



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2127-4
FCC ID : IHDT56ZM3
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Oct. 22, 2020 and testing was completed on Dec. 23, 2020. We, Sporton International (ShenZhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager



Sporton International (ShenZhen) Inc.

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People's Republic of China**



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification of Equipment Under Test.....	5
1.5 Modification of EUT	5
1.6 Testing Location	6
1.7 Test Software.....	6
1.8 Applicable Standards.....	6
1.9 Specification of Accessory.....	7
1.10 Re-use of Measured Data	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	9
2.1 Carrier Frequency and Channel	9
2.2 Test Mode.....	9
2.3 Connection Diagram of Test System.....	10
2.4 Support Unit used in test configuration and system	10
2.5 EUT Operation Test Setup	10
3 TEST RESULT	11
3.1 Unwanted Emissions Measurement	11
3.2 Antenna Requirements.....	15
4 LIST OF MEASURING EQUIPMENT	16
5 UNCERTAINTY OF EVALUATION	17
APPENDIX A. RADIATED SPURIOUS EMISSION	
APPENDIX B. DUTY CYCLE PLOTS	
APPENDIX C. SETUP PHOTOGRAPHS	
APPENDIX D. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR002013-03E	Rev. 01	Initial issue of report	Dec. 25, 2020

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 6.15 dB at 11650.00 MHz
3.2	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

Declaration of Conformity:

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

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza,Chicago,IL60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza,Chicago,IL60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2127-4
FCC ID	IHDT56ZM3
EUT supports Radios application	GSM/WCDMA/LTE WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver and GNSS
IMEI Code	Radiation: 358922320014619/358922320014627
HW Version	DVT2
SW Version	RRB31.30
EUT Stage	Production Unit

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) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type / Gain	PIFA Antenna with gain -0.50 dBi

Remark: For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing have assessed only 802.11n HT20/ HT40 by referring to the higher output power.

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	TH01-SZ	CN1256	421272

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart 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.



1.9 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Motorola (Acbel)	Model Name	MC-201
AC Adapter 2(US)	Brand Name	Motorola (Chenyang)	Model Name	MC-201
AC Adapter 2(IN)	Brand Name	Motorola (Chenyang)	Model Name	MC-204
Battery	Brand Name	Motorola (ATL)	Model Name	MH60
USB Cable 1	Brand Name	Motorola (Chuangyitong)	Model Name	88806-024
USB Cable 2	Brand Name	Motorola (SUNTOPS)	Model Name	336258

1.10 Re-use of Measured Data

1.10.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT2127-4, FCC ID: IHDT56ZM3) is electrically identical to the reference device (Model: XT2127-2, FCC ID: IHDT56ZM2) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.10.2 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 D (Sporton RF Report No. FR002013F for the reference device Model: XT2127-2, FCC ID: IHDT56ZM2).

1.10.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
NII (B1~3)	IHDT56ZM2	Part15E(FR002013E)	All sections applicable except for RSE
NII (B4)	IHDT56ZM2	Part15E(FR002013F)	All sections applicable except for RSE
DFS	IHDT56ZM2	Part15E(FZ002013)	All sections applicable



1.10.4 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: IHDT56ZM2 and the RSE to re-test

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	IHDT56ZM2 Worst Result	IHDT56ZM3 Worst Result	Difference (dB)
Conducted Power (dBm)	802.11a CH60	17.74	17.68	0.06
	802.11n HT20 CH60	17.59	17.58	0.01
	802.11n HT20 CH140	17.5	15.7	1.8
	802.11n HT40 CH46	17.40	17.39	0.01
	802.11n HT20 CH38	17.28	15.18	2.1
	802.11n HT20 CH102	14.30	13.80	0.5
	802.11n HT20 CH134	17.21	16.71	0.5
	802.11ac VHT20 CH60	17.57	17.53	0.04
	802.11ac VHT40 CH46	17.38	17.36	0.02
	802.11ac VHT80 CH58	17.62	17.58	0.04
	802.11ac VHT80 CH42	16.16	13.16	3
	802.11ac VHT80 CH58	15.3	12.3	3
	802.11ac VHT80 CH106	13.1	12.6	0.5
	802.11ac VHT80 CH122	17.54	17.02	0.52

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 (Y plane) were recorded in this report.

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:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "[#]" were 802.11ac VHT80.

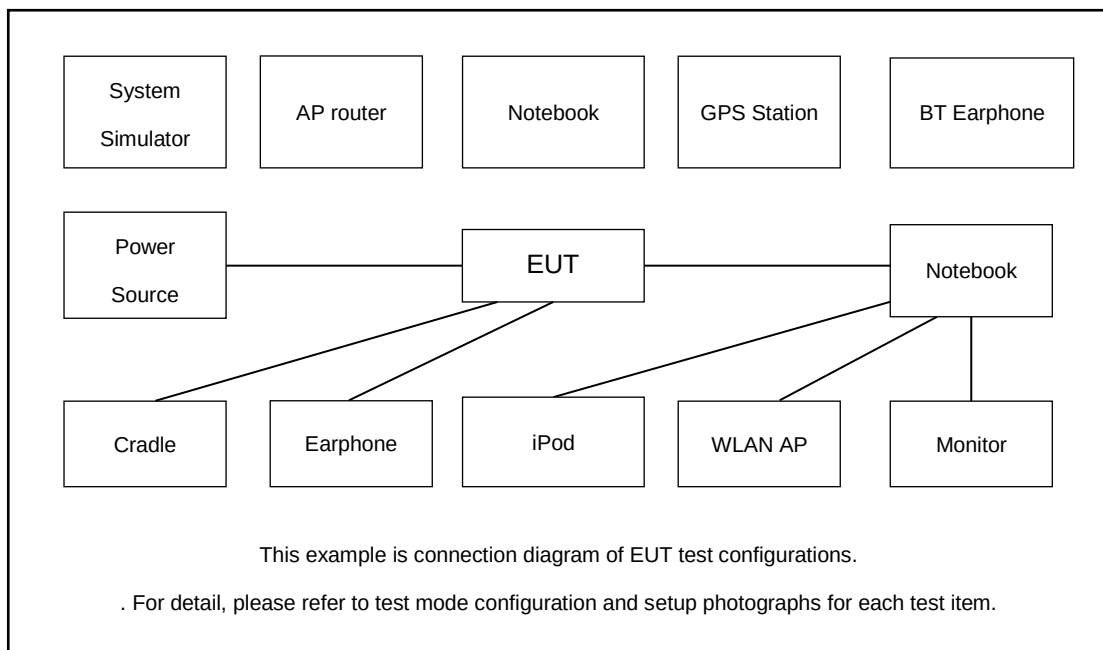
2.2 Test Mode

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
802.11ac VHT80	MCS0

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Earphone	Apple	MC690ZP/A	N/A	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

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

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.

$$\text{EIRP} = E_{\text{Meas}} + 20\log(d_{\text{Meas}}) - 104.8$$

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.

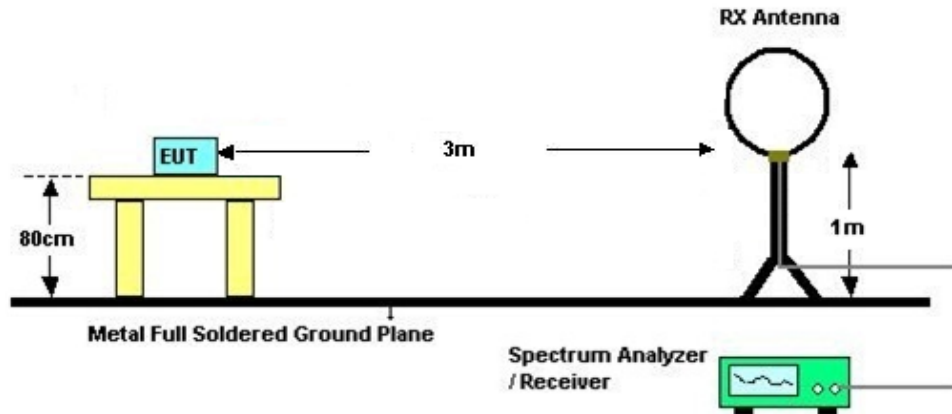
3.1.3 Test Procedures

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 $\geq$ 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 peak

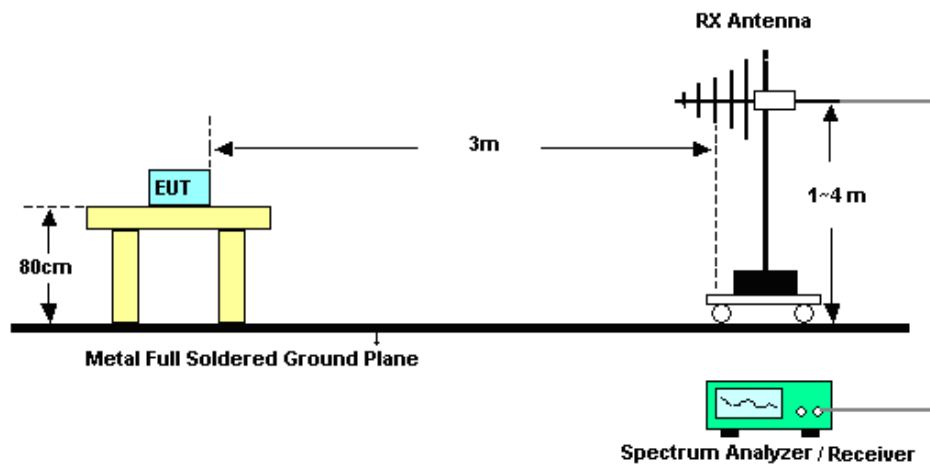
limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.1.4 Test Setup

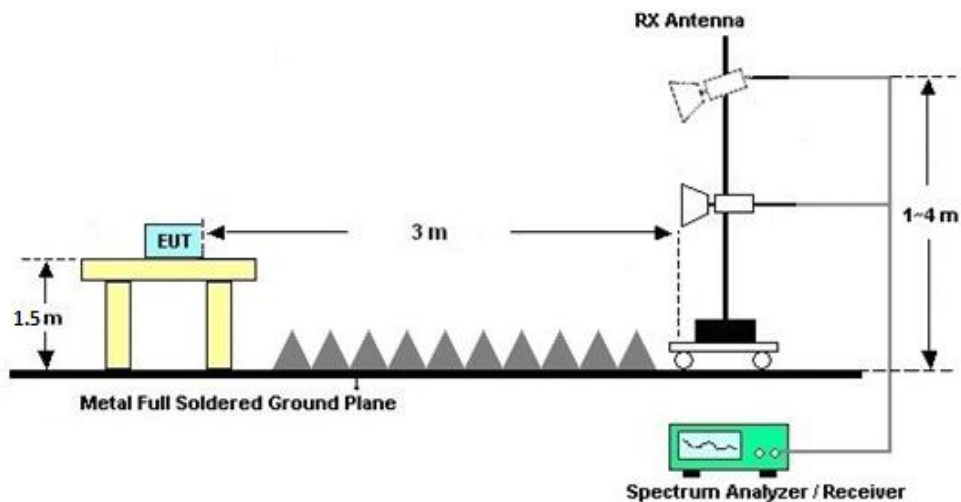
For radiated emissions below 30MHz



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 or 40GHz, whichever is lower)

Please refer to Appendix A.



3.2 Antenna Requirements

3.2.1 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.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 17, 2020	Dec. 23, 2020	Apr. 16, 2021	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2019	Dec. 23, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2019	Dec. 23, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 16, 2020	Dec. 12, 2020	Oct. 15, 2021	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 21, 2020	Dec. 12, 2020	Jul. 20, 2021	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2020	Dec. 12, 2020	Jun. 21, 2022	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Nov. 07, 2020	Dec. 12, 2020	Nov. 06, 2021	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	May 23, 2020	Dec. 12, 2020	May 22, 2021	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 26, 2020	Dec. 12, 2020	Jul. 25, 2021	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz~3000MHz	Oct. 16, 2020	Dec. 12, 2020	Oct. 15, 2021	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 17, 2020	Dec. 12, 2020	Oct. 16, 2021	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 21, 2020	Dec. 12, 2020	Jul. 20, 2021	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Oct. 17, 2020	Dec. 12, 2020	Oct. 16, 2021	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Dec. 12, 2020	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Dec. 12, 2020	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Dec. 12, 2020	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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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		5618.8	52.48	-15.82	68.3	39.97	32.2	9.76	29.45	159	312	P	H
		5688.6	52.78	-44.04	96.82	40.08	32.2	9.92	29.42	159	312	P	H
		5719	53.35	-57.17	110.52	40.55	32.2	10.01	29.41	159	312	P	H
		5724.6	63.22	-58.07	121.29	50.42	32.2	10.01	29.41	159	312	P	H
		5745	105.21	-	-	92.32	32.2	10.09	29.4	159	312	P	H
		5745	99	-	-	86.11	32.2	10.09	29.4	159	312	A	H
		5639.8	52.61	-15.69	68.3	40.01	32.2	9.84	29.44	256	315	P	V
		5682.8	52.1	-40.44	92.54	39.4	32.2	9.92	29.42	256	315	P	V
		5710.6	53.74	-54.43	108.17	40.94	32.2	10.01	29.41	256	315	P	V
		5723.8	59.98	-59.48	119.46	47.18	32.2	10.01	29.41	256	315	P	V
		5745	102.85	-	-	89.96	32.2	10.09	29.4	256	315	P	V
		5745	95.47	-	-	82.58	32.2	10.09	29.4	256	315	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 157 5785MHz		5604	53.11	-15.19	68.3	40.6	32.2	9.76	29.45	296	318	P	H
		5683.8	52.39	-40.89	93.28	39.69	32.2	9.92	29.42	296	318	P	H
		5707.6	52.25	-55.08	107.33	39.45	32.2	10.01	29.41	296	318	P	H
		5725	51.24	-70.96	122.2	38.44	32.2	10.01	29.41	296	318	P	H
		5785	104.59	-	-	91.6	32.2	10.17	29.38	296	318	P	H
		5785	97.76	-	-	84.77	32.2	10.17	29.38	296	318	A	H
		5850	52.45	-69.75	122.2	39.28	32.28	10.25	29.36	296	318	P	H
		5862.4	52.4	-56.33	108.73	39.13	32.29	10.33	29.35	296	318	P	H
		5882.6	52.83	-46.74	99.57	39.53	32.32	10.33	29.35	296	318	P	H
		5925.6	52.72	-15.58	68.3	39.24	32.39	10.42	29.33	296	318	P	H
		5611.4	53.35	-14.95	68.3	40.84	32.2	9.76	29.45	235	121	P	V
		5665.8	51.62	-28.38	80	38.93	32.2	9.92	29.43	235	121	P	V
		5717.4	51.96	-58.11	110.07	39.16	32.2	10.01	29.41	235	121	P	V
		5722.8	52.67	-64.51	117.18	39.87	32.2	10.01	29.41	235	121	P	V
		5785	103.93	-	-	90.94	32.2	10.17	29.38	235	121	P	V
		5785	96.12	-	-	83.13	32.2	10.17	29.38	235	121	A	V
		5850.6	53.34	-67.49	120.83	40.17	32.28	10.25	29.36	235	121	P	V
		5856.2	52.78	-57.68	110.46	39.53	32.28	10.33	29.36	235	121	P	V
		5916	52.25	-22.67	74.92	38.79	32.37	10.42	29.33	235	121	P	V
		5946.6	52.54	-15.76	68.3	38.94	32.42	10.5	29.32	235	121	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz		5825	104.06	-	-	90.94	32.24	10.25	29.37	299	317	P	H
		5825	95.75	-	-	82.63	32.24	10.25	29.37	299	317	A	H
		5851	56.67	-63.25	119.92	43.5	32.28	10.25	29.36	299	317	P	H
		5864.8	53.96	-54.09	108.05	40.68	32.3	10.33	29.35	299	317	P	H
		5875.8	53.55	-51.06	104.61	40.26	32.31	10.33	29.35	299	317	P	H
		5947.4	51.95	-16.35	68.3	38.35	32.42	10.5	29.32	299	317	P	H
		5825	105.32	-	-	92.2	32.24	10.25	29.37	299	117	P	V
		5825	98.68	-	-	85.56	32.24	10.25	29.37	299	117	A	V
		5850	57.89	-64.31	122.2	44.72	32.28	10.25	29.36	299	117	P	V
		5857.6	54.29	-55.78	110.07	41.03	32.29	10.33	29.36	299	117	P	V
		5907.8	52.99	-27.97	80.96	39.55	32.36	10.42	29.34	299	117	P	V
		5926.6	52.4	-15.9	68.3	38.92	32.39	10.42	29.33	299	117	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	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 149 5745MHz		11490	50.48	-23.52	74	49.98	40.5	12.88	52.88	165	110	P	H
		17235	49.02	-19.28	68.3	42.44	43.2	15.71	52.33	170	155	P	H
		11490	49.66	-24.34	74	49.16	40.5	12.88	52.88	165	110	P	V
		17235	49.78	-18.52	68.3	43.2	43.2	15.71	52.33	170	155	P	V
802.11a CH 157 5785MHz		11570	49.89	-24.11	74	49.44	40.32	12.93	52.8	175	198	P	H
		17355	50.24	-18.06	68.3	43.32	43.61	15.8	52.49	189	185	P	H
		11570	51.05	-22.95	74	50.6	40.32	12.93	52.8	175	198	P	V
		17355	50.43	-17.87	68.3	43.51	43.61	15.8	52.49	189	185	P	V
802.11a CH 165 5825MHz		11650	49.8	-24.2	74	49.41	40.11	12.99	52.71	156	347	P	H
		17475	50.6	-17.7	68.3	43.35	44.01	15.89	52.65	150	360	P	H
		11650	53.01	-20.99	74	52.62	40.11	12.99	52.71	156	347	P	V
		11650	46.31	-7.69	54	45.92	40.11	12.99	52.71	156	347	A	V
		17475	51.41	-16.89	68.3	44.16	44.01	15.89	52.65	150	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. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		5604.4	52.99	-15.31	68.3	40.48	32.2	9.76	29.45	292	320	P	H
		5692	54.21	-45.11	99.32	41.51	32.2	9.92	29.42	292	320	P	H
		5716.2	54.93	-54.81	109.74	42.13	32.2	10.01	29.41	292	320	P	H
		5723.2	56.66	-61.44	118.1	43.86	32.2	10.01	29.41	292	320	P	H
		5745	103.88	-	-	90.99	32.2	10.09	29.4	292	320	P	H
		5745	97.5	-	-	84.61	32.2	10.09	29.4	292	320	A	H
		5629	52.78	-15.52	68.3	40.18	32.2	9.84	29.44	243	126	P	V
		5687	52.81	-42.83	95.64	40.11	32.2	9.92	29.42	243	126	P	V
		5701.6	52.93	-52.72	105.65	40.14	32.2	10.01	29.42	243	126	P	V
		5723.6	54.49	-64.52	119.01	41.69	32.2	10.01	29.41	243	126	P	V
		5745	102.25	-	-	89.36	32.2	10.09	29.4	243	126	P	V
		5745	95.12	-	-	82.23	32.2	10.09	29.4	243	126	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 157 5785MHz		5616	48.5	-19.8	68.3	40.14	32.2	9.76	33.6	377	357	P	H
		5698.8	48.83	-55.49	104.32	40.31	32.2	9.92	33.6	377	357	P	H
		5714.8	48.11	-61.24	109.35	39.5	32.2	10.01	33.6	377	357	P	H
		5721.8	47.8	-67.1	114.9	39.19	32.2	10.01	33.6	377	357	P	H
		5785	101.16	-	-	92.39	32.2	10.17	33.6	377	357	P	H
		5785	94.77	-	-	86	32.2	10.17	33.6	377	357	A	H
		5853	47.33	-68.03	115.36	38.4	32.28	10.25	33.6	377	357	P	H
		5868.6	49.99	-57	106.99	40.96	32.3	10.33	33.6	377	357	P	H
		5923	49.94	-19.83	69.77	40.74	32.38	10.42	33.6	377	357	P	H
		5932	48.26	-20.04	68.3	39.04	32.4	10.42	33.6	377	357	P	H
		5611.2	48.65	-19.65	68.3	40.29	32.2	9.76	33.6	271	294	P	V
		5653.2	48.86	-21.81	70.67	40.42	32.2	9.84	33.6	271	294	P	V
		5715.6	48.26	-61.31	109.57	39.65	32.2	10.01	33.6	271	294	P	V
		5724.8	49.2	-72.54	121.74	40.59	32.2	10.01	33.6	271	294	P	V
		5785	100.48	-	-	91.71	32.2	10.17	33.6	271	294	P	V
		5785	93	-	-	84.23	32.2	10.17	33.6	271	294	A	V
		5850.4	47.57	-73.72	121.29	38.64	32.28	10.25	33.6	271	294	P	V
		5869.6	47.98	-58.73	106.71	38.95	32.3	10.33	33.6	271	294	P	V
		5888.6	48.54	-46.59	95.13	39.48	32.33	10.33	33.6	271	294	P	V
		5940.8	48.71	-19.59	68.3	39.4	32.41	10.5	33.6	271	294	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz		5825	103.78	-	-	90.66	32.24	10.25	29.37	277	317	P	H
		5825	96.96	-	-	83.84	32.24	10.25	29.37	277	317	A	H
		5850.6	57.9	-62.93	120.83	44.73	32.28	10.25	29.36	277	317	P	H
		5868	54.39	-52.77	107.16	41.11	32.3	10.33	29.35	277	317	P	H
		5900.2	52.65	-33.91	86.56	39.22	32.35	10.42	29.34	277	317	P	H
		5925.2	53.2	-15.1	68.3	39.72	32.39	10.42	29.33	277	317	P	H
		5825	102.89	-	-	89.77	32.24	10.25	29.37	129	125	P	V
		5825	96	-	-	82.88	32.24	10.25	29.37	129	125	A	V
		5851	55.56	-64.36	119.92	42.39	32.28	10.25	29.36	129	125	P	V
		5855.6	53.52	-57.11	110.63	40.27	32.28	10.33	29.36	129	125	P	V
		5924.4	53.12	-15.62	68.74	39.64	32.39	10.42	29.33	129	125	P	V
		5943.2	53.32	-14.98	68.3	39.73	32.41	10.5	29.32	129	125	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. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		11490	50.25	-23.75	74	49.75	40.5	12.88	52.88	165	110	P	H
		17235	49.11	-19.19	68.3	42.53	43.2	15.71	52.33	170	155	P	H
		11490	50.09	-23.91	74	49.59	40.5	12.88	52.88	146	123	P	V
		17235	49.79	-18.51	68.3	43.21	43.2	15.71	52.33	129	185	P	V
802.11n HT20 CH 157 5785MHz		11570	49.18	-24.82	74	48.73	40.32	12.93	52.8	175	198	P	H
		17355	50.33	-17.97	68.3	43.41	43.61	15.8	52.49	189	185	P	H
		11570	51.03	-22.97	74	50.58	40.32	12.93	52.8	175	198	P	V
		17355	49.41	-18.89	68.3	42.49	43.61	15.8	52.49	189	185	P	V
802.11n HT20 CH 165 5825MHz		11650	49.55	-24.45	74	27.78	40.11	12.99	31.33	122	184	P	H
		17475	50.35	-17.95	68.3	23.15	44.01	15.89	32.7	136	259	P	H
		11650	52.98	-21.02	74	52.59	40.11	12.99	52.71	156	347	P	V
		11650	47.85	-6.15	54	47.46	40.11	12.99	52.71	156	347	A	V
		17475	51.18	-17.12	68.3	43.93	44.01	15.89	52.65	150	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. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		5600.2	52	-16.3	68.3	39.5	32.2	9.76	29.46	140	315	P	H
		5689.6	54.37	-43.18	97.55	41.67	32.2	9.92	29.42	140	315	P	H
		5719	65.75	-44.77	110.52	52.95	32.2	10.01	29.41	140	315	P	H
		5724	65.83	-54.09	119.92	53.03	32.2	10.01	29.41	140	315	P	H
		5755	101.03	-	-	88.14	32.2	10.09	29.4	140	315	P	H
		5755	94.29	-	-	81.4	32.2	10.09	29.4	140	315	A	H
		5850.6	51.9	-68.93	120.83	38.73	32.28	10.25	29.36	140	315	P	H
		5868.4	52.49	-54.56	107.05	39.21	32.3	10.33	29.35	140	315	P	H
		5914.2	52.76	-23.48	76.24	39.3	32.37	10.42	29.33	140	315	P	H
		5930.6	52.31	-15.99	68.3	38.82	32.4	10.42	29.33	140	315	P	H
		5606.2	52.16	-16.14	68.3	39.65	32.2	9.76	29.45	224	128	P	V
		5694.8	52.38	-49	101.38	39.68	32.2	9.92	29.42	224	128	P	V
		5718	62.31	-47.93	110.24	49.51	32.2	10.01	29.41	224	128	P	V
		5725	63.91	-58.29	122.2	51.11	32.2	10.01	29.41	224	128	P	V
		5755	100.15	-	-	87.26	32.2	10.09	29.4	224	128	P	V
		5755	92.78	-	-	79.89	32.2	10.09	29.4	224	128	A	V
		5851.8	50.85	-67.25	118.1	37.68	32.28	10.25	29.36	224	128	P	V
		5875	52.37	-52.83	105.2	39.08	32.31	10.33	29.35	224	128	P	V
		5890.2	52.55	-41.4	93.95	39.22	32.34	10.33	29.34	224	128	P	V
		5926	52.48	-15.82	68.3	39	32.39	10.42	29.33	224	128	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5602	52.34	-15.96	68.3	39.84	32.2	9.76	29.46	137	309	P	H
		5684.8	53.55	-40.47	94.02	40.85	32.2	9.92	29.42	137	309	P	H
		5717.8	53.84	-56.34	110.18	41.04	32.2	10.01	29.41	137	309	P	H
		5724.4	53.25	-67.58	120.83	40.45	32.2	10.01	29.41	137	309	P	H
		5795	101.81	-	-	88.82	32.2	10.17	29.38	137	309	P	H
		5795	94.52	-	-	81.53	32.2	10.17	29.38	137	309	A	H
		5853.2	53.18	-61.72	114.9	40.01	32.28	10.25	29.36	137	309	P	H
		5867.6	53.53	-53.74	107.27	40.25	32.3	10.33	29.35	137	309	P	H
		5922.6	52.97	-17.09	70.06	39.5	32.38	10.42	29.33	137	309	P	H
		5927.2	53.23	-15.07	68.3	39.75	32.39	10.42	29.33	137	309	P	H
		5607.4	52.13	-16.17	68.3	39.62	32.2	9.76	29.45	128	125	P	V
		5688.8	51.9	-45.06	96.96	39.2	32.2	9.92	29.42	128	125	P	V
		5708.8	52.21	-55.46	107.67	39.41	32.2	10.01	29.41	128	125	P	V
		5720	51.5	-59.3	110.8	38.7	32.2	10.01	29.41	128	125	P	V
		5795	100.42	-	-	87.43	32.2	10.17	29.38	128	125	P	V
		5795	92.17	-	-	79.18	32.2	10.17	29.38	128	125	A	V
		5851.2	52.61	-66.85	119.46	39.44	32.28	10.25	29.36	128	125	P	V
		5873.8	53.69	-51.85	105.54	40.4	32.31	10.33	29.35	128	125	P	V
		5921.8	53.1	-17.55	70.65	39.63	32.38	10.42	29.33	128	125	P	V
		5931	52.65	-15.65	68.3	39.16	32.4	10.42	29.33	128	125	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. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		11510	49.21	-24.79	74	48.76	40.47	12.88	52.9	126	336	P	H
HT40		17265	49.47	-18.83	68.3	42.8	43.3	15.74	52.37	156	291	P	H
CH 151		11510	49.82	-24.18	74	49.37	40.47	12.88	52.9	160	360	P	V
5755MHz		17265	51.76	-16.54	68.3	45.09	43.3	15.74	52.37	170	360	P	V
802.11n		11590	49.32	-24.68	74	48.87	40.27	12.96	52.78	126	297	P	H
HT40		17385	49.53	-18.77	68.3	42.53	43.71	15.83	52.54	136	248	P	H
CH 159		11590	50.48	-23.52	74	50.03	40.27	12.96	52.78	170	300	P	V
5795MHz		17385	50.71	-17.59	68.3	43.71	43.71	15.83	52.54	150	200	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		5649.6	51.95	-16.35	68.3	39.35	32.2	9.84	29.44	129	313	P	H
		5698.4	60.78	-43.24	104.02	48.08	32.2	9.92	29.42	129	313	P	H
		5718.8	66.68	-43.78	110.46	53.88	32.2	10.01	29.41	129	313	P	H
		5724.2	67.49	-52.89	120.38	54.69	32.2	10.01	29.41	129	313	P	H
		5775	98.21	-	-	85.31	32.2	10.09	29.39	129	313	P	H
		5775	91.35	-	-	78.45	32.2	10.09	29.39	129	313	A	H
		5850.4	56.62	-64.67	121.29	43.45	32.28	10.25	29.36	129	313	P	H
		5870	60.6	-46	106.6	47.31	32.31	10.33	29.35	129	313	P	H
		5880.6	55.31	-45.74	101.05	42.01	32.32	10.33	29.35	129	313	P	H
		5938.2	52.54	-15.76	68.3	38.95	32.41	10.5	29.32	129	313	P	H
		5616.6	52.55	-15.75	68.3	40.04	32.2	9.76	29.45	227	137	P	V
		5699	58.1	-46.37	104.47	45.4	32.2	9.92	29.42	227	137	P	V
		5716.8	65.74	-44.17	109.91	52.94	32.2	10.01	29.41	227	137	P	V
		5720.2	66.79	-44.47	111.26	53.99	32.2	10.01	29.41	227	137	P	V
		5775	96.79	-	-	83.89	32.2	10.09	29.39	227	137	P	V
		5775	89.26	-	-	76.36	32.2	10.09	29.39	227	137	A	V
		5854.8	55.62	-55.64	111.26	42.45	32.28	10.25	29.36	227	137	P	V
		5860	60.54	-48.86	109.4	47.27	32.29	10.33	29.35	227	137	P	V
		5875	54.02	-51.18	105.2	40.73	32.31	10.33	29.35	227	137	P	V
		5934.6	52.42	-15.88	68.3	38.84	32.4	10.5	29.32	227	137	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Band 4 5725~5850MHz****WIFI 802.11ac VHT80 (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac		11550	49.47	-24.53	74	49	40.37	12.93	52.83	125	332	P	H
VHT80		17325	49.81	-18.49	68.3	42.94	43.51	15.8	52.44	144	196	P	H
CH 155		11550	49.83	-24.17	74	49.36	40.37	12.93	52.83	160	360	P	V
5775MHz		17325	50.21	-18.09	68.3	43.34	43.51	15.8	52.44	170	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

5GHz WIFI 802.11n HT20 (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 802.11n HT20 LF		30	27.35	-12.65	40	34.03	25.19	0.53	32.4	-	-	P	H
		83.35	29.6	-10.4	40	47.54	13.6	0.91	32.45	155	178	P	H
		153.19	30.78	-12.72	43.5	45.16	16.55	1.26	32.19	-	-	P	H
		253.1	30.09	-15.91	46	41.19	19.03	1.66	31.79	-	-	P	H
		438.37	31.22	-14.78	46	37.68	22.68	2.18	31.32	-	-	P	H
		918.52	29.53	-16.47	46	31.03	26.81	3.19	31.5	-	-	P	H
		34.85	30.2	-9.8	40	39.66	22.37	0.57	32.4	-	-	P	V
		83.35	30.51	-9.49	40	48.45	13.6	0.91	32.45	163	294	P	V
		184.23	30.3	-13.2	43.5	45.72	15.33	1.38	32.13	-	-	P	V
		270.56	30.18	-15.82	46	41.33	18.9	1.71	31.76	-	-	P	V
		349.13	29.86	-16.14	46	39.05	20.53	1.98	31.7	-	-	P	V
		584.84	31.04	-14.96	46	34.15	25.12	2.53	30.76	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	P eak or A verage
H/V	H orizontal or V ertical



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

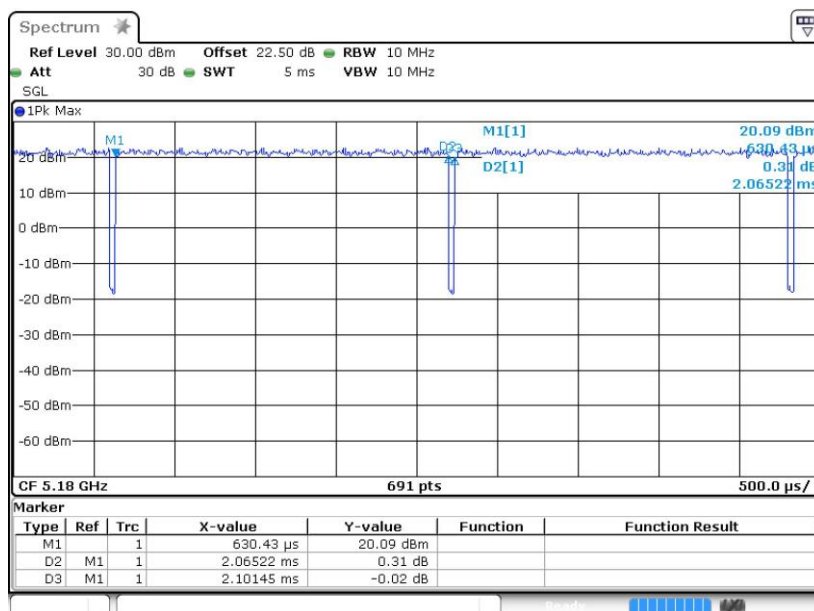
= -10.46(dB)

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

Appendix B. Duty Cycle Plots

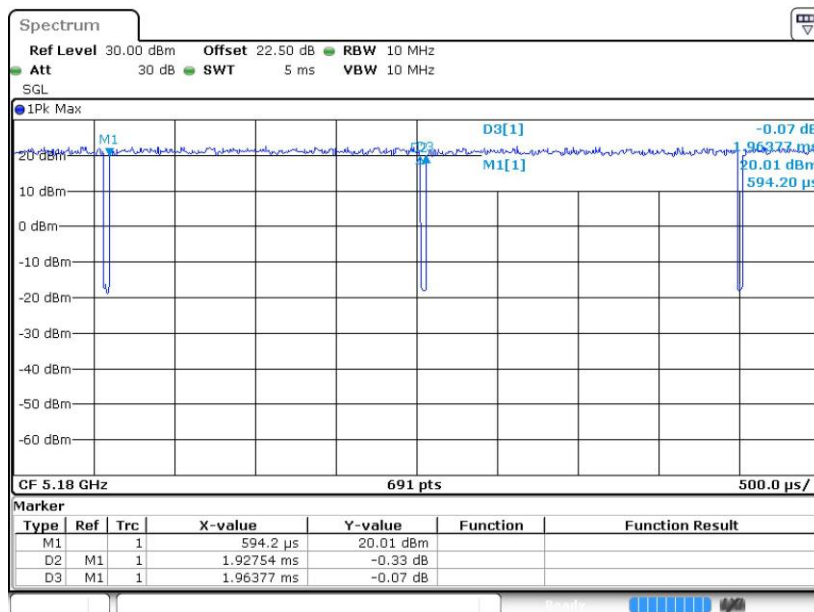
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	98.28	-	-	10Hz
802.11n HT20	98.16	-	-	10Hz
802.11n HT40	96.32	0.9493	1.053	3kHz
802.11ac VHT80	92.79	0.466	2.146	3kHz

802.11a

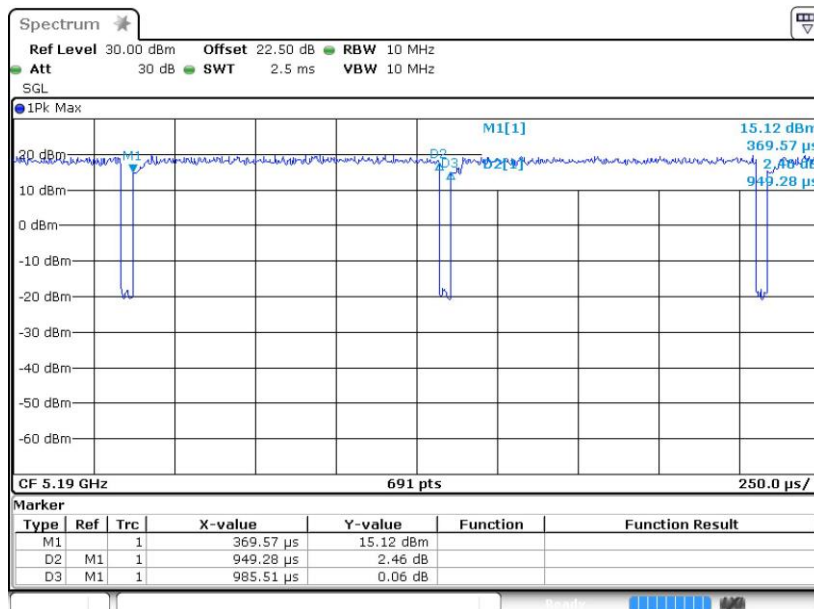




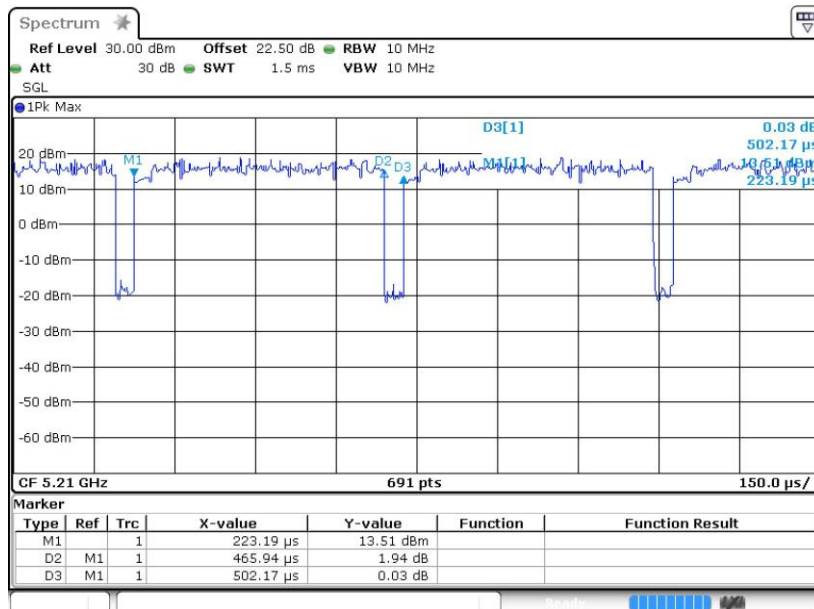
802.11n HT20



802.11n HT40



802.11ac VHT80





Appendix D. Reference Report

Please refer to Sporton report number FR002013F which is issued separately.