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TEST REPORT

Report Number: 22120988HKG-001

Application for Original of 47 CFR Part 15 Certification

New Family of RSS-247 Issue 2 Equipment

FCC ID: 2AVPR-4533

IC: 25872-4533C

Prepared and Checked by:	Approved by:
Signed On File Wong Cheuk Ho, Herbert Assistant Supervisor	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Limited Wong Kowk Yeung, Kenneth Assistant Manager Date: September 04, 2023

TEST REPORT

GENERAL INFORMATION

Applicant Name:	Nacon (HK) Limited
Applicant Address:	17/F. 148 Electric Road,North Point, Hong Kong
FCC Specification Standard:	FCC Part 15, October 1, 2021 Edition
FCC ID:	2AVPR-4533
FCC Model(s):	NC4533
IC Specification Standard:	RSS-247 Issue 2, February 2017 RSS-Gen Issue 5 Amendment 2, February 2021
IC:	25872-4533C
HVIN:	4533C
PMN:	NC4533
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	Revolution 5 PRO (Controller)
Sample Receipt Date:	July 28, 2023
Date of Test:	July 31, 2023 to August 08, 2023
Report Date:	September 04, 2023
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 / RSS-247 Issue 2 Certification.

TEST REPORT

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TEST REPORT

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-247/ RSS-Gen# Section	Results	Details See Section
Antenna Requirement	15.203	8.3#	Pass	2.1
Max. Conducted Output Power	15.247(b)(1) & (4)	5.4(2)	Pass	4.1
Max. 20dB RF Bandwidth	N/A	5.1(1)	N/A	4.2
Min. No. of Hopping Frequencies	15.247(a)(1)(iii)	5.1(4)	Pass	4.3
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	5.1(2)	Pass	4.4
Average Time of Occupancy	15.247(a)(1)(iii)	5.1(4)	Pass	4.5
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.6
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d)	8.10#	Pass	4.8
AC Power Line Conducted Emission	15.207 & 15.107	8.8#	Pass	4.9

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2021 Edition
RSS-247 Issue 2, February 2017
RSS-Gen Issue 5 Amendment 2, February 2021

TEST REPORT

2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment Under Test (EUT) (NC4533) is a composite device which consists of 2.4GHz wireless and Bluetooth 3.0 functions.

The EUT is powered by DC 3.7V internal rechargeable battery.

The antenna(s) used in the EUT is internal, integral, and the test sample is a prototype.
Peak Antenna Gain = 1.98 dBi (2.4GHz Bluetooth 3.0 portion)

This report contains the data of 2.4GHz Bluetooth 3.0 portion only.

The circuit description is saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and KDB Publication No.558074 D01 v05r02 (02-April-2019) All other measurements were made in accordance with the procedures in 47 CFR Part 2 and RSS-Gen Issue 5 Amendment 2, February 2021.

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Shenzhen UnionTrust Quality and Technology Co., Ltd. at 16/F., Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada No.: 21600, CABID “HKAP01”, “CN0023”.

TEST REPORT

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by fully charged DC 3.7V internal rechargeable battery during test.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable at 0.8m height from the ground plane for emission testing at or below 1GHz and 1.5m for emission measurements above 1GHz.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 3 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Receiver was performed from 30MHz to the fifth harmonic of the highest frequency or 40GHz, whichever is lower.

TEST REPORT

3.1 Justification - Cont'd

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter is subject to FCC Part Section 15.109 Limits.

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.3.4.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.3.4. With the resolution bandwidth 3MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

Different data rates have been tested. Worst case is reported only.

All relevant operation modes have been tested, and the worst-case data is included in this report.

For simultaneous transmission, both 2.4GHz wireless and Bluetooth 3.0 portions are also switched on when taking radiated emission for determining worst-case spurious emission.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

TEST REPORT

3.3 Details of EUT and Description of Accessories

None.

3.4 Measurement Uncertainty

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level (k=2). In case, the measured value is within guard band region, undetermined decision will be used. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

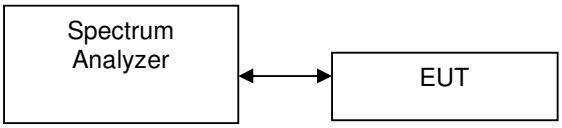
Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

TEST REPORT

4.0 TEST RESULTS

RF Conducted measurement Test Setup by a Spectrum Analyzer.

The figure below shows the test setup, which is utilized to make these measurements.



4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

☐ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

☒ The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW>20dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyzer.

Antenna Gain = 1.98 dBi

Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2402	6.061	4.037
Middle Channel: 2441	5.447	3.505
High Channel: 2480	4.344	2.719

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

dBm max. output level = 6.061 dBm

Limits:
☒ 0.125W (21dBm) for antennas with gains of 6dBi or less

☐ 0.25W (24dBm) for antennas with gains of 6dBi or less

☐ 1W (30dBm) for antennas with gains of 6dBi or less

☐ ___W (___dBm) for antennas with gains more than 6dBi

Tested by: Rain Wang

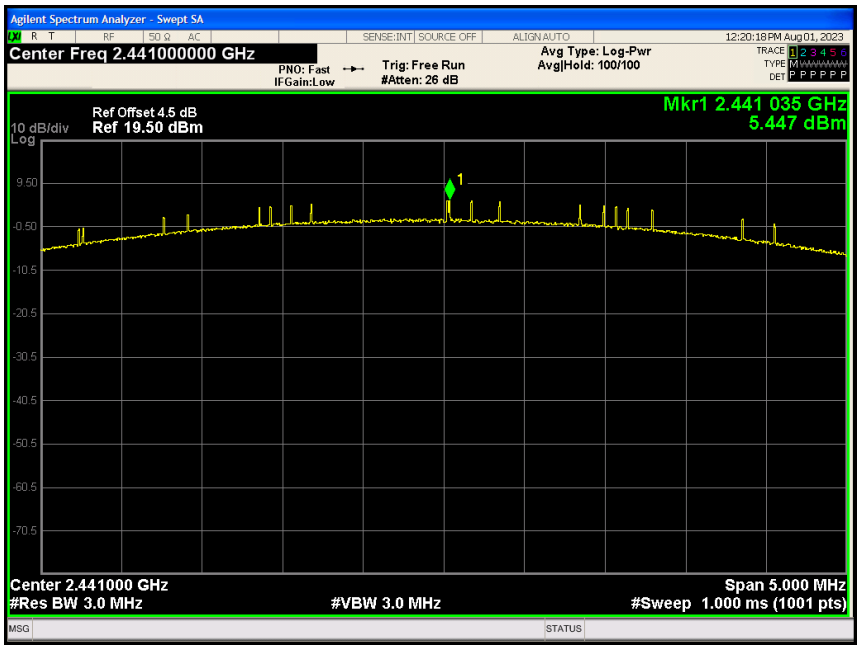
The plots of conducted output power are saved as below.

TEST REPORT

PLOTS OF CONDUCTED OUTPUT POWER

Lowest Channel

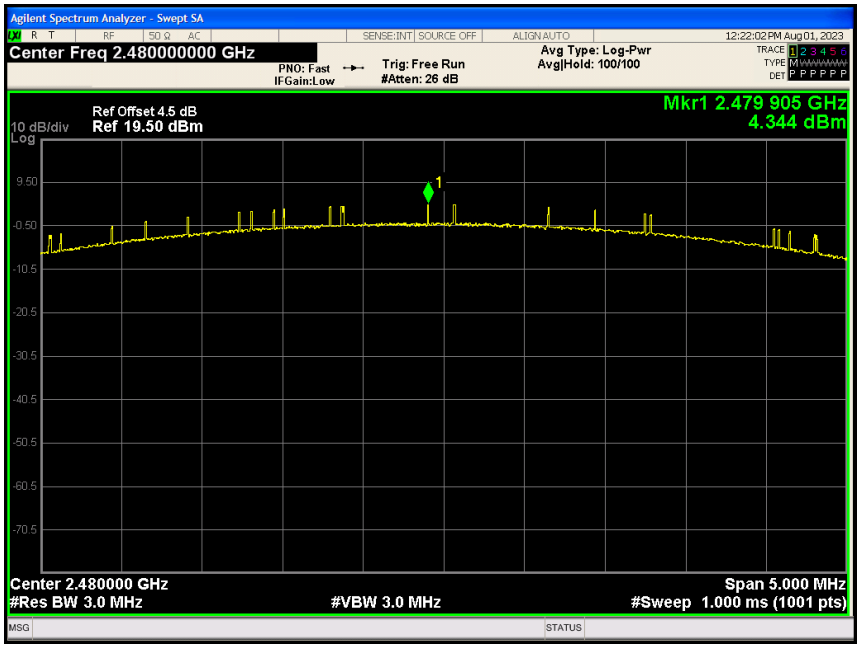
Middle Channel



TEST REPORT

PLOTS OF CONDUCTED OUTPUT POWER

Highest Channel



TEST REPORT

4.2 Maximum 20 dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Frequency (MHz)	20 dB Bandwidth (MHz)
Low Channel: 2402	1.323
Middle Channel: 2441	1.324
High Channel: 2480	1.327

Limits

☐ ≤500kHz for 902-928MHz

☒ N/A for 2400-2483.5MHz

☐ ≤1MHz for 5725-5850MHz

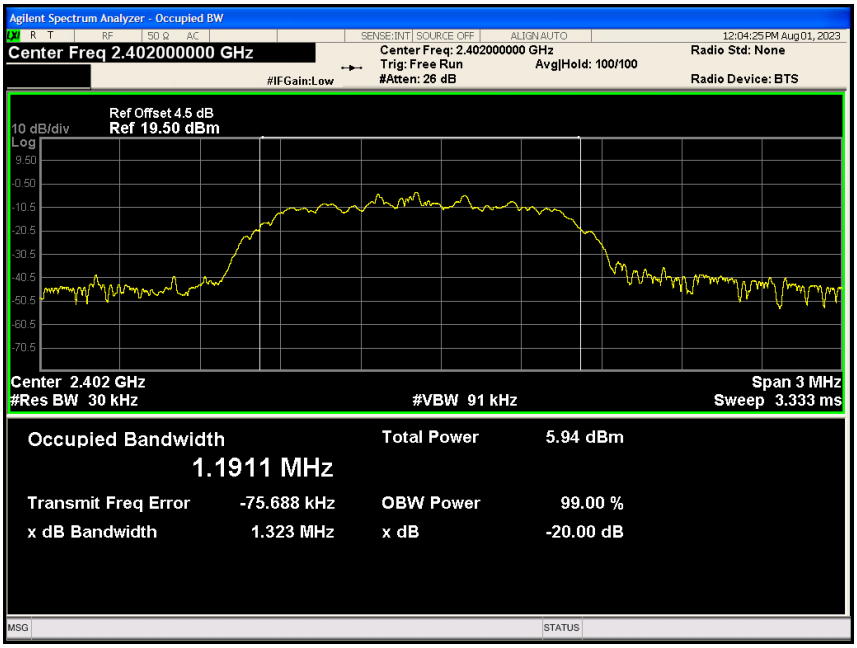
Tested by: Rain Wang

The plots of 20dB RF bandwidth are saved as below.

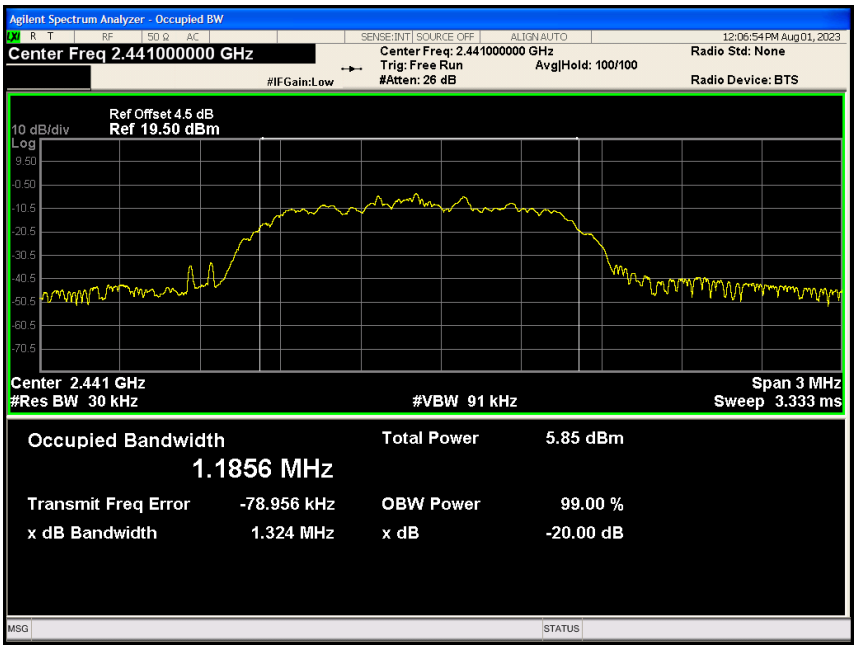
TEST REPORT

PLOTS OF 20dB RF BANDWIDTH

Lowest Channel



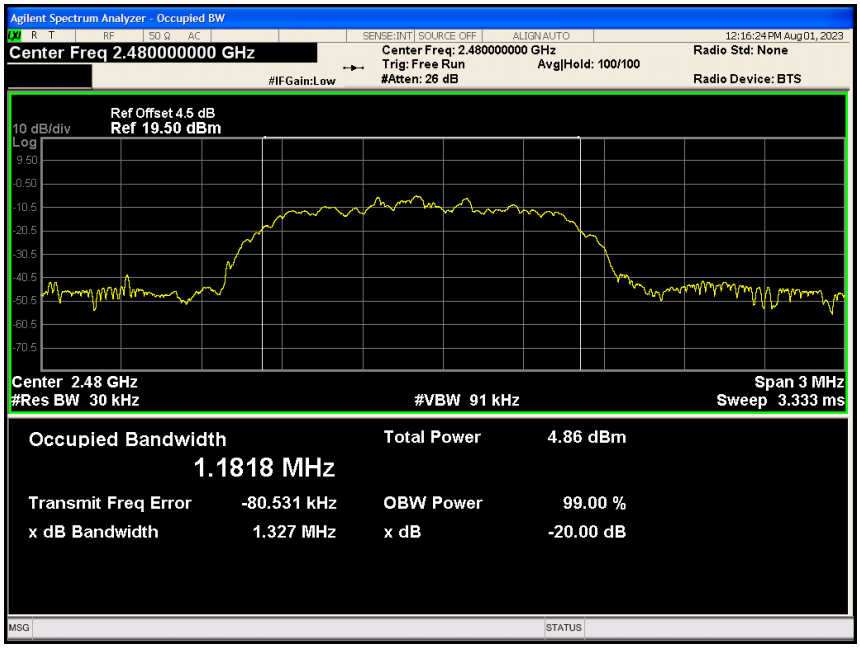
Middle Channel



TEST REPORT

PLOTS OF 20dB RF BANDWIDTH

Highest Channel



TEST REPORT

4.3 Minimum Number of Hopping Frequencies

With the analyzer set to MAX HOLD readings were taken for 2-3 minutes in each band. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

No. of Hopping Channels	79

Minimum Requirements:

☐ at least 50 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel < 250kHz)

☐ at least 25 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel ≥ 250kHz)

☒ at least 15 hopping channels for 2400MHz-2483.5MHz.

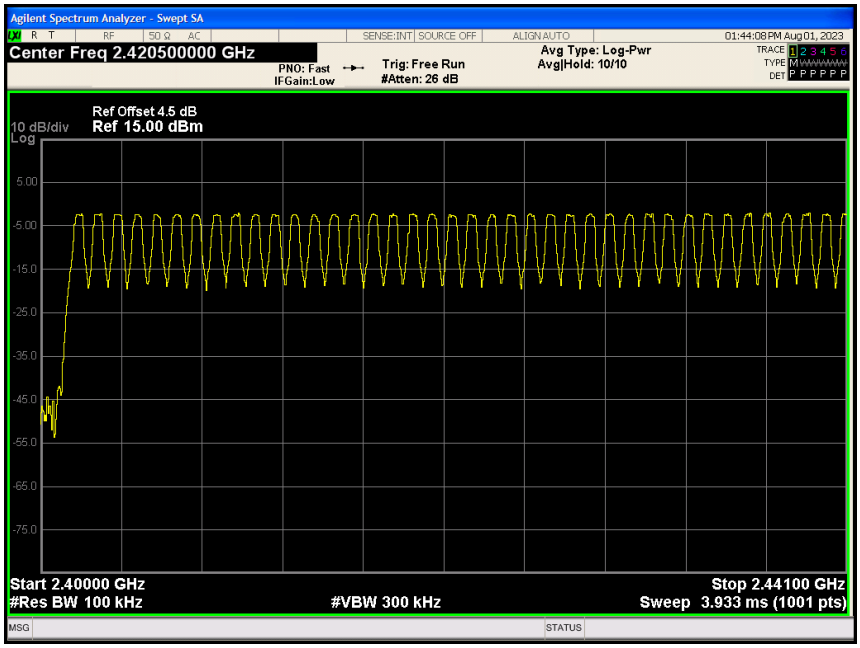
☐ at least 75 hopping channels for 5725MHz-5850MHz.

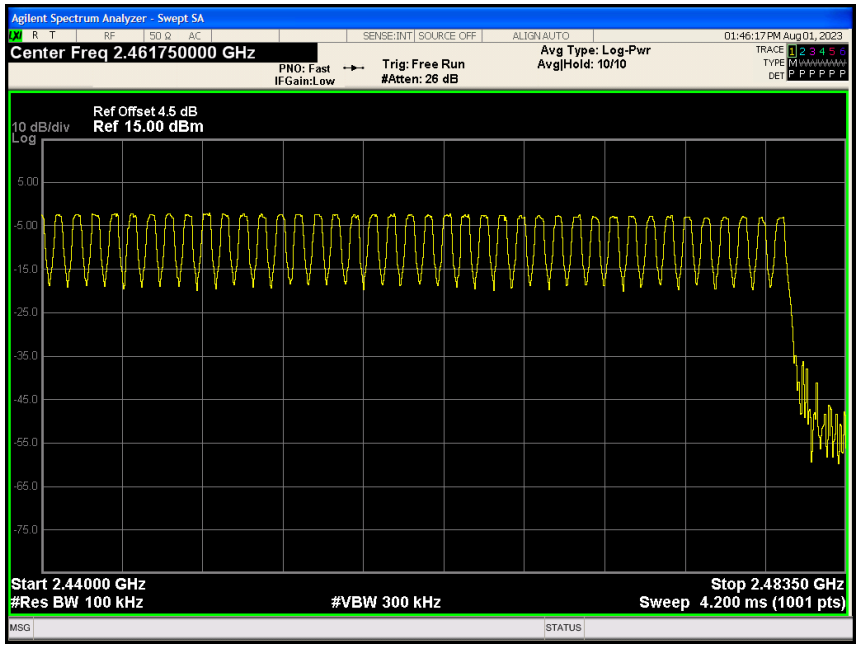
Tested by: Rain Wang

The plots of number of hopping frequencies are saved as below.

TEST REPORT

PLOTS OF NUMBER OF HOPPING FREQUENCIES





TEST REPORT

4.4 Minimum Hopping Channel Carrier Frequency Separation

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and met the requirement.

Channel Separation	1 MHz

Limits:
The channel separation must be larger than:

☐ 25 kHz

☐ 20 dB bandwidth of hopping channel: ___Hz

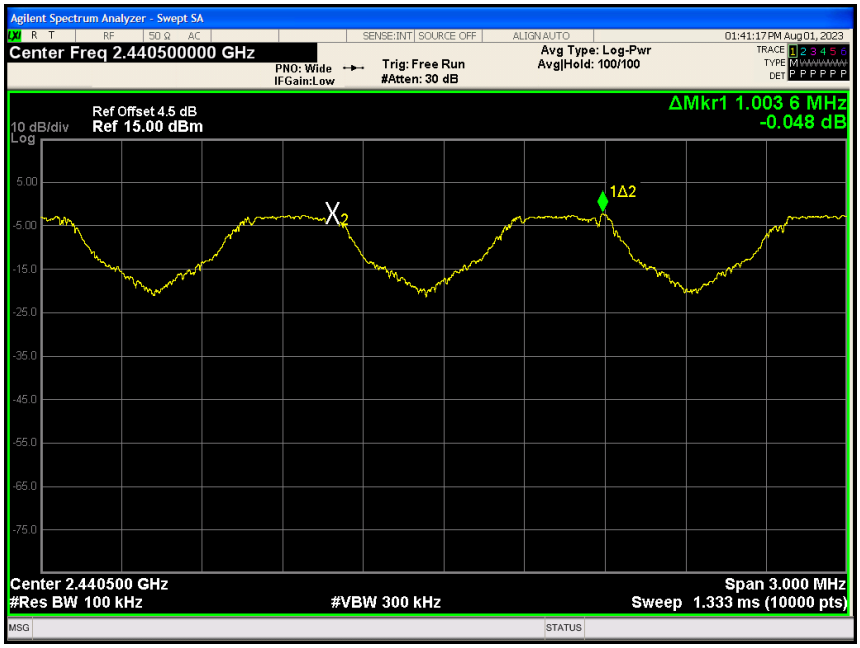
☒ 2/3 of 20dB bandwidth of hopping channel: _885_ kHz

Tested by: Rain Wang

The plot(s) of hopping channel carrier frequency separation is saved as below.

TEST REPORT

PLOTS OF HOPPING CHANNEL CARRIER FREQUENCY SEPARATION



TEST REPORT

4.5 Average Channel Occupancy Time

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 1ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

The SWEEP was then set to the time required by the regulation (20 seconds for 902-928 MHz devices, if the 20dB bandwidth is less than 250kHz, 10 seconds for 902-928 MHz if the 20dB bandwidth is or greater than 250kHz, "0.4 seconds x Number of hopping channels employed" seconds for 2400-2483.5 MHz, 30 seconds for 5725-5850 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4 seconds).

	worst-case: 2DH5
Average Occupancy Time (Traffic – in a clear RF environment) =	2.832ms x 98 = 277.54ms

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 31.6 seconds (0.4 sec. x 79) for 2400MHz-2483.5MHz
(Traffic – in a clear RF environment)

☐ 20 seconds for 902MHz-928MHz ≥ 50 hopping channels

☐ 10 seconds for 902MHz-928MHz ≥ 25 hopping channels

☐ 30 seconds for 5725-5850MHz

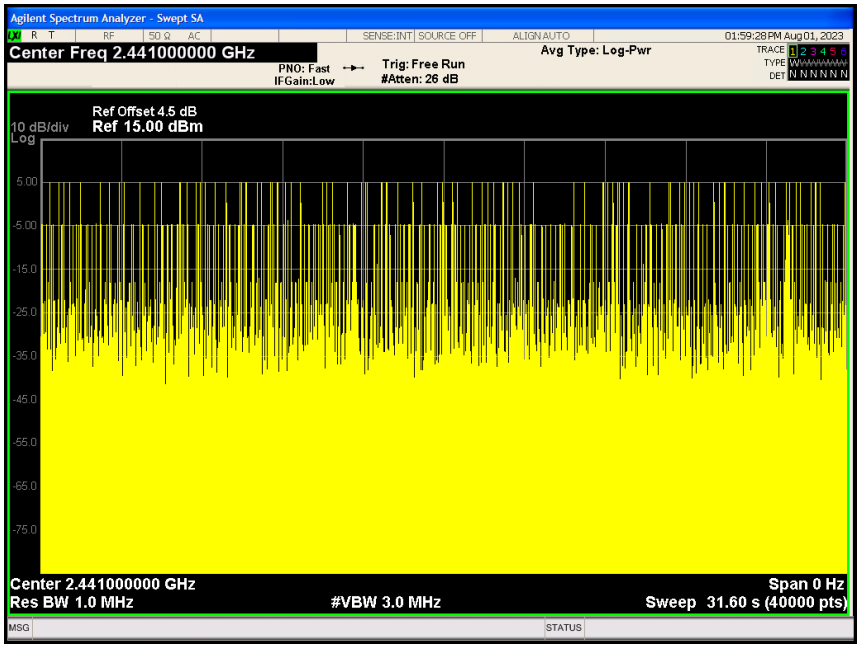
Tested by: Rain Wang

The plots of average channel occupancy time are saved as below.

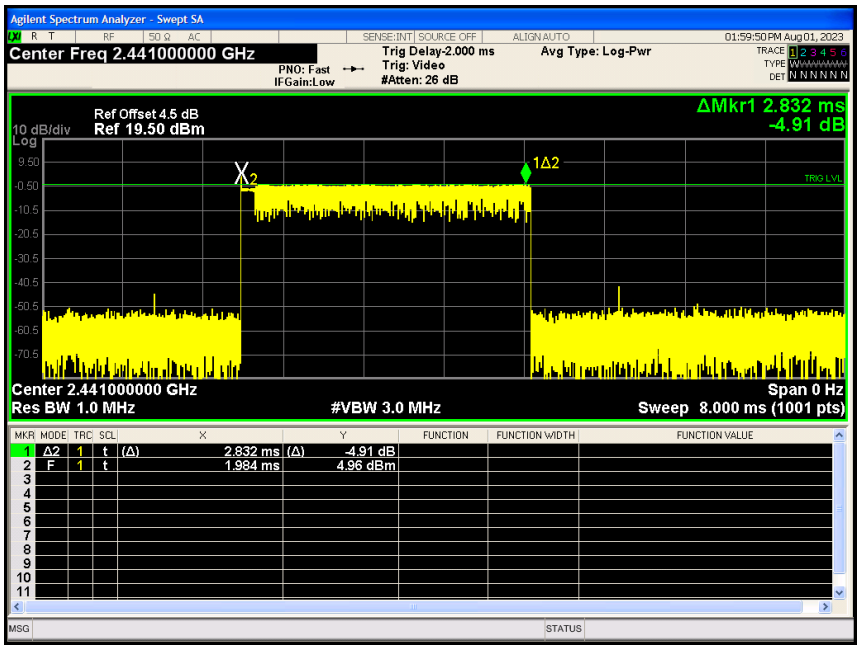
TEST REPORT

PLOTS AVERAGE CHANNEL OCCUPANCY TIME

Plot A



Plot B



TEST REPORT

4.6 Out of Band Conducted Emissions

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

The plot(s) of bandedge compliance is shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

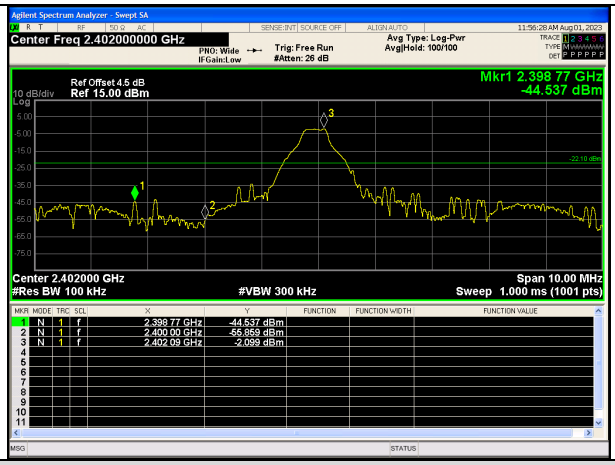
Tested by: Rain Wang

The plots of out of band conducted emissions are saved as below.

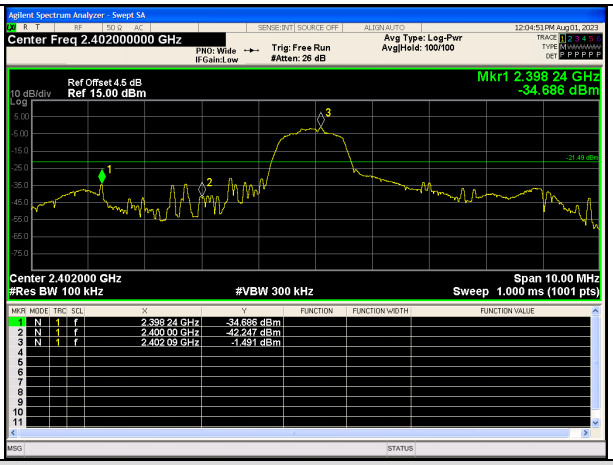
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

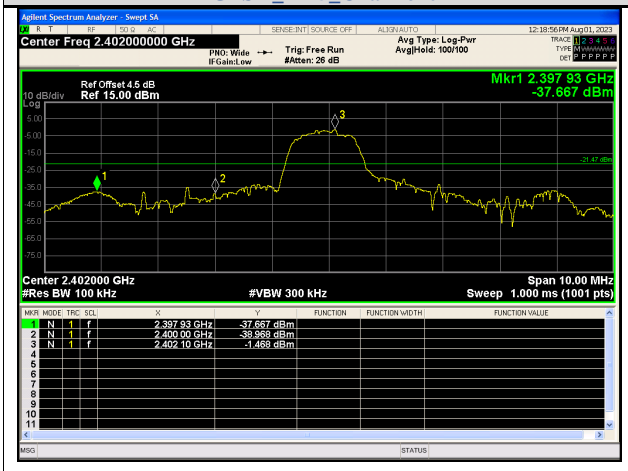
Lowest Channel, Plot 1



Out Of Band Emission
GFSK_DH5_Channel 0



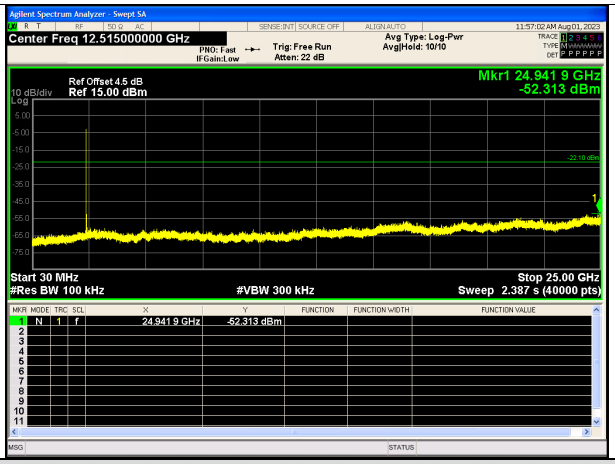
Out Of Band Emission
π/4DQPSK_2-DH5_Channel 0



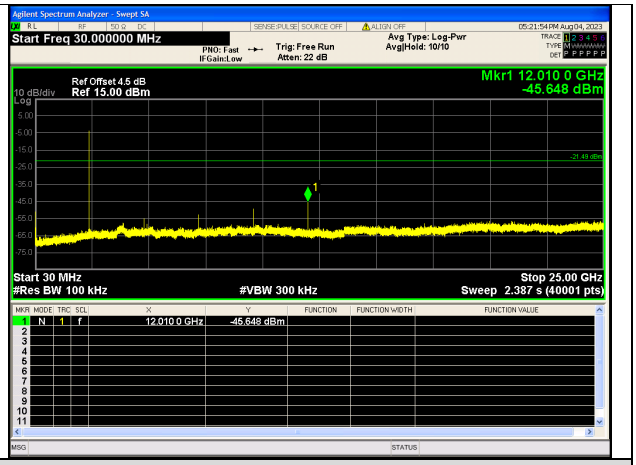
Out Of Band Emission
8DPSK_3-DH5_Channel 0

TEST REPORT

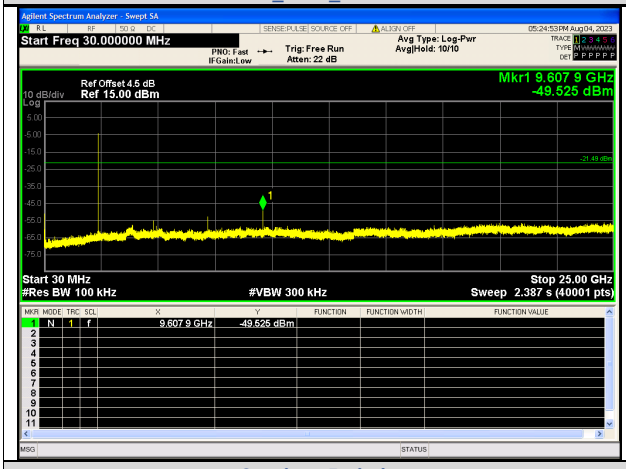
Lowest Channel, Plot 2



Spurious Emission
GFSK_DH5_Channel 0



Spurious Emission
π/4DQPSK_2-DH5_Channel 0

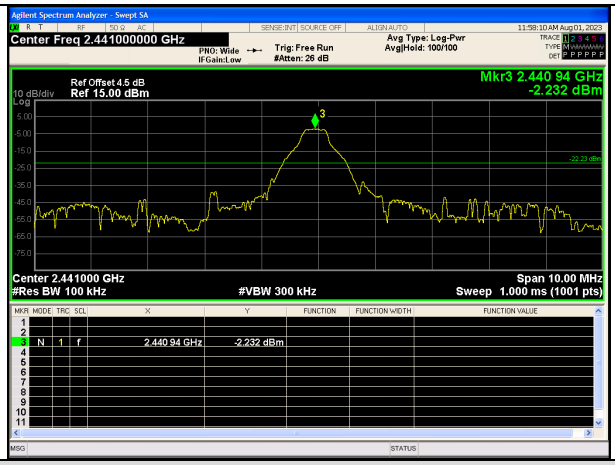


Spurious Emission
8DPSK_3-DH5_Channel 0

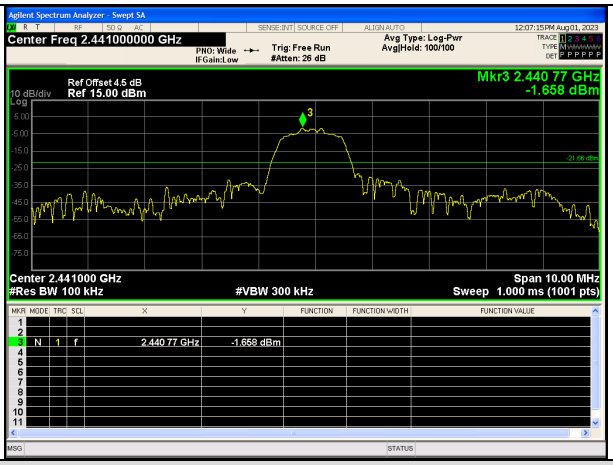
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

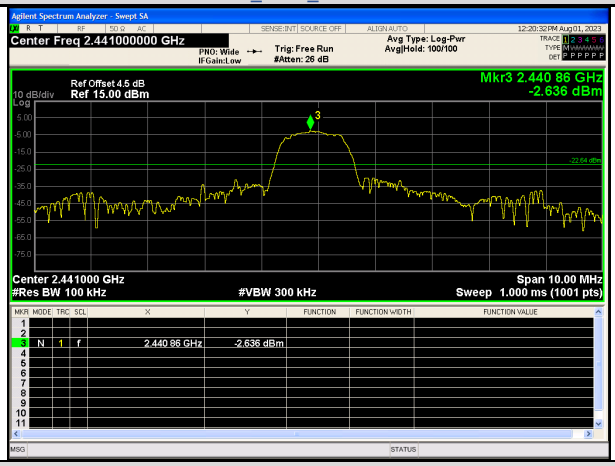
Middle Channel, Plot 1



Out Of Band Emission
GFSK_DH5_Channel 39



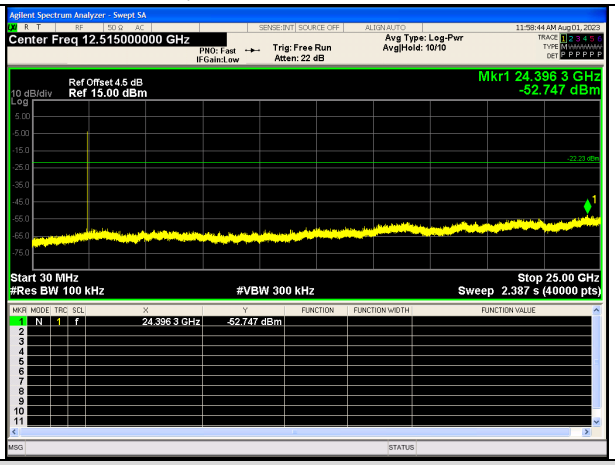
Out Of Band Emission
π/4DQPSK_2-DH5_Channel 39



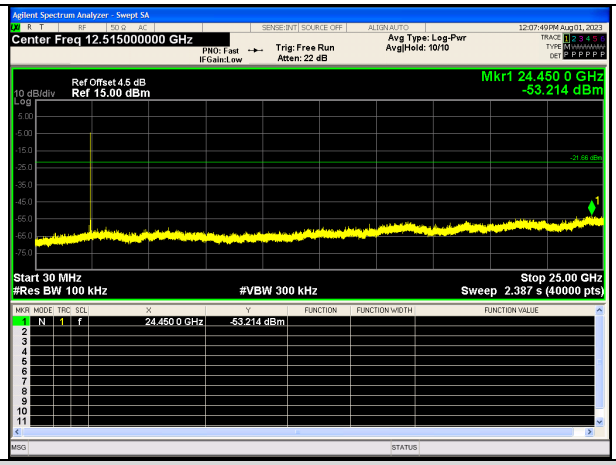
Out Of Band Emission
8DPSK_3-DH5_Channel 39

TEST REPORT

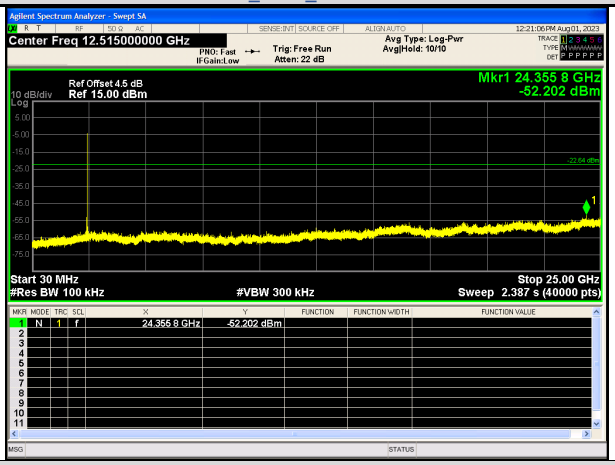
Middle Channel, Plot 2



Spurious Emissions
GFSK_DH5_Channel 39



Spurious Emissions
π/4DQPSK_2-DH5_Channel 39

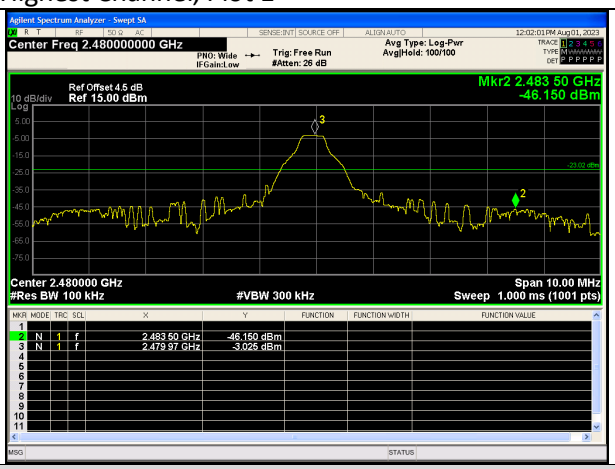


Spurious Emissions
8DPSK_3-DH5_Channel 39

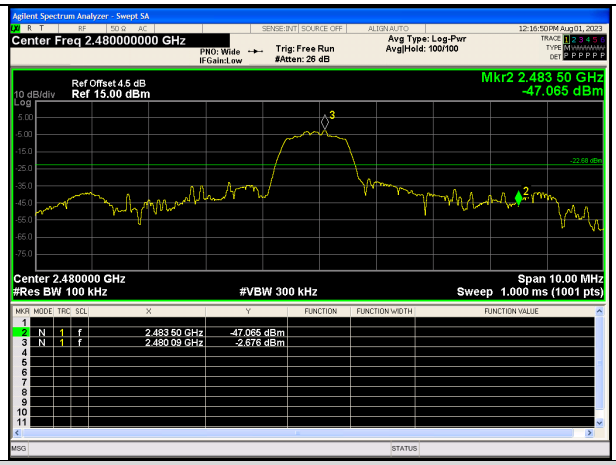
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

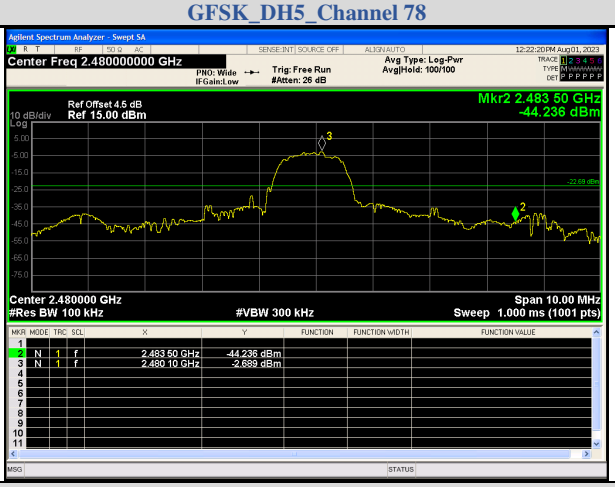
Highest Channel, Plot 1



Out Of Band Emission
GFSK_DH5_Channel 78



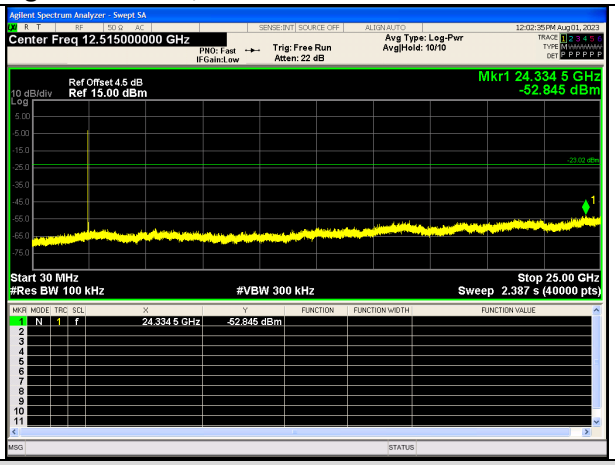
Out Of Band Emission
π/4DQPSK_2-DH5_Channel 78



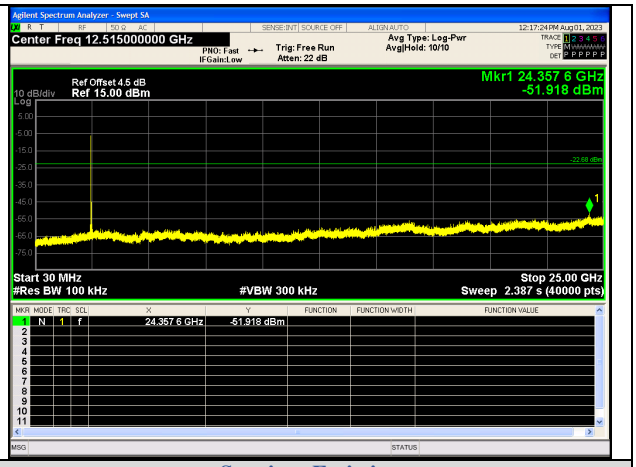
Out Of Band Emission
8DPSK_3-DH5_Channel 78

TEST REPORT

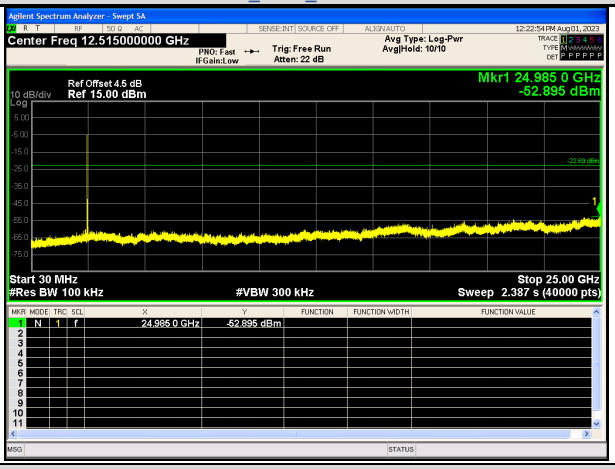
Highest Channel, Plot 2



Spurious Emission
GFSK_DH5_Channel 78



Spurious Emission
π/4DQPSK_2-DH5_Channel 78

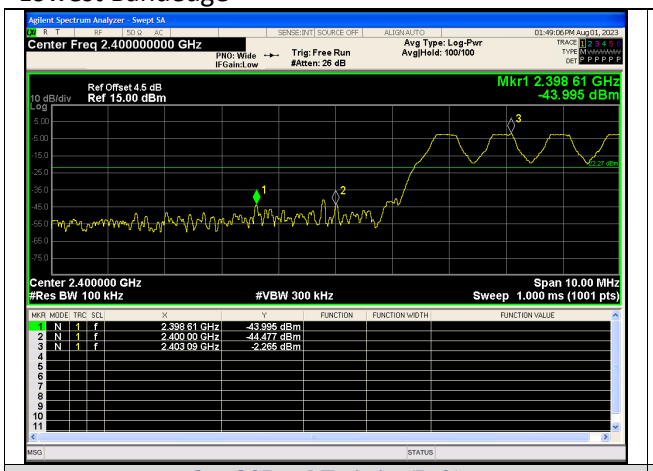


Spurious Emission
8DPSK_3-DH5_Channel 78

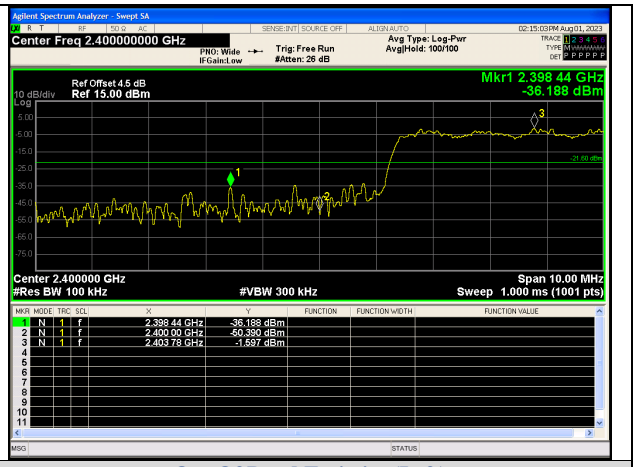
TEST REPORT

PLOTS OF BANDEDGE (hopping)

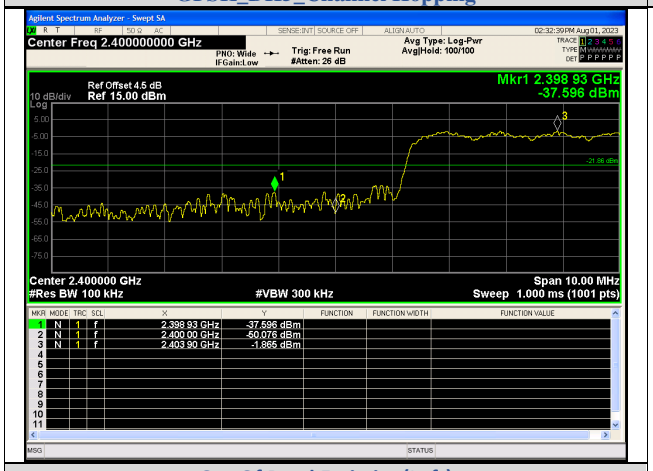
Lowest Bandedge



Out Of Band Emission(Left)
GFSK_DH5_Channel Hopping



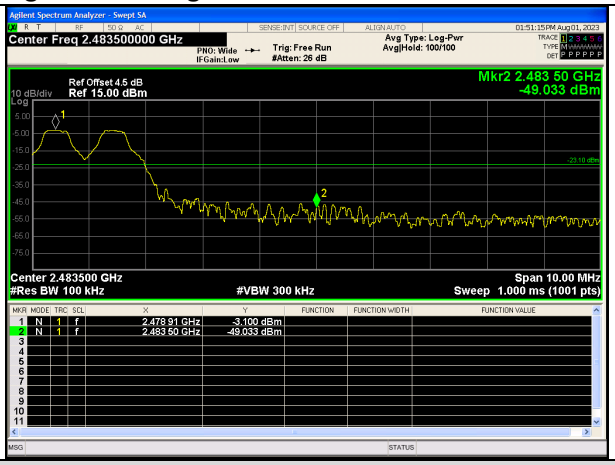
Out Of Band Emission(Left)
π/4DQPSK_2-DH5_Channel Hopping



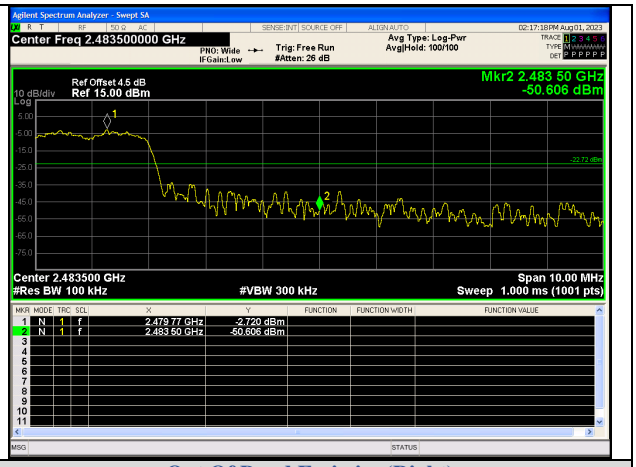
Out Of Band Emission(Left)
8DPSK_3-DH5_Channel Hopping

TEST REPORT

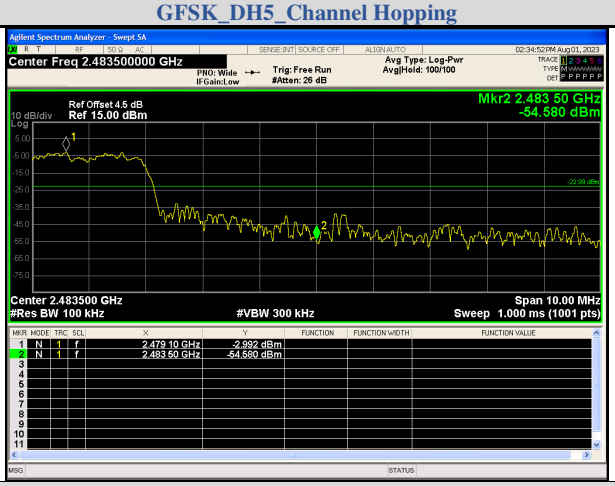
Highest Bandedge



Out Of Band Emission(Right)
GFSK_DH5_Channel Hopping



Out Of Band Emission(Right)
π/4DQPSK_2-DH5_Channel Hopping



Out Of Band Emission(Right)
8DPSK_3-DH5_Channel Hopping

TEST REPORT

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

TEST REPORT

4.8 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

TEST REPORT

4.8.1 Radiated Emission Configuration Photograph

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.8.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

Tested by: Andy Lin

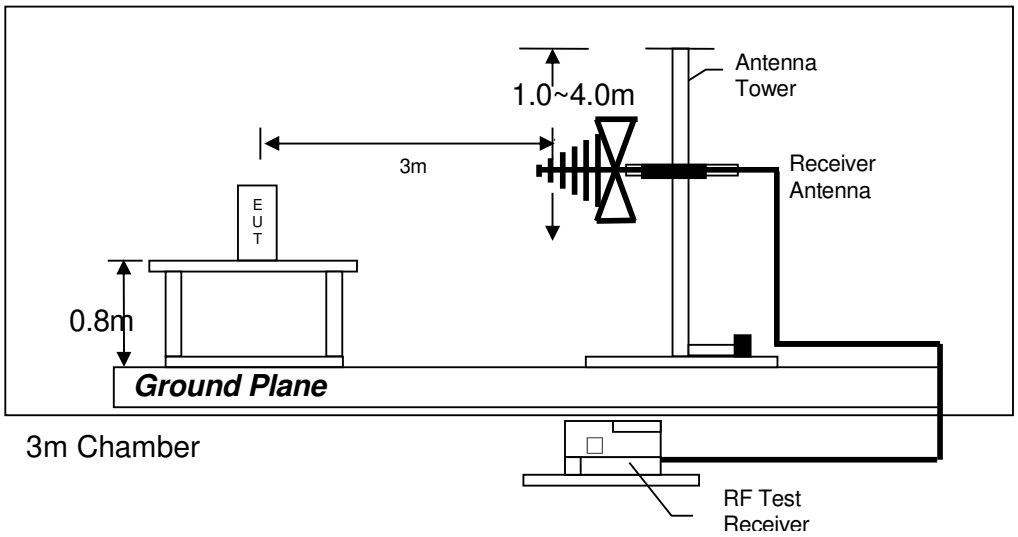
Judgement -

Passed by 8.8 dB margin at 2483.500 MHz

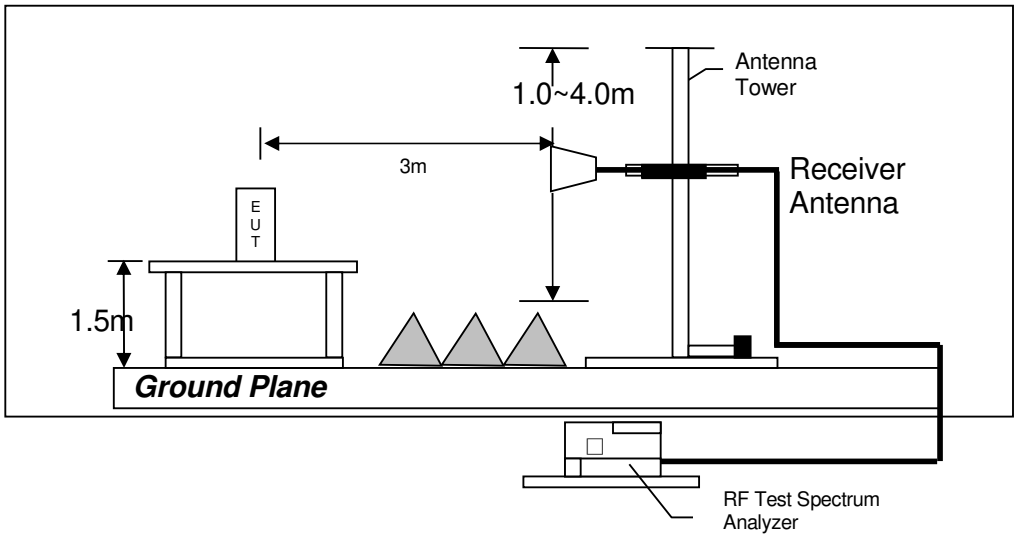
TEST REPORT

4.8.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

TEST REPORT

RADIATED EMISSION DATA

Mode: TX-Channel 2402MHz

Table 1

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	2390.00	56.51	-8.22	48.29	74.00	-25.71	Peak	Horizontal
2	2390.00	38.78	-8.22	30.56	54.00	-23.44	Average	Horizontal
3	4804.00	39.71	-1.56	38.15	74.00	-35.85	Peak	Horizontal
4	4804.00	27.60	-1.56	26.04	54.00	-27.96	Average	Horizontal
5	7206.00	37.67	2.28	39.95	74.00	-34.05	Peak	Horizontal
6	7206.00	26.34	2.28	28.62	54.00	-25.38	Average	Horizontal
7	2390.00	54.29	-8.22	46.07	74.00	-27.93	Peak	Vertical
8	2390.00	38.90	-8.22	30.68	54.00	-23.32	Average	Vertical
9	4804.00	40.77	-1.56	39.21	74.00	-34.79	Peak	Vertical
10	4804.00	27.10	-1.56	29.38	54.00	-26.72	Average	Vertical
11	7206.00	38.54	2.28	40.82	74.00	-33.18	Peak	Vertical
12	7206.00	27.10	2.28	29.38	54.00	-24.62	Average	Vertical

NOTES:
1. Peak detector is used for the emission measurement. Average detector is used for the average data of emission measurement
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

Mode: TX-Channel 2441MHz

Table 2

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4882.00	28.31	-1.47	26.84	54.00	-27.16	Average	Horizontal
2	4882.00	40.56	-1.47	39.09	74.00	-34.91	Peak	Horizontal
3	7323.00	25.27	2.32	27.59	54.00	-26.41	Average	Horizontal
4	7323.00	37.62	2.32	39.94	74.00	-34.06	Peak	Horizontal
5	4882.00	28.96	-1.47	27.49	54.00	-26.51	Average	Vertical
6	4882.00	40.13	-1.47	38.66	74.00	-35.34	Peak	Vertical
7	7323.00	25.11	2.32	27.43	54.00	-26.57	Average	Vertical
8	7323.00	38.25	2.32	40.57	74.00	-33.43	Peak	Vertical

NOTES: 1. Peak detector is used for the emission measurement. Average detector is used for the average data of emission measurement

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

Mode: TX-Channel 2480MHz

Table 3

No.	Frequency (MHz)	Reading (dBuV/m)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	2483.50	57.29	-7.65	49.64	74.00	-24.36	Peak	Horizontal
2	2483.50	52.86	-7.65	45.21	54.00	-8.79	Average	Horizontal
3	4960.00	40.95	-1.37	39.58	74.00	-34.42	Peak	Horizontal
4	4960.00	28.85	-1.37	27.48	54.00	-26.52	Average	Horizontal
5	7440.00	38.14	2.38	40.52	74.00	-33.48	Peak	Horizontal
6	7440.00	25.09	2.38	27.47	54.00	-26.53	Average	Horizontal
7	2483.50	54.47	-7.65	46.82	74.00	-27.18	Peak	Vertical
8	2483.50	46.15	-7.65	38.50	54.00	-15.50	Average	Vertical
9	4960.00	39.80	-1.37	38.43	74.00	-35.57	Peak	Vertical
10	4960.00	28.70	-1.37	28.95	54.00	-25.05	Average	Vertical
11	7440.00	38.24	2.38	40.62	74.00	-33.38	Peak	Vertical
12	7440.00	26.57	2.38	28.95	54.00	-25.05	Average	Vertical

NOTES:
1. Peak detector is used for the emission measurement. Average detector is used for the average data of emission measurement
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

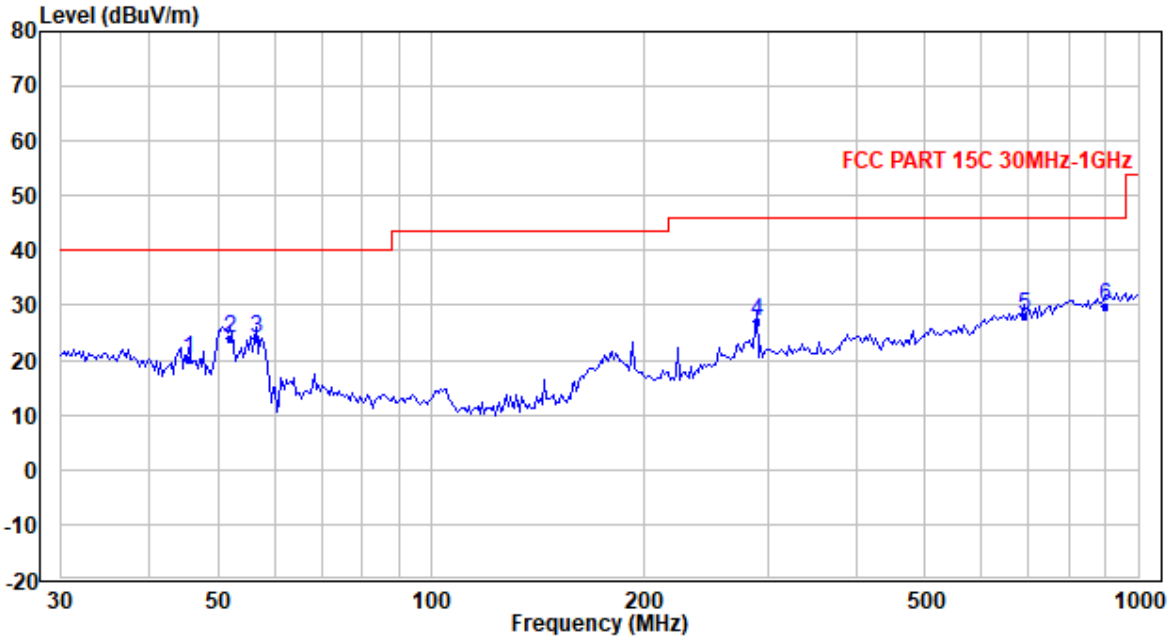
TEST REPORT

Mode: Transmitting simultaneously

Table 4-Horizontal

	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	45.413	32.03	-11.69	20.34	40.00	-19.66	QP
2	51.900	39.71	-15.63	24.08	40.00	-15.92	QP
3	56.466	41.01	-17.07	23.94	40.00	-16.06	QP
4	288.284	34.22	-7.05	27.17	46.00	-18.83	QP
5	689.051	26.08	2.00	28.08	46.00	-17.92	QP
6	899.958	25.23	4.73	29.96	46.00	-16.04	QP

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

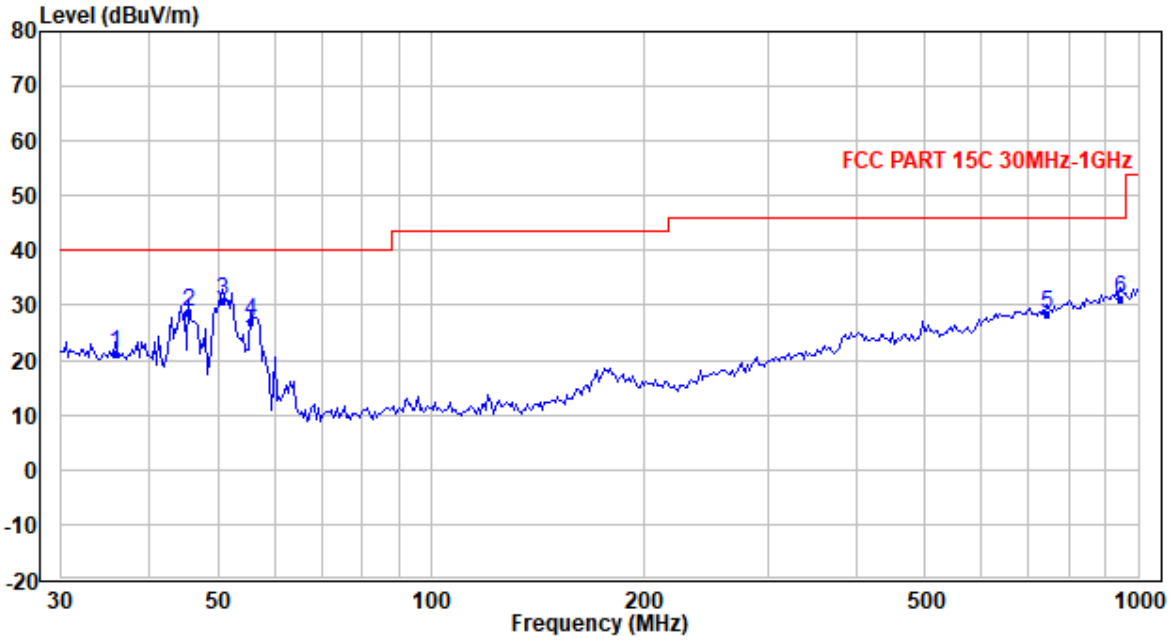


TEST REPORT

Table 5-Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	35.762	26.87	-5.62	21.25	40.00	-18.75	QP
2	45.413	40.57	-11.69	28.88	40.00	-11.12	QP
3	50.817	45.82	-14.84	30.98	40.00	-9.02	QP
4	55.678	44.03	-16.88	27.15	40.00	-12.85	QP
5	744.427	25.99	2.35	28.34	46.00	-17.66	QP
6	945.334	26.36	4.83	31.19	46.00	-14.81	QP

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.



TEST REPORT

4.9 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.9.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

0.190 MHz

The worst-case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.9.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

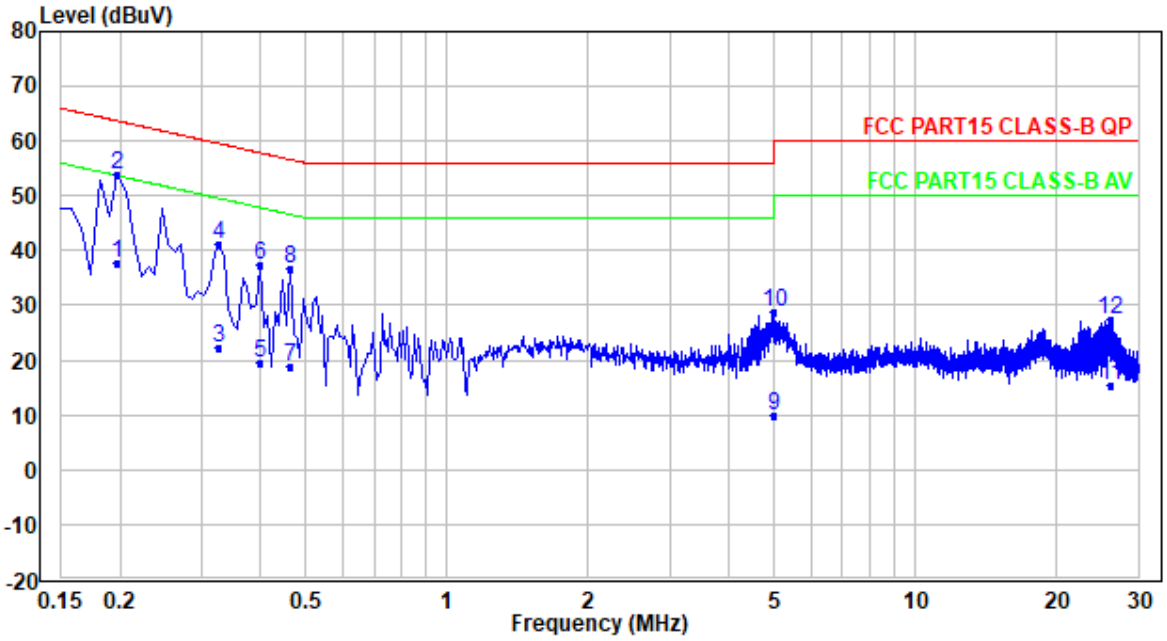
Tested by: Yana Zeng

Passed by 9.3 dB margin

TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Line:



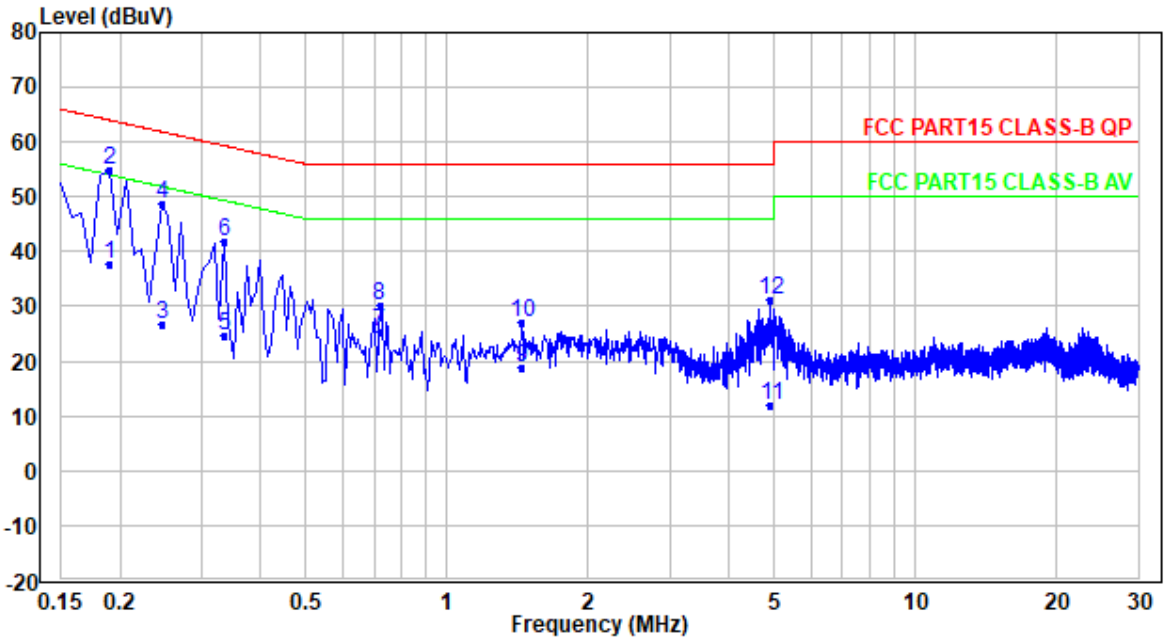
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.198	27.70	10.02	37.72	53.69	-15.97	Average
2	0.198	43.70	10.02	53.72	63.69	-9.97	QP
3	0.326	12.31	10.03	22.34	49.55	-27.21	Average
4	0.326	31.31	10.03	41.34	59.55	-18.21	QP
5	0.398	9.47	10.04	19.51	47.90	-28.39	Average
6	0.398	27.47	10.04	37.51	57.90	-20.39	QP
7	0.462	8.74	10.04	18.78	46.66	-27.88	Average
8	0.462	26.74	10.04	36.78	56.66	-19.88	QP
9	4.989	-0.50	10.32	9.82	46.00	-36.18	Average
10	4.989	18.50	10.32	28.82	56.00	-27.18	QP
11	26.097	3.93	11.46	15.39	50.00	-34.61	Average
12	26.097	15.93	11.46	27.39	60.00	-32.61	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

TEST REPORT

Neatrul:



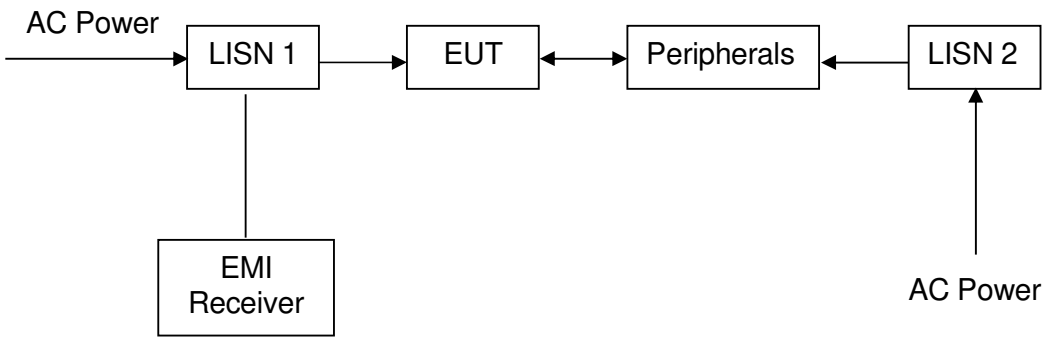
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.190	27.78	10.00	37.78	54.04	-16.26	Average
2	0.190	44.78	10.00	54.78	64.04	-9.26	QP
3	0.246	16.70	10.01	26.71	51.89	-25.18	Average
4	0.246	38.70	10.01	48.71	61.89	-13.18	QP
5	0.334	14.67	10.02	24.69	49.35	-24.66	Average
6	0.334	31.67	10.02	41.69	59.35	-17.66	QP
7	0.718	15.20	10.04	25.24	46.00	-20.76	Average
8	0.718	20.20	10.04	30.24	56.00	-25.76	QP
9	1.446	8.89	10.07	18.96	46.00	-27.04	Average
10	1.446	16.89	10.07	26.96	56.00	-29.04	QP
11	4.925	1.76	10.32	12.08	46.00	-33.92	Average
12	4.925	20.76	10.32	31.08	56.00	-24.92	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

TEST REPORT

4.9.3 AC Line Conducted Emission Test Setup



The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

TEST REPORT

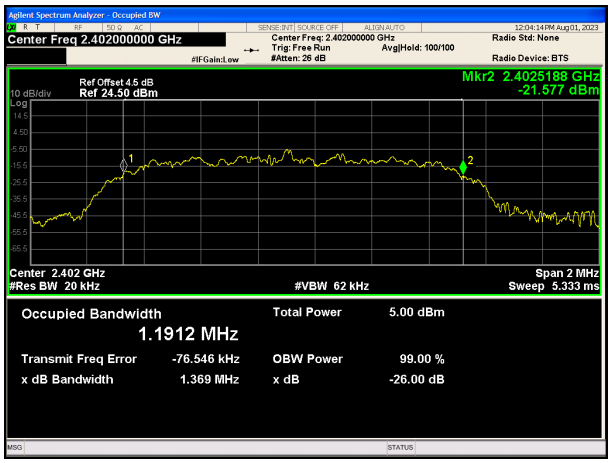
4.10 Occupied Bandwidth

Occupied Bandwidth Results:

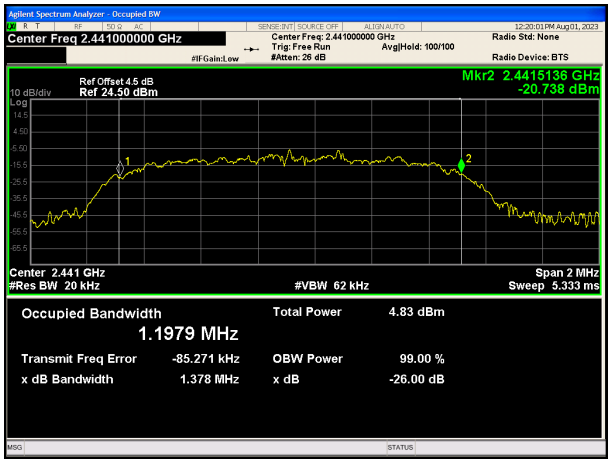
	Occupied Bandwidth (MHz)
Low Channel: 2402	1.1912
Middle Channel: 2441	1.1979
High Channel: 2480	1.2013

The case is shown as below

Lowest Channel

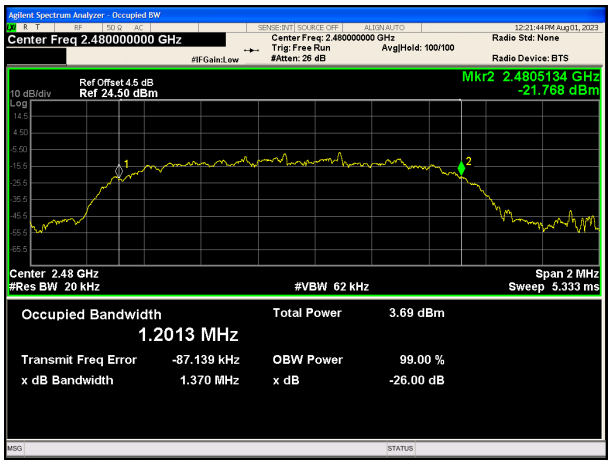


Middle Channel



TEST REPORT

Highest Channel



Tested by: Rain Wang

TEST REPORT

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	Manufacturer	Model No.	Serial Number	Cal. Due date
3m SAC	ETS-LINDGREN	3m	N/A	Jan. 21, 2024
Receiver	R&S	ESIB26	100114	Nov. 2, 2023
Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec.12, 2023
6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec.12, 2023
Preamplifier	HP	8447F	2805A02960	Oct. 31, 2023
Double-Ridged Waveguide Horn Antenna	ETS-LINDGREN	3117-PA	00201541	Apr. 16, 2024
(Pre-amplifier)	ETS-LINDGREN	00118385	00201874	Oct. 31, 2023
Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A
Test Software	Audix	e3	Software Version: 9.160323	

2) Conducted Emissions Test

Equipment	Manufacturer	Model No.	Serial Number	Cal. Due date
Receiver	R&S	ESR7	101181	Oct. 31, 2023
Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Oct. 31, 2023
LISN	R&S	ESH2-Z5	860014/024	Oct. 31, 2023
Test Software	Audix	e3	Software Version: 9.20151119i	

3) RF Test

Equipment	Manufacturer	Model No.	Serial Number	Cal. Due date
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Apr. 13, 2024
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 02, 2023

END OF TEST REPORT