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FCC LISTED,
REGISTRATION
NUMBER: 905266

TEST REPORT

Report No.: 18376RET.101

TEST NAME: FCC PART 15.247 TESTING FOR BLUETOOTH RADIO DEVICE

Product	:	Bluetooth Headset
Trade Mark	:	PrimeNet
Model/type Ref.	:	PHS12101
Manufacturer	:	PrimeNet Co., Ltd
Requested by	:	PrimeNet Co., Ltd
Other identification of the product	:	Prototype
Standard(s)	:	USA FCC Part 15.247

This test report includes 2 annexes and therefore the total number of pages is 38.

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Date: 2003-05-08	Test operator A. Llamas	Revised by: Date: 2003-05-12 A. Rojas	Approved by: Date: March 14, 2003 F. Broissin Area Director	Page: 1 of 6

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1. COMPETENCE AND GUARANTEES

Centro de Tecnología de las Comunicaciones (CETECOM), S.A. is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjuction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 905266.

In order to assure the traceability to other national and international laboratories, CETECOM has a calibration and maintenance programme for its measuring equipment.

CETECOM guarantees the reliability of the data presented in this report, which is the result of measurements and tests performed to the item under test on the date and under the conditions stated on the report and is based on the knowledge and technical facilities available at CETECOM at the time of execution of the test.

CETECOM is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the item under test and the results of the test.

2. GENERAL CONDITIONS

1. This report only refers to the item that has undergone the test.
2. This report does not constitute or imply by its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without written approval of CETECOM.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of CETECOM and the Accreditation Bodies.

3. CHARACTERISTICS OF THE TEST

3.1 TEST REQUESTED

RF measurements for frequency hopping spread spectrum equipment (Bluetooth Headset) operating in the 2400 MHz -2483.5 MHz band, according to FCC Part 15.247.

This Bluetooth Headset model PHS12101 incorporates the same RF Bluetooth module as the Bluetooth AudioGateway Dongle model PAG12101.

The radiated spurious emissions measurements (Emission limitations radiated for transmitter and radiated emission limit for receiver) for this equipment are included in separate exhibits.

3.2 REQUIREMENTS AND METHOD

The test has been carried out according to FCC parts 15.33, 15.35, 15.247 and the document DA 00-705:"Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems".

The testing was performed according to the procedure in ANSI C63.4 (1992). Conducted RF measurements are performed in a shielded room.

Radiated testing of transmitter output peak power was performed in Cetecom's semi-anechoic chamber. This site has been fully described in a report submitted to the FCC and was accepted in a letter dated July 25, 2002.

The instrumentation used to perform the conducted testing is listed below:

1. Spectrum analyzer R&S ESIB26.
2. DC power supply R&S NGPE 40/40.

The instrumentation used to perform the radiated carrier peak power measurement is listed below:

1. Double-ridge Guide Horn antenna 1-18 GHz HP 11966E.
2. EMI Test Receiver R&S ESIB26.

4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT

Identificaton data in this section has been supplied by the client.

4.1 APPLICANT

Name or Company: PrimeNet Co, Ltd.

V.A.T.: -----

Address: #602, Sungdo Bldg, 336-1, Seogyo-dong, Mapo-gu **City:** Seoul

Postal code: 121-836 **Country:** Korea

Telephone: +82 2 3142 0257 **Fax:** +82 2 3142 9794

4.2 REPRESENTATIVE

Name: Jaehee You

4.3 TEST SAMPLES SUPPLIER

Name or Company: Same as indicated in point 4.1

Samples undergoing test have been selected by: **the client.**

4.4 IDENTIFICATION OF ITEM/ITEMS TESTED

Product: Bluetooth Headset

Trade mark: PrimeNet **Model:** PHS12101

Manufacturer: PrimeNet Co., Ltd.

Country of manufacture: Korea

Manufacture site: Data not available

Description: Primenet's Headset is a highly integrated Bluetooth Application which consist of two main Bluetooth ICs (PCF87750E-V3B and BGB100) from Philips Semiconductor, system 13MHz X-Tal, one low drop-out voltage regulator, 1chip dual pnp transistor and clear sound, sensitive microphone audio interface circuit.

Primenet headset weight is 22.6g .The baseband controller (PCF87750E-V3B), which is based on powerful 32-bit ARM7TDMI RISC core, has built-in Bluetooth core logic, audio CODEC, internal flash memory (MTP), SRAM and so on.

5. USAGE OF SAMPLES, PERIOD OF TESTING AND ENVIRONMENTAL CONDITIONS

5.1 USAGE OF SAMPLES

Sample M/01 is formed by the following elements:

Control No.	Description	Model	Serial No.	Date of reception
18376/06	Bluetooth Headset with antenna connector	PHS12101	Prototype	27/03/03

Sample M/02 is formed by the following elements:

Control No.	Description	Model	Serial No.	Date of reception
18376/11	Bluetooth Headset with integral antenna	PHS12101	Prototype	02/04/03

1. Sample M/01 has undergone following test(s).

   All tests indicated in annex A, except radiated carrier output peak power.

2. Sample M/02 has undergone following test(s).

   Radiated carrier output peak power.

5.2 PERIOD OF TESTING

The performed test started on 2003-03-27 and finished on the 2003-04-03.

The tests as detailed in this report have been performed at CETECOM.

5.3 ENVIROMENTAL CONDITIONS

In the chamber for conducted measurements the following limits were no exceeded during the test:

Temperature	Min. = 21 ºC Max. = 22 ºC
Relative humidity	Min. = 49 % Max. = 50 %
Air pressure	Min. = 1009 mbar Max. = 1010 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

6. TEST RESULTS

Abbreviations used in the VERDICT column of the following tables are:

P Pass

F Fail

NA not applicable

NM not measured

FCC PART 15 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.247 Subclause (a) (1). 20 dB Bandwidth and Carrier frequency separation		P		
15.247 Subclause (a) (1) (iii). Number of hopping channels		P		
15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)		P		
15.247 Subclause (b). Maximum peak output power and antenna gain		P		
15.247 Subclause (c). Band-edge of conducted emissions (Transmitter)		P		
15.247 Subclause (c). Emission limitations conducted (Transmitter)		P		
15.247 Subclause (c). Emission limitations radiated (Transmitter)				NM[1]
15.207. Conducted limits	NA			
15.109. Radiated emission limits for receiver				NM[1]

1: See point 7: "Remarks and comments."

7. REMARKS AND COMMENTS

1: Test not requested (see point 3.1. "Test requested").

8. SUMMARY

Based on the results of the performed test, stated in annex A the item under test is **IN COMPLIANCE** with the specifications listed in section 3.1 “TEST REQUESTED”.

NOTE: The results presented in this Test Report apply only to the particular item under test declared in section 4.4 “IDENTIFICATION OF ITEM/ITEMS TESTED” of this document, as presented for test on the date(s) declared in section 5, “USAGE OF SAMPLES, PERIOD OF TESTING AND ENVIRONMENTAL CONDITIONS”.

ANNEX A
TEST RESULTS

Report No: 18376RET.101

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 4.2 Vdc

Type of power supply = Rechargable battery

Type of antenna = Integral antenna (patch antenna)

Declared maximum antenna gain: 1.8 dBi

Operating Temperature Range (ºC):

T_n = +0 to + 45

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2441 MHz

Highest channel: 2480 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.4-1992.

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is directly connected to the spectrum analyzer via the antenna connector (sma type) provided with the test sample. No coaxial low-loss connecting cable was necessary for such connection so no cable attenuation correction was made.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determing compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

Section 15.247 Subclause (a) (1). 20 dB Bandwidth and Carrier frequency separation

SPECIFICATION

Frequency hopping system shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

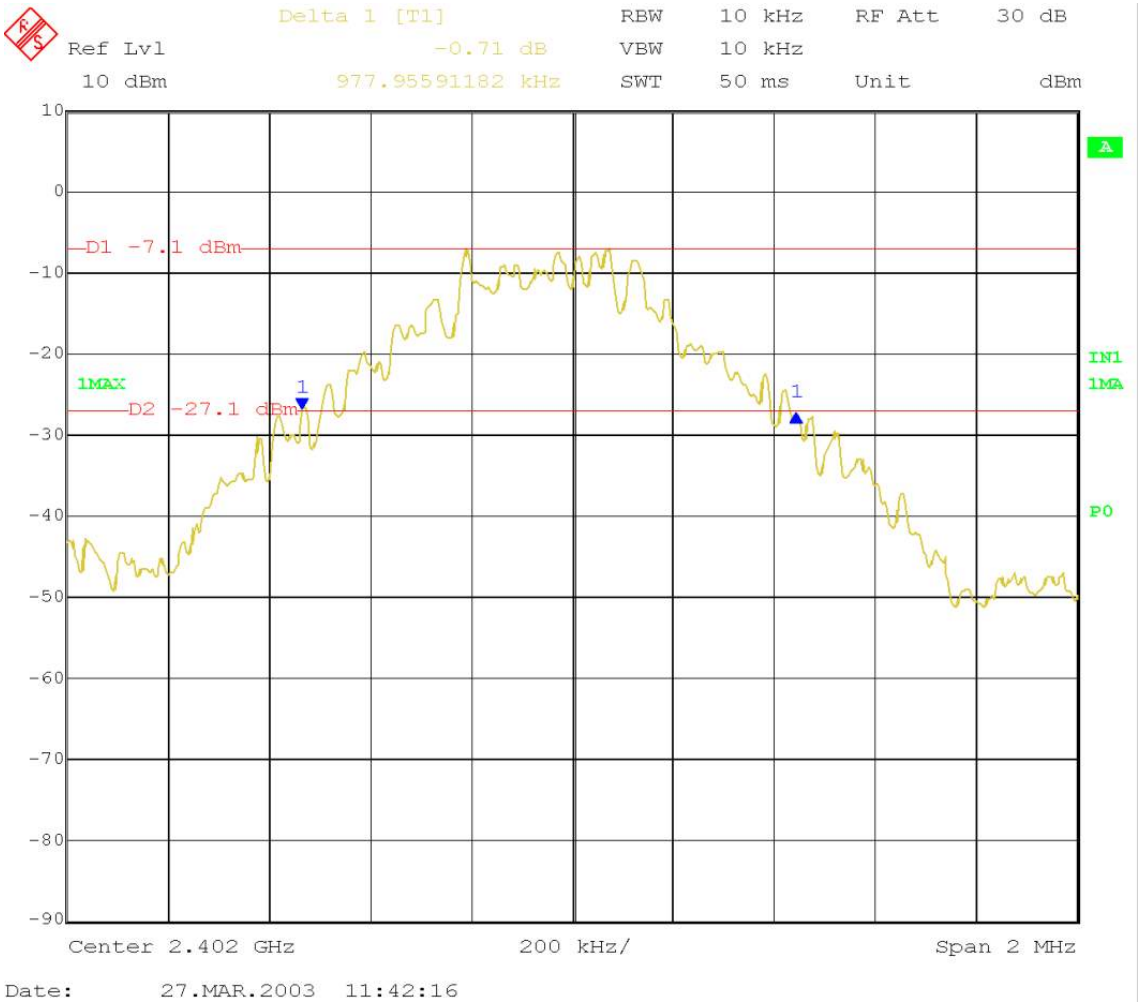
RESULTS

20 dB Bandwidth (see next 3 plots).

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
20 dB Spectrum bandwidth (kHz)	977.96	965.93	969.94
Measurement uncertainty (kHz)	±11		

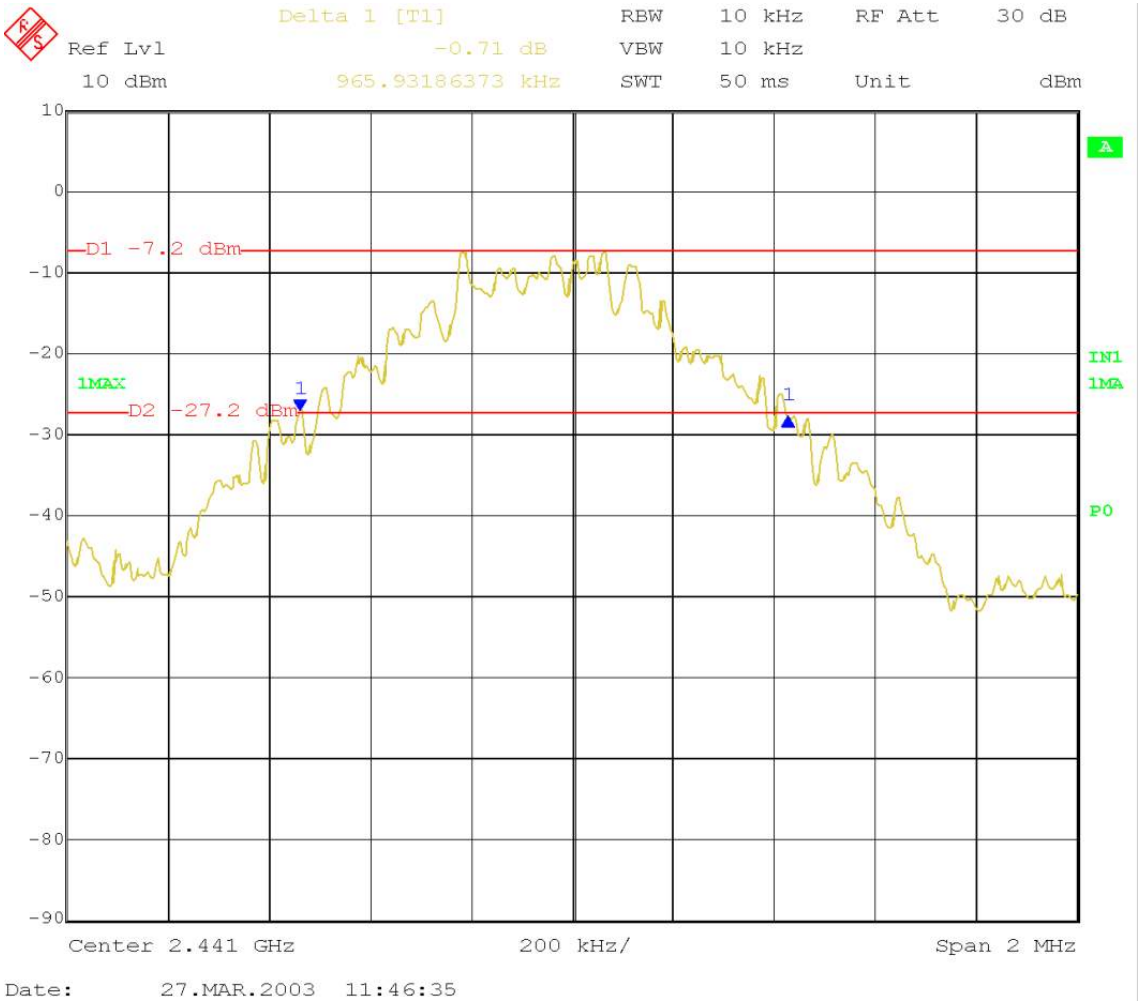
20 dB BANDWIDTH.

Lowest Channel: 2402 MHz.



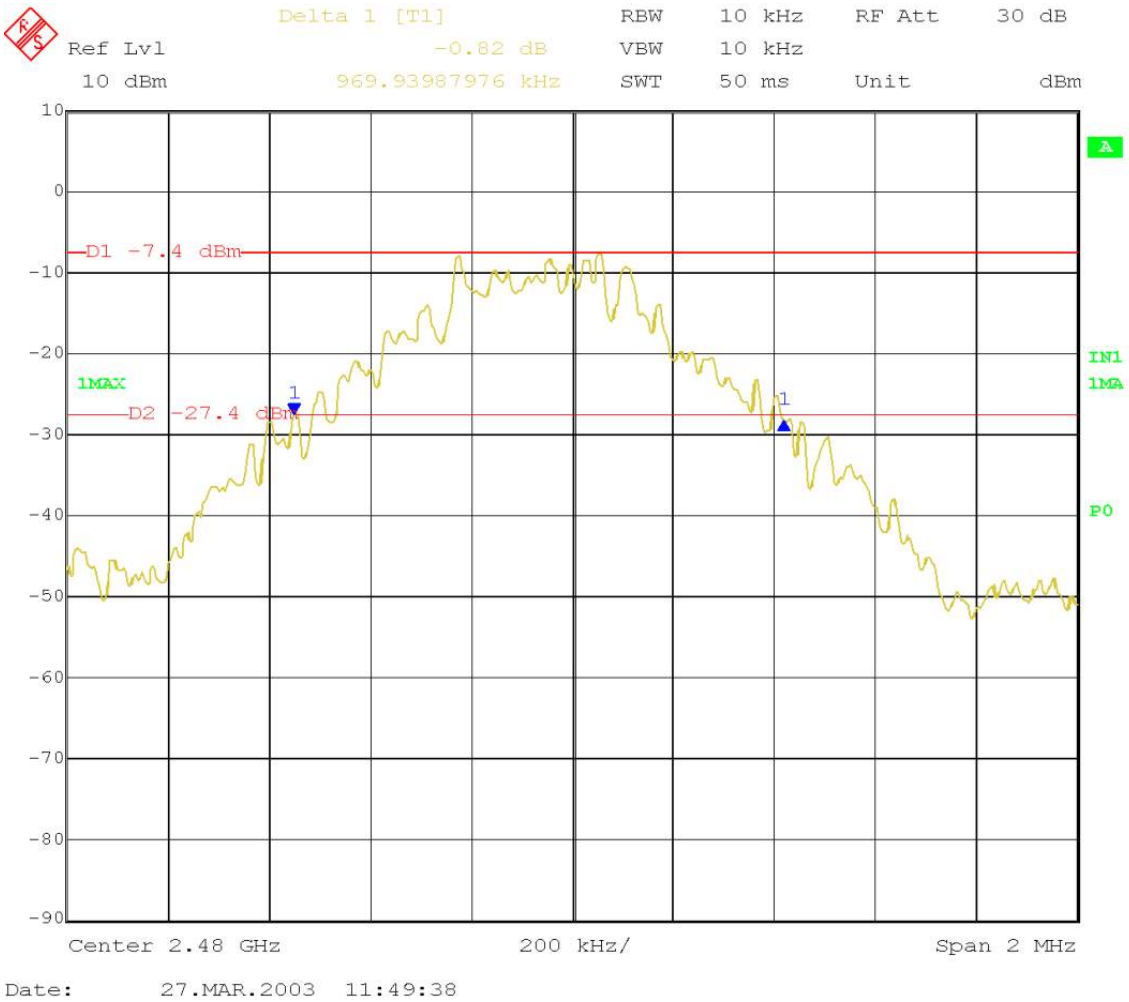
20 dB BANDWIDTH.

Middle Channel: 2441 MHz.

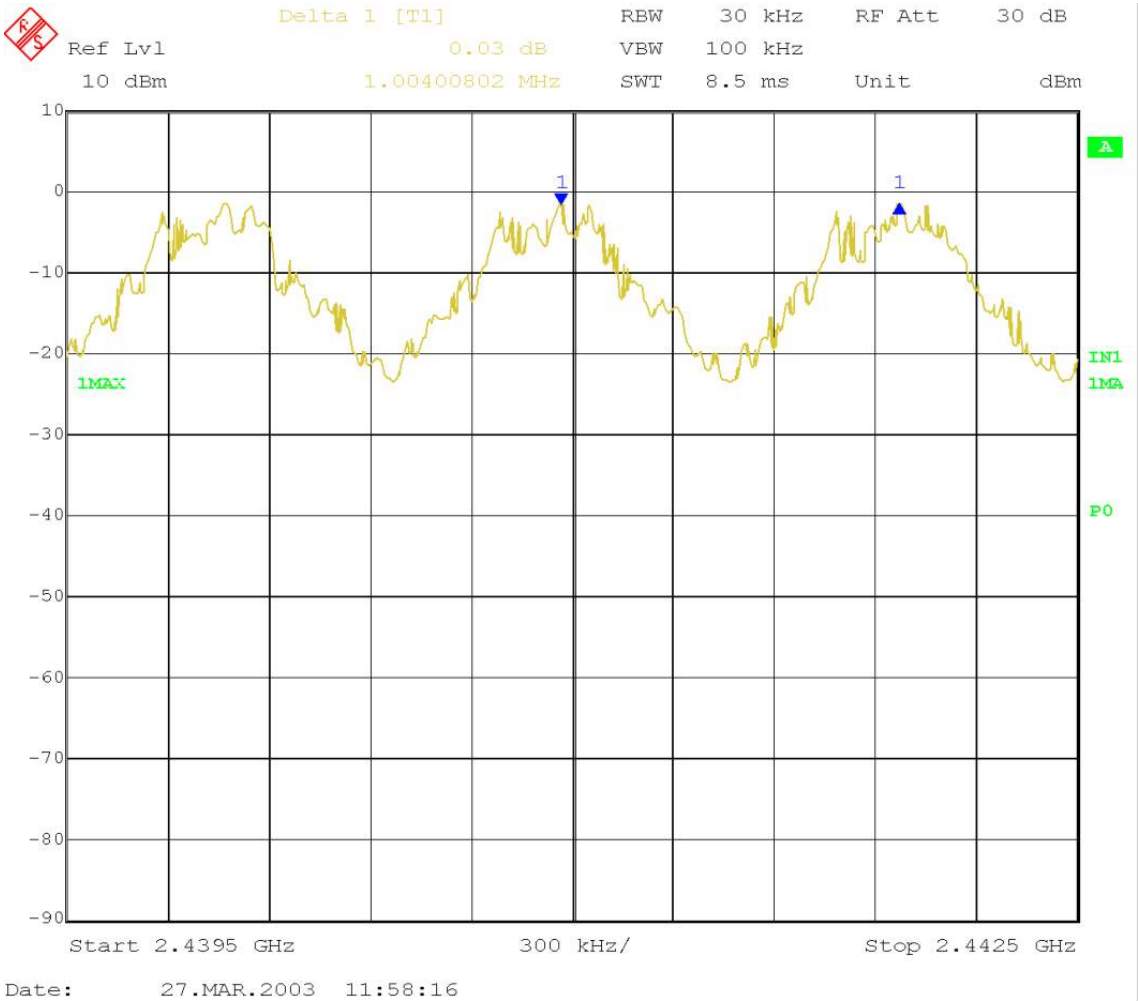


20 dB BANDWIDTH.

Highest Channel: 2480 MHz.



Carrier frequency separation (see next plot).



The hopping channel carrier frequencies are separated by a minimum of the 20 dB bandwidth of the hopping channel.

Verdict: PASS

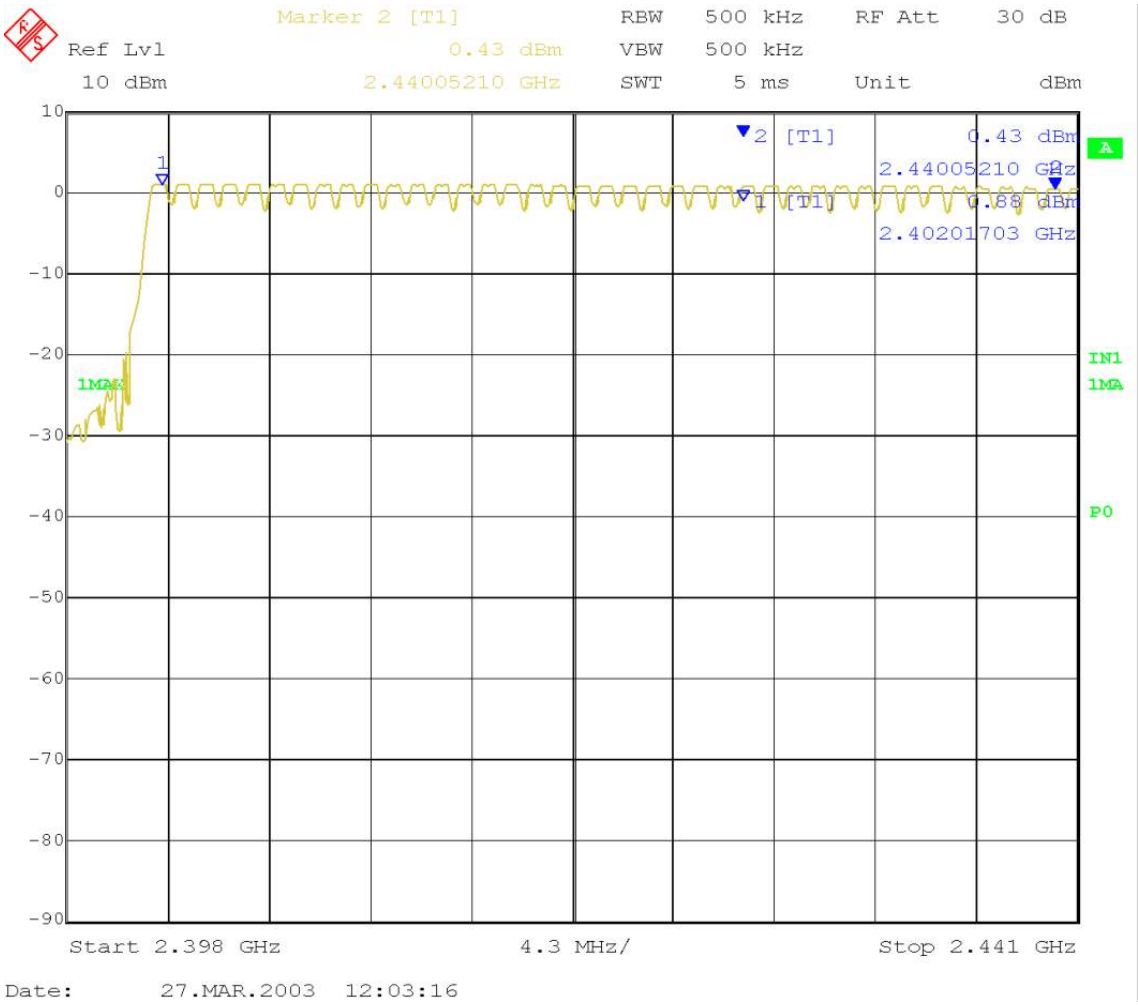
Section 15.247 Subclause (a) (1) (iii). Number of hopping channels

SPECIFICATION

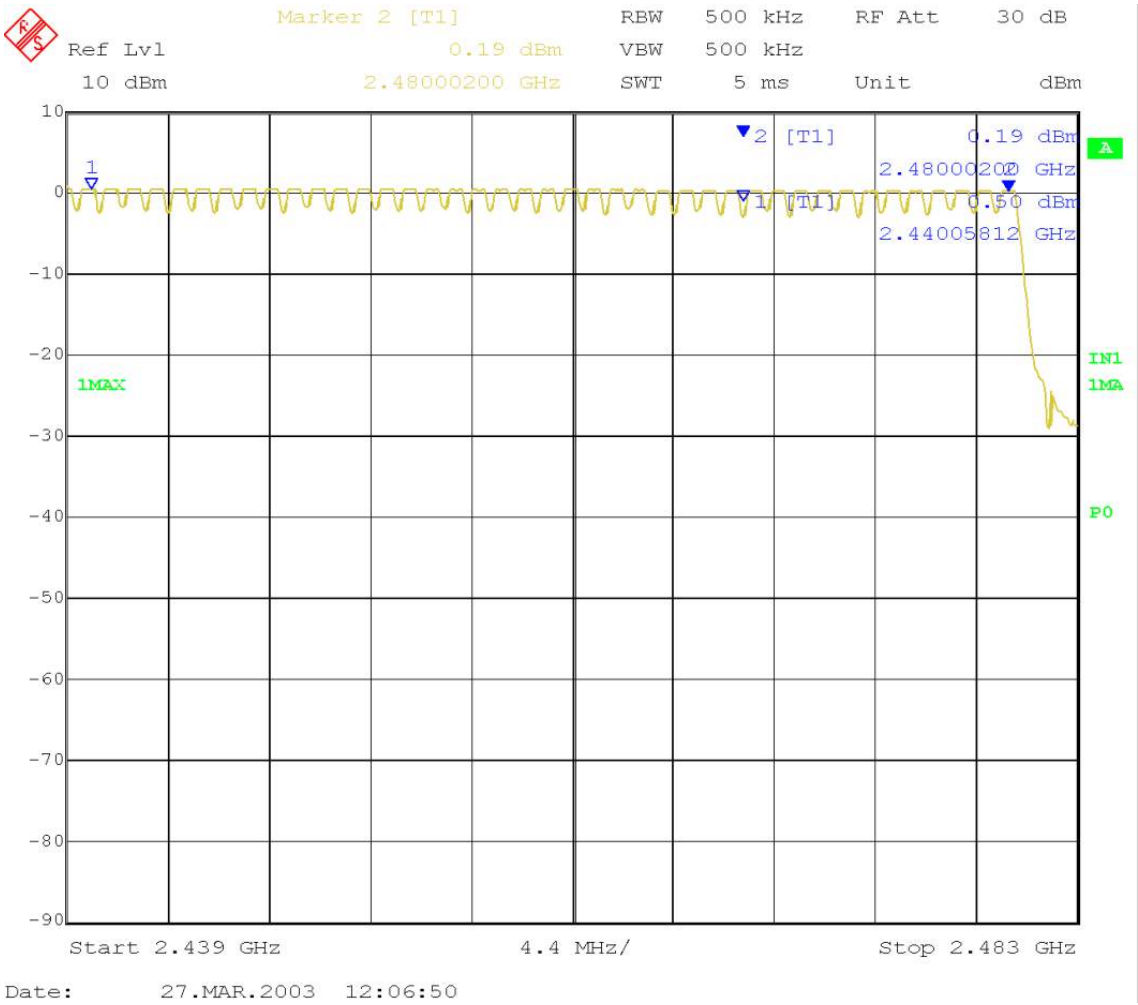
Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels.

RESULTS

The number of hopping channels is 79 (see next two plots).



Number of hopping frequencies: 39



Number of hopping frequencies: 40

Total number of hopping frequencies: 79

Verdict: PASS

Section 15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)

SPECIFICATION

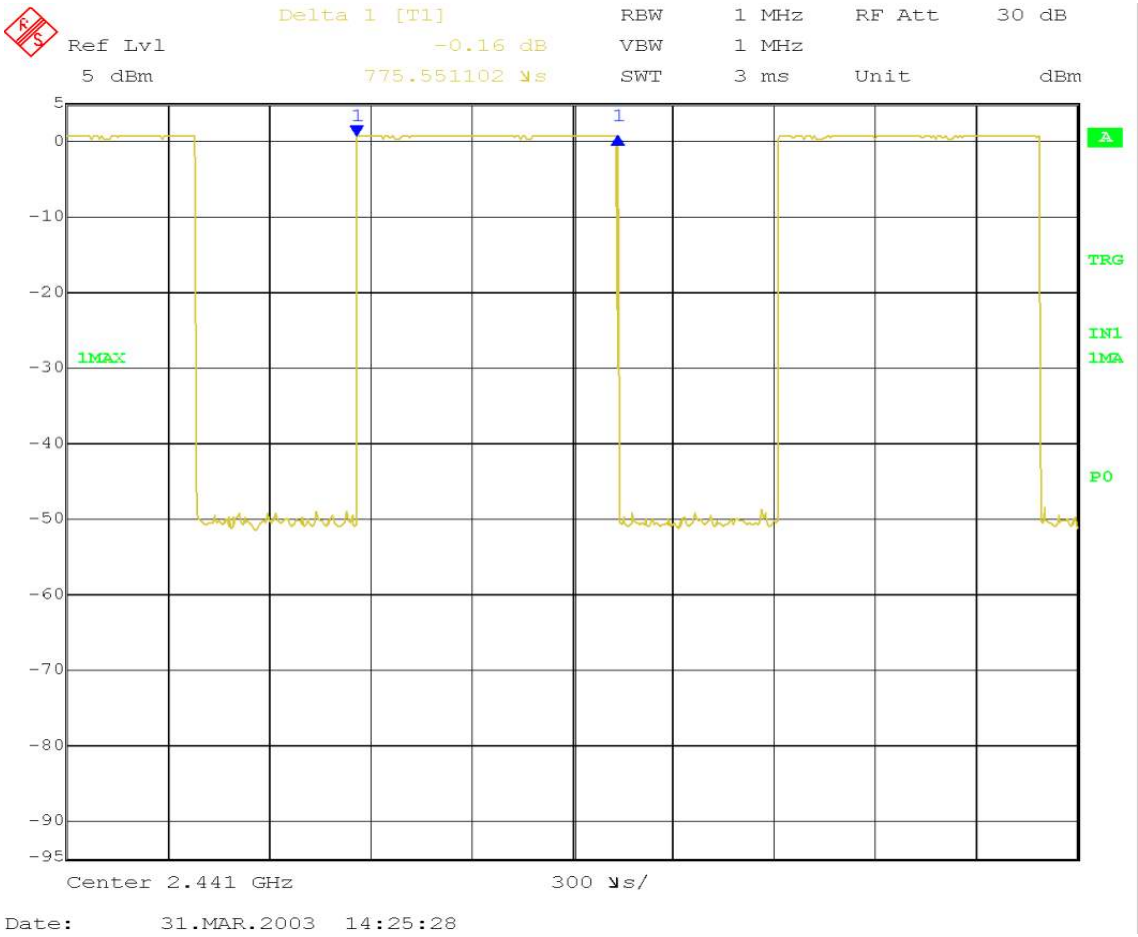
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400 ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed = 0.4 x 79= 31.6 seconds.

RESULTS

The equipment only supports 1 slot packet (DH1).

1. TIME OF OCCUPANCY (DWELL TIME) FOR PACKET TYPE DH1.

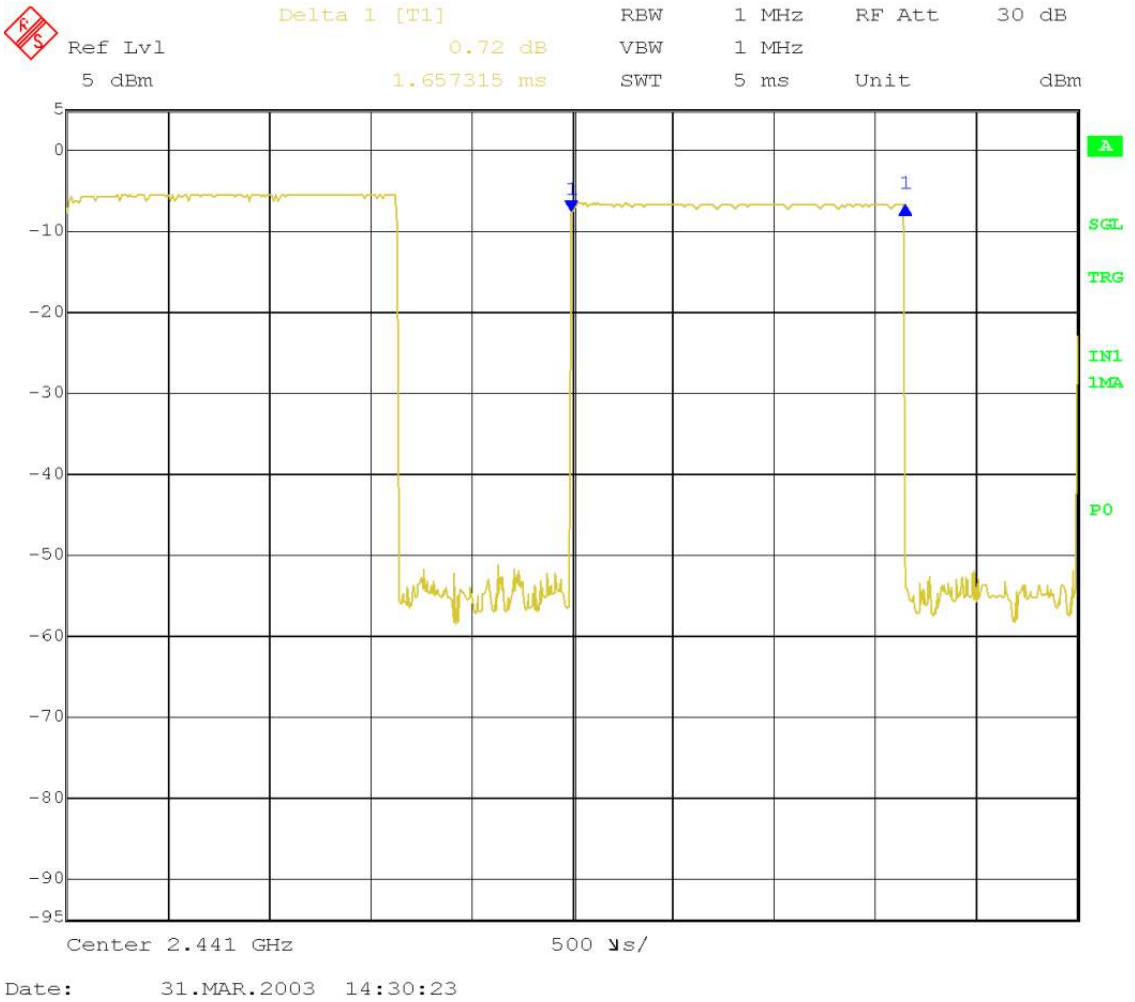
The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. So you have each channel 800/79 = 10.13 times per second and so for a period of 0.4 x 79 = 31.6 seconds you have 10.13 x 31.6 = 320.11 times of appearence .
Each Tx-time per appearence is 775.5 µs (see next plot).
So we have 320.11 x 775.5 µs = 248.24 ms per 31.6 seconds.



Verdict: PASS

2. TIME OF OCCUPANCY (DWELL TIME) FOR PACKET TYPE DH3.

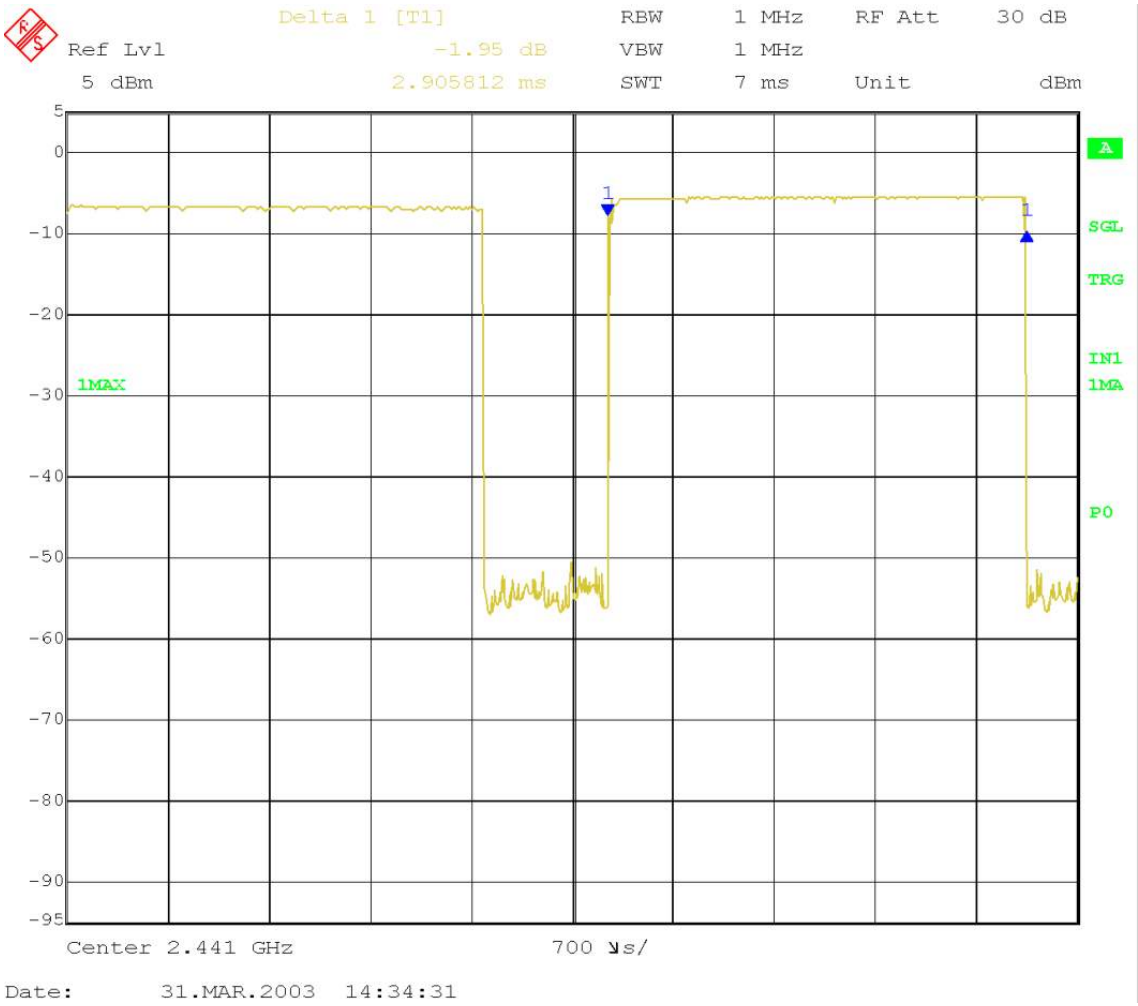
A DH3 Packet need 3 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/4 = 400 hops per second with 79 channels. So you have each channel 400/79 = 5.1 times per second and so for a period of 0.4 x 79 = 31.6 seconds you have 5.1 x 31.6 = 161.16 times of appearence .
Each Tx-time per appearence is 1.66 ms (see next plot).
So we have 161.16 x 1.66 ms = 267.53 ms per 31.6 seconds.



Verdict: PASS

3. TIME OF OCCUPANCY (DWELL TIME) FOR PACKET TYPE DH5.

A DH5 Packet need 5 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/6 = 266.67 hops per second with 79 channels. So you have each channel 266.67/79 = 3.37 times per second and so for a period of 0.4 x 79 = 31.6 seconds you have 3.37 x 31.6 = 106.49 times of appearence .
Each Tx-time per appearence is 2.91 ms (see next plot).
So we have 106.49 x 2.91 ms = 309.88 ms per 31.6 seconds.



Verdict: PASS

Section 15.247 Subclause (b). Maximum peak output power and antenna gain

SPECIFICATION

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm).

RESULTS

MAXIMUM PEAK OUTPUT POWER (CONDUCTED). See next plots.

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
Maximum peak power (dBm)	1.21	0.78	0.53
Measurement uncertainty (dB)	±1.5		

The maximum declared antenna gain for this device is 1.8 dBi, therefore the maximum theoretical peak radiated power (EIRP) in the three measurement channels for this device is 3.01 dBm or 2 mW.

The actual peak rediated power (EIRP) was measured for the lowest, middle and highest frequency (see next plots):

MAXIMUM PEAK OUTPUT POWER (RADIATED).

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
Instrument reading (dBm)	-37.41	-38.01	-39.01
Correction Factor (dB)	34.96	35.10	35.24
Maximum EIRP peak power (dBm)	-2.45	-2.91	-3.77
Measurement uncertainty (dB)	+1.98 / -1.75		

The antenna is integrated in the class 2 surface Bluetooth module.

Declared peak gain: 1.8 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Verdict: PASS