TEST REPORT

Report Number: 3180052MPK-005
Project Number: 3180052
Report Date: October 31, 2009

Testing performed on the
Bluetooth Module
Model: BT4EX8M
FCC ID: WJ4BT4EX8M
IC : 3504A-BT4EX8M
to

FCC Part 15.247 and RSS-210 Issue 7
For

JavadGNSS, Inc.

Test Performed by:	Test Authorized by:
Intertek	JavadGNSS, Inc.
1365 Adams Court	1731 Technology Drive
Menlo Park, CA 94025	San Jose, CA 95110 USA

Prepared by: _Bruce Gordon_   **Date:** October 31, 2009

Reviewed by: _Krishna K Vemuri_   **Date:** October 31, 2009

Report No. 3180052MPK-005

Equipment Under Test:	Bluetooth Module
Trade Name:	JavadGNSS, Inc.
Model No.:	BT4EX8M
FCC ID:	WJ4BT4EX8M
IC :	3504A-BT4EX8M
Applicant:	JavadGNSS, Inc.
Contact:	Dr. Vladimir Zhukov
Address:	1731 Technology Drive
	San Jose, CA 95110
Country	USA
Tel. Number:	408-573-8100
Fax number:	408-573-9100
Applicable Regulation:	FCC Part 15, Subpart C
	RSS-210 Issue 7
Test Site Location:	ITS – Site 1
	1365 Adams Drive
	Menlo Park, CA 94025
Date of Test:	October 27 to 28, 2009

We attest to the accuracy of this report:

Bruce Gordon
Test Engineer

Krishna K Vemuri
EMC Senior Staff Engineer

TABLE OF CONTENTS

1.0 Introduction

The Equipment under Test (EUT) is a device with two Bluetooth transceivers operating in the 2.4GHz frequency band.

This report is designed to show compliance of the 2.4 GHz transceiver with FCC Part 15.247 and RSS-210 requirements.

1.1 Summary of Tests

TEST	REFERENCE FCC 17.247	REFERENCE RSS-210	RESULTS
Output power	15.247(b)	A8.4(2)	Complies
20-dB Bandwidth	15.247(a)(1)	A8.1(a)	Complies
Channel Separation	15.247(a)(1)	A8.1(b)	Complies
Number of Hopping Channels	15.247(a)(1)	A8.1(d)	Complies
Average Channel Occupancy Time	15.47(a)(1)	A8.1(d)	Complies
Out-of-band Antenna Conducted Emission	15.247(c)	A8.5	Complies
Out-of-Band Radiated Emission (except emissions in Restricted Bands)	15.247(c)	A8.5	Not Applicable. The device passed Out-of-band Antenna Conducted Emission
Radiated Emission in Restricted Bands	15.247(c), 15.205	2.2	Complies
RF exposure	15.247(i)	RSS-102	Complies
AC Conducted Emission	15.207	RSS-GEN	Not Applicable. The EUT does not have any direct connection to public power network. In normal use, EUT is installed inside the host unit and it is DC powered internally.
Radiated Emission from Digital Parts and receiver	15.109	ICES-003	Complies

2.0   General Description

2.1   Product Description

Overview of the EUT

Applicant	Javad GNSS, Inc. 1731 Technology Drive San Jose, CA 95110 USA
Manufacturer name & address	Javad GNSS, Inc. 1731 Technology Drive San Jose, CA 95110 USA
Trade Name & Part No.	BT4EX8M
FCC Identifier	WJ4BT4EX8M
IC	3504A-BT4EX8M
Use of Product	Bluetooth Module
Type of Transmission	Digital Transmission Signal (DTS)
Rated RF Output	1.54 mW
Frequency Range	2402-2480 MHz
Number of Channel(s)	79
Modulation Type	GFSK, π/4 DQPSK, 8DPSK
Data Rate	Up to 3 Mbps
Antenna(s) type & Gain	Monopole/omni-directional, 3 dBi
Extreme conditions	Temperature range: -30 ^{0}C to + 50 ^{0}C

A pre-production version of the sample was received on October 20, 2009 in good condition. As declared by the Applicant, it is identical to production units.

Test start date October 27, 2009
Test end date: October 28, 2009

2.2   Related Submittal(s) Grants

None.

2.3 Test Methodology

Radiated and AC Line conducted emissions measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures described in DA 00-705.

2.4 Test Facility

Then radiated emission test site and conducted measurement facility used to collect the data is 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC.

3.0   System Test Configuration

3.1   Support Equipment

Item #	Description	Model No.	Serial No.
1	Laptop	Compaq Evo N610c	INTERTEK LAB PC#1

3.2   Block Diagram of Test Setup

The diagram shown below details the interconnection of the EUT and support equipment. For specific layout, refer to the test configuration photograph in the relevant section of this report.

Test Configuration- Antenna conducted and Temperature- Frequency variation measurements

USB cable, S, 1m

25 pin Serial cable, S, 2m

Antenna Port

#1

EUT

9 pin Serial cable, S, 2m

Spectrum Analyzer
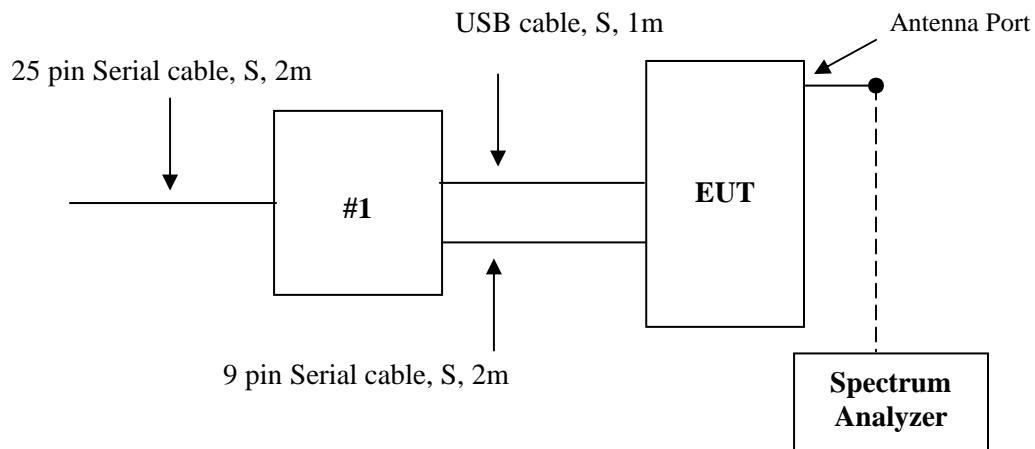
S = Shielded	**F** = With Ferrite
U = Unshielded	**m** = Length in Meters

3.2 Block Diagram of Test Setup (Continued)

Test Configuration- Radiated emission measurements

Antennas for
Radiated Emission
Measurements

USB cable, S, 1m

25 pin Serial cable, S, 2m

Tx1

#1

EUT

9 pin Serial cable, S, 2m
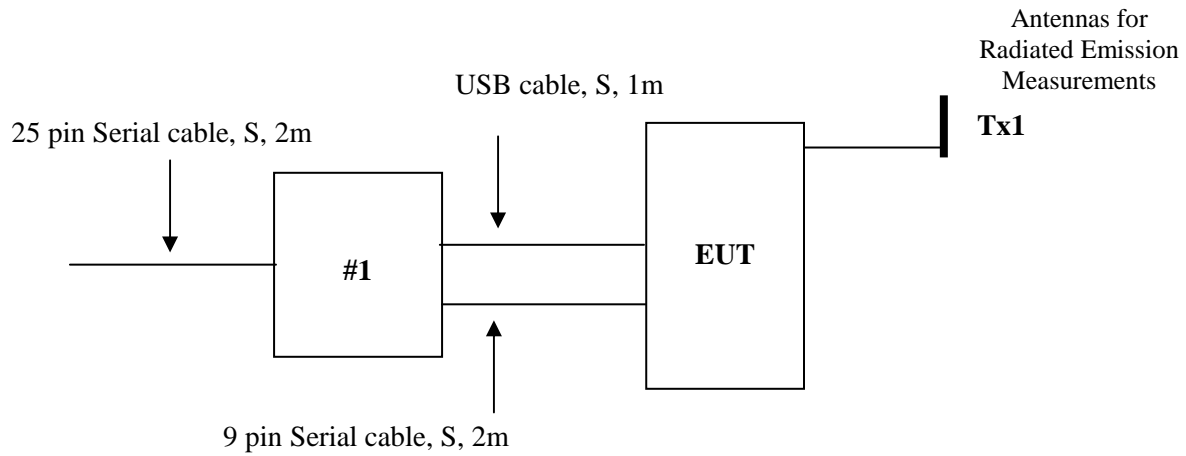
S = Shielded	**F** = With Ferrite
U = Unshielded	**m** = Length in Meters

3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. The EUT is attached to peripherals and they are connected and operational (as typical as possible).The EUT is wired to transmit full power. During testing all cables are manipulated to produce worst-case emissions.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was provided by the Applicant.

3.5 Mode of Operation During Test

The EUT was tested in three modes: hopping mode as in normal use, hopping disabled mode in which the EUT was transmitting at the lowest, middle, and highest channels (frequencies), and receive mode (LO=2441MHz).

3.6 Modifications Required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by JavadGNSS, Inc. prior to compliance testing).

4.0 Measurement Results

4.1 Conducted Output Power at Antenna Terminals
FCC 15.247(b)(1)

Requirements

For systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum peak output power is 1 watt (30 dBm), for all other systems 0.125 W (21 dBm).

Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. Power was read directly and the cable loss correction was added to the reading to obtain the power at the EUT antenna terminal.

Test Results

Frequency (MHz)	Output in dBm	Output in mW	Plot number
2402	1.88	1.54	1.1
2440	1.15	1.30	1.2
2480	0.3	1.07	1.3

Notes: 1. Hopping function was disabled during the test.
2. The EUT's antenna has less than 6 dBi gain.

Intertek

Plot 1.1


```
                                        *RBW  3 MHz      Marker 1 [T1 ]
                                        *VBW  3 MHz                1.88 dBm
Ref  10 dBm          Att   40 dB         SWT 2.5 ms       2.401840000 GHz

10  Offset  0.6 dB
                                        1
-0
1 PK
VIEW
--10

--20

--30

--40

--50

--60

--70

--80

-90
Center  2.402 GHz              1 MHz/              Span 10 MHz
```

A
LVL
PRN
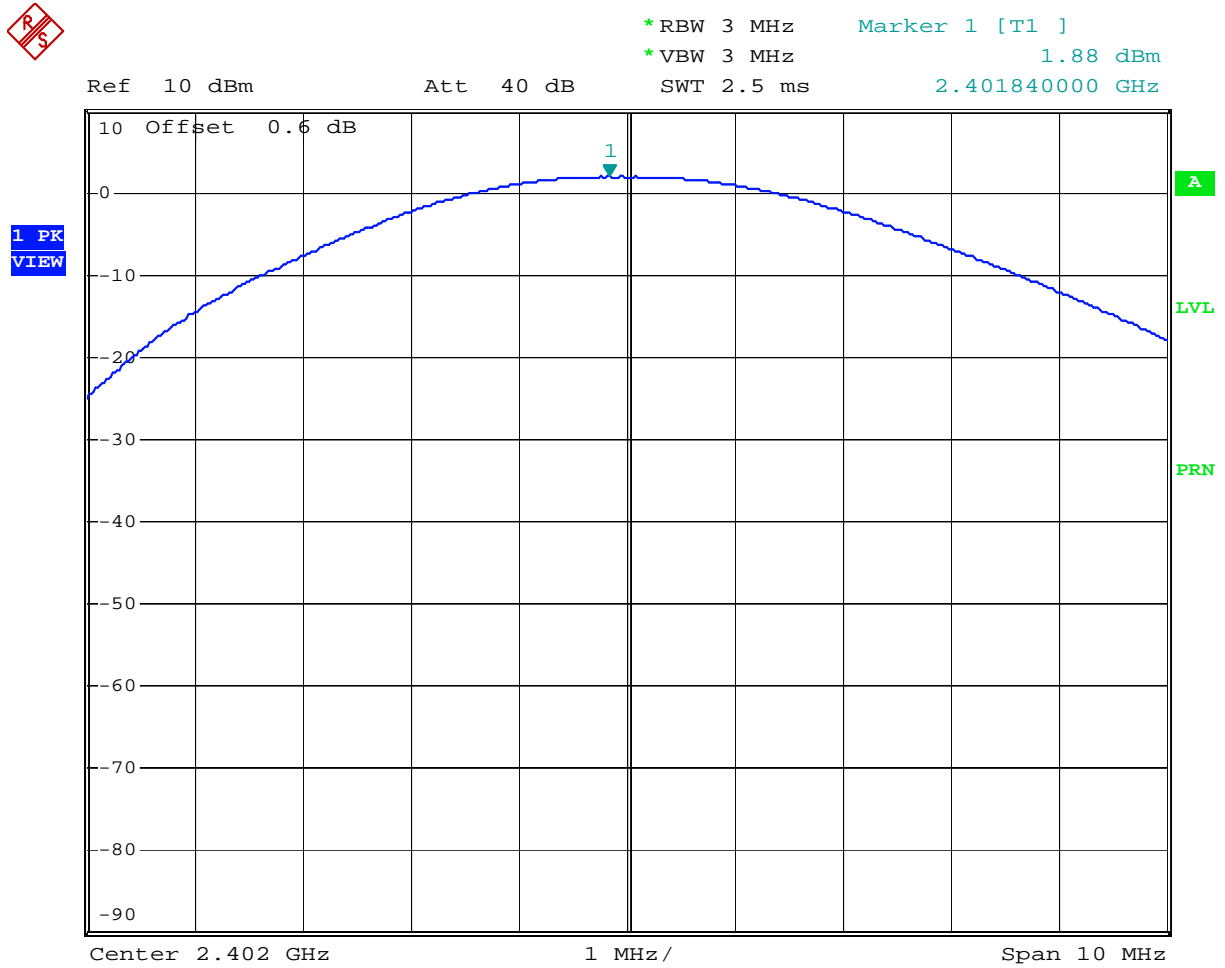
Comment: Output power, low channel
Date: 27.OCT.2009 21:12:16

Plot 1.2
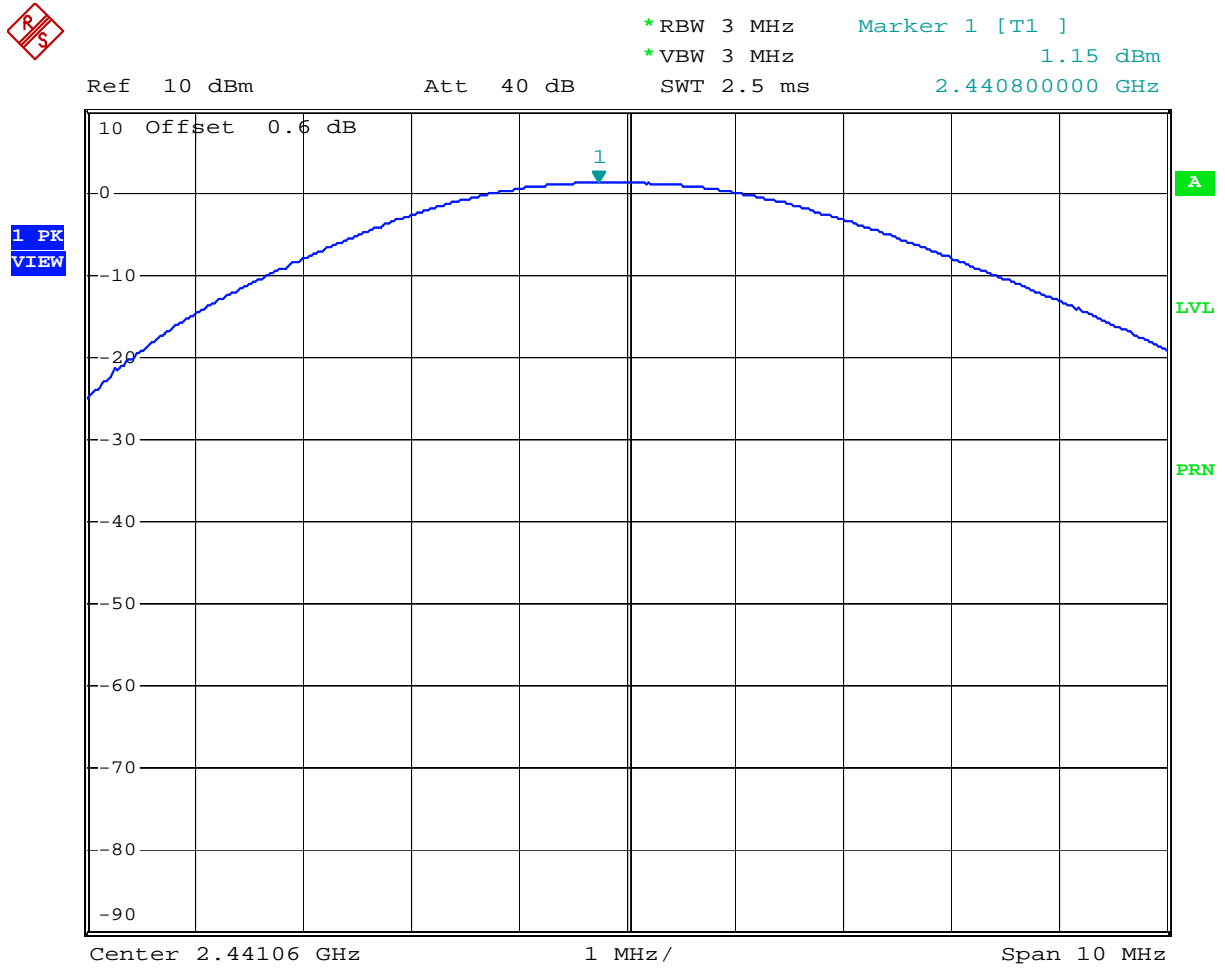
Comment: Output Power, mid channel
Date: 27.OCT.2009   18:30:26

Plot 1.3

4.2   20-dB Bandwidth
   FCC 15.247(a)

Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer. The spectrum analyzer resolution bandwidth was set to approximately 1% of the 20-dB Bandwidth. The 20-dB Bandwidth was measured by using the DELTA MARKER function of the analyzer.

In addition, the occupied bandwidth (99%) was measured.

Test Results

Frequency (MHz)	20-dB channel bandwidth (MHz)	Plot
2402	1.16	2.1
2440	1.16	2.2
2480	1.18	2.3

Frequency (MHz)	Occupied bandwidth (kHz)	Plot
2402	870	2.4
2440	870	2.5
2480	870	2.6

Plot 2.1


```
                                    *RBW  10 kHz    Marker 1 [T1 ]
                                    *VBW  100 kHz           -3.66 dBm
 Ref  10 dBm         *Att  40 dB     SWT 100 ms      2.402020000 GHz
```

10 Offset 0.6 dB	ndB [T1] 26.00 dB
	BW 1.160000000 MHz
0	Temp 1 [T1 ndB]
	-29.77 dBm
-10	2.401420000 GHz
	Temp 2 [T1 ndB]
-20	-29.21 dBm
	2.402580000 GHz

1 PK
VIEW

A

LVL

PRN

```
 Center 2.402 GHz          1 MHz/            Span 10 MHz
```
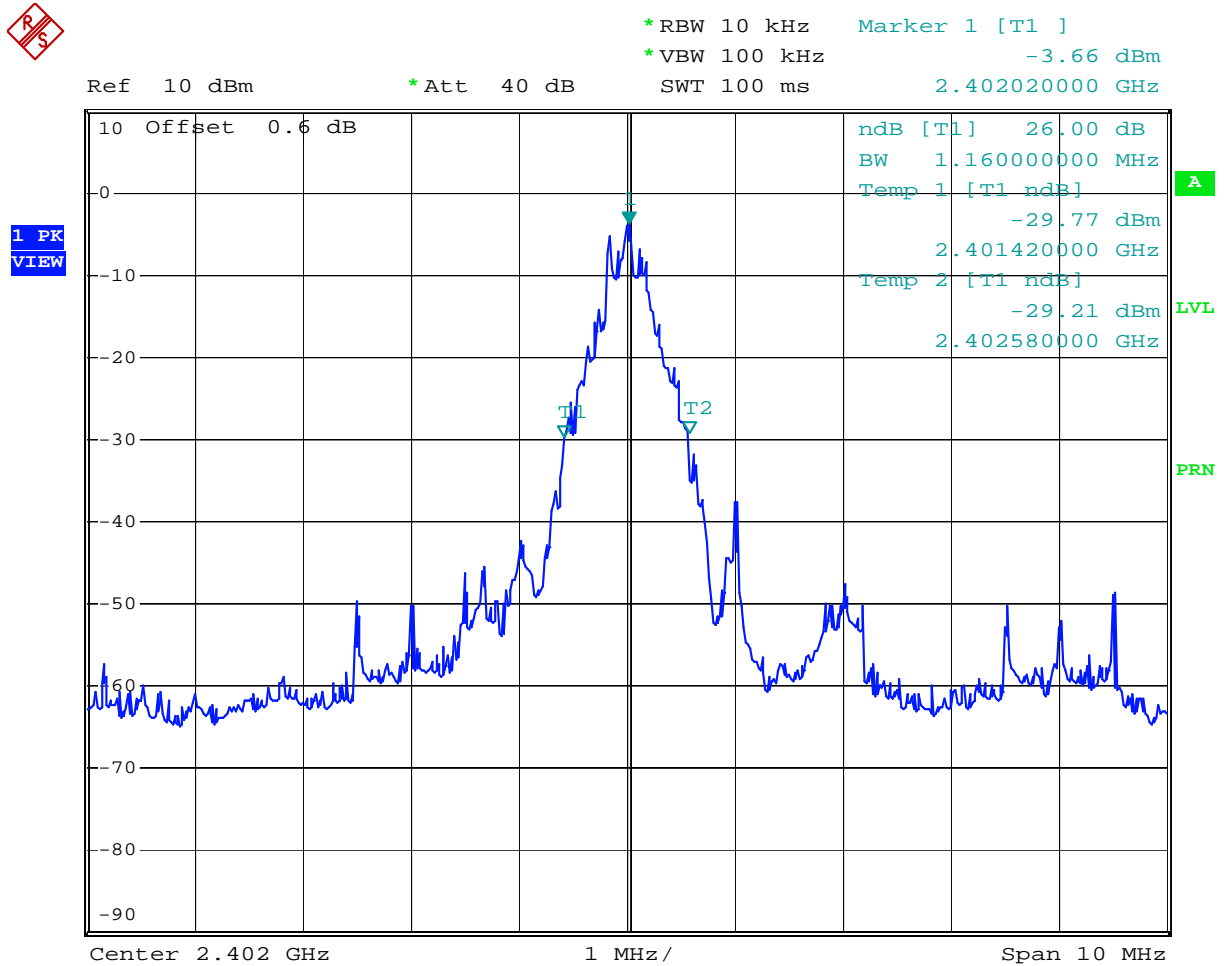
Comment: 26dB BW
Date: 28.OCT.2009 17:24:00

Plot 2.2
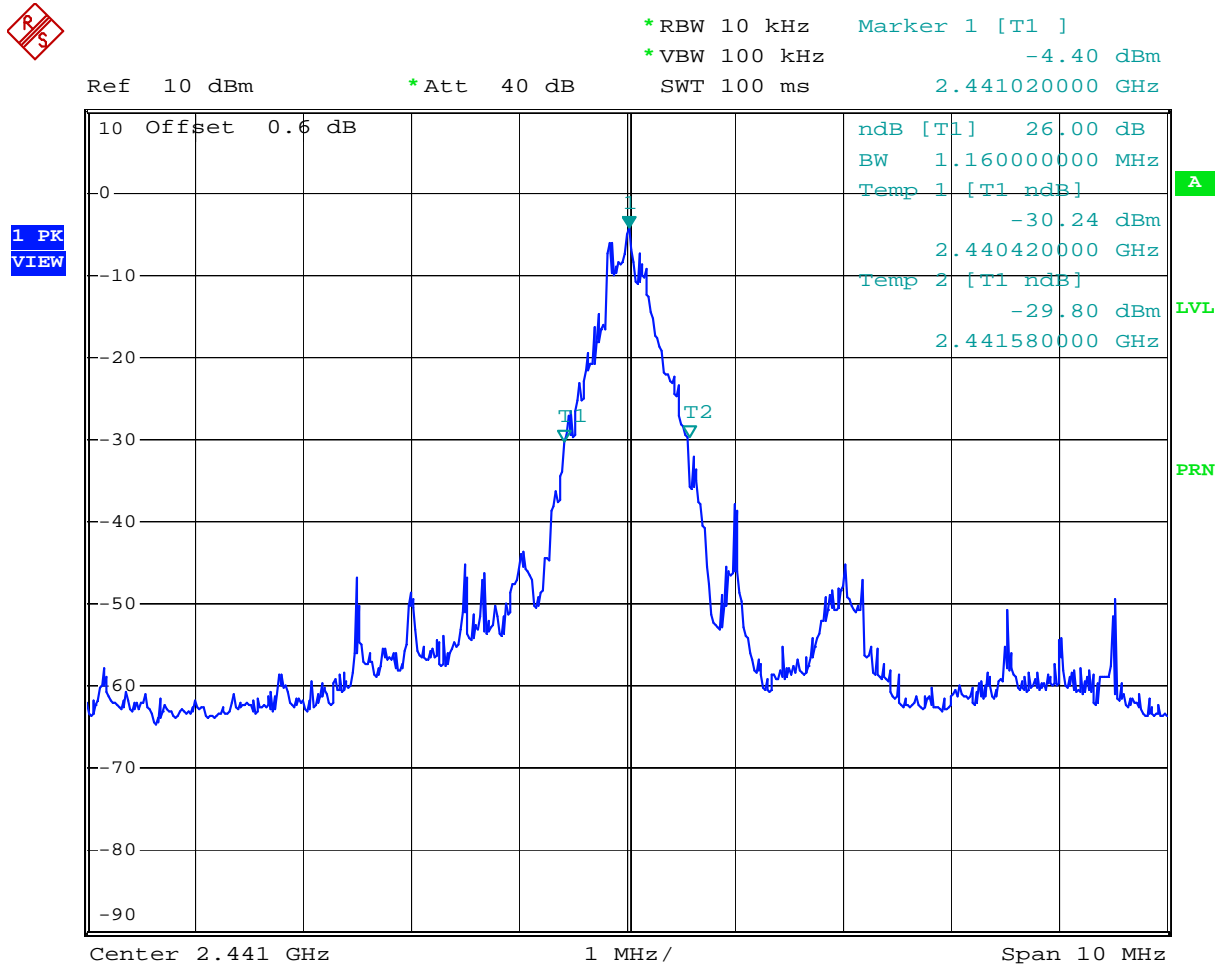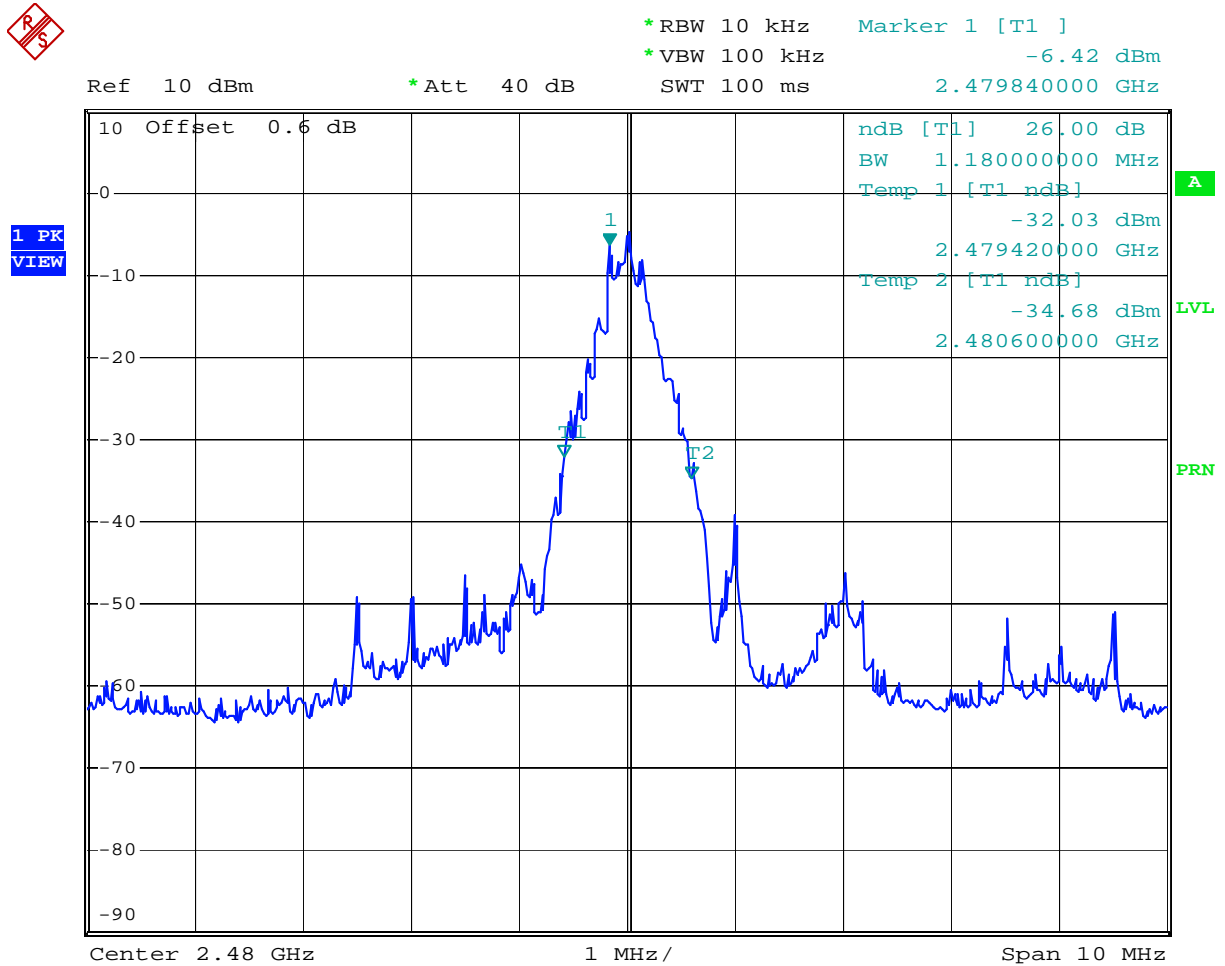
Plot 2.3

Comment: 26dB BW
Date: 28.OCT.2009 17:21:45
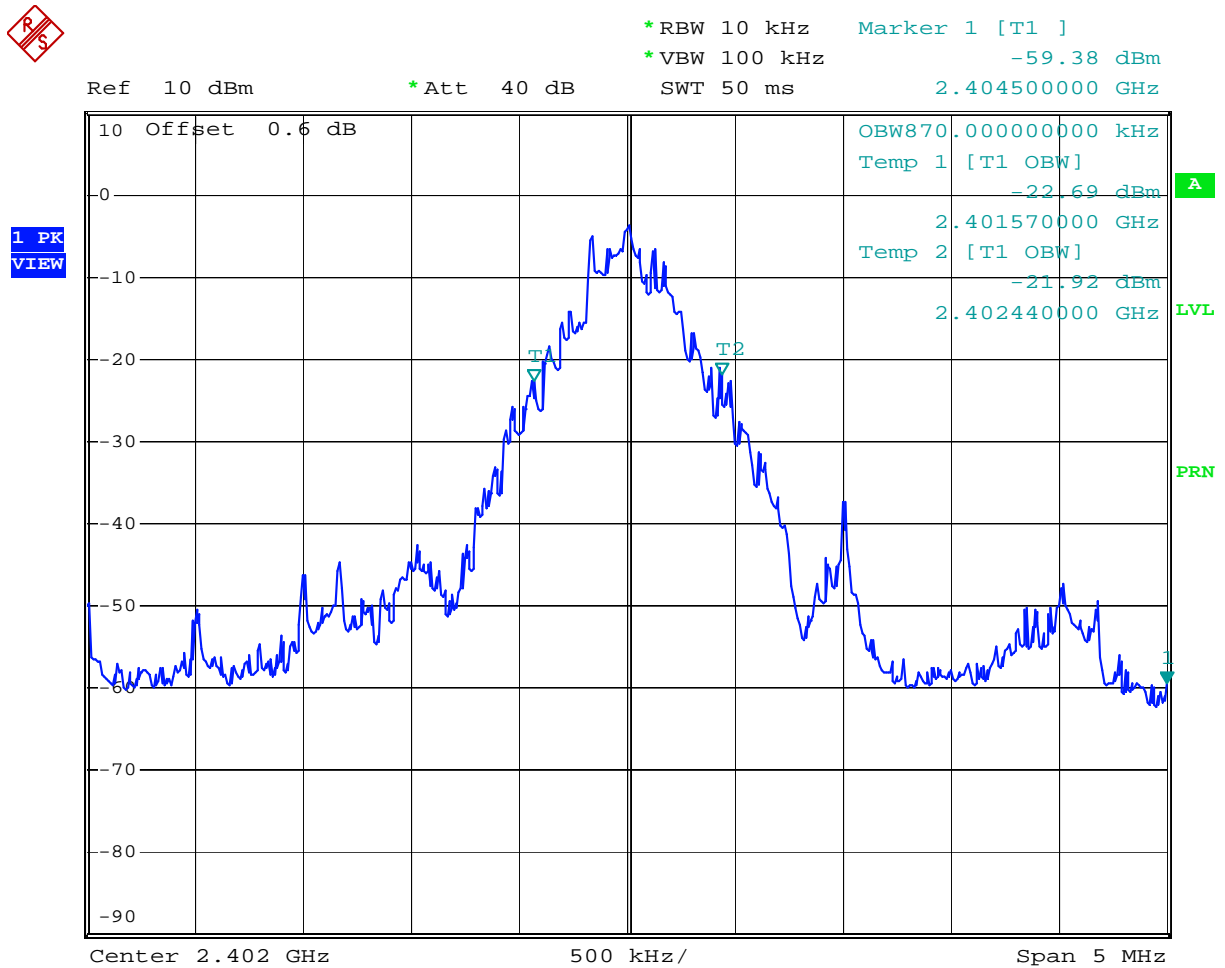
Comment: Occupied BW
Date: 28.OCT.2009 17:04:45

Plot 2.5
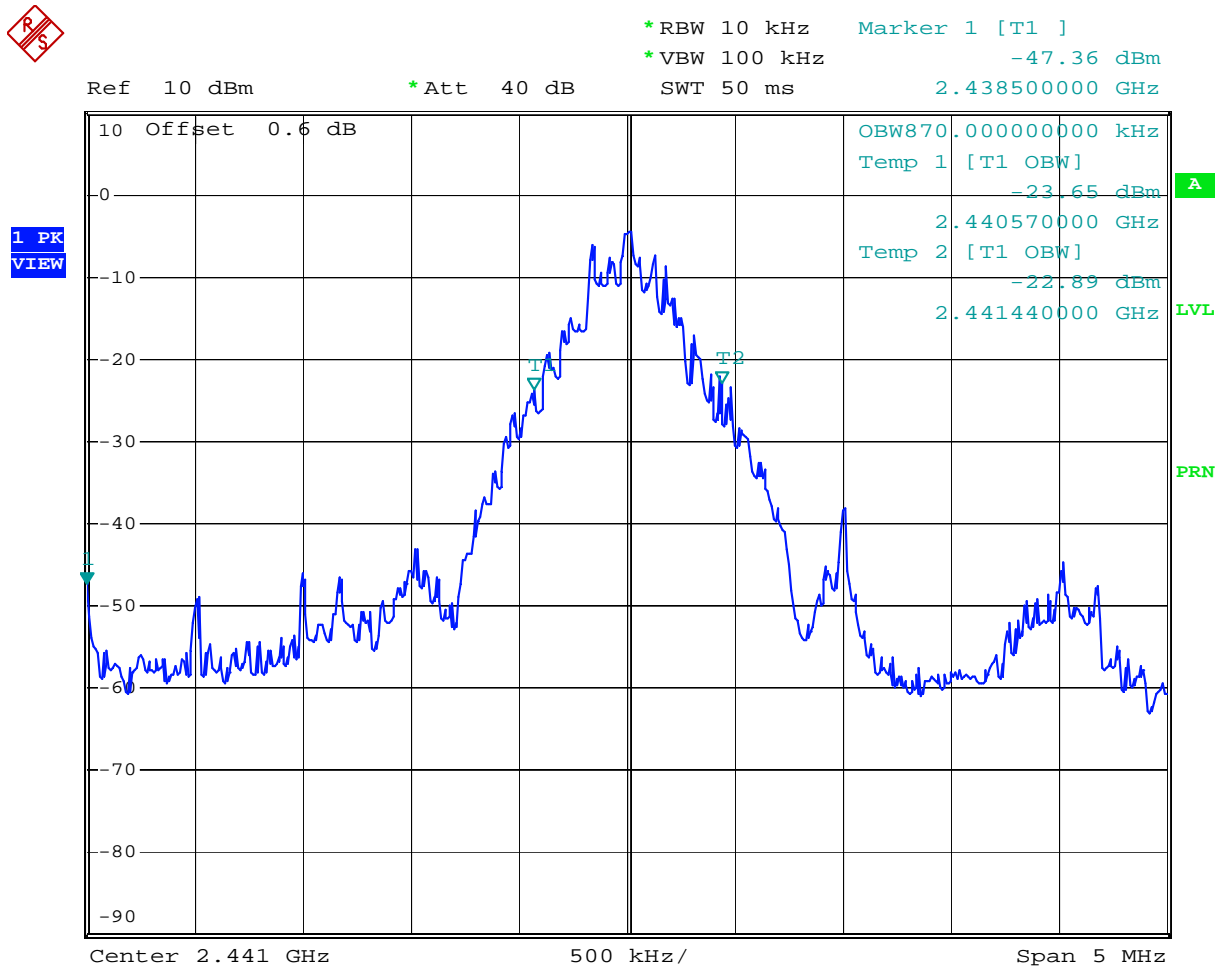
Plot 2.6
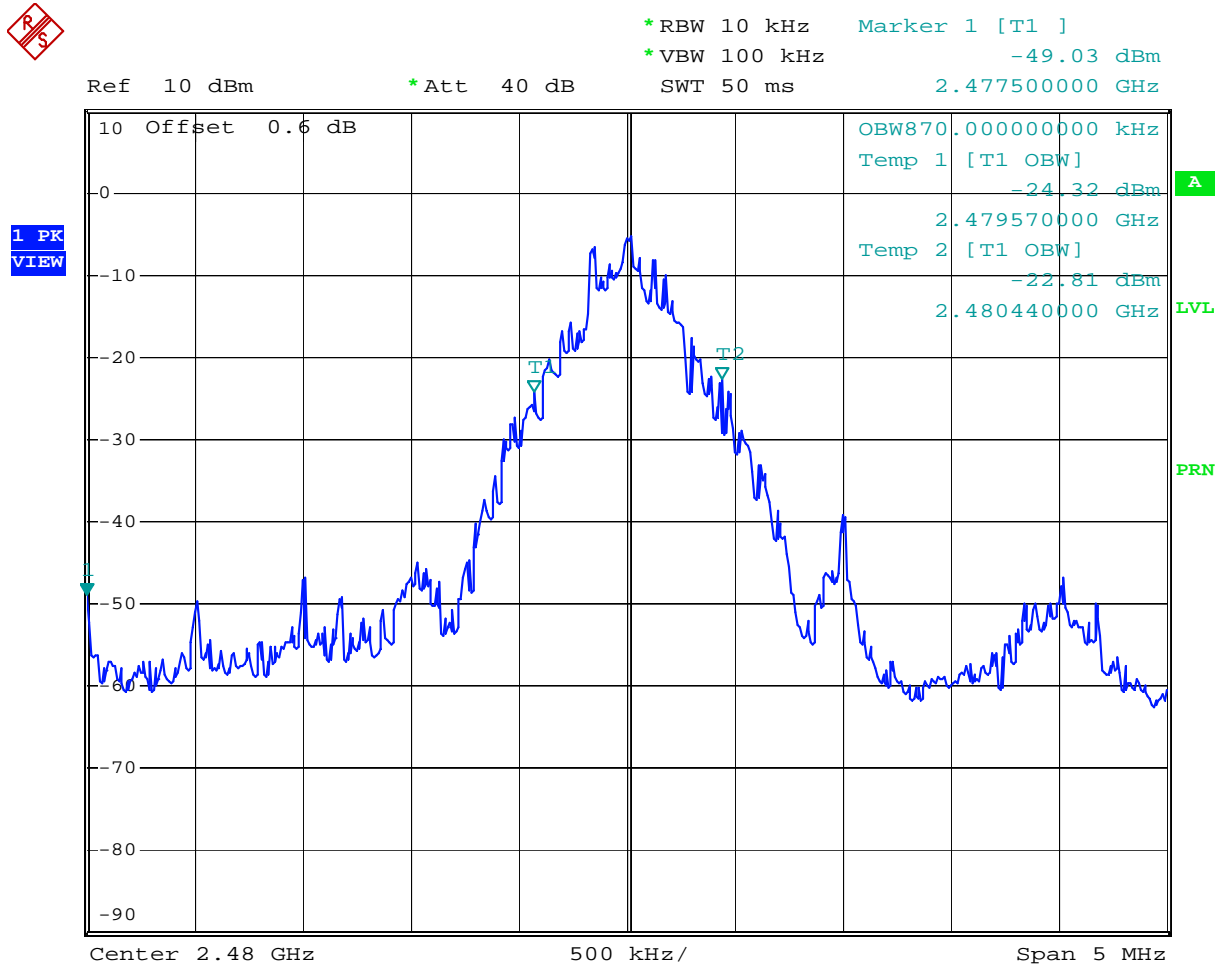
Comment: Occupied BW
Date: 28.OCT.2009   17:08:38

4.3   Carrier Frequency Separation
        FCC Ref: 15.247(a)(1)

Requirement

Systems shall have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20-dB bandwidth of the hopping channel, whichever is greater.

Procedure

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

Test Results

Please refer to the attached spectrum analyzer plot 3.1 and 3.2 for the test result.
The channel separation is 1.008 MHz.

Plot 3.1
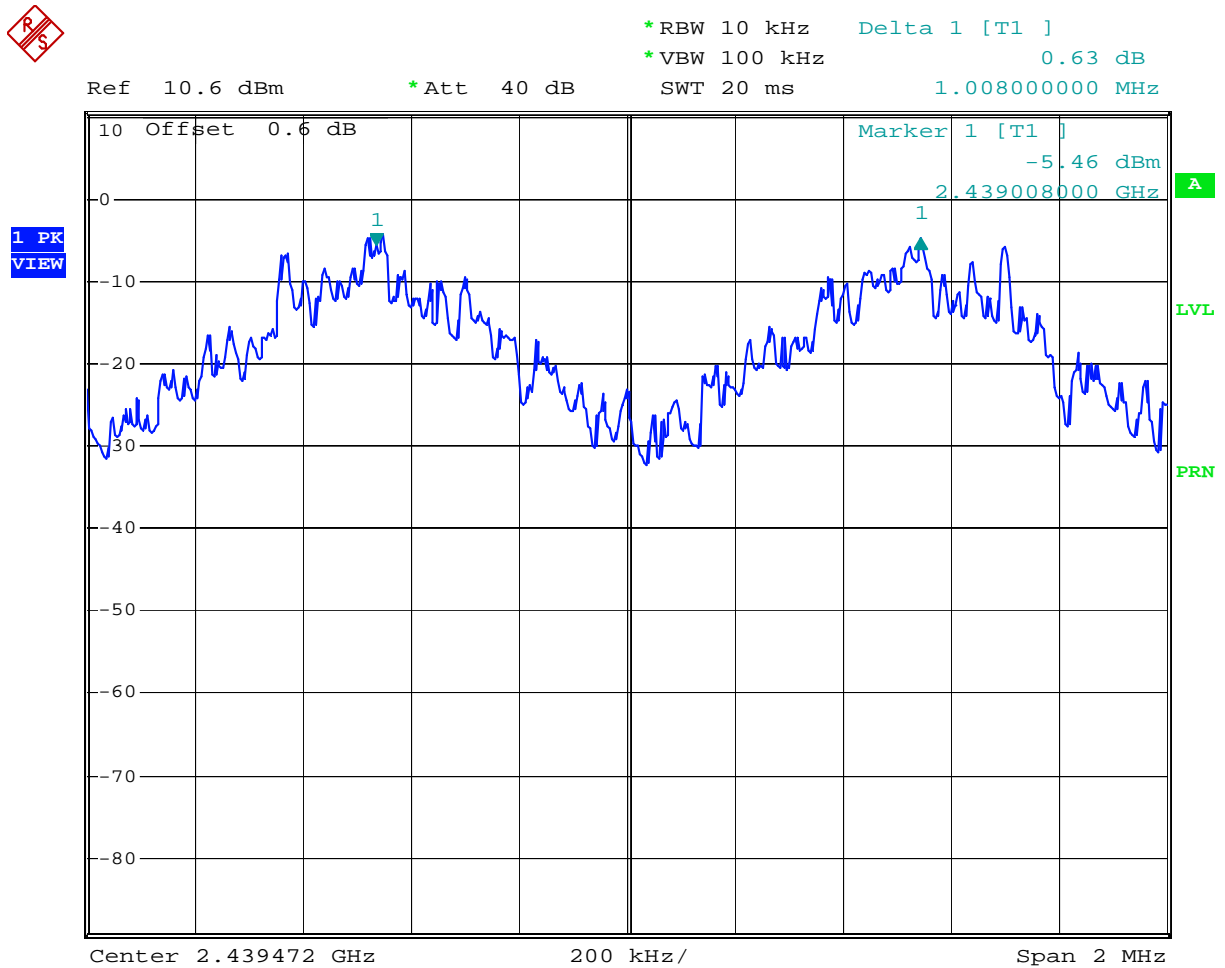
Comment: Carrier frequency separation
Date: 28.OCT.2009   16:37:40

Plot 3.2
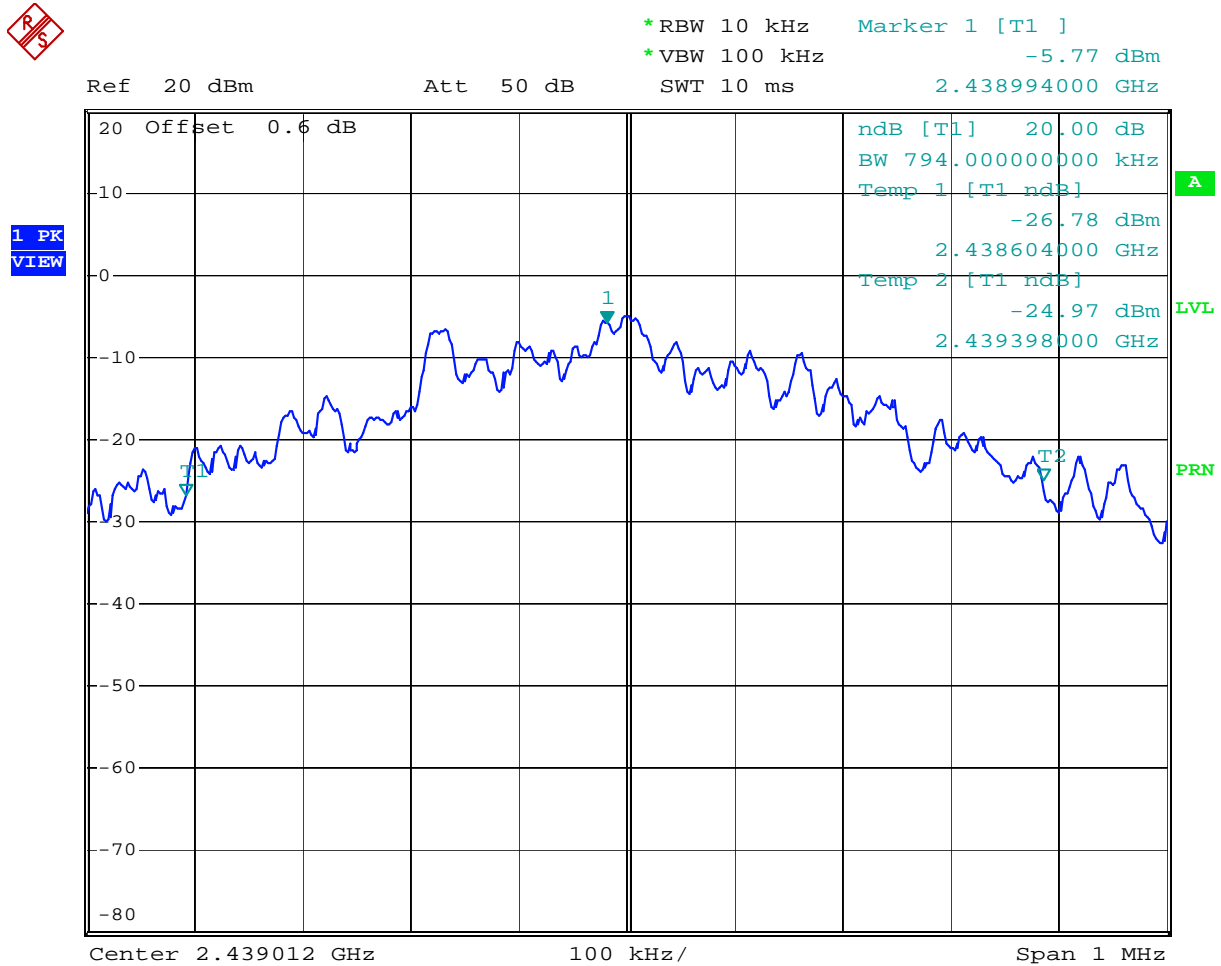
Comment: 20dB BW hopping channel
Date: 28.OCT.2009 16:40:36

4.4   Number of Hopping Channels
         FCC Ref: 15.247(a)(1)(iii)

Requirement

Systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels.

Procedure

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

Test Results

| Number of hopping channels | 79 |

Refer to attached spectrum analyzer charts: Plot 4.1

Plot 4.1

Ref 10 dBm Att 40 dB SWT 2.5 ms

*RBW 300 kHz
*VBW 1 MHz

10 Offset 0.6 dB

1 PK
VIEW

A

LVL

PRN

Start 2.4 GHz 8.35 MHz/ Stop 2.4835 GHz
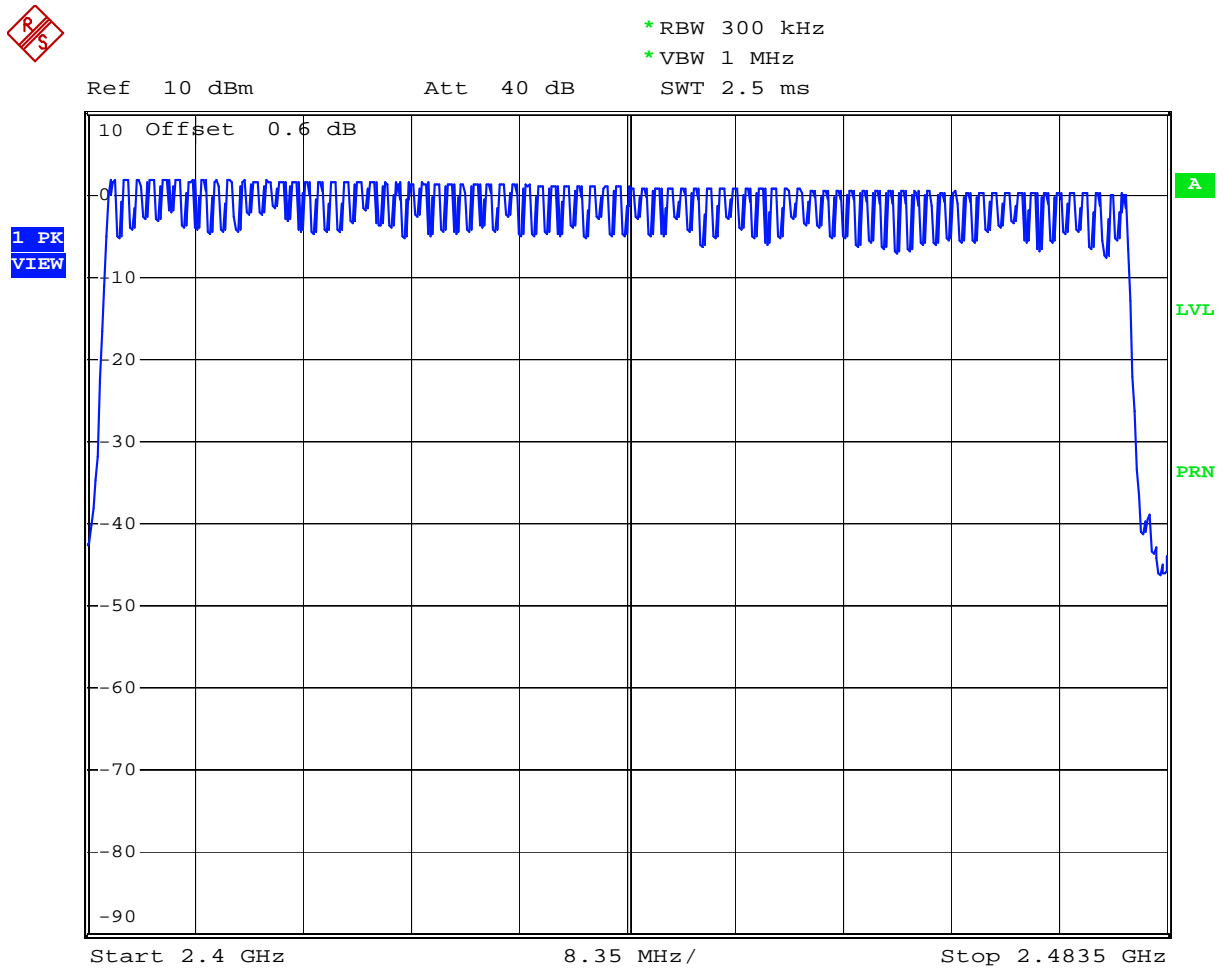
Comment: Number of hopping channels
Date: 27.OCT.2009 19:33:46

4.5   Average Channel Occupancy Time
        FCC 15.247(a)(1)(ii)(iii)

Requirement

For systems operating in the 2400-2483.5 MHz band the average time of occupancy on any channel shall not be greater than 0.4 second within a period of 0.4 second multiplied by the number of hopping channels employed.

Procedure

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

Since the radio is employed 79 hopping channels the Occupancy Time was calculated for the period of 0.4 * 79 = 31.6 sec.

Test Results

Occupancy Time (see plots 5.1 and 5.2)

0.000396 * 32 *10 = 0.12672 sec.

Refer to attached spectrum analyzer plots 5.1-5.2 for details.

Plot 5.1

Plot 5.2

RBW 300 kHz
*VBW 1 MHz
Ref 30 dBm   *Att 40 dB   SWT 3.16 s

Center 2.441 GHz   316 ms/
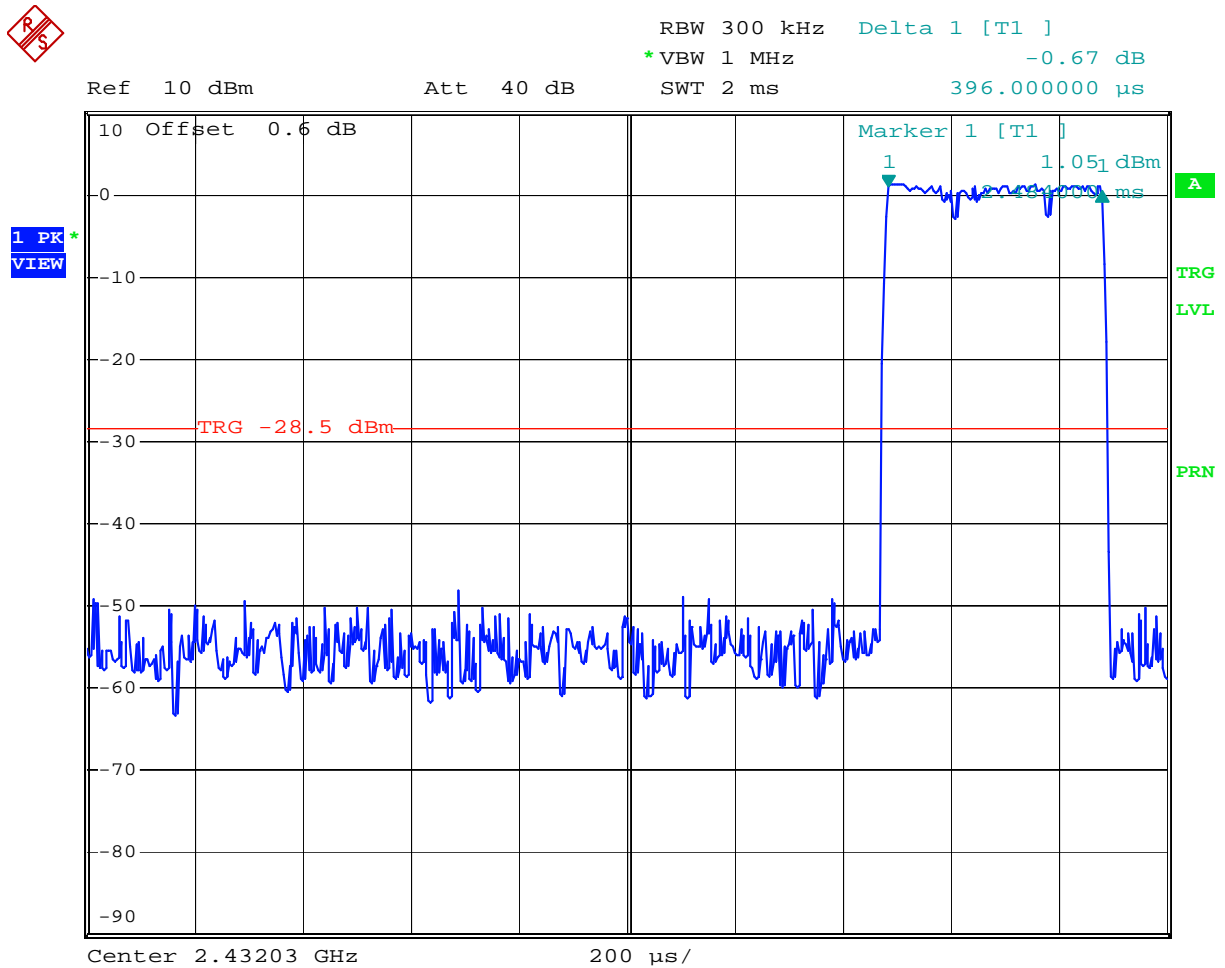
Comment: Dwell time
Date: 28.OCT.2009 16:42:58

4.6   Out-of Band-Conducted Emissions
        FCC 15.247(c)

Requirement

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

Procedure

A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated the in-band and out-of-band emission measurements were performed. The out-of-band emissions were measured from 30 MHz to 25 GHz.

Test Result

Refer to the following plots for the test result:

Description	Comments	Plot number
In-band Emissions, F=2402 MHz	None	6.1
In-band Emissions, F=2441 MHz	None	6.5
In-band Emissions, F=2480 MHz	None	6.9
Emissions on the low band-edge frequency	Fixed channel, 2402 MHz	6.13
Emissions on the low band-edge frequency	Hopping mode	6.14
Emissions on the high band-edge frequency	Fixed channel, 2480 MHz	6.15
Emissions on the high band-edge frequency	Hopping mode	6.16
Out-of-band low Channel Emissions	Fixed channel, 2402 MHz	6.2 – 6.4
Out-of-band middle Channel Emissions	Fixed channel, 2441 MHz	6.6 – 6.8
Out-of-band high Channel Emissions	Fixed channel, 2480 MHz	6.10 – 6.12

The attenuation is more than 20 dB.

Plot 6.1
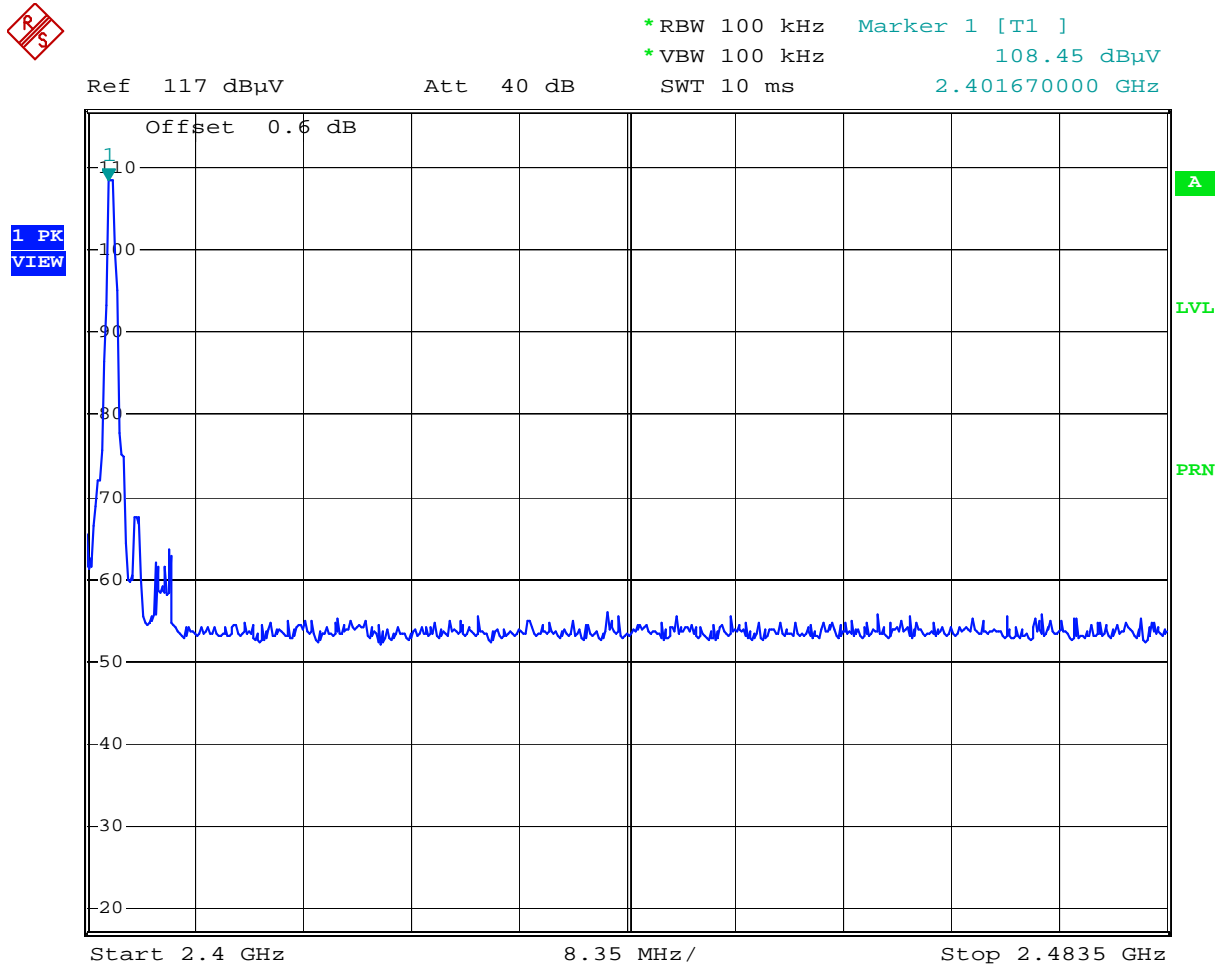
Comment: In-band emission, 2402 MHz (low channel)
Date: 27.OCT.2009   21:37:30

Plot 6.2


```
                                        *RBW  100 kHz    Marker 1 [T1 ]
                                        *VBW  100 kHz              65.25 dBµV
Ref   80 dBµV           *Att   20 dB     SWT  240 ms       2.400000000 GHz
```

Start 30 MHz   237 MHz/   Stop 2.4 GHz
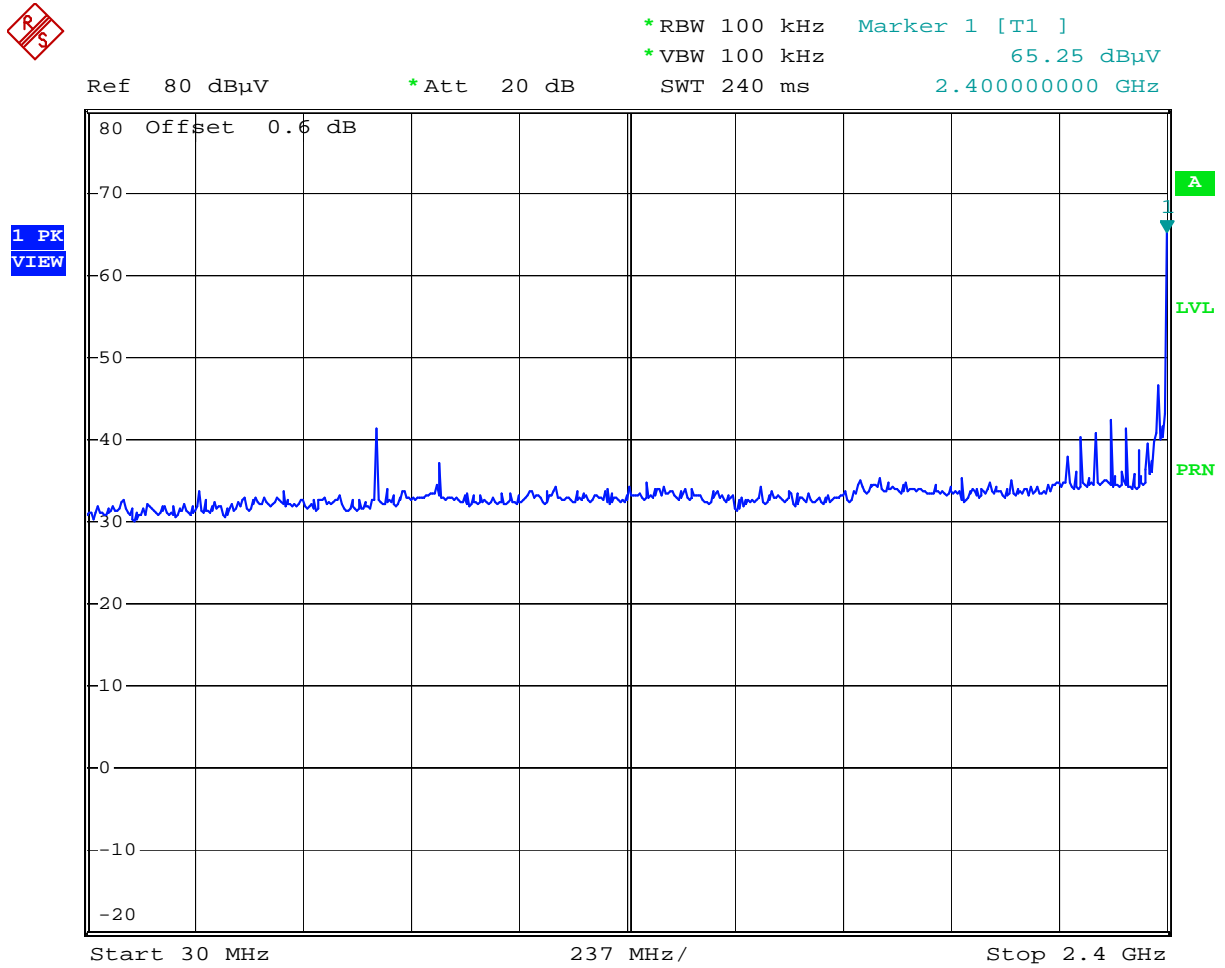
Comment: Spurious out-of-band conducted emission (low channel)
Date: 27.OCT.2009   21:50:41

Plot 6.3

Comment: Spurious out-of-band conducted emission (low channel)
Date: 27.OCT.2009   22:14:48

Plot 6.4


```
                                    *RBW  100 kHz    Marker 1 [T1 ]
                                    *VBW  100 kHz              54.88 dBµV
Ref   90 dBµV          *Att   20 dB    SWT 1.5 s      24.520000000 GHz

90  Offset   0.6 dB
-80                                                              A

1 PK
VIEW
-70                                                            LVL

-60                                                        1
-50                                                            PRN
-40

-30

-20

-10

-0

-10

Start 10 GHz              1.5 GHz/              Stop 25 GHz
```

Comment: Spurious out-of-band conducted emission (low channel)
Date: 27.OCT.2009   22:21:18

Plot 6.5

Comment: In-band emission, 2441 MHz (middle channel)
Date: 27.OCT.2009   21:39:35

Plot 6.6


```
                                        *RBW  100 kHz   Marker 1 [T1 ]
                                        *VBW  100 kHz            41.49 dBµV
 Ref   80 dBµV          *Att   20 dB     SWT  240 ms      2.347860000 GHz
```

Comment: Spurious out-of-band conducted emission (middle channel)
Date: 27.OCT.2009   21:53:46

Plot 6.7

Comment: Spurious out-of-band conducted emission (middle channel)
Date: 27.OCT.2009   22:13:24

Plot 6.8

Comment: Spurious out-of-band conducted emission (middle channel)
Date: 27.OCT.2009   22:23:34

Plot 6.9
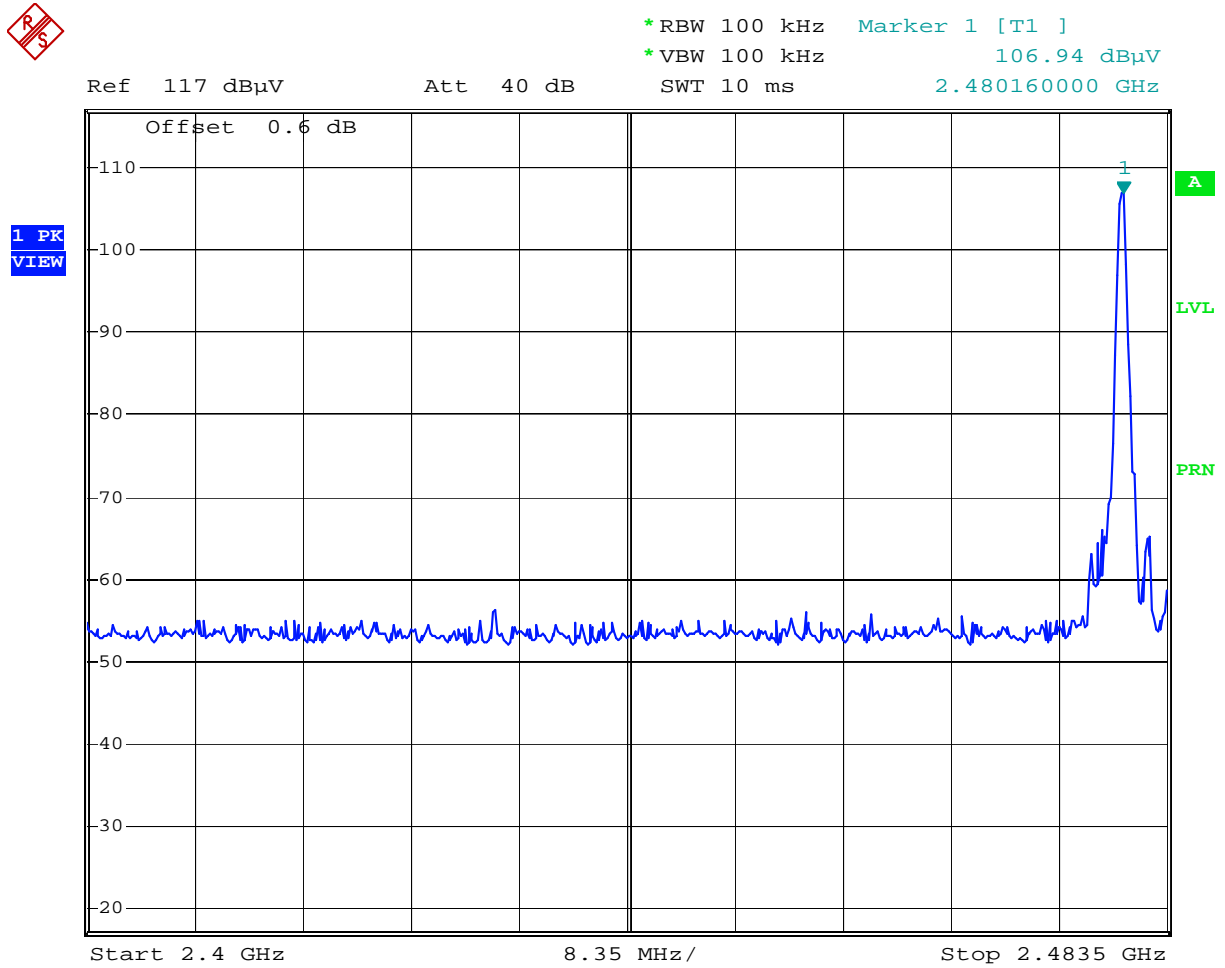
Comment: In-band emission, 2480 MHz (high channel)
Date: 27.OCT.2009   21:43:02

Plot 6.10


```
                                              * RBW  100 kHz    Marker 1 [T1 ]
                                              * VBW  100 kHz              42.92 dBμV
     Ref   80 dBμV            * Att   20 dB     SWT 240 ms      2.352600000 GHz
```
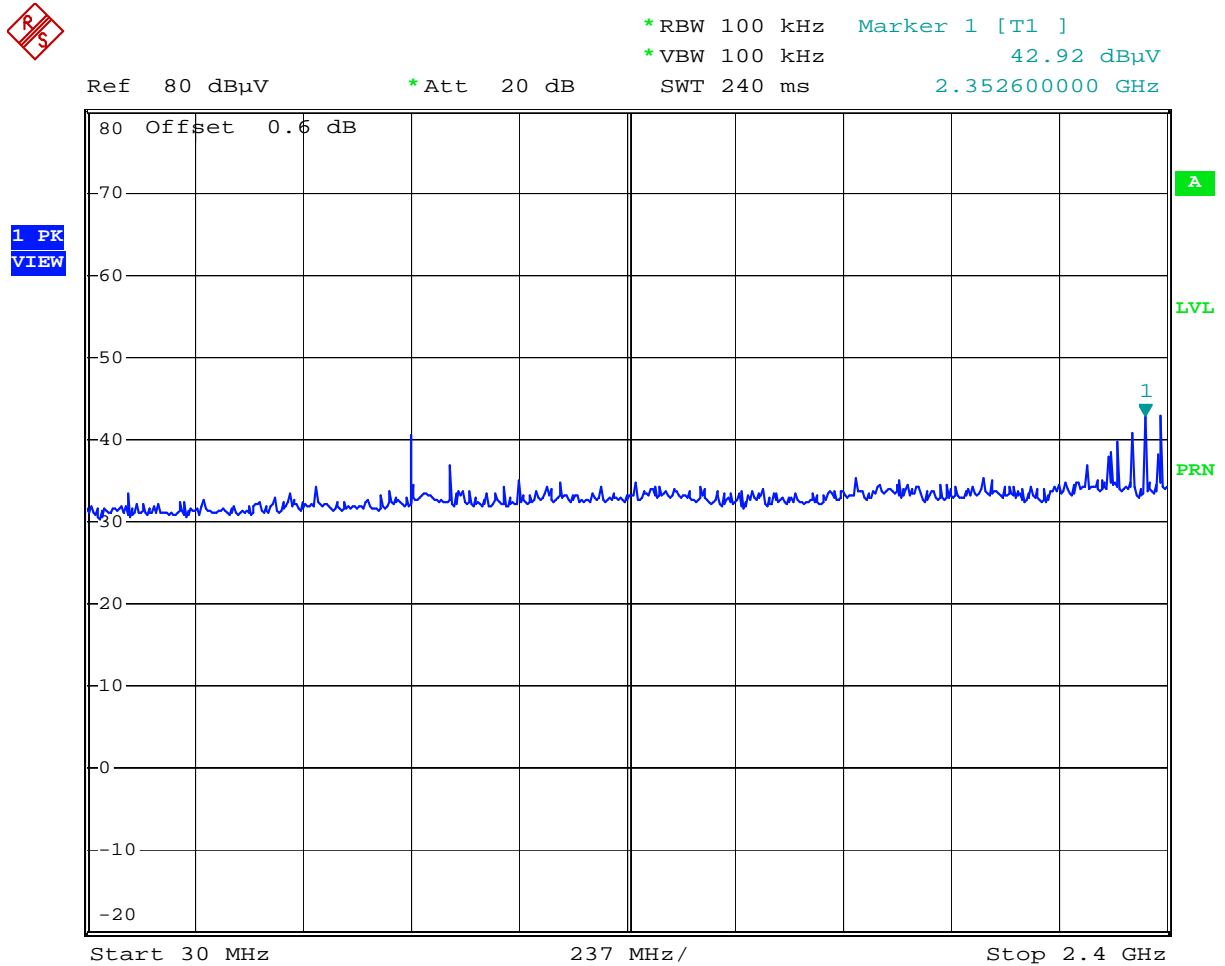
Comment: Spurious out-of-band conducted emission (high channel)
Date: 27.OCT.2009   21:55:38

Plot 6.11
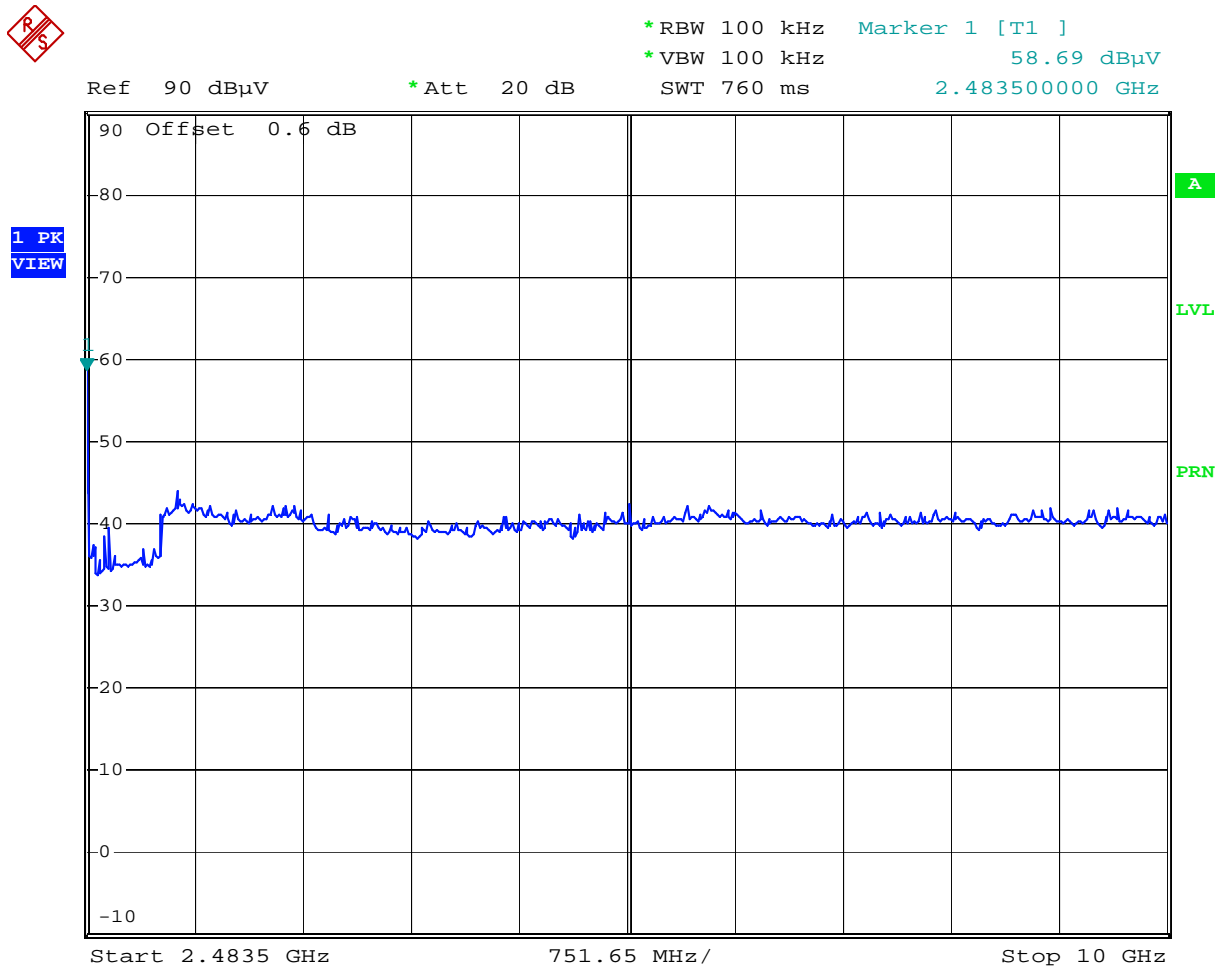
Comment: Spurious out-of-band conducted emission (high channel)
Date: 27.OCT.2009   22:09:57

Plot 6.12
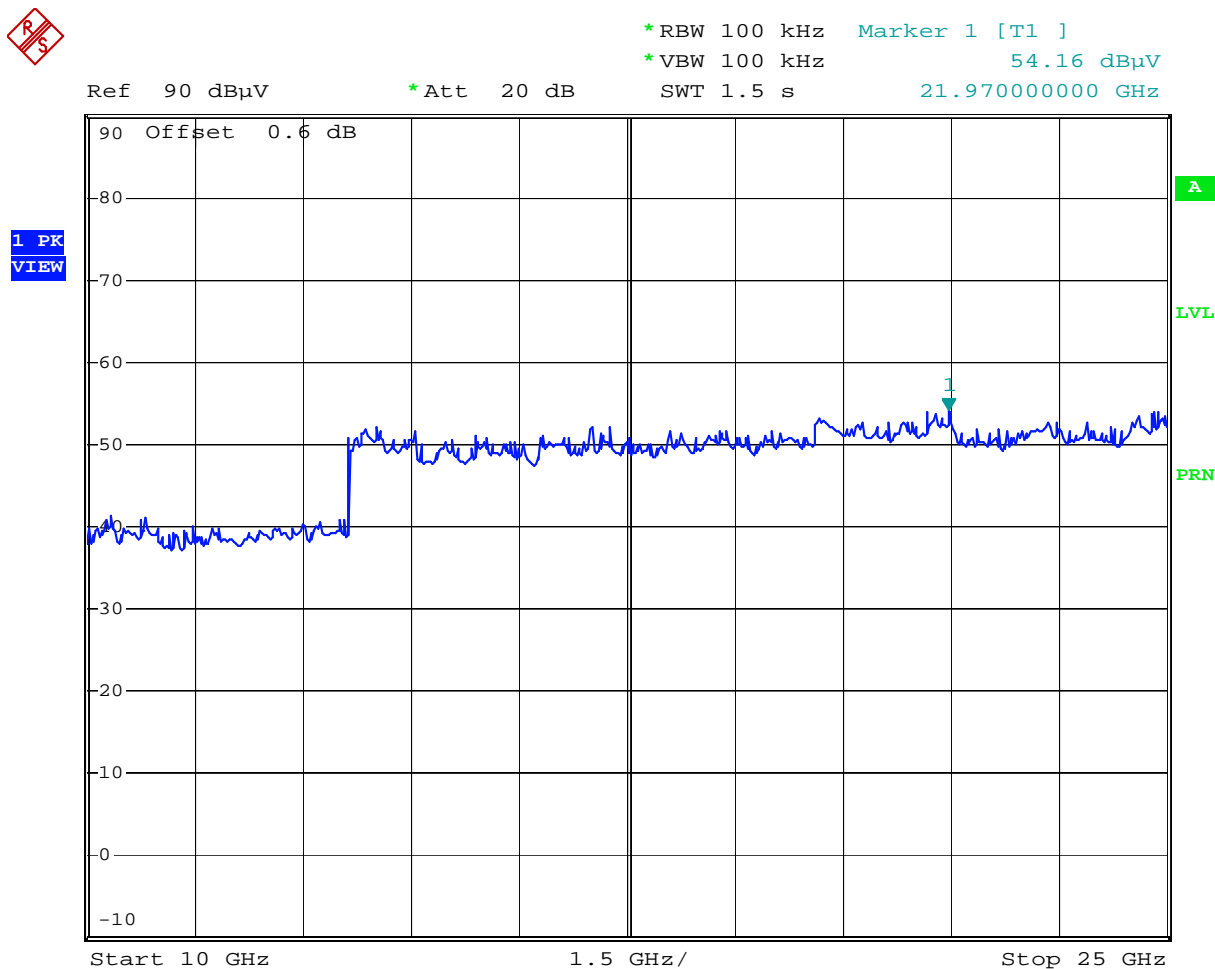
Comment: Spurious out-of-band conducted emission (high channel)
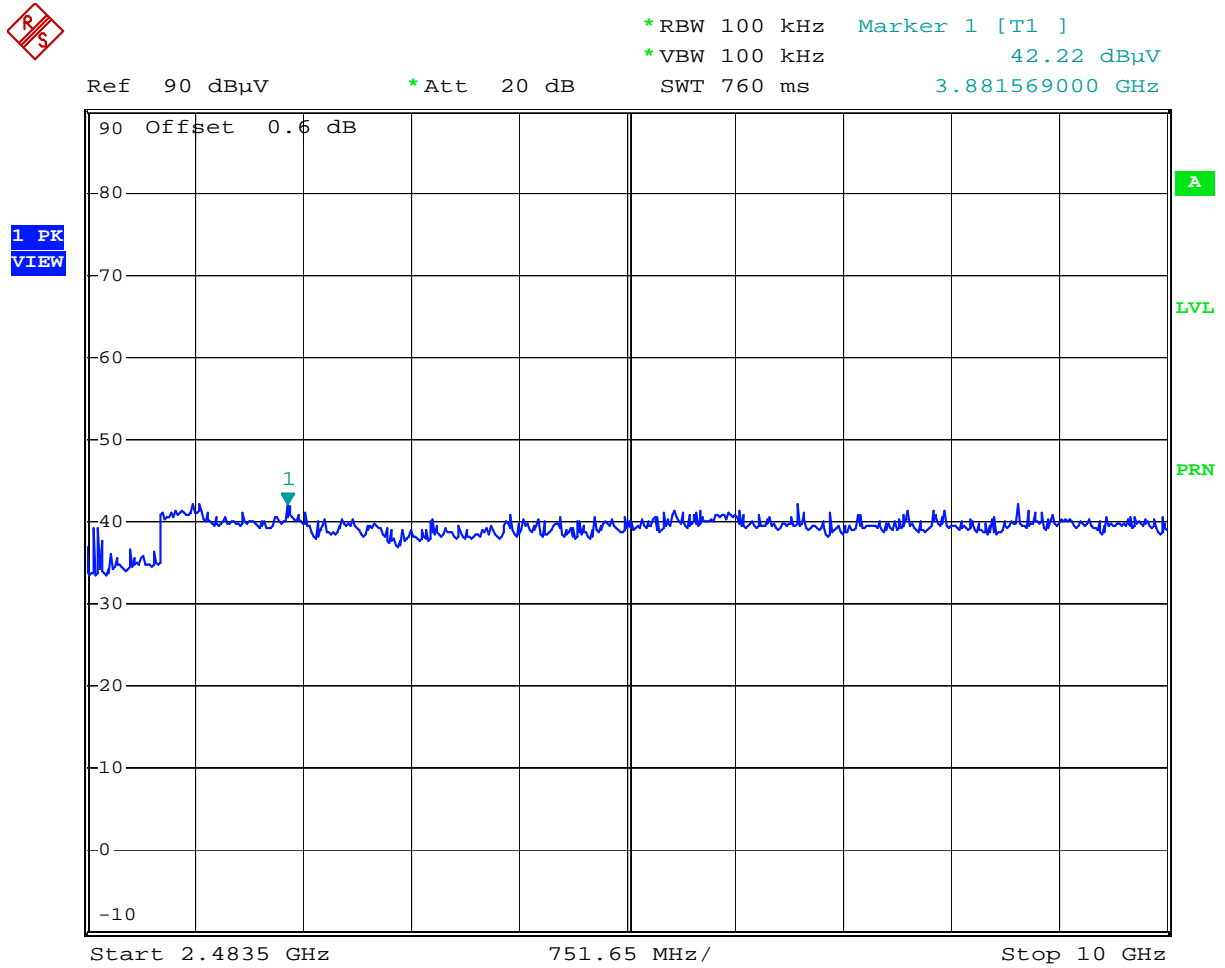Date: 27.OCT.2009   22:34:52

Plot 6.13
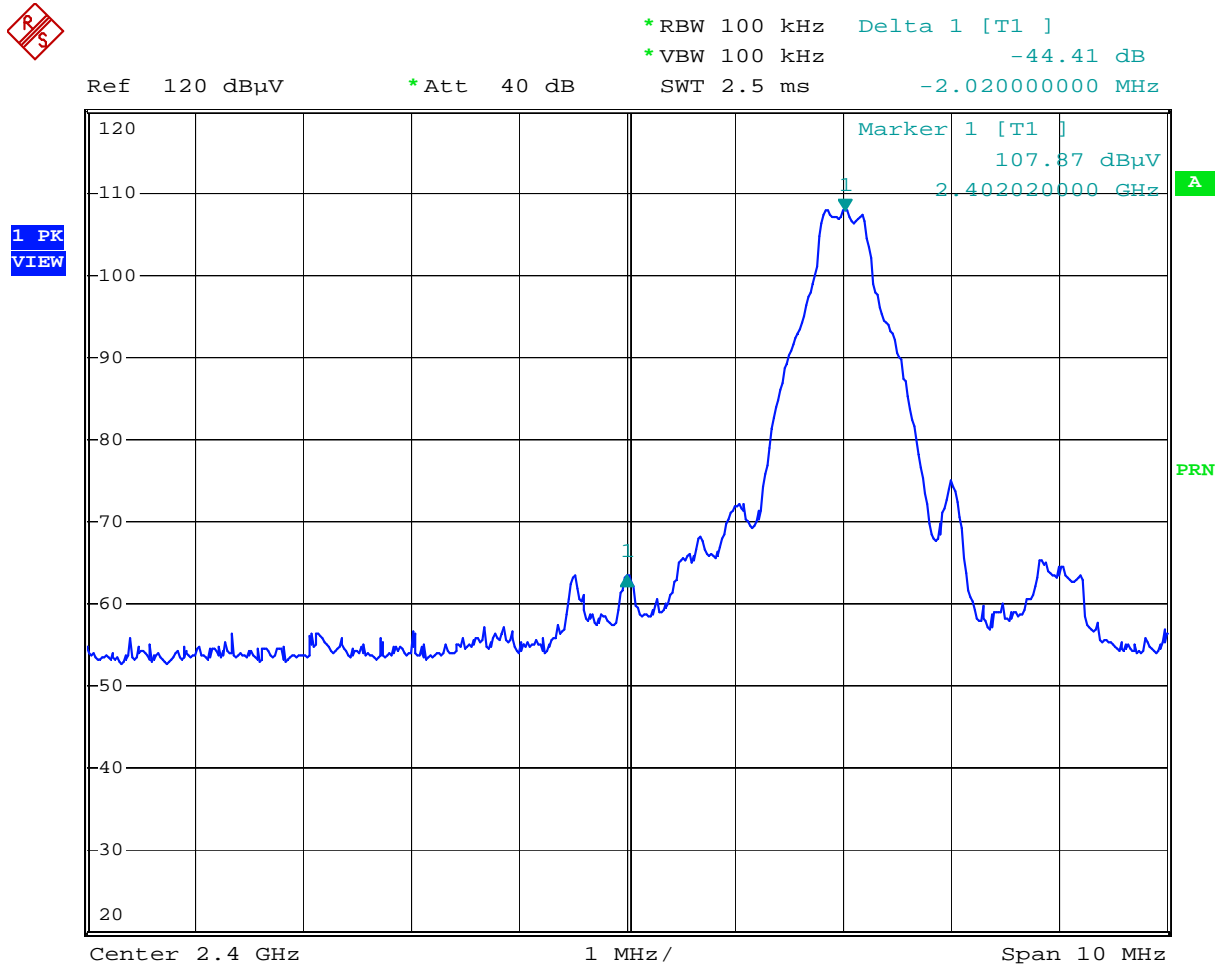
Comment: Spurious out-of-band conducted emission (low channel)
Date: 27.OCT.2009 22:48:26

Plot 6.14


```
                                      *RBW  100 kHz    Delta 1 [T1 ]
                                      *VBW  100 kHz            -46.28 dB
 Ref   120 dBµV        *Att   40 dB    SWT  2.5 ms        -4.040000000 MHz

  120                                            Marker 1 [T1 ]
                                                     107.74 dBµV       A
  110                                            2.404020000 GHz
1 PK
VIEW
  100
                                                                      PRN
   90
   80
   70
   60
   50
   40
   30
   20
 Center 2.4 GHz             1 MHz/              Span 10 MHz
```
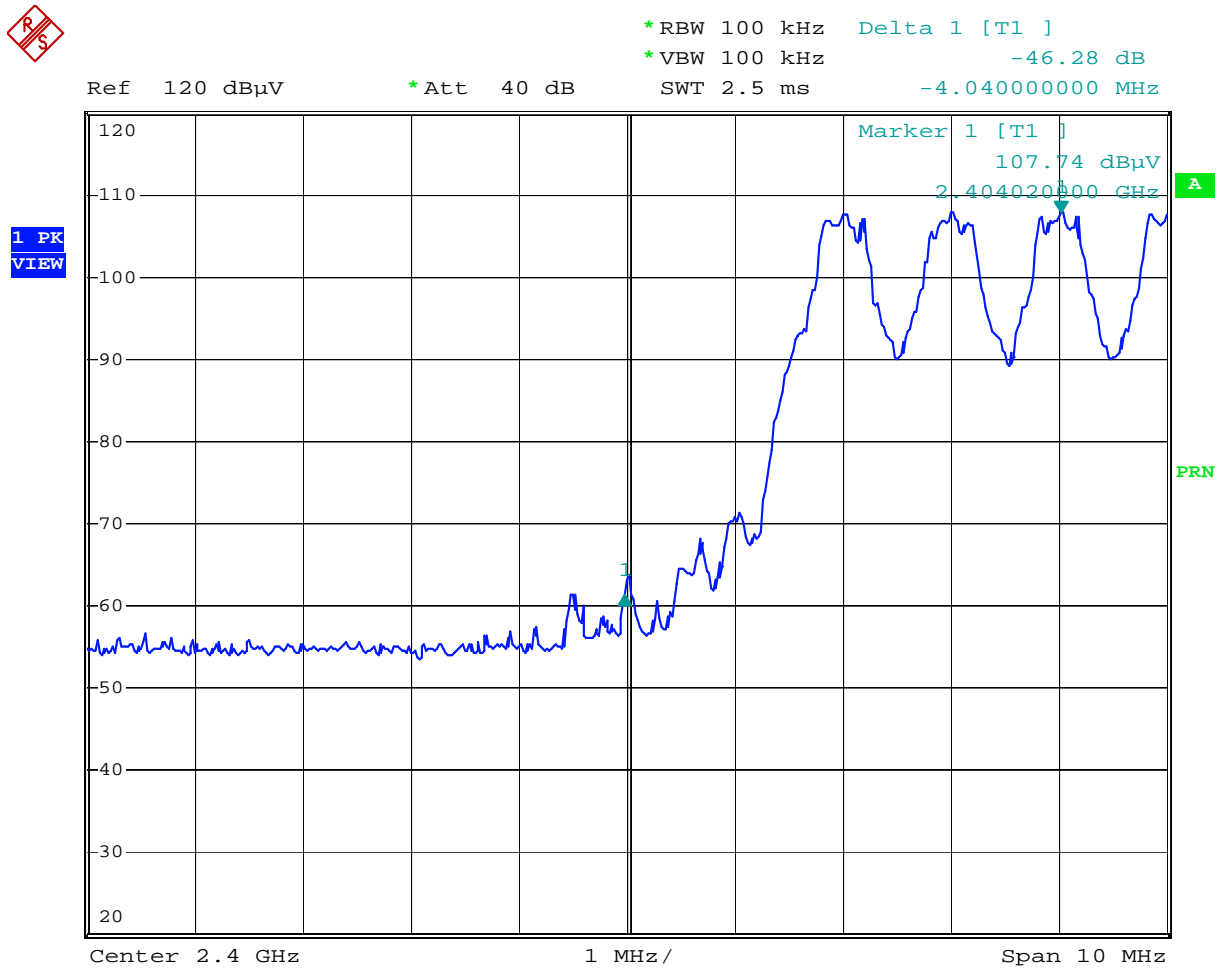
Comment: Spurious out-of-band conducted emission (low channel)
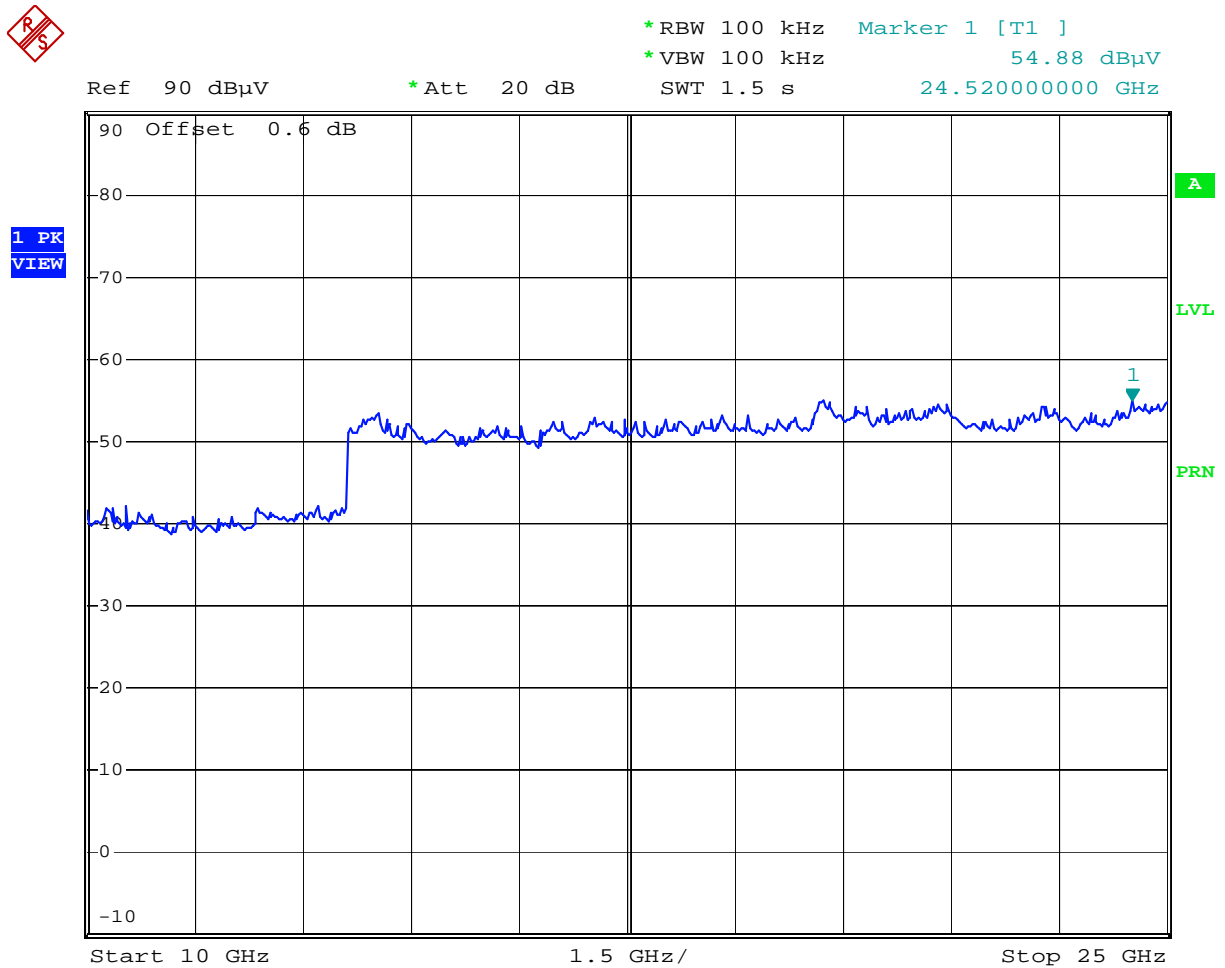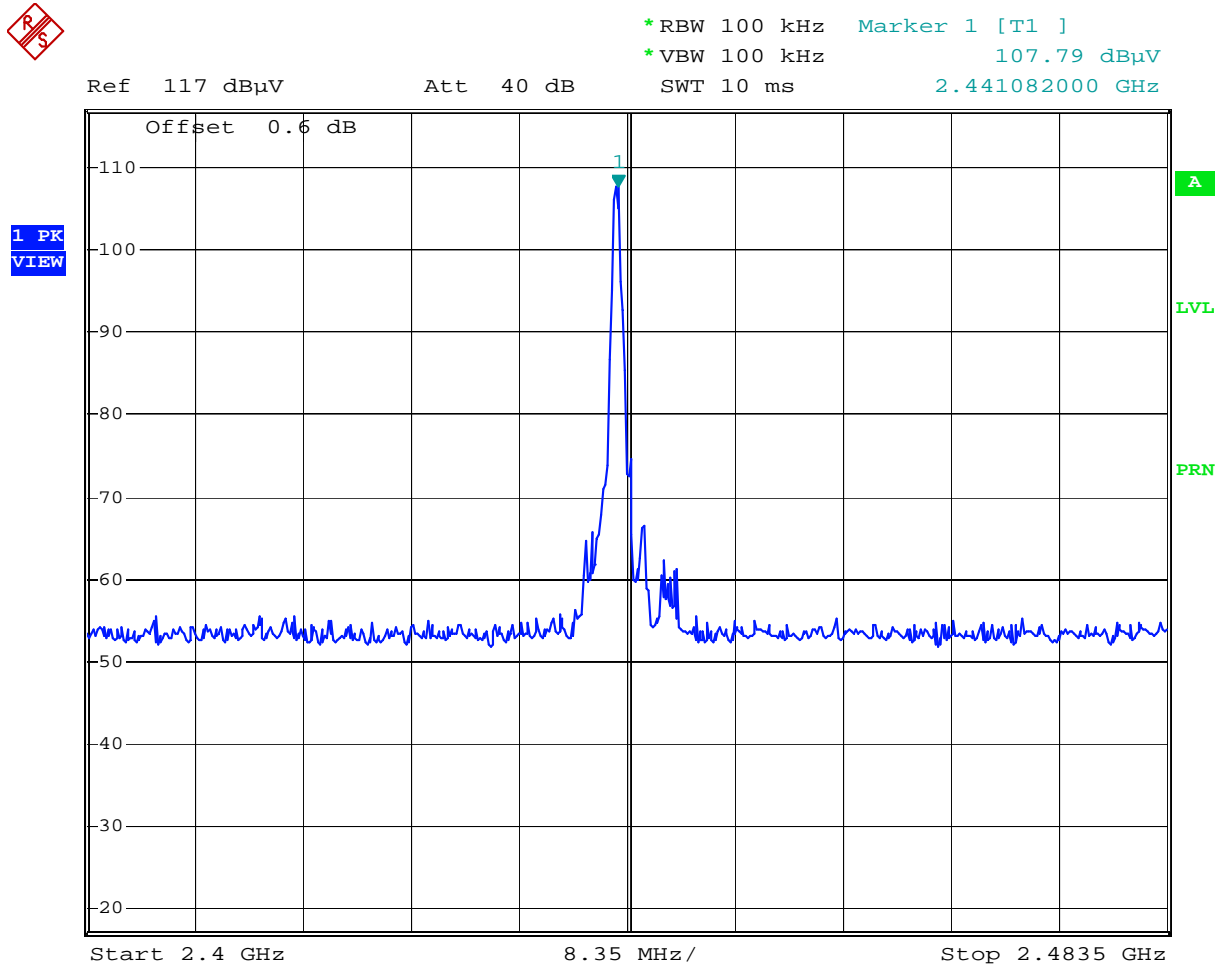Date: 27.OCT.2009   22:57:33

Plot 6.15
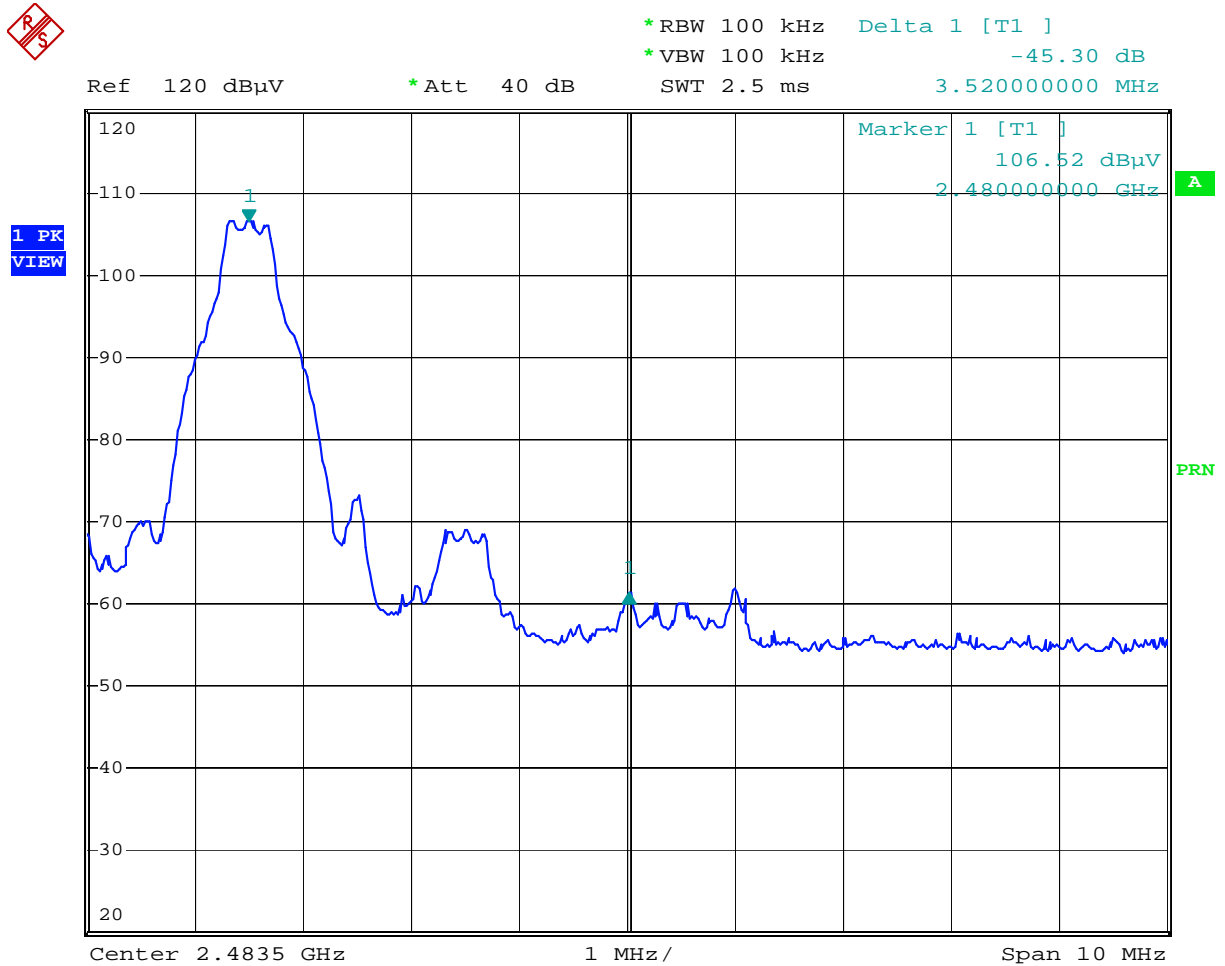
Comment: Spurious out-of-band conducted emission (high channel)
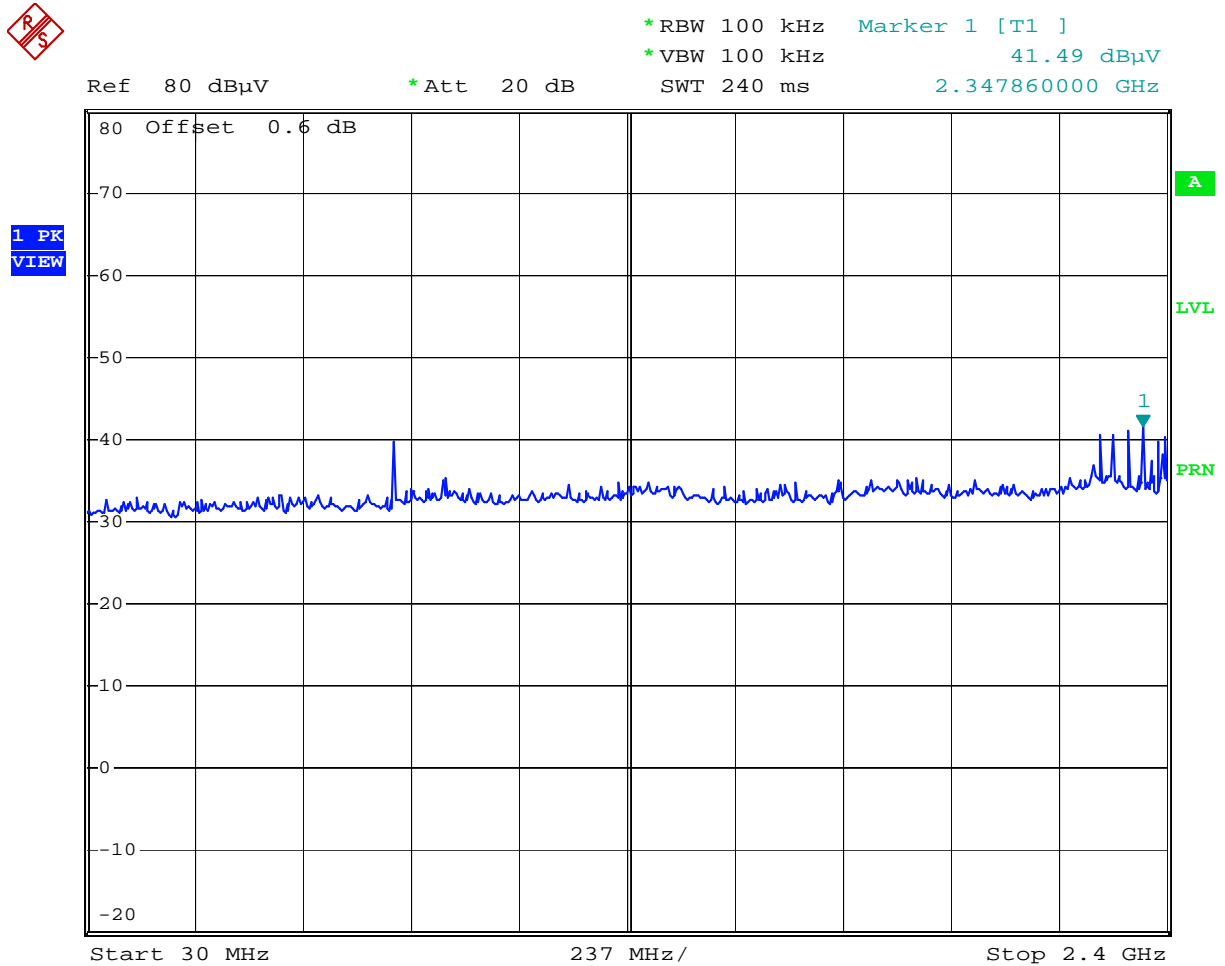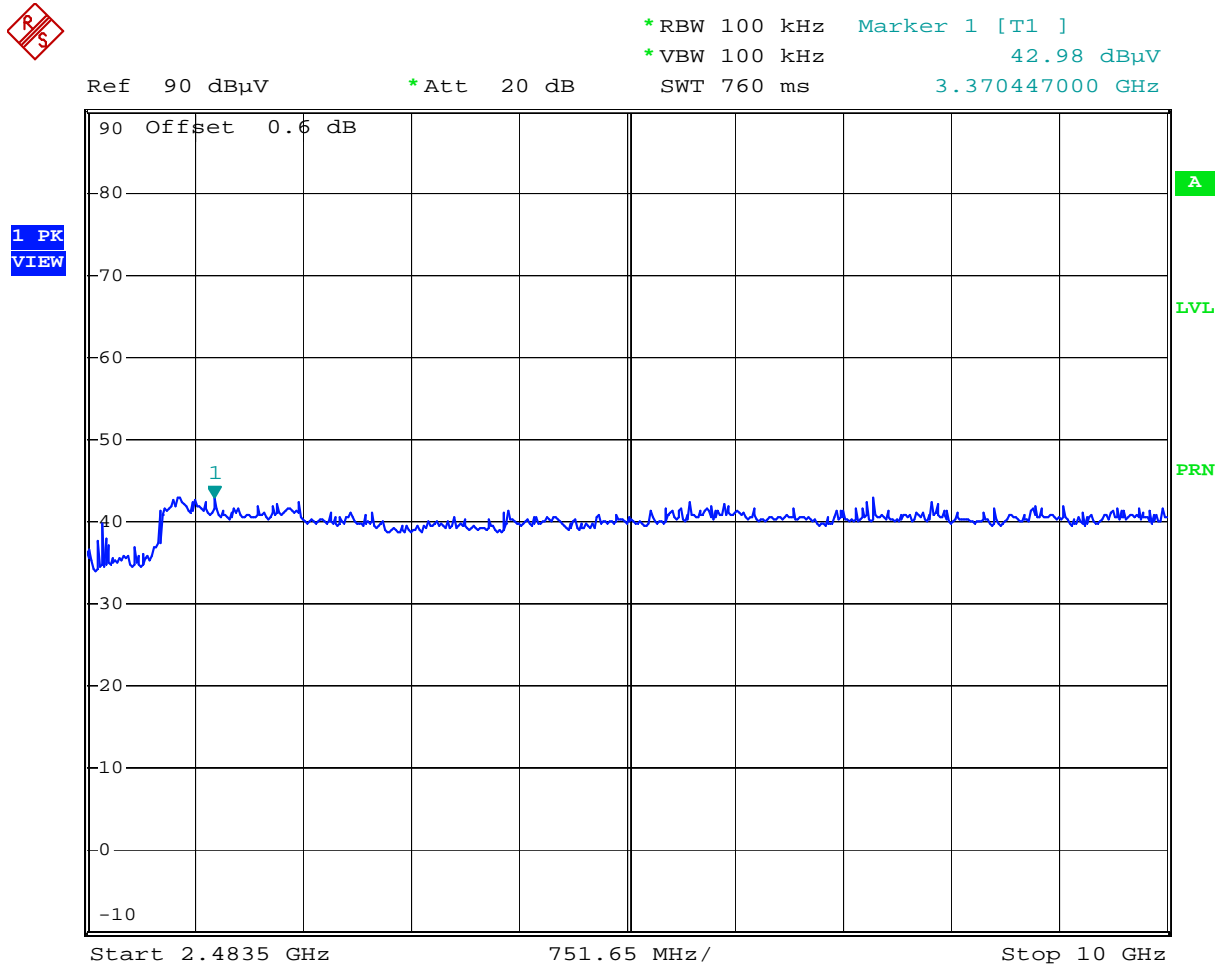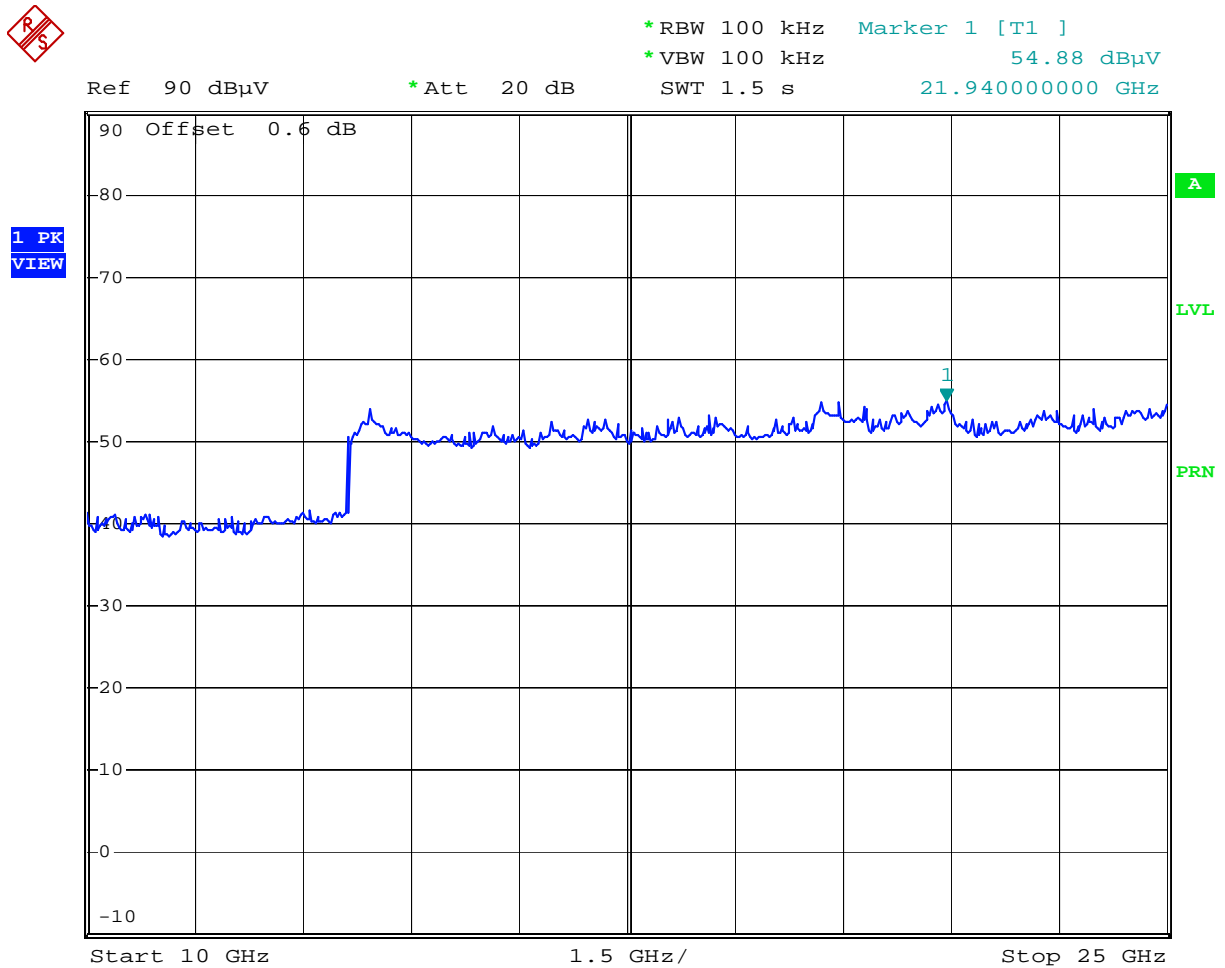Date: 27.OCT.2009   23:14:35

Plot 6.16
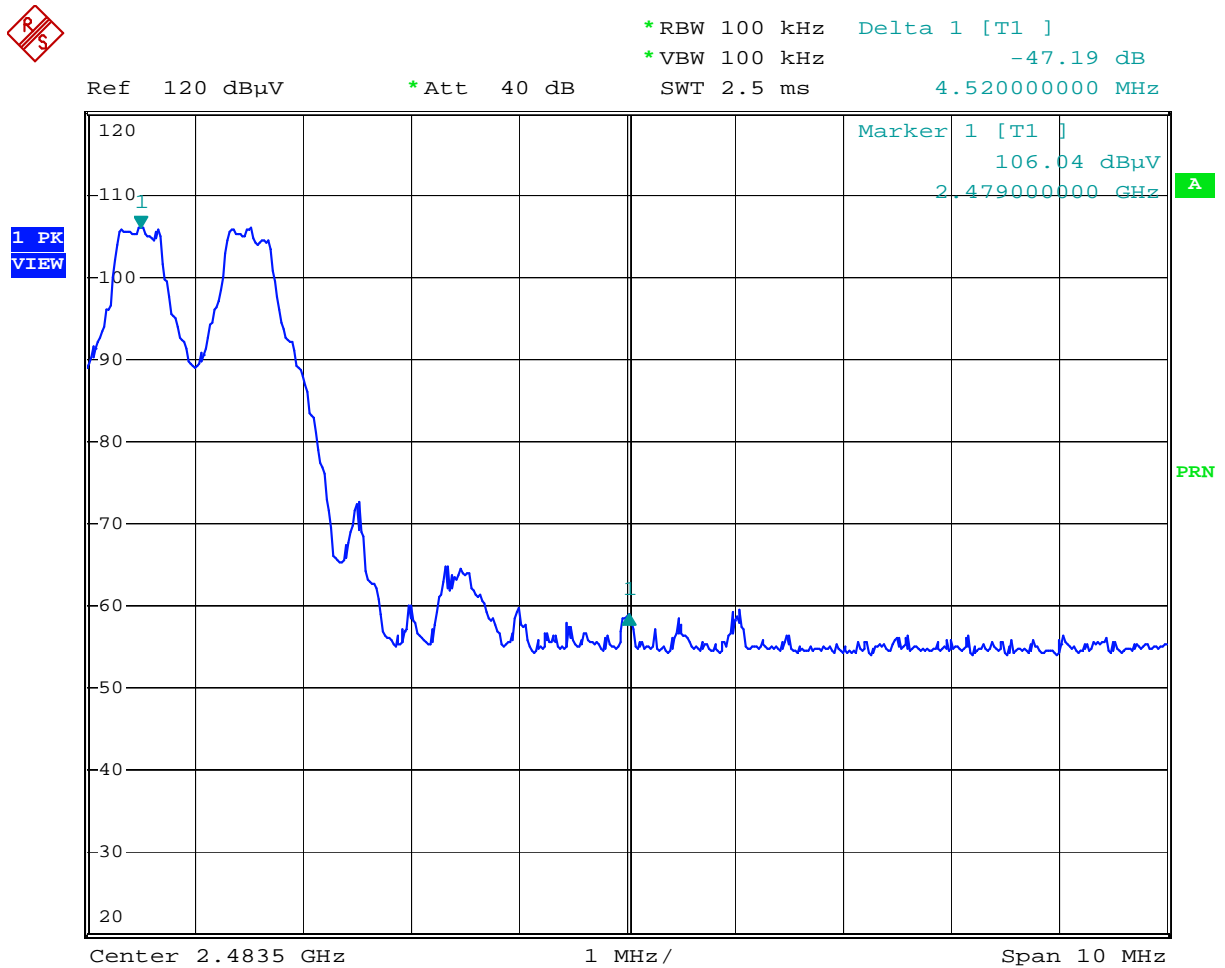
Comment: Spurious out-of-band conducted emission (high channel)
Date: 27.OCT.2009   23:06:10

4.7   Out-of-Band Radiated Emissions (except emissions in restricted bands)
           FCC 15.247(c)

For out-of-band radiated emissions (except for frequencies in restricted bands) that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Not performed, the EUT passed out-of-band antenna conducted emission test.

4.8   **Transmitter Radiated Emissions in Restricted Bands**
             FCC 15.247 (c), 15.205

Procedure

Radiated emission measurements were performed from 30 MHz to 25,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

The EUT is placed on a non-conductive table. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing all cables were manipulated to produce worst case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

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

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where   FS = Field Strength in dB(μV/m)
                 RA = Receiver Amplitude (including preamplifier) in dB(μV)
                 CF = Cable Attenuation Factor in dB
                 AF = Antenna Factor in dB
                 AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
AF = 7.4 dB(1/m)
CF = 1.6 dB
AG = 29.0 dB
FS = 52.0+7.4+1.6-29.0 = 32 dB(μV/m)
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

Result

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

The radiated emissions in the restricted bands near the operating band are presented on the following Plots 8.1 to 8.4. On these plots antenna factor and cable loss are included in the OFFSET of the spectrum analyzer reading, therefore the readings are field strength.

The EUT passed the test by 0.8 dB.

Test Result
FCC Part 15.247 Radiated Emission in Restricted Bands
Temperature: 20C   JavadGNSS, Inc.
Humidity: 50%   Model: BT4EX8M
Test distance = 3 m
Test date: October 28, 2009

Frequency MHz	Detector	SA reading dB(uV)	Correction Factor dB	Duty * cycle dB	Ant. Factor dB(1/m)	Field Strength dB(uV/m)	Limit dB(uV/m)	Margin dB
Tx at 2402 MHz								
4804	Peak	57.8	-27.0	-	33.0	63.8	74.0	-10.2
4804	Aver	56.2	-27.0	-10.0	33.0	52.2	54.0	-1.8
12010	Peak	34.6	-21.8	-	39.2	52.0	74.0	-22.0
12010	Aver	30.8	-21.8	-10.0	39.2	38.2	54.0	-15.8
Tx at 2441 MHz								
4882	Peak	58.1	-26.8	-	33.2	64.5	74.0	-9.5
4882	Aver	56.8	-26.8	-10.0	33.2	53.2	54.0	-0.8
7323	Peak	37.2	-23.2	-	36.1	50.1	74.0	-23.9
7323	Aver	34.6	-23.2	-10.0	36.1	37.5	54.0	-16.5
12205	Peak	35.0	-22.0	-	39.0	52.0	74.0	-22.0
12205	Aver	30.9	-22.0	-10.0	39.0	37.9	54.0	-16.1
Tx at 2480 MHz								
4960	Peak	52.9	-26.6	-	33.4	59.7	74.0	-14.3
4960	Aver	51.5	-26.6	-10.0	33.4	48.3	54.0	-5.7
7440	Peak	36.6	-23.1	-	36.4	49.9	74.0	-24.1
7440	Aver	34.5	-23.1	-10.0	36.4	37.8	54.0	-16.2
12400	Peak	35.5	-21.9	-	38.7	52.3	74.0	-21.7
12400	Aver	31.4	-21.9	-10.0	38.7	38.2	54.0	-15.8

* See Appendix A for Duty cycle measurement.

a) RBW = 1 MHz, VBW = 1 MHz - for peak measurements
   RBW = 1MHz,   VBW = 100 Hz - for average measurements
b) Correction Factor: Pre-amplifier gain + Cable loss + HP-Filter loss
c) Duty cycle correction factor = 20 * log(Transmitter ON time / one full duty cycle)

Test Result
FCC Part 15.247 Radiated Emission at the Band Edge
Temperature: 20C   JavadGNSS, Inc.
Humidity: 50%   Model: BT4EX8M
Test distance = 3 m
Test date: October 30, 2009

Frequency MHz	Detector	SA reading dB(uV)	Correction Factor dB (1/m)	Field Strength dB(uV/m)	Marker-Delta Correction dB	Limit dB(uV/m)	Margin dB
Tx at 2402 MHz							
2390	Peak	97.9	-1.4	96.5	-60.3	74.0	-37.8
2402	Aver	93.9	-1.4	92.5	-60.3	54.0	-21.8
Tx at 2480 MHz							
2483.5	Peak	96.6	-1.1	95.5	-52.5	74.0	-31.0
2483.5	Aver	92.8	-1.1	91.7	-52.5	54.0	-14.8

Correction Factor = (Antenna Factor + Cable Factor) – Amplifier gain

RBW 1 MHz　　Delta 2 [T1]
*VBW 100 kHz　　　　　-60.31 dB
Ref 10 dBm　　　*Att 20 dB　　SWT 2.5 ms　　-12.000000000 MHz

Marker 1 [T1]
-7.00 dBm
2.402080000 GHz
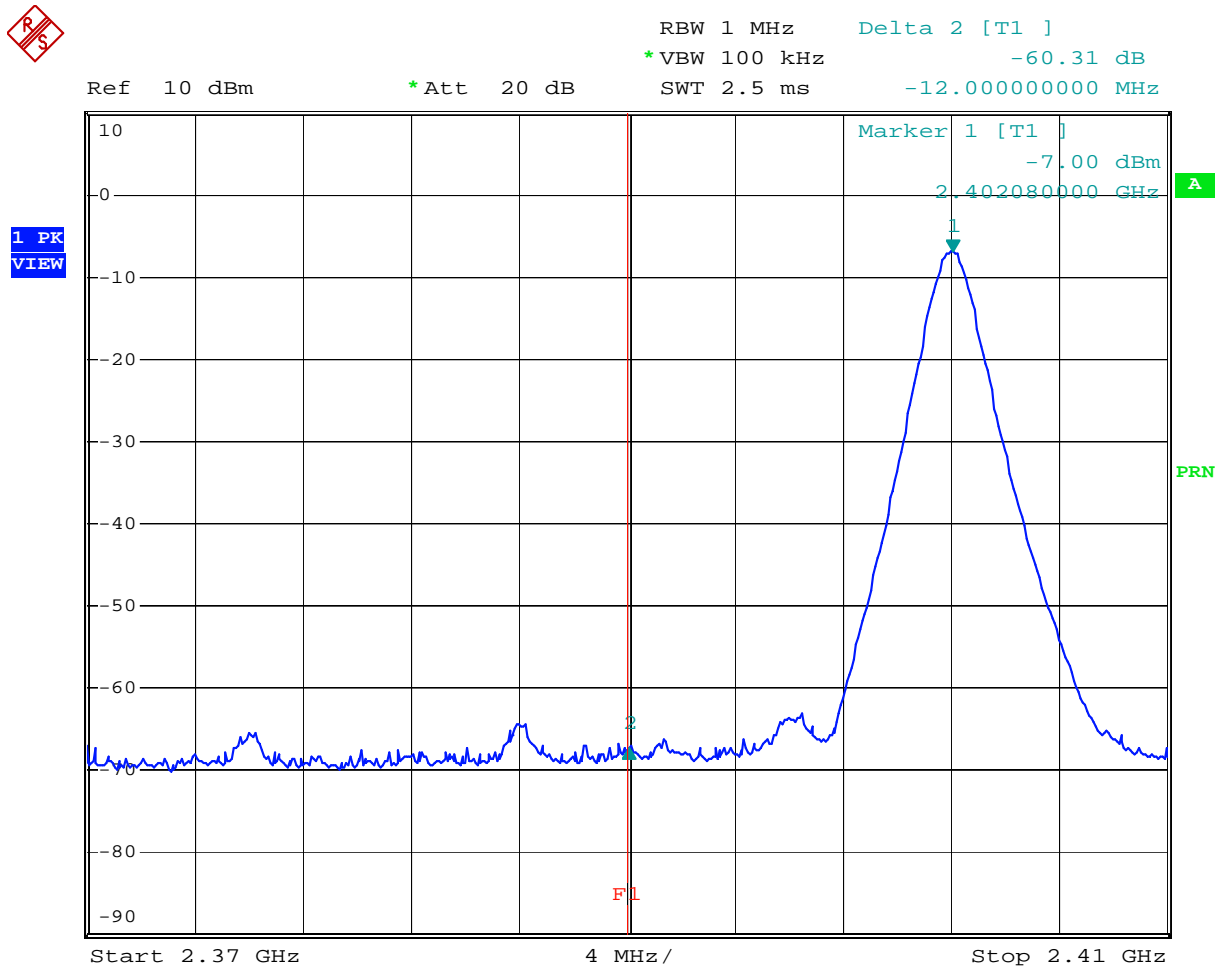
Comment: Bandedge, Low Channel
Date:　　　30.OCT.2009　02:36:53

Plot 8.2

RBW 1 MHz   Marker 2 [T1]
*VBW 100 kHz   -52.48 dBm
Ref 10 dBm   *Att 20 dB   SWT 2.5 ms   2.483500000 GHz

Marker 1 [T1]
                          -10.07 dBm
                         2.480000000 GHz

1 PK
VIEW

A

PRN

Start 2.47 GHz   4 MHz/   Stop 2.51 GHz
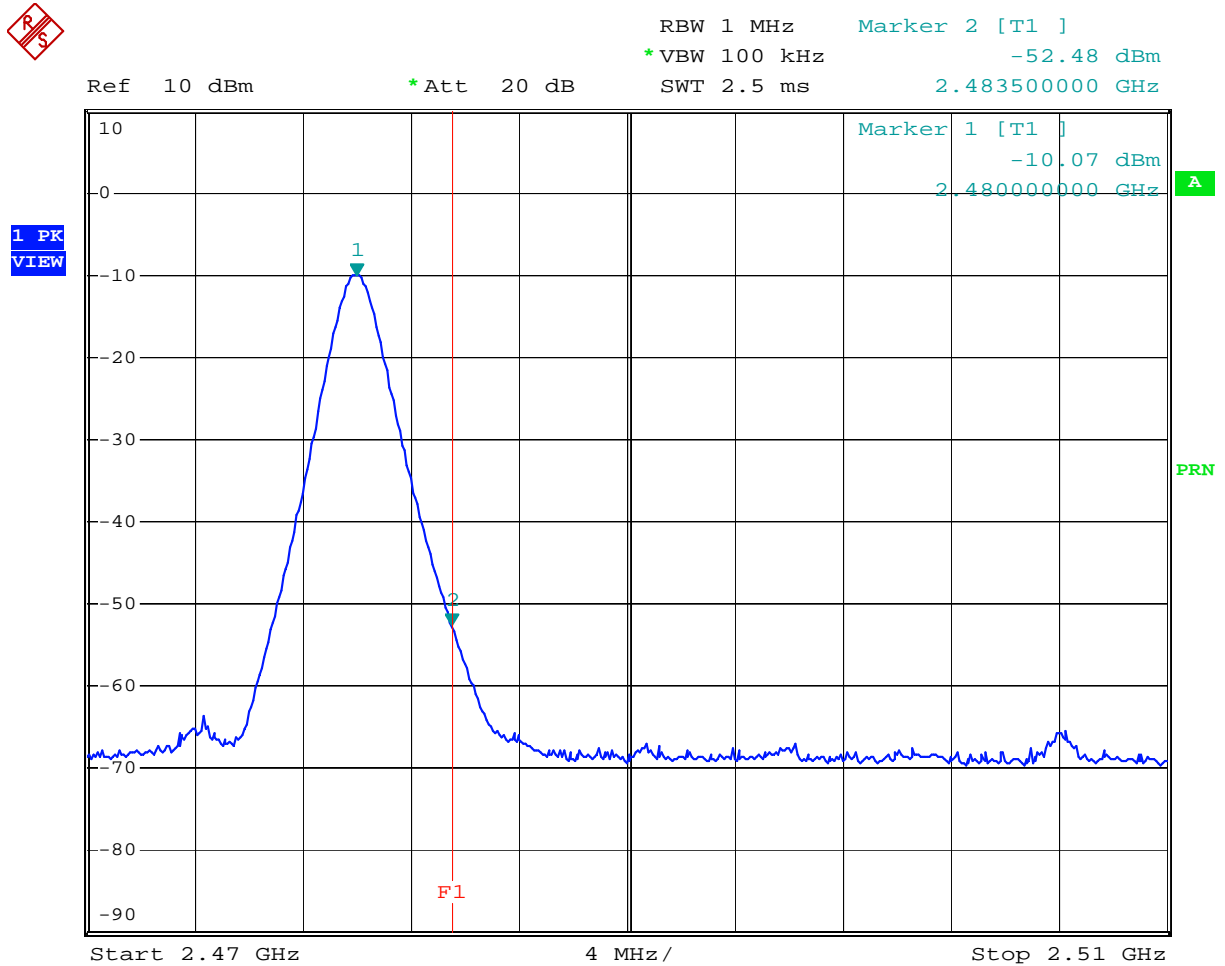
Comment: Bandedge, Hi Channel
Date: 30.OCT.2009   02:41:33

4.9 Radiated Emissions from Digital Parts and Receiver
FCC Ref: 15.109

Test Limit

Limits for Electromagnetic Radiated Emissions, FCC Section 15.109(b) and ICES 003 *

Frequency (MHz)	Class A at 10m dB(µV/m)	Class B at 3m dB(µV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

Test Results

Radiated emission measurements were performed from 30 MHz to 1000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater below 1000 MHz and 1 MHz - above 1000 MHz.

The EUT passed by 10.7 dB for Class B.

Intertek
Radiated Emissions 30 MHz - 1000 MHz
EN 55022 Class B (Horizontal)

Operator: BG   Model Number: BT4EX8M
October 28, 2009   Company: JavadGNSS, Inc.

Frequency	Peak FS	Limit@10m	Margin	RA	CF	AG	AF
(MHz)	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
32.667	16.9	30.0	-13.1	30.0	0.6	32.0	12.7
68.436	12.3	30.0	-17.7	35.7	0.8	32.0	6.4
117.179	12.6	30.0	-17.4	31.9	1.1	32.0	6.1
146.521	12.0	30.0	-18.0	34.1	1.2	31.9	12.9
801.878	25.4	37.0	-11.6	33.4	3.0	32.0	21.7
973.810	26.3	37.0	-10.7	30.8	3.3	30.8	23.4

Test Mode: Rx mode
Temperature: 20 C
Humidity : 50 %

4.10 AC Line Conducted Emission
FCC 15.207:

Not Applicable. The EUT does not have any direct connection to public power network. In normal use the EUT is installed inside the host unit and it is DC powered via its USB connection.

Intertek

5.0   RF Exposure evaluation

The EUT is a Bluetooth device used in mobile application, at least 20 cm from any body part of the user or near by persons.

The maximum conducted power is 0.550 mW; antenna is fix-mounted, 4.1 dBi gain. Therefore, to comply with RF Exposure Requirement, the MPE is calculated.

The maximum Peak EIRP calculated is 1.5 dBm or 1.4 mW.

The Power Density can be calculated using the formula
$$S = EIRP/ 4\pi D^2$$

Where: S is Power Density in W/m^2
         D is the distance from the antenna.

It is considered that 20cm is the minimum distance that user can go closer to the EUT (BT4EX8M) which is installed inside the Console of WhiteStar Signature Advanced Control Pedal system.

At 0.2 m, S = 0.00278 W/m^2, which is below the MPE Limit of 10 W/m^2

Intertek

6.0   List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
BI-Log Antenna	ARA	LPB-2513/A	1154	12	06/23/10
Horn Antenna	EMCO	3115	9509-3712	12	10/22/09
Pre-Amplifier	Sonoma	310N	185634	12	11/10/09
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	07/28/10
Spectrum Analyzer	Rohde&Schwarz	FSU26	200482	12	11/20/09

7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3180052	BG	October 31, 2009	Original document

Intertek

8.0 Appendix A –Graphs for Duty cycle measurement

Graph A1


```
                                          RBW 1 MHz      Delta 3 [T1 ]
                                        * VBW 30 kHz              0.00 dB
   Ref  20 dBm              * Att  40 dB  SWT 2 ms             1.260000 ms
```

```
  20  Offset  0.6 dB                       Marker 1 [T1 ]
                                                      1.41 dBm
  10                                        400.000000 µs
1 AP
VIEW                    1                2      3  Delta 2 [T1 ]
   0                                              0.16 dB
                                                  884.000000 µs
  -10

  -20        TRG -21.3 dBm
  
  -30

  -40

  -50

  -60

  -70

  -80
   Center 2.402 GHz                       200 µs/
```

Comment: Duty cycle
Date: 28.OCT.2009 17:36:54

Intertek

Graph A2

RBW 1 MHz　　Delta 3 [T1]
*VBW 30 kHz　　　　-0.01 dB
Ref　20 dBm　　　　*Att　40 dB　　SWT 2 ms　　　1.260000 ms

20　Offset　0.6 dB

Marker 1 [T1]
0.35 dBm
-10　　　　　　　　　　400.000000 µs

A

1 AP
VIEW

Delta 2 [T1]
1　　　　　　2　　　　3　　0.15 dB
884.000000 µs

TRG
LVL

-10

-20　　TRG -21.1 dBm

PRN

-30

-40

-50

-60

-70

-80

Center 2.441 GHz　　　　　　　200 µs/

Comment: Duty cycle
Date:　　　28.OCT.2009　17:45:42

Intertek

Graph A3

RBW 1 MHz   Delta 3 [T1]
*VBW 30 kHz   -0.12 dB
Ref   30 dBm   *Att   40 dB   SWT 2 ms   1.260000 ms

```
30  Offset  0.6 dB                    Marker 1 [T1 ]
                                             -0.34 dBm          A
 20                                   400.000000 µs
                                      Delta 2 [T1 ]
1 AP                                          0.20 dB
VIEW                                  884.000000 µs           TRG
 10                                                           LVL
        1                        2              3
  0
                                                             PRN
-10

-20    TRG -20.2 dBm

-30

-40

-50

-60

-70
```
Center 2.48 GHz   200 µs/

Comment: Duty cycle
Date: 28.OCT.2009 17:48:22