RF MEASUREMENT REPORT

FCC ID:	Q9DAPINR605
Applicant:	Hewlett Packard Enterprise Company
Product:	ACCESS POINT
Model No.:	APINR605
Trademark:	aruba a Hewlett Packard Enterprise company / Hewlett Packard Enterprise
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Result:	Complies
Received Date:	2022-09-30
Test Date:	2022-10-26 ~ 2023-05-16

Reviewed By: Jame Yuan

Approved By: Robin Wu

ilac-MRA

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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
2209RSU069-U1	Rev. 01	Initial Report	2023-05-17	Valid

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1. General Information

1.1. Applicant

Hewlett Packard Enterprise Company

6280 America Center Drive, San Jose CA 95002, United States

1.2. Manufacturer

Hewlett Packard Enterprise Company

6280 America Center Drive, San Jose CA 95002, United States

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐R-20025 ☐G-20034 ☐C-20020 ☐T-20020 ☐R-20141 ☐G-20134 ☐C-20103 ☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
☐	**Test Site – MRT Taiwan Laboratory**
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	ACCESS POINT
Model No.	APINR605
Serial No.	CNP6L8M02S (Conducted Testing) CNP6L8M00G (Radiated Testing)
Software Version	RAJB-AB05 V1.6.2
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	v5.0 single mode, BLE only
Zigbee Specification	802.15.4
Antenna Information	Refer to section 1.5
Operating Environment	Indoor Use
Operating Temperature	0 ~ 40 °C
Power Type	AC/DC Adapter input
Accessories	
AC/DC Adapter	Model: ADP-50GR BD Input: 100 ~ 240V 1.3A 50 – 60Hz Output: 48V 1.042A 50.016W
Optional Integrated Modular	Modular Name: LTE-A Cat 12 M.2 Module Mode No.: APINCM12 Contain FCC ID: XMR201901EM12G Supported UTRA Band: 2, 4, 5 Supported E-UTRA Band: FDD Band: 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 66, TDD Band: 38, 41
Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

Frequency Range	2402 ~ 2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps & 2Mbps
Antenna Type	PIFA Antenna
Antenna Gain	5.1dBi

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. Description of Operating Paths

Filter	Specification	Remark
Wi-Fi		
Filter 1#	Band Pass Filter (2412-2472)	Allowing any transmission on all channels
Filter 2#	Band Pass Filter (2402-2447)	Allowing any transmission on 20MHz channels 1 thru 6 and 40MHz channel 3.
Filter 3#	Band Pass Filter (2452-2472)	Allowing any transmission on 20MHz channel 11
Filter 4#	Band Pass Filter (5150-5895)	Allowing any transmission on all channels
Filter 5#	Band Pass Filter (5150-5835)	Allowing any transmission on UNII Band 1/2a/2c/3
Filter 6#	Band Pass Filter (5925-7125)	Allowing any transmission on UNII Band 5/6/7/8
Bluetooth / ZigBee		
Filter 7#	Band Pass Filter (2402-2480)	Allowing any transmission on all channels
Filter 8#	Band Pass Filter (2402-2430)	Allowing transmission on BLE channels 37 (2402MHz) and 38 (2426MHz) and Zigbee channel 11 (2405MHz)
Filter 9#	Band Pass Filter (2478-2482)	Allowing transmission on BLE channel 39 (2480MHz) and Zigbee channel 26(2480MHz)
Note: ZigBee and BLE can't work simultaneously.		

Working Mode

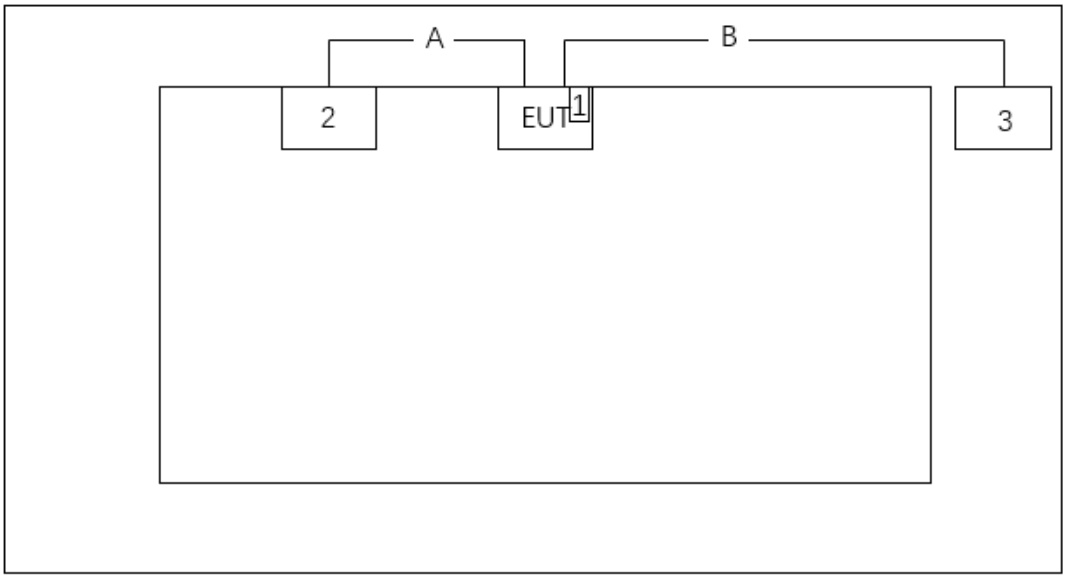
	Radio 0	Radio 1	BLE/ZigBee
1	2.4G_Full Band (Filter 1#)	6G_Full Band (Filter 6#)	---
2	---	6G_Full Band (Filter 6#)	2.4G_Full Band (Filter 7#)
3	2.4G_Low Band (Filter 2#)	6G_Full Band (Filter 6#)	2.4G_High Band (Filter 9#)
4	2.4G_High Band (Filter 3#)	6G_Full Band (Filter 6#)	2.4G_Low Band (Filter 8#)
5	5G_Full Band (Filter 4#)	2.4G_Full Band (Filter 1#)	---
6	5G_Full Band (Filter 4#)	---	2.4G_Full Band (Filter 7#)
7	5G_Full Band (Filter 4#)	2.4G_Low Band (Filter 2#)	2.4G_High Band (Filter 9#)
8	5G_Full Band (Filter 4#)	2.4G_High Band (Filter 3#)	2.4G_Low Band (Filter 8#)
9	5G_Full Band (Filter 5#)	6G_Full Band (Filter 6#)	2.4G_Full Band (Filter 1#)
10	5G_Full Band (Filter 5#)	6G_Full Band (Filter 6#)	2.4G_Full Band (Filter 1#)
11	5G_Full Band (Filter 5#)	6G_Full Band (Filter 6#)	2.4G_Full Band (Filter 1#)
12	5G_Full Band (Filter 5#)	6G_Full Band (Filter 6#)	2.4G_Full Band (Filter 1#)

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



Cable Type		Cable Spec.	Length
A	Power Cable	Non-Shielding	1.5m
B	Ethernet Cable	Non-Shielding, Cat 5e	>10.0m
Product		Manufacturer	Model No.
1	USB Flash Disk	SanDisk	N/A
2	AC Adapter	APD	WB-18Q12R
3	Notebook	Dell	Latitude 5491

2.3. Test Software

The test utility software used during testing was “telnet.exe” and command was provided by the manufacturer.

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
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2023-05-20	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2023-06-04	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2023-11-27	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC2
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2023-08-22	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2023-06-21	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2024-04-20	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2023-06-06	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2023-12-28	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2023-11-01	WZ-AC1
Signal Generator	Agilent	E4438C	MRTSUE06081	1 year	2024-02-29	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2023-06-06	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2023-06-04	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11073	1 year	2023-06-09	WZ
Attenuator	MVE	MVE2213	MRTSUE11074	1 year	2023-06-09	WZ
Attenuator	MVE	MVE2213	MRTSUE11086	1 year	2023-06-09	WZ
Attenuator	MVE	MVE2213	MRTSUE11087	1 year	2023-06-09	WZ

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
BenchVue Power Meter	2018.1	Power
Controller_MF 7802	2.03C	RE Antenna & Turntable
Controller_MF 7802	1.02	RE Antenna & Turntable

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
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
The maximum measurement uncertainty is evaluated as: Coaxial: 9kHz~30MHz: 2.59dB Coplanar: 9kHz~30MHz: 2.60dB Horizontal: 30MHz~200MHz: 3.85dB 200MHz~1GHz: 4.36dB 1GHz~40GHz: 4.98dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.28dB 1GHz~40GHz: 4.91dB
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:

1. 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.
2. All modes of operation and data rates were investigated. 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.

Test Items	Filter 7#	Filter 8#	Filter 9#
6dB Bandwidth	●		
Output Power	●	●	●
Power Spectral Density	●		
Band Edge / Out-of-Band Emissions	●	●	●
Radiated Spurious Emission	●	●	●
Radiated Band Edge	●	●	●
AC Conducted Emissions 150kHz - 30MHz	●		

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

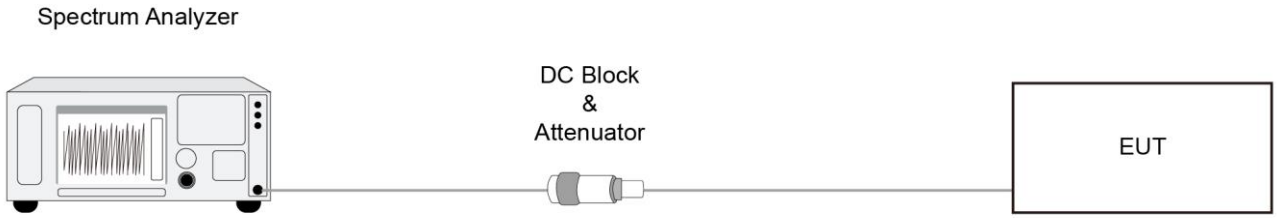
6.2.2. Test Procedure

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 ≥ 3 × 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

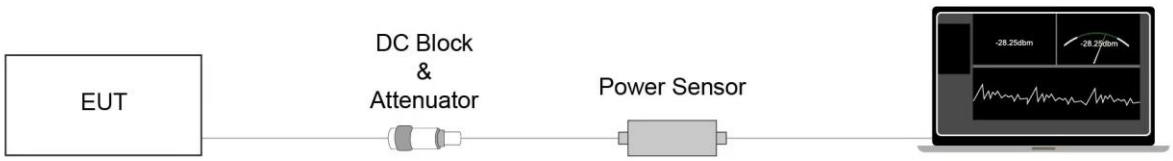
Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 50MHz)

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.

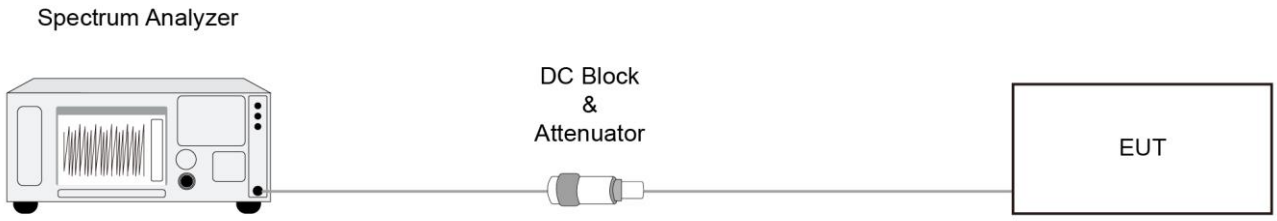
6.4.2. Test Procedure

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 30dB 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 Settitng

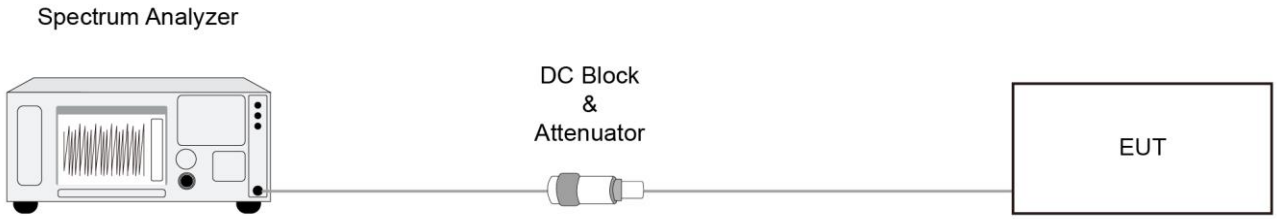
Reference level measurement

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 ≥ 3 x 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 ≥ 98%, set VBW = 10 Hz.

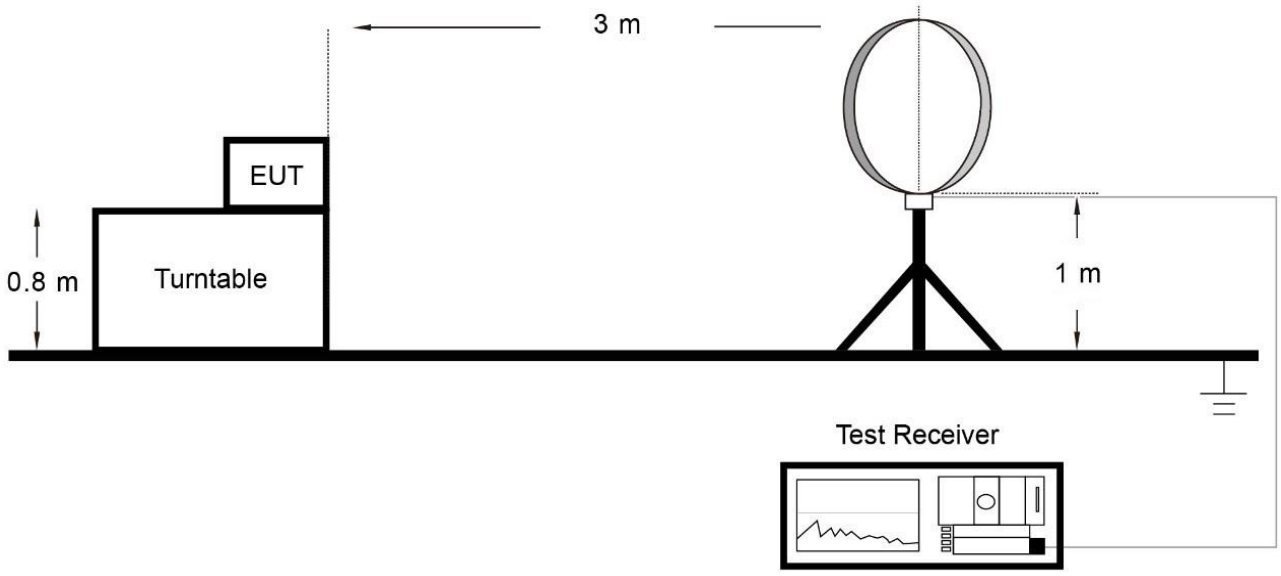
If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

BLE 1Mbps	VBW = 2700Hz	BLE 2Mbps	VBW = 5100Hz

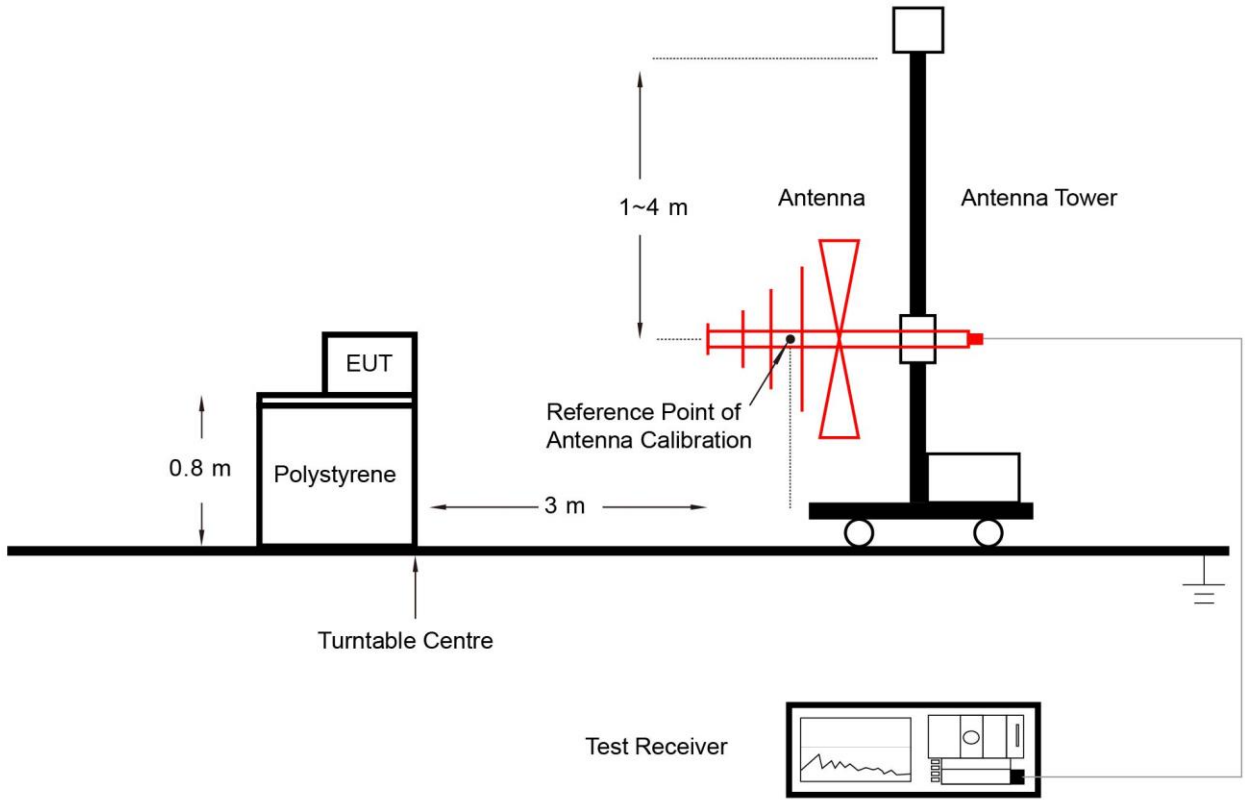
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

6.6.4. Test Setup

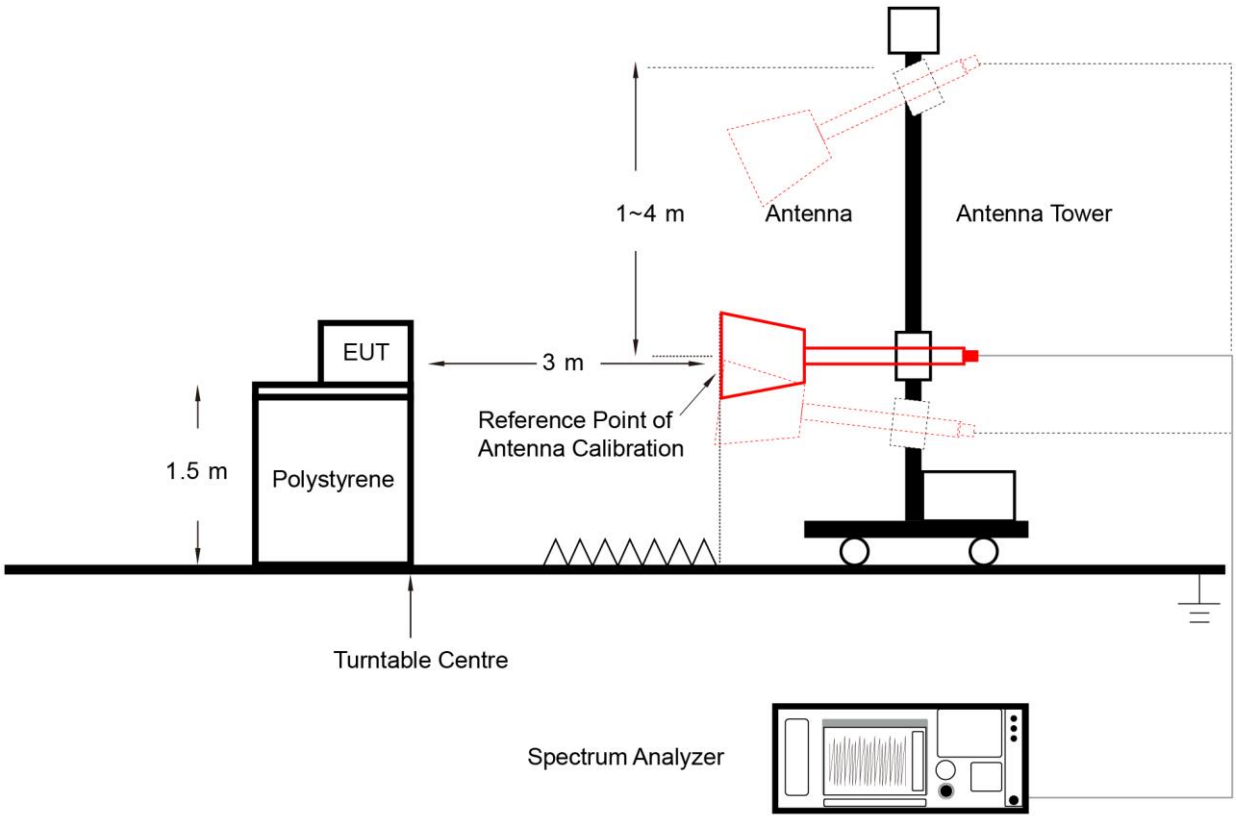
Below 30MHz Test Setup:



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

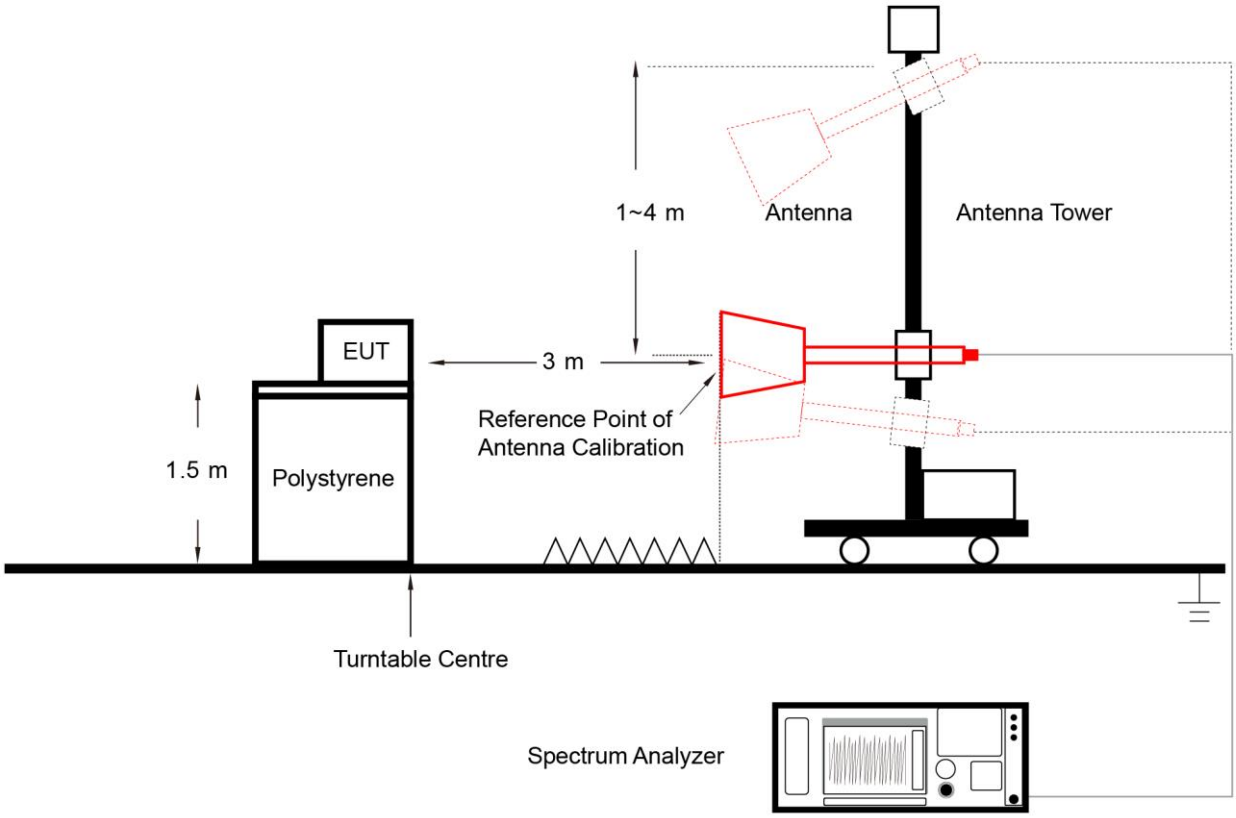
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T

BLE 1Mbps	VBW = 2700Hz	BLE 2Mbps	VBW = 5100Hz

4. Average Type = Voltage
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

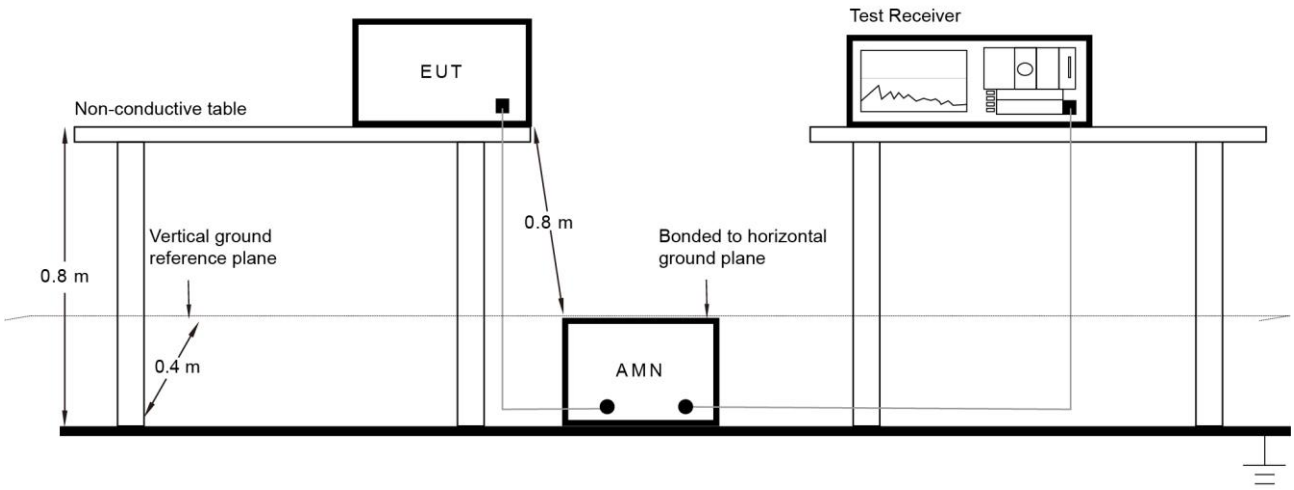
Refer to Appendix A.7.

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



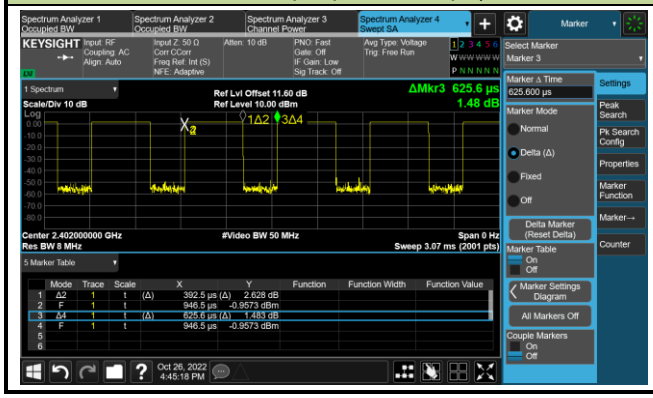
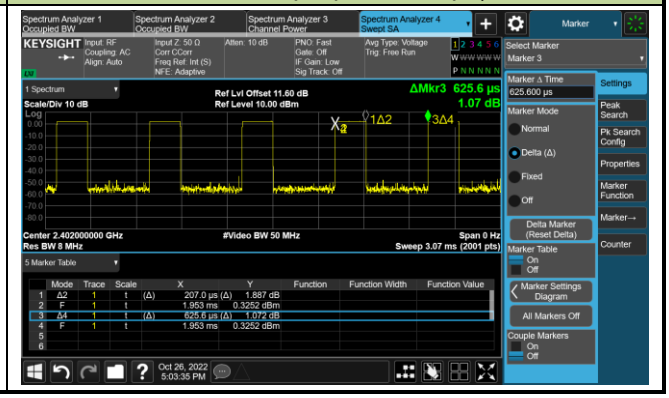
6.8.3. Test Result

Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2022-10-26		

Test Mode	Duty Cycle
BLE-1Mbps	62.74%
BLE-2Mbps	33.09%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 392.5μs)	BLE-2Mbps (T = 207.0μs)
	

A.2 6dB Bandwidth Test Result

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-06		

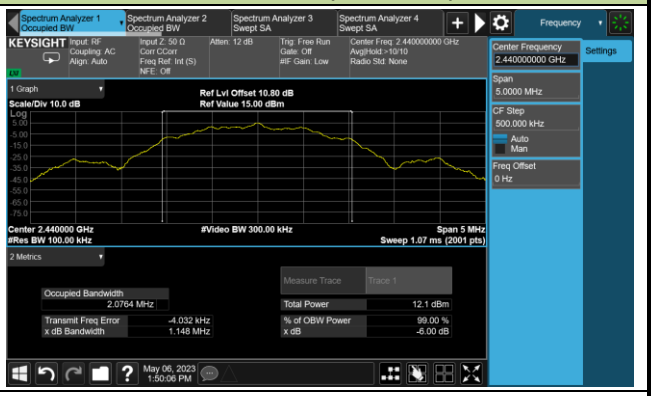
Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6996	≥ 0.5
BLE	1Mbps	19	2440	0.7053	≥ 0.5
BLE	1Mbps	39	2480	0.6983	≥ 0.5
BLE	2Mbps	00	2402	1.150	≥ 0.5
BLE	2Mbps	19	2440	1.148	≥ 0.5
BLE	2Mbps	39	2480	1.157	≥ 0.5

BLE-1Mbps 6dB Bandwidth

Channel 00 (2402MHz)

Channel 19 (2440MHz)

Channel 39 (2480MHz)

BLE-2Mbps 6dB Bandwidth	
Channel 00 (2402MHz)	Channel 19 (2440MHz)
	
Channel 39 (2480MHz)	

A.3 Output Power Test Result

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-04	Filter Configuration	Filter 7#

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	4.24	≤ 30.00	Pass
BLE	1Mbps	19	2440	5.04	≤ 30.00	Pass
BLE	1Mbps	39	2480	4.55	≤ 30.00	Pass
BLE	2Mbps	00	2402	4.25	≤ 30.00	Pass
BLE	2Mbps	19	2440	5.05	≤ 30.00	Pass
BLE	2Mbps	39	2480	4.56	≤ 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	4.08	≤ 30.00	Pass
BLE	1Mbps	19	2440	4.94	≤ 30.00	Pass
BLE	1Mbps	39	2480	4.42	≤ 30.00	Pass
BLE	2Mbps	00	2402	4.09	≤ 30.00	Pass
BLE	2Mbps	19	2440	4.95	≤ 30.00	Pass
BLE	2Mbps	39	2480	4.43	≤ 30.00	Pass

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-04	Filter Configuration	Filter 8#

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	4.11	≤ 30.00	Pass
BLE	2Mbps	00	2402	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	3.98	≤ 30.00	Pass
BLE	2Mbps	00	2402	3.99	≤ 30.00	Pass

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-04	Filter Configuration	Filter 9#

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	39	2480	3.29	≤ 30.00	Pass
BLE	2Mbps	39	2480	3.32	≤ 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	39	2480	3.16	≤ 30.00	Pass
BLE	2Mbps	39	2480	3.17	≤ 30.00	Pass

A.4 Power Spectral Density Test Result

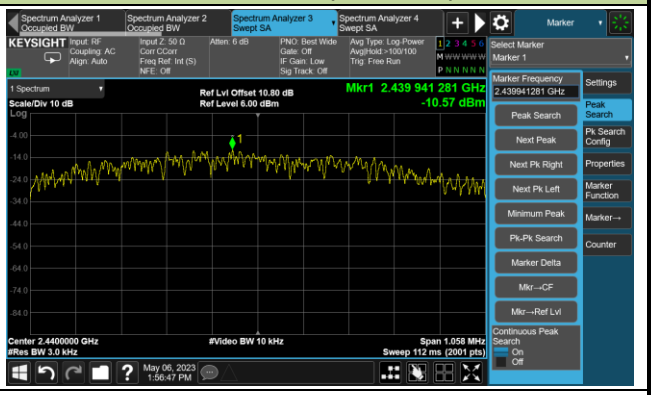
Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-06		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-11.16	≤ 8.00	Pass
BLE	1Mbps	19	2440	-10.57	≤ 8.00	Pass
BLE	1Mbps	39	2480	-10.99	≤ 8.00	Pass
BLE	2Mbps	00	2402	-13.22	≤ 8.00	Pass
BLE	2Mbps	19	2440	-12.79	≤ 8.00	Pass
BLE	2Mbps	39	2480	-13.27	≤ 8.00	Pass

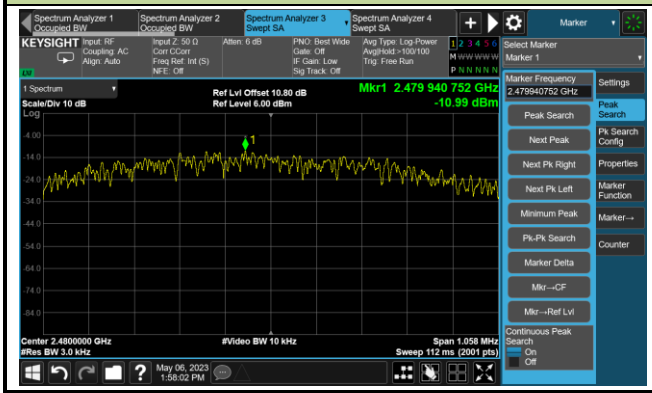
BLE-1Mbps PSD

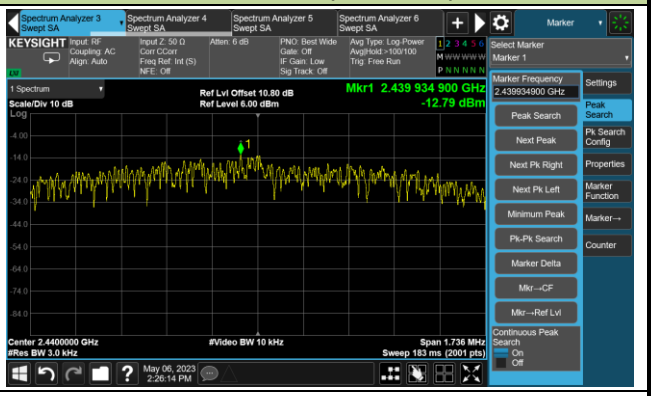
Channel 00 (2402MHz)

Channel 19 (2440MHz)



Channel 39 (2480MHz)



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	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-06	Filter Configuration	Filter 7#

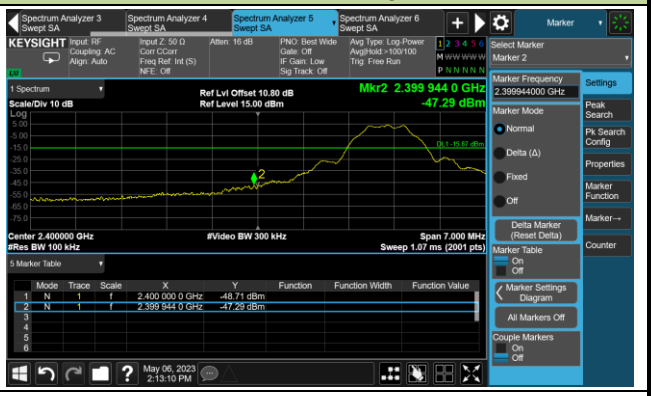
Test Mode	Data Rate / Mbps	Channel No.	Frequency (MHz)	Limit (dBc)	Result
BLE	1	00	2402	20	Pass
BLE	1	19	2440	20	Pass
BLE	1	39	2480	20	Pass
BLE	2	00	2402	20	Pass
BLE	2	19	2440	20	Pass
BLE	2	39	2480	20	Pass

BLE-1Mbps Out-of-Band Emissions

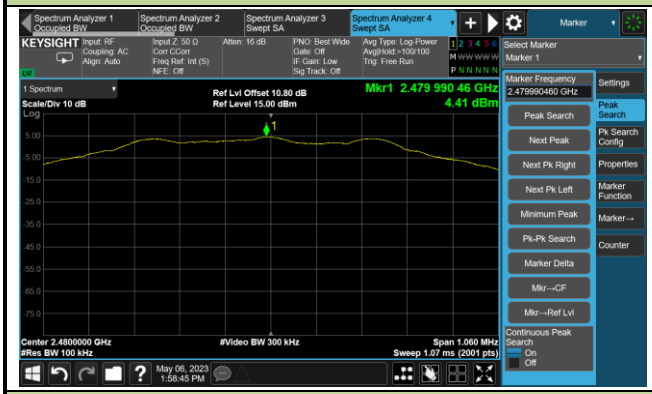
Channel 00 (2402MHz)

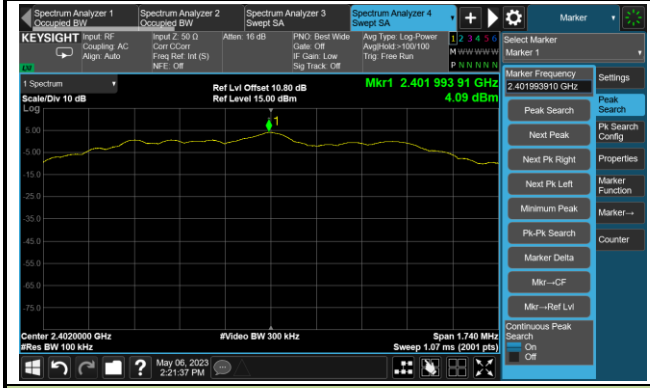
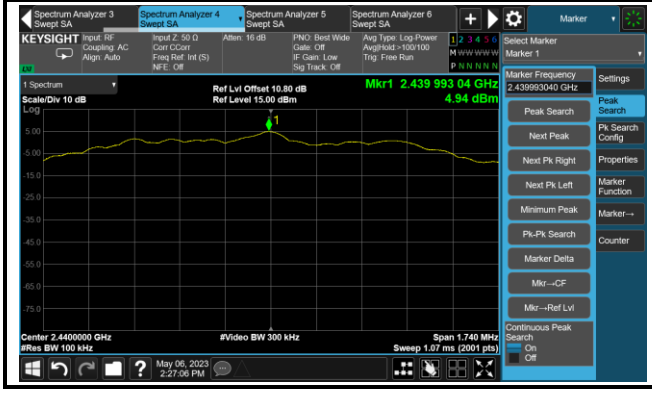
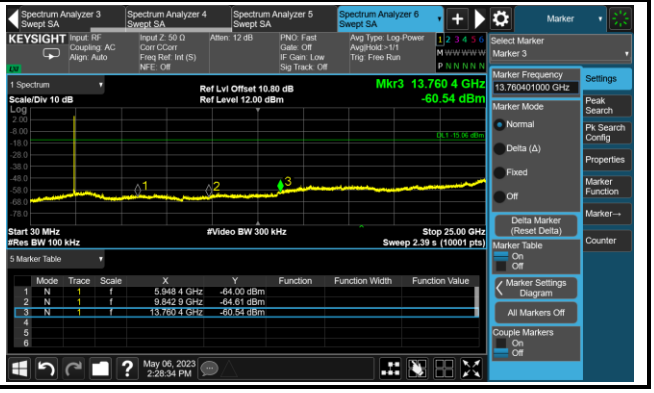
100kHz PSD Reference Level

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	

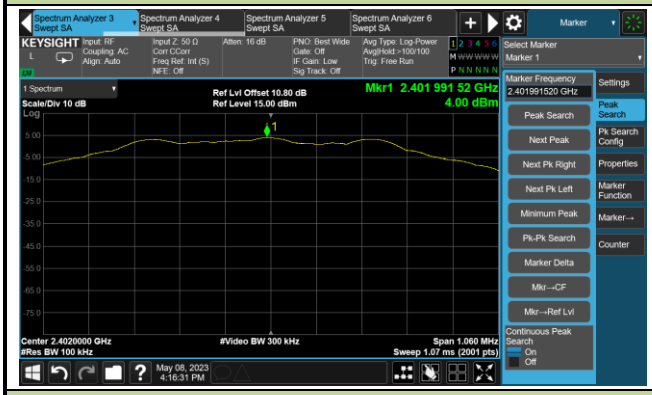
Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-08	Filter Configuration	Filter 8#

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

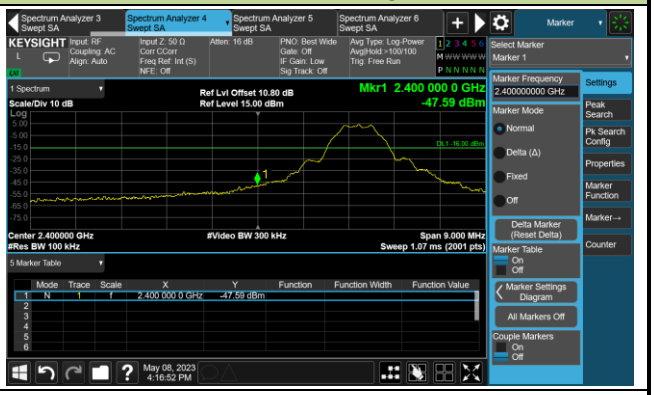
BLE - 1Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

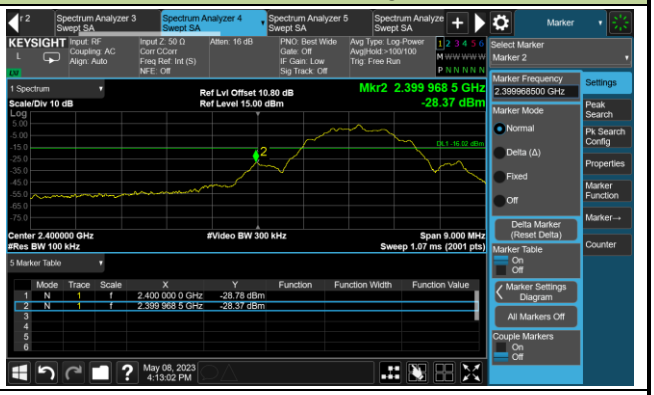
100kHz PSD Reference Level



Low 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	

Test Site	WZ-TR3	Test Engineer	Lynn Yang
Test Date	2023-05-08	Filter Configuration	Filter 9#

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

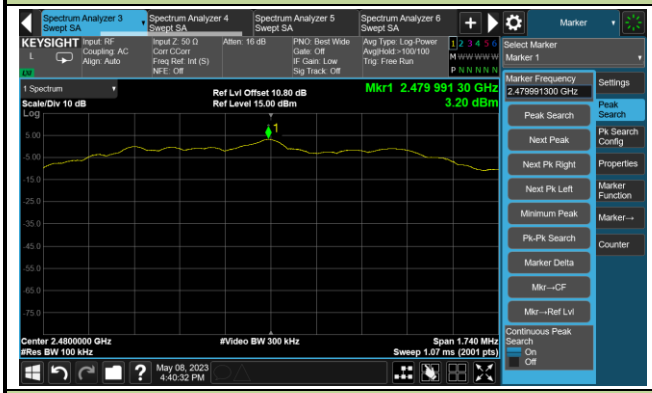
BLE-1Mbps Out-of-Band Emissions

Channel 39 (2480MHz)

100kHz PSD Reference Level

Low Band Edge

Spurious Emission 30MHz ~ 25GHz

BLE-2Mbps Out-of-Band Emissions	
Channel 39 (2480MHz)	
100kHz PSD Reference Level	Low Band Edge
	
Spurious Emission 30MHz ~ 25GHz	

A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-1Mbps
Filter Configuration	Filter 7#		
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	8148.5	37.3	8.7	46.0	74.0	-28.0	Peak	Horizontal
	9423.5	35.7	11.9	47.6	74.0	-26.4	Peak	Horizontal
	10987.5	35.6	13.6	49.2	74.0	-24.8	Peak	Horizontal
	7375.0	36.4	8.3	44.7	74.0	-29.3	Peak	Vertical
	9423.5	35.7	11.9	47.6	74.0	-26.4	Peak	Vertical
	11013.0	35.6	13.4	49.0	74.0	-25.0	Peak	Vertical
19	8267.5	37.3	8.4	45.7	74.0	-36.4	Peak	Horizontal
	9415.0	35.5	11.8	47.3	74.0	-34.4	Peak	Horizontal
	11106.5	35.8	13.1	48.9	74.0	-24.8	Peak	Horizontal
	9355.5	36.5	11.9	48.4	74.0	-36.8	Peak	Vertical
	10987.5	35.7	13.6	49.3	74.0	-33.4	Peak	Vertical
	11914.0	37.4	12.2	49.6	74.0	-25.0	Peak	Vertical
39	9457.5	36.1	11.8	47.9	74.0	-36.9	Peak	Horizontal
	10851.5	35.5	13.5	49.0	74.0	-29.4	Peak	Horizontal
	11565.5	36.7	12.7	49.4	74.0	-24.7	Peak	Horizontal
	9092.0	36.3	10.5	46.8	74.0	-35.7	Peak	Vertical
	11030.0	36.6	13.4	50.0	74.0	-29.8	Peak	Vertical
	11914.0	36.4	12.2	48.6	74.0	-25.4	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-2Mbps
Filter Configuration	Filter 7#		
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	8471.5	37.2	8.9	46.1	74.0	-27.9	Peak	Horizontal
	9160.0	35.5	11.2	46.7	74.0	-27.3	Peak	Horizontal
	11123.5	35.8	12.7	48.5	74.0	-25.5	Peak	Horizontal
	9440.5	35.3	11.8	47.1	74.0	-26.9	Peak	Vertical
	10902.5	36.1	13.4	49.5	74.0	-24.5	Peak	Vertical
	11489.0	35.2	13.2	48.4	74.0	-25.6	Peak	Vertical
19	8097.5	36.9	9.0	45.9	74.0	-28.1	Peak	Horizontal
	9440.5	35.1	11.8	46.9	74.0	-27.1	Peak	Horizontal
	11489.0	35.8	13.2	49.0	74.0	-25.0	Peak	Horizontal
	9117.5	36.6	11.0	47.6	74.0	-26.4	Peak	Vertical
	10987.5	35.2	13.6	48.8	74.0	-25.2	Peak	Vertical
	11514.5	35.8	13.0	48.8	74.0	-25.2	Peak	Vertical
39	8106.0	36.7	9.0	45.7	74.0	-28.3	Peak	Horizontal
	9389.5	35.8	12.0	47.8	74.0	-26.2	Peak	Horizontal
	11089.5	35.6	13.3	48.9	74.0	-25.1	Peak	Horizontal
	8089.0	37.0	8.9	45.9	74.0	-28.1	Peak	Vertical
	9423.5	35.8	11.9	47.7	74.0	-26.3	Peak	Vertical
	11293.5	36.4	12.7	49.1	74.0	-24.9	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-1Mbps
Filter Configuration	Filter 8#		
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	9466.0	35.5	11.8	47.3	74.0	-26.7	Peak	Horizontal
	10987.5	37.3	13.6	50.9	74.0	-23.1	Peak	Horizontal
	11599.5	36.3	12.8	49.1	74.0	-24.9	Peak	Horizontal
	8403.5	37.1	8.6	45.7	74.0	-28.3	Peak	Vertical
	9406.5	35.2	11.9	47.1	74.0	-26.9	Peak	Vertical
	11055.5	35.9	13.5	49.4	74.0	-24.6	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-2Mbps
Filter Configuration	Filter 8#		
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	8208.0	36.3	8.7	45.0	74.0	-29.0	Peak	Horizontal
	9457.5	35.5	11.8	47.3	74.0	-26.7	Peak	Horizontal
	10877.0	35.8	13.4	49.2	74.0	-24.8	Peak	Horizontal
	8454.5	36.3	8.9	45.2	74.0	-28.8	Peak	Vertical
	9398.0	35.8	12.0	47.8	74.0	-26.2	Peak	Vertical
	11174.5	36.5	12.8	49.3	74.0	-24.7	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-1Mbps
Filter Configuration	Filter 9#		
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
39	8318.5	36.9	8.4	45.3	74.0	-28.7	Peak	Horizontal
	9398.0	35.1	12.0	47.1	74.0	-26.9	Peak	Horizontal
	11395.5	36.0	13.0	49.0	74.0	-25.0	Peak	Horizontal
	8140.0	37.0	8.7	45.7	74.0	-28.3	Peak	Vertical
	9389.5	35.1	12.0	47.1	74.0	-26.9	Peak	Vertical
	11956.5	37.5	12.2	49.7	74.0	-24.3	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Charles Zhang
Test Date	2023-05-09	Test Mode	BLE-2Mbps
Filter Configuration	Filter 9#		
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
39	8157.0	36.5	8.7	45.2	74.0	-28.8	Peak	Horizontal
	9381.0	34.5	12.0	46.5	74.0	-27.5	Peak	Horizontal
	11523.0	36.1	12.9	49.0	74.0	-25.0	Peak	Horizontal
	9398.0	35.7	12.0	47.7	74.0	-26.3	Peak	Vertical
	10996.0	35.2	13.6	48.8	74.0	-25.2	Peak	Vertical
	11565.5	36.3	12.7	49.0	74.0	-25.0	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)