



FCC RF Test Report

APPLICANT : Xiaomi Communications Co., Ltd.
EQUIPMENT : Tablet Computer
BRAND NAME : XIAOMI
MODEL NAME : 21051182G
FCC ID : 2AFZZ1182G
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Jun. 18, 2021 ~ Jul. 07, 2021

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

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex Wang

Approved by: Alex Wang / Manager



Sporton International (Kunshan) Inc.

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



TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification of Equipment Under Test.....	6
1.5 Modification of EUT	6
1.6 Testing Location	7
1.7 Test Software.....	7
1.8 Applicable Standards.....	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency and Channel	8
2.2 Test Mode.....	9
2.3 Connection Diagram of Test System.....	9
2.4 Support Unit used in test configuration and system	11
2.5 EUT Operation Test Setup	11
2.6 Measurement Results Explanation Example.....	11
3 TEST RESULT	12
3.1 6dB Bandwidth Measurement	12
3.2 Output Power Measurement.....	14
3.3 Power Spectral Density Measurement	15
3.4 Conducted Band Edges and Spurious Emission Measurement	17
3.5 Radiated Band Edges and Spurious Emission Measurement	36
3.6 AC Conducted Emission Measurement.....	40
3.7 Antenna Requirements.....	42
4 LIST OF MEASURING EQUIPMENT	43
5 UNCERTAINTY OF EVALUATION	44
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. AC CONDUCTED EMISSION TEST RESULT	
APPENDIX C. RADIATED SPURIOUS EMISSION	
APPENDIX D. DUTY CYCLE PLOTS	
APPENDIX E. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR160318C	Rev. 01	Initial issue of report	Jul. 12, 2021

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	-
3.2	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 3.21 dB at 4926.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.88 dB at 0.166 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	N/A	-

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

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet Computer
Brand Name	XIAOMI
Model Name	21051182G
FCC ID	2AFZZ1182G
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE/WPT
HW Version	P2
SW Version	MIUI 12.5
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 ~ 2462 MHz		
Maximum (Peak) Output Power to antenna		SISO <Ant. 1> 802.11b : 20.99 dBm (0.1256 W) 802.11g : 22.11 dBm (0.1626 W) SISO <Ant. 2> 802.11b : 14.47 dBm (0.0280 W) 802.11g : 16.61 dBm (0.0458 W) MIMO <Ant. 1 + 2> 802.11n HT20 : 22.24 dBm (0.1675 W)		
Antenna Type / Gain		Ant. 1: IFA Antenna with gain -1.51 dBi Ant. 2: IFA Antenna with gain 1.26 dBi		
Type of Modulation		802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Function				
		802.11b/g/n SISO	Ant. 1 V	Ant. 2 V
		802.11n MIMO	V	

Note: For 802.11n SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power.

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International (Kunshan) Inc.		
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 03CH04-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a
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
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- 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 and Laptop mode. The worst cases(X/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	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

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

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps

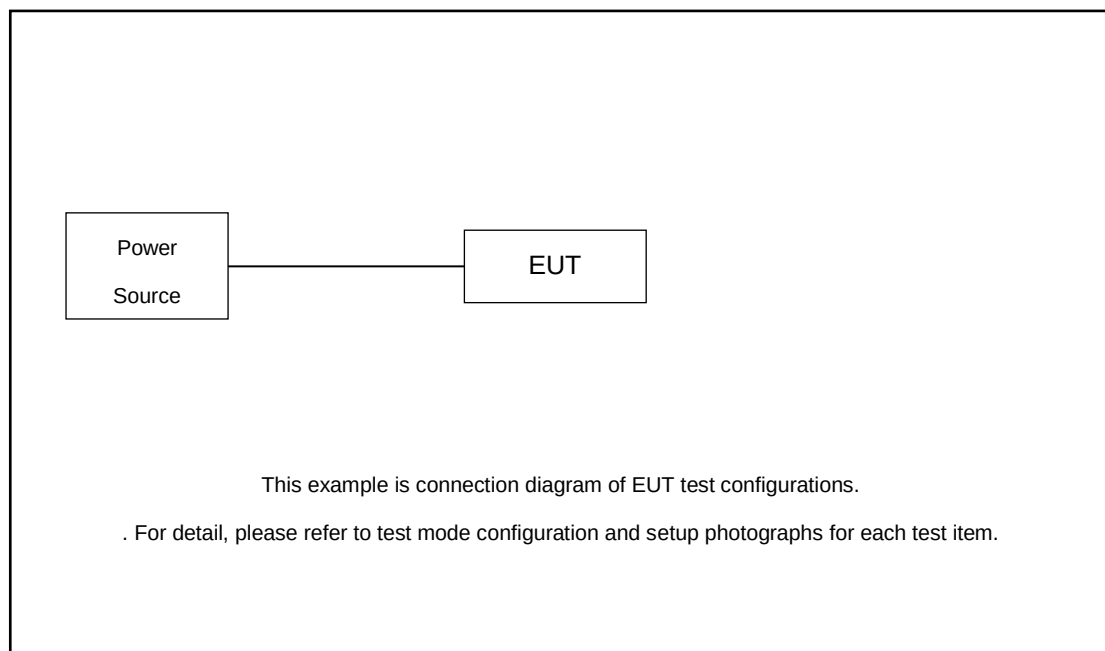
MIMO Antenna

Modulation	Data Rate
802.11n HT20	MCS0

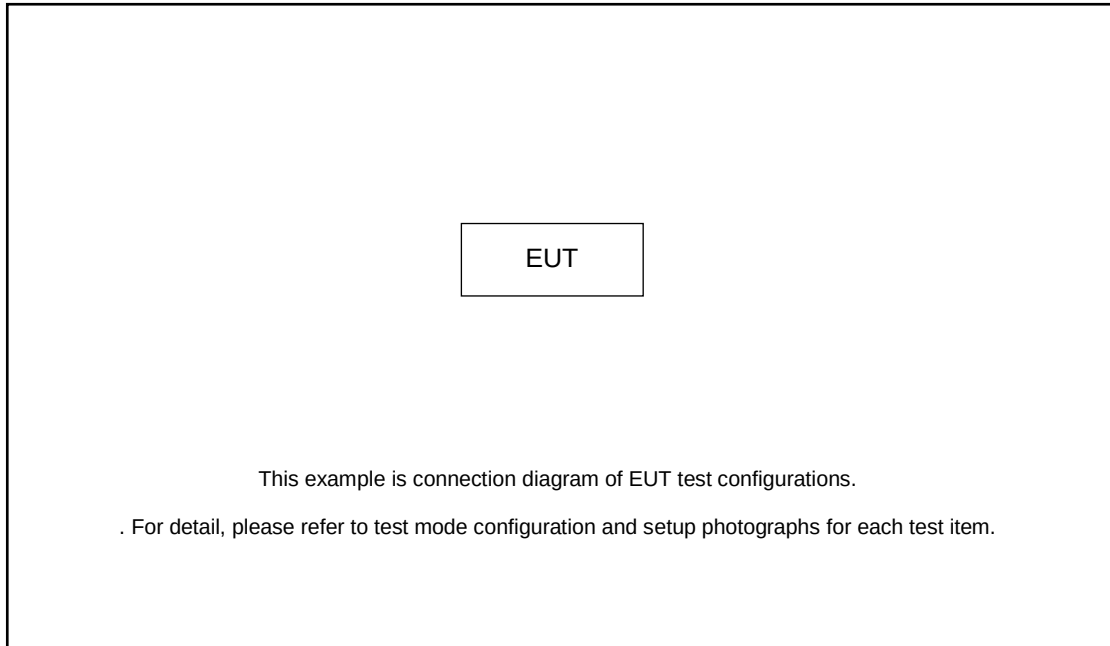
Test Cases	
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter) + Keyboard + EUT Charger to Stylus
Radiated Co-location	Mode 1: BLE_Tx_Ch39 + 802.11g_Tx_Ch01

2.3 Connection Diagram of Test System

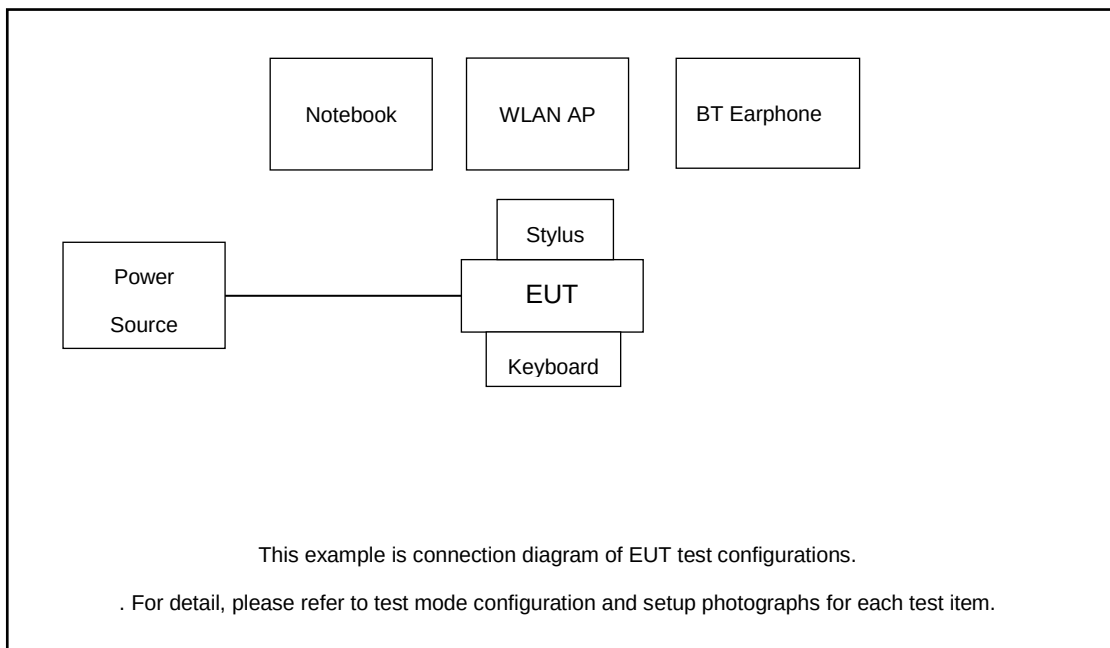
For Radiated Emission (SISO Ant. 1/2)



For Radiated Emission (MIMO Ant. 1+2)



For Conducted Emission



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
2.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	Earphone	Xiaomi	N/A	N/A	Unshielded,1.2m	N/A
5.	Keyboard	N/A	N/A	N/A	N/A	N/A
6.	Stylus	N/A	N/A	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/receive.

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 6.0 dB.

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

= 6.0 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

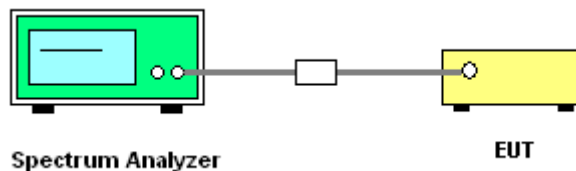
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

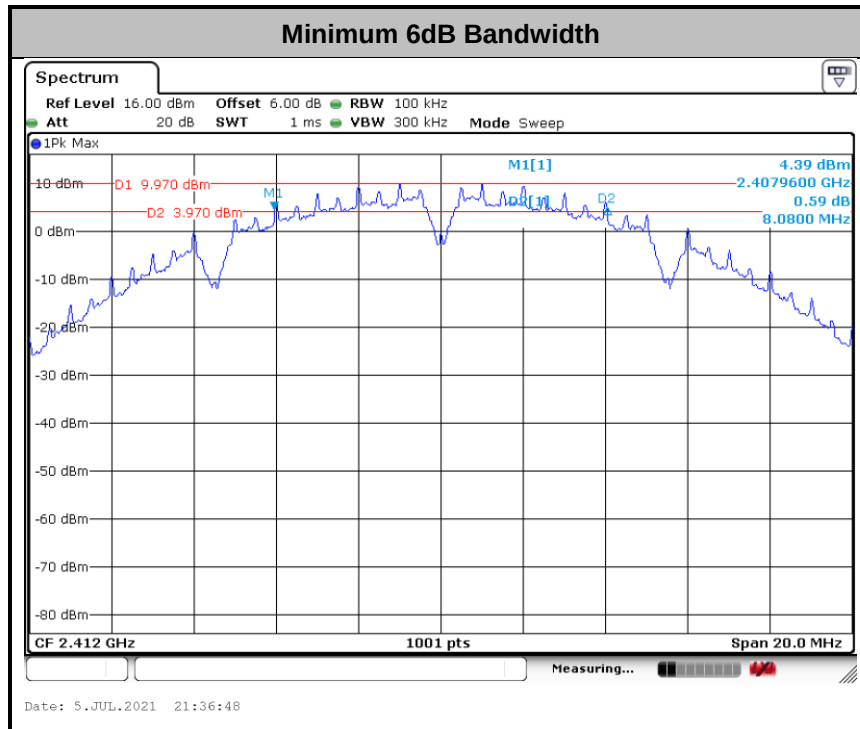
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.



3.2 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.

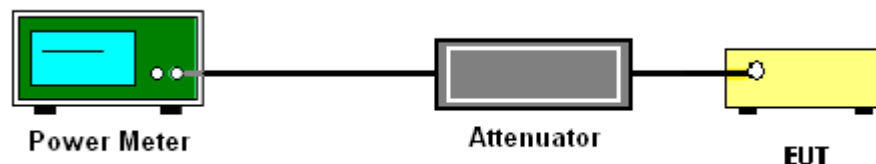
3.2.2 Measuring Instruments

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 11.9.2.3.2 Method AVGPM-G method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

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.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

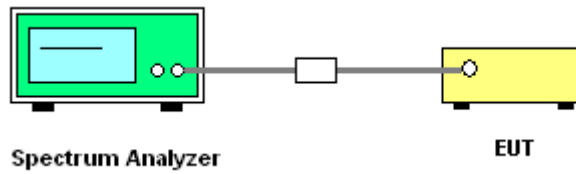
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

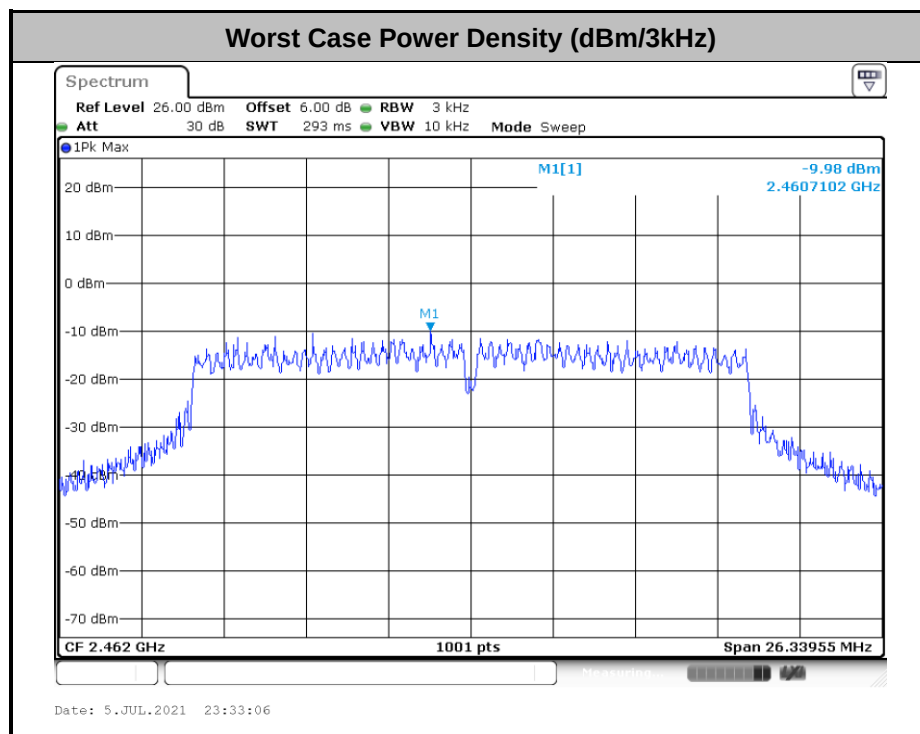
Method (2): Measure and add $10 \log(N)$ dB, where N is the number of outputs. (N=2)

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.

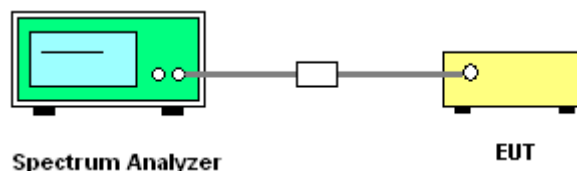
3.4.2 Measuring Instruments

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



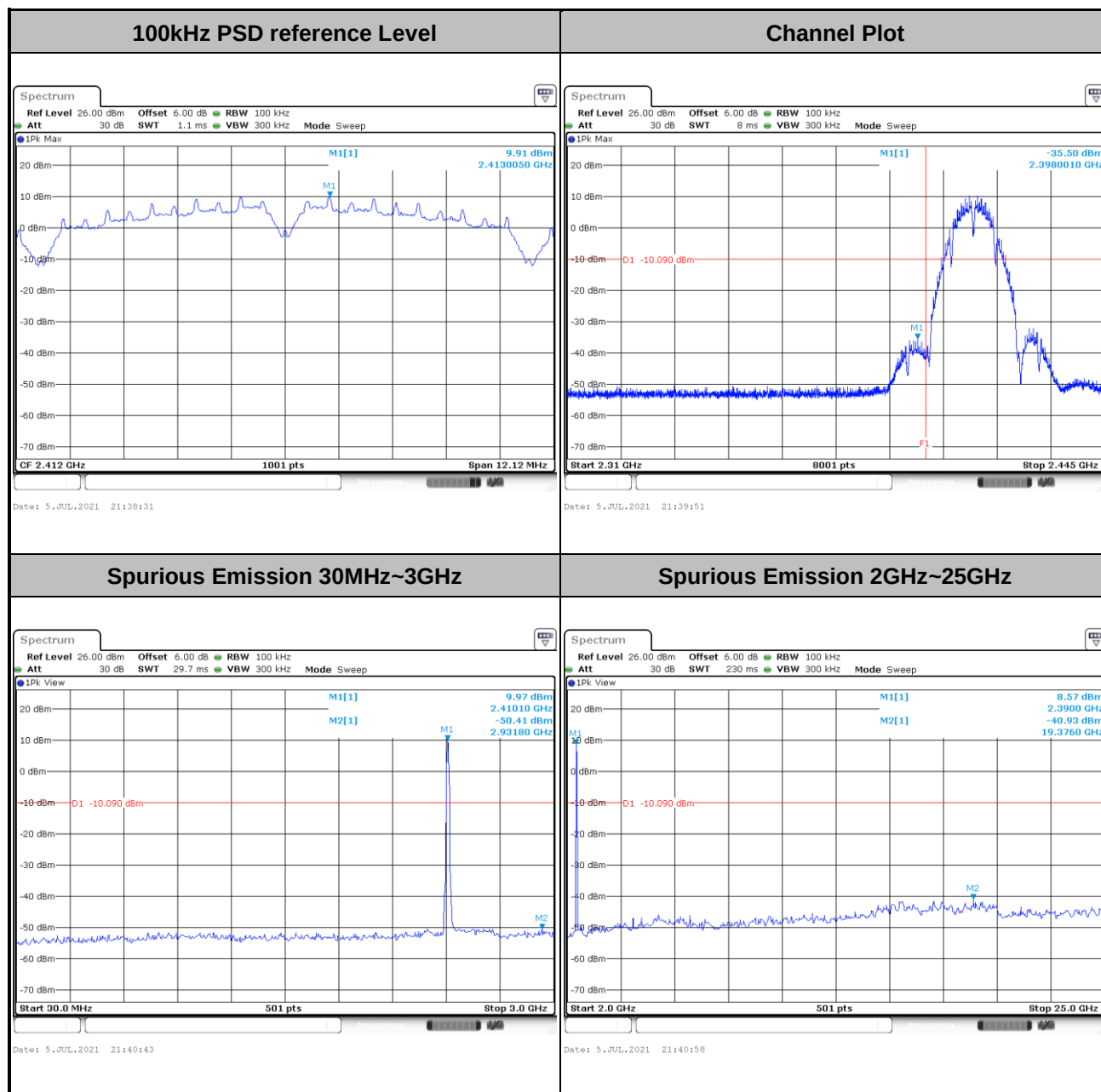


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Gene Wang	Temperature :	21~25°C
		Relative Humidity :	51~54%

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

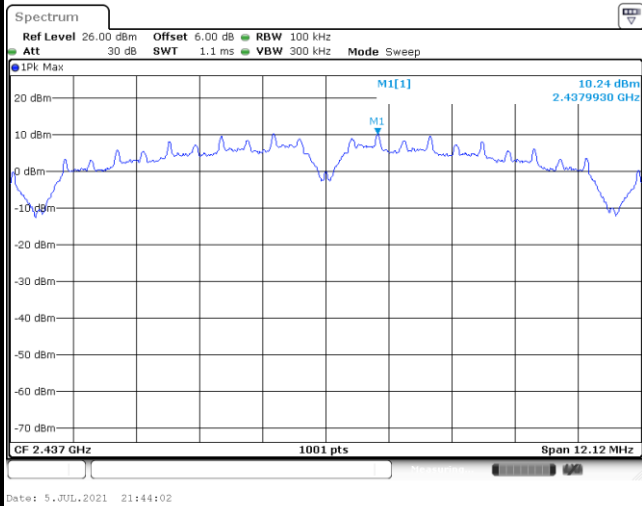
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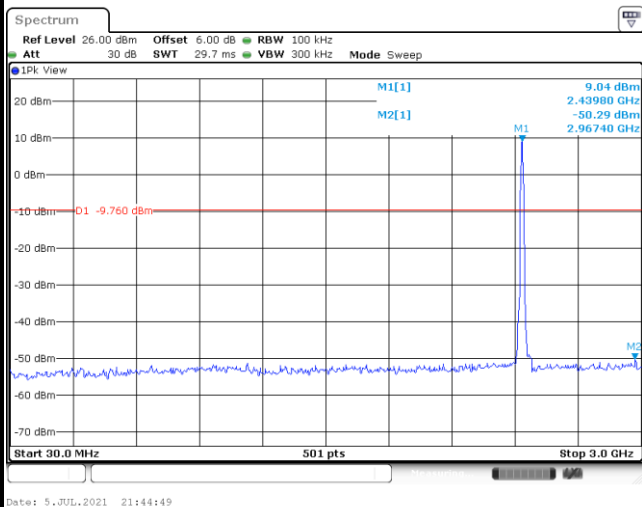


Test Mode :	802.11b	Test Channel :	06
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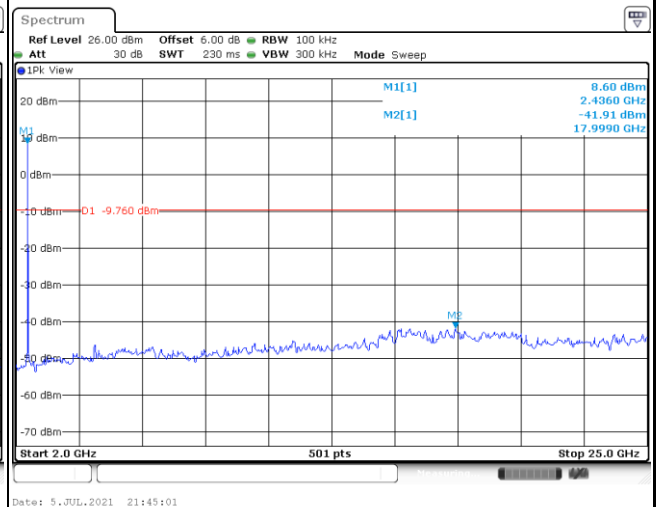
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

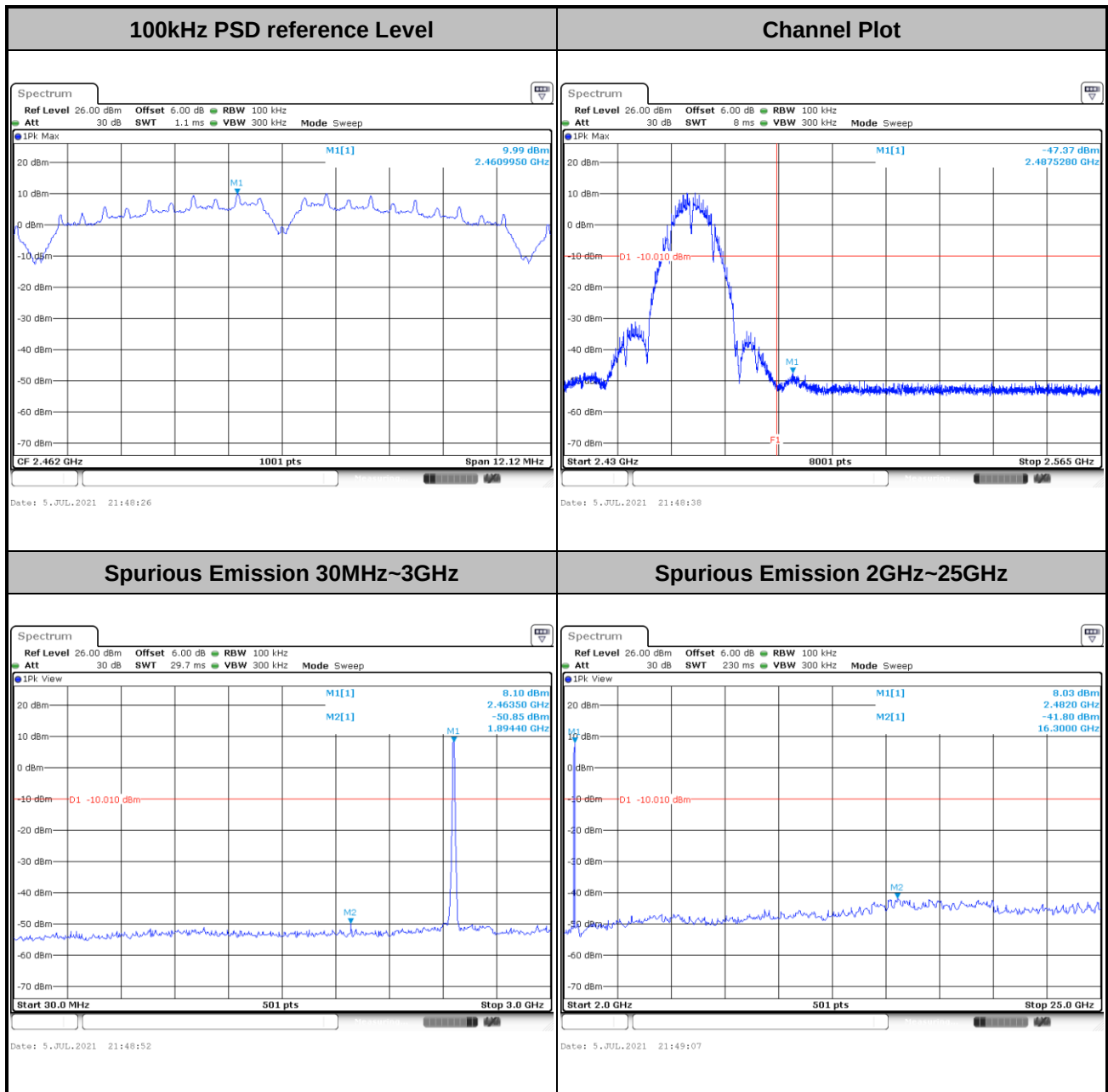


Spurious Emission 2GHz~25GHz





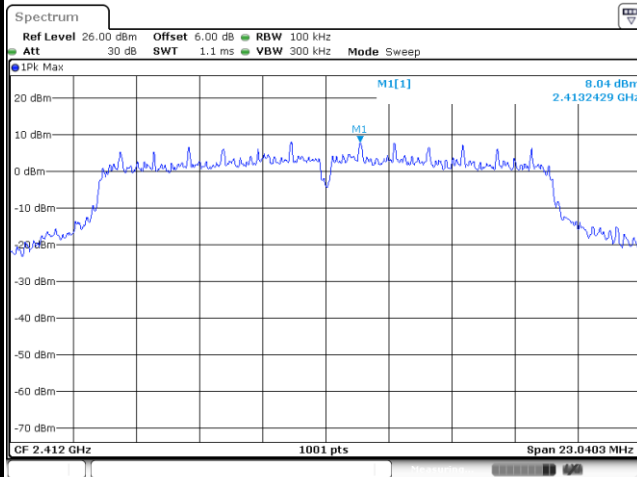
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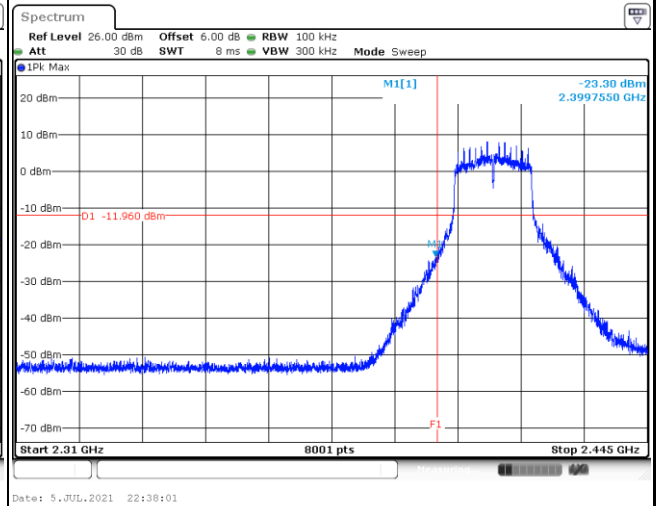


Test Mode :	802.11g	Test Channel :	01
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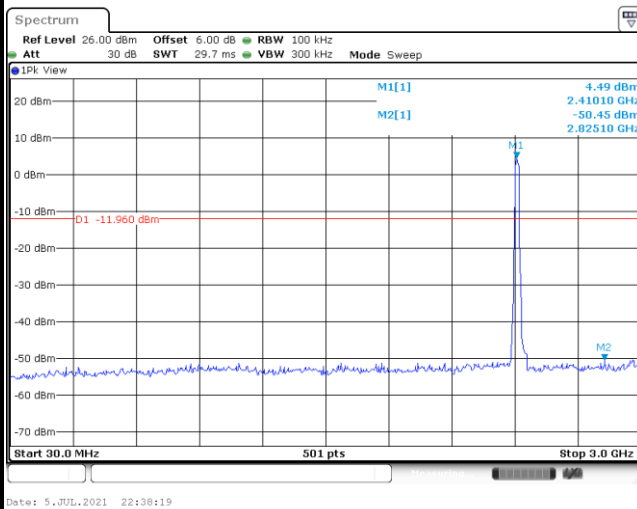
100kHz PSD reference Level



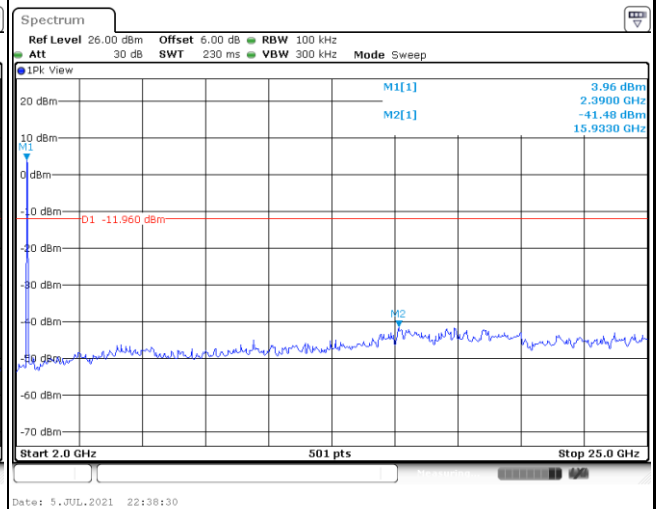
Channel Plot



Spurious Emission 30MHz~3GHz



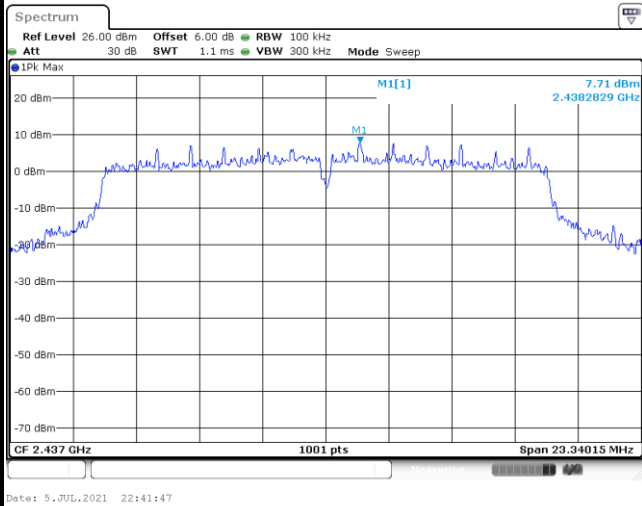
Spurious Emission 2GHz~25GHz



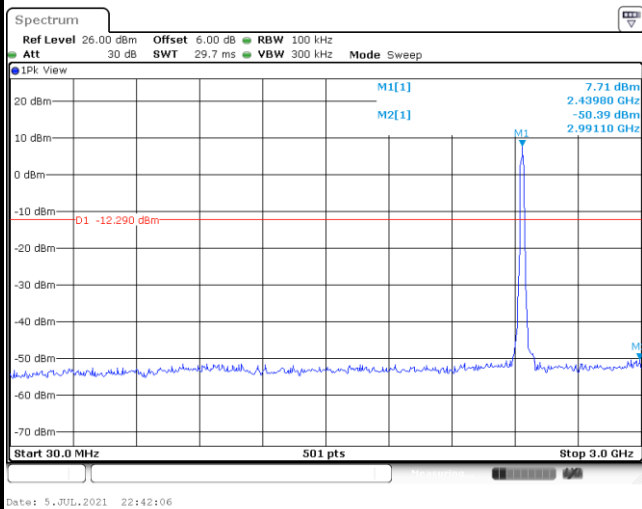


Test Mode :	802.11g	Test Channel :	06
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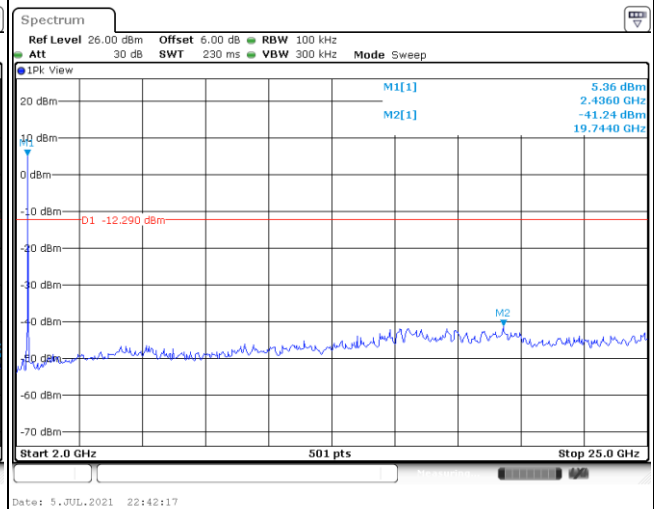
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



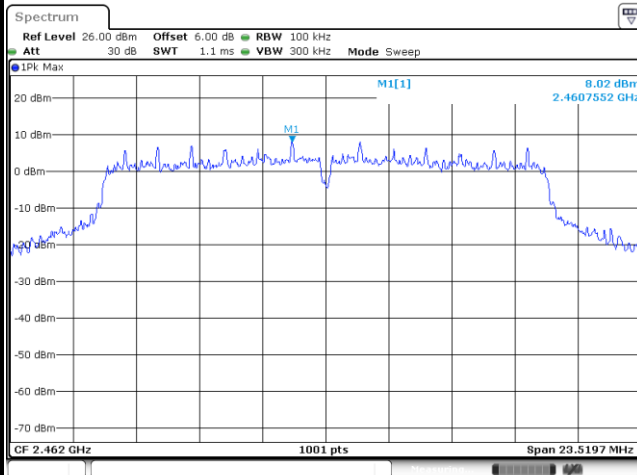
Spurious Emission 2GHz~25GHz



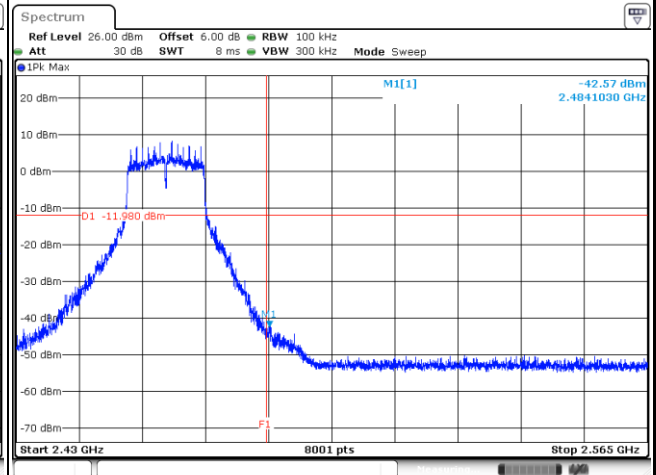


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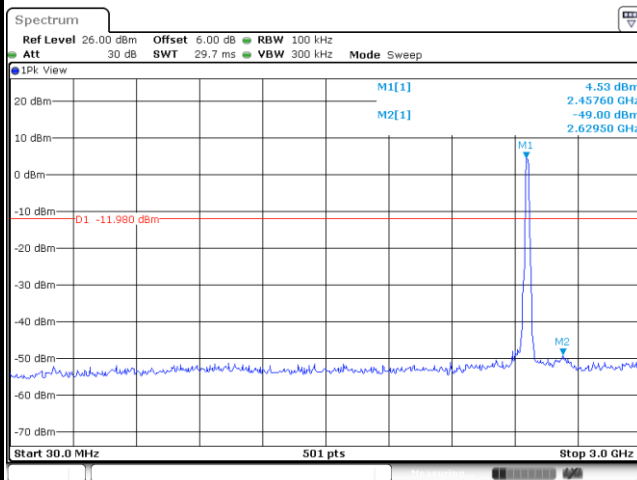
100kHz PSD reference Level



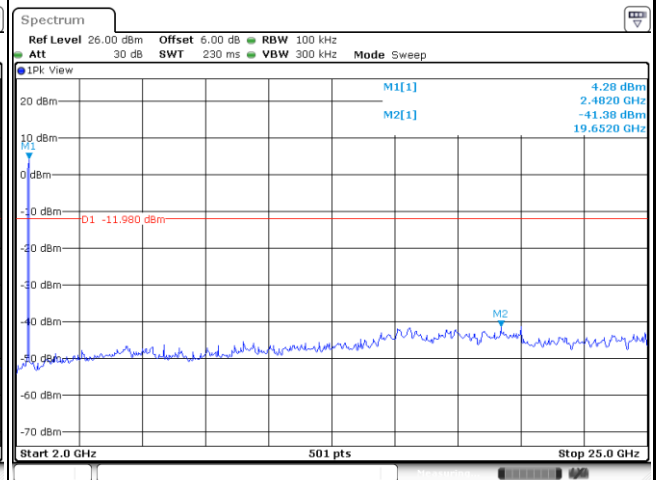
Channel Plot



Spurious Emission 30MHz~3GHz



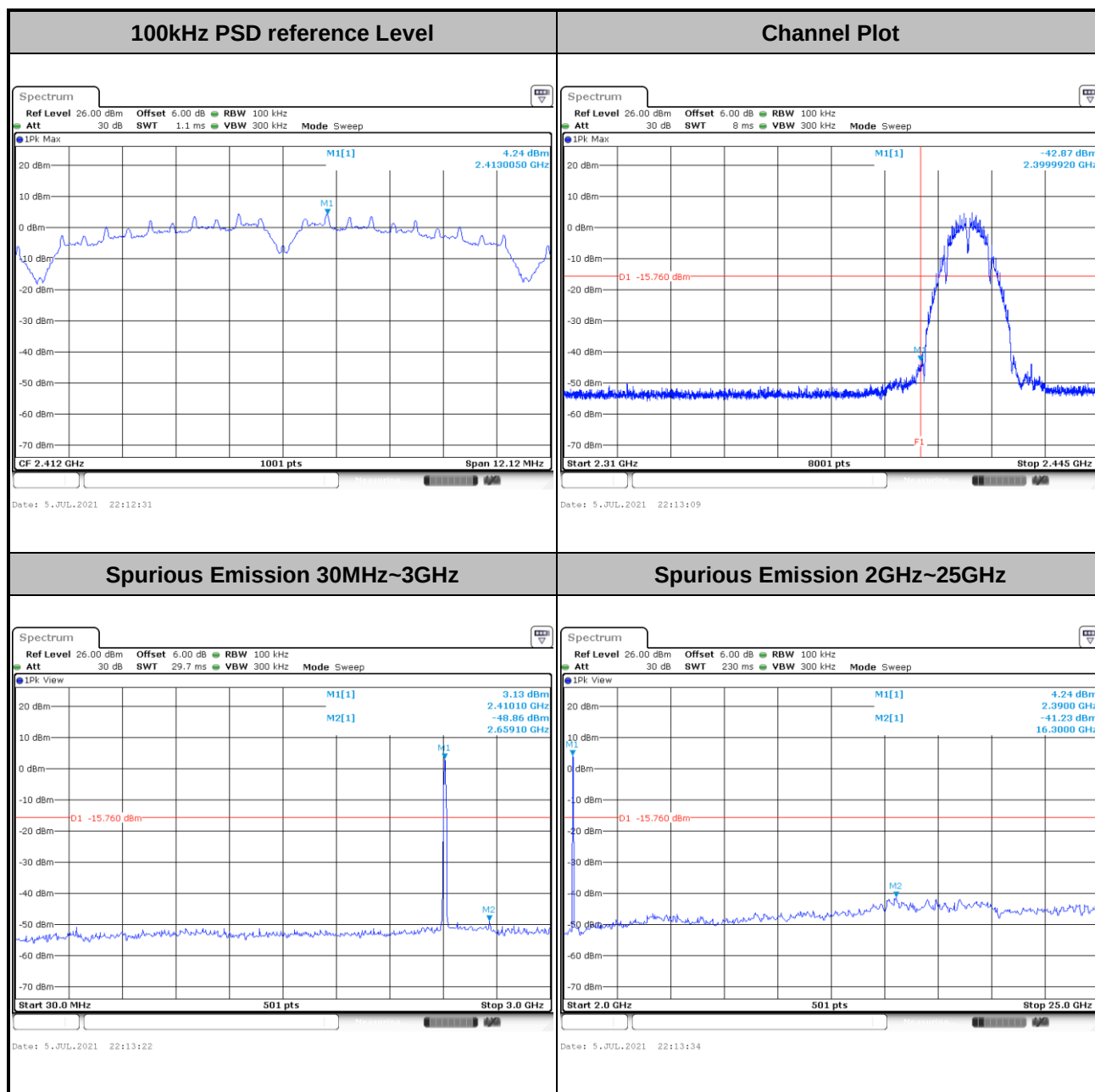
Spurious Emission 2GHz~25GHz





Number of TX = 1, Ant. 2 (Measured)

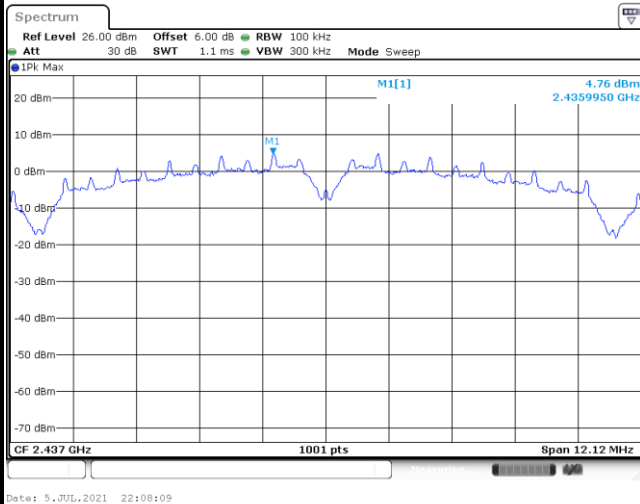
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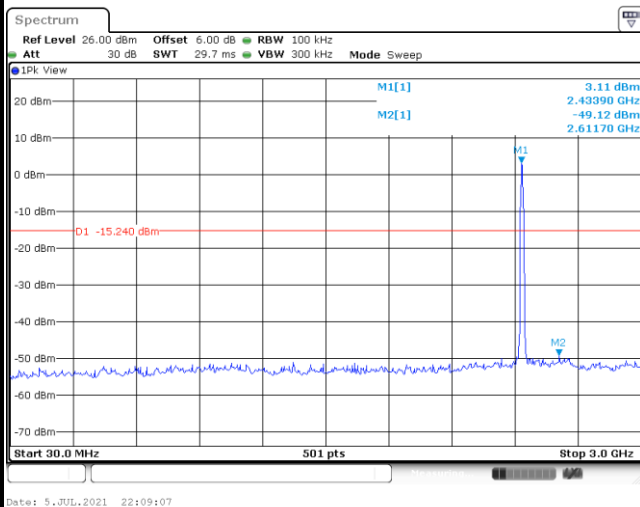


Test Mode :	802.11b	Test Channel :	06
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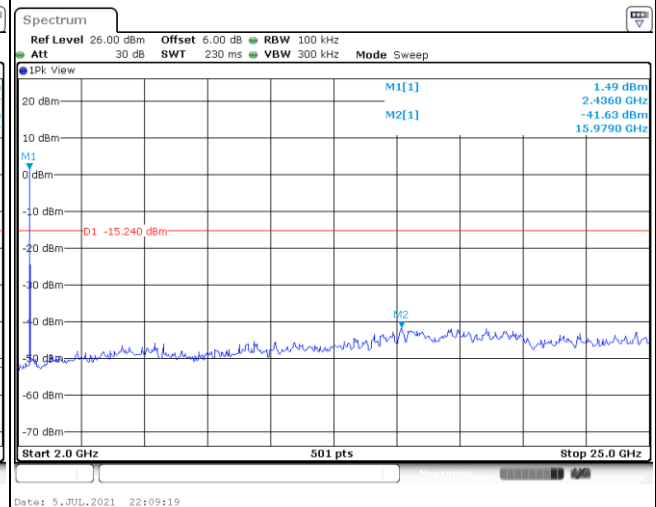
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

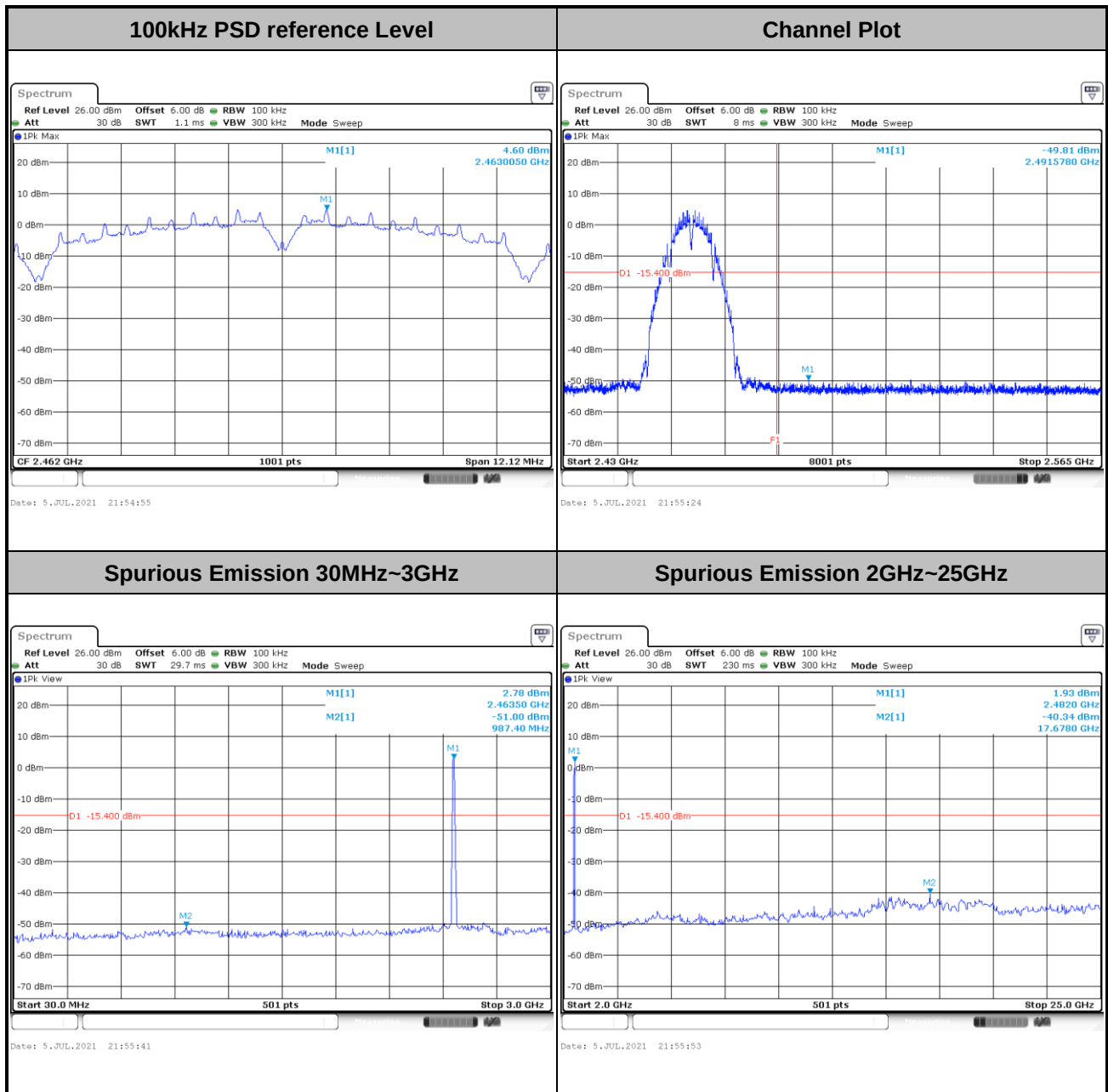


Spurious Emission 2GHz~25GHz





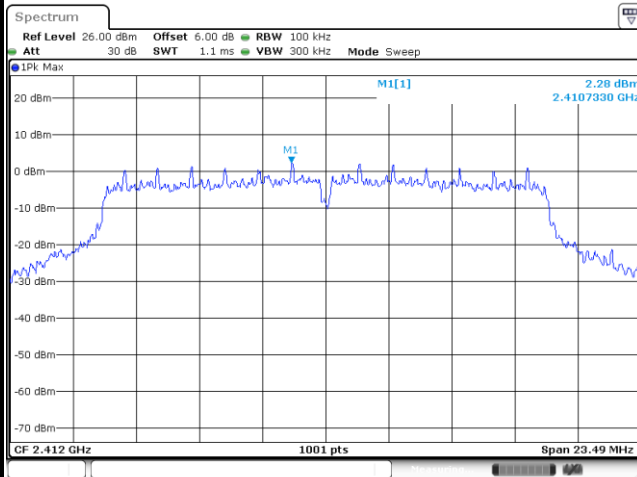
Test Mode :	802.11b	Test Channel :	11
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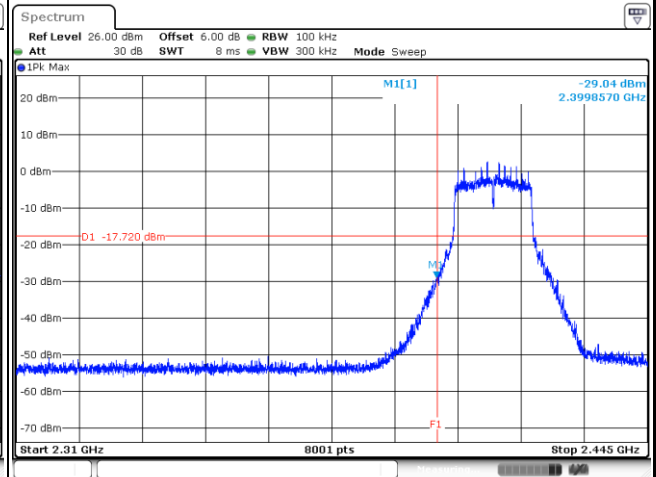


Test Mode :	802.11g	Test Channel :	01
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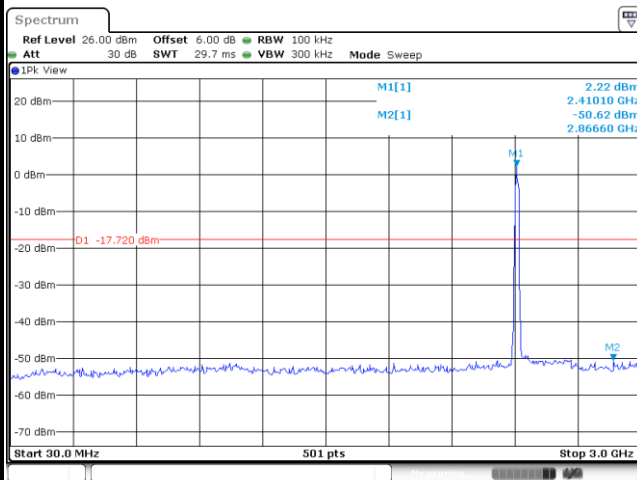
100kHz PSD reference Level



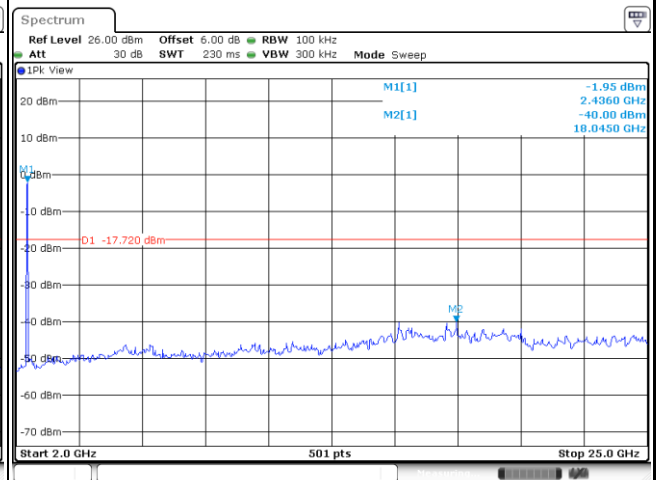
Channel Plot



Spurious Emission 30MHz~3GHz



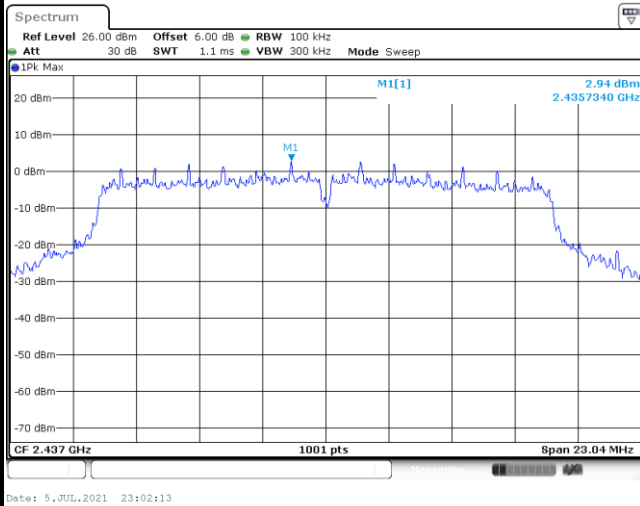
Spurious Emission 2GHz~25GHz



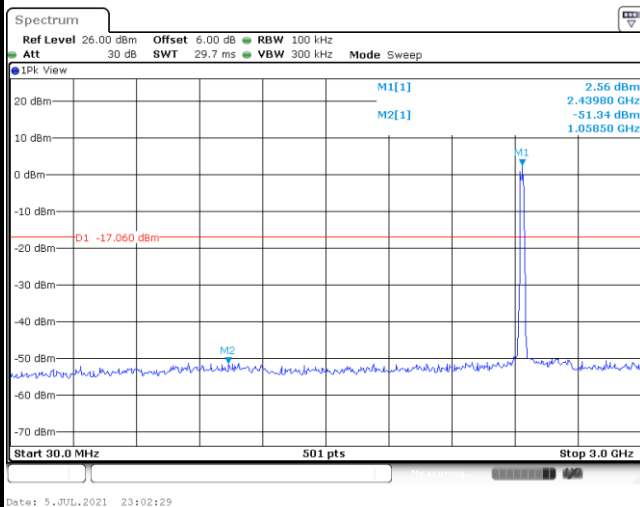


Test Mode :	802.11g	Test Channel :	06
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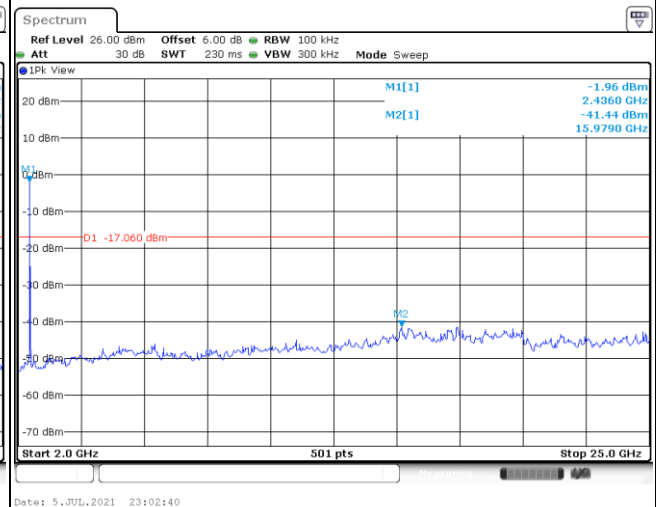
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



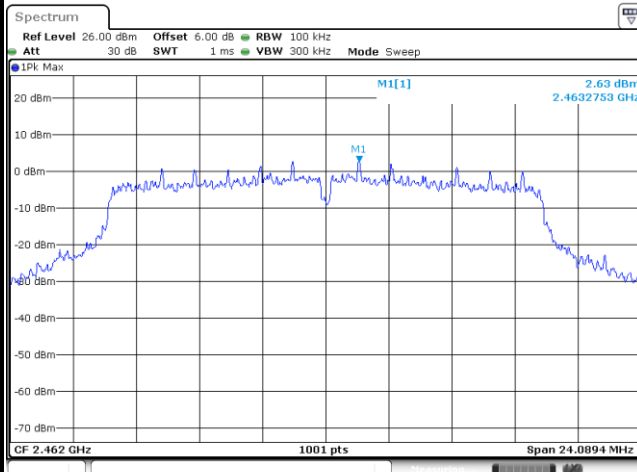
Spurious Emission 2GHz~25GHz



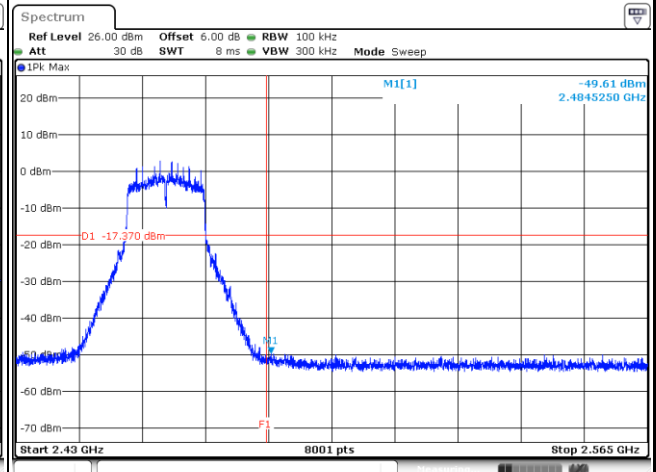


Test Mode :	802.11g	Test Channel :	11
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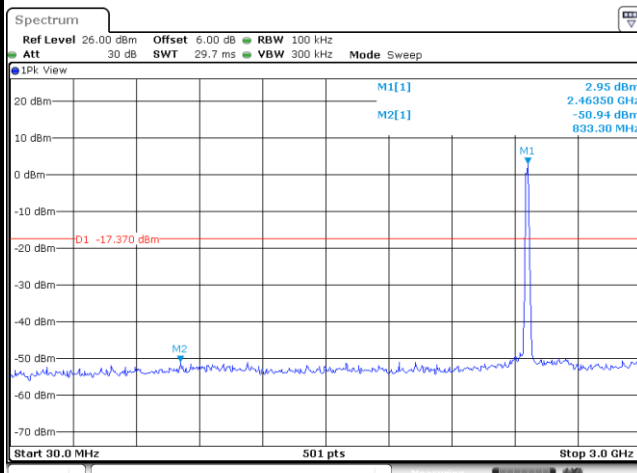
100kHz PSD reference Level



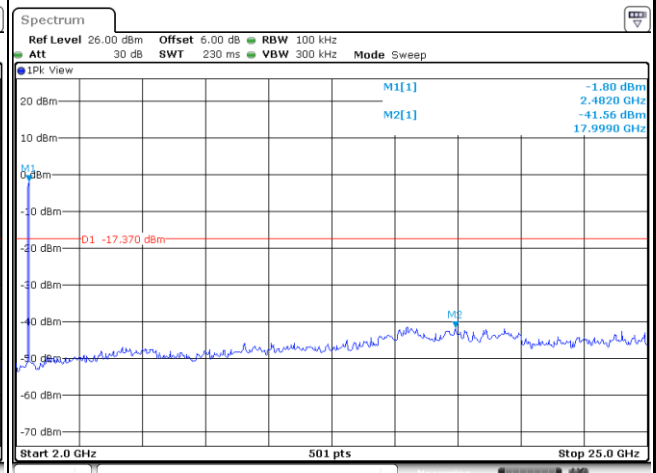
Channel Plot



Spurious Emission 30MHz~3GHz

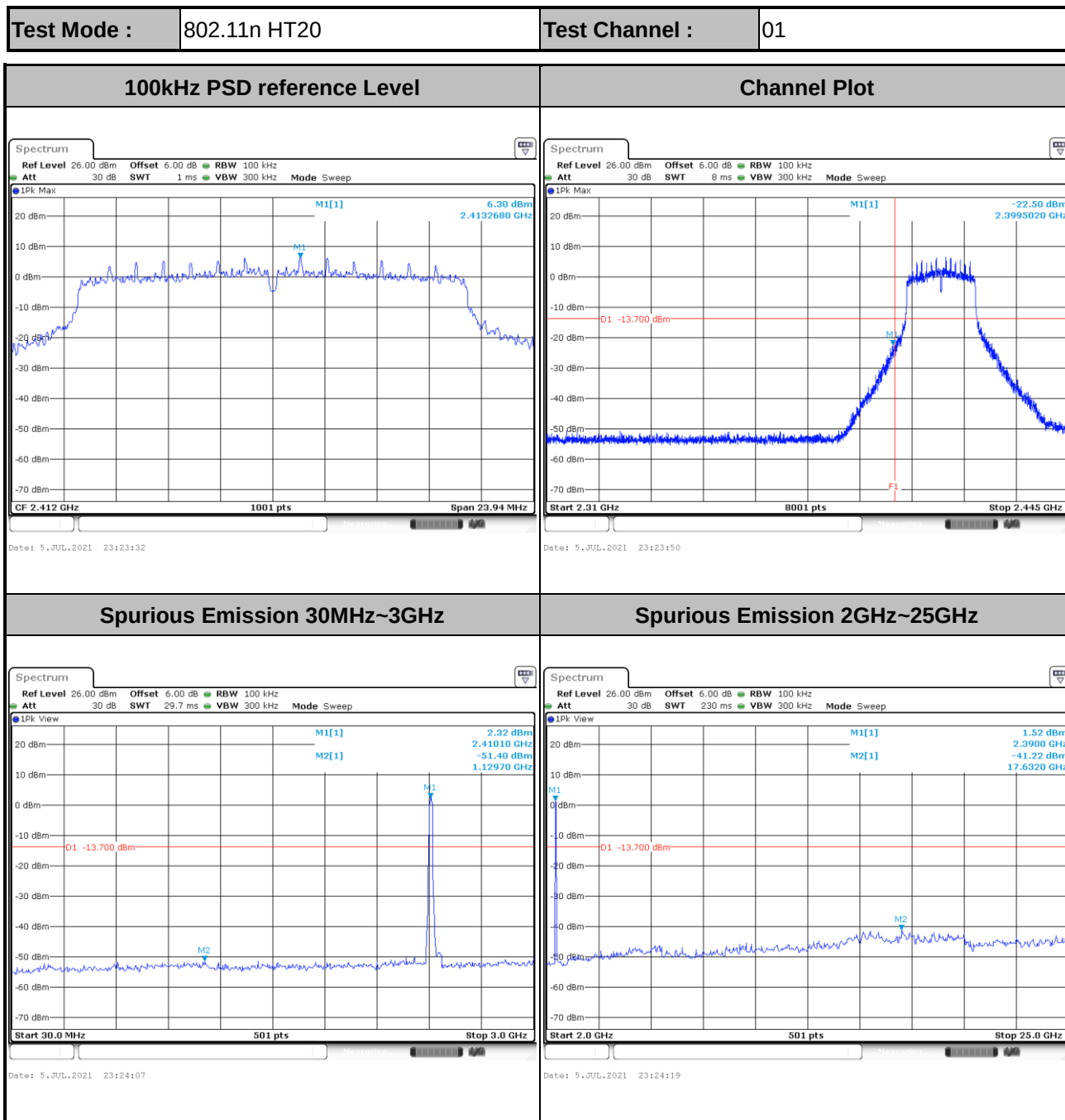


Spurious Emission 2GHz~25GHz





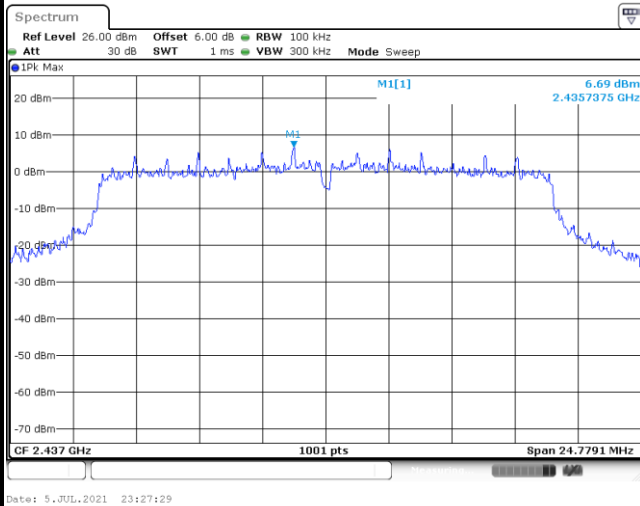
Number of TX = 2, Ant. 1 (Measured)



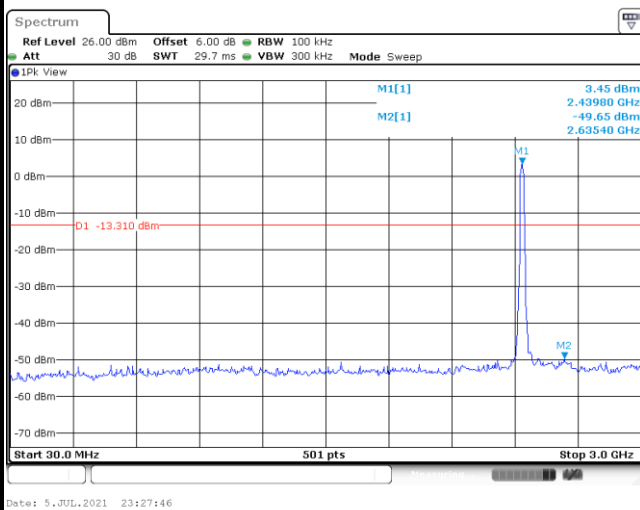


Test Mode :	802.11n HT20	Test Channel :	06
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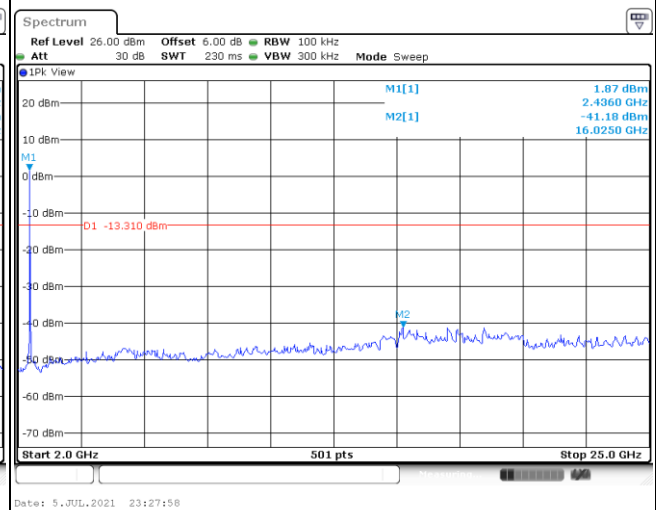
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

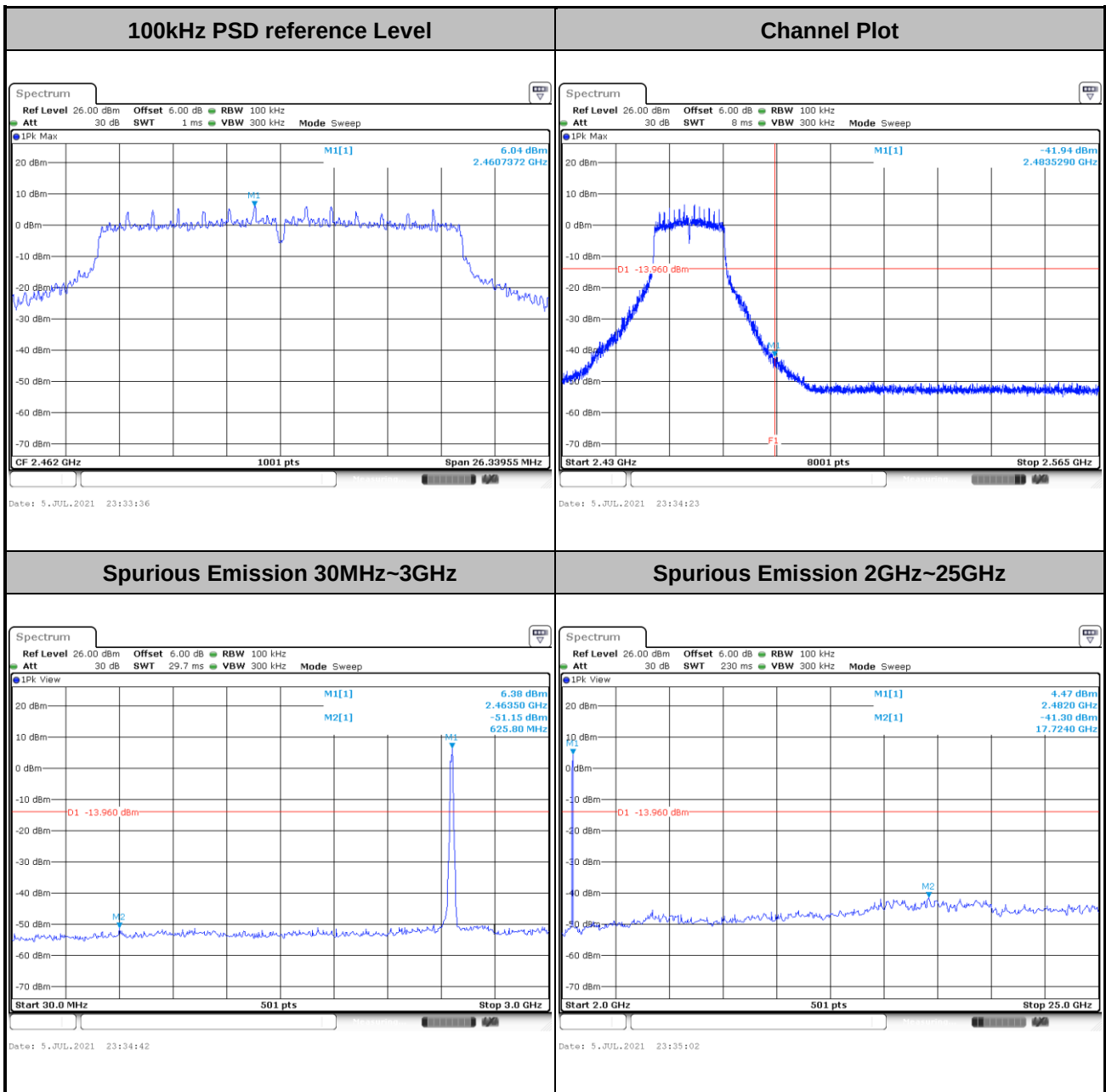


Spurious Emission 2GHz~25GHz



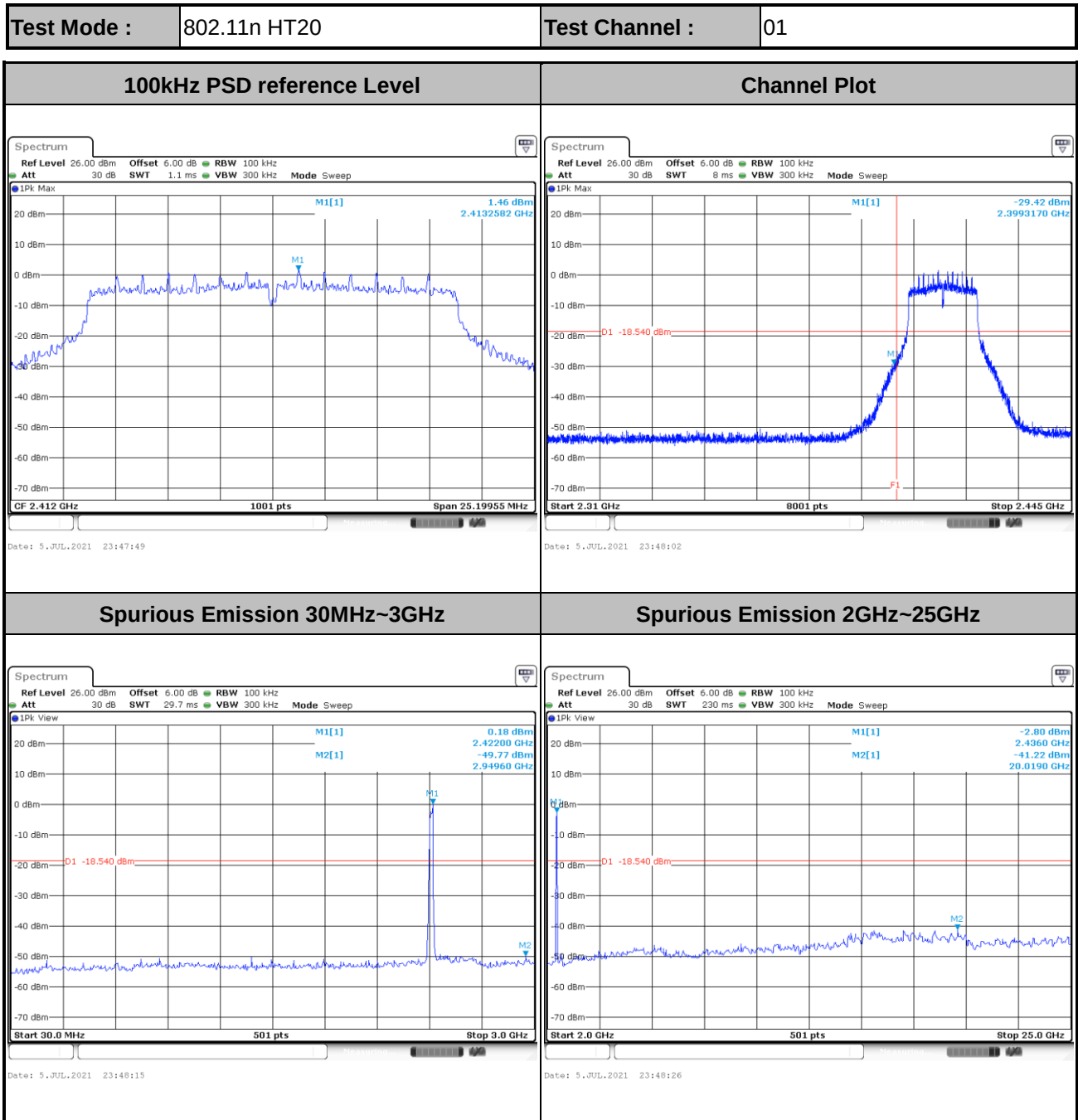


Test Mode :	802.11n HT20	Test Channel :	11
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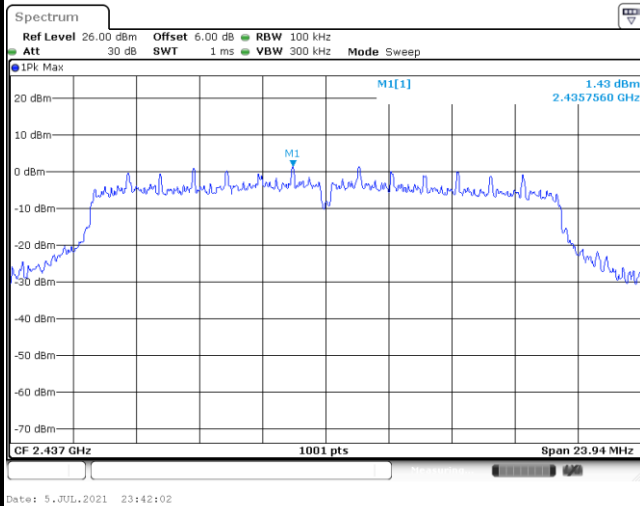
Number of TX = 2, Ant. 2 (Measured)



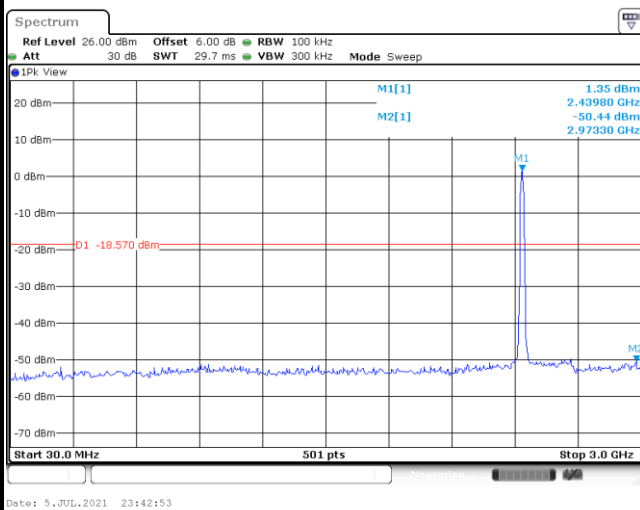


Test Mode :	802.11n HT20	Test Channel :	06
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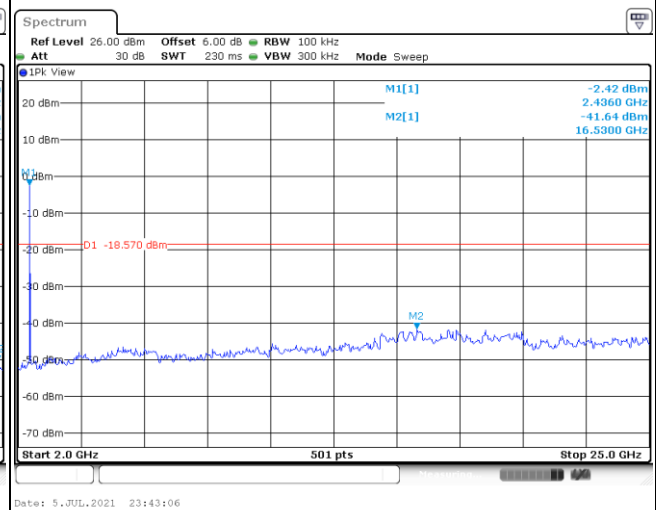
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

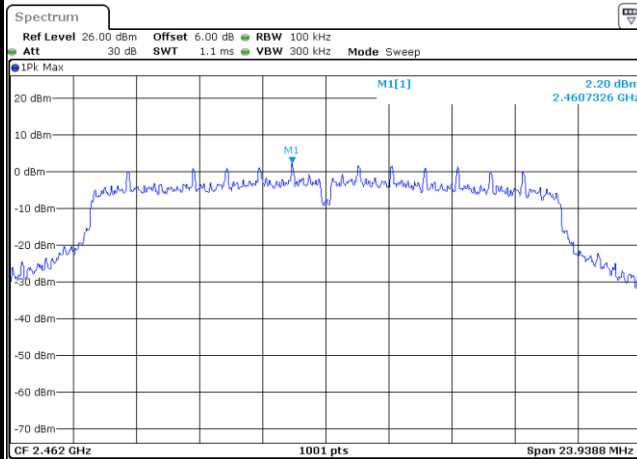




Test Mode : 802.11n HT20

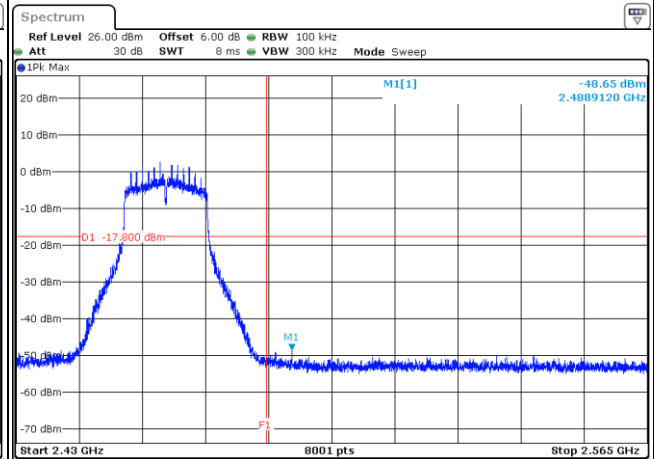
Test Channel : 11

100kHz PSD reference Level



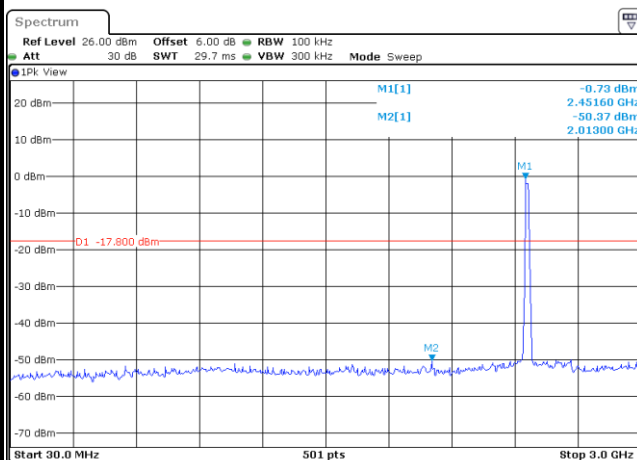
Date: 5.JUL.2021 23:38:13

Channel Plot



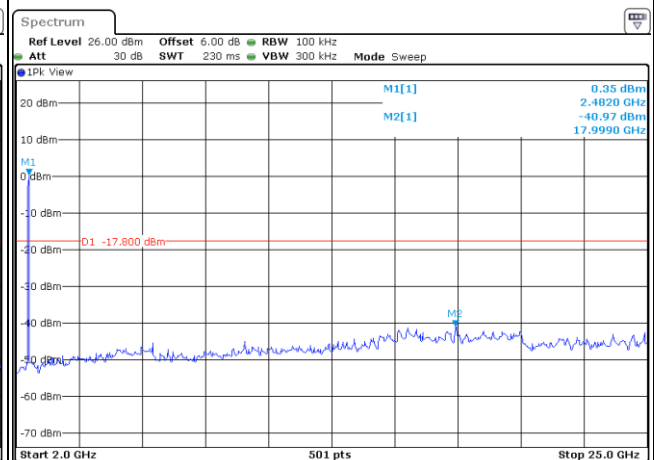
Date: 5.JUL.2021 23:38:26

Spurious Emission 30MHz~3GHz



Date: 5.JUL.2021 23:38:39

Spurious Emission 2GHz~25GHz



Date: 5.JUL.2021 23:38:52

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

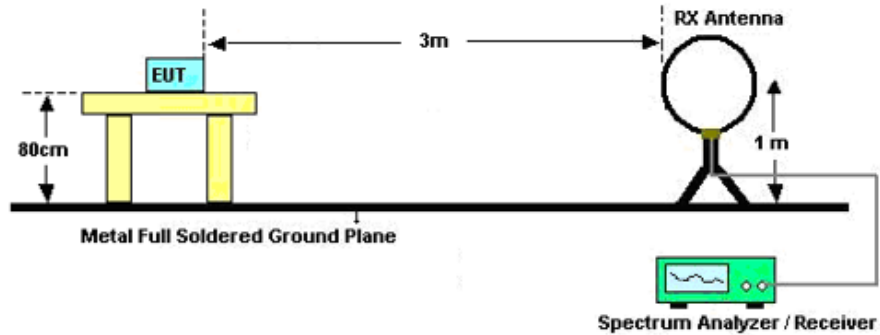
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

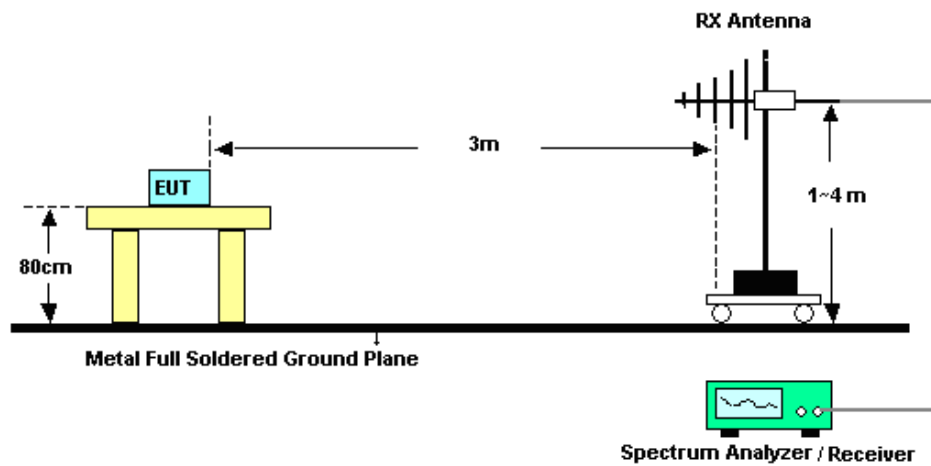
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

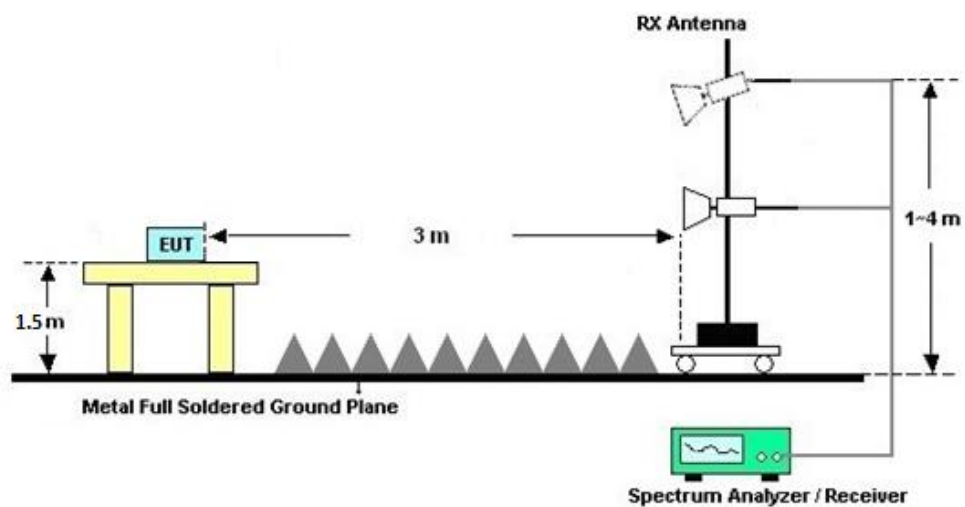
For radiated emissions below 30MHz



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 (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.

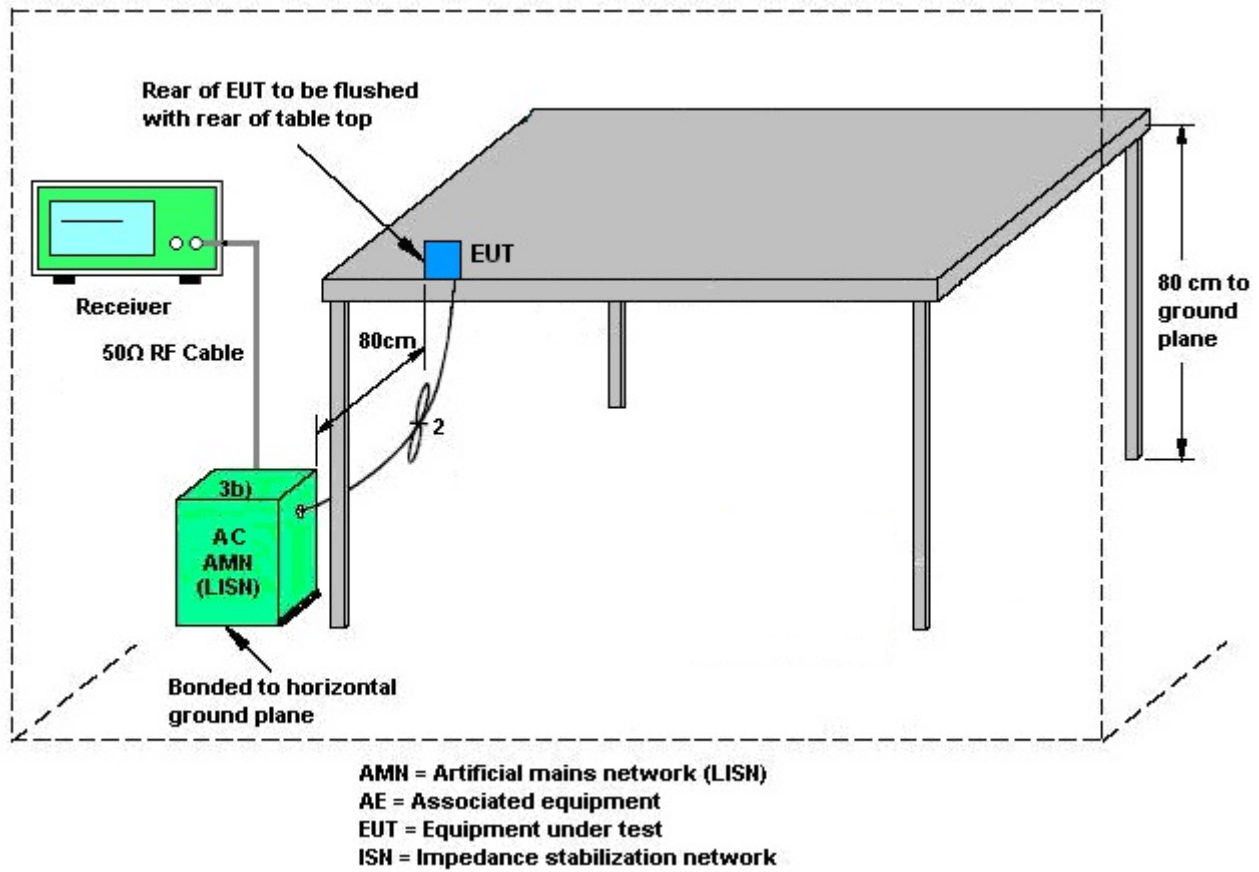
3.6.2 Measuring Instruments

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

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

<CDD Modes>						
			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant. 1 (dBi)	Ant. 2 (dBi)				
2.4 GHz 11n	-1.51	1.26	1.26	3.00	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)



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	Nov. 01, 2020	Jul. 05, 2021	Oct. 31, 2021	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 07, 2021	Jul. 05, 2021	Jan. 06, 2022	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 07, 2021	Jul. 05, 2021	Jan. 06, 2022	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz; Max 30dBm	Jul. 13, 2020	Jul. 01, 2021~Jul. 07, 2021	Jul. 12, 2021	Radiation (03CH04-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44G, MAX 30dB	Apr. 13, 2021	Jul. 01, 2021~Jul. 07, 2021	Apr. 12, 2022	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 01, 2020	Jul. 01, 2021~Jul. 07, 2021	Oct. 31, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz~1GHz	May 30, 2021	Jul. 01, 2021~Jul. 07, 2021	May 29, 2022	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 18, 2021	Jul. 01, 2021~Jul. 07, 2021	Apr. 17, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2020	Jul. 01, 2021~Jul. 07, 2021	Nov. 09, 2021	Radiation (03CH04-KS)
Amplifier	Burgeon	BPA-530	102219	0.01MHz~3000MHz	Nov 02, 2020	Jul. 01, 2021~Jul. 07, 2021	Nov. 01, 2021	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 07, 2021	Jul. 01, 2021~Jul. 07, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Jul. 01, 2021~Jul. 07, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Jul. 01, 2021~Jul. 07, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 01, 2021~Jul. 07, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 01, 2021~Jul. 07, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 01, 2021~Jul. 07, 2021	NCR	Radiation (03CH04-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 21, 2021	Jun. 18, 2021	Apr. 20, 2022	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 17, 2020	Jun. 18, 2021	Oct. 16, 2021	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 13, 2021	Jun. 18, 2021	Apr. 12, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 17, 2020	Jun. 18, 2021	Oct. 16, 2021	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 Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.94dB
---	--------

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% ($U = 2Uc(y)$)	5.1dB
---	-------

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

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

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



Appendix A. Conducted Test Results

Test Engineer:	Gene Wang	Temperature:	21~25	°C
Test Date:	2021/7/5	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.99	13.99	8.08	8.08	0.50	Pass
11b	1Mbps	1	6	2437	14.04	13.84	8.08	8.08	0.50	Pass
11b	1Mbps	1	11	2462	14.04	13.79	8.08	8.08	0.50	Pass
11g	6Mbps	1	1	2412	17.53	17.58	15.36	15.66	0.50	Pass
11g	6Mbps	1	6	2437	17.53	17.53	15.56	15.36	0.50	Pass
11g	6Mbps	1	11	2462	17.63	17.38	15.68	16.06	0.50	Pass
HT20	MCS0	2	1	2412	18.73	18.73	15.96	16.80	0.50	Pass
HT20	MCS0	2	6	2437	18.78	18.63	16.52	15.96	0.50	Pass
HT20	MCS0	2	11	2462	18.88	18.53	17.56	15.96	0.50	Pass

TEST RESULTS DATA
Peak Output Power

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
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	20.82	14.44		30.00	30.00	-1.51	1.26	19.31	15.70	36.00	36.00	Pass
11b	1Mbps	1	6	2437	20.99	14.30		30.00	30.00	-1.51	1.26	19.48	15.56	36.00	36.00	Pass
11b	1Mbps	1	11	2462	20.65	14.47		30.00	30.00	-1.51	1.26	19.14	15.73	36.00	36.00	Pass
11g	6Mbps	1	1	2412	21.68	16.47		30.00	30.00	-1.51	1.26	20.17	17.73	36.00	36.00	Pass
11g	6Mbps	1	6	2437	22.11	16.03		30.00	30.00	-1.51	1.26	20.60	17.29	36.00	36.00	Pass
11g	6Mbps	1	11	2462	21.84	16.61		30.00	30.00	-1.51	1.26	20.33	17.87	36.00	36.00	Pass
HT20	MCS0	2	1	2412	20.75	16.26	22.07	30.00		1.26		23.33		36.00		Pass
HT20	MCS0	2	6	2437	20.72	15.36	21.83	30.00		1.26		23.09		36.00		Pass
HT20	MCS0	2	11	2462	20.71	16.97	22.24	30.00		1.26		23.50		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.00	0.00	18.03	12.08	
11b	1Mbps	1	6	2437	0.00	0.00	18.36	12.15	
11b	1Mbps	1	11	2462	0.00	0.00	18.19	12.25	
11g	6Mbps	1	1	2412	0.08	0.08	17.26	11.69	
11g	6Mbps	1	6	2437	0.08	0.08	17.66	11.55	
11g	6Mbps	1	11	2462	0.08	0.08	17.28	11.89	
HT20	MCS0	2	1	2412	0.08	0.08	15.82	11.21	17.11
HT20	MCS0	2	6	2437	0.08	0.08	16.02	10.56	17.11
HT20	MCS0	2	11	2462	0.08	0.08	15.94	11.61	17.30

Note: Measured power (dBm) has offset with cable loss.

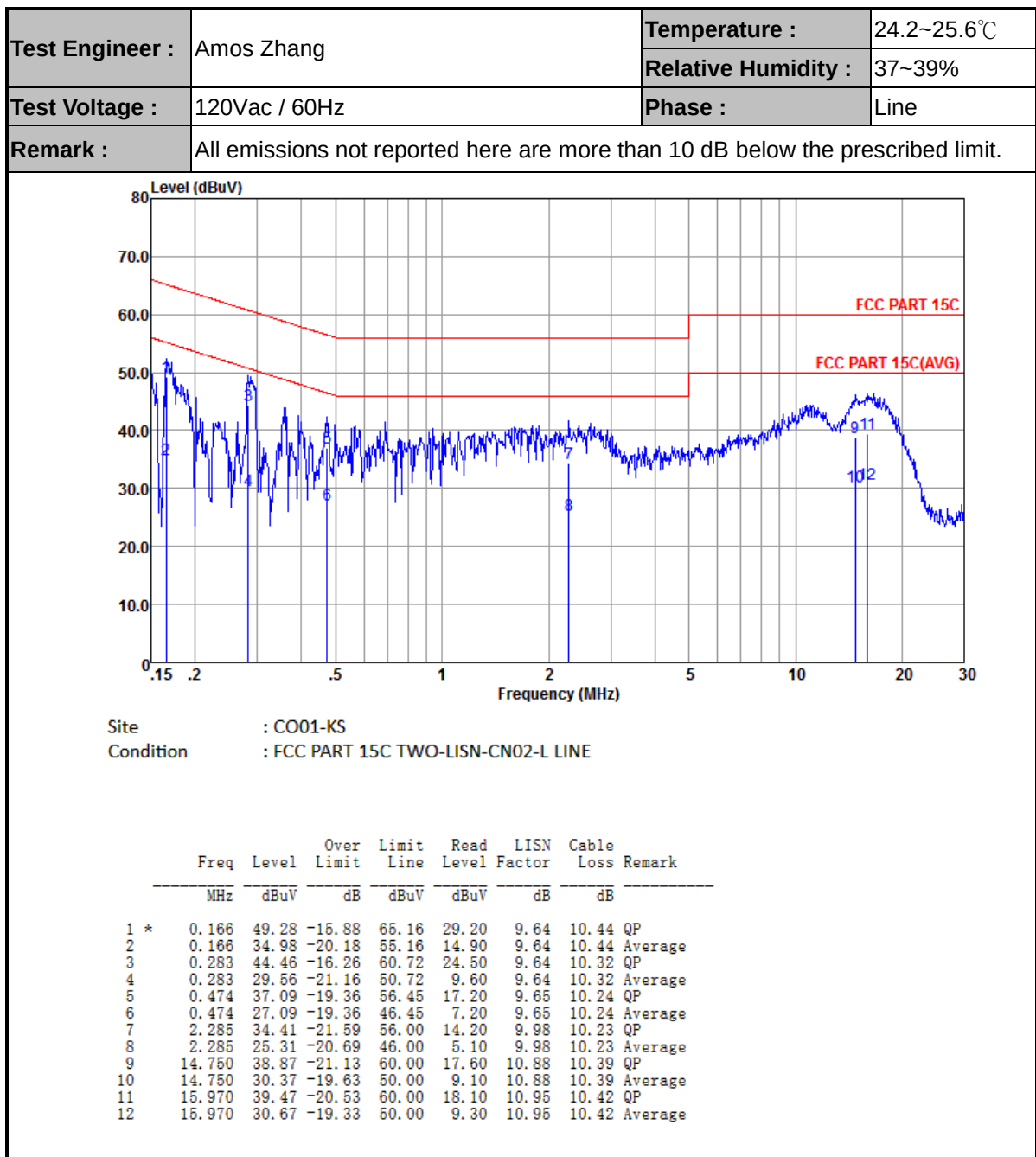
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-8.03	-14.13		-1.51	1.26	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-8.05	-14.30		-1.51	1.26	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-8.32	-14.19		-1.51	1.26	8.00	8.00	Pass
11g	6Mbps	1	1	2412	-8.57	-13.73		-1.51	1.26	8.00	8.00	Pass
11g	6Mbps	1	6	2437	-8.38	-13.48		-1.51	1.26	8.00	8.00	Pass
11g	6Mbps	1	11	2462	-8.77	-13.99		-1.51	1.26	8.00	8.00	Pass
HT20	MCS0	2	1	2412	-10.40	-14.55	-7.39	3.00		8.00		Pass
HT20	MCS0	2	6	2437	-10.02	-14.78	-7.01	3.00		8.00		Pass
HT20	MCS0	2	11	2462	-9.98	-14.11	-6.97	3.00		8.00		Pass

Measured power density (dBm) has offset with cable loss.

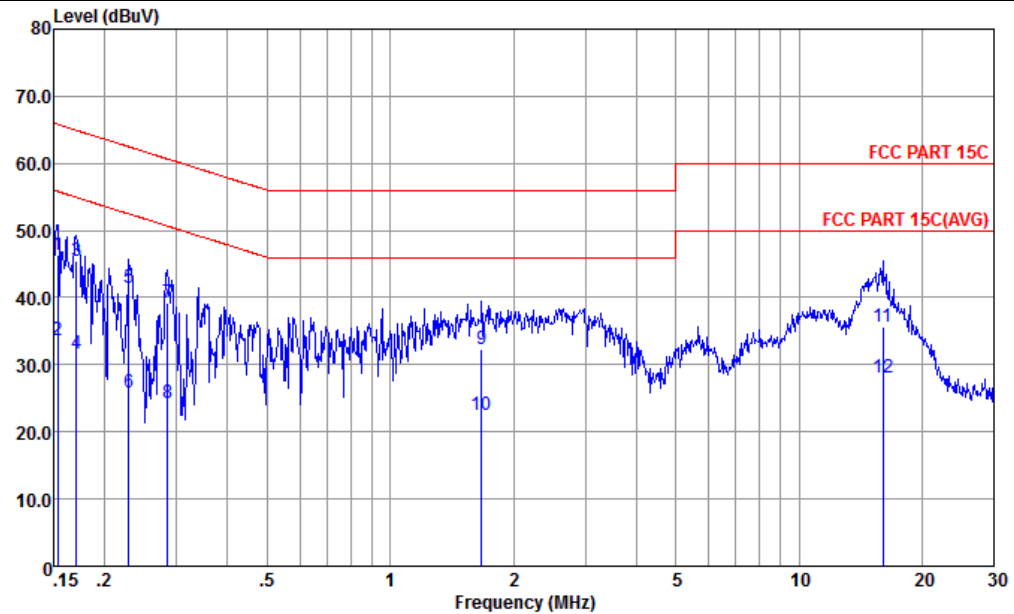


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Amos Zhang	Temperature :	24.2~25.6℃
		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 TWO-LISN-CN02-N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1 *	0.153	46.37	-19.45	65.82	26.10	9.80	10.47	QP
2	0.153	33.57	-22.25	55.82	13.30	9.80	10.47	Average
3	0.170	45.37	-19.57	64.94	25.10	9.84	10.43	QP
4	0.170	31.57	-23.37	54.94	11.30	9.84	10.43	Average
5	0.229	41.40	-21.08	62.48	21.19	9.86	10.35	QP
6	0.229	25.80	-26.68	52.48	5.59	9.86	10.35	Average
7	0.285	39.32	-21.36	60.68	19.21	9.80	10.31	QP
8	0.285	24.22	-26.46	50.68	4.11	9.80	10.31	Average
9	1.671	32.30	-23.70	56.00	12.20	9.87	10.23	QP
10	1.671	22.40	-23.60	46.00	2.30	9.87	10.23	Average
11	16.055	35.66	-24.34	60.00	14.10	11.14	10.42	QP
12	16.055	28.16	-21.84	50.00	6.60	11.14	10.42	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

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		2352.51	54.72	-19.28	74	50.84	33.05	5.59	34.76	170	315	P	H
		2389.95	43.52	-10.48	54	39.2	33.4	5.63	34.71	170	315	A	H
	*	2412	105.47	-	-	101.24	33.26	5.65	34.68	170	315	P	H
	*	2410	102.16	-	-	97.96	33.26	5.65	34.71	170	315	A	H
		2362.13	54.64	-19.36	74	50.73	33.05	5.59	34.73	397	353	P	V
		2389.95	43.09	-10.91	54	38.77	33.4	5.63	34.71	397	353	A	V
	*	2412	100.07	-	-	95.84	33.26	5.65	34.68	397	353	P	V
	*	2412	96.82	-	-	92.59	33.26	5.65	34.68	397	353	A	V
802.11b CH 11 2462MHz		2483.5	54.92	-19.08	74	51.14	32.69	5.72	34.63	141	134	P	H
		2487.7	43.5	-10.5	54	39.85	32.54	5.74	34.63	141	134	A	H
	*	2464	105.55	-	-	101.65	32.83	5.7	34.63	141	134	P	H
	*	2464	102.32	-	-	98.42	32.83	5.7	34.63	141	134	A	H
		2494.48	54.46	-19.54	74	50.78	32.54	5.74	34.6	346	174	P	V
		2487.82	42.65	-11.35	54	39	32.54	5.74	34.63	346	174	A	V
	*	2464	101.87	-	-	97.97	32.83	5.7	34.63	346	174	P	V
	*	2464	98.71	-	-	94.81	32.83	5.7	34.63	346	174	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		4824	53.2	-20.8	74	73.41	34.69	8.43	63.33	100	355	P	H
CH 01		4824	50.56	-3.44	54	70.77	34.69	8.43	63.33	100	355	A	H
2412MHz		4824	46.68	-27.32	74	66.89	34.69	8.43	63.33	300	360	P	V
802.11b		4872	53.09	-20.91	74	73.3	34.72	8.43	63.36	105	331	P	H
CH 06		4872	50.5	-3.5	54	70.71	34.72	8.43	63.36	105	331	A	H
2437MHz		7308	40.75	-33.25	74	57.98	36.55	10.07	63.85	300	0	P	H
		4872	47.85	-26.15	74	68.06	34.72	8.43	63.36	300	360	P	V
		7308	40.71	-33.29	74	57.94	36.55	10.07	63.85	300	360	P	V
802.11b		4926	52.85	-21.15	74	73.05	34.75	8.44	63.39	101	348	P	H
CH 11		4926	50.79	-3.21	54	70.99	34.75	8.44	63.39	101	348	A	H
2462MHz		7386	41.84	-32.16	74	59.08	36.48	10.15	63.87	300	0	P	H
		4926	48.86	-25.14	74	69.06	34.75	8.44	63.39	300	360	P	V
		7386	41.29	-32.71	74	58.53	36.48	10.15	63.87	300	360	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	61.36	-12.64	74	57.04	33.4	5.63	34.71	109	322	P	H
		2389.95	49.64	-4.36	54	45.32	33.4	5.63	34.71	109	322	A	H
	*	2412	106.25	-	-	102.02	33.26	5.65	34.68	109	322	P	H
	*	2412	98.2	-	-	93.97	33.26	5.65	34.68	109	322	A	H
		2389.82	59.62	-14.38	74	55.3	33.4	5.63	34.71	394	1	P	V
		2389.95	47.69	-6.31	54	43.37	33.4	5.63	34.71	394	1	A	V
	*	2414	101.8	-	-	97.57	33.26	5.65	34.68	394	1	P	V
	*	2414	93.67	-	-	89.44	33.26	5.65	34.68	394	1	A	V
802.11g CH 11 2462MHz		2483.56	60.83	-13.17	74	57.05	32.69	5.72	34.63	124	324	P	H
		2483.62	49.81	-4.19	54	46.03	32.69	5.72	34.63	124	324	A	H
	*	2466	107.02	-	-	103.12	32.83	5.7	34.63	124	324	P	H
	*	2464	98.79	-	-	94.89	32.83	5.7	34.63	124	324	A	H
		2484.1	57.37	-16.63	74	53.59	32.69	5.72	34.63	387	26	P	V
		2483.5	46.43	-7.57	54	42.65	32.69	5.72	34.63	387	26	A	V
	*	2464	104.34	-	-	100.44	32.83	5.7	34.63	387	26	P	V
	*	2462	96.22	-	-	92.34	32.83	5.7	34.65	387	26	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		4824	47.88	-26.12	74	68.09	34.69	8.43	63.33	300	0	P	H
		4824	42.2	-31.8	74	62.41	34.69	8.43	63.33	300	360	P	V
802.11g CH 06 2437MHz		4872	45.81	-28.19	74	66.02	34.72	8.43	63.36	300	0	P	H
		7308	41.39	-32.61	74	58.62	36.55	10.07	63.85	300	0	P	H
		4872	41.99	-32.01	74	62.2	34.72	8.43	63.36	300	360	P	V
		7308	40.99	-33.01	74	58.22	36.55	10.07	63.85	300	360	P	V
802.11g CH 11 2462MHz		4926	47.43	-26.57	74	67.63	34.75	8.44	63.39	300	0	P	H
		7386	41.22	-32.78	74	58.46	36.48	10.15	63.87	300	0	P	H
		4926	43.03	-30.97	74	63.23	34.75	8.44	63.39	300	360	P	V
		7386	41.71	-32.29	74	58.95	36.48	10.15	63.87	300	360	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 802.11b (Band Edge @ 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.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2388.13	55.93	-18.07	74	51.61	33.4	5.63	34.71	181	311	P	H
		2386.7	45.37	-8.63	54	41.05	33.4	5.63	34.71	181	311	A	H
	*	2412	107.95	-	-	103.72	33.26	5.65	34.68	181	311	P	H
	*	2410	104.33	-	-	100.13	33.26	5.65	34.71	181	311	A	H
		2385.4	55.2	-18.8	74	51.07	33.23	5.61	34.71	373	278	P	V
		2386.7	45.3	-8.7	54	40.98	33.4	5.63	34.71	373	278	A	V
	*	2412	108.67	-	-	104.44	33.26	5.65	34.68	373	278	P	V
	*	2410	105.29	-	-	101.09	33.26	5.65	34.71	373	278	A	V
802.11b CH 11 2462MHz		2487.52	55	-19	74	51.35	32.54	5.74	34.63	207	235	P	H
		2486.74	44.53	-9.47	54	40.75	32.69	5.72	34.63	207	235	A	H
	*	2462	106.93	-	-	103.05	32.83	5.7	34.65	207	235	P	H
	*	2460	103.41	-	-	99.53	32.83	5.7	34.65	207	235	A	H
		2484.46	56.02	-17.98	74	52.24	32.69	5.72	34.63	312	289	P	V
		2487.22	44.72	-9.28	54	40.94	32.69	5.72	34.63	312	289	A	V
	*	2462	106.34	-	-	102.46	32.83	5.7	34.65	312	289	P	V
	*	2460	102.85	-	-	98.97	32.83	5.7	34.65	312	289	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. 2	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		4824	41.64	-32.36	74	61.85	34.69	8.43	63.33	300	0	P	H
		4824	41.48	-32.52	74	61.69	34.69	8.43	63.33	300	360	P	V
802.11b CH 06 2437MHz		4872	41.63	-32.37	74	61.84	34.72	8.43	63.36	300	0	P	H
		7308	41.22	-32.78	74	58.45	36.55	10.07	63.85	300	0	P	H
		4872	41.59	-32.41	74	61.8	34.72	8.43	63.36	300	360	P	V
		7308	41.1	-32.9	74	58.33	36.55	10.07	63.85	300	360	P	V
802.11b CH 11 2462MHz		4926	41.97	-32.03	74	62.17	34.75	8.44	63.39	300	0	P	H
		7386	41.36	-32.64	74	58.6	36.48	10.15	63.87	300	0	P	H
		4926	43.02	-30.98	74	63.22	34.75	8.44	63.39	300	360	P	V
		7386	40.48	-33.52	74	57.72	36.48	10.15	63.87	300	360	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. 2	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	61.57	-12.43	74	57.25	33.4	5.63	34.71	105	305	P	H
		2389.95	50.21	-3.79	54	45.89	33.4	5.63	34.71	105	305	A	H
	*	2410	106.63	-	-	102.43	33.26	5.65	34.71	105	305	P	H
	*	2410	98.93	-	-	94.73	33.26	5.65	34.71	105	305	A	H
		2389.82	60.47	-13.53	74	56.15	33.4	5.63	34.71	296	286	P	V
		2389.95	49.57	-4.43	54	45.25	33.4	5.63	34.71	296	286	A	V
	*	2408	107.62	-	-	103.42	33.26	5.65	34.71	296	286	P	V
	*	2410	99.52	-	-	95.32	33.26	5.65	34.71	296	286	A	V
802.11g CH 11 2462MHz		2486.26	60.06	-13.94	74	56.28	32.69	5.72	34.63	100	306	P	H
		2484.4	46.17	-7.83	54	42.39	32.69	5.72	34.63	100	306	A	H
	*	2464	108.11	-	-	104.21	32.83	5.7	34.63	100	306	P	H
	*	2462	99.96	-	-	96.08	32.83	5.7	34.65	100	306	A	H
		2485.78	61.71	-12.29	74	57.93	32.69	5.72	34.63	310	287	P	V
		2483.68	47.18	-6.82	54	43.4	32.69	5.72	34.63	310	287	A	V
	*	2462	107.67	-	-	103.79	32.83	5.7	34.65	310	287	P	V
	*	2462	99.64	-	-	95.76	32.83	5.7	34.65	310	287	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. 2	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		4824	39.53	-34.47	74	59.74	34.69	8.43	63.33	300	0	P	H
		4824	40.35	-33.65	74	60.56	34.69	8.43	63.33	300	360	P	V
802.11g CH 06 2437MHz		4872	41.01	-32.99	74	61.22	34.72	8.43	63.36	300	0	P	H
		7308	40.34	-33.66	74	57.57	36.55	10.07	63.85	300	0	P	H
		4872	39.7	-34.3	74	59.91	34.72	8.43	63.36	300	360	P	V
		7308	40.44	-33.56	74	57.67	36.55	10.07	63.85	300	360	P	V
802.11g CH 11 2462MHz		4926	40.78	-33.22	74	60.98	34.75	8.44	63.39	300	0	P	H
		7386	41.27	-32.73	74	58.51	36.48	10.15	63.87	300	0	P	H
		4926	40.7	-33.3	74	60.9	34.75	8.44	63.39	300	360	P	V
		7386	40.34	-33.66	74	57.58	36.48	10.15	63.87	300	360	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+2	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		2389.95	60.49	-13.51	74	56.17	33.4	5.63	34.71	138	304	P	H
		2389.95	49.77	-4.23	54	45.45	33.4	5.63	34.71	138	304	A	H
	*	2410	109.29	-	-	105.09	33.26	5.65	34.71	138	304	P	H
	*	2410	100.75	-	-	96.55	33.26	5.65	34.71	138	304	A	H
		2388.52	60.16	-13.84	74	55.84	33.4	5.63	34.71	202	270	P	V
		2389.69	47.84	-6.16	54	43.52	33.4	5.63	34.71	202	270	A	V
	*	2414	108.51	-	-	104.28	33.26	5.65	34.68	202	270	P	V
	*	2414	99.54	-	-	95.31	33.26	5.65	34.68	202	270	A	V
802.11n HT20 CH 11 2462MHz		2484.58	60.75	-13.25	74	56.97	32.69	5.72	34.63	102	235	P	H
		2483.5	46.44	-7.56	54	42.66	32.69	5.72	34.63	102	235	A	H
	*	2462	107.89	-	-	104.01	32.83	5.7	34.65	102	235	P	H
	*	2462	99.8	-	-	95.92	32.83	5.7	34.65	102	235	A	H
		2484.94	58.27	-15.73	74	54.49	32.69	5.72	34.63	165	289	P	V
		2483.5	45.96	-8.04	54	42.18	32.69	5.72	34.63	165	289	A	V
	*	2466	106.94	-	-	103.04	32.83	5.7	34.63	165	289	P	V
	*	2466	98.94	-	-	95.04	32.83	5.7	34.63	165	289	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. 1+2	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		4824	43.15	-30.85	74	63.36	34.69	8.43	63.33	300	0	P	H
		4824	43.1	-30.9	74	63.31	34.69	8.43	63.33	300	360	P	V
802.11n HT20 CH 06 2437MHz		4872	42.54	-31.46	74	62.75	34.72	8.43	63.36	300	0	P	H
		7308	40.36	-33.64	74	57.59	36.55	10.07	63.85	300	0	P	H
		4872	46.49	-27.51	74	66.7	34.72	8.43	63.36	300	360	P	V
		7308	41.56	-32.44	74	58.79	36.55	10.07	63.85	300	360	P	V
802.11n HT20 CH 11 2462MHz		4926	42.37	-31.63	74	62.57	34.75	8.44	63.39	300	0	P	H
		7386	41.27	-32.73	74	58.51	36.48	10.15	63.87	300	0	P	H
		4926	42.95	-31.05	74	63.15	34.75	8.44	63.39	300	360	P	V
		7386	41.41	-32.59	74	58.65	36.48	10.15	63.87	300	360	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	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 802.11b LF		33.88	25.88	-14.12	40	35.38	22.76	0.76	33.02	-	-	P	H
		46.49	27.72	-12.28	40	44.07	15.77	0.98	33.1	100	0	P	H
		155.13	18.2	-25.3	43.5	32.98	16.4	1.81	32.99	-	-	P	H
		169.68	18.9	-24.6	43.5	33.86	16.11	1.89	32.96	-	-	P	H
		314.21	16.23	-29.77	46	26.71	19.65	2.6	32.73	-	-	P	H
		943.74	24.16	-21.84	46	24.73	27.05	4.49	32.11	-	-	P	H
		33.88	25.47	-14.53	40	34.97	22.76	0.76	33.02	-	-	P	V
		46.49	27.88	-12.12	40	44.23	15.77	0.98	33.1	100	360	P	V
		170.65	19	-24.5	43.5	33.97	16.09	1.9	32.96	-	-	P	V
		250.19	14.08	-31.92	46	26.06	18.5	2.32	32.8	-	-	P	V
		321.97	16.48	-29.52	46	26.76	19.83	2.63	32.74	-	-	P	V
		940.83	23.27	-22.73	46	23.87	27.03	4.49	32.12	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Co-location:

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		2389.95	61.75	-12.25	74	57.43	33.4	5.63	34.71	162	296	P	H
		2389.95	49.96	-4.04	54	45.64	33.4	5.63	34.71	162	296	A	H
	*	2410	108.61	-	-	104.41	33.26	5.65	34.71	162	296	P	H
	*	2410	100.59	-	-	96.39	33.26	5.65	34.71	162	296	A	H
		2389.95	59.27	-14.73	74	54.95	33.4	5.63	34.71	294	245	P	V
		2389.95	47.95	-6.05	54	43.63	33.4	5.63	34.71	294	245	A	V
	*	2410	104.83	-	-	100.63	33.26	5.65	34.71	294	245	P	V
	*	2410	96.91	-	-	92.71	33.26	5.65	34.71	294	245	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE CH39 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	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)
BLE CH39 2480MHz		2483.68	56.13	-17.87	74	52.35	32.69	5.72	34.63	154	141	P	H
		2483.5	48.64	-5.36	54	44.86	32.69	5.72	34.63	154	141	A	H
	*	2480	101.18	-	-	97.4	32.69	5.72	34.63	154	141	P	H
	*	2480	99.74	-	-	95.96	32.69	5.72	34.63	154	141	A	H
		2483.8	53.43	-20.57	74	49.65	32.69	5.72	34.63	331	199	P	V
		2483.5	46.34	-7.66	54	42.56	32.69	5.72	34.63	331	199	A	V
	*	2480	97.08	-	-	93.3	32.69	5.72	34.63	331	199	P	V
	*	2480	95.64	-	-	91.86	32.69	5.72	34.63	331	199	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 CH01&BLE CH39 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2&1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz & BLE CH39 2480MHz		4830	39.88	-34.12	74	60.09	34.69	8.43	63.33	300	0	P	H
		4962	39.85	-34.15	74	60.05	34.77	8.44	63.41	300	0	P	H
		7440	40.92	-33.08	74	58.17	36.44	10.18	63.87	300	0	P	H
		4830	41.12	-32.88	74	61.33	34.69	8.43	63.33	300	360	P	V
		4962	39.75	-34.25	74	59.95	34.77	8.44	63.41	300	360	P	V
		7440	40.09	-33.91	74	57.34	36.44	10.18	63.87	300	360	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)

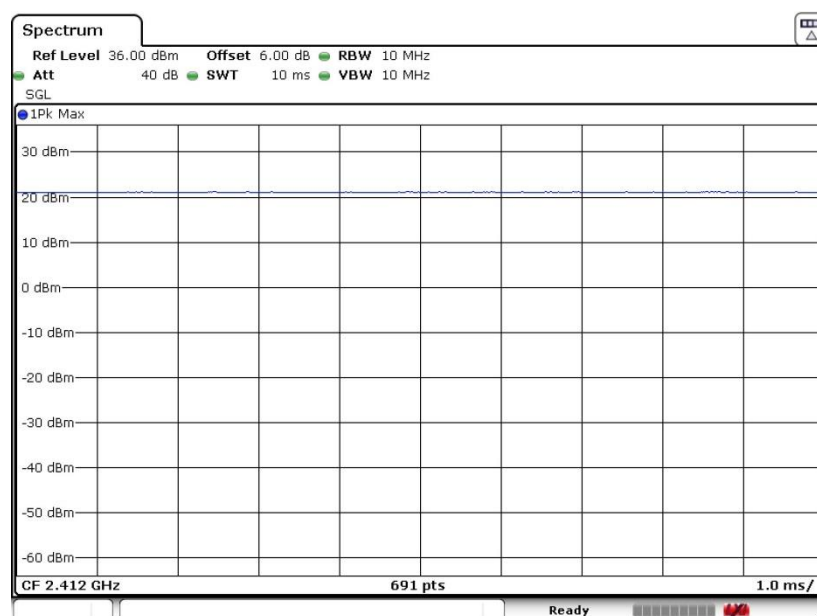
= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

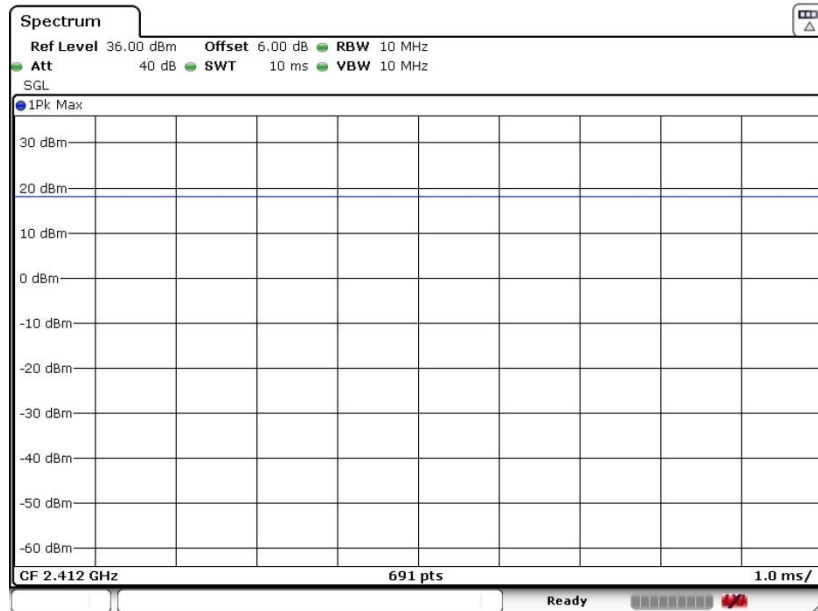
Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	100	-	-	10Hz
2	802.11b	100	-	-	10Hz
1	802.11g	98.28	-	-	10Hz
2	802.11g	98.28	-	-	10Hz
1+2	802.11n HT20	98.16	-	-	10Hz

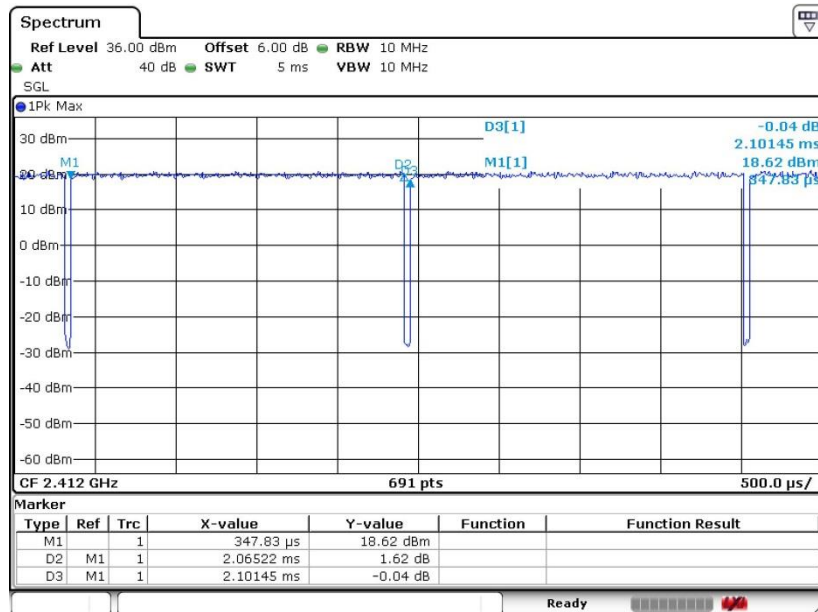
802.11b for Ant.1




802.11b for Ant.2

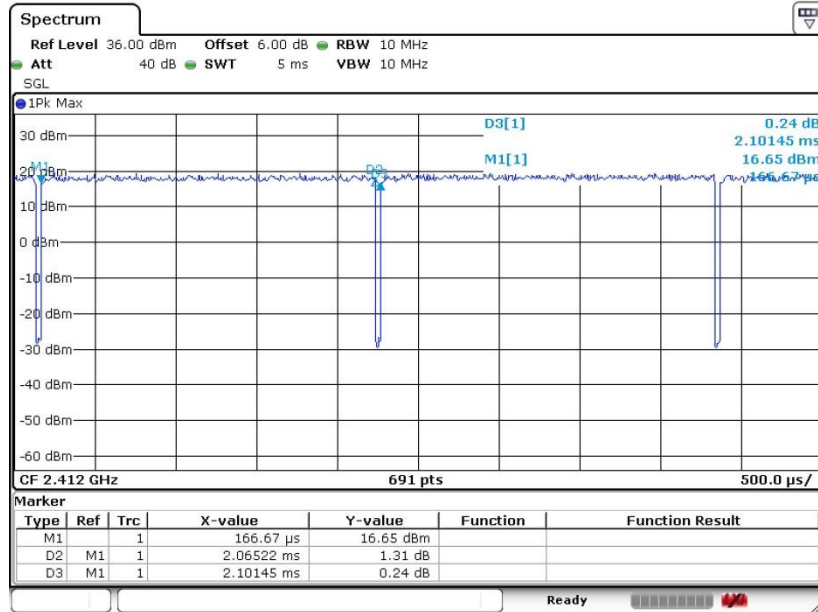


802.11g for Ant.1





802.11g for Ant.2



802.11n HT20

