NCC RADIO TEST REPORT

Equipment	:	**Wireless Access Point**
Brand Name	:	**Ruckus**
Model Name	:	**R550**
Applicant	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Manufacturer	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Standard	:	**NCC LP0002 (2018-01-10)**

The product was received on Jan. 22, 2020 and testing was started from Feb. 06, 2020 and completed on Mar. 10, 2020. We, Sporton International (USA) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures NCC LP0002 (2018-01-10) and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of government.

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

Sporton Lab in Taiwan is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No.TW1190 under the FCC rule by Mutual Recognition Agreement (MRA) in FCC Test.

Approved by: Ken Chen

Sporton International (USA) Inc.
1175 Montague Expressway, Milpitas, CA 95035

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History of this test report

Report No.	Version	Description	Issued Date
TR200117001B	01	Initial issue of report	May 07, 2020
TR200117001B	02	1. Revise Antenna type information and test data 2. Revise Carrier Frequency Channel	Jun. 29, 2020
TR200117001B	03	Revise Connection Diagram of Test System	Jul. 01, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	LP0002 3.10.1.6 (2)(A)	6dB Bandwidth	Pass	Please refer to test report. Report No.: TR021504B
-	-	99% Occupied Bandwidth	Reporting only	
-	LP0002 3.10.1.2 (1)(C)	Output Power	Pass	
-	LP0002 3.10.1.6 (2)(B)	Power Spectral Density	Pass	
-	LP0002 3.10.1.5	Conducted Band Edges and Spurious Emission	Pass	
3.1	LP0002 3.10.1.5	Radiated Band Edges and Spurious Emission	Pass	Under limit 0.37 dB at 7425.000 MHz
-	LP0002 2.11	Receiver Radiated Emission	Pass	Please refer to test report. Report No.: TR021504C
3.2	LP0002 2.3	AC Conducted Emission	Pass	Under limit 2.48 dB at 0.461 MHz
3.3	LP0002 2.2 3.10.1.3 3.10.1.4	Antenna Requirement	Pass	-
-	LP0002 2.2 5.20.2	Maximum Power Density	Pass	Please refer to test report. Report No.: TR021504B

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 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and Zigbee

Product Specification subjective to this standard	
Antenna Type	WLAN (Brand Name: Ruckus / Model Name: A550h25br): <Ant. 1> Internal Antenna / 2.4GHz: -1.5dBi, 5GHz: -2.5dBi <Ant. 2> Internal Antenna / 2.4GHz: -0.5dBi, 5GHz: -1.5dBi Bluetooth (Brand Name: Ruckus / Model Name: IOT): Metal Antenna /1dBi Zigbee (Brand Name: Ruckus / Model Name: IOT): Metal Antenna / 1dBi

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	Sporton International (USA) Inc.	
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300	
Test Site No.	**Sporton Site No.**	
	CO01-CA	03CH02-CA

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

1.4 Applicable Standards

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

- NCC LP0002 (2018-01-10)
- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- 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

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	11	2405	19	2445
	12	2410	20	2450
	13	2415	21	2455
	14	2420	22	2460
	15	2425	23	2465
	16	2430	24	2470
	17	2435	25	2475
	18	2440		

2.2 Test Mode

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: conduction emission (150 kHz to 30 MHz), 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 and Accessory (POE or Adapter). The worst cases (Y plane with POE) were recorded in this report.

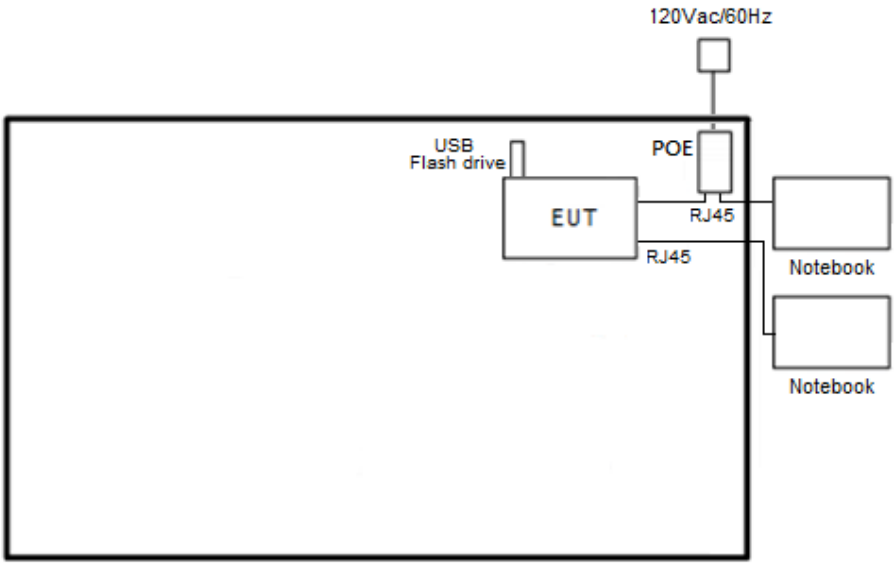
b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

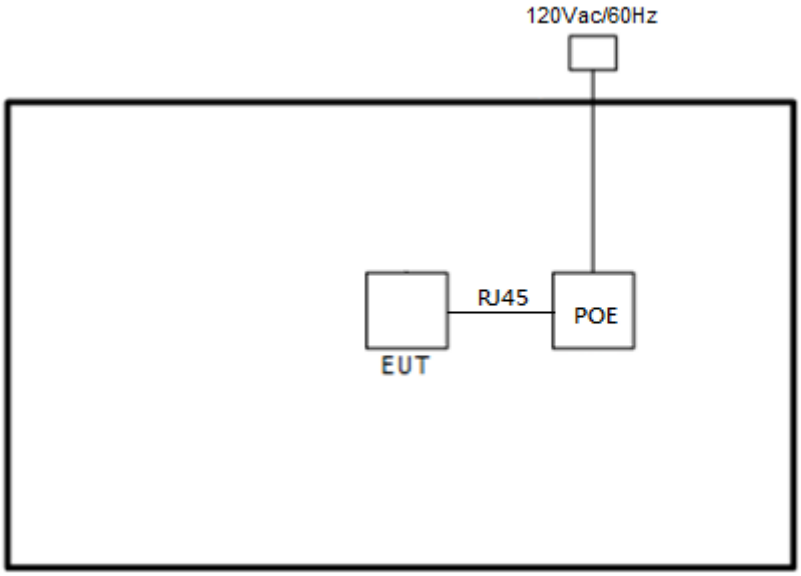
Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
	250 kbps / OQPSK
Radiated Test Cases	Mode 1: Zigbee Tx CH11_2405 MHz Mode 2: Zigbee Tx CH18_2440 MHz Mode 3: Zigbee Tx CH25_2475 MHz
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + WLAN (5GHz) Idle + Zigbee Idle + PoE + LAN Link

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<Radiated Emission>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Laptop	DELL	P79G	FCC DoC	N/A	N/A
2.	Laptop	DELL	E6430	N/A	N/A	N/A
3.	Notebook	HP	15t-cu000	PD97265NG	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	USB Flash drive	SanDisk	N/A	N/A	N/A	N/A
5.	Adapter	Ruckus Wireless Inc.	APH-5020	N/A	N/A	N/A
6.	PoE Adapter	Ruckus Wireless Inc.	N/A	N/A	N/A	N/A

Remark: Applicant has ensured accessory would not be attached with the product on the market, accessory is provided by lab or applicant for testing.

2.5 EUT Operation Test Setup

The RF test items, utility “Putty” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

3 Test Result

3.1 Radiated Band Edges and Spurious Emission Measurement

3.1.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the NCC LP0002 section 2.8 limits as below.

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

3.1.2 Measuring Instruments

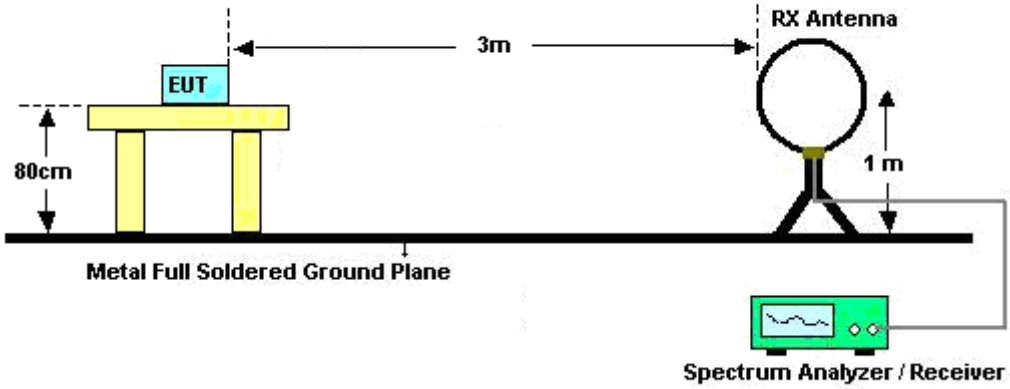
See list of measuring equipment of this test report.

3.1.3 Test Procedures

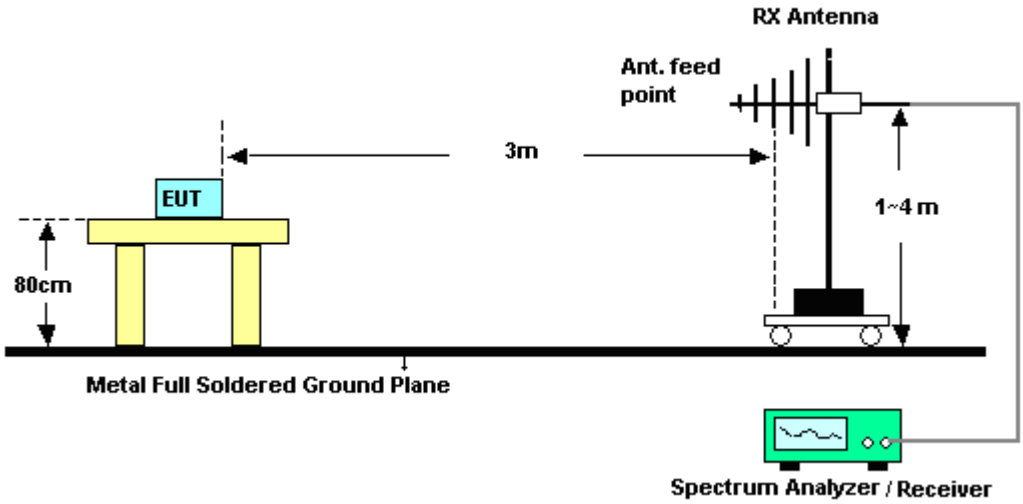
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
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.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - 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.

3.1.4 Test Setup

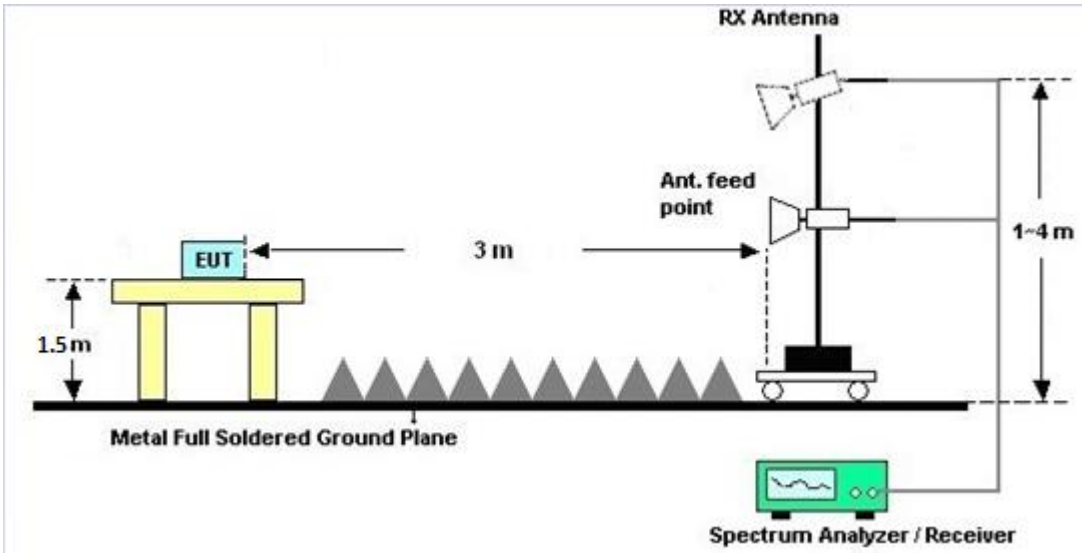
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.1.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.

3.2 AC Conducted Emission Measurement

3.2.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

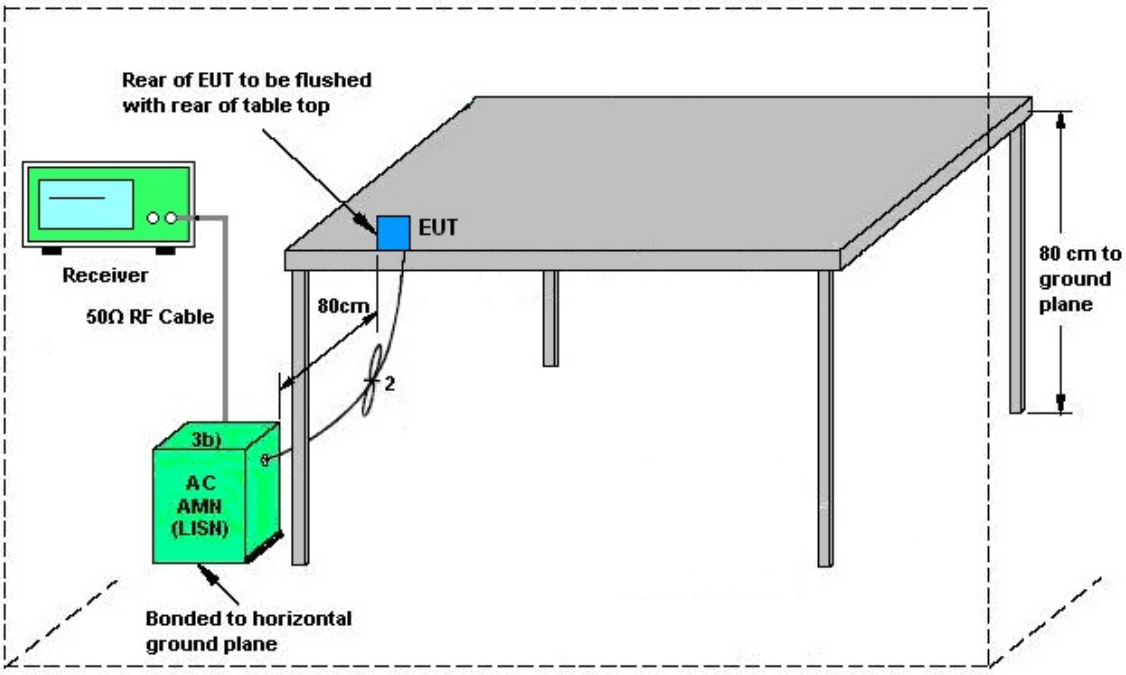
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.2.4 Test Setup



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

3.2.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.3 Antenna Requirements

3.3.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the LP0002 Section 2.2, Section 3.10.1.3, and Section 3.10.1.4.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LISN	TESEQ	NNB51	47407	N/A	Jun. 26, 2019	Feb. 25, 2020	Jun. 25, 2020	Conduction (CO01-CA)
EMI Test Receiver	R&S	ESR7	102177	9KHz~7GHz	Jun. 27, 2019	Feb. 25, 2020	Jun. 26, 2020	Conduction (CO01-CA)
Pulse limiter with 10dB attenuation	R&S	VTSD 9561-F N	9561-F-N00412	N/A	Jun. 11, 2019	Feb. 25, 2020	Jun. 10, 2020	Conduction (CO01-CA)
Test Software	EMC32	N/A	N/A	N/A	N/A	Feb. 25, 2020	N/A	Conduction (CO01-CA)
Bilog Antenna	TESEQ	6111D	50392	30MHz~1GHz	May 15, 2019	Feb. 06, 2020~ Mar. 10, 2020	May 14, 2020	Radiation (03CH02-CA)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	01894	1GHz~18GHz	Jul. 22, 2019	Feb. 06, 2020~ Mar. 10, 2020	Jul. 21, 2020	Radiation (03CH02-CA)
Amplifier	SONOMA	310N	372241	N/A	Jul. 26, 2019	Feb. 06, 2020~ Mar. 10, 2020	Jul. 25, 2020	Radiation (03CH02-CA)
Preamplifier	Keysight	83017A	MY532703 21	1GHz~26.5GHz	Jul. 26, 2019	Feb. 06, 2020~ Mar. 10, 2020	Jul. 25, 2020	Radiation (03CH02-CA)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0055007	1GHz~18GHz	Apr. 01, 2019	Feb. 06, 2020~ Mar. 10, 2020	Mar. 31, 2020	Radiation (03CH02-CA)
Spectrum Analyzer	Keysight	N9010A	MY574202 21	10Hz~44GHz	Sep. 11, 2019	Feb. 06, 2020~ Mar. 10, 2020	Sep. 10, 2020	Radiation (03CH02-CA)
Filter	Wainwright	WLK12-1200-1272-11000-4 0SS	SN2	1.2G Low Pass	Aug. 02, 2019	Feb. 06, 2020~ Mar. 10, 2020	Aug. 01, 2020	Radiation (03CH02-CA)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60ST	SN10	3G Highpass	Aug. 02, 2019	Feb. 06, 2020~ Mar. 10, 2020	Aug. 01, 2020	Radiation (03CH02-CA)
Hygrometer	TESEO	608-H1	45142602	N/A	Jul. 25, 2019	Feb. 06, 2020~ Mar. 10, 2020	Jul. 24, 2020	Radiation (03CH02-CA)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Feb. 06, 2020~ Mar. 10, 2020	N/A	Radiation (03CH02-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Feb. 06, 2020~ Mar. 10, 2020	N/A	Radiation (03CH02-CA)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Feb. 06, 2020~ Mar. 10, 2020	N/A	Radiation (03CH02-CA)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	1.7

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.4

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.5

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.3

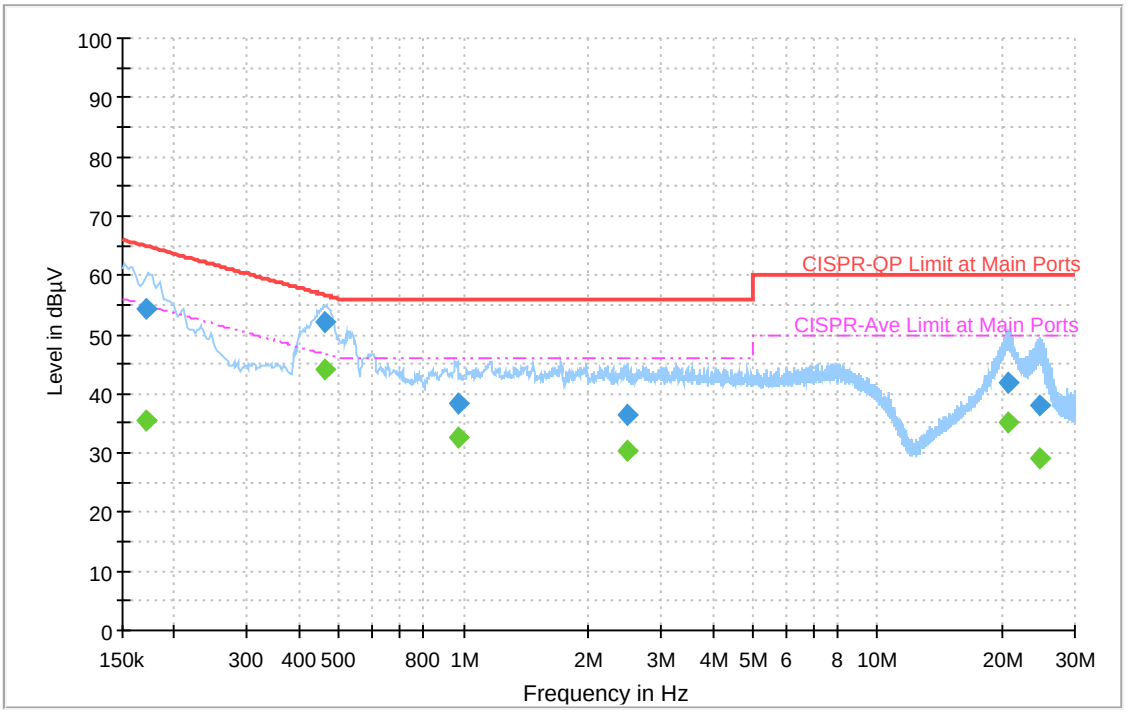
Appendix A. AC Conducted Emission Test Results

Test Engineer :	JC Liang	**Temperature :**	24~26℃
		Relative Humidity :	22~25%

EUT Information

Site:	CO01-CA
Project:	200117001
Power:	120Vac/60Hz
Mode:	1

Full Spectrum



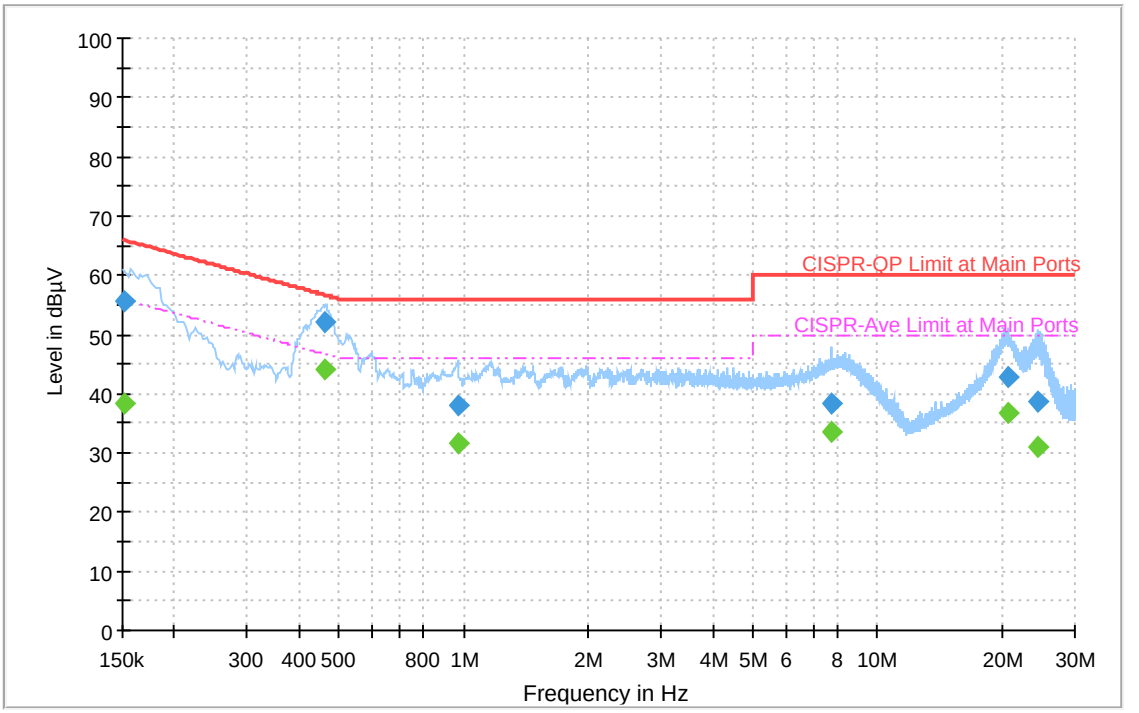
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170250	---	35.62	54.95	19.33	L1	OFF	20.3
0.170250	54.31	---	64.95	10.64	L1	OFF	20.3
0.460500	---	44.12	46.68	2.56	L1	OFF	20.4
0.460500	51.95	---	56.68	4.73	L1	OFF	20.4
0.971250	---	32.49	46.00	13.51	L1	OFF	20.4
0.971250	38.47	---	56.00	17.53	L1	OFF	20.4
2.484330	---	30.21	46.00	15.79	L1	OFF	20.4
2.484330	36.36	---	56.00	19.64	L1	OFF	20.4
20.640750	---	35.14	50.00	14.86	L1	OFF	20.7
20.640750	41.76	---	60.00	18.24	L1	OFF	20.7
24.702000	---	29.18	50.00	20.82	L1	OFF	20.8
24.702000	37.87	---	60.00	22.13	L1	OFF	20.8

EUT Information

Site:	CO01-CA
Project:	200117001
Power:	120Vac/60Hz
Mode:	1

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.43	55.88	17.45	N	OFF	20.3
0.152250	55.63	---	65.88	10.25	N	OFF	20.3
0.460500	---	44.20	46.68	2.48	N	OFF	20.4
0.460500	51.93	---	56.68	4.75	N	OFF	20.4
0.971250	---	31.73	46.00	14.27	N	OFF	20.4
0.971250	37.90	---	56.00	18.10	N	OFF	20.4
7.741500	---	33.48	50.00	16.52	N	OFF	20.5
7.741500	38.49	---	60.00	21.51	N	OFF	20.5
20.715000	---	36.76	50.00	13.24	N	OFF	20.7
20.715000	42.79	---	60.00	17.21	N	OFF	20.7
24.384750	---	30.98	50.00	19.02	N	OFF	20.8
24.384750	38.52	---	60.00	21.48	N	OFF	20.8

Appendix B. Radiated Spurious Emission

Test Engineer :	Calvin Wu, Leo Liu and Jacky Hong	Temperature :	19~22℃
		Relative Humidity :	36~45%

2.4GHz 2400~2483.5MHz

ZigBee (Band Edge @ 3m)

Zigbee	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	Limit (dB)	Line (dBμV/m)	Level (dBμV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
ZigBee CH 11 2405MHz		2366.175	59.14	-14.86	74	45.3	27.73	17.29	31.18	100	185	P	H
		2366.49	52.35	-1.65	54	38.51	27.73	17.29	31.18	100	185	A	H
	*	2405	116.91	-	-	103.19	27.53	17.35	31.16	100	185	P	H
	*	2405	115.06	-	-	101.34	27.53	17.35	31.16	100	185	A	H
													H
		2366.595	57.9	-16.1	74	43.93	27.86	17.29	31.18	348	138	P	V
		2366.49	49.68	-4.32	54	35.71	27.86	17.29	31.18	348	138	A	V
	*	2405	114.41	-	-	100.66	27.56	17.35	31.16	348	138	P	V
	*	2405	112.58	-	-	98.83	27.56	17.35	31.16	348	138	A	V
													V
ZigBee CH 18 2440MHz		2344.56	55.13	-18.87	74	41.21	27.85	17.26	31.19	166	181	P	H
		2310.96	43.89	-10.11	54	29.88	28.01	17.21	31.21	166	181	A	H
	*	2440	114.15	-	-	100.4	27.48	17.41	31.14	166	181	P	H
	*	2440	112.29	-	-	98.54	27.48	17.41	31.14	166	181	A	H
		2494.72	54.87	-19.13	74	40.95	27.53	17.5	31.11	166	181	P	H
		2495.52	43.91	-10.09	54	29.99	27.53	17.5	31.11	166	181	A	H
		2350.32	55.19	-18.81	74	41.11	28	17.27	31.19	335	129	P	V
		2351.28	44.06	-9.94	54	29.99	27.99	17.27	31.19	335	129	A	V
	*	2440	111.72	-	-	98.02	27.43	17.41	31.14	335	129	P	V
	*	2440	109.78	-	-	96.08	27.43	17.41	31.14	335	129	A	V
		2490.16	54.45	-19.55	74	40.58	27.5	17.49	31.12	335	129	P	V
		2494.96	43.82	-10.18	54	29.91	27.52	17.5	31.11	335	129	A	V

ZigBee CH 25 2475MHz	*	2475	117.43	-	-	103.59	27.5	17.46	31.12	117	175	P	H
	*	2475	115.58	-	-	101.74	27.5	17.46	31.12	117	175	A	H
		2483.84	62.39	-11.61	74	48.52	27.51	17.48	31.12	117	175	P	H
		2483.52	51.51	-2.49	54	37.64	27.51	17.48	31.12	117	175	A	H
													H
													H
	*	2475	114.51	-	-	100.71	27.46	17.46	31.12	264	124	P	V
	*	2475	112.62	-	-	98.82	27.46	17.46	31.12	264	124	A	V
		2483.72	59.79	-14.21	74	45.95	27.48	17.48	31.12	264	124	P	V
		2483.52	49.41	-4.59	54	35.57	27.48	17.48	31.12	264	124	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

ZigBee (Harmonic @ 3m)

Zigbee	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
ZigBee CH 11 2405MHz		4810	44.92	-29.08	74	68.27	31.38	11.55	66.28	100	0	P	H
		12025	57.43	-16.57	74	67.14	39.28	17.67	66.66	178	24	A	H
		12025	50.37	-3.63	54	60.08	39.28	17.67	66.66	178	24	A	H
													H
		4810	44.25	-29.75	74	67.58	31.4	11.55	66.28	100	0	P	V
		12025	52.67	-21.33	74	62.31	39.35	17.67	66.66	111	341	P	V
		12025	44.05	-9.95	54	53.69	39.35	17.67	66.66	111	341	A	V
													V
ZigBee CH 18 2440MHz		4880	47.81	-26.19	74	71.25	31.31	11.39	66.14	100	0	P	H
		7320	57.68	-16.32	74	73.61	36.35	13.58	65.86	252	279	P	H
		7320	51.81	-2.19	54	67.74	36.35	13.58	65.86	252	279	A	H
													H
		4880	46.15	-27.85	74	69.65	31.25	11.39	66.14	100	0	P	V
		7320	59.1	-14.9	74	75.04	36.34	13.58	65.86	240	170	P	V
		7320	53.62	-0.38	54	69.56	36.34	13.58	65.86	240	170	A	V
													V
ZigBee CH 25 2475MHz		4950	49.81	-24.19	74	73.19	31.38	11.24	66	100	0	P	H
		7425	59.14	-14.86	74	74.93	36.45	13.65	65.89	245	310	P	H
		7425	53.63	-0.37	54	69.42	36.45	13.65	65.89	245	310	A	H
		12375	59.8	-14.2	74	68.78	39.26	17.86	66.1	316	0	P	H
		12375	52.51	-1.49	54	61.49	39.26	17.86	66.1	316	0	A	H
		4950	48.78	-25.22	74	72.16	31.38	11.24	66	100	0	P	V
		7425	58.22	-15.78	74	74.02	36.44	13.65	65.89	112	301	P	V
		7425	52.13	-1.87	54	67.93	36.44	13.65	65.89	112	301	A	V
		12375	51.76	-22.24	74	61.28	38.72	17.86	66.1	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

ZigBee (LF)

Zigbee	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBµV/m)	Limit (dB)	Line (dBµV/m)	Level (dBµV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
ZigBee LF		30	22.18	-17.82	40	29.03	24.7	0.93	32.48	-	-	P	H
		105.66	22.11	-21.39	43.5	36.17	16.67	1.69	32.42	-	-	P	H
		132.82	25.64	-17.86	43.5	38.42	17.7	1.95	32.43	-	-	P	H
		186.17	20.11	-23.39	43.5	35.5	14.8	2.22	32.41	-	-	P	H
		782.72	30.54	-15.46	46	30.13	28.1	4.56	32.25	-	-	P	H
		915.61	32.51	-13.49	46	29.76	29.31	4.94	31.5	100	0	P	H
													H
													H
													H
													H
													H
													H
		30	25.68	-14.32	40	32.53	24.7	0.93	32.48	-	-	P	V
		37.76	25.48	-14.52	40	35.86	21.02	1.06	32.46	-	-	P	V
		57.16	26.97	-13.03	40	45.99	11.88	1.54	32.44	-	-	P	V
		124.09	28.88	-14.62	43.5	41.89	17.6	1.81	32.42	-	-	P	V
		703.18	28.06	-17.94	46	29.46	26.66	4.45	32.51	-	-	P	V
		959.26	34.19	-11.81	46	29.21	30.99	5.08	31.09	100	0	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

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

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		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. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path 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) + Path 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 Plots

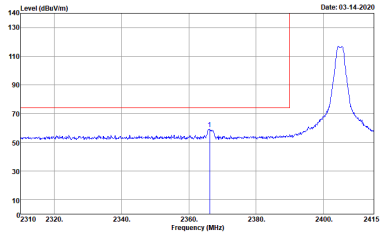
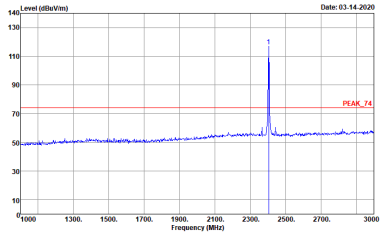
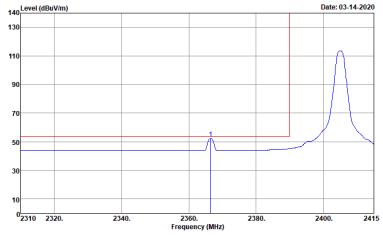
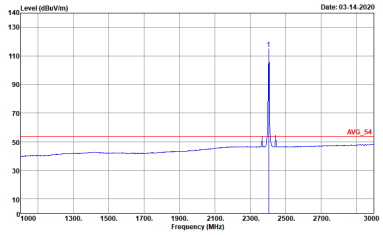
Test Engineer :	Calvin Wu, Leo Liu and Jacky Hong	**Temperature :**	19~22℃
		Relative Humidity :	36~45%

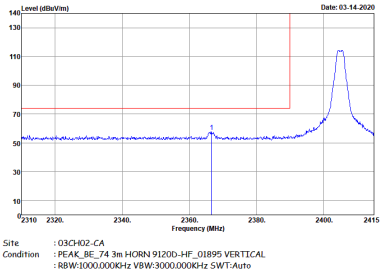
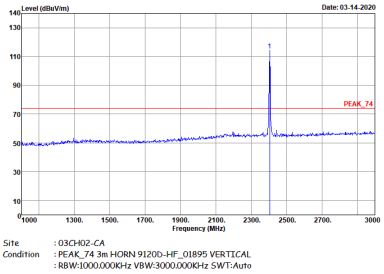
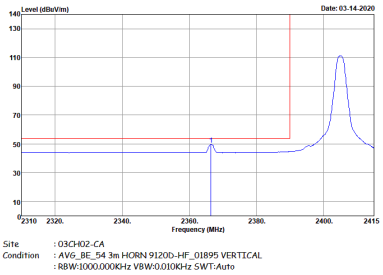
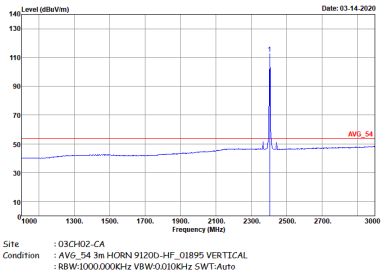
Note symbol

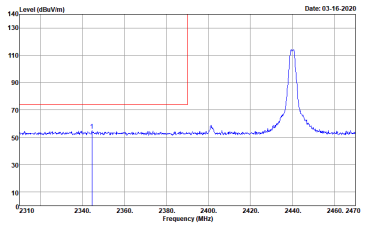
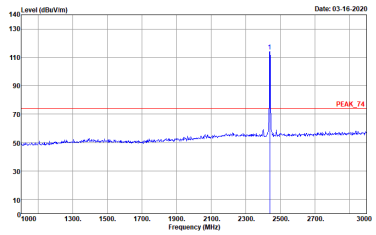
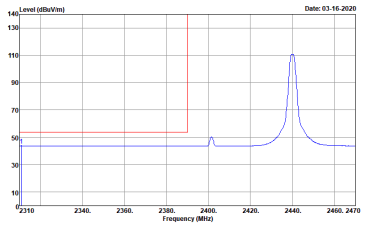
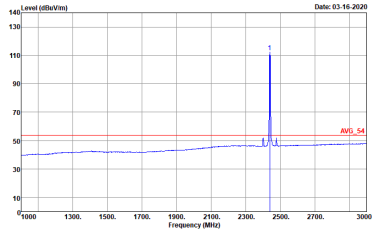
-L	**Low channel location**
-R	**High channel location**

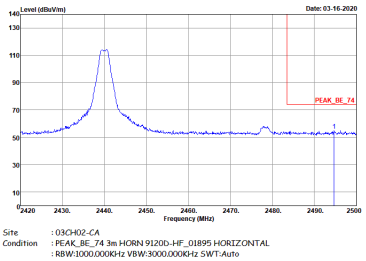
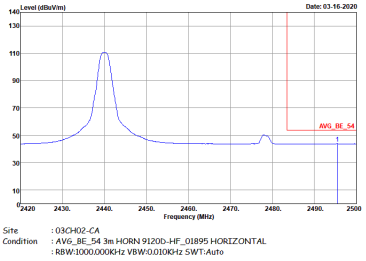
2.4GHz 2400~2483.5MHz

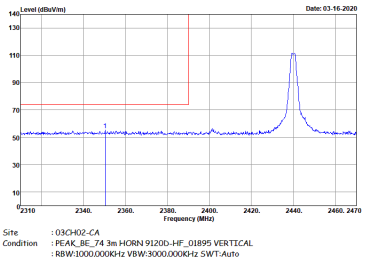
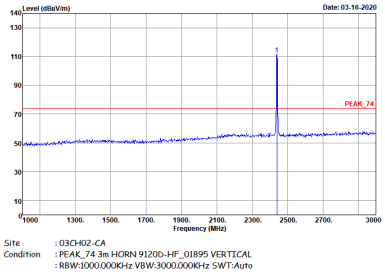
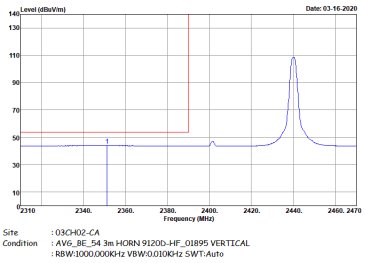
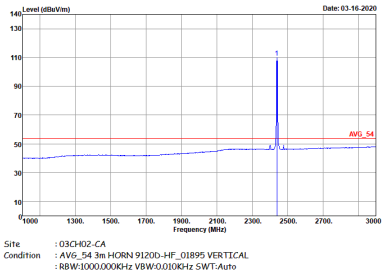
ZIGBEE (Band Edge @ 3m)

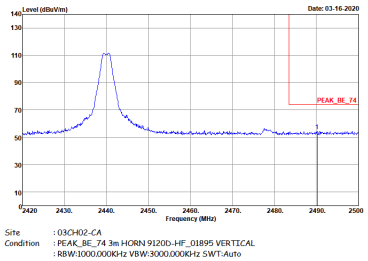
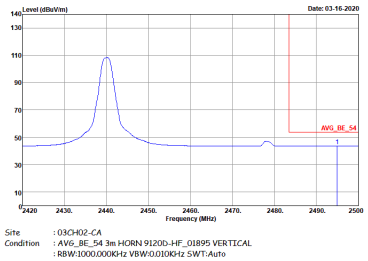
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH11 2405MHz	
	Horizontal	Fundamental
Peak		
Avg.		

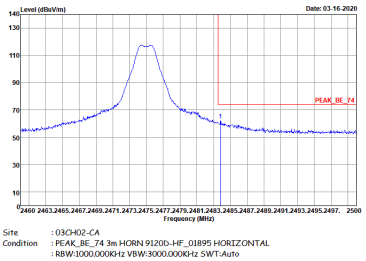
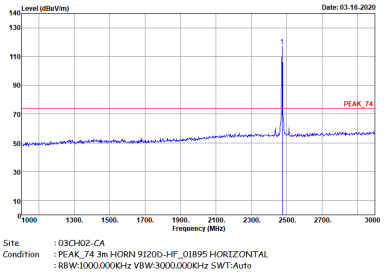
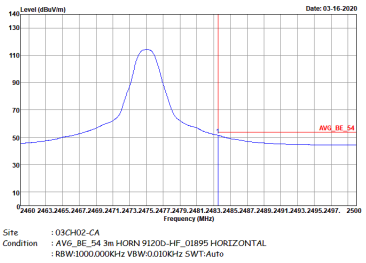
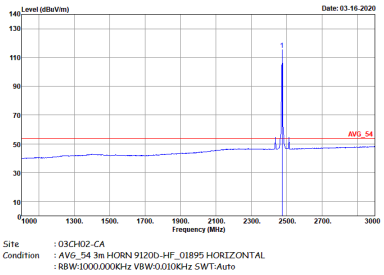
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH11 2405MHz	
	Vertical	Fundamental
Peak		
Avg		

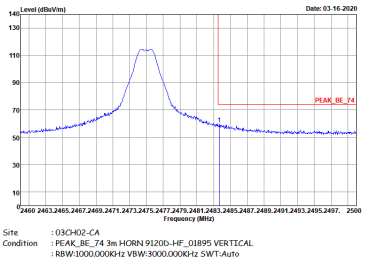
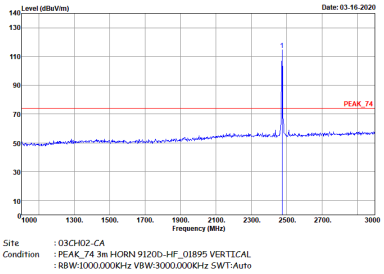
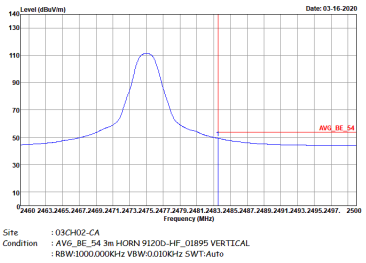
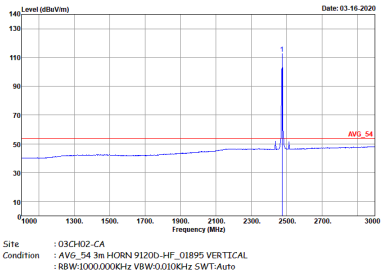
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH18 2440MHz - L	
	Horizontal	Fundamental
Peak	 Site : 03CH02-CA Condition : PEAK_8E_74 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH02-CA Condition : AVG_8E_54 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH02-CA Condition : AVG_54 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH18 2440MHz - R	
	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH18 2440MHz - L	
	Vertical	Fundamental
Peak		
Avg.		

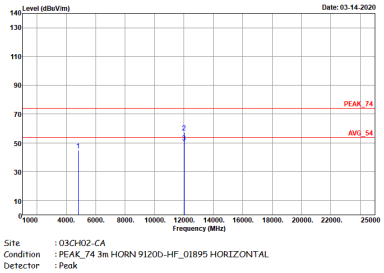
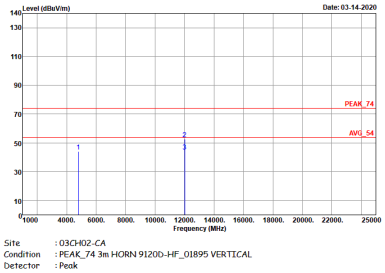
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH18 2440MHz - R	
	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

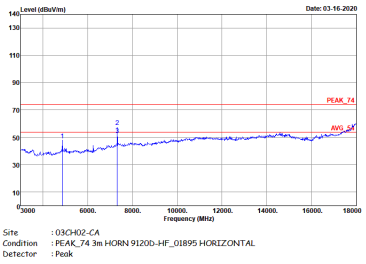
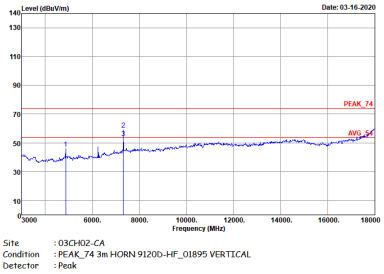
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH25 2475MHz	
	Horizontal	Fundamental
Peak		
Avg.		

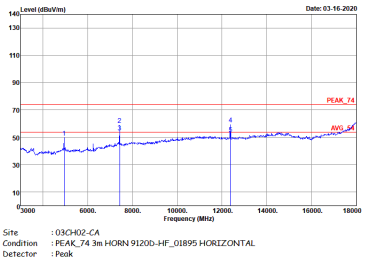
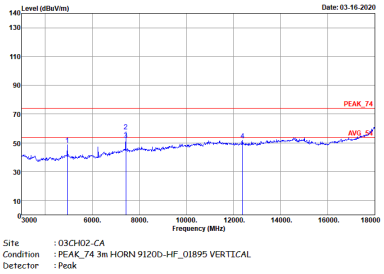
ZIGBEE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	ZIGBEE CH25 2475MHz	
	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

ZIGBEE (Harmonic @ 3m)

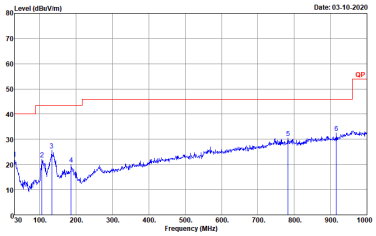
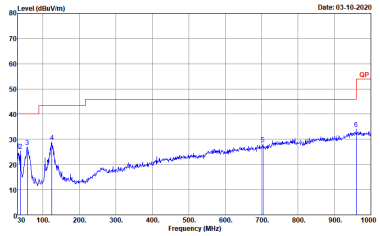
ZIGBEE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	ZIGBEE CH11 2405MHz	
	Horizontal	Vertical
Peak Avg.		

ZIGBEE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	ZIGBEE CH18 2440MHz	
	Horizontal	Vertical
Peak Avg.		

ZIGBEE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	ZIGBEE CH25 2475MHz	
	Horizontal	Vertical
Peak		

Emission below 1GHz

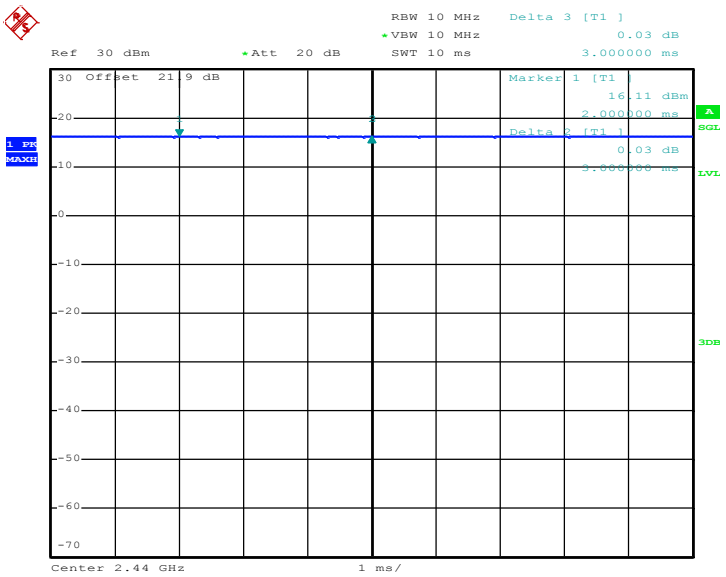
2.4GHz ZIGBEE (LF)

ZIGBEE	2.4GHz 2400~2483.5MHz	
	ZIGBEE LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH02-CA Condition : QP 3m BILOG 6111D-LF_50392 HORIZONTAL : RBW:120.000KHz VBW:300.000KHz SWT:0.500sec	 Site : 03CH02-CA Condition : QP 3m BILOG 6111D-LF_50392 VERTICAL : RBW:120.000KHz VBW:300.000KHz SWT:0.500sec

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
Zigbee	100	-	-	10Hz	0.00

Zigbee



Appendix F. External Subcontractors to Perform Testing Data

The test report as below presents all the Conducted test data, Receiver Radiated Emission, AC Conducted Emission for Idle Mode and Maximum Power Density performed by the subcontracted Sporton laboratory located in Taiwan.

NCC RADIO TEST REPORT

Equipment	:	**Wireless Access Point**
Brand Name	:	**Ruckus**
Model Name	:	**R550**
Applicant	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Manufacturer	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Standard	:	**NCC LP0002 (2018-01-10)**

The product was received on Mar. 20, 2020 and testing was started from Mar. 26, 2020 and completed on Mar. 26, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures NCC LP0002 (2018-01-10) and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Appendix A. Conducted Test Results

History of this test report

Report No.	Version	Description	Issued Date
TR021504B	01	Initial issue of report	May 07, 2020
TR021504B	02	1. Revise Antenna type information 2. Revise Carrier Frequency Channel 3. Add power setting information in section 2.2	Jun. 29, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 3.10.1.6 (2)(A)	6dB Bandwidth	Pass	-
3.1	-	99% Occupied Bandwidth	Reporting only	-
3.2	LP0002 3.10.1.2 (1)(C)	Output Power	Pass	-
3.3	LP0002 3.10.1.6 (2)(B)	Power Spectral Density	Pass	-
3.4	LP0002 3.10.1.5	Conducted Band Edges and Spurious Emission	Pass	-
3.5	LP0002 2.2 3.10.1.3 3.10.1.4	Antenna Requirement	Pass	-
3.6	LP0002 2.2 5.20.2	Maximum Power Density	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.

Reviewed by: Wii Chang

Report Producer: Yimin Ho

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and Zigbee

Product Specification subjective to this standard	
Antenna Type	WLAN (Brand Name: Ruckus / Model Name: A550h25br): <Ant. 1> Internal Antenna / 2.4GHz: -1.5dBi, 5GHz: -2.5dBi <Ant. 2> Internal Antenna / 2.4GHz: -0.5dBi, 5GHz: -1.5dBi Bluetooth (Brand Name: Ruckus / Model Name: IOT): Metal Antenna /1dBi Zigbee (Brand Name: Ruckus / Model Name: IOT): Metal Antenna / 1dBi

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

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

FCC designation No.: TW1190

1.4 Applicable Standards

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

- NCC LP0002 (2018-01-10)
- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02

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. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	11	2405	19	2445
	12	2410	20	2450
	13	2415	21	2455
	14	2420	22	2460
	15	2425	23	2465
	16	2430	24	2470
	17	2435	25	2475
	18	2440		

2.2 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	250 kbps / OQPSK
Conducted Test Cases	Mode 1: Zigbee Tx CH11_2405 MHz Mode 2: Zigbee Tx CH18_2440 MHz Mode 3: Zigbee Tx CH25_2475 MHz

Channel	Frequency (MHz)	Data Rate	Power Setting
		250 kbps	
CH 11	2405 MHz	19.60	20
CH 18	2440 MHz	16.40	17
CH 25	2475 MHz	19.20	20

2.3 EUT Operation Test Setup

The RF test items, utility “Putty” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.4 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 4.2 dB and 10dB attenuator.

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

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

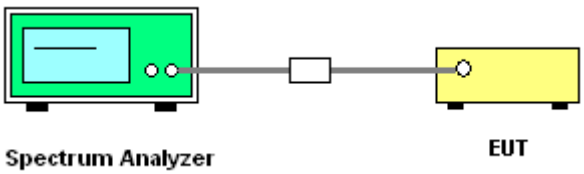
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
6. Measure and record the results in the test report.

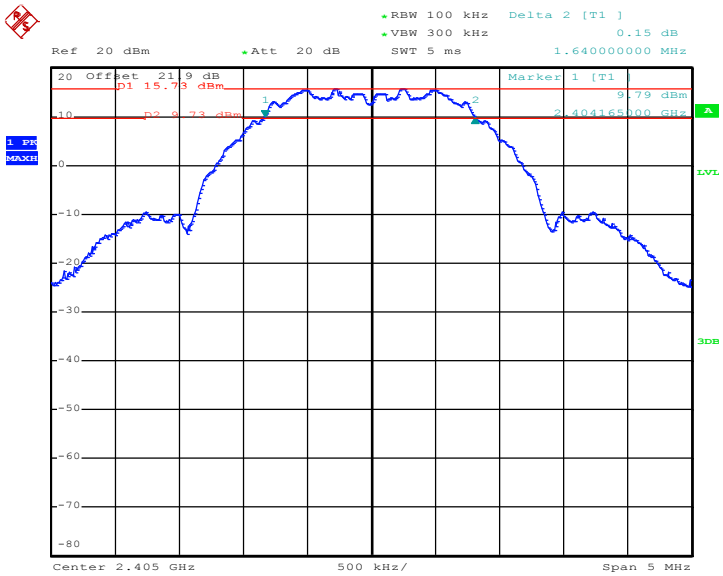
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

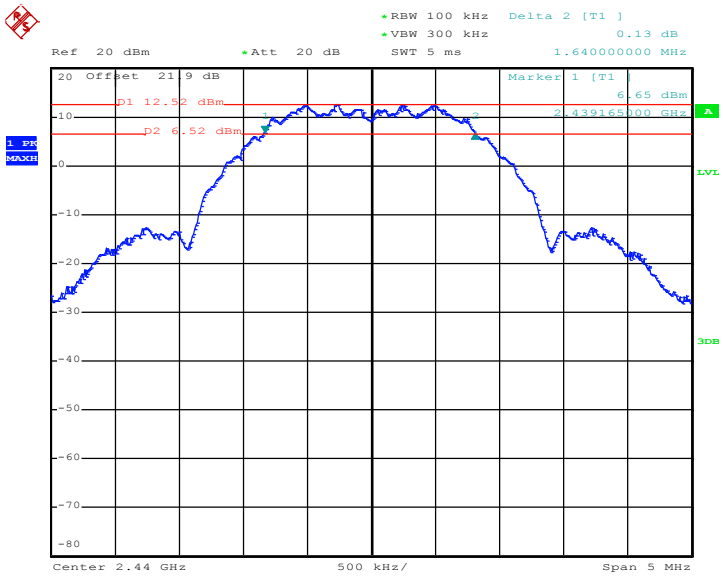
Please refer to Appendix A.

6 dB Bandwidth Plot on Channel 11



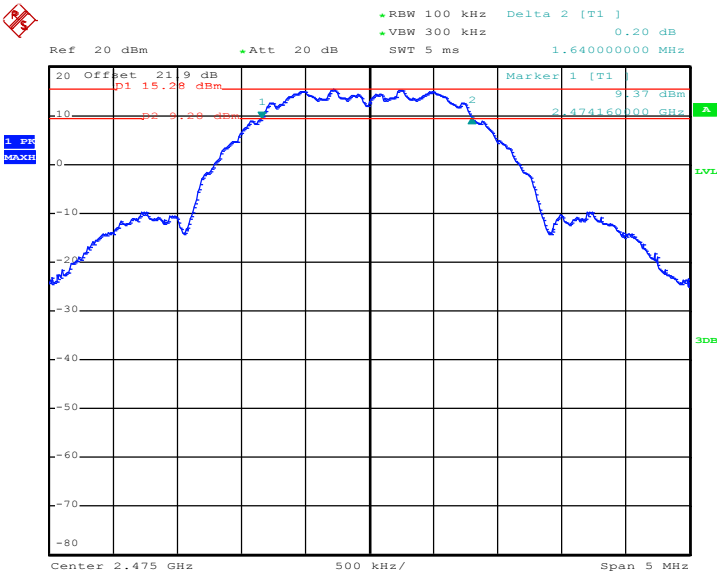
Date: 26.MAR.2020 21:35:00

6 dB Bandwidth Plot on Channel 18



Date: 26.MAR.2020 22:06:07

6 dB Bandwidth Plot on Channel 25

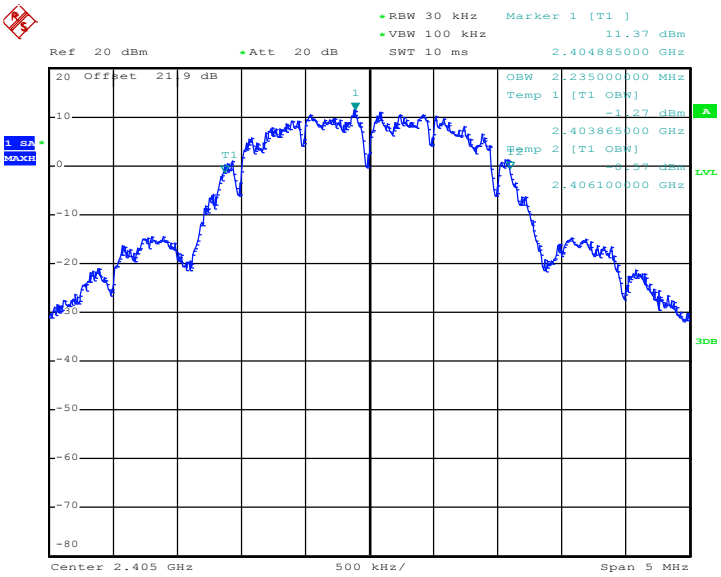


Date: 26.MAR.2020 21:48:21

3.1.6 Test Result of 99% Occupied Bandwidth

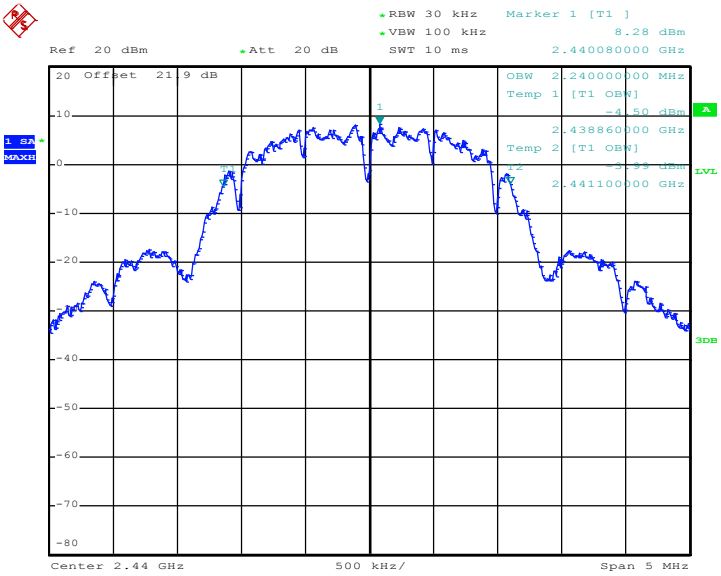
Please refer to Appendix A.

99% Bandwidth Plot on Channel 11



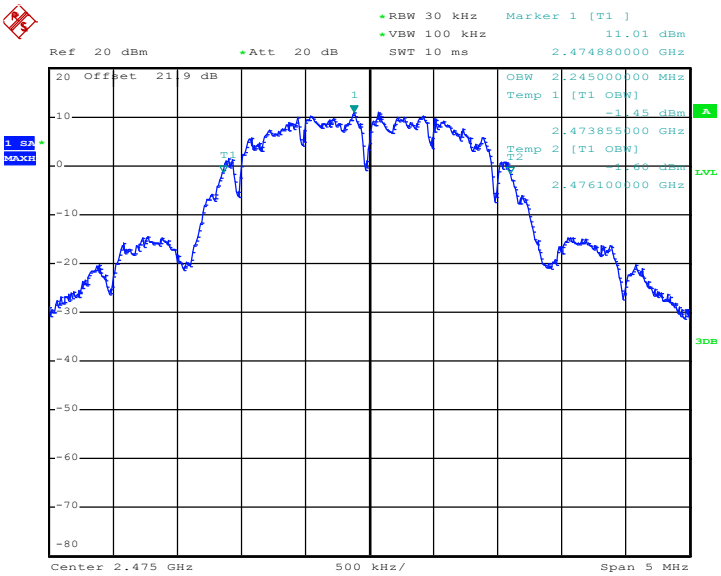
Date: 26.MAR.2020 21:33:06

99% Occupied Bandwidth Plot on Channel 18



Date: 26.MAR.2020 22:04:45

99% Occupied Bandwidth Plot on Channel 25



Date: 26.MAR.2020 21:51:56

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

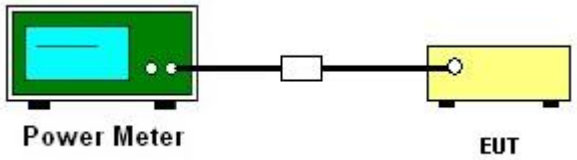
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

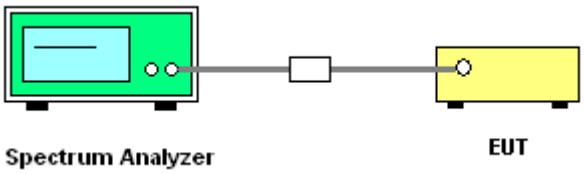
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup

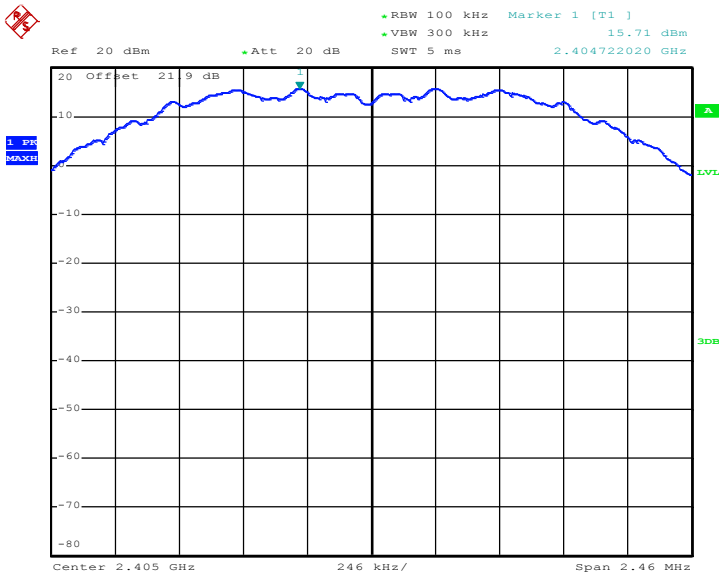


3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

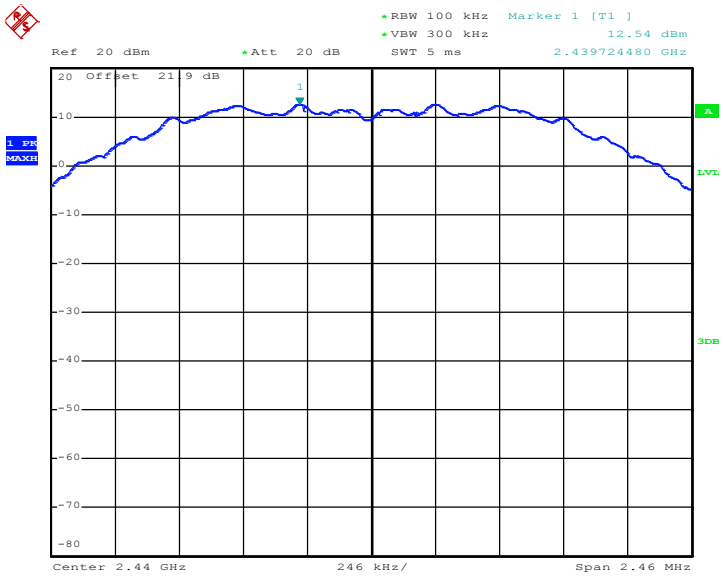
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 11



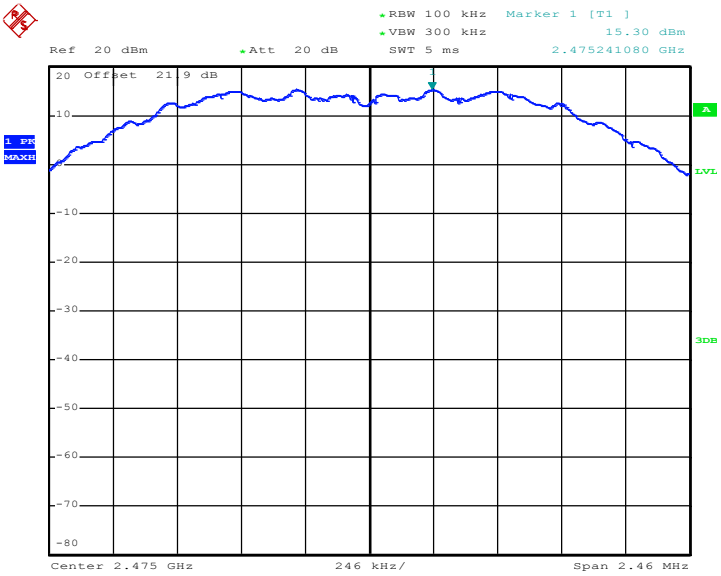
Date: 26.MAR.2020 21:36:40

PSD 100kHz Plot on Channel 18



Date: 26.MAR.2020 22:08:15

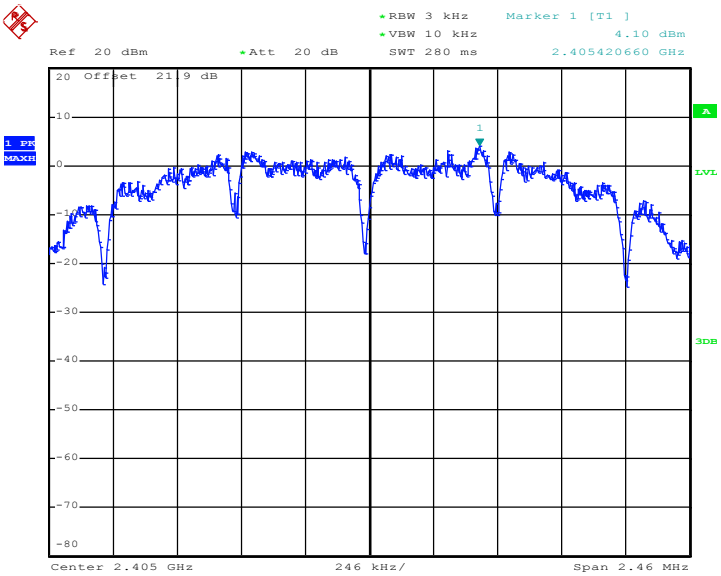
PSD 100kHz Plot on Channel 25



Date: 26.MAR.2020 21:49:23

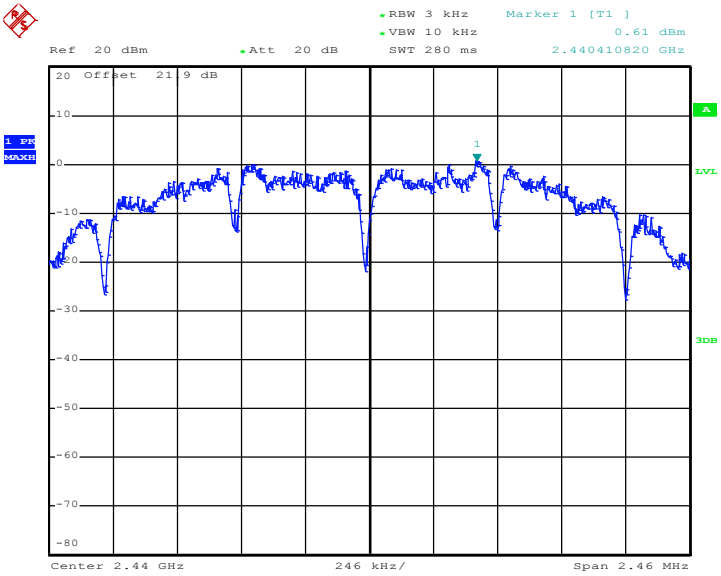
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 11



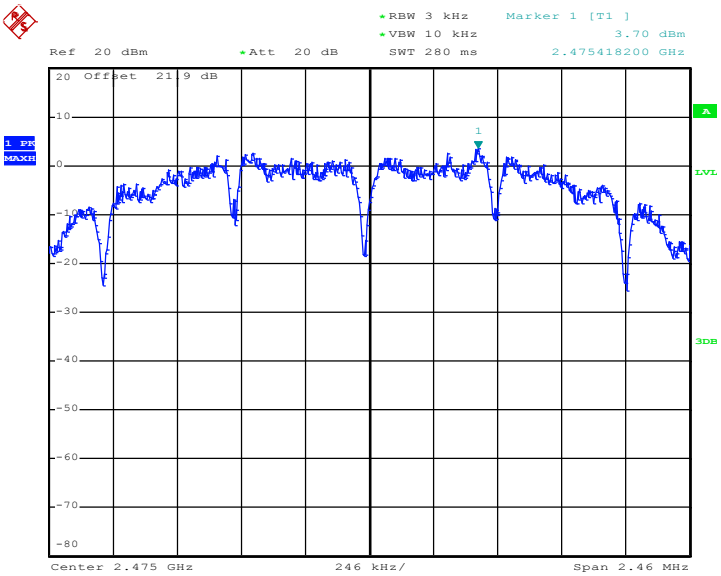
Date: 26.MAR.2020 21:36:00

PSD 3kHz Plot on Channel 18



Date: 26.MAR.2020 22:06:58

PSD 3kHz Plot on Channel 25



Date: 26.MAR.2020 21:48:47

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

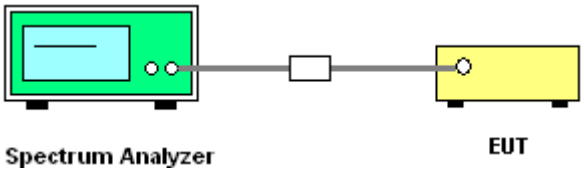
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedure

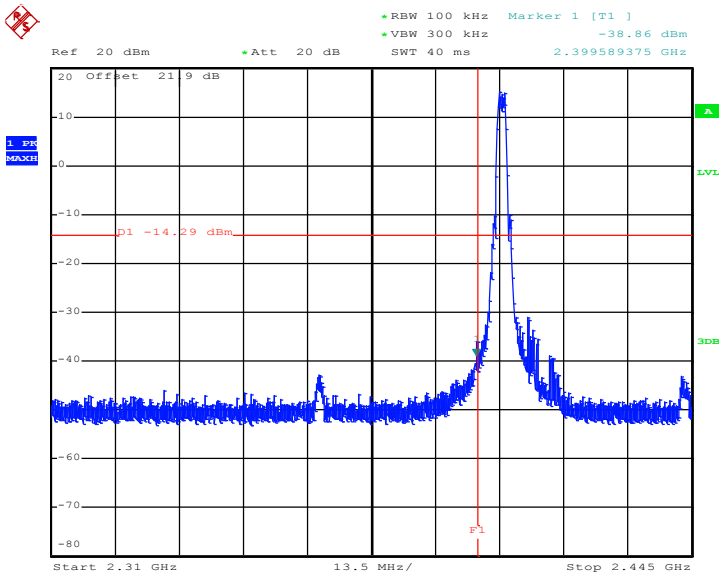
1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



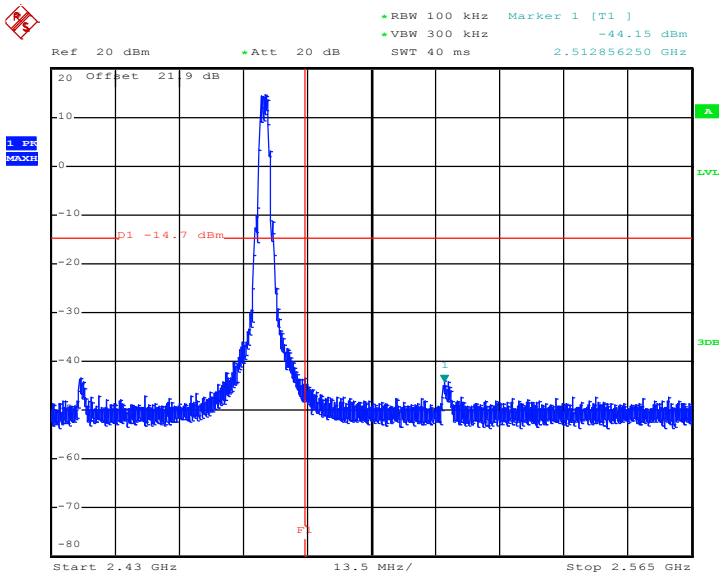
3.4.5 Test Result of Conducted Band Edges Plots

Low Band Edge Plot on Channel 11



Date: 26.MAR.2020 21:37:05

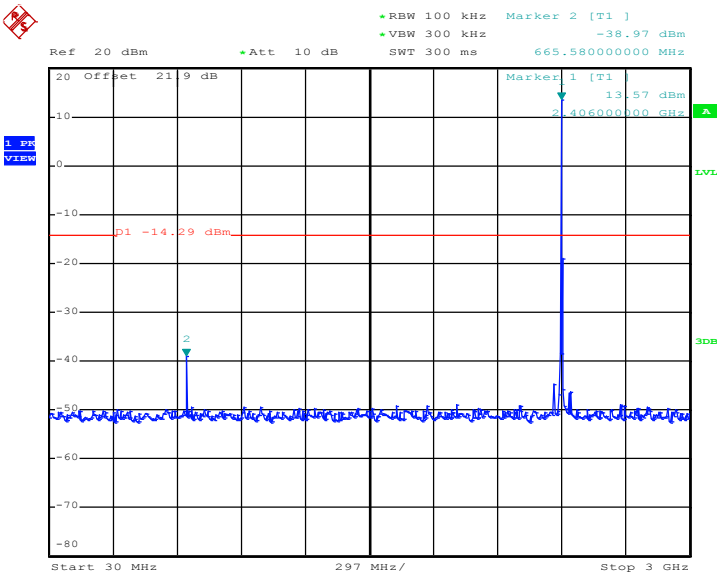
High Band Edge Plot on Channel 25



Date: 26.MAR.2020 21:49:46

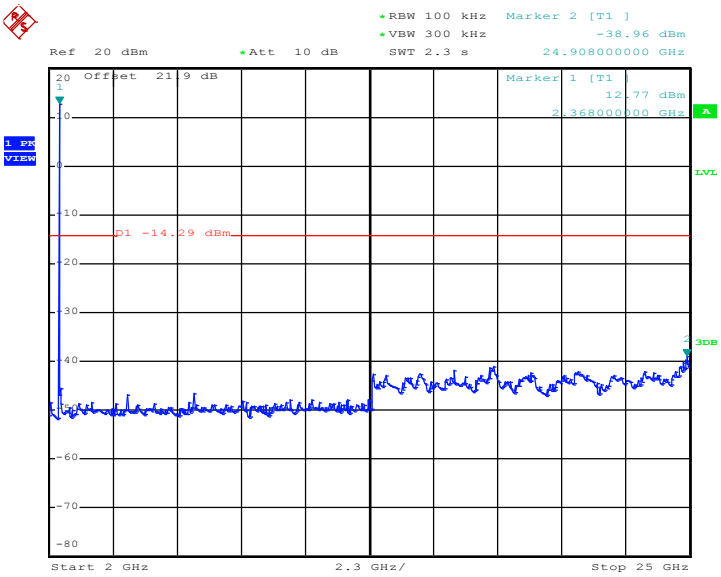
3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Zigbee Channel 11



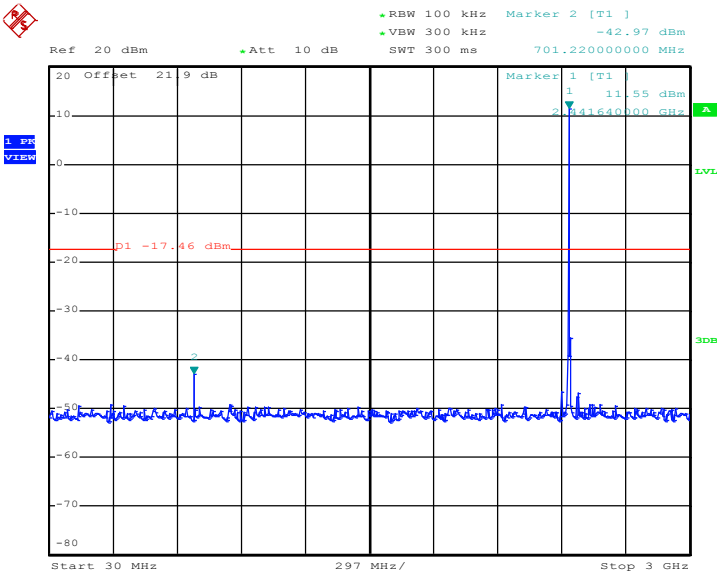
Date: 26.MAR.2020 21:37:23

Conducted Spurious Emission Plot on Zigbee Channel 11



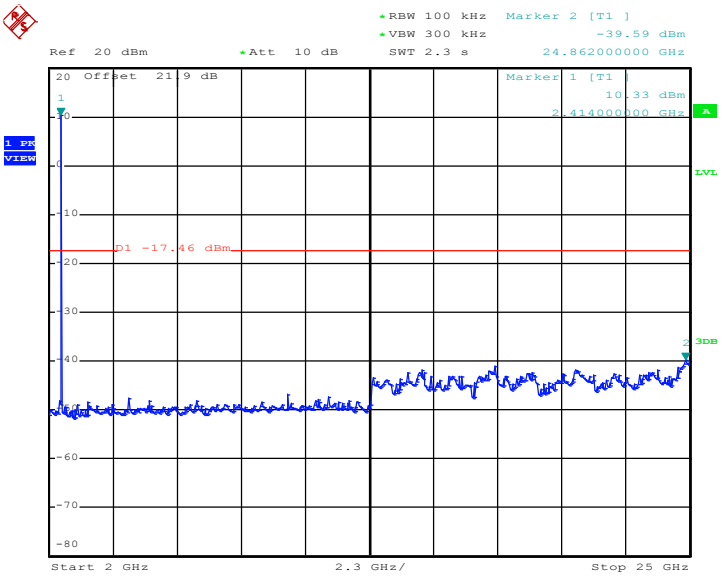
Date: 26.MAR.2020 21:37:41

Conducted Spurious Emission Plot on Zigbee Channel 18



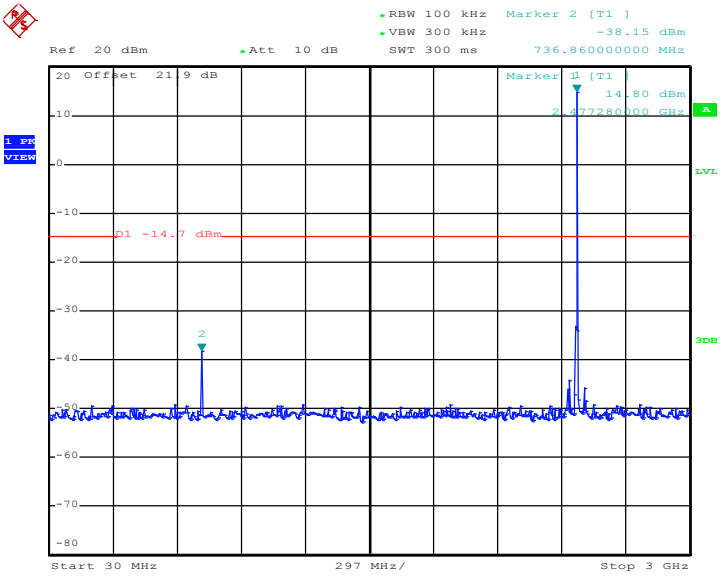
Date: 26.MAR.2020 22:09:35

Conducted Spurious Emission Plot on Zigbee Channel 18



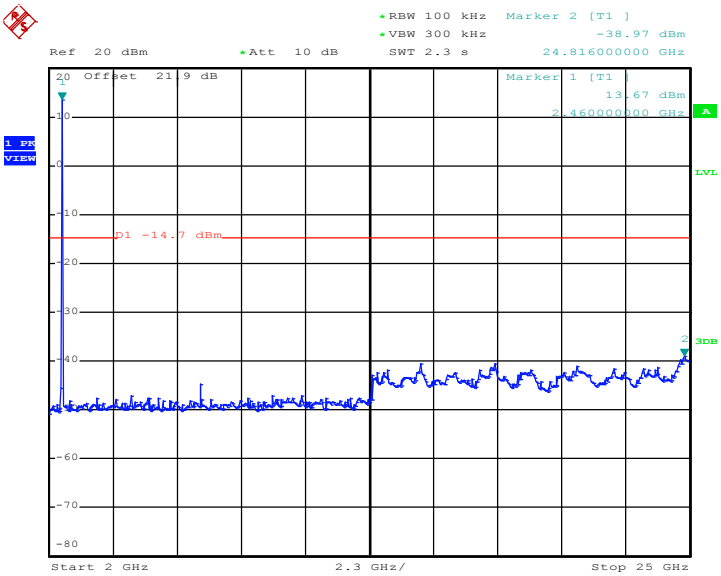
Date: 26.MAR.2020 22:09:55

Conducted Spurious Emission Plot on Zigbee Channel 25



Date: 26.MAR.2020 21:50:22

Conducted Spurious Emission Plot on Zigbee Channel 25



Date: 26.MAR.2020 21:51:26

3.5 Antenna Requirements

3.5.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the LP0002 Section 2.2, Section 3.10.1.3, and Section 3.10.1.4.

3.5.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.5.3 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.

3.6 Maximum Power Density

3.6.1 RF Exposure Limit Introduction

According to NCC LP0002, the criteria listed in Table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §5.20.2.1 and §5.20.2.2.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

3.6.2 Standalone Power Density Calculation

Maximum Power Density				
Max. Power	Gain	EIRP	20 cm PSD	Limit
19.6	1	20.6	0.0229	1
dBm	dBi	dBm	mW/cm^2	mW/cm^2

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H2	41410069	N/A	Jun. 17, 2019	Mar. 26, 2020	Jun. 16, 2020	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO10	10MHz~6GHz	Dec. 23, 2019	Mar. 26, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Jul. 15, 2019	Mar. 26, 2020	Jul. 14, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Aug. 14, 2019	Mar. 26, 2020	Aug. 13, 2020	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUMENT	ETF-1405-0	EC1900067	N/A	Aug. 15, 2019	Mar. 26, 2020	Aug. 14, 2020	Conducted (TH05-HY)

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kai Liao	Temperature:	21~25	°C
Test Date:	2020/3/26	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
Zigbee	250K	1	11	2405	2.235	1.640	0.50	Pass
Zigbee	250K	1	18	2440	2.240	1.640	0.50	Pass
Zigbee	250K	1	25	2475	2.245	1.640	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
Zigbee	250K	1	11	2405	19.60	30.00	1.00	20.60	36.00	Pass
Zigbee	250K	1	18	2440	16.40	30.00	1.00	17.40	36.00	Pass
Zigbee	250K	1	25	2475	19.20	30.00	1.00	20.20	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
Zigbee	250K	1	11	2405	15.71	4.10	1.00	8.00	Pass
Zigbee	250K	1	18	2440	12.54	0.61	1.00	8.00	Pass
Zigbee	250K	1	25	2475	15.30	3.70	1.00	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 30dBc limit.

THE END

NCC RADIO TEST REPORT

Equipment	:	**Wireless Access Point**
Brand Name	:	**Ruckus**
Model Name	:	**R550**
Applicant	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Manufacturer	:	**Ruckus Wireless Inc.** **350 W. Java Dr., Sunnyvale CA 94089 USA**
Standard	:	**NCC LP0002 (2018-01-10)**

The product was received on Mar. 20, 2020 and testing was started from Mar. 25, 2020 and completed on Apr. 08, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures NCC LP0002 (2018-01-10) and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Appendix A. AC Conducted Emission Test Result
Appendix B. Receiver Radiated Emission
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History of this test report

Report No.	Version	Description	Issued Date
TR021504C	01	Initial issue of report	May 07, 2020
TR021504C	02	Revise Antenna type information	Jun. 29, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 2.11	Receiver Radiated Emission	Pass	Under limit 0.09 dB at 55.220 MHz
3.2	LP0002 2.3	AC Conducted Emission	Pass	Under limit 3.05 dB at 0.465 MHz

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.

Reviewed by: Wii Chang

Report Producer: Dara Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and Zigbee.

Product Specification subjective to this standard	
Antenna Type	WLAN (Brand Name: Ruckus / Model Name: A550h25br): <Ant. 1> Internal Antenna / 2.4GHz: -1.5dBi, 5GHz: -2.5dBi <Ant. 2> Internal Antenna / 2.4GHz: -0.5dBi, 5GHz: -1.5dBi Bluetooth (Brand Name: Ruckus / Model Name: IOT): Metal Antenna /1dBi Zigbee (Brand Name: Ruckus / Model Name: IOT): Metal Antenna / 1dBi

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY

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

FCC designation No.: TW1190

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH16-HY

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

FCC designation No.: TW0007

1.4 Applicable Standards

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

- NCC LP0002 (2018-01-10)
- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- 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. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Test Cases	
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + Zigbee Idle + Adapter + LAN Link Mode 2: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + Zigbee Idle + PoE + LAN Link Mode 3: Bluetooth-LE RX + PoE + LAN Link
Receiver Radiated Emission	Mode 1: WLAN (2.4GHz) Rx + WLAN (5GHz) Rx + Zigbee Rx + Adapter + LAN Link Mode 2: WLAN (2.4GHz) Rx + WLAN (5GHz) Rx + Zigbee Rx + PoE + LAN Link Mode 3: Bluetooth-LE Rx + PoE + LAN Link

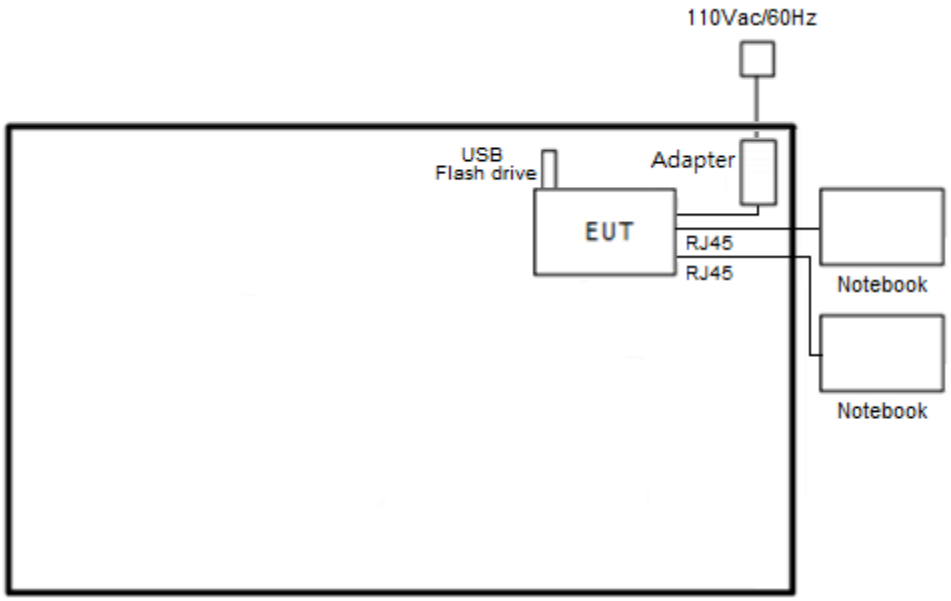
Remark:

1. The worst case of AC is mode 2; only the test data of this mode was reported.

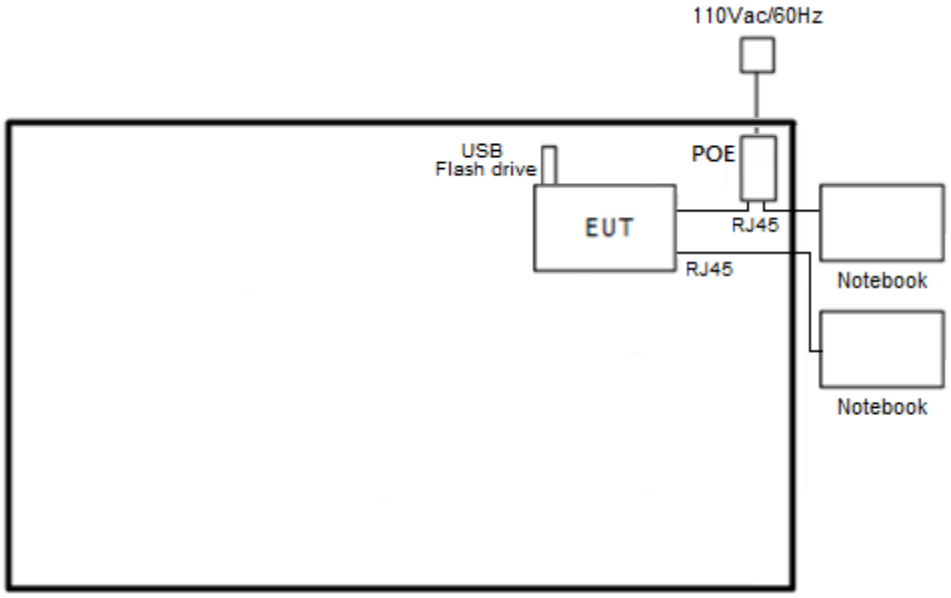
2. The worst case of RE is mode 3; only the test data of this mode was reported.

2.2 Connection Diagram of Test System

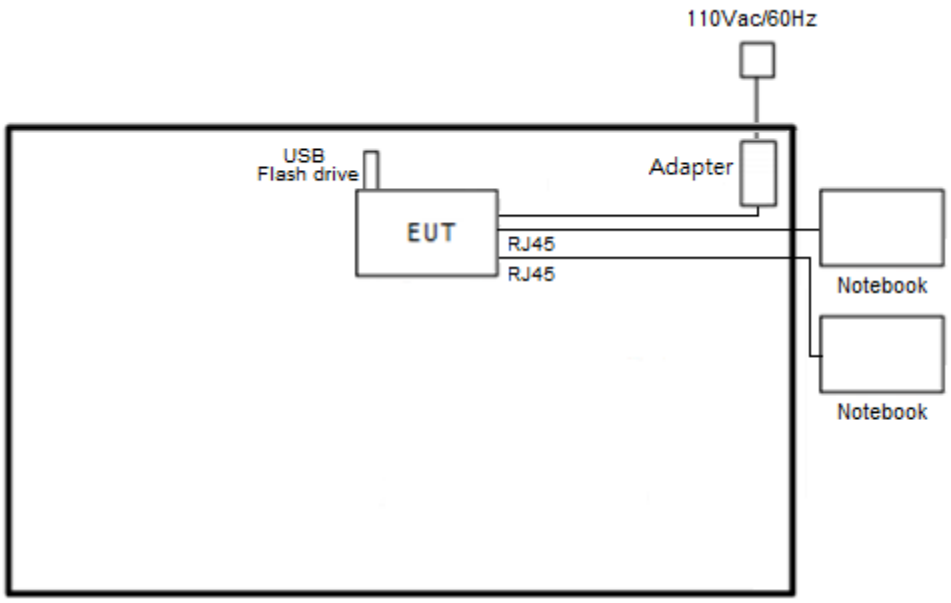
<AC Conducted Emission with Adapter Mode>



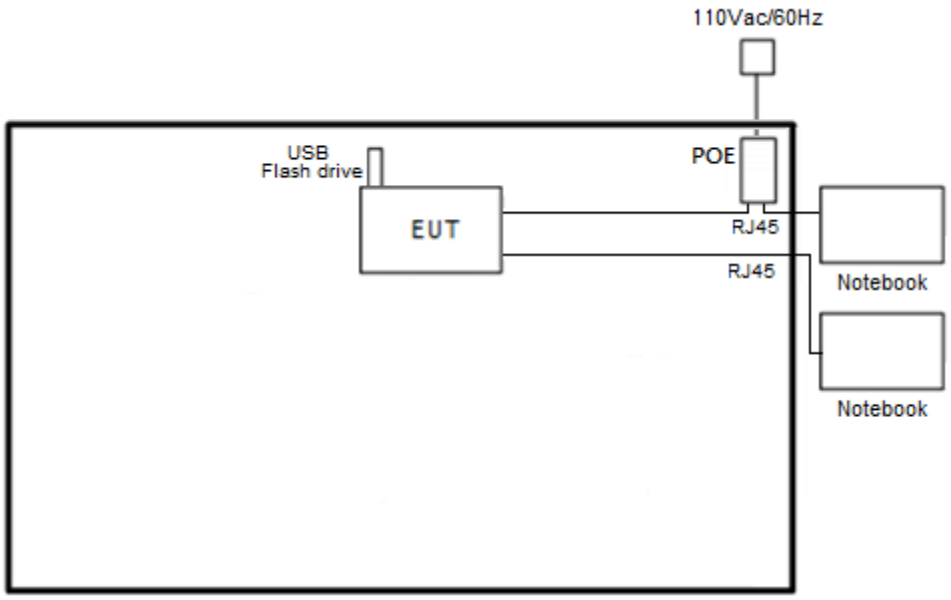
<AC Conducted Emission with PoE Mode>



<Receiver Radiated Emission with Adapter Mode>



<Receiver Radiated Emission with PoE Mode>



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	DELL	Latitude 5480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	Lenovo	L570	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	USB Flash Drive	Kingston	DTDUO3C	FCC DoC	N/A	N/A
5.	Adapter	Ruckus Wireless Inc.	APH-5020	N/A	N/A	N/A
6.	PoE Adapter	Ruckus Wireless Inc.	N/A	N/A	N/A	N/A

Remark: Applicant has ensured accessory would not be attached with the product on the market, accessory is provided by lab or applicant for testing.

2.4 EUT Operation Test Setup

The RF test items, utility “Putty” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous receiver signals.

3 Test Result

3.1 Receiver Radiated Emission Measurement

3.1.1 Limit of Receiver Radiated Emission

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

3.1.2 Measuring Instruments

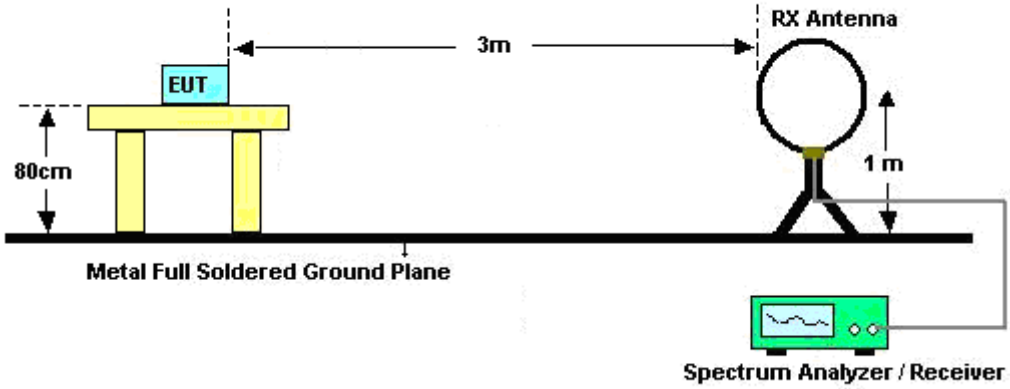
See list of measuring equipment of this test report.

3.1.3 Test Procedures

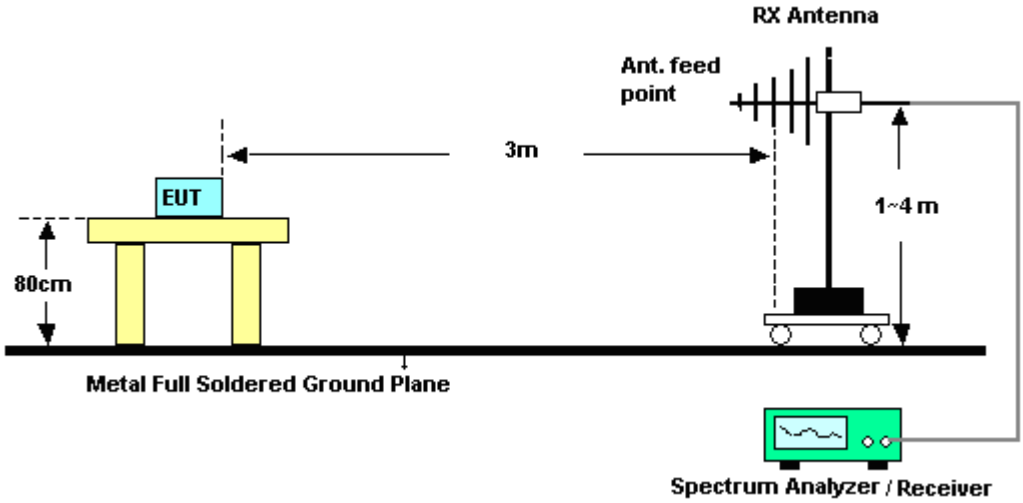
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to 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 tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.1.4 Test Setup

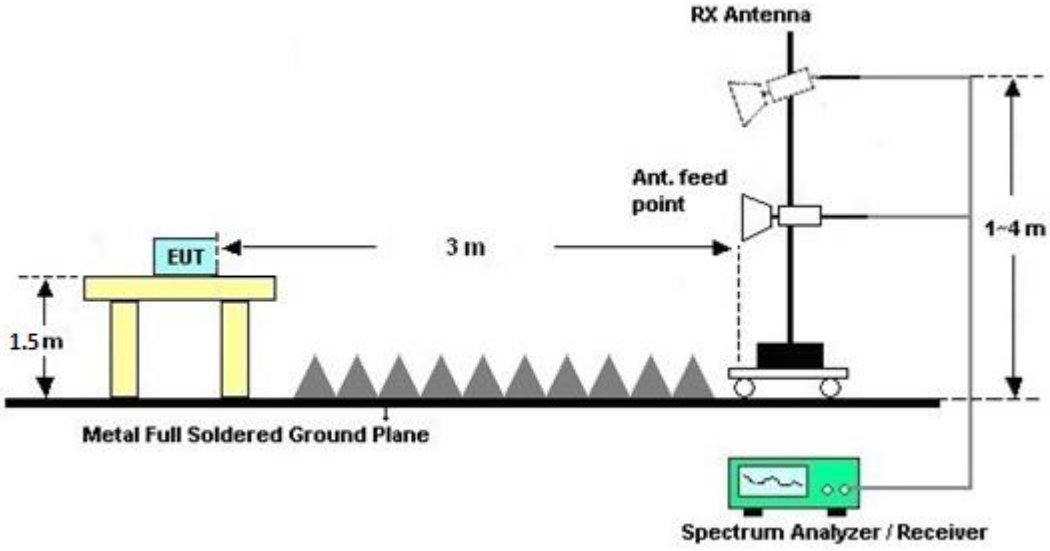
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 Test Result of Receiver Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.1.6 Test Result

Please refer to Appendix B.

3.2 AC Conducted Emission Measurement

3.2.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

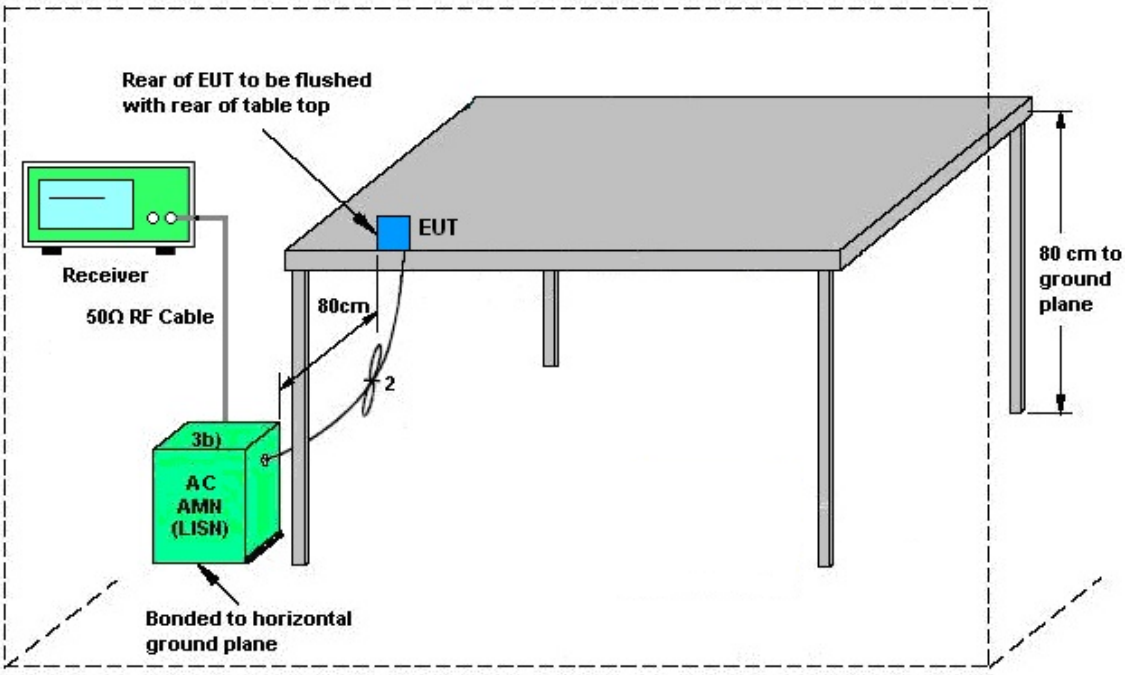
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it 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 (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.2.4 Test Setup



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

3.2.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Dec. 26, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Dec. 25, 2020	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL6111D&00802N1D01N-06	47020&06	30MHz to 1GHz	Oct. 13, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Oct. 12, 2020	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Sep. 19, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Sep. 18, 2020	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 14, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	May 13, 2020	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1000MHz	Oct. 01, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Sep. 30, 2020	Radiation (03CH16-HY)
Preamplifier	Jet-Power	JPA0118-55-303	17100018000 55007	1GHz~18GHz	Apr. 01, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Mar. 31, 2020	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 11, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Dec. 10, 2020	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 13, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Dec. 12, 2020	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY57290111	3Hz~26.5GHz	Dec. 05, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Dec. 04, 2020	Radiation (03CH16-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 29, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Apr. 28, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4PE	NA	Aug. 30, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Aug. 29, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4PE	NA	Aug. 30, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Aug. 29, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5757	NA	Aug. 30, 2019	Mar. 27, 2020 ~ Mar. 28, 2020	Aug. 29, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 25, 2020	Mar. 27, 2020 ~ Mar. 28, 2020	Feb. 24, 2021	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 25, 2020	Mar. 27, 2020 ~ Mar. 28, 2020	Feb. 24, 2021	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Mar. 27, 2020 ~ Mar. 28, 2020	N/A	Radiation (03CH16-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 25, 2020 ~ Apr. 08, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Mar. 25, 2020 ~ Apr. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 07, 2019	Mar. 25, 2020 ~ Apr. 08, 2020	Nov. 06, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Mar. 25, 2020 ~ Apr. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Mar. 25, 2020 ~ Apr. 08, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Mar. 25, 2020 ~ Apr. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Mar. 25, 2020 ~ Apr. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.3

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.7

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.9

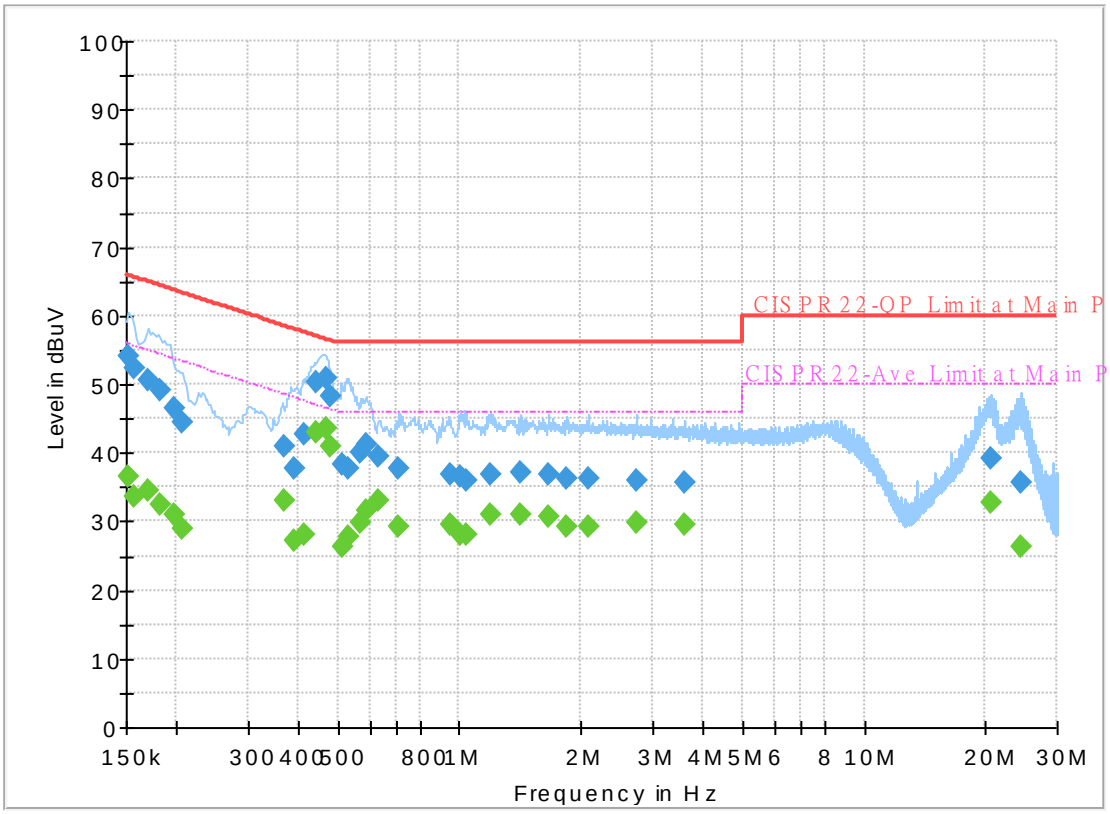
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Howard Huang	**Temperature :**	21~25℃
		Relative Humidity :	42~50%

EUT Information

Report NO :	021504
Test Mode :	Mode 2
Test Voltage :	110Vac/60Hz
Phase :	Line

Full Spectrum



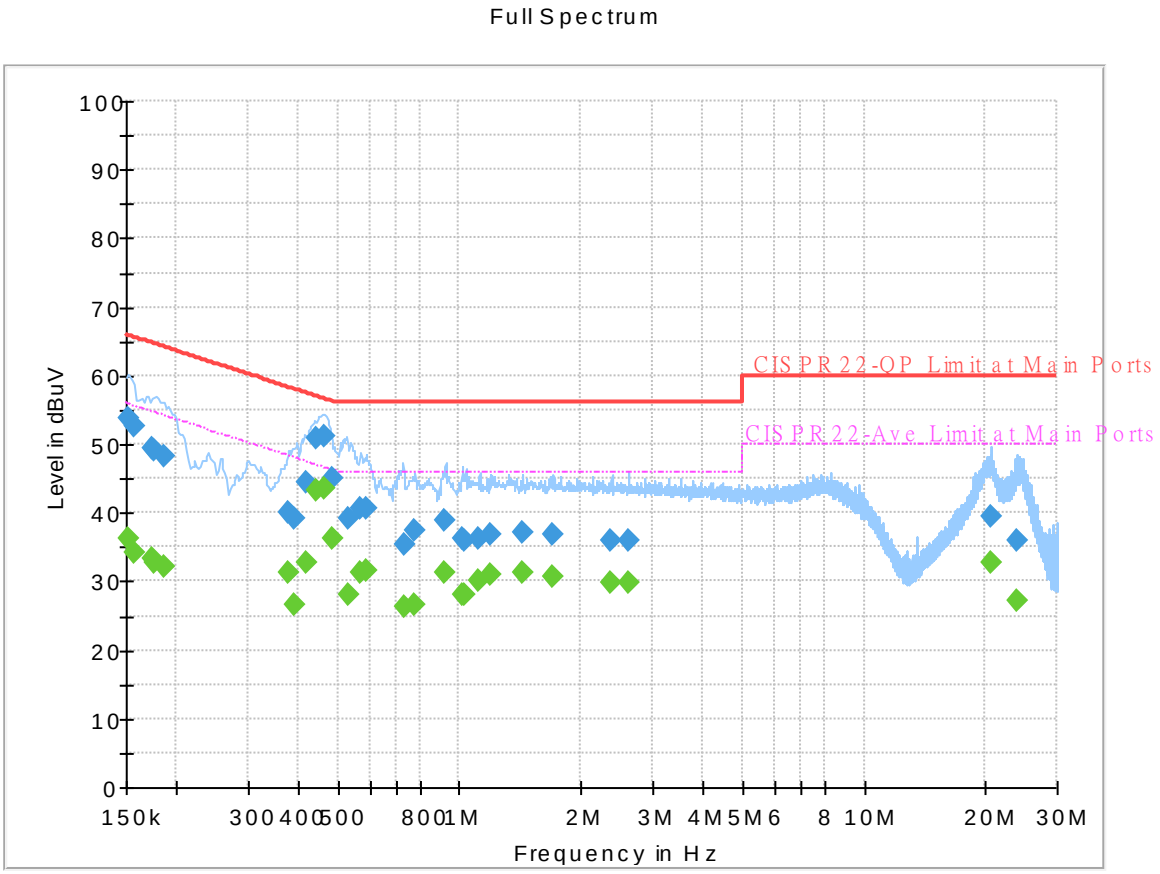
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152160	54.18	---	65.88	11.70	L1	OFF	19.5
0.152160	---	36.49	55.88	19.39	L1	OFF	19.5
0.157470	52.35	---	65.60	13.25	L1	OFF	19.5
0.157470	---	33.72	55.60	21.88	L1	OFF	19.5
0.170340	50.58	---	64.94	14.36	L1	OFF	19.5
0.170340	---	34.38	54.94	20.56	L1	OFF	19.5
0.181050	49.15	---	64.44	15.29	L1	OFF	19.5
0.181050	---	32.57	54.44	21.87	L1	OFF	19.5
0.196980	46.56	---	63.74	17.18	L1	OFF	19.5
0.196980	---	30.95	53.74	22.79	L1	OFF	19.5
0.207150	44.39	---	63.32	18.93	L1	OFF	19.5
0.207150	---	28.87	53.32	24.45	L1	OFF	19.5
0.367710	40.89	---	58.55	17.66	L1	OFF	19.5
0.367710	---	33.17	48.55	15.38	L1	OFF	19.5
0.388500	37.66	---	58.10	20.44	L1	OFF	19.5
0.388500	---	27.19	48.10	20.91	L1	OFF	19.5
0.413610	42.63	---	57.58	14.95	L1	OFF	19.5
0.413610	---	28.20	47.58	19.38	L1	OFF	19.5
0.442140	50.34	---	57.02	6.68	L1	OFF	19.5
0.442140	---	42.95	47.02	4.07	L1	OFF	19.5
0.467250	50.77	---	56.56	5.79	L1	OFF	19.5

0.467250	---	43.48	46.56	3.08	L1	OFF	19.5
0.478500	48.39	---	56.37	7.98	L1	OFF	19.5
0.478500	---	41.05	46.37	5.32	L1	OFF	19.5
0.514500	38.40	---	56.00	17.60	L1	OFF	19.5
0.514500	---	26.34	46.00	19.66	L1	OFF	19.5
0.531780	37.69	---	56.00	18.31	L1	OFF	19.5
0.531780	---	27.91	46.00	18.09	L1	OFF	19.5
0.566250	40.06	---	56.00	15.94	L1	OFF	19.5
0.566250	---	29.97	46.00	16.03	L1	OFF	19.5
0.587850	41.17	---	56.00	14.83	L1	OFF	19.5
0.587850	---	31.58	46.00	14.42	L1	OFF	19.5
0.632670	39.49	---	56.00	16.51	L1	OFF	19.5
0.632670	---	33.09	46.00	12.91	L1	OFF	19.5
0.705750	37.59	---	56.00	18.41	L1	OFF	19.5
0.705750	---	29.38	46.00	16.62	L1	OFF	19.5
0.945150	36.86	---	56.00	19.14	L1	OFF	19.5
0.945150	---	29.55	46.00	16.45	L1	OFF	19.5
1.008870	36.42	---	56.00	19.58	L1	OFF	19.5
1.008870	---	28.16	46.00	17.84	L1	OFF	19.5
1.036500	35.83	---	56.00	20.17	L1	OFF	19.5
1.036500	---	28.08	46.00	17.92	L1	OFF	19.5
1.187250	36.92	---	56.00	19.08	L1	OFF	19.6
1.187250	---	31.03	46.00	14.97	L1	OFF	19.6
1.419270	37.05	---	56.00	18.95	L1	OFF	19.6
1.419270	---	31.04	46.00	14.96	L1	OFF	19.6
1.664250	36.84	---	56.00	19.16	L1	OFF	19.6
1.664250	---	30.62	46.00	15.38	L1	OFF	19.6
1.836150	36.22	---	56.00	19.78	L1	OFF	19.6
1.836150	---	29.10	46.00	16.90	L1	OFF	19.6
2.080500	36.26	---	56.00	19.74	L1	OFF	19.6
2.080500	---	29.34	46.00	16.66	L1	OFF	19.6
2.727780	35.94	---	56.00	20.06	L1	OFF	19.6
2.727780	---	29.81	46.00	16.19	L1	OFF	19.6
3.621750	35.67	---	56.00	20.33	L1	OFF	19.6
3.621750	---	29.64	46.00	16.36	L1	OFF	19.6
20.600250	39.23	---	60.00	20.77	L1	OFF	19.8
20.600250	---	32.63	50.00	17.37	L1	OFF	19.8
24.425520	35.75	---	60.00	24.25	L1	OFF	19.8
24.425520	---	26.28	50.00	23.72	L1	OFF	19.8

EUT Information

Report NO :	021504
Test Mode :	Mode 2
Test Voltage :	110Vac/60Hz
Phase :	Neutral



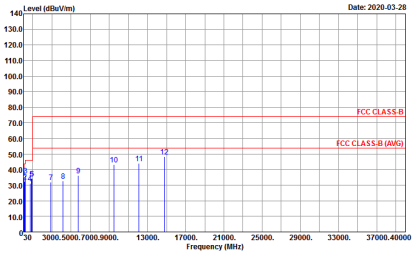
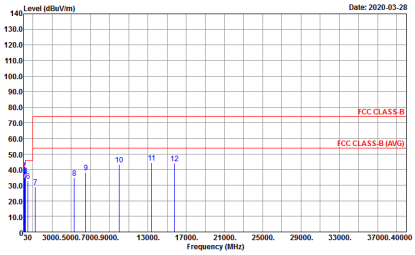
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.151350	---	36.38	55.93	19.55	N	OFF	19.5
0.151350	53.76	---	65.93	12.17	N	OFF	19.5
0.156750	---	34.36	55.63	21.27	N	OFF	19.5
0.156750	52.64	---	65.63	12.99	N	OFF	19.5
0.173760	---	33.45	54.78	21.33	N	OFF	19.5
0.173760	49.29	---	64.78	15.49	N	OFF	19.5
0.176190	---	32.86	54.66	21.80	N	OFF	19.5
0.176190	48.98	---	64.66	15.68	N	OFF	19.5
0.186000	---	32.14	54.21	22.07	N	OFF	19.5
0.186000	48.33	---	64.21	15.88	N	OFF	19.5
0.376170	---	31.30	48.36	17.06	N	OFF	19.5
0.376170	40.14	---	58.36	18.22	N	OFF	19.5
0.390750	---	26.48	48.05	21.57	N	OFF	19.5
0.390750	39.23	---	58.05	18.82	N	OFF	19.5
0.420000	---	32.70	47.45	14.75	N	OFF	19.5
0.420000	44.34	---	57.45	13.11	N	OFF	19.5
0.443940	---	43.24	46.99	3.75	N	OFF	19.5
0.443940	50.73	---	56.99	6.26	N	OFF	19.5
0.465000	---	43.55	46.60	3.05	N	OFF	19.5
0.465000	51.22	---	56.60	5.38	N	OFF	19.5
0.487500	---	36.13	46.21	10.08	N	OFF	19.5

0.487500	44.91	---	56.21	11.30	N	OFF	19.5
0.531420	---	28.16	46.00	17.84	N	OFF	19.5
0.531420	39.10	---	56.00	16.90	N	OFF	19.5
0.567420	---	31.18	46.00	14.82	N	OFF	19.5
0.567420	40.77	---	56.00	15.23	N	OFF	19.5
0.591900	---	31.58	46.00	14.42	N	OFF	19.5
0.591900	40.72	---	56.00	15.28	N	OFF	19.5
0.729780	---	26.43	46.00	19.57	N	OFF	19.5
0.729780	35.32	---	56.00	20.68	N	OFF	19.5
0.775770	---	26.56	46.00	19.44	N	OFF	19.6
0.775770	37.33	---	56.00	18.67	N	OFF	19.6
0.919950	---	31.38	46.00	14.62	N	OFF	19.6
0.919950	38.81	---	56.00	17.19	N	OFF	19.6
1.020750	---	28.12	46.00	17.88	N	OFF	19.6
1.020750	36.32	---	56.00	19.68	N	OFF	19.6
1.032990	---	28.16	46.00	17.84	N	OFF	19.6
1.032990	36.02	---	56.00	19.98	N	OFF	19.6
1.117500	---	30.10	46.00	15.90	N	OFF	19.6
1.117500	36.22	---	56.00	19.78	N	OFF	19.6
1.198590	---	30.90	46.00	15.10	N	OFF	19.6
1.198590	36.79	---	56.00	19.21	N	OFF	19.6
1.437000	---	31.19	46.00	14.81	N	OFF	19.6
1.437000	37.08	---	56.00	18.92	N	OFF	19.6
1.702770	---	30.66	46.00	15.34	N	OFF	19.6
1.702770	36.72	---	56.00	19.28	N	OFF	19.6
2.373000	---	29.87	46.00	16.13	N	OFF	19.6
2.373000	36.05	---	56.00	19.95	N	OFF	19.6
2.619240	---	29.80	46.00	16.20	N	OFF	19.6
2.619240	35.98	---	56.00	20.02	N	OFF	19.6
20.541480	---	32.84	50.00	17.16	N	OFF	19.9
20.541480	39.47	---	60.00	20.53	N	OFF	19.9
23.869500	---	27.24	50.00	22.76	N	OFF	20.0
23.869500	35.90	---	60.00	24.10	N	OFF	20.0

Appendix B. Receiver Radiated Emission Measurement

Test Engineer :	Andy Yang	**Temperature :**	20~25°C
		Relative Humidity :	50~60%
Frequency	55.220 MHz	**Margin**	Under 0.09 dB
Test Mode	Bluetooth-LE Rx + PoE + LAN Link		

	Horizontal	Vertical
Peak **Avg.**	 Site : 03CH16-HY Condition : FCC CLASS-B 3m 9120D_1522 HORIZONTAL Detector : Peak Project : 021504 (Freq, Level, Over Limit, Limit Line, ReadAntenna Level, Factor, Cable Loss, Preamp Factor, A/Pos, T/Pos, Remark) 1 90.14 34.70 -8.80 43.50 50.77 14.61 1.59 32.29 100 0 Peak 2 168.71 32.45 -11.05 43.50 46.77 15.69 2.19 32.30 --- --- Peak 3 250.19 36.27 -9.73 46.00 47.26 18.58 2.70 32.34 --- --- Peak 4 711.91 31.36 -14.64 46.00 32.32 26.64 4.45 32.18 --- --- Peak 5 874.87 34.12 -11.88 46.00 32.04 29.02 4.93 32.03 --- --- Peak 6 932.10 34.22 -11.78 46.00 30.60 29.90 5.09 31.54 --- --- Peak 7 2908.00 31.81 -42.19 74.00 55.33 28.40 9.05 60.97 --- --- Peak 8 4180.00 32.62 -41.38 74.00 51.47 29.82 11.07 59.74 --- --- Peak 9 5758.00 36.39 -37.61 74.00 50.46 32.02 13.21 59.30 --- --- Peak 10 9508.00 43.44 -30.56 74.00 46.31 38.58 17.76 59.21 --- --- Peak 11 12104.00 44.13 -29.87 74.00 47.09 38.90 20.76 62.62 --- --- Peak 12 14777.00 48.50 -25.50 74.00 45.02 42.07 23.39 61.98 100 0 Peak	 Site : 03CH16-HY Condition : FCC CLASS-B 3m 9120D_1522 VERTICAL Detector : Peak Project : 021504 (Freq, Level, Over Limit, Limit Line, ReadAntenna Level, Factor, Cable Loss, Preamp Factor, A/Pos, T/Pos, Remark) 1 40.67 35.43 -4.57 40.00 47.77 18.91 1.06 32.32 100 0 QP 2 55.22 39.91 -0.09 40.00 58.76 12.29 1.26 32.41 100 0 QP 3 64.92 34.82 -5.18 40.00 54.17 11.68 1.34 32.38 100 0 QP 4 167.74 35.80 -7.70 43.50 50.06 15.75 2.19 32.30 --- --- Peak 5 250.19 36.46 -9.54 46.00 47.45 18.58 2.70 32.34 --- --- Peak 6 499.48 32.70 -13.30 46.00 37.14 23.90 3.70 32.09 --- --- Peak 7 1264.00 29.00 -45.00 74.00 60.58 25.66 5.89 63.13 --- --- Peak 8 5332.00 34.56 -39.44 74.00 50.13 31.24 12.52 59.33 --- --- Peak 9 6514.00 38.10 -35.90 74.00 49.23 33.96 14.11 59.20 --- --- Peak 10 9992.00 43.33 -30.67 74.00 45.92 39.12 18.18 59.89 --- --- Peak 11 13402.00 44.46 -29.54 74.00 45.46 39.91 21.39 62.30 100 0 Peak 12 15789.00 43.98 -30.02 74.00 44.07 37.30 23.86 61.25 --- --- Peak