



RF MEASUREMENT REPORT

FCC ID: 2ALS8-KS0019
Applicant: Ninebot (Changzhou) Tech Co., Ltd.
Product: Segway SuperScooter ST2 Pro
Model No.: 060205PE
Brand Name: Segway
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
Result: Complies
Received Date: 2023-07-12
Test Date: 2023-07-20 ~ 2023-09-15

Reviewed By:

Vincent Yu

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2307RSU032-U1	V01	Initial Report	2023-09-18	Valid

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1.4. Product Information

Product Name	Segway SuperScooter ST2 Pro
Model No.	060205PE
Serial No.	GR5515: 20230712Sample#07 (For conducted testing) 20230712Sample#10 (For radiated testing) MHCB05P-B: 20230719Sample#07 (For conducted testing) 20230712Sample#11 (For radiated testing)
Bluetooth Specification ^{Note 2}	GR5515: V5.1 MHCB05P-B: V5.0
Antenna Information	Refer to section 1.7
Accessories	
Adapter	Model: NBW84D004D0D Input: 100 - 240 V ~ 50 - 60Hz, 4.5A MAX Rated output: 83V, 4.0A
Rechargeable Li-ion Battery	Model: NDBF7220A Capacitance: 19.2Ah / 1382.4Wh Rated Voltage: 72V
<p>Note:</p> <ol style="list-style-type: none"> The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. The device contains two Bluetooth chips, GR5515 and MHCB05P-B. 	

1.5. Radio Specification under Test

GR5515 Bluetooth Chip	
Bluetooth Version	V5.1
Frequency Range	2402 ~ 2480MHz
Channel Number	40
Type of Modulation	GFSK
Data Rate	1Mbps & 2Mbps
MHCB05P-B Bluetooth Chip	
Bluetooth Version	V5.0
Frequency Range	2402 ~ 2480MHz
Channel Number	40
Type of Modulation	GFSK
Data Rate	1Mbps & 2Mbps

1.6. Working Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

1.7. Antenna Details

Antenna Type	Frequency Band (MHz)	T _x Paths	Max Antenna Gain (dBi)
Bluetooth Antenna (GR5515)			
Onboard PCB Antenna	2402 ~ 2480	1	-1.26
Bluetooth Antenna (MHCB05P-B)			
Onboard PCB Antenna	2402 ~ 2480	1	0.20

Note: The antenna gain is from antenna data sheet provided by the manufacturer.

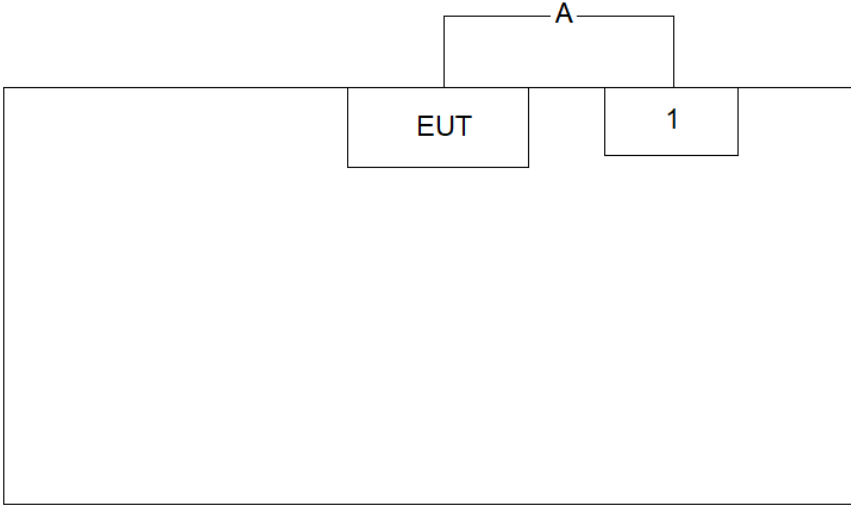
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by BLE-1Mbps
Mode 2: Transmit by BLE-2Mbps

2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram			
 <p>The diagram shows a large rectangular box representing the test chamber. Inside the box, there are two smaller boxes: one labeled 'EUT' (Equipment Under Test) on the left and one labeled '1' on the right. A line labeled 'A' connects the top of the 'EUT' box to the top of the '1' box, forming a bridge between them.</p>			
Cable Type		Cable Description	
A	USB Cable	Shielded, 3m	
Product		Manufacturer	Model No.
1	Notebook	HP	24-df052wcn

2.3. Test Software

The test utility software used during testing was “BLE_DTM.exe” for GR5515, and the version was 1.1.9.

The test utility software used during testing was “RTL8762x_RFTestTool.exe” for MHCB05P-B, and the version was 1.0.2.1.

2.4. Applied Standards

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

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.5. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2023-12-28	SIP-AC1
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2023-12-22	SIP-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2024-05-23	SIP-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2023-10-13	SIP-AC1/SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2024-06-17	SIP-AC1
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2023-11-07	SIP-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2023-10-10	SIP-AC1/SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2023-11-01	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06620	1 year	2023-11-27	SIP-AC1
Preamplifier	EMCI	EMC001330	MRTSUE06643	1 year	2024-01-12	SIP-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2024-07-13	SIP-AC1
Preamplifier	EMCI	EMC051845SE	MRTSUE06601	1 year	2023-11-22	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2023-10-25	SIP-AC2
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2024-05-23	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06623	1 year	2023-11-27	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2023-11-27	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06648	1 year	2023-10-22	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2023-12-22	SIP-AC2
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2024-02-26	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2023-11-01	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2023-11-27	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2023-12-22	SIP-AC3
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2023-11-25	SIP-AC3
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2024-06-29	SIP-TR2
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2023-08-23	SIP-TR2
Thermohygrometer	testo	608-H1	MRTSUE11109	1 year	2024-03-03	SIP-TR2

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~30MHz: 2.60dB 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.28dB 1GHz~40GHz: 4.98dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.5dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 3.2%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Notes:

- The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

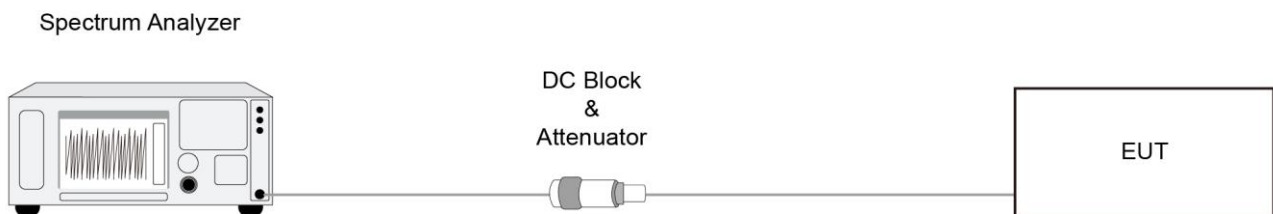
6.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

6.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.9.1.3

ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

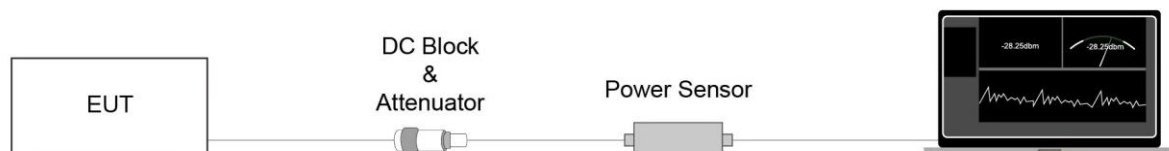
Method PKPM1 (Peak Power Measurement of Signals with DTS BW \leq 50MHz)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

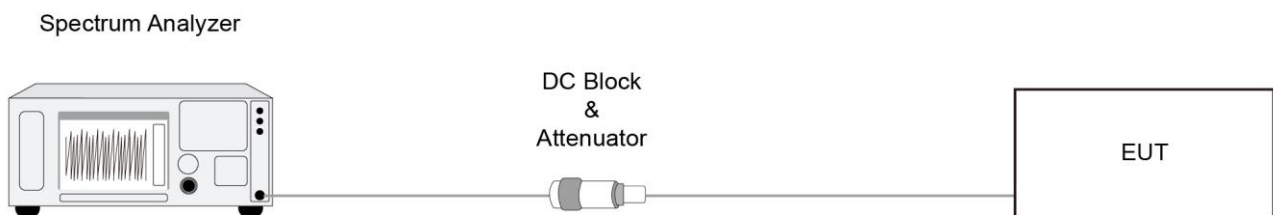
6.4.2. Test Procedure

ANSI C63.10-2013 Section 11.10.2

6.4.3. Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Conducted Band Edge and Out-of-Band Emissions Measurement

6.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Setting

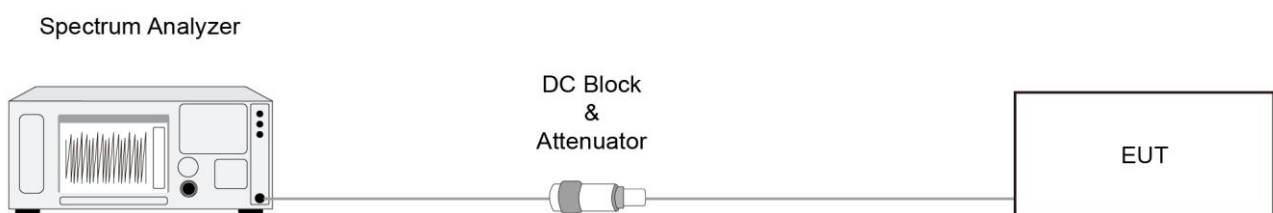
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW $\geq 3 \times$ RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.6.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

6.6.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

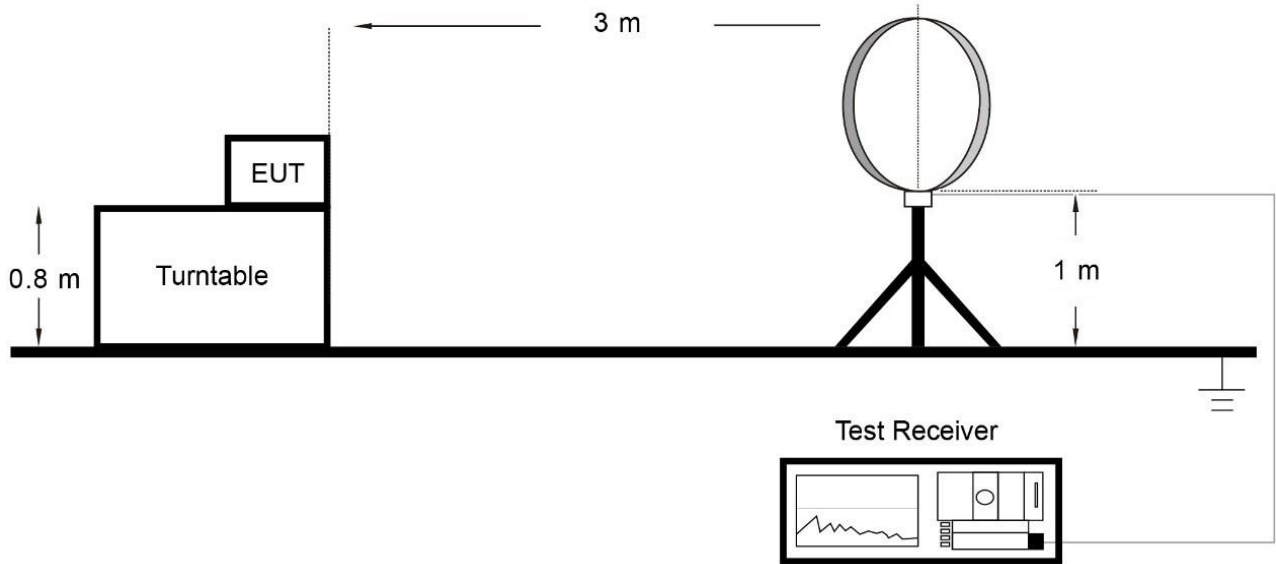
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

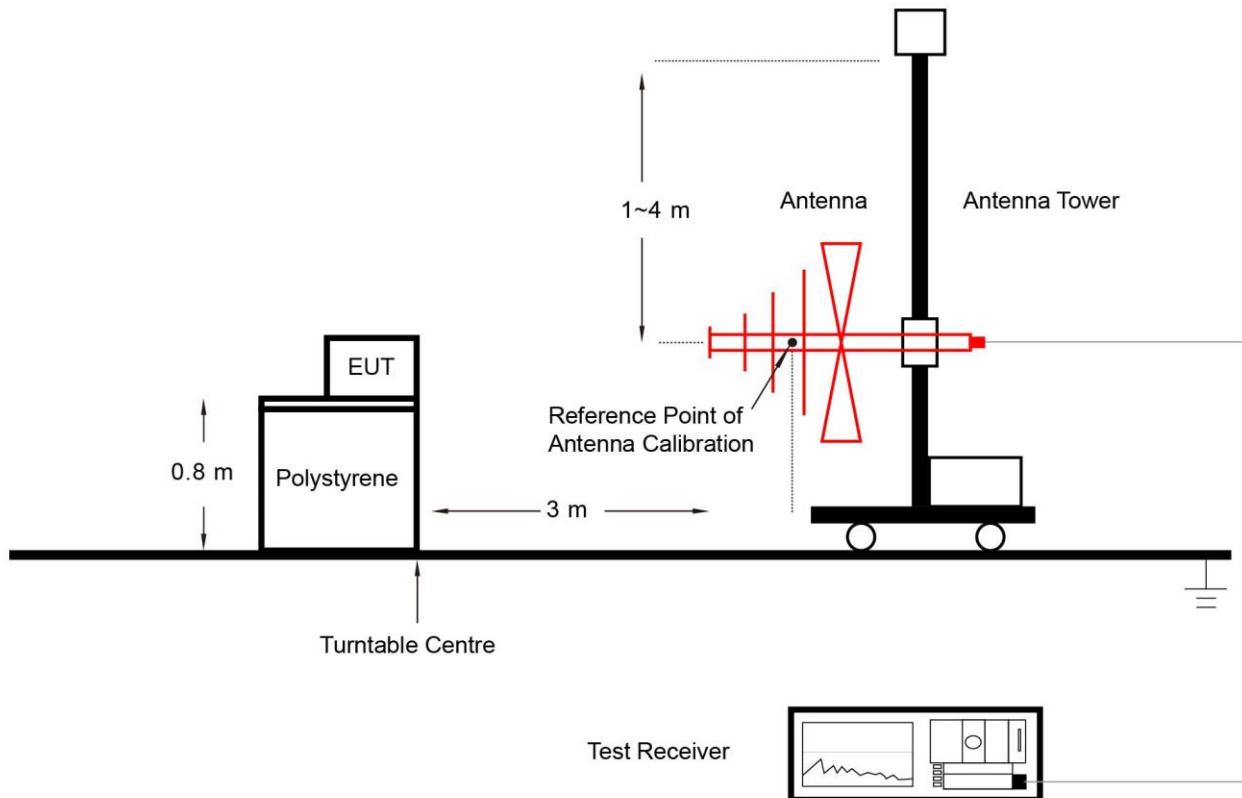
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

6.6.4. Test Setup

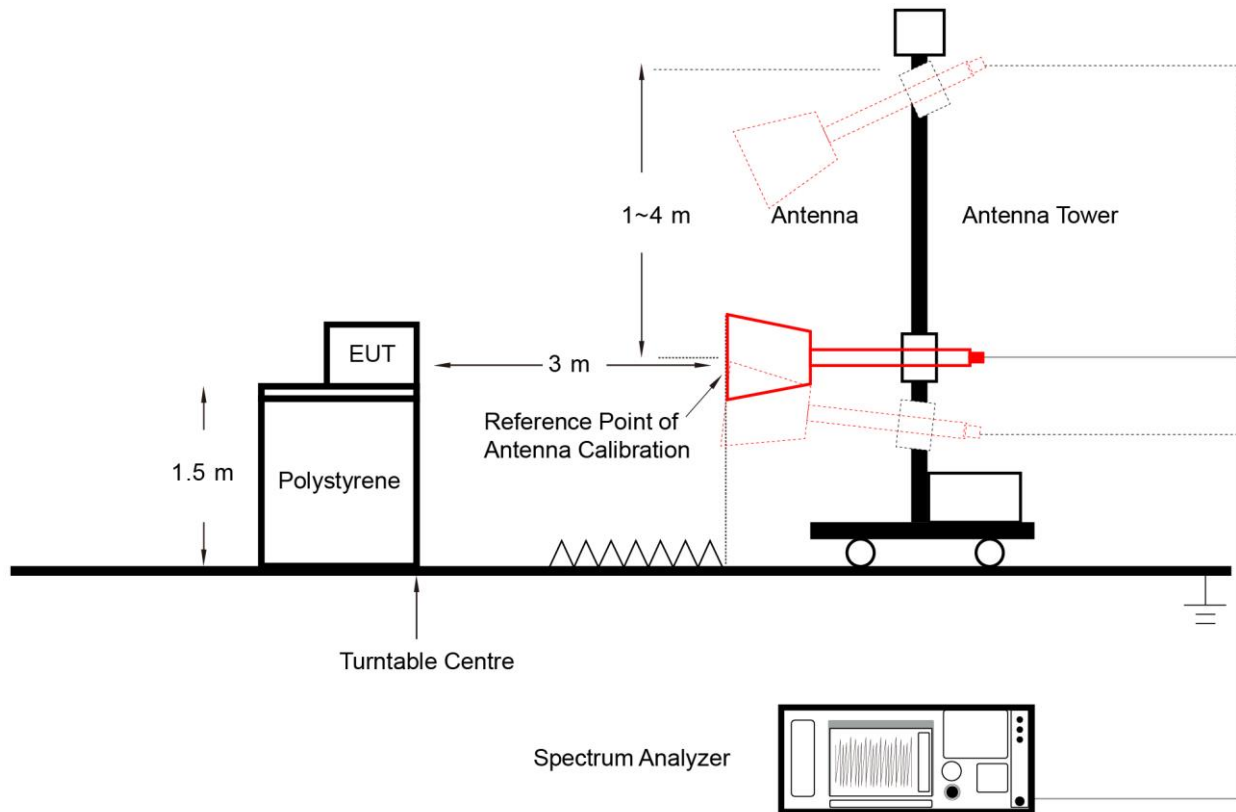
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Refer to Appendix A.6.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	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	(²)
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.7.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 11.13

6.7.3. Test Setting

Peak Field Strength Measurements

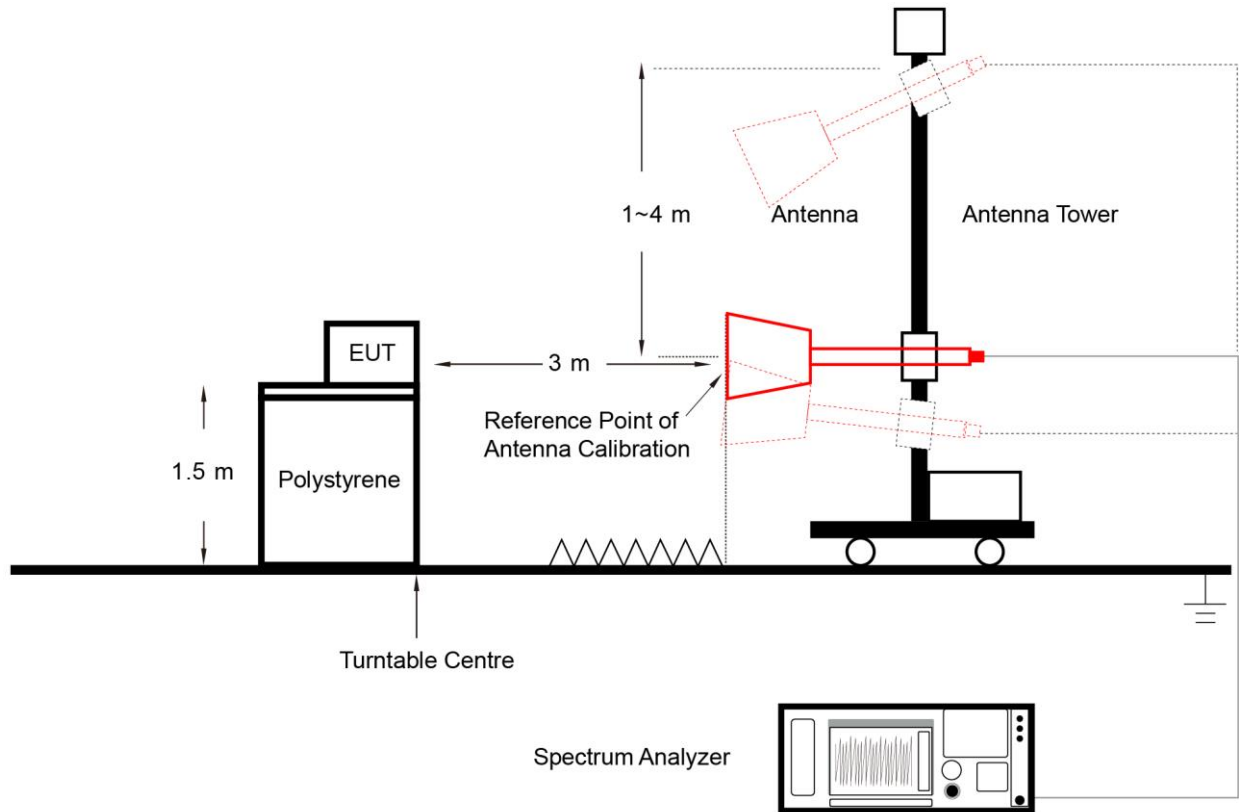
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW $\geq 1/T$
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak

6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

6.7.4. Test Setup



6.7.5. Test Result

Refer to Appendix A.7.

6.8. AC Conducted Emissions Measurement

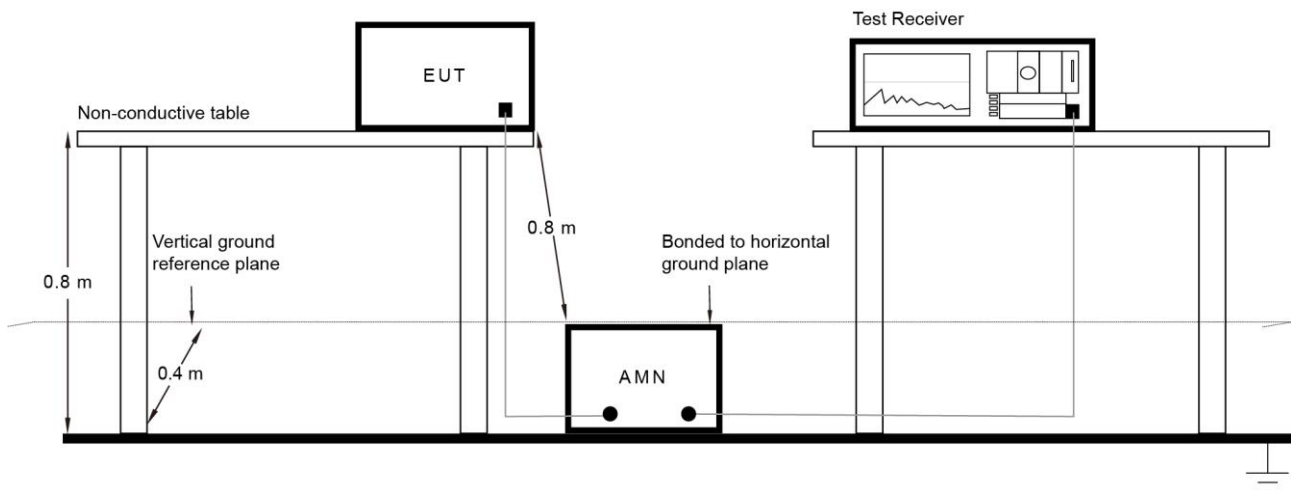
6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.8.2. Test Setup



6.8.3. Test Result

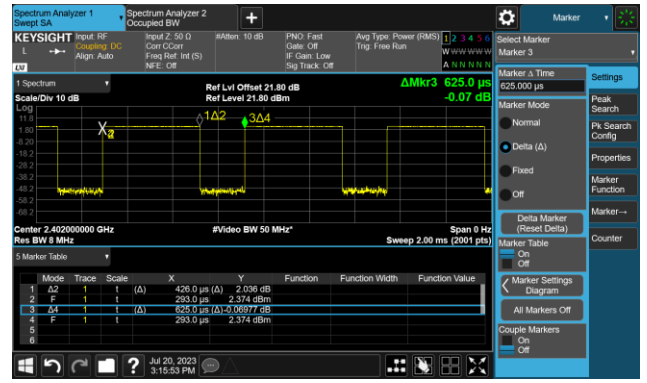

Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

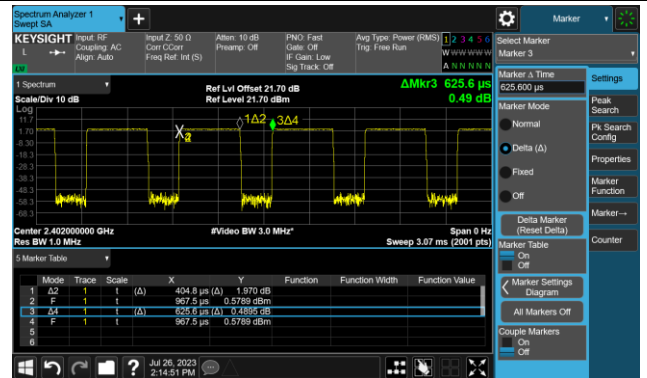
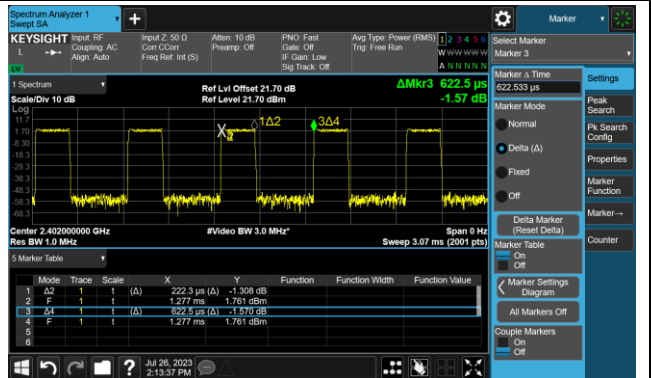
Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-20	Remark	GR5515

Test Mode	Duty Cycle
BLE-1Mbps	68.16%
BLE-2Mbps	39.52%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 426.0 μ s)	BLE-2Mbps (T = 247.0 μ s)

Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-26	Remark	MHCB05P-B

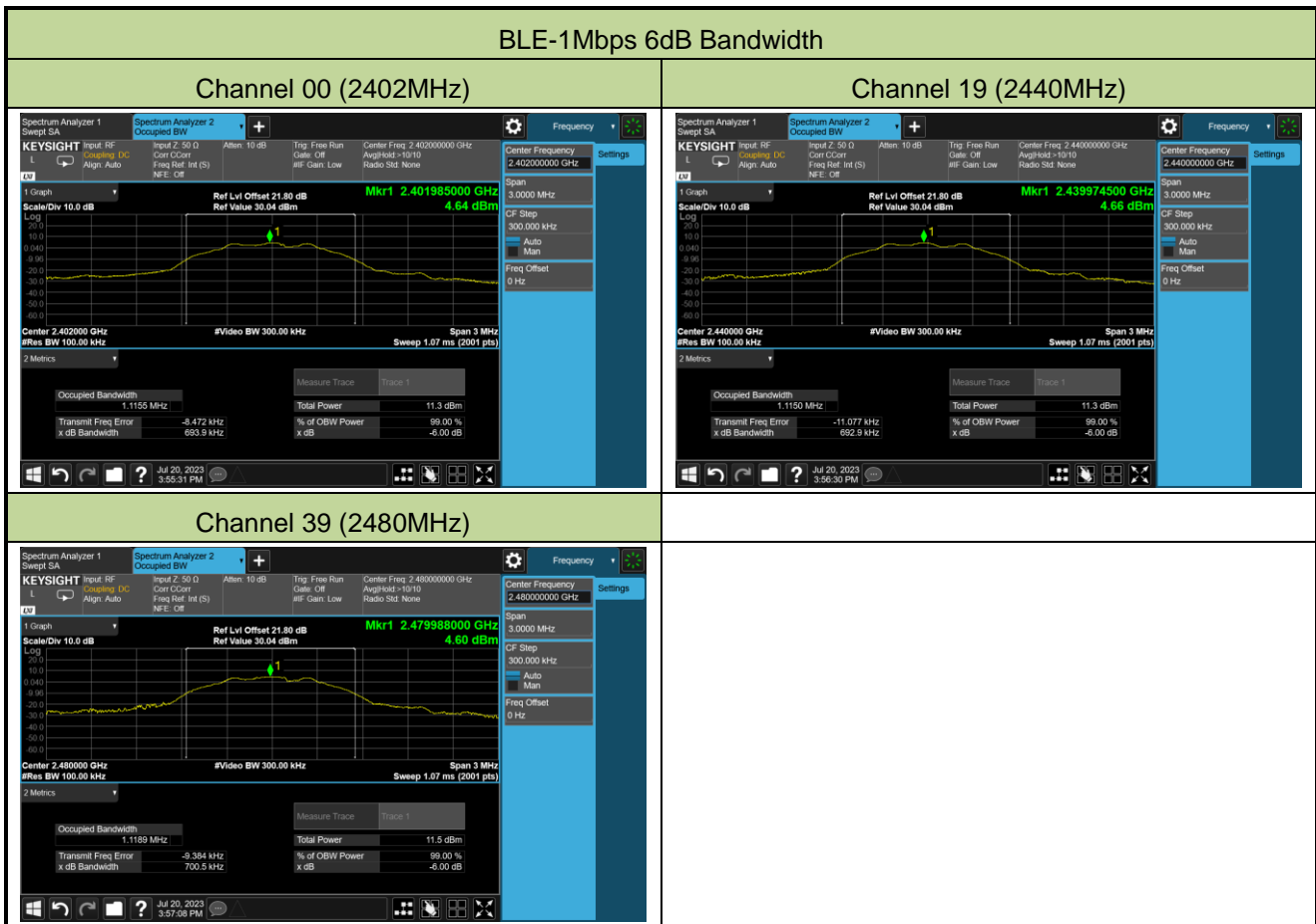
Test Mode	Duty Cycle
BLE-1Mbps	64.71%
BLE-2Mbps	35.71%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 404.8 μ s)	BLE-2Mbps (T = 222.3 μ s)

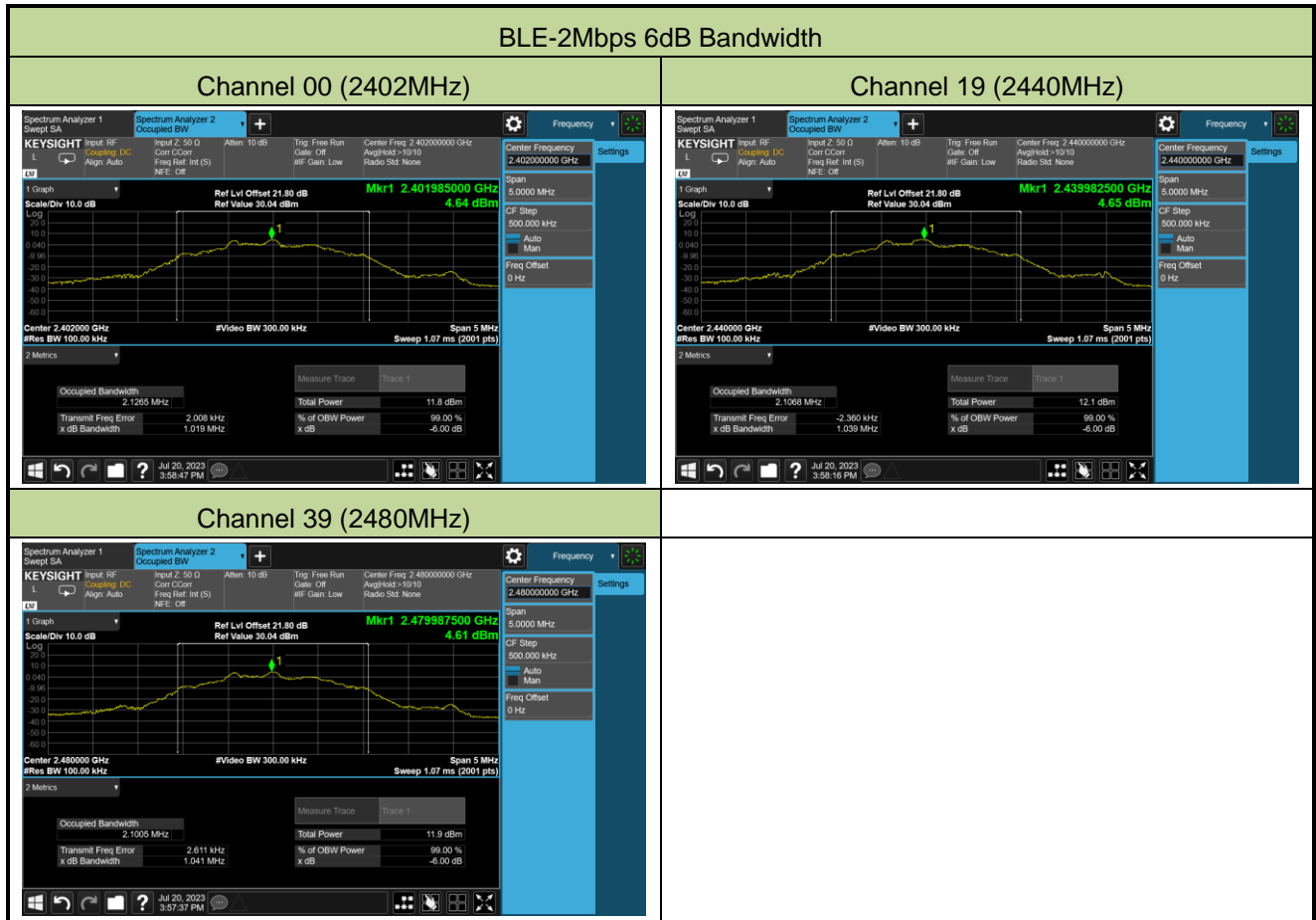



A.2 6dB Bandwidth Test Result

Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-20	Remark	GR5515

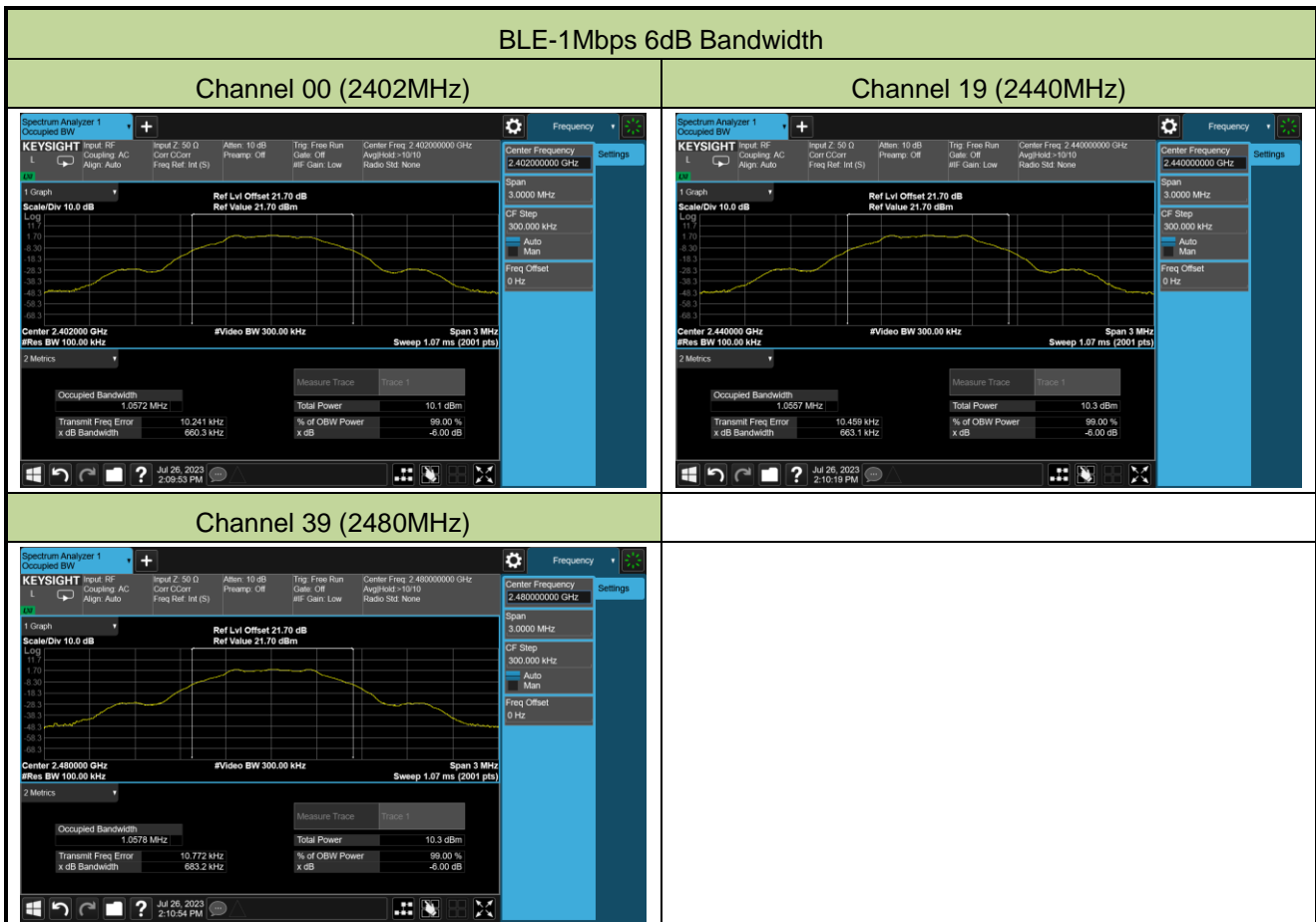
Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6939	≥ 0.5
BLE	1Mbps	19	2440	0.6929	≥ 0.5
BLE	1Mbps	39	2480	0.7005	≥ 0.5
BLE	2Mbps	00	2402	1.019	≥ 0.5
BLE	2Mbps	19	2440	1.039	≥ 0.5
BLE	2Mbps	39	2480	1.041	≥ 0.5

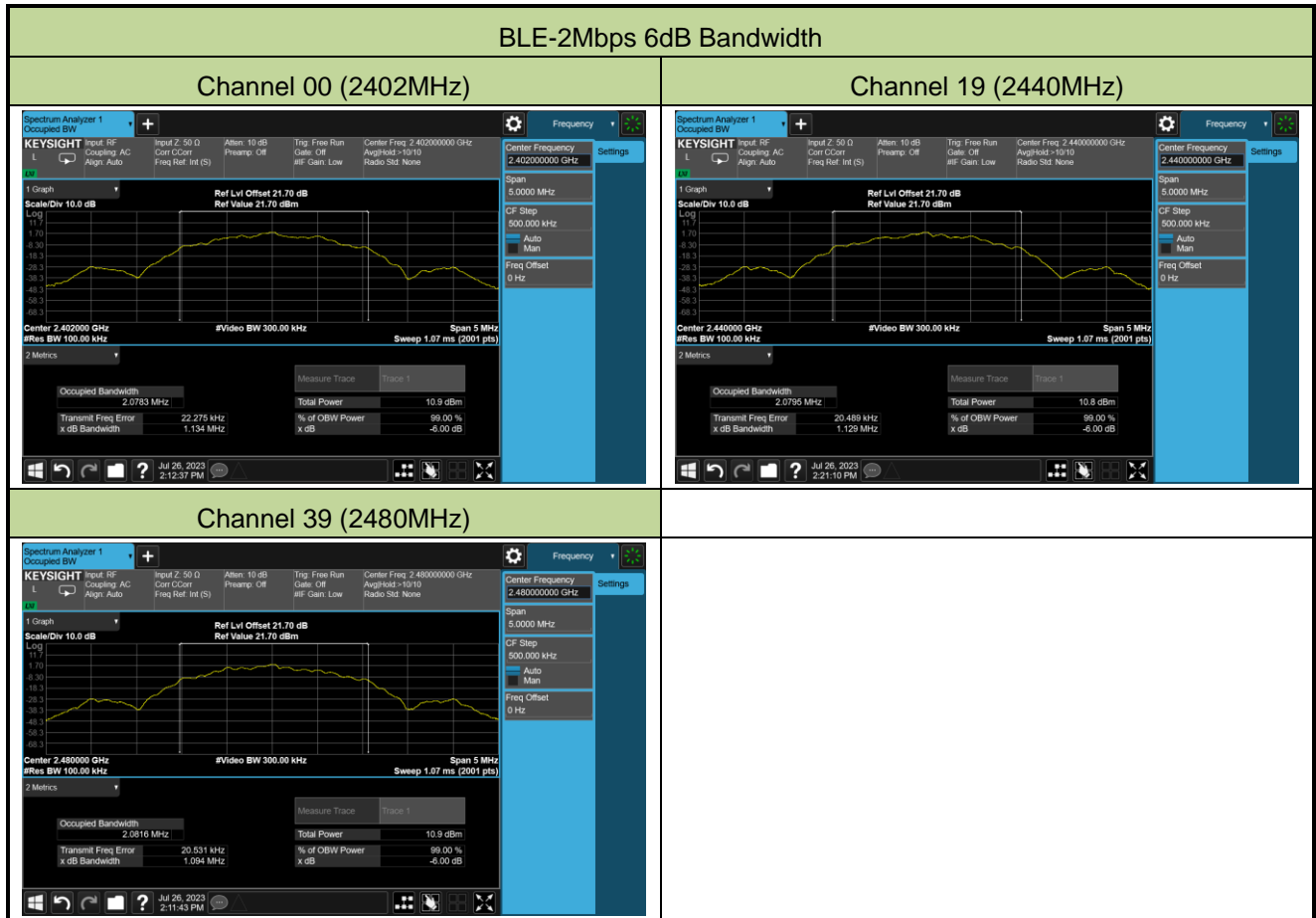




Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-26	Remark	MHCB05P-B

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6603	≥ 0.5
BLE	1Mbps	19	2440	0.6631	≥ 0.5
BLE	1Mbps	39	2480	0.6832	≥ 0.5
BLE	2Mbps	00	2402	1.134	≥ 0.5
BLE	2Mbps	19	2440	1.129	≥ 0.5
BLE	2Mbps	39	2480	1.094	≥ 0.5





A.3 Output Power Test Result

Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-08-07	Remark	GR5515

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	3.68	≤ 30.00	Pass
BLE	1Mbps	19	2440	3.53	≤ 30.00	Pass
BLE	1Mbps	39	2480	3.71	≤ 30.00	Pass
BLE	2Mbps	00	2402	2.13	≤ 30.00	Pass
BLE	2Mbps	19	2440	2.17	≤ 30.00	Pass
BLE	2Mbps	39	2480	1.59	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	2.31	≤ 30.00	Pass
BLE	1Mbps	19	2440	2.26	≤ 30.00	Pass
BLE	1Mbps	39	2480	2.25	≤ 30.00	Pass
BLE	2Mbps	00	2402	0.25	≤ 30.00	Pass
BLE	2Mbps	19	2440	0.12	≤ 30.00	Pass
BLE	2Mbps	39	2480	-0.70	≤ 30.00	Pass

Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-20	Remark	MHCB05P-B

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	4.31	≤ 30.00	Pass
BLE	1Mbps	19	2440	4.25	≤ 30.00	Pass
BLE	1Mbps	39	2480	4.16	≤ 30.00	Pass
BLE	2Mbps	00	2402	4.29	≤ 30.00	Pass
BLE	2Mbps	19	2440	4.23	≤ 30.00	Pass
BLE	2Mbps	39	2480	4.13	≤ 30.00	Pass

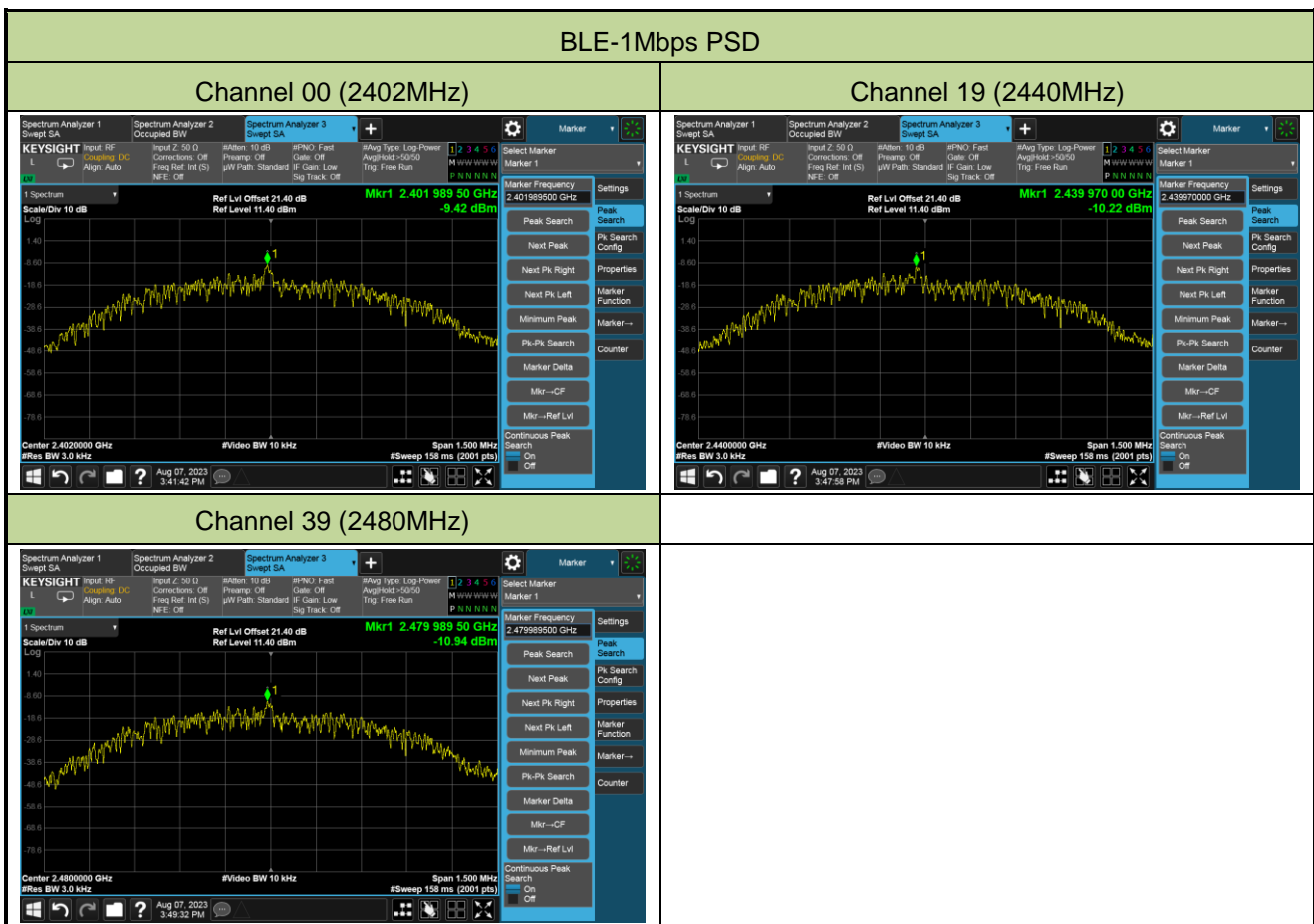
Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	3.38	≤ 30.00	Pass
BLE	1Mbps	19	2440	3.33	≤ 30.00	Pass
BLE	1Mbps	39	2480	3.24	≤ 30.00	Pass
BLE	2Mbps	00	2402	3.38	≤ 30.00	Pass
BLE	2Mbps	19	2440	3.33	≤ 30.00	Pass
BLE	2Mbps	39	2480	3.23	≤ 30.00	Pass

A.4 Power Spectral Density Test Result

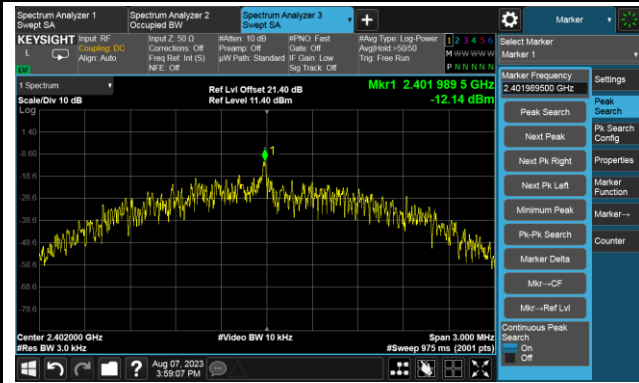
Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-08-07	Remark	GR5515

Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-9.42	≤ 8.00	Pass
BLE	1Mbps	19	2440	-10.22	≤ 8.00	Pass
BLE	1Mbps	39	2480	-10.94	≤ 8.00	Pass
BLE	2Mbps	00	2402	-12.14	≤ 8.00	Pass
BLE	2Mbps	19	2440	-14.84	≤ 8.00	Pass
BLE	2Mbps	39	2480	-12.77	≤ 8.00	Pass

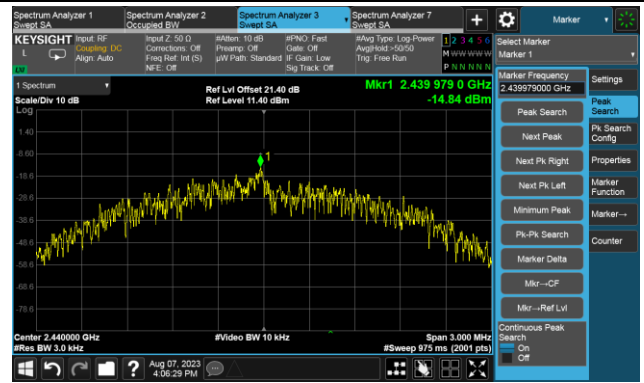


BLE-2Mbps PSD

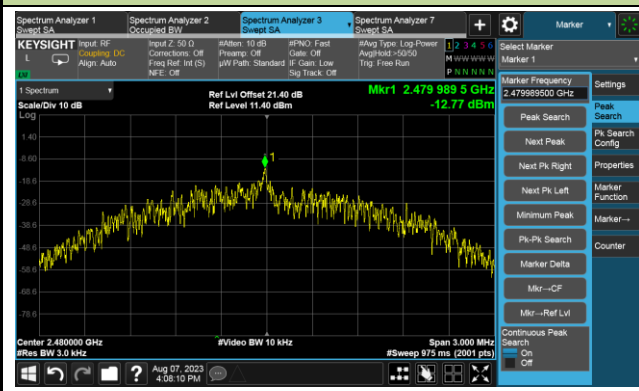
Channel 00 (2402MHz)



Channel 19 (2440MHz)

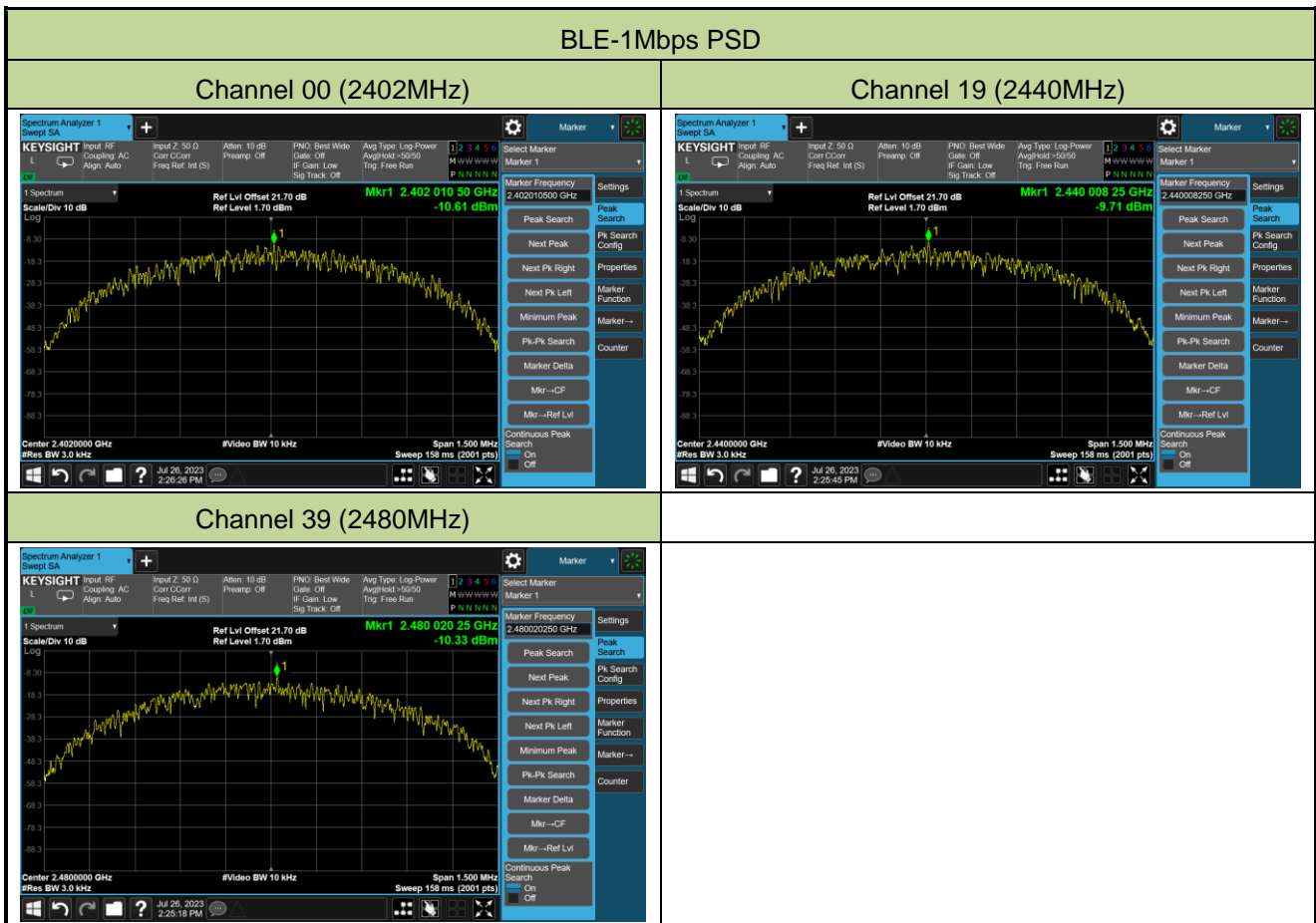


Channel 39 (2480MHz)



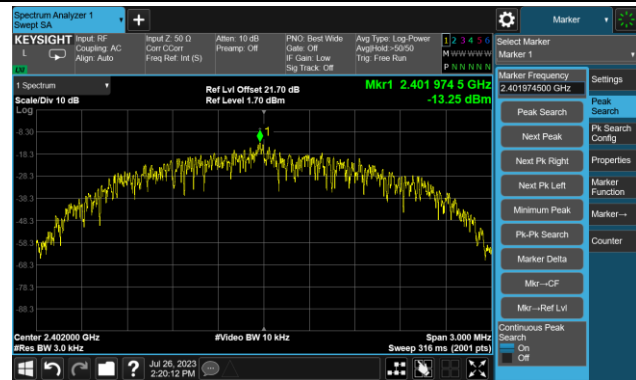
Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-26	Remark	MHCB05P-B

Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-10.61	≤ 8.00	Pass
BLE	1Mbps	19	2440	-9.71	≤ 8.00	Pass
BLE	1Mbps	39	2480	-10.33	≤ 8.00	Pass
BLE	2Mbps	00	2402	-13.25	≤ 8.00	Pass
BLE	2Mbps	19	2440	-13.12	≤ 8.00	Pass
BLE	2Mbps	39	2480	-13.13	≤ 8.00	Pass

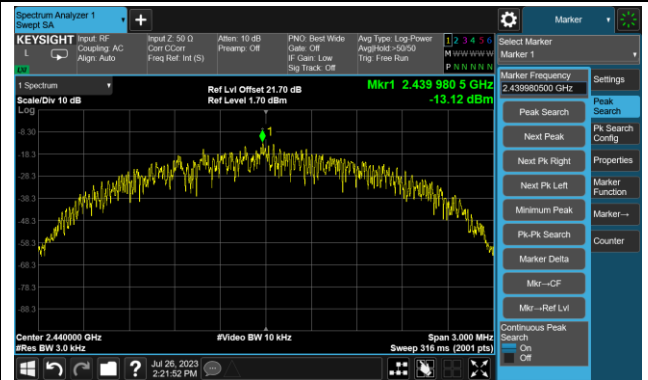


BLE-2Mbps PSD

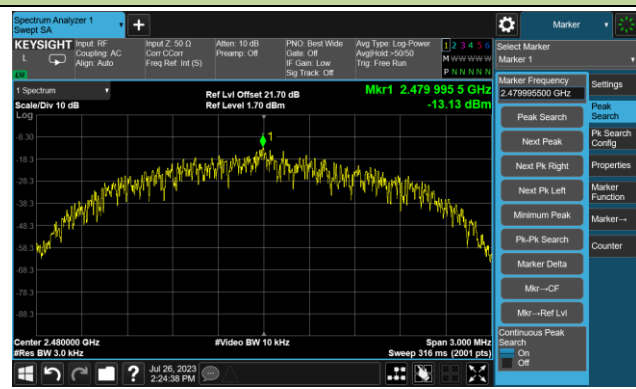
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-08-10	Remark	GR5515

Test Mode	Data Rate / Mbps	Channel No.	Frequency (MHz)	Limit (dBc)	Result
BLE	1	00	2402	20	Pass
BLE	1	19	2440	20	Pass
BLE	1	39	2480	20	Pass
BLE	2	00	2402	20	Pass
BLE	2	19	2440	20	Pass
BLE	2	39	2480	20	Pass

BLE-1Mbps Out-of-Band Emissions
Channel 00 (2402MHz)

100kHz PSD Reference Level	Low Band Edge
Spurious Emission 30MHz ~ 25GHz	

Channel 19 (2440MHz)

100kHz PSD Reference Level

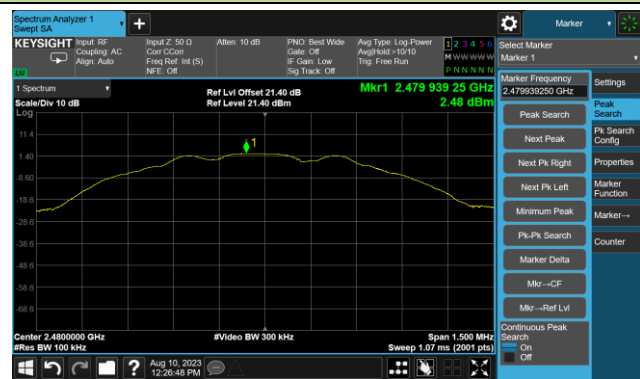


Spurious Emission 30MHz ~ 25GHz



Channel 39 (2480MHz)

100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



BLE-2Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

100kHz PSD Reference Level



Low Band Edge

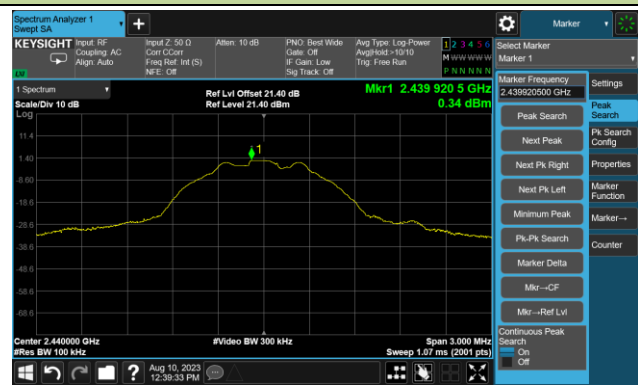


Spurious Emission 30MHz ~ 25GHz

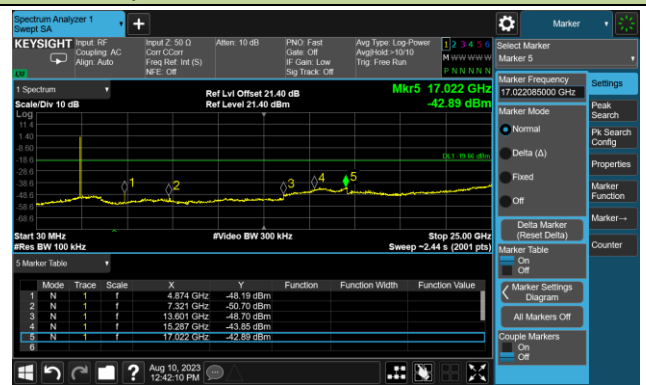


Channel 19 (2440MHz)

100kHz PSD Reference Level

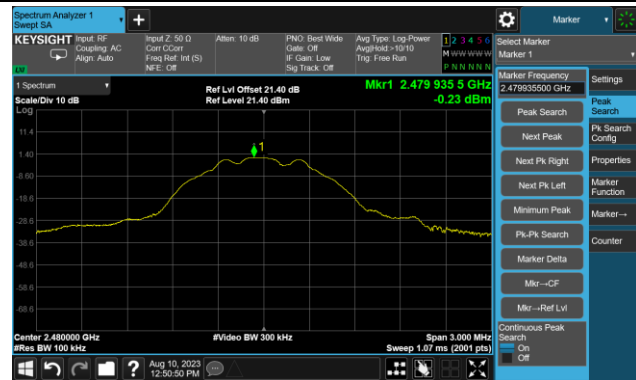


Spurious Emission 30MHz ~ 25GHz



Channel 39 (2480MHz)

100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



Test Site	SIP-TR2	Test Engineer	Alisa Deng
Test Date	2023-07-26	Remark	MHCB05P-B

Test Mode	Data Rate / Mbps	Channel No.	Frequency (MHz)	Limit (dBc)	Result
BLE	1	00	2402	20	Pass
BLE	1	19	2440	20	Pass
BLE	1	39	2480	20	Pass
BLE	2	00	2402	20	Pass
BLE	2	19	2440	20	Pass
BLE	2	39	2480	20	Pass

BLE-1Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

100kHz PSD Reference Level

Marker Frequency: 2.40201050 GHz
Mkr1 2.402 010 50 GHz
3.39 dBm

Low Band Edge

Marker Frequency: 2.39998000 GHz
Mkr2 2.399 980 GHz
-53.38 dBm

Spurious Emission 30MHz ~ 25GHz

Marker Frequency: 12.84940000 GHz
Mkr3 12.850 GHz
-53.05 dBm

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	6.987 GHz	-52.94 dBm			
2	N	1	8.975 GHz	-54.50 dBm			
3	N	1	12.850 GHz	-53.05 dBm			

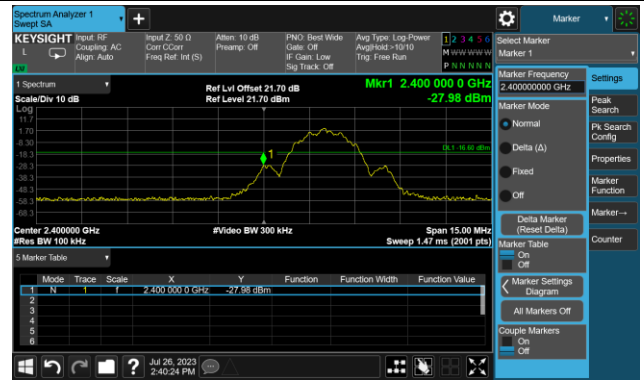
BLE-2Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

100kHz PSD Reference Level



Low Band Edge



Spurious Emission 30MHz ~ 25GHz



Channel 19 (2440MHz)

100kHz PSD Reference Level



Spurious Emission 30MHz ~ 25GHz

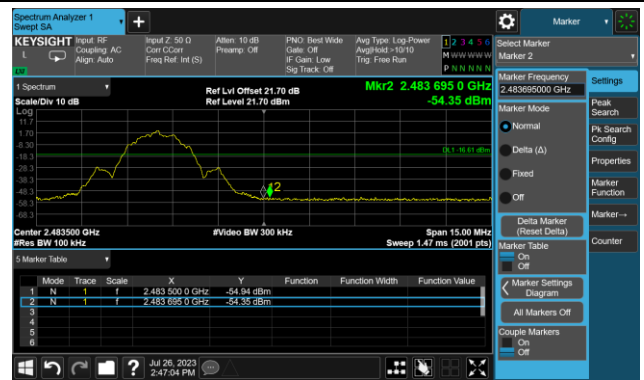


Channel 39 (2480MHz)

100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



A.6 Radiated Spurious Emission Test Result
GR5515:

Test Site	SIP-AC2	Test Engineer	Arvin Ding
Test Date	2023-07-29	Test Mode:	BLE-1Mbps
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
00	4808.0	50.4	-6.3	44.1	74.0	-29.9	Peak	Horizontal
	8191.0	42.6	2.9	45.5	74.0	-28.5	Peak	Horizontal
	12007.5	44.9	7.2	52.1	74.0	-21.9	Peak	Horizontal
	12007.5	45.2	7.2	52.4	54.0	-1.6	Average	Horizontal
	4799.5	49.7	-6.0	43.7	74.0	-30.3	Peak	Vertical
	12007.5	49.0	7.2	56.2	74.0	-17.8	Peak	Vertical
	12007.5	43.9	7.2	51.1	54.0	-2.9	Average	Vertical
	15569.0	36.6	9.9	46.5	74.0	-27.5	Peak	Vertical
19	4884.5	54.3	-6.0	48.3	74.0	-25.7	Peak	Horizontal
	7315.5	49.2	1.5	50.7	74.0	-23.3	Peak	Horizontal
	12194.5	43.7	7.2	50.9	74.0	-23.1	Peak	Horizontal
	4876.0	55.2	-6.1	49.1	74.0	-24.9	Peak	Vertical
	7315.5	52.7	1.5	54.2	74.0	-19.8	Peak	Vertical
	7315.5	48.6	1.5	50.1	54.0	-3.9	Average	Vertical
	12194.5	45.6	7.2	52.8	74.0	-21.2	Peak	Vertical
	12194.5	41.7	7.2	48.9	54.0	-5.1	Average	Vertical
39	7443.0	49.4	2.2	51.6	74.0	-22.4	Peak	Horizontal
	7443.0	46.2	2.2	48.4	54.0	-5.6	Average	Horizontal
	12398.5	50.4	7.2	57.6	74.0	-16.4	Peak	Horizontal
	12398.5	46.4	7.2	53.6	54.0	-0.4	Average	Horizontal
	15560.5	35.7	9.9	45.6	74.0	-28.4	Peak	Horizontal
	7443.0	52.6	2.2	54.8	74.0	-19.2	Peak	Vertical
	7443.0	49.4	2.2	51.6	54.0	-2.4	Average	Vertical
	12398.5	49.1	7.2	56.3	74.0	-17.7	Peak	Vertical
	12398.5	46.2	7.2	53.4	54.0	-0.6	Average	Vertical
	15620.0	37.5	10.1	47.6	74.0	-26.4	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

$\text{Factor (dB/m)} = \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)} - \text{Pre_Amplifier Gain (dB)}$
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