



FCC RADIO TEST REPORT

FCC ID : A4RGX7AS
Equipment : Phone
Model Name : GX7AS, GB17L
Applicant : Google LLC
1600 Amphitheatre Parkway,
Mountain View, California, 94043 USA
Standard : FCC Part 15 Subpart C §15.247

The product was received on Nov. 10, 2021 and testing was performed from Nov. 16, 2021 to Feb. 21, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
FR161608-05B	01	Initial issue of report	Feb. 11, 2022
FR161608-05B	02	1. Revise Appendix C and D 2. Revise Limit of Conducted Band Edges and Spurious Emission 3. Revise test mode in section 2.2 4. Add description in section 3.8.6 5. and List of Measuring Equipment	Feb. 18, 2022
FR161608-05B	03	Revise Conducted Band Edges and Spurious Emission Measurement Data	Feb. 21, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)(3)	Output Power	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	3.84 dB under the limit at 7440.000 MHz
3.6	15.207	AC Conducted Emission	Pass	14.68 dB under the limit at 0.152 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: William Chen

Report Producer: Celery Wei

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Phone
Model Name	GX7AS, GB17L
FCC ID	A4RGX7AS
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/NFC/GNSS WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE

Remark:

1. The above EUT's information was declared by manufacturer.
2. All the tests were performed with GX7AS.

EUT Information List	
S/N	Performed Test Item
1A261FQGR00062	RF Conducted Measurement
1A291FQGR00028	Radiated Spurious Emission
1A281FQGR00002	Conducted Emission

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel (37 hopping + 3 advertising channel)
Maximum Output Power to Antenna	<Ant. 4> Bluetooth – LE (1Mbps): 18.99 dBm / 0.0793 W Bluetooth – LE (2Mbps): 18.84 dBm / 0.0765 W <Ant. 3> Bluetooth – LE (1Mbps): 18.81 dBm / 0.0760 W Bluetooth – LE (2Mbps): 18.68 dBm / 0.0738 W
99% Occupied Bandwidth	<Ant. 4> Bluetooth – LE (1Mbps): 1.039 MHz Bluetooth – LE (2Mbps): 2.050 MHz <Ant. 3> Bluetooth – LE (1Mbps): 1.039 MHz Bluetooth – LE (2Mbps): 2.054 MHz
Antenna Type / Gain	<Ant. 4> : IFA Antenna with gain -0.2 dBi <Ant. 3> : IFA Antenna with gain -0.4 dBi
Type of Modulation	Bluetooth - LE : GFSK

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.3 Modification of EUT

No modifications made to the EUT during the testing.

1.4 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. CO05-HY (TAF Code: 1190)
Remark	The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

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

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. TH05-HY; 03CH16-HY

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

FCC designation No.: TW1190 and TW3786

1.5 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

2.2 Test Mode

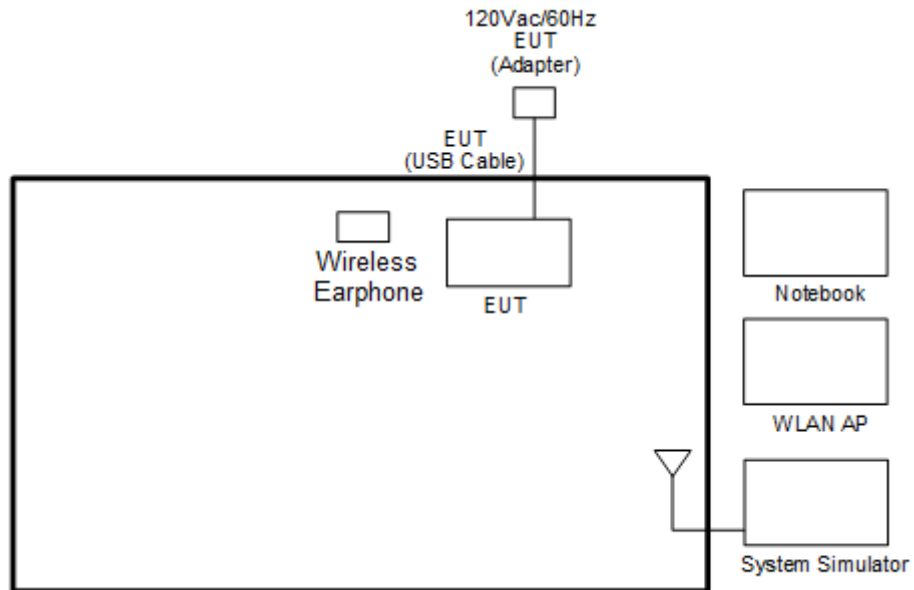
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape) and accessory (Adapter or Earphone), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane with Adapter as worst plane.
- b. AC power line Conducted Emission was tested under maximum output power.

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

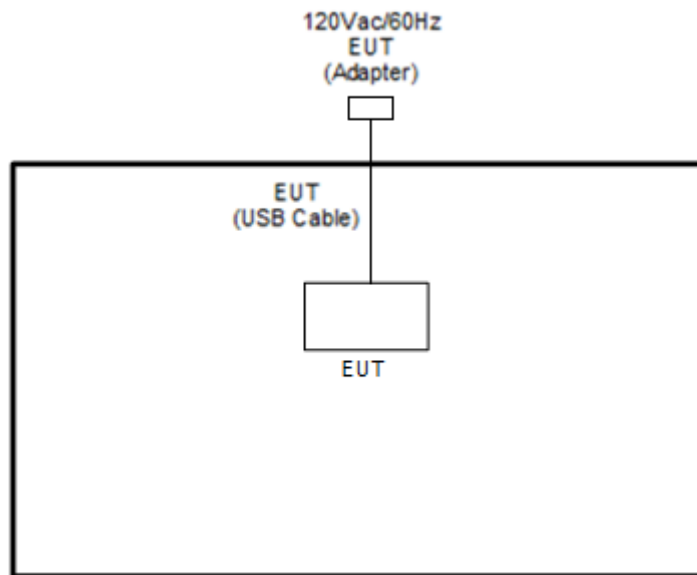
Summary table of Test Cases	
Test Item	Data Rate / Modulation
Conducted Test Cases	Bluetooth – LE / GFSK
	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
Radiated Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
	Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps
	Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps
AC Conducted Emission	Mode 1: GSM850 Idle + WLAN (2.4GHz) Link + Bluetooth Link + USB Cable 2 (Charging from AC Adapter 2)
Remark: For Radiated Test Cases, the tests were performed with Adapter 1 and USB Cable 2.	

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<Bluetooth – LE Tx Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Wireless Earphone	Google	G1007/G1008	A4RG1007/ A4RG1008	N/A	N/A
3.	WLAN AP	NETGEAR64	RAXE500	N/A	N/A	Unshielded, 1.8 m
4.	Notebook	Dell	Latitude E3400	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m

2.5 EUT Operation Test Setup

The RF test items, utility “Command v10.0.17134.134” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\
 &= 4.2 + 10 = 14.2 \text{ (dB)}
 \end{aligned}$$

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

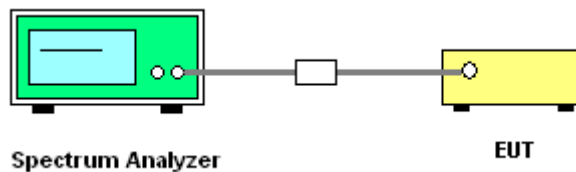
3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedures

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

3.1.4 Test Setup



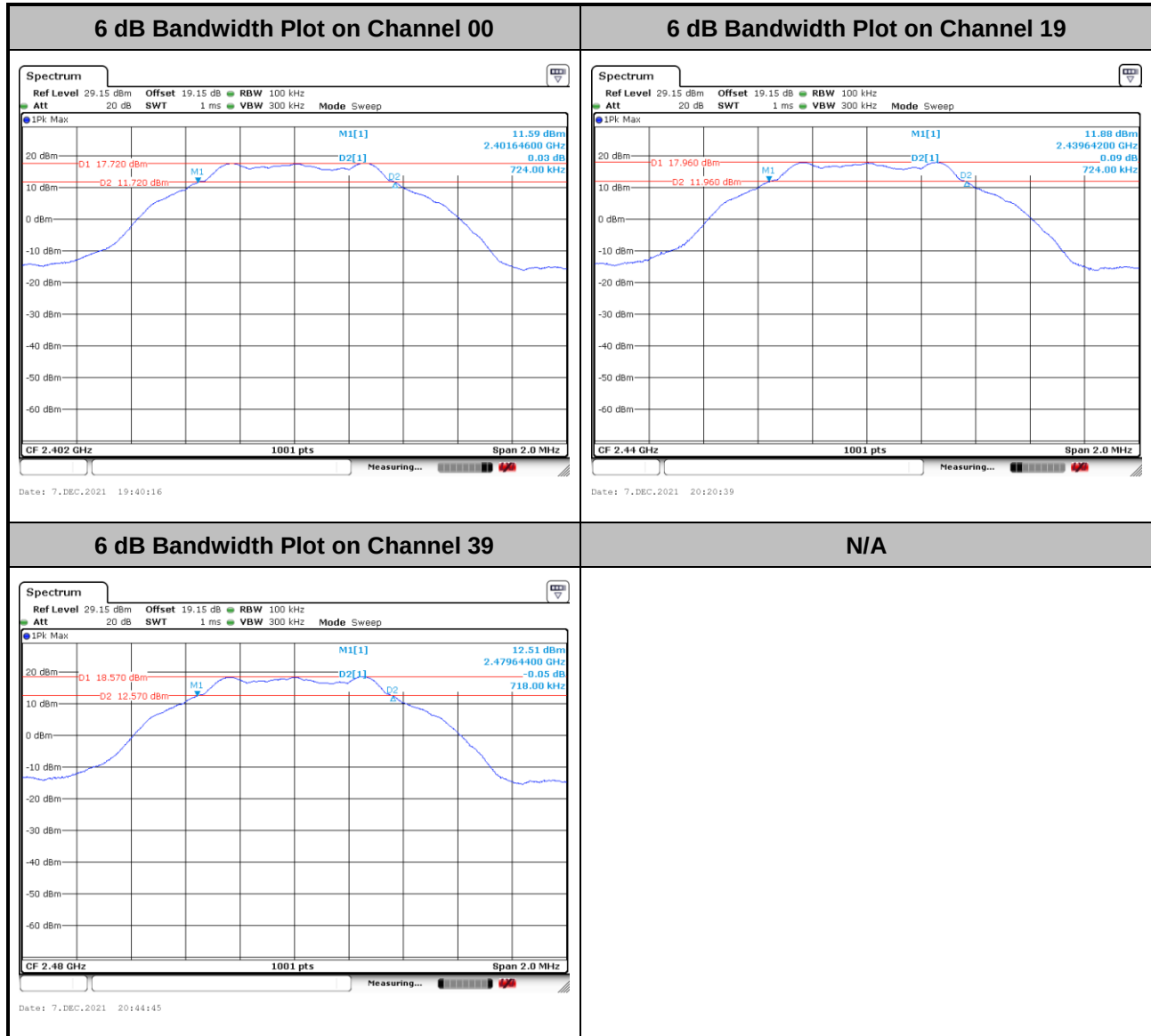


3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

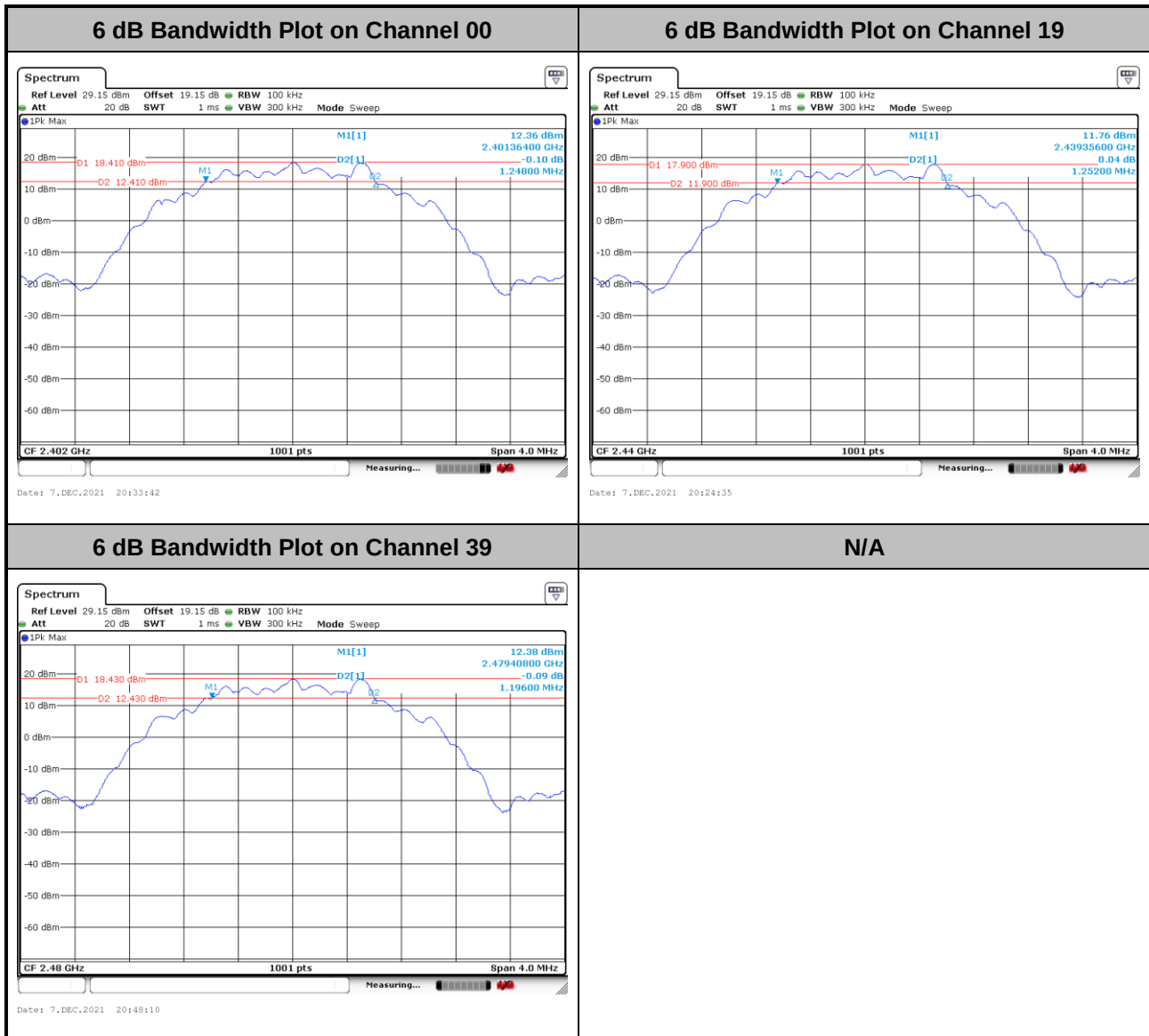
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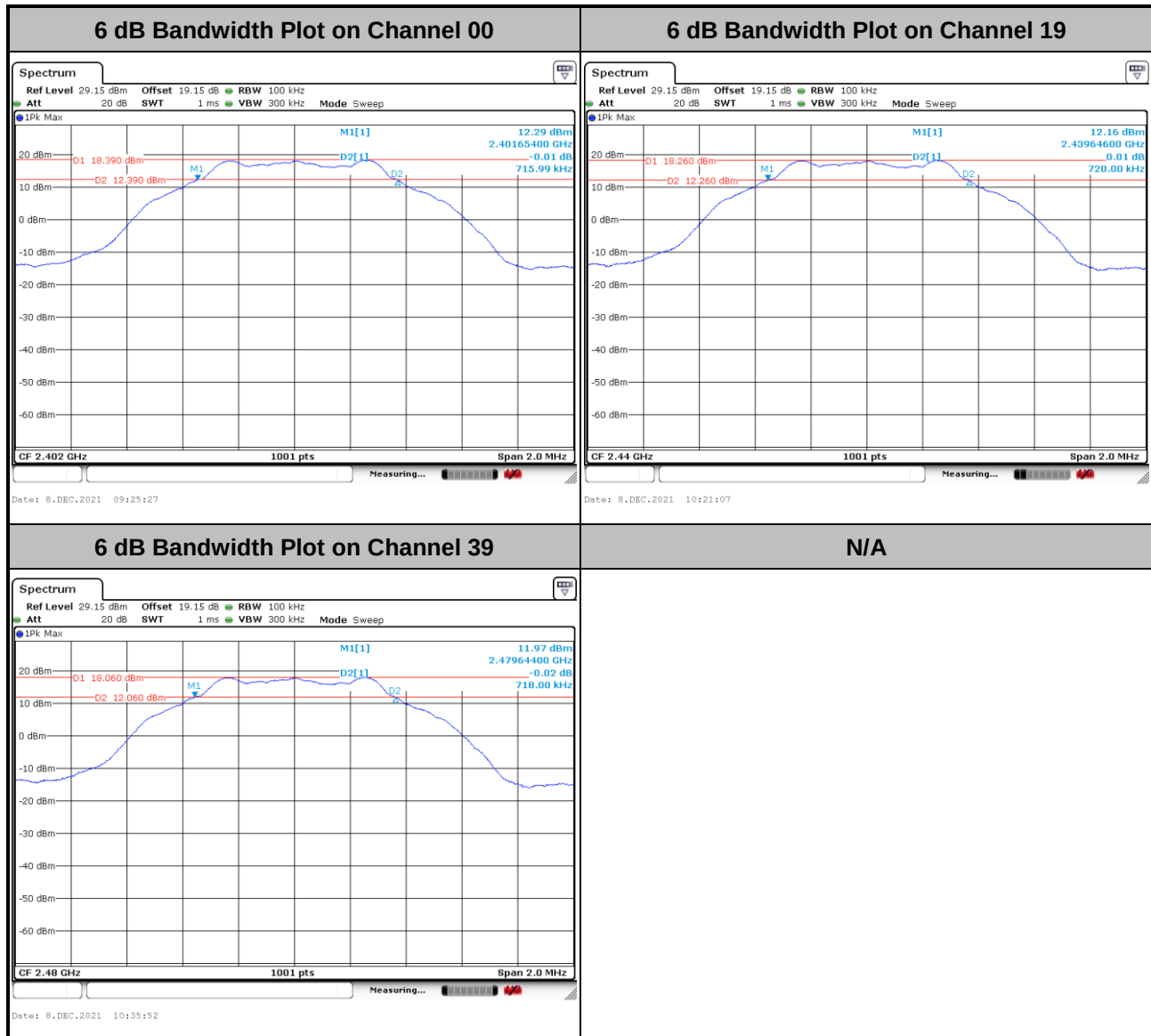
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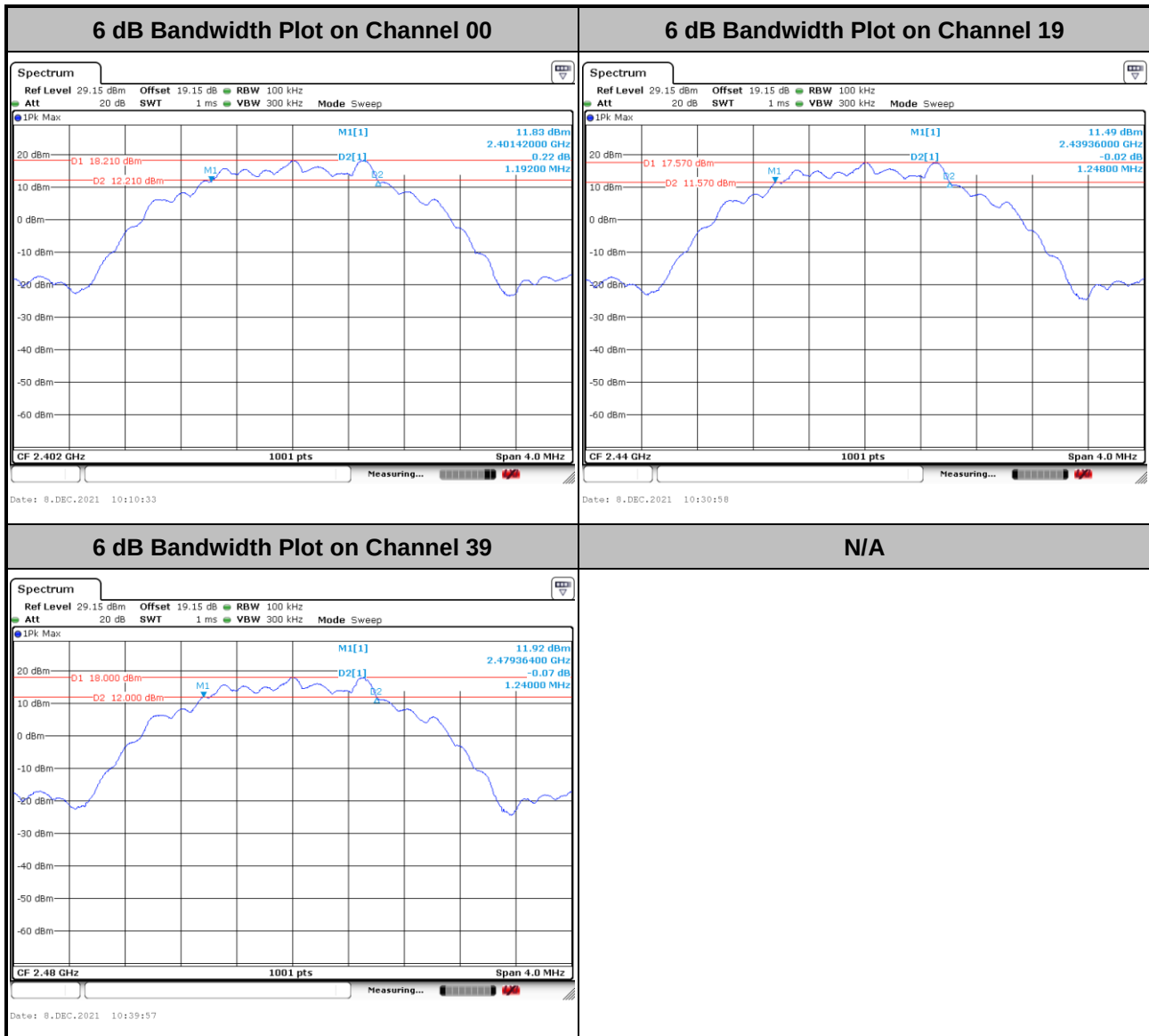
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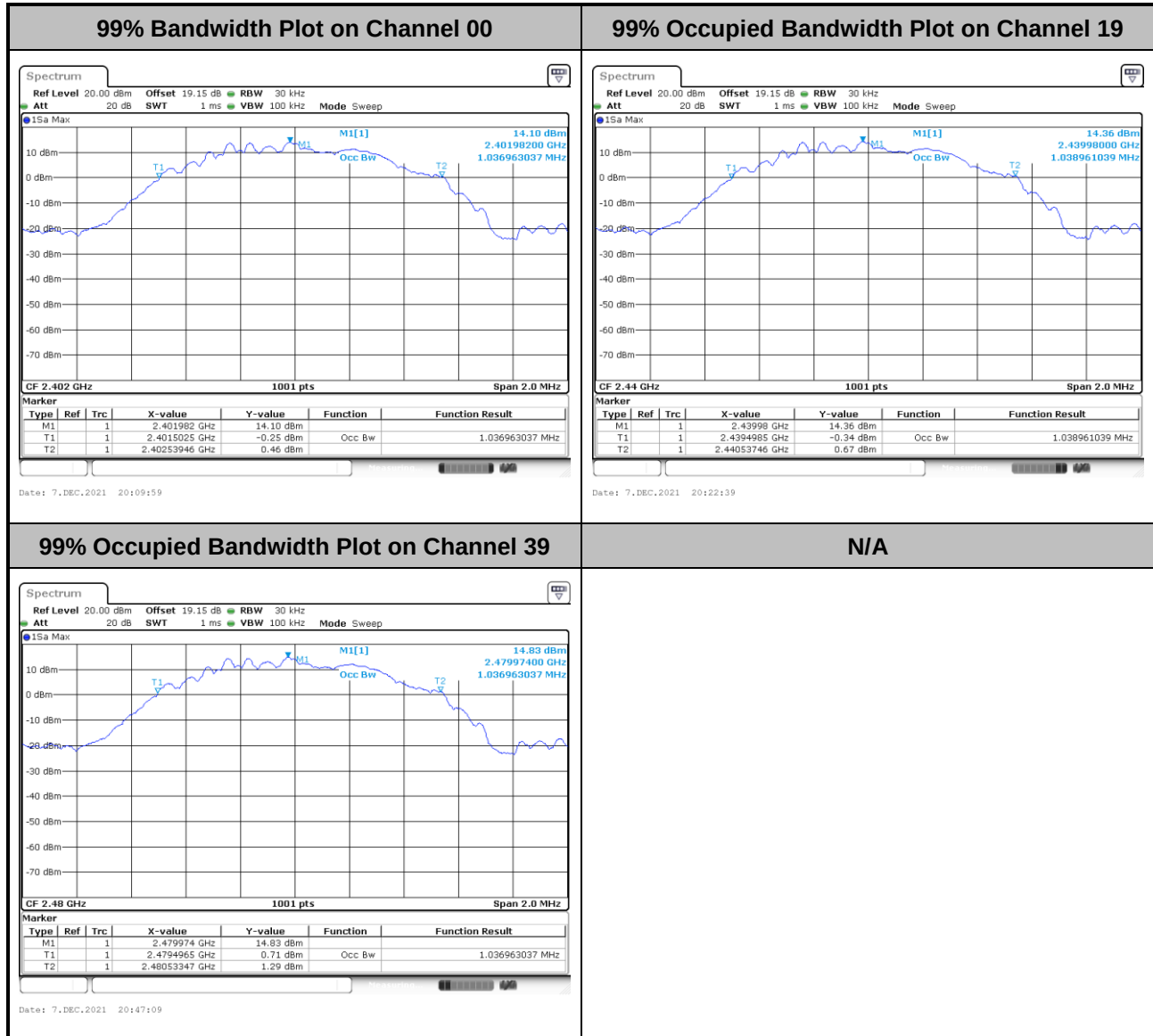


3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

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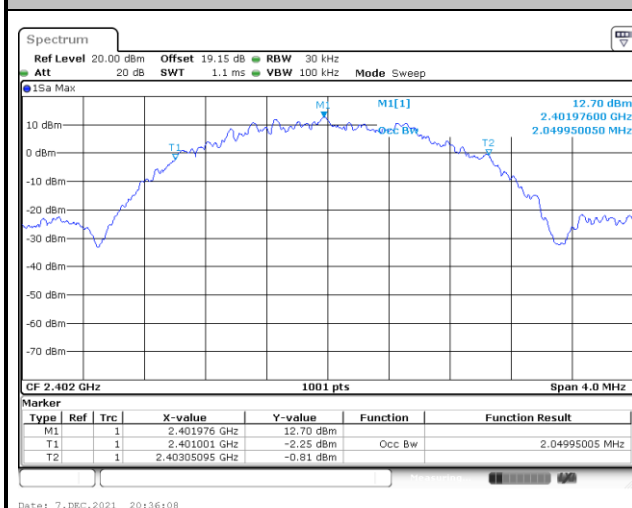


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

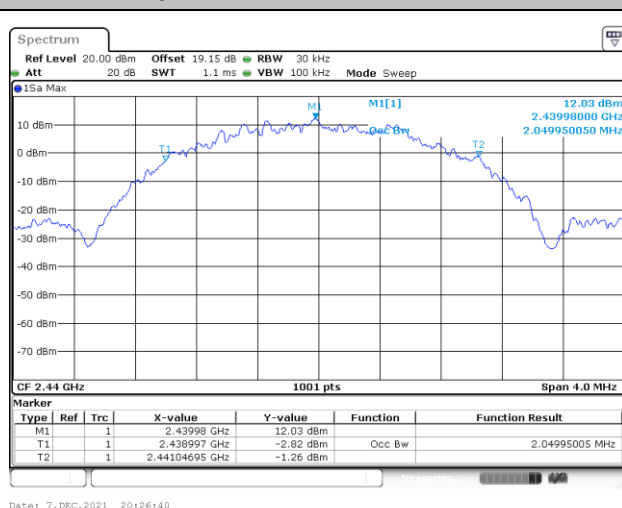


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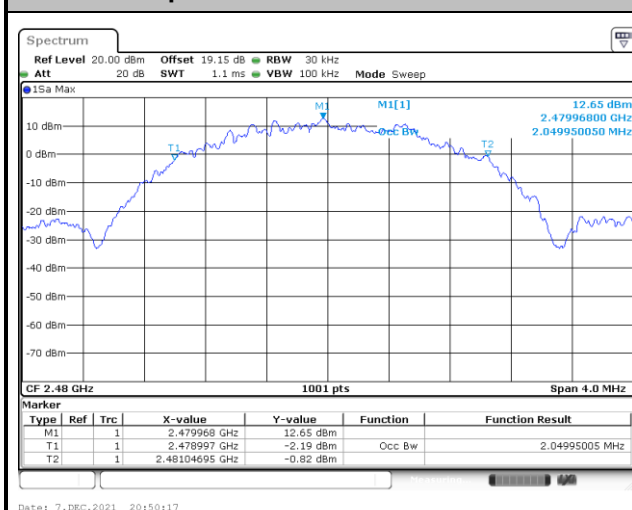
99% Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 19



99% Occupied Bandwidth Plot on Channel 39



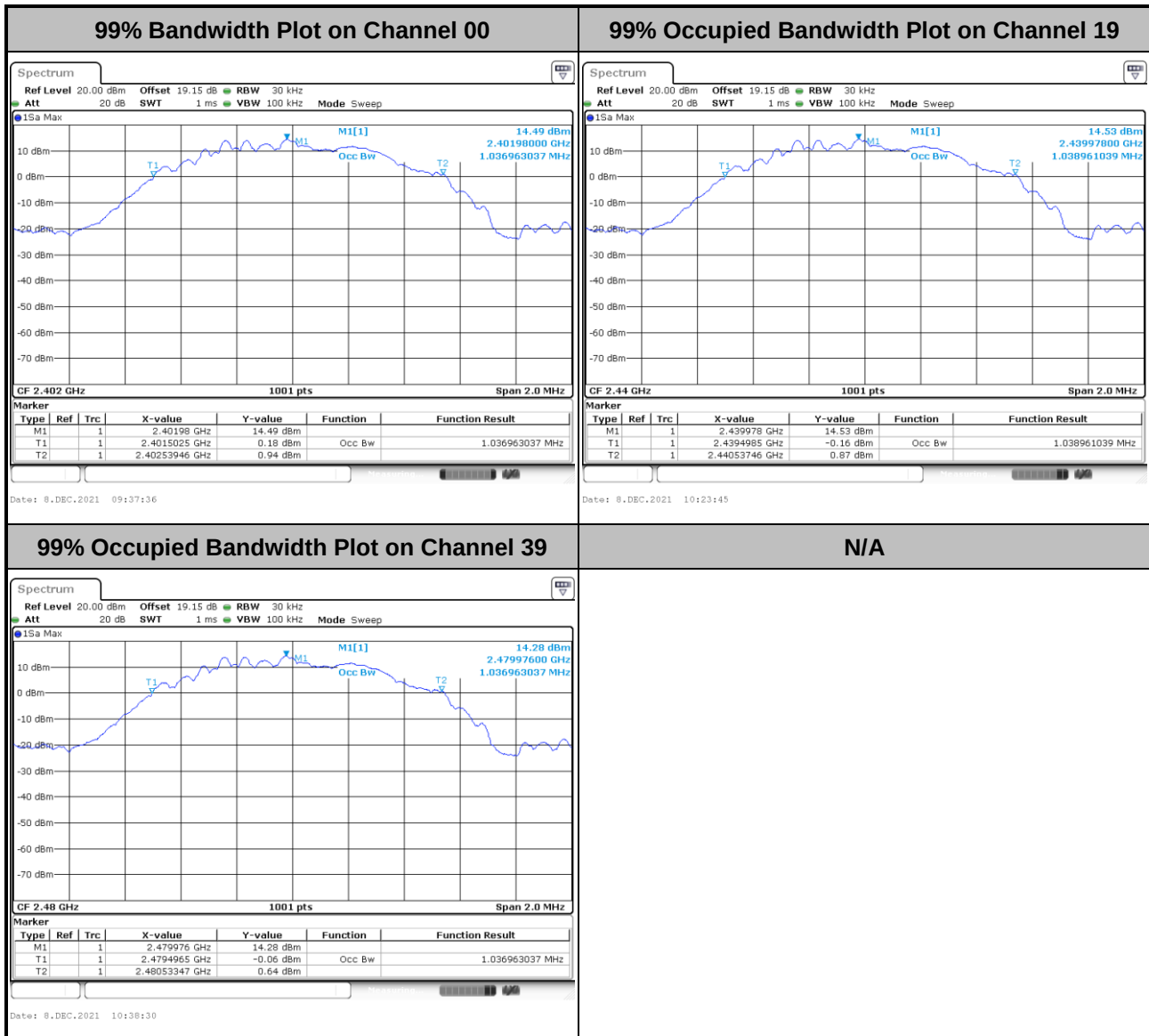
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Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



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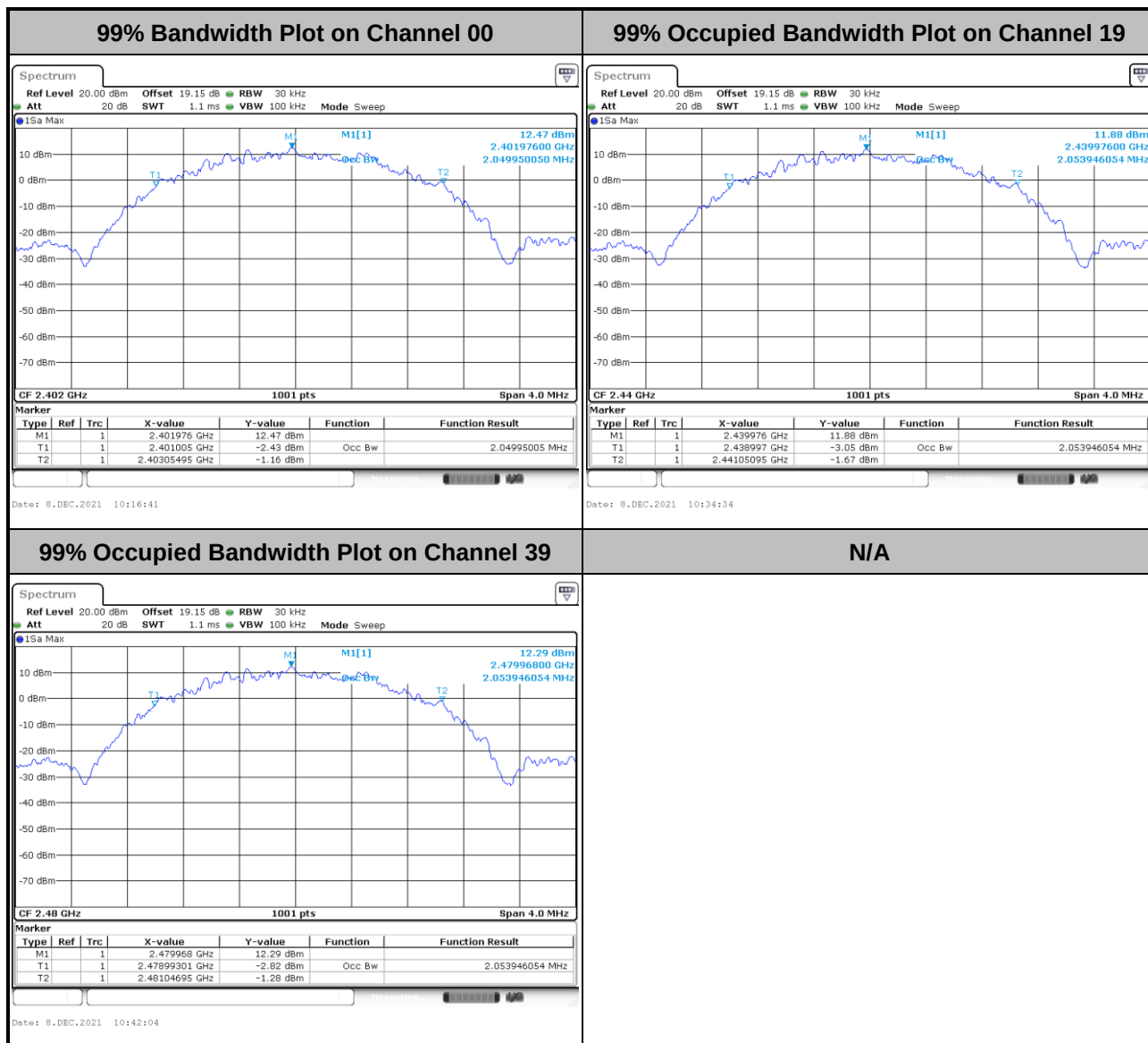
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Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<2Mbps>



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

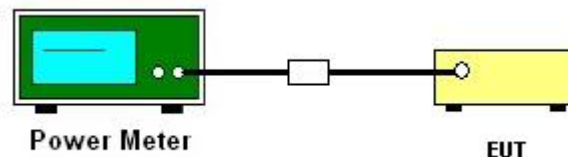
3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.2.3 Test Procedures

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

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

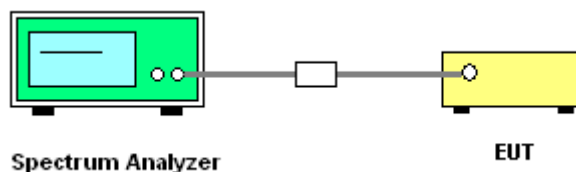
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

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

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

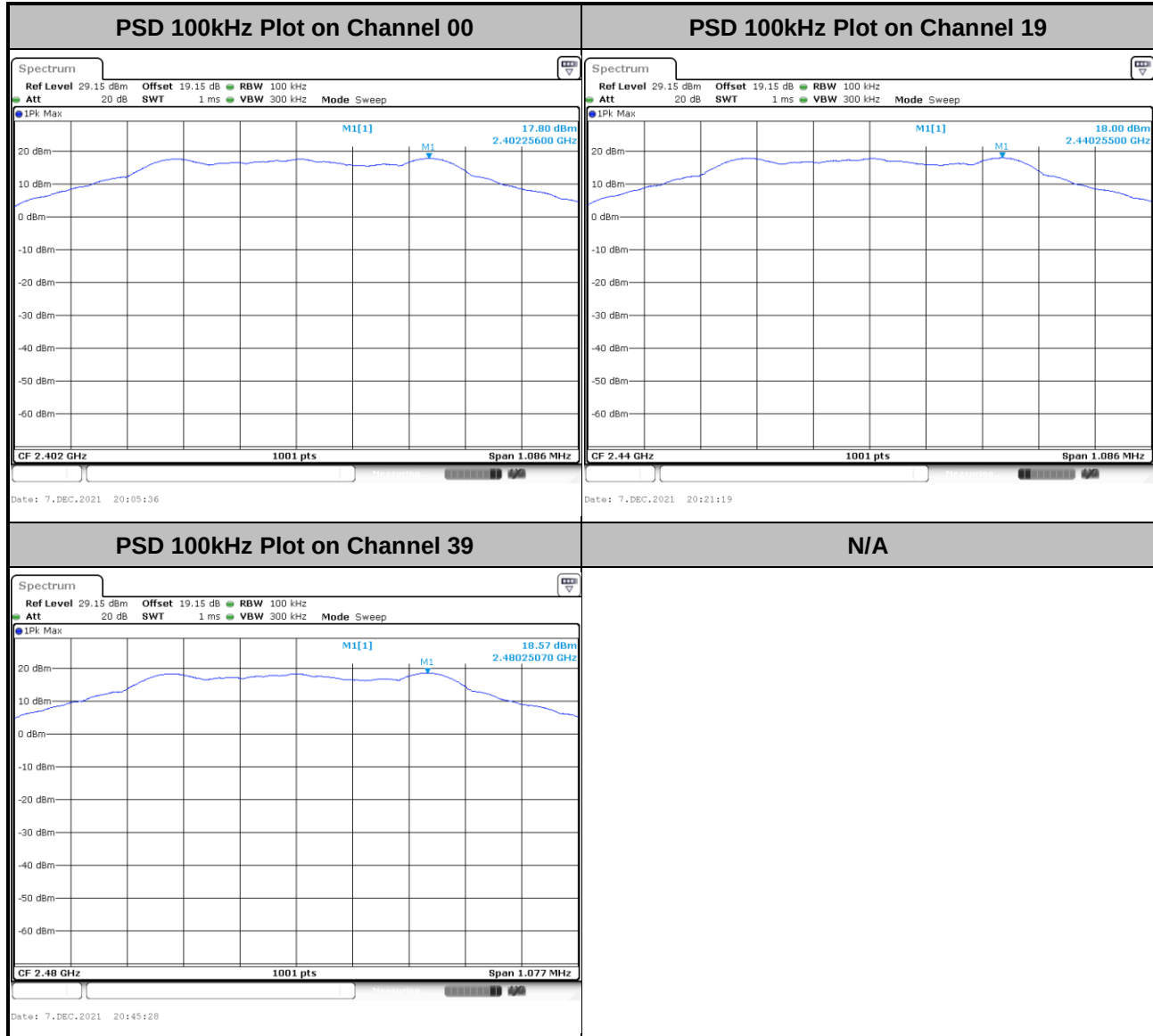
Please refer to Appendix A.



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

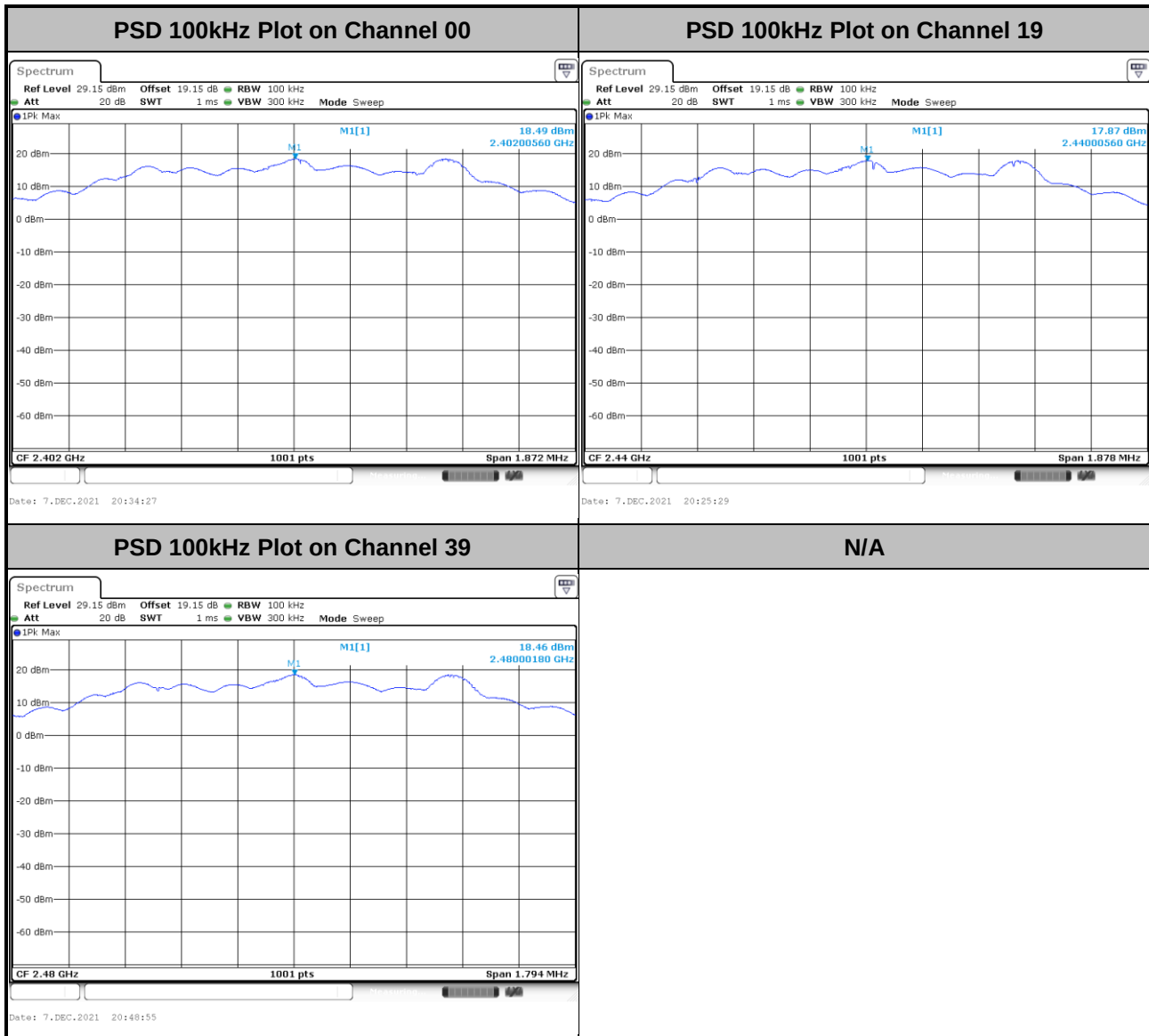
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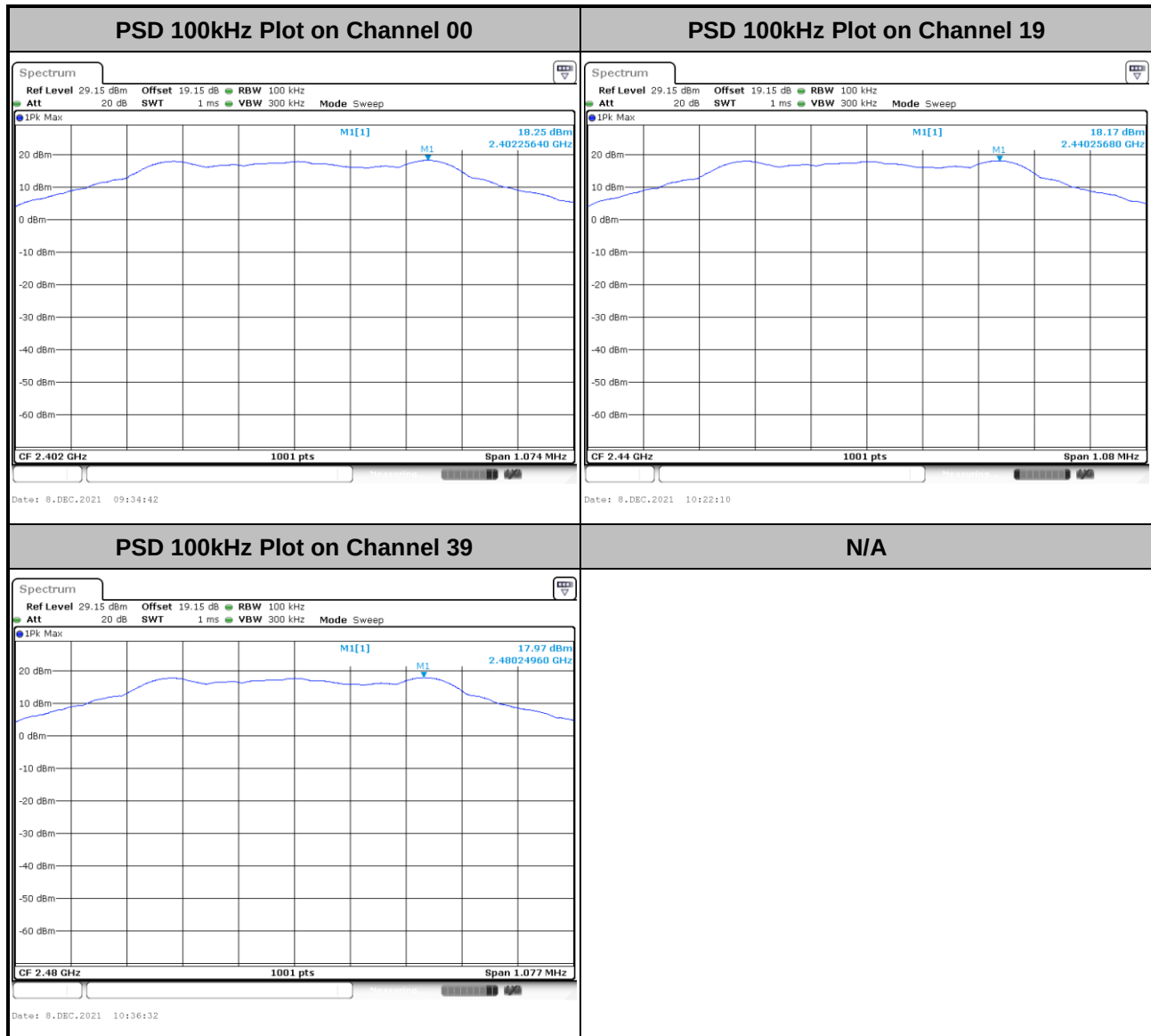
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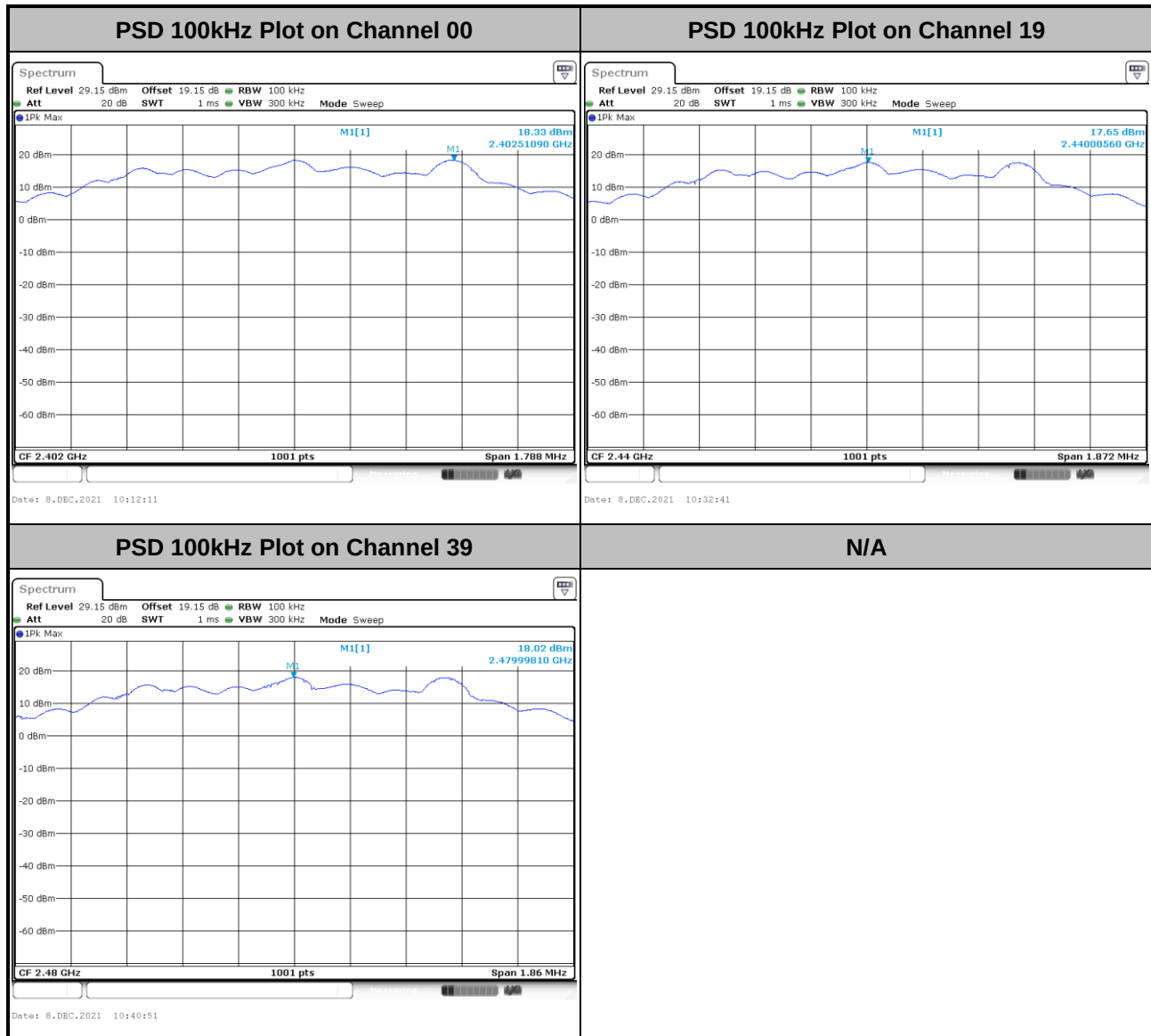
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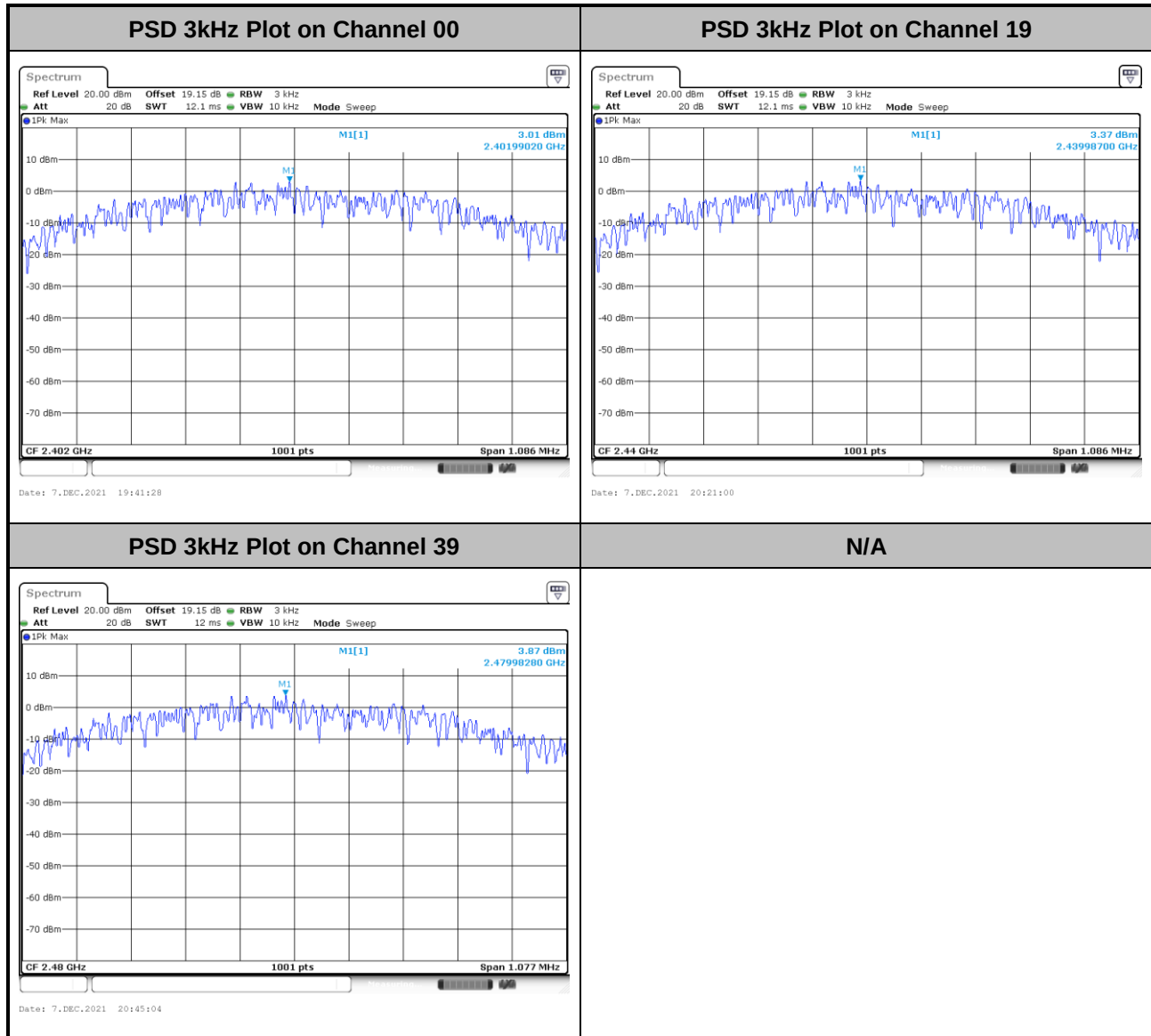




3.3.7 Test Result of Power Spectral Density Plots (3kHz)

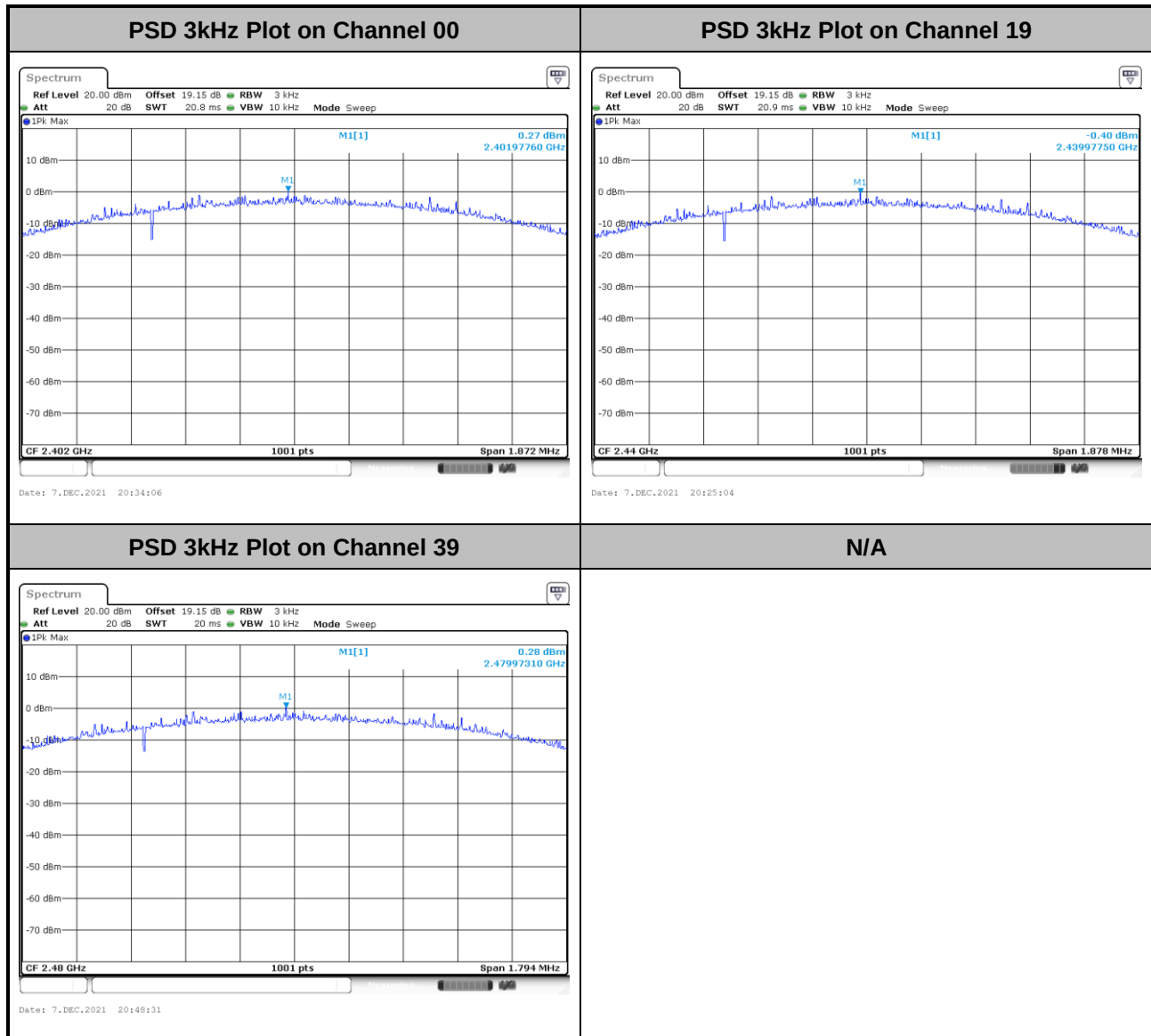
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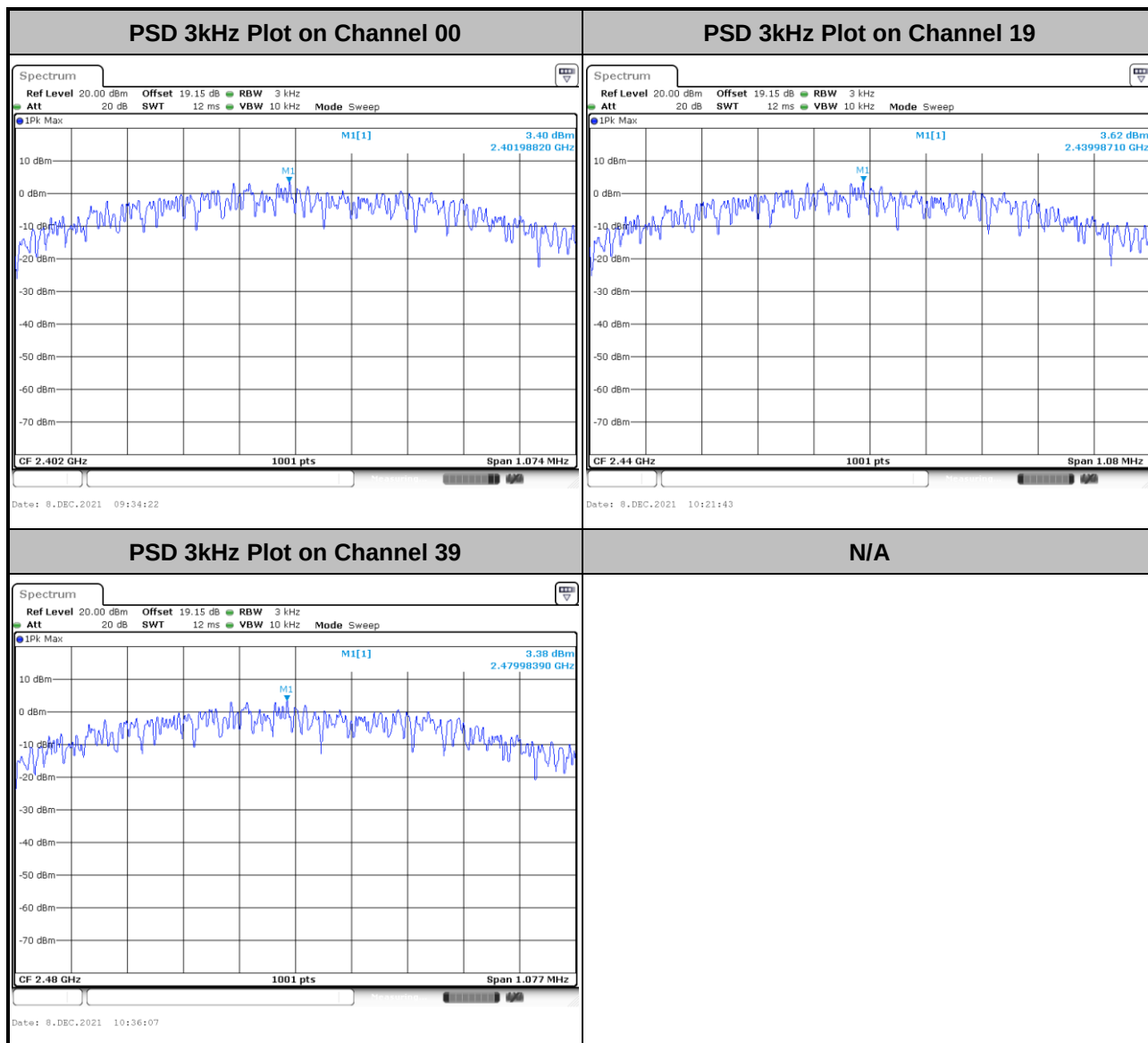
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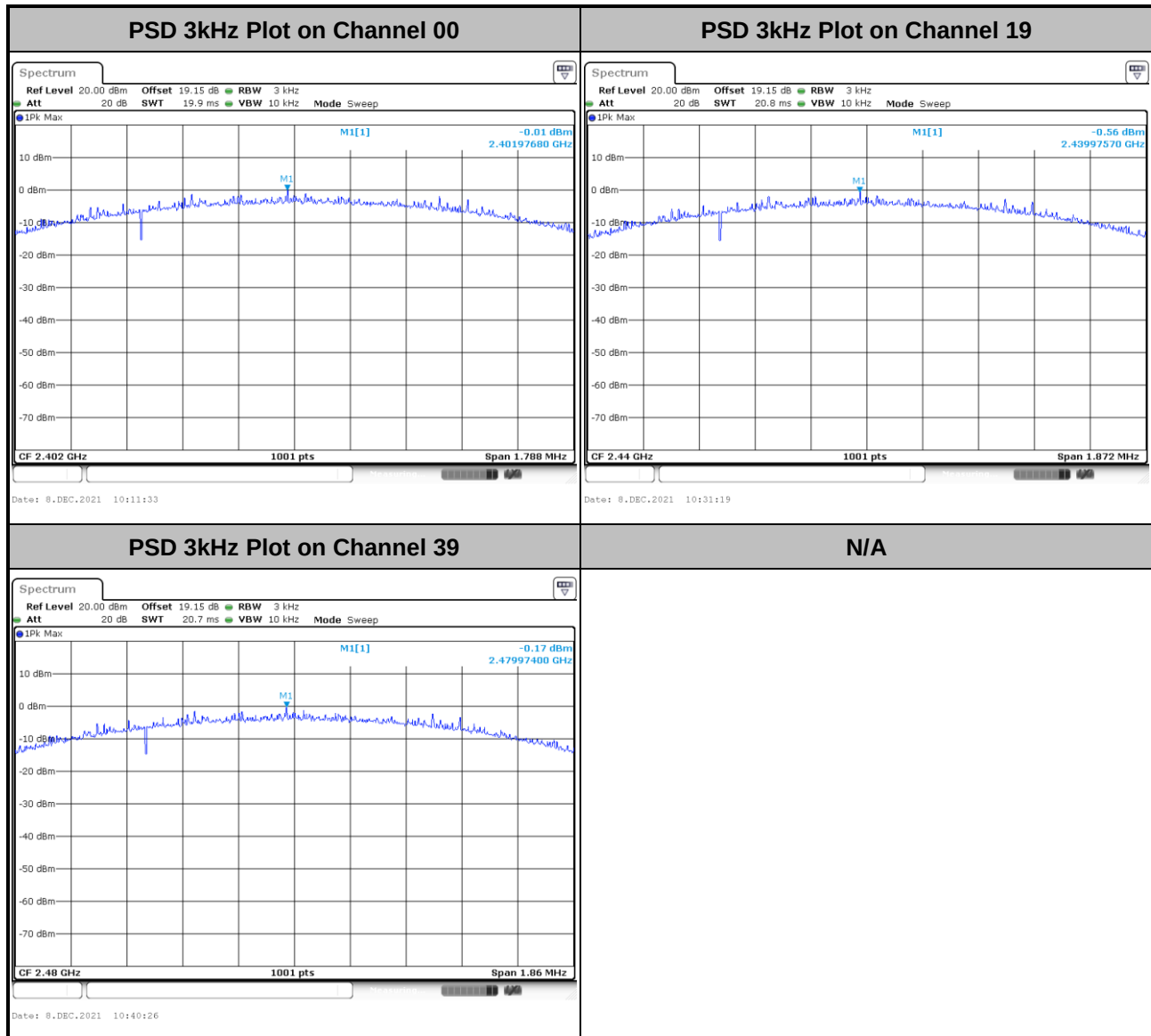
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3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

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

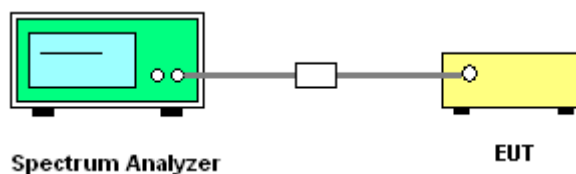
3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.4.3 Test Procedure

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

3.4.4 Test Setup

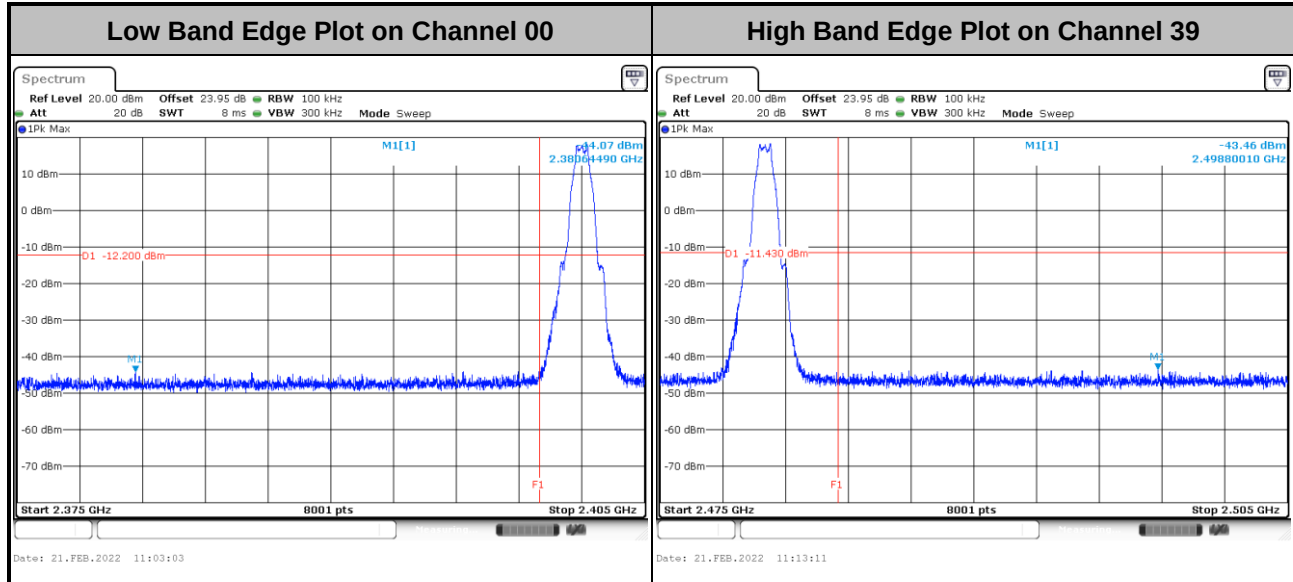




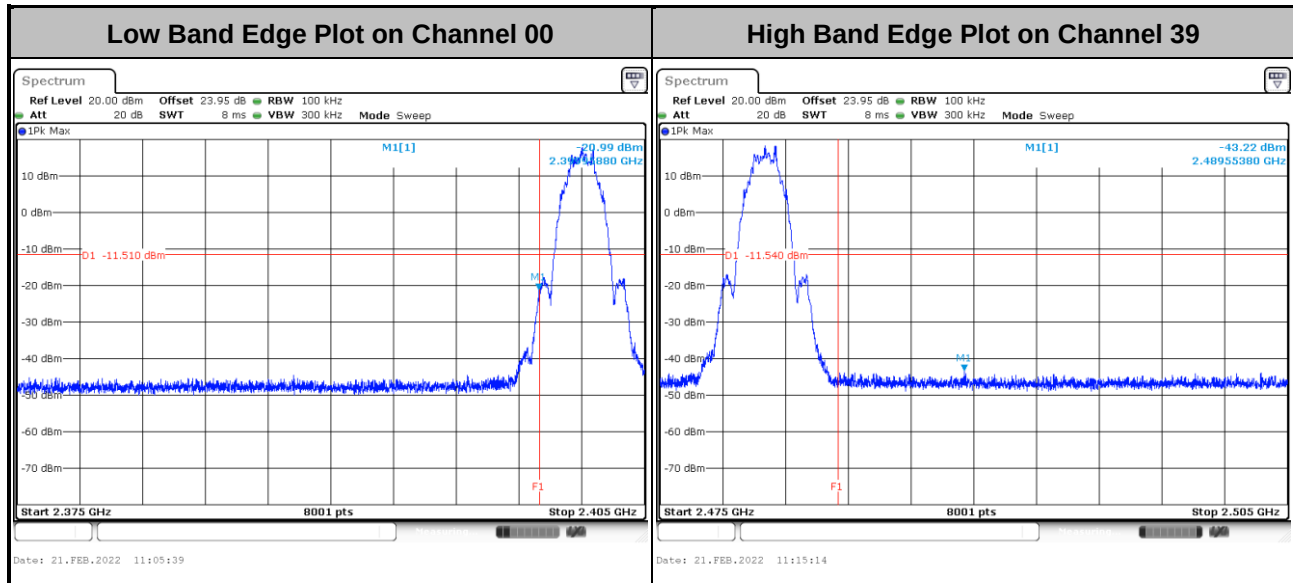
3.4.5 Test Result of Conducted Band Edges Plots

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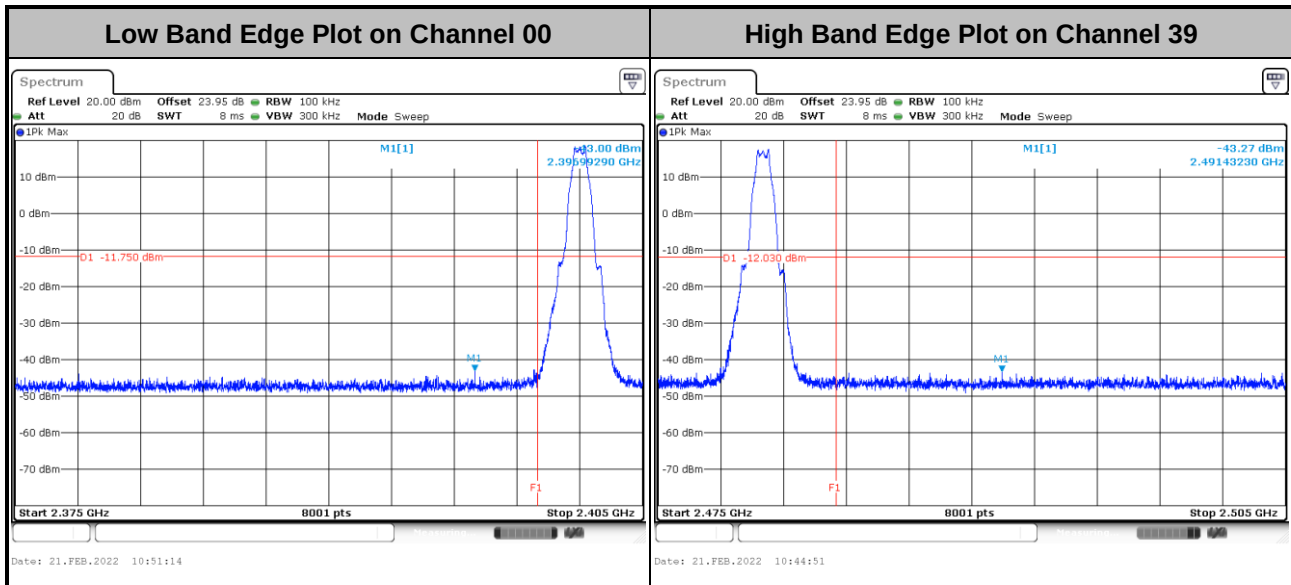
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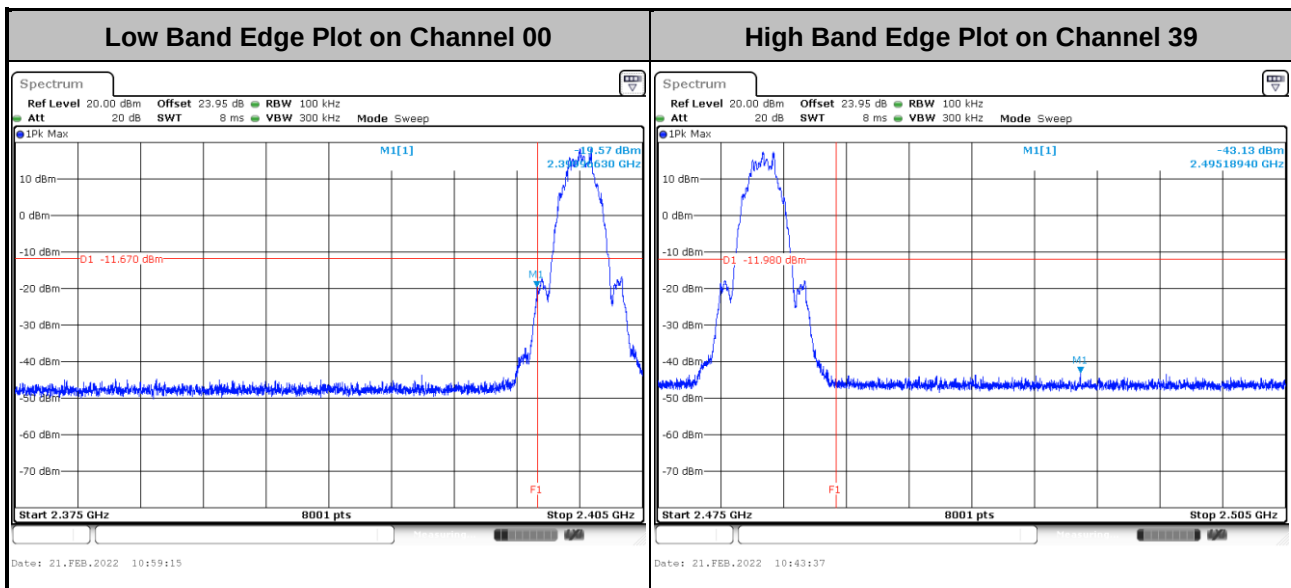


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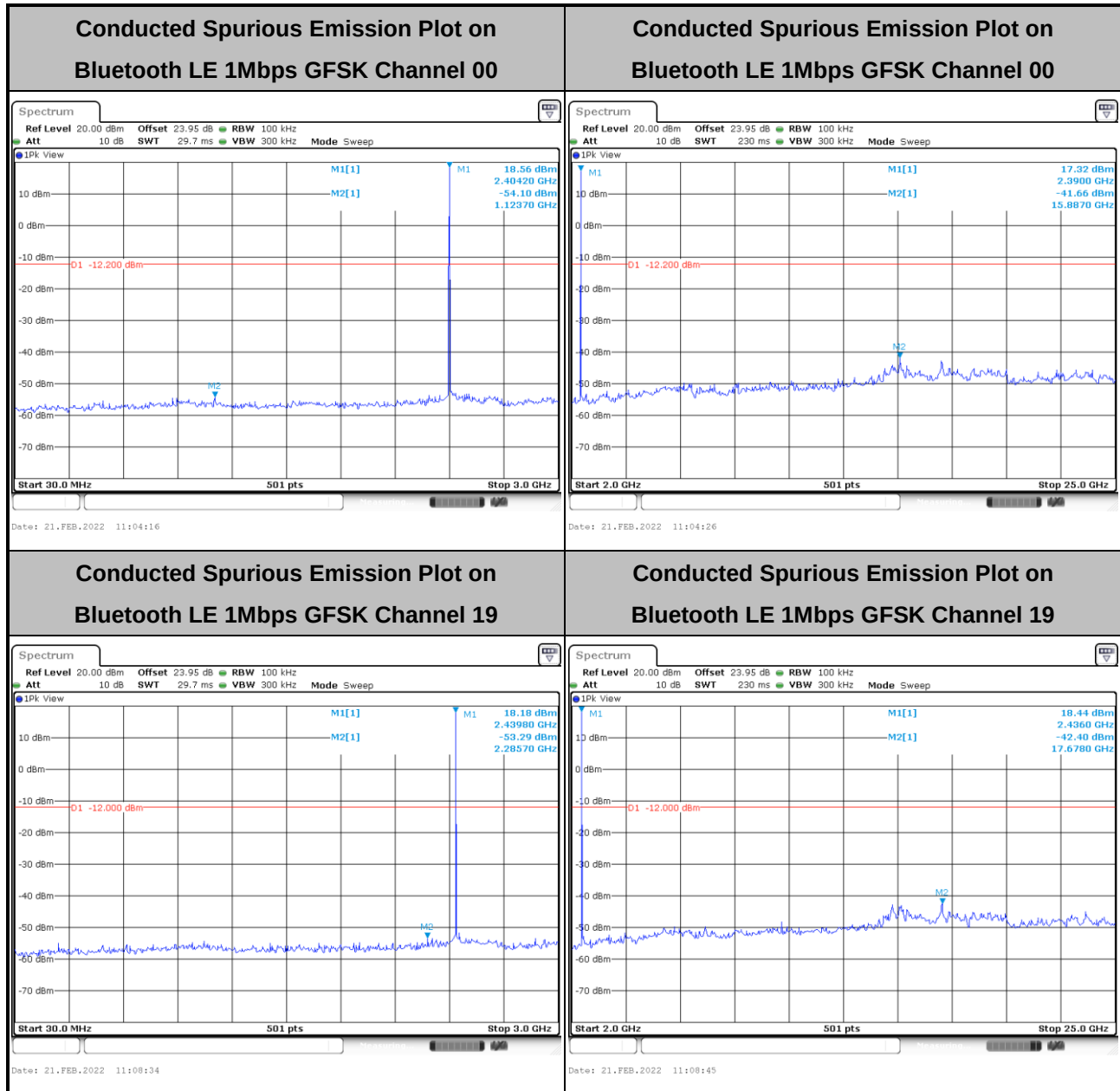
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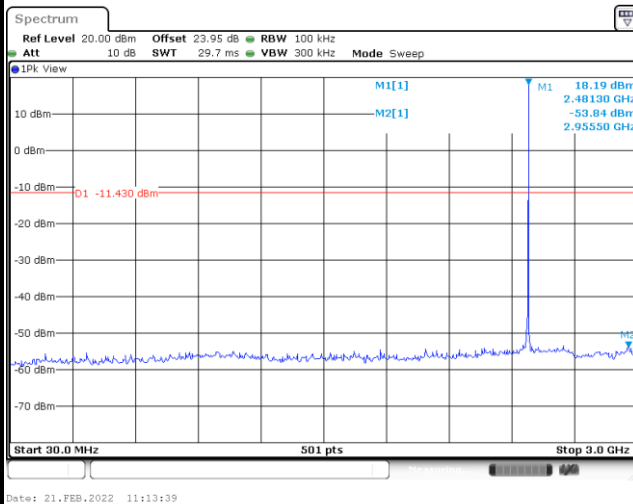
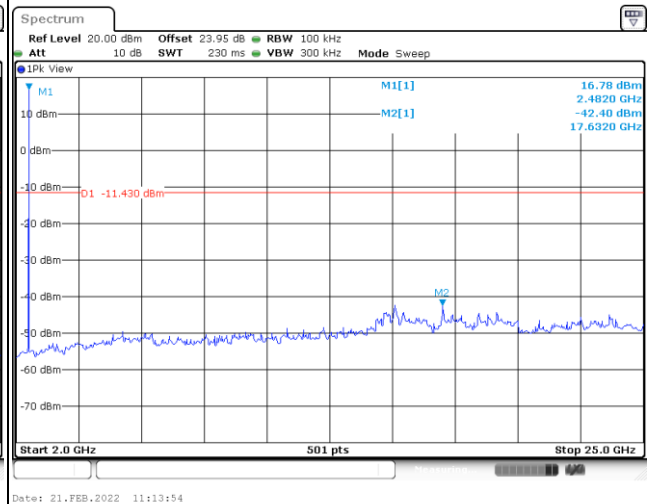


3.4.6 Test Result of Conducted Spurious Emission Plots

<Ant. 4>

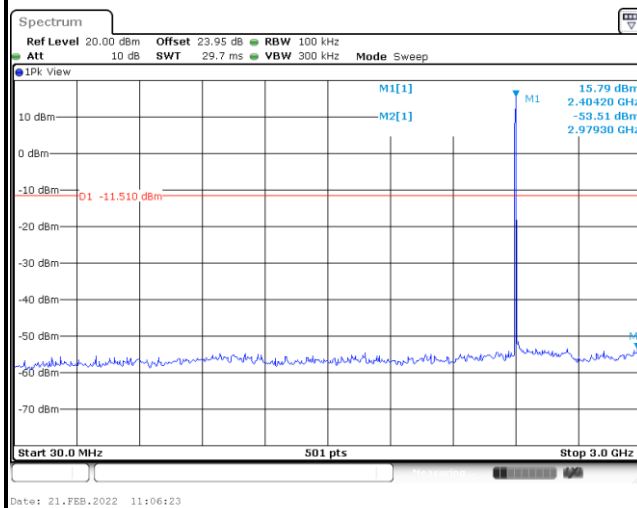
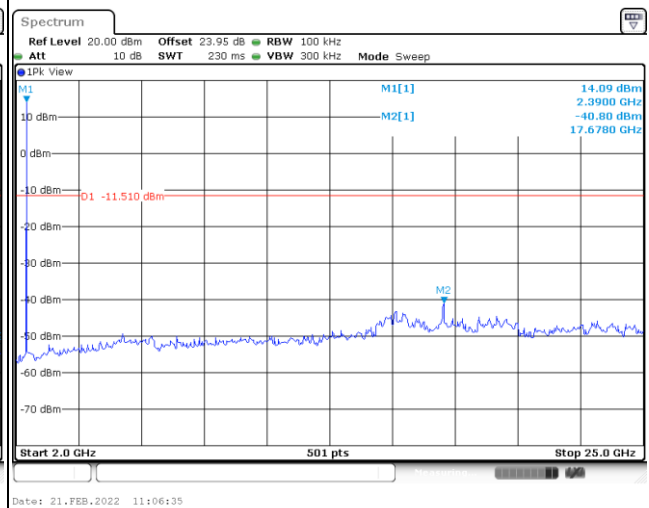
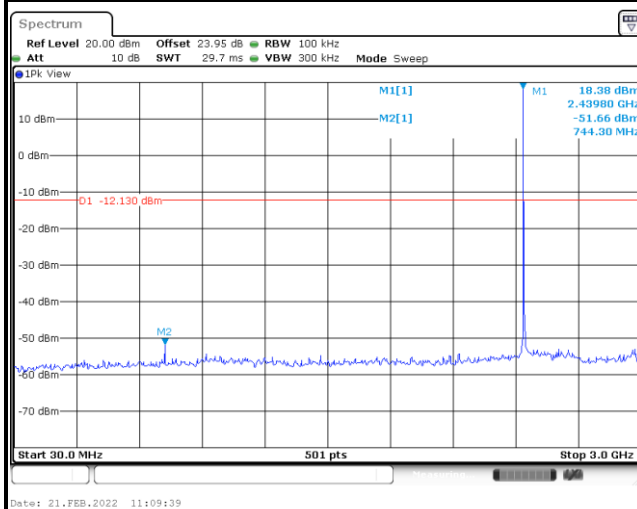
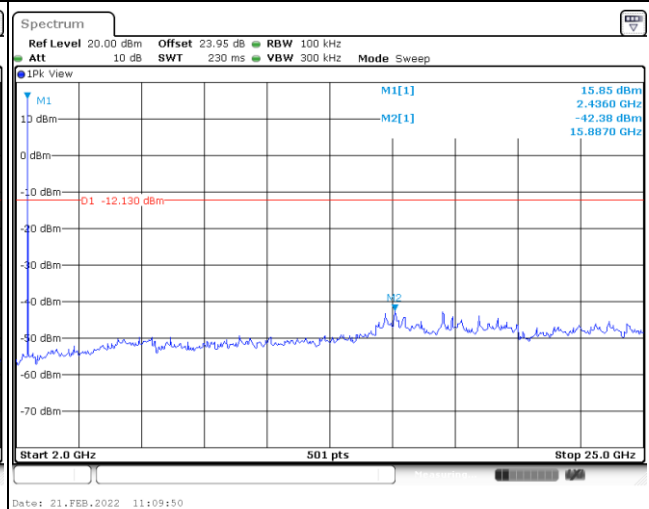
<1Mbps>



**Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 39****Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 39**

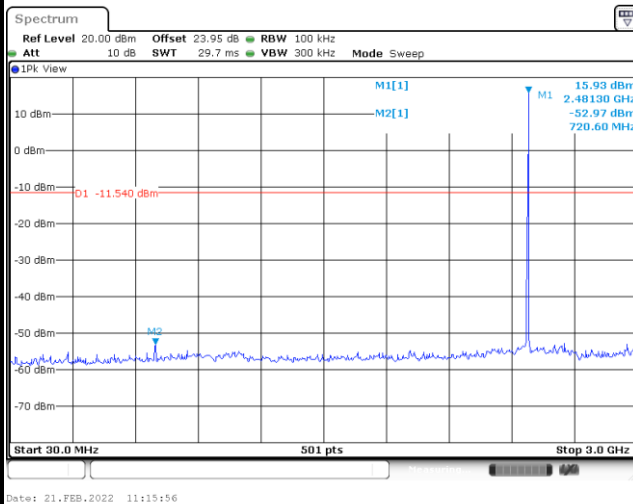


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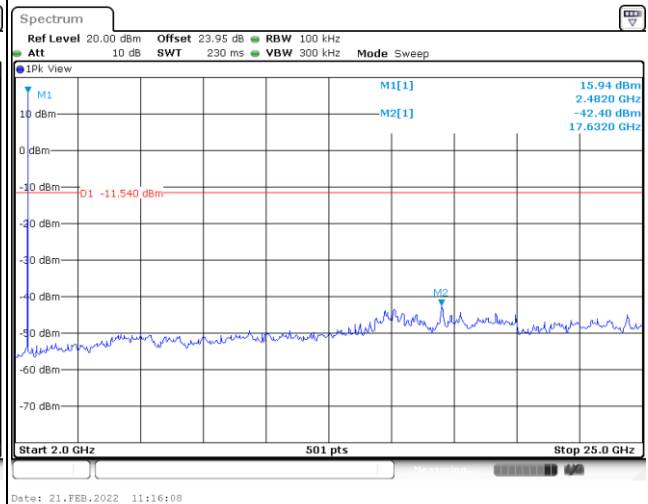
**Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19**



Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 39



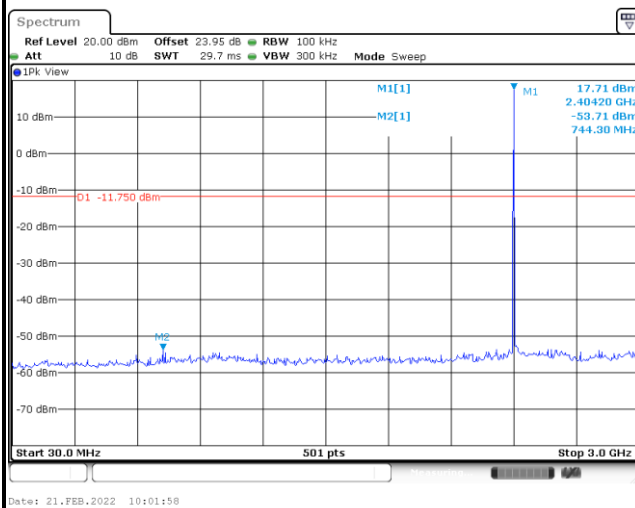
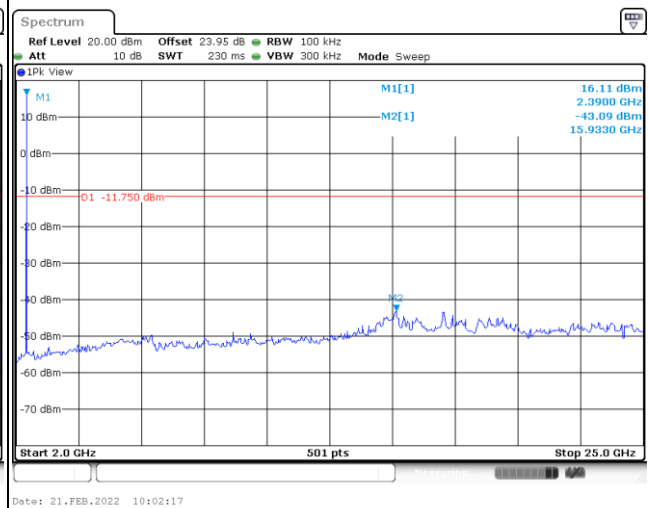
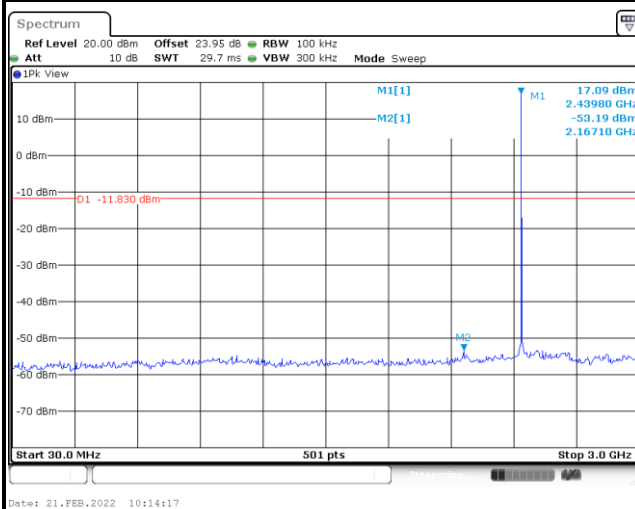
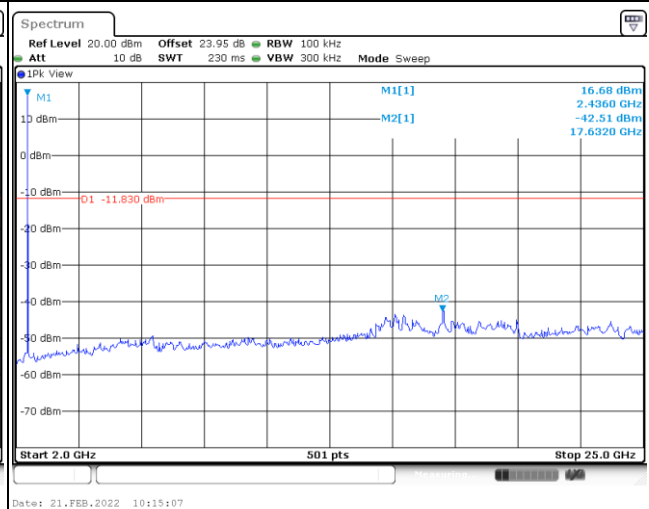
Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 39

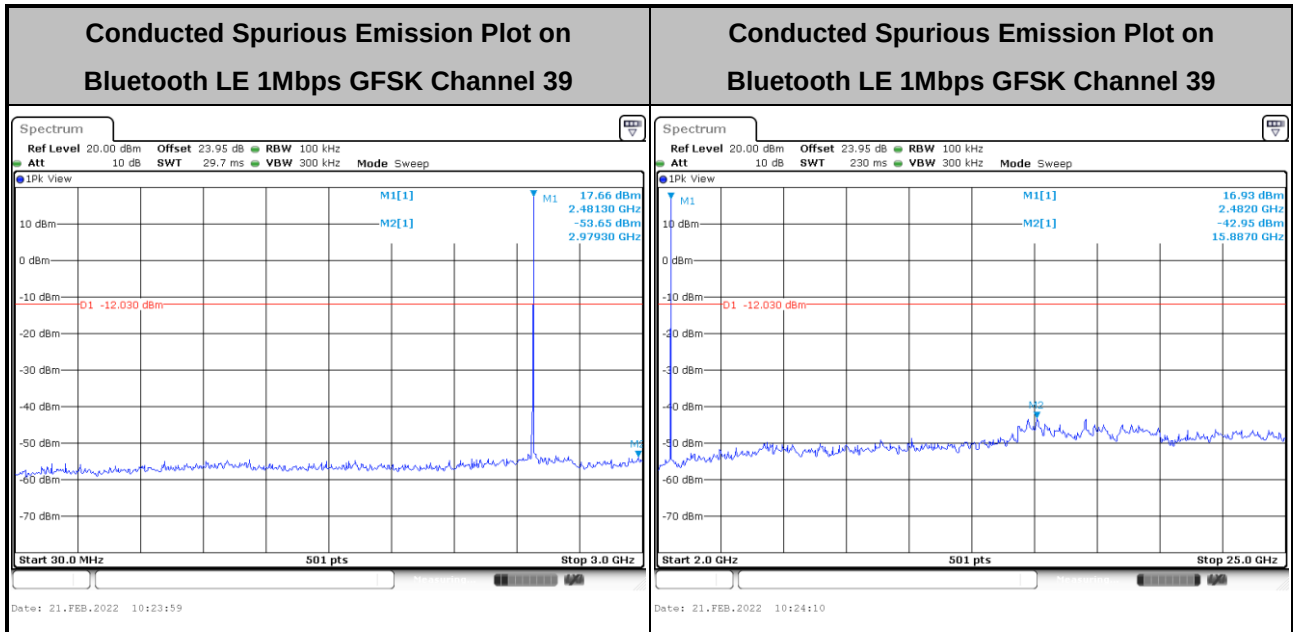




<Ant. 3>

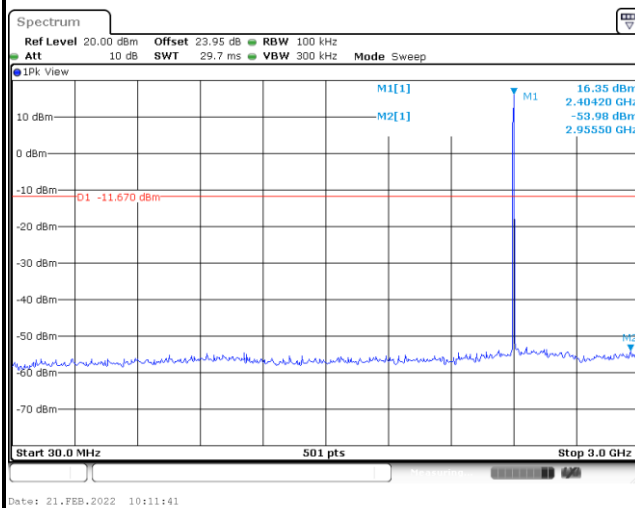
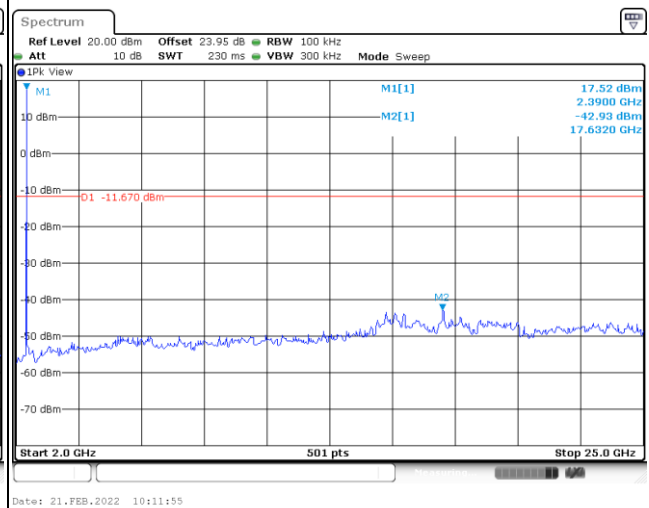
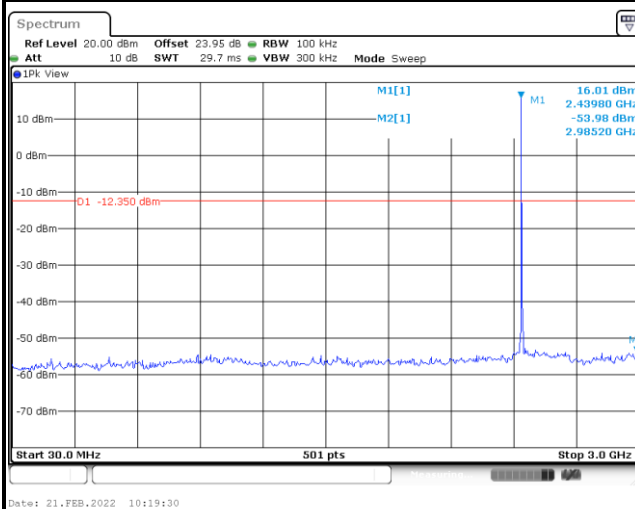
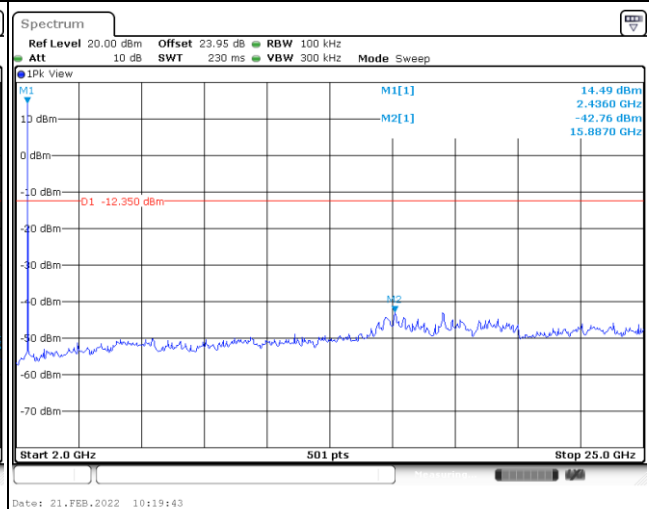
<1Mbps>

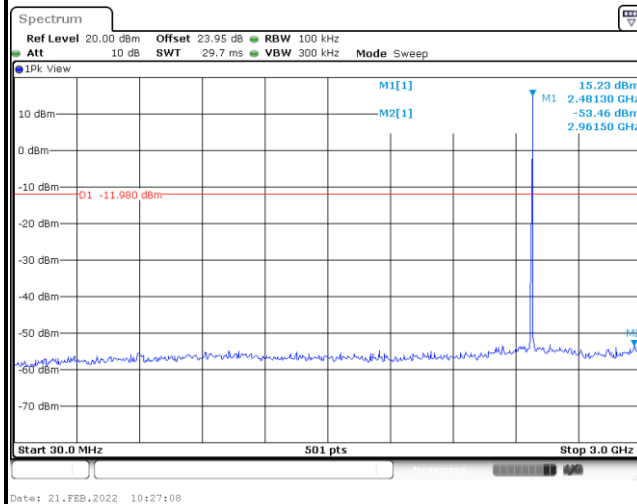
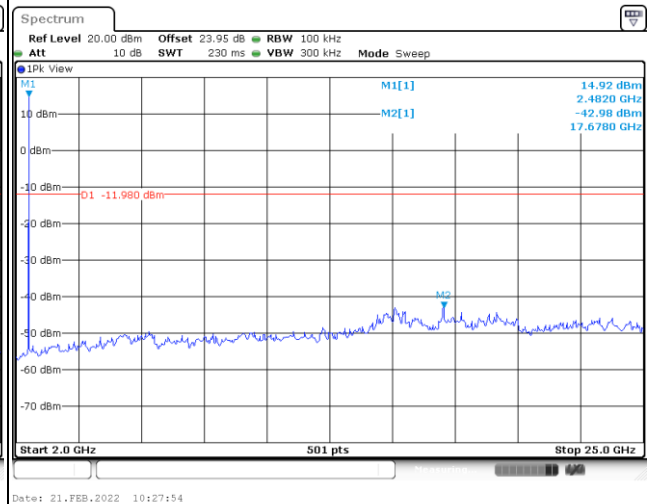
**Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 19****Conducted Spurious Emission Plot on
Bluetooth LE 1Mbps GFSK Channel 19**





<2Mbps>

**Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 00****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 19**

**Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 39****Conducted Spurious Emission Plot on
Bluetooth LE 2Mbps GFSK Channel 39**

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
4. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-”.

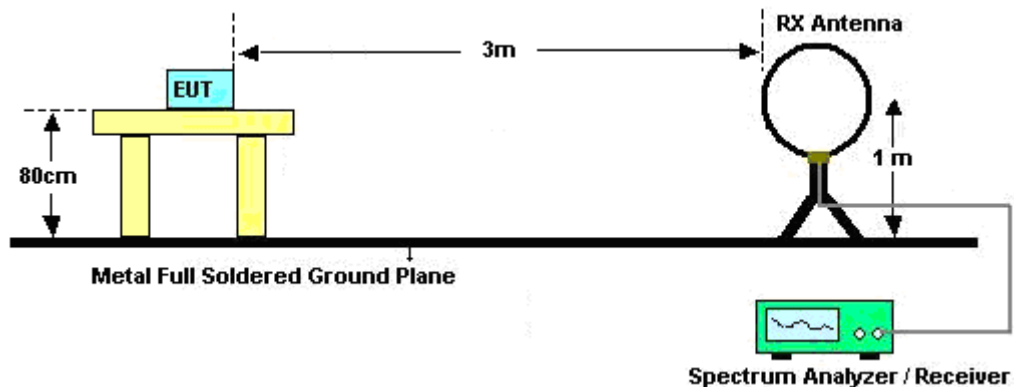
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as “-”.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW = 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW = 3 MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

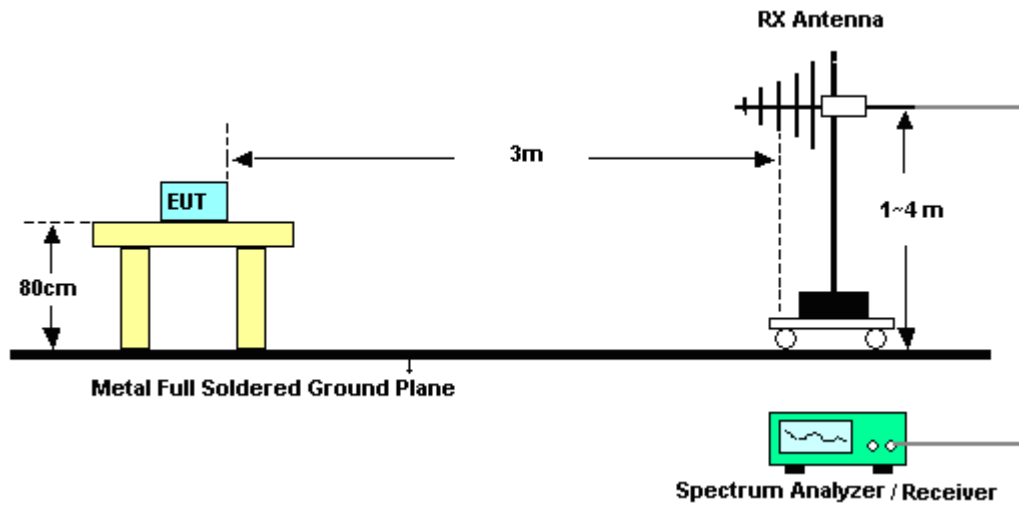
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

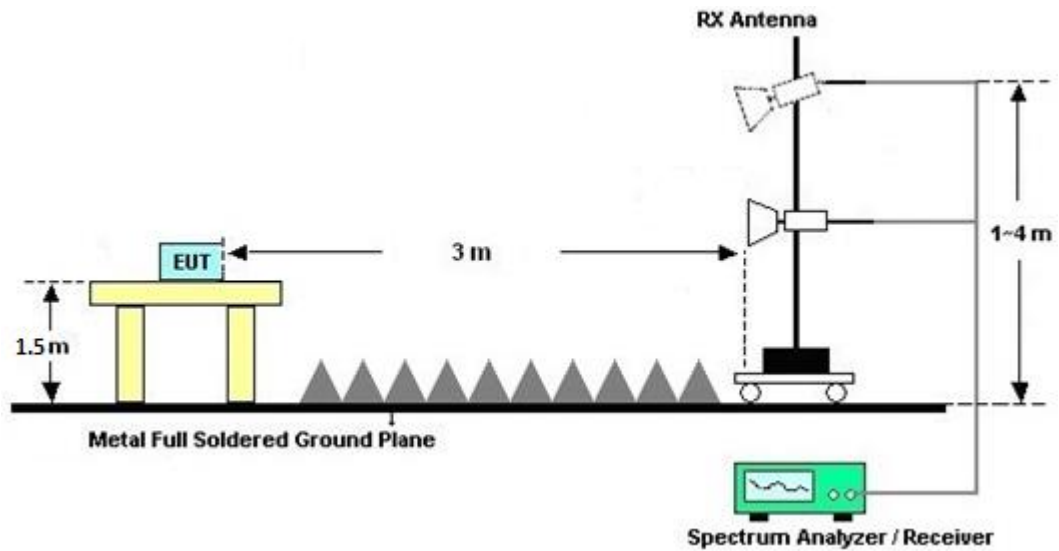
For radiated test below 30MHz



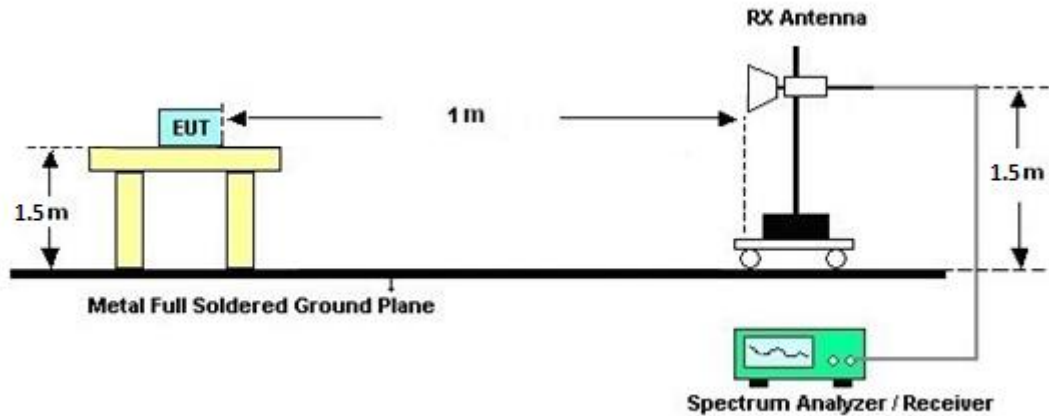
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



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

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

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

3.5.6 Test Results of Radiated Spurious Emissions (above 18 GHz)

For frequency above 18GHz, the pre-scanned result is 20dB lower than the limit line is not reported.

3.5.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.5.8 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

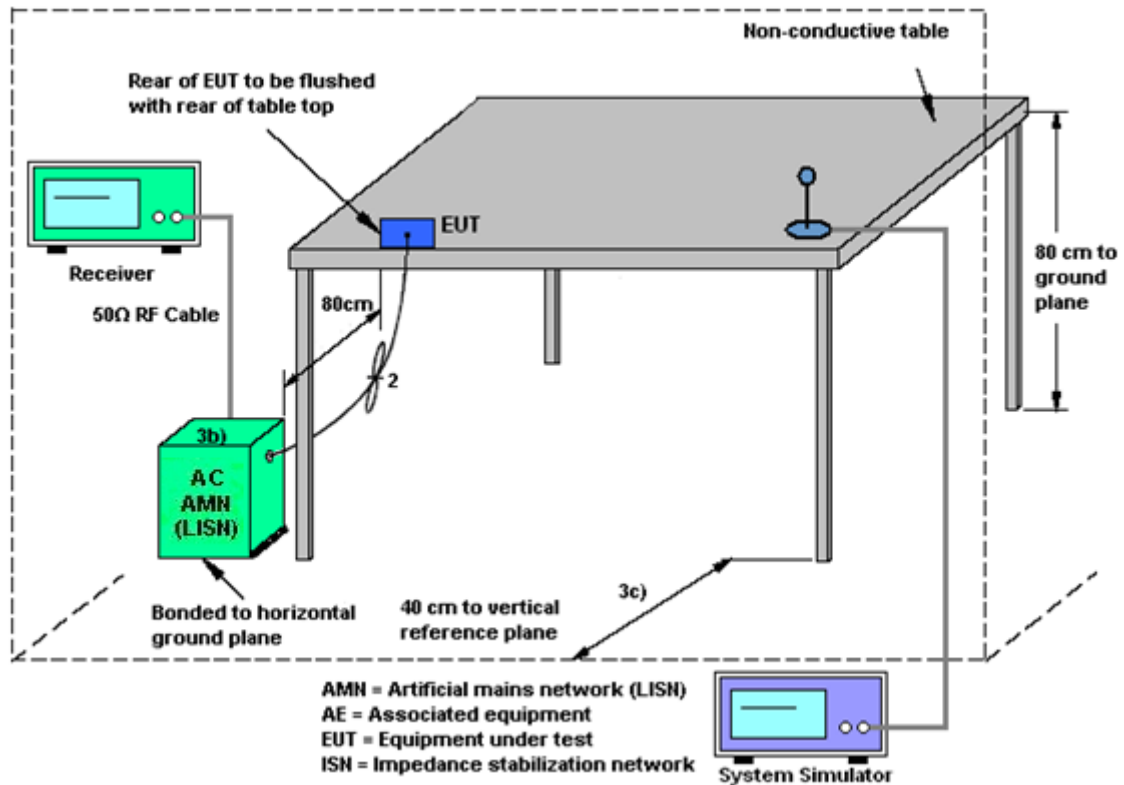
3.6.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. 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 rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 07, 2021	Nov. 25, 2021~ Dec. 15, 2021	Sep. 06, 2022	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N -06	47020 & 06	30MHz to 1GHz	Oct. 09, 2021	Nov. 25, 2021~ Dec. 15, 2021	Oct. 08, 2022	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1522	1G~18GHz	Oct. 12, 2021	Nov. 25, 2021~ Dec. 15, 2021	Oct. 11, 2022	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	00991	18GHz ~40GHz	May 12, 2021	Nov. 25, 2021~ Dec. 15, 2021	May 11, 2022	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1G	Jul. 05, 2021	Nov. 25, 2021~ Dec. 15, 2021	Jul. 04, 2022	Radiation (03CH16-HY)
Amplifier	Jet-Power	JPA0118-55-30 3	17100018000 54001	1-18GHz	Jun. 16, 2021	Nov. 25, 2021~ Dec. 15, 2021	Jun. 15, 2022	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2020	Nov. 25, 2021~ Dec. 15, 2021	Jun. 21, 2021	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 10, 2020	Nov. 25, 2021~ Dec. 08, 2021	Dec. 09, 2021	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 09, 2021	Dec. 09, 2021~ Dec. 15, 2021	Dec. 08, 2022	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	3Hz~26.5GHz	Dec. 11, 2020	Nov. 25, 2021~ Dec. 09, 2021	Dec. 10, 2021	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY59053012	3Hz~26.5GHz	Nov. 18, 2021	Dec. 09, 2021~ Dec. 15, 2021	Nov. 17, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4P E	NA	Aug. 28, 2021	Nov. 25, 2021~ Dec. 15, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4P E	NA	Aug. 28, 2021	Nov. 25, 2021~ Dec. 15, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5 757	NA	Aug. 28, 2021	Nov. 25, 2021~ Dec. 15, 2021	Aug. 27, 2022	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Nov. 25, 2021~ Dec. 15, 2021	N/A	Radiation (03CH16-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Nov. 25, 2021~ Dec. 15, 2021	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Nov. 25, 2021~ Dec. 15, 2021	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Nov. 25, 2021~ Dec. 15, 2021	N/A	Radiation (03CH16-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECEP	DTM-303A	TP201996	N/A	Nov. 16, 2021	Nov. 22, 2021~ Feb. 21, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Meter	DARE	RPR3006W	13100030SN O31(NO:182)	10MHz~6GHz	Dec. 30, 2020	Nov. 22, 2021~ Dec. 08, 2021	Dec. 29, 2021	Conducted (TH05-HY)
Power Meter	DARE	RPR3006W	15100041SN O10 (NO:248)	10MHz~6GHz	Dec. 29, 2021	Feb. 21, 2022	Dec. 28, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	Nov. 22, 2021~ Feb. 21, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	932001	N/A	Sep. 30, 2021	Nov. 22, 2021~ Feb. 21, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	846202	300MHz~40GHz	Sep. 30, 2021	Nov. 22, 2021~ Feb. 21, 2022	Sep. 29, 2022	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW191204 (BOX8)	N/A	Jan. 07, 2021	Nov. 22, 2021~ Dec. 08, 2021	Jan. 06, 2022	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUMENT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	Feb. 21, 2022	Aug. 11, 2022	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 16, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	Nov. 16, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	TECEP	DTM-303A	TP201973	N/A	Oct. 22, 2021	Nov. 16, 2021	Oct. 21, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2020	Nov. 16, 2021	Nov. 30, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Nov. 16, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	N/A	Jul. 28, 2021	Nov. 16, 2021	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Nov. 16, 2021	Dec. 30, 2021	Conduction (CO05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.1 dB
--	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.8 dB
--	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2 dB
--	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.8 dB
--	--------

Appendix A. Test Result of Conducted Test Items

<Ant. 4>

Test Engineer:	Ching Chen	Temperature:	21~25	°C
Test Date:	2021/11/24-2022/2/21	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.037	0.724	0.50	Pass
BLE	1Mbps	1	19	2440	1.039	0.724	0.50	Pass
BLE	1Mbps	1	39	2480	1.037	0.718	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	18.78	30.00	-0.20	18.58	36.00	Pass
BLE	1Mbps	1	19	2440	18.99	30.00	-0.20	18.79	36.00	Pass
BLE	1Mbps	1	39	2480	18.80	30.00	-0.20	18.60	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	17.64	3.02	-0.20	8.00	Pass
BLE	1Mbps	1	19	2440	18.00	3.37	-0.20	8.00	Pass
BLE	1Mbps	1	39	2480	18.57	3.87	-0.20	8.00	Pass

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

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.050	1.248	0.50	Pass
BLE	2Mbps	1	19	2440	2.050	1.252	0.50	Pass
BLE	2Mbps	1	39	2480	2.050	1.196	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	18.78	30.00	-0.20	18.58	36.00	Pass
BLE	2Mbps	1	19	2440	18.82	30.00	-0.20	18.62	36.00	Pass
BLE	2Mbps	1	39	2480	18.84	30.00	-0.20	18.64	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	18.49	0.27	-0.20	8.00	Pass
BLE	2Mbps	1	19	2440	17.87	-0.34	-0.20	8.00	Pass
BLE	2Mbps	1	39	2480	18.46	0.28	-0.20	8.00	Pass

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

<Ant. 3>

Test Engineer:	Ching Chen	Temperature:	21~25	°C
Test Date:	2021/11/22-2022/2/21	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.037	0.716	0.50	Pass
BLE	1Mbps	1	19	2440	1.039	0.720	0.50	Pass
BLE	1Mbps	1	39	2480	1.037	0.718	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	18.71	30.00	-0.40	18.31	36.00	Pass
BLE	1Mbps	1	19	2440	18.81	30.00	-0.40	18.41	36.00	Pass
BLE	1Mbps	1	39	2480	18.71	30.00	-0.40	18.31	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	18.25	3.40	-0.40	8.00	Pass
BLE	1Mbps	1	19	2440	18.17	3.62	-0.40	8.00	Pass
BLE	1Mbps	1	39	2480	17.97	3.38	-0.40	8.00	Pass

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

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	2Mbps	1	0	2402	2.050	1.192	0.50	Pass
BLE	2Mbps	1	19	2440	2.054	1.248	0.50	Pass
BLE	2Mbps	1	39	2480	2.054	1.240	0.50	Pass

TEST RESULTS DATA
Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	0	2402	18.64	30.00	-0.40	18.24	36.00	Pass
BLE	2Mbps	1	19	2440	18.68	30.00	-0.40	18.28	36.00	Pass
BLE	2Mbps	1	39	2480	18.64	30.00	-0.40	18.24	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	2Mbps	1	0	2402	18.33	-0.01	-0.40	8.00	Pass
BLE	2Mbps	1	19	2440	17.65	-0.56	-0.40	8.00	Pass
BLE	2Mbps	1	39	2480	18.02	-0.17	-0.40	8.00	Pass

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



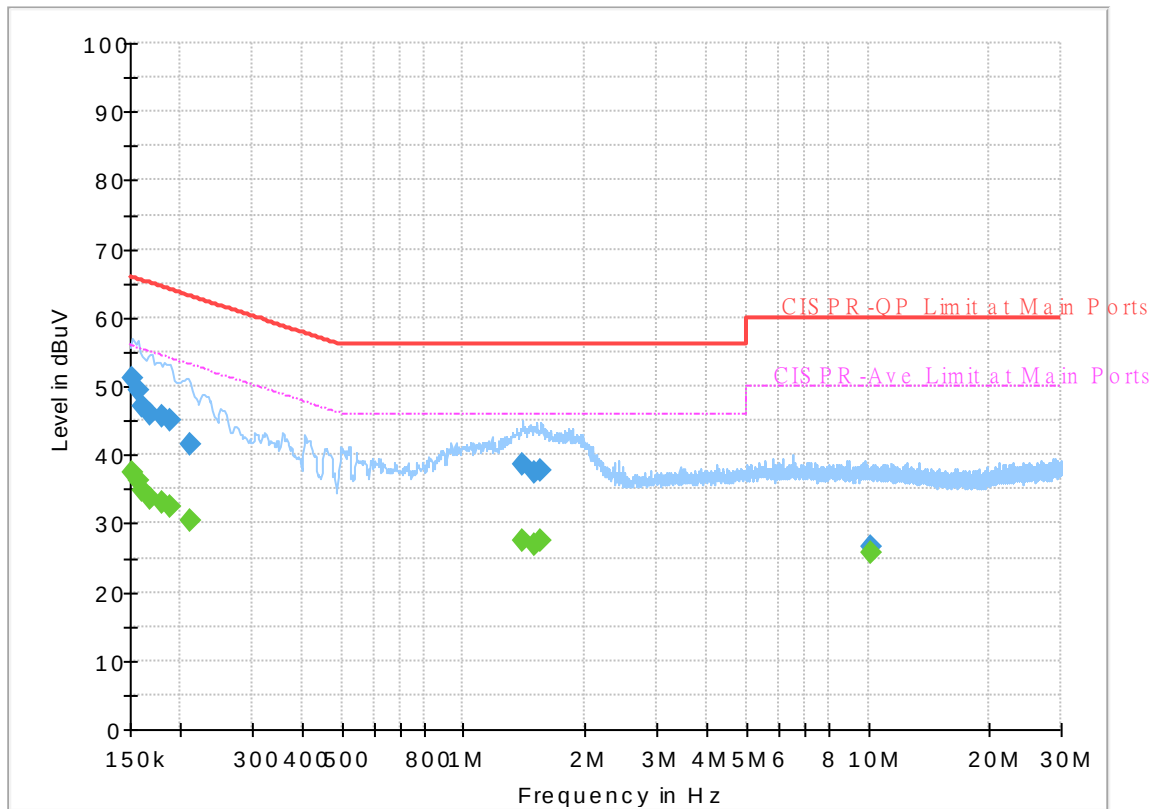
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26°C
		Relative Humidity :	45~55%

EUT Information

Report NO : 161608-05
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



Final Result

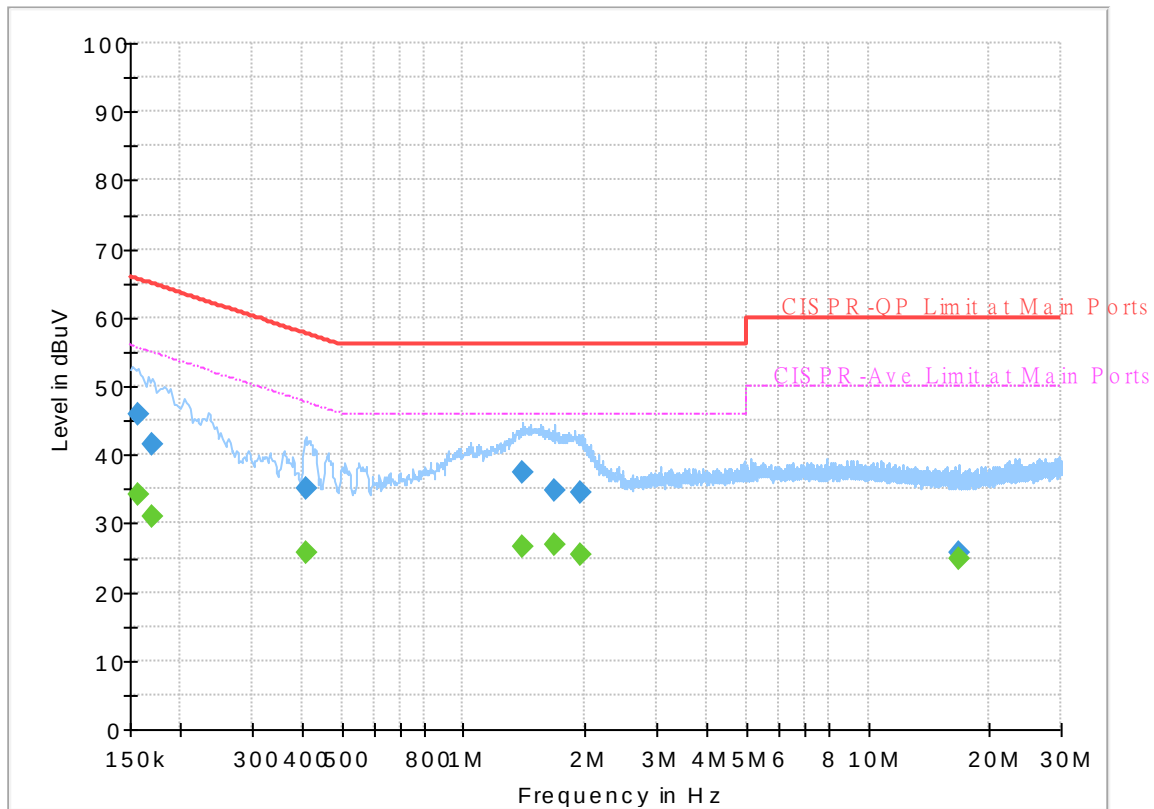
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	37.57	55.88	18.31	L1	OFF	19.7
0.152250	51.20	---	65.88	14.68	L1	OFF	19.7
0.156750	---	36.37	55.63	19.26	L1	OFF	19.7
0.156750	49.47	---	65.63	16.16	L1	OFF	19.7
0.161250	---	34.88	55.40	20.52	L1	OFF	19.7
0.161250	47.20	---	65.40	18.20	L1	OFF	19.7
0.168000	---	33.68	55.06	21.38	L1	OFF	19.7
0.168000	46.01	---	65.06	19.05	L1	OFF	19.7
0.179250	---	33.02	54.52	21.50	L1	OFF	19.7
0.179250	45.60	---	64.52	18.92	L1	OFF	19.7
0.188250	---	32.59	54.11	21.52	L1	OFF	19.7
0.188250	45.04	---	64.11	19.07	L1	OFF	19.7
0.210750	---	30.41	53.18	22.77	L1	OFF	19.7
0.210750	41.39	---	63.18	21.79	L1	OFF	19.7
1.403250	---	27.60	46.00	18.40	L1	OFF	20.2
1.403250	38.52	---	56.00	17.48	L1	OFF	20.2
1.491000	---	26.93	46.00	19.07	L1	OFF	20.2
1.491000	37.47	---	56.00	18.53	L1	OFF	20.2
1.556250	---	27.56	46.00	18.44	L1	OFF	20.2
1.556250	37.70	---	56.00	18.30	L1	OFF	20.2
10.212000	---	25.71	50.00	24.29	L1	OFF	20.2

10.212000	26.71	---	60.00	33.29	L1	OFF	20.2
-----------	-------	-----	-------	-------	----	-----	------

EUT Information

Report NO : 161608-05
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	34.16	55.63	21.47	N	OFF	19.7
0.156750	45.99	---	65.63	19.64	N	OFF	19.7
0.170250	---	30.85	54.95	24.10	N	OFF	19.7
0.170250	41.66	---	64.95	23.29	N	OFF	19.7
0.408750	---	25.86	47.67	21.81	N	OFF	19.7
0.408750	35.23	---	57.67	22.44	N	OFF	19.7
1.403250	---	26.51	46.00	19.49	N	OFF	20.2
1.403250	37.47	---	56.00	18.53	N	OFF	20.2
1.675500	---	26.77	46.00	19.23	N	OFF	20.2
1.675500	34.84	---	56.00	21.16	N	OFF	20.2
1.938750	---	25.55	46.00	20.45	N	OFF	20.2
1.938750	34.54	---	56.00	21.46	N	OFF	20.2
16.818000	---	24.75	50.00	25.25	N	OFF	20.5
16.818000	25.82	---	60.00	34.18	N	OFF	20.5



Appendix C. Radiated Spurious Emission

Test Engineer :	Karl Hou and Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~65%

<Ant. 4>

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2323.23	56.01	-17.99	74	40.42	27.8	18.09	30.3	111	241	P	H
		2362.29	46.54	-7.46	54	30.94	27.73	18.16	30.29	111	241	A	H
	*	2402	112.61	-	-	97.15	27.5	18.24	30.28	111	241	P	H
	*	2402	111.97	-	-	96.51	27.5	18.24	30.28	111	241	A	H
													H
													H
		2350.53	56.36	-17.64	74	40.71	27.8	18.14	30.29	384	129	P	V
		2320.815	46	-8	54	30.42	27.8	18.08	30.3	384	129	A	V
	*	2402	107.88	-	-	92.42	27.5	18.24	30.28	384	129	P	V
	*	2402	107.27	-	-	91.81	27.5	18.24	30.28	384	129	A	V
													V
													V



BLE CH 19 2440MHz		2376.64	56.89	-17.11	74	41.34	27.64	18.19	30.28	104	243	P	H
		2382.1	46.21	-7.79	54	30.68	27.61	18.2	30.28	104	243	A	H
	*	2440	112.75	-	-	97.29	27.42	18.31	30.27	104	243	P	H
	*	2440	112.17	-	-	96.71	27.42	18.31	30.27	104	243	A	H
		2485.3	56.18	-17.82	74	40.64	27.4	18.39	30.25	104	243	P	H
		2489.57	46.12	-7.88	54	30.57	27.4	18.4	30.25	104	243	A	H
		2363.06	55.71	-18.29	74	40.11	27.72	18.17	30.29	368	128	P	V
		2340.94	46.11	-7.89	54	30.48	27.8	18.12	30.29	368	128	A	V
	*	2440	107.3	-	-	91.84	27.42	18.31	30.27	368	128	P	V
	*	2440	106.65	-	-	91.19	27.42	18.31	30.27	368	128	A	V
		2496.08	56.2	-17.8	74	40.64	27.4	18.41	30.25	368	128	P	V
		2489.01	46.03	-7.97	54	30.48	27.4	18.4	30.25	368	128	A	V
BLE CH 39 2480MHz	*	2480	114.76	-	-	99.24	27.4	18.38	30.26	100	239	P	H
	*	2480	114.15	-	-	98.63	27.4	18.38	30.26	100	239	A	H
		2486.08	56.74	-17.26	74	41.2	27.4	18.39	30.25	100	239	P	H
		2484.24	46.87	-7.13	54	31.33	27.4	18.39	30.25	100	239	A	H
													H
													H
	*	2480	108.49	-	-	92.97	27.4	18.38	30.26	400	119	P	V
	*	2480	107.9	-	-	92.38	27.4	18.38	30.26	400	119	A	V
		2484.04	55.81	-18.19	74	40.27	27.4	18.39	30.25	400	119	P	V
		2489.92	46.24	-7.76	54	30.69	27.4	18.4	30.25	400	119	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	42.49	-31.51	74	57.03	31.19	12.35	58.08	-	-	P	H
		11340	54.06	-19.94	74	55.02	39.98	19.92	60.86	-	-	P	H
		11340	42.56	-11.44	54	43.52	39.98	19.92	60.86	-	-	A	H
		14475	54.62	-19.38	74	51.45	42	22	60.83	-	-	P	H
		14475	44	-10	54	40.83	42	22	60.83	-	-	A	H
		17970	62.92	-11.08	74	46.22	48.51	25.03	56.84	-	-	P	H
		17970	47.62	-6.38	54	30.92	48.51	25.03	56.84	-	-	A	H
													H
													H
													H
													H
													H
		4804	41.71	-32.29	74	56.25	31.19	12.35	58.08	-	-	P	V
		11055	54.02	-19.98	74	55.55	40.18	19.6	61.31	-	-	P	V
		11055	43.09	-10.91	54	44.62	40.18	19.6	61.31	-	-	A	V
		14505	53.64	-20.36	74	50.41	42.01	22.02	60.8	-	-	P	V
		14505	43.99	-10.01	54	40.76	42.01	22.02	60.8	-	-	A	V
		17985	62.94	-11.06	74	45.87	48.85	25.04	56.82	-	-	P	V
		17985	47.24	-6.76	54	30.17	48.85	25.04	56.82	-	-	A	V
													V
													V
													V
													V
													V



BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	42.52	-31.48	74	57.03	31.22	12.32	58.05	-	-	P	H
		7320	52.98	-21.02	74	58.66	36.4	15.88	57.96	100	120	P	H
		7320	45.31	-8.69	54	50.99	36.4	15.88	57.96	100	120	A	H
		10995	53.14	-20.86	74	54.61	40.4	19.54	61.41	-	-	P	H
		10995	42.04	-11.96	54	43.51	40.4	19.54	61.41	-	-	A	H
		14475	53.75	-20.25	74	50.58	42	22	60.83	-	-	P	H
		14475	43.53	-10.47	54	40.36	42	22	60.83	-	-	A	H
		17970	61.63	-12.37	74	44.93	48.51	25.03	56.84	-	-	P	H
		17970	47.72	-6.28	54	31.02	48.51	25.03	56.84	-	-	A	H
													H
													H
													H
		4880	41.58	-32.42	74	56.09	31.22	12.32	58.05	-	-	P	V
		7320	55.41	-18.59	74	61.09	36.4	15.88	57.96	100	58	P	V
		7320	50.07	-3.93	54	55.75	36.4	15.88	57.96	100	58	A	V
		10710	53.44	-20.56	74	56.12	39.83	19.3	61.81	-	-	P	V
		10710	41.66	-12.34	54	44.34	39.83	19.3	61.81	-	-	A	V
		14490	53.26	-20.74	74	50.06	42	22.01	60.81	-	-	P	V
		14490	43.72	-10.28	54	40.52	42	22.01	60.81	-	-	A	V
		17955	61.76	-12.24	74	45.4	48.17	25.04	56.85	-	-	P	V
		17955	47.97	-6.03	54	31.61	48.17	25.04	56.85	-	-	A	V
													V
													V
													V

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz		4960	42.34	-31.66	74	56.64	31.44	12.28	58.02	-	-	P	H
		7440	52.8	-21.2	74	58.15	36.44	16.2	57.99	100	119	P	H
		7440	46.53	-7.47	54	51.88	36.44	16.2	57.99	100	119	A	H
		11010	53.77	-20.23	74	55.24	40.36	19.55	61.38	-	-	P	H
		11010	42.74	-11.26	54	44.21	40.36	19.55	61.38	-	-	A	H
		14505	53.91	-20.09	74	50.68	42.01	22.02	60.8	-	-	P	H
		14505	43.75	-10.25	54	40.52	42.01	22.02	60.8	-	-	A	H
		17985	61.53	-12.47	74	44.46	48.85	25.04	56.82	-	-	P	H
		17985	47.83	-6.17	54	30.76	48.85	25.04	56.82	-	-	A	H
													H
													H
													H
		4960	41.36	-32.64	74	55.66	31.44	12.28	58.02	-	-	P	V
		7440	56.09	-17.91	74	61.44	36.44	16.2	57.99	100	79	P	V
		7440	50.16	-3.84	54	55.51	36.44	16.2	57.99	100	79	A	V
		10755	53.14	-20.86	74	55.57	39.97	19.34	61.74	-	-	P	V
		10755	42.02	-11.98	54	44.45	39.97	19.34	61.74	-	-	A	V
		14475	53.76	-20.24	74	50.59	42	22	60.83	-	-	P	V
		14475	46.7	-7.3	54	43.53	42	22	60.83	-	-	A	V
		17970	62.22	-11.78	74	45.52	48.51	25.03	56.84	-	-	P	V
		17970	47.4	-6.6	54	30.7	48.51	25.03	56.84	-	-	A	V
													V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												
	3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												
	4. The emission level close to 18GHz is checked that the average emission level is noise floor only.												

Emission below 1GHz

2.4GHz BLE (LF)

[illegible]



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2363.025	56.02	-17.98	74	40.42	27.72	18.17	30.29	108	237	P	H
		2346.645	45.44	-8.56	54	29.8	27.8	18.13	30.29	108	237	A	H
	*	2402	112.59	-	-	97.13	27.5	18.24	30.28	108	237	P	H
	*	2402	110.99	-	-	95.53	27.5	18.24	30.28	108	237	A	H
													H
													H
		2324.07	56.28	-17.72	74	40.69	27.8	18.09	30.3	383	127	P	V
		2360.295	45.21	-8.79	54	29.6	27.74	18.16	30.29	383	127	A	V
	*	2402	107.8	-	-	92.34	27.5	18.24	30.28	383	127	P	V
	*	2402	106.21	-	-	90.75	27.5	18.24	30.28	383	127	A	V
													V
													V
BLE CH 19 2440MHz		2318.68	56.63	-17.37	74	41.05	27.8	18.08	30.3	102	240	P	H
		2356.76	45.39	-8.61	54	29.77	27.76	18.15	30.29	102	240	A	H
	*	2440	113.45	-	-	97.99	27.42	18.31	30.27	102	240	P	H
	*	2440	111.86	-	-	96.4	27.42	18.31	30.27	102	240	A	H
		2490.2	55.98	-18.02	74	40.43	27.4	18.4	30.25	102	240	P	H
		2495.38	45.54	-8.46	54	29.98	27.4	18.41	30.25	102	240	A	H
		2348.64	56.41	-17.59	74	40.76	27.8	18.14	30.29	365	125	P	V
		2316.16	45.17	-8.83	54	29.6	27.8	18.07	30.3	365	125	A	V
	*	2440	107.76	-	-	92.3	27.42	18.31	30.27	365	125	P	V
	*	2440	104.08	-	-	88.62	27.42	18.31	30.27	365	125	A	V
		2495.45	56.22	-17.78	74	40.66	27.4	18.41	30.25	365	125	P	V
		2484.11	45.49	-8.51	54	29.95	27.4	18.39	30.25	365	125	A	V



BLE CH 39 2480MHz	*	2480	115.01	-	-	99.49	27.4	18.38	30.26	100	240	P	H
	*	2480	113.49	-	-	97.97	27.4	18.38	30.26	100	240	A	H
		2483.56	57.21	-16.79	74	41.67	27.4	18.39	30.25	100	240	P	H
		2483.52	48.01	-5.99	54	32.47	27.4	18.39	30.25	100	240	A	H
													H
													H
	*	2480	108.94	-	-	93.42	27.4	18.38	30.26	400	119	P	V
	*	2480	107.42	-	-	91.9	27.4	18.38	30.26	400	119	A	V
		2495.64	56.99	-17.01	74	41.43	27.4	18.41	30.25	400	119	P	V
		2483.64	45.84	-8.16	54	30.3	27.4	18.39	30.25	400	119	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	41.24	-32.76	74	55.77	31.2	12.35	58.08	-	-	P	H
		10920	53.31	-20.69	74	54.94	40.4	19.48	61.51	-	-	P	H
		10920	41.99	-12.01	54	43.62	40.4	19.48	61.51	-	-	A	H
		14490	53.55	-20.45	74	50.35	42	22.01	60.81	-	-	P	H
		14490	43.76	-10.24	54	40.56	42	22.01	60.81	-	-	A	H
		18000	62.62	-11.38	74	45.18	49.2	25.04	56.8	-	-	P	H
		18000	47.66	-6.34	54	30.22	49.2	25.04	56.8	-	-	A	H
													H
													H
													H
													H
													H
		4804	41.96	-32.04	74	56.49	31.2	12.35	58.08	-	-	P	V
		10650	53.36	-20.64	74	56.1	39.9	19.25	61.89	-	-	P	V
		10650	41.14	-12.86	54	43.88	39.9	19.25	61.89	-	-	A	V
		14475	53.74	-20.26	74	50.57	42	22	60.83	-	-	P	V
		14475	44.13	-9.87	54	40.96	42	22	60.83	-	-	A	V
		17985	61.84	-12.16	74	44.77	48.85	25.04	56.82	-	-	P	V
		17985	47.63	-6.37	54	30.56	48.85	25.04	56.82	-	-	A	V
													V
													V
													V
													V
													V



BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	41.17	-32.83	74	55.7	31.2	12.32	58.05	-	-	P	H
		7320	51.62	-22.38	74	57.3	36.4	15.88	57.96	100	119	P	H
		7320	43.29	-10.71	54	48.97	36.4	15.88	57.96	100	119	A	H
		10875	53.06	-20.94	74	54.87	40.33	19.44	61.58	-	-	P	H
		10875	41.71	-12.29	54	43.52	40.33	19.44	61.58	-	-	A	H
		14475	54.3	-19.7	74	51.13	42	22	60.83	-	-	P	H
		14475	43.82	-10.18	54	40.65	42	22	60.83	-	-	A	H
		18000	61.97	-12.03	74	44.53	49.2	25.04	56.8	-	-	P	H
		18000	47.98	-6.02	54	30.54	49.2	25.04	56.8	-	-	A	H
													H
													H
													H
		4880	41.39	-32.61	74	55.9	31.22	12.32	58.05	-	-	P	V
		7320	55.85	-18.15	74	61.53	36.4	15.88	57.96	100	297	P	V
		7320	49.25	-4.75	54	54.93	36.4	15.88	57.96	100	297	A	V
		10830	53.92	-20.08	74	55.97	40.19	19.4	61.64	-	-	P	V
		10830	42.46	-11.54	54	44.51	40.19	19.4	61.64	-	-	A	V
		14475	53.53	-20.47	74	50.36	42	22	60.83	-	-	P	V
		14475	43.54	-10.46	54	40.37	42	22	60.83	-	-	A	V
		17985	61.36	-12.64	74	44.29	48.85	25.04	56.82	-	-	P	V
		17985	47.92	-6.08	54	30.85	48.85	25.04	56.82	-	-	A	V
													V
													V
													V

BLE	Note	Frequency	Level	Over Limit	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
BLE CH 39 2480MHz		4960	41.47	-32.53	74	55.77	31.44	12.28	58.02	-	-	P	H
		7440	51.08	-22.92	74	56.43	36.44	16.2	57.99	316	66	P	H
		7440	42.33	-11.67	54	47.68	36.44	16.2	57.99	316	66	A	H
		11520	53.43	-20.57	74	53.89	40.04	20.11	60.61	-	-	P	H
		11520	43.07	-10.93	54	43.53	40.04	20.11	60.61	-	-	A	H
		14490	54.24	-19.76	74	51.04	42	22.01	60.81	-	-	P	H
		14490	43.76	-10.24	54	40.56	42	22.01	60.81	-	-	A	H
		17955	62.13	-11.87	74	45.77	48.17	25.04	56.85	-	-	P	H
		17955	47.7	-6.3	54	31.34	48.17	25.04	56.85	-	-	A	H
													H
													H
													H
		4960	41	-33	74	55.3	31.44	12.28	58.02	-	-	P	V
		7440	56.14	-17.86	74	61.49	36.44	16.2	57.99	100	237	P	V
		7440	48.9	-5.1	54	54.25	36.44	16.2	57.99	100	237	A	V
		11370	53.97	-20.03	74	54.8	40.04	19.94	60.81	-	-	P	V
		11370	43.78	-10.22	54	44.61	40.04	19.94	60.81	-	-	A	V
		14475	54.01	-19.99	74	50.84	42	22	60.83	-	-	P	V
		14475	43.94	-10.06	54	40.77	42	22	60.83	-	-	A	V
		17985	62.06	-11.94	74	44.99	48.85	25.04	56.82	-	-	P	V
		17985	47.71	-6.29	54	30.64	48.85	25.04	56.82	-	-	A	V
													V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against limit line.												
	3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												
	4. The emission level close to 18GHz is checked that the average emission level is noise floor only.												



<Ant. 3>

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2377.305	55.96	-18.04	74	40.41	27.64	18.19	30.28	117	22	P	H
		2358.615	46.15	-7.85	54	30.53	27.75	18.16	30.29	117	22	A	H
	*	2402	108.95	-	-	93.49	27.5	18.24	30.28	117	22	P	H
	*	2402	108.37	-	-	92.91	27.5	18.24	30.28	117	22	A	H
													H
													H
		2354.52	56.34	-17.66	74	40.71	27.77	18.15	30.29	374	55	P	V
		2388.33	46.03	-7.97	54	30.52	27.57	18.22	30.28	374	55	A	V
	*	2402	104.71	-	-	89.25	27.5	18.24	30.28	374	55	P	V
	*	2402	104.09	-	-	88.63	27.5	18.24	30.28	374	55	A	V
													V
													V
BLE CH 19 2440MHz		2322.6	56.66	-17.34	74	41.07	27.8	18.09	30.3	100	20	P	H
		2332.4	45.91	-8.09	54	30.31	27.8	18.1	30.3	100	20	A	H
	*	2440	110.02	-	-	94.56	27.42	18.31	30.27	100	20	P	H
	*	2440	109.24	-	-	93.78	27.42	18.31	30.27	100	20	A	H
		2492.16	56.04	-17.96	74	40.48	27.4	18.41	30.25	100	20	P	H
		2492.72	46.08	-7.92	54	30.52	27.4	18.41	30.25	100	20	A	H
		2362.36	56.05	-17.95	74	40.45	27.73	18.16	30.29	370	50	P	V
		2321.48	46.15	-7.85	54	30.57	27.8	18.08	30.3	370	50	A	V
	*	2440	104.53	-	-	89.07	27.42	18.31	30.27	370	50	P	V
	*	2440	103.89	-	-	88.43	27.42	18.31	30.27	370	50	A	V
		2493.98	56	-18	74	40.44	27.4	18.41	30.25	370	50	P	V
		2493.63	46.27	-7.73	54	30.71	27.4	18.41	30.25	370	50	A	V



BLE CH 39 2480MHz	*	2480	111.7	-	-	96.18	27.4	18.38	30.26	100	22	P	H
	*	2480	111.02	-	-	95.5	27.4	18.38	30.26	100	22	A	H
		2487.12	56	-18	74	40.45	27.4	18.4	30.25	100	22	P	H
		2495.96	46.37	-7.63	54	30.81	27.4	18.41	30.25	100	22	A	H
													H
													H
	*	2480	109.69	-	-	94.17	27.4	18.38	30.26	397	89	P	V
	*	2480	108.94	-	-	93.42	27.4	18.38	30.26	397	89	A	V
		2495.96	56.17	-17.83	74	40.61	27.4	18.41	30.25	397	89	P	V
		2489.4	46.34	-7.66	54	30.79	27.4	18.4	30.25	397	89	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz****BLE (Harmonic @ 3m)**

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	42.66	-31.34	74	57.2	31.19	12.35	58.08	-	-	P	H
		10740	53.29	-20.71	74	55.8	39.92	19.33	61.76	-	-	P	H
		10740	42.34	-11.66	54	44.85	39.92	19.33	61.76	-	-	A	H
		14475	53.46	-20.54	74	50.29	42	22	60.83	-	-	P	H
		14475	43.94	-10.06	54	40.77	42	22	60.83	-	-	A	H
		17985	62.35	-11.65	74	45.28	48.85	25.04	56.82	-	-	P	H
		17985	47.44	-6.56	54	30.37	48.85	25.04	56.82	-	-	A	H
													H
													H
													H
													H
													H
		4804	41.32	-32.68	74	55.86	31.19	12.35	58.08	-	-	P	V
		10860	52.98	-21.02	74	54.87	40.28	19.43	61.6	-	-	P	V
		10860	42.62	-11.38	54	44.51	40.28	19.43	61.6	-	-	A	V
		14475	53.51	-20.49	74	50.34	42	22	60.83	-	-	P	V
		14475	43.94	-10.06	54	40.77	42	22	60.83	-	-	A	V
		18000	61.94	-12.06	74	44.5	49.2	25.04	56.8	-	-	P	V
		18000	47.58	-6.42	54	30.14	49.2	25.04	56.8	-	-	A	V
													V
													V
													V
													V
													V



BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	43.2	-30.8	74	57.71	31.22	12.32	58.05	-	-	P	H
		7320	50.05	-23.95	74	55.73	36.4	15.88	57.96	100	16	P	H
		7320	41.2	-12.8	54	46.88	36.4	15.88	57.96	100	16	A	H
		10740	53.07	-20.93	74	55.58	39.92	19.33	61.76	-	-	P	H
		10740	42.47	-11.53	54	44.98	39.92	19.33	61.76	-	-	A	H
		14475	54.13	-19.87	74	50.96	42	22	60.83	-	-	P	H
		14475	43.53	-10.47	54	40.36	42	22	60.83	-	-	A	H
		17985	62.47	-11.53	74	45.4	48.85	25.04	56.82	-	-	P	H
		17985	47.6	-6.4	54	30.53	48.85	25.04	56.82	-	-	A	H
													H
													H
													H
		4880	43.23	-30.77	74	57.74	31.22	12.32	58.05	-	-	P	V
		7320	52.17	-21.83	74	57.85	36.4	15.88	57.96	100	322	P	V
		7320	45.11	-8.89	54	50.79	36.4	15.88	57.96	100	322	A	V
		10965	53.08	-20.92	74	54.62	40.4	19.51	61.45	-	-	P	V
		10965	43.23	-10.77	54	44.77	40.4	19.51	61.45	-	-	A	V
		14475	53.48	-20.52	74	50.31	42	22	60.83	-	-	P	V
		14475	44.03	-9.97	54	40.86	42	22	60.83	-	-	A	V
		17985	61.65	-12.35	74	44.58	48.85	25.04	56.82	-	-	P	V
		17985	47.62	-6.38	54	30.55	48.85	25.04	56.82	-	-	A	V
													V
													V
													V



BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 39 2480MHz		4960	42.31	-31.69	74	56.61	31.44	12.28	58.02	-	-	P	H
		7440	51.22	-22.78	74	56.57	36.44	16.2	57.99	116	17	P	H
		7440	42.03	-11.97	54	47.38	36.44	16.2	57.99	116	17	A	H
		11265	53.17	-20.83	74	54.45	39.87	19.83	60.98	-	-	P	H
		11265	43.32	-10.68	54	44.6	39.87	19.83	60.98	-	-	A	H
		14475	53.32	-20.68	74	50.15	42	22	60.83	-	-	P	H
		14475	43.93	-10.07	54	40.76	42	22	60.83	-	-	A	H
		17985	62.25	-11.75	74	45.18	48.85	25.04	56.82	-	-	P	H
		17985	47.31	-6.69	54	30.24	48.85	25.04	56.82	-	-	A	H
													H
													H
													H
		4960	41.8	-32.2	74	56.1	31.44	12.28	58.02	-	-	P	V
		7440	53.7	-20.3	74	59.05	36.44	16.2	57.99	100	326	P	V
		7440	45.93	-8.07	54	51.28	36.44	16.2	57.99	100	326	A	V
		11100	53.54	-20.46	74	55.13	40	19.65	61.24	-	-	P	V
		11100	43.21	-10.79	54	44.8	40	19.65	61.24	-	-	A	V
		14490	53.03	-20.97	74	49.83	42	22.01	60.81	-	-	P	V
		14490	44.06	-9.94	54	40.86	42	22.01	60.81	-	-	A	V
		17985	62.57	-11.43	74	45.5	48.85	25.04	56.82	-	-	P	V
		17985	47.44	-6.56	54	30.37	48.85	25.04	56.82	-	-	A	V
													V
													V
													V
Remark	1.	No other spurious found.											
	2.	All results are PASS against Peak and Average limit line.											
	3.	The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.											
	4.	The emission level close to 18GHz is checked that the average emission level is noise floor only.											



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2378.88	56.39	-17.61	74	40.84	27.63	18.2	30.28	119	72	P	H
		2347.065	45.22	-8.78	54	29.58	27.8	18.13	30.29	119	72	A	H
	*	2402	108.68	-	-	93.22	27.5	18.24	30.28	119	72	P	H
	*	2402	107.14	-	-	91.68	27.5	18.24	30.28	119	72	A	H
													H
													H
		2352.735	57.25	-16.75	74	41.61	27.78	18.15	30.29	376	102	P	V
		2317.77	45.05	-8.95	54	29.47	27.8	18.08	30.3	376	102	A	V
	*	2402	107.54	-	-	92.08	27.5	18.24	30.28	376	102	P	V
	*	2402	105.05	-	-	89.59	27.5	18.24	30.28	376	102	A	V
													V
													V
BLE CH 19 2440MHz		2375.38	55.88	-18.12	74	40.32	27.65	18.19	30.28	100	17	P	H
		2372.58	44.84	-9.16	54	29.28	27.66	18.19	30.29	100	17	A	H
	*	2440	109.35	-	-	93.89	27.42	18.31	30.27	100	17	P	H
	*	2440	107.77	-	-	92.31	27.42	18.31	30.27	100	17	A	H
		2498.04	55.85	-18.15	74	40.28	27.4	18.42	30.25	100	17	P	H
		2493.7	45.16	-8.84	54	29.6	27.4	18.41	30.25	100	17	A	H
		2386.02	56.15	-17.85	74	40.64	27.58	18.21	30.28	363	97	P	V
		2372.3	44.89	-9.11	54	29.33	27.67	18.18	30.29	363	97	A	V
	*	2440	107.76	-	-	92.3	27.42	18.31	30.27	363	97	P	V
	*	2440	105.84	-	-	90.38	27.42	18.31	30.27	363	97	A	V
		2493.63	55.79	-18.21	74	40.23	27.4	18.41	30.25	363	97	P	V
		2497.55	45.36	-8.64	54	29.79	27.4	18.42	30.25	363	97	A	V



BLE CH 39 2480MHz	*	2480	111.97	-	-	96.45	27.4	18.38	30.26	100	21	P	H
	*	2480	109.75	-	-	94.23	27.4	18.38	30.26	100	21	A	H
		2491.4	57.43	-16.57	74	41.88	27.4	18.4	30.25	100	21	P	H
		2483.52	46.22	-7.78	54	30.68	27.4	18.39	30.25	100	21	A	H
													H
													H
	*	2480	110.29	-	-	94.77	27.4	18.38	30.26	395	101	P	V
	*	2480	108.68	-	-	93.16	27.4	18.38	30.26	395	101	A	V
		2499.96	55.73	-18.27	74	40.16	27.4	18.42	30.25	395	101	P	V
		2483.52	45.66	-8.34	54	30.12	27.4	18.39	30.25	395	101	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	44.93	-29.07	74	59.47	31.19	12.35	58.08	-	-	P	H
		10860	52.83	-21.17	74	54.72	40.28	19.43	61.6	-	-	P	H
		10860	42.69	-11.31	54	44.58	40.28	19.43	61.6	-	-	A	H
		14475	53.22	-20.78	74	50.05	42	22	60.83	-	-	P	H
		14475	44.03	-9.97	54	40.86	42	22	60.83	-	-	A	H
		17970	61.57	-12.43	74	44.87	48.51	25.03	56.84	-	-	P	H
		17970	47.34	-6.66	54	30.64	48.51	25.03	56.84	-	-	A	H
													H
													H
													H
													H
													H
		4804	43.96	-30.04	74	58.5	31.19	12.35	58.08	-	-	P	V
		10845	53.05	-20.95	74	55.02	40.24	19.41	61.62	-	-	P	V
		10845	42.81	-11.19	54	44.78	40.24	19.41	61.62	-	-	A	V
		14505	53.21	-20.79	74	49.98	42.01	22.02	60.8	-	-	P	V
		14505	43.9	-10.1	54	40.67	42.01	22.02	60.8	-	-	A	V
		18000	61.73	-12.27	74	44.29	49.2	25.04	56.8	-	-	P	V
		18000	47.85	-6.15	54	30.41	49.2	25.04	56.8	-	-	A	V
													V
													V
													V
													V
													V



BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 19 2440MHz		4880	41.68	-32.32	74	56.19	31.22	12.32	58.05	-	-	P	H
		7320	48.98	-25.02	74	54.66	36.4	15.88	57.96	100	14	P	H
		7320	40.4	-13.6	54	46.08	36.4	15.88	57.96	100	14	A	H
		10845	52.83	-21.17	74	54.8	40.24	19.41	61.62	-	-	P	H
		10845	42.5	-11.5	54	44.47	40.24	19.41	61.62	-	-	A	H
		14490	53.51	-20.49	74	50.31	42	22.01	60.81	-	-	P	H
		14490	43.73	-10.27	54	40.53	42	22.01	60.81	-	-	A	H
		18000	62.02	-11.98	74	44.58	49.2	25.04	56.8	-	-	P	H
		18000	47.67	-6.33	54	30.23	49.2	25.04	56.8	-	-	A	H
													H
													H
													H
		4880	42.13	-31.87	74	56.64	31.22	12.32	58.05	-	-	P	V
		7320	52.06	-21.94	74	57.74	36.4	15.88	57.96	100	318	P	V
		7320	44.56	-9.44	54	50.24	36.4	15.88	57.96	100	318	A	V
		10860	53.28	-20.72	74	55.17	40.28	19.43	61.6	-	-	P	V
		10860	42.92	-11.08	54	44.81	40.28	19.43	61.6	-	-	A	V
		14475	53.82	-20.18	74	50.65	42	22	60.83	-	-	P	V
		14475	43.72	-10.28	54	40.55	42	22	60.83	-	-	A	V
		17970	61.7	-12.3	74	45	48.51	25.03	56.84	-	-	P	V
		17970	47.72	-6.28	54	31.02	48.51	25.03	56.84	-	-	A	V
													V
													V
													V

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamplifier Factor	Antenna Position	Table Position	Peak Average	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz		4960	41.81	-32.19	74	56.11	31.44	12.28	58.02	-	-	P	H
		7440	50.75	-23.25	74	56.1	36.44	16.2	57.99	100	6	P	H
		7440	41.61	-12.39	54	46.96	36.44	16.2	57.99	100	6	A	H
		10950	53.58	-20.42	74	55.16	40.4	19.49	61.47	-	-	P	H
		10950	43.27	-10.73	54	44.85	40.4	19.49	61.47	-	-	A	H
		14475	53.76	-20.24	74	50.59	42	22	60.83	-	-	P	H
		14475	44.02	-9.98	54	40.85	42	22	60.83	-	-	A	H
		17955	61.56	-12.44	74	45.2	48.17	25.04	56.85	-	-	P	H
		17955	47.94	-6.06	54	31.58	48.17	25.04	56.85	-	-	A	H
													H
													H
													H
		4960	44.11	-29.89	74	58.41	31.44	12.28	58.02	-	-	P	V
		7440	52.51	-21.49	74	57.86	36.44	16.2	57.99	100	323	P	V
		7440	44.33	-9.67	54	49.68	36.44	16.2	57.99	100	323	A	V
		10860	54.39	-19.61	74	56.28	40.28	19.43	61.6	-	-	P	V
		10860	42.72	-11.28	54	44.61	40.28	19.43	61.6	-	-	A	V
		14475	53.15	-20.85	74	49.98	42	22	60.83	-	-	P	V
		14475	43.81	-10.19	54	40.64	42	22	60.83	-	-	A	V
		17985	61.86	-12.14	74	44.79	48.85	25.04	56.82	-	-	P	V
		17985	47.43	-6.57	54	30.36	48.85	25.04	56.82	-	-	A	V
													V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												
	3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												
	4. The emission level close to 18GHz is checked that the average emission level is noise floor only.												



Note symbol

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



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

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Karl Hou and Andy Yang	Temperature :	20~25°C
		Relative Humidity :	50~65%

Note symbol

-L	Low channel location
-R	High channel location

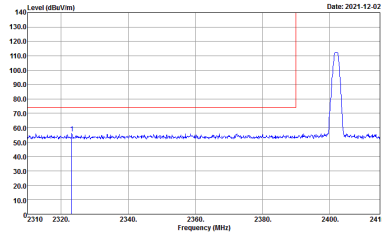
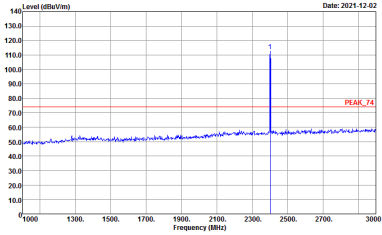
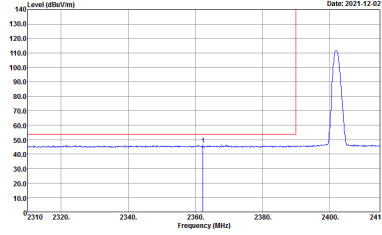
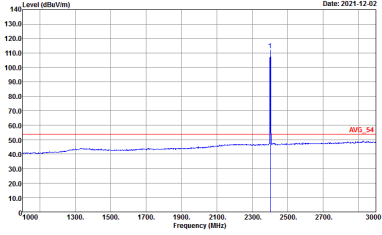


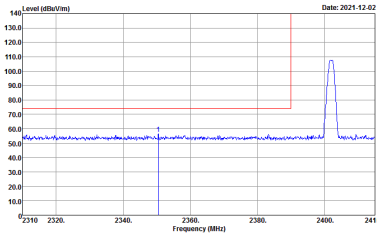
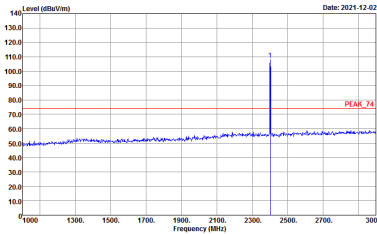
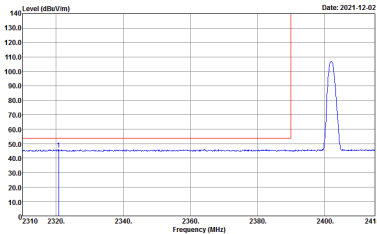
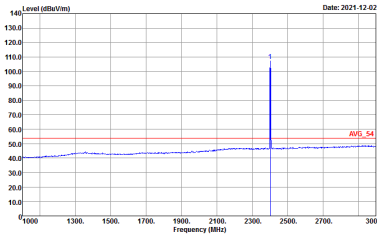
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<1Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

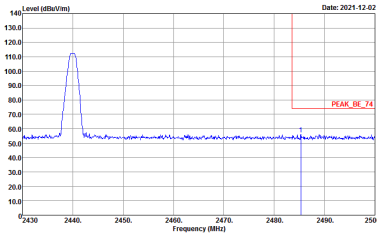
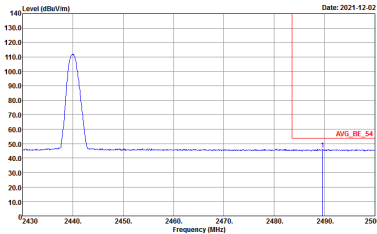
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

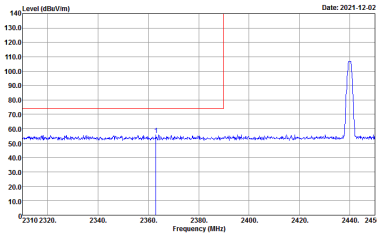
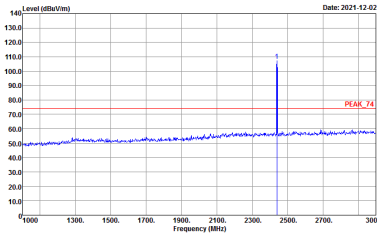
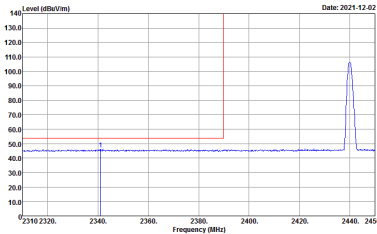
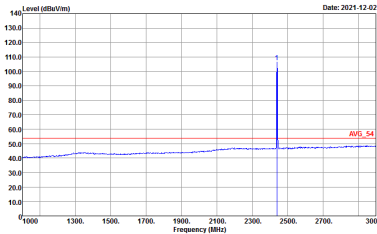


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

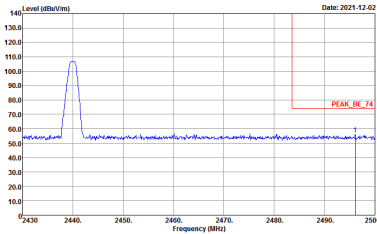
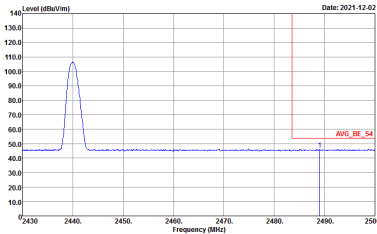


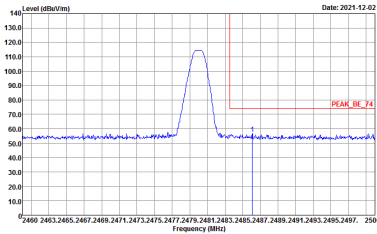
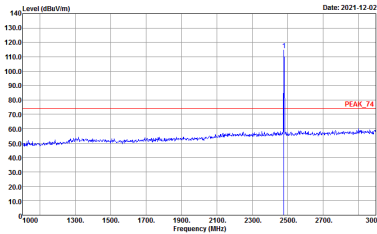
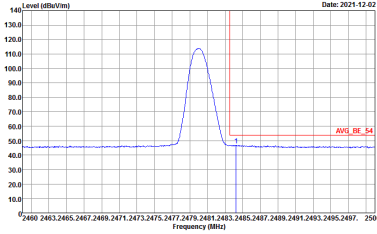
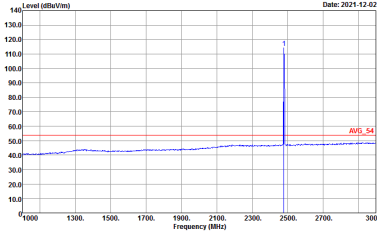
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

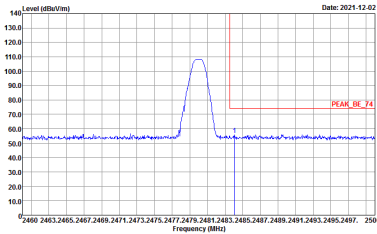
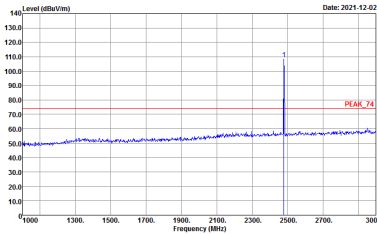
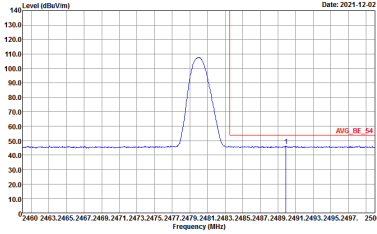
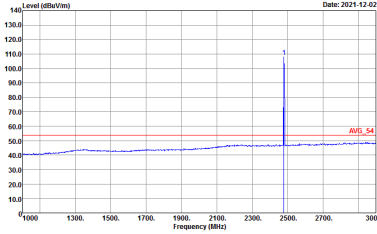


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

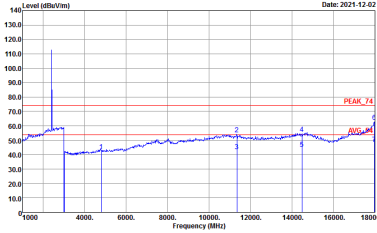
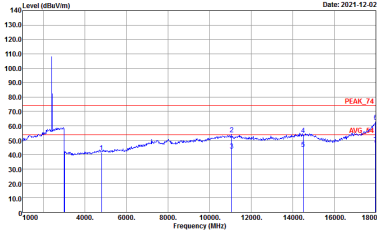
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH39 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

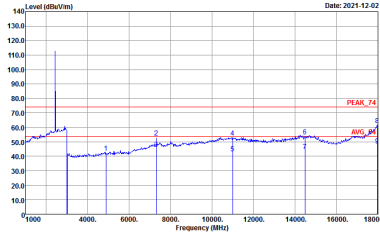
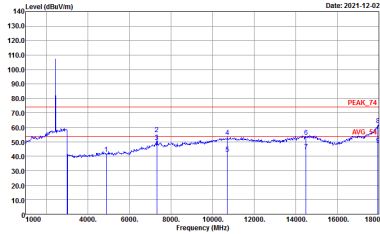


2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL

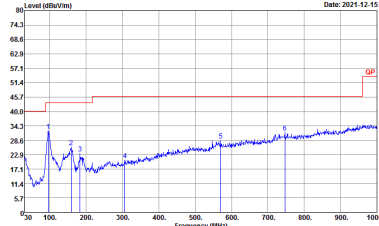
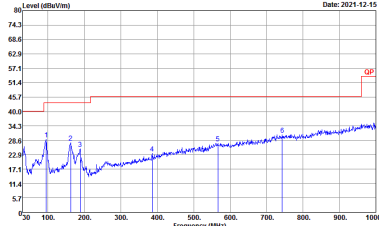


BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH39 2480MHz	
	Horizontal	Vertical
Peak Avg.	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL	Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 VERTICAL

Emission below 1GHz
2.4GHz BLE (LF)

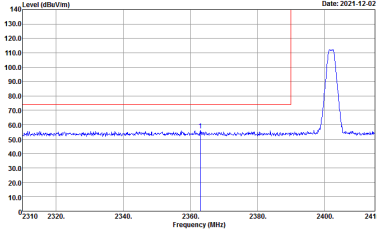
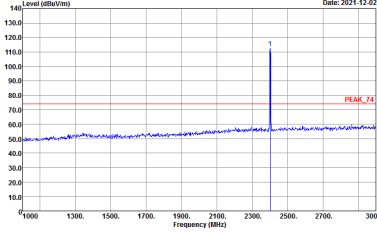
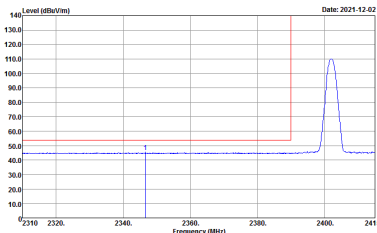
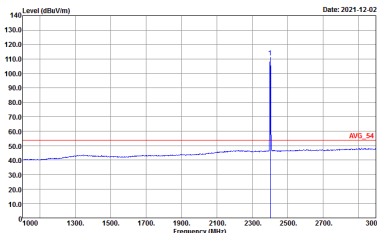
BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m B1LOG_47020_211009 HORIZONTAL	 Site : 03CH16-HY Condition : QP 3m B1LOG_47020_211009 VERTICAL



<2Mbps>

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 91200_1522_211012 HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto