



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2233-1
FCC ID : IHDT56AD2
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Feb. 24, 2022 ~ Apr. 01, 2022

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

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

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR212625C	Rev. 01	Initial issue of report	Apr. 15, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	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 3.07 dB at 2483.520 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 5.73 dB at 11.200 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

Motorola Mobility LLC

222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC

222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2233-1
FCC ID	IHDT56AD2
IMEI Code	Conducted: 353028750021234/353028750021242 Conduction: 353028750008355/353028750008363 Radiation: 353028750015715/353028750015723 for Sample 1 353028750015491/353028750015509 for Sample 2
HW Version	DVT2
SW Version	S2SE32.1
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT. The differences between them refer to the XT2233-1_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we choose sample 1 perform full test and sample 2 verify the worst case for RSE.

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	802.11b : 22.13 dBm (0.1633 W) 802.11g : 23.87 dBm (0.2438 W) 802.11n HT20 : 23.41 dBm (0.2193 W)
Antenna Type / Gain	PIFA Antenna with gain -4.9 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Motorola (Chengyang)	Model Name	MC-201
AC Adapter 1(EU)	Brand Name	Motorola (Chengyang)	Model Name	MC-202
AC Adapter 1(UK)	Brand Name	Motorola (Chengyang)	Model Name	MC-203
AC Adapter 1(IN)	Brand Name	Motorola (Chengyang)	Model Name	MC-204
AC Adapter 1(AU)	Brand Name	Motorola (Chengyang)	Model Name	MC-205
AC Adapter 1(AR)	Brand Name	Motorola (Chengyang)	Model Name	MC-206
AC Adapter 1(CHILE)	Brand Name	Motorola (Chengyang)	Model Name	MC-209
AC Adapter 2(US)	Brand Name	Motorola (Acbel)	Model Name	MC-201
AC Adapter 2(EU)	Brand Name	Motorola (Acbel)	Model Name	MC-202
AC Adapter 2(UK)	Brand Name	Motorola (Acbel)	Model Name	MC-203
AC Adapter 2(AU)	Brand Name	Motorola (Acbel)	Model Name	MC-205
AC Adapter 2(AR)	Brand Name	Motorola (Acbel)	Model Name	MC-206
AC Adapter 2(CHILE)	Brand Name	Motorola (Acbel)	Model Name	MC-209
AC Adapter 3(IN)	Brand Name	Motorola (AOHAI)	Model Name	MC-204
AC Adapter 4(BR)	Brand Name	Motorola (Flex)	Model Name	MC-207
AC Adapter 5(BR)	Brand Name	Motorola (Salcomp)	Model Name	MC-207
Battery 1	Brand Name	Motorola (ATL)	Model Name	ND50
Battery 2	Brand Name	Motorola (Jiade)	Model Name	ND50
Earphone 1	Brand Name	Motorola (lyand)	Model Name	MH191
Earphone 2	Brand Name	Motorola (LCHSE)	Model Name	MH191
Earphone 3	Brand Name	Motorola (Xinlide)	Model Name	MH202
Earphone 4	Brand Name	Motorola (Juwei)	Model Name	MH202
USB Cable 1	Brand Name	Motorola (SUNTOPS)	Model Name	336258
USB Cable 2	Brand Name	Motorola (Yihuaxing)	Model Name	T365-012B
USB Cable 3	Brand Name	Motorola (I SHENG)	Model Name	SC18D33506
USB Cable 4	Brand Name	Motorola (I SHENG)	Model Name	SC18D38574

1.6 Modification of EUT

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

1.7 Testing Location

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

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



	CO01-SZ TH01-SZ	CN1256	421272
Test Firm	Sporton International Inc. (Shenzhen)		
Test Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH01-SZ	CN1256	421272

1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

1.9 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. 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	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

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

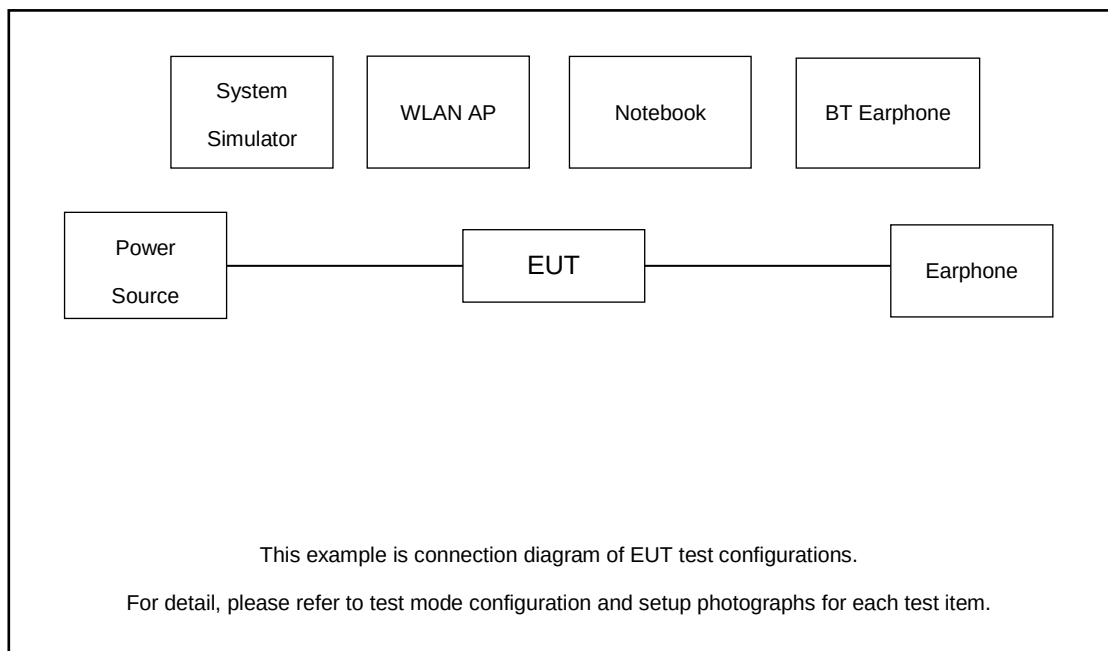
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

Co-location Mode
802.11n HT20 CH11 2462MHz Tx + LTE Band41 Link

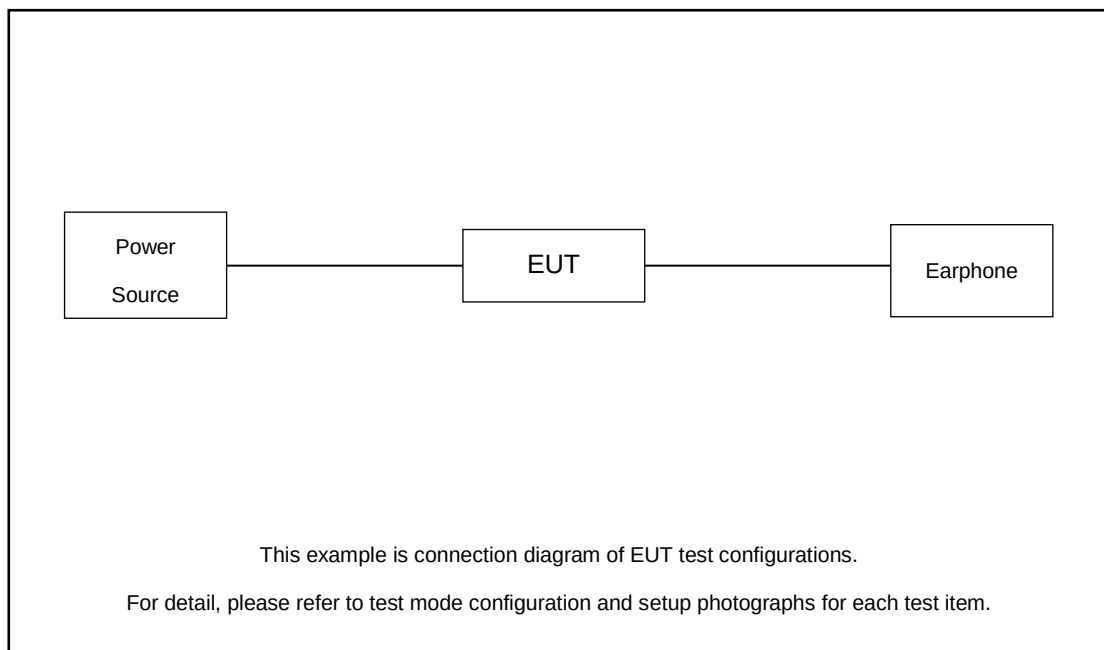
Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable 4(Charging from Adapter5) + Earphone 4
Remark: For Radiated Test Cases, The tests were performance with Adapter 1, Earphone 1 and USB Cable 1.	

2.3 Connection Diagram of Test System

Conducted Emission:



Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Dlink
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	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 and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 1.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 1.2 + 10 = 11.2 \text{ (dB)}\end{aligned}$$

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.

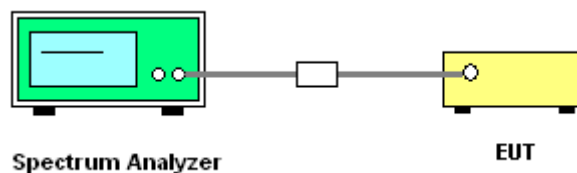
3.1.2 Measuring Instruments

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.

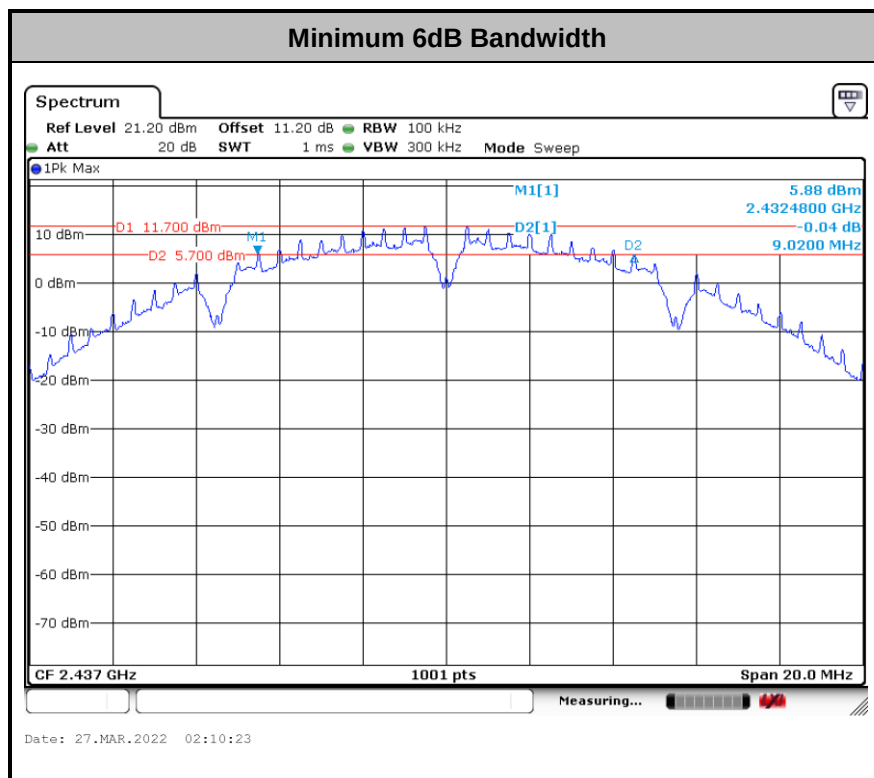
3.1.4 Test Setup





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.

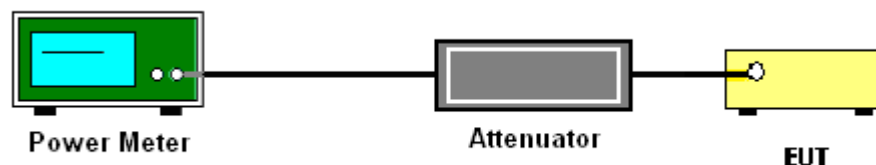
3.2.2 Measuring Instruments

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 11.9.2.3.1 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.

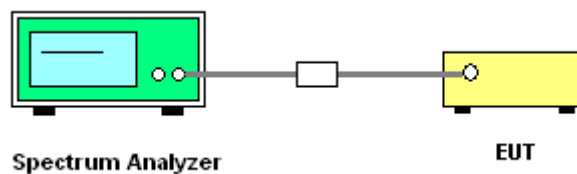
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

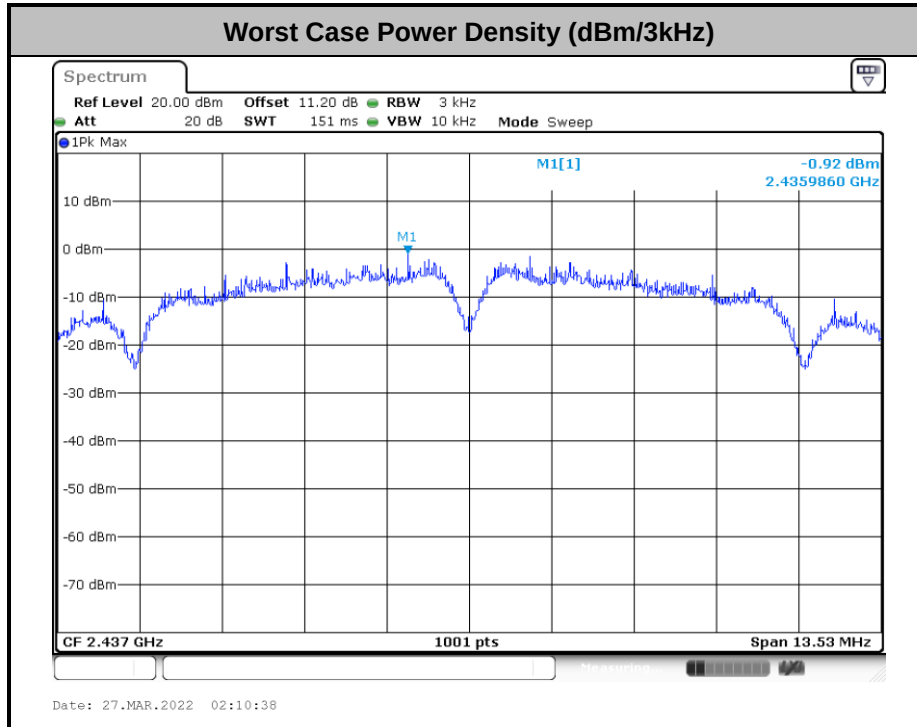
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the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

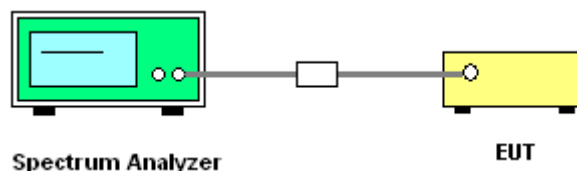
3.4.2 Measuring Instruments

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

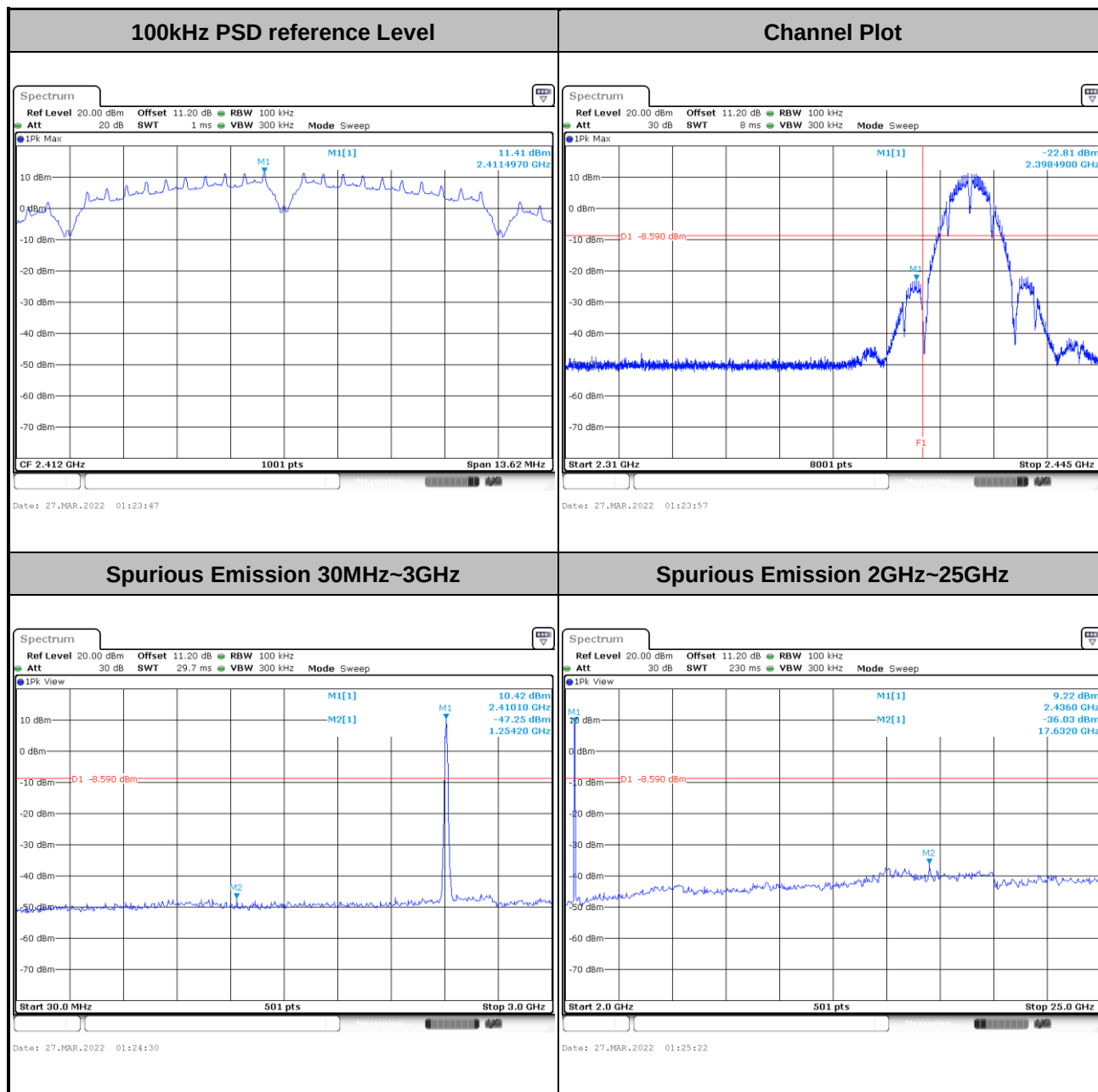




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Ma Jie	Temperature :	21~25°C
		Relative Humidity :	51~54%

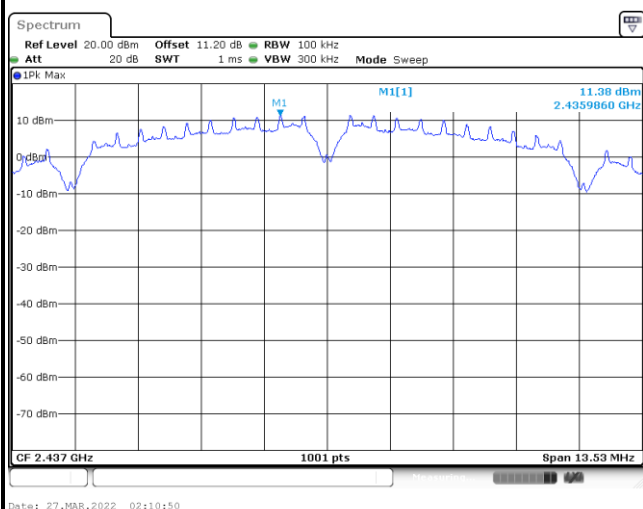
Test Mode :	802.11b	Test Channel :	01
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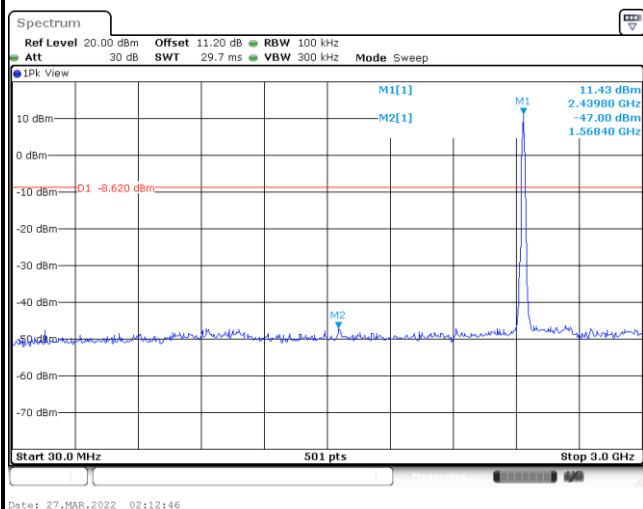


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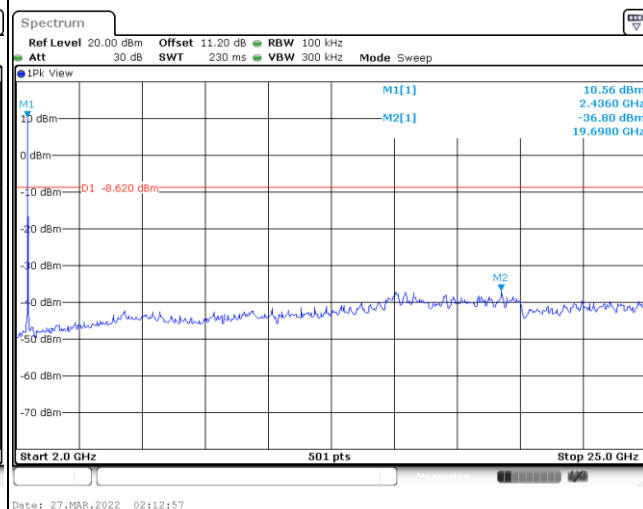
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



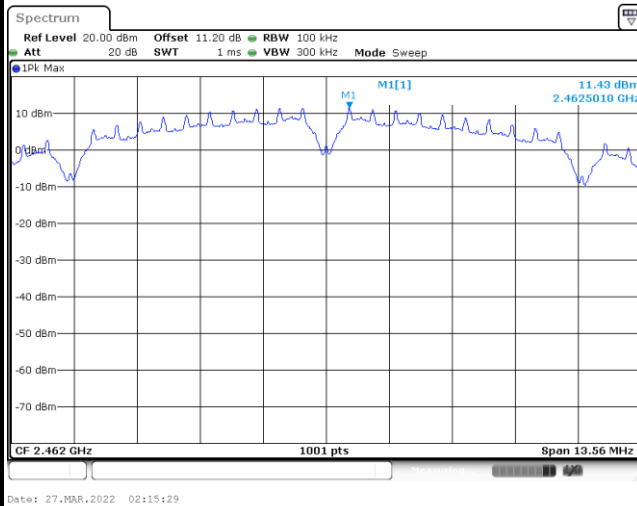
Spurious Emission 2GHz~25GHz



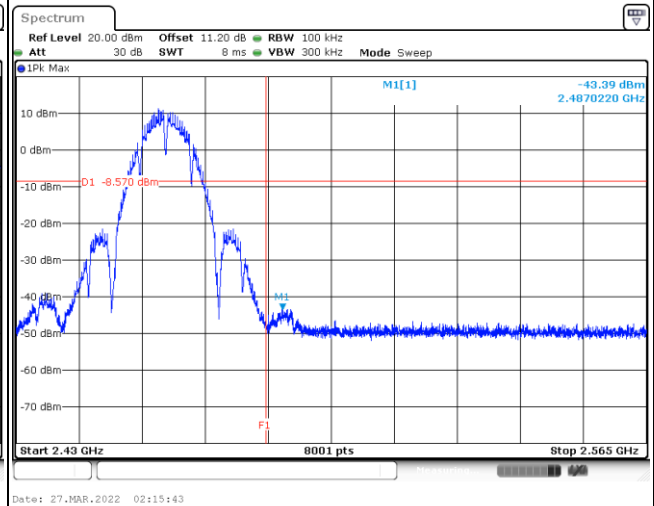


Test Mode :	802.11b	Test Channel :	11
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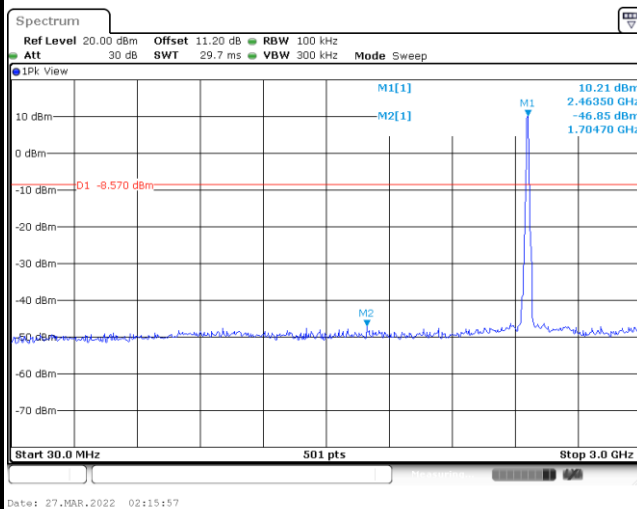
100kHz PSD reference Level



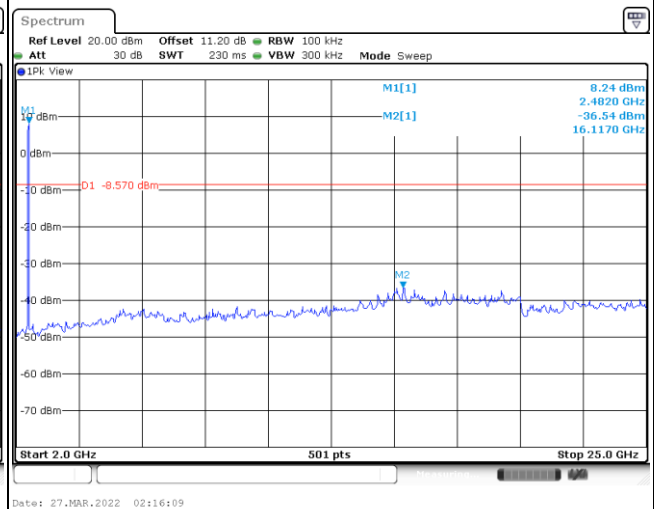
Channel Plot



Spurious Emission 30MHz~3GHz



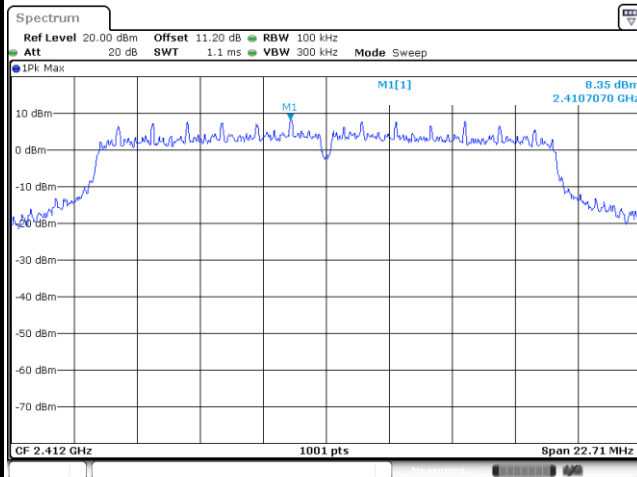
Spurious Emission 2GHz~25GHz





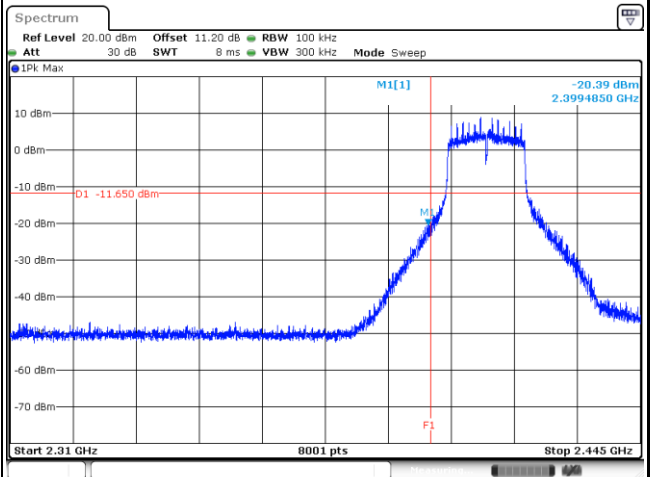
Test Mode :	802.11g	Test Channel :	01
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100kHz PSD reference Level



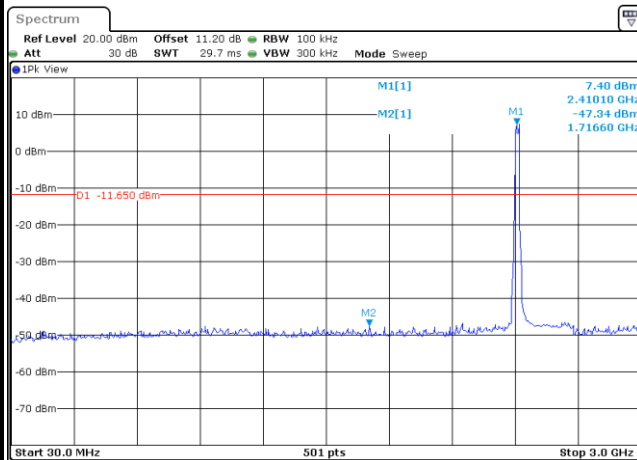
Date: 27.MAR.2022 02:20:14

Channel Plot



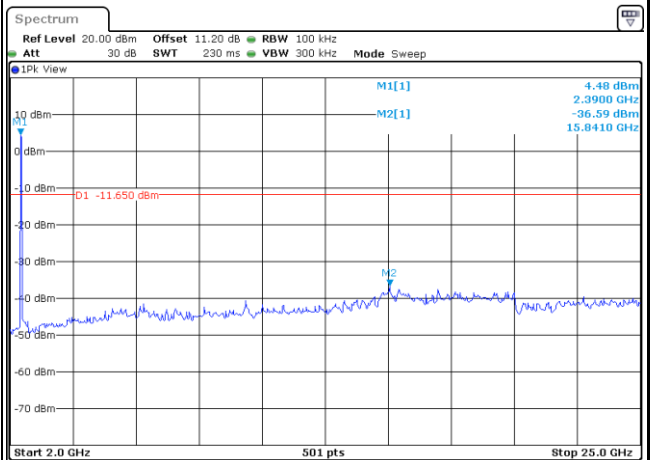
Date: 27.MAR.2022 02:20:43

Spurious Emission 30MHz~3GHz



Date: 27.MAR.2022 02:21:33

Spurious Emission 2GHz~25GHz

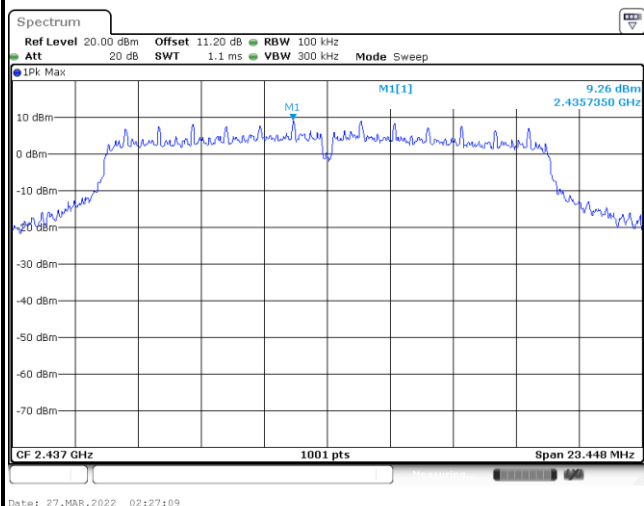


Date: 27.MAR.2022 02:21:49

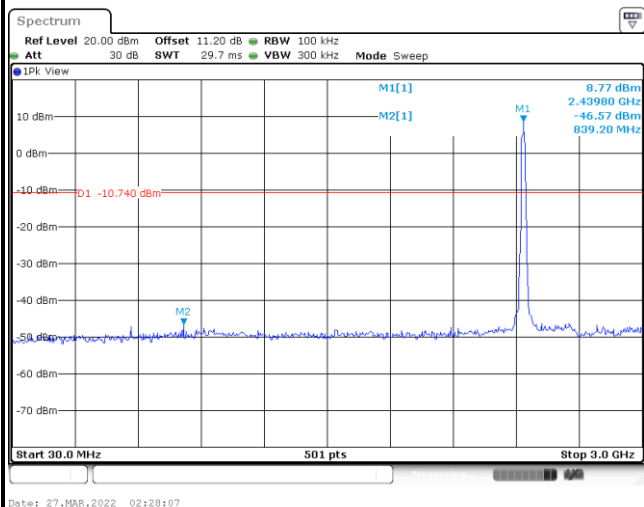


Test Mode :	802.11g	Test Channel :	06
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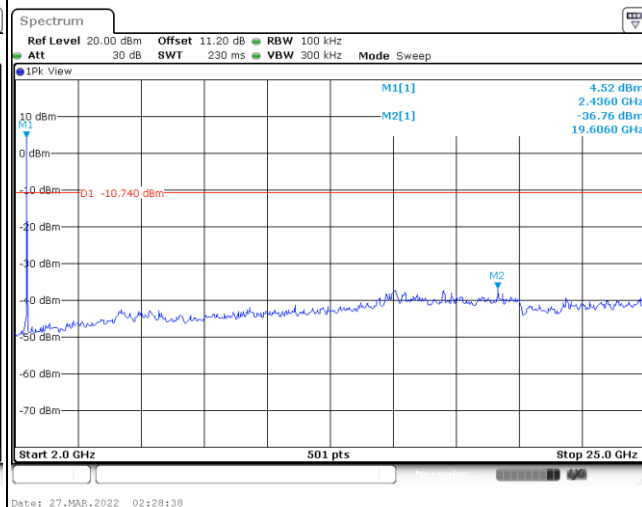
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

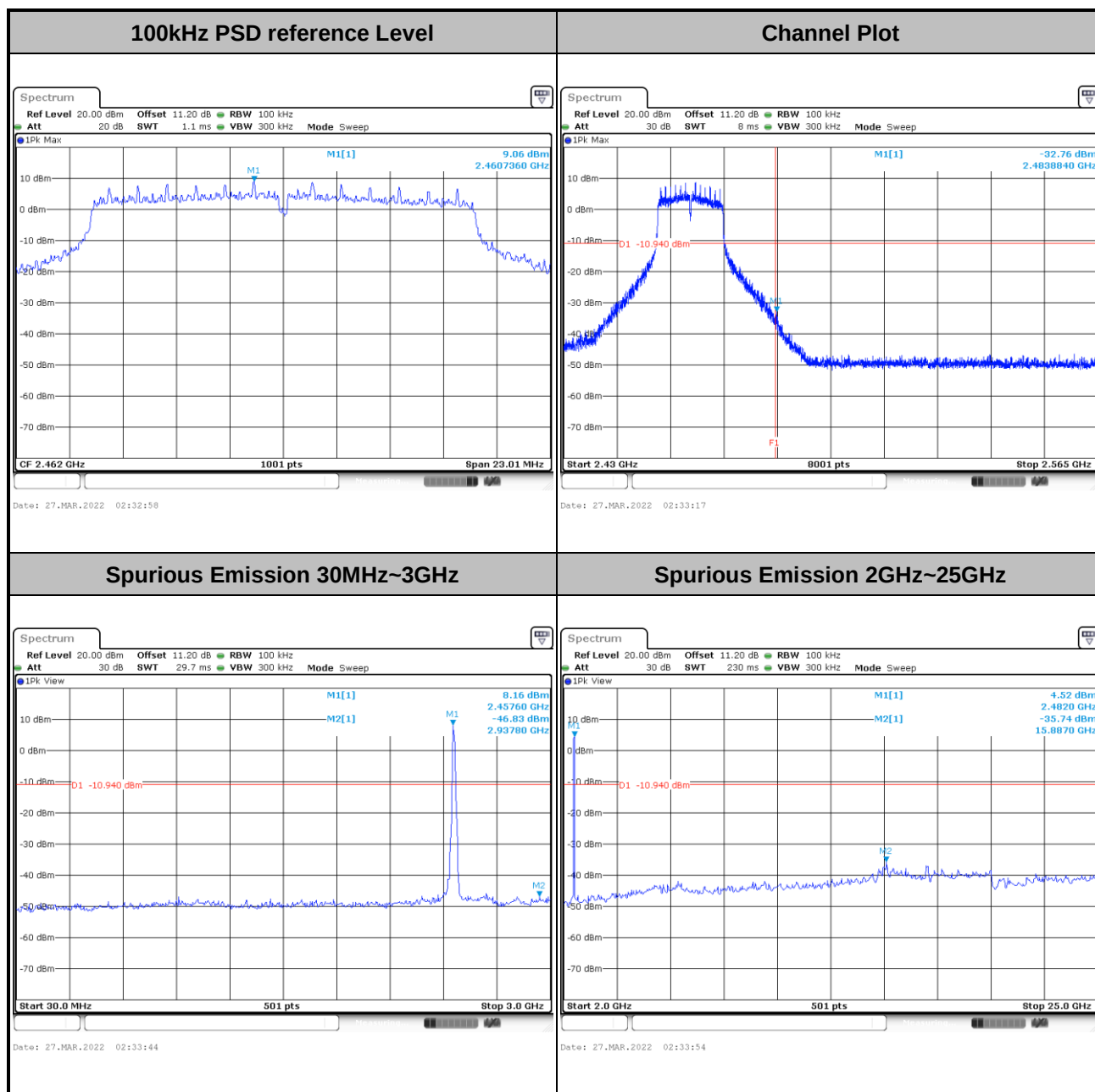


Spurious Emission 2GHz~25GHz





Test Mode :	802.11g	Test Channel :	11
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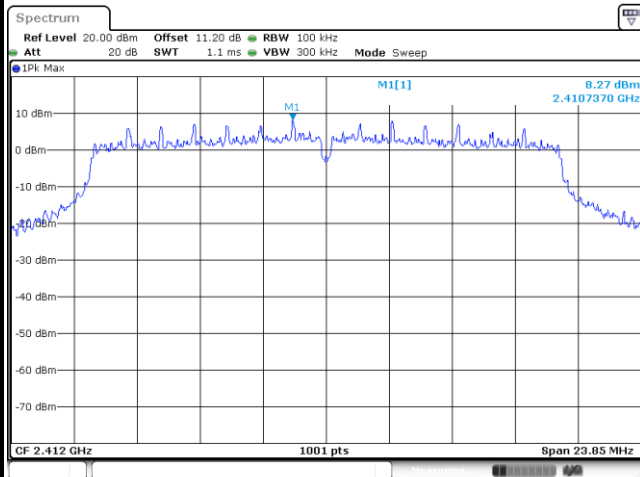




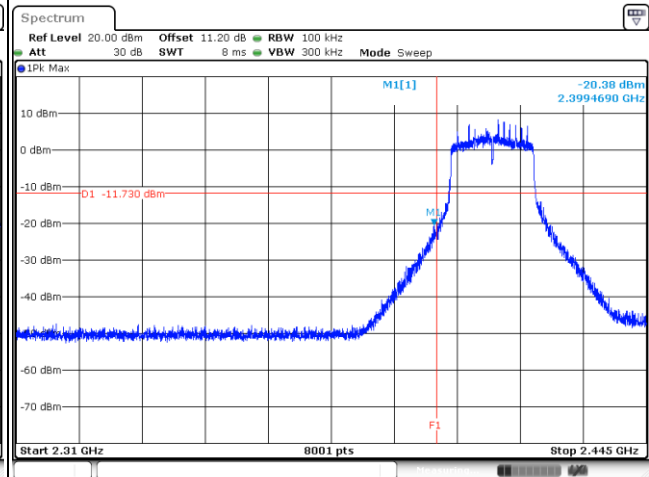
Test Mode : 802.11n HT20

Test Channel : 01

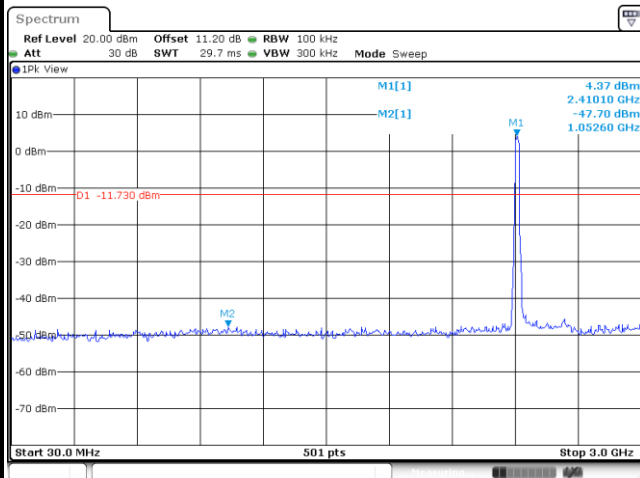
100kHz PSD reference Level



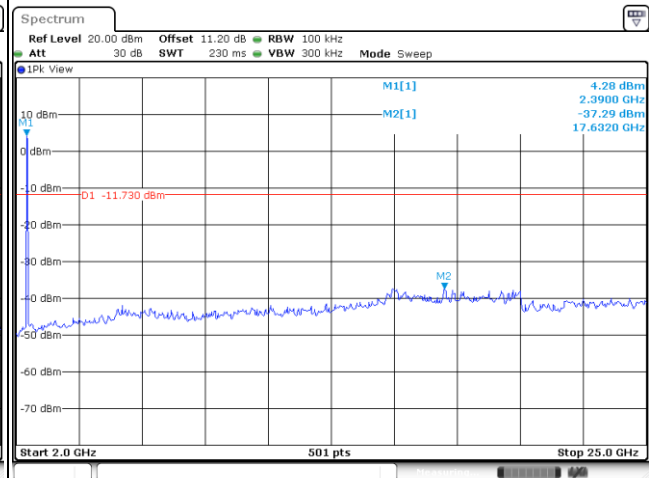
Channel Plot



Spurious Emission 30MHz~3GHz



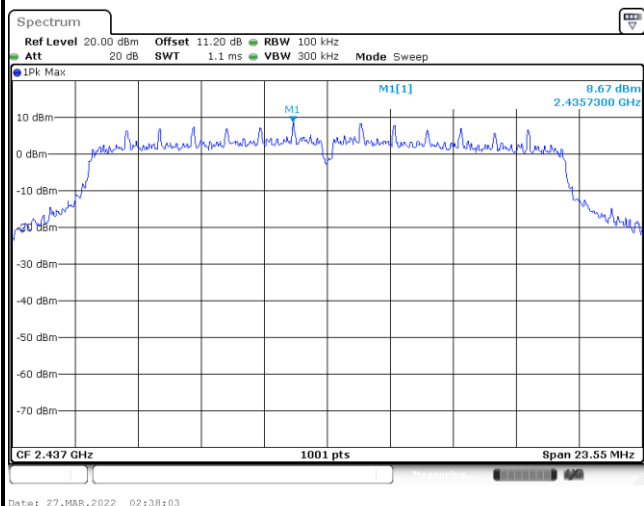
Spurious Emission 2GHz~25GHz



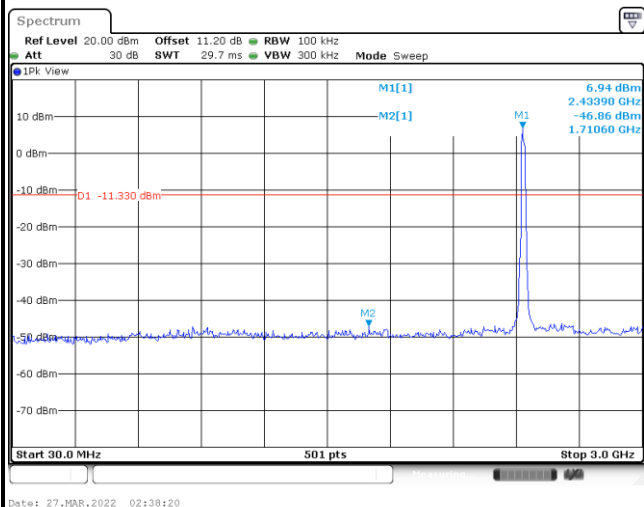


Test Mode :	802.11n HT20	Test Channel :	06
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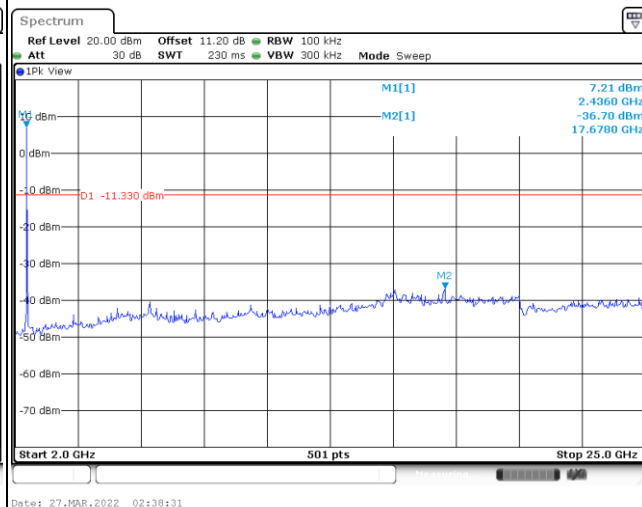
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

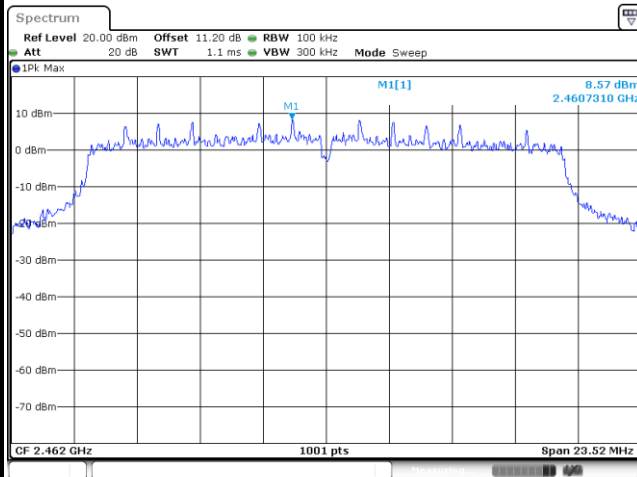




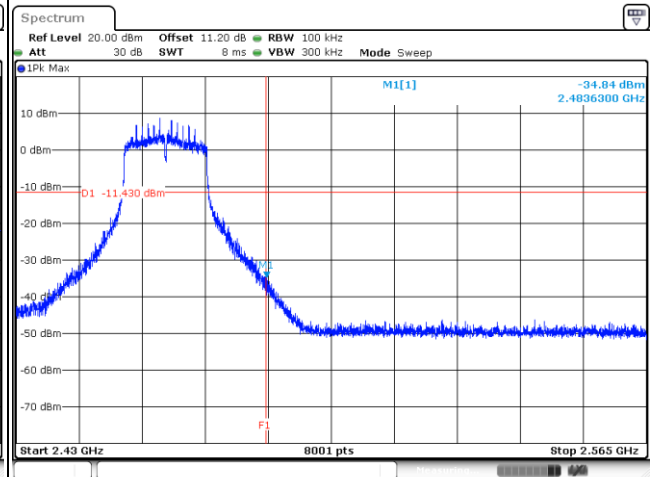
Test Mode : 802.11n HT20

Test Channel : 11

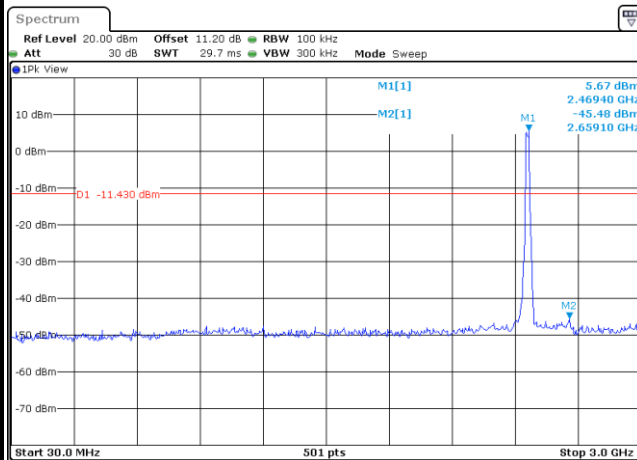
100kHz PSD reference Level



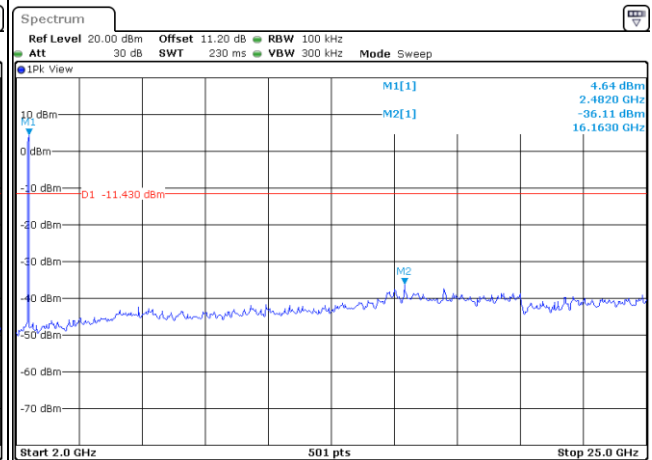
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



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

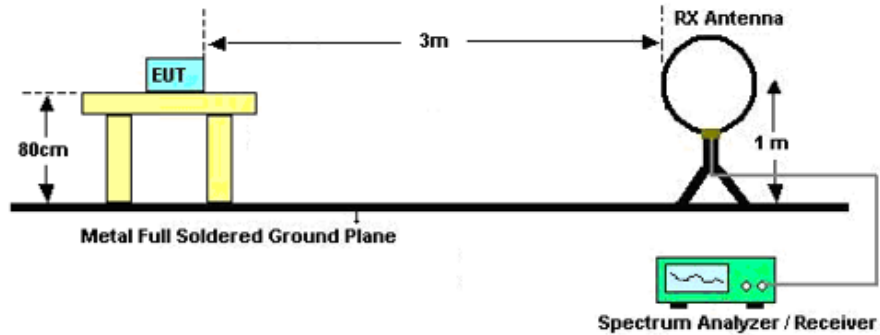
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

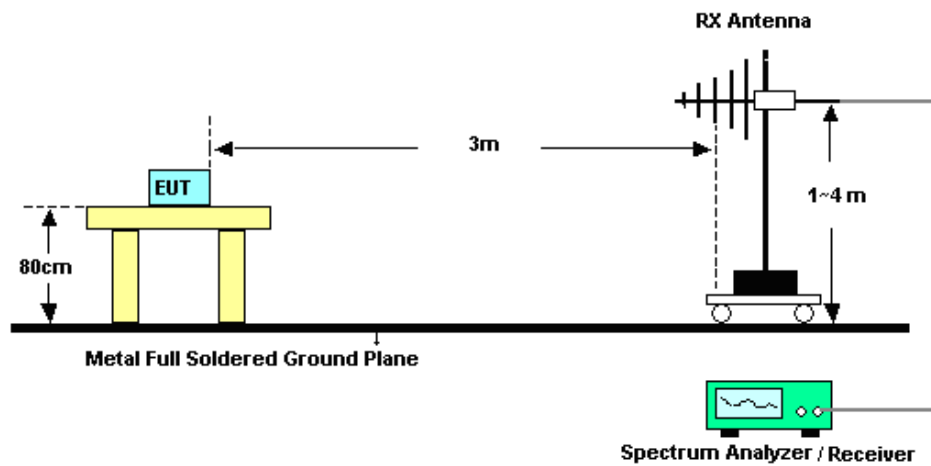
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

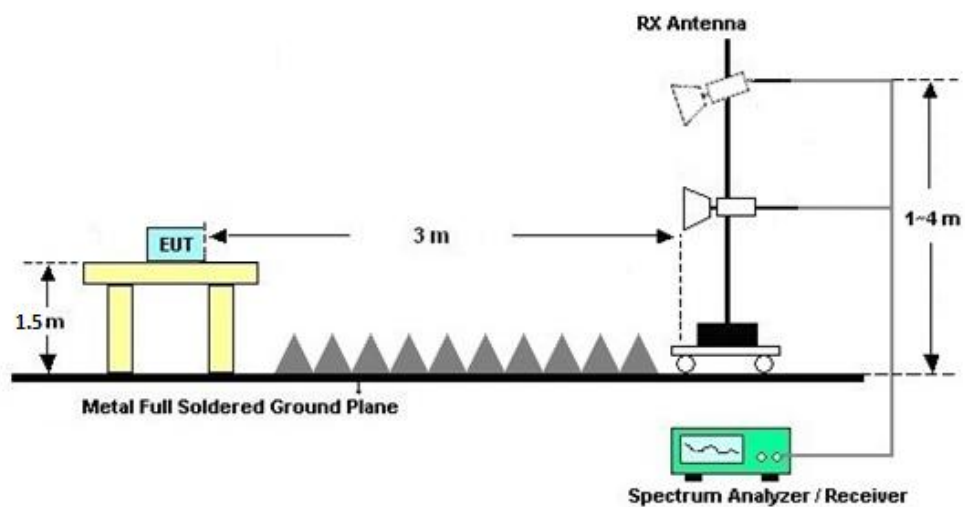
For radiated emissions below 30MHz



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.

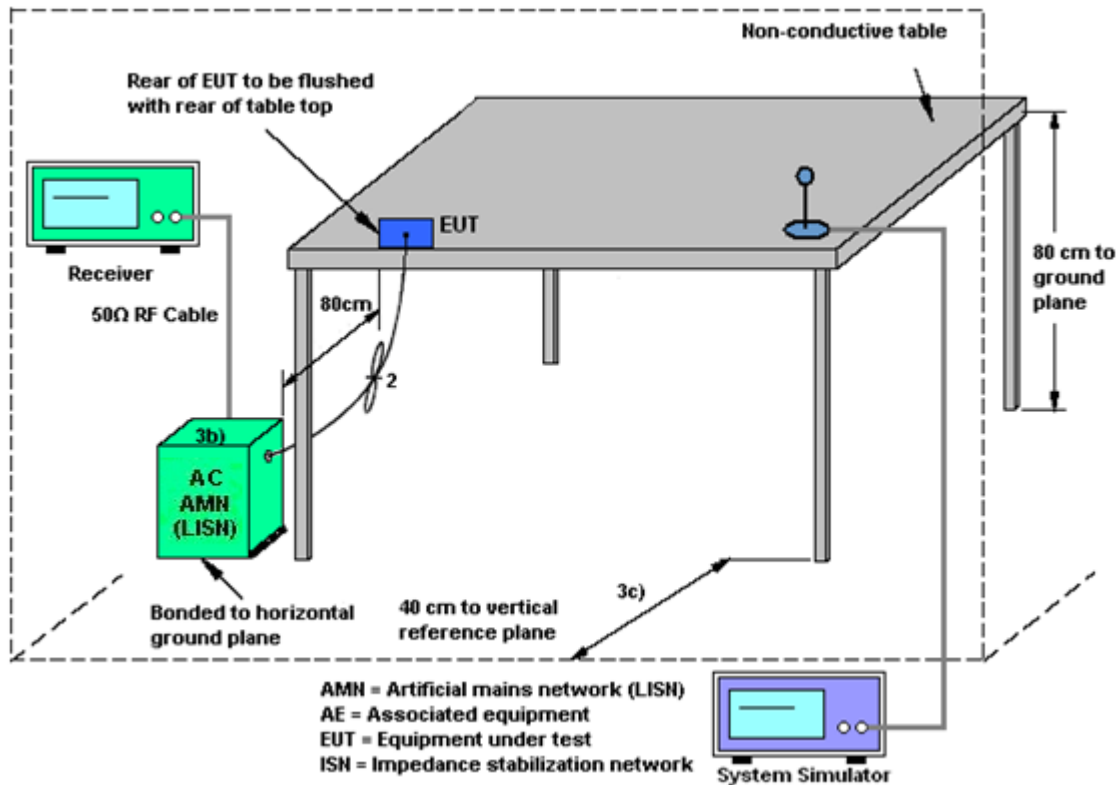
3.6.2 Measuring Instruments

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

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 08, 2021	Mar. 27, 2022	Apr. 07, 2022	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 28, 2021	Mar. 27, 2022	Dec. 27, 2022	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 28, 2021	Mar. 27, 2022	Dec. 27, 2022	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 21, 2021	Apr. 01, 2022	Jul. 20, 2022	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Apr. 01, 2022	Jun. 21, 2022	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jul. 15, 2021	Apr. 01, 2022	Jul. 14, 2022	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 25, 2021	Apr. 01, 2022	Jul. 24, 2022	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Apr. 11, 2021	Apr. 01, 2022	Apr. 10, 2022	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 07, 2021	Apr. 01, 2022	Apr. 06, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 16, 2021	Apr. 01, 2022	Oct. 15, 2022	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5GHz	Oct. 16, 2021	Apr. 01, 2022	Oct. 15, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 21, 2021	Apr. 01, 2022	Jul. 20, 2022	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Apr. 01, 2022	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Apr. 01, 2022	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Apr. 01, 2022	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Mar. 08, 2021	Feb. 24, 2022	Mar. 07, 2022	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 01, 2021	Feb. 24, 2022	Aug. 31, 2022	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 28, 2021	Feb. 24, 2022	Oct. 27, 2022	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 14, 2021	Feb. 24, 2022	Jul. 13, 2022	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.2dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.2dB
---	-------

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.3dB
---	-------

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



Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ma Jie	Temperature:	21~25	°C
Test Date:	2022/3/27	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
					Ant4	Ant4		
11b	1Mbps	1	1	2412	14.89	9.08	0.50	Pass
11b	1Mbps	1	6	2437	14.74	9.02	0.50	Pass
11b	1Mbps	1	11	2462	14.99	9.04	0.50	Pass
11g	6Mbps	1	1	2412	16.93	15.14	0.50	Pass
11g	6Mbps	1	6	2437	16.83	15.63	0.50	Pass
11g	6Mbps	1	11	2462	16.88	15.34	0.50	Pass
HT20	MCS0	1	1	2412	18.03	15.90	0.50	Pass
HT20	MCS0	1	6	2437	17.98	15.70	0.50	Pass
HT20	MCS0	1	11	2462	17.98	15.68	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
					Ant4	Ant4	Ant4	Ant4	Ant4	
11b	1Mbps	1	1	2412	21.94	30.00	-4.90	17.04	36.00	Pass
11b	1Mbps	1	6	2437	22.13	30.00	-4.90	17.23	36.00	Pass
11b	1Mbps	1	11	2462	20.92	30.00	-4.90	16.02	36.00	Pass
11g	6Mbps	1	1	2412	22.47	30.00	-4.90	17.57	36.00	Pass
11g	6Mbps	1	6	2437	23.87	30.00	-4.90	18.97	36.00	Pass
11g	6Mbps	1	11	2462	23.02	30.00	-4.90	18.12	36.00	Pass
HT20	MCS0	1	1	2412	22.12	30.00	-4.90	17.22	36.00	Pass
HT20	MCS0	1	6	2437	23.41	30.00	-4.90	18.51	36.00	Pass
HT20	MCS0	1	11	2462	21.63	30.00	-4.90	16.73	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)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
					Ant4	Ant4	Ant4	Ant4	Ant4	
11b	1Mbps	1	1	2412	19.90	30.00	-4.90	15.00	36.00	Pass
11b	1Mbps	1	6	2437	19.90	30.00	-4.90	15.00	36.00	Pass
11b	1Mbps	1	11	2462	18.40	30.00	-4.90	13.50	36.00	Pass
11g	6Mbps	1	1	2412	17.40	30.00	-4.90	12.50	36.00	Pass
11g	6Mbps	1	6	2437	19.00	30.00	-4.90	14.10	36.00	Pass
11g	6Mbps	1	11	2462	17.90	30.00	-4.90	13.00	36.00	Pass
HT20	MCS0	1	1	2412	17.20	30.00	-4.90	12.30	36.00	Pass
HT20	MCS0	1	6	2437	18.30	30.00	-4.90	13.40	36.00	Pass
HT20	MCS0	1	11	2462	16.70	30.00	-4.90	11.80	36.00	Pass

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

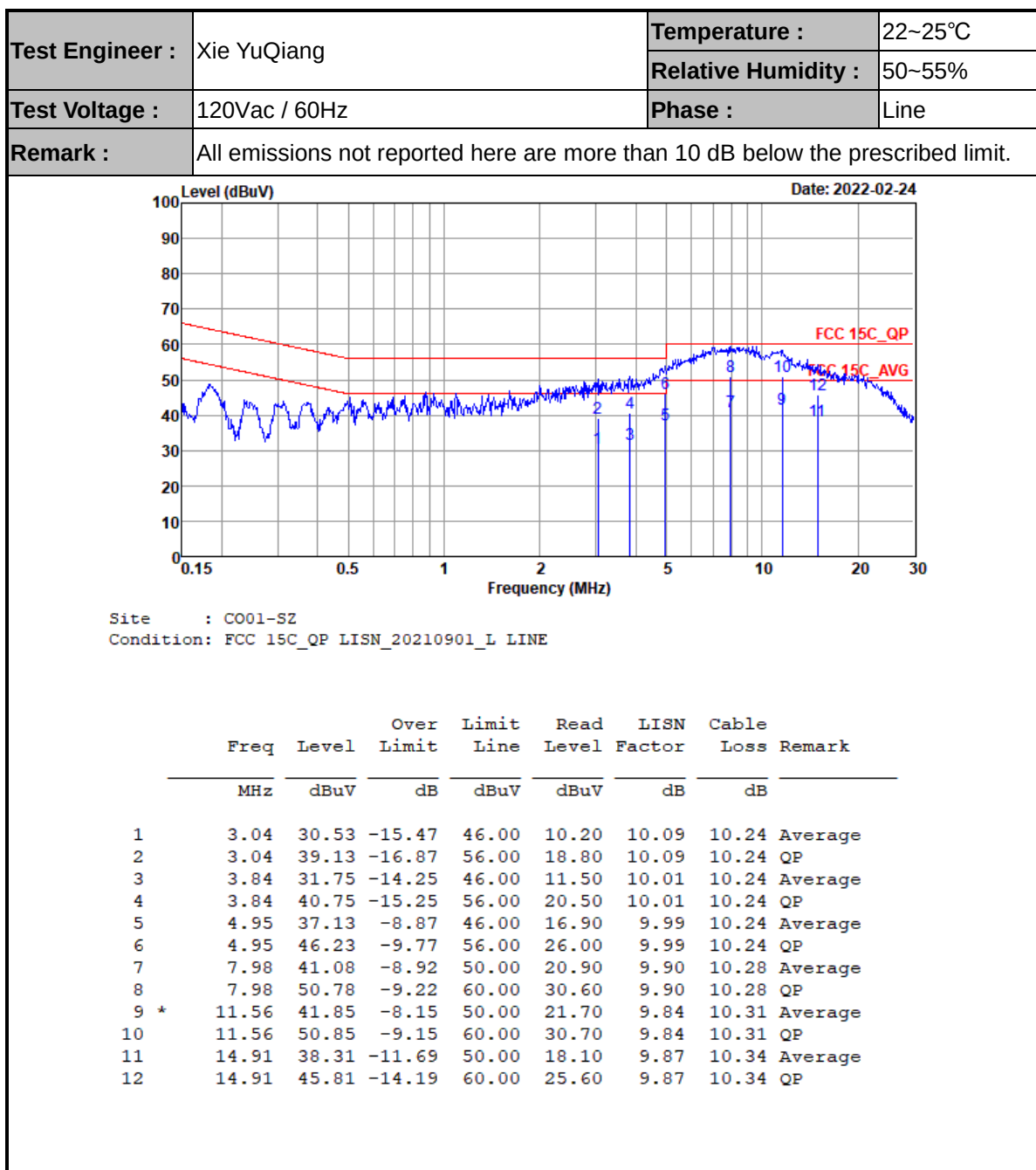
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)		DG (dBi)	Peak PSD Limit (dBm/3kHz)	Pass/Fail
					Ant4	Worse + 3.01		Ant4	
11b	1Mbps	1	1	2412	-1.21	-	-4.90	8.00	Pass
11b	1Mbps	1	6	2437	-0.92	-	-4.90	8.00	Pass
11b	1Mbps	1	11	2462	-1.36	-	-4.90	8.00	Pass
11g	6Mbps	1	1	2412	-6.40	-	-4.90	8.00	Pass
11g	6Mbps	1	6	2437	-5.69	-	-4.90	8.00	Pass
11g	6Mbps	1	11	2462	-6.39	-	-4.90	8.00	Pass
HT20	MCS0	1	1	2412	-7.09	-	-4.90	8.00	Pass
HT20	MCS0	1	6	2437	-6.85	-	-4.90	8.00	Pass
HT20	MCS0	1	11	2462	-6.52	-	-4.90	8.00	Pass

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

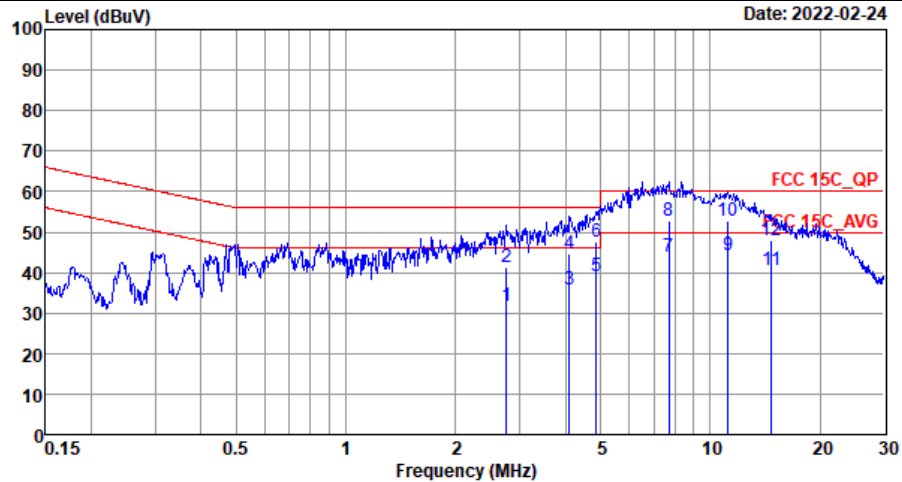


Appendix B. AC Conducted Emission Test Results





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



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20210901_N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	2.76	31.78	-14.22	46.00	11.40	10.14	10.24	Average
2	2.76	41.18	-14.82	56.00	20.80	10.14	10.24	QP
3	4.11	35.79	-10.21	46.00	15.40	10.15	10.24	Average
4	4.11	44.69	-11.31	56.00	24.30	10.15	10.24	QP
5	4.87	39.17	-6.83	46.00	18.80	10.13	10.24	Average
6	4.87	47.67	-8.33	56.00	27.30	10.13	10.24	QP
7	7.69	43.89	-6.11	50.00	23.60	10.01	10.28	Average
8	7.69	52.89	-7.11	60.00	32.60	10.01	10.28	QP
9 *	11.20	44.27	-5.73	50.00	24.00	9.96	10.31	Average
10	11.20	52.77	-7.23	60.00	32.50	9.96	10.31	QP
11	14.75	40.41	-9.59	50.00	20.19	9.88	10.34	Average
12	14.75	48.01	-11.99	60.00	27.79	9.88	10.34	QP

Note:

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



Appendix C. Radiated Spurious Emission

For Sample 1:

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		2387.7	56.51	-17.49	74	47.57	32	9.64	32.7	264	228	P	H
		2388.015	46.73	-7.27	54	37.79	32	9.64	32.7	264	228	A	H
		2412	108.91	-	-	99.85	32.1	9.66	32.7	264	228	P	H
		2412	106.01	-	-	96.95	32.1	9.66	32.7	264	228	A	H
		2386.545	57.46	-16.54	74	48.53	32	9.63	32.7	295	249	P	V
		2387.91	49.51	-4.49	54	40.57	32	9.64	32.7	295	249	A	V
		2412	112.22	-	-	103.16	32.1	9.66	32.7	295	249	P	V
		2412	110.41	-	-	101.35	32.1	9.66	32.7	295	249	A	V
802.11b CH 06 2437MHz		2368.94	55.26	-18.74	74	46.32	32.03	9.61	32.7	113	228	P	H
		2389.8	44.32	-9.68	54	35.38	32	9.64	32.7	113	228	A	H
		2437	107.77	-	-	98.48	32.3	9.69	32.7	113	228	P	H
		2437	106.07	-	-	96.78	32.3	9.69	32.7	113	228	A	H
		2483.69	54.9	-19.1	74	45.68	32.17	9.75	32.7	113	228	P	H
		2484.95	44.57	-9.43	54	35.35	32.17	9.75	32.7	113	228	A	H
		2335.48	55.58	-18.42	74	46.61	32.1	9.57	32.7	289	250	P	V
		2389.94	44.92	-9.08	54	35.98	32	9.64	32.7	289	250	A	V
		2437	113.26	-	-	103.97	32.3	9.69	32.7	289	250	P	V
		2437	111.51	-	-	102.22	32.3	9.69	32.7	289	250	A	V
		2486.07	55.98	-18.02	74	46.76	32.17	9.75	32.7	289	250	P	V
		2483.55	47.99	-6.01	54	38.77	32.17	9.75	32.7	289	250	A	V



802.11b CH 11 2462MHz		2462	106.71	-	-	97.46	32.23	9.72	32.7	122	227	P	H
		2462	104.65	-	-	95.4	32.23	9.72	32.7	122	227	A	H
		2487.48	56	-18	74	46.78	32.17	9.75	32.7	122	227	P	H
		2487.2	45.84	-8.16	54	36.62	32.17	9.75	32.7	122	227	A	H
		2462	112.16	-	-	102.91	32.23	9.72	32.7	256	249	P	V
		2462	110.21	-	-	100.96	32.23	9.72	32.7	256	249	A	V
		2486.16	58.32	-15.68	74	49.1	32.17	9.75	32.7	256	249	P	V
		2485.24	50.81	-3.19	54	41.59	32.17	9.75	32.7	256	249	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		4824	49.02	-24.98	74	55.3	33.85	12.01	52.14	265	332	P	H
		4824	49.6	-24.4	74	55.88	33.85	12.01	52.14	293	83	P	V
802.11b CH 06 2437MHz		4874	47.89	-26.11	74	54.22	33.73	12.04	52.1	282	323	P	H
		7311	48.11	-25.89	74	49.98	35.76	14.16	51.79	282	323	P	H
		4874	48.43	-25.57	74	54.76	33.73	12.04	52.1	395	343	P	V
		7311	48.93	-25.07	74	50.8	35.76	14.16	51.79	395	343	P	V
802.11b CH 11 2462MHz		4924	47.29	-26.71	74	53.58	33.7	12.07	52.06	185	350	P	H
		7386	47.99	-26.01	74	49.7	35.78	14.21	51.7	185	350	P	H
		4924	49	-25	74	55.29	33.7	12.07	52.06	249	128	P	V
		7386	49.18	-24.82	74	50.89	35.78	14.21	51.7	249	128	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		2389.38	56.58	-17.42	74	47.64	32	9.64	32.7	266	229	P	H
		2389.8	46.69	-7.31	54	37.75	32	9.64	32.7	266	229	A	H
		2412	107.05	-	-	97.99	32.1	9.66	32.7	266	229	P	H
		2412	99.77	-	-	90.71	32.1	9.66	32.7	266	229	A	H
		2389.695	60.78	-13.22	74	51.84	32	9.64	32.7	268	251	P	V
		2389.8	50.49	-3.51	54	41.55	32	9.64	32.7	268	251	A	V
		2412	111.89	-	-	102.83	32.1	9.66	32.7	268	251	P	V
		2412	105	-	-	95.94	32.1	9.66	32.7	268	251	A	V
802.11g CH 06 2437MHz		2371.04	55.38	-18.62	74	46.43	32.03	9.62	32.7	127	227	P	H
		2389.94	44.84	-9.16	54	35.9	32	9.64	32.7	127	227	A	H
		2437	110.23	-	-	100.94	32.3	9.69	32.7	127	227	P	H
		2437	102.51	-	-	93.22	32.3	9.69	32.7	127	227	A	H
		2486.63	55.39	-18.61	74	46.17	32.17	9.75	32.7	127	227	P	H
		2483.58	45.24	-8.76	54	36.02	32.17	9.75	32.7	127	227	A	H
		2388.96	56.84	-17.16	74	47.9	32	9.64	32.7	287	250	P	V
		2389.94	46.81	-7.19	54	37.87	32	9.64	32.7	287	250	A	V
		2437	114.99	-	-	105.7	32.3	9.69	32.7	287	250	P	V
		2437	107.74	-	-	98.45	32.3	9.69	32.7	287	250	A	V
		2484.39	59.15	-14.85	74	49.93	32.17	9.75	32.7	287	250	P	V
		2483.58	48.42	-5.58	54	39.2	32.17	9.75	32.7	287	250	A	V



802.11g CH 11 2462MHz		2462	108.63	-	-	99.38	32.23	9.72	32.7	142	228	P	H
		2462	101.32	-	-	92.07	32.23	9.72	32.7	142	228	A	H
		2483.84	58.18	-15.82	74	48.96	32.17	9.75	32.7	142	228	P	H
		2483.52	48.05	-5.95	54	38.83	32.17	9.75	32.7	142	228	A	H
		2460	110.79	-	-	101.54	32.23	9.72	32.7	320	235	P	V
		2462	104.04	-	-	94.79	32.23	9.72	32.7	320	235	A	V
		2483.8	58.84	-15.16	74	49.62	32.17	9.75	32.7	320	235	P	V
		2483.52	48.93	-5.07	54	39.71	32.17	9.75	32.7	320	235	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	46.43	-27.57	74	52.71	33.85	12.01	52.14	-	-	P	H
		4824	47.36	-26.64	74	53.64	33.85	12.01	52.14	-	-	P	V
802.11g CH 06 2437MHz		4874	46.59	-27.41	74	52.92	33.73	12.04	52.1	-	-	P	H
		7311	48.38	-25.62	74	50.25	35.76	14.16	51.79	-	-	P	H
		4874	46.3	-27.7	74	52.63	33.73	12.04	52.1	-	-	P	V
		7311	49.07	-24.93	74	50.94	35.76	14.16	51.79	-	-	P	V
802.11g CH 11 2462MHz		4924	46.03	-27.97	74	52.32	33.7	12.07	52.06	-	-	P	H
		7386	47.96	-26.04	74	49.67	35.78	14.21	51.7	-	-	P	H
		4924	46.96	-27.04	74	53.25	33.7	12.07	52.06	-	-	P	V
		7386	48.49	-25.51	74	50.2	35.78	14.21	51.7	-	-	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		2389.485	56.89	-17.11	74	47.95	32	9.64	32.7	264	227	P	H
		2389.905	47.57	-6.43	54	38.63	32	9.64	32.7	264	227	A	H
		2412	106.63	-	-	97.57	32.1	9.66	32.7	264	227	P	H
		2412	99.75	-	-	90.69	32.1	9.66	32.7	264	227	A	H
		2389.695	60.77	-13.23	74	51.83	32	9.64	32.7	295	250	P	V
		2389.905	50.63	-3.37	54	41.69	32	9.64	32.7	295	250	A	V
		2412	112.75	-	-	103.69	32.1	9.66	32.7	295	250	P	V
		2412	105.59	-	-	96.53	32.1	9.66	32.7	295	250	A	V
802.11n HT20 CH 06 2437MHz		2332.4	55.49	-18.51	74	46.62	32	9.57	32.7	178	226	P	H
		2389.8	45.2	-8.8	54	36.26	32	9.64	32.7	178	226	A	H
		2437	109.29	-	-	100	32.3	9.69	32.7	178	226	P	H
		2437	101.36	-	-	92.07	32.3	9.69	32.7	178	226	A	H
		2497.69	55.08	-18.92	74	45.91	32.1	9.77	32.7	178	226	P	H
		2483.9	45.59	-8.41	54	36.37	32.17	9.75	32.7	178	226	A	H
		2388.96	55.93	-18.07	74	46.99	32	9.64	32.7	289	250	P	V
		2389.66	46.23	-7.77	54	37.29	32	9.64	32.7	289	250	A	V
		2437	114.58	-	-	105.29	32.3	9.69	32.7	289	250	P	V
		2437	107.3	-	-	98.01	32.3	9.69	32.7	289	250	A	V
		2483.58	57.1	-16.9	74	47.88	32.17	9.75	32.7	289	250	P	V
		2484.46	47.61	-6.39	54	38.39	32.17	9.75	32.7	289	250	A	V



802.11n HT20 CH 11 2462MHz		2462	106.8	-	-	97.55	32.23	9.72	32.7	142	228	P	H
		2462	100.32	-	-	91.07	32.23	9.72	32.7	142	228	A	H
		2487.56	58.29	-15.71	74	49.13	32.1	9.76	32.7	142	228	P	H
		2483.56	47.42	-6.58	54	38.2	32.17	9.75	32.7	142	228	A	H
		2462	112.49	-	-	103.24	32.23	9.72	32.7	281	249	P	V
		2462	105.13	-	-	95.88	32.23	9.72	32.7	281	249	A	V
		2489.92	59.04	-14.96	74	49.88	32.1	9.76	32.7	281	249	P	V
		2484.16	50.87	-3.13	54	41.65	32.17	9.75	32.7	281	249	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	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		4824	45.9	-28.1	74	52.18	33.85	12.01	52.14	-	-	P	H
CH 01 2412MHz		4824	47.66	-26.34	74	53.94	33.85	12.01	52.14	-	-	P	V
802.11n HT20		4874	46.24	-27.76	74	52.57	33.73	12.04	52.1	-	-	P	H
CH 06 2437MHz		7311	48.31	-25.69	74	50.18	35.76	14.16	51.79	-	-	P	H
		4874	46.13	-27.87	74	52.46	33.73	12.04	52.1	-	-	P	V
		7311	47.96	-26.04	74	49.83	35.76	14.16	51.79	-	-	P	V
802.11n HT20		4924	45.64	-28.36	74	51.93	33.7	12.07	52.06	-	-	P	H
CH 11 2462MHz		7386	49.05	-24.95	74	50.76	35.78	14.21	51.7	-	-	P	H
		4924	46.53	-27.47	74	52.82	33.7	12.07	52.06	-	-	P	V
		7386	48.2	-25.8	74	49.91	35.78	14.21	51.7	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

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)
2.4GHz 802.11n HT20 LF		38.73	23.34	-16.66	40	36.78	19.58	1.98	35	-	-	P	H
		118.27	32.38	-11.12	43.5	48.08	16.97	2.49	35.16	-	-	P	H
		219.15	25.49	-20.51	46	40.7	17.06	2.79	35.06	-	-	P	H
		311.3	36.71	-9.29	46	48.42	19.99	3.2	34.9	-	-	P	H
		397.63	33.05	-12.95	46	42.48	22.06	3.31	34.8	-	-	P	H
		602.3	26.16	-19.84	46	30.96	25.81	3.89	34.5	-	-	P	H
		39.7	36.16	-3.84	40	49.49	19.7	1.97	35	-	-	P	V
		147.37	30.63	-12.87	43.5	43.85	19.34	2.55	35.11	-	-	P	V
		218.18	26.95	-19.05	46	42.2	17.02	2.79	35.06	-	-	P	V
		307.42	33.46	-12.54	46	45.26	19.9	3.2	34.9	-	-	P	V
		391.81	28.52	-17.48	46	38.08	21.96	3.3	34.82	-	-	P	V
		616.85	25.99	-20.01	46	30.6	26	3.89	34.5	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Co-location data for Sample 1:

2.4GHz 2400~2483.5MHz

802.11n HT20 CH11 2462MHz Tx + LTE Band41 Link

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)	Cable Loss (dB)	Preamplifier Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 11 2462MHz & LTE B41	*	2462	106.75	-	-	97.5	32.23	9.72	32.7	100	243	P	H
	*	2462	99.66	-	-	90.41	32.23	9.72	32.7	100	243	A	H
		2483.8	58.75	-15.25	74	49.53	32.17	9.75	32.7	100	243	P	H
		2483.52	49.04	-4.96	54	39.82	32.17	9.75	32.7	100	243	A	H
	*	2462	109.14	-	-	99.89	32.23	9.72	32.7	279	271	P	V
	*	2462	102.23	-	-	92.98	32.23	9.72	32.7	279	271	A	V
		2483.52	63.03	-10.97	74	53.81	32.17	9.75	32.7	279	271	P	V
		2483.52	50.93	-3.07	54	41.71	32.17	9.75	32.7	279	271	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 11 2462MHz & LTE B41		4924	46.04	-27.96	74	52.33	33.7	12.07	52.06	-	-	P	H
		5168	50.61	-23.39	74	56.58	34.07	12.16	52.2	-	-	P	H
		7386	48.58	-25.42	74	50.29	35.78	14.21	51.7	-	-	P	H
		7752	61.38	-12.62	74	44.45	35.85	14.59	33.51	-	-	P	H
		10336	48.1	-25.9	74	27.59	37.37	15.31	32.17	-	-	P	H
		4924	45.95	-28.05	74	52.24	33.7	12.07	52.06	-	-	P	V
		5168	49.82	-24.18	74	55.79	34.07	12.16	52.2	-	-	P	V
		7386	48.6	-25.4	74	50.31	35.78	14.21	51.7	-	-	P	V
		7752	57.97	-16.03	74	41.04	35.85	14.59	33.51	-	-	P	V
		10336	48.59	-25.41	74	28.08	37.37	15.31	32.17	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



For Sample 2:

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable 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 11 2462MHz		2462	107.43	-	-	98.18	32.23	9.72	32.7	100	303	P	H
		2462	100.33	-	-	91.08	32.23	9.72	32.7	100	303	A	H
		2483.88	57.45	-16.55	74	48.23	32.17	9.75	32.7	100	303	P	H
		2483.52	47.84	-6.16	54	38.62	32.17	9.75	32.7	100	303	A	H
		2462	109.46	-	-	100.21	32.23	9.72	32.7	219	242	P	V
		2462	102.58	-	-	93.33	32.23	9.72	32.7	219	242	A	V
		2484.96	58.34	-15.66	74	49.12	32.17	9.75	32.7	219	242	P	V
		2483.52	48.27	-5.73	54	39.05	32.17	9.75	32.7	219	242	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	Cable 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 11 2462MHz		4924	45.53	-28.47	74	51.82	33.7	12.07	52.06	-	-	P	H
		7386	47.98	-26.02	74	49.69	35.78	14.21	51.7	-	-	P	H
		4924	45.2	-28.8	74	51.49	33.7	12.07	52.06	-	-	P	V
		7386	47.14	-26.86	74	48.85	35.78	14.21	51.7	-	-	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	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)

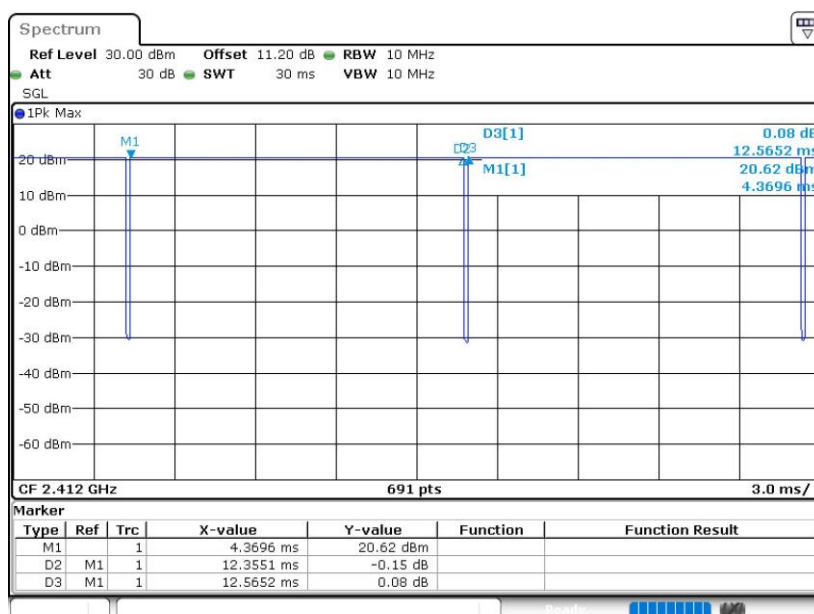
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

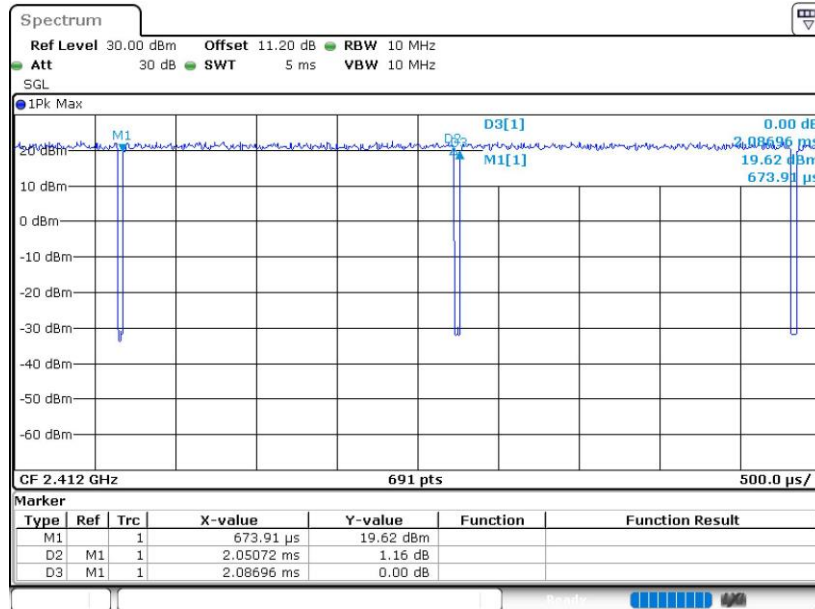
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	98.33	-	-	10Hz
802.11g	98.26	-	-	10Hz
802.11n HT20	98.13	-	-	10Hz

802.11b





802.11g



802.11n HT20

