

FCC PART 15.247 TEST REPORT

For

Signify (China) Investment Co., Ltd.

Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233, China

FCC ID: 2AGBW9290023351X

Report Type: Class II Permissive Change	Product Type: LED Lamp
Report Number: RXM201109050-00AA1	
Report Date: 2020-11-30	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
SYSTEM TEST CONFIGURATION	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL I/O CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	9
APPLICABLE STANDARD	9
EUT SETUP	9
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	10
TEST PROCEDURE	10
CORRECTED AMPLITUDE & MARGIN CALCULATION	10
TEST DATA	10

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	LED Lamp
Model	9290023351
Frequency Range	Bluetooth LE: 2402~2480MHz ZigBee: 2405~2480MHz
Maximum conducted peak output power	Bluetooth LE 1M: 10.52dBm Bluetooth LE 2M: 9.34dBm ZigBee: 10.14dBm
Modulation Technique	Bluetooth LE: GFSK ZigBee: OQPSK
Antenna Specification*	Bluetooth LE/ZigBee: -3dBi (It is provided by the applicant)
Voltage	110-130Vac, 50-60Hz
Date of Test	2020-11-21~2020-11-22
Sample serial number	68CA07 (Assigned by applicant)
Received date	2020-11-09
Sample/EUT Status	Good condition

Objective

This report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.247 rules.

This is a CIIPC application of the device; the differences between the original device and the current one are as follows:

1. Adding one capacitor on board to improve UDS function.

Based on above differences, it will affected partial test data, so the changed items were performed.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1 °C
Humidity		±6%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For BLE 1M & BLE 2M mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 20 and 39.

For ZigBee mode, 16 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445
12	2410	...	...
...	...	...	...
...	...	...	...
...	...	25	2475
18	2440	26	2480

EUT was tested with Channel 11, 19 and 26.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

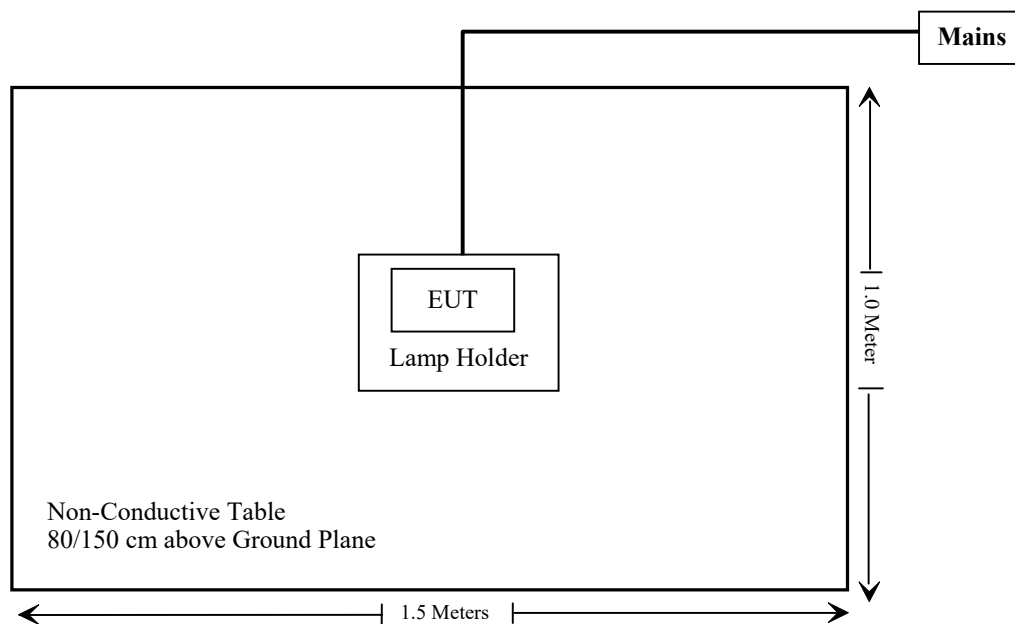
“UartAssistV4.2.3”* software was used for testing, and power level is Default*. The software and power level was provided by the applicant.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	Lamp Holder	Unknown	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielded Un-detachable AC Cable	1.2	LISN	Lamp Holder

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	MPE	Compliance*
§15.203	Antenna Requirement	Compliance*
§15.207 (a)	AC Line Conducted Emissions	Compliance*
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance*
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance*
§15.247(e)	Power Spectral Density	Compliance*

Compliance*: Please referred to FCC ID: 2AGBW9290023351X granted on 2020-03-31. Report No.: RXM200119050-00A, which was tested by Bay Area Compliance Laboratories Corp. (Shenzhen).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2020/08/04	2021/08/03
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
SNSD	Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2020/04/20	2021/04/20
Ducommun Technologies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/06	2020/12/05

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

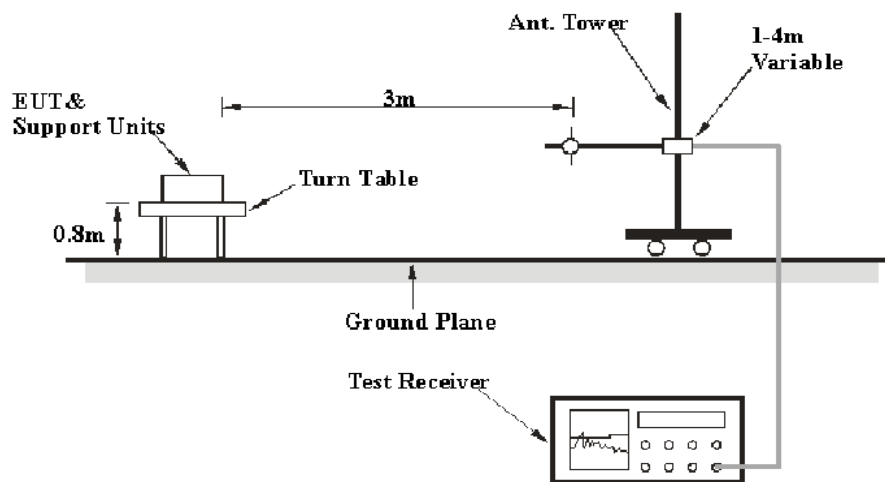
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

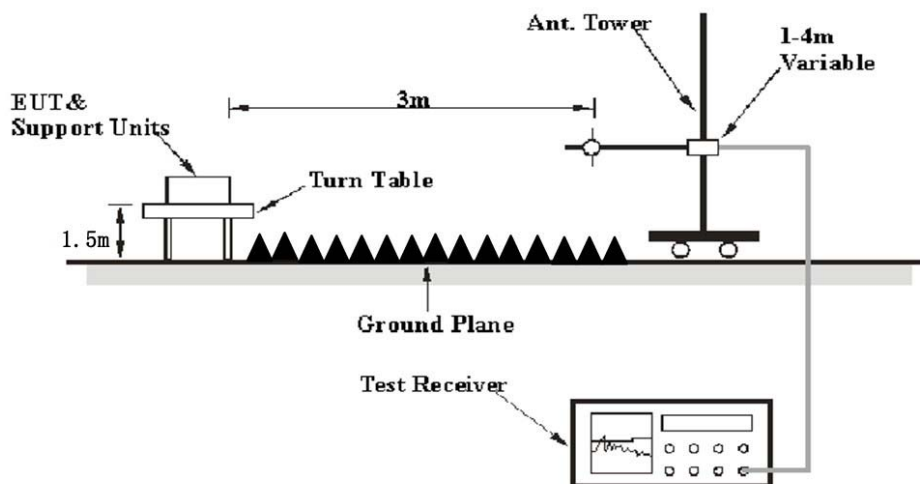
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz ^{Note 1}	/	Average
	1MHz	> 1/T ^{Note 2}	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

Environmental Conditions

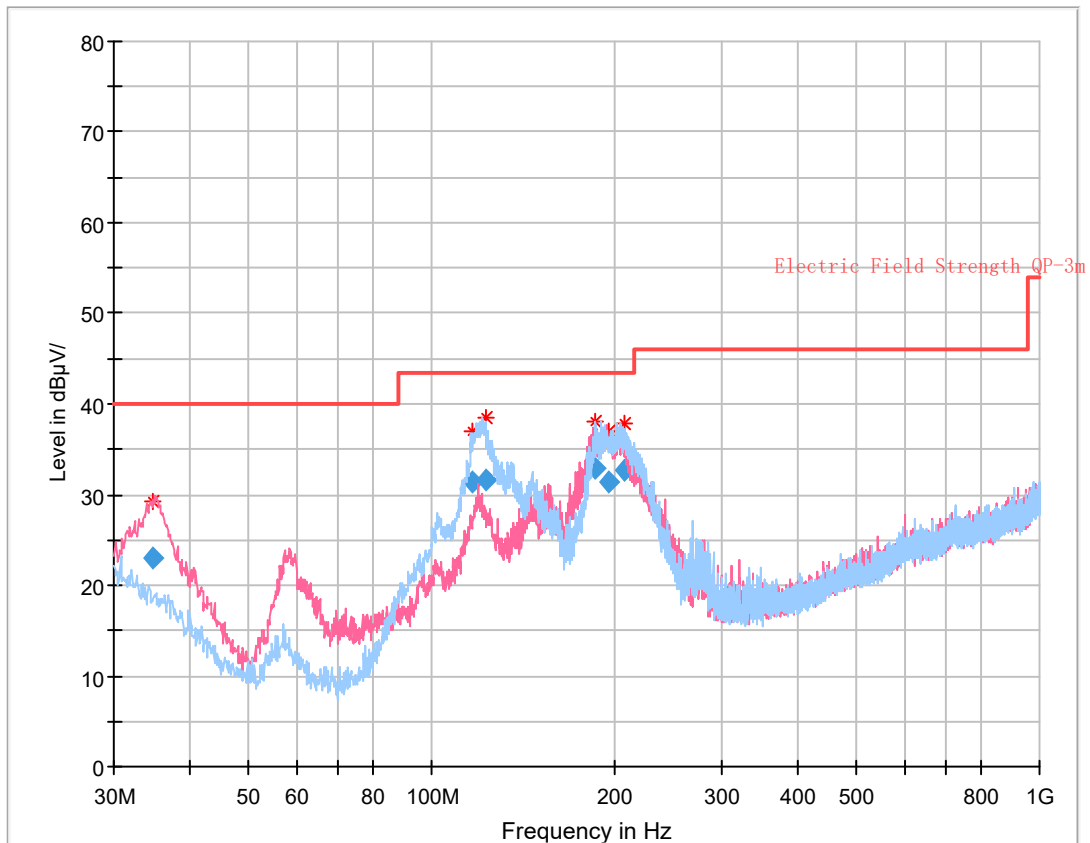
Temperature:	28~29.8 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang on 2020-11-22 for below 1GHz and Alen He on 2020-11-21 for above 1GHz.

EUT operation mode: Transmitting

BLE Mode:

30 MHz~1 GHz: (worst case is Middle channel of BLE 1M Mode)



Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.661125	23.08	40.00	16.92	102.0	V	246.0	-7.2
116.795250	31.42	43.50	12.08	290.0	H	283.0	-11.2
122.521000	31.59	43.50	11.91	284.0	H	243.0	-10.8
186.225625	32.83	43.50	10.67	126.0	H	124.0	-12.0
195.066875	31.31	43.50	12.19	110.0	V	251.0	-11.3
207.514875	32.61	43.50	10.89	153.0	H	237.0	-10.7

1 GHz-25 GHz:**BLE 1M Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2316.31	29.09	PK	114	1.2	H	31.64	60.73	74	13.27
2316.31	16.41	Ave.	114	1.2	H	31.64	48.05	54	5.95
2493.30	28.73	PK	69	1.8	H	32.13	60.86	74	13.14
2493.30	16.26	Ave.	69	1.8	H	32.13	48.39	54	5.61
4804.00	45.34	PK	226	2.3	H	5.40	50.74	74	23.26
4804.00	34.91	Ave.	226	2.3	H	5.40	40.31	54	13.69
7206.00	46.34	PK	40	1.9	H	12.02	58.36	74	15.64
7206.00	37.64	Ave.	40	1.9	H	12.02	49.66	54	4.34
Middle Channel (2442 MHz)									
4884.00	44.84	PK	292	1.9	H	6.43	51.27	74	22.73
4884.00	34.68	Ave.	292	1.9	H	6.43	41.11	54	12.89
7326.00	46.50	PK	327	1.7	H	11.27	57.77	74	16.23
7326.00	37.02	Ave.	327	1.7	H	11.27	48.29	54	5.71
High Channel (2480 MHz)									
2326.38	28.64	PK	337	2.1	H	31.64	60.28	74	13.72
2326.38	16.02	Ave.	337	2.1	H	31.64	47.66	54	6.34
2498.75	30.19	PK	319	1.7	H	32.13	62.32	74	11.68
2498.75	16.38	Ave.	319	1.7	H	32.13	48.51	54	5.49
4960.00	46.13	PK	221	1.2	H	6.95	53.08	74	20.92
4960.00	36.66	Ave.	221	1.2	H	6.95	43.61	54	10.39
7440.00	45.17	PK	243	2.4	H	12.31	57.48	74	16.52
7440.00	34.95	Ave.	243	2.4	H	12.31	47.26	54	6.74

BLE 2M Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2324.05	29.18	PK	203	1.4	H	31.64	60.82	74	13.18
2324.05	16.72	Ave.	203	1.4	H	31.64	48.36	54	5.64
2493.32	28.63	PK	260	1.3	H	32.13	60.76	74	13.24
2493.32	16.45	Ave.	260	1.3	H	32.13	48.58	54	5.42
4804.00	44.96	PK	108	2.4	H	5.40	50.36	74	23.64
4804.00	34.41	Ave.	108	2.4	H	5.40	39.81	54	14.19
7206.00	46.10	PK	245	2.5	H	12.02	58.12	74	15.88
7206.00	36.02	Ave.	245	2.5	H	12.02	48.04	54	5.96
Middle Channel (2442 MHz)									
4884.00	44.98	PK	228	2.1	H	6.43	51.41	74	22.59
4884.00	34.64	Ave.	228	2.1	H	6.43	41.07	54	12.93
7326.00	45.31	PK	226	1.5	H	11.27	56.58	74	17.42
7326.00	35.58	Ave.	226	1.5	H	11.27	46.85	54	7.15
High Channel (2480 MHz)									
2350.46	29.04	PK	342	1.6	H	31.77	60.81	74	13.19
2350.46	16.6	Ave.	342	1.6	H	31.77	48.37	54	5.63
2498.84	30.81	PK	292	2.5	H	32.13	62.94	74	11.06
2498.84	17.78	Ave.	292	2.5	H	32.13	49.91	54	4.09
4960.00	45.10	PK	115	2.2	H	6.95	52.05	74	21.95
4960.00	34.79	Ave.	115	2.2	H	6.95	41.74	54	12.26
7440.00	43.83	PK	191	1.1	H	12.31	56.14	74	17.86
7440.00	32.45	Ave.	191	1.1	H	12.31	44.76	54	9.24

Note:

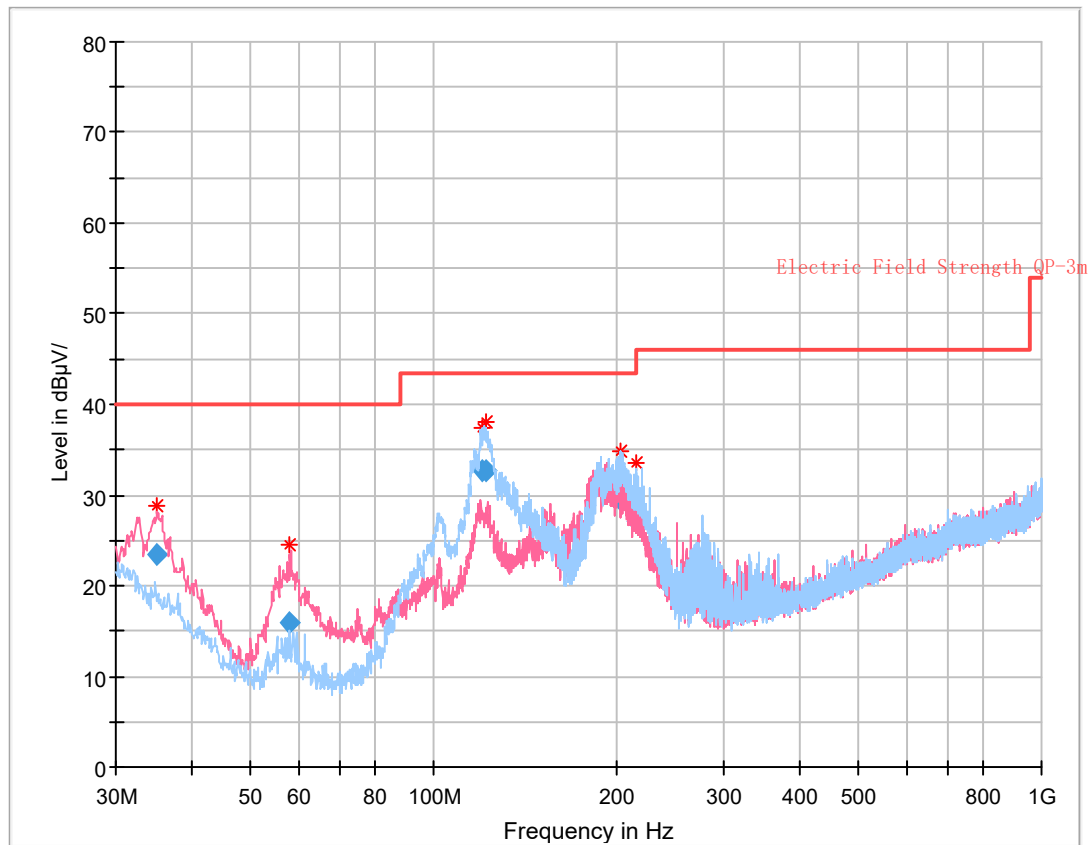
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

The other spurious emission which is 20dB to the limit was not recorded.

And for the pre-scan is performed with the 2400-2483.5MHz band filter.

ZigBee Mode:**30 MHz~1 GHz: (Middle channel was worst case)****Final Result**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.007625	23.48	40.00	16.52	112.0	V	355.0	-7.4
57.828625	15.97	40.00	24.03	102.0	V	256.0	-17.0
120.039000	32.66	43.50	10.84	265.0	H	279.0	-10.8
121.658625	32.79	43.50	10.71	282.0	H	256.0	-10.8
203.311125	29.55	43.50	13.95	111.0	H	252.0	-10.6
215.203375	27.17	43.50	16.33	126.0	H	254.0	-10.7

1 GHz-25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2405 MHz)									
2351.62	29.48	PK	194	1.6	H	31.77	61.25	74	12.75
2351.62	14.76	Ave.	194	1.6	H	31.77	46.53	54	7.47
2484.37	28.7	PK	273	1.0	H	32.13	60.83	74	13.17
2484.37	14.83	Ave.	273	1.0	H	32.13	46.96	54	7.04
4810.00	44.57	PK	235	1.6	H	5.40	49.97	74	24.03
4810.00	31.57	Ave.	235	1.6	H	5.40	36.97	54	17.03
Middle Channel (2445 MHz)									
4890.00	44.48	PK	223	2.3	H	6.43	50.91	74	23.09
4890.00	31.48	Ave.	223	2.3	H	6.43	37.91	54	16.09
High Channel (2480 MHz)									
2324.51	28.62	PK	226	1.8	H	31.64	60.26	74	13.74
2324.51	14.72	Ave.	226	1.8	H	31.64	46.36	54	7.64
2486.67	29.31	PK	111	2.3	H	32.13	61.44	74	12.56
2486.67	14.85	Ave.	111	2.3	H	32.13	46.98	54	7.02
4960.00	44.42	PK	137	1.5	H	6.95	51.37	74	22.63
4960.00	31.43	Ave.	137	1.5	H	6.95	38.38	54	15.62

Note:

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

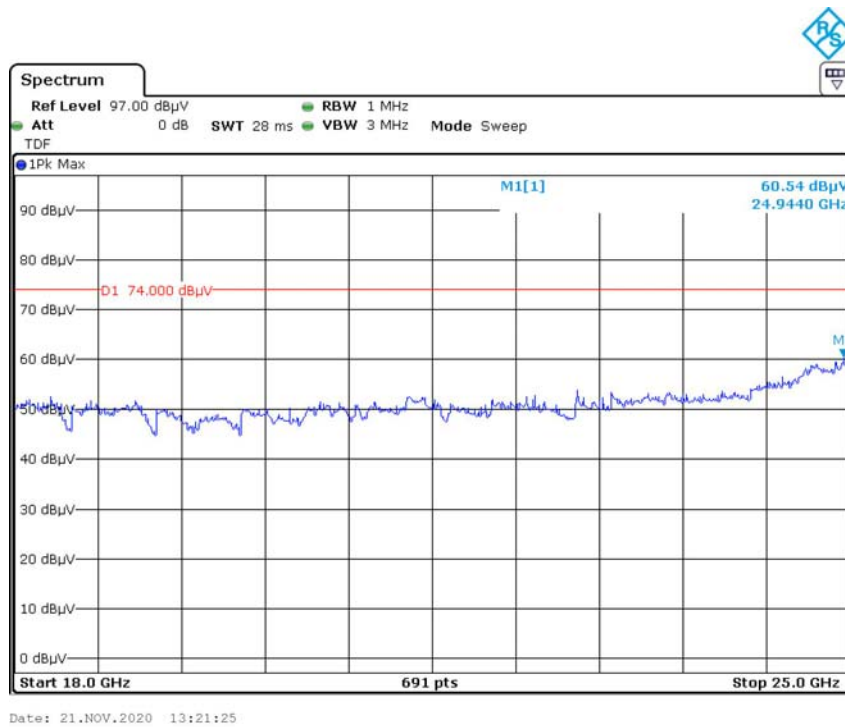
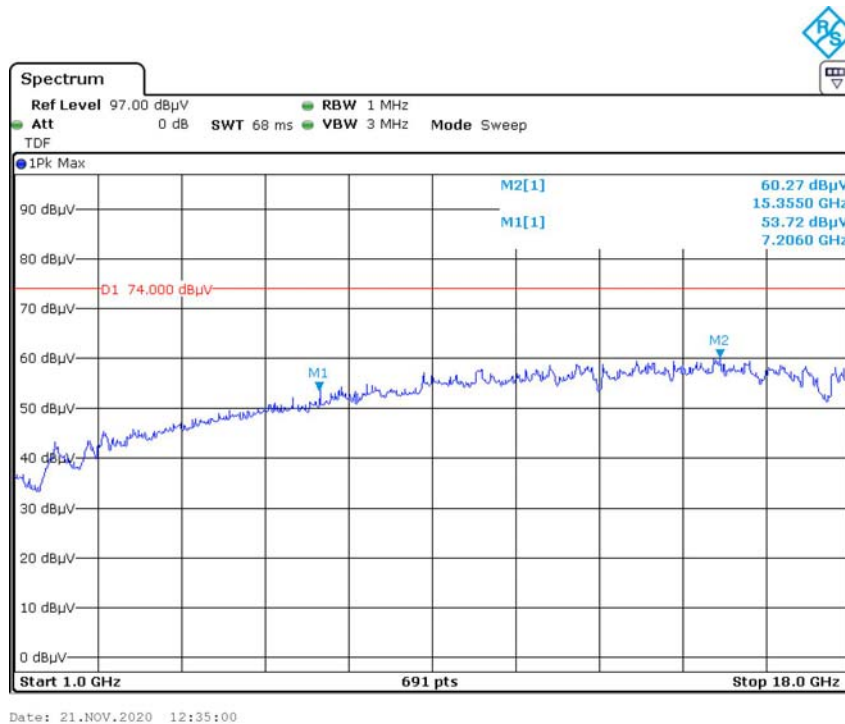
Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

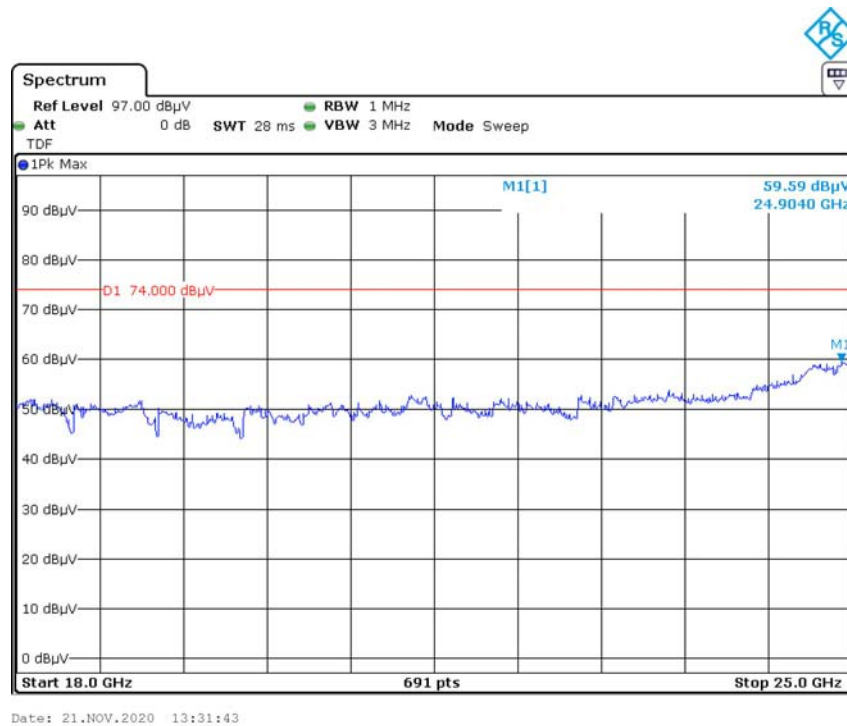
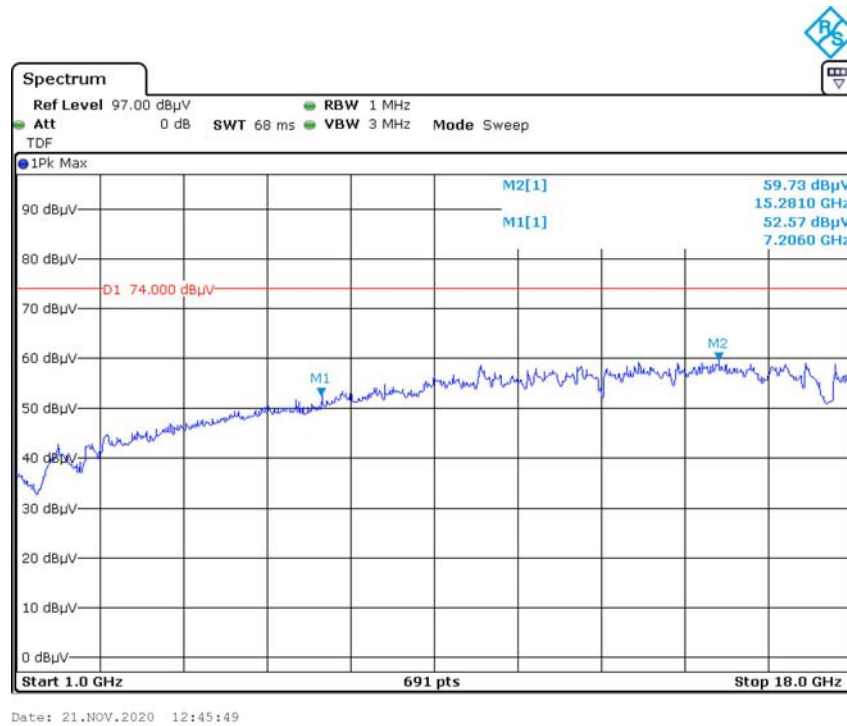
The other spurious emission which is 20dB to the limit was not recorded.

And for the pre-scan is performed with the 2400-2483.5MHz band filter.

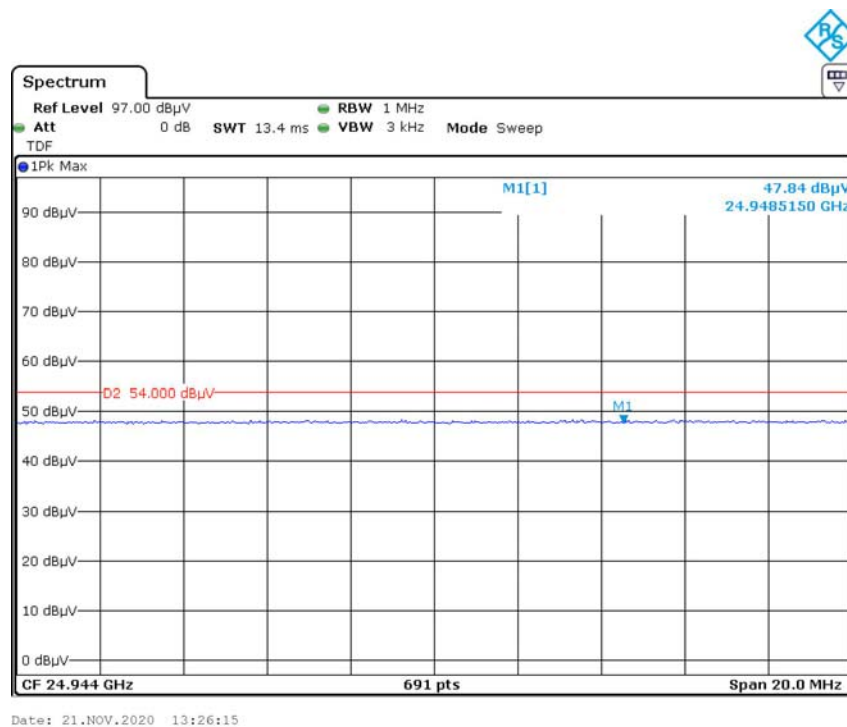
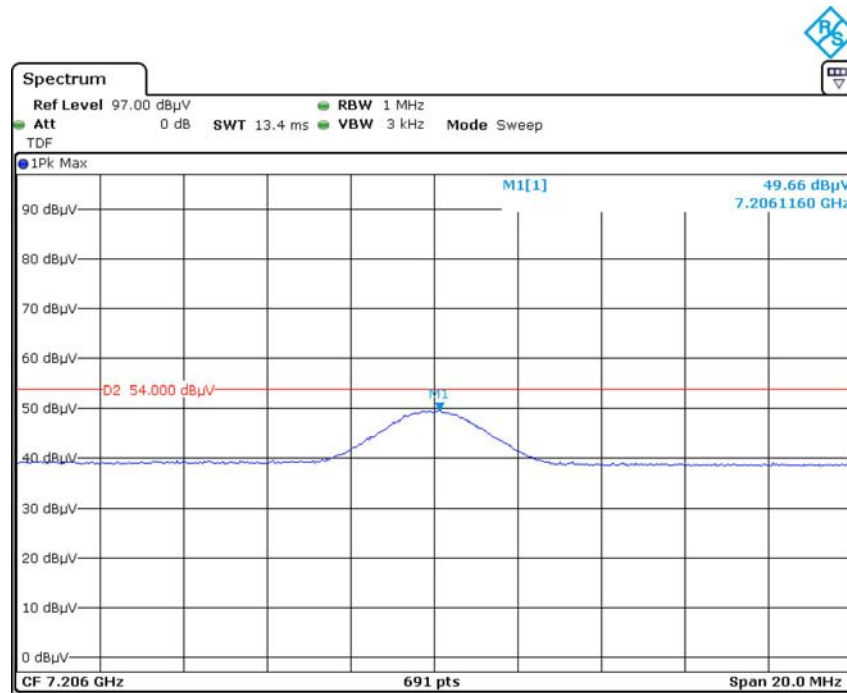
Pre-scan with BLE 1M Low channel Horizontal



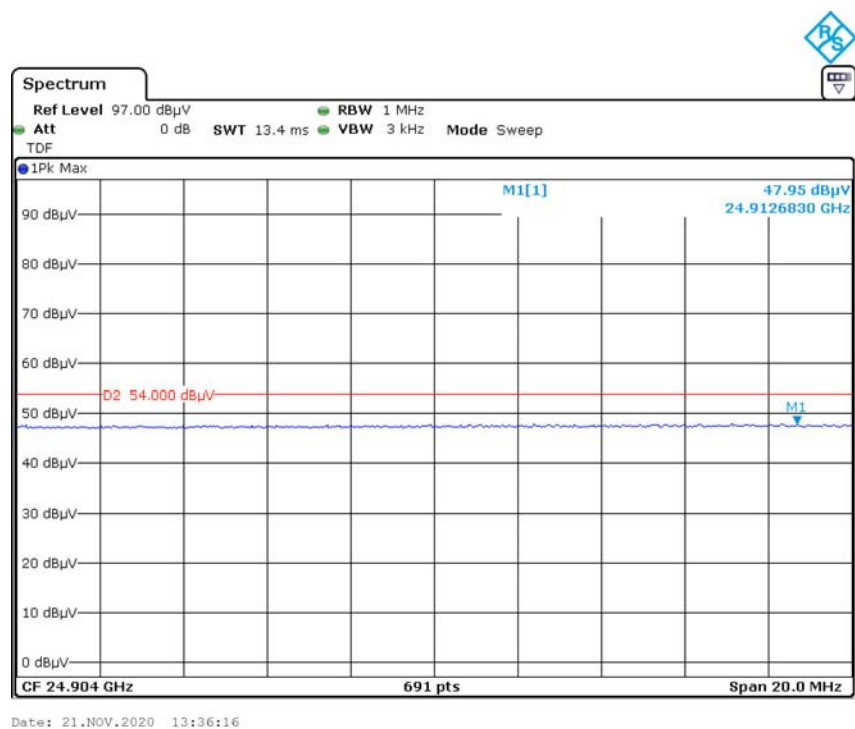
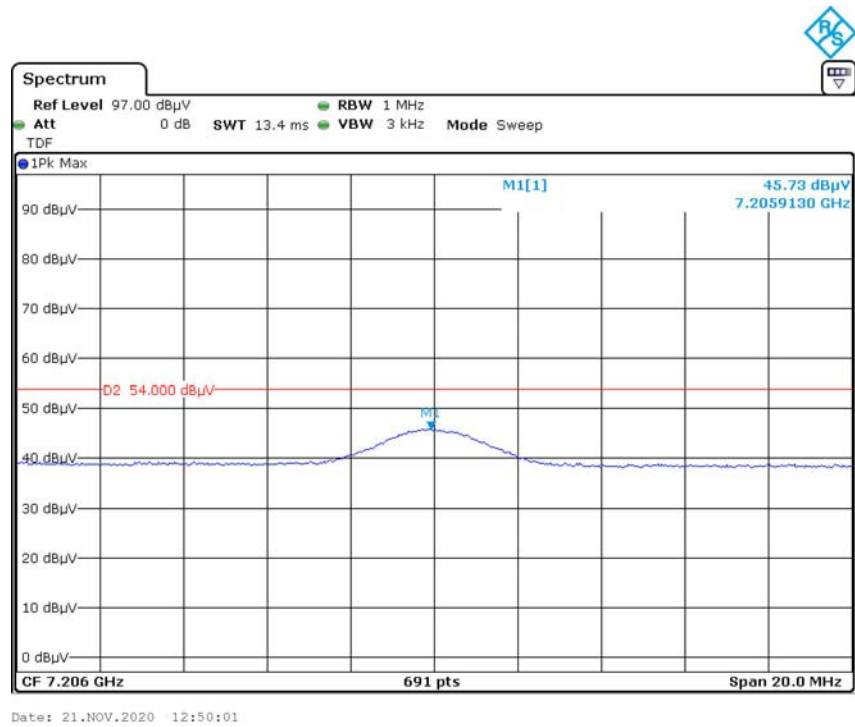
Vertical



Average Horizontal



Vertical



***** END OF REPORT *****