



FCC RF Test Report

APPLICANT : Motorola Mobility, LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : 10722
FCC ID : IHDT56WB4
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

This is a variant report which is only valid together with the original test report. The product was received on May 17, 2017 and testing was completed on Jun. 03, 2017. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : IHDT56WB4

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.407(b)	Unwanted Emissions	15.407(b)(4)(i)	Pass	Under limit 6.23 dB at 46.740 MHz
3.2	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.90 dB at 0.238 MHz



1 General Description

1.1 Applicant

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.2 Manufacturer

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	10722
FCC ID	IHDT56WB4
IMEI Code	353311080000163 (for Radiation) 353311080000221 (for Conduction)
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
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. This is a variant report by adding WPC Back cover. All the test cases were performed on original report which can be referred to Sporton Report Number FR733129F. Based on the original report, only worst case was verified.

Accessory List	
WPC Cover	Brand Name : Motorola
	Model Name : MD100W



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) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)		
Antenna Type / Gain	<Ant. 1> Fixed Internal Antenna type with gain -2.40 dBi <Ant. 2> Fixed Internal Antenna type with gain -3.50 dBi		
Antenna Function Description			
		Ant. 1	Ant. 2
	802.11 a/n/ac	V	V
802.11 n/ac MIMO	V	V	

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

1.5 Modification of EUT

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



1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
- ♦ 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

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: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 [#]	5775	165	5825

Note: The above Frequency and Channel in "[#]" were 802.11ac VHT80.



2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

MIMO Antenna

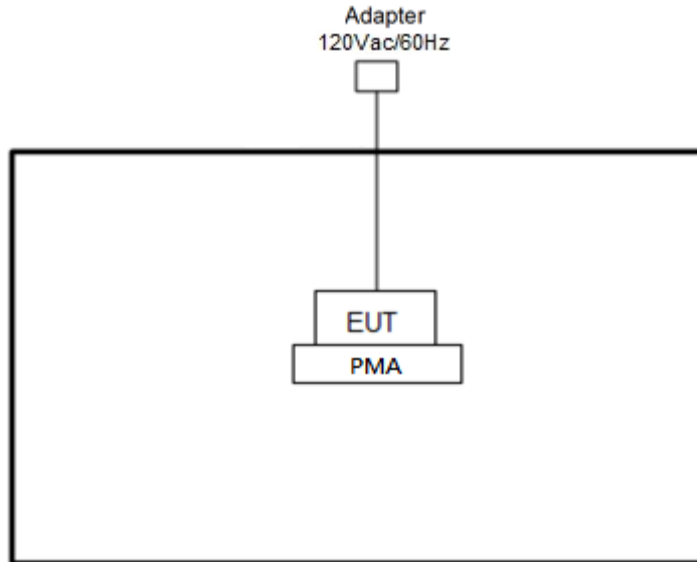
Modulation	Data Rate
802.11a	6 Mbps

AC Conducted Emission	Mode 1 : GSM1900 Idle + Bluetooth Link + WLAN (5GHz) Link + Camera + WPC Back cover + Battery + LG Charging pad + USB Cable (Charging from Adapter) Mode 2 : WCDMA Band V Idle + Bluetooth Link + WLAN (5GHz) Link + MPEG4 + WPC Back cover + Battery + PMA Charging pad + Adapter
Remark: The worst case of conducted emission is mode 2; only the test data of it was reported.	

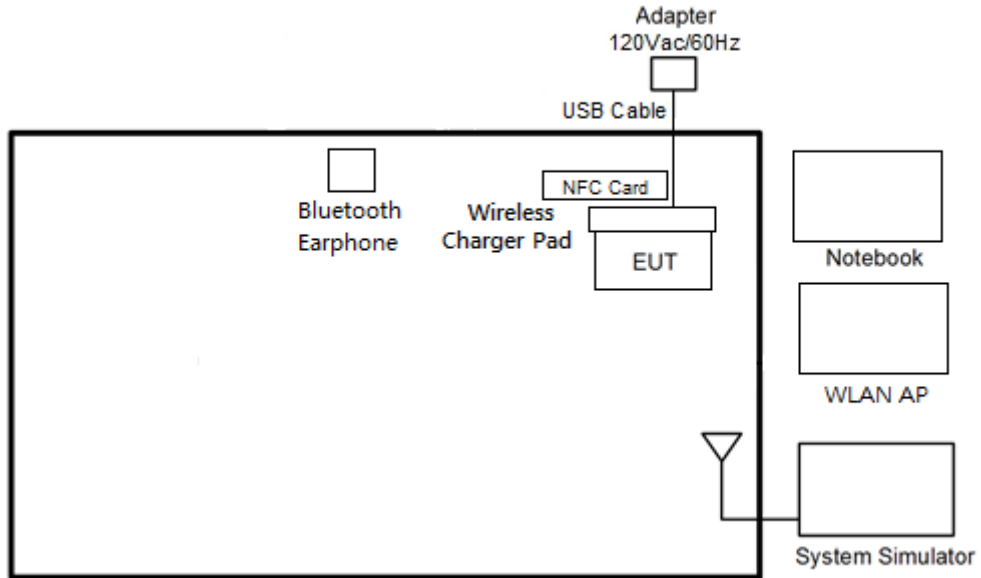
Ch. #		Band IV : 5725-5850 MHz
		802.11ac VHT80
L	Low	-
M	Middle	155
H	High	-

2.3 Connection Diagram of Test System

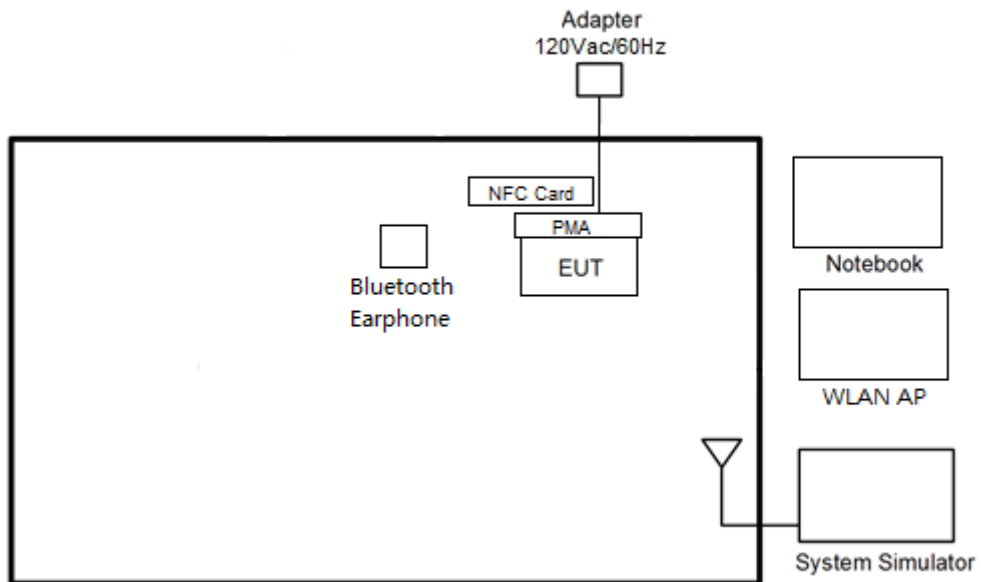
<WLAN Tx with PMA Charging Mode>



<AC Conducted Emission with WPC Charging Mode>



<AC Conducted Emissions with PAM Charging Mode>





2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	SD Card	Transcend	MicroSD HC 16G	FCC DoC	N/A	N/A
6.	Adapter	HUAWEI	HW-059200UHQ	FCC DoC	N/A	N/A
7.	USB Cable	HUAWEI	N/A	FCC DoC	N/A	N/A
8.	WPC Pad	LG	WCD-100	FCC DoC	N/A	N/A
9.	PMA Pad	DURACELL	M-018B-518A	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

For RF function, programmed RF utility, “QRCT” installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.



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 set forth 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

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

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$



EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

(3) KDB789033 D02 v01r04 G)2)c)

- (i) Sections 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.³
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.⁴

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

3.1.2 Measuring Instruments

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

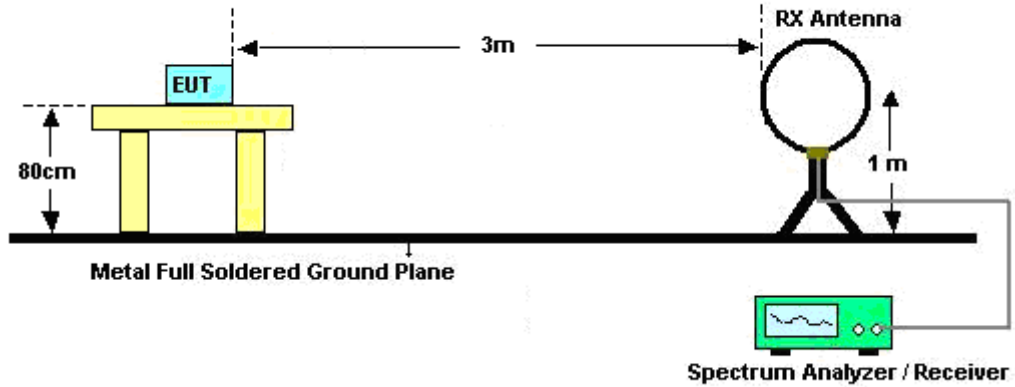


3.1.3 Test Procedures

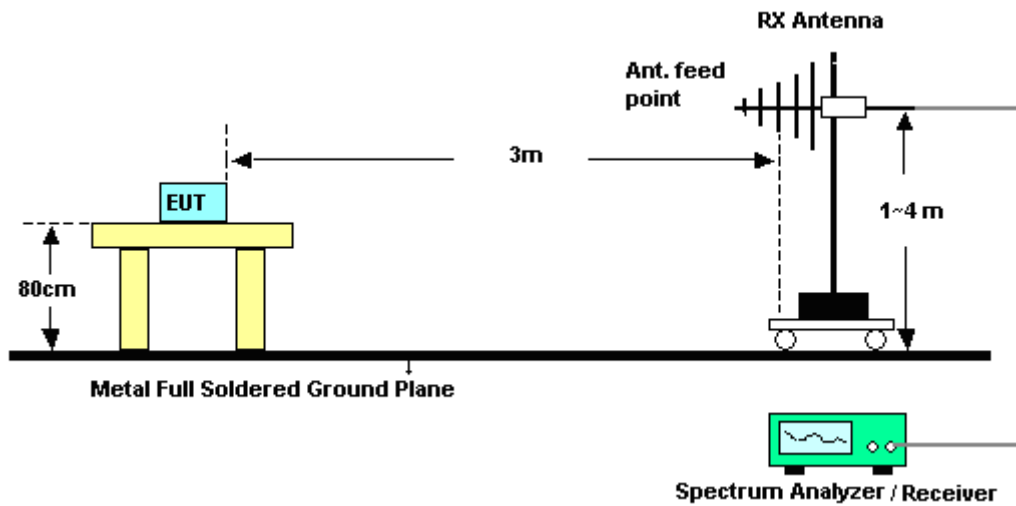
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW \geq 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 \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.
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

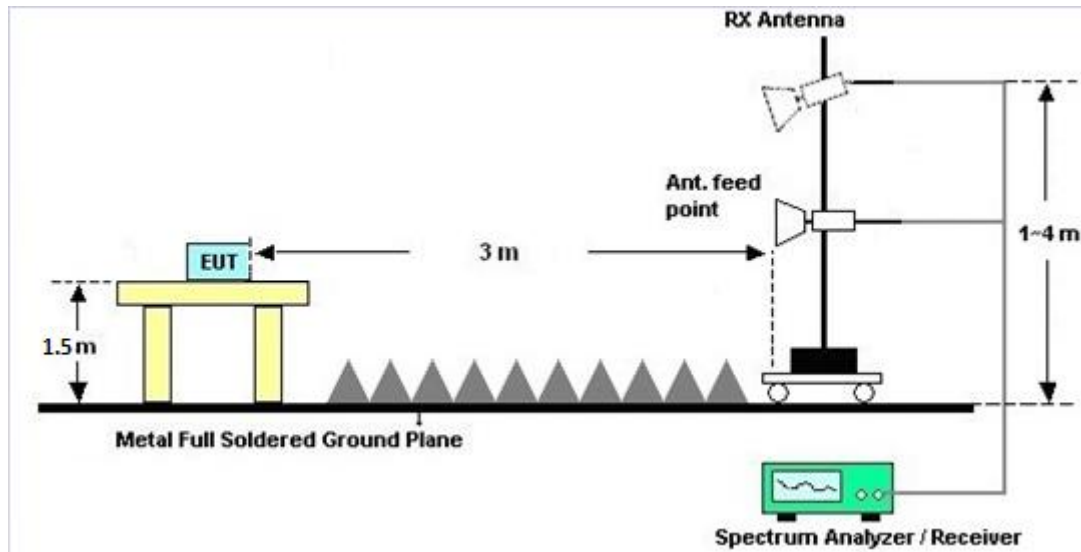
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 Test Results of Radiated Spurious 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.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.1.7 Duty Cycle

Please refer to Appendix D.

3.1.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.



3.2 AC Conducted Emission Measurement

3.2.1 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 (dBµV)	
	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.

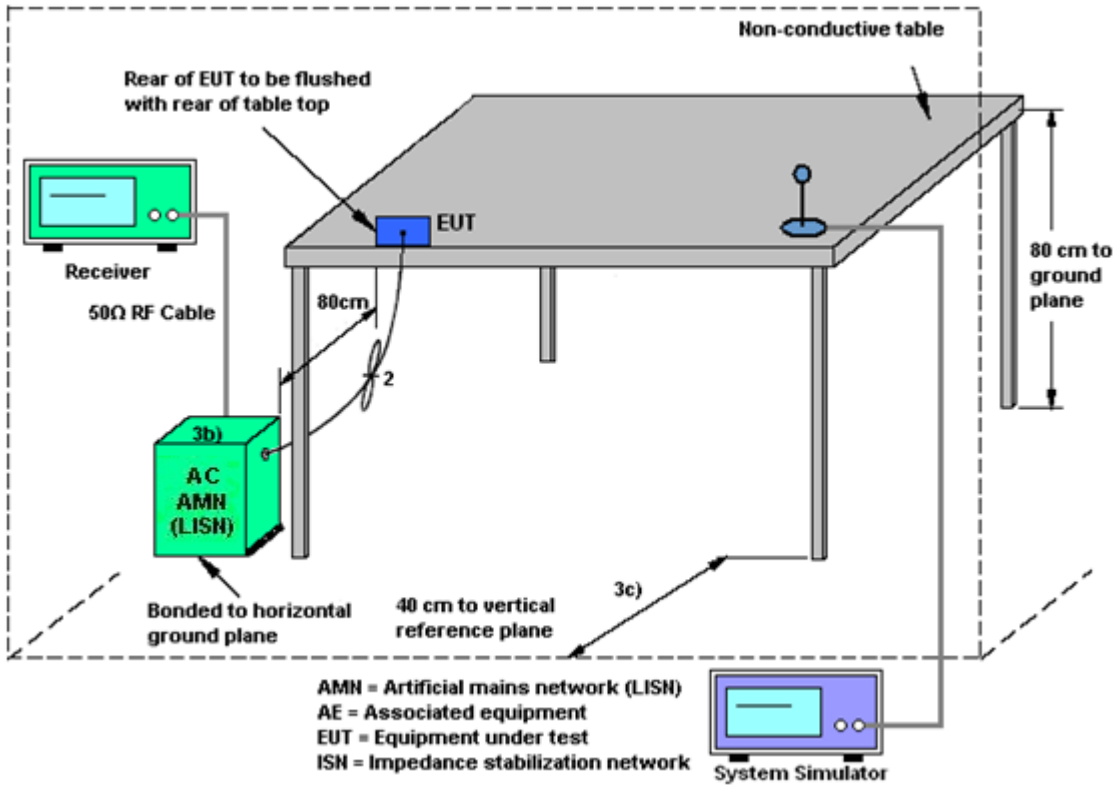
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room 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 with Maximum Hold Mode.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	May 26, 2017~ Jun. 03, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	May 26, 2017~ Jun. 03, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	May 26, 2017~ Jun. 03, 2017	Nov. 28, 2017	Conduction (CO05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-132 6	1GHz ~ 18GHz	Oct. 07, 2016	Jun. 02, 2017~ Jun. 03, 2017	Oct. 06, 2017	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jun. 02, 2017~ Jun. 03, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-0 6	35414&AT- N0602	30MHz~1GHz	Oct. 15, 2016	Jun. 02, 2017~ Jun. 03, 2017	Oct. 14, 2017	Radiation (03CH11-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY532900 53	20Hz to 26.5GHz	Jan. 12, 2017	Jun. 02, 2017~ Jun. 03, 2017	Jan. 11, 2018	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Jun. 02, 2017~ Jun. 03, 2017	Oct. 19, 2018	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY532700 80	1GHz~26.5GHz	Nov. 10, 2016	Jun. 02, 2017~ Jun. 03, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 86	10Hz ~ 44GHz	Oct. 12, 2016	Jun. 02, 2017~ Jun. 03, 2017	Oct. 11, 2017	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1~4m	N/A	Jun. 02, 2017~ Jun. 03, 2017	N/A	Radiation (03CH11-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Jun. 02, 2017~ Jun. 03, 2017	Jun. 13, 2017	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jun. 02, 2017~ Jun. 03, 2017	N/A	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Nov. 08, 2016	Jun. 02, 2017~ Jun. 03, 2017	Nov. 07, 2017	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1815698	1GHz~18GHz	Dec. 01, 2016	Jun. 02, 2017~ Jun. 03, 2017	Nov. 30, 2017	Radiation (03CH11-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.70
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.50
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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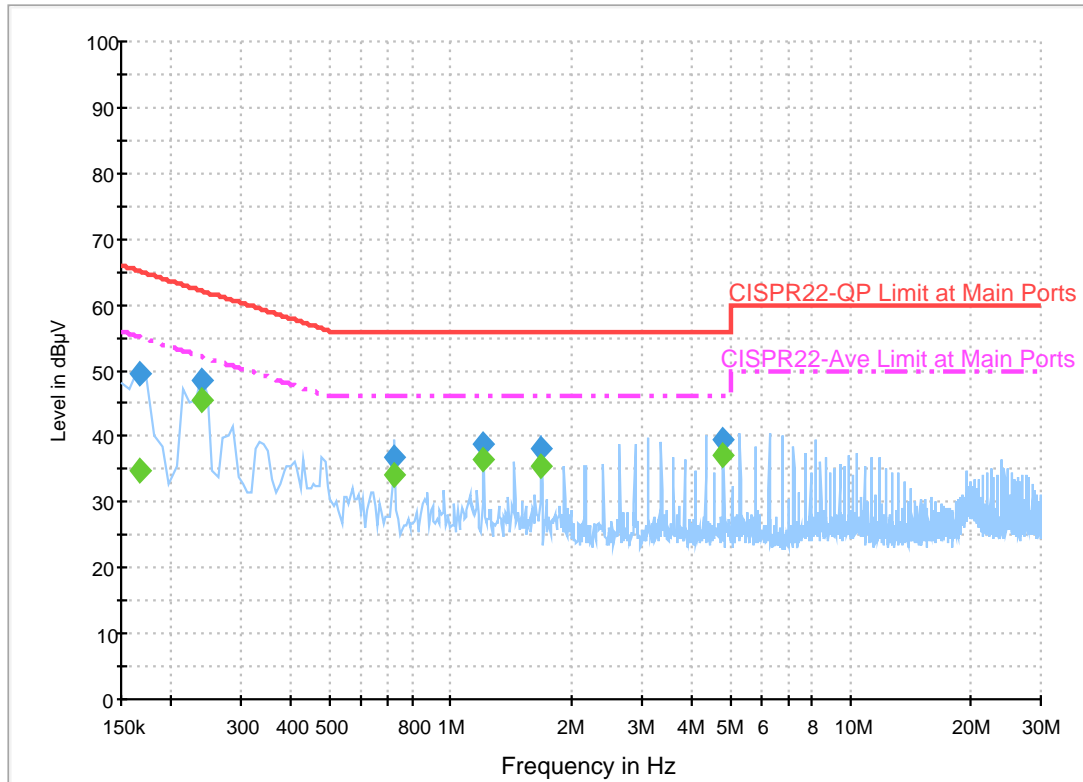
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Eric Jeng	Temperature :	21~24°C
		Relative Humidity :	52~55%

EUT Information

Report NO : 733129-08
 Test Mode : Mode 2
 Test Voltage : 120Vac/60Hz
 Phase : Line

ENV216 Auto Test FCC Power Bar - L



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	49.4	Off	L1	19.6	15.8	65.2
0.238000	48.4	Off	L1	19.6	13.8	62.2
0.726000	36.9	Off	L1	19.6	19.1	56.0
1.206000	38.8	Off	L1	19.6	17.2	56.0
1.686000	38.0	Off	L1	19.6	18.0	56.0
4.822000	39.4	Off	L1	19.8	16.6	56.0

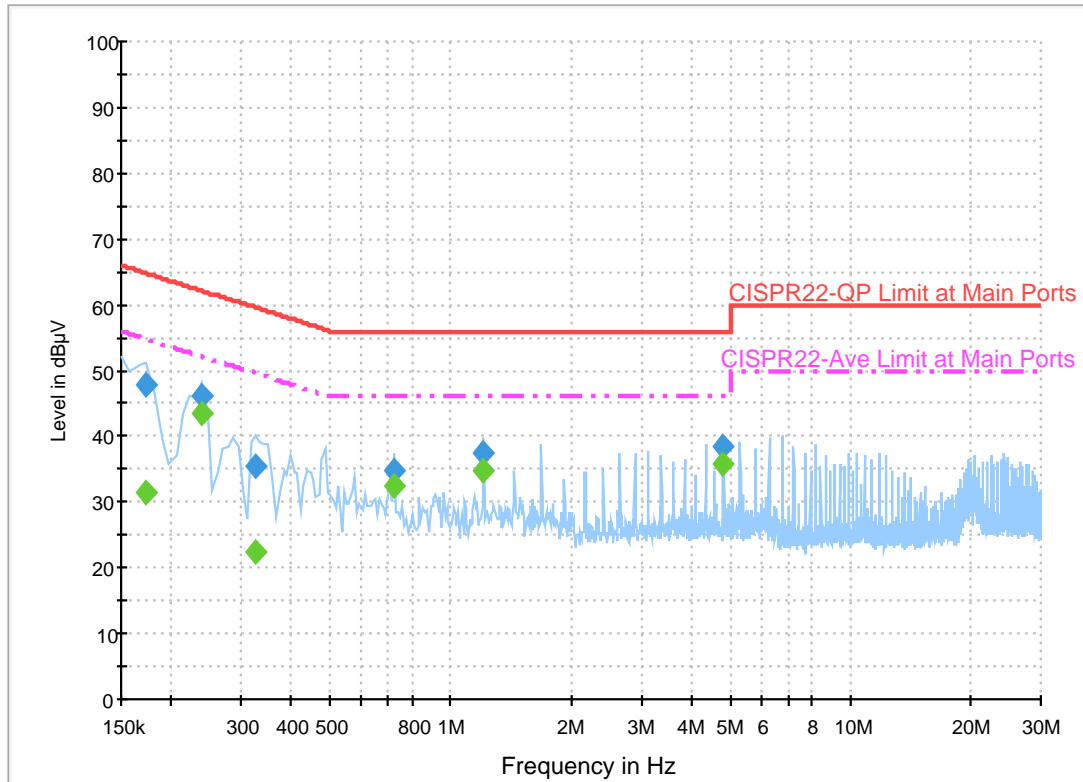
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	34.8	Off	L1	19.6	20.4	55.2
0.238000	45.3	Off	L1	19.6	6.9	52.2
0.726000	34.1	Off	L1	19.6	11.9	46.0
1.206000	36.5	Off	L1	19.6	9.5	46.0
1.686000	35.5	Off	L1	19.6	10.5	46.0
4.822000	37.2	Off	L1	19.8	8.8	46.0

EUT Information

Report NO : 733129-08
 Test Mode : Mode 2
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

ENV216 Auto Test FCC Power Bar - N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	47.9	Off	N	19.5	16.9	64.8
0.238000	46.0	Off	N	19.5	16.2	62.2
0.326000	35.6	Off	N	19.5	24.0	59.6
0.726000	34.7	Off	N	19.5	21.3	56.0
1.206000	37.4	Off	N	19.6	18.6	56.0
4.822000	38.5	Off	N	19.7	17.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	31.3	Off	N	19.5	23.5	54.8
0.238000	43.6	Off	N	19.5	8.6	52.2
0.326000	22.5	Off	N	19.5	27.1	49.6
0.726000	32.3	Off	N	19.5	13.7	46.0
1.206000	34.9	Off	N	19.6	11.1	46.0
4.822000	35.7	Off	N	19.7	10.3	46.0



Appendix B. Radiated Spurious Emission

Test Engineer :	Jacky Hung, and Ken Wu	Temperature :	20~24°C
		Relative Humidity :	50~55%

<PMA Charging Mode>

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

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)
802.11a CH 157 5785MHz		5630.4	49.17	-19.03	68.2	40	32.69	9.58	33.1	100	332	P	H
		5659.2	50.04	-24.99	75.03	40.76	32.77	9.62	33.11	100	332	P	H
		5707.8	51.19	-56.2	107.39	41.65	32.9	9.77	33.13	100	332	P	H
		5721.2	50.17	-63.37	113.54	40.54	32.94	9.82	33.13	100	332	P	H
	*	5785	109.36	-	-	99.5	33.06	9.97	33.17	100	332	P	H
	*	5785	102.08	-	-	92.22	33.06	9.97	33.17	100	332	A	H
		5854.4	50.51	-61.66	112.17	40.41	33.27	10.02	33.19	100	332	P	H
		5856.4	49.94	-60.47	110.41	39.84	33.27	10.02	33.19	100	332	P	H
		5891.4	50.36	-42.67	93.03	40.21	33.35	10.02	33.22	100	332	P	H
		5939	50.98	-17.22	68.2	40.72	33.48	10.02	33.24	100	332	P	H
		5630.6	49.78	-18.42	68.2	40.61	32.69	9.58	33.1	300	86	P	V
		5671.4	49.36	-34.72	84.08	39.99	32.81	9.67	33.11	300	86	P	V
		5705.4	50.06	-56.65	106.71	40.52	32.9	9.77	33.13	300	86	P	V
		5723	49.11	-68.53	117.64	39.48	32.94	9.82	33.13	300	86	P	V
	*	5785	108.85	-	-	98.99	33.06	9.97	33.17	300	86	P	V
	*	5785	101.92	-	-	92.06	33.06	9.97	33.17	300	86	A	V
		5850	49.75	-72.45	122.2	39.69	33.23	10.02	33.19	300	86	P	V
		5863	51.49	-57.07	108.56	41.41	33.27	10.02	33.21	300	86	P	V
	5877.4	50.73	-52.69	103.42	40.61	33.31	10.02	33.21	300	86	P	V	
	5946	49.64	-18.56	68.2	39.38	33.48	10.02	33.24	300	86	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. 1+2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11a CH 157 5785MHz		11570	50.87	-23.13	74	61.53	38.56	15.87	65.37	100	0	P	H	
		17355	46.07	-22.13	68.2	49.21	40.69	19.91	64.11	100	0	P	H	
													H	
													H	
			11570	54.26	-19.74	74	65.2	38.56	15.87	65.37	100	239	P	V
			11570	44	-10	54	54.94	38.56	15.87	65.37	100	239	A	V
			17355	47.06	-21.14	68.2	50.2	40.69	19.91	64.11	100	0	P	V
														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 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)	
5GHz 802.11a LF		85.08	28.39	-11.61	40	45.75	13.88	1.22	32.48	100	74	P	H	
		155.55	24.18	-19.32	43.5	38.25	16.66	1.61	32.43			P	H	
		243.84	23.74	-22.26	46	36.42	17.68	1.95	32.38			P	H	
		325.2	26.43	-19.57	46	36.84	19.6	2.28	32.36			P	H	
		686.4	33.12	-12.88	46	35.53	26.59	3.35	32.47			P	H	
		951.7	33.69	-12.31	46	30.02	30.86	3.82	31.18			P	H	
														H
														H
														H
														H
														H
														H
														H
			46.74	33.77	-6.23	40	49.52	15.8	0.94	32.49	100	300	P	V
			53.22	32.64	-7.36	40	51.19	12.99	0.94	32.49			P	V
			81.57	30.14	-9.86	40	47.97	13.42	1.22	32.48			P	V
			332.2	25.16	-20.84	46	35.32	19.8	2.34	32.36			P	V
			638.1	28.78	-17.22	46	31.46	26.52	3.16	32.46			P	V
			954.5	34.43	-11.57	46	30.62	30.98	3.82	31.16			P	V
														V
													V	
													V	
													V	
													V	
													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	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(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

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

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- 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 C. Radiated Spurious Emission Plots

Test Engineer :	Jacky Hung, and Ken Wu	Temperature :	20~24°C
		Relative Humidity :	50~55%

Note symbol

-L	Low channel location
-R	High channel location



<PMA Charging Mode>

Band 4 - 5725~5850MHz
WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1+2	Horizontal	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 733129-08</p>	<p>Site : 03CH11-HY Condition : PEAK(LINII) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 733129-08</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 733129-08</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1+2	Vertical	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 733129-08</p>	<p>Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 733129-08</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 733129-08</p>	Left blank



Band 4 - 5725~5850MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1+2	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH11-4F Condition : PEAK(UNB) 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak Project : 733129-08</p>	<p>Site : 03CH11-4F Condition : PEAK(UNB) 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak Project : 733129-08</p>



Emission below 1GHz
5GHz WIFI 802.11a (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1+2	Horizontal	Vertical
QP / Peak	<p>Site : 03CH11-HY Condition : QP 3m BT-LOG 6111D-LF_ETC HORIZONTAL Detector : Peak Project : 733129-08</p>	<p>Site : 03CH11-HY Condition : QP 3m BT-LOG 6111D-LF_ETC VERTICAL Detector : Peak Project : 733129-08</p>



Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1+2	5GHz 802.11a for Ant 1	94.853	2064	0.484	1kHz
1+2	5GHz 802.11a for Ant 2	94.853	2064	0.484	1kHz



<MIMO Ant. 1>

802.11a

