FCC RF Test Report

APPLICANT	:	**Quectel Wireless Solutions Co., Ltd.**
EQUIPMENT	:	**LoRa Module**
BRAND NAME	:	**Quectel**
MODEL NAME	:	**KG200Z**
FCC ID	:	**XMR2024KG200Z**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**
TEST DATE(S)	:	**Mar. 06, 2024 ~ Apr. 05, 2024**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR411603A	Rev. 01	Initial issue of report	May 06, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report Only	-
3.2	15.247(b)(3)	Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 30dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.81 dB at 2708.20 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 8.32 dB at 0.168 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Remark: Not required means after assessing, test items are not necessary to carry out.

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	LoRa Module
Brand Name	Quectel
Model Name	KG200Z
FCC ID	XMR2024KG200Z
SN Code	E1N24AG0E000028
HW Version	R1.0
SW Version	KG200ZAAR01A01
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	902.5 MHz ~ 926.5 MHz
Number of Channels	31
Bandwidth / Spread Factor	500kHz / 5, 6, 7, 8, 9, 10, 11, 12
Maximum Average Power to Antenna	LoRa DTS SF5 : 19.63 dBm (0.0918 W) LoRa DTS SF6 : 19.61 dBm (0.0914 W) LoRa DTS SF7 : 19.55 dBm (0.0902 W) LoRa DTS SF8 : 19.62 dBm (0.0916 W) LoRa DTS SF9 : 19.56 dBm (0.0904 W) LoRa DTS SF10 : 19.49 dBm (0.0889 W) LoRa DTS SF11 : 19.59 dBm (0.0910 W) LoRa DTS SF12 : 19.68 dBm (0.0929 W)
99% Occupied Bandwidth	LoRa DTS SF5 : 0.541 MHz LoRa DTS SF6 : 0.535 MHz LoRa DTS SF7 : 0.525 MHz LoRa DTS SF8 : 0.523 MHz LoRa DTS SF9 : 0.527 MHz LoRa DTS SF10 : 0.523 MHz LoRa DTS SF11 : 0.523 MHz

	LoRa DTS SF12 : 0.523 MHz
Antenna Type / Gain	Dipole Antenna with gain 2.50 dBi
Type of Modulation	LoRa

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH05-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-KS	AUDIX	E3	210616
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
902.5-926.5 MHz	1	902.5	17	915.3
	2	903.3	18	916.1
	3	904.1	19	916.9
	4	904.9	20	917.7
	5	905.7	21	918.5
	6	906.5	22	919.3
	7	907.3	23	920.1
	8	908.1	24	920.9
	9	908.9	25	921.7
	10	909.7	26	922.5
	11	910.5	27	923.3
	12	911.3	28	924.1
	13	912.1	29	924.9
	14	912.9	30	925.7
	15	913.7	31	926.5
	16	914.5	-	-

Note: The above EUT's information was declared by manufacturer.

2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

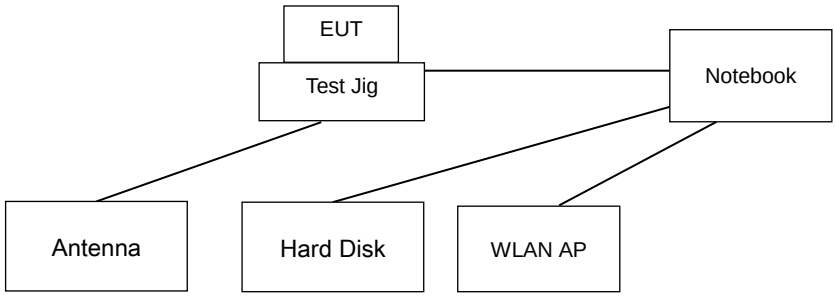
b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**Modulation**
	Lora 500kHz DTS
Conducted TCs	Mode 1: LoRa Tx CH01_902.5 MHz Mode 2: LoRa Tx CH16_914.5 MHz Mode 3: LoRa Tx CH31_926.5 MHz
Radiated TCs	Mode 1: LoRa Tx CH01_902.5 MHz Mode 2: LoRa Tx CH16_914.5 MHz Mode 3: LoRa Tx CH31_926.5 MHz
AC Conducted Emission	Mode 1 : Lora TX+ power from Test Jig

2.3 Connection Diagram of Test System

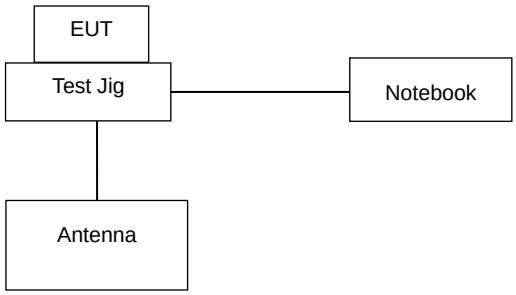
For AC Conducted Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

For Radiated Emission:



This example is connection diagram of EUT test configurations.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Hard Disk	Lenovo	F310	DoC	Shielded, 1.2m	N/A
4.	Test jig	N/A	N/A	N/A	N/A	N/A
5.	Antenna	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For LoRa function, the engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 9.55 dB.

Offset(dB) = RF cable loss(dB).

=9.55 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 20kHz and set the Video bandwidth (VBW) = 100kHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup

3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 902-928MHz, the limit for output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

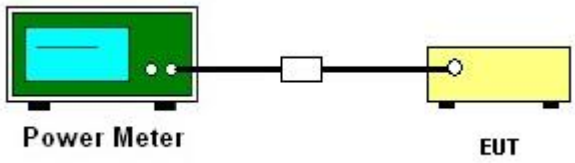
3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.2 Method AVGPM-G method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

For LoRa DTS SF5:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF5	1	902.5Mhz	3.84	19.63	20
SF5	16	914.5Mhz	3.84	19.62	20
SF5	31	926.5Mhz	3.84	19.25	20

For LoRa DTS SF6:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF6	1	902.5Mhz	2.76	19.61	20
SF6	16	914.5Mhz	2.76	19.56	20
SF6	31	926.5Mhz	2.76	19.53	20

For LoRa DTS SF7:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF7	1	902.5Mhz	1.58	19.51	20
SF7	16	914.5Mhz	1.58	19.45	20
SF7	31	926.5Mhz	1.58	19.55	20

For LoRa DTS SF8:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF8	1	902.5Mhz	1.00	19.62	20
SF8	16	914.5Mhz	1.00	19.53	20
SF8	31	926.5Mhz	1.00	19.55	20

For LoRa DTS SF9:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF9	1	902.5Mhz	0.61	19.49	20
SF9	16	914.5Mhz	0.61	19.56	20
SF9	31	926.5Mhz	0.61	19.54	20

For LoRa DTS SF10:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF10	1	902.5Mhz	0.32	19.49	20
SF10	16	914.5Mhz	0.32	19.40	20
SF10	31	926.5Mhz	0.32	19.38	20

For LoRa DTS SF11:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF11	1	902.5Mhz	0.16	19.59	20
SF11	16	914.5Mhz	0.16	19.50	20
SF11	31	926.5Mhz	0.16	19.47	20

For LoRa DTS SF12:

Mod.	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	power setting
SF12	1	902.5Mhz	0.07	19.68	20
SF12	16	914.5Mhz	0.07	19.64	20
SF12	31	926.5Mhz	0.07	19.60	20

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

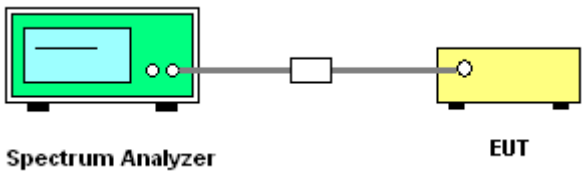
3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.5 Method AVGPSD-2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = power averaging (rms), Sweep time = auto couple. Use the peak marker function to determine the maximum power level.
6. Employ trace averaging (rms) mode over a minimum of 100 traces.
7. Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
8. Measure and record the results in the test report.
9. Add [10 log (1 / D)], where D is the duty cycle.
10. The Measured power density (dBm)/ 100kHz is a reference level and used as 30dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

3.3.6 Test Result of Power Spectral Density Plots (100kHz)

Please refer to Appendix A.

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 30 dB down from the highest emission level within the authorized band.

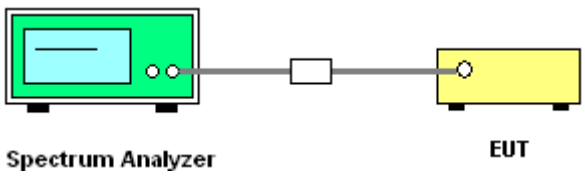
3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.4.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 11.13
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured 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 when the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges Plots

Please refer to Appendix A.

3.4.6 Test Result of Conducted Spurious Emission Plots

Please refer to Appendix A.

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

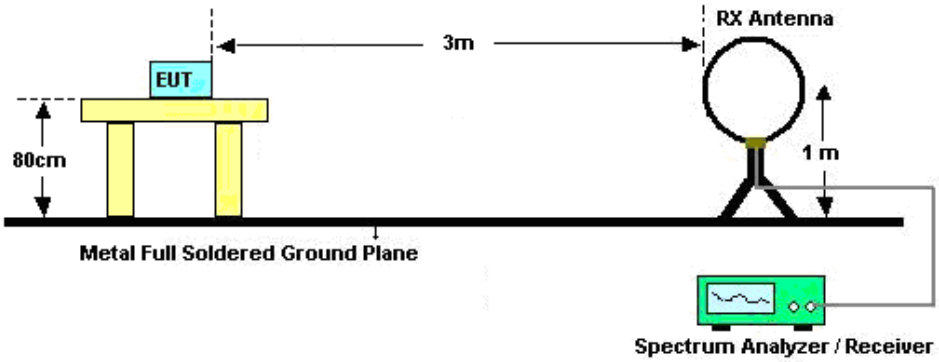
The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.5.3 Test Procedures

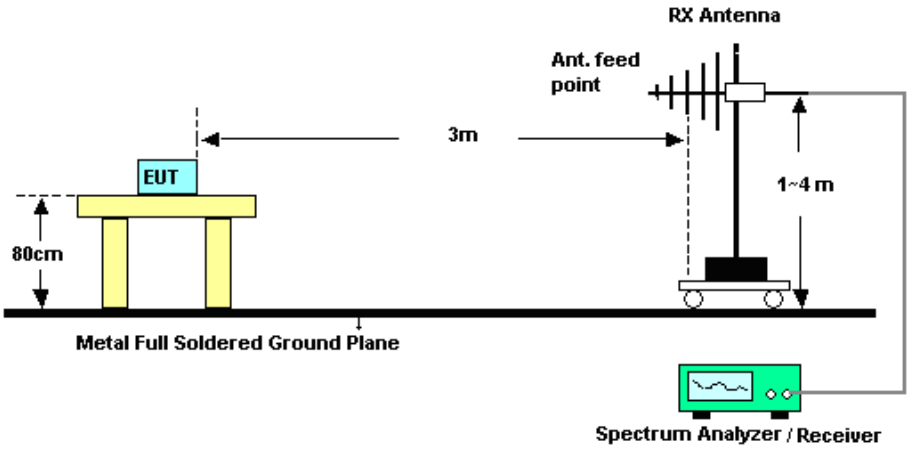
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

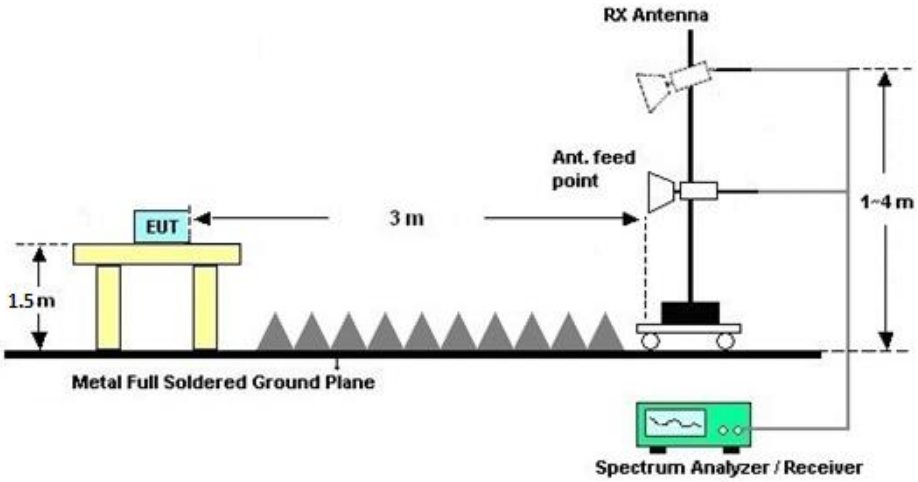
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C&D.

3.5.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C&D.

3.5.8 Duty cycle

Please refer to Appendix E

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

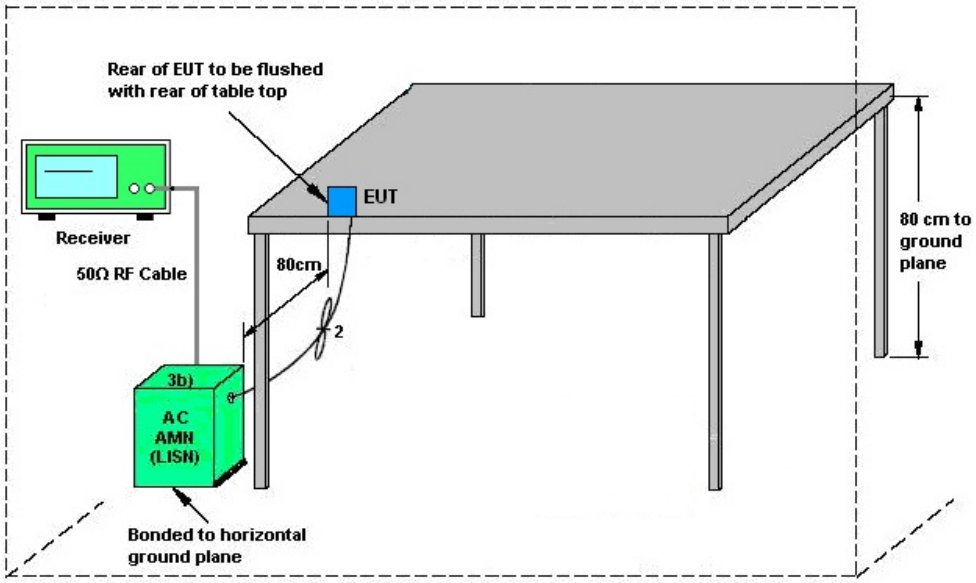
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.6.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Apr. 05, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2024	Apr. 05, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Apr. 05, 2024	Jan. 01, 2025	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 10, 2023	Mar. 30, 2024	Oct. 09, 2024	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Mar. 23, 2024	Mar. 30, 2024	Mar. 22, 2025	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 10, 2023	Mar. 30, 2024	Oct. 09, 2024	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Apr. 09, 2023	Mar. 30, 2024	Apr. 08, 2024	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 06, 2023	Mar. 30, 2024	Apr. 05, 2024	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2024	Mar. 30, 2024	Jan. 04, 2025	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul. 06, 2023	Mar. 30, 2024	Jul. 05, 2024	Radiation (03CH05-KS)
Amplifier	EM	EM18G40GA	060852	18~40GHz	Jan. 05, 2024	Mar. 30, 2024	Jan. 04, 2025	Radiation (03CH05-KS)
high gain Amplifier	EM	EM01G18GA	060839	1Ghz-18Ghz	Oct. 10, 2023	Mar. 30, 2024	Oct. 09, 2024	Radiation (03CH05-KS)
Amplifier	EM	EM01G18GA	060833	1Ghz-18Ghz	Jan. 03, 2024	Mar. 30, 2024	Jan. 02, 2025	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 30, 2024	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 30, 2024	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 30, 2024	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 16, 2023	Mar. 06, 2024	May 15, 2024	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Mar. 06, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 16, 2023	Mar. 06, 2024	May 15, 2024	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Mar. 06, 2024	Oct. 10, 2024	Conduction (CO01-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Conducted Spurious Emission & Bandedge	**±2.26 dB**
Occupied Channel Bandwidth	**±0.1%**
Conducted Power	**±0.46 dB**
Conducted Power Spectral Density	**±0.88 dB**
Frequency	**±0.4 Hz**

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.84dB**

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.30dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.28dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.88dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.26dB**

---------- THE END ----------

Appendix A. Conducted Test Results

Test Engineer :	Smile Wang	**Temperature :**	22~23℃
		Relative Humidity :	40~42%

Case No. : 411603
Ambient Condition: 25 ℃, 45 %RH
According Standard: ■Part15C
Test Date: 2024.4.5 **Test Engineer:** Jiang Jun

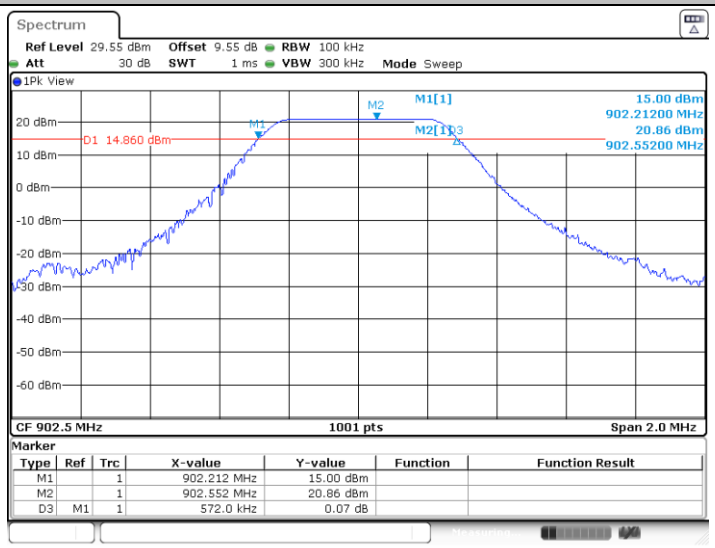
DTS Bandwidth

Test Result

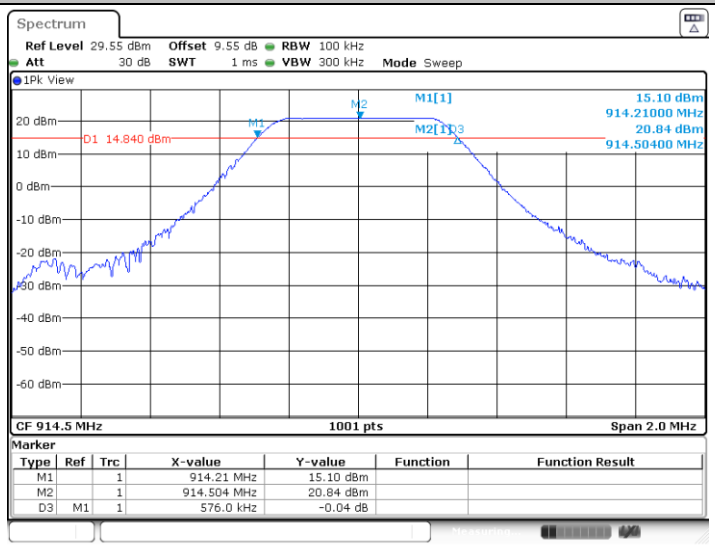
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DTS-SF5	Ant1	902.5	0.57	902.21	902.78	0.5	PASS
		914.5	0.58	914.21	914.79	0.5	PASS
		926.5	0.57	926.22	926.79	0.5	PASS
DTS-SF6	Ant1	902.5	0.61	902.20	902.80	0.5	PASS
		914.5	0.61	914.19	914.80	0.5	PASS
		926.5	0.60	926.20	926.80	0.5	PASS
DTS-SF7	Ant1	902.5	0.62	902.19	902.81	0.5	PASS
		914.5	0.63	914.18	914.81	0.5	PASS
		926.5	0.62	926.19	926.81	0.5	PASS
DTS-SF8	Ant1	902.5	0.63	902.18	902.82	0.5	PASS
		914.5	0.64	914.18	914.82	0.5	PASS
		926.5	0.63	926.19	926.82	0.5	PASS
DTS-SF9	Ant1	902.5	0.64	902.18	902.82	0.5	PASS
		914.5	0.64	914.18	914.82	0.5	PASS
		926.5	0.63	926.18	926.82	0.5	PASS
DTS-SF10	Ant1	902.5	0.64	902.18	902.82	0.5	PASS
		914.5	0.64	914.18	914.82	0.5	PASS
		926.5	0.64	926.18	926.82	0.5	PASS
DTS-SF11	Ant1	902.5	0.64	902.18	902.82	0.5	PASS
		914.5	0.65	914.17	914.82	0.5	PASS
		926.5	0.64	926.18	926.82	0.5	PASS
DTS-SF12	Ant1	902.5	0.65	902.17	902.82	0.5	PASS
		914.5	0.64	914.18	914.82	0.5	PASS
		926.5	0.64	926.18	926.82	0.5	PASS

Test Graphs

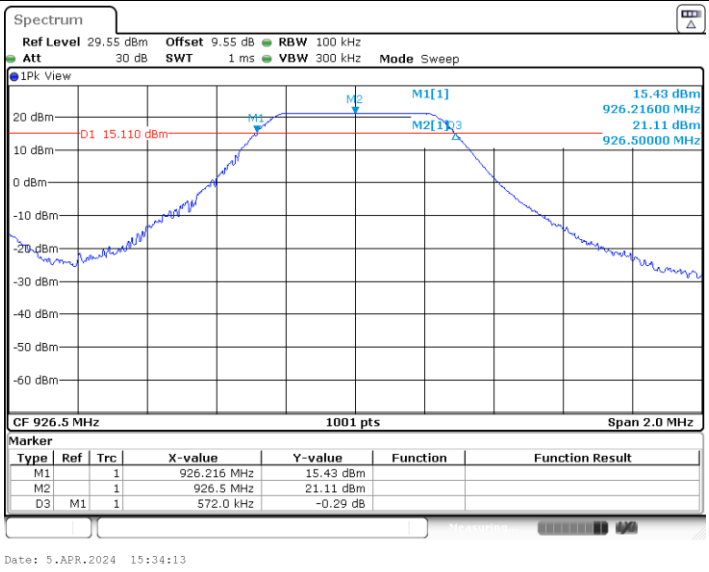
DTS-SF5_Ant1_902.5



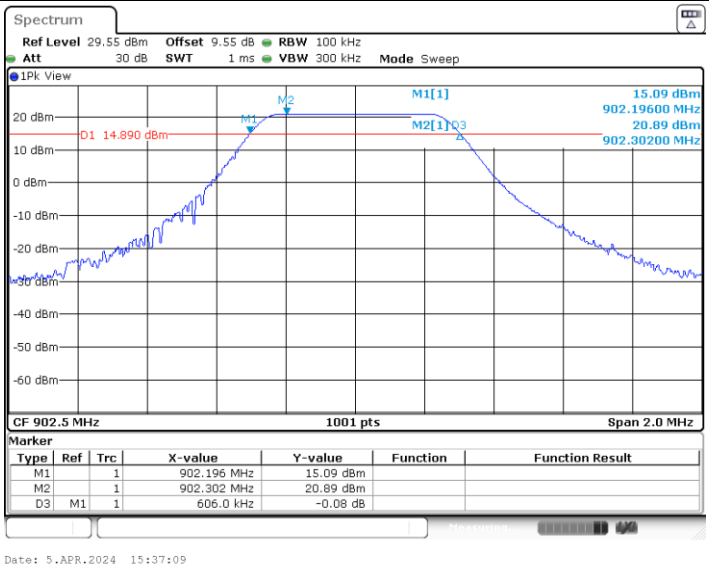
DTS-SF5_Ant1_914.5



DTS-SF5_Ant1_926.5



DTS-SF6_Ant1_902.5



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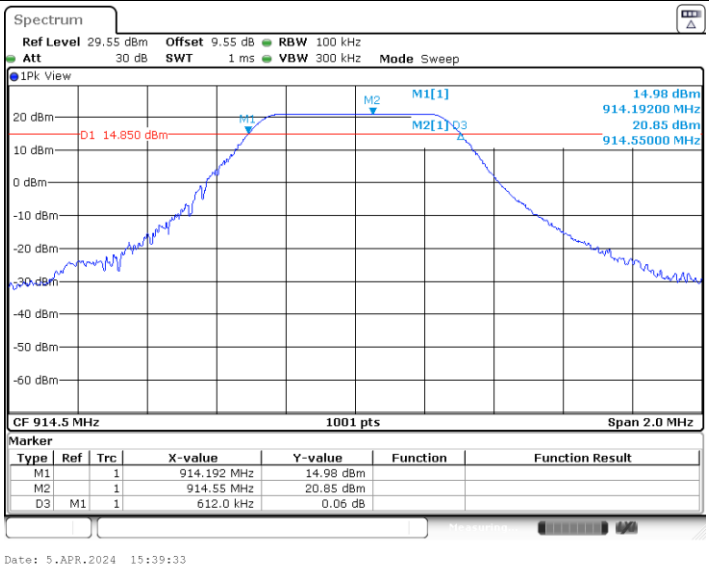

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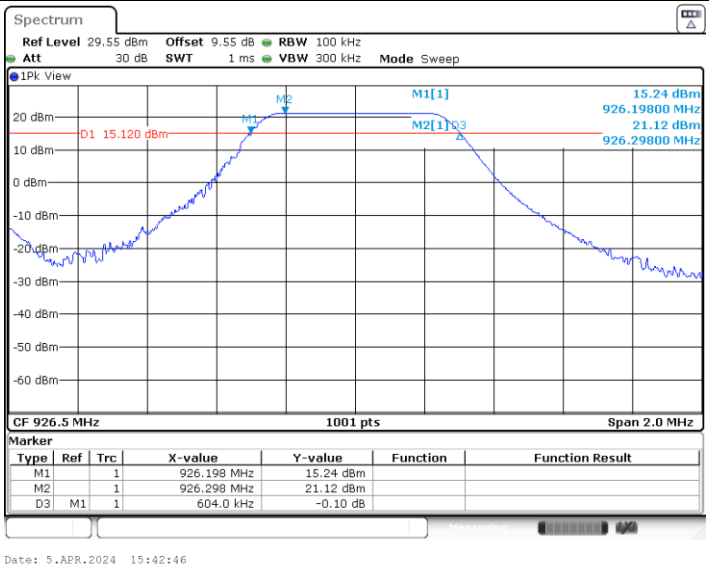
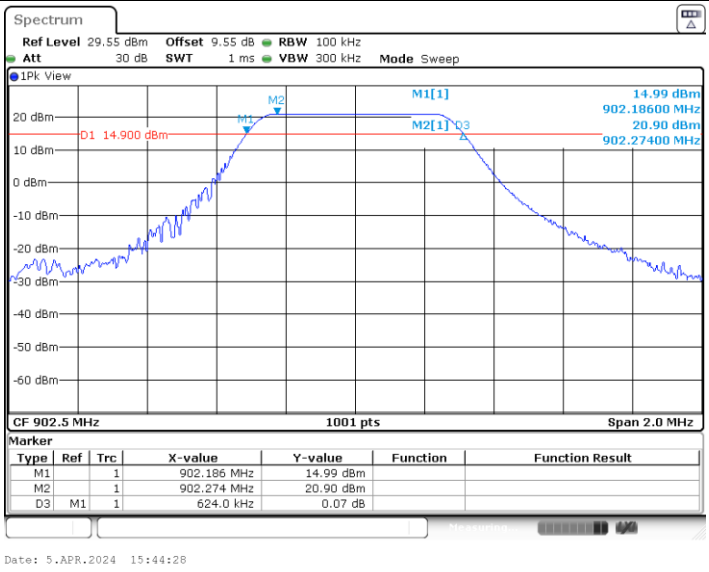


DTS-SF7_Ant1_902.5



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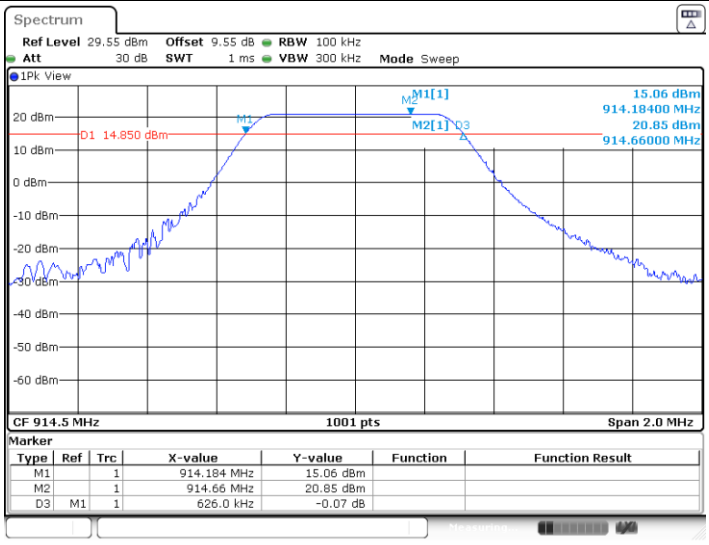

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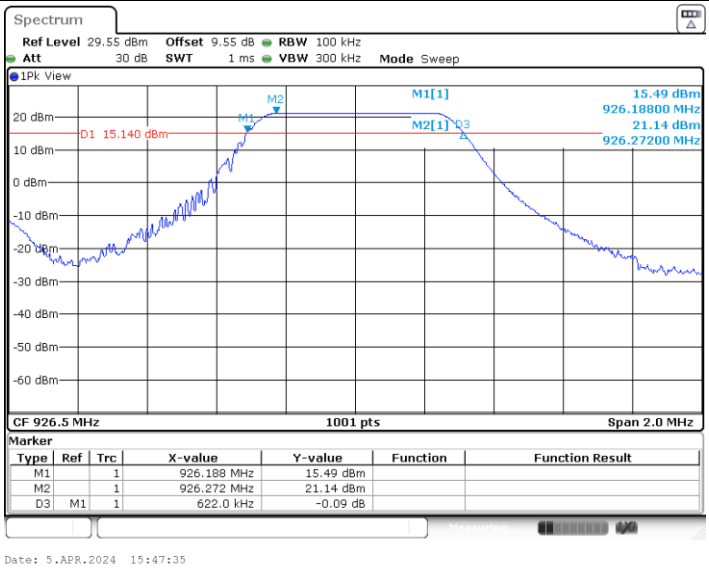

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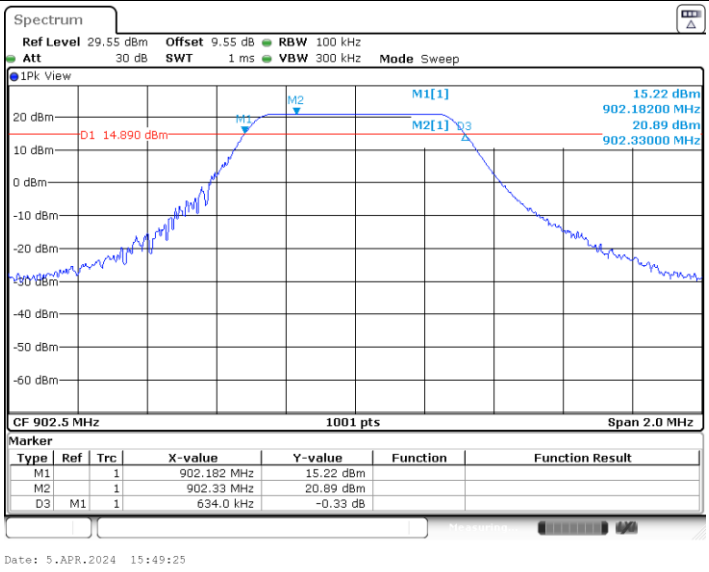

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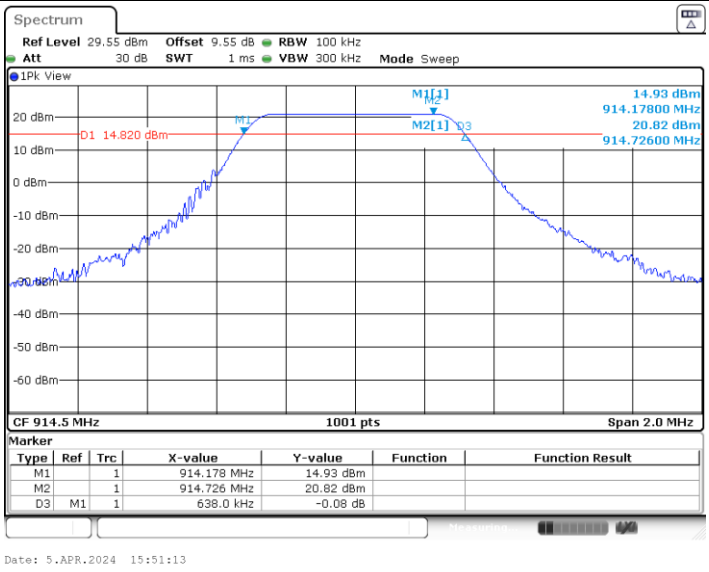

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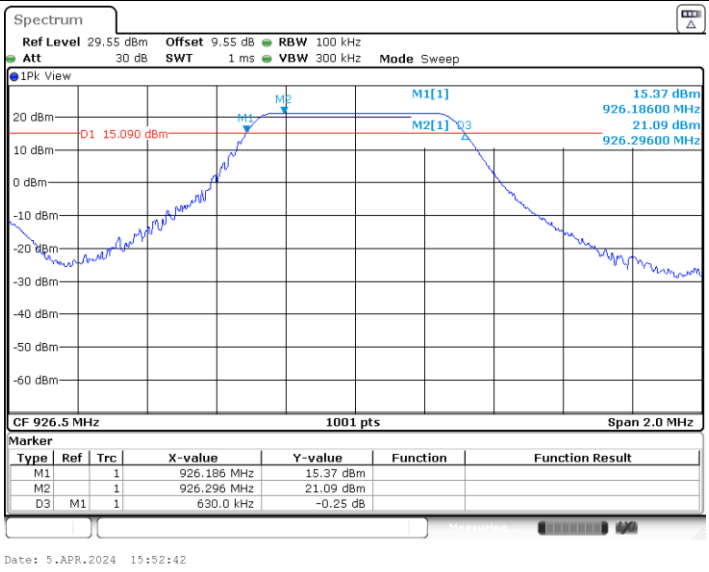

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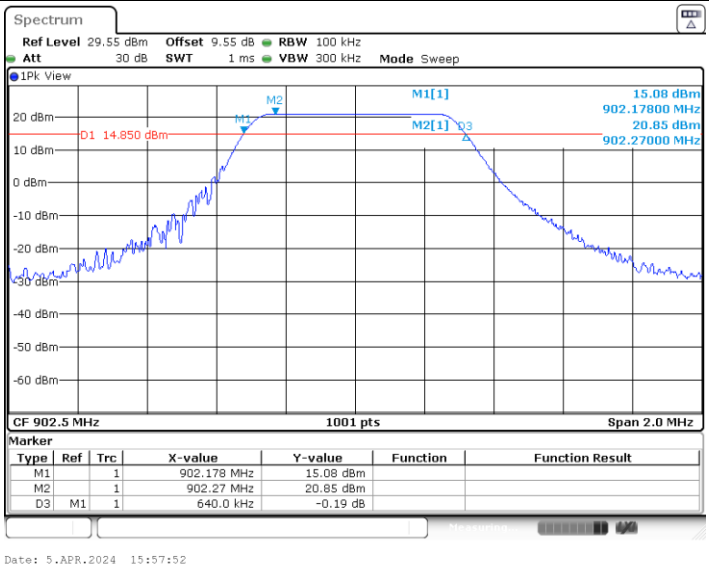

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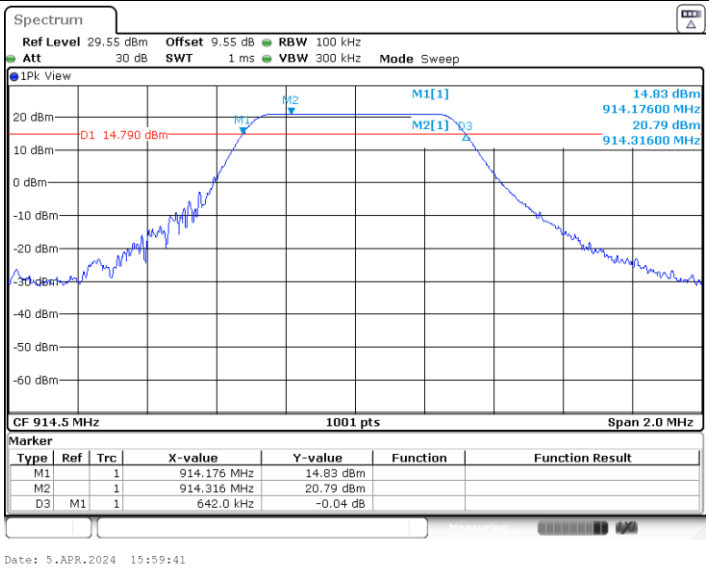

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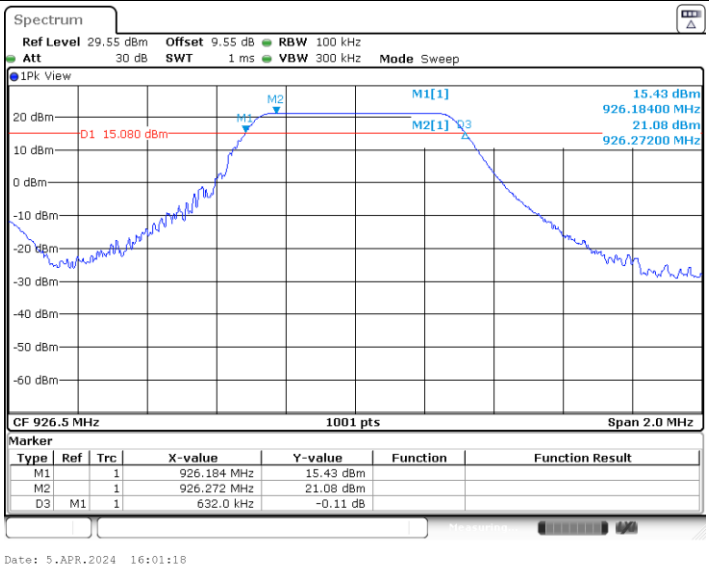
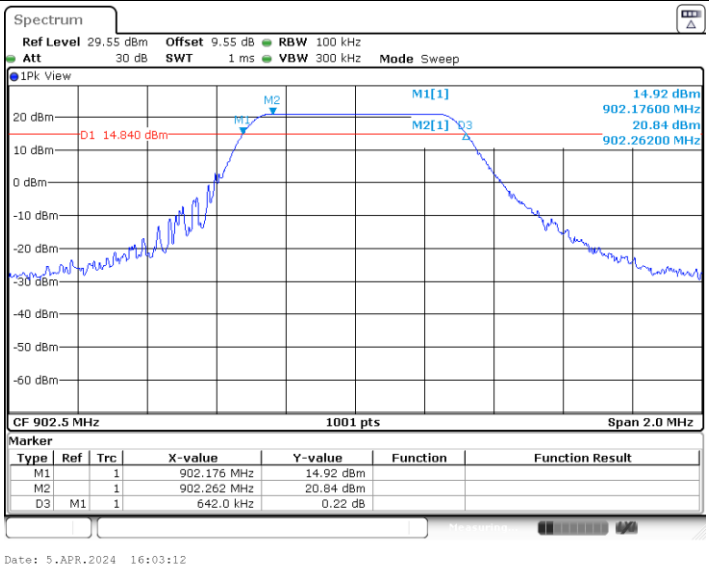


DTS-SF10_Ant1_902.5



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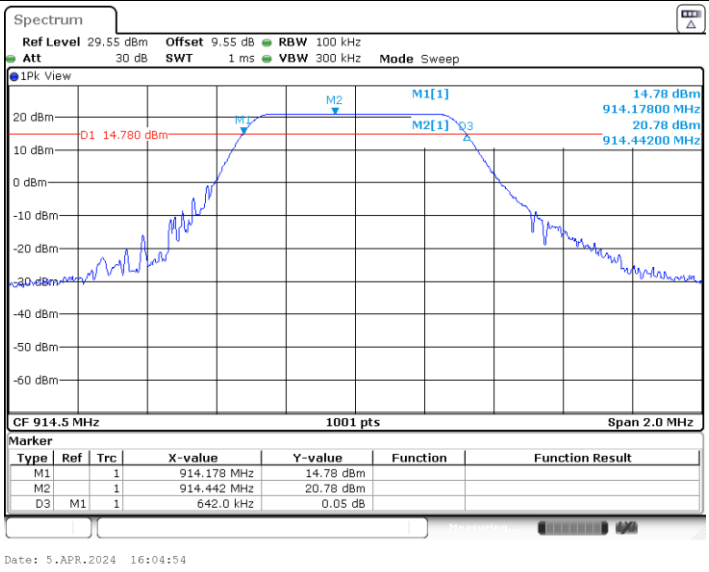

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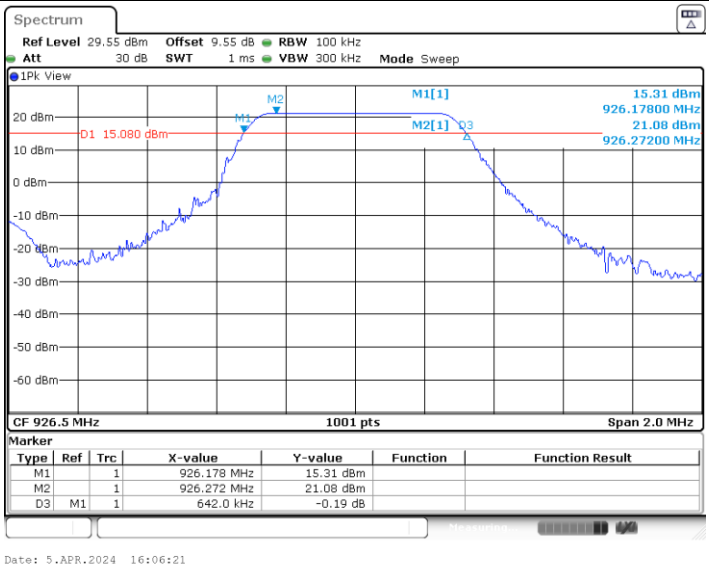
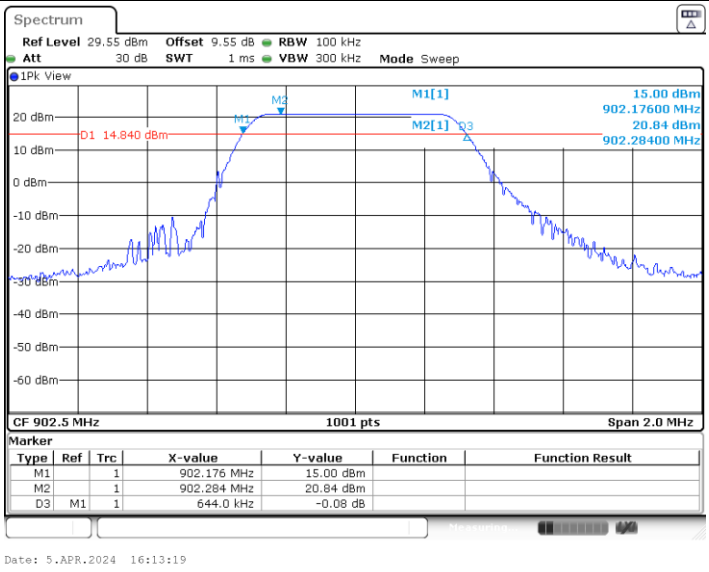


DTS-SF11_Ant1_902.5



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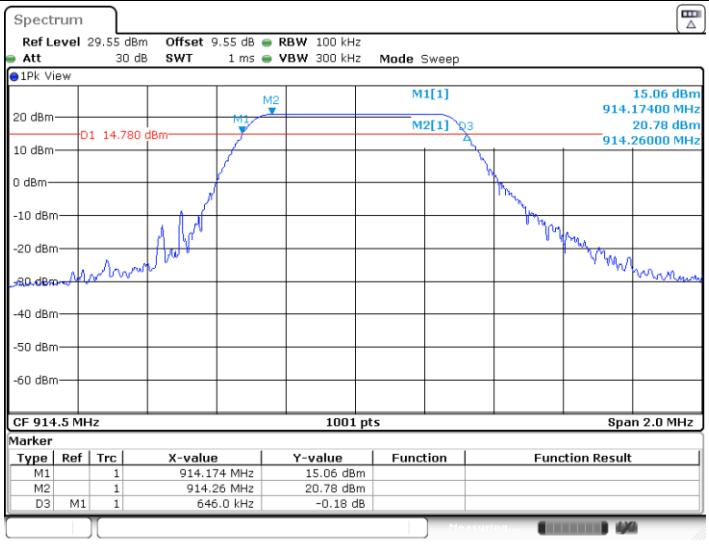

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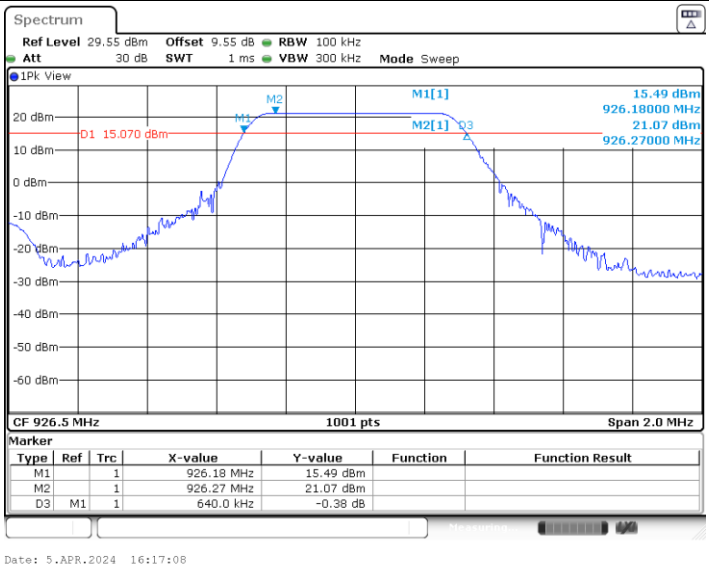
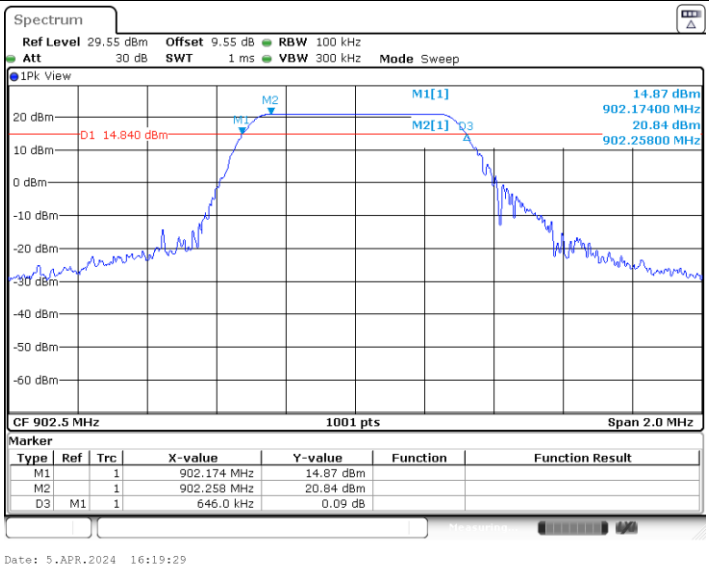
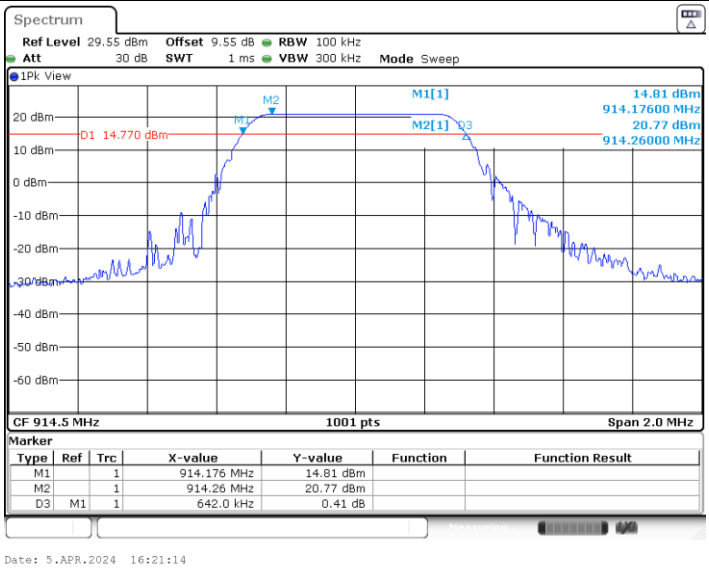


DTS-SF12_Ant1_902.5



DTS-SF12_Ant1_914.5



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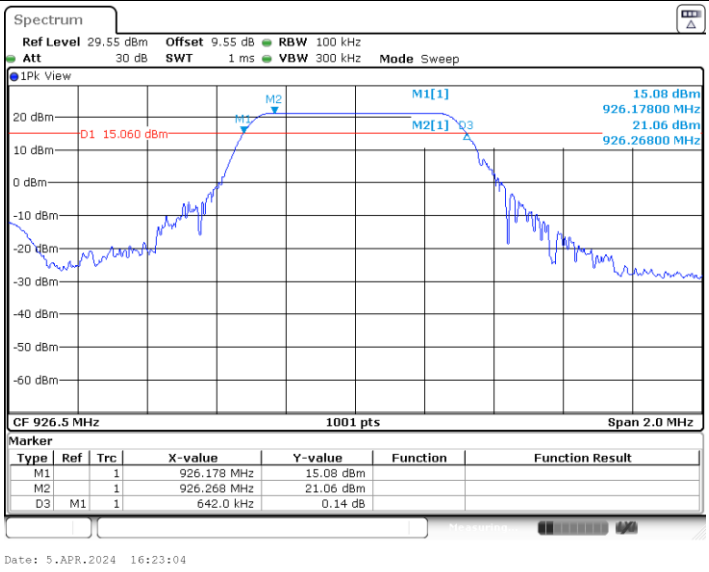


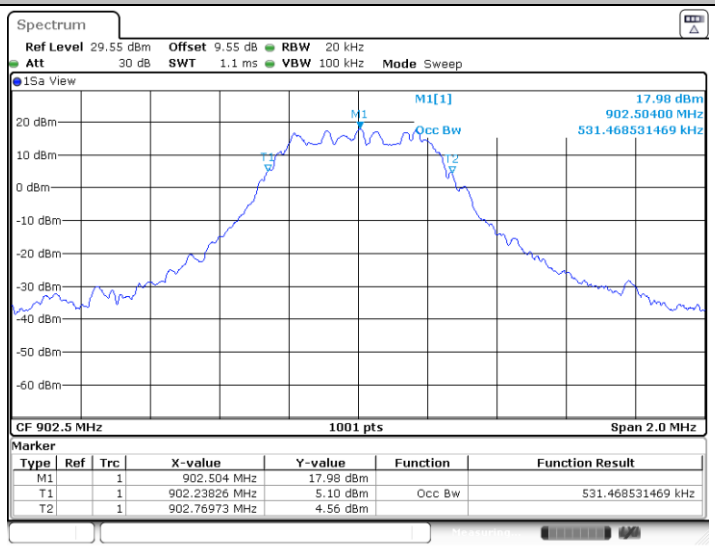
Occupied Channel Bandwidth

Test Result

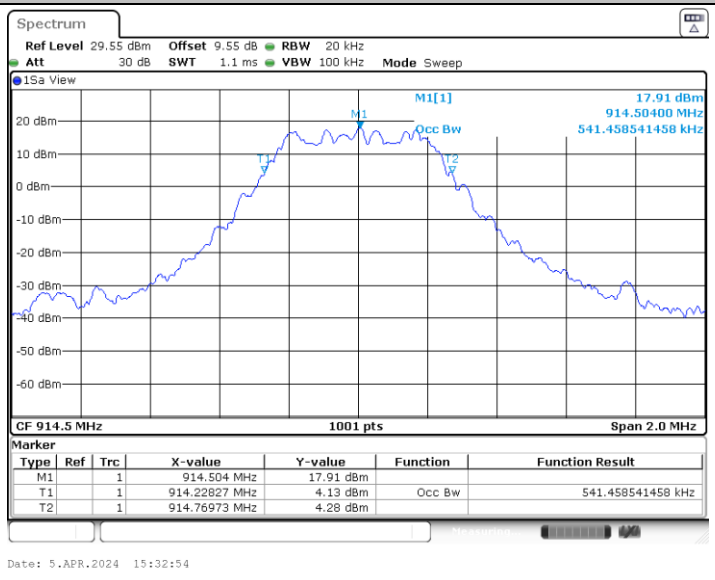
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DTS-SF5	Ant1	902.5	0.531	902.2383	902.7697	---	---
		914.5	0.541	914.2283	914.7697	---	---
		926.5	0.523	926.2383	926.7617	---	---
DTS-SF6	Ant1	902.5	0.527	902.2363	902.7637	---	---
		914.5	0.535	914.2323	914.7677	---	---
		926.5	0.519	926.2383	926.7577	---	---
DTS-SF7	Ant1	902.5	0.515	902.2403	902.7557	---	---
		914.5	0.525	914.2363	914.7617	---	---
		926.5	0.513	926.2403	926.7537	---	---
DTS-SF8	Ant1	902.5	0.517	902.2363	902.7537	---	---
		914.5	0.523	914.2323	914.7557	---	---
		926.5	0.515	926.2383	926.7537	---	---
DTS-SF9	Ant1	902.5	0.519	902.2363	902.7557	---	---
		914.5	0.527	914.2343	914.7617	---	---
		926.5	0.517	926.2383	926.7557	---	---
DTS-SF10	Ant1	902.5	0.519	902.2363	902.7557	---	---
		914.5	0.523	914.2343	914.7577	---	---
		926.5	0.517	926.2383	926.7557	---	---
DTS-SF11	Ant1	902.5	0.521	902.2363	902.7577	---	---
		914.5	0.523	914.2343	914.7577	---	---
		926.5	0.521	926.2363	926.7577	---	---
DTS-SF12	Ant1	902.5	0.523	902.2343	902.7577	---	---
		914.5	0.523	914.2343	914.7577	---	---
		926.5	0.523	926.2343	926.7577	---	---

Test Graphs

DTS-SF5_Ant1_902.5



DTS-SF5_Ant1_914.5



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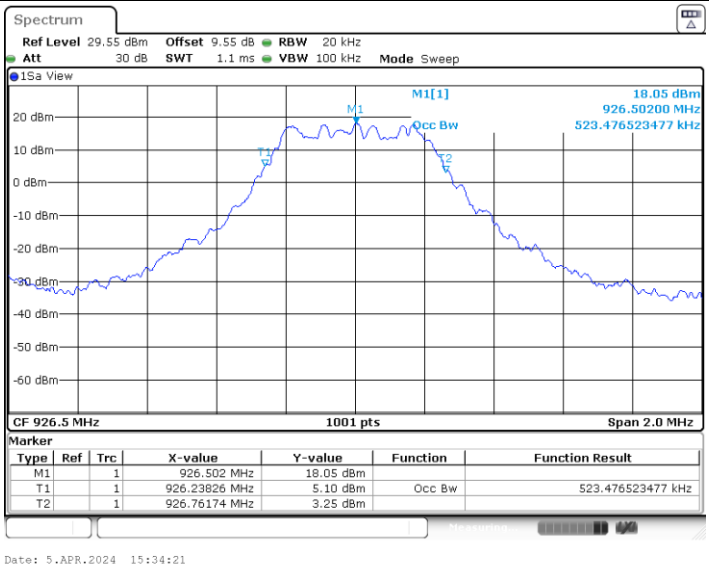
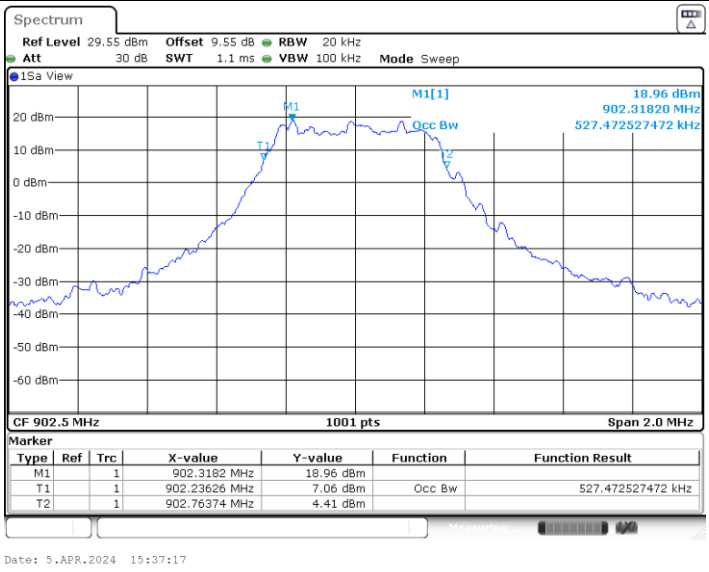
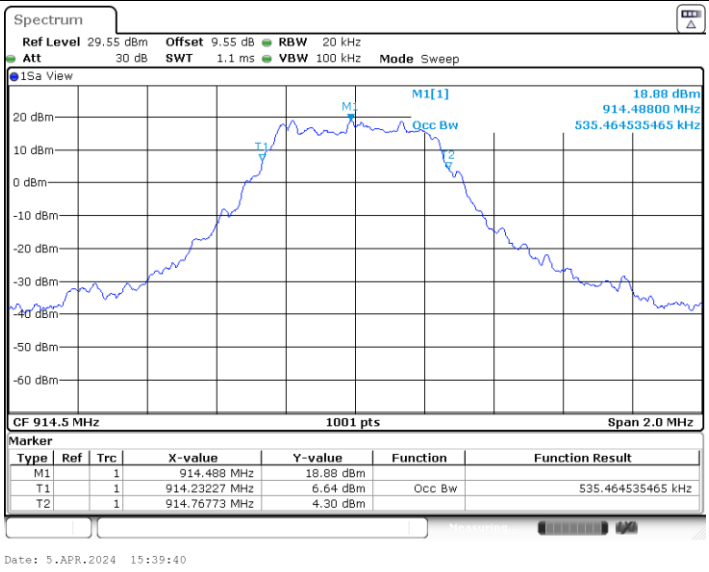


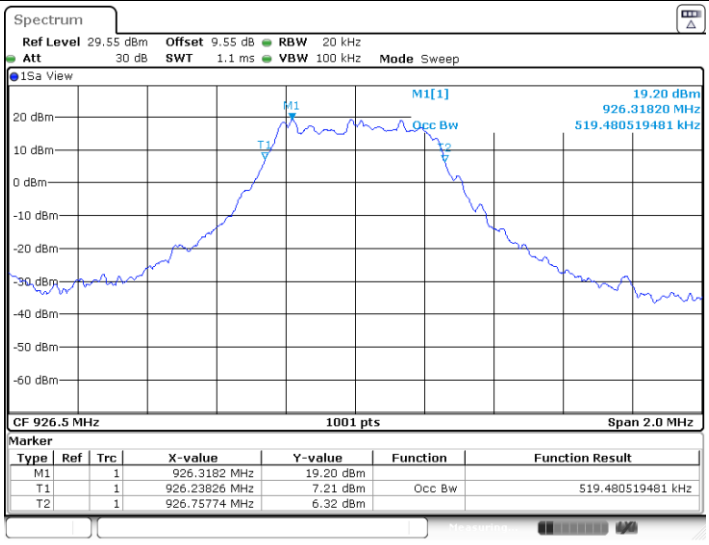
DTS-SF6_Ant1_902.5



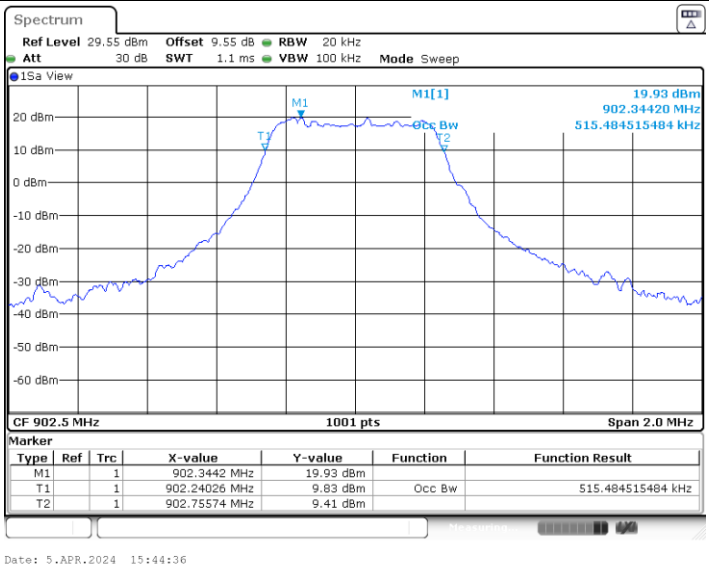
DTS-SF6_Ant1_914.5



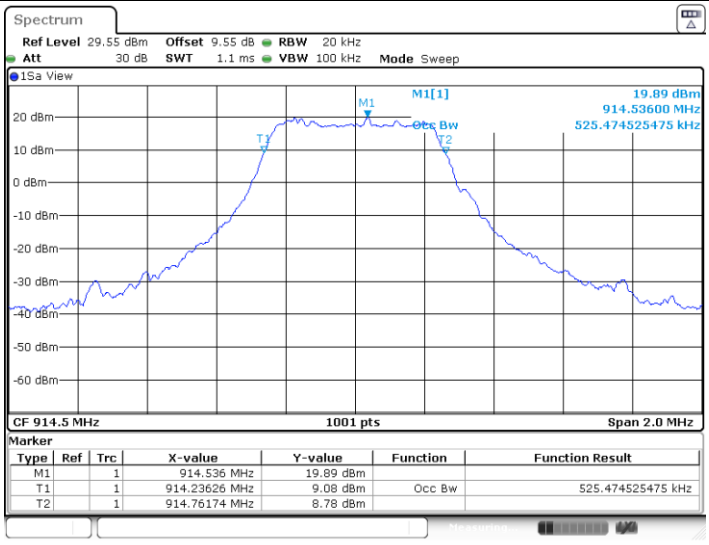
DTS-SF6_Ant1_926.5



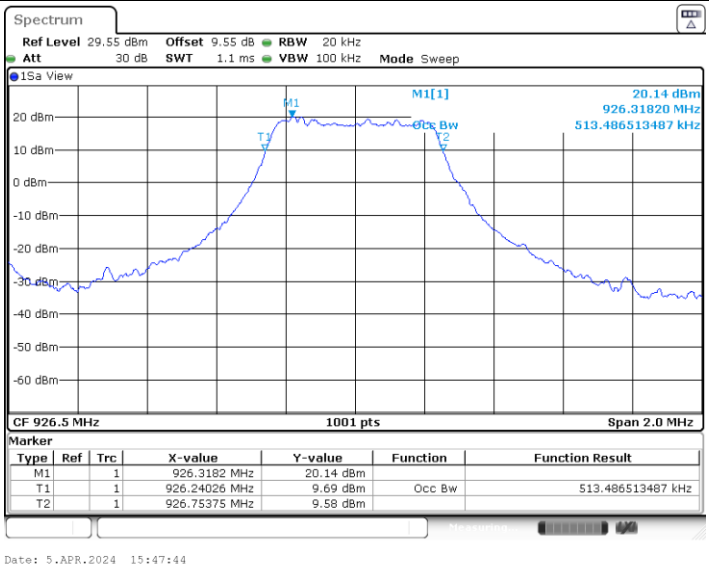
DTS-SF7_Ant1_902.5



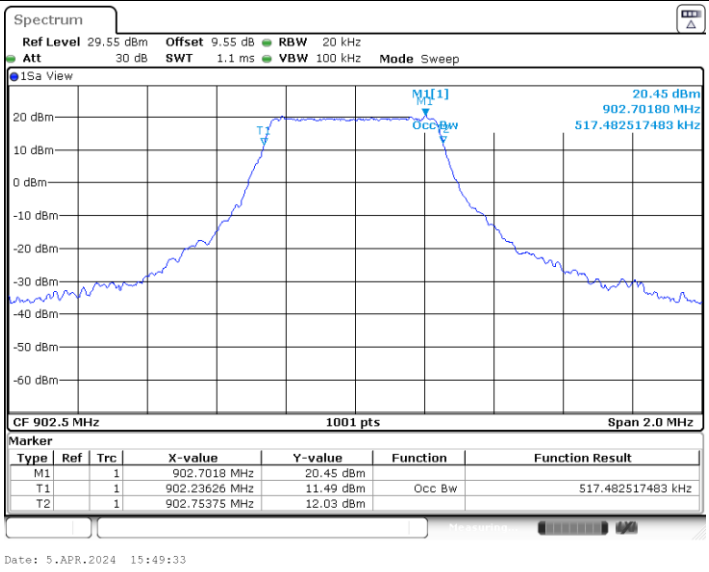
DTS-SF7_Ant1_914.5



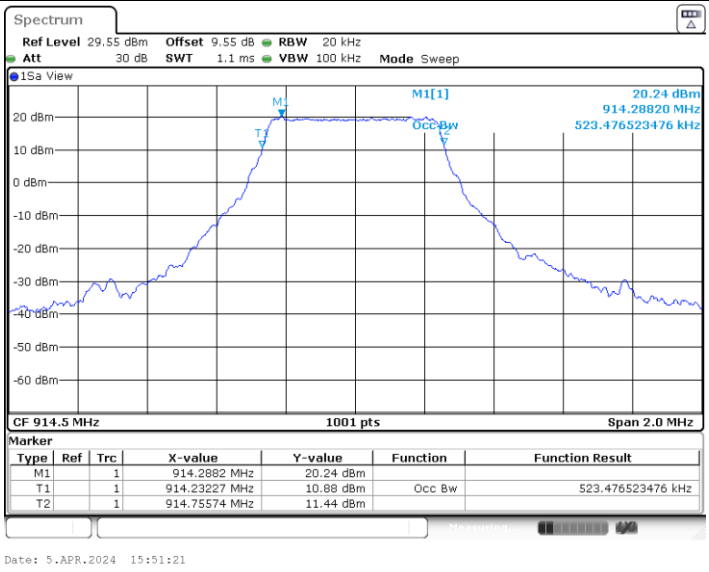
DTS-SF7_Ant1_926.5



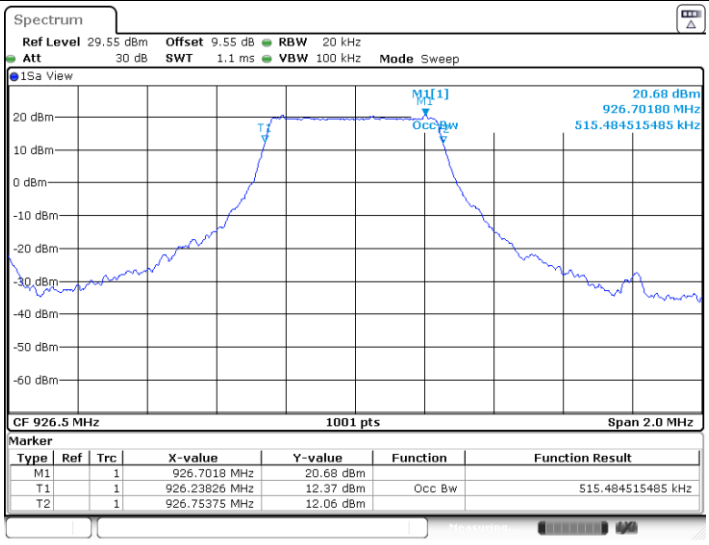
DTS-SF8_Ant1_902.5



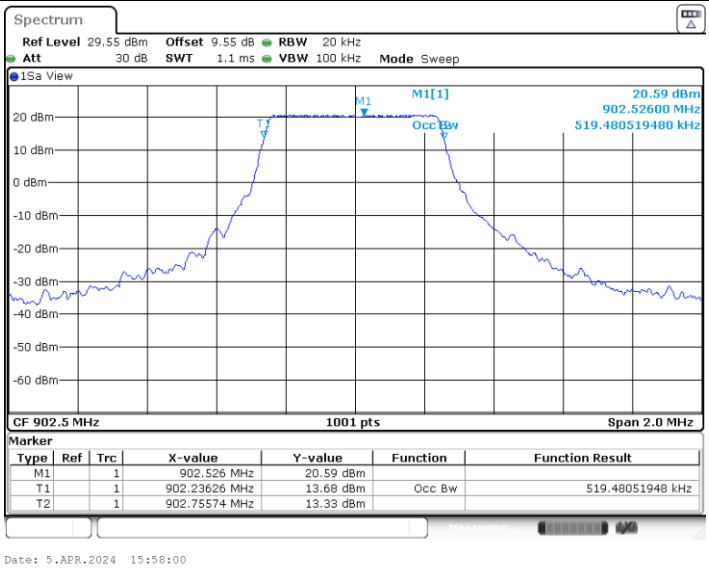
DTS-SF8_Ant1_914.5



DTS-SF8_Ant1_926.5



DTS-SF9_Ant1_902.5



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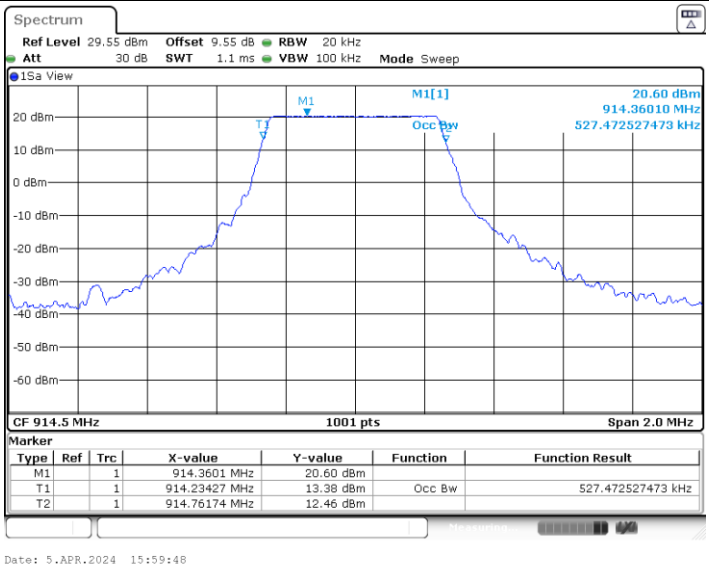
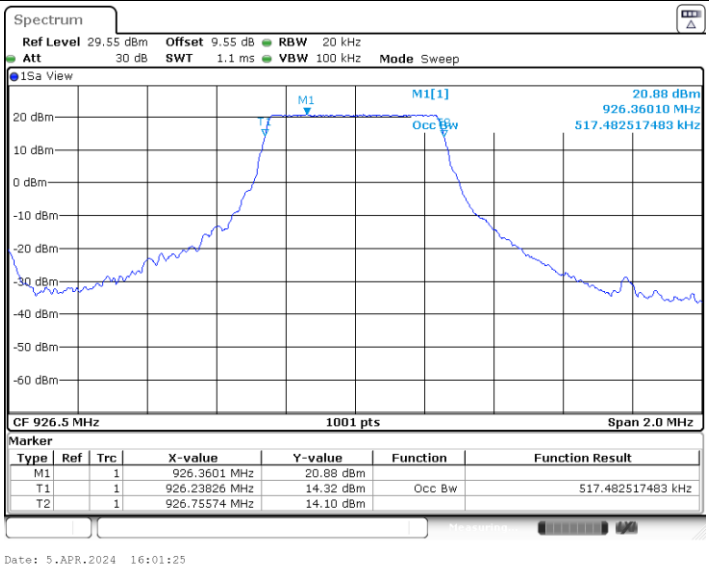
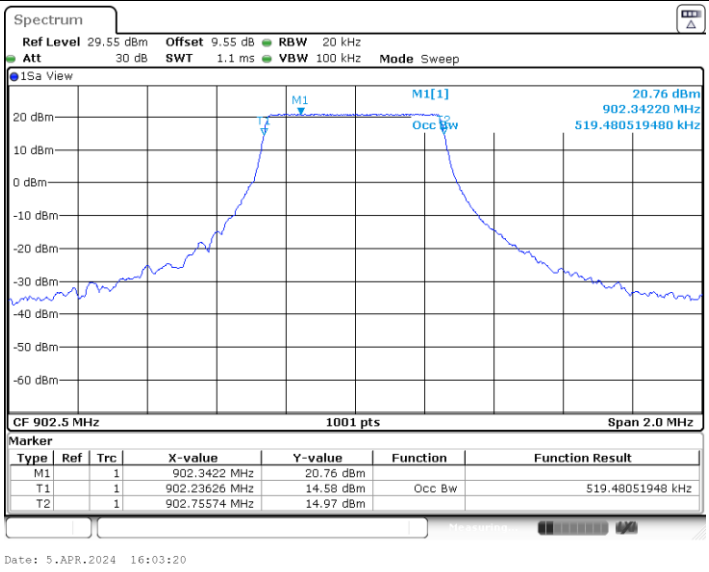


DTS-SF9_Ant1_926.5



DTS-SF10_Ant1_902.5



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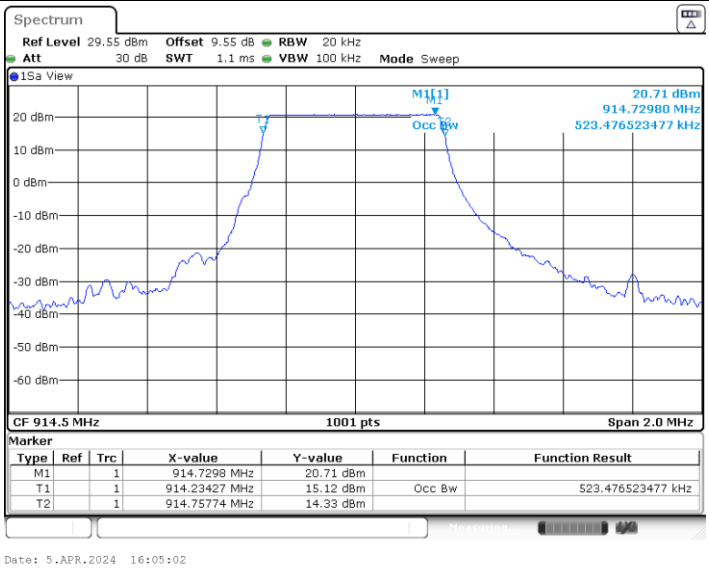

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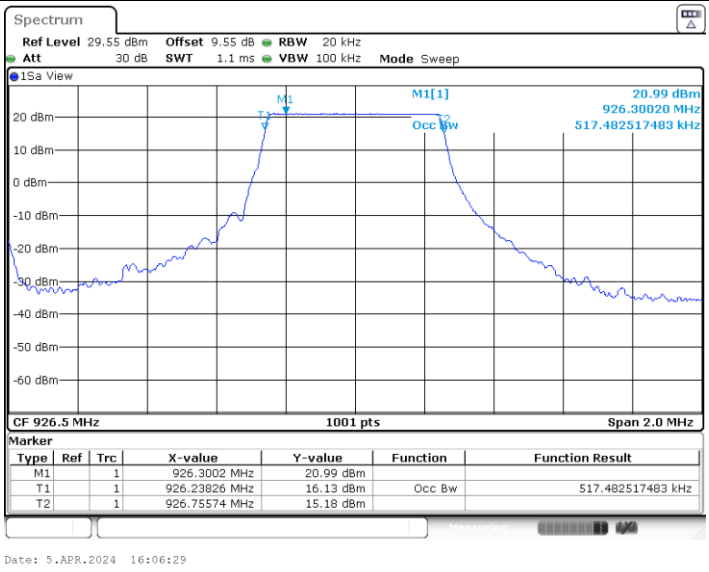
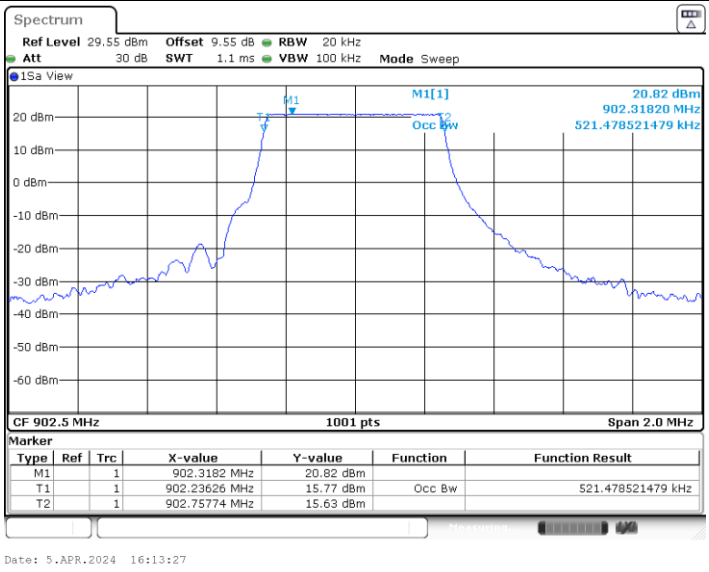


DTS-SF11_Ant1_902.5



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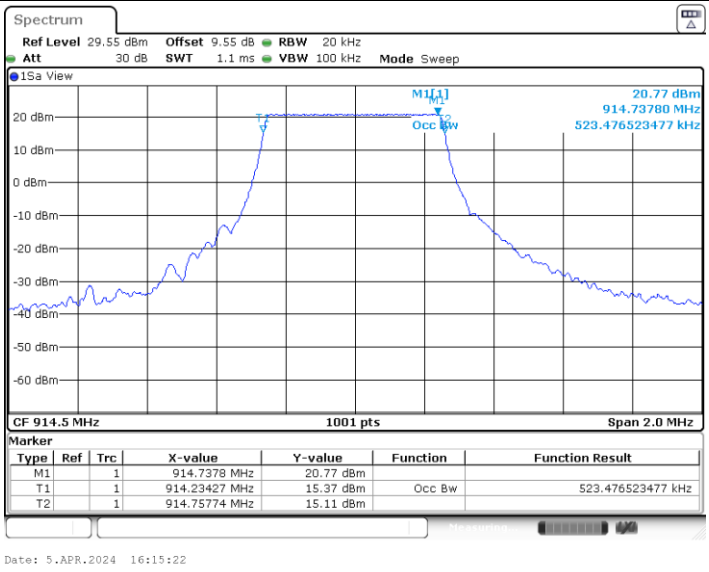
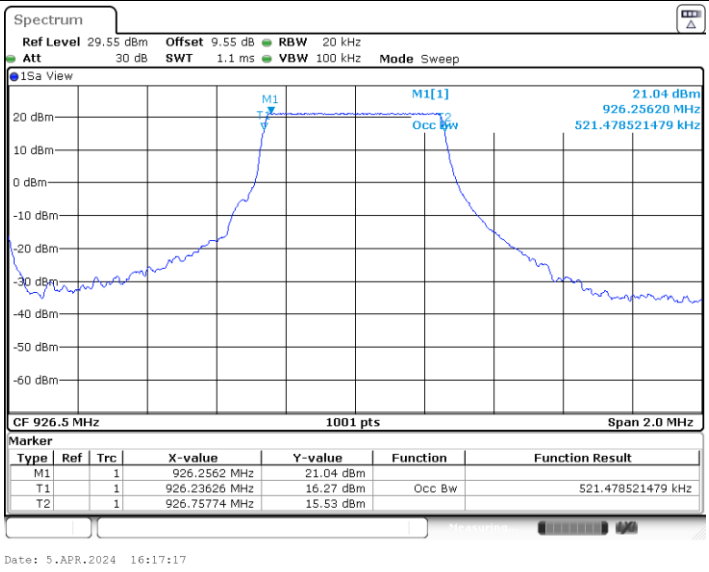


DTS-SF11_Ant1_926.5



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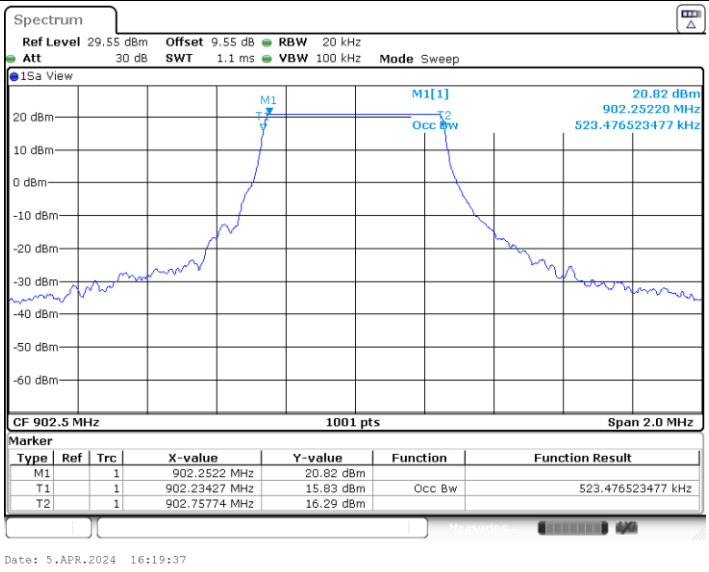

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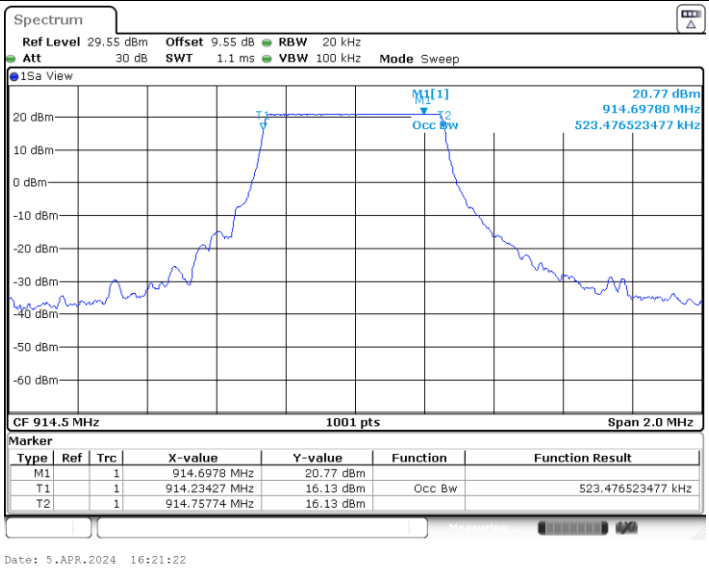
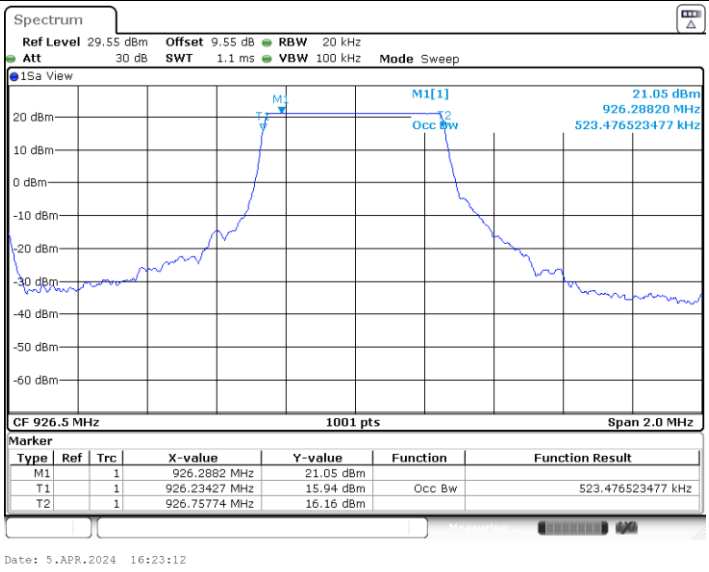


DTS-SF12_Ant1_926.5



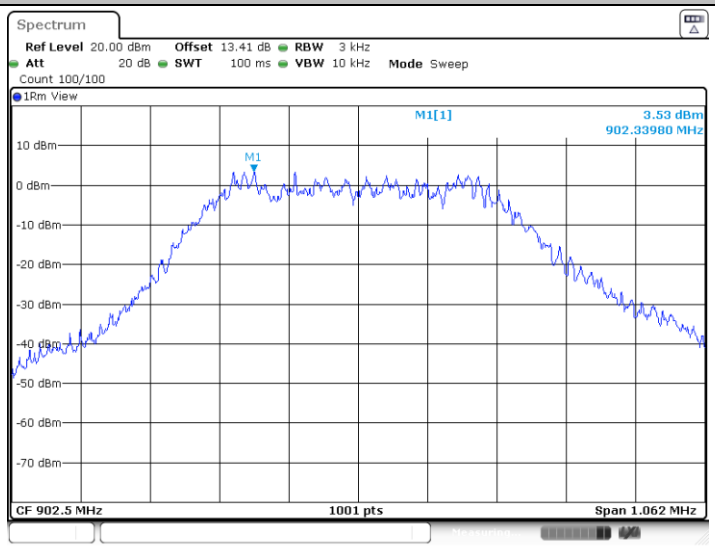
Maximum power spectral density

Test Result

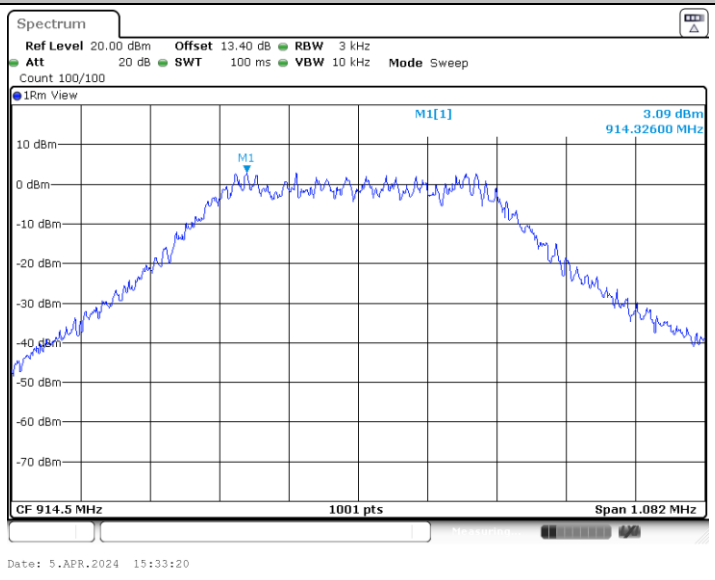
TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
DTS-SF5	Ant1	902.5	3.53	≤8	PASS
		914.5	3.09	≤8	PASS
		926.5	3.55	≤8	PASS
DTS-SF6	Ant1	902.5	2.67	≤8	PASS
		914.5	2.38	≤8	PASS
		926.5	3.27	≤8	PASS
DTS-SF7	Ant1	902.5	1.19	≤8	PASS
		914.5	1.28	≤8	PASS
		926.5	1.98	≤8	PASS
DTS-SF8	Ant1	902.5	0.88	≤8	PASS
		914.5	0.68	≤8	PASS
		926.5	1.26	≤8	PASS
DTS-SF9	Ant1	902.5	1.65	≤8	PASS
		914.5	0.95	≤8	PASS
		926.5	1.41	≤8	PASS
DTS-SF10	Ant1	902.5	1.52	≤8	PASS
		914.5	1.62	≤8	PASS
		926.5	0.85	≤8	PASS
DTS-SF11	Ant1	902.5	2.14	≤8	PASS
		914.5	1.93	≤8	PASS
		926.5	2.07	≤8	PASS
DTS-SF12	Ant1	902.5	3.38	≤8	PASS
		914.5	3.02	≤8	PASS
		926.5	3.01	≤8	PASS

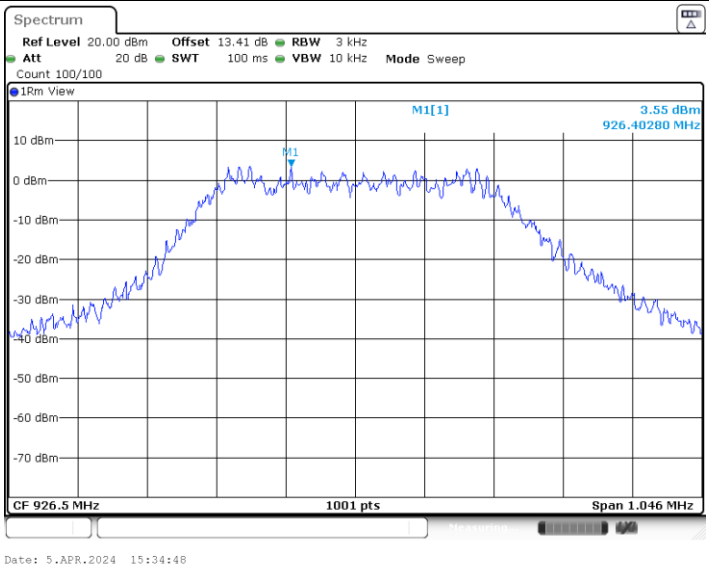
Test Graphs

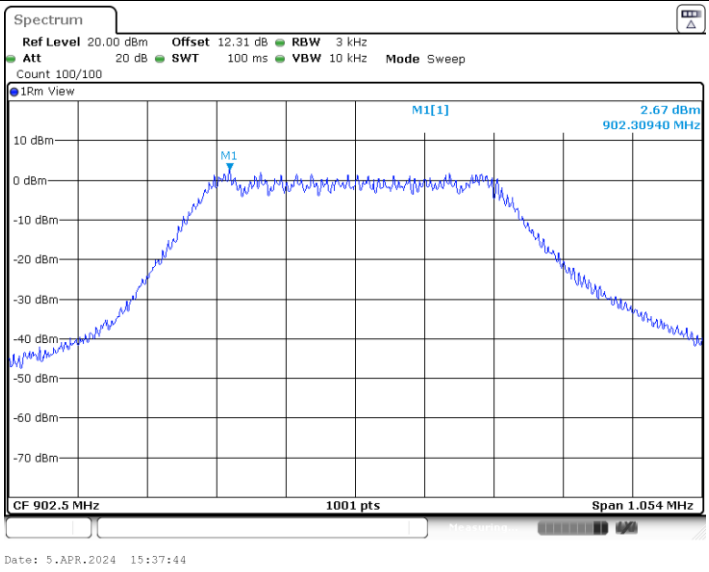
DTS-SF5_Ant1_902.5



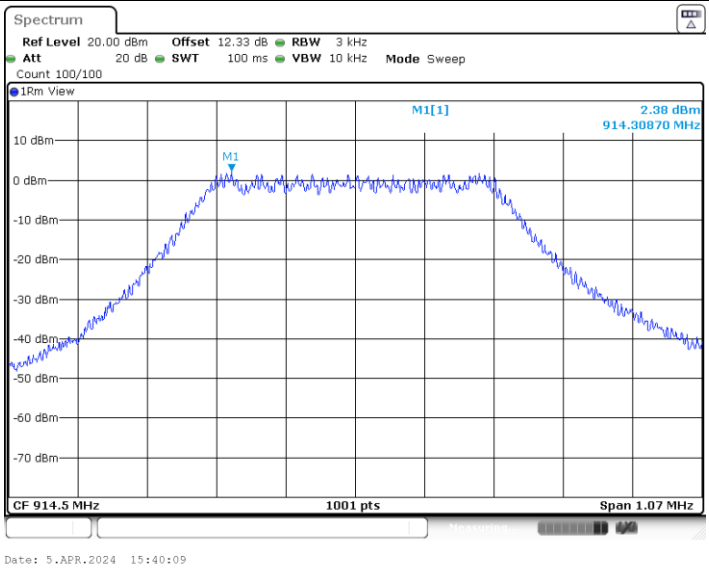
DTS-SF5_Ant1_914.5



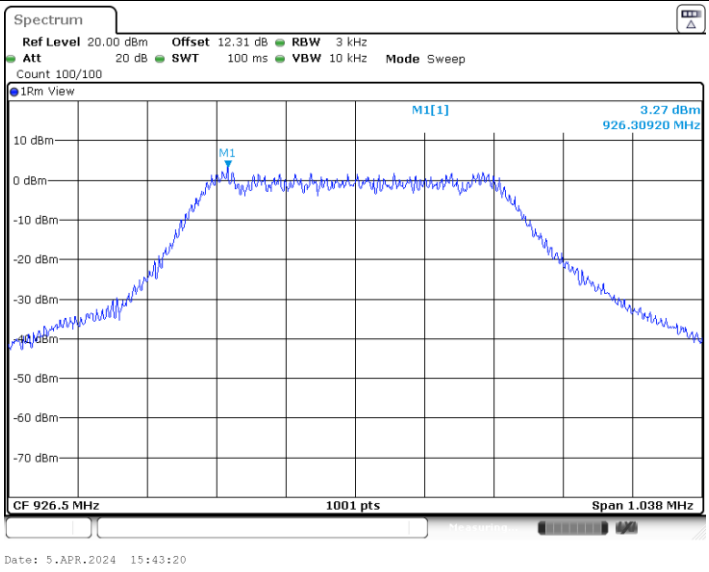
DTS-SF5_Ant1_926.5


DTS-SF6_Ant1_902.5


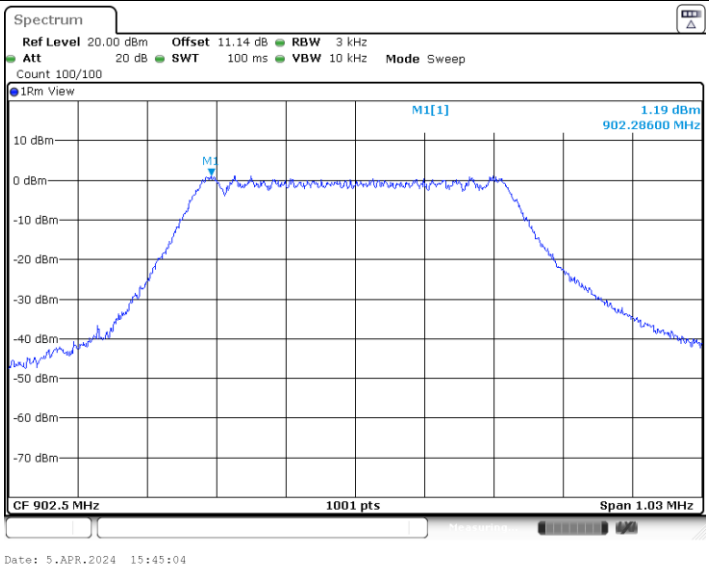
DTS-SF6_Ant1_914.5



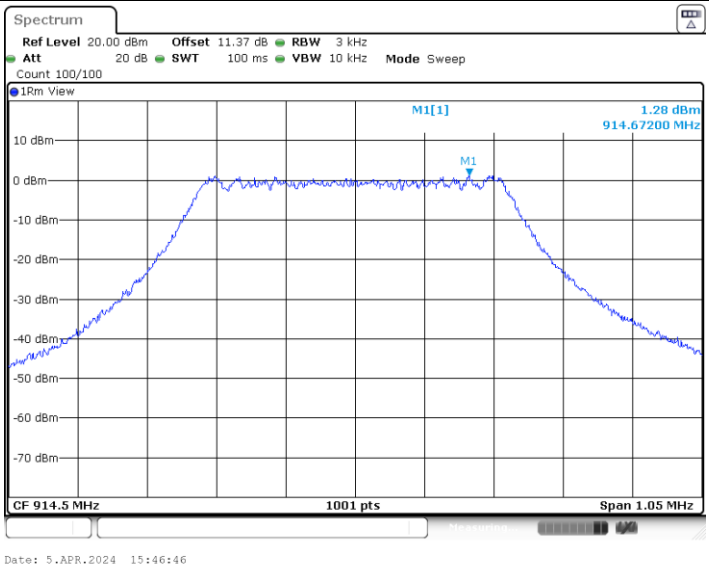
DTS-SF6_Ant1_926.5



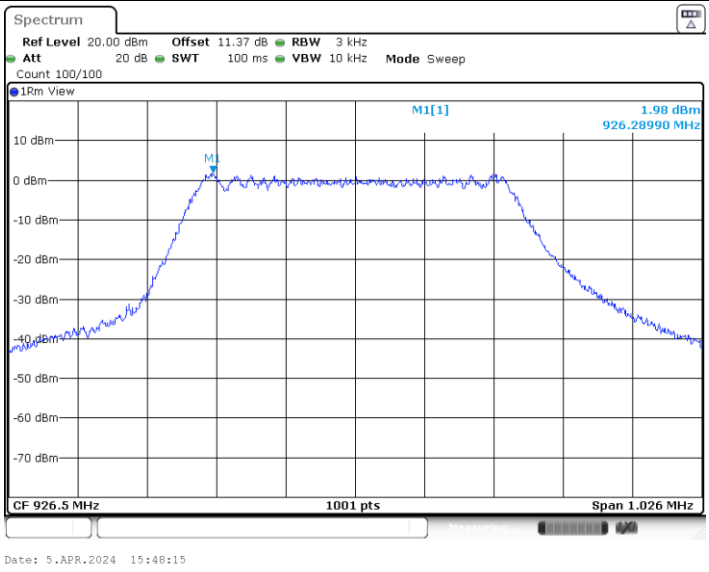
DTS-SF7_Ant1_902.5



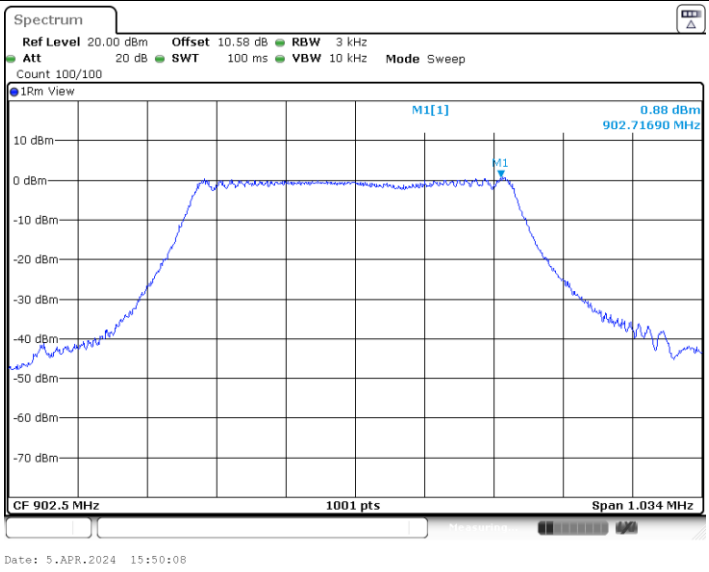
DTS-SF7_Ant1_914.5



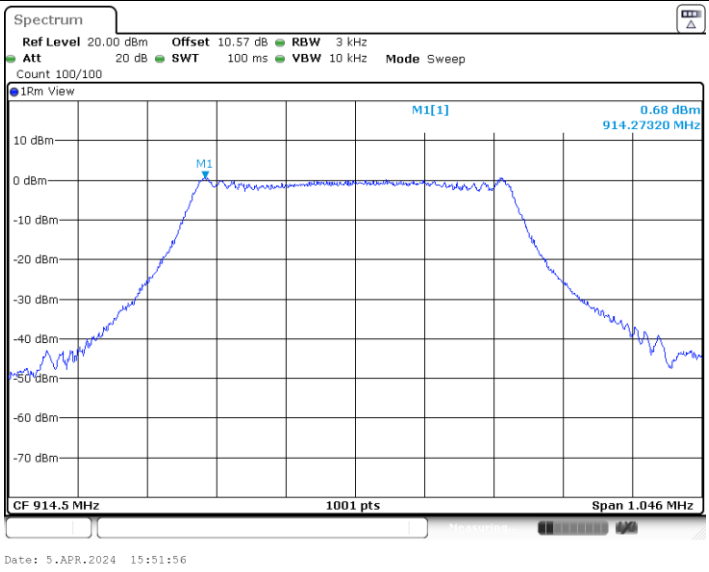
DTS-SF7_Ant1_926.5



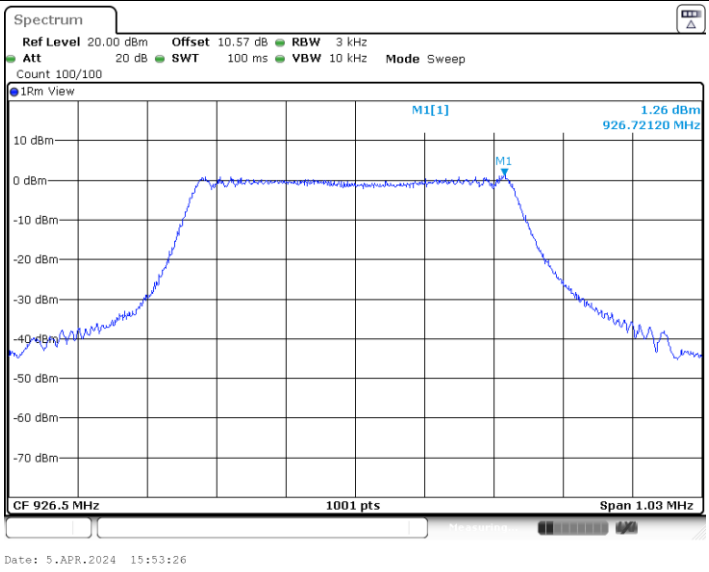
DTS-SF8_Ant1_902.5



DTS-SF8_Ant1_914.5



DTS-SF8_Ant1_926.5



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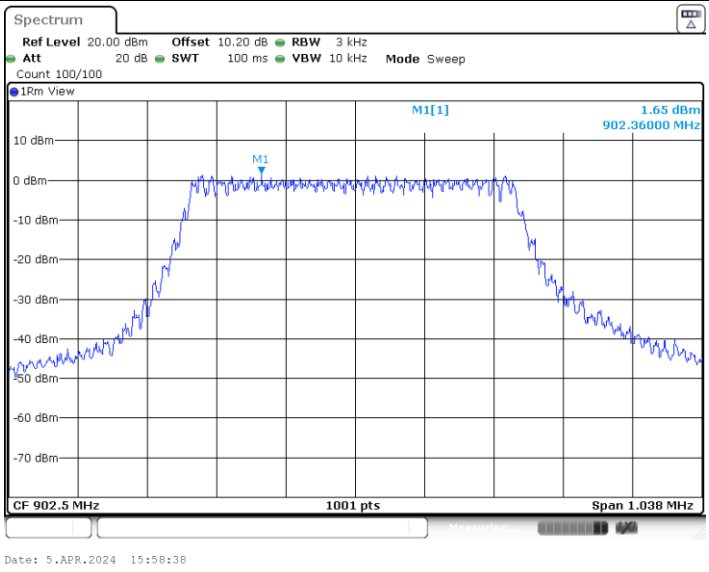

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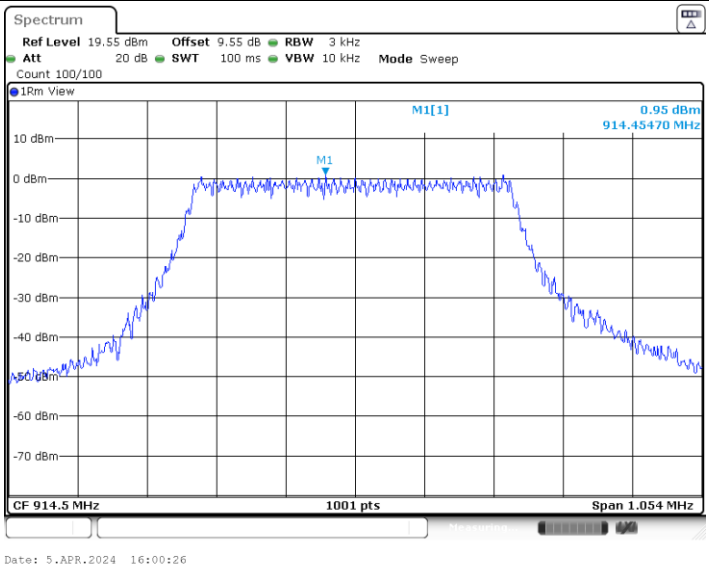

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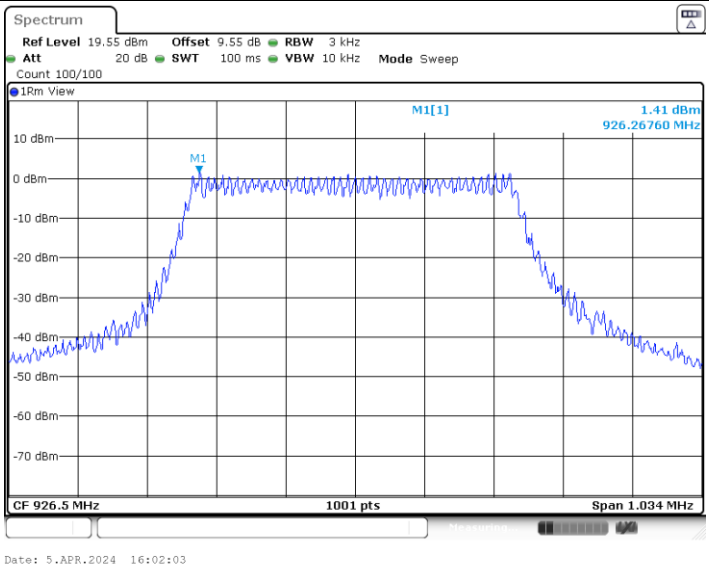
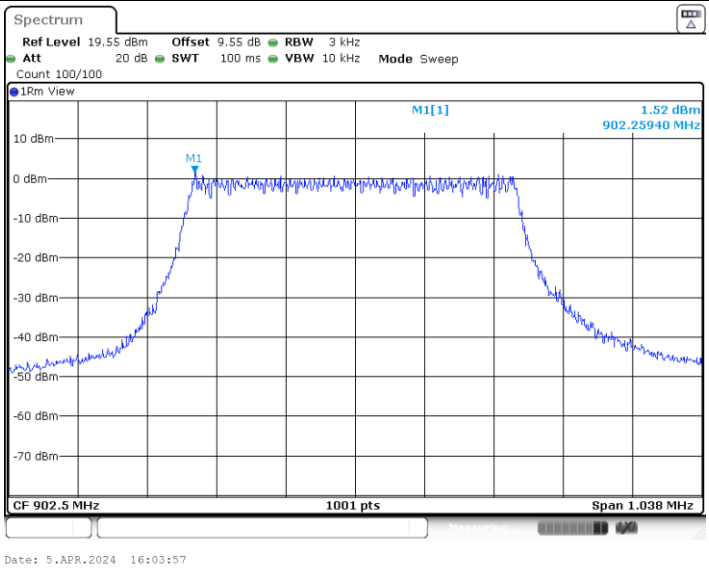


DTS-SF10_Ant1_902.5



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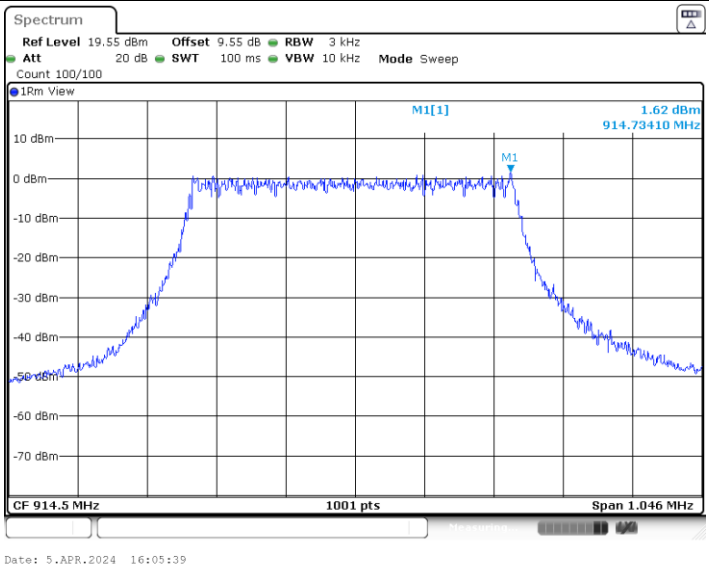

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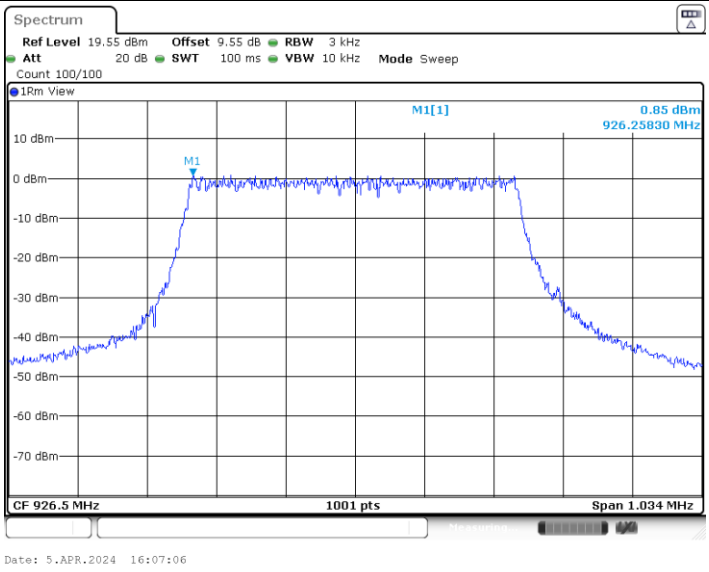
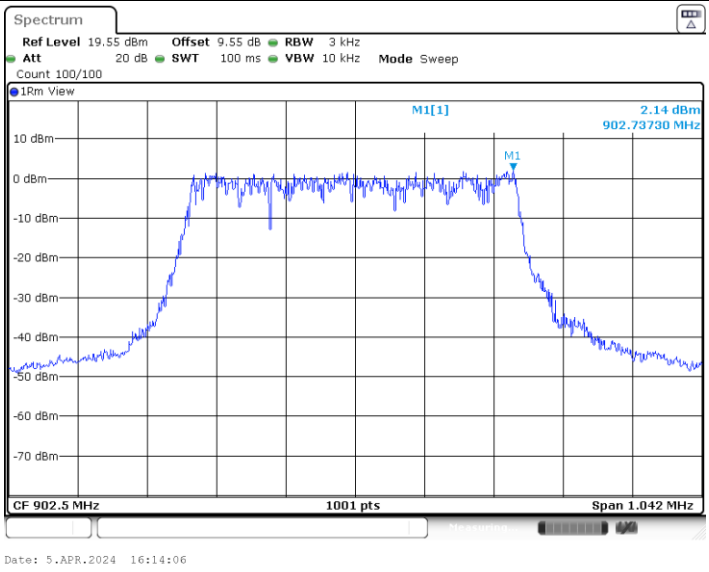


DTS-SF11_Ant1_902.5



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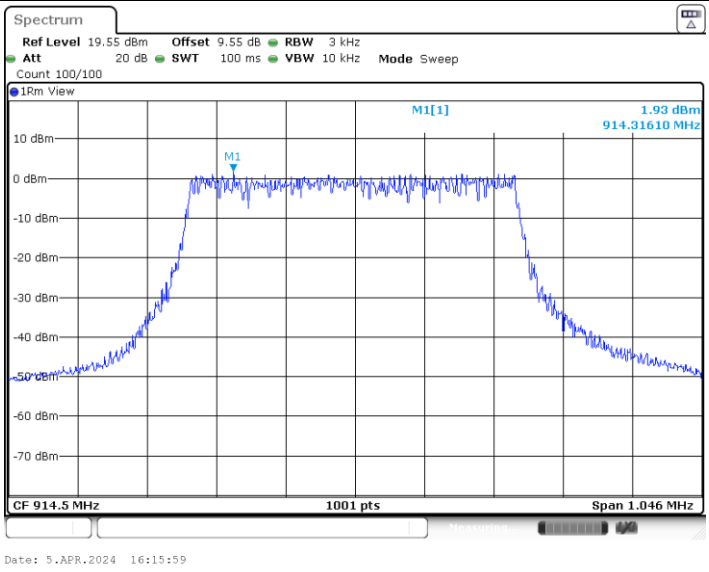
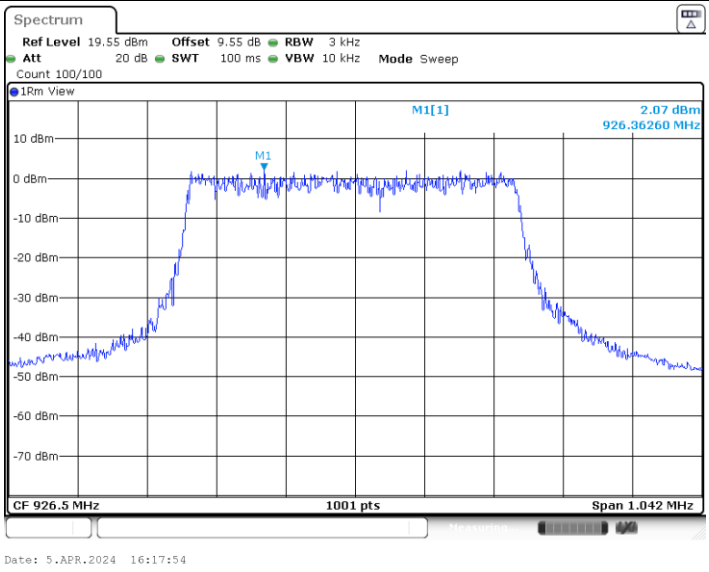
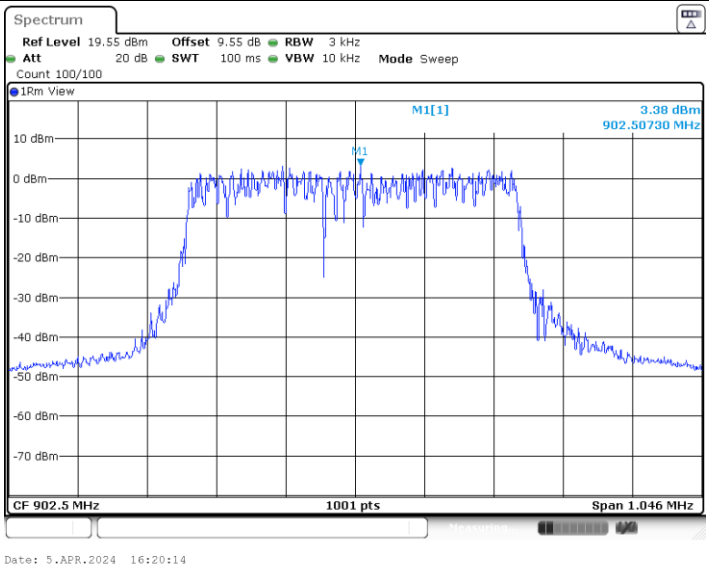


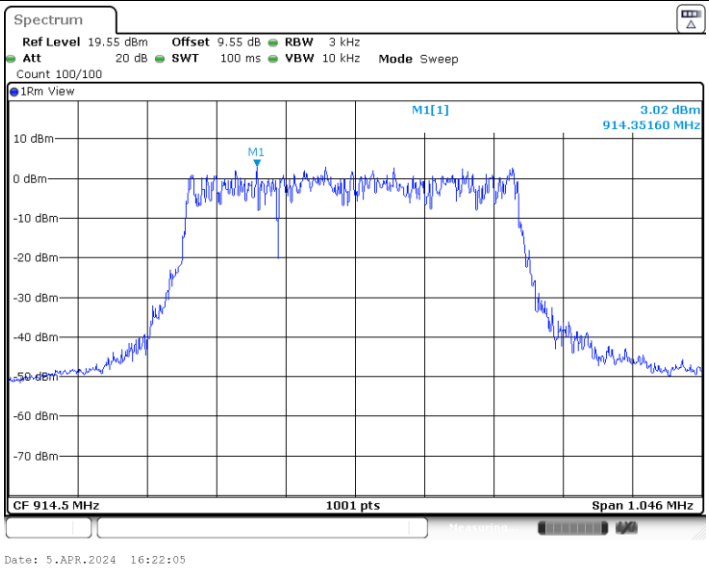
DTS-SF11_Ant1_926.5



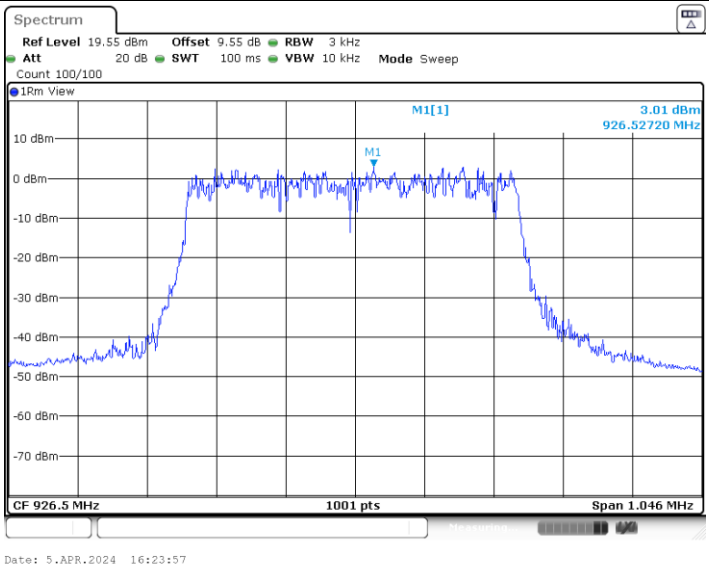
DTS-SF12_Ant1_902.5



DTS-SF12_Ant1_914.5



DTS-SF12_Ant1_926.5



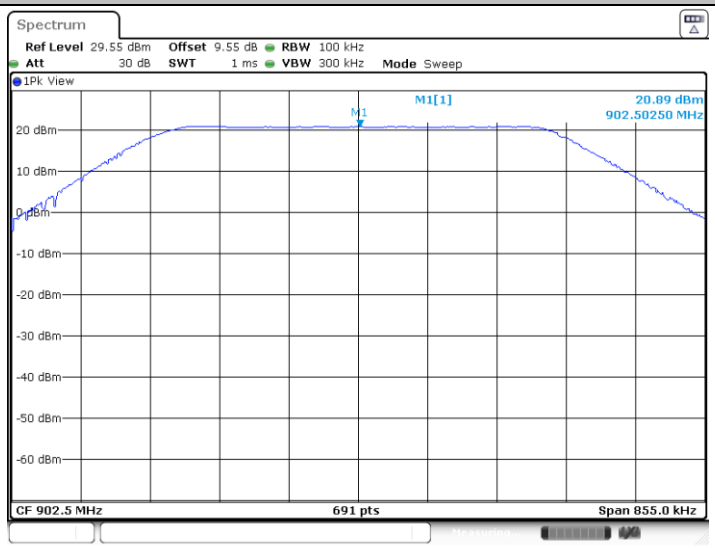
Reference level measurement

Test Result

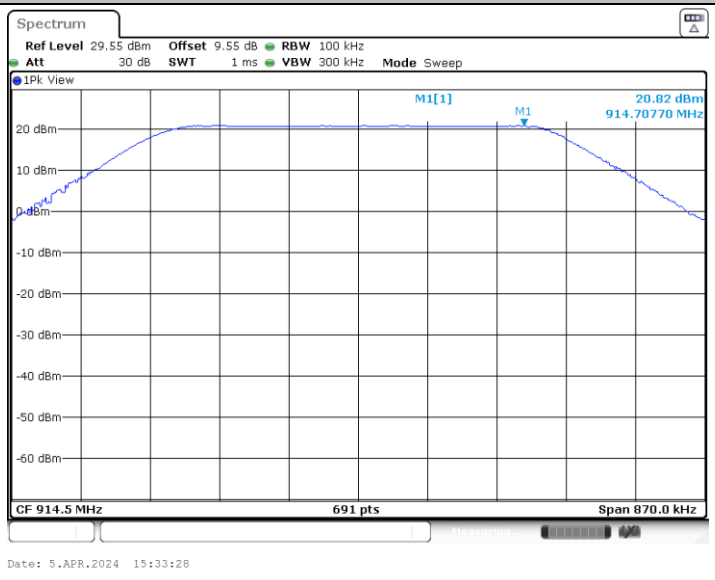
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
DTS-SF5	Ant1	902.5	902.50	20.89
		914.5	914.71	20.82
		926.5	926.50	21.12
DTS-SF6	Ant1	902.5	902.50	20.88
		914.5	914.50	20.83
		926.5	926.29	21.10
DTS-SF7	Ant1	902.5	902.28	20.88
		914.5	914.72	20.83
		926.5	926.29	21.12
DTS-SF8	Ant1	902.5	902.26	20.87
		914.5	914.52	20.79
		926.5	926.26	21.08
DTS-SF9	Ant1	902.5	902.26	20.84
		914.5	914.27	20.76
		926.5	926.27	21.07
DTS-SF10	Ant1	902.5	902.26	20.84
		914.5	914.25	20.78
		926.5	926.28	21.06
DTS-SF11	Ant1	902.5	902.25	20.84
		914.5	914.26	20.76
		926.5	926.25	21.06
DTS-SF12	Ant1	902.5	902.25	20.84
		914.5	914.25	20.77
		926.5	926.25	21.06

Test Graphs

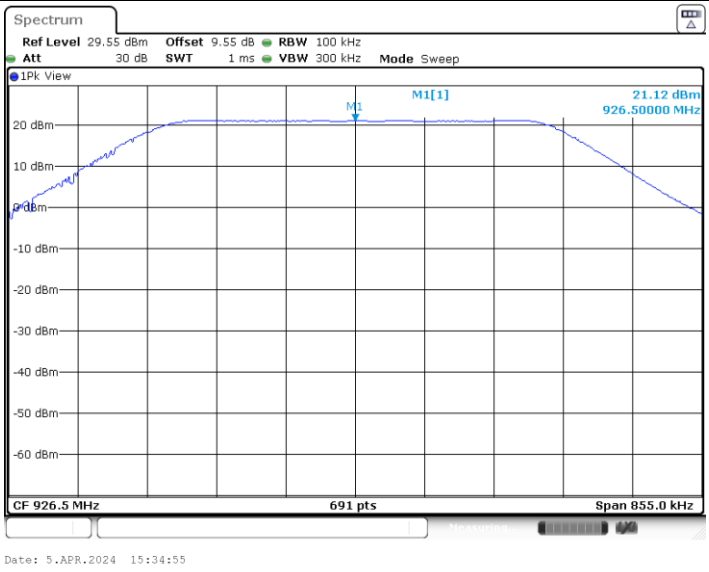
DTS-SF5_Ant1_902.5



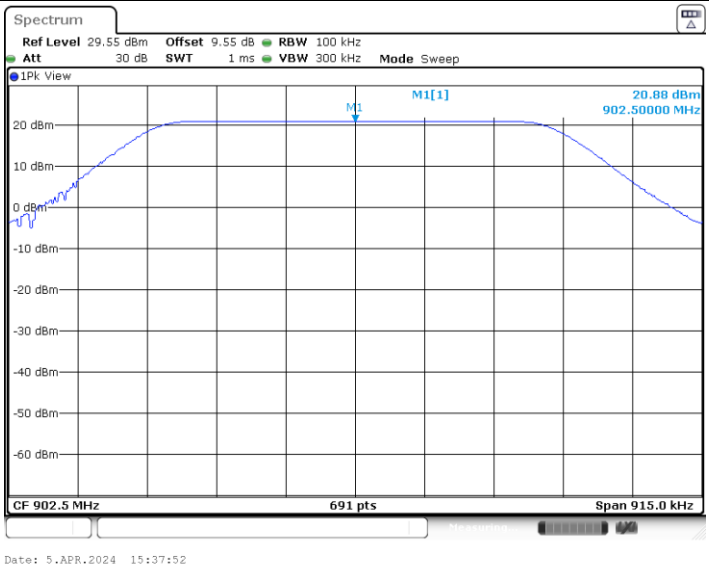
DTS-SF5_Ant1_914.5



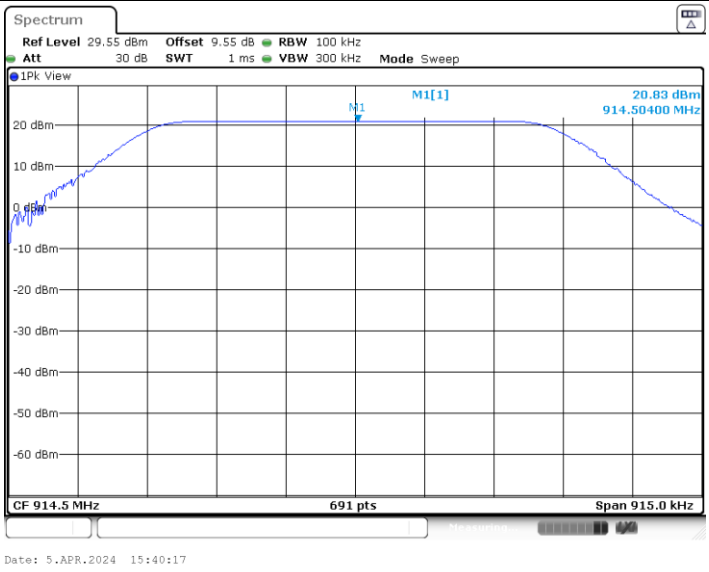
DTS-SF5_Ant1_926.5



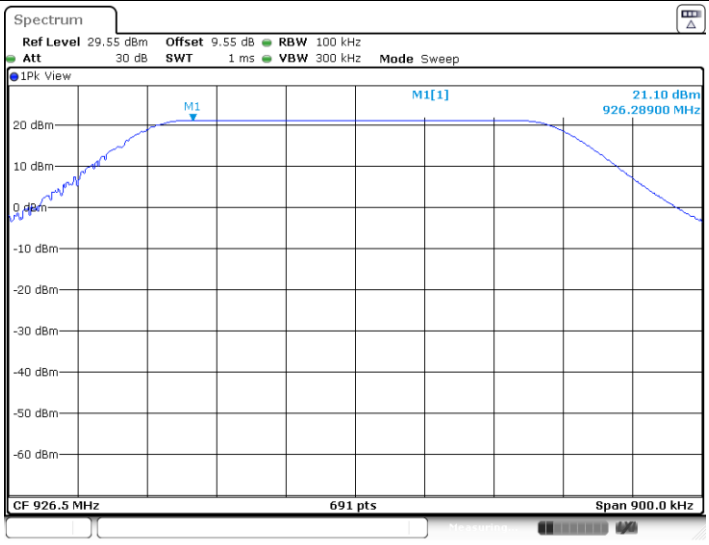
DTS-SF6_Ant1_902.5



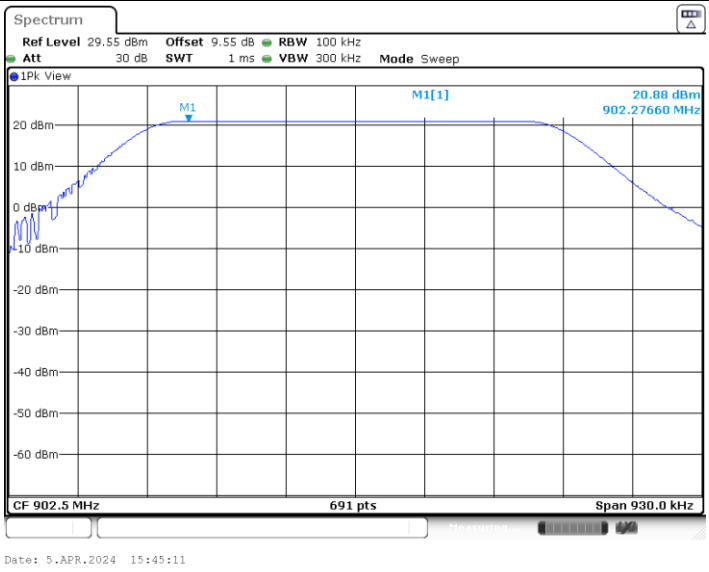
DTS-SF6_Ant1_914.5



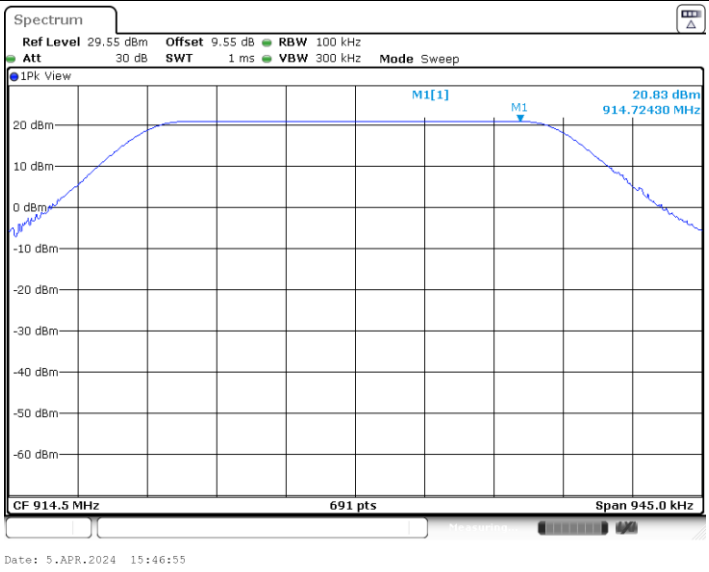
DTS-SF6_Ant1_926.5



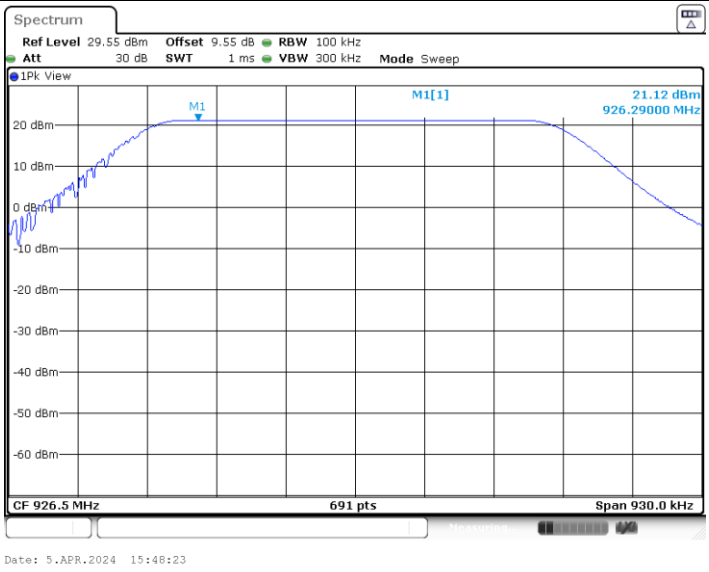
DTS-SF7_Ant1_902.5



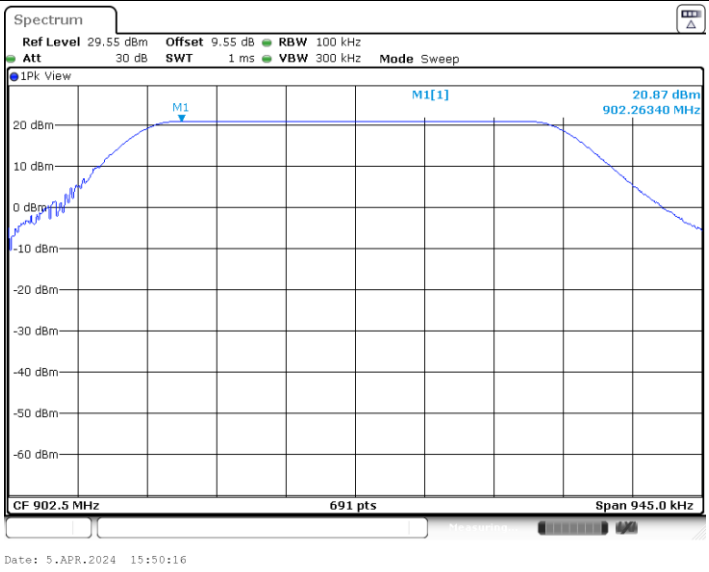
DTS-SF7_Ant1_914.5



DTS-SF7_Ant1_926.5



DTS-SF8_Ant1_902.5



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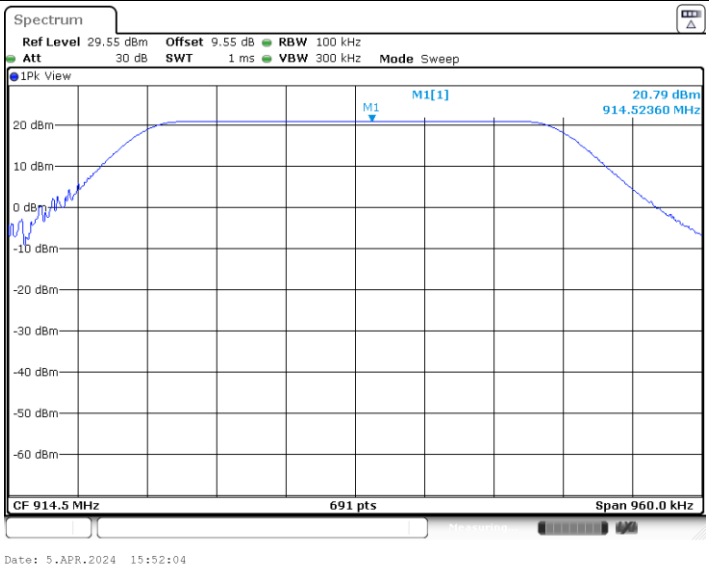

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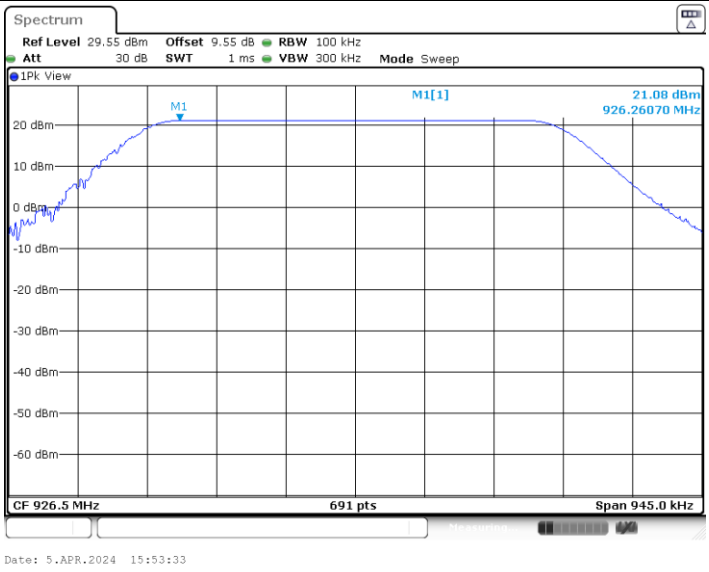

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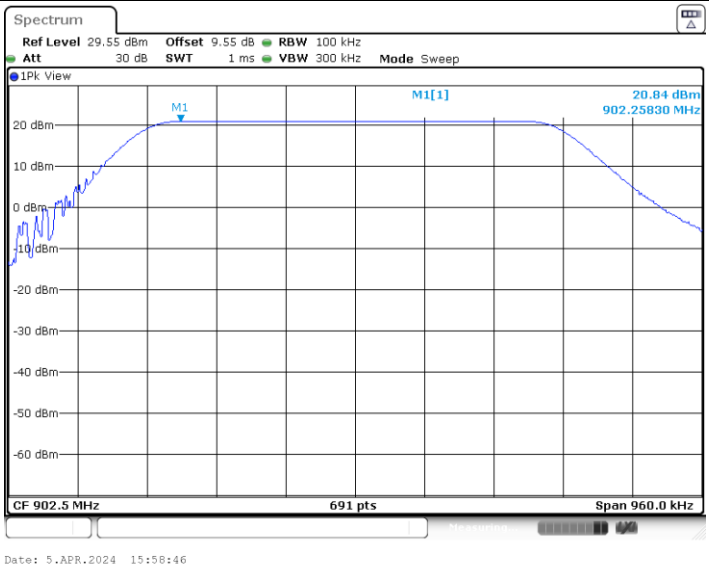

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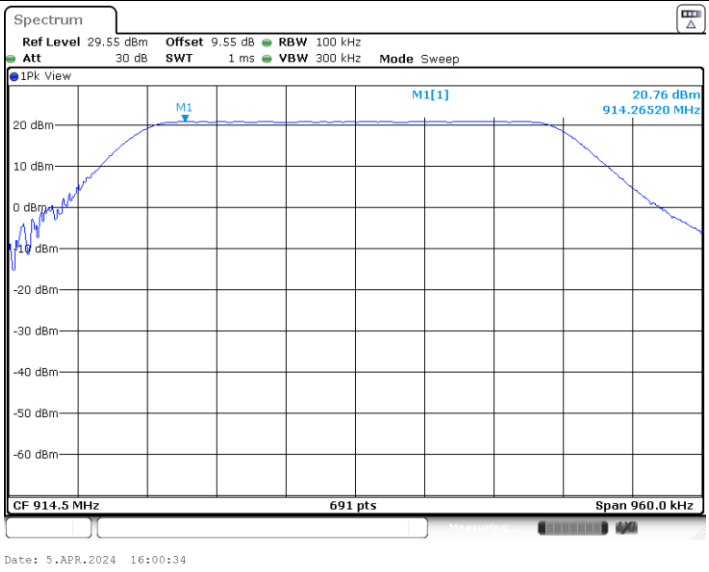

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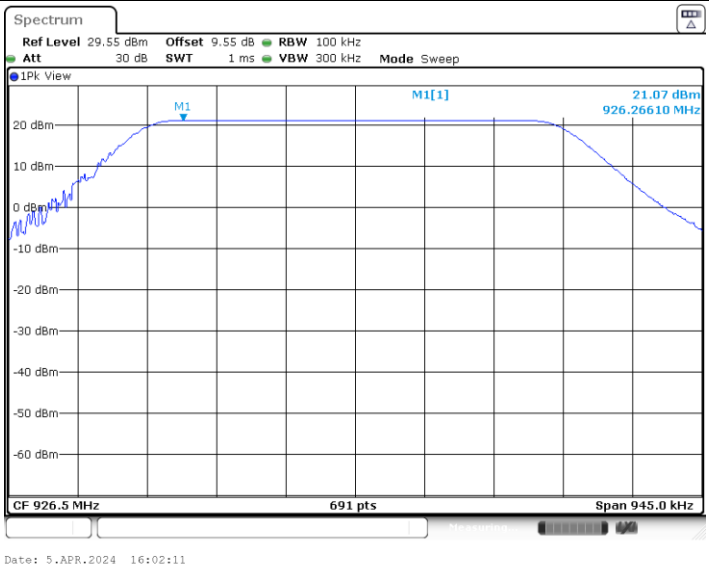

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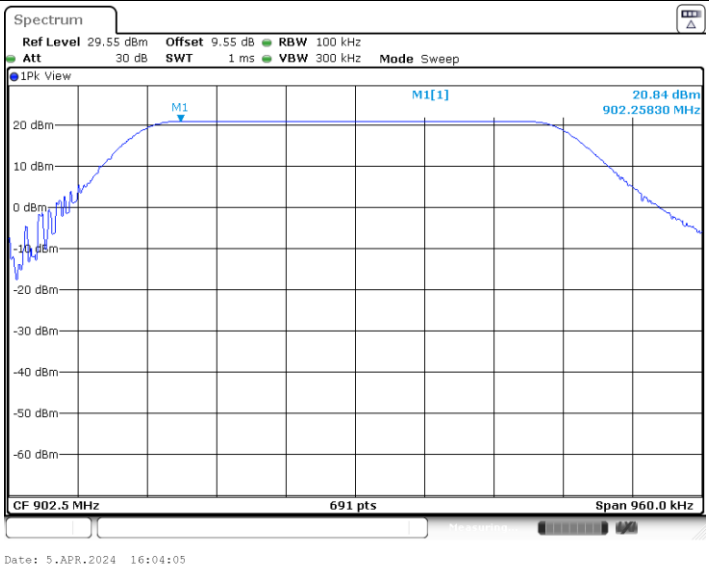

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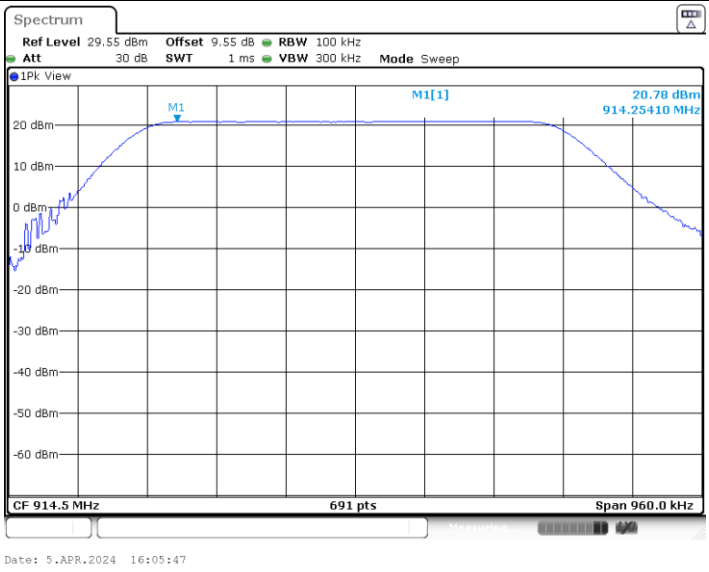

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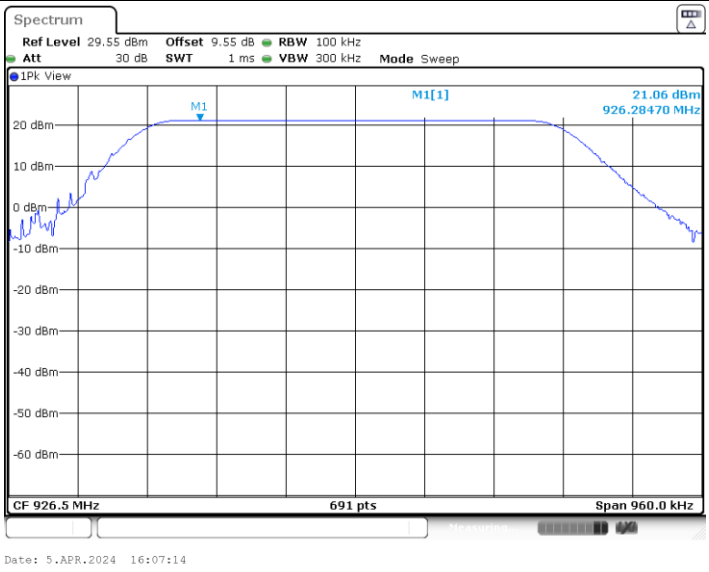

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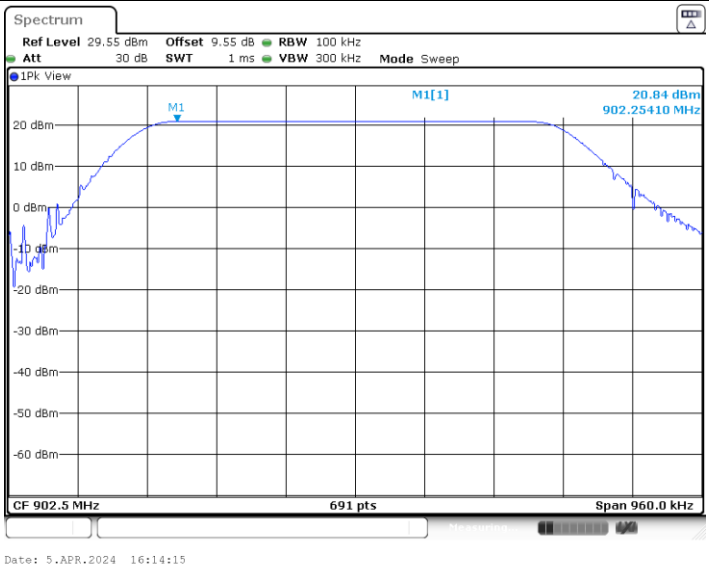

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