



TESTING LABORATORY
CERTIFICATE # 4297.01

ATC

FCC PART 15.247 TEST REPORT

For

Shenzhen Zaina Technology Co., Ltd

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FCC ID: 2A3A5-GL5712

Report Type: Original Report	Product Type: LoRa Concentrator Card
Report Number:	ATC210517-17624E-RF
Report Date:	2021-08-13
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Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk ★.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	LoRa Concentrator Card
Trademark	MAXIOT
Tested Model	GL5712-UX
Frequency Range	923.3-927.5 MHz
Maximum Conducted Peak Output Power	14.90dBm
Modulation Technique	LoRa/Chirp Spread Spectrum
Voltage Range	DC 3.3V from test fixture
Antenna Specification*	1dBi(It is provided by the applicant)
Date of Test	2021-08-02 to 2021-08-13
Sample serial number	ATC210517-17624E-RF-S1 (Assigned by ATC)
Received date	2021-05-17
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	Uncertainty	
Occupied Channel Bandwidth	5%	
RF output power, conducted	0.73dB	
Unwanted Emission, conducted	1.6dB	
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz- 18GHz	4.98dB
	18GHz- 26.5GHz	5.06dB
Temperature	1°C	
Humidity	6%	
Supply voltages	0.4%	

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

Channel List

Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	923.3	5	925.7
2	923.9	6	926.3
3	924.5	7	926.9
4	925.1	8	927.5

Channel 1, 4 and 8 were tested.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Software: "SSCOM V5.13.1" was used to test and the power level is 11*.

Duty cycle

Test Result: Compliant. Please refer to the Appendix.

Support Equipment List and Details

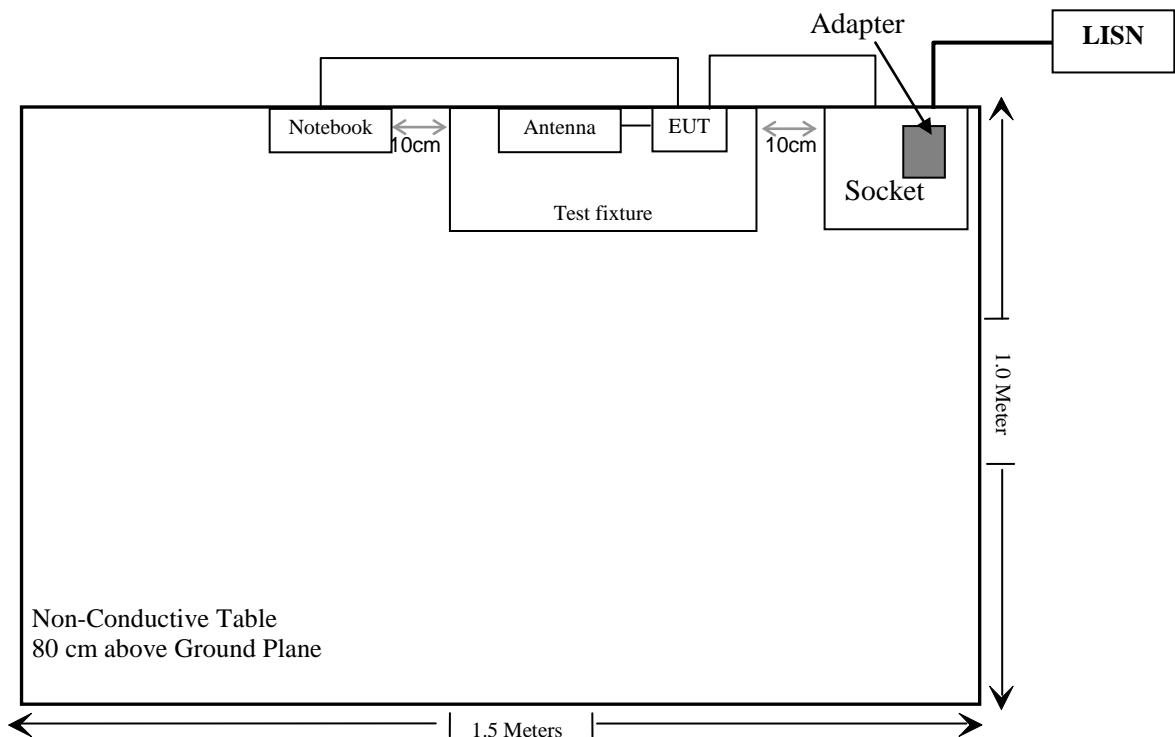
Manufacturer	Description	Model	Serial Number
Unknown	Test Fixture	GL5712 (SPI)	Unknown
Unknown	Antenna	Unknown	Unknown
Unknown	Adapter	HN-5258	Unknown
LENOVO	Notebook	4290-RT8	R9-FW93G 11/08

External I/O Cable

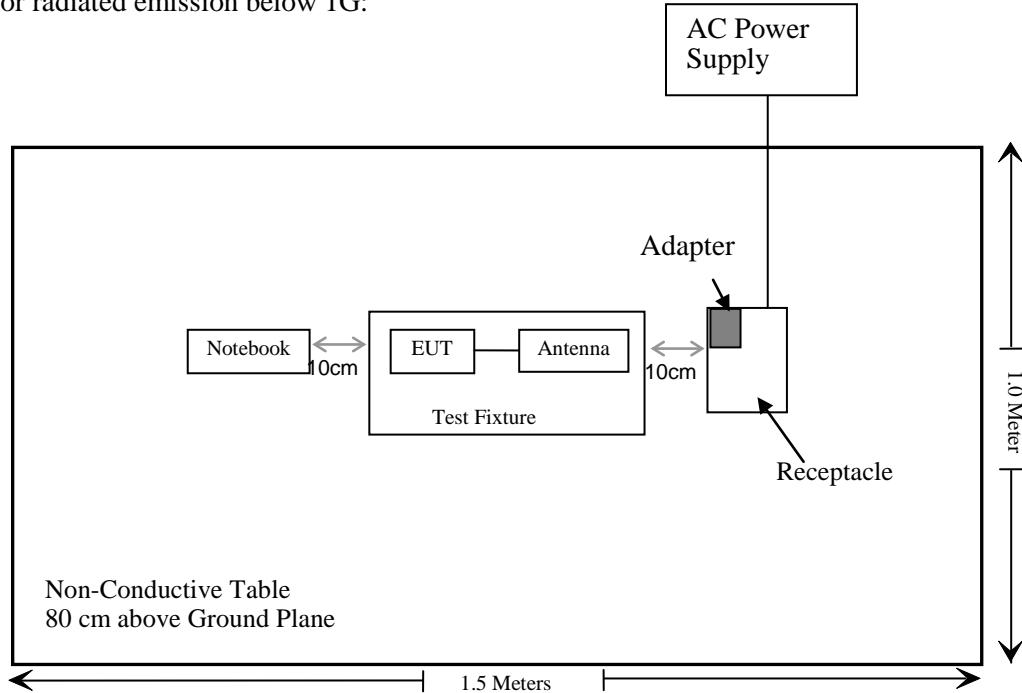
Cable Description	Length (m)	From Port	To
Unshielded un-detachable DC Output Cable	0.73	Adapter	Test Fixture
Unshielded un-detachable USB Cable	0.25	Test Fixture	Notebook

Block Diagram of Test Setup

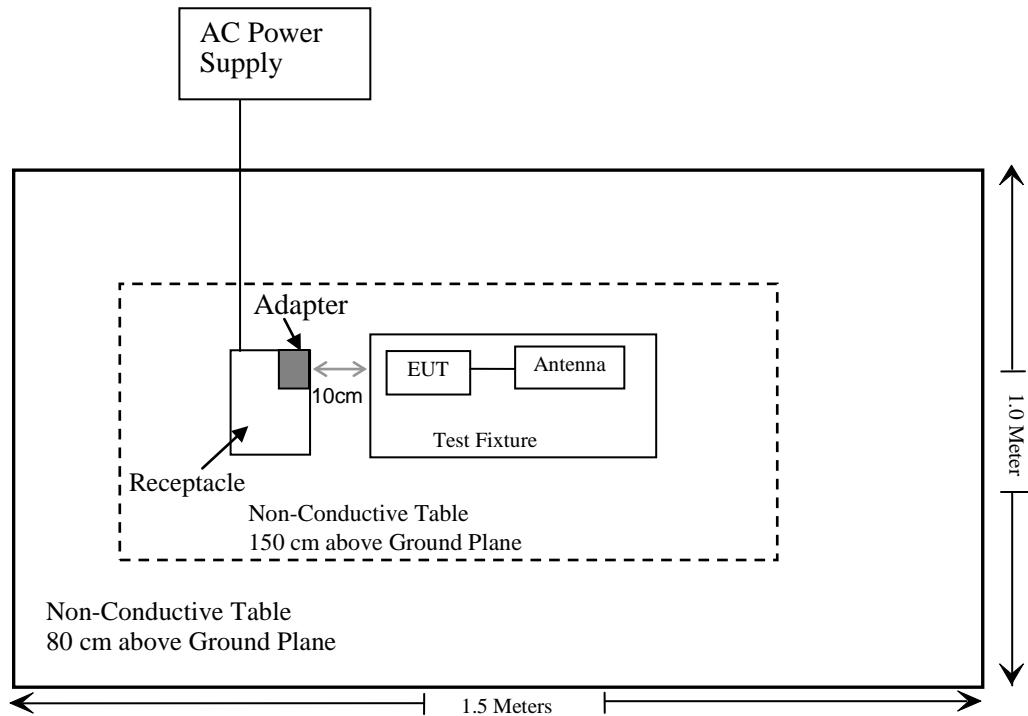
For conducted emission:



For radiated emission below 1G:



For radiated emission above 1G:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliance
FCC §15.203	Antenna Requirement	Compliance
FCC §15.207(a)	AC Line Conducted Emissions	Compliance
FCC §15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
FCC §15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliance
FCC §15.247(b)(3)	Maximum Conducted Output Power	Compliance
FCC §15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
FCC §15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50Ω Coaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Radiated Emissions Test					
Rohde&Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/07/08	2022/07/07
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Quinstar	Amplifier	QLW-1840553 6-J0	15964001002	2020/11/28	2021/11/27
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/04	2023/01/03
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.4	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.6	2020/12/25	2021/12/24
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2020/12/24	2021/12/23
Unknown	RF Coaxial Cable	No.32	RF-02	Each time	

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**Applicable Standard**

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result**Calculated Formulary:**

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
923.3-927.5	1.0	1.26	15	31.62	20	0.008	0.61

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Pass

FCC §15.203- ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a unique antenna port arrangement for LoRa, which was employed the antenna maximum gain is 1dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Type	Antenna Gain	Impedance
Dipole	1dBi	50 Ω

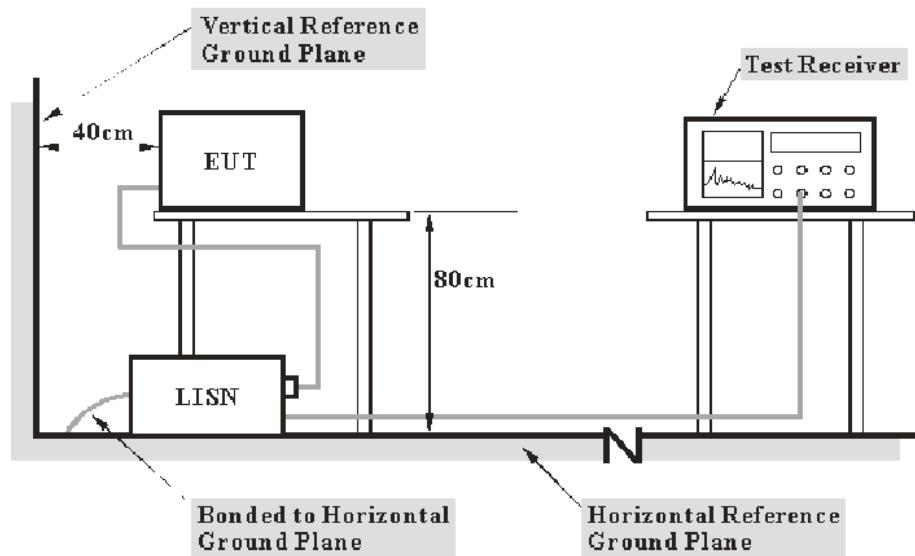
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Transd Factor} = \text{LISN VDF} + \text{Cable Loss}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{level}$$

$$\text{Level} = \text{reading level} + \text{Transd Factor}$$

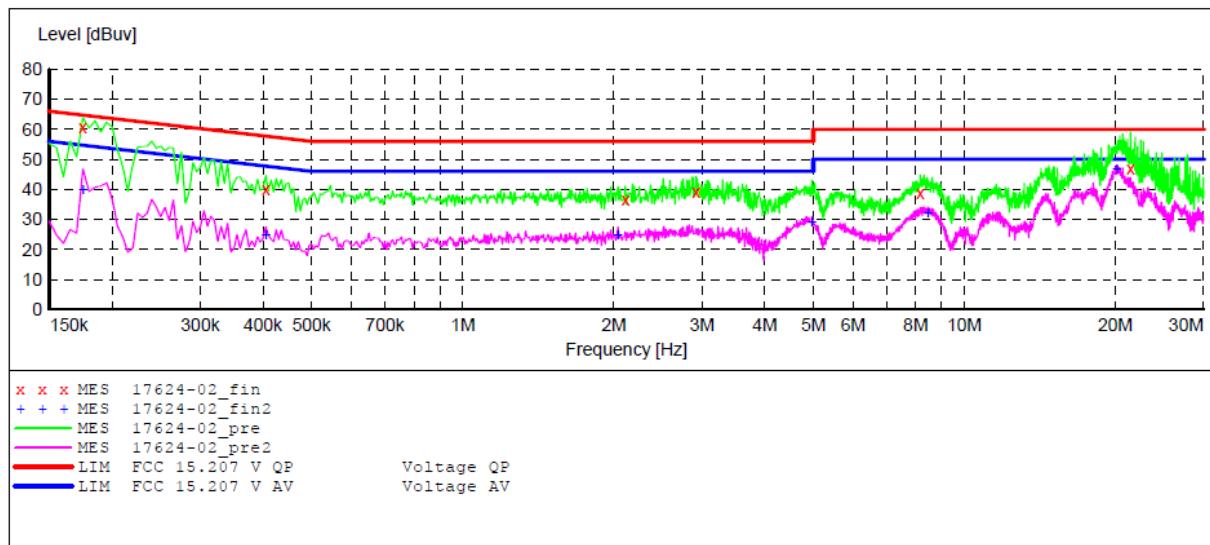
Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lü on 2021-08-13.

EUT operation mode: Transmitting (worst case for Low Channel)

AC 120V/60 Hz, Line**MEASUREMENT RESULT: "17624-02_fin"**

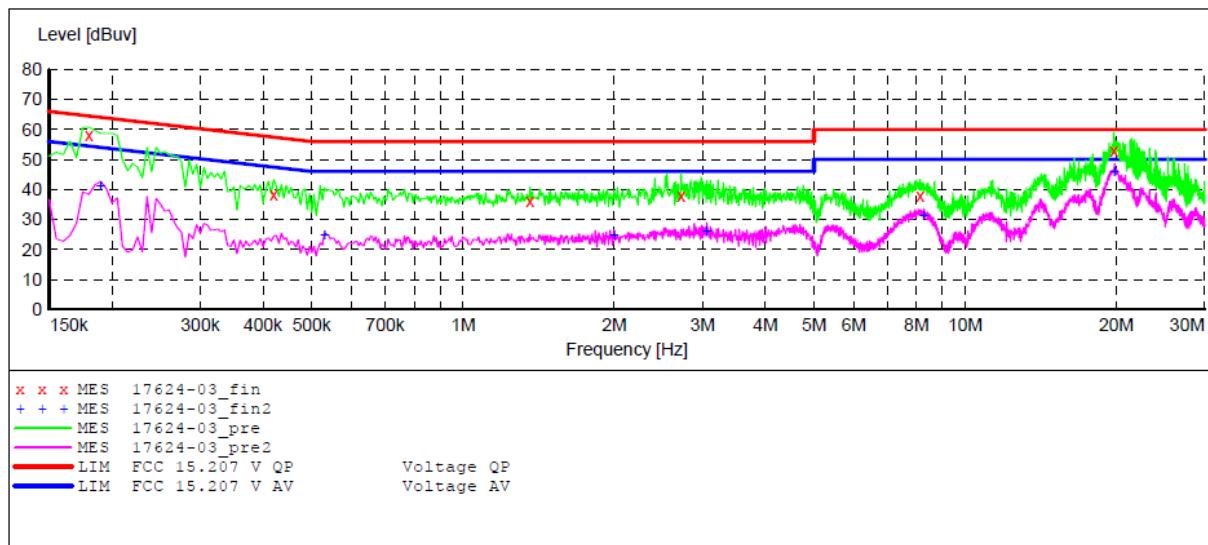
2021-8-13 03:38

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.175000	61.00	10.8	65	4.0	QP	L1	GND
0.405000	40.20	11.0	58	17.8	QP	L1	GND
2.110000	36.50	11.3	56	19.5	QP	L1	GND
2.920000	39.00	11.3	56	17.0	QP	L1	GND
8.170000	38.90	11.5	60	21.1	QP	L1	GND
21.450000	46.90	11.7	60	13.1	QP	L1	GND

MEASUREMENT RESULT: "17624-02_fin2"

2021-8-13 03:38

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.175000	40.10	10.8	55	14.9	AV	L1	GND
0.405000	24.90	11.0	48	23.1	AV	L1	GND
2.040000	25.10	11.3	46	20.9	AV	L1	GND
4.970000	29.10	11.4	46	16.9	AV	L1	GND
8.460000	32.50	11.5	50	17.5	AV	L1	GND
20.150000	46.80	11.7	50	3.2	AV	L1	GND

AC 120V/60 Hz, Neutral**MEASUREMENT RESULT: "17624-03_fin"**

2021-8-13 03:40

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.180000	58.30	10.8	65	6.7	QP	N	GND
0.420000	38.40	11.0	57	18.6	QP	N	GND
1.360000	36.20	11.2	56	19.8	QP	N	GND
2.720000	37.90	11.3	56	18.1	QP	N	GND
8.130000	37.80	11.5	60	22.2	QP	N	GND
19.775000	52.80	11.7	60	7.2	QP	N	GND

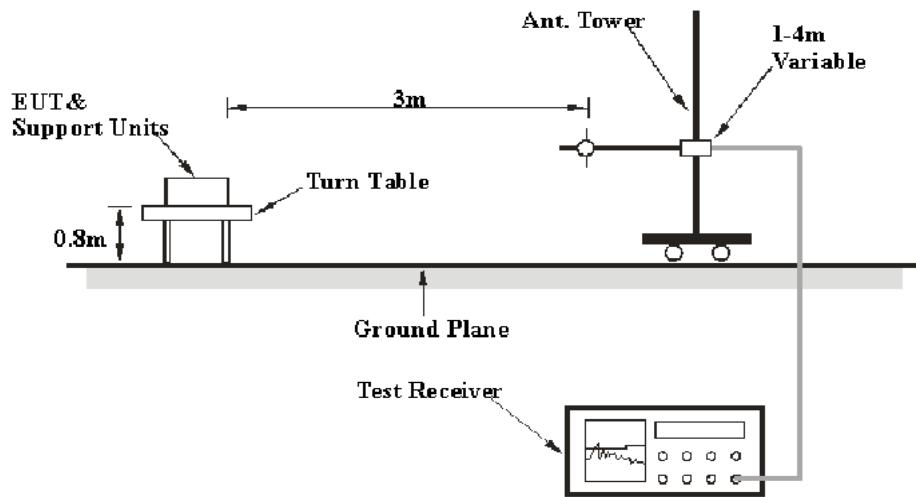
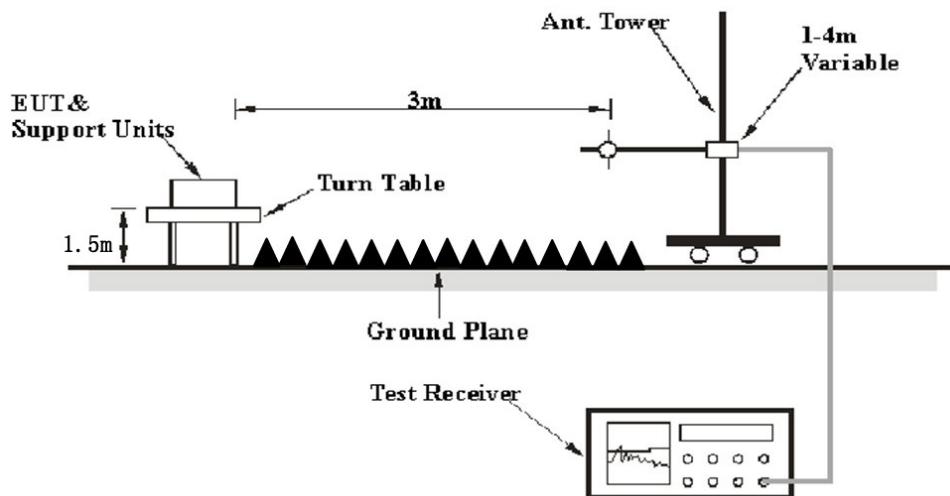
MEASUREMENT RESULT: "17624-03_fin2"

2021-8-13 03:40

Frequency MHz	Level dBuv	Transd dB	Limit dBuv	Margin dB	Detector	Line	PE
0.190000	41.40	10.8	54	12.6	AV	N	GND
0.530000	25.20	11.0	46	20.8	AV	N	GND
2.000000	25.10	11.3	46	20.9	AV	N	GND
3.060000	26.20	11.3	46	19.8	AV	N	GND
8.280000	31.30	11.5	50	18.7	AV	N	GND
19.850000	46.20	11.7	50	3.8	AV	N	GND

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

EUT Setup**Below 1 GHz:****Above 1GHz:**

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz ^{Note 1}	/	Average
	1MHz	>1/T ^{Note 2}	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Factor} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Result-Limit}$$

$$\text{Result} = \text{Reading} + \text{Factor}$$

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

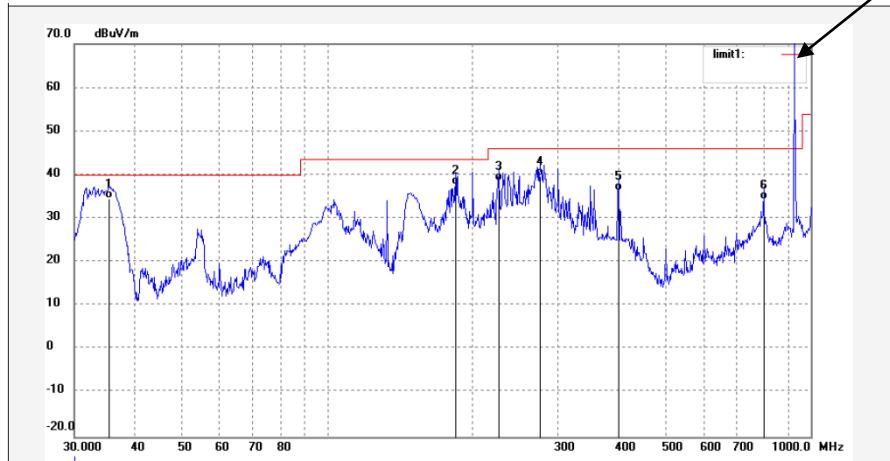
The testing was performed by Ting Lii on 2021-08-02.

EUT operation mode: Transmitting (Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Radiated spurious emissions:
Low Channel
30MHz-1GHz:

Fundamental

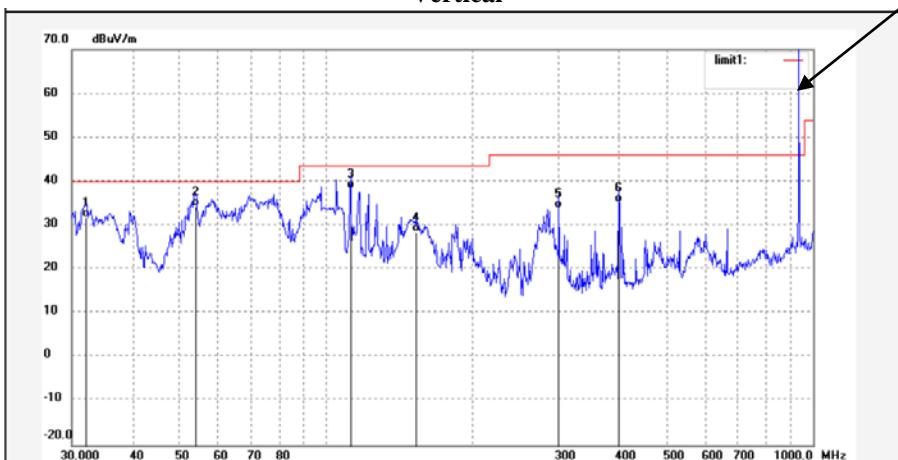
Horizontal



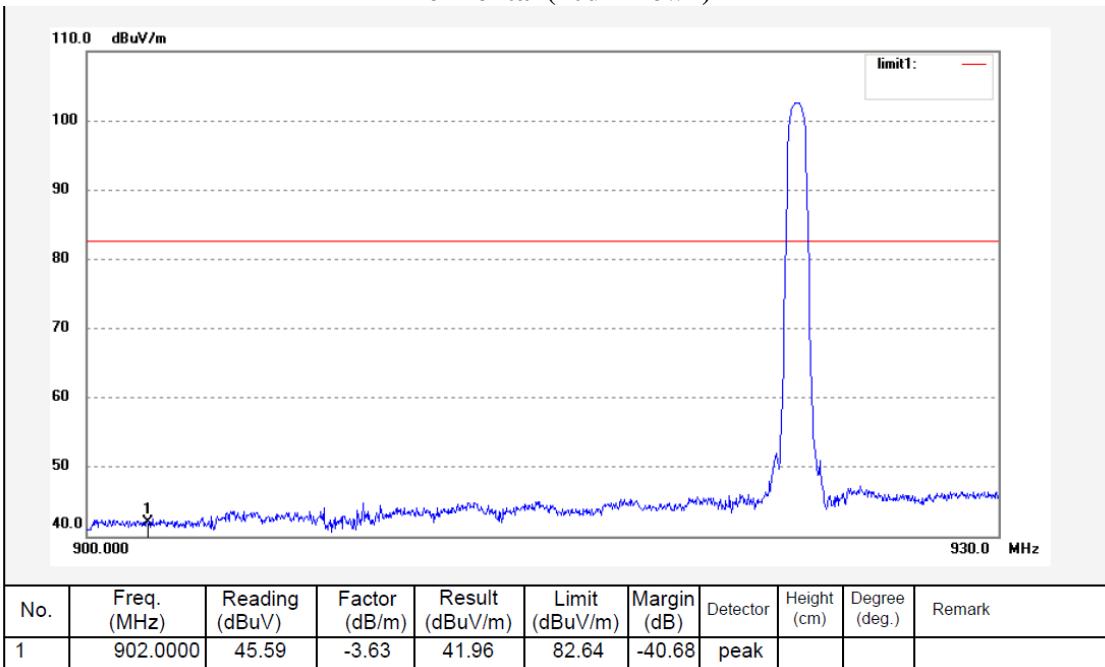
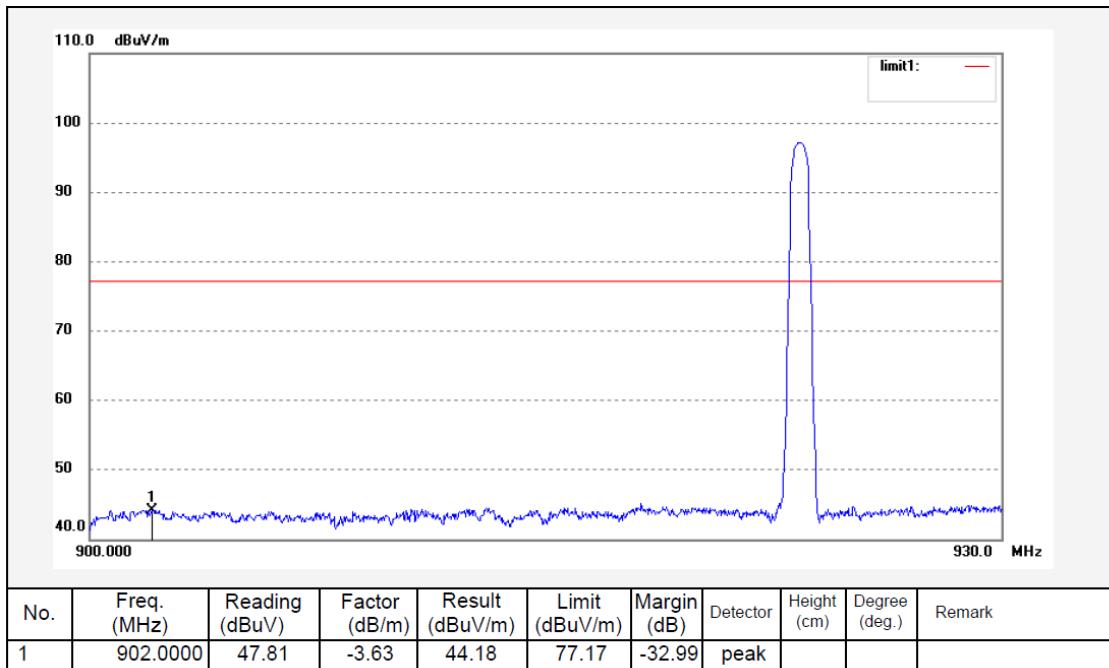
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.3750	49.62	-15.14	34.48	40.00	-5.52	QP			
2	184.4898	55.56	-17.88	37.68	43.50	-5.82	QP			
3	226.0994	55.46	-16.85	38.61	46.00	-7.39	QP			
4	275.1569	55.20	-15.43	39.77	46.00	-6.23	QP			
5	400.4318	48.73	-12.41	36.32	46.00	-9.68	QP			
6	798.9796	39.82	-5.48	34.34	46.00	-11.66	QP			

Vertical

Fundamental

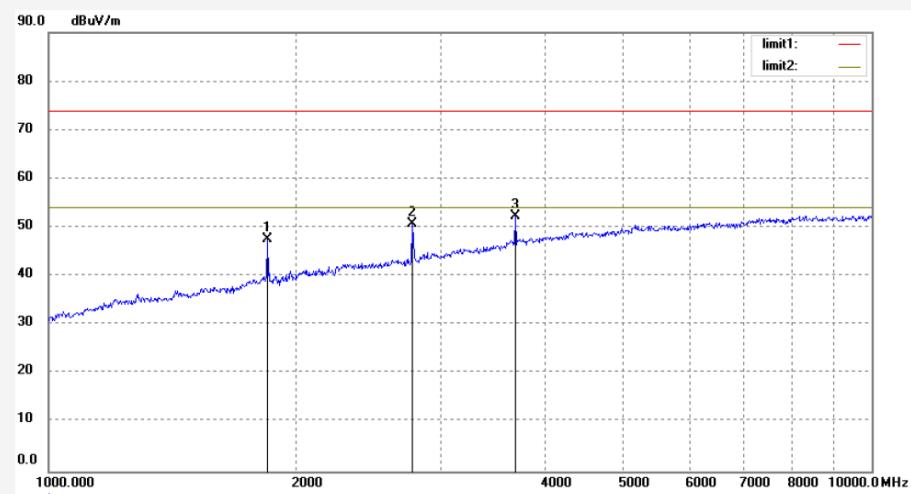


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.0867	46.00	-14.17	31.83	40.00	-8.17	QP			
2	53.8818	51.85	-17.59	34.26	40.00	-5.74	QP			
3	112.1305	57.03	-18.54	38.49	43.50	-5.01	QP			
4	152.6641	48.60	-20.03	28.57	43.50	-14.93	QP			
5	300.3672	48.43	-14.53	33.90	46.00	-12.10	QP			
6	399.0302	47.62	-12.47	35.15	46.00	-10.85	QP			

Horizontal (20dB Down)**Vertical (20dB Down)**

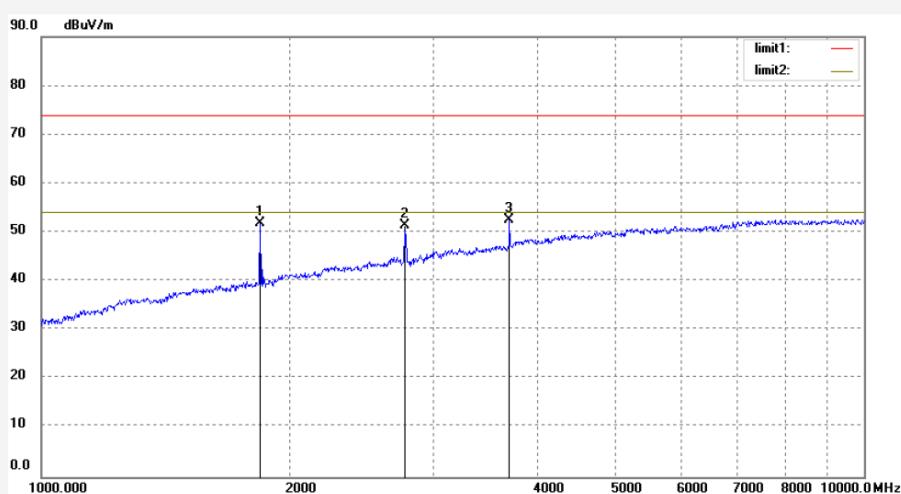
1-10GHz:

Horizontal



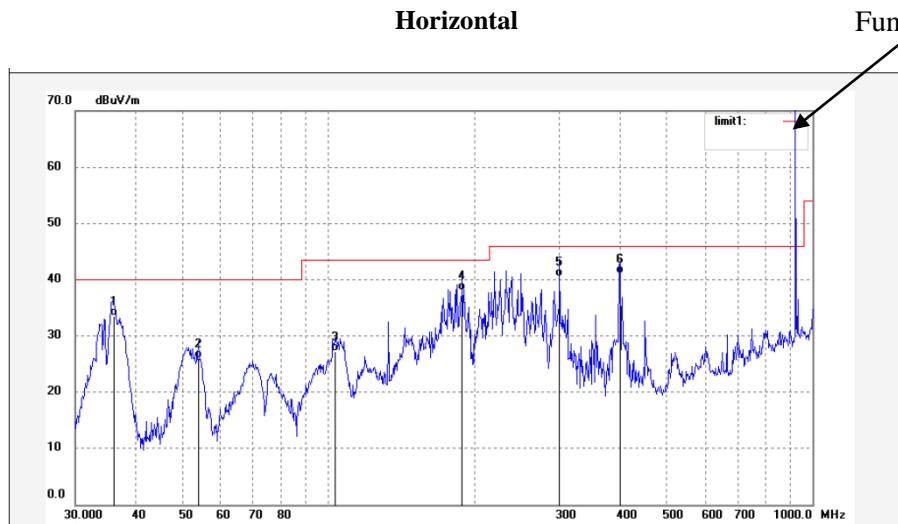
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1846.620	56.87	-9.21	47.66	74.00	-26.34	peak			
2	2769.930	55.49	-4.68	50.81	74.00	-23.19	peak			
3	3693.260	51.29	1.08	52.37	74.00	-21.63	peak			

Vertical

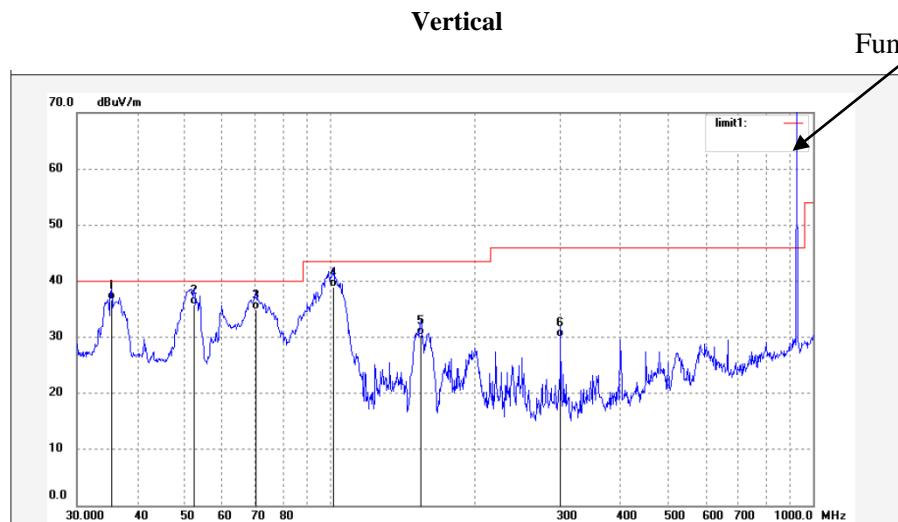


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1846.620	61.13	-9.21	51.92	74.00	-22.08	peak			
2	2769.930	56.06	-4.68	51.38	74.00	-22.62	peak			
3	3693.260	51.45	1.17	52.62	74.00	-21.38	peak			

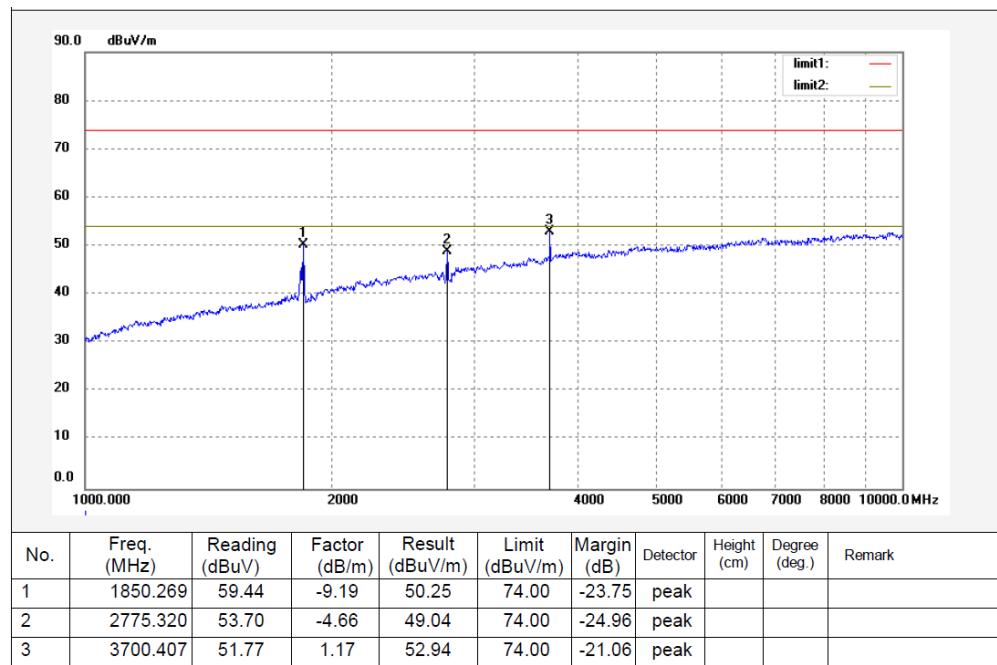
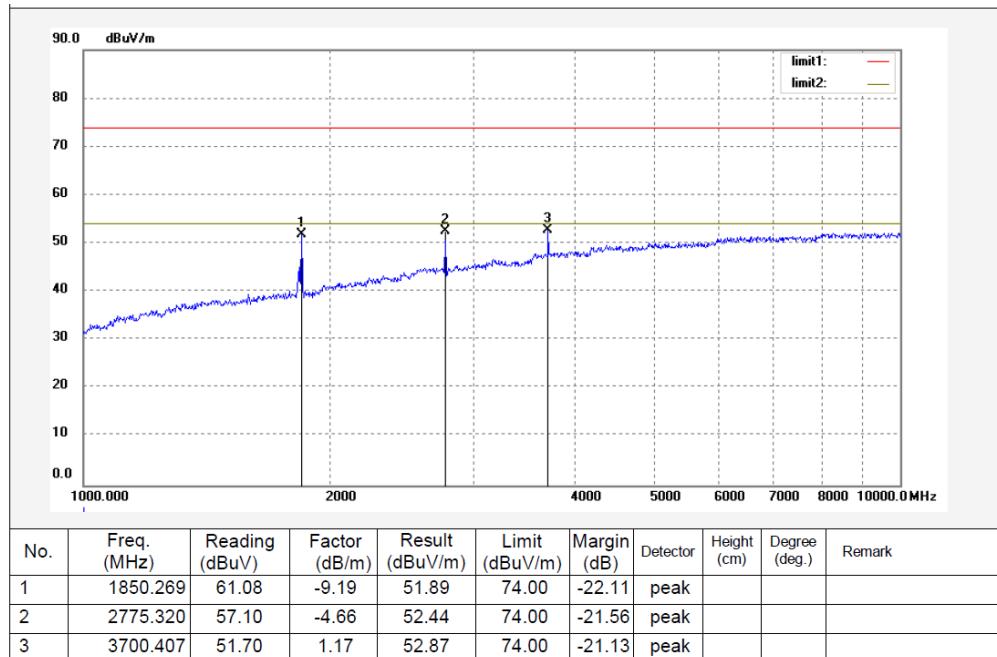
Middle Channel
30MHz-1GHz:



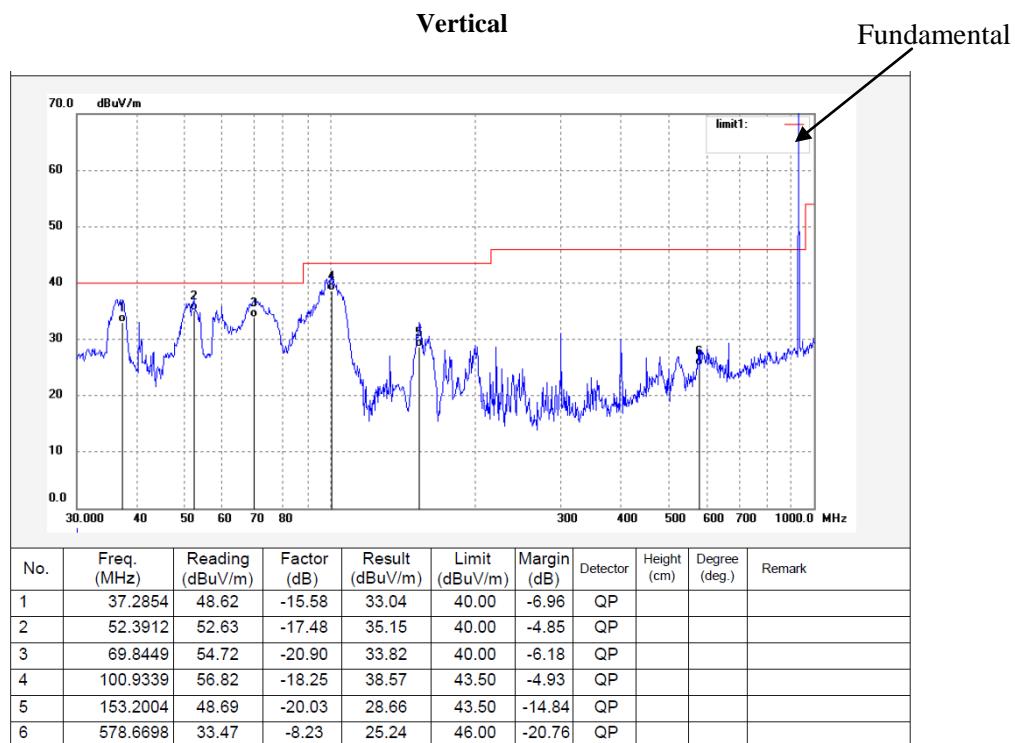
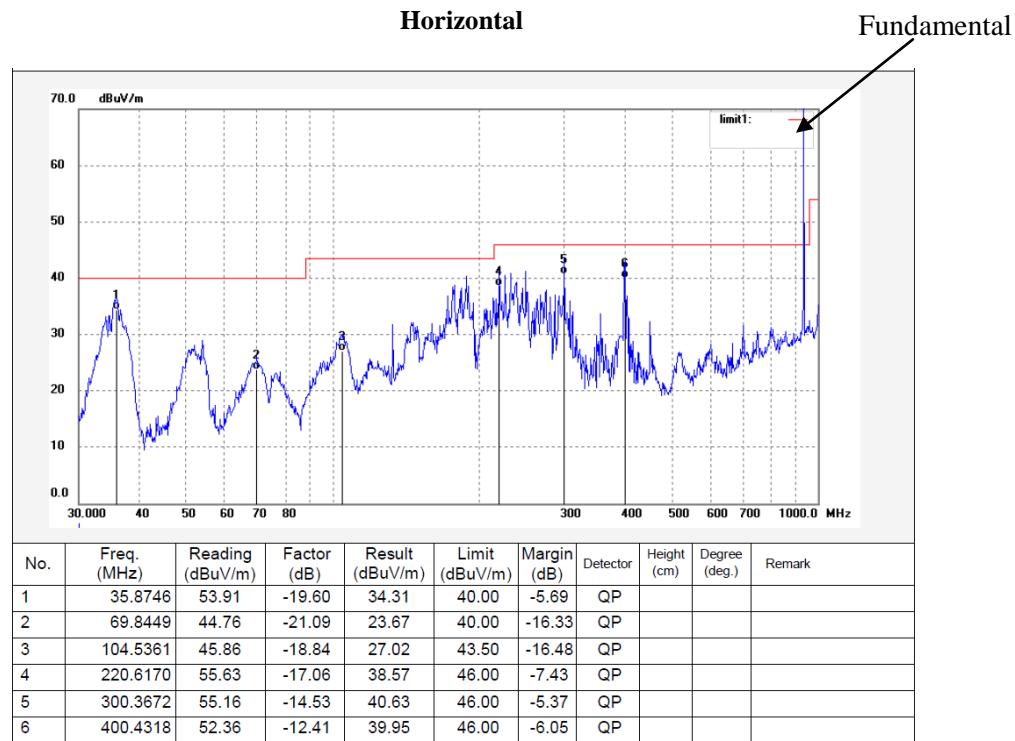
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	36.0007	53.13	-19.56	33.57	40.00	-6.43	QP			
2	53.8817	43.26	-17.33	25.93	40.00	-14.07	QP			
3	103.4419	45.86	-18.67	27.19	43.50	-16.31	QP			
4	189.0742	55.78	-17.78	38.00	43.50	-5.50	QP			
5	300.3672	55.11	-14.53	40.58	46.00	-5.42	QP			
6	400.4318	53.37	-12.41	40.96	46.00	-5.04	QP			

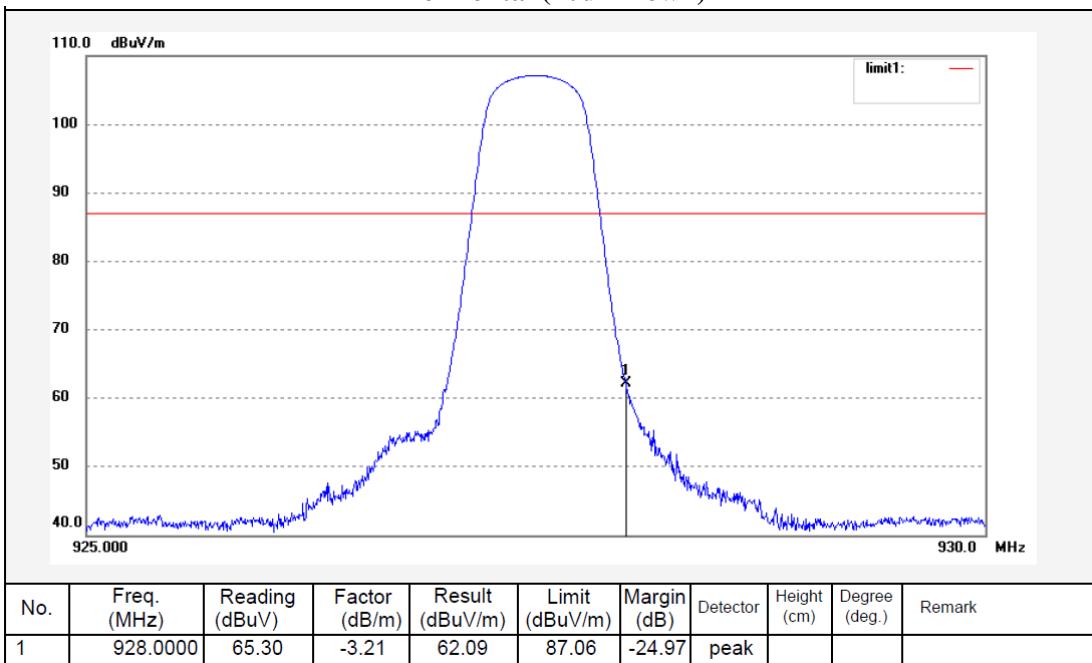
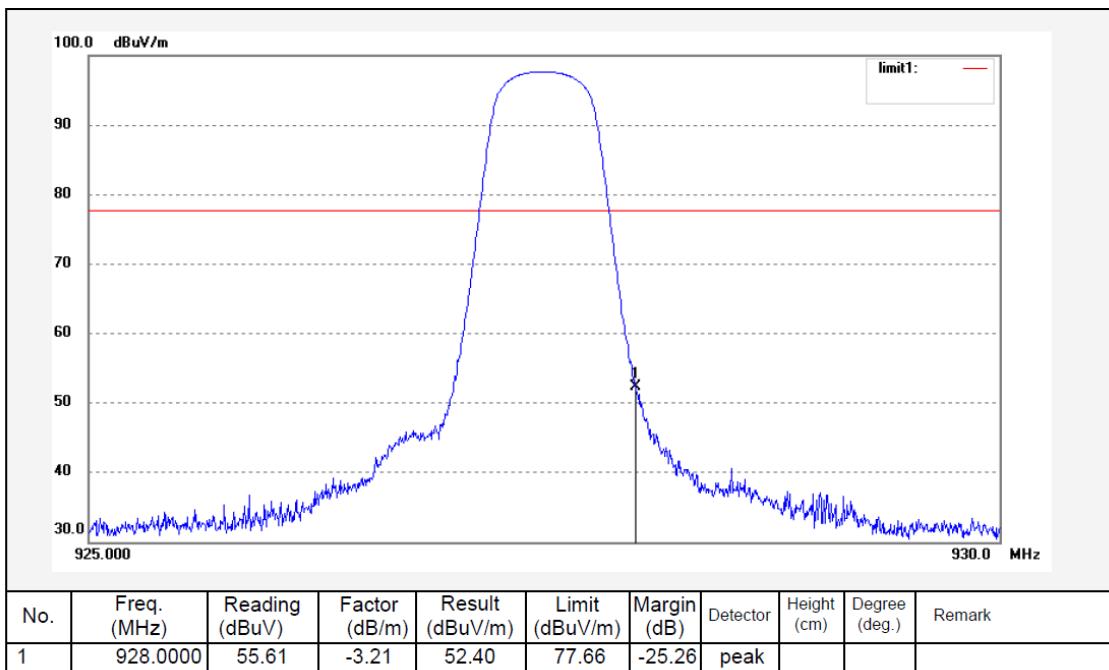


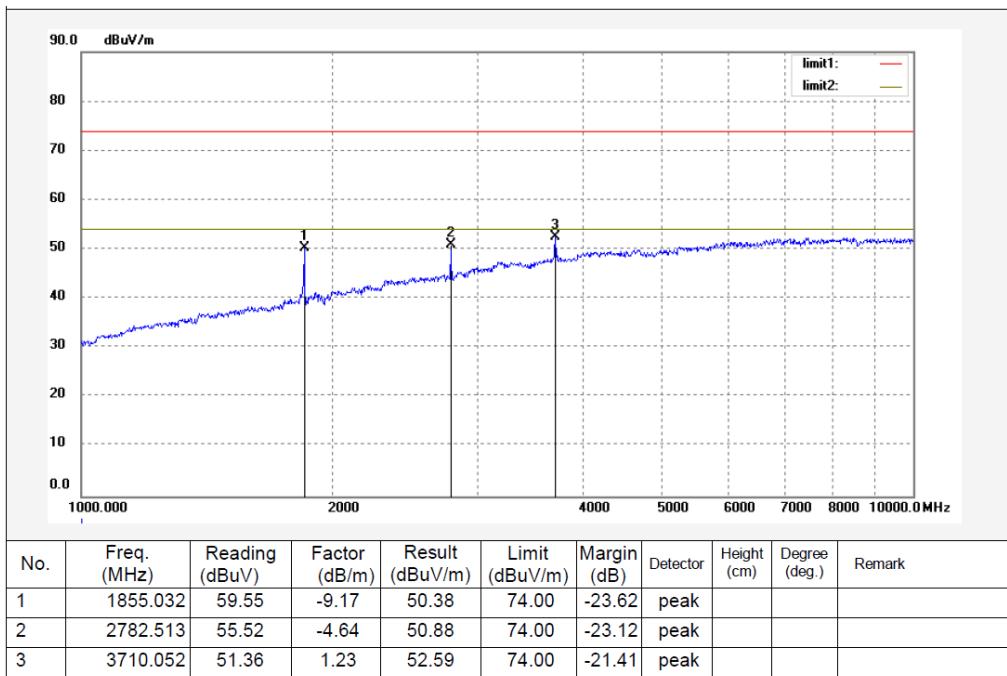
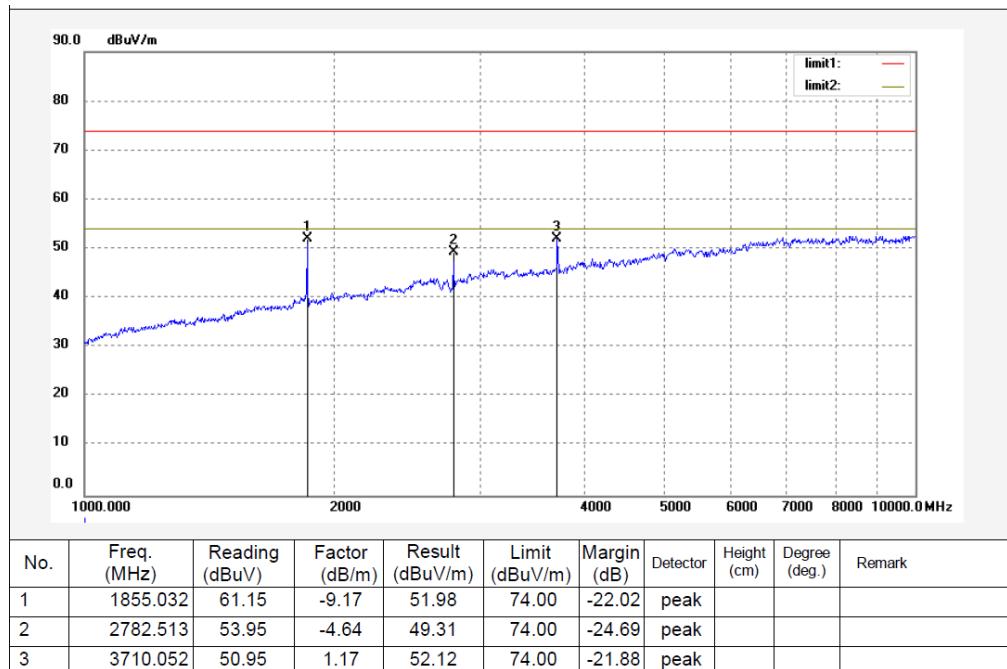
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	35.3750	51.83	-15.14	36.69	40.00	-3.31	QP			
2	52.3912	53.26	-17.48	35.78	40.00	-4.22	QP			
3	70.0901	55.82	-20.92	34.90	40.00	-5.10	QP			
4	102.0014	57.41	-18.43	38.98	43.50	-4.52	QP			
5	154.2786	50.36	-20.03	30.33	43.50	-13.17	QP			
6	300.3672	44.53	-14.53	30.00	46.00	-16.00	QP			

1-10GHz:**Horizontal****Vertical**

**High Channel
30MHz-1GHz:**

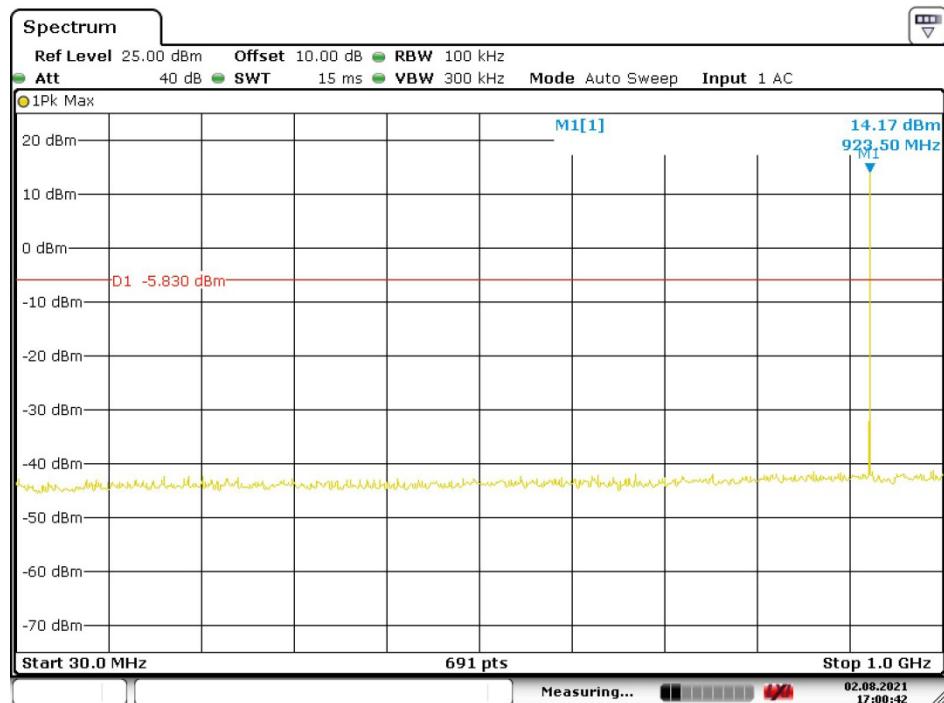


Horizontal (20dB Down)**Vertical (20dB Down)**

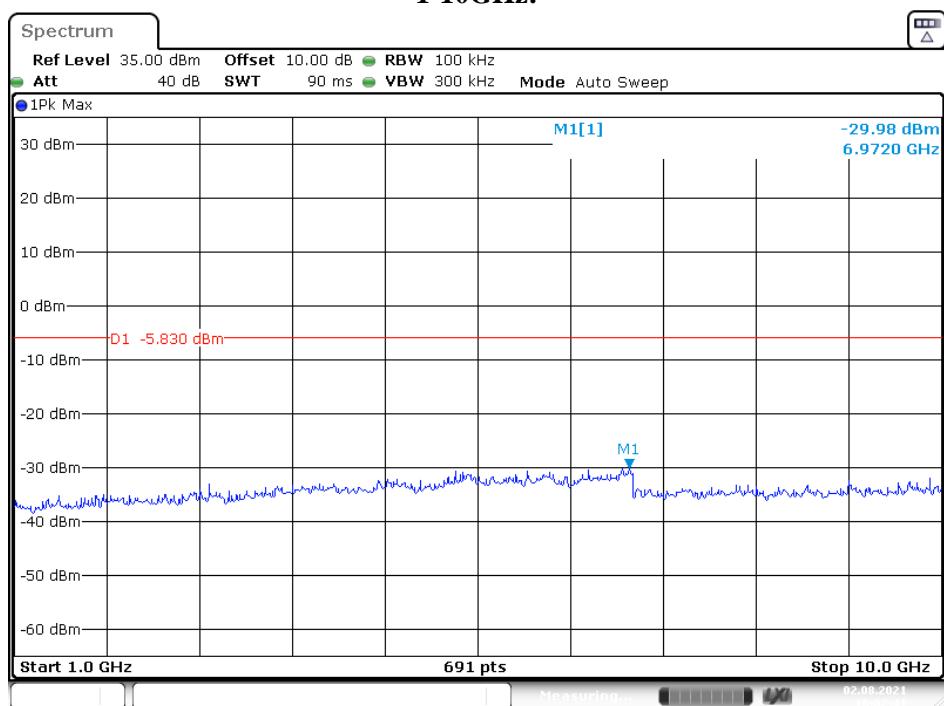
1-10GHz:**Horizontal****Vertical**

Note: All spurious emissions are compliant to the limit.

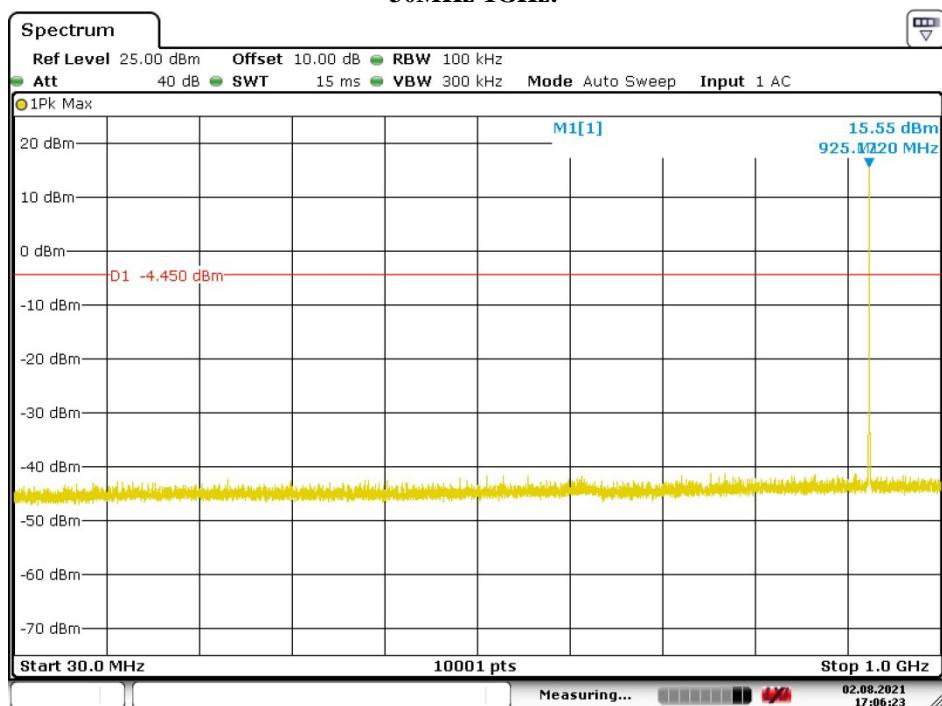
For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

Conducted spurious emissions:**Low Channel:****30MHz-1GHz:**

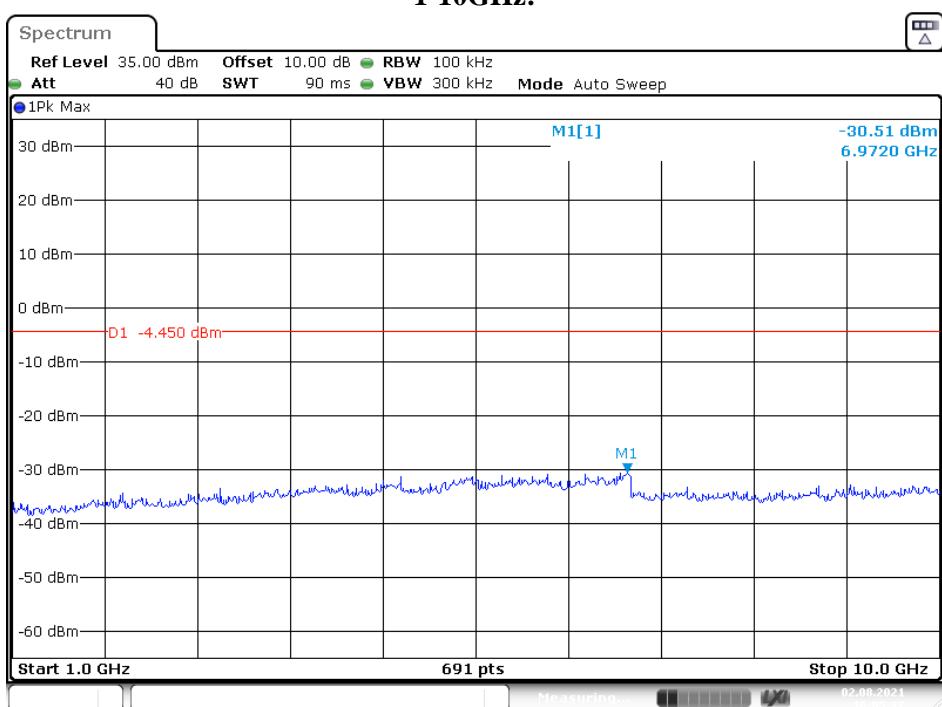
Date: 2.AUG.2021 17:00:42

1-10GHz:

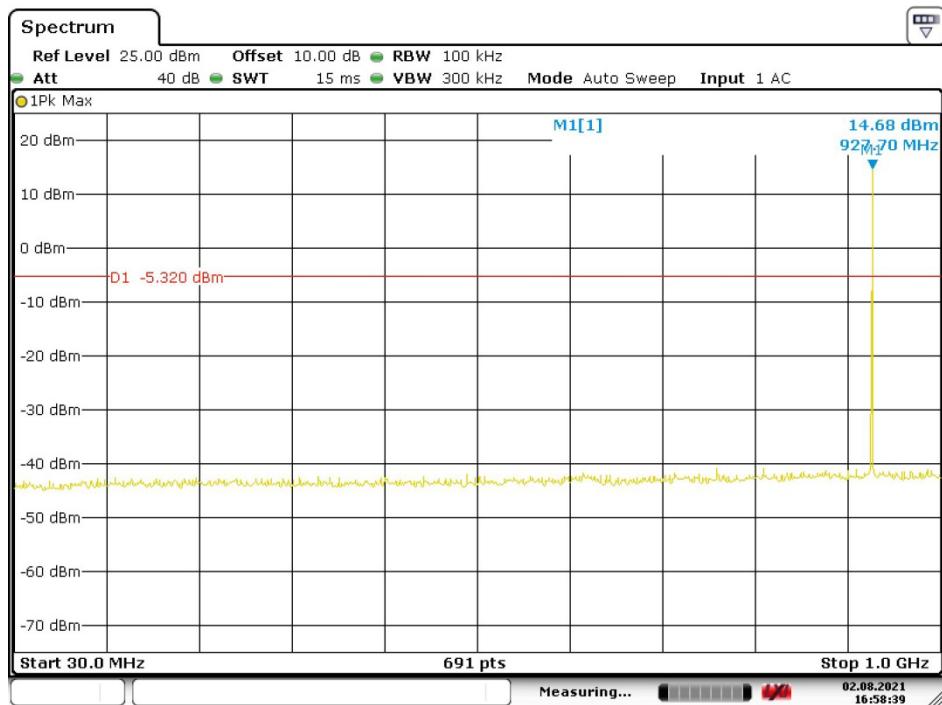
Date: 2.AUG.2021 16:02:42

Middle Channel:**30MHz-1GHz:**

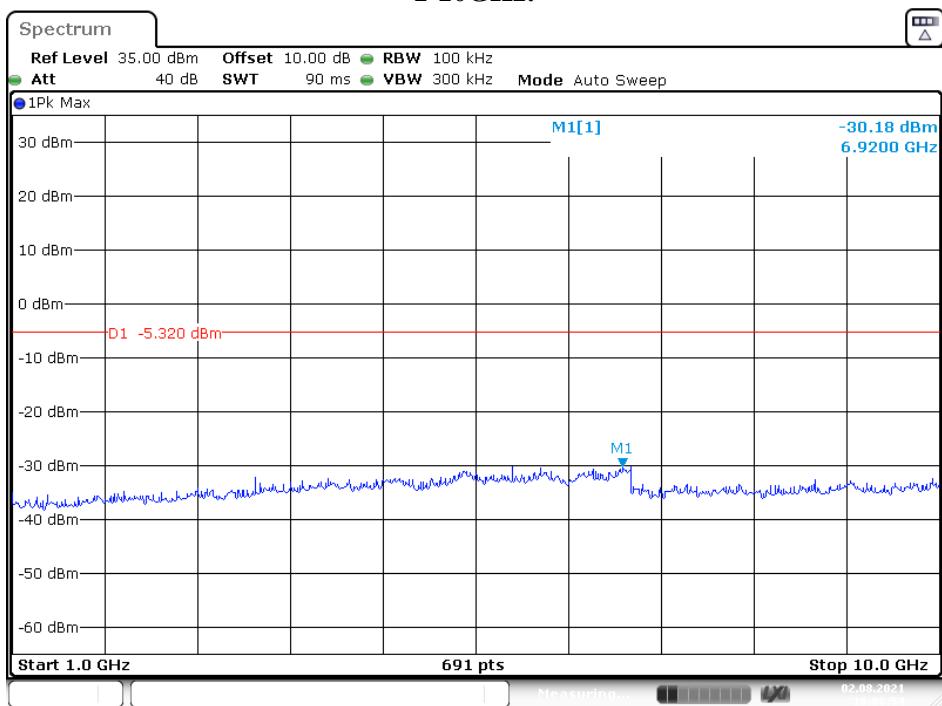
Date: 2.AUG.2021 17:06:23

1-10GHz:

Date: 2.AUG.2021 16:05:18

High Channel:**30MHz-1GHz:**

Date: 2.AUG.2021 16:58:39

1-10GHz:

Date: 2.AUG.2021 16:06:55

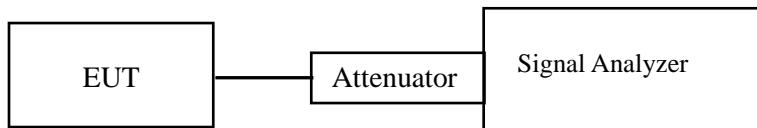
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lii on 2021-08-13.

EUT operation mode: Transmitting

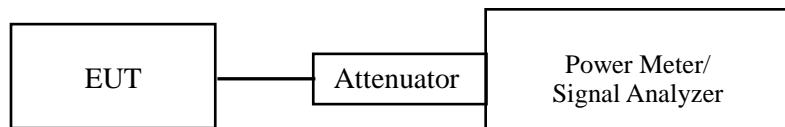
Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER**Applicable Standard**

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lii on 2021-08-02.

EUT operation mode: Transmitting

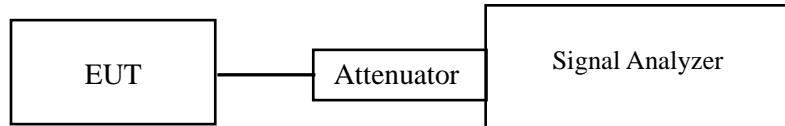
Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lii on 2021-08-02 and 2021-08-13

EUT operation mode: Transmitting

Test Result: Compliant.

Conducted Band Edge Result:

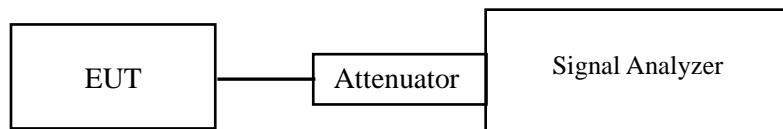
Please refer to the Appendix.

FCC §15.247(e) - POWER SPECTRAL DENSITY**Applicable Standard**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lü on 2021-08-13.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

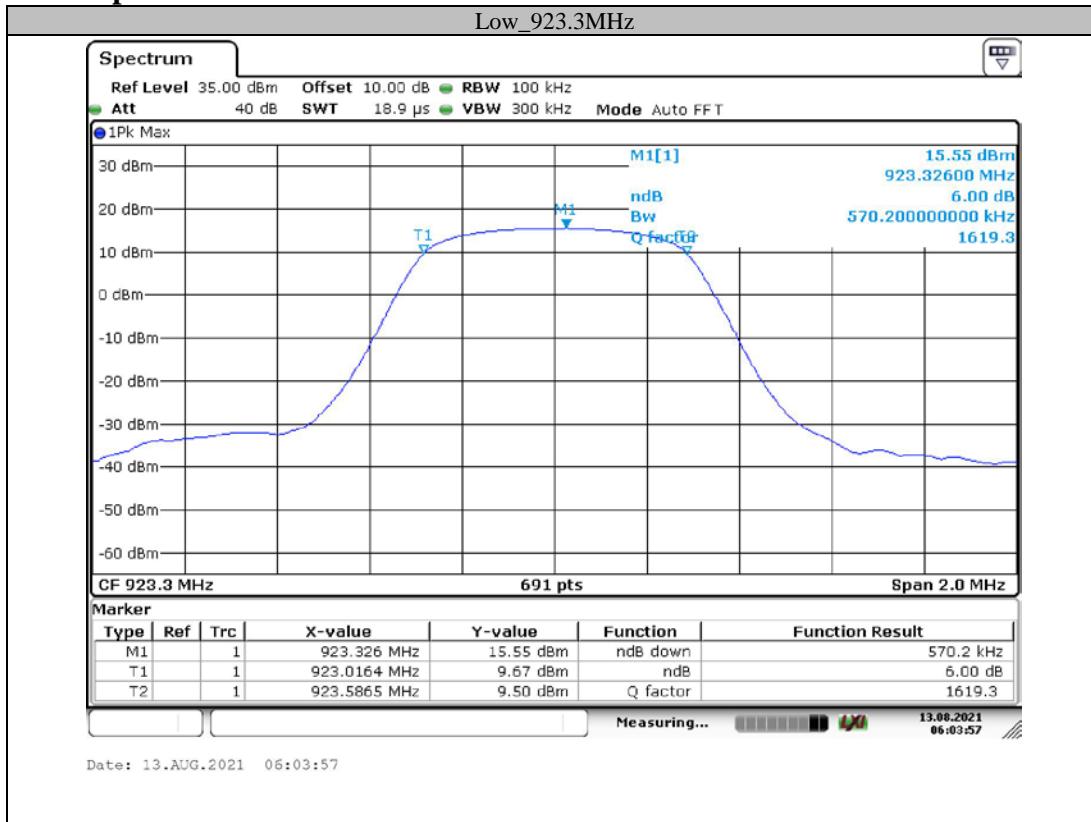
APPENDIX

Appendix A: 6dB Emission Bandwidth

Test Result

Channel [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
923.3	0.570	0.5	PASS
925.1	0.576	0.5	PASS
927.5	0.573	0.5	PASS

Test Graphs



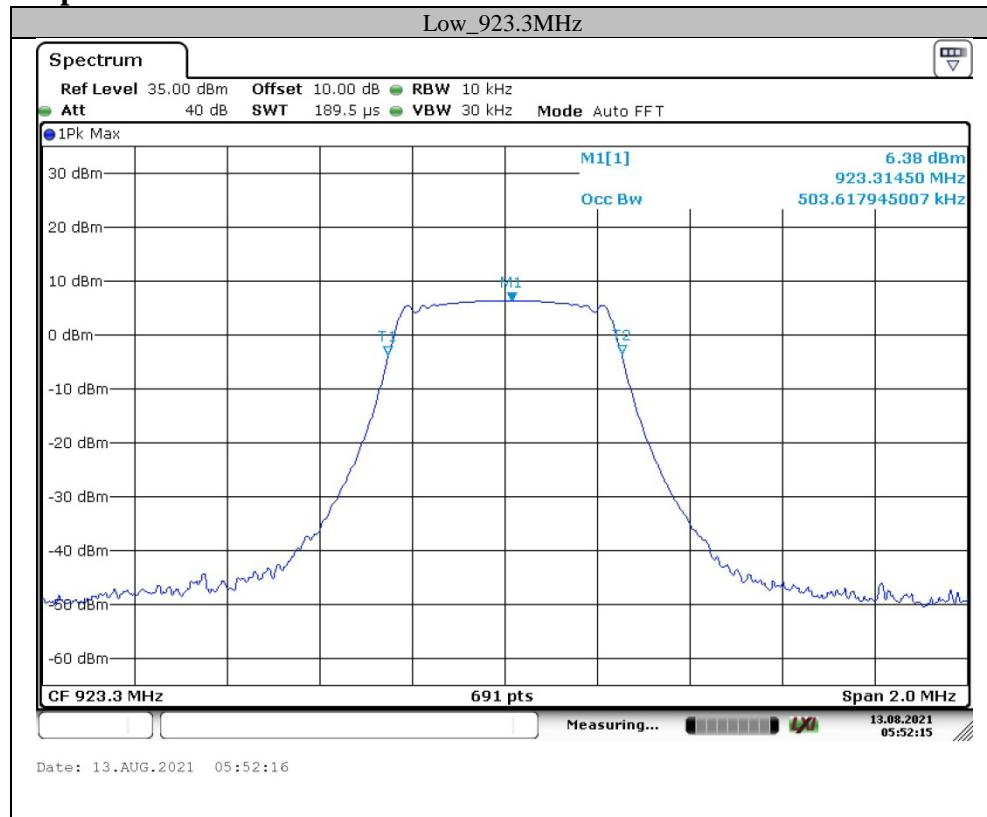


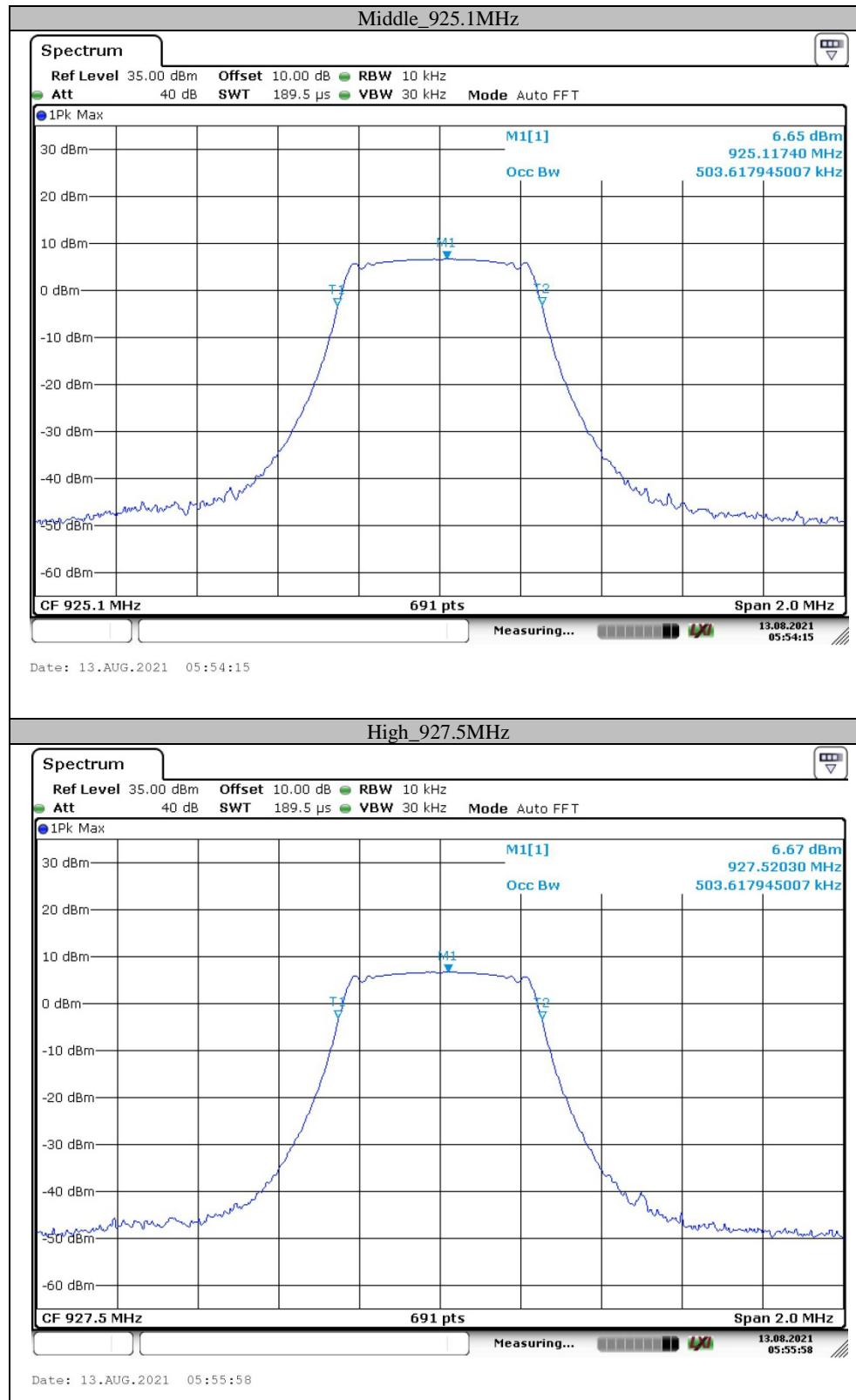
Appendix B: Occupied Channel Bandwidth

Test Result

Channel [MHz]	OCB [MHz]	Limit[dBm]	Verdict
923.3	0.504	---	PASS
925.1	0.504	---	PASS
927.5	0.504	---	PASS

Test Graphs





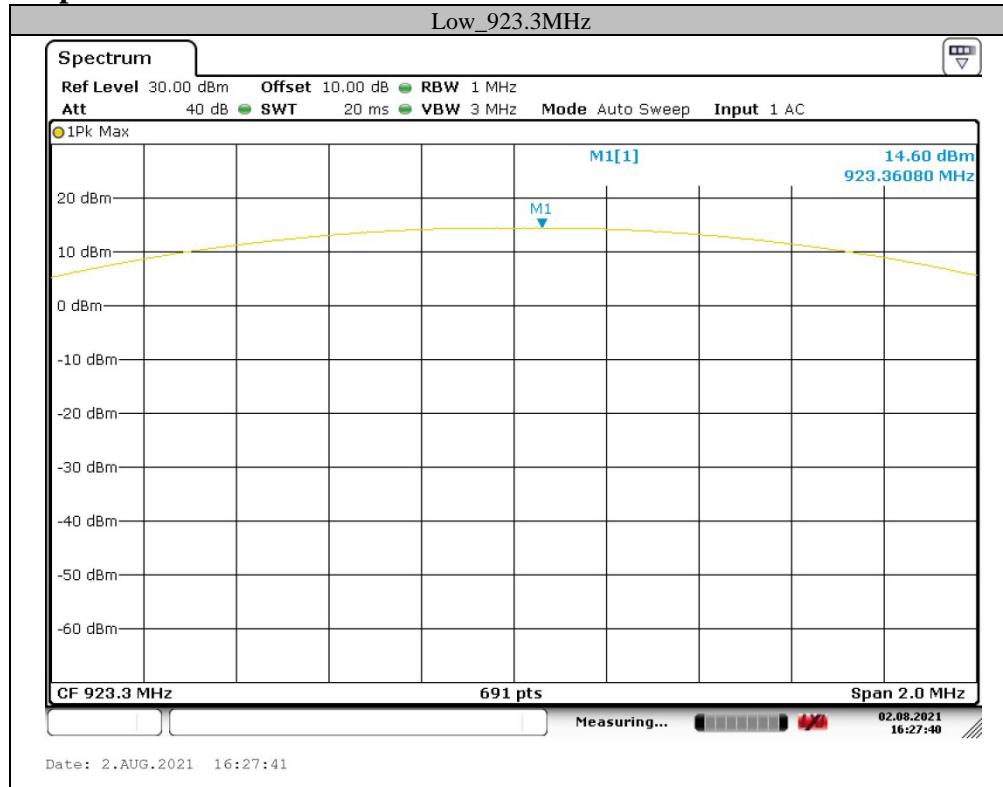
Appendix C: Maximum conducted Peak output power

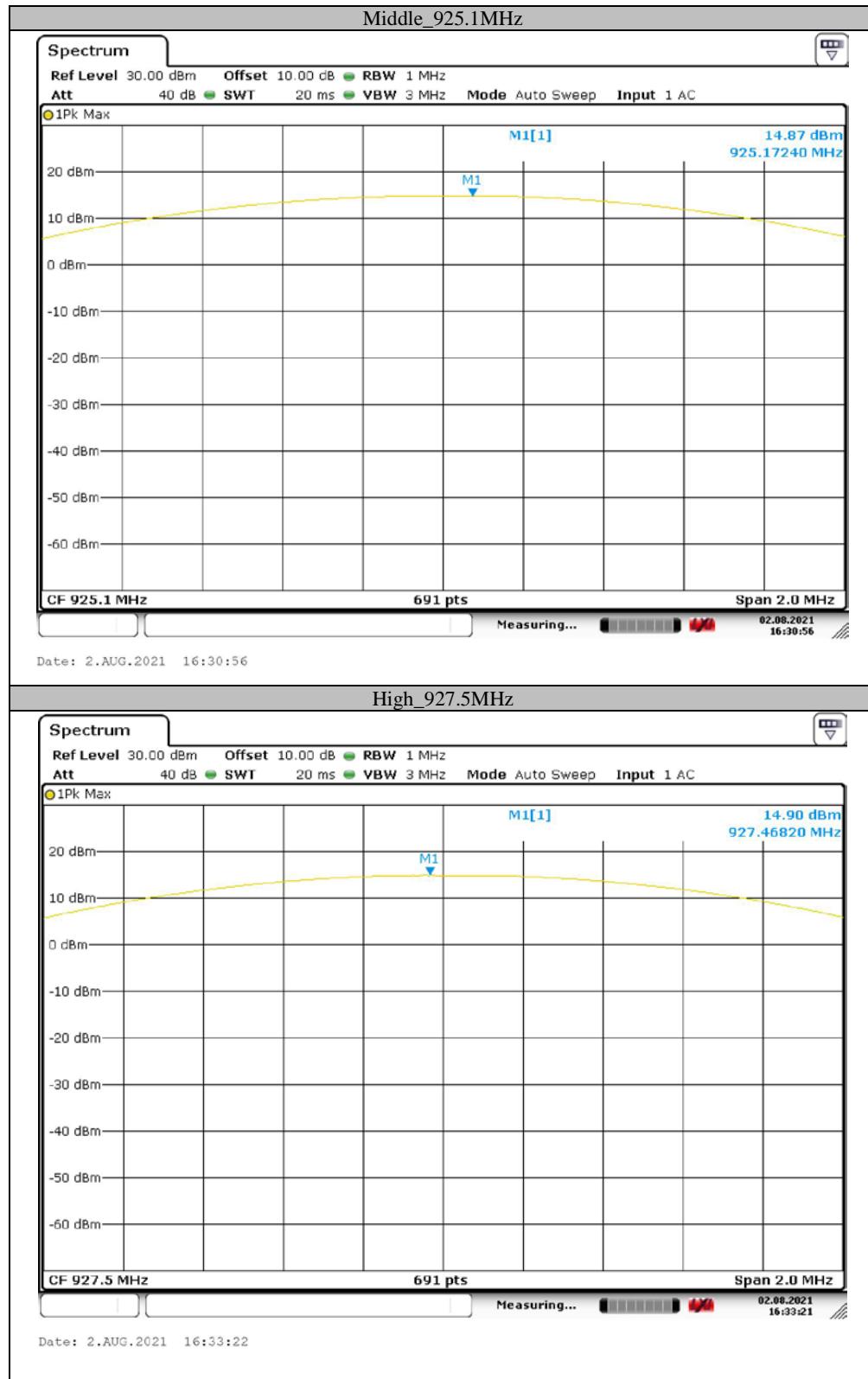
Test Result

Channel [MHz]	Result [dBm]	Limit[dBm]	Verdict
923.3	14.60	<=30	PASS
925.1	14.87	<=30	PASS
927.5	14.90	<=30	PASS

Note: The maximum antenna gain is 1dBi.

Test Graphs



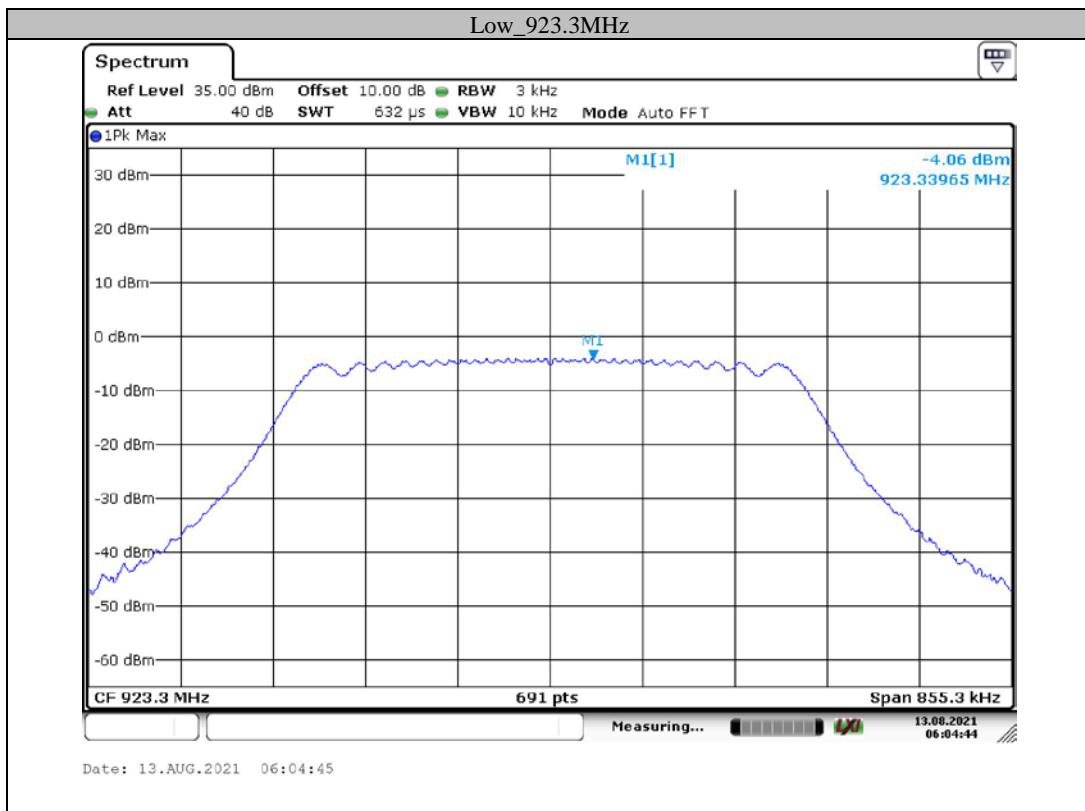


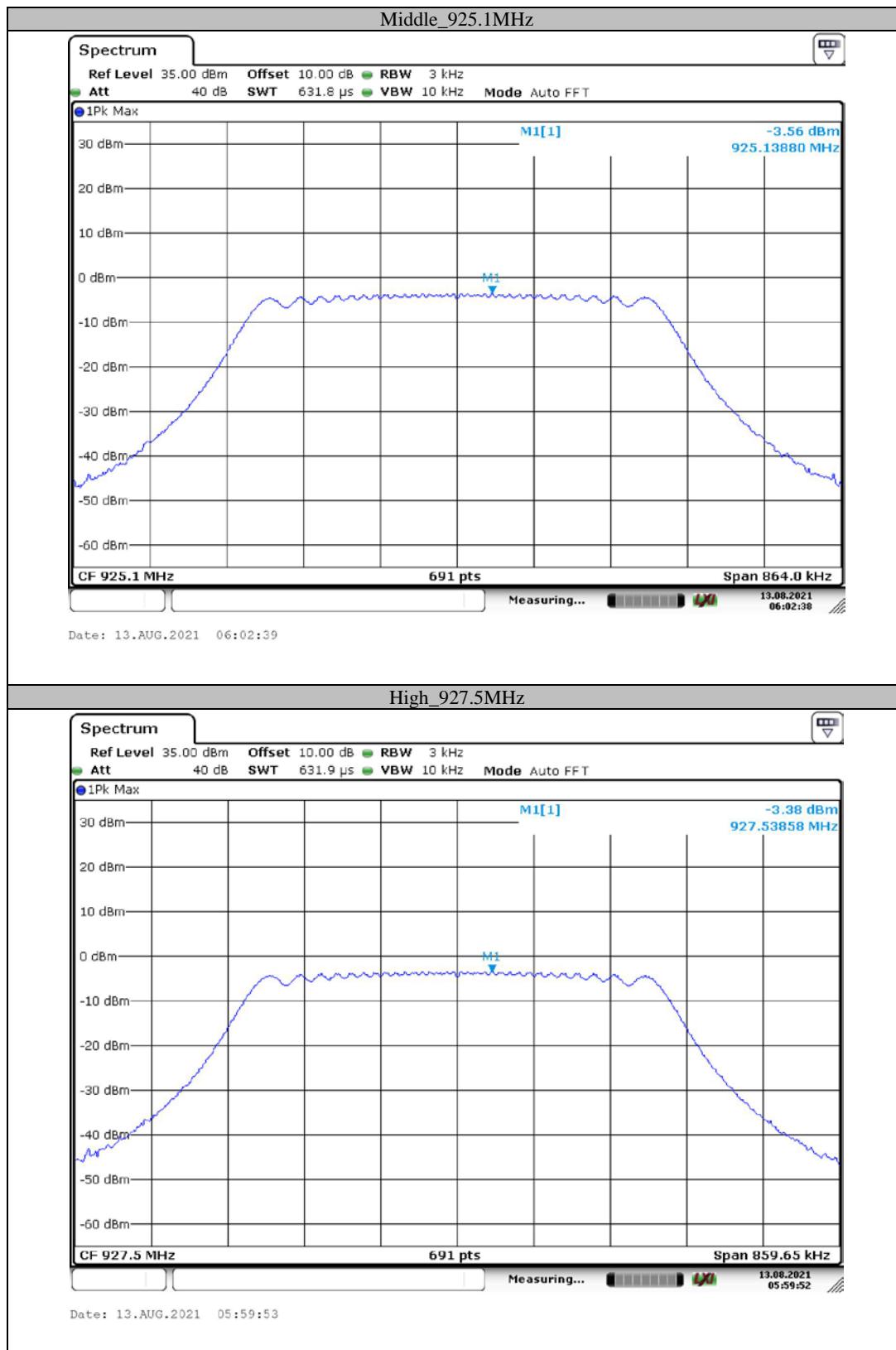
Appendix D: Power spectral density

Test Result

Channel[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
923.3	-4.06	<=8	PASS
925.1	-3.56	<=8	PASS
927.5	-3.38	<=8	PASS

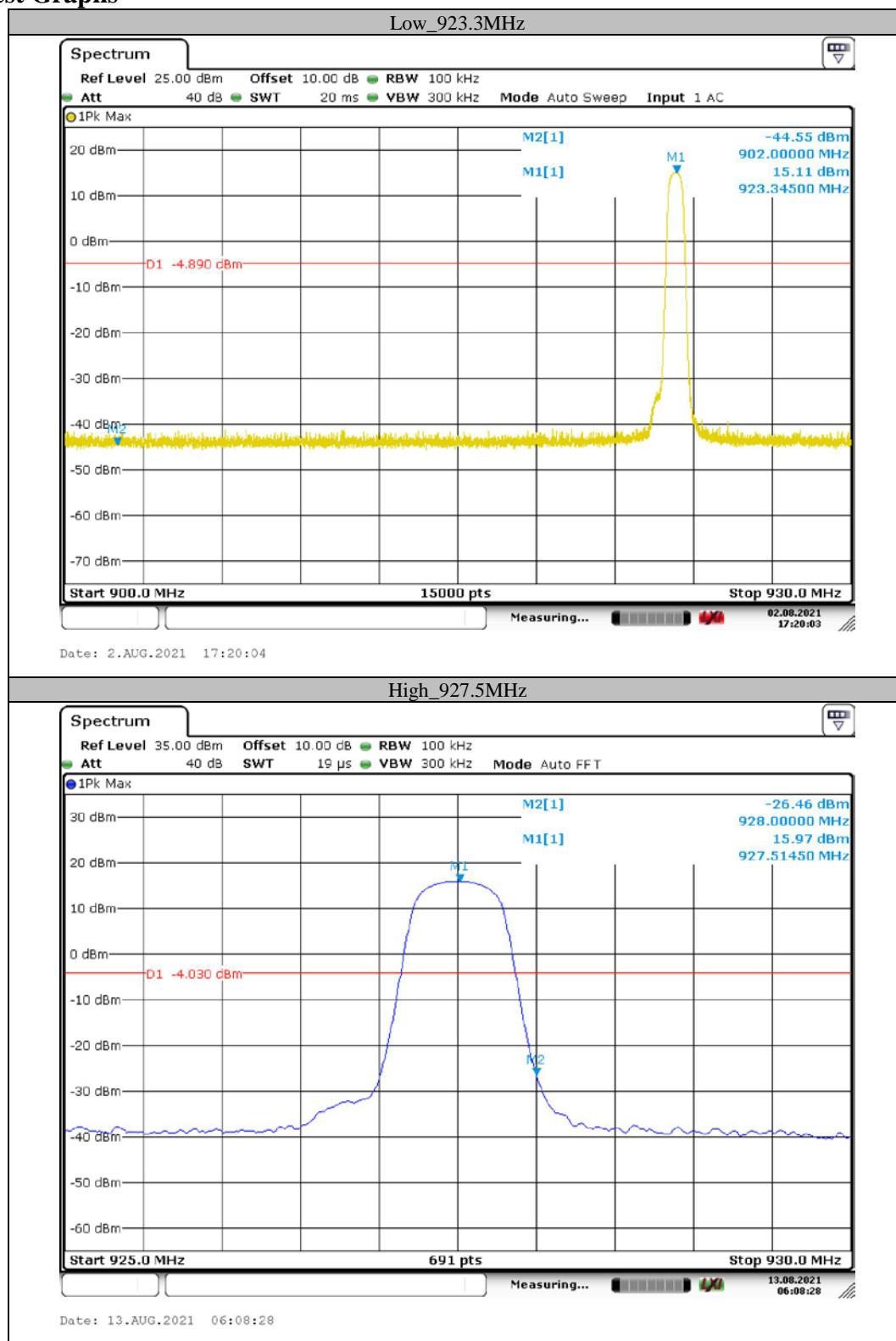
Test Graphs





Appendix E: Band edge measurements

Test Graphs

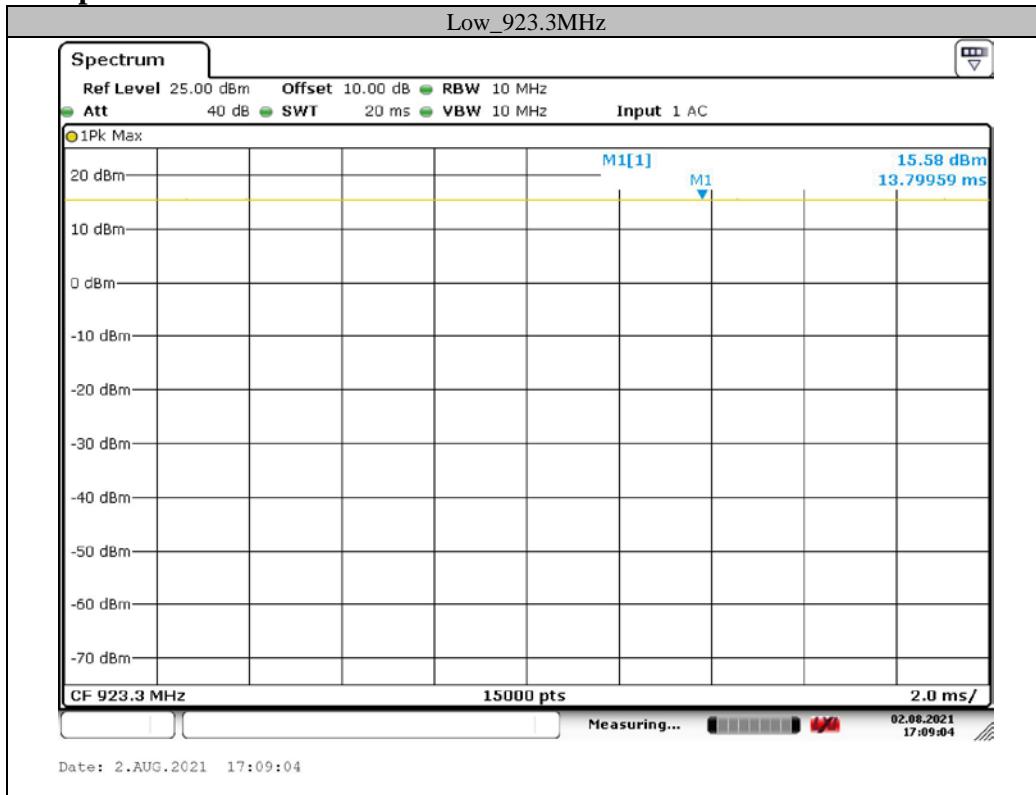


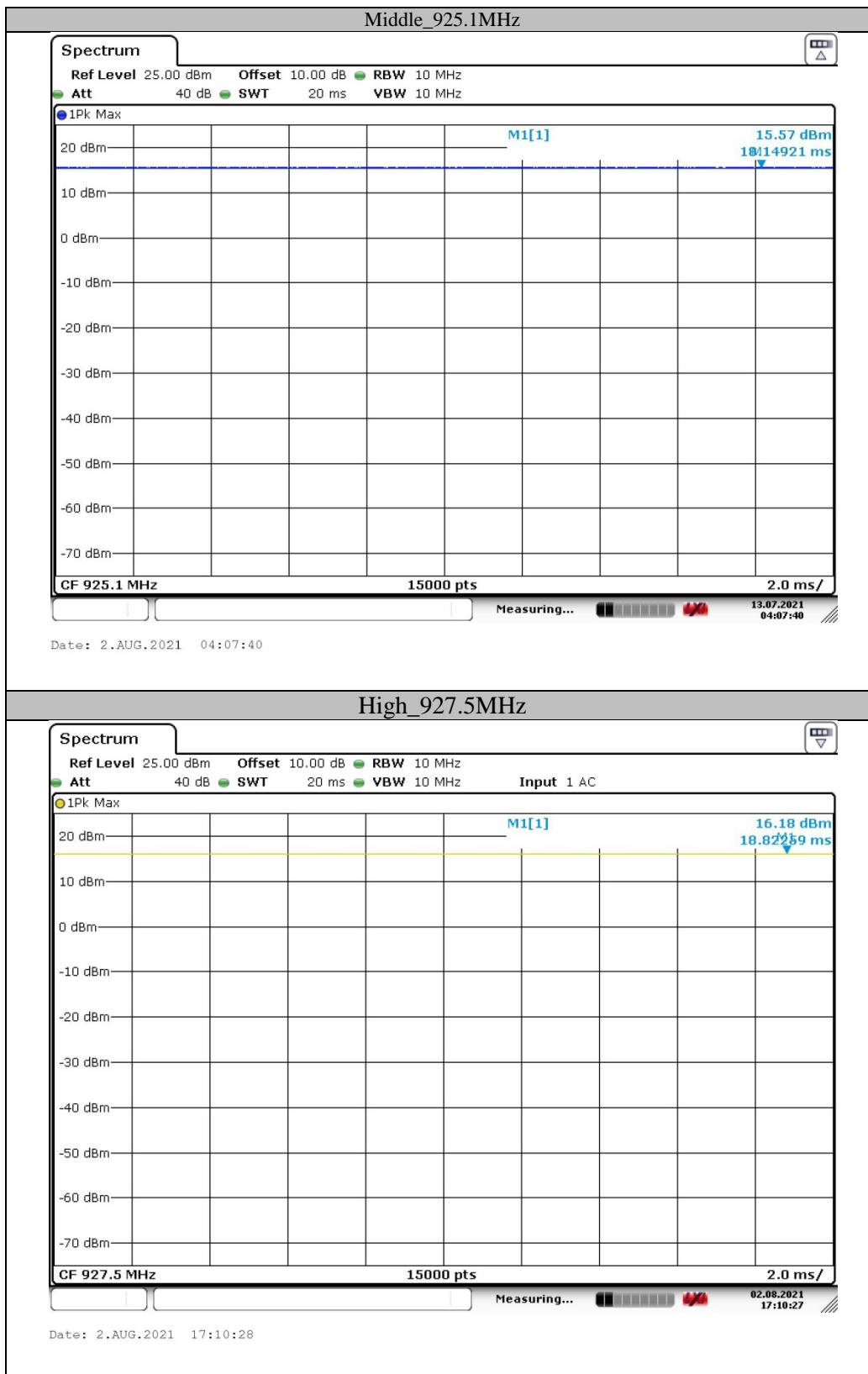
Appendix F: Duty Cycle

Test Result

Channel [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
923.3	20	20	100
925.1	20	20	100
927.5	20	20	100

Test Graphs





***** END OF REPORT *****