



28 November 2009

Nokia Corporation
Joensuunkatu 7
FIN-24100 SALO
FINLAND

Dear Tero Lehtinen :

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: PYABH-505).

For your reference, TCB will normally take another 5 days for reviewing the report. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

A handwritten signature in black ink, appearing to read "Shawn Xing", with a stylized flourish at the end.

Shawn Xing
Assistant Manager

Enclosure

Nokia Corporation

Application For Certification (FCC ID: PYABH-505)

Nokia Bluetooth Stereo Headset

MODEL: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)

2.4GHz Transceiver



SZ09080054-6R1

Billy Li

28 November 2009

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF No.: FCC 15C_TXa

FCC ID: PYABH-505

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch

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INTERTEK TESTING SERVICES

LIST OF EXHIBITS

INTRODUCTION

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MEASUREMENT/TECHNICAL REPORT

Nokia Corporation - MODEL: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)

FCC ID: PYABH-505

28 November 2009

This report concerns (check one) Original Grant ☒ Class II Change ☐

Equipment Type: DSS - Part 15 Spread Spectrum Transmitter

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-08 Edition] provision.

Report prepared by:



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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operational Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
External Photos	External Photo	external photos.pdf
Internal Photos	Internal Photo	internal photos.pdf
ID Label/Location Info	Label Artwork and Location	label.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Users Manual	User Manual	manual.pdf
Cover Letter	Letter of Agency	letter of agency.pdf

EXHIBIT 1

GENERAL DESCRIPTION

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1.0 **General Description**

1.1 Product Description

The Equipment Under Test (EUT) is a Bluetooth Headset model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0). It is powered by an internal 3.7V rechargeable battery, and also can be powered by an external adapter (Input: 100-240VAC, 50/60Hz, output: DC 5.0V, 350mA).

Antenna Type: PCB antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application for certification of a transceiver.

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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003) and DA 00-705. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data is **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC.

EXHIBIT 2
SYSTEM TEST CONFIGURATION

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2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered fully charged 3.7V internal rechargeable battery and an external adaptor (Input: 100-240V AC, 50/ 60Hz, output: DC 5.0V, 350mA) in the testing.

All packets DH1, DH3 & DH5 mode in all modulation type GFSK, $\pi/4$ -DQPSK and 8-DPSK were tested, and only the worst data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was placed in the center of the turntable when powered by internal rechargeable battery and the rear of unit shall be flushed with the rear of the table when powered by adapter.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

The EUT exercise program (BlueSuite2.0, provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level.

2.3 Special Accessories

No special accessories used.

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2.4 Equipment Modification

Any modifications installed previous to testing by Nokia Corporation will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in the following configuration:


Refer List:

Description	Manufacturer	Model No.
Mobile phone	Nokia	N73
Adapter	Nokia	AC-3U

All the items listed under section 2.0 of this report are

Confirmed by:

Shawn Xing
Assistant Manager
Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch
Agent for Nokia Corporation



Signature

28 November 2009

Date

EXHIBIT 3
TEST RESULTS

3.0 **Test Results**

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

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3.1 **Radiated Test Results**

A sample calculation, configuration photographs and data tables of the emissions are included.

3.1.1 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 dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 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 reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

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

Assume a receiver reading of 62.0 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 62.0 dB μ V
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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3.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

3.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
49.400 MHz

Judgement: Passed by 10.7 dB

TEST PERSONNEL:



Signature

Billy Li, Compliance Engineer
Typed/Printed Name

24 October 2009
Date

INTERTEK TESTING SERVICES

Applicant: Nokia Corporation

Date of Test: 24 October 2009

Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)

Sample: 1/2

Worst Case Operating Mode: Link with Mobile Phone (with the adaptor)

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Vertical	30.020	26.0	20.0	19.3	25.3	40.0	-14.7
Vertical	38.730	34.2	20.0	14.2	28.4	40.0	-11.6
Vertical	42.610	35.7	20.0	12.4	28.1	40.0	-11.9
Vertical	49.400	39.3	20.0	10.0	29.3	40.0	-10.7
Vertical	58.130	34.2	20.0	8.4	22.6	40.0	-17.4
Vertical	72.680	37.9	20.0	7.8	25.7	40.0	-14.3

- NOTES:
1. Quasi-Peak detector is used except for others stated.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. All emissions are below the QP limit.

Test Engineer: Billy Li

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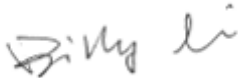
3.1.4 Transmitter Spurious Emissions (Radiated)

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
4803.720 MHz

Judgement: Passed by 12.3 dB

TEST PERSONNEL:



Signature

Billy Li, Compliance Engineer
Typed/Printed Name

24 October 2009
Date

INTERTEK TESTING SERVICES

Applicant: NOKIA CORPORATION
 Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)
 Sample: 2/2
 Mode: TX-Channel 0 (2402MHz)

Date of Test: 24 October 2009

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Vertical	**2402.000	107.7	36.7	28.5	99.5	--	--
Vertical	*4803.720	64.7	36.1	33.1	61.7	74.0	-12.3
Vertical	*12010.000	32.0	35.6	39.5	35.9	74.0	-38.1

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Vertical	**2402.000	107.7	36.7	28.5	--	99.5	--	--
Vertical	*4803.720	64.7	36.1	33.1	30.5	31.2	54.0	-22.8

- NOTES: 1. Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.
- ** Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

Test Engineer: Billy Li

INTERTEK TESTING SERVICES

Applicant: NOKIA CORPORATION
Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)
Sample: 2/2
Mode: TX-Channel 39 (2441MHz)

Date of Test: 24 October 2009

Table 3

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Vertical	*4882.970	60.3	36.1	33.3	57.5	74.0	-16.5
Vertical	*7332.940	33.9	36.2	37.9	35.6	74.0	-38.4
Vertical	*12205.700	36.0	36.3	39.6	39.3	74.0	-34.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Vertical	*4882.970	60.3	36.1	33.3	30.5	27.0	54.0	-27.0

- NOTES: 1. Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Billy Li

INTERTEK TESTING SERVICES

Applicant: NOKIA CORPORATION
 Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)
 Sample: 2/2
 Mode: TX-Channel 78 (2480MHz)

Date of Test: 24 October 2009

Table 4

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Vertical	**2480.000	108.8	36.7	28.6	100.7	—	--
Vertical	*4959.850	61.0	36.1	33.4	58.3	74.0	-15.7
Vertical	*7440.740	39.0	36.2	38.2	41.0	74.0	-33.0
Vertical	*12400.000	39.1	36.3	39.6	42.4	74.0	-31.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Vertical	**2480.000	108.8	36.7	28.6	--	100.7	--	--
Vertical	*4959.850	61.0	36.1	33.4	30.5	27.8	54.0	-26.2

NOTES: 1. Peak detector is used except for others stated.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

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

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

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

** Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

Test Engineer: Billy Li

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3.2 Conducted Emission at Mains Terminal

3.2.1 Conducted Emissions Configuration Photograph

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

3.2.2 Conducted Emissions

Worst Case Line-Conducted Configuration
at
2.522 MHz

Judgement: Passed by 18.7 dB margin

TEST PERSONNEL:



Signature

Billy Li, Compliance Engineer
Typed/Printed Name

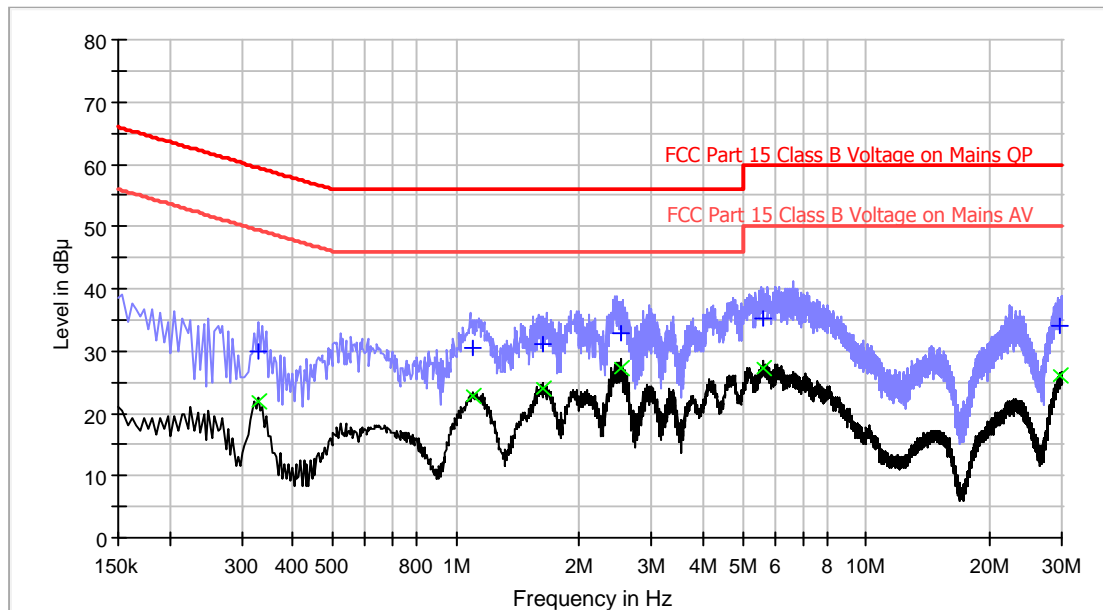
24 October 2009
Date

INTERTEK TESTING SERVICES

Company: NOKIA CORPORATION
Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)
Sample:1/2
Worst Case Operating Mode: Link with Mobile Phone

Date of Test: 24 October 2009

Conducted Emission Test



Result Table-QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.330000	30.1	L1	9.6	29.4	59.5
1.102000	30.5	L1	9.7	25.5	56.0
1.626000	31.0	L1	9.7	25.0	56.0
2.522000	33.0	L1	9.7	23.0	56.0
5.610000	35.2	L1	9.8	24.8	60.0
29.734000	34.2	L1	10.4	25.8	60.0

Result Table-AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.330000	21.8	L1	9.6	27.7	49.5
1.102000	22.7	L1	9.7	23.3	46.0
1.626000	24.1	L1	9.7	21.9	46.0
2.522000	27.3	L1	9.7	18.7	46.0
5.610000	27.2	L1	9.8	22.8	50.0
29.734000	26.1	L1	10.4	23.9	50.0

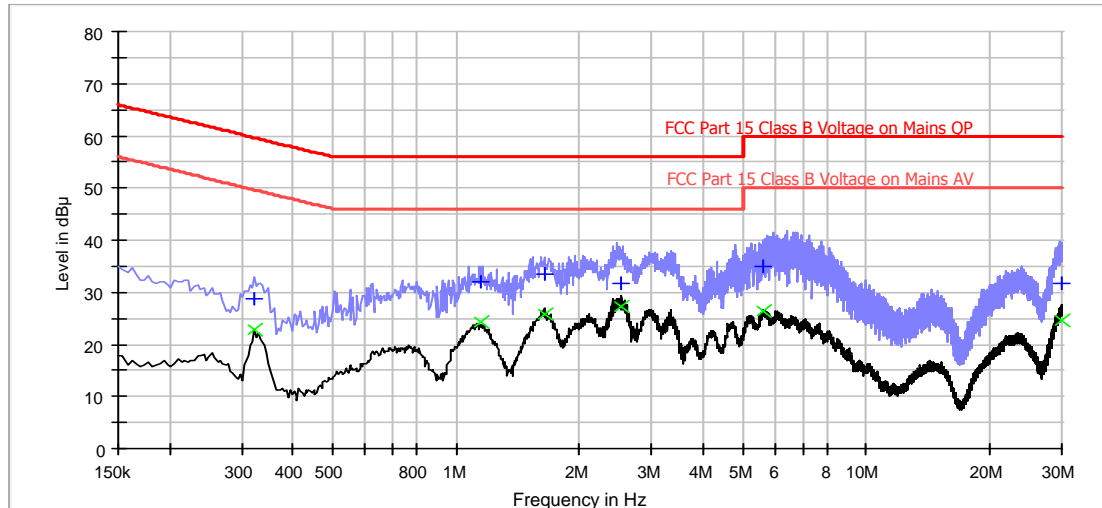
INTERTEK TESTING SERVICES

Company: NOKIA CORPORATION
Model: BH-505(HW: V4.0, SW: V3.2, MV: 2.0)
Sample:1/2

Date of Test: 24 October 2009

Worst Case Operating Mode: Link with Mobile Phone

Conducted Emission Test



Result Table-QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.321000	28.7	N	9.6	31.0	59.7
1.146000	32.1	N	9.7	23.9	56.0
1.638000	33.5	N	9.7	22.5	56.0
2.526000	31.7	N	9.7	24.3	56.0
5.590000	35.1	N	9.8	24.9	60.0
29.990000	31.8	N	10.5	28.2	60.0

Result Table-AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.321000	22.7	N	9.6	27.0	49.7
1.146000	24.3	N	9.7	21.7	46.0
1.638000	25.9	N	9.7	20.1	46.0
2.526000	27.2	N	9.7	18.8	46.0
5.590000	26.5	N	9.8	23.5	50.0
29.990000	24.6	N	10.5	25.4	50.0

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3.3 Peak Power

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1)

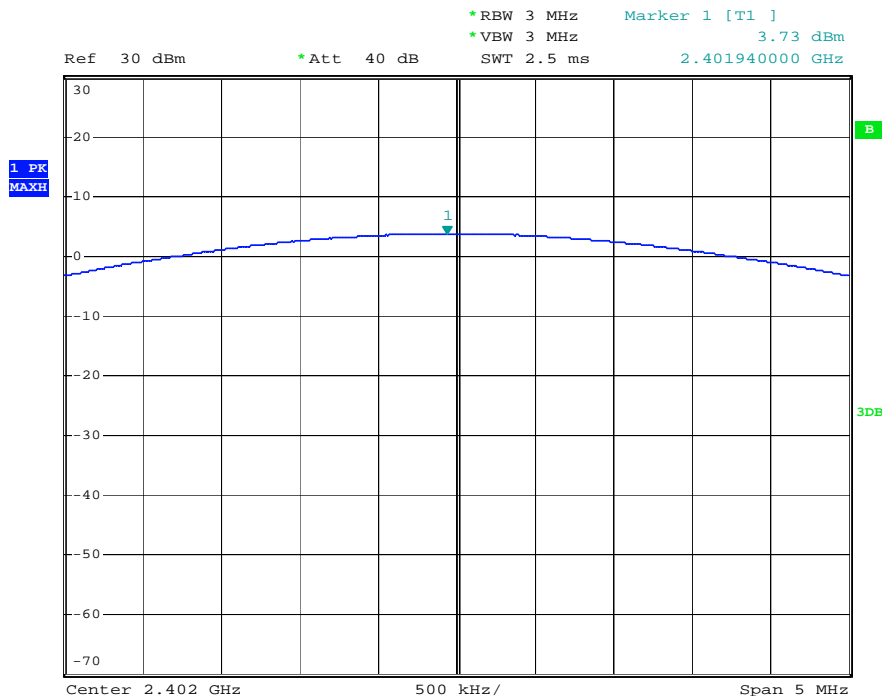
The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm. Cable loss was considered during this measurement.

For antenna with gains of 6dBi or less, maximum allowed transmitter output 1 watt (+30dBm)

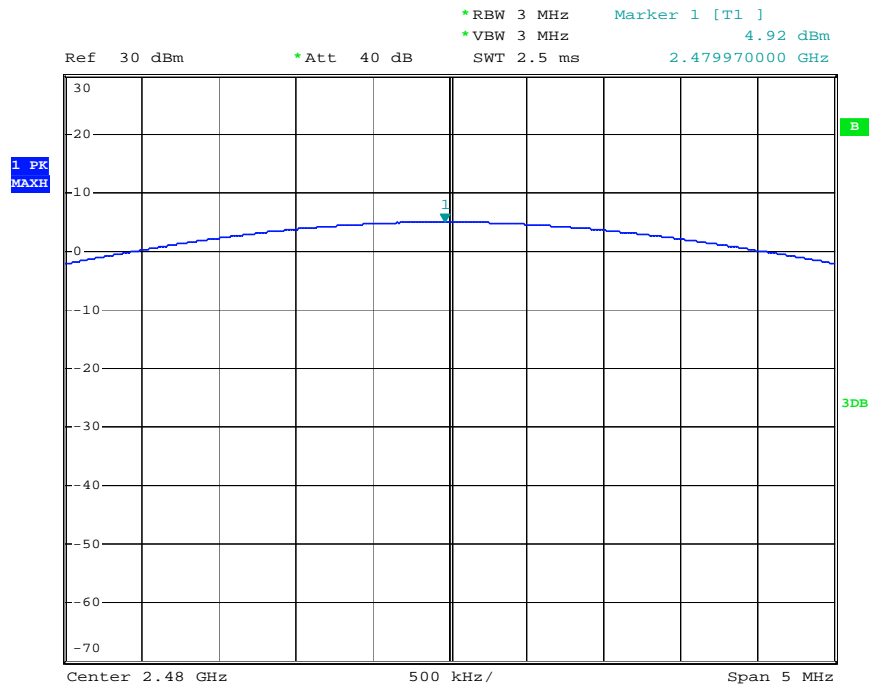
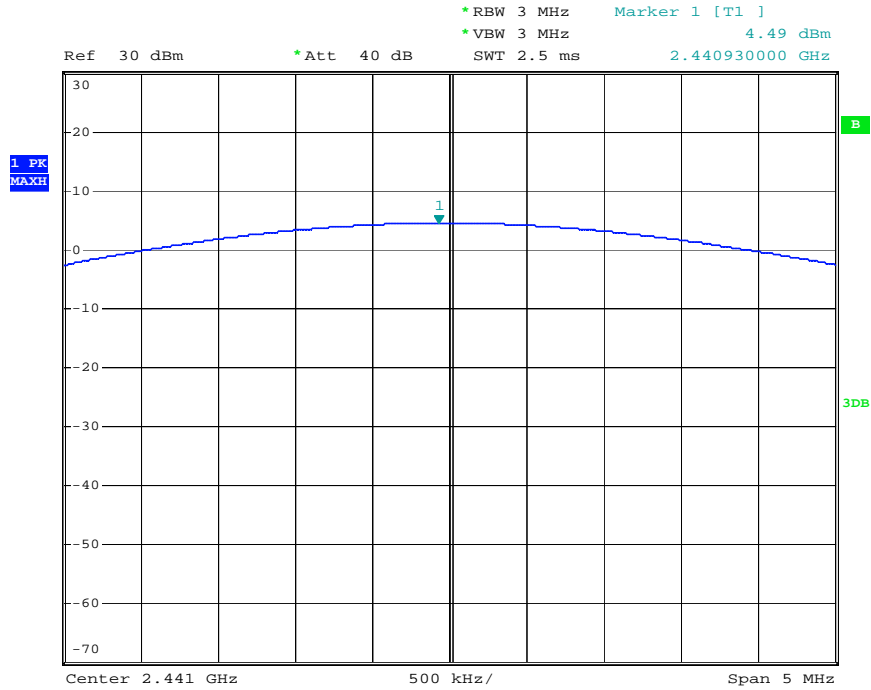
Antenna Gain = 0dBi		
Frequency (MHz)	Output in dBm	Output in mWatt
2402	4.23	2.65
2441	4.99	3.16
2480	5.42	3.48

cable loss: 0.5dB

Modulation Type: GFSK
Packet: DH1



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3.4 20dB Bandwidth

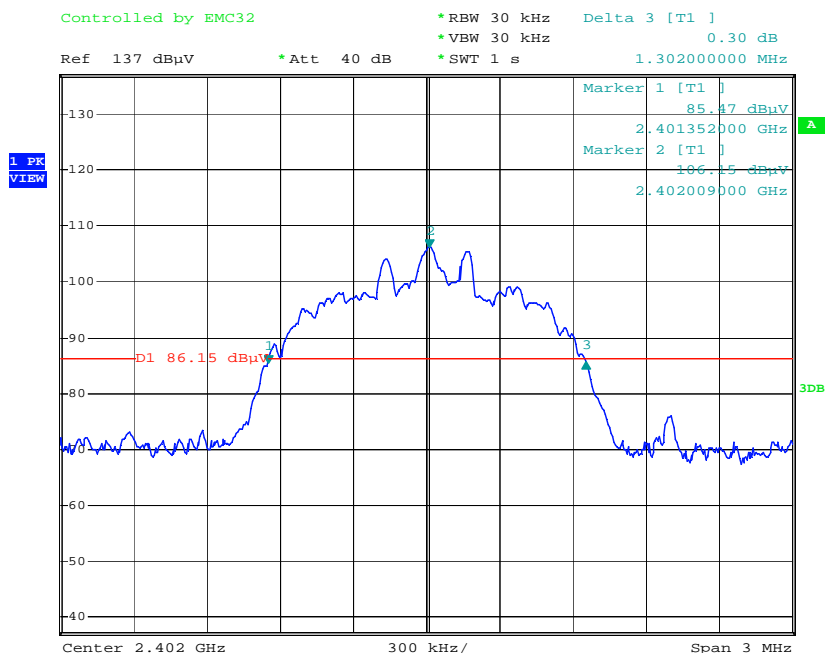
Maximum 20dB RF Bandwidth, FCC Rule 15.247(a) (1):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW 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. Use the spectrum 20dB down delta function to measure the bandwidth.

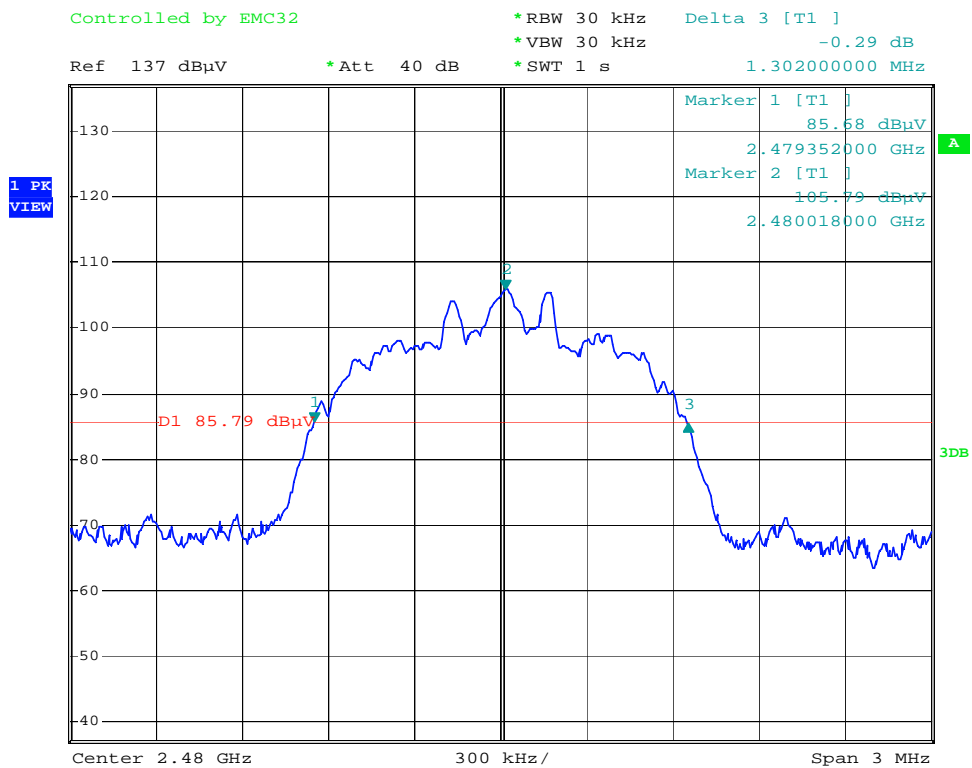
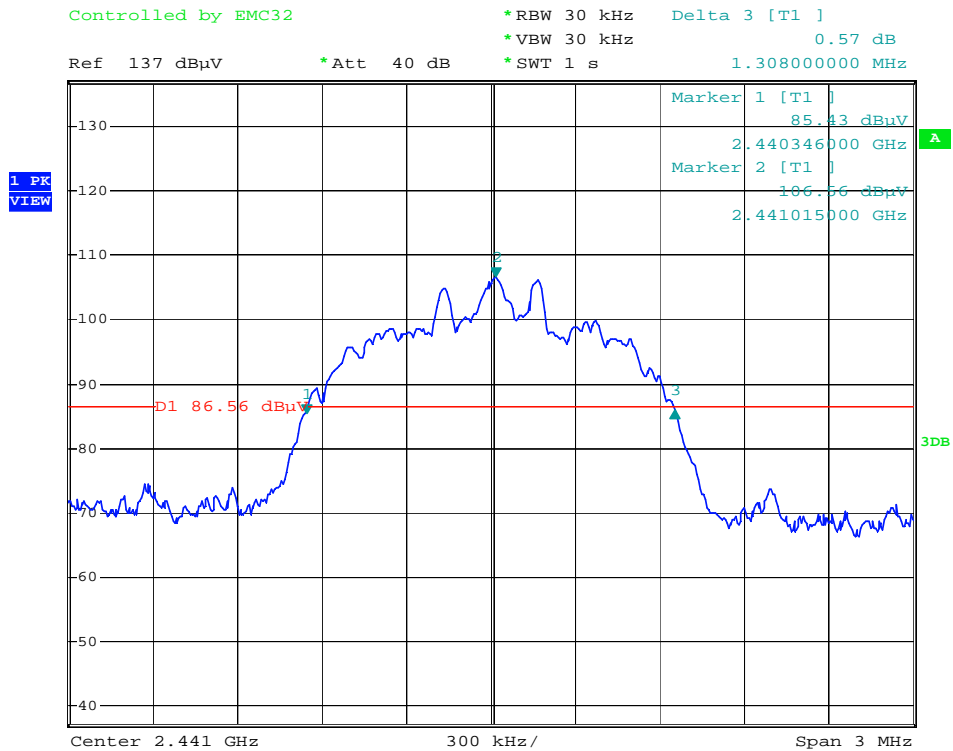
Frequency (MHz)	20 dB Bandwidth (MHz)
2441	1.308

Modulation Type: 8 -DPSK

Packet: DH5



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3.5 Channel Number (Number of Hopping Frequencies)

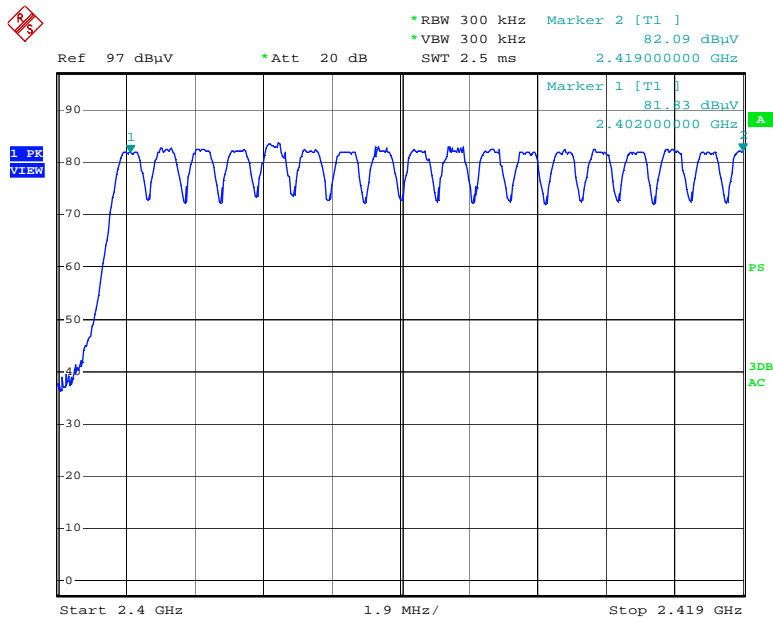
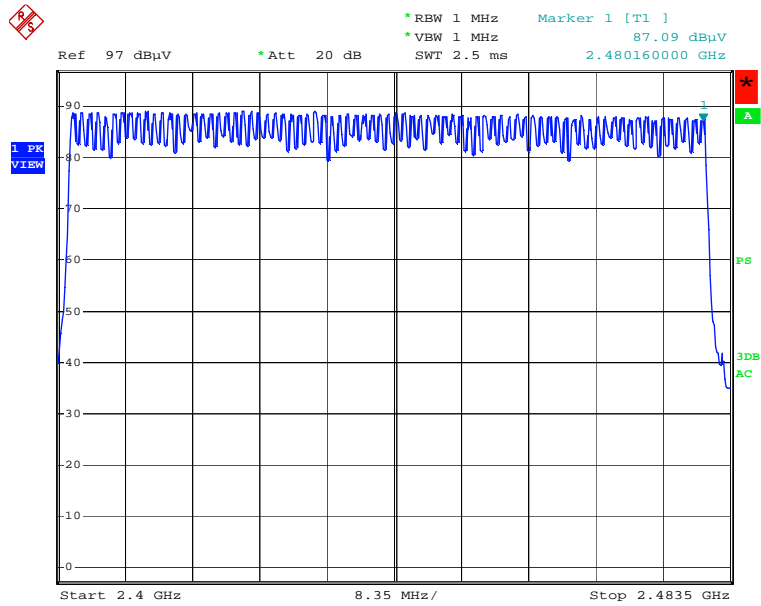
Minimum Number of Hopping Frequencies, FCC Rule 15.247(a) (1) (iii):

The RF passband of the EUT was divided into 5 approximately equal bands. With the analyzer set to MAX HOLD readings were taken for 2-3 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

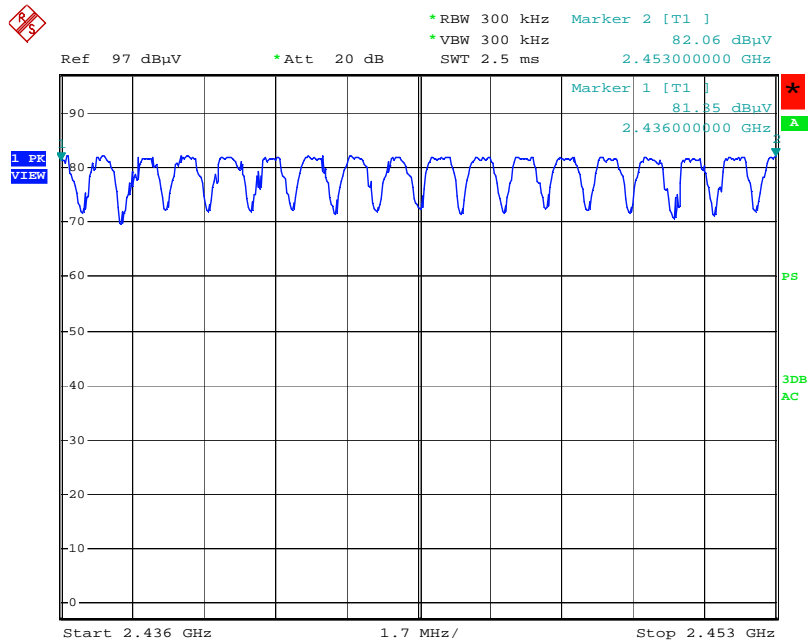
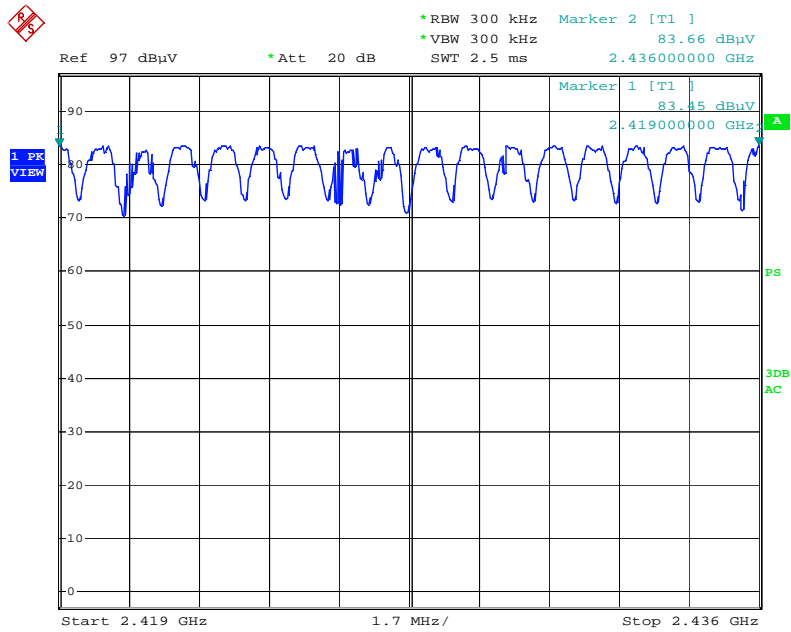
Number of hopping channels =	79
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Modulation Type: GFSK
Packet: DH1

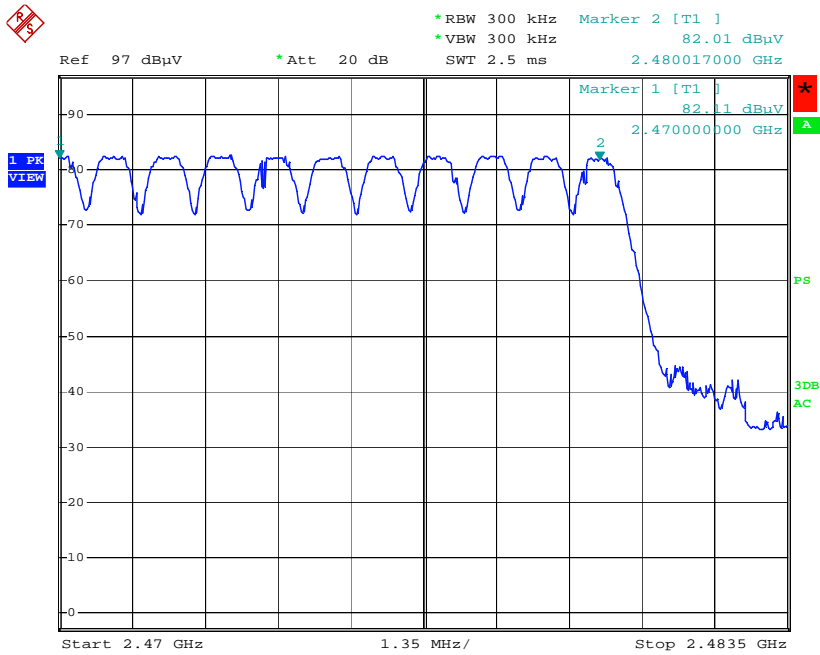
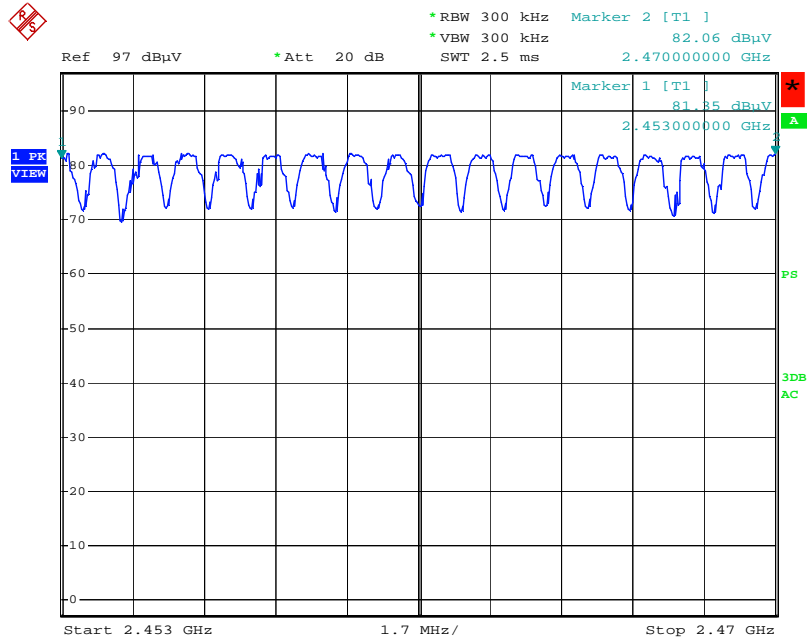
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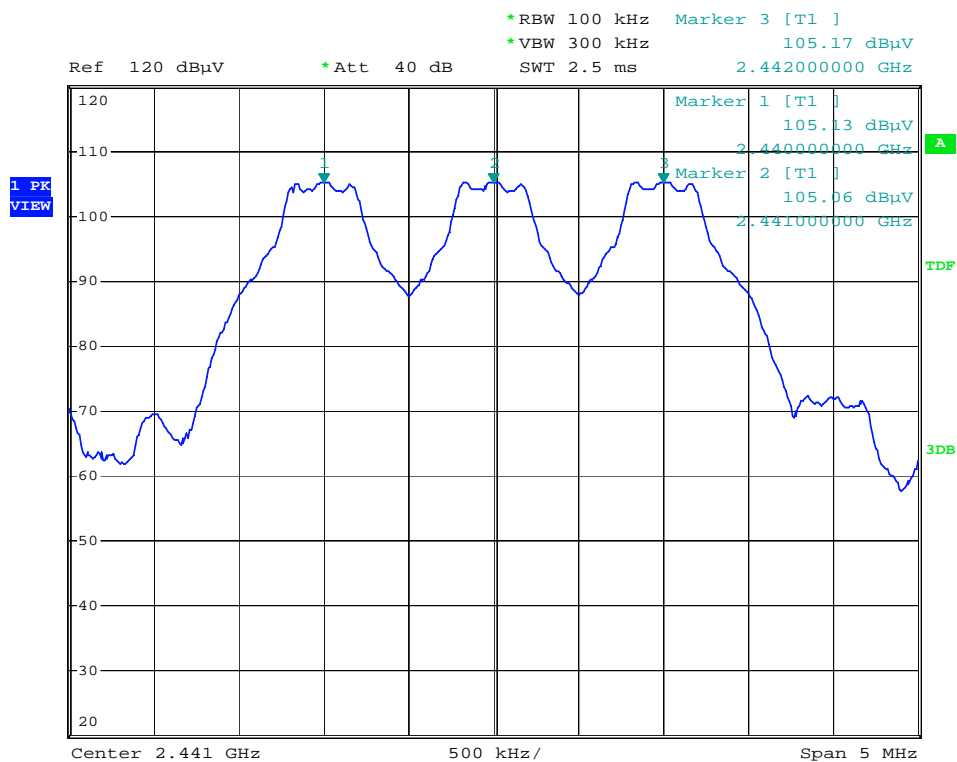
3.6 Channel Separation (Carrier Frequency Separation)

Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1):

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit:

2/3 of 20dB bandwidth of hopping channel: 0.872MHz

Channel Separation	1 MHz
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3.7 Dwell Time (Time of Occupancy)

Average Channel Occupancy Time, FCC Ref: 15.247(a)(1)(iii):

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 10ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmissions so captured was measured with the MARKER DELTA function.

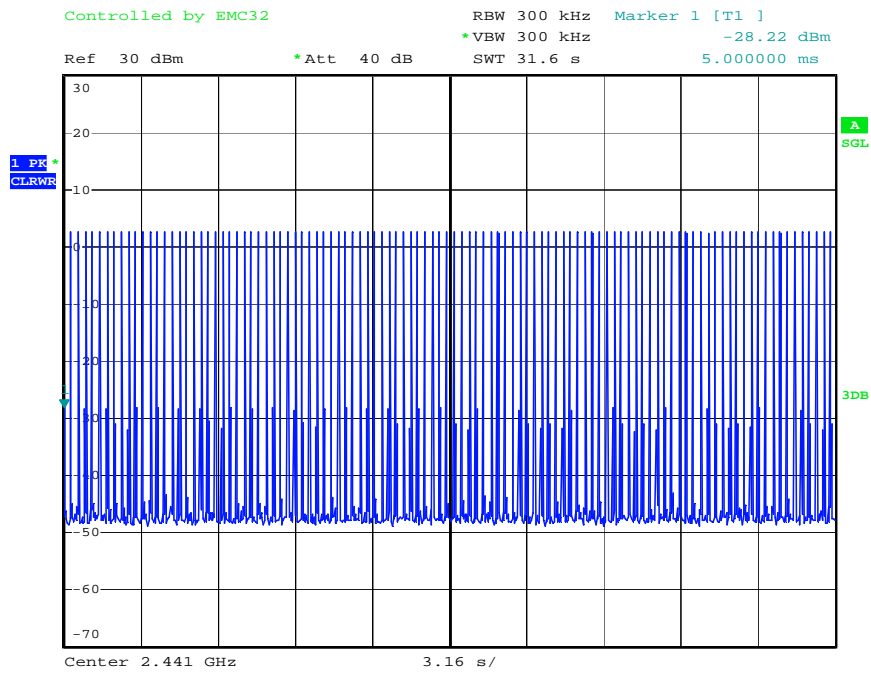
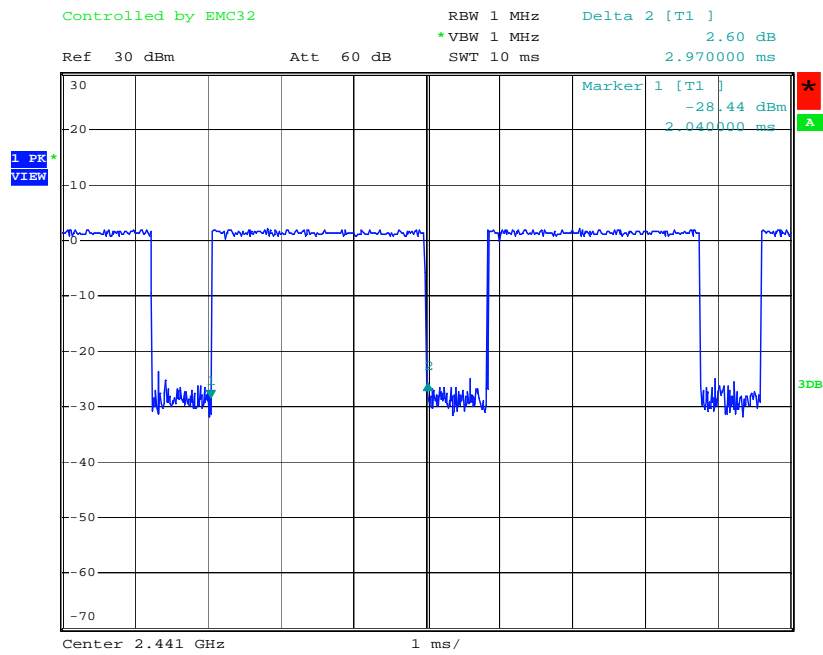
The SWEEP was then set to the time required by the regulation (0.4s x number of hopping channels employed for 2400-2483.5 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4s)

Dwell Time = $2.97 * 106$	314.82ms
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Modulation Type: 8 -DPSK

Packet: DH5

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3.8 **Band Edge**

Out of Band Conducted Emissions, FCC Rule 15.247(d):

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, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

Furthermore, delta measurement technique for measuring bandage emissions was shown as below:

(i) Lower channel 2402MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta
from the bandedge plot

$$= 99.5\text{dB}\mu\text{v/m} - 44.9\text{dB}$$

$$= 54.6\text{dB}\mu\text{v/m}$$

Average Resultant field strength = $54.6\text{dB}\mu\text{v/m} - 30.5\text{dB}$

$$= 24.1\text{dB}\mu\text{v/m}$$

(ii) Upper channel 2480MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta
from the bandedge plot

$$= 100.7\text{dB}\mu\text{v/m} - 44.0\text{dB}$$

$$= 56.7\text{dB}\mu\text{v/m}$$

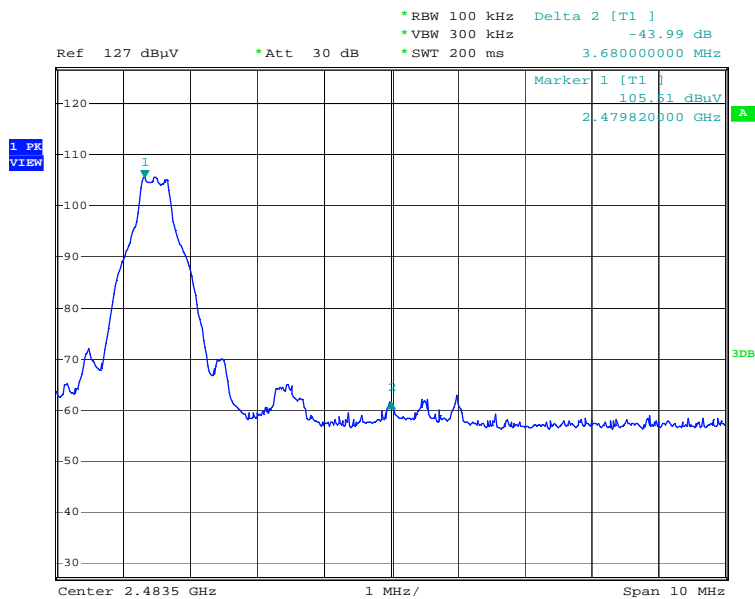
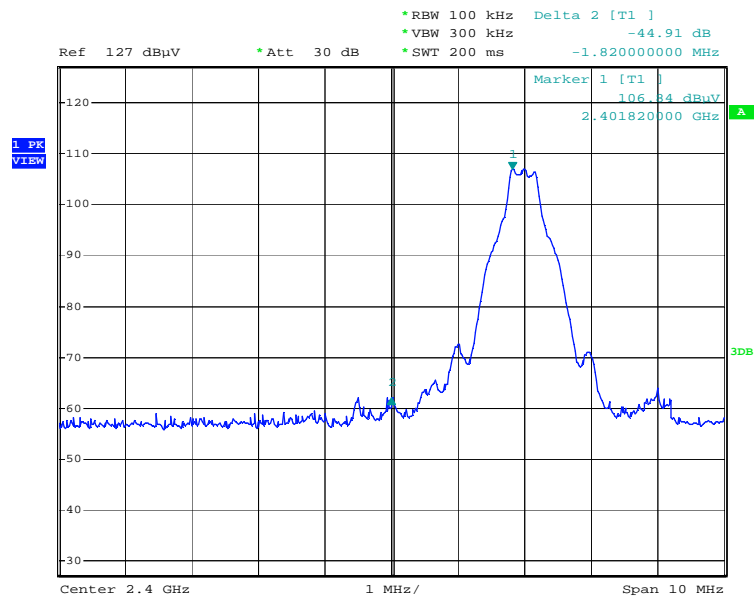
Average Resultant field strength = $56.7\text{dB}\mu\text{v/m} - 30.5\text{dB}$

$$= 26.2\text{dB}\mu\text{v/m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu\text{v/m}$ (Peak Limit) and 54dB $\mu\text{v/m}$ (Average Limit).

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Modulation Type: GFSK
Packet: DH1



3.9 Transmitter Spurious Emissions (Conducted)

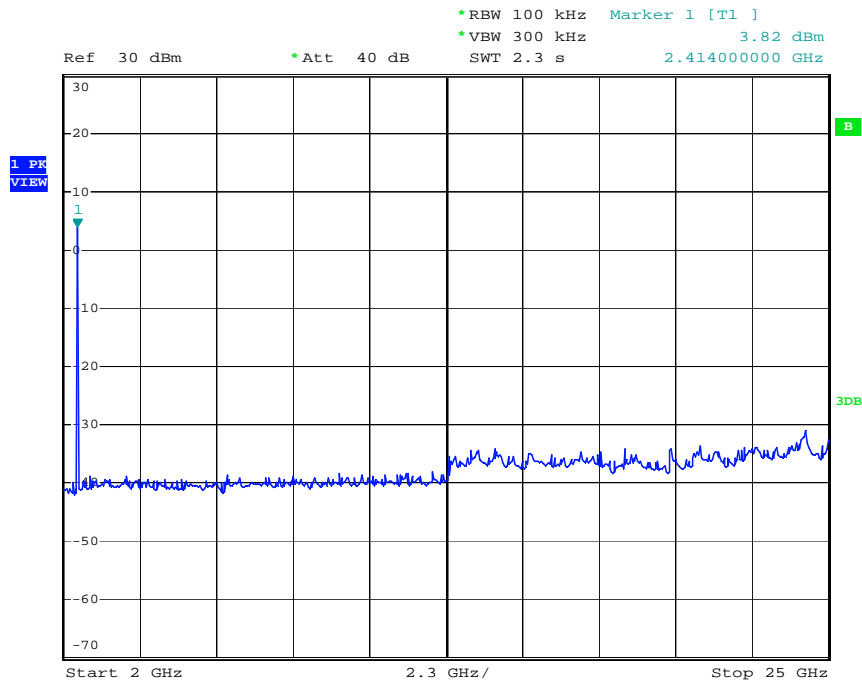
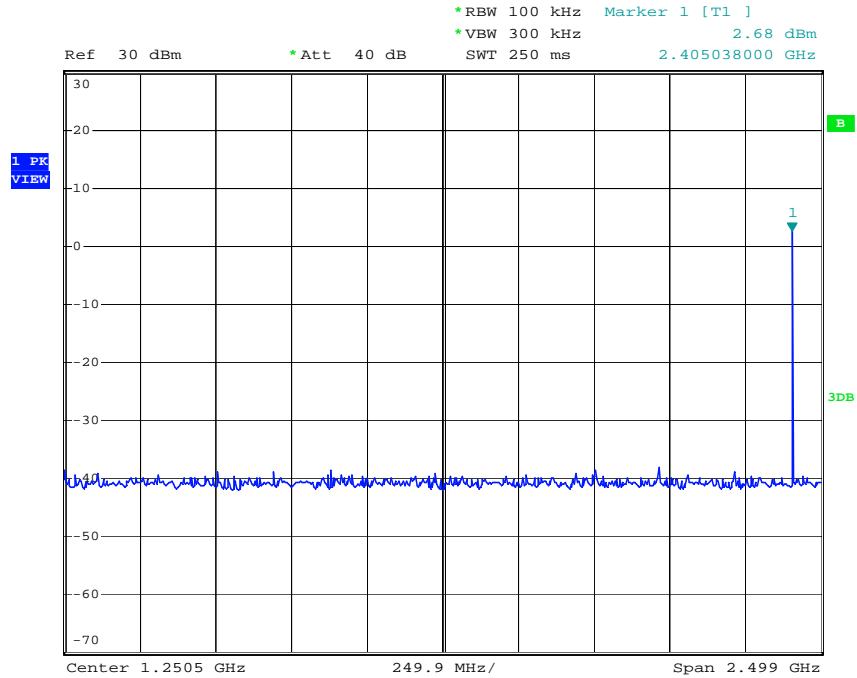
Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

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.

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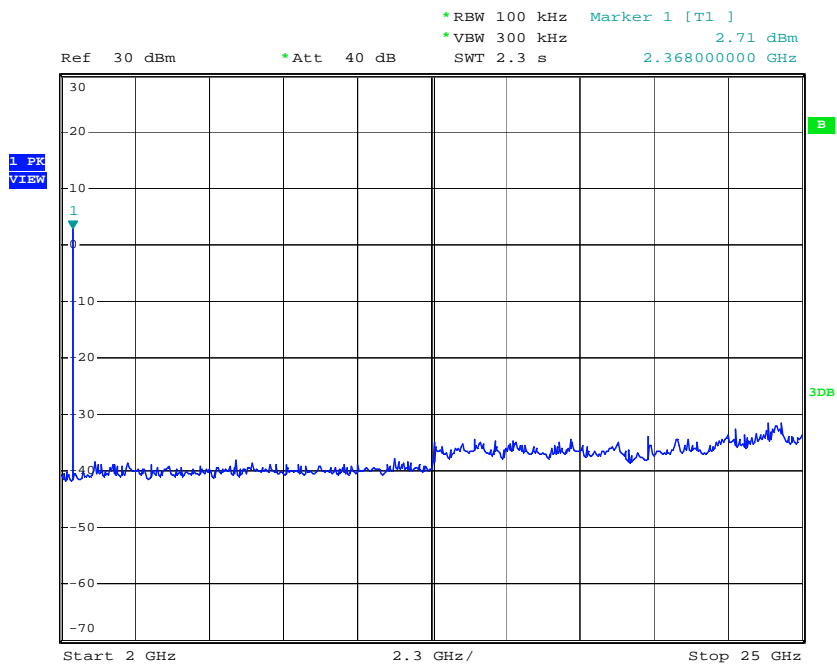
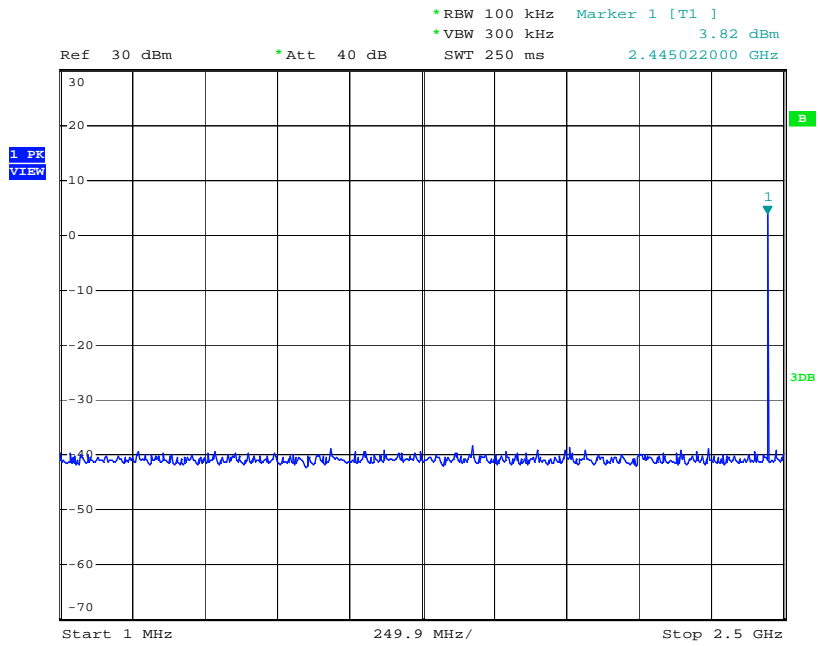
Modulation Type: GFSK
Packet: DH1

2402MHz:



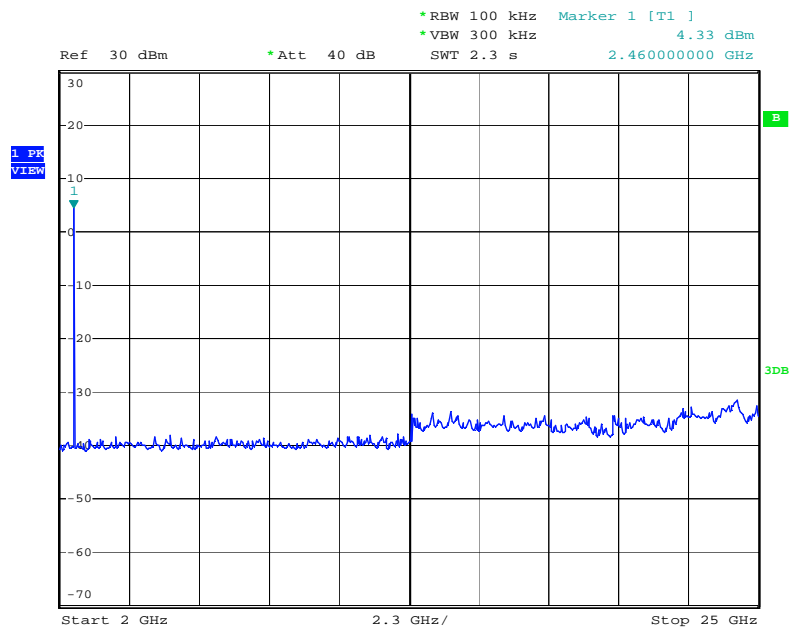
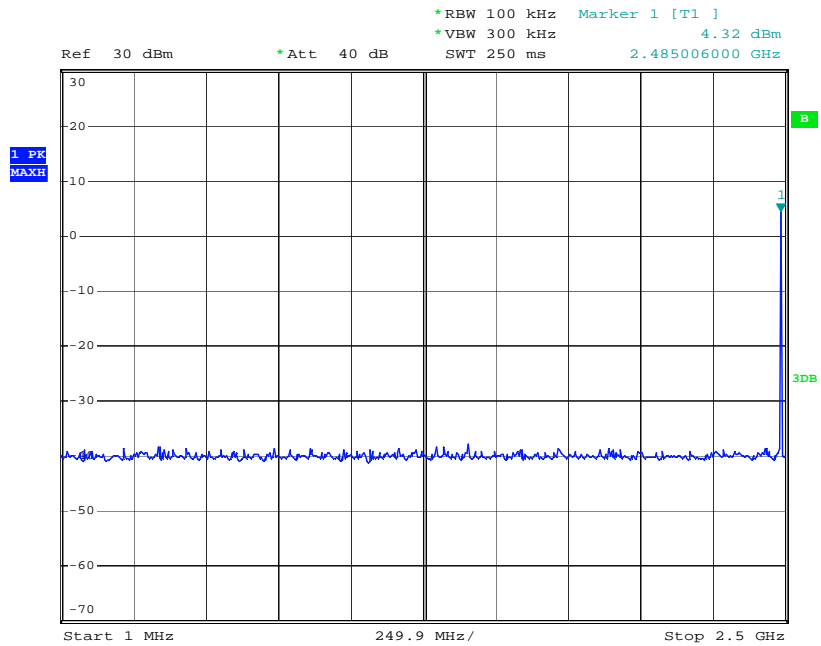
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2441MHz:



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2480MHz:



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3.10 Radio Frequency Radiation Exposure, FCC Rule 15.247(i):

The EUT is a Bluetooth Headset used in portable application, less than 20 cm from any body part of the user or near by persons.

According to the DA 00-705 and KDB 447498,

The power thresholds for source-based time-averaging Conducted output power (in the worst-case duty cycle of DH5 of 8-DPSK modulation type)
= $5.42 \times (2.97/3.79)$ dBm
= 4.25 dBm

And SAR Low Threshold Level:

$$\begin{aligned} 60/f \text{ (GHz)} &= 60/2.45 \\ &= 24.5 \text{ mW} \\ &= 13.9 \text{ dBm} \end{aligned}$$

Since 4.25dBm is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

EXHIBIT 4
EQUIPMENT PHOTOGRAPHS

4.0 **Equipment Photographs**

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

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EXHIBIT 5

PRODUCT LABELLING

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5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 **Technical Specifications**

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

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EXHIBIT 7

INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 **Miscellaneous Information**

This miscellaneous information includes details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

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8.1 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 420 μ s for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

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8.2 Transmitter Duty Cycle Calculation, FCC Rule 15.35(b, c)

Averaging factor in dB = $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with the FCC rules specifies measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

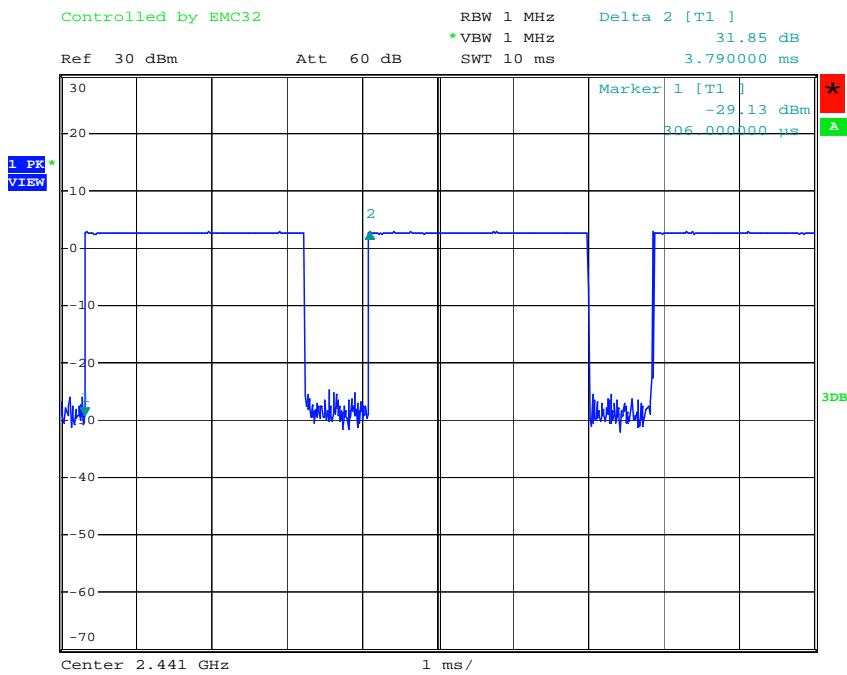
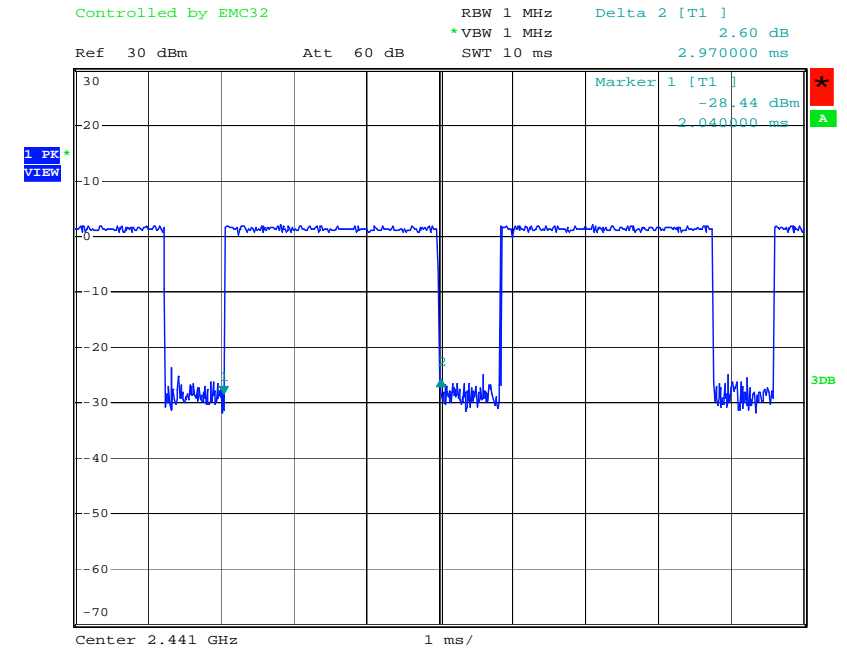
For one period for a pseudo-random hopping through all 79 RF channels, it takes: $79 \times 3.79\text{ms} = 299.41\text{ms}$.

Therefore,

$$\begin{aligned}\text{Average Factor (AF) of Bluetooth in dB} &= 20 \log_{10} (2.97/100) \text{ dB} \\ &= 20 \log_{10} (0.00297) \text{ dB} \\ &= -30.5\text{dB}\end{aligned}$$

A plot of the worst-case duty cycle of DH5 of 8 -DPSK modulation type as detected as below,

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8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is 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 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

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8.3 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

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EXHIBIT 9

TEST EQUIPMENT LIST

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9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	12-May-08	12-Nov-09
SZ185-01	EMI Receiver	R&S	ESCI	100547	18-May-09	18-May-10
SZ061-08	Horn Antenna	ETS	3115	00092346	17-Jul-08	17-Jan-10
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	19-Mar-09	19-Mar-10
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	18-Mar-09	18-Mar-10
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	25-Oct-08	25-Oct-09
SZ062-02	RF Cable	RADIAL	RG 213U	--	29-Apr-09	29-Oct-09
SZ062-06	RF Cable	RADIAL	0.04-26.5GHz	--	17-Aug-09	17-Aug-10
SZ062-01	RF Cable	MIZU	RG58/AU	2M	29-Apr-09	29-Oct-09
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	28-Nov-08	28-Nov-09
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	01-Dec-08	01-Dec-09
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	01-Dec-08	01-Dec-09
SZ188-03	Shielding Room	ETS	RFD-100	4100	15-Sep-07	15-Sep-10

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10.0 Annex

Document History

Report No.	Issue Date	Change
SZ09080054-6	October 24, 2009	Original
		<ol style="list-style-type: none">1. updated the issue date and report number.2. updated the equipment class from DXX to DSS in page ii.3. add DA 00-705 for the test method in page 3.4. updated the limit in page 11.5. updated radiated emission table in page 13, 14&15.6. updated page 21 for bandwidth plot.7. updated the conducted emission table.8. delete "4*17+11" in page 23.9. updated page 27 for the plot of channel separation.10. updated plot of the dwell time.11. updated page 36 for the RF exposure.12. update the page number in content.
SZ09080054-6R1	November 28, 2009	