FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 3

TEST REPORT

For

Smart Cordless Floor Washer

FCC MODEL NUMBER: FW310100US

FCC SERIES MODEL NUMBER: FW31****
("*" = 0-9, A-Z or blank used to denote different countries, customers, colors or minor cosmetic changes, or for indicate factory identification)**

IC MODEL NUMBER: FW310100US

PROJECT NUMBER: 4791643847

REPORT NUMBER: 4791643847-1

FCC ID: 2AV7A-FS31

IC: 26039-FS31

ISSUE DATE: Mar. 06, 2025

Prepared for

Tineco Intelligent Technology Co., Ltd.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	03/06/2025	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Tineco Intelligent Technology Co., Ltd.
Address:	No. 108 Shihu Road West, Wuzhong Zone Suzhou, Jiangsu, China 215128

Manufacturer Information

Company Name:	Tineco Intelligent Technology Co., Ltd.
Address:	No. 108 Shihu Road West, Wuzhong Zone Suzhou, Jiangsu, China 215128

EUT Description

Product Name:	Smart Cordless Floor Washer
FCC Model Number:	FW310100US
FCC Series Model Number:	FW31****** ("*" = 0-9, A-Z or blank used to denote different countries, customers, colors or minor cosmetic changes, or for indicate factory identification)
IC Model Number:	FW310100US
Model Difference:	Their electrical circuit design, layout, components used and internal wiring are identical, only the color and model name is different. The model FW310100US was selected as the representative model for compliance test.
Sample Number:	8058052
Data of Receipt Sample:	Jan. 22, 2025
Test Date:	Jan. 22, 2025~ Mar. 01, 2025

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 3	PASS
ISED RSS-GEN Issue 5	PASS

Summary of Test Results			
Clause	Test Items	FCC and ISED Rules	Test Results
1	6 dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a) RSS-Gen Clause 6.7	PASS
2	Conducted Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (d) RSS-Gen Clause 6.12	PASS
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	PASS
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13	PASS
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 6.13	PASS
6	Conducted Emission Test for AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	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, ISED RSS-GEN, ISED RSS-247> when <Accuracy Method> decision rule is applied.			

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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, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 3 and ISED RSS-GEN Issue 5.

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.**

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: ±0.90dB 30MHz-1GHz: ±1.5 dB 1GHz-12.75GHz: ±1.9dB 12.75GHz-26.5GHz: ±2.1dB
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-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:	Smart Cordless Floor Washer	
Model Name:	FW310100US	
Technology:	Bluetooth - Low Energy	
Transmit Frequency Range:	2402 MHz ~ 2480 MHz	
Modulation:	GFSK	
Data Rate:	LE 1M	1 Mbps
Test software of EUT:	EspRFTestTool (manufacturer declare)	
Antenna Type:	PCB Antenna	
Antenna Gain:	3.96 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]	-1.10

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		EspRFTestTool		
Modulation Type	Transmit Antenna Number	Test Channel		
		LCH	MCH	HCH
GFSK	1	7	7	7

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	PCB Antenna	3.96 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	☒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
	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	E580	/

I/O PORT

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

ACCESSORY

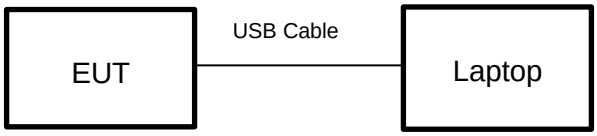
Item	Accessory	Brand Name	Model Name	Description
1	Drying & Charging Dock	Tineco	AA2463	Input(drying): 120V~ 60Hz 5.2A Input(charging): 120V~ 60Hz 0.5A Output: 26V⎓1A

TEST SETUP

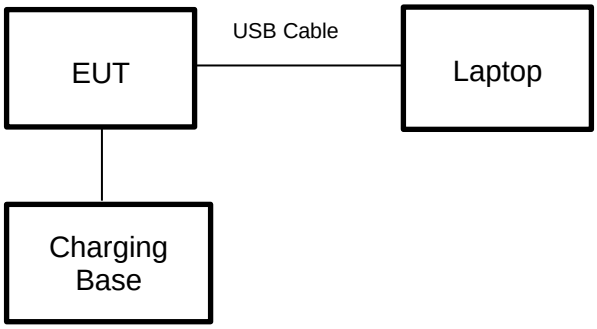
The EUT can work in an engineer mode with a software through a laptop.

SETUP DIAGRAM FOR TESTS

For Antenna Port test and Radiated Test:



For Conducted Emission Test:



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	126700	2023-11-25	2024-11-02	2025-11-01
☑	Two-Line V-Network	R&S	ENV216	126701	2023-11-25	2024-11-02	2025-11-01

Conducted Emissions Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Conducted Emissions Test	R&S	EMC32	9.25.00	

Radiated Emissions Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI test receiver	R&S	ESR7	222993	2023-04-08	2024-03-23	2025-03-22
☑	EMI test receiver	R&S	ESR26	126703	2023-11-25	2024-11-02	2025-11-01
☑	Spectrum Analyzer	R&S	FSV3044	222992	2023-04-08	2024-03-23	2025-03-22
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2021-06-03	2024-05-27	2027-05-26
☑	Receiver Antenna (30MHz-1GHz)	Schwarzbeck	VULB 9168	171952	2021-07-05	2024-07-04	2027-07-03
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2022-02-28	2025-02-17	2028-02-16
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2022-02-28	2025-02-17	2028-02-16
☑	Pre-amplification (To 18GHz)	Tonscned	TAP01018050	224539	2023-10-10	2024-10-10	2025-10-09
☑	Pre-amplification (To 18GHz)	R&S	SCU-18D	134667	2023-11-25	2024-11-02	2025-11-01
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2023-11-25	2024-11-02	2025-11-01
☑	Band Reject Filter	Wainwright	WRCGV12-2375-2400-2485-2510-40SS	1	2023-12-18	2024-11-02	2025-11-01
☑	High Pass Filter	COM-MW	ZBF13-3-18G-01	2	2023-12-18	2024-11-02	2025-11-01

Radiated Emissions Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Radiated Emissions Test	Tonscend	JS32-RE	5.0.0.2	

Antenna Port Test (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	155368	2023-04-08	2024-03-23	2025-03-22
☑	Power Meter	MWT	MW100-RFCB	221694	2023-04-08	2024-03-23	2025-03-22
☑	Power Meter	Anritsu	MA24406A	12896	2023-04-08	2024-03-23	2025-03-22
☑	Attenuator	PASTERNACK	PE7087-6	1624	/	2024-11-04	2025-11-03

Antenna Port Test (Software)					
Used	Description	Manufacturer	Name	Version	
☑	Software for Antenna Port Test	Tonscend	JS1120-3 Test System	V3.2.22	

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

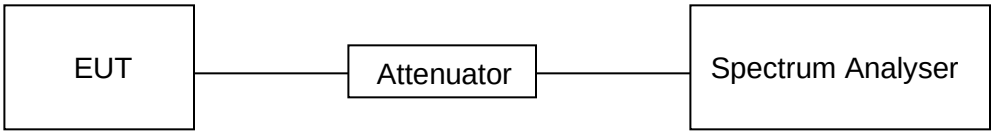
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

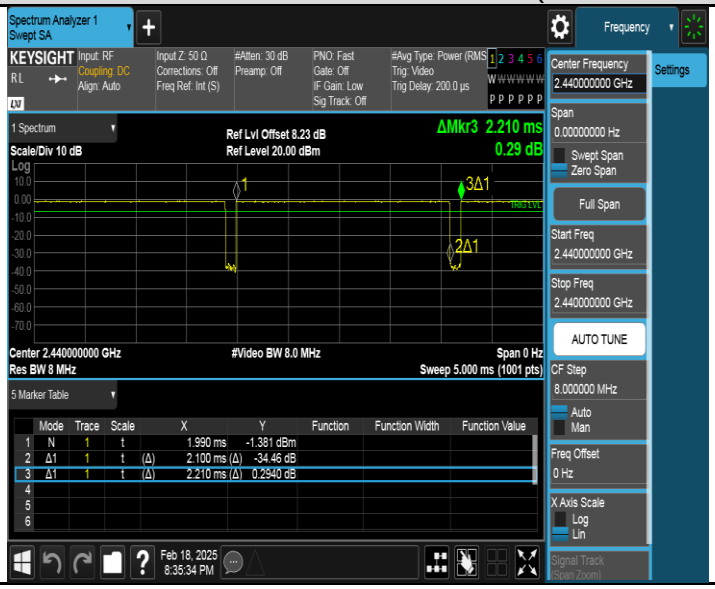
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

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	2.10	2.21	0.9502	95.02%	0.22	0.476	0.5

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 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)


7.2. 6 dB BANDWIDTH AND 99% OCCUPIED 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	>= 500kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	For reporting purposes only	2400-2483.5

TEST PROCEDURE

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

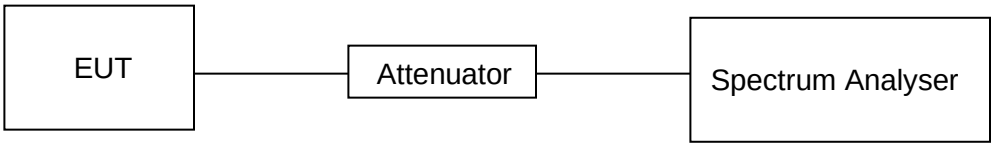
Connect the EUT to the spectrum analyser and use the following settings:

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 For 99 % Occupied Bandwidth: Between 1.5 times and 5 times the OBW
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 6 dB Bandwidth: ≥3 × RBW For 99 % Occupied Bandwidth: ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) 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	AC 120V

TEST RESULTS TABLE

Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
BLE	LCH	0.664	1.0876	Pass
	MCH	0.668	1.0883	Pass
	HCH	0.668	1.0886	Pass

TEST GRAPHS

6dB Bandwdith

Test Mode	Test Channel	Verdict
BLE	LCH	PASS

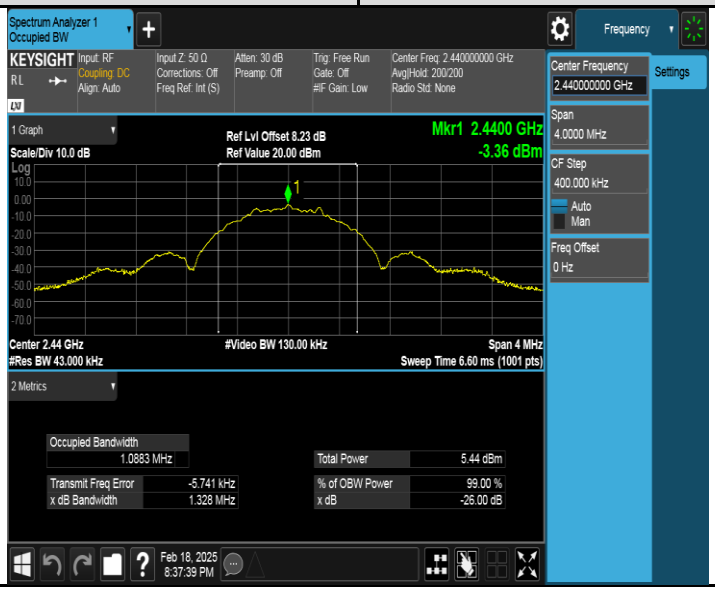
Test Mode	Test Channel	Verdict
BLE	MCH	PASS

Test Mode	Test Channel	Verdict
BLE	HCH	PASS

99% Bandwidth

Test Mode	Test Channel
BLE	LCH

Test Mode	Test Channel
BLE	MCH



Test Mode	Test Channel
BLE	HCH

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

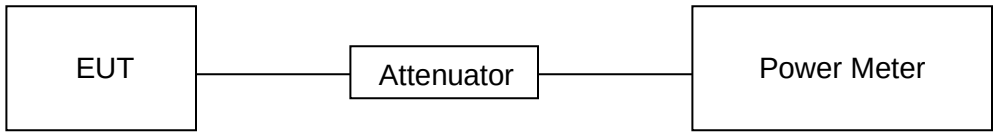
TEST PROCEDURE

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.
Peak Detector used for Peak result.

TEST ENVIRONMENT

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

TEST SETUP



TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Conducted Output Power (PK)	LIMIT
		dBm	dBm
BLE	LCH	-1.59	30
	MCH	-1.10	30
	HCH	-1.46	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:

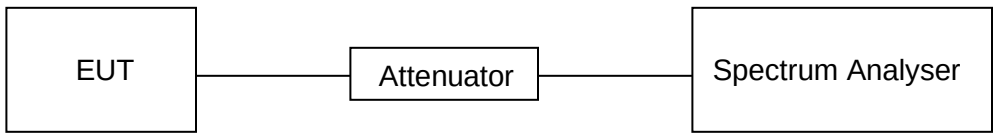
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

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

TEST SETUP

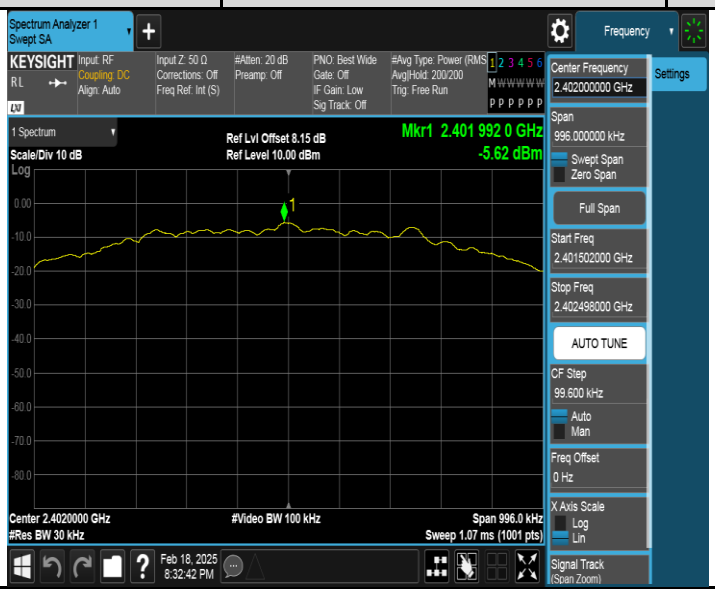


TEST RESULTS TABLE

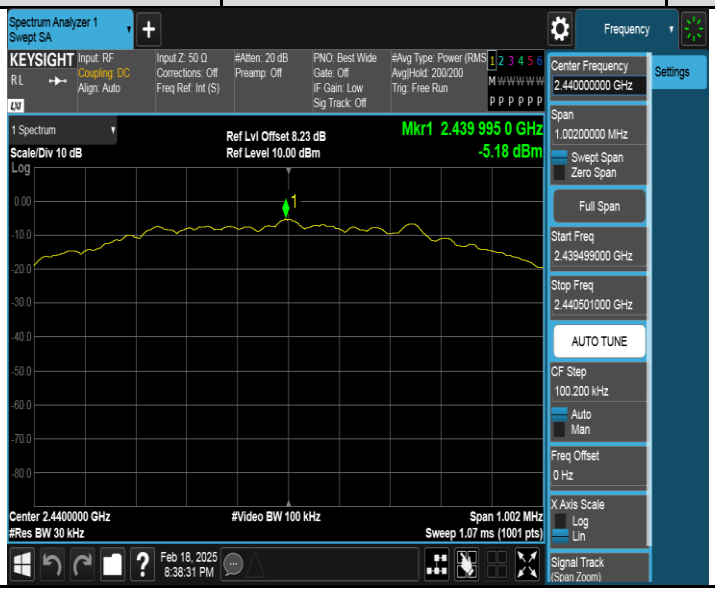
Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
BLE	LCH	-5.62	Pass
	MCH	-5.18	Pass
	HCH	-5.65	Pass

TEST GRAPHS

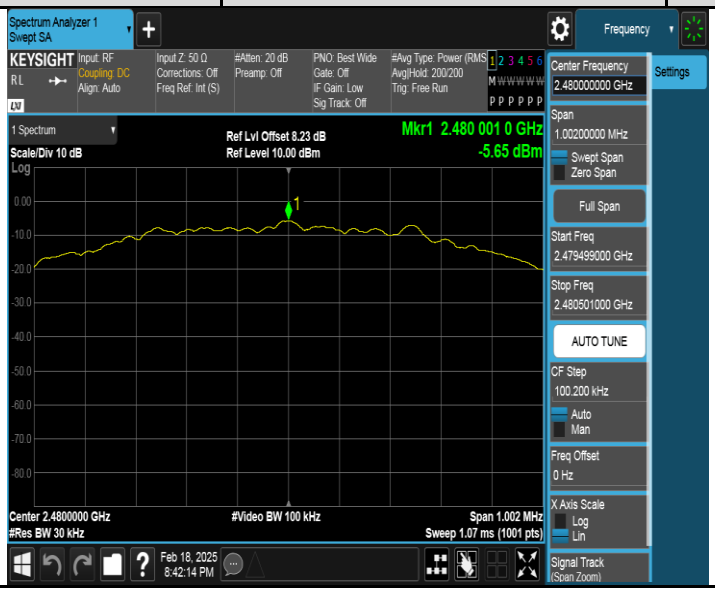
Test Mode	Test Channel	Verdict
BLE	LCH	PASS



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:

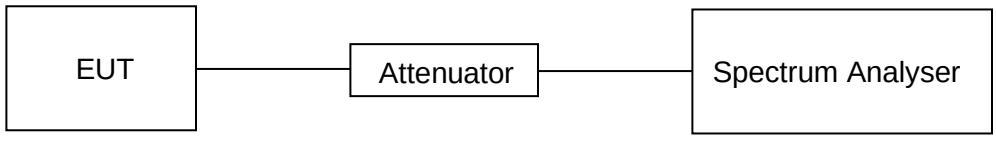
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

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	≥3 × RBW
measurement points	≥span/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	AC 120V

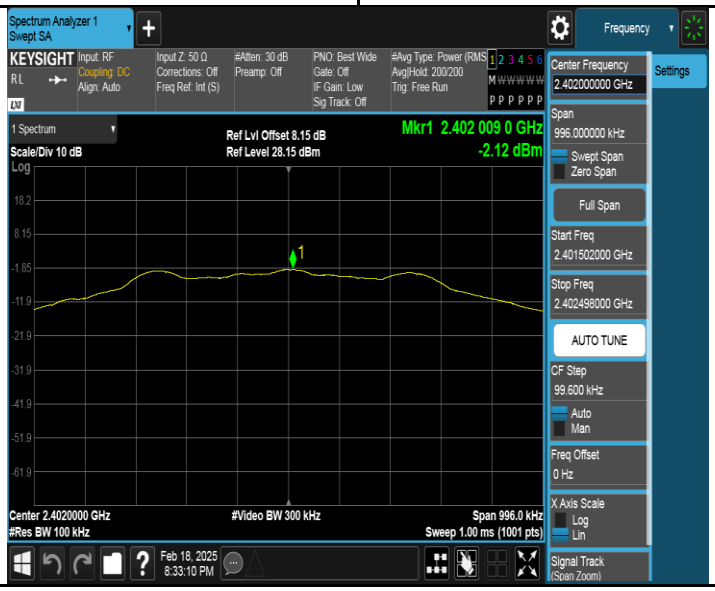
PART 1: REFERENCE LEVEL MEASUREMENT

TEST RESULTS TABLE

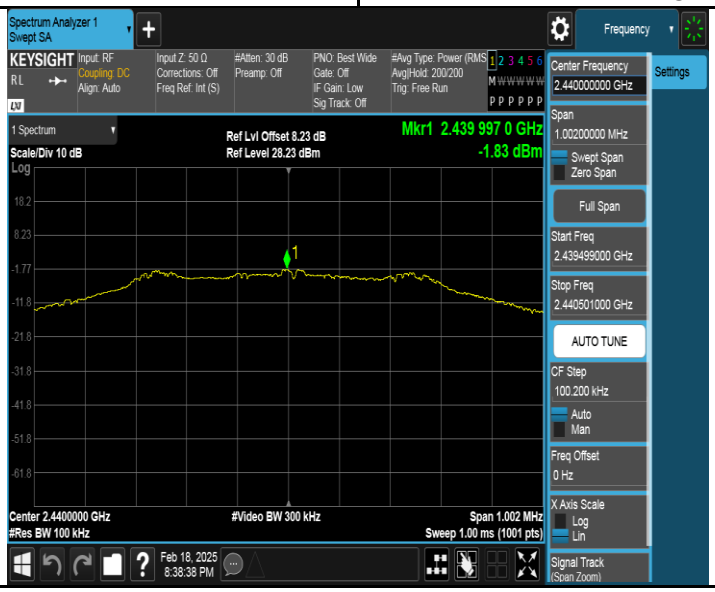
Test Mode	Test Channel	Result[dBm]
BLE	LCH	-2.12
	MCH	-1.83
	HCH	-2.07

TEST GRAPHS

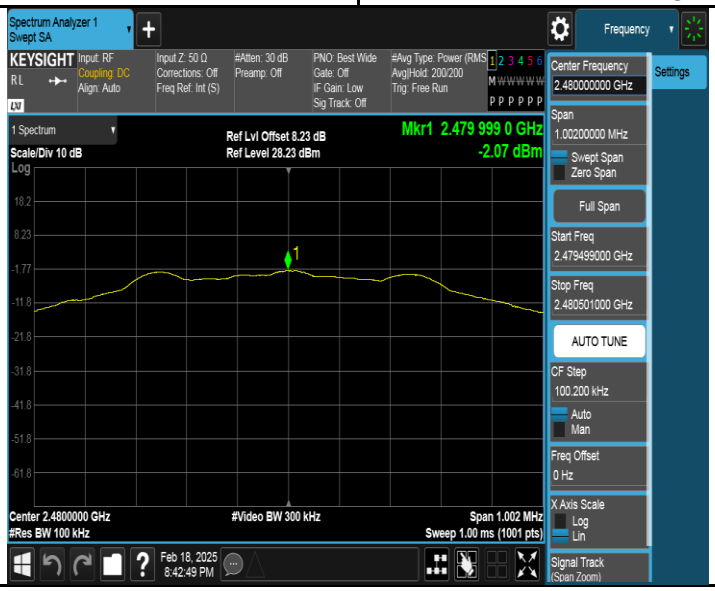
Test Mode	Channel
BLE	LCH



Test Mode	Channel
BLE	MCH



Test Mode	Channel
BLE	HCH



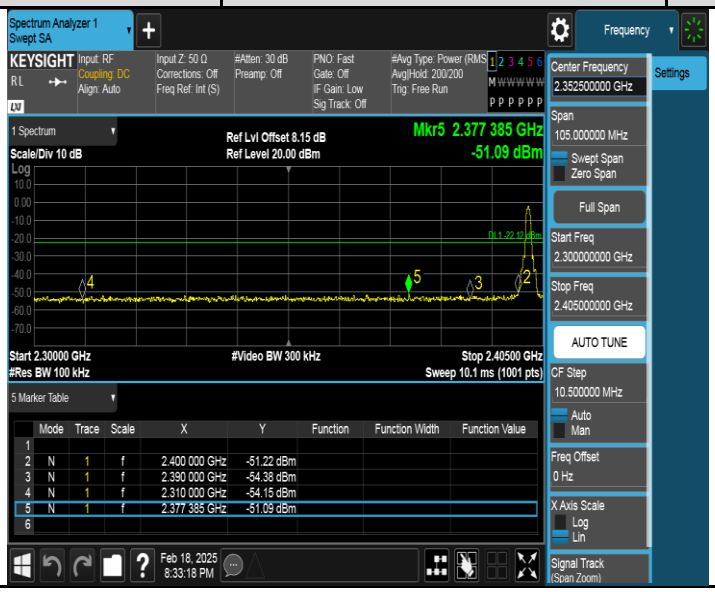
PART 2: CONDUCTED BANDEDGE

TEST RESULTS TABLE

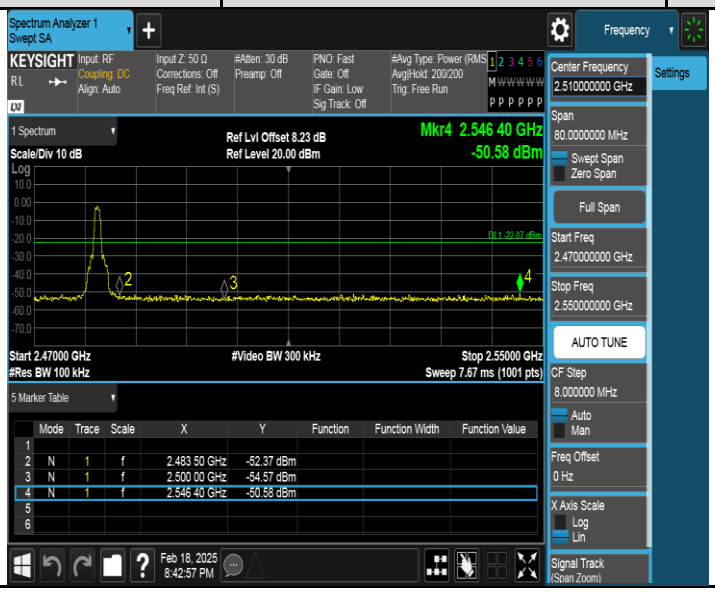
Test Mode	Test Channel	Result	Verdict
BLE	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS

TEST GRAPHS

Test Mode	Test Channel	Verdict
BLE	LCH	PASS



Test Mode	Test Channel	Verdict
BLE	HCH	PASS



PART 3: CONDUCTED SPURIOUS EMISSION

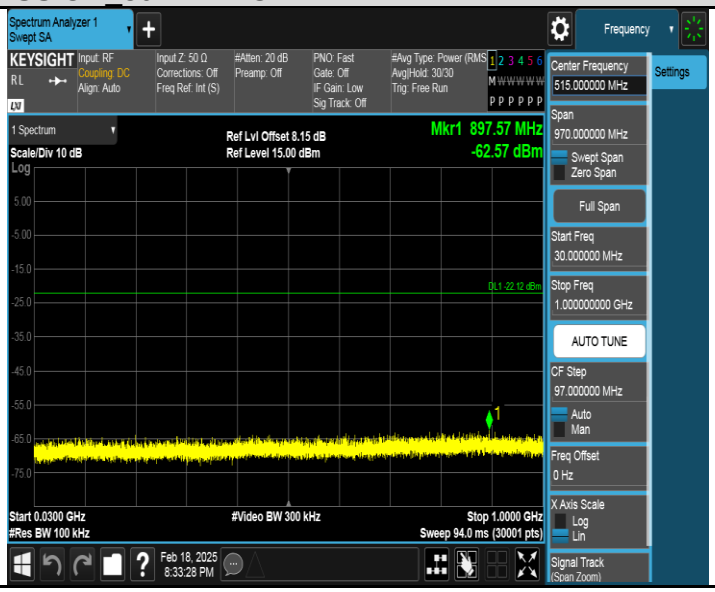
TEST RESULTS TABLE

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

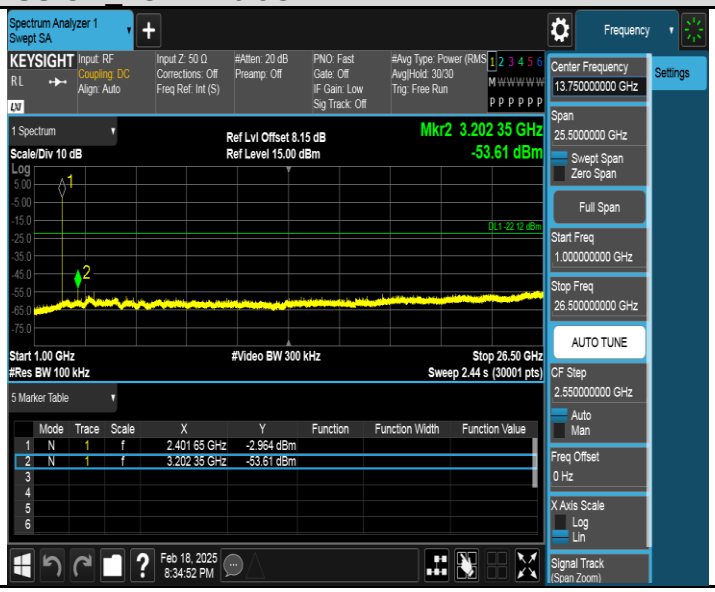
TEST GRAPHS

Test Mode	Channel	Verdict
BLE	LCH	PASS

LCH SPURIOUS EMISSION_30MHz~1GHz

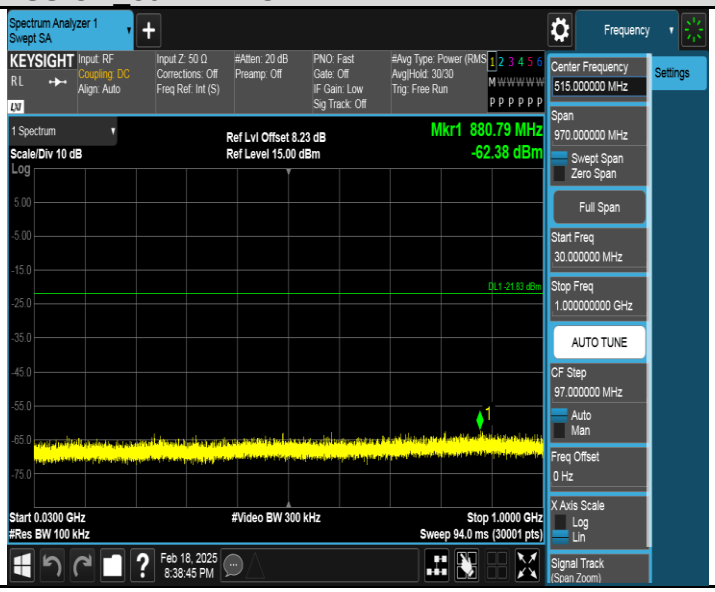


LCH SPURIOUS EMISSION_1GHz~26.5GHz

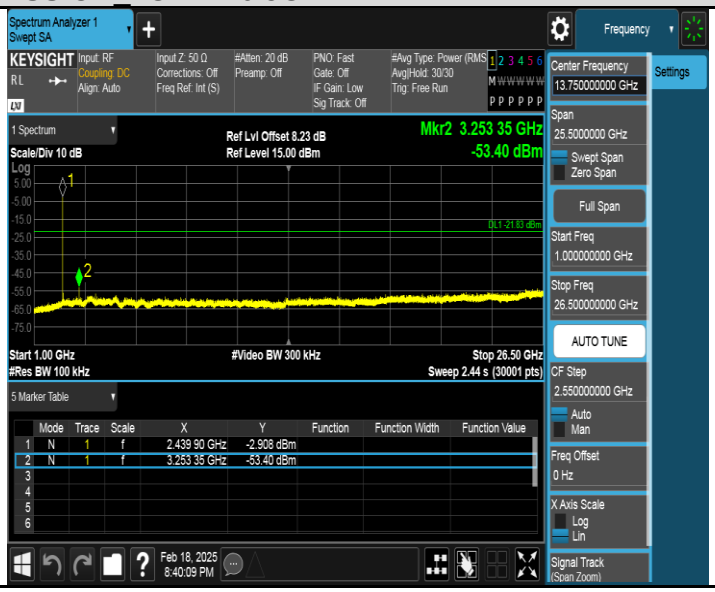


Test Mode	Channel	Verdict
BLE	MCH	PASS

MCH SPURIOUS EMISSION_30MHz~1GHz

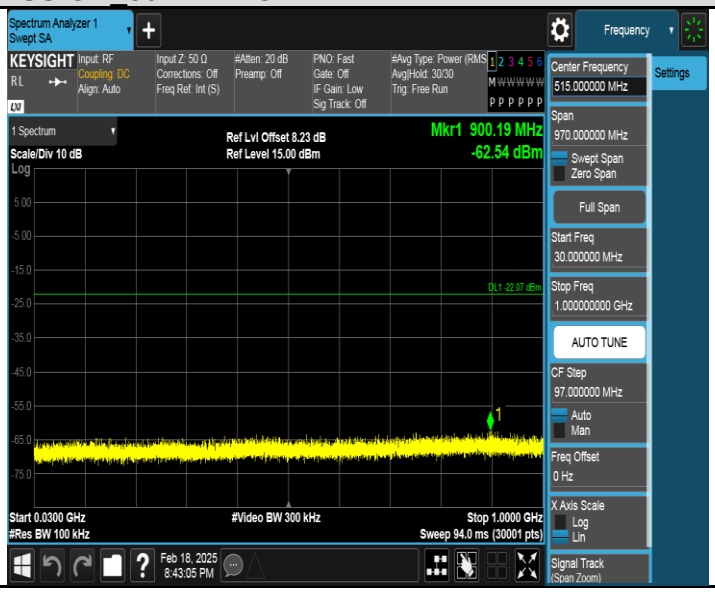


MCH SPURIOUS EMISSION_1GHz~26.5GHz

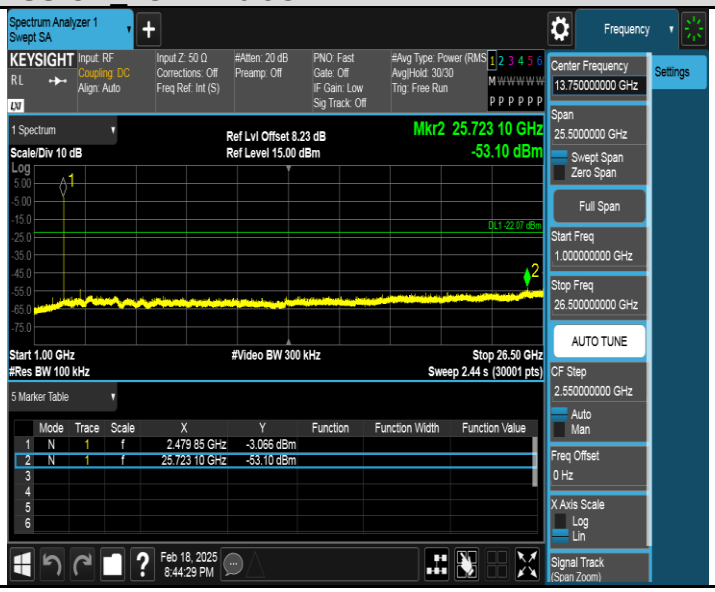


Test Mode	Channel	Verdict
BLE	HCH	PASS

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, ISED RSS-247 Clause 5.5, ISED RSS-GEN Clause 8.9&6.13 (Transmitter)
Radiation Disturbance Test Limit for ISED (9kHz-1GHz)

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

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

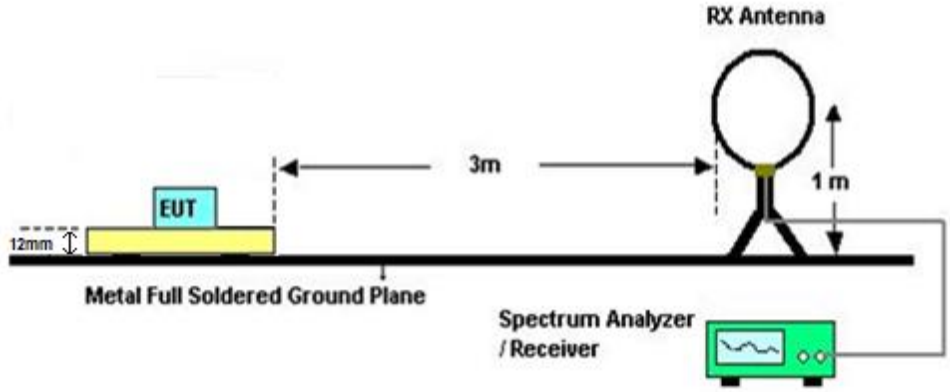
Restricted bands of operation

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: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 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

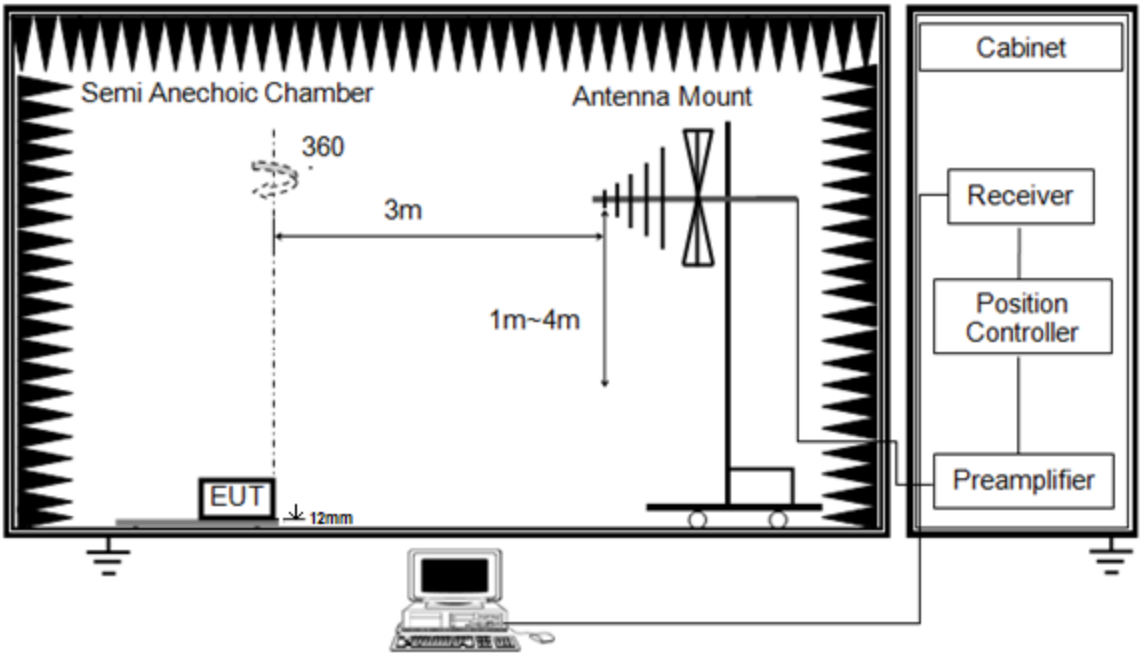
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the 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)

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.

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.

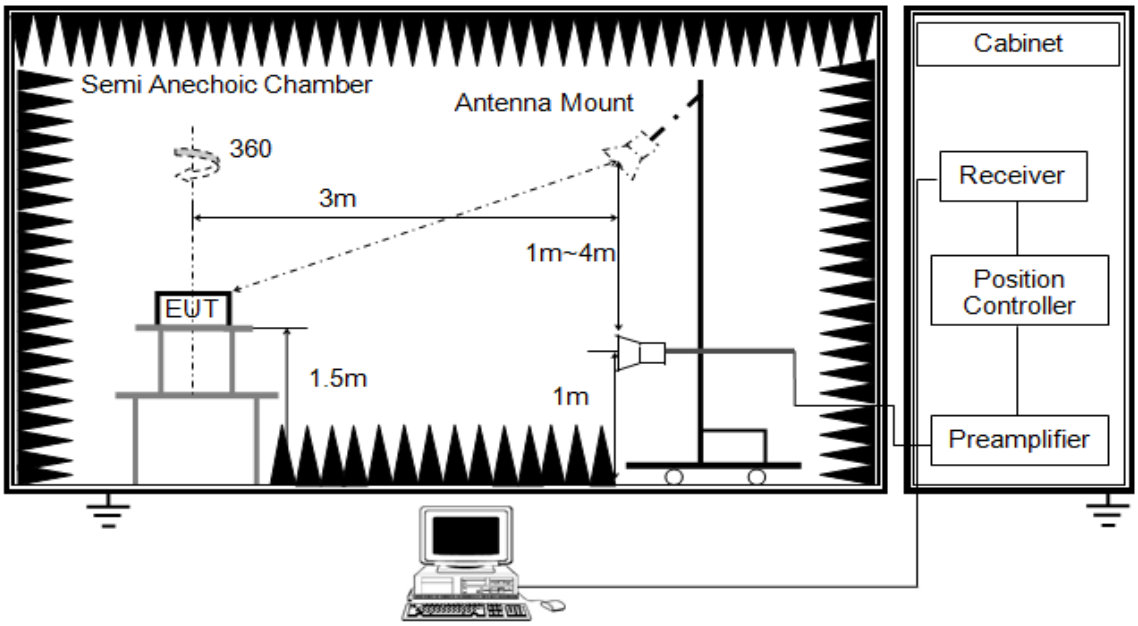
3. The EUT was placed on a turntable with 12 mm above ground.

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 1.5m above ground.

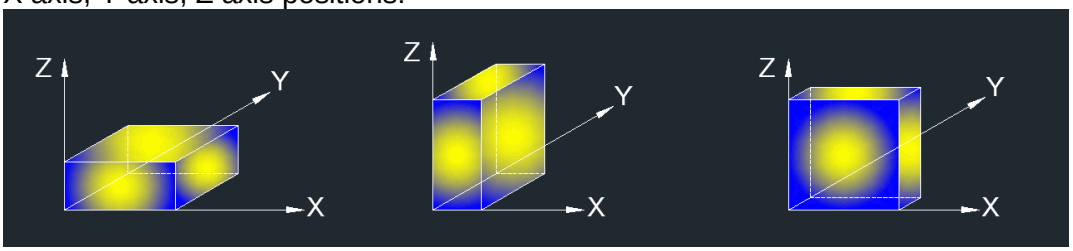
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

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 $\geqslant$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 two orthogonal axis emissions had been tested, but only the worse case (X axis) data recorded in the report.

8.2. TEST ENVIRONMENT

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

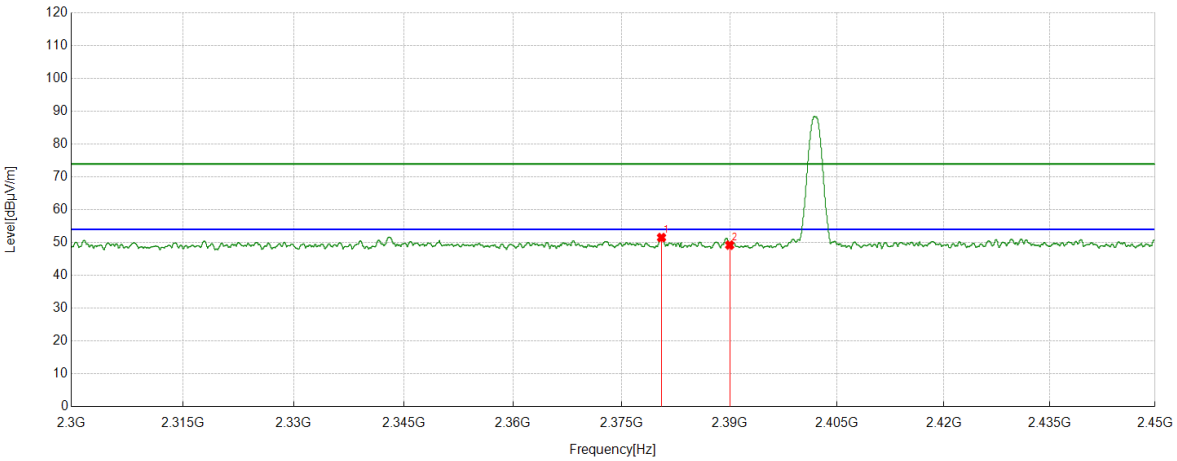
8.3. RESTRICTED BANDEDGE

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

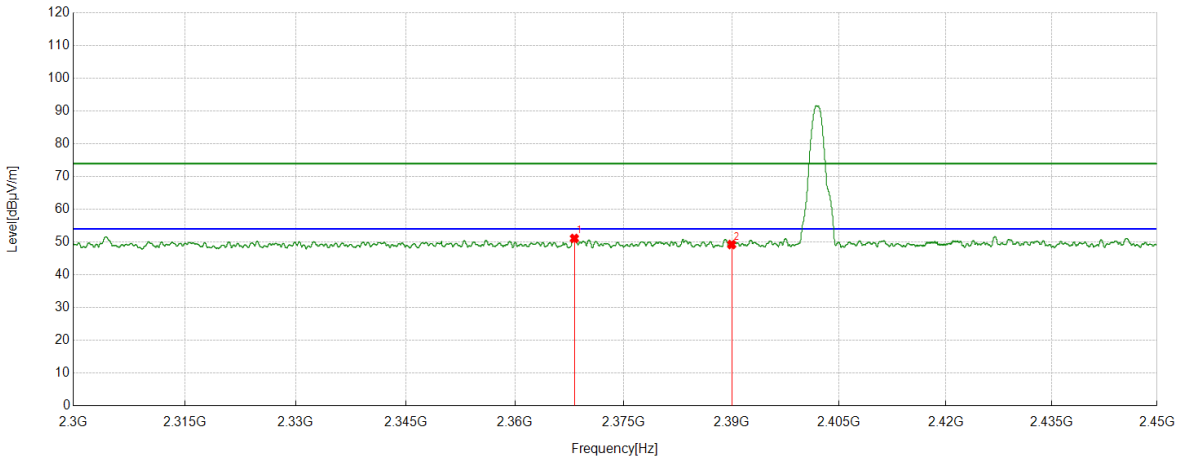


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2380.5226	37.93	13.59	51.52	74.00	-22.48	Horizontal
2	2390.0000	35.74	13.48	49.22	74.00	-24.78	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

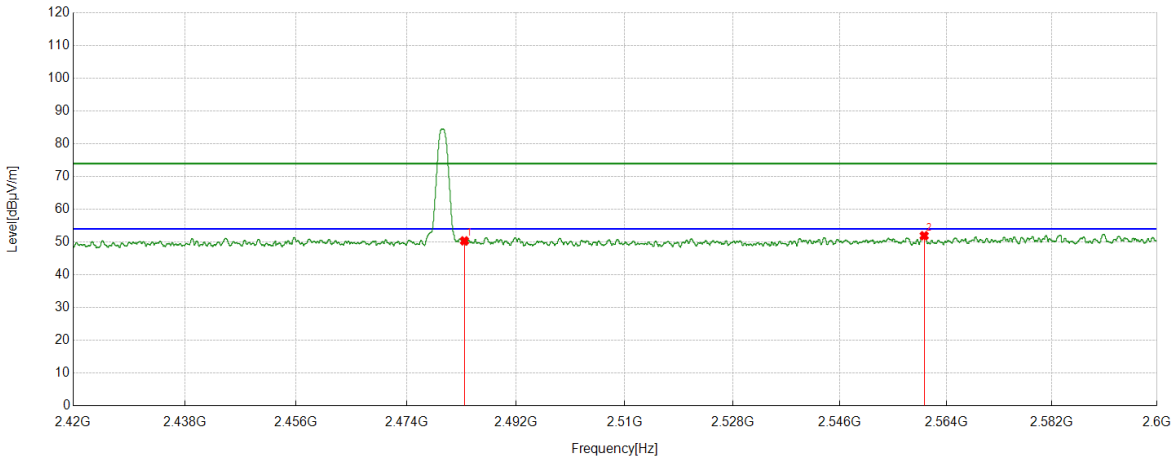


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2368.1835	37.58	13.53	51.11	74.00	-22.89	Vertical
2	2390.0000	35.76	13.48	49.24	74.00	-24.76	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

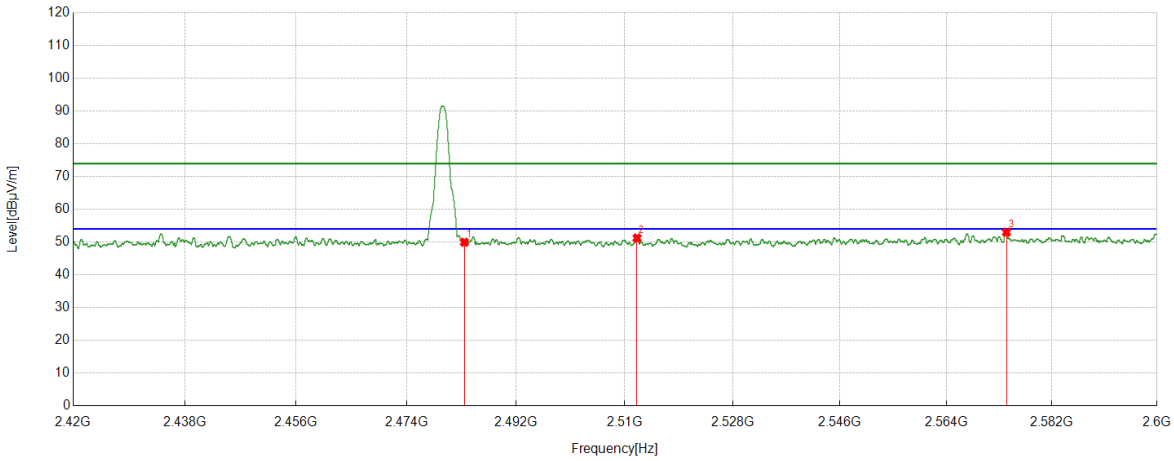


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5000	36.11	14.25	50.36	74.00	-23.64	Horizontal
2	2560.2375	37.42	14.51	51.93	74.00	-22.07	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	35.69	14.25	49.94	74.00	-24.06	Vertical
2	2512.0365	36.72	14.48	51.20	74.00	-22.80	Vertical
3	2574.2118	38.27	14.72	52.99	74.00	-21.01	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	Puw(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	Puw(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	Puw(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

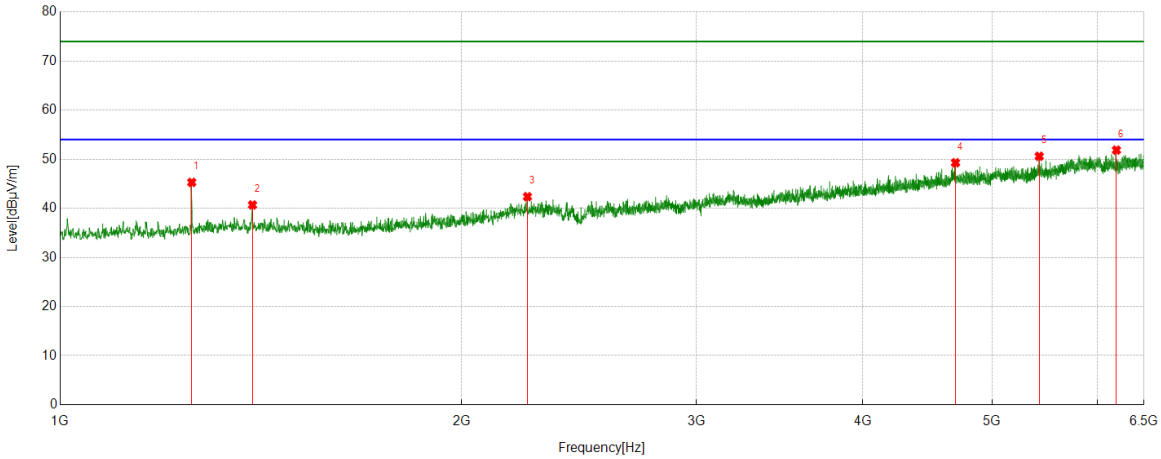
Test Mode	Channel	Puw(dBm)	Verdict
BLE	HCH	<Limit	PASS

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

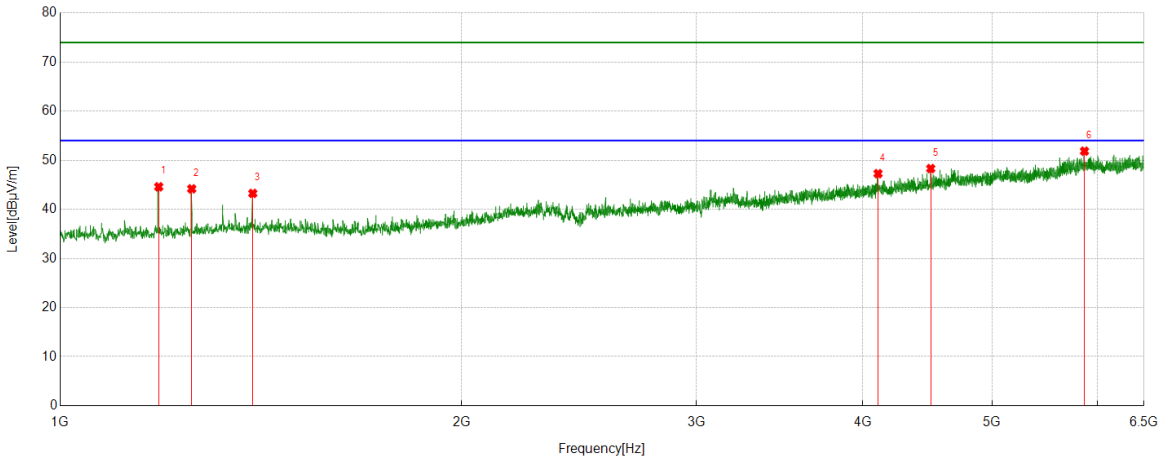


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1255.0944	46.15	-0.86	45.29	74.00	-28.71	Horizontal
2	1393.9867	41.11	-0.42	40.69	74.00	-33.31	Horizontal
3	2241.0926	38.58	3.80	42.38	74.00	-31.62	Horizontal
4	4693.7117	36.53	12.76	49.29	74.00	-24.71	Horizontal
5	5423.9280	36.20	14.40	50.60	74.00	-23.40	Horizontal
6	6197.4622	35.51	16.35	51.86	74.00	-22.14	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

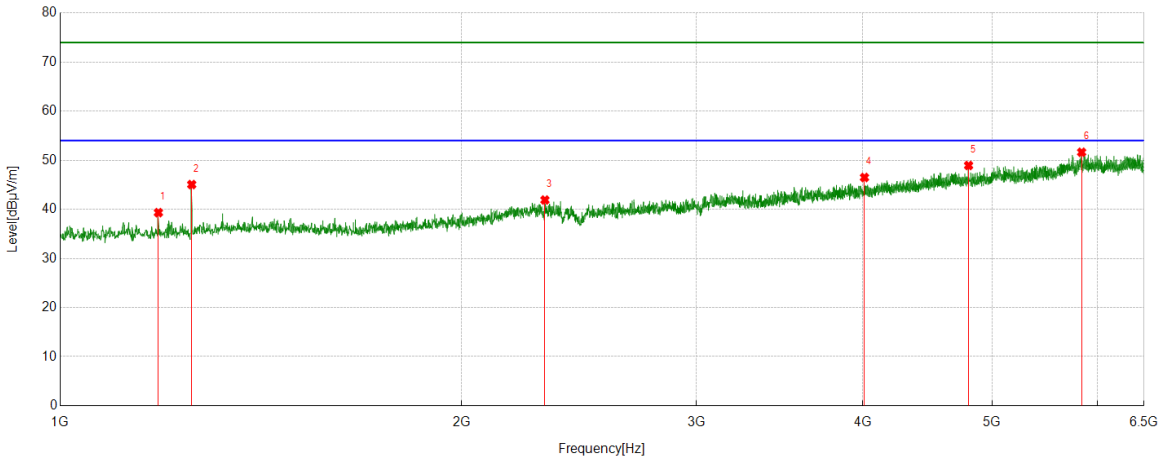


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1185.6482	45.80	-1.21	44.59	74.00	-29.41	Vertical
2	1255.0944	45.04	-0.86	44.18	74.00	-29.82	Vertical
3	1394.6743	43.68	-0.43	43.25	74.00	-30.75	Vertical
4	4105.8257	37.48	9.79	47.27	74.00	-26.73	Vertical
5	4497.0621	37.62	10.69	48.31	74.00	-25.69	Vertical
6	5864.6706	36.26	15.59	51.85	74.00	-22.15	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

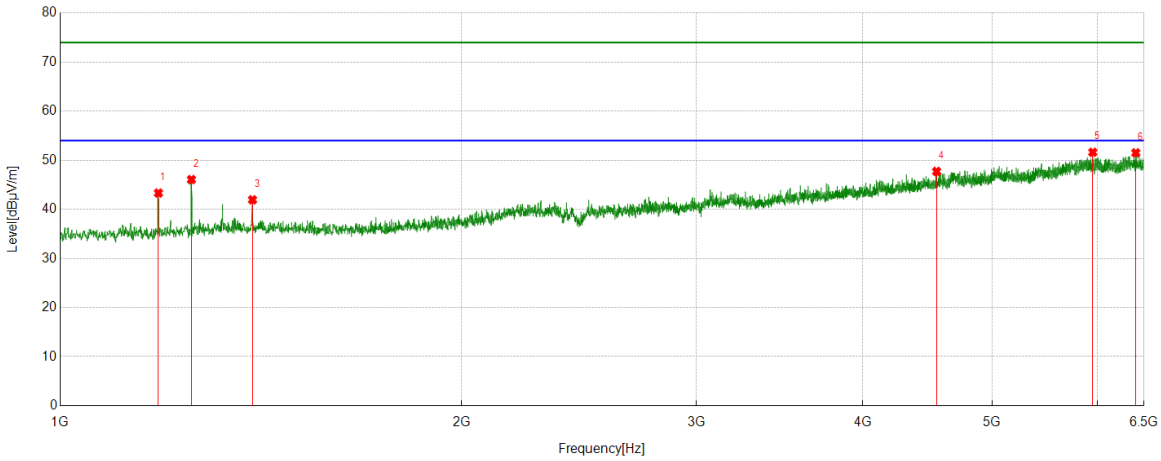


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1184.9606	40.52	-1.19	39.33	74.00	-34.67	Horizontal
2	1255.0944	45.91	-0.86	45.05	74.00	-28.95	Horizontal
3	2309.8512	38.28	3.62	41.90	74.00	-32.10	Horizontal
4	4010.9389	37.19	9.30	46.49	74.00	-27.51	Horizontal
5	4800.9751	36.54	12.39	48.93	74.00	-25.07	Horizontal
6	5835.7920	35.45	16.18	51.63	74.00	-22.37	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

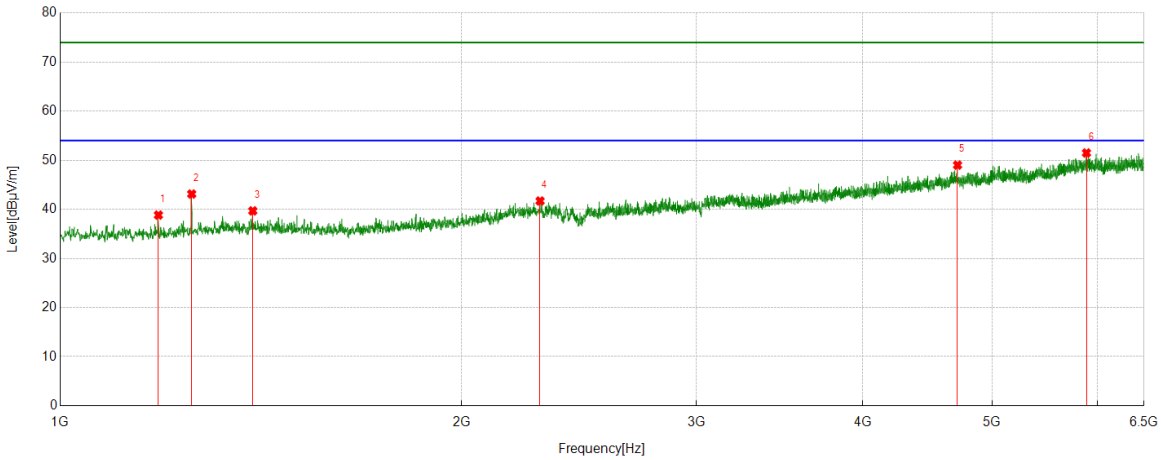


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1184.9606	44.51	-1.19	43.32	74.00	-30.68	Vertical
2	1254.4068	46.91	-0.85	46.06	74.00	-27.94	Vertical
3	1393.9867	42.36	-0.42	41.94	74.00	-32.06	Vertical
4	4543.1304	36.81	10.91	47.72	74.00	-26.28	Vertical
5	5949.2437	35.55	16.07	51.62	74.00	-22.38	Vertical
6	6408.5511	34.22	17.29	51.51	74.00	-22.49	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

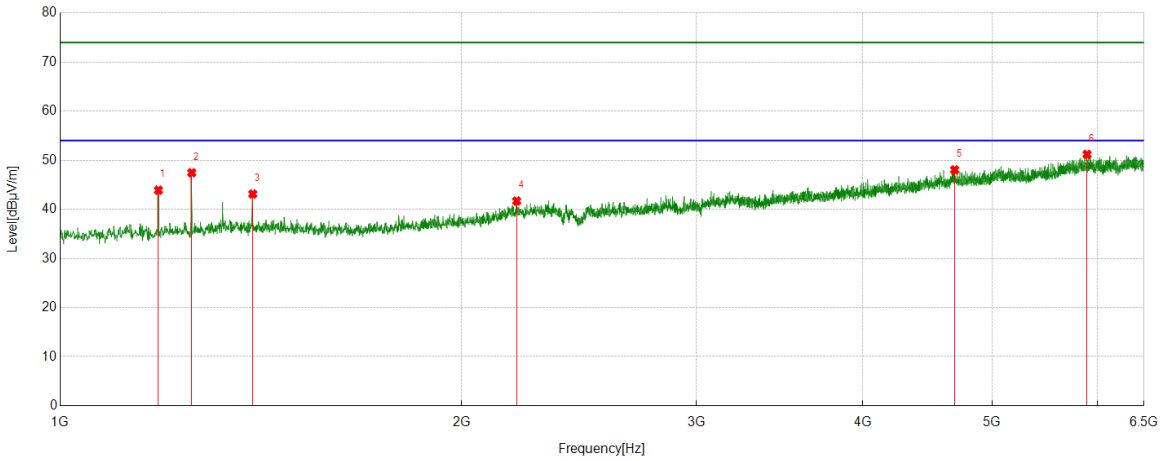


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1184.9606	40.02	-1.19	38.83	74.00	-35.17	Horizontal
2	1255.0944	43.98	-0.86	43.12	74.00	-30.88	Horizontal
3	1394.6743	40.11	-0.43	39.68	74.00	-34.32	Horizontal
4	2290.5988	37.89	3.81	41.70	74.00	-32.30	Horizontal
5	4710.2138	36.38	12.63	49.01	74.00	-24.99	Horizontal
6	5885.2982	36.00	15.49	51.49	74.00	-22.51	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:

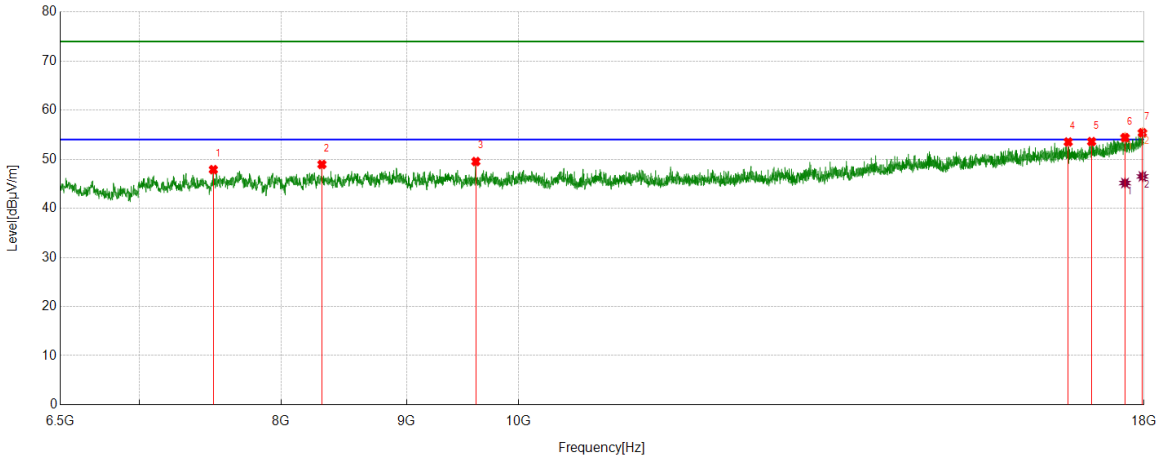
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1184.9606	45.09	-1.19	43.90	74.00	-30.10	Vertical
2	1255.0944	48.31	-0.86	47.45	74.00	-26.55	Vertical
3	1394.6743	43.55	-0.43	43.12	74.00	-30.88	Vertical
4	2199.8375	37.74	3.94	41.68	74.00	-32.32	Vertical
5	4686.8359	35.18	12.86	48.04	74.00	-25.96	Vertical
6	5890.7988	35.57	15.61	51.18	74.00	-22.82	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:

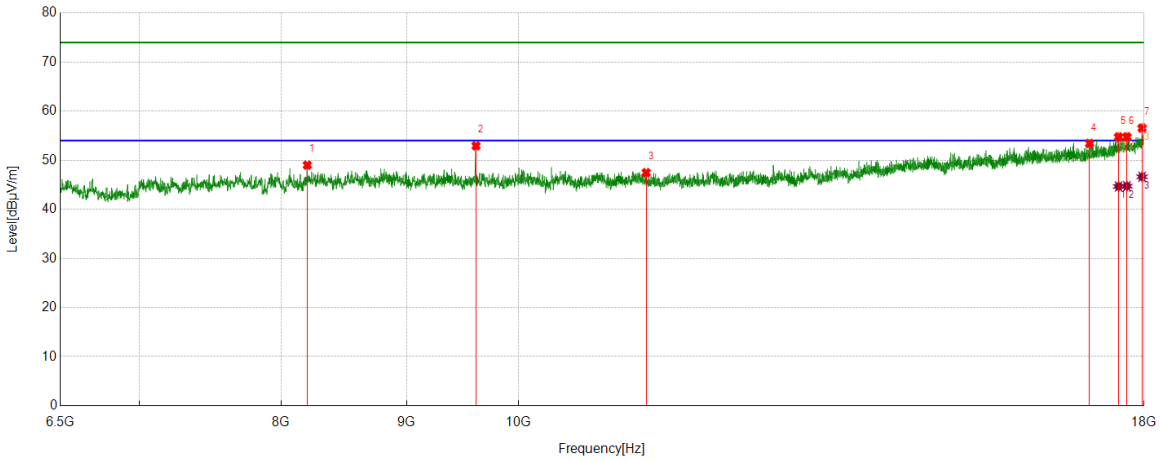
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	7506.3758	43.52	4.36	47.88	74.00	-26.12	Horizontal
2	8312.9141	42.73	6.21	48.94	74.00	-25.06	Horizontal
3	9606.8259	43.31	6.22	49.53	74.00	-24.47	Horizontal
4	16762.1578	37.47	16.05	53.52	74.00	-20.48	Horizontal
5	17134.5168	37.07	16.52	53.59	74.00	-20.41	Horizontal
6	17680.8351	36.29	18.12	54.41	74.00	-19.59	Horizontal
7	17972.6841	35.71	19.68	55.39	74.00	-18.61	Horizontal

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17680.8351	27.04	18.12	45.16	54.00	-8.84	Horizontal
2	17972.6841	26.82	19.68	46.50	54.00	-7.50	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:

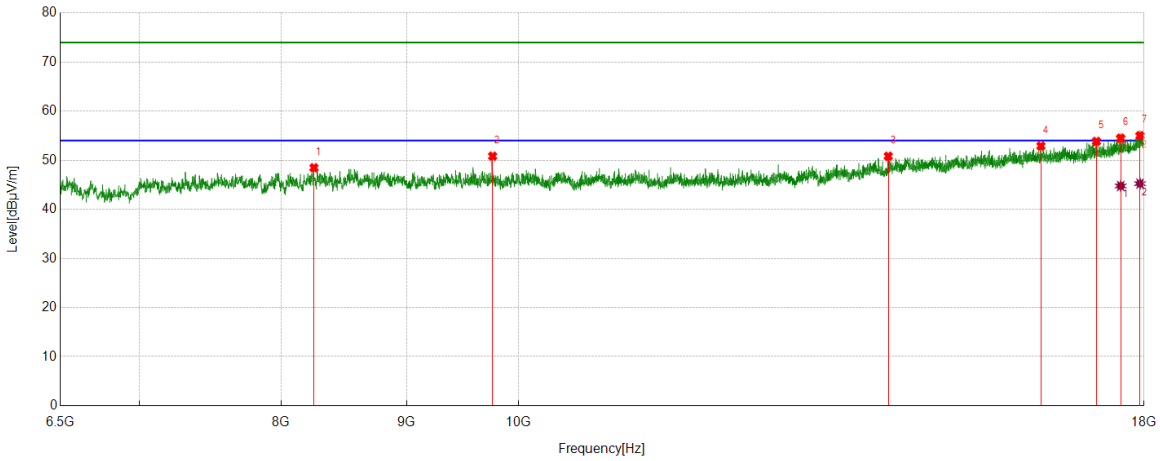
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	8199.3374	42.83	6.17	49.00	74.00	-25.00	Vertical
2	9608.2635	46.70	6.23	52.93	74.00	-21.07	Vertical
3	11274.5343	40.29	7.18	47.47	74.00	-26.53	Vertical
4	17102.8879	36.96	16.47	53.43	74.00	-20.57	Vertical
5	17574.4468	36.83	17.92	54.75	74.00	-19.25	Vertical
6	17712.4641	36.39	18.38	54.77	74.00	-19.23	Vertical
7	17966.9334	36.93	19.63	56.56	74.00	-17.44	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17574.4468	26.74	17.92	44.66	54.00	-9.34	Vertical
2	17712.4641	26.35	18.38	44.73	54.00	-9.27	Vertical
3	17966.9334	27.00	19.63	46.63	54.00	-7.37	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:

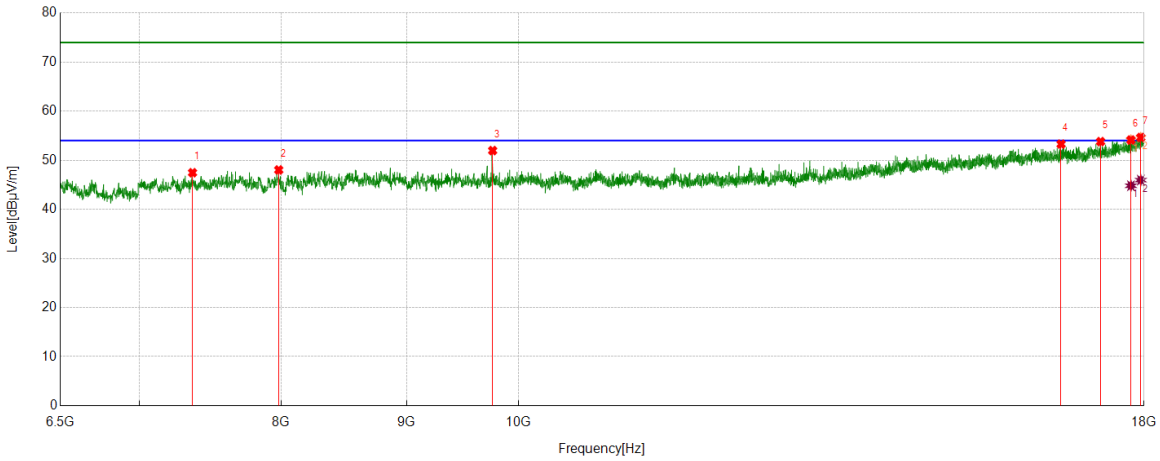
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	8251.0939	42.17	6.30	48.47	74.00	-25.53	Horizontal
2	9759.2199	44.32	6.51	50.83	74.00	-23.17	Horizontal
3	14154.2068	38.80	12.02	50.82	74.00	-23.18	Horizontal
4	16338.0423	37.85	15.05	52.90	74.00	-21.10	Horizontal
5	17212.1515	37.07	16.77	53.84	74.00	-20.16	Horizontal
6	17608.9511	36.43	18.06	54.49	74.00	-19.51	Horizontal
7	17932.4291	35.62	19.39	55.01	74.00	-18.99	Horizontal

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17608.9511	26.70	18.06	44.76	54.00	-9.24	Horizontal
2	17932.4291	25.85	19.39	45.24	54.00	-8.76	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:

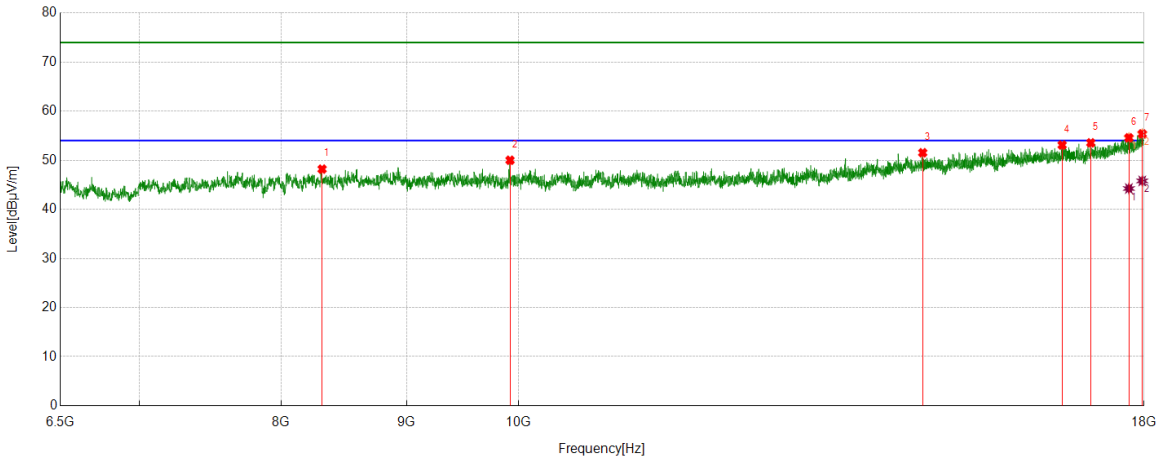
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	7361.1701	43.27	4.19	47.46	74.00	-26.54	Vertical
2	7982.2478	42.60	5.42	48.02	74.00	-25.98	Vertical
3	9759.2199	45.46	6.51	51.97	74.00	-22.03	Vertical
4	16650.0188	37.58	15.70	53.28	74.00	-20.72	Vertical
5	17279.7225	36.90	16.90	53.80	74.00	-20.20	Vertical
6	17780.0350	35.34	18.79	54.13	74.00	-19.87	Vertical
7	17945.3682	35.16	19.48	54.64	74.00	-19.36	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17780.0350	26.02	18.79	44.81	54.00	-9.19	Vertical
2	17945.3682	26.47	19.48	45.95	54.00	-8.05	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:

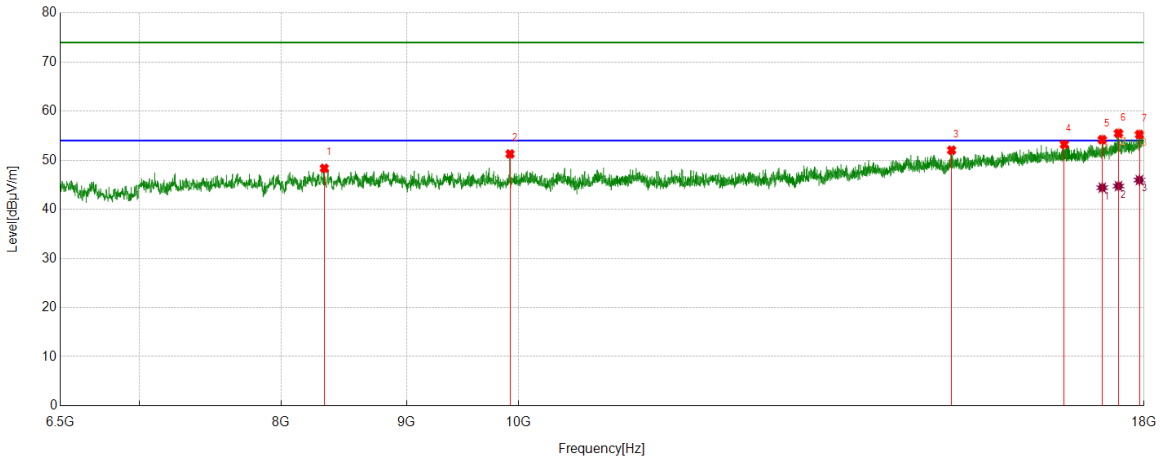
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	8314.3518	42.05	6.14	48.19	74.00	-25.81	Horizontal
2	9920.2400	43.43	6.57	50.00	74.00	-24.00	Horizontal
3	14620.0150	38.70	12.83	51.53	74.00	-22.47	Horizontal
4	16667.2709	37.35	15.75	53.10	74.00	-20.90	Horizontal
5	17121.5777	37.06	16.48	53.54	74.00	-20.46	Horizontal
6	17745.5307	35.99	18.58	54.57	74.00	-19.43	Horizontal
7	17969.8087	35.74	19.63	55.37	74.00	-18.63	Horizontal

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17745.5307	25.66	18.58	44.24	54.00	-9.76	Horizontal
2	17969.8087	26.16	19.63	45.79	54.00	-8.21	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	8331.6040	42.33	6.03	48.36	74.00	-25.64	Vertical
2	9920.2400	44.71	6.57	51.28	74.00	-22.72	Vertical
3	15022.5653	39.10	12.95	52.05	74.00	-21.95	Vertical
4	16700.3375	37.17	16.06	53.23	74.00	-20.77	Vertical
5	17307.0384	37.19	17.00	54.19	74.00	-19.81	Vertical
6	17573.0091	37.57	17.92	55.49	74.00	-18.51	Vertical
7	17922.3653	35.88	19.37	55.25	74.00	-18.75	Vertical

AV Result:

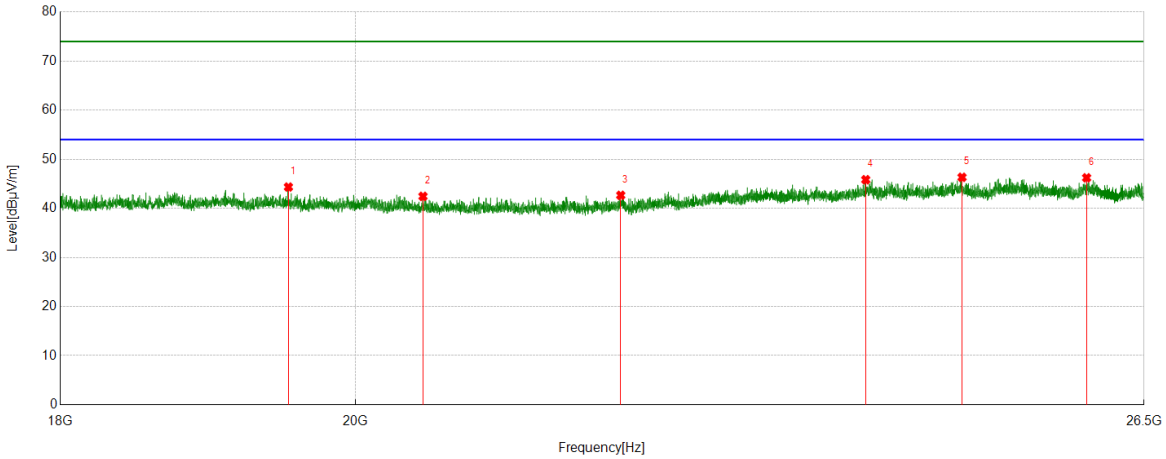
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17307.0384	27.41	17.00	44.41	54.00	-9.59	Vertical
2	17573.0091	26.82	17.92	44.74	54.00	-9.26	Vertical
3	17922.3653	26.59	19.37	45.96	54.00	-8.04	Vertical

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 ~ 26.5GHz (WORST-CASE CONFIGURATION)

Test Mode	Channel	Polarization	Verdict
BLE	HCH	Horizontal	PASS

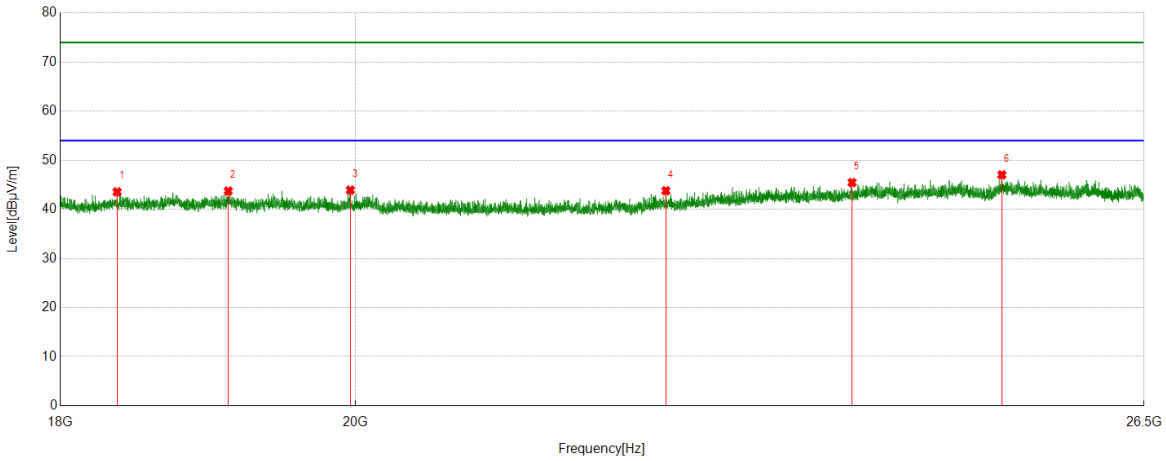


PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	19527.6028	49.79	-5.45	44.34	74.00	-29.66	Horizontal
2	20488.1988	48.08	-5.64	42.44	74.00	-31.56	Horizontal
3	21986.0486	48.41	-5.76	42.65	74.00	-31.35	Horizontal
4	23994.7995	48.45	-2.62	45.83	74.00	-28.17	Horizontal
5	24833.8334	49.69	-3.37	46.32	74.00	-27.68	Horizontal
6	25962.7463	48.94	-2.72	46.22	74.00	-27.78	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:

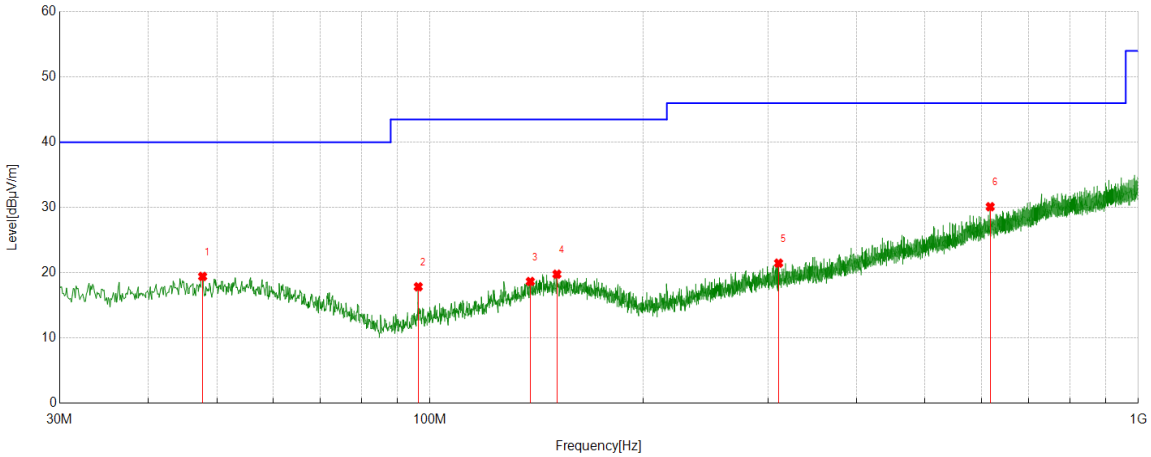
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	18369.7870	50.24	-6.69	43.55	74.00	-30.45	Vertical
2	19112.7613	49.61	-5.89	43.72	74.00	-30.28	Vertical
3	19963.6964	49.02	-5.10	43.92	74.00	-30.08	Vertical
4	22343.0843	48.85	-5.07	43.78	74.00	-30.22	Vertical
5	23878.3378	48.26	-2.80	45.46	74.00	-28.54	Vertical
6	25189.1689	50.44	-3.41	47.03	74.00	-26.97	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 30MHz ~ 1GHz (WORST-CASE CONFIGURATION)

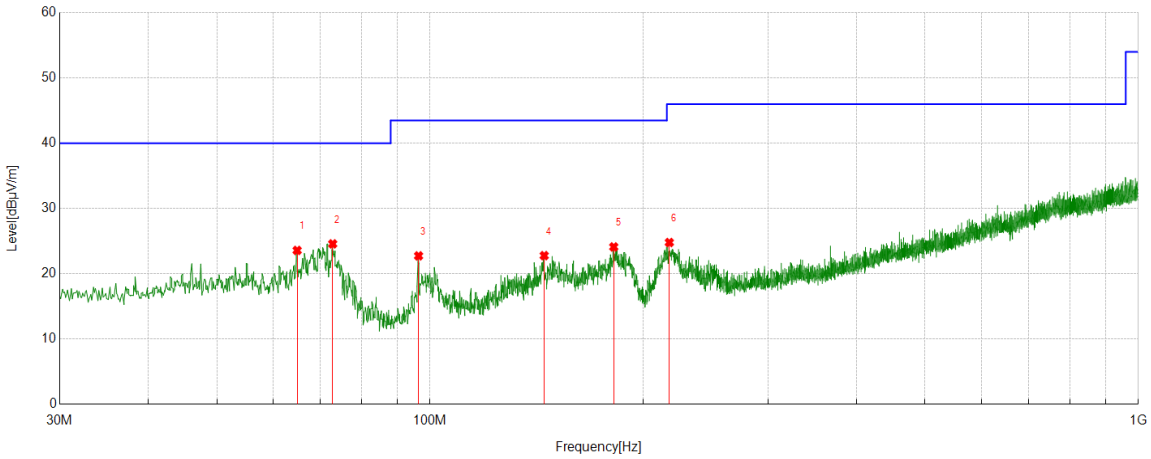
Test Mode	Channel	Polarization	Verdict
BLE	HCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	47.7528	-0.99	20.41	19.42	40.00	-20.58	Peak
2	96.2576	2.73	15.11	17.84	43.50	-25.66	Peak
3	138.5539	-1.21	19.86	18.65	43.50	-24.85	Peak
4	151.0681	-0.76	20.52	19.76	43.50	-23.74	Peak
5	310.5521	0.13	21.33	21.46	46.00	-24.54	Peak
6	617.8788	1.52	28.59	30.11	46.00	-15.89	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



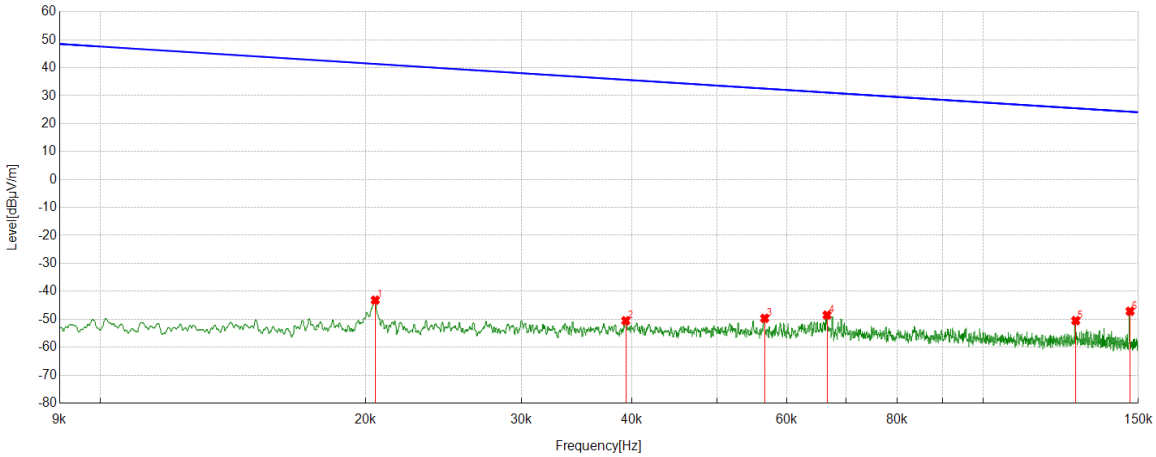
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	64.9235	4.54	19.03	23.57	40.00	-16.43	Peak
2	72.8783	7.18	17.39	24.57	40.00	-15.43	Peak
3	96.3546	7.61	15.12	22.73	43.50	-20.77	Peak
4	144.9565	2.46	20.31	22.77	43.50	-20.73	Peak
5	181.7232	5.47	18.63	24.10	43.50	-19.40	Peak
6	217.7138	7.44	17.34	24.78	46.00	-21.22	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 9kHz ~ 30MHz (WORST CASE CONFIGURATION-FACE ON)

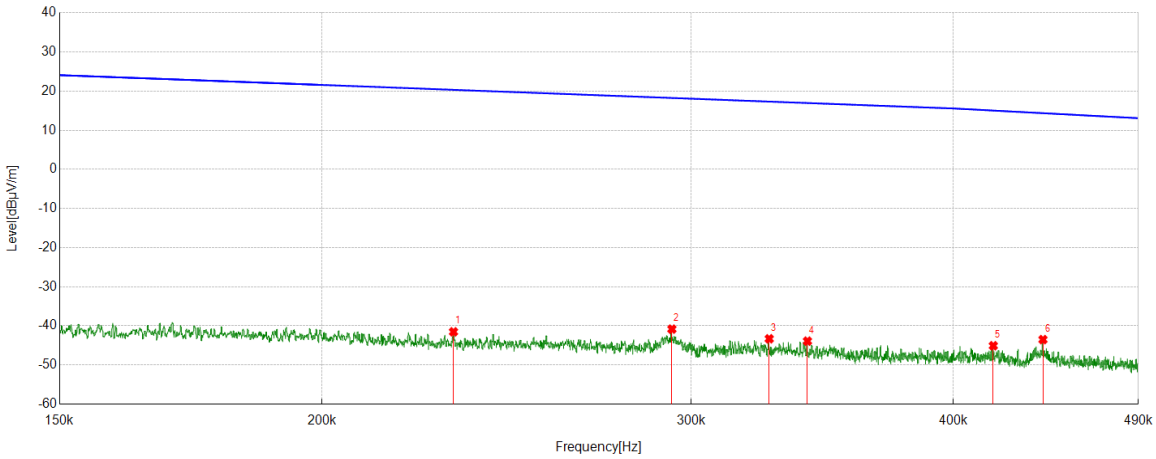
Test Mode	Channel	Frequency Range	Verdict
BLE	HCH	9kHz~150kHz	PASS



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.0205	18.57	-61.74	-43.17	41.38	-94.67	-10.12	-84.55	Peak
2	0.0394	11.07	-61.60	-50.53	35.68	-102.03	-15.82	-86.21	Peak
3	0.0566	11.92	-61.60	-49.68	32.55	-101.18	-18.95	-82.23	Peak
4	0.0666	13.09	-61.61	-48.52	31.14	-100.02	-20.36	-79.66	Peak
5	0.1274	11.22	-61.72	-50.50	25.50	-102.00	-26.00	-76.00	Peak
6	0.1468	14.60	-61.73	-47.13	24.27	-98.63	-27.23	-71.40	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.

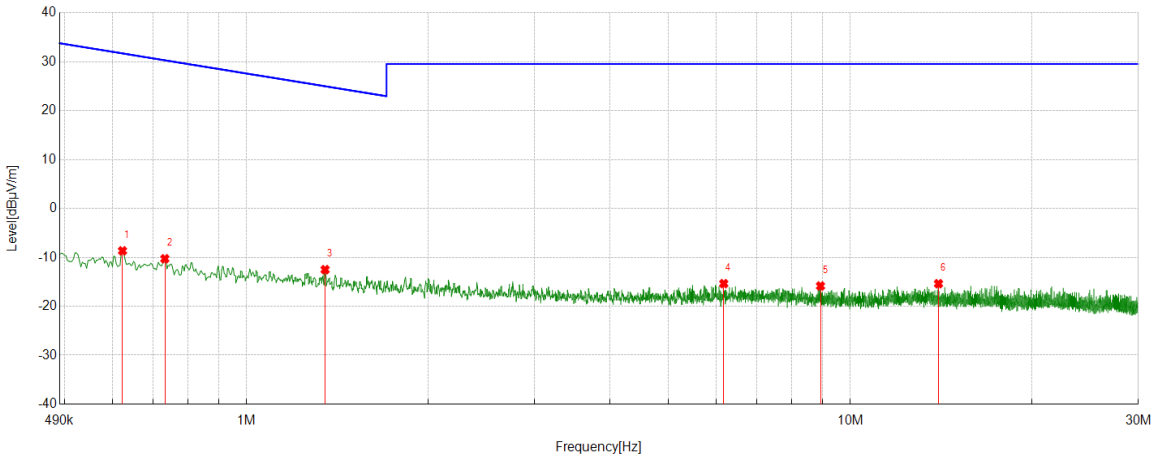
Test Mode	Channel	Frequency Range	Verdict
BLE	HCH	150kHz~490kHz	PASS



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.2311	20.26	-61.79	-41.53	20.32	-93.03	-31.18	-61.85	Peak
2	0.2937	20.98	-61.82	-40.84	18.24	-92.34	-33.26	-59.08	Peak
3	0.3268	18.51	-61.82	-43.31	17.32	-94.81	-34.18	-60.63	Peak
4	0.3408	17.92	-61.83	-43.91	16.95	-95.41	-34.55	-60.86	Peak
5	0.4179	16.75	-61.84	-45.09	15.03	-96.59	-36.47	-60.12	Peak
6	0.4413	18.34	-61.86	-43.52	14.36	-95.02	-37.14	-57.88	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	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.6228	13.23	-21.89	-8.66	31.72	-60.16	-19.78	-40.38	Peak
2	0.7320	11.59	-21.87	-10.28	30.31	-61.78	-21.19	-40.59	Peak
3	1.3488	9.33	-21.84	-12.51	25.01	-64.01	-26.49	-37.52	Peak
4	6.1712	6.46	-21.83	-15.37	29.54	-66.87	-21.96	-44.91	Peak
5	8.9248	5.82	-21.67	-15.85	29.54	-67.35	-21.96	-45.39	Peak
6	13.9981	6.19	-21.57	-15.38	29.54	-66.88	-21.96	-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

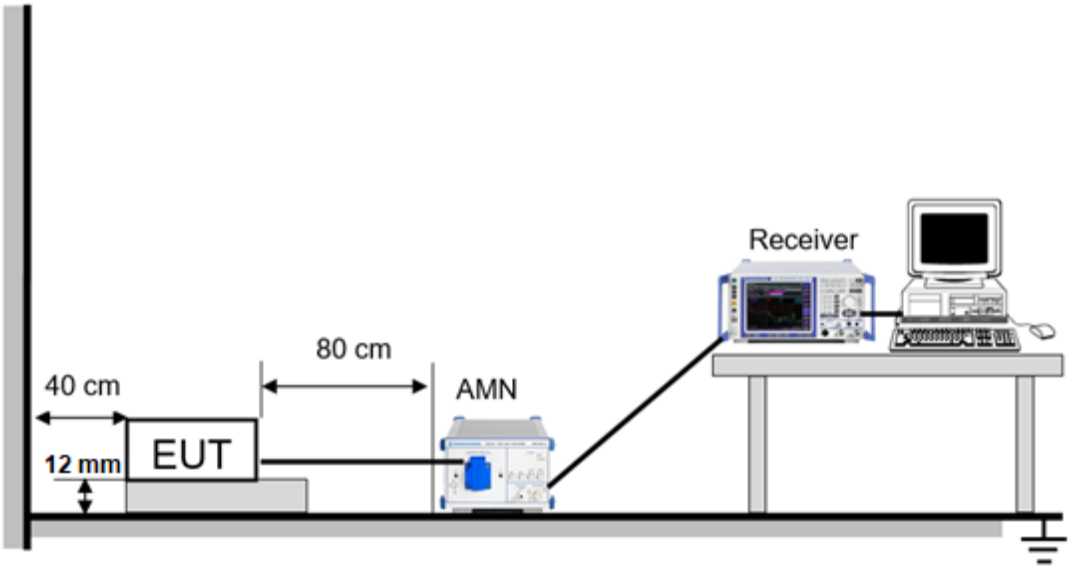
Please refer to FCC §15.207 (a)

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

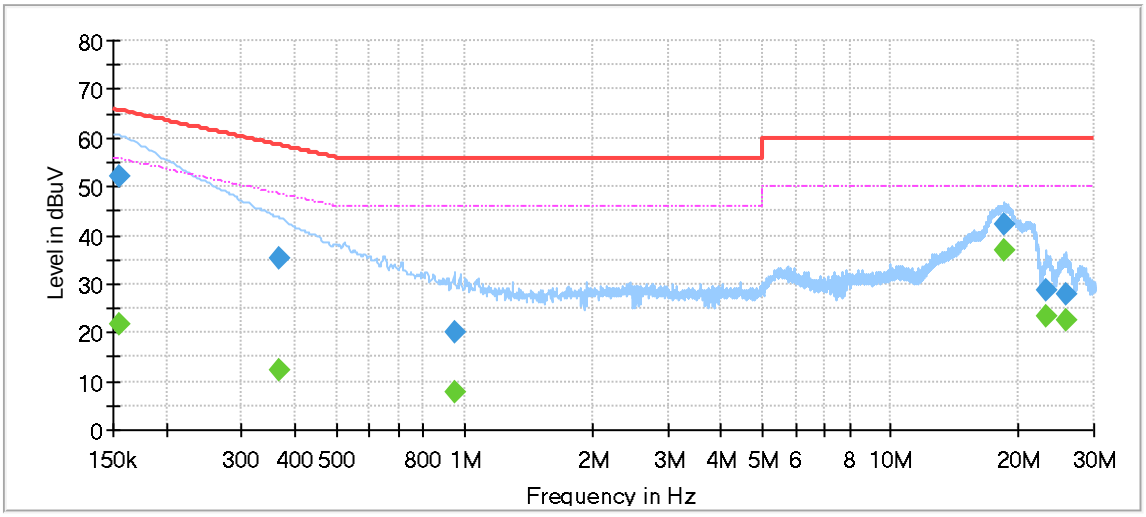
TEST SETUP AND PROCEDURE



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)

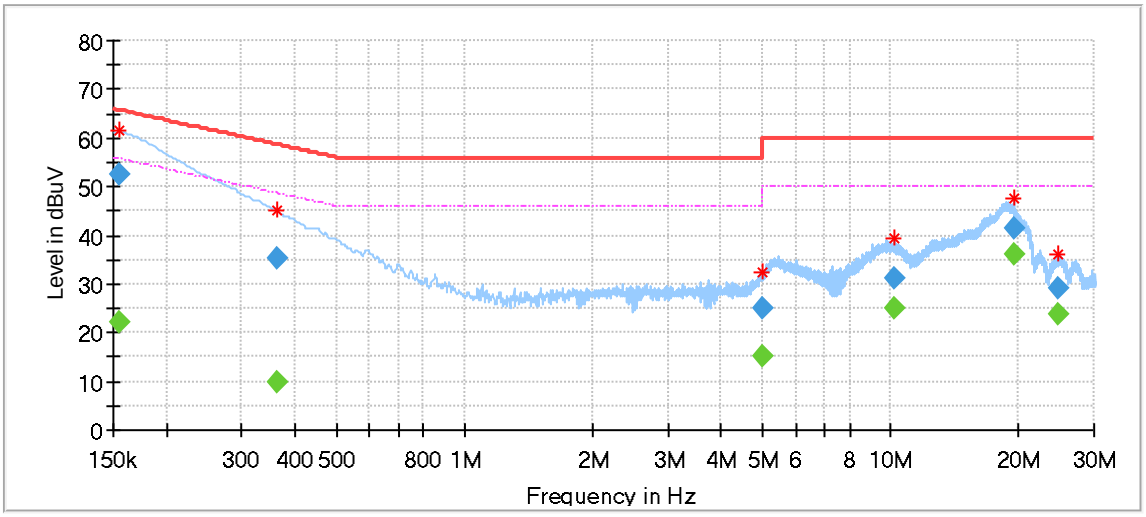


Final_Result

Frequency [MHz]	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line	Filter	Corr. [dB]
0.154975	---	21.77	55.73	33.95	5000.0	9.000	L1	OFF	9.6
0.154975	52.31	---	65.73	13.42	5000.0	9.000	L1	OFF	9.6
0.366413	---	12.37	48.58	36.21	5000.0	9.000	L1	OFF	9.6
0.366413	35.08	---	58.58	23.50	5000.0	9.000	L1	OFF	9.6
0.948488	---	7.73	46.00	38.27	5000.0	9.000	L1	OFF	9.6
0.948488	20.08	---	56.00	35.92	5000.0	9.000	L1	OFF	9.6
18.408250	---	36.77	50.00	13.23	5000.0	9.000	L1	OFF	9.9
18.408250	42.11	---	60.00	17.89	5000.0	9.000	L1	OFF	9.9
23.039975	---	23.41	50.00	26.59	5000.0	9.000	L1	OFF	9.8
23.039975	28.56	---	60.00	31.44	5000.0	9.000	L1	OFF	9.8
25.778713	---	22.73	50.00	27.27	5000.0	9.000	L1	OFF	9.8
25.778713	27.78	---	60.00	32.22	5000.0	9.000	L1	OFF	9.8

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.

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]
0.154975	---	22.06	55.73	33.67	5000.0	9.000	N	OFF	9.5
0.154975	52.60	---	65.73	13.13	5000.0	9.000	N	OFF	9.5
0.363925	---	9.78	48.64	38.85	5000.0	9.000	N	OFF	9.6
0.363925	35.39	---	58.64	23.25	5000.0	9.000	N	OFF	9.6
4.998138	---	15.15	46.00	30.85	5000.0	9.000	N	OFF	9.6
4.998138	24.83	---	56.00	31.17	5000.0	9.000	N	OFF	9.6
10.224375	---	25.18	50.00	24.82	5000.0	9.000	N	OFF	9.8
10.224375	31.34	---	60.00	28.66	5000.0	9.000	N	OFF	9.8
19.405738	---	36.26	50.00	13.74	5000.0	9.000	N	OFF	9.9
19.405738	41.56	---	60.00	18.44	5000.0	9.000	N	OFF	9.9
24.778738	---	23.98	50.00	26.02	5000.0	9.000	N	OFF	9.9
24.778738	29.01	---	60.00	30.99	5000.0	9.000	N	OFF	9.9

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