FCC RF Test Report

APPLICANT	:	**Motorola Mobility LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**XT2005-4, XT2005DL, XT2005-5**
FCC ID	:	**IHDT56YA2**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

This is a data re-used report which is only valid together with the original test report. The product was received on Feb. 21, 2019 and testing was completed on Apr. 15, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

James Huang

Approved by: James Huang / Manager

TESTING
NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone,
Jiangsu Province 215335, China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR922110-01E	Rev. 01	Initial issue of report	May 13, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	1
-	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	1
-	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	1
3.1	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 7.73 dB at 37.76 MHz
-	15.207	AC Conducted Emission	15.207(a)	Pass	1
3.2	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.3	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

Remark 1: Test items are performed on original report which can be referred to Sporton report number FR922110E.

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2005-4, XT2005DL, XT2005-5
FCC ID	IHDT56YA2
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR / EDR / LE FM Receiver/GNSS
HW Version	88941-1-12
SW Version	fastboot_surfna_oem_userdebug_9_PPB29.12_2fc78_intcfg-test-keys_oem
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
Antenna Type / Gain	IFA Antenna with gain -6.00 dBi

1.5 Modification of EUT

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

1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT2005-4, XT2005DL, XT2005-5, FCC ID: IHDT56YA2) is electrically identical to the reference device (Model: XT2005-3, FCC ID: IHDT56YA3) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix A (Sporton RF Report No. FR922110E for the reference device Model: XT2005-3, FCC ID: IHDT56YA3).

1.6.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
NII (B1~3)	IHDT56YA3	Part15E(FR922110D)	All sections applicable except RSE
NII (B4)	IHDT56YA3	Part15E(FR922110E)	All sections applicable except RSE
NII (DFS)	IHDT56YA3	Part15E(FZ922110)	All sections applicable except RSE

1.6.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the following test items, the test result were consistent with FCC ID: IHDT56YA3.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

Test Item	Mode	IHDT56YA3 Worst Result	IHDT56YA2 Worst Result	Difference (dB)
Average Conducted Power (dBm)	11a, 5.2GHz	18.14	17.80	0.34
	11n HT20, 5.2GHz	18.40	18.07	0.33
	11n HT40, 5.2GHz	14.95	14.62	0.33
	11a, 5.3GHz	18.27	17.85	0.42
	11n HT20, 5.3GHz	18.45	18.03	0.42
	11n HT40, 5.3GHz	14.93	14.56	0.37
	11a, 5.5GHz	18.53	18.08	0.45
	11n HT20, 5.5GHz	18.04	17.59	0.45
	11n HT40, 5.5GHz	15.24	14.85	0.39
	11a, 5.8GHz	19.10	18.77	0.33
	11n HT20, 5.8GHz	19.16	18.83	0.33
	11n HT40, 5.8GHz	15.46	15.02	0.44

1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	03CH02-KS	CN5013	630927

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 E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5745-5825 MHz Band 4 (U-NII-3)	149	5745	159*	5795
	151*	5755	161	5805
	153	5765	165	5825
	157	5785		

Note: The above Frequency and Channel in "*" were 802.11n HT40.

2.2 Test Mode

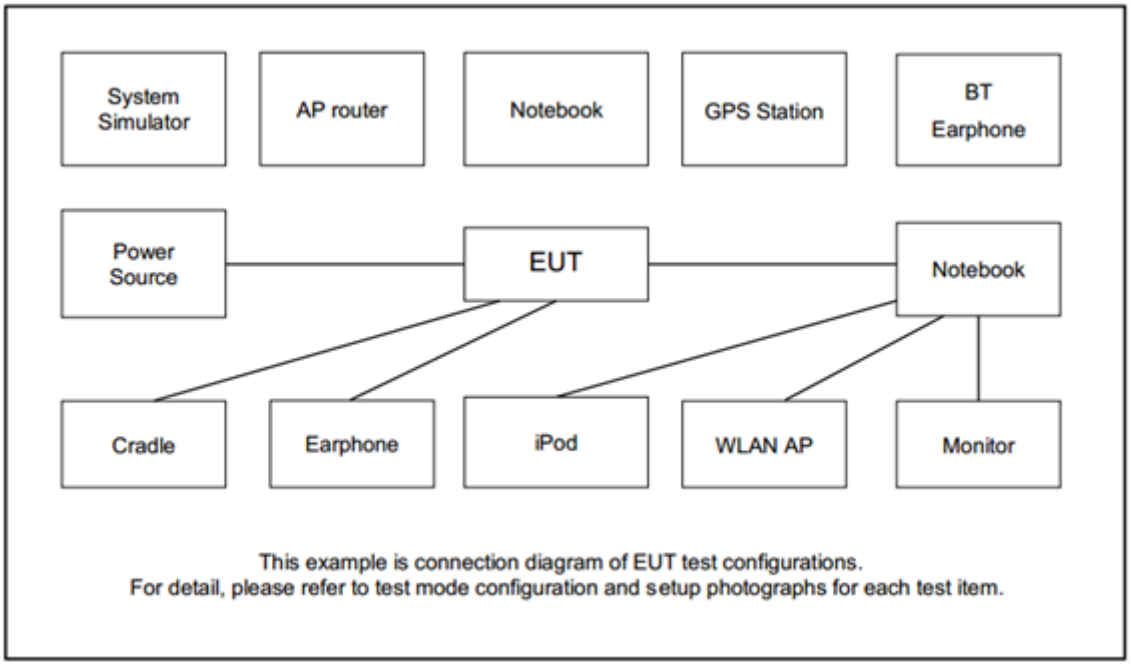
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases
Remark: For Radiated Test Cases, The tests were performed with Adapter 2, Battery 2, Earphone and USB Cable..

Ch. #		Band IV：5745-5825 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

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

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

3 Test Result

3.1 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.1.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

Note: The following formula is used to convert the EIRP to field strength.

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBμV/m

d_{Meas} is the measurement distance, in m

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 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.

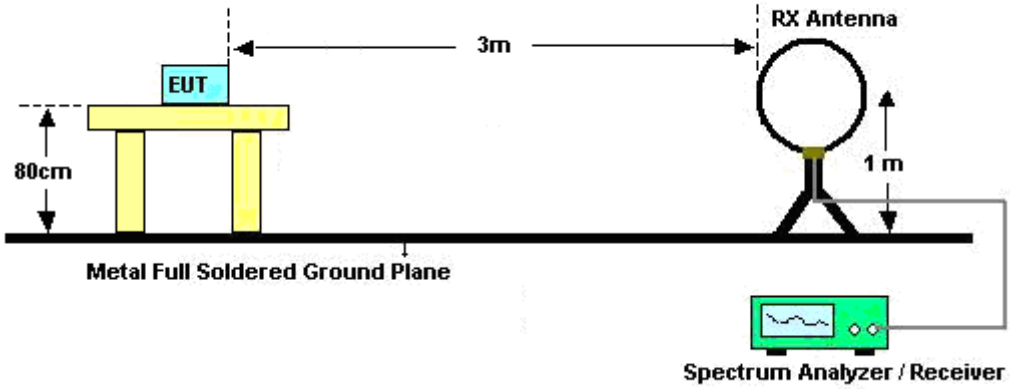
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

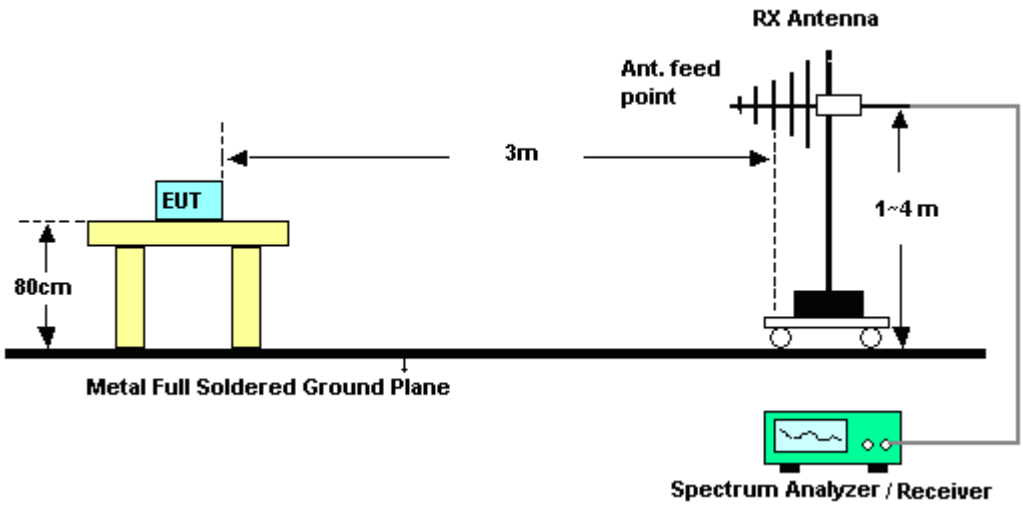
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. 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.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

3.1.4 Test Setup

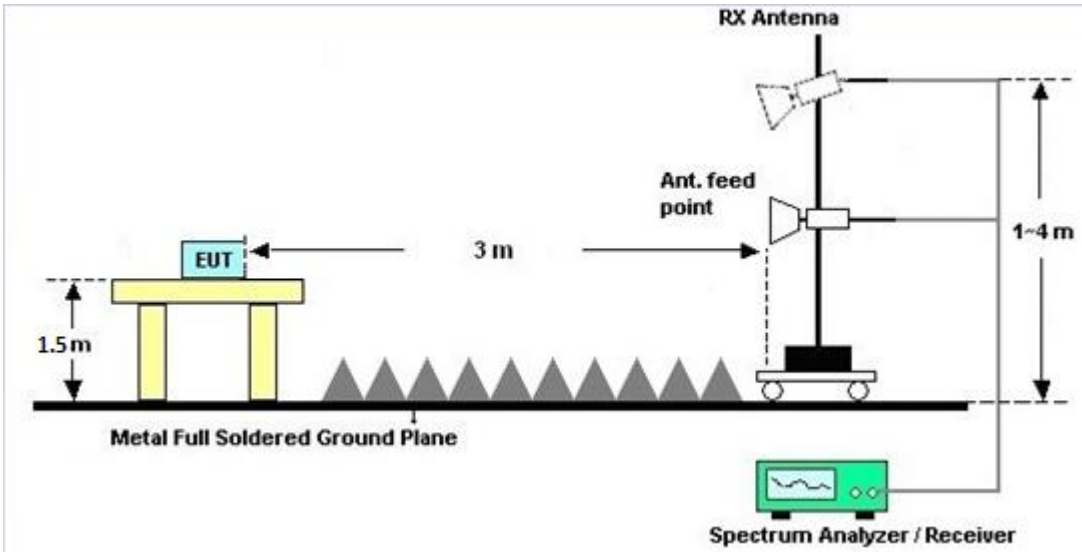
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

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.

3.1.6 Test Result of Radiated Band Edges

Please refer to Appendix A.

3.1.7 Duty Cycle

Please refer to Appendix B.

3.1.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

3.2 Automatically Discontinue Transmission

3.2.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.2.2 Measuring Instruments

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

3.2.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.3 Antenna Requirements

3.3.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 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
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Aug. 06, 2018	Apr. 15, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr. 17, 2018	Apr. 15, 2019	Apr. 16, 2019	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Apr. 15, 2019	Oct. 18, 2019	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Dec. 29, 2018	Apr. 15, 2019	Dec. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Apr. 15, 2019	Jan. 26, 2020	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	100MHz-18GHz	Apr. 17, 2018	Apr. 15, 2019	Apr. 16, 2019	Radiation (03CH02-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Apr. 15, 2019	Jan. 04, 2020	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Apr. 15, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Apr. 18, 2018	Apr. 15, 2019	Apr. 17, 2019	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Jan. 14, 2019	Apr. 15, 2019	Jan. 13, 2020	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Apr. 15, 2019	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 15, 2019	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 15, 2019	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2 dB**

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

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

Appendix A. Radiated Spurious Emission

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5604.4	51.58	-16.72	68.3	44.86	34.6	8.52	36.4	222	23	P	H
		5692	59.22	-40.18	99.4	52.36	34.7	8.58	36.42	222	23	P	H
		5720	72.4	-38.5	110.9	65.45	34.77	8.61	36.43	222	23	P	H
		5723.2	77.29	-40.91	118.2	70.34	34.77	8.61	36.43	222	23	P	H
		5740	112.2	-	-	105.2	34.8	8.64	36.44	222	23	P	H
		5740	105.01	-	-	98.01	34.8	8.64	36.44	222	23	A	H
		5639.2	49.92	-18.38	68.3	43.09	34.67	8.55	36.39	325	355	P	V
		5691.2	51.53	-47.28	98.81	44.67	34.7	8.58	36.42	325	355	P	V
		5718.4	59.9	-50.55	110.45	52.95	34.77	8.61	36.43	325	355	P	V
		5723.6	65.77	-53.34	119.11	58.82	34.77	8.61	36.43	325	355	P	V
		5740	100.63	-	-	93.63	34.8	8.64	36.44	325	355	P	V
		5740	93.21	-	-	86.21	34.8	8.64	36.44	325	355	A	V

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 165 5825MHz		5818	106.91	-	-	99.73	34.93	8.72	36.47	101	202	P	H
		5818	99.52	-	-	92.34	34.93	8.72	36.47	101	202	A	H
		5850.4	65.43	-55.96	121.39	58.2	35	8.72	36.49	101	202	P	H
		5857.2	65.92	-44.36	110.28	58.62	35.03	8.77	36.5	101	202	P	H
		5877.6	53.45	-49.92	103.37	46.12	35.07	8.77	36.51	101	202	P	H
		5936.4	50.91	-17.39	68.3	43.38	35.17	8.88	36.52	101	202	P	H
		5818	106.8	-	-	99.62	34.93	8.72	36.47	100	113	P	V
		5818	99.5	-	-	92.32	34.93	8.72	36.47	100	113	A	V
		5850	66.73	-55.57	122.3	59.5	35	8.72	36.49	100	113	P	V
		5856	63.91	-46.71	110.62	56.61	35.03	8.77	36.5	100	113	P	V
		5877.6	53.41	-49.96	103.37	46.08	35.07	8.77	36.51	100	113	P	V
		5983.6	50.54	-17.76	68.3	42.88	35.27	8.93	36.54	100	113	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		11490	44.45	-29.55	74	56.46	38.08	12.74	62.83	100	360	P	H
		11490	45.99	-28.01	74	58	38.08	12.74	62.83	100	360	P	V
802.11a CH 157 5785MHz		11570	47.03	-26.97	74	58.89	38.17	12.79	62.82	100	360	P	H
		11570	47.13	-26.87	74	58.99	38.17	12.79	62.82	100	360	P	V
802.11a CH 165 5825MHz		11650	46.11	-27.89	74	57.83	38.24	12.85	62.81	100	360	P	H
		11650	47.75	-26.25	74	59.47	38.24	12.85	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		5607.6	49.65	-18.65	68.3	42.93	34.6	8.52	36.4	120	203	P	H
		5692.4	55.58	-44.12	99.7	48.72	34.7	8.58	36.42	120	203	P	H
		5719.2	68.18	-42.5	110.68	61.23	34.77	8.61	36.43	120	203	P	H
		5724.8	78.21	-43.63	121.84	71.26	34.77	8.61	36.43	120	203	P	H
		5738	106.56	-	-	99.59	34.8	8.61	36.44	120	203	P	H
		5738	99.13	-	-	92.16	34.8	8.61	36.44	120	203	A	H
		5630.8	50.34	-17.96	68.3	43.55	34.63	8.55	36.39	100	75	P	V
		5693.6	55.12	-45.46	100.58	48.26	34.7	8.58	36.42	100	75	P	V
		5718.8	69.44	-41.12	110.56	62.49	34.77	8.61	36.43	100	75	P	V
		5724	77.65	-42.37	120.02	70.7	34.77	8.61	36.43	100	75	P	V
		5752	106.52	-	-	99.5	34.83	8.64	36.45	100	75	P	V
		5752	99.16	-	-	92.14	34.83	8.64	36.45	100	75	A	V

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 165 5825MHz		5822	112.39	-	-	105.18	34.97	8.72	36.48	227	192	P	H
		5822	104.97	-	-	97.76	34.97	8.72	36.48	227	192	A	H
		5850.8	74.69	-45.79	120.48	67.46	35	8.72	36.49	227	192	P	H
		5856.4	70.78	-39.73	110.51	63.48	35.03	8.77	36.5	227	192	P	H
		5876.4	59.44	-44.82	104.26	52.11	35.07	8.77	36.51	227	192	P	H
		5925.2	51.84	-16.46	68.3	44.37	35.17	8.82	36.52	227	192	P	H
		5818	102.94	-	-	95.76	34.93	8.72	36.47	328	94	P	V
		5818	94.64	-	-	87.46	34.93	8.72	36.47	328	94	A	V
		5850	64.89	-57.41	122.3	57.66	35	8.72	36.49	328	94	P	V
		5856	58.88	-51.74	110.62	51.58	35.03	8.77	36.5	328	94	P	V
		5924	53.04	-16	69.04	45.57	35.17	8.82	36.52	328	94	P	V
		5933.6	50.22	-18.08	68.3	42.69	35.17	8.88	36.52	328	94	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		11490	45.89	-28.11	74	57.9	38.08	12.74	62.83	100	360	P	H
		11490	45.54	-28.46	74	57.55	38.08	12.74	62.83	100	360	P	V
802.11n HT20 CH 157 5785MHz		11570	46.16	-27.84	74	58.02	38.17	12.79	62.82	100	360	P	H
		11570	48.21	-25.79	74	60.07	38.17	12.79	62.82	100	360	P	V
802.11n HT20 CH 165 5825MHz		11650	45.06	-28.94	74	56.78	38.24	12.85	62.81	100	360	P	H
		11650	48.72	-25.28	74	60.44	38.24	12.85	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		5649.2	51.62	-16.68	68.3	44.79	34.67	8.55	36.39	232	194	P	H
		5652.8	52.03	-18.35	70.38	45.18	34.7	8.55	36.4	232	194	P	H
		5718	64.8	-45.54	110.34	57.85	34.77	8.61	36.43	232	194	P	H
		5724.8	66.5	-55.34	121.84	59.55	34.77	8.61	36.43	232	194	P	H
		5746	104.78	-	-	97.78	34.8	8.64	36.44	232	194	P	H
		5746	97.27	-	-	90.27	34.8	8.64	36.44	232	194	A	H
		5853.2	49.52	-65.48	115	42.29	35	8.72	36.49	232	194	P	H
		5860	52.81	-56.69	109.5	45.51	35.03	8.77	36.5	232	194	P	H
		5904	51.64	-32.16	83.8	44.23	35.1	8.82	36.51	232	194	P	H
		5932	50.77	-17.53	68.3	43.3	35.17	8.82	36.52	232	194	P	H
		5649.6	49.55	-18.75	68.3	42.7	34.7	8.55	36.4	318	87	P	V
		5684.4	50.24	-43.55	93.79	43.38	34.7	8.58	36.42	318	87	P	V
		5718.8	54.31	-56.25	110.56	47.36	34.77	8.61	36.43	318	87	P	V
		5722.4	56.17	-60.2	116.37	49.22	34.77	8.61	36.43	318	87	P	V
		5746	96.25	-	-	89.25	34.8	8.64	36.44	318	87	P	V
		5746	88.48	-	-	81.48	34.8	8.64	36.44	318	87	A	V
		5852.8	49.49	-66.43	115.92	42.26	35	8.72	36.49	318	87	P	V
		5869.2	49.87	-57.05	106.92	42.57	35.03	8.77	36.5	318	87	P	V
		5876.4	50.28	-53.98	104.26	42.95	35.07	8.77	36.51	318	87	P	V
		5947.6	50.65	-17.65	68.3	43.1	35.2	8.88	36.53	318	87	P	V

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 159 5795MHz		5615.6	50.62	-17.68	68.3	43.86	34.63	8.52	36.39	210	187	P	H
		5691.2	52.15	-46.66	98.81	45.29	34.7	8.58	36.42	210	187	P	H
		5711.2	50.91	-57.53	108.44	43.99	34.73	8.61	36.42	210	187	P	H
		5722.4	49.84	-66.53	116.37	42.89	34.77	8.61	36.43	210	187	P	H
		5806	104.52	-	-	97.39	34.93	8.67	36.47	210	187	P	H
		5806	96.86	-	-	89.73	34.93	8.67	36.47	210	187	A	H
		5853.2	51.37	-63.63	115	44.14	35	8.72	36.49	210	187	P	H
		5855.6	51.25	-59.48	110.73	43.95	35.03	8.77	36.5	210	187	P	H
		5897.2	51.16	-37.67	88.83	43.75	35.1	8.82	36.51	210	187	P	H
		5990.8	50.41	-17.89	68.3	42.72	35.3	8.93	36.54	210	187	P	H
		5639.6	49.68	-18.62	68.3	42.85	34.67	8.55	36.39	349	92	P	V
		5692	49.52	-49.88	99.4	42.66	34.7	8.58	36.42	349	92	P	V
		5701.6	49.34	-56.41	105.75	42.42	34.73	8.61	36.42	349	92	P	V
		5723.6	48.44	-70.67	119.11	41.49	34.77	8.61	36.43	349	92	P	V
		5780	95.04	-	-	87.96	34.87	8.67	36.46	349	92	P	V
		5780	87.79	-	-	80.71	34.87	8.67	36.46	349	92	A	V
		5854	49.51	-63.67	113.18	42.26	35.03	8.72	36.5	349	92	P	V
		5870	50.19	-56.51	106.7	42.89	35.03	8.77	36.5	349	92	P	V
		5897.2	50.5	-38.33	88.83	43.09	35.1	8.82	36.51	349	92	P	V
		5959.2	50.39	-17.91	68.3	42.81	35.23	8.88	36.53	349	92	P	V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		11510	46.32	-27.68	74	58.31	38.1	12.74	62.83	100	360	P	H
		11510	44.85	-29.15	74	56.84	38.1	12.74	62.83	100	360	P	V
802.11n HT40 CH 159 5795MHz		11590	44.64	-29.36	74	56.45	38.18	12.82	62.81	100	360	P	H
		11590	46.22	-27.78	74	58.03	38.18	12.82	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

Emission below 1GHz

5GHz WIFI 802.11a (LF @ 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)
5GHz 802.11a LF		101.78	31.64	-11.86	43.5	45.63	16.78	1.16	31.93	100	0	P	H
		166.77	28.02	-15.48	43.5	42.41	16.03	1.51	31.93	-	-	P	H
		322.94	20.7	-25.3	46	30.99	19.71	2.04	32.04	-	-	P	H
		451.95	21.49	-24.51	46	28.69	22.63	2.39	32.22	-	-	P	H
		607.15	23.89	-22.11	46	28.86	24.67	2.76	32.4	-	-	P	H
		971.87	26.76	-27.24	54	26.55	27.42	3.57	30.78	-	-	P	H
		37.76	32.27	-7.73	40	44.3	19.22	0.71	31.96	100	0	P	V
		97.9	29.81	-13.69	43.5	44.2	16.4	1.14	31.93	-	-	P	V
		161.92	28.77	-14.73	43.5	43.06	16.14	1.5	31.93	-	-	P	V
		262.8	20.27	-25.73	46	31.92	18.45	1.89	31.99	-	-	P	V
		438.37	21.96	-24.04	46	29.41	22.39	2.35	32.19	-	-	P	V
		600.36	31.96	-14.04	46	37.04	24.6	2.73	32.41	-	-	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 Ant. 1+2	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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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)

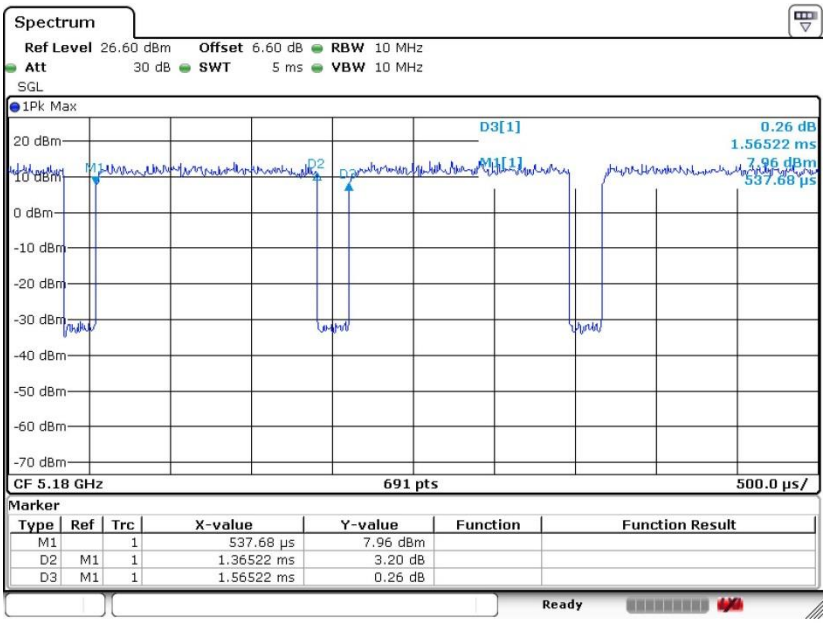
= -10.46(dB)

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

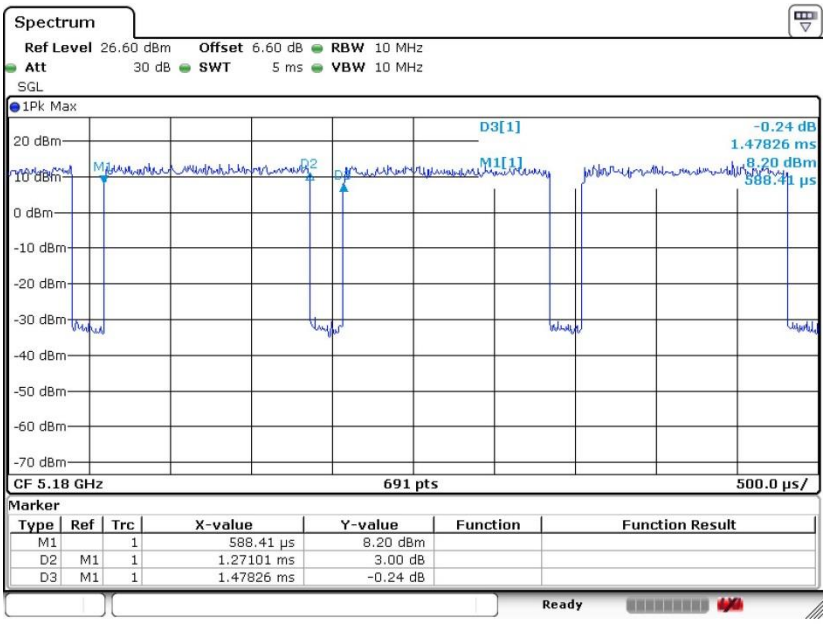
Appendix B. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.22	1.365	0.732	0.75kHz
5GHz 802.11n HT20	85.98	1.271	0.787	0.82kHz
5GHz 802.11n HT40	85.56	1.228	0.815	0.82kHz

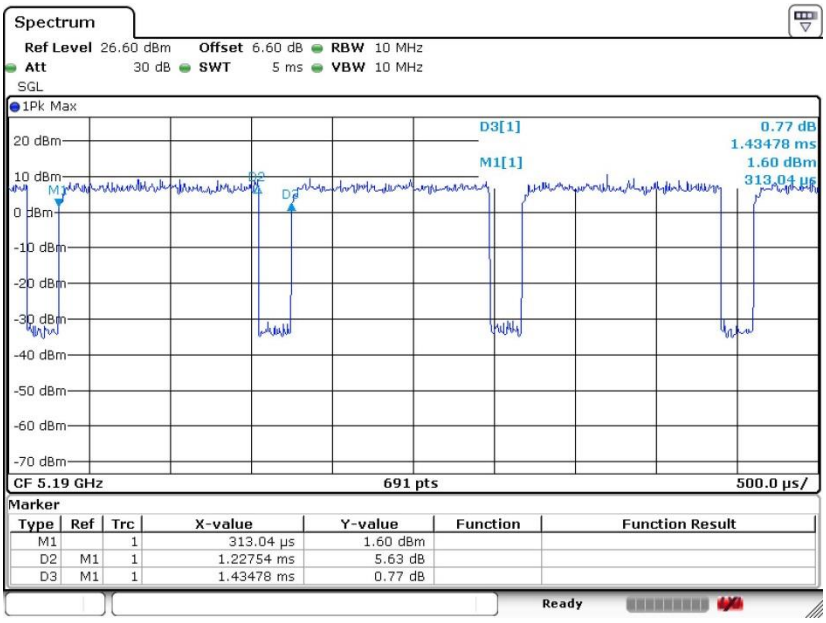
802.11a



802.11n HT20



802.11n HT40



Appendix D. Reference Report

Please refer to Sporton report number FR922110E which is issued separately.