

FCC RF Test Report

APPLICANT : SHARP CORPORATION, Mobile Communication B.U.
EQUIPMENT : Smart Phone
BRAND NAME : SHARP
FCC ID : APYHRO00290
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Sep. 02, 2020 and testing was completed on Sep. 23, 2020. We, Sporton International (ShenZhen) 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 (ShenZhen) Inc., the test report shall not be reproduced except in full.



Reviewed by: Derreck Chen / Supervisor



Approved by: Eric Shih / Manager



Sporton International (ShenZhen) Inc.

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
FR090204C	Rev. 01	Initial issue of report	Oct. 06, 2020

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Not Required	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.44 dB at 280.260 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 8.43 dB at 0.552 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

Remark: Not required means after assessing, test items are not necessary to carry out.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

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

SHARP CORPORATION, Mobile Communication B.U.

2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi, Hiroshima 739-0192, Japan

1.2 Manufacturer

SHARP CORPORATION

1 Takumi-cho, Sakai-ku, Sakai-shi, Osaka 590-8522, Japan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	SHARP
FCC ID	APYHRO00290
EUT supports Radios application	GSM/WCDMA/LTE/NFC 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 GNSS/FM Receiver
IMEI Code	Conducted: 004401117424180 Conduction: 004401117424610 Radiation: 004401117424529
HW Version	DVT
SW Version	A729A
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	802.11b : 15.82 dBm (0.0382 W) 802.11g : 16.42 dBm (0.0439 W) 802.11n HT20 : 16.45 dBm (0.0442 W)
Antenna Type / Gain	IFA Antenna Type with gain -2.2 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International (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	CN1257	314309

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

Test Firm	Sporton International (Shenzhen) Inc.		
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.
	TH01-SZ	CN1256	421272

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan Shenzhen, 518055 People's Republic of China TEL: +86-755-33202398		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH02-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-SZ	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
- ♦ 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 (Y plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

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

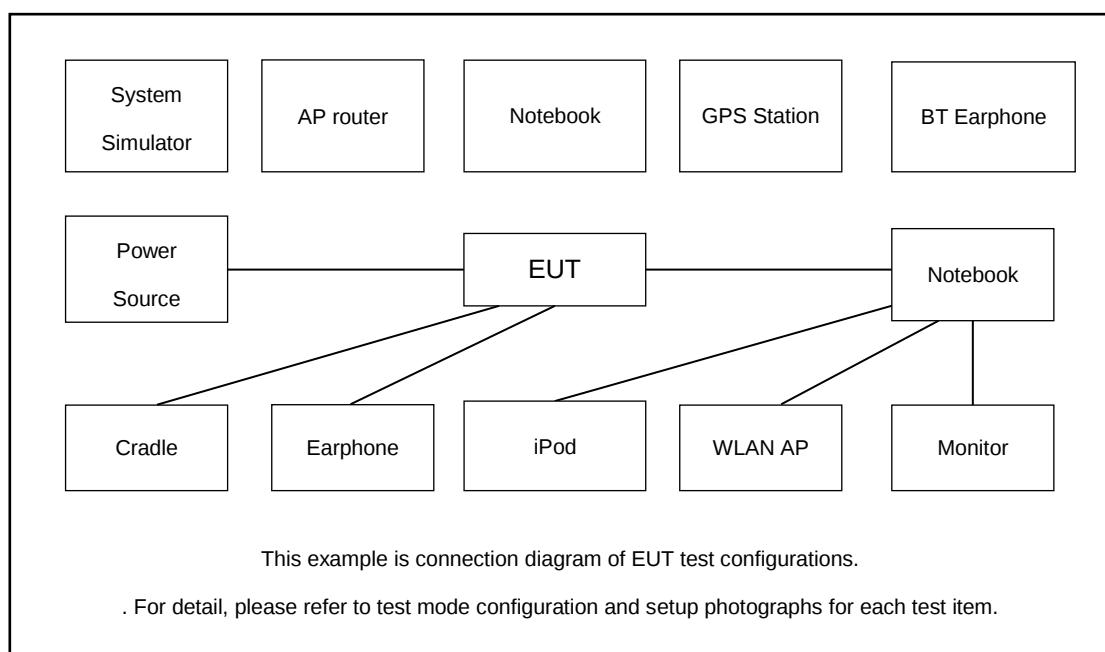
2.2 Test Mode

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

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

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

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Earphone	Lenovo	P121	N/A	N/A	N/A
5.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
6.	SD Card	Kingston	8GB	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 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 1.20dB and attenuator factor 20.00 dB.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\
 &= 1.20(\text{dB}) + 20.00 (\text{dB}) \\
 &= 21.20(\text{dB})
 \end{aligned}$$

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.

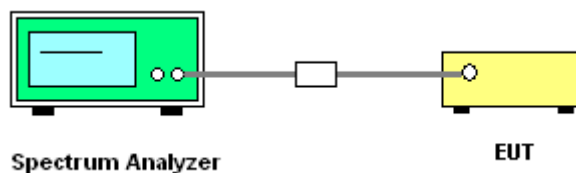
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

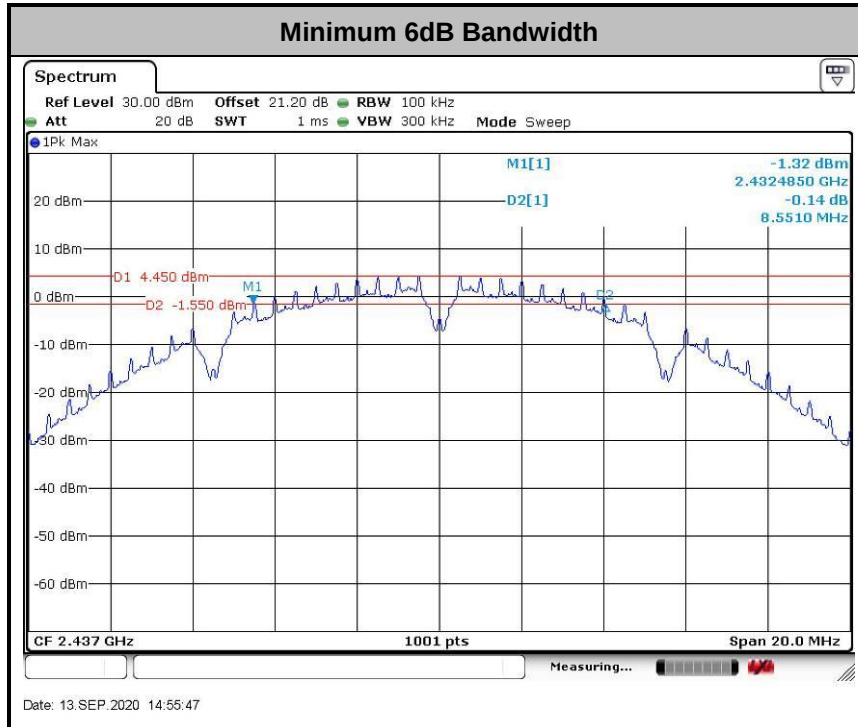
1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement 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 and 99% Occupied Bandwidth

Please refer to Appendix A.



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.2 Method AVGPM-G method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of 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

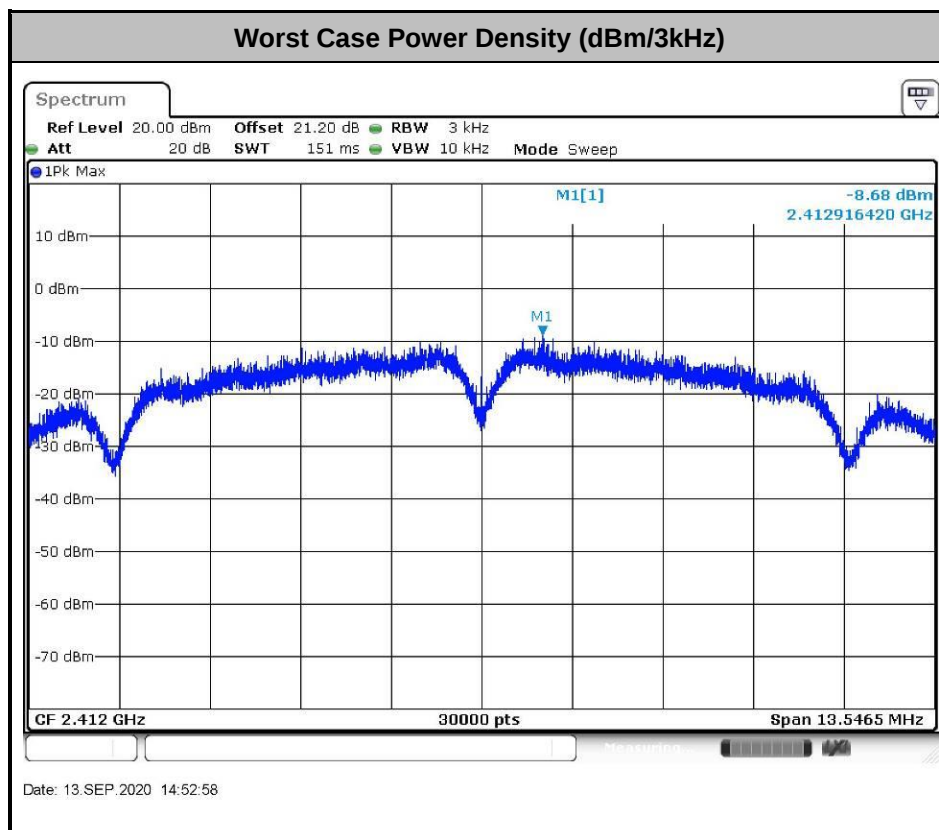
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the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

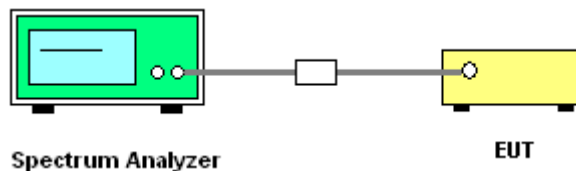
3.4.2 Measuring Instruments

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

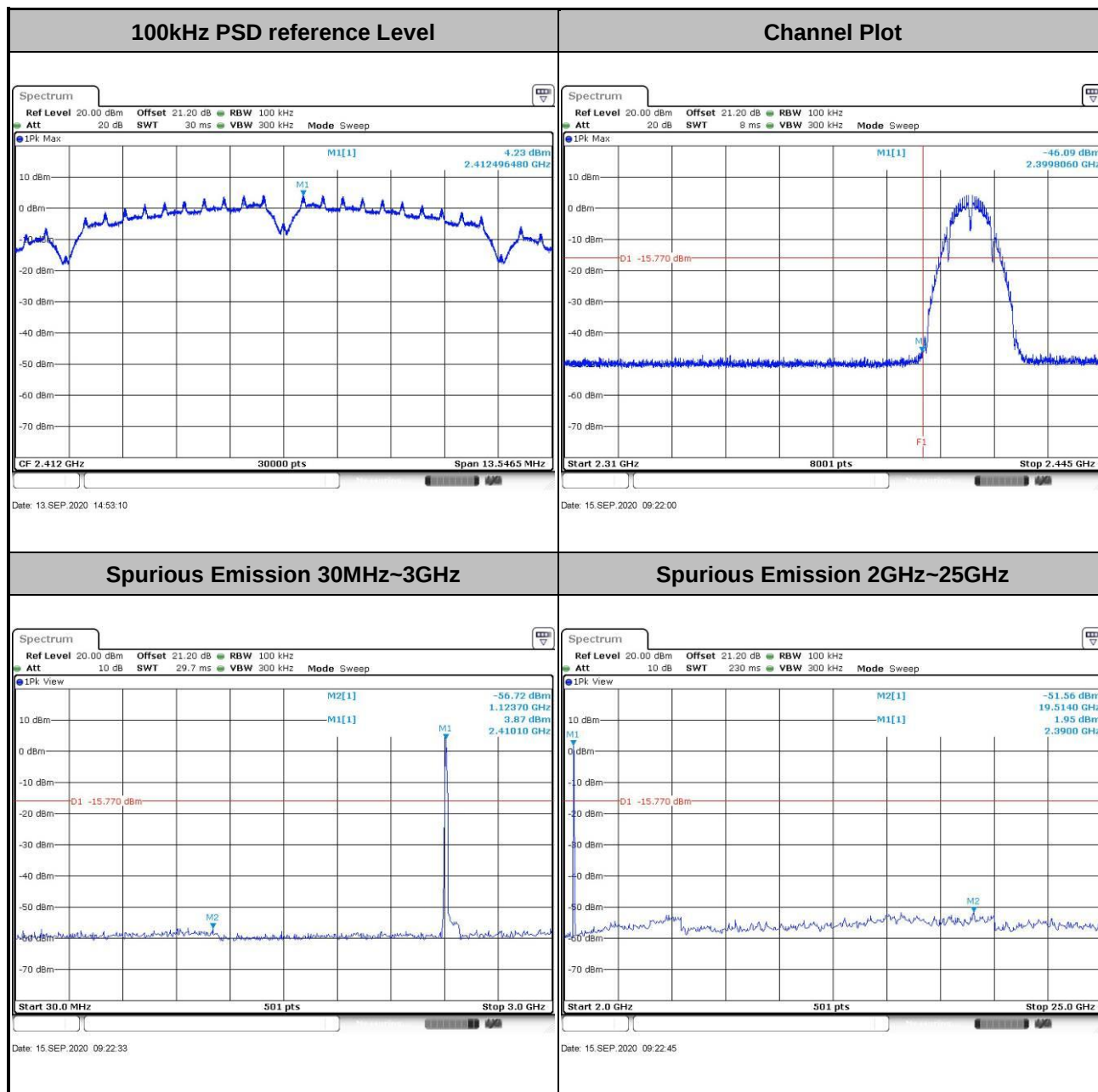




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Zeng Meng Hui	Temperature :	21~25°C
		Relative Humidity :	51~54%

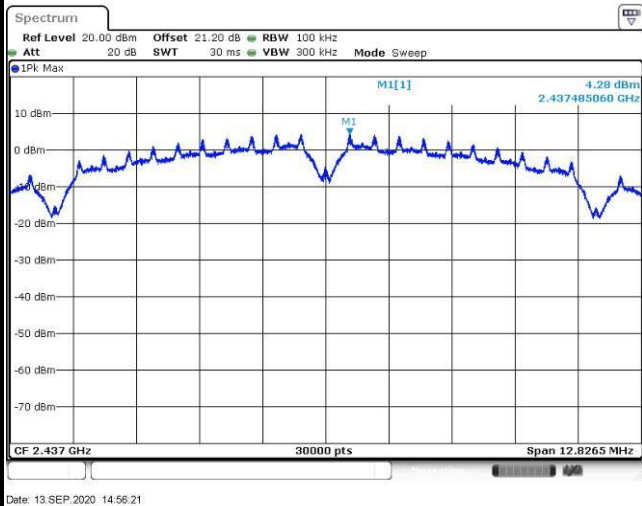
Test Mode :	802.11b	Test Channel :	01
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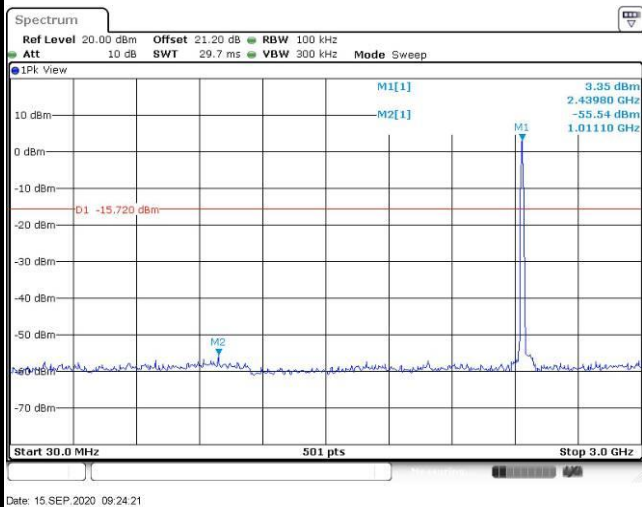
Test Mode :	802.11b	Test Channel :	06
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100kHz PSD reference Level

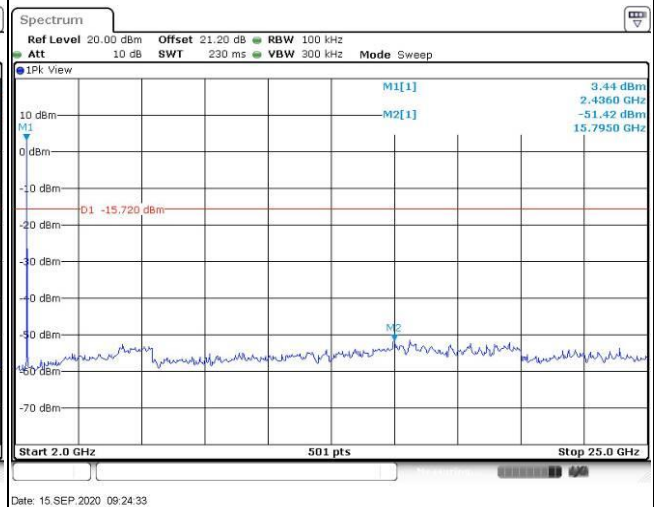


Channel Plot

Spurious Emission 30MHz~3GHz

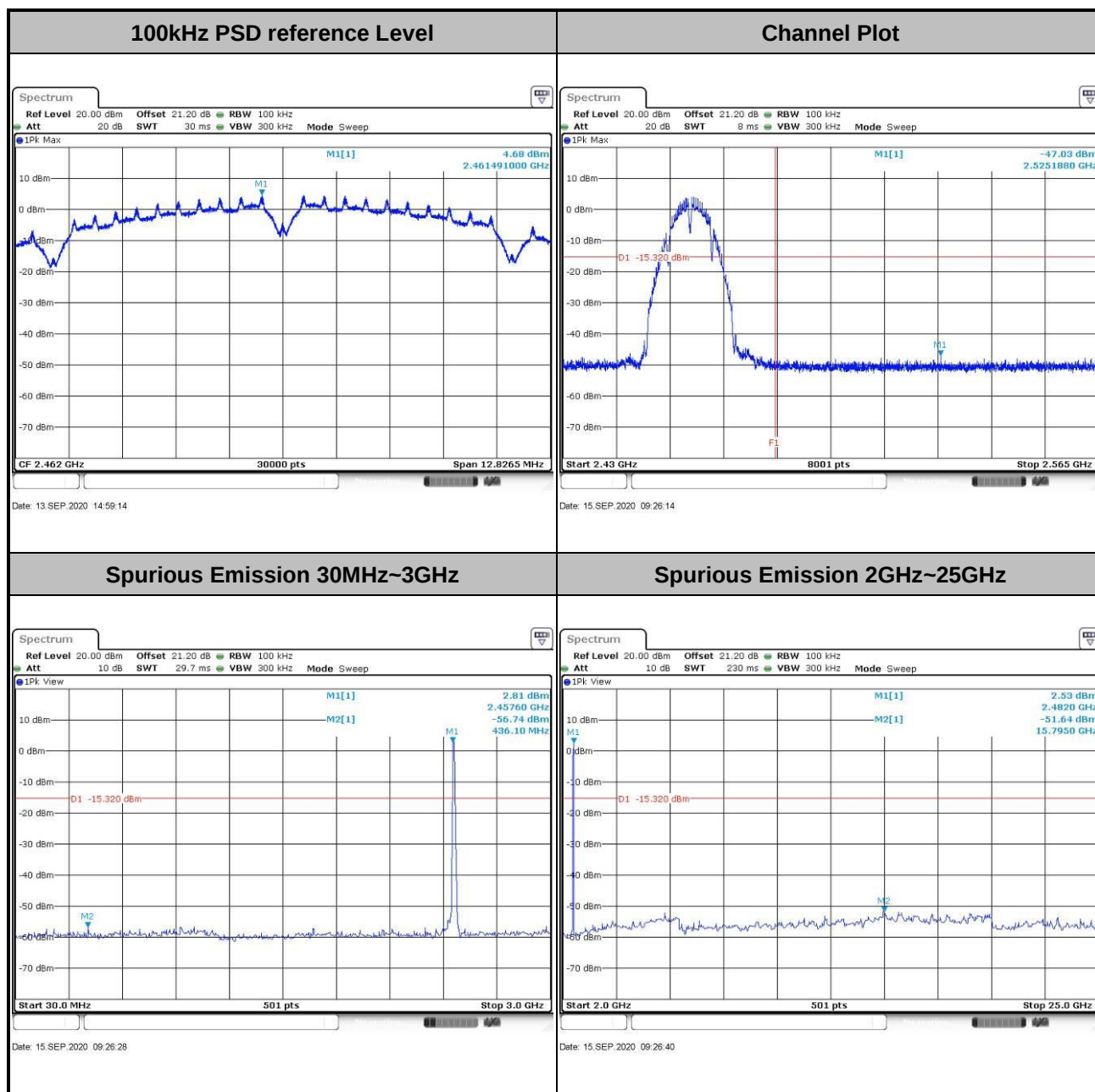


Spurious Emission 2GHz~25GHz





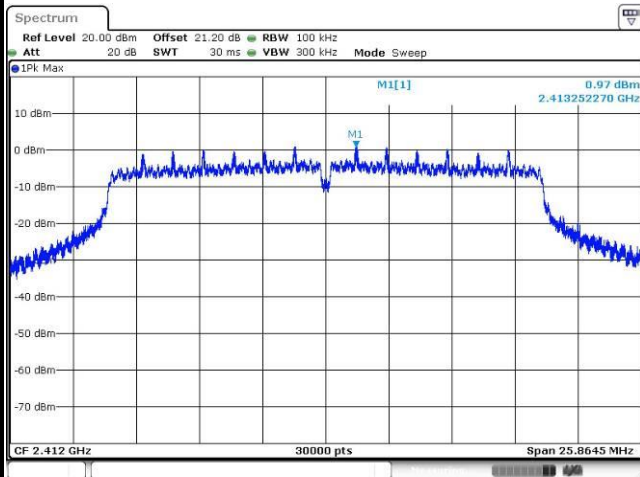
Test Mode :	802.11b	Test Channel :	11
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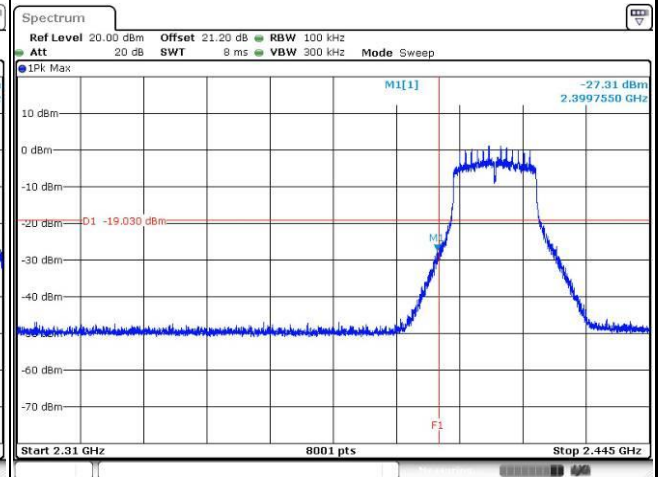


Test Mode :	802.11g	Test Channel :	01
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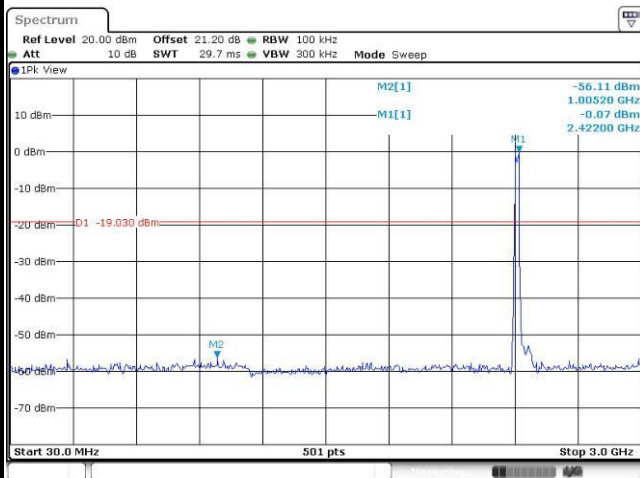
100kHz PSD reference Level



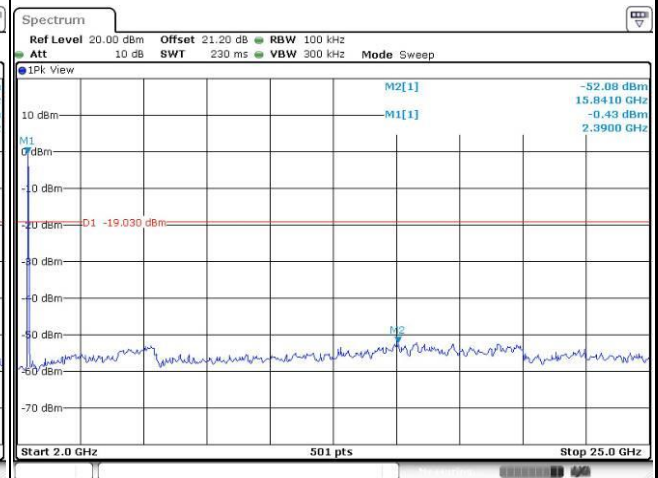
Channel Plot



Spurious Emission 30MHz~3GHz



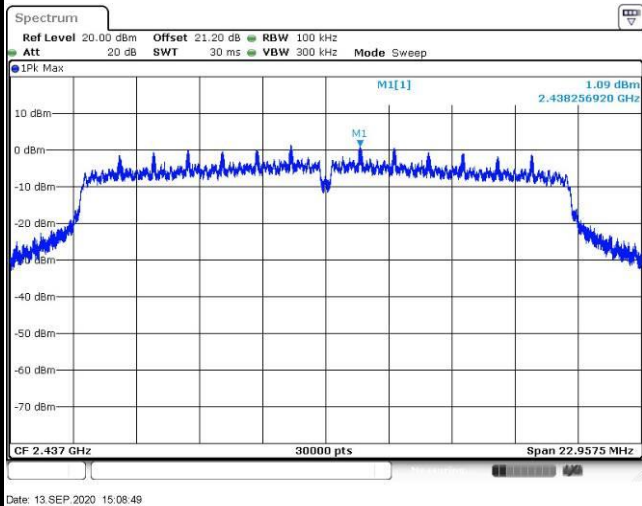
Spurious Emission 2GHz~25GHz





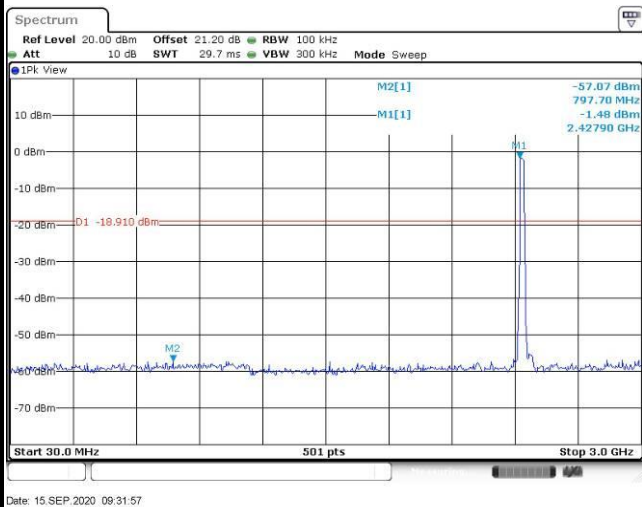
Test Mode :	802.11g	Test Channel :	06
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100kHz PSD reference Level

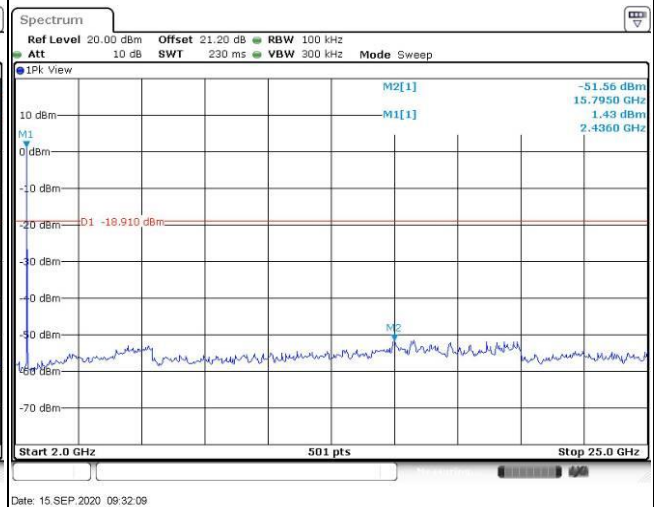


Channel Plot

Spurious Emission 30MHz~3GHz

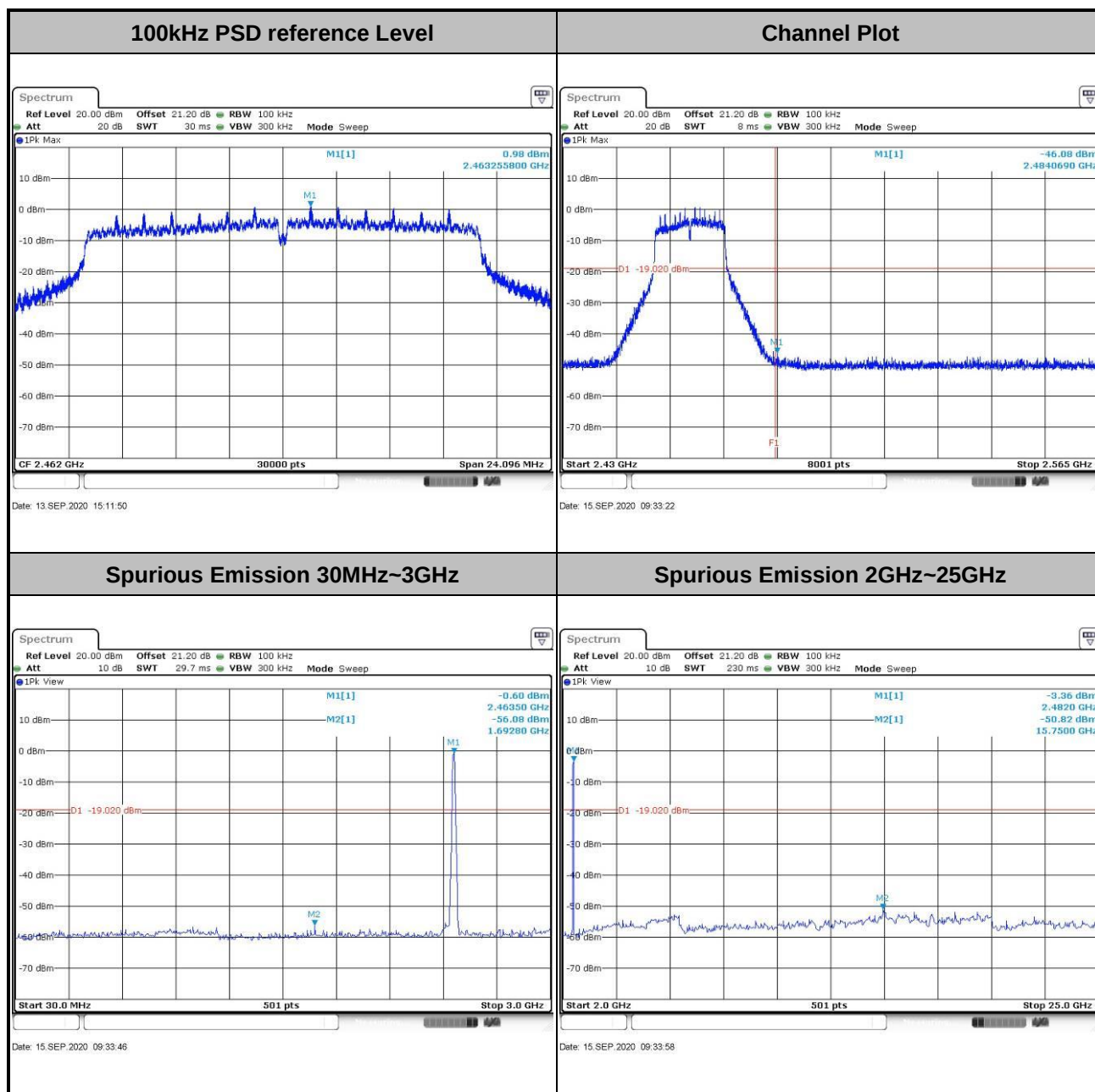


Spurious Emission 2GHz~25GHz



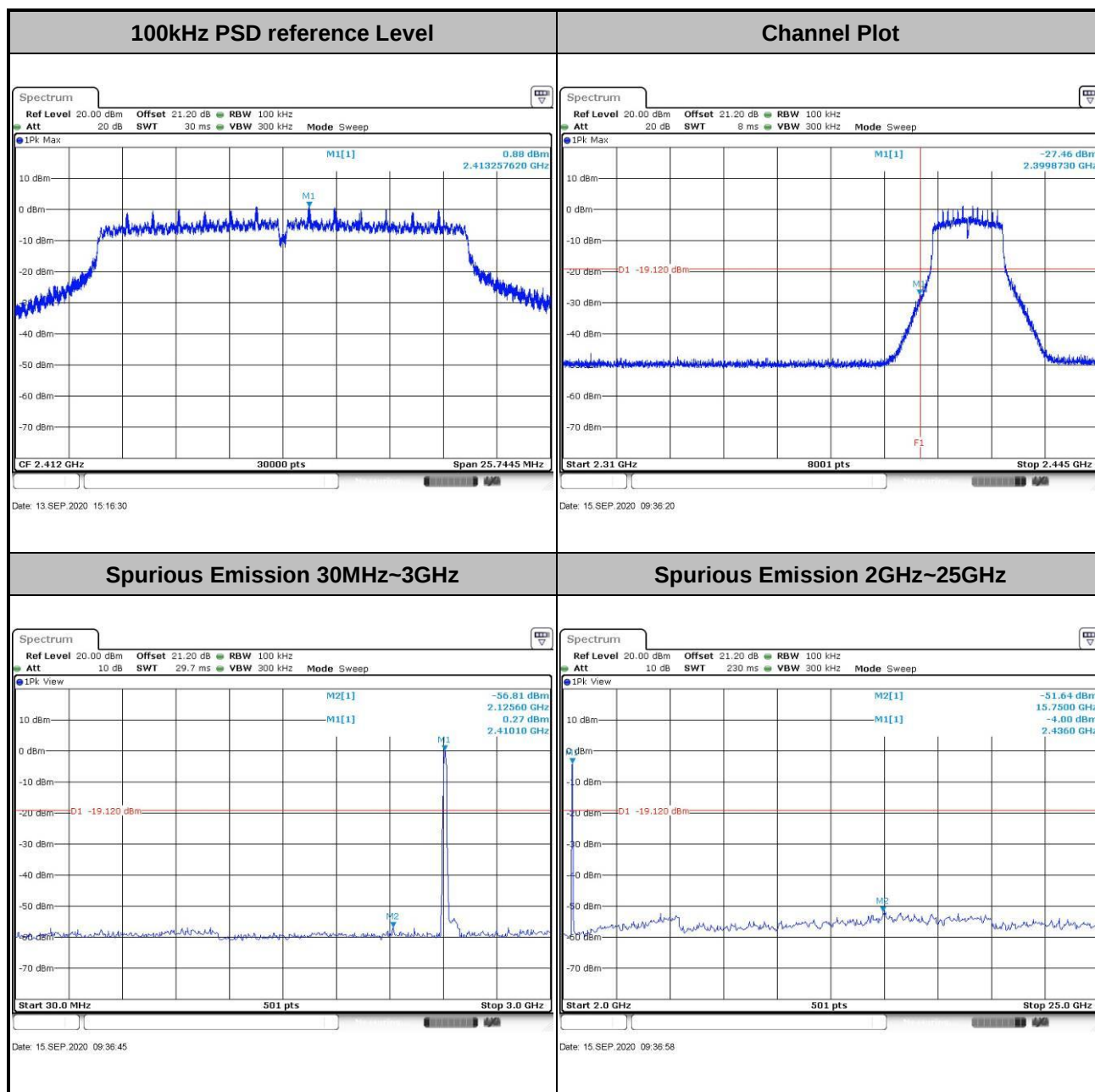


Test Mode :	802.11g	Test Channel :	11
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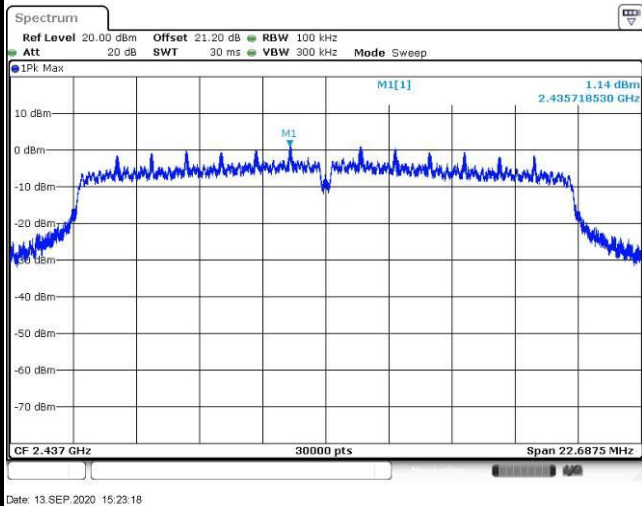
Test Mode :	802.11n HT20	Test Channel :	01
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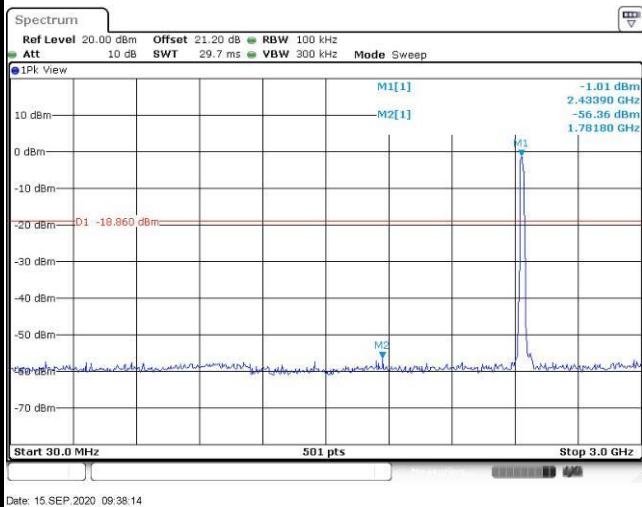
Test Mode :	802.11n HT20	Test Channel :	06
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100kHz PSD reference Level

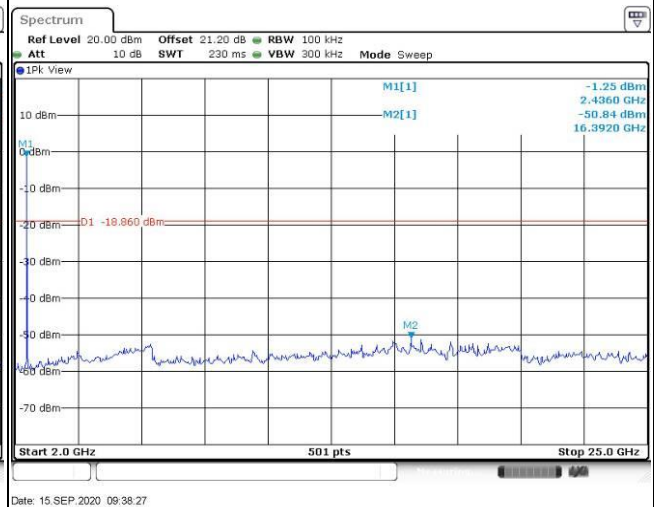


Channel Plot

Spurious Emission 30MHz~3GHz

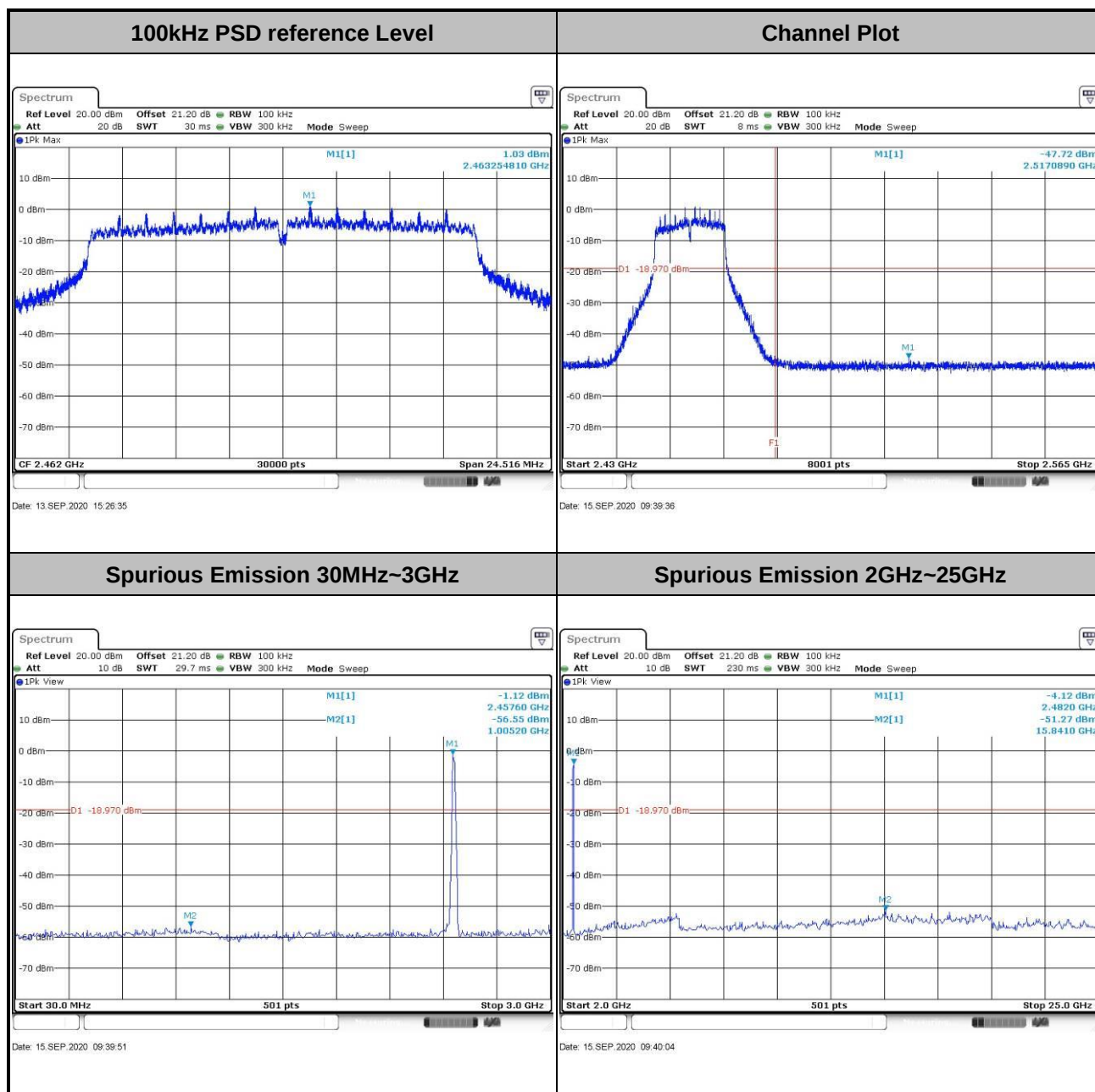


Spurious Emission 2GHz~25GHz





Test Mode :	802.11n HT20	Test Channel :	11
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3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

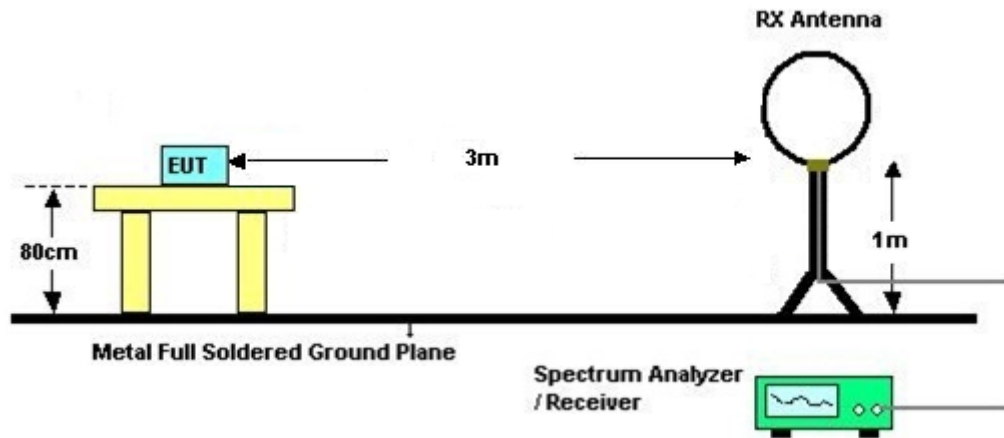
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

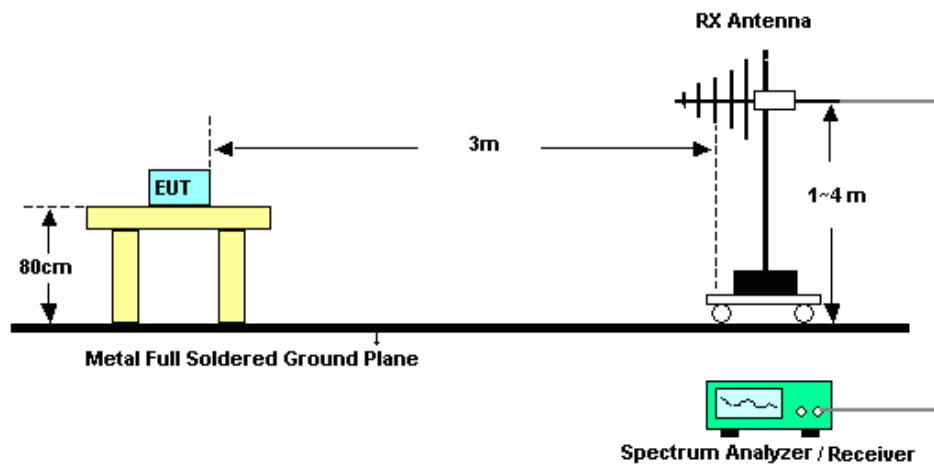
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

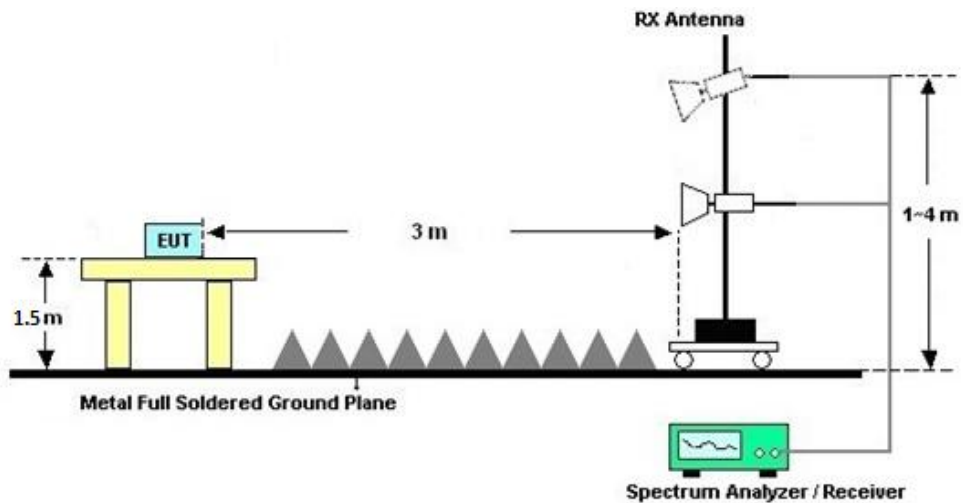
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (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.

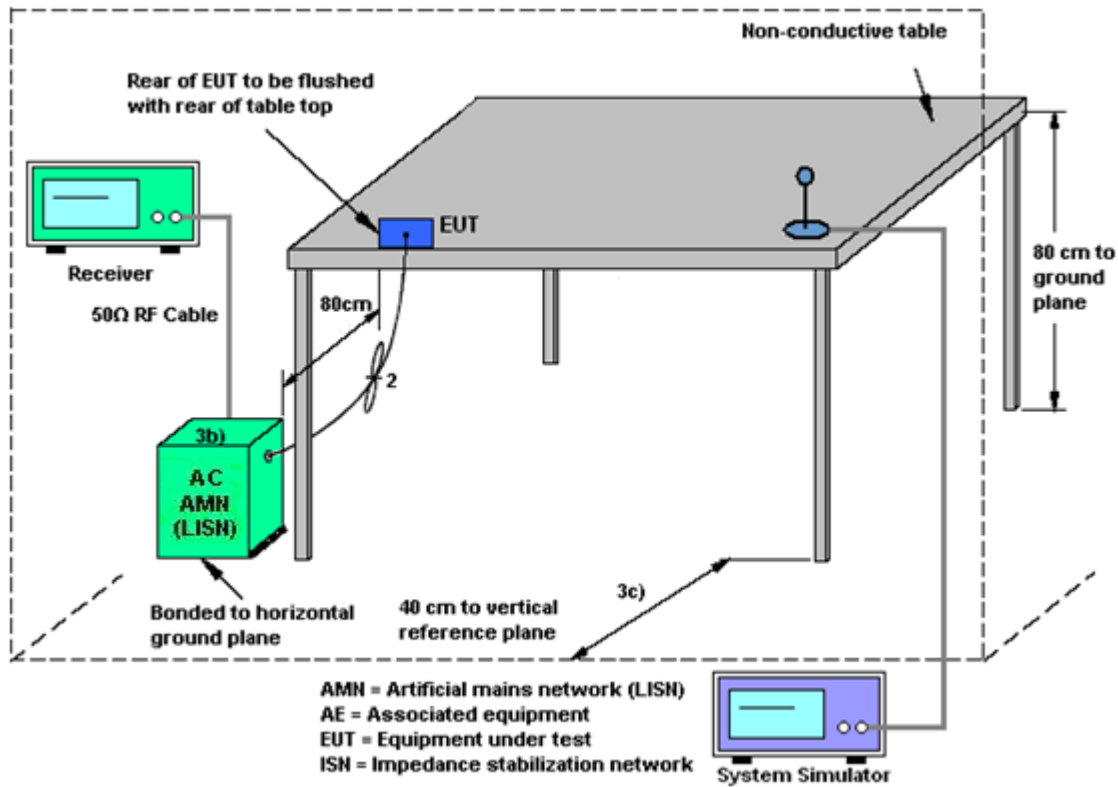
3.6.2 Measuring Instruments

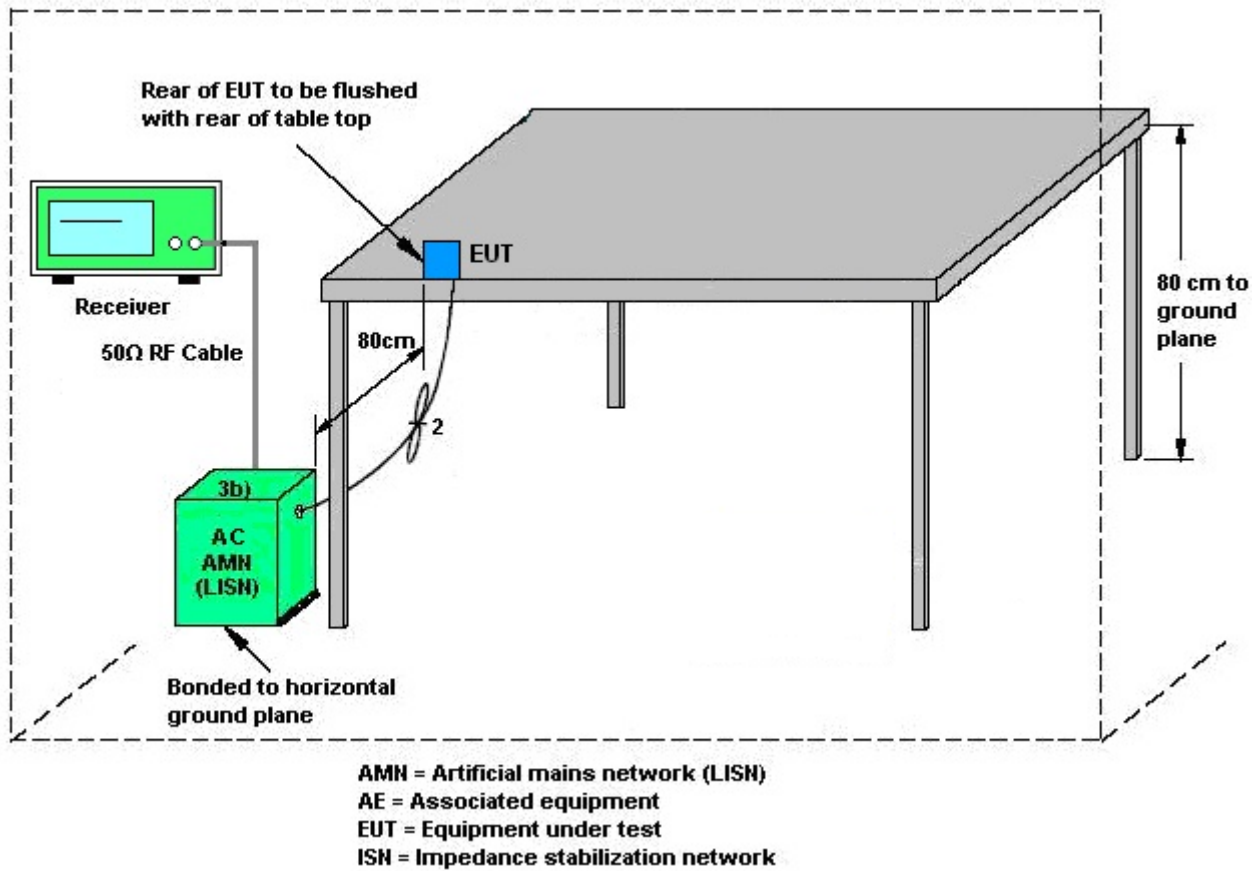
The measuring equipment is listed in the section 4 of this test report.

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. 17, 2020	Sep. 13, 2020~Sep. 15, 2020	Apr. 16, 2021	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2019	Sep. 13, 2020~Sep. 15, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2019	Sep. 13, 2020~Sep. 15, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 21, 2020	Sep. 21, 2020~Sep. 23, 2020	Jul. 20, 2021	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Sep. 21, 2020~Sep. 23, 2020	Jun. 21, 2022	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jul. 15, 2020	Sep. 21, 2020~Sep. 23, 2020	Jul. 14, 2021	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 25, 2020	Sep. 21, 2020~Sep. 23, 2020	Jul. 24, 2021	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 21, 2020	Sep. 21, 2020~Sep. 23, 2020	Jul. 20, 2021	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Apr. 23, 2020	Sep. 21, 2020~Sep. 23, 2020	Apr. 22, 2021	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 17, 2019	Sep. 21, 2020~Sep. 23, 2020	Oct. 16, 2020	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 17, 2019	Sep. 21, 2020~Sep. 23, 2020	Oct. 16, 2020	Radiation (03CH02-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5GHz	Oct. 17, 2019	Sep. 21, 2020~Sep. 23, 2020	Oct. 16, 2020	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Sep. 21, 2020~Sep. 23, 2020	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Sep. 21, 2020~Sep. 23, 2020	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Sep. 21, 2020~Sep. 23, 2020	NCR	Radiation (03CH02-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 14, 2020	Sep. 21, 2020	Apr. 13, 2021	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 18, 2019	Sep. 21, 2020	Oct. 17, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Oct. 28, 2019	Sep. 21, 2020	Oct. 27, 2020	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 18, 2019	Sep. 21, 2020	Oct. 17, 2020	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
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0 dB
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Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Zeng Meng Hui	Temperature:	21~25	°C
Test Date:	2020/9/9	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	-	9.03	-	0.50	Pass
11b	1Mbps	1	6	2437	13.69	-	8.55	-	0.50	Pass
11b	1Mbps	1	11	2462	13.84	-	8.55	-	0.50	Pass
11g	6Mbps	1	1	2412	18.03	-	17.24	-	0.50	Pass
11g	6Mbps	1	6	2437	17.78	-	15.31	-	0.50	Pass
11g	6Mbps	1	11	2462	17.93	-	16.06	-	0.50	Pass
HT20	MCS0	1	1	2412	18.03	-	17.16	-	0.50	Pass
HT20	MCS0	1	6	2437	17.83	-	15.13	-	0.50	Pass
HT20	MCS0	1	11	2462	17.93	-	16.34	-	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 1	Ant 1	Ant 1	Ant 1	
11b	1Mbps	1	1	2412	15.73	30.00	-2.20	13.53	36.00	Pass
11b	1Mbps	1	6	2437	15.82	30.00	-2.20	13.62	36.00	Pass
11b	1Mbps	1	11	2462	15.76	30.00	-2.20	13.56	36.00	Pass
11g	6Mbps	1	1	2412	16.42	30.00	-2.20	14.22	36.00	Pass
11g	6Mbps	1	6	2437	16.37	30.00	-2.20	14.17	36.00	Pass
11g	6Mbps	1	11	2462	16.32	30.00	-2.20	14.12	36.00	Pass
HT20	MCS0	1	1	2412	16.45	30.00	-2.20	14.25	36.00	Pass
HT20	MCS0	1	6	2437	16.31	30.00	-2.20	14.11	36.00	Pass
HT20	MCS0	1	11	2462	16.15	30.00	-2.20	13.95	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
					Ant 1	Ant 1	Ant 1	Ant 1	Ant 1	
11b	1Mbps	1	1	2412	13.30	30.00	-2.20	11.10	36.00	Pass
11b	1Mbps	1	6	2437	13.60	30.00	-2.20	11.40	36.00	Pass
11b	1Mbps	1	11	2462	13.50	30.00	-2.20	11.30	36.00	Pass
11g	6Mbps	1	1	2412	11.20	30.00	-2.20	9.00	36.00	Pass
11g	6Mbps	1	6	2437	11.30	30.00	-2.20	9.10	36.00	Pass
11g	6Mbps	1	11	2462	11.20	30.00	-2.20	9.00	36.00	Pass
HT20	MCS0	1	1	2412	11.10	30.00	-2.20	8.90	36.00	Pass
HT20	MCS0	1	6	2437	11.10	30.00	-2.20	8.90	36.00	Pass
HT20	MCS0	1	11	2462	11.00	30.00	-2.20	8.80	36.00	Pass

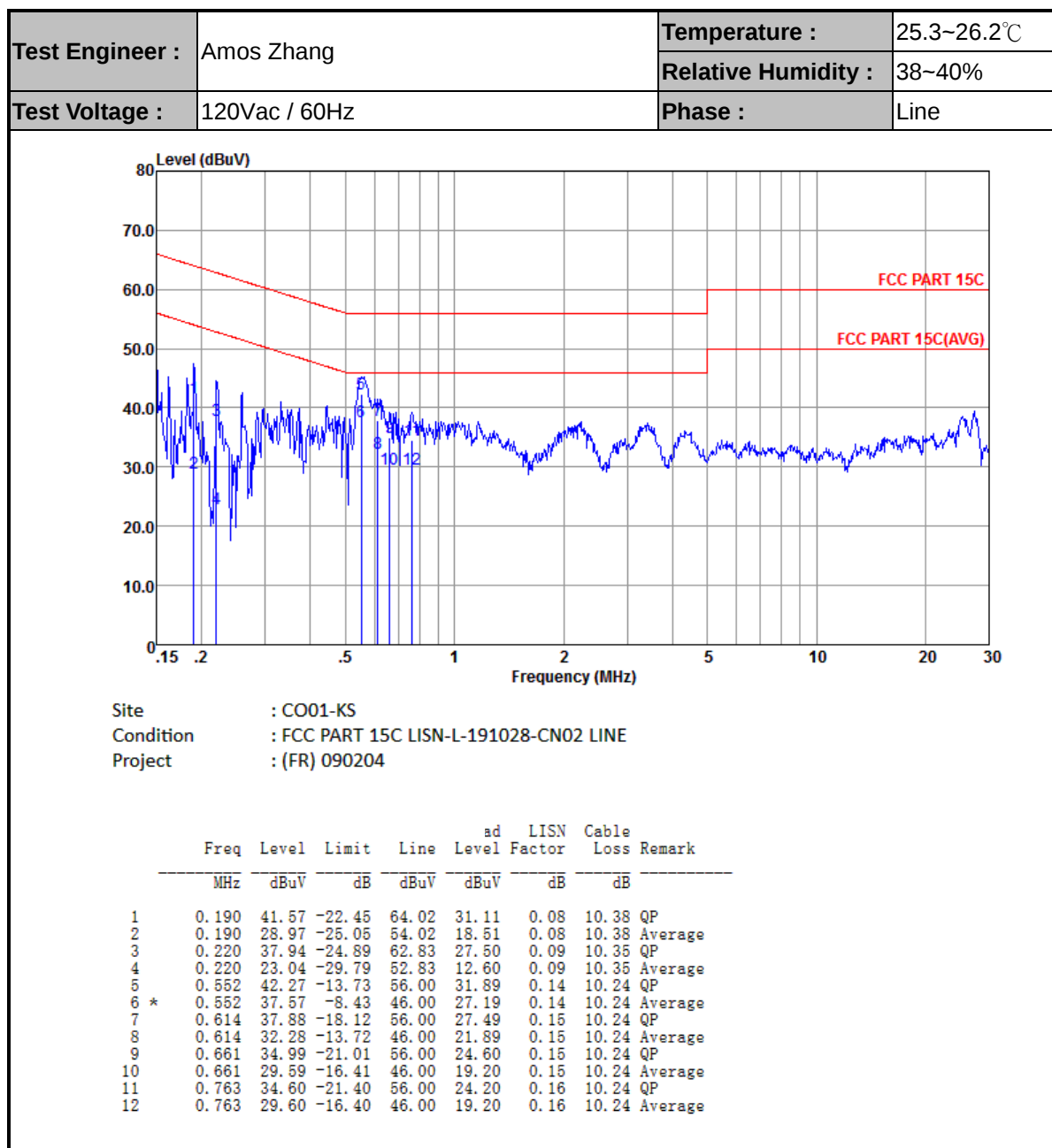
TEST RESULTS DATA
Peak Power Spectral Density

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	-8.68	-	-	-2.20	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-8.96	-	-	-2.20	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-8.94	-	-	-2.20	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-14.34	-	-	-2.20	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-13.51	-	-	-2.20	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-13.73	-	-	-2.20	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-13.63	-	-	-2.20	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-13.91	-	-	-2.20	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-13.44	-	-	-2.20	-	8.00	-	Pass

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

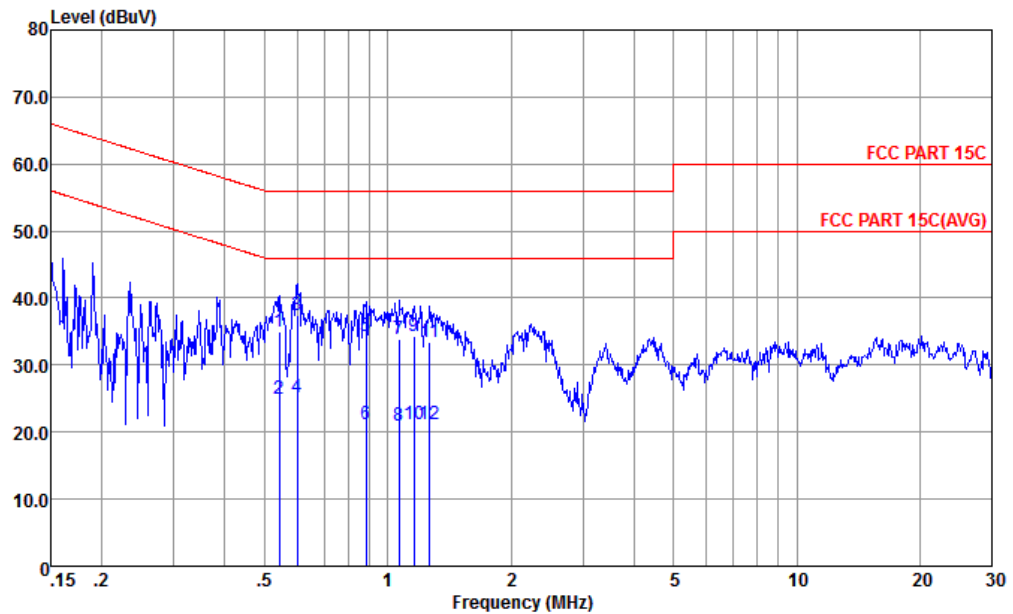


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Amos Zhang	Temperature :	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS
Condition : FCC PART 15C LISN-N-191028-CN02 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.544	34.97	-21.03	56.00	24.49	0.24	10.24	QP
2	0.544	24.97	-21.03	46.00	14.49	0.24	10.24	Average
3 *	0.601	37.38	-18.62	56.00	26.90	0.24	10.24	QP
4	0.601	25.28	-20.72	46.00	14.80	0.24	10.24	Average
5	0.885	34.31	-21.69	56.00	23.79	0.28	10.24	QP
6	0.885	21.11	-24.89	46.00	10.59	0.28	10.24	Average
7	1.065	33.85	-22.15	56.00	23.31	0.31	10.23	QP
8	1.065	20.85	-25.15	46.00	10.31	0.31	10.23	Average
9	1.160	34.37	-21.63	56.00	23.80	0.34	10.23	QP
10	1.160	21.17	-24.83	46.00	10.60	0.34	10.23	Average
11	1.269	33.50	-22.50	56.00	22.90	0.37	10.23	QP
12	1.269	21.10	-24.90	46.00	10.50	0.37	10.23	Average

Note:

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



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (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.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2363.97	50.37	-23.63	74	46.97	27.83	7.51	31.94	264	231	P	H
		2311.89	39.49	-14.51	54	36.03	27.97	7.48	31.99	264	231	A	H
	*	2412	99.12	-	-	95.8	27.67	7.54	31.89	264	231	P	H
	*	2412	96.16	-	-	92.84	27.67	7.54	31.89	264	231	A	H
		2335.83	50.45	-23.55	74	47.03	27.9	7.48	31.96	229	92	P	V
		2389.59	39.53	-14.47	54	36.2	27.7	7.54	31.91	229	92	A	V
	*	2412	100.48	-	-	97.16	27.67	7.54	31.89	229	92	P	V
	*	2412	97.49	-	-	94.17	27.67	7.54	31.89	229	92	A	V
802.11b CH 06 2437MHz		2340.94	50.21	-23.79	74	46.79	27.9	7.48	31.96	140	139	P	H
		2316.86	39.57	-14.43	54	36.1	27.97	7.48	31.98	140	139	A	H
	*	2437	98.51	-	-	95.23	27.6	7.54	31.86	140	139	P	H
	*	2437	95.38	-	-	92.1	27.6	7.54	31.86	140	139	A	H
		2496.78	49.99	-24.01	74	46.86	27.4	7.53	31.8	140	139	P	H
		2483.83	39.56	-14.44	54	36.38	27.47	7.53	31.82	140	139	A	H
		2342.06	50.05	-23.95	74	46.63	27.9	7.48	31.96	230	103	P	V
		2332.96	39.53	-14.47	54	36.09	27.93	7.48	31.97	230	103	A	V
	*	2437	98.42	-	-	95.14	27.6	7.54	31.86	230	103	P	V
	*	2437	95.29	-	-	92.01	27.6	7.54	31.86	230	103	A	V
		2485.51	49.9	-24.1	74	46.71	27.47	7.53	31.81	230	103	P	V
		2484.81	39.48	-14.52	54	36.3	27.47	7.53	31.82	230	103	A	V



802.11b CH 11 2462MHz	*	2462	98.92	-	-	95.69	27.53	7.54	31.84	117	141	P	H
	*	2462	95.75	-	-	92.52	27.53	7.54	31.84	117	141	A	H
		2490.4	50.47	-23.53	74	47.35	27.4	7.53	31.81	117	141	P	H
		2483.52	39.57	-14.43	54	36.39	27.47	7.53	31.82	117	141	A	H
	*	2462	96.88	-	-	93.65	27.53	7.54	31.84	142	290	P	V
	*	2462	93.66	-	-	90.43	27.53	7.54	31.84	142	290	A	V
		2498.92	50.02	-23.98	74	46.89	27.4	7.53	31.8	142	290	P	V
		2483.52	39.41	-14.59	54	36.23	27.47	7.53	31.82	142	290	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	40.5	-33.5	74	55.01	31.15	8.71	54.37	160	360	P	H
		4824	39.2	-34.8	74	53.71	31.15	8.71	54.37	194	311	P	V
802.11b CH 06 2437MHz		4874	40.78	-33.22	74	55.21	31.13	8.79	54.35	108	294	P	H
		7311	46.75	-27.25	74	53.77	36.4	11.09	54.51	117	356	P	H
		4874	40.67	-33.33	74	55.1	31.13	8.79	54.35	108	294	P	V
		7311	46.88	-27.12	74	53.9	36.4	11.09	54.51	117	356	P	V
802.11b CH 11 2462MHz		4924	40.05	-33.95	74	54.25	31.23	8.9	54.33	122	94	P	H
		7386	46.3	-27.7	74	53.52	36.3	11.08	54.6	188	164	P	H
		4924	40.01	-33.99	74	54.21	31.23	8.9	54.33	122	94	P	V
		7386	46.47	-27.53	74	53.69	36.3	11.08	54.6	188	164	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2333.83	50.61	-23.39	74	47.17	27.93	7.48	31.97	147	138	P	H
		2390	39.76	-14.24	54	36.43	27.7	7.54	31.91	147	138	A	H
	*	2412	101.19	-	-	97.87	27.67	7.54	31.89	147	138	P	H
	*	2412	93.47	-	-	90.15	27.67	7.54	31.89	147	138	A	H
		2377.62	51.14	-22.86	74	47.78	27.77	7.51	31.92	155	287	P	V
		2390	39.62	-14.38	54	36.29	27.7	7.54	31.91	155	287	A	V
	*	2412	99.62	-	-	96.3	27.67	7.54	31.89	155	287	P	V
	*	2412	91.38	-	-	88.06	27.67	7.54	31.89	155	287	A	V
802.11g CH 06 2437MHz		2375.38	50.43	-23.57	74	47.07	27.77	7.51	31.92	129	143	P	H
		2389.94	39.5	-14.5	54	36.17	27.7	7.54	31.91	129	143	A	H
	*	2437	99.46	-	-	96.18	27.6	7.54	31.86	129	143	P	H
	*	2437	91.11	-	-	87.83	27.6	7.54	31.86	129	143	A	H
		2493.98	50.41	-23.59	74	47.29	27.4	7.53	31.81	129	143	P	H
		2483.5	39.57	-14.43	54	36.39	27.47	7.53	31.82	129	143	A	H
		2389.8	50.67	-23.33	74	47.34	27.7	7.54	31.91	150	302	P	V
		2320.22	39.51	-14.49	54	36.08	27.93	7.48	31.98	150	302	A	V
	*	2437	96.54	-	-	93.26	27.6	7.54	31.86	150	302	P	V
	*	2437	88.81	-	-	85.53	27.6	7.54	31.86	150	302	A	V
		2484.53	49.96	-24.04	74	46.78	27.47	7.53	31.82	150	302	P	V
		2483.97	39.4	-14.6	54	36.22	27.47	7.53	31.82	150	302	A	V



802.11g CH 11 2462MHz	*	2462	98.93	-	-	95.7	27.53	7.54	31.84	159	139	P	H
	*	2462	91.18	-	-	87.95	27.53	7.54	31.84	159	139	A	H
		2487.4	49.94	-24.06	74	46.75	27.47	7.53	31.81	159	139	P	H
		2483.56	39.81	-14.19	54	36.63	27.47	7.53	31.82	159	139	A	H
	*	2462	98.66	-	-	95.43	27.53	7.54	31.84	168	289	P	V
	*	2462	90.4	-	-	87.17	27.53	7.54	31.84	168	289	A	V
		2484.52	50.23	-23.77	74	47.05	27.47	7.53	31.82	168	289	P	V
		2483.76	39.61	-14.39	54	36.43	27.47	7.53	31.82	168	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 802.11g (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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	40.33	-33.67	74	54.84	31.15	8.71	54.37	194	311	P	H
		4824	40.07	-33.93	74	54.58	31.15	8.71	54.37	194	311	P	V
802.11g CH 06 2437MHz		4874	40.19	-33.81	74	54.62	31.13	8.79	54.35	108	294	P	H
		7311	46.95	-27.05	74	53.97	36.4	11.09	54.51	117	356	P	H
		4874	39.37	-34.63	74	53.8	31.13	8.79	54.35	108	294	P	V
		7311	47.35	-26.65	74	54.37	36.4	11.09	54.51	117	356	P	V
802.11g CH 11 2462MHz		4924	39.07	-34.93	74	53.27	31.23	8.9	54.33	122	94	P	H
		7386	45.72	-28.28	74	52.94	36.3	11.08	54.6	188	164	P	H
		4924	39.21	-34.79	74	53.41	31.23	8.9	54.33	122	94	P	V
		7386	46.9	-27.1	74	54.12	36.3	11.08	54.6	188	164	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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2386.23	50.52	-23.48	74	47.19	27.7	7.54	31.91	265	229	P	H
		2390	39.66	-14.34	54	36.33	27.7	7.54	31.91	265	229	A	H
	*	2412	98.99	-	-	95.67	27.67	7.54	31.89	265	229	P	H
	*	2412	91.51	-	-	88.19	27.67	7.54	31.89	265	229	A	H
		2338.87	50.58	-23.42	74	47.16	27.9	7.48	31.96	215	123	P	V
		2390	39.92	-14.08	54	36.59	27.7	7.54	31.91	215	123	A	V
	*	2412	99	-	-	95.68	27.67	7.54	31.89	215	123	P	V
	*	2412	93.49	-	-	90.17	27.67	7.54	31.89	215	123	A	V
802.11n HT20 CH 06 2437MHz		2379.72	50.43	-23.57	74	47.07	27.77	7.51	31.92	188	50	P	H
		2320.08	39.5	-14.5	54	36.07	27.93	7.48	31.98	188	50	A	H
	*	2437	98.52	-	-	95.24	27.6	7.54	31.86	188	50	P	H
	*	2437	91.26	-	-	87.98	27.6	7.54	31.86	188	50	A	H
		2488.1	49.6	-24.4	74	46.48	27.4	7.53	31.81	188	50	P	H
		2483.69	39.46	-14.54	54	36.28	27.47	7.53	31.82	188	50	A	H
		2386.86	50.51	-23.49	74	47.18	27.7	7.54	31.91	211	94	P	V
		2334.64	39.49	-14.51	54	36.08	27.9	7.48	31.97	211	94	A	V
	*	2437	99.03	-	-	95.75	27.6	7.54	31.86	211	94	P	V
	*	2437	91.4	-	-	88.12	27.6	7.54	31.86	211	94	A	V
		2489.5	50.3	-23.7	74	47.18	27.4	7.53	31.81	211	94	P	V
		2484.25	39.46	-14.54	54	36.28	27.47	7.53	31.82	211	94	A	V



802.11n HT20 CH 11 2462MHz	*	2462	98.95	-	-	95.72	27.53	7.54	31.84	192	39	P	H
	*	2462	90.22	-	-	86.99	27.53	7.54	31.84	192	39	A	H
		2484.24	50.24	-23.76	74	47.06	27.47	7.53	31.82	192	39	P	H
		2483.56	39.66	-14.34	54	36.48	27.47	7.53	31.82	192	39	A	H
	*	2462	99.28	-	-	96.05	27.53	7.54	31.84	225	126	P	V
	*	2462	90.91	-	-	87.68	27.53	7.54	31.84	225	126	A	V
		2485.04	50.56	-23.44	74	47.37	27.47	7.53	31.81	225	126	P	V
		2483.56	39.88	-14.12	54	36.7	27.47	7.53	31.82	225	126	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		4824	39.34	-34.66	74	53.85	31.15	8.71	54.37	194	311	P	H
CH 01 2412MHz		4824	40.52	-33.48	74	55.03	31.15	8.71	54.37	194	311	P	V
802.11n HT20		4874	40.3	-33.7	74	54.73	31.13	8.79	54.35	108	294	P	H
CH 06 2437MHz		7311	46.47	-27.53	74	53.49	36.4	11.09	54.51	117	356	P	H
		4874	40.46	-33.54	74	54.89	31.13	8.79	54.35	108	294	P	V
		7311	46.88	-27.12	74	53.9	36.4	11.09	54.51	117	356	P	V
802.11n HT20		4924	40.31	-33.69	74	54.51	31.23	8.9	54.33	122	94	P	H
CH 11 2462MHz		7386	45.61	-28.39	74	52.83	36.3	11.08	54.6	188	164	P	H
		4924	39.07	-34.93	74	53.27	31.23	8.9	54.33	122	94	P	V
		7386	46.08	-27.92	74	53.3	36.3	11.08	54.6	188	164	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	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)
2.4GHz 802.11n HT20 LF		78.5	20.97	-19.03	40	42.82	15.77	2.38	40	-	-	P	H
		155.13	27.07	-16.43	43.5	45.31	19.29	2.57	40.1	-	-	P	H
		195.87	30.35	-13.15	43.5	51.18	16.54	2.73	40.1	-	-	P	H
		280.26	40.56	-5.44	46	58.17	19.35	3.06	40.02	100	267	P	H
		340.4	34.85	-11.15	46	50.82	20.77	3.22	39.96	-	-	P	H
		928.22	28.68	-17.32	46	34.5	29.59	4.15	39.56	-	-	P	H
		41.64	31.6	-8.4	40	49.69	19.9	2.02	40.01	100	128	P	V
		79.47	28.1	-11.9	40	50.16	15.56	2.38	40	-	-	P	V
		195.87	32.82	-10.68	43.5	53.65	16.54	2.73	40.1	-	-	P	V
		283.17	30.18	-15.82	46	47.69	19.43	3.08	40.02	-	-	P	V
		466.5	24.92	-21.08	46	37.98	23.41	3.36	39.83	-	-	P	V
		980.6	29.86	-24.14	54	35.24	30.06	4.15	39.59	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against 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	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)
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. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable 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) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

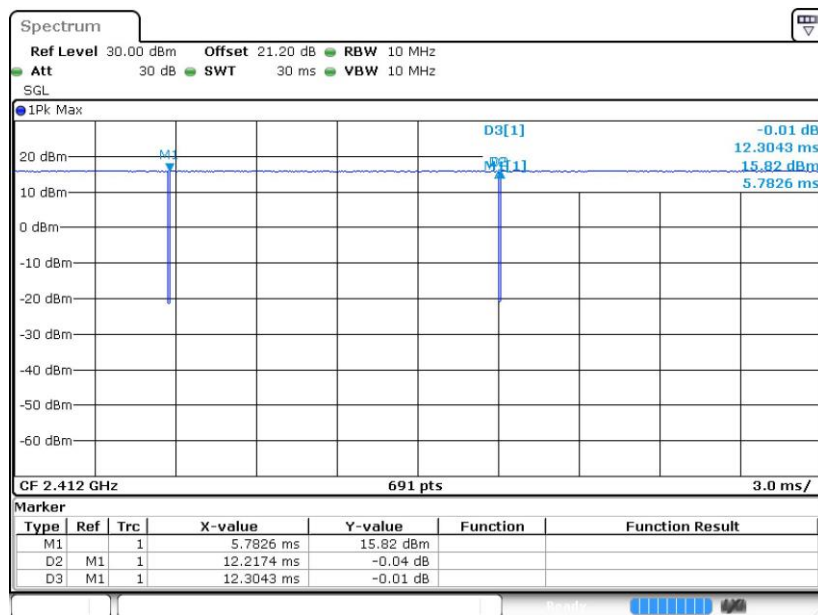
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

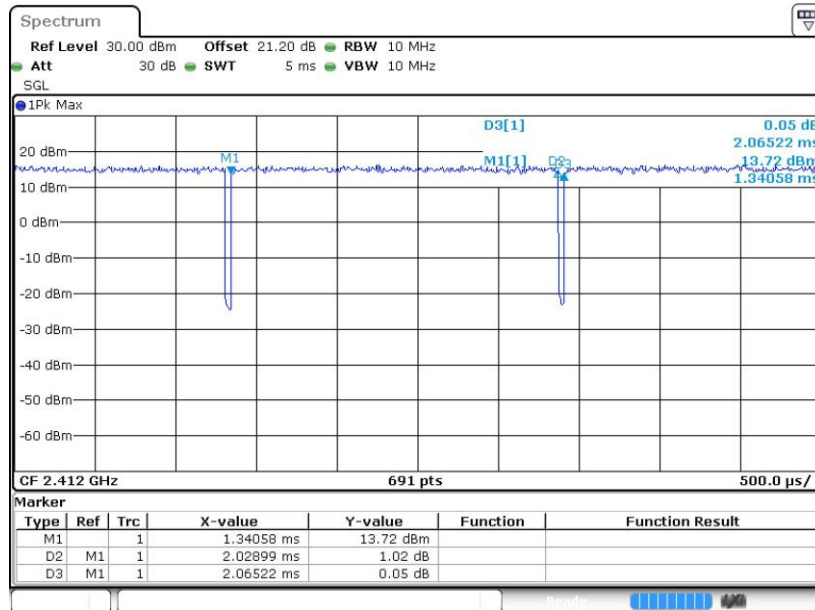
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	99.29	-	-	10Hz
802.11g	98.25	-	-	10Hz
802.11n HT20	98.11	-	-	10Hz

802.11b





802.11g



802.11n HT20

