



FCC RF Test Report

APPLICANT : Verifone, Inc.
EQUIPMENT : Point of Sale Terminal
BRAND NAME : Verifone
MODEL NAME : T650c
FCC ID : B32T650C
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Dec. 11, 2019 and testing was completed on Mar. 10, 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.

This report contains data that were produced under subcontract by Laboratory Sporton International (Kunshan) Inc.

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**



TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification of Equipment Under Test.....	6
1.5 Modification of EUT	6
1.6 Testing Location	7
1.7 Test Software.....	8
1.8 Applicable Standards.....	8
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	9
2.1 Carrier Frequency and Channel	9
2.2 Test Mode.....	10
2.3 Connection Diagram of Test System.....	11
2.4 Support Unit used in test configuration and system	12
2.5 EUT Operation Test Setup	12
2.6 Measurement Results Explanation Example.....	12
3 TEST RESULT	13
3.1 6dB and 99% Bandwidth Measurement	13
3.2 Output Power Measurement.....	15
3.3 Power Spectral Density Measurement	16
3.4 Conducted Band Edges and Spurious Emission Measurement	18
3.5 Radiated Band Edges and Spurious Emission Measurement	31
3.6 AC Conducted Emission Measurement.....	35
3.7 Antenna Requirements.....	37
4 LIST OF MEASURING EQUIPMENT	38
5 UNCERTAINTY OF EVALUATION	39
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. AC CONDUCTED EMISSION TEST RESULT	
APPENDIX C. RADIATED SPURIOUS EMISSION	
APPENDIX D. DUTY CYCLE PLOTS	
APPENDIX E. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR9D1105C	Rev. 01	Initial issue of report	Mar. 30, 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	-	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 3.11 dB at 2484.670 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.02 dB at 0.440 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

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

Verifone, Inc.

Suite 200 1400 W Stanford Ranch Rd Rocklin CA 95765 USA

1.2 Manufacturer

Verifone Systems (China) Inc.

Rm 318, south of Bld C18, Startup Headquarters Base, North of Fuyuan Road, Wuqing Development Area, Tianjin, China, 301700

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Point of Sale Terminal
Brand Name	Verifone
Model Name	T650c
FCC ID	B32T650C
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR/EDR/LE NFC
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 five types of EUT, the difference between them is different suppliers for the printer and LCD. We only choose the sample 1 to perform full tests.



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 : 16.54 dBm (0.0451 W) 802.11g : 20.28 dBm (0.1067 W) 802.11n HT20 : 18.54 dBm (0.0714 W) 802.11n HT40: 17.84 dBm (0.0608 W)
99% Occupied Bandwidth	802.11b : 13.69MHz 802.11g : 19.28MHz 802.11n HT20 : 19.43MHz 802.11n HT40: 37.66MHz
Antenna Type / Gain	FPC Antenna type with gain 0.57 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.
	TH01-KS	CN1257	314309

Note: Test data subcontracted: Conducted test items in section 3.1~3.4 of this report

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.
	CO01-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-SZ	AUDIX	E3	6.120613b

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 (X plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

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

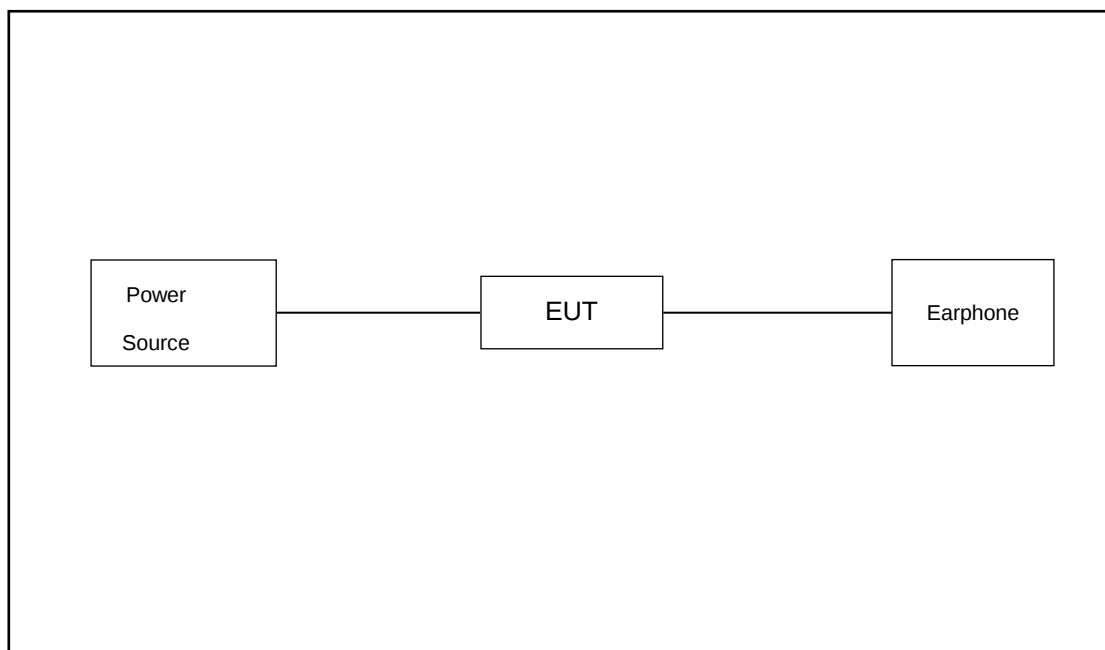
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

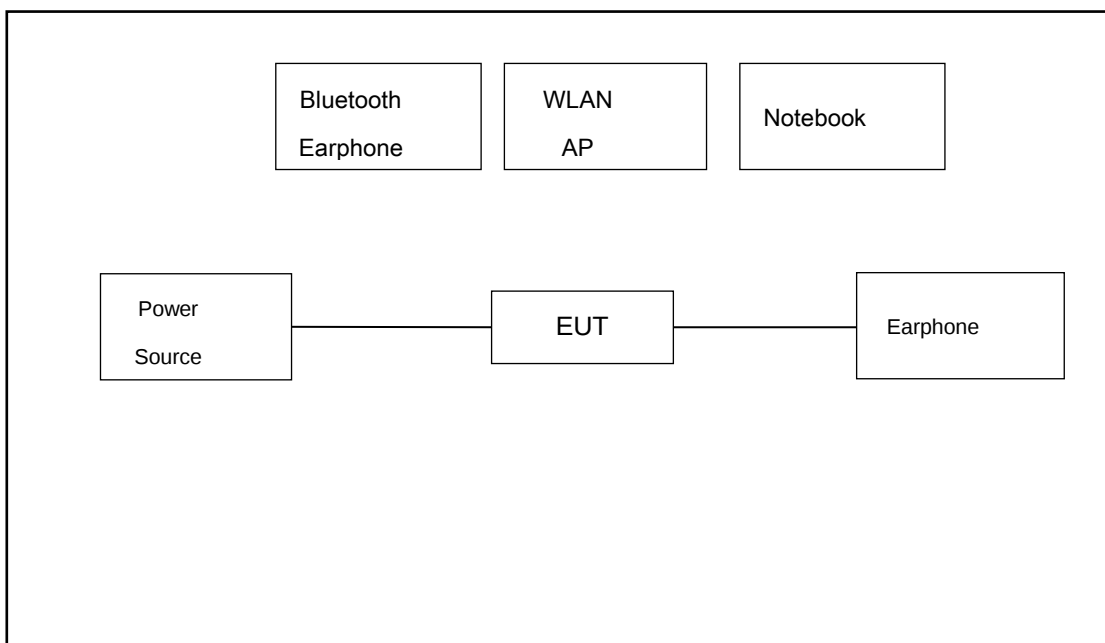
Test Cases	
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN Link (2.4G) + Earphone + Charging from Adapter
Remark: For Radiated Test Cases, The tests were performed with Adapter and Earphone.	

2.3 Connection Diagram of Test System

For Radiation



For Conducted Emission



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Samsung	EO-MG900	N/A	N/A	N/A
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	NOTE BOOK	Lenovo	E540	FCC DoC	N/A	Unshielded,1.8m
4.	Earphone	Apple	MC690ZP/A	N/A	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.80 dB.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} . \\
 &= 5.80 \text{ (dB)}
 \end{aligned}$$

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

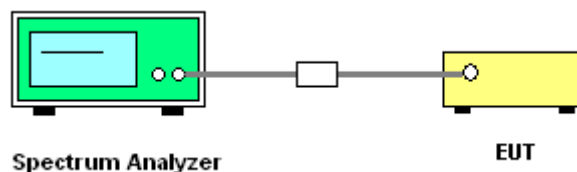
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

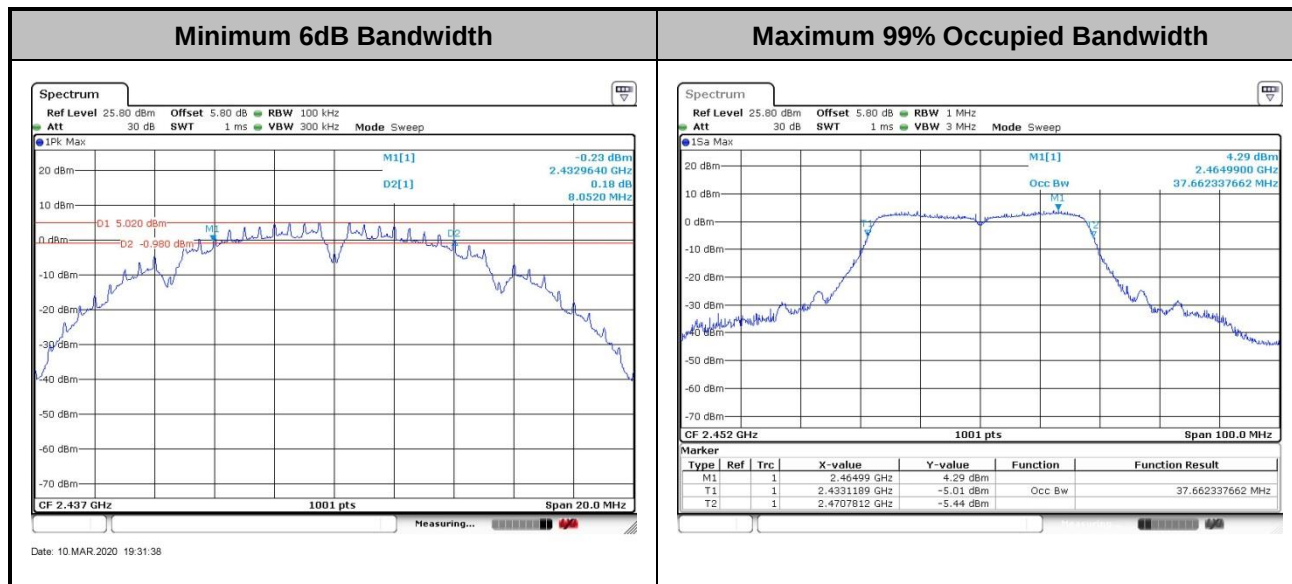
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



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.

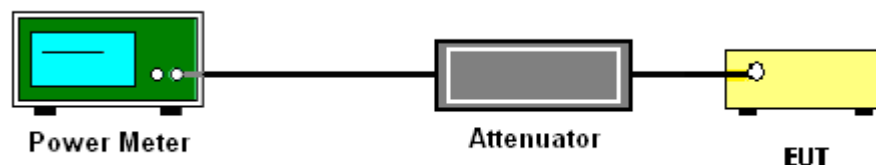
3.2.2 Measuring Instruments

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.

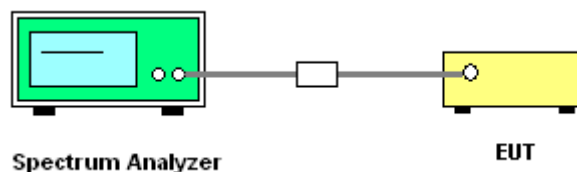
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

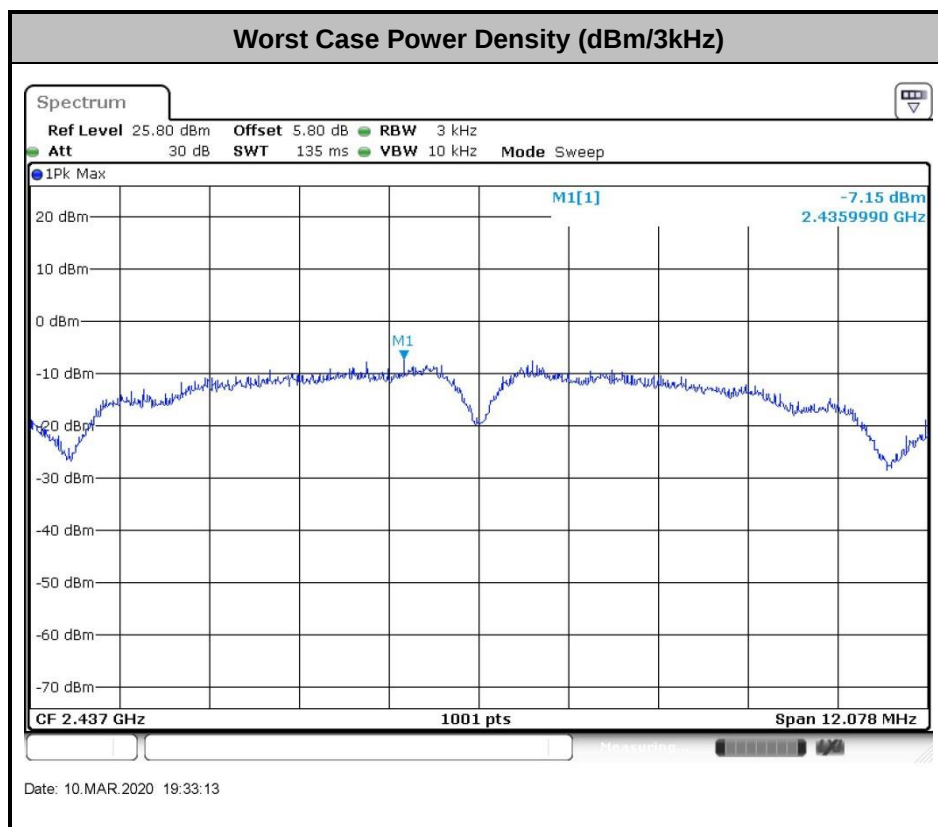
1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the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

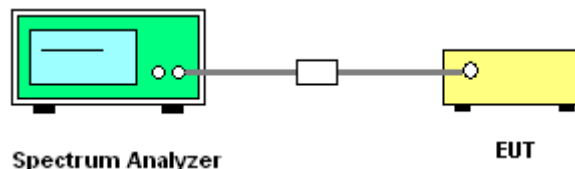
3.4.2 Measuring Instruments

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

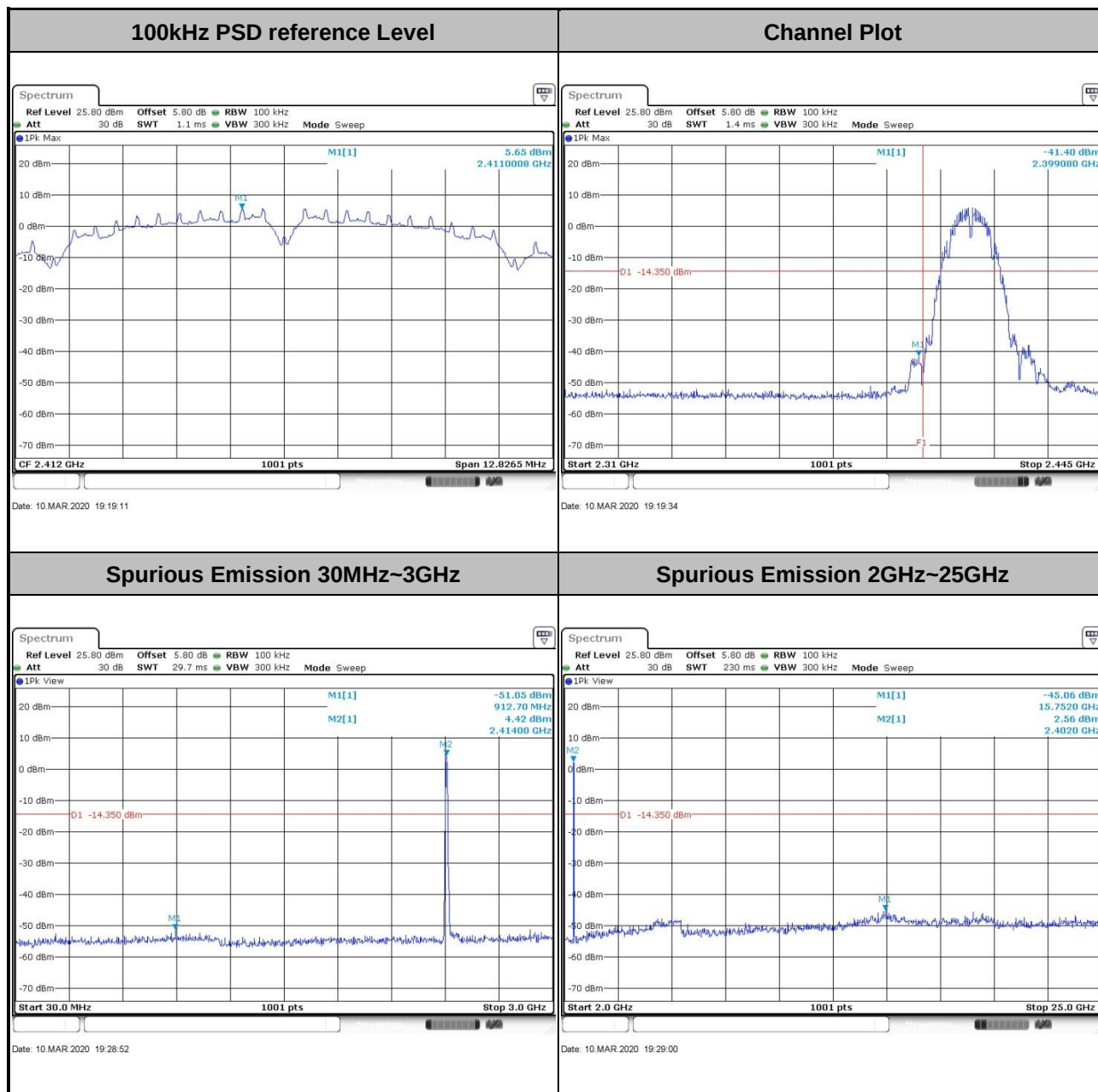




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

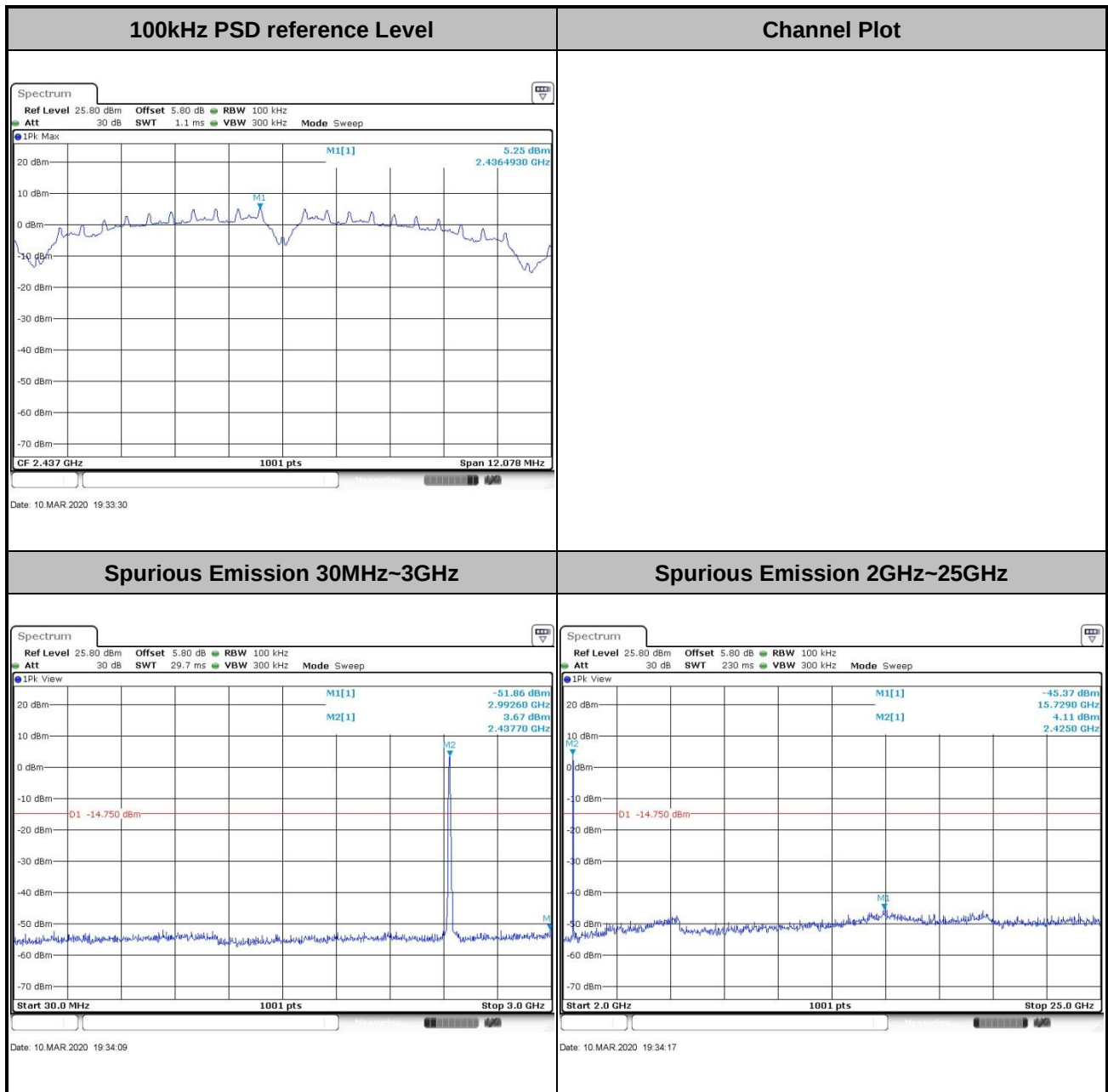
Test Engineer :	Pro Zhou	Temperature :	21~25°C
		Relative Humidity :	51~54%

Test Mode :	802.11b	Test Channel :	01
-------------	---------	----------------	----



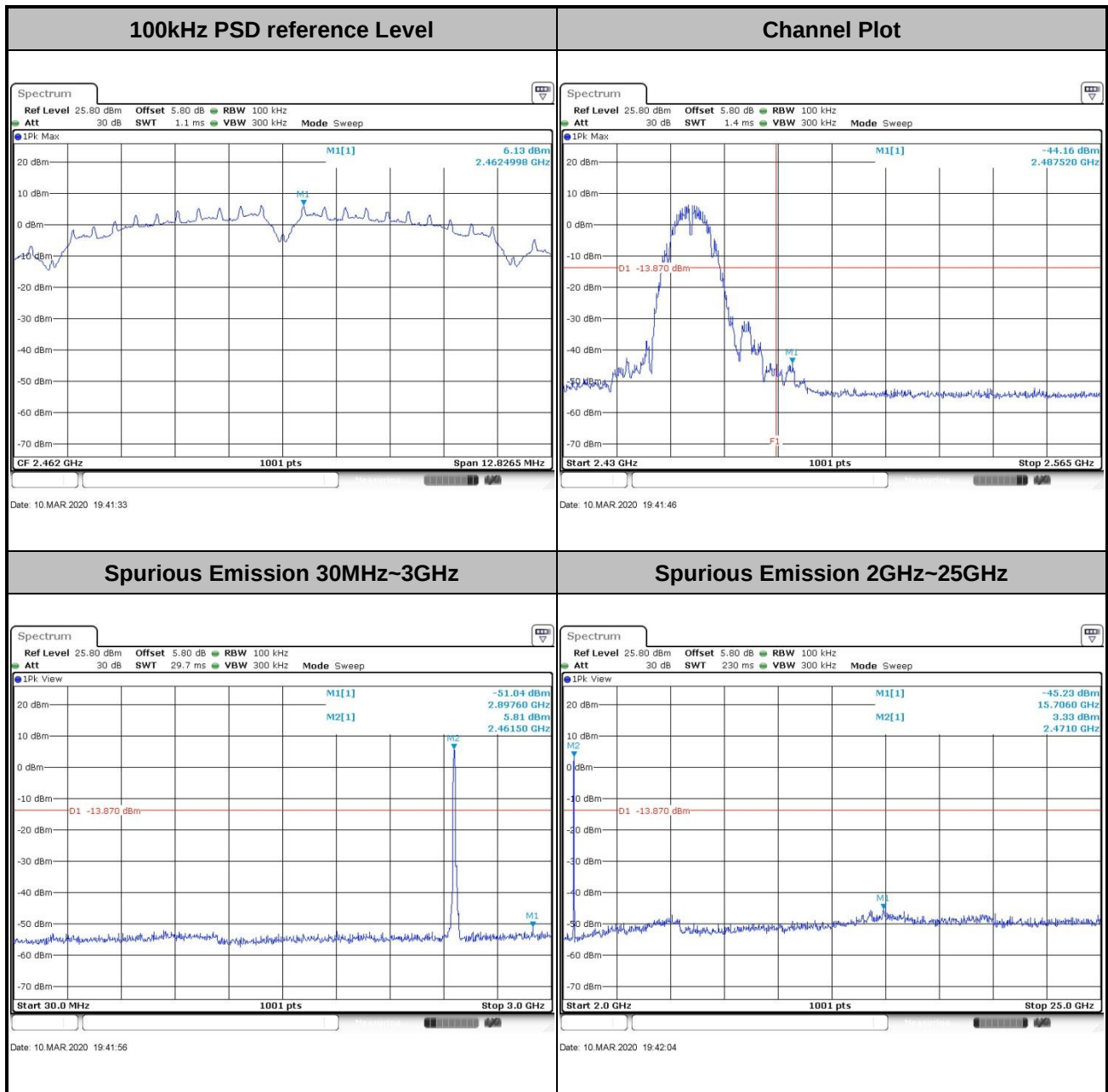


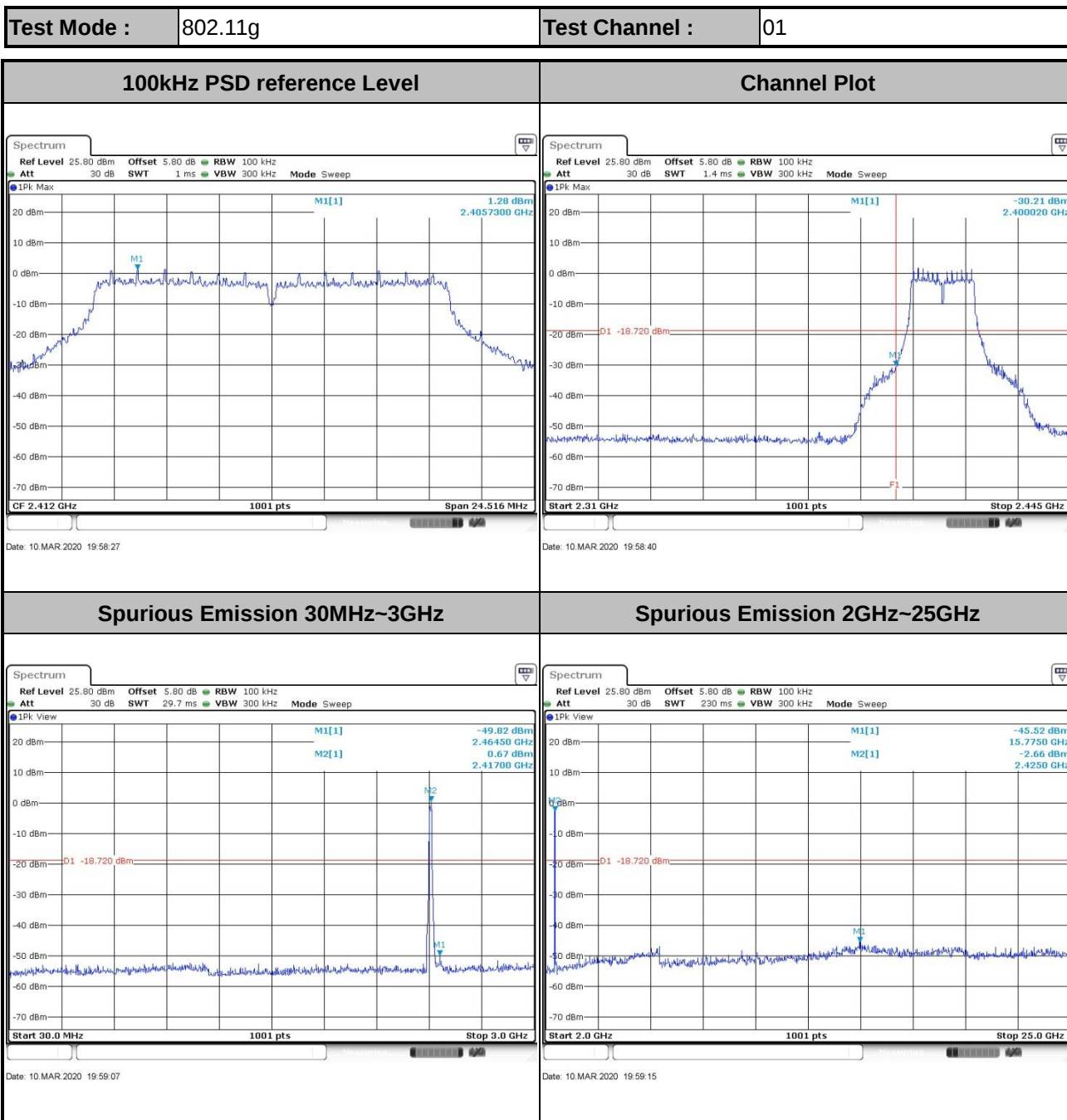
Test Mode :	802.11b	Test Channel :	06
-------------	---------	----------------	----

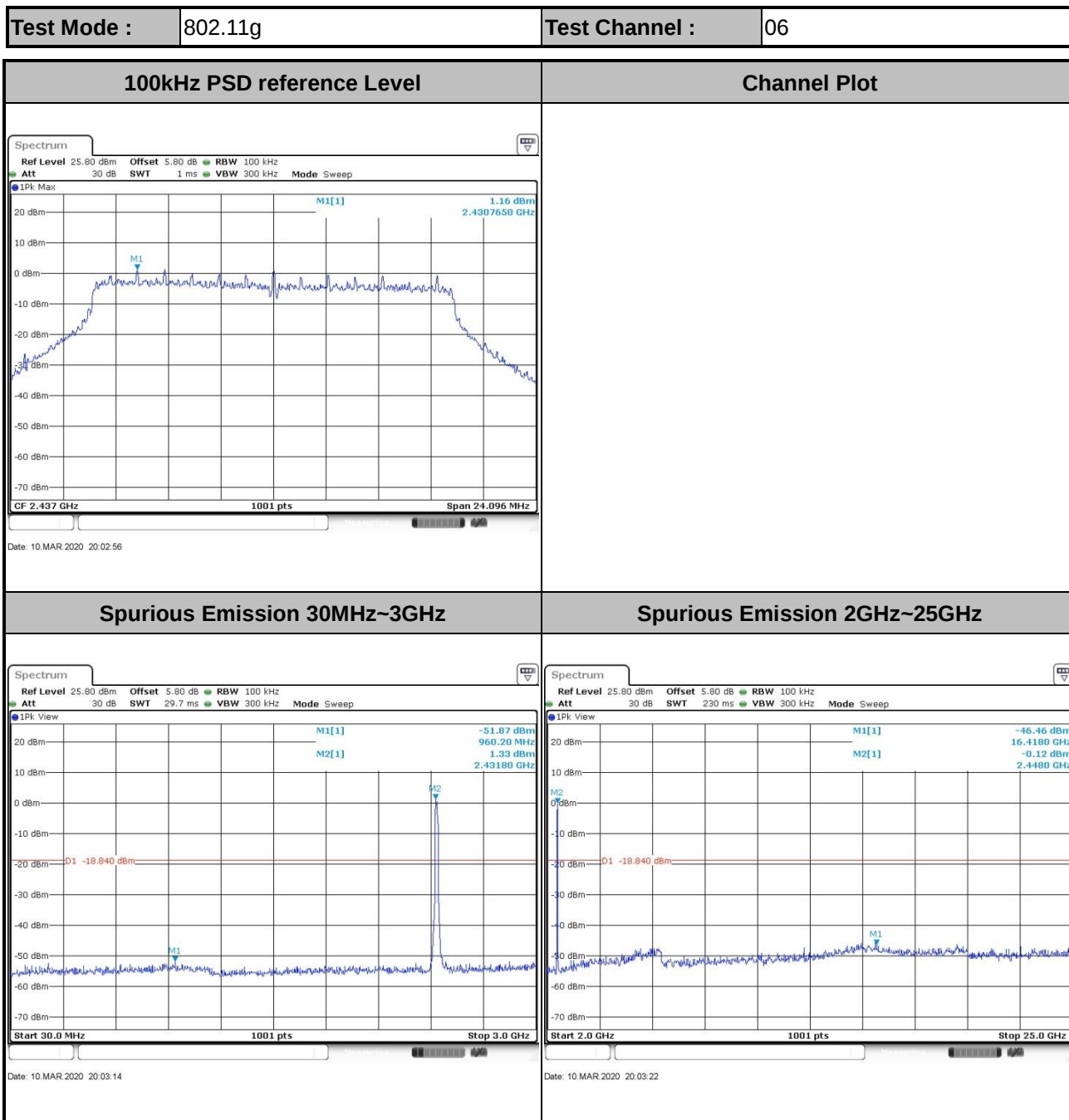




Test Mode :	802.11b	Test Channel :	11
-------------	---------	----------------	----

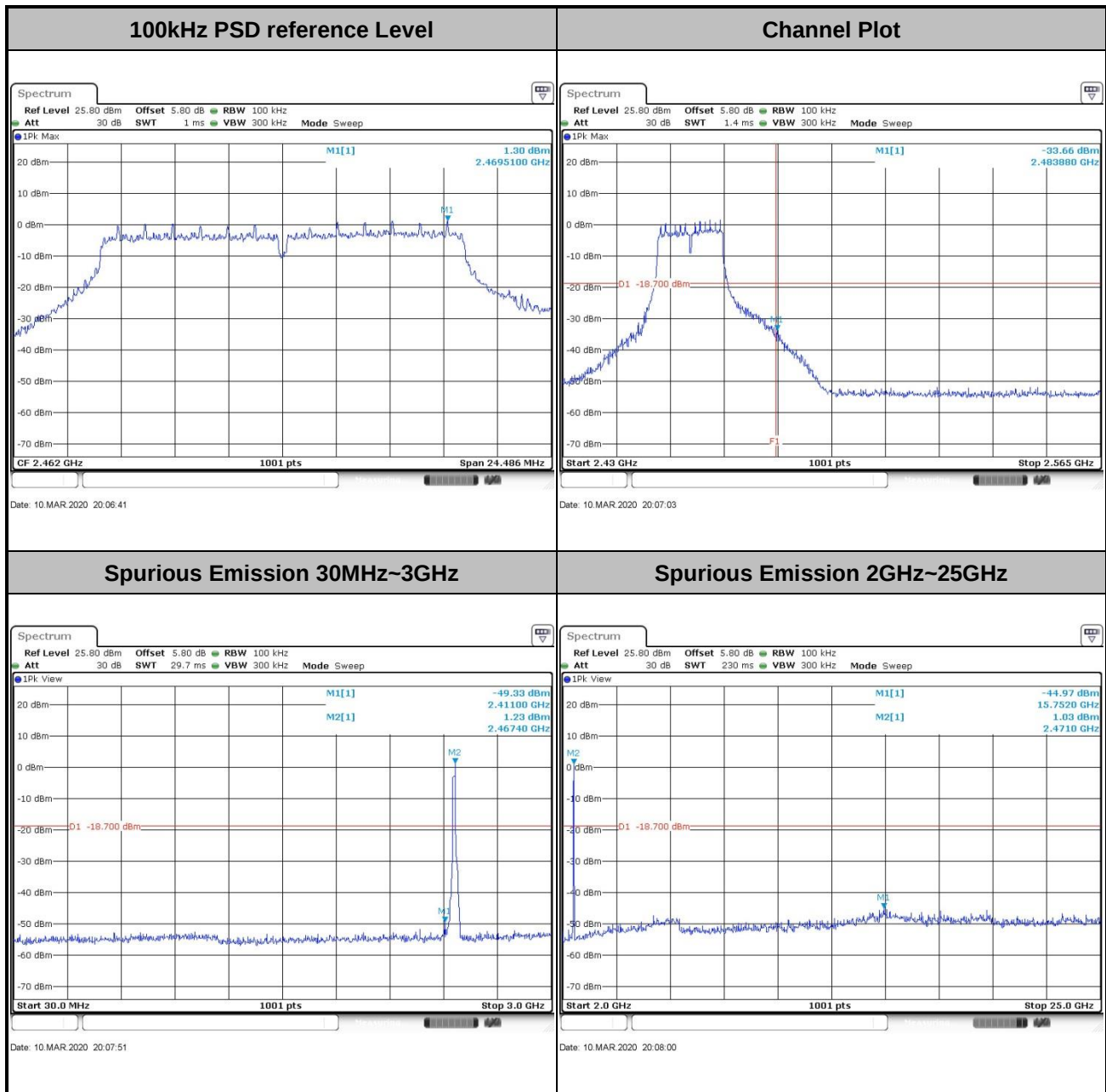








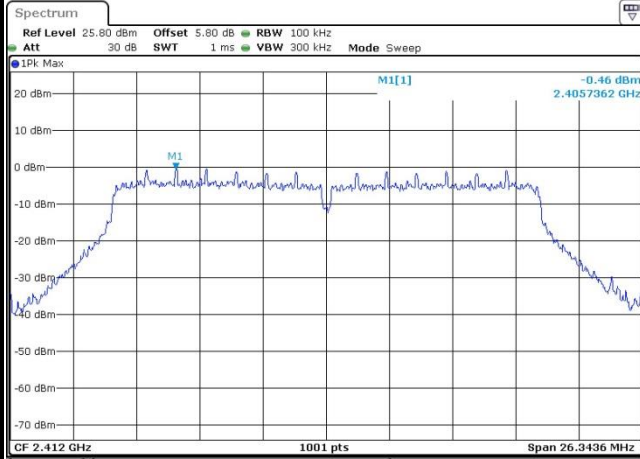
Test Mode :	802.11g	Test Channel :	11
-------------	---------	----------------	----



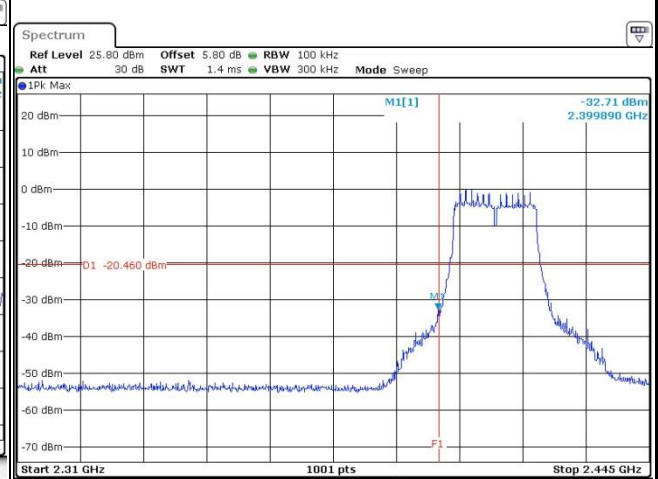


Test Mode :	802.11n HT20	Test Channel :	01
-------------	--------------	----------------	----

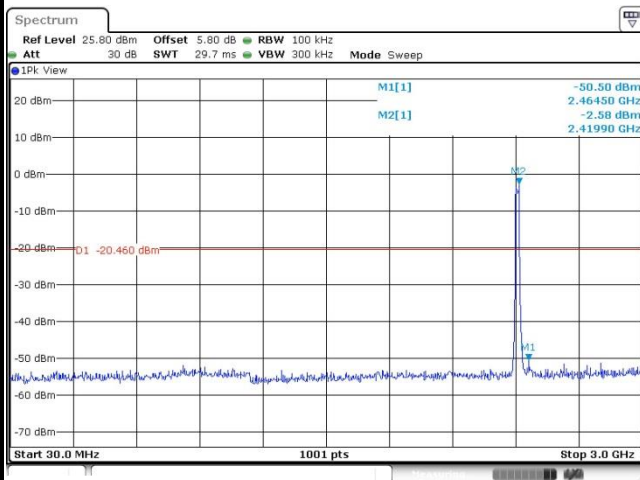
100kHz PSD reference Level



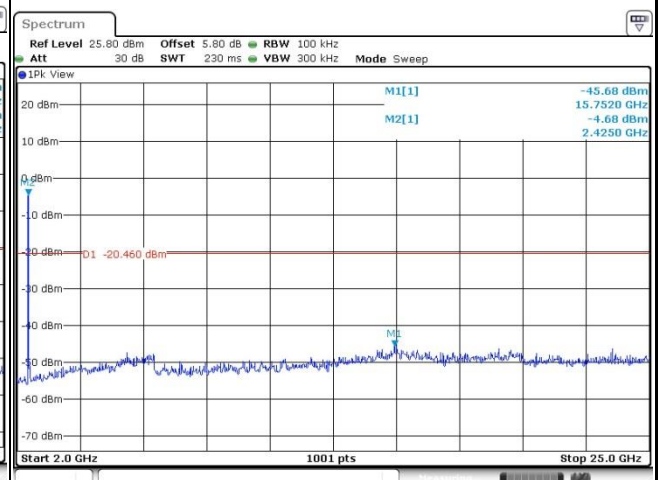
Channel Plot



Spurious Emission 30MHz~3GHz



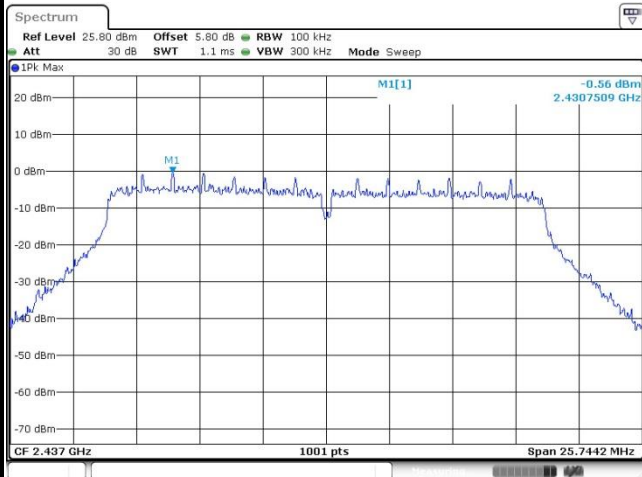
Spurious Emission 2GHz~25GHz





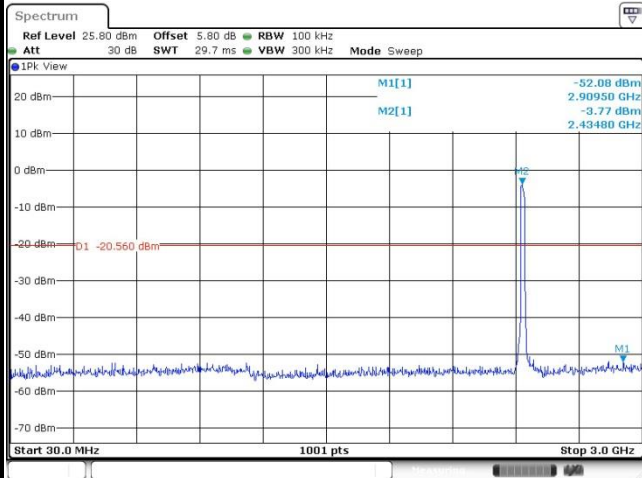
Test Mode :	802.11n HT20	Test Channel :	06
-------------	--------------	----------------	----

100kHz PSD reference Level

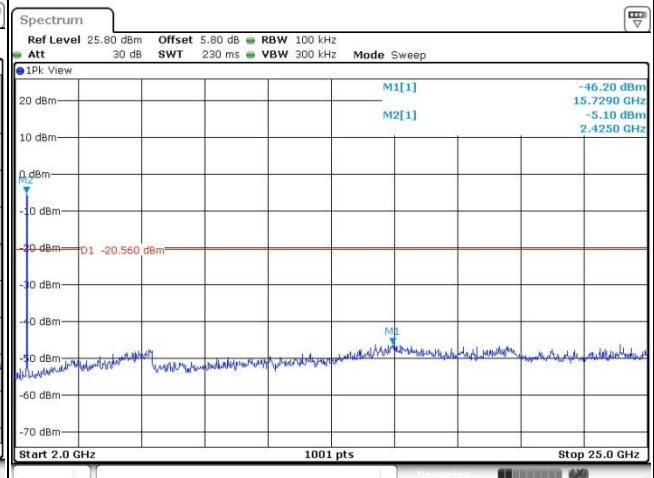


Channel Plot

Spurious Emission 30MHz~3GHz



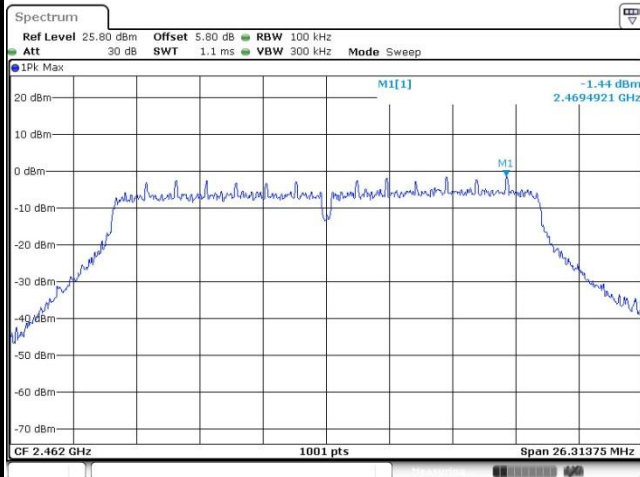
Spurious Emission 2GHz~25GHz



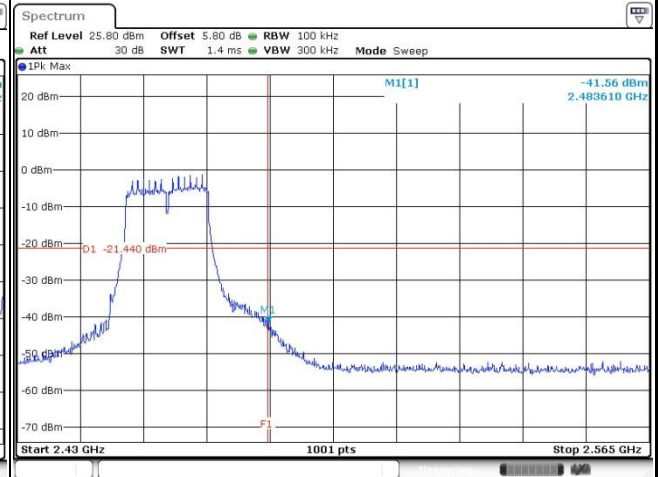


Test Mode :	802.11n HT20	Test Channel :	11
-------------	--------------	----------------	----

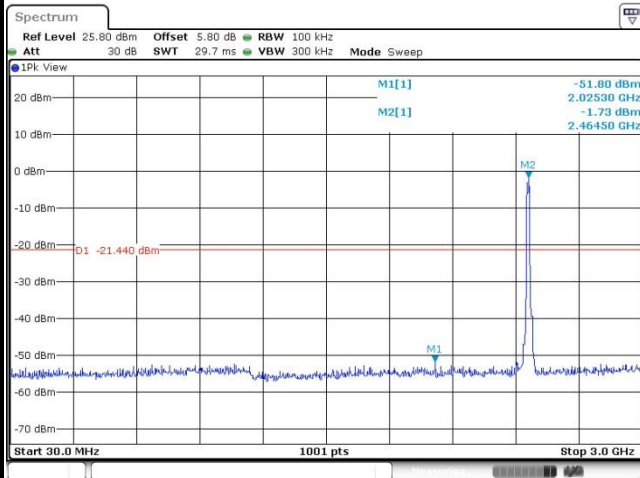
100kHz PSD reference Level



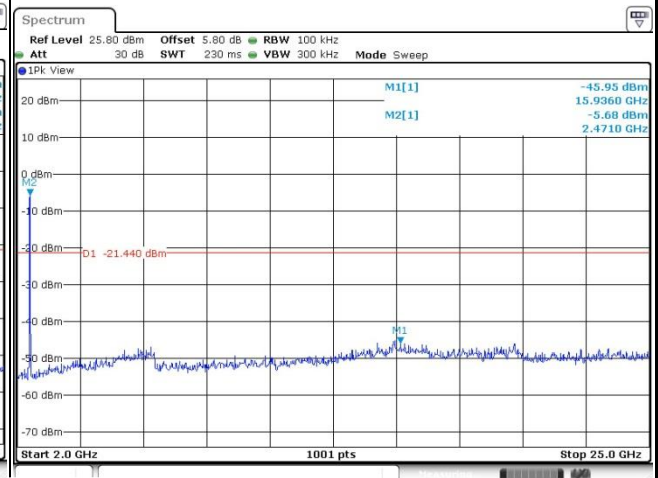
Channel Plot



Spurious Emission 30MHz~3GHz

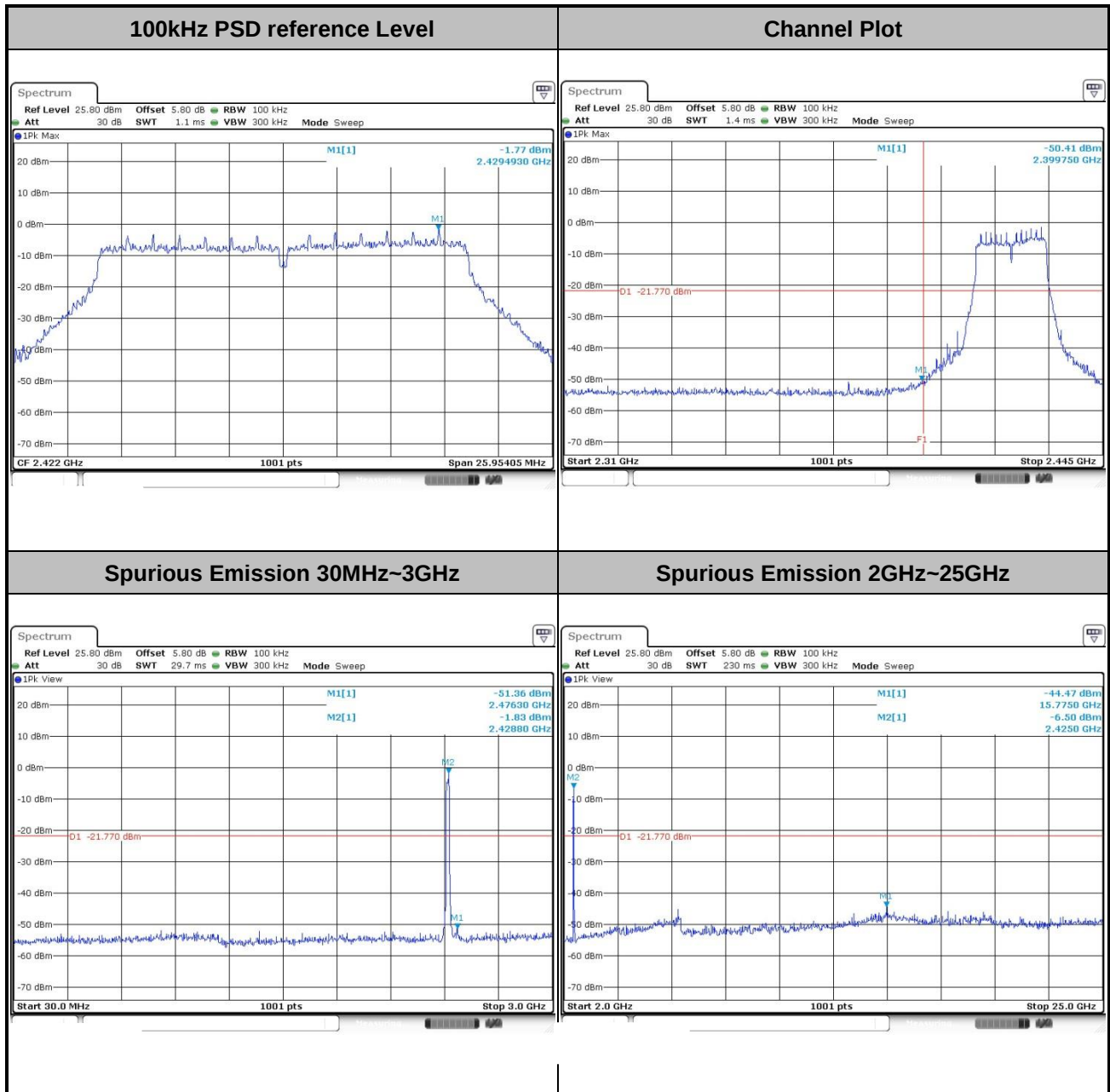


Spurious Emission 2GHz~25GHz



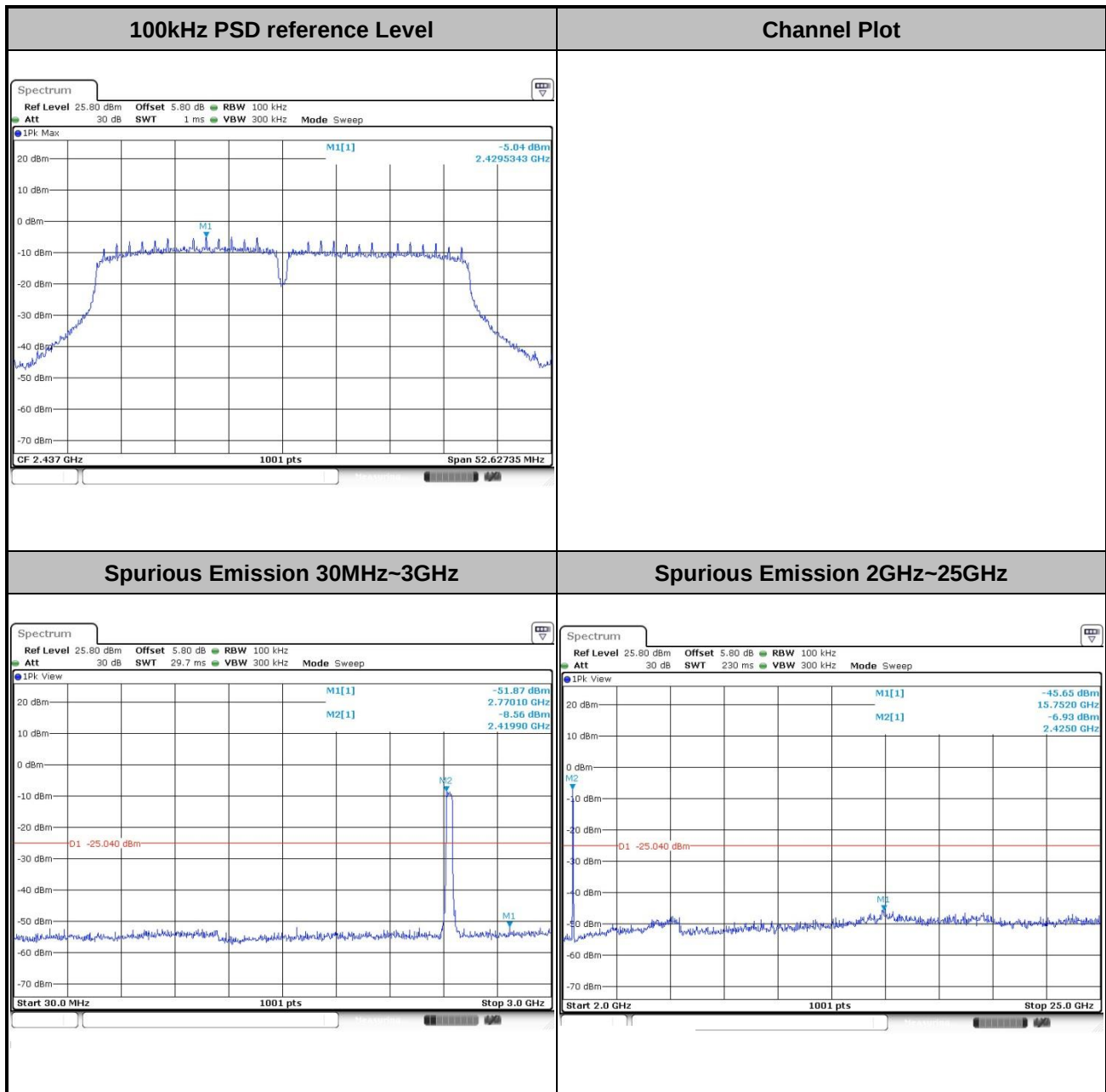


Test Mode :	802.11n HT40	Test Channel :	03
-------------	--------------	----------------	----





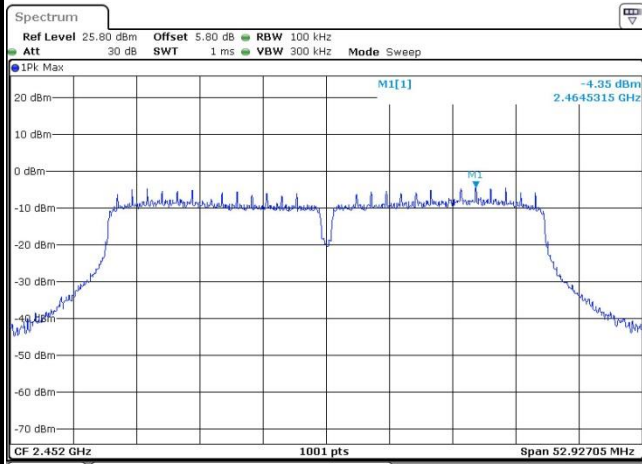
Test Mode :	802.11n HT40	Test Channel :	06
-------------	--------------	----------------	----



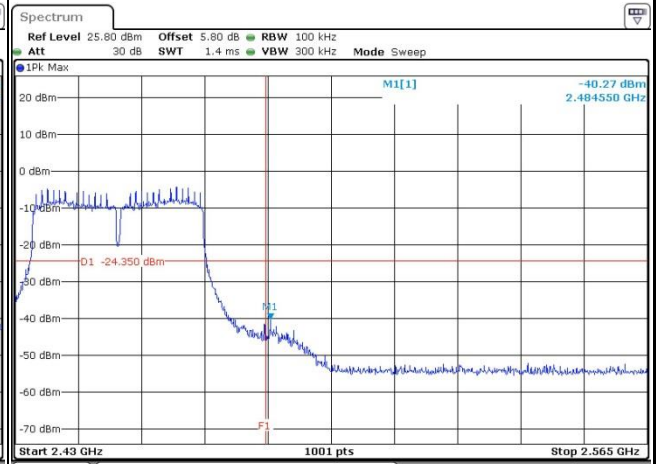


Test Mode :	802.11n HT40	Test Channel :	09
-------------	--------------	----------------	----

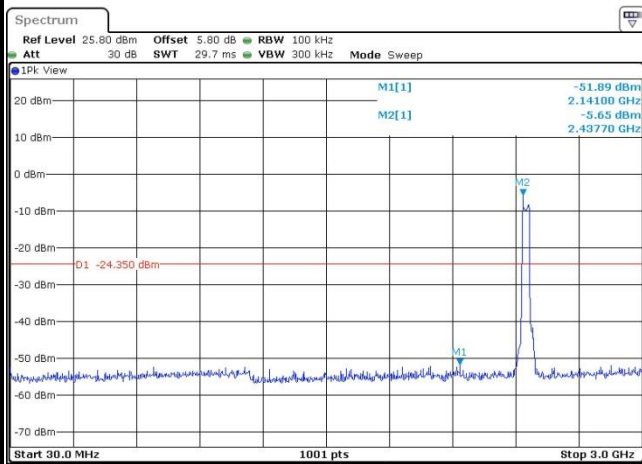
100kHz PSD reference Level



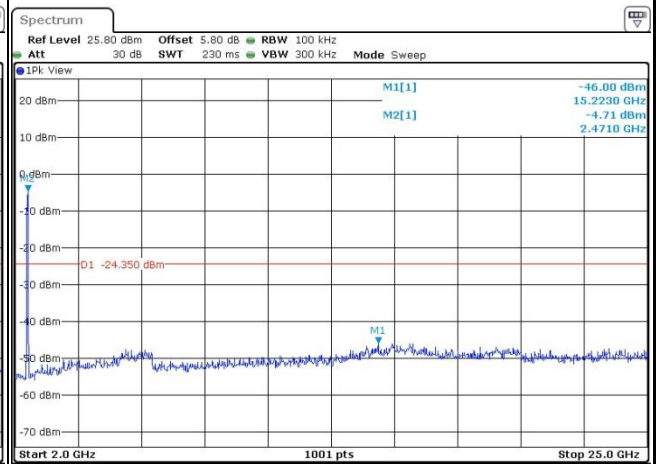
Channel Plot



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

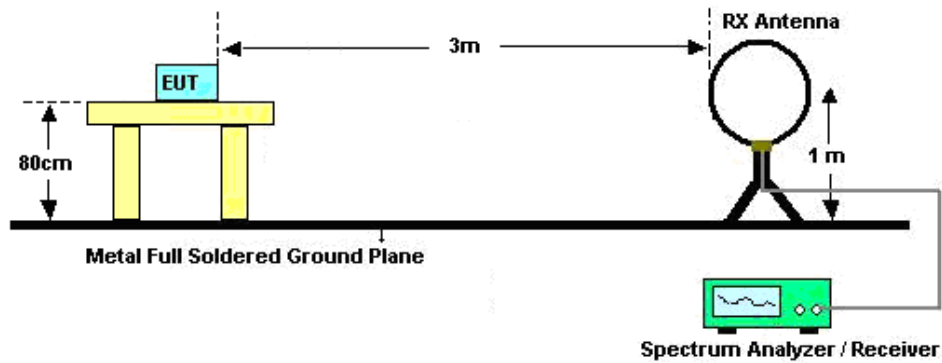
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

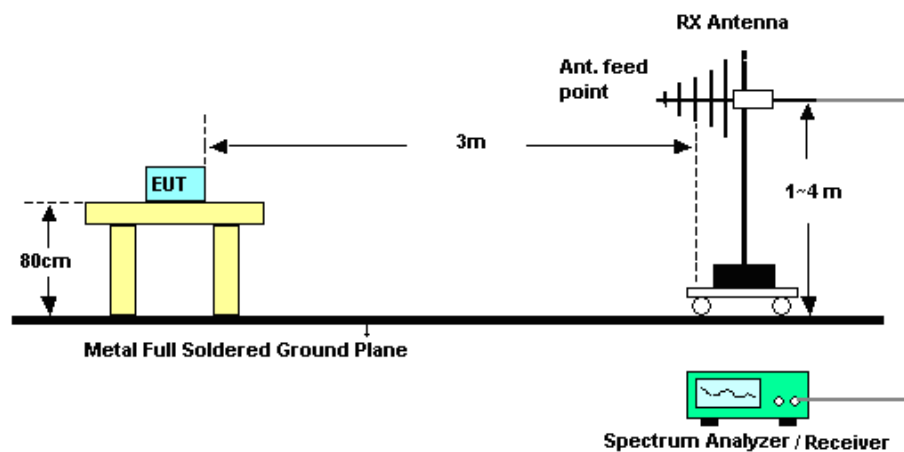
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

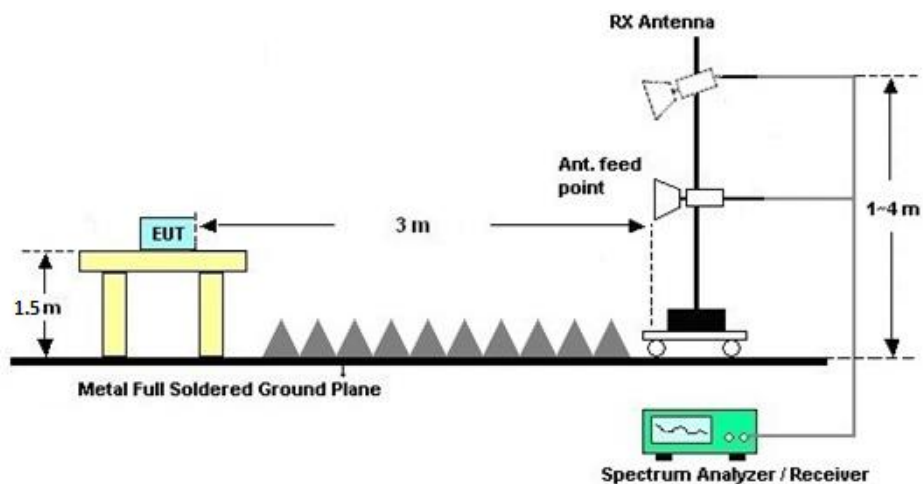
For radiated emissions below 30MHz



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)

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

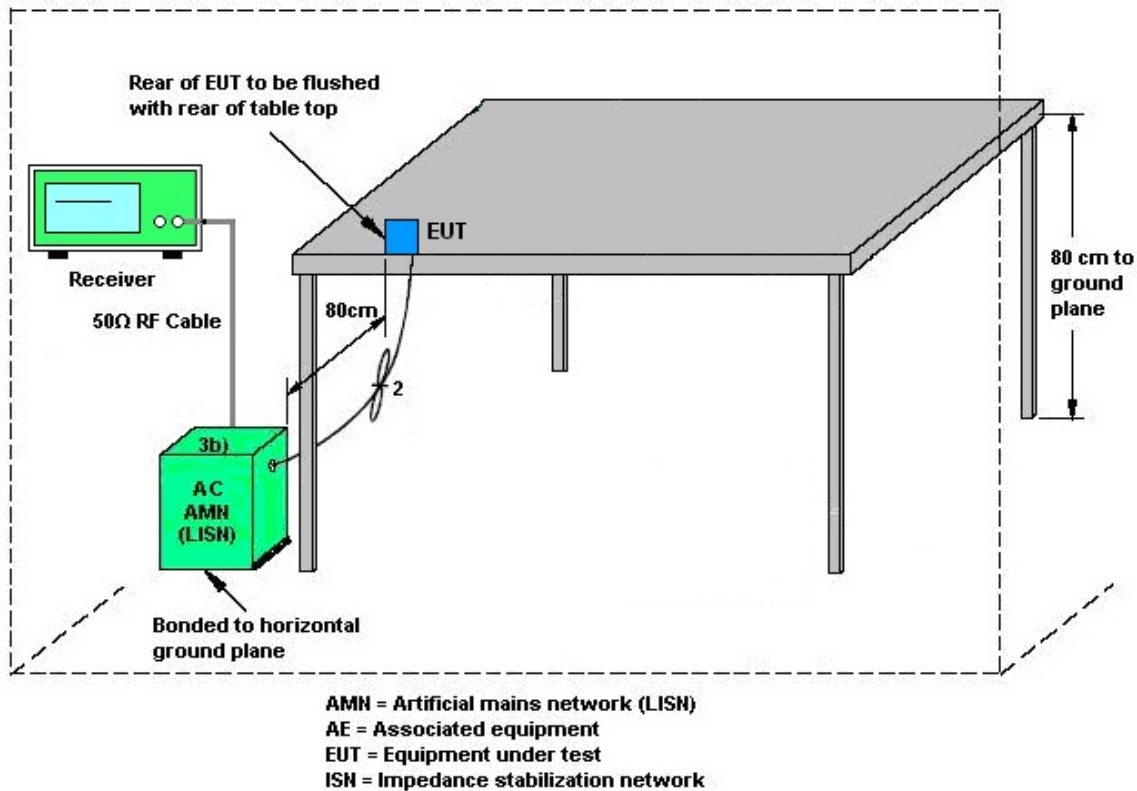
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 02, 2019	Mar. 10, 2020	Nov. 01, 2020	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 13, 2020	Mar. 10, 2020	Jan. 12, 2021	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 13, 2020	Mar. 10, 2020	Jan. 12, 2021	Conducted (TH01-KS)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2019	Jan. 12, 2020	Apr. 18, 2020	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 29, 2019	Jan. 12, 2020	May 28, 2020	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jul. 19, 2019	Jan. 12, 2020	Jul. 18, 2020	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Aug. 27, 2019	Jan. 12, 2020	Aug. 26, 2020	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 22, 2019	Jan. 12, 2020	Jul. 21, 2020	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Apr. 18, 2019	Jan. 12, 2020	Apr. 17, 2020	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 18, 2019	Jan. 12, 2020	Oct. 17, 2020	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2019	Jan. 12, 2020	Oct. 17, 2020	Radiation (03CH02-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5GHz	Oct. 18, 2019	Jan. 12, 2020	Oct. 17, 2020	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Jan. 12, 2020	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Jan. 12, 2020	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Jan. 12, 2020	NCR	Radiation (03CH02-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2018	Dec. 22, 2019	Dec. 25, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 17, 2019	Dec. 22, 2019	Oct. 16, 2020	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 27, 2018	Dec. 22, 2019	Dec. 26, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 23, 2019	Dec. 22, 2019	Jul. 22, 2020	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 (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.6dB
---	-------

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.4 dB
---	--------



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Pro Zhou	Temperature:	21~25	°C
Test Date:	2020/3/10	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
11b	1Mbps	1	1	2412	13.69	8.55	0.50	Pass
11b	1Mbps	1	6	2437	13.59	8.05	0.50	Pass
11b	1Mbps	1	11	2462	13.39	8.55	0.50	Pass
11g	6Mbps	1	1	2412	18.98	8.55	0.50	Pass
11g	6Mbps	1	6	2437	18.48	8.05	0.50	Pass
11g	6Mbps	1	11	2462	19.28	8.55	0.50	Pass
HT20	MCS0	1	1	2412	19.43	8.55	0.50	Pass
HT20	MCS0	1	6	2437	19.28	8.05	0.50	Pass
HT20	MCS0	1	11	2462	19.43	8.55	0.50	Pass
HT40	MCS0	1	3	2422	36.16	8.55	0.50	Pass
HT40	MCS0	1	6	2437	36.66	8.05	0.50	Pass
HT40	MCS0	1	9	2452	37.66	8.55	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	16.52	30.00	0.57	17.09	36.00	Pass
11b	1Mbps	1	6	2437	16.48	30.00	0.57	17.05	36.00	Pass
11b	1Mbps	1	11	2462	16.54	30.00	0.57	17.11	36.00	Pass
11g	6Mbps	1	1	2412	20.08	30.00	0.57	20.65	36.00	Pass
11g	6Mbps	1	6	2437	20.28	30.00	0.57	20.85	36.00	Pass
11g	6Mbps	1	11	2462	19.96	30.00	0.57	20.53	36.00	Pass
HT20	MCS0	1	1	2412	18.54	30.00	0.57	19.11	36.00	Pass
HT20	MCS0	1	6	2437	18.42	30.00	0.57	18.99	36.00	Pass
HT20	MCS0	1	11	2462	18.49	30.00	0.57	19.06	36.00	Pass
HT40	MCS0	1	3	2422	17.72	30.00	0.57	18.29	36.00	Pass
HT40	MCS0	1	6	2437	17.64	30.00	0.57	18.21	36.00	Pass
HT40	MCS0	1	9	2452	17.84	30.00	0.57	18.41	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.11	13.70
11b	1Mbps	1	6	2437	0.11	13.80
11b	1Mbps	1	11	2462	0.11	13.70
11g	6Mbps	1	1	2412	0.58	11.20
11g	6Mbps	1	6	2437	0.58	10.80
11g	6Mbps	1	11	2462	0.58	10.40
HT20	MCS0	1	1	2412	0.64	9.20
HT20	MCS0	1	6	2437	0.64	8.90
HT20	MCS0	1	11	2462	0.64	8.50
HT40	MCS0	1	3	2422	1.22	7.90
HT40	MCS0	1	6	2437	1.22	7.30
HT40	MCS0	1	9	2452	1.22	7.90

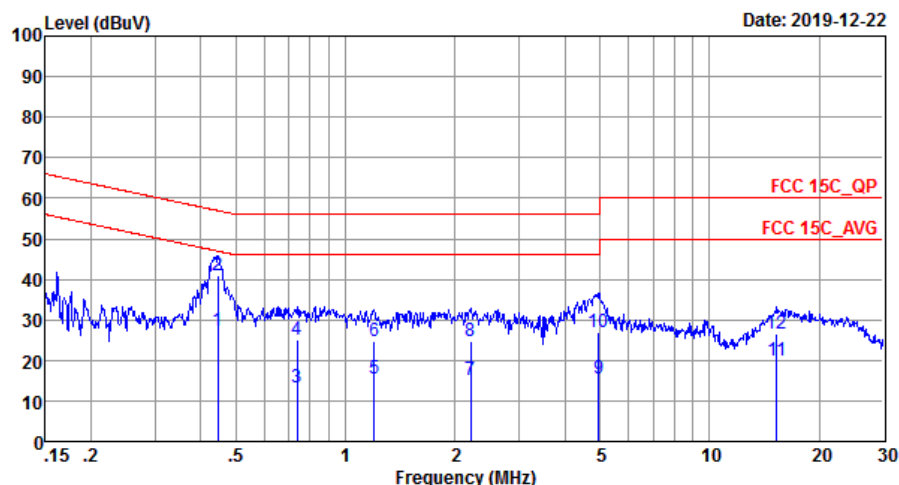
TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-7.93	0.57	8.00	Pass
11b	1Mbps	1	6	2437	-7.15	0.57	8.00	Pass
11b	1Mbps	1	11	2462	-7.64	0.57	8.00	Pass
11g	6Mbps	1	1	2412	-11.95	0.57	8.00	Pass
11g	6Mbps	1	6	2437	-10.44	0.57	8.00	Pass
11g	6Mbps	1	11	2462	-12.72	0.57	8.00	Pass
HT20	MCS0	1	1	2412	-14.30	0.57	8.00	Pass
HT20	MCS0	1	6	2437	-13.87	0.57	8.00	Pass
HT20	MCS0	1	11	2462	-15.82	0.57	8.00	Pass
HT40	MCS0	1	3	2422	-15.70	0.57	8.00	Pass
HT40	MCS0	1	6	2437	-19.86	0.57	8.00	Pass
HT40	MCS0	1	9	2452	-18.52	0.57	8.00	Pass



Appendix B. AC Conducted Emission Test Results

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

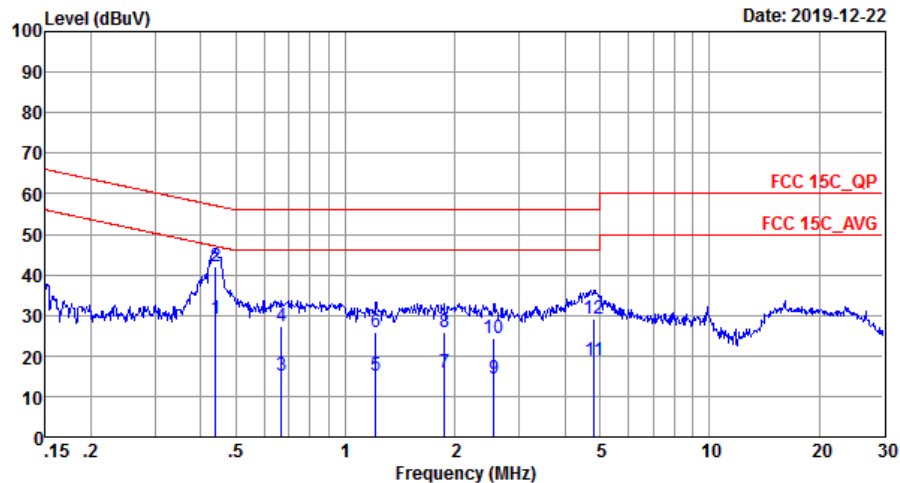


Site : C001-SZ
Condition: FCC 15C OP LISN 20190719 L LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.45	27.26	-19.67	46.93	17.20	0.03	10.03	Average
2 *	0.45	41.06	-15.87	56.93	31.00	0.03	10.03	QP
3	0.74	13.19	-32.81	46.00	3.09	0.03	10.07	Average
4	0.74	25.09	-30.91	56.00	14.99	0.03	10.07	QP
5	1.20	15.43	-30.57	46.00	5.30	0.08	10.05	Average
6	1.20	24.73	-31.27	56.00	14.60	0.08	10.05	QP
7	2.21	14.98	-31.02	46.00	4.80	0.12	10.06	Average
8	2.21	24.58	-31.42	56.00	14.40	0.12	10.06	QP
9	4.95	15.45	-30.55	46.00	5.10	0.19	10.16	Average
10	4.95	26.95	-29.05	56.00	16.60	0.19	10.16	QP
11	15.31	20.05	-29.95	50.00	9.20	0.56	10.29	Average
12	15.31	26.55	-33.45	60.00	15.70	0.56	10.29	QP



Test Engineer :	LiuDaLin	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 : C001-SZ
Condition: FCC 15C_QP LISN_20190719_N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.44	29.15	-17.92	47.07	19.10	0.02	10.03	Average
2 *	0.44	42.05	-15.02	57.07	32.00	0.02	10.03	QP
3	0.67	15.19	-30.81	46.00	5.10	0.02	10.07	Average
4	0.67	27.39	-28.61	56.00	17.30	0.02	10.07	QP
5	1.21	15.20	-30.80	46.00	5.10	0.05	10.05	Average
6	1.21	25.80	-30.20	56.00	15.70	0.05	10.05	QP
7	1.87	15.70	-30.30	46.00	5.60	0.05	10.05	Average
8	1.87	25.90	-30.10	56.00	15.80	0.05	10.05	QP
9	2.55	14.31	-31.69	46.00	4.20	0.04	10.07	Average
10	2.55	24.51	-31.49	56.00	14.40	0.04	10.07	QP
11	4.82	18.72	-27.28	46.00	8.50	0.07	10.15	Average
12	4.82	29.22	-26.78	56.00	19.00	0.07	10.15	QP

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	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 CH 01 2412MHz		2325.12	46.54	-27.46	74	44.95	27.93	6.5	32.84	275	109	P	H
		2390	35.35	-18.65	54	33.83	27.7	6.6	32.78	275	109	A	H
	*	2412	99.75	-	-	98.26	27.67	6.6	32.78	275	109	P	H
	*	2412	96.62	-	-	95.13	27.67	6.6	32.78	275	109	A	H
		2327.535	46.19	-27.81	74	44.6	27.93	6.5	32.84	100	106	P	V
		2390	35.57	-18.43	54	34.05	27.7	6.6	32.78	100	106	A	V
	*	2412	101.45	-	-	99.96	27.67	6.6	32.78	100	106	P	V
	*	2412	98.29	-	-	96.8	27.67	6.6	32.78	100	106	A	V
802.11b CH 06 2437MHz		2342.9	45.88	-28.12	74	44.27	27.9	6.53	32.82	276	107	P	H
		2347.52	35.1	-18.9	54	33.49	27.9	6.53	32.82	276	107	A	H
	*	2437	100.6	-	-	99.13	27.6	6.63	32.76	276	107	P	H
	*	2437	97.43	-	-	95.96	27.6	6.63	32.76	276	107	A	H
		2484.25	46.71	-27.29	74	45.26	27.47	6.7	32.72	276	107	P	H
		2483.55	35.54	-18.46	54	34.09	27.47	6.7	32.72	276	107	A	H
		2331.14	46.86	-27.14	74	45.27	27.93	6.5	32.84	100	89	P	V
		2389.8	35.36	-18.64	54	33.84	27.7	6.6	32.78	100	89	A	V
	*	2437	101.69	-	-	100.22	27.6	6.63	32.76	100	89	P	V
	*	2437	98.51	-	-	97.04	27.6	6.63	32.76	100	89	A	V
		2486.49	47.16	-26.84	74	45.71	27.47	6.7	32.72	100	89	P	V
		2483.5	35.95	-18.05	54	34.5	27.47	6.7	32.72	100	89	A	V



802.11b CH 11 2462MHz	*	2462	100.36	-	-	98.9	27.53	6.67	32.74	276	111	P	H
	*	2462	97.21	-	-	95.75	27.53	6.67	32.74	276	111	A	H
		2483.64	48.25	-25.75	74	46.8	27.47	6.7	32.72	276	111	P	H
		2483.52	40.75	-13.25	54	39.3	27.47	6.7	32.72	276	111	A	H
	*	2462	101.08	-	-	99.62	27.53	6.67	32.74	100	89	P	V
	*	2462	97.9	-	-	96.44	27.53	6.67	32.74	100	89	A	V
		2483.72	49.44	-24.56	74	47.99	27.47	6.7	32.72	100	89	P	V
		2483.52	42.4	-11.6	54	40.95	27.47	6.7	32.72	100	89	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	40.17	-33.83	74	56.85	31.15	9.65	57.48	185	185	P	H
		4824	41.97	-32.03	74	58.65	31.15	9.65	57.48	185	255	P	V
802.11b CH 06 2437MHz		4874	39.69	-34.31	74	56.37	31.13	9.71	57.52	152	63	P	H
		7311	45.65	-28.35	74	56.16	36.4	12.01	58.92	174	86	P	H
		4874	39.09	-34.91	74	55.77	31.13	9.71	57.52	165	106	P	V
		7311	45.93	-28.07	74	56.44	36.4	12.01	58.92	174	100	P	V
802.11b CH 11 2462MHz		4924	40.25	-33.75	74	56.8	31.23	9.77	57.55	150	152	P	H
		7386	44.13	-29.87	74	54.71	36.3	12.08	58.96	155	274	P	H
		4924	41.12	-32.88	74	57.67	31.23	9.77	57.55	150	186	P	V
		7386	45.4	-28.6	74	55.98	36.3	12.08	58.96	155	4	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		2389.905	53.4	-20.6	74	51.88	27.7	6.6	32.78	276	107	P	H
		2389.905	40.58	-13.42	54	39.06	27.7	6.6	32.78	276	107	A	H
	*	2412	100.7	-	-	99.21	27.67	6.6	32.78	276	107	P	H
	*	2412	92.78	-	-	91.29	27.67	6.6	32.78	276	107	A	H
		2389.905	56.62	-17.38	74	55.1	27.7	6.6	32.78	100	87	P	V
		2389.905	43.26	-10.74	54	41.74	27.7	6.6	32.78	100	87	A	V
	*	2412	102.6	-	-	101.11	27.67	6.6	32.78	100	87	P	V
	*	2412	95	-	-	93.51	27.67	6.6	32.78	100	87	A	V
802.11g CH 06 2437MHz		2329.74	46.09	-27.91	74	44.5	27.93	6.5	32.84	256	107	P	H
		2330.02	35.99	-18.01	54	34.4	27.93	6.5	32.84	256	107	A	H
	*	2437	101.33	-	-	99.86	27.6	6.63	32.76	256	107	P	H
	*	2437	93.55	-	-	92.08	27.6	6.63	32.76	256	107	A	H
		2489.08	46.51	-27.49	74	45.1	27.4	6.73	32.72	256	107	P	H
		2488.94	38.05	-15.95	54	36.64	27.4	6.73	32.72	256	107	A	H
		2379.58	46.18	-27.82	74	44.64	27.77	6.57	32.8	101	87	P	V
		2347.66	36.1	-17.9	54	34.49	27.9	6.53	32.82	101	87	A	V
	*	2437	102.5	-	-	101.03	27.6	6.63	32.76	101	87	P	V
	*	2437	94.7	-	-	93.23	27.6	6.63	32.76	101	87	A	V
		2489.22	47.36	-26.64	74	45.95	27.4	6.73	32.72	101	87	P	V
		2489.22	39.57	-14.43	54	38.16	27.4	6.73	32.72	101	87	A	V



802.11g CH 11 2462MHz	*	2462	98.06	-	-	95.73	27.53	7.54	32.74	100	246	P	H
	*	2462	89.66	-	-	87.33	27.53	7.54	32.74	100	246	A	H
		2483.76	61.43	-12.57	74	59.15	27.47	7.53	32.72	100	246	P	H
		2483.6	47.53	-6.47	54	45.25	27.47	7.53	32.72	100	246	A	H
	*	2462	98.9	-	-	96.57	27.53	7.54	32.74	110	261	P	V
	*	2462	91.33	-	-	89	27.53	7.54	32.74	110	261	A	V
		2483.72	62.17	-11.83	74	59.89	27.47	7.53	32.72	110	261	P	V
		2483.8	49.25	-4.75	54	46.97	27.47	7.53	32.72	110	261	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	39.66	-34.34	74	56.34	31.15	9.65	57.48	155	201	P	H
		4824	40.77	-33.23	74	57.45	31.15	9.65	57.48	185	255	P	V
802.11g CH 06 2437MHz		4874	38.91	-35.09	74	55.59	31.13	9.71	57.52	170	122	P	H
		7311	45.05	-28.95	74	55.56	36.4	12.01	58.92	190	123	P	H
		4874	39.12	-34.88	74	55.8	31.13	9.71	57.52	165	106	P	V
		7311	45.48	-28.52	74	55.99	36.4	12.01	58.92	174	100	P	V
802.11g CH 11 2462MHz		4924	39.46	-34.54	74	56.01	31.23	9.77	57.55	200	120	P	H
		7386	44.95	-29.05	74	55.53	36.3	12.08	58.96	160	300	P	H
		4924	39.5	-34.5	74	56.05	31.23	9.77	57.55	150	285	P	V
		7386	45.35	-28.65	74	55.93	36.3	12.08	58.96	155	274	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		2389.38	52.09	-21.91	74	50.59	27.7	6.6	32.8	276	102	P	H
		2389.905	40.3	-13.7	54	38.78	27.7	6.6	32.78	276	102	A	H
	*	2412	100.11	-	-	98.62	27.67	6.6	32.78	276	102	P	H
	*	2412	91.55	-	-	90.06	27.67	6.6	32.78	276	102	A	H
		2389.8	57.68	-16.32	74	56.16	27.7	6.6	32.78	100	81	P	V
		2389.905	42.89	-11.11	54	41.37	27.7	6.6	32.78	100	81	A	V
	*	2412	101.97	-	-	100.48	27.67	6.6	32.78	100	81	P	V
	*	2412	93.55	-	-	92.06	27.67	6.6	32.78	100	81	A	V
802.11n HT20 CH 06 2437MHz		2363.34	46.66	-27.34	74	45.08	27.83	6.57	32.82	276	107	P	H
		2333.52	36.05	-17.95	54	34.46	27.93	6.5	32.84	276	107	A	H
	*	2437	100.04	-	-	98.57	27.6	6.63	32.76	276	107	P	H
	*	2437	92.3	-	-	90.83	27.6	6.63	32.76	276	107	A	H
		2488.59	47.68	-26.32	74	46.27	27.4	6.73	32.72	276	107	P	H
		2488.52	38.36	-15.64	54	36.95	27.4	6.73	32.72	276	107	A	H
		2383.5	46.19	-27.81	74	44.65	27.77	6.57	32.8	100	84	P	V
		2338.14	35.95	-18.05	54	34.36	27.9	6.53	32.84	100	84	A	V
	*	2437	101.12	-	-	99.65	27.6	6.63	32.76	100	84	P	V
	*	2437	93.17	-	-	91.7	27.6	6.63	32.76	100	84	A	V
		2488.03	47.68	-26.32	74	46.27	27.4	6.73	32.72	100	84	P	V
		2488.52	39.54	-14.46	54	38.13	27.4	6.73	32.72	100	84	A	V



802.11n HT20 CH 11 2462MHz	*	2462	96.82	-	-	94.49	27.53	7.54	32.74	100	247	P	H
	*	2462	89.69	-	-	87.36	27.53	7.54	32.74	100	247	A	H
		2483.76	62.53	-11.47	74	60.25	27.47	7.53	32.72	100	247	P	H
		2483.72	49.29	-4.71	54	47.01	27.47	7.53	32.72	100	247	A	H
	*	2462	98.58	-	-	96.25	27.53	7.54	32.74	100	260	P	V
	*	2462	91.79	-	-	89.46	27.53	7.54	32.74	100	260	A	V
		2483.68	65.95	-8.05	74	63.67	27.47	7.53	32.72	100	260	P	V
		2483.52	50.78	-3.22	54	48.5	27.47	7.53	32.72	100	260	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 01 2412MHz		4824	39.38	-34.62	74	56.06	31.15	9.65	57.48	155	140	P	H
		4824	39.58	-34.42	74	56.26	31.15	9.65	57.48	185	255	P	V
802.11n HT20 CH 06 2437MHz		4874	39.19	-34.81	74	55.87	31.13	9.71	57.52	170	167	P	H
		7311	46.09	-27.91	74	56.6	36.4	12.01	58.92	180	200	P	H
		4874	39.61	-34.39	74	56.29	31.13	9.71	57.52	165	106	P	V
		7311	45.94	-28.06	74	56.45	36.4	12.01	58.92	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	38.95	-35.05	74	55.5	31.23	9.77	57.55	230	150	P	H
		7386	45.52	-28.48	74	56.1	36.3	12.08	58.96	120	130	P	H
		4924	39.68	-34.32	74	56.23	31.23	9.77	57.55	150	285	P	V
		7386	45.71	-28.29	74	56.29	36.3	12.08	58.96	155	274	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 HT40 (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 HT40 CH 03 2422MHz		2389.94	52.28	-21.72	74	50.76	27.7	6.6	32.78	100	212	P	H
		2389.94	41.04	-12.96	54	39.52	27.7	6.6	32.78	100	212	A	H
	*	2422	96.99	-	-	95.49	27.63	6.63	32.76	100	212	P	H
	*	2422	89.18	-	-	87.68	27.63	6.63	32.76	100	212	A	H
		2483.55	48.81	-25.19	74	47.36	27.47	6.7	32.72	100	212	P	H
		2483.9	38.8	-15.2	54	37.35	27.47	6.7	32.72	100	212	A	H
		2389.94	58.41	-15.59	74	56.89	27.7	6.6	32.78	100	88	P	V
		2389.8	43.65	-10.35	54	42.13	27.7	6.6	32.78	100	88	A	V
	*	2422	99.06	-	-	97.56	27.63	6.63	32.76	100	88	P	V
	*	2422	91.6	-	-	90.1	27.63	6.63	32.76	100	88	A	V
		2485.93	51.29	-22.71	74	49.84	27.47	6.7	32.72	100	88	P	V
		2484.11	39.45	-14.55	54	38	27.47	6.7	32.72	100	88	A	V
802.11n HT40 CH 06 2437MHz		2352.98	45.76	-28.24	74	44.22	27.83	6.53	32.82	100	212	P	H
		2389.94	37.35	-16.65	54	35.83	27.7	6.6	32.78	100	212	A	H
	*	2437	96.01	-	-	94.54	27.6	6.63	32.76	100	212	P	H
	*	2437	88.48	-	-	87.01	27.6	6.63	32.76	100	212	A	H
		2484.04	48.85	-25.15	74	47.4	27.47	6.7	32.72	100	212	P	H
		2483.55	40.1	-13.9	54	38.65	27.47	6.7	32.72	100	212	A	H
		2389.8	45.9	-28.1	74	44.38	27.7	6.6	32.78	100	86	P	V
		2389.94	37.45	-16.55	54	35.93	27.7	6.6	32.78	100	86	A	V
	*	2437	98.56	-	-	97.09	27.6	6.63	32.76	100	86	P	V
	*	2437	91.24	-	-	89.77	27.6	6.63	32.76	100	86	A	V
		2484.74	51.35	-22.65	74	49.9	27.47	6.7	32.72	100	86	P	V
		2483.5	42.09	-11.91	54	40.64	27.47	6.7	32.72	100	86	A	V



802.11n HT40 CH 09 2452MHz		2370.34	46.7	-27.3	74	45.16	27.77	6.57	32.8	100	252	P	H
		2389.1	37.38	-16.62	54	35.88	27.7	6.6	32.8	100	252	A	H
	*	2452	95.45	-	-	93.92	27.6	6.67	32.74	100	252	P	H
	*	2452	88.19	-	-	86.66	27.6	6.67	32.74	100	252	A	H
		2484.95	59.43	-14.57	74	57.98	27.47	6.7	32.72	100	252	P	H
		2484.53	49.47	-4.53	54	48.02	27.47	6.7	32.72	100	252	A	H
		2313.64	46.36	-27.64	74	44.73	27.97	6.5	32.84	100	304	P	V
		2351.02	37.15	-16.85	54	35.54	27.9	6.53	32.82	100	304	A	V
	*	2452	96.77	-	-	95.24	27.6	6.67	32.74	100	304	P	V
	*	2452	89.34	-	-	87.81	27.6	6.67	32.74	100	304	A	V
		2486.56	61.41	-12.59	74	59.96	27.47	6.7	32.72	100	304	P	V
		2484.67	50.89	-3.11	54	49.44	27.47	6.7	32.72	100	304	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 HT40 (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		4844	40.87	-33.13	74	57.48	31.2	9.68	57.49	166	178	P	H
HT40		7266	45.69	-28.31	74	56.21	36.4	11.99	58.91	158	300	P	H
CH 03		4844	39.85	-34.15	74	56.46	31.2	9.68	57.49	150	350	P	V
2422MHz		7266	46.15	-27.85	74	56.67	36.4	11.99	58.91	200	360	P	V
802.11n		4874	39.4	-34.6	74	56.08	31.13	9.71	57.52	260	268	P	H
HT40		7311	46.16	-27.84	74	56.67	36.4	12.01	58.92	222	129	P	H
CH 06		4874	40.14	-33.86	74	56.82	31.13	9.71	57.52	165	230	P	V
2437MHz		7311	46.87	-27.13	74	57.38	36.4	12.01	58.92	186	323	P	V
802.11n		4904	41.09	-32.91	74	57.72	31.17	9.74	57.54	190	165	P	H
HT40		7356	46.27	-27.73	74	56.75	36.4	12.06	58.94	144	290	P	H
CH 09		4904	40.33	-33.67	74	56.96	31.17	9.74	57.54	150	360	P	V
2452MHz		7356	46.62	-27.38	74	57.1	36.4	12.06	58.94	165	335	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

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)
2.4GHz 802.11n HT40 LF		30	23.07	-16.93	40	29.5	24.8	0.74	31.97	-	-	P	H
		133.79	26.63	-16.87	43.5	39.26	17.47	1.51	31.61	-	-	P	H
		167.74	30.92	-12.58	43.5	44.84	15.87	1.68	31.47	100	43	P	H
		431.58	32.09	-13.91	46	38.19	22.47	2.68	31.25	-	-	P	H
		720.64	30.86	-15.14	46	31.55	27.07	3.48	31.24	-	-	P	H
		839.95	31.71	-14.29	46	30.43	28.7	3.76	31.18	-	-	P	H
		61.04	26.82	-13.18	40	45.81	11.88	1.04	31.91	100	153	P	V
		120.21	25.19	-18.31	43.5	38.01	17.4	1.43	31.65	-	-	P	V
		172.59	27.39	-16.11	43.5	41.61	15.53	1.7	31.45	-	-	P	V
		455.83	27.51	-18.49	46	33.06	22.97	2.76	31.28	-	-	P	V
		600.36	29.77	-16.23	46	32.07	25.8	3.17	31.27	-	-	P	V
		699.3	28.11	-17.89	46	29.26	26.69	3.42	31.26	-	-	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)

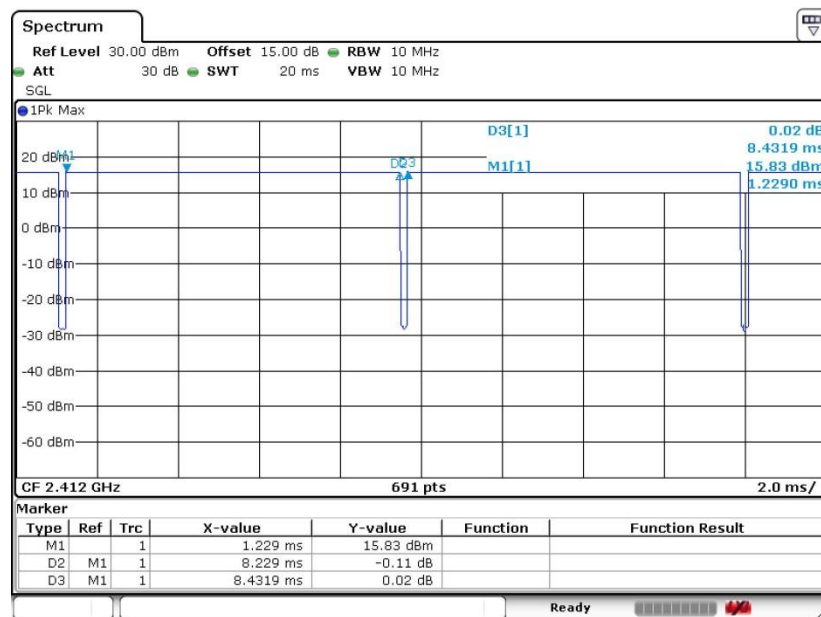
= -10.46(dB)

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

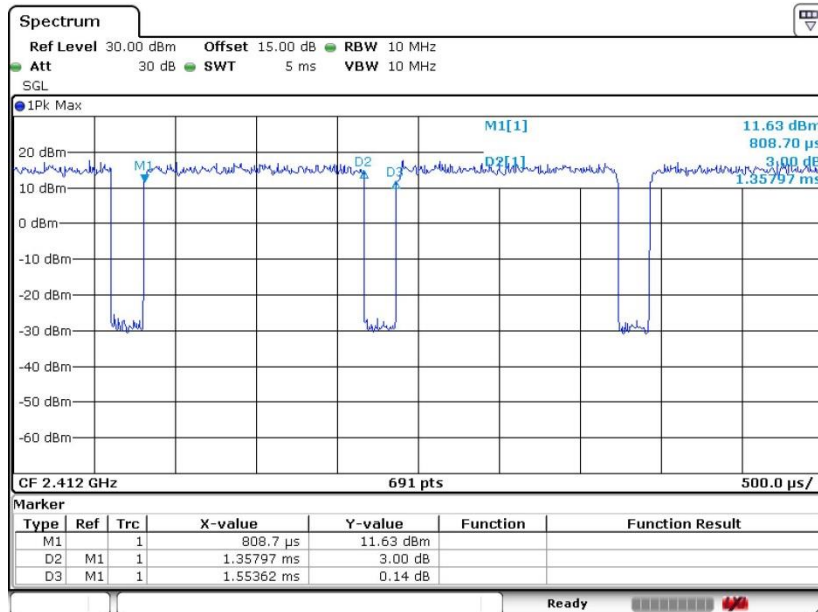
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.59	8.229	0.122	300Hz
802.11g	87.41	1.358	0.736	1KHz
802.11n HT20	86.21	1.268	0.789	1KHz
802.11n HT4	75.56	0.636	1.572	3KHz

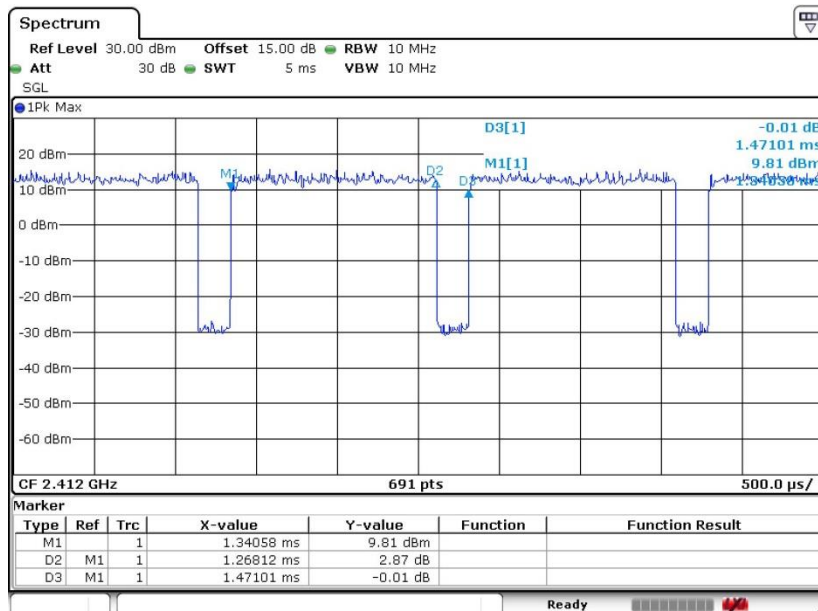
802.11b



802.11g



802.11n HT20



802.11n HT40

