



FCC RF Test Report

APPLICANT : vivo Mobile Communication Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : vivo
MODEL NAME : V2242
FCC ID : 2AUCY-V2242
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Jan. 13, 2023 ~ Jan. 30, 2023

We, Sporton International Inc. (Shenzhen), 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. (Shenzhen), the test report shall not be reproduced except in full.

Jason Jia



Approved by: Jason Jia

Sporton International Inc. (ShenZhen)

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People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR311104C	Rev. 01	Initial issue of report	Feb. 20, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Report Only	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 30\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.01 dB at 2483.560 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 20.34 dB at 1.050 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

vivo Mobile Communication Co., Ltd.

No.1, vivo Road, Chang'an, Dongguan,Guangdong,China

1.2 Manufacturer

vivo Mobile Communication Co., Ltd.

No.1, vivo Road, Chang'an, Dongguan,Guangdong,China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	vivo
Model Name	V2242
FCC ID	2AUCY-V2242
IMEI Code	Conducted: 868848060190884 Conduction: 868848060193631 Radiation: 868848060193672
HW Version	MP_0.1
SW Version	PD2268EF_EX_A_13.0.4.5.W30
EUT Stage	Production Unit

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 Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Average) Output Power to antenna	802.11b : 18.80 dBm (0.0759 W) 802.11g : 16.50 dBm (0.0447 W) 802.11n HT20 : 15.50 dBm (0.0355 W)
99% Occupied Bandwidth	802.11b : 13.267MHz 802.11g : 17.143MHz 802.11n HT20 : 18.102MHz
Antenna Type / Gain	PIFA Antenna type with gain -2.10 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-SZ TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

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

- 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 (X plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		



2.2 Test Mode

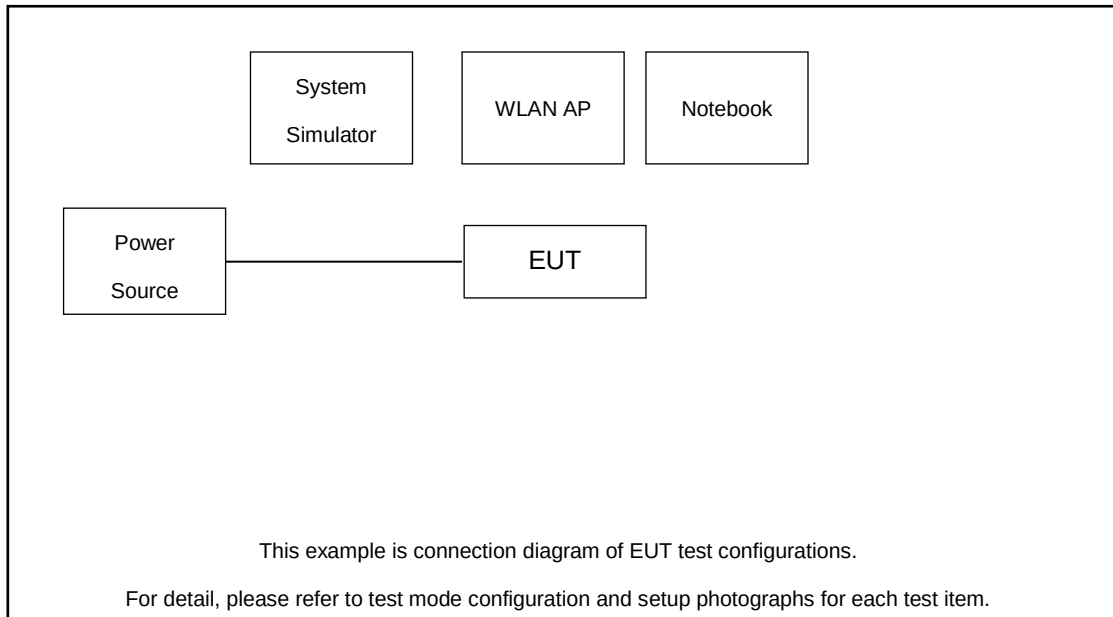
Final test modes are considering the modulation and worse data rates as below table.

Modulation		Data Rate
802.11b		1 Mbps
802.11g		6 Mbps
802.11n HT20		MCS0
Test Cases		
AC Conducted Emission	Mode 1 :GSM850 Idle + WLAN Link(2.4G) + Adapter + USB Cable + Battery	
Remark: For Radiated Test Cases, The tests were performed with Adapter and USB Cable		

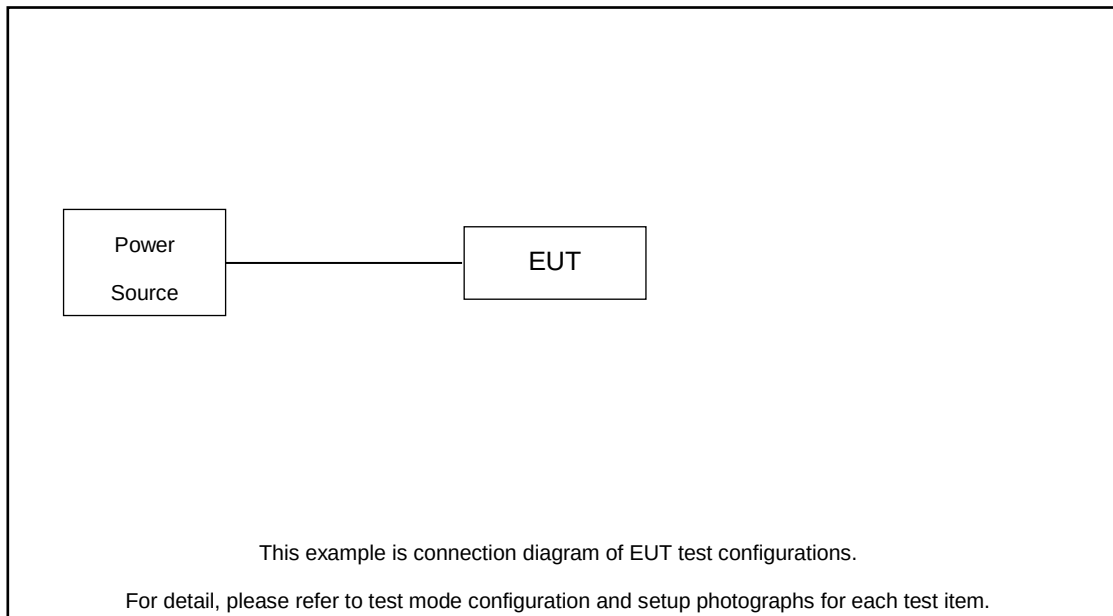
CO-location
802.11g_Tx_Ch11 + LTE Band13_BW_20M_Tx

2.3 Connection Diagram of Test System

For AC Conducted Emission:



For Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
3.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m

2.5 EUT Operation Test Setup

For WLAN RF test items, an 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 and attenuator factor 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 and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 2.12 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 2.12 + 10 = 12.12 \text{ (dB)}\end{aligned}$$

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.

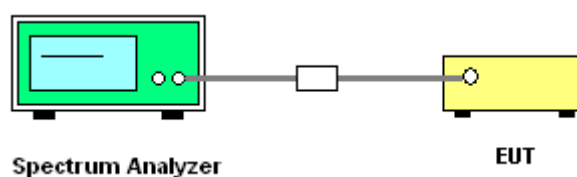
3.1.2 Measuring Instruments

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

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) = 1%~5% of OBW and set the Video bandwidth (VBW) $\geq 3 * RBW$.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 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 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with 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.

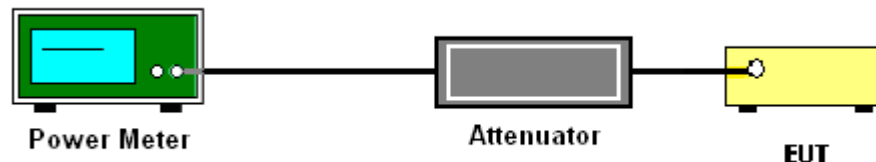
3.2.2 Measuring Instruments

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

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**

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
					Ant 22	Ant 22	Ant 22	Ant 22	Ant 22	
11b	1Mbps	1	1	2412	18.80	30.00	-2.10	16.70	36.00	Pass
11b	1Mbps	1	6	2437	18.70	30.00	-2.10	16.60	36.00	Pass
11b	1Mbps	1	11	2462	18.70	30.00	-2.10	16.60	36.00	Pass
11g	6Mbps	1	1	2412	14.30	30.00	-2.10	12.20	36.00	Pass
11g	6Mbps	1	6	2437	16.50	30.00	-2.10	14.40	36.00	Pass
11g	6Mbps	1	11	2462	13.60	30.00	-2.10	11.50	36.00	Pass
HT20	MCS0	1	1	2412	14.10	30.00	-2.10	12.00	36.00	Pass
HT20	MCS0	1	6	2437	15.50	30.00	-2.10	13.40	36.00	Pass
HT20	MCS0	1	11	2462	13.40	30.00	-2.10	11.30	36.00	Pass

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.

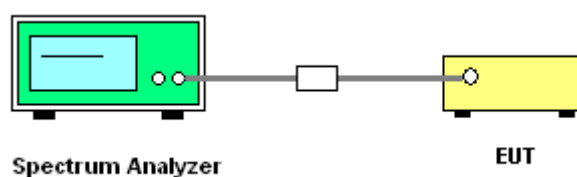
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
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 = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

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 Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

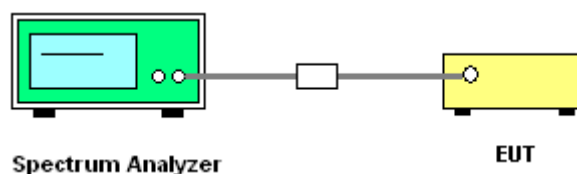
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
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 and Spurious Emission

Please refer to Appendix A.

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

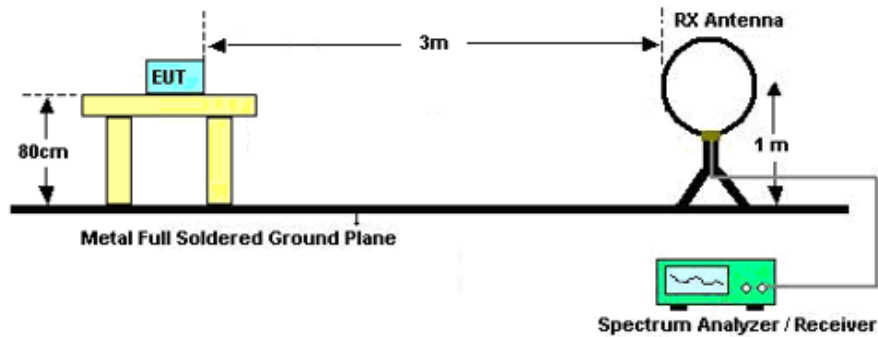
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

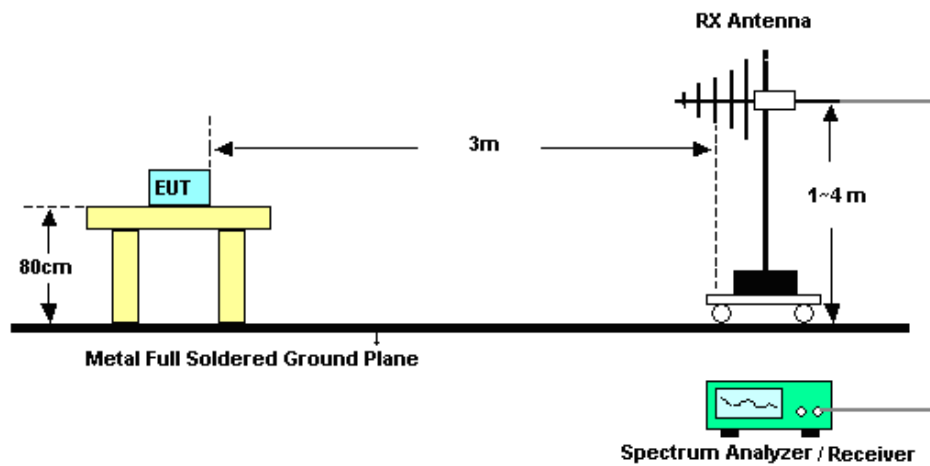
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 peak 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; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, 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

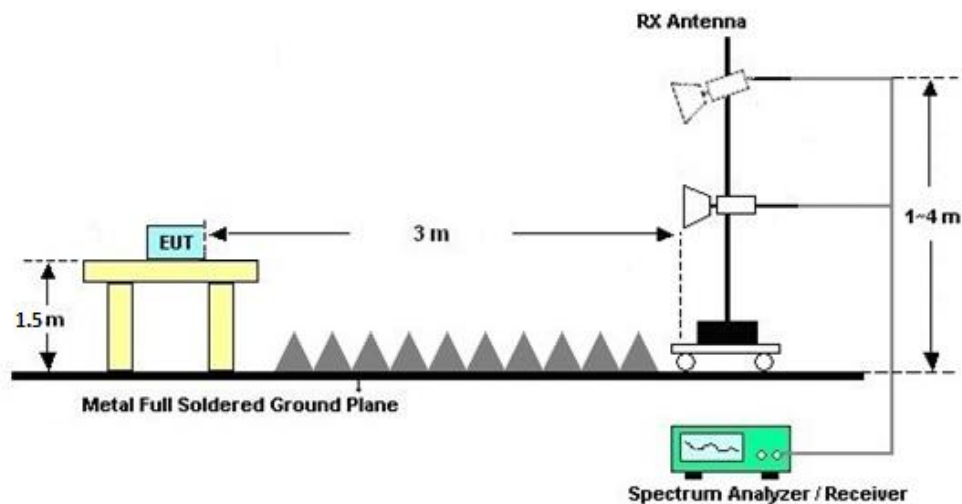
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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 Duty Cycle

Please refer to Appendix E.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C&D.

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 (dB μ V)	
	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.

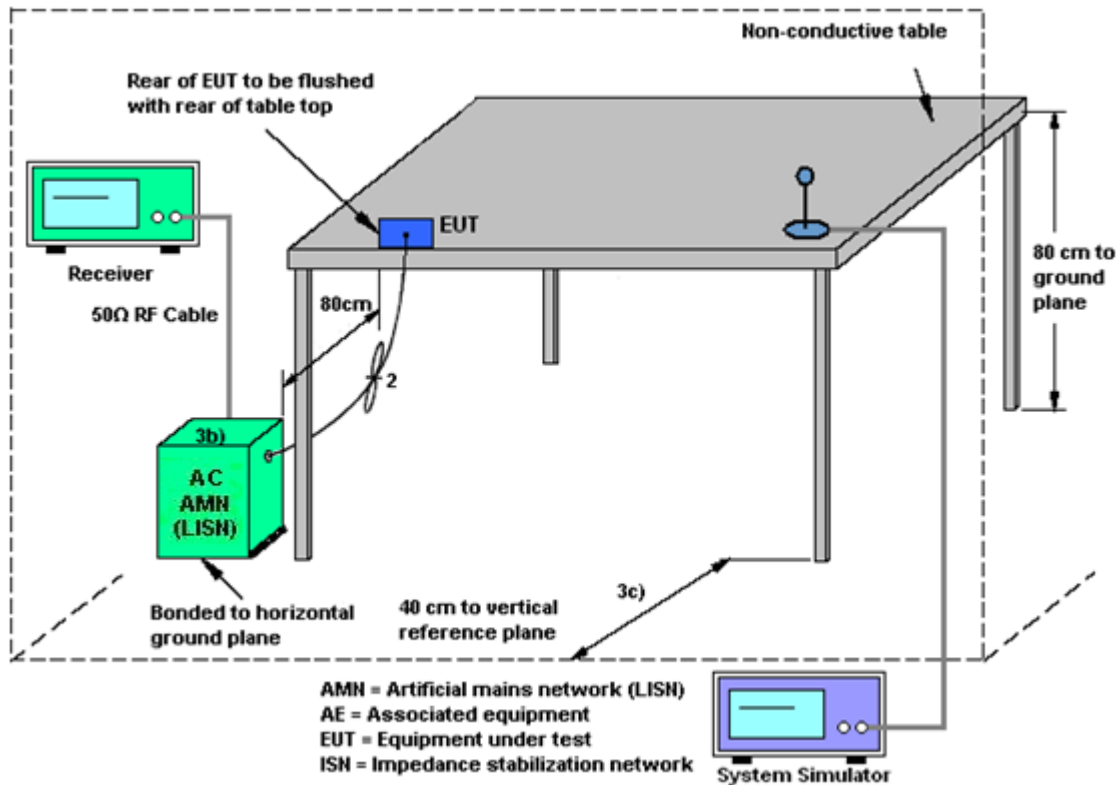
3.6.2 Measuring Instruments

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, and it 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.

3.6.4 Test Setup



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	101078	10Hz~40GHz	Apr. 07, 2022	Jan. 21, 2023	Apr. 06, 2023	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	Jan. 21, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	Jan. 21, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 19, 2022	Jan. 13, 2023 Jan. 30, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2022	Jan. 13, 2023 Jan. 30, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	Jan. 13, 2023 Jan. 30, 2023	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Apr. 27, 2022	Jan. 13, 2023 Jan. 30, 2023	Apr. 26, 2023	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBEC K	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2022	Jan. 13, 2023 Jan. 30, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBEC K	BBHA9170	9170#679	15GHz~40GHz	Jul. 07, 2022	Jan. 13, 2023 Jan. 30, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2022	Jan. 13, 2023 Jan. 30, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	Jan. 13, 2023 Jan. 30, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 06, 2022	Jan. 13, 2023 Jan. 30, 2023	Jul. 05, 2023	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Sep. 30, 2022	Jan. 13, 2023 Jan. 30, 2023	Sep. 29, 2023	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Nov. 10, 2022	Jan. 13, 2023 Jan. 30, 2023	Nov. 09, 2023	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 13, 2023 Jan. 30, 2023	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 13, 2023 Jan. 30, 2023	NCR	Radiation (03CH04-SZ)
laser range finder	Lomvum	LV50	#04	NA	Oct. 09, 2022	Jan. 13, 2023 Jan. 30, 2023	Oct. 08, 2023	Radiation (03CH04-SZ)
Thermo meter	Anymetre	JR593	#12	-10℃ ~ 50℃ 10%RH ~99%RH	Dec. 29, 2022	Jan. 13, 2023 Jan. 30, 2023	Dec. 28, 2023	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 07, 2022	Jan. 16, 2023	Jul. 06, 2023	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 15, 2022	Jan. 16, 2023	Sep. 14, 2023	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 17, 2022	Jan. 16, 2023	Oct. 16, 2023	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 07, 2022	Jan. 16, 2023	Jul. 06, 2023	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

Test Item	Uncertainty
Conducted Power	± 1.34 dB
Conducted Emissions	± 1.34 dB
Occupied Channel Bandwidth	± 1.2 %
Conducted Power Spectral Density	± 1.32 dB

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.2 dB
---	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1 dB
---	--------

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8 dB
---	--------

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1 dB
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----- THE END -----



Appendix A. Conducted Test Results

**Ambient Condition:** 24~26 °C,45~55 %RH**According Standard:** ■Part15C**Test Date:**2023/1/21**Test Engineer:** Zhang Xue Yi

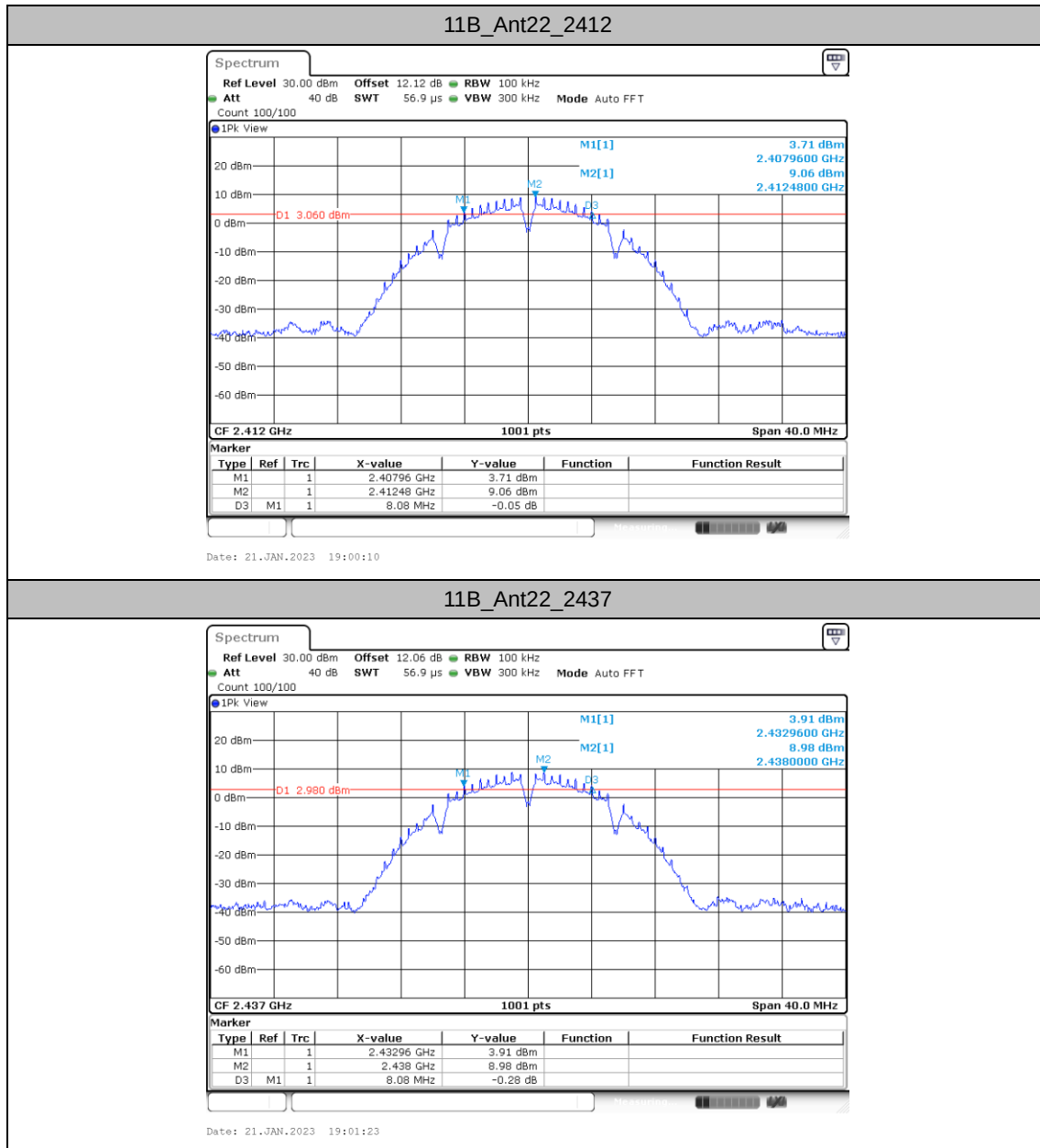
DTS Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant22	2412	8.08	2407.96	2416.04	0.5	PASS
		2437	8.08	2432.96	2441.04	0.5	PASS
		2462	8.56	2457.48	2466.04	0.5	PASS
11G	Ant22	2412	15.08	2404.44	2419.52	0.5	PASS
		2437	15.32	2429.44	2444.76	0.5	PASS
		2462	15.08	2454.48	2469.56	0.5	PASS
11N20SISO	Ant22	2412	15.44	2404.44	2419.88	0.5	PASS
		2437	15.12	2429.44	2444.56	0.5	PASS
		2462	15.12	2454.44	2469.56	0.5	PASS

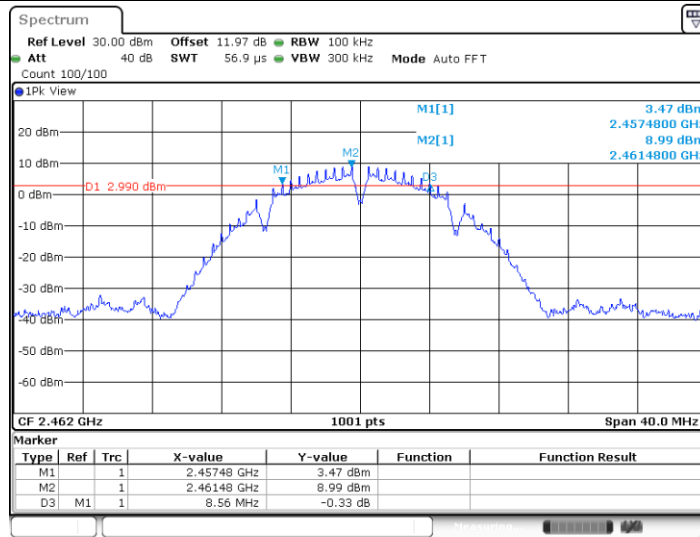


Test Graphs

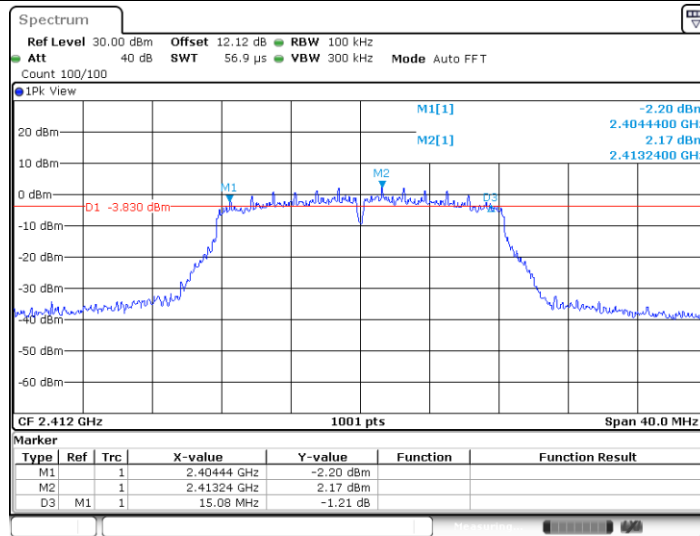


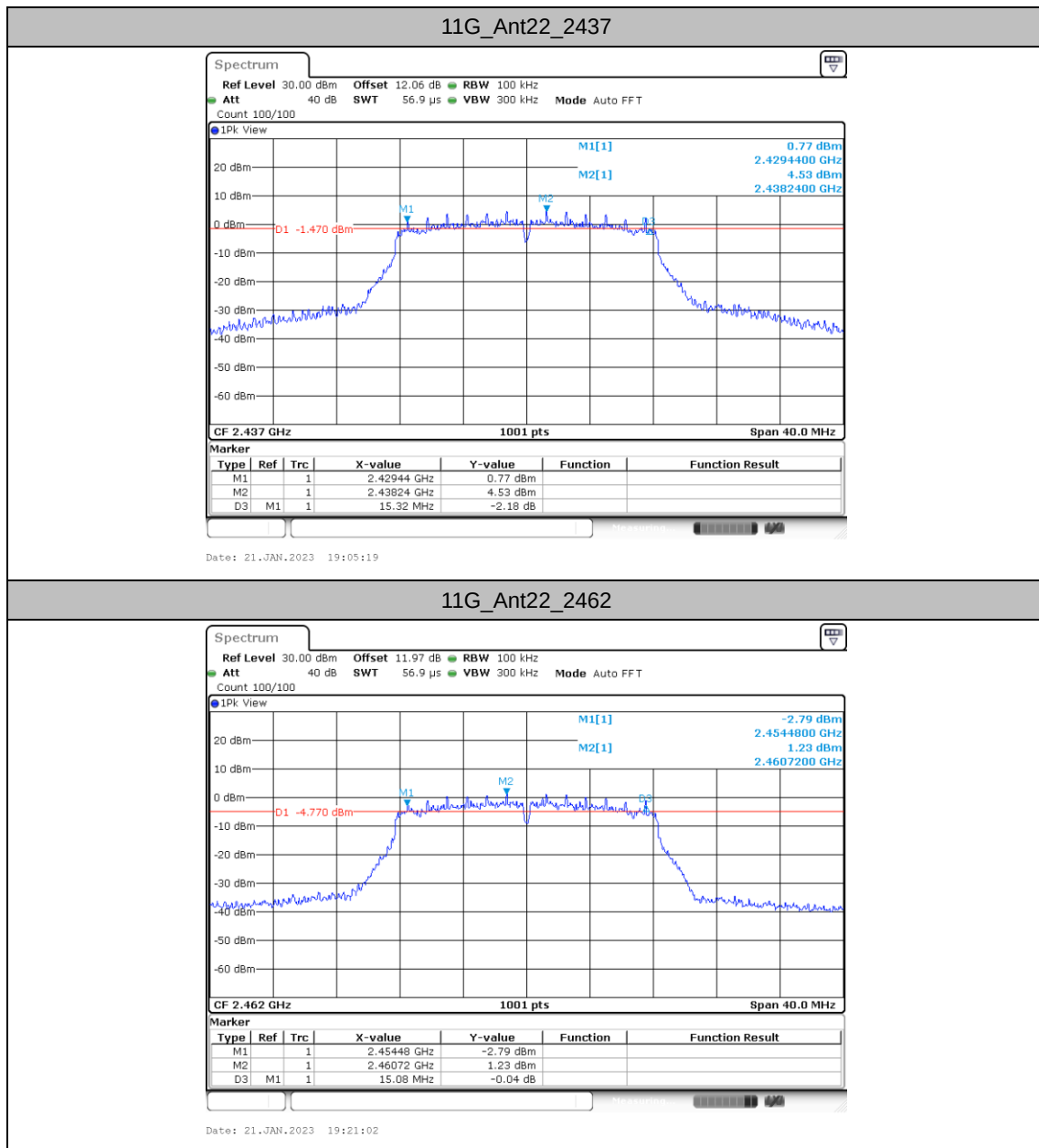


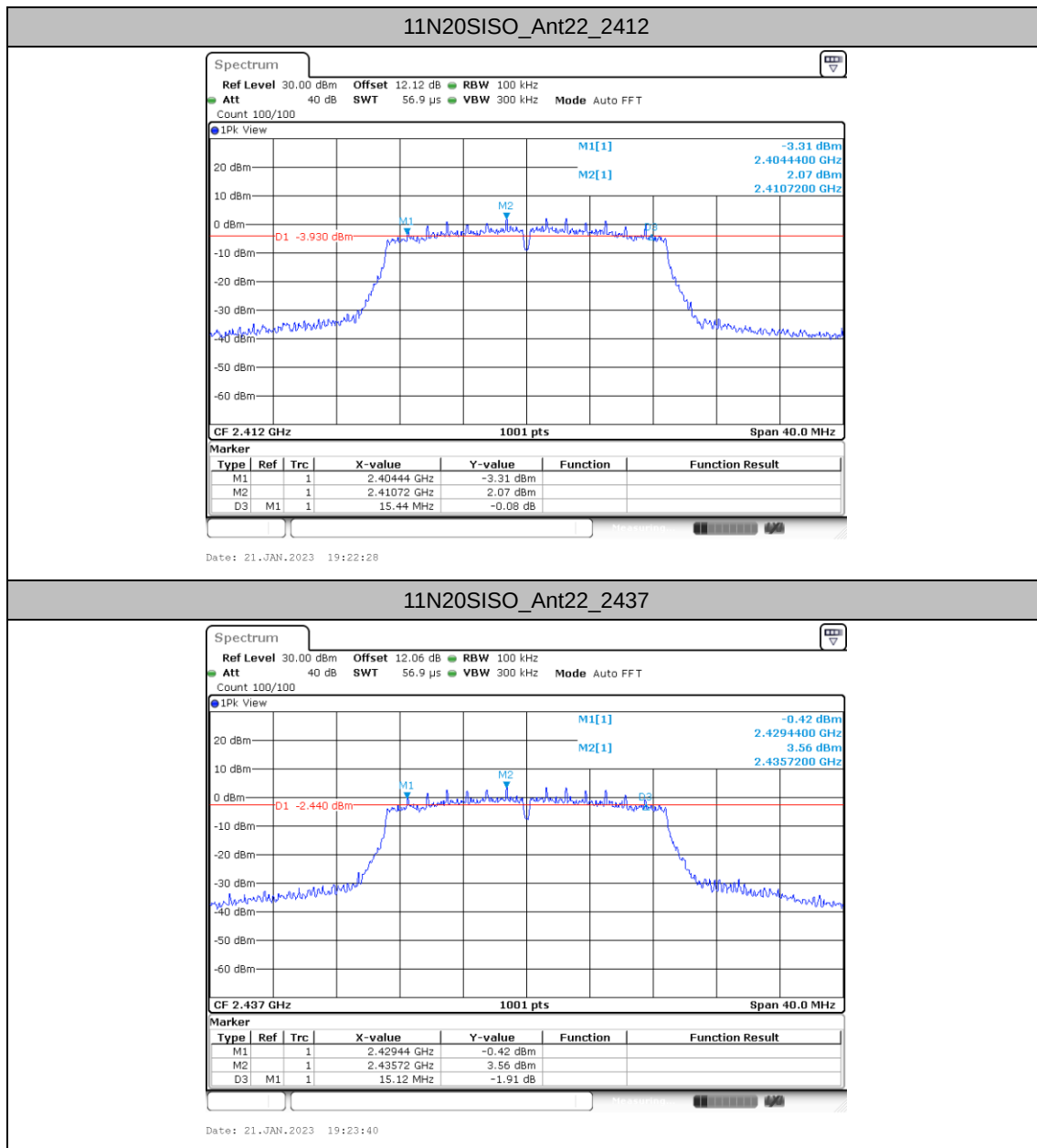
11B_Ant22_2462

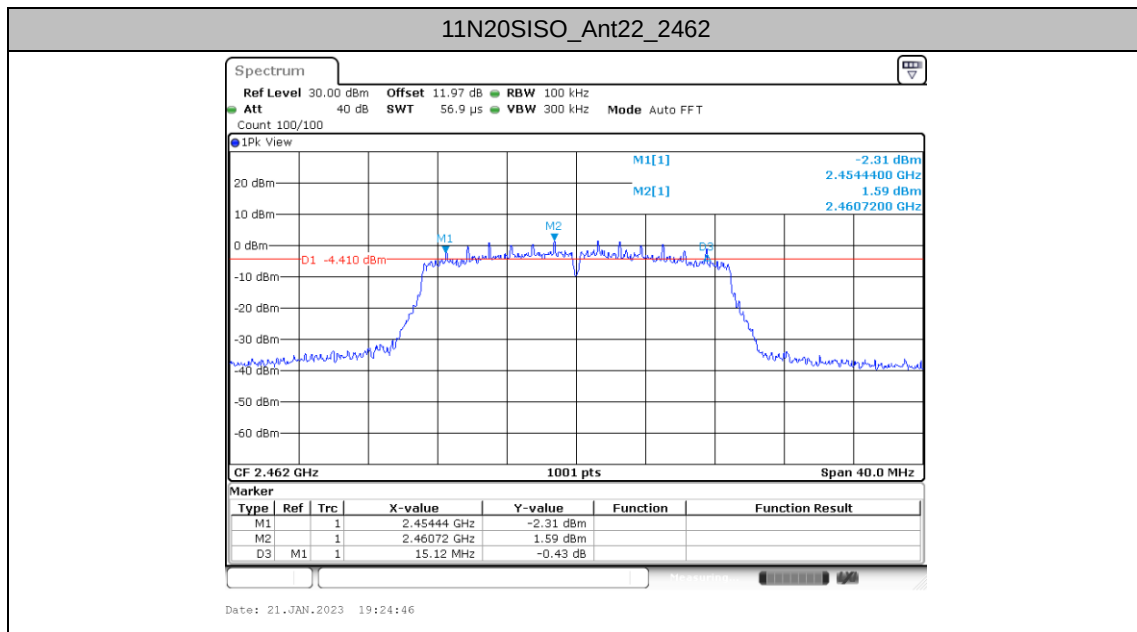


11G_Ant22_2412











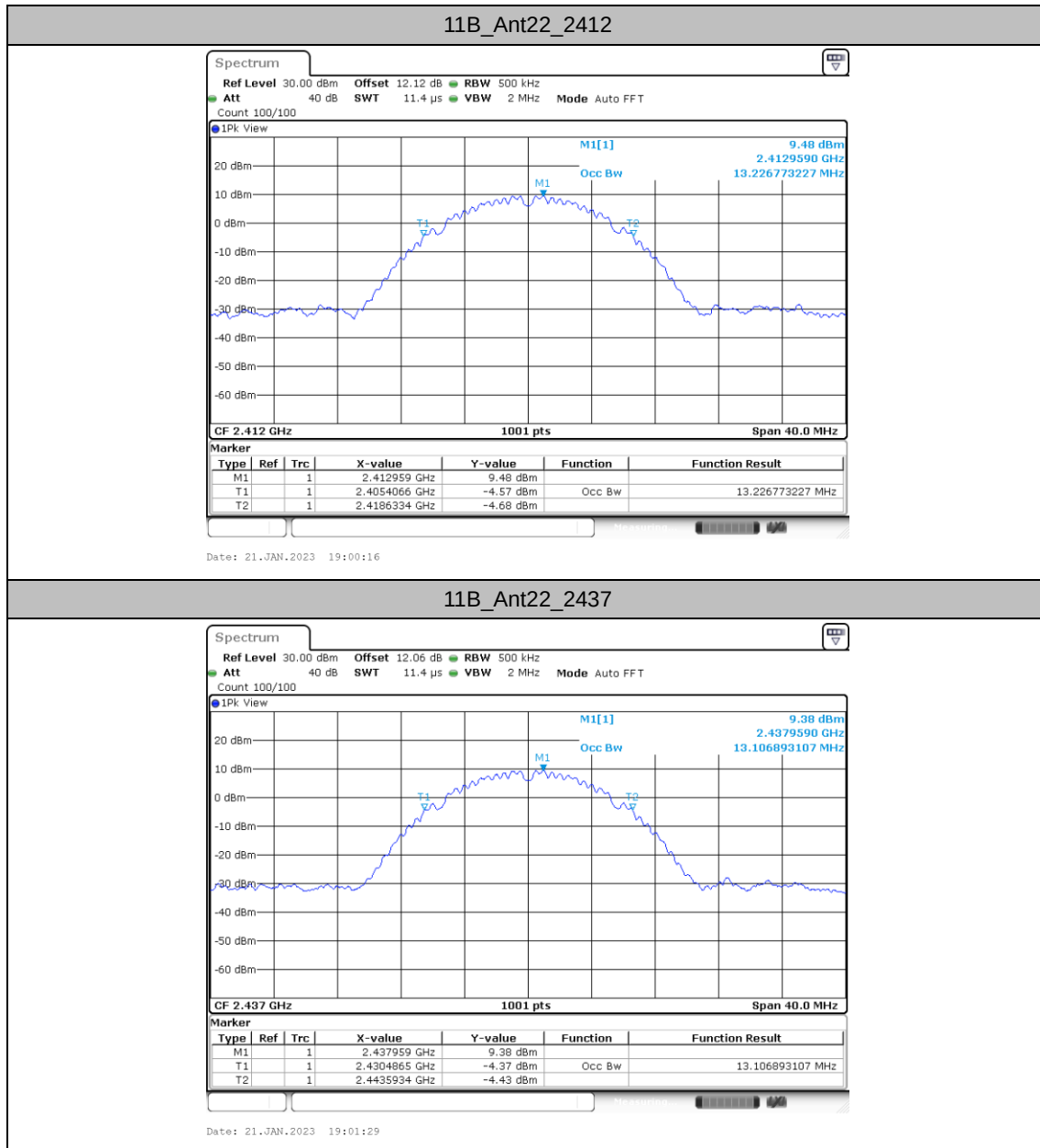
Occupied Channel Bandwidth

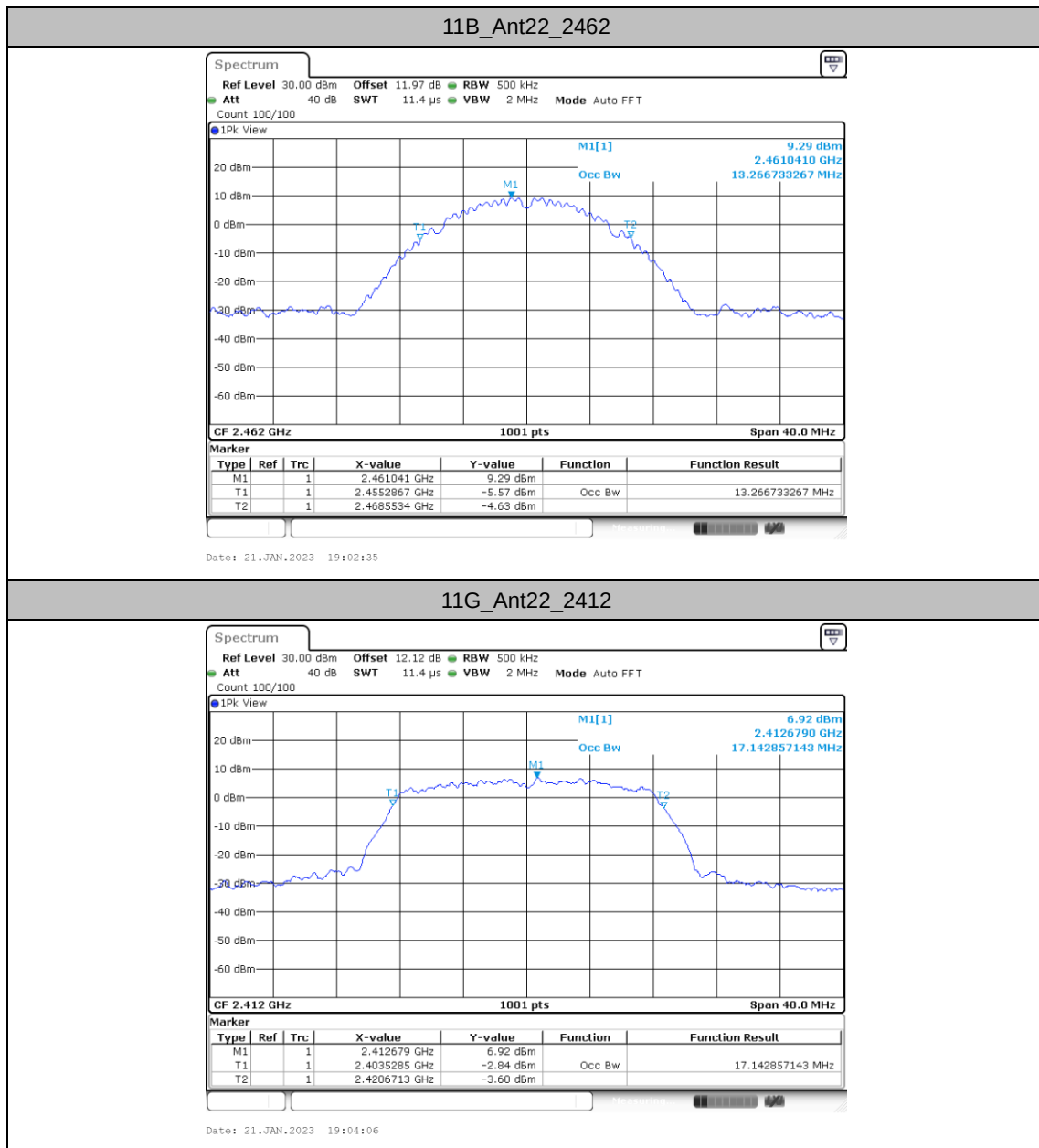
Test Result

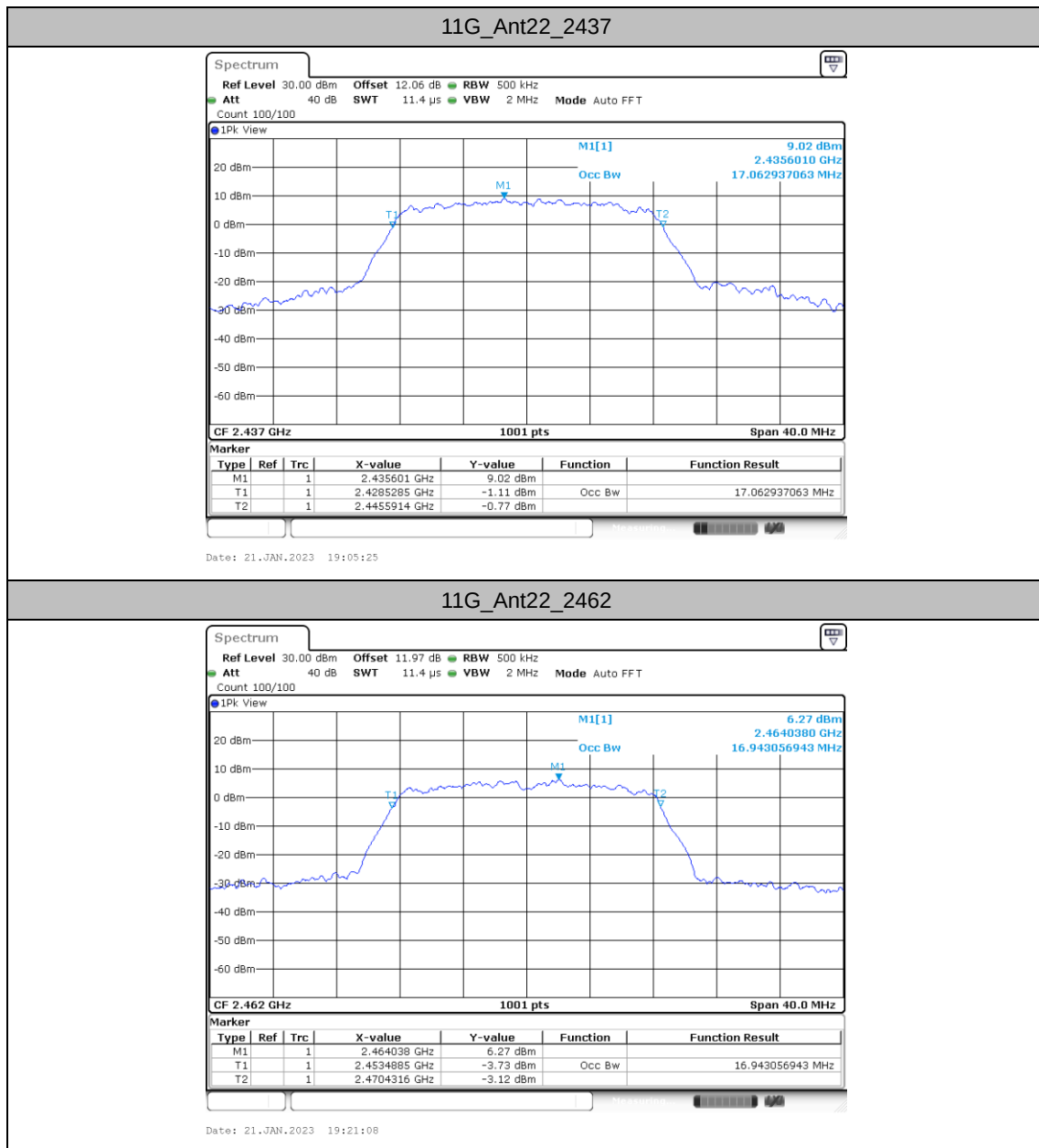
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant22	2412	13.227	2405.4066	2418.6334	---	---
		2437	13.107	2430.4865	2443.5934	---	---
		2462	13.267	2455.2867	2468.5534	---	---
11G	Ant22	2412	17.143	2403.5285	2420.6713	---	---
		2437	17.063	2428.5285	2445.5914	---	---
		2462	16.943	2453.4885	2470.4316	---	---
11N20SISO	Ant22	2412	18.102	2402.9690	2421.0709	---	---
		2437	17.862	2428.0490	2445.9111	---	---
		2462	17.982	2453.0490	2471.0310	---	---

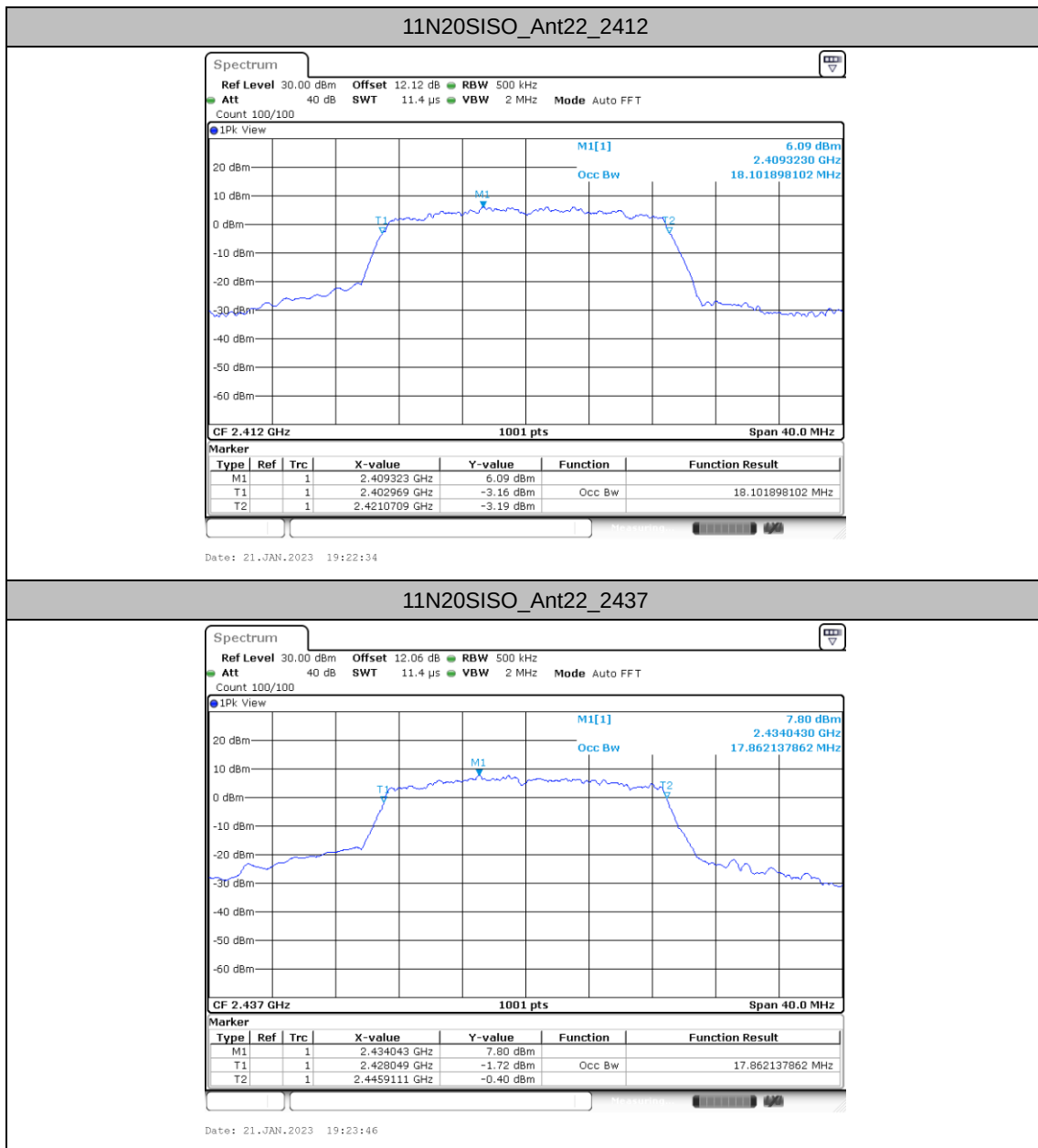


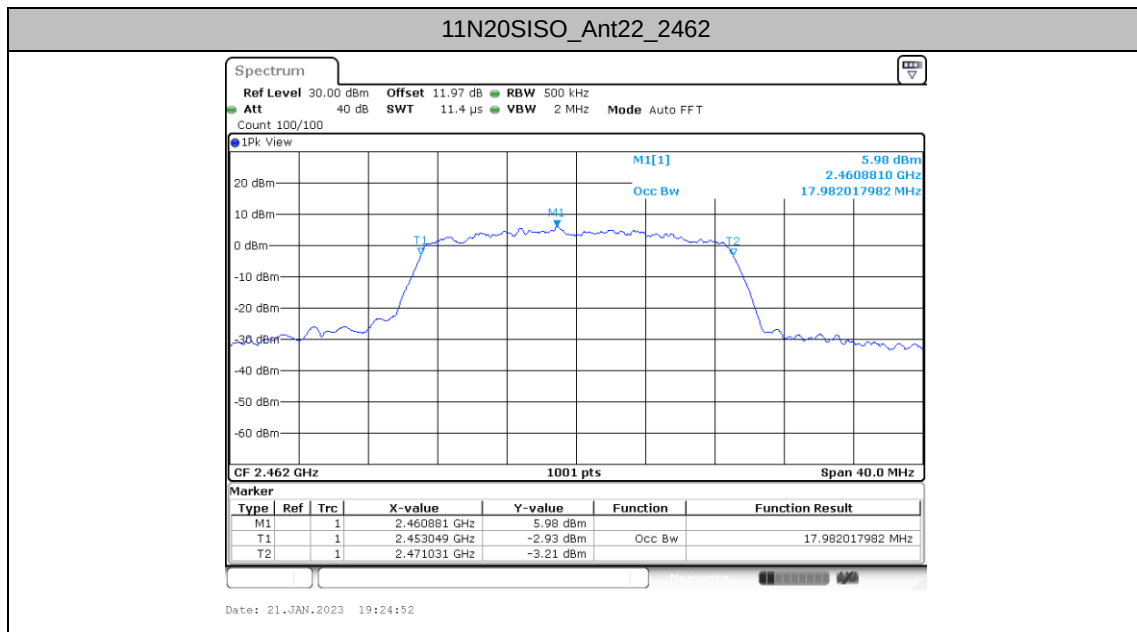
Test Graphs









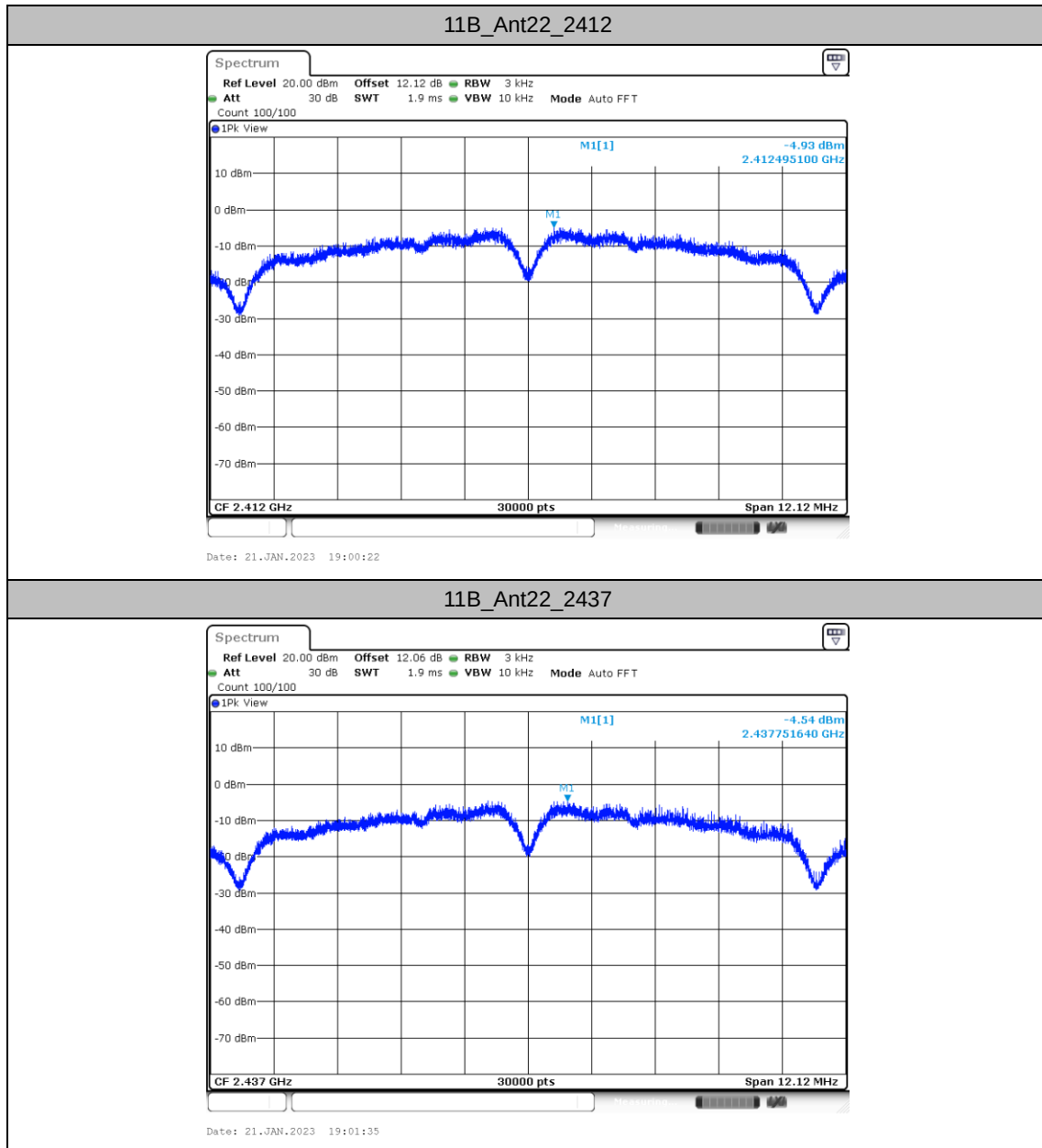


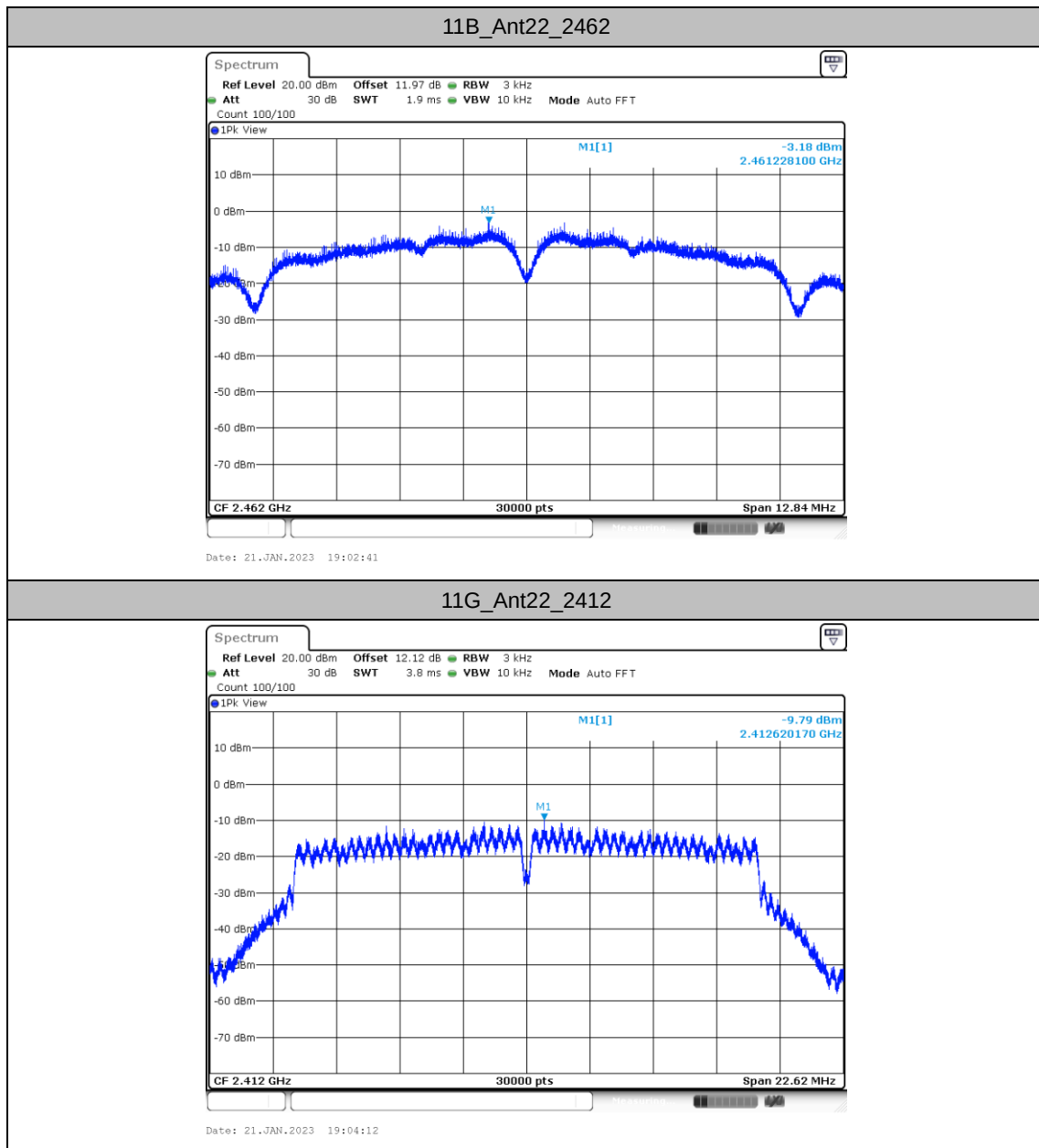
Power spectral density

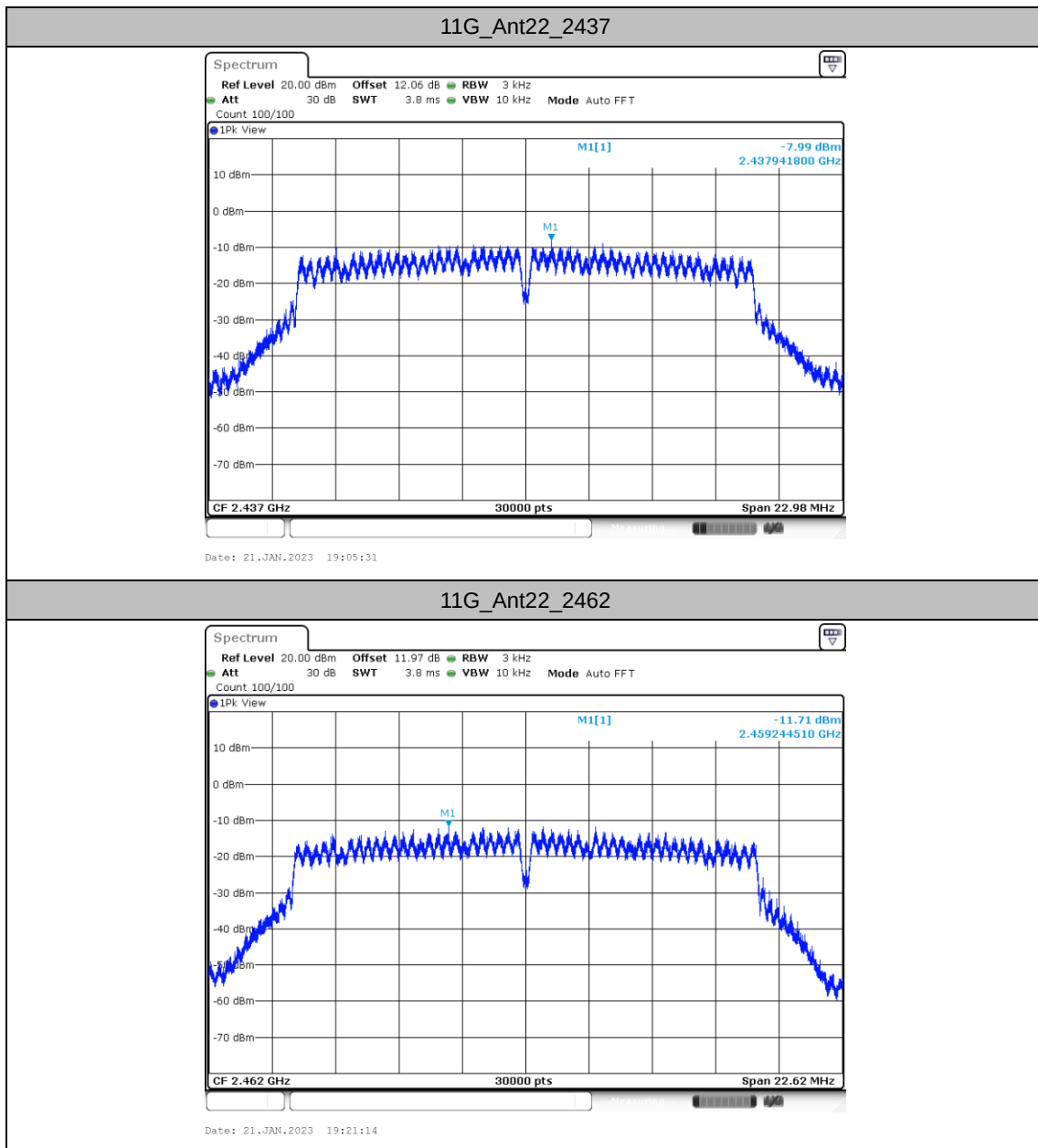
Test Result

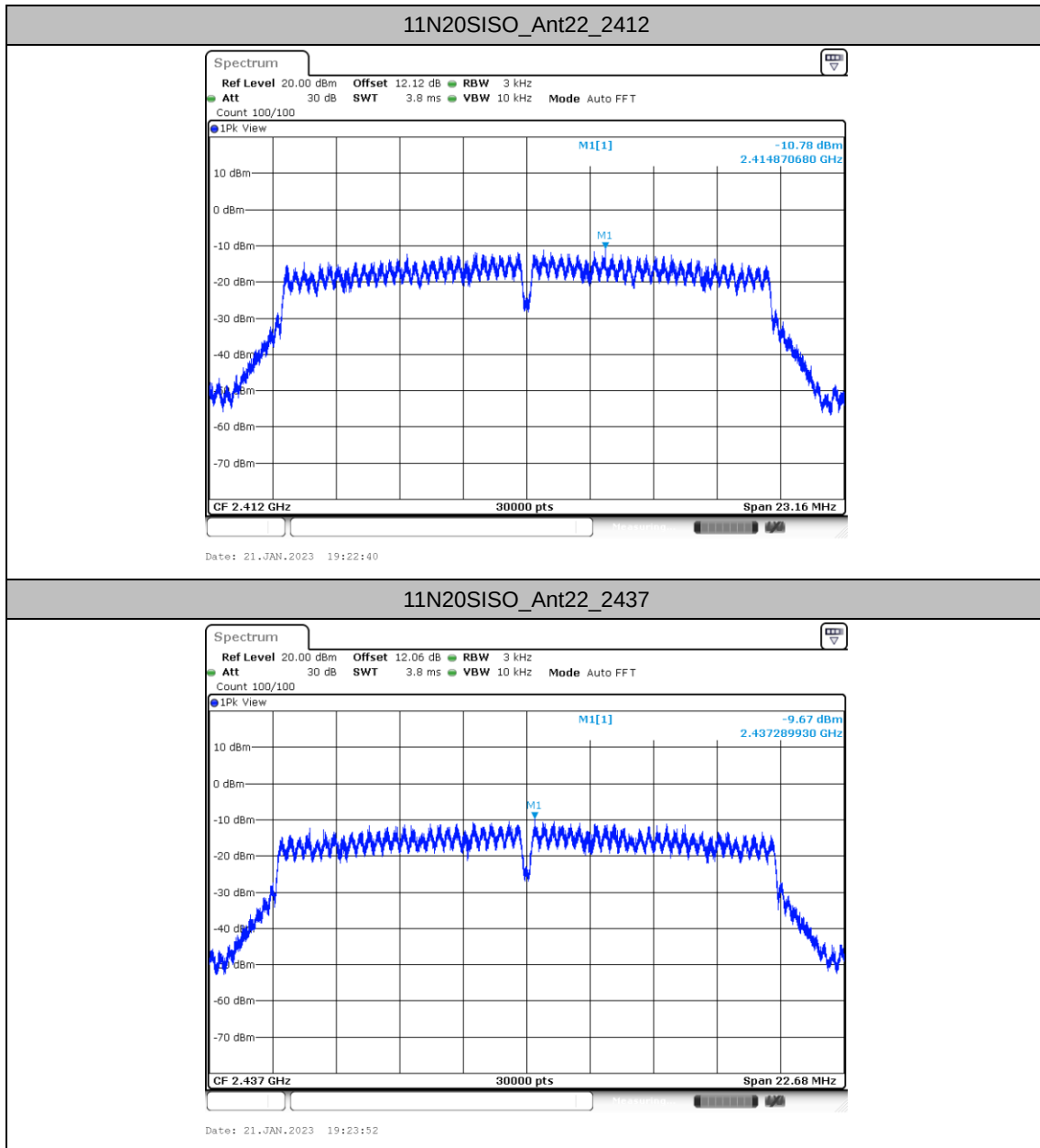
TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant22	2412	-4.93	≤8.00	PASS
		2437	-4.54	≤8.00	PASS
		2462	-3.18	≤8.00	PASS
11G	Ant22	2412	-9.79	≤8.00	PASS
		2437	-7.99	≤8.00	PASS
		2462	-11.71	≤8.00	PASS
11N20SISO	Ant22	2412	-10.78	≤8.00	PASS
		2437	-9.67	≤8.00	PASS
		2462	-12.49	≤8.00	PASS

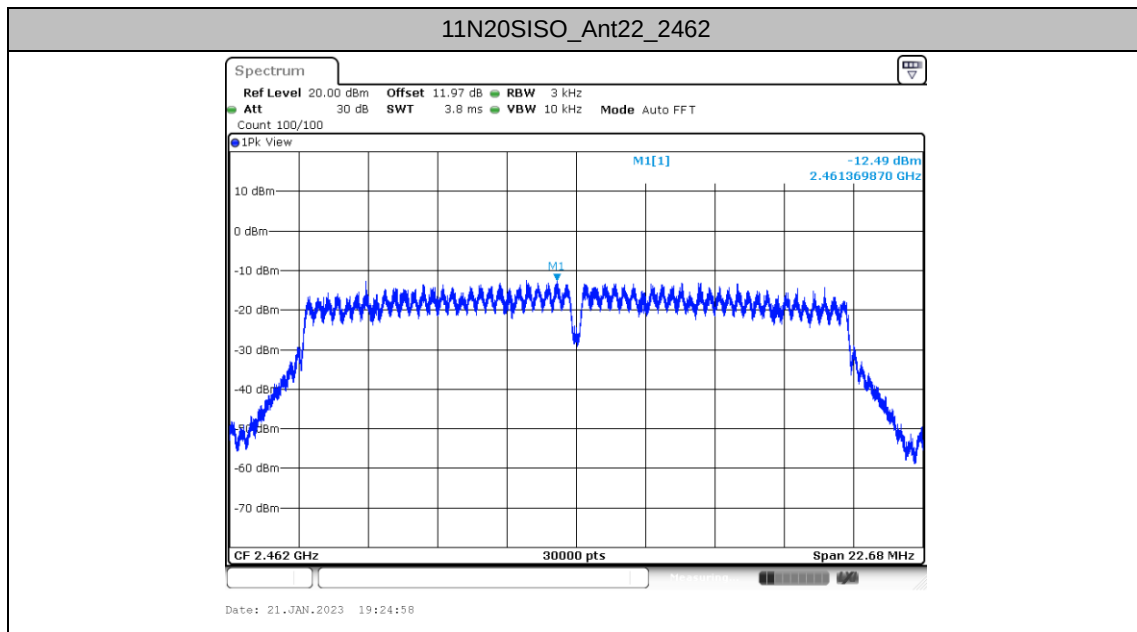
Test Graphs











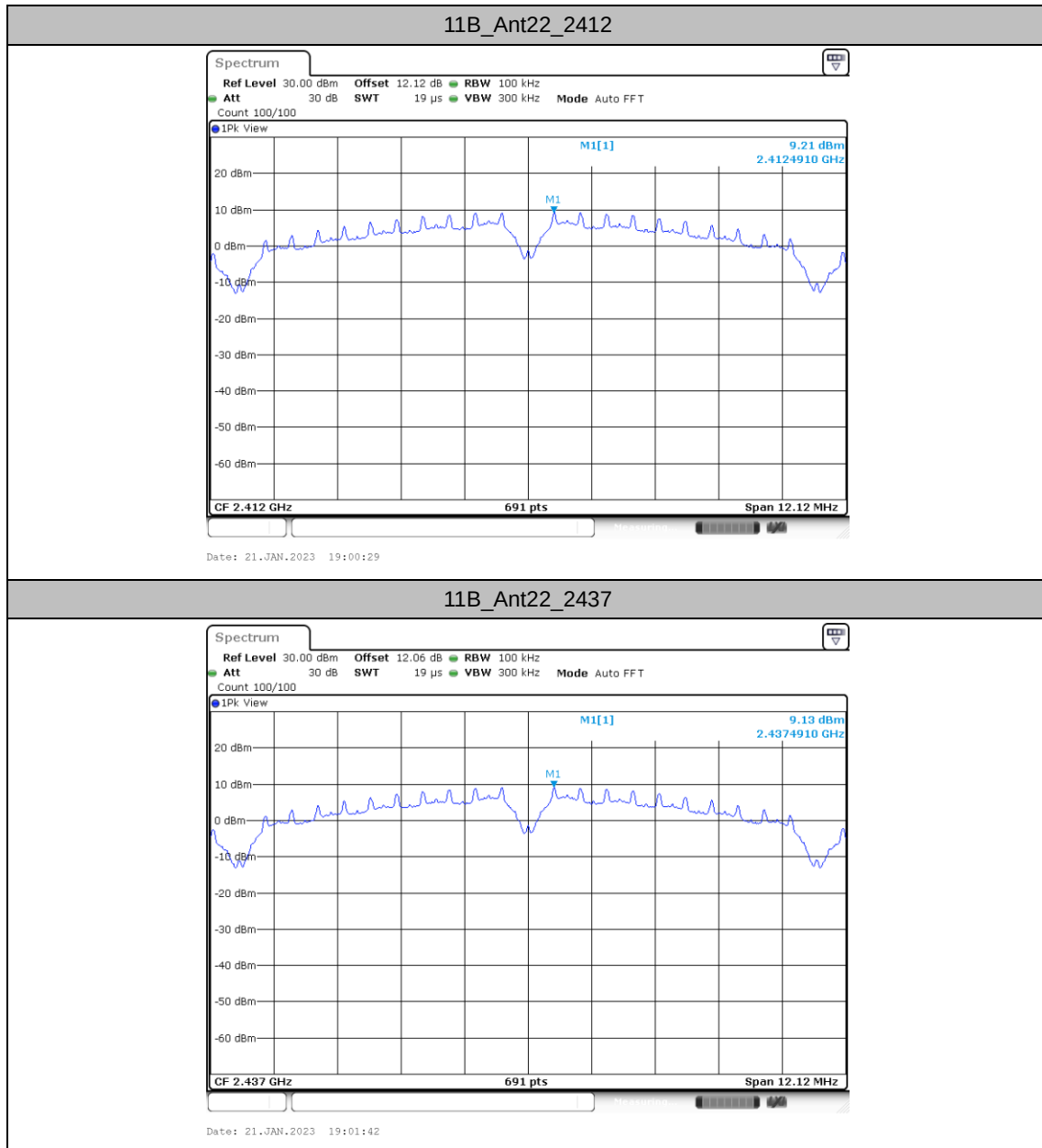
Reference level measurement

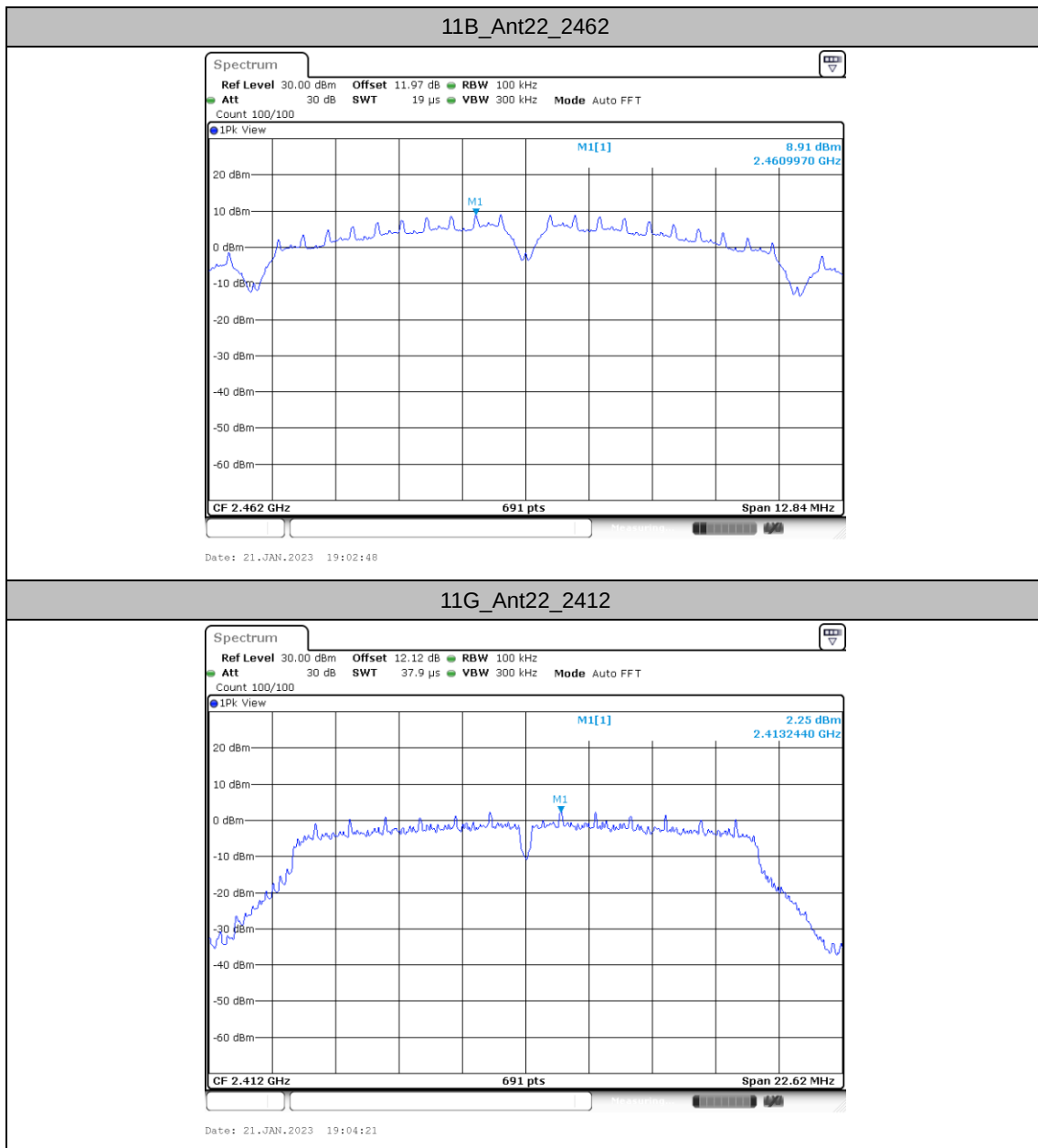
Test Result

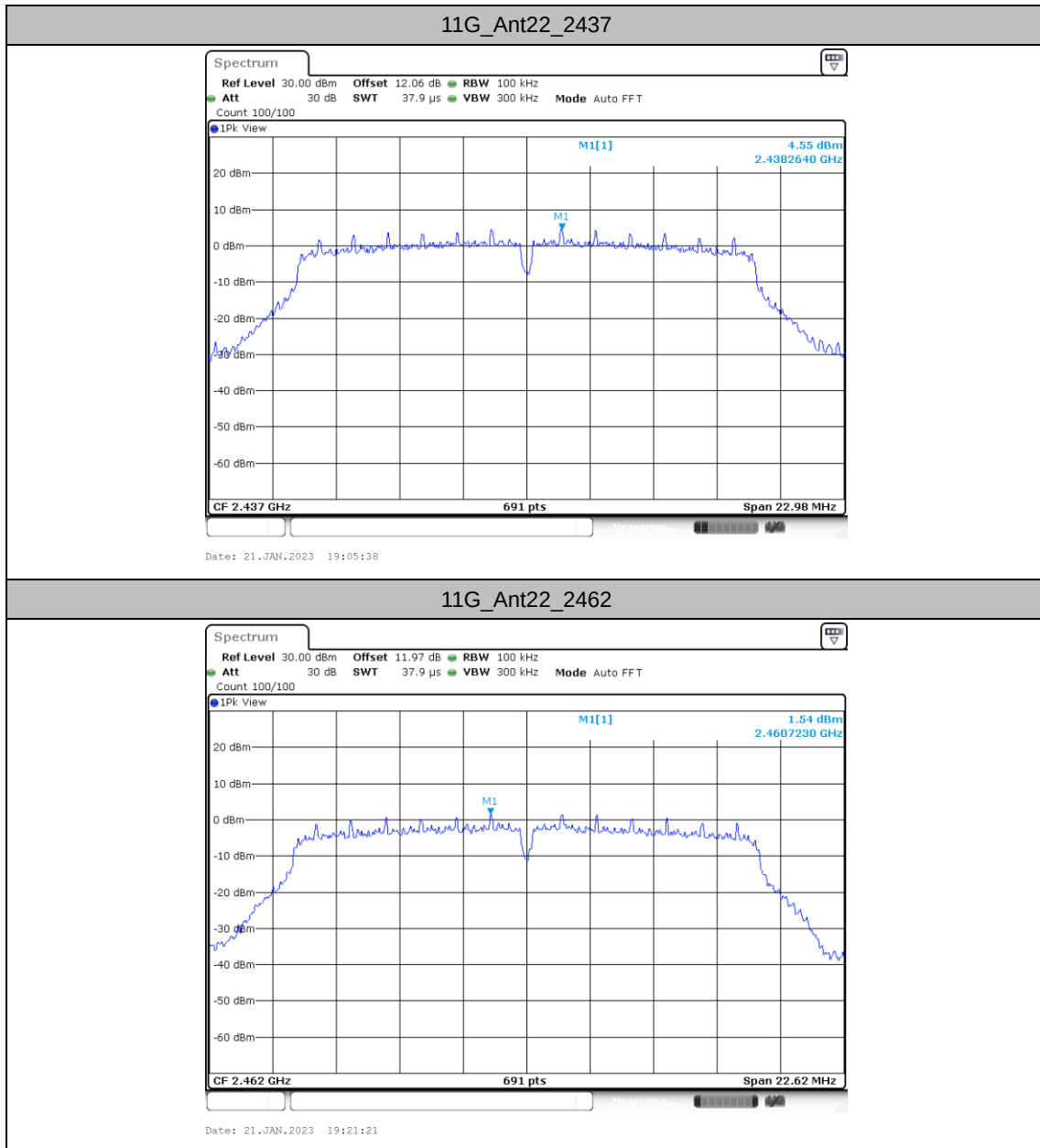
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
11B	Ant22	2412	2412.49	9.21
		2437	2437.49	9.13
		2462	2461.00	8.91
11G	Ant22	2412	2413.24	2.25
		2437	2438.26	4.55
		2462	2460.72	1.54
11N20SISO	Ant22	2412	2413.24	2.34
		2437	2435.72	3.52
		2462	2460.72	1.50

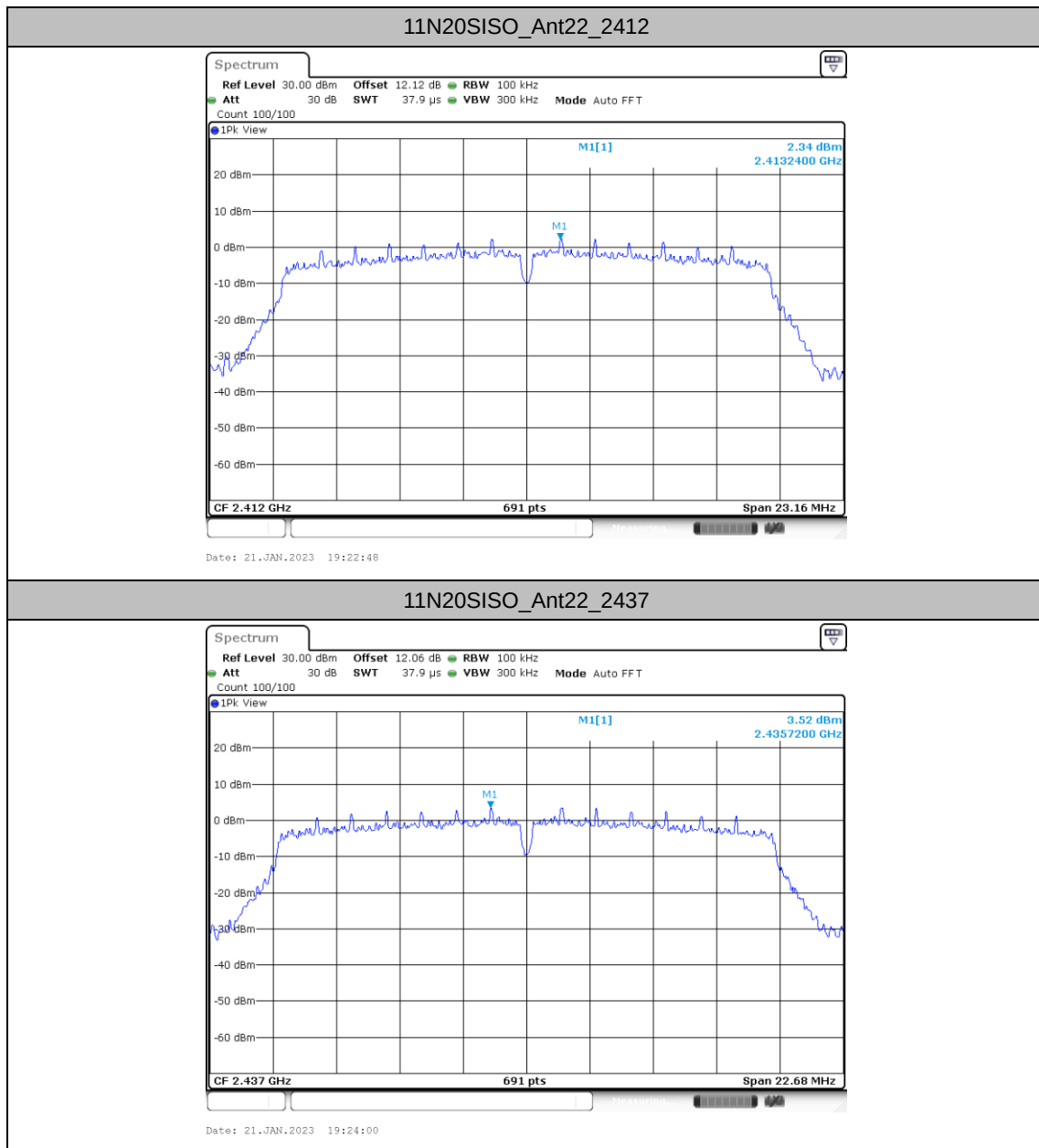


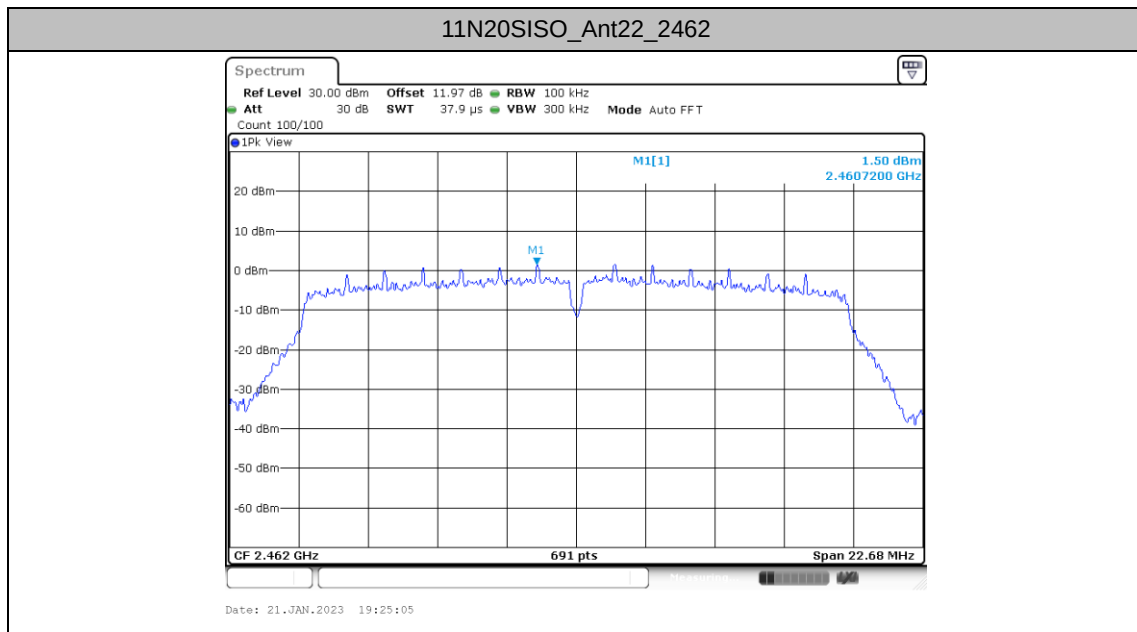
Test Graphs













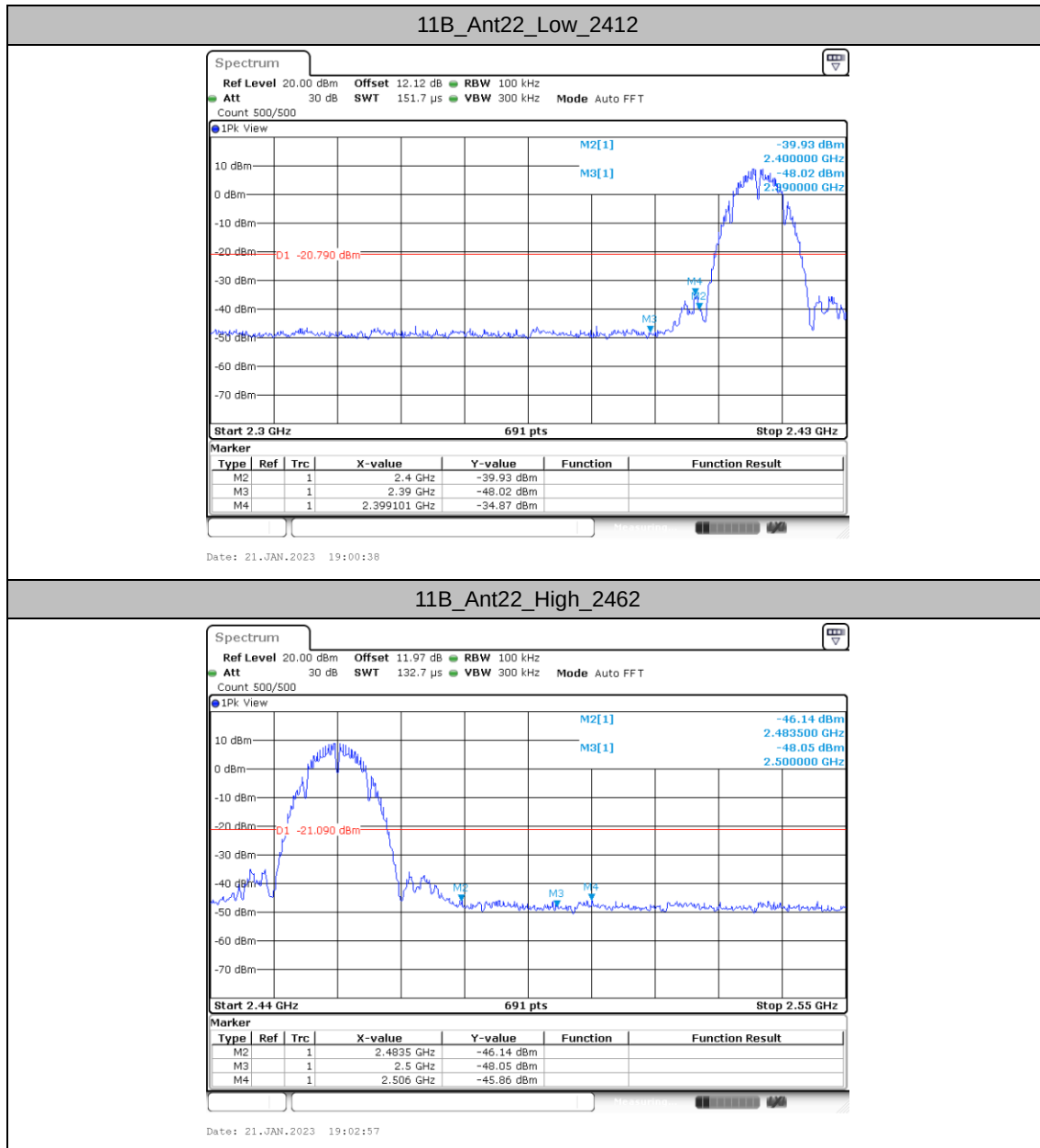
Band edge measurements

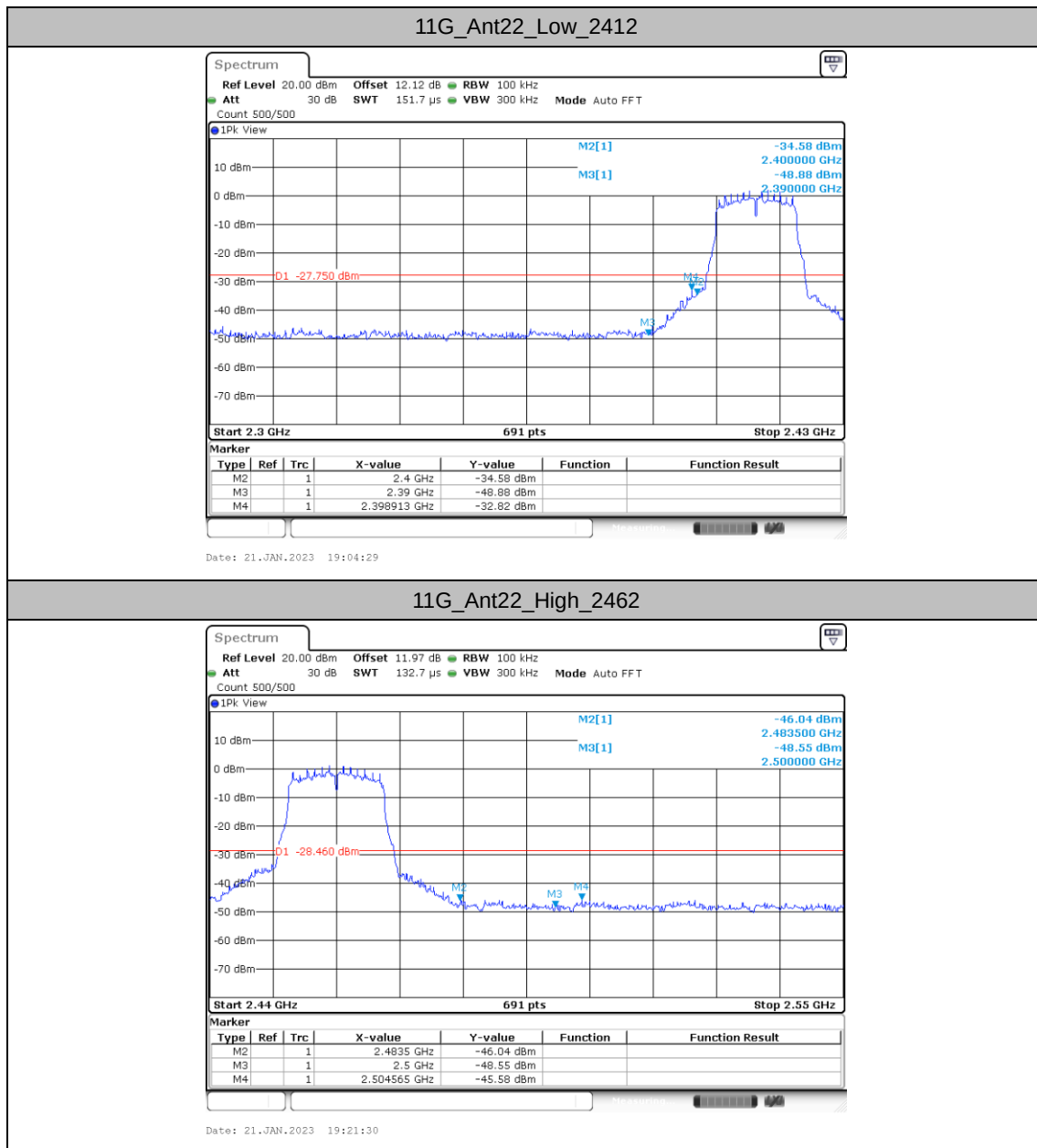
Test Result

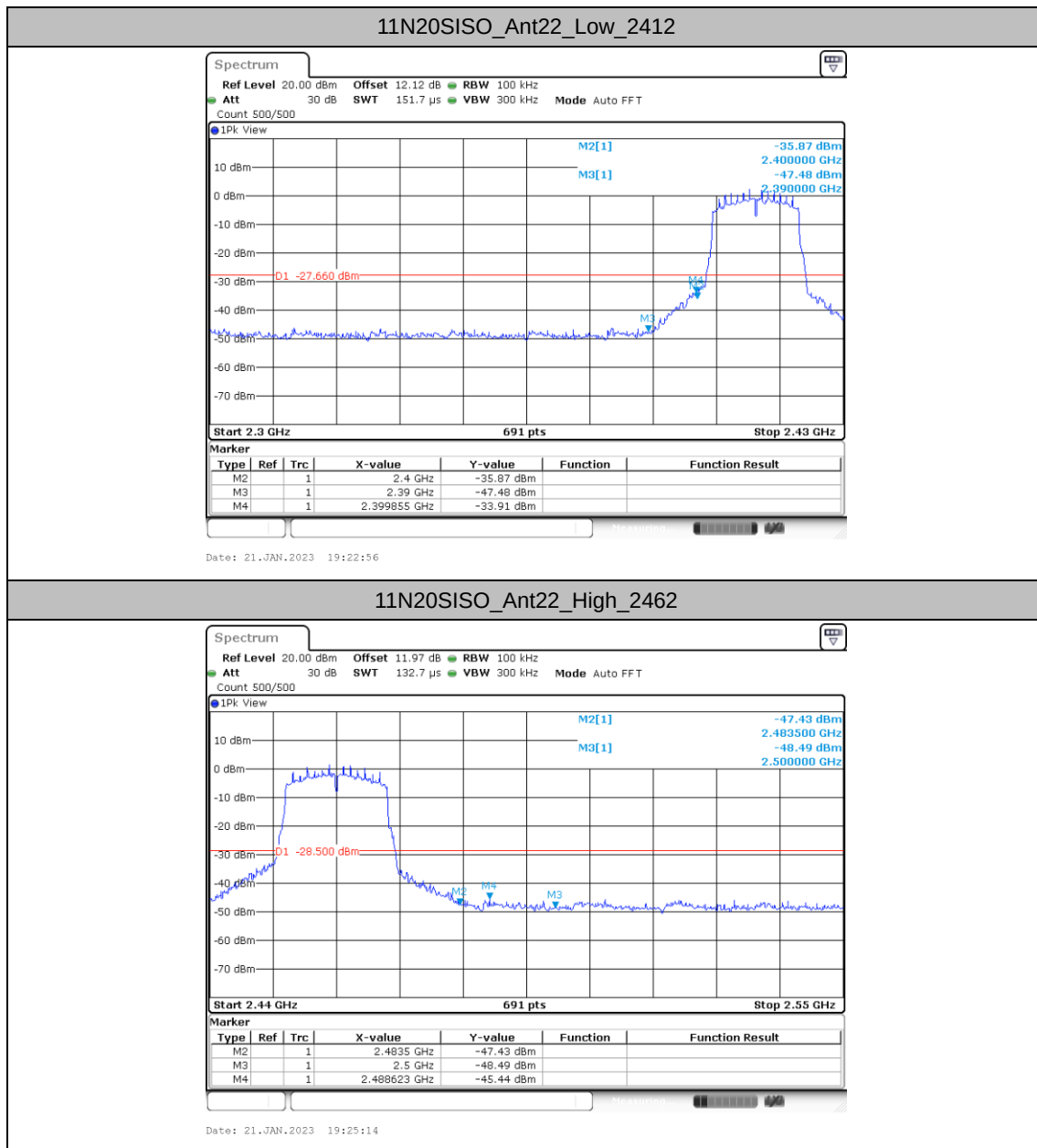
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm/100KHz]	Result[dBm/100KHz]	Limit[dBm/100KHz]	Verdict
11B	Ant22	Low	2412	9.21	-34.87	≤-20.79	PASS
		High	2462	8.91	-45.86	≤-21.09	PASS
11G	Ant22	Low	2412	2.25	-32.82	≤-27.75	PASS
		High	2462	1.54	-45.58	≤-28.46	PASS
11N20SISO	Ant22	Low	2412	2.34	-33.91	≤-27.66	PASS
		High	2462	1.50	-45.44	≤-28.5	PASS



Test Graphs







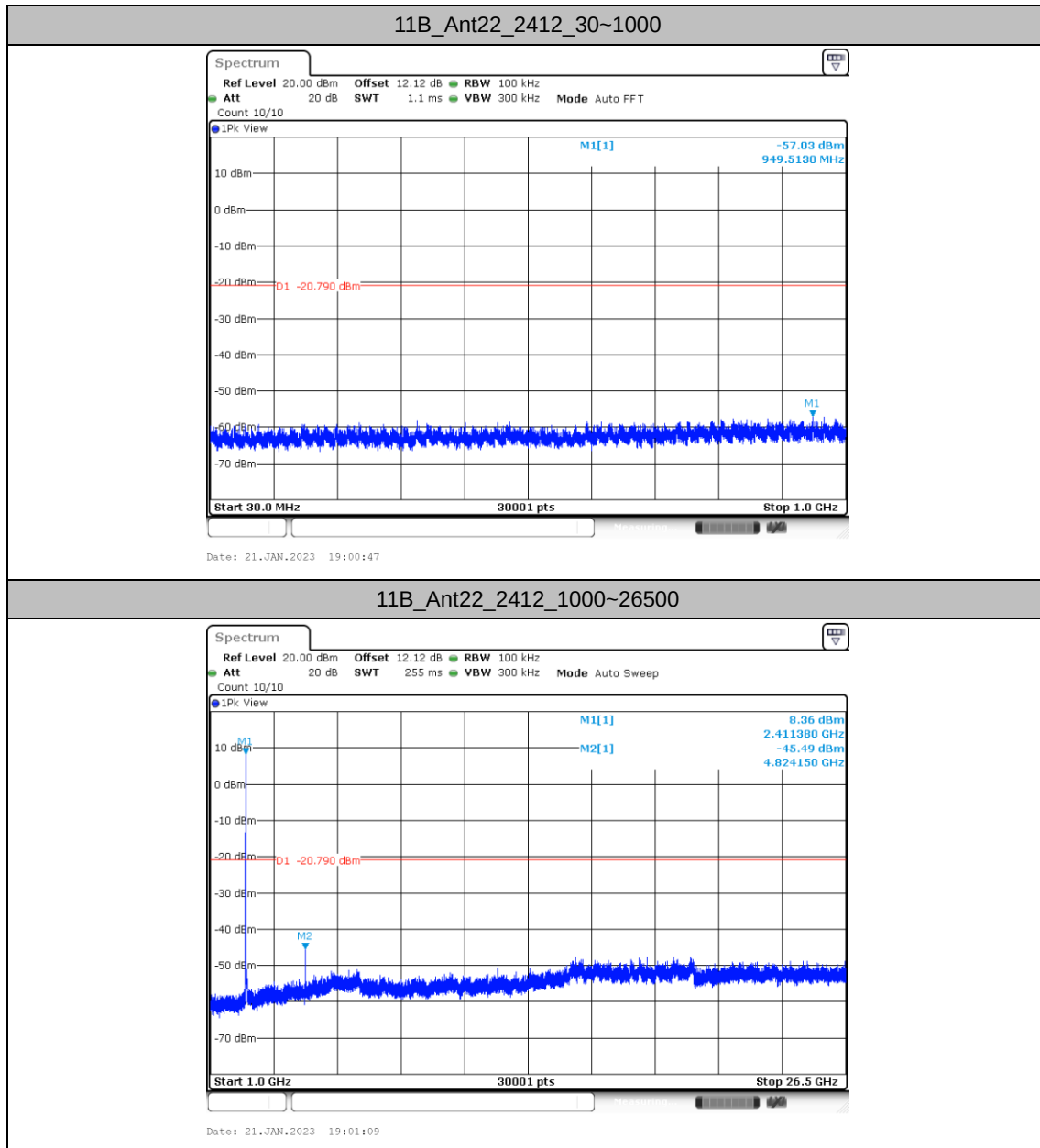
Conducted Spurious Emission

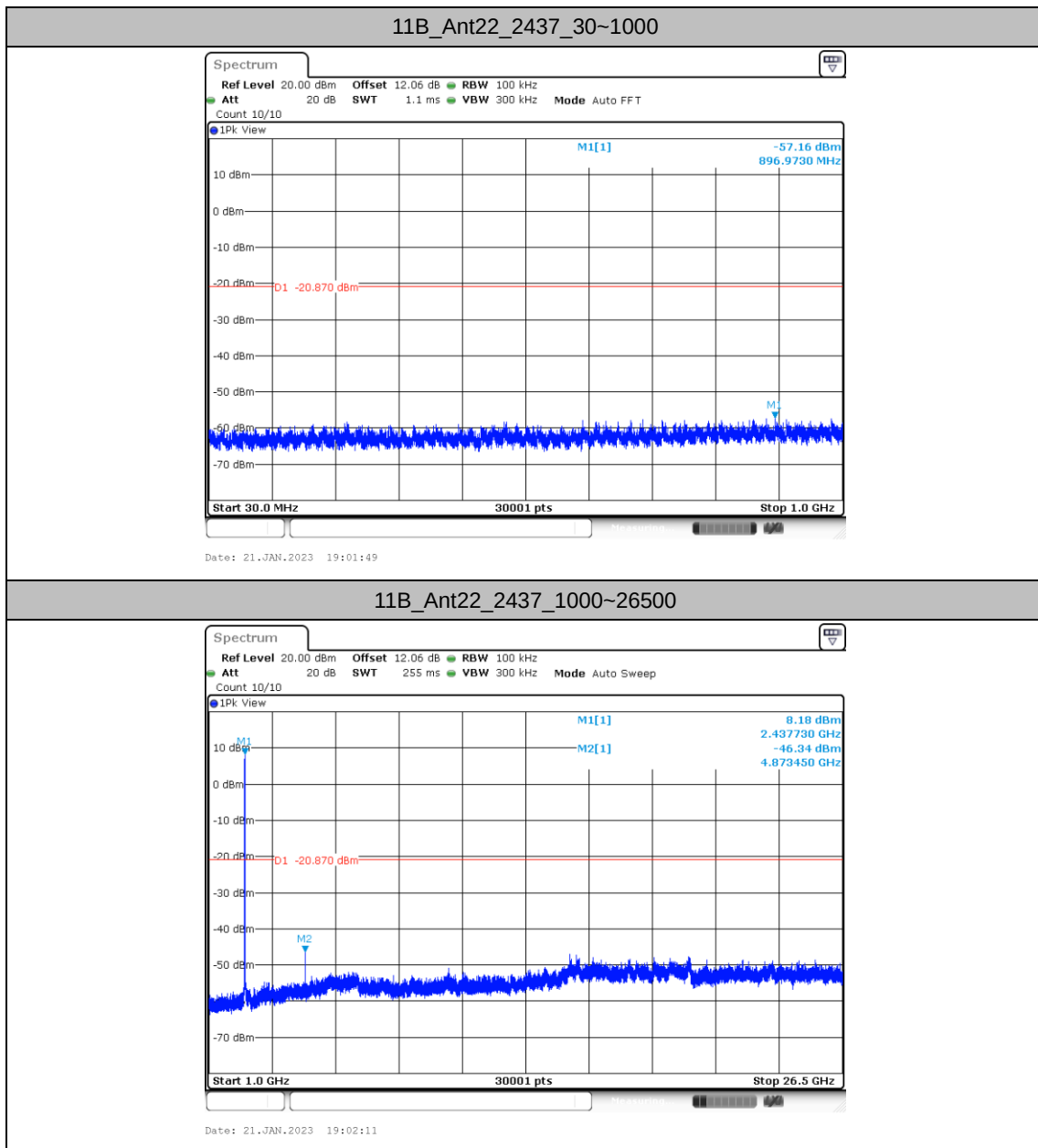
Test Result

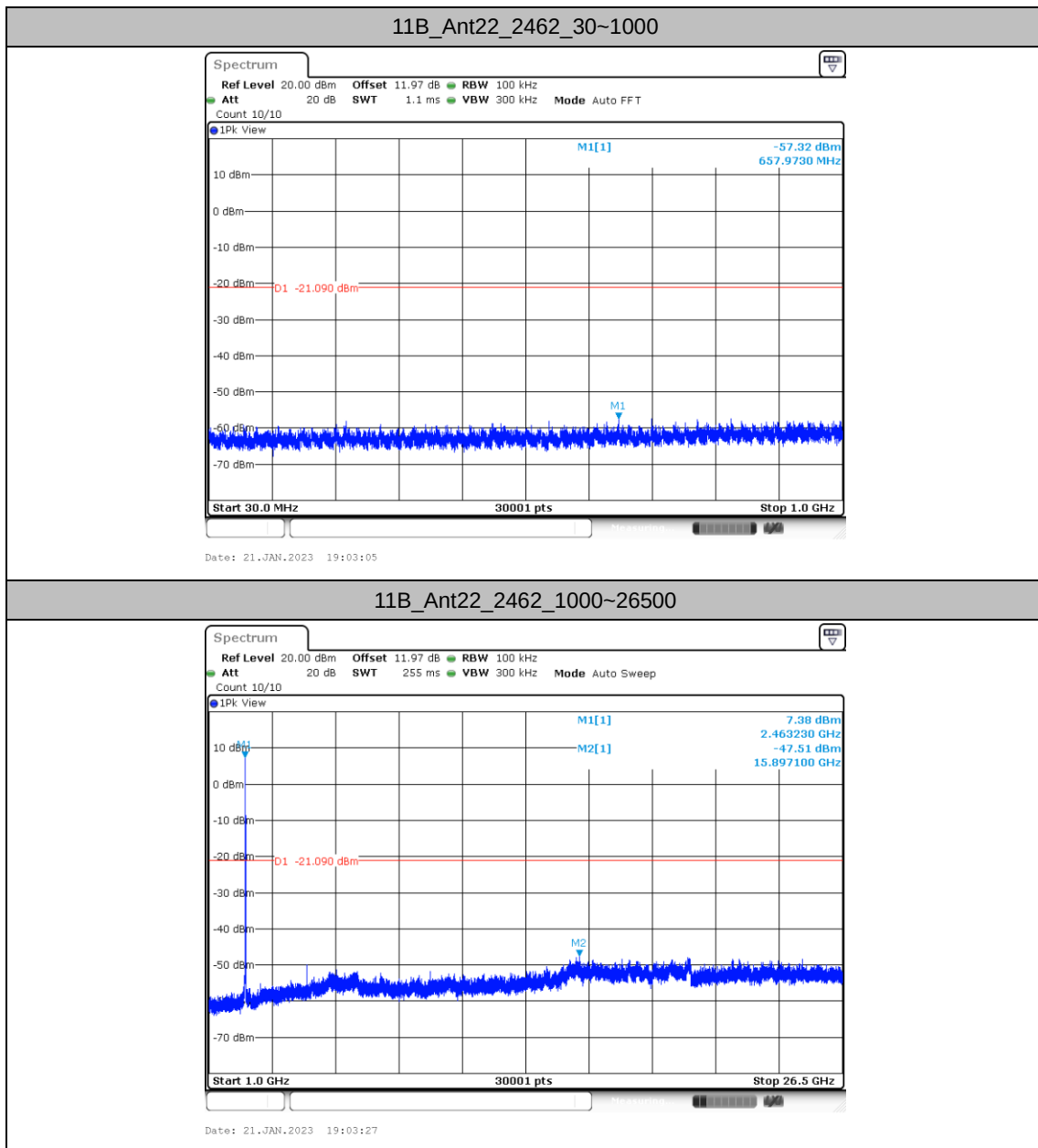
TestMode	Antenna	Freq(MHz)	FreqRange [Mhz]	RefLevel [dBm/100KHz]	Result [dBm/100KHz]	Limit [dBm/100KHz]	Verdict
11B	Ant22	2412	30~1000	9.21	-57.03	≤-20.79	PASS
			1000~26500	9.21	-45.49	≤-20.79	PASS
		2437	30~1000	9.13	-57.16	≤-20.87	PASS
			1000~26500	9.13	-46.34	≤-20.87	PASS
		2462	30~1000	8.91	-57.32	≤-21.09	PASS
			1000~26500	8.91	-47.51	≤-21.09	PASS
11G	Ant22	2412	30~1000	2.25	-57.28	≤-27.75	PASS
			1000~26500	2.25	-47.71	≤-27.75	PASS
		2437	30~1000	4.55	-57.61	≤-25.45	PASS
			1000~26500	4.55	-47.43	≤-25.45	PASS
		2462	30~1000	1.54	-56.51	≤-28.46	PASS
			1000~26500	1.54	-47.07	≤-28.46	PASS
11N20SISO	Ant22	2412	30~1000	2.34	-56.69	≤-27.66	PASS
			1000~26500	2.34	-47.33	≤-27.66	PASS
		2437	30~1000	3.52	-57.44	≤-26.48	PASS
			1000~26500	3.52	-47.72	≤-26.48	PASS
		2462	30~1000	1.50	-56.59	≤-28.5	PASS
			1000~26500	1.50	-47.17	≤-28.5	PASS

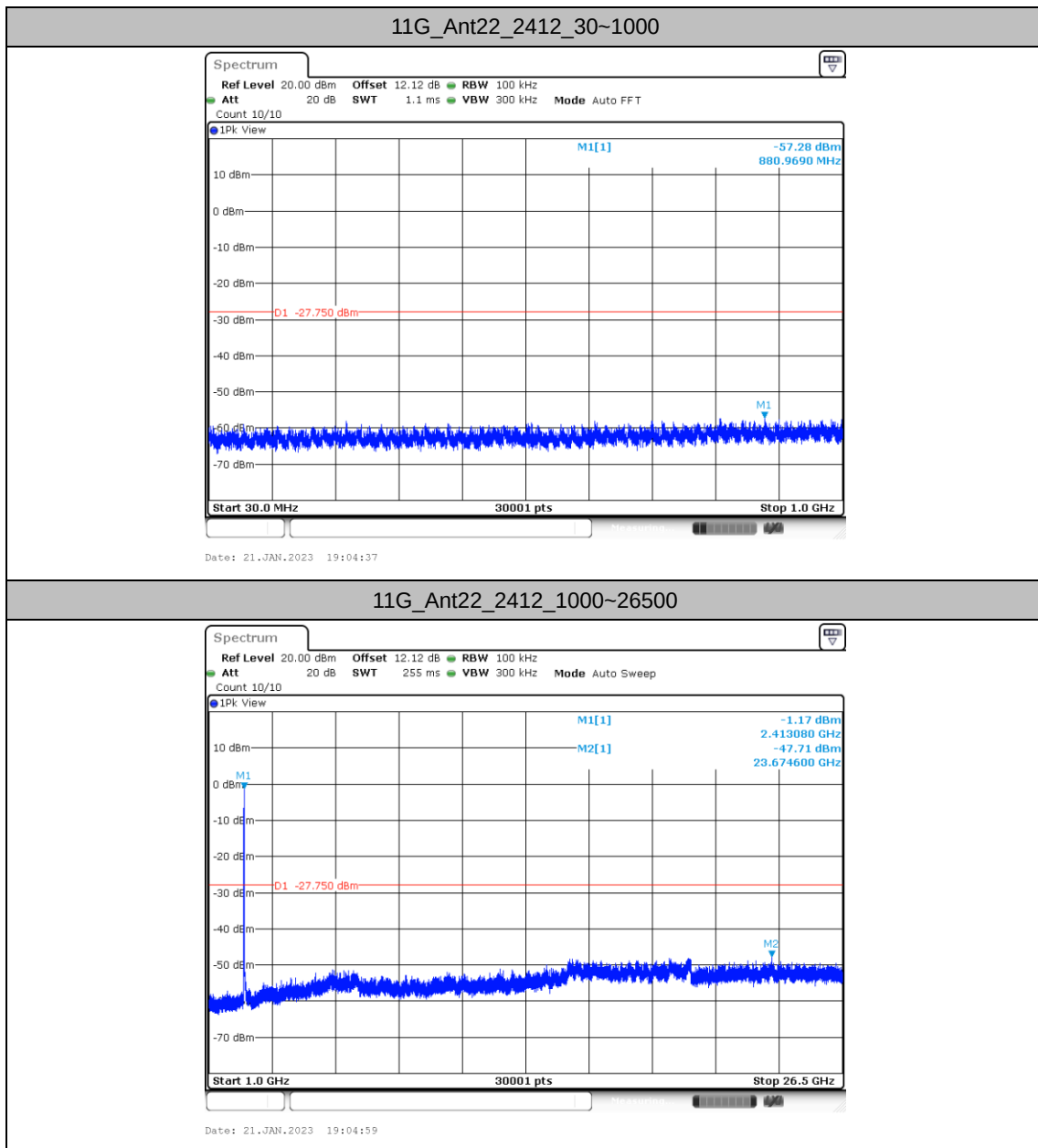


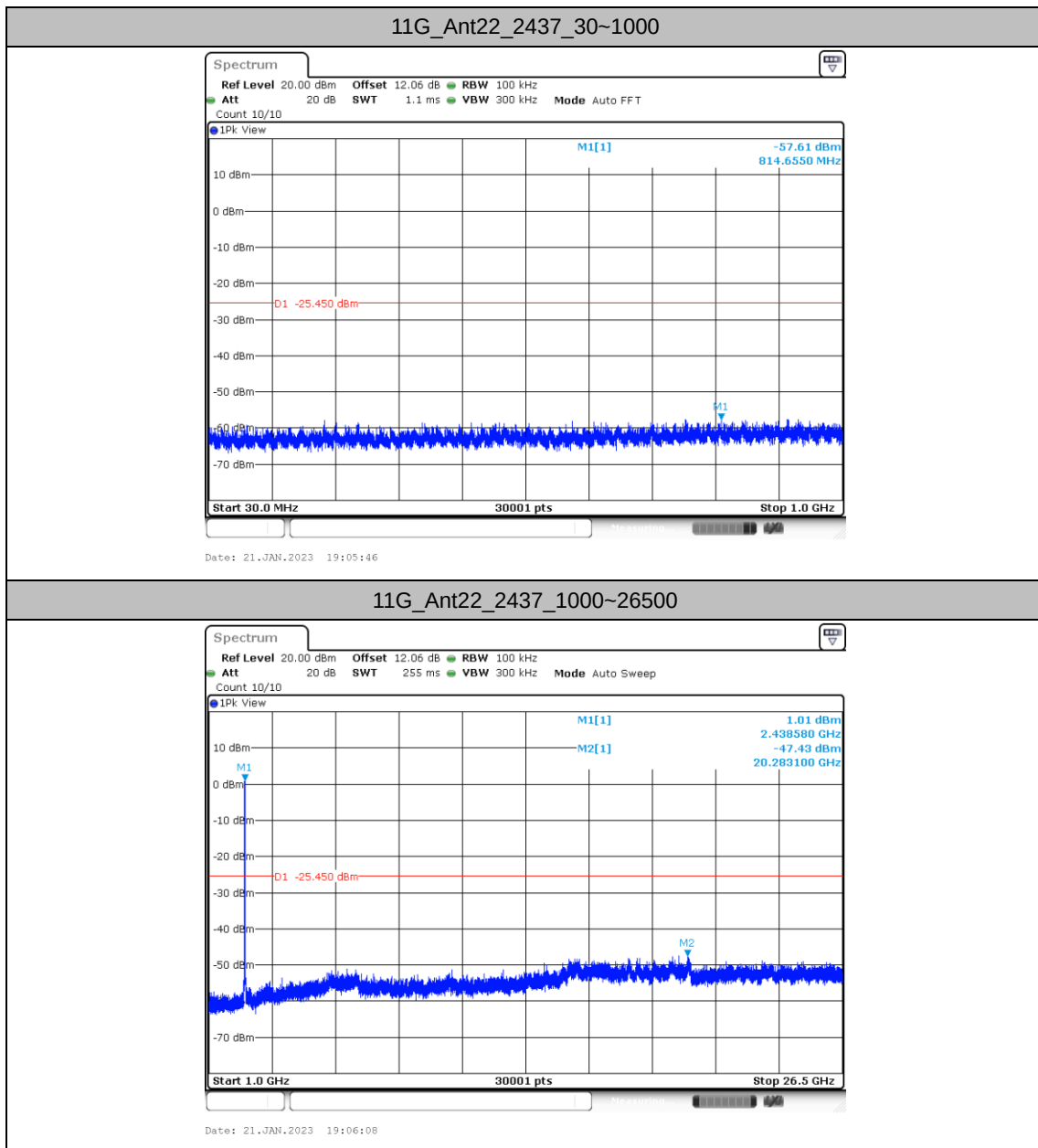
Test Graphs

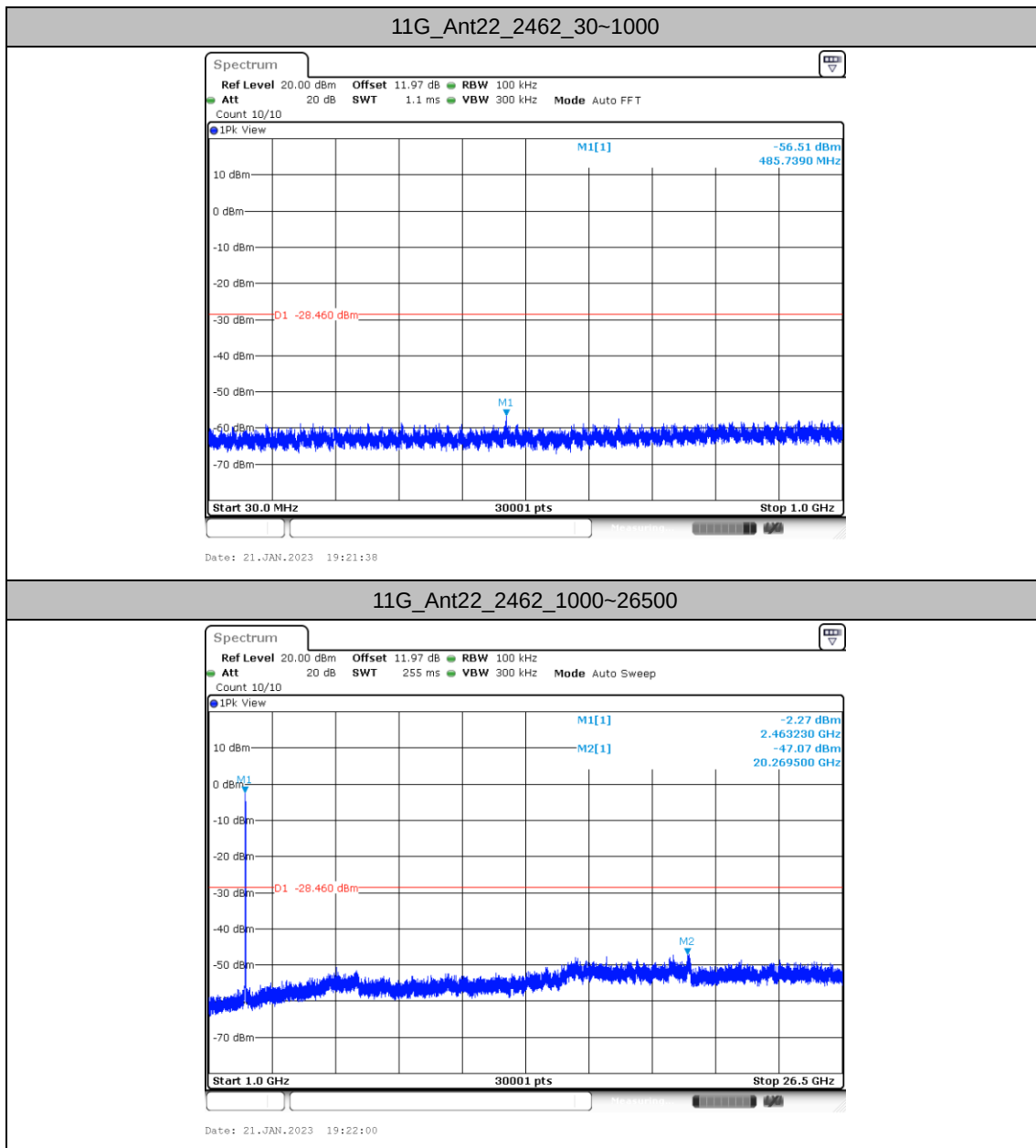


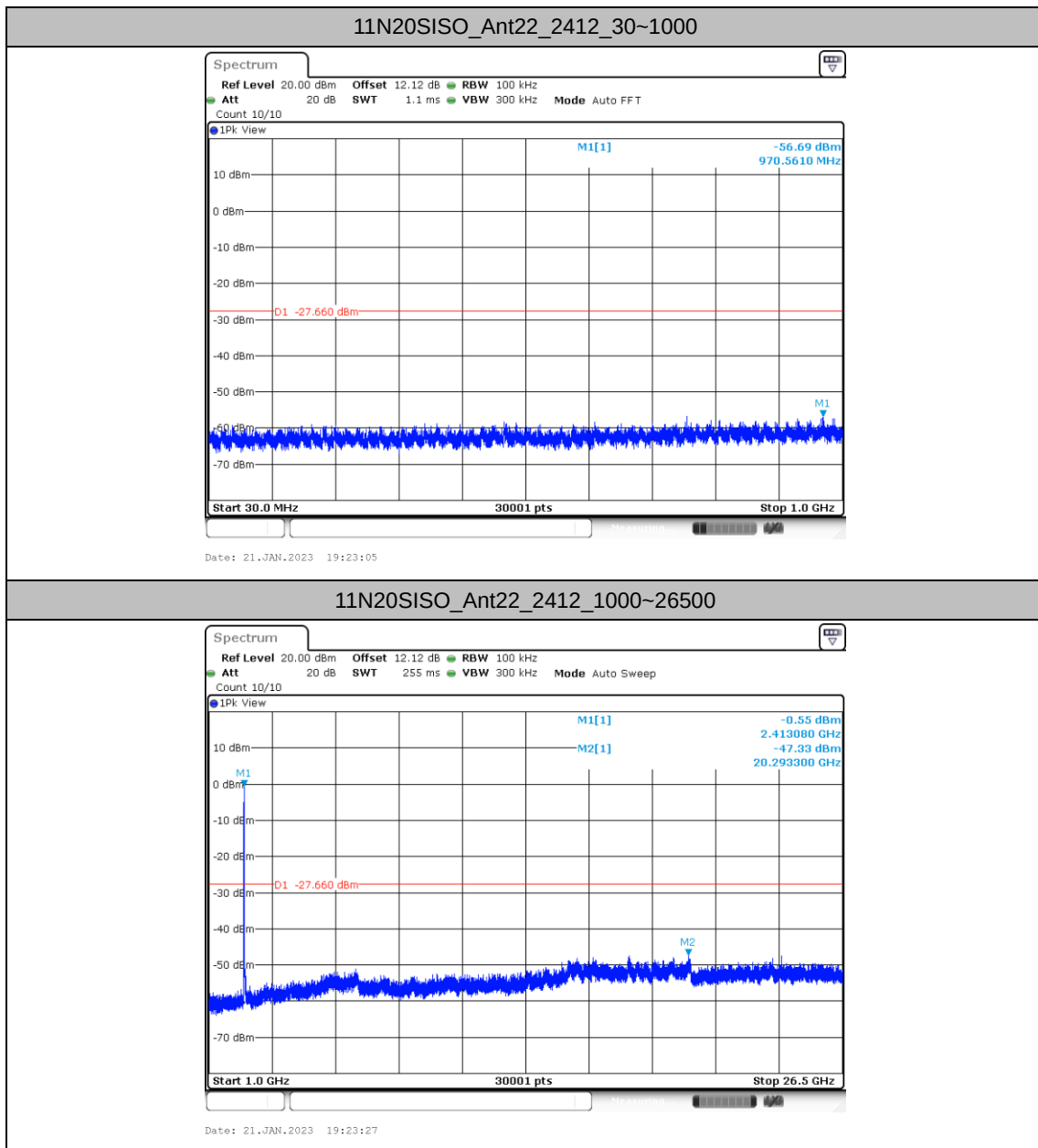


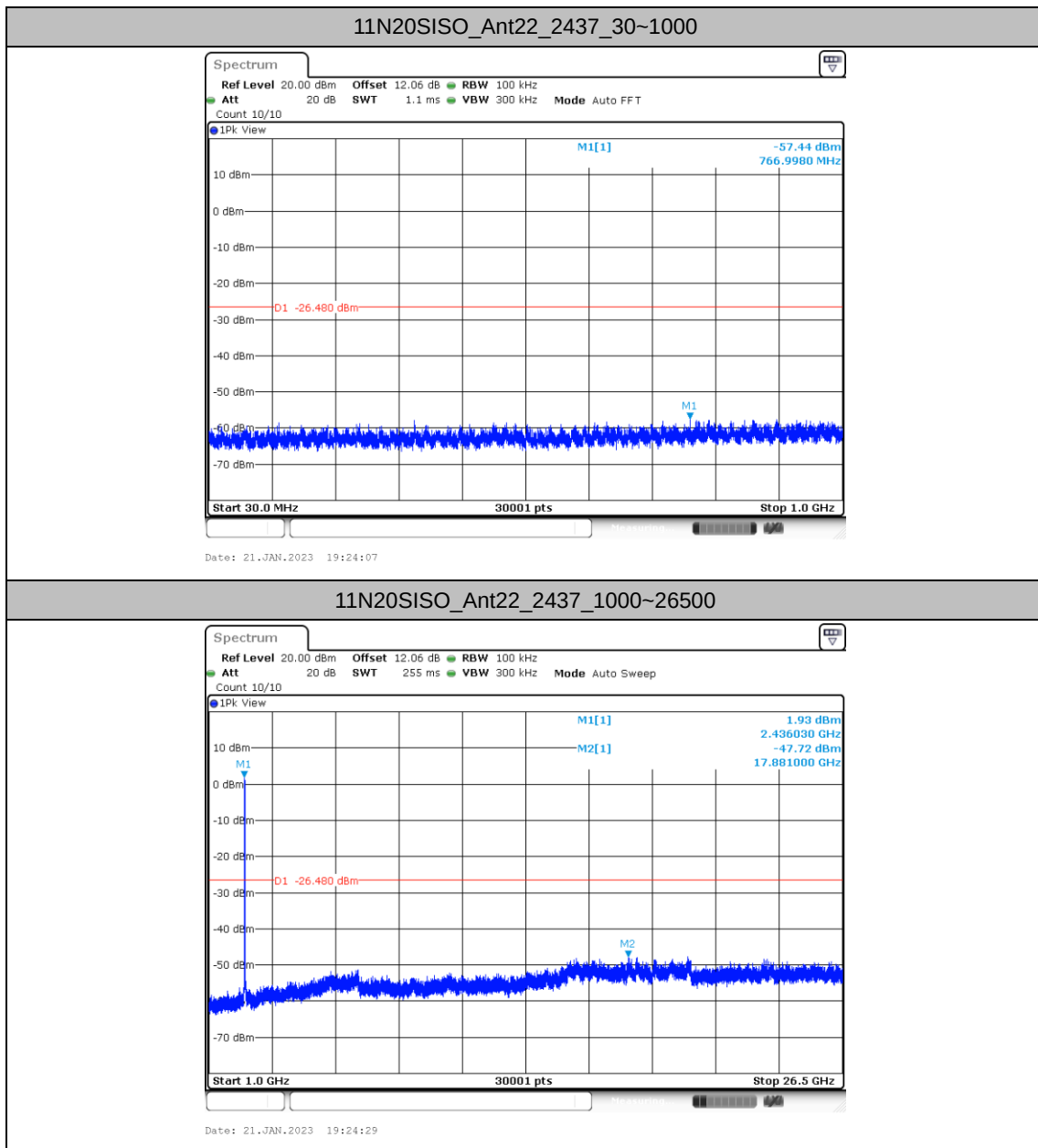


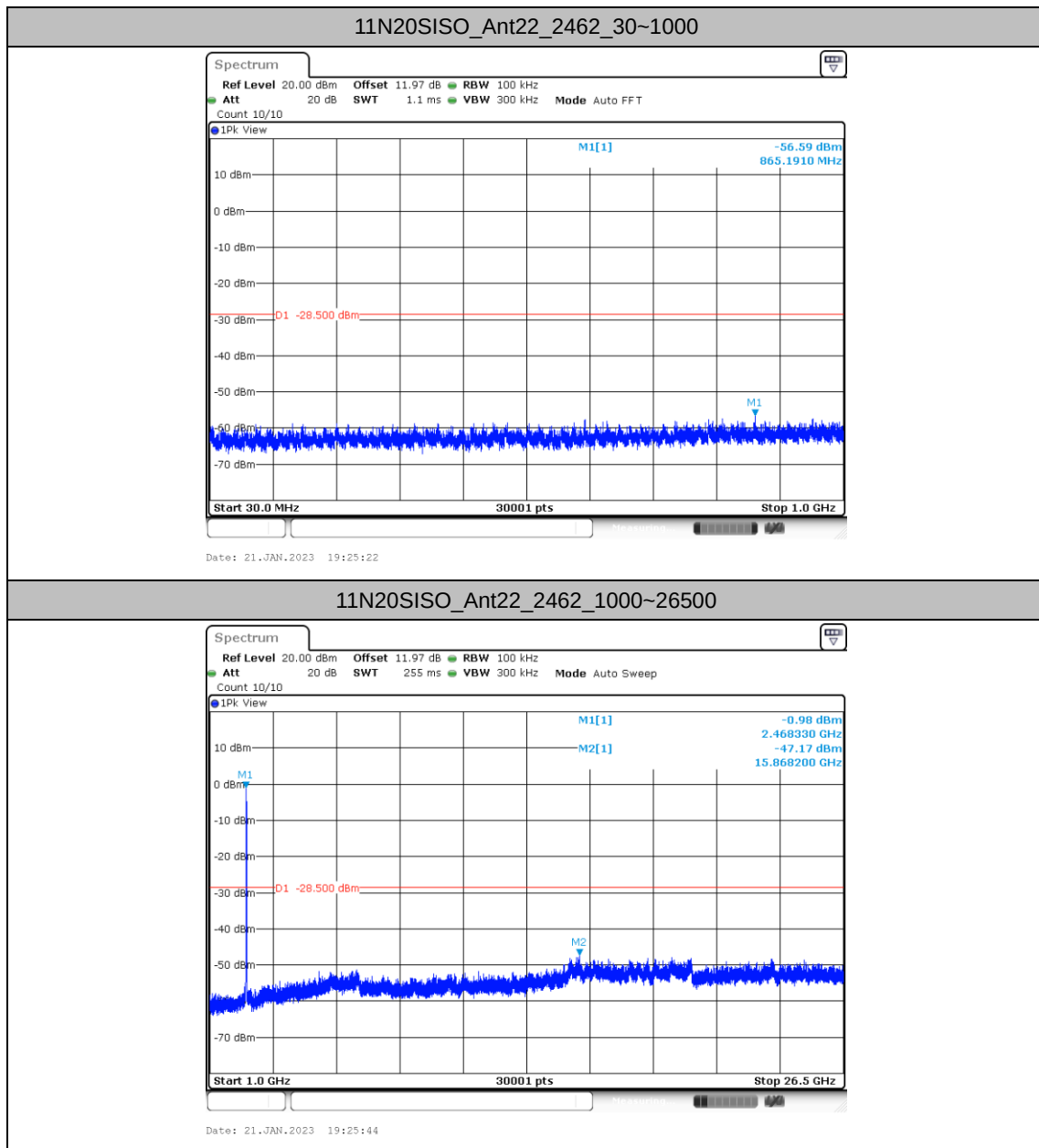






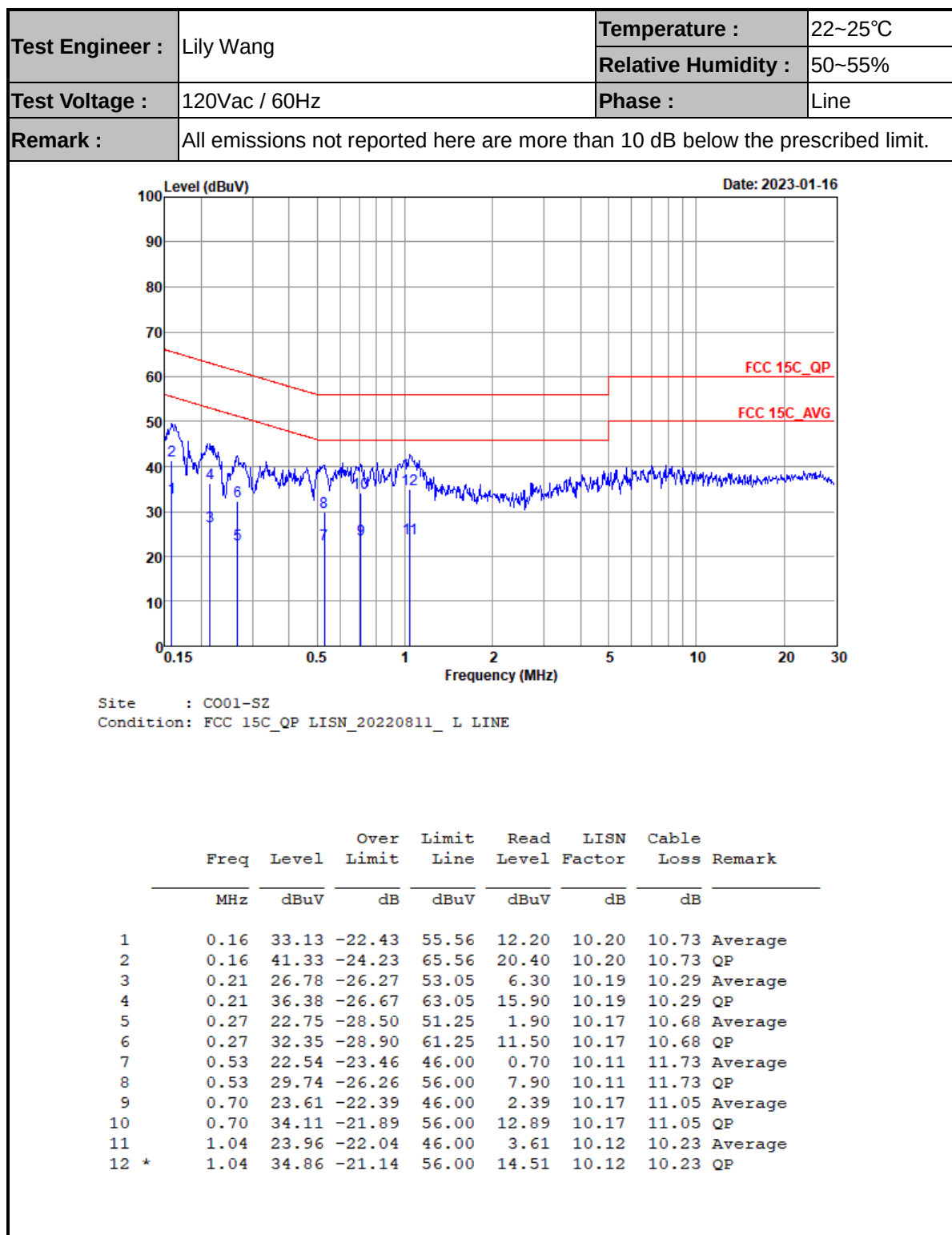






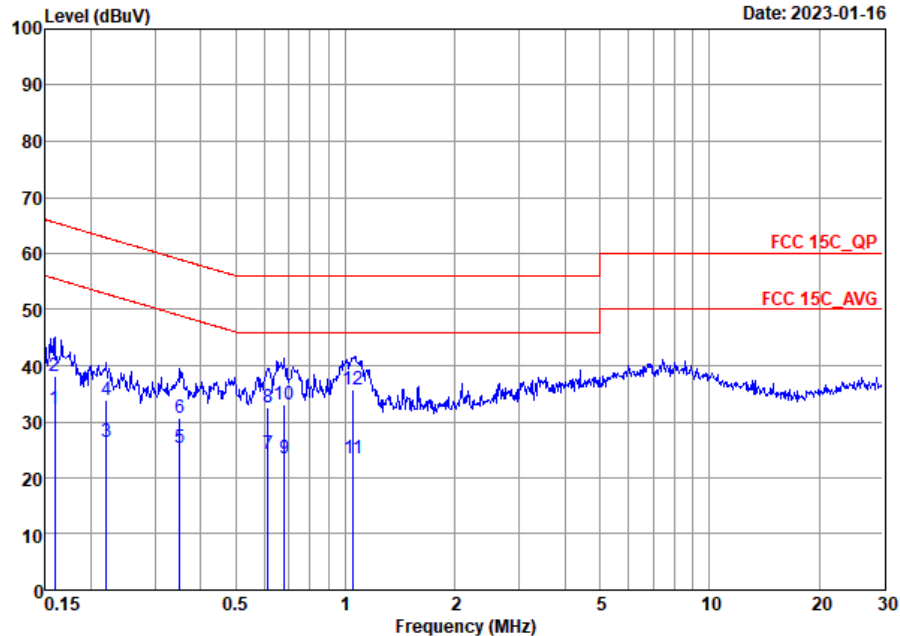


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Lily Wang	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-SZ
Condition: FCC 15C QP LISN 20220811 N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.16	32.32	-23.20	55.52	11.30	10.31	10.71	Average
2	0.16	38.22	-27.30	65.52	17.20	10.31	10.71	QP
3	0.22	26.41	-26.38	52.79	5.79	10.27	10.35	Average
4	0.22	33.81	-28.98	62.79	13.19	10.27	10.35	QP
5	0.35	25.36	-23.60	48.96	4.00	10.17	11.19	Average
6	0.35	30.76	-28.20	58.96	9.40	10.17	11.19	QP
7	0.61	24.20	-21.80	46.00	2.59	10.24	11.37	Average
8	0.61	32.60	-23.40	56.00	10.99	10.24	11.37	QP
9	0.68	23.36	-22.64	46.00	2.00	10.22	11.14	Average
10	0.68	33.06	-22.94	56.00	11.70	10.22	11.14	QP
11	1.05	23.36	-22.64	46.00	2.90	10.23	10.23	Average
12 *	1.05	35.66	-20.34	56.00	15.20	10.23	10.23	QP

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
22		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2387.7	49.74	-24.26	74	50.73	27.52	5.37	33.88	100	121	P	H
		2385.39	39.03	-14.97	54	40.03	27.51	5.37	33.88	100	121	A	H
	*	2412	102.43	-	-	103.34	27.6	5.37	33.88	100	121	P	H
	*	2412	100.79	-	-	101.7	27.6	5.37	33.88	100	121	A	H
		2387.7	49.9	-24.1	74	50.89	27.52	5.37	33.88	375	222	P	V
		2385.285	38.83	-15.17	54	39.83	27.51	5.37	33.88	375	222	A	V
	*	2412	101.91	-	-	102.82	27.6	5.37	33.88	375	222	P	V
	*	2412	100.21	-	-	101.12	27.6	5.37	33.88	375	222	A	V
802.11b CH 11 2462MHz	*	2462	103.19	-	-	103.9	27.77	5.41	33.89	100	120	P	H
	*	2462	101.6	-	-	102.31	27.77	5.41	33.89	100	120	A	H
		2488.4	51.07	-22.93	74	51.65	27.86	5.46	33.9	100	120	P	H
		2483.52	41.23	-12.77	54	41.83	27.84	5.46	33.9	100	120	A	H
	*	2462	101.85	-	-	102.56	27.77	5.41	33.89	400	225	P	V
	*	2462	100.24	-	-	100.95	27.77	5.41	33.89	400	225	A	V
		2487.72	51.31	-22.69	74	51.89	27.86	5.46	33.9	400	225	P	V
		2483.52	40.78	-13.22	54	41.38	27.84	5.46	33.9	400	225	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4804	44.8	-29.2	74	54.13	31.55	8.88	49.76	-	-	P	H
		4804	42.83	-31.17	74	52.16	31.55	8.88	49.76	-	-	P	V
802.11b CH 06 2437MHz		4874	44.73	-29.27	74	54.07	31.67	8.76	49.77	-	-	P	H
		7311	45.22	-28.78	74	48.78	36.21	10.18	49.95	-	-	P	H
		4874	42.84	-31.16	74	52.18	31.67	8.76	49.77	-	-	P	V
		7311	45.66	-28.34	74	49.22	36.21	10.18	49.95	-	-	P	V
802.11b CH 11 2462MHz		4924	42.17	-31.83	74	51.66	31.76	8.53	49.78	-	-	P	H
		7386	45.55	-28.45	74	49.21	36.29	10.18	50.13	-	-	P	H
		4924	41.26	-32.74	74	50.75	31.76	8.53	49.78	-	-	P	V
		7386	45.8	-28.2	74	49.46	36.29	10.18	50.13	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
22		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		2389.8	62.01	-11.99	74	62.99	27.53	5.37	33.88	100	127	P	H
		2389.905	43.96	-10.04	54	44.94	27.53	5.37	33.88	100	127	A	H
	*	2412	100.84	-	-	101.75	27.6	5.37	33.88	100	127	P	H
	*	2412	94.06	-	-	94.97	27.6	5.37	33.88	100	127	A	H
		2389.275	56.23	-17.77	74	57.22	27.52	5.37	33.88	400	218	P	V
		2389.905	42.18	-11.82	54	43.16	27.53	5.37	33.88	400	218	A	V
	*	2412	96.67	-	-	97.58	27.6	5.37	33.88	400	218	P	V
	*	2412	89.3	-	-	90.21	27.6	5.37	33.88	400	218	A	V
802.11g CH 11 2462MHz	*	2462	101.23	-	-	101.94	27.77	5.41	33.89	100	125	P	H
	*	2462	93.83	-	-	94.54	27.77	5.41	33.89	100	125	A	H
		2483.64	63	-11	74	63.6	27.84	5.46	33.9	100	125	P	H
		2483.56	47.99	-6.01	54	48.59	27.84	5.46	33.9	100	125	A	H
	*	2462	101.98	-	-	102.69	27.77	5.41	33.89	400	225	P	V
	*	2462	94.67	-	-	95.38	27.77	5.41	33.89	400	225	A	V
		2483.56	63.1	-10.9	74	63.7	27.84	5.46	33.9	400	225	P	V
		2483.52	46.28	-7.72	54	46.88	27.84	5.46	33.9	400	225	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	44.43	-29.57	74	53.73	31.58	8.88	49.76	-	-	P	H
		4824	43.67	-30.33	74	52.97	31.58	8.88	49.76	-	-	P	V
802.11g CH 06 2437MHz		4874	42.8	-31.2	74	52.14	31.67	8.76	49.77	-	-	P	H
		7311	45.62	-28.38	74	49.18	36.21	10.18	49.95	-	-	P	H
		4874	42.43	-31.57	74	51.77	31.67	8.76	49.77	-	-	P	V
		7311	46.04	-27.96	74	49.6	36.21	10.18	49.95	-	-	P	V
802.11g CH 11 2462MHz		4924	41.67	-32.33	74	51.16	31.76	8.53	49.78	-	-	P	H
		7386	45.68	-28.32	74	49.34	36.29	10.18	50.13	-	-	P	H
		4924	42.49	-31.51	74	51.98	31.76	8.53	49.78	-	-	P	V
		7386	45.85	-28.15	74	49.51	36.29	10.18	50.13	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.905	61.51	-12.49	74	62.49	27.53	5.37	33.88	100	121	P	H
		2389.905	43.4	-10.6	54	44.38	27.53	5.37	33.88	100	121	A	H
	*	2412	99.72	-	-	100.63	27.6	5.37	33.88	100	121	P	H
	*	2412	92.32	-	-	93.23	27.6	5.37	33.88	100	121	A	H
		2389.38	60.42	-13.58	74	61.41	27.52	5.37	33.88	380	225	P	V
		2389.8	44	-10	54	44.98	27.53	5.37	33.88	380	225	A	V
	*	2412	98.78	-	-	99.69	27.6	5.37	33.88	380	225	P	V
	*	2412	90.92	-	-	91.83	27.6	5.37	33.88	380	225	A	V
802.11n HT20 CH 11 2462MHz	*	2462	99.2	-	-	99.91	27.77	5.41	33.89	100	259	P	H
	*	2462	90.35	-	-	91.06	27.77	5.41	33.89	100	259	A	H
		2483.96	62.65	-11.35	74	63.24	27.85	5.46	33.9	100	259	P	H
		2483.56	43.89	-10.11	54	44.49	27.84	5.46	33.9	100	259	A	H
	*	2462	98.03	-	-	98.74	27.77	5.41	33.89	400	223	P	V
	*	2462	91.1	-	-	91.81	27.77	5.41	33.89	400	223	A	V
		2484.12	62.2	-11.8	74	62.79	27.85	5.46	33.9	400	223	P	V
		2483.52	45.2	-8.8	54	45.8	27.84	5.46	33.9	400	223	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	44.26	-29.74	74	53.56	31.58	8.88	49.76	-	-	P	H
		4824	43.65	-30.35	74	52.95	31.58	8.88	49.76	-	-	P	V
802.11n HT20 CH 06 2437MHz		4874	43.07	-30.93	74	52.41	31.67	8.76	49.77	-	-	P	H
		7311	45.92	-28.08	74	49.48	36.21	10.18	49.95	-	-	P	H
		4874	42.45	-31.55	74	51.79	31.67	8.76	49.77	-	-	P	V
		7311	46.32	-27.68	74	49.88	36.21	10.18	49.95	-	-	P	V
802.11n HT20 CH 11 2462MHz		4924	41.3	-32.7	74	50.79	31.76	8.53	49.78	-	-	P	H
		7386	45.64	-28.36	74	49.3	36.29	10.18	50.13	-	-	P	H
		4924	41.23	-32.77	74	50.72	31.76	8.53	49.78	-	-	P	V
		7386	46.41	-27.59	74	50.07	36.29	10.18	50.13	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
22		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		30	25.18	-14.82	40	30.69	25.86	0.53	31.9	-	-	P	H
		98.87	20.95	-22.55	43.5	35.69	16	1.01	31.75	-	-	P	H
		187.14	20.18	-23.32	43.5	34.52	15.6	1.39	31.33	-	-	P	H
		522.76	27.28	-18.72	46	30.74	25	2.39	30.85	-	-	P	H
		796.3	31.97	-14.03	46	31.08	28.86	2.93	30.9	-	-	P	H
		991.27	34.88	-19.12	54	31.84	30.29	3.3	30.55	-	-	P	H
		30	26.2	-13.8	40	31.71	25.86	0.53	31.9	-	-	P	V
		56.19	18.52	-21.48	40	36.81	12.97	0.75	32.01	-	-	P	V
		88.2	19.51	-23.99	43.5	35.43	14.65	0.94	31.51	-	-	P	V
		295.78	22.45	-23.55	46	31.94	19.83	1.79	31.11	-	-	P	V
		767.2	31.76	-14.24	46	31.13	28.65	2.88	30.9	-	-	P	V
		963.14	34.44	-19.56	54	31.03	30.88	3.25	30.72	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Co-location

802.11g_Tx_Ch11 + LTE Band13_BW_20M_Tx

(Band Edge @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g_Tx_Ch11 + LTE Band13_BW_20M_Tx	*	2462	103.95	-	-	104.66	27.77	5.41	33.89	100	130	P	H
	*	2462	95.7	-	-	96.41	27.77	5.41	33.89	100	130	A	H
		2483.68	63.3	-10.7	74	63.9	27.84	5.46	33.9	100	130	P	H
		2483.56	47.71	-6.29	54	48.31	27.84	5.46	33.9	100	130	A	H
	*	2462	101.64	-	-	102.35	27.77	5.41	33.89	400	205	P	V
	*	2462	94.13	-	-	94.84	27.77	5.41	33.89	400	205	A	V
		2483.68	63.96	-10.04	74	64.56	27.84	5.46	33.9	400	205	P	V
		2483.6	45.22	-8.78	54	45.82	27.84	5.46	33.9	400	205	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

802.11g_Tx_Ch11 + LTE Band13_BW_20M_Tx

(Harmonic @ 3m)

WIFI Ant. 22	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g_Tx_Ch11 + LTE Band13_BW_20M_Tx		4924	42.8	-31.2	74	52.29	31.76	8.53	49.78	-	-	P	H
		7386	45.75	-28.25	74	49.41	36.29	10.18	50.13	-	-	P	H
		4924	42.63	-31.37	74	52.12	31.76	8.53	49.78	-	-	P	V
		7386	46.26	-27.74	74	49.92	36.29	10.18	50.13	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Note symbol**

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is Margin line.
P/A	P eak or A verage
H/V	H orizontal or V ertical

A calculation example for radiated spurious emission is shown as below:

Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
			Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Margin (dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Margin (dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Margin (dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix D. Radiated Spurious Emission Plots

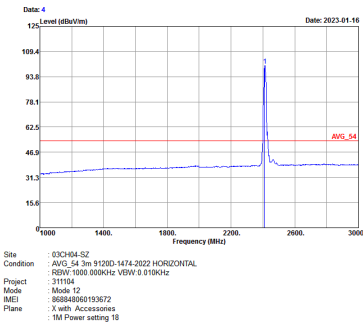
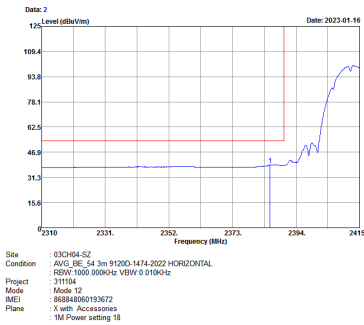
2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
22	Horizontal	Fundamental
Peak	Date: 1 Level (dBuV/m) Frequency (MHz) Site : 82CH04-SZ Condition : PEAK_BE_74 3m 91200-1474-2022 HORIZONTAL RBW: 1000.000kHz VBW: 3000.000kHz Project : 311104 Mode : Mode 12 MEI : 960840960153672 Plane : X with Accessories IM Power setting 18	Date: 3 Level (dBuV/m) Frequency (MHz) Site : 82CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL RBW: 1000.000kHz VBW: 3000.000kHz Project : 311104 Mode : Mode 12 MEI : 960840960153672 Plane : X with Accessories IM Power setting 18



Avg.





WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
22	Vertical	Fundamental
Peak	Date: 5 Level (dBuV/m) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_BE_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 12 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Date: 7 Level (dBuV/m) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 12 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18
Avg.	Date: 6 Level (dBuV/m) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_BE_54 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:5.010kHz Project : 311104 Mode : Mode 12 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Date: 8 Level (dBuV/m) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:5.010kHz Project : 311104 Mode : Mode 12 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
22	Horizontal	Fundamental
Peak	Horizontal Date: 3 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_RE_74 3m 91200-1474-2022 HORIZONTAL Project : REW 1000 000kHz VEW 3000 000kHz Mode : 311104 IMEI : 86848060193672 Plane : X with Accessories 1M Power setting 18	Fundamental Date: 1 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_F4 3m 91200-1474-2022 HORIZONTAL Project : REW 1000 000kHz VEW 3000 000kHz Mode : 311104 IMEI : 86848060193672 Plane : X with Accessories 1M Power setting 18
Avg.	Horizontal Date: 4 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_RE_54 3m 91200-1474-2022 HORIZONTAL Project : REW 1000 000kHz VEW 0 0100kHz Mode : 311104 IMEI : 86848060193672 Plane : X with Accessories 1M Power setting 18	Fundamental Date: 2 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_F4 3m 91200-1474-2022 HORIZONTAL Project : REW 1000 000kHz VEW 0 0100kHz Mode : 311104 IMEI : 86848060193672 Plane : X with Accessories 1M Power setting 18



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
22	Vertical	Fundamental
Peak	Figure 7: Peak Spectrum (Vertical) Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VSW:3000.000kHz Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Figure 5: Peak Spectrum (Fundamental) Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VSW:3000.000kHz Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18
Avg.	Figure 8: Avg Spectrum (Vertical) Site : 03CH04-SZ Condition : AVG_84 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VSW:5.010kHz Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Figure 6: Avg Spectrum (Fundamental) Site : 03CH04-SZ Condition : AVG_84 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VSW:5.010kHz Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
22	Horizontal	Fundamental
Peak	Date: 1 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_BE_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5	Date: 3 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5
Avg.	Date: 2 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_BE_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5	Date: 4 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
22	Vertical	Fundamental
Peak	Figure 5: Peak Spectrum (Vertical) Site : 03CH04-SZ Condition : PEAK_EE_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5	Figure 7: Peak Spectrum (Fundamental) Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5
Avg.	Figure 6: Avg Spectrum (Vertical) Site : 03CH04-SZ Condition : AVG_EE_54 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5	Figure 8: Avg Spectrum (Fundamental) Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 15 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13.5



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
22	Horizontal	Fundamental
Peak	Horizontal Peak Site : 03CH04-SZ Condition : PEAK_RE_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13	Fundamental Peak Site : 03CH04-SZ Condition : PEAK_F4 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13
	Horizontal Avg. Site : 03CH04-SZ Condition : AVG_RE_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13	Fundamental Avg. Site : 03CH04-SZ Condition : AVG_F4 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
22	Vertical	Fundamental
Peak	Date: 7 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_RE_74 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13	Date: 5 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_F4 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13
Avg.	Date: 8 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_RE_54 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13	Date: 6 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_F4 3m 91200-1474-2022 VERTICAL REBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 17 IMEI : 868848060193672 Plane : X with Accessories GM Power setting 13



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
22	Horizontal	Fundamental
Peak	Date: 1 Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_BE_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 18 IMEI : 868848060193672 Plane : X with Accessories MCS0 Power setting 13.5	Date: 3 Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 18 IMEI : 868848060193672 Plane : X with Accessories MCS0 Power setting 13.5
Avg.	Date: 2 Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_BE_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 18 IMEI : 868848060193672 Plane : X with Accessories MCS0 Power setting 13.5	Date: 4 Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 18 IMEI : 868848060193672 Plane : X with Accessories MCS0 Power setting 13.5



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
22	Vertical	Fundamental
Peak	Date: 5 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_EE_74 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 1B IMEI : 868848060193672 Plane : X with Accessories MCS9 Power setting 13.5	Date: 7 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 1B IMEI : 868848060193672 Plane : X with Accessories MCS9 Power setting 13.5
	Date: 6 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_EE_54 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 1B IMEI : 868848060193672 Plane : X with Accessories MCS9 Power setting 13.5	Date: 8 Level (dBu/Vm) Date: 2023-01-16 Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 1B IMEI : 868848060193672 Plane : X with Accessories MCS9 Power setting 13.5



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
22	Horizontal	Fundamental
Peak	Date: 3 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_BE_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS9 Power setting 13	Date: 1 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS9 Power setting 13
	Date: 4 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_BE_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS9 Power setting 13	Date: 2 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS9 Power setting 13

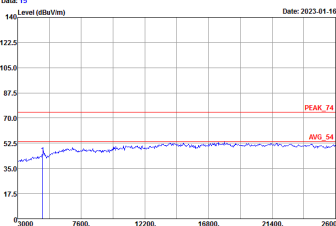
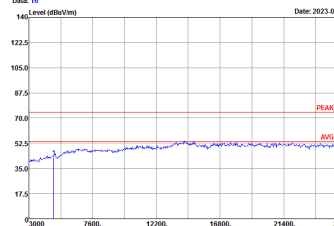


WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
22	Vertical	Fundamental
Peak	Date: 7 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_RE_74 3m 91200-1474-2022 VERTICAL RBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS0 Power setting 13	Date: 5 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL RBW:1000.000kHz VBW:3000.000kHz Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS0 Power setting 13
Avg.	Date: 8 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_RE_54 3m 91200-1474-2022 VERTICAL RBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS0 Power setting 13	Date: 6 Level (dBuV/m) Frequency (MHz) Site : 03CH04-SZ Condition : AVG_54 3m 91200-1474-2022 VERTICAL RBW:1000.000kHz VBW:1.000kHz Project : 311104 Mode : Mode 20 IMEI : 868849060193672 Plane : X with Accessories MCS0 Power setting 13



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
22	Horizontal	Vertical
Peak Avg.	Date: 15 Level (dBu/Vm) Date: 2023-01-16  Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 211104 Mode : Mode 12 IMEI : 060848060193672 Plane : X with Accessories IM Power setting 18	Date: 16 Level (dBu/Vm) Date: 2023-01-16  Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL Project : 211104 Mode : Mode 12 IMEI : 060848060193672 Plane : X with Accessories IM Power setting 18



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
22	Horizontal	Vertical
Peak Avg.	Horizontal Date: 7 Level (dBuV/m) Date: 2023-01-16 Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 13 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Vertical Date: 8 Level (dBuV/m) Date: 2023-01-16 Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 13 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
22	Horizontal	Vertical
Peak Avg.	Date: 15 Level (dBuV/m) PEAK_74 AVG_54 Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 HORIZONTAL Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18	Date: 16 Level (dBuV/m) PEAK_74 AVG_54 Site : 02CH04-SZ Condition : PEAK_74 3m 91200-1474-2022 VERTICAL Project : 311104 Mode : Mode 14 IMEI : 868848060193672 Plane : X with Accessories 1M Power setting 18