



FCC RF Test Report

APPLICANT : Ring LLC
EQUIPMENT : Indoor Cam
BRAND NAME : Ring
MODEL NAME : 5F72E9
FCC ID : 2AEUPBHAIC011
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Nov. 05, 2022 ~ Nov. 30, 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)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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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 3.12 dB at 2385.40 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.01 dB at 27.766 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

Ring LLC
12515 Cerise Ave, Hawthorne, CA 90250, USA

1.2 Manufacturer

Ring LLC
12515 Cerise Ave, Hawthorne, CA 90250, USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Indoor Cam
Brand Name	Ring
Model Name	5F72E9
FCC ID	2AEUPBHAIC011
SN	Conducted: GCC2CC002426009Q Conduction: GCC2CC022434008A Radiation: GCC2CC0024260098
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2472 MHz
Maximum (Peak) Output Power to antenna	802.11b : 20.72 dBm (0.1180 W) 802.11g : 24.47 dBm (0.2799 W) 802.11n HT20 : 24.52 dBm (0.2831 W)
99% Occupied Bandwidth	802.11b : 14.19MHz 802.11g : 18.23MHz 802.11n HT20 : 19.08MHz
Antenna Type / Gain	PCB Antenna type with gain 2.4 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. (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 03CH05-KS TH01-KS	CN1257	314309

1.7 Test Software

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

1.8 Applicable Standards

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

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

Remark:

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



2 Test Configuration of Equipment Under Test

- 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 (Z 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	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		

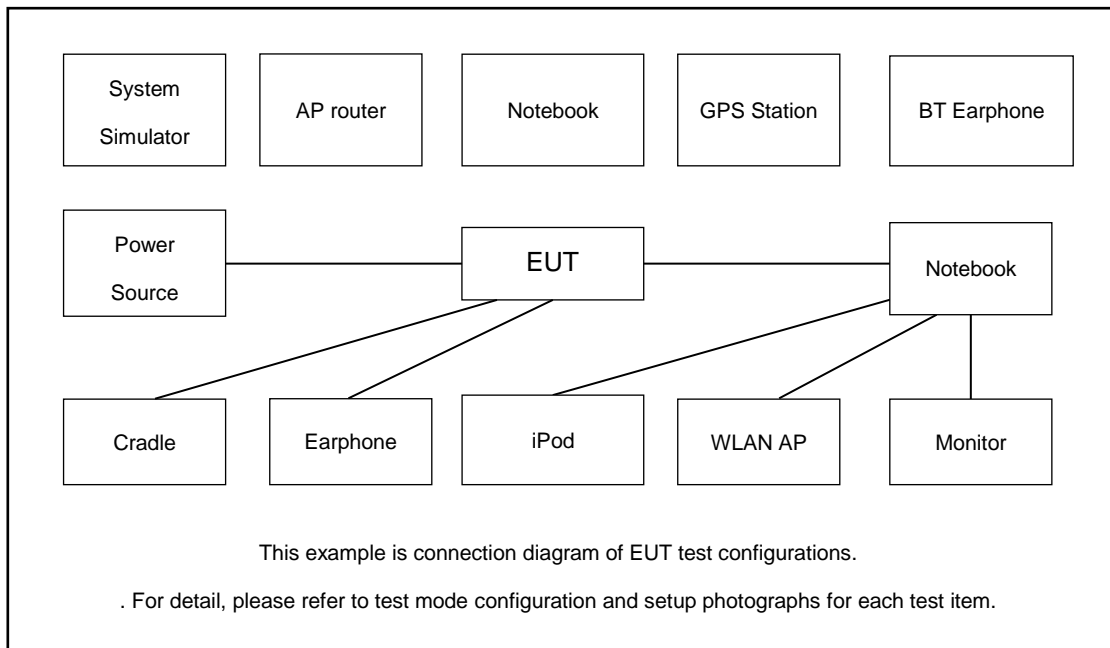
2.2 Test Mode

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 :WLAN Link(2.4G)+ USB Cable(Charging From Adapter)
Remark: For Radiated Test Cases, The tests were performance with Adapter, USB Cable.	

2.3 Connection Diagram of Test System





2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Mobile Phone	ZTE	A1	N/A	N/A	N/A

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 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.

$$\text{Offset} = \text{RF cable loss.}$$

Following shows an offset computation example with cable loss 5.8 dB.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.8 \text{ (dB)} \end{aligned}$$

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.

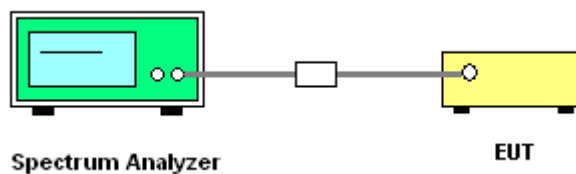
3.1.2 Measuring Instruments

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) = 3MHz.
6. Measure and record the results in the test report.

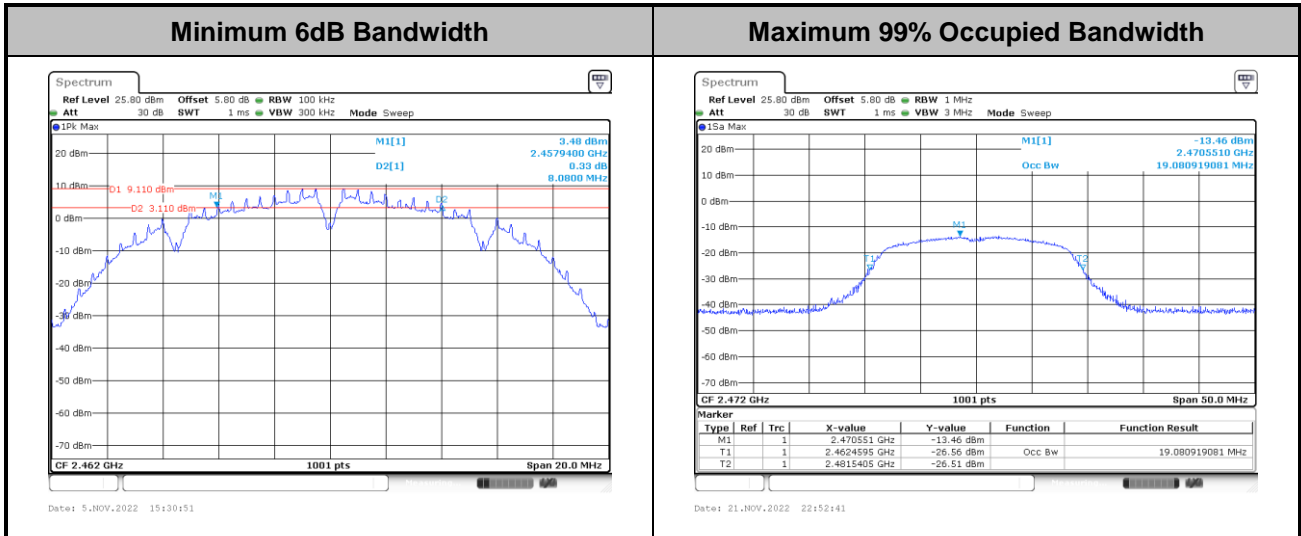
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

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.

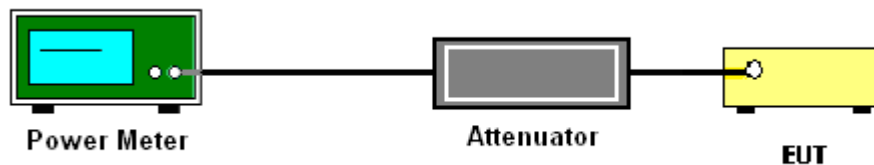
3.2.2 Measuring Instruments

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.

3.2.6 Test Result of Average Output Power (Reporting Only)

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.

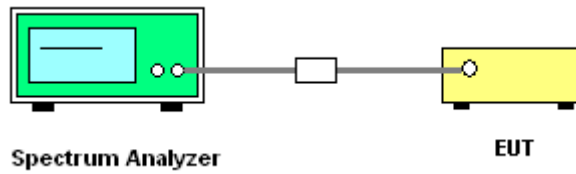
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

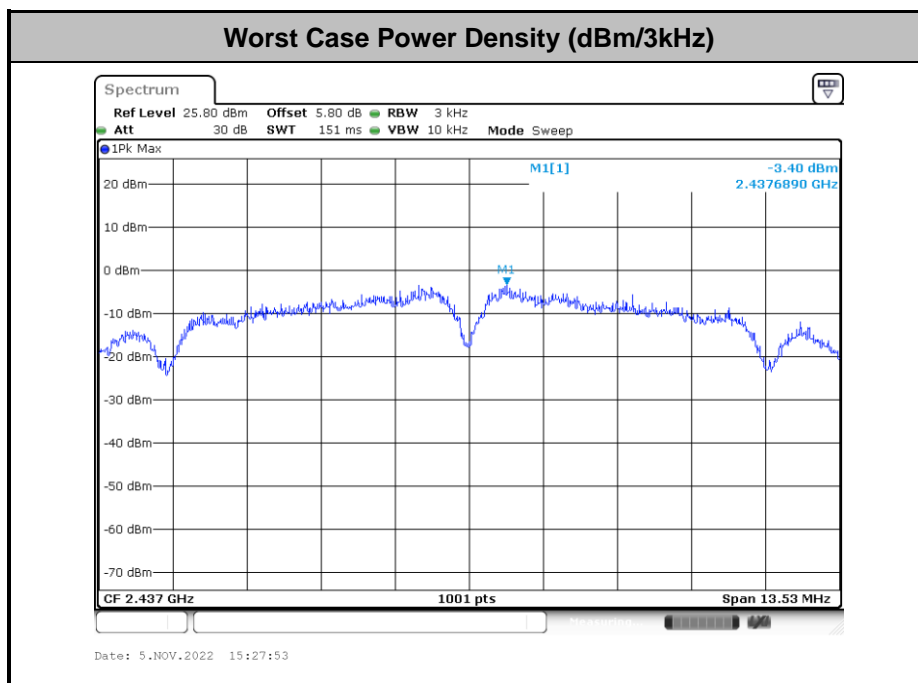
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the 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



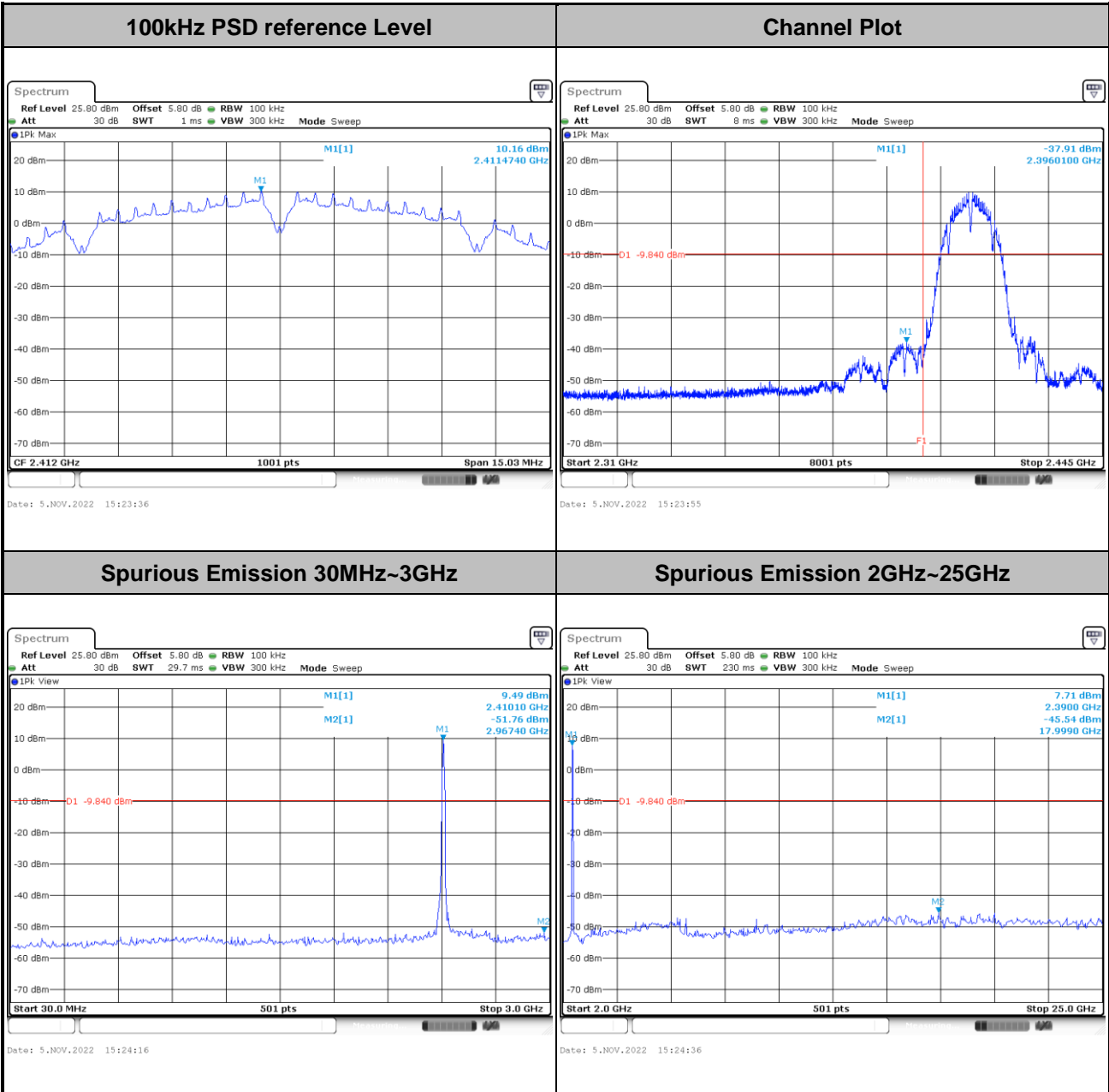


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer : Jacob Zhang	Temperature : 21~25°C
	Relative Humidity : 51~54%

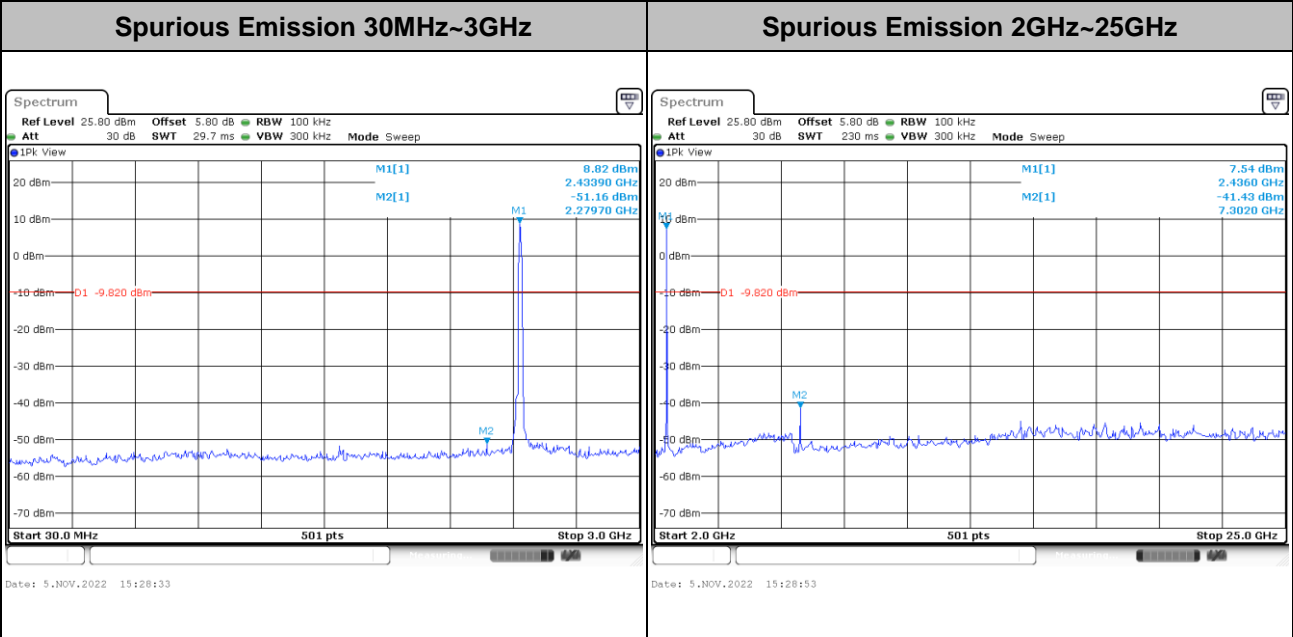
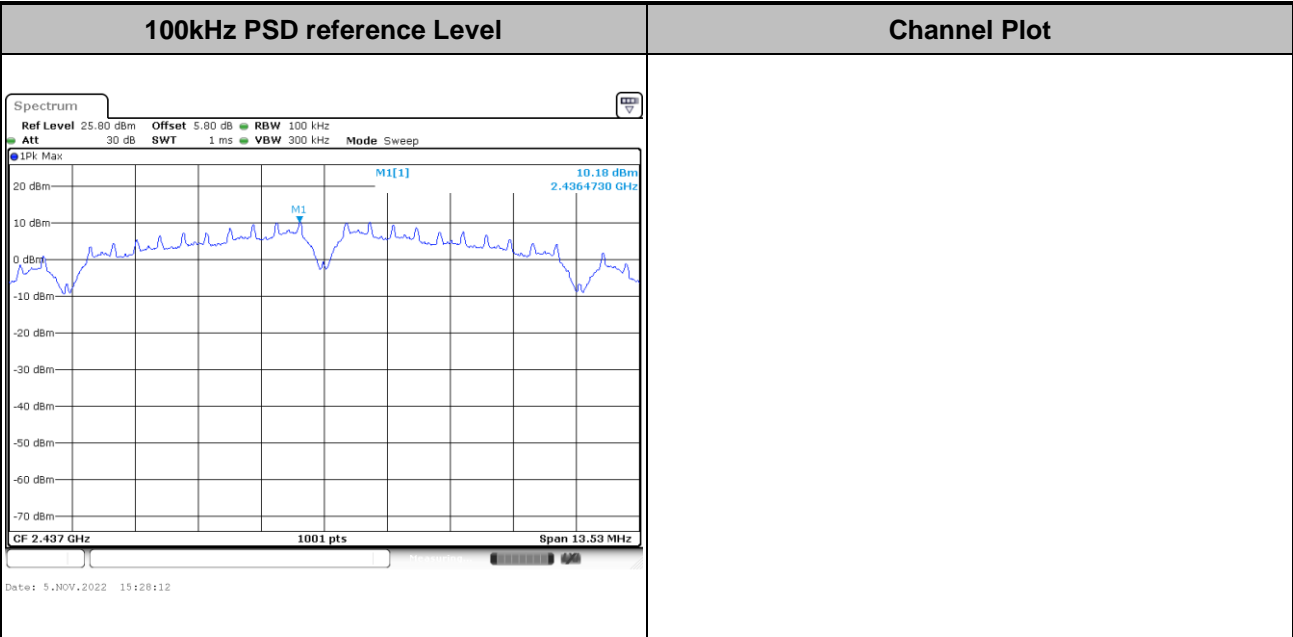
Number of TX = 1, Ant. 1 (Measured)

Test Mode : 802.11b	Test Channel : 01
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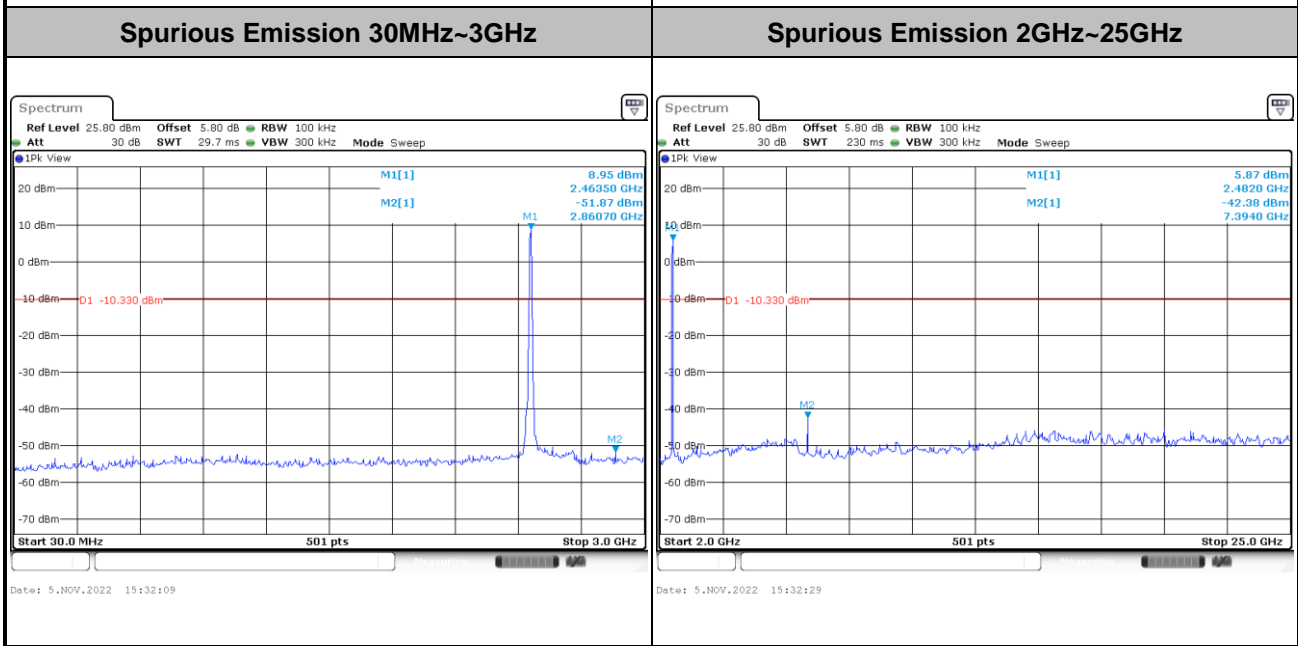
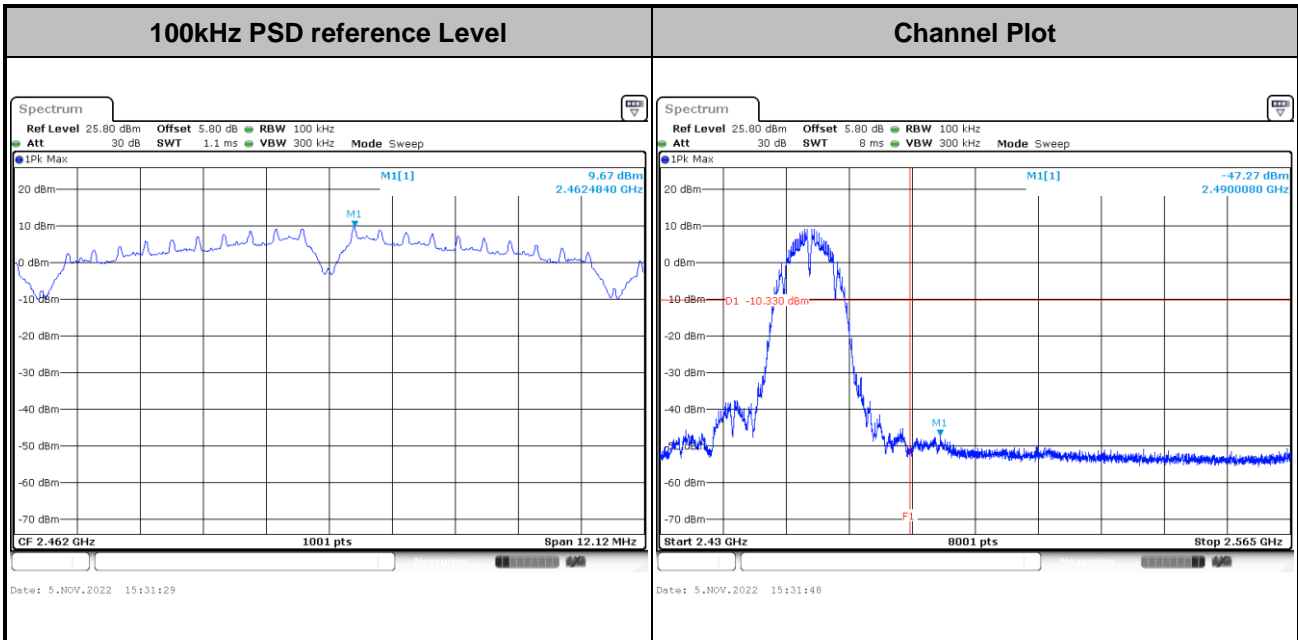


Test Mode :	802.11b	Test Channel :	06
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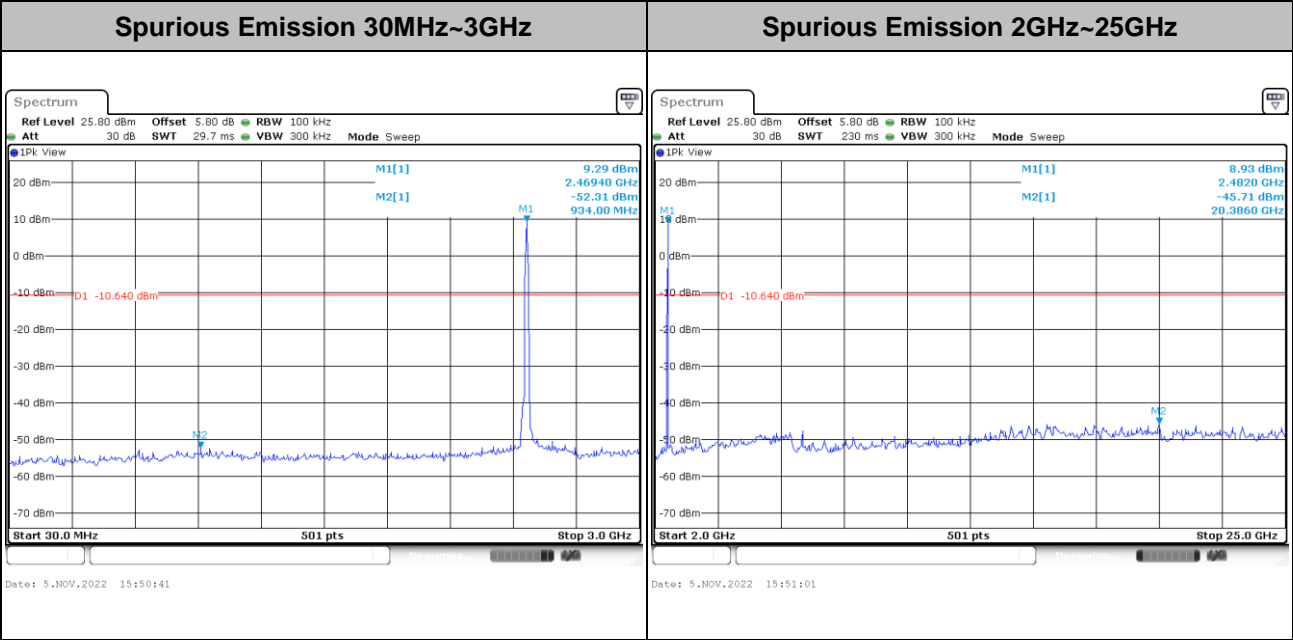
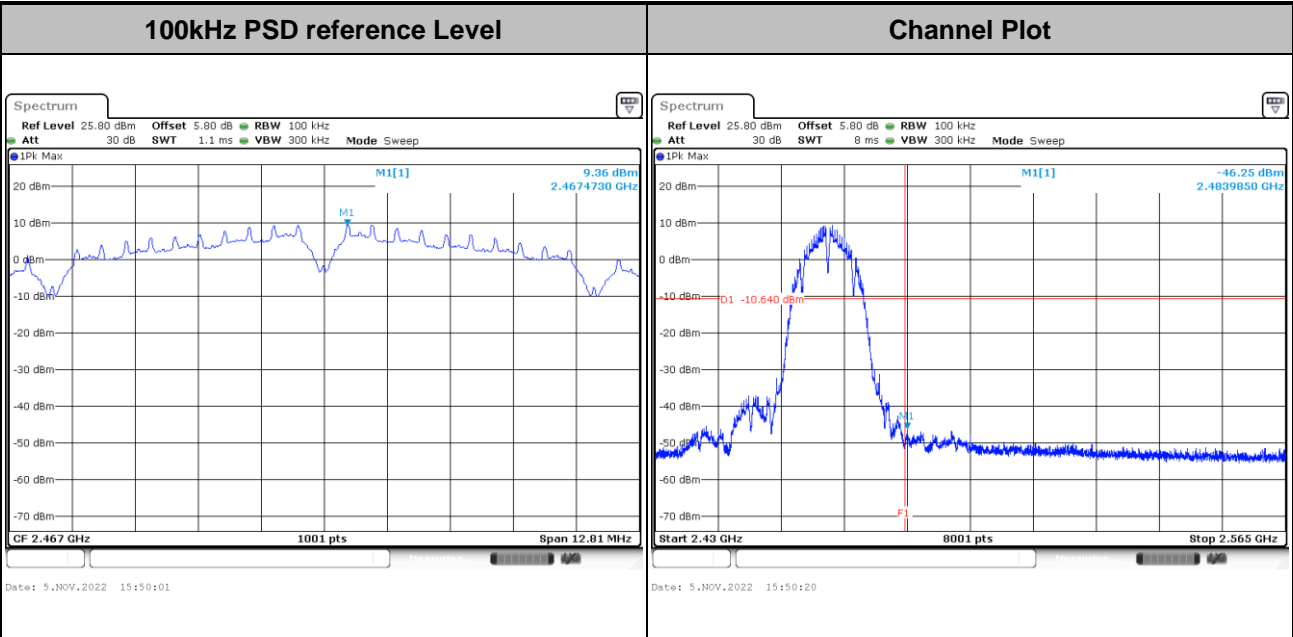


Test Mode :	802.11b	Test Channel :	11
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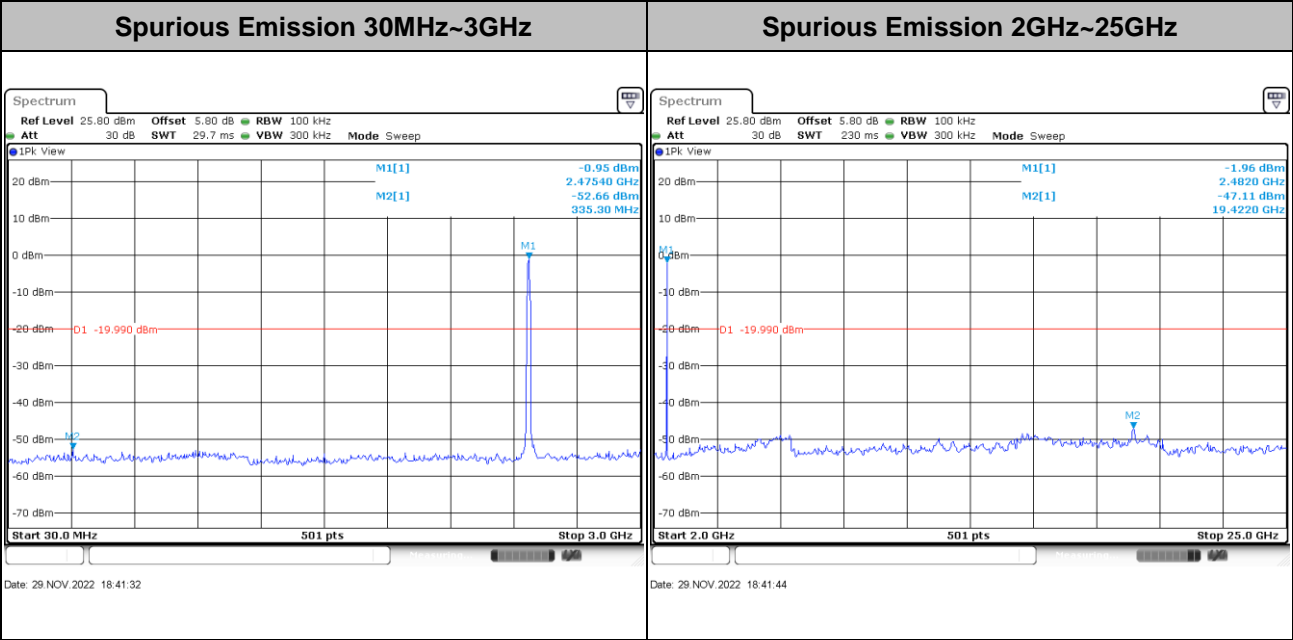
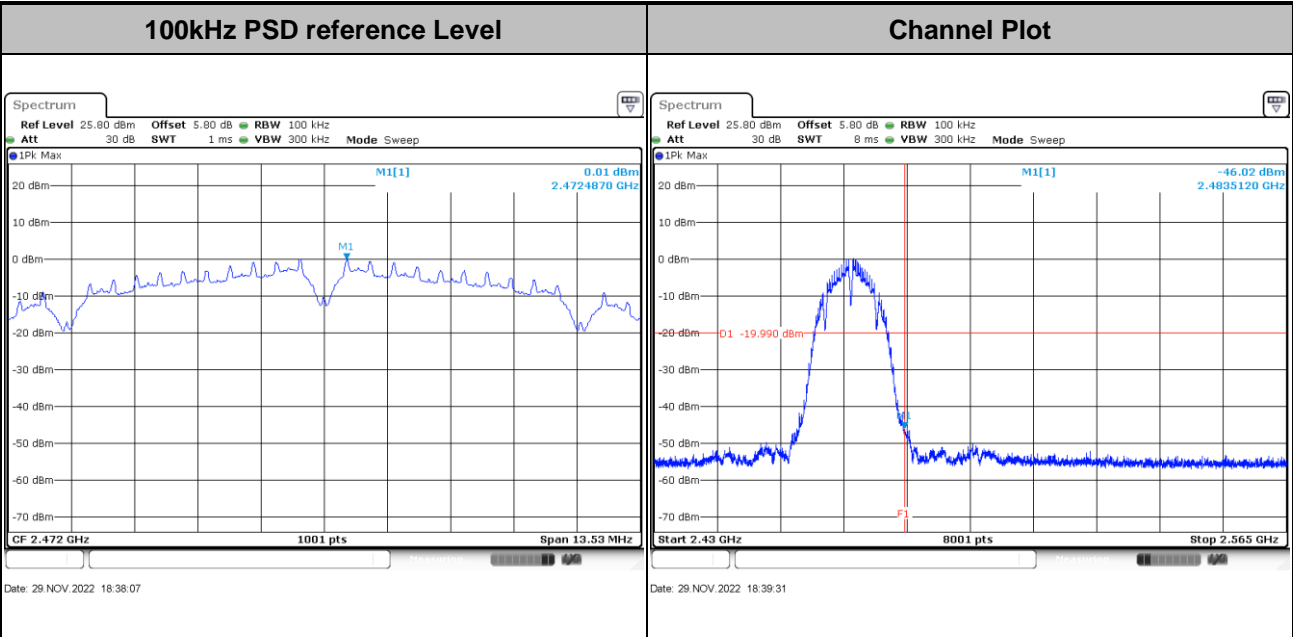


Test Mode :	802.11b	Test Channel :	12
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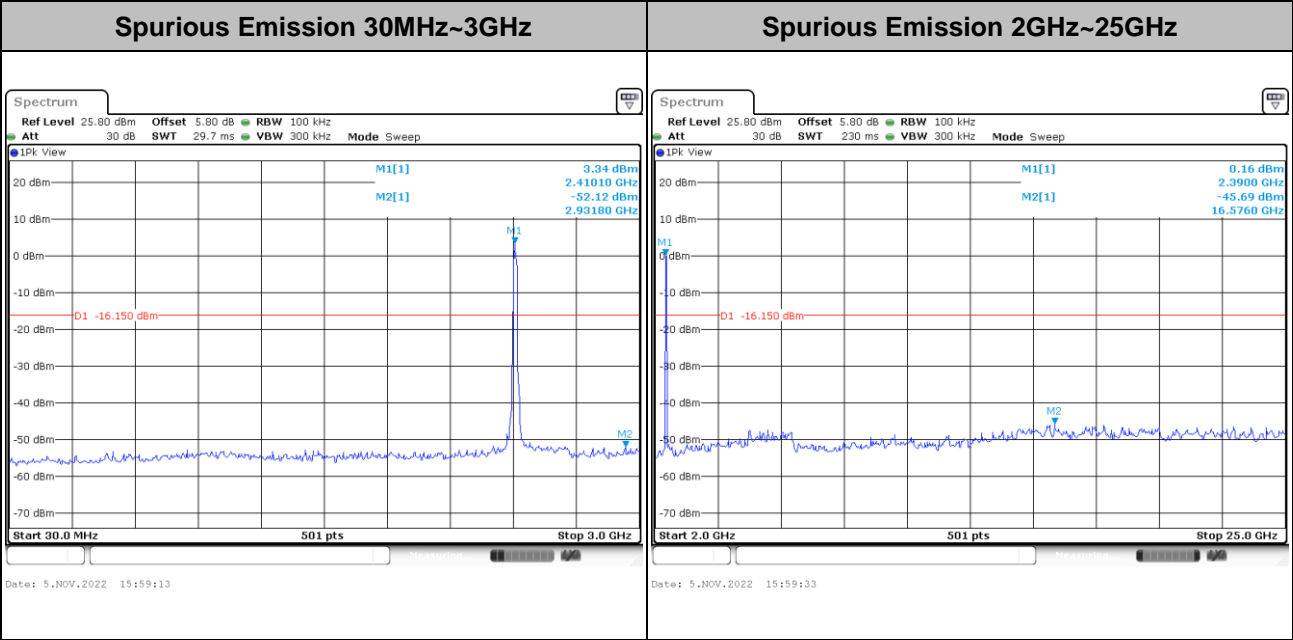
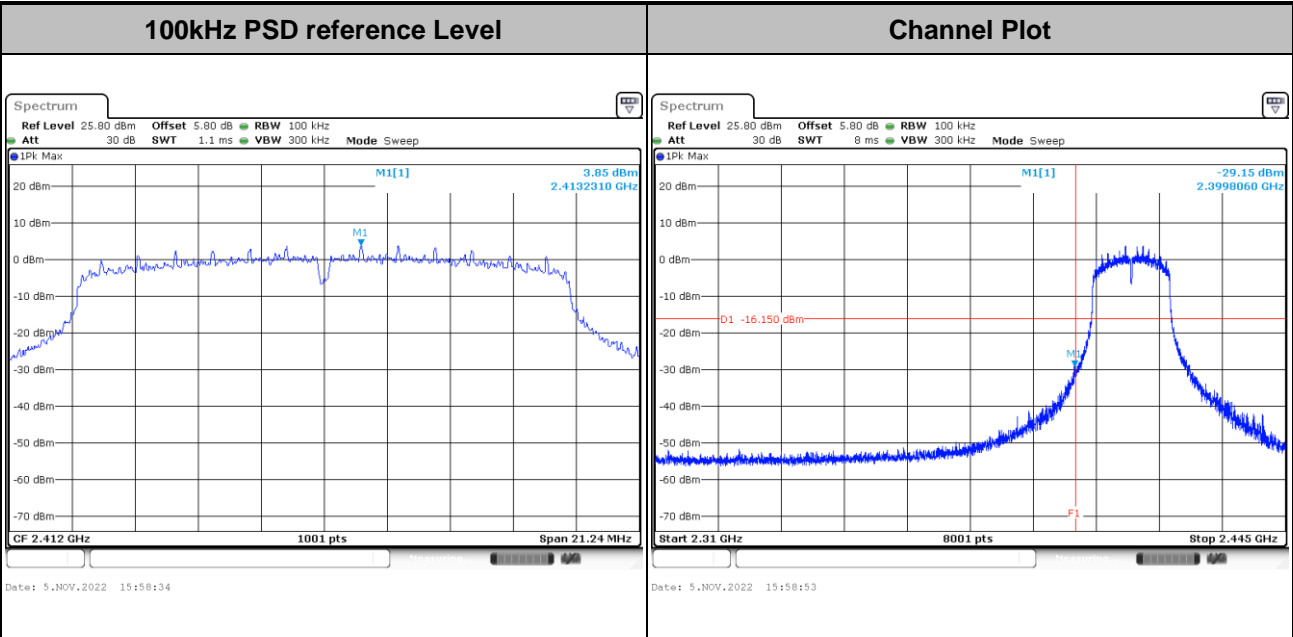


Test Mode :	802.11b	Test Channel :	13
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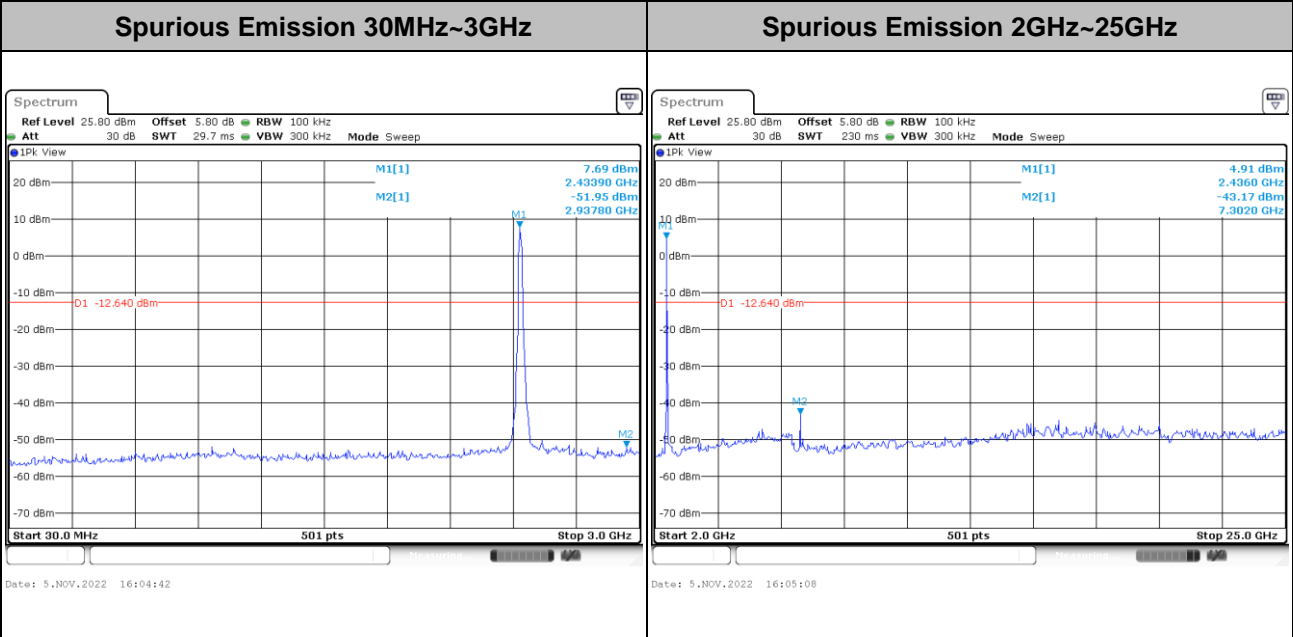
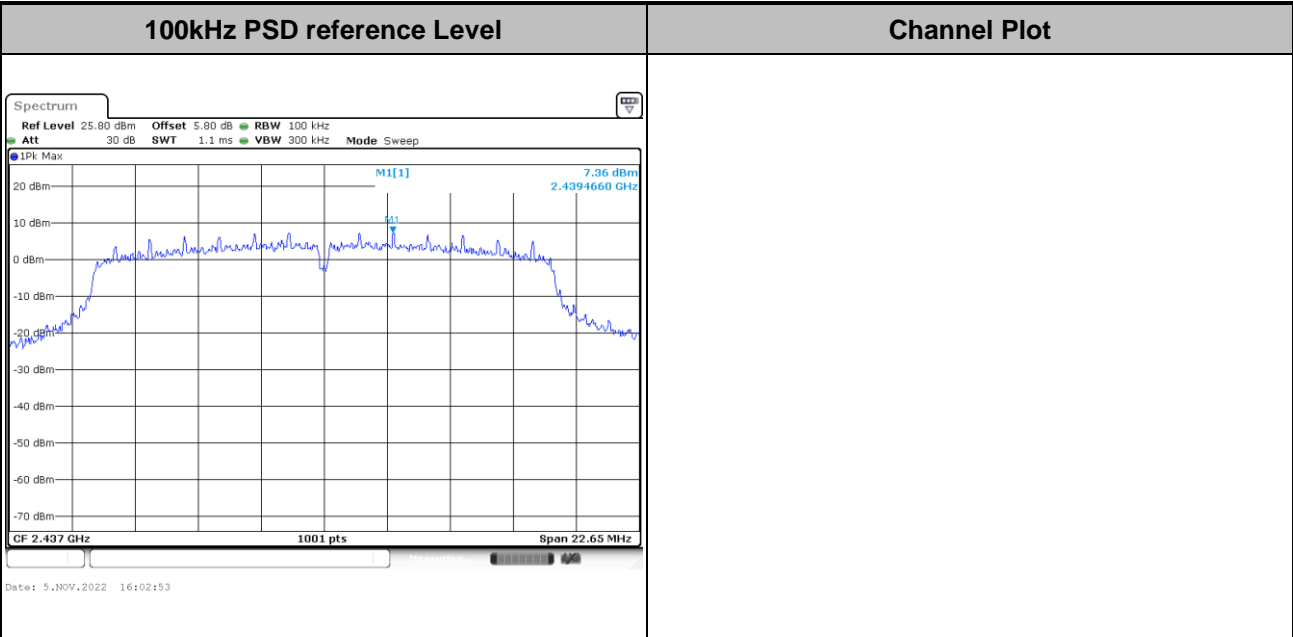


Test Mode : 802.11g Test Channel : 01



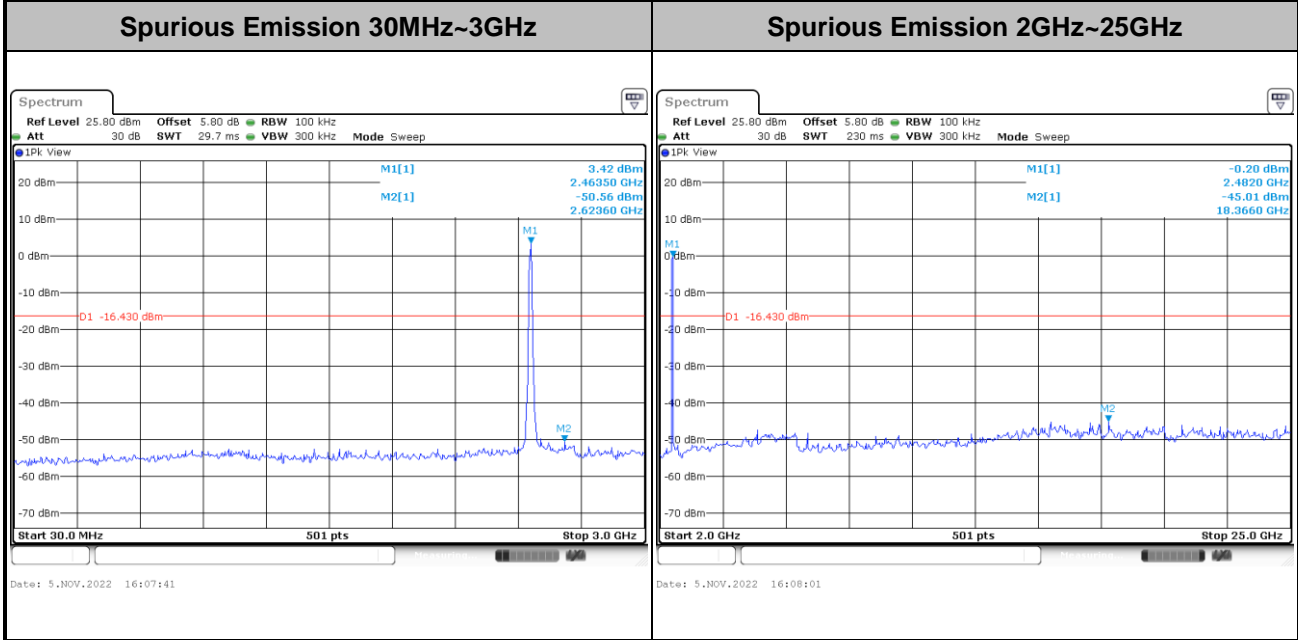
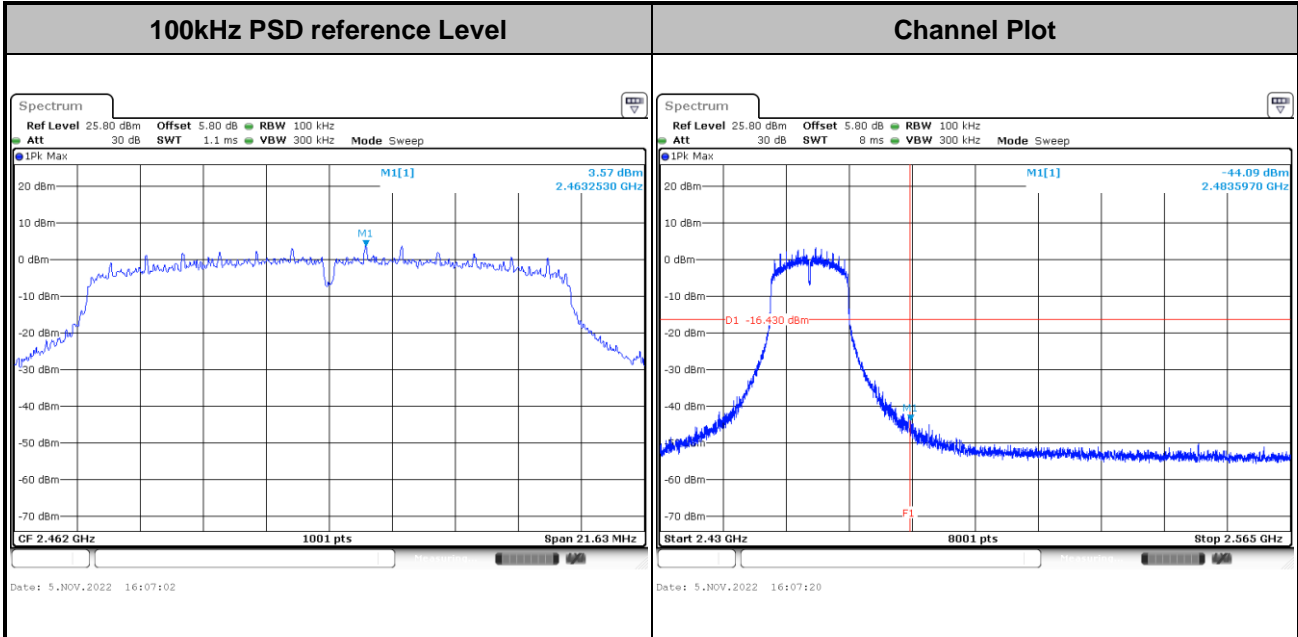


Test Mode :	802.11g	Test Channel :	06
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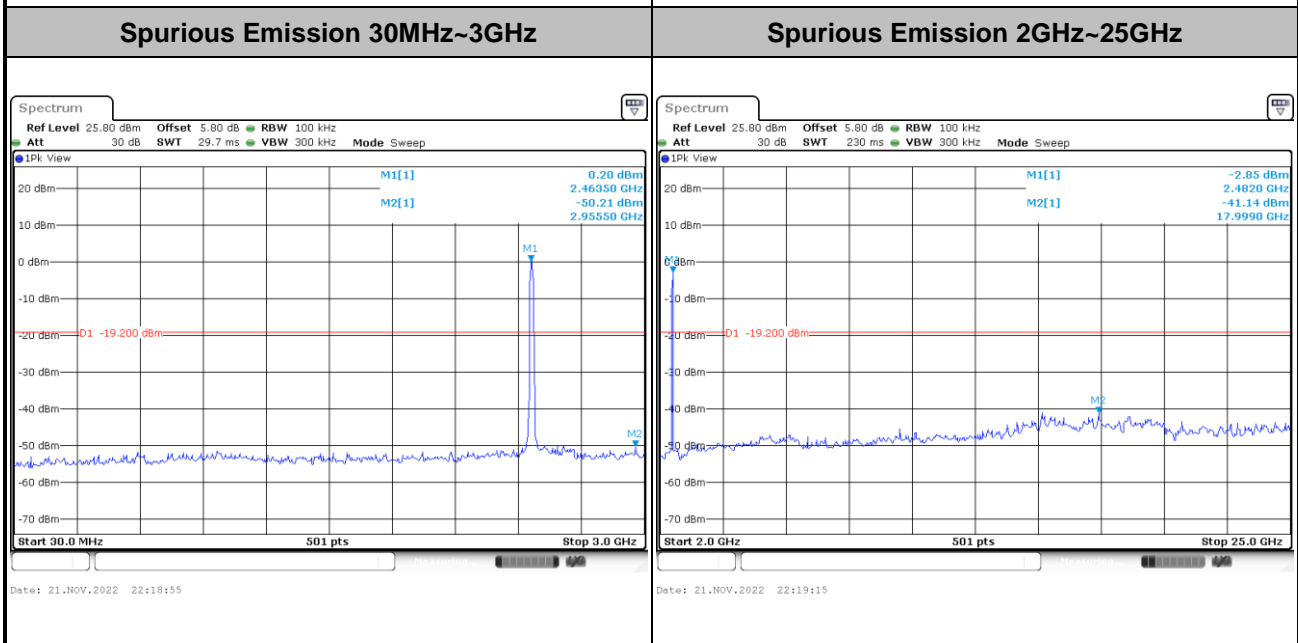
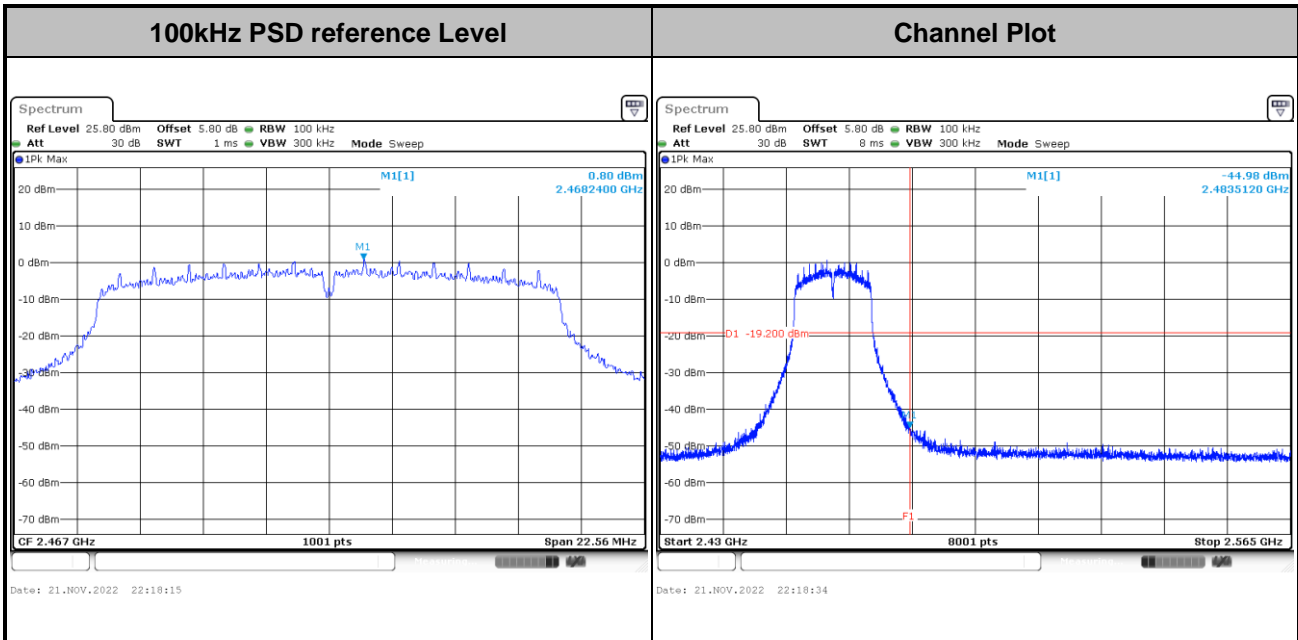


Test Mode :	802.11g	Test Channel :	11
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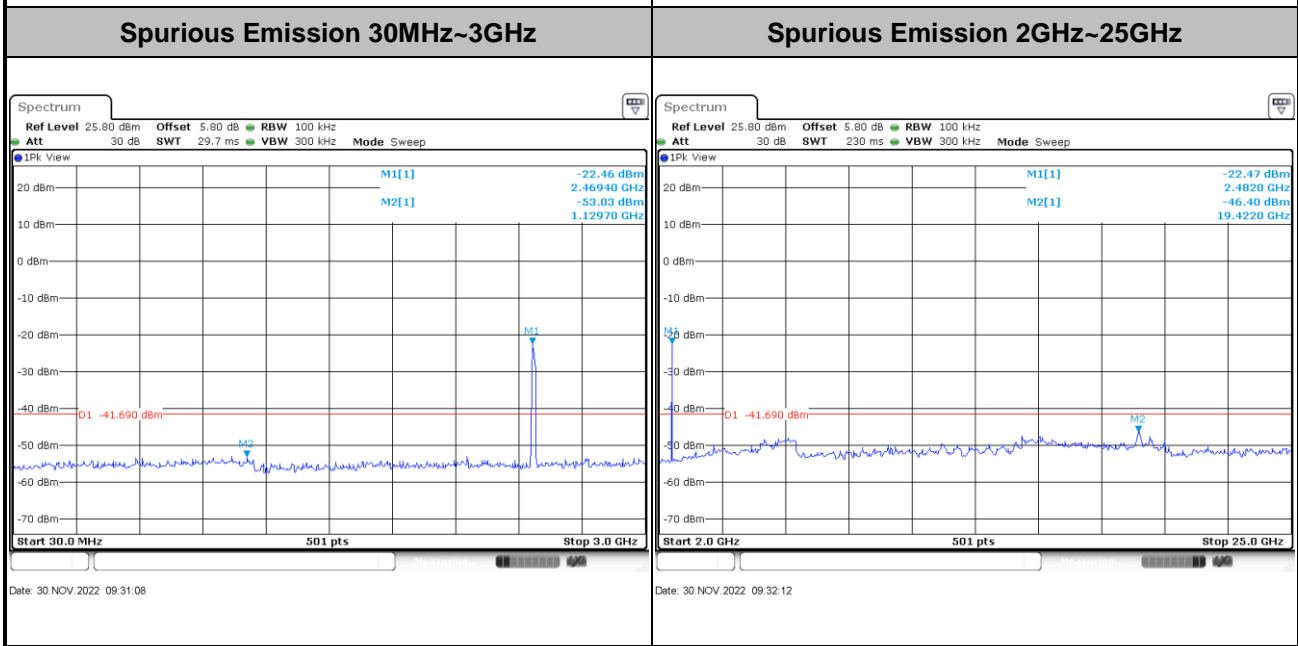
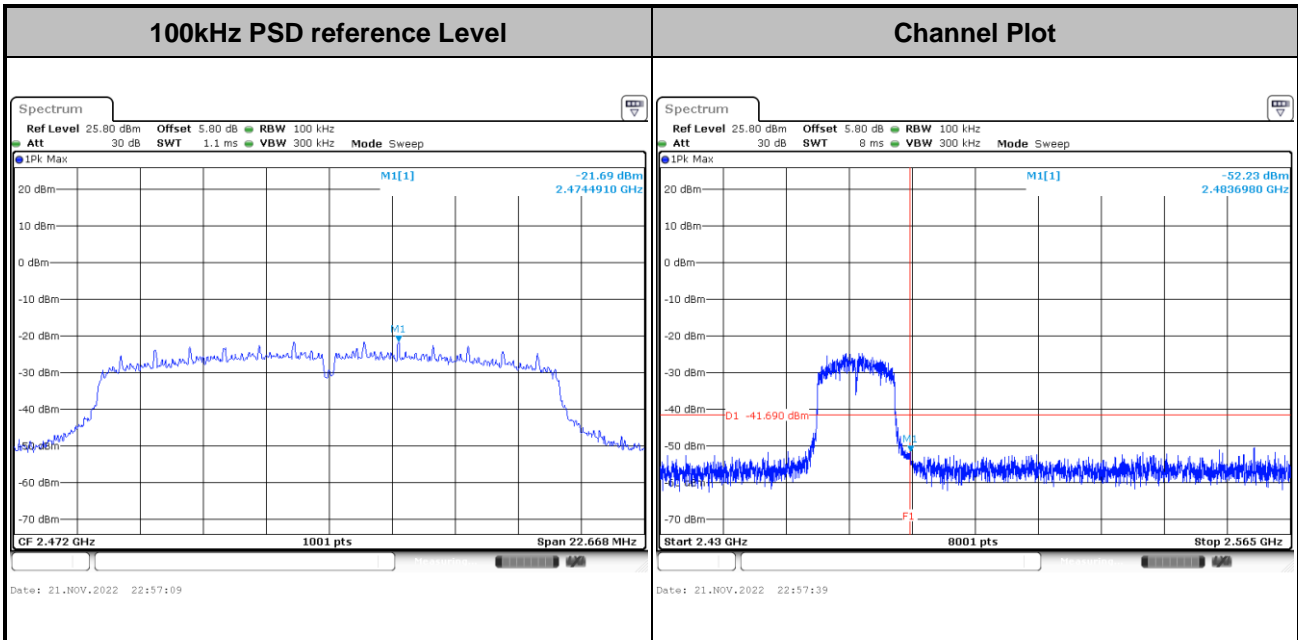


Test Mode :	802.11g	Test Channel :	12
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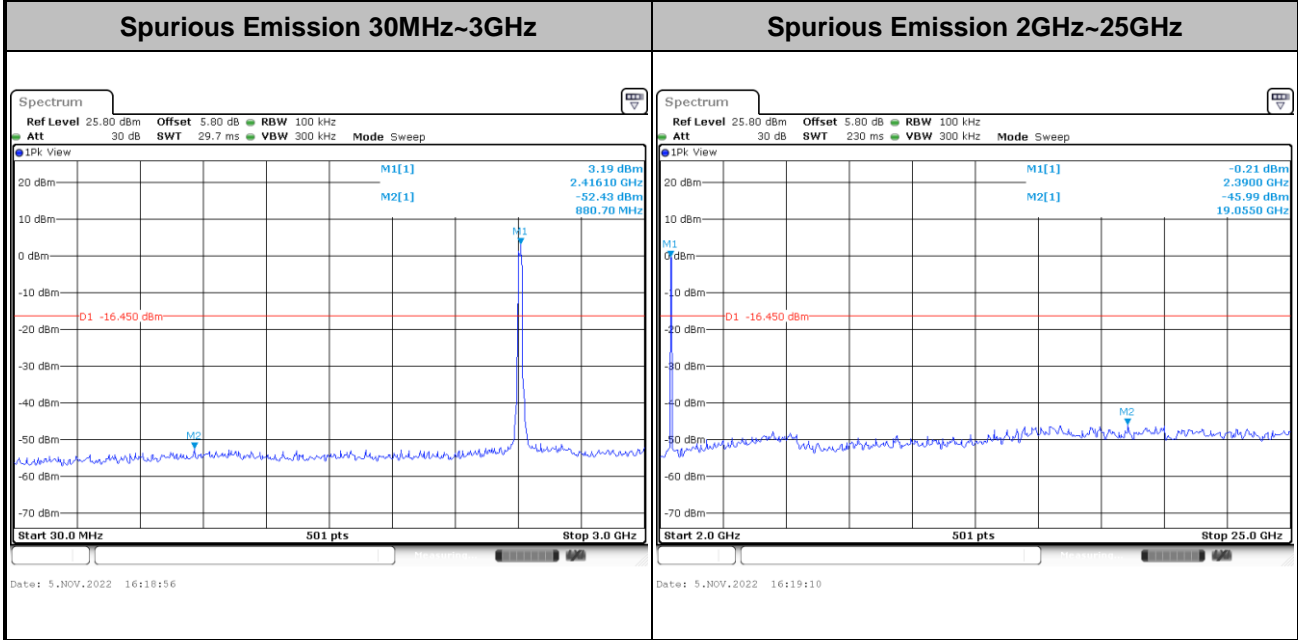
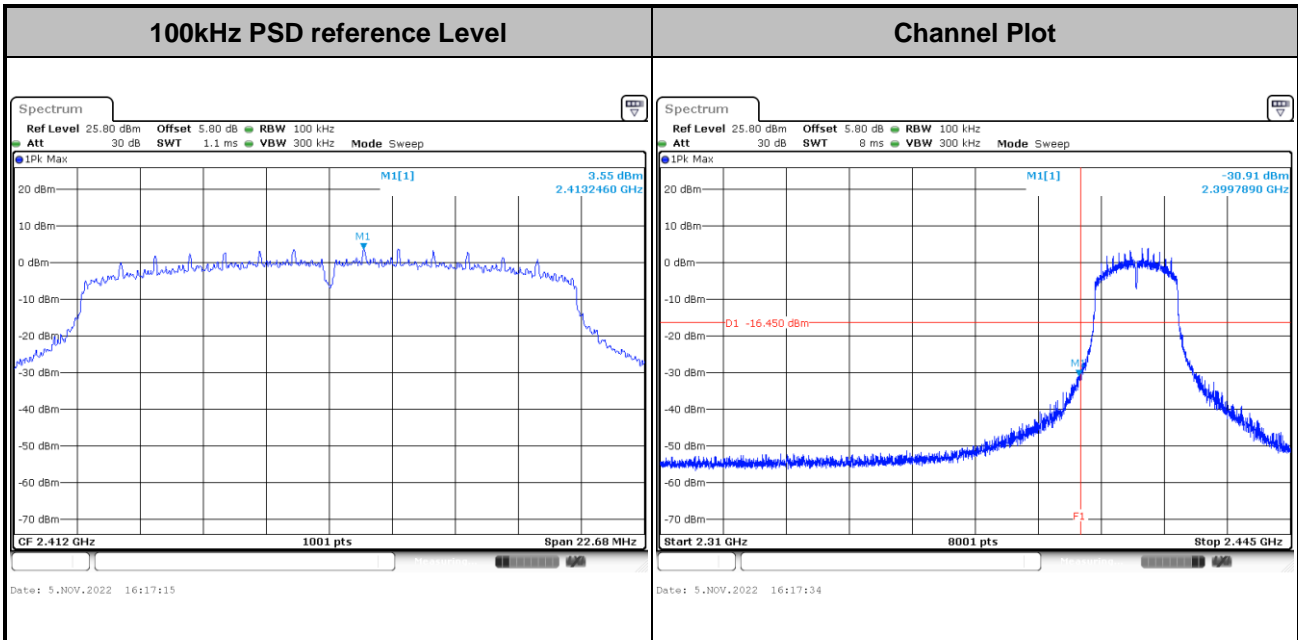


Test Mode :	802.11g	Test Channel :	13
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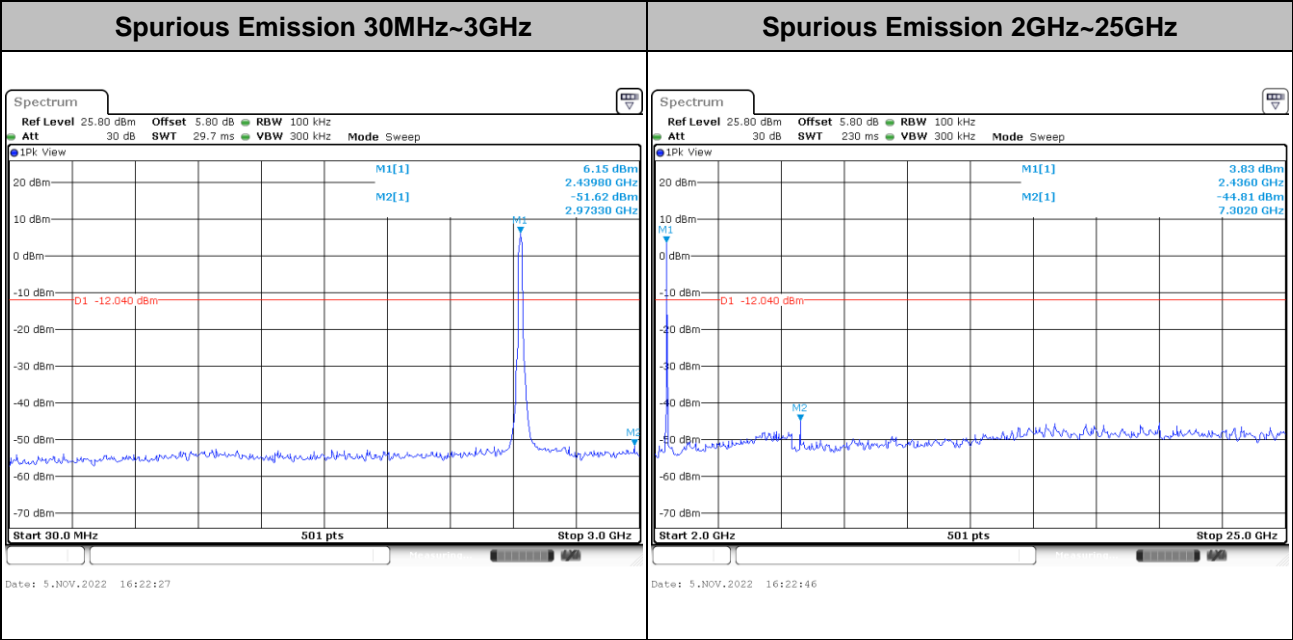
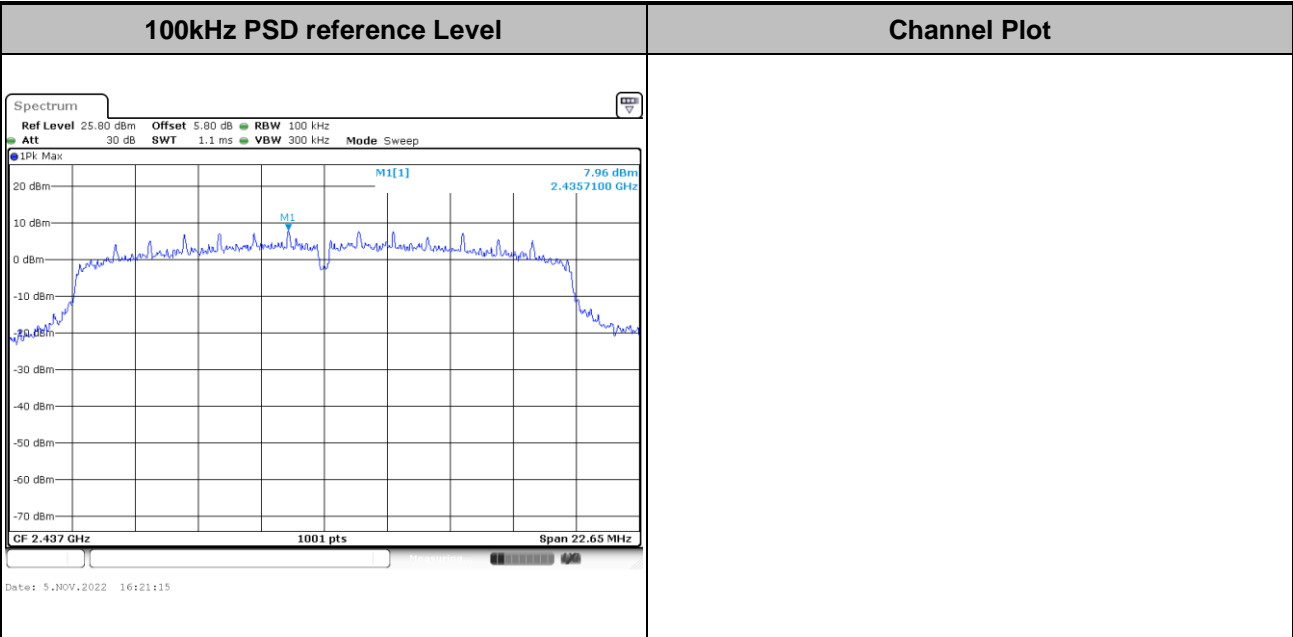


Test Mode :	802.11n HT20	Test Channel :	01
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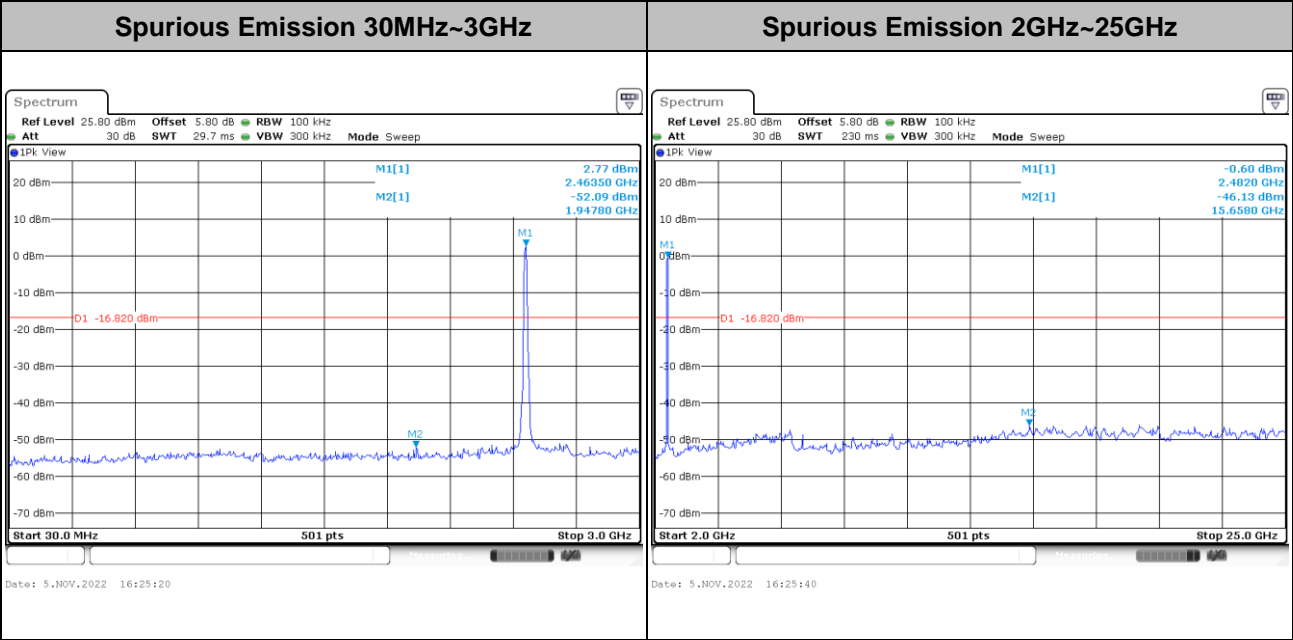
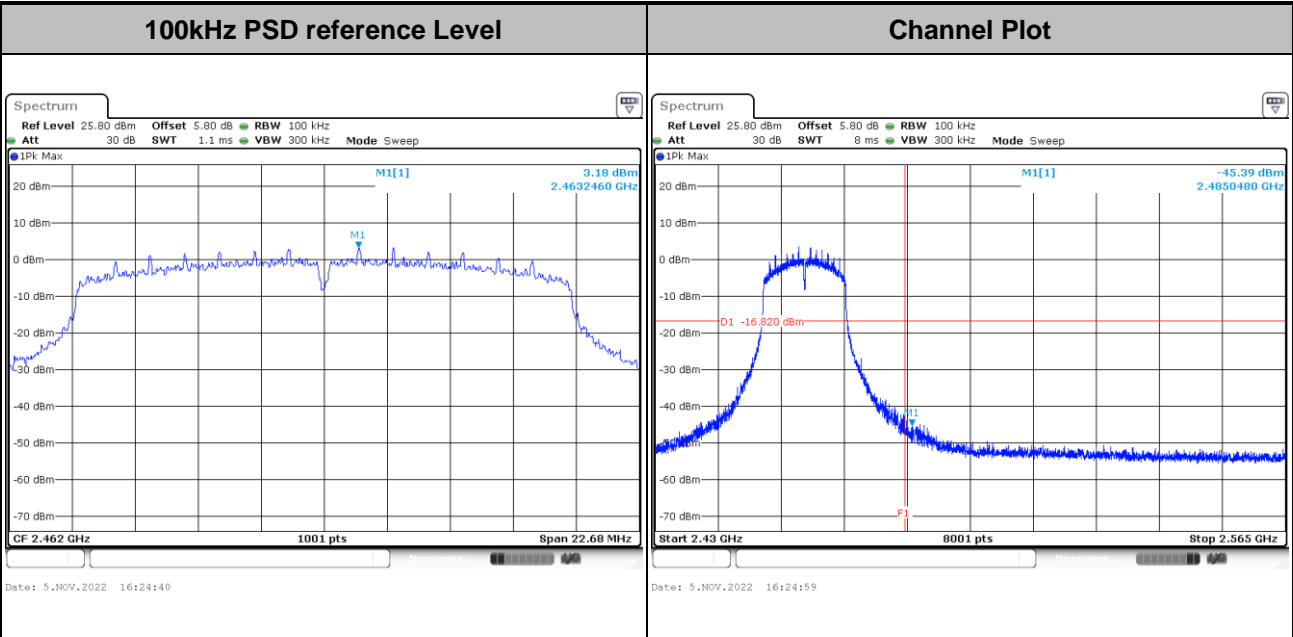


Test Mode :	802.11n HT20	Test Channel :	06
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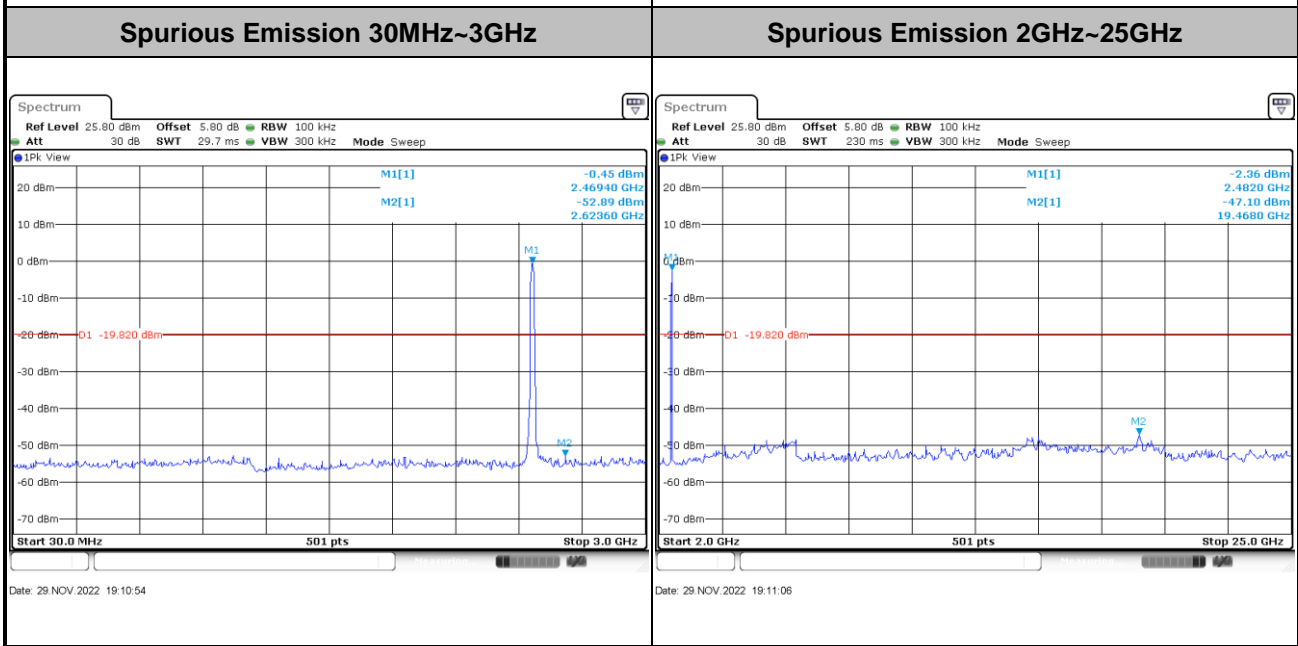
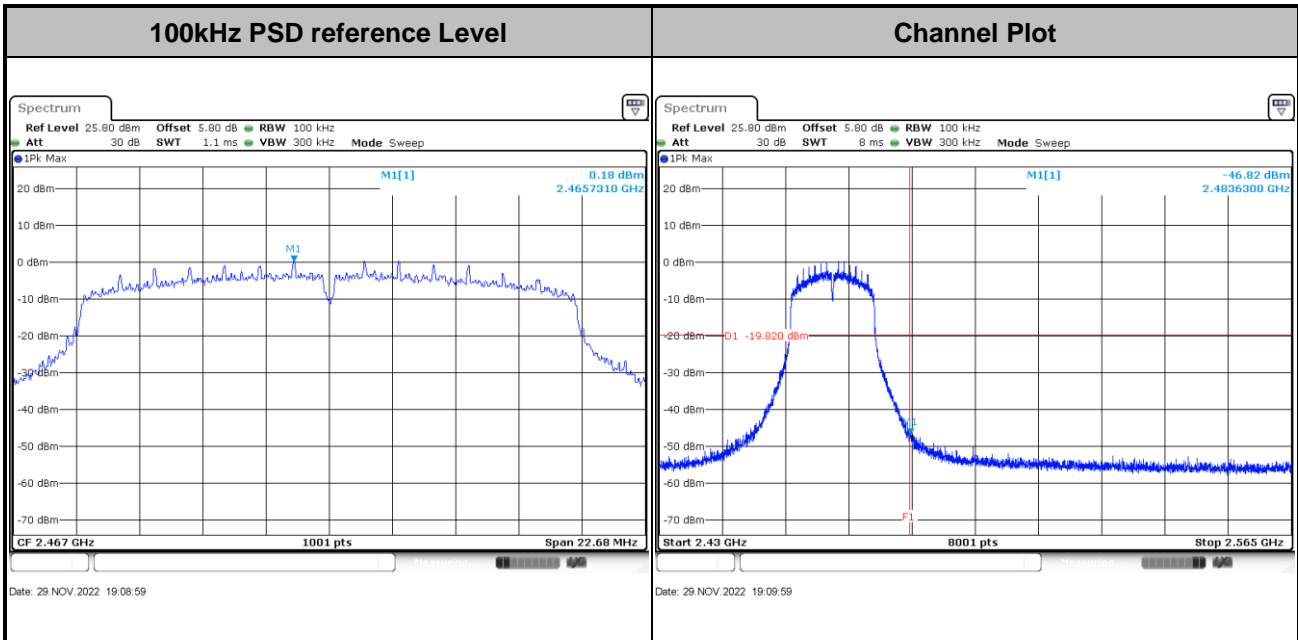


Test Mode :	802.11n HT20	Test Channel :	11
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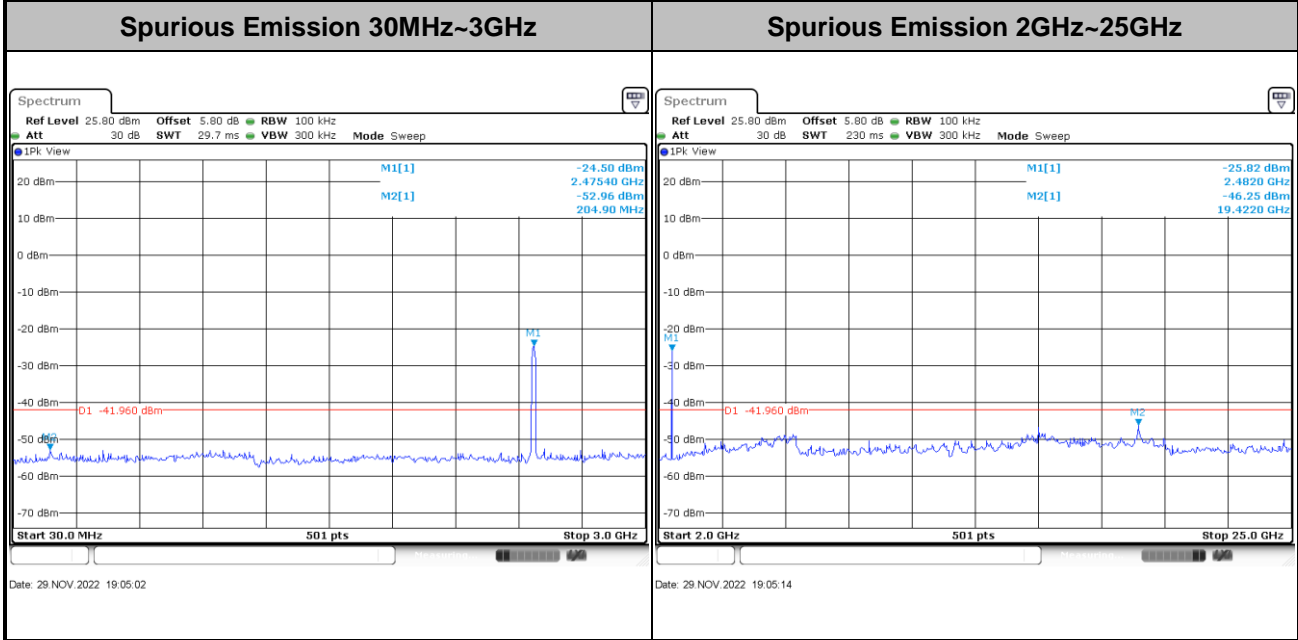
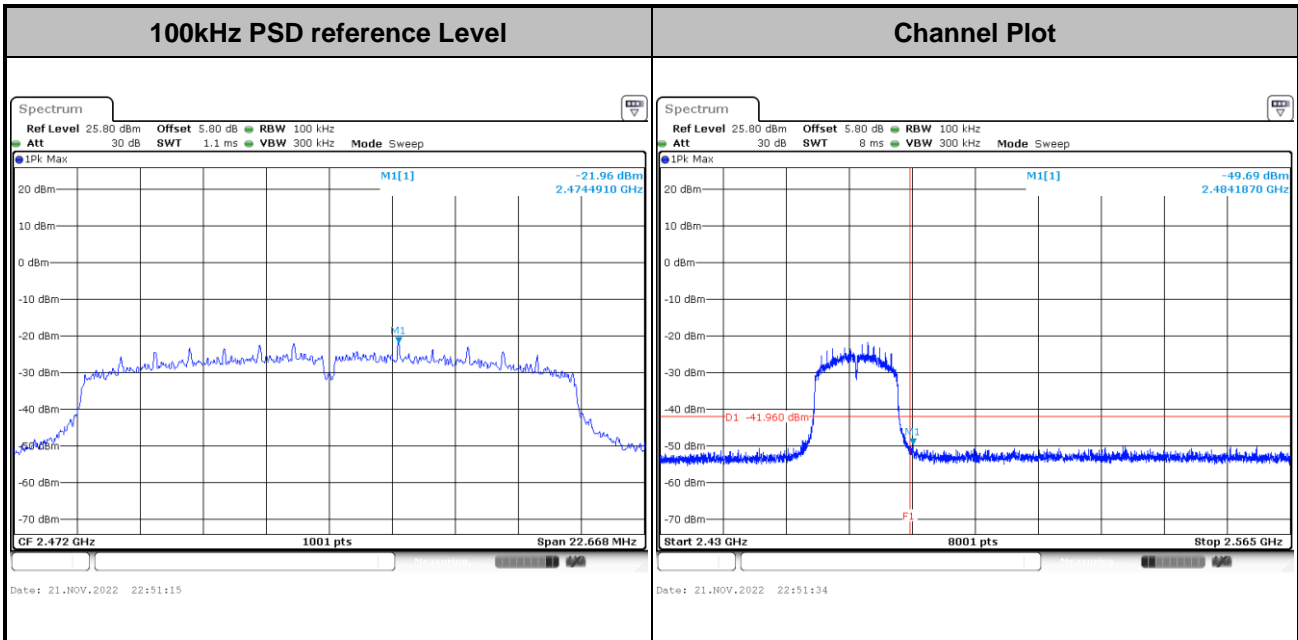


Test Mode :	802.11n HT20	Test Channel :	12
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Test Mode :	802.11n HT20	Test Channel :	13
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3.5 Radiated Band Edges and Spurious Emission Measurement

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.

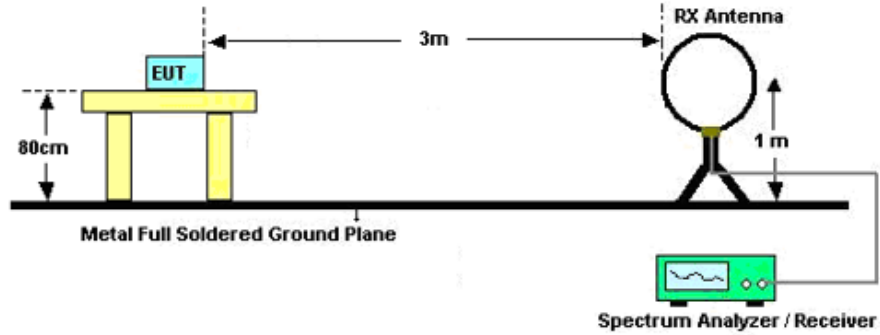


3.5.3 Test Procedures

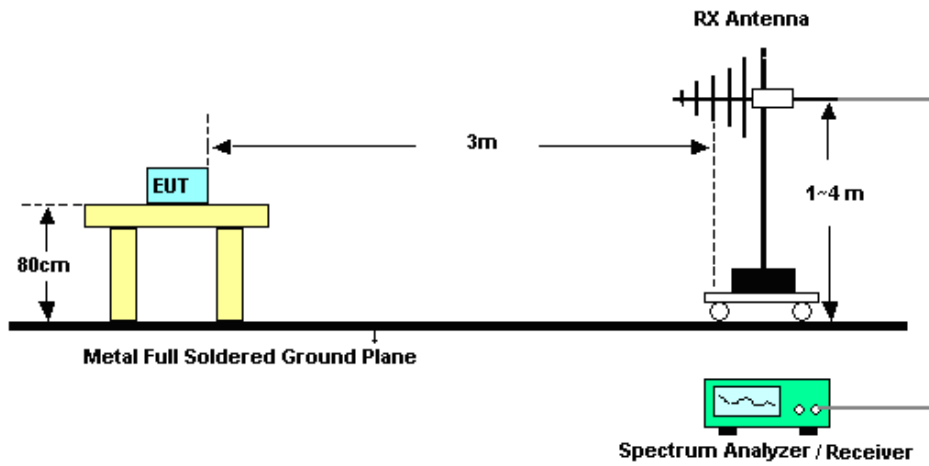
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

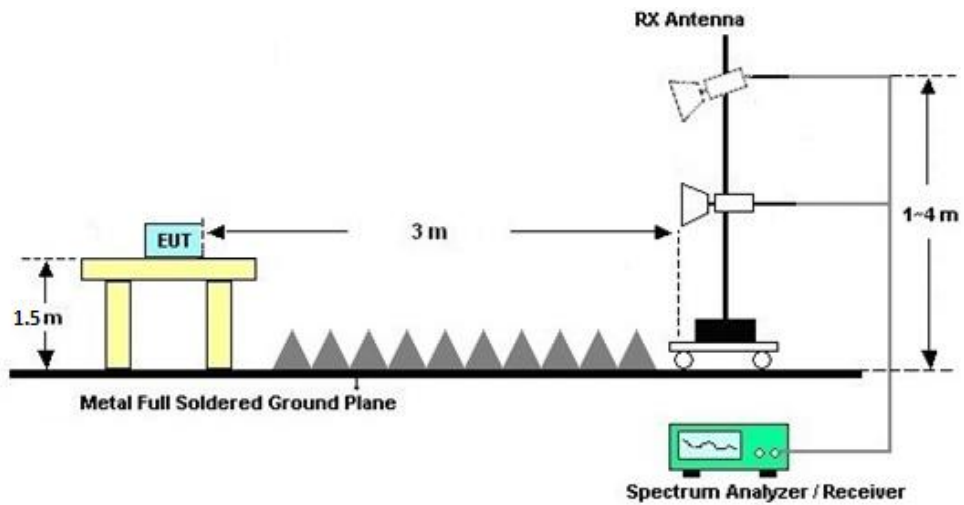
For radiated emissions below 30MHz



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.

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 (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

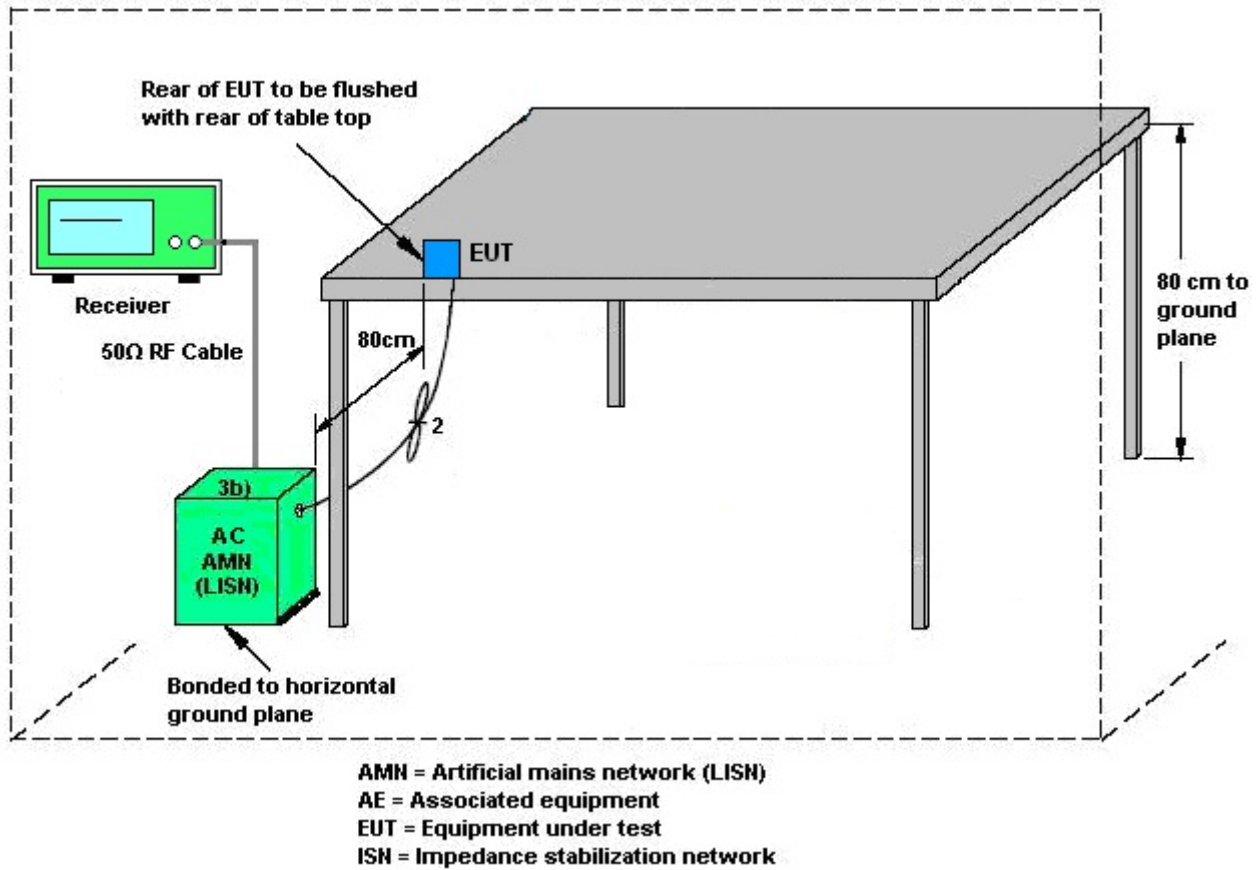
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, 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. 12, 2022	Nov. 05, 2022~Nov. 30, 2022	Oct. 11, 2023	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Nov. 05, 2022~Nov. 30, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Nov. 05, 2022~Nov. 30, 2022	Jan. 04, 2023	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max x 30dBm	Oct. 13, 2022	Nov. 24, 2022	Oct. 12, 2023	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44G,MAX 30dB	Mar. 24, 2022	Nov. 24, 2022	Mar. 23, 2023	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	Nov. 24, 2022	Oct. 15, 2023	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 24, 2022	Nov. 24, 2022	May 23, 2023	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 18, 2022	Nov. 24, 2022	Apr. 17, 2023	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Nov. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul. 11, 2022	Nov. 24, 2022	Jul. 10, 2023	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Nov. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
high gain Amplifier	EM	EM01G18GA	060839	1Ghz-18Ghz	Oct. 12, 2022	Nov. 24, 2022	Oct. 11, 2023	Radiation (03CH05-KS)
Amplifier	EM	EM01G18GA	060833	1Ghz-18Ghz	Jan. 05, 2022	Nov. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Nov. 24, 2022	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Nov. 24, 2022	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Nov. 24, 2022	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Nov. 18, 2022	May 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2022	Nov. 18, 2022	Oct. 12, 2023	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Nov. 18, 2022	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2022	Nov. 18, 2022	Oct. 11, 2023	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	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %
Conducted Power Spectral Density	±0.40 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.78dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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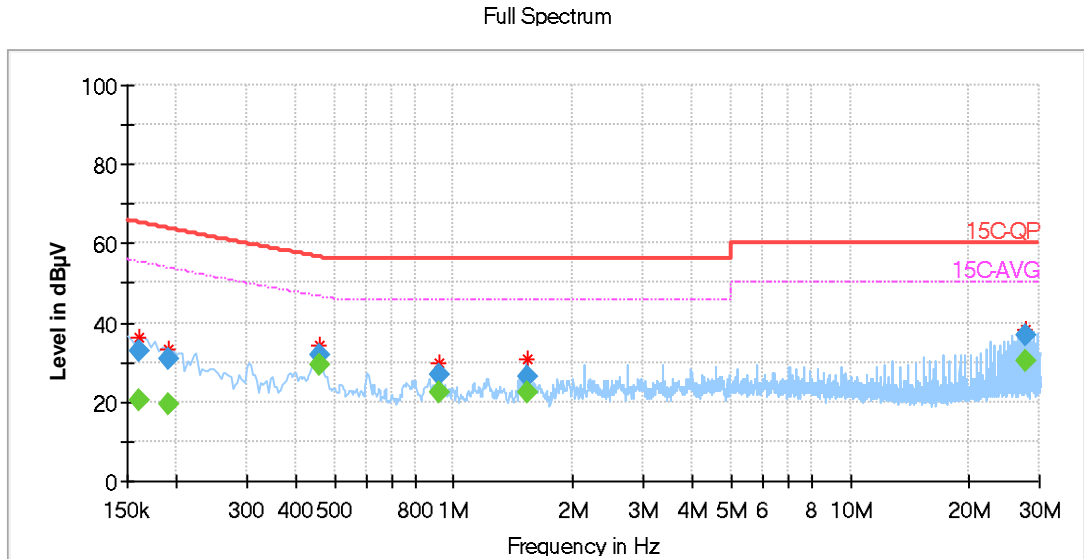
Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

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



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.		



Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.160425	---	20.42	55.39	34.97	N	OFF	20.2
0.160425	32.89	---	65.40	32.51	N	OFF	20.2
0.190275	---	19.58	53.87	34.28	N	OFF	20.2
0.190275	30.74	---	63.89	33.15	N	OFF	20.2
0.455962	---	29.17	46.70	17.53	N	OFF	19.9
0.455962	32.02	---	56.71	24.69	N	OFF	19.9
0.914832	---	22.22	46.00	23.78	N	OFF	19.8
0.914832	26.65	---	56.00	29.35	N	OFF	19.8
1.524485	---	22.32	46.00	23.68	N	OFF	19.8
1.524485	26.20	---	56.00	29.80	N	OFF	19.8
27.767906	---	30.29	50.00	19.71	N	OFF	20.7
27.767906	36.75	---	60.00	23.25	N	OFF	20.7

Note: Margin (dB) = Limit (dBµV) – QuasiPeak/Average Level (dBµV)



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Jacob Zhang	Temperature:	21~25	°C
Test Date:	2022/11/5~2022/11/30	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	14.14	10.02	0.50	Pass
11b	1Mbps	1	6	2437	14.14	9.02	0.50	Pass
11b	1Mbps	1	11	2462	14.09	8.08	0.50	Pass
11b	1Mbps	1	12	2467	14.04	8.54	0.50	Pass
11b	1Mbps	1	13	2472	14.19	9.02	0.50	Pass
11g	6Mbps	1	1	2412	17.53	14.16	0.50	Pass
11g	6Mbps	1	6	2437	17.93	15.10	0.50	Pass
11g	6Mbps	1	11	2462	17.48	14.42	0.50	Pass
11g	6Mbps	1	12	2467	17.68	15.04	0.50	Pass
11g	6Mbps	1	13	2472	18.23	15.11	0.50	Pass
HT20	MCS0	1	1	2412	18.48	15.12	0.50	Pass
HT20	MCS0	1	6	2437	18.78	15.10	0.50	Pass
HT20	MCS0	1	11	2462	18.38	15.12	0.50	Pass
HT20	MCS0	1	12	2467	18.38	15.12	0.50	Pass
HT20	MCS0	1	13	2472	19.08	15.11	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	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	1	2412	20.72	30.00	2.40	23.12	36.00	Pass
11b	1Mbps	1	6	2437	20.37	30.00	2.40	22.77	36.00	Pass
11b	1Mbps	1	11	2462	19.95	30.00	2.40	22.35	36.00	Pass
11b	1Mbps	1	12	2467	19.71	30.00	2.40	22.11	36.00	Pass
11b	1Mbps	1	13	2472	7.91	30.00	2.40	10.31	36.00	Pass
11g	6Mbps	1	1	2412	24.23	30.00	2.40	26.63	36.00	Pass
11g	6Mbps	1	6	2437	24.47	30.00	2.40	26.87	36.00	Pass
11g	6Mbps	1	11	2462	24.32	30.00	2.40	26.72	36.00	Pass
11g	6Mbps	1	12	2467	22.22	30.00	2.40	24.62	36.00	Pass
11g	6Mbps	1	13	2472	-0.13	30.00	2.40	2.27	36.00	Pass
HT20	MCS0	1	1	2412	24.41	30.00	2.40	26.81	36.00	Pass
HT20	MCS0	1	6	2437	24.52	30.00	2.40	26.92	36.00	Pass
HT20	MCS0	1	11	2462	23.93	30.00	2.40	26.33	36.00	Pass
HT20	MCS0	1	12	2467	21.88	30.00	2.40	24.28	36.00	Pass
HT20	MCS0	1	13	2472	0.02	30.00	2.40	2.42	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.03	18.16
11b	1Mbps	1	6	2437	0.03	18.12
11b	1Mbps	1	11	2462	0.03	17.59
11b	1Mbps	1	12	2467	0.03	17.17
11b	1Mbps	1	13	2472	0.03	5.64
11g	6Mbps	1	1	2412	0.21	14.30
11g	6Mbps	1	6	2437	0.21	16.14
11g	6Mbps	1	11	2462	0.21	13.79
11g	6Mbps	1	12	2467	0.21	11.42
11g	6Mbps	1	13	2472	0.21	-10.59
HT20	MCS0	1	1	2412	0.23	14.20
HT20	MCS0	1	6	2437	0.23	15.89
HT20	MCS0	1	11	2462	0.23	13.58
HT20	MCS0	1	12	2467	0.23	11.29
HT20	MCS0	1	13	2472	0.23	-11.07

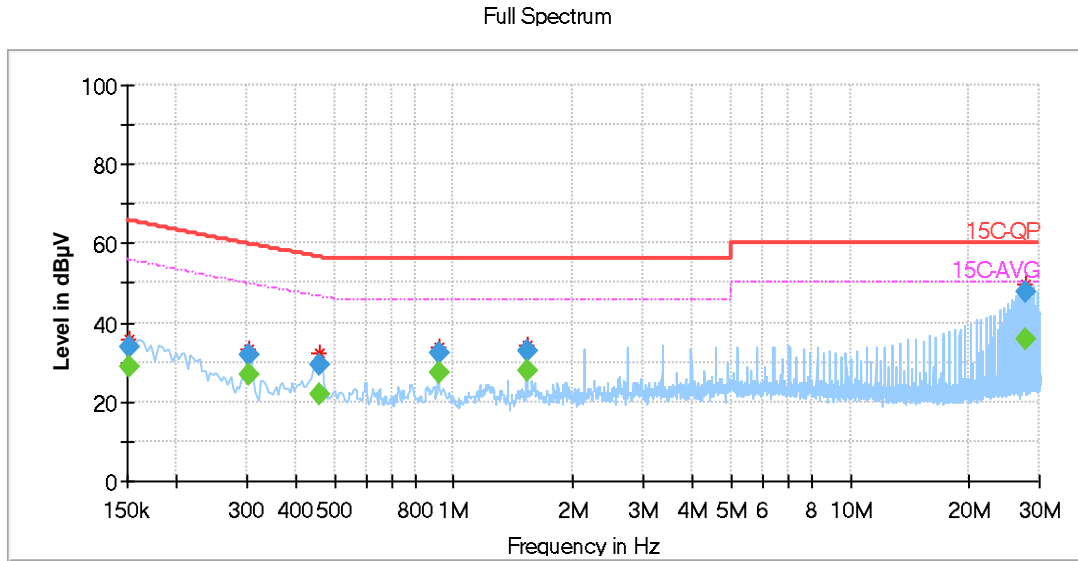
TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-3.82	2.40	8.00	Pass
11b	1Mbps	1	6	2437	-3.40	2.40	8.00	Pass
11b	1Mbps	1	11	2462	-4.13	2.40	8.00	Pass
11b	1Mbps	1	12	2467	-4.38	2.40	8.00	Pass
11b	1Mbps	1	13	2472	-14.63	2.40	8.00	Pass
11g	6Mbps	1	1	2412	-8.83	2.40	8.00	Pass
11g	6Mbps	1	6	2437	-8.47	2.40	8.00	Pass
11g	6Mbps	1	11	2462	-10.44	2.40	8.00	Pass
11g	6Mbps	1	12	2467	-12.68	2.40	8.00	Pass
11g	6Mbps	1	13	2472	-35.06	2.40	8.00	Pass
HT20	MCS0	1	1	2412	-10.13	2.40	8.00	Pass
HT20	MCS0	1	6	2437	-8.76	2.40	8.00	Pass
HT20	MCS0	1	11	2462	-10.57	2.40	8.00	Pass
HT20	MCS0	1	12	2467	-13.07	2.40	8.00	Pass
HT20	MCS0	1	13	2472	-35.33	2.40	8.00	Pass



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.		



Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152194	---	28.99	55.87	26.88	L1	OFF	20.1
0.152194	34.04	---	65.87	31.83	L1	OFF	20.1
0.305231	---	26.83	49.86	23.04	L1	OFF	19.9
0.305231	31.64	---	59.90	28.26	L1	OFF	19.9
0.455962	---	22.07	46.70	24.63	L1	OFF	19.8
0.455962	29.25	---	56.71	27.46	L1	OFF	19.8
0.914906	---	27.51	46.00	18.49	L1	OFF	19.8
0.914906	32.54	---	56.00	23.46	L1	OFF	19.8
1.525350	---	27.64	46.00	18.36	L1	OFF	19.8
1.525350	32.70	---	56.00	23.30	L1	OFF	19.8
27.765750	---	36.06	50.00	13.94	L1	OFF	20.3
27.765750	47.99	---	60.00	12.01	L1	OFF	20.3



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

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 01 2412MHz		2382.54	53.21	-20.79	74	50.35	32.31	7.1	36.55	349	156	P	H
		2385.27	47.04	-6.96	54	44.18	32.31	7.1	36.55	349	156	A	H
	*	2412	105.63	-	-	102.72	32.39	7.13	36.61	349	156	P	H
	*	2412	103.1	-	-	100.19	32.39	7.13	36.61	349	156	A	H
		2384.88	56.71	-17.29	74	53.85	32.31	7.1	36.55	144	210	P	V
		2385.4	50.88	-3.12	54	48.02	32.31	7.1	36.55	144	210	A	V
	*	2412	109.16	-	-	106.25	32.39	7.13	36.61	144	210	P	V
	*	2412	106.62	-	-	103.71	32.39	7.13	36.61	144	210	A	V
802.11b CH 11 2462MHz	*	2462	108.52	-	-	105.86	32.36	7.22	36.92	300	40	P	H
	*	2462	105.47	-	-	102.81	32.36	7.22	36.92	300	40	A	H
		2489.86	55.65	-18.35	74	53.2	32.33	7.25	37.13	300	40	P	H
		2488.6	47.75	-6.25	54	45.3	32.33	7.25	37.13	300	40	A	H
	*	2462	107.9	-	-	105.24	32.36	7.22	36.92	214	115	P	V
	*	2462	105.28	-	-	102.62	32.36	7.22	36.92	214	115	A	V
		2488.9	53.77	-20.23	74	51.32	32.33	7.25	37.13	214	115	P	V
		2488.6	44.92	-9.08	54	42.47	32.33	7.25	37.13	214	115	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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)
802.11b CH 12 2467MHz	*	2466	108.51	-	-	105.85	32.36	7.22	36.92	333	202	P	H
	*	2468	106.12	-	-	103.46	32.36	7.22	36.92	333	202	A	H
		2486.38	55.42	-18.58	74	52.85	32.34	7.25	37.02	333	202	P	H
		2486.38	46.9	-7.1	54	44.33	32.34	7.25	37.02	333	202	A	H
	*	2466	108.05	-	-	105.39	32.36	7.22	36.92	300	132	P	V
	*	2466	105.15	-	-	102.49	32.36	7.22	36.92	300	132	A	V
		2486.62	54.39	-19.61	74	51.82	32.34	7.25	37.02	300	132	P	V
		2486.62	45.3	-8.7	54	42.73	32.34	7.25	37.02	300	132	A	V
802.11b CH 13 2472MHz	*	2472	96.69	-	-	94.15	32.34	7.22	37.02	295	206	P	H
	*	2472	94.26	-	-	91.72	32.34	7.22	37.02	295	206	A	H
		2483.68	54.93	-19.07	74	52.36	32.34	7.25	37.02	295	206	P	H
		2483.5	49.6	-4.4	54	47.03	32.34	7.25	37.02	295	206	A	H
	*	2472	95.66	-	-	93.12	32.34	7.22	37.02	263	115	P	V
	*	2472	93.23	-	-	90.69	32.34	7.22	37.02	263	115	A	V
		2483.5	54.17	-19.83	74	51.6	32.34	7.25	37.02	263	115	P	V
		2483.5	48.95	-5.05	54	46.38	32.34	7.25	37.02	263	115	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. 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)
802.11b CH 01 2412MHz		4830	40.44	-33.56	74	61.45	34	10.25	65.26	300	0	P	H
		4830	40.79	-33.21	74	61.8	34	10.25	65.26	100	0	P	V
802.11b CH 06 2437MHz		4875	39.46	-34.54	74	60.45	34	10.29	65.28	300	0	P	H
		7305	44.81	-29.19	74	63.01	35.76	12.72	66.68	300	0	P	H
		4875	40.45	-33.55	74	61.44	34	10.29	65.28	100	0	P	V
		7305	44.37	-29.63	74	62.57	35.76	12.72	66.68	100	0	P	V
802.11b CH 11 2462MHz		4920	40.3	-33.7	74	61.26	34	10.34	65.3	300	0	P	H
		7380	45.06	-28.94	74	63.46	35.78	12.73	66.91	300	0	P	H
		4920	40.26	-33.74	74	61.22	34	10.34	65.3	100	0	P	V
		7380	44.51	-29.49	74	62.91	35.78	12.73	66.91	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

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)
802.11b CH 12 2467MHz		4935	40	-34	74	60.93	34	10.37	65.3	300	0	P	H
		7395	44.35	-29.65	74	62.8	35.78	12.73	66.96	300	0	P	H
		4934	40.4	-33.6	74	61.33	34	10.37	65.3	100	0	P	V
		7395	44.17	-29.83	74	62.62	35.78	12.73	66.96	100	0	P	V
802.11b CH 13 2472MHz		4944	40.41	-33.59	74	61.33	34	10.39	65.31	300	0	P	H
		7410	41.65	-32.35	74	60.16	35.78	12.73	67.02	300	0	P	H
		4950	40.69	-33.31	74	61.61	34	10.39	65.31	100	0	P	V
		7416	41.6	-32.4	74	60.08	35.78	12.76	67.02	100	0	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 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 01 2412MHz		2389.95	63.76	-10.24	74	60.77	32.4	7.1	36.51	249	185	P	H
		2389.95	49.72	-4.28	54	46.73	32.4	7.1	36.51	249	185	A	H
	*	2410	108.31	-	-	105.4	32.39	7.13	36.61	249	185	P	H
	*	2414	100.44	-	-	97.53	32.39	7.13	36.61	249	185	A	H
		2388.78	65.82	-8.18	74	62.83	32.4	7.1	36.51	100	300	P	V
		2389.95	50.38	-3.62	54	47.39	32.4	7.1	36.51	100	300	A	V
	*	2410	106.01	-	-	103.1	32.39	7.13	36.61	100	300	P	V
	*	2410	98.34	-	-	95.43	32.39	7.13	36.61	100	300	A	V
802.11g CH 11 2462MHz	*	2460	108.79	-	-	106.13	32.36	7.22	36.92	305	38	P	H
	*	2460	100.26	-	-	97.6	32.36	7.22	36.92	305	38	A	H
		2484.04	67.13	-6.87	74	64.56	32.34	7.25	37.02	305	38	P	H
		2483.56	48.52	-5.48	54	45.95	32.34	7.25	37.02	305	38	A	H
	*	2460	106.98	-	-	104.32	32.36	7.22	36.92	213	114	P	V
	*	2460	99.22	-	-	96.56	32.36	7.22	36.92	213	114	A	V
		2483.98	64.27	-9.73	74	61.7	32.34	7.25	37.02	213	114	P	V
		2483.74	46.86	-7.14	54	44.29	32.34	7.25	37.02	213	114	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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 12 2467MHz	*	2468	105.01	-	-	102.35	32.36	7.22	36.92	300	333	P	H
	*	2468	97.3	-	-	94.64	32.36	7.22	36.92	300	333	A	H
		2483.98	65.08	-8.92	74	62.51	32.34	7.25	37.02	300	333	P	H
		2483.68	50.17	-3.83	54	47.6	32.34	7.25	37.02	300	333	A	H
	*	2468	103.43	-	-	100.77	32.36	7.22	36.92	102	211	P	V
	*	2466	95.28	-	-	92.62	32.36	7.22	36.92	102	211	A	V
		2483.56	64.09	-9.91	74	61.52	32.34	7.25	37.02	102	211	P	V
		2483.5	45.59	-8.41	54	43.02	32.34	7.25	37.02	102	211	A	V
802.11g CH 13 2472MHz	*	2474	81.61	-	-	79.04	32.34	7.25	37.02	375	360	P	H
	*	2474	73.79	-	-	71.22	32.34	7.25	37.02	375	360	A	H
		2483.74	57.86	-16.14	74	55.29	32.34	7.25	37.02	375	360	P	H
		2483.5	43.32	-10.68	54	40.75	32.34	7.25	37.02	375	360	A	H
	*	2474	82.27	-	-	79.7	32.34	7.25	37.02	300	71	P	V
	*	2474	74.71	-	-	72.14	32.34	7.25	37.02	300	71	A	V
		2483.5	58.17	-15.83	74	55.6	32.34	7.25	37.02	300	71	P	V
		2483.5	44.17	-9.83	54	41.6	32.34	7.25	37.02	300	71	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. 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 01 2412MHz		4830	40.19	-33.81	74	61.2	34	10.25	65.26	300	0	P	H
		4830	40.54	-33.46	74	61.55	34	10.25	65.26	100	0	P	V
802.11g CH 06 2437MHz		4875	39.1	-34.9	74	60.09	34	10.29	65.28	300	0	P	H
		7305	46.12	-27.88	74	64.32	35.76	12.72	66.68	300	0	P	H
		4875	39.63	-34.37	74	60.62	34	10.29	65.28	100	0	P	V
		7305	47.03	-26.97	74	65.23	35.76	12.72	66.68	100	0	P	V
802.11g CH 11 2462MHz		4920	39.94	-34.06	74	60.9	34	10.34	65.3	300	0	P	H
		7380	41.67	-32.33	74	60.07	35.78	12.73	66.91	300	0	P	H
		4920	39.59	-34.41	74	60.55	34	10.34	65.3	100	0	P	V
		7380	43.06	-30.94	74	61.46	35.78	12.73	66.91	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

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 12 2467MHz		4935	39.8	-34.2	74	60.73	34	10.37	65.3	300	0	P	H
		7401	40.91	-33.09	74	59.42	35.78	12.73	67.02	300	0	P	H
		4934	39.69	-34.31	74	60.62	34	10.37	65.3	100	0	P	V
		7395	40.78	-33.22	74	59.23	35.78	12.73	66.96	100	0	P	V
802.11g CH 13 2472MHz		4944	40.69	-33.31	74	61.61	34	10.39	65.31	300	0	P	H
		7416	41.16	-32.84	74	59.64	35.78	12.76	67.02	300	0	P	H
		4944	39.61	-34.39	74	60.53	34	10.39	65.31	100	0	P	V
		7416	41.66	-32.34	74	60.14	35.78	12.76	67.02	100	0	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. 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 01 2412MHz		2389.56	62.3	-11.7	74	59.31	32.4	7.1	36.51	112	155	P	H
		2389.95	48.71	-5.29	54	45.72	32.4	7.1	36.51	112	155	A	H
	*	2414	104.57	-	-	101.66	32.39	7.13	36.61	112	155	P	H
	*	2414	96.99	-	-	94.08	32.39	7.13	36.61	112	155	A	H
		2389.56	63.39	-10.61	74	60.4	32.4	7.1	36.51	144	211	P	V
		2389.95	49.09	-4.91	54	46.1	32.4	7.1	36.51	144	211	A	V
	*	2414	107.37	-	-	104.46	32.39	7.13	36.61	144	211	P	V
	*	2414	99.85	-	-	96.94	32.39	7.13	36.61	144	211	A	V
802.11n HT20 CH 11 2462MHz	*	2464	106.34	-	-	103.68	32.36	7.22	36.92	300	305	P	H
	*	2462	99.09	-	-	96.43	32.36	7.22	36.92	300	305	A	H
		2483.8	64.55	-9.45	74	61.98	32.34	7.25	37.02	300	305	P	H
		2483.62	49.19	-4.81	54	46.62	32.34	7.25	37.02	300	305	A	H
	*	2464	105.01	-	-	102.35	32.36	7.22	36.92	100	209	P	V
	*	2460	98.32	-	-	95.66	32.36	7.22	36.92	100	209	A	V
		2487.64	63.87	-10.13	74	61.42	32.33	7.25	37.13	100	209	P	V
	2483.92	47.48	-6.52	54	44.91	32.34	7.25	37.02	100	209	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

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 12 2467MHz	*	2468	104.56	-	-	101.9	32.36	7.22	36.92	300	332	P	H
	*	2468	96.99	-	-	94.33	32.36	7.22	36.92	300	332	A	H
		2484.58	63.59	-10.41	74	61.02	32.34	7.25	37.02	300	332	P	H
		2483.5	50.43	-3.57	54	47.86	32.34	7.25	37.02	300	332	A	H
	*	2464	104.09	-	-	101.43	32.36	7.22	36.92	103	212	P	V
	*	2466	95	-	-	92.34	32.36	7.22	36.92	103	212	A	V
		2483.68	60.66	-13.34	74	58.09	32.34	7.25	37.02	103	212	P	V
	2483.5	45.51	-8.49	54	42.94	32.34	7.25	37.02	103	212	A	V	



802.11n HT20 CH 13 2472MHz	*	2474	81.14	-	-	78.57	32.34	7.25	37.02	300	2	P	H
	*	2470	73.65	-	-	70.99	32.36	7.22	36.92	300	2	A	H
		2483.8	57.61	-16.39	74	55.04	32.34	7.25	37.02	300	2	P	H
		2483.5	43.55	-10.45	54	40.98	32.34	7.25	37.02	300	2	A	H
	*	2470	82.33	-	-	79.67	32.36	7.22	36.92	300	74	P	V
	*	2474	74.78	-	-	72.21	32.34	7.25	37.02	300	74	A	V
		2483.62	59.91	-14.09	74	57.34	32.34	7.25	37.02	300	74	P	V
	2483.5	45.01	-8.99	54	42.44	32.34	7.25	37.02	300	74	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.	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)
802.11n HT20 CH 01 2412MHz		4830	40.09	-33.91	74	61.1	34	10.25	65.26	300	0	P	H
		4830	40.77	-33.23	74	61.78	34	10.25	65.26	100	0	P	V
802.11n HT20 CH 06 2437MHz		4875	40.38	-33.62	74	61.37	34	10.29	65.28	300	0	P	H
		7305	47.03	-26.97	74	65.23	35.76	12.72	66.68	300	0	P	H
		4875	40.09	-33.91	74	61.08	34	10.29	65.28	100	0	P	V
		7305	46.81	-27.19	74	65.01	35.76	12.72	66.68	100	0	P	V
802.11n HT20 CH 11 2462MHz		4920	39.47	-34.53	74	60.43	34	10.34	65.3	300	0	P	H
		7380	42.07	-31.93	74	60.47	35.78	12.73	66.91	300	0	P	H
		4920	40.03	-33.97	74	60.99	34	10.34	65.3	100	0	P	V
		7380	41.67	-32.33	74	60.07	35.78	12.73	66.91	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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		4935	39.69	-34.31	74	60.62	34	10.37	65.3	300	0	P	H
HT20		7401	41.34	-32.66	74	59.85	35.78	12.73	67.02	300	0	P	H
CH 12		4934	40.27	-33.73	74	61.2	34	10.37	65.3	100	0	P	V
2467MHz		7395	41	-33	74	59.45	35.78	12.73	66.96	100	0	P	V
802.11n		4944	40.17	-33.83	74	61.09	34	10.39	65.31	300	0	P	H
HT20		7416	41.78	-32.22	74	60.26	35.78	12.76	67.02	300	0	P	H
CH 13		4944	40.32	-33.68	74	61.24	34	10.39	65.31	100	0	P	V
2472MHz		7416	41.27	-32.73	74	59.75	35.78	12.76	67.02	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 802.11b (LF)

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)
2.4GHz 802.11b LF		30	28.21	-11.79	40	35.95	24.57	0.71	33.02	-	-	P	H
		159.98	20.99	-22.51	43.5	35.66	16.22	1.93	32.82	-	-	P	H
		239.52	20.96	-25.04	46	33.6	17.78	2.36	32.78	-	-	P	H
		320.03	27.75	-18.25	46	38.12	19.77	2.72	32.86	-	-	P	H
		480.08	28.44	-17.56	46	34.9	23.17	3.35	32.98	-	-	P	H
		741.01	25.91	-20.09	46	28.86	25.72	4.17	32.84	-	-	P	H
		30	24.09	-15.91	40	31.83	24.57	0.71	33.02	-	-	P	V
		42.61	23.21	-16.79	40	37.61	17.57	0.99	32.96	-	-	P	V
		56.19	22.78	-17.22	40	41.3	13.28	1.12	32.92	-	-	P	V
		159.98	20.69	-22.81	43.5	35.36	16.22	1.93	32.82	-	-	P	V
		239.52	21.01	-24.99	46	33.65	17.78	2.36	32.78	-	-	P	V
		320.03	25.89	-20.11	46	36.26	19.77	2.72	32.86	-	-	P	V



Remark	<ol style="list-style-type: none">1. No other spurious found.2. All results are PASS against limit line.
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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	Peak or Average
H/V	Horizontal or Vertical



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)

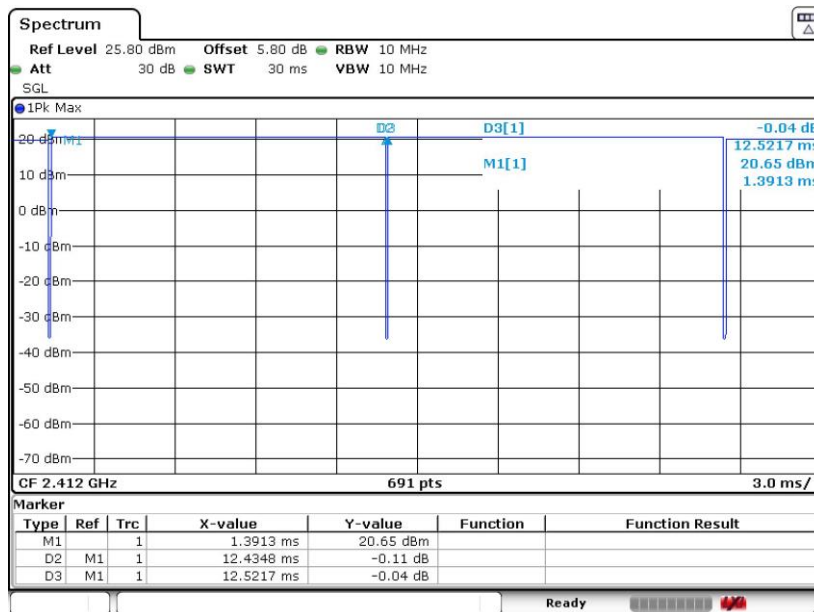
Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix D. Duty Cycle Plots

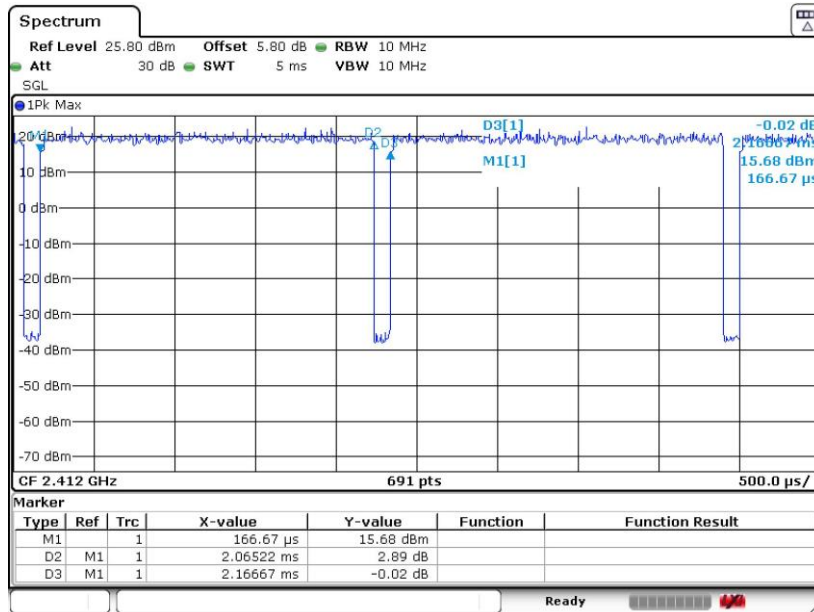
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	99.31	-	-	10Hz
802.11g	95.32	2.065	0.484	0.51KHz
802.11n HT20	94.78	1.922	0.520	0.56KHz

802.11b





802.11g



802.11n HT20

