

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Electric Bicycle

MODEL NUMBER: EB70

PROJECT NUMBER: 4791228933

REPORT NUMBER: 4791228933-1

FCC ID: 2AYF8-YBEB70

ISSUE DATE: Apr. 02, 2024

Prepared for

Zhejiang OKAI Vehicle CO., LTD

Prepared by

UL-CCIC COMPANY LIMITED

No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China

Tel: +86 512-6808 6400

Fax: +86 512-6808 4099

Website: www.ul.com

Revision History

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Zhejiang OKAI Vehicle CO., LTD
Address: No. 9, Xinxing Road, Xinbi Town, Jinyun County, Zhejiang, China

Manufacturer Information

Company Name: Zhejiang OKAI Vehicle CO., LTD
Address: No. 9, Xinxing Road, Xinbi Town, Jinyun County, Zhejiang, China

EUT Description

Product Name: Electric Bicycle
FCC Model Number: EB70
FCC Additional No.: /
Model Difference: /
Sample Number: 6998663
Data of Receipt Sample: Mar. 20, 2024
Test Date: Mar. 20, 2024~ Apr. 02, 2024

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

Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	6 dB Bandwidth and	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	PASS
7	Antenna Requirement	FCC 15.203	PASS
Note: 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.			

Prepared By:

Tom Tang

Tom Tang

Reviewed By:

Kevin Shen

Kevin Shen

Authorized By:

Leon Wu

Leon Wu

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, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA. 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. 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.
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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	3.1 dB
DTS Bandwidth	1.9 %
Maximum Conducted Output Power	1.3 dB
Maximum Power Spectral Density Level	1.5 dB
Band-edge Compliance	1.9%
Unwanted Emissions in Non-restricted Freq Bands	9kHz-30MHz: ± 0.90 dB 30MHz-1GHz: ± 1.5 dB 1GHz-12.75GHz: ± 1.9 dB 12.75GHz-26.5GHz: ± 2.1 dB
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-18GHz)
	3.9dB (18GHz-26.5GHz)
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:	Electric Bicycle	
Model Name:	EB70	
Technology:	Bluetooth - Low Energy	
Transmit Frequency Range:	2402 MHz ~ 2480 MHz	
Modulation:	GFSK	
Data Rate:	LE 1M	1 Mbps
Test software of EUT:	EspRFTTestTool (manufacturer declare)	
Antenna Type:	Chip Antenna	
Antenna Gain:	1.3 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	2402-2480	0-39[40]	0.87

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 Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		EspRFTTestTool		
Modulation Type	Transmit Antenna Number	Test Channel		
		LCH	MCH	HCH
GFSK	1	9	8	8

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	Chip Antenna	1.3 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	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.

5.7. THE WORSE CASE CONFIGURATIONS

For BLE module, the product only supports 1 Mbps, so 1 Mbps was tested and the test result was recorded in this report.

5.8. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	101kPa	
Temperature	TN	23 ~ 28°C
Voltage:	VL	N/A
	VN	AC 120V for line conducted emission, DC 5V for antenna port test and radiated test
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O PORT

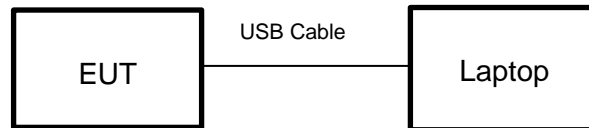
Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	USB	100cm Length	/

ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Li-ion Battery Charger	MDA	BC323480030	INPUT: 100-240V~, 2.5A 50/60Hz OUTPUT: 54.6V=3.0A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS

5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted 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	ESR3	126700	2022-11-26	2023-11-25	2024-11-24	
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	126701	2022-11-26	2023-11-25	2024-11-24	
<input checked="" type="checkbox"/>	Artificial Mains Networks	R&S	ENY81	126712	2022-09-27	2023-09-26	2024-09-25	
Software								
Used	Description		Manufacturer		Name	Version		
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance		R&S		EMC32	Ver. 9.25		
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	2023-04-08	2024-04-07	
<input checked="" type="checkbox"/>	EMI test receiver	R&S	ESR26	126703	2022-11-26	202-11-25	2024-11-24	
<input checked="" type="checkbox"/>	Spectrum Analyzer	R&S	FSV3044	222992	2022-05-20	2023-04-08	2024-04-07	
<input checked="" type="checkbox"/>	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-04	2021-06-03	2024-06-02	
<input checked="" type="checkbox"/>	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	177821	2019-01-28	2022-01-18	2025-01-17	
<input checked="" type="checkbox"/>	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2019-01-27	2022-02-28	2025-02-27	
<input checked="" type="checkbox"/>	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-02-29	2022-02-28	2025-02-27	
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	Tonsched	TAP01018050	224539	2022-10-11	2023-10-10	2024-10-09	
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	R&S	SCU-18D	134667	2022-11-26	2023-11-25	2024-11-24	
<input checked="" type="checkbox"/>	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2022-11-26	2023-11-25	2024-11-24	
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCGV12-2375-2400-2485-2510-40SS	1	2022-12-19	2023-12-18	2024-12-17	
<input checked="" type="checkbox"/>	High Pass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	2	2022-12-19	2023-12-18	2024-12-17	
Software								
Used	Description		Manufacturer		Name		Version	
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance		Tonscend		TS+		Ver. 2.5	
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	2022-05-20	2023-04-08	2024-04-07	
<input checked="" type="checkbox"/>	Power Meter	MWT	MW100-RFCB	221694	2022-05-23	2023-04-08	2024-04-07	
<input checked="" type="checkbox"/>	Attenuator	PASTERNACK	PE7087-6	1624	2022-05-23	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	8.3.1.3
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4
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

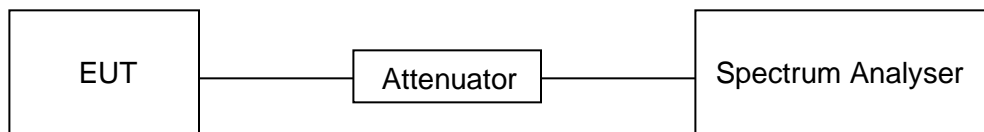
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

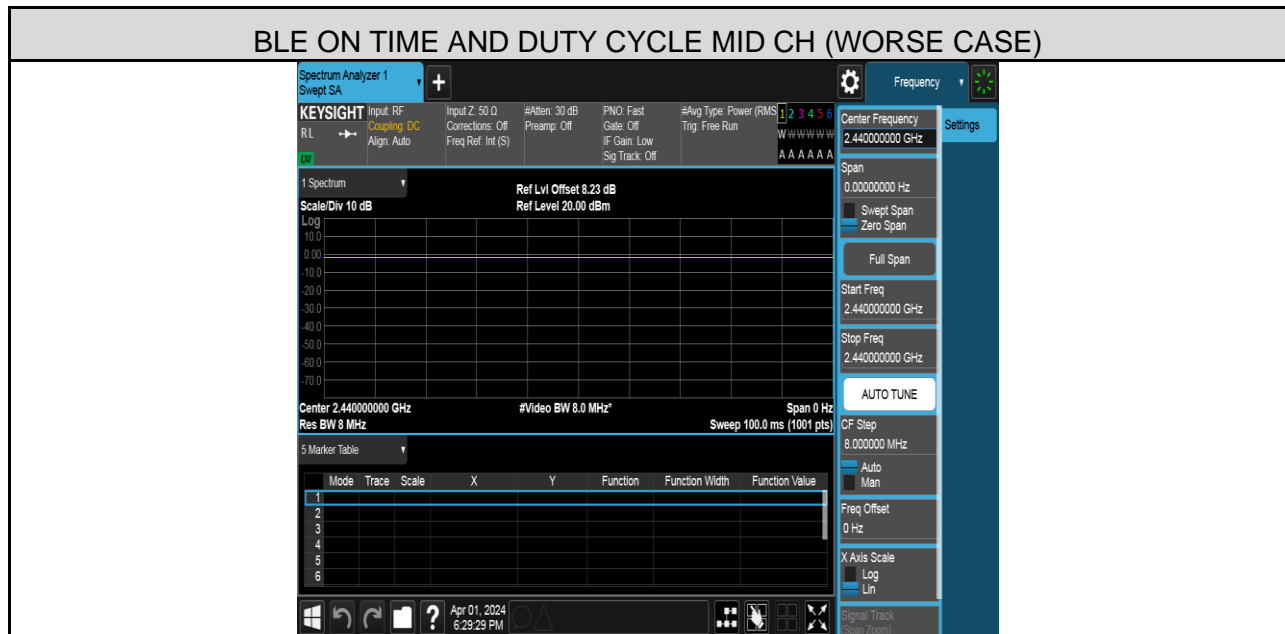
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

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	100	100	100	100%	0	0.01	0.01

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



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)	6dB Bandwidth	$\geq 500\text{kHz}$	2400-2483.5

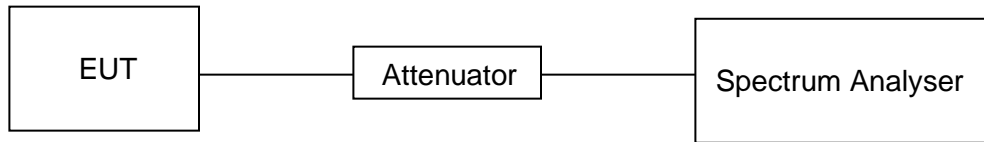
TEST PROCEDURE

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	Enough to capture all products of the modulation carrier emission
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

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.

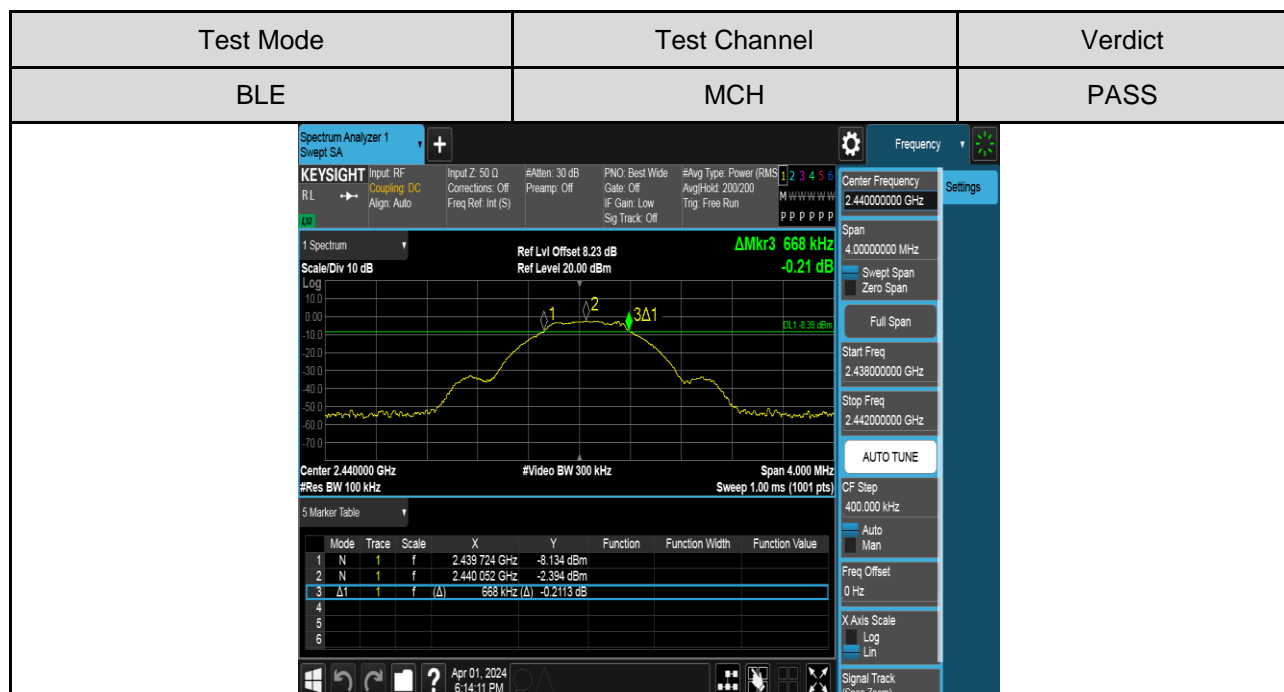
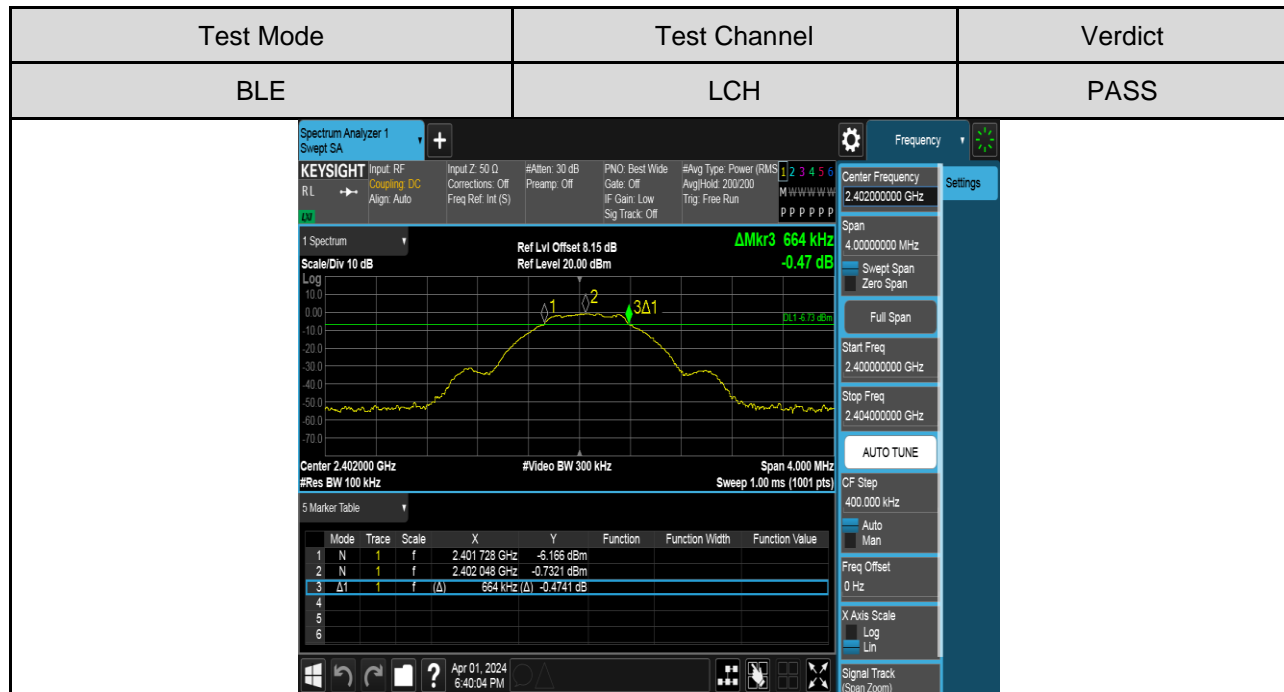
TEST SETUP**TEST ENVIRONMENT**

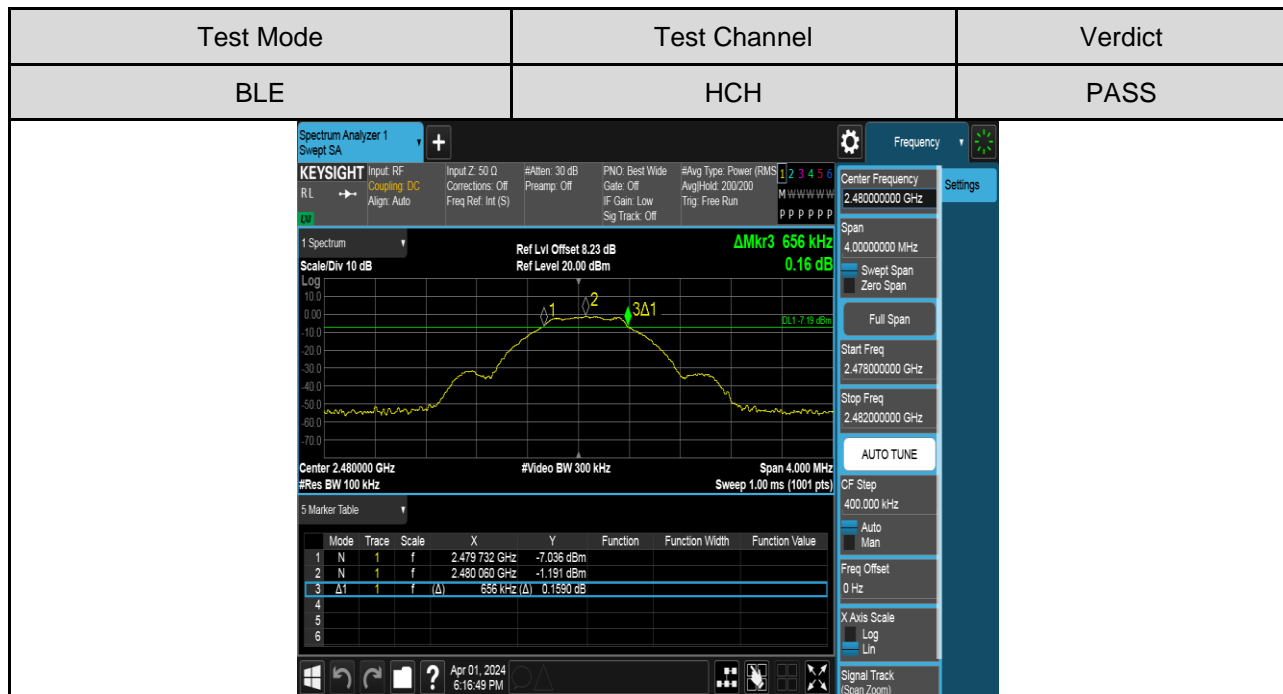
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

TEST RESULTS TABLE

Test Mode	Test Channel	6dB bandwidth (MHz)	Result
BLE	LCH	0.664	Pass
	MCH	0.668	Pass
	HCH	0.656	Pass

TEST GRAPHS





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

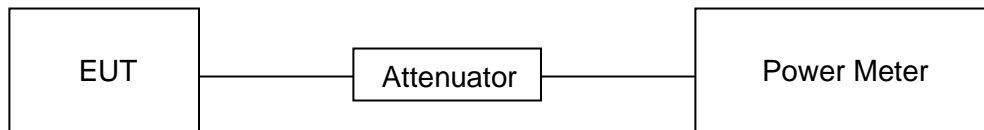
TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure the power of each channel.
PK Detector used for PK result.

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

TEST SETUP



TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Conducted Output Power (PK)	LIMIT
		dBm	dBm
BLE	LCH	0.87	30
	MCH	-0.87	30
	HCH	0.25	30

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	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

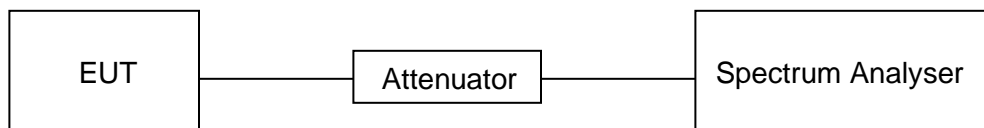
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

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

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

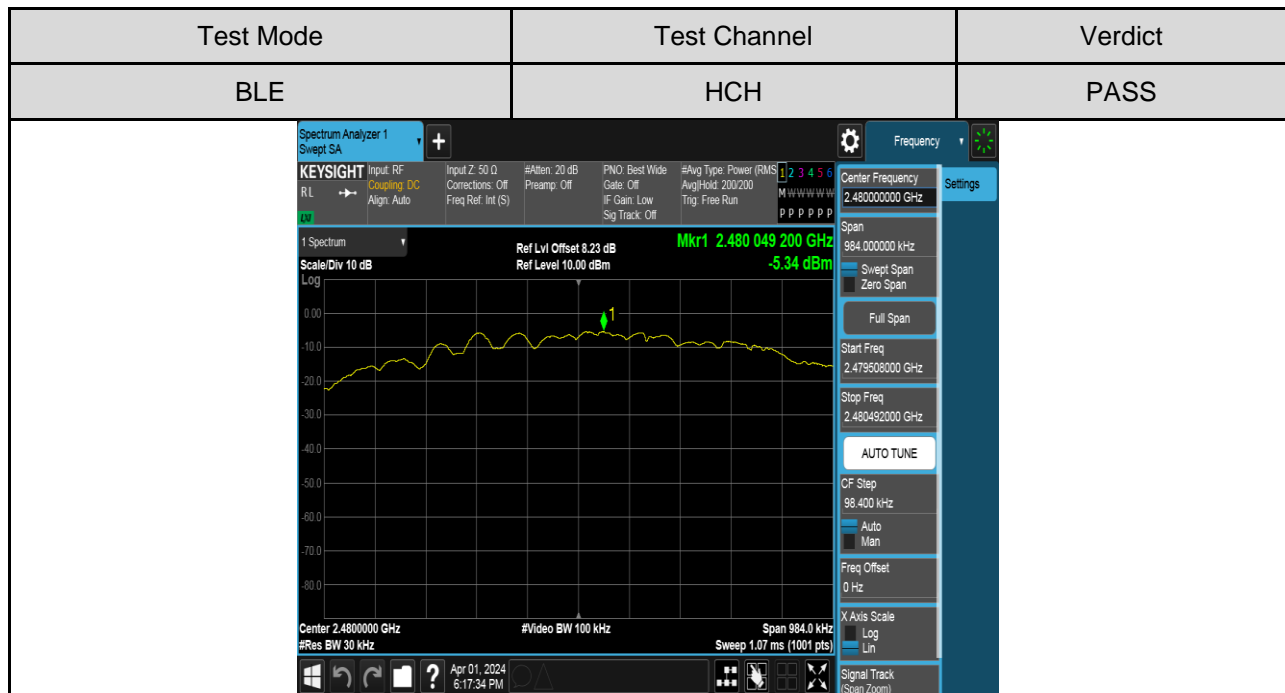
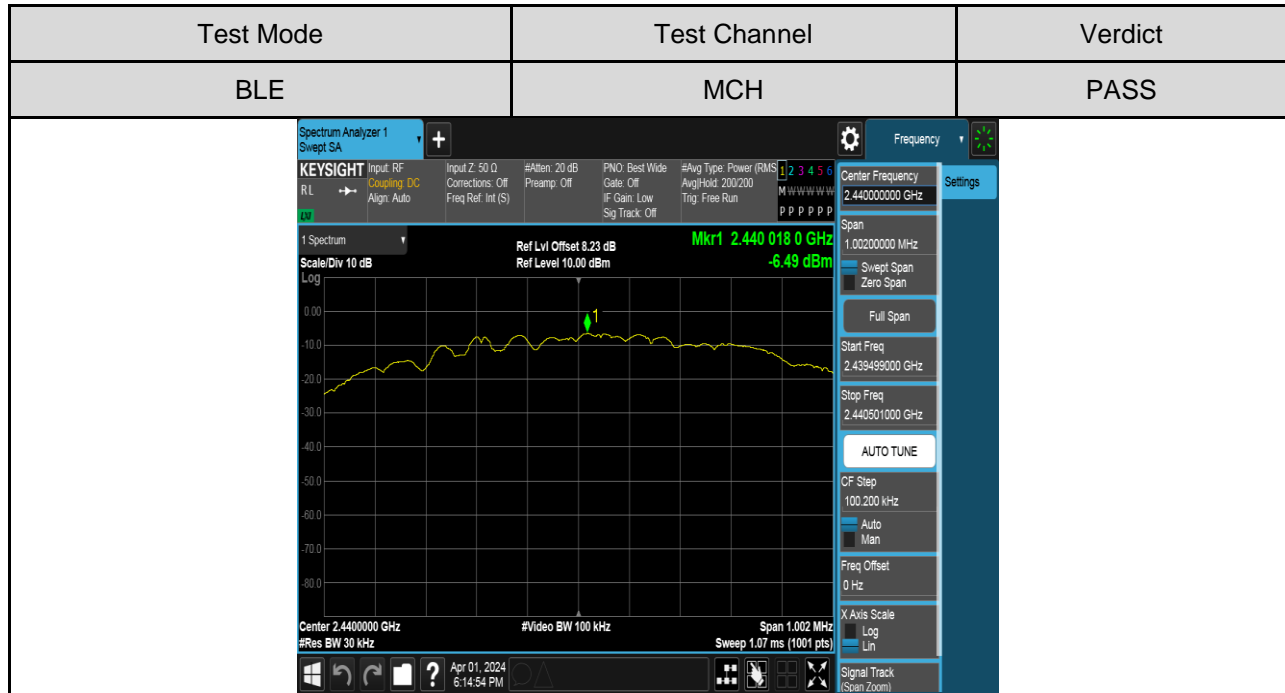
TEST SETUP



Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
BLE	LCH	-4.76	30
	MCH	-6.49	30
	HCH	-5.34	30

Test Mode	Test Channel	Verdict
BLE	LCH	PASS

The screenshot displays a Keysight Spectrum Analyzer interface. The main display shows a spectrum plot with a peak labeled '1' at a frequency of 2.4020189 GHz and a power level of -4.76 dBm. The plot is set to a logarithmic scale with a resolution bandwidth of 30 kHz. The center frequency is 2.4020000 GHz, and the span is 996.000000 kHz. The reference level is 10.00 dBm, and the reference level offset is 8.15 dB. The interface includes various settings panels on the right, such as Frequency, Span, Start Freq, Stop Freq, AUTO TUNE, CF Step, Freq Offset, X Axis Scale, and Signal Track. The bottom status bar shows the date and time as Apr 01, 2024, 6:40:47 PM.



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:

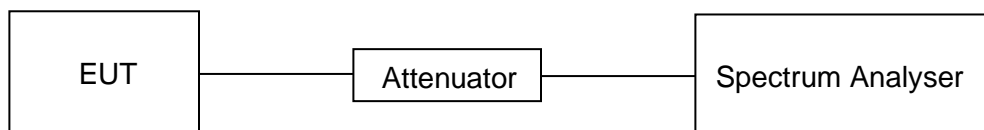
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

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

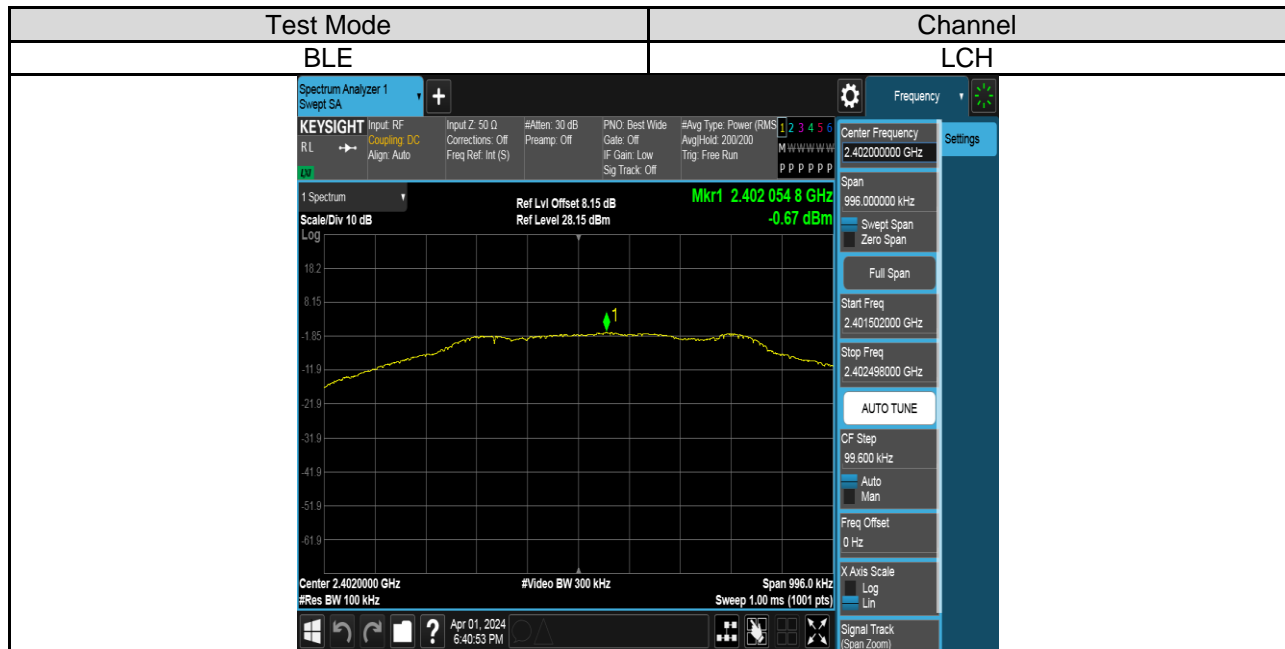
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

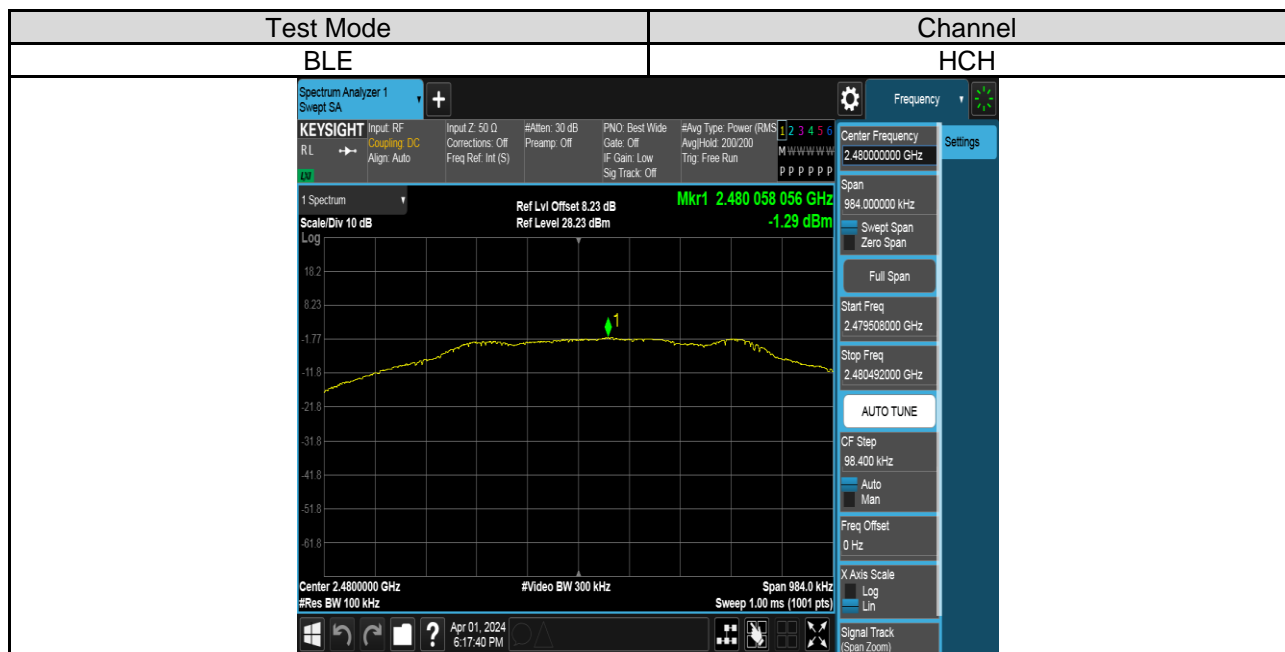
PART 1: REFERENCE LEVEL MEASUREMENT

TEST RESULTS TABLE

Test Mode	Test Channel	Result[dBm]
BLE	LCH	-0.67
	MCH	-2.38
	HCH	-1.29

TEST GRAPHS

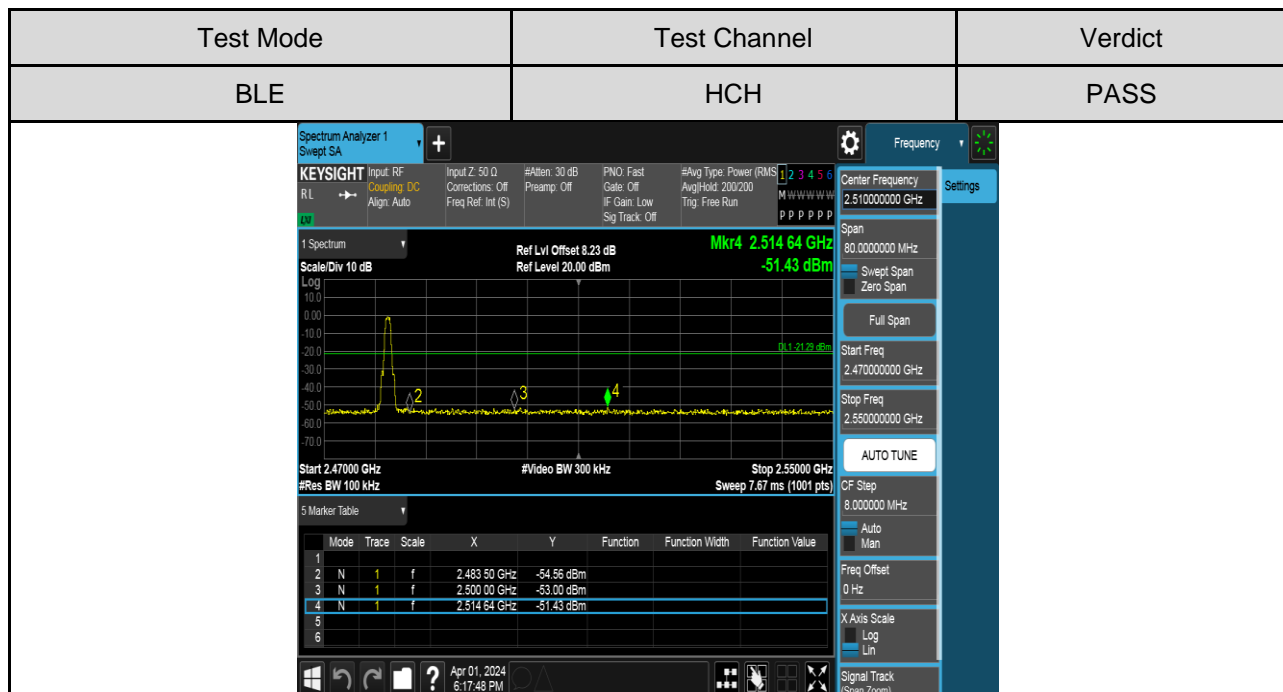
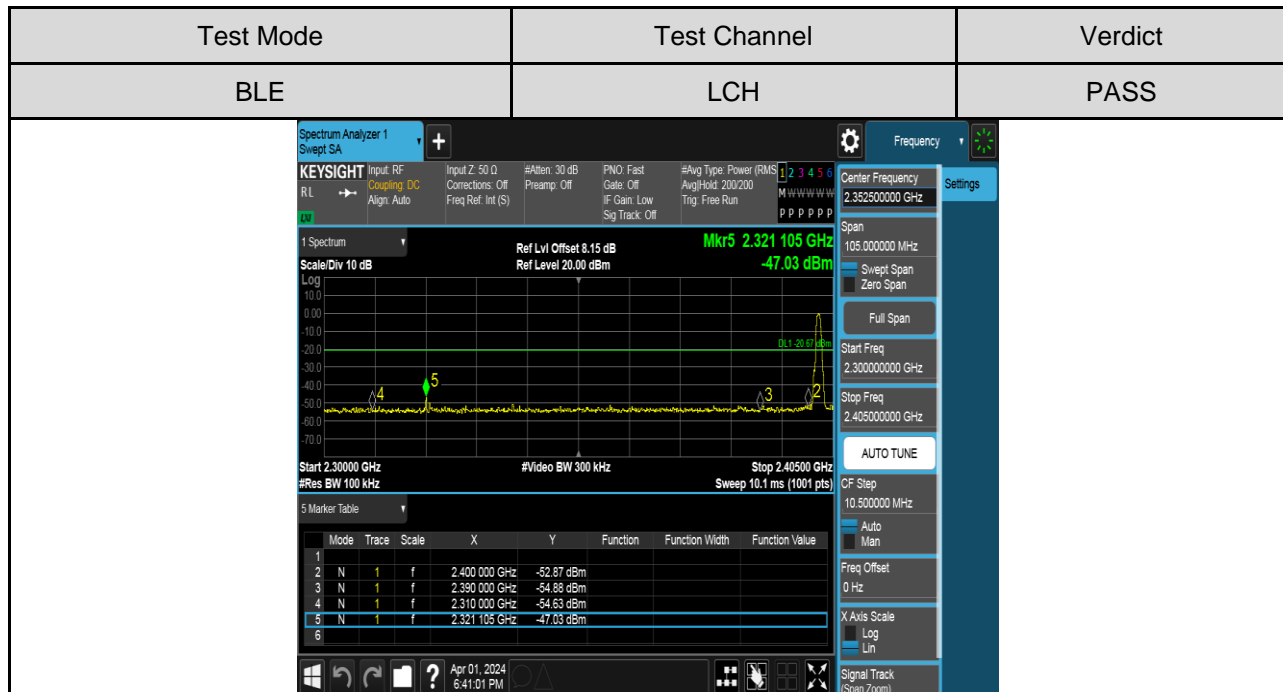




PART 2: CONDUCTED BANEDGE**TEST RESULTS TABLE**

Test Mode	Test Channel	Result	Verdict
BLE	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS

TEST GRAPHS

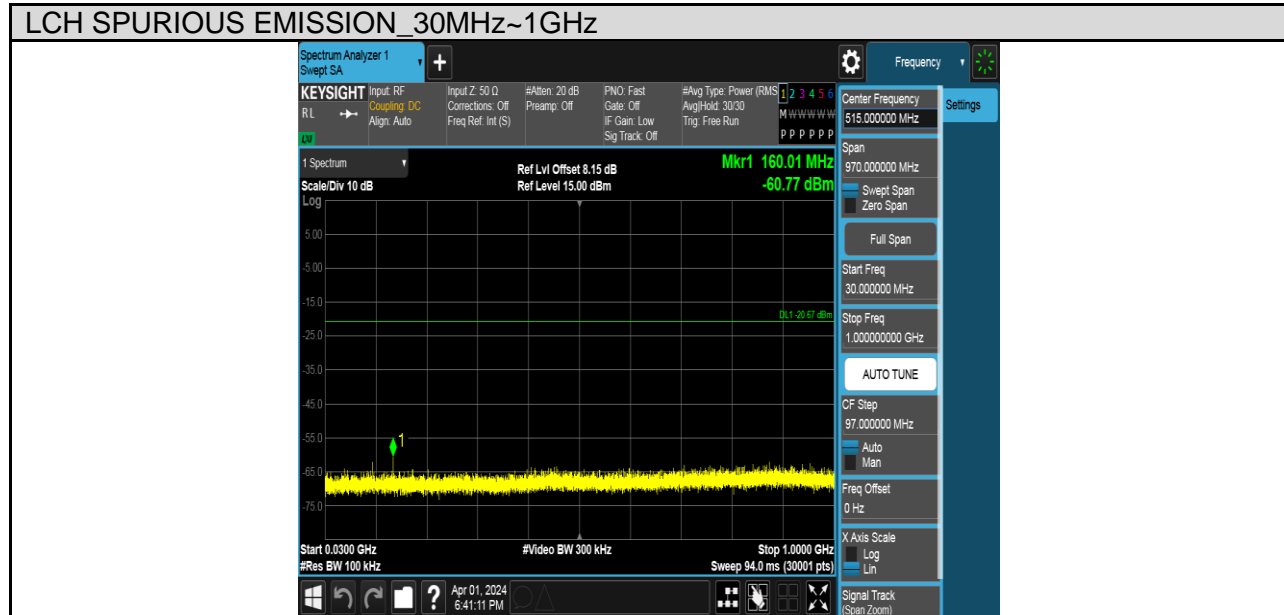


PART 3: CONDUCTED SPURIOUS EMISSION**TEST RESULTS TABLE**

Test Mode	Test Channel	Result	Verdict
BLE	LCH	Refer to the Test Graph	PASS
	MCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS

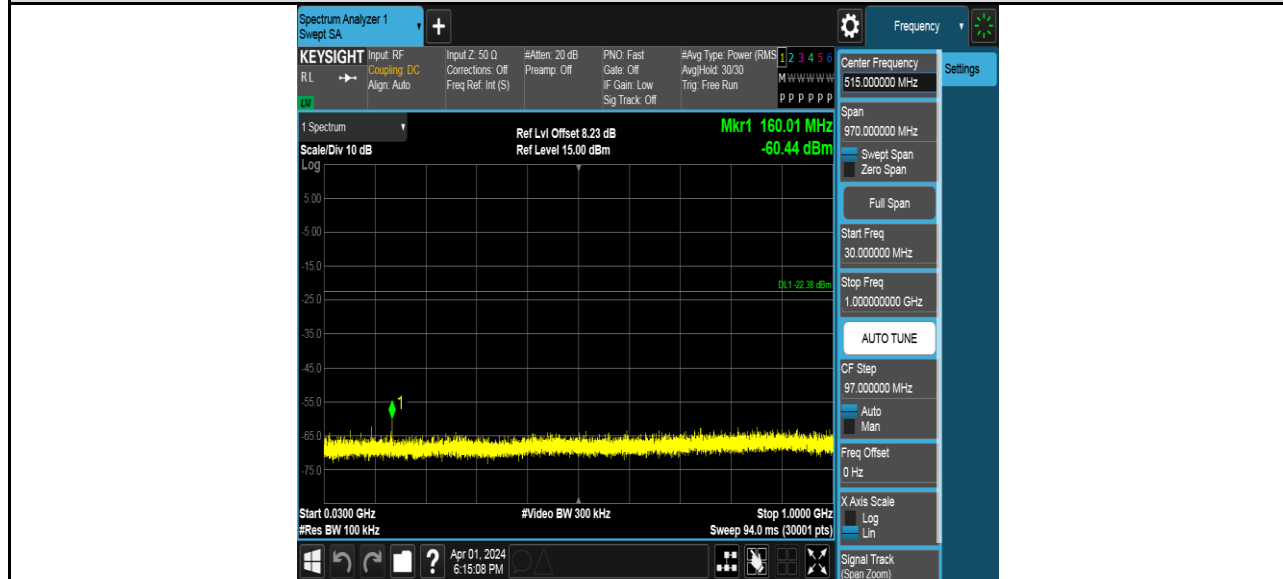
TEST GRAPHS

Test Mode	Channel	Verdict
BLE	LCH	PASS



Test Mode	Channel	Verdict
BLE	MCH	PASS

MCH SPURIOUS EMISSION_30MHz~1GHz

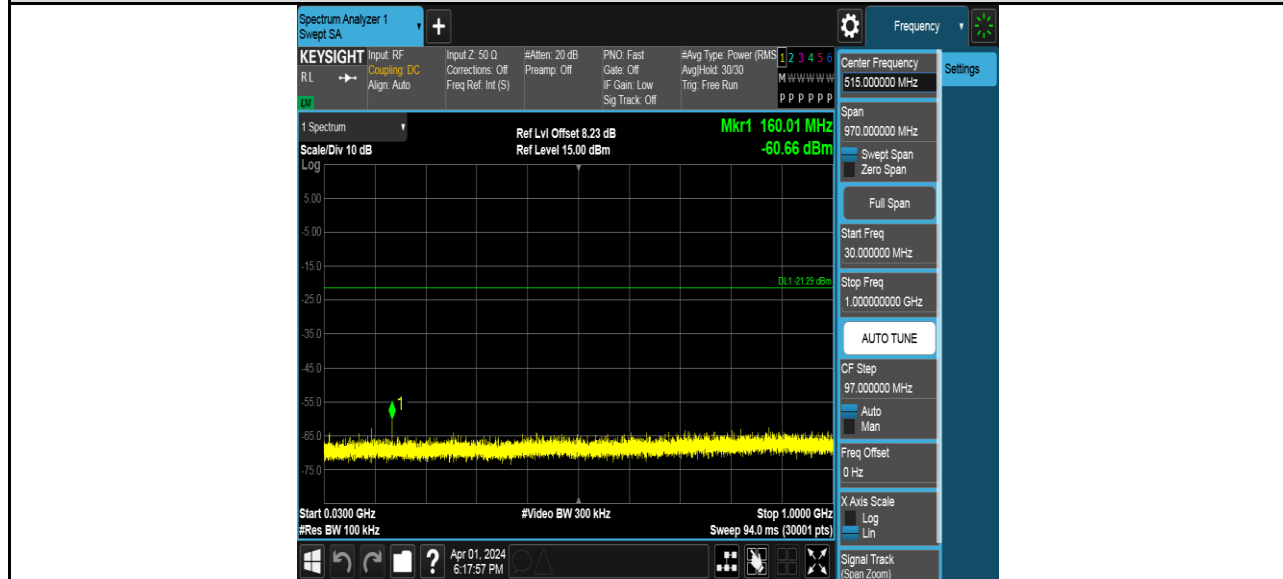


MCH SPURIOUS EMISSION_1GHz~26.5GHz

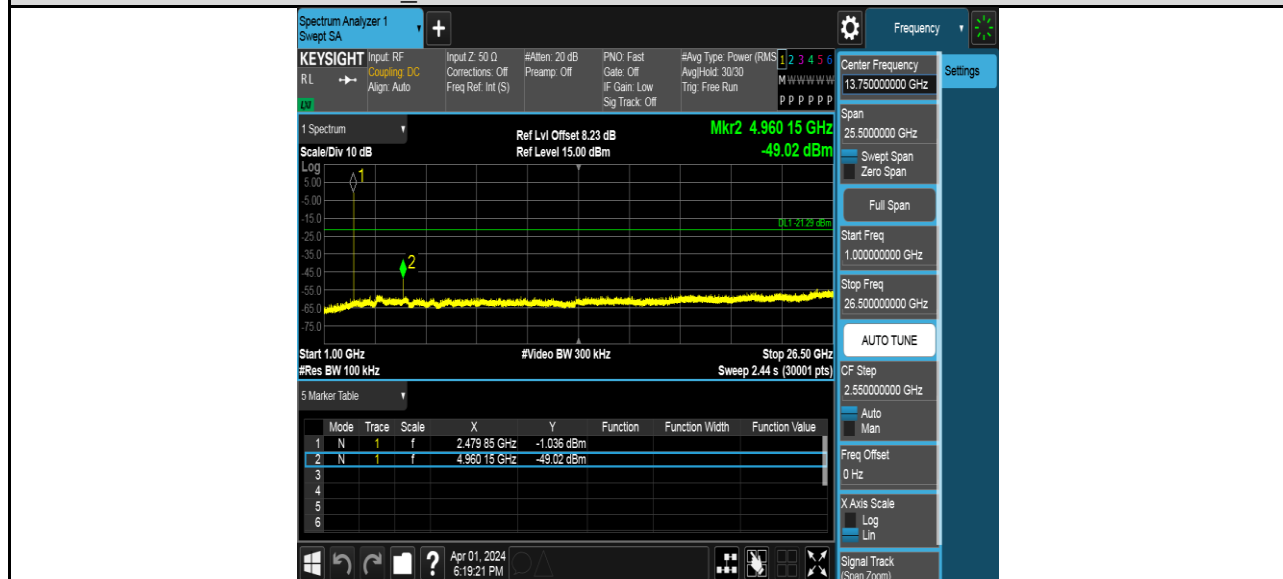


Test Mode	Channel	Verdict
BLE	HCH	PASS

HCH SPURIOUS EMISSION_30MHz~1GHz



HCH SPURIOUS EMISSION_1GHz~26.5GHz



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

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

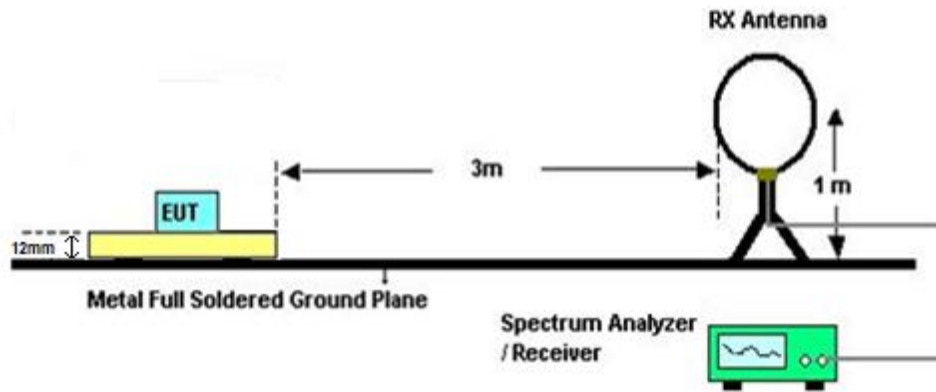
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218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

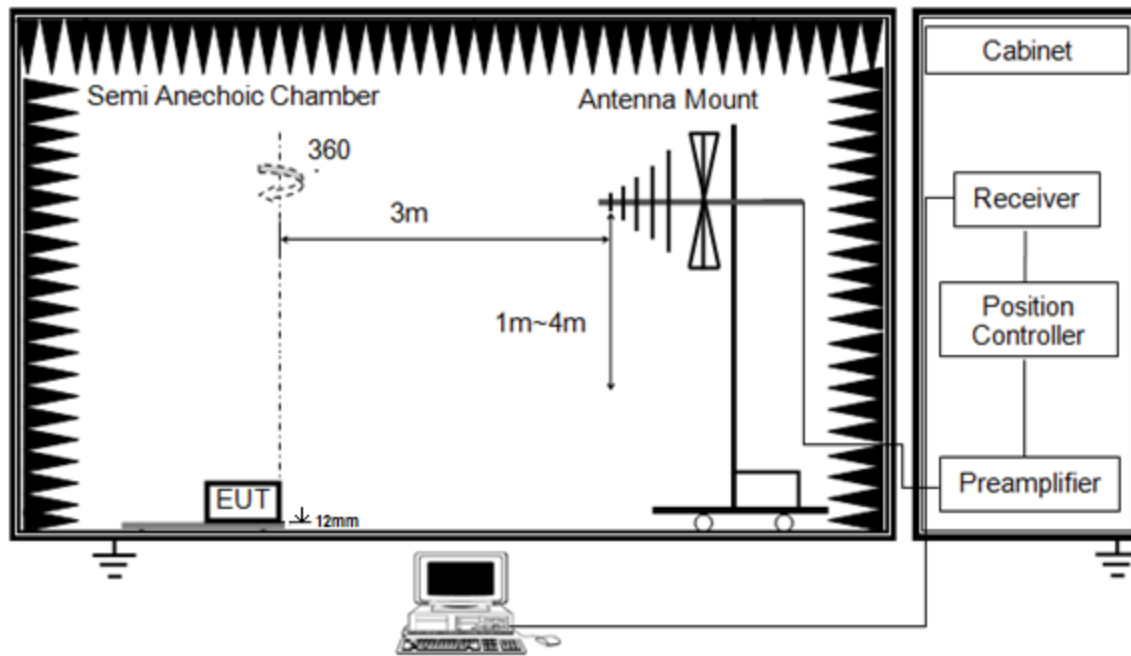


The setting of the spectrum analyser

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 12 mm 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)

Below 1G

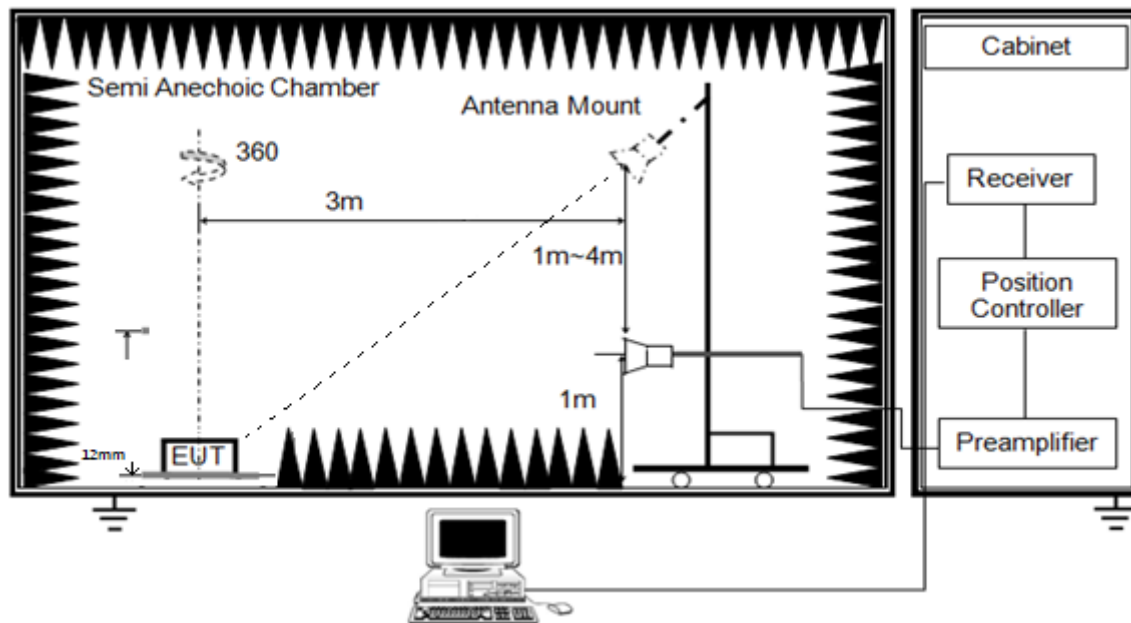


The setting of the spectrum analyser

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 12 mm 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

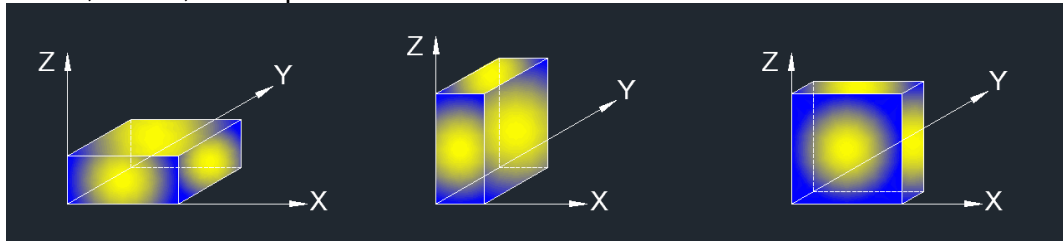


The setting of the spectrum analyser

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 12mm 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 $[50 \cdot (1/\text{Duty Cycle})]$ 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 (Y axis) data recorded in the report.

8.2. TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

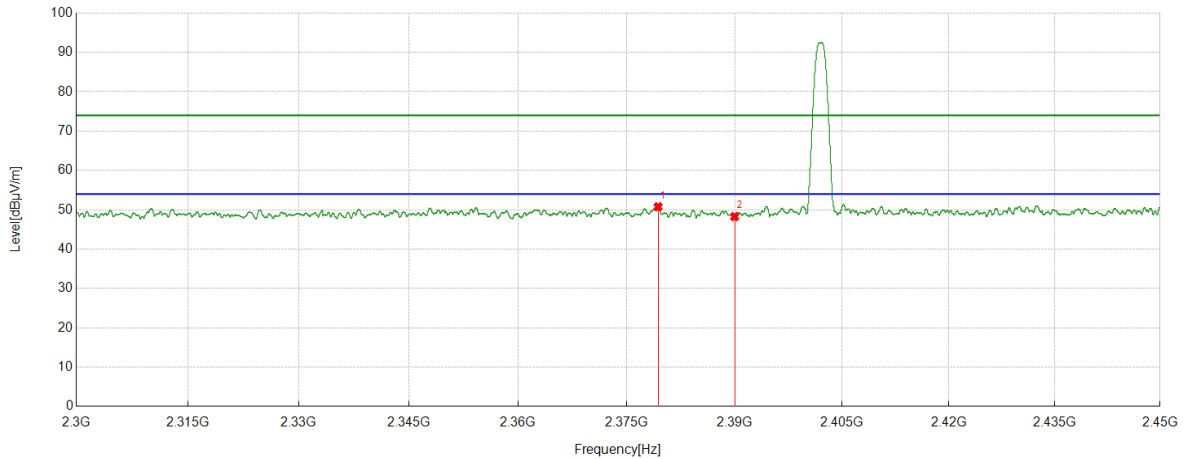
8.3. RESTRICTED BANDEDGE

TEST RESULT TABLE

Test Mode	Channel	Puw(dBm)	Verdict
BLE	LCH	<Limit	PASS
	HCH	<Limit	PASS

TEST GRAPHS

Test Mode	Channel	Polarization	Verdict
BLE	LCH	Horizontal	PASS

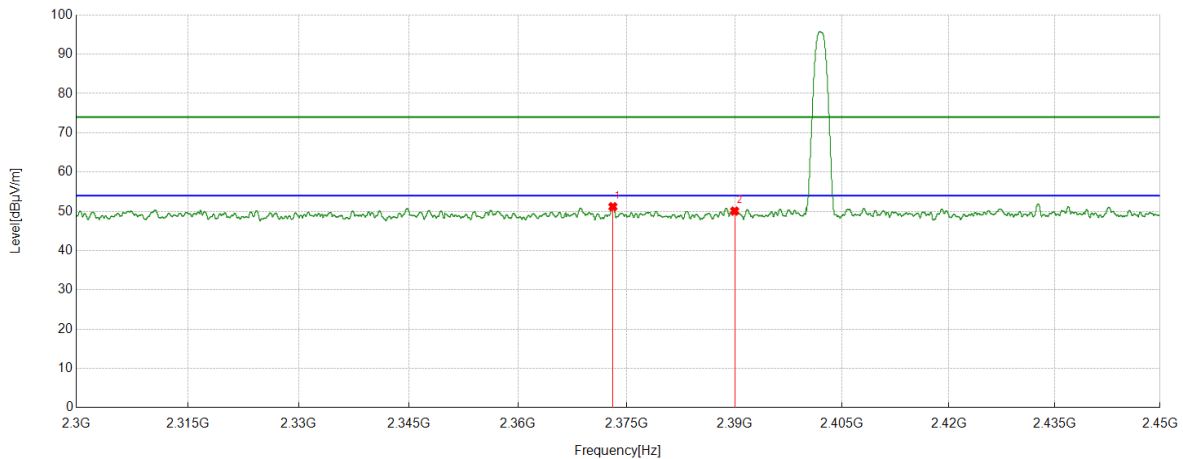


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2379.3599	37.16	13.60	50.76	74.00	-23.24	Horizontal
2	2390.0000	34.78	13.48	48.26	74.00	-25.74	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

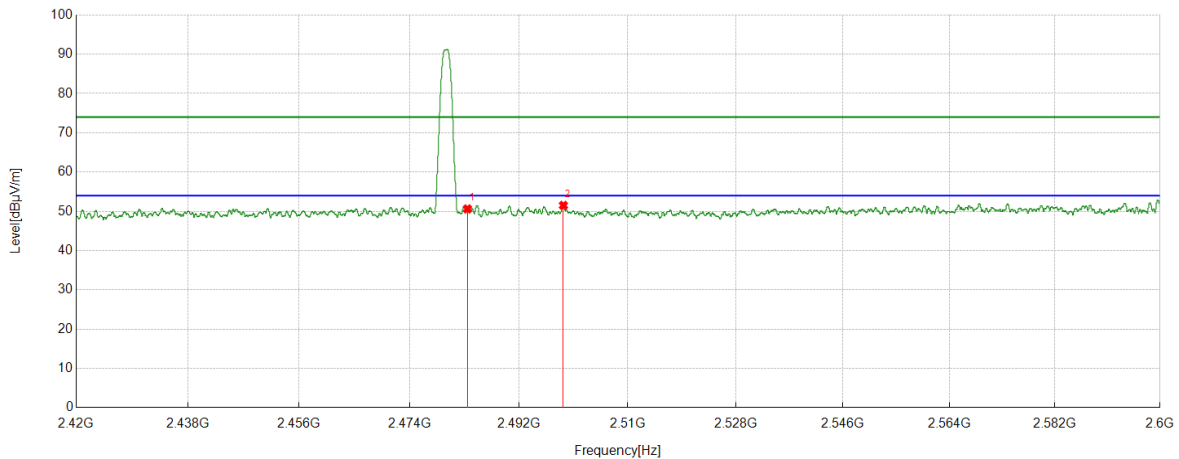


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2373.0966	37.61	13.56	51.17	74.00	-22.83	Vertical
2	2390.0000	36.58	13.48	50.06	74.00	-23.94	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

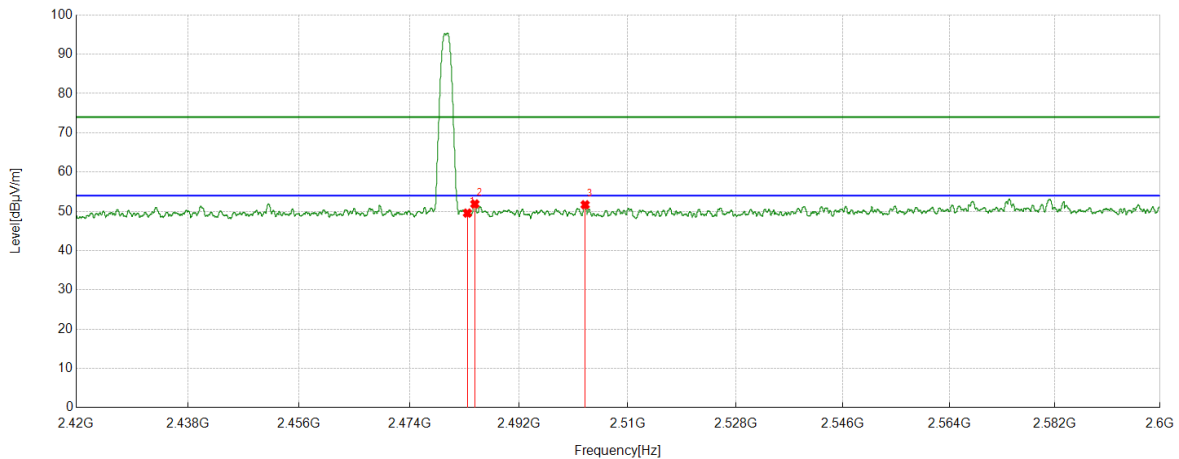


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5000	36.36	14.25	50.61	74.00	-23.39	Horizontal
2	2499.3224	37.21	14.29	51.50	74.00	-22.50	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	35.30	14.25	49.55	74.00	-24.45	Vertical
2	2484.7181	37.59	14.28	51.87	74.00	-22.13	Vertical
3	2502.9229	37.33	14.34	51.67	74.00	-22.33	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.

8.4. SPURIOUS EMISSIONS

TEST RESULTS TABLE

1) For 1GHz~18GHz

Test Mode	Channel	P _{uw} (dBm)	Verdict
BLE	LCH	<Limit	PASS
	MCH	<Limit	PASS
	HCH	<Limit	PASS

Note:

Through pre-testing all the test modes and test channels, but only the data of the worst case is included in this test report.

2) For 9kHz~30MHz

Test Mode	Channel	P _{uw} (dBm)	Verdict
BLE	HCH	<Limit	PASS

Note:

Through pre-testing all the test modes and test channels, but only the data of the worst case is included in this test report.

3) For 30MHz~1GHz

Test Mode	Channel	P _{uw} (dBm)	Verdict
BLE	HCH	<Limit	PASS

Note:

Through pre-testing all the test modes and test channels, but only the data of the worst case is included in this test report.

4) For 18GHz~26.5GHz

Test Mode	Channel	P _{uw} (dBm)	Verdict
BLE	HCH	<Limit	PASS

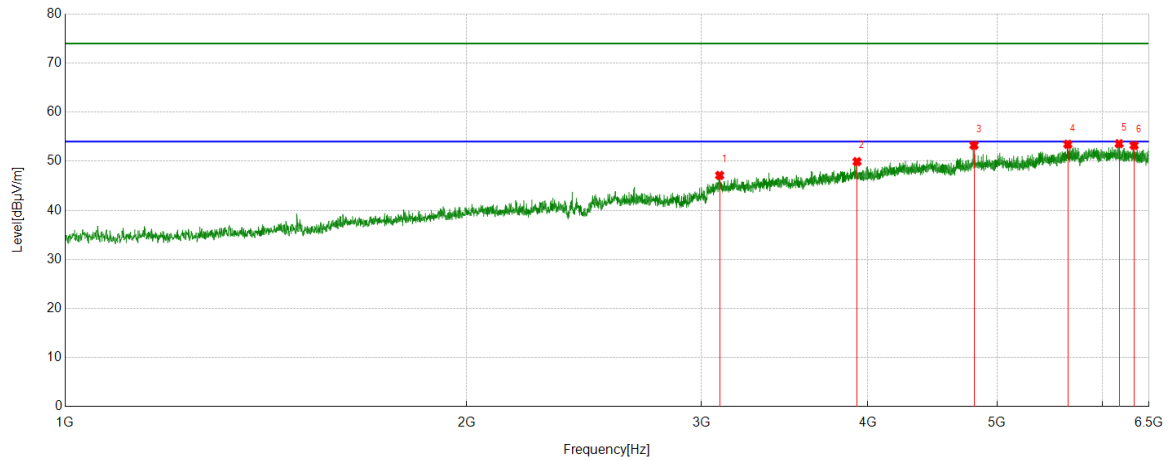
Note:

Through pre-testing all the test modes and test channels, but only the data of the worst case is included in this test report.

Part 1: 1GHz~6.5GHz

HARMONICS AND SPURIOUS EMISSIONS

Test Mode	Channel	Polarization	Verdict
BLE	LCH	Horizontal	PASS

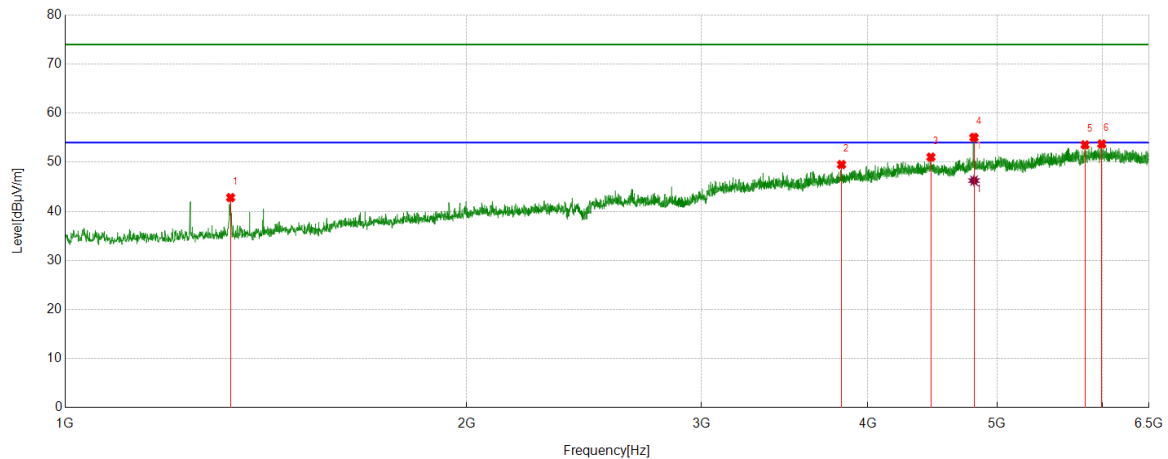


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	3096.4496	37.65	9.47	47.12	74.00	-26.88	Horizontal
2	3925.6782	37.46	12.46	49.92	74.00	-24.08	Horizontal
3	4804.4131	37.80	15.46	53.26	74.00	-20.74	Horizontal
4	5649.4562	36.00	17.46	53.46	74.00	-20.54	Horizontal
5	6172.7091	34.83	18.74	53.57	74.00	-20.43	Horizontal
6	6334.2918	34.24	18.99	53.23	74.00	-20.77	Horizontal

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. 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	1330.7288	43.88	-1.08	42.80	74.00	-31.20	Vertical
2	3821.8527	37.23	12.29	49.52	74.00	-24.48	Vertical
3	4459.9325	36.11	14.94	51.05	74.00	-22.95	Vertical
4	4804.4131	39.55	15.46	55.01	74.00	-18.99	Vertical
5	5819.9775	34.89	18.66	53.55	74.00	-20.45	Vertical
6	5990.4988	35.40	18.31	53.71	74.00	-20.29	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4804.4131	30.80	15.46	46.26	54.00	-7.74	Vertical

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

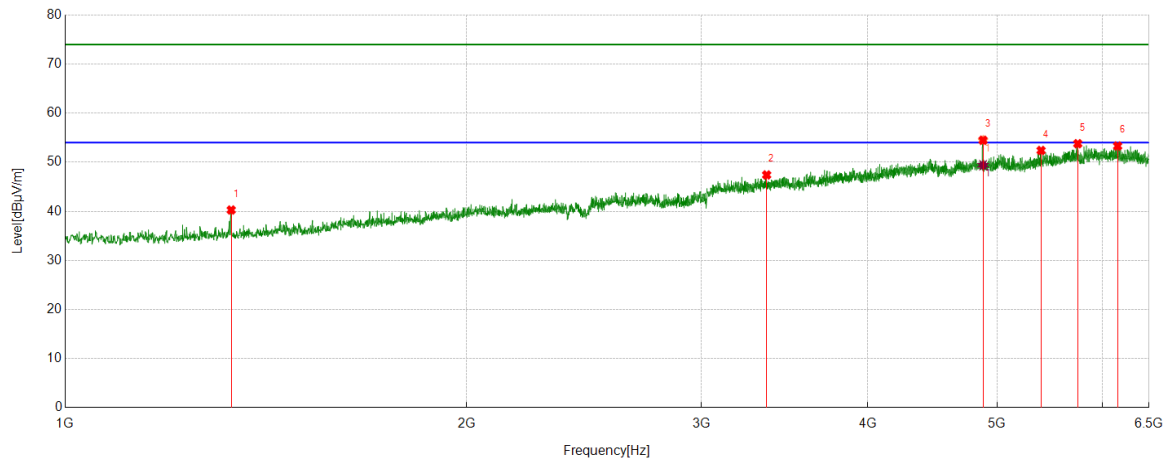
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. Peak: Peak detector.

5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.

6. 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	MCH	Horizontal	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1332.1040	41.38	-1.11	40.27	74.00	-33.73	Horizontal
2	3358.4198	37.29	10.12	47.41	74.00	-26.59	Horizontal
3	4880.0475	39.29	15.20	54.49	74.00	-19.51	Horizontal
4	5394.3618	35.66	16.74	52.40	74.00	-21.60	Horizontal
5	5747.0934	36.06	17.72	53.78	74.00	-20.22	Horizontal
6	6156.8946	34.73	18.57	53.30	74.00	-20.70	Horizontal

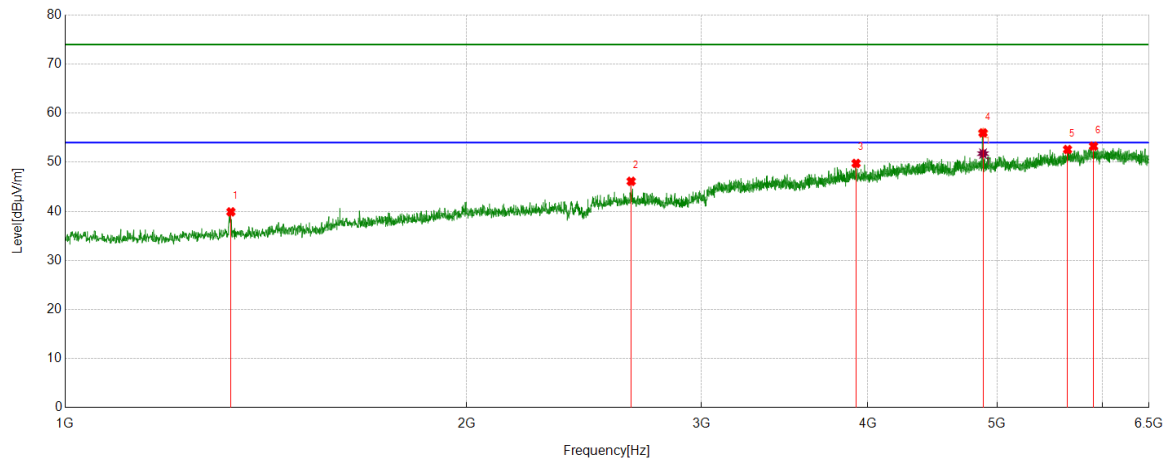
AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4880.0475	34.20	15.20	49.40	54.00	-4.60	Horizontal

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. 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	MCH	Vertical	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1331.4164	40.98	-1.09	39.89	74.00	-34.11	Vertical
2	2657.7697	39.99	6.12	46.11	74.00	-27.89	Vertical
3	3919.4899	37.40	12.37	49.77	74.00	-24.23	Vertical
4	4880.0475	40.73	15.20	55.93	74.00	-18.07	Vertical
5	5646.7058	35.08	17.51	52.59	74.00	-21.41	Vertical
6	5905.9257	35.19	18.08	53.27	74.00	-20.73	Vertical

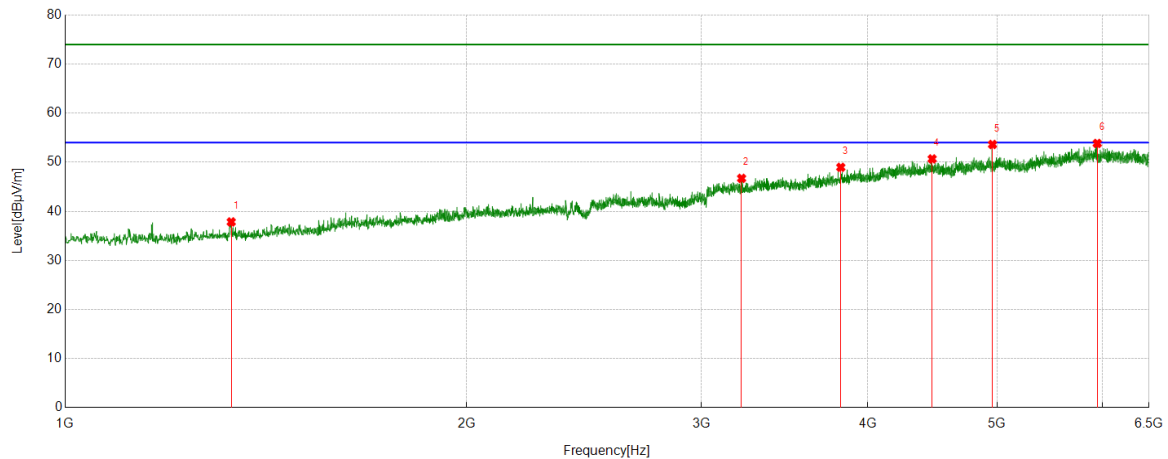
AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4880.0475	36.56	15.20	51.76	54.00	-2.24	Vertical

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. 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

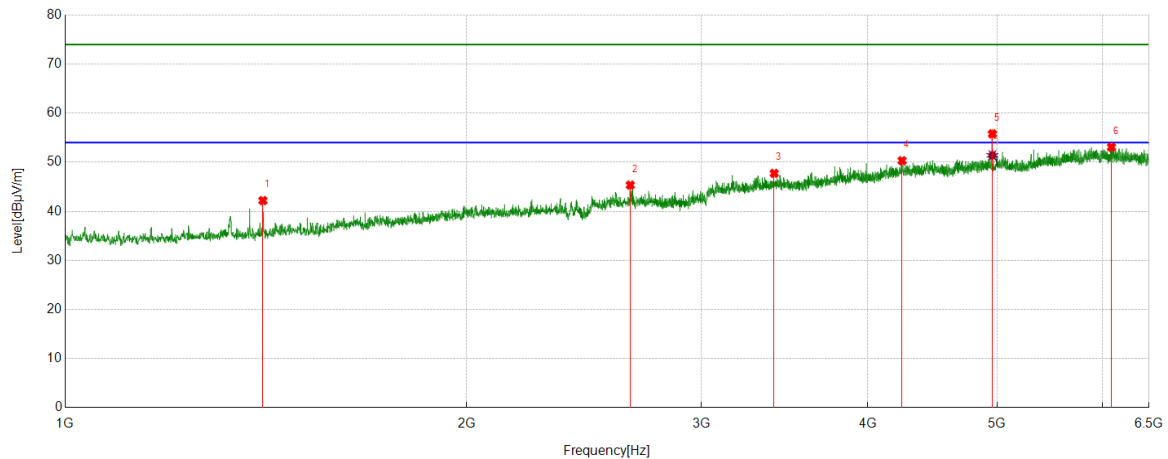


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1332.104	38.95	-1.11	37.84	74.00	-36.16	Horizontal
2	3216.0895	37.30	9.42	46.72	74.00	-27.28	Horizontal
3	3817.0396	36.77	12.20	48.97	74.00	-25.03	Horizontal
4	4469.5587	36.15	14.53	50.68	74.00	-23.32	Horizontal
5	4960.4951	38.12	15.50	53.62	74.00	-20.38	Horizontal
6	5943.743	35.38	18.45	53.83	74.00	-20.17	Horizontal

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. 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	1407.0509	43.53	-1.34	42.19	74.00	-31.81	Vertical
2	2653.6442	39.04	6.30	45.34	74.00	-28.66	Vertical
3	3402.4253	37.49	10.24	47.73	74.00	-26.27	Vertical
4	4243.3429	36.36	13.96	50.32	74.00	-23.68	Vertical
5	4959.8075	40.26	15.51	55.77	74.00	-18.23	Vertical
6	6091.5739	34.91	18.17	53.08	74.00	-20.92	Vertical

AV Result:

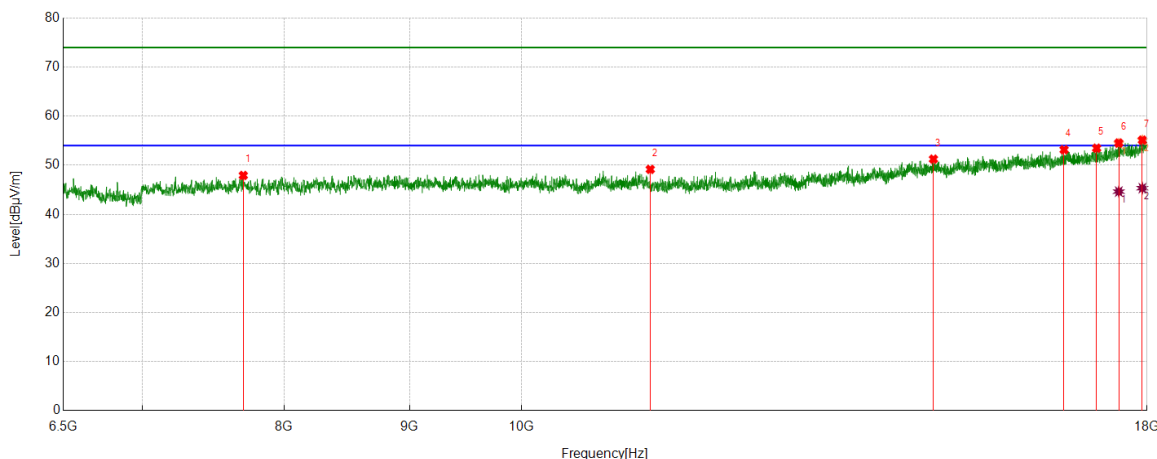
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4959.8075	35.89	15.51	51.40	54.00	-2.60	Vertical

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Part 2: 6.5GHz~18GHz

HARMONICS AND SPURIOUS EMISSIONS

Test Mode	Channel	Polarization	Verdict
BLE	LCH	Horizontal	PASS



PK Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	7699.0249	42.35	5.57	47.92	74.00	-26.08	Horizontal
2	11286.0358	42.00	7.16	49.16	74.00	-24.84	Horizontal
3	14726.4033	38.45	12.80	51.25	74.00	-22.75	Horizontal
4	16650.0188	37.45	15.70	53.15	74.00	-20.85	Horizontal
5	17167.5834	37.00	16.47	53.47	74.00	-20.53	Horizontal
6	17528.4411	36.95	17.58	54.53	74.00	-19.47	Horizontal
7	17920.9276	35.76	19.36	55.12	74.00	-18.88	Horizontal

AV Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	17528.4411	27.05	17.58	44.63	54.00	-9.37	Horizontal
2	17920.9276	25.97	19.36	45.33	54.00	-8.67	Horizontal

Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.

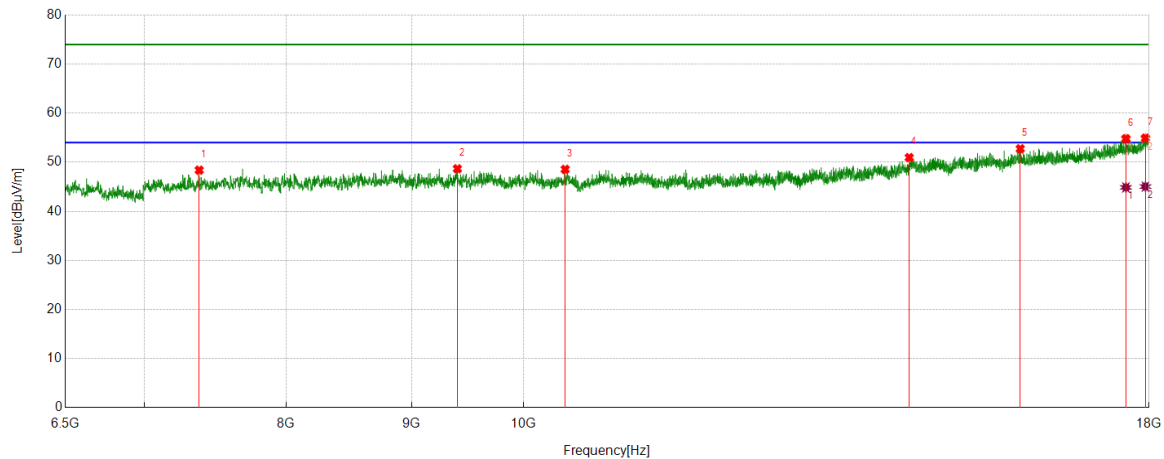
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.

4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).

5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.

6. 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 [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	7372.6716	44.10	4.29	48.39	74.00	-25.61	Vertical
2	9396.9246	42.08	6.59	48.67	74.00	-25.33	Vertical
3	10398.9874	41.83	6.72	48.55	74.00	-25.45	Vertical
4	14368.4211	38.30	12.65	50.95	74.00	-23.05	Vertical
5	15948.4311	38.29	14.45	52.74	74.00	-21.26	Vertical
6	17613.2642	36.73	18.06	54.79	74.00	-19.21	Vertical
7	17939.6175	35.46	19.45	54.91	74.00	-19.09	Vertical

AV Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	17613.2642	26.81	18.06	44.87	54.00	-9.13	Vertical
2	17939.6175	25.59	19.45	45.04	54.00	-8.96	Vertical

Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.

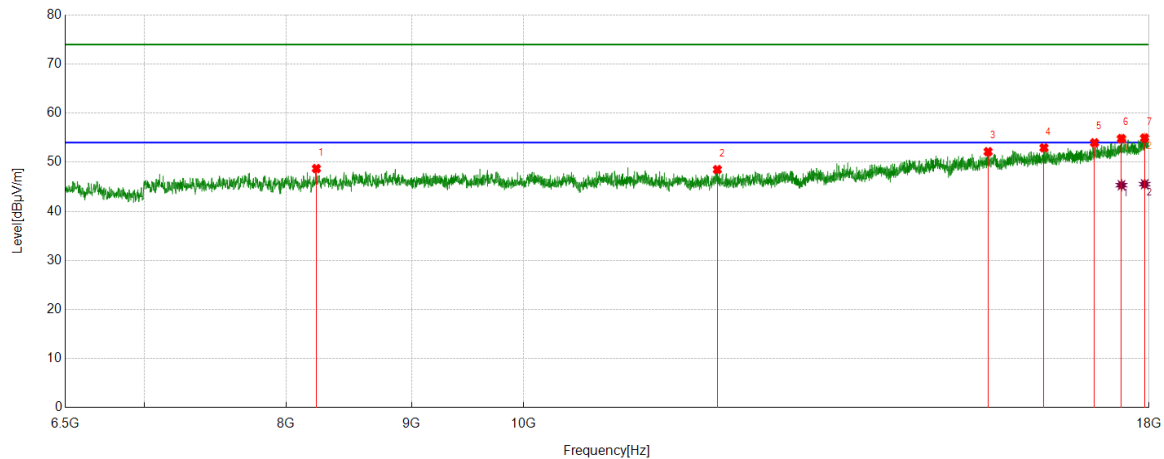
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.

4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).

5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.

6. 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	MCH	Horizontal	PASS



PK Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	8230.9664	42.65	6.06	48.71	74.00	-25.29	Horizontal
2	11997.6872	40.21	8.30	48.51	74.00	-25.49	Horizontal
3	15473.9968	38.18	13.97	52.15	74.00	-21.85	Horizontal
4	16307.851	37.84	15.10	52.94	74.00	-21.06	Horizontal
5	17101.4502	37.48	16.49	53.97	74.00	-20.03	Horizontal
6	17539.9425	37.13	17.70	54.83	74.00	-19.17	Horizontal
7	17926.6783	35.57	19.37	54.94	74.00	-19.06	Horizontal

AV Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	17539.9425	27.63	17.70	45.33	54.00	-8.67	Horizontal
2	17926.6783	26.16	19.37	45.53	54.00	-8.47	Horizontal

Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.

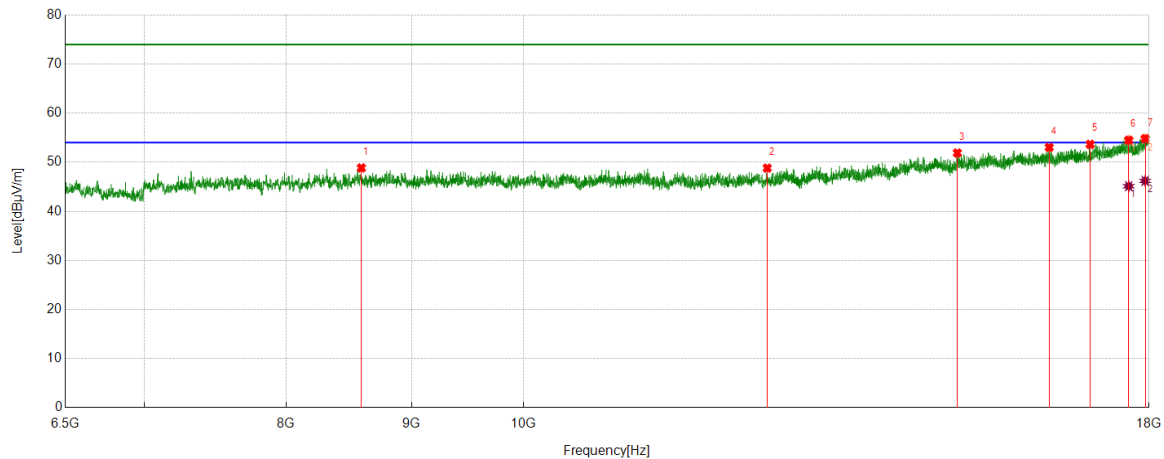
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.

4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).

5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.

6. 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	MCH	Vertical	PASS



PK Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	8586.0733	42.72	6.12	48.84	74.00	-25.16	Vertical
2	12574.1968	40.03	8.78	48.81	74.00	-25.19	Vertical
3	15032.6291	38.89	13.00	51.89	74.00	-22.11	Vertical
4	16388.361	38.03	15.00	53.03	74.00	-20.97	Vertical
5	17031.0039	37.51	16.14	53.65	74.00	-20.35	Vertical
6	17659.2699	36.43	18.07	54.50	74.00	-19.50	Vertical
7	17935.3044	35.39	19.42	54.81	74.00	-19.19	Vertical

AV Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	17659.2699	27.05	18.07	45.12	54.00	-8.88	Vertical
2	17935.3044	26.79	19.42	46.21	54.00	-7.79	Vertical

Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.

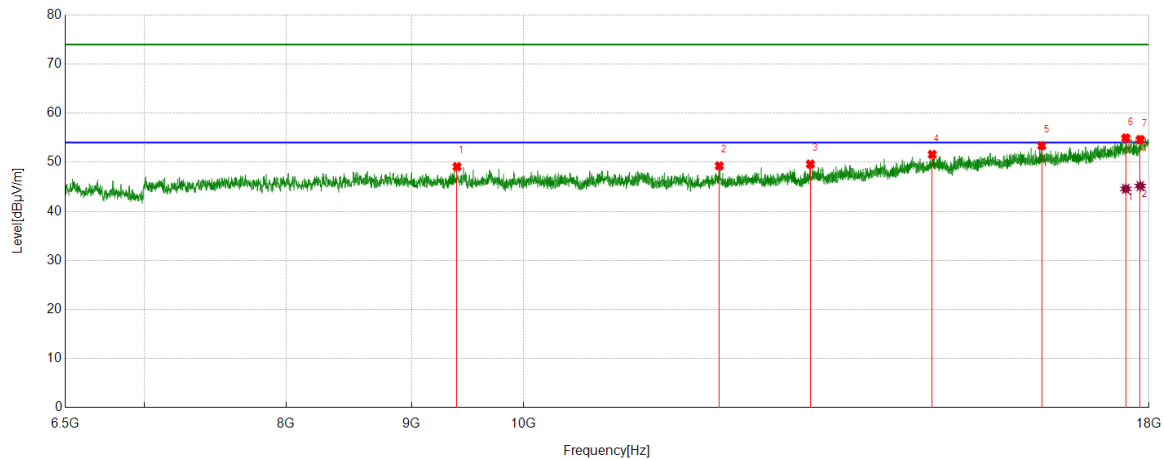
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.

4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).

5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.

6. 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	9394.0493	42.52	6.58	49.10	74.00	-24.90	Horizontal
2	12019.2524	41.08	8.18	49.26	74.00	-24.74	Horizontal
3	13093.1992	40.08	9.54	49.62	74.00	-24.38	Horizontal
4	14681.8352	38.80	12.78	51.58	74.00	-22.42	Horizontal
5	16273.3467	38.23	15.15	53.38	74.00	-20.62	Horizontal
6	17611.8265	36.88	18.06	54.94	74.00	-19.06	Horizontal
7	17851.919	35.43	19.17	54.60	74.00	-19.40	Horizontal

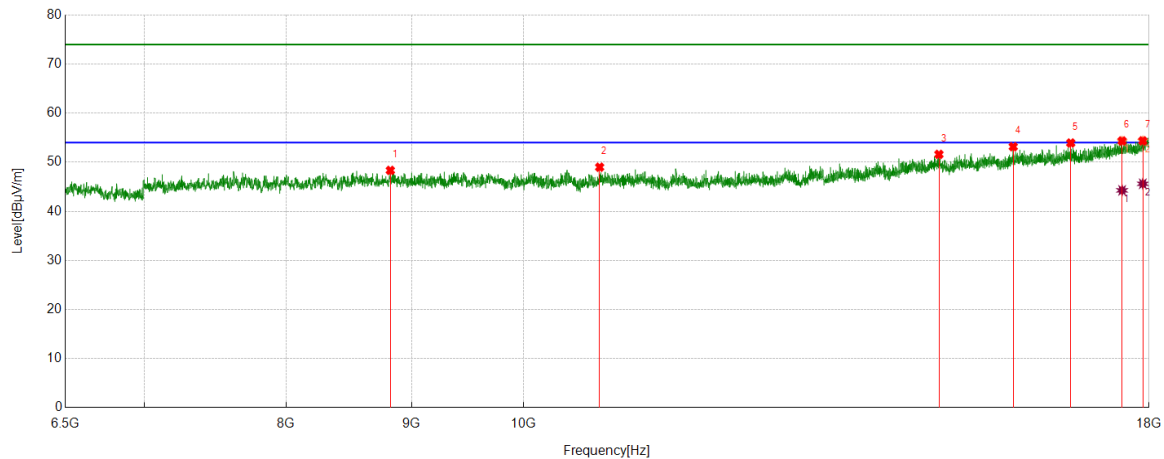
AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17611.8265	26.52	18.06	44.58	54.00	-9.42	Horizontal
2	17851.9190	25.99	19.17	45.16	54.00	-8.84	Horizontal

Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).
5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.
6. 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	8823.2904	42.09	6.25	48.34	74.00	-25.66	Vertical
2	10741.1551	41.93	7.06	48.99	74.00	-25.01	Vertical
3	14775.2844	38.72	12.88	51.60	74.00	-22.40	Vertical
4	15843.4804	38.52	14.64	53.16	74.00	-20.84	Vertical
5	16723.3404	37.65	16.27	53.92	74.00	-20.08	Vertical
6	17550.0063	36.60	17.74	54.34	74.00	-19.66	Vertical
7	17895.0494	35.11	19.25	54.36	74.00	-19.64	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17550.0063	26.53	17.74	44.27	54.00	-9.73	Vertical
2	17895.0494	26.36	19.25	45.61	54.00	-8.39	Vertical

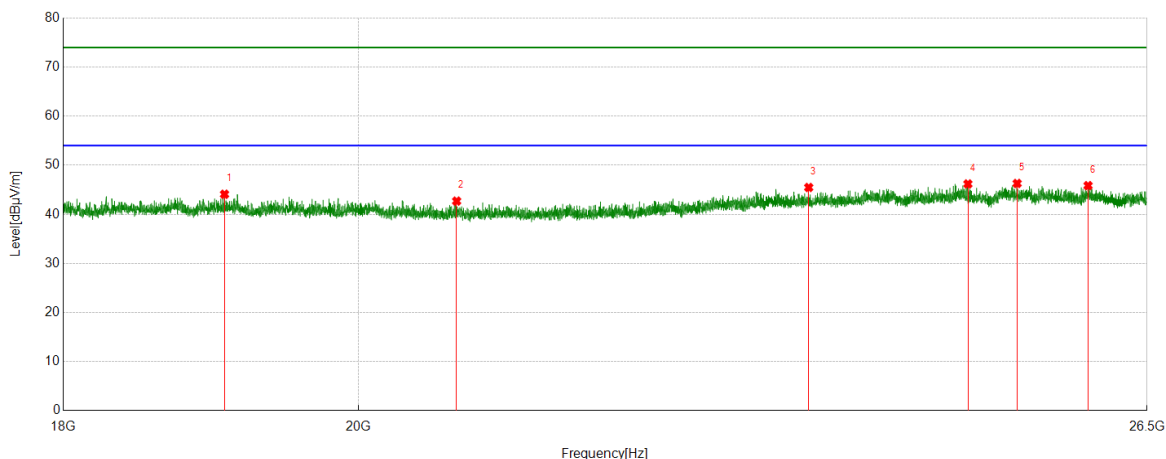
Note: 1. Measurement = Reading Level + Correct Factor.

2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.
4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).
5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Part 3: 18GHz~26.5GHz

SPURIOUS EMISSIONS 18GHz TO 26.5GHz (WORST-CASE CONFIGURATION)

Test Mode	Channel	Polarization	Verdict
BLE	HCH	Horizontal	PASS

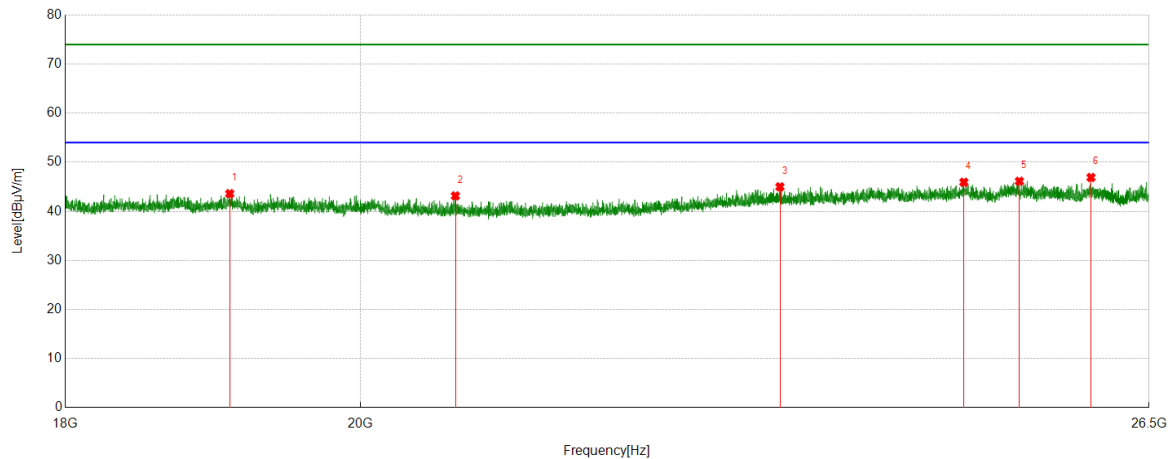


PK Result:

No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	19066.8567	50.06	-5.97	44.09	74.00	-29.91	Horizontal
2	20713.4713	48.58	-5.89	42.69	74.00	-31.31	Horizontal
3	23486.4486	48.63	-3.16	45.47	74.00	-28.53	Horizontal
4	24859.3359	49.60	-3.41	46.19	74.00	-27.81	Horizontal
5	25299.68	49.61	-3.32	46.29	74.00	-27.71	Horizontal
6	25948.2948	48.58	-2.73	45.85	74.00	-28.15	Horizontal

- Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
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:

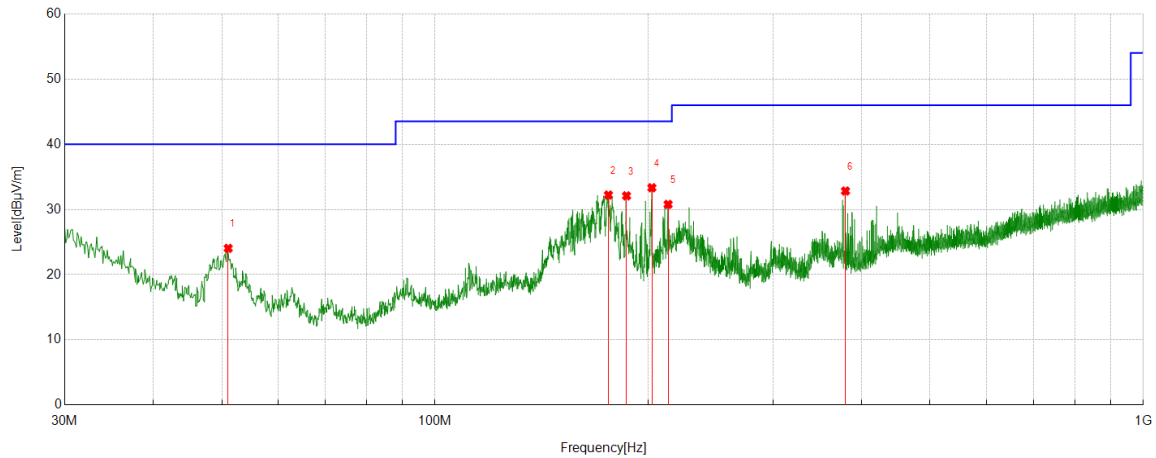
No.	Frequency [MHz]	Reading Level [dBuV/m]	Correct Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
1	19088.9589	49.53	-5.93	43.60	74.00	-30.40	Vertical
2	20689.669	49.03	-5.88	43.15	74.00	-30.85	Vertical
3	23229.723	48.37	-3.38	44.99	74.00	-29.01	Vertical
4	24805.7806	49.25	-3.33	45.92	74.00	-28.08	Vertical
5	25302.2302	49.45	-3.32	46.13	74.00	-27.87	Vertical
6	25956.7957	49.62	-2.72	46.90	74.00	-27.10	Vertical

- Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
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.

Part 4: 30MHz~1GHz

SPURIOUS EMISSIONS 30M TO 1GHz (WORST-CASE CONFIGURATION)

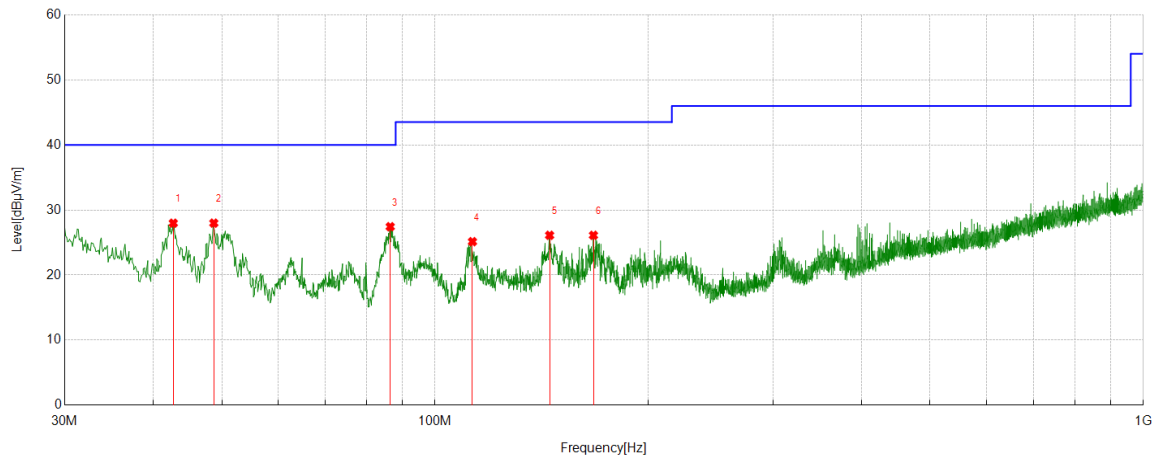
Test Mode	Channel	Polarization	Verdict
BLE	HCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	51.0511	9.65	14.39	24.04	40.00	-15.96	Peak
2	175.7086	13.88	18.34	32.22	43.50	-11.28	Peak
3	186.3796	13.79	18.30	32.09	43.50	-11.41	Peak
4	202.3862	13.64	19.69	33.33	43.50	-10.17	Peak
5	213.3483	11.21	19.57	30.78	43.50	-12.72	Peak
6	379.72	10.05	22.78	32.83	46.00	-13.17	Peak

- Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.

Test Mode	Channel	Polarization	Verdict
BLE	HCH	Vertical	PASS



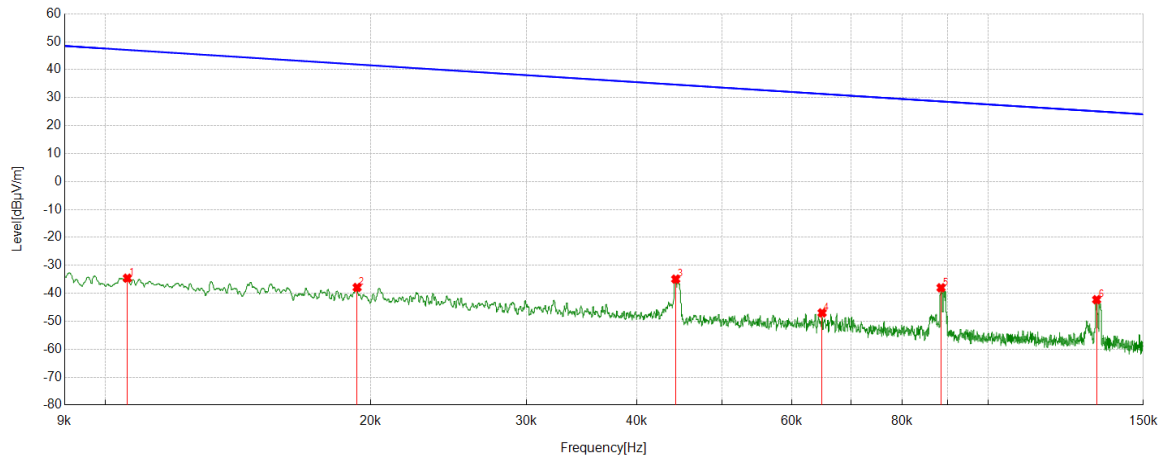
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	42.7083	8.95	19.03	27.98	40.00	-12.02	Peak
2	48.7229	12.76	15.23	27.99	40.00	-12.01	Peak
3	86.4596	12.97	14.47	27.44	40.00	-12.56	Peak
4	112.9433	5.64	19.50	25.14	43.50	-18.36	Peak
5	145.1505	6.26	19.86	26.12	43.50	-17.38	Peak
6	167.3657	7.40	18.72	26.12	43.50	-17.38	Peak

Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.

Part 5: 9kHz~30MHz

SPURIOUS EMISSIONS Below 30MHz (WORST CASE CONFIGURATION-FACE ON)

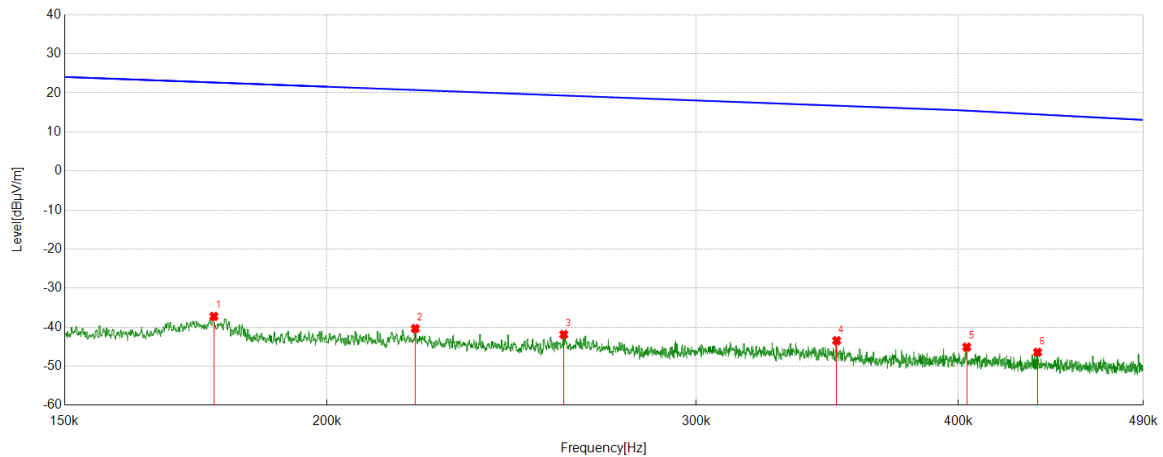
Test Mode	Channel	Frequency Range	Verdict
BLE	HCH	9kHz~150kHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	0.0106	27.41	-61.99	-34.58	47.11	-81.69	Peak
2	0.0193	24.00	-61.91	-37.91	41.90	-79.81	Peak
3	0.0443	26.87	-61.80	-34.93	34.68	-69.61	Peak
4	0.0649	14.85	-61.86	-47.01	31.36	-78.37	Peak
5	0.0885	23.89	-61.91	-38.02	28.66	-66.68	Peak
6	0.1328	19.64	-61.93	-42.29	25.14	-67.43	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

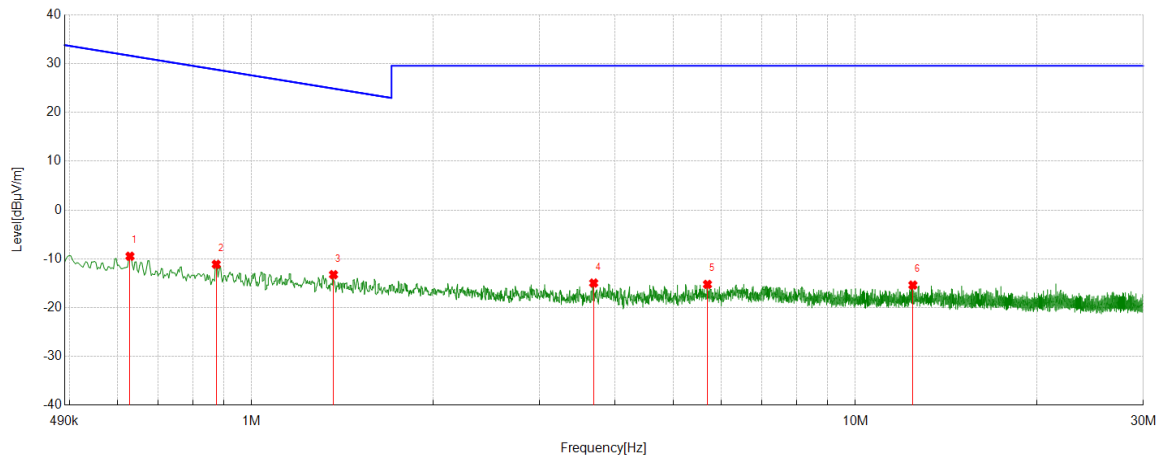
Test Mode	Channel	Frequency Range	Verdict
BLE	HCH	150kHz~490kHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	0.1767	24.71	-61.96	-37.25	22.66	-59.91	Peak
2	0.2204	21.62	-61.98	-40.36	20.74	-61.10	Peak
3	0.2594	20.13	-62.00	-41.87	19.32	-61.19	Peak
4	0.35	18.58	-62.03	-43.45	16.72	-60.17	Peak
5	0.4037	16.94	-62.04	-45.10	15.45	-60.55	Peak
6	0.4363	15.62	-62.05	-46.43	14.50	-60.93	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Test Mode	Channel	Frequency Range	Verdict
BLE	HCH	490kHz~30MHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	0.6287	12.62	-22.09	-9.47	31.63	-41.10	Peak
2	0.8737	10.94	-22.07	-11.13	28.78	-39.91	Peak
3	1.3665	8.80	-22.04	-13.24	24.89	-38.13	Peak
4	3.6863	7.00	-21.96	-14.96	29.54	-44.50	Peak
5	5.6902	6.73	-21.96	-15.23	29.54	-44.77	Peak
6	12.4546	6.44	-21.82	-15.38	29.54	-44.92	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

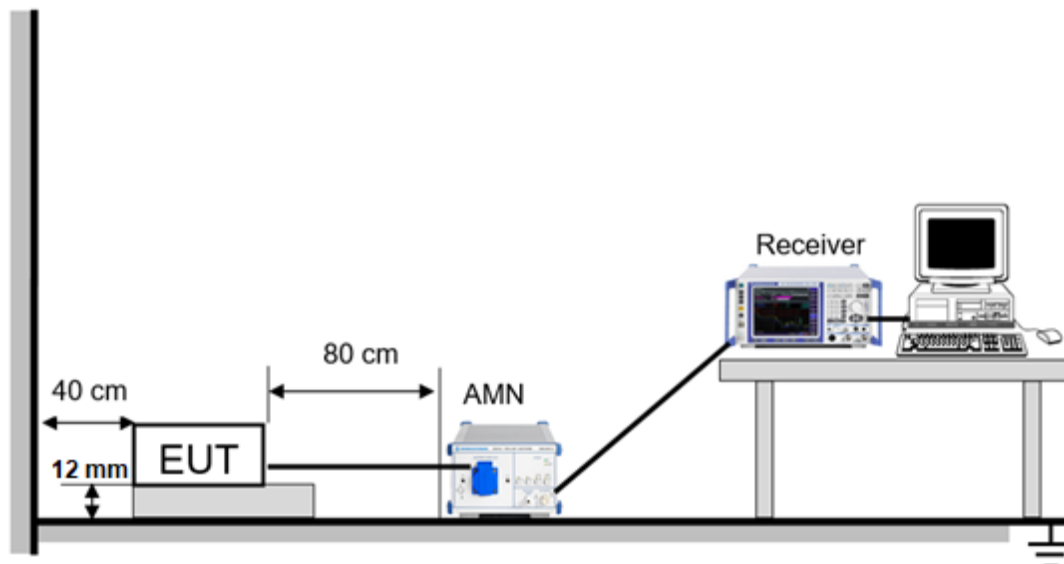
Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

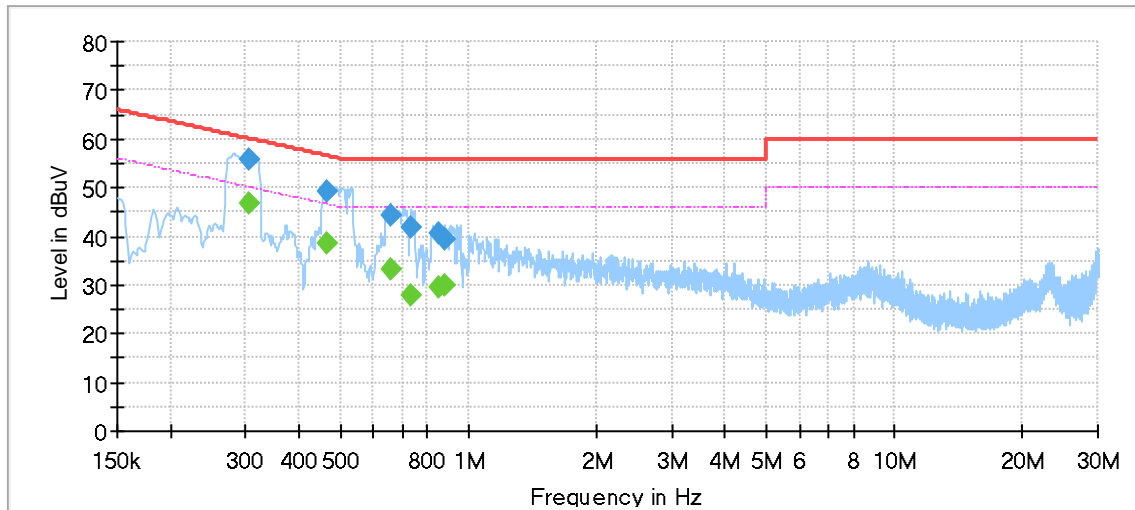
TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 12 mm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

LINE L RESULTS (WORST-CASE CONFIGURATION)

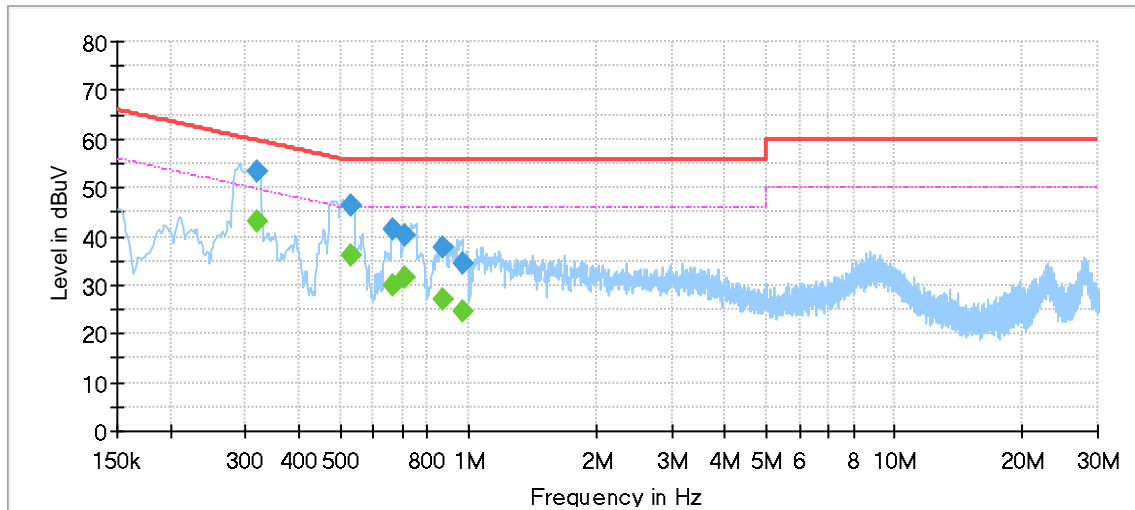


Final_Result

Frequency [MHz]	QuasiPeak [dBμV]	Average [dBμV]	Limit [dBμV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line	Filter	Corr. [dB]
0.306713	---	46.75	50.06	3.31	1000.0	9.000	L1	OFF	9.6
0.306713	55.83	---	60.06	4.23	1000.0	9.000	L1	OFF	9.6
0.466410	---	38.63	46.58	7.95	1000.0	9.000	L1	OFF	9.5
0.466410	49.23	---	56.58	7.34	1000.0	9.000	L1	OFF	9.5
0.658943	---	33.31	46.00	12.69	1000.0	9.000	L1	OFF	9.5
0.658943	44.44	---	56.00	11.56	1000.0	9.000	L1	OFF	9.5
0.732075	---	27.81	46.00	18.19	1000.0	9.000	L1	OFF	9.5
0.732075	41.87	---	56.00	14.13	1000.0	9.000	L1	OFF	9.5
0.855953	---	29.36	46.00	16.64	1000.0	9.000	L1	OFF	9.5
0.855953	40.46	---	56.00	15.54	1000.0	9.000	L1	OFF	9.5
0.882818	---	30.05	46.00	15.95	1000.0	9.000	L1	OFF	9.5
0.882818	39.36	---	56.00	16.64	1000.0	9.000	L1	OFF	9.5

- Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.
5. Pre-testing all test modes and channels and find the HCH which is the worst case, so only the worst case is included in this test report.
6. Two types of power supply will be collocated to the EUT, one is a adapter, another is a dock, both of them have been test, the result of the adapter is the worse case and recorded in this test report.

LINE N RESULTS (WORST-CASE CONFIGURATION)



Final_Result

Frequency [MHz]	QuasiPeak [dBμV]	Average [dBμV]	Limit [dBμV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line	Filter	Corr. [dB]
0.320145	---	43.21	49.70	6.50	1000.0	9.000	N	OFF	9.5
0.320145	53.18	---	59.70	6.53	1000.0	9.000	N	OFF	9.5
0.530588	---	36.13	46.00	9.87	1000.0	9.000	N	OFF	9.5
0.530588	46.54	---	56.00	9.46	1000.0	9.000	N	OFF	9.5
0.667898	---	29.89	46.00	16.11	1000.0	9.000	N	OFF	9.5
0.667898	41.40	---	56.00	14.60	1000.0	9.000	N	OFF	9.5
0.708195	---	31.44	46.00	14.56	1000.0	9.000	N	OFF	9.5
0.708195	40.21	---	56.00	15.79	1000.0	9.000	N	OFF	9.5
0.873863	---	27.10	46.00	18.90	1000.0	9.000	N	OFF	9.4
0.873863	37.56	---	56.00	18.44	1000.0	9.000	N	OFF	9.4
0.967890	---	24.49	46.00	21.51	1000.0	9.000	N	OFF	9.4
0.967890	34.62	---	56.00	21.38	1000.0	9.000	N	OFF	9.4

- Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.
5. Pre-testing all test modes and channels and find the HCH which is the worst case, so only the worst case is included in this test report.
6. wo types of power supply will be collocated to the EUT, one is a adapter, another is a dock, both of them have been test, the result of the adapter is the worse case and recorded in this test report.

10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, 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 (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi

END OF REPORT