FCC RF Test Report

APPLICANT	:	Circuit Board Design LLC
EQUIPMENT	:	Tablet
MODEL NAME	:	L5S83A
FCC ID	:	2ANXB-5276
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was completed on Mar. 12, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Laboratory SPORTON INTERNATIONAL INC.

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

Eric Shih

Approved by: Eric Shih / Manager

TESTING
NVLAP LAB CODE 600156-0

Sporton International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR7O2504-01D	Rev. 01	Initial issue of report	Apr. 03, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass
3.2	15.407(a)	Maximum Conducted Output Power	FCC ≤ 24 dBm (depend on band)	Pass
3.3	15.407(a)	Power Spectral Density	FCC ≤ 11 dBm (depend on band)	Pass
3.4	15.407(b)	Unwanted Emissions	15.407(b) 15.209(a)	Pass
3.5	15.207	AC Conducted Emission	15.207(a)	Pass
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass
3.7	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass

1 General Description

1.1 Applicant

Circuit Board Design LLC
4320 Winfield Road Cornerstone @ Cantera Suite 200 Warrenfille, Illinois, 60555

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet
Model Name	L5S83A
FCC ID	2ANXB-5276
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth v3.0+EDR/Bluetooth v4.0 LE Bluetooth v4.1 LE/ Bluetooth v4.2 LE
SW Version	userdebug 6.0 NMAIN1 530

			SN
Conducted	Sample	B#4	G0W0U0027516F07V
Conducted Emission	Sample	B#1	G0W0U0027516F057
	Adapter	AP16#1	AH17320956997
Radiated Emission	Sample	B#4	G0W0U0027516F07V
	Adapter	AP16#1	AH17320956997

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz
Maximum Output Power to Antenna	**<5180 MHz ~ 5240 MHz>** 802.11a : 13.90 dBm / 0.0245 W 802.11n HT20 : 13.77 dBm / 0.0238 W 802.11n HT40 : 13.73 dBm / 0.0236 W
99% Occupied Bandwidth	802.11a : 17.88 MHz 802.11n HT20 : 18.53 MHz 802.11n HT40 : 36.56 MHz
Antenna Gain / Gain	**<5150 MHz ~ 5250 MHz>** Fixed Internal Antenna with gain -0.97 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Modification of EUT

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

1.5 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No. are CN5018 and CN5019.

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	**Sporton Site No.**		**FCC Test Firm Registration No.**
	TH01-SZ	CO01-SZ	251365

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	577730

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

SPORTON INTERNATIONAL INC. is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and under the FCC-recognized accredited testing laboratories by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st 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.**
	DFS02-HY

Note:

1. The test site complies with ANSI C63.4 2014 requirement.
2. Test data subcontracted: Automatically Discontinue Transmission only in section 3.6 of this report.

1.6 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 v02r01
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38	5190	46	5230
	40	5200	48	5240

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.

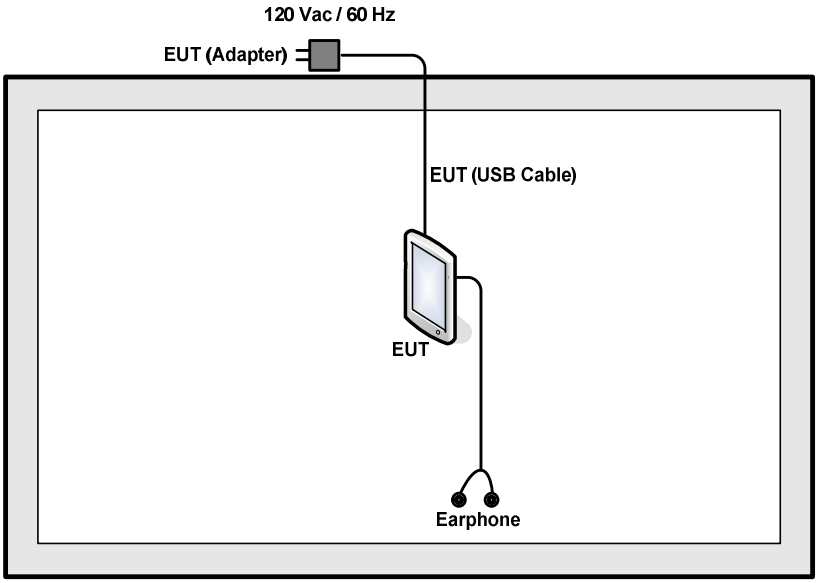
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

AC Conducted Emission	Mode 1 : WLAN Link (5G)+ Bluetooth Link + MicroSD Card+ Play MPEG4 from MicroSD card+ USB Cable (Charging from Adapter AP-16)

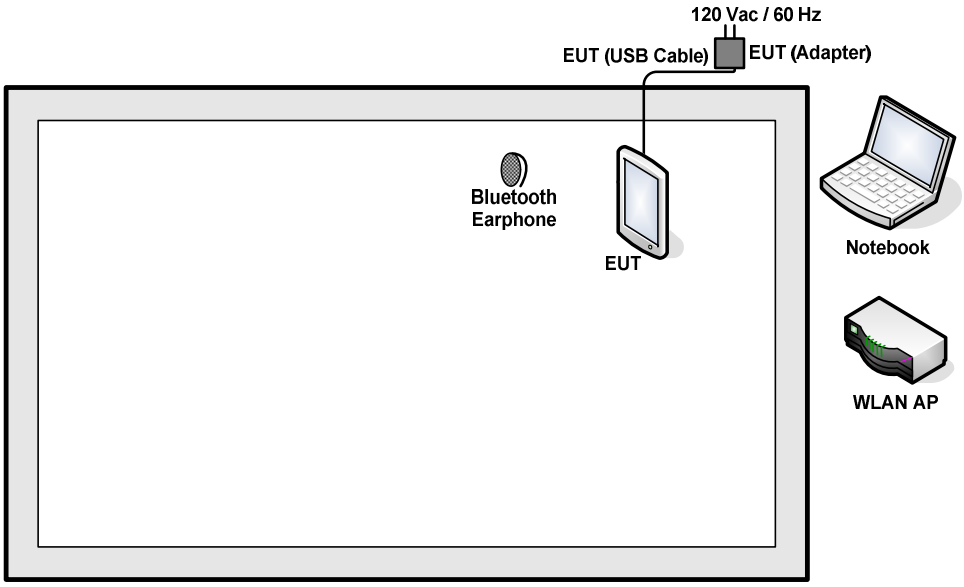
Ch. #		Band I：5180-5240 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	36	36	38
M	Middle	44	44	-
H	High	48	48	46

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
2.	Notebook	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Earphone	MC690ZP/A	N/A	Unshielded,1.6m	N/A
4.	Bluetooth Earphone	EO-MG900	N/A	N/A	N/A
5.	SD Card	MicroSD HC	FCC DoC	N/A	N/A

2.5 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.

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 6.3 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 6.3 + 10 = 16.3 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

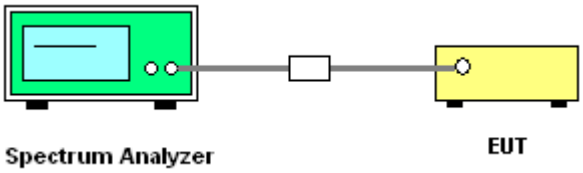
3.1.2 Measuring Instruments

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 C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

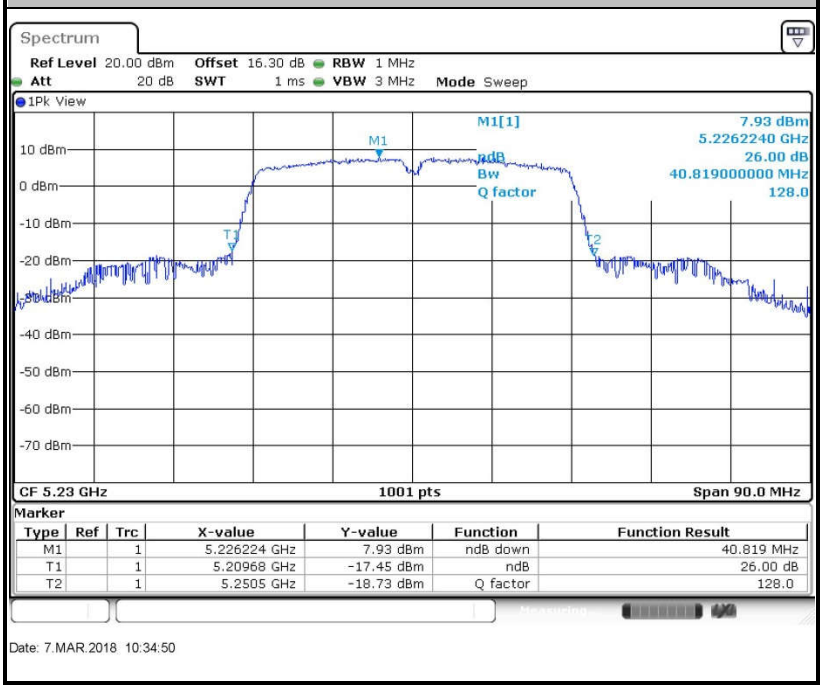
3.1.4 Test Setup



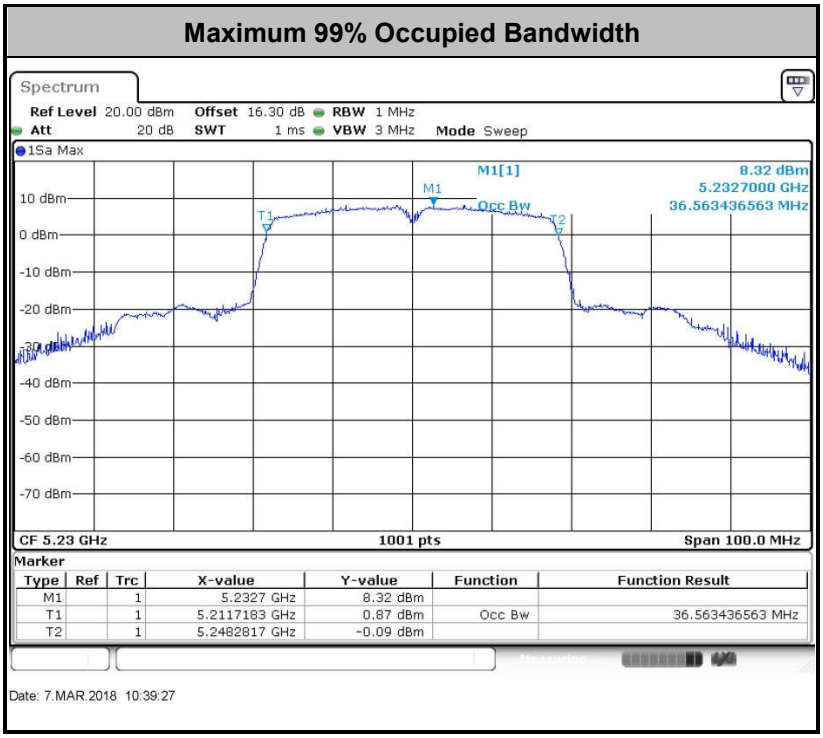
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Please refer to Appendix A.

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

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

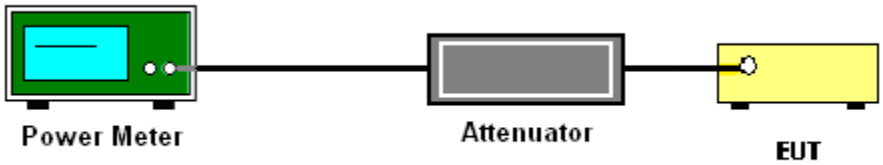
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

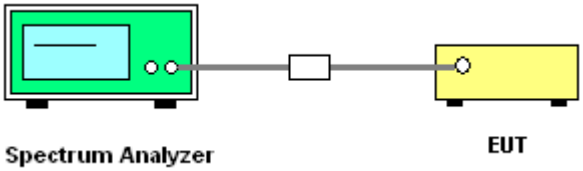
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

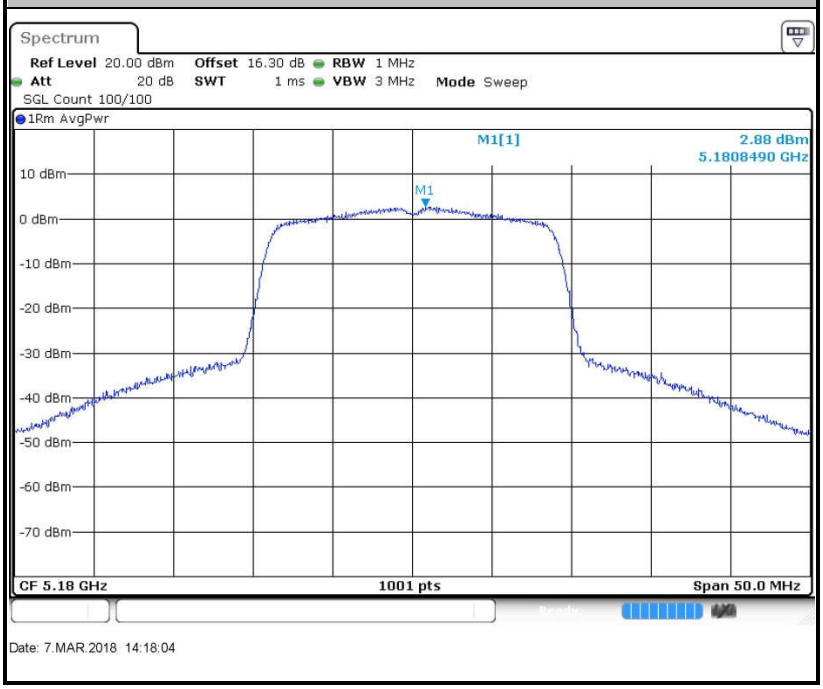
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Spectral Density(dBm/MHz)



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Radiated Emission Measurement

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

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(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

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

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

EIRP (dBm)	Field Strength at 3m (dBµV/m)
- 27	68.2

(3) KDB789033 D01 v02r01 G)2)c)

(i) Section 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).

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows 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

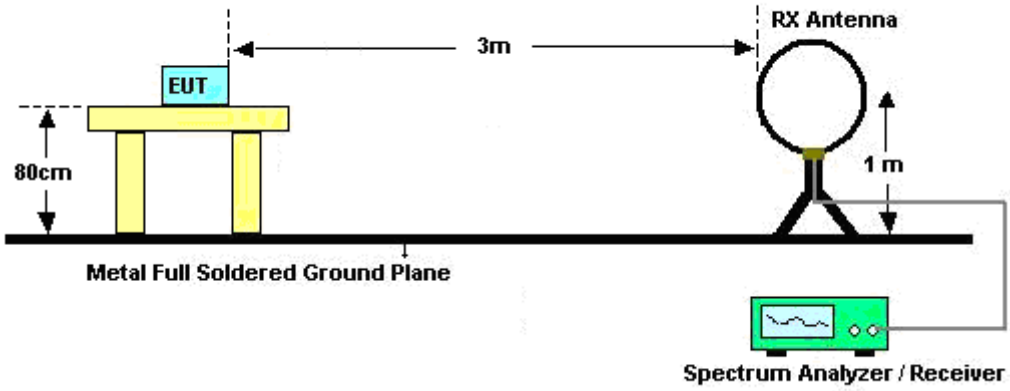
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - 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.

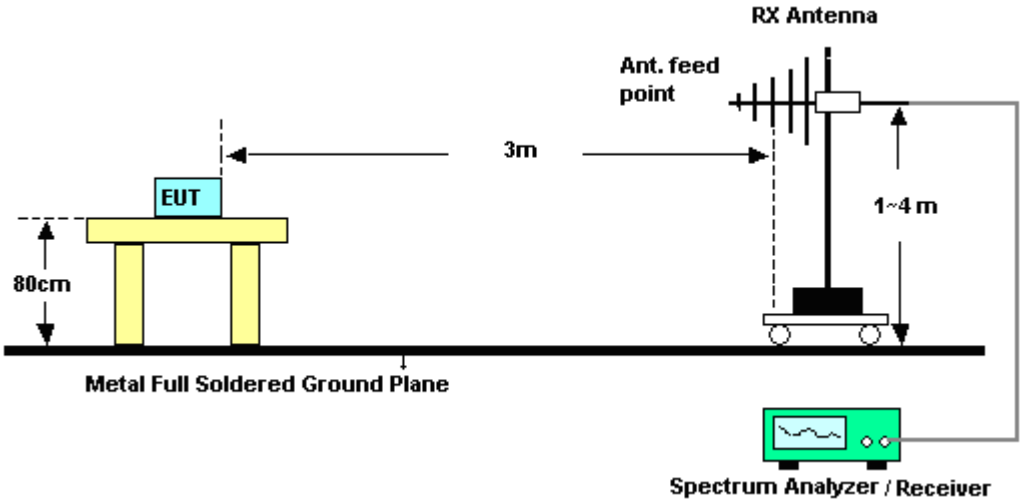
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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.

3.4.4 Test Setup

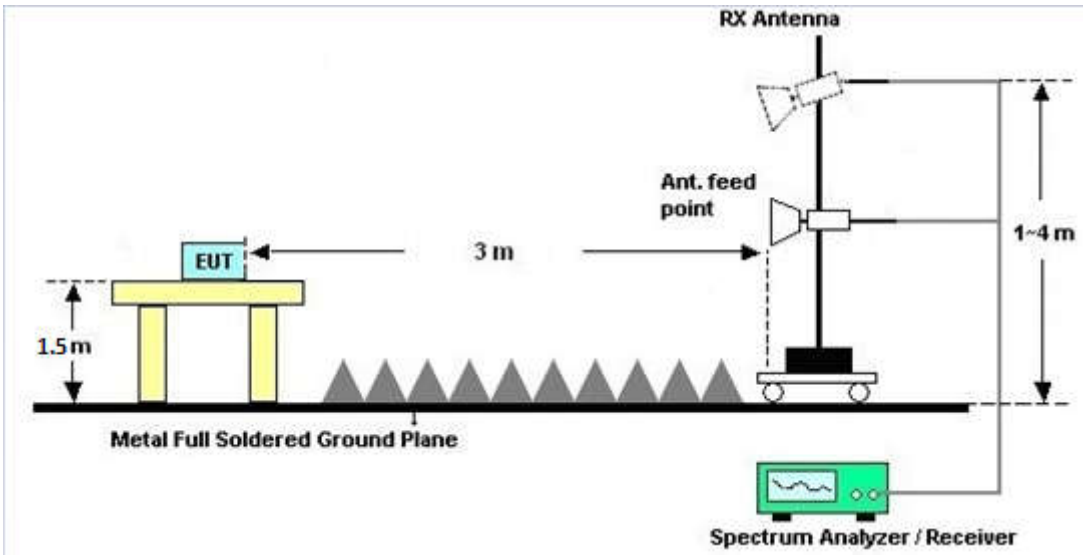
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 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.

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.4.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.

3.5 AC Conducted Emission Measurement

3.5.1 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.

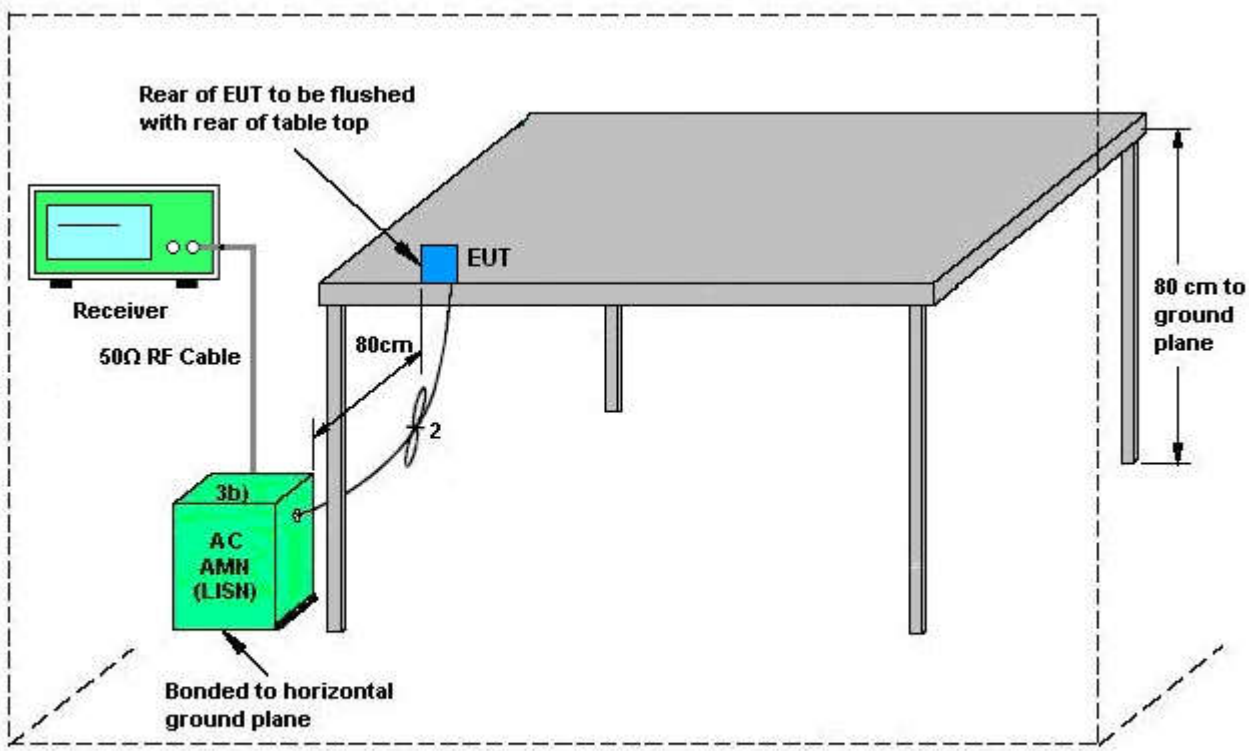
3.5.2 Measuring Instruments

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

3.5.3 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.

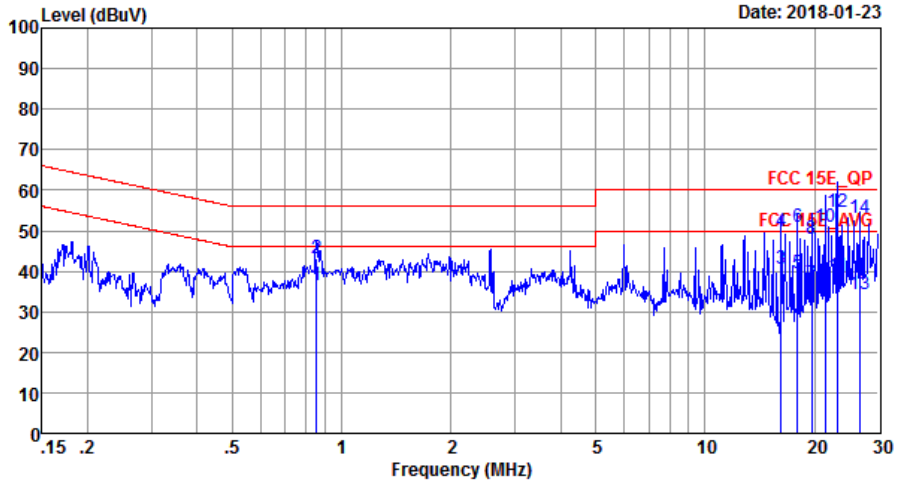
3.5.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.5.5 Test Result of AC Conducted Emission

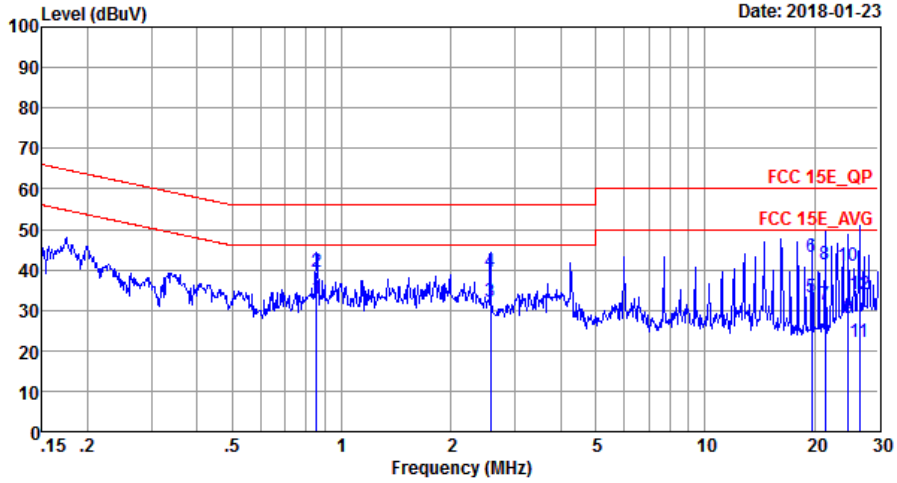
Test Mode :	Mode 1	**Temperature :**	22~25℃
Test Engineer :	Peng Wang	**Relative Humidity :**	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN Link (5G)+ Bluetooth Link + MicroSD Card+ Play MPEG4 from MicroSD card+ USB Cable (Charging from Adapter AP-16)		



Site : CO01-SZ
Condition: FCC 15E_QP LISN_20170907_L LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.85	36.63	-9.37	46.00	26.49	0.05	10.09	Average
2		0.85	43.33	-12.67	56.00	33.19	0.05	10.09	QP
3		16.23	40.61	-9.39	50.00	29.49	0.72	10.40	Average
4		16.23	49.81	-10.19	60.00	38.69	0.72	10.40	QP
5		17.94	39.39	-10.61	50.00	28.01	1.01	10.37	Average
6		17.94	50.79	-9.21	60.00	39.41	1.01	10.37	QP
7		19.64	36.72	-13.28	50.00	25.11	1.26	10.35	Average
8		19.64	47.82	-12.18	60.00	36.21	1.26	10.35	QP
9		21.37	37.39	-12.61	50.00	25.69	1.33	10.37	Average
10		21.37	50.79	-9.21	60.00	39.09	1.33	10.37	QP
11		23.14	38.84	-11.16	50.00	27.10	1.35	10.39	Average
12	*	23.14	54.54	-5.46	60.00	42.80	1.35	10.39	QP
13		26.56	34.42	-15.58	50.00	22.60	1.38	10.44	Average
14		26.56	53.12	-6.88	60.00	41.30	1.38	10.44	QP

Test Mode :	Mode 1	**Temperature :**	22~25℃
Test Engineer :	Peng Wang	**Relative Humidity :**	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WLAN Link (5G)+ Bluetooth Link + MicroSD Card+ Play MPEG4 from MicroSD card+ USB Cable (Charging from Adapter AP-16)		



Site : CO01-SZ
Condition: FCC 15E_QP LISN_20170907_N NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.85	32.82	-13.18	46.00	22.69	0.04	10.09	Average
2		0.85	39.42	-16.58	56.00	29.29	0.04	10.09	QP
3		2.57	31.96	-14.04	46.00	21.79	0.04	10.13	Average
4		2.57	39.56	-16.44	56.00	29.39	0.04	10.13	QP
5		19.64	33.12	-16.88	50.00	22.20	0.57	10.35	Average
6		19.64	43.02	-16.98	60.00	32.10	0.57	10.35	QP
7		21.37	31.37	-18.63	50.00	20.30	0.70	10.37	Average
8		21.37	41.47	-18.53	60.00	30.40	0.70	10.37	QP
9		24.79	28.08	-21.92	50.00	16.70	0.97	10.41	Average
10		24.79	41.08	-18.92	60.00	29.70	0.97	10.41	QP
11		26.56	22.04	-27.96	50.00	10.49	1.11	10.44	Average
12		26.56	33.84	-26.16	60.00	22.29	1.11	10.44	QP

3.6 Automatically Discontinue Transmission

3.6.1 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.

3.6.2 Measuring Instruments

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

3.6.3 Test Result of Automatically Discontinue Transmission

EUT is verified this characteristic during the function check of normal sample associated with an access point:

A. Information start: make EUT supply information to the access point.

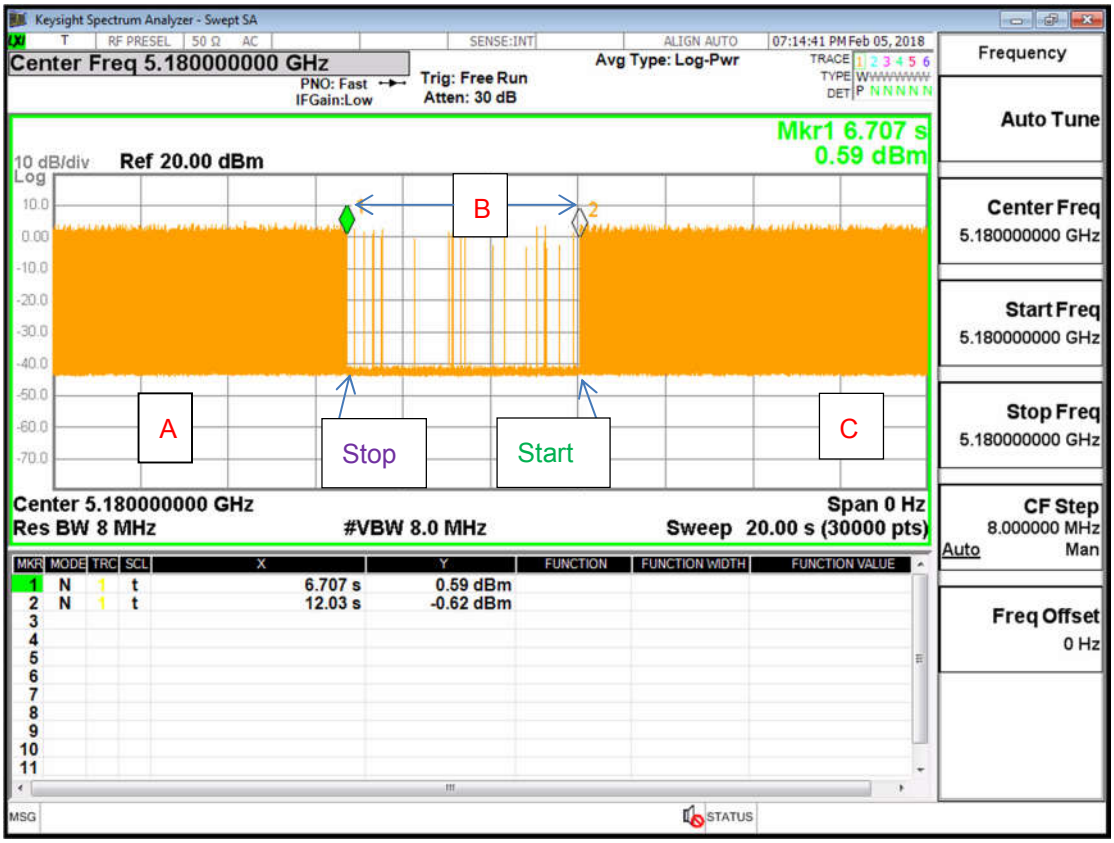
B. Information stop: stop supplying information to the access point.

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving.

C. Information start: make EUT supply information to the access point again.

The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

5180MHz



Note : The control / signalling information during the period B is precluded.

3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 20, 2017	Mar. 07, 2018~ Mar. 12, 2018	Apr. 19, 2018	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Mar. 07, 2018~ Mar. 12, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Mar. 07, 2018~ Mar. 12, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	Keysight	N9010A	MY56070412	10Hz~7GHz	Aug. 08, 2017	Feb. 05, 2018	Aug. 07, 2018	DFS (DFS02-HY)
Power Divider	MTJ	2Way SMA Power Divider	MD10003	0.5G~6GHz	NCR	Feb. 05, 2018	NCR	DFS (DFS02-HY)
Power Divider	MTJ	2Way SMA Power Divider	MD10007	0.5G~6GHz	NCR	Feb. 05, 2018	NCR	DFS (DFS02-HY)
Power Divider	Woken	4Way SMA Power Divider	0120A02056 002D	0.5G~6GHz	NCR	Feb. 05, 2018	NCR	DFS (DFS02-HY)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 20, 2017	Mar. 08, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 20, 2017	Mar. 08, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2017	Mar. 08, 2018	May 13, 2018	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 16, 2017	Mar. 08, 2018	May 15, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Mar. 08, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	May 17, 2017	Mar. 08, 2018	May 16, 2018	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2017	Mar. 08, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Mar. 08, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 27, 2017	Mar. 08, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 20, 2017	Mar. 08, 2018	Apr. 19, 2018	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Mar. 08, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Mar. 08, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Mar. 08, 2018	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Jan. 23, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Jan. 23, 2018	Dec. 25, 2018	Conduction (CO01-SZ)

AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	Jan. 23, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	Jan. 23, 2018	Jul. 18, 2018	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1dB

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1dB

Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Sam Zheng	Temperature:	24~26	°C
Test Date:	2018/3/7 ~ 2018/3/12	Relative Humidity:	50~53	%

TEST RESULTS DATA
26dB and 99% OBW

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	IC 99% Bandwidth Power Limit (dBm)	IC 99% Bandwidth EIRP Limit (dBm)		
11a	6Mbps	1	36	5180	17.88	20.53	-	22.52		
11a	6Mbps	1	44	5220	17.88	20.93	-	22.52		
11a	6Mbps	1	48	5240	17.83	20.68	-	22.51		
HT20	MCS0	1	36	5180	18.38	21.18	-	22.64		
HT20	MCS0	1	44	5220	18.53	21.48	-	22.68		
HT20	MCS0	1	48	5240	18.53	22.58	-	22.68		
HT40	MCS0	1	38	5190	36.56	40.37	-	23.01		
HT40	MCS0	1	46	5230	36.56	40.82	-	23.01		

TEST RESULTS DATA
Average Power Table

FCC Band I										
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6Mbps	1	36	5180	0.50	13.73	24.00	-0.97		Pass
11a	6Mbps	1	44	5220	0.50	13.90	24.00	-0.97		Pass
11a	6Mbps	1	48	5240	0.50	13.74	24.00	-0.97		Pass
HT20	MCS0	1	36	5180	0.54	13.71	24.00	-0.97		Pass
HT20	MCS0	1	44	5220	0.54	13.77	24.00	-0.97		Pass
HT20	MCS0	1	48	5240	0.54	13.73	24.00	-0.97		Pass
HT40	MCS0	1	38	5190	1.03	13.70	24.00	-0.97		Pass
HT40	MCS0	1	46	5230	1.03	13.73	24.00	-0.97		Pass

TEST RESULTS DATA
Power Spectral Density

FCC Band I										
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)	-	Pass/Fail
11a	6Mbps	1	36	5180	0.50	3.33	11.00	-0.97		Pass
11a	6Mbps	1	44	5220	0.50	3.25	11.00	-0.97		Pass
11a	6Mbps	1	48	5240	0.50	3.03	11.00	-0.97		Pass
HT20	MCS0	1	36	5180	0.54	3.42	11.00	-0.97		Pass
HT20	MCS0	1	44	5220	0.54	3.16	11.00	-0.97		Pass
HT20	MCS0	1	48	5240	0.54	3.10	11.00	-0.97		Pass
HT40	MCS0	1	38	5190	1.03	-0.34	11.00	-0.97		Pass
HT40	MCS0	1	46	5230	1.03	-0.28	11.00	-0.97		Pass

Appendix B. Radiated Spurious Emission

Band 1 - 5150~5250MHz

WIFI 802.11a (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)
802.11a CH 36 5180MHz		5142.48	52.87	-21.13	74	42.19	31.96	6.04	27.32	131	107	P	H
		5149.24	44.58	-9.42	54	33.86	31.96	6.04	27.28	131	107	A	H
	*	5180	102.98	-	-	92.21	31.97	6.04	27.24	131	107	P	H
	*	5180	96.95	-	-	86.18	31.97	6.04	27.24	131	107	A	H
		5144.82	51.67	-22.33	74	40.95	31.96	6.04	27.28	188	268	P	V
		5150	44.26	-9.74	54	33.54	31.96	6.04	27.28	188	268	A	V
	*	5180	104.29	-	-	93.49	31.97	6.04	27.24	188	268	P	V
	*	5180	97.75	-	-	86.98	31.97	6.04	27.24	188	268	A	V
802.11a CH 44 5220MHz		5140.14	52.44	-21.56	74	41.76	31.96	6.04	27.32	131	107	P	H
		5139.88	43.71	-10.17	54	33.03	31.96	6.04	27.32	131	107	A	H
	*	5220	102.03	-	-	91.22	31.99	6.03	27.21	131	107	P	H
	*	5220	96.67	-	-	85.86	31.99	6.03	27.21	131	107	A	H
		5357.24	48.95	-25.05	74	37.88	32.04	6.01	26.98	131	107	P	H
		5452.72	40.99	-13.01	54	29.69	32.08	6.06	26.84	131	107	A	H
		5143.26	50.66	-23.34	74	39.98	31.96	6.04	27.32	187	270	P	V
		5139.88	43.31	-10.57	54	32.63	31.96	6.04	27.32	187	270	A	V
	*	5220	104.46	-	-	93.23	31.99	6.03	27.21	187	270	P	V
	*	5220	97.93	-	-	87.12	31.99	6.03	27.21	187	270	A	V
		5357.24	49.79	-24.21	74	38.72	32.04	6.01	26.98	187	270	P	V
		5441.8	40.88	-13.12	54	29.62	32.07	6.06	26.87	187	270	A	V

802.11a CH 48 5240MHz		5129.48	50.59	-23.41	74	39.92	31.95	6.04	27.32	109	105	P	H
		5141.7	42.15	-11.82	54	31.47	31.96	6.04	27.32	109	105	A	H
	*	5240	103.02	-	-	92.17	31.99	6.03	27.17	109	105	P	H
	*	5240	96.97	-	-	86.12	31.99	6.03	27.17	109	105	A	H
		5442.08	49.78	-24.22	74	38.52	32.07	6.06	26.87	109	105	P	H
		5447.12	40.99	-13.01	54	29.72	32.08	6.06	26.87	109	105	A	H
		5118.3	50.7	-23.3	74	40.03	31.95	6.04	27.32	184	269	P	V
		5147.94	42	-12	54	31.28	31.96	6.04	27.28	184	269	A	V
	*	5240	104.42	-	-	94.02	31.99	6.03	27.17	184	269	P	V
	*	5240	98.64	-	-	87.79	31.99	6.03	27.17	184	269	A	V
		5377.12	49.2	-24.8	74	38.09	32.05	6.01	26.95	184	269	P	V
		5350.24	41.07	-12.93	54	30	32.04	6.01	26.98	184	269	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 36 5180MHz		10360	46.86	-27.14	74	54.79	38.69	9.23	55.85	150	0	P	H
		15540	48.72	-25.28	74	54.64	38.88	11.93	56.73	150	0	P	H
		10360	47.41	-26.59	74	55.34	38.69	9.23	55.85	150	0	P	V
		15540	49.45	-24.55	74	55.37	38.88	11.93	56.73	150	0	P	V
802.11a CH 44 5220MHz		10440	47.62	-26.38	74	55.5	38.75	9.25	55.88	150	0	P	H
		15660	48.15	-25.85	74	53.76	38.81	12.07	56.49	150	0	P	H
		10440	47.4	-26.6	74	55.28	38.75	9.25	55.88	150	0	P	V
		15660	48.05	-25.95	74	53.66	38.81	12.07	56.49	150	0	P	V
802.11a CH 48 5240MHz		10480	47.18	-26.82	74	55.03	38.79	9.26	55.9	150	0	P	H
		15720	47.87	-26.13	74	53.34	38.77	12.11	56.35	150	0	P	H
		10480	46.68	-27.32	74	54.53	38.79	9.26	55.9	150	0	P	V
		15720	49.03	-24.97	74	54.5	38.77	12.11	56.35	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 36 5180MHz		5068.38	52.23	-21.77	74	41.64	31.93	6.05	27.39	123	108	P	H
		5146.12	44.58	-9.42	54	33.86	31.96	6.04	27.28	123	108	A	H
	*	5180	103.06	-	-	92.29	31.97	6.04	27.24	123	108	P	H
	*	5180	97.04	-	-	86.27	31.97	6.04	27.24	123	108	A	H
		5138.58	51.69	-22.31	74	41.02	31.95	6.04	27.32	187	267	P	V
		5150	44.29	-9.71	54	33.57	31.96	6.04	27.28	187	267	A	V
	*	5180	103.64	-	-	92.87	31.97	6.04	27.24	187	267	P	V
	*	5180	97.64	-	-	86.87	31.97	6.04	27.24	187	267	A	V
802.11n HT20 CH 44 5220MHz		5139.62	51.37	-22.63	74	40.69	31.96	6.04	27.32	124	108	P	H
		5139.88	43.78	-10.22	54	33.1	31.96	6.04	27.32	124	108	A	H
	*	5220	103.52	-	-	92.71	31.99	6.03	27.21	124	108	P	H
	*	5220	97.45	-	-	86.64	31.99	6.03	27.21	124	108	A	H
		5449.92	50.69	-23.31	74	39.39	32.08	6.06	26.84	124	108	P	H
		5447.96	41.01	-12.99	54	29.74	32.08	6.06	26.87	124	108	A	H
		5142.48	51.96	-22.04	74	41.28	31.96	6.04	27.32	186	267	P	V
		5139.88	43.67	-10.33	54	32.99	31.96	6.04	27.32	186	267	A	V
	*	5220	104.72	-	-	93.91	31.99	6.03	27.21	186	267	P	V
	*	5220	98.05	-	-	87.24	31.99	6.03	27.21	186	267	A	V
		5355.56	50.01	-23.99	74	38.94	32.04	6.01	26.98	186	267	P	V
		5372.64	41.11	-12.89	54	30.03	32.05	6.01	26.98	186	267	A	V

802.11n HT20 CH 48 5240MHz		5147.16	51.66	-22.34	74	40.94	31.96	6.04	27.28	110	107	P	H
		5144.3	42.64	-11.36	54	31.92	31.96	6.04	27.28	110	107	A	H
	*	5240	103.8	-	-	92.95	31.99	6.03	27.17	110	107	P	H
	*	5240	97.39	-	-	86.54	31.99	6.03	27.17	110	107	A	H
		5454.68	49.58	-24.42	74	38.28	32.08	6.06	26.84	110	107	P	H
		5458.88	40.91	-13.09	54	29.61	32.08	6.06	26.84	110	107	A	H
		5145.86	50.42	-23.58	74	39.7	31.96	6.04	27.28	188	268	P	V
		5149.5	42.47	-11.53	54	31.75	31.96	6.04	27.28	188	268	A	V
	*	5240	104.4	-	-	93.55	31.99	6.03	27.17	188	268	P	V
	*	5240	98.41	-	-	87.56	31.99	6.03	27.17	188	268	A	V
		5390.28	50.22	-23.78	74	39.11	32.05	6.01	26.95	188	268	P	V
		5355.84	40.95	-13.05	54	29.88	32.04	6.01	26.98	188	268	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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		10360	46.68	-27.32	74	54.61	38.69	9.23	55.85	150	0	P	H
HT20		15540	48.92	-25.08	74	54.84	38.88	11.93	56.73	150	0	P	H
CH 36		10360	47.34	-26.66	74	55.27	38.69	9.23	55.85	150	0	P	V
5180MHz		15540	48.7	-25.3	74	54.62	38.88	11.93	56.73	150	0	P	V
802.11n		10440	48.14	-25.86	74	56.02	38.75	9.25	55.88	150	0	P	H
HT20		15660	47.83	-26.17	74	53.44	38.81	12.07	56.49	150	0	P	H
CH 44		10440	47.24	-26.76	74	55.12	38.75	9.25	55.88	150	0	P	V
5220MHz		15660	48.2	-25.8	74	53.81	38.81	12.07	56.49	150	0	P	V
802.11n		10480	47.51	-26.49	74	55.36	38.79	9.26	55.9	150	0	P	H
HT20		15720	48.38	-25.62	74	53.85	38.77	12.11	56.35	150	0	P	H
CH 48		10480	47.62	-26.38	74	55.47	38.79	9.26	55.9	150	0	P	V
5240MHz		15720	47.8	-26.2	74	53.27	38.77	12.11	56.35	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 38 5190MHz		5150	61.58	-12.42	74	50.86	31.96	6.04	27.28	117	105	P	H
		5150	52.37	-1.63	54	41.65	31.96	6.04	27.28	117	105	A	H
	*	5190	100.11	-	-	89.34	31.97	6.04	27.24	117	105	P	H
	*	5190	93.53	-	-	82.76	31.97	6.04	27.24	117	105	A	H
		5431.16	49.81	-24.19	74	38.55	32.07	6.06	26.87	117	105	P	H
		5423.6	41.6	-12.4	54	30.43	32.07	6.01	26.91	117	105	A	H
		5150	62.1	-11.9	74	51.38	31.96	6.04	27.28	193	266	P	V
		5148.72	52.24	-1.76	54	41.52	31.96	6.04	27.28	193	266	A	V
	*	5190	101.36	-	-	90.59	31.97	6.04	27.24	193	266	P	V
	*	5190	94.95	-	-	84.18	31.97	6.04	27.24	193	266	A	V
		5455.8	49.65	-24.35	74	38.35	32.08	6.06	26.84	193	266	P	V
		5439.28	41.5	-12.5	54	30.24	32.07	6.06	26.87	193	266	A	V
802.11n HT40 CH 46 5230MHz		5089.44	51.58	-22.42	74	40.98	31.94	6.05	27.39	117	105	P	H
		5149.24	43.35	-10.65	54	32.63	31.96	6.04	27.28	117	105	A	H
	*	5230	99.81	-	-	88.96	31.99	6.03	27.17	117	105	P	H
	*	5230	93.61	-	-	82.76	31.99	6.03	27.17	117	105	A	H
		5388.72	49.07	-24.93	74	37.96	32.05	6.01	26.95	117	105	P	H
		5452.32	41.46	-12.54	54	30.16	32.08	6.06	26.84	117	105	A	H
		5128.7	51.19	-22.81	74	40.52	31.95	6.04	27.32	183	267	P	V
		5148.72	43.54	-10.46	54	32.82	31.96	6.04	27.28	183	267	A	V
	*	5230	101.44	-	-	90.59	31.99	6.03	27.17	183	267	P	V
	*	5230	94.97	-	-	84.12	31.99	6.03	27.17	183	267	A	V
		5447.04	50.94	-23.06	74	39.67	32.08	6.06	26.87	183	267	P	V
		5417.28	41.81	-12.19	54	30.64	32.07	6.01	26.91	183	267	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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		10380	47.27	-26.73	74	55.18	38.71	9.24	55.86	150	0	P	H
HT40		15570	48.76	-25.24	74	54.58	38.86	11.98	56.66	150	0	P	H
CH 38		10380	47.85	-26.15	74	55.76	38.71	9.24	55.86	150	0	P	V
5190MHz		15570	47.56	-26.44	74	53.38	38.86	11.98	56.66	150	0	P	V
802.11n		10460	47.48	-26.52	74	55.34	38.76	9.26	55.88	150	0	P	H
HT40		15690	48.01	-25.99	74	53.53	38.79	12.11	56.42	150	0	P	H
CH 46		10460	46.74	-27.26	74	54.6	38.76	9.26	55.88	150	0	P	V
5230MHz		15690	47.61	-26.39	74	53.13	38.79	12.11	56.42	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11n HT40 (LF @ 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 LF		31.94	24.14	-15.86	40	31.86	23.96	0.29	31.97	-	-	P	H
		127.97	19.62	-23.88	43.5	32.52	17.54	1.18	31.62	-	-	P	H
		335.55	21.69	-24.31	46	30.57	20.3	2.03	31.21	-	-	P	H
		547.98	27.33	-18.67	46	31.17	24.86	2.55	31.25	-	-	P	H
		726.46	29.87	-16.13	46	30.96	27.17	2.98	31.24	-	-	P	H
		907.85	32.71	-13.29	46	31.11	29.39	3.4	31.19	100	360	P	H
		30	26.28	-13.72	40	33.1	24.9	0.25	31.97	-	-	P	V
		56.19	24.83	-15.17	40	43.02	12.94	0.79	31.92	-	-	P	V
		209.45	20.7	-22.8	43.5	35.08	15.3	1.63	31.31	-	-	P	V
		256.98	21.82	-24.18	46	31.34	19.99	1.73	31.24	-	-	P	V
		638.19	28.47	-17.53	46	30.78	26.14	2.79	31.24	-	-	P	V
		923.37	33.01	-12.99	46	31.24	29.58	3.43	31.24	100	0	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 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”.

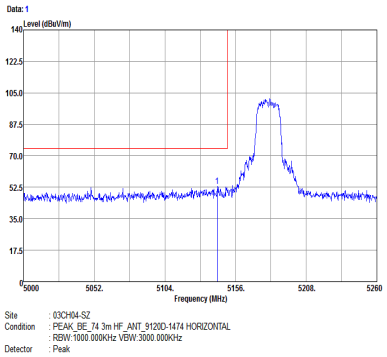
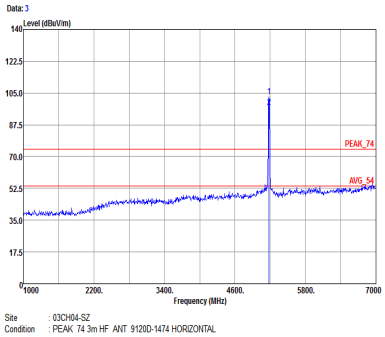
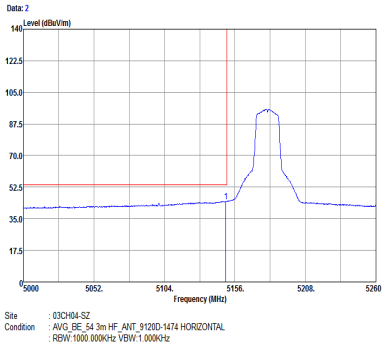
Appendix C. Radiated Spurious Emission

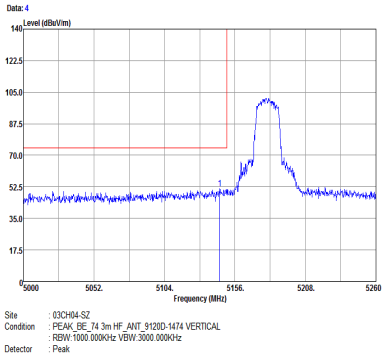
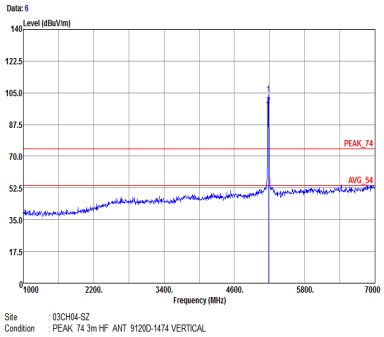
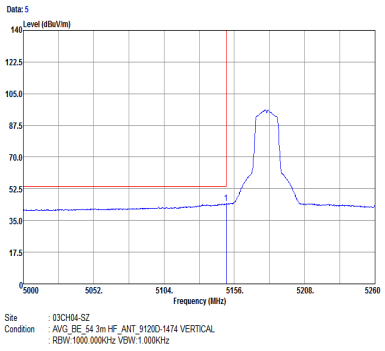
Note symbol

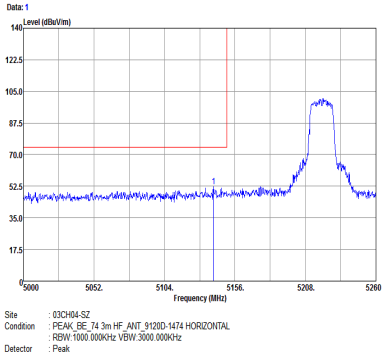
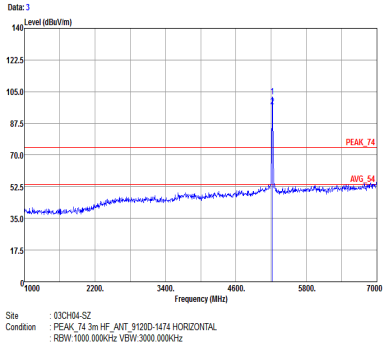
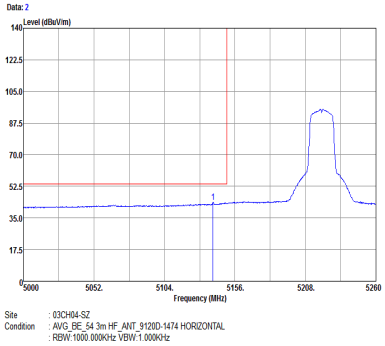
-L	**Low channel location**
-R	**High channel location**

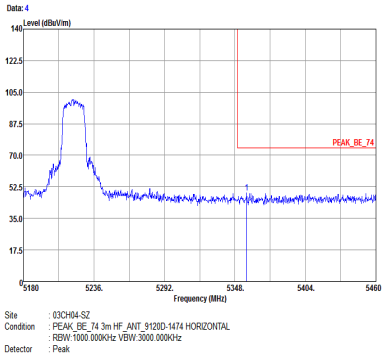
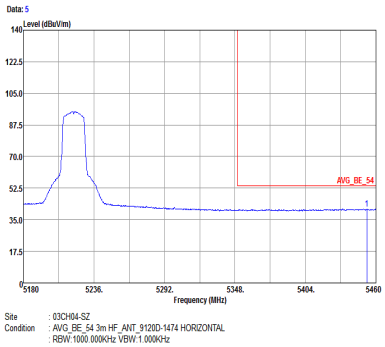
Band 1 - 5150~5250MHz

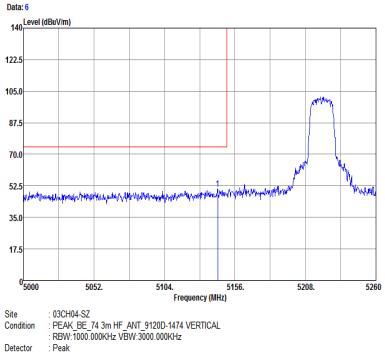
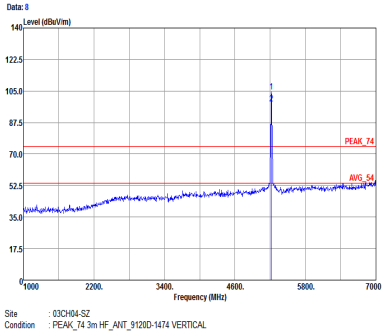
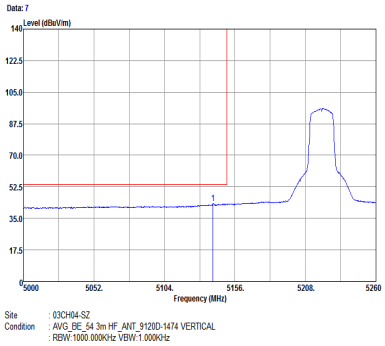
WIFI 802.11a (Band Edge @ 3m)

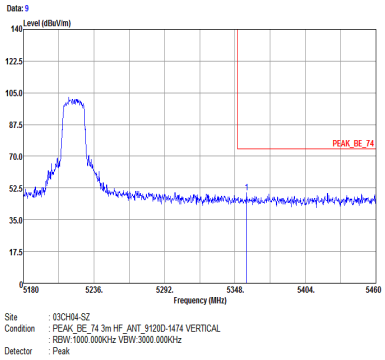
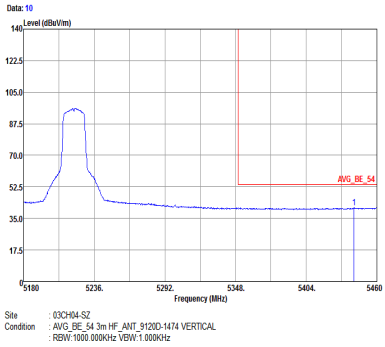
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1	Horizontal	Fundamental
Peak /Avg.		
Avg.		

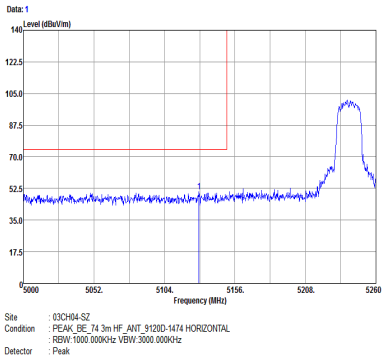
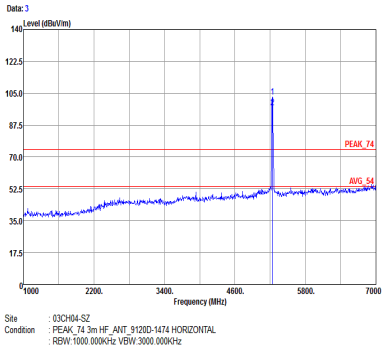
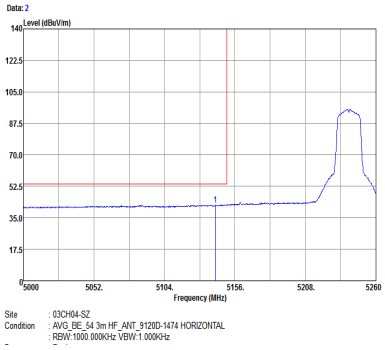
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH36 5180MHz	
1	Vertical	Fundamental
Peak /Avg.		
Avg.		

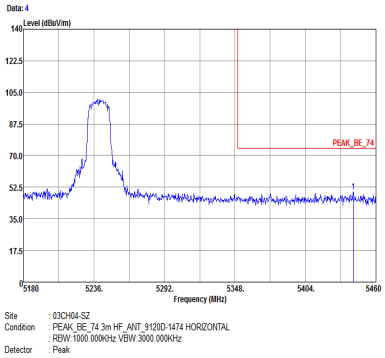
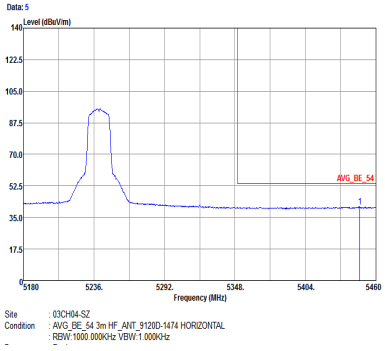
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1	Horizontal	Fundamental
Peak /Avg.		
Avg.		

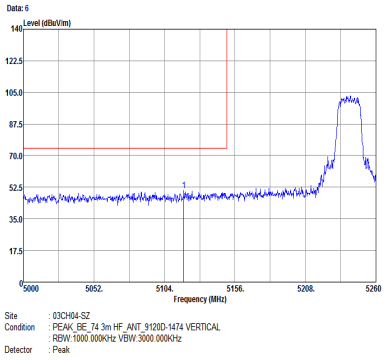
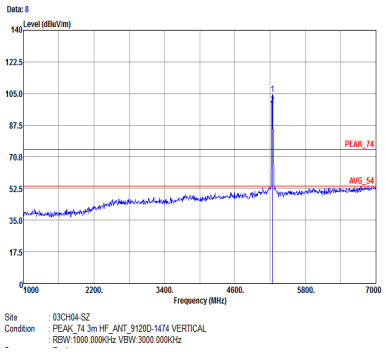
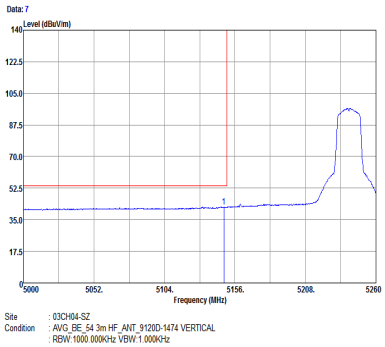
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

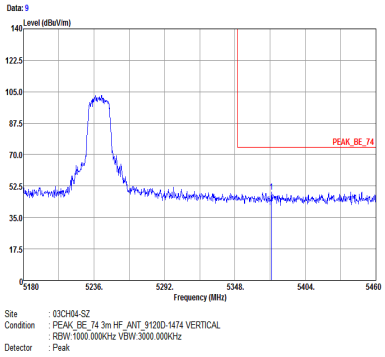
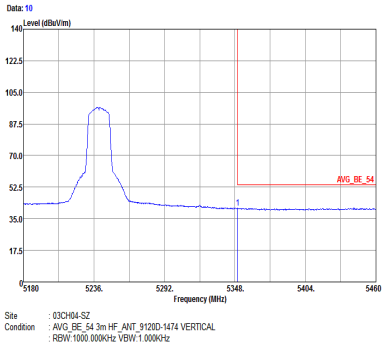
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH44 5220MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

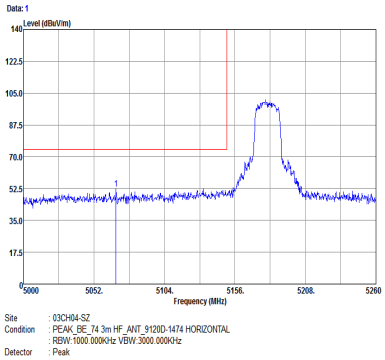
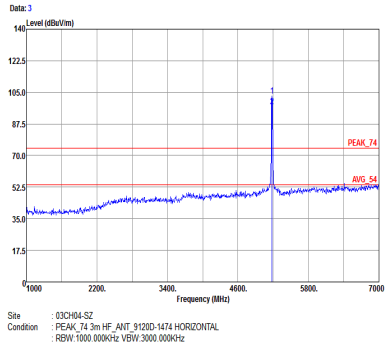
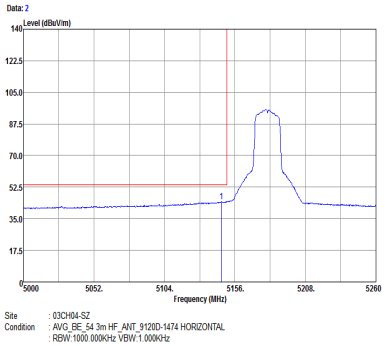
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

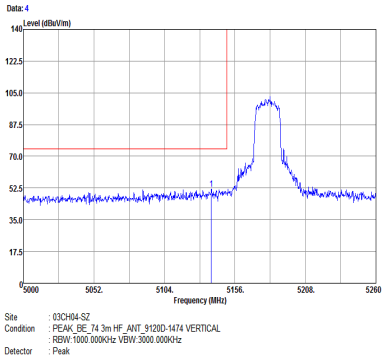
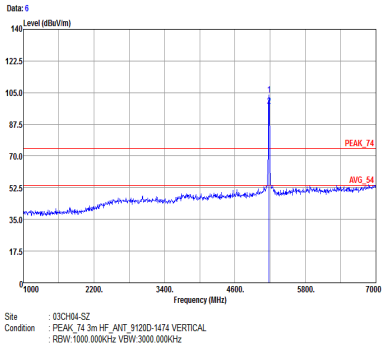
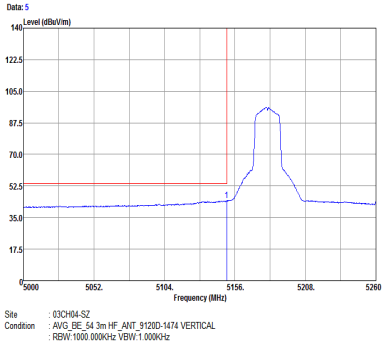
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

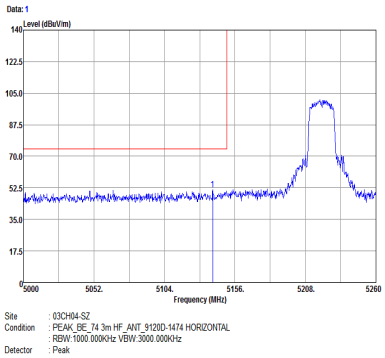
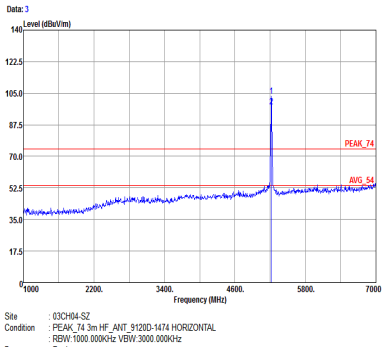
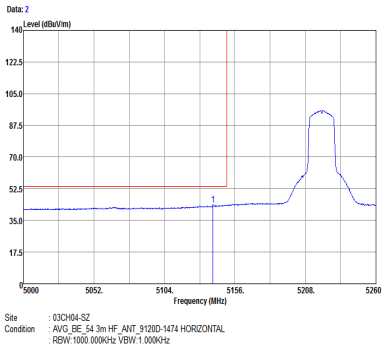
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

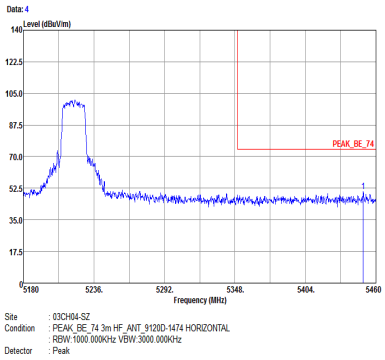
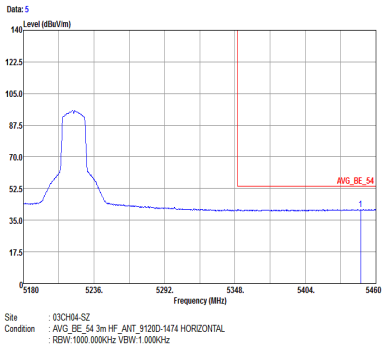
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11a CH48 5240MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

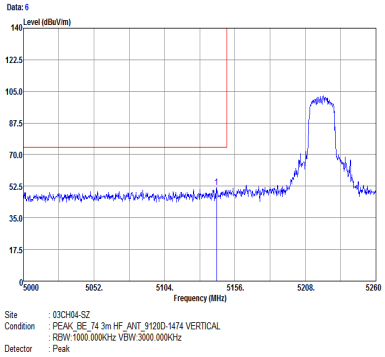
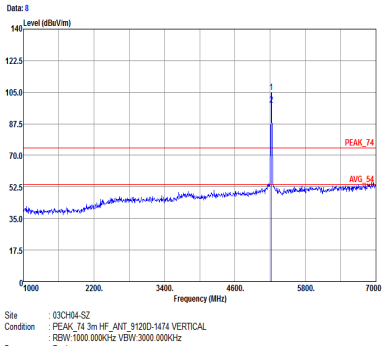
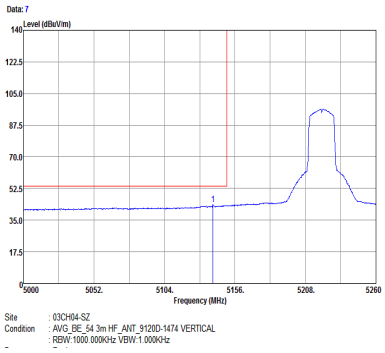
Band 1 5150~5250MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

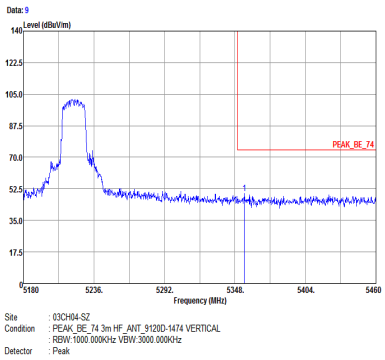
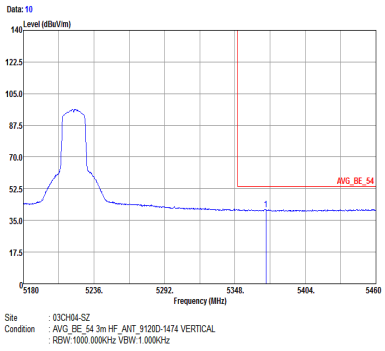
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

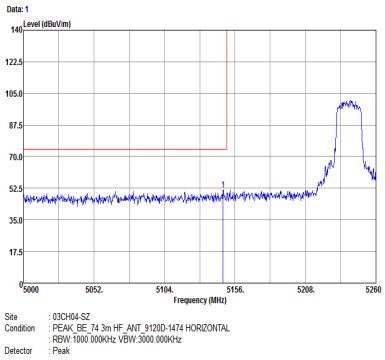
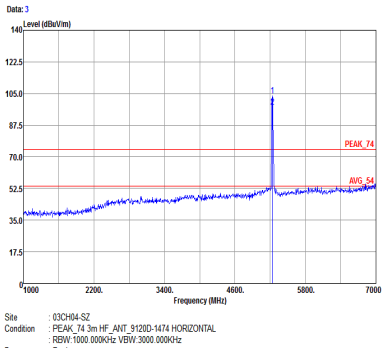
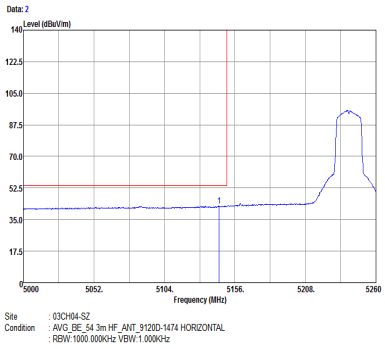
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

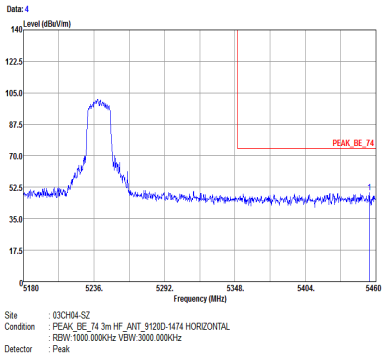
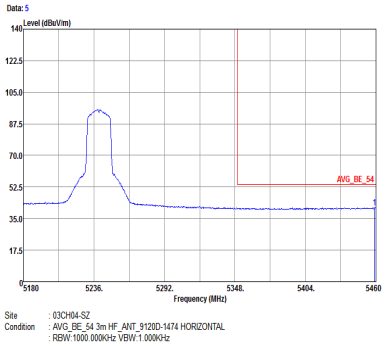
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

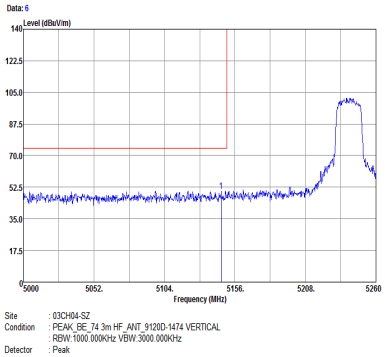
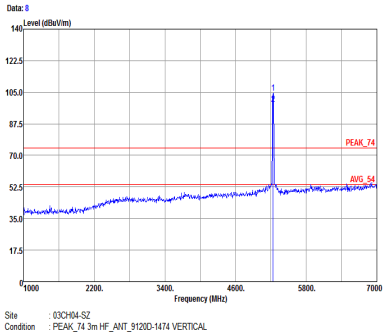
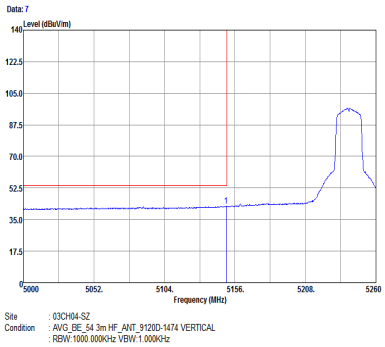
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

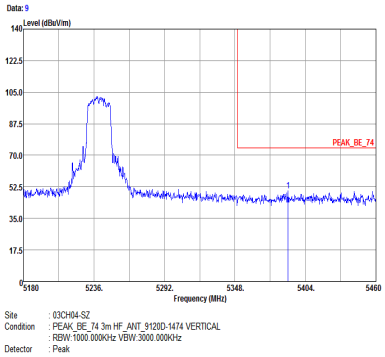
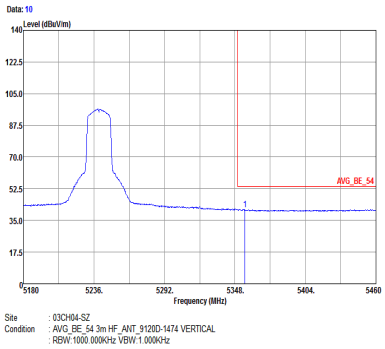
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH44 5220MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

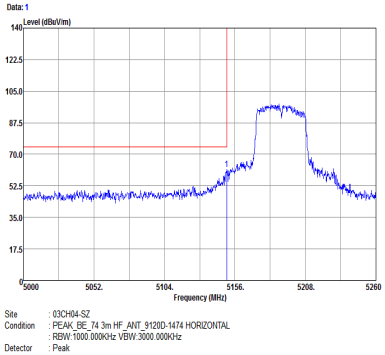
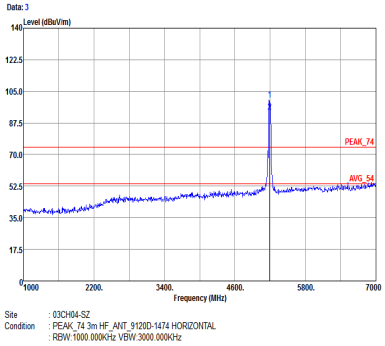
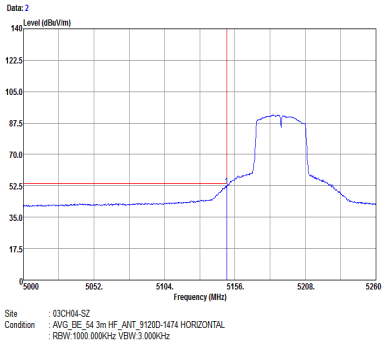
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

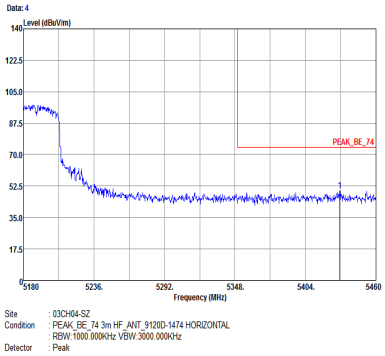
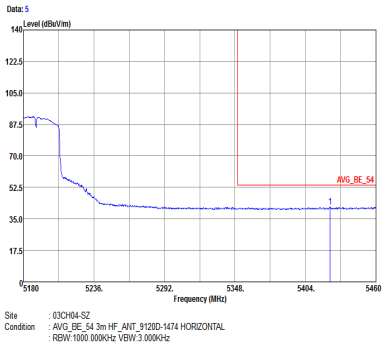
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

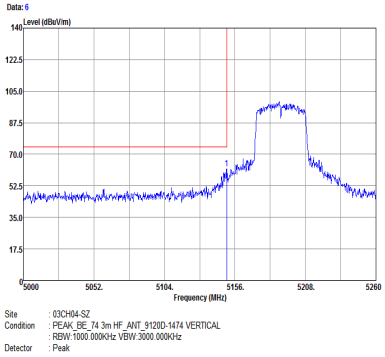
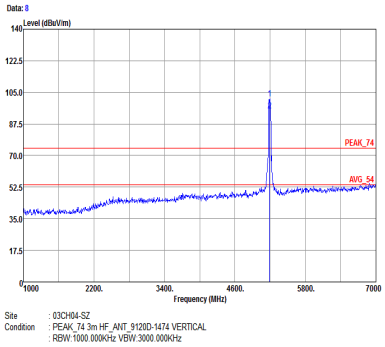
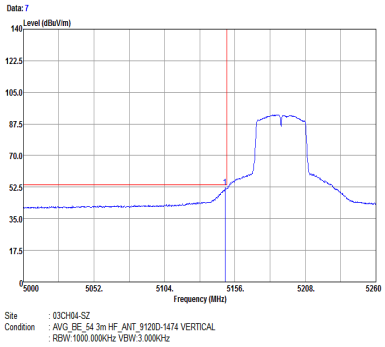
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

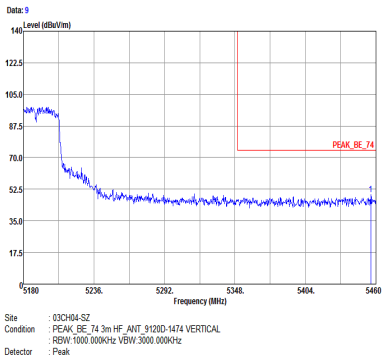
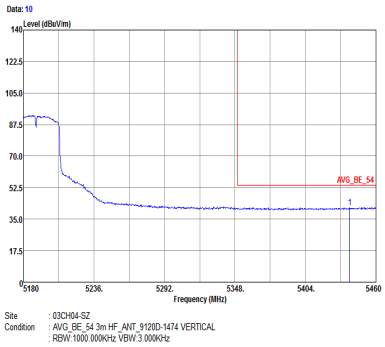
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT20 CH48 5240MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

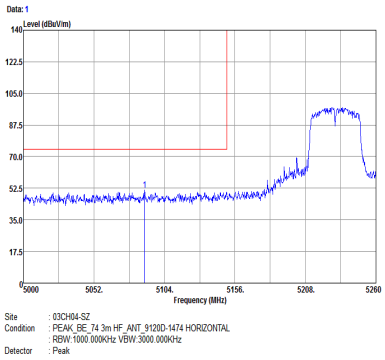
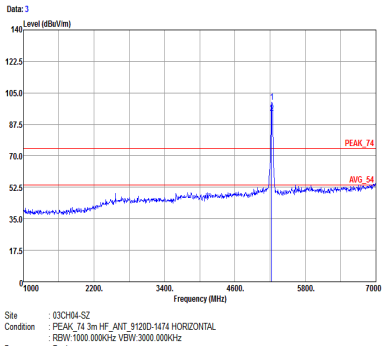
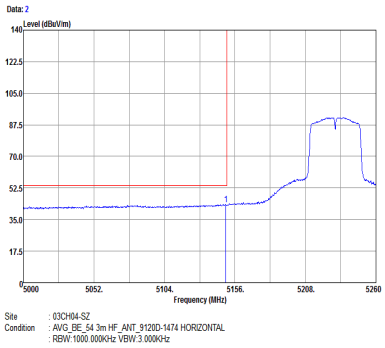
Band 1 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

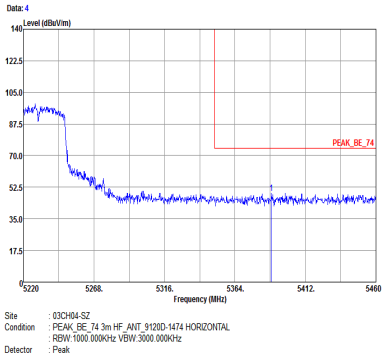
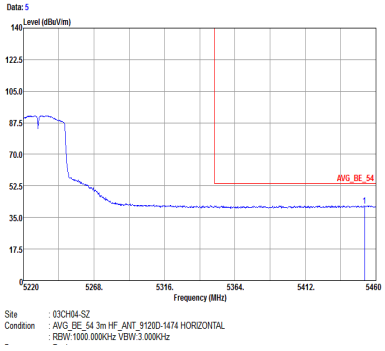
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

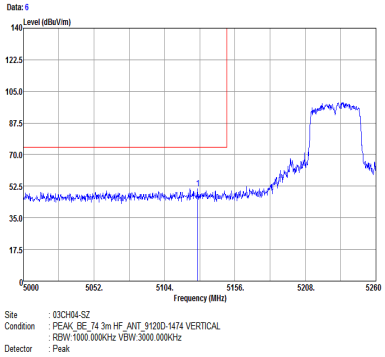
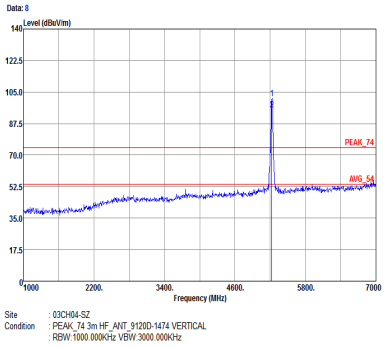
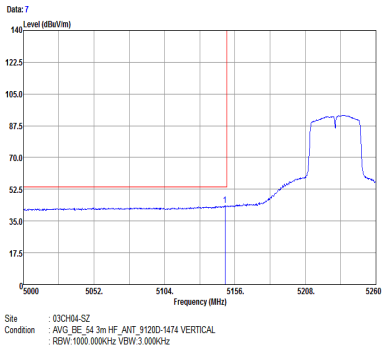
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

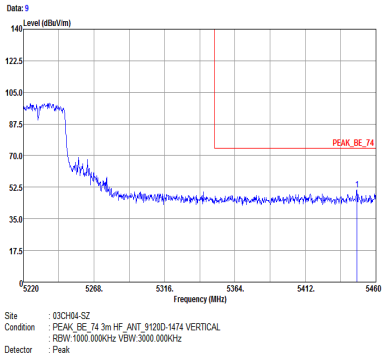
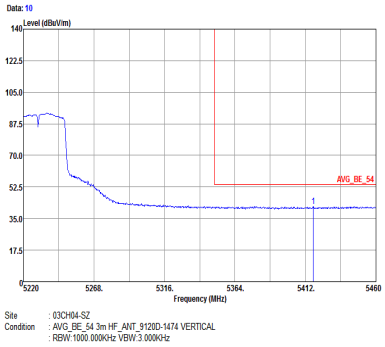
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1	Horizontal	Fundamental
Peak / Avg.		
Avg.		

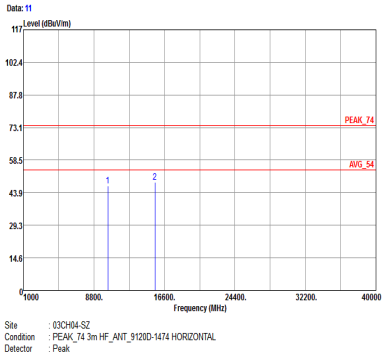
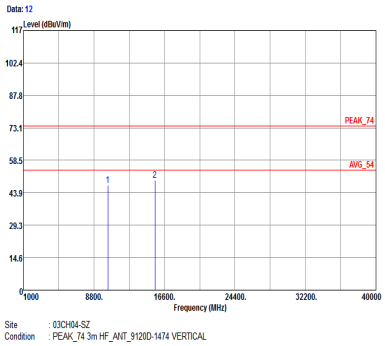
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1	Horizontal	Fundamental
Peak		
Avg.		

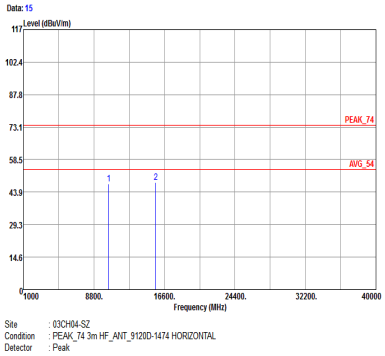
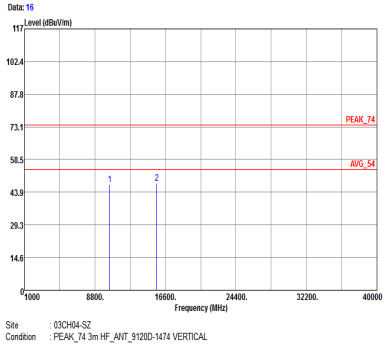
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - L	
1	Vertical	Fundamental
Peak / Avg.		
Avg.		

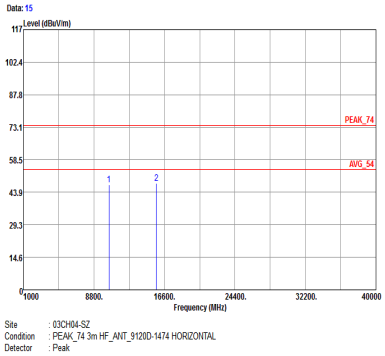
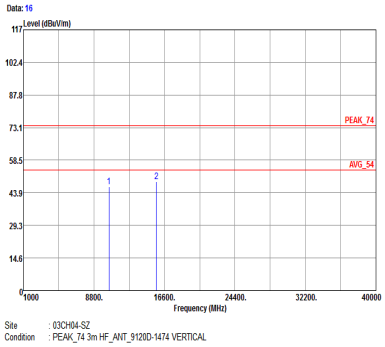
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH46 5230MHz - R	
1	Vertical	Fundamental
Peak		
Avg.		

Band 1 - 5150~5250MHz

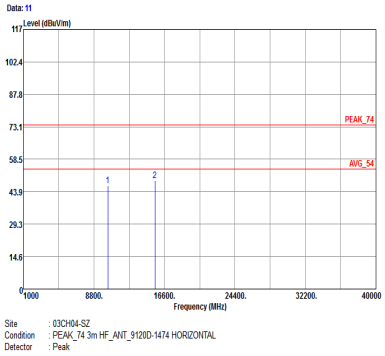
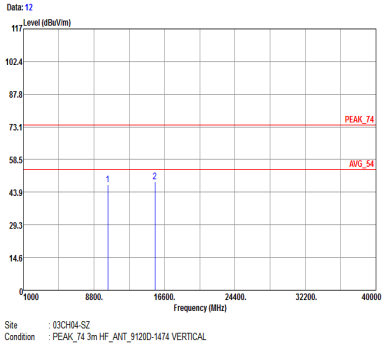
WIFI 802.11a (Harmonic @ 3m)

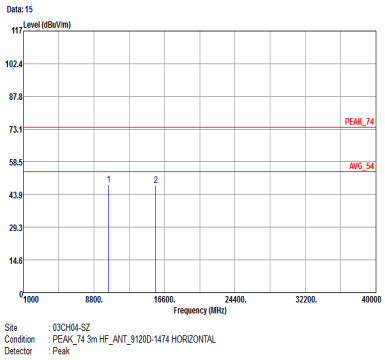
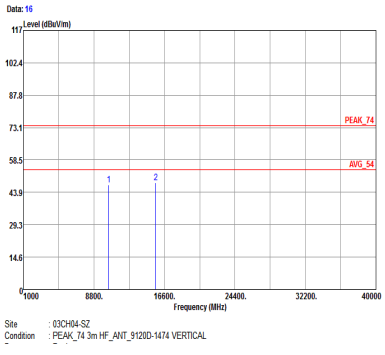
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH36 5180MHz	
1	Horizontal	Vertical
Peak / Avg.		

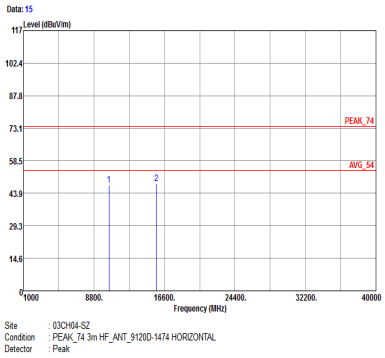
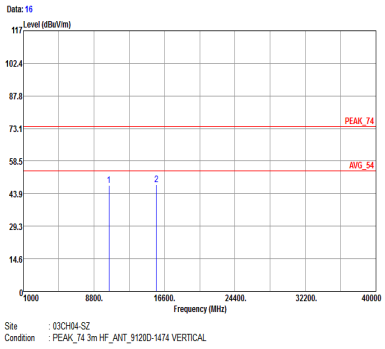
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH44 5220MHz	
1	Horizontal	Vertical
Peak / Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11a CH48 5240MHz	
1	Horizontal	Vertical
Peak / Avg.		

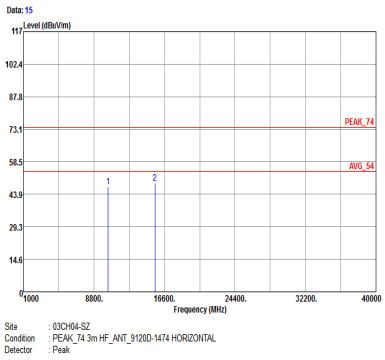
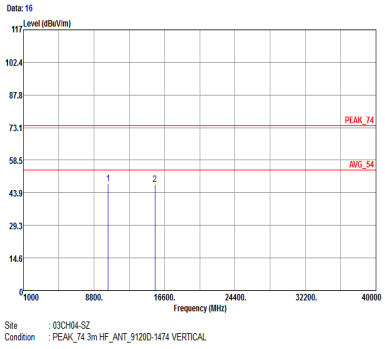
Band 1 5150~5250MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

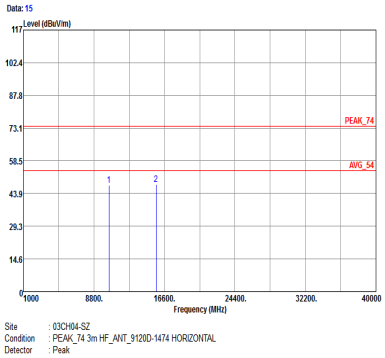
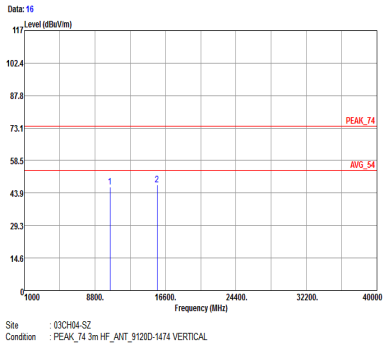
WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH36 5180MHz	
1	Horizontal	Vertical
Peak / Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH44 5220MHz	
1	Horizontal	Vertical
Peak / Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT20 CH48 5240MHz	
1	Horizontal	Vertical
Peak / Avg.		

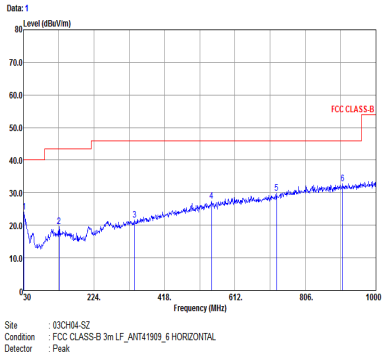
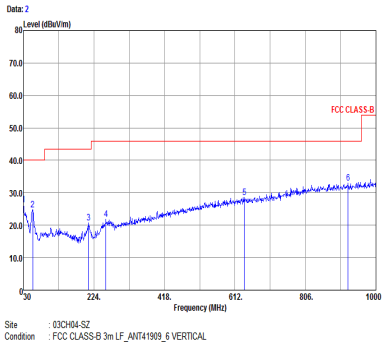
Band 1 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH38 5190MHz	
1	Horizontal	Vertical
Peak / Avg.		

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH46 5230MHz	
1	Horizontal	Vertical
Peak / Avg.		

Emission below 1GHz

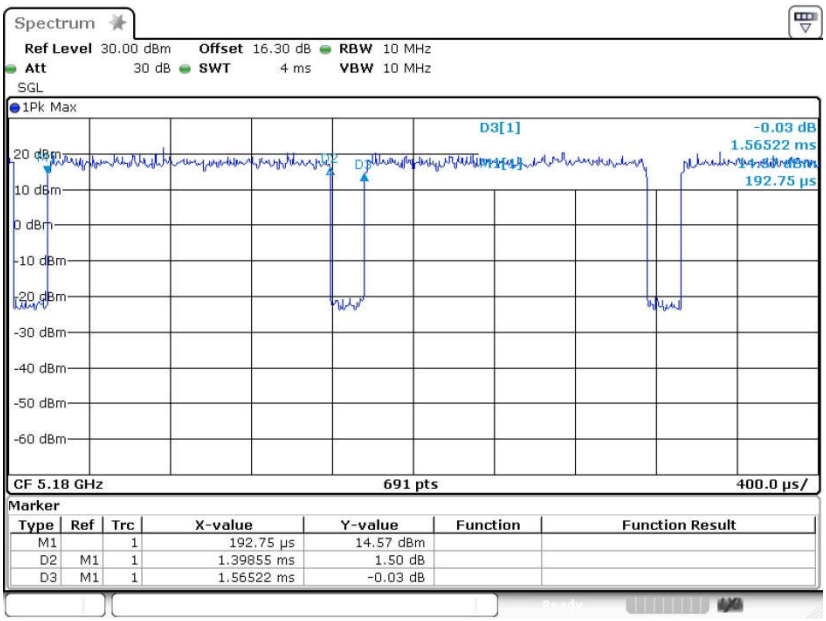
5GHz WIFI 802.11n HT40 (LF)

WIFI	5GHz WIFI	
ANT	802.11n HT40 LF	
1	Horizontal	Vertical
Peak		

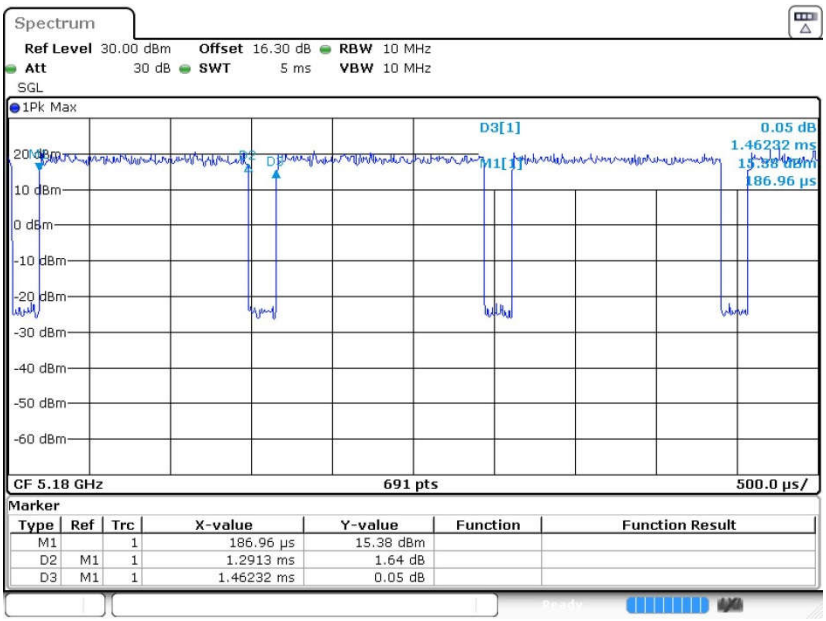
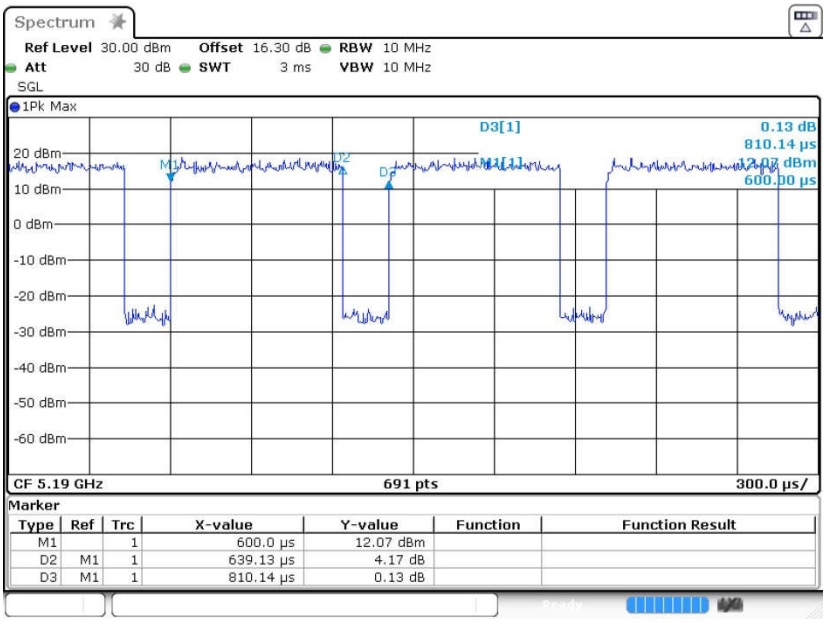
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	89.35	1.399	0.715	1kHz
802.11n HT20	88.30	1.291	0.774	1kHz
802.11n HT40	78.89	0.639	1.565	3kHz

802.11a



802.11n HT20



802.11n HT40