

TEST REPORT

Reference No...... : WTX22X0604058W-1
FCC ID..... : 2A4VAWA01
Applicant : Shenzhen Qiluoxiang Technology Co., Ltd.
Address : Room 1811, Block A, Xintianxia Bairuida Building, Vanke City Community,
Bantian Street, Longgang District, Shenzhen
Product Name : wireless carplay adapter
Test Model : WA01
Standards : FCC Part 15.247
Date of Receipt sample : May 30, 2022
Date of Test : May 30, 2022 to June 5, 2022
Date of Issue : June 5, 2022
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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Report version

Version No.	Date of issue	Description
Rev.00	June 5, 2022	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Shenzhen Qiluoxiang Technology Co., Ltd.
Address of applicant: Room 1811, Block A, Xintianxia Bairuida Building, Vanke City Community, Bantian Street, Longgang District, Shenzhen

Manufacturer: Shenzhen Qiluoxiang Technology Co., Ltd.
Address of manufacturer: Room 1811, Block A, Xintianxia Bairuida Building, Vanke City Community, Bantian Street, Longgang District, Shenzhen

General Description of EUT	
Product Name:	wireless carplay adapter
Trade Name:	/
Model No.:	WA01
Adding Model(s):	WA02 WA03 WA04 WA05 WA06 WA07 WA08 WA09 WA10 WA11 WA12 WA13 WA14 WA15 WA16 WA17 WA18 WA19 WA20
Rated Voltage:	DC 5V
Power Adapter Model:	/
Serial number:	283HDK2003
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20)
RF Output Power:	17.46dBm (Conducted)
Type of Modulation:	DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM
Quantity of Channels:	11 for 802.11b/g/n(HT20)
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	1dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under section 15.247 of the FCC rules.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	Low:2412MHz, Middle:2437MHz,High:2462MHz
TM2	802.11g	Low:2412MHz, Middle:2437MHz,High:2462MHz
TM3	802.11n-HT20	Low:2412MHz, Middle:2437MHz,High:2462MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~55 %.
ATM Pressure:	1019 mbar

Test software(Fix the Tx frequency)	Power level(Testing)
Name	level
SecureCRT	Index

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-26GHz $\pm 3.92\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2022-03-27	2023-03-26
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2022-03-27	2023-03-26
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2022-03-27	2023-03-26
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2022-03-27	2023-03-26
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2022-03-27	2023-03-26
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2022-03-27	2023-03-26
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2022-03-27	2023-03-26
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2022-03-27	2023-03-26
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-1096	Power Sensor	Agilent	U2021XA	MY54250019	2022-03-27	2023-03-26
☐ Chamber A: Below 1GHz						
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2022-03-27	2023-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-03-27	2023-03-26
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2022-03-27	2023-03-26
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2022-03-27	2023-03-26
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2022-03-27	2023-03-26
☒ Chamber A: Above 1GHz						
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2022-03-27	2023-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-03-27	2023-03-26
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2022-03-27	2023-03-26
SEMT-1042	Horn Antenna	ETS	3117	00086197	2022-03-27	2023-03-26
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2022-03-27	2023-03-26
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2022-03-27	2023-03-26
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2022-03-27	2023-03-26
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2022-03-27	2023-03-26
☒ Chamber B: Below 1GHz						
SEMT-1068	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2022-03-27	2023-03-26
SEMT-1067	Amplifier	Agilent	8447D	2944A10179	2022-03-27	2023-03-26

Waltek Testing Group (Shenzhen) Co., Ltd.

[Http://www.waltek.com.cn](http://www.waltek.com.cn)

SEMT-1066	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2022-03-27	2023-03-26
☐ Chamber C: Below 1GHz						
SEMT-1319	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2022-03-27	2023-03-26
SEMT-1343	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2022-03-27	2023-03-26
SEMT-1333	Amplifier	HP	8447F	2944A03869	2022-03-27	2023-03-26
☒ Conducted Room 1#						
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2022-03-27	2023-03-26
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2022-03-27	2023-03-26
SEMT-1003	AC LISN	Schwarz beck	NSLK8126	8126-224	2022-03-27	2023-03-26
☐ Conducted Room 2#						
SEMT-1334	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2022-03-27	2023-03-26
SEMT-1336	LISN	Rohde & Schwarz	ENV 216	100097	2022-03-27	2023-03-26

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§ 15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	DTS Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: Not applicable.

3. Antenna Requirement

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section.

3.2 Evaluation Information

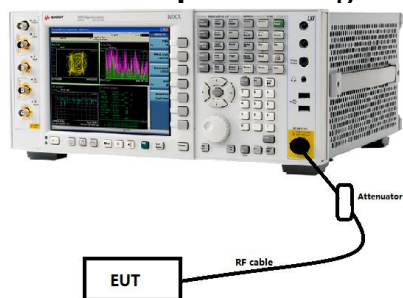
This product has a PCB antenna, fulfill the requirement of this section.

4. Power Spectral Density

4.1 Standard Applicable

According to 15.247(a)(1)(iii), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

4.2 Test Setup Block Diagram



4.3 Test Procedure

According to the KDB 558074 D01 v05r02 Subclause 8.4 and ANSI C63.10-2013 Subclause 11.10.3, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

4.4 Summary of Test Results/Plots

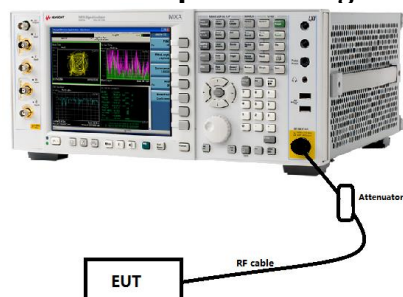
Please refer to Appendix A

5. DTS Bandwidth

5.1 Standard Applicable

According to 15.247(a)(2), systems using digital modulation techniques may operate in the 902–928MHz, 2400–2483.5MHz, and 5725–5850MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

5.2 Test Setup Block Diagram



5.3 Test Procedure

According to the KDB 558074 D01 v05r02 Subclause 8.2 and ANSI C63.10-2013 Subclause 11.8.1, the test method of DTS Bandwidth as below:

- Set RBW = 100kHz.
- Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.4 Summary of Test Results/Plots

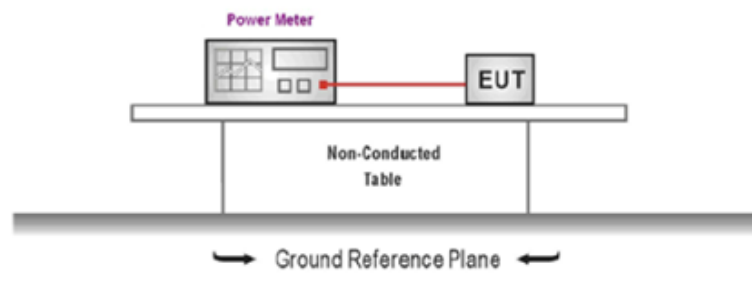
Please refer to Appendix B

6. RF Output Power

6.1 Standard Applicable

According to 15.247(b)(3), for systems using digital modulation in the 902–928MHz, 2400–2483.5MHz, and 5725–5850MHz bands: 1 Watt.

6.2 Test Setup Block Diagram



6.3 Test Procedure

According to the KDB-558074 D01 v05r02 Subclause 8.3.2.2 and ANSI C63.10-2013 Subclause 11.9.2.2, when this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.

- The EUT was tested according to ANSI C63.10: 2013 and KDB 558074 D01 for compliance to FCC 47 CFR 15.247 requirements.
- The maximum peak conducted output power may be measured using a broadband peak RF power meter.
- The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector
- Record the measurement data.

6.4 Summary of Test Results/Plots

Please refer to Appendix C

7. Field Strength of Spurious Emissions

7.1 Standard Applicable

According to §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

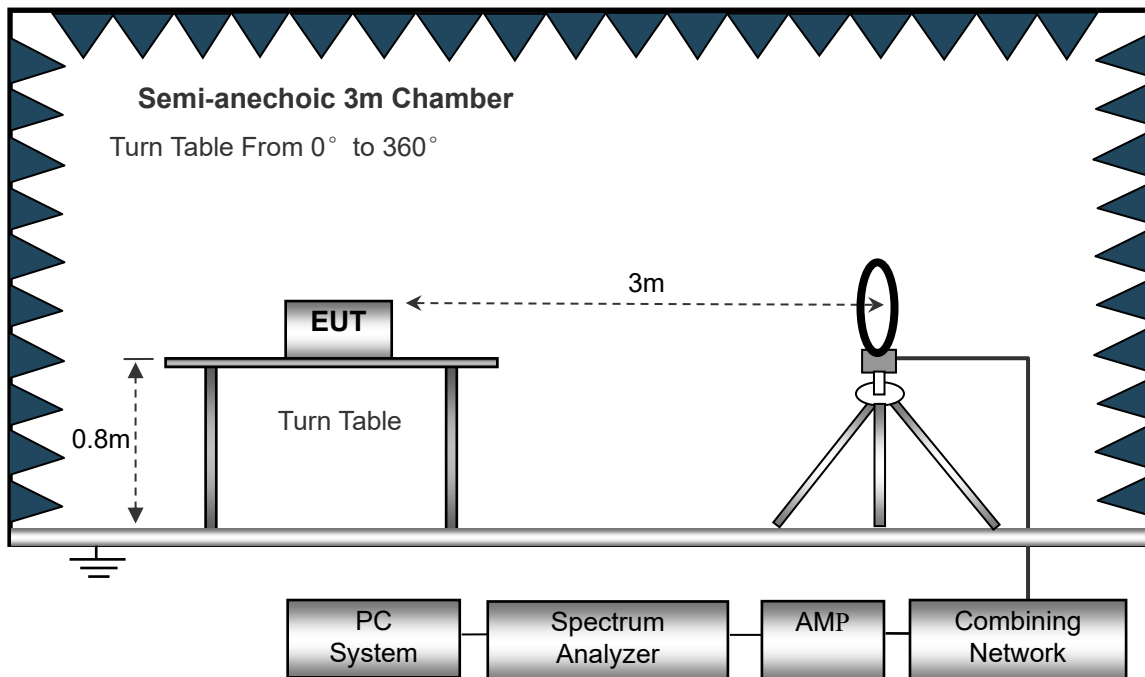
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

7.2 Test Procedure

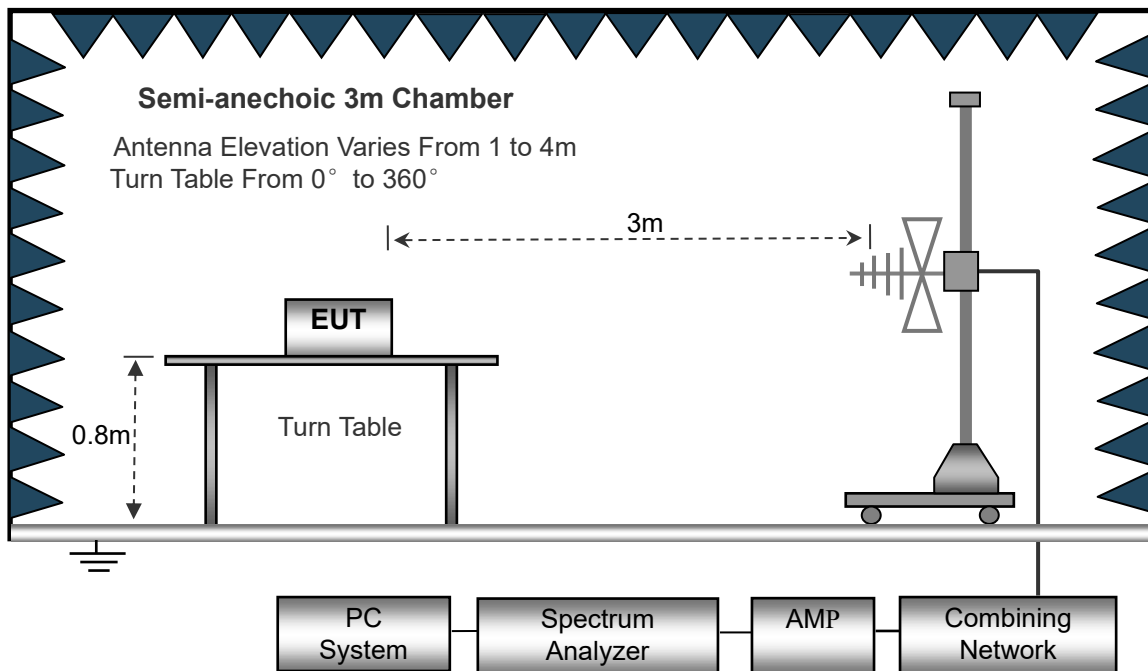
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

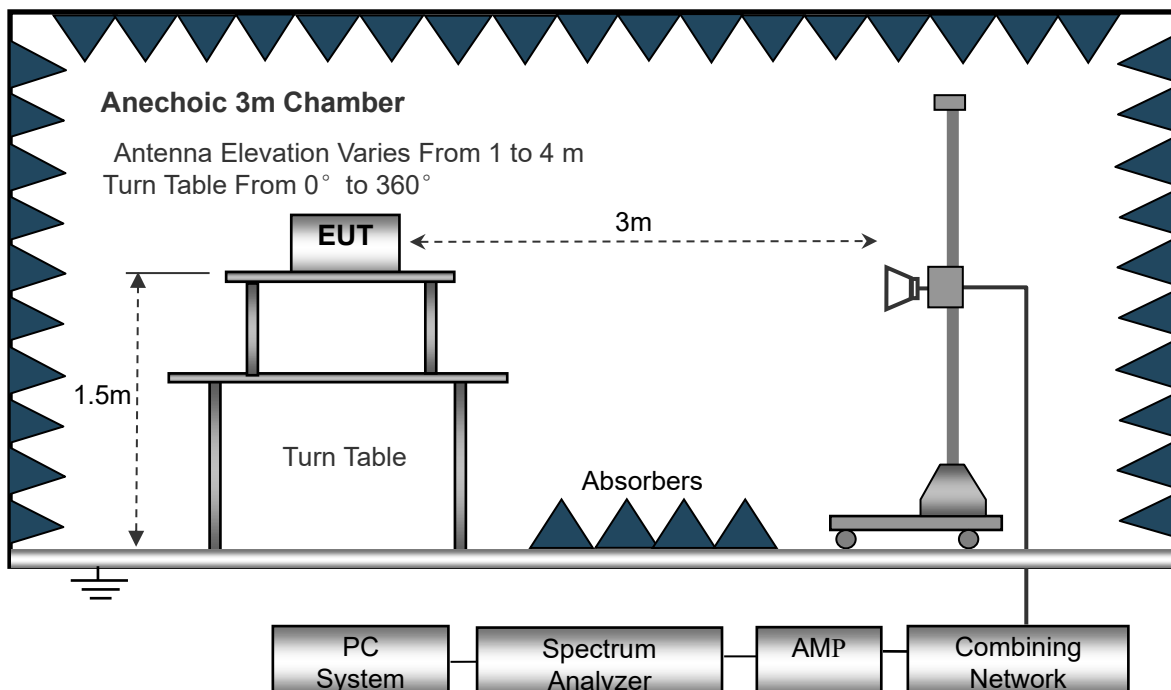
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



Frequency :9kHz-30MHz
 RBW=10KHz,
 VBW =30KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak

Frequency :30MHz-1GHz
 RBW=120KHz,
 VBW=300KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, QP

Frequency :Above 1GHz
 RBW=1MHz,
 VBW=3MHz(Peak), 10Hz(AV)
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, AV

7.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\begin{aligned}\text{Result} &= \text{Indicated Reading} + \text{Correct} \\ \text{Correct} &= \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}\end{aligned}$$

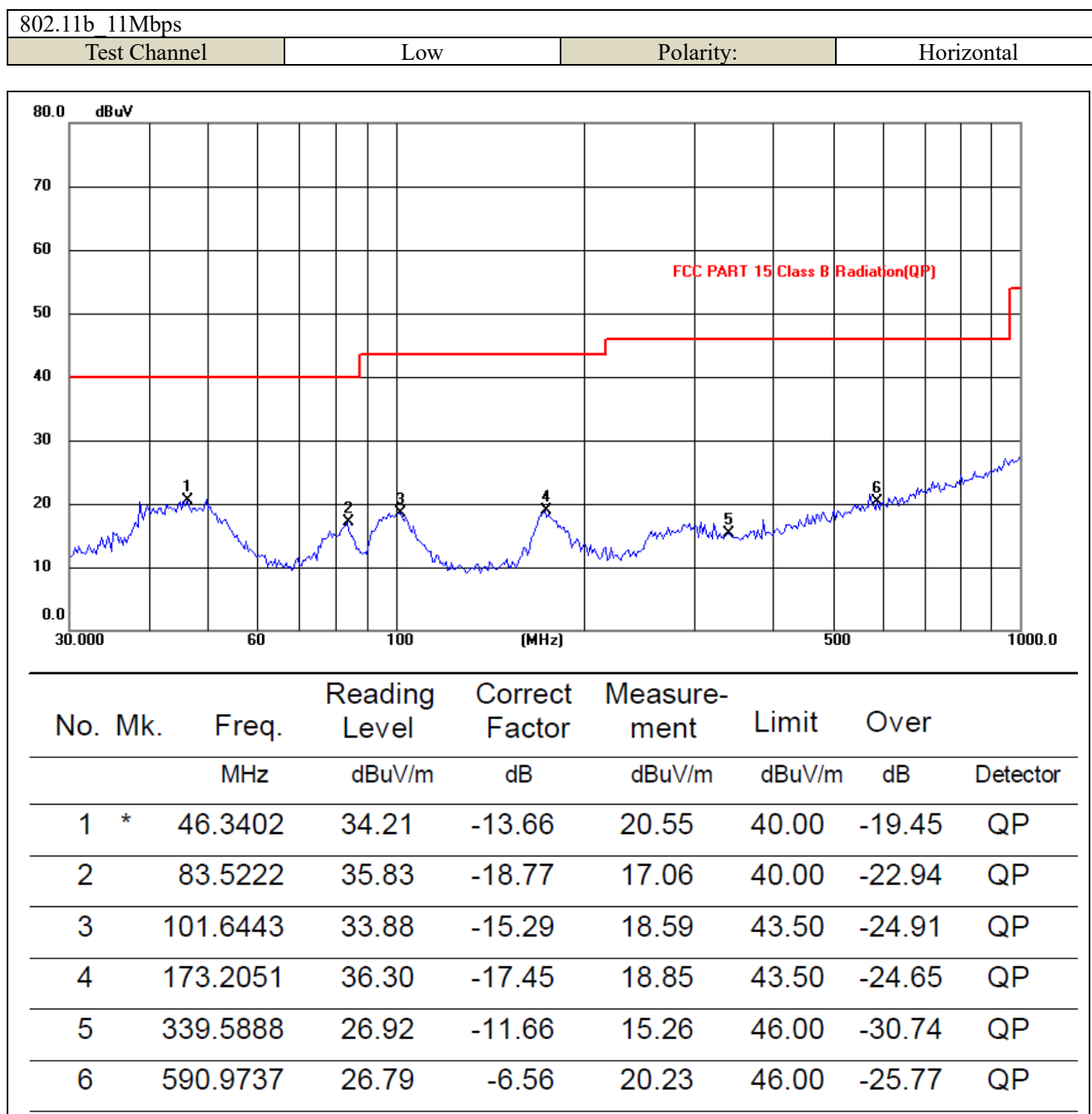
The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Result} - \text{FCC Part 15 Limit}$$

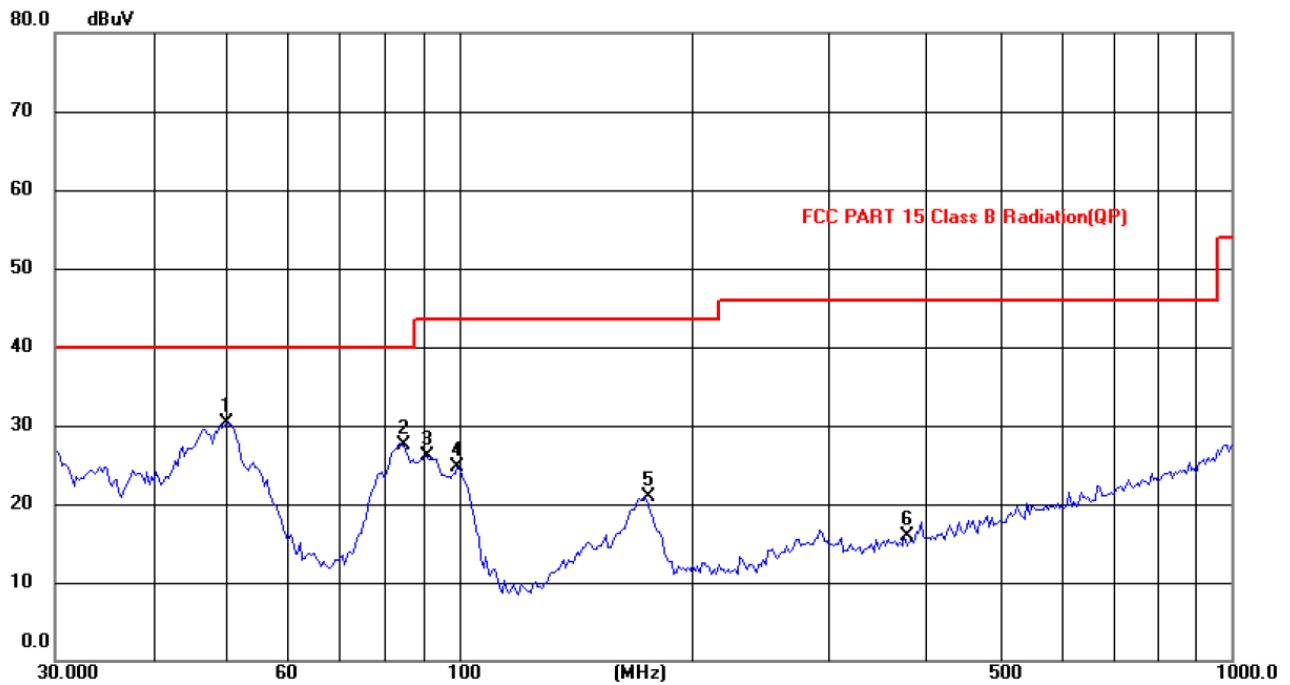
7.4 Summary of Test Results/Plots

*Note: 1. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.
 2. All test modes (different data rate and different modulation) are performed, but only the worst case(802.11b-11Mbps-Low channel) is recorded in this report.*

Spurious Emissions Below 1GHz



802.11b_11Mbps			
Test Channel	Low	Polarity:	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detect
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB	
1	*	50.0566	38.40	-8.01	30.39	40.00	-9.61	QP
2		84.7019	45.38	-17.97	27.41	40.00	-12.59	QP
3		90.8554	42.96	-16.88	26.08	43.50	-17.42	QP
4		99.5281	39.79	-15.18	24.61	43.50	-18.89	QP
5		174.4241	38.10	-17.12	20.98	43.50	-22.52	QP
6		377.2591	27.32	-11.38	15.94	46.00	-30.06	QP

- Spurious Emissions Above 1GHz
- *Test Mode: 802.11b_11Mbps (worst case)*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	58.81	-3.86	54.95	74	-19.05	H	PK
4824.000	43.54	-3.86	39.68	54	-14.32	H	AV
7236.000	54.95	1.1	56.05	74	-17.95	H	PK
7236.000	40.5	1.1	41.6	54	-12.4	H	AV
4824.000	61.64	-3.86	57.78	74	-16.22	V	PK
4824.000	41.54	-3.86	37.68	54	-16.32	V	AV
7236.000	52.59	1.1	53.69	74	-20.31	V	PK
7236.000	40.74	1.1	41.84	54	-12.16	V	AV
Middle Channel-2437MHz							
4874.000	58.66	-3.74	54.92	74	-19.08	H	PK
4874.000	41.78	-3.74	38.04	54	-15.96	H	AV
7311.000	52.83	1.47	54.3	74	-19.7	H	PK
7311.000	38.8	1.47	40.27	54	-13.73	H	AV
4874.000	58.75	-3.74	55.01	74	-18.99	V	PK
4874.000	41.95	-3.74	38.21	54	-15.79	V	AV
7311.000	55.94	1.47	57.41	74	-16.59	V	PK
7311.000	38.51	1.47	39.98	54	-14.02	V	AV
High Channel-2462MHz							
4924.000	59.17	-3.63	55.54	74	-18.46	H	PK
4924.000	42.07	-3.63	38.44	54	-15.56	H	AV
7386.000	53.66	1.62	55.28	74	-18.72	H	PK
7386.000	38.14	1.62	39.76	54	-14.24	H	AV
4924.000	57.54	-3.63	53.91	74	-20.09	V	PK
4924.000	42.11	-3.63	38.48	54	-15.52	V	AV
7386.000	52.84	1.62	54.46	74	-19.54	V	PK
7386.000	38.94	1.62	40.56	54	-13.44	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to bemeasured.

8. Out of Band Emissions

8.1 Standard Applicable

According to §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

8.2 Test Procedure

According to the KDB 558074D01 v05r02 Subclause 8.4 and ANSI C63.10-2013 Subclause 11.11, the Emissions in nonrestricted frequency bands test method as follows:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

According to the KDB 558074 D01 v05r02 Subclause 8.5 and ANSI C63.10-2013 Subclause 11.12, the Emissions in restricted frequency bands test method as follows:

A. Radiated emission measurements:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

B. Antenna-port conducted measurements

Peak emission levels are measured by setting the instrument as follows:

- a) RBW = as specified in Table 9.
- b) VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = peak.
- d) Sweep time = auto.
- e) Trace mode = max hold.
- f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be lengthened for

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low-duty-cycle applications.)

Table 9—RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1000 MHz	100 kHz to 120 kHz
>1000 MHz	1 MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

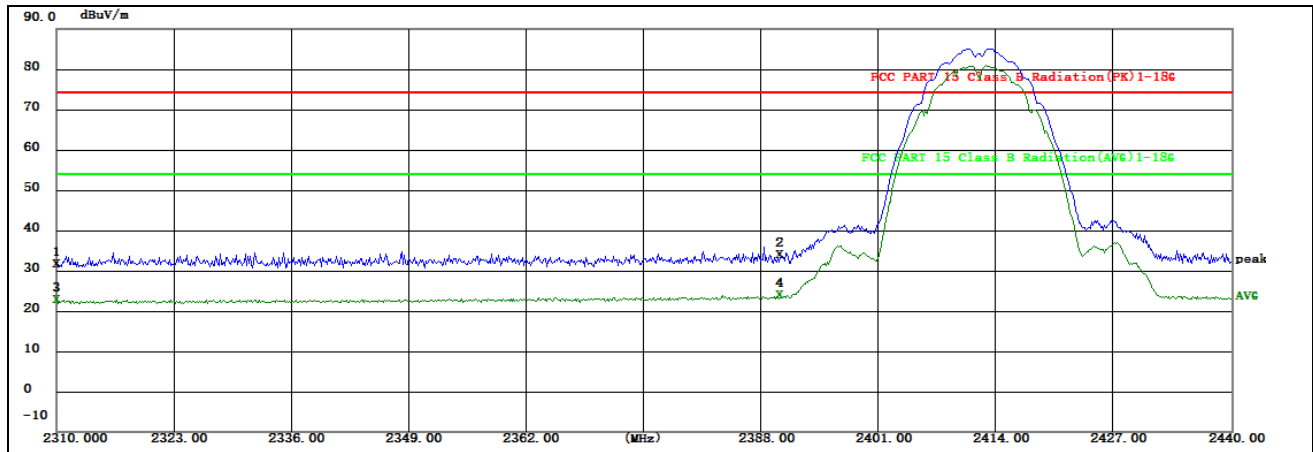
8.3 Summary of Test Results/Plots

Note: 1. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

2. All test modes (different data rate and different modulation) are performed, but only the worst case (Vertical) is recorded in this report.

➤ Radiated test

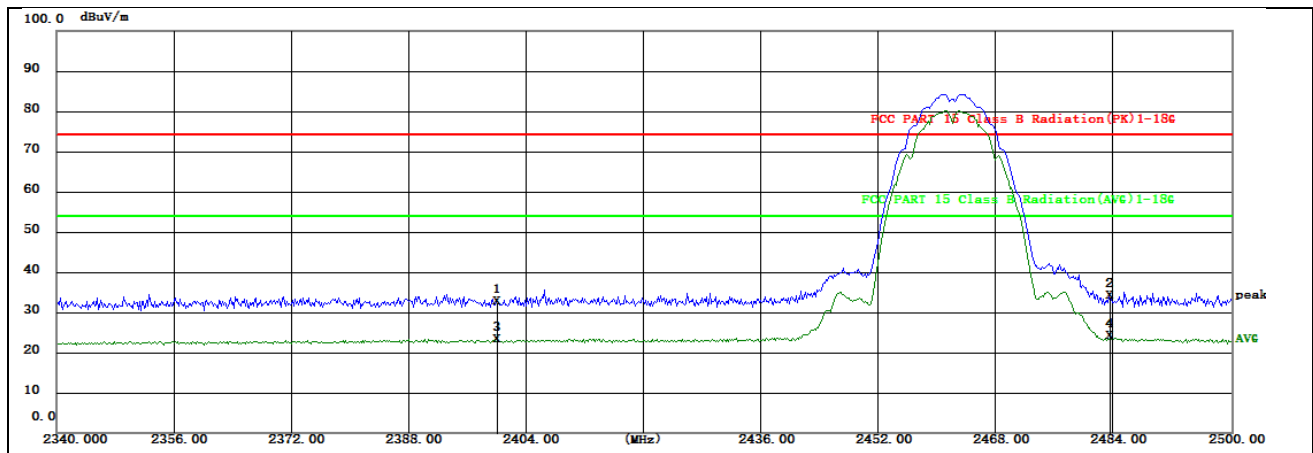
802.11b_11Mbps			
Test Channel	Low	Polarity:	Vertical(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	40.61	-9.66	30.95	74	-43.05	Peak Detector
2	2390.000	42.7	-9.66	33.04	74	-40.96	Peak Detector
3	2310.000	31.43	-9.5	21.93	54	-32.07	Average Detector
4	2390.000	32.6	-9.5	23.1	54	-30.9	Average Detector

802.11b_11Mbps

Test Channel	High	Polarity:	Vertical(worst case)
--------------	------	-----------	----------------------



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2400.000	41.34	-9.36	31.98	74	-42.02	Peak Detector
2	2483.500	42.64	-9.35	33.29	74	-40.71	Peak Detector
3	2400.000	31.71	-9.31	22.4	54	-31.6	Average Detector
4	2483.500	32.58	-9.31	23.27	54	-30.73	Average Detector

➤ Conducted test

Please refer to Appendix D

9. Conducted Emissions

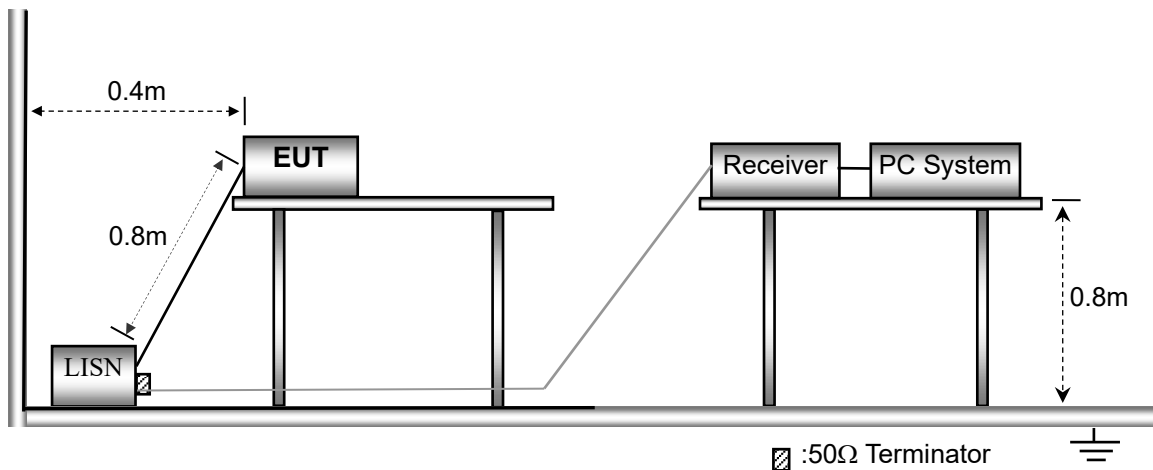
9.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

The spacing between the peripherals was 10cm.

9.2 Basic Test Setup Block Diagram

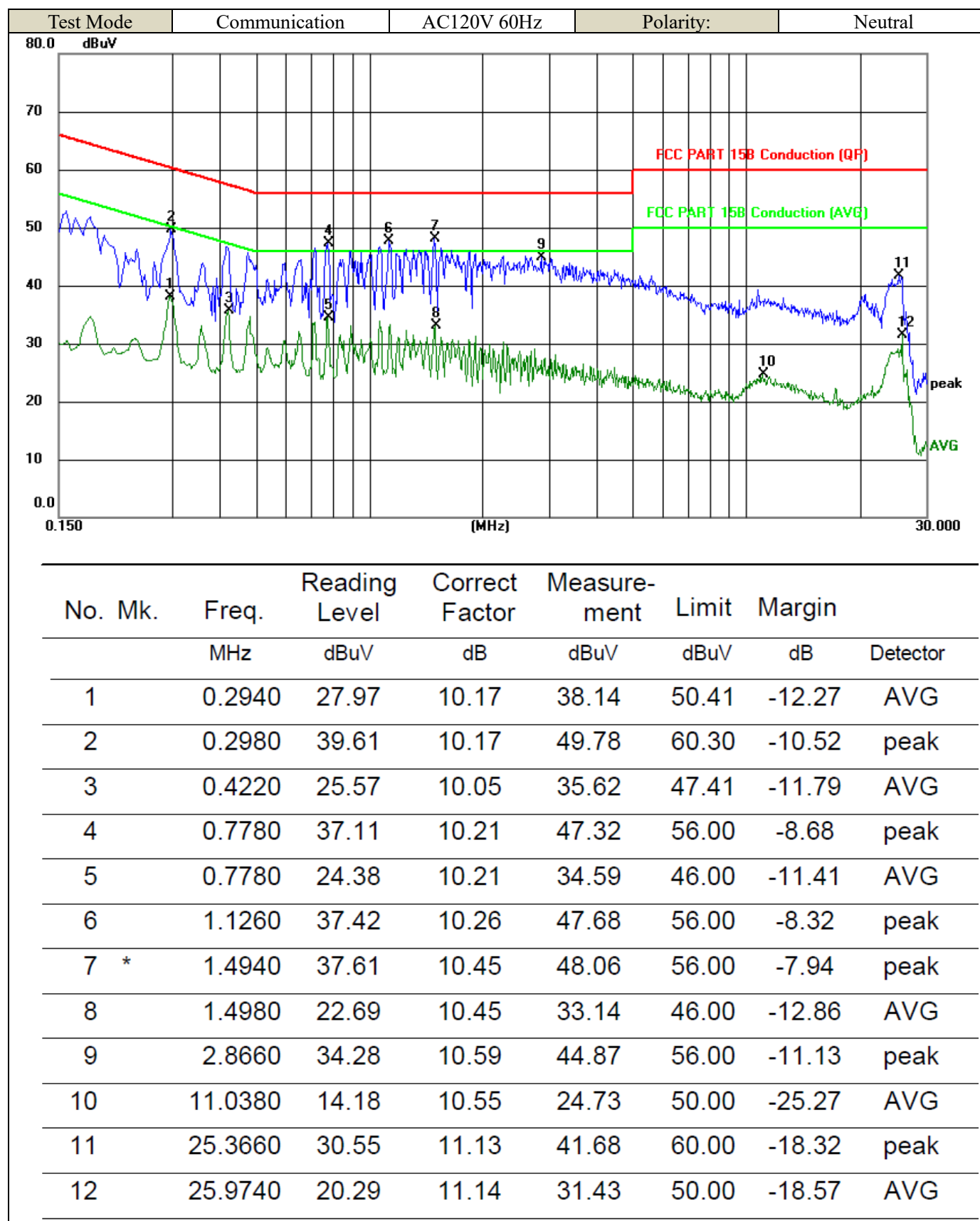


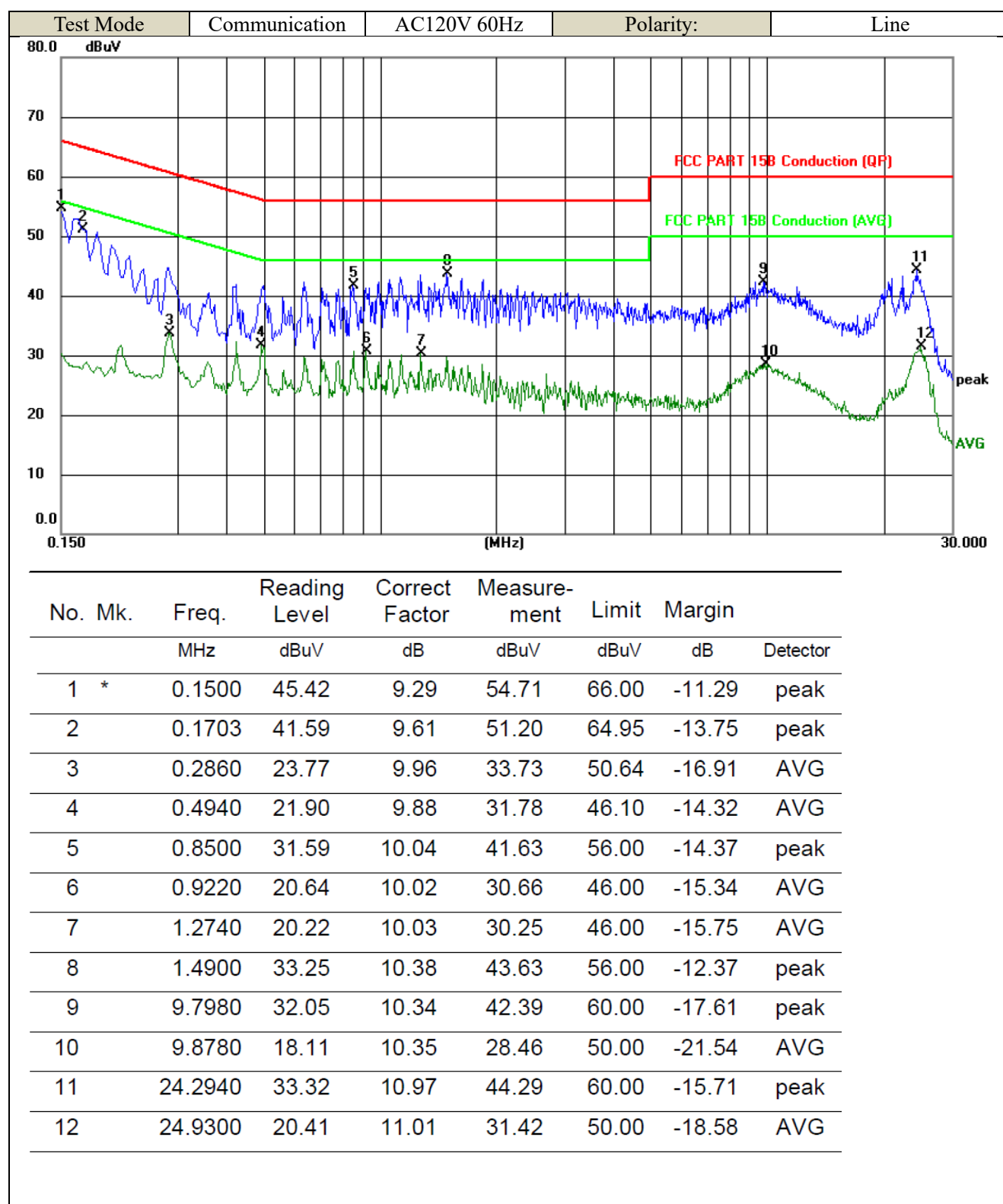
9.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency.....	150kHz
Stop Frequency.....	30MHz
Sweep Speed.....	Auto
IF Bandwidth.....	10kHz
Quasi-Peak Adapter Bandwidth.....	9kHz
Quasi-Peak Adapter Mode.....	Normal

9.4 Summary of Test Results/Plots





APPENDIX SUMMARY

Project No.	WTX22X0604058W-1	Test Engineer	Tom Wang
Start date	2022/05/30	Finish date	2022/06/05
Temperature	24.3℃	Humidity	53%
RF specifications	2.4G WIFI		

APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	DTS Bandwidth	Compliant
C	RF Output Power	Compliant
D	Conducted Out of Band Emissions AND Conducted Emissions	Compliant

APPENDIX A

Power Spectral Density			
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
802.11b_11Mbps	2412	-14.60	8
	2437	-14.50	8
	2462	-13.97	8
802.11g_54Mbps	2412	-20.70	8
	2437	-20.71	8
	2462	-20.40	8
802.11n-HT20_MCS7	2412	-21.88	8
	2437	-22.16	8
	2462	-21.58	8

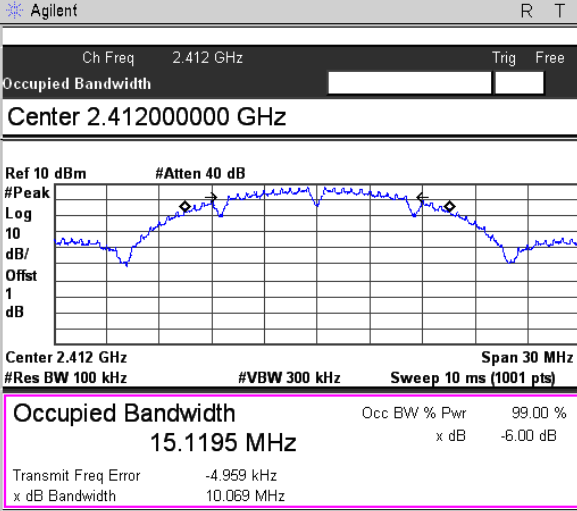
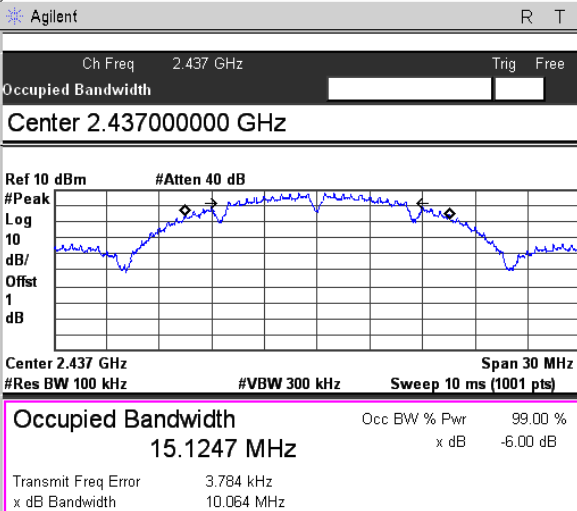
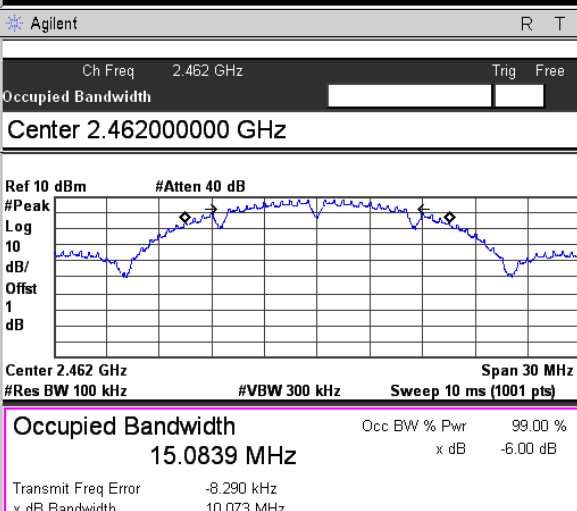
802.11b-Low	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.412616 GHz -14.6 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.412615600 GHz -14.6 dBm Center 2.412 GHz #Res BW 3 kHz #VBW 10 kHz Span 22.8 MHz Sweep 4.123 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11b-Middle	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.437616 GHz -14.5 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.437615600 GHz -14.5 dBm Center 2.437 GHz #Res BW 3 kHz #VBW 10 kHz Span 22.8 MHz Sweep 4.123 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11b-High	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.462680 GHz -13.97 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.462679500 GHz -13.97 dBm Center 2.462 GHz #Res BW 3 kHz #VBW 10 kHz Span 22.65 MHz Sweep 4.096 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

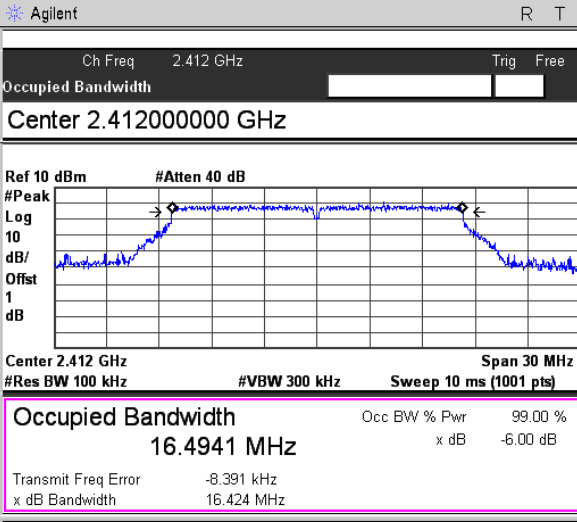
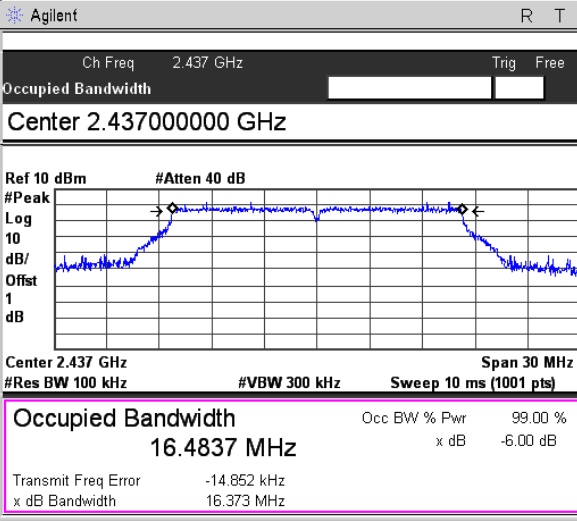
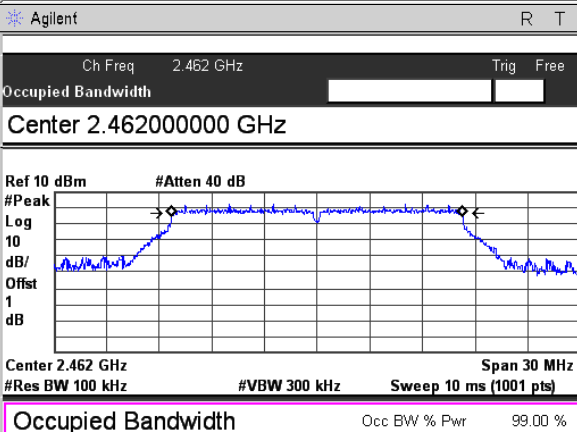
802.11g-Low	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.409179 GHz -20.7 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.409178500 GHz -20.7 dBm Center 2.412 GHz Span 24.75 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 4.475 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11g-Middle	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.439475 GHz -20.7 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.439475000 GHz -20.71 dBm Center 2.437 GHz Span 24.75 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 4.475 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11g-High	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.460441 GHz -20.4 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.460440750 GHz -20.4 dBm Center 2.462 GHz Span 24.75 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 4.475 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

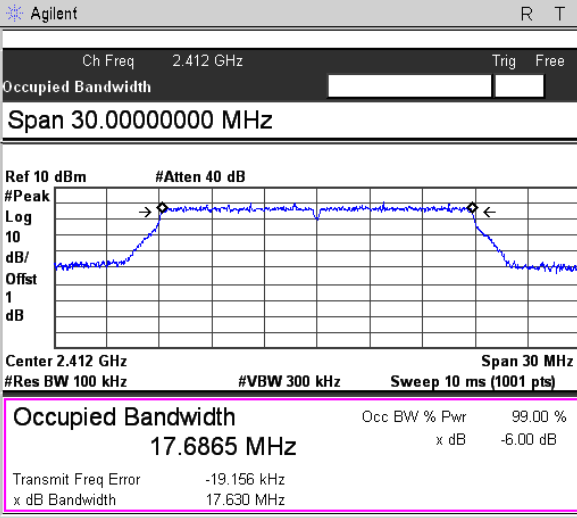
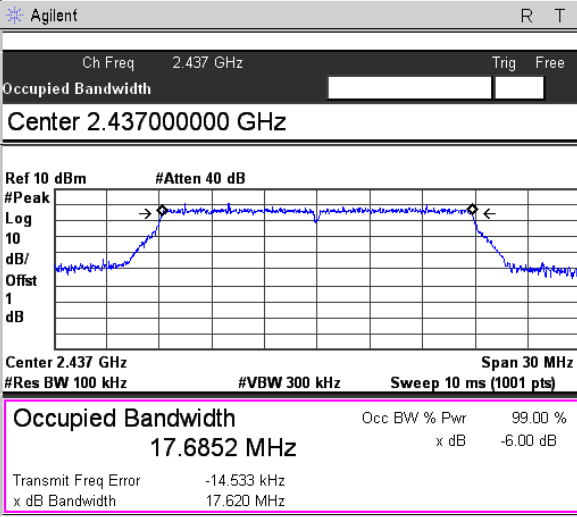
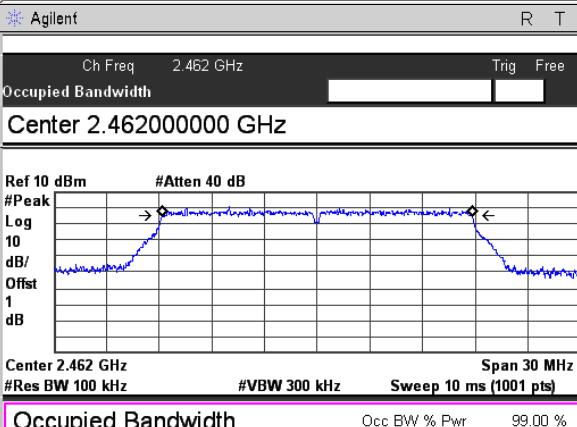
802.11n-HT20-Low	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.418584 GHz -21.88 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.418584400 GHz -21.88 dBm Center 2.412 GHz #Res BW 3 kHz #VBW 10 kHz Span 26.55 MHz Sweep 4.801 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11n-HT20-Middle	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.438832 GHz -22.16 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.438831950 GHz -22.16 dBm Center 2.437 GHz #Res BW 3 kHz #VBW 10 kHz Span 26.55 MHz Sweep 4.801 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11n-HT20-High	Agilent R T Ref 0 dBm #Atten 40 dB Mkr1 2.457301 GHz -21.58 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 2.457300650 GHz -21.58 dBm Center 2.462 GHz #Res BW 3 kHz #VBW 10 kHz Span 26.55 MHz Sweep 4.801 s (1001 pts) Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

APPENDIX B

DTS Bandwidth			
Test Mode	Test Channel MHz	6 dB Bandwidth MHz	Limit kHz
802.11b_11Mbps	2412	10.069	≥500
	2437	10.064	≥500
	2462	10.073	≥500
802.11g_54Mbps	2412	16.424	≥500
	2437	16.373	≥500
	2462	16.363	≥500
802.11n-HT20_MCS7	2412	17.630	≥500
	2437	17.620	≥500
	2462	17.604	≥500

802.11b-Low		<table><tr><td>Freq/Channel</td></tr><tr><td>Center Freq 2.41200000 GHz</td></tr><tr><td>Start Freq 2.39700000 GHz</td></tr><tr><td>Stop Freq 2.42700000 GHz</td></tr><tr><td>CF Step 3.00000000 MHz Auto Man</td></tr><tr><td>Freq Offset 0.00000000 Hz</td></tr><tr><td>Signal Track On Off</td></tr><tr><td>Scale Type Log Lin</td></tr></table>	Freq/Channel	Center Freq 2.41200000 GHz	Start Freq 2.39700000 GHz	Stop Freq 2.42700000 GHz	CF Step 3.00000000 MHz Auto Man	Freq Offset 0.00000000 Hz	Signal Track On Off	Scale Type Log Lin
Freq/Channel										
Center Freq 2.41200000 GHz										
Start Freq 2.39700000 GHz										
Stop Freq 2.42700000 GHz										
CF Step 3.00000000 MHz Auto Man										
Freq Offset 0.00000000 Hz										
Signal Track On Off										
Scale Type Log Lin										
802.11b-Middle		<table><tr><td>Freq/Channel</td></tr><tr><td>Center Freq 2.43700000 GHz</td></tr><tr><td>Start Freq 2.42200000 GHz</td></tr><tr><td>Stop Freq 2.45200000 GHz</td></tr><tr><td>CF Step 3.00000000 MHz Auto Man</td></tr><tr><td>Freq Offset 0.00000000 Hz</td></tr><tr><td>Signal Track On Off</td></tr><tr><td>Scale Type Log Lin</td></tr></table>	Freq/Channel	Center Freq 2.43700000 GHz	Start Freq 2.42200000 GHz	Stop Freq 2.45200000 GHz	CF Step 3.00000000 MHz Auto Man	Freq Offset 0.00000000 Hz	Signal Track On Off	Scale Type Log Lin
Freq/Channel										
Center Freq 2.43700000 GHz										
Start Freq 2.42200000 GHz										
Stop Freq 2.45200000 GHz										
CF Step 3.00000000 MHz Auto Man										
Freq Offset 0.00000000 Hz										
Signal Track On Off										
Scale Type Log Lin										
802.11b-High		<table><tr><td>Freq/Channel</td></tr><tr><td>Center Freq 2.46200000 GHz</td></tr><tr><td>Start Freq 2.44700000 GHz</td></tr><tr><td>Stop Freq 2.47700000 GHz</td></tr><tr><td>CF Step 3.00000000 MHz Auto Man</td></tr><tr><td>Freq Offset 0.00000000 Hz</td></tr><tr><td>Signal Track On Off</td></tr><tr><td>Scale Type Log Lin</td></tr></table>	Freq/Channel	Center Freq 2.46200000 GHz	Start Freq 2.44700000 GHz	Stop Freq 2.47700000 GHz	CF Step 3.00000000 MHz Auto Man	Freq Offset 0.00000000 Hz	Signal Track On Off	Scale Type Log Lin
Freq/Channel										
Center Freq 2.46200000 GHz										
Start Freq 2.44700000 GHz										
Stop Freq 2.47700000 GHz										
CF Step 3.00000000 MHz Auto Man										
Freq Offset 0.00000000 Hz										
Signal Track On Off										
Scale Type Log Lin										

802.11g-Low	 Agilent R T Ch Freq 2.412 GHz Trig Free Occupied Bandwidth Center 2.41200000 GHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.412 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 16.4941 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -8.391 kHz x dB Bandwidth 16.424 MHz Freq/Channel Center Freq 2.41200000 GHz Start Freq 2.39700000 GHz Stop Freq 2.42700000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11g-Middle	 Agilent R T Ch Freq 2.437 GHz Trig Free Occupied Bandwidth Center 2.43700000 GHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.437 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 16.4837 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -14.852 kHz x dB Bandwidth 16.373 MHz Freq/Channel Center Freq 2.43700000 GHz Start Freq 2.42200000 GHz Stop Freq 2.45200000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11g-High	 Agilent R T Ch Freq 2.462 GHz Trig Free Occupied Bandwidth Center 2.46200000 GHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.462 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 16.4969 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -22.950 kHz x dB Bandwidth 16.363 MHz Freq/Channel Center Freq 2.46200000 GHz Start Freq 2.44700000 GHz Stop Freq 2.47700000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

802.11n-HT20-Low	 Agilent R T Ch Freq 2.412 GHz Trig Free Occupied Bandwidth Span 30.00000000 MHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.412 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 17.6865 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -19.156 kHz x dB Bandwidth 17.630 MHz Span Span 30.00000000 MHz Span Zoom Full Span Zero Span Last Span Zone ▶
802.11n-HT20-Middle	 Agilent R T Ch Freq 2.437 GHz Trig Free Occupied Bandwidth Center 2.437000000 GHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.437 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 17.6852 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -14.533 kHz x dB Bandwidth 17.620 MHz Freq/Channel Center Freq 2.43700000 GHz Start Freq 2.42200000 GHz Stop Freq 2.45200000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11n-HT20-High	 Agilent R T Ch Freq 2.462 GHz Trig Free Occupied Bandwidth Center 2.462000000 GHz Ref 10 dBm #Atten 40 dB #Peak Log 10 dB/Offset 1 dB Center 2.462 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 17.6762 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -14.267 kHz x dB Bandwidth 17.604 MHz Freq/Channel Center Freq 2.46200000 GHz Start Freq 2.44700000 GHz Stop Freq 2.47700000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

APPENDIX C

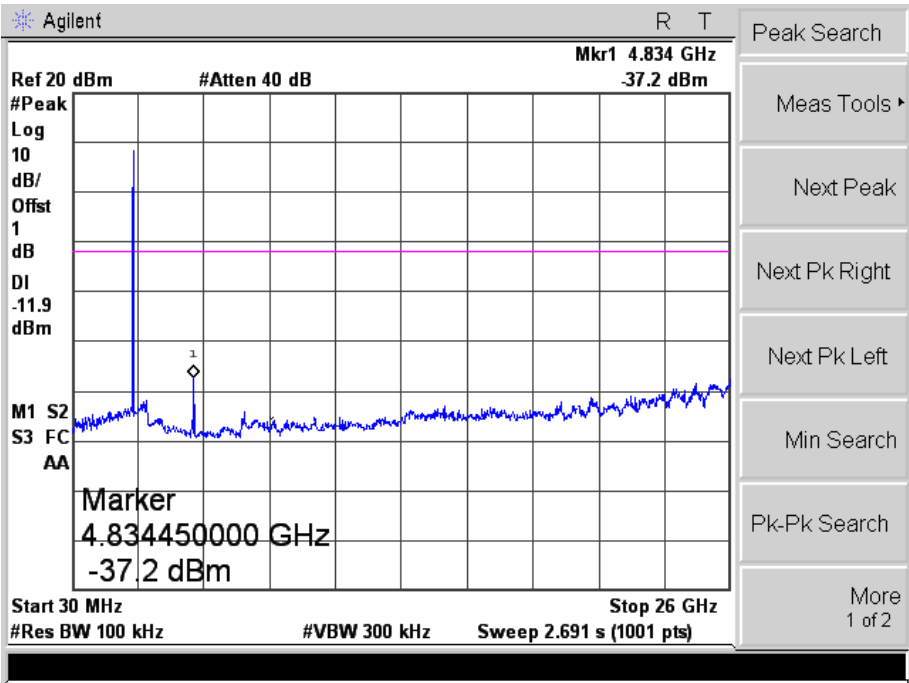
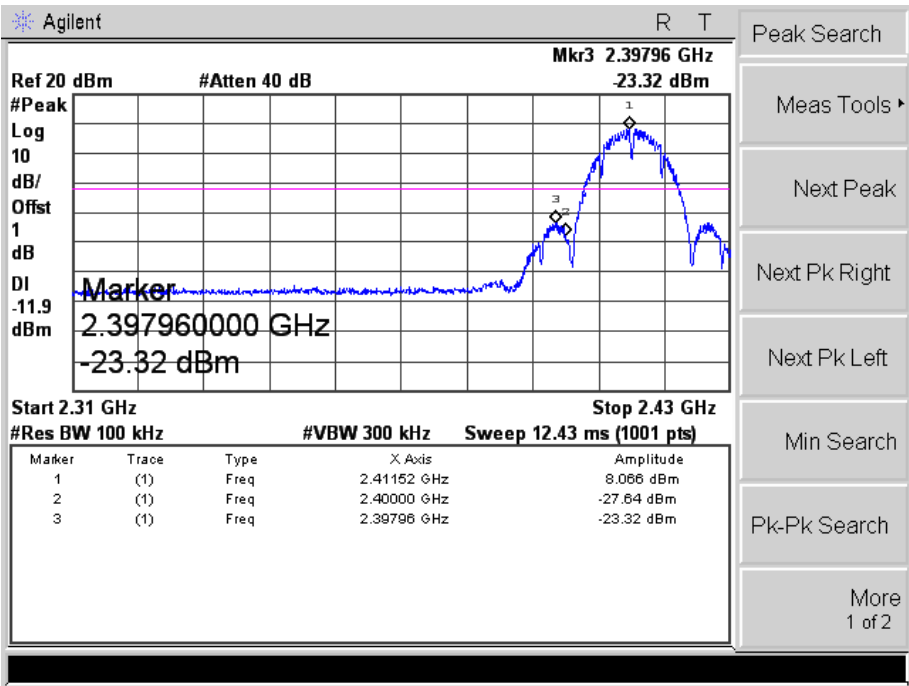
RF Output Power				
Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
802.11b _ 11Mbps	2412	17.21	52.60	1000
	2437	17.46	55.72	1000
	2462	17.34	54.20	1000
802.11g_54Mbps	2412	12.90	19.50	1000
	2437	13.20	20.89	1000
	2462	13.24	21.09	1000
802.11n HT20_MCS7	2412	11.91	15.52	1000
	2437	12.03	15.96	1000
	2462	12.52	17.86	1000

APPENDIX D

CONDUCTED OUT OF BAND EMISSIONS AND CONDUCTED EMISSION

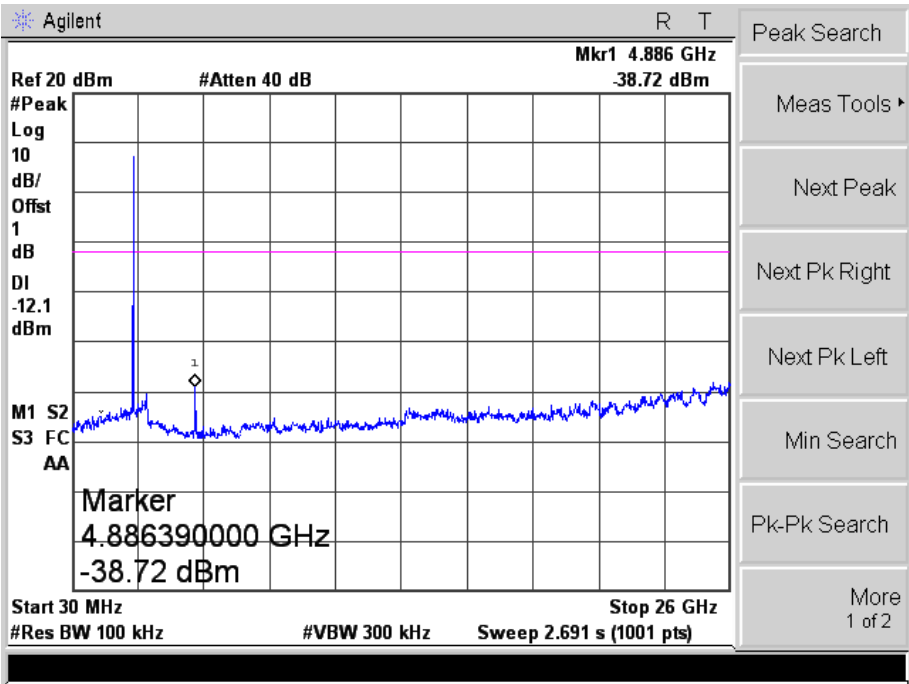
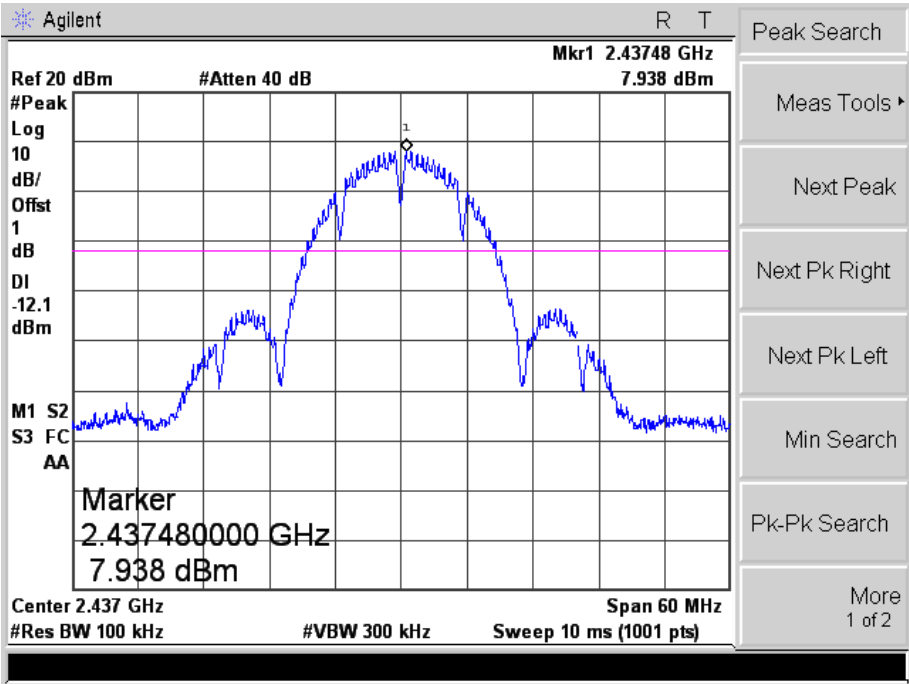
802.11b_11Mbps

Low



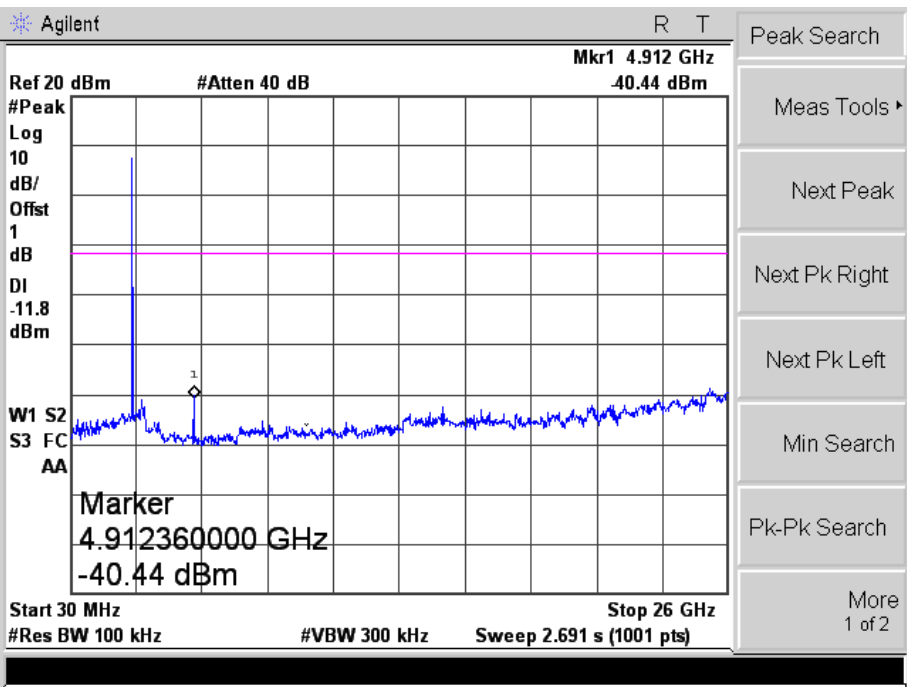
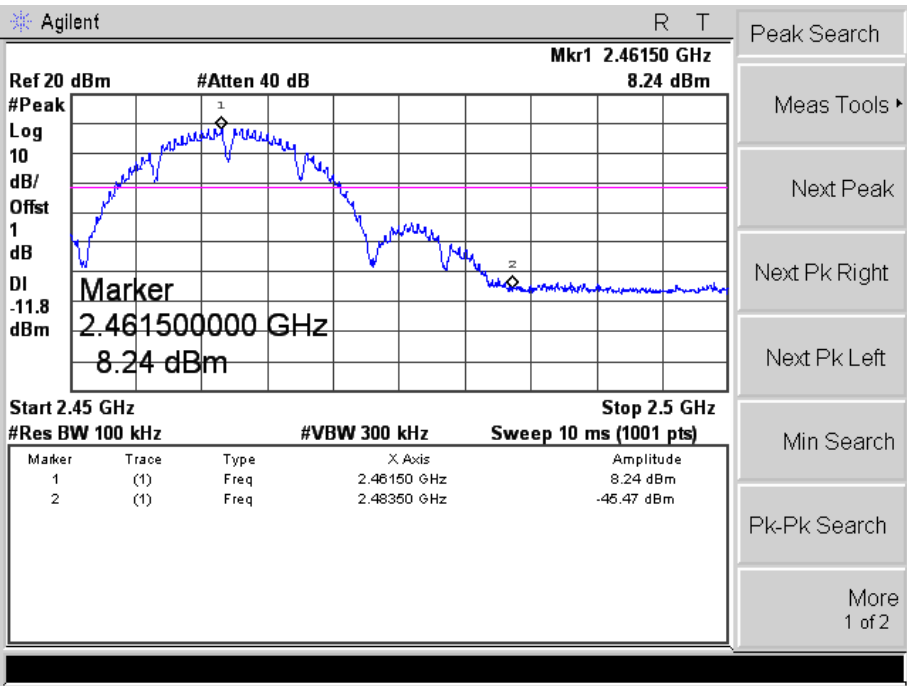
802.11b_11Mbps

Middle



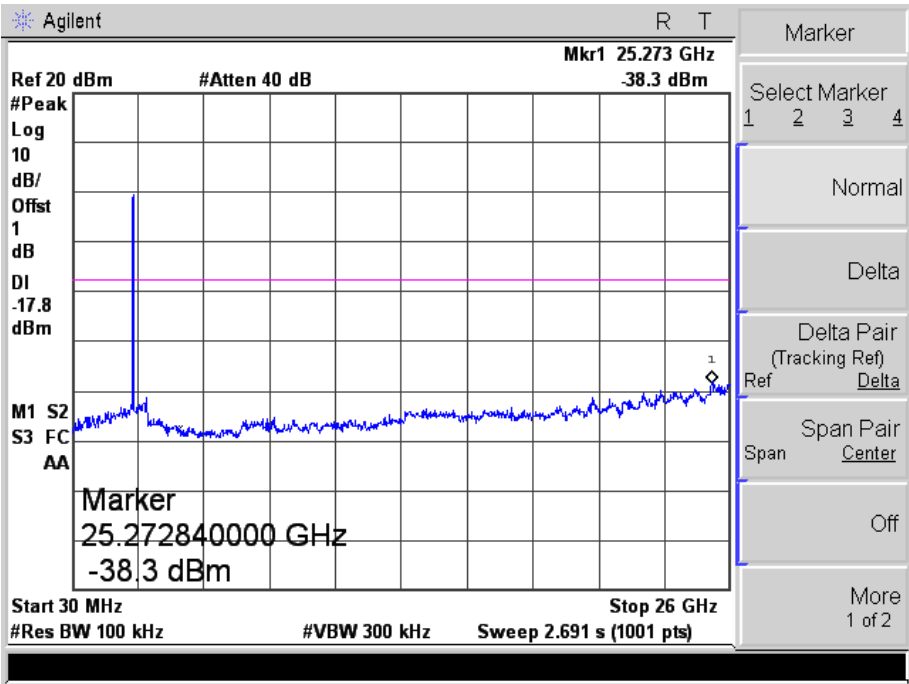
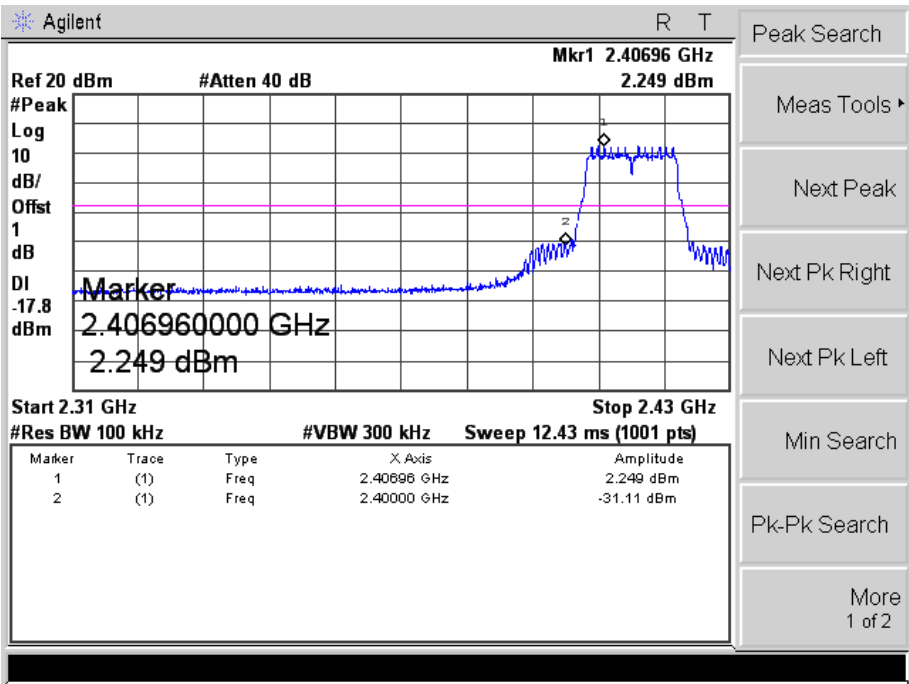
802.11b_11Mbps

High



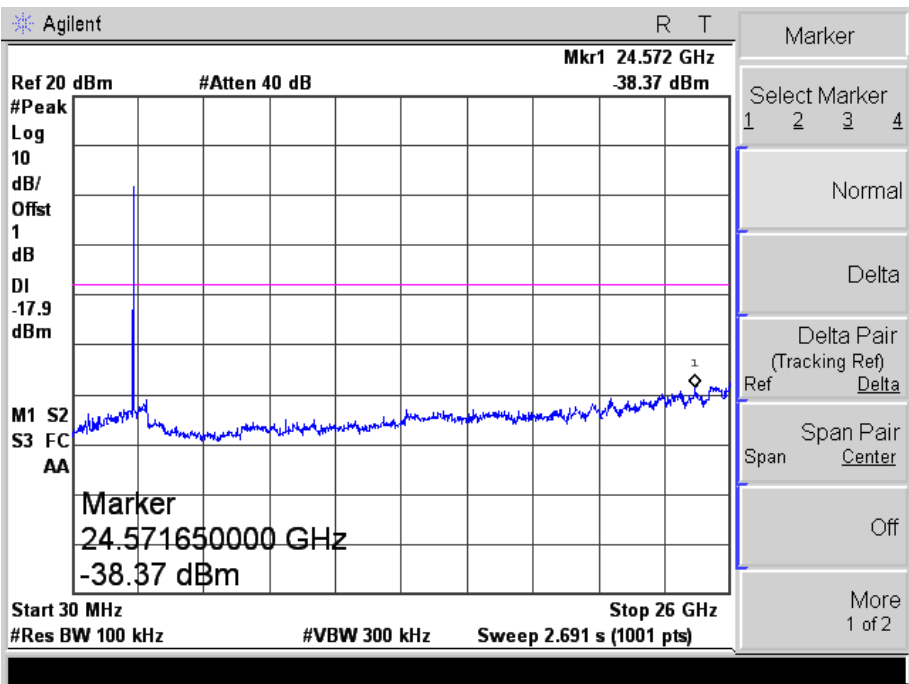
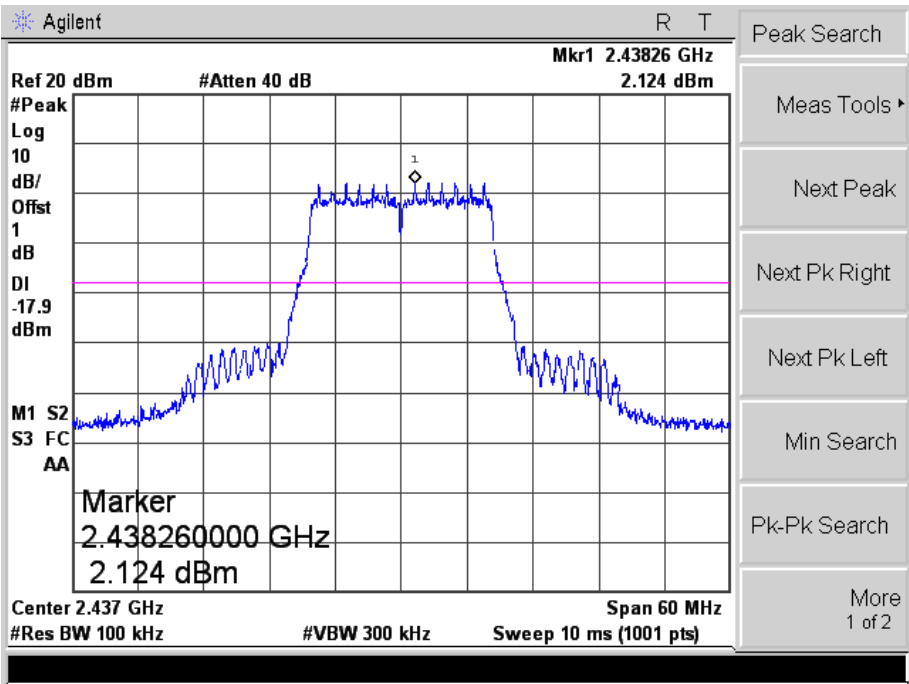
802.11g_54Mbps

Low



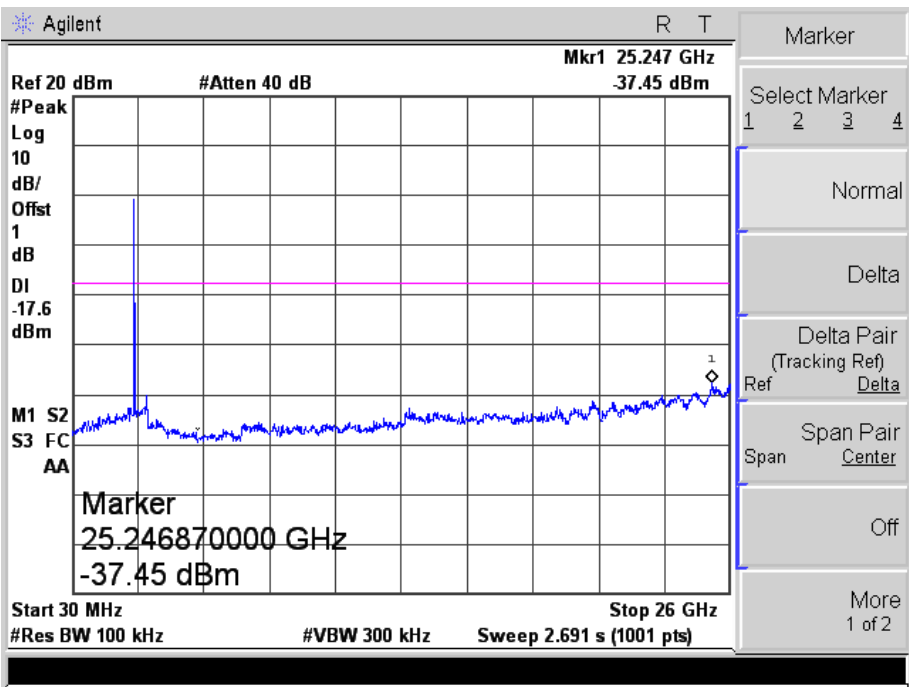
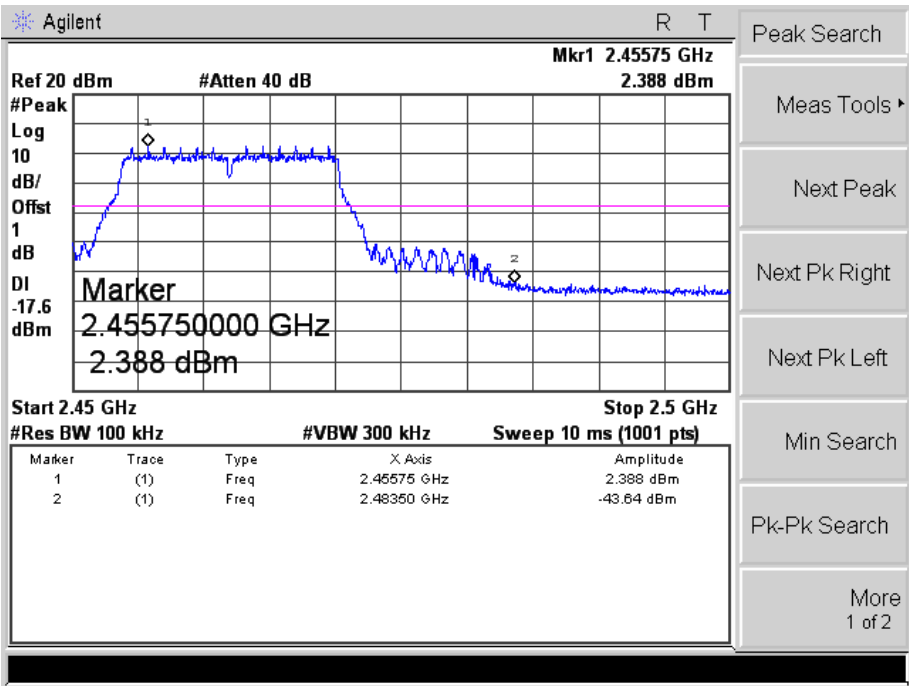
802.11g_54Mbps

Middle



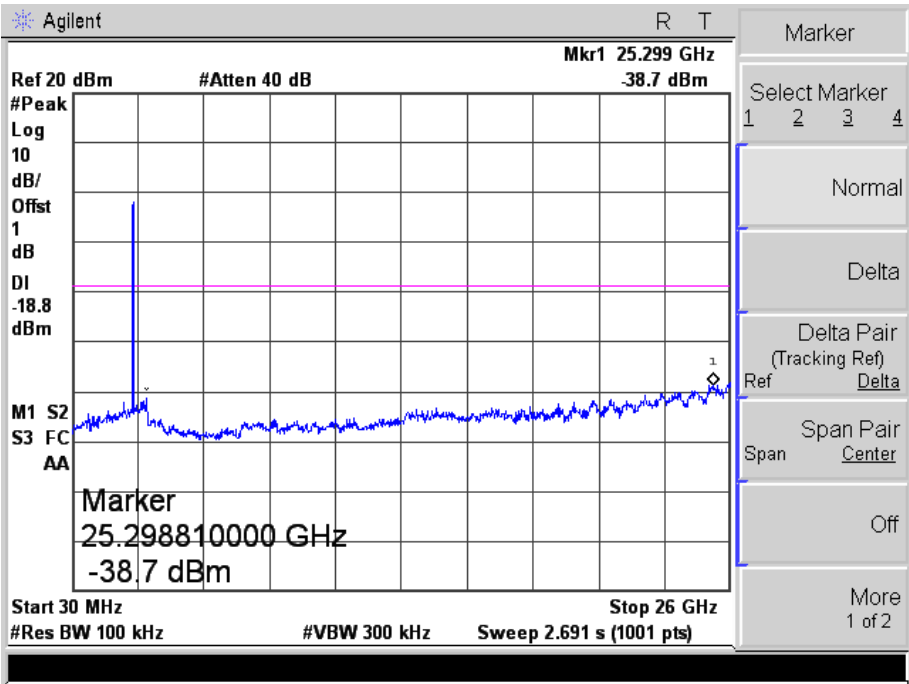
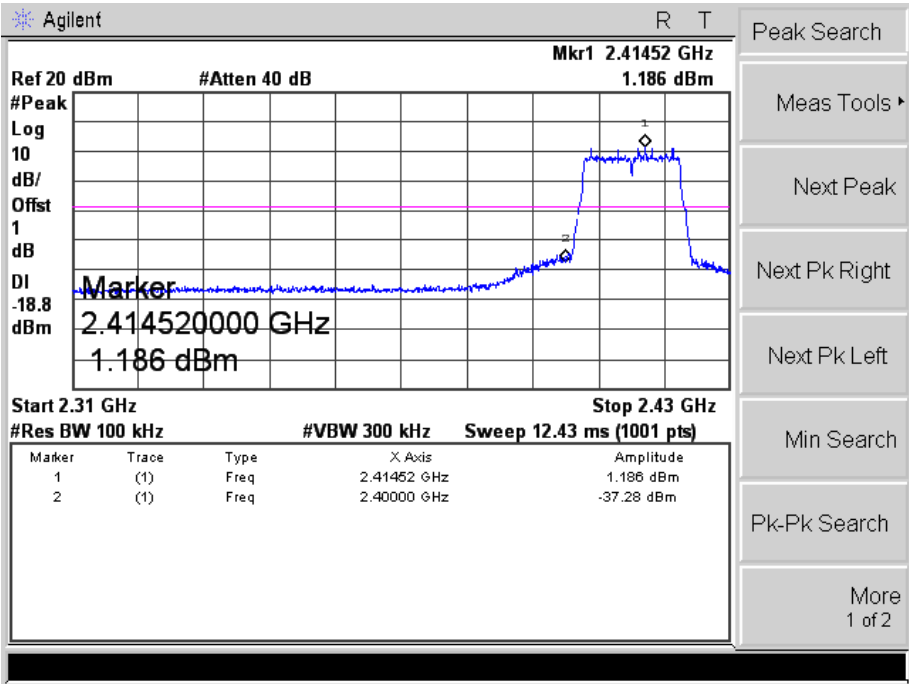
802.11g_54Mbps

High



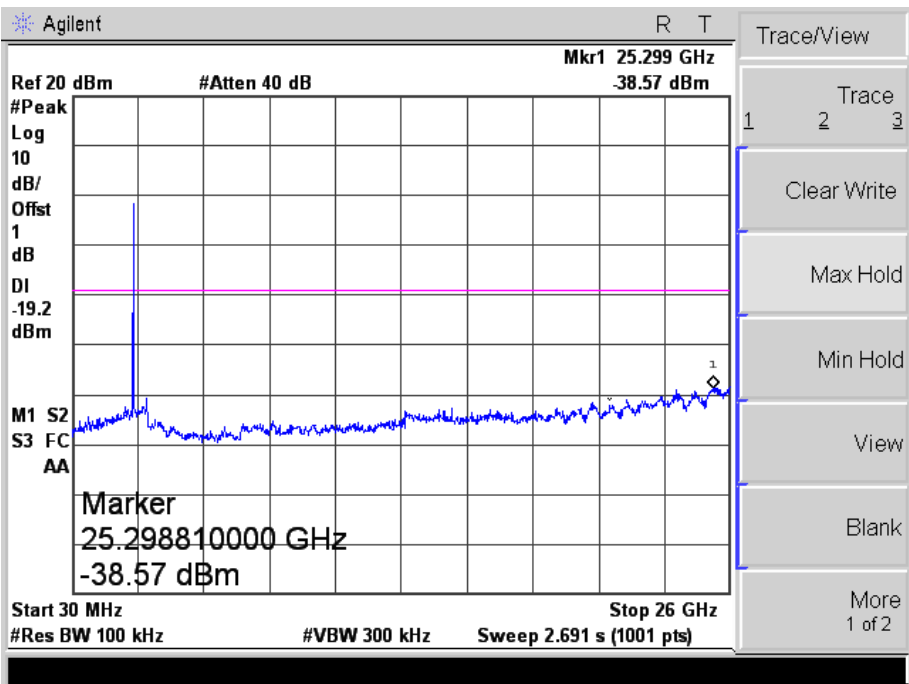
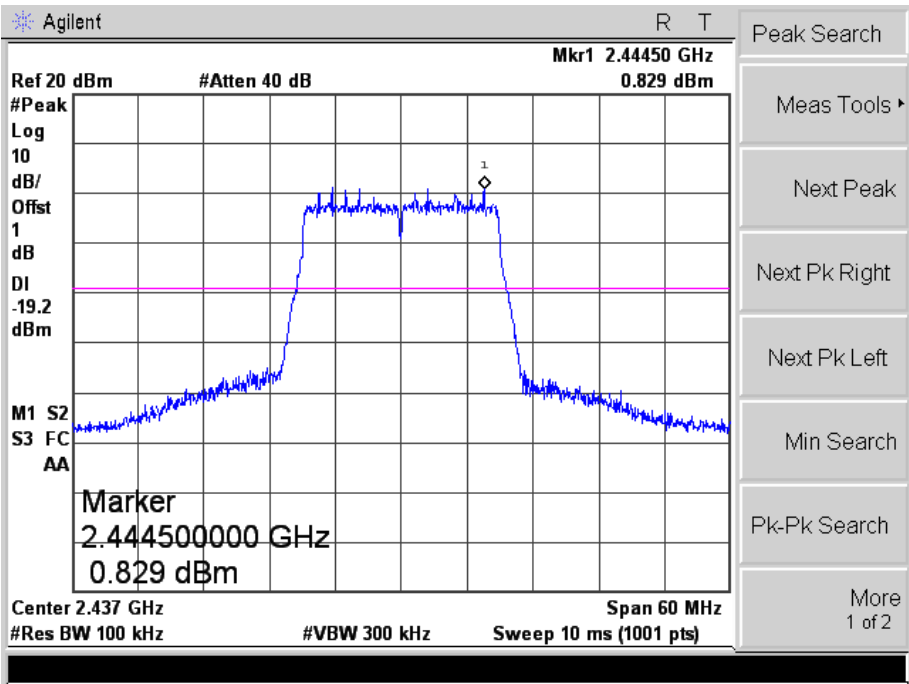
802.11n-HT20_MCS7

Low



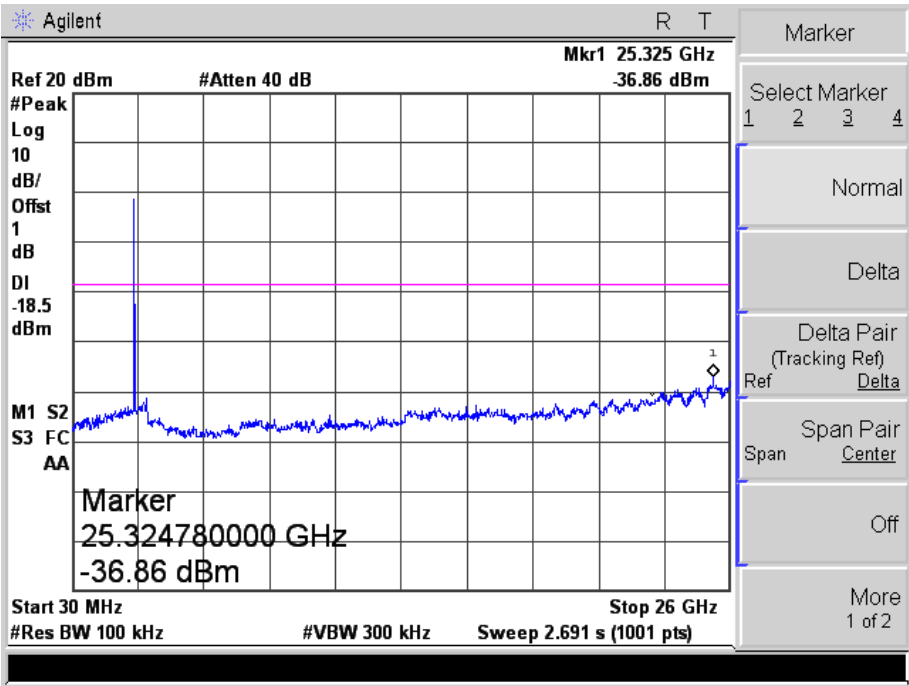
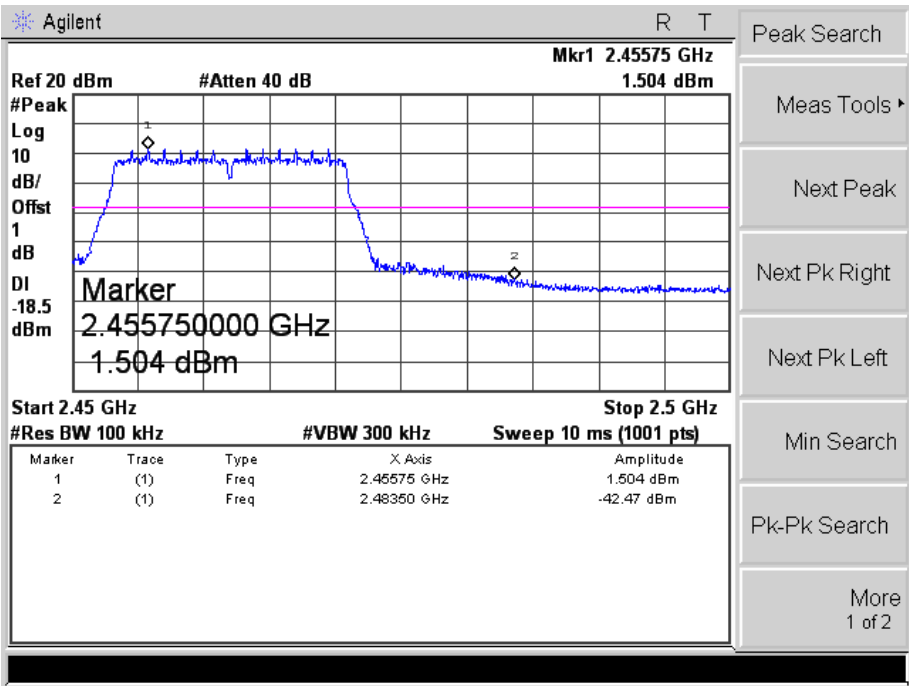
802.11n-HT20_MCS7

Middle



802.11n-HT20_MCS7

High



APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

******* END OF REPORT *******