



FCC RF Test Report

APPLICANT : Meta Platforms Technologies, LLC.
EQUIPMENT : Handheld controller
BRAND NAME : META PLATFORMS TECHNOLOGIES, LLC
MODEL NAME : LW9
FCC ID : 2AGOZ-D39
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Feb. 03, 2022 ~ Jun. 09, 2022

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)

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People's Republic of China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR192411-03B	Rev. 01	Initial issue of report	Jul. 12, 2022

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	$\leq 20\text{dBc}$	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 5.39 dB at 42.610 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 22.13 dB at 0.428 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

Meta Platforms Technologies, LLC.
1 Hacker Way, Menlo Park, CA 94025, USA

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Handheld controller
Brand Name	META PLATFORMS TECHNOLOGIES, LLC
Model Name	LW9
FCC ID	2AGOZ-D39
SW Version	QCAHLSWMTPLZ-1.473021.1
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.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2457 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 11.91 dBm (0.0155 W) 802.11g : 14.66 dBm (0.0292 W) 802.11n HT20 : 14.76 dBm (0.0299 W) 802.11ac VHT20 : 14.73 dBm (0.0297 W)
99% Occupied Bandwidth	802.11b : 13.986MHz 802.11g : 17.303MHz 802.11n HT20 : 18.422MHz
Antenna Type / Gain	PCB Antenna type with gain 0.91 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

Note:

1. The sample 1 is Antenna with no glue, the sample 2 is Antenna with UV glue, Stylus magnet tip, and second source memory supplier and the sample 3 is Antenna with no glue, alternate source antenna vendor (same design, another vendor), LED Flex S-bend design, integrated shield can. According to the difference, we choose the sample 1 to full test and the sample 3 is verified for harmonic for WLAN mode and the sample 2 is verified worse cases between sample 1 and sample 3 which could refer to FR192411-03A.
2. For 802.11n HT20 / ac VHT20, the whole testing have assessed only 802.11n HT20 by referring to their maximum conducted power.

3. The device only support CH 10, 11, at restricted frequency bands 2310~2390MHz no signals, test channels closer to 2483.5~ 2500 MHz, so only this segment 2483.5~ 2500 MHz was tested for RSE testing.

1.4 Modification of EUT

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

1.5 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 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH06-KS 03CH08-KS TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH06-KS	AUDIX	E3	6.2009-8-24al
2.	03CH08-KS	AUDIX	E3	6.2009-8-24al
3.	CO01-KS	AUDIX	E3	6.2009-8-24



1.7 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

Channel	Freq. (MHz)
10	2457
11	2462

2.2 Test Mode

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

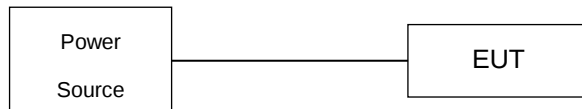
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11ac VHT20	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : nRF Tx+WLAN Tx(2.4G)+USB Cable 1(Charging from Adapter)
Remark: Radiated Test Cases, The tests were performed with Adapter.	

Simultaneous transmission

nRF Filter Mode CH12 (2426MHz) Tx + WLAN 2.4GHz 11g CH 11(2462MHz) Tx

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

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



2.4 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit.

2.5 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 2.66 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 2.66 + 10 = 12.66 \text{ (dB)}\end{aligned}$$

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) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
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 peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak 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 11.9.2.3.1 Method AVGPM 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 Peak Output Power

Please refer to Appendix A.

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.

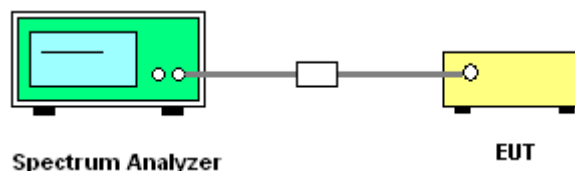
3.4.2 Measuring Instruments

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

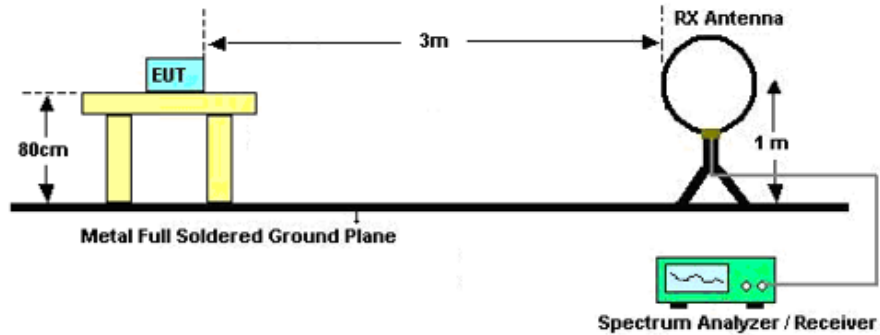
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

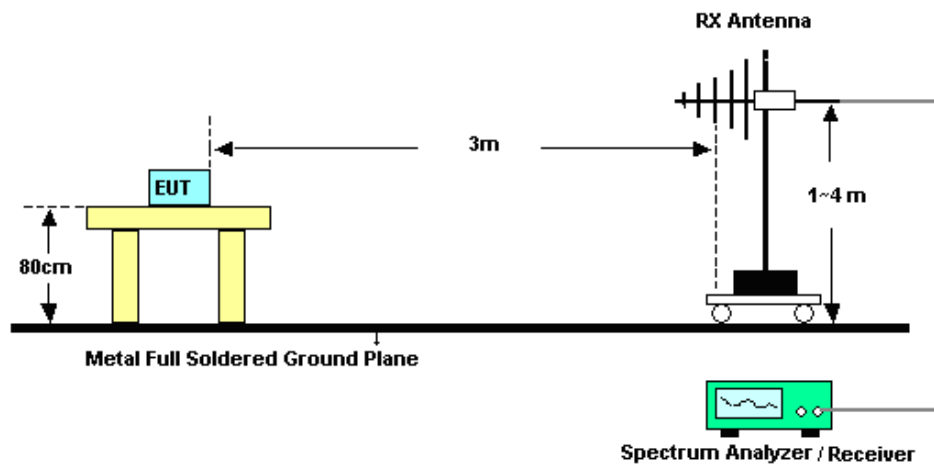
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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:
 - RBW = 1 MHz, VBW= 3MHz
 - Detector = RMS (power averaging).
 - If power averaging (rms) mode was used, then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.

3.5.4 Test Setup

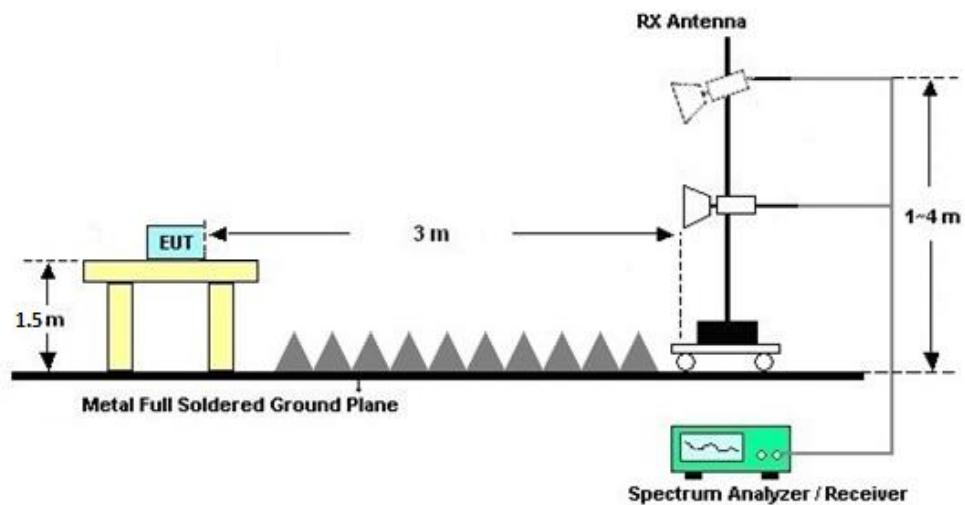
For radiated emissions below 30MHz



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.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

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.

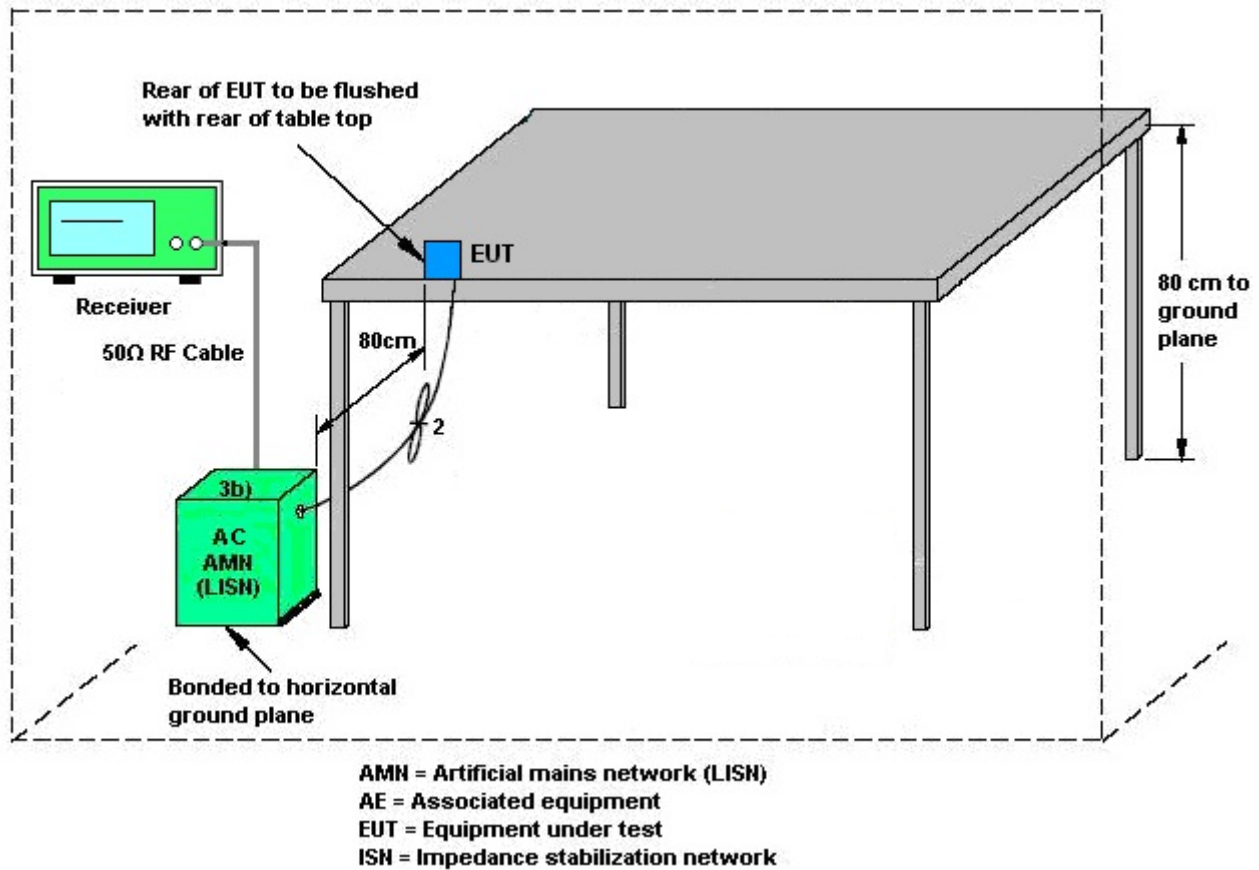
3.6.2 Measuring Instruments

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	101040	10Hz~40GHz	Oct. 14, 2021	Feb. 03, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Feb. 03, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Feb. 03, 2022	Jan. 04, 2023	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max x 30dBm	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY60242126	10Hz~44GHz	Oct. 26, 2021	May 24, 2022	Oct. 25, 2022	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 24, 2022	Oct. 29, 2022	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz~1GHz	May 27, 2021	May 24, 2022	May 26, 2022	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 19, 2021	May 24, 2022	Jul. 18, 2022	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	380827	9KHz ~1GHZ	Jul. 30, 2021	May 24, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 24, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270319	500MHz~26.5GHz	Oct. 14, 2021	May 24, 2022	Oct. 13, 2022	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 24, 2022	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 24, 2022	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 24, 2022	NCR	Radiation (03CH06-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH08-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz~44G,MAX 30dB	Jul. 12, 2021	May 24, 2022	Jul. 11, 2022	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 24, 2022	Oct. 29, 2022	Radiation (03CH08-KS)
Bilog Ante1ma	TESEQ& VGT	CBL 61110	59915	30MHz~1GHz	Sep. 02, 2021	May 24, 2022	Sep. 01, 2022	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Dec. 24, 2021	May 24, 2022	Dec. 23, 2022	Radiation (03CH08-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 24, 2022	Jul. 29, 2022	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	Keysight	83017A	MY53270389	500MHz~26.5GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Jun. 09, 2022	May 23, 2023	Conduction (CO01-KS)



AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Jun. 09, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	R&S	ENV216	100334	9kHz~30MHz	Oct. 14, 2021	Jun. 09, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jun. 09, 2022	Oct. 13, 2022	Conduction (CO01-KS)

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	±0.56 dB
Conducted Emissions	±0.92 dB
Occupied Channel Bandwidth	±0.03 %
Conducted Power Spectral Density	±0.54 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.94dB
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03CH06:

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
---	-------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
---	-------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
---	-------

**03CH08:****Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.9dB
--	-------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
--	-------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
--	-------

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



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Gene Wang	Temperature:	21~25	°C
Test Date:	2022/2/3	Relative Humidity:	51~54	%

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	10	2457	11.91	30.00	0.91	12.82	36.00	Pass
11b	1Mbps	1	11	2462	11.82	30.00	0.91	12.73	36.00	Pass
11g	6Mbps	1	10	2457	14.66	30.00	0.91	15.57	36.00	Pass
11g	6Mbps	1	11	2462	14.24	30.00	0.91	15.15	36.00	Pass
HT20	MCS0	1	10	2457	14.76	30.00	0.91	15.67	36.00	Pass
HT20	MCS0	1	11	2462	14.33	30.00	0.91	15.24	36.00	Pass
VHT20	MCS0	1	10	2457	14.73	30.00	0.91	15.64	36.00	Pass
VHT20	MCS0	1	11	2462	14.28	30.00	0.91	15.19	36.00	Pass



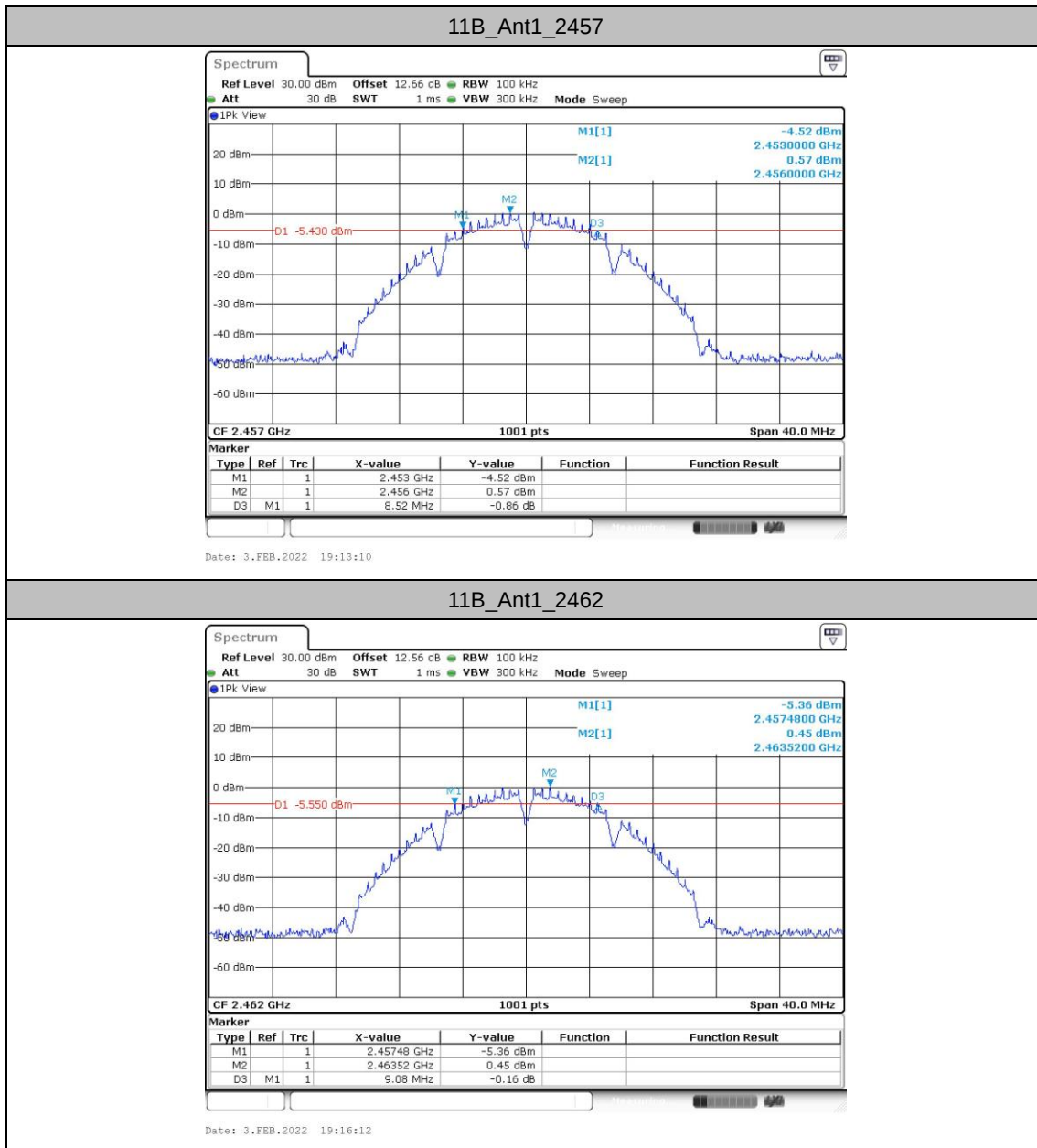
DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2457	8.52	2453.00	2461.52	0.5	PASS
		2462	9.08	2457.48	2466.56	0.5	PASS
11G	Ant1	2457	15.88	2449.24	2465.12	0.5	PASS
		2462	15.72	2454.44	2470.16	0.5	PASS
11N20SISO	Ant1	2457	17.28	2448.48	2465.76	0.5	PASS
		2462	16.56	2454.24	2470.80	0.5	PASS

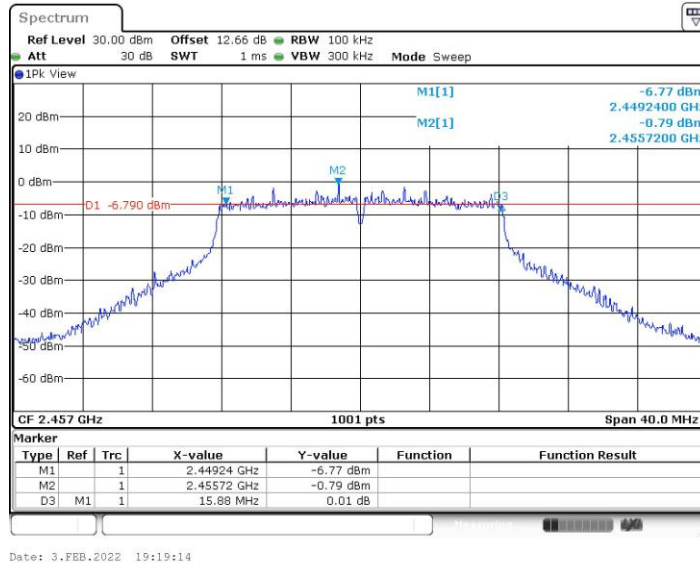


Test Graphs

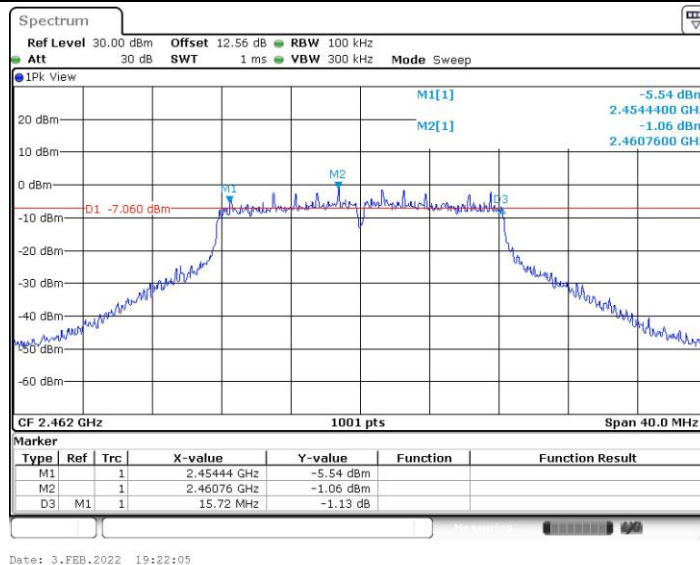




11G_Ant1_2457

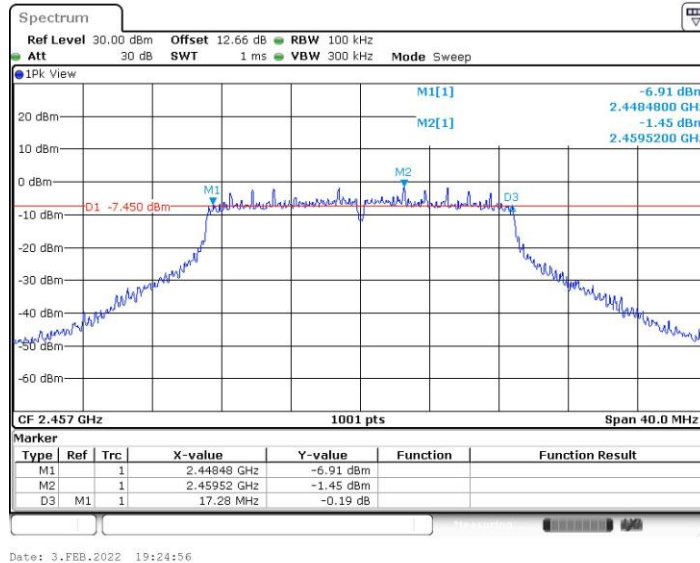


11G_Ant1_2462

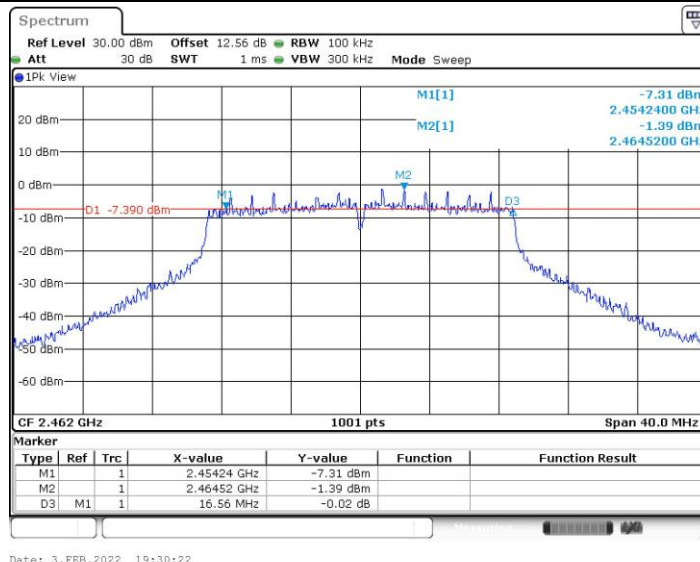




11N20SISO_Ant1_2457



11N20SISO_Ant1_2462





Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2457	13.986	2450.047	2464.033	---	---
		2462	13.986	2455.087	2469.073	---	---
11G	Ant1	2457	17.303	2448.369	2465.671	---	---
		2462	17.303	2453.449	2470.751	---	---
11N20SISO	Ant1	2457	18.422	2447.849	2466.271	---	---
		2462	18.422	2452.849	2471.271	---	---

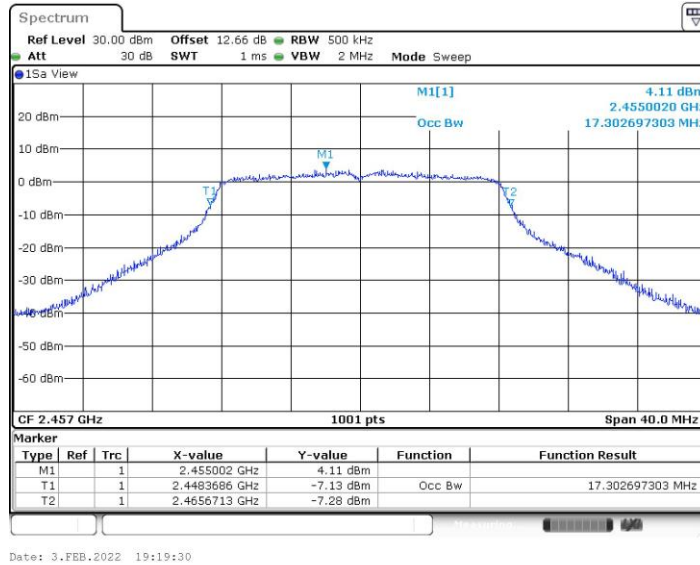


Test Graphs

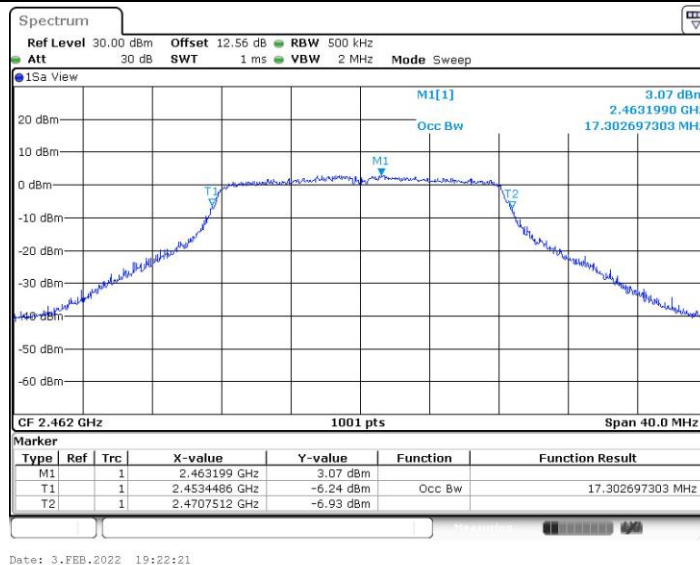




11G_Ant1_2457

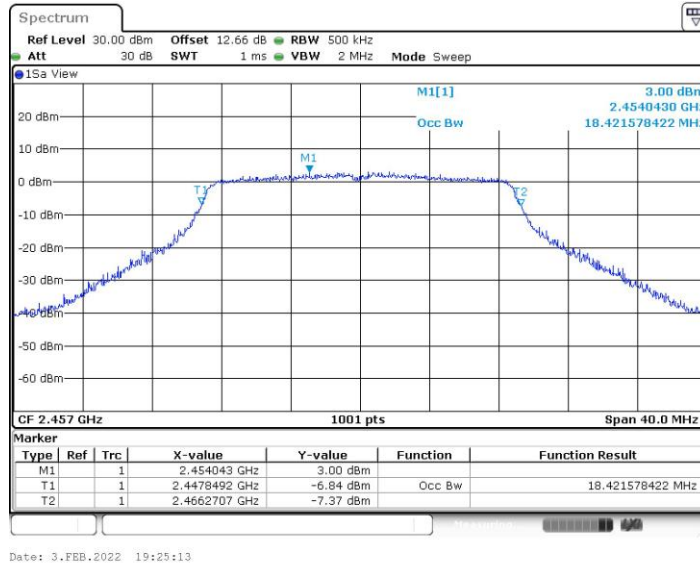


11G_Ant1_2462

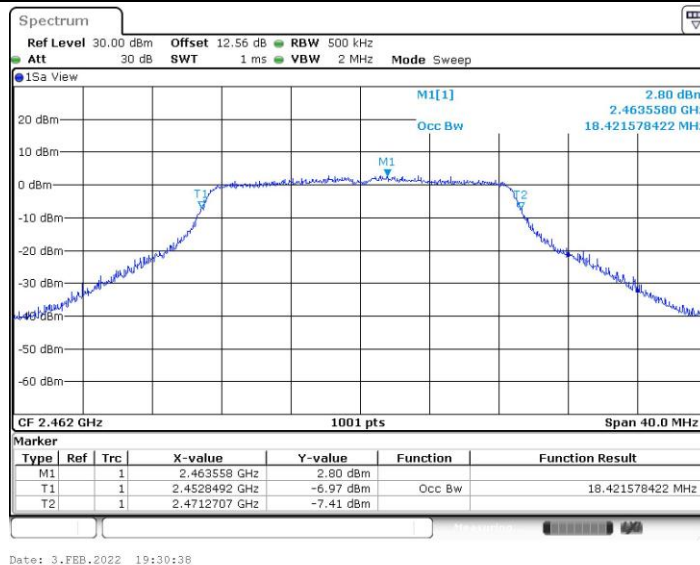




11N20SISO_Ant1_2457



11N20SISO_Ant1_2462





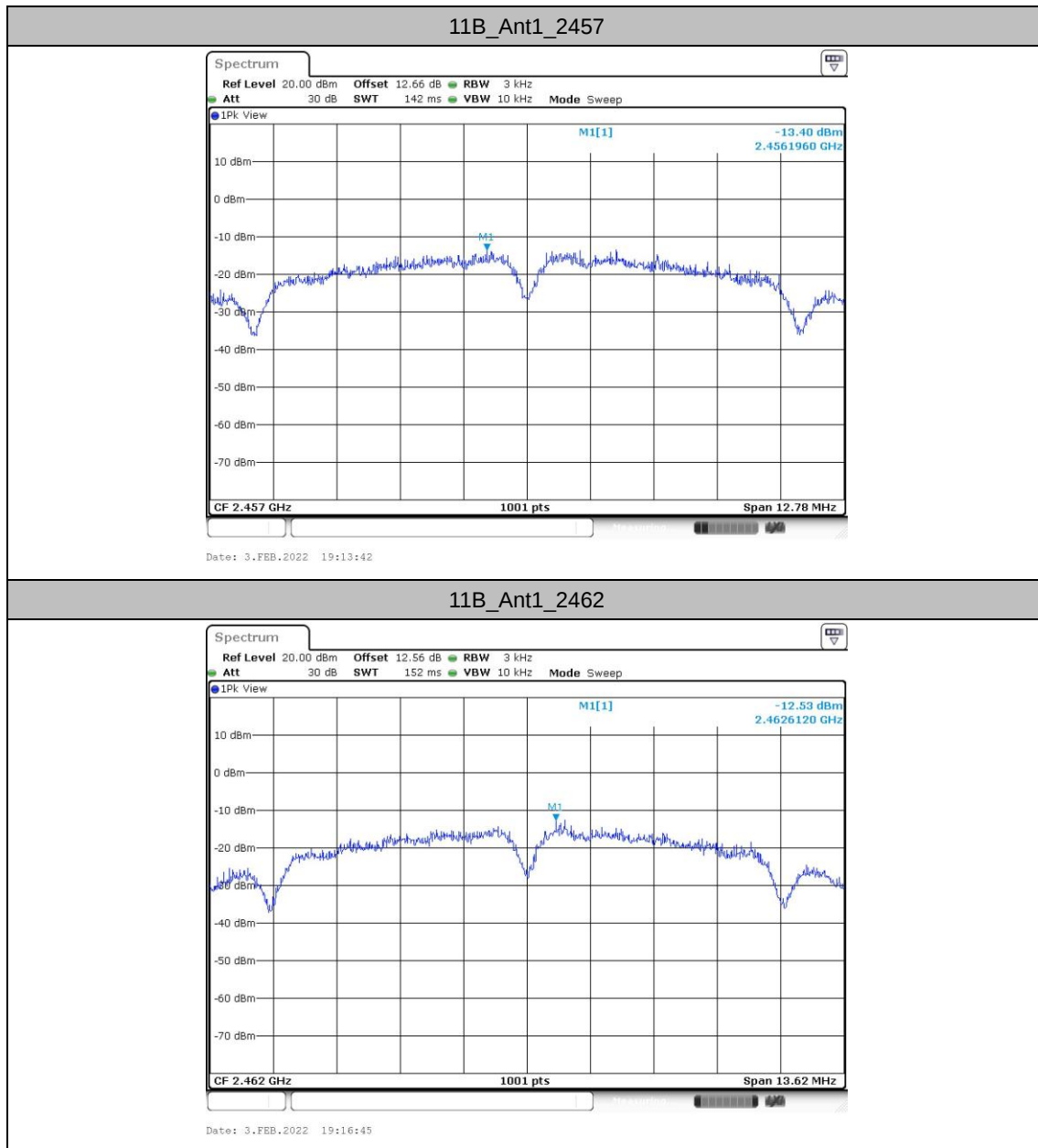
Power spectral density

Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2457	-13.4	≤8.00	PASS
		2462	-12.53	≤8.00	PASS
11G	Ant1	2457	-14.01	≤8.00	PASS
		2462	-14.28	≤8.00	PASS
11N20SISO	Ant1	2457	-16.02	≤8.00	PASS
		2462	-16.34	≤8.00	PASS

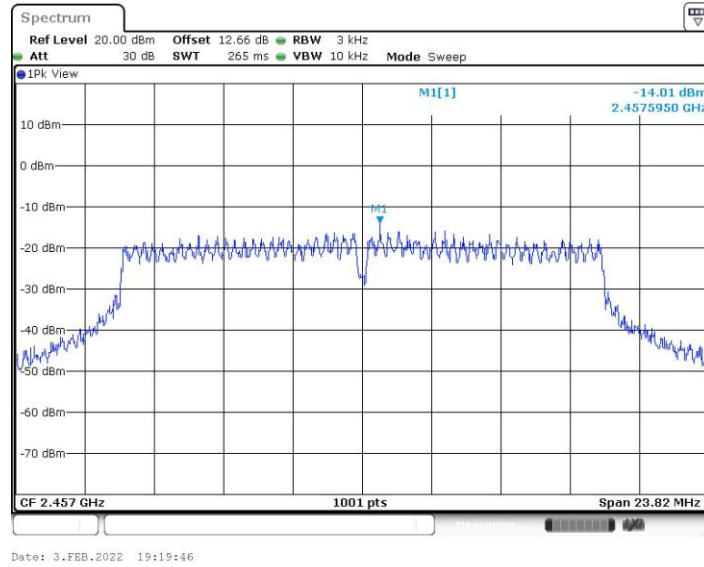


Test Graphs

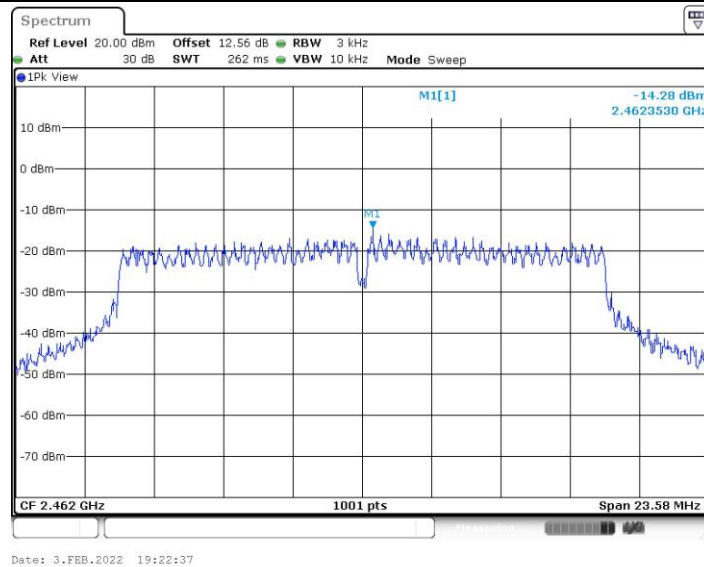




11G_Ant1_2457

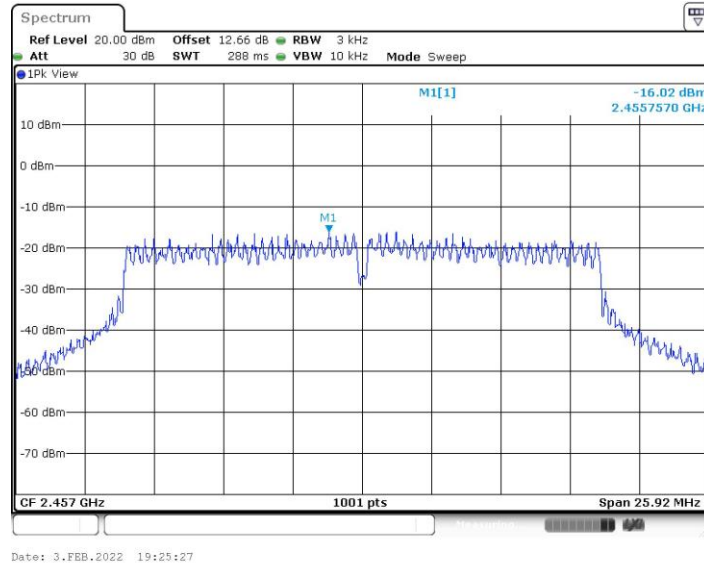


11G_Ant1_2462

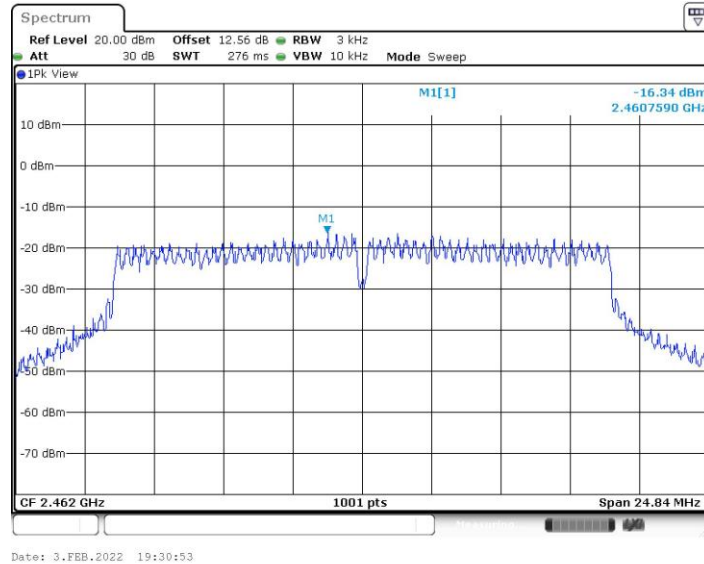




11N20SISO_Ant1_2457



11N20SISO_Ant1_2462





Reference level measurement

Test Result

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100kHz]
11B	Ant1	2457	2457.48	0.35
		2462	2461.49	0.22
11G	Ant1	2457	2459.48	-1.48
		2462	2464.49	-1.55
11N20SISO	Ant1	2457	2458.28	-1.13
		2462	2464.52	-1.45

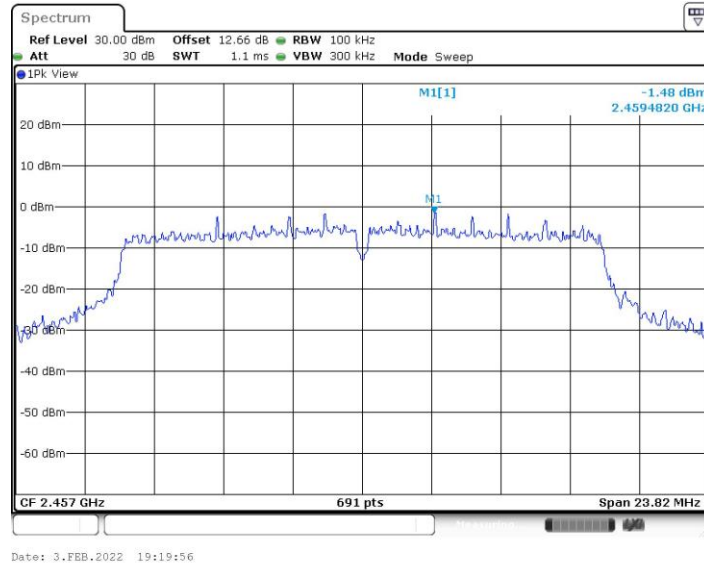


Test Graphs

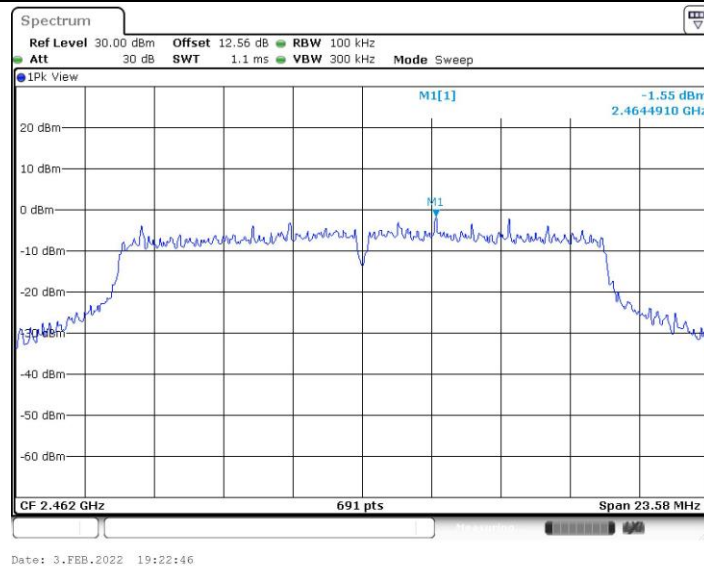




11G_Ant1_2457

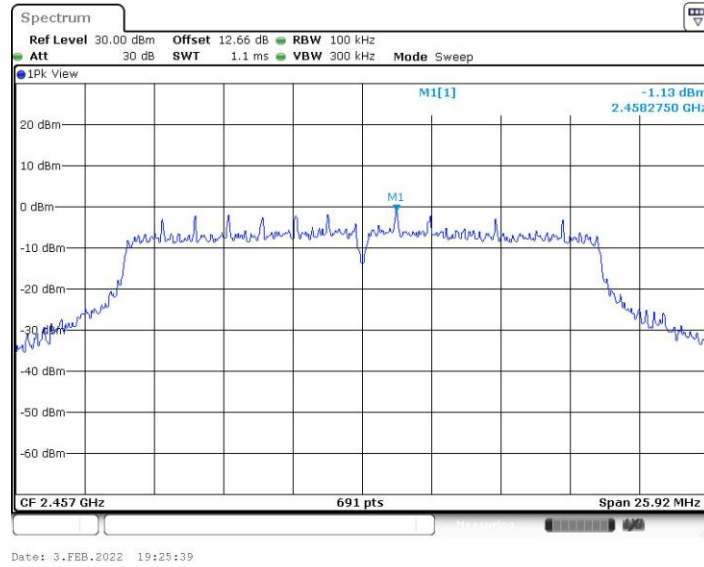


11G_Ant1_2462

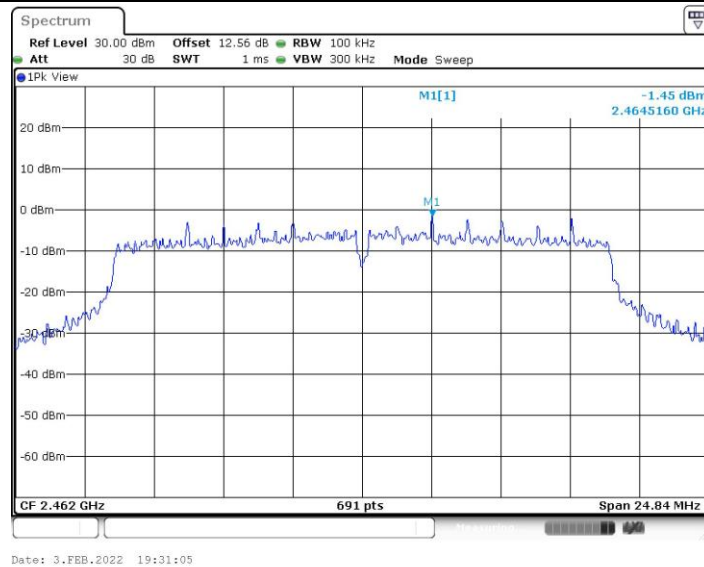




11N20SISO_Ant1_2457



11N20SISO_Ant1_2462



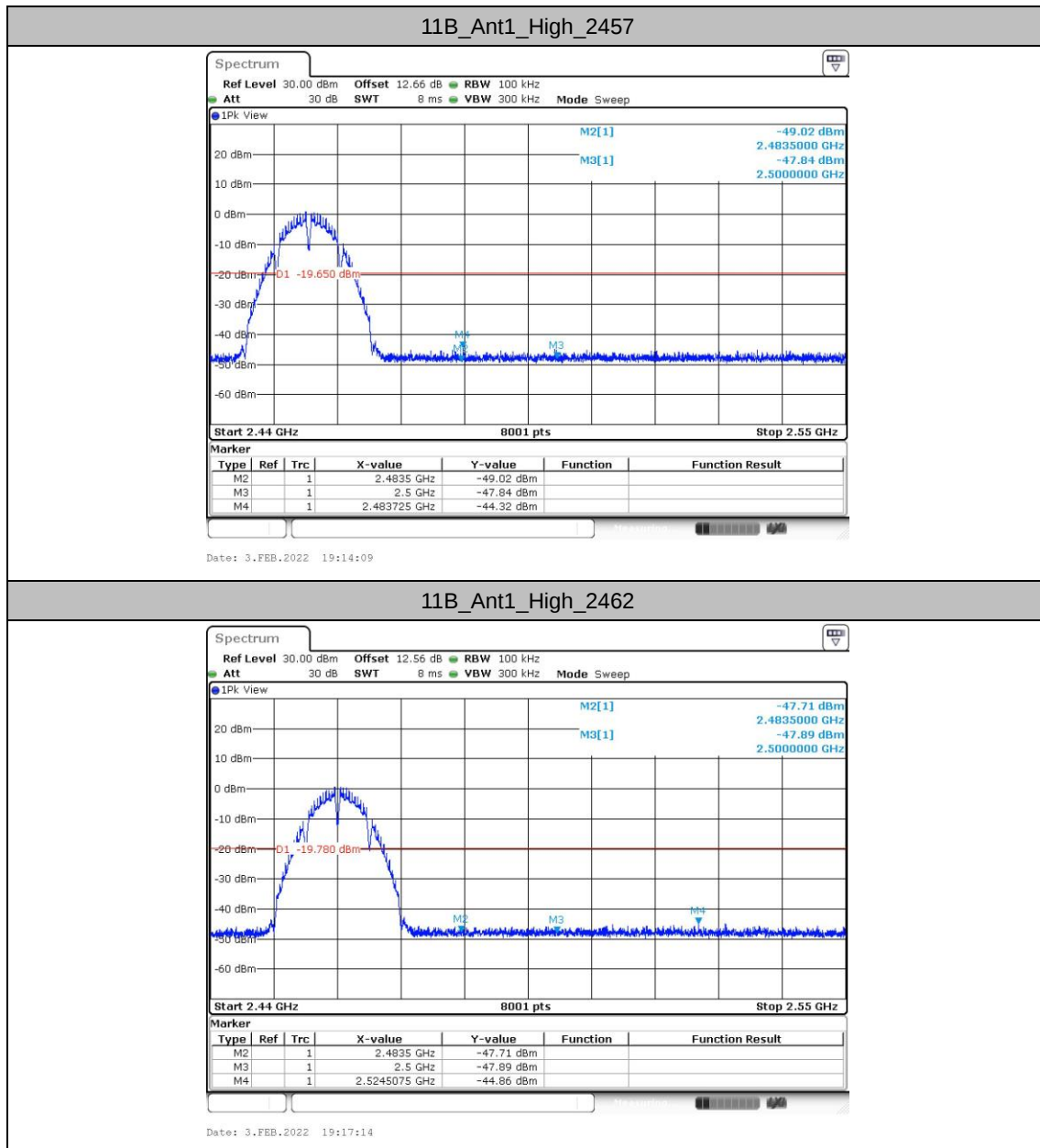
Band edge measurements

Test Result

TestMode	Antenna	Channel Name	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	High	2457	0.35	-44.32	≤-19.65	PASS
			2462	0.22	-44.86	≤-19.78	PASS
11G	Ant1	High	2457	-1.48	-44.57	≤-21.48	PASS
			2462	-1.55	-44.57	≤-21.55	PASS
11N20SISO	Ant1	High	2457	-1.13	-45.1	≤-21.13	PASS
			2462	-1.45	-44.61	≤-21.45	PASS

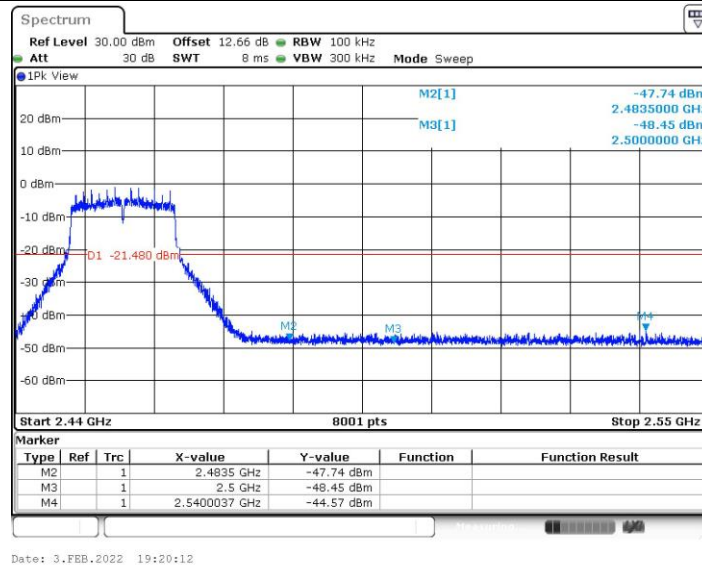


Test Graphs

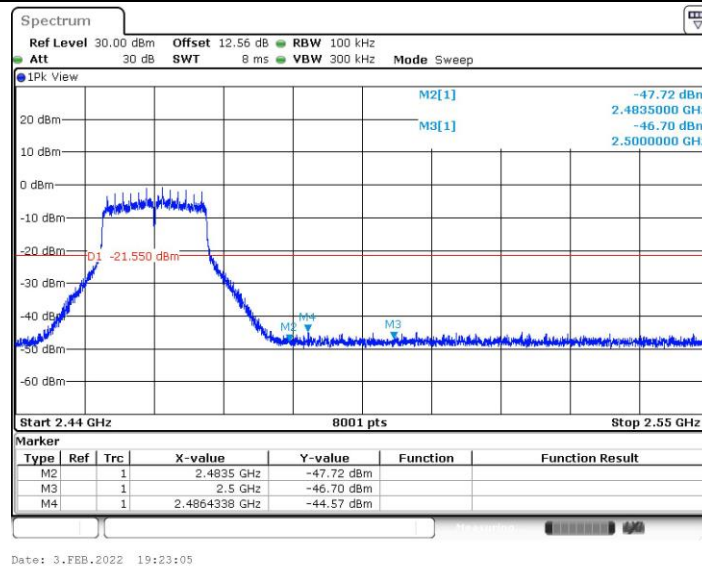




11G_Ant1_High_2457

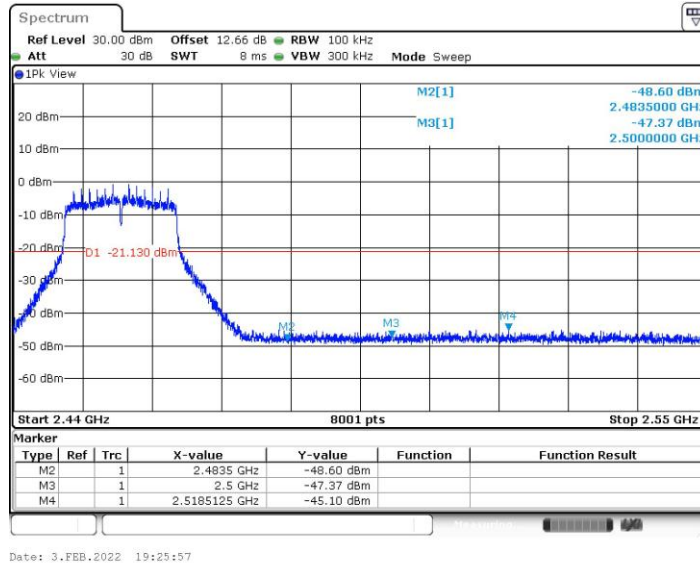


11G_Ant1_High_2462

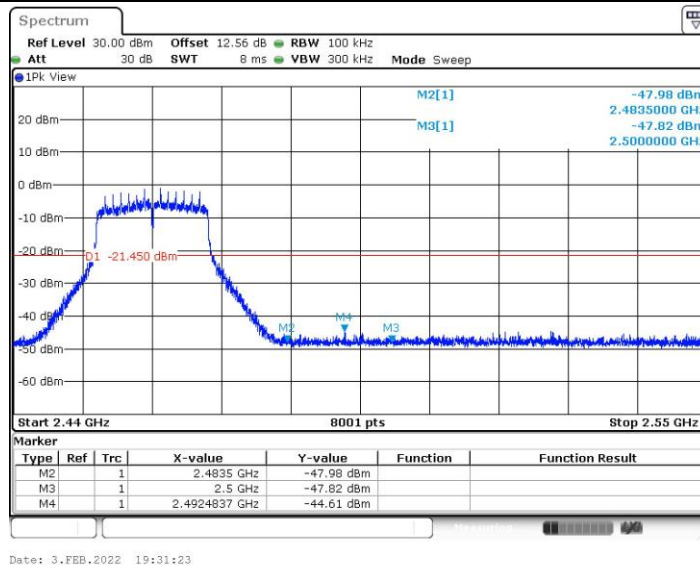




11N20SISO_Ant1_High_2457



11N20SISO_Ant1_High_2462



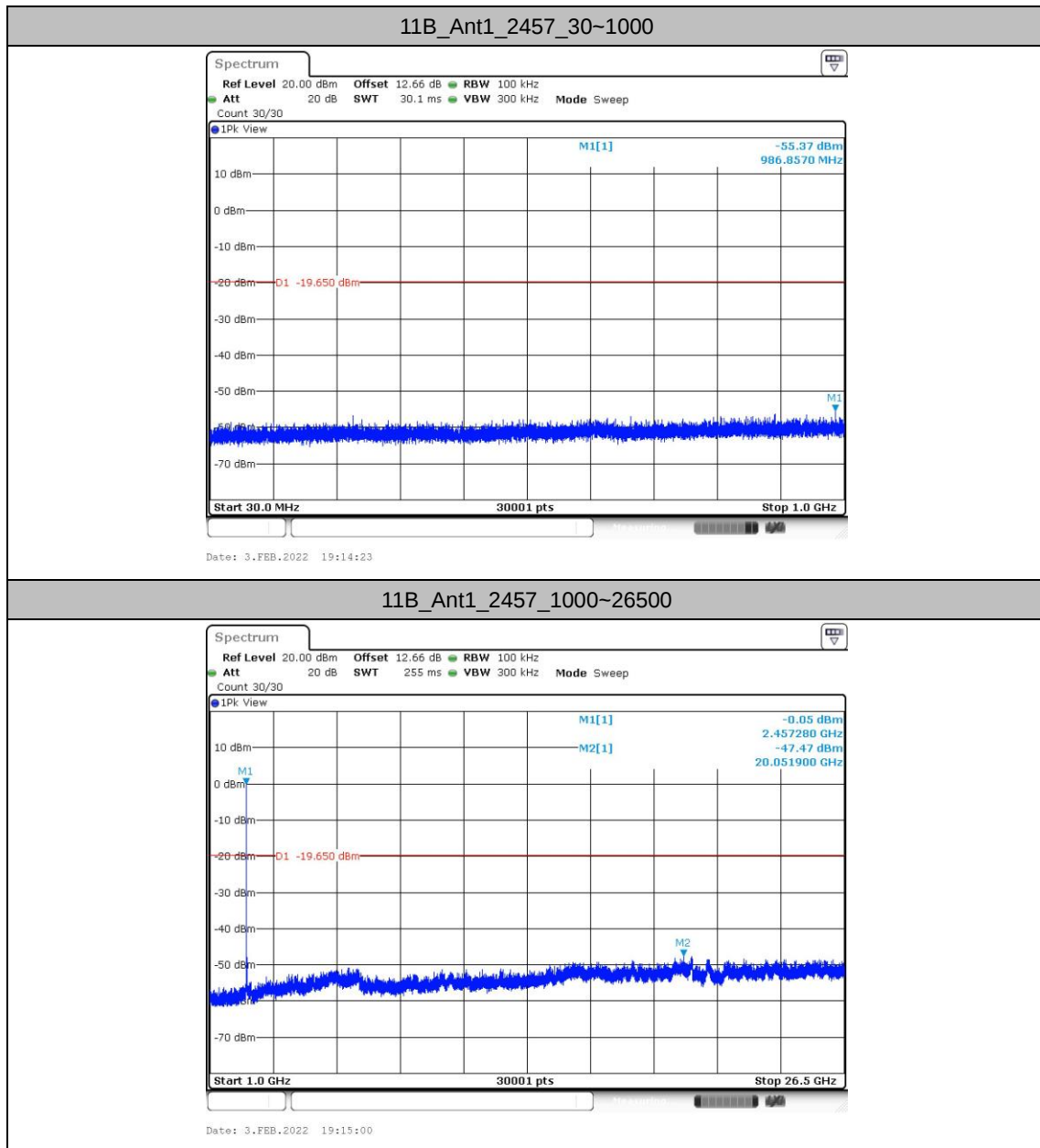
Conducted Spurious Emission

Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2457	30~1000	0.35	-55.37	≤-19.65	PASS
			1000~26500	0.35	-47.47	≤-19.65	PASS
		2462	30~1000	0.22	-56.62	≤-19.78	PASS
			1000~26500	0.22	-47.31	≤-19.78	PASS
11G	Ant1	2457	30~1000	-1.48	-56.42	≤-21.48	PASS
			1000~26500	-1.48	-47.31	≤-21.48	PASS
		2462	30~1000	-1.55	-56.1	≤-21.55	PASS
			1000~26500	-1.55	-47.77	≤-21.55	PASS
11N20SISO	Ant1	2457	30~1000	-1.13	-55.25	≤-21.13	PASS
			1000~26500	-1.13	-47.37	≤-21.13	PASS
		2462	30~1000	-1.45	-56.03	≤-21.45	PASS
			1000~26500	-1.45	-47.35	≤-21.45	PASS

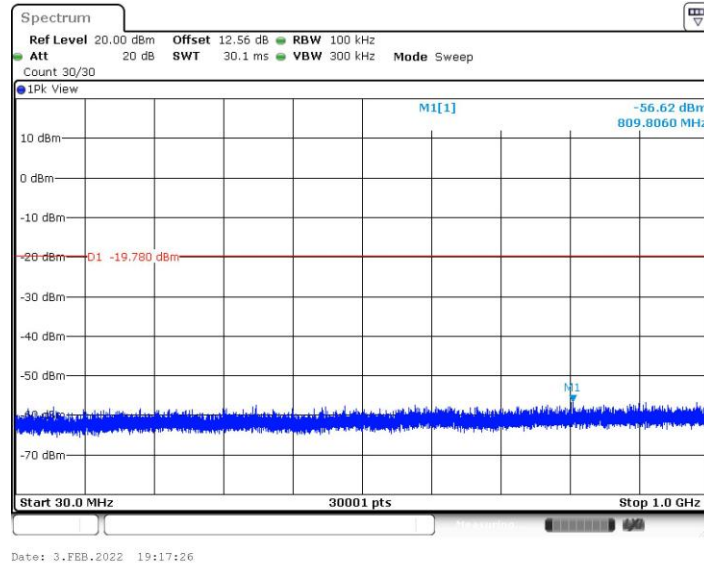


Test Graphs

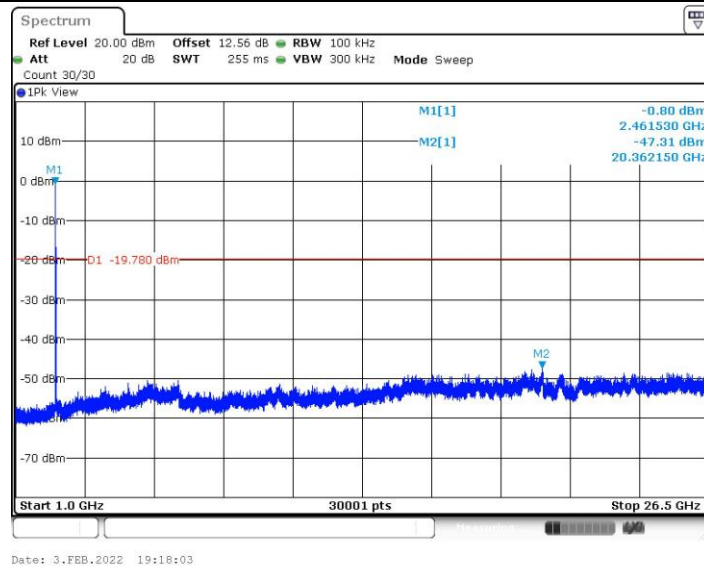




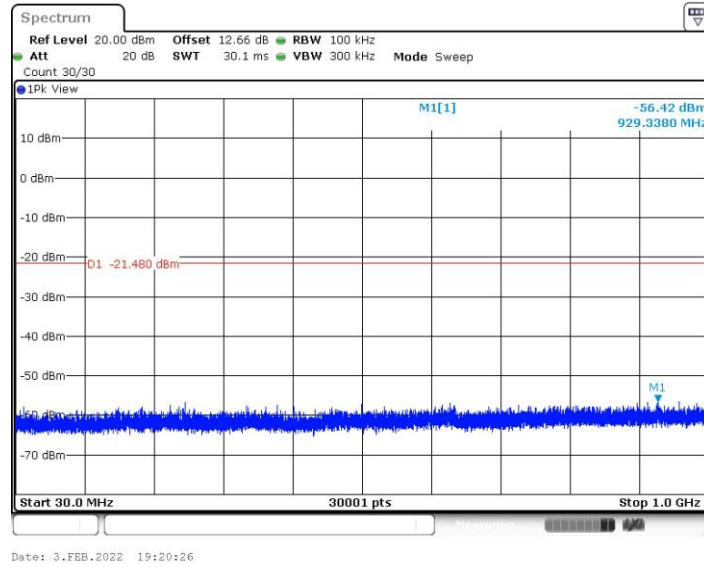
11B_Ant1_2462_30~1000



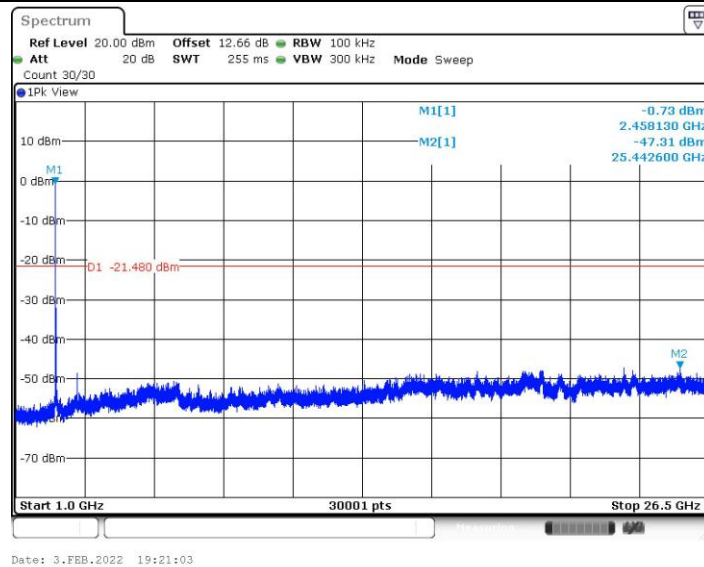
11B_Ant1_2462_1000~26500



11G_Ant1_2457_30~1000

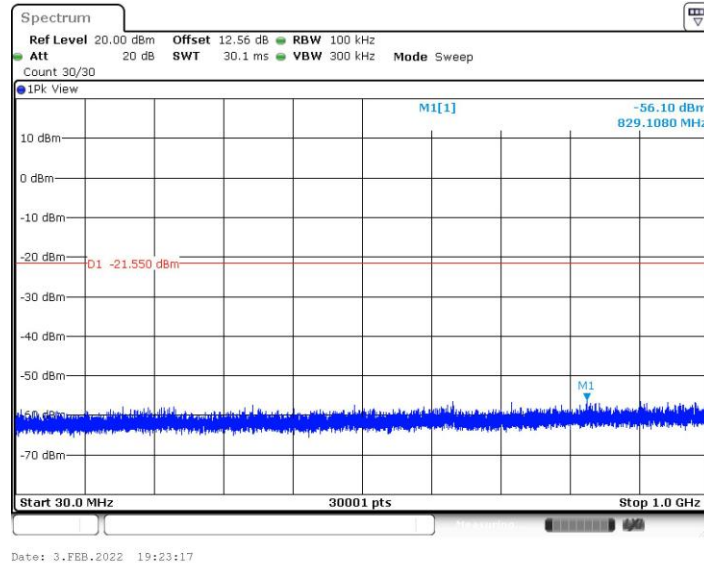


11G_Ant1_2457_1000~26500

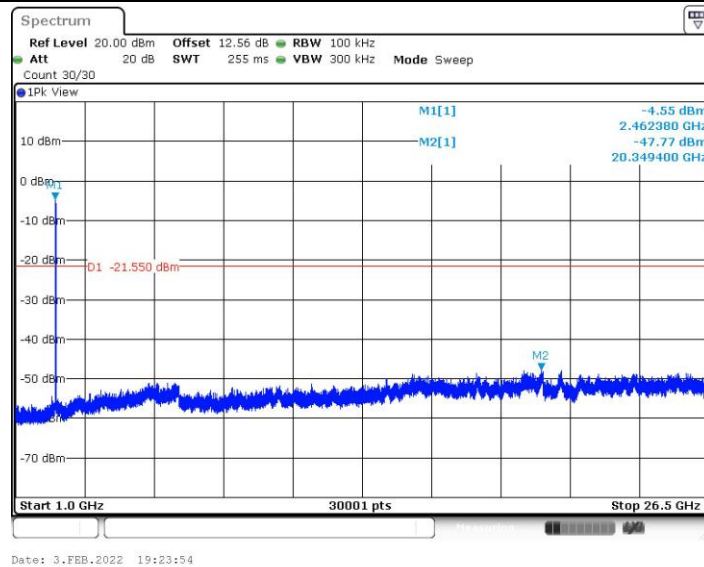




11G_Ant1_2462_30~1000

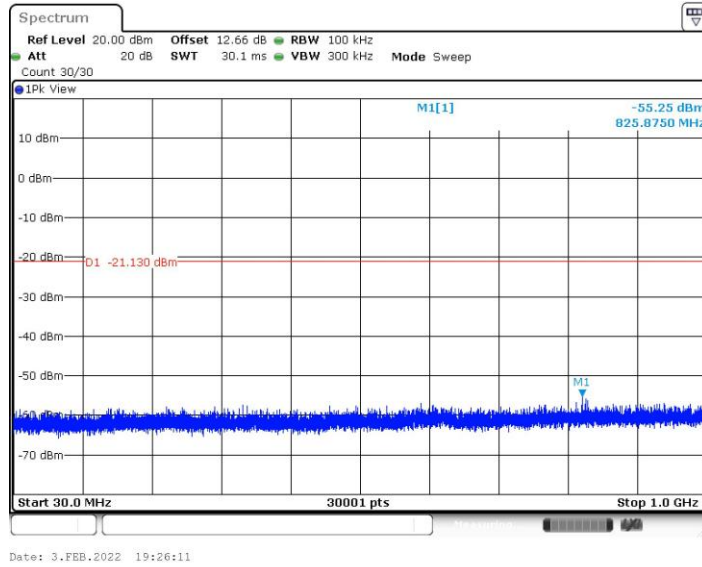


11G_Ant1_2462_1000~26500

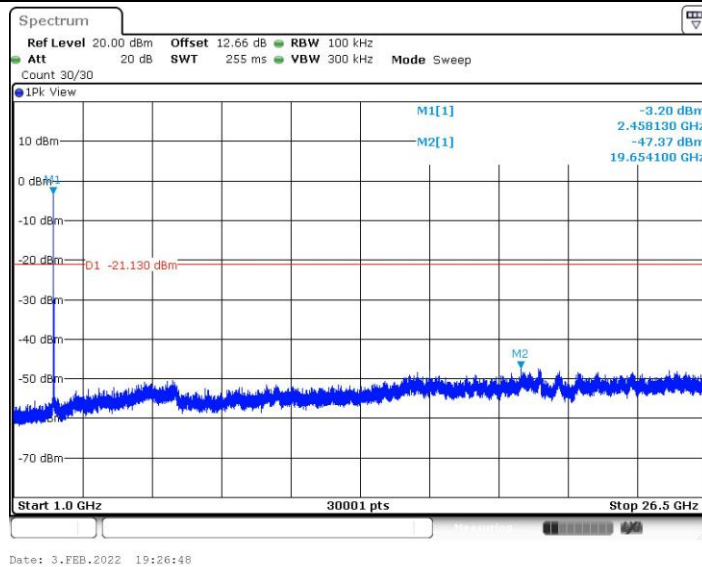




11N20SISO_Ant1_2457_30~1000

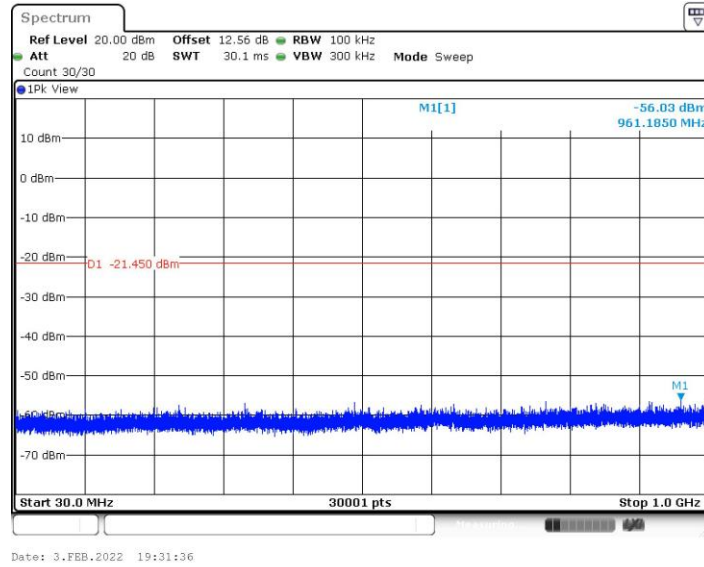


11N20SISO_Ant1_2457_1000~26500

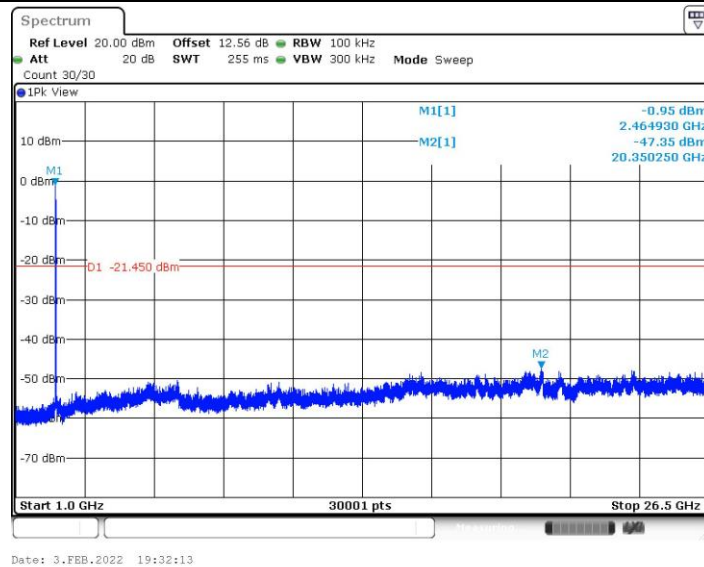




11N20SISO_Ant1_2462_30~1000



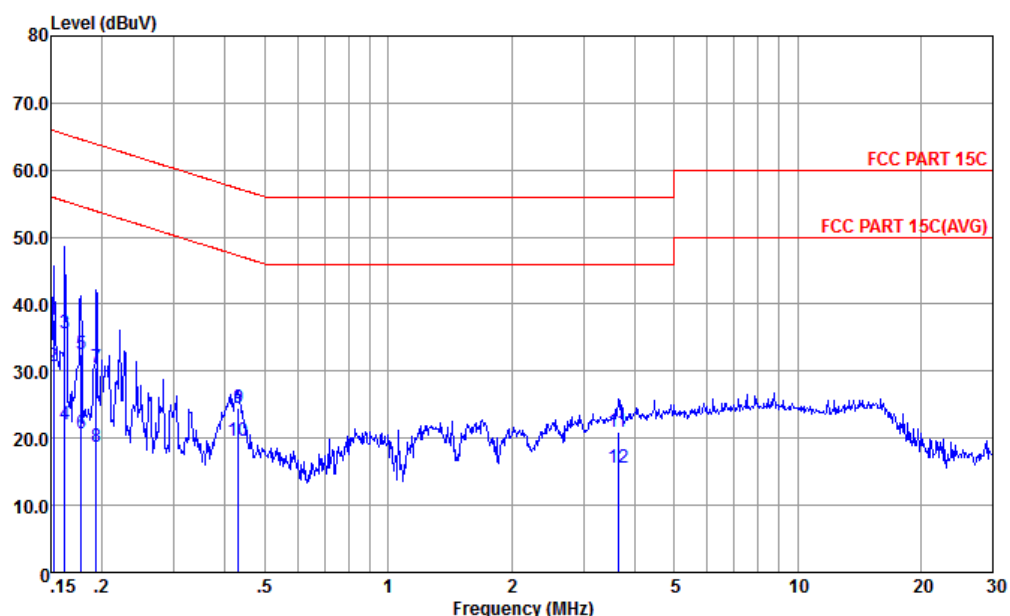
11N20SISO_Ant1_2462_1000~26500





Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	24.2~25.6°C
		Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

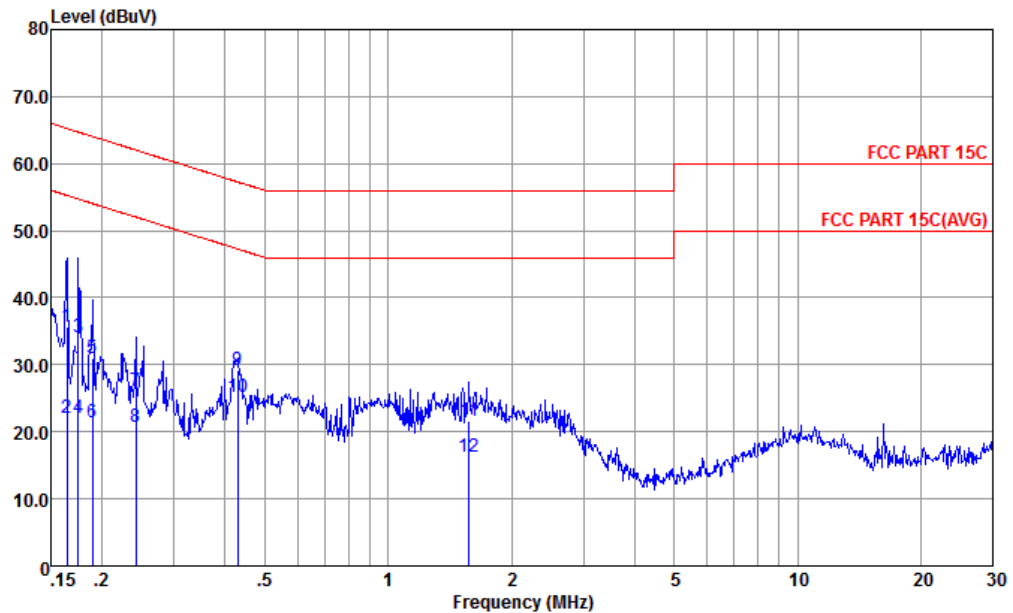


Site : CO01-KS
Condition : FCC PART 15C LISN-060105-L LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.152	37.69	-28.18	65.87	27.20	0.02	10.47	QP
2 *	0.152	30.69	-26.18	55.87	20.20	0.02	10.47	Average
3	0.162	35.67	-29.67	65.34	25.19	0.03	10.45	QP
4	0.162	22.07	-33.27	55.34	11.59	0.03	10.45	Average
5	0.178	32.64	-31.95	64.59	22.20	0.03	10.41	QP
6	0.178	20.64	-33.95	54.59	10.20	0.03	10.41	Average
7	0.193	30.62	-33.27	63.89	20.20	0.04	10.38	QP
8	0.193	18.72	-35.17	53.89	8.30	0.04	10.38	Average
9	0.431	24.55	-32.69	57.24	14.20	0.09	10.26	QP
10	0.431	19.65	-27.59	47.24	9.30	0.09	10.26	Average
11	3.642	20.91	-35.09	56.00	10.50	0.16	10.25	QP
12	3.642	15.61	-30.39	46.00	5.20	0.16	10.25	Average



Test Engineer :	Amos Zhang	Temperature :	24.2~25.6°C
		Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C LISN-060105-N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.164	35.65	-29.60	65.25	25.10	0.11	10.44	QP
2	0.164	22.15	-33.10	55.25	11.60	0.11	10.44	Average
3	0.175	34.12	-30.60	64.72	23.60	0.10	10.42	QP
4	0.175	22.02	-32.70	54.72	11.50	0.10	10.42	Average
5	0.189	31.09	-32.97	64.06	20.61	0.10	10.38	QP
6	0.189	21.29	-32.77	54.06	10.81	0.10	10.38	Average
7	0.242	26.04	-36.00	62.04	15.60	0.10	10.34	QP
8	0.242	20.64	-31.40	52.04	10.20	0.10	10.34	Average
9	0.428	29.16	-28.13	57.29	18.79	0.11	10.26	QP
10 *	0.428	25.16	-22.13	47.29	14.79	0.11	10.26	Average
11	1.577	21.56	-34.44	56.00	11.20	0.13	10.23	QP
12	1.577	16.16	-29.84	46.00	5.80	0.13	10.23	Average

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

Sample1

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 10 2457MHz		2493.28	55.5	-18.5	74	49.12	32.2	6.75	32.57	252	34	P	H
		2499.7	44.21	-9.79	54	37.83	32.2	6.75	32.57	252	34	A	H
		2456	96.14	-	-	89.95	32.2	6.7	32.71	252	34	P	H
		2458	91.2	-	-	85.01	32.2	6.7	32.71	252	34	A	H
		2487.76	56.08	-17.92	74	49.77	32.2	6.75	32.64	116	251	P	V
		2491.54	44.12	-9.88	54	34.86	32.6	9.3	32.64	116	251	A	V
		2456	102.56	-	-	96.37	32.2	6.7	32.71	116	251	P	V
		2458	89.74	-	-	80.67	32.55	9.23	32.71	116	251	A	V
802.11b CH 11 2462MHz		2491.24	55.82	-18.18	74	49.51	32.2	6.75	32.64	100	82	P	H
		2488.06	44.39	-9.61	54	38.08	32.2	6.75	32.64	100	82	A	H
	*	2462	96.81	-	-	90.62	32.2	6.7	32.71	100	82	P	H
	*	2460	92.12	-	-	85.93	32.2	6.7	32.71	100	82	A	H
		2483.5	56.96	-17.04	74	50.67	32.2	6.73	32.64	120	254	P	V
		2488.3	45.28	-8.72	54	38.97	32.2	6.75	32.64	120	254	A	V
	*	2462	102.66	-	-	96.47	32.2	6.7	32.71	120	254	P	V
	*	2460	98.22	-	-	92.03	32.2	6.7	32.71	120	254	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 10 2457MHz		4914	46.49	-27.51	74	65.41	33.73	11.89	64.54	178	55	P	H
		7365	42.91	-31.09	74	58.71	35.4	14.06	65.26	178	55	P	H
		4914	46.71	-27.29	74	65.63	33.73	11.89	64.54	125	114	P	V
		7365	42.9	-31.1	74	58.7	35.4	14.06	65.26	125	114	P	V
802.11b CH 11 2462MHz		4924	46.86	-27.14	74	65.77	33.76	11.86	64.53	164	321	P	H
		7380	42.86	-31.14	74	58.69	35.4	14.08	65.31	164	321	P	H
		4924	46.57	-27.43	74	65.48	33.76	11.86	64.53	247	114	P	V
		7380	42.67	-31.33	74	58.5	35.4	14.08	65.31	247	114	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	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 CH 10 2457MHz		2490.88	55.9	-18.1	74	49.59	32.2	6.75	32.64	100	56	P	H
		2485.36	44.15	-9.85	54	37.86	32.2	6.73	32.64	100	56	A	H
		2456	98.2	-	-	92.01	32.2	6.7	32.71	100	56	P	H
		2454	88.47	-	-	82.28	32.2	6.7	32.71	100	56	A	H
		2497.54	56.08	-17.92	74	49.7	32.2	6.75	32.57	139	260	P	V
		2484.28	45.07	-8.93	54	38.78	32.2	6.73	32.64	139	260	A	V
		2456	105.01	-	-	98.82	32.2	6.7	32.71	139	260	P	V
		2458	95.4	-	-	89.21	32.2	6.7	32.71	139	260	A	V
802.11g CH 11 2462MHz		2488.72	55.95	-18.05	74	49.64	32.2	6.75	32.64	354	57	P	H
		2483.98	44.33	-9.67	54	38.04	32.2	6.73	32.64	354	57	A	H
	*	2462	98.52	-	-	92.33	32.2	6.7	32.71	354	57	P	H
	*	2460	89.29	-	-	83.1	32.2	6.7	32.71	354	57	A	H
		2486.38	56.97	-17.03	74	50.68	32.2	6.73	32.64	120	254	P	V
		2484.88	45.7	-8.3	54	39.41	32.2	6.73	32.64	120	254	A	V
	*	2464	103.67	-	-	97.48	32.2	6.7	32.71	120	254	P	V
	*	2460	94.89	-	-	88.7	32.2	6.7	32.71	120	254	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	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 CH 10 2457MHz		4914	46.69	-27.31	74	65.61	33.73	11.89	64.54	141	22	P	H
		7365	42.6	-31.4	74	58.4	35.4	14.06	65.26	141	22	P	H
		4914	43.09	-30.91	74	62.01	33.73	11.89	64.54	249	119	P	V
		7365	43.43	-30.57	74	59.23	35.4	14.06	65.26	249	119	P	V
802.11g CH 11 2462MHz		4924	46.25	-27.75	74	65.16	33.76	11.86	64.53	221	99	P	H
		7380	43.09	-30.91	74	58.92	35.4	14.08	65.31	221	99	P	H
		4924	45.11	-28.89	74	64.02	33.76	11.86	64.53	174	46	P	V
		7380	42.14	-31.86	74	57.97	35.4	14.08	65.31	174	46	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	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)
802.11n HT20 CH 06 2437MHz		2490.82	55.9	-18.1	74	49.59	32.2	6.75	32.64	119	216	P	H
		2483.56	45.03	-8.97	54	38.74	32.2	6.73	32.64	119	216	A	H
		2456	100.49	-	-	94.3	32.2	6.7	32.71	119	216	P	H
		2454	91.14	-	-	84.95	32.2	6.7	32.71	119	216	A	H
		2497.66	56.51	-17.49	74	50.13	32.2	6.75	32.57	100	283	P	V
		2484.1	45.13	-8.87	54	38.84	32.2	6.73	32.64	100	283	A	V
		2454	104.7	-	-	98.51	32.2	6.7	32.71	100	283	P	V
		2458	95.11	-	-	88.92	32.2	6.7	32.71	100	283	A	V
802.11n HT20 CH 11 2462MHz		2489.2	56.18	-17.82	74	49.87	32.2	6.75	32.64	103	295	P	H
		2484.88	44.31	-9.69	54	38.02	32.2	6.73	32.64	103	295	A	H
	*	2460	99.4	-	-	93.21	32.2	6.7	32.71	103	295	P	H
	*	2460	90.2	-	-	84.01	32.2	6.7	32.71	103	295	A	H
		2485.24	56.51	-17.49	74	50.22	32.2	6.73	32.64	109	263	P	V
		2483.92	45.43	-8.57	54	39.14	32.2	6.73	32.64	109	263	A	V
	*	2464	104.18	-	-	97.99	32.2	6.7	32.71	109	263	P	V
	*	2464	94.79	-	-	88.6	32.2	6.7	32.71	109	263	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4914	43.43	-30.57	74	62.35	33.73	11.89	64.54	224	319	P	H
HT20		7365	42.22	-31.78	74	58.02	35.4	14.06	65.26	224	319	P	H
CH 10		4914	44.64	-29.36	74	63.56	33.73	11.89	64.54	258	305	P	V
2457MHz		7365	42.28	-31.72	74	58.08	35.4	14.06	65.26	258	305	P	V
802.11n		4924	43.23	-30.77	74	62.14	33.76	11.86	64.53	121	58	P	H
HT20		7380	43.3	-30.7	74	59.13	35.4	14.08	65.31	121	58	P	H
CH 11		4924	42.8	-31.2	74	61.71	33.76	11.86	64.53	115	328	P	V
2462MHz		7380	42.73	-31.27	74	58.56	35.4	14.08	65.31	115	328	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Sample3

WIFI 802.11b (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 10 2457MHz		4920	48.55	-25.45	74	66.81	33.9	9.58	61.74	300	0	P	H
		7365	43.24	-30.76	74	57.93	35.66	11.71	62.06	300	0	P	H
		4920	46.45	-27.55	74	64.71	33.9	9.58	61.74	100	0	P	V
		7365	43.24	-30.76	74	57.93	35.66	11.71	62.06	100	0	P	V
802.11b CH 11 2462MHz		4920	47.74	-26.26	74	66	33.9	9.58	61.74	300	0	P	H
		7380	42.44	-31.56	74	57.11	35.68	11.71	62.06	300	0	P	H
		4920	46.29	-27.71	74	64.55	33.9	9.58	61.74	100	0	P	V
		7380	42.53	-31.47	74	57.2	35.68	11.71	62.06	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

WIFI 802.11g (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 10 2457MHz		4920	46.35	-27.65	74	64.61	33.9	9.58	61.74	300	0	P	H
		7365	44.14	-29.86	74	58.83	35.66	11.71	62.06	300	0	P	H
		4920	43.79	-30.21	74	62.05	33.9	9.58	61.74	100	0	P	V
		7365	42.44	-31.56	74	57.13	35.66	11.71	62.06	100	0	P	V
802.11g CH 11 2462MHz		4920	47.23	-26.77	74	65.49	33.9	9.58	61.74	300	0	P	H
		7380	42.84	-31.16	74	57.51	35.68	11.71	62.06	300	0	P	H
		4920	45.21	-28.79	74	63.47	33.9	9.58	61.74	100	0	P	V
		7380	43.43	-30.57	74	58.1	35.68	11.71	62.06	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	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)
802.11n		4920	44.81	-29.19	74	63.07	33.9	9.58	61.74	300	0	P	H
HT20		7365	43.93	-30.07	74	58.62	35.66	11.71	62.06	300	0	P	H
CH 10		4920	42.72	-31.28	74	60.98	33.9	9.58	61.74	100	0	P	V
2457MHz		7365	42.47	-31.53	74	57.16	35.66	11.71	62.06	100	0	P	V
802.11n		4920	46.39	-27.61	74	64.65	33.9	9.58	61.74	300	0	P	H
HT20		7380	43.33	-30.67	74	58	35.68	11.71	62.06	300	0	P	H
CH 11		4920	45.39	-28.61	74	63.65	33.9	9.58	61.74	100	0	P	V
2462MHz		7380	42.38	-31.62	74	57.05	35.68	11.71	62.06	100	0	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	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		35.82	26.89	-13.11	40	36.97	21.82	0.97	32.87	-	-	P	H
		78.5	29.39	-10.61	40	47.77	13.13	1.41	32.92	-	-	P	H
		167.74	28.32	-15.18	43.5	42.97	16.22	2.06	32.93	-	-	P	H
		307.42	22.8	-23.2	46	33.62	19.35	2.82	32.99	-	-	P	H
		389.87	22.74	-23.26	46	31.25	21.33	3.15	32.99	-	-	P	H
		524.7	30.37	-15.63	46	35.63	24.44	3.66	33.36	-	-	P	H
		42.61	34.61	-5.39	40	48.59	17.88	1.04	32.9	100	20	P	V
		52.31	33.75	-6.25	40	52.06	13.46	1.14	32.91	-	-	P	V
		78.5	28.35	-11.65	40	46.73	13.13	1.41	32.92	-	-	P	V
		94.99	30.06	-13.44	43.5	46.32	15.1	1.55	32.91	-	-	P	V
		169.68	28.79	-14.71	43.5	43.51	16.14	2.08	32.94	-	-	P	V
		540.22	30.05	-15.95	46	34.84	24.85	3.71	33.35	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



<Simultaneous transmission>

nRF Filter Mode CH12 (2426MHz) Tx + WLAN 2.4GHz 11g CH 11(2462MHz) Tx

(Band Edge @ 3m)

nRF--Filter	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)
nRF Filter Mode CH12 (2426MHz) Tx		2377.99	56.47	-17.53	74	50.84	31.93	6.58	32.88	165	40	P	H
		2361.87	45.01	-8.99	54	39.5	31.87	6.56	32.92	165	40	A	H
		2426	107.06	---	---	101.04	32.13	6.66	32.77	165	40	P	H
		2426	103.36	---	---	97.34	32.13	6.66	32.77	165	40	A	H
		2378.12	55.8	-18.2	74	50.17	31.93	6.58	32.88	309	96	P	V
		2362.13	44.37	-9.63	54	38.86	31.87	6.56	32.92	309	96	A	V
		2426	99.84	---	---	93.82	32.13	6.66	32.77	309	96	P	V
		2426	96.16	---	---	90.14	32.13	6.66	32.77	309	96	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

nRF Filter Mode CH12 (2426MHz) Tx + WLAN 2.4GHz 11g CH 11(2462MHz) Tx

(Harmonic @ 3m)

nRF--Filter	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)
nRF Filter Mode CH12 (2426MHz) Tx		4845	41.6	-32.4	74	59.9	34	9.49	61.79	300	0	P	H
		7278	43.3	-30.7	74	58.07	35.6	11.68	62.05	300	0	P	H
		4845	42.48	-31.52	74	60.78	34	9.49	61.79	100	0	P	V
		7278	43.38	-30.62	74	58.15	35.6	11.68	62.05	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



nRF Filter Mode CH12 (2426MHz) Tx + WLAN 2.4GHz 11g CH 11(2462MHz) Tx

(Band Edge @ 3m)

WIFI Ant. 1	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)
WLAN 2.4GHz 11g CH 11(2462MHz)		2484.46	56.83	-17.17	74	50.54	32.2	6.73	32.64	119	243	P	H
		2488.6	44.69	-9.31	54	38.38	32.2	6.75	32.64	119	243	A	H
	*	2460	104.1	---	---	97.91	32.2	6.7	32.71	119	243	P	H
	*	2460	95.03	---	---	88.84	32.2	6.7	32.71	119	243	A	H
		2487.46	55.83	-18.17	74	49.54	32.2	6.73	32.64	298	187	P	V
		2483.92	44.34	-9.66	54	38.05	32.2	6.73	32.64	298	187	A	V
	*	2460	102.89	---	---	96.7	32.2	6.7	32.71	298	187	P	V
	*	2460	93.26	---	---	87.07	32.2	6.7	32.71	298	187	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

nRF Filter Mode CH12 (2426MHz) Tx + WLAN 2.4GHz 11g CH 11(2462MHz) Tx

(Harmonic @ 3m)

WIFI Ant. 1	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 CH 11 2462MHz		4920	43.14	-30.86	74	61.4	33.9	9.58	61.74	300	0	P	H
		7380	44.29	-29.71	74	58.96	35.68	11.71	62.06	300	0	P	H
		4920	44.43	-29.57	74	62.69	33.9	9.58	61.74	100	0	P	V
		7380	43.44	-30.56	74	58.11	35.68	11.71	62.06	100	0	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 over limit 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:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		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. Over Limit(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. Over Limit(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. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

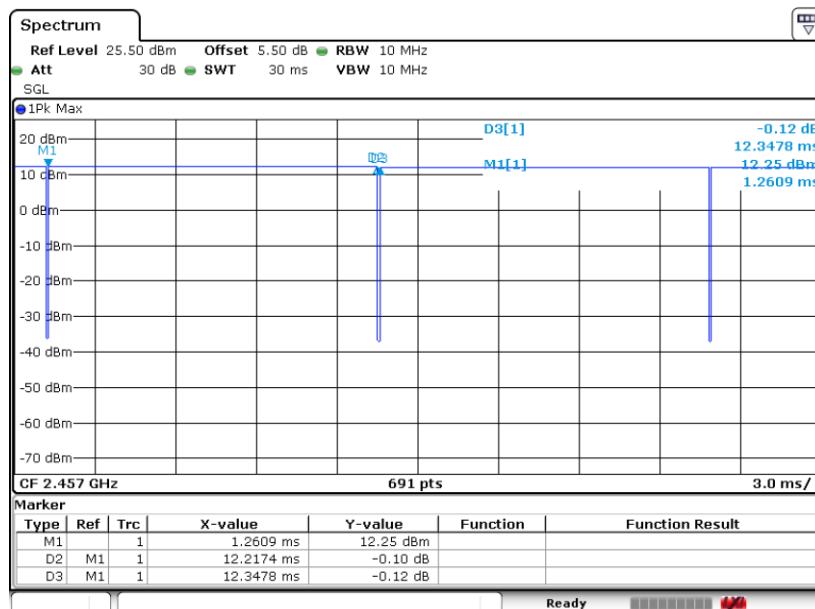
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

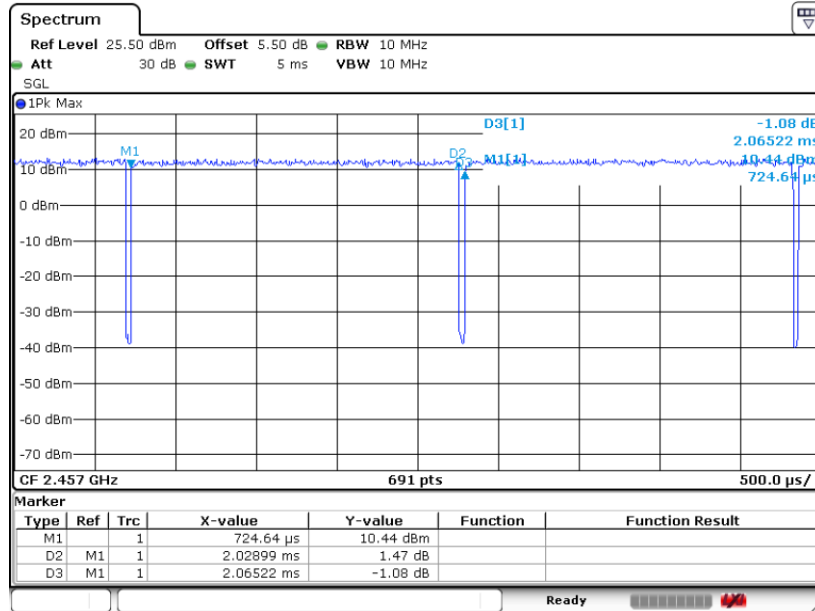
Band	Duty Cycle(%)	Duty factor(dB)
802.11b	98.94	0.05
802.11g	98.25	0.08
802.11n HT20	98.12	0.08

802.11b





802.11g



802.11n HT20

