



FCC Part 15.247

RSS-247 Issue 2, Feb 2017; RSS-Gen Issue 5, Mar 2019

TEST REPORT

For

Silicon Labs

9th Floor, Maximus Towers 2B, Raheja Mindspace IT Park, APIIC Software Layout, Madhapur, Hyderabad,
Telangana, India - 500 081

Report Type:	Original Report
Brand Name:	Silicon Labs
FCC Identity:	FCC ID: XF6-B001P4V2P1
IC Identity:	IC: 8407A-B001P4V2P1
Product Name:	WiFi bgn, BT5.0 SIP Module
Model Name:	RS9116-B0014
Report Number:	RLK201108002-00A
Report Date:	2021/01/16
Reviewed By:	Flight Hsieh <i>Flight. Hsieh</i>

Prepared By:

Bay Area Compliance Laboratories Corp.(Linkou Laboratory)

No. 6, Wende 2Rd., Guishan Dist., Taoyuan City 33382, Taiwan (R.O.C.)

Tel: +886 (3)3961072; Fax: +886 (3) 3961027

www.bacl.com.tw

Note: This test report is prepared for the customer shown above and for the device described herein.

It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

Revision History

Revision	Report Number	Issue Date	Description
1.0	RLK201108002-00A	2021/01/16	Original Report

TABLE OF CONTENTS

1 GENERAL INFORMATION	5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
1.2 OBJECTIVE AND TEST METHODOLOGY	6
1.3 MEASUREMENT UNCERTAINTY	6
1.4 TEST FACILITY	6
2 SYSTEM TEST CONFIGURATION.....	7
2.1 TEST CHANNELS AND DESCRIPTION OF WORST TEST CONFIGURATION	7
2.2 SUPPORT EQUIPMENT LIST AND EXTERNAL CABLE LIST.....	8
2.3 BLOCK DIAGRAM OF TEST SETUP	8
2.4 DUTY CYCLE	9
2.5 ENVIRONMENTAL CONDITIONS AND TEST DATE.....	9
3 SUMMARY OF TEST RESULTS	10
4 FCC§15.247(I), §1.1307, § 2.1093 – RF EXPOSURE.....	11
4.1 APPLICABLE STANDARD.....	11
4.2 RF EXPOSURE EVALUATION RESULT	11
5 RSS-102 SEC 2.5.2 - EXEMPTION LIMITS FOR ROUTINE EVALUATION – RF EXPOSURE EVALUATION.....	12
5.1 APPLICABLE STANDARD.....	12
5.2 RF EXPOSURE EVALUATION RESULT	12
6 FCC §15.203 AND RSS-GEN SEC 6.8- ANTENNA REQUIREMENTS	13
6.1 APPLICABLE STANDARD.....	13
6.2 ANTENNA LIST AND DETAILS	13
7 FCC §15.207 AND RSS-GEN SEC 8.8 - AC LINE CONDUCTED EMISSIONS	14
7.1 APPLICABLE STANDARD.....	14
7.2 EUT SETUP AND TEST PROCEDURE	14
7.3 TEST EQUIPMENT LIST AND DETAILS.....	15
7.4 TEST RESULT.....	16
8 FCC §15.209, §15.205, §15.247(D), RSS-GEN SEC 8.9, 8.10 AND RSS-247 SEC 5.5 – SPURIOUS EMISSIONS	17
8.1 APPLICABLE STANDARD.....	17
8.2 EUT SETUP AND TEST PROCEDURE	20
8.3 TEST EQUIPMENT LIST AND DETAILS.....	21
8.4 TEST RESULTS	22
9 FCC §15.247(A)(2) AND RSS-247 SEC 5.2 – 6 DB EMISSION BANDWIDTH AND RSS-GEN SEC 6.7 99% OBW	33
9.1 APPLICABLE STANDARD.....	33
9.2 TEST PROCEDURE	34
9.3 TEST EQUIPMENT LIST AND DETAILS.....	35
9.4 TEST RESULTS	35
10 FCC §15.247(B)(3) AND RSS-247 §5.4(D)– MAXIMUM OUTPUT POWER	38
10.1 APPLICABLE STANDARD.....	38
10.2 TEST PROCEDURE	38
10.3 TEST EQUIPMENT LIST AND DETAILS.....	38
10.4 TEST RESULTS	39
11 FCC §15.247(D) AND RSS-247 §5.5 – 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	42
11.1 APPLICABLE STANDARD.....	42
11.2 TEST PROCEDURE	42
11.3 TEST EQUIPMENT LIST AND DETAILS.....	43
11.4 TEST RESULTS	44
12 FCC §15.247(E) AND RSS-247 §5.2(B) – POWER SPECTRAL DENSITY.....	48
12.1 APPLICABLE STANDARD.....	48
12.2 TEST PROCEDURE	48
12.3 TEST EQUIPMENT LIST AND DETAILS.....	48

12.4 TEST RESULTS 49

1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Silicon Labs 9th Floor, Maximus Towers 2B, Raheja Mindspace IT Park, APIIC Software Layout, Madhapur, Hyderabad, Telangana, India - 500 081
Manufacturer	Silicon Labs 9th Floor, Maximus Towers 2B, Raheja Mindspace IT Park, APIIC Software Layout, Madhapur, Hyderabad, Telangana, India - 500 081
Brand Name	Silicon Labs
Product (Equipment)	WiFi bgn, BT5.0 SIP Module
Model Name	RS9116-B0014
Frequency Range	2402 - 2480 MHz
Number of Channels	40 Channels
Output Power	Chip Antenna (FR05-S1-N-0-102) with 1.8Vdc BLE-1Mbps: 17.00 dBm (0.0501 W) BLE-2Mbps: 16.84 dBm (0.0483 W) Chip Antenna (FR05-S1-N-0-102) with 3.3Vdc BLE-1Mbps: 21.58 dBm (0.1439 W) BLE-2Mbps: 21.20 dBm (0.1318 W) Dipole Antenna (GW.34.5153) with 1.8Vdc BLE-1Mbps: 16.91 dBm (0.0491 W) BLE-2Mbps: 16.85 dBm (0.0484 W) Dipole Antenna (GW.34.5153) with 3.3Vdc BLE-1Mbps: 21.53 dBm (0.1422 W) BLE-2Mbps: 21.09 dBm (0.1285 W)
Modulation Type	BLE: GFSK
Power Operation (Voltage Range)	<input checked="" type="checkbox"/> DC Type <input checked="" type="checkbox"/> From Host System: 1.8Vdc/3.3Vdc
Related Submittal(s)/Grant(s)	FCC Part 15.247 DSS with FCC ID: XF6-B001P4V2P1 FCC Part 15.247 DTS with FCC ID: XF6-B001P4V2P1
Received Date	2020/11/13
Date of Test	2020/11/27 - 2020/12/10

*All measurement and test data in this report was gathered from production sample serial number: 201108002. Assigned by Bay Area Compliance Laboratories Corp. (Linkou Laboratory)

1.2 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the Silicon Labs. Appliance (Model: RS9116-B0014) to the requirements of the following Standards:

- Part 2, Subpart J, Part 15, Subparts A and C, section 15.247 of the Federal Communication Commission's rules.
- ANSI C63.10-2013 of the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- RSS-Gen Issue 5, Mar 2019— General Requirements for Compliance of Radio Apparatus
- RSS-247 Issue 2, Feb 2017— Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.3 Measurement Uncertainty

Parameter	Expanded Measurement uncertainty
RF output power with Power Meter	± 1.488 dB
Occupied Channel Bandwidth	± 453.927 Hz
RF Conducted test with Spectrum	± 2.77 dB
AC Power Line Conducted Emission	± 2.66 dB
Radiated Below 1G	± 3.57 dB
Radiated Above 1G	± 5.32 dB

The test results with statement of conformity, the decision rules are based on the specifications and standards. The test results will not take the measurement uncertainty into account.

1.4 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Linkou Laboratory) to collect test data is located on

No.6, Wende 2Rd., Guishan Dist., Taoyuan City 33382, Taiwan (R.O.C.).

Bay Area Compliance Laboratories Corp. (Linkou Laboratory) Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3546) by Mutual Recognition Agreement (MRA). 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. The FCC Registration No.: 0027578244. Designation No.: TW3546. The Test Firm Registration No.: 181430.

2 System Test Configuration

2.1 Test Channels and Description of Worst Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer. No special accessory, No modification was made to the EUT and No special equipment used during test.

For BLE, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	2440	39	2480

For BLE: Channel **0, 19** and **39** were tested.

For Radiated Emission, Conducted Power, Conducted Band Edge and PSD had test for two antenna and two voltage that because the power setting is different, the result will be different. For Bandwidth, Conducted Emission only test one result that because the power not affect the result.

Modulation Used for Conformance Test			
Configuration	N _{TX}	Data Rate	Worst Data Rate
BLE-1M	1	125 kbps-1 Mbps	1 Mbps
BLE-2M	1	125 kbps-2 Mbps	2 Mbps

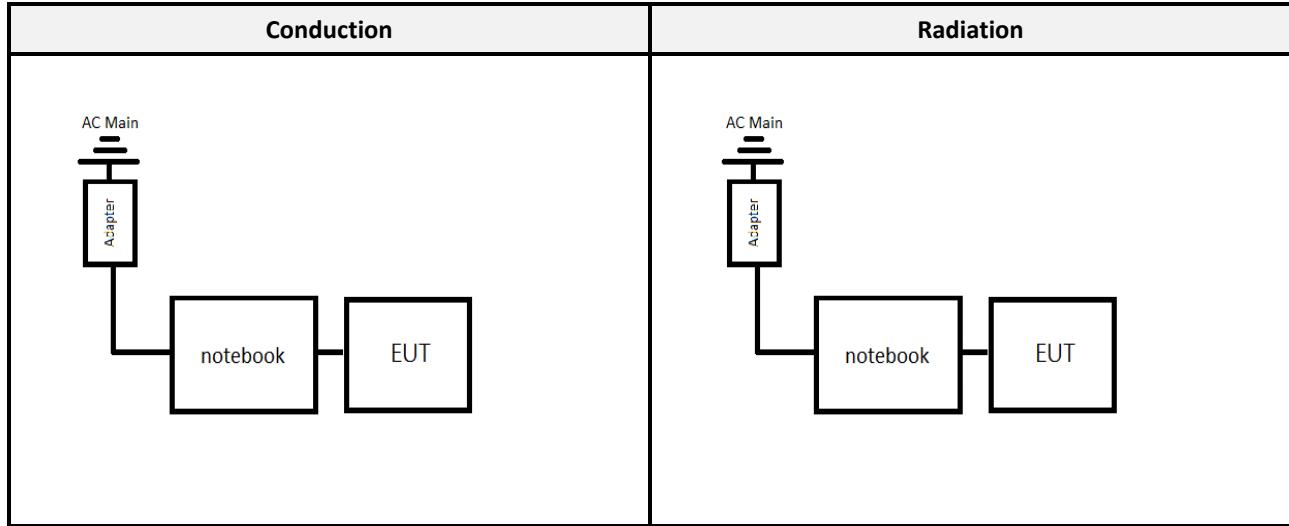
Worst Case of Power Setting				
EUT Exercise Software		PER Test App		
Configuration	N _{TX}	Low CH	Mid CH	High CH
Chip 1.8V BLE-1M	1	22	22	22
Chip 1.8V BLE-2M	1	22	22	8
Chip 3.3V BLE-1M	1	22	22	19
Chip 3.3V BLE-2M	1	22	22	11
Dipole 1.8V BLE-1M	1	22	22	22
Dipole 1.8V BLE-2M	1	22	22	8
Dipole 3.3V BLE-1M	1	22	22	20
Dipole 3.3V BLE-2M	1	22	22	11

2.2 Support Equipment List and External Cable List

No.	Description	Manufacturer	Model Number	Serial Number
A	NoteBook	DELL	Latitude E6410	PP27LA001

No.	Description	Manufacturer	Model Number
1	USB Cable	Tensility International Corp	10-02331

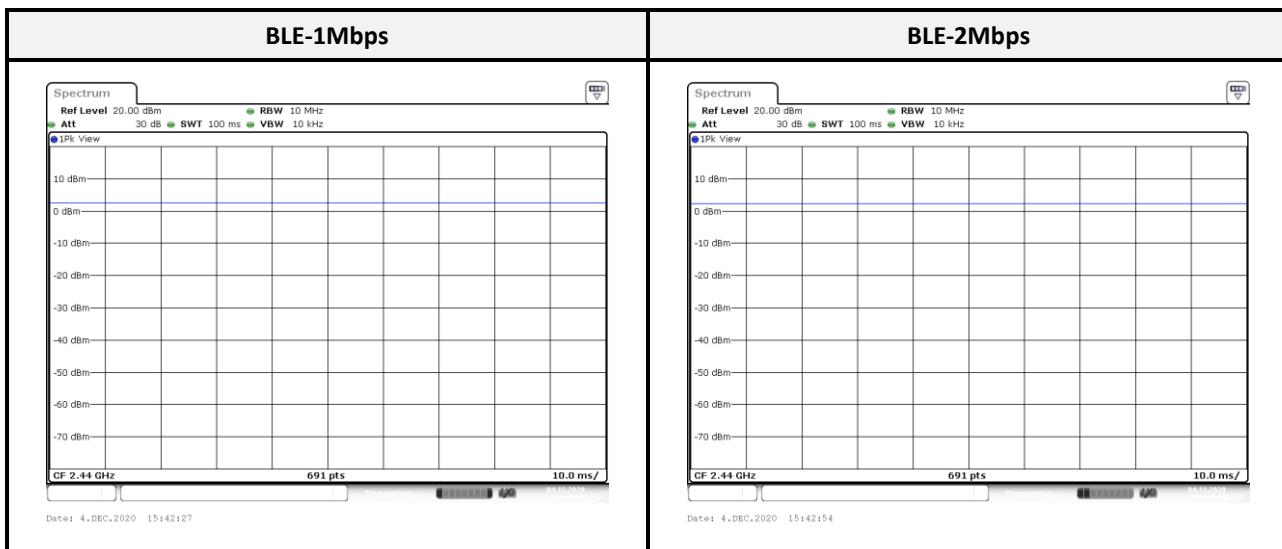
2.3 Block Diagram of Test Setup



2.4 Duty Cycle

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE-1M	100.00	100.00	100.00	0.00
BLE-2M	100.00	100.00	100.00	0.00



Note1: Duty Factor = $10^{\log(1/\text{Duty cycle})}$

2.5 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (% RH)	Test Engineer
Conduction (Con-01)	2020/12/09	24.6	58	Rui Zhan
Radiated (966A)	2020/11/27 - 2020/12/10	19.5 - 21.5	55 - 61	Leo Cheng
Conducted (TH-02)	2020/12/04 - 2020/12/10	22.5 - 23.2	57 - 60	Rui Zhan

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
ISEDC RSS-102 Sec 2.5.2	Exemption Limits for Routine Evaluation – RF Exposure Evaluation	Compliance
§15.203 ISEDC RSS-Gen Sec 6.8	Antenna Requirement	Compliance
§15.207(a) ISEDC RSS-Gen Sec 6.8	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d) ISED RSS-Gen Sec 8.9 and 8.10 ISEDC RSS-247 Sec 5.5	Spurious Emissions	Compliance
§15.247(a)(2) ISEDC RSS-247 Sec 5.2 ISEDC RSS-Gen Sec 6.7	6 dB Emission Bandwidth and Occupied Bandwidth	Compliance
§15.247(b)(3) ISED RSS-247 Sec 5.4(d)	Maximum Output Power	Compliance
§15.247(d) ISEDC RSS-247 Sec 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e) ISEDC RSS-247 Sec 5.2(b)	Power Spectral Density	Compliance

4 FCC§15.247(i), §1.1310, § 2.1091 – Maximum Permissible Exposure (MPE)

4.1 Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

Note: f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary: Prediction of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with: $\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$

4.2 RF Exposure Evaluation Result

MPE Evaluation:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	5.89	3.8815	22.00	158.4893	20	0.1224	1.0
BR/EDR	2402-2480	5.89	3.8815	21.00	125.8925	20	0.0973	1.0
Wi-Fi 2.4G	2412-2462	5.89	3.8815	23.00	199.5262	20	0.1542	1.0

Note: Wi-Fi and BT can't simultaneously.

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.

5 RSS-102 Sec 2.5.2 - Exemption Limits for Routine Evaluation – RF Exposure Evaluation

5.1 Applicable Standard

According to subpart RSS-102 Sec 2.5.2,

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz⁶ and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2 RF Exposure Evaluation Result

BLE Max tune-up conducted output power is 22.00 dBm (158.4893 mW) at 2402 MHz, Antenna Gain = 5.89 dBi, EIRP = 27.89 dBm (0.6152 W), so the maximum conducted and E.I.R.P. source-based, time-averaged output is less than 2.68 W for general public use.

BR/EDR Max tune-up conducted output power is 21.00 dBm (125.8925 mW) at 2402 MHz, Antenna Gain = 5.89 dBi, EIRP = 26.89 dBm (0.4887 W), so the maximum conducted and E.I.R.P. source-based, time-averaged output is less than 2.68 W for general public use.

Wi-Fi 2.4G Max tune-up conducted output power is 23.00 dBm (199.5262 mW) at 2437 MHz, Antenna Gain = 5.89 dBi, EIRP = 28.89 dBm (0.7745 W), so the maximum conducted and E.I.R.P. source-based, time-averaged output is less than 2.70 W for general public use.

Note: Wi-Fi and BT can't simultaneously.

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.

6 FCC §15.203 and RSS-Gen Sec 6.8- Antenna Requirements

6.1 Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi.

According to RSS-Gen 6.8: Transmitter Antenna for Licence-Exempt Radio Apparatus

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.^{Footnote8} When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

6.2 Antenna List and Details

Brand	Model	Antenna Type	Antenna Gain	Result
Fractus	FR05-S1-N-0-102	Chip	1.70 dBi	Compliance
TAOGLAS	GW.34.5153	Dipole	5.89dBi	Compliance

The EUT have an internal and external antennas arrangement and fulfill the requirement of this section.

7 FCC §15.207 and RSS-Gen Sec 8.8 - AC Line Conducted Emissions

7.1 Applicable Standard

According to FCC §15.207,

For an intentional radiator 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, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

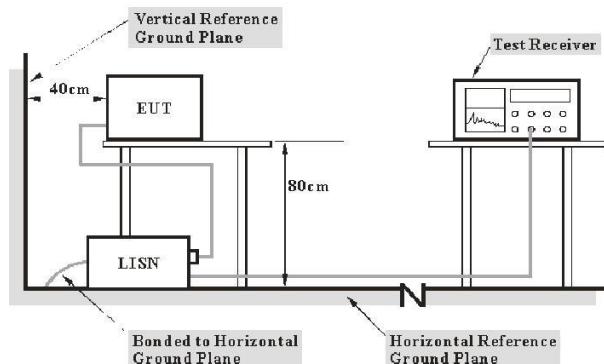
According to RSS-Gen 8.8 Conducted limits:

For an intentional radiator 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, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 2}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency. Note 2: A linear average detector is required

7.2 EUT Setup and Test Procedure



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 and RSS-Gen limits.

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz. During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

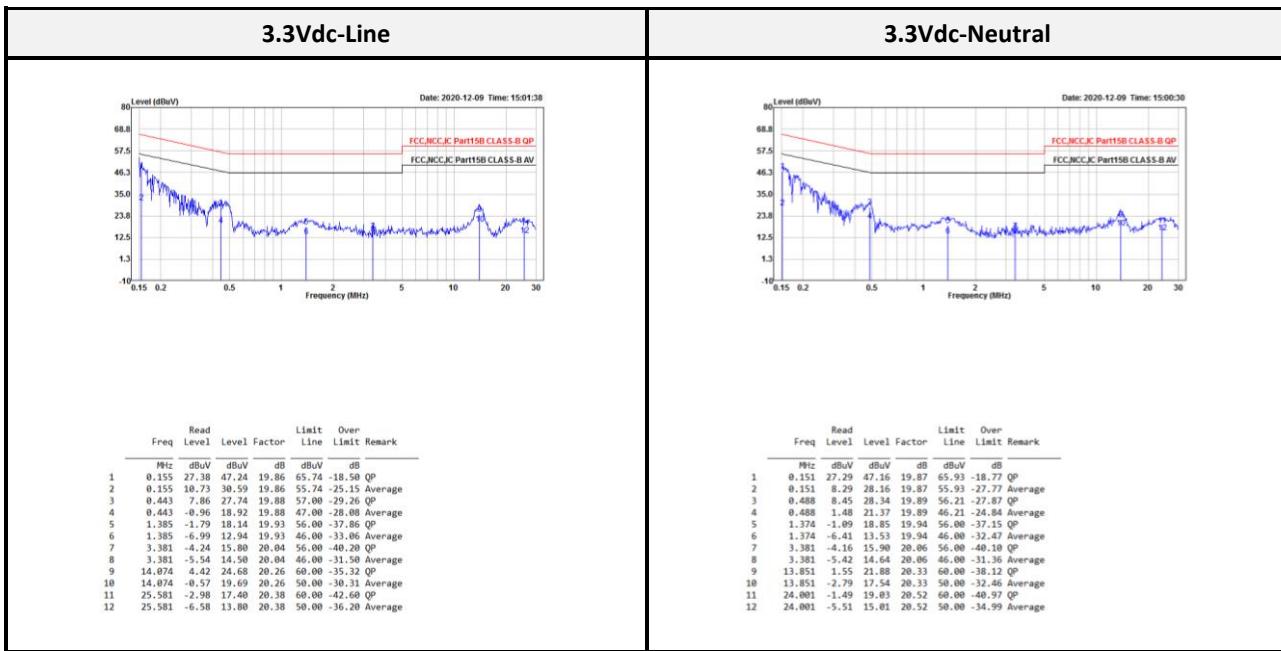
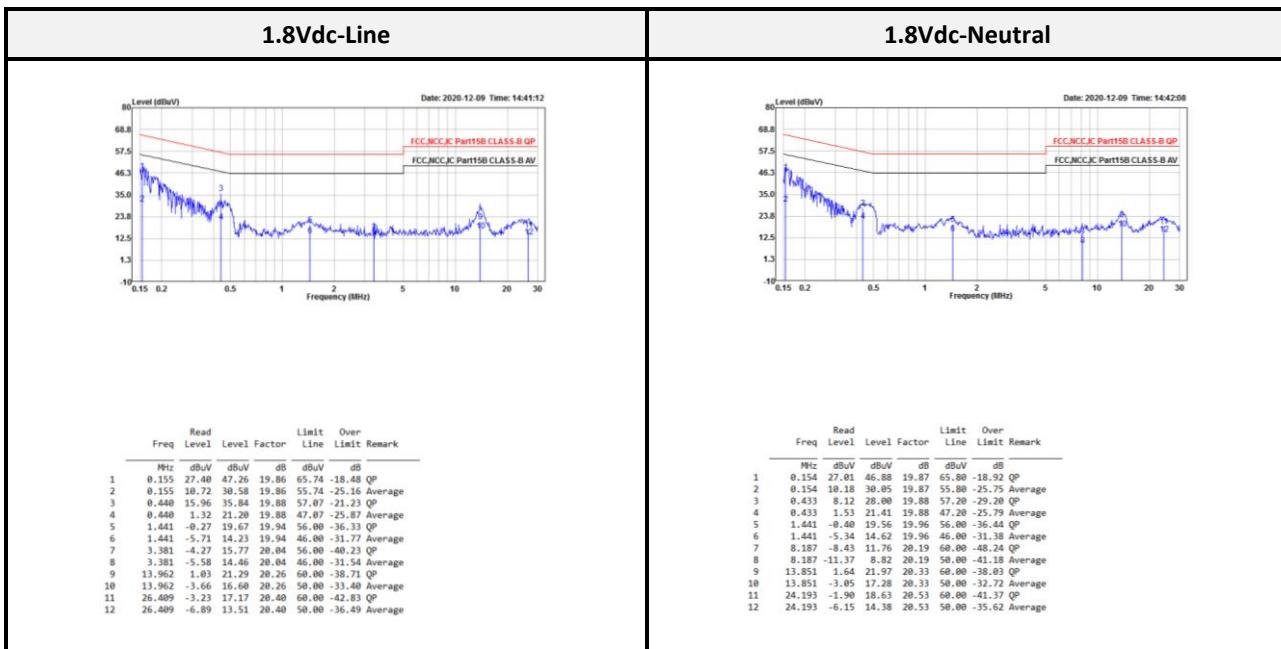
During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

7.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
AC Line Conduction Room (CON-01)					
Two-Line V-Network	Rohde & Schwarz	ENV216	100010	2020/09/14	2021/09/13
Pulse Limiter	SCHWARZBECK	VSTD 9561-F	00432	2020/09/11	2021/09/10
ESR EMI Test Receiver	Rohde & Schwarz	ESR3	102430	2020/05/07	2021/05/06
RF Cable	EMCI	EMCCFD300-BM-BM-8000	180526	2020/08/18	2021/08/17
Software	Audix	e3 v9	E3LK-03	N.C.R	N.C.R

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

7.4 Test Result



Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8 FCC §15.209, §15.205, §15.247(d), RSS-Gen Sec 8.9, 8.10 and RSS-247 Sec 5.5 – Spurious Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	399.9-410	4.5-5.15
0.495-0.505	16.42-16.423	608-614	5.35-5.46
2.1735-2.1905	16.69475-16.69525	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

As per RSS-Gen 8.9,

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

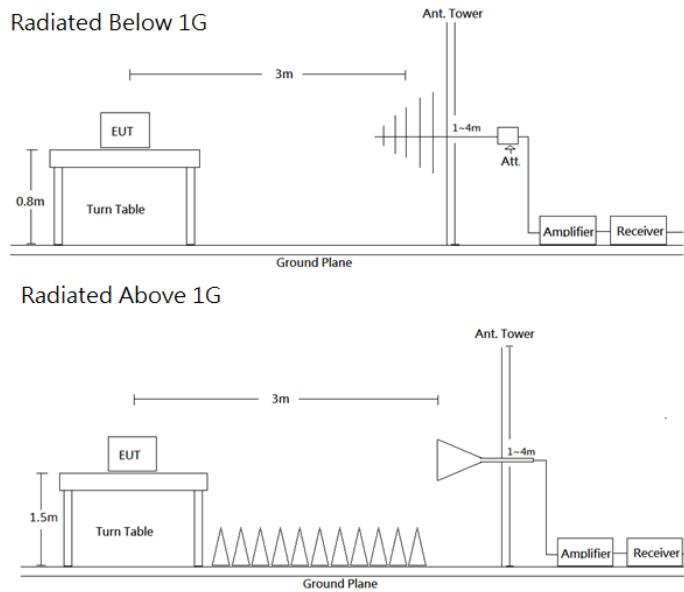
Frequency (MHz)	Field Strength (μV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 EUT Setup and Test Procedure



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the RSS-Gen, FCC Part 15.209 and FCC 15.247 Limits.

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	-	QP
Above 1 GHz	1 MHz	3 MHz	-	PK
	1 MHz	10 Hz	>98%	PK
	1 MHz	1/T	<98%	Ave

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

8.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966B)					
Active Loop	EMCO	6502	0001-3322	2020/03/16	2021/03/15
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2020/03/19	2021/03/18
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Horn Antenna	ETS-Lindgren	3115	00109141	2020/07/15	2021/07/14
Horn Antenna	ETS-Lindgren	3160-09	00123852	2020/07/07	2021/07/06
Preamplifier	A.H. Systems	PAM-1840VH	174	2020/03/25	2021/03/24
Preamplifier	A.H. Systems	PAM-0118	478	2020/05/05	2021/05/04
Microflex Cable (1m)	EMCI	EMC102-KM-KM-1000	180524	2020/08/06	2021/08/05
Microflex Cable (2m)	EMCI	EMC106-SM-SM-2000	180516	2020/08/06	2021/08/05
Microflex Cable (8m)	UTIFLEX	UFA210A-1-3149-300300	MFR 64639 232490-002	2020/08/06	2021/08/05
Turn Table	Chaintek	T-200-S-1	003501	N.C.R	N.C.R
Antenna Tower	Chaintek	MBD-400-1	003504	N.C.R	N.C.R
Controller	Chaintek	3000-1	003507	N.C.R	N.C.R
Software	Audix	e3 v9	E3LK-01	N.C.R	N.C.R
Conducted Room(TH-02)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

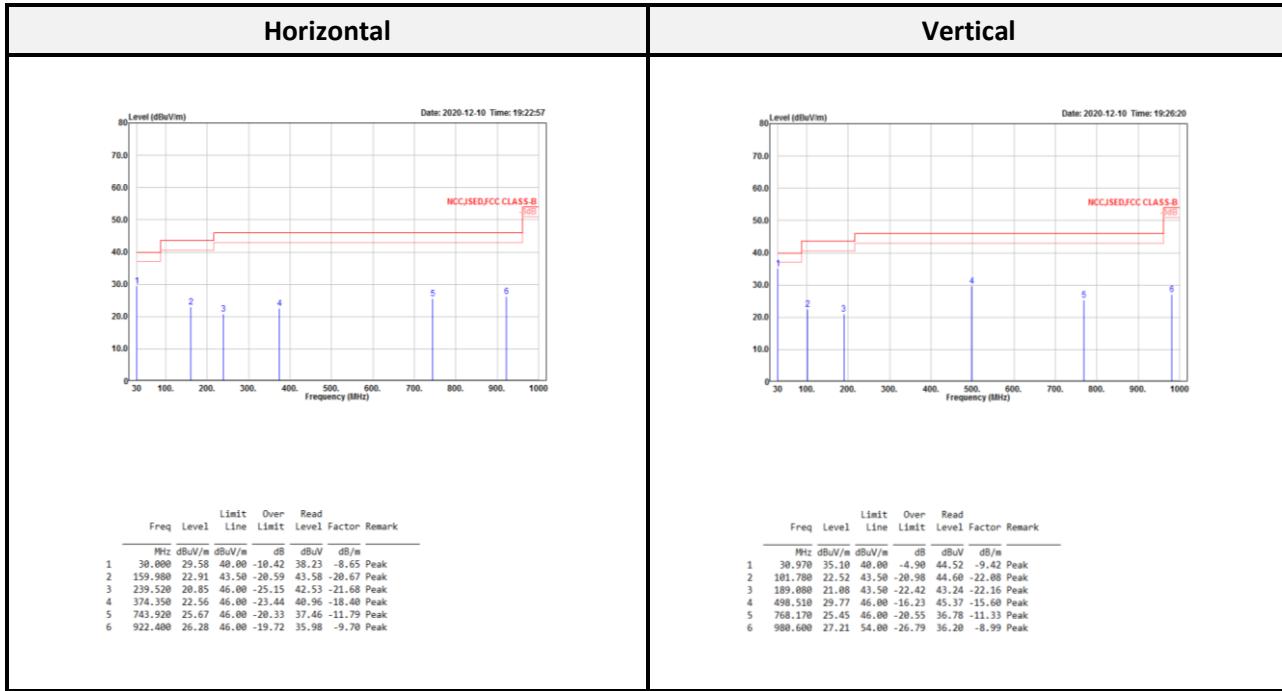
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center,

Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

8.4 Test Results

Transmitting mode (Pre-scan with three orthogonal axis, and worse case as Z axis)

Below 1G (30 MHz-1 GHz) test the worst mode



Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Above 1G (1 GHz-26.5 GHz)<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

BLE-1M Low CH Horizontal							BLE-1M Low CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2362.300	49.73	54.00	-4.27	57.57	-7.84	Average	1 ! 2362.100	43.09	54.00	-10.91	50.93	-7.84	Average	
2 ! 2362.300	56.54	74.00	-17.46	64.38	-7.84	Peak	2 2362.100	52.71	74.00	-21.29	60.55	-7.84	Peak	
3 * 2401.900	116.17			23.90	-7.73	Average	3 * 2401.900	108.47			116.20	-7.73	Average	
4 * 2401.900	117.38			25.11	-7.73	Peak	4 * 2401.900	109.63			117.36	-7.73	Peak	
1 ! 3202.700	45.75	54.00	-8.25	51.27	-5.52	Average	1 ! 3202.700	41.75	54.00	-12.25	47.27	-5.52	Average	
2 3202.700	49.26	74.00	-24.74	54.78	-5.52	Peak	2 3202.700	44.27	74.00	-29.73	49.79	-5.52	Peak	
3 ! 4804.000	38.42	54.00	-15.58	40.10	-1.68	Average	3 ! 4804.000	42.07	54.00	-11.93	43.75	-1.68	Average	
4 4804.000	47.02	74.00	-26.98	48.70	-1.68	Peak	4 4804.000	50.12	74.00	-23.88	51.80	-1.68	Peak	
5 ! 7206.000	47.79	54.00	-6.21	41.96	5.83	Average	5 ! 7206.000	48.42	54.00	-5.58	42.59	5.83	Average	
6 ! 7206.000	56.40	74.00	-17.60	50.57	5.83	Peak	6 ! 7206.000	56.75	74.00	-17.25	50.92	5.83	Peak	

BLE-1M Middle CH Horizontal							BLE-1M Middle CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2360.336	43.46	54.00	-10.54	51.32	-7.86	Average	1 ! 2359.852	39.91	54.00	-14.09	47.77	-7.86	Average	
2 2360.336	52.86	74.00	-21.14	60.72	-7.86	Peak	2 2359.852	51.41	74.00	-22.59	59.27	-7.86	Peak	
3 * 2439.954	114.22			21.87	-7.65	Average	3 * 2439.954	107.10			114.75	-7.65	Average	
4 * 2439.954	115.40			23.05	-7.65	Peak	4 * 2439.954	108.23			115.88	-7.65	Peak	
5 ! 2486.418	41.23	54.00	-12.77	48.82	-7.59	Average	5 ! 2483.756	38.50	54.00	-15.50	46.09	-7.59	Average	
6 2486.418	51.85	74.00	-22.15	59.44	-7.59	Peak	6 2483.756	51.01	74.00	-22.99	58.60	-7.59	Peak	
1 ! 3253.300	47.57	54.00	-6.43	52.92	-5.35	Average	1 ! 3253.300	42.84	54.00	-11.16	48.19	-5.35	Average	
2 3253.300	49.92	74.00	-24.08	55.27	-5.35	Peak	2 3253.300	46.19	74.00	-27.81	51.54	-5.35	Peak	
3 ! 4880.000	40.68	54.00	-13.32	42.21	-1.53	Average	3 ! 4880.000	46.10	54.00	-7.90	47.63	-1.53	Average	
4 4880.000	48.01	74.00	-25.99	49.54	-1.53	Peak	4 4880.000	52.33	74.00	-21.67	53.86	-1.53	Peak	
5 ! 7320.000	49.72	54.00	-4.28	44.42	5.30	Average	5 ! 7320.000	51.05	54.00	-2.95	45.75	5.30	Average	
6 ! 7320.000	57.83	74.00	-16.17	52.53	5.30	Peak	6 ! 7320.000	59.14	74.00	-14.86	53.84	5.30	Peak	

BLE-1M High CH Horizontal							BLE-1M High CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 * 2479.758	113.73			121.33	-7.60	Average	1 * 2480.332	105.76			113.36	-7.60	Average	
2 * 2479.758	114.91			122.51	-7.60	Peak	2 * 2480.332	106.94			114.54	-7.60	Peak	
3 ! 2483.858	53.66	54.00	-0.34	61.25	-7.59	Average	3 ! 2483.694	45.85	54.00	-8.15	53.44	-7.59	Average	
4 ! 2483.858	65.31	74.00	-8.69	72.90	-7.59	Peak	4 ! 2483.694	57.57	74.00	-16.43	65.16	-7.59	Peak	
1 ! 3306.700	47.17	54.00	-6.83	52.40	-5.23	Average	1 ! 3306.700	44.77	54.00	-9.23	50.00	-5.23	Average	
2 3306.700	50.40	74.00	-23.60	55.63	-5.23	Peak	2 3306.700	46.91	74.00	-27.09	52.14	-5.23	Peak	
3 ! 4960.000	43.19	54.00	-10.81	44.53	-1.34	Average	3 ! 4960.000	49.21	54.00	-4.79	50.55	-1.34	Average	
4 4960.000	50.32	74.00	-23.68	51.66	-1.34	Peak	4 ! 4960.000	55.08	74.00	-18.92	56.42	-1.34	Peak	
5 ! 7440.000	46.94	54.00	-7.06	41.30	5.64	Average	5 ! 7440.000	50.83	54.00	-3.17	45.19	5.64	Average	
6 ! 7440.000	55.84	74.00	-18.16	50.20	5.64	Peak	6 ! 7440.000	58.29	74.00	-15.71	52.65	5.64	Peak	

BLE-2M Low CH Horizontal							BLE-2M Low CH Vertical															
Freq		Limit		Over		Read			Freq		Limit		Over		Read							
	Level	Line	Limit	Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
1 !	2361.900	46.91	54.00	-7.09	54.75	-7.84	Average								1 !	2362.300	40.81	54.00	-13.19	48.65	-7.84	Average
2 !	2361.900	56.09	74.00	-17.91	63.93	-7.84	Peak								2	2362.300	52.02	74.00	-21.98	59.86	-7.84	Peak
3 *	2401.600	113.82			121.55	-7.73	Average								3 *	2401.600	106.01			113.74	-7.73	Average
4 *	2401.600	117.01			124.74	-7.73	Peak								4 *	2401.600	109.21			116.94	-7.73	Peak
1 !	3202.700	46.71	54.00	-7.29	52.23	-5.52	Average								1 !	3202.700	41.61	54.00	-12.39	47.13	-5.52	Average
2	3202.700	50.23	74.00	-23.77	55.75	-5.52	Peak								2	3202.700	45.12	74.00	-28.88	50.64	-5.52	Peak
3 !	4804.000	36.84	54.00	-17.16	38.52	-1.68	Average								3 !	4804.000	39.82	54.00	-14.18	41.50	-1.68	Average
4	4804.000	46.17	74.00	-27.83	47.85	-1.68	Peak								4	4804.000	48.98	74.00	-25.02	50.66	-1.68	Peak
5 !	7206.000	46.33	54.00	-7.67	40.50	5.83	Average								5 !	7206.000	46.33	54.00	-7.67	40.50	5.83	Average
6 !	7206.000	55.45	74.00	-18.55	49.62	5.83	Peak								6 !	7206.000	56.42	74.00	-17.58	50.59	5.83	Peak

BLE-2M Middle CH Horizontal							BLE-2M Middle CH Vertical															
Freq		Limit		Over		Read			Freq		Limit		Over		Read							
	Level	Line	Limit	Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
1 !	2360.820	43.79	54.00	-10.21	51.65	-7.86	Average								1 !	2371.710	38.64	54.00	-15.36	46.45	-7.81	Average
2	2360.820	52.84	74.00	-21.16	60.70	-7.86	Peak								2	2371.710	50.73	74.00	-23.27	58.54	-7.81	Peak
3 *	2439.712	112.86			120.51	-7.65	Average								3 *	2440.680	105.91			113.56	-7.65	Average
4 *	2439.712	116.11			123.76	-7.65	Peak								4 *	2440.680	109.13			116.78	-7.65	Peak
5 !	2486.660	38.45	54.00	-15.55	46.04	-7.59	Average								5 !	2493.436	38.04	54.00	-15.96	45.63	-7.59	Average
6	2486.660	52.06	74.00	-21.94	59.65	-7.59	Peak								6	2493.436	51.39	74.00	-22.61	58.98	-7.59	Peak
1 !	3253.300	46.15	54.00	-7.85	51.50	-5.35	Average								1 !	3253.300	44.39	54.00	-9.61	49.74	-5.35	Average
2	3253.300	49.31	74.00	-24.49	54.86	-5.35	Peak								2	3253.300	46.74	74.00	-27.26	52.09	-5.35	Peak
3 !	4880.000	39.12	54.00	-14.88	40.65	-1.53	Average								3 !	4880.000	43.47	54.00	-10.53	45.00	-1.53	Average
4	4880.000	48.37	74.00	-25.63	49.90	-1.53	Peak								4	4880.000	51.23	74.00	-22.77	52.76	-1.53	Peak
5 !	7320.000	47.24	54.00	-6.76	41.94	5.30	Average								5 !	7320.000	48.80	54.00	-5.20	43.50	5.30	Average
6 !	7320.000	56.82	74.00	-17.18	51.52	5.30	Peak								6 !	7320.000	57.82	74.00	-16.18	52.52	5.30	Peak

BLE-2M High CH Horizontal							BLE-2M High CH Vertical															
Freq		Limit		Over		Read			Freq		Limit		Over		Read							
	Level	Line	Limit	Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
1 *	2479.512	104.77			112.37	-7.60	Average								1 *	2479.512	96.67			104.27	-7.60	Average
2 *	2479.512	108.10			115.70	-7.60	Peak								2 *	2479.512	100.05			107.65	-7.60	Peak
3 !	2483.530	52.43	54.00	-1.57	60.02	-7.59	Average								3 !	2483.612	45.23	54.00	-8.77	52.82	-7.59	Average
4 !	2483.530	60.39	74.00	-13.61	67.98	-7.59	Peak								4	2483.612	53.04	74.00	-20.96	60.63	-7.59	Peak
1 !	3306.700	46.56	54.00	-7.44	51.79	-5.23	Average								1 !	3306.700	44.65	54.00	-9.35	49.88	-5.23	Average
2	3306.700	48.80	74.00	-25.20	54.03	-5.23	Peak								2	3306.700	46.88	74.00	-27.12	52.11	-5.23	Peak
3 !	4960.000	38.46	54.00	-15.54	39.80	-1.34	Average								3 !	4960.000	42.41	54.00	-11.59	43.75	-1.34	Average
4	4960.000	46.97	74.00	-27.03	48.31	-1.34	Peak								4	4960.000	49.21	74.00	-24.79	50.55	-1.34	Peak
5 !	7440.000	34.28	54.00	-19.72	28.64	5.64	Average								5 !	7440.000	34.17	54.00	-19.83	28.53	5.64	Average
6	7440.000	48.40	74.00	-25.60	42.76	5.64	Peak								6	7440.000	48.72	74.00	-25.28	43.08	5.64	Peak

<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

BLE-1M Low CH Horizontal							BLE-1M Low CH Vertical													
Freq		Level		Limit		Over		Read		Freq		Level		Limit		Over		Read		
				Line		Limit		Level						Line		Limit		Level		
	MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m				MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m			
1 !	2362.600	48.48	54.00	-5.52	56.32	-7.84	Average				1 !	2361.900	43.07	54.00	-10.93	50.91	-7.84	Average		
2 !	2362.600	55.60	74.00	-18.40	63.44	-7.84	Peak				2	2361.900	53.12	74.00	-20.88	60.96	-7.84	Peak		
3 *	2402.300	115.58			123.31	-7.73	Average				3 *	2401.900	108.81			116.54	-7.73	Average		
4 *	2402.300	116.84			124.57	-7.73	Peak				4 *	2401.900	110.11			117.84	-7.73	Peak		
1 !	3202.700	47.22	54.00	-6.78	52.74	-5.52	Average				1 !	3202.700	41.86	54.00	-12.14	47.38	-5.52	Average		
2	3202.700	48.73	74.00	-25.27	54.25	-5.52	Peak				2	3202.700	44.37	74.00	-29.63	49.89	-5.52	Peak		
3 !	4804.000	43.32	54.00	-10.68	45.00	-1.68	Average				3 !	4804.000	47.82	54.00	-6.18	49.50	-1.68	Average		
4	4804.000	50.62	74.00	-23.38	52.30	-1.68	Peak				4	4804.000	53.43	74.00	-20.57	55.11	-1.68	Peak		
5 !	7206.000	49.32	54.00	-4.68	43.49	5.83	Average				5 !	7206.000	50.12	54.00	-3.88	44.29	5.83	Average		
6 !	7206.000	58.25	74.00	-15.75	52.42	5.83	Peak				6 !	7206.000	58.47	74.00	-15.53	52.64	5.83	Peak		

BLE-1M Middle CH Horizontal							BLE-1M Middle CH Vertical													
Freq		Level		Limit		Over		Read		Freq		Level		Limit		Over		Read		
				Line		Limit		Level						Line		Limit		Level		
	MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m				MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m			
1 !	2359.852	46.09	54.00	-7.91	53.95	-7.86	Average				1 !	2360.094	42.00	54.00	-12.00	49.86	-7.86	Average		
2	2359.852	53.84	74.00	-20.16	61.70	-7.86	Peak				2	2360.094	52.16	74.00	-21.84	60.02	-7.86	Peak		
3 *	2439.954	117.18			124.83	-7.65	Average				3 *	2440.438	111.85			119.50	-7.65	Average		
4 *	2439.954	118.42			126.07	-7.65	Peak				4 *	2440.438	113.18			120.83	-7.65	Peak		
5 !	2488.354	44.10	54.00	-9.90	51.69	-7.59	Average				5 !	2493.436	40.00	54.00	-14.00	47.59	-7.59	Average		
6	2488.354	53.33	74.00	-20.67	60.92	-7.59	Peak				6	2493.436	51.66	74.00	-22.34	59.25	-7.59	Peak		
1 !	3253.300	47.90	54.00	-6.10	53.25	-5.35	Average				1 !	3253.300	46.54	54.00	-7.46	51.89	-5.35	Average		
2	3253.300	50.25	74.00	-23.75	55.60	-5.35	Peak				2	3253.300	47.90	74.00	-26.10	53.25	-5.35	Peak		
3 !	4880.000	48.90	54.00	-5.10	50.43	-1.53	Average				3 !	4880.000	51.10	54.00	-2.90	52.63	-1.53	Average		
4 !	4880.000	54.98	74.00	-19.02	56.51	-1.53	Peak				4 !	4880.000	56.37	74.00	-17.63	57.90	-1.53	Peak		
5 !	7320.000	51.00	54.00	-3.00	45.70	5.30	Average				5 !	7320.000	53.84	54.00	-0.16	48.54	5.30	Average		
6 !	7320.000	59.27	74.00	-14.73	53.97	5.30	Peak				6 !	7320.000	61.95	74.00	-12.05	56.65	5.30	Peak		

BLE-1M High CH Horizontal							BLE-1M High CH Vertical													
Freq		Level		Limit		Over		Read		Freq		Level		Limit		Over		Read		
				Line		Limit		Level						Line		Limit		Level		
	MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m				MHz	dB _{UV} /m	dB _{UV} /m		dB	dB _{UV}	dB/m			
1 *	2479.758	114.78			122.38	-7.60	Average				1 *	2479.758	107.80			115.40	-7.60	Average		
2 *	2479.758	116.00			123.60	-7.60	Peak				2 *	2479.758	109.04			116.64	-7.60	Peak		
3 !	2483.612	53.91	54.00	-0.09	61.50	-7.59	Average				3 !	2483.694	46.57	54.00	-7.43	54.16	-7.59	Average		
4 !	2483.612	63.61	74.00	-10.39	71.20	-7.59	Peak				4 !	2483.694	59.07	74.00	-14.93	66.66	-7.59	Peak		
1 !	3306.700	46.67	54.00	-7.33	51.90	-5.23	Average				1 !	3306.700	46.24	54.00	-7.76	51.47	-5.23	Average		
2	3306.700	48.90	74.00	-25.10	54.13	-5.23	Peak				2	3306.700	48.47	74.00	-25.53	53.70	-5.23	Peak		
3 !	4960.000	50.16	54.00	-3.84	51.50	-1.34	Average				3 !	4960.000	52.17	54.00	-1.83	53.51	-1.34	Average		
4 !	4960.000	55.53	74.00	-18.47	56.87	-1.34	Peak				4 !	4960.000	57.51	74.00	-16.49	58.85	-1.34	Peak		
5 !	7440.000	43.98	54.00	-10.02	38.34	5.64	Average				5 !	7440.000	49.06	54.00	-4.94	43.42	5.64	Average		
6	7440.000	53.28	74.00	-20.72	47.64	5.64	Peak				6 !	7440.000	56.89	74.00	-17.11	51.25	5.64	Peak		

BLE-2M Low CH Horizontal							BLE-2M Low CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
				Line	Limit	Level Factor Remark					Line	Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 ! 2361.800	47.57	54.00	-6.43	55.41	-7.84	Average	1 ! 2361.700	42.36	54.00	-11.64	50.20	-7.84	Average
2 ! 2361.800	57.37	74.00	-16.63	65.21	-7.84	Peak	2 2361.700	53.51	74.00	-20.49	61.35	-7.84	Peak
3 * 2401.600	114.94			122.67	-7.73	Average	3 * 2402.600	109.68			117.41	-7.73	Average
4 * 2401.600	118.22			125.95	-7.73	Peak	4 * 2402.600	112.69			120.42	-7.73	Peak
1 ! 3202.700	44.92	54.00	-9.08	50.44	-5.52	Average	1 ! 3202.700	41.26	54.00	-12.74	46.78	-5.52	Average
2 3202.700	47.41	74.00	-26.59	52.93	-5.52	Peak	2 3202.700	43.05	74.00	-30.95	48.57	-5.52	Peak
3 ! 4804.000	42.18	54.00	-11.82	43.86	-1.68	Average	3 ! 4804.000	45.56	54.00	-8.44	47.24	-1.68	Average
4 4804.000	50.64	74.00	-23.36	52.32	-1.68	Peak	4 4804.000	52.86	74.00	-21.14	54.54	-1.68	Peak
5 ! 7206.000	46.53	54.00	-7.47	40.70	5.83	Average	5 ! 7206.000	46.45	54.00	-7.55	40.62	5.83	Average
6 ! 7206.000	56.24	74.00	-17.76	50.41	5.83	Peak	6 ! 7206.000	55.74	74.00	-18.26	49.91	5.83	Peak

BLE-2M Middle CH Horizontal							BLE-2M Middle CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
				Line	Limit	Level Factor Remark					Line	Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 ! 2359.126	43.70	54.00	-10.30	51.56	-7.86	Average	1 ! 2384.052	40.24	54.00	-13.76	48.02	-7.78	Average
2 2359.126	53.59	74.00	-20.41	61.45	-7.86	Peak	2 2384.052	51.13	74.00	-22.87	58.91	-7.78	Peak
3 * 2439.712	114.76			122.41	-7.65	Average	3 * 2439.712	109.26			116.91	-7.65	Average
4 * 2439.712	118.05			125.70	-7.65	Peak	4 * 2439.712	112.74			120.39	-7.65	Peak
5 ! 2488.354	43.41	54.00	-10.59	51.00	-7.59	Average	5 ! 2483.514	38.94	54.00	-15.06	46.53	-7.59	Average
6 ! 2488.354	54.78	74.00	-19.22	62.37	-7.59	Peak	6 2483.514	51.21	74.00	-22.79	58.80	-7.59	Peak
1 ! 3202.700	44.92	54.00	-9.08	50.44	-5.52	Average	1 ! 3253.300	43.42	54.00	-10.58	48.77	-5.35	Average
2 3202.700	47.41	74.00	-26.59	52.93	-5.52	Peak	2 3253.300	46.22	74.00	-27.78	51.57	-5.35	Peak
3 ! 4804.000	42.18	54.00	-11.82	43.86	-1.68	Average	3 ! 4880.000	48.85	54.00	-5.15	50.38	-1.53	Average
4 4804.000	50.64	74.00	-23.36	52.32	-1.68	Peak	4 ! 4880.000	56.82	74.00	-17.18	58.35	-1.53	Peak
5 ! 7206.000	46.53	54.00	-7.47	40.70	5.83	Average	5 ! 7320.000	50.85	54.00	-3.15	45.55	5.30	Average
6 ! 7206.000	56.24	74.00	-17.76	50.41	5.83	Peak	6 ! 7320.000	60.20	74.00	-13.80	54.90	5.30	Peak

BLE-2M High CH Horizontal							BLE-2M High CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
				Line	Limit	Level Factor Remark					Line	Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1 * 2480.496	106.44			114.04	-7.60	Average	1 * 2479.512	99.15			106.75	-7.60	Average
2 * 2480.496	189.81			117.41	-7.60	Peak	2 * 2479.512	102.52			110.12	-7.60	Peak
3 ! 2483.530	53.19	54.00	-0.81	60.78	-7.59	Average	3 ! 2483.530	45.09	54.00	-8.91	52.68	-7.59	Average
4 ! 2483.530	63.00	74.00	-11.00	70.59	-7.59	Peak	4 ! 2483.530	55.69	74.00	-18.31	63.28	-7.59	Peak
1 ! 3306.700	47.48	54.00	-6.52	52.71	-5.23	Average	1 ! 3306.700	45.67	54.00	-8.33	50.90	-5.23	Average
2 3306.700	49.72	74.00	-24.28	54.95	-5.23	Peak	2 3306.700	46.10	74.00	-27.90	51.33	-5.23	Peak
3 ! 4960.000	42.97	54.00	-11.03	44.31	-1.34	Average	3 ! 4960.000	44.40	54.00	-9.60	45.74	-1.34	Average
4 4960.000	50.86	74.00	-23.14	52.20	-1.34	Peak	4 4960.000	52.13	74.00	-21.87	53.47	-1.34	Peak
5 ! 7440.000	34.32	54.00	-19.68	28.68	5.64	Average	5 ! 7440.000	34.16	54.00	-19.84	28.52	5.64	Average
6 7440.000	48.10	74.00	-25.90	42.46	5.64	Peak	6 7440.000	48.51	74.00	-25.49	42.87	5.64	Peak

< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

BLE-1M Low CH Horizontal							BLE-1M Low CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2343.800	38.50	54.00	-15.50	46.39	-7.89	Average	1 ! 2362.000	48.56	54.00	-5.44	56.40	-7.84	Average	
2 2343.800	50.94	74.00	-23.06	58.83	-7.89	Peak	2 ! 2362.000	56.10	74.00	-17.90	63.94	-7.84	Peak	
3 * 2401.900	101.58			109.31	-7.73	Average	3 * 2401.900	114.92			122.65	-7.73	Average	
4 * 2401.900	102.69			110.42	-7.73	Peak	4 * 2401.900	116.05			123.78	-7.73	Peak	
1 ! 3202.700	46.40	54.00	-7.60	51.92	-5.52	Average	1 ! 3202.700	42.42	54.00	-11.58	47.94	-5.52	Average	
2 3202.700	50.29	74.00	-23.71	55.81	-5.52	Peak	2 3202.700	48.95	74.00	-25.05	54.47	-5.52	Peak	
3 ! 4804.000	45.37	54.00	-8.63	47.05	-1.68	Average	3 ! 4804.000	45.64	54.00	-8.36	47.32	-1.68	Average	
4 4804.000	49.94	74.00	-24.06	51.62	-1.68	Peak	4 4804.000	49.23	74.00	-24.77	50.91	-1.68	Peak	
5 ! 7206.000	47.18	54.00	-6.82	41.35	5.83	Average	5 ! 7206.000	50.73	54.00	-3.27	44.90	5.83	Average	
6 7206.000	52.93	74.00	-21.07	47.10	5.83	Peak	6 ! 7206.000	59.29	74.00	-14.71	53.46	5.83	Peak	

BLE-1M Middle CH Horizontal							BLE-1M Middle CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2369.774	37.12	54.00	-16.88	44.94	-7.82	Average	1 ! 2359.852	43.56	54.00	-10.44	51.42	-7.86	Average	
2 2369.774	50.95	74.00	-23.05	58.77	-7.82	Peak	2 2359.852	52.04	74.00	-21.96	59.90	-7.86	Peak	
3 * 2439.954	101.22			108.87	-7.65	Average	3 * 2439.954	115.17			122.82	-7.65	Average	
4 * 2439.954	102.31			109.96	-7.65	Peak	4 * 2439.954	116.34			123.99	-7.65	Peak	
5 ! 2526.348	37.94	54.00	-16.06	45.42	-7.48	Average	5 ! 2505.778	42.64	54.00	-11.36	50.19	-7.55	Average	
6 2526.348	51.05	74.00	-22.95	58.53	-7.48	Peak	6 2505.778	52.44	74.00	-21.56	59.99	-7.55	Peak	
1 ! 3253.300	47.24	54.00	-6.76	52.59	-5.35	Average	1 ! 3253.300	45.49	54.00	-8.51	50.84	-5.35	Average	
2 3253.300	49.27	74.00	-24.73	54.62	-5.35	Peak	2 3253.300	48.06	74.00	-25.94	53.41	-5.35	Peak	
3 ! 4880.000	43.74	54.00	-10.26	45.27	-1.53	Average	3 ! 4880.000	46.65	54.00	-7.35	48.18	-1.53	Average	
4 4880.000	50.52	74.00	-23.48	52.05	-1.53	Peak	4 4880.000	52.79	74.00	-21.21	54.32	-1.53	Peak	
5 ! 7320.000	48.48	54.00	-5.52	43.18	5.30	Average	5 ! 7320.000	51.45	54.00	-2.55	46.15	5.30	Average	
6 ! 7320.000	57.04	74.00	-16.96	51.74	5.30	Peak	6 ! 7320.000	58.96	74.00	-15.04	53.66	5.30	Peak	

BLE-1M High CH Horizontal							BLE-1M High CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 * 2479.758	100.40			108.00	-7.60	Average	1 * 2480.250	113.90			121.50	-7.60	Average	
2 * 2479.758	101.55			109.15	-7.60	Peak	2 * 2480.250	114.59			122.19	-7.60	Peak	
3 ! 2483.500	40.66	54.00	-13.34	48.25	-7.59	Average	3 ! 2483.530	52.95	54.00	-1.05	60.54	-7.59	Average	
4 * 2483.500	52.49	74.00	-21.51	60.08	-7.59	Peak	4 ! 2483.530	63.97	74.00	-10.03	71.56	-7.59	Peak	
1 ! 3306.700	48.92	54.00	-5.08	54.15	-5.23	Average	1 ! 3306.700	48.32	54.00	-5.68	53.55	-5.23	Average	
2 3306.700	52.26	74.00	-21.74	57.49	-5.23	Peak	2 3306.700	52.43	74.00	-21.57	57.66	-5.23	Peak	
3 ! 4960.000	45.69	54.00	-8.31	47.03	-1.34	Average	3 ! 4960.000	47.12	54.00	-6.88	48.46	-1.34	Average	
4 4960.000	49.16	74.00	-24.84	50.50	-1.34	Peak	4 4960.000	51.75	74.00	-22.25	53.09	-1.34	Peak	
5 ! 7440.000	45.72	54.00	-8.28	40.08	5.64	Average	5 ! 7440.000	48.18	54.00	-5.82	42.54	5.64	Average	
6 7440.000	50.41	74.00	-23.59	44.77	5.64	Peak	6 ! 7440.000	54.50	74.00	-19.50	48.86	5.64	Peak	

BLE-2M Low CH Horizontal							BLE-2M Low CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2381.000	38.05	54.00	-15.95	45.84	-7.79	Average	1 ! 2362.200	45.81	54.00	-8.19	53.65	-7.84	Average	
2 2381.000	50.93	74.00	-23.07	58.72	-7.79	Peak	2 ! 2362.200	55.88	74.00	-18.12	63.72	-7.84	Peak	
3 * 2401.600	99.78			107.51	-7.73	Average	3 * 2401.600	112.59			120.32	-7.73	Average	
4 * 2401.600	102.49			110.22	-7.73	Peak	4 * 2401.600	115.76			123.49	-7.73	Peak	
1 ! 3202.700	45.52	54.00	-8.48	51.04	-5.52	Average	1 ! 3202.700	42.18	54.00	-11.82	47.70	-5.52	Average	
2 3202.700	51.38	74.00	-22.62	56.90	-5.52	Peak	2 3202.700	47.77	74.00	-26.23	53.29	-5.52	Peak	
3 ! 4804.000	41.98	54.00	-12.02	43.66	-1.68	Average	3 ! 4804.000	42.99	54.00	-11.01	44.67	-1.68	Average	
4 4804.000	47.52	74.00	-26.48	49.20	-1.68	Peak	4 4804.000	47.87	74.00	-26.13	49.55	-1.68	Peak	
5 ! 7206.000	46.51	54.00	-7.49	40.68	5.83	Average	5 ! 7206.000	51.26	54.00	-2.74	45.43	5.83	Average	
6 7206.000	50.16	74.00	-23.84	44.33	5.83	Peak	6 ! 7206.000	58.25	74.00	-15.75	52.42	5.83	Peak	

BLE-2M Middle CH Horizontal							BLE-2M Middle CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2366.386	37.07	54.00	-16.93	44.90	-7.83	Average	1 ! 2360.578	42.09	54.00	-11.91	49.95	-7.86	Average	
2 2366.386	50.69	74.00	-23.31	58.52	-7.83	Peak	2 2360.578	52.09	74.00	-21.91	59.95	-7.86	Peak	
3 * 2439.712	95.55			103.20	-7.65	Average	3 * 2439.712	112.77			120.42	-7.65	Average	
4 * 2439.712	98.83			106.48	-7.65	Peak	4 * 2439.712	115.94			123.59	-7.65	Peak	
5 ! 2541.352	37.78	54.00	-16.22	45.20	-7.42	Average	5 ! 2486.418	41.55	54.00	-12.45	49.14	-7.59	Average	
6 2541.352	51.74	74.00	-22.26	59.16	-7.42	Peak	6 2486.418	51.49	74.00	-22.51	59.08	-7.59	Peak	
1 ! 3253.300	47.03	54.00	-6.97	52.38	-5.35	Average	1 ! 3253.300	46.34	54.00	-7.66	51.69	-5.35	Average	
2 3253.300	50.99	74.00	-23.01	56.34	-5.35	Peak	2 3253.300	51.44	74.00	-22.56	56.79	-5.35	Peak	
3 ! 4880.000	41.76	54.00	-12.24	43.29	-1.53	Average	3 ! 4880.000	43.83	54.00	-10.17	45.36	-1.53	Average	
4 4880.000	46.20	74.00	-27.80	47.73	-1.53	Peak	4 4880.000	49.86	74.00	-24.14	51.39	-1.53	Peak	
5 ! 7320.000	46.07	54.00	-7.93	40.77	5.30	Average	5 ! 7320.000	49.90	54.00	-4.10	44.60	5.30	Average	
6 7320.000	52.52	74.00	-21.48	47.22	5.30	Peak	6 ! 7320.000	56.79	74.00	-17.21	51.49	5.30	Peak	

BLE-2M High CH Horizontal							BLE-2M High CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2366.386	37.07	54.00	-16.93	44.90	-7.83	Average	1 ! 2360.578	42.09	54.00	-11.91	49.95	-7.86	Average	
2 2366.386	50.69	74.00	-23.31	58.52	-7.83	Peak	2 2360.578	52.09	74.00	-21.91	59.95	-7.86	Peak	
3 * 2439.712	95.55			103.20	-7.65	Average	3 * 2439.712	112.77			120.42	-7.65	Average	
4 * 2439.712	98.83			106.48	-7.65	Peak	4 * 2439.712	115.94			123.59	-7.65	Peak	
5 ! 2541.352	37.78	54.00	-16.22	45.20	-7.42	Average	5 ! 2486.418	41.55	54.00	-12.45	49.14	-7.59	Average	
6 2541.352	51.74	74.00	-22.26	59.16	-7.42	Peak	6 2486.418	51.49	74.00	-22.51	59.08	-7.59	Peak	
1 ! 3253.300	47.03	54.00	-6.97	52.38	-5.35	Average	1 ! 3253.300	46.34	54.00	-7.66	51.69	-5.35	Average	
2 3253.300	50.99	74.00	-23.01	56.34	-5.35	Peak	2 3253.300	51.44	74.00	-22.56	56.79	-5.35	Peak	
3 ! 4880.000	41.76	54.00	-12.24	43.29	-1.53	Average	3 ! 4880.000	43.83	54.00	-10.17	45.36	-1.53	Average	
4 4880.000	46.20	74.00	-27.80	47.73	-1.53	Peak	4 4880.000	49.86	74.00	-24.14	51.39	-1.53	Peak	
5 ! 7320.000	46.07	54.00	-7.93	40.77	5.30	Average	5 ! 7320.000	49.90	54.00	-4.10	44.60	5.30	Average	
6 7320.000	52.52	74.00	-21.48	47.22	5.30	Peak	6 ! 7320.000	56.79	74.00	-17.21	51.49	5.30	Peak	

< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

BLE-1M Low CH Horizontal							BLE-1M Low CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor
1 ! 2389.400	38.59	54.00	-15.41	46.35	-7.76	Average	1 ! 2362.300	50.09	54.00	-3.91	57.93	-7.84	Average
2 2389.400	51.23	74.00	-22.77	58.99	-7.76	Peak	2 ! 2362.300	57.69	74.00	-16.31	65.53	-7.84	Peak
3 * 2402.300	104.66			112.39	-7.73	Average	3 * 2401.900	117.50			125.23	-7.73	Average
4 * 2402.300	106.66			113.79	-7.73	Peak	4 * 2401.900	118.76			126.49	-7.73	Peak
1 ! 3202.700	44.63	54.00	-9.37	50.15	-5.52	Average	1 ! 3202.700	42.78	54.00	-11.22	48.30	-5.52	Average
2 3202.700	47.45	74.00	-26.55	52.97	-5.52	Peak	2 3202.700	45.72	74.00	-28.28	51.24	-5.52	Peak
3 ! 4804.000	48.26	54.00	-5.74	49.94	-1.68	Average	3 ! 4804.000	50.28	54.00	-3.72	51.96	-1.68	Average
4 ! 4804.000	54.22	74.00	-19.78	55.90	-1.68	Peak	4 ! 4804.000	56.08	74.00	-17.92	57.76	-1.68	Peak
5 ! 7206.000	49.10	54.00	-4.90	43.27	5.83	Average	5 ! 7206.000	53.50	54.00	-0.50	47.67	5.83	Average
6 ! 7206.000	57.47	74.00	-16.53	51.64	5.83	Peak	6 ! 7206.000	61.10	74.00	-12.90	55.27	5.83	Peak

BLE-1M Middle CH Horizontal							BLE-1M Middle CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor
1 ! 2327.182	37.48	54.00	-16.52	45.40	-7.92	Average	1 ! 2359.852	44.57	54.00	-9.43	52.43	-7.86	Average
2 2327.182	50.81	74.00	-23.19	58.73	-7.92	Peak	2 2359.852	53.81	74.00	-20.19	61.67	-7.86	Peak
3 * 2439.954	104.11			111.76	-7.65	Average	3 * 2439.954	118.11			125.76	-7.65	Average
4 * 2439.954	105.41			113.06	-7.65	Peak	4 * 2439.954	119.38			127.03	-7.65	Peak
5 ! 2529.978	37.84	54.00	-16.16	45.30	-7.46	Average	5 ! 2520.056	44.50	54.00	-9.50	52.01	-7.51	Average
6 2529.978	52.06	74.00	-21.94	59.52	-7.46	Peak	6 ! 2520.056	54.03	74.00	-19.97	61.54	-7.51	Peak
1 ! 3253.300	47.07	54.00	-6.93	52.42	-5.35	Average	1 ! 3253.300	45.11	54.00	-8.89	50.46	-5.35	Average
2 3253.300	50.43	74.00	-23.57	55.78	-5.35	Peak	2 3253.300	48.46	74.00	-25.54	53.81	-5.35	Peak
3 ! 4880.000	49.17	54.00	-4.83	50.70	-1.53	Average	3 ! 4880.000	52.85	54.00	-1.15	54.38	-1.53	Average
4 ! 4880.000	54.68	74.00	-19.32	56.21	-1.53	Peak	4 ! 4880.000	58.10	74.00	-15.90	59.63	-1.53	Peak
5 ! 7320.000	48.53	54.00	-5.47	43.23	5.30	Average	5 ! 7320.000	53.72	54.00	-0.28	48.42	5.30	Average
6 ! 7320.000	57.07	74.00	-16.93	51.77	5.30	Peak	6 ! 7320.000	61.14	74.00	-12.86	55.84	5.30	Peak
							7 ! 12200.000	46.83	54.00	-7.17	36.99	9.84	Average
							8 ! 12200.000	57.60	74.00	-16.40	47.76	9.84	Peak

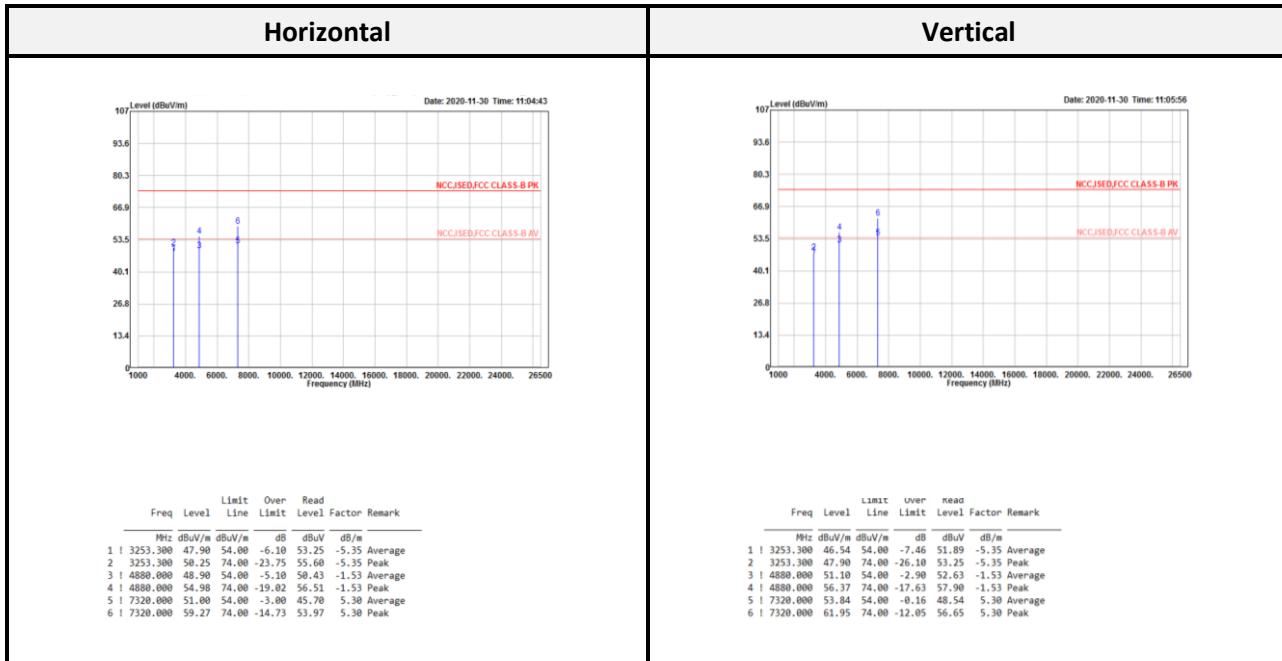
BLE-1M High CH Horizontal							BLE-1M High CH Vertical						
Freq		Level		Limit	Over	Read	Freq		Level		Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	Factor
1 * 2479.758	100.73			108.33	-7.60	Average	1 * 2480.250	115.84			123.44	-7.60	Average
2 * 2479.758	101.90			109.50	-7.60	Peak	2 * 2480.250	116.96			124.56	-7.60	Peak
3 ! 2483.694	41.02	54.00	-12.98	48.61	-7.59	Average	3 ! 2483.694	53.35	54.00	-0.65	68.94	-7.59	Average
4 2483.694	53.14	74.00	-20.86	60.73	-7.59	Peak	4 ! 2483.694	65.05	74.00	-8.95	72.64	-7.59	Peak
1 ! 3306.700	47.50	54.00	-6.50	52.73	-5.23	Average	1 ! 3306.700	47.13	54.00	-6.87	52.36	-5.23	Average
2 3306.700	50.40	74.00	-23.60	55.63	-5.23	Peak	2 3306.700	49.36	74.00	-24.64	54.59	-5.23	Peak
3 ! 4960.000	50.39	54.00	-3.61	51.73	-1.34	Average	3 ! 4960.000	50.64	54.00	-3.36	51.98	-1.34	Average
4 ! 4960.000	55.88	74.00	-18.12	57.22	-1.34	Peak	4 ! 4960.000	55.31	74.00	-18.69	56.65	-1.34	Peak
5 ! 7440.000	43.88	54.00	-10.12	38.24	5.64	Average	5 ! 7440.000	44.92	54.00	-9.08	39.28	5.64	Average
6 7440.000	52.94	74.00	-21.06	47.30	5.64	Peak	6 7440.000	53.15	74.00	-20.85	47.51	5.64	Peak
							7 ! 12400.000	40.27	54.00	-13.73	31.16	9.11	Average
							8 ! 12400.000	51.54	74.00	-22.46	42.43	9.11	Peak

BLE-2M Low CH Horizontal							BLE-2M Low CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2338.800	37.60	54.00	-16.40	45.50	-7.90	Average	1 ! 2361.500	46.96	54.00	-7.04	54.80	-7.84	Average	
2 2338.800	51.30	74.00	-22.70	59.20	-7.90	Peak	2 ! 2361.500	57.56	74.00	-16.44	65.40	-7.84	Peak	
3 * 2402.600	101.58			109.31	-7.73	Average	3 * 2401.600	114.98	54.00			-7.73	Average	
4 * 2402.600	104.72			112.45	-7.73	Peak	4 * 2401.600	118.24	74.00			-7.73	Peak	
1 ! 3202.700	44.93	54.00	-9.07	50.45	-5.52	Average	1 ! 3202.700	43.40	54.00	-10.60	48.92	-5.52	Average	
2 3202.700	47.39	74.00	-26.61	52.91	-5.52	Peak	2 3202.700	46.00	74.00	-28.00	51.52	-5.52	Peak	
3 ! 4804.000	39.19	54.00	-14.81	40.87	-1.68	Average	3 ! 4804.000	48.08	54.00	-5.92	49.76	-1.68	Average	
4 4804.000	46.97	74.00	-27.03	48.65	-1.68	Peak	4 ! 4804.000	55.28	74.00	-18.72	56.96	-1.68	Peak	
5 ! 7206.000	44.37	54.00	-9.63	38.54	5.83	Average	5 ! 7206.000	50.34	54.00	-3.66	44.51	5.83	Average	
6 ! 7206.000	54.67	74.00	-19.33	48.84	5.83	Peak	6 ! 7206.000	59.22	74.00	-14.78	53.39	5.83	Peak	

BLE-2M Middle CH Horizontal							BLE-2M Middle CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 ! 2313.872	36.68	54.00	-17.32	44.61	-7.93	Average	1 ! 2387.198	42.65	54.00	-11.35	50.42	-7.77	Average	
2 2313.872	52.27	74.00	-21.73	60.20	-7.93	Peak	2 2387.198	53.46	74.00	-20.54	61.23	-7.77	Peak	
3 * 2439.712	100.65			108.30	-7.65	Average	3 * 2440.680	115.75			123.40	-7.65	Average	
4 * 2439.712	104.15			111.80	-7.65	Peak	4 * 2440.680	119.00			126.65	-7.65	Peak	
5 ! 2547.160	37.46	54.00	-16.54	44.85	-7.39	Average	5 ! 2493.920	43.51	54.00	-10.49	51.09	-7.58	Average	
6 2547.160	51.49	74.00	-22.51	58.88	-7.39	Peak	6 ! 2493.920	54.06	74.00	-19.94	61.64	-7.58	Peak	
1 ! 3253.300	48.58	54.00	-5.42	53.93	-5.35	Average	1 ! 3253.300	45.23	54.00	-8.77	50.58	-5.35	Average	
2 3253.300	50.93	74.00	-23.07	56.28	-5.35	Peak	2 3253.300	47.58	74.00	-26.42	52.93	-5.35	Peak	
3 ! 4880.000	47.11	54.00	-6.89	48.64	-1.53	Average	3 ! 4880.000	49.47	54.00	-4.53	51.00	-1.53	Average	
4 ! 4880.000	54.37	74.00	-19.63	55.90	-1.53	Peak	4 ! 4880.000	56.67	74.00	-17.33	58.20	-1.53	Peak	
5 ! 7320.000	45.74	54.00	-8.26	40.44	5.30	Average	5 ! 7320.000	50.00	54.00	-4.00	44.70	5.30	Average	
6 ! 7320.000	55.20	74.00	-18.80	49.90	5.30	Peak	6 ! 7320.000	58.61	74.00	-15.39	53.31	5.30	Peak	
							7 ! 12200.000	44.44	54.00	-9.56	34.60	9.84	Average	
							8 ! 12200.000	56.14	74.00	-17.86	46.30	9.84	Peak	

BLE-2M High CH Horizontal							BLE-2M High CH Vertical							
Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read	Freq	Level	Limit	Over	Read
MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV	MHz	dBuV/m	dBuV/m	dB	dBuV
1 * 2479.512	91.23			98.83	-7.60	Average	1 * 2480.496	107.26			114.86	-7.60	Average	
2 * 2479.512	94.63			102.23	-7.60	Peak	2 * 2480.496	110.48			118.08	-7.60	Peak	
3 ! 2537.896	37.37	54.00	-16.63	44.80	-7.43	Average	3 ! 2483.530	53.81	54.00	-0.19	61.40	-7.59	Average	
4 2537.896	52.02	74.00	-21.98	59.45	-7.43	Peak	4 ! 2483.530	64.23	74.00	-9.77	71.82	-7.59	Peak	
1 ! 3306.700	48.24	54.00	-5.76	53.47	-5.23	Average	1 ! 3306.700	47.24	54.00	-6.76	52.47	-5.23	Average	
2 3306.700	49.91	74.00	-24.09	55.14	-5.23	Peak	2 3306.700	49.47	74.00	-24.53	54.70	-5.23	Peak	
3 ! 4960.000	42.52	54.00	-11.48	43.86	-1.34	Average	3 ! 4960.000	43.31	54.00	-10.69	44.65	-1.34	Average	
4 4960.000	50.31	74.00	-23.69	51.65	-1.34	Peak	4 4960.000	51.10	74.00	-22.90	52.44	-1.34	Peak	
5 ! 7440.000	34.08	54.00	-19.92	28.44	5.64	Average	5 ! 7440.000	34.20	54.00	-19.80	28.56	5.64	Average	
6 7440.000	48.86	74.00	-25.14	43.22	5.64	Peak	6 7440.000	48.41	74.00	-25.59	42.77	5.64	Peak	

Above 1G (1 GHz-26.5 GHz): The worst mode is Chip Antenna with 3.3V_{dc} for BLE-1M middle CH.



Level = Read Level + Factor

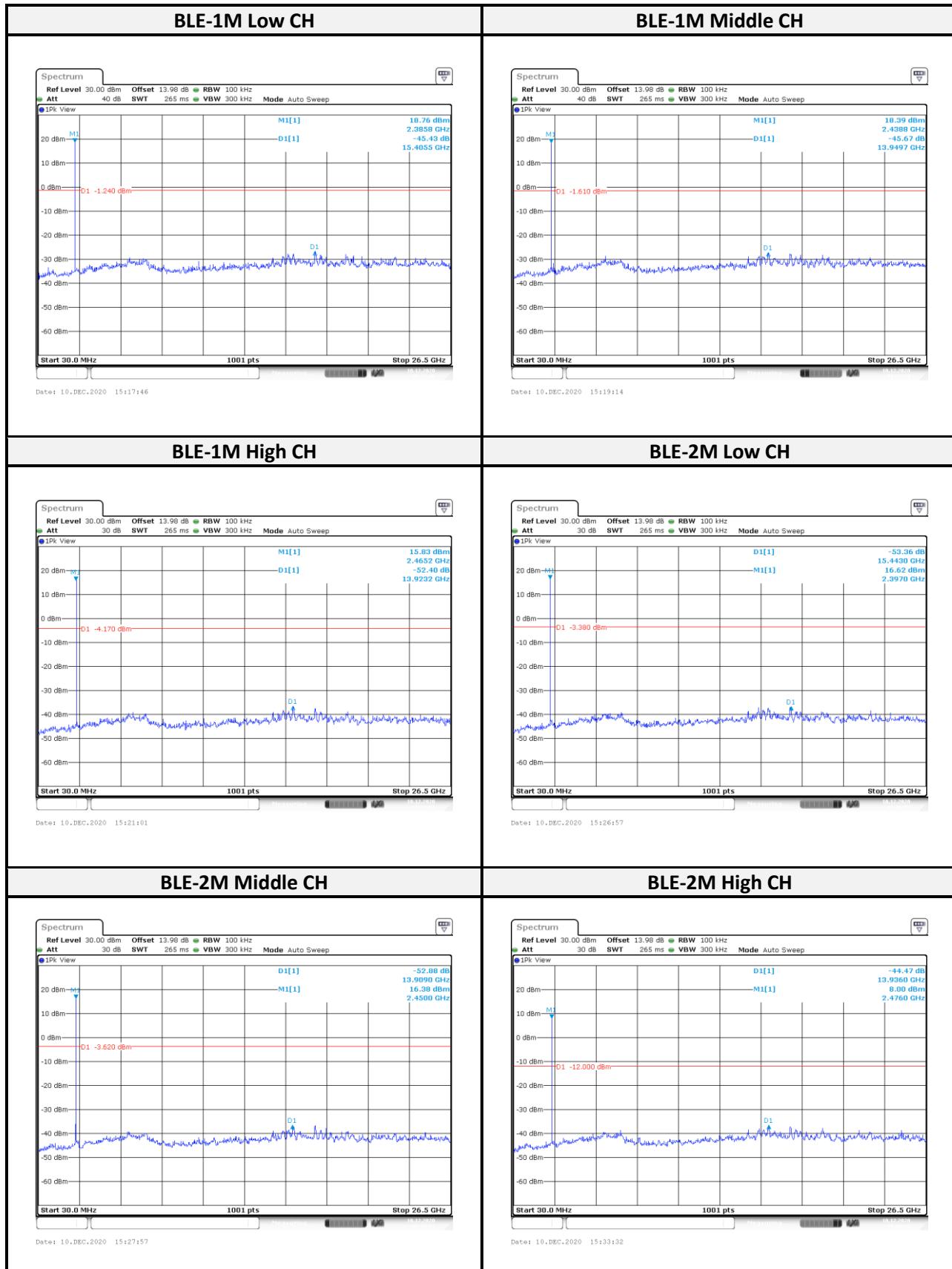
Over Limit = Level – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Conducted Spurious Emissions:

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE-1Mbps	Low	2402	45.43	≥ 20	Compliance
	Mid	2440	45.67	≥ 20	Compliance
	High	2480	52.40	≥ 20	Compliance
BLE-2Mbps	Low	2402	51.20	≥ 20	Compliance
	Mid	2440	52.27	≥ 20	Compliance
	High	2480	51.40	≥ 20	Compliance



9 FCC §15.247(a)(2) and RSS-247 Sec 5.2 – 6 dB Emission Bandwidth and RSS-Gen Sec 6.7 99% OBW

9.1 Applicable Standard

According to FCC §15.247(a) (2),

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

According to RSS-247 §5.2 a),

The minimum 6 dB bandwidth shall be 500 kHz.

According to RSS-Gen §6.7,

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

9.2 Test Procedure

6 dB Emission Bandwidth

According to ANSI C63.10-2013, the steps for the first option are as follows:

(1) Set RBW = 100 kHz. (2) Set the VBW $\geq [3 \times \text{RBW}]$. (3) Detector = peak. (4) Trace mode = max hold. (5) Sweep = auto couple. (6) Allow the trace to stabilize. (7) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99% Emission Bandwidth

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

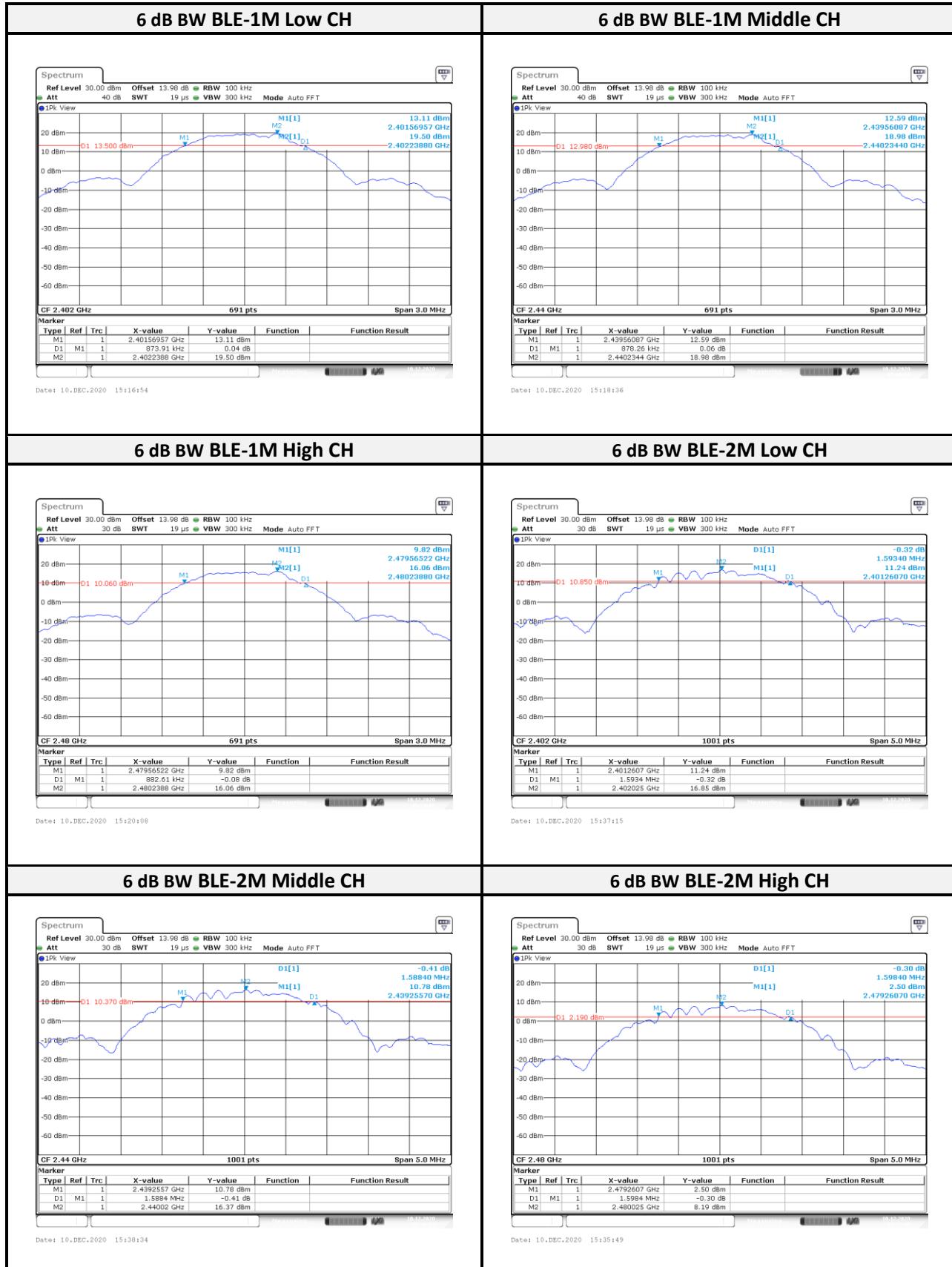
9.3 Test Equipment List and Details

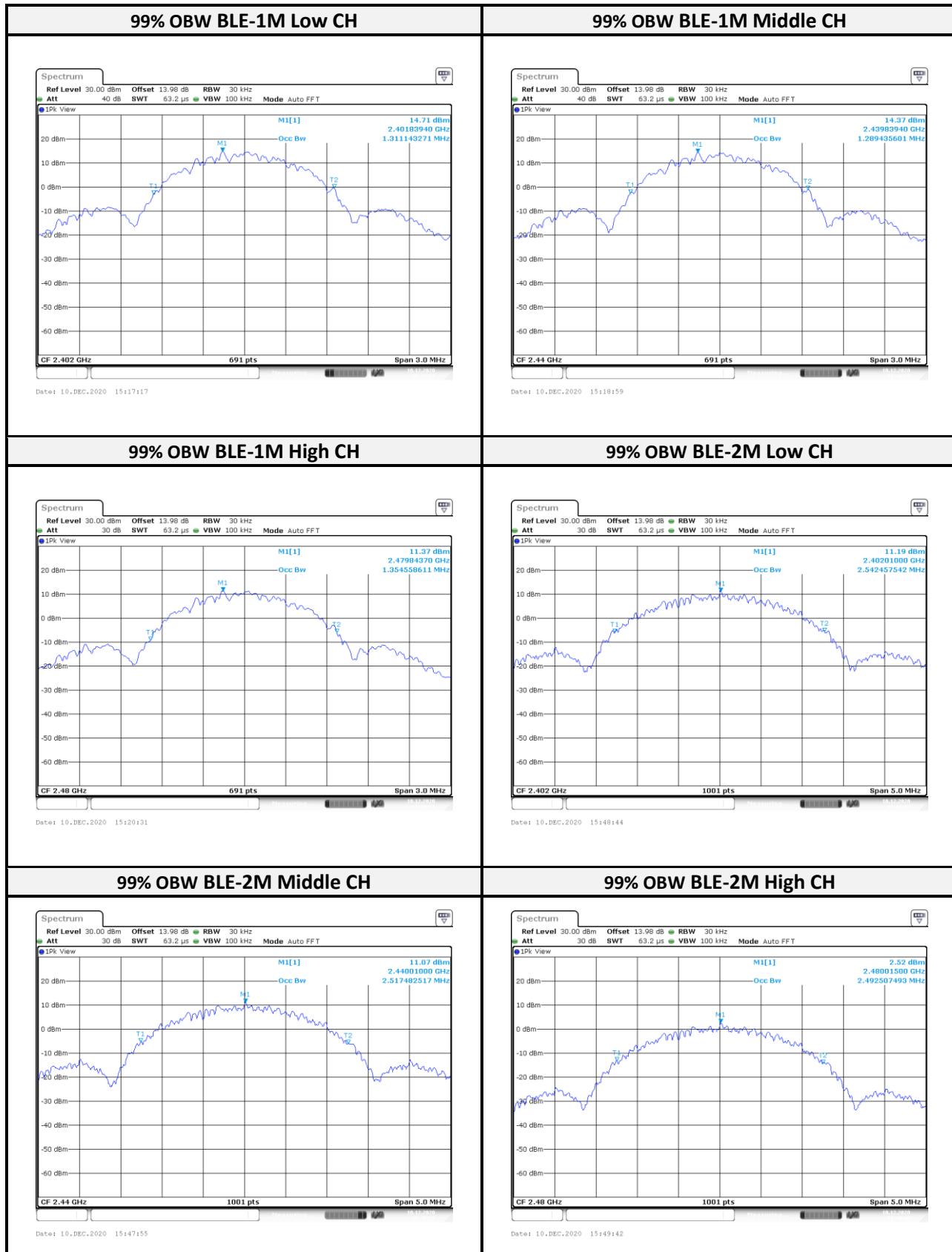
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

9.4 Test Results

Configuration	Channel	Frequency (MHz)	99% OBW (MHz)	6 dB BW (MHz)	6dB Limit (MHz)	Result
BLE-1Mbps	Low	2402	1.31	0.87	> 0.5	Compliance
	Middle	2440	1.29	0.88	> 0.5	Compliance
	High	2480	1.35	0.88	> 0.5	Compliance
BLE-2Mbps	Low	2402	2.54	1.59	> 0.5	Compliance
	Middle	2440	2.52	1.59	> 0.5	Compliance
	High	2480	2.49	1.60	> 0.5	Compliance





10 FCC §15.247(b)(3) and RSS-247 §5.4(d)– Maximum Output Power

10.1 Applicable Standard

According to FCC §15.247(b) (3),

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to RSS-247 §5.4(d).

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

10.2 Test Procedure

- (1) Place the EUT on a bench and set it in transmitting mode.
- (2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.
- (3). Add a correction factor to the display.

10.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
USB Wideband Power Sensor	Agilent	U2021XA	MY52500008	2020/01/06	2021/01/05
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

10.4 Test Results

<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE-1Mbps	Low	2402	17.00	0.0501	1.70	18.70	0.0741	30	36
	Middle	2440	16.45	0.0442	1.70	18.15	0.0653	30	36
	High	2480	15.76	0.0377	1.70	17.46	0.0557	30	36
BLE-2Mbps	Low	2402	16.84	0.0483	1.70	18.54	0.0714	30	36
	Middle	2440	16.33	0.0430	1.70	18.03	0.0635	30	36
	High	2480	10.18	0.0104	1.70	11.88	0.0154	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE-1Mbps	Low	2402	16.88	0.0488	1.70	18.58	0.0721	30	36
	Middle	2440	16.35	0.0432	1.70	18.05	0.0638	30	36
	High	2480	15.66	0.0368	1.70	17.36	0.0545	30	36
BLE-2Mbps	Low	2402	16.73	0.0471	1.70	18.43	0.0697	30	36
	Middle	2440	16.22	0.0419	1.70	17.92	0.0619	30	36
	High	2480	9.51	0.0089	1.70	11.21	0.0132	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE-1Mbps	Low	2402	21.58	0.1439	1.70	24.98	0.3148	30	36
	Middle	2440	21.13	0.1297	1.70	24.53	0.2838	30	36
	High	2480	18.01	0.0632	1.70	21.41	0.1384	30	36
BLE-2Mbps	Low	2402	21.20	0.1318	1.70	24.60	0.2884	30	36
	Middle	2440	20.81	0.1205	1.70	24.21	0.2636	30	36
	High	2480	13.07	0.0203	1.70	16.47	0.0444	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE- 1Mbps	Low	2402	21.23	0.1327	1.70	22.93	0.1963	30	36
	Middle	2440	20.86	0.1219	1.70	22.56	0.1803	30	36
	High	2480	17.71	0.0590	1.70	19.41	0.0873	30	36
BLE- 2Mbps	Low	2402	20.78	0.1197	1.70	22.48	0.1770	30	36
	Middle	2440	20.50	0.1122	1.70	22.20	0.1660	30	36
	High	2480	12.00	0.0158	1.70	13.70	0.0234	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE- 1Mbps	Low	2402	16.91	0.0491	5.89	22.80	0.1905	30	36
	Middle	2440	16.40	0.0437	5.89	22.29	0.1694	30	36
	High	2480	15.70	0.0372	5.89	21.59	0.1442	30	36
BLE- 2Mbps	Low	2402	16.85	0.0484	5.89	22.74	0.1879	30	36
	Middle	2440	16.35	0.0432	5.89	22.24	0.1675	30	36
	High	2480	10.27	0.0106	5.89	16.16	0.0413	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE- 1Mbps	Low	2402	16.83	0.0482	5.89	22.72	0.1871	30	36
	Middle	2440	16.31	0.0428	5.89	22.20	0.1660	30	36
	High	2480	15.62	0.0365	5.89	21.51	0.1416	30	36
BLE- 2Mbps	Low	2402	16.75	0.0473	5.89	22.64	0.1837	30	36
	Middle	2440	16.24	0.0421	5.89	22.13	0.1633	30	36
	High	2480	9.60	0.0091	5.89	15.49	0.0354	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

Mode	CH	Freq. (MHz)	Peak Output Power		Ant Gain (dBi)	EIRP Peak Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE- 1Mbps	Low	2402	21.53	0.1422	5.89	27.42	0.5521	30	36
	Middle	2440	21.06	0.1276	5.89	26.95	0.4955	30	36
	High	2480	18.12	0.0649	5.89	24.01	0.2518	30	36
BLE- 2Mbps	Low	2402	21.09	0.1285	5.89	26.98	0.4989	30	36
	Middle	2440	20.74	0.1186	5.89	26.63	0.4603	30	36
	High	2480	12.83	0.0192	5.89	18.72	0.0745	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm

Mode	CH	Freq. (MHz)	Average Output Power		Ant Gain (dBi)	EIRP Average Output Power		Limit (dBm)	EIRP Limit (dBm)
			(dBm)	(W)		(dBm)	(W)		
BLE- 1Mbps	Low	2402	21.21	0.1321	5.89	27.10	0.5129	30	36
	Middle	2440	20.80	0.1202	5.89	26.69	0.4667	30	36
	High	2480	17.84	0.0608	5.89	23.73	0.2360	30	36
BLE- 2Mbps	Low	2402	20.64	0.1159	5.89	26.53	0.4498	30	36
	Middle	2440	20.40	0.1096	5.89	26.29	0.4256	30	36
	High	2480	11.81	0.0152	5.89	17.70	0.0589	30	36

Note1: Conducted Power Limit: 1W = 30 dBm, 4W = 36 dBm; Note2: Duty Cycle is 100% and Duty Factor is 0 dB.

11 FCC §15.247(d) and RSS-247 §5.5 – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d),

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to RSS-247 §5.5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.2 Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- (3) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- (4) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

11.3 Test Equipment List and Details

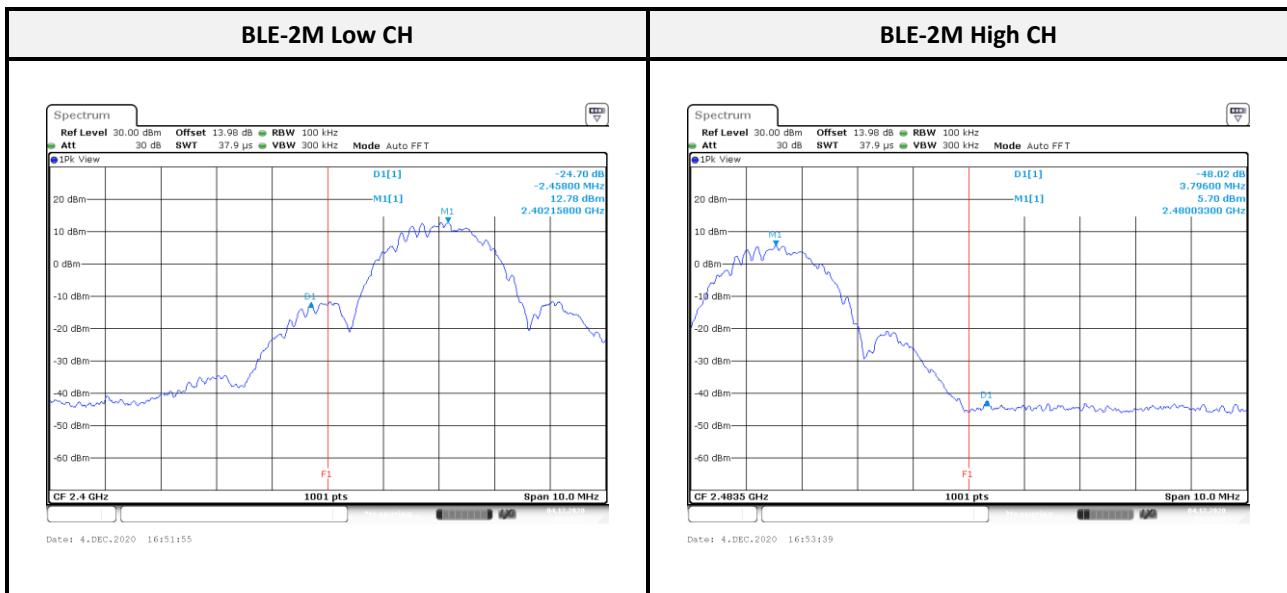
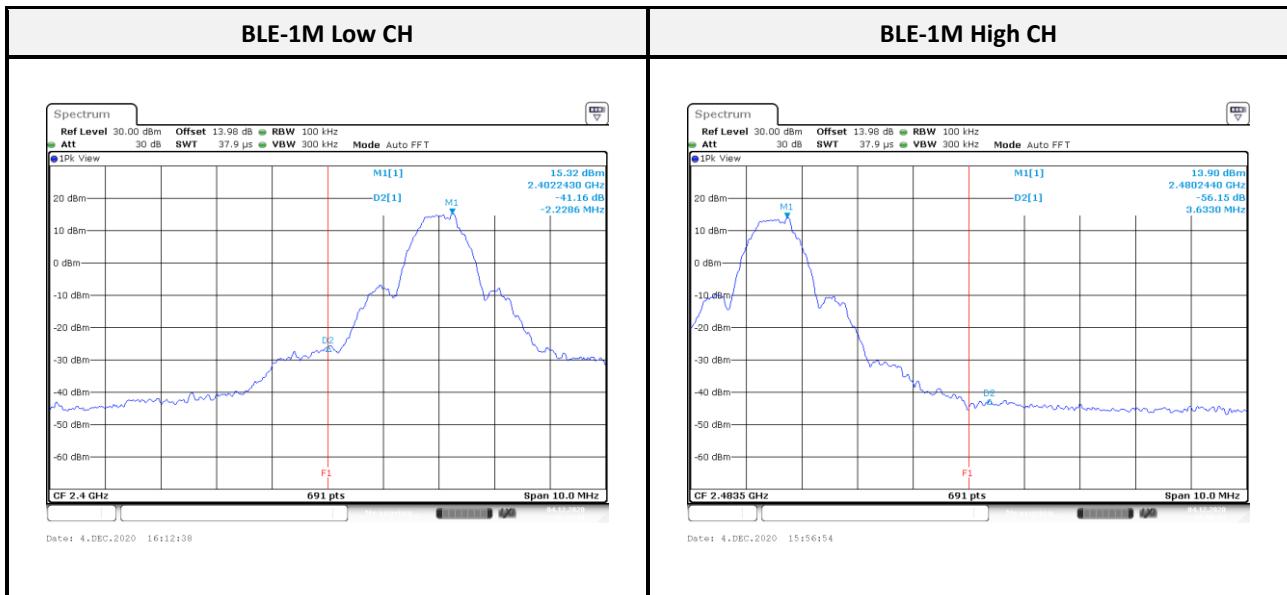
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

11.4 Test Results

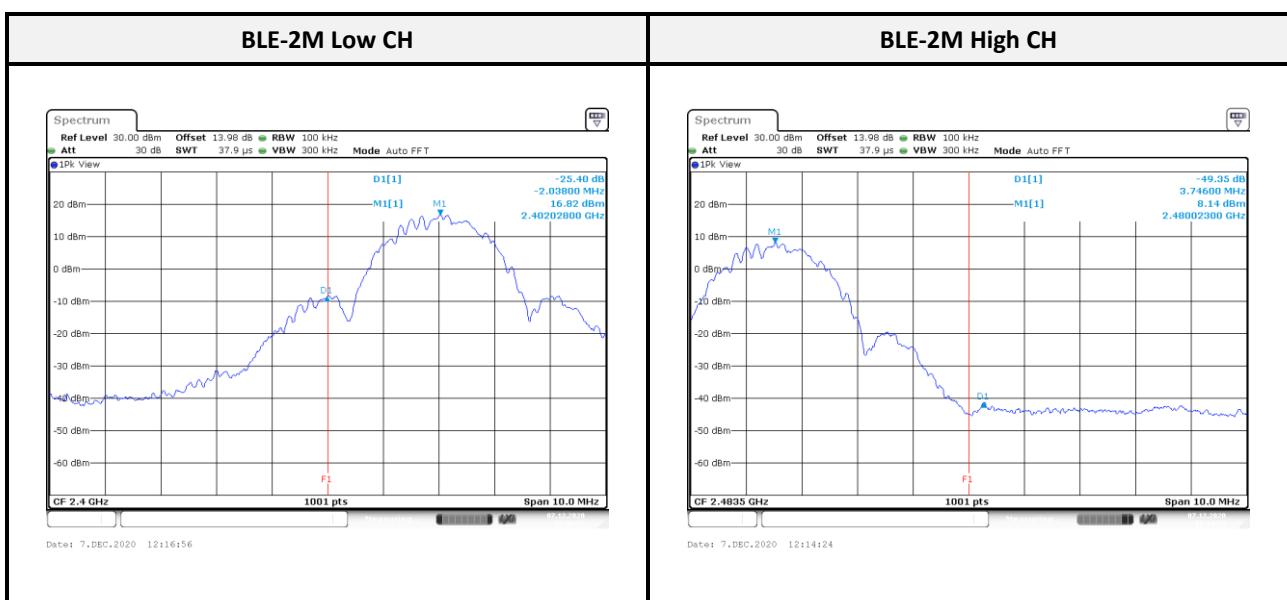
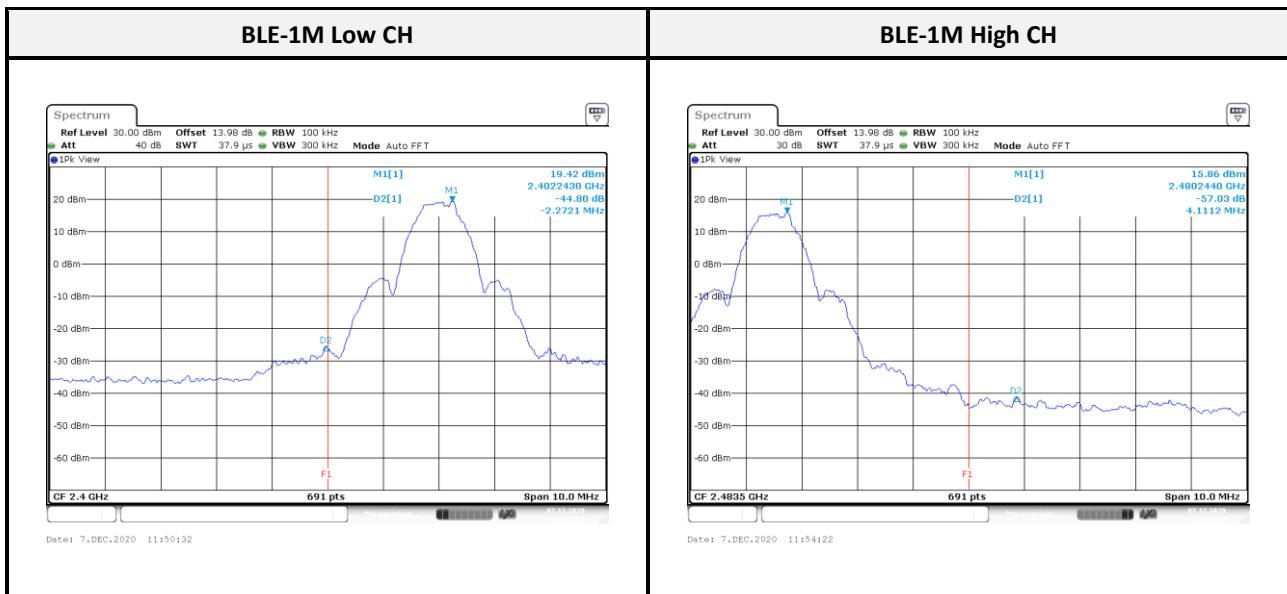
<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE-1M	Low	2402	41.16	≥ 20	Compliance
	High	2480	56.15	≥ 20	Compliance
BLE-2M	Low	2402	24.70	≥ 20	Compliance
	High	2480	48.02	≥ 20	Compliance



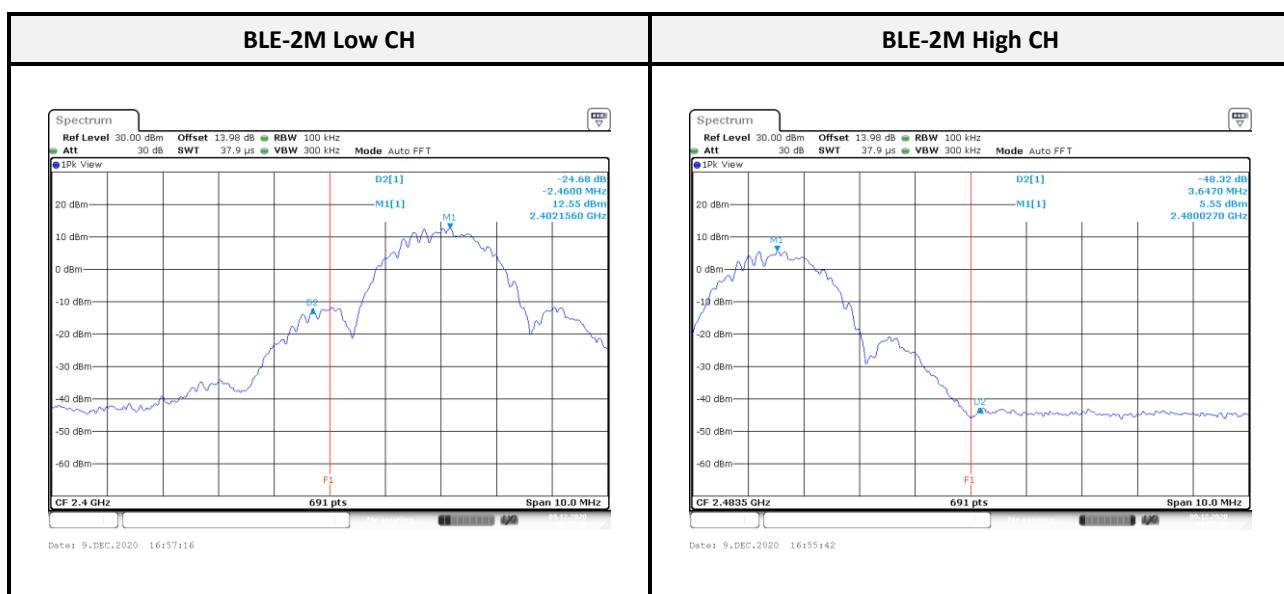
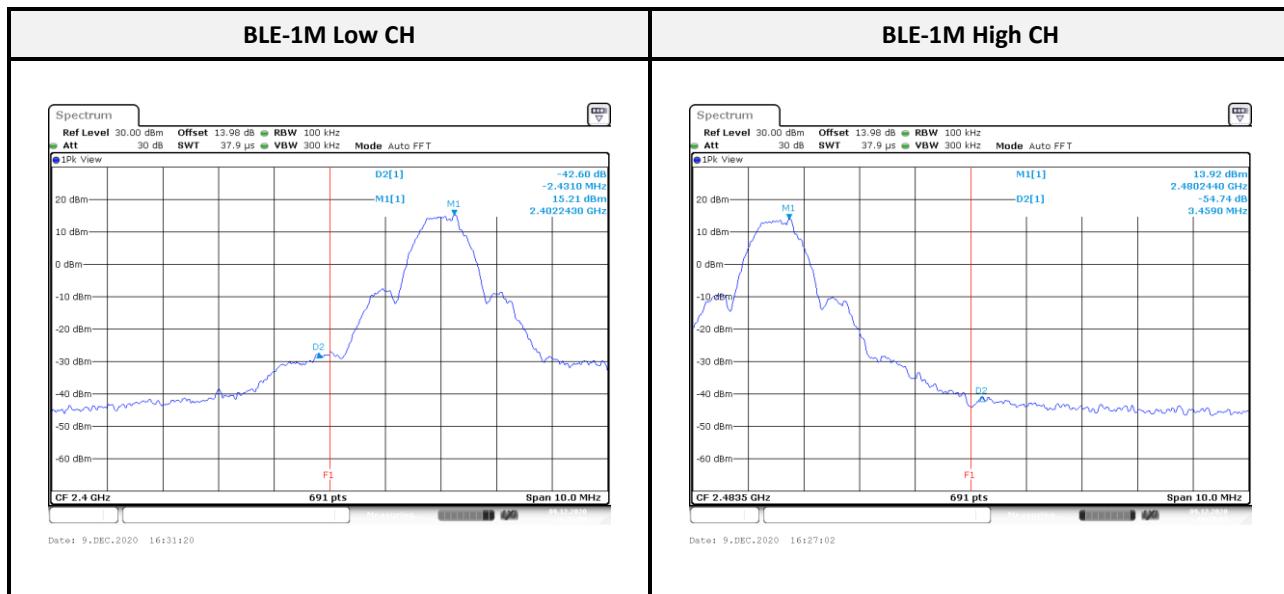
<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE-1M	Low	2402	44.80	≥ 20	Compliance
	High	2480	57.03	≥ 20	Compliance
BLE-2M	Low	2402	25.40	≥ 20	Compliance
	High	2480	49.35	≥ 20	Compliance



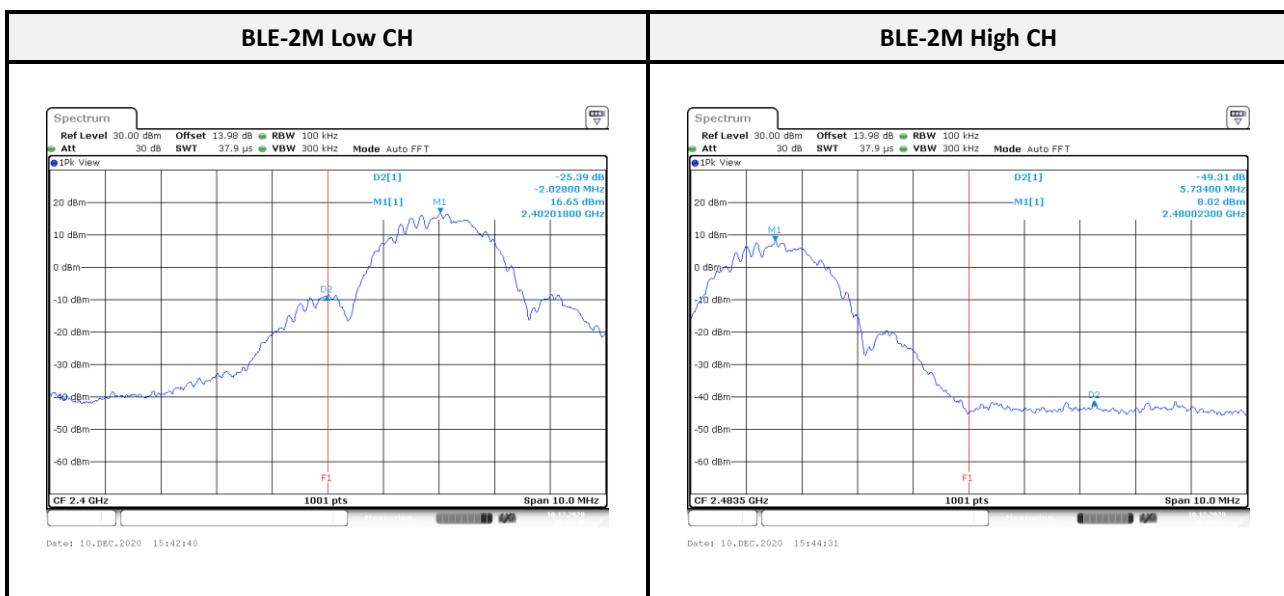
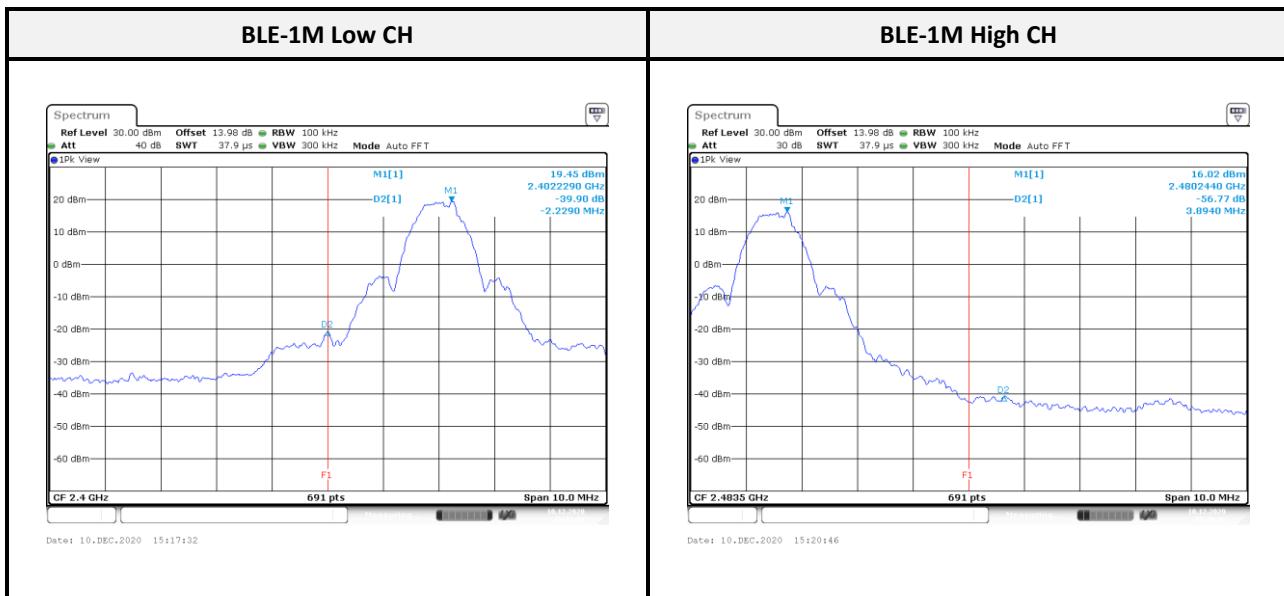
< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE-1M	Low	2402	42.60	≥ 20	Compliance
	High	2480	54.74	≥ 20	Compliance
BLE-2M	Low	2402	24.68	≥ 20	Compliance
	High	2480	48.32	≥ 20	Compliance



< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

Configuration	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BLE-1M	Low	2402	39.90	≥ 20	Compliance
	High	2480	56.77	≥ 20	Compliance
BLE-2M	Low	2402	25.39	≥ 20	Compliance
	High	2480	49.31	≥ 20	Compliance



12 FCC §15.247(e) and RSS-247 §5.2(b) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

According to RSS-247 §5.2(b).

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

12.2 Test Procedure

According to ANSI C63.10-2013,

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth. (3) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq [3 \times \text{RBW}]$. (5) Detector = peak. (6) Sweep time = auto couple.
- (7) Trace mode = max hold. (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level within the RBW.
- (10) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

12.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Spectrum Analyzer	Rohde & Schwarz	FSU26	100406	2020/03/11	2021/03/10
Cable	MTJ	MT40S	620620-MT40S-100	Each Use	-

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

12.4 Test Results

<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
BLE-1M	Low	2402	-0.77	8	Compliance
	Middle	2440	-0.89	8	Compliance
	High	2480	-1.35	8	Compliance
BLE-2M	Low	2402	-1.60	8	Compliance
	Middle	2440	-2.06	8	Compliance
	High	2480	-8.59	8	Compliance

<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

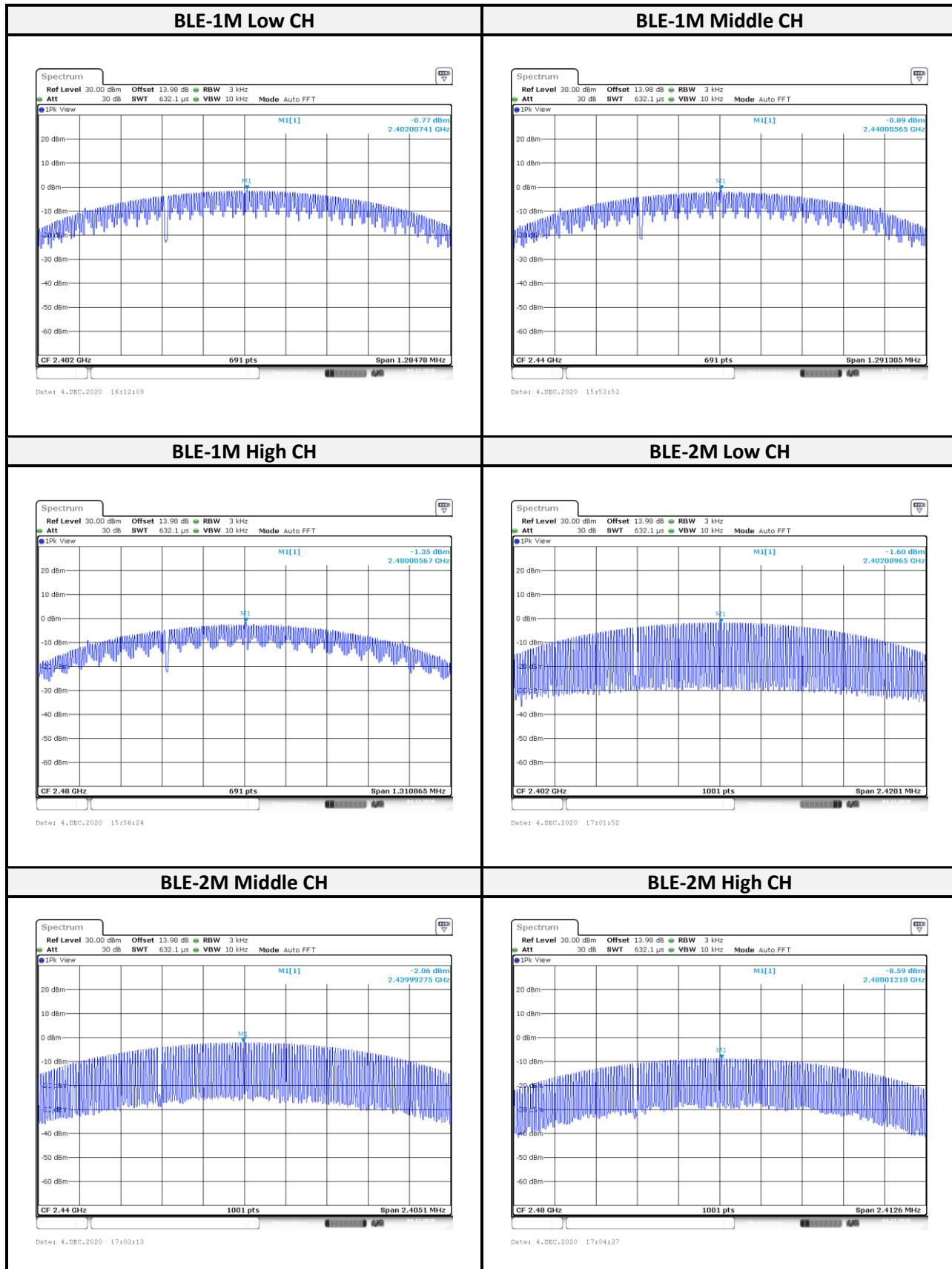
Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
BLE-1M	Low	2402	4.87	8	Compliance
	Middle	2440	4.65	8	Compliance
	High	2480	1.12	8	Compliance
BLE-2M	Low	2402	2.14	8	Compliance
	Middle	2440	2.09	8	Compliance
	High	2480	-6.31	8	Compliance

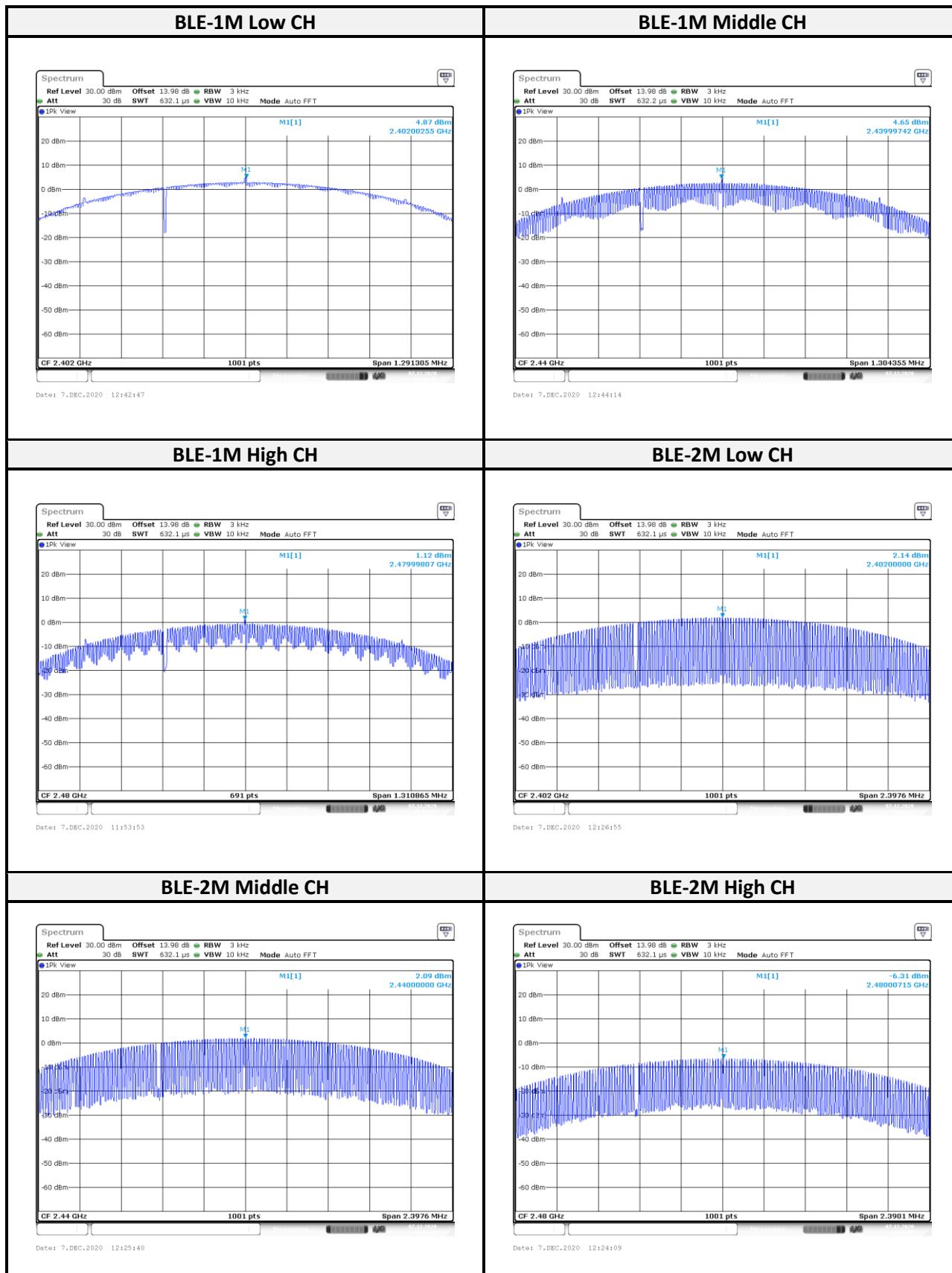
< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

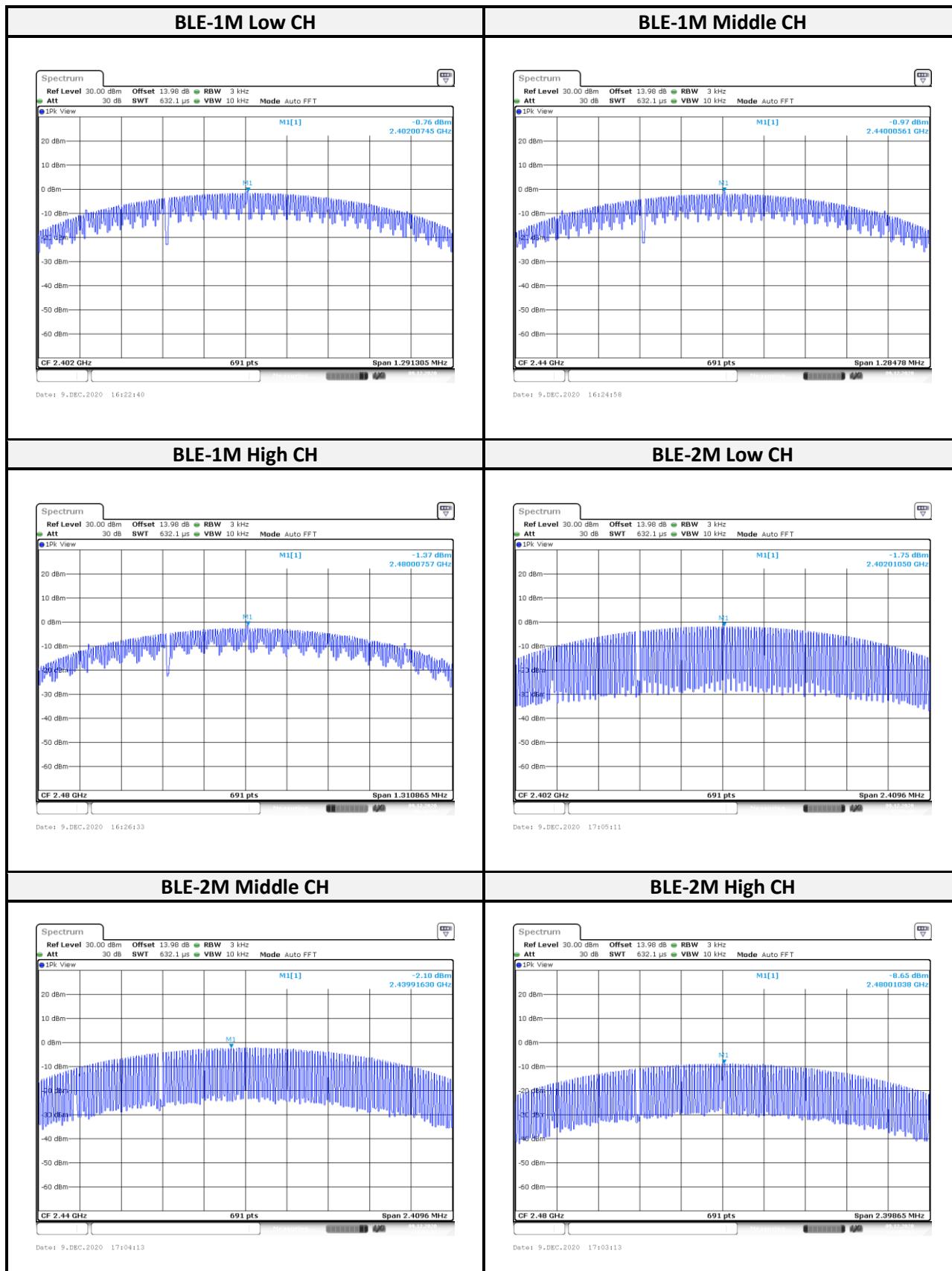
Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
BLE-1M	Low	2402	-0.76	8	Compliance
	Middle	2440	-0.97	8	Compliance
	High	2480	-1.37	8	Compliance
BLE-2M	Low	2402	-1.75	8	Compliance
	Middle	2440	-2.10	8	Compliance
	High	2480	-8.65	8	Compliance

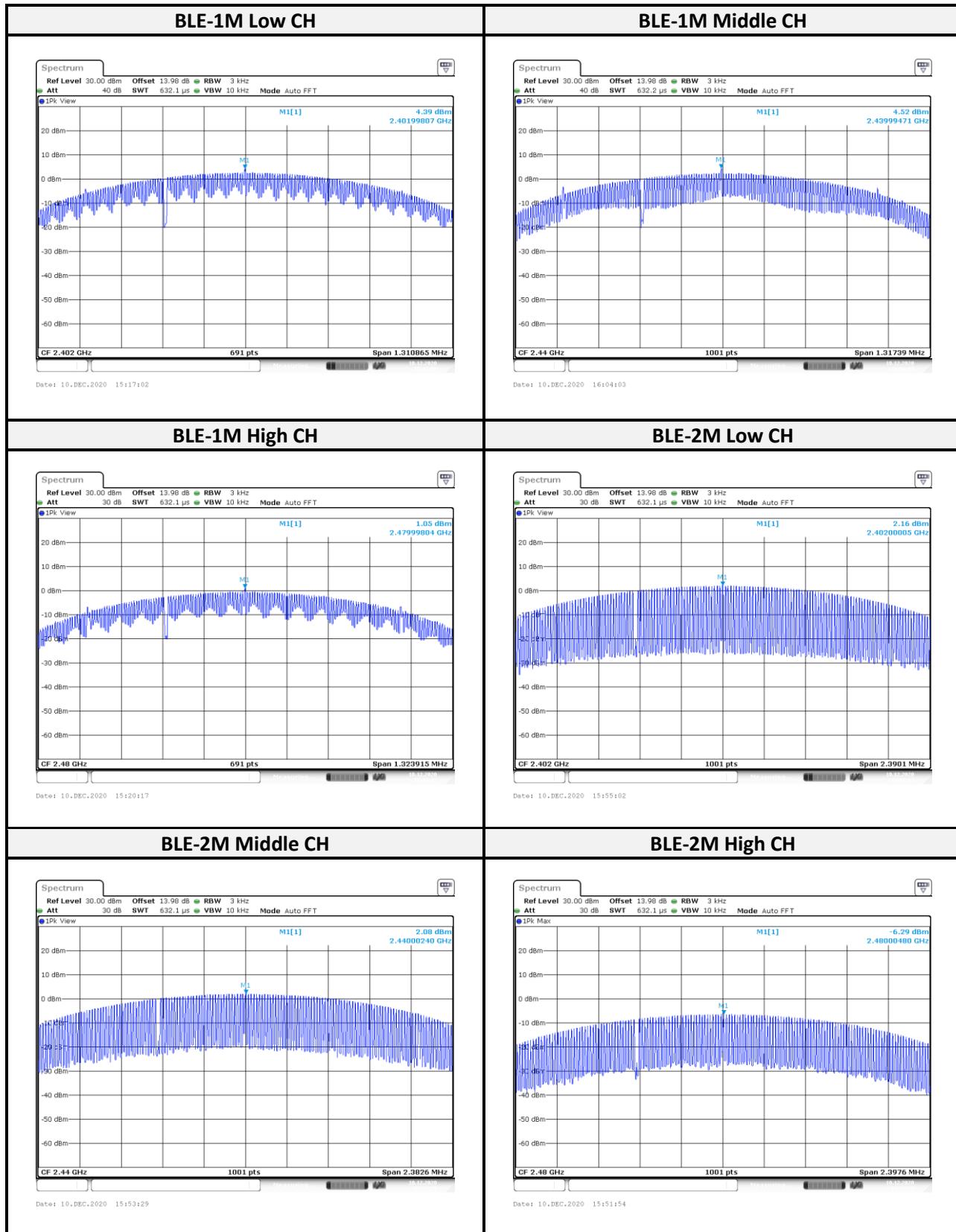
< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

Configuration	Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
BLE-1M	Low	2402	4.39	8	Compliance
	Middle	2440	4.52	8	Compliance
	High	2480	1.05	8	Compliance
BLE-2M	Low	2402	2.16	8	Compliance
	Middle	2440	2.08	8	Compliance
	High	2480	-6.29	8	Compliance

<Chip Antenna (FR05-S1-N-0-102) with 1.8V_{dc}>

<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

----- END OF REPORT -----