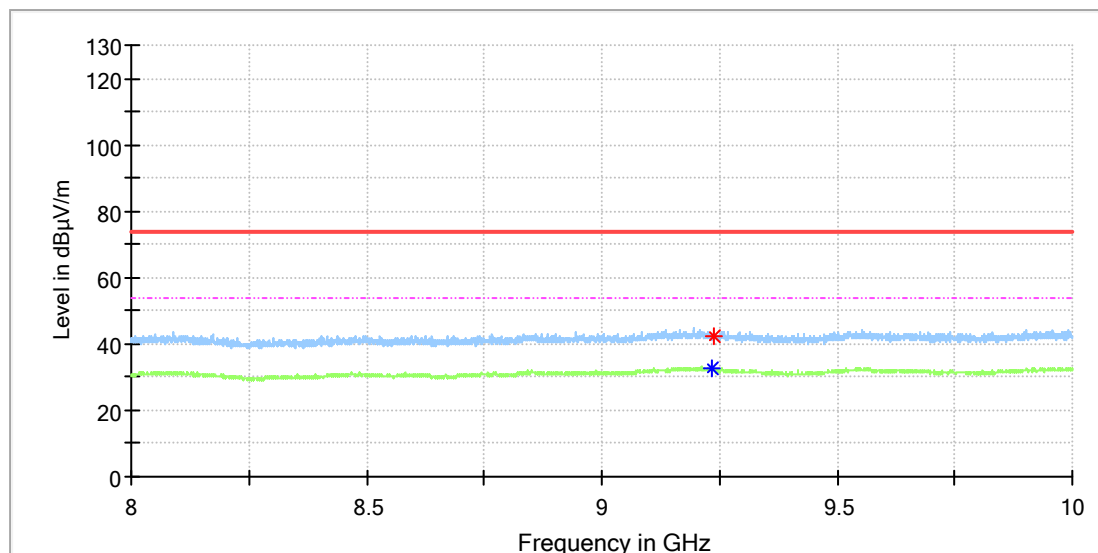
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1250.000000	47.42	---	74.00	26.58	100.0	V	348.0	1.9
1250.000000	---	41.05	54.00	12.95	100.0	V	348.0	1.9
1872.850000	44.71	---	74.00	29.29	100.0	V	159.0	5.3
1874.525000	---	35.63	54.00	18.37	100.0	V	171.0	5.3
2779.862500	---	37.47	54.00	16.53	100.0	V	249.0	7.9
2783.212500	48.14	---	74.00	25.86	100.0	V	69.0	7.9

8GHz - 10GHz

EUT Information

EUT Name:	WisLink LPWAN Concentrator
Model:	RAK5146
Test Mode:	Lora_DTS 500K_SF12_923.3MHz
Test Voltage::	DC 5V
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

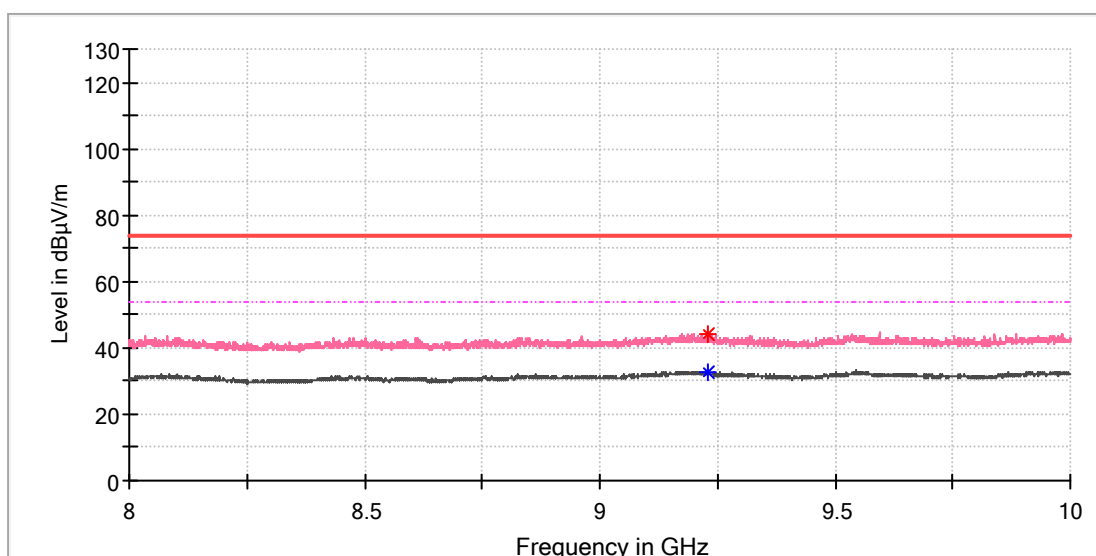


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9234.000000	---	32.39	54.00	21.61	100.0	H	176.0	10.4
9236.500000	42.52	---	74.00	31.48	100.0	H	22.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_923.3MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

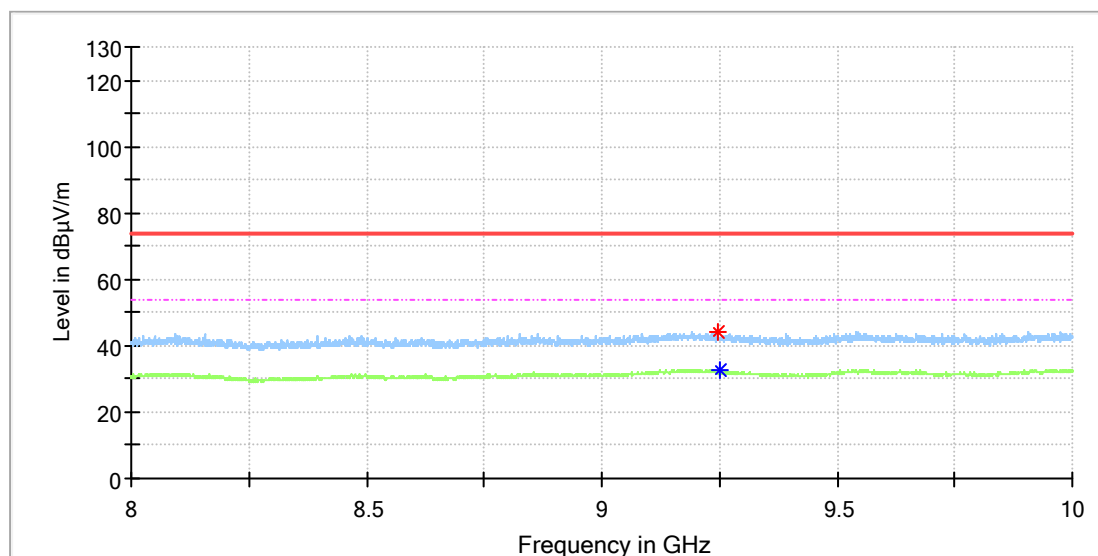


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9231.500000	43.93	---	74.00	30.07	100.0	V	263.0	10.4
9231.500000	---	32.58	54.00	21.42	100.0	V	263.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

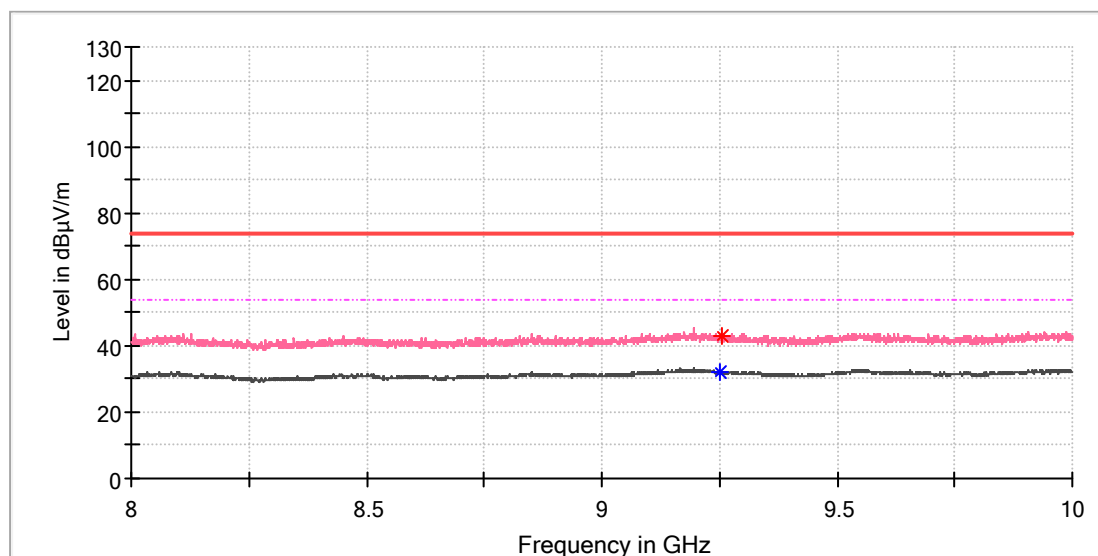


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9246.500000	44.12	---	74.00	29.88	100.0	H	36.0	10.4
9250.500000	---	32.46	54.00	21.54	100.0	H	53.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_925.1MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

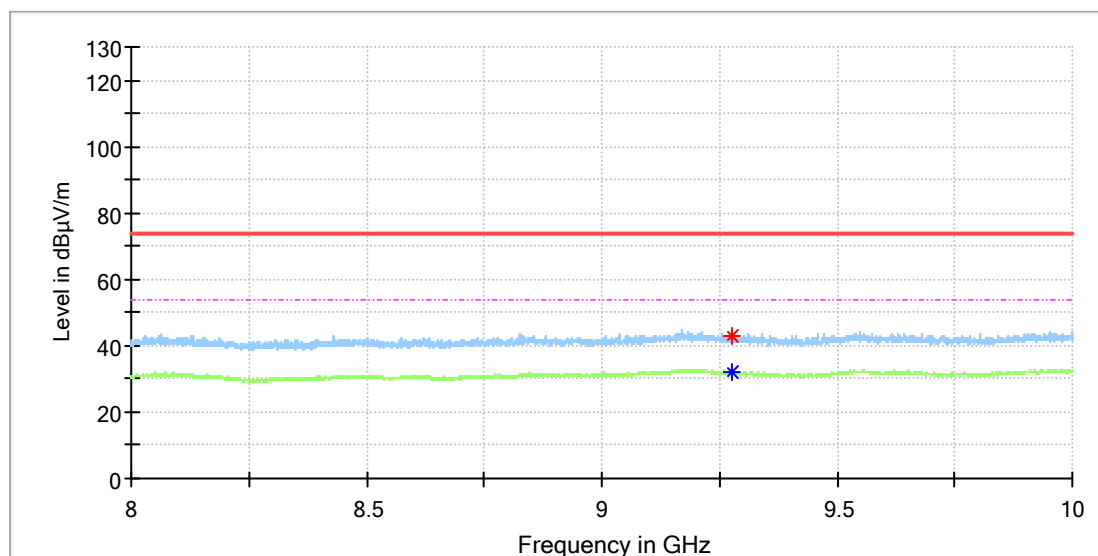


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9252.500000	---	32.28	54.00	21.72	100.0	V	173.0	10.4
9256.000000	43.01	---	74.00	30.99	100.0	V	240.0	10.4

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_927.5MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

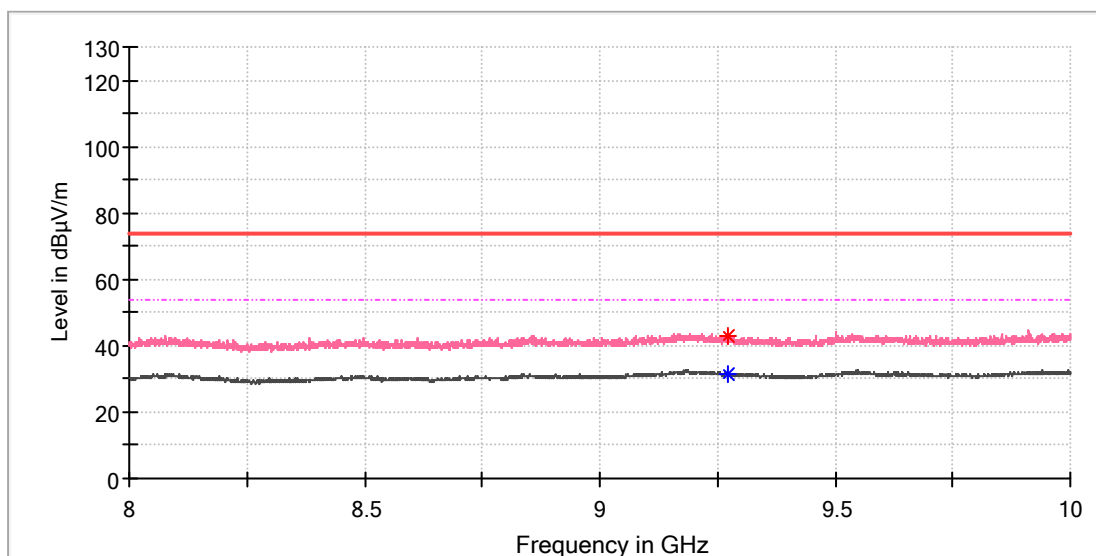


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9274.500000	---	31.96	54.00	22.04	100.0	H	159.0	10.2
9275.500000	42.78	---	74.00	31.22	100.0	H	308.0	10.2

EUT Information

EUT Name: WisLink LPWAN Concentrator
Model: RAK5146
Test Mode: Lora_DTS 500K_SF12_927.5MHz
Test Voltage:: DC 5V
Remark: Temp 24 Humi:47%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



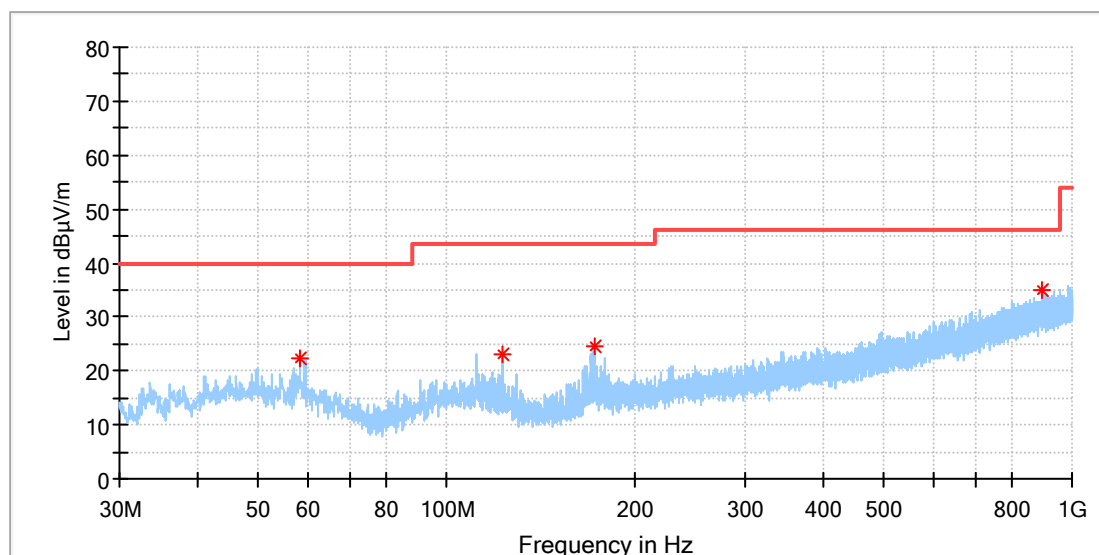
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9272.000000	42.80	---	74.00	31.20	100.0	V	128.0	10.2
9272.500000	---	31.71	54.00	22.29	100.0	V	87.0	10.2

Appendix A.6: Test Results of Receiver Radiated Spurious Emissions

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

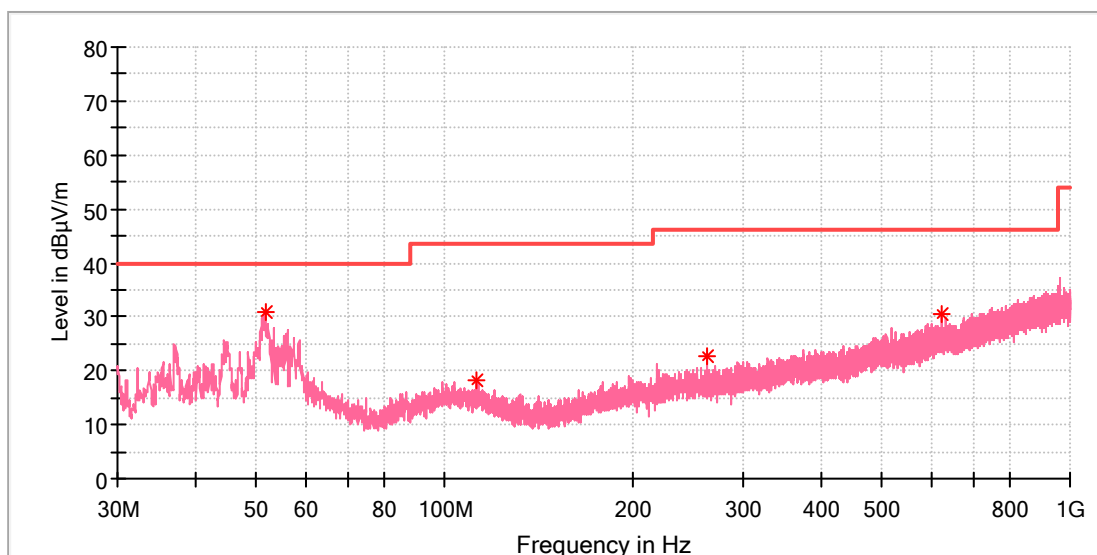


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
58.324000	22.41	40.00	17.59	100.0	H	198.0	-18.8
123.120000	23.08	43.50	20.42	100.0	H	25.0	-21.1
172.056500	24.62	43.50	18.88	100.0	H	284.0	-21.0
897.180000	34.90	46.00	11.10	100.0	H	209.0	-5.0

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

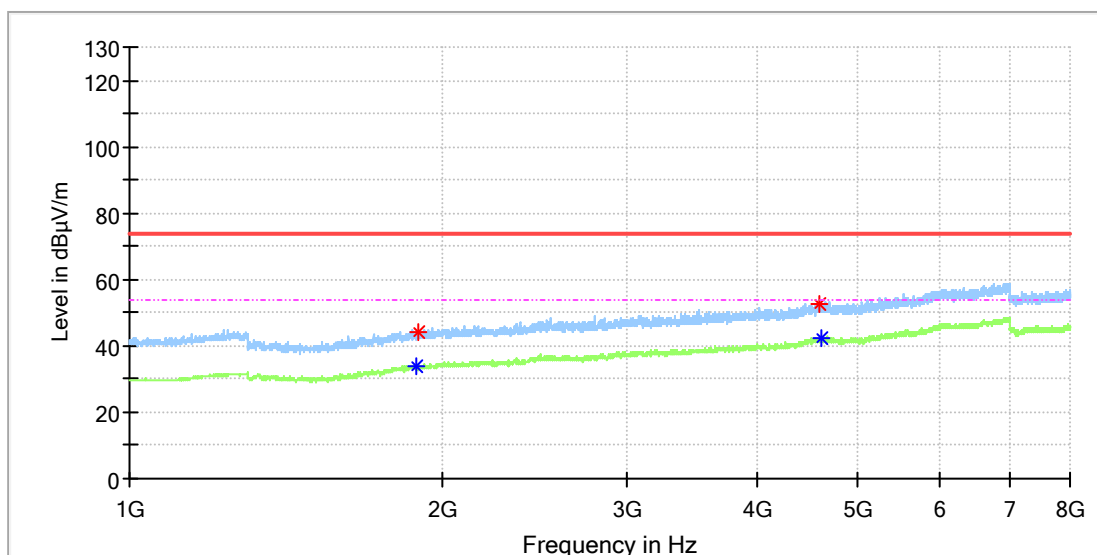


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.631000	30.80	40.00	9.20	100.0	V	0.0	-18.4
112.401500	18.19	43.50	25.31	100.0	V	223.0	-19.4
262.509000	22.63	46.00	23.37	100.0	V	307.0	-17.0
623.688500	30.60	46.00	15.40	100.0	V	157.0	-9.5

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

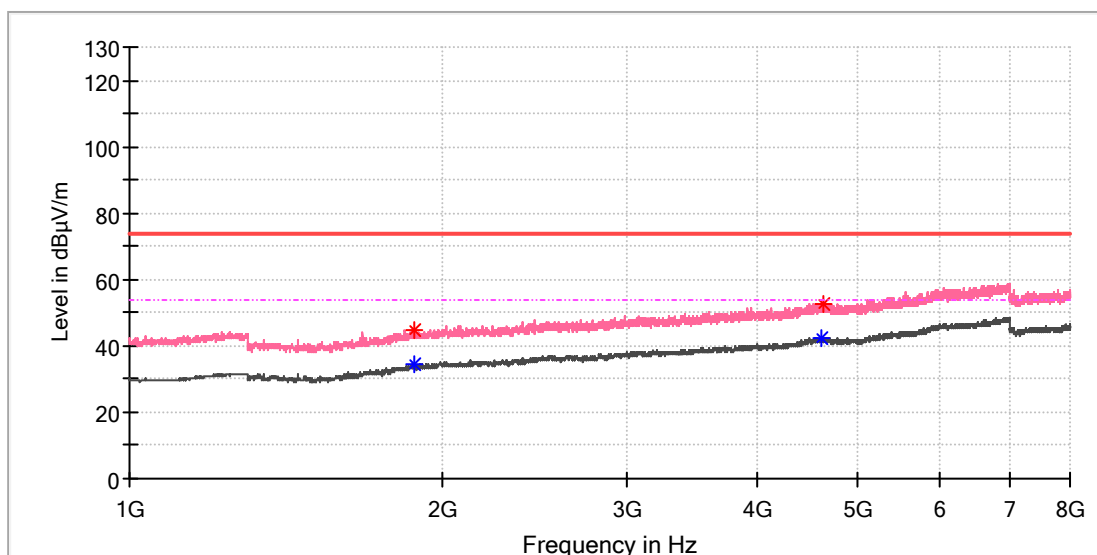


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1884.575000	---	33.66	54.00	20.34	100.0	H	315.0	5.4
1896.300000	44.40	---	74.00	29.60	100.0	H	271.0	5.6
4603.937500	52.50	---	74.00	21.50	100.0	H	226.0	12.0
4626.550000	---	42.59	54.00	11.41	100.0	H	215.0	12.0

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

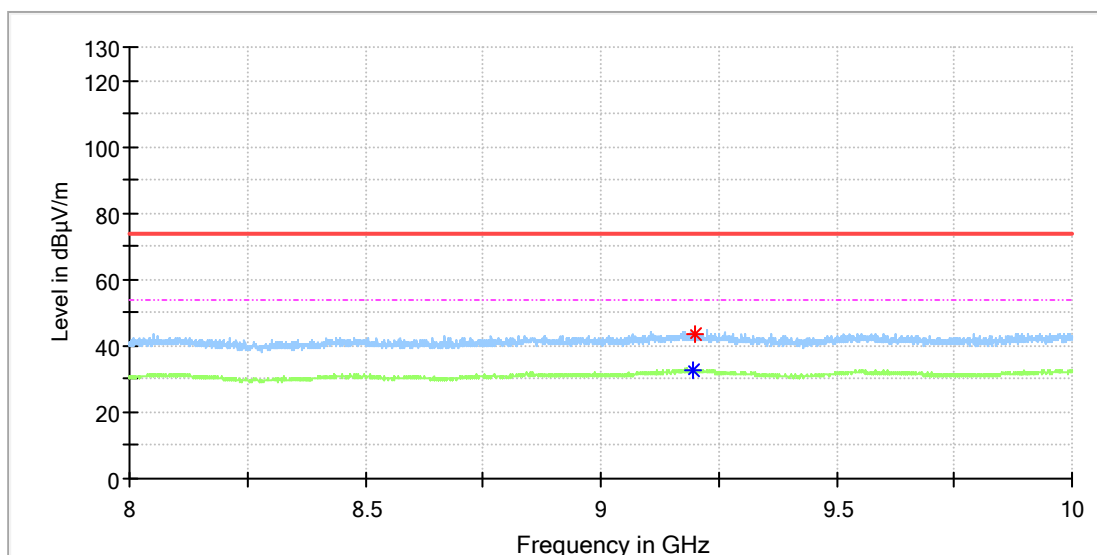


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1877.875000	---	34.17	54.00	19.83	100.0	V	209.0	5.3
1880.387500	44.59	---	74.00	29.41	100.0	V	266.0	5.4
4611.475000	---	42.29	54.00	11.71	100.0	V	18.0	12.0
4627.387500	52.75	---	74.00	21.25	100.0	V	319.0	12.0

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

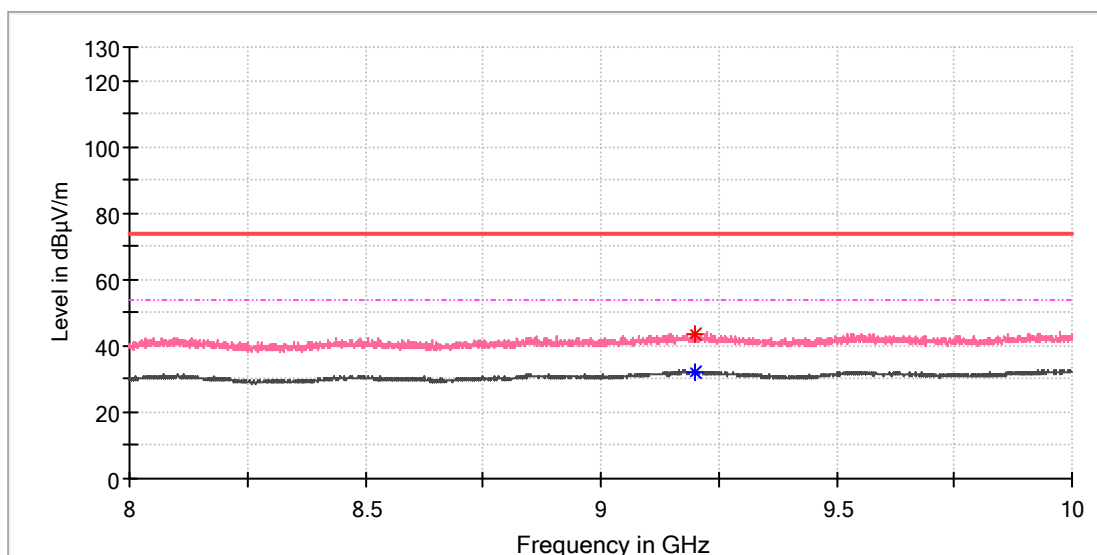


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9195.000000	---	32.75	54.00	21.25	100.0	H	262.0	10.3
9198.500000	43.65	---	74.00	30.35	100.0	H	349.0	10.3

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	FSK 50Kbps_927.9MHz
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

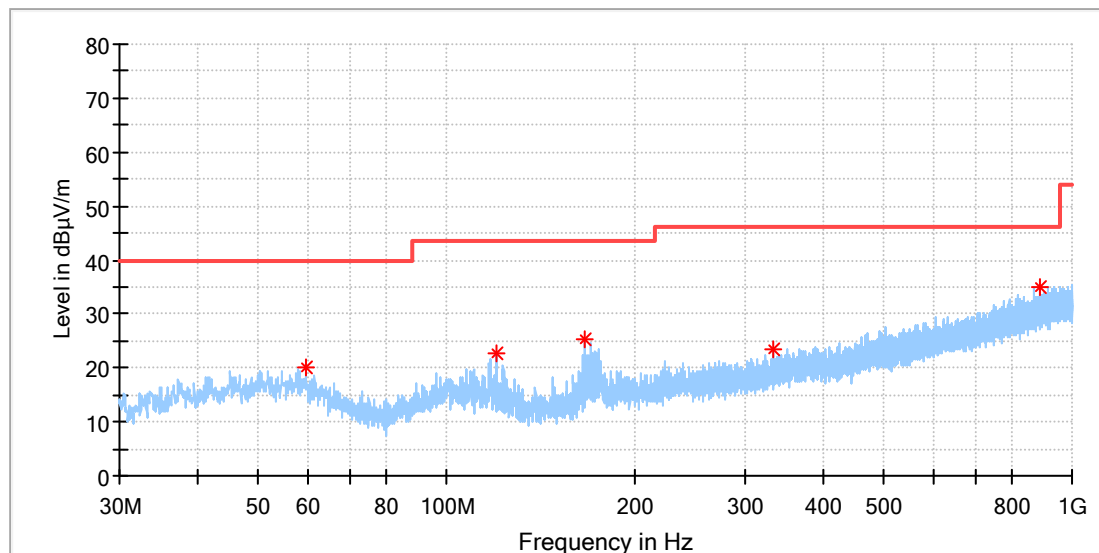


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9198.000000	43.69	---	74.00	30.31	100.0	V	283.0	10.3
9201.000000	---	32.27	54.00	21.73	100.0	V	54.0	10.3

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

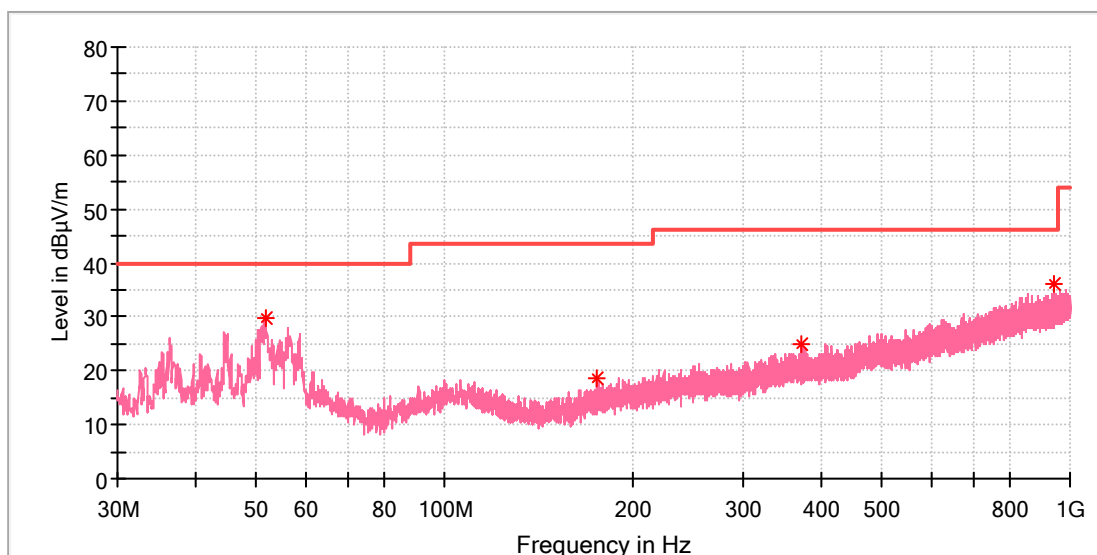


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
59.585000	20.10	40.00	19.90	100.0	H	173.0	-18.9
119.919000	22.79	43.50	20.71	100.0	H	19.0	-20.8
166.333500	25.33	43.50	18.17	100.0	H	105.0	-21.4
332.009500	23.53	46.00	22.47	100.0	H	39.0	-15.4
887.819500	34.84	46.00	11.16	100.0	H	86.0	-5.1

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

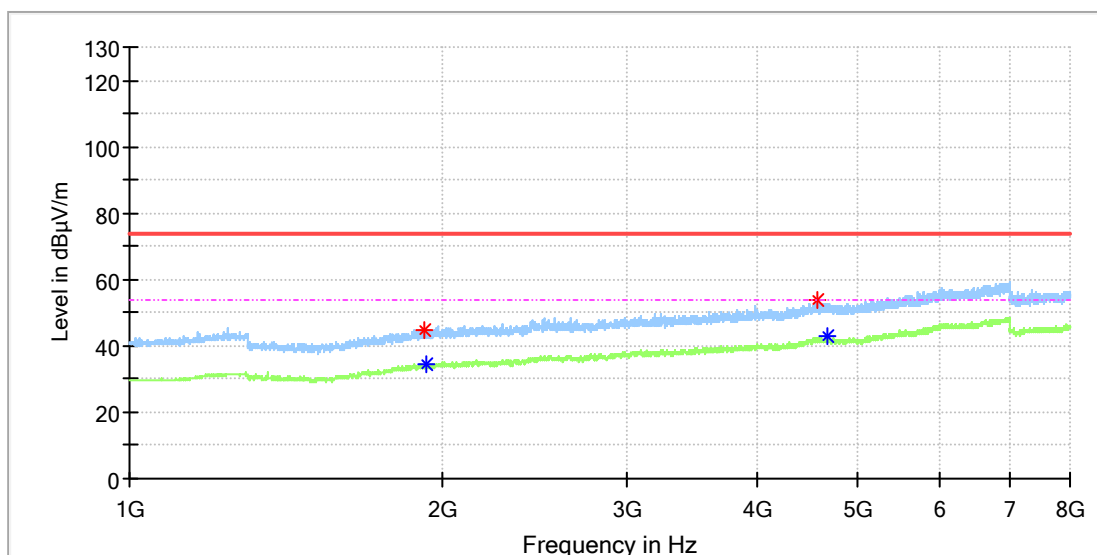


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.728000	29.69	40.00	10.31	100.0	V	326.0	-18.4
174.627000	18.47	43.50	25.03	100.0	V	244.0	-20.9
372.749500	24.87	46.00	21.13	100.0	V	112.0	-14.4
940.878500	35.92	46.00	10.08	100.0	V	209.0	-4.5

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

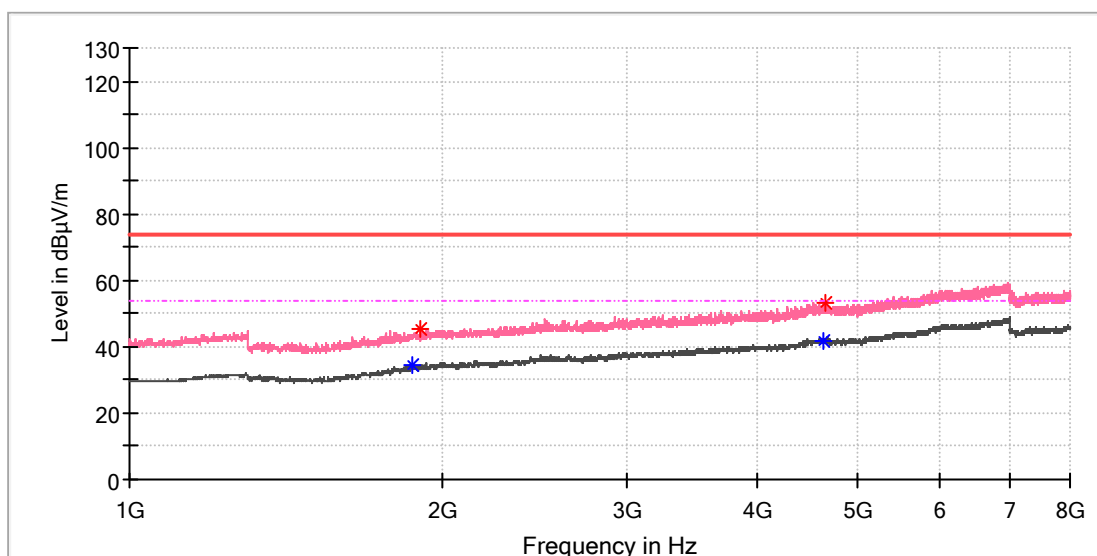


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1920.587500	45.01	---	74.00	28.99	100.0	H	132.0	5.6
1923.937500	---	34.31	54.00	19.69	100.0	H	144.0	5.6
4578.812500	53.55	---	74.00	20.45	100.0	H	308.0	12.0
4674.287500	---	43.00	54.00	11.00	100.0	H	274.0	12.0

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

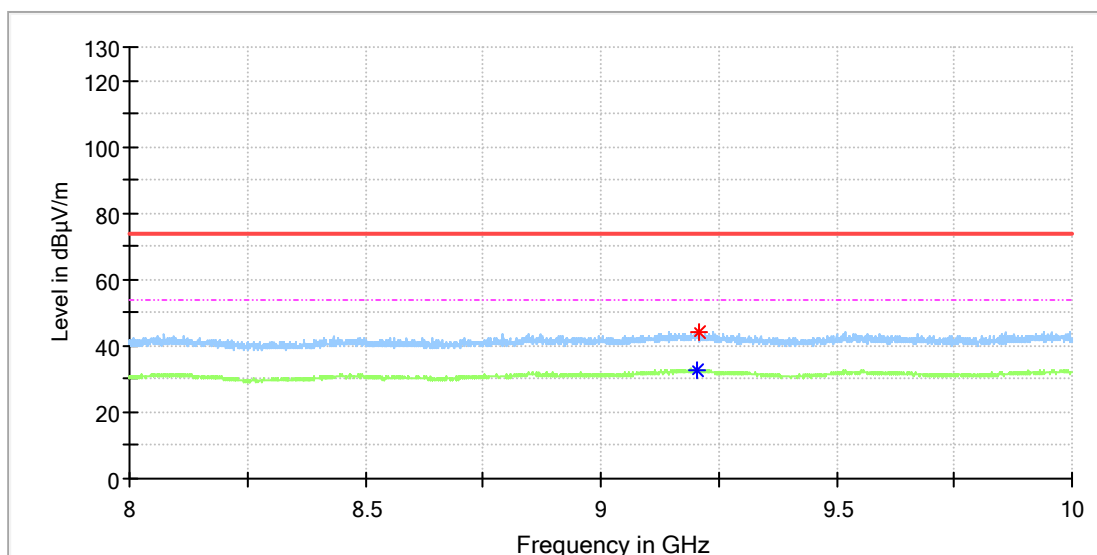


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1872.012500	---	34.40	54.00	19.60	100.0	V	331.0	5.3
1903.837500	45.06	---	74.00	28.94	100.0	V	251.0	5.6
4638.275000	---	41.96	54.00	12.04	100.0	V	74.0	12.0
4652.512500	53.38	---	74.00	20.62	100.0	V	207.0	12.0

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

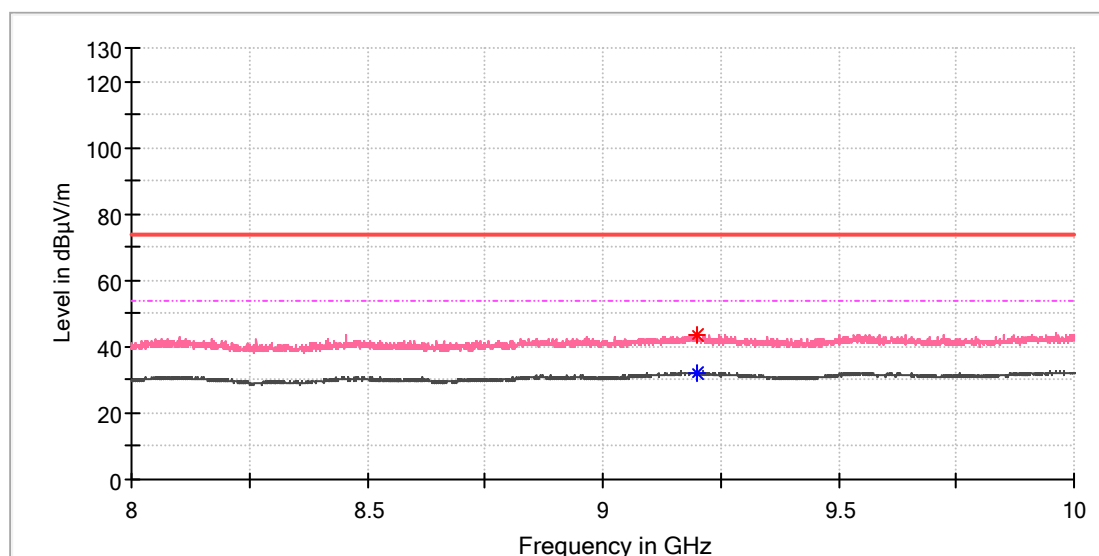


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9205.000000	---	32.63	54.00	21.37	100.0	H	193.0	10.3
9206.500000	44.43	---	74.00	29.57	100.0	H	119.0	10.3

EUT Information

EUT Name:	Lora module
Model:	RAK5146
Test Mode:	Lora DTS 500KHz SF12
Order No/Sample No:	168345328/A003106787-015
Test Voltage::	DC 5V
Remark:	Temp 23 Humi:58%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



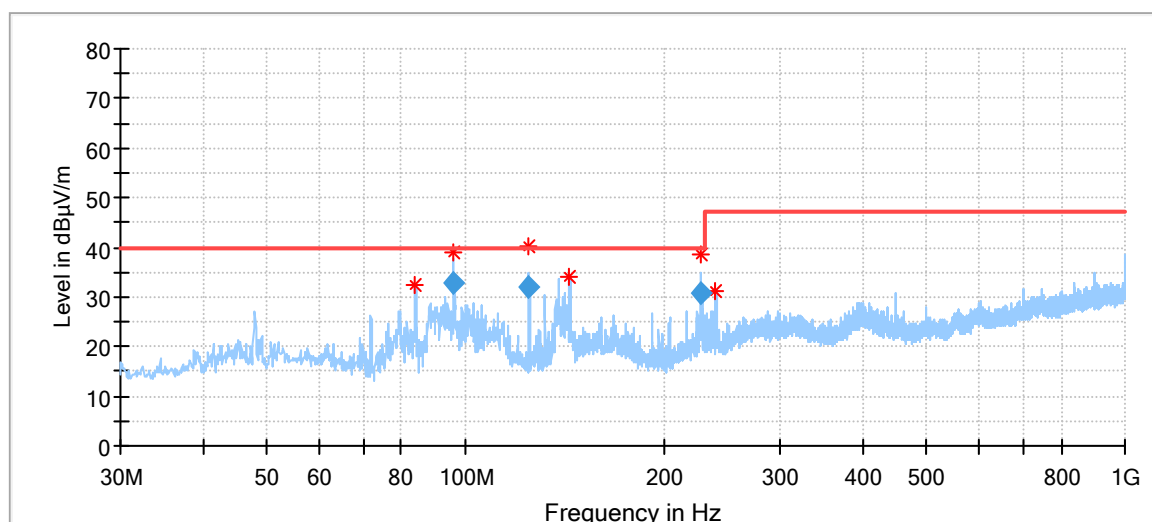
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9200.000000	43.36	---	74.00	30.64	100.0	V	173.0	10.3
9200.000000	---	32.20	54.00	21.80	100.0	V	173.0	10.3

Appendix A.7: Test Results of Radiated Emission

EUT Information

EUT Name:	Lora module
Model	RAK5146
Order No:	168332007
Test Mode:	ON, normal working (Lora)
Test Voltage:	DC5V
Test By:	Steve Lan
Review By:	Gary Chen
Remark:	3m Chamber



Critical Freqs

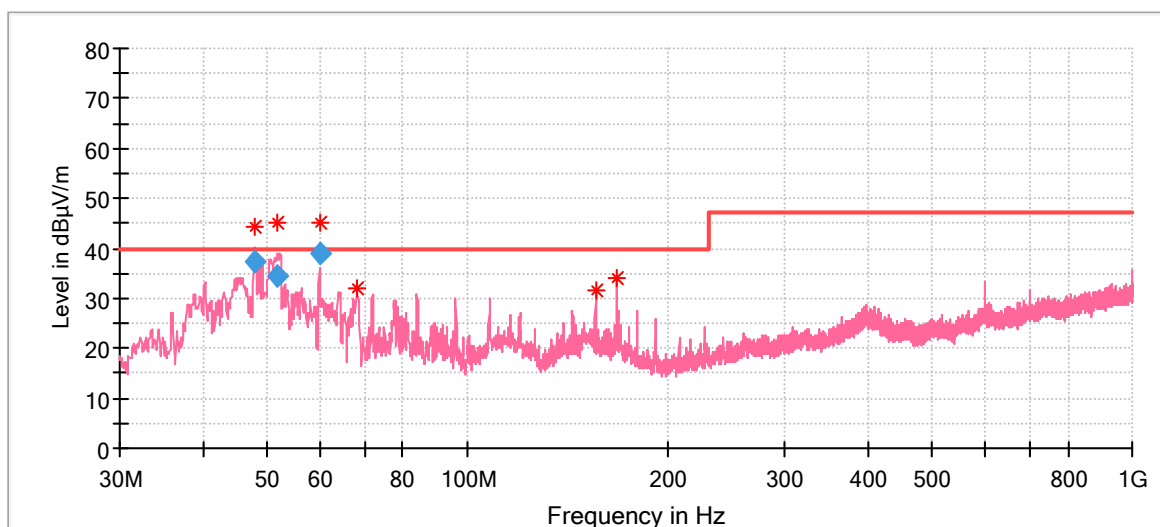
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
83.932000	32.58	40.00	7.42	200.0	H	243.0	15.3
95.980000	39.15	40.00	2.43	200.0	H	218.0	16.5
124.983000	40.32	40.00	5.17	100.0	H	226.0	19.1
143.975000	34.11	40.00	5.89	200.0	H	53.0	20.2
228.037000	38.65	40.00	5.22	200.0	H	171.0	18.8
239.908000	31.20	47.00	15.80	200.0	H	184.0	18.7

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
95.980000	32.81	40.00	7.19	1000.0	120.000	200.0	H	218.0	16.5
124.983000	32.09	40.00	7.91	1000.0	120.000	100.0	H	226.0	19.1
228.037000	30.80	40.00	9.20	1000.0	120.000	200.0	H	171.0	18.8

EUT Information

EUT Name: Lora module
Model: RAK5146
Order No: 168332007
Test Mode: ON, normal working (Lora)
Test Voltage: DC5V
Test By: Steve Lan
Review By: Gary Chen
Remark: 3m Chamber



Critical_Freqs

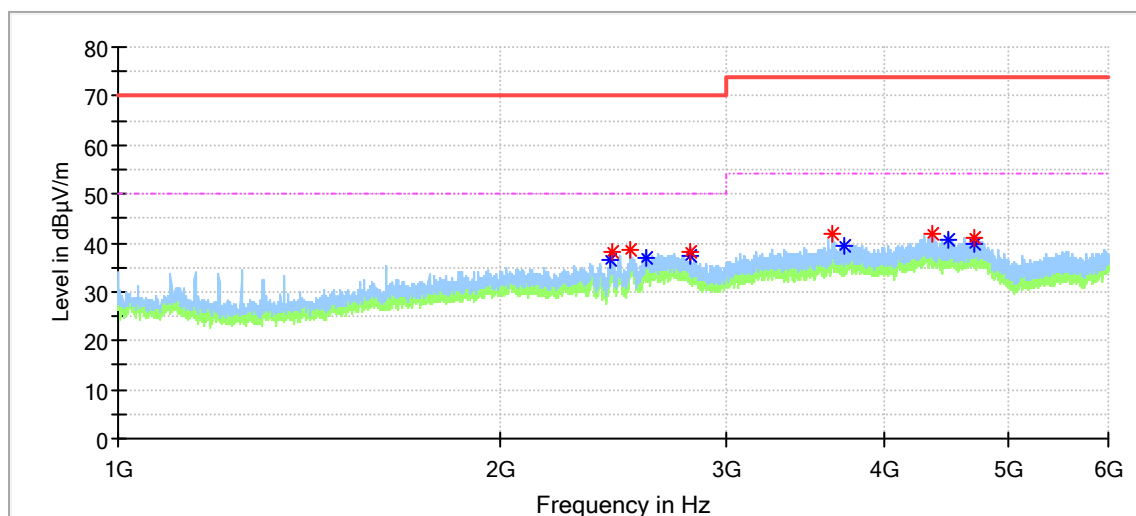
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.805000	45.13	40.00	1.01	100.0	V	339.0	20.8
60.033000	45.09	40.00	3.77	100.0	V	261.0	20.9
68.315000	32.03	40.00	7.97	200.0	V	231.0	19.0
155.906000	31.76	40.00	8.24	100.0	V	4.0	21.5
168.031000	34.07	40.00	5.93	200.0	V	338.0	21.5

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
48.005000	37.49	40.00	2.51	1000.0	120.000	100.0	V	103.0	21.4
51.805000	34.46	40.00	5.54	1000.0	120.000	100.0	V	339.0	20.8
60.033000	38.91	40.00	1.09	1000.0	120.000	100.0	V	261.0	20.9

EUT Information

EUT Name:	Lora module
Model	RAK5146
Order No:	168332007
Test Mode:	ON, normal working (Lora)
Test Voltage:	DC5V
Test By:	Steve Lan
Review By:	Gary Chen
Remark:	3m Chamber

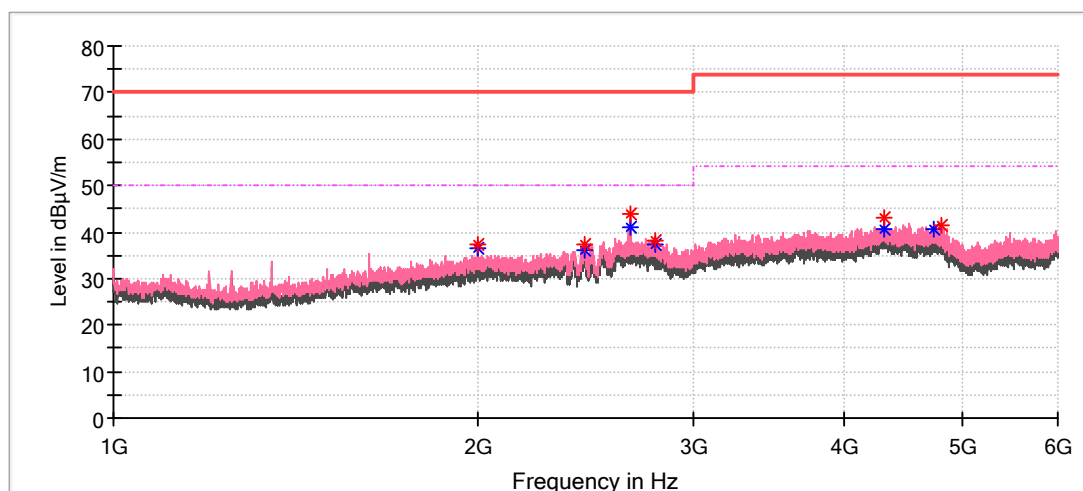


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2438.000000	---	36.36	50.00	13.64	200.0	H	111.0	-5.2
2442.000000	37.96	---	70.00	32.04	100.0	H	126.0	-5.2
2526.000000	38.69	---	70.00	31.31	100.0	H	70.0	-4.3
2599.500000	---	36.93	50.00	13.07	100.0	H	339.0	-3.8
2813.500000	---	37.25	50.00	12.75	200.0	H	152.0	-3.9
2813.500000	38.17	---	70.00	31.83	200.0	H	152.0	-3.9
3640.000000	41.93	---	74.00	32.07	100.0	H	232.0	-0.2
3722.500000	---	39.53	54.00	14.47	100.0	H	174.0	0.3
4361.000000	41.90	---	74.00	32.10	200.0	H	236.0	2.1
4485.000000	---	40.70	54.00	13.30	200.0	H	266.0	2.1
4707.000000	---	39.61	54.00	14.39	200.0	H	116.0	2.7
4711.500000	41.05	---	74.00	32.95	200.0	H	15.0	2.7

EUT Information

EUT Name:	Lora module
Model	RAK5146
Order No:	168332007
Test Mode:	ON, normal working (Lora)
Test Voltage:	DC5V
Test By:	Steve Lan
Review By:	Gary Chen
Remark:	3m Chamber



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2798.000000	---	37.29	50.00	12.71	100.0	V	0.0	-3.7
2798.000000	37.97	---	70.00	32.03	100.0	V	0.0	-3.7
4737.000000	---	40.67	54.00	13.33	100.0	V	126.0	2.8
2442.500000	---	35.99	50.00	14.01	100.0	V	151.0	-5.2
2446.500000	37.17	---	70.00	32.83	100.0	V	202.0	-5.1
2664.500000	---	41.12	50.00	8.88	100.0	V	202.0	-3.3
2665.000000	43.87	---	70.00	26.13	100.0	V	202.0	-3.3
4311.000000	43.23	---	74.00	30.77	100.0	V	212.0	2.2
4313.500000	---	40.63	54.00	13.37	100.0	V	274.0	2.2
1995.000000	37.54	---	70.00	32.46	200.0	V	204.0	-7.5
1995.000000	---	36.46	50.00	13.54	200.0	V	204.0	-7.5
4807.000000	41.51	---	74.00	32.49	200.0	V	347.0	2.3