



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-B001P5V2P1
IC Identity:	IC: 8407A-B001P5V2P1
Product Name:	WiFi bgn, BT5.0 SIP Module
Model Name:	RS9116-B00
Report Number:	RLK201108001-00B
Report Date:	2021/02/01
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	RLK201108001-00B	2021/02/01	Original Report

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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-B00
Frequency Range	2402 - 2480 MHz
Number of Channels	79 Channels
Output Power	<p>Chip Antenna (FR05-S1-N-0-102) with 1.8Vdc BR-1Mbps: 16.52 dBm (0.0449 W) EDR-2Mbps: 17.17 dBm (0.0521 W) EDR-3Mbps: 17.45 dBm (0.0556 W)</p> <p>Chip Antenna (FR05-S1-N-0-102) with 3.3Vdc BR-1Mbps: 18.88 dBm (0.0773 W) EDR-2Mbps: 20.48 dBm (0.1117 W) EDR-3Mbps: 20.67 dBm (0.1167 W)</p> <p>Dipole Antenna (GW.34.5153) with 1.8Vdc BR-1Mbps: 16.73 dBm (0.0471 W) EDR-2Mbps: 17.47 dBm (0.0558 W) EDR-3Mbps: 17.75 dBm (0.0596 W)</p> <p>Dipole Antenna (GW.34.5153) with 3.3Vdc BR-1Mbps: 20.68 dBm (0.1169 W) EDR-2Mbps: 20.26 dBm (0.1062 W) EDR-3Mbps: 20.47 dBm (0.1114 W)</p>
Power Operation (Voltage Range)	<input checked="" type="checkbox"/> DC Type <input checked="" type="checkbox"/> From Host System: 1.8Vdc/3.3Vdc
Modulation Type	BR-1Mbps: GFSK; EDR-2Mbps: $\pi/4$ -DQPSK; EDR-3Mbps: 8-DPSK
Related Submittal(s)/Grant(s)	FCC Part 15.247 DSS with FCC ID: XF6-B001P5V2P1 FCC Part 15.247 DTS with FCC ID: XF6-B001P5V2P1
Received Date	2020/11/10
Date of Test	2020/11/10 - 2020/11/28

*All measurement and test data in this report was gathered from production sample serial number: 201108001. 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-B00) 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 Description of 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 BT (BR/EDR), there are totally 79 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441
1	2403	--	--
2	2404	--	--
3	2405	76	2478
--	--	77	2479
38	2440	78	2480

For BLE: Channel **0, 39** and **78** were tested.

For Radiated Emission, Conducted Power, Conducted Band Edge had test for four antenna because the power setting is different, the result will be different. For Bandwidth, Conducted Emission, Separation, Dwell Time, Hopping Channel Test only test one result that because the power not affect the result

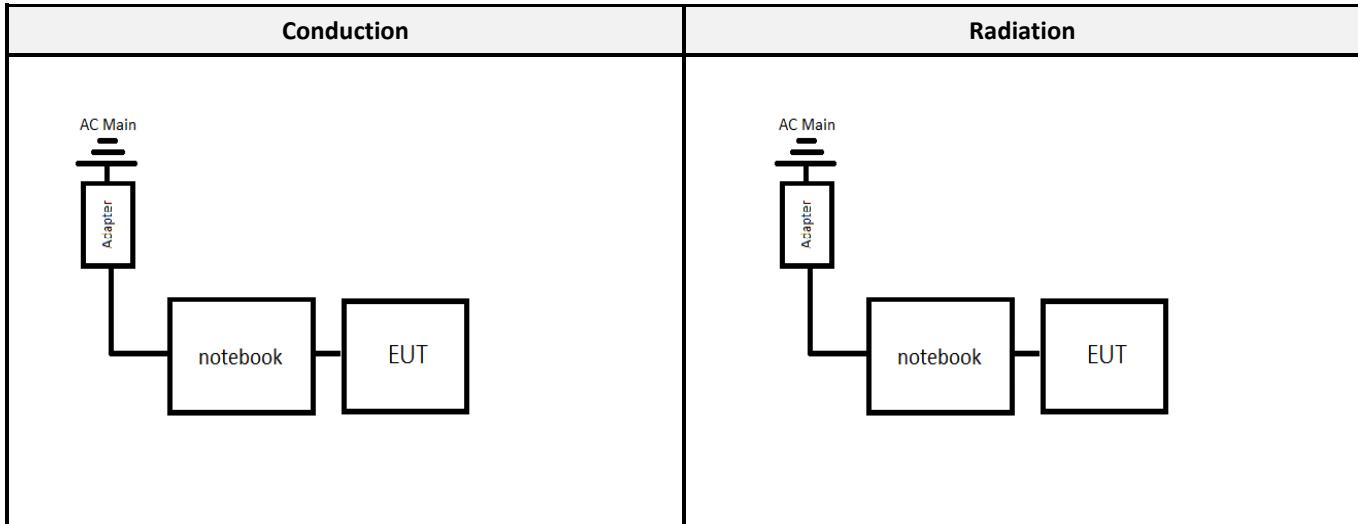
Worst Case of Power Setting				
EUT Exercise Software		PER Test App		
Configuration	N _{TX}	Low CH	Mid CH	High CH
Chip 1.8V BR-1Mbps	1	22	22	22
Chip 1.8V EDR-2Mbps	1	22	22	18
Chip 1.8V EDR-3Mbps	1	22	22	17
Chip 3.3V BR-1Mbps	1	21	21	21
Chip 3.3V EDR-2Mbps	1	19	19	19
Chip 3.3V EDR-3Mbps	1	18	18	18
Dipole 1.8V BR-1Mbps	1	22	22	19
Dipole 1.8V EDR-2Mbps	1	22	22	17
Dipole 1.8V EDR-3Mbps	1	22	22	14
Dipole 3.3V BR-1Mbps	1	21	21	22
Dipole 3.3V EDR-2Mbps	1	19	19	19
Dipole 3.3V EDR-3Mbps	1	18	18	18

2.2 Support Equipment List and Details

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 Environmental Conditions and Test Date

Test Site	Test Date	Temperature (°C)	Relative Humidity (% RH)	Test Engineer
Conduction (Con-01)	2020/11/26	20.9	57	Brian Chang
Radiated (966A)	2020/11/10 - 2020/11/23	19.8-23.2	50-58	Leo Cheng
Conducted (TH-02)	2020/11/12 - 2020/11/280	22.5-23.3	55-60	Blake Wang

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 8.8	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d) ISEDC RSS-247 Sec 5.5 ISED RSS-Gen Sec 8.9 and 8.10	Spurious Emissions	Compliance
§15.247(a)(1) ISEDC RSS-247 Sec 5.1 ISEDC RSS-Gen Sec 6.7	20 dB Emission Bandwidth and Occupied Bandwidth	Compliance
§15.247(a)(1) ISEDC RSS-247 Sec 5.1(b)	Channel Separation Test	Compliance
§15.247(a)(1)(iii) ISEDC RSS-247 Sec 5.1(d)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii) ISEDC RSS-247 Sec 5.1(b)	Quantity of hopping channel Test	Compliance
§15.247(b)(3) ISEDC RSS-247 Sec 5.1(b) ISEDC RSS-247 Sec 5.4(b)	Maximum Output Power	Compliance
§15.247(d) ISEDC RSS-247 Sec 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance

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

4.1 Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot$

$[\text{Vf(GHz)}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

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	21.00	125.8925	20	0.0973	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 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.

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 – 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	5.89 dBi	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.

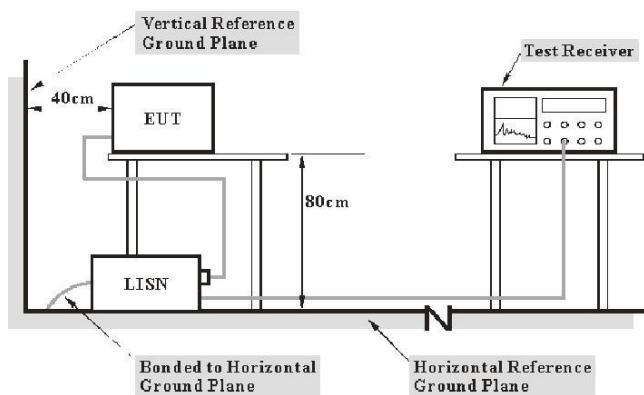
According to RSS-Gen 8.8 Conducted limits:

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

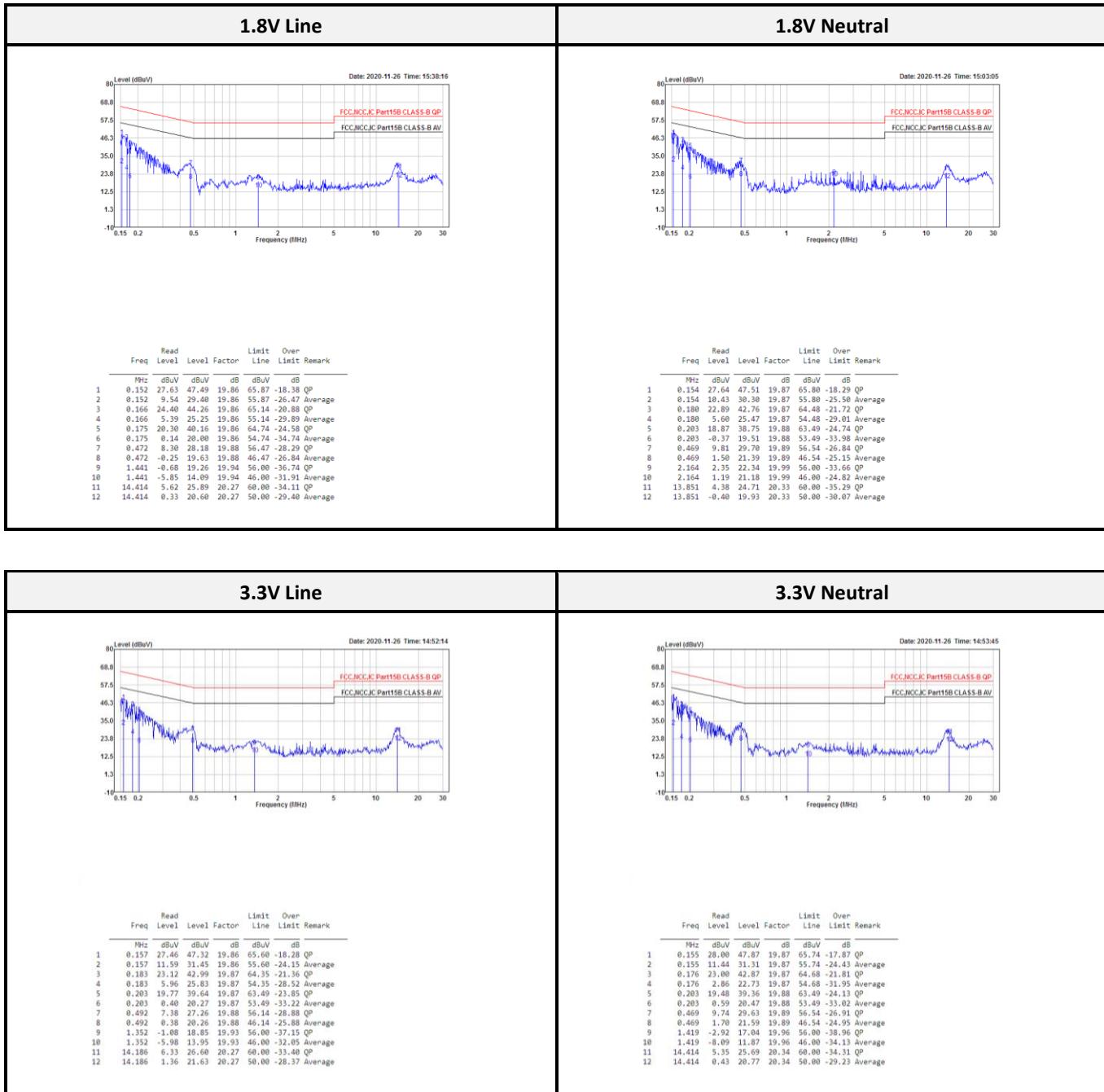
During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

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 Data and Test Plot



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

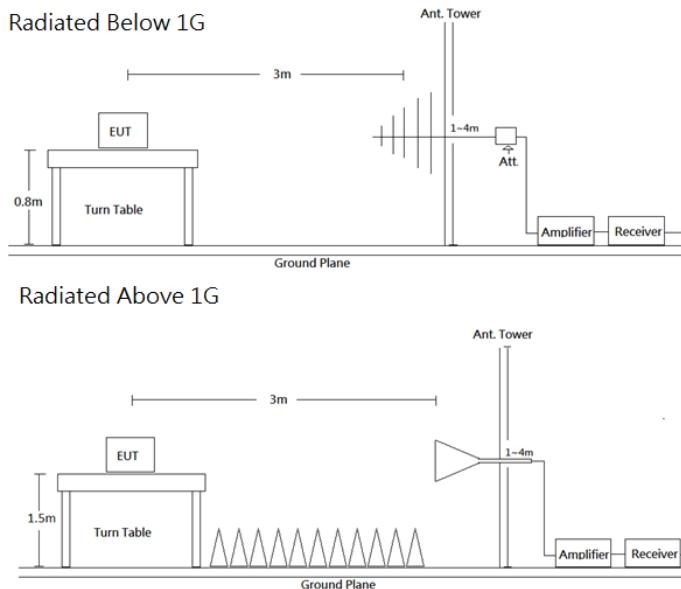
Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* 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 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	Detector	Measurement method
30-1000 MHz	120 kHz	/	QP	QP
Above 1 GHz	1 MHz	3 MHz	PK	PK
	1 MHz	10 Hz	RMS	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

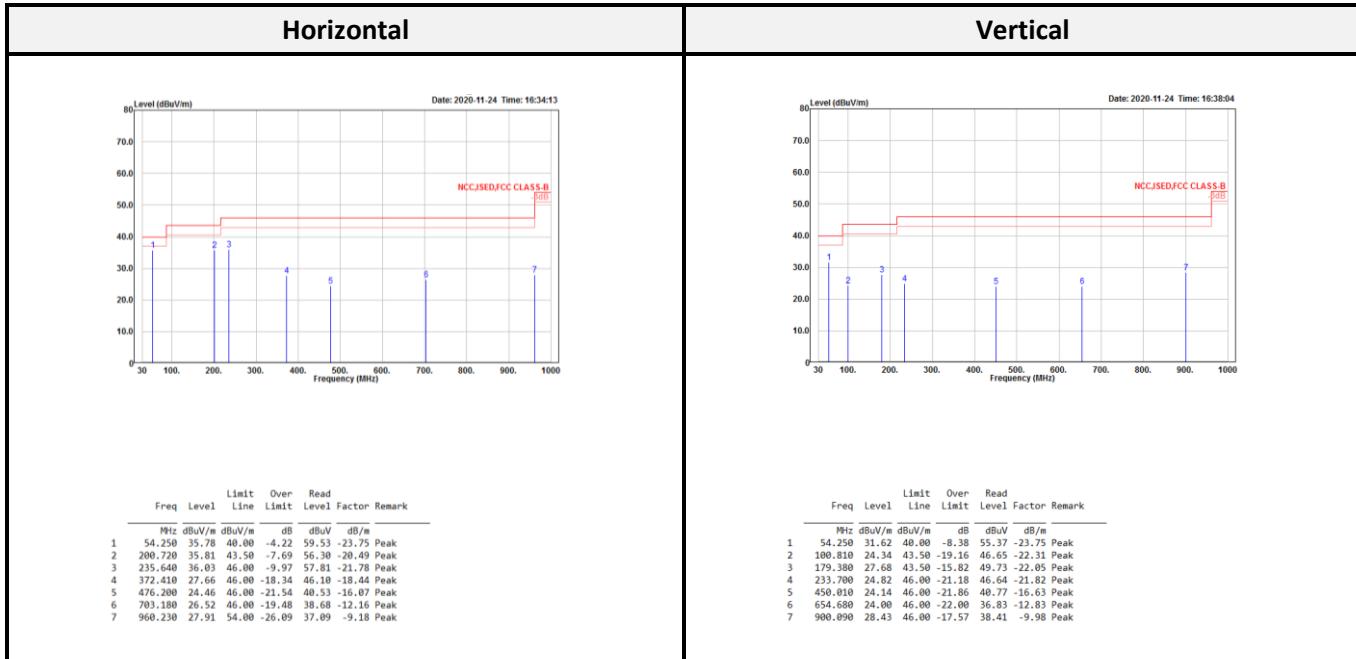
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Radiation 3M Room (966B)					
Active Loop	EMCO	6502	0001-3322	2020/03/16	2021/03/15
Bilog Antenna/6 dB Attenuator	SUNOL SCIENCES & EMEC /EMCI	JB3/N-6-06	A111513/AT-N0668	2020/03/19	2021/03/18
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	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)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
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 Radiated Emission Test Plot and Data

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

Below 1G (30 MHz-1 GHz)



Note:

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

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

BR-1Mbps Horizontal Low CH							BR-1Mbps Vertical Low CH						
Freq	Level	Limit	Over	Read			Freq	Level	Limit	Over	Read		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2389.600	46.17	54.00	-7.83	53.93	-7.76	Average	2389.400	41.11	54.00	-12.89	48.87	-7.76	Average
2389.600	64.86	74.00	-9.14	72.62	-7.76	Peak	2389.400	58.66	74.00	-15.34	66.42	-7.76	Peak
2402.200	99.03			106.76	-7.73	Average	2402.200	93.38			101.11	-7.73	Average
2402.200	117.19			124.92	-7.73	Peak	2402.200	110.05			117.78	-7.73	Peak
3202.700	44.74	54.00	-9.26	50.26	-5.52	Average	3202.700	42.62	54.00	-11.38	48.14	-5.52	Average
3202.700	47.25	74.00	-26.75	52.77	-5.52	Peak	3202.700	45.13	74.00	-28.87	50.65	-5.52	Peak
4804.000	39.82	54.00	-14.18	41.50	-1.68	Average	4804.000	40.30	54.00	-13.70	41.98	-1.68	Average
4804.000	48.97	74.00	-25.03	50.65	-1.68	Peak	4804.000	49.13	74.00	-24.87	50.81	-1.68	Peak
7206.000	49.23	54.00	-4.77	43.40	5.83	Average	7206.000	47.92	54.00	-6.08	42.09	5.83	Average
7206.000	58.79	74.00	-15.21	52.96	5.83	Peak	7206.000	58.12	74.00	-15.88	52.29	5.83	Peak

BR-1Mbps Horizontal Middle CH							BR-1Mbps Vertical Middle CH						
Freq	Level	Limit	Over	Read			Freq	Level	Limit	Over	Read		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2368.806	39.97	54.00	-14.03	47.79	-7.82	Average	2372.678	36.74	54.00	-17.26	44.55	-7.81	Average
2368.806	54.11	74.00	-19.89	61.93	-7.82	Peak	2372.678	51.15	74.00	-22.85	58.96	-7.81	Peak
2441.164	97.85			105.50	-7.65	Average	2441.164	92.08			99.73	-7.65	Average
2441.164	115.71			123.36	-7.65	Peak	2441.164	108.42			116.07	-7.65	Peak
2489.564	37.51	54.00	-16.49	45.10	-7.59	Average	2536.270	37.15	54.00	-16.85	44.58	-7.43	Average
2489.564	54.07	74.00	-19.93	61.66	-7.59	Peak	2536.270	51.57	74.00	-22.43	59.00	-7.43	Peak
3254.700	45.39	54.00	-8.61	50.74	-5.35	Average	3254.700	42.91	54.00	-11.09	48.26	-5.35	Average
3254.700	47.74	74.00	-26.26	53.09	-5.35	Peak	3254.700	45.26	74.00	-28.74	50.61	-5.35	Peak
4882.000	41.68	54.00	-12.32	43.20	-1.52	Average	4882.000	43.78	54.00	-10.22	45.30	-1.52	Average
4882.000	50.24	74.00	-23.76	51.76	-1.52	Peak	4882.000	51.78	74.00	-22.22	53.30	-1.52	Peak
7323.000	51.10	54.00	-2.90	45.80	5.30	Average	7323.000	49.99	54.00	-4.01	44.69	5.30	Average
7323.000	61.24	74.00	-12.76	55.94	5.30	Peak	7323.000	59.39	74.00	-14.61	54.09	5.30	Peak

BR-1Mbps Horizontal High CH							BR-1Mbps Vertical High CH						
Freq	Level	Limit	Over	Read			Freq	Level	Limit	Over	Read		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
2480.168	97.15			104.75	-7.60	Average	2480.168	91.03			98.63	-7.60	Average
2480.168	114.45			122.05	-7.60	Peak	2480.168	106.89			114.49	-7.60	Peak
2483.530	46.95	54.00	-7.05	54.54	-7.59	Average	2483.530	40.02	54.00	-13.98	47.61	-7.59	Average
2483.530	71.51	74.00	-2.49	79.10	-7.59	Peak	2483.530	63.71	74.00	-10.29	71.30	-7.59	Peak
3306.700	46.72	54.00	-7.28	51.95	-5.23	Average	3306.700	44.53	54.00	-9.47	49.76	-5.23	Average
3306.700	49.70	74.00	-24.30	54.93	-5.23	Peak	3306.700	45.98	74.00	-28.02	51.21	-5.23	Peak
4960.000	43.19	54.00	-10.81	44.53	-1.34	Average	4960.000	46.63	54.00	-7.37	47.97	-1.34	Average
4960.000	52.07	74.00	-21.93	53.41	-1.34	Peak	4960.000	55.48	74.00	-18.52	56.82	-1.34	Peak
7440.000	51.03	54.00	-2.97	45.39	5.64	Average	7440.000	48.88	54.00	-5.12	43.24	5.64	Average
7440.000	59.51	74.00	-14.49	53.87	5.64	Peak	7440.000	58.38	74.00	-15.62	52.74	5.64	Peak

EDR-2Mbps Horizontal Low CH							EDR-2Mbps Vertical Low CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2389.900	46.45	54.00	-7.55	54.21	-7.76	Average		2389.400	40.41	54.00	-13.59	48.17	-7.76	Average	
2389.900	68.20	74.00	-5.80	75.96	-7.76	Peak		2389.400	60.48	74.00	-13.52	68.24	-7.76	Peak	
2402.300	97.39			105.12	-7.73	Average		2402.200	91.82			99.55	-7.73	Average	
2402.300	116.95			124.68	-7.73	Peak		2402.200	110.02			117.75	-7.73	Peak	
3202.700	44.43	54.00	-9.57	49.95	-5.52	Average		3202.700	42.59	54.00	-11.41	48.11	-5.52	Average	
3202.700	46.94	74.00	-27.06	52.46	-5.52	Peak		3202.700	45.10	74.00	-28.90	50.62	-5.52	Peak	
4804.000	36.97	54.00	-17.03	38.65	-1.68	Average		4804.000	37.02	54.00	-16.98	38.70	-1.68	Average	
4804.000	47.08	74.00	-26.92	48.76	-1.68	Peak		4804.000	47.24	74.00	-26.76	48.92	-1.68	Peak	
7206.000	45.62	54.00	-8.38	39.79	5.83	Average		7206.000	46.60	54.00	-7.40	40.77	5.83	Average	
7206.000	56.45	74.00	-17.55	50.62	5.83	Peak		7206.000	55.12	74.00	-18.88	49.29	5.83	Peak	

EDR-2Mbps Horizontal Middle CH							EDR-2Mbps Vertical Middle CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2357.432	40.01	54.00	-13.99	47.87	-7.86	Average		2372.436	37.49	54.00	-16.51	45.30	-7.81	Average	
2357.432	55.79	74.00	-18.21	63.65	-7.86	Peak		2372.436	51.62	74.00	-22.38	59.43	-7.81	Peak	
2441.164	96.70			104.35	-7.65	Average		2441.164	90.69			98.34	-7.65	Average	
2441.164	116.13			123.78	-7.65	Peak		2441.164	108.39			116.04	-7.65	Peak	
2496.582	39.19	54.00	-14.81	46.77	-7.58	Average		2505.536	37.31	54.00	-16.69	44.86	-7.55	Average	
2496.582	55.62	74.00	-18.38	63.20	-7.58	Peak		2505.536	51.44	74.00	-22.56	58.99	-7.55	Peak	
3254.300	45.74	54.00	-8.26	51.09	-5.35	Average		3254.300	43.84	54.00	-10.16	49.19	-5.35	Average	
3254.300	49.09	74.00	-24.91	54.44	-5.35	Peak		3254.300	45.89	74.00	-28.11	51.24	-5.35	Peak	
4882.000	38.79	54.00	-15.21	40.31	-1.52	Average		4882.000	40.03	54.00	-13.97	41.55	-1.52	Average	
4882.000	49.03	74.00	-24.97	50.55	-1.52	Peak		4882.000	50.33	74.00	-23.67	51.85	-1.52	Peak	
7323.000	48.12	54.00	-5.88	42.82	5.30	Average		7323.000	45.94	54.00	-8.06	40.64	5.30	Average	
7323.000	58.94	74.00	-15.06	53.64	5.30	Peak		7323.000	56.74	74.00	-17.26	51.44	5.30	Peak	

EDR-2Mbps Horizontal High CH							EDR-2Mbps Vertical High CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.086	95.60			103.20	-7.60	Average		2480.086	89.84			97.44	-7.60	Average	
2480.086	114.28			121.88	-7.60	Peak		2480.086	107.23			114.83	-7.60	Peak	
2483.530	51.90	54.00	-2.10	59.49	-7.59	Average		2483.530	46.17	54.00	-7.83	53.76	-7.59	Average	
2483.530	72.13	74.00	-1.87	79.72	-7.59	Peak		2483.530	65.61	74.00	-8.39	73.20	-7.59	Peak	
3306.700	46.29	54.00	-7.71	51.52	-5.23	Average		3306.700	42.98	54.00	-11.02	48.21	-5.23	Average	
3306.700	49.61	74.00	-24.39	54.84	-5.23	Peak		3306.700	46.21	74.00	-27.79	51.44	-5.23	Peak	
4960.000	41.62	54.00	-12.38	42.96	-1.34	Average		4960.000	43.59	54.00	-10.41	44.93	-1.34	Average	
4960.000	52.06	74.00	-21.94	53.40	-1.34	Peak		4960.000	54.19	74.00	-19.81	55.53	-1.34	Peak	
7440.000	47.17	54.00	-6.83	41.53	5.64	Average		7440.000	46.33	54.00	-7.67	40.69	5.64	Average	
7440.000	57.28	74.00	-16.72	51.64	5.64	Peak		7440.000	56.58	74.00	-17.42	50.94	5.64	Peak	

EDR-3Mbps Horizontal Low CH							EDR-3Mbps Vertical Low CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2389.000	45.61	54.00	-8.39	53.37	-7.76	Average		2390.000	40.49	54.00	-13.51	48.25	-7.76	Average	
2389.000	67.18	74.00	-6.82	74.94	-7.76	Peak		2390.000	61.03	74.00	-12.97	68.79	-7.76	Peak	
2402.300	97.33			105.06	-7.73	Average		2402.300	91.80			99.53	-7.73	Average	
2402.300	117.01			124.74	-7.73	Peak		2402.300	110.10			117.83	-7.73	Peak	
3202.700	44.70	54.00	-9.30	50.22	-5.52	Average		3202.700	42.66	54.00	-11.34	48.18	-5.52	Average	
3202.700	46.59	74.00	-27.41	52.11	-5.52	Peak		3202.700	45.47	74.00	-28.53	50.99	-5.52	Peak	
4804.000	36.77	54.00	-17.23	38.45	-1.68	Average		4804.000	36.27	54.00	-17.73	37.95	-1.68	Average	
4804.000	47.60	74.00	-26.40	49.28	-1.68	Peak		4804.000	49.18	74.00	-24.82	50.86	-1.68	Peak	
7206.000	45.23	54.00	-8.77	39.40	5.83	Average		7206.000	47.23	54.00	-6.77	41.40	5.83	Average	
7206.000	57.03	74.00	-16.97	51.20	5.83	Peak		7206.000	55.45	74.00	-18.55	49.62	5.83	Peak	

EDR-3Mbps Horizontal Middle CH							EDR-3Mbps Vertical Middle CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2388.892	39.61	54.00	-14.39	47.37	-7.76	Average		2372.436	37.51	54.00	-16.49	45.32	-7.81	Average	
2388.892	56.85	74.00	-17.15	64.61	-7.76	Peak		2372.436	51.79	74.00	-22.21	59.60	-7.81	Peak	
2441.164	96.25			103.90	-7.65	Average		2441.164	86.48			94.13	-7.65	Average	
2441.164	115.66			123.31	-7.65	Peak		2441.164	107.02			114.67	-7.65	Peak	
2508.924	39.42	54.00	-14.58	46.96	-7.54	Average		2517.394	37.55	54.00	-16.45	45.05	-7.50	Average	
2508.924	55.47	74.00	-18.53	63.01	-7.54	Peak		2517.394	51.39	74.00	-22.61	58.89	-7.50	Peak	
3254.300	45.26	54.00	-8.74	50.61	-5.35	Average		3254.300	43.08	54.00	-10.92	48.43	-5.35	Average	
3254.300	48.61	74.00	-25.39	53.96	-5.35	Peak		3254.300	46.43	74.00	-27.57	51.78	-5.35	Peak	
4882.000	39.24	54.00	-14.76	40.76	-1.52	Average		4882.000	40.45	54.00	-13.55	41.97	-1.52	Average	
4882.000	49.43	74.00	-24.57	50.95	-1.52	Peak		4882.000	50.79	74.00	-23.21	52.31	-1.52	Peak	
7323.000	47.44	54.00	-6.56	42.14	5.30	Average		7323.000	45.80	54.00	-8.20	40.50	5.30	Average	
7323.000	59.17	74.00	-14.83	53.87	5.30	Peak		7323.000	57.69	74.00	-16.31	52.39	5.30	Peak	

EDR-3Mbps Horizontal High CH							EDR-3Mbps Vertical High CH								
Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark	Freq	Level	Limit	Over Line	Read Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.168	95.50			103.10	-7.60	Average		2479.922	88.21			95.81	-7.60	Average	
2480.168	114.61			122.21	-7.60	Peak		2479.922	105.37			112.97	-7.60	Peak	
2483.530	52.25	54.00	-1.75	59.84	-7.59	Average		2483.530	43.80	54.00	-10.20	51.39	-7.59	Average	
2483.530	71.40	74.00	-2.60	78.99	-7.59	Peak		2483.530	61.44	74.00	-12.56	69.03	-7.59	Peak	
3306.700	46.40	54.00	-7.60	51.63	-5.23	Average		3306.700	43.25	54.00	-10.75	48.48	-5.23	Average	
3306.700	49.63	74.00	-24.37	54.86	-5.23	Peak		3306.700	45.48	74.00	-28.52	50.71	-5.23	Peak	
4960.000	41.41	54.00	-12.59	42.75	-1.34	Average		4960.000	43.29	54.00	-10.71	44.63	-1.34	Average	
4960.000	52.07	74.00	-21.93	53.41	-1.34	Peak		4960.000	53.96	74.00	-20.04	55.30	-1.34	Peak	
7440.000	46.42	54.00	-7.58	40.78	5.64	Average		7440.000	45.05	54.00	-8.95	39.41	5.64	Average	
7440.000	57.16	74.00	-16.84	51.52	5.64	Peak		7440.000	57.29	74.00	-16.71	51.65	5.64	Peak	

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

BR-1Mbps Horizontal Low CH						BR-1Mbps Vertical Low CH					
Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark	Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2389.800	45.53	54.00	-8.47	53.29	-7.76 Average	2389.900	40.35	54.00	-13.65	48.11	-7.76 Average
2389.800	59.31	74.00	-14.69	67.07	-7.76 Peak	2389.900	53.85	74.00	-20.15	61.61	-7.76 Peak
2402.100	100.48			108.21	-7.73 Average	2402.100	94.79			102.52	-7.73 Average
2402.100	118.68			126.41	-7.73 Peak	2402.100	111.51			119.24	-7.73 Peak
3202.700	39.42	54.00	-14.58	44.94	-5.52 Average	3202.700	36.71	54.00	-17.29	42.23	-5.52 Average
3202.700	45.99	74.00	-28.01	51.51	-5.52 Peak	3202.700	44.25	74.00	-29.75	49.77	-5.52 Peak
4804.000	45.86	54.00	-8.14	47.54	-1.68 Average	4804.000	45.75	54.00	-8.25	47.43	-1.68 Average
4804.000	53.98	74.00	-20.02	55.66	-1.68 Peak	4804.000	53.48	74.00	-20.52	55.16	-1.68 Peak
7206.000	49.11	54.00	-4.89	43.28	5.83 Average	7206.000	50.54	54.00	-3.46	44.71	5.83 Average
7206.000	59.32	74.00	-14.68	53.49	5.83 Peak	7206.000	60.43	74.00	-13.57	54.60	5.83 Peak

BR-1Mbps Horizontal Middle CH						BR-1Mbps Vertical Middle CH					
Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark	Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2388.408	40.52	54.00	-13.48	48.29	-7.77 Average	2380.422	37.16	54.00	-16.84	44.95	-7.79 Average
2388.408	52.41	74.00	-21.59	60.18	-7.77 Peak	2380.422	51.59	74.00	-22.41	59.38	-7.79 Peak
2441.164	99.65			107.30	-7.65 Average	2441.164	93.68			101.33	-7.65 Average
2441.164	117.70			125.35	-7.65 Peak	2441.164	110.15			117.80	-7.65 Peak
2521.024	38.91	54.00	-15.09	46.41	-7.50 Average	2530.704	37.04	54.00	-16.96	44.50	-7.46 Average
2521.024	52.14	74.00	-21.86	59.64	-7.50 Peak	2530.704	51.54	74.00	-22.46	59.00	-7.46 Peak
3254.700	41.21	54.00	-12.79	46.56	-5.35 Average	3254.700	40.00	54.00	-14.00	45.35	-5.35 Average
3254.700	47.97	74.00	-26.03	53.32	-5.35 Peak	3254.700	46.75	74.00	-27.25	52.10	-5.35 Peak
4882.000	46.12	54.00	-7.88	47.64	-1.52 Average	4882.000	46.13	54.00	-7.87	47.65	-1.52 Average
4882.000	55.18	74.00	-18.82	56.70	-1.52 Peak	4882.000	55.28	74.00	-18.72	56.80	-1.52 Peak
7323.000	50.57	54.00	-3.43	45.27	5.30 Average	7323.000	50.24	54.00	-3.76	44.94	5.30 Average
7323.000	60.70	74.00	-13.30	55.40	5.30 Peak	7323.000	60.57	74.00	-13.43	55.27	5.30 Peak

BR-1Mbps Horizontal High CH						BR-1Mbps Vertical High CH					
Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark	Freq	Level	Limit Line	Over Limit	Read Level	Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2480.168	98.55			106.15	-7.60 Average	2480.004	93.06			100.66	-7.60 Average
2480.168	116.22			123.82	-7.60 Peak	2480.004	109.28			116.88	-7.60 Peak
2483.530	48.93	54.00	-5.07	56.52	-7.59 Average	2483.612	41.56	54.00	-12.44	49.15	-7.59 Average
2483.530	66.92	74.00	-7.08	74.51	-7.59 Peak	2483.612	59.72	74.00	-14.28	67.31	-7.59 Peak
3306.700	47.77	54.00	-6.23	53.00	-5.23 Average	3306.700	42.06	54.00	-11.94	47.29	-5.23 Average
3306.700	50.47	74.00	-23.53	55.70	-5.23 Peak	3306.700	48.38	74.00	-25.62	53.61	-5.23 Peak
4960.000	47.51	54.00	-6.49	48.85	-1.34 Average	4960.000	49.39	54.00	-4.61	50.73	-1.34 Average
4960.000	56.12	74.00	-17.88	57.46	-1.34 Peak	4960.000	57.96	74.00	-16.04	59.30	-1.34 Peak
7440.000	49.13	54.00	-4.87	43.49	5.64 Average	7440.000	49.94	54.00	-4.06	44.30	5.64 Average
7440.000	59.33	74.00	-14.67	53.69	5.64 Peak	7440.000	60.15	74.00	-13.85	54.51	5.64 Peak

EDR-2Mbps Horizontal Low CH							EDR-2Mbps Vertical Low CH							
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
2389.600	45.65	54.00	-8.35	53.41	-7.76	Average	2380.700	40.70	54.00	-13.30	48.49	-7.79	Average	
2389.600	59.61	74.00	-14.39	67.37	-7.76	Peak	2380.700	55.71	74.00	-18.29	63.50	-7.79	Peak	
2402.200	99.48			107.21	-7.73	Average	2401.900	94.25			101.98	-7.73	Average	
2402.200	119.66			127.39	-7.73	Peak	2401.900	113.77			121.50	-7.73	Peak	
3202.700	40.24	54.00	-13.76	45.76	-5.52	Average	3202.700	38.03	54.00	-15.97	43.55	-5.52	Average	
3202.700	46.36	74.00	-27.64	51.88	-5.52	Peak	3202.700	45.06	74.00	-28.94	50.58	-5.52	Peak	
4804.000	44.22	54.00	-9.78	45.90	-1.68	Average	4804.000	42.75	54.00	-11.25	44.43	-1.68	Average	
4804.000	54.97	74.00	-19.03	56.65	-1.68	Peak	4804.000	52.92	74.00	-21.08	54.60	-1.68	Peak	
7206.000	49.23	54.00	-4.77	43.40	5.83	Average	7206.000	49.27	54.00	-4.73	43.44	5.83	Average	
7206.000	60.67	74.00	-13.33	54.84	5.83	Peak	7206.000	61.41	74.00	-12.59	55.58	5.83	Peak	

EDR-2Mbps Horizontal Middle CH							EDR-2Mbps Vertical Middle CH							
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
2387.198	41.36	54.00	-12.64	49.13	-7.77	Average	2386.714	38.56	54.00	-15.44	46.33	-7.77	Average	
2387.198	56.24	74.00	-17.76	64.01	-7.77	Peak	2386.714	52.91	74.00	-21.09	60.68	-7.77	Peak	
2440.922	99.33			106.98	-7.65	Average	2441.164	93.65			101.30	-7.65	Average	
2440.922	119.45			127.10	-7.65	Peak	2441.164	112.56			120.21	-7.65	Peak	
2483.998	41.32	54.00	-12.68	48.91	-7.59	Average	2520.540	38.78	54.00	-15.22	46.28	-7.50	Average	
2483.998	57.13	74.00	-16.87	64.72	-7.59	Peak	2520.540	52.96	74.00	-21.04	60.46	-7.50	Peak	
3254.700	42.17	54.00	-11.83	47.52	-5.35	Average	3254.700	40.98	54.00	-13.02	46.33	-5.35	Average	
3254.700	48.85	74.00	-25.15	54.20	-5.35	Peak	3254.700	47.17	74.00	-26.83	52.52	-5.35	Peak	
4882.000	45.86	54.00	-8.14	47.38	-1.52	Average	4882.000	44.42	54.00	-9.58	45.94	-1.52	Average	
4882.000	56.33	74.00	-17.67	57.85	-1.52	Peak	4882.000	54.80	74.00	-19.20	56.32	-1.52	Peak	
7323.000	52.04	54.00	-1.96	46.74	5.30	Average	7323.000	51.71	54.00	-2.29	46.41	5.30	Average	
7323.000	63.71	74.00	-10.29	58.41	5.30	Peak	7323.000	63.27	74.00	-10.73	57.97	5.30	Peak	

EDR-2Mbps Horizontal High CH							EDR-2Mbps Vertical High CH							
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
2479.922	96.60			104.20	-7.60	Average	2480.168	91.17			98.77	-7.60	Average	
2479.922	116.65			124.25	-7.60	Peak	2480.168	109.78			117.38	-7.60	Peak	
2483.530	49.91	54.00	-4.09	57.50	-7.59	Average	2483.530	44.16	54.00	-9.84	51.75	-7.59	Average	
2483.530	71.73	74.00	-2.27	79.32	-7.59	Peak	2483.530	64.31	74.00	-9.69	71.90	-7.59	Peak	
3306.700	41.50	54.00	-12.50	46.73	-5.23	Average	3306.700	43.02	54.00	-10.98	48.25	-5.23	Average	
3306.700	48.15	74.00	-25.85	53.38	-5.23	Peak	3306.700	48.57	74.00	-25.43	53.80	-5.23	Peak	
4960.000	46.42	54.00	-7.58	47.76	-1.34	Average	4960.000	47.96	54.00	-6.04	49.30	-1.34	Average	
4960.000	57.07	74.00	-16.93	58.41	-1.34	Peak	4960.000	58.96	74.00	-15.04	60.30	-1.34	Peak	
7440.000	45.53	54.00	-8.47	39.89	5.64	Average	7440.000	46.11	54.00	-7.89	40.47	5.64	Average	
7440.000	57.20	74.00	-16.80	51.56	5.64	Peak	7440.000	58.18	74.00	-15.82	52.54	5.64	Peak	

EDR-3Mbps Horizontal Low CH							EDR-3Mbps Vertical Low CH								
Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark	Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2384.400	45.50	54.00	-8.50	53.27	-7.77	Average		2361.800	41.55	54.00	-12.45	49.39	-7.84	Average	
2384.400	58.55	74.00	-15.45	66.32	-7.77	Peak		2361.800	54.25	74.00	-19.75	62.09	-7.84	Peak	
2402.300	99.55			107.28	-7.73	Average		2402.100	94.26			101.99	-7.73	Average	
2402.300	119.84			127.57	-7.73	Peak		2402.100	113.62			121.35	-7.73	Peak	
3202.700	44.04	54.00	-9.96	49.56	-5.52	Average		3202.700	38.12	54.00	-15.88	43.64	-5.52	Average	
3202.700	47.13	74.00	-26.87	52.65	-5.52	Peak		3202.700	45.05	74.00	-28.95	50.57	-5.52	Peak	
4804.000	43.96	54.00	-10.04	45.64	-1.68	Average		4804.000	42.92	54.00	-11.08	44.60	-1.68	Average	
4804.000	54.54	74.00	-19.46	56.22	-1.68	Peak		4804.000	52.88	74.00	-21.12	54.56	-1.68	Peak	
7206.000	49.02	54.00	-4.98	43.19	5.83	Average		7206.000	49.78	54.00	-4.22	43.95	5.83	Average	
7206.000	61.56	74.00	-12.44	55.73	5.83	Peak		7206.000	62.03	74.00	-11.97	56.20	5.83	Peak	

EDR-3Mbps Horizontal Middle CH							EDR-3Mbps Vertical Middle CH								
Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark	Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2383.810	41.27	54.00	-12.73	49.05	-7.78	Average		2387.440	38.53	54.00	-15.47	46.30	-7.77	Average	
2383.810	55.44	74.00	-18.56	63.22	-7.78	Peak		2387.440	52.30	74.00	-21.70	60.07	-7.77	Peak	
2441.164	99.39			107.04	-7.65	Average		2441.406	89.46			97.11	-7.65	Average	
2441.164	119.54			127.19	-7.65	Peak		2441.406	113.77			121.42	-7.65	Peak	
2488.354	40.86	54.00	-13.14	48.45	-7.59	Average		2526.832	38.51	54.00	-15.49	45.98	-7.47	Average	
2488.354	56.04	74.00	-17.96	63.63	-7.59	Peak		2526.832	52.59	74.00	-21.41	60.06	-7.47	Peak	
3254.700	41.86	54.00	-12.14	47.21	-5.35	Average		3254.700	41.50	54.00	-12.50	46.85	-5.35	Average	
3254.700	48.28	74.00	-25.72	53.63	-5.35	Peak		3254.700	46.80	74.00	-27.20	52.15	-5.35	Peak	
4882.000	43.79	54.00	-10.21	45.31	-1.52	Average		4882.000	45.06	54.00	-8.94	46.58	-1.52	Average	
4882.000	54.35	74.00	-19.65	55.87	-1.52	Peak		4882.000	54.33	74.00	-19.67	55.85	-1.52	Peak	
7323.000	51.72	54.00	-2.28	46.42	5.30	Average		7323.000	51.59	54.00	-2.41	46.29	5.30	Average	
7323.000	64.39	74.00	-9.61	59.09	5.30	Peak		7323.000	63.90	74.00	-10.10	58.60	5.30	Peak	

EDR-3Mbps Horizontal High CH							EDR-3Mbps Vertical High CH								
Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark	Freq	Level	Limit	Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.004	96.60			104.20	-7.60	Average		2480.004	90.86			98.46	-7.60	Average	
2480.004	116.53			124.13	-7.60	Peak		2480.004	109.64			117.24	-7.60	Peak	
2483.530	50.12	54.00	-3.88	57.71	-7.59	Average		2483.530	44.35	54.00	-9.65	51.94	-7.59	Average	
2483.530	71.81	74.00	-2.19	79.40	-7.59	Peak		2483.530	63.55	74.00	-10.45	71.14	-7.59	Peak	
3306.700	43.47	54.00	-10.53	48.70	-5.23	Average		3306.700	42.31	54.00	-11.69	47.54	-5.23	Average	
3306.700	49.44	74.00	-24.56	54.67	-5.23	Peak		3306.700	48.43	74.00	-25.57	53.66	-5.23	Peak	
4960.000	46.51	54.00	-7.49	47.85	-1.34	Average		4960.000	47.82	54.00	-6.18	49.16	-1.34	Average	
4960.000	57.18	74.00	-16.82	58.52	-1.34	Peak		4960.000	58.80	74.00	-15.20	60.14	-1.34	Peak	
7440.000	44.27	54.00	-9.73	38.63	5.64	Average		7440.000	45.11	54.00	-8.89	39.47	5.64	Average	
7440.000	57.59	74.00	-16.41	51.95	5.64	Peak		7440.000	57.89	74.00	-16.11	52.25	5.64	Peak	

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

BR-1Mbps Horizontal Low CH						BR-1Mbps Vertical Low CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2389.500	37.34	54.00	-16.66	45.10	-7.76	Average	2389.600	45.21	54.00	-8.79	52.97	-7.76	Average
2389.500	54.82	74.00	-19.18	62.58	-7.76	Peak	2389.600	62.63	74.00	-11.37	70.39	-7.76	Peak
2402.200	87.78			95.51	-7.73	Average	2402.200	99.35			107.08	-7.73	Average
2402.200	102.76			110.49	-7.73	Peak	2402.200	117.42			125.15	-7.73	Peak
3202.700	39.17	54.00	-14.83	44.69	-5.52	Average	3202.700	37.87	54.00	-16.13	43.39	-5.52	Average
3202.700	45.73	74.00	-28.27	51.25	-5.52	Peak	3202.700	44.93	74.00	-29.07	50.45	-5.52	Peak
4804.000	40.23	54.00	-13.77	41.91	-1.68	Average	4804.000	45.75	54.00	-8.25	47.43	-1.68	Average
4804.000	48.71	74.00	-25.29	50.39	-1.68	Peak	4804.000	48.23	74.00	-25.77	49.91	-1.68	Peak
7206.000	48.55	54.00	-5.45	42.72	5.83	Average	7206.000	49.99	54.00	-4.01	44.16	5.83	Average
7206.000	58.32	74.00	-15.68	52.49	5.83	Peak	7206.000	59.96	74.00	-14.04	54.13	5.83	Peak

BR-1Mbps Horizontal Middle CH						BR-1Mbps Vertical Middle CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2341.944	36.63	54.00	-17.37	44.53	-7.90	Average	2387.198	38.87	54.00	-15.13	46.64	-7.77	Average
2341.944	51.08	74.00	-22.92	58.98	-7.90	Peak	2387.198	55.17	74.00	-18.83	62.94	-7.77	Peak
2441.164	88.45			96.10	-7.65	Average	2441.164	99.22			106.87	-7.65	Average
2441.164	103.54			111.19	-7.65	Peak	2441.164	117.29			124.94	-7.65	Peak
2525.138	37.32	54.00	-16.68	44.80	-7.48	Average	2509.166	38.06	54.00	-15.94	45.60	-7.54	Average
2525.138	52.42	74.00	-21.58	59.90	-7.48	Peak	2509.166	55.47	74.00	-18.53	63.01	-7.54	Peak
3254.700	45.91	54.00	-8.09	51.26	-5.35	Average	3254.700	40.63	54.00	-13.37	45.98	-5.35	Average
3254.700	47.90	74.00	-26.10	53.25	-5.35	Peak	3254.700	47.31	74.00	-26.69	52.66	-5.35	Peak
4882.000	42.82	54.00	-11.18	44.34	-1.52	Average	4882.000	43.46	54.00	-10.54	44.98	-1.52	Average
4882.000	51.10	74.00	-22.90	52.62	-1.52	Peak	4882.000	51.80	74.00	-22.20	53.32	-1.52	Peak
7323.000	46.48	54.00	-7.52	41.18	5.30	Average	7323.000	49.92	54.00	-4.08	44.62	5.30	Average
7323.000	56.27	74.00	-17.73	50.97	5.30	Peak	7323.000	59.75	74.00	-14.25	54.45	5.30	Peak

BR-1Mbps Horizontal High CH						BR-1Mbps Vertical High CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.168	85.13			92.73	-7.60	Average	2480.168	95.72			103.32	-7.60	Average
2480.168	99.22			106.82	-7.60	Peak	2480.168	112.66			120.26	-7.60	Peak
2483.940	38.03	54.00	-15.97	45.62	-7.59	Average	2483.694	44.04	54.00	-9.96	51.63	-7.59	Average
2483.940	54.27	74.00	-19.73	61.86	-7.59	Peak	2483.694	66.23	74.00	-7.77	73.82	-7.59	Peak
3306.700	44.68	54.00	-9.32	49.91	-5.23	Average	3306.700	44.85	54.00	-9.15	50.08	-5.23	Average
3306.700	50.62	74.00	-23.38	55.85	-5.23	Peak	3306.700	51.14	74.00	-22.86	56.37	-5.23	Peak
4960.000	41.41	54.00	-12.59	42.75	-1.34	Average	4960.000	42.97	54.00	-11.03	44.31	-1.34	Average
4960.000	49.95	74.00	-24.05	51.29	-1.34	Peak	4960.000	51.38	74.00	-22.62	52.72	-1.34	Peak
7440.000	43.27	54.00	-10.73	37.63	5.64	Average	7440.000	43.60	54.00	-10.40	37.96	5.64	Average
7440.000	53.79	74.00	-20.21	48.15	5.64	Peak	7440.000	53.93	74.00	-20.07	48.29	5.64	Peak

EDR-2Mbps Horizontal Low CH							EDR-2Mbps Vertical Low CH								
Freq	Level	Limit	Over	Read	Level	Factor	Remark	Freq	Level	Limit	Over	Read	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2380.000	36.96	54.00	-17.04	44.75	-7.79	Average		2362.400	43.32	54.00	-10.68	51.16	-7.84	Average	
2380.000	51.55	74.00	-22.45	59.34	-7.79	Peak		2362.400	57.70	74.00	-16.30	65.54	-7.84	Peak	
2402.200	86.03			93.76	-7.73	Average		2402.200	96.91			104.64	-7.73	Average	
2402.200	102.29			110.02	-7.73	Peak		2402.200	116.34			124.07	-7.73	Peak	
3202.700	39.77	54.00	-14.23	45.29	-5.52	Average		3202.700	38.41	54.00	-15.59	43.93	-5.52	Average	
3202.700	46.26	74.00	-27.74	51.78	-5.52	Peak		3202.700	45.58	74.00	-28.42	51.10	-5.52	Peak	
4804.000	35.24	54.00	-18.76	36.92	-1.68	Average		4804.000	36.95	54.00	-17.05	38.63	-1.68	Average	
4804.000	46.74	74.00	-27.26	48.42	-1.68	Peak		4804.000	47.66	74.00	-26.34	49.34	-1.68	Peak	
7206.000	42.59	54.00	-11.41	36.76	5.83	Average		7206.000	46.66	54.00	-7.34	40.83	5.83	Average	
7206.000	54.05	74.00	-19.95	48.22	5.83	Peak		7206.000	58.07	74.00	-15.93	52.24	5.83	Peak	

EDR-2Mbps Horizontal Middle CH							EDR-2Mbps Vertical Middle CH								
Freq	Level	Limit	Over	Read	Level	Factor	Remark	Freq	Level	Limit	Over	Read	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2386.714	36.86	54.00	-17.14	44.63	-7.77	Average		2387.682	39.53	54.00	-14.47	47.30	-7.77	Average	
2386.714	51.94	74.00	-22.06	59.71	-7.77	Peak		2387.682	54.45	74.00	-19.55	62.22	-7.77	Peak	
2441.164	86.69			94.34	-7.65	Average		2440.922	97.66			105.31	-7.65	Average	
2441.164	103.18			110.83	-7.65	Peak		2440.922	116.83			124.48	-7.65	Peak	
2549.580	37.72	54.00	-16.28	45.10	-7.38	Average		2498.518	40.02	54.00	-13.98	47.60	-7.58	Average	
2549.580	52.33	74.00	-21.67	59.71	-7.38	Peak		2498.518	57.99	74.00	-16.01	65.57	-7.58	Peak	
3254.700	40.84	54.00	-13.16	46.19	-5.35	Average		3254.700	39.52	54.00	-14.48	44.87	-5.35	Average	
3254.700	47.27	74.00	-26.73	52.62	-5.35	Peak		3254.700	46.74	74.00	-27.26	52.09	-5.35	Peak	
4882.000	38.24	54.00	-15.76	39.76	-1.52	Average		4882.000	41.09	54.00	-12.91	42.61	-1.52	Average	
4882.000	49.03	74.00	-24.97	50.55	-1.52	Peak		4882.000	51.90	74.00	-22.10	53.42	-1.52	Peak	
7323.000	44.32	54.00	-9.68	39.02	5.30	Average		7323.000	46.44	54.00	-7.56	41.14	5.30	Average	
7323.000	55.62	74.00	-18.38	50.32	5.30	Peak		7323.000	57.51	74.00	-16.49	52.21	5.30	Peak	

EDR-2Mbps Horizontal High CH							EDR-2Mbps Vertical High CH								
Freq	Level	Limit	Over	Read	Level	Factor	Remark	Freq	Level	Limit	Over	Read	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.168	85.55			93.15	-7.60	Average		2480.168	95.60			103.20	-7.60	Average	
2480.168	101.67			109.27	-7.60	Peak		2480.168	114.23			121.83	-7.60	Peak	
2483.694	42.05	54.00	-11.95	49.64	-7.59	Average		2483.530	50.25	54.00	-3.75	57.84	-7.59	Average	
2483.694	60.23	74.00	-13.77	67.82	-7.59	Peak		2483.530	71.97	74.00	-2.03	79.56	-7.59	Peak	
3306.700	43.28	54.00	-10.72	48.51	-5.23	Average		3306.700	39.02	54.00	-14.98	44.25	-5.23	Average	
3306.700	49.79	74.00	-24.21	55.02	-5.23	Peak		3306.700	49.52	74.00	-24.48	54.75	-5.23	Peak	
4960.000	41.81	54.00	-12.19	43.15	-1.34	Average		4960.000	43.26	54.00	-10.74	44.60	-1.34	Average	
4960.000	52.11	74.00	-21.89	53.45	-1.34	Peak		4960.000	53.66	74.00	-20.34	55.00	-1.34	Peak	
7440.000	41.22	54.00	-12.78	35.58	5.64	Average		7440.000	42.15	54.00	-11.85	36.51	5.64	Average	
7440.000	52.42	74.00	-21.58	46.78	5.64	Peak		7440.000	53.21	74.00	-20.79	47.57	5.64	Peak	

EDR-3Mbps Horizontal Low CH						EDR-3Mbps Vertical Low CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2324.600	36.78	54.00	-17.22	44.70	-7.92	Average	2384.200	43.75	54.00	-10.25	51.52	-7.77	Average
2324.600	51.60	74.00	-22.40	59.52	-7.92	Peak	2384.200	56.98	74.00	-17.02	64.75	-7.77	Peak
2402.200	85.76			93.49	-7.73	Average	2402.200	97.42			105.15	-7.73	Average
2402.200	102.44			110.17	-7.73	Peak	2402.200	117.07			124.80	-7.73	Peak
3202.700	39.31	54.00	-14.69	44.83	-5.52	Average	3202.700	37.91	54.00	-16.09	43.43	-5.52	Average
3202.700	46.18	74.00	-27.82	51.70	-5.52	Peak	3202.700	45.37	74.00	-28.63	50.89	-5.52	Peak
4804.000	36.69	54.00	-17.31	38.37	-1.68	Average	4804.000	37.27	54.00	-16.73	38.95	-1.68	Average
4804.000	48.32	74.00	-25.68	50.00	-1.68	Peak	4804.000	48.18	74.00	-25.82	49.86	-1.68	Peak
7206.000	44.89	54.00	-9.11	39.06	5.83	Average	7206.000	46.93	54.00	-7.07	41.10	5.83	Average
7206.000	56.78	74.00	-17.22	50.95	5.83	Peak	7206.000	59.04	74.00	-14.96	53.21	5.83	Peak

EDR-3Mbps Horizontal Middle CH						EDR-3Mbps Vertical Middle CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2370.984	36.78	54.00	-17.22	44.59	-7.81	Average	2388.166	39.69	54.00	-14.31	47.46	-7.77	Average
2370.984	51.04	74.00	-22.96	58.85	-7.81	Peak	2388.166	55.50	74.00	-18.50	63.27	-7.77	Peak
2441.164	86.87			94.52	-7.65	Average	2440.922	97.69			105.34	-7.65	Average
2441.164	103.33			110.98	-7.65	Peak	2440.922	117.37			125.02	-7.65	Peak
2534.092	37.45	54.00	-16.55	44.90	-7.45	Average	2538.690	39.87	54.00	-14.13	47.30	-7.43	Average
2534.092	52.00	74.00	-22.00	59.45	-7.45	Peak	2538.690	56.35	74.00	-17.65	63.78	-7.43	Peak
3254.700	41.54	54.00	-12.46	46.89	-5.35	Average	3254.700	41.87	54.00	-12.13	47.22	-5.35	Average
3254.700	48.29	74.00	-25.71	53.64	-5.35	Peak	3254.700	48.41	74.00	-25.59	53.76	-5.35	Peak
4882.000	39.66	54.00	-14.34	41.18	-1.52	Average	4882.000	41.58	54.00	-12.42	43.10	-1.52	Average
4882.000	50.11	74.00	-23.89	51.63	-1.52	Peak	4882.000	51.61	74.00	-22.39	53.13	-1.52	Peak
7323.000	42.16	54.00	-11.84	36.86	5.30	Average	7323.000	45.05	54.00	-8.95	39.75	5.30	Average
7323.000	55.29	74.00	-18.71	49.99	5.30	Peak	7323.000	56.71	74.00	-17.29	51.41	5.30	Peak

EDR-3Mbps Horizontal High CH						EDR-3Mbps Vertical High CH							
Freq	Level	Limit	Over Line	Read Limit	Factor	Freq	Level	Limit	Over Line	Read Limit	Factor		
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
2480.004	84.00			91.60	-7.60	Average	2480.004	94.09			101.69	-7.60	Average
2480.004	100.19			107.79	-7.60	Peak	2480.004	112.98			120.58	-7.60	Peak
2483.530	40.83	54.00	-13.17	48.42	-7.59	Average	2483.530	48.90	54.00	-5.10	56.49	-7.59	Average
2483.530	58.41	74.00	-15.59	66.00	-7.59	Peak	2483.530	70.21	74.00	-3.79	77.80	-7.59	Peak
3306.700	-5.23	54.00	-59.23	0.00	-5.23	Average	3306.700	44.71	54.00	-9.29	49.94	-5.23	Average
3306.700	49.94	74.00	-24.06	55.17	-5.23	Peak	3306.700	50.68	74.00	-23.32	55.91	-5.23	Peak
4960.000	40.66	54.00	-13.34	42.00	-1.34	Average	4960.000	42.92	54.00	-11.08	44.26	-1.34	Average
4960.000	51.10	74.00	-22.90	52.44	-1.34	Peak	4960.000	53.25	74.00	-20.75	54.59	-1.34	Peak
7440.000	37.45	54.00	-16.55	31.81	5.64	Average	7440.000	38.25	54.00	-15.75	32.61	5.64	Average
7440.000	50.80	74.00	-23.20	45.16	5.64	Peak	7440.000	51.17	74.00	-22.83	45.53	5.64	Peak

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

BR-1Mbps Horizontal Low CH						BR-1Mbps Vertical Low CH					
Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark	Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2345.500	36.72	54.00	-17.28	44.61	-7.89 Average	2389.800	44.68	54.00	-9.32	52.44	-7.76 Average
2345.500	51.33	74.00	-22.67	59.22	-7.89 Peak	2389.800	59.45	74.00	-14.55	67.21	-7.76 Peak
2402.100	87.08			94.81	-7.73 Average	2402.100	99.69			107.42	-7.73 Average
2402.100	101.75			109.48	-7.73 Peak	2402.100	117.86			125.59	-7.73 Peak
3202.700	40.66	54.00	-13.34	46.18	-5.52 Average	3202.700	37.32	54.00	-16.68	42.84	-5.52 Average
3202.700	45.17	74.00	-28.83	50.69	-5.52 Peak	3202.700	44.59	74.00	-29.41	50.11	-5.52 Peak
4804.000	42.52	54.00	-11.48	44.20	-1.68 Average	4804.000	44.32	54.00	-9.68	46.00	-1.68 Average
4804.000	50.98	74.00	-23.02	52.66	-1.68 Peak	4804.000	52.84	74.00	-21.16	54.52	-1.68 Peak
7206.000	48.34	54.00	-5.66	42.51	5.83 Average	7206.000	51.13	54.00	-2.87	45.30	5.83 Average
7206.000	58.57	74.00	-15.43	52.74	5.83 Peak	7206.000	61.34	74.00	-12.66	55.51	5.83 Peak

BR-1Mbps Horizontal Middle CH						BR-1Mbps Vertical Middle CH					
Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark	Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2312.662	36.56	54.00	-17.44	44.49	-7.93 Average	2388.892	40.29	54.00	-13.71	48.05	-7.76 Average
2312.662	50.84	74.00	-23.16	58.77	-7.93 Peak	2388.892	51.85	74.00	-22.15	59.61	-7.76 Peak
2441.164	88.63			96.28	-7.65 Average	2441.164	100.07			107.72	-7.65 Average
2441.164	103.70			111.35	-7.65 Peak	2441.164	118.25			125.90	-7.65 Peak
2529.978	37.30	54.00	-16.70	44.76	-7.46 Average	2534.092	39.10	54.00	-14.90	46.55	-7.45 Average
2529.978	51.31	74.00	-22.69	58.77	-7.46 Peak	2534.092	52.84	74.00	-21.16	60.29	-7.45 Peak
3254.700	40.67	54.00	-13.33	46.02	-5.35 Average	3254.700	40.50	54.00	-13.50	45.85	-5.35 Average
3254.700	47.02	74.00	-26.98	52.37	-5.35 Peak	3254.700	47.29	74.00	-26.71	52.64	-5.35 Peak
4882.000	45.02	54.00	-8.98	46.54	-1.52 Average	4882.000	47.88	54.00	-6.12	49.40	-1.52 Average
4882.000	53.23	74.00	-20.77	54.75	-1.52 Peak	4882.000	56.45	74.00	-17.55	57.97	-1.52 Peak
7323.000	47.29	54.00	-6.71	41.99	5.30 Average	7323.000	49.59	54.00	-4.41	44.29	5.30 Average
7323.000	55.46	74.00	-18.54	50.16	5.30 Peak	7323.000	59.17	74.00	-14.83	53.87	5.30 Peak

BR-1Mbps Horizontal High CH						BR-1Mbps Vertical High CH					
Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark	Freq	Level	Limit	Over Line	Read Limit	Level Factor Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2480.004	88.16			95.76	-7.60 Average	2480.168	99.28			106.88	-7.60 Average
2480.004	103.02			110.62	-7.60 Peak	2480.168	117.21			124.81	-7.60 Peak
2483.612	40.09	54.00	-13.91	47.68	-7.59 Average	2483.530	51.21	54.00	-2.79	58.80	-7.59 Average
2483.612	55.88	74.00	-18.12	63.47	-7.59 Peak	2483.530	68.03	74.00	-5.97	75.62	-7.59 Peak
3306.700	43.90	54.00	-10.10	49.13	-5.23 Average	3306.700	43.19	54.00	-10.81	48.42	-5.23 Average
3306.700	48.14	74.00	-25.86	53.37	-5.23 Peak	3306.700	49.37	74.00	-24.63	54.60	-5.23 Peak
4960.000	46.62	54.00	-7.38	47.96	-1.34 Average	4960.000	50.06	54.00	-3.94	51.40	-1.34 Average
4960.000	54.66	74.00	-19.34	56.00	-1.34 Peak	4960.000	59.14	74.00	-14.86	60.48	-1.34 Peak
7440.000	46.46	54.00	-7.54	40.82	5.64 Average	7440.000	52.43	54.00	-1.57	46.79	5.64 Average
7440.000	55.95	74.00	-18.05	50.31	5.64 Peak	7440.000	57.50	74.00	-16.50	51.86	5.64 Peak

EDR-2Mbps Horizontal Low CH							EDR-2Mbps Vertical Low CH										
Freq	Level	Limit		Over		Read			Freq	Level	Limit		Over		Read		
		Line	Limit	Line	Limit	Level	Factor	Remark			Line	Limit	Line	Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m				MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			
2386.700	37.18	54.00	-16.82	44.95	-7.77	Average			2388.900	44.74	54.00	-9.26	52.50	-7.76	Average		
2386.700	51.73	74.00	-22.27	59.50	-7.77	Peak			2388.900	58.47	74.00	-15.53	66.23	-7.76	Peak		
2402.200	87.01			94.74	-7.73	Average			2401.900	98.90			106.63	-7.73	Average		
2402.200	104.76			112.49	-7.73	Peak			2401.900	119.13			126.86	-7.73	Peak		
3202.700	38.93	54.00	-15.07	44.45	-5.52	Average			3202.700	39.14	54.00	-14.86	44.66	-5.52	Average		
3202.700	45.30	74.00	-28.70	50.82	-5.52	Peak			3202.700	46.00	74.00	-28.00	51.52	-5.52	Peak		
4804.000	40.63	54.00	-13.37	42.31	-1.68	Average			4804.000	44.85	54.00	-9.15	46.53	-1.68	Average		
4804.000	50.93	74.00	-23.07	52.61	-1.68	Peak			4804.000	55.28	74.00	-18.72	56.96	-1.68	Peak		
7206.000	48.42	54.00	-5.58	42.59	5.83	Average			7206.000	50.65	54.00	-3.35	44.82	5.83	Average		
7206.000	59.32	74.00	-14.68	53.49	5.83	Peak			7206.000	62.12	74.00	-11.88	56.29	5.83	Peak		

EDR-2Mbps Horizontal Middle CH							EDR-2Mbps Vertical Middle CH										
Freq	Level	Limit		Over		Read			Freq	Level	Limit		Over		Read		
		Line	Limit	Line	Limit	Level	Factor	Remark			Line	Limit	Line	Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m				MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			
2336.378	36.70	54.00	-17.30	44.61	-7.91	Average			2389.376	40.53	54.00	-13.47	48.29	-7.76	Average		
2336.378	50.88	74.00	-23.12	58.79	-7.91	Peak			2389.376	55.50	74.00	-18.50	63.26	-7.76	Peak		
2440.922	88.86			96.51	-7.65	Average			2440.922	99.68			107.33	-7.65	Average		
2440.922	106.82			114.47	-7.65	Peak			2440.922	119.78			127.43	-7.65	Peak		
2534.334	37.56	54.00	-16.44	45.01	-7.45	Average			2486.660	41.31	54.00	-12.69	48.90	-7.59	Average		
2534.334	52.23	74.00	-21.77	59.68	-7.45	Peak			2486.660	58.38	74.00	-15.62	65.97	-7.59	Peak		
3254.700	44.51	54.00	-9.49	49.86	-5.35	Average			3254.700	41.86	54.00	-12.14	47.21	-5.35	Average		
3254.700	47.15	74.00	-26.85	52.50	-5.35	Peak			3254.700	48.15	74.00	-25.85	53.50	-5.35	Peak		
4882.000	44.13	54.00	-9.87	45.65	-1.52	Average			4882.000	46.88	54.00	-7.12	48.40	-1.52	Average		
4882.000	54.48	74.00	-19.52	56.00	-1.52	Peak			4882.000	58.78	74.00	-15.22	60.30	-1.52	Peak		
7323.000	49.94	54.00	-4.06	44.64	5.30	Average			7323.000	51.09	54.00	-2.91	45.79	5.30	Average		
7323.000	61.50	74.00	-12.50	56.20	5.30	Peak			7323.000	62.69	74.00	-11.31	57.39	5.30	Peak		

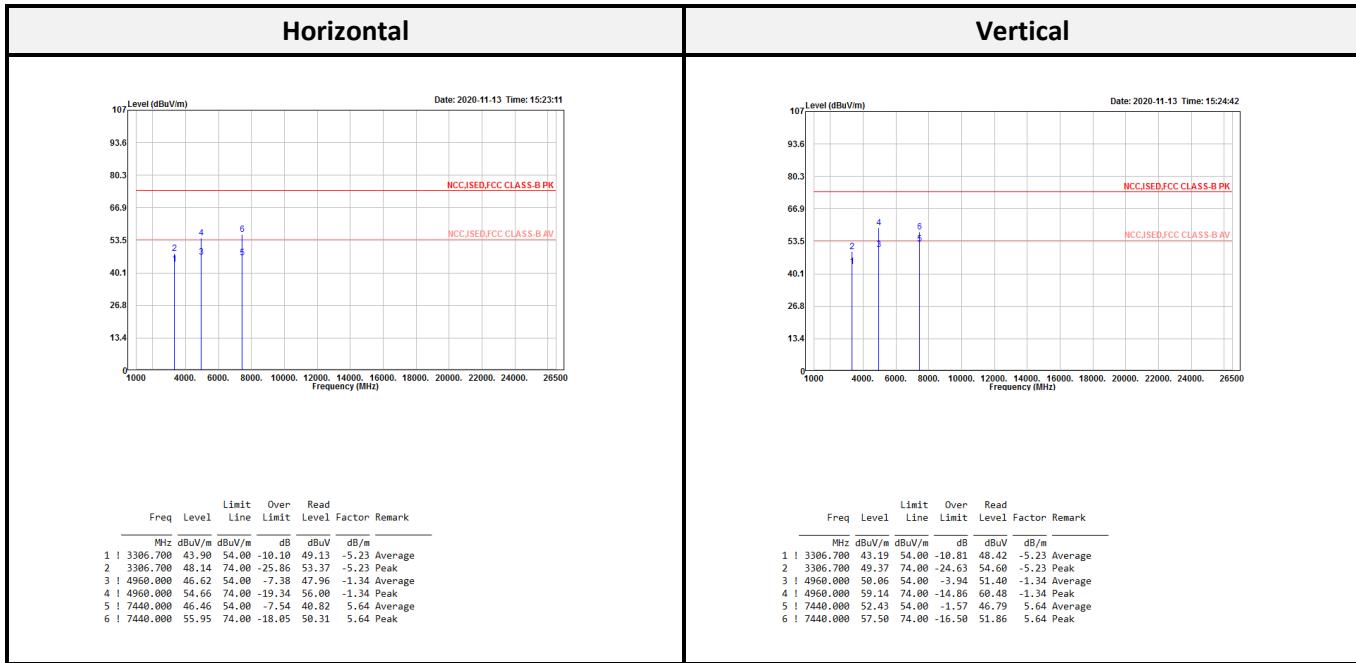
EDR-2Mbps Horizontal High CH							EDR-2Mbps Vertical High CH										
Freq	Level	Limit		Over		Read			Freq	Level	Limit		Over		Read		
		Line	Limit	Line	Limit	Level	Factor	Remark			Line	Limit	Line	Limit	Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m				MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m			
2480.168	99.24			106.84	-7.60	Average			2479.840	97.71			105.31	-7.60	Average		
2480.168	103.40			111.00	-7.60	Peak			2479.840	117.59			125.19	-7.60	Peak		
2483.612	43.60	54.00	-10.40	51.19	-7.59	Average			2483.530	51.39	54.00	-2.61	58.98	-7.59	Average		
2483.612	58.83	74.00	-15.17	66.42	-7.59	Peak			2483.530	72.38	74.00	-1.62	79.97	-7.59	Peak		
3306.700	44.20	54.00	-9.80	49.43	-5.23	Average			3306.700	42.54	54.00	-11.46	47.77	-5.23	Average		
3306.700	47.43	74.00	-26.57	52.66	-5.23	Peak			3306.700	48.98	74.00	-25.02	54.21	-5.23	Peak		
4960.000	45.40	54.00	-8.60	46.74	-1.34	Average			4960.000	48.77	54.00	-5.23	50.11	-1.34	Average		
4960.000	55.64	74.00	-18.36	56.98	-1.34	Peak			4960.000	59.63	74.00	-14.37	60.97	-1.34	Peak		
7440.000	42.82	54.00	-11.18	37.18	5.64	Average			7440.000	44.15	54.00	-9.85	38.51	5.64	Average		
7440.000	54.54	74.00	-19.46	48.90	5.64	Peak			7440.000	55.49	74.00	-18.51	49.85	5.64	Peak		

EDR-3Mbps Horizontal Low CH						EDR-3Mbps Vertical Low CH					
Freq	Level	Limit	Over	Read		Freq	Level	Limit	Over	Read	
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2312.100	37.03	54.00	-16.97	44.97	-7.94 Average	2389.900	44.75	54.00	-9.25	52.51	-7.76 Average
2312.100	51.51	74.00	-22.49	59.45	-7.94 Peak	2389.900	57.96	74.00	-16.04	65.72	-7.76 Peak
2402.100	87.25			94.98	-7.73 Average	2402.200	98.93			106.66	-7.73 Average
2402.100	104.91			112.64	-7.73 Peak	2402.200	119.18			126.91	-7.73 Peak
3202.700	38.80	54.00	-15.20	44.32	-5.52 Average	3202.700	42.23	54.00	-11.77	47.75	-5.52 Average
3202.700	45.65	74.00	-28.35	51.17	-5.52 Peak	3202.700	45.82	74.00	-28.18	51.34	-5.52 Peak
4804.000	41.83	54.00	-12.17	43.51	-1.68 Average	4804.000	44.84	54.00	-9.16	46.52	-1.68 Average
4804.000	51.87	74.00	-22.13	53.55	-1.68 Peak	4804.000	55.17	74.00	-18.83	56.85	-1.68 Peak
7206.000	47.67	54.00	-6.33	41.84	5.83 Average	7206.000	50.52	54.00	-3.48	44.69	5.83 Average
7206.000	60.24	74.00	-13.76	54.41	5.83 Peak	7206.000	63.47	74.00	-10.53	57.64	5.83 Peak

EDR-3Mbps Horizontal Middle CH						EDR-3Mbps Vertical Middle CH					
Freq	Level	Limit	Over	Read		Freq	Level	Limit	Over	Read	
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2362.998	36.76	54.00	-17.24	44.60	-7.84 Average	2385.504	40.64	54.00	-13.36	48.41	-7.77 Average
2362.998	50.59	74.00	-23.41	58.43	-7.84 Peak	2385.504	55.47	74.00	-18.53	63.24	-7.77 Peak
2441.164	89.19			96.84	-7.65 Average	2441.406	99.56			107.21	-7.65 Average
2441.164	107.08			114.73	-7.65 Peak	2441.406	119.65			127.30	-7.65 Peak
2544.982	37.90	54.00	-16.10	45.31	-7.41 Average	2489.322	40.78	54.00	-13.22	48.37	-7.59 Average
2544.982	51.68	74.00	-22.32	59.09	-7.41 Peak	2489.322	57.32	74.00	-16.68	64.91	-7.59 Peak
3254.700	41.15	54.00	-12.85	46.50	-5.35 Average	3254.700	41.81	54.00	-12.19	47.16	-5.35 Average
3254.700	47.40	74.00	-26.60	52.75	-5.35 Peak	3254.700	48.19	74.00	-25.81	53.54	-5.35 Peak
4882.000	44.35	54.00	-9.65	45.87	-1.52 Average	4882.000	46.90	54.00	-7.10	48.42	-1.52 Average
4882.000	54.70	74.00	-19.30	56.22	-1.52 Peak	4882.000	57.59	74.00	-16.41	59.11	-1.52 Peak
7323.000	49.72	54.00	-4.28	44.42	5.30 Average	7323.000	51.40	54.00	-2.60	46.10	5.30 Average
7323.000	62.11	74.00	-11.89	56.81	5.30 Peak	7323.000	62.79	74.00	-11.21	57.49	5.30 Peak

EDR-3Mbps Horizontal High CH						EDR-3Mbps Vertical High CH					
Freq	Level	Limit	Over	Read		Freq	Level	Limit	Over	Read	
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m
2480.004	85.82			93.42	-7.60 Average	2479.840	97.32			104.92	-7.60 Average
2480.004	103.31			110.91	-7.60 Peak	2479.840	117.52			125.12	-7.60 Peak
2483.500	40.38	54.00	-13.62	47.97	-7.59 Average	2483.530	51.03	54.00	-2.97	58.62	-7.59 Average
2483.500	57.88	74.00	-16.12	65.47	-7.59 Peak	2483.530	73.55	74.00	-0.45	81.14	-7.59 Peak
3306.700	42.97	54.00	-11.03	48.20	-5.23 Average	3306.700	42.95	54.00	-11.05	48.18	-5.23 Average
3306.700	49.12	74.00	-24.88	54.35	-5.23 Peak	3306.700	49.57	74.00	-24.43	54.80	-5.23 Peak
4960.000	44.99	54.00	-9.01	46.33	-1.34 Average	4960.000	48.76	54.00	-5.24	50.10	-1.34 Average
4960.000	55.57	74.00	-18.43	56.91	-1.34 Peak	4960.000	60.08	74.00	-13.92	61.42	-1.34 Peak
7440.000	44.74	54.00	-9.26	39.10	5.64 Average	7440.000	43.36	54.00	-10.64	37.72	5.64 Average
7440.000	54.83	74.00	-19.17	49.19	5.64 Peak	7440.000	56.20	74.00	-17.80	50.56	5.64 Peak

Above 1G (1 GHz-26.5 GHz): The worst mode is Dipole with 3.3V_{dc} for BR-1M High CH.



Level = Read Level + Factor

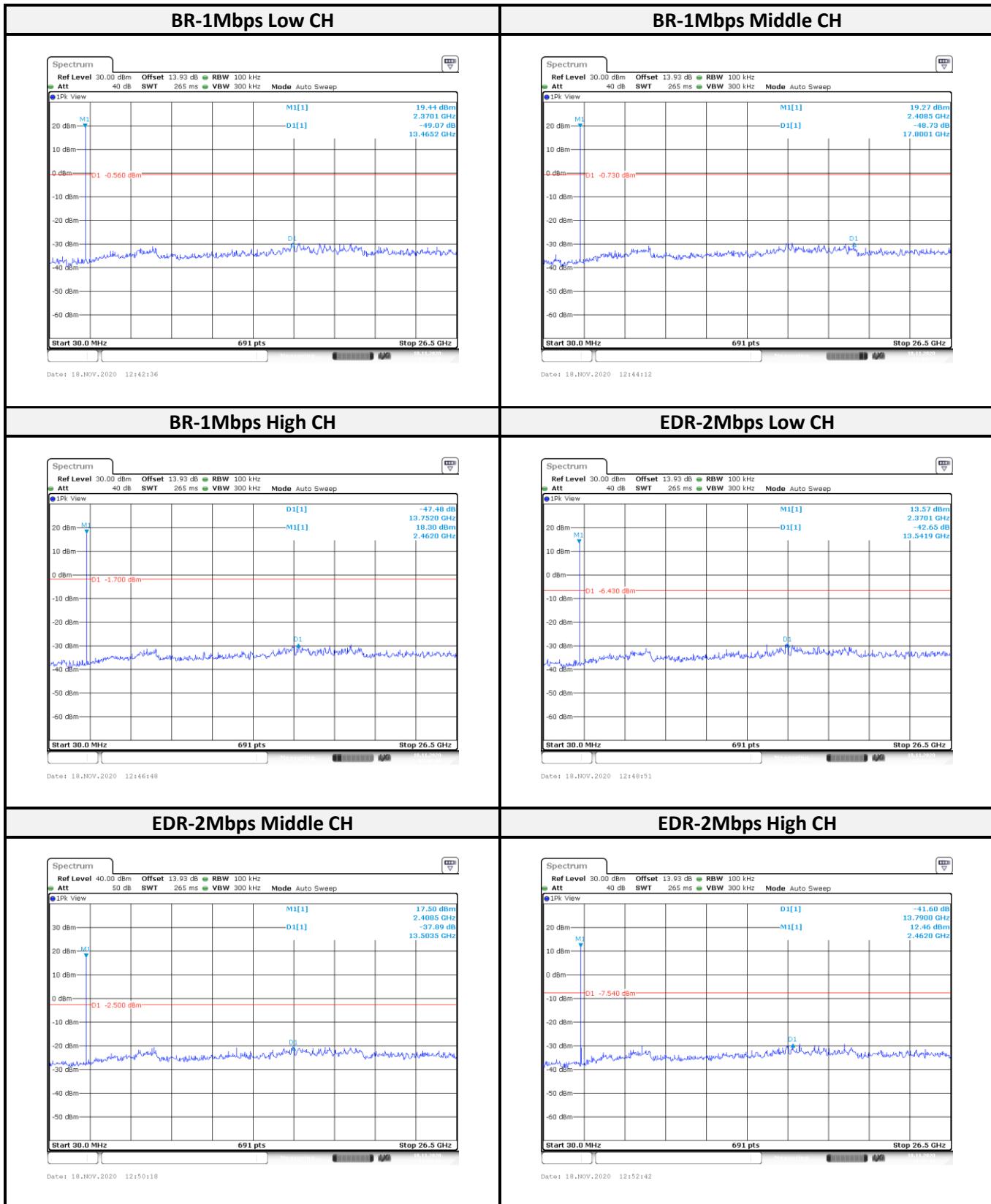
Over Limit = Level – Limit

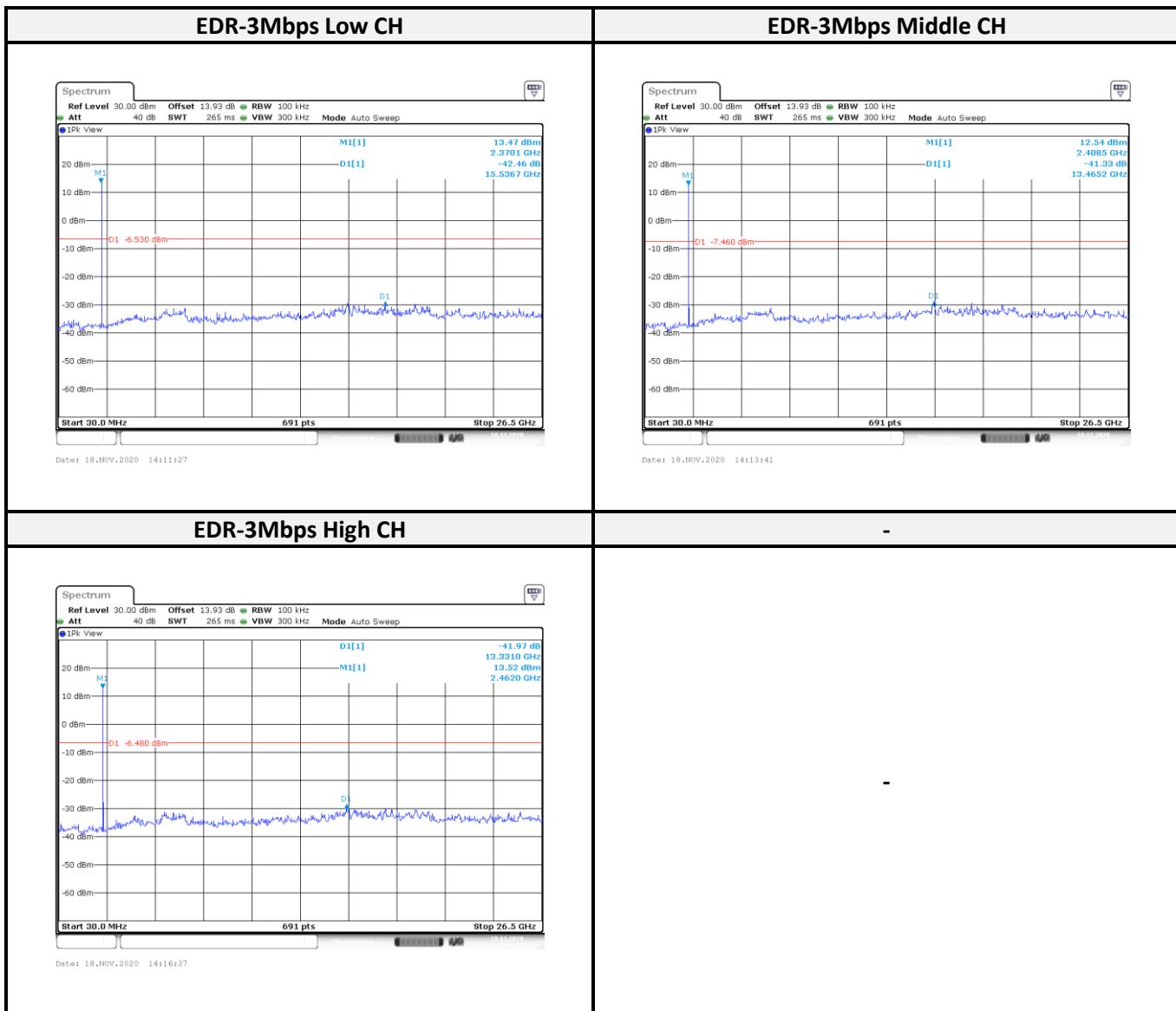
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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	49.07	≥ 20	Compliance
	Mid	2440	48.73	≥ 20	Compliance
	High	2480	47.48	≥ 20	Compliance
BLE-2Mbps	Low	2402	42.65	≥ 20	Compliance
	Mid	2440	37.89	≥ 20	Compliance
	High	2480	41.60	≥ 20	Compliance
BLE-3Mbps	Low	2402	42.46	≥ 20	Compliance
	Mid	2440	41.33	≥ 20	Compliance
	High	2480	41.97	≥ 20	Compliance





9 FCC §15.247(a)(1) and RSS-Gen Sec 6.7– 20 dB Emission Bandwidth and 99% OBW

9.1 Applicable Standard

According to FCC §15.247(a) (1) the maximum 20 dB bandwidth of the hopping channel shall be presented.

According to RSS-247 §5.1

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system's radio frequency (RF) bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals

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

20dB Bandwidth:

- (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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

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 $[10 \log (OBW/RBW)]$ 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).

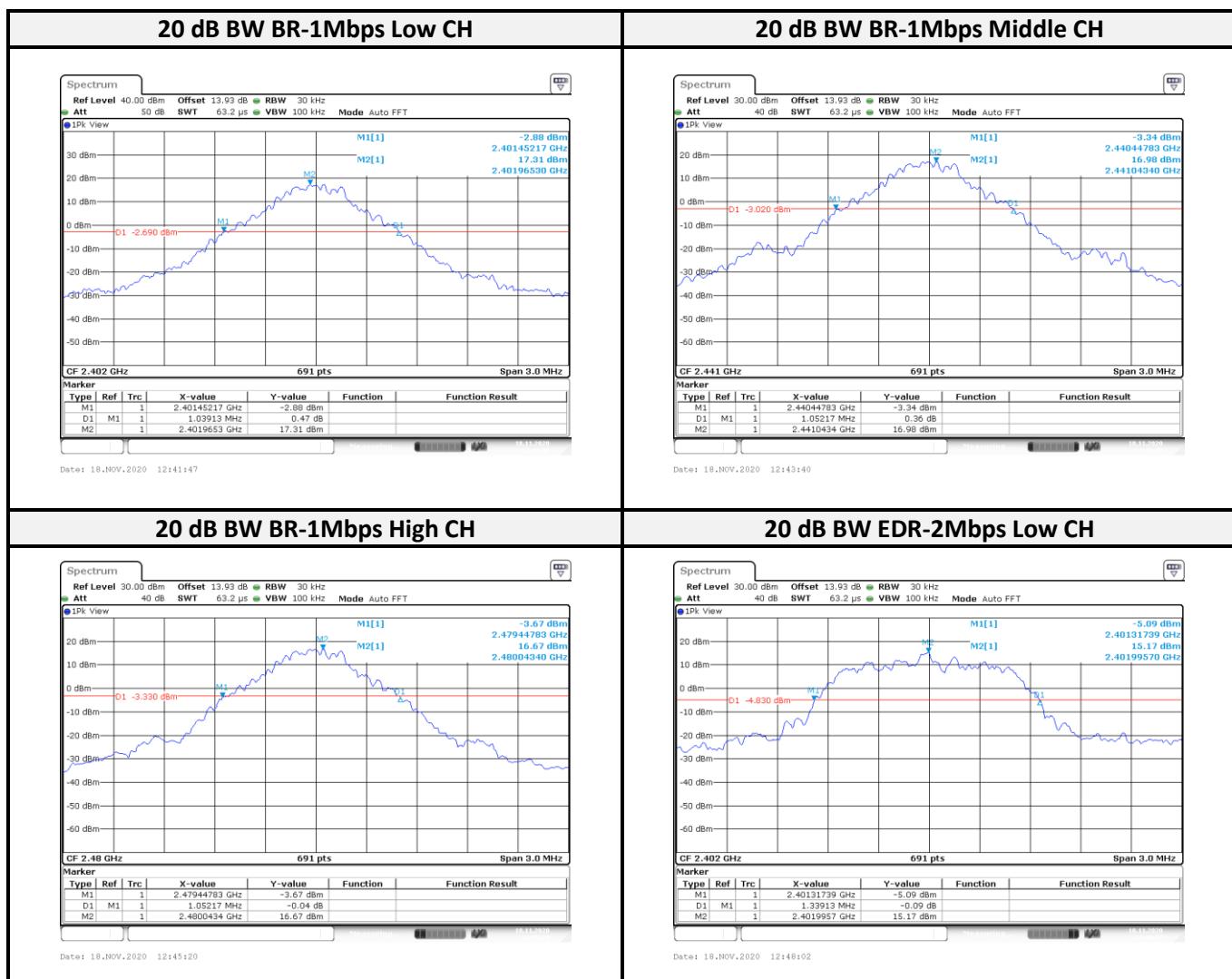
9.3 Test Equipment List and Details

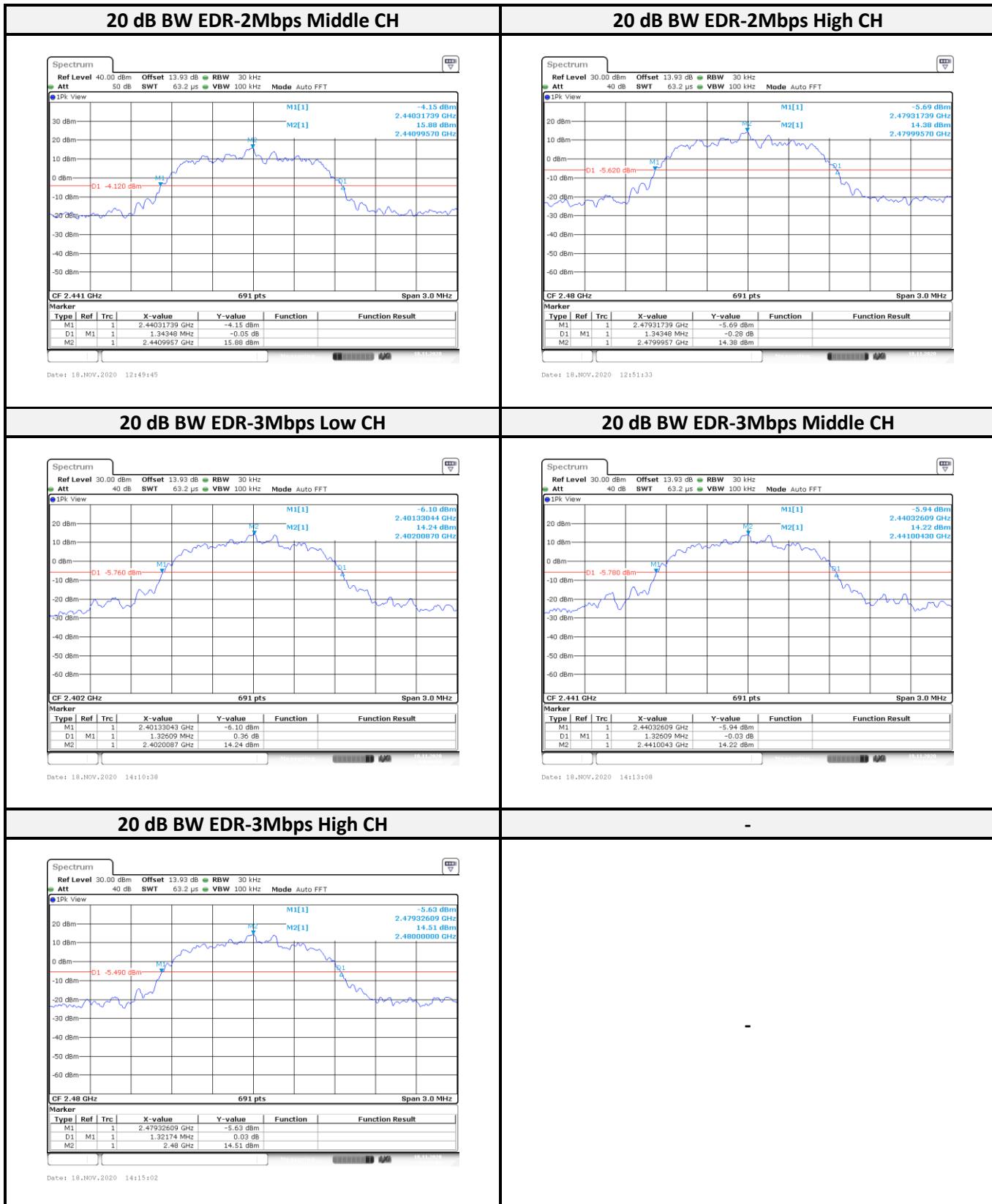
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each use	-

***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).

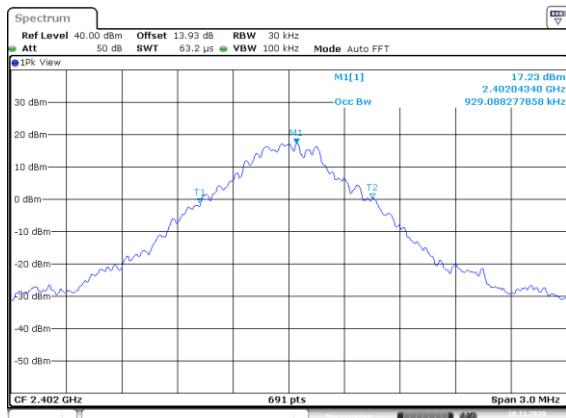
9.4 Test Results

Configuration	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
BR-1Mbps	Low	2402	1.04	0.93
	Middle	2441	1.05	0.91
	High	2480	1.05	0.91
EDR-2Mbps	Low	2402	1.34	1.20
	Middle	2441	1.34	1.21
	High	2480	1.34	1.20
EDR-3Mbps	Low	2402	1.33	1.19
	Middle	2441	1.33	1.19
	High	2480	1.32	1.20



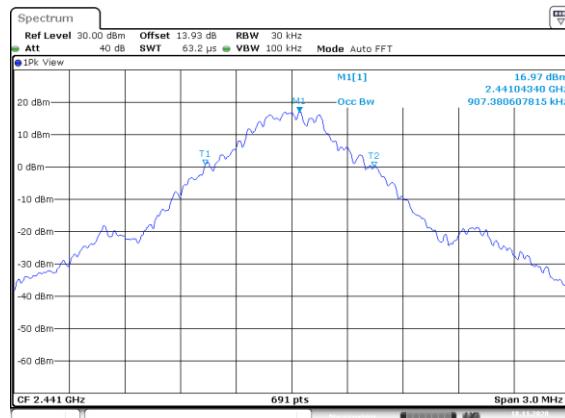


99% OBW BR-1Mbps Low CH



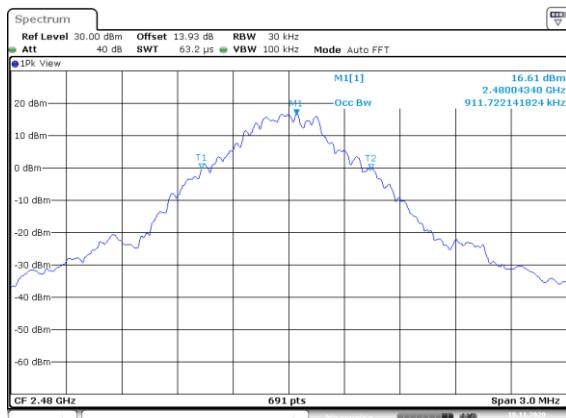
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99% OBW BR-1Mbps Middle CH



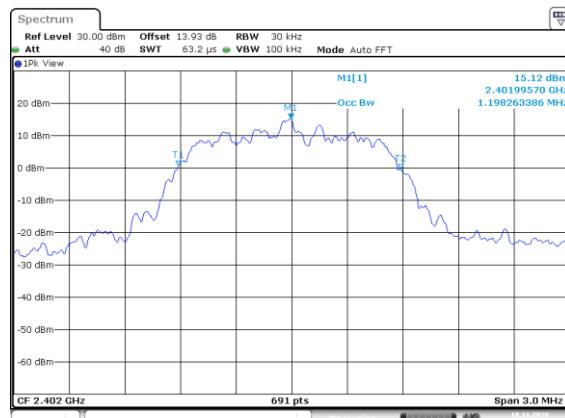
Date: 18.NOV.2020 12:43:56

99% OBW BR-1Mbps High CH



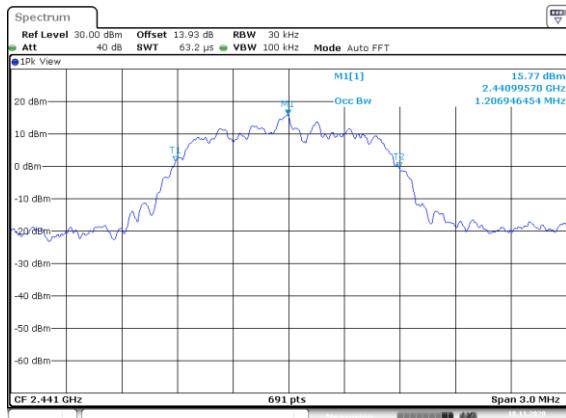
Date: 18.NOV.2020 12:45:36

99% OBW EDR-2Mbps Low CH



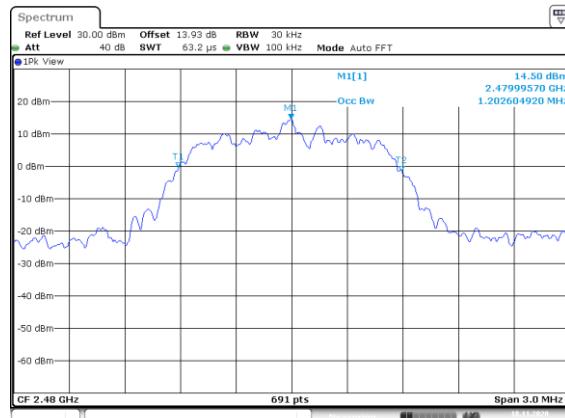
Date: 18.NOV.2020 12:48:19

99% OBW EDR-2Mbps Middle CH

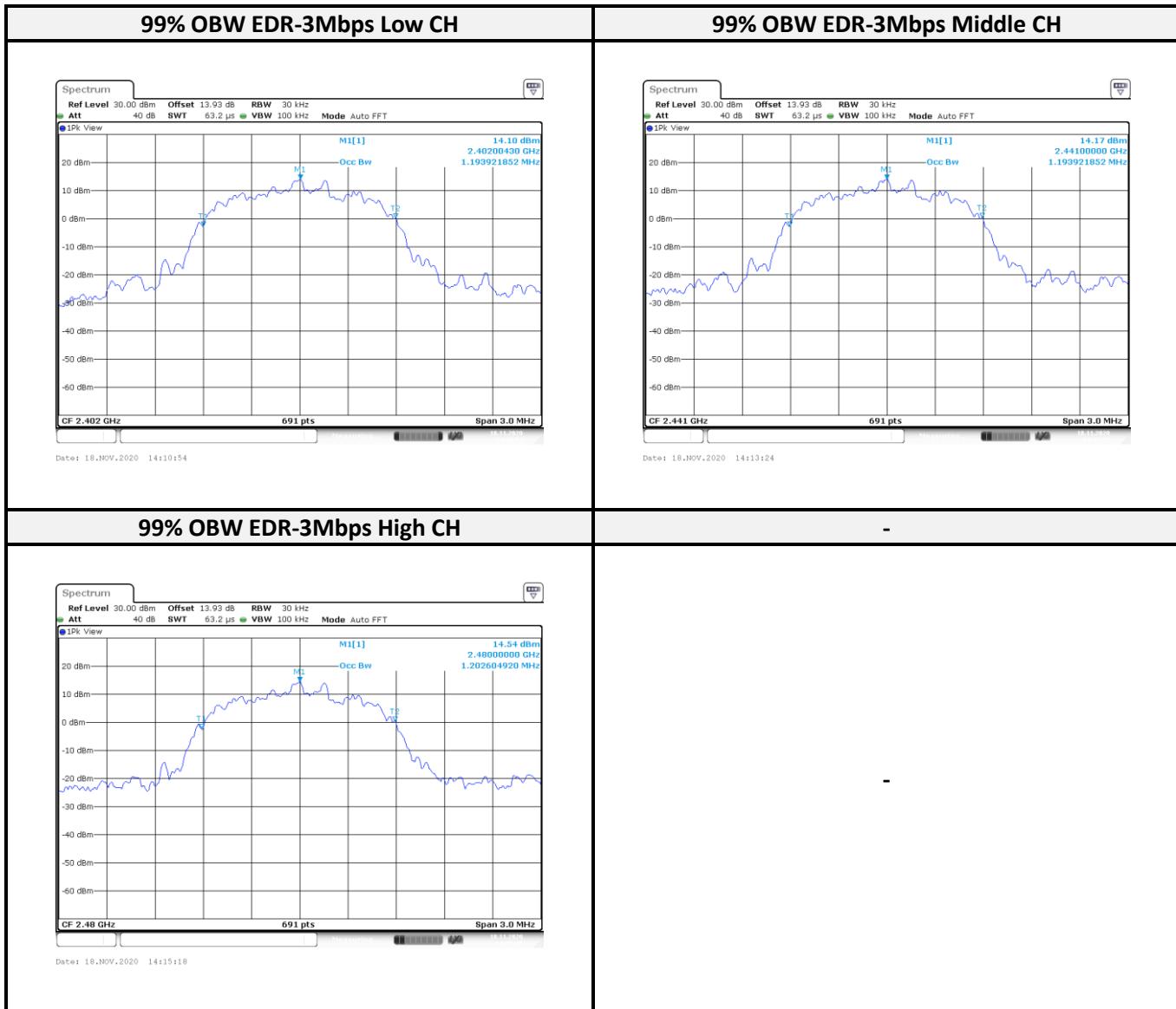


Date: 18.NOV.2020 12:50:01

99% OBW EDR-2Mbps High CH



Date: 18.NOV.2020 12:51:50



10 FCC §15.247(a)(1) and RSS-247 Sec 5.1(b)– Channel Separation Test

10.1 Applicable Standard

According to FCC §15.247(a) (1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to RSS-247 Sec 5.1(b):

FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

10.2 Test Procedure

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) \approx 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel. Video (or Average) Bandwidth (VBW) \geq RBW. Sweep = auto

Detector function = peak Trace = max hold

10.3 Test Equipment List and Details

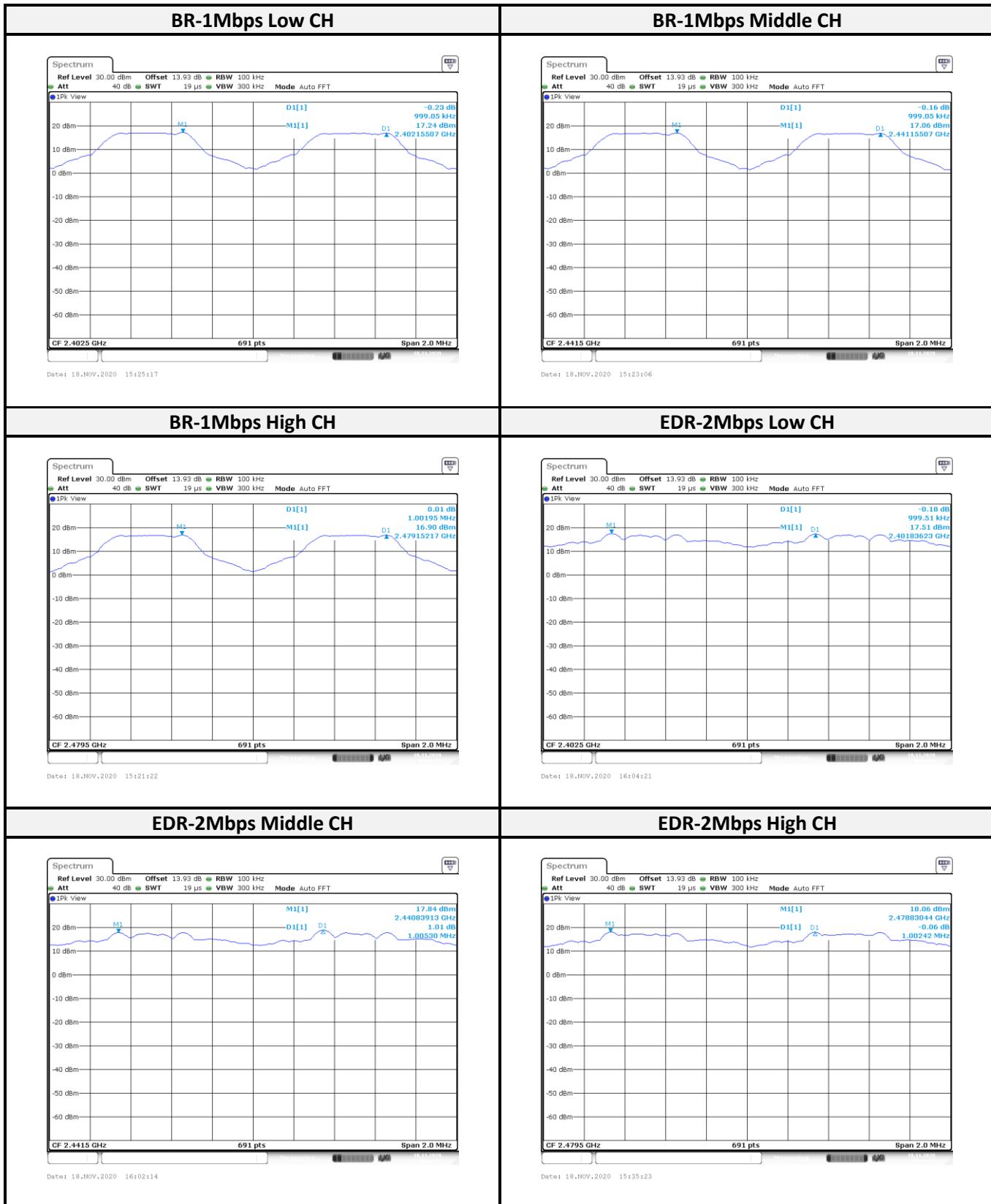
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each use	-

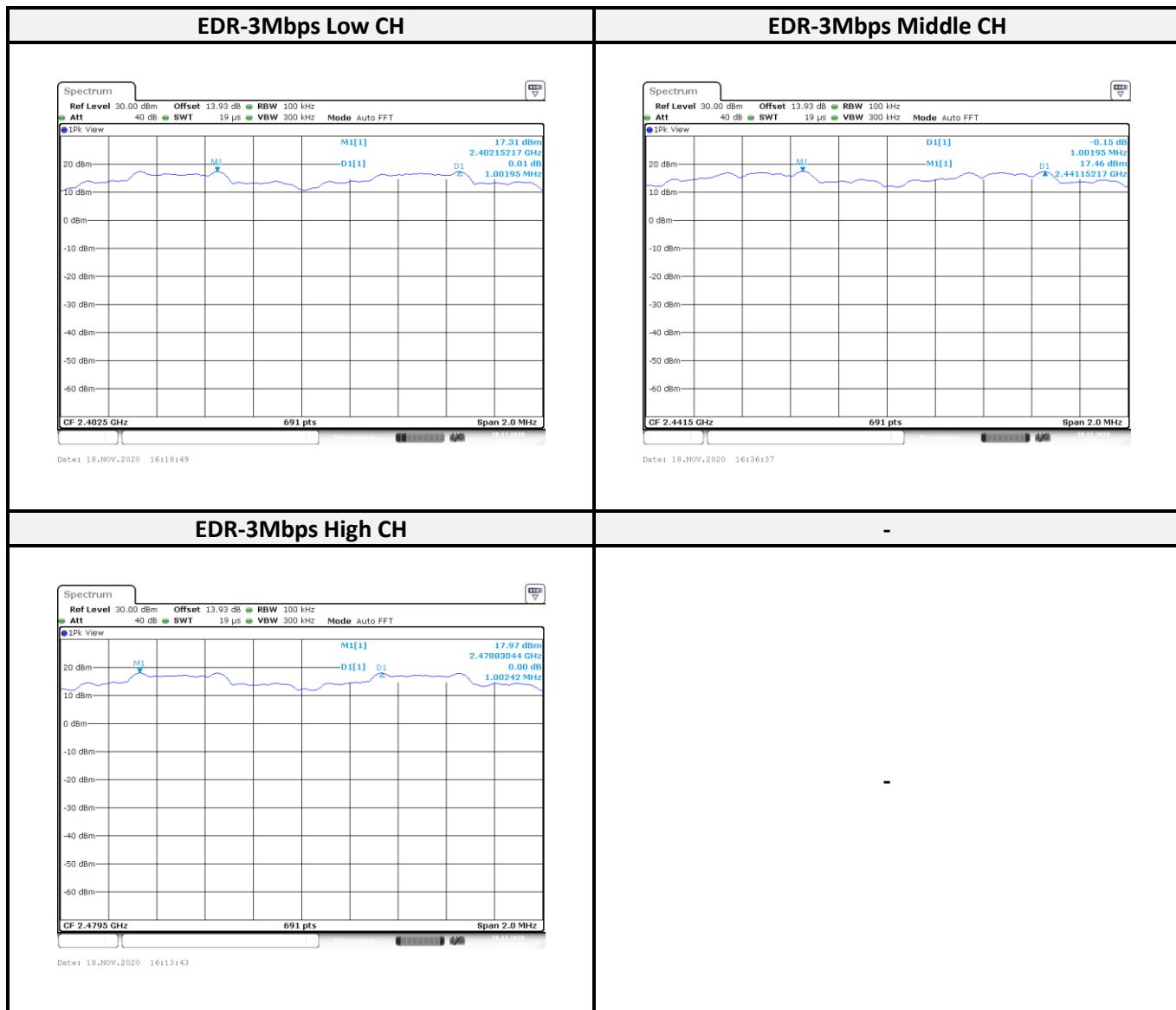
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units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

10.4 Test Results

Mode	Channel	Frequency (MHz)	20 dBc BW (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BR-1Mbps	Low	2402	1.04	1.00	0.693	Compliance
	Middle	2441	1.05	1.00	0.701	Compliance
	High	2480	1.05	1.00	0.701	Compliance
EDR-2Mbps	Low	2402	1.34	1.00	0.893	Compliance
	Middle	2441	1.34	1.01	0.896	Compliance
	High	2480	1.34	1.00	0.896	Compliance
EDR-3Mbps	Low	2402	1.33	1.00	0.884	Compliance
	Middle	2441	1.33	1.00	0.884	Compliance
	High	2480	1.32	1.00	0.881	Compliance

Note: Limit is >two-thirds of the 20 dB bandwidth





11 FCC §15.247(a)(1)(iii) and RSS-247 Sec 5.1(d)– Time of Occupancy (Dwell Time)

11.1 Applicable Standard

According to FCC §15.247(a)(1)(iii),

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

According to RSS-247 Sec 5.1(d),

FHSs operating in the band 2400–2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

11.2 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel

RBW \leq channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel

Sweep = as necessary to capture the entire dwell time per hopping channel Detector function = peak

Trace = max hold

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements.

Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

11.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
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

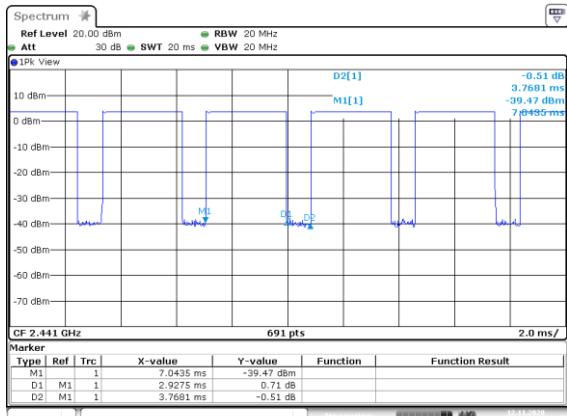
Modulation Mode	Pulse Time per Hop (ms)	Number of Pulse in [0.4 x N sec]	Dwell Time in [0.4 x N sec] (s)	Dwell Time Limits (s)
BR-1Mbps	2.93	106.7	0.312	0.4
EDR-2Mbps	2.93	106.7	0.312	0.4
EDR-3Mbps	2.96	106.7	0.315	0.4

Note1: Number of Pulse in [0.4 x N sec] = $1600/79/6*(0.4*79)$

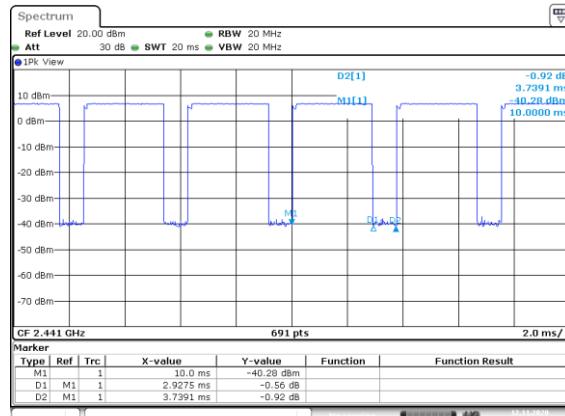
Note2: Dwell Time in [0.4 x N sec] = (Pulse Time * Number of Pulse in [0.4 x N sec])/1000

Note3: Bluetooth ACL packets can be 1, 3, or 5 time slots. The DH1 packet can cover a single time slot. The DH3 packet can cover up to 3 time slots. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms.

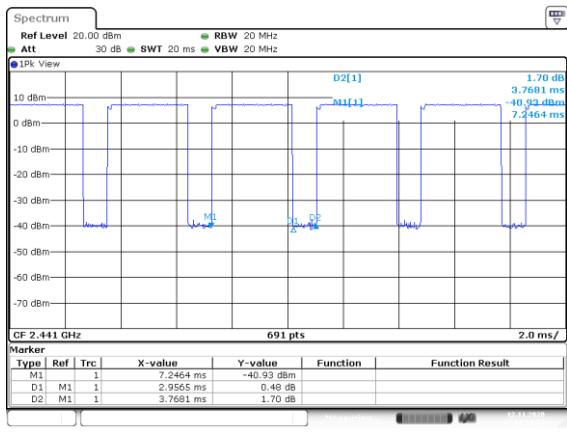
DH5



2-DH5



3-DH5



12 FCC §15.247(a)(1)(iii) and RSS-247 Sec 5.1(b)–Quantity of hopping channel Test

12.1 Applicable Standard

According to FCC §15.247(a)(1)(iii),

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

According to RSS-247 Sec 5.1(b):

FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

12.2 Test Procedure

Span = the frequency band of operation.

RBW < 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller VBW ≥ RBW.

Sweep = auto. Detector function = peak Trace = max hold.

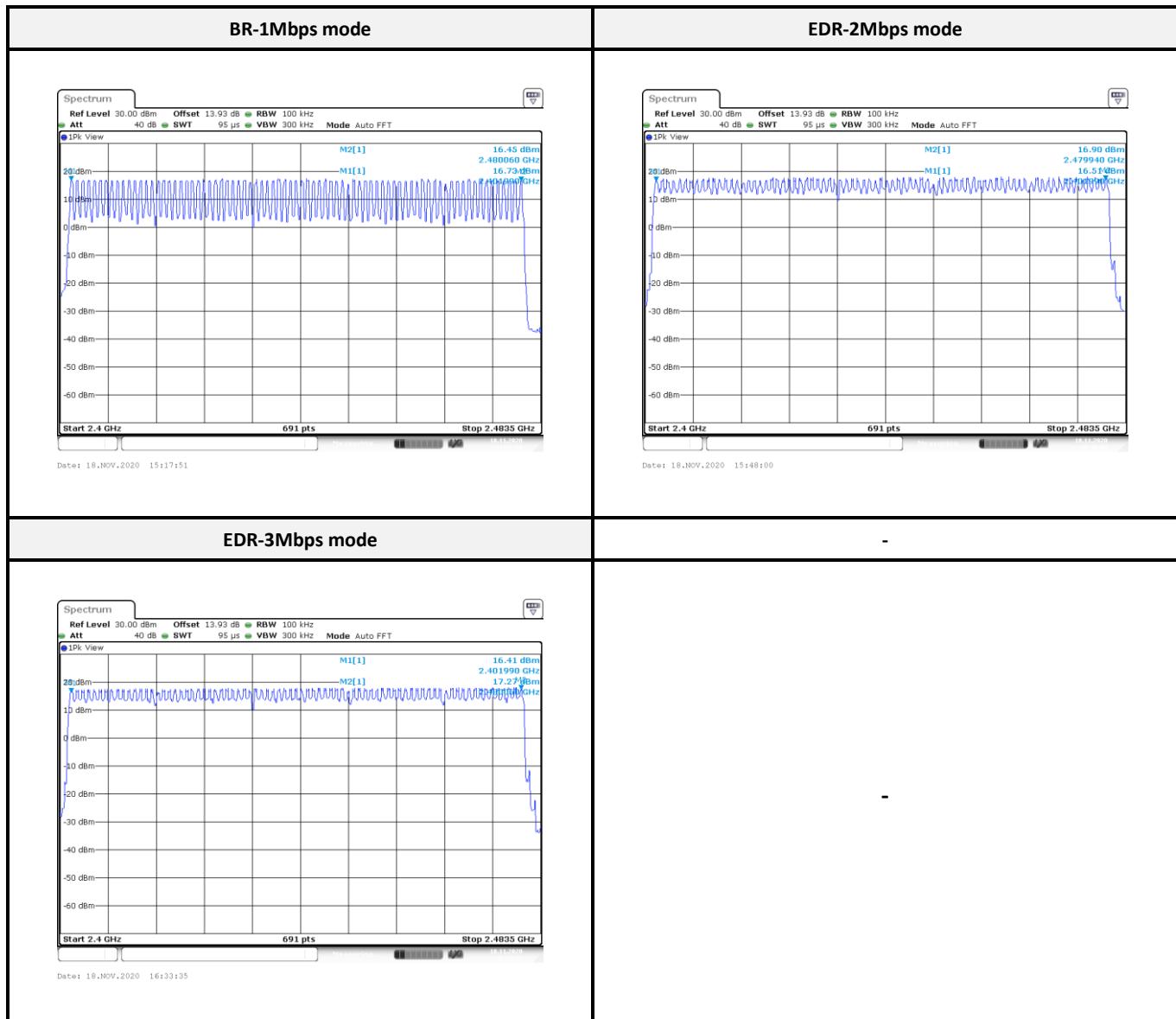
12.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
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

Mode	Frequency Range (MHz)	Number of Hopping Channel	Limit (CH)	Result
BR-1Mbps	2402-2480	79	>15	Compliance
EDR-2Mbps	2402-2480	79	>15	Compliance
EDR-3Mbps	2402-2480	79	>15	Compliance



13 FCC §15.247(b)(1) and RSS-247 Sec 5.1(b) and Sec 5.4(b) – Maximum Output Power

13.1 Applicable Standard

According to FCC §15.247(b) (1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

13.2 Test Procedure

Place the EUT on a bench and set it in transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Power sensor.

13.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
USB Wideband Power Sensor	Agilent	U2021XA	MY56120026	2020/09/14	2021/09/13
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).

13.4 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)		
BR-1Mbps	Low	2402	16.52	0.0449	1.70	18.22	0.0664	21	36
	Middle	2440	16.18	0.0415	1.70	17.88	0.0614	21	36
	High	2480	15.72	0.0373	1.70	17.42	0.0552	21	36
EDR-2Mbps	Low	2402	17.17	0.0521	1.70	18.87	0.0771	21	36
	Middle	2440	16.88	0.0488	1.70	18.58	0.0721	21	36
	High	2480	16.37	0.0434	1.70	18.07	0.0641	21	36
EDR-3Mbps	Low	2402	17.45	0.0556	1.70	19.15	0.0822	21	36
	Middle	2440	17.13	0.0516	1.70	18.83	0.0764	21	36
	High	2480	16.42	0.0439	1.70	18.12	0.0649	21	36

Note1: Conducted Power Limit: 0.125W = 21 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)		
BR-1Mbps	Low	2402	16.44	0.0441	1.70	18.14	0.0652	21	36
	Middle	2440	16.09	0.0406	1.70	17.79	0.0601	21	36
	High	2480	15.65	0.0367	1.70	17.35	0.0543	21	36
EDR-2Mbps	Low	2402	15.84	0.0384	1.70	17.54	0.0568	21	36
	Middle	2440	15.81	0.0381	1.70	17.51	0.0564	21	36
	High	2480	15.49	0.0354	1.70	17.19	0.0524	21	36
EDR-3Mbps	Low	2402	16.16	0.0413	1.70	17.86	0.0611	21	36
	Middle	2440	16.07	0.0405	1.70	17.77	0.0598	21	36
	High	2480	15.41	0.0348	1.70	17.11	0.0514	21	36

Note1: Conducted Power Limit: 0.125W = 21 dBm, 4W = 36 dBm.

<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)		
BR-1Mbps	Low	2402	18.88	0.0773	1.70	20.58	0.1143	21	36
	Middle	2440	18.77	0.0753	1.70	20.47	0.1114	21	36
	High	2480	18.52	0.0711	1.70	20.22	0.1052	21	36
EDR-2Mbps	Low	2402	20.41	0.1099	1.70	22.11	0.1626	21	36
	Middle	2440	20.48	0.1117	1.70	22.18	0.1652	21	36
	High	2480	20.16	0.1038	1.70	21.86	0.1535	21	36
EDR-3Mbps	Low	2402	20.64	0.1159	1.70	22.34	0.1714	21	36
	Middle	2440	20.67	0.1167	1.70	22.37	0.1726	21	36
	High	2480	20.27	0.1064	1.70	21.97	0.1574	21	36

Note1: Conducted Power Limit: 0.125W = 21 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)		
BR-1Mbps	Low	2402	17.02	0.0504	1.70	18.72	0.0745	21	36
	Middle	2440	16.91	0.0491	1.70	18.61	0.0726	21	36
	High	2480	16.72	0.0470	1.70	18.42	0.0695	21	36
EDR-2Mbps	Low	2402	17.91	0.0618	1.70	19.61	0.0914	21	36
	Middle	2440	18.24	0.0667	1.70	19.94	0.0986	21	36
	High	2480	18.15	0.0653	1.70	19.85	0.0966	21	36
EDR-3Mbps	Low	2402	17.66	0.0583	1.70	19.36	0.0863	21	36
	Middle	2440	18.06	0.0640	1.70	19.76	0.0946	21	36
	High	2480	17.99	0.0630	1.70	19.69	0.0931	21	36

Note1: Conducted Power Limit: 0.125W = 21 dBm, 4W = 36 dBm.

Note2: Duty Cycle is 78.46% and Duty Factor is 1.05 dB, and the Average Output Power is already adding duty factor.

< 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)		
BR-1Mbps	Low	2402	16.73	0.0471	5.89	22.62	0.1828	21	36
	Middle	2440	16.34	0.0431	5.89	22.23	0.1671	21	36
	High	2480	15.56	0.0360	5.89	21.45	0.1396	21	36
EDR-2Mbps	Low	2402	17.47	0.0558	5.89	23.36	0.2168	21	36
	Middle	2440	17.09	0.0512	5.89	22.98	0.1986	21	36
	High	2480	16.39	0.0436	5.89	22.28	0.1690	21	36
EDR-3Mbps	Low	2402	17.75	0.0596	5.89	23.64	0.2312	21	36
	Middle	2440	17.33	0.0541	5.89	23.22	0.2099	21	36
	High	2480	14.86	0.0306	5.89	20.75	0.1189	21	36

Note1: Conducted Power Limit: 0.125W = 21 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)		
BR-1Mbps	Low	2402	16.66	0.0463	5.89	22.55	0.1799	21	36
	Middle	2440	16.27	0.0424	5.89	22.16	0.1644	21	36
	High	2480	15.47	0.0352	5.89	21.36	0.1368	21	36
EDR-2Mbps	Low	2402	16.21	0.0418	5.89	22.10	0.1622	21	36
	Middle	2440	16.05	0.0403	5.89	21.94	0.1563	21	36
	High	2480	15.36	0.0344	5.89	21.25	0.1334	21	36
EDR-3Mbps	Low	2402	16.52	0.0449	5.89	22.41	0.1742	21	36
	Middle	2440	16.29	0.0426	5.89	22.18	0.1652	21	36
	High	2480	12.71	0.0187	5.89	18.60	0.0724	21	36

Note1: Conducted Power Limit: 0.125W = 21 dBm, 4W = 36 dBm.

Note2: Duty Cycle is 78.46% and Duty Factor is 1.05 dB, and the Average Output Power is already adding duty factor.

< 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)		
BR-1Mbps	Low	2402	18.28	0.0673	5.89	24.17	0.2612	21	36
	Middle	2440	18.39	0.0690	5.89	24.28	0.2679	21	36
	High	2480	20.68	0.1169	5.89	26.57	0.4539	21	36
EDR-2Mbps	Low	2402	20.18	0.1042	5.89	26.07	0.4046	21	36
	Middle	2440	20.26	0.1062	5.89	26.15	0.4121	21	36
	High	2480	20.16	0.1038	5.89	26.05	0.4027	21	36
EDR-3Mbps	Low	2402	20.46	0.1112	5.89	26.35	0.4315	21	36
	Middle	2440	20.47	0.1114	5.89	26.36	0.4325	21	36
	High	2480	20.27	0.1064	5.89	26.16	0.4130	21	36

Note1: Conducted Power Limit: 0.125W = 21 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)		
BR-1Mbps	Low	2402	18.08	0.0643	5.89	23.97	0.2495	21	36
	Middle	2440	18.21	0.0662	5.89	24.10	0.2570	21	36
	High	2480	20.53	0.1130	5.89	26.42	0.4385	21	36
EDR-2Mbps	Low	2402	17.62	0.0578	5.89	23.51	0.2244	21	36
	Middle	2440	18.01	0.0632	5.89	23.90	0.2455	21	36
	High	2480	18.15	0.0653	5.89	24.04	0.2535	21	36
EDR-3Mbps	Low	2402	17.42	0.0552	5.89	23.31	0.2143	21	36
	Middle	2440	17.81	0.0604	5.89	23.70	0.2344	21	36
	High	2480	17.99	0.0630	5.89	23.88	0.2443	21	36

Note1: Conducted Power Limit: 0.125W = 21 dBm, 4W = 36 dBm.

Note2: Duty Cycle is 78.46% and Duty Factor is 1.05 dB, and the Average Output Power is already adding duty factor.

14 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

14.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)

14.2 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.

RBW = 100 kHz VBW = 300 kHz.

Sweep = coupled. Detector function = peak Trace = max hold.

14.3 Test Equipment List and Details

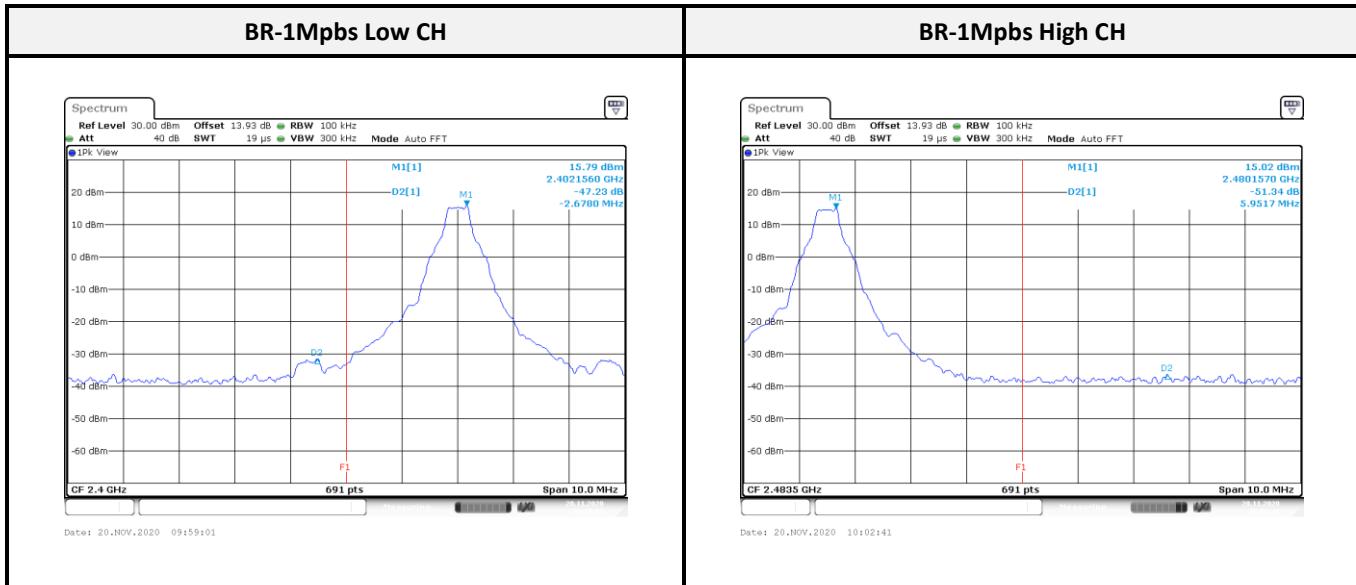
Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room(TH-02)					
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101434	2020/05/07	2021/05/06
Cable	MTJ	MT40S	620620-MT40S-100	Each use	-

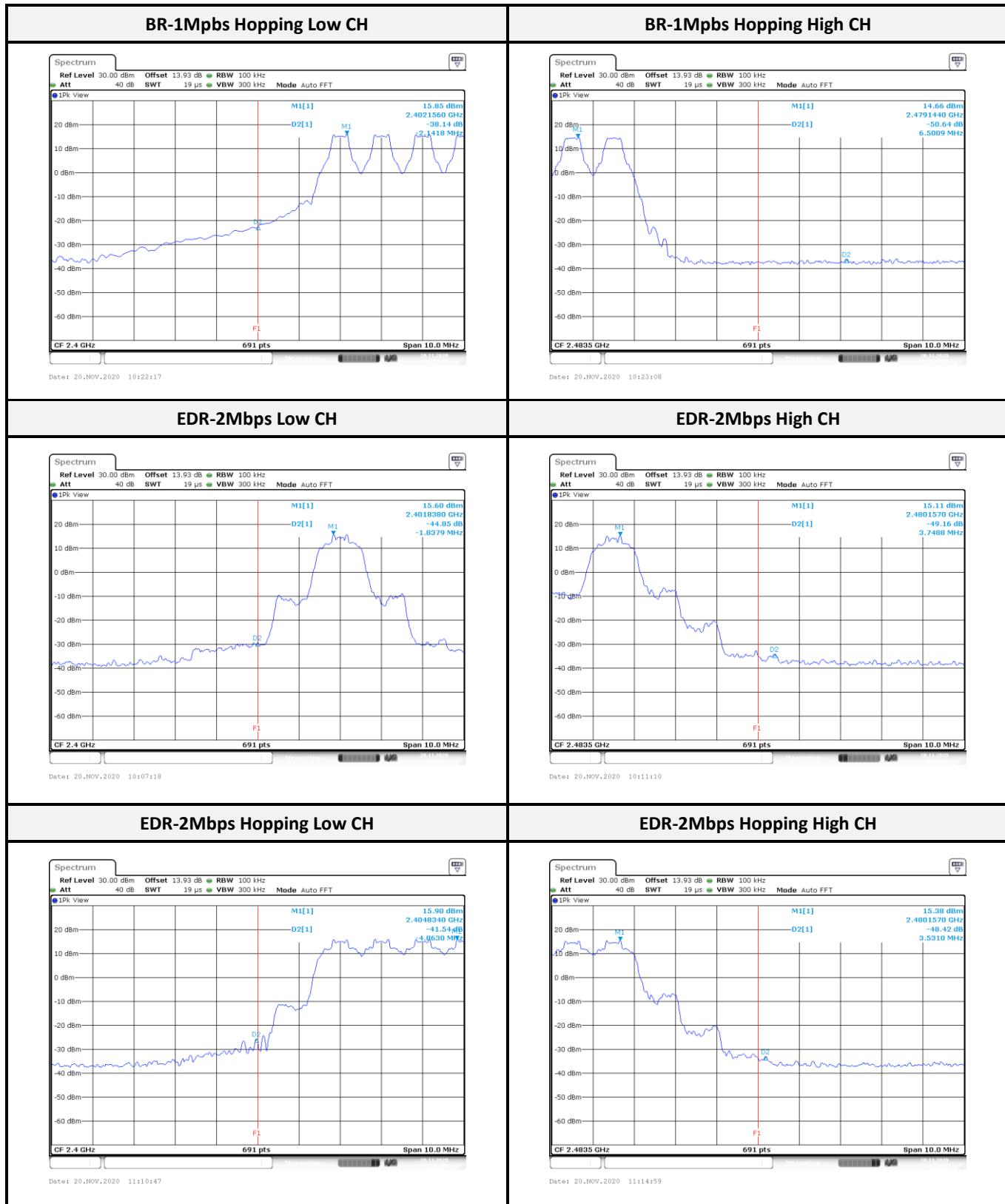
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units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

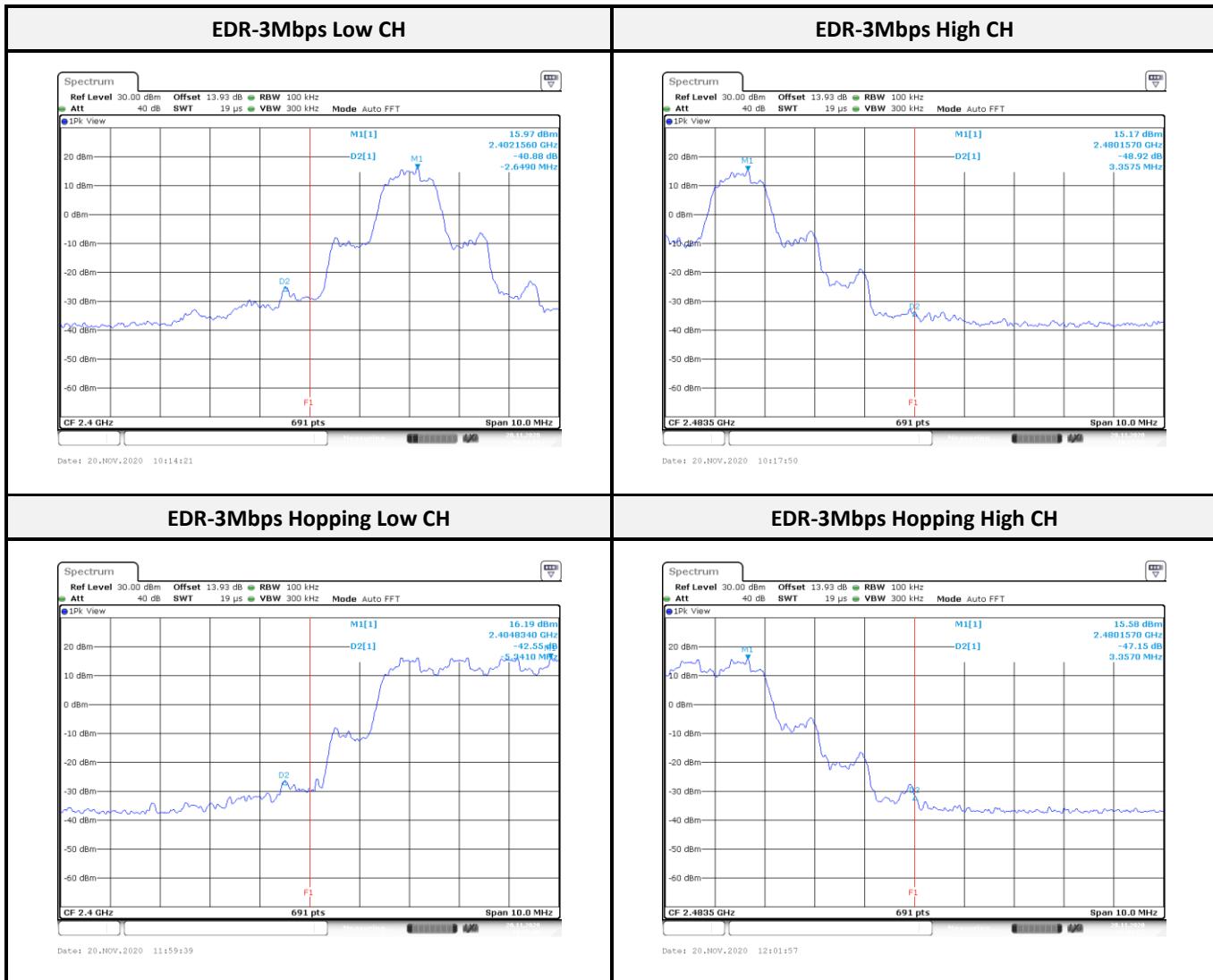
14.4 Test Results

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

Mode	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR-1Mbps	Low	2402	47.23	≥ 20	Compliance
	High	2480	51.34	≥ 20	Compliance
BR-1Mbps Hopping	Low	2402	38.14	≥ 20	Compliance
	High	2480	50.64	≥ 20	Compliance
EDR-2Mbps	Low	2402	44.85	≥ 20	Compliance
	High	2480	49.16	≥ 20	Compliance
EDR-2Mbps Hopping	Low	2402	41.54	≥ 20	Compliance
	High	2480	48.42	≥ 20	Compliance
EDR-3Mbps	Low	2402	40.88	≥ 20	Compliance
	High	2480	48.92	≥ 20	Compliance
EDR-3Mbps Hopping	Low	2402	42.55	≥ 20	Compliance
	High	2480	47.15	≥ 20	Compliance

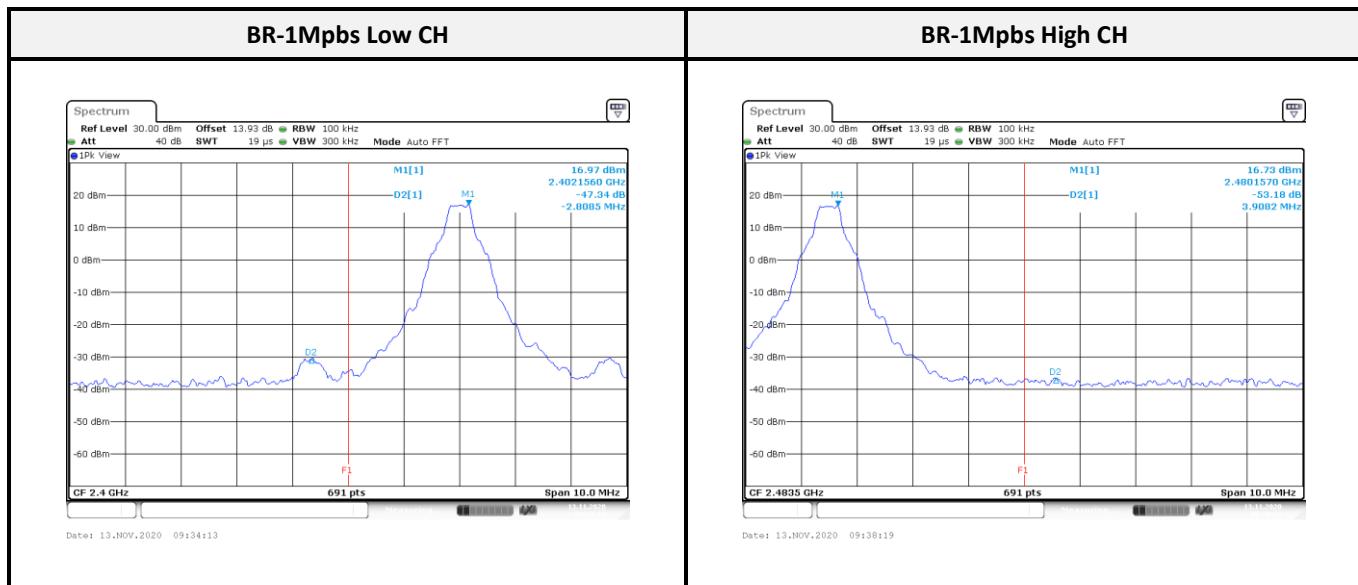


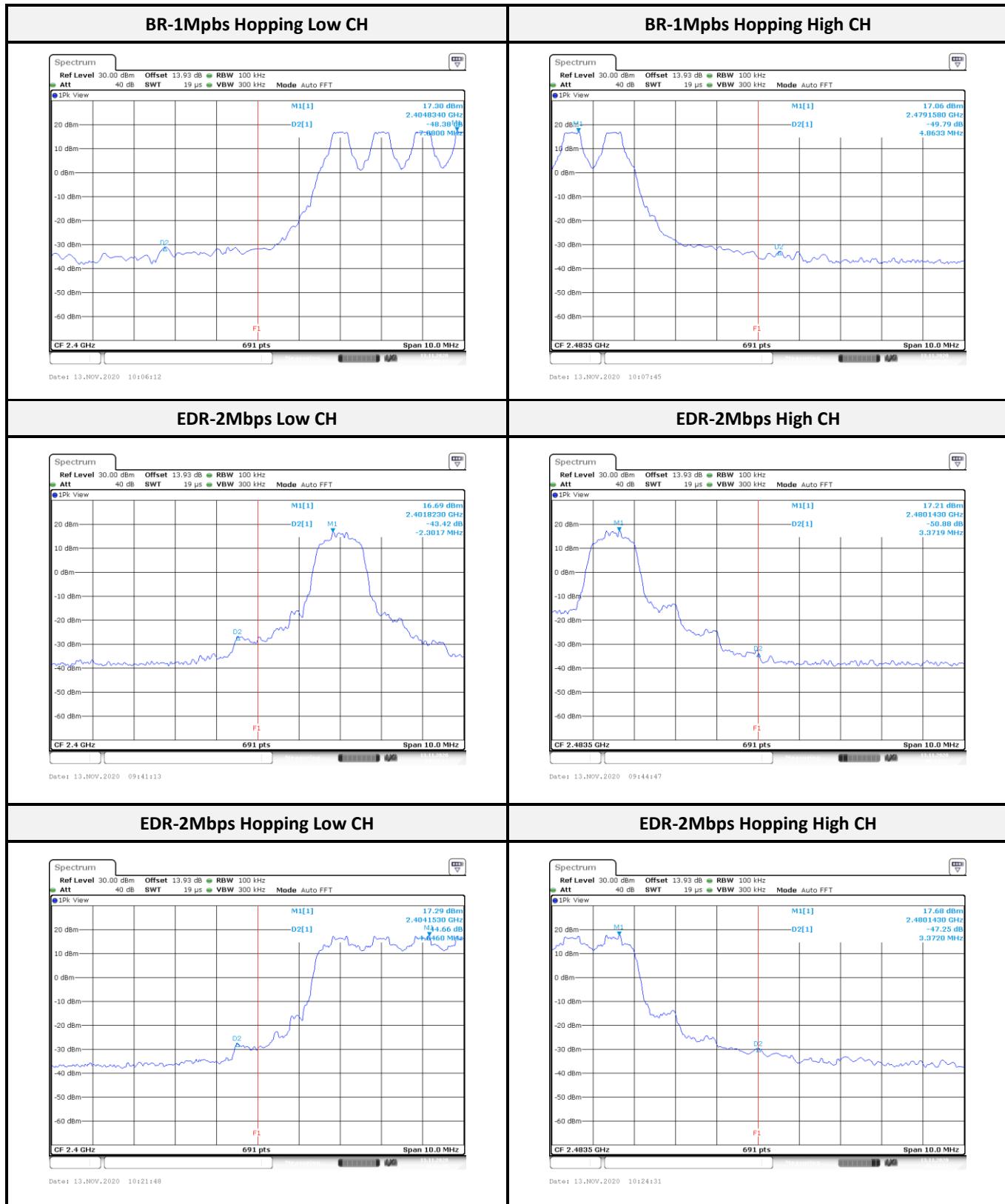


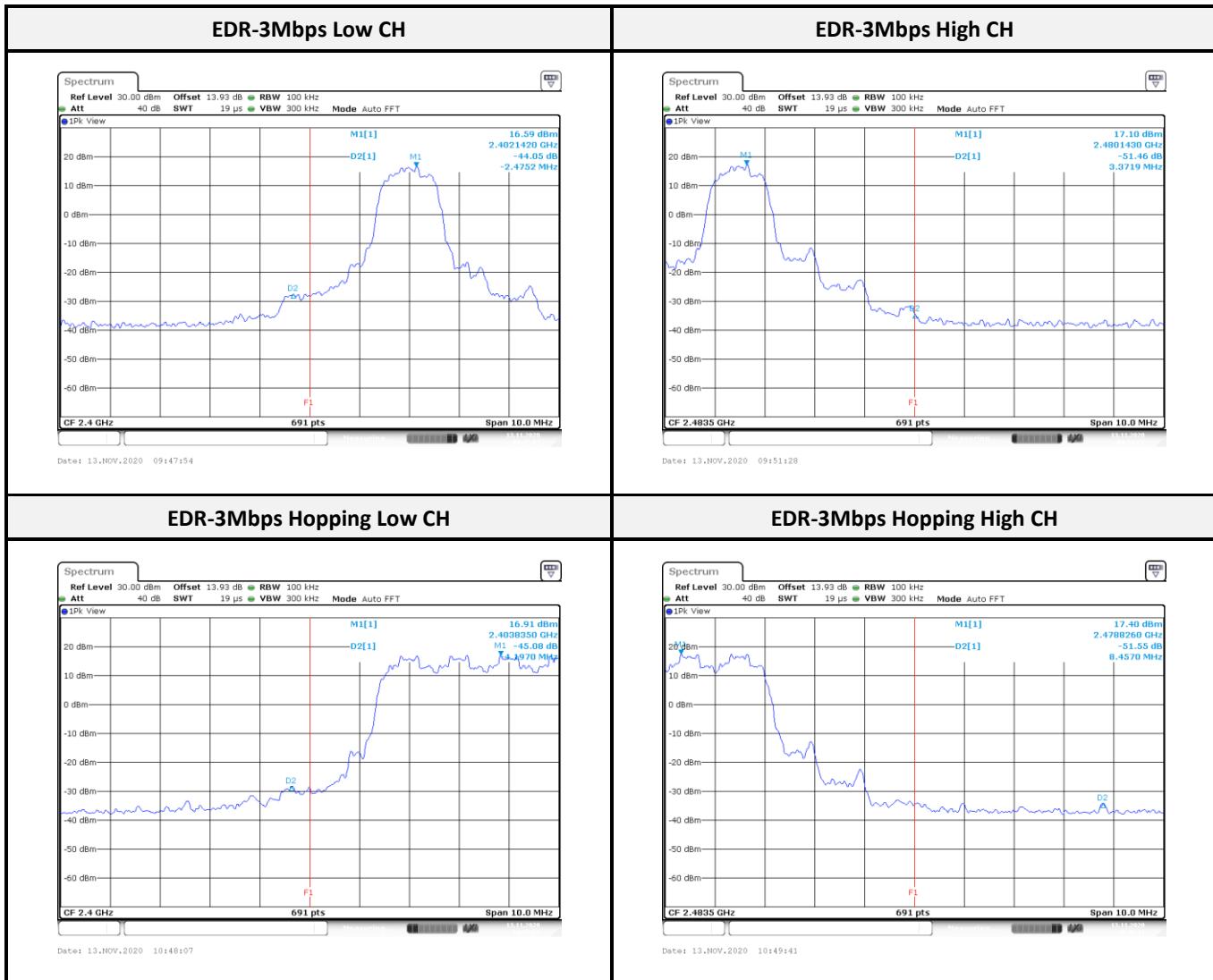


<Chip Antenna (FR05-S1-N-0-102) with 3.3V_{dc}>

Mode	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR-1Mbps	Low	2402	47.34	≥ 20	Compliance
	High	2480	53.18	≥ 20	Compliance
BR-1Mbps Hopping	Low	2402	48.38	≥ 20	Compliance
	High	2480	49.79	≥ 20	Compliance
EDR-2Mbps	Low	2402	43.42	≥ 20	Compliance
	High	2480	50.88	≥ 20	Compliance
EDR-2Mbps Hopping	Low	2402	44.66	≥ 20	Compliance
	High	2480	47.25	≥ 20	Compliance
EDR-3Mbps	Low	2402	44.05	≥ 20	Compliance
	High	2480	51.46	≥ 20	Compliance
EDR-3Mbps Hopping	Low	2402	45.08	≥ 20	Compliance
	High	2480	51.55	≥ 20	Compliance

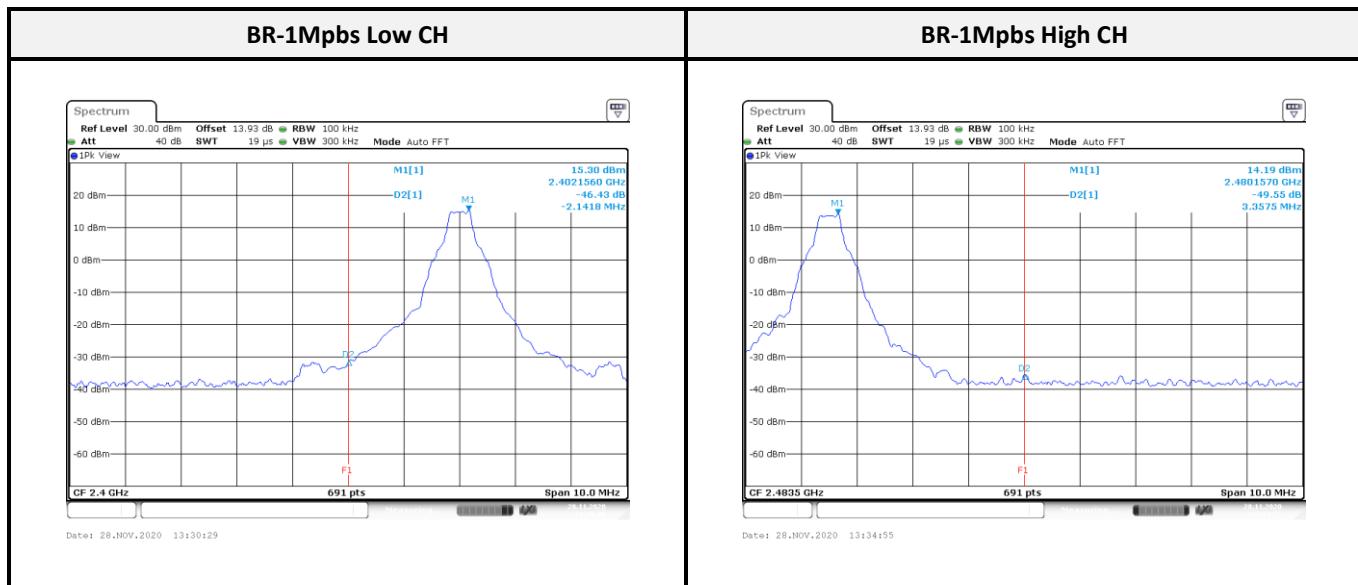


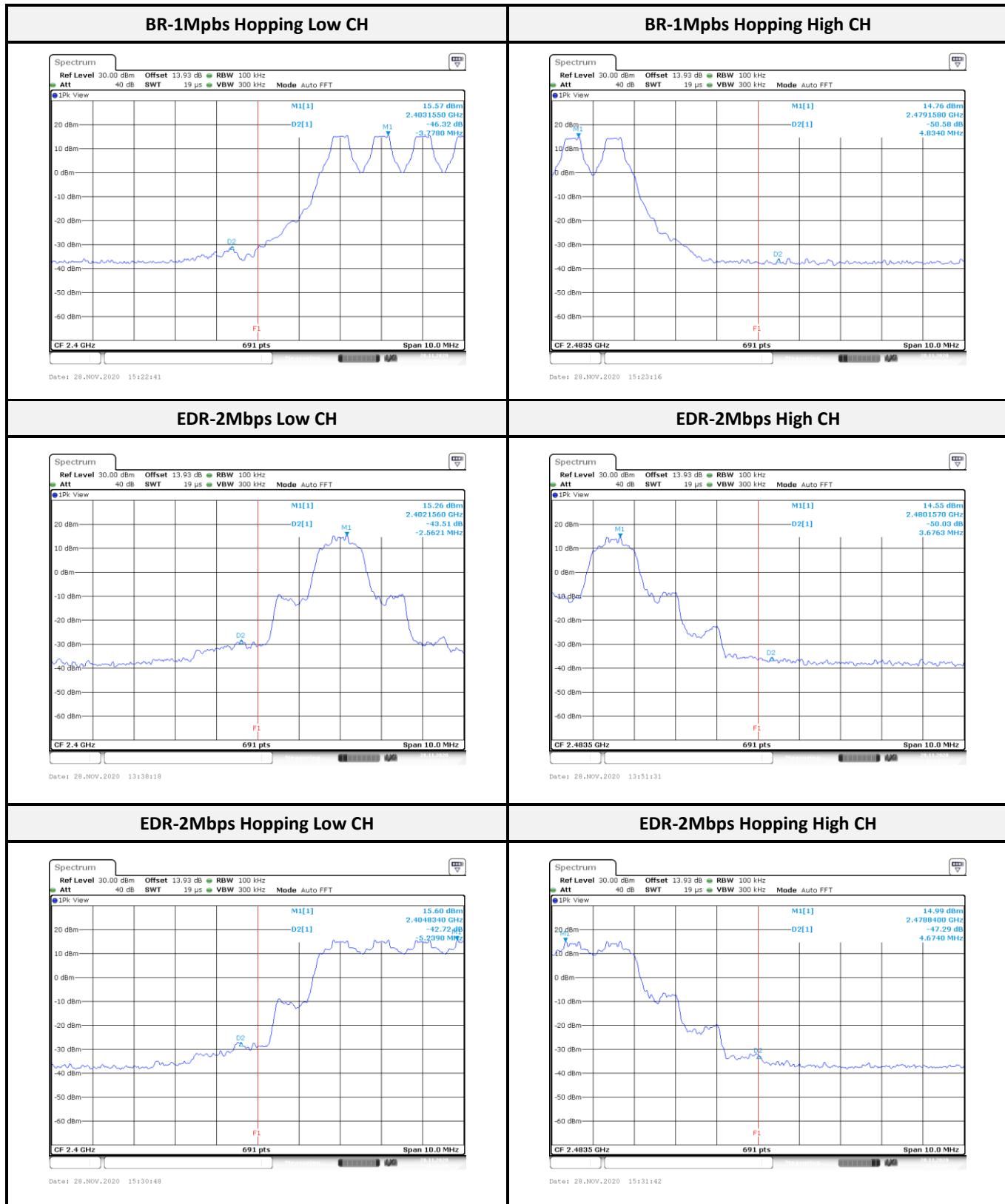


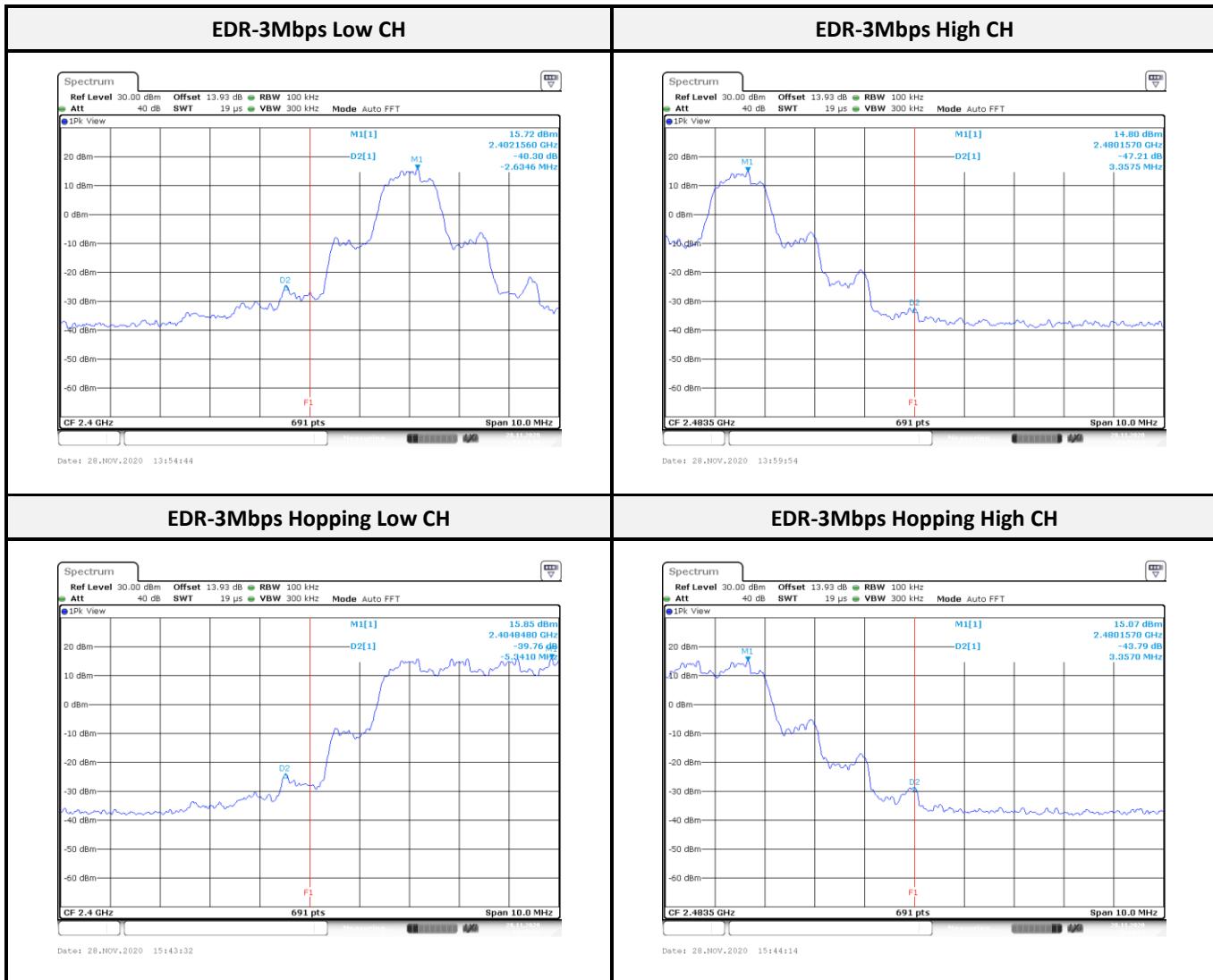


< Dipole Antenna (GW.34.5153) with 1.8V_{dc}>

Mode	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR-1Mbps	Low	2402	46.43	≥ 20	Compliance
	High	2480	49.55	≥ 20	Compliance
BR-1Mbps Hopping	Low	2402	46.32	≥ 20	Compliance
	High	2480	50.58	≥ 20	Compliance
EDR-2Mbps	Low	2402	43.51	≥ 20	Compliance
	High	2480	50.03	≥ 20	Compliance
EDR-2Mbps Hopping	Low	2402	42.72	≥ 20	Compliance
	High	2480	47.29	≥ 20	Compliance
EDR-3Mbps	Low	2402	40.30	≥ 20	Compliance
	High	2480	47.21	≥ 20	Compliance
EDR-3Mbps Hopping	Low	2402	39.76	≥ 20	Compliance
	High	2480	43.79	≥ 20	Compliance

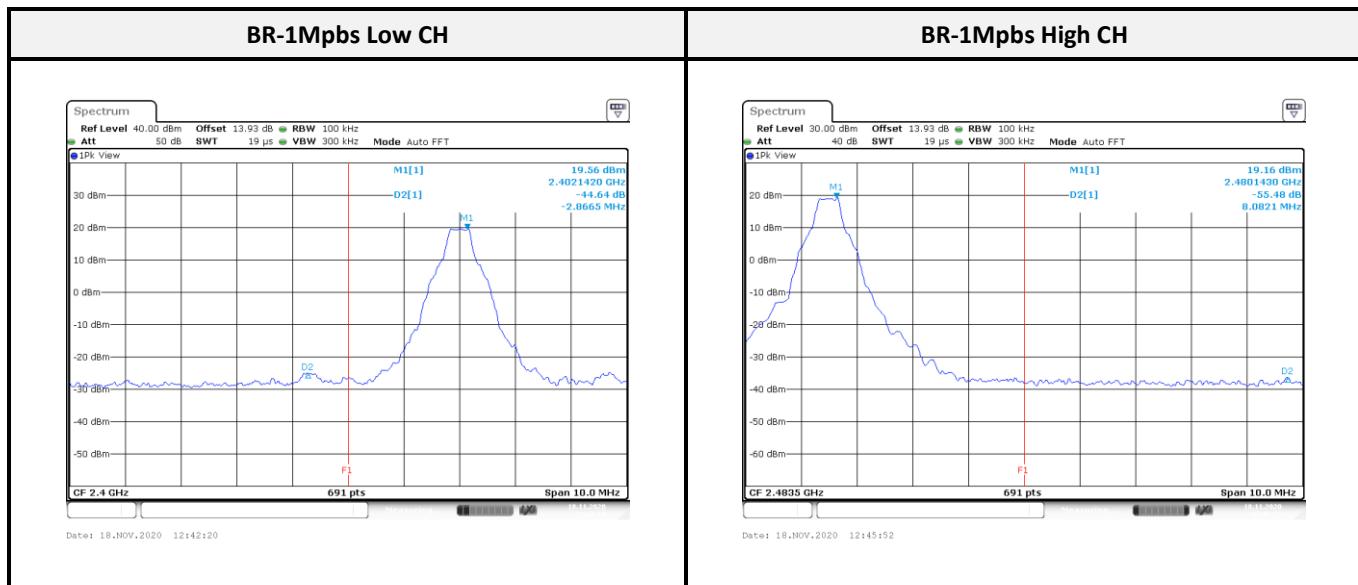


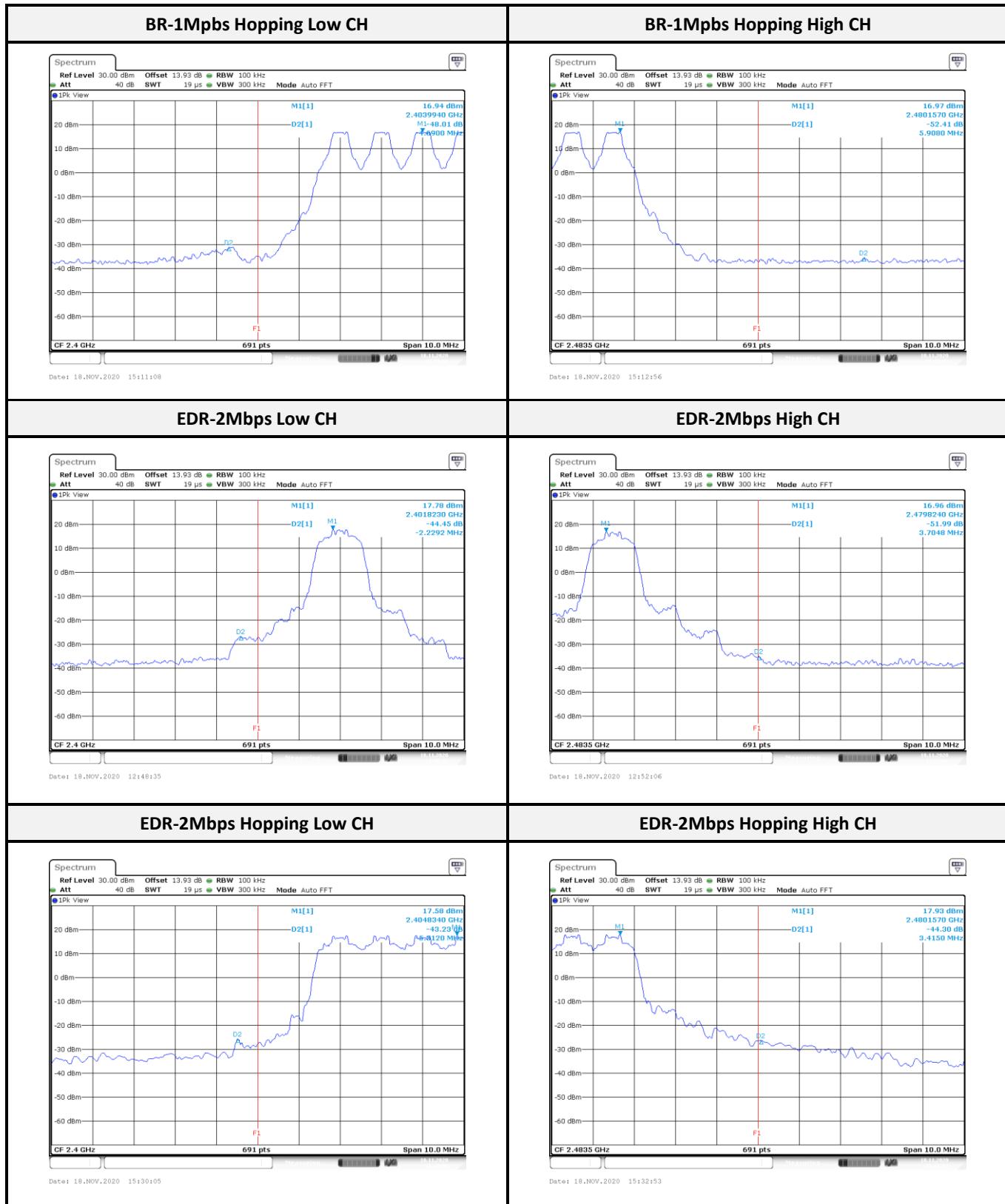


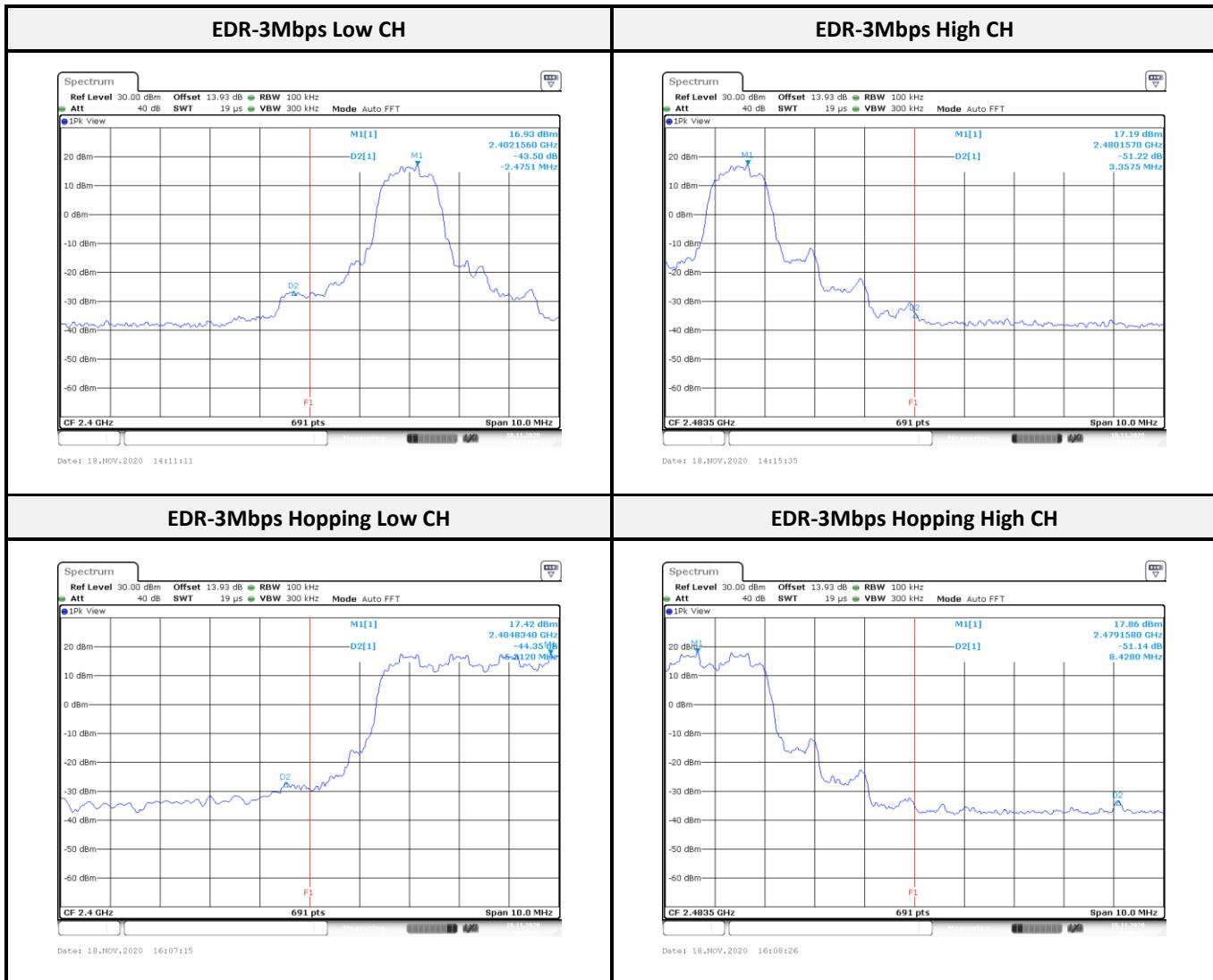


< Dipole Antenna (GW.34.5153) with 3.3V_{dc}>

Mode	Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR-1Mbps	Low	2402	44.64	≥ 20	Compliance
	High	2480	55.48	≥ 20	Compliance
BR-1Mbps Hopping	Low	2402	48.01	≥ 20	Compliance
	High	2480	52.41	≥ 20	Compliance
EDR-2Mbps	Low	2402	44.45	≥ 20	Compliance
	High	2480	51.99	≥ 20	Compliance
EDR-2Mbps Hopping	Low	2402	43.23	≥ 20	Compliance
	High	2480	44.30	≥ 20	Compliance
EDR-3Mbps	Low	2402	43.50	≥ 20	Compliance
	High	2480	51.22	≥ 20	Compliance
EDR-3Mbps Hopping	Low	2402	44.35	≥ 20	Compliance
	High	2480	51.14	≥ 20	Compliance







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