

Prüfbericht-Nr.: <i>Test report no.:</i>	CN20KBZ8 001	Auftrags-Nr.: <i>Order no.:</i>	168292074	Seite 1 von 24 Page 1 of 24
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-11-20	
Auftraggeber: <i>Client:</i>	ARKON ELECTRONICS (HUIZHOU) CO., LIMITED NO.4 Taihao Road, High-tech Industrial Park, Sandong Town, Huicheng District, Huizhou, Guangdong, China			
Prüfgegenstand: <i>Test item:</i>	Digital Wireless Headphone System			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	DH900, DH900D, APH100, AR-TV, Introson 2.4 SET (Trademark: ARKON, ARTISTE, Introson 2.4)			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.207 FCC Part 2 (Section 2.1093) CFR47 FCC Part 15: Subpart C Section 15.209 KDB 447498 D01 CFR47 FCC Part 15: Subpart C Section 15.247 ANSI C63.4:2014			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-10-20	Refer to External Photos		
Prüfmuster-Nr.: <i>Test sample no.:</i>	HS201023N001-001-001 HS201023N001-001-002			
Prüfzeitraum: <i>Testing period:</i>	2020-11-05 – 2020-11-20			
Ort der Prüfung: <i>Place of testing:</i>	Hwa-Hsing (Dongguan) Testing Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	2020-12-21	Ausstellungsdatum: <i>Issue date:</i>		2020-12-21
Stellung / Position:	Project Manager	Stellung / Position:		Technical Certifier
Sonstiges / Other: FCC ID: 2APBSDH901-01TX				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

Test Summary

5.1.1 Antenna Requirement

RESULT: Pass

5.1.2 Maximum Peak Conducted Output Power

RESULT: Pass

5.1.3 RF Exposure (Calculation)

RESULT: Pass

5.1.4 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: Pass

5.1.5 Radiated Spurious Emission

RESULT: Pass

5.1.6 20dB Bandwidth

RESULT: Pass

5.1.7 Carrier Frequency Separation

RESULT: Pass

5.1.8 Number of Hopping Frequency

RESULT: Pass

5.1.9 Time of Occupancy

RESULT: Pass

5.1.10 Conducted Emission on AC Mains

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of FHSS Wireless mode

Appendix B: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

Hwa-Hsing (Dongguan) Testing Co., Ltd.

No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China

FCC Registration No.: 0028199784

ISED wireless device testing laboratory: 25433

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Hwa-Hsing (Dongguan) Testing Co., Ltd.

Conducted Emission on AC Mains				
Equipment	Manufacturer	Model No.	Serial No.	Cali. until
EMI Test Receiver (9kHz~3GHz)	Rohde&Schwarz	ESCI	101418	2021/09/16
Artificial Mains Network	Rohde&Schwarz	ENV216	3560.6550.15	2021/09/16
Test software	FARAD	EZ_EMC V1.1.4.2	N/A	N/A
Hygrothermograph	Yuhuaze	HTC-1	NA	2021/09/16
Digital Multimeter	FLUKE	15B+	43512617WS	2021/09/16
Radiated Emission (3m chamber,Below 1GHz)				
Equipment	Manufacturer	Model No.	Serial No.	Cali. until
EMI Test Receiver (10kHz~7GHz)	Rohde&Schwarz	ESCI 7	100962	2021/05/14
Broadband antenna (25MHz~2500MHz)	Schwarzbeck	VULB 9168	00937	2021/04/15
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2021/04/14
Signal Amplifier (30MHz~1000MHz)	Com-power	PAM-103	18020051	2021/04/15
Attenuator	R&S	TS2GA-6dB	18101101	N/A
Test software	EZ	EZ_EMC V1.1.4.2	N/A	N/A
Radiated Emission (3m chamber, Above 1GHz)				
Equipment	Manufacturer	Model No.	Serial No.	Cali. until
Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA 9170	01959	2021/04/15
Broadband Coaxial Preamplifier (1GHz-18GHz)	Schwarzbeck	BBV 9718	00025	2021/04/15
Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101783	2021/04/15
Horn Antenna (18GHz-40GHz)	Schwarzbeck	BBHA 9170	BBHA9170242	2021/04/15
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	2021/04/15
High pass filter	Micro-Tronics	HPM50107	G050	2021/09/16
High pass filter	Micro-Tronics	HPM50117	G007	2021/09/16
Test software	EZ	EZ_EMC V1.1.4.2	N/A	N/A
Spectrum (10kHz~26.5GHz)	Keysight	N9020A	MY51240612	2021/09/16
RF conducted test				
Equipment	Manufacturer	Model No.	Serial No.	Cali. until
Spectrum (10kHz~26.5GHz)	Keysight	N9020A	MY51240612	2021/09/16

Power Meter 10Hz~18GHz	Tonscend	JS0806-2	188060126	2021/09/16
Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101783	2021/09/16
Signal generator	Keysight	N4421B	GB40051020	2021/09/16
Signal generator	Keysight	N5182A	MY47420944	2021/09/16
Test Software	Tonscend	JS0806-2	NA	NA
Power Meter 10Hz~18GHz	Tonscend	JS0806-2	188060126	2021/09/16
Test Software	Tonscend	JS0806-2	NA	NA
Humidity tester (- 40 to 150°C)	SanShun	SS-HWHS-800	NA	NA
Universal Switch Control Unit	Rohde&Schwarz	CMW500	12010002K50	2021/09/16

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 1.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
Conducted Emission, 150kHz to 30MHz	± 2.66 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.84 dB
Radiated Emission (3m SAC), above 1000MHz	± 3.47 dB
Temperature	± 0.5 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

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2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Hwa-Hsing (Dongguan) Testing Co., Ltd. Test facility located at No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a wireless transmitter which supports 2.4G Wireless: FHSS wireless technology. This report is for 2.4G Wireless transmitter function. It contains a Wireless Headphone (only for RX) and a Charging Base.

For details refer to the User Manual, Technical Description and Circuit Diagram.

The Headphone (RX only) and powered by batteries as below:

Battery Model	Manufacturer	Ratings
Li-POLYMER 350mA	N/A	DC3.7V 350mAh

The Charging Base (TX) powered by adapter as below:

Adaptor Model	Manufacturer	Ratings
1 YLJXA-T050055	N/A	Input: AC100-240V~50/60Hz 0.5A Max. Output: DC5.0V0.55A 2.75W

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT (Transmitter/Charging Base)

General Information of EUT	Value
Kind of Equipment	Digital Wireless Headphone System
Type Designation	DH900, DH900D; APH100, AR-TV; Introson 2.4 SET;
Model Difference	* different for model name, trade mark only
Trade Mark	ARKON/ ARTISTE/Introson 2.4
FCC ID	2APBSDH901-01TX
Operating Voltage:	DC5V from adaptor The adaptor input: AC100-240V~50/60Hz 0.5A Max. The adaptor output: DC5.0V 0.55A 2.75W
Testing Voltage	DC5V from adaptor The adaptor input: AC120V~60Hz
Antenna Type	Internal (PIFA) Antenna
Antenna Gain	-2.2 dBi
Power Adapter	YLJXA-T050055
Other accessories	Aux in Line: unshielded, detachable 1.6m Optical Line: un-shielded, detachable 1.52m RCA Line: unshielded, detachable 0.2m
Technical Specification of wireless (GFSK)FHSS	

Operating Frequency	2406 – 2472 MHz
Type of Modulation	GFSK(FHSS)
Channel Number	31 channels total. The module RF normal operation mode support 15 hopping channel/Per Sequence, as listed in table 2.
Channel Separation	2 MHz

Table 3: RF Channel and Frequency of FHSS

● The UUT support total 31 channels of FHSS mode

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2406	8	2422	16	2444	24	2460
1	2408	9	2424	17	2446	25	2462
2	2410	10	2426	18	2448	26	2464
3	2412	11	2428	19	2450	27	2466
4	2414	12	2430	20	2452	28	2468
5	2416	13	2432	21	2454	29	2470
6	2418	14	2438	22	2456	30	2472
7	2420	15	2440	23	2458		

- This module is controlled by microchip to generate Pseudorandom Frequency Hopping Sequence. The module RF normal operation mode support 15 hopping channel/Per Sequence.

- There are four hopping sequences list as below:

Hopping Sequence 1 Channel list		Hopping Sequence 2 Channel list		Hopping Sequence 3 Channel list		Hopping Sequence 4 Channel list	
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2406	0	2406	13	2432	0	2406
7	2420	1	2408	15	2440	1	2408
8	2422	2	2410	18	2448	2	2410
9	2424	3	2412	19	2450	3	2412
10	2426	4	2414	20	2452	4	2414
11	2428	5	2416	21	2454	5	2416
16	2444	6	2418	22	2456	6	2418
17	2446	7	2420	23	2458	10	2426
18	2448	8	2422	24	2460	21	2454
19	2450	9	2424	25	2462	25	2462
20	2452	10	2426	26	2464	26	2464
22	2456	11	2428	27	2466	27	2466
28	2468	12	2430	28	2468	28	2468
29	2470	14	2438	29	2470	29	2470
30	2472	17	2446	30	2472	30	2472

Test frequencies are lowest channel: 2406 MHz, middle channel: 2440 MHz and highest channel: 2472 MHz for General 2.4GHz

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Wireless transmitting mode (GFSK mode)

- 1) Low Channel
- 2) Middle Channel
- 3) High Channel

B. On, Transmitting on Hopping channel

C. On, Standby mode(Charging)

D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|------------------------------|-------------------------|
| - Application Form | - Photo Document |
| - Block Diagram | - Schematics |
| - Operation Description | - User Manual |
| - ID Label and Location Info | - Operation Description |

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
----	--	--	--	--

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 30MHz)

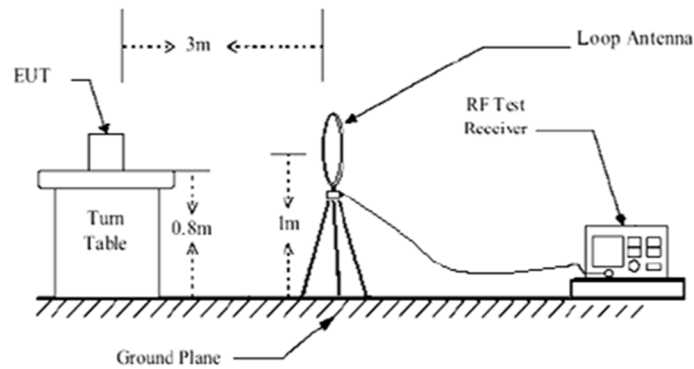


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

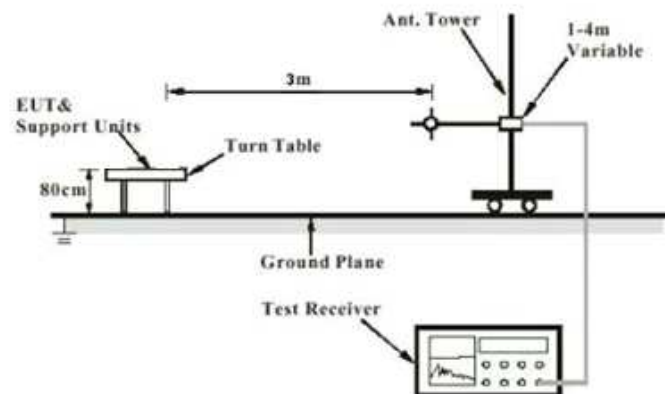


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

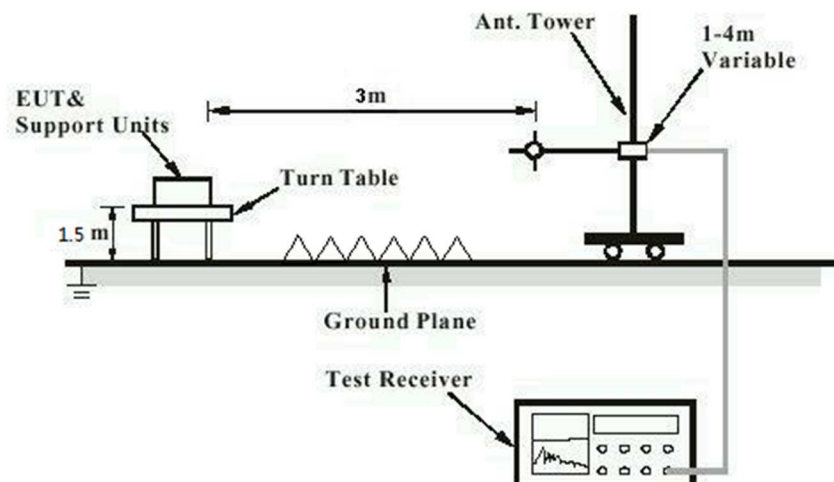


Diagram of Measurement Configuration for Mains Conduction Measurement

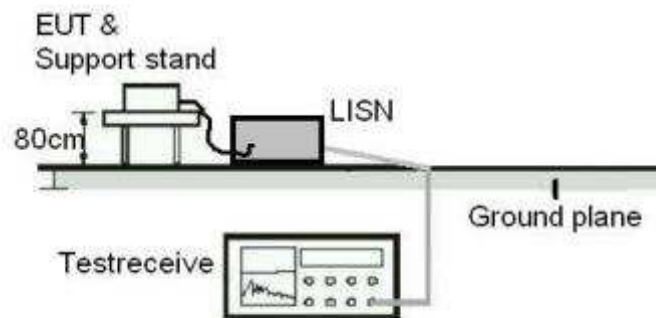
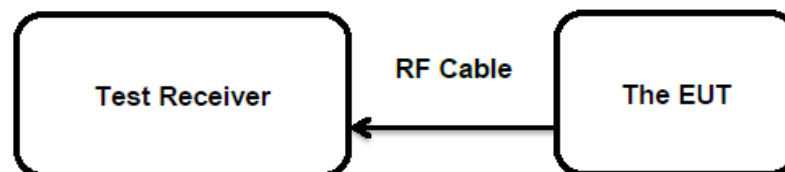


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

: FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has an internal antenna, the max. directional gain of antenna is -2.2dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power
RESULT:
Pass

Test Specification	CFR47 FCC Part 15: Subpart C
Test standard	: FCC Part 15.247(b)(1)&(3)
Basic standard	: ANSI C63.10: 2013
Limits	: FHSS < 0.125 Watts, DSSS < 1.0 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2020-11-10 – 2020-11-12
Input voltage	: DC5V from adaptor
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25.3 °C
Relative humidity	: 58.3 %
Atmospheric pressure	: 101 kPa

Table 5: Test Result of Maximum Average Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
GFSK	2406	7.51	5.64	< 0.125
	2440	7.15	5.19	
	2472	6.80	4.79	
Maximum Measured Value		7.51	5.64	

Table 6: Test Result of Maximum Peak Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
GFSK	2406	8.33	6.81	< 1.0
	2440	7.52	5.65	
	2472	7.17	5.21	
Maximum Measured Value		8.33	6.81	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G) of Bluetooth: -2.2dBi

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5.1.3 RF Exposure (Calculation)**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

:

Part 2.1093

FCC KDB Publication 447498 v06

Maximum Peak conducted power

8.33 dBm

The highest maximum power is 8.33dBm (6.81mW), lower than the threshold power 9.67mW@2406, SAR is exempted.

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5.1.4 Conducted Spurious Emissions Measured in 100 kHz Bandwidth**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

: FCC Part 15.247(d)

Basic standard

: ANSI C63.10: 2013

Limits

: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);

In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)

Kind of test site

: Shielded Room

Test Setup

Date of testing

: 2020-11-10 – 2020-11-12

Input voltage

: DC5V from adaptor

Operation mode

: A, B

Test channel

: Low / Middle / High

Ambient temperature

: 25.3 °C

Relative humidity

: 58.5 %

Atmospheric pressure

: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A

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5.1.5 Radiated Spurious Emission**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

: FCC Part 15.247(d) & FCC Part 15.205

Basic standard

: ANSI C63.10: 2013

Limits

: Refer to 15.209(a) of FCC part 15.247(d)

Kind of test site

: 3m Semi-anechoic Chamber

Test Setup

Date of testing

: 2020-11-10 – 2020-11-12

Input voltage

: DC5V from adaptor

Operation mode

: A, B,C

Test channel

: Low / Middle / High

Ambient temperature

: 24.4 °C

Relative humidity

: 57.2 %

Atmospheric pressure

: 101 kPa

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A

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5.1.6 20dB Bandwidth**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

: FCC Part 15.247(a)(1)

Basic standard

: ANSI C63.10: 2013

Kind of test site

: Shielded Room

Test Setup

Date of testing

: 2020-11-10 – 2020-11-12

Input voltage

: DC5V from adaptor

Operation mode

: A

Test channel

: Low / Middle / High

Ambient temperature

: 25.3 °C

Relative humidity

: 58.5 %

Atmospheric pressure

: 101 kPa

For the measurement records, refer to the appendix A.

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5.1.7 Carrier Frequency Separation**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard : FCC Part 15.247(a)(1)

Basic standard : ANSI C63.10: 2013

Limits : $\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth, whichever is greater

Kind of test site : Shielded Room

Test Setup

Date of testing : 2020-11-10 – 2020-11-12

Input voltage : DC5V from adaptor

Operation mode : B

Test channel : Low / Middle / High

Ambient temperature : $25.3\text{ }^{\circ}\text{C}$ Relative humidity : 58.5% Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A

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5.1.8 Number of Hopping Frequency**RESULT:****Pass****Test Specification**

CFR47 FCC Part 15: Subpart C

Test standard

: FCC part 15.247(a)(1)(iii)

RSS-247 Clause 5.1(d)

Basic standard

: ANSI C63.10: 2013

Limits

: ≥ 15 non-overlapping channels

Kind of test site

: Shielded Room

Test Setup

Date of testing

: 2020-11-10 – 2020-11-12

Input voltage

: DC5V from adaptor

Operation mode

: B

Ambient temperature

: 25.3 °C

Relative humidity

: 58.5 %

Atmospheric pressure

: 101 kPa

For the measurement records, refer to the appendix A

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5.1.9 Time of Occupancy**RESULT:****Pass****Test Specification** CFR47 FCC Part 15: Subpart C

Test standard : FCC part 15.247(a)(1)(iii)

Basic standard : ANSI C63.10: 2013

Limits : < 0.4s

Kind of test site : Shielded Room

Test Setup

Date of testing : 2020-11-10 – 2020-11-12

Input voltage : DC5V from adaptor

Operation mode : B

Test channel : Low / Middle / High

Ambient temperature : 25.3 °C

Relative humidity : 58.5 %

Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A

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5.1.10 Conducted Emission on AC Mains**RESULT:****Pass****Test Specification** CFR47 FCC Part 15: Subpart C

Test standard : FCC Part 15.207(a)

Basic standard : ANSI C63.10: 2013

Frequency range : 0.15 – 30MHz

Limits : FCC Part 15.207(a)

Kind of test site : Shielded Room

Test Setup

Date of testing : 2020-11-10 – 2020-11-12

Input voltage : DC5V from adaptor

Operation mode : C

Earthing : Not connected

Ambient temperature : 25.3 °C

Relative humidity : 58.5 %

Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix B

7 List of Tables

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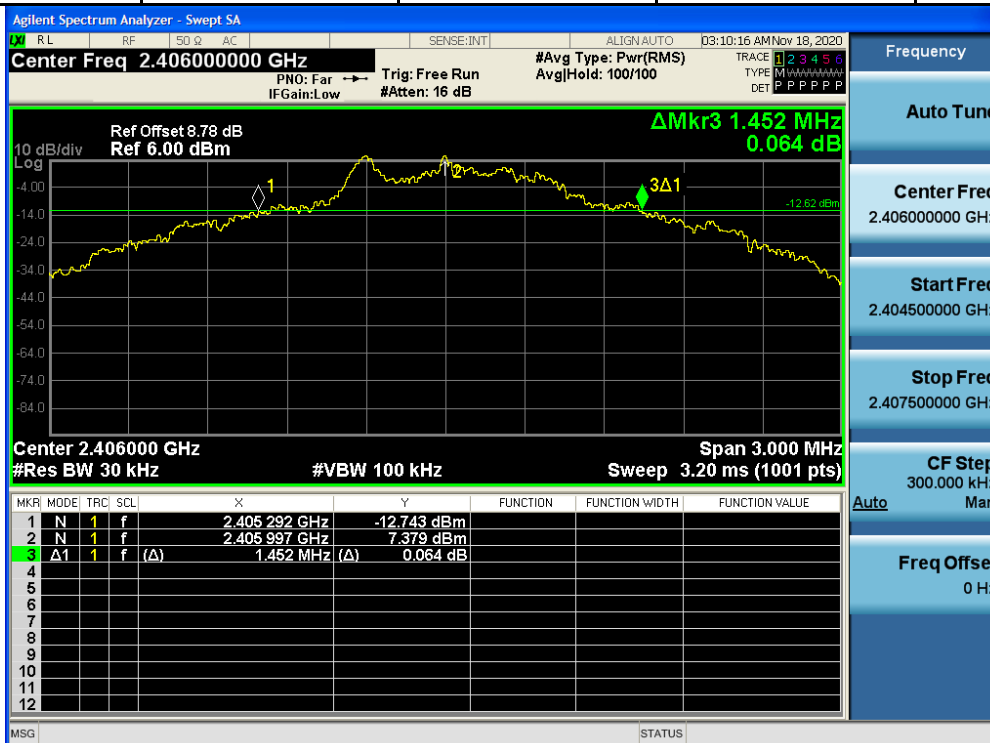
--End--

Appendix A: Test Results of FHSS

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Appendix A.1: 20dB Bandwidth

Channel Number	Frequency (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Verdict
0	2406	1.452	-	Pass
15	2440	1.431	-	Pass
30	2472	1.443	-	Pass



Frequency

Auto Tune

Center Freq
2.406000000 GHz

Start Freq
2.404500000 GHz

Stop Freq
2.407500000 GHz

CF Step
300.000 kHz
Man

Freq Offset
0 Hz



Frequency

Auto Tune

Center Freq
2.440000000 GHz

Start Freq
2.438500000 GHz

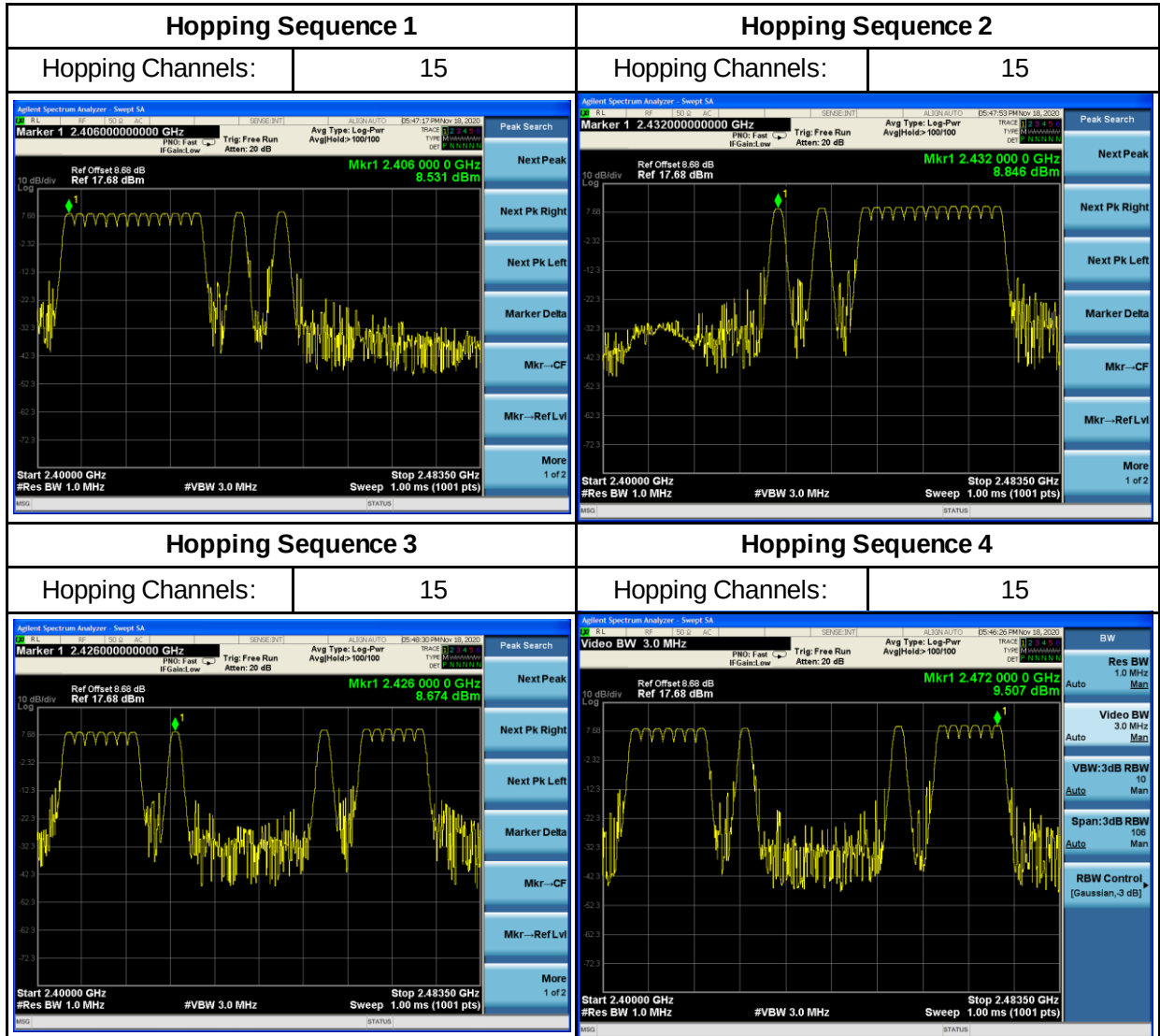
Stop Freq
2.441500000 GHz

CF Step
300.000 kHz
Man

Freq Offset
0 Hz

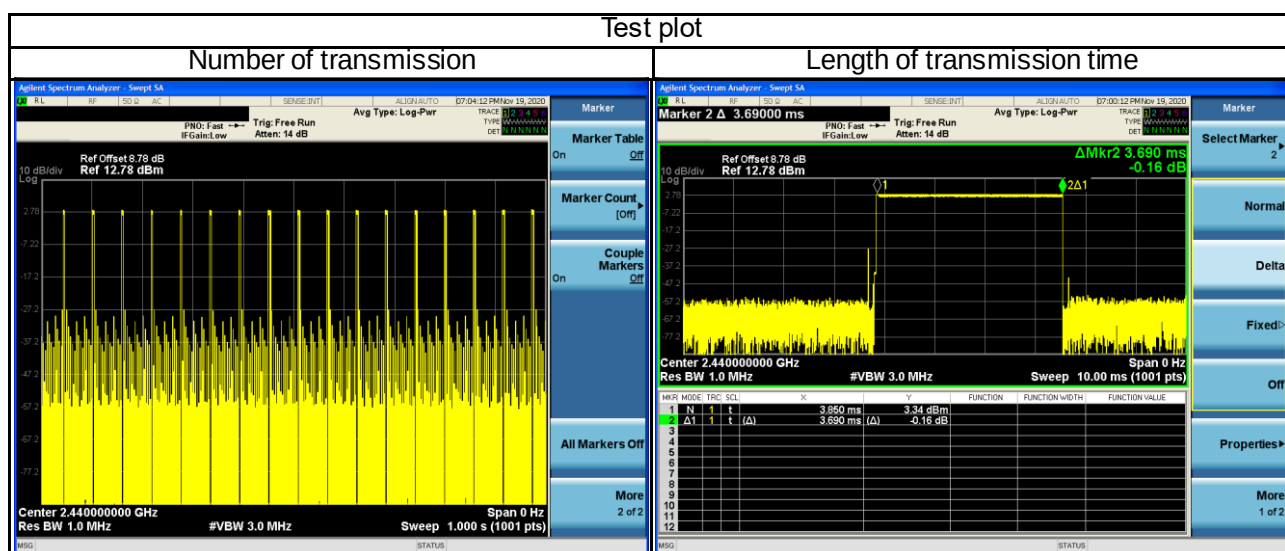


Appendix A2: Test Results of Number of Hopping Frequency



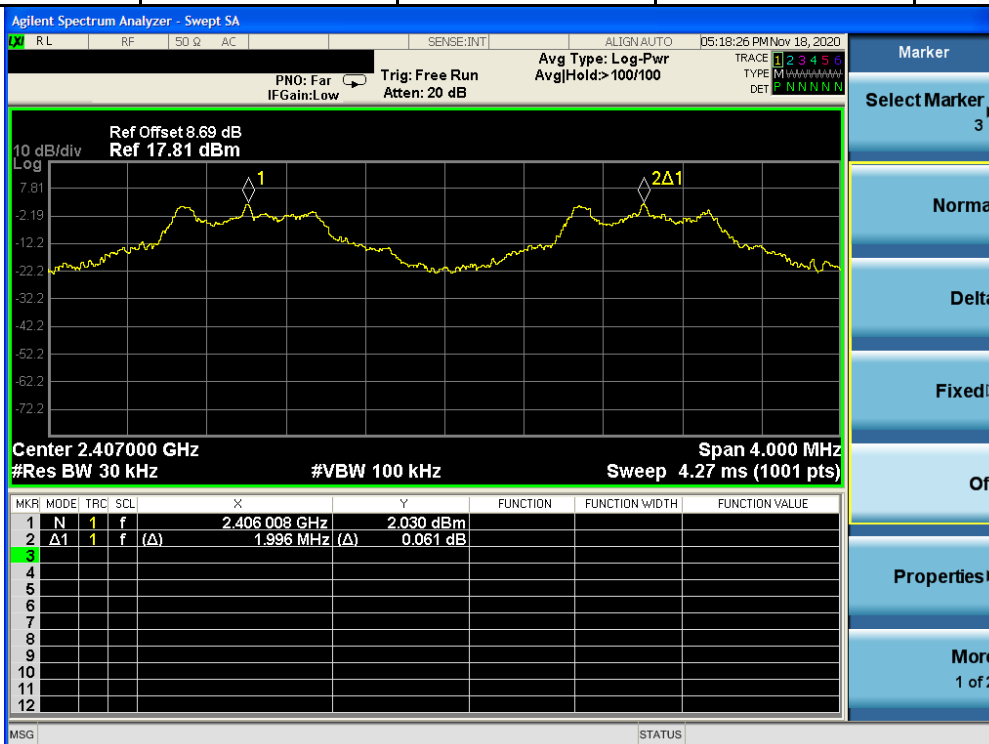
Appendix A3: Time of Occupancy

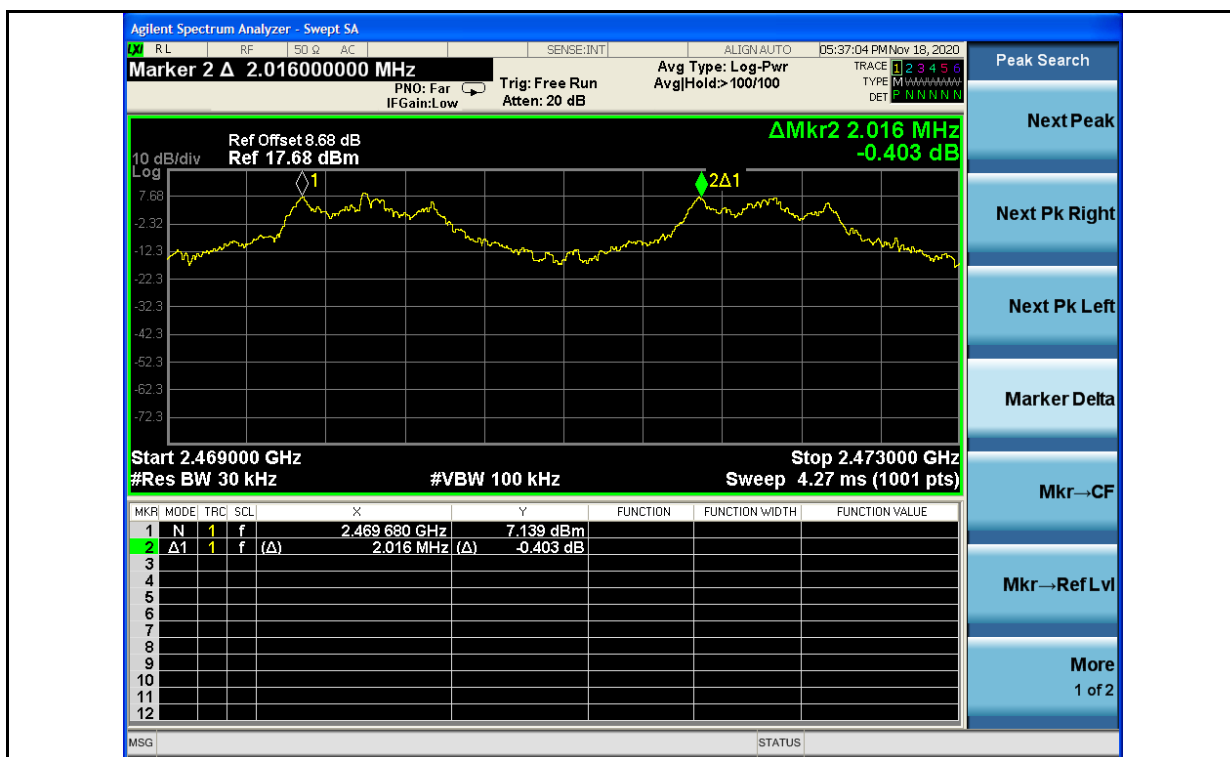
Number of Hopping Channel	Number of transmission in a period (channel number*0.4 sec)				Length of transmission time (ms)	Result (ms)	Limit (ms)	Verdict
	Period (Sec)	Sweep time (Sec)	Number in a sweep	Number in a period				
15	6	1	17	102	3.7	377.4	400	Pass



Appendix A4: Carrier Frequency Separation

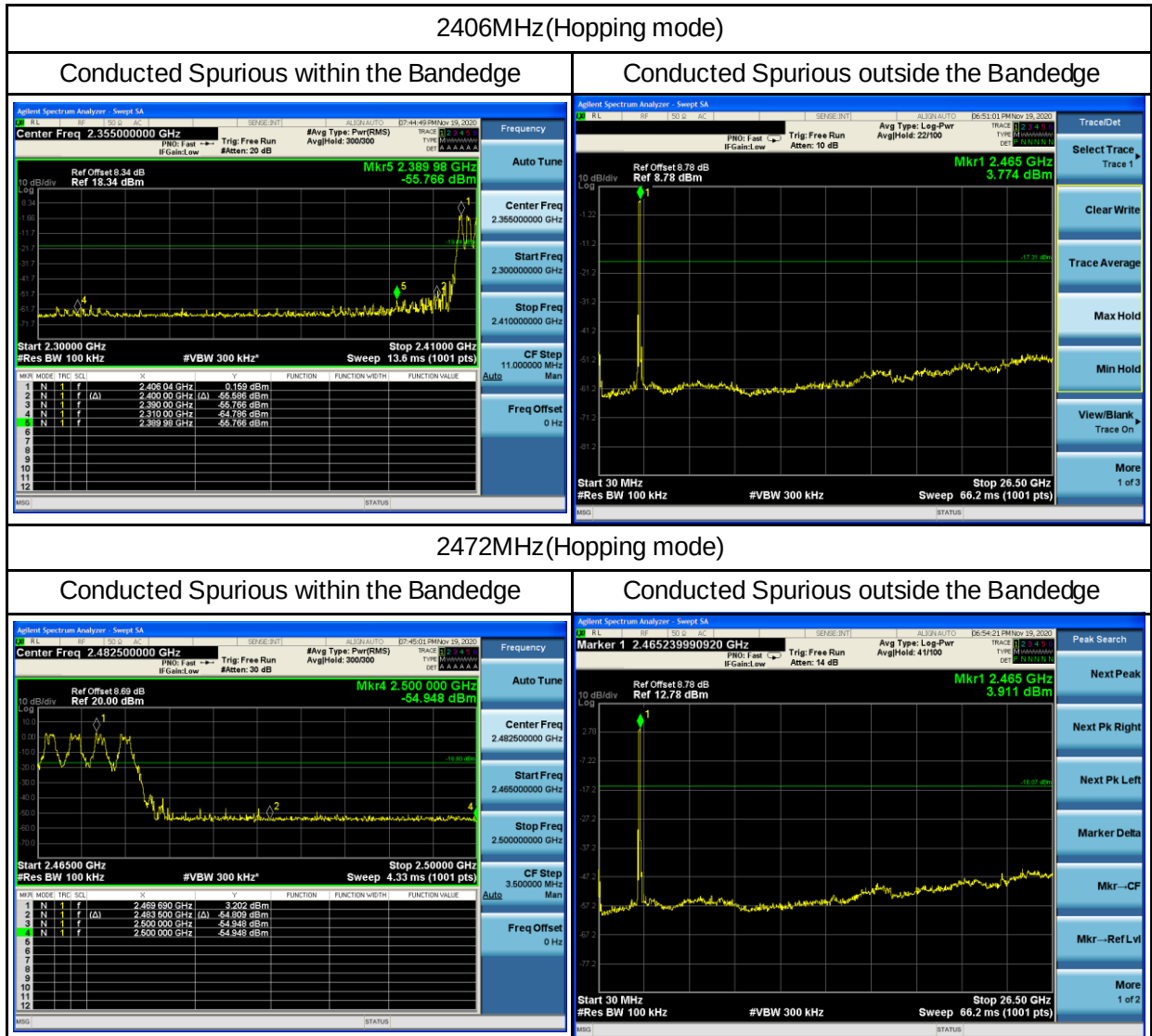
Channel Number	Frequency (MHz)	Channel Separation (MHz)	Minimum Limit (MHz)	Verdict
0	2406	1.996	0.968	Pass
15	2440	2.076	0.954	Pass
30	2472	2.016	0.962	Pass





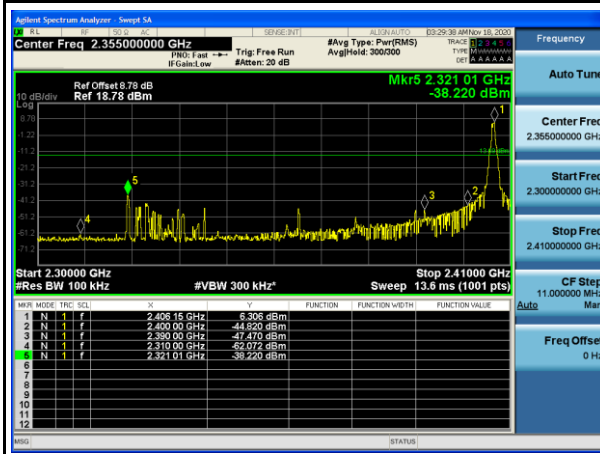
Appendix A5: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Only the high and low channels which produce the worst results listed



2406MHz (Disable Hopping mode)

Conducted Spurious within the Bandedge

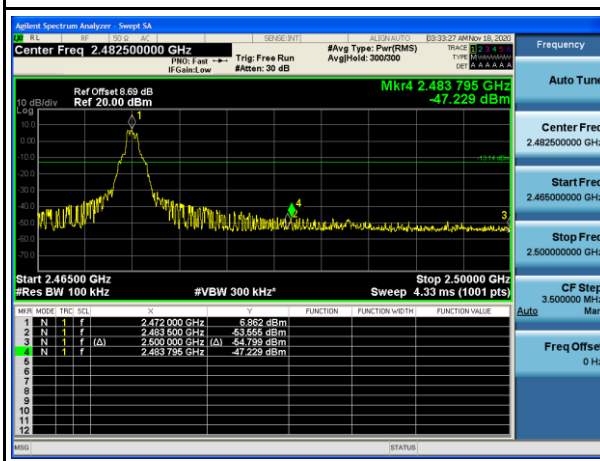


Conducted Spurious outside the Bandedge



2472MHz (Disable Hopping mode)

Conducted Spurious within the Bandedge



Conducted Spurious outside the Bandedge



Appendix A6: Test Results of Radiated Spurious Emissions

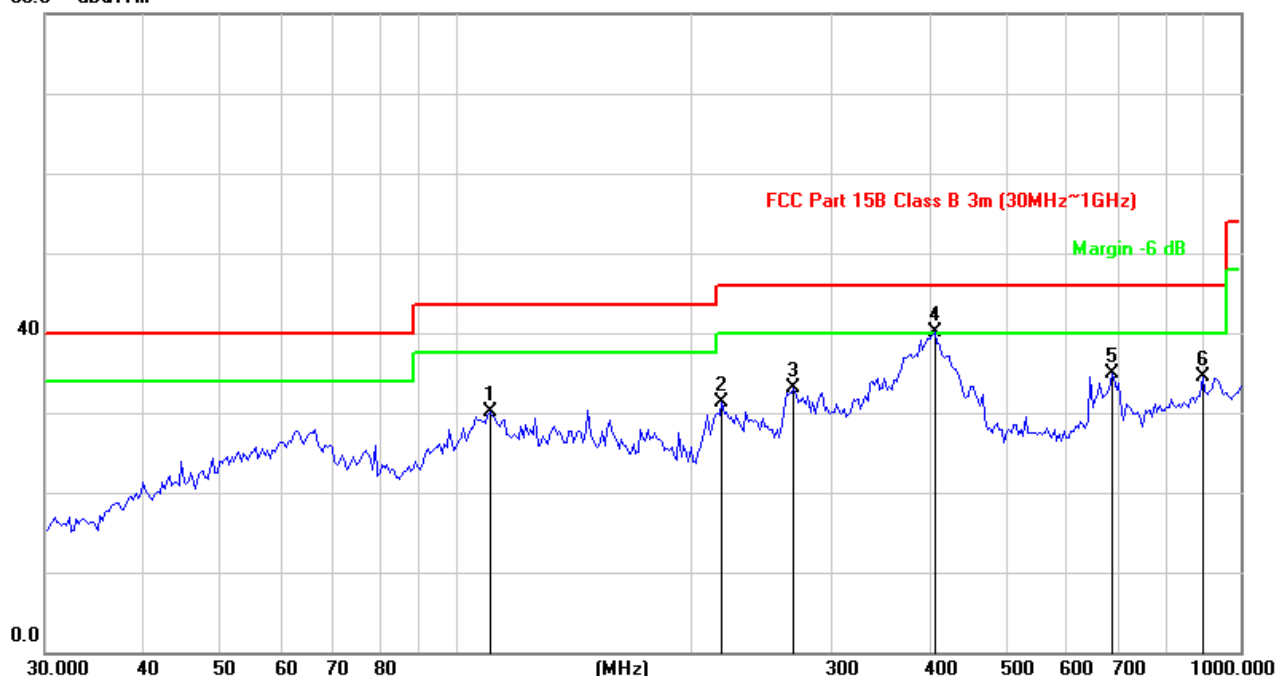
9kHz ~ 30MHz

Note: The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

30MHz - 1GHz

GFSK_Horizontal

80.0 dBuV/m



No.	Frequency (MHz)	Reading (dBUV)	Correction Factor (dB/m)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	110.5687	46.26	-16.07	30.19	43.50	-13.31	300	194
2	218.3085	47.29	-16.04	31.25	46.00	-14.75	100	140
3	269.4284	46.29	-13.15	33.14	46.00	-12.86	100	240
4	407.5145	49.15	-9.12	40.03	46.00	-5.97	100	286
5	684.7454	38.33	-3.33	35.00	46.00	-11.00	100	228
6	893.8567	33.71	0.71	34.42	46.00	-11.58	100	117

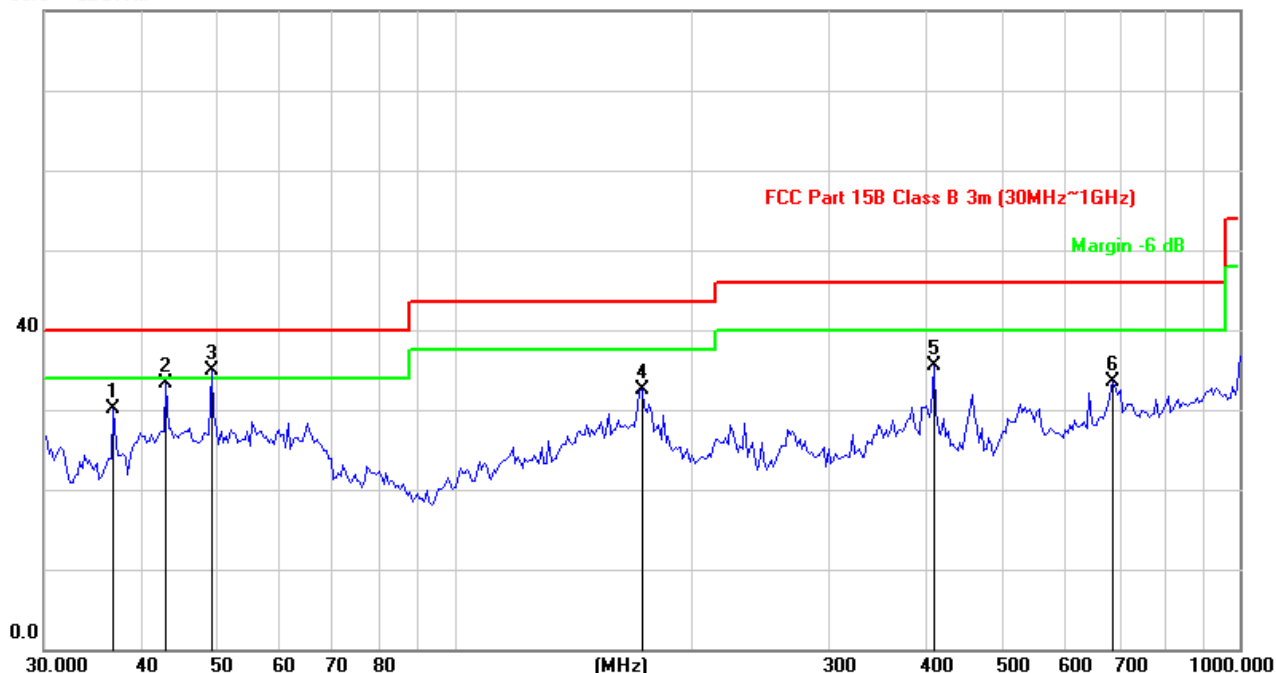
Remarks:

1. Emission Level (dBUV/m) = Reading Value (dBUV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

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GFSK_Vertical

80.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	36.7662	46.37	-16.23	30.14	40.00	-9.86	100	168
2	42.8998	47.93	-14.61	33.32	40.00	-6.68	200	105
3	49.0145	48.99	-14.11	34.88	40.00	-5.12	100	196
4	173.2051	45.75	-13.22	32.53	43.50	-10.97	200	239
5	407.5145	44.58	-9.12	35.46	46.00	-10.54	300	318
6	689.5644	36.80	-3.29	33.51	46.00	-12.49	200	281

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

Above 1GHz - 18GHz

GFSK_Horizontal_Low Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4812.000	42.99	-1.30	41.69	74.00	-32.31	peak	153	168
2	4812.000	31.51	-1.30	30.21	54.00	-23.79	AVG	153	168
3	7218.000	41.49	3.47	44.96	74.00	-29.04	peak	162	254
4	7218.000	28.09	3.47	31.56	54.00	-22.44	AVG	162	254

GFSK_Vertical_Low Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4812.000	41.97	-1.30	40.67	74.00	-33.33	peak	200	108
2	4812.000	30.63	-1.30	29.33	54.00	-24.67	AVG	200	108
3	7218.000	40.90	3.47	44.37	74.00	-29.63	peak	100	125
4	7218.000	28.94	3.47	32.41	54.00	-21.59	AVG	100	125

GFSK_Horizontal_Middle Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4880.000	43.86	-1.18	42.68	74.00	-31.32	peak	200	185
2	4880.000	32.72	-1.18	31.54	54.00	-22.46	AVG	200	185
3	7320.000	40.51	3.76	44.27	74.00	-29.73	peak	180	144
4	7320.000	29.15	3.76	32.91	54.00	-21.09	AVG	180	144

GFSK_Vertical_Middle Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4880.000	40.51	-1.18	39.33	74.00	-34.67	peak	150	296
2	4880.000	29.85	-1.18	28.67	54.00	-25.33	AVG	150	296
3	7320.000	39.96	3.76	43.72	74.00	-30.28	peak	100	75
4	7320.000	26.19	3.76	29.95	54.00	-24.05	AVG	100	75

GFSK_Horizontal_High Channel

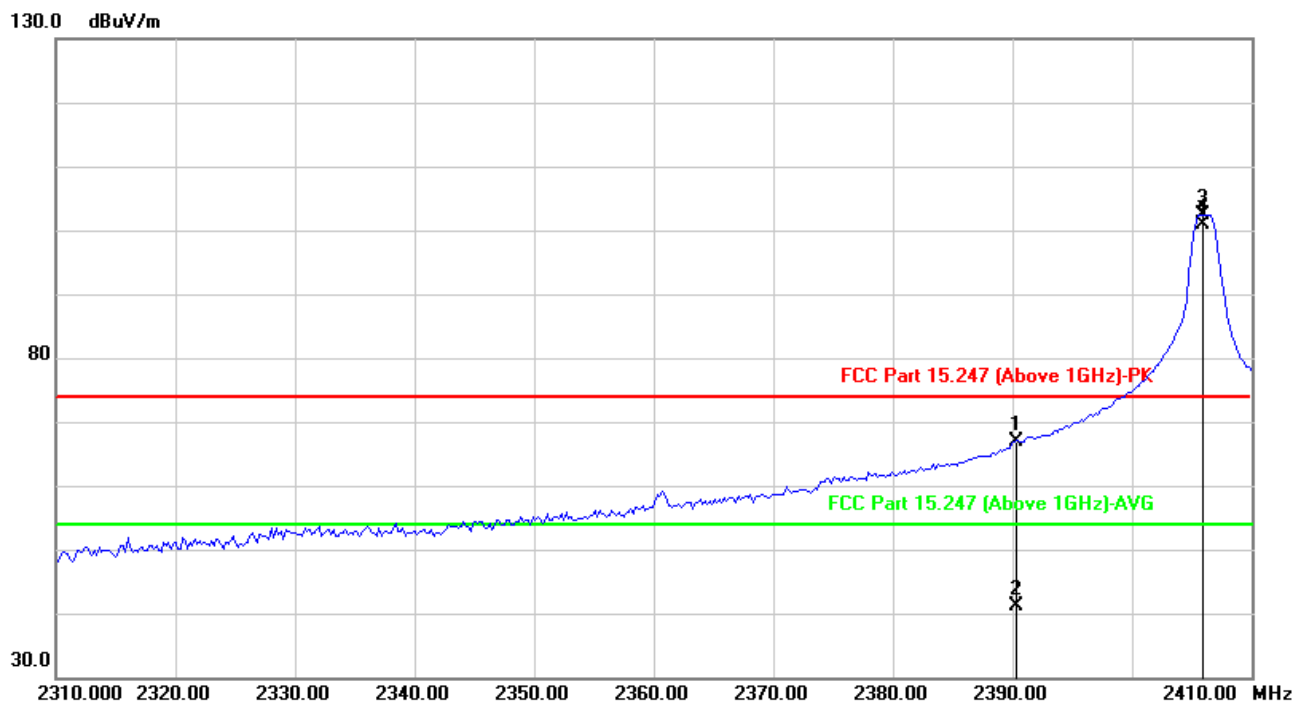
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4940.000	41.75	-1.06	40.69	74.00	-33.31	peak	200	347
2	4940.000	31.24	-1.06	30.18	54.00	-23.82	AVG	200	347
3	7410.000	39.09	4.02	43.11	74.00	-30.89	peak	260	23
4	7410.000	27.25	4.02	31.27	54.00	-22.73	AVG	260	23

GFSK_Vertical_High Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	4944.000	42.74	-1.06	41.68	74.00	-32.32	peak	200	309
2	4944.000	32.31	-1.06	31.25	54.00	-22.75	AVG	200	309
3	7416.000	38.94	4.02	42.96	74.00	-31.04	peak	260	158
4	7416.000	28.15	4.02	32.17	54.00	-21.83	AVG	260	158

Appendix A7: Test Results of Radiated Emissions in Restricted Bands

GFSK_Horizontal_Low Channel



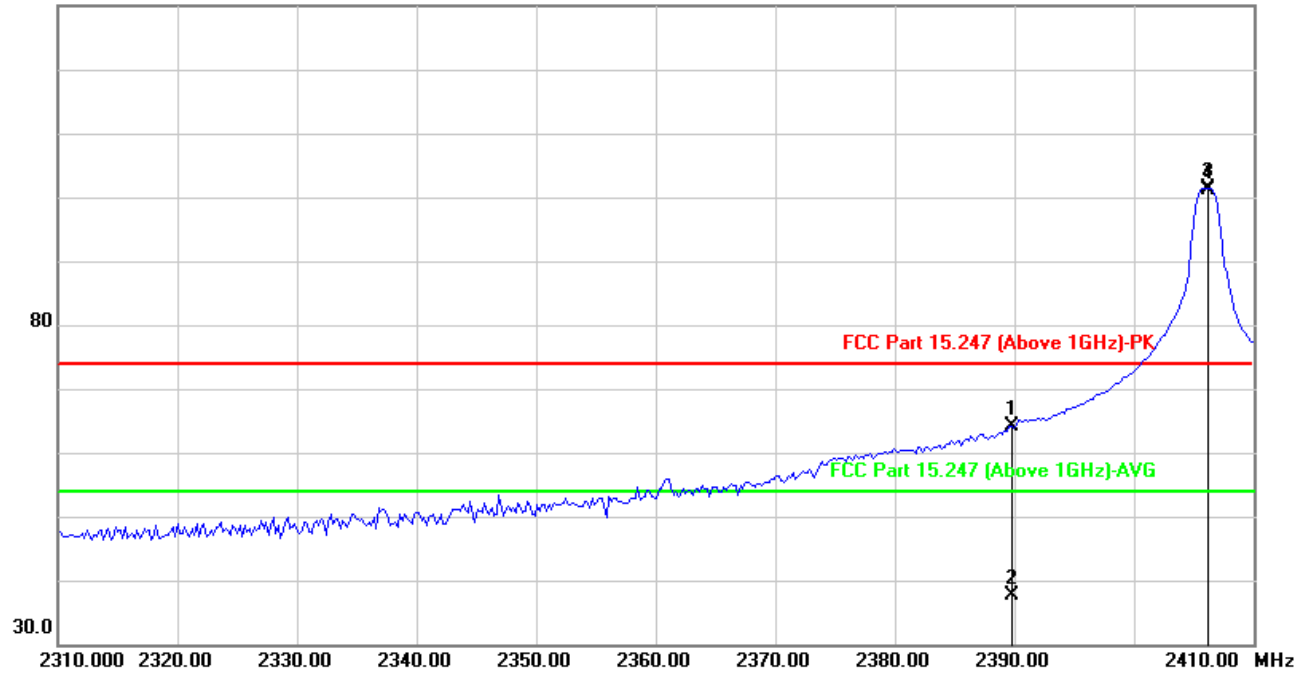
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	2390.361	67.77	-0.77	67.00	74.00	-7.00	peak	100	212
2	2390.361	41.80	-0.77	41.03	54.00	-12.97	AVG	100	212
3	*2405.992	103.18	-0.73	102.45	\	\	peak	100	212
4	*2405.992	101.57	-0.73	100.84	\	\	AVG	100	212

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

GFSK_Vertical_Low Channel

130.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	2389.760	64.88	-0.77	64.11	74.00	-9.89	peak	290	126
2	2389.760	38.39	-0.77	37.62	54.00	-16.38	AVG	290	126
3	*2406.192	102.04	-0.73	101.31	\	\	peak	290	126
4	*2406.192	101.77	-0.73	101.04	\	\	AVG	290	126

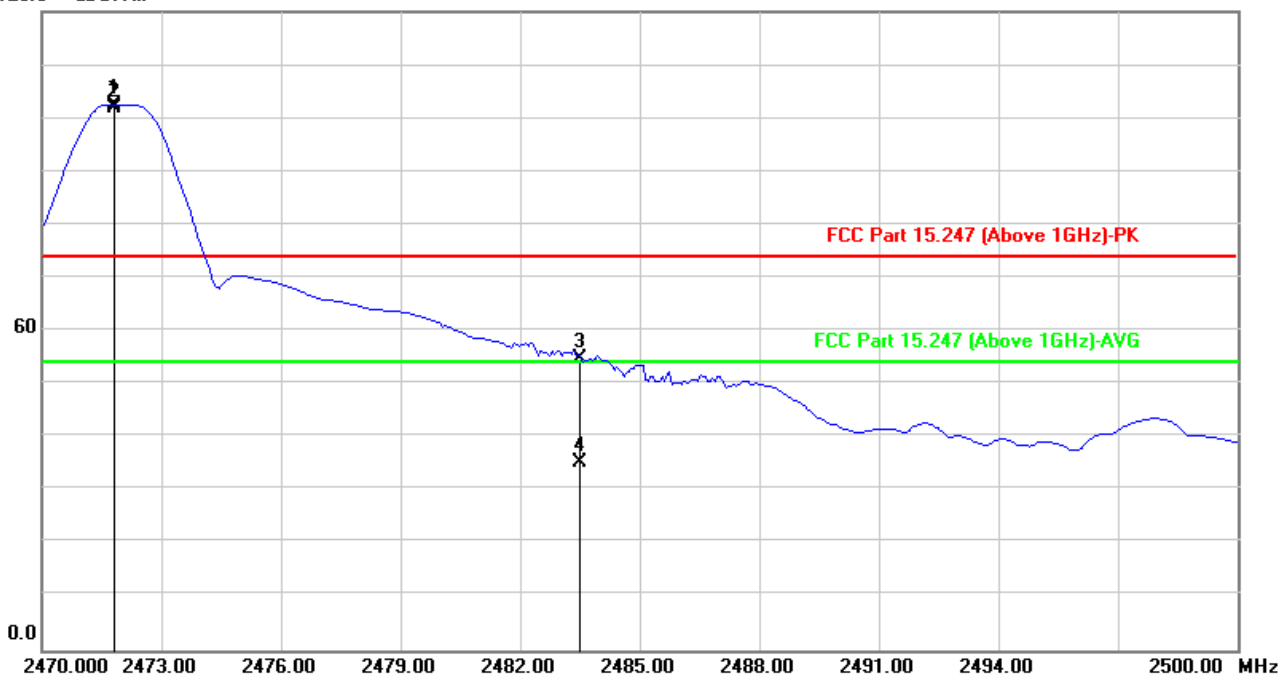
Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

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GFSK_Horizontal_High Channel

120.0 dBuV/m



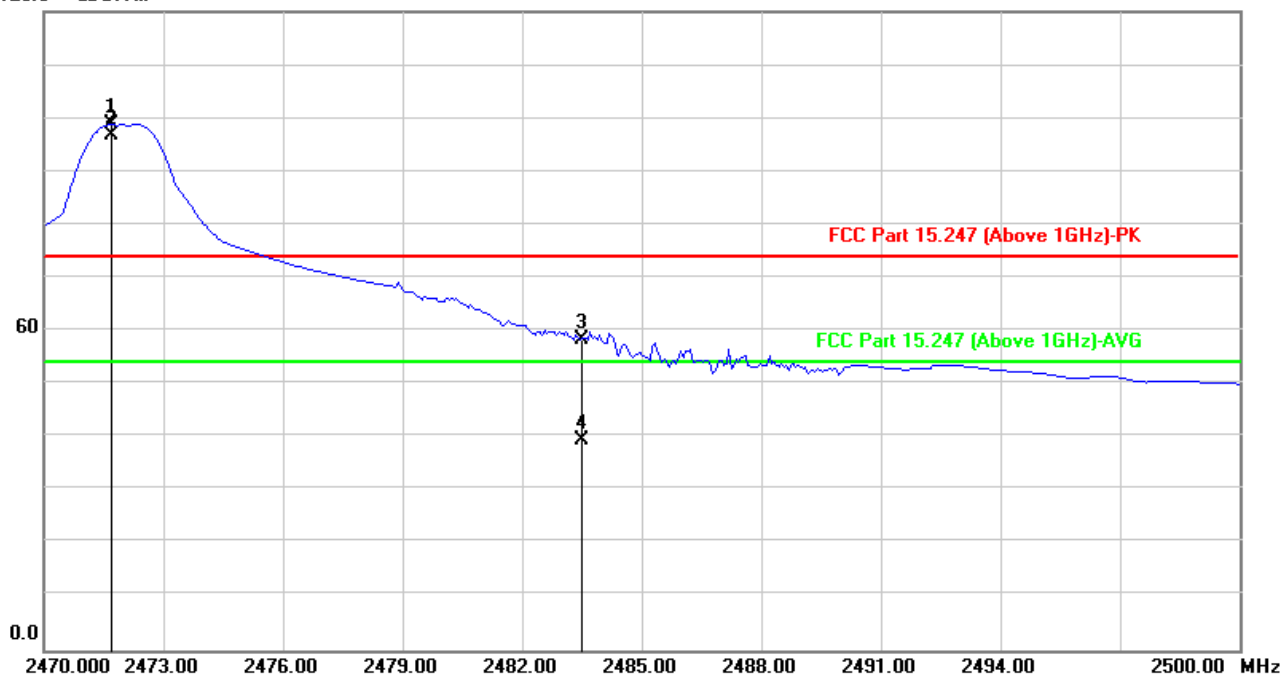
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	*2471.804	103.13	-0.55	102.58	\	\	peak	186	284
2	*2471.804	102.35	-0.55	101.80	\	\	AVG	186	284
3	2483.500	55.21	-0.51	54.70	74.00	-19.30	peak	200	136
4	2483.500	35.66	-0.51	35.15	74.00	-38.85	QP	200	136

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

GFSK_Vertical_High Channel

120.0 dBuV/m



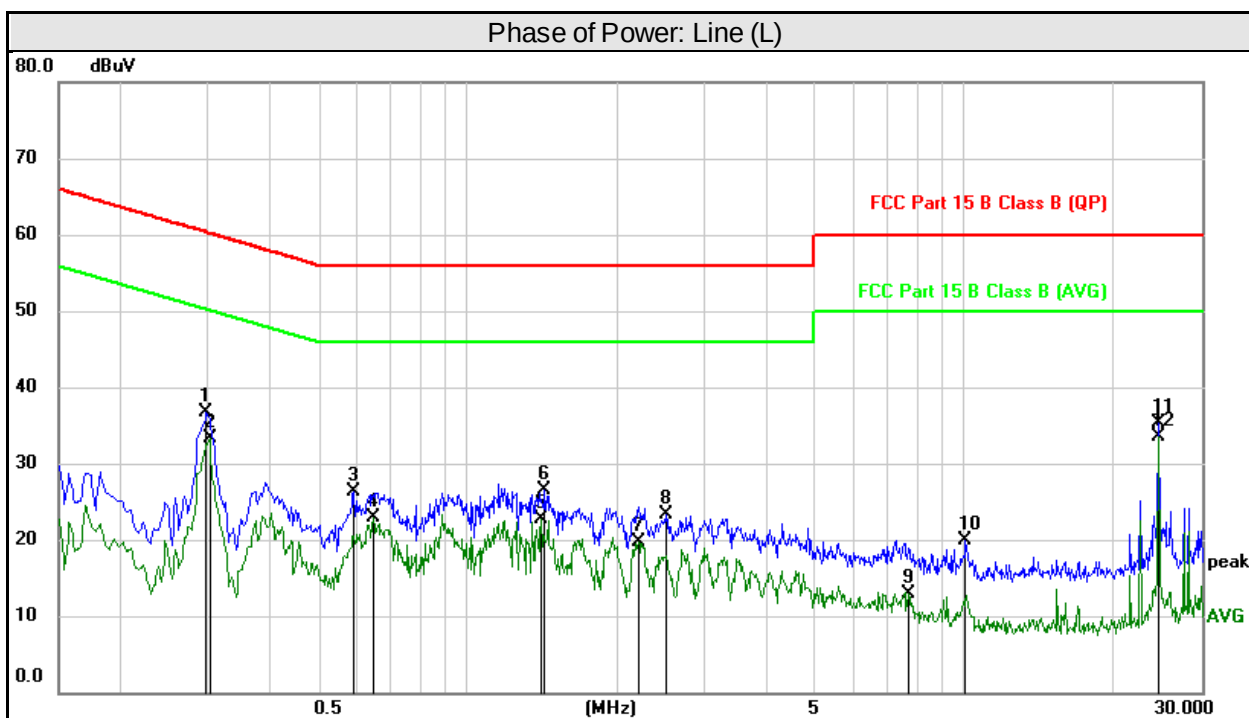
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	*2471.683	99.38	-0.55	98.83	\	\	peak	100	292
2	*2471.683	97.25	-0.55	96.70	\	\	AVG	100	292
3	2483.500	59.01	-0.51	58.50	74.00	-15.50	peak	100	314
4	2483.500	39.92	-0.51	39.41	74.00	-34.59	AVG	100	314

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

Appendix A8: Test Results of Conducted Emission on AC Mains

Test mode	Normal mode (Optical audio input+earphone playing)		
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Band Width	Quasi-Peak (QP) / CISPR Average (AV), 9kHz

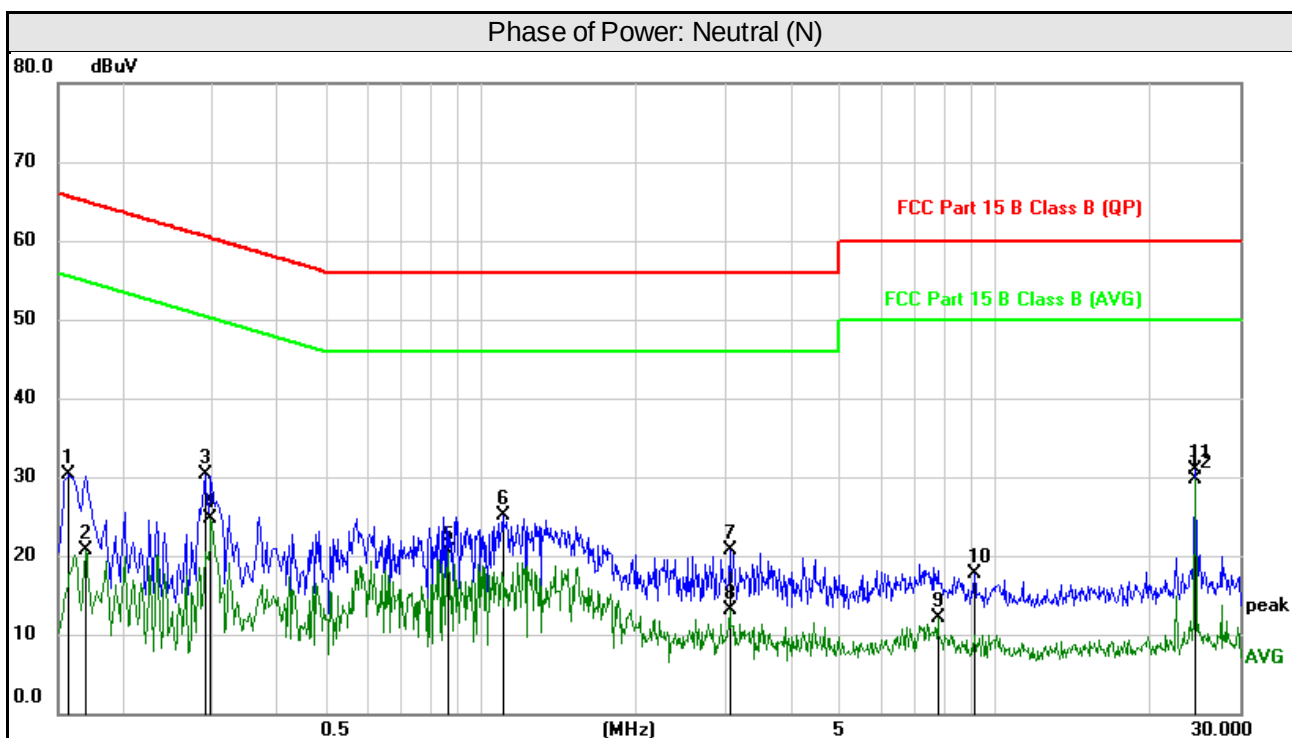


No.	Frequency	Reading	Correction Factor	Emissions Level	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	Detector
1	0.2980	26.86	9.77	36.63	60.30	-23.67	peak
2	0.3020	23.59	9.77	33.36	50.19	-16.83	AVG
3	0.5899	16.63	9.76	26.39	56.00	-29.61	peak
4	0.6460	13.11	9.76	22.87	46.00	-23.13	AVG
5	1.4100	13.09	9.63	22.72	46.00	-23.28	AVG
6	1.4260	16.82	9.63	26.45	56.00	-29.55	peak
7	2.2020	10.16	9.60	19.76	46.00	-26.24	AVG
8	2.5020	13.69	9.58	23.27	56.00	-32.73	peak
9	7.7100	3.19	9.75	12.94	50.00	-37.06	AVG
10	10.0219	10.05	9.91	19.96	60.00	-40.04	peak
11	24.5780	24.54	10.77	35.31	60.00	-24.69	peak
12	24.5780	22.71	10.77	33.48	50.00	-16.52	AVG

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

Test mode	Normal mode (Optical audio input+earphone playing)		
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Band Width	Quasi-Peak (QP) / CISPR Average (AV), 9kHz



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor dB	Emissions Level (dBuV)	Limit (dBuV)	Margin (dB)	Remark Detector
1	0.1580	20.53	9.81	30.34	65.57	-35.23	peak
2	0.1700	10.94	9.80	20.74	54.96	-34.22	AVG
3	0.2900	20.62	9.77	30.39	60.52	-30.13	peak
4	0.2980	14.99	9.77	24.76	50.30	-25.54	AVG
5	0.8620	10.78	9.68	20.46	46.00	-25.54	AVG
6	1.1019	15.46	9.64	25.10	56.00	-30.90	peak
7	3.0540	11.21	9.53	20.74	56.00	-35.26	peak
8	3.0540	3.60	9.53	13.13	46.00	-32.87	AVG
9	7.7420	2.42	9.75	12.17	50.00	-37.83	AVG
10	9.1380	7.84	9.87	17.71	60.00	-42.29	peak
11	24.5780	20.18	10.77	30.95	60.00	-29.05	peak
12	24.5780	18.96	10.77	29.73	50.00	-20.27	AVG

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value