



**FCC 47 CFR PART 15 SUBPART C
CERTIFICATION TEST REPORT**

For

Wireless Moudle

MODEL NUMBER: VS0B9MW3565UE

PROJECT NUMBER: 4790751248

REPORT NUMBER: 4790751248-8

FCC ID: 2AL8S-0211C5L1

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Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	04/12/2023	Initial Issue	

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	7
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	<i>7</i>
4.2. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>7</i>
5. EQUIPMENT UNDER TEST	8
5.1. <i>DESCRIPTION OF EUT</i>	<i>8</i>
5.2. <i>MAXIMUM OUTPUT POWER.....</i>	<i>9</i>
5.3. <i>CHANNEL LIST</i>	<i>9</i>
5.4. <i>TEST CHANNEL CONFIGURATION.....</i>	<i>9</i>
5.5. <i>THE WORSE CASE POWER SETTING PARAMETER.....</i>	<i>9</i>
5.6. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	<i>10</i>
5.7. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>11</i>
5.8. <i>MEASURING INSTRUMENT AND SOFTWARE USED.....</i>	<i>12</i>
6. MEASUREMENT METHODS	13
7. ANTENNA PORT TEST RESULTS	14
7.1. <i>ON TIME AND DUTY CYCLE.....</i>	<i>14</i>
7.2. <i>6 dB BANDWIDTH.....</i>	<i>16</i>
7.3. <i>CONDUCTED OUTPUT POWER.....</i>	<i>21</i>
7.4. <i>POWER SPECTRAL DENSITY</i>	<i>26</i>
7.5. <i>CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS.....</i>	<i>31</i>
8. RADIATED TEST RESULTS.....	46
8.1. <i>LIMITS AND PROCEDURE</i>	<i>46</i>
8.2. <i>TEST ENVIRONMENT</i>	<i>52</i>
8.3. <i>RESTRICTED BANDEDGE.....</i>	<i>52</i>
8.4. <i>SPURIOUS EMISSIONS</i>	<i>61</i>
9. ANTENNA REQUIREMENTS.....	94

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: ZHEJIANG UNIVIEW TECHNOLOGIES CO., LTD
Address: 88 JIANGLING RD BINJIANG DISTRICT HANGZHOU ZHEJIANG
310051 CHINA

Manufacturer Information

Company Name: ZHEJIANG UNIVIEW TECHNOLOGIES CO., LTD
Address: 88 JIANGLING RD BINJIANG DISTRICT HANGZHOU ZHEJIANG
310051 CHINA

EUT Description

Product Name: Wireless Moudle
Model Name: VS0B9MW3565UE
Sample Number: 5811281
Data of Receipt Sample: Feb. 21, 2023
Test Date: Feb. 23, 2023~ Apr. 11, 2023

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS

Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	6dB Bandwidth	FCC 15.247 (a) (2)	PASS
2	Conducted Power	FCC 15.247 (b) (3)	PASS
3	Power Spectral Density	FCC 15.247 (e)	PASS
4	Conducted Band edge And Spurious emission	FCC 15.247 (d)	PASS
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	PASS
6	Conducted Emission Test for AC Power Port	FCC 15.207	N/A(Note2)
7	Antenna Requirement	FCC 15.203	PASS
<p>Note:</p> <p>1)The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied.</p> <p>2)This product is power supply by DC.</p>			

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, KDB 662911 D01 Multiple Transmitter Output v02r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p>A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.</p> <p>FCC (FCC Designation No.: CN1247) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</p> <p>IC (IC Designation No.: 25056; CAB No.: CN0073) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</p>
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Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.1dB
Radiation Emission test (include Fundamental emission) (9kHz-30MHz)	3.4dB
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	3.4dB
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	3.5dB (1GHz-18Gz)
	3.9dB (18GHz-26.5Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Wireless Moudle		
Model Name	VS0B9MW3565UE		
Product Description	Operation Frequency	2402 MHz ~ 2480 MHz	
	Modulation Type	Data Rate	
	GFSK	1Mbps, 2Mbps	
Test software of EUT:	WCN_Combo_Tool		
Antenna Type:	PIFA antenna		
Antenna Gain:	2.65 dBi		
	Note: This data is provided by customer and our lab isn't responsible for this data.		

5.2. MAXIMUM OUTPUT POWER

Bluetooth Mode	Frequency (MHz)	Channel Number	Max Output Power(dBm)
BLE-1M	2402-2480	0-39[40]	6.05
BLE-2M	2402-2480	0-39[40]	6.13

Remark: For this product can support both BLE-1M and BLE-2M modes.

5.3. CHANNEL LIST

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

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel		Frequency
GFSK	Low Channel	CH 0	2402MHz
	Middle Channel	CH 19	2440MHz
	High Channel	CH 39	2480MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		WCN_Combio_Tool		
Modulation Type	Transmit Antenna Number	Test Channel		
		LCH	MCH	HCH
GFSK(1M)	1	6	6	6
GFSK(2M)	1	6	6	6

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	PIFA antenna	2.65 dBi

Note: This data is provided by customer and our lab isn't responsible for this data.

Test Mode	Transmit and Receive Mode	Description
BLE-1M	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
BLE-2M	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E590	N/A

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	USB	100cm Length	N/A

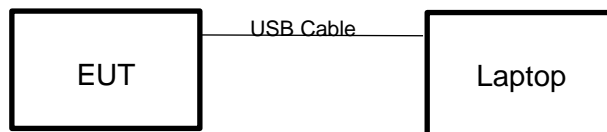
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in an engineer mode with a software through a table PC.

SETUP DIAGRAM FOR TESTS



5.8. MEASURING INSTRUMENT AND SOFTWARE USED

Radiated Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI test receiver	R&S	ESR7	222993	/	2022-05-20	2023-05-19
<input checked="" type="checkbox"/>	EMI test receiver	R&S	ESR26	126703	2021-12-04	2022-12-03	2023-12-02
<input checked="" type="checkbox"/>	Spectrum Analyzer	R&S	FSV3044	222992	/	2022-05-27	2023-05-26
<input checked="" type="checkbox"/>	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-15	2021-06-03	2024-06-02
<input checked="" type="checkbox"/>	Receiver Antenna (30MHz-1GHz)	Schwarzbeck	VULB 9163	126704	2019-01-28	2022-01-18	2025-01-17
<input checked="" type="checkbox"/>	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2018-01-29	2022-02-28	2025-02-27
<input checked="" type="checkbox"/>	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-01-05	2021-07-15	2024-07-14
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	Tonscnd	TAP01018050	224539	/	2022-10-20	2023-10-19
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	R&S	SCU-18D	134667	2021-12-05	2022-12-04	2023-12-03
<input checked="" type="checkbox"/>	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2021-12-05	2022-12-04	2023-12-03
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCGV12-2375-2400-2485-2510-40SS	1	2021-12-05	2022-12-04	2023-12-03
<input checked="" type="checkbox"/>	High Pass Filter	COM-MW	ZBF13-3-18G-01	2	2021-12-05	2022-12-04	2023-12-03
	Chamber A	Albatross	9*6*6	126721	2019-05-31	2022-05-30	2025-05-29
	Chamber B	SAEMC	9*6*6	220350	/	2022-07-03	2025-06-01
	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	183135	/	2022-07-20	2023-07-19
Software							
Used	Description	Manufacturer	Name	Version			
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance	JSTONSCEND	JS32-RE	Ver. 4.0.0.1			
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance	Chinese-EMC	RE_RSE	Ver. 3.03			
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9010B	155368	2022-04-09	2023-04-08	2024-04-07
<input checked="" type="checkbox"/>	Power Meter	MWT	MW100-RFCB	221694	2022-04-09	2023-04-08	2024-04-07
<input checked="" type="checkbox"/>	Attenuator	PASTERNAK	PE7087-6	1624	2022-04-09	2023-04-08	2024-04-07

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.1.1
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4 (Method PKPSD)
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.6
6	Band-edge	KDB 558074 D01 15.247 Meas Guidance v05r02	8.7
7	Conducted Emission Test for AC Power Port	ANSI C63.10-2013	6.2

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

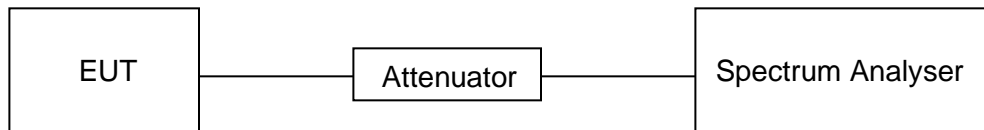
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2°C	Relative Humidity	52.5%
Atmosphere Pressure	102.1kpa	Test Voltage	DC 5V

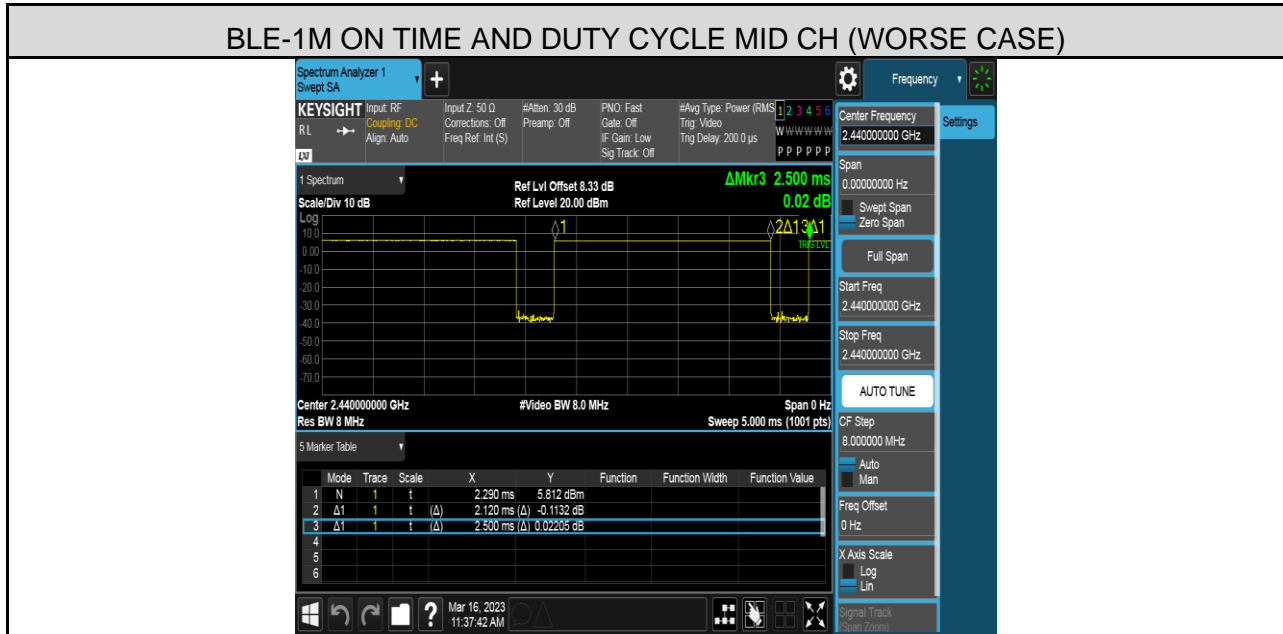
TEST RESULTS TABLE

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final VBW (kHz)
BLE-1M	2.12	2.50	0.85	85	0.71	0.47	1
BLE-2M	1.07	1.88	0.57	57	2.44	0.93	1

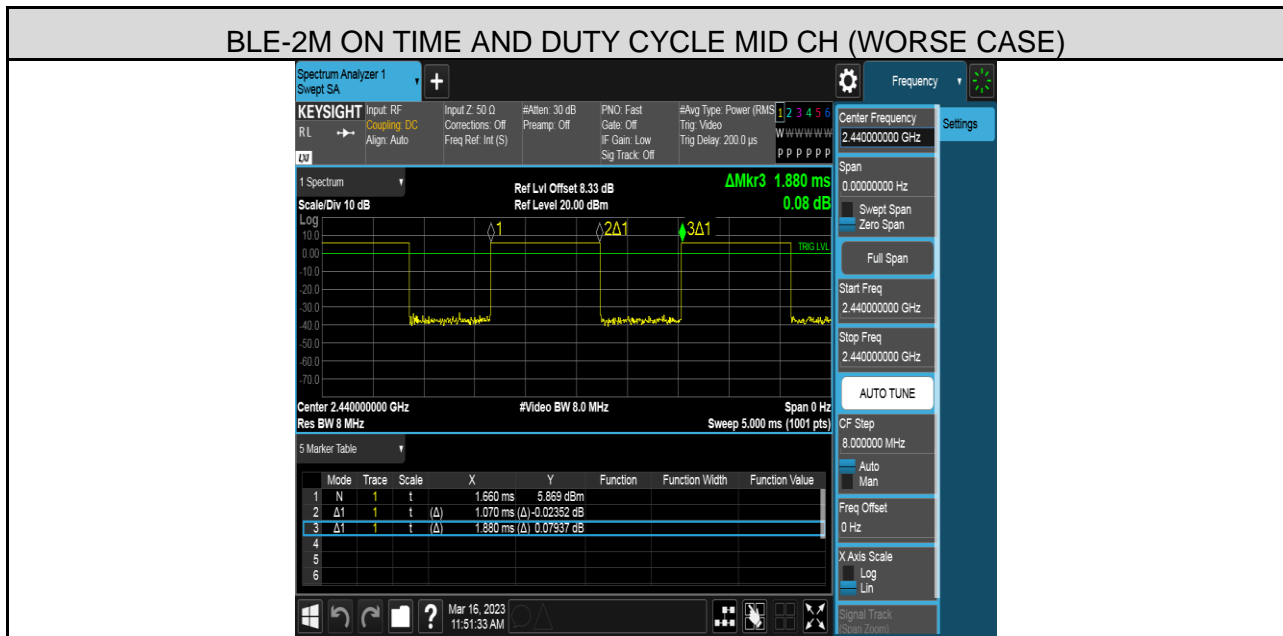
Note: 1) Duty Cycle Correction Factor=10log(1/x).
 2) Where: x is Duty Cycle (Linear)
 3) Where: T is On Time (transmit duration)

TEST GRAPHS

BLE-1M ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



BLE-2M ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



7.2. 6 dB BANDWIDTH

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a)	6dB Bandwidth	$\geq 500\text{kHz}$	2400-2483.5

TEST PROCEDURE

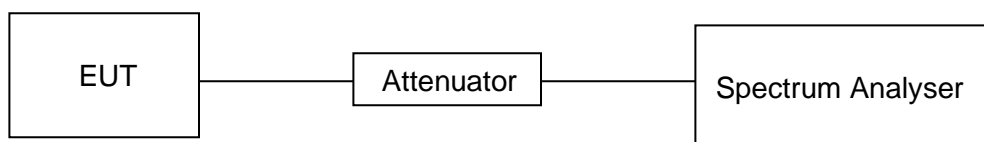
Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Frequency Span	For 6 dB Bandwidth: enough to capture all products of the modulation carrier emission
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz
VBW	For 6 dB Bandwidth: $\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

a) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

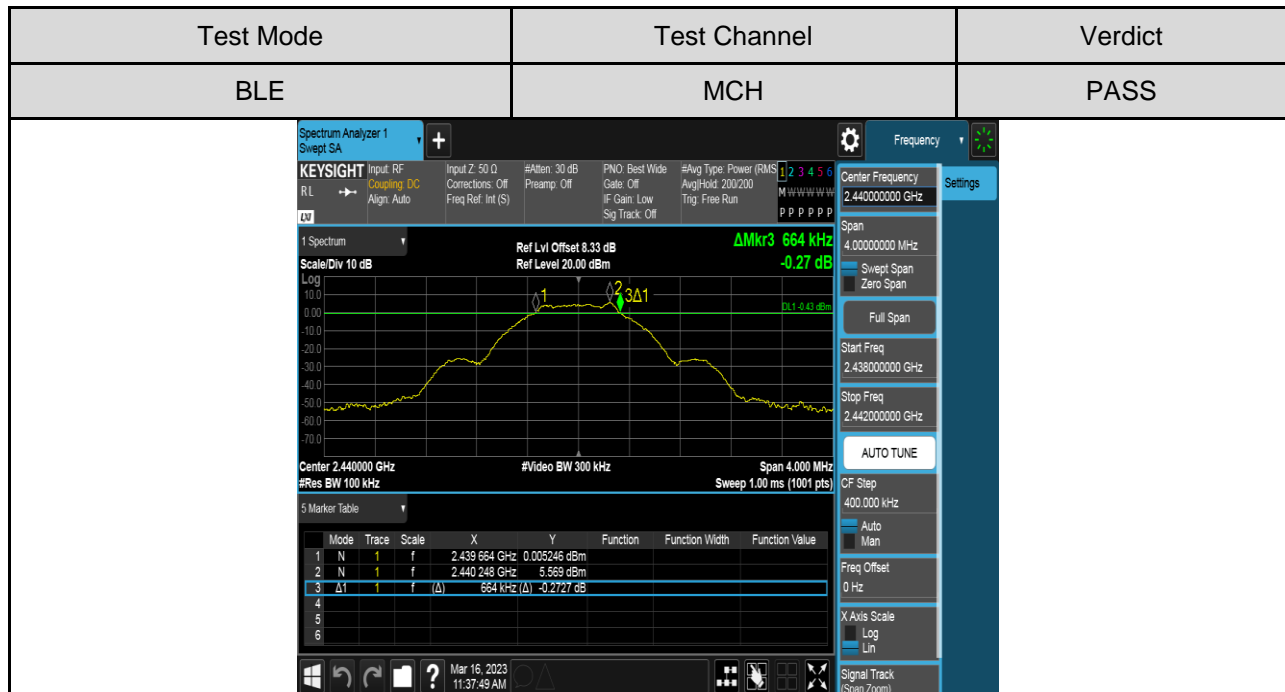
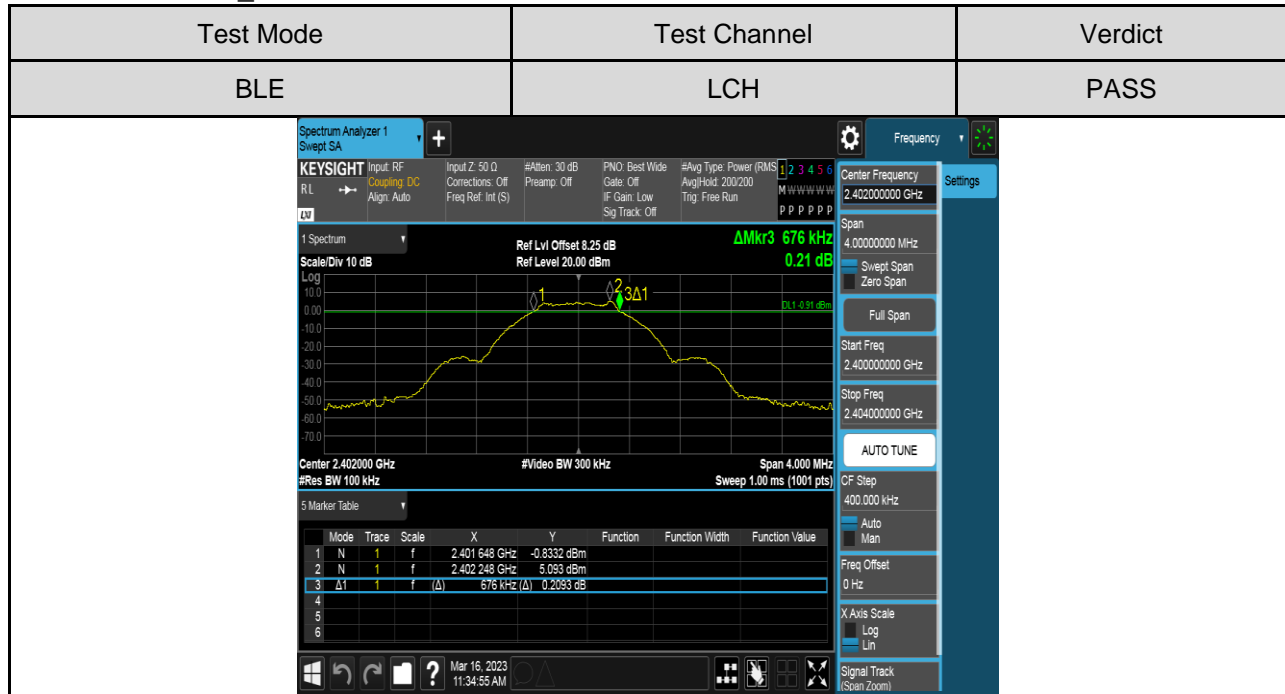
Temperature	24.2°C	Relative Humidity	52.5%
Atmosphere Pressure	102.1kpa	Test Voltage	DC 5V

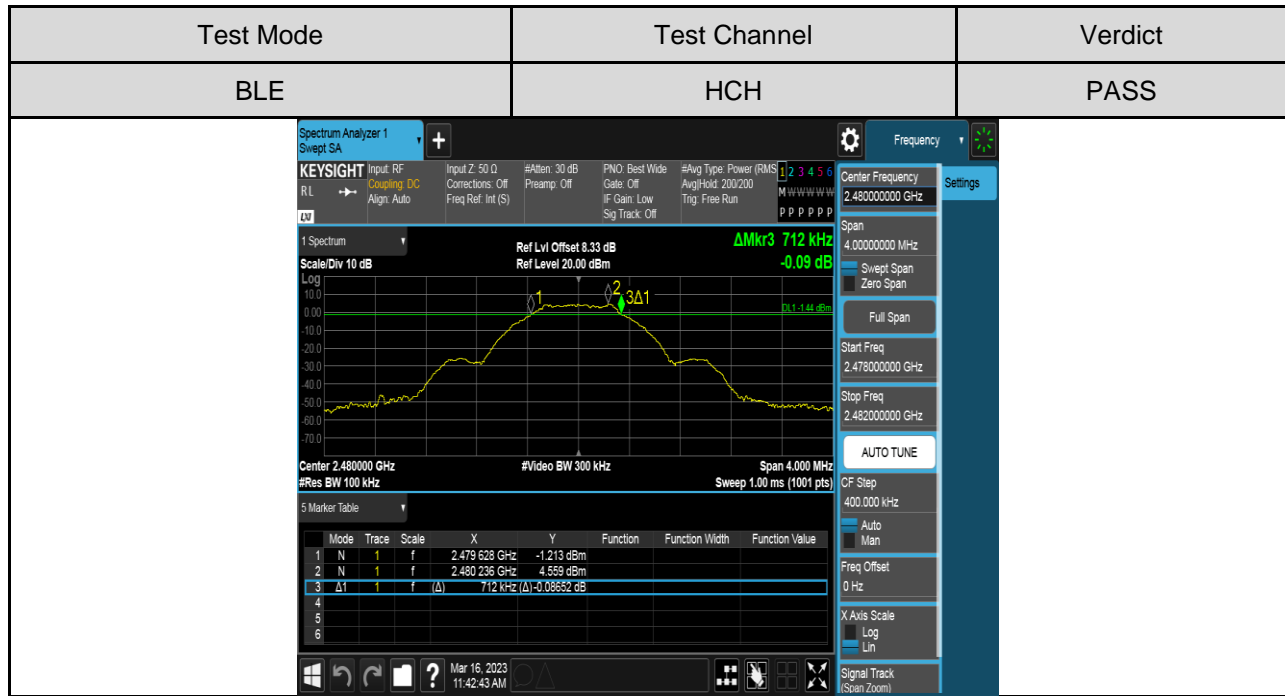
TEST RESULTS TABLE

Test Mode	Test Channel	6dB bandwidth (MHz)	Result
BLE-1M	LCH	0.676	Pass
	MCH	0.664	Pass
	HCH	0.712	Pass
BLE-2M	LCH	1.240	Pass
	MCH	1.160	Pass
	HCH	1.112	Pass

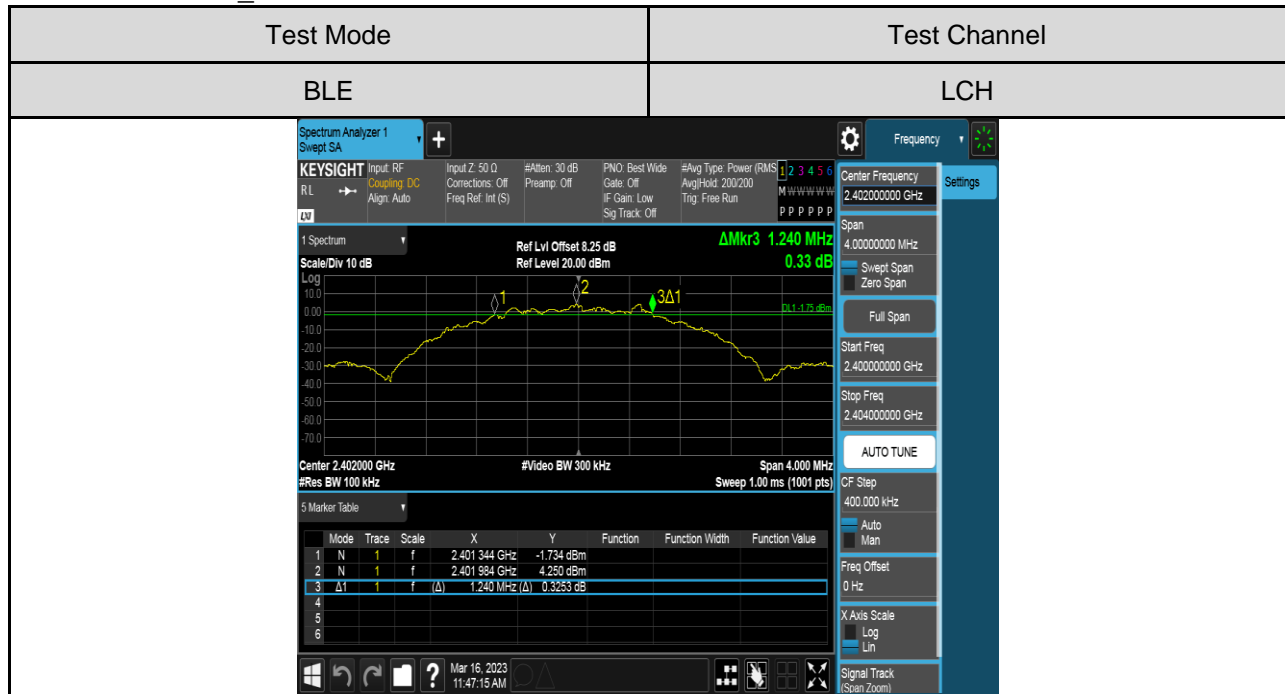
TEST GRAPHS

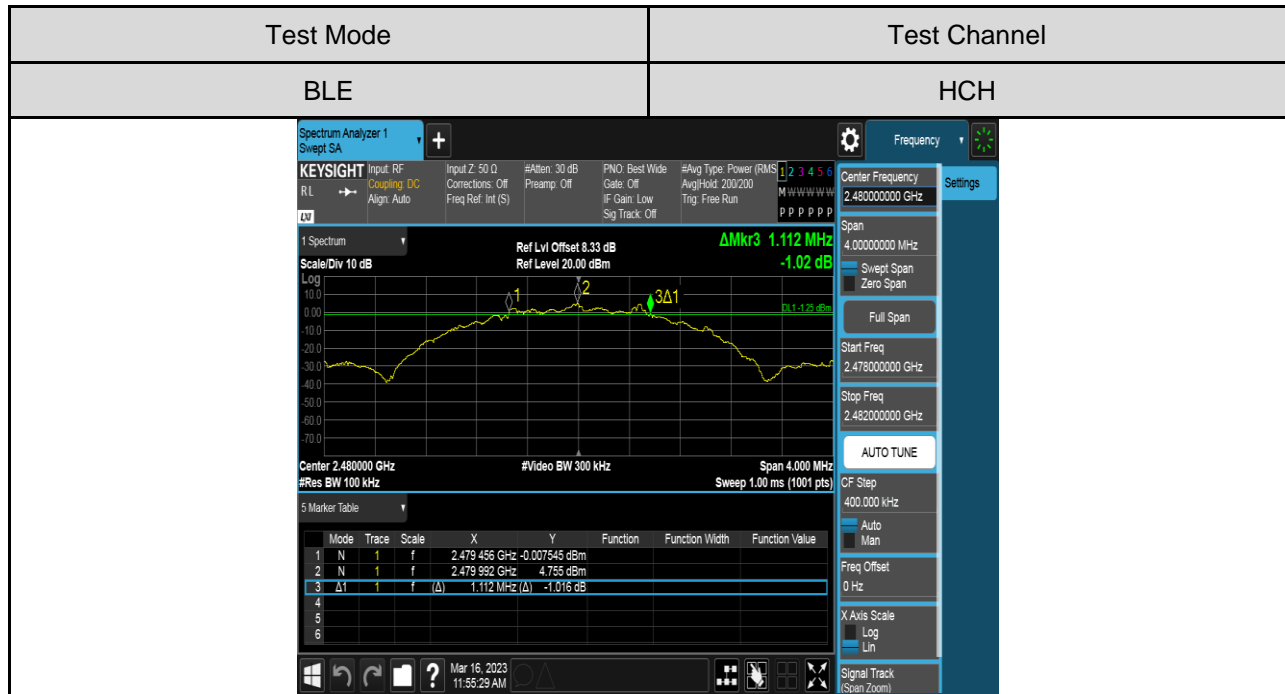
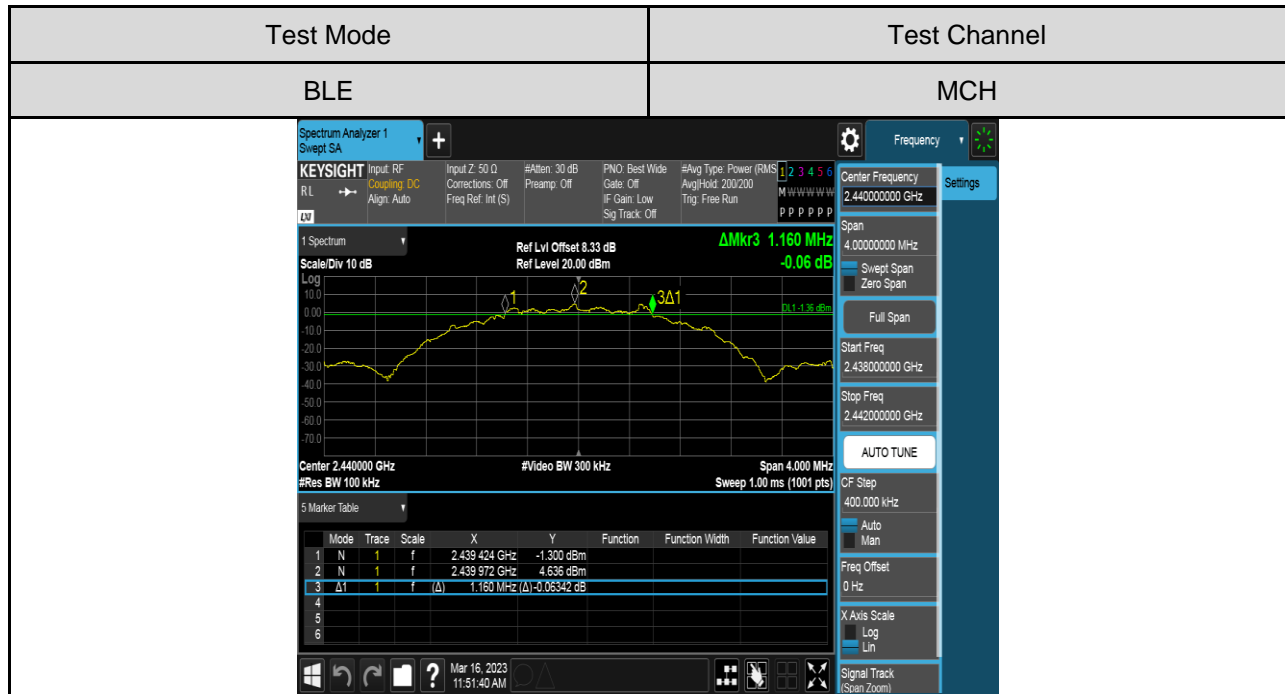
6dB Bandwidth_For 1M Part:





6dB Bandwidth_For 2M Part:





7.3. CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5

TEST PROCEDURE

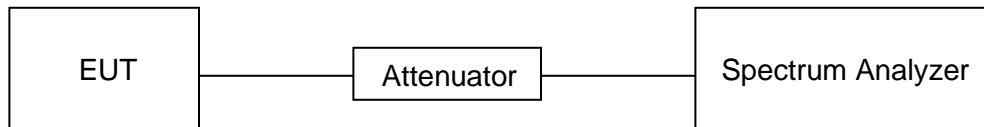
The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

- a) Set the RBW \geq DTS bandwidth.
- b) Set VBW \geq [3 \times RBW].
- c) Set span \geq [3 \times RBW].
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

TEST ENVIRONMENT

Temperature	24.2°C	Relative Humidity	52.5%
Atmosphere Pressure	102.1kpa	Test Voltage	DC 5V

TEST SETUP



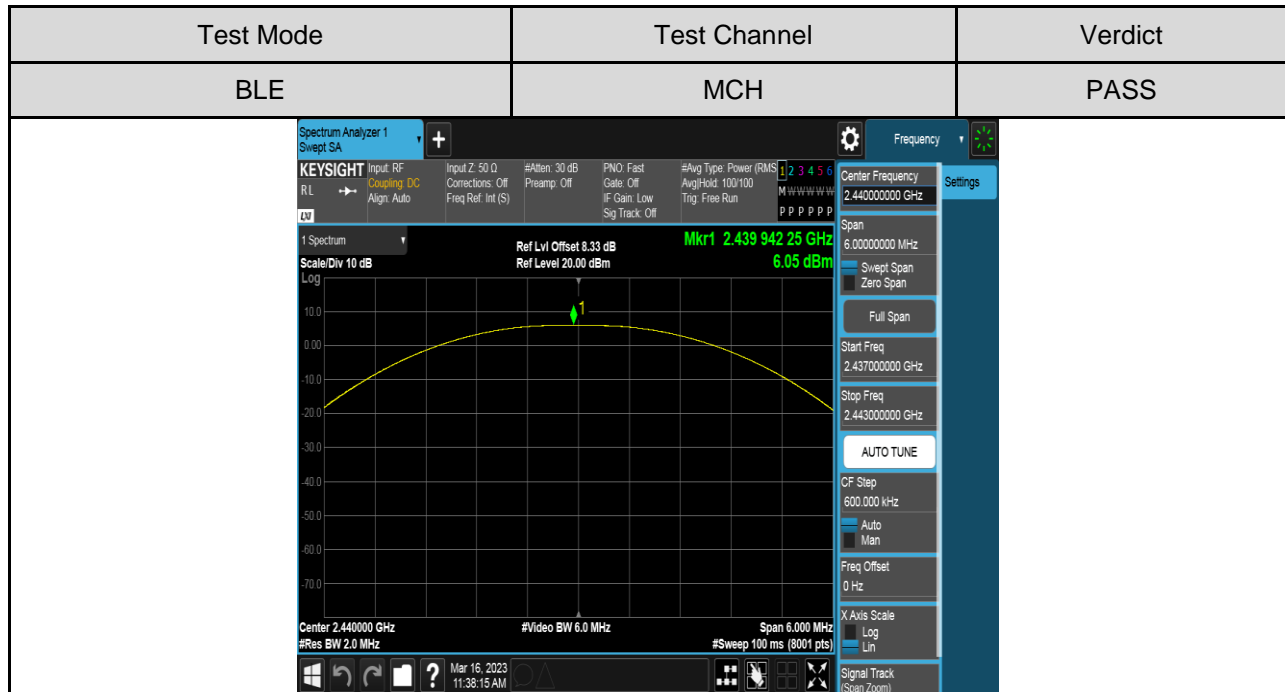
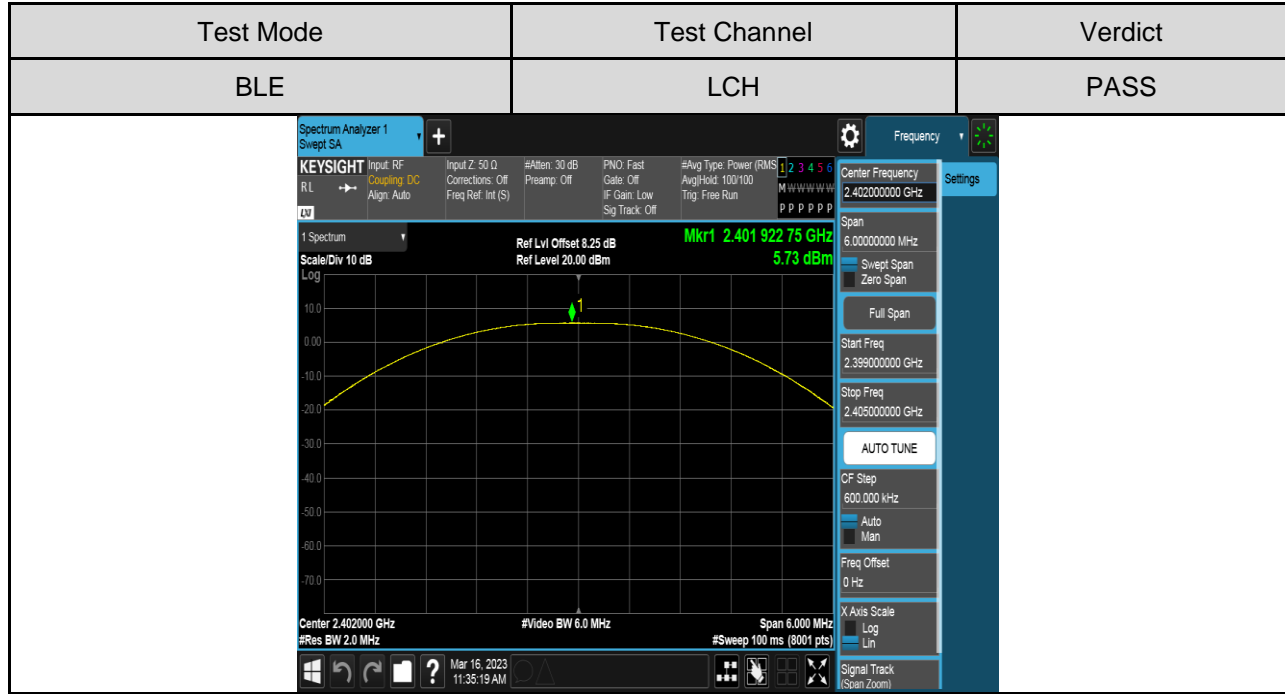
TEST RESULTS TABLE

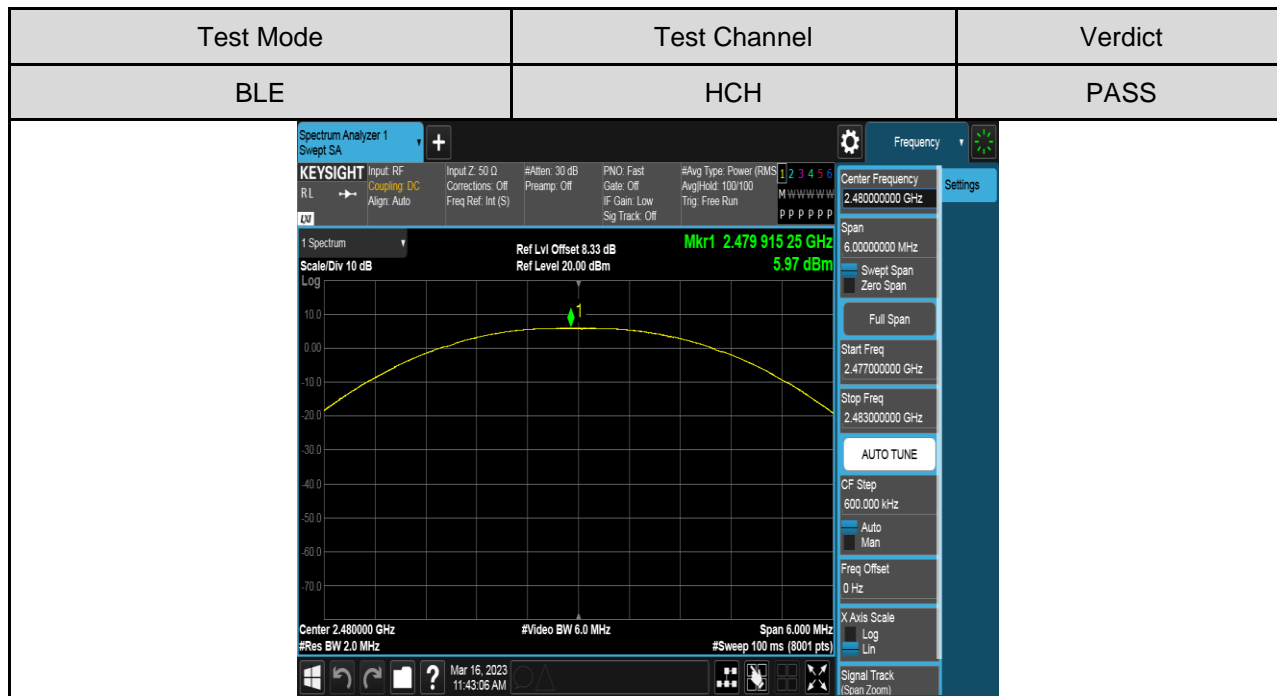
Test Mode	Test Channel	Maximum Conducted Output Power (PK)	LIMIT
		dBm	dBm
BLE-1M	LCH	5.73	≤30
	MCH	6.05	≤30
	HCH	5.98	≤30
BLE-2M	LCH	5.79	≤30
	MCH	6.13	≤30
	HCH	5.91	≤30

Remark:

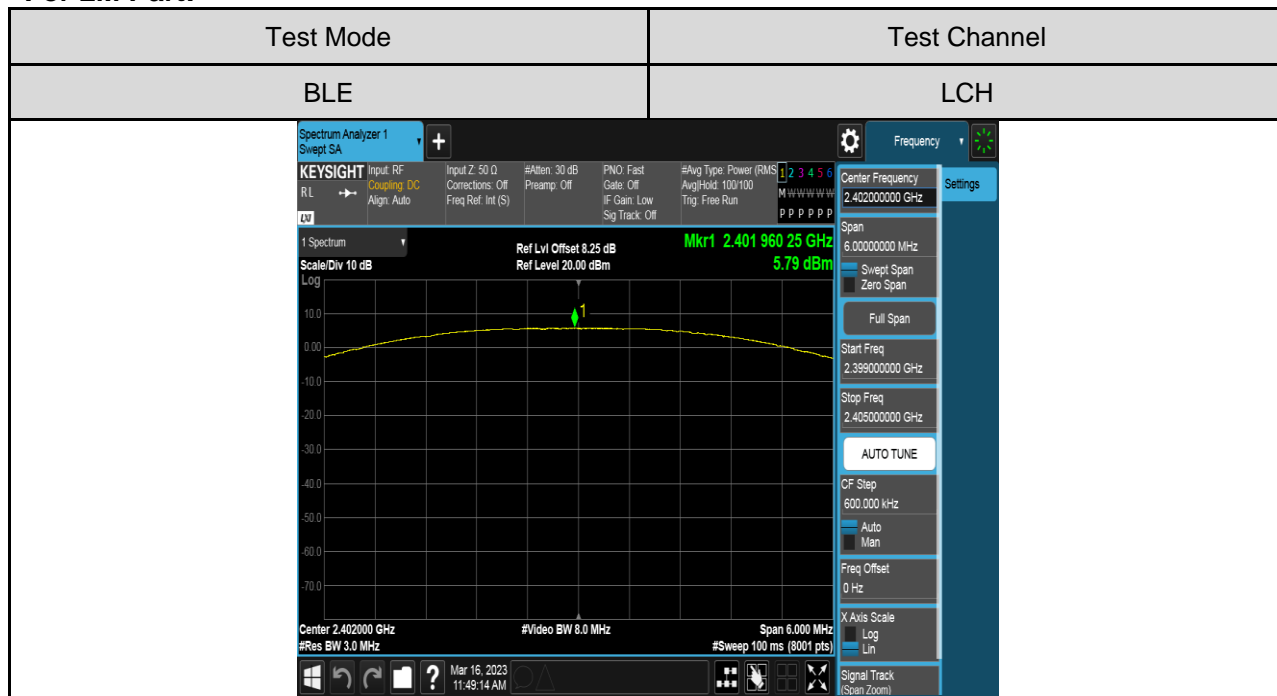
- 1) For all the test results has been adjusted the duty cycle factor.
- 2) For Correction Factor is refer to the result in section 7.2

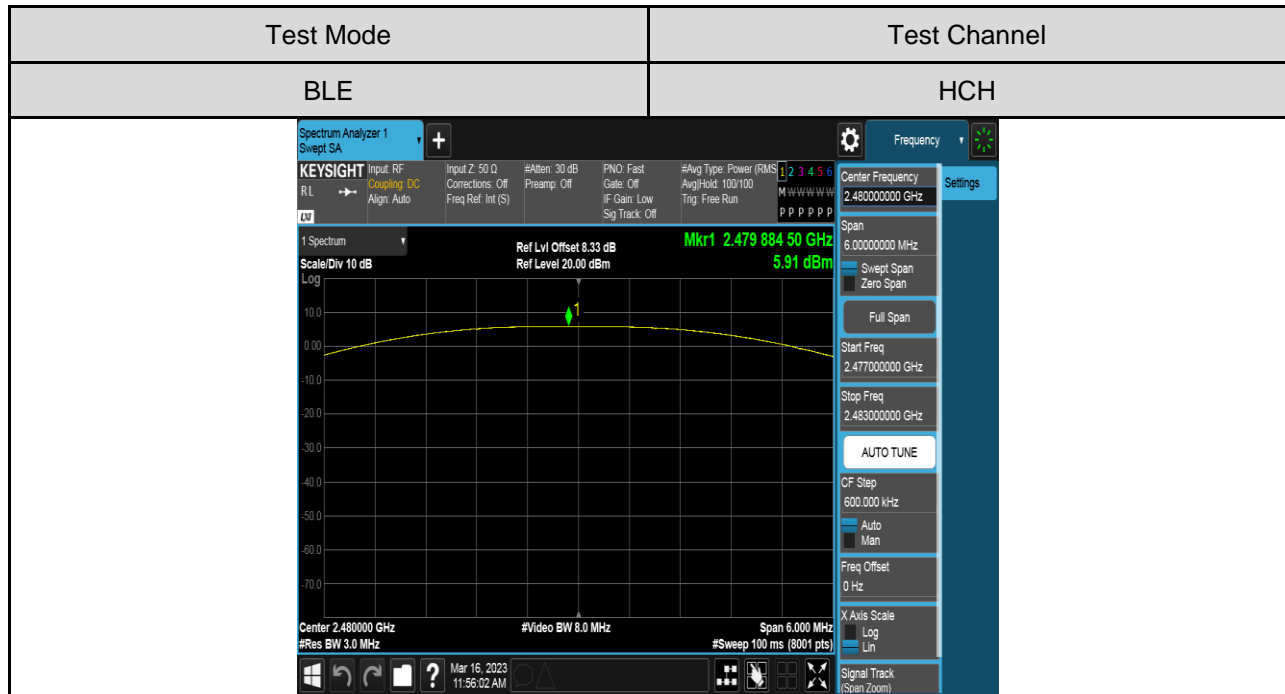
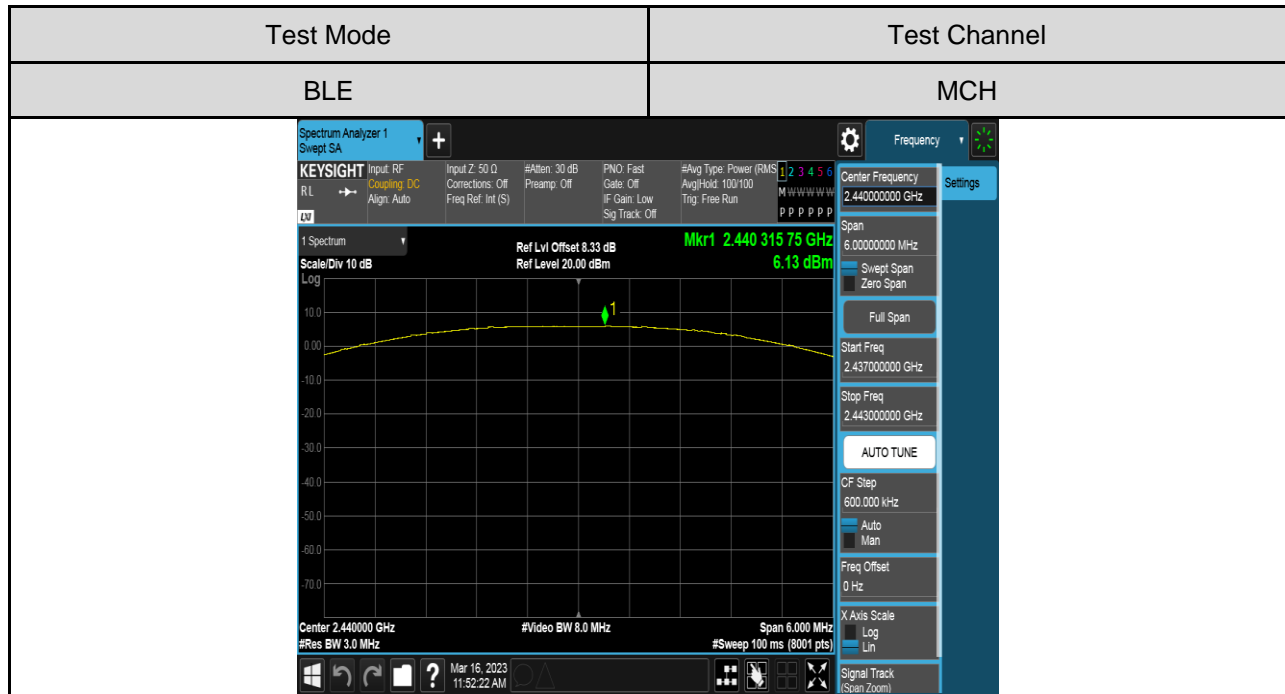
Test Graphs:
For 1M Part:





For 2M Part:





7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e)	Power Spectral Density	8 dBm/3 kHz	2400-2483.5

TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

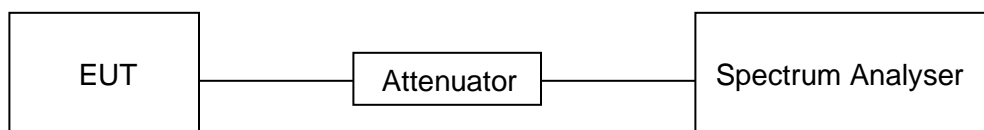
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST ENVIRONMENT

Temperature	24.2°C	Relative Humidity	52.5%
Atmosphere Pressure	102.1kpa	Test Voltage	DC 5V

TEST SETUP

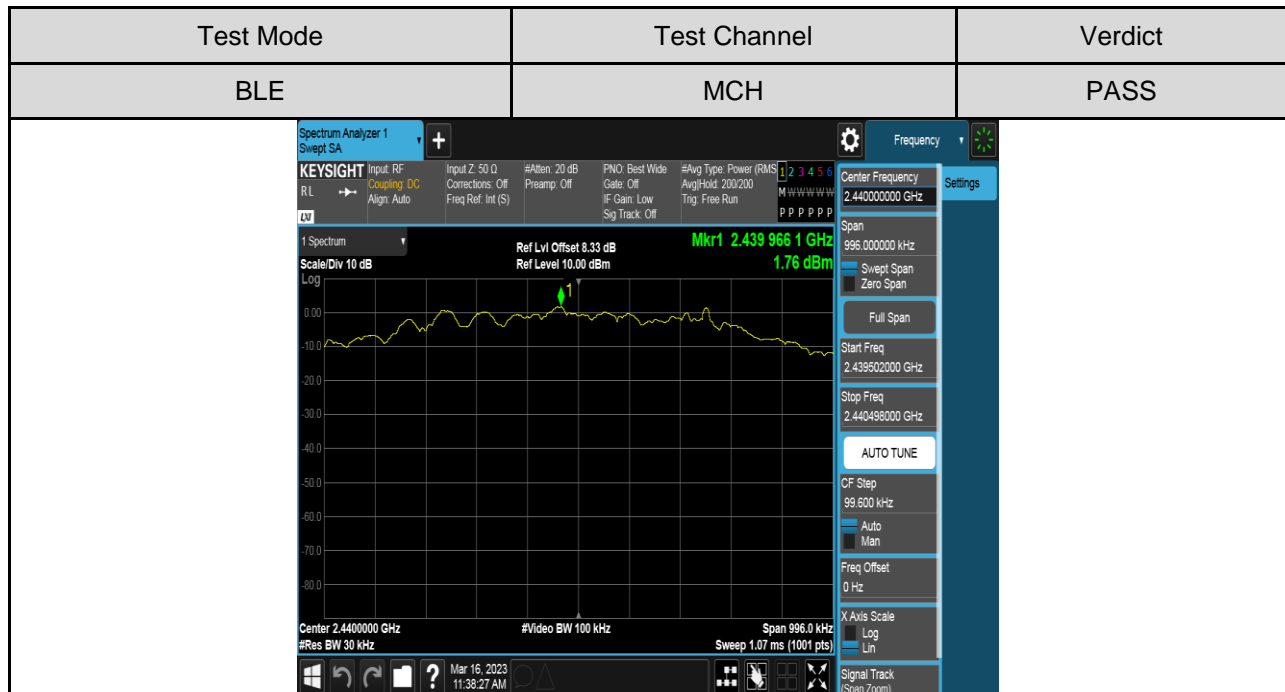
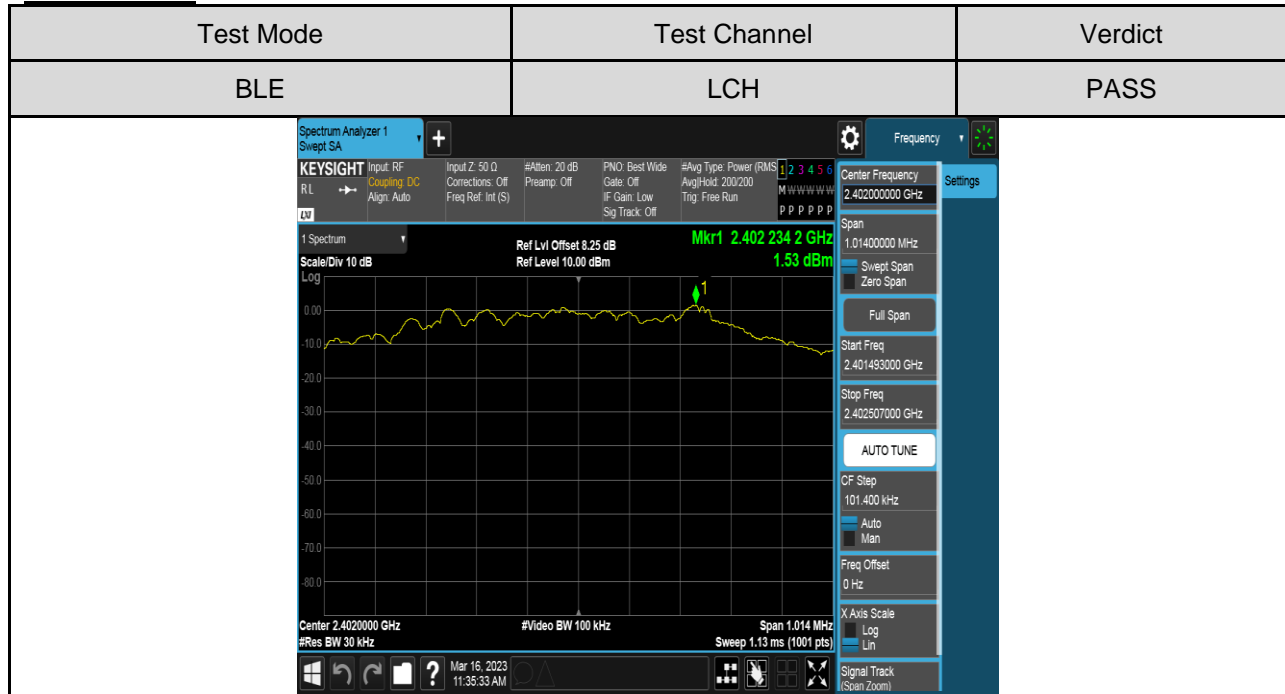



TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
BLE-1M	LCH	1.53	Pass
	MCH	1.76	Pass
	HCH	1.87	Pass
BLE-2M	LCH	-0.75	Pass
	MCH	-0.43	Pass
	HCH	-0.19	Pass


TEST GRAPHS


For 1M Part:

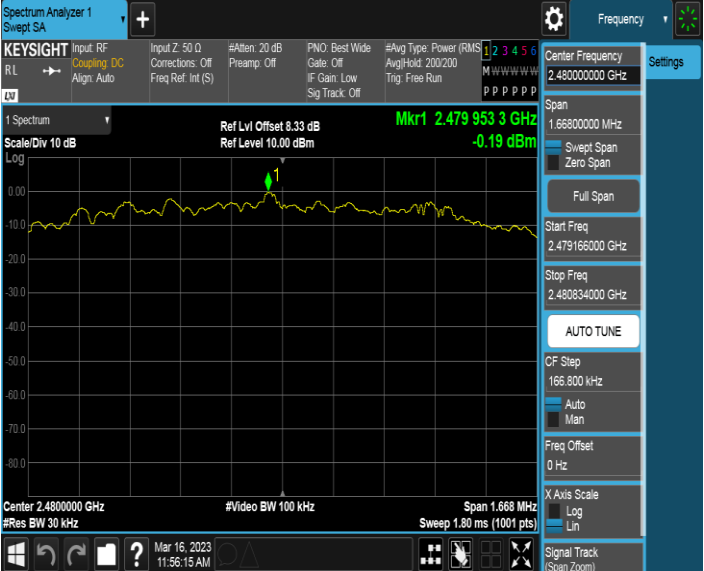


Test Mode	Test Channel	Verdict
BLE	HCH	PASS
		

For 2M Part:

Test Mode	Test Channel	Verdict
BLE	LCH	PASS
		

Test Mode	Test Channel	Verdict
BLE	MCH	PASS
		

Test Mode	Test Channel	Verdict
BLE	HCH	PASS
		

7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247), Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

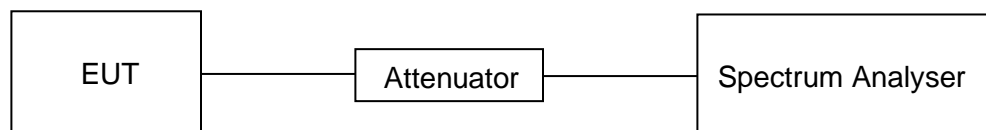
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

TEST SETUP



TEST ENVIRONMENT

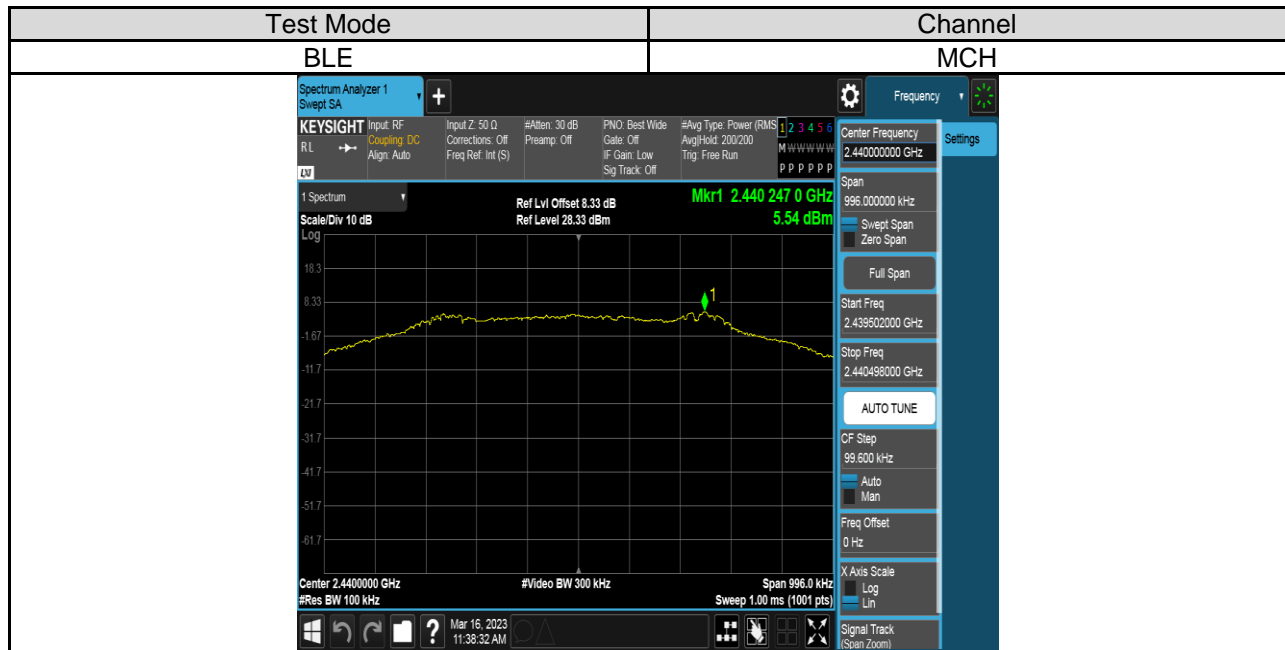
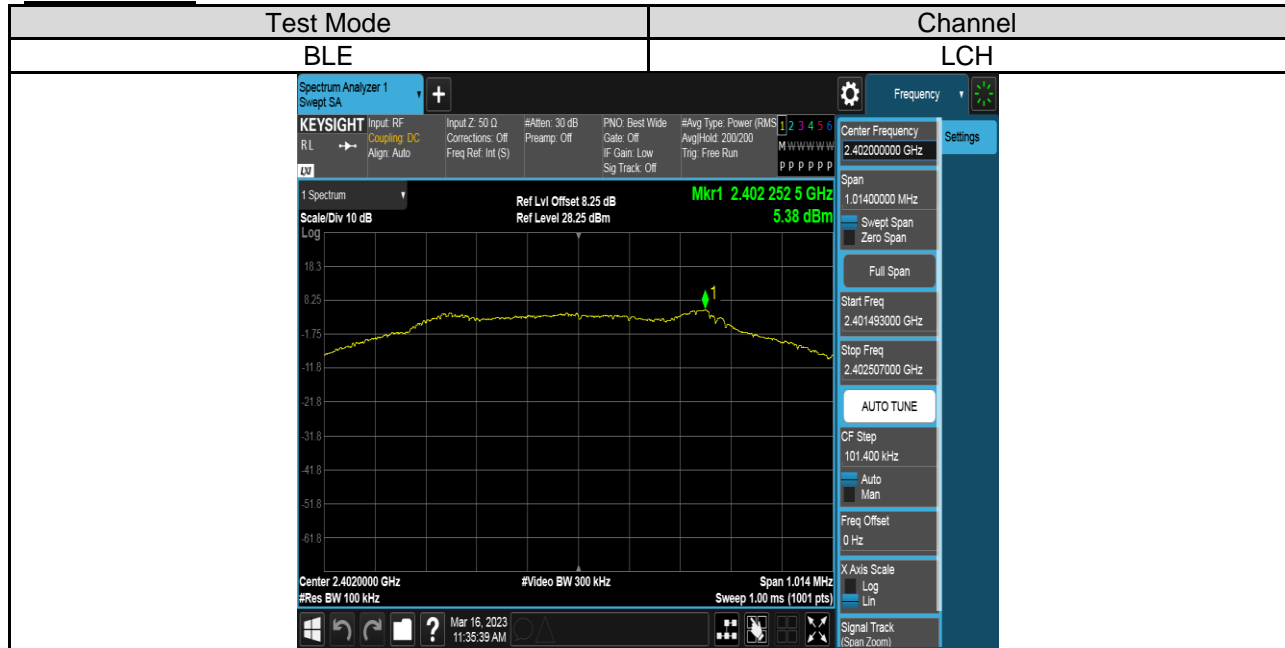
Temperature	24.2°C	Relative Humidity	52.5%
Atmosphere Pressure	102.1kpa	Test Voltage	DC 5V

PART 1: REFERENCE LEVEL MEASUREMENT**TEST RESULTS TABLE**

Test Mode	Test Channel	Result[dBm]
BLE-1M	LCH	5.39
	MCH	5.54
	HCH	5.29
BLE-2M	LCH	4.26
	MCH	4.55
	HCH	4.36

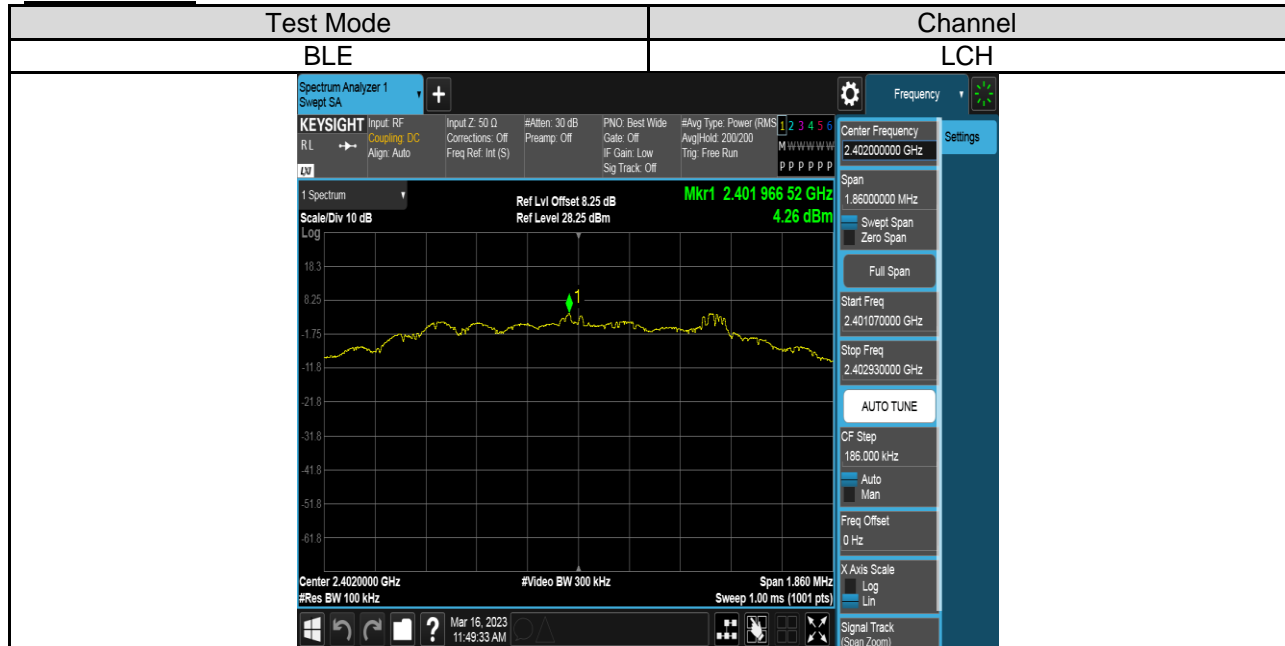
TEST GRAPHS

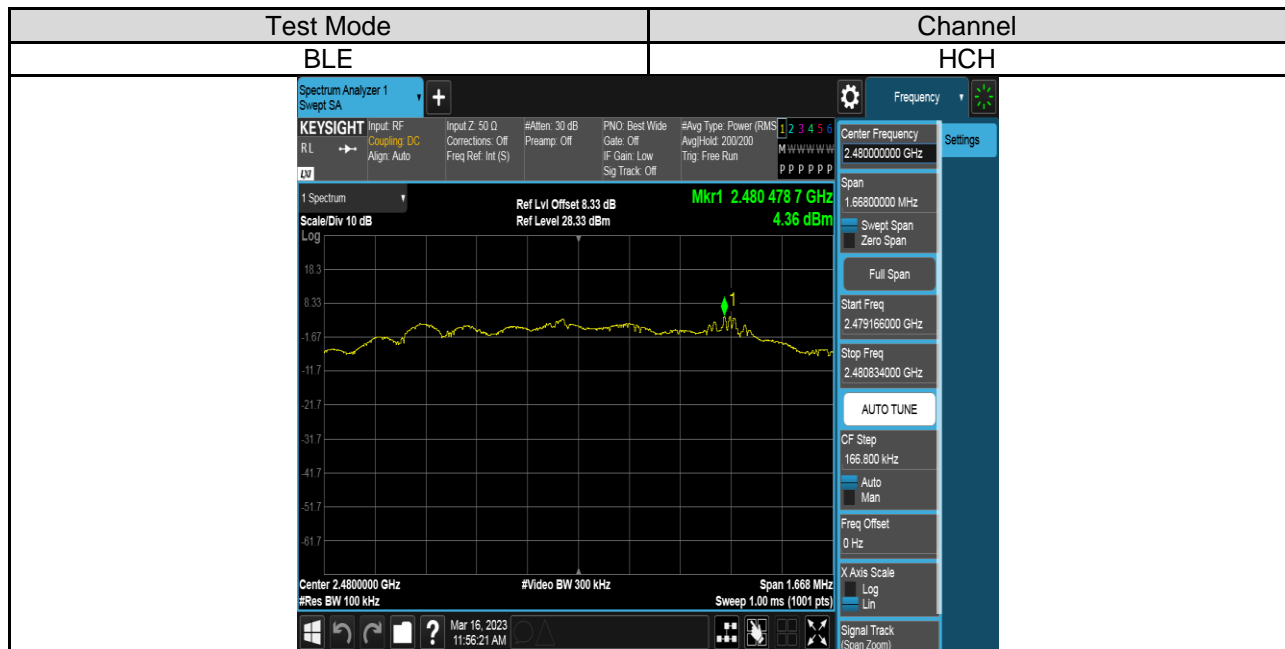
For 1M Part:





For 2M Part:



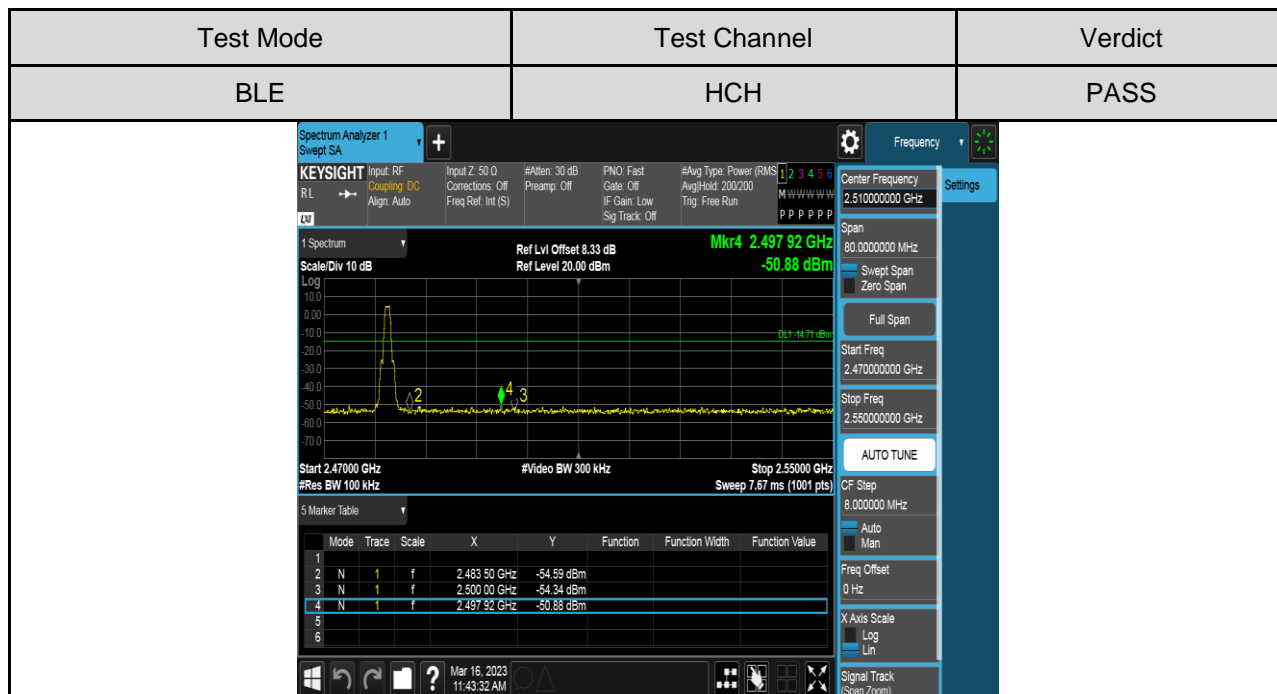
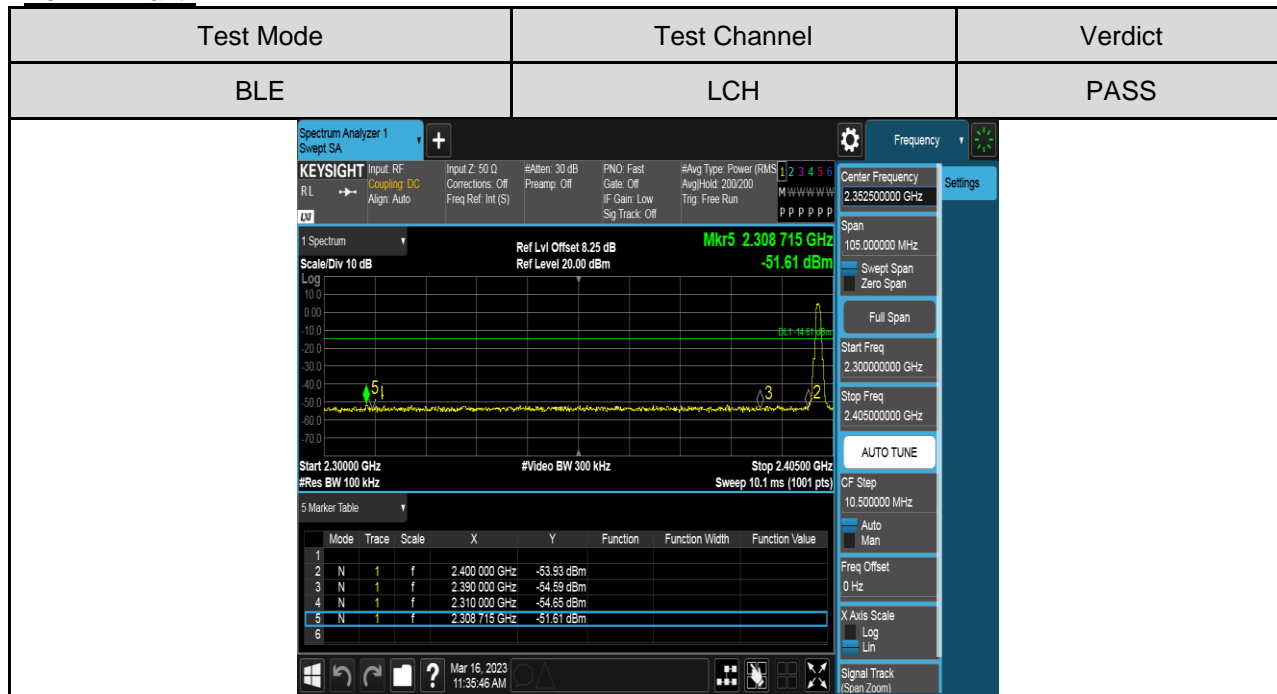


PART 2: CONDUCTED BANDEDGE**TEST RESULTS TABLE**

Test Mode	Test Channel	Result	Verdict
BLE-1M	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS
BLE-2M	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS

TEST GRAPHS

For 1M Part:



For 2M Part:

Test Mode	Test Channel	Verdict
BLE	LCH	PASS

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	f	2.400 000 GHz	-27.01 dBm			
2	N	f	2.390 000 GHz	-53.20 dBm			
3	N	f	2.310 000 GHz	-54.75 dBm			
4	N	f	2.399 960 GHz	-27.01 dBm			
5	N	f	2.399 960 GHz	-27.01 dBm			

Test Mode	Test Channel	Verdict
BLE	HCH	PASS

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	f	2.483 50 GHz	-51.24 dBm			
2	N	f	2.500 00 GHz	-54.39 dBm			
3	N	f	2.491 52 GHz	-50.94 dBm			
4	N	f	2.491 52 GHz	-50.94 dBm			

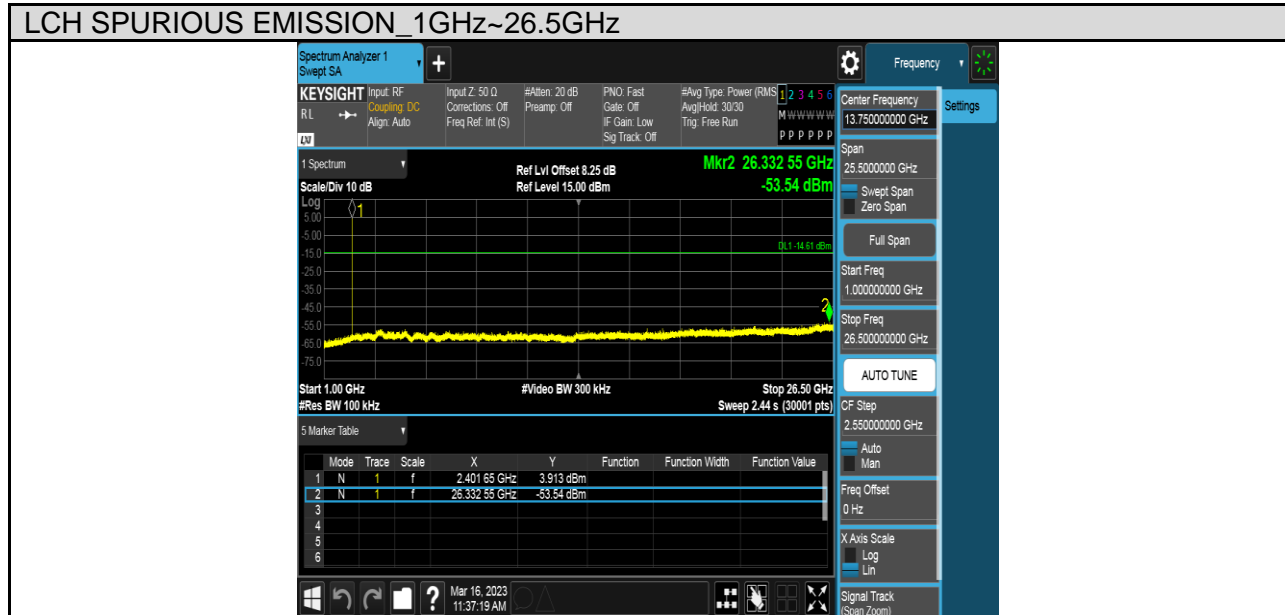
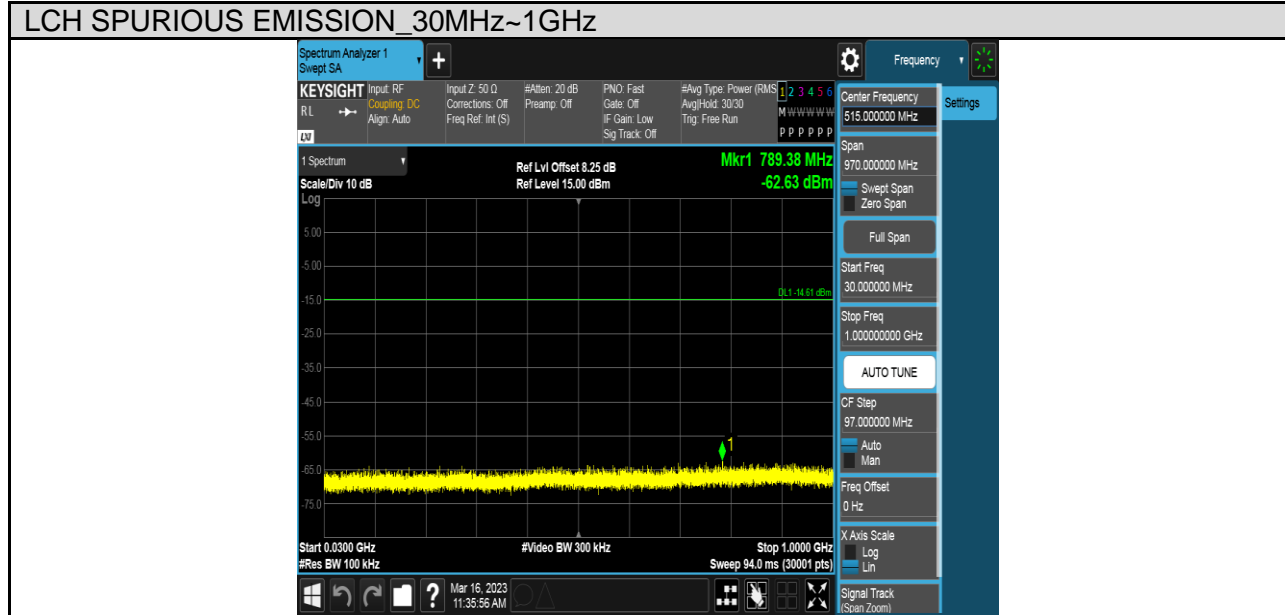
PART 3: CONDUCTED SPURIOUS EMISSION**TEST RESULTS TABLE**

Test Mode	Test Channel	Result	Verdict
BLE-1M	LCH	Refer to the Test Graph	PASS
	MCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS
BLE-2M	LCH	Refer to the Test Graph	PASS
	MCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS

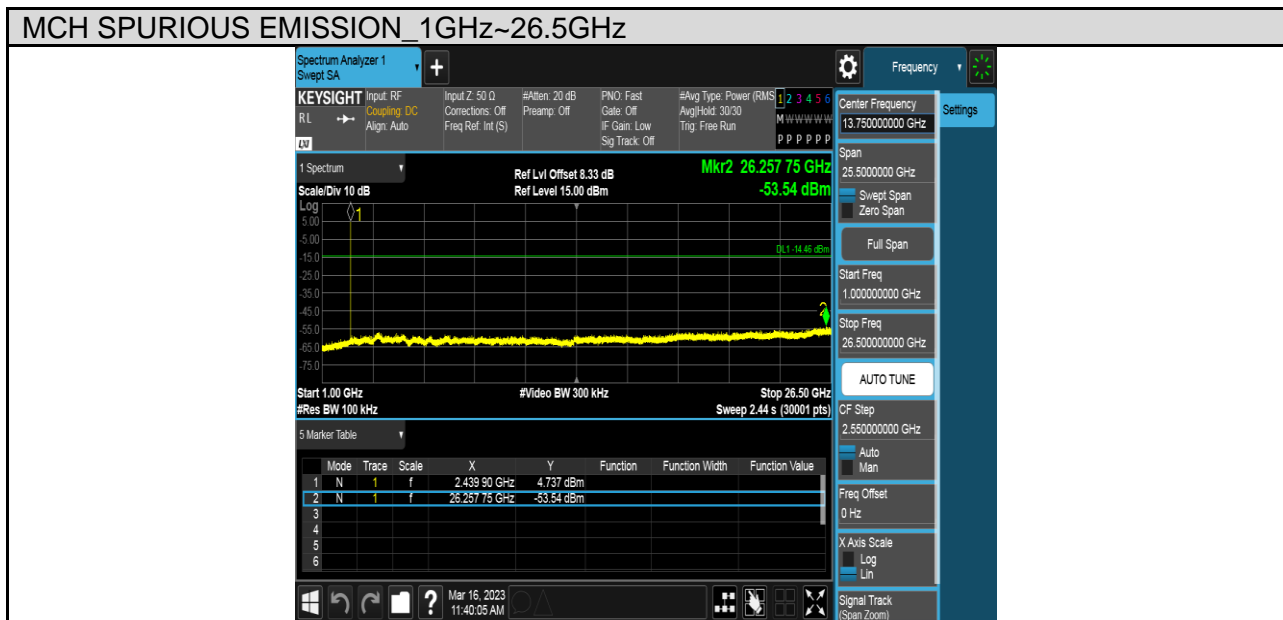
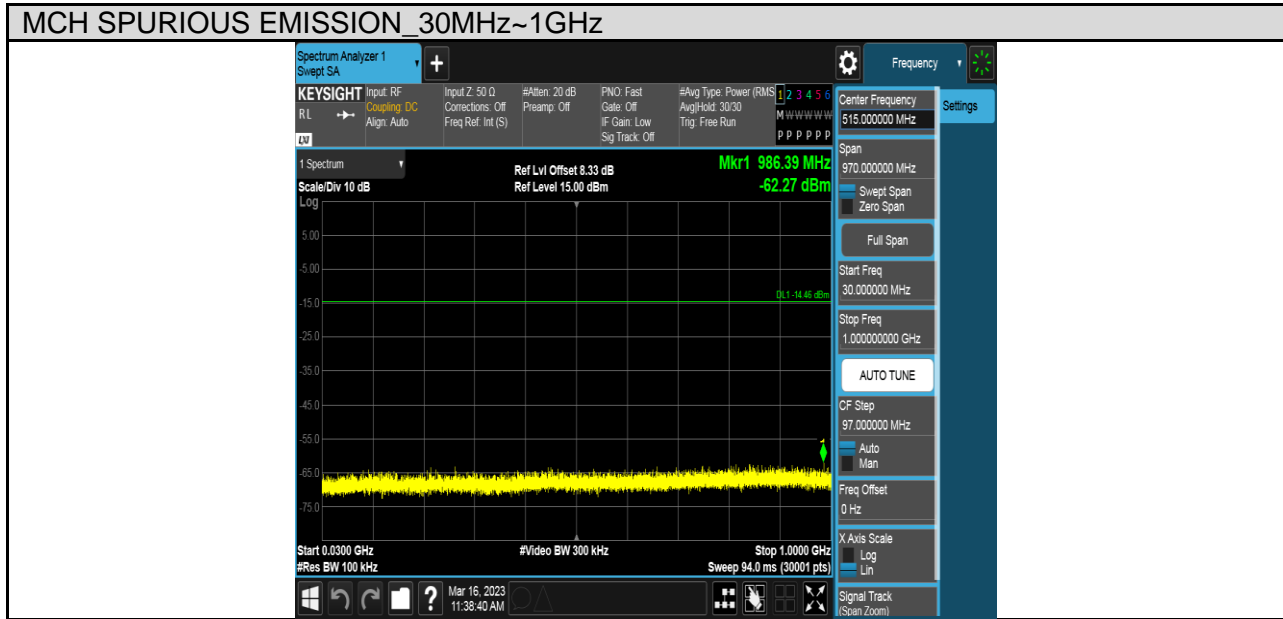
TEST GRAPHS

For 1M Part:

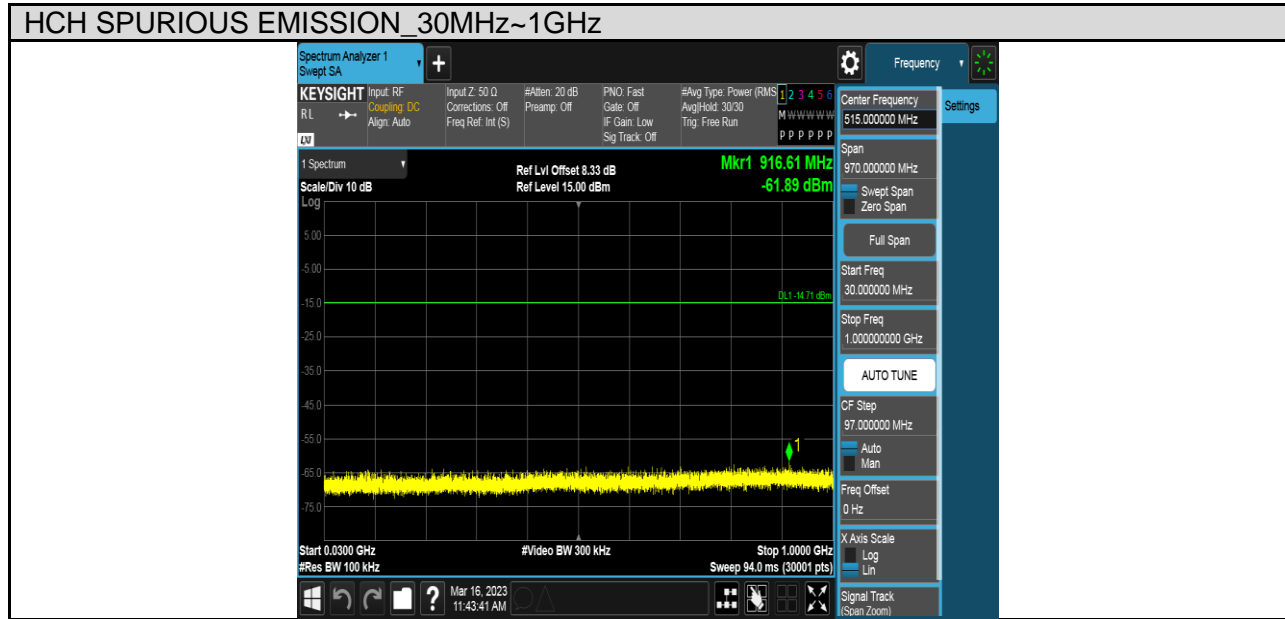
Test Mode	Channel	Verdict
BLE	LCH	PASS



Test Mode	Channel	Verdict
BLE	MCH	PASS

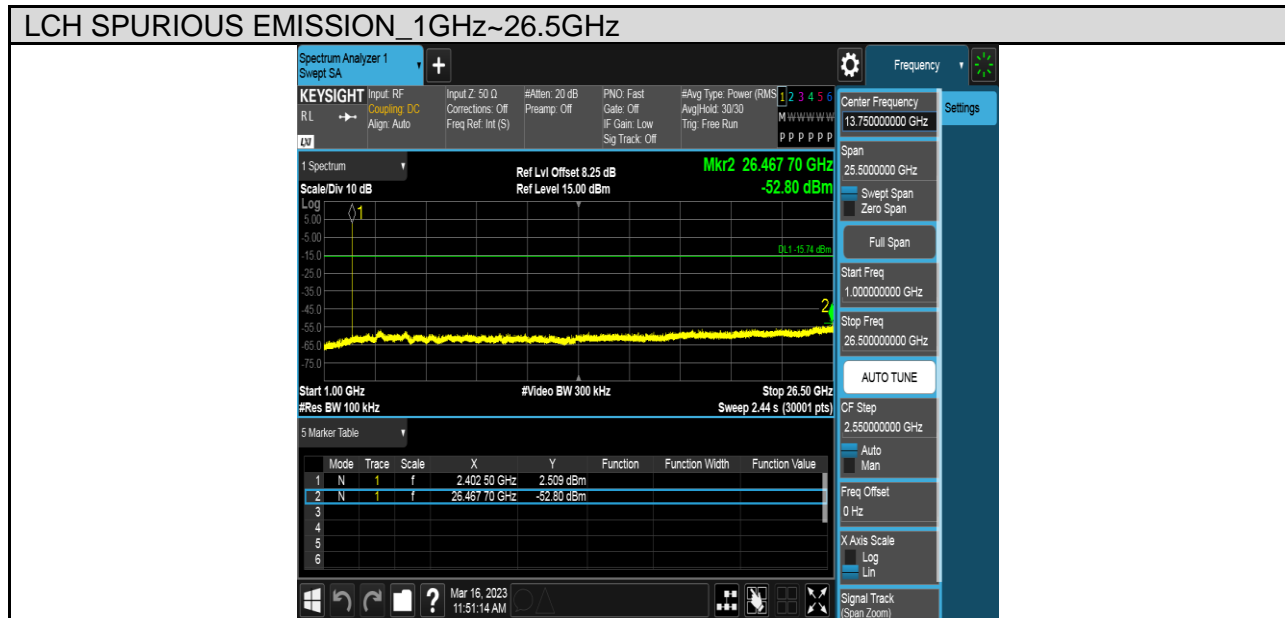
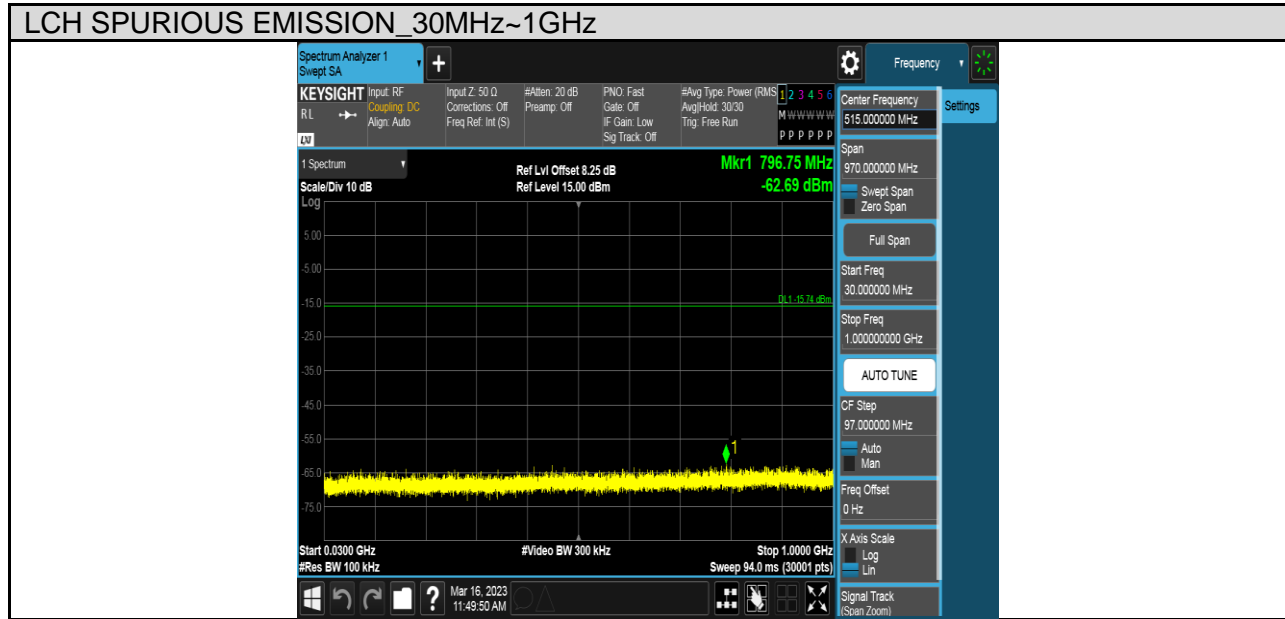


Test Mode	Channel	Verdict
BLE	HCH	PASS

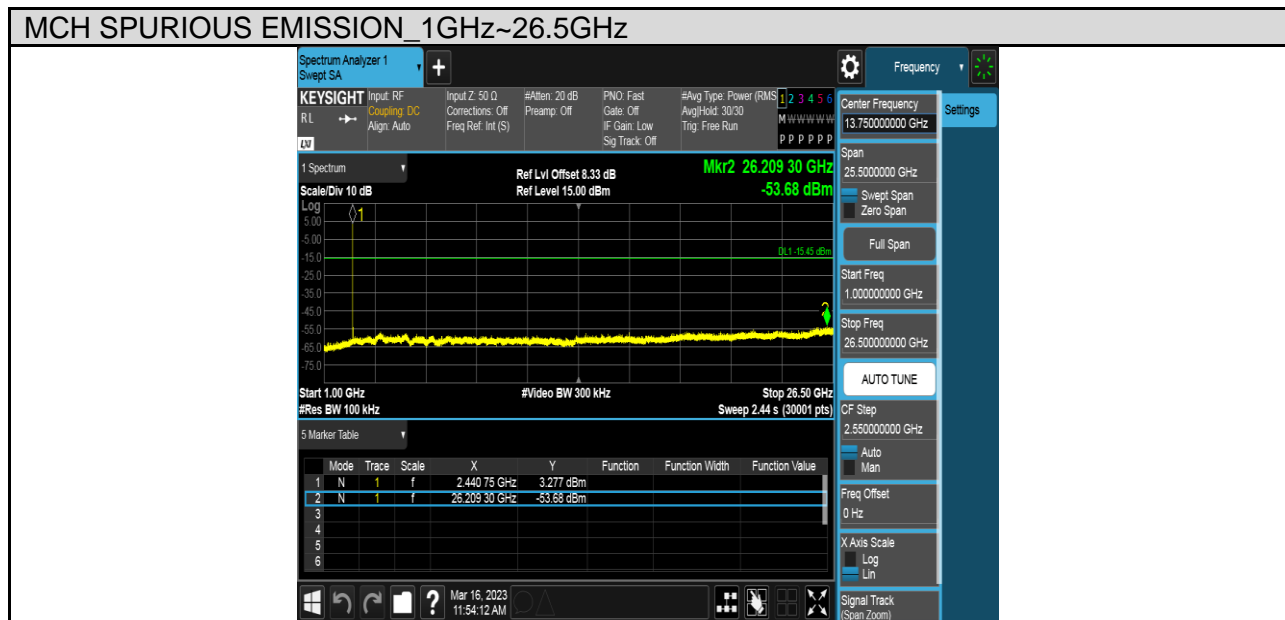
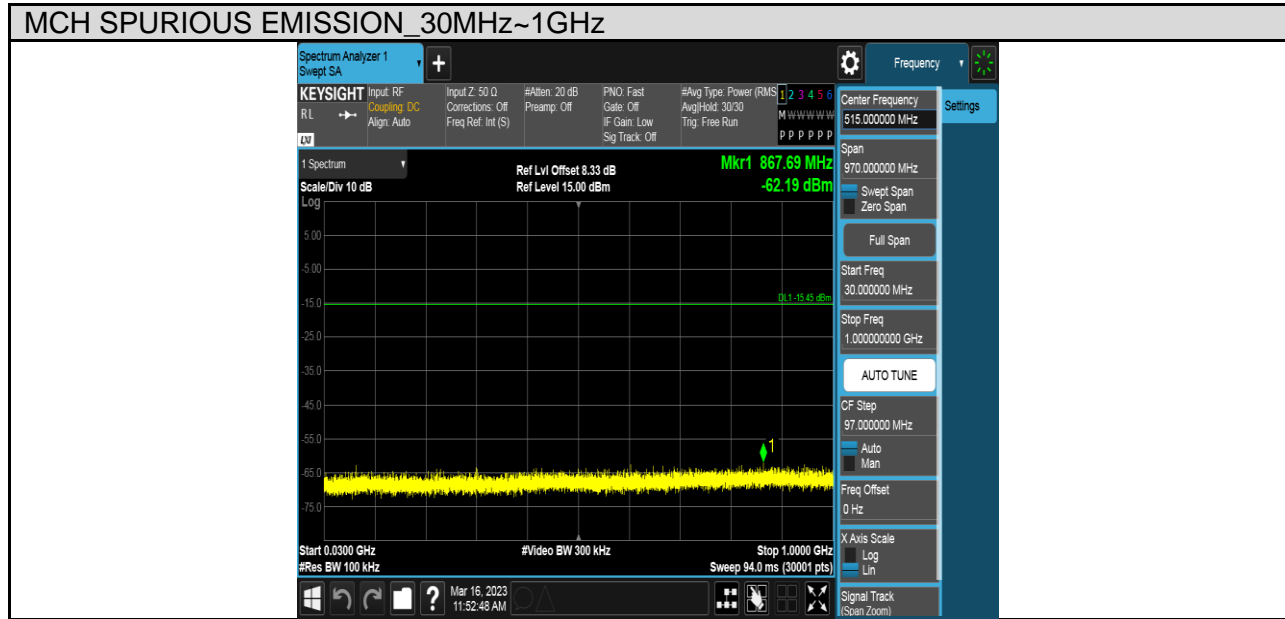


For 2M Part:

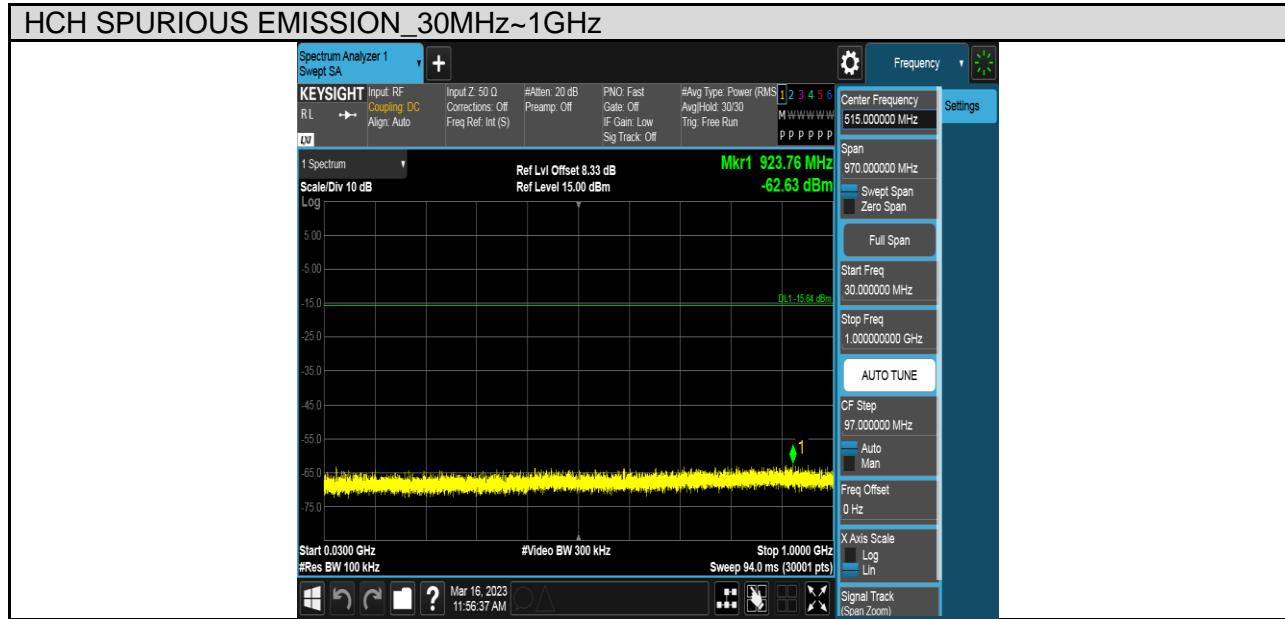
Test Mode	Channel	Verdict
BLE	LCH	PASS



Test Mode	Channel	Verdict
BLE	MCH	PASS



Test Mode	Channel	Verdict
BLE	HCH	PASS



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209 (Transmitter)

Please refer to FCC KDB 558074

Radiation Disturbance Test Limit for FCC (Class B) (9kHz-1GHz)

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
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Restricted bands of operation

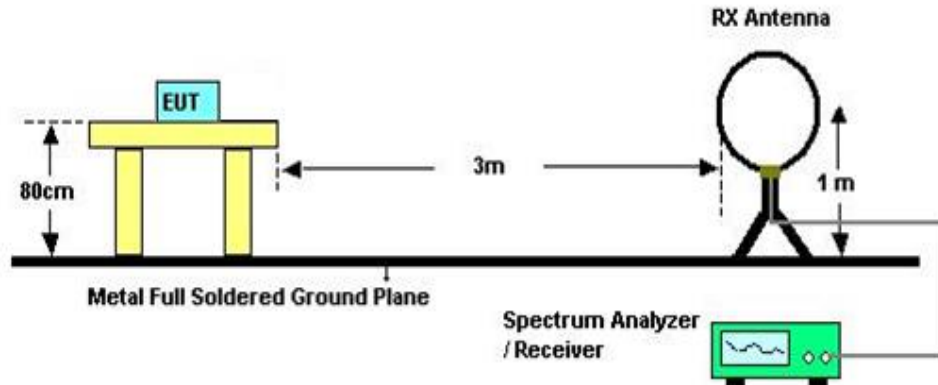
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz



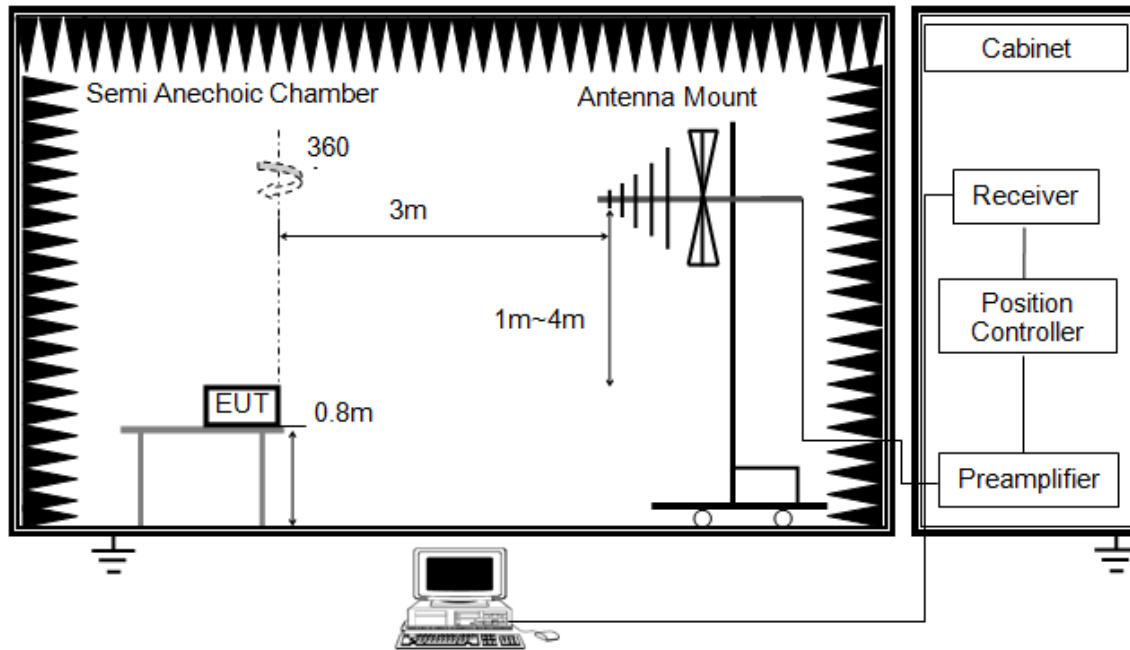
The setting of the spectrum analyser

RBW	200 Hz (From 9kHz to 0.15MHz) / 9kHz (From 0.15MHz to 30MHz)
VBW	200 Hz (From 9kHz to 0.15MHz) / 9kHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then 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. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ω . For example, the measurement frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to $Y-51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

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Below 1G

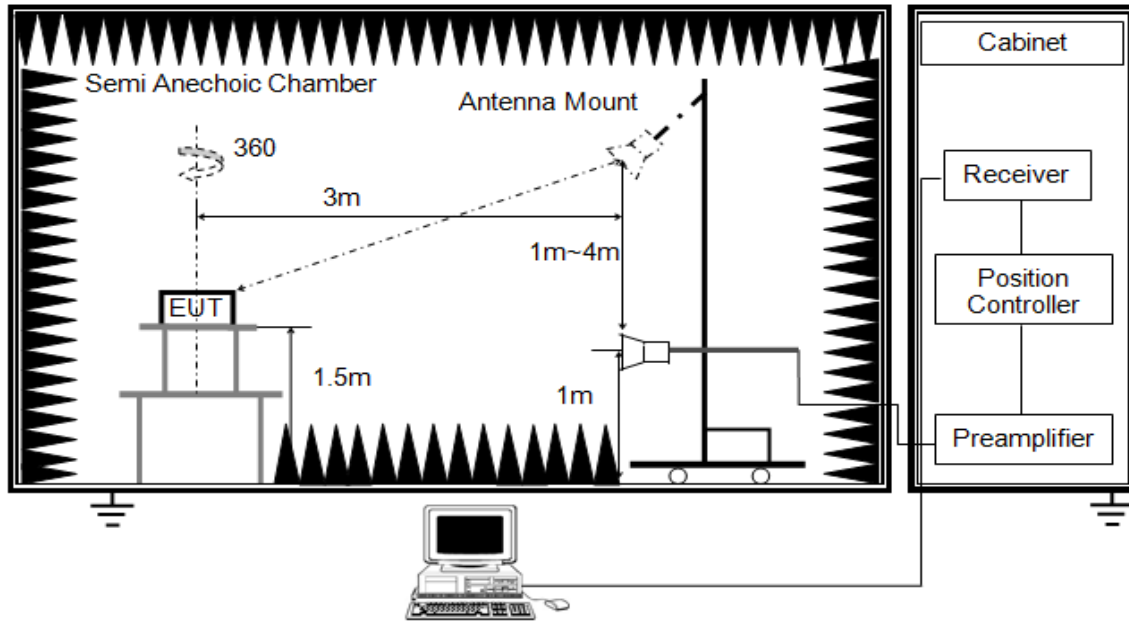


The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Above 1G

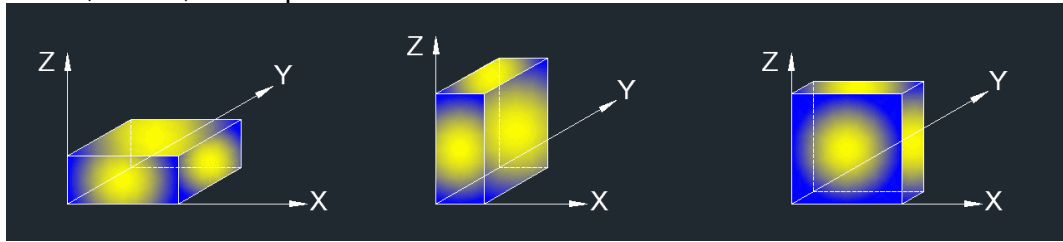


The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK:3 MHz AVG: See note6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements; and 1 MHz resolution bandwidth with video bandwidth $\geq 1/T$ but not less than the setting list in section 7.1 when use peak detector, max hold to be run for at least $[50*(1/Duty\ Cycle)]$ traces for average measurements. For the Duty Cycle need to refer the results in section 7.1.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worse case (X axis) data recorded in the report.

8.2. TEST ENVIRONMENT

Temperature	21.6°C	Relative Humidity	56.2%
Atmosphere Pressure	101.5kpa	Test Voltage	DC 5V

8.3. RESTRICTED BANDEGE

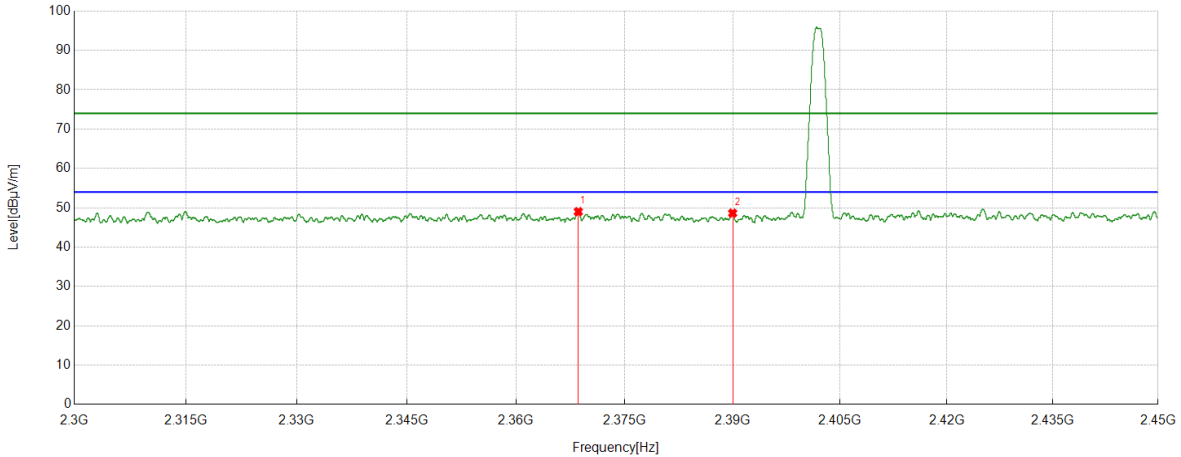
TEST RESULT TABLE

Test Mode	Channel	P _{uw} (dBm)	Verdict
BLE-1M	LCH	<Limit	PASS
	HCH	<Limit	PASS
BLE-2M	LCH	<Limit	PASS
	HCH	<Limit	PASS

TEST GRAPHS

For 1M Part:

Test Mode	Channel	Polarization	Verdict
BLE	LCH	Horizontal	PASS

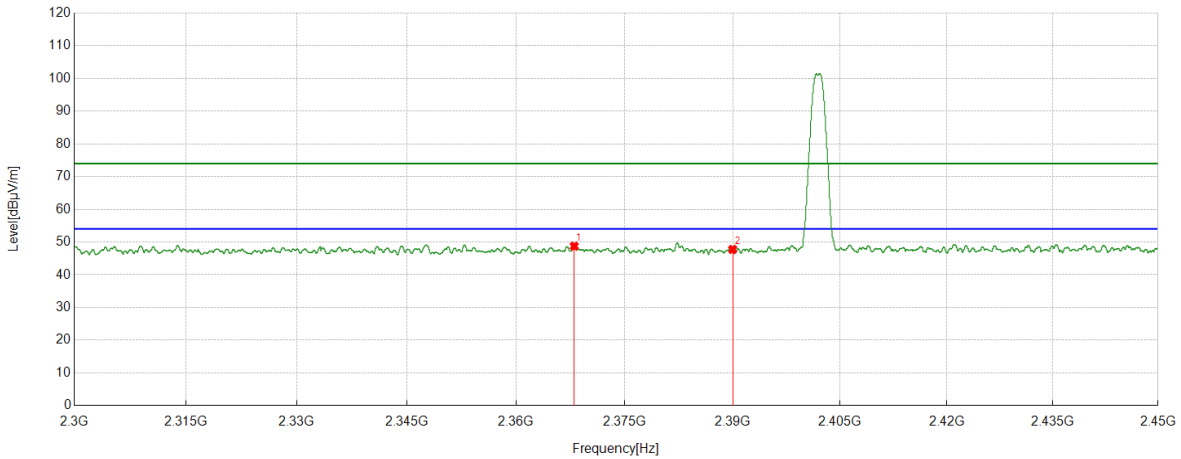


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2368.5961	38.92	10.09	49.01	74.00	24.99	Horizontal
2	2390.0000	38.28	10.35	48.63	74.00	25.37	Horizontal

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
 2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).
 3. Measurement = Reading Level + Correct Factor.
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
BLE	LCH	Vertical	PASS

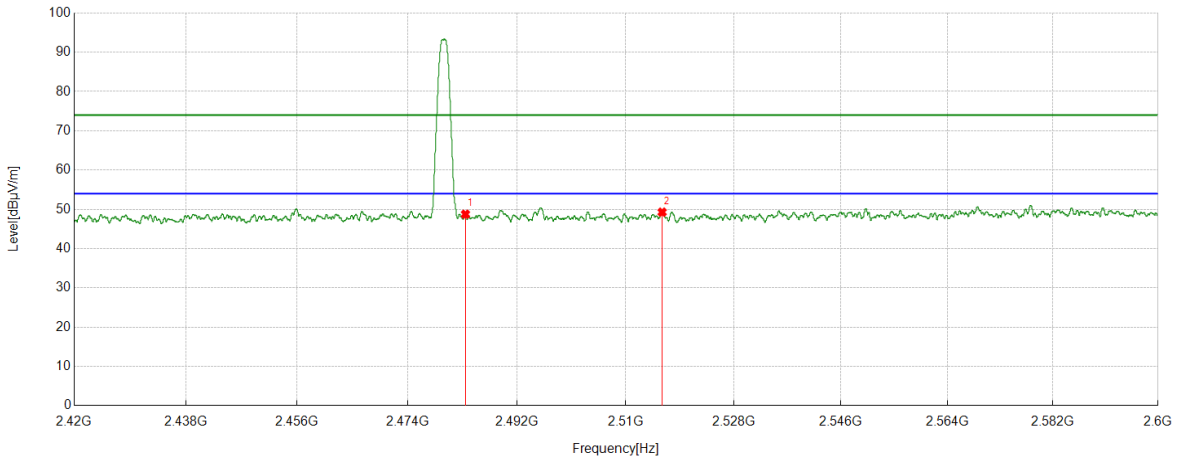


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2368.0335	38.68	10.07	48.75	74.00	25.25	Vertical
2	2390.0000	37.40	10.35	47.75	74.00	26.25	Vertical

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
 2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).
 3. Measurement = Reading Level + Correct Factor.
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
BLE	HCH	Horizontal	PASS

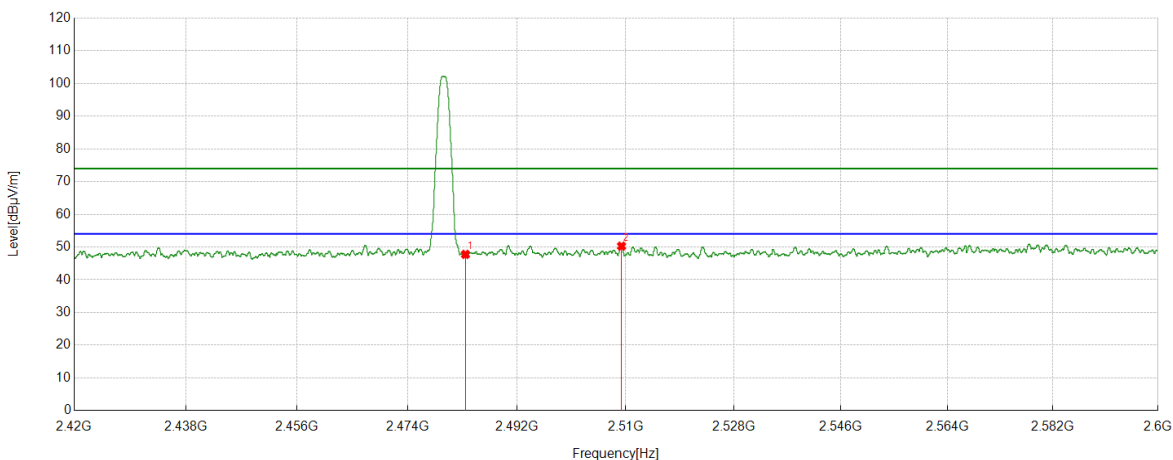


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5000	38.12	10.64	48.76	74.00	25.24	Horizontal
2	2516.042	38.24	11.04	49.28	74.00	24.72	Horizontal

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
 2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).
 3. Measurement = Reading Level + Correct Factor.
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
BLE	HCH	Vertical	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5000	37.12	10.64	47.76	74.00	26.24	Vertical
2	2509.2912	39.19	11.08	50.27	74.00	23.73	Vertical

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
 2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).
 3. Measurement = Reading Level + Correct Factor.
 4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.