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Report On

FCC Testing of the Beijing Choice Electronic Company Co., Ltd
Bluetooth Pulse Oximeter MD300C318
In accordance with FCC CFR 47 Part 15 Part C

COMMERCIAL-IN-CONFIDENCE

FCC ID: WWIMD300C318

Document 57008073 Report 01 Issue 1

April 2009





Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC CFR 47 Parts 15 C: 2008 Testing of the
Beijing Choice Electronic Company Co., Ltd
Bluetooth Pulse Oximeter MD300C318

Document 57008073 Report 01 Issue 1

April 09

PREPARED FOR

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PREPARED BY

ZHANG Xiaoying
Project Engineer

APPROVED BY

ZHANG Changxin
Project manager

DATED

24 April 2009

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Part 15. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

C Zhang

X Zhang



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SECTION 1

REPORT SUMMARY

FCC Testing of the Beijing Choice Electronic Company Co., Ltd
Bluetooth Pulse Oximeter MD300C318 in accordance with FCC CFR 47 Part 15C



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Beijing Choice Electronic Company Co., Ltd Bluetooth Pulse Oximeter MD300C318 to the requirements of FCC CFR 47 Part 15C: 2008.

Testing was carried out in support of an application for Grant of Equipment Authorisation of Bluetooth Pulse Oximeter MD300C318.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Beijing Choice Electronic Company Co., Ltd
Model Number(s)	Bluetooth Pulse Oximeter MD300C318
Serial Number(s)	Engineering sample
Antenna Gain	2dBi
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C: 2008
Incoming Release Date	Declaration of Build Status 08 February 2009
Start of Test	17 February 2009
Finish of Test	26 February 2009
Name of Engineer(s)	C Zhang X Zhang
Related Document(s)	FCC CFR 47 Part 15:2008 ANSI C63.4:2003



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15: 2008.

Configuration - Bluetooth Pulse Oximeter						
Section	FCC Clause	Test Description	Mode	Mod State	Result	Comments
2.1	15.247(b)(1)	Maximum Peak Output Power (Conducted)	2402 MHz	0	Pass	-
			2441 MHz	0	Pass	
			2480 MHz	0	Pass	
2.2	15.247(b)(1)	Maximum Peak Output Power (Radiated)	2402 MHz	0	Pass	-
			2441 MHz	0	Pass	
			2480 MHz	0	Pass	
2.3	15.247(a)(1)	20dB Bandwidth	2402 MHz	0	Pass	-
			2441 MHz	0	Pass	
			2480 MHz	0	Pass	
2.4	15.205,15.247(d)	Band Edge Compliance	2402 MHz	0	Pass	-
			2480 MHz	0	Pass	
2.4	15.247(d)	Spurious Conducted Emissions on Antenna Port	2402 MHz	0	Pass	-
			2441 MHz	0	Pass	
			2480 MHz	0	Pass	
2.6	15.209,15.247(d)	Radiated Spurious Emissions	2402 MHz	0	Pass	-
			2441 MHz	0	Pass	
			2480 MHz	0	Pass	
2.7	15.247(a) (1)(iii)	Channel Dwell Time – DH1	Hopping	0	Pass	-
2.8	15.247(a) (1)(iii)	Channel Dwell Time – DH3	Hopping	0	Pass	-
2.9	15.247(a) (1)(iii)	Channel Dwell Time – DH5	Hopping	0	Pass	-
2.10	15.247(a)(1)	Channel Separation	Hopping	0	Pass	-
2.11	15.247(a)(1)(iii)	Number of Hopping Channels	Hopping	0	Pass	-
2.12	15.207	Conducted Emissions on Power Line			N/A	-
			2441 MHz	0	Pass	
					N/A	

N/A – Not Applicable



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1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Bluetooth Pulse Oximeter
MANUFACTURER	Beijing Choice Electronic Company Co., Ltd
TYPE	MD300C318
PART NUMBER	--
SERIAL NUMBER	Engineering sample
HARDWARE VERSION	--
SOFTWARE VERSION	--
TRANSMITTER OPERATING RANGE	2400-2483.5MHz
RECEIVER OPERATING RANGE	2400-2483.5MHz
COUNTRY OF ORIGIN	P.R. CHINA
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	1M00F1D
HIGHEST INTERNALLY GENERATED FREQUENCY	2480MHz (Channel 78)
OUTPUT POWER (mW or dBm)	2.51mW / 4dBm
FCC ID	WWIMD300C318
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	MD300C318 is a Bluetooth Pulse Oximeter

Signature

Chen Lei

Date

20 April 2009

D of B S Serial No

57008073

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) MD300C318 is a Beijing Choice Electronic Company Co., Ltd Bluetooth Pulse Oximeter as shown below. A full technical description can be found in the Manufacturers documentation.



Equipment Under Test



1.4.2 Test Configuration

Configuration 1: 1Mbps Data Rate,

The EUT was configured in accordance with FCC CFR 47 Part 15: 2008.

Configuration 2: 3Mbps Data Rate,

The EUT was configured in accordance with FCC CFR 47 Part 15: 2008.

1.4.3 Modes of Operation

Operation Modes

Mode 1 – 2402 MHz (Bottom Channel)

Mode 2 – 2441 MHz (Middle Channel)

Mode 3 – 2480 MHz (Top Channel)

Mode 4 – Frequency hopping

Mode 5 – Idle

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

**1.5 TEST CONDITIONS**

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification State	Description of Modification fitted to EUT	Sample S/N
0	Initial sample supplied by customer	Engineering sample

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

The testing was conducted at following site registrations:

FCC Accreditation

910917 The State Radio Monitoring Center, No.80 Beilishi Road Xicheng District Beijing, China.



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SECTION 2

TEST DETAILS

FCC Testing of the Beijing Choice Electronic Company Co., Ltd
Bluetooth Pulse Oximeter MD300C318 in accordance with FCC CFR 47 Part 15C



Product Service

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(b)(1)

2.1.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.1.3 Date of Test and Modification State

18, 19 February 2009 – Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The EUT was connected to the spectrum analyzer via an RF cable. The path loss of the cable was measured and entered as an offset. The peak level was recorded and compared with the test limits.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration1 - Mode 1
- Mode 2
- Mode 3

Configuration2 - Mode 1
- Mode 2
- Mode 3

2.1.6 Environmental Conditions

	18 February 2009	19 February 2009
Ambient Temperature	23.2°C	23.3°C
Relative Humidity	24.1%	24.4%



2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Maximum Peak Output Power - Conducted.

The test results are shown below.

Configuration 1 - Mode 1, 2 & 3

Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (mW)
2402	1.0	5.21	3.32
2441	1.0	6.20	4.17
2480	1.0	6.14	4.11

Configuration 2 - Mode 1, 2 & 3

Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (mW)
2402	1.0	3.14	2.06
2441	1.0	3.99	2.51
2480	1.0	3.76	2.38

Limit	≤1000mW or ≤30dBm
-------	-------------------

Remarks

The EUT does not exceed 1000mW or 30dBm at the measured frequencies.



Product Service

2.2 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.2.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(b)(1)

2.2.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.2.3 Date of Test and Modification State

25 February 2009 – Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

Configuration 2 - Mode 1
- Mode 2
- Mode 3

2.2.6 Environmental Conditions

	25 February 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%



2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 Maximum Peak Output Power - Radiated.

The test results are shown below.

Configuration 1 - Mode 1, 2 & 3

Frequency (MHz)	EIRP Result (dBm)	Limit (dBm)	EIRP Result (mW)	Limit (mW)
2402	5.19	20.97	3.30	1000
2441	4.43	20.97	2.77	1000
2480	4.63	20.97	2.90	1000

Configuration 2 - Mode 1, 2 & 3

Frequency (MHz)	EIRP Result (dBm)	Limit (dBm)	EIRP Result (mW)	Limit (mW)
2402	3.53	20.97	2.25	1000
2441	3.94	20.97	2.48	1000
2480	4.68	20.97	2.94	1000

Limit	≤1000mW or ≤30dBm
-------	-------------------

Remarks

The EUT does not exceed 1000mW or 30dBm at the measured frequencies.



Product Service

2.3 20DB BANDWIDTH

2.3.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)

2.3.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.3.3 Date of Test and Modification State

18 and 19 February 2009 – Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

Configuration 2 - Mode 1
 - Mode 2
 - Mode 3

2.3.6 Environmental Conditions

	18 February 2009	19 February 2009
Ambient Temperature	23.2°C	23.3°C
Relative Humidity	24.1%	24.4%



2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Occupied Bandwidth.

Configuration 1 - Mode 1, 2 & 3

Frequency (MHz)	Data Rate (Mbps)	20dB bandwidth (MHz)
2402	DH5	0.8
2441	DH5	0.8
2480	DH5	0.8

Configuration 2 - Mode 1, 2 & 3

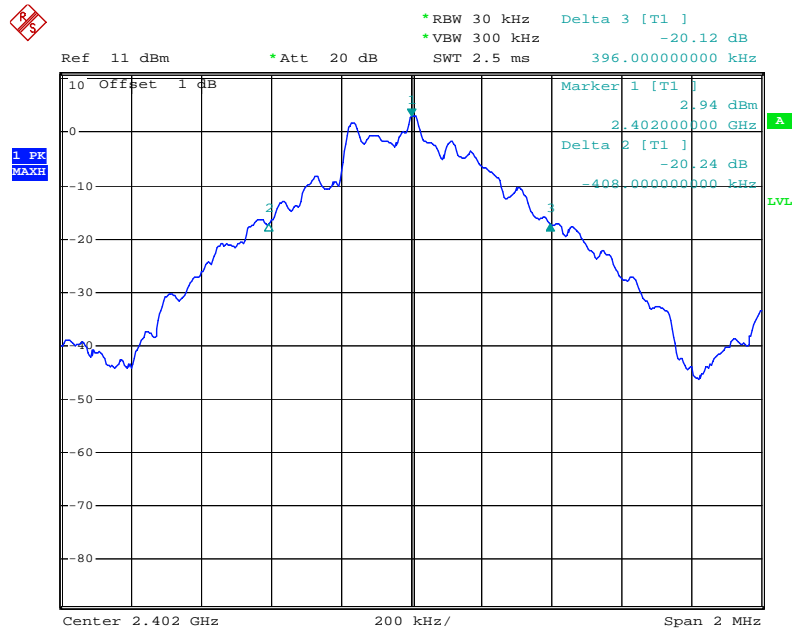
Frequency (MHz)	Data Rate (Mbps)	20dB bandwidth (MHz)
2402	DH5	1.3
2441	DH5	1.3
2480	DH5	1.3



Product Service

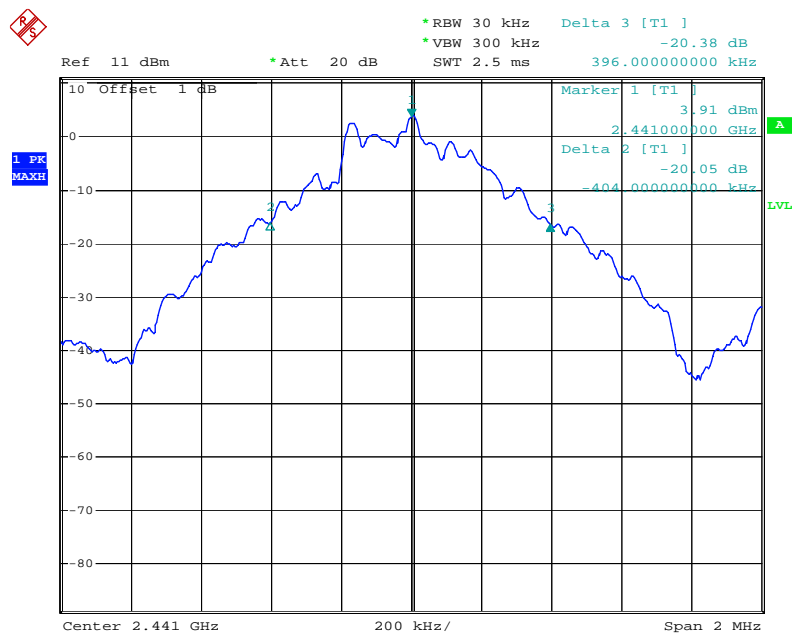
The plots of test results are shown below.

Configuration 1 - Mode 1



Date: 18.FEB.2009 15:29:56

Configuration 1 – Mode 2

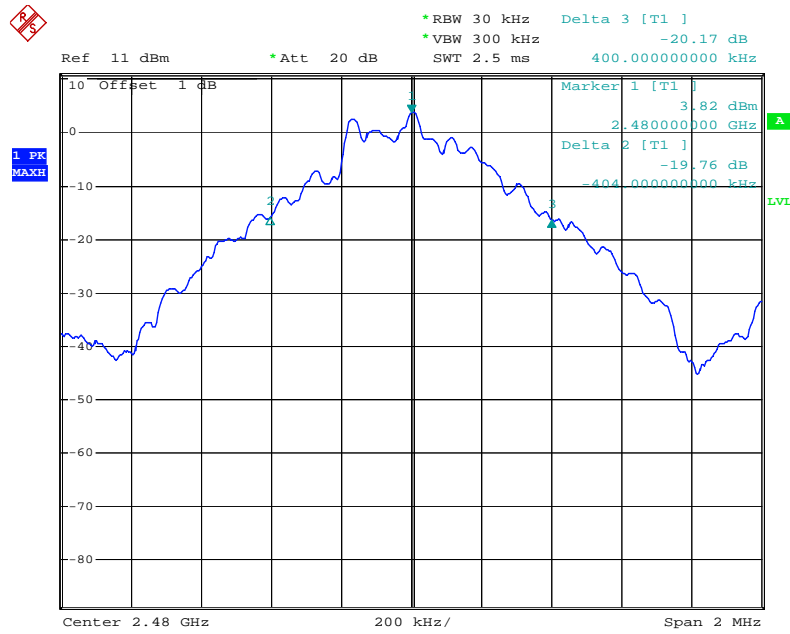


Date: 18.FEB.2009 15:29:16



Product Service

Configuration 1 – Mode 3

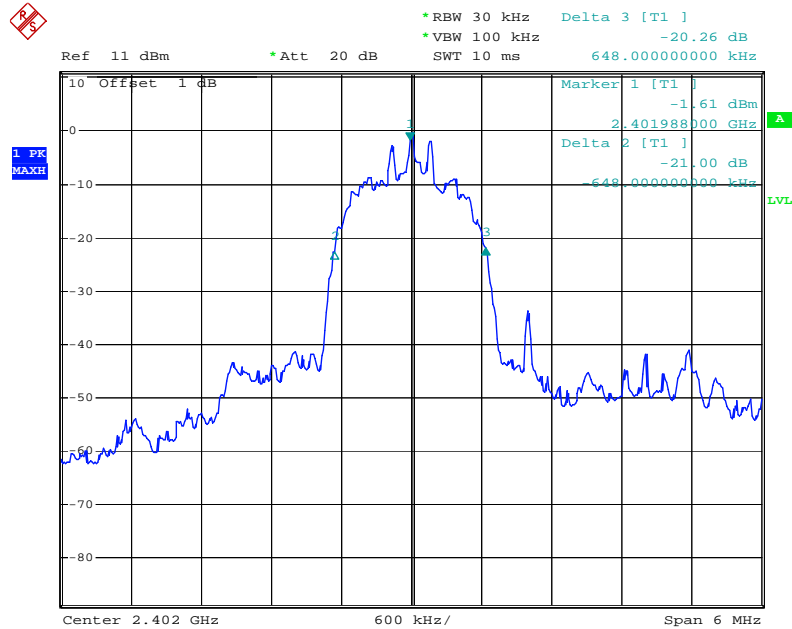


Date: 18.FEB.2009 15:28:16



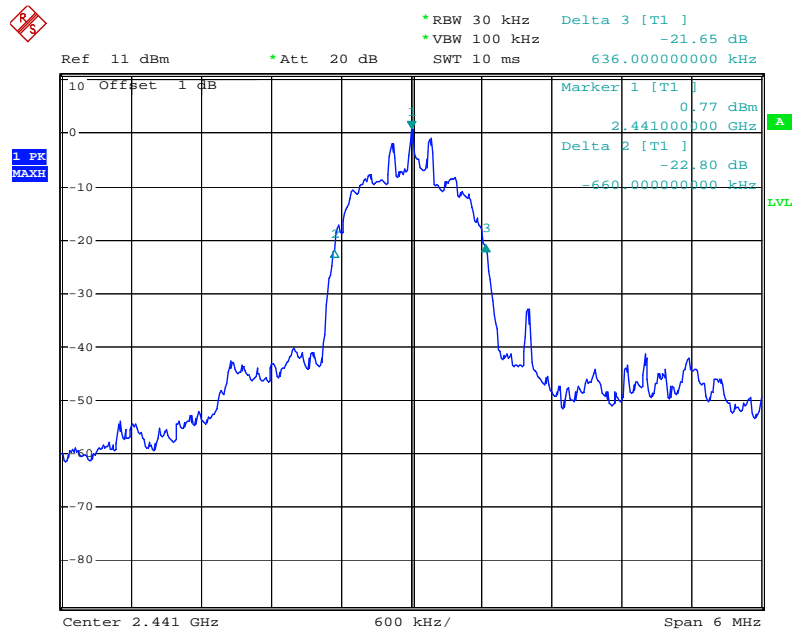
Product Service

Configuration 2 - Mode 1

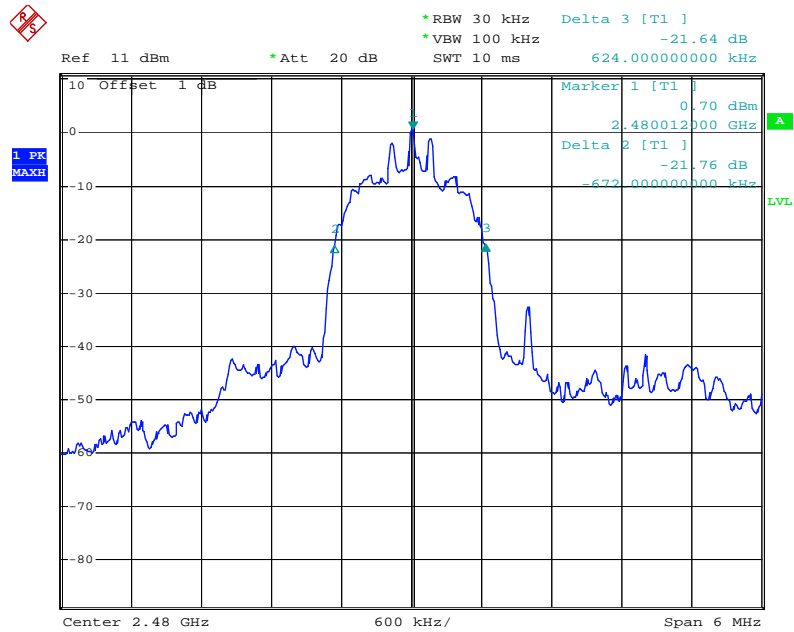


Date: 19.FEB.2009 09:15:14

Configuration 2 - Mode 2



Date: 19.FEB.2009 09:14:48

Configuration 2 – Mode 3

Date: 19.FEB.2009 09:14:09



Product Service

2.4 BAND EDGE COMPLIANCE

2.4.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.205, 15.247(d)

2.4.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.4.3 Date of Test and Modification State

19 February 2009 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The EUT was transmitted at maximum power to the Spectrum Analyser. The Analyser settings were adjusted to display the resluted trace on screen. The peak point of the trace was measured and the markers positioned to give the -20dBc points of the displayed sprectrum.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 3

Configuration 2 - Mode 1
- Mode 3

2.4.6 Environmental Conditions

19 February 2009

Ambient Temperature 23.3°C

Relative Humidity 24.4%

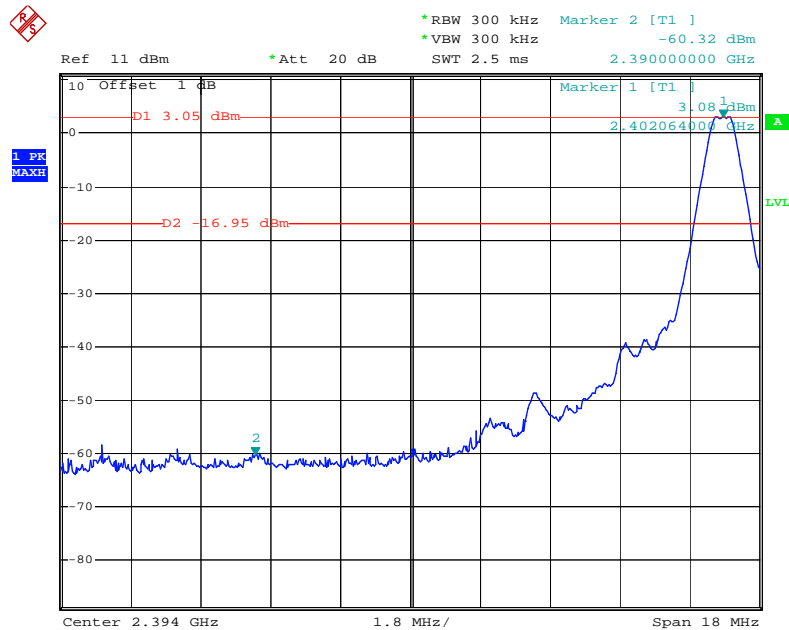


2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Band Edge Compliance.

The plots of test results are shown below.

Configuration 1 - Mode 1

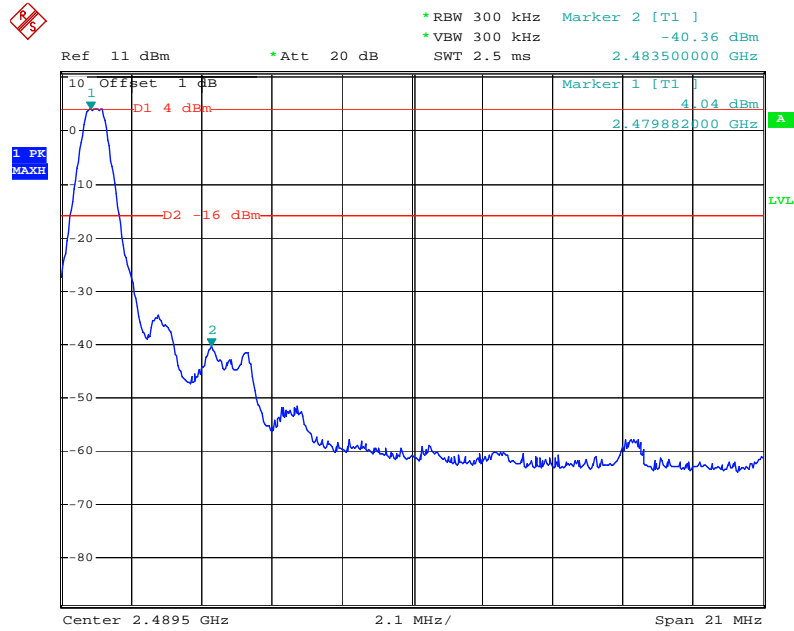


Date: 19.FEB.2009 09:32:02



Product Service

Configuration 1 - Mode 3

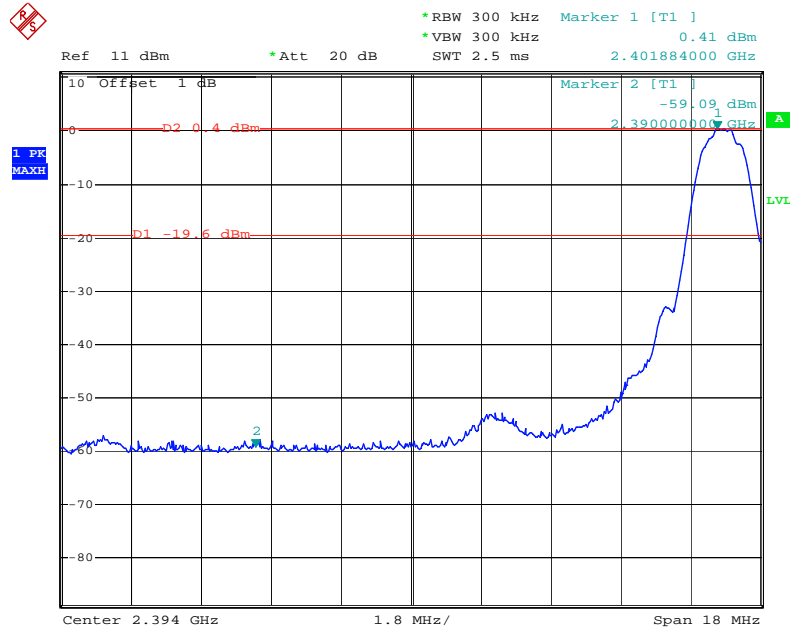


Date: 19.FEB.2009 09:34:15



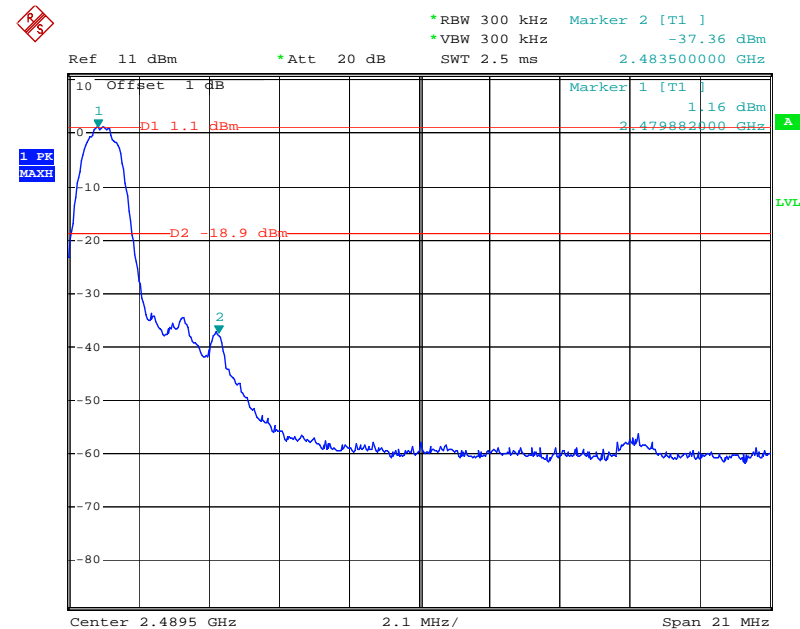
Product Service

Configuration 2 - Mode 1



Date: 19.FEB.2009 09:30:00

Configuration 2 - Mode 3



Date: 19.FEB.2009 09:35:33



Product Service

2.5 SPURIOUS CONDUCTED EMISSIONS ON ANTENNA PORT

2.5.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(d)

2.5.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.5.3 Date of Test and Modification State

18 February 2009 – Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

In accordance with Part 15.247(d), the Spurious Conducted Emissions from the antenna terminal were measured. The frequency spectrum investigated from 9kHz to 25 GHz. The EUT was set to transmit on full power. The spectrum analyser detector was set to Max Hold.

With the EUT transmitting at maximum power, the Spectrum Analyser was set to Max Hold and the fundamental peak measured in a RBW and VBW of 1MHz. The level was used to determine the limit line as displayed on the plots of -20dBc.

The maximum path loss across each measurement band was used as the reference level offset to ensure worst case results.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

Configuration 2 - Mode 1
 - Mode 2
 - Mode 3

2.5.6 Environmental Conditions

18 February 2009

Ambient Temperature 23.2°C

Relative Humidity 24.1%



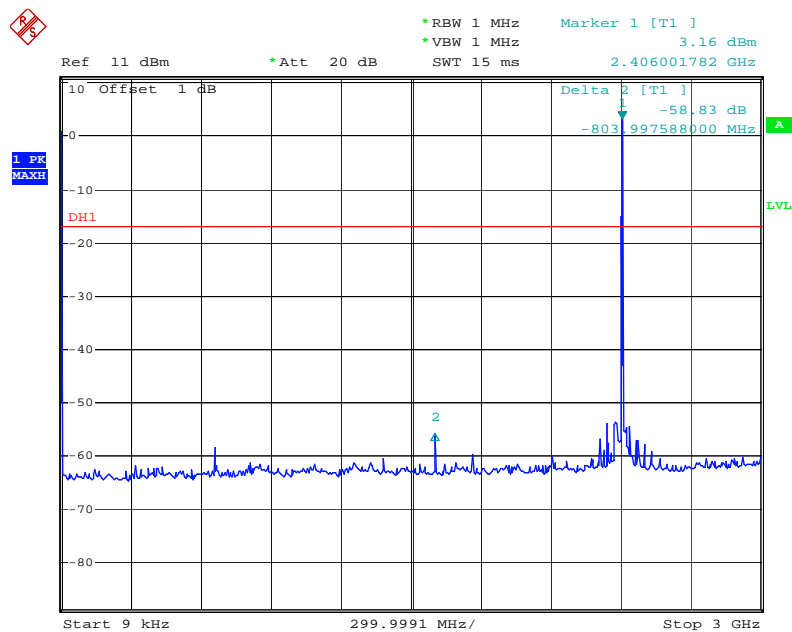
2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Spurious Conducted Emissions on Antenna Port.

The plots of test results are shown below.

Configuration 1 - Mode 1

9kHz – 3GHz

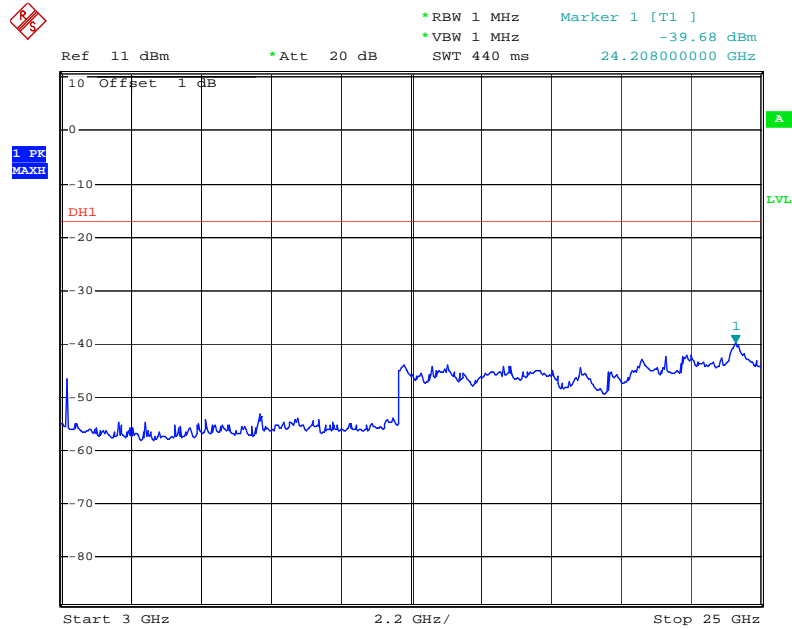


Date: 18.FEB.2009 16:14:43

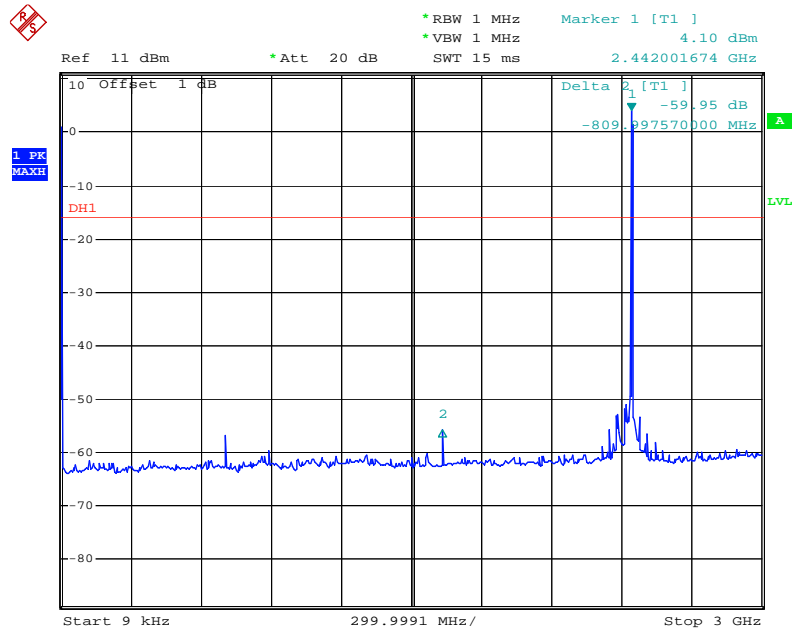


Product Service

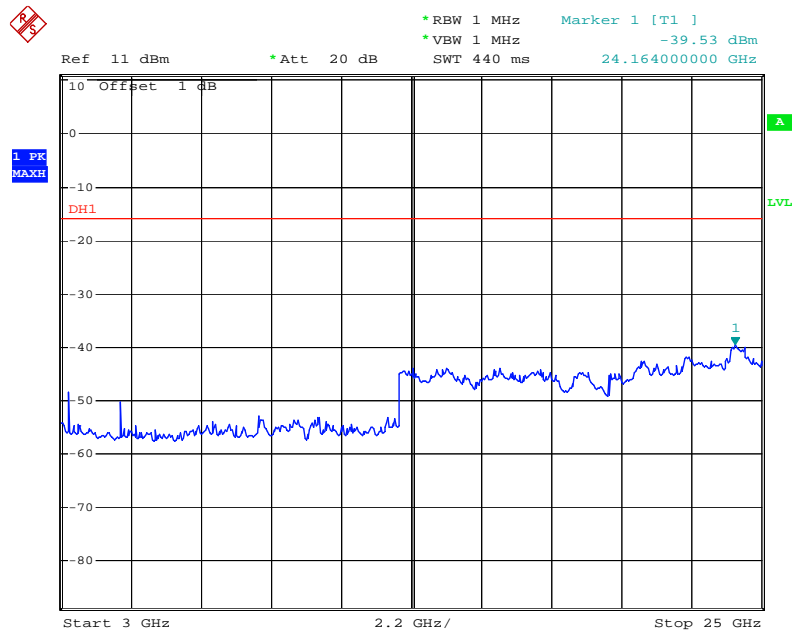
3GHz – 25GHz



Date: 18.FEB.2009 16:15:03

Configuration 1 - Mode 29kHz – 3GHz

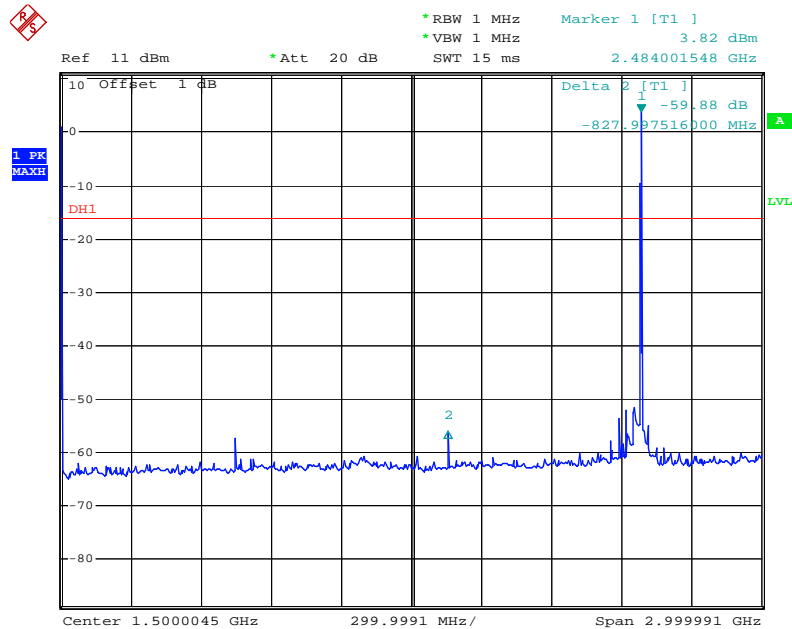
Date: 18.FEB.2009 16:13:01

3GHz – 25GHz

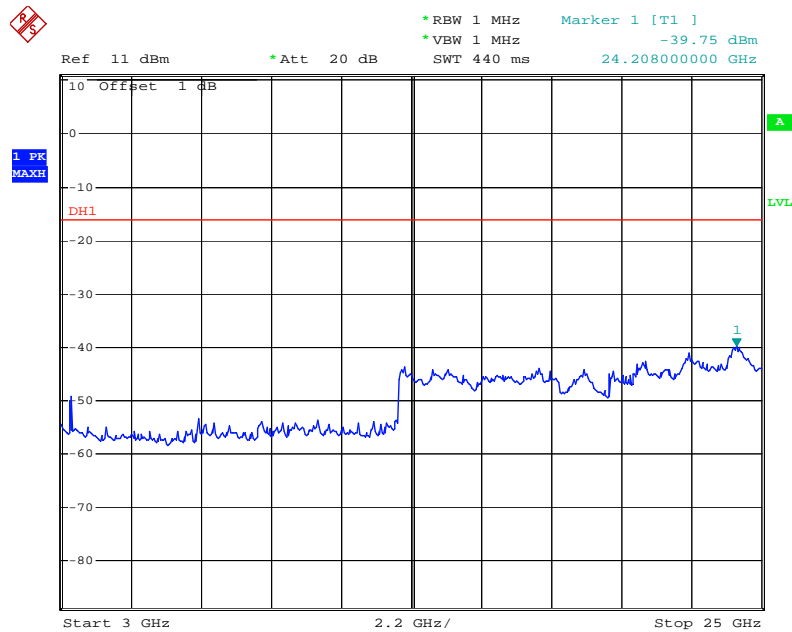
Date: 18.FEB.2009 16:13:37



Product Service

Configuration 1 - Mode 39kHz – 3GHz

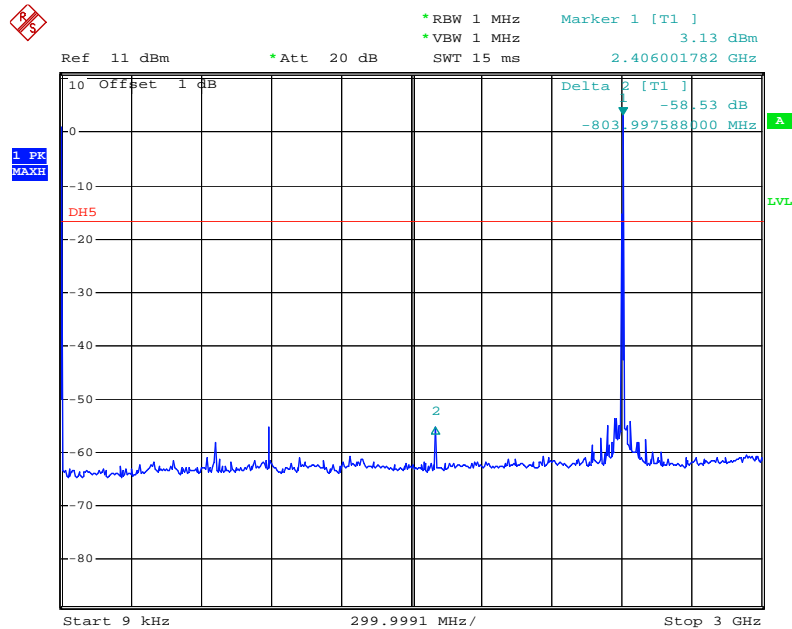
Date: 18.FEB.2009 16:16:34

3GHz – 25GHz

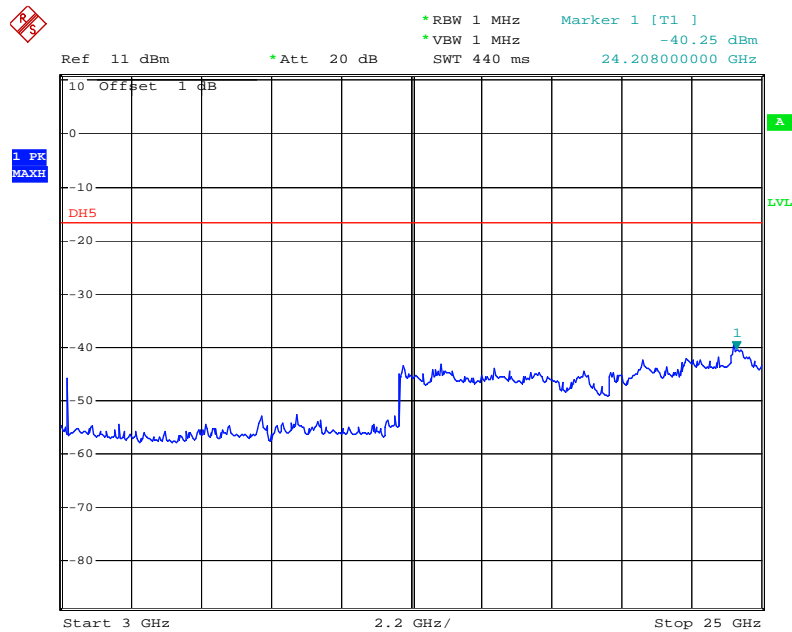
Date: 18.FEB.2009 16:16:59



Product Service

Configuration 2 - Mode 19kHz – 3GHz

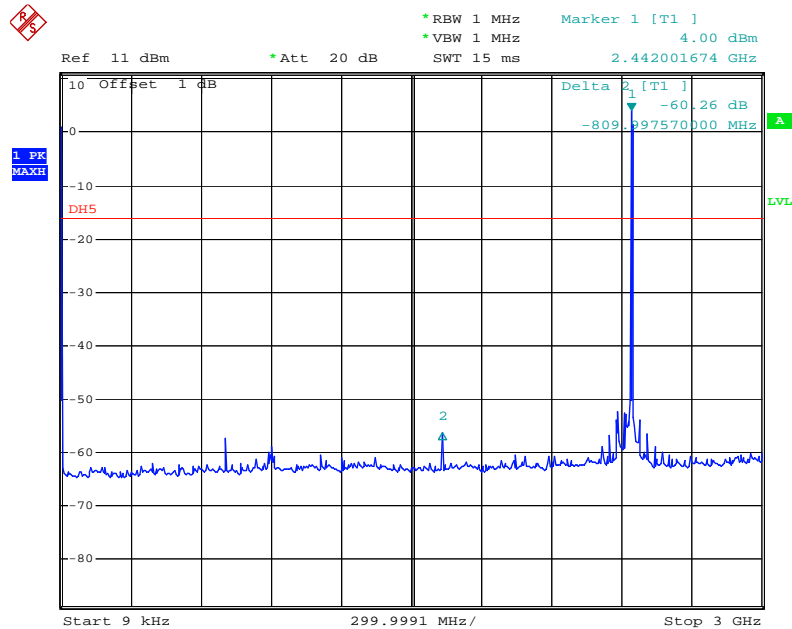
Date: 18.FEB.2009 16:22:55

3GHz – 25GHz

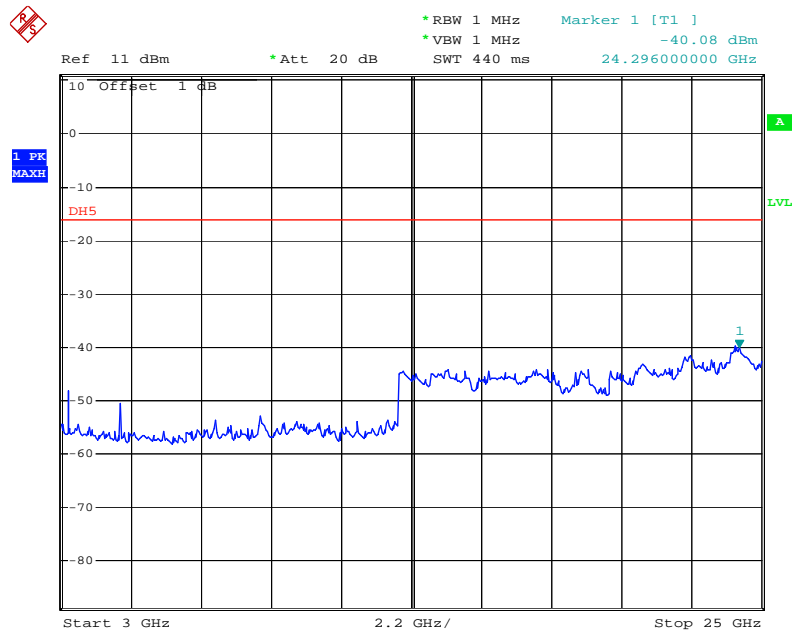
Date: 18.FEB.2009 16:23:20



Product Service

Configuration 2 – Mode 29kHz – 3GHz

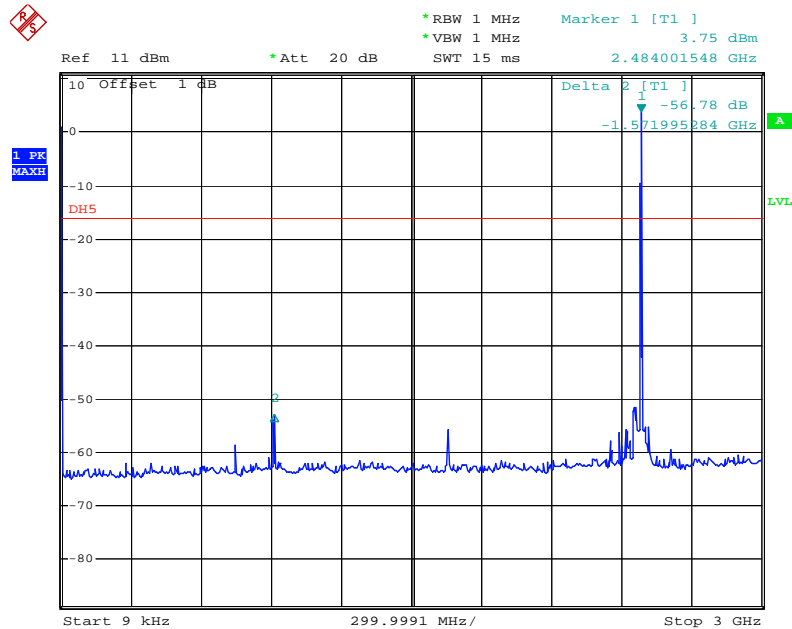
Date: 18.FEB.2009 16:20:58

3GHz – 25GHz

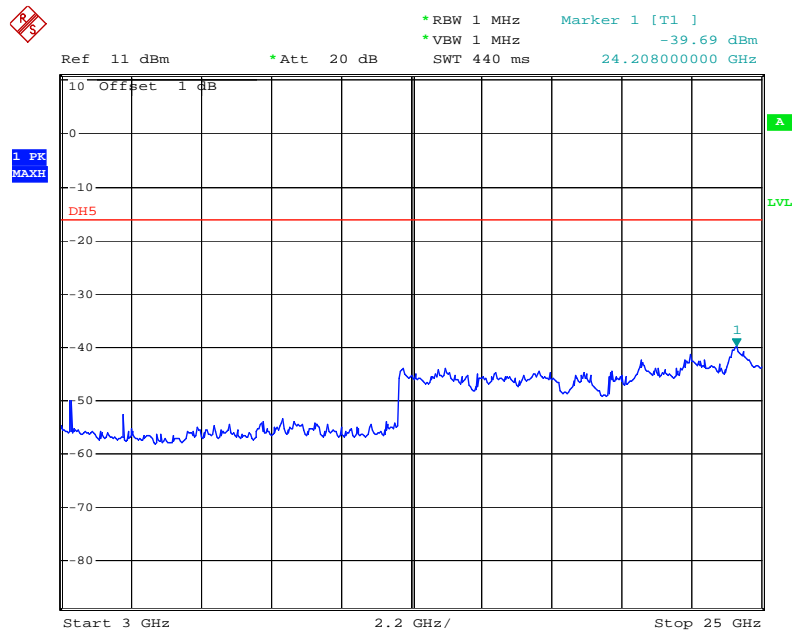
Date: 18.FEB.2009 16:21:18



Product Service

Configuration 2 – Mode 39kHz – 3GHz

Date: 18.FEB.2009 16:19:30

3GHz – 25GHz

Date: 18.FEB.2009 16:19:52



Product Service

2.6 RADIATED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.209, 15.247(d), 15.205

2.6.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.6.3 Date of Test and Modification State

25 February 2009 – Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

Configuration 2 - Mode 1
- Mode 2
- Mode 3

2.6.6 Environmental Conditions

	25 February 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%



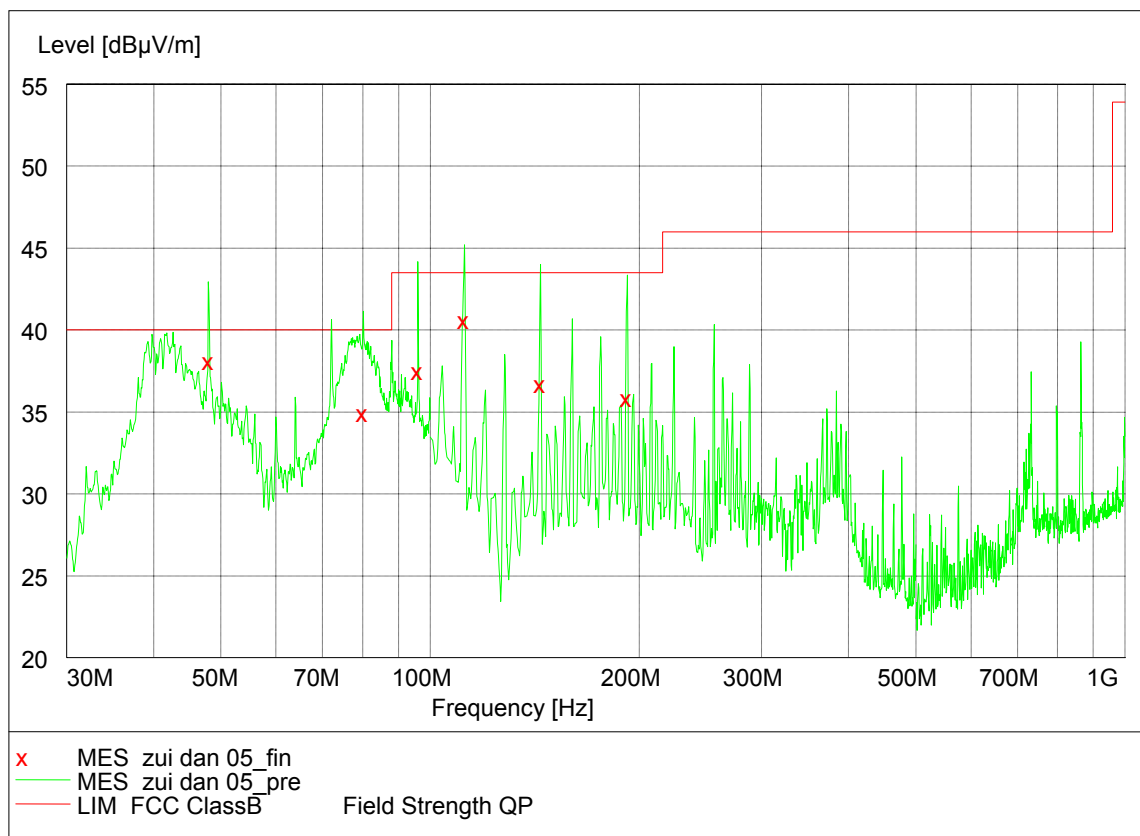
2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 Radiated Spurious Emissions.

The test results are shown below.

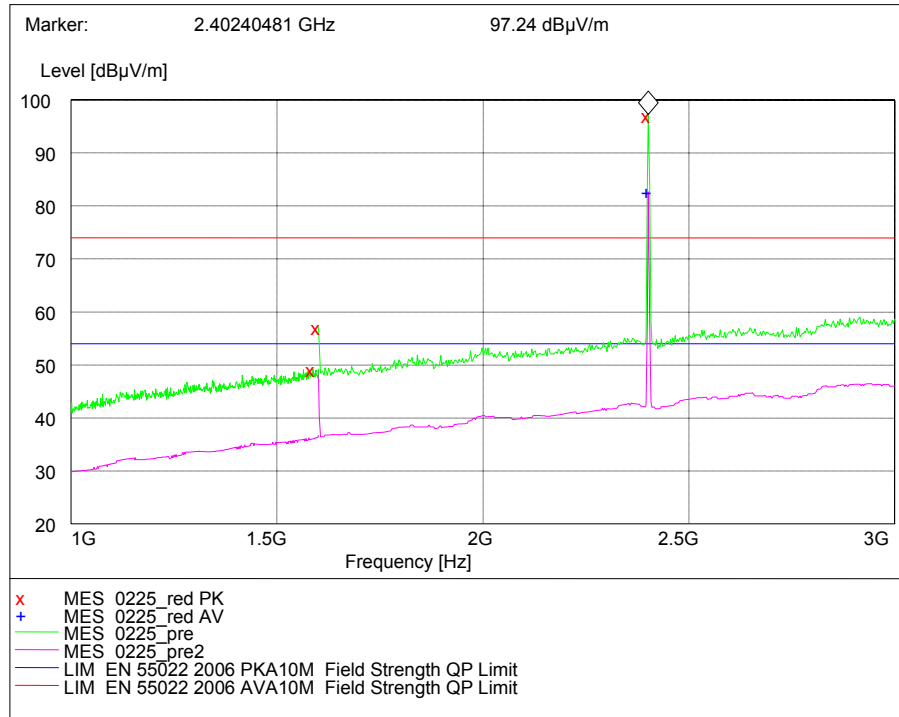
Below 1GHz

Configuration 1 - Mode 2 as the worst case

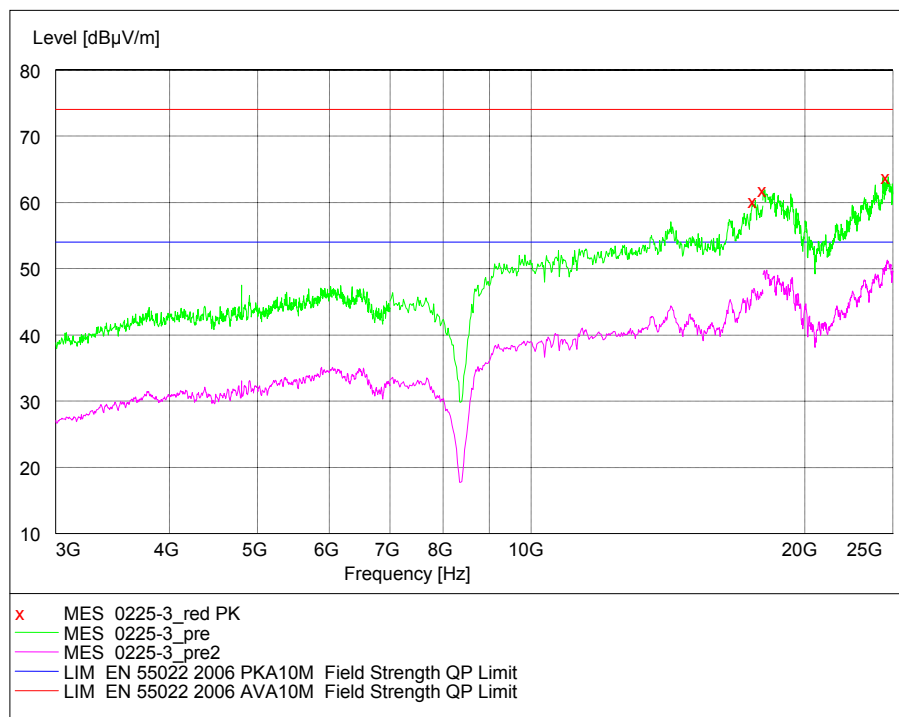


Note: The emission beyond the limit is the operating frequency.

Emission Frequency (MHz)	Polarisation	Height (cm)	Azimuth (degree)	Field Strength		Limit	
				dBμV/m	μV/m	dBμV/m	μV/m
48.000000	Vertical	100.0	0.00	38.20	81.28	40.0	100.00
79.980000	Vertical	100.0	90.00	35.00	56.23	40.0	100.00
96.000000	Vertical	100.0	0.00	37.60	75.86	43.5	149.62
112.000000	Vertical	100.0	180.00	40.70	108.39	43.5	149.62
144.040000	Vertical	100.0	270.00	36.80	69.18	43.5	149.62
192.040000	Vertical	100.0	270.00	35.90	57.41	43.5	149.62

Above 1GHzConfiguration 1 – Mode 11GHz- 3GHz

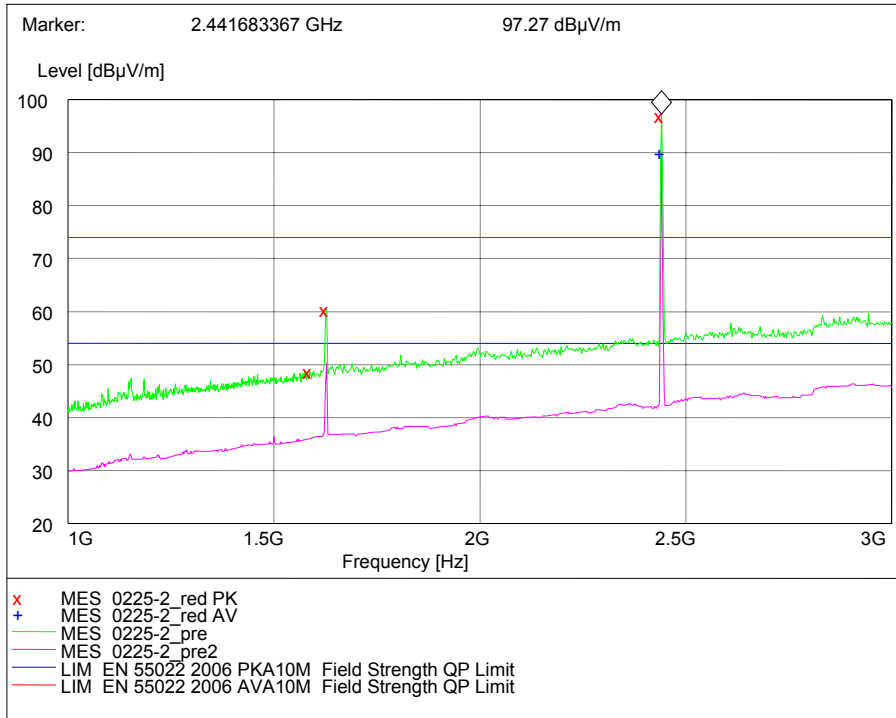
Note: The emission beyond the limit is the operating frequency.

3GHz – 25GHz



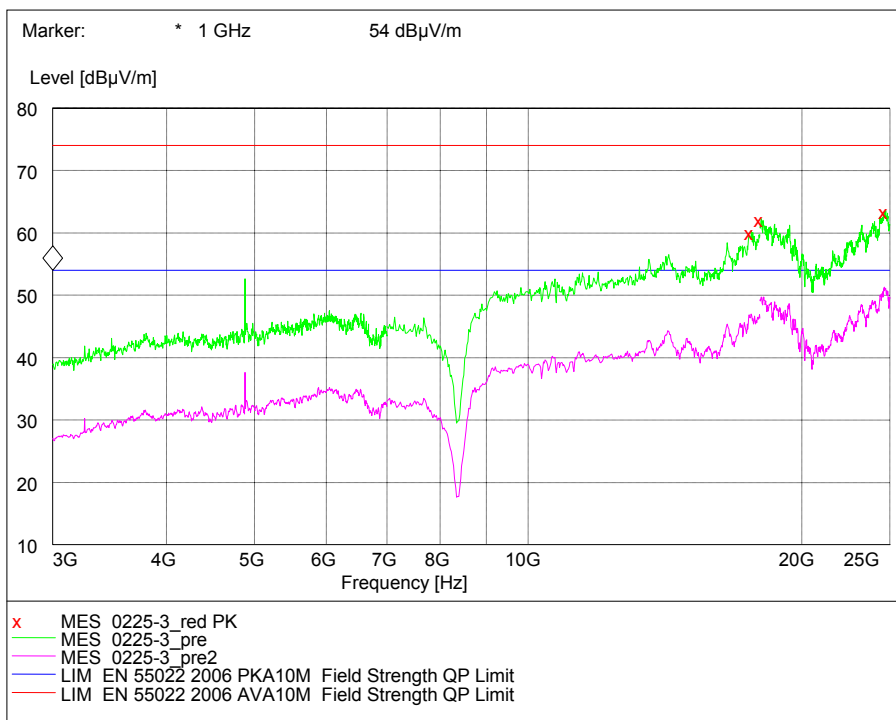
Configuration 1 – Mode 2

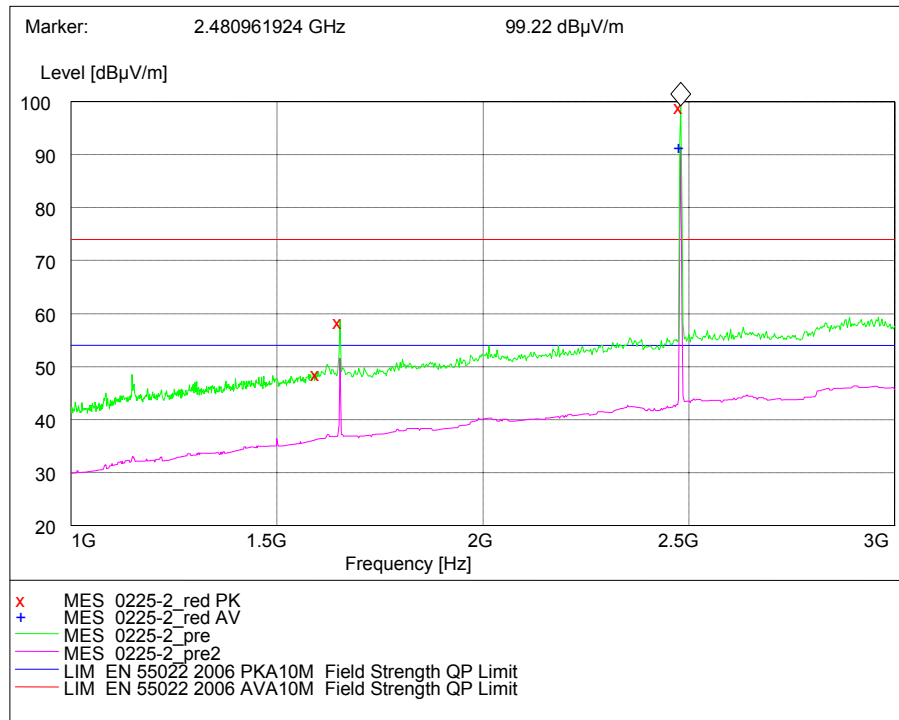
1GHz- 3GHz



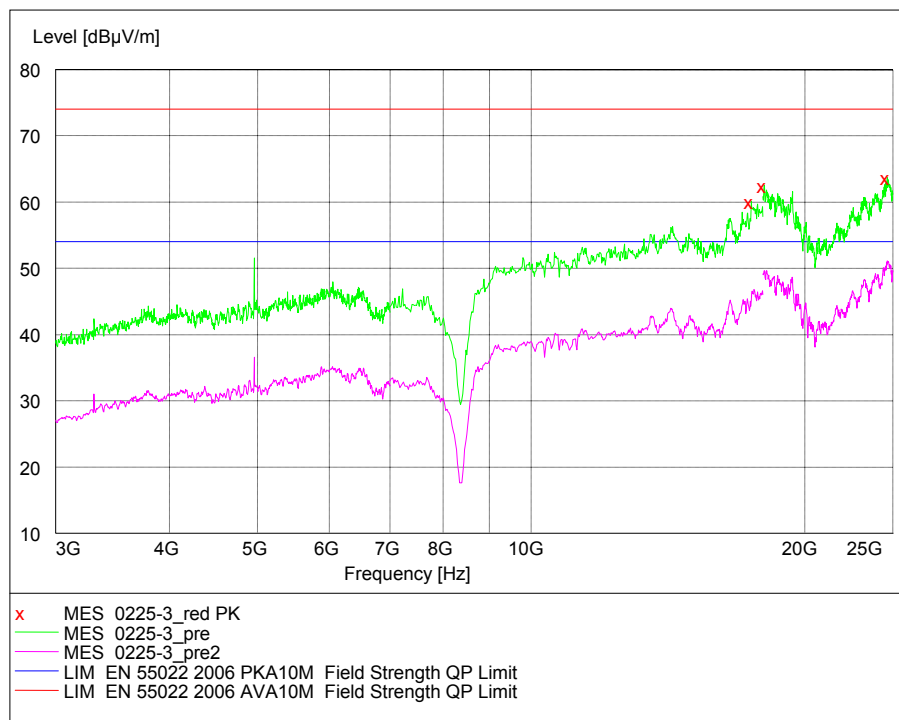
Note: The emission beyond the limit is the operating frequency.

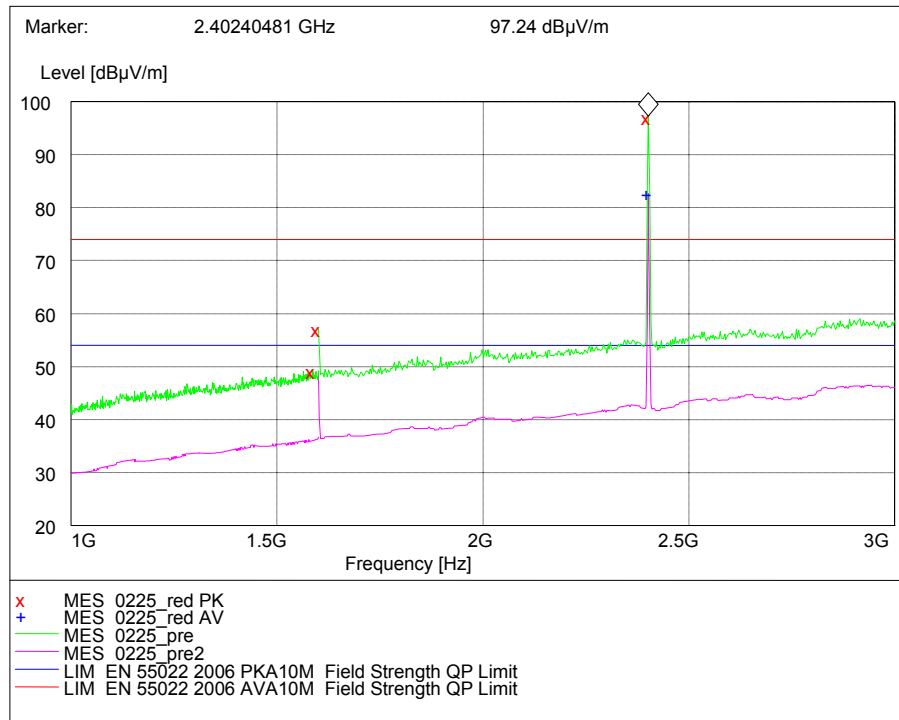
3GHz – 25GHz



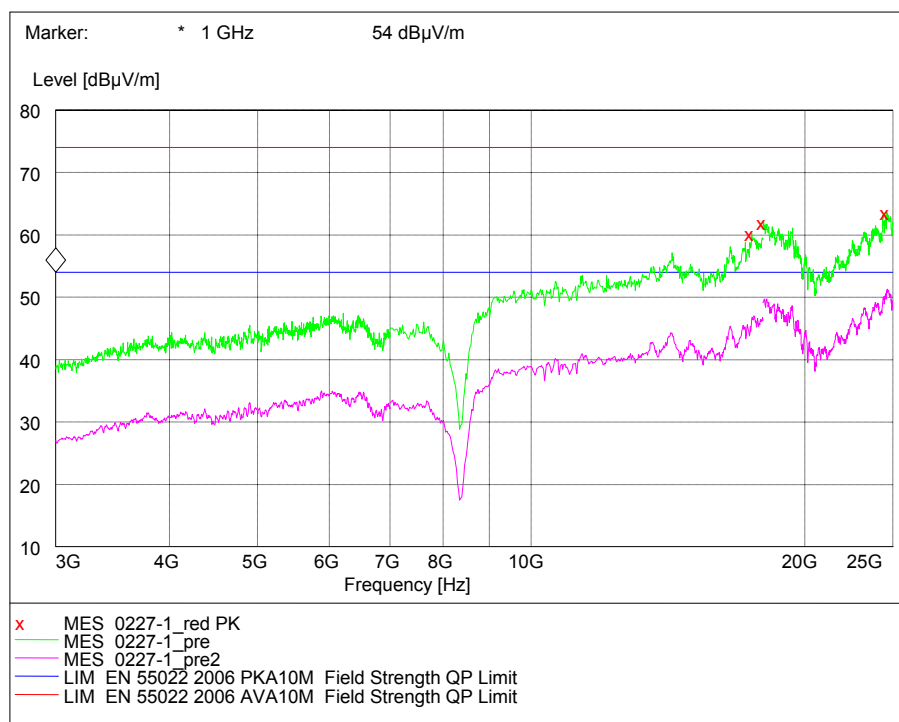
Configuration 1 – Mode 31GHz- 3GHz

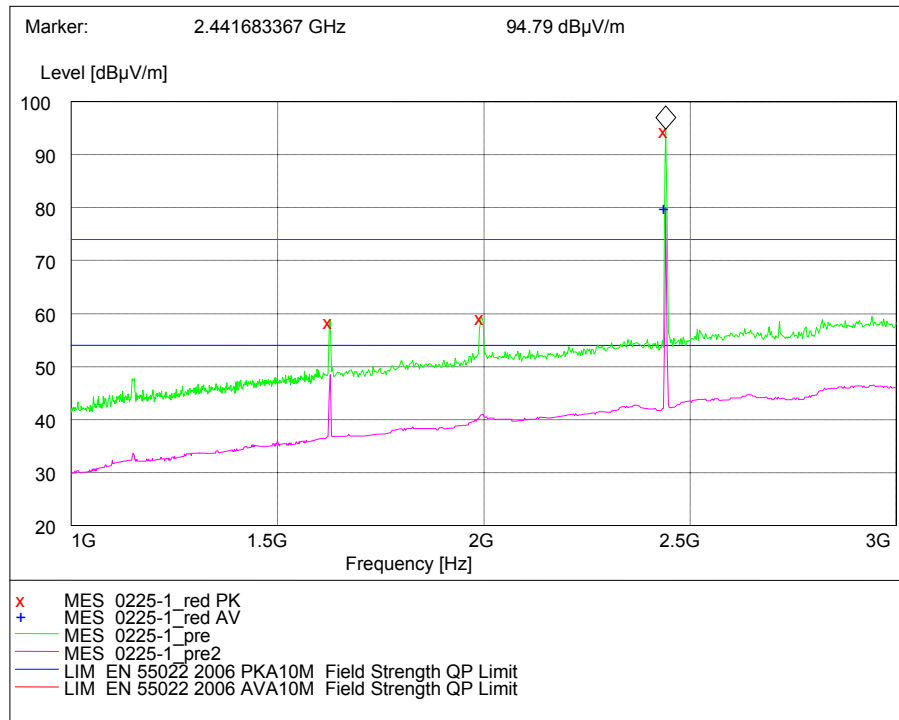
Note: The emission beyond the limit is the operating frequency.

3GHz – 25GHz

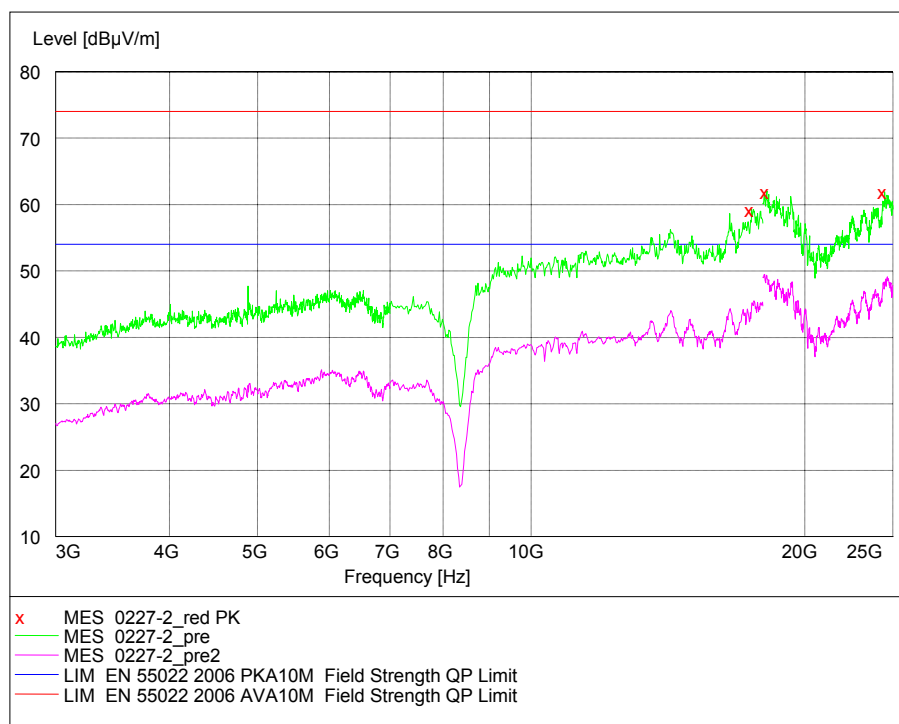
Configuration 2 – Mode 11GHz- 3GHz

Note: The emission beyond the limit is the operating frequency.

3GHz – 25GHz

Configuration 2 – Mode 21GHz- 3GHz

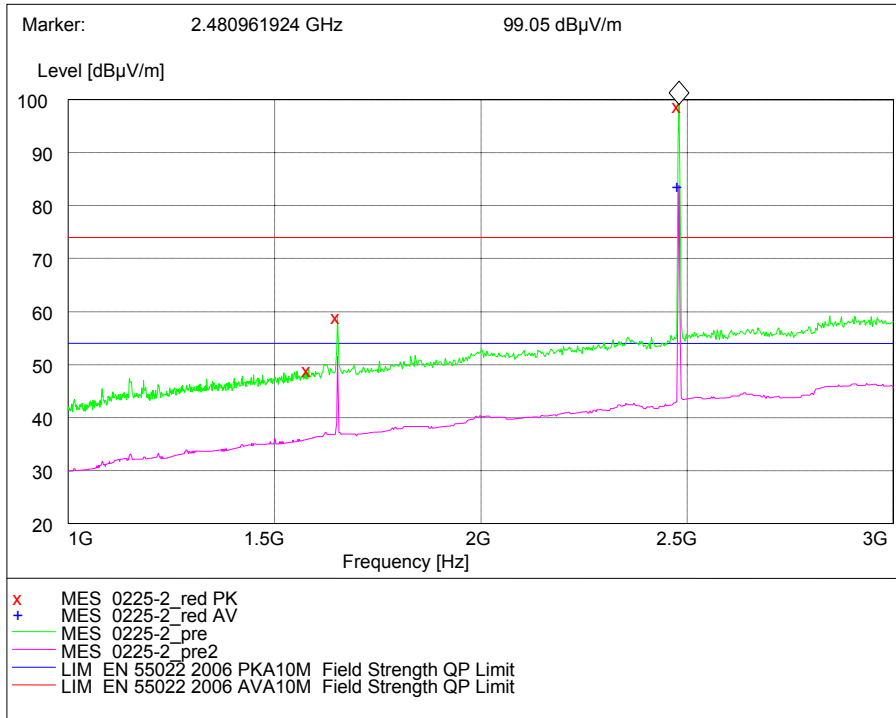
Note: The emission beyond the limit is the operating frequency.

3GHz – 25GHz



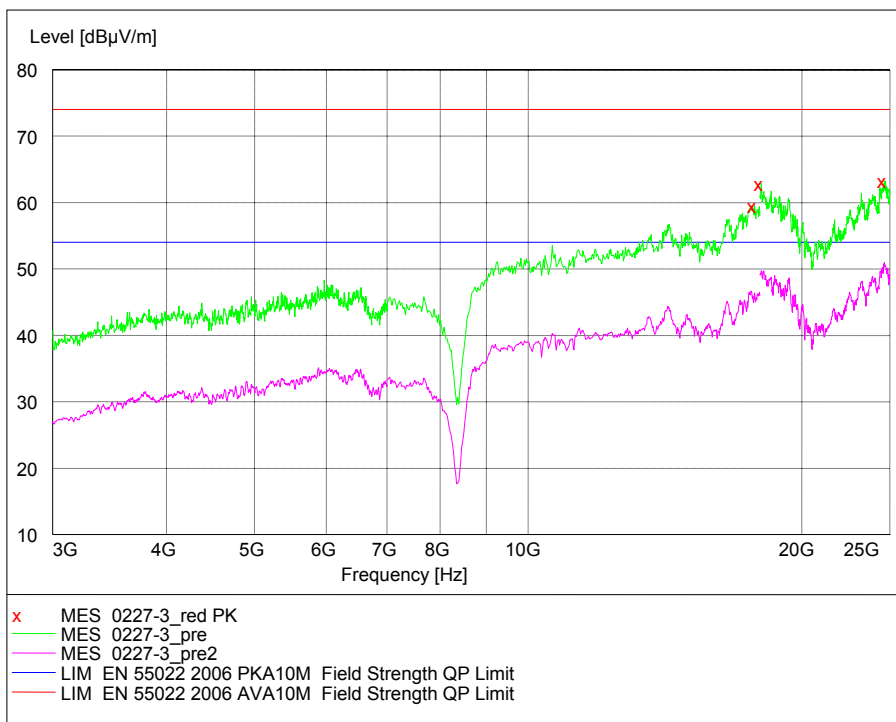
Configuration 2 – Mode 3

1GHz- 3GHz



Note: The emission beyond the limit is the operating frequency.

3GHz – 25GHz





2.7 CHANNEL DWELL TIME (DH1)

2.7.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)(iii)

2.7.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.7.3 Date of Test and Modification State

18 February 2009 – Modification State 0

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Method and Operating Modes

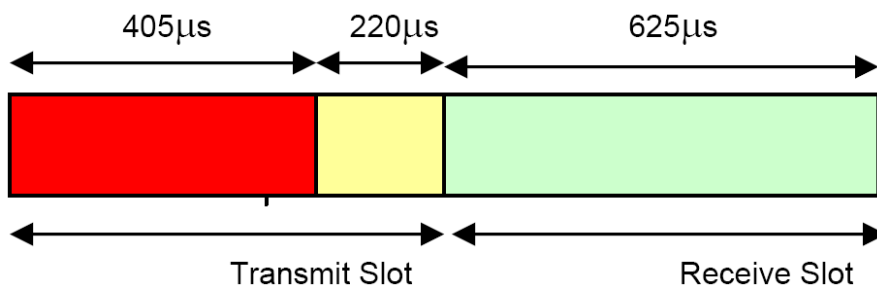
The test was applied in accordance with 15.247.

The Bluetooth system hops at a rate of 1600 times per second. Thus, this equates to 1600 timeslots in 1 second. The DH1 data rate operates on a Transmit on 1 timeslot and Receive on 1 timeslot basis. Thus, in 1 second, there are 800 Transmit timeslots and 800 Receive timeslots.

Thus:

$$1 \text{ Timeslot} = \frac{1}{1600} = 625\mu\text{s}$$

In 1 transmit timeslot, the transmit on time is only 405μs. 220μs is reserved as off time for the synthesizer to re-tune ready for the next transmit frequency. The following timeslot is a receive slot. This process continues assuming the data rate remains the same.



DH1 Timeslot Arrangement Showing One Complete Transmit and Receive Cycle



Product Service

So, with 800 Tx and 800 Rx timeslots, the transmitter is on for $800 \times 405\mu\text{s} = 0.324$ seconds.

$$\frac{\text{Total Tx Time On}}{\text{No of Channels}} = \frac{0.324}{79} = 4.10\text{ms}$$

So, in 31.6 seconds, the transmitter dwell time per channel is:

$$31.6 \times 4.10\text{ms} = 0.1296 \text{ seconds}$$

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.7.6 Environmental Conditions

18 February 2009

Ambient Temperature 23.2°C

Relative Humidity 24.1%



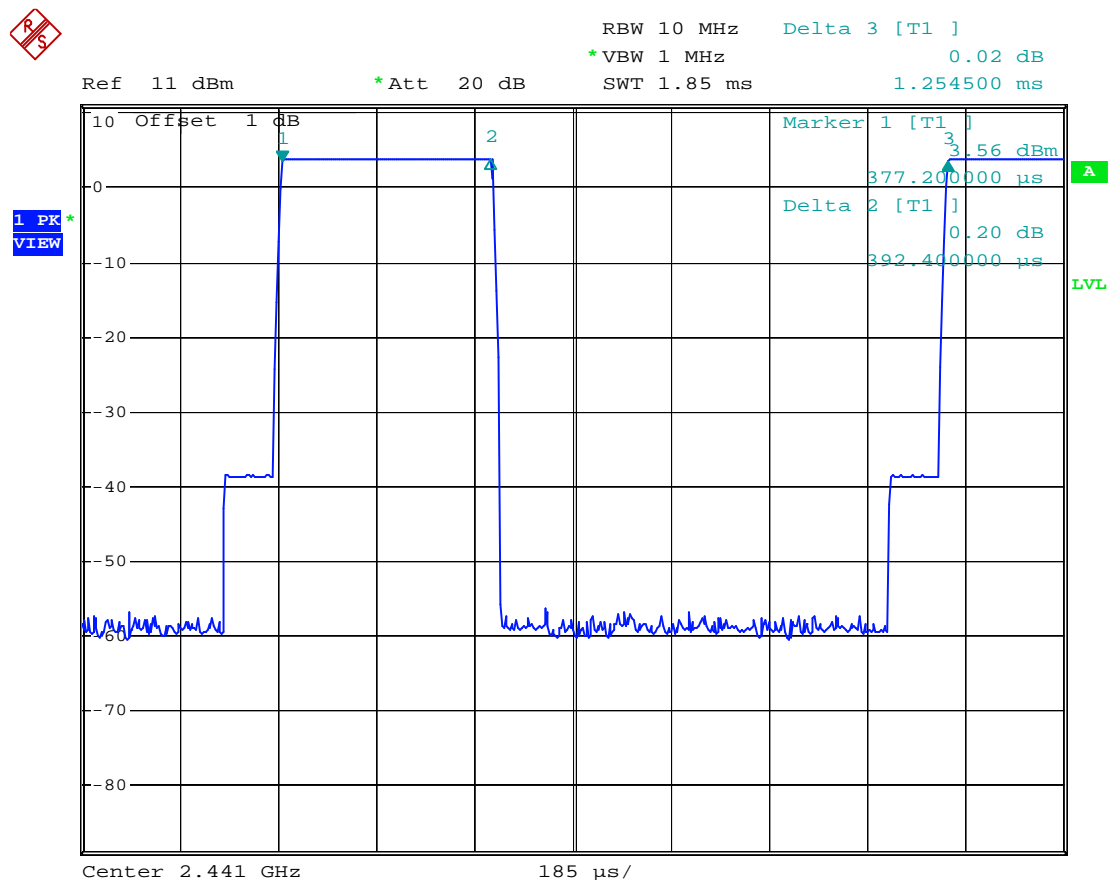
Product Service

2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Dwell Time.

The plots of test results are shown below.

Configuration 1 - Mode 2



Date: 18.FEB.2009 16:32:27

Plot Showing DH1 Timeslot



2.8 CHANNEL DWELL TIME (DH3)

2.8.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)(iii)

2.8.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.8.3 Date of Test and Modification State

18 February 2009 – Modification State 0

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Method and Operating Modes

The test was applied in accordance with 15.247.

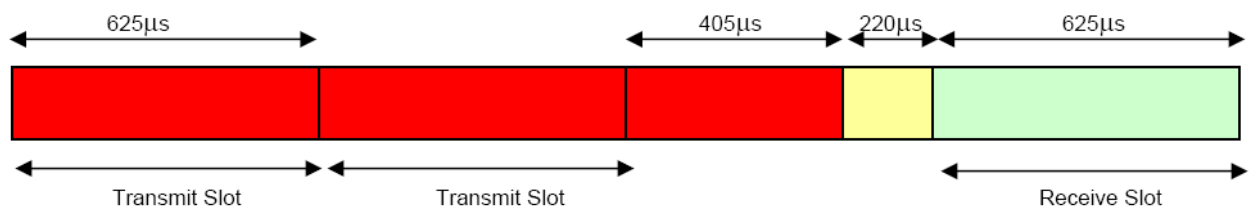
The Bluetooth system hops at a rate of 1600 times per second. Thus, this equates to 1600 timeslots in 1 second. With data rate DH3, the data payload is higher and can use up to 3 timeslots. When more than one timeslot is used, the frequency does not hop and transmission is continuous on all 3 slots, (ie. no receive slot in-between the 3 transmit slots). The 220µs off time for synthesizer re-tuning at the end of a slot is only used on the final slot. Thus, for one cycle, there are 3 transmit timeslots. 2 are 625µs long and the final slot is transmitting for 405µs.

The DH3 data rate operates on a Transmit on 3 timeslots and Receives on 1 timeslot basis, (assuming maximum data payload). The frequency-hopping rate is the same. Thus, in 1 second, there are 1200 Transmit timeslots and 400 Receive timeslots.

Thus:

$$1 \text{ Timeslot} = \frac{1}{1600} = 625\mu\text{s}$$

The first 2 Transmit timeslots are transmitting for the complete 625µs. In the third transmit slot, the transmit on time is only 405µs. 220µs is reserved as off time for the synthesizer to re-tune ready for the next transmit frequency. The following timeslot is a receive slot. This process continues assuming the data rate remains the same.



DH3 Timeslot Arrangement Showing One Complete Transmit and Receive Cycle
(Maximum Payload)



Thus, the transmitter for one complete transmit and receive cycle would be on for:

$$\text{Tx} \quad (2 \times 625\mu\text{s}) + (1 \times 405\mu\text{s}) = 1.655\text{ms}$$

So:

$$\begin{aligned} 800 \times 625\mu\text{s} &= 0.5 \text{ seconds} \\ 400 \times 405 \mu\text{s} &= 0.162 \text{ seconds} \end{aligned}$$

$$\text{Thus: } 0.5 + 0.162 = 0.662 \text{ seconds}$$

$$\frac{\text{Total Tx Time On}}{\text{No of Channels}} = \frac{0.662}{79} = 8.379\text{ms}$$

So, in 31.6 seconds, the transmitter dwell time per channel is:

$$31.6 \times 8.379\text{ms} = 0.2648 \text{ seconds}$$

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.8.6 Environmental Conditions

18 February 2009

Ambient Temperature 23.2°C

Relative Humidity 24.1%



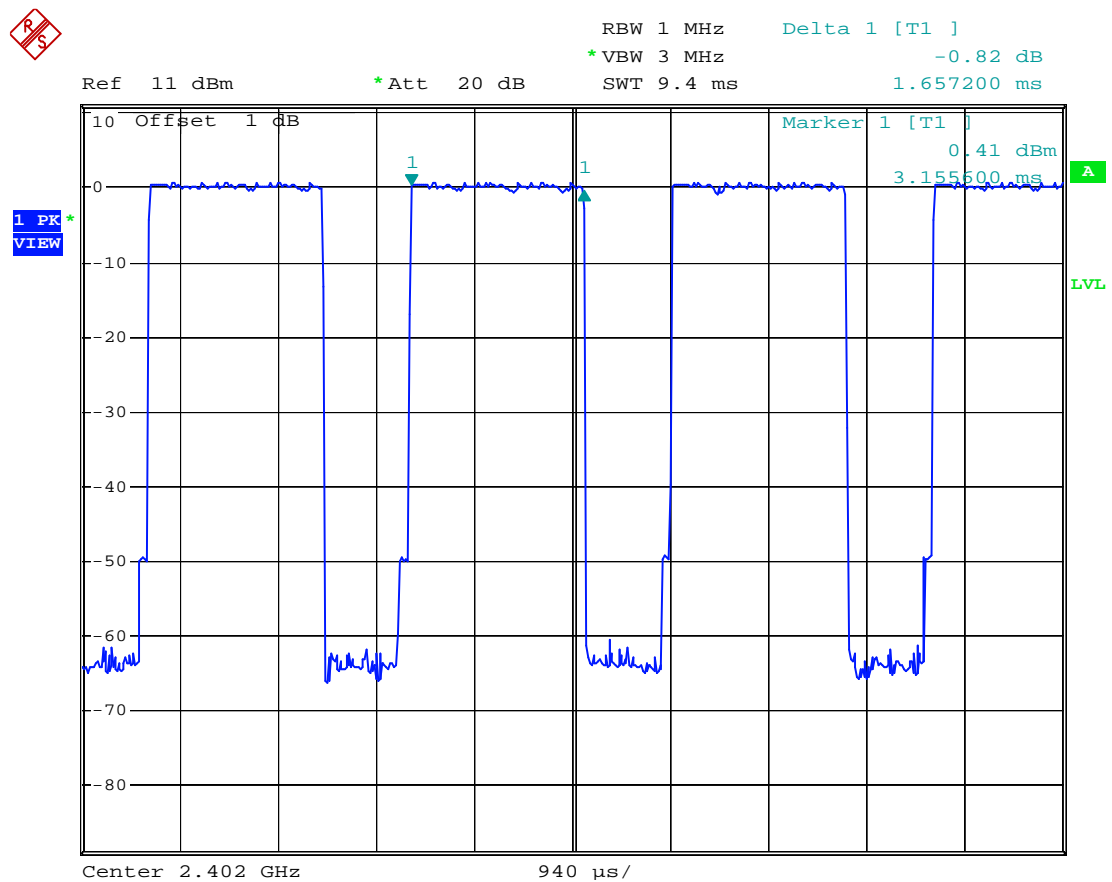
Product Service

2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Dwell Time.

The plots of test results are shown below.

Configuration 1 - Mode 1



Date: 19.FEB.2009 09:39:40

Plot Showing DH3 Timeslot



2.9 CHANNEL DWELL TIME (DH5)

2.9.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)(iii)

2.9.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.9.3 Date of Test and Modification State

18 February 2009 – Modification State 0

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Method and Operating Modes

The test was applied in accordance with 15.247.

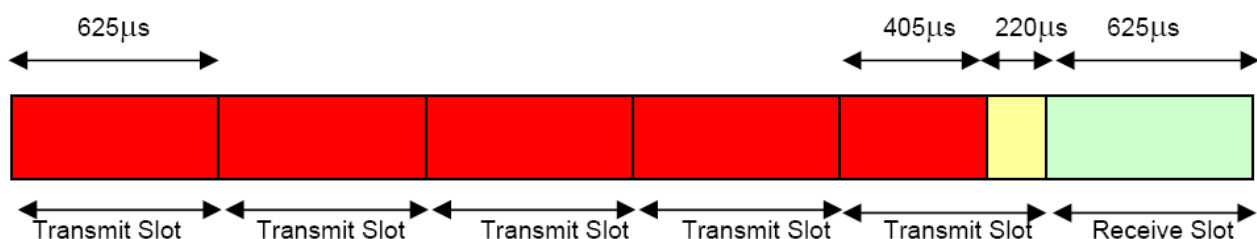
The Bluetooth system hops at a rate of 1600 times per second. Thus, this equates to 1600 timeslots in 1 second. With data rate DH5, the data payload is higher and can use up to 5 timeslots. When more than one timeslot is used, the frequency does not hop and transmission is continuous on all 5 slots, (ie. no receive slot in-between the 5 transmit slots). The 220µs off time for synthesizer re-tuning at the end of a slot is only used on the final slot. Thus, for one cycle, there are 5 transmit timeslots. 4 are 625µs long and the final slot is transmitting for 405µs.

The DH5 data rate operates on a Transmit on 5 timeslots and Receives on 1 timeslot basis, (assuming maximum data payload). The frequency-hopping rate is the same. Thus, in 1 second, there are 1333.3 Transmit timeslots and 266.7 Receive timeslots.

Thus:

$$1 \text{ Timeslot} = \frac{1}{1600} = 625\mu\text{s}$$

The first 4 Transmit timeslots are transmitting for the complete 625µs. In the fifth transmit slot, the transmit on time is only 405µs. 220µs is reserved as off time for the synthesizer to re-tune ready for the next transmit frequency. The following timeslot is a receive slot. This process continues assuming the data rate remains the same.



DH5 Timeslot Arrangement Showing One Complete Transmit and Receive Cycle
(Maximum Payload)



Thus, the transmitter for one complete transmit and receive cycle would be on for:

$$\text{Tx} \quad (4 \times 625\mu\text{s}) + (1 \times 405\mu\text{s}) \quad = \quad 2.905\text{ms}$$

So:

$$1066.7 \times 625\mu\text{s} = 0.666 \text{ seconds}$$

$$266.7 \times 405\mu\text{s} = 0.108 \text{ seconds}$$

$$\text{Thus:} \quad 0.666 + 0.108 = 0.774 \text{ seconds}$$

$$\frac{\text{Total Tx Time On}}{\text{No of Channels}} = \frac{0.774}{79} = 9.797\text{ms}$$

So, in 31.6 seconds, the transmitter dwell time per channel is:

$$31.6 \times 9.797 \text{ ms} = 0.31 \text{ seconds}$$

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.9.6 Environmental Conditions

18 February 2009

Ambient Temperature 23.2°C

Relative Humidity 24.1%

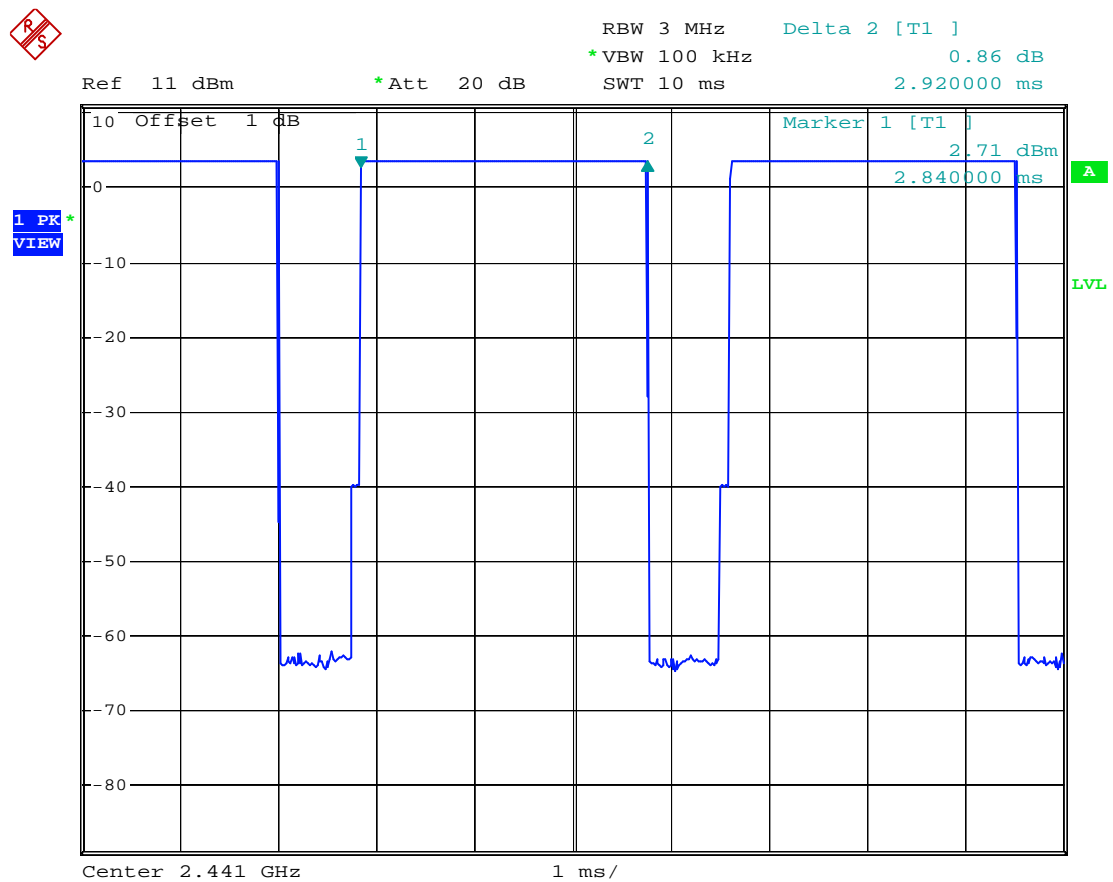


2.9.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Dwell Time.

The plots of test results are shown below.

Configuration 1 - Mode 2



Date: 18.FEB.2009 17:05:51

Plot Showing DH5 Timeslot



Product Service

2.10 CHANNEL SEPARATION

2.10.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)

2.10.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.10.3 Date of Test and Modification State

18, 25 February 2009 – Modification State 0

2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The EUT was transmitted at maximum power into a Spectrum Analyser. The trace was set to Max Hold to store several adjacent channels on screen. Using the marker delta function, the marker were positioned to show the separation between adjacent channels.

The test was performed with the EUT in the following configurations and modes of operation:

Configuratjion 1 - Mode 4

Configuratjion 2 - Mode 4

2.10.6 Environmental Conditions

	18 February 2009	25 February 2009
Ambient Temperature	23.2°C	22.9°C
Relative Humidity	24.1%	24.2%



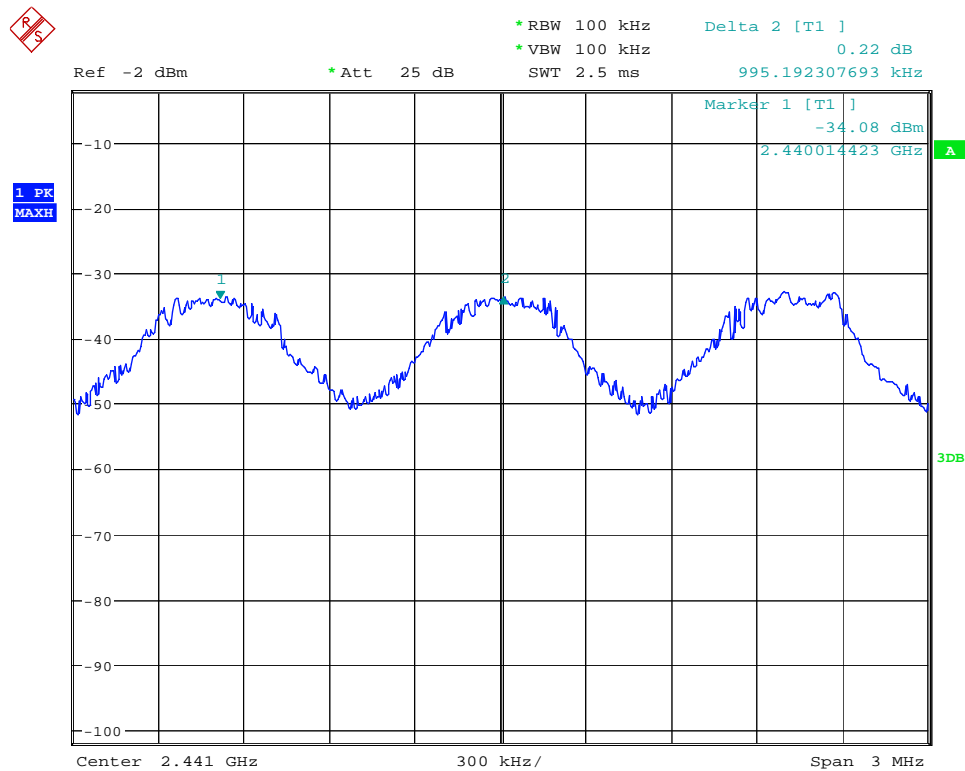
Product Service

2.10.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Channel Separation.

The test results are shown below.

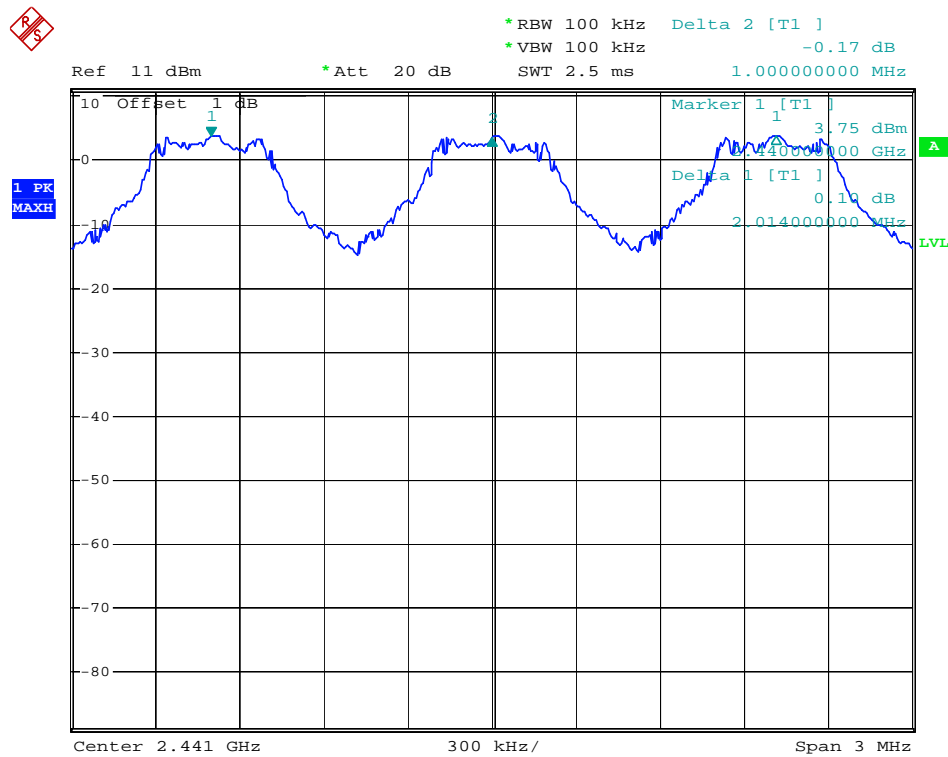
Configuration 1 - Mode 4



Date: 25.FEB.2009 17:42:29



Configuration 2 – Mode 4



Date: 18.FEB.2009 16:55:53

The system channel separation is specified as being 1MHz. The measured channel separation from the plt above is: 1000kHz.

Limit	>25 kHz
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Remarks

The channel separation of the EUT is more than 25 kHz.



Product Service

2.11 NUMBER OF HOPPING CHANNELS**2.11.1 Specification Reference**

FCC CFR 47 Part 15: 2008, Subpart C, Clause 15.247(a)(1)

2.11.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.11.3 Date of Test and Modification State

18 February 2009 – Modification State 0

2.11.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.11.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2008.

The EUT was connected to a spectrum Analyser via a cable. The EUT was set to transmit on maximum power and hopping on all channels. The span was adjusted to show the individual channels. To reasonably display the number of channels, the occupied band was split into two traces. The display trace was set to Max Hold and the plots recorded.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4

2.11.6 Environmental Conditions

18 February 2009

Ambient Temperature 23.2°C

Relative Humidity 24.1%

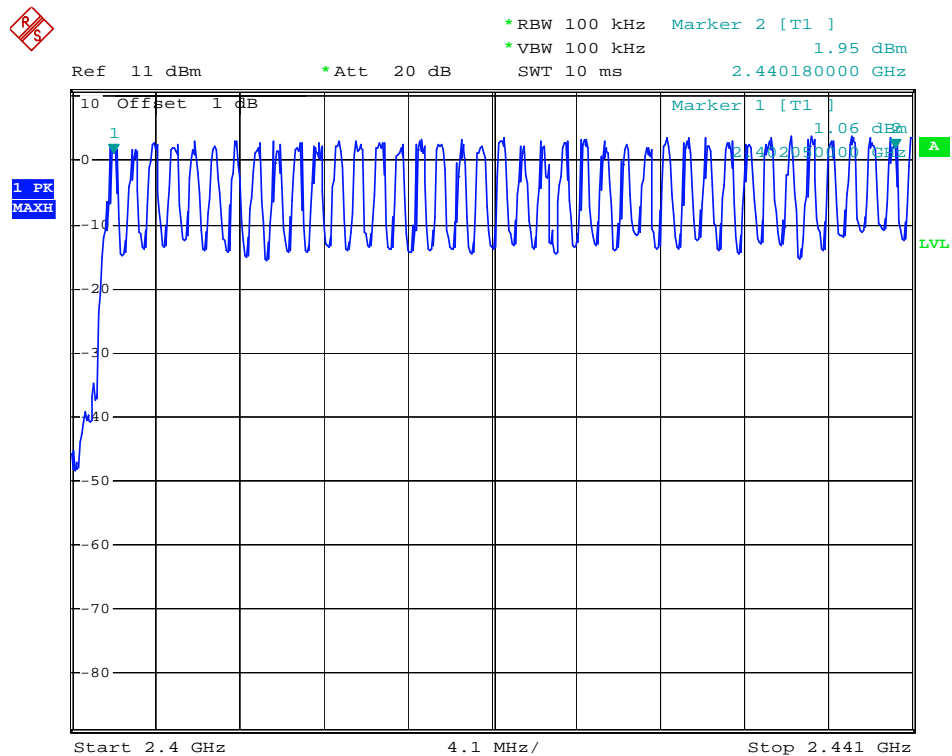


2.11.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Number of Hopping Channels.

The test results are shown below.

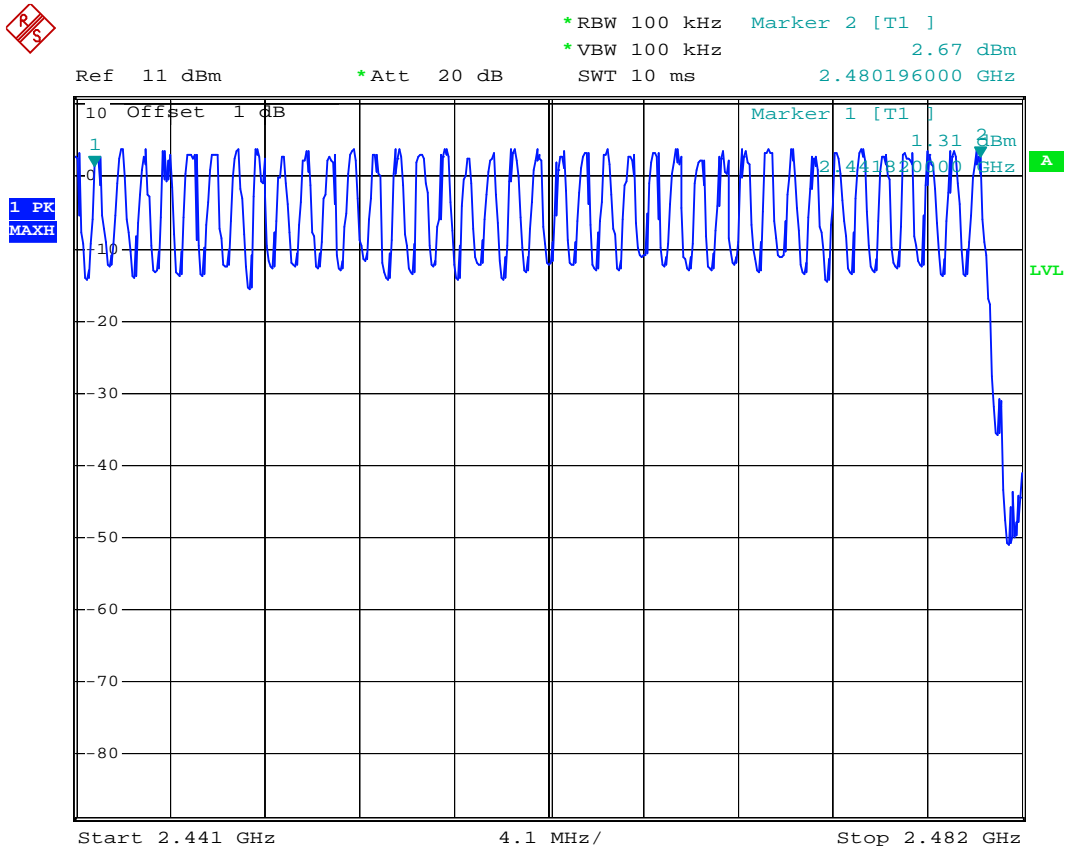
Configuration 1 - Mode 4



Date: 18.FEB.2009 17:03:15



Product Service



Date: 18.FEB.2009 17:01:53

Limit	>15 channels
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Product Service

2.12 CONDUCTED EMISSIONS ON POWER LINE**2.12.1 Specification Reference**

FCC CFR 47 Part 15: 2008, Clause 15.207

2.12.2 Equipment Under Test

Bluetooth Pulse Oximeter MD300C318

2.12.3 Date of Test and Modification State

20 February 2009 – Modification State 0

2.12.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.12.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of ANSI C63.4.

Emissions were formally measured using a Quasi-Peak and Average Detectors, which meet the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables below.

Conducted Emission were measured on Live and Neutral Lines in turn.

Measurements were made over the frequency range 0.15MHz to 30MHz.

The EUT was supplied from a 120V, 60Hz supply.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.12.6 Environmental Conditions

20 February 2009

Ambient Temperature 23.5°C

Relative Humidity 24.7%



2.12.7 Test Results

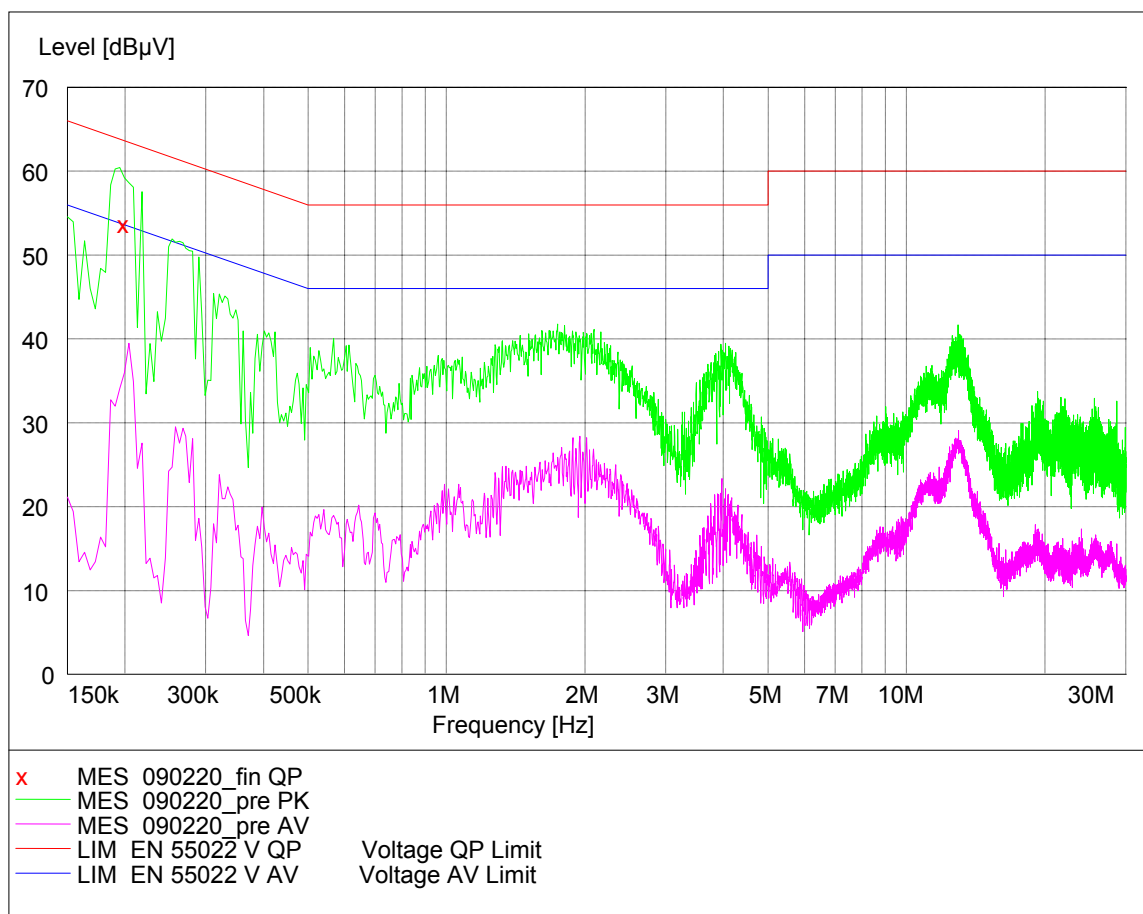
For the period of test the EUT met the requirements of FCC CFR 47 Part 15: 2008 for Conducted Emissions on AC Power Ports.

Measurements were made with the EUT in Bluetooth Mode (See section 1.4.10 for details).

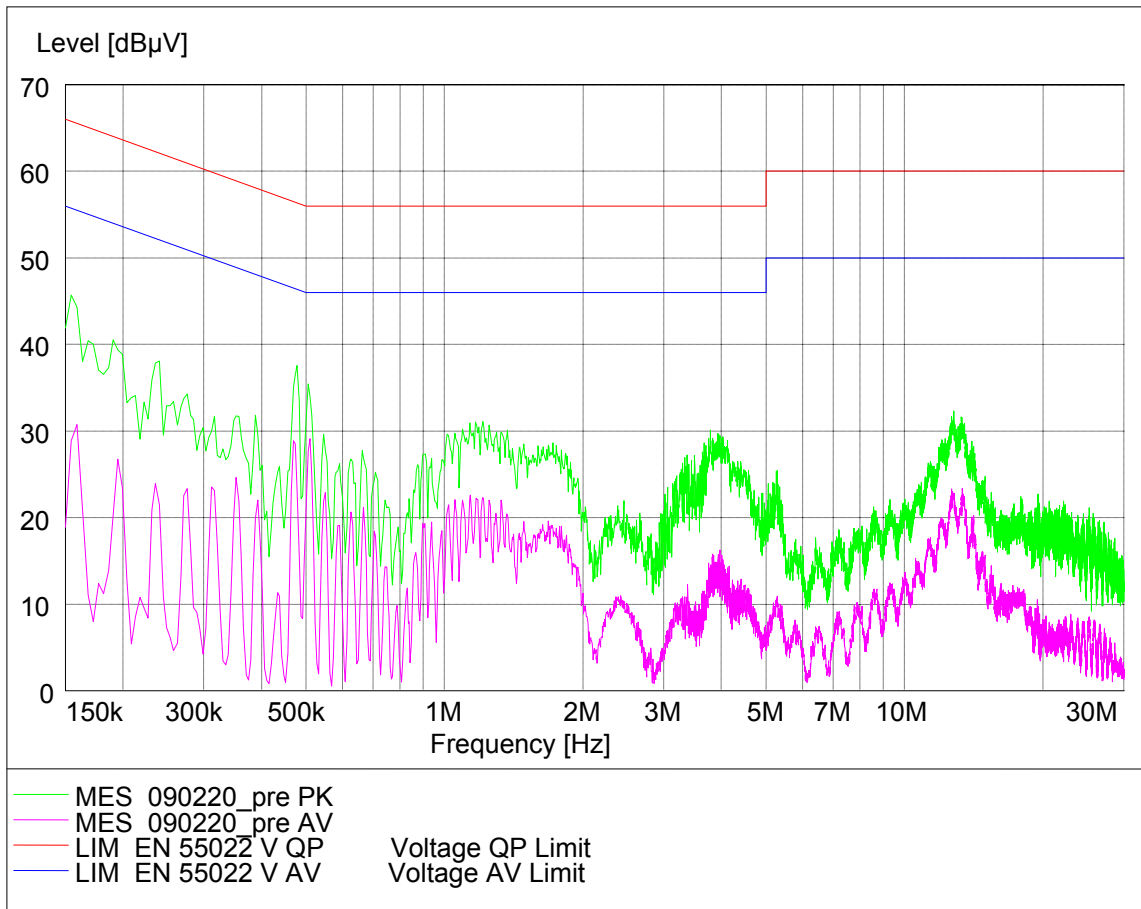
Test results are shown in the following tables.

Configuration 1 - Mode 2

Live Line



Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	QP Margin (dBµV)	Average Level (dBµV)	Average Limit (dBµV)	AV Margin (dBµV)
0.199500	53.8	64	9.8	35.96	54	18.04

**Neutral Line**

The margin between the specification requirements and all other emissions was 20dB or more below the specified Quasi-Peak and 20dB or more below the specified Average limit.



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	Serial No.	Calibration Due
Spectrum Analyser	R&S	FSP30	100118	2009/08/20
Network Analyzer	Agilent	8720D	US38431317	2009/05/03
EMI Receiver	Rohde & Schwarz	ESI 40	100015	2009/08/19
Ultra log test antenna	Rohde & Schwarz	HL562	100167	2009/08/19
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100029	2009/08/19
Antenna master	Frankonia	MA 260	-	TU
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	TU
Signal generator	Rohde & Schwarz	SMR 20	100086	2009/08/19
Semi- Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-	2010/09/23
Full- Anechoic Chamber	Frankonia	12.65mx8.03mx7.50m	-	2010/09/23
Turn Table	Frankonia	PS2000	-	2009/08/19
EMI test software	Rohde & Schwarz	ES-K1	-	TU
EMI Test receiver	Rohde & Schwarz	ESCS	100029	2009/08/19
LISN	Rohde & Schwarz	ESH3-Z5	100020	2009/08/19
Thermo-hygrometer	AZ Instruments	8705	9151655	2009/12/16

TU Traceability Unscheduled



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3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Substitution Antenna, Radiated Field	30MHz to 22GHz Amplitude	2.6dB
Worst case error for both Time and Frequency measurement 12 parts in 10 ⁶ .		

* In accordance with CISPR 16-4



Product Service

SECTION 4

DISCLAIMERS AND COPYRIGHT



Product Service

4.1 DISCLAIMERS AND COPYRIGHT

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