AS/NZS Test Report

Equipment	:	**Intelligent LoRa/BLE Module [915MHz LoRa) featuring smartBASIC**
Model No.	:	**RM191-SM**
Brand Name	:	**Laird Connectivity**
Applicant	:	**Laird Connectivity**
Address	:	**W66N220 Commerce Court, Cedarburg, Wisconsin 53012, USA**
Standard	:	**AS/NZS 4268:2017**
Received Date	:	**May 08, 2019**
Tested Date	:	**May 08 ~ Jul. 22, 2019**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

James Fan / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	ersion	Description	Issued Date
AR821301-03	Rev. 01	Initial issue	Jul. 30, 2019

Summary of Test Results

Ref. Std. Clause	Description	Measured	Result
6.3	Maximum EIRP	EIRP (dBm): 18.25	Pass
Row 58	Power Spectral Density	Meet the requirement of limit.	Pass
6.4	Transmitter Spurious Emissions	Meet the requirement of limit.	Pass
6.5	Emission Bandwidth	Meet the requirement of limit.	Pass
6.6	Operating Frequencies	Meet the requirement of limit.	Pass
7.2	Receiver Spurious Emissions	Meet the requirement of limit.	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information									
Country	Region	Frequency Range (MHz)	Modulati on	Type	Test Channel Frequency (MHz)	Spreading Factor	Physical bit rate (bit/s)	UL/DL	Channel Bandwidth (kHz)
AUSTRALIA	AS923	915.3 ~ 927.7	LoRa	DTS	915.3, 921.6, 927.7	12 ~ 7	250 ~ 5470	UL/DL	125
		915.4 ~ 927.6	LoRa	DTS	915.4, 921.6, 927.6	7	11000	UL/DL	250
		915.2 ~ 927.8	FSK	DTS	915.2, 921.6, 927.8	---	50000	UL/DL	125
	AU915	923.3 ~ 927.5	LoRa	DTS	923.3, 924.9, 927.5	12 ~ 7	980 ~ 21900	DL	500
		915.3 ~ 927.7	LoRa	DTS	915.3, 921.6, 927.7	12 ~ 7	250 ~ 5470	UL	125
		915.9 ~ 927.1	LoRa	DTS	915.9, 920.7, 927.1	8	12500	UL	500
Note: RF output power specifies that Maximum Peak Conducted Output Power.									

1.1.2 Antenna Details

Ant. No.	External Antenna Part Number	Laird Part Number	Mfg.	Type	Gain (dBi)	Connector Type
1	RFDPA131015IMBB301	0600-00060	Walsin	Dipole	0.9	U.FL
2	WPANTDP036-R5A	---	World Products	Dipole	2	U.FL
3	S152CL-L-PX-915S	---	Nearson	Dipole	2	U.FL
4	001-0002	---	Laird	Dipole	2	SMA
5	WPANT10009	---	World Products	PCB Dipole	2	MHF

1.1.3 EUT Operational Condition

Power Supply Type	3.5Vdc from host		
Operational Voltage	☒ Vnom (3.3 Vdc)	☒ Vmax (3.50 Vdc)	☒ Vmin (1.80 Vdc)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (85°C)	☒ Tmin (-40°C)

1.1.4 Accessories

N/A

1.1.5 Test Tool and Duty Cycle

Test Tool	test command			
Duty Cycle and Duty Factor	**LoRa 125kHz**	**LoRa 250kHz**	**LoRa 500kHz**	**FSK 50kbps**
Duty Cycle (%)	100	98.32	98.43	100
Duty Factor (dB)	0	0.07	0.07	0

1.1.6 Power Index of Test Tool

Channel Bandwidth 125 kHz			
Modulation Mode	**Test Frequency (MHz)**		
	915.3	**921.6**	**927.7**
LoRa 125kHz	15	15	15

Channel Bandwidth 250 kHz			
Modulation Mode	**Test Frequency (MHz)**		
	915.4	**921.6**	**927.6**
LoRa 250kHz	15	15	15

Channel Bandwidth 500 kHz			
Modulation Mode	**Test Frequency (MHz)**		
	915.9	**920.7**	**927.1**
LoRa 500kHz	15	15	15

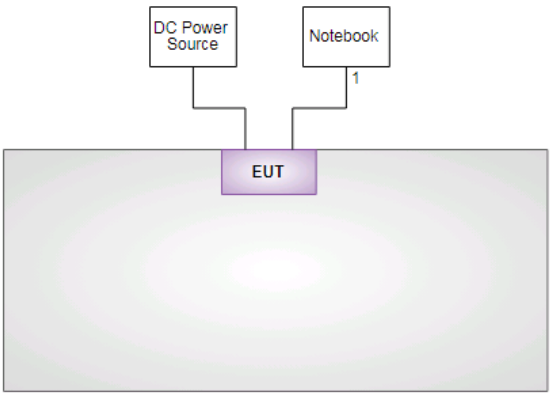
Channel Bandwidth 125 kHz			
Modulation Mode	**Test Frequency (MHz)**		
	915.2	**921.6**	**927.8**
FSK 50kbps	14	14	14

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E6440	JPXMD12	---

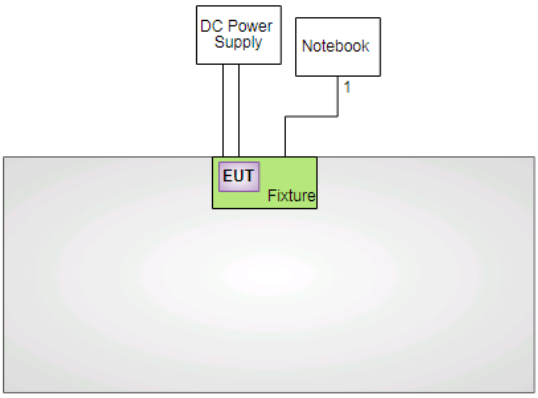
1.3 Test Setup Chart

Test Setup Diagram (below 30 MHz)



No.	Signal cable / Length (m)
1	USB, 0.5m non-shielded.

Test Setup Diagram above 30 MHz



No.	Signal cable / Length (m)
1	RJ45, 1.81m non-shielded.

1.4 Test Equipment and Calibration Data

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	May 30 ~ Jul. 22, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101486	Jan. 08, 2019	Jan. 07, 2020
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 05, 2018	Dec. 04, 2019
Power Sensor	Agilent	U2021XA	MY53480019	Jan. 30, 2019	Jan. 29, 2020
AC POWER SOURCE	APC	AFC-500W	F312060012	Nov. 29, 2018	Nov. 28, 2019
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Measurement Software	Agilent	EN RF test	1.1501125	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	May 08 ~ Jun. 13, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 27, 2018	Dec. 26, 2019
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 18, 2018	Jul. 17, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 18, 2018	Dec. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 08, 2018	Oct. 07, 2019
Preamplifier	EMC	EMC02325	980225	Jul. 20, 2018	Jul. 19, 2019
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF Cable	EMC	EMC104-SM-SM-8000	181106	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 08, 2018	Oct. 07, 2019
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 08, 2018	Oct. 07, 2019
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 08, 2018	Oct. 07, 2019
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 08, 2018	Oct. 07, 2019
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emissions				
Test Site	(10CH01-HY)				
Tested Date	Jun. 13, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	Keysight	N9038A	MY54130031	Nov. 06, 2018	Nov. 05, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
RF Cable-R10m	Suhner Switzerland + Rosenberger	RG223/U + UAA220A-0	CB022-DOOR	Nov. 11, 2018	Nov. 10, 2019
Turn Table	HD	DT 60 RPS	1513/004/00	NA	NA
Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

AS/NZS 4268:2017

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Measurement Uncertainty	
Parameters	**Uncertainty**
Radio Frequency	$\pm 1.4 \times 10^{-9}$
RF Power Conducted	±0.808 dB
RF Power Radiated	±3.398 dB
Spurious Emission, Conducted	±2.470 dB
Spurious Emission, Radiated	±3.398 dB
Humidity	±0.8 ^{o}C
Temperature	±4.7%
Time	±0.1%

2 Test Configuration

2.1 Testing Condition

Testing Location			
☒	ICC Lab	ADD : No.3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan (R.O.C.) TEL : 886-3-271-8666 FAX : 886-3-318-0155	
☒	Sporton Lab	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973	

Test Item	Test Site	Ambient Condition	Tested By
Antenna port conducted measurement	TH01-WS	25°C / 62%	Birkin Cheng
Transmitter Radiated Emission > 30 MHz Receiver Radiated Emission > 30 MHz	03CH01-WS	22°C / 63%	Felix Sung
Transmitter Radiated Emission ≤ 30 MHz Receiver Radiated Emission ≤ 30 MHz	10CH01-HY*	25°C / 65%	Jack Li

Note: * ICC lab subcontracts this test item to Sporton Lab (TAF:1190).
Sporton Lab is a TAF accreditation test firm and also is an approved provider of ICC lab.

2.2 The Worst Test Modes and Channel Details

Test item	Conducted / Radiated measurement	Configuration	Test Frequency (MHz)	SF	Voltage	Temperature	TX / RX test	Mode
EIRP	Conducted	LoRa 125 kHz LoRa 500 kHz	915.3 / 921.6 / 927.7 915.9 / 920.7 / 927.1	12 8	Vnom=3.3V, Vmin=1.8V Vmax=3.5V	Tnom=20°C Tmin=- 40°C Tmax=85°C	TX	AU915
Power Spectral Density	Conducted				Vnom=3.3V	Tnom=20°C		
Emission Bandwidth	Conducted				Vnom=3.3V	Tnom=20°C		
Operating Frequencies	Conducted				Vnom=3.3V, Vmin=1.8V Vmax=3.5V	Tnom=20°C Tmin=- 40°C Tmax=85°C		
Transmitter Spurious Emissions	Radiated	LoRa 125 kHz LoRa 500 kHz	915.3 / 921.6 / 927.7 915.9 / 920.7 / 927.1	12 8	Vnom=3.3V	Tnom=20°C	TX	AU915
EIRP	Conducted	LoRa 125 kHz LoRa 250 kHz FSK 50kbps	915.3 / 921.6 / 927.7 915.4 / 921.6 / 927.6 915.2 / 921.6 / 927.8	12 7 -	Vnom=3.3V, Vmin=1.8V Vmax=3.5V	Tnom=20°C Tmin=- 40°C Tmax=85°C	TX	AS923
Power Spectral Density	Conducted				Vnom=3.3V	Tnom=20°C		
Emission Bandwidth	Conducted				Vnom=3.3V	Tnom=20°C		
Operating Frequencies	Conducted				Vnom=3.3V, Vmin=1.8V Vmax=3.5V	Tnom=20°C Tmin=- 40°C Tmax=85°C		
Transmitter Spurious Emissions	Radiated	LoRa 125 kHz LoRa 250 kHz FSK 50kbps	915.3 / 921.6 / 927.7 915.4 / 921.6 / 927.6 915.2 / 921.6 / 927.8	12 7 -	Vnom=3.3V	Tnom=20°C	TX	AS923

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** result was found as the worst case and was shown in this report.
2. TX channels of Lora 125 kHz is same for AU915 and AS923. Thus, only one mode test results are mentioned on test report.

Test item	Conducted / Radiated measurement	Configuration	Test Frequency (MHz)	SF	Voltage	Temperature	TX / RX test	Mode
Receiver Spurious Emissions (Below 30MHz) Receiver Spurious Emissions (Below 1GHz) Receiver Spurious Emissions (Above 1GHz)	Radiated	LoRa 500 kHz	924.9	12	Vnom=3.3V	Tnom=20°C	RX	AU915
		LoRa 125 kHz LoRa 250 kHz FSK 50kbps	921.6 921.6 921.6	12 7 -	Vnom=3.3V	Tnom=20°C	RX	AS923

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** result was found as the worst case and was shown in this report.

3 Transmitter Test Results

3.1 Maximum EIRP & Power Spectral Density

3.1.1 Maximum EIRP & Power Spectral Density Limit

Permitted Operating Frequency Band (MHz)	Maximum EIRP	Other Requirements
915 to 928	1W (30dBm)	The radiated peak power spectral density in any 3 kHz is limited to 25 mW (14dBm) per 3 kHz.

Note: Limit is from AS/NZS 4268:2017

3.1.2 Test Procedures

Conducted Power

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

ERIP

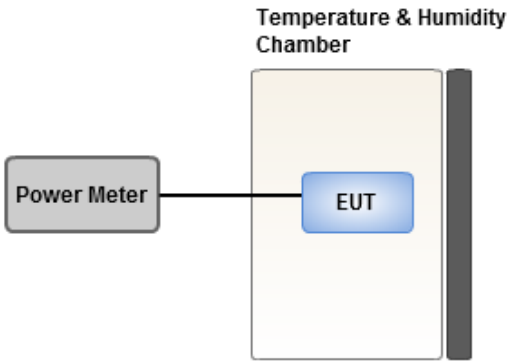
Antenna gain is added to measured conducted power

Power Density

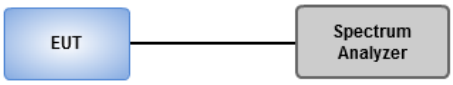
Set the RBW = 3 kHz, VBW = 10 kHz., Detector = RMS, Sweep time = auto couple,
Sweep time = auto couple.
Employ trace averaging (RMS) mode over a minimum of 100 traces.
Use the peak marker function to determine the maximum amplitude level.
Add antenna gain to measured Power density

3.1.3 Test Setup

Conducted Power



Power Density



3.1.4 Test Result of EIRP

LoRa 125 kHz / SF:12

Condition	Freqeuncy (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)
$T_{nom}V_{nom}$	915.3	17.41	30
$T_{min}V_{max}$	915.3	18.25	30
$T_{min}V_{min}$	915.3	13.13	30
$T_{max}V_{max}$	915.3	17.04	30
$T_{max}V_{min}$	915.3	10.53	30
$T_{nom}V_{nom}$	921.6	17.28	30
$T_{min}V_{max}$	921.6	17.98	30
$T_{min}V_{min}$	921.6	12.91	30
$T_{max}V_{max}$	921.6	16.99	30
$T_{max}V_{min}$	921.6	10.60	30
$T_{nom}V_{nom}$	927.7	17.19	30
$T_{min}V_{max}$	927.7	17.84	30
$T_{min}V_{min}$	927.7	12.83	30
$T_{max}V_{max}$	927.7	16.83	30
$T_{max}V_{min}$	927.7	10.54	30

LoRa 250 kHz / SF:7

Condition	Freqeuncy (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)
$T_{nom}V_{nom}$	915.4	17.32	30
$T_{min}V_{max}$	915.4	17.76	30
$T_{min}V_{min}$	915.4	12.64	30
$T_{max}V_{max}$	915.4	17.02	30
$T_{max}V_{min}$	915.4	10.51	30
$T_{nom}V_{nom}$	921.6	17.24	30
$T_{min}V_{max}$	921.6	17.70	30
$T_{min}V_{min}$	921.6	12.63	30
$T_{max}V_{max}$	921.6	16.91	30
$T_{max}V_{min}$	921.6	10.52	30
$T_{nom}V_{nom}$	927.6	17.20	30
$T_{min}V_{max}$	927.6	17.64	30
$T_{min}V_{min}$	927.6	12.63	30
$T_{max}V_{max}$	927.6	16.90	30
$T_{max}V_{min}$	927.6	10.61	30

LoRa 500 kHz / SF:8

Condition	Freqeuncy (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)
$T_{nom}V_{nom}$	915.9	17.38	30
$T_{min}V_{max}$	915.9	17.65	30
$T_{min}V_{min}$	915.9	12.53	30
$T_{max}V_{max}$	915.9	17.04	30
$T_{max}V_{min}$	915.9	10.53	30
$T_{nom}V_{nom}$	920.7	17.25	30
$T_{min}V_{max}$	920.7	17.50	30
$T_{min}V_{min}$	920.7	12.43	30
$T_{max}V_{max}$	920.7	16.90	30
$T_{max}V_{min}$	920.7	10.51	30
$T_{nom}V_{nom}$	927.1	17.32	30
$T_{min}V_{max}$	927.1	17.55	30
$T_{min}V_{min}$	927.1	12.56	30
$T_{max}V_{max}$	927.1	16.99	30
$T_{max}V_{min}$	927.1	10.70	30

FSK 50kbps

Condition	Freqeuncy (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)
$T_{nom}V_{nom}$	915.2	15.71	30
$T_{min}V_{max}$	915.2	15.98	30
$T_{min}V_{min}$	915.2	10.86	30
$T_{max}V_{max}$	915.2	15.38	30
$T_{max}V_{min}$	915.2	8.87	30
$T_{nom}V_{nom}$	921.6	15.67	30
$T_{min}V_{max}$	921.6	15.92	30
$T_{min}V_{min}$	921.6	10.85	30
$T_{max}V_{max}$	921.6	15.34	30
$T_{max}V_{min}$	921.6	8.95	30
$T_{nom}V_{nom}$	927.8	15.65	30
$T_{min}V_{max}$	927.8	15.95	30
$T_{min}V_{min}$	927.8	10.94	30
$T_{max}V_{max}$	927.8	15.32	30
$T_{max}V_{min}$	927.8	9.03	30

3.1.5 Test Result of Power Density

LoRa 125 kHz / SF:12

Modulation Mode	Freqeuncy (MHz)	EIRP Power Density (dBm/3kHz)	EIRP Limit (dBm/3kHz)
LoRa	915.3	3.28	14
LoRa	921.6	2.83	14
LoRa	927.7	2.60	14

LoRa 250 kHz / SF:7

Modulation Mode	Freqeuncy (MHz)	EIRP Power Density (dBm/3kHz)	EIRP Limit (dBm/3kHz)
LoRa	915.4	0.38	14
LoRa	921.6	0.07	14
LoRa	927.6	-0.04	14

LoRa 500 kHz / SF:8

Modulation Mode	Freqeuncy (MHz)	EIRP Power Density (dBm/3kHz)	EIRP Limit (dBm/3kHz)
LoRa	915.9	-3.14	14
LoRa	920.7	-3.42	14
LoRa	927.1	-3.22	14

FSK 50kbps

Modulation Mode	Freqeuncy (MHz)	EIRP Power Density (dBm/3kHz)	EIRP Limit (dBm/3kHz)
FSK	915.2	13.02	14
FSK	921.6	12.99	14
FSK	927.8	12.97	14

3.2 Transmitter Spurious Emissions

3.2.1 Transmitter Spurious Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

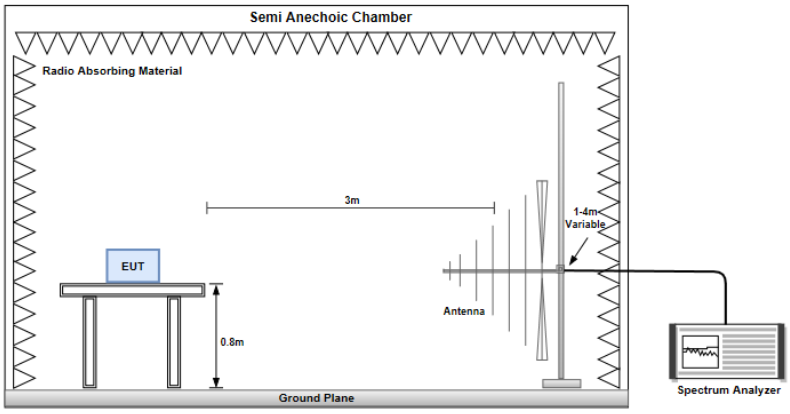
Note: Limit is from FCC Part 15.209

3.2.2 Test Procedures

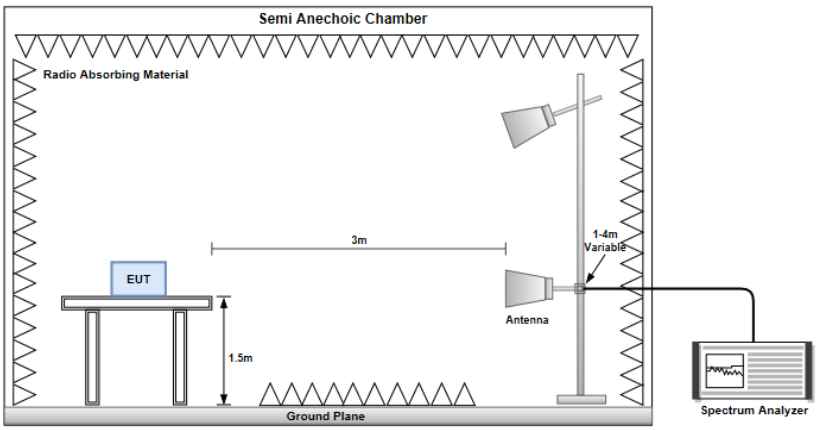
Reference to clause 6.2.1 of AS/NZS 4268:2017.

3.2.3 Test Setup

Below 1GHz



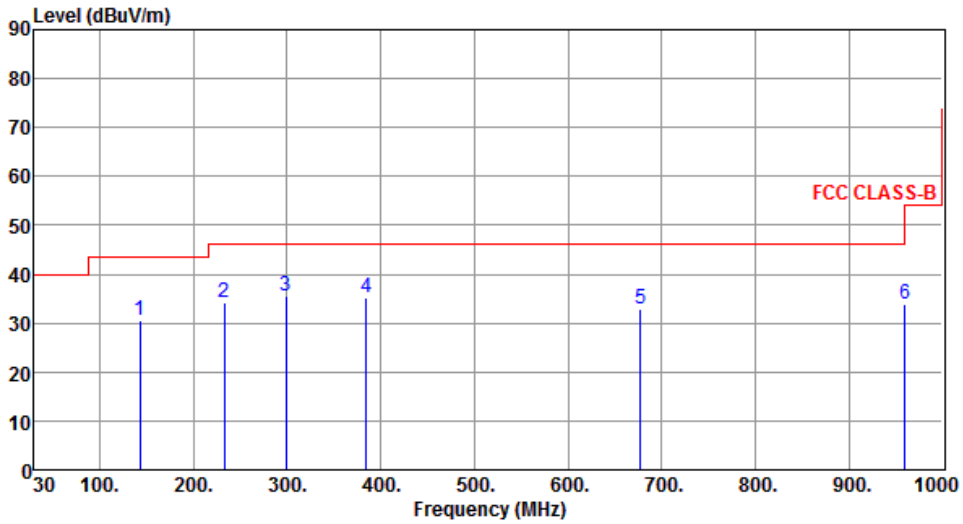
Above 1 GHz



3.2.4 Transmitter Spurious Emissions (Below 1GHz)

LoRa 125 kHz

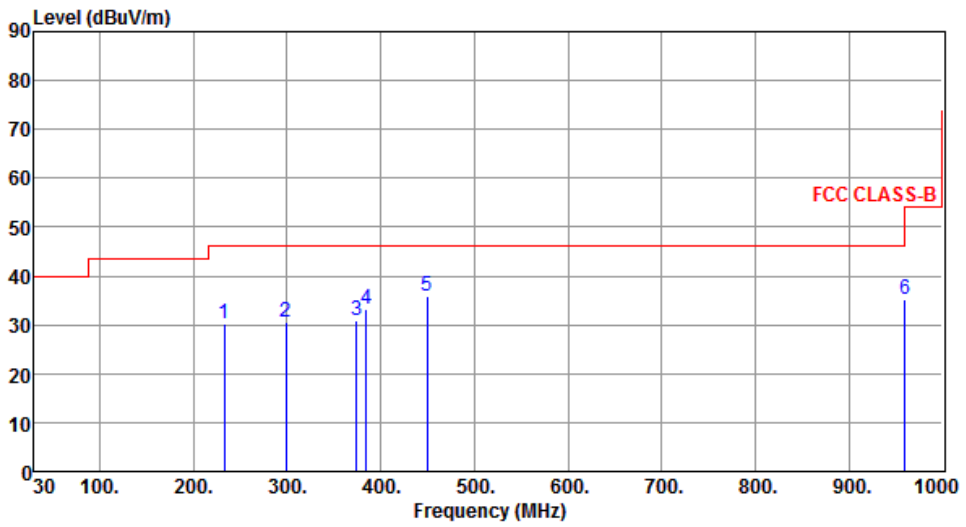
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.3
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	142.94	30.55	43.50	-12.95	39.11	-8.56	Peak	---	---
2	232.85	34.12	46.00	-11.88	44.21	-10.09	Peak	---	---
3	298.84	35.52	46.00	-10.48	43.34	-7.82	Peak	---	---
4	385.06	35.31	46.00	-10.69	40.65	-5.34	Peak	---	---
5	677.24	32.72	46.00	-13.28	32.25	0.47	Peak	---	---
6	960.00	33.77	46.00	-12.23	29.18	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

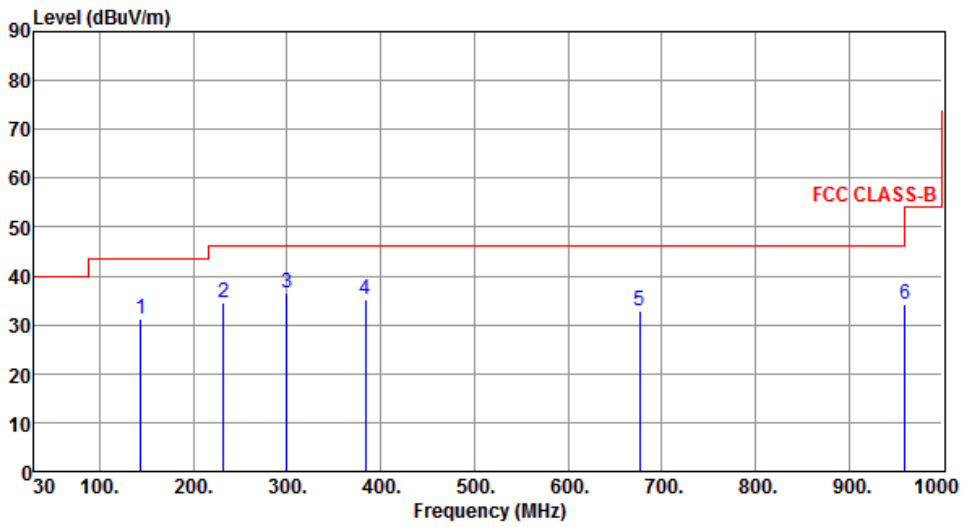
Modulation Mode	LoRa	Test Freq. (MHz)	915.3
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.65	30.33	46.00	-15.67	40.44	-10.11	Peak	---	---
2	298.87	30.52	46.00	-15.48	38.34	-7.82	Peak	---	---
3	374.45	30.80	46.00	-15.20	36.49	-5.69	Peak	---	---
4	384.42	33.10	46.00	-12.90	38.47	-5.37	Peak	---	---
5	449.44	35.86	46.00	-10.14	39.78	-3.92	Peak	---	---
6	960.00	35.24	46.00	-10.76	30.65	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

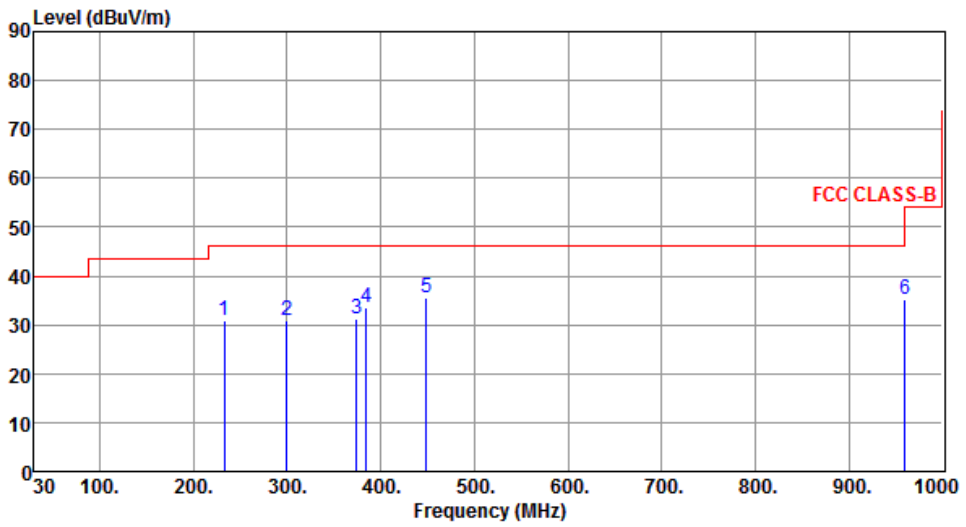
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.23	31.25	43.50	-12.25	39.71	-8.46	Peak	---	---
2	232.58	34.38	46.00	-11.62	44.49	-10.11	Peak	---	---
3	299.49	36.37	46.00	-9.63	44.18	-7.81	Peak	---	---
4	383.74	35.25	46.00	-10.75	40.65	-5.40	Peak	---	---
5	676.78	33.00	46.00	-13.00	32.53	0.47	Peak	---	---
6	960.00	34.06	46.00	-11.94	29.47	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

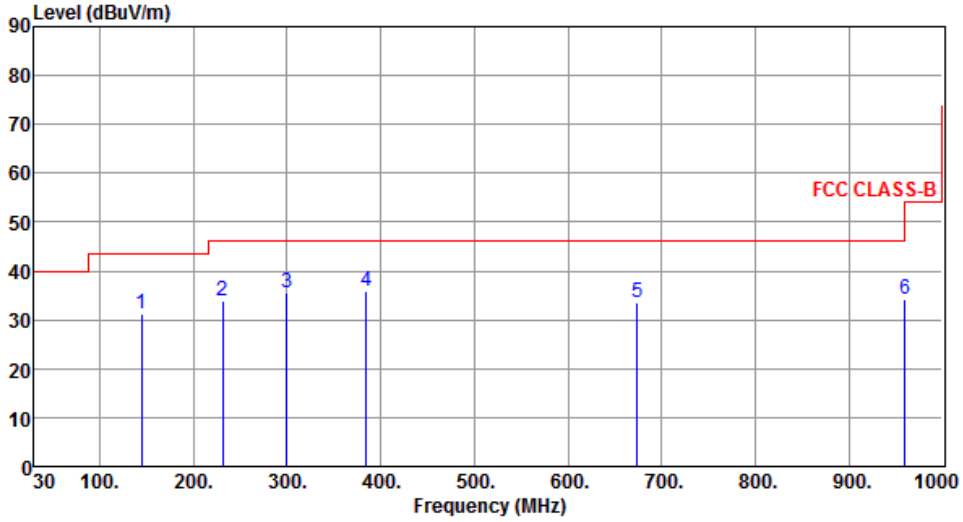
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.98	31.03	46.00	-14.97	41.11	-10.08	Peak	---	---
2	299.64	30.80	46.00	-15.20	38.61	-7.81	Peak	---	---
3	374.34	31.29	46.00	-14.71	36.98	-5.69	Peak	---	---
4	384.46	33.52	46.00	-12.48	38.89	-5.37	Peak	---	---
5	448.85	35.49	46.00	-10.51	39.42	-3.93	Peak	---	---
6	960.00	35.26	46.00	-10.74	30.67	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

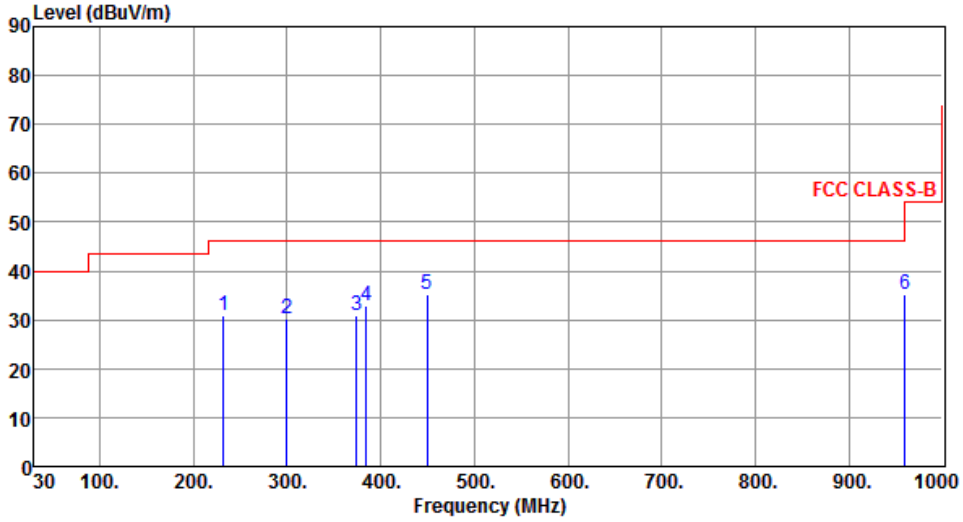
Modulation Mode	LoRa	Test Freq. (MHz)	927.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.35	31.08	43.50	-12.42	39.54	-8.46	Peak	---	---
2	231.68	33.99	46.00	-12.01	44.18	-10.19	Peak	---	---
3	300.06	35.55	46.00	-10.45	43.35	-7.80	Peak	---	---
4	384.35	35.74	46.00	-10.26	41.12	-5.38	Peak	---	---
5	674.29	33.47	46.00	-12.53	33.06	0.41	Peak	---	---
6	960.00	34.17	46.00	-11.83	29.58	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.7
Polarization	Vertical		

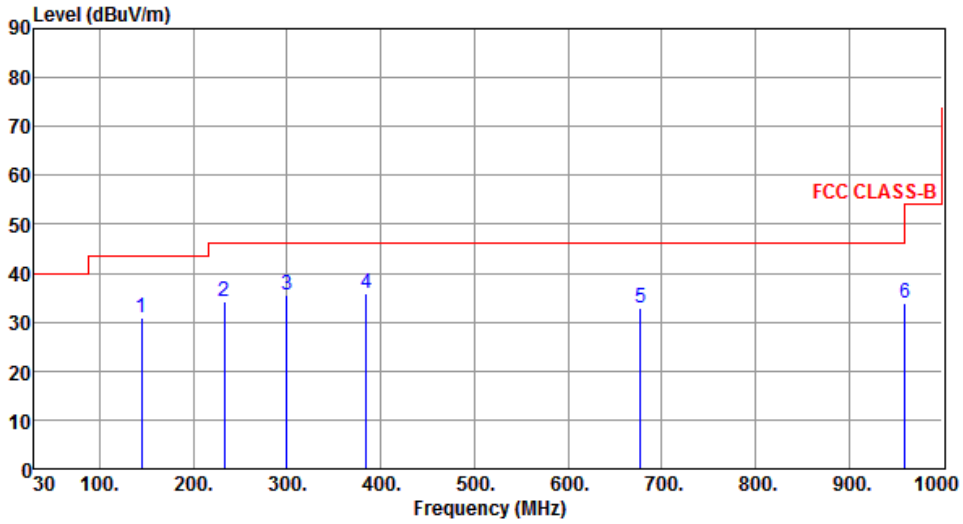


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.22	31.03	46.00	-14.97	41.17	-10.14	Peak	---	---
2	299.65	30.17	46.00	-15.83	37.98	-7.81	Peak	---	---
3	374.65	30.91	46.00	-15.09	36.60	-5.69	Peak	---	---
4	384.35	33.04	46.00	-12.96	38.42	-5.38	Peak	---	---
5	449.57	35.31	46.00	-10.69	39.23	-3.92	Peak	---	---
6	960.00	35.21	46.00	-10.79	30.62	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 250 kHz

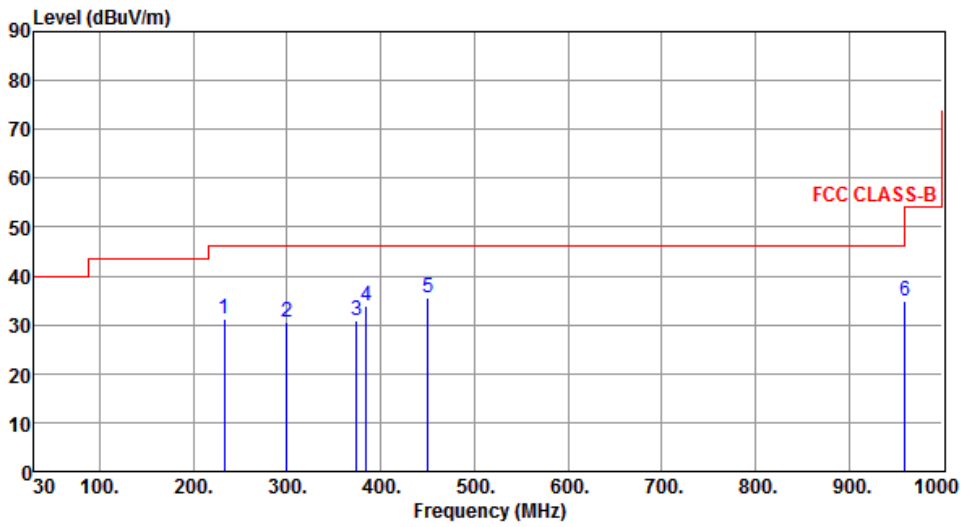
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.4
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.45	30.89	43.50	-12.61	39.35	-8.46	Peak	---	---
2	232.87	34.37	46.00	-11.63	44.46	-10.09	Peak	---	---
3	299.54	35.54	46.00	-10.46	43.35	-7.81	Peak	---	---
4	384.35	35.74	46.00	-10.26	41.12	-5.38	Peak	---	---
5	677.43	32.80	46.00	-13.20	32.32	0.48	Peak	---	---
6	960.00	33.80	46.00	-12.20	29.21	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

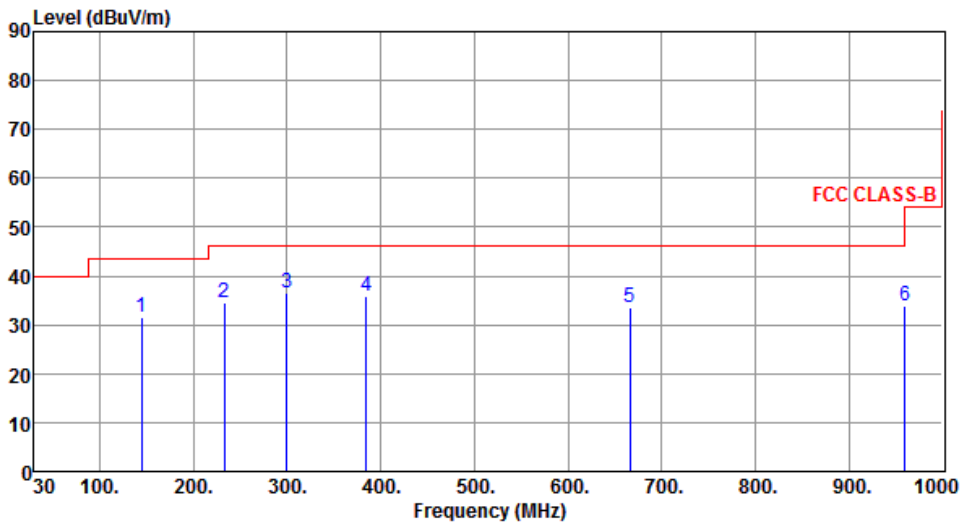
Modulation Mode	LoRa	Test Freq. (MHz)	915.4
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.89	31.08	46.00	-14.92	41.17	-10.09	Peak	---	---
2	299.73	30.54	46.00	-15.46	38.35	-7.81	Peak	---	---
3	374.52	30.96	46.00	-15.04	36.65	-5.69	Peak	---	---
4	384.21	33.87	46.00	-12.13	39.25	-5.38	Peak	---	---
5	450.17	35.45	46.00	-10.55	39.35	-3.90	Peak	---	---
6	960.00	34.84	46.00	-11.16	30.25	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

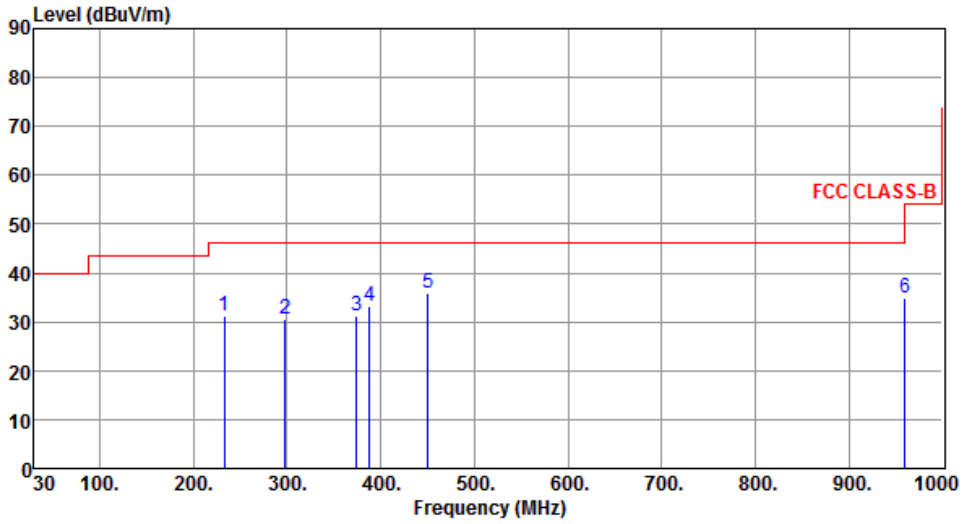
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.35	31.71	43.50	-11.79	40.17	-8.46	Peak	---	---
2	232.87	34.56	46.00	-11.44	44.65	-10.09	Peak	---	---
3	300.06	36.54	46.00	-9.46	44.34	-7.80	Peak	---	---
4	384.35	35.74	46.00	-10.26	41.12	-5.38	Peak	---	---
5	666.25	33.47	46.00	-12.53	33.24	0.23	Peak	---	---
6	960.00	33.94	46.00	-12.06	29.35	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

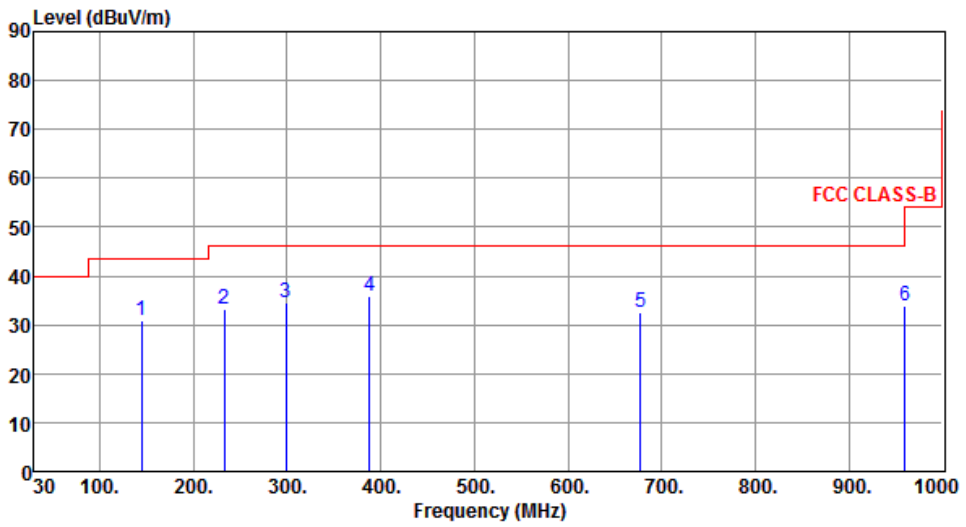
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	233.16	31.11	46.00	-14.89	41.18	-10.07	Peak	---	---
2	297.74	30.69	46.00	-15.31	38.55	-7.86	Peak	---	---
3	374.35	31.09	46.00	-14.91	36.78	-5.69	Peak	---	---
4	388.21	33.21	46.00	-12.79	38.54	-5.33	Peak	---	---
5	450.29	35.75	46.00	-10.25	39.64	-3.89	Peak	---	---
6	960.00	35.02	46.00	-10.98	30.43	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

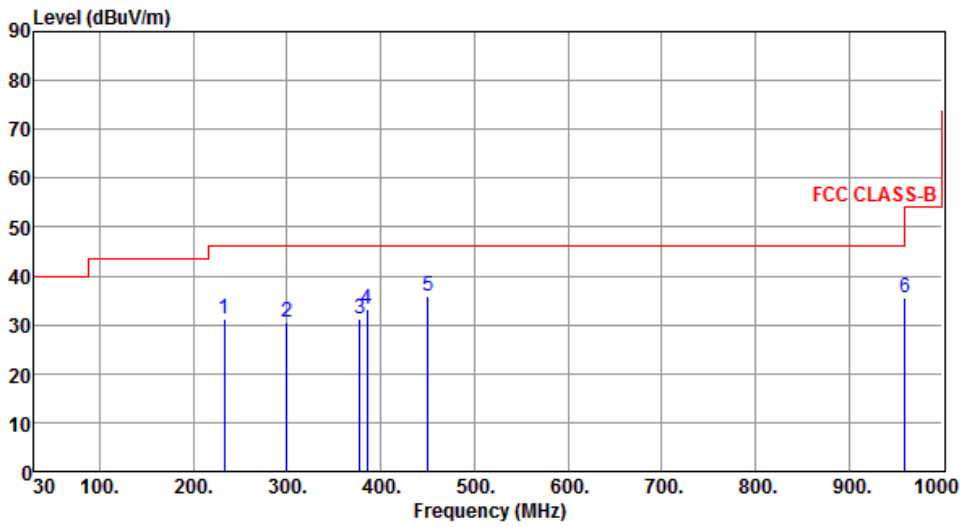
Modulation Mode	LoRa	Test Freq. (MHz)	927.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.43	30.81	43.50	-12.69	39.27	-8.46	Peak	---	---
2	232.87	33.30	46.00	-12.70	43.39	-10.09	Peak	---	---
3	299.26	34.59	46.00	-11.41	42.40	-7.81	Peak	---	---
4	388.29	35.83	46.00	-10.17	41.16	-5.33	Peak	---	---
5	677.25	32.69	46.00	-13.31	32.21	0.48	Peak	---	---
6	960.00	33.81	46.00	-12.19	29.22	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.6
Polarization	Vertical		

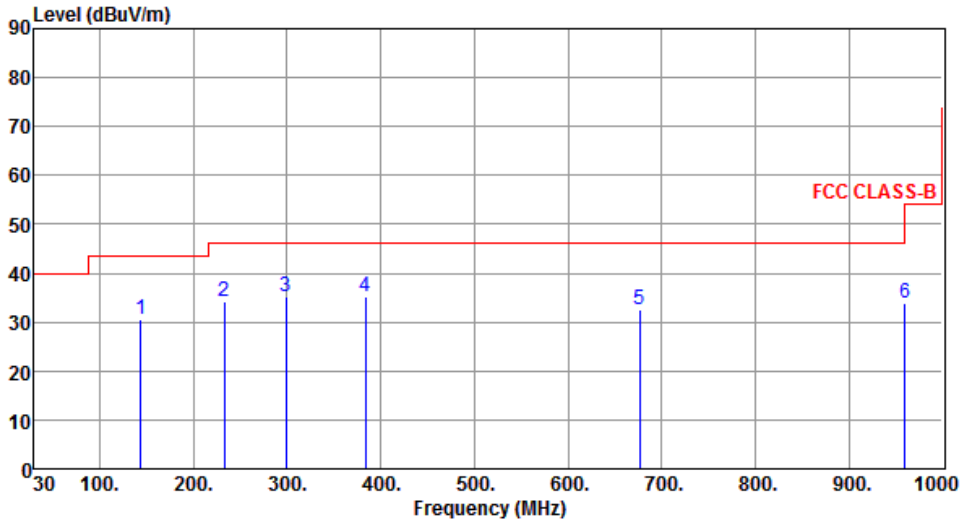


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	233.31	31.06	46.00	-14.94	41.12	-10.06	Peak	---	---
2	299.65	30.54	46.00	-15.46	38.35	-7.81	Peak	---	---
3	377.35	31.36	46.00	-14.64	36.98	-5.62	Peak	---	---
4	385.27	33.22	46.00	-12.78	38.56	-5.34	Peak	---	---
5	450.27	35.98	46.00	-10.02	39.87	-3.89	Peak	---	---
6	960.00	35.62	46.00	-10.38	31.03	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 500 kHz

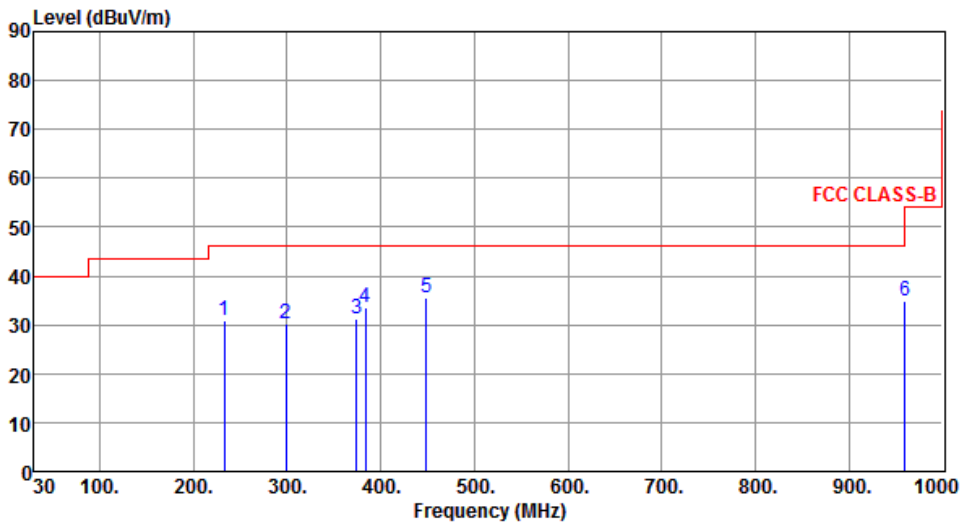
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.9
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	143.49	30.70	43.50	-12.80	39.21	-8.51	Peak	---	---
2	232.73	34.29	46.00	-11.71	44.39	-10.10	Peak	---	---
3	298.69	35.29	46.00	-10.71	43.12	-7.83	Peak	---	---
4	384.05	35.09	46.00	-10.91	40.48	-5.39	Peak	---	---
5	676.99	32.55	46.00	-13.45	32.08	0.47	Peak	---	---
6	960.00	33.80	46.00	-12.20	29.21	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

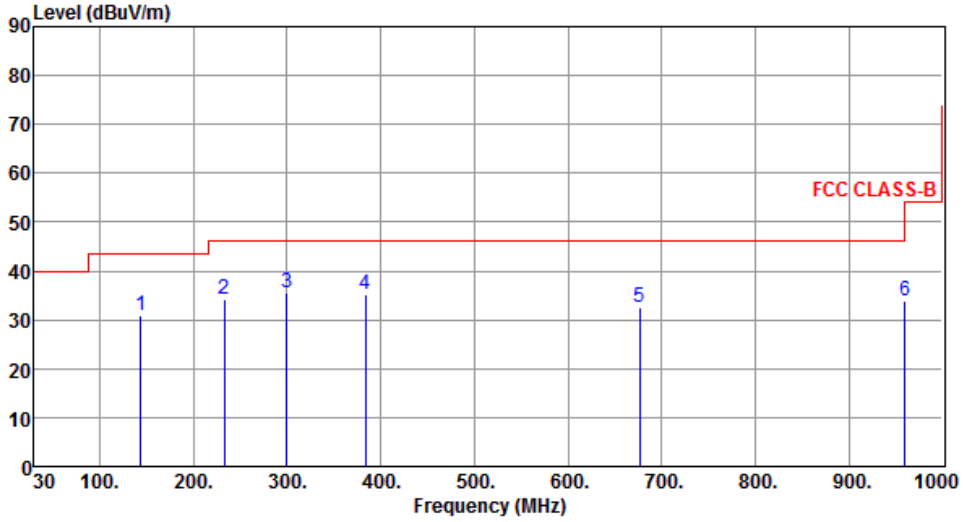
Modulation Mode	LoRa	Test Freq. (MHz)	915.9
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.73	30.77	46.00	-15.23	40.87	-10.10	Peak	---	---
2	298.69	30.37	46.00	-15.63	38.20	-7.83	Peak	---	---
3	374.35	31.07	46.00	-14.93	36.76	-5.69	Peak	---	---
4	384.05	33.62	46.00	-12.38	39.01	-5.39	Peak	---	---
5	449.04	35.50	46.00	-10.50	39.43	-3.93	Peak	---	---
6	960.00	34.84	46.00	-11.16	30.25	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

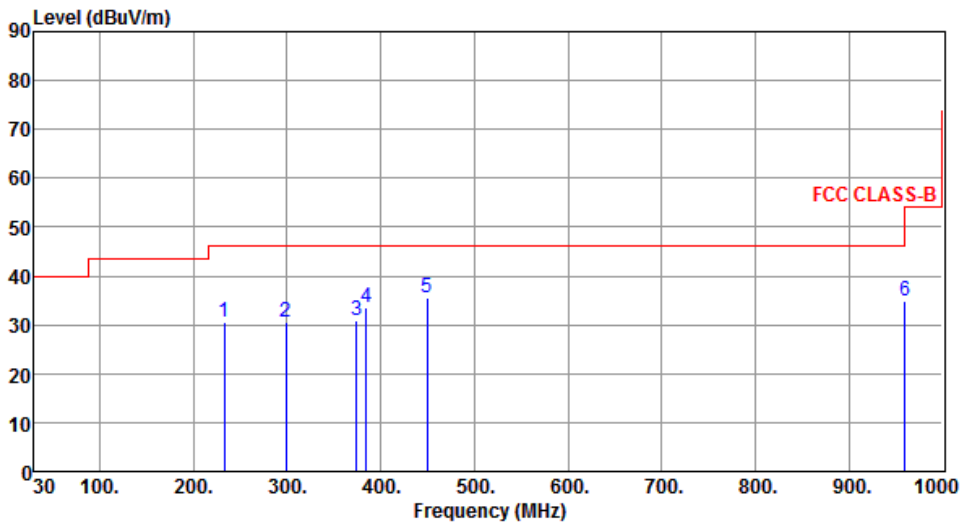
Modulation Mode	LoRa	Test Freq. (MHz)	920.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	143.52	30.76	43.50	-12.74	39.27	-8.51	Peak	---	---
2	232.74	34.33	46.00	-11.67	44.43	-10.10	Peak	---	---
3	299.73	35.44	46.00	-10.56	43.25	-7.81	Peak	---	---
4	384.11	35.15	46.00	-10.85	40.54	-5.39	Peak	---	---
5	676.92	32.65	46.00	-13.35	32.18	0.47	Peak	---	---
6	960.00	33.81	46.00	-12.19	29.22	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

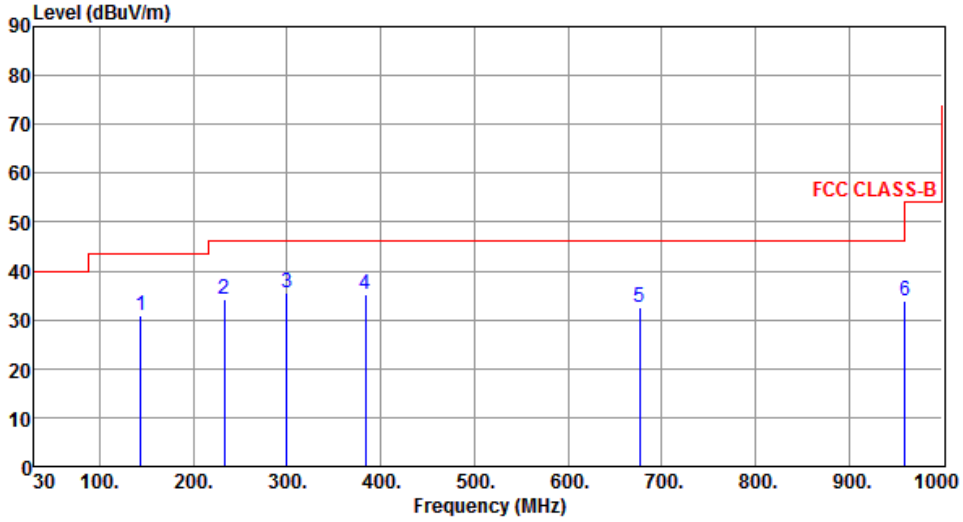
Modulation Mode	LoRa	Test Freq. (MHz)	920.7
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.81	30.69	46.00	-15.31	40.79	-10.10	Peak	---	---
2	298.73	30.43	46.00	-15.57	38.26	-7.83	Peak	---	---
3	374.26	30.90	46.00	-15.10	36.59	-5.69	Peak	---	---
4	384.52	33.56	46.00	-12.44	38.93	-5.37	Peak	---	---
5	449.54	35.43	46.00	-10.57	39.35	-3.92	Peak	---	---
6	960.00	34.92	46.00	-11.08	30.33	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

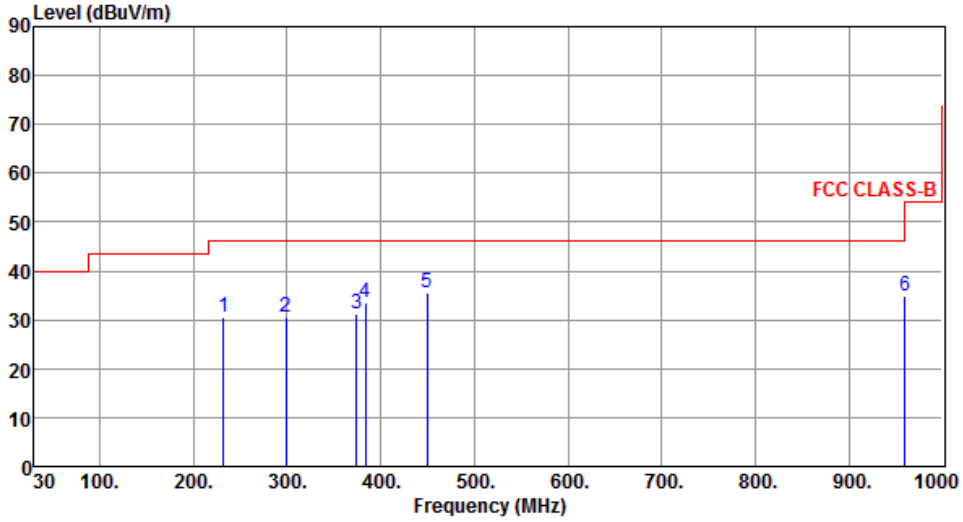
Modulation Mode	LoRa	Test Freq. (MHz)	927.1
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.21	30.89	43.50	-12.61	39.35	-8.46	Peak	---	---
2	232.75	34.33	46.00	-11.67	44.43	-10.10	Peak	---	---
3	299.34	35.43	46.00	-10.57	43.24	-7.81	Peak	---	---
4	384.17	35.15	46.00	-10.85	40.53	-5.38	Peak	---	---
5	676.77	32.59	46.00	-13.41	32.12	0.47	Peak	---	---
6	960.00	33.84	46.00	-12.16	29.25	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.1
Polarization	Vertical		

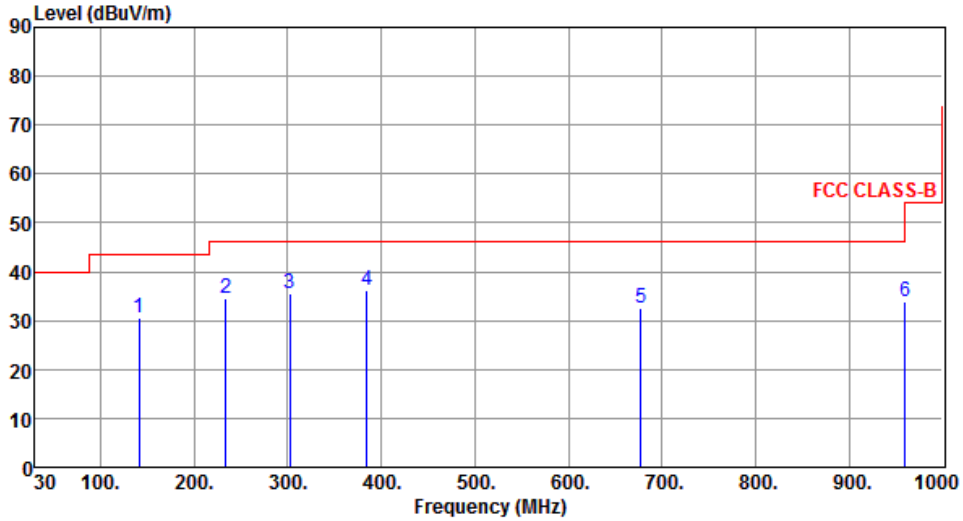


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.59	30.70	46.00	-15.30	40.81	-10.11	Peak	---	---
2	298.73	30.42	46.00	-15.58	38.25	-7.83	Peak	---	---
3	374.43	31.19	46.00	-14.81	36.88	-5.69	Peak	---	---
4	384.16	33.44	46.00	-12.56	38.82	-5.38	Peak	---	---
5	449.65	35.50	46.00	-10.50	39.42	-3.92	Peak	---	---
6	960.00	34.92	46.00	-11.08	30.33	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

FSK 50kbps

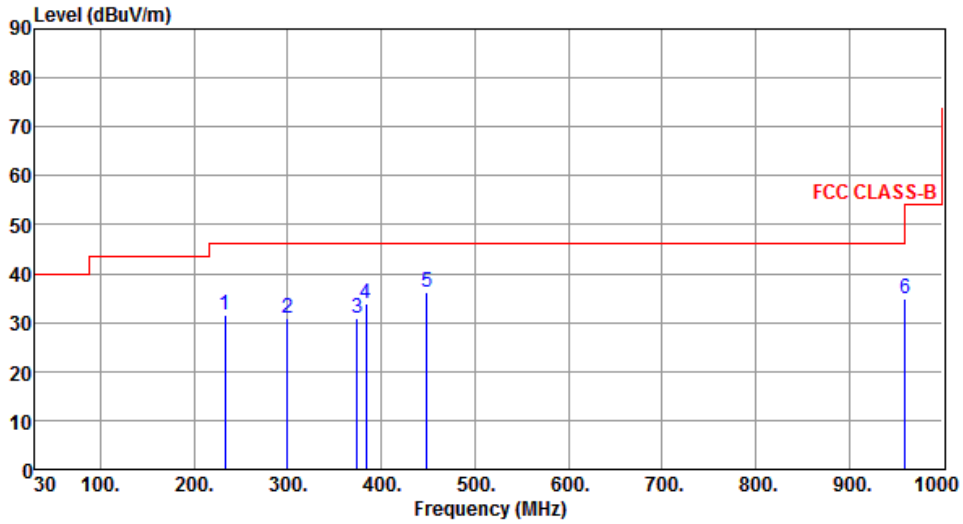
Modulation Mode	FSK	**Test Freq. (MHz)**	915.2
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	141.25	30.52	43.50	-12.98	39.08	-8.56	Peak	---	---
2	234.21	34.50	46.00	-11.50	44.48	-9.98	Peak	---	---
3	302.21	35.60	46.00	-10.40	43.35	-7.75	Peak	---	---
4	384.57	36.15	46.00	-9.85	41.52	-5.37	Peak	---	---
5	677.00	32.62	46.00	-13.38	32.15	0.47	Peak	---	---
6	960.00	33.80	46.00	-12.20	29.21	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

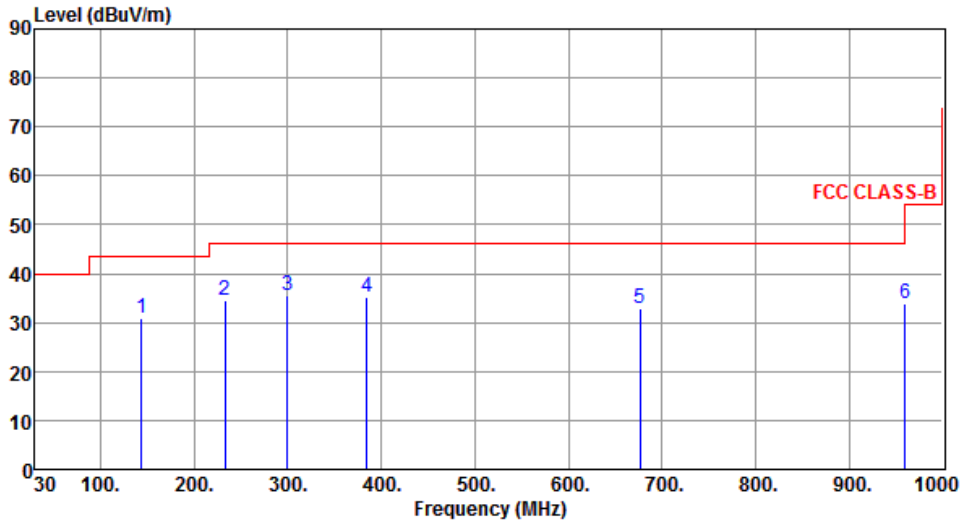
Modulation Mode	FSK	Test Freq. (MHz)	915.2
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.84	31.56	46.00	-14.44	41.65	-10.09	Peak	---	---
2	300.06	30.75	46.00	-15.25	38.55	-7.80	Peak	---	---
3	374.26	30.85	46.00	-15.15	36.54	-5.69	Peak	---	---
4	384.19	33.83	46.00	-12.17	39.21	-5.38	Peak	---	---
5	449.16	36.24	46.00	-9.76	40.17	-3.93	Peak	---	---
6	960.00	34.80	46.00	-11.20	30.21	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

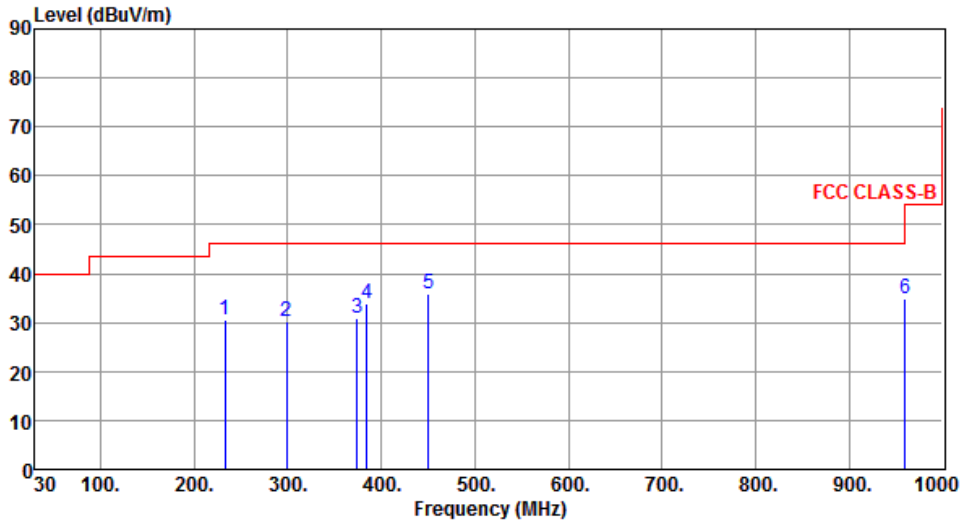
Modulation Mode	FSK	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	143.44	30.84	43.50	-12.66	39.36	-8.52	Peak	---	---
2	232.95	34.57	46.00	-11.43	44.65	-10.08	Peak	---	---
3	300.01	35.55	46.00	-10.45	43.35	-7.80	Peak	---	---
4	384.35	35.31	46.00	-10.69	40.69	-5.38	Peak	---	---
5	676.84	32.90	46.00	-13.10	32.43	0.47	Peak	---	---
6	960.00	33.92	46.00	-12.08	29.33	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

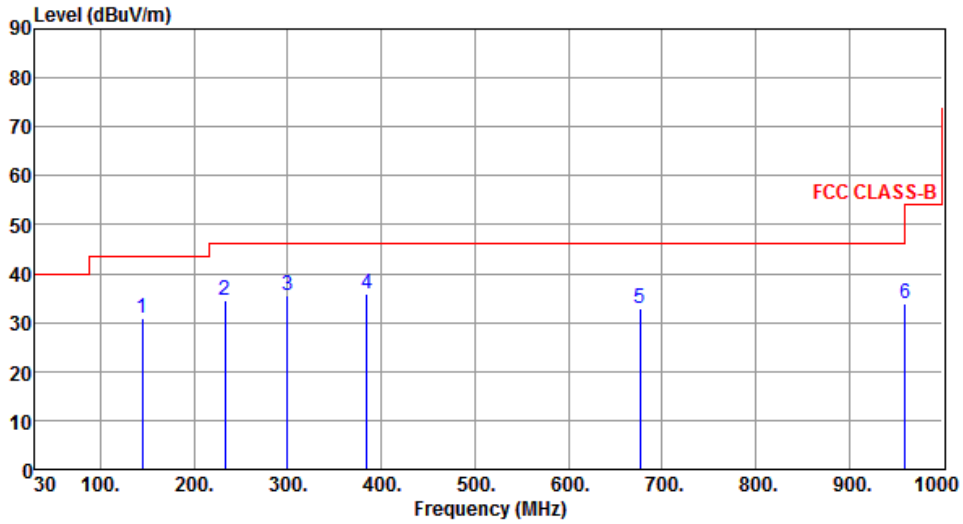
Modulation Mode	FSK	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	233.16	30.61	46.00	-15.39	40.68	-10.07	Peak	---	---
2	298.84	30.31	46.00	-15.69	38.13	-7.82	Peak	---	---
3	373.87	30.97	46.00	-15.03	36.67	-5.70	Peak	---	---
4	384.79	33.86	46.00	-12.14	39.22	-5.36	Peak	---	---
5	450.21	35.91	46.00	-10.09	39.81	-3.90	Peak	---	---
6	960.00	34.73	46.00	-11.27	30.14	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

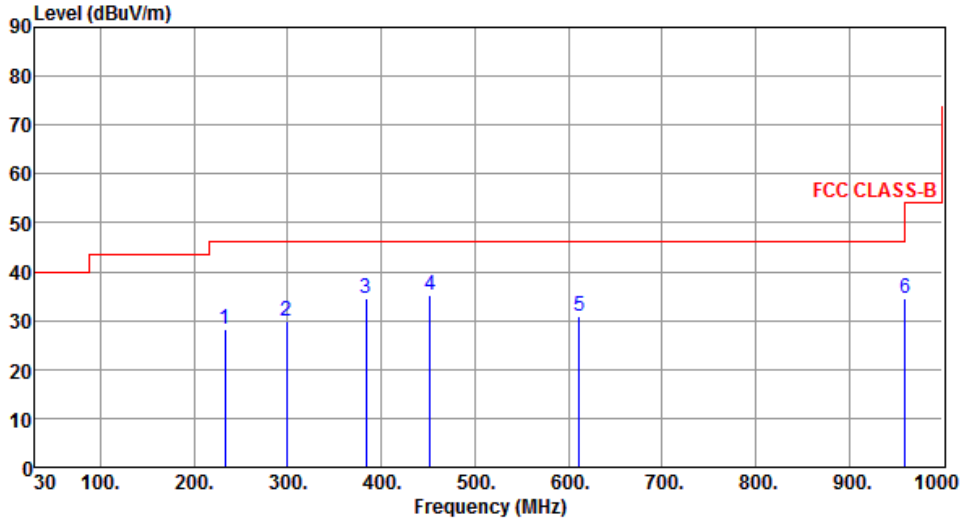
Modulation Mode	FSK	Test Freq. (MHz)	927.8
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	144.29	30.97	43.50	-12.53	39.43	-8.46	Peak	---	---
2	232.65	34.41	46.00	-11.59	44.52	-10.11	Peak	---	---
3	299.53	35.54	46.00	-10.46	43.35	-7.81	Peak	---	---
4	384.26	35.74	46.00	-10.26	41.12	-5.38	Peak	---	---
5	676.59	32.73	46.00	-13.27	32.27	0.46	Peak	---	---
6	960.00	33.77	46.00	-12.23	29.18	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	FSK	Test Freq. (MHz)	927.8
Polarization	Vertical		



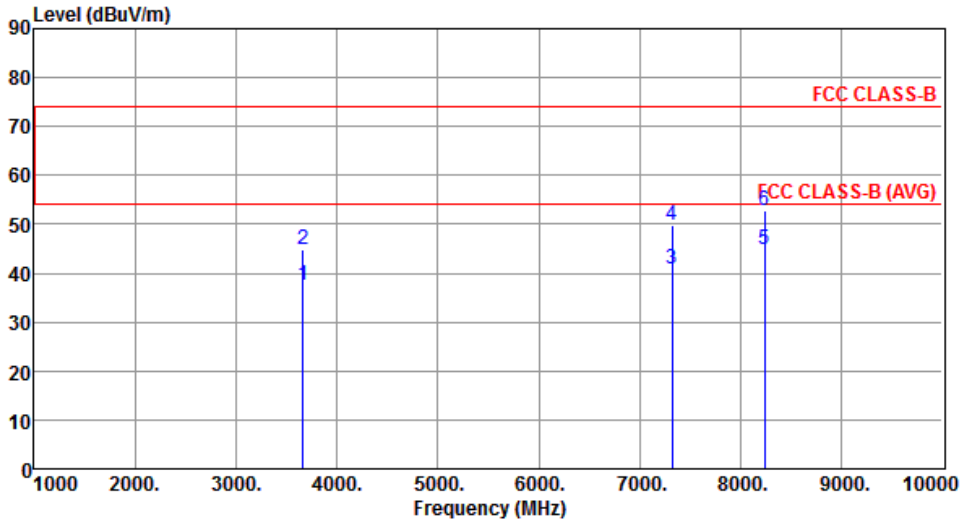
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	232.73	28.24	46.00	-17.76	38.34	-10.10	Peak	---	---
2	298.69	29.85	46.00	-16.15	37.68	-7.83	Peak	---	---
3	384.05	34.70	46.00	-11.30	40.09	-5.39	Peak	---	---
4	451.95	35.27	46.00	-10.73	39.13	-3.86	Peak	---	---
5	612.00	30.86	46.00	-15.14	31.30	-0.44	Peak	---	---
6	960.00	34.70	46.00	-11.30	30.11	4.59	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.2.5 Transmitter Spurious Emissions (Above 1GHz)

LoRa 125 kHz

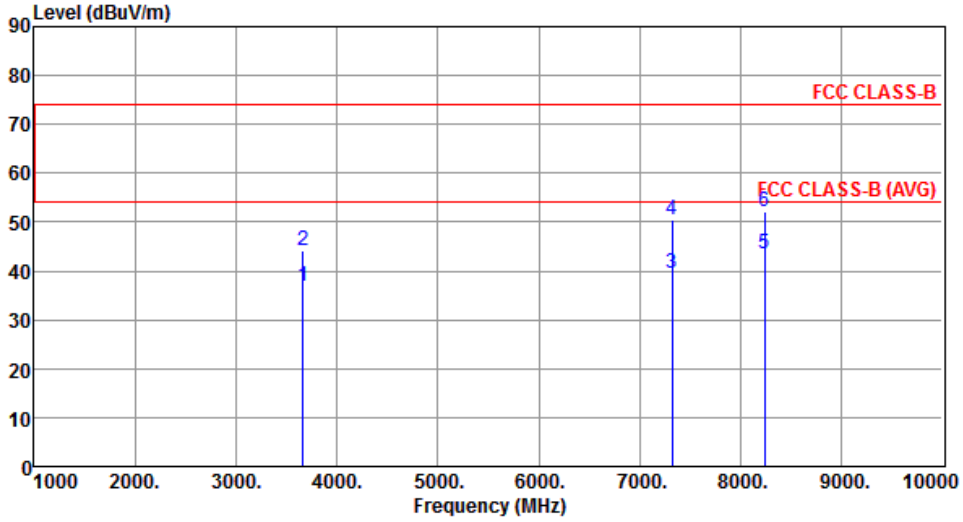
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.3
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3661.20	37.52	54.00	-16.48	37.22	0.30	Average	285	15
2	3661.20	44.89	74.00	-29.11	44.59	0.30	Peak	285	15
3	7322.40	40.82	54.00	-13.18	32.02	8.80	Average	215	52
4	7322.40	49.98	74.00	-24.02	41.18	8.80	Peak	215	52
5	8237.70	44.74	54.00	-9.26	35.55	9.19	Average	203	28
6	8237.70	52.96	74.00	-21.04	43.77	9.19	Peak	203	28

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

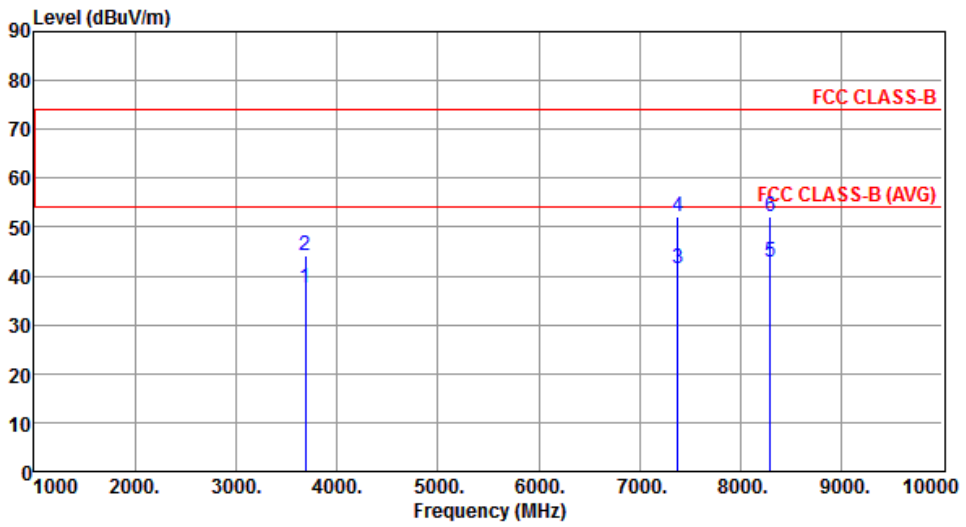
Modulation Mode	LoRa	Test Freq. (MHz)	915.3
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3661.20	36.85	54.00	-17.15	36.55	0.30	Average	300	348
2	3661.20	44.02	74.00	-29.98	43.72	0.30	Peak	300	348
3	7322.40	39.38	54.00	-14.62	30.58	8.80	Average	304	348
4	7322.40	50.34	74.00	-23.66	41.54	8.80	Peak	304	348
5	8237.70	43.41	54.00	-10.59	34.22	9.19	Average	287	13
6	8237.70	52.11	74.00	-21.89	42.92	9.19	Peak	287	13

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

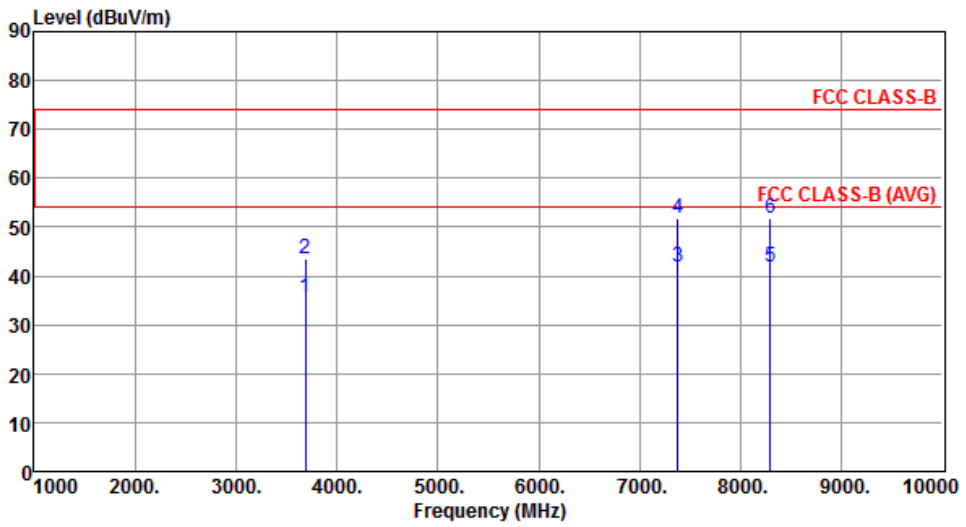
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	37.39	54.00	-16.61	37.11	0.28	Average	282	14
2	3686.40	44.13	74.00	-29.87	43.85	0.28	Peak	282	14
3	7372.80	41.45	54.00	-12.55	32.83	8.62	Average	216	46
4	7372.80	52.16	74.00	-21.84	43.54	8.62	Peak	216	46
5	8294.40	42.74	54.00	-11.26	33.59	9.15	Average	209	43
6	8294.40	52.26	74.00	-21.74	43.11	9.15	Peak	209	43

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

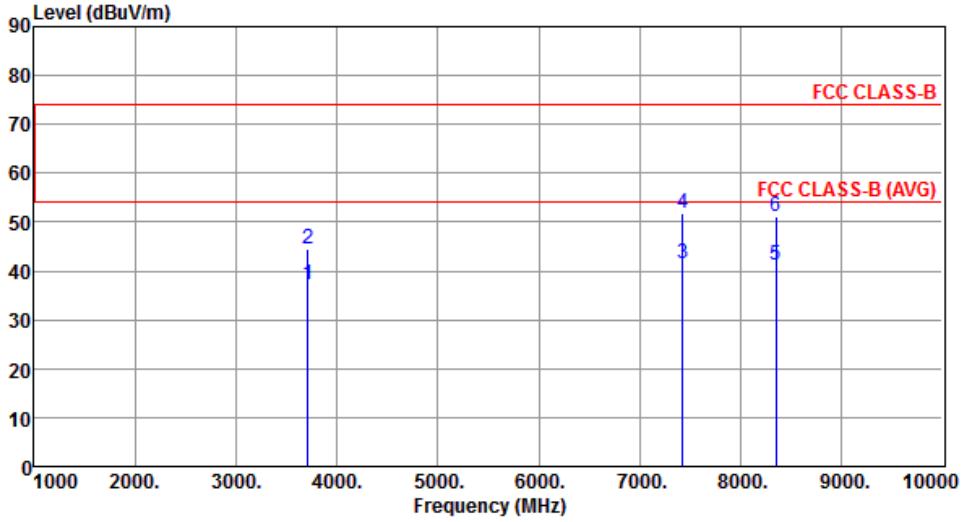
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	35.57	54.00	-18.43	35.29	0.28	Average	288	315
2	3686.40	43.53	74.00	-30.47	43.25	0.28	Peak	288	315
3	7372.80	41.79	54.00	-12.21	33.17	8.62	Average	285	213
4	7372.80	51.72	74.00	-22.28	43.10	8.62	Peak	285	213
5	8294.40	41.80	54.00	-12.20	32.65	9.15	Average	283	12
6	8294.40	51.81	74.00	-22.19	42.66	9.15	Peak	283	12

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

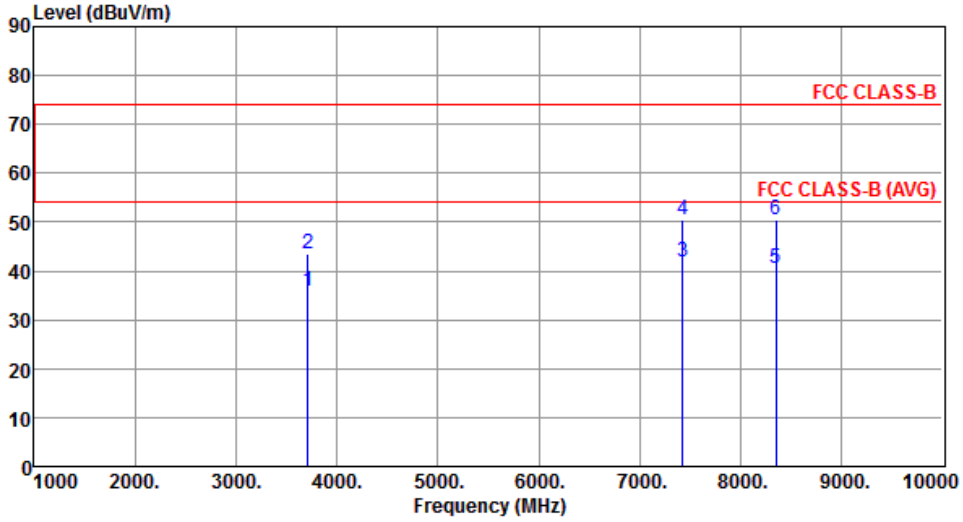
Modulation Mode	LoRa	Test Freq. (MHz)	927.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3710.80	37.19	54.00	-16.81	36.88	0.31	Average	263	13
2	3710.80	44.47	74.00	-29.53	44.16	0.31	Peak	263	13
3	7421.60	41.40	54.00	-12.60	32.89	8.51	Average	220	45
4	7421.60	51.73	74.00	-22.27	43.22	8.51	Peak	220	45
5	8349.30	41.33	54.00	-12.67	32.26	9.07	Average	208	42
6	8349.30	51.07	74.00	-22.93	42.00	9.07	Peak	208	42

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.7
Polarization	Vertical		

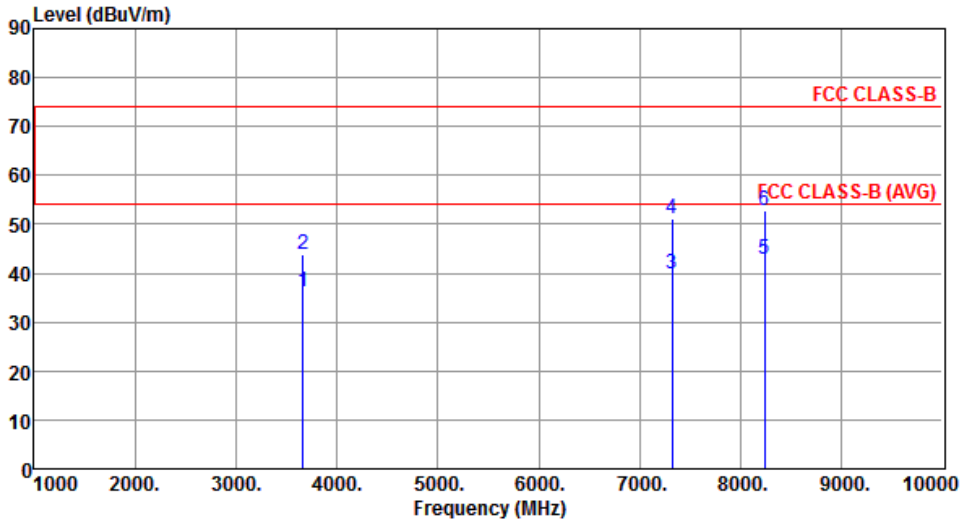


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3710.80	35.86	54.00	-18.14	35.55	0.31	Average	311	315
2	3710.80	43.47	74.00	-30.53	43.16	0.31	Peak	311	315
3	7421.60	41.76	54.00	-12.24	33.25	8.51	Average	265	256
4	7421.60	50.62	74.00	-23.38	42.11	8.51	Peak	265	256
5	8349.30	40.63	54.00	-13.37	31.56	9.07	Average	271	11
6	8349.30	50.52	74.00	-23.48	41.45	9.07	Peak	271	11

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 250 kHz

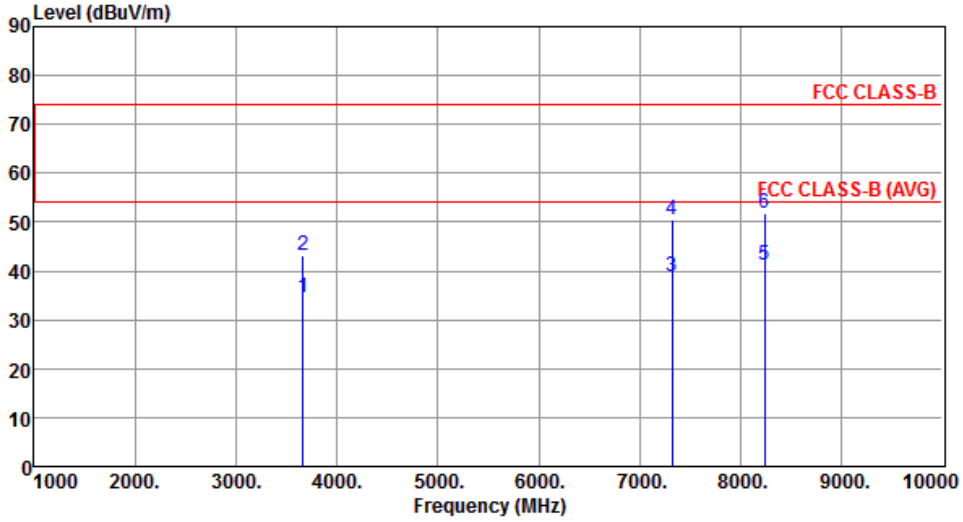
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.4
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3661.60	36.29	54.00	-17.71	35.99	0.30	Average	285	19
2	3661.60	43.91	74.00	-30.09	43.61	0.30	Peak	285	19
3	7323.20	39.95	54.00	-14.05	31.16	8.79	Average	216	45
4	7323.20	51.04	74.00	-22.96	42.25	8.79	Peak	216	45
5	8238.60	42.74	54.00	-11.26	33.55	9.19	Average	204	28
6	8238.60	52.97	74.00	-21.03	43.78	9.19	Peak	204	28

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

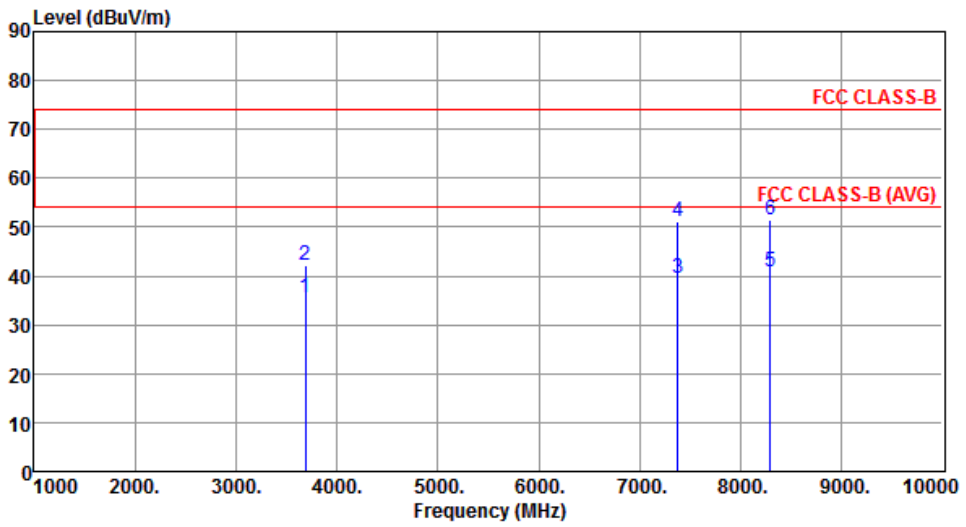
Modulation Mode	LoRa	Test Freq. (MHz)	915.4
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3661.60	34.55	54.00	-19.45	34.25	0.30	Average	303	339
2	3661.60	43.28	74.00	-30.72	42.98	0.30	Peak	303	339
3	7323.20	38.77	54.00	-15.23	29.98	8.79	Average	300	343
4	7323.20	50.38	74.00	-23.62	41.59	8.79	Peak	300	343
5	8238.60	41.30	54.00	-12.70	32.11	9.19	Average	288	15
6	8238.60	51.73	74.00	-22.27	42.54	9.19	Peak	288	15

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

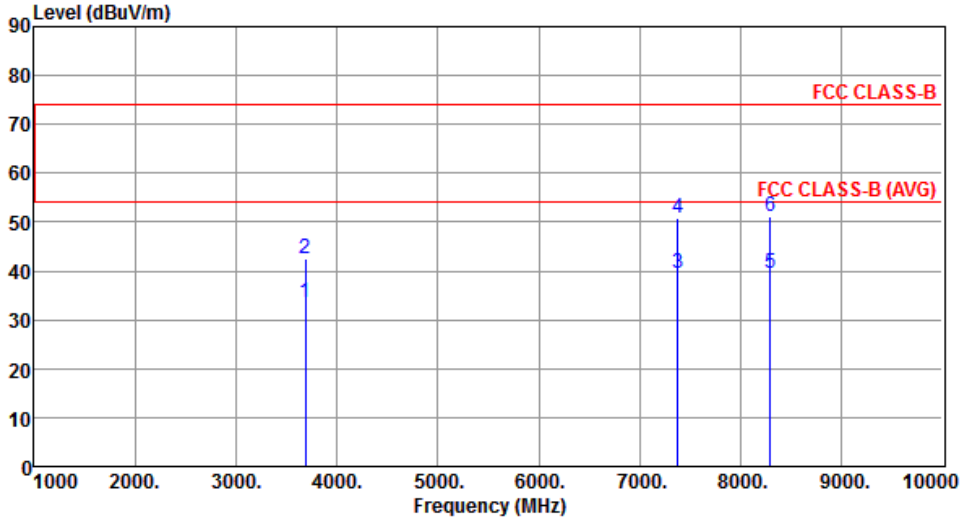
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	35.50	54.00	-18.50	35.22	0.28	Average	282	15
2	3686.40	42.20	74.00	-31.80	41.92	0.28	Peak	282	15
3	7372.80	39.56	54.00	-14.44	30.94	8.62	Average	203	41
4	7372.80	51.10	74.00	-22.90	42.48	8.62	Peak	203	41
5	8294.40	40.83	54.00	-13.17	31.68	9.15	Average	210	46
6	8294.40	51.50	74.00	-22.50	42.35	9.15	Peak	210	46

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

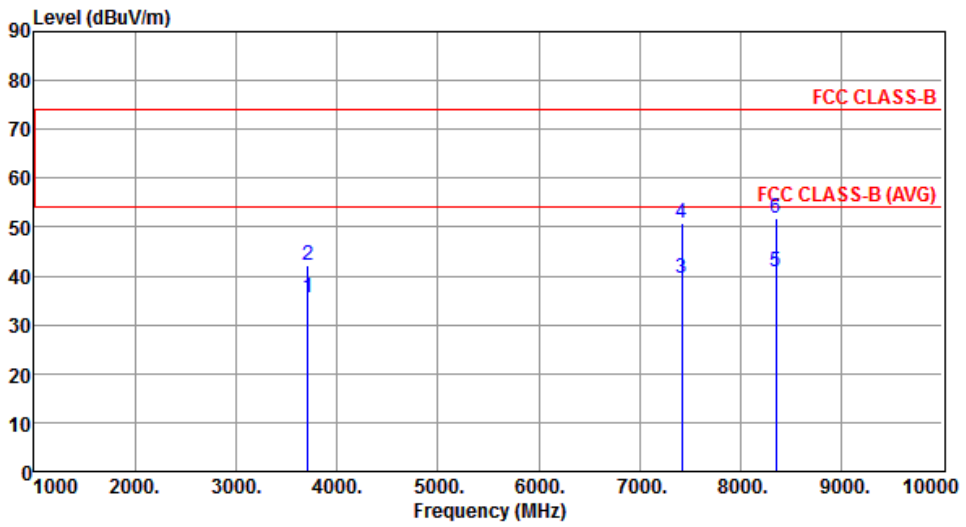
Modulation Mode	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	33.53	54.00	-20.47	33.25	0.28	Average	285	306
2	3686.40	42.63	74.00	-31.37	42.35	0.28	Peak	285	306
3	7372.80	39.67	54.00	-14.33	31.05	8.62	Average	283	206
4	7372.80	50.96	74.00	-23.04	42.34	8.62	Peak	283	206
5	8294.40	39.64	54.00	-14.36	30.49	9.15	Average	285	16
6	8294.40	51.26	74.00	-22.74	42.11	9.15	Peak	285	16

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

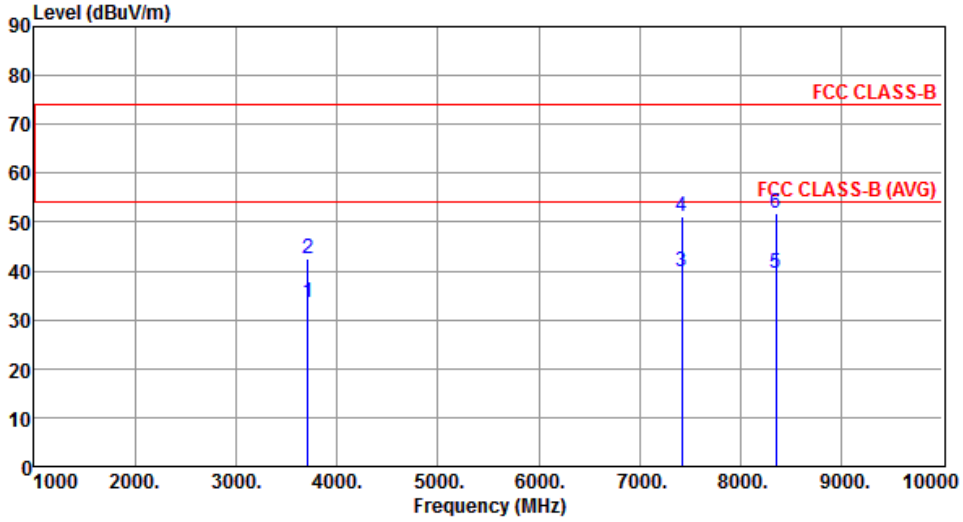
Modulation Mode	LoRa	Test Freq. (MHz)	927.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3710.40	35.41	54.00	-18.59	35.10	0.31	Average	287	17
2	3710.40	42.29	74.00	-31.71	41.98	0.31	Peak	287	17
3	7420.80	39.53	54.00	-14.47	31.02	8.51	Average	210	42
4	7420.80	50.79	74.00	-23.21	42.28	8.51	Peak	210	42
5	8348.40	40.70	54.00	-13.30	31.63	9.07	Average	213	48
6	8348.40	51.71	74.00	-22.29	42.64	9.07	Peak	213	48

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.6
Polarization	Vertical		

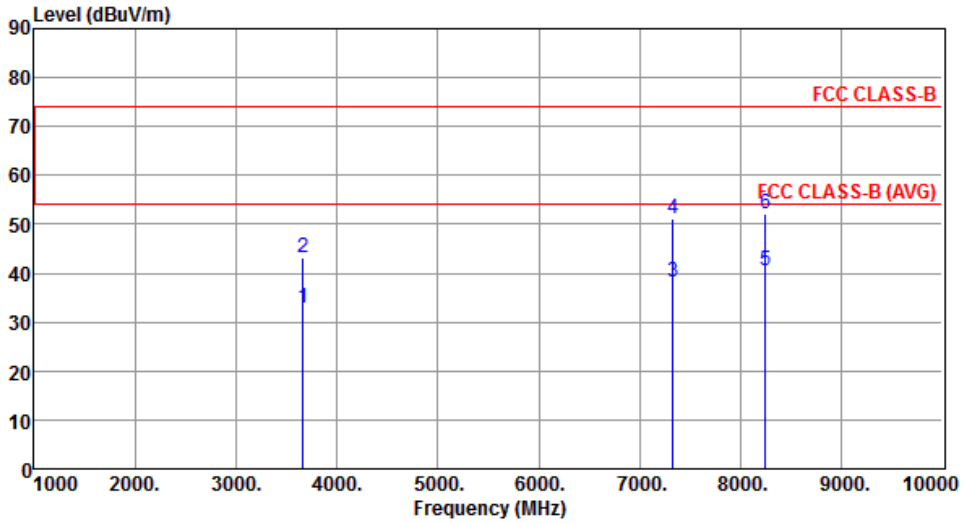


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3710.40	33.47	54.00	-20.53	33.16	0.31	Average	284	302
2	3710.40	42.64	74.00	-31.36	42.33	0.31	Peak	284	302
3	7420.80	39.79	54.00	-14.21	31.28	8.51	Average	286	208
4	7420.80	50.98	74.00	-23.02	42.47	8.51	Peak	286	208
5	8348.40	39.64	54.00	-14.36	30.57	9.07	Average	296	20
6	8348.40	51.82	74.00	-22.18	42.75	9.07	Peak	296	20

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 500 kHz

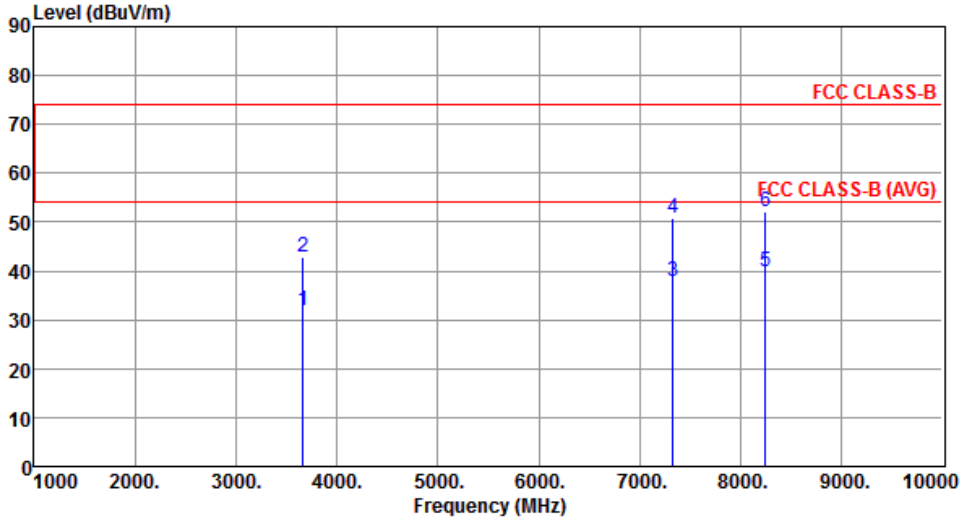
Modulation Mode	LoRa	**Test Freq. (MHz)**	915.9
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3663.60	32.76	54.00	-21.24	32.47	0.29	Average	282	16
2	3663.60	43.19	74.00	-30.81	42.90	0.29	Peak	282	16
3	7327.20	38.32	54.00	-15.68	29.54	8.78	Average	211	45
4	7327.20	51.07	74.00	-22.93	42.29	8.78	Peak	211	45
5	8243.10	40.58	54.00	-13.42	31.42	9.16	Average	218	46
6	8243.10	52.27	74.00	-21.73	43.11	9.16	Peak	218	46

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

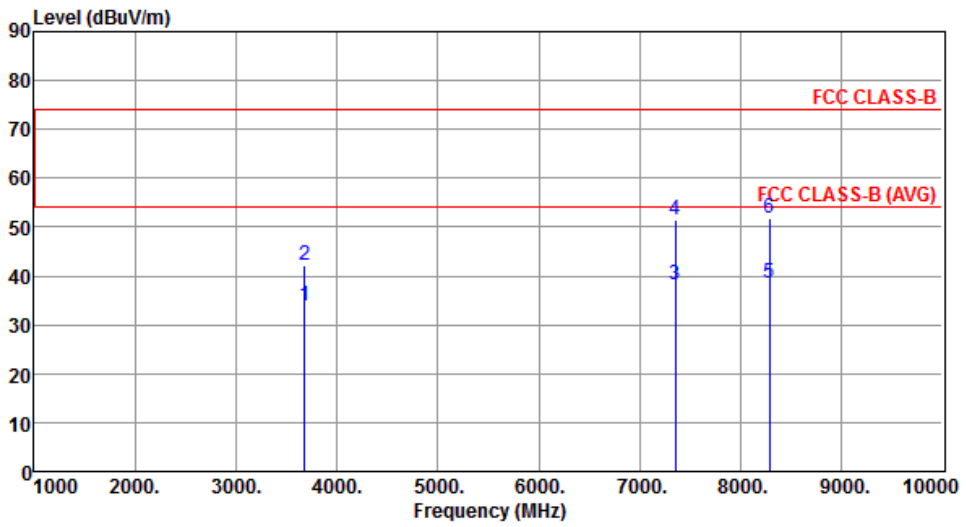
Modulation Mode	LoRa	Test Freq. (MHz)	915.9
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3663.60	31.85	54.00	-22.15	31.56	0.29	Average	301	343
2	3663.60	42.85	74.00	-31.15	42.56	0.29	Peak	301	343
3	7327.20	37.94	54.00	-16.06	29.16	8.78	Average	303	333
4	7327.20	50.94	74.00	-23.06	42.16	8.78	Peak	303	343
5	8243.10	39.71	54.00	-14.29	30.55	9.16	Average	288	15
6	8243.10	51.98	74.00	-22.02	42.82	9.16	Peak	288	15

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

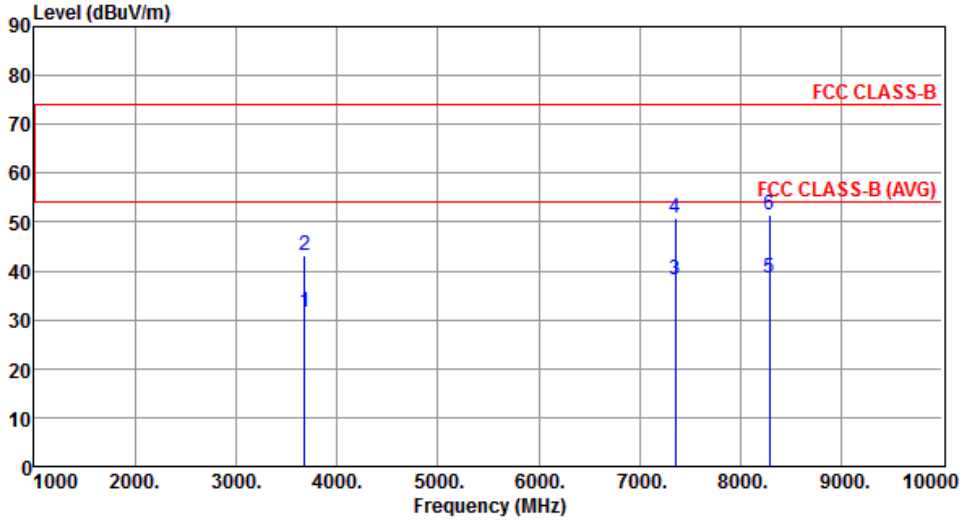
Modulation Mode	LoRa	Test Freq. (MHz)	920.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3682.80	33.82	54.00	-20.18	33.54	0.28	Average	279	23
2	3682.80	42.16	74.00	-31.84	41.88	0.28	Peak	279	23
3	7356.60	38.21	54.00	-15.79	29.52	8.69	Average	198	49
4	7356.60	51.44	74.00	-22.56	42.75	8.69	Peak	198	49
5	8286.30	38.62	54.00	-15.38	29.47	9.15	Average	204	50
6	8286.30	51.78	74.00	-22.22	42.63	9.15	Peak	204	50

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

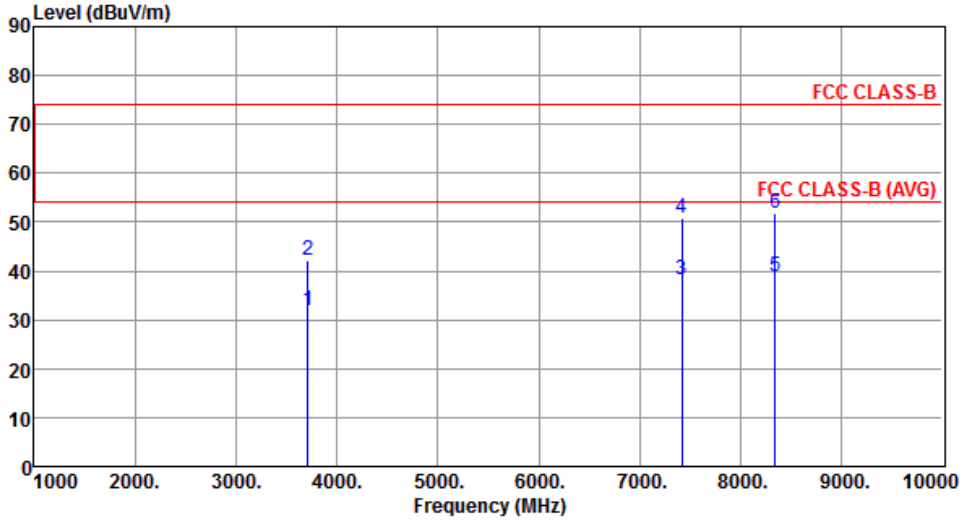
Modulation Mode	LoRa	Test Freq. (MHz)	920.7
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3682.80	31.70	54.00	-22.30	31.42	0.28	Average	294	304
2	3682.80	43.12	74.00	-30.88	42.84	0.28	Peak	294	304
3	7356.60	38.10	54.00	-15.90	29.41	8.69	Average	274	199
4	7356.60	50.86	74.00	-23.14	42.17	8.69	Peak	274	199
5	8286.30	38.66	54.00	-15.34	29.51	9.15	Average	271	19
6	8286.30	51.55	74.00	-22.45	42.40	9.15	Peak	271	19

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

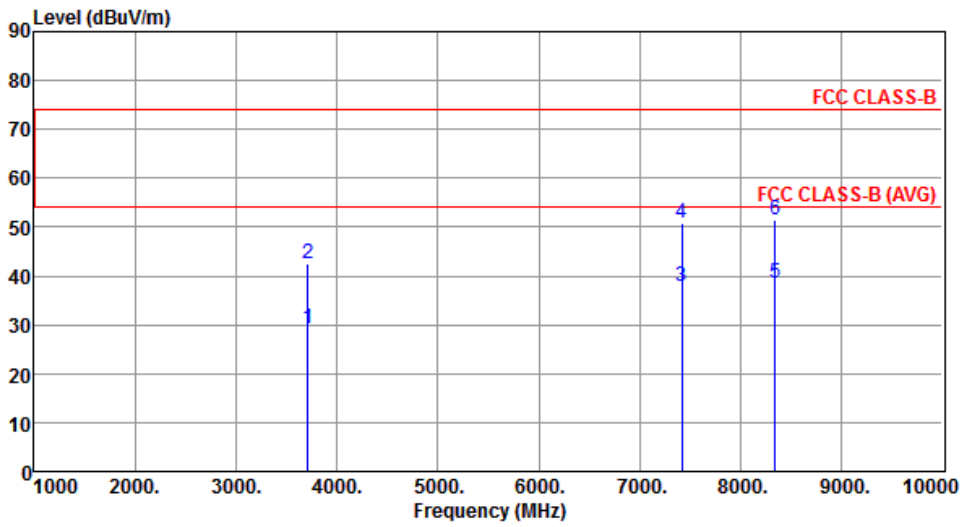
Modulation Mode	LoRa	Test Freq. (MHz)	927.1
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3708.40	31.87	54.00	-22.13	31.57	0.30	Average	281	15
2	3708.40	42.25	74.00	-31.75	41.95	0.30	Peak	281	15
3	7416.80	38.36	54.00	-15.64	29.85	8.51	Average	180	53
4	7416.80	50.91	74.00	-23.09	42.40	8.51	Peak	180	53
5	8343.90	38.82	54.00	-15.18	29.74	9.08	Average	195	48
6	8343.90	51.65	74.00	-22.35	42.57	9.08	Peak	195	48

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	LoRa	Test Freq. (MHz)	927.1
Polarization	Vertical		

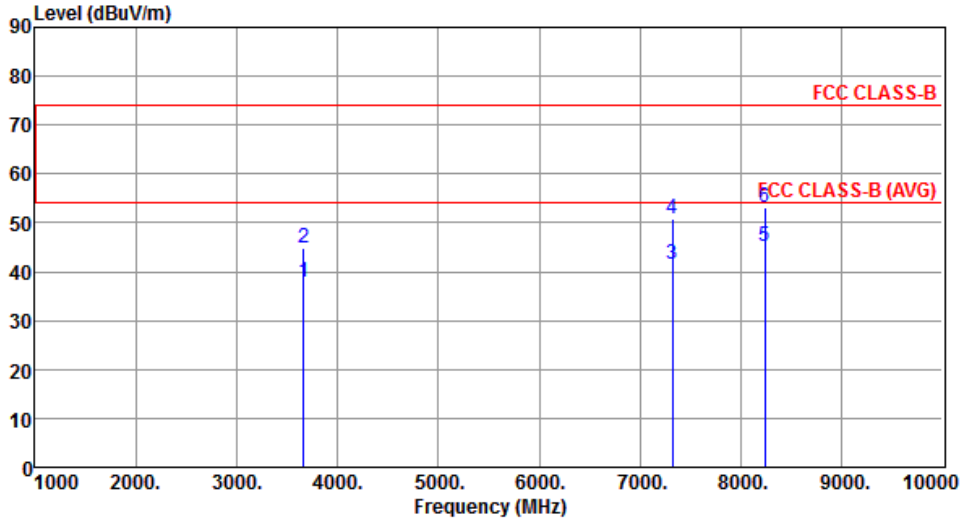


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3708.40	29.38	54.00	-24.62	29.08	0.30	Average	295	300
2	3708.40	42.37	74.00	-31.63	42.07	0.30	Peak	295	300
3	7416.80	37.79	54.00	-16.21	29.28	8.51	Average	280	204
4	7416.80	50.86	74.00	-23.14	42.35	8.51	Peak	280	204
5	8343.90	38.36	54.00	-15.64	29.28	9.08	Average	266	23
6	8343.90	51.41	74.00	-22.59	42.33	9.08	Peak	266	23

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

FSK 50kbps

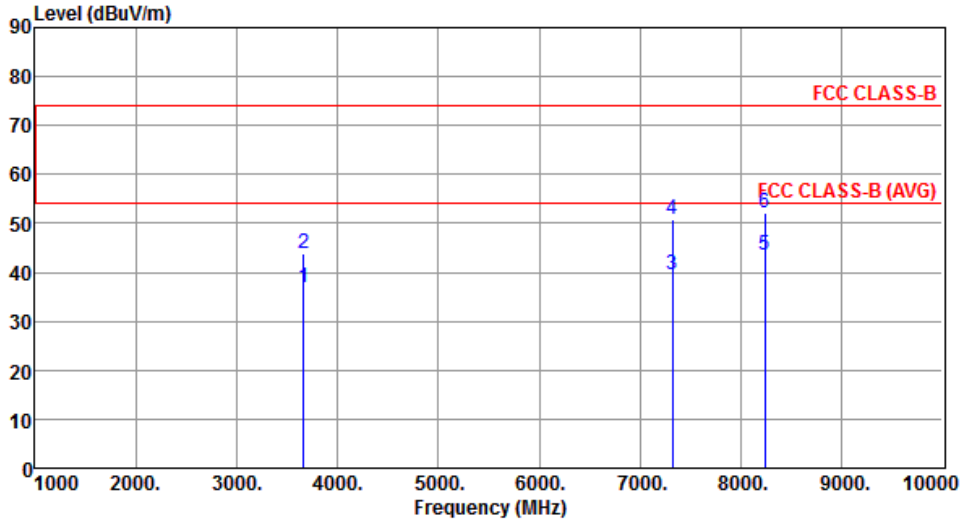
Modulation Mode	FSK	**Test Freq. (MHz)**	915.2
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3660.80	37.75	54.00	-16.25	37.45	0.30	Average	288	11
2	3660.80	44.79	74.00	-29.21	44.49	0.30	Peak	288	11
3	7321.60	41.38	54.00	-12.62	32.58	8.80	Average	222	49
4	7321.60	50.66	74.00	-23.34	41.86	8.80	Peak	222	49
5	8236.80	45.23	54.00	-8.77	36.03	9.20	Average	211	25
6	8236.80	53.14	74.00	-20.86	43.94	9.20	Peak	211	25

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

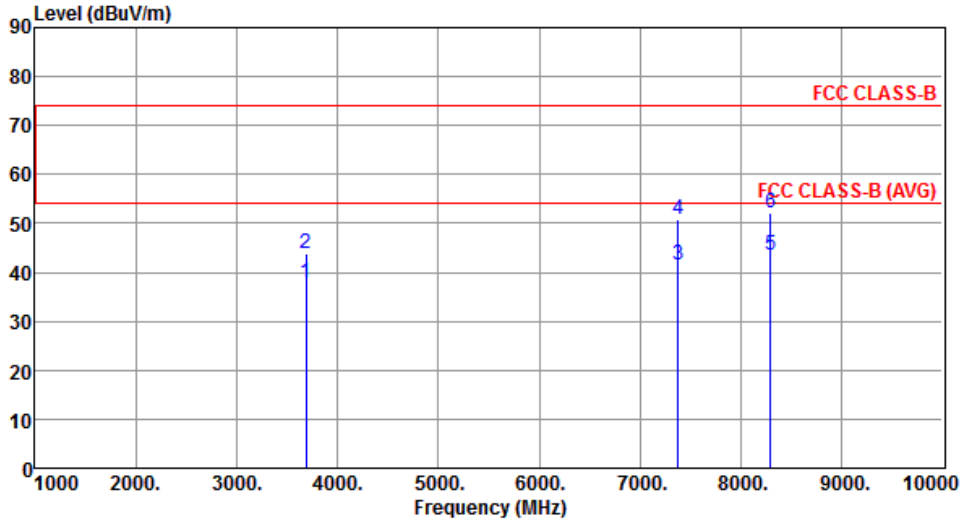
Modulation Mode	FSK	Test Freq. (MHz)	915.2
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3660.80	36.78	54.00	-17.22	36.48	0.30	Average	298	335
2	3660.80	43.91	74.00	-30.09	43.61	0.30	Peak	298	335
3	7321.60	39.57	54.00	-14.43	30.77	8.80	Average	300	339
4	7321.60	50.66	74.00	-23.34	41.86	8.80	Peak	300	339
5	8236.80	43.55	54.00	-10.45	34.35	9.20	Average	285	14
6	8236.80	52.23	74.00	-21.77	43.03	9.20	Peak	285	14

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

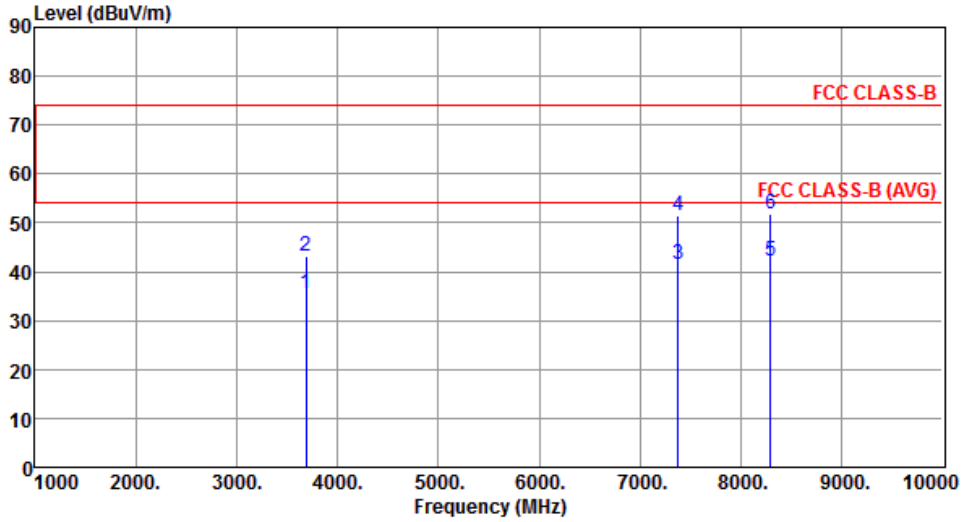
Modulation Mode	FSK	Test Freq. (MHz)	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	37.83	54.00	-16.17	37.55	0.28	Average	285	13
2	3686.40	43.93	74.00	-30.07	43.65	0.28	Peak	285	13
3	7372.80	41.46	54.00	-12.54	32.84	8.62	Average	210	49
4	7372.80	50.90	74.00	-23.10	42.28	8.62	Peak	210	49
5	8294.40	43.59	54.00	-10.41	34.44	9.15	Average	211	44
6	8294.40	52.04	74.00	-21.96	42.89	9.15	Peak	211	44

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

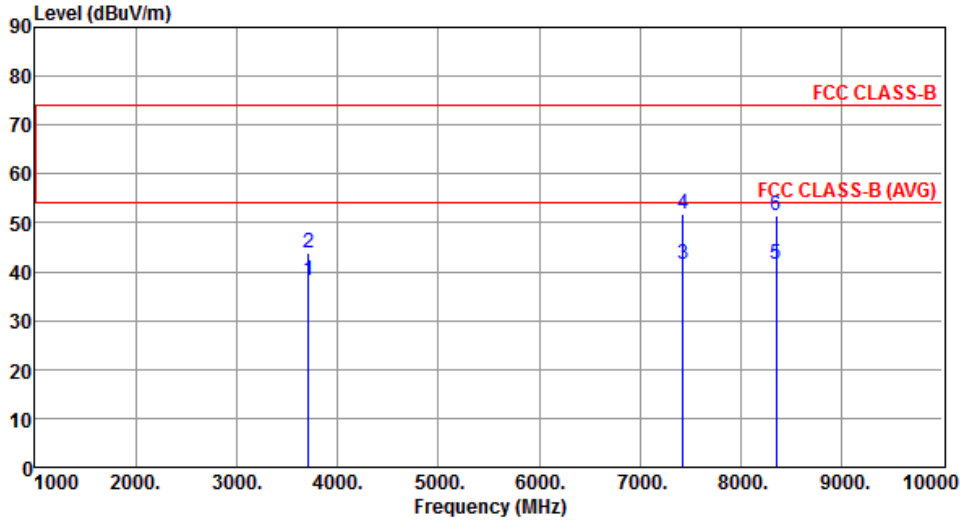
Modulation Mode	FSK	Test Freq. (MHz)	921.6
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3686.40	35.70	54.00	-18.30	35.42	0.28	Average	285	311
2	3686.40	43.16	74.00	-30.84	42.88	0.28	Peak	285	311
3	7372.80	41.45	54.00	-12.55	32.83	8.62	Average	281	209
4	7372.80	51.46	74.00	-22.54	42.84	8.62	Peak	281	209
5	8294.40	42.29	54.00	-11.71	33.14	9.15	Average	280	16
6	8294.40	51.87	74.00	-22.13	42.72	9.15	Peak	280	16

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

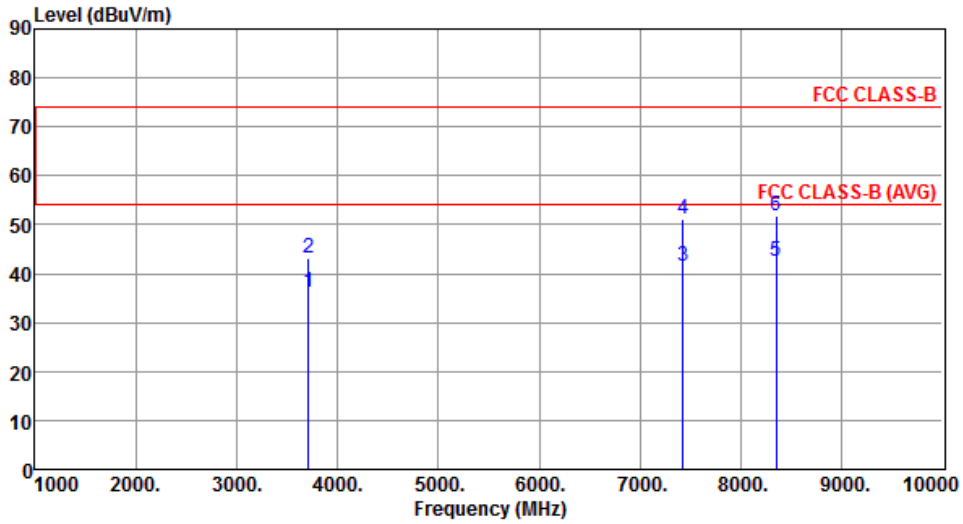
Modulation Mode	FSK	Test Freq. (MHz)	927.8
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3711.20	38.07	54.00	-15.93	37.76	0.31	Average	283	12
2	3711.20	43.86	74.00	-30.14	43.55	0.31	Peak	283	12
3	7422.40	41.39	54.00	-12.61	32.88	8.51	Average	212	44
4	7422.40	51.86	74.00	-22.14	43.35	8.51	Peak	212	44
5	8350.20	41.41	54.00	-12.59	32.33	9.08	Average	210	41
6	8350.20	51.36	74.00	-22.64	42.28	9.08	Peak	210	41

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation Mode	FSK	Test Freq. (MHz)	927.8
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3711.20	36.33	54.00	-17.67	36.02	0.31	Average	281	306
2	3711.20	43.06	74.00	-30.94	42.75	0.31	Peak	281	306
3	7422.40	41.46	54.00	-12.54	32.95	8.51	Average	288	211
4	7422.40	51.24	74.00	-22.76	42.73	8.51	Peak	288	211
5	8350.20	42.37	54.00	-11.63	33.29	9.08	Average	288	25
6	8350.20	51.95	74.00	-22.05	42.87	9.08	Peak	288	25

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.3 Emissions in Non-Restricted Frequency Bands

3.3.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

Note: Limit is from FCC Part 15.247

3.3.2 Test Procedures

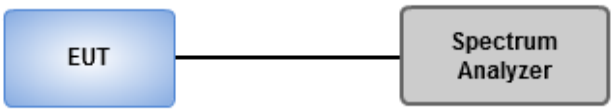
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 10GHz
4. Use the peak marker function to determine the maximum amplitude level

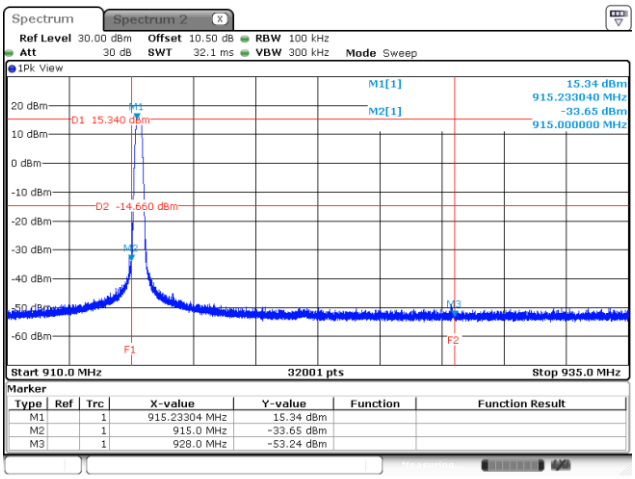
3.3.3 Test Setup



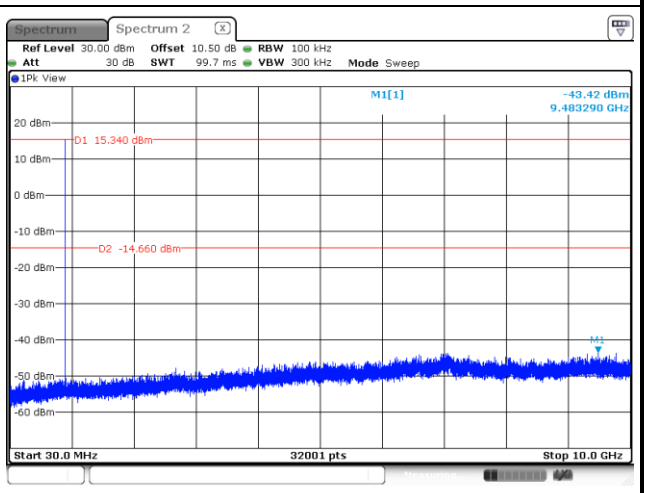
3.3.4 Test Result of Emissions in non-restricted Frequency Bands

LoRa 125 kHz

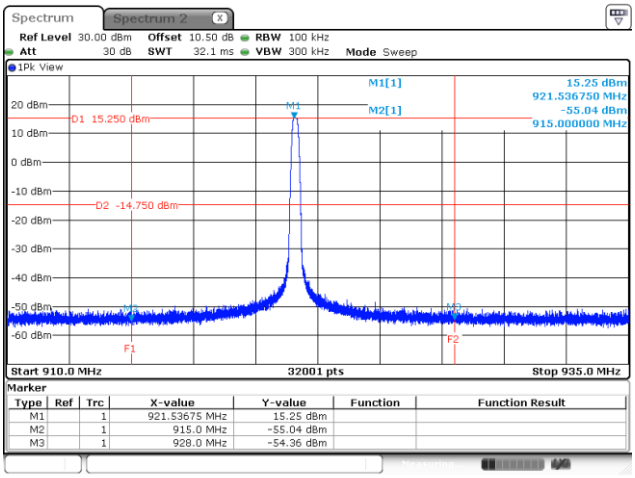
915.3MHz / 910MHz~935MHz (down 30dBc)



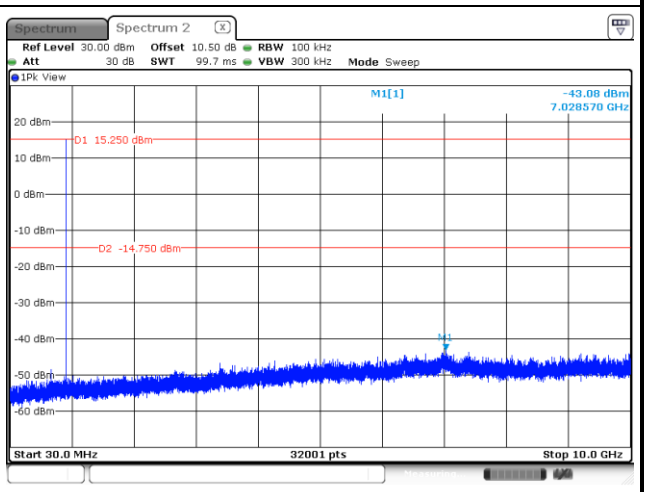
915.3MHz / 30MHz~10GHz (down 30dBc)



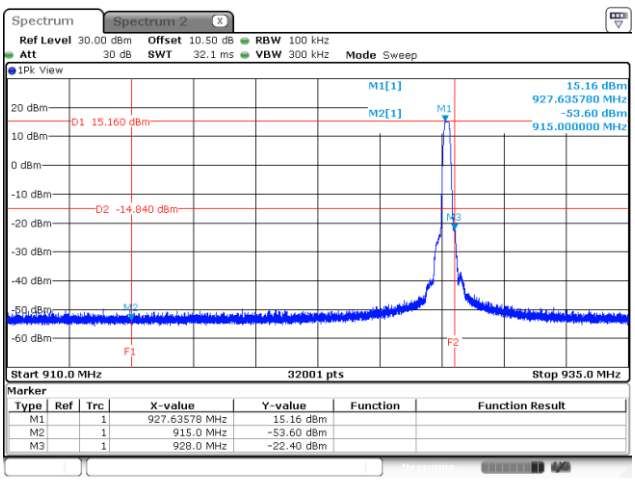
921.6MHz / 910MHz~935MHz (down 30dBc)



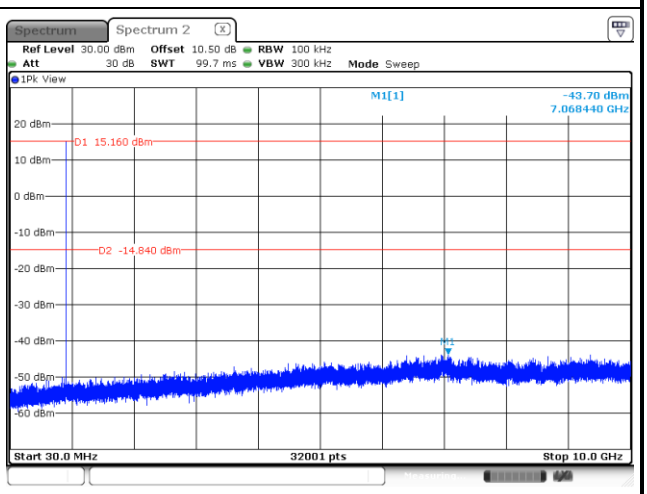
921.6MHz / 30MHz~10GHz (down 30dBc)



927.7MHz / 910MHz~935MHz (down 30dBc)

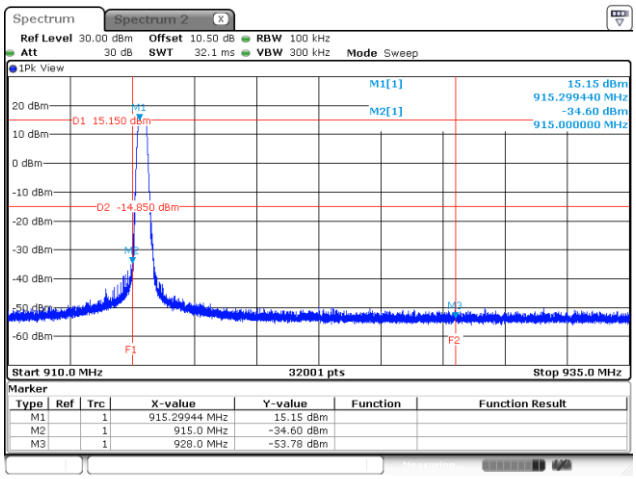


927.7MHz / 30MHz~10GHz (down 30dBc)

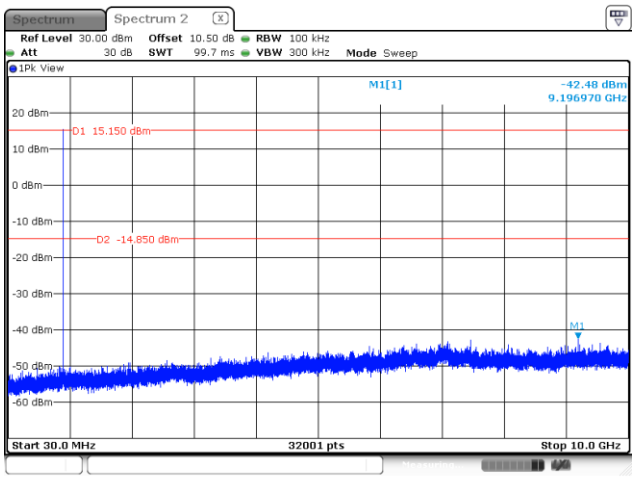


LoRa 250 kHz

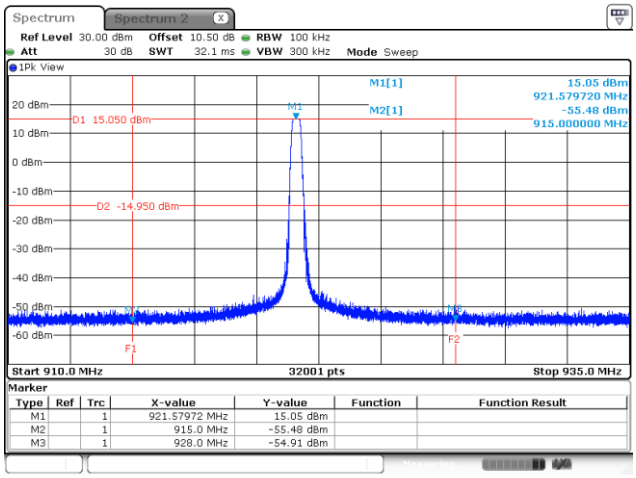
915.4MHz / 910MHz~935MHz (down 30dBc)



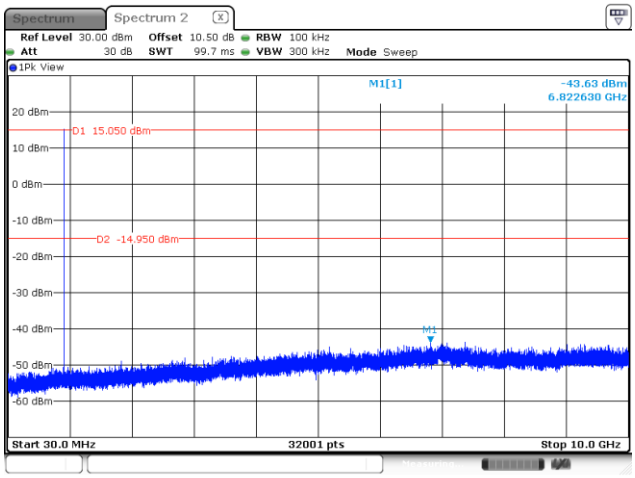
915.4MHz / 30MHz~10GHz (down 30dBc)



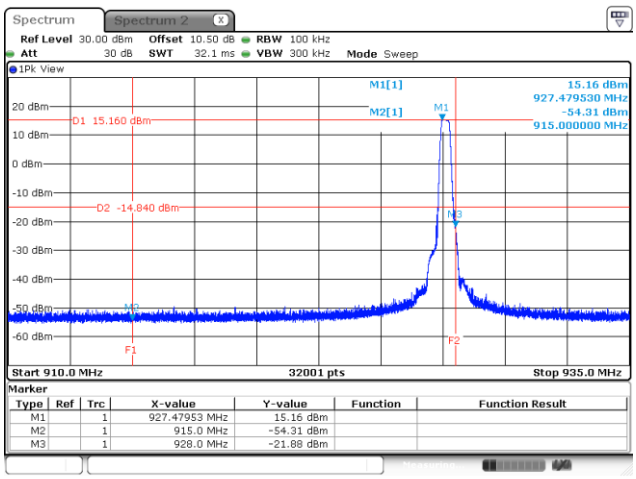
921.6MHz / 910MHz~935MHz (down 30dBc)



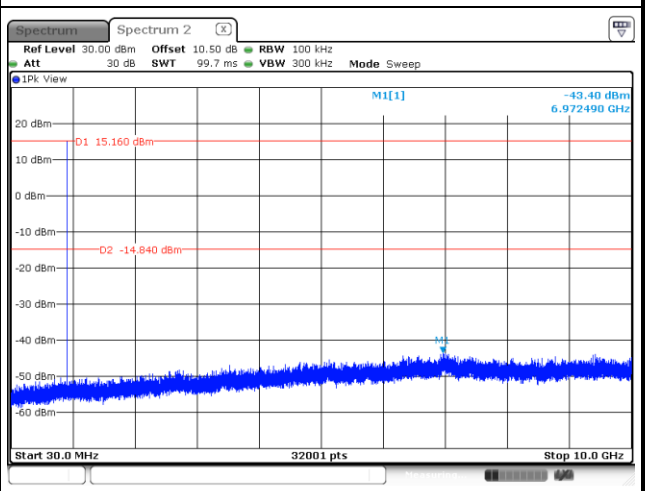
921.6MHz / 30MHz~10GHz (down 30dBc)



927.6MHz / 910MHz~935MHz (down 30dBc)

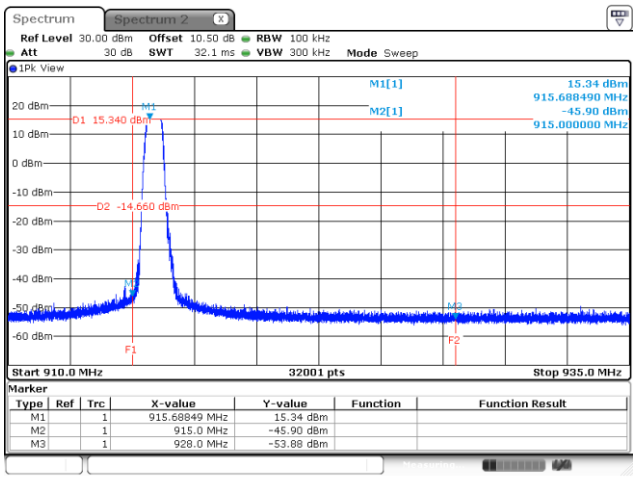


927.6MHz / 30MHz~10GHz (down 30dBc)

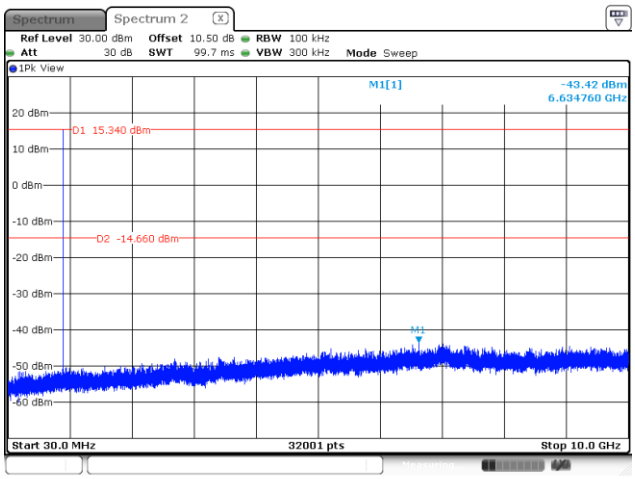


LoRa 500 kHz

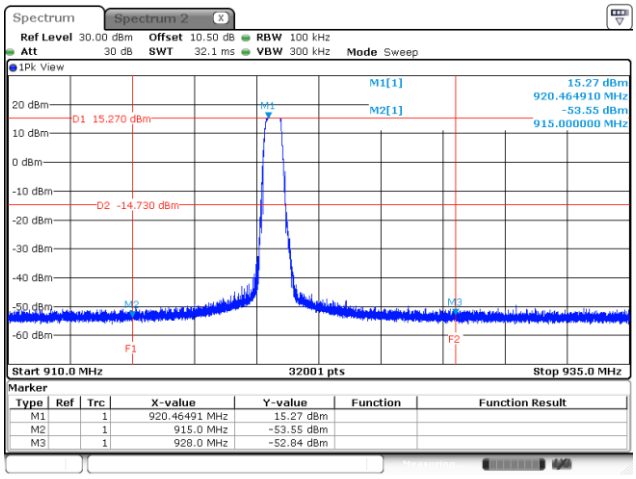
915.9MHz / 910MHz~935MHz (down 30dBc)



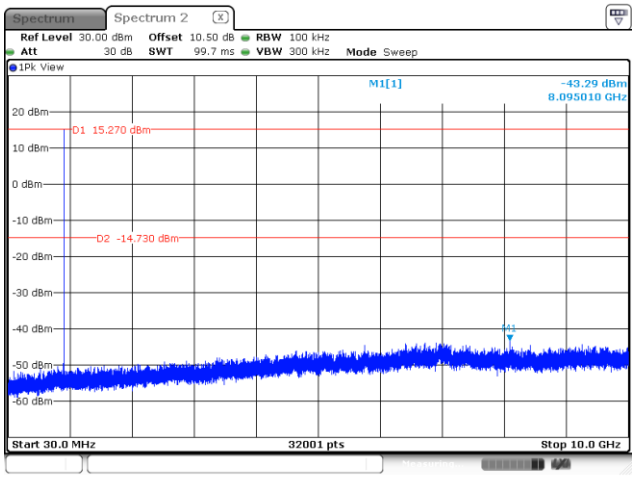
915.9MHz / 30MHz~10GHz (down 30dBc)



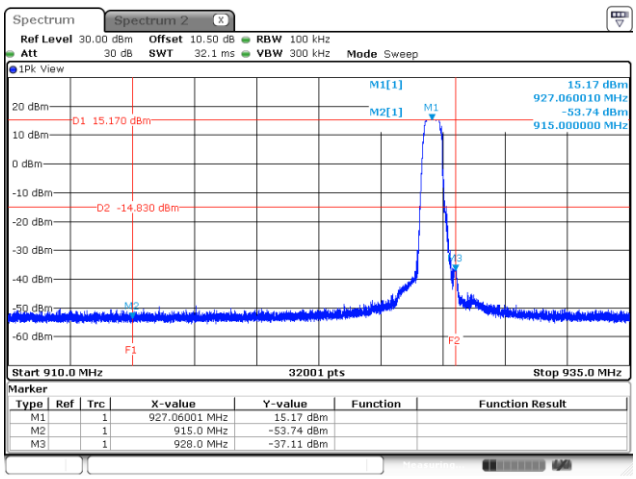
920.7MHz / 910MHz~935MHz (down 30dBc)



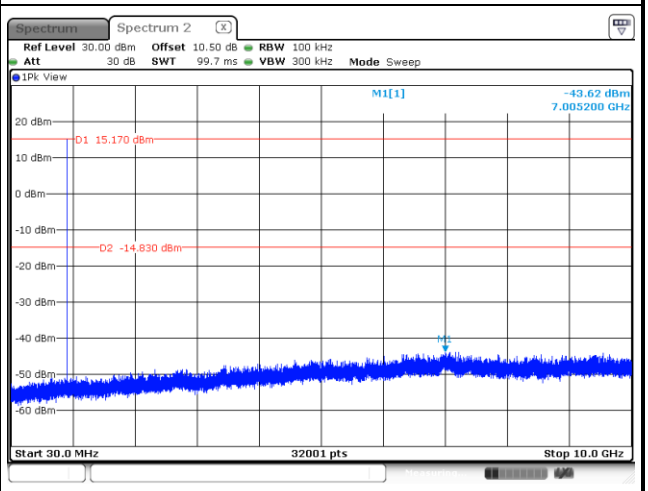
920.7MHz / 30MHz~10GHz (down 30dBc)



927.1MHz / 910MHz~935MHz (down 30dBc)

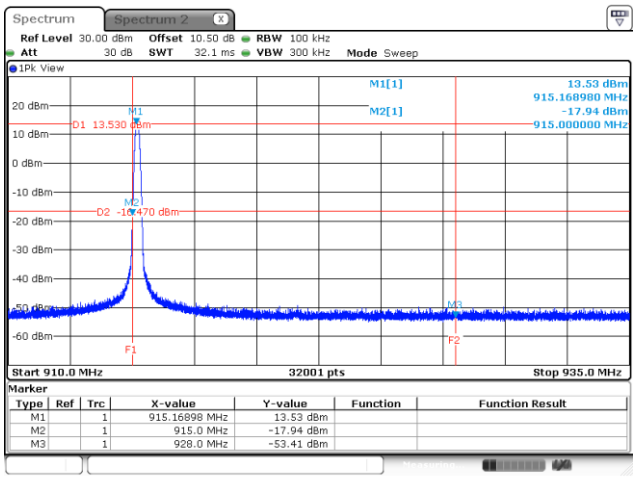


927.1MHz / 30MHz~10GHz (down 30dBc)

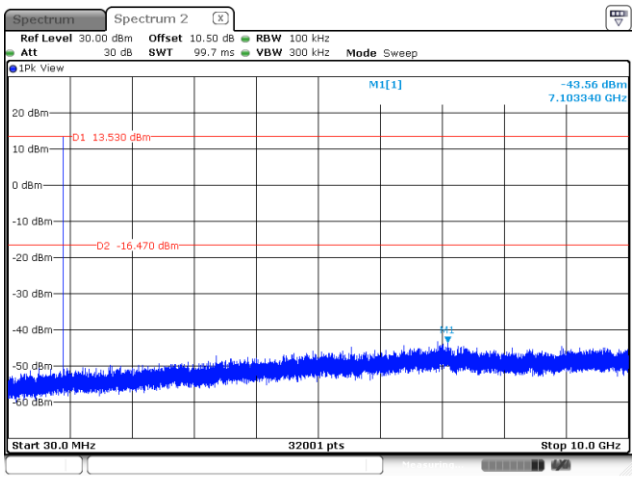


FSK 50kbps

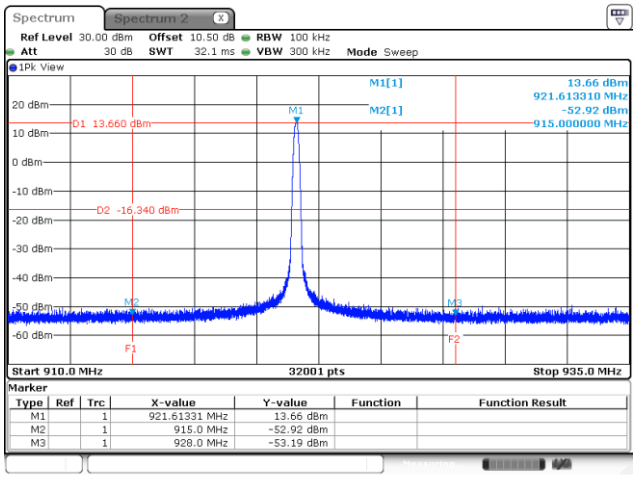
915.2MHz / 910MHz~935MHz (down 30dBc)



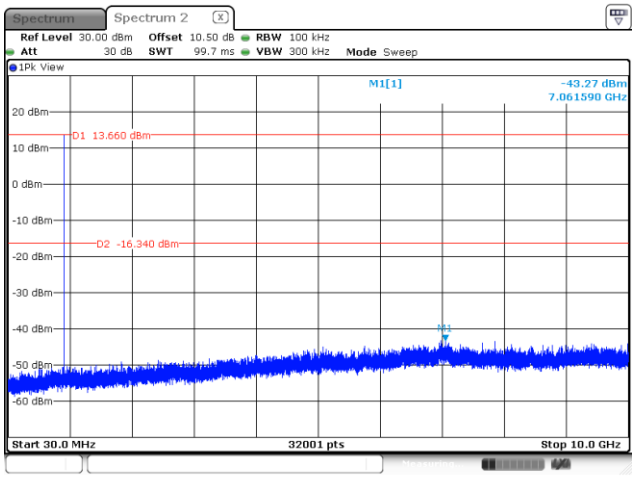
915.2MHz / 30MHz~10GHz (down 30dBc)



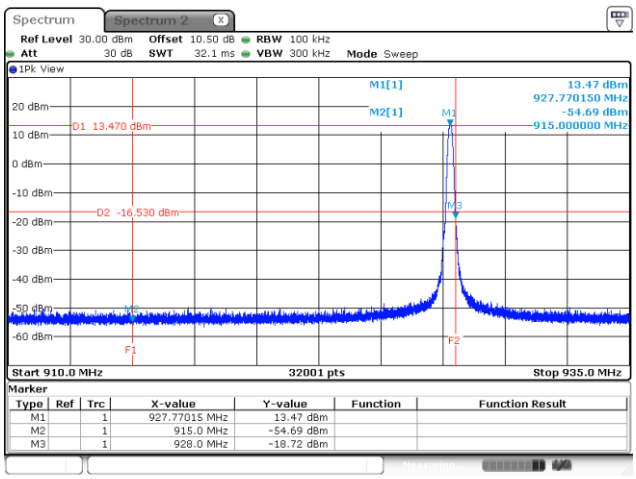
921.6MHz / 910MHz~935MHz (down 30dBc)



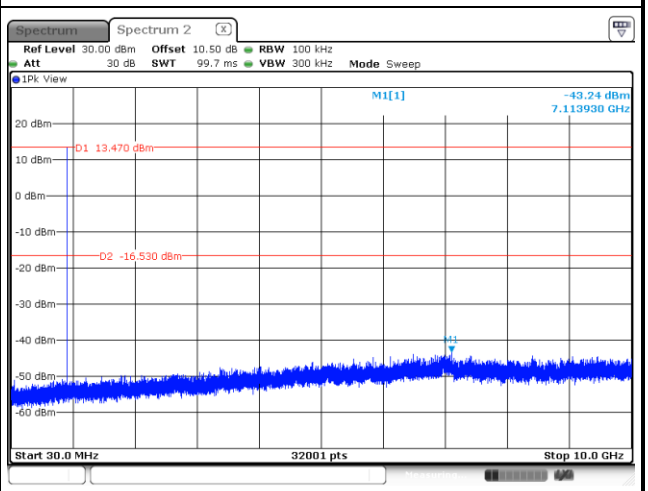
921.6MHz / 30MHz~10GHz (down 30dBc)



927.8MHz / 910MHz~935MHz (down 30dBc)



927.8MHz / 30MHz~10GHz (down 30dBc)



3.4 Emission Bandwidth

3.4.1 Limit of Emission Bandwidth

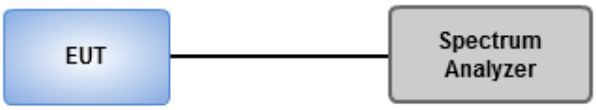
The upper and lower frequency limits of the transmitter 99% emission power bandwidth shall at all times remain within the operating frequency limits(915 ~ 928 MHz).

Note: Limit is from AS/NZS 4268:2017

3.4.2 Test Procedures

Reference to clause 6.2.1 of AS/NZS 4268:2017.

3.4.3 Test Setup



3.4.4 Test Result of Emission Bandwidth

Summary

Mode	OBW (Hz)	ITU-Code
915-928MHz	-	-
LoRa 125kHz	125.031k	125KF1D
915-928MHz	-	-
LoRa 250kHz	262.559k	263KF1D
915-928MHz	-	-
LoRa 500kHz	498.375k	498KF1D
915-928MHz	-	-
FSK 50kbps	100.85k	100KF1D

OBW = Minimum99% occupied bandwidth;

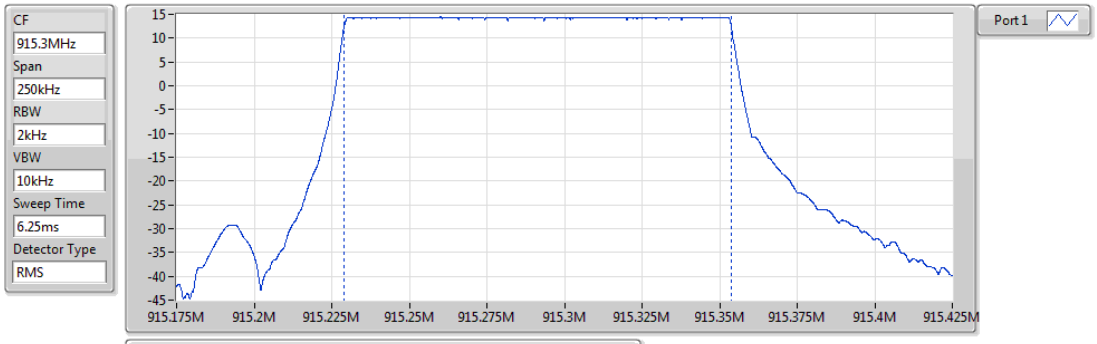
Result

Mode	Result	OBW (Hz)	Fl-OBW (Hz)	Fh-OBW (Hz)	Fl-Limit (Hz)	Fh-Limit (Hz)
LoRa 125kHz	-	-	-	-	-	-
915.3MHz_TnomVnom	Pass	124.906k	915.228955M	915.353862M	915M	928M
921.6MHz_TnomVnom	Pass	125.031k	921.528955M	921.653987M	915M	928M
927.7MHz_TnomVnom	Pass	125.031k	927.628955M	927.753987M	915M	928M
LoRa 250kHz	-	-	-	-	-	-
915.4MHz_TnomVnom	Pass	262.559k	915.257411M	915.51997M	915M	928M
921.6MHz_TnomVnom	Pass	261.685k	921.45916M	921.720845M	915M	928M
927.6MHz_TnomVnom	Pass	262.059k	927.458785M	927.720845M	915M	928M
LoRa 500kHz	-	-	-	-	-	-
915.9MHz_TnomVnom	Pass	497.376k	915.640815M	916.13819M	915M	928M
920.7MHz_TnomVnom	Pass	498.375k	920.440815M	920.93919M	915M	928M
927.1MHz_TnomVnom	Pass	498.375k	926.840815M	927.33919M	915M	928M
FSK 50kbps	-	-	-	-	-	-
915.2MHz_TnomVnom	Pass	100.85k	915.140765M	915.241615M	915M	928M
921.6MHz_TnomVnom	Pass	100.85k	921.540827M	921.641677M	915M	928M
927.8MHz_TnomVnom	Pass	100.85k	927.740827M	927.841677M	915M	928M

fl-OBW = fl lower edge 99% occupied bandwidth; **fh-OBW** = fh higher edge 99% occupied bandwidth; **OBW** = 99% occupied bandwidth; **N dB** = 6dB down bandwidth;

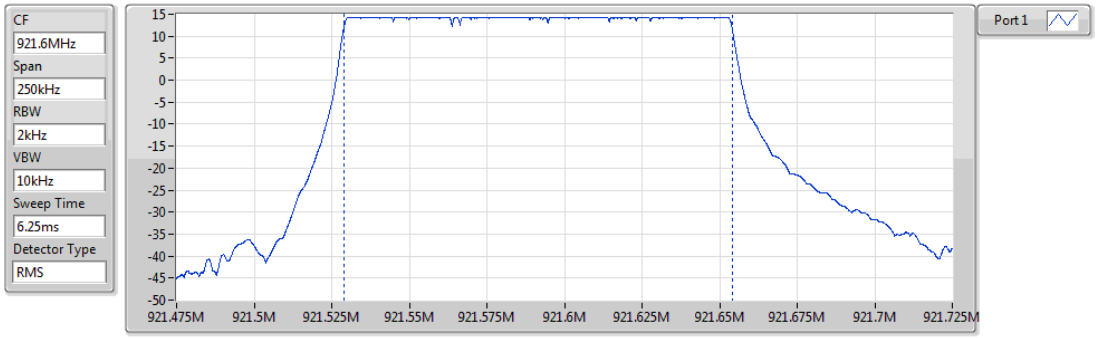
LoRa 125kHz

915.3MHz_TnomVnom



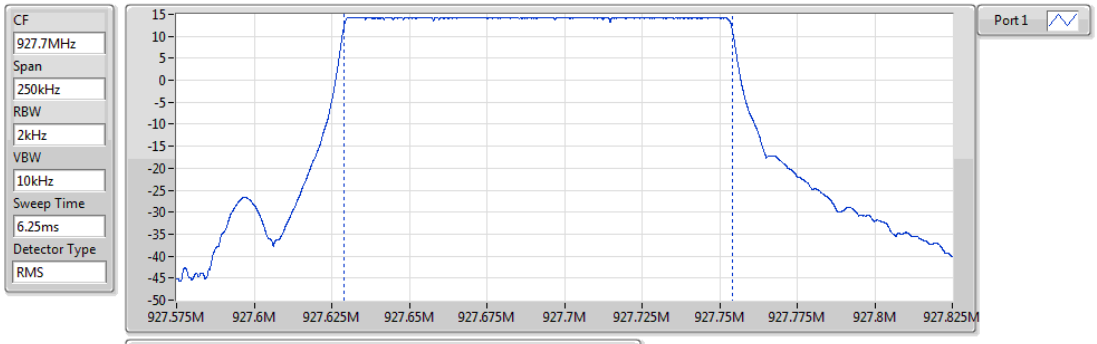
OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
124.906k	915.228955M	915.353862M	13M	915M	928M

921.6MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
125.031k	921.528955M	921.653987M	13M	915M	928M

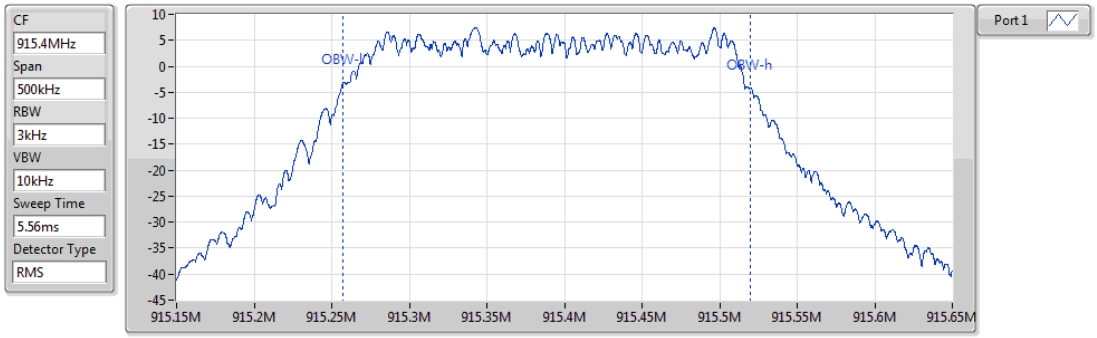
927.7MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
125.031k	927.628955M	927.753987M	13M	915M	928M

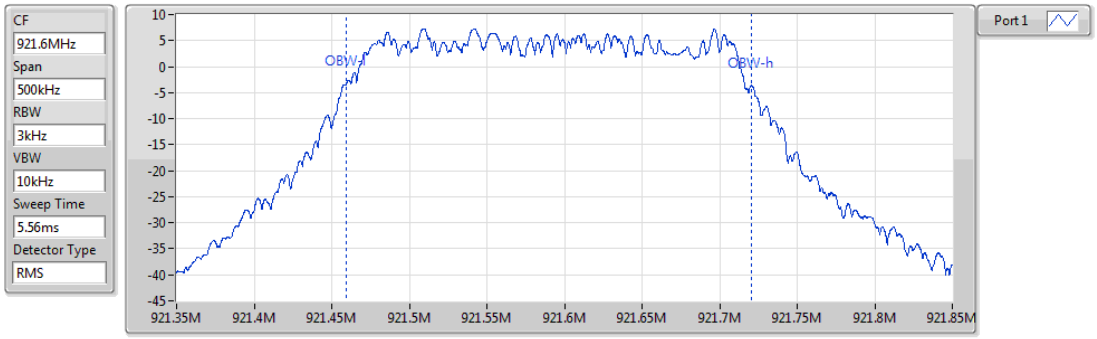
LoRa 250kHz

915.4MHz_TnomVnom



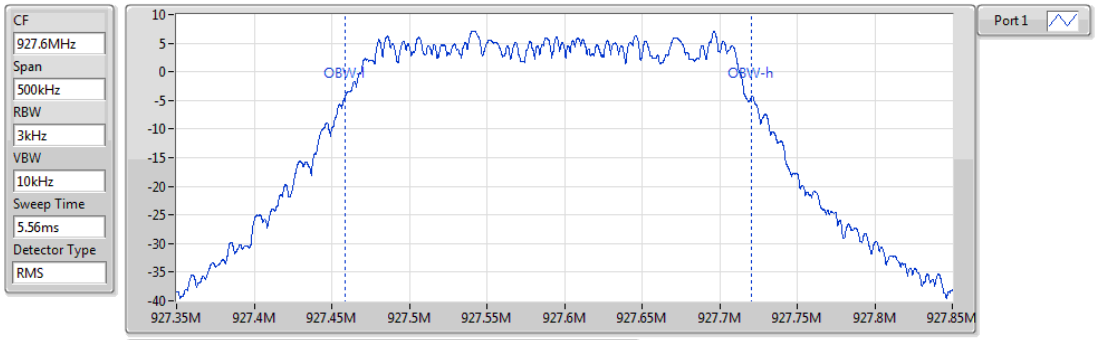
OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
262.559k	915.257411M	915.51997M	13M	915M	928M

921.6MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
261.685k	921.45916M	921.720845M	13M	915M	928M

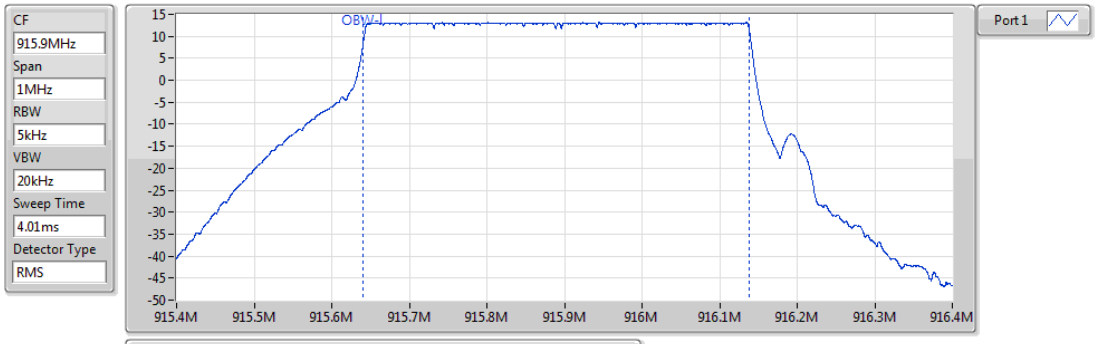
927.6MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
262.059k	927.458785M	927.720845M	13M	915M	928M

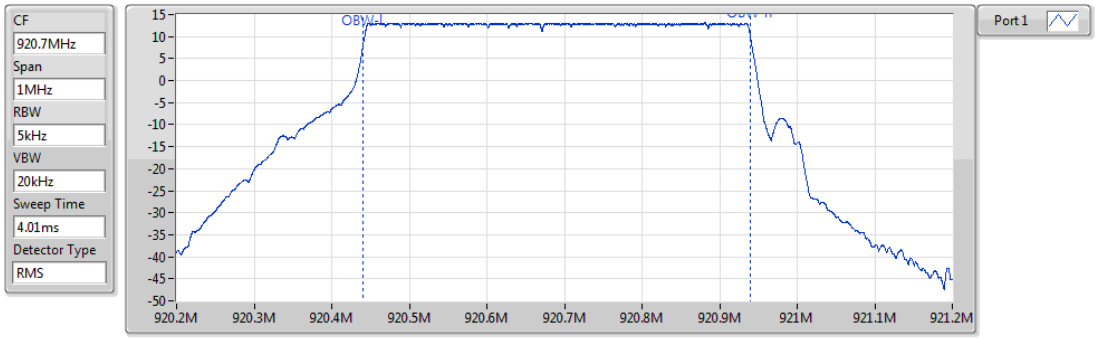
LoRa 500kHz

915.9MHz_TnomVnom



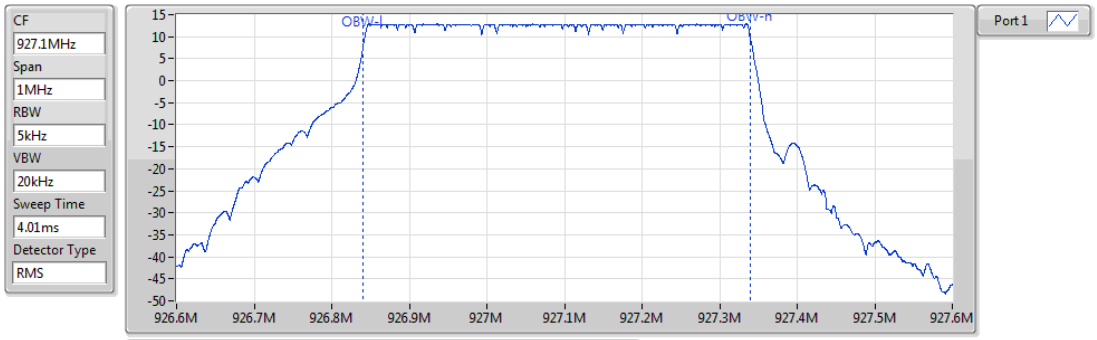
OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
497.376k	915.640815M	916.13819M	13M	915M	928M

920.7MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
498.375k	920.440815M	920.93919M	13M	915M	928M

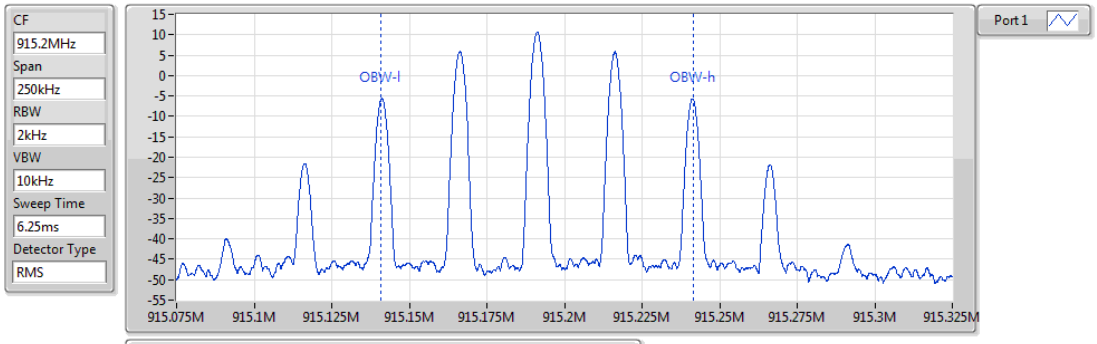
927.1MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
498.375k	926.840815M	927.33919M	13M	915M	928M

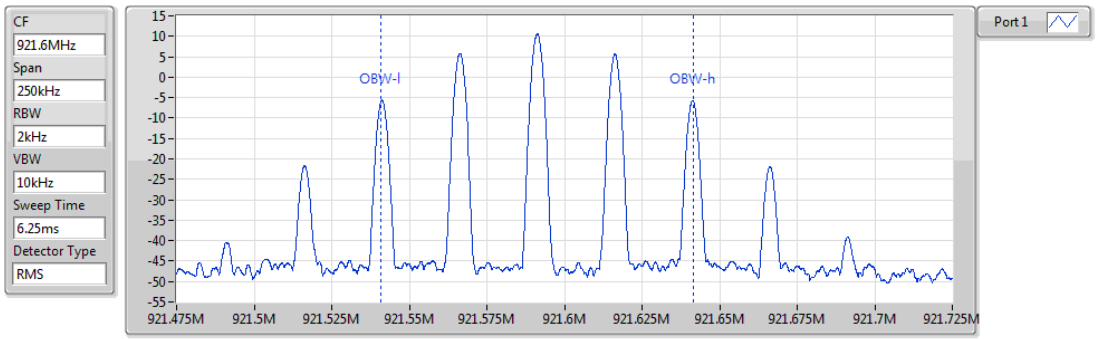
FSK 50kbps

915.2MHz_TnomVnom



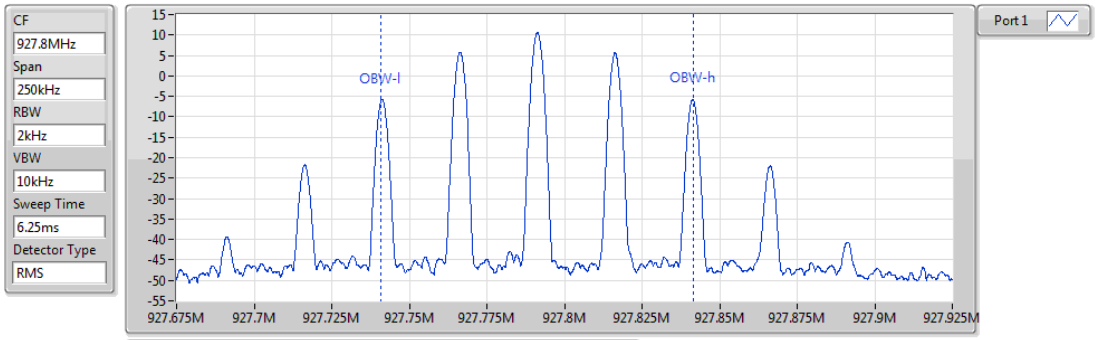
OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
100.85k	915.140765M	915.241615M	13M	915M	928M

921.6MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
100.85k	921.540827M	921.641677M	13M	915M	928M

927.8MHz_TnomVnom



OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Fl-Limit(Hz)	Fh-Limit(Hz)
100.85k	927.740827M	927.841677M	13M	915M	928M

3.5 Operating Frequencies

3.5.1 Limit of Operating Frequencies

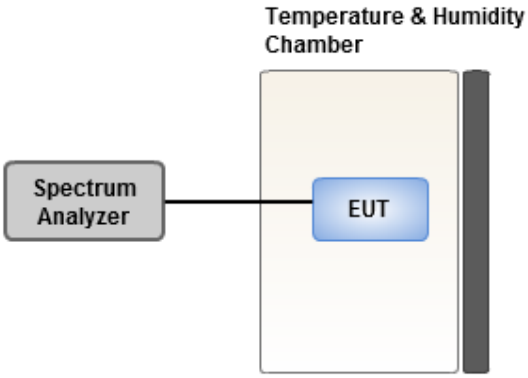
The upper and lower frequency limits of the transmitter 99% emission power bandwidth shall at all times remain within the operating frequency limits(915 ~ 928 MHz).

Note: Limit is from AS/NZS 4268:2017

3.5.2 Test Procedures

Reference to clause 6.2.1 of AS/NZS 4268:2017.

3.5.3 Test Setup



3.5.4 Test Result of Operating Frequencies

LoRa 125 kHz

Condition	Freqeuncy (MHz)	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
$T_{nom}V_{nom}$	915.3	915.228	-	915	928
$T_{min}V_{max}$	915.3	915.226	-	915	928
$T_{min}V_{min}$	915.3	915.227	-	915	928
$T_{max}V_{max}$	915.3	915.229	-	915	928
$T_{max}V_{min}$	915.3	915.228	-	915	928
$T_{nom}V_{nom}$	927.7	-	927.753	915	928
$T_{min}V_{max}$	927.7	-	927.755	915	928
$T_{min}V_{min}$	927.7	-	927.752	915	928
$T_{max}V_{max}$	927.7	-	927.751	915	928
$T_{max}V_{min}$	927.7	-	927.750	915	928

LoRa 250 kHz

Condition	Freqeuncy (MHz)	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
$T_{nom}V_{nom}$	915.4	915.257	-	915	928
$T_{min}V_{max}$	915.4	915.255	-	915	928
$T_{min}V_{min}$	915.4	915.258	-	915	928
$T_{max}V_{max}$	915.4	915.258	-	915	928
$T_{max}V_{min}$	915.4	915.256	-	915	928
$T_{nom}V_{nom}$	927.6	-	927.720	915	928
$T_{min}V_{max}$	927.6	-	927.722	915	928
$T_{min}V_{min}$	927.6	-	927.720	915	928
$T_{max}V_{max}$	927.6	-	927.718	915	928
$T_{max}V_{min}$	927.6	-	927.716	915	928

LoRa 500 kHz

Condition	Freqeuncy (MHz)	F_L(MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
$T_{nom}V_{nom}$	915.9	915.640	-	915	928
$T_{min}V_{max}$	915.9	915.638	-	915	928
$T_{min}V_{min}$	915.9	915.641	-	915	928
$T_{max}V_{max}$	915.9	915.641	-	915	928
$T_{max}V_{min}$	915.9	915.639	-	915	928
$T_{nom}V_{nom}$	927.1	-	927.339	915	928
$T_{min}V_{max}$	927.1	-	927.341	915	928
$T_{min}V_{min}$	927.1	-	927.340	915	928
$T_{max}V_{max}$	927.1	-	927.337	915	928
$T_{max}V_{min}$	927.1	-	927.335	915	928

FSK 50kbps

Condition	Freqeuncy (MHz)	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
$T_{nom}V_{nom}$	915.2	915.140	-	915	928
$T_{min}V_{max}$	915.2	915.138	-	915	928
$T_{min}V_{min}$	915.2	915.141	-	915	928
$T_{max}V_{max}$	915.2	915.141	-	915	928
$T_{max}V_{min}$	915.2	915.142	-	915	928
$T_{nom}V_{nom}$	927.8	-	927.841	915	928
$T_{min}V_{max}$	927.8	-	927.843	915	928
$T_{min}V_{min}$	927.8	-	927.841	915	928
$T_{max}V_{max}$	927.8	-	927.840	915	928
$T_{max}V_{min}$	927.8	-	927.838	915	928

4 Receiver Test Results

4.1 Receiver Spurious Emissions

4.1.1 Receiver Spurious Emissions Limits

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3
Note 1: Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit **Note 2:** Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.			

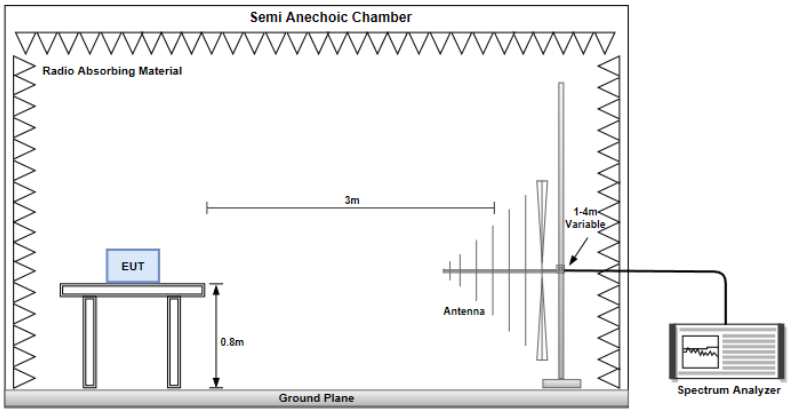
Note: Limit is from FCC Part 15.109

4.1.2 Test Procedures

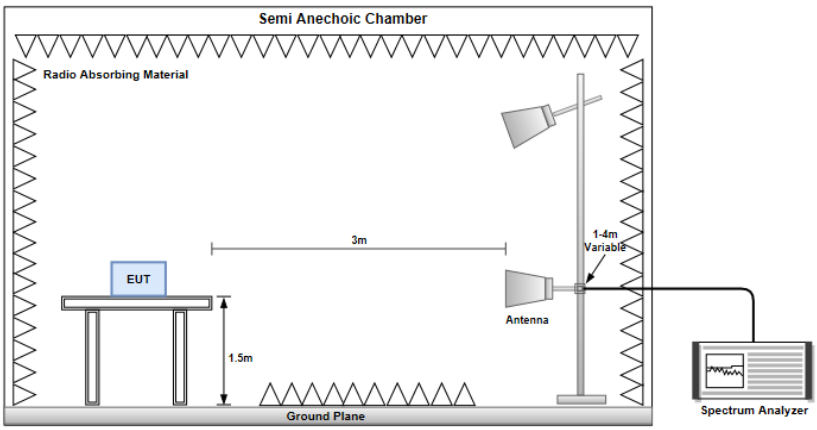
Reference to clause 7.2.1 of AS/NZS 4268:2017.

4.1.3 Test Setup

Below 1GHz



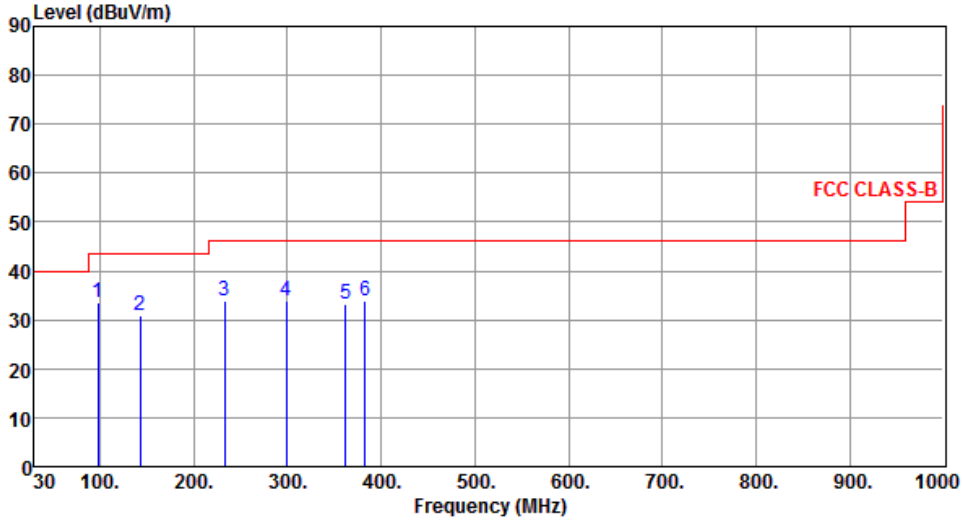
Above 1 GHz



4.1.4 Receiver Spurious Emissions (Below 1GHz)

LoRa 125 kHz

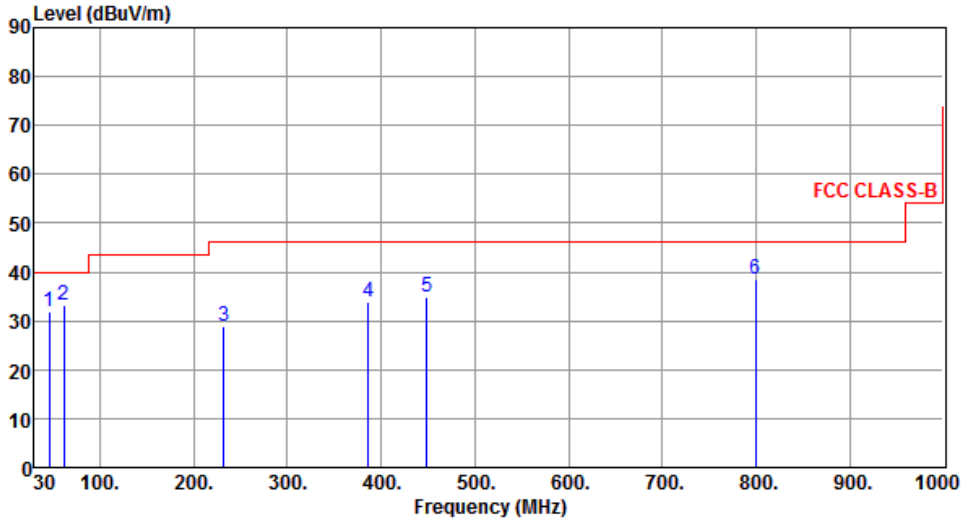
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	97.84	33.65	43.50	-9.85	47.05	-13.40	Peak	---	---
2	142.89	30.95	43.50	-12.55	39.51	-8.56	Peak	---	---
3	232.88	33.85	46.00	-12.15	43.94	-10.09	Peak	---	---
4	298.74	33.96	46.00	-12.04	41.79	-7.83	Peak	---	---
5	361.87	33.17	46.00	-12.83	39.22	-6.05	Peak	---	---
6	382.47	33.89	46.00	-12.11	39.34	-5.45	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

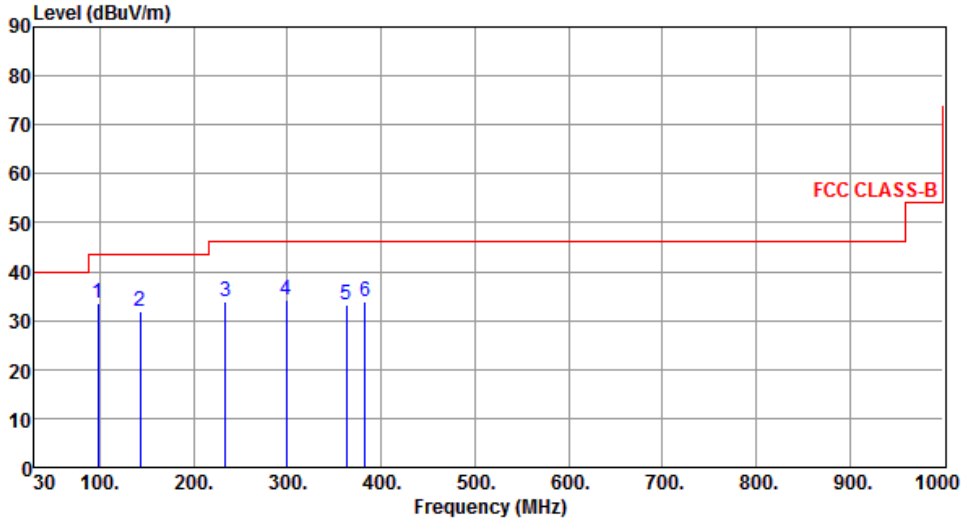


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.52	31.93	40.00	-8.07	39.72	-7.79	Peak	---	---
2	61.30	33.28	40.00	-6.72	42.17	-8.89	Peak	---	---
3	231.89	28.93	46.00	-17.07	39.10	-10.17	Peak	---	---
4	386.39	33.74	46.00	-12.26	39.08	-5.34	Peak	---	---
5	448.89	34.79	46.00	-11.21	38.72	-3.93	Peak	---	---
6	799.38	38.48	46.00	-7.52	36.24	2.24	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 250 kHz

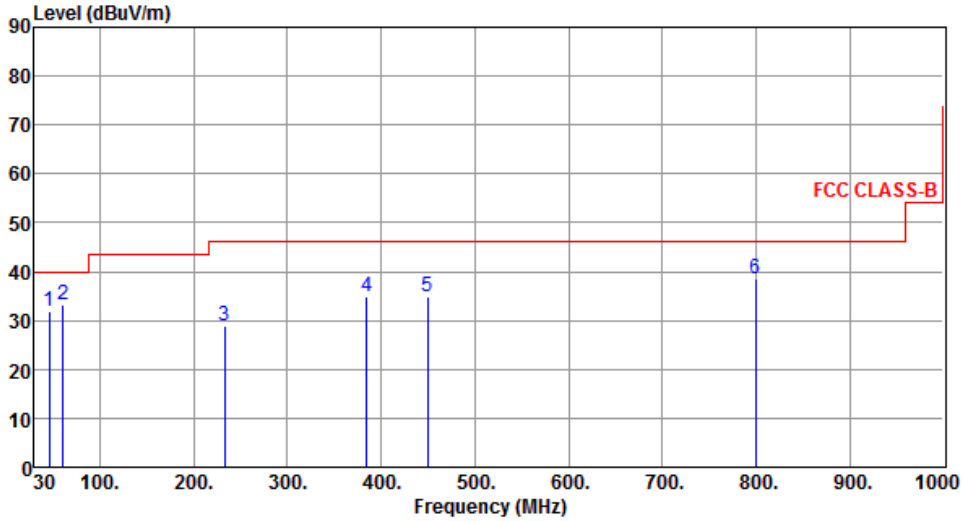
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.15	33.66	43.50	-9.84	47.00	-13.34	Peak	---	---
2	142.88	31.85	43.50	-11.65	40.41	-8.56	Peak	---	---
3	233.82	33.85	46.00	-12.15	43.86	-10.01	Peak	---	---
4	299.21	34.33	46.00	-11.67	42.15	-7.82	Peak	---	---
5	363.20	33.17	46.00	-12.83	39.15	-5.98	Peak	---	---
6	382.96	33.85	46.00	-12.15	39.28	-5.43	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

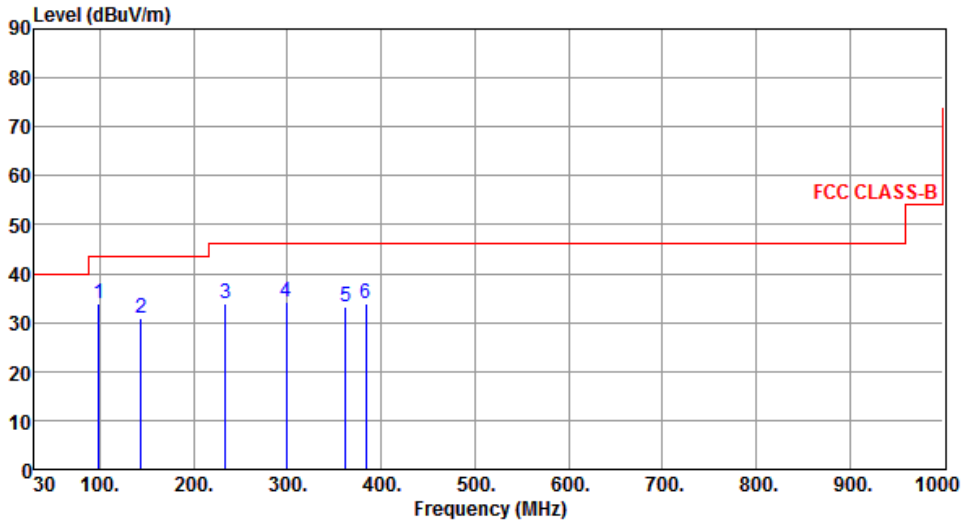


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.78	31.87	40.00	-8.13	39.63	-7.76	Peak	---	---
2	60.36	33.27	40.00	-6.73	41.95	-8.68	Peak	---	---
3	233.28	28.95	46.00	-17.05	39.01	-10.06	Peak	---	---
4	384.85	34.85	46.00	-11.15	40.21	-5.36	Peak	---	---
5	449.85	34.75	46.00	-11.25	38.66	-3.91	Peak	---	---
6	799.88	38.62	46.00	-7.38	36.36	2.26	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

FSK 50kbps

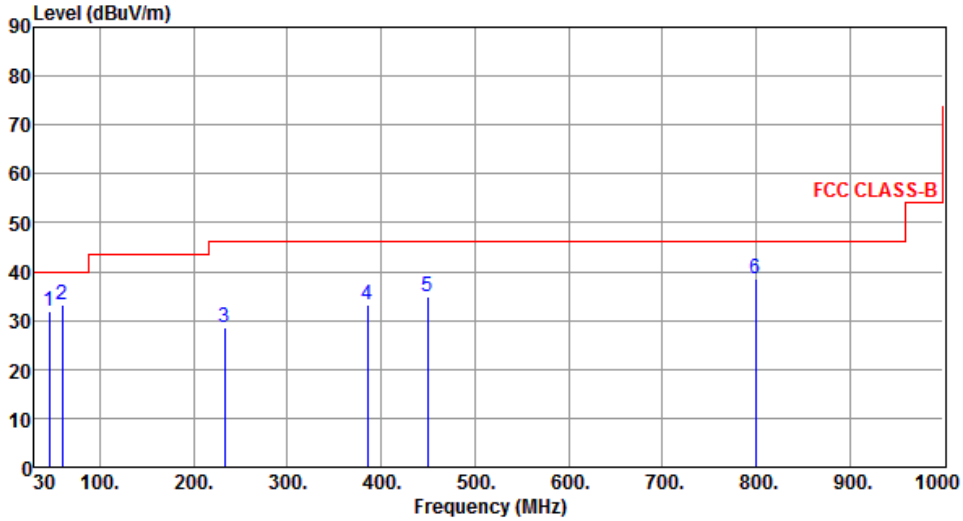
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.45	33.75	43.50	-9.75	47.03	-13.28	Peak	---	---
2	143.44	30.88	43.50	-12.62	39.40	-8.52	Peak	---	---
3	233.57	33.96	46.00	-12.04	43.99	-10.03	Peak	---	---
4	299.14	34.28	46.00	-11.72	42.10	-7.82	Peak	---	---
5	362.21	33.20	46.00	-12.80	39.23	-6.03	Peak	---	---
6	383.88	33.74	46.00	-12.26	39.13	-5.39	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

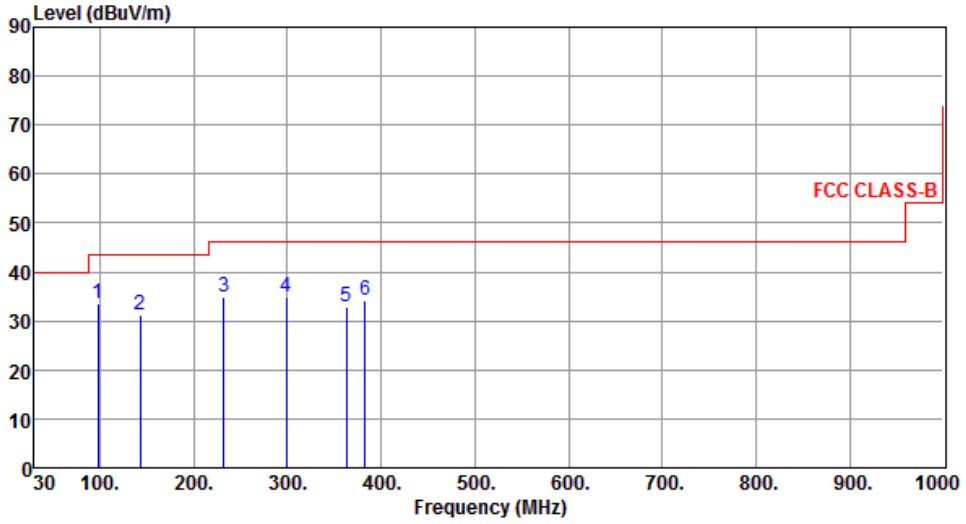


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.72	31.88	40.00	-8.12	39.65	-7.77	Peak	---	---
2	60.21	33.17	40.00	-6.83	41.82	-8.65	Peak	---	---
3	232.77	28.71	46.00	-17.29	38.81	-10.10	Peak	---	---
4	385.28	33.34	46.00	-12.66	38.68	-5.34	Peak	---	---
5	449.88	34.88	46.00	-11.12	38.79	-3.91	Peak	---	---
6	799.47	38.44	46.00	-7.56	36.20	2.24	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 500 kHz

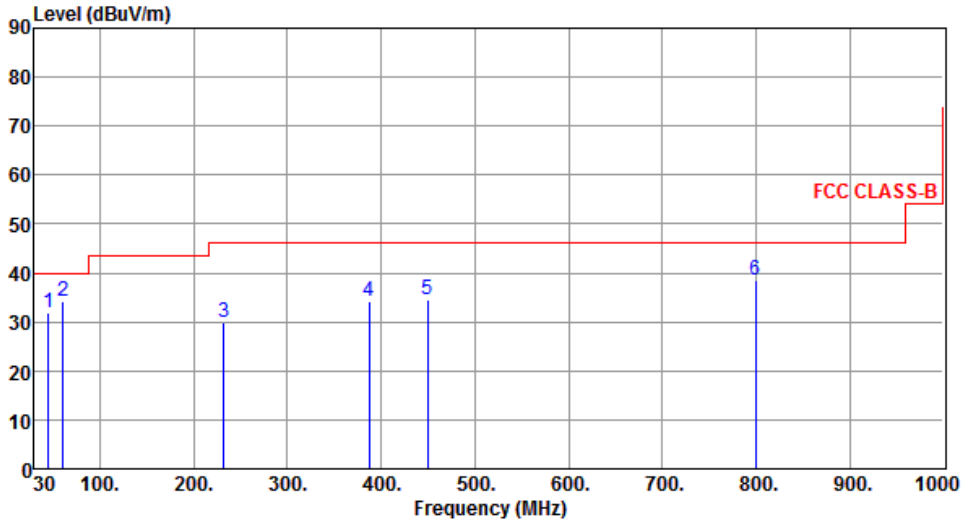
Modulation	LoRa	**Test Freq. (MHz)**	924.9
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	97.57	33.69	43.50	-9.81	47.15	-13.46	Peak	---	---
2	142.75	31.28	43.50	-12.22	39.84	-8.56	Peak	---	---
3	232.48	34.85	46.00	-11.15	44.97	-10.12	Peak	---	---
4	299.25	34.80	46.00	-11.20	42.61	-7.81	Peak	---	---
5	362.74	32.88	46.00	-13.12	38.88	-6.00	Peak	---	---
6	383.20	34.28	46.00	-11.72	39.70	-5.42	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	924.9
Polarization	Vertical		



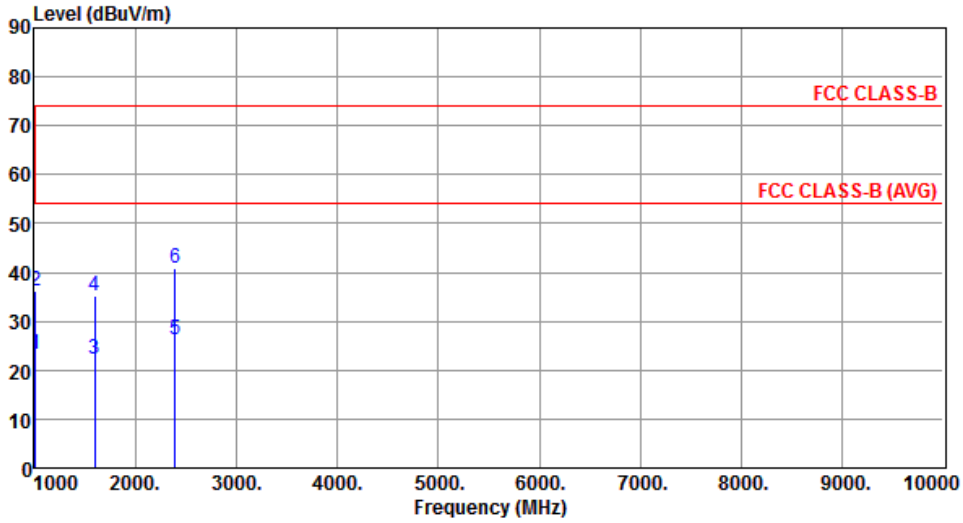
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	44.95	31.85	40.00	-8.15	39.69	-7.84	Peak	---	---
2	60.88	34.20	40.00	-5.80	42.98	-8.78	Peak	---	---
3	232.50	29.85	46.00	-16.15	39.97	-10.12	Peak	---	---
4	387.50	34.21	46.00	-11.79	39.55	-5.34	Peak	---	---
5	449.85	34.55	46.00	-11.45	38.46	-3.91	Peak	---	---
6	799.69	38.52	46.00	-7.48	36.27	2.25	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

4.1.5 Receiver Spurious Emissions (Above 1GHz)

LoRa 125 kHz

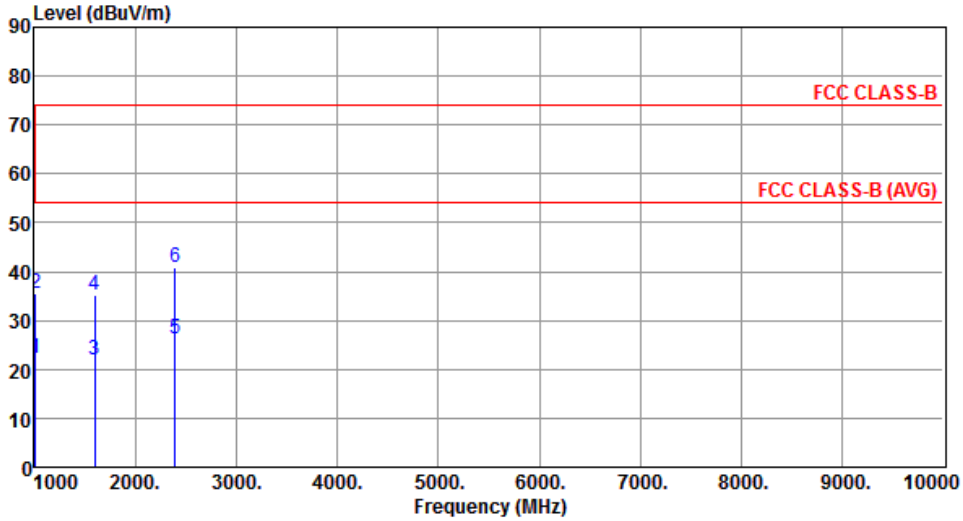
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	23.31	54.00	-30.69	33.54	-10.23	Average	100	54
2	1010.00	36.31	74.00	-37.69	46.54	-10.23	Peak	100	54
3	1600.00	22.21	54.00	-31.79	29.21	-7.00	Average	100	263
4	1600.00	35.24	74.00	-38.76	42.24	-7.00	Peak	100	263
5	2395.00	26.09	54.00	-27.91	29.17	-3.08	Average	100	244
6	2395.00	40.80	74.00	-33.20	43.88	-3.08	Peak	100	244

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

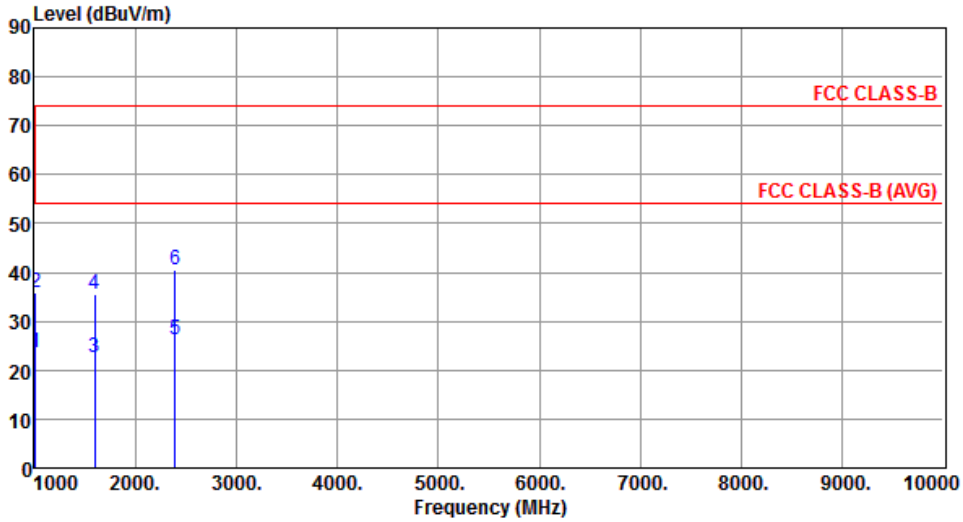


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	22.32	54.00	-31.68	32.55	-10.23	Average	100	218
2	1010.00	35.65	74.00	-38.35	45.88	-10.23	Peak	100	218
3	1600.00	21.89	54.00	-32.11	28.89	-7.00	Average	100	175
4	1600.00	35.35	74.00	-38.65	42.35	-7.00	Peak	100	175
5	2395.00	26.34	54.00	-27.66	29.42	-3.08	Average	100	63
6	2395.00	40.69	74.00	-33.31	43.77	-3.08	Peak	100	63

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 250 kHz

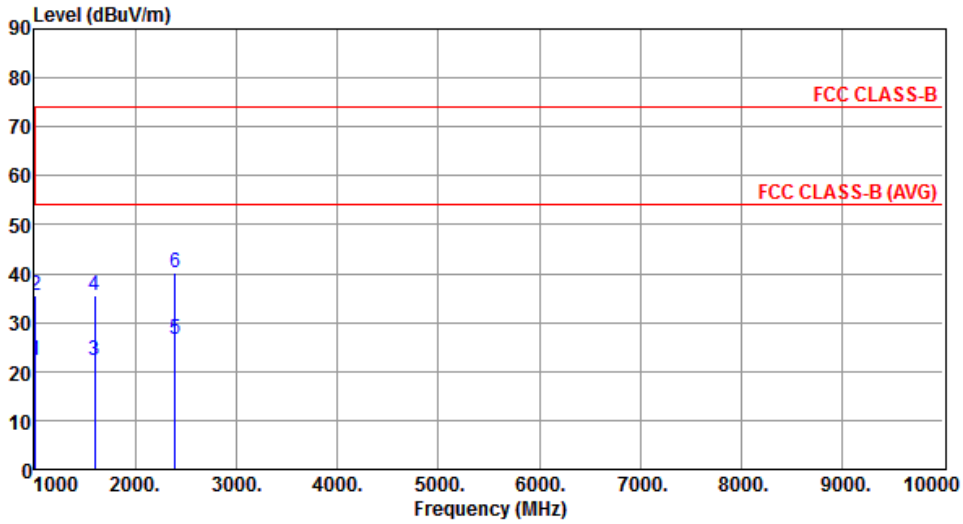
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	23.51	54.00	-30.49	33.74	-10.23	Average	100	56
2	1010.00	36.00	74.00	-38.00	46.23	-10.23	Peak	100	56
3	1600.00	22.54	54.00	-31.46	29.54	-7.00	Average	100	266
4	1600.00	35.37	74.00	-38.63	42.37	-7.00	Peak	100	266
5	2395.00	26.33	54.00	-27.67	29.41	-3.08	Average	100	248
6	2395.00	40.66	74.00	-33.34	43.74	-3.08	Peak	100	248

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

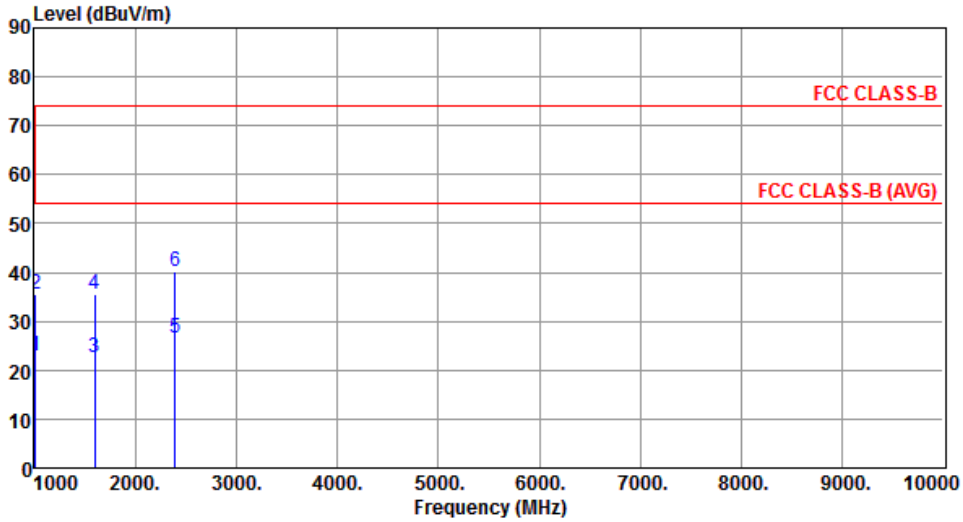


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	22.40	54.00	-31.60	32.63	-10.23	Average	100	227
2	1010.00	35.51	74.00	-38.49	45.74	-10.23	Peak	100	227
3	1600.00	22.17	54.00	-31.83	29.17	-7.00	Average	100	182
4	1600.00	35.63	74.00	-38.37	42.63	-7.00	Peak	100	182
5	2395.00	26.63	54.00	-27.37	29.71	-3.08	Average	100	72
6	2395.00	40.19	74.00	-33.81	43.27	-3.08	Peak	100	72

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

FSK 50kbps

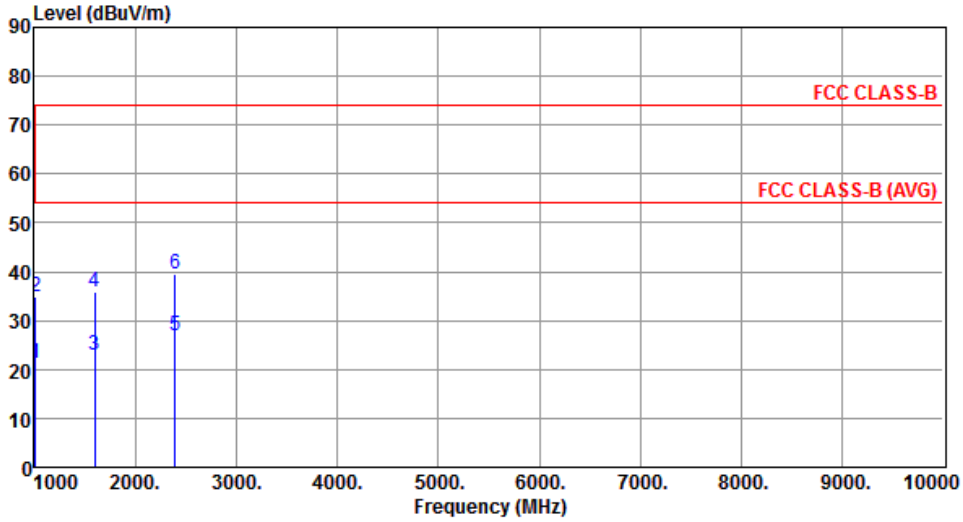
Modulation	LoRa	**Test Freq. (MHz)**	921.6
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	22.95	54.00	-31.05	33.18	-10.23	Average	100	66
2	1010.00	35.63	74.00	-38.37	45.86	-10.23	Peak	100	66
3	1600.00	22.54	54.00	-31.46	29.54	-7.00	Average	100	269
4	1600.00	35.68	74.00	-38.32	42.68	-7.00	Peak	100	269
5	2395.00	26.70	54.00	-27.30	29.78	-3.08	Average	100	248
6	2395.00	40.13	74.00	-33.87	43.21	-3.08	Peak	100	248

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	921.6
Polarization	Vertical		

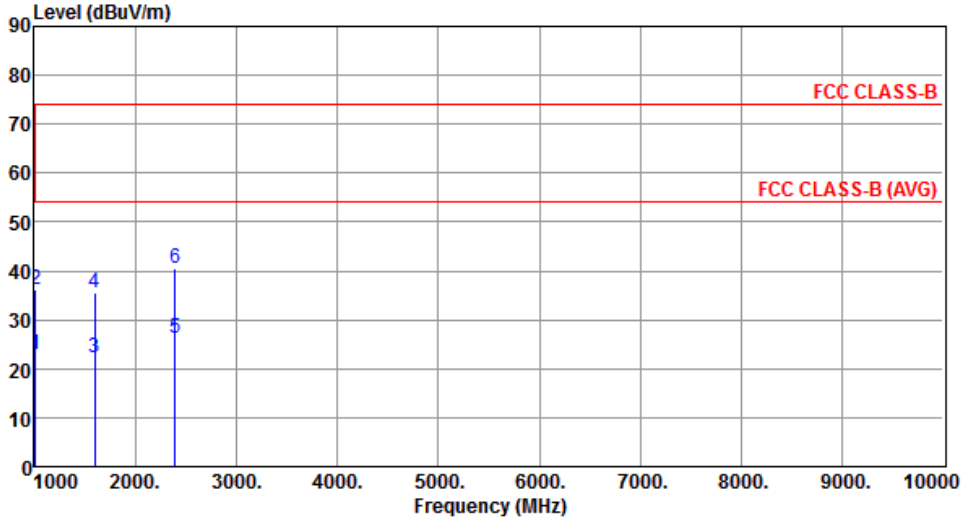


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	21.35	54.00	-32.65	31.58	-10.23	Average	100	241
2	1010.00	35.01	74.00	-38.99	45.24	-10.23	Peak	100	241
3	1600.00	22.85	54.00	-31.15	29.85	-7.00	Average	100	192
4	1600.00	35.85	74.00	-38.15	42.85	-7.00	Peak	100	192
5	2395.00	26.77	54.00	-27.23	29.85	-3.08	Average	100	92
6	2395.00	39.49	74.00	-34.51	42.57	-3.08	Peak	100	92

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

LoRa 500 kHz

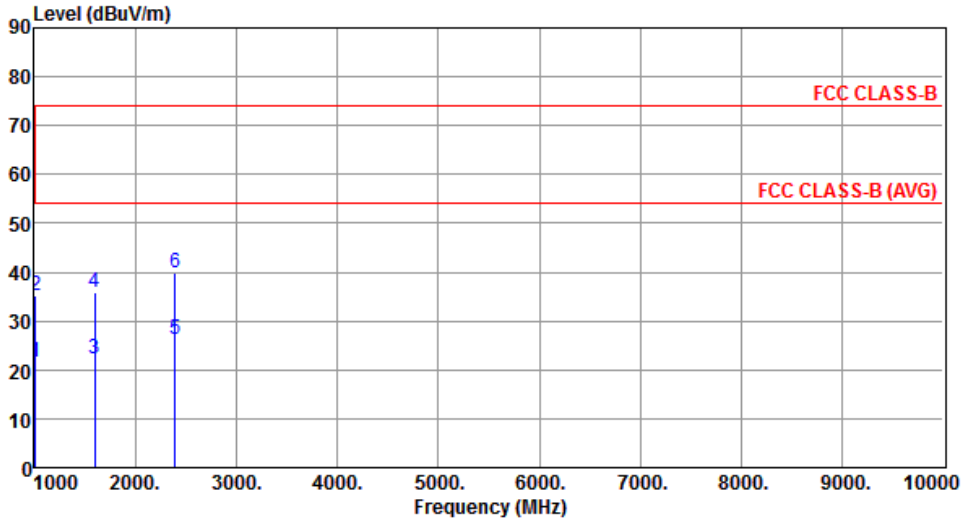
Modulation	LoRa	**Test Freq. (MHz)**	924.9
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	23.04	54.00	-30.96	33.27	-10.23	Average	100	62
2	1010.00	36.18	74.00	-37.82	46.41	-10.23	Peak	100	62
3	1600.00	22.23	54.00	-31.77	29.23	-7.00	Average	100	262
4	1600.00	35.41	74.00	-38.59	42.41	-7.00	Peak	100	262
5	2395.00	26.30	54.00	-27.70	29.38	-3.08	Average	100	250
6	2395.00	40.36	74.00	-33.64	43.44	-3.08	Peak	100	250

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	LoRa	Test Freq. (MHz)	924.9
Polarization	Vertical		

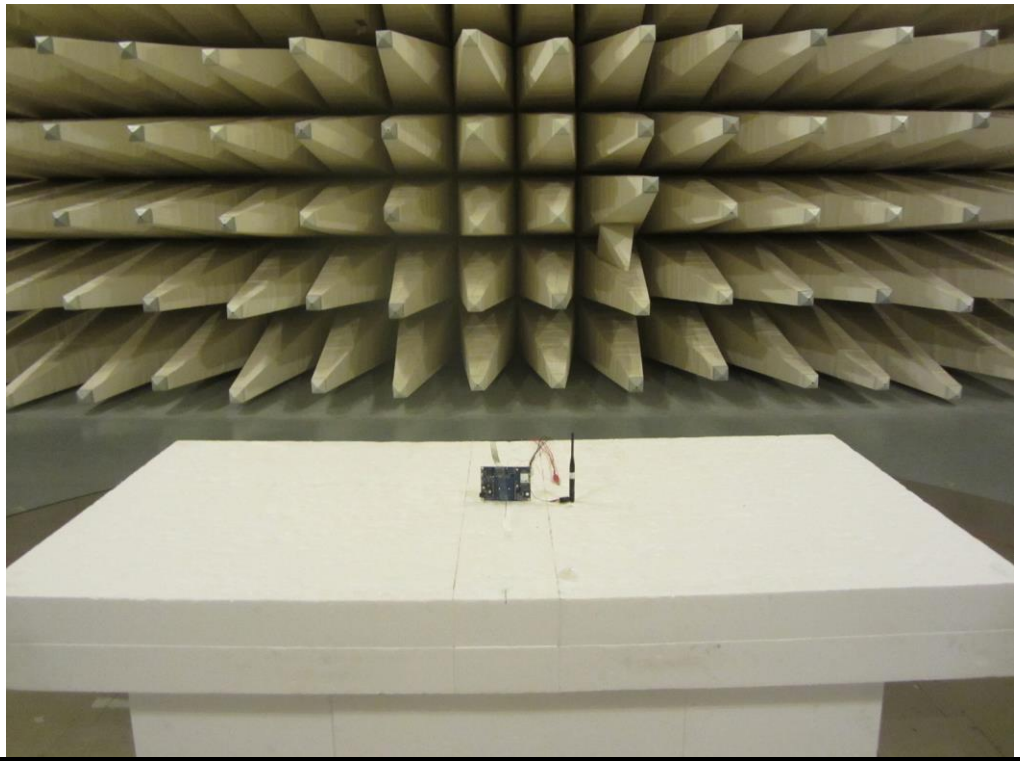


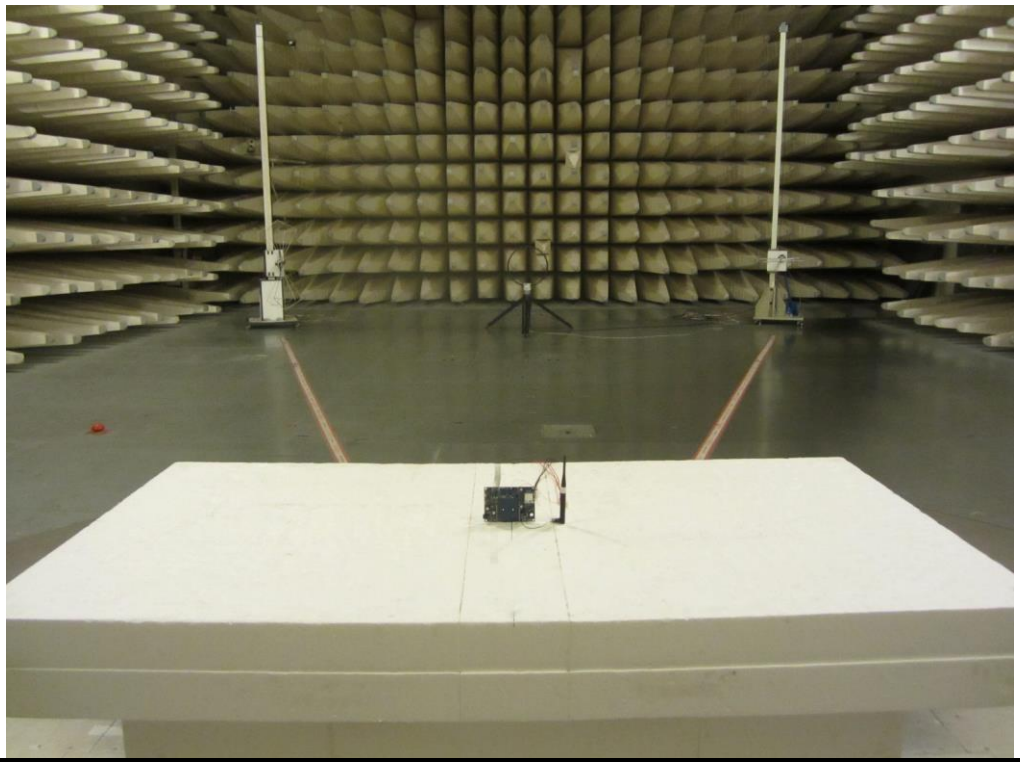
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1010.00	21.52	54.00	-32.48	31.75	-10.23	Average	100	224
2	1010.00	35.18	74.00	-38.82	45.41	-10.23	Peak	100	224
3	1600.00	22.27	54.00	-31.73	29.27	-7.00	Average	100	186
4	1600.00	35.74	74.00	-38.26	42.74	-7.00	Peak	100	186
5	2395.00	26.34	54.00	-27.66	29.42	-3.08	Average	100	81
6	2395.00	39.88	74.00	-34.12	42.96	-3.08	Peak	100	81

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

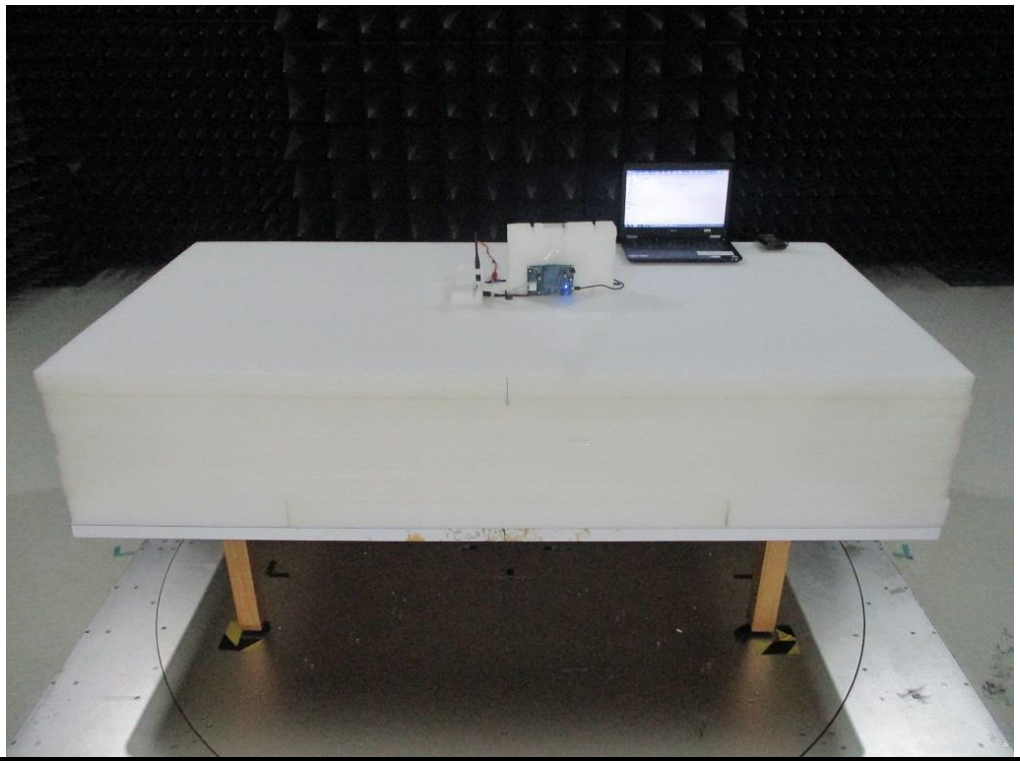
5 Photographs of the Test Configuration

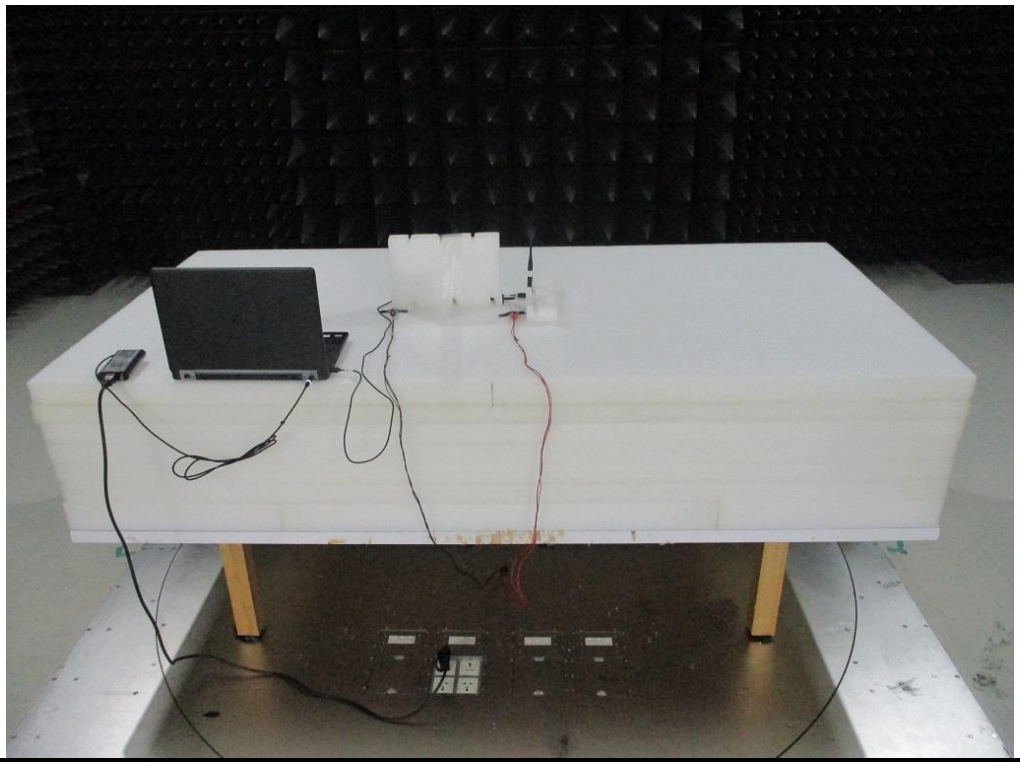
Spurious Emission below 30MHz Test



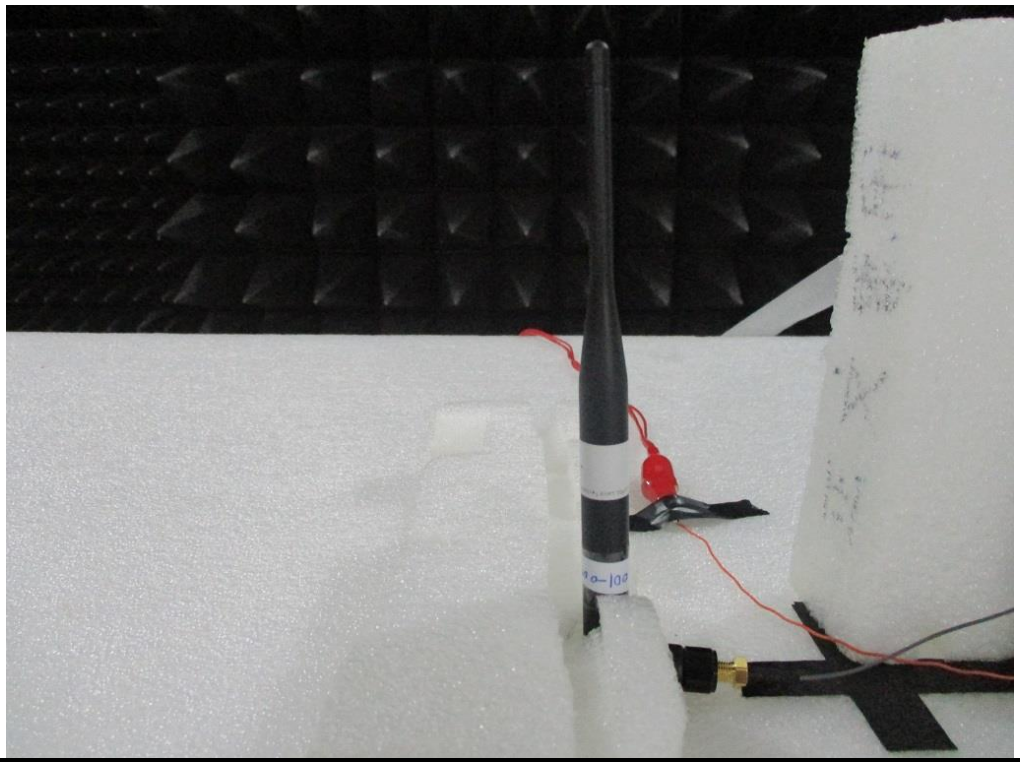


Spurious Emission Below 1GHz Test

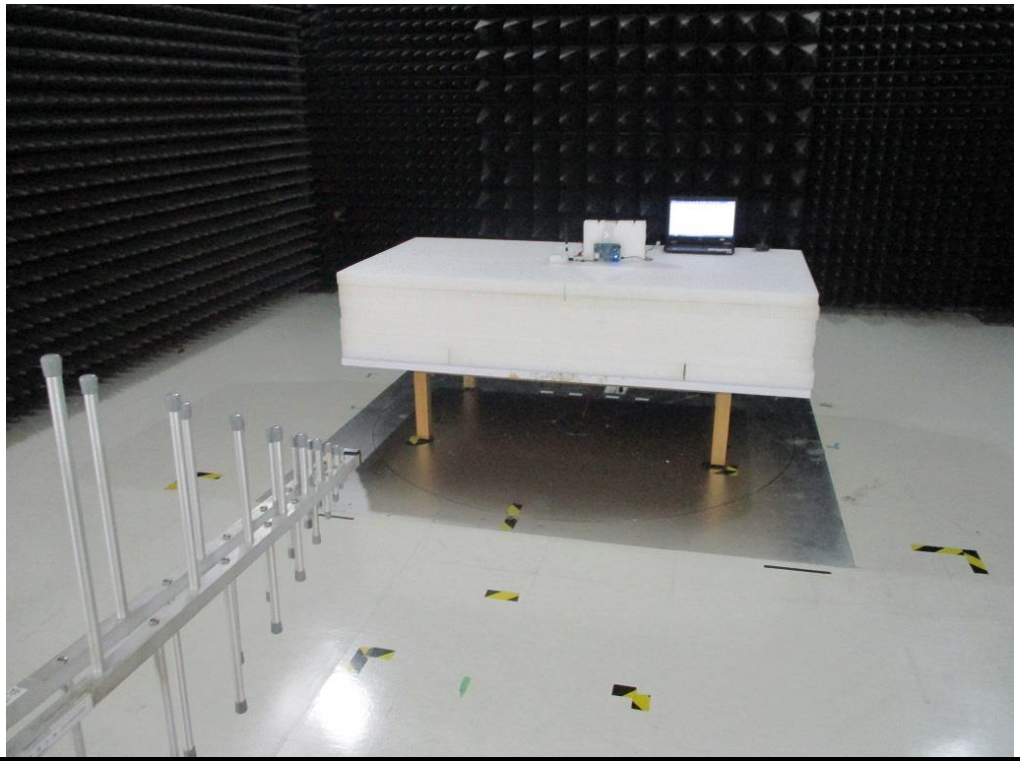




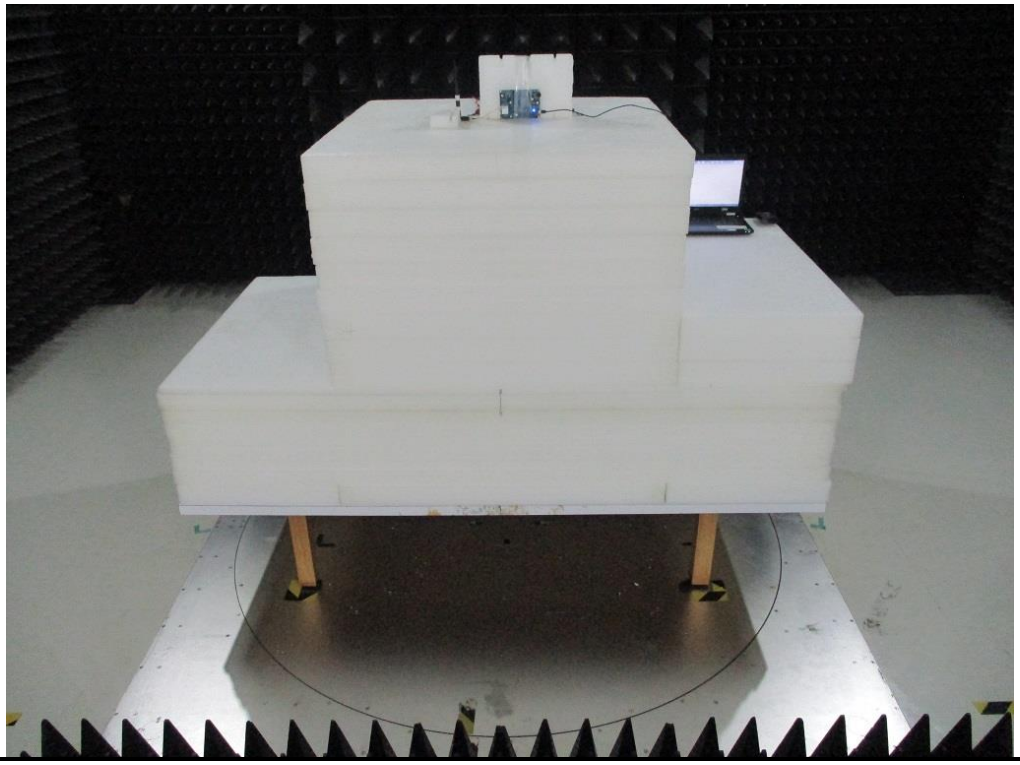
Spurious Emission Below 1GHz Test

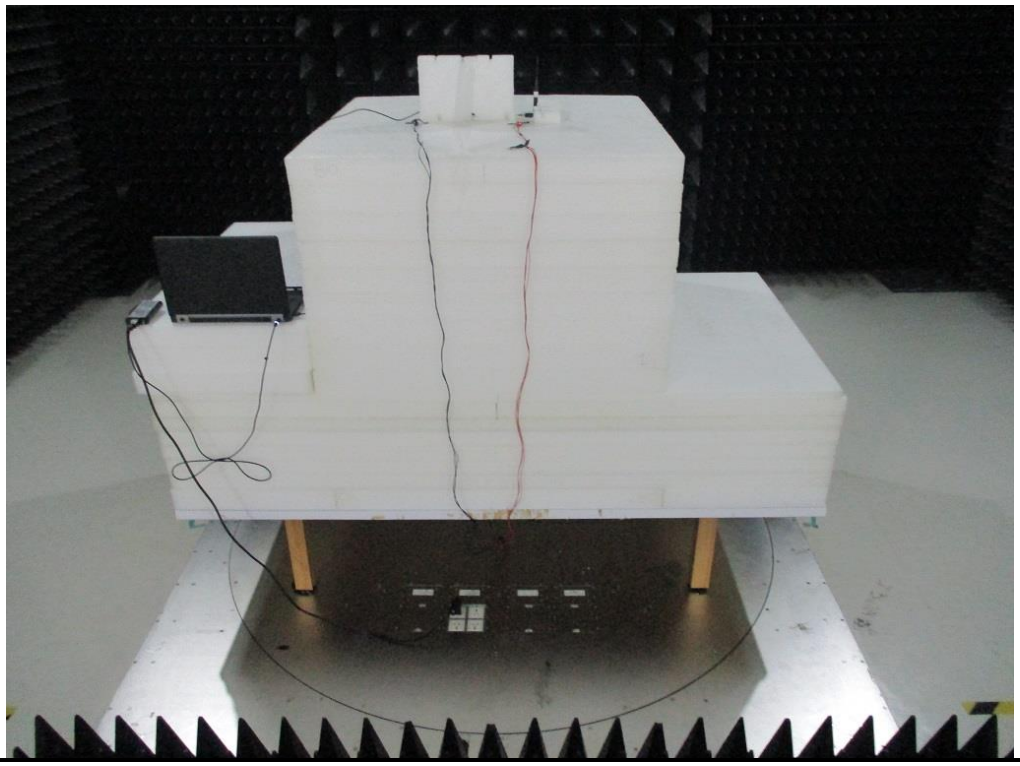


Spurious Emission Below 1GHz Test

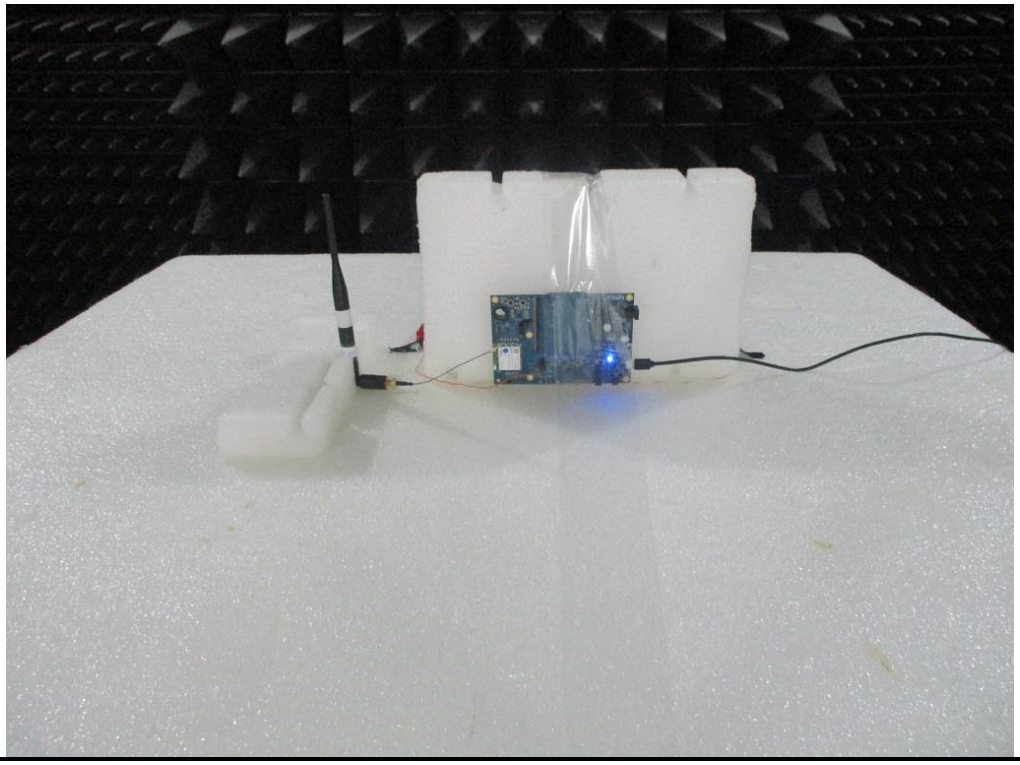


Spurious Emission Above 1GHz Test

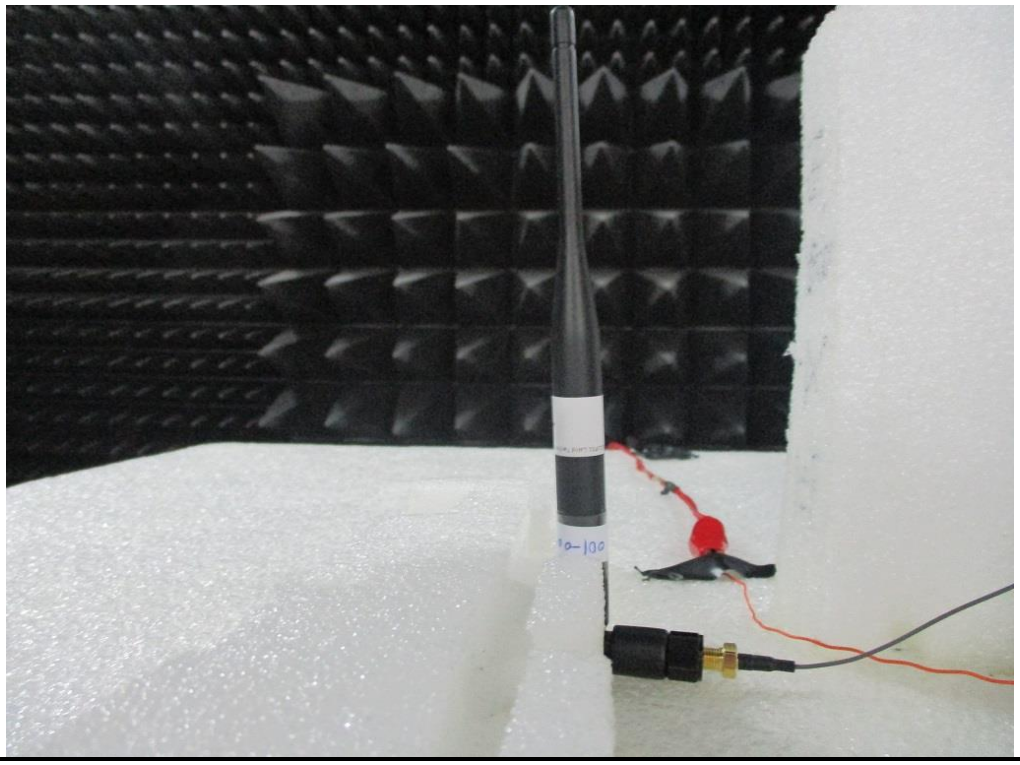


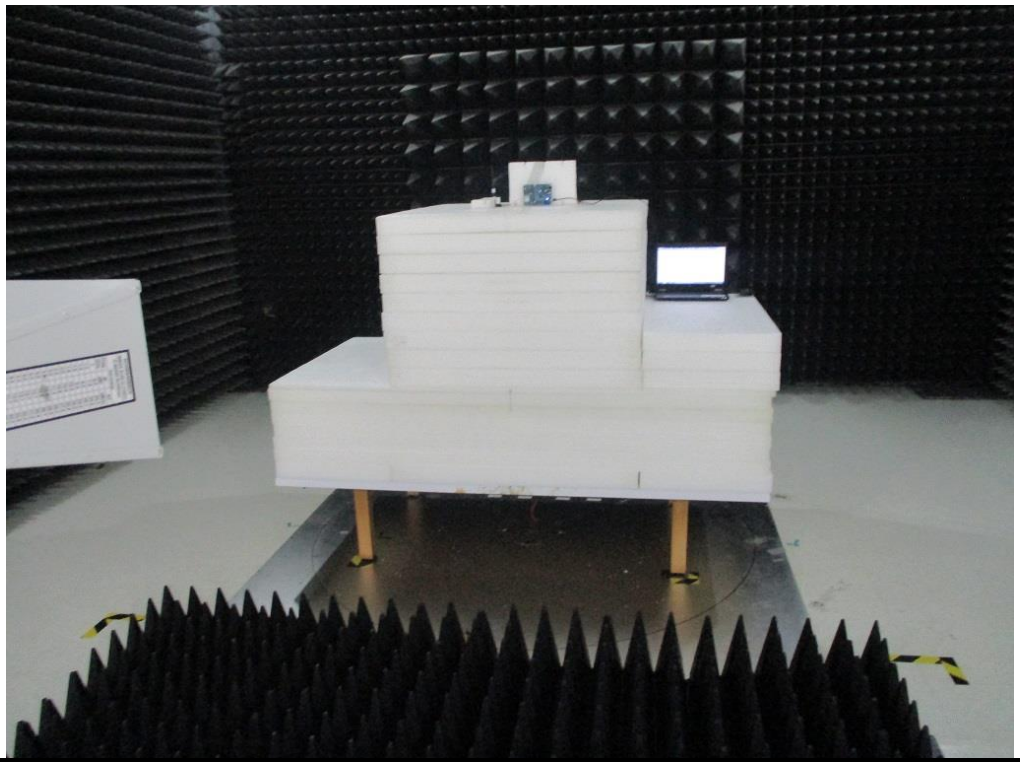


Spurious Emission Above 1GHz Test



Spurious Emission Above 1GHz Test





6 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C..

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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