

TEST REPORT

Report Number: 3164295MPK-004
Project Number: 3164295 & 3164837
Report Date: October 01, 2008

Testing performed on the
Advanced Control Pedal Slave for the WHITESTAR Signature™ system NGP680702
Model: Advanced Control Pedal Slave
FCC ID: VGESIGACPS
IC : 7228A-SIGACPS
to

FCC Part 15.247 and RSS-210 Annex 8
For


Advanced Medical Optics



A2LA Certificate Number: 1755-01

Test Performed by:
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Menlo Park, CA 94025

Test Authorized by:
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Prepared by: 
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Date: October 01, 2008

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Date: October 01, 2008

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Report No. 3164295MPK-004

Equipment Under Test:	Advanced Control Pedal Slave for the WHITESTAR Signature™ system NGP680702
Trade Name:	Advanced Medical Optics
Model No.:	Advanced Control Pedal Slave
FCC ID:	VGESIGACPS
IC:	7228A-SIGACPS
Applicant:	Advanced Medical Optics
Contact:	Mr. Dung Ma
Address:	1700 E. Saint Andrew Place Santa Ana, CA 92705
Country	USA
Tel. Number:	714-247-8579
Fax number:	714-247-8678
Applicable Regulation:	FCC Part 15, Subpart C
Test Site Location:	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025
Date of Test:	August 20 to September 24, 2008

We attest to the accuracy of this report:



Krishna K Vemuri
Test Engineer



David Chernomordik
EMC Technical Manager

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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. EUT does not contain AC power ports. EUT is battery powered.
Radiated Emission from Digital Parts and receiver	15.109	ICES-003	Complies

2.0 General Description

2.1 Product Description

The WHITESTAR Signature Advanced Control Pedal system consists of the Advanced Control Pedal Master and Advanced Control Pedal Slave (EUT in this report) which reside in the WHITESTAR Signature™ system NGP680702. Each device: Master and Slave consists two Bluetooth radios (transceivers), operating simultaneously in the 2.4 GHz frequency band. Both transmitters report the data alternatively to the host. This radio subsystem is used to communicate the footpedal control signal to the WHITESTAR Signature™ system for use in cataract surgery.

Overview of the EUT

Applicant	Advanced Medical Optics 1700 E. Saint Andrew Place Santa Ana, CA 92705 USA
Manufacturer name & address	Advanced Medical Optics 1700 E. Saint Andrew Place Santa Ana, CA 92705 USA
Trade Name	Advanced Control Pedal Slave
FCC Identifier	VGESIGACPS
IC	7228A-SIGACPS
Use of Product	WhiteStar Signature Advanced Control Pedal
Type of Transmission	Spread Spectrum, Frequency Hopping
Rated RF Output	1 mW
Frequency Range	2402-2480 MHz
Number of Channel(s)	79
Modulation Type	GFSK
Data Rate	1 Mbps
Antenna(s) type & Gain	Omnidirectional Dipole, 4.1 dBi,

A production version of the sample was received on August 20, 2008 in good condition. As declared by the Applicant, it is identical to production units.

Test start date: August 20, 2008

Test end date: September 24, 2008

2.2 Related Submittal(s) Grants

The FCC Part 15.247 Application for FHSS transmitter with the FCC ID: VGESIGACPM and IC: 7228A-SIGACPM.

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

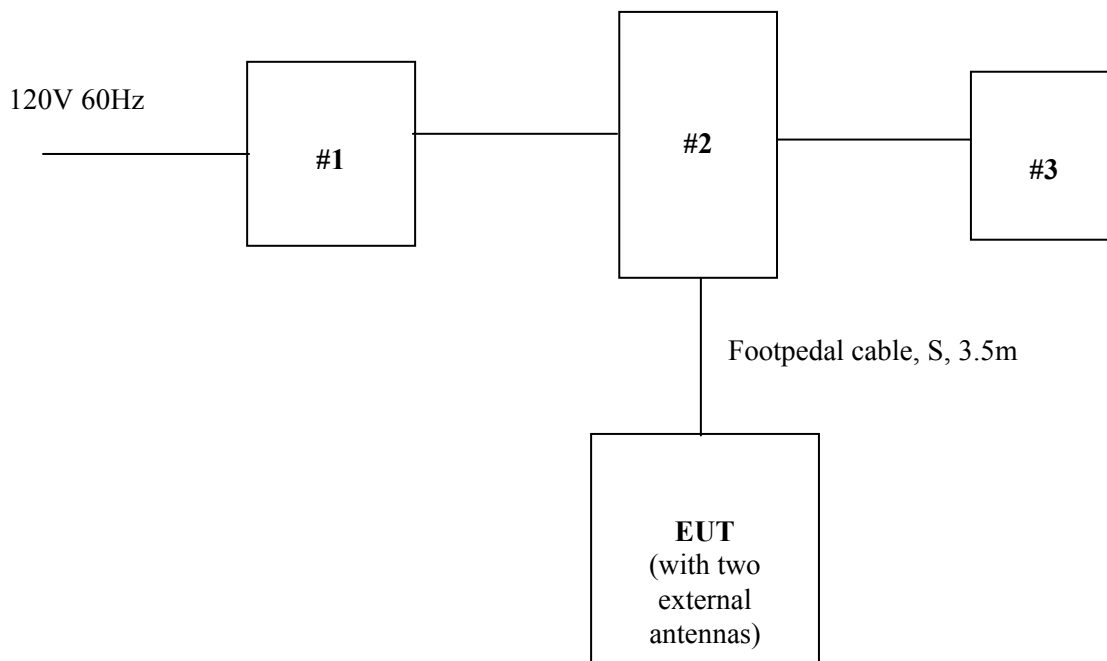
Then radiated emission test site and conducted measurement facility used to collect the data 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC.

3.0 System Test Configuration

3.1 Support Equipment

Item #	Description	Model No.	Serial No.
1	LAMBDA power supply	Vega 650	2060530007
2	AMO, Advanced Control Pedal Master	---	--
3	Laptop	Compaq Armada	ITS# 013112

3.2 Block Diagram of Test Setup



S = Shielded
U = Unshielded

F = With Ferrite
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.

In normal operation the EUT is battery powered. For testing the EUT was attached to a test board, connected to a laptop, which provides the power to the EUT and control the radio by the test software. The EUT was tested without a plastic enclosure because it was impossible to control the radio when it is inside the enclosure.

Since two transmitters are identical by design, all RF conducted tests were performed on one transmitter and limited tests (output power and spurious emissions) on the second transmitter. Radiated emission tests were performed when both transmitters are transmitting simultaneously.

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 two modes: hopping mode as in normal use and hopping disabled mode in which the EUT was transmitting at the lowest, middle, and highest channels (frequencies).

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 Advanced Medical Optics 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 cable loss correction was added to the reading to obtain the power at the EUT antenna terminal.

Test Results

Transmitter 1 (Tx1)

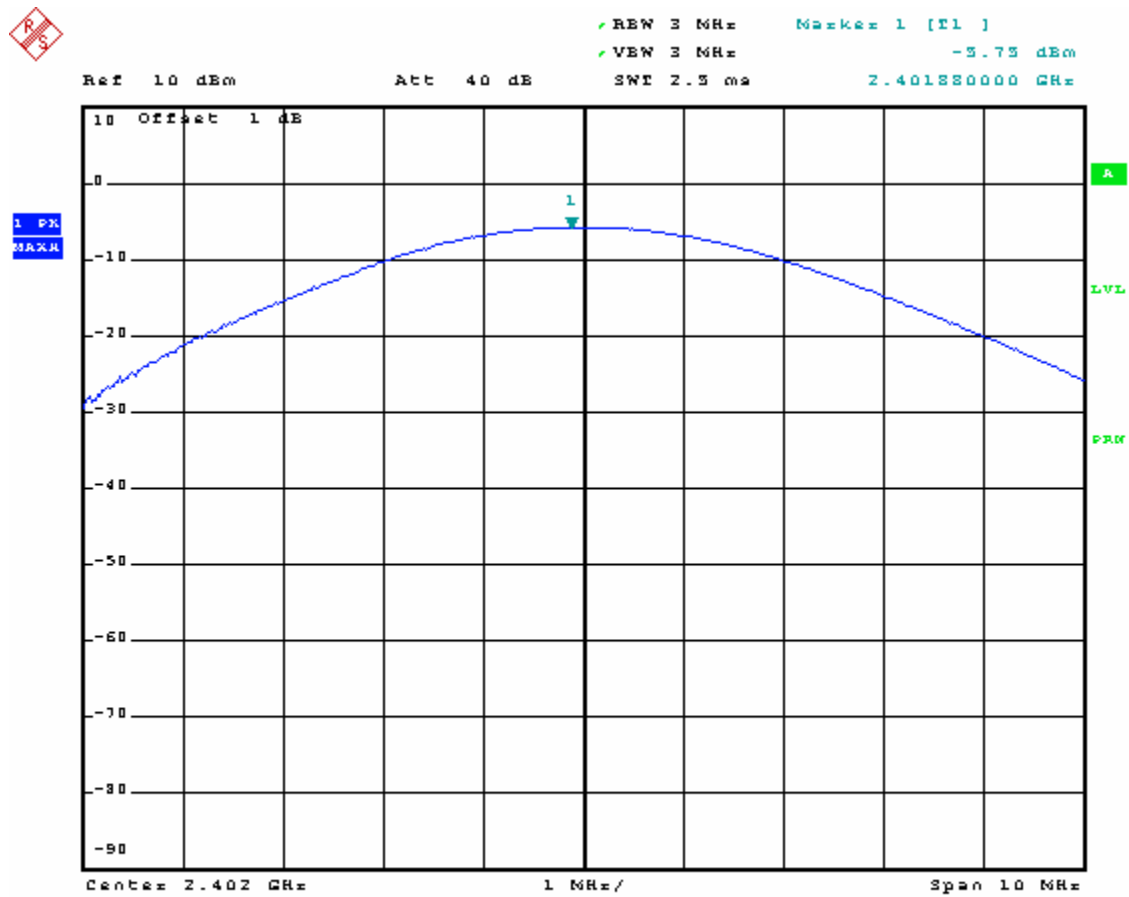
Frequency (MHz)	Output in dBm	Output in mW	Plot number
2402	-5.75	0.266	1.1
2440	-5.72	0.268	1.2
2480	-6.01	0.251	1.3

Transmitter 2 (Tx2)

Frequency (MHz)	Output in dBm	Output in mW	Plot number
2402	-5.96	0.254	1.4
2440	-5.87	0.259	1.5
2480	-6.15	0.243	1.6

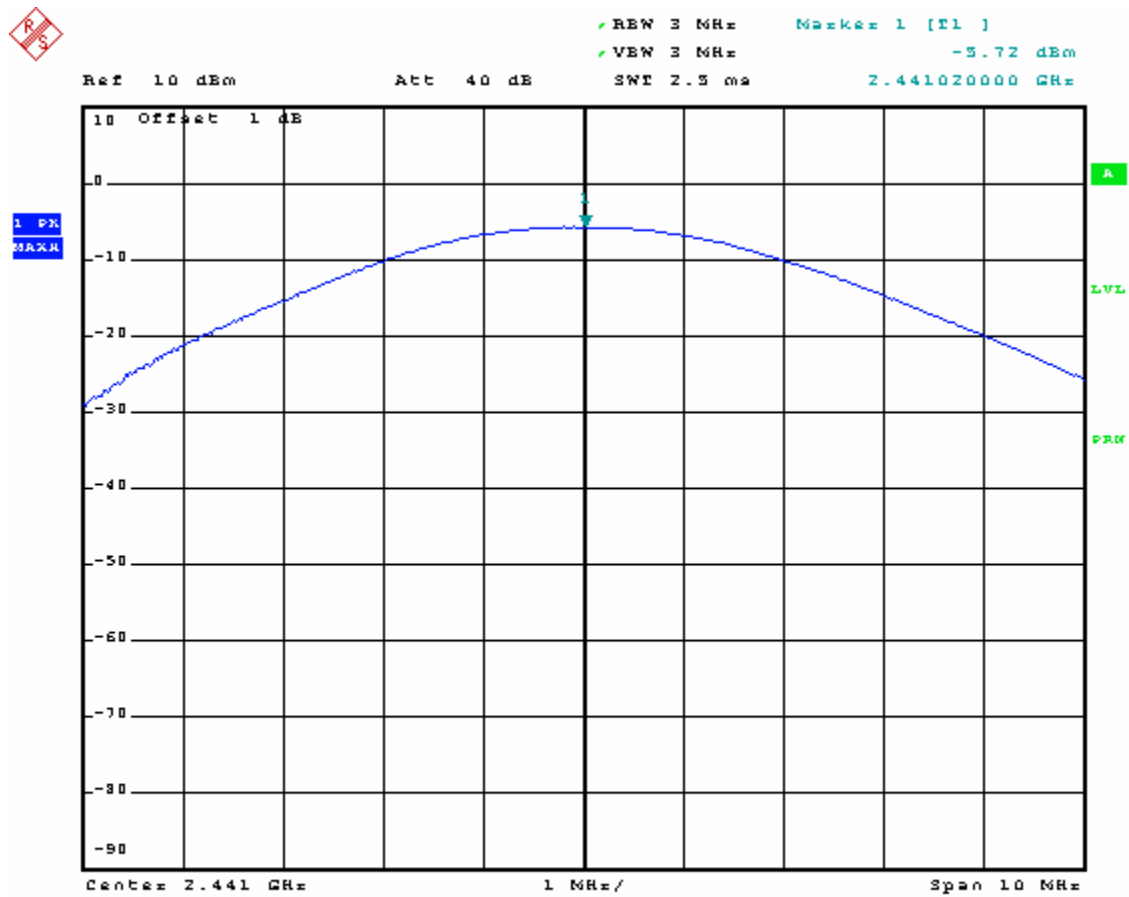
Notes: 1. Hopping function was disabled during the test.
2. The EUT's antenna has less than 6 dBi gain.

Plot 1.1



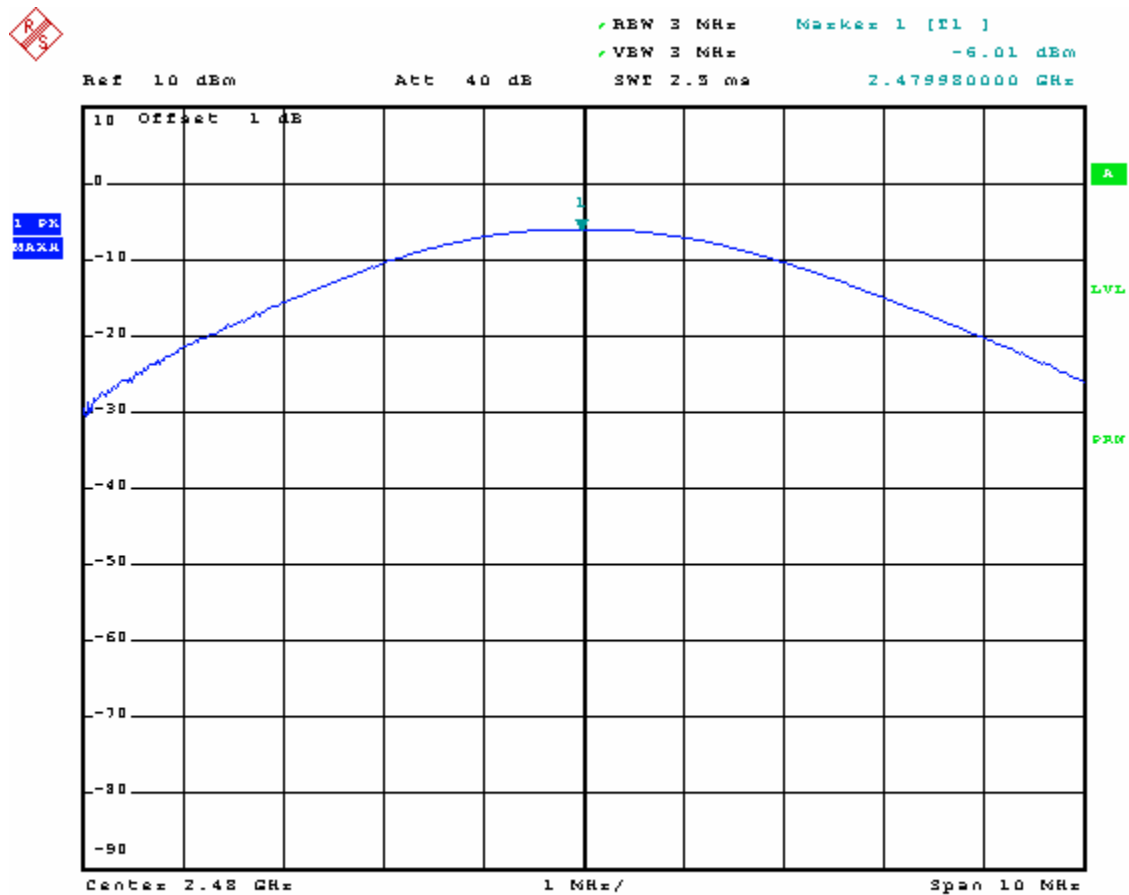
Comment: Output Power, Tx1
Date: 23.AUG.2008 13:06:49

Plot 1.2



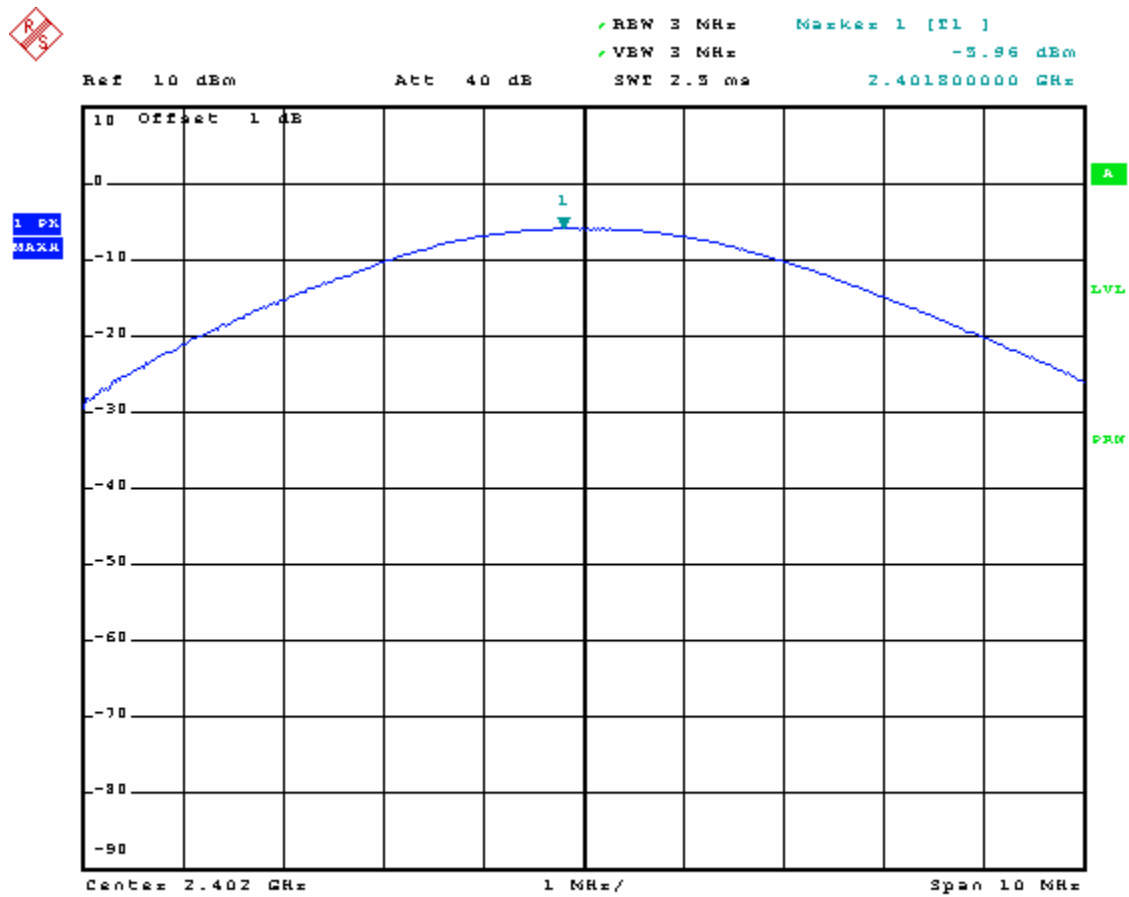
Comment: Output Power, Tx1
 Date: 23.AUG.2008 13:10:52

Plot 1.3



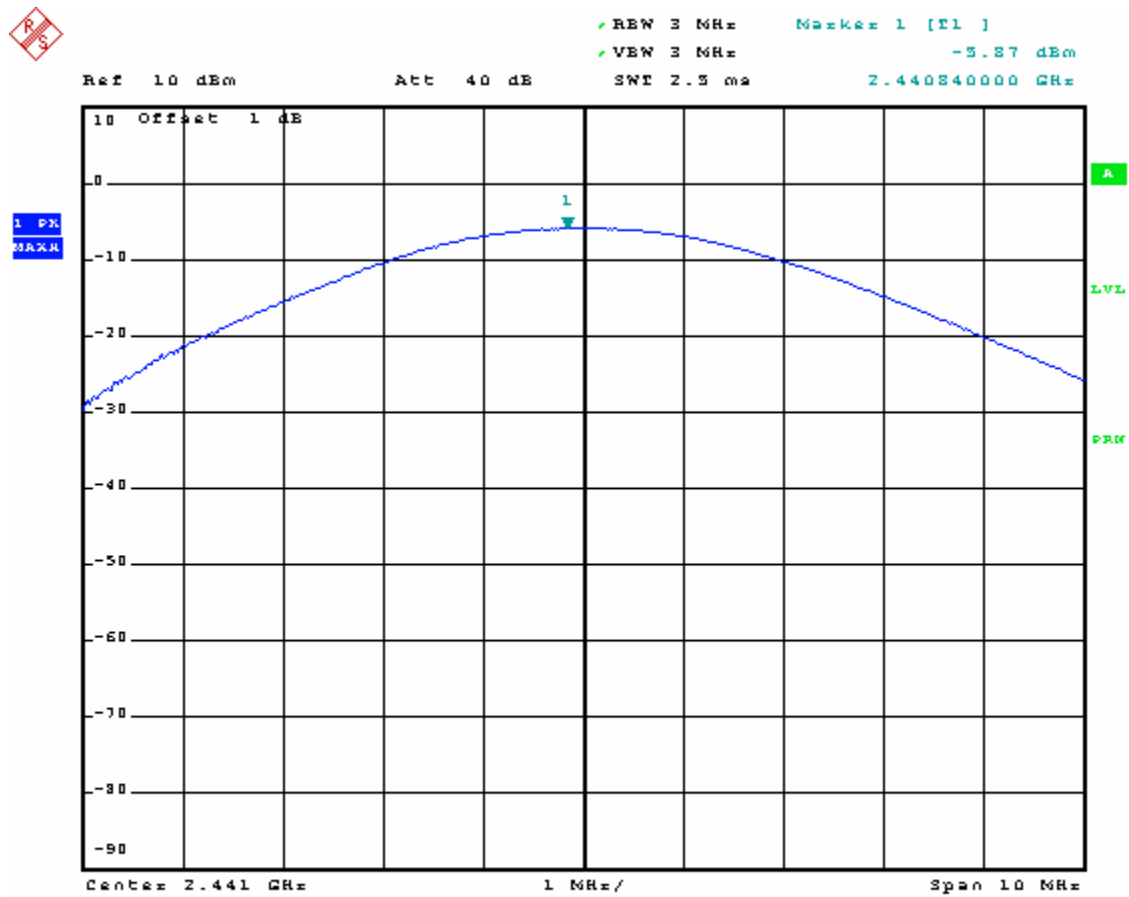
Comment: Output Power, Tx1
Date: 23.AUG.2008 13:13:28

Plot 1.4



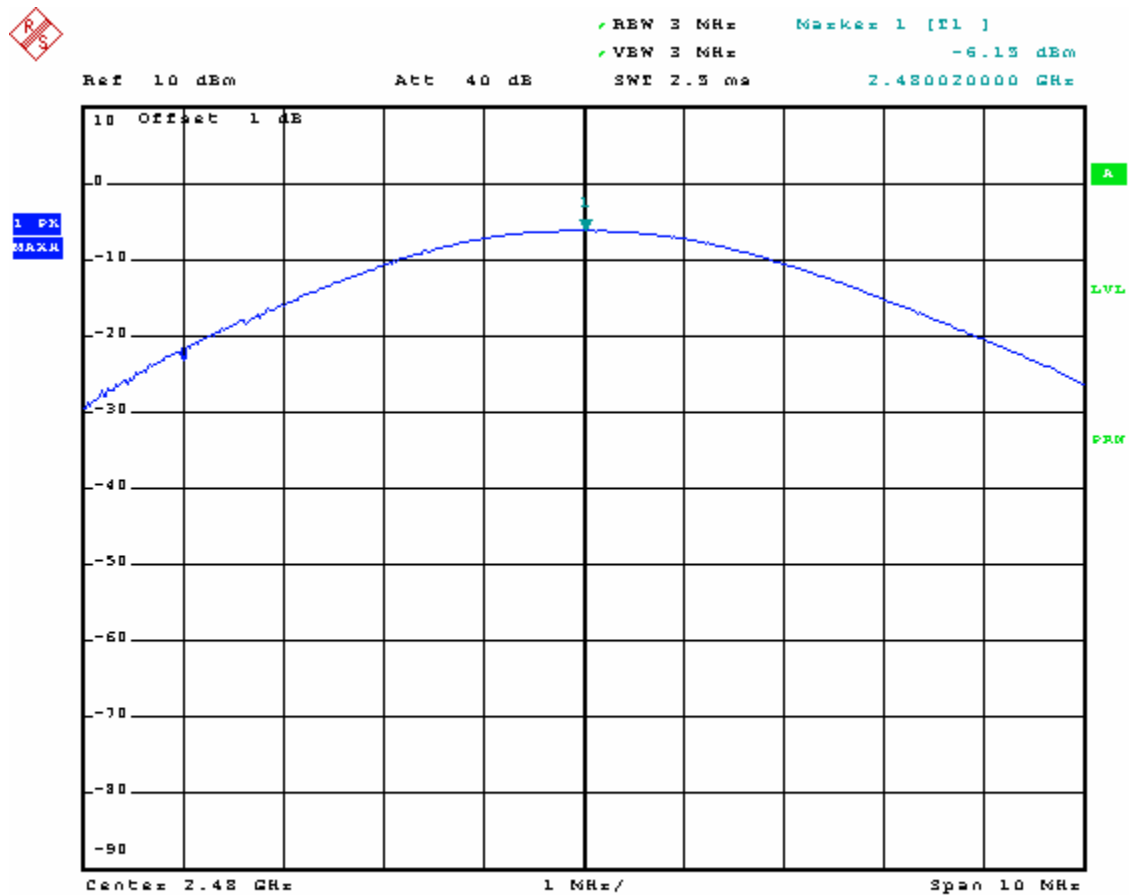
Comment: Output Power, Tx2
Date: 23.AUG.2008 12:22:26

Plot 1.5



Comment: Output Power, Tx2
Date: 23.AUG.2008 12:24:39

Plot 1.6



Comment: Output Power, Tx2
Date: 23.AUG.2008 12:59:52

4.2 Hopping Channel 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.

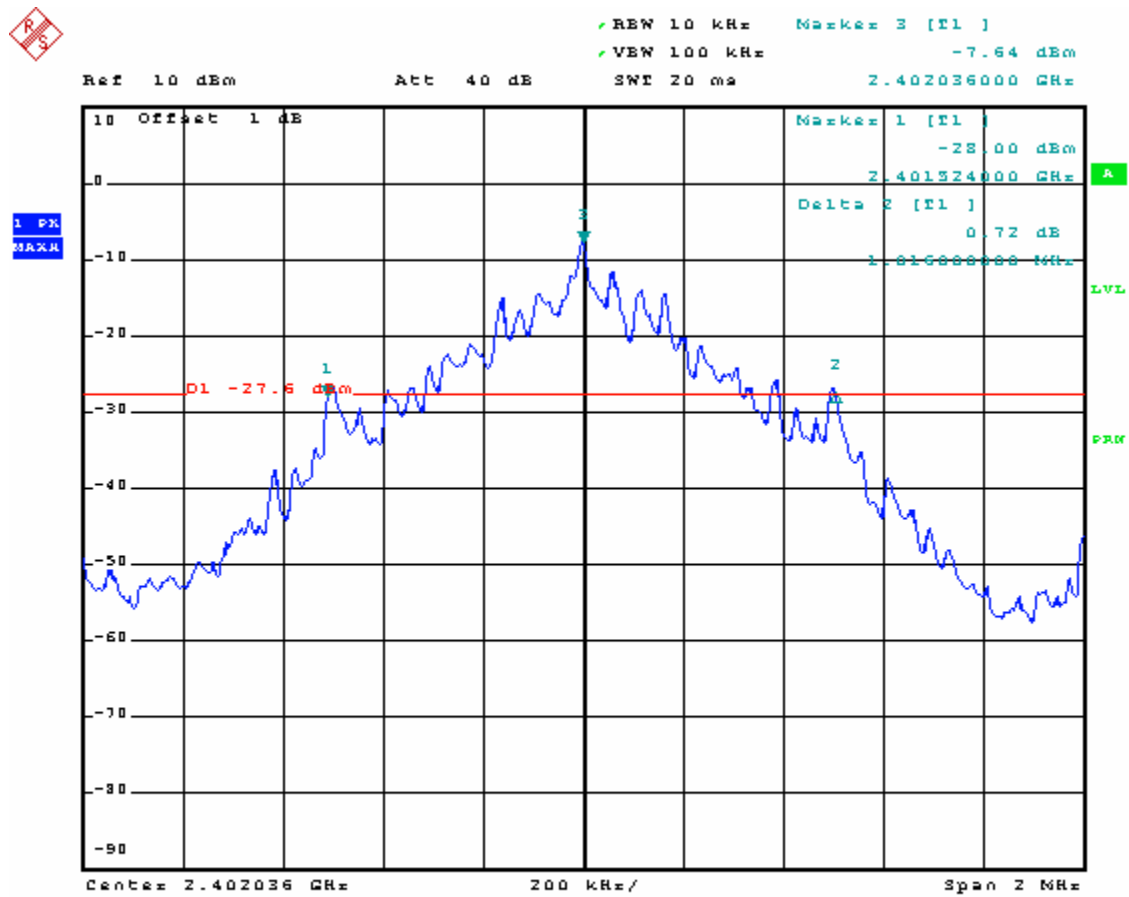
In addition, the occupied bandwidth (99%) was measured.

Test Results

Frequency (MHz)	20-dB channel bandwidth (MHz)	Plot
2402	1.016	2.1
2440	1.016	2.2
2480	1.016	2.3

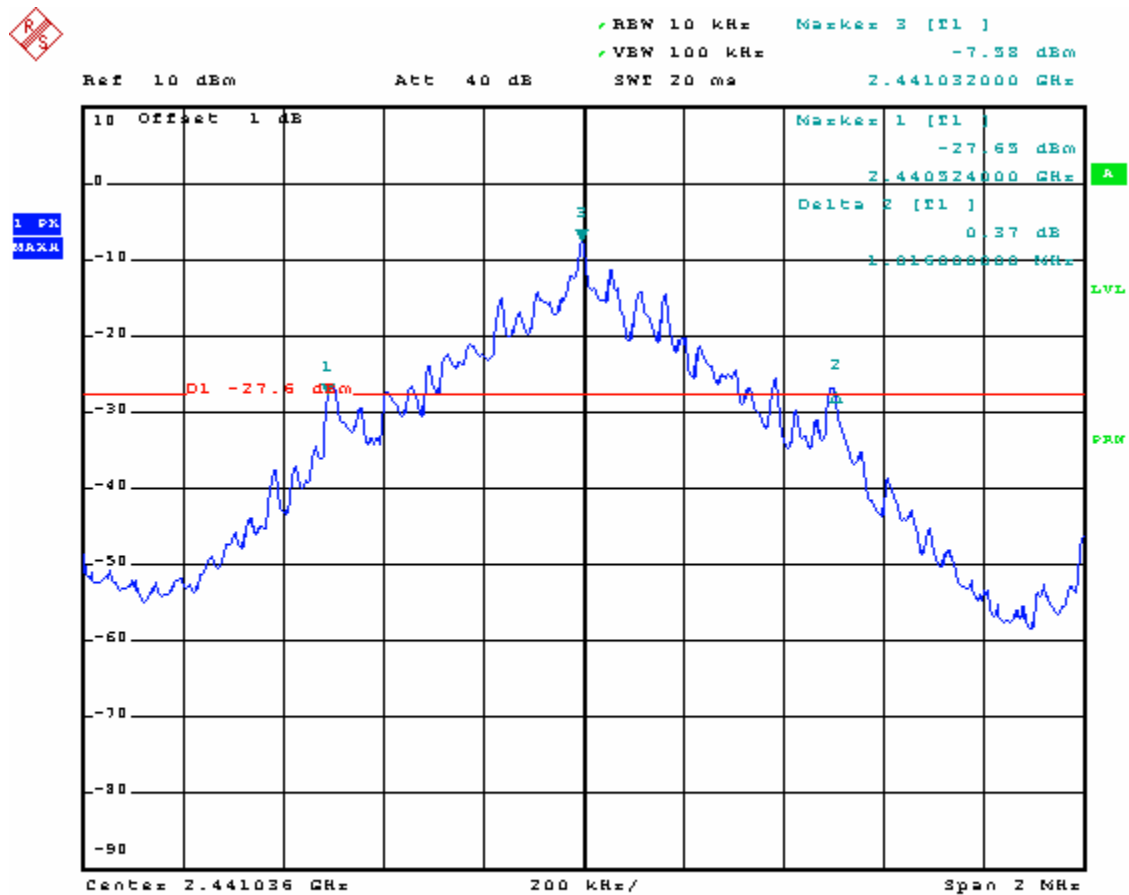
Frequency (MHz)	Occupied bandwidth (MHz)	Plot
2402	0.980	2.4
2440	0.980	2.5
2480	0.984	2.6

Plot 2.1



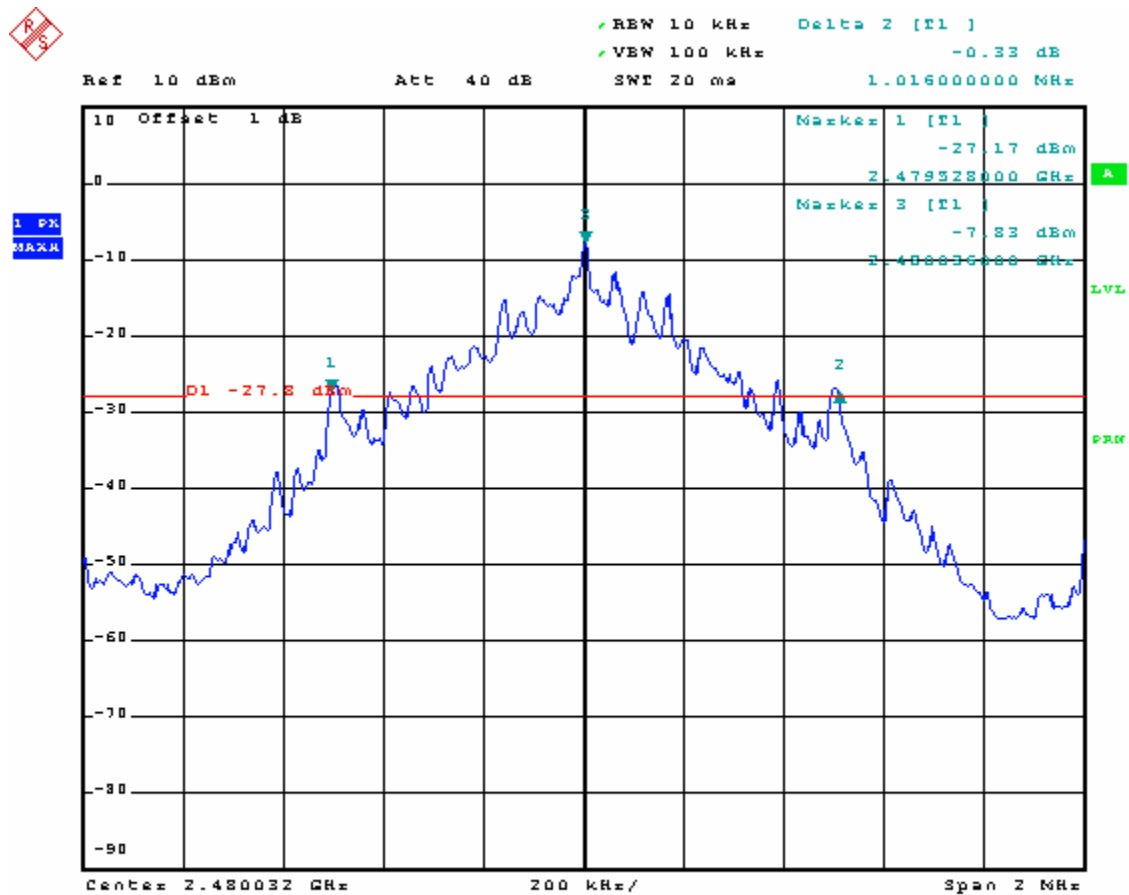
Comment: 20-dB Bandwidth, Fx1
 Date: 23.AUG.2008 13:23:23

Plot 2.2



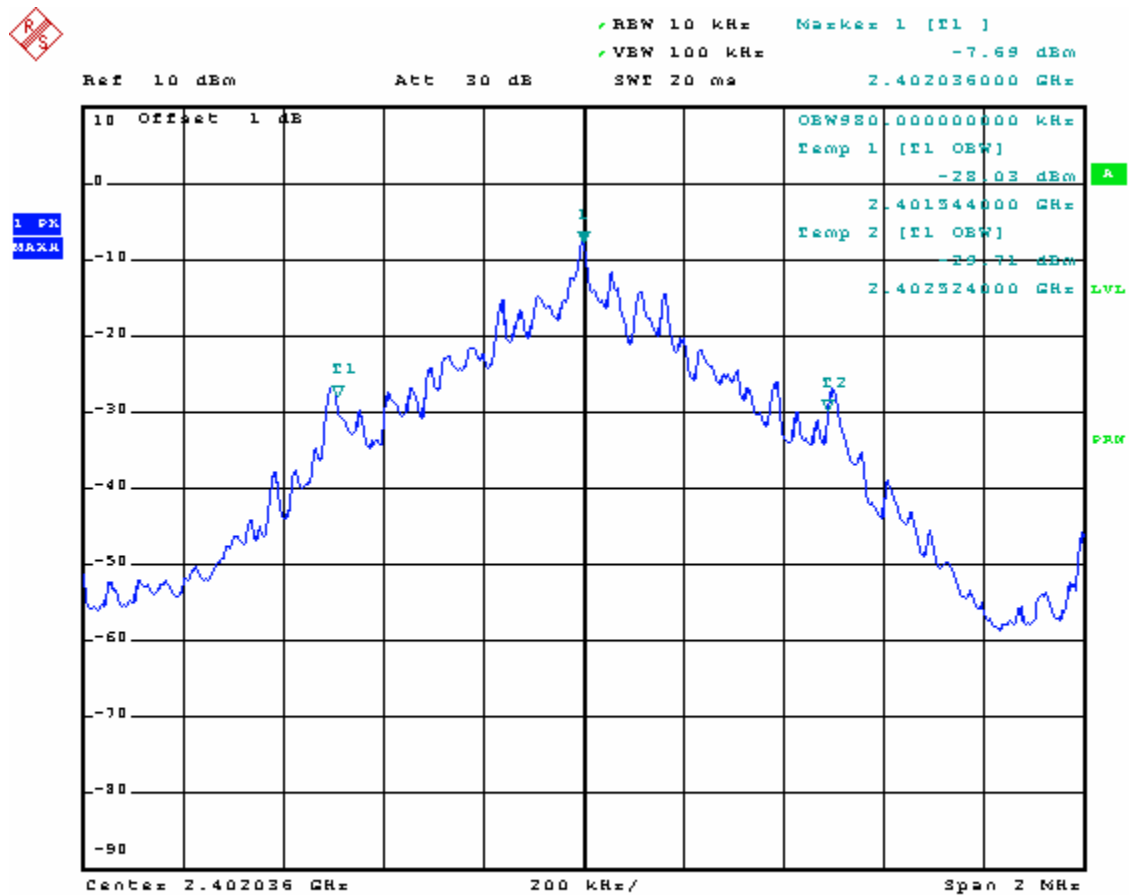
Comment: 20-dB Bandwidth, Fx1
Date: 23.AUG.2008 13:23:49

Plot 2.3



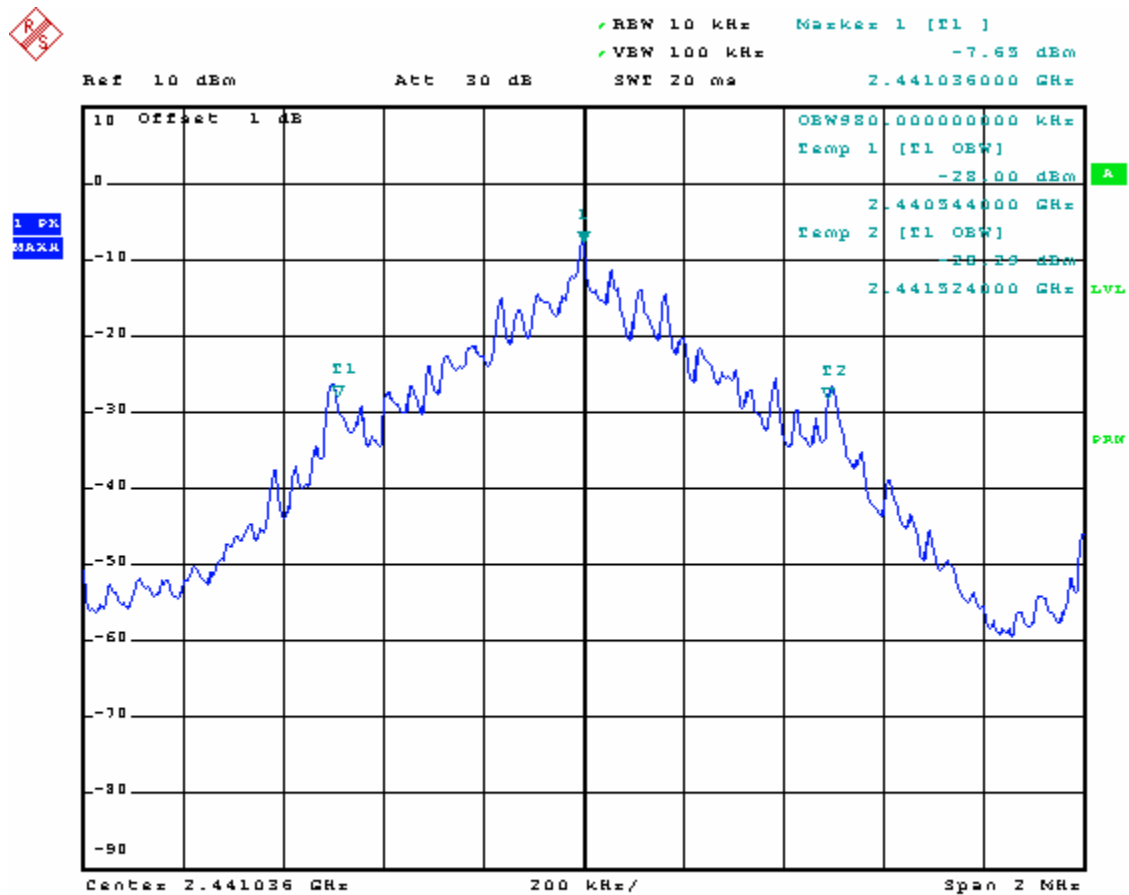
Comment: 20-dB Bandwidth, Fx1
Date: 23.AUG.2008 13:33:00

Plot 2.4



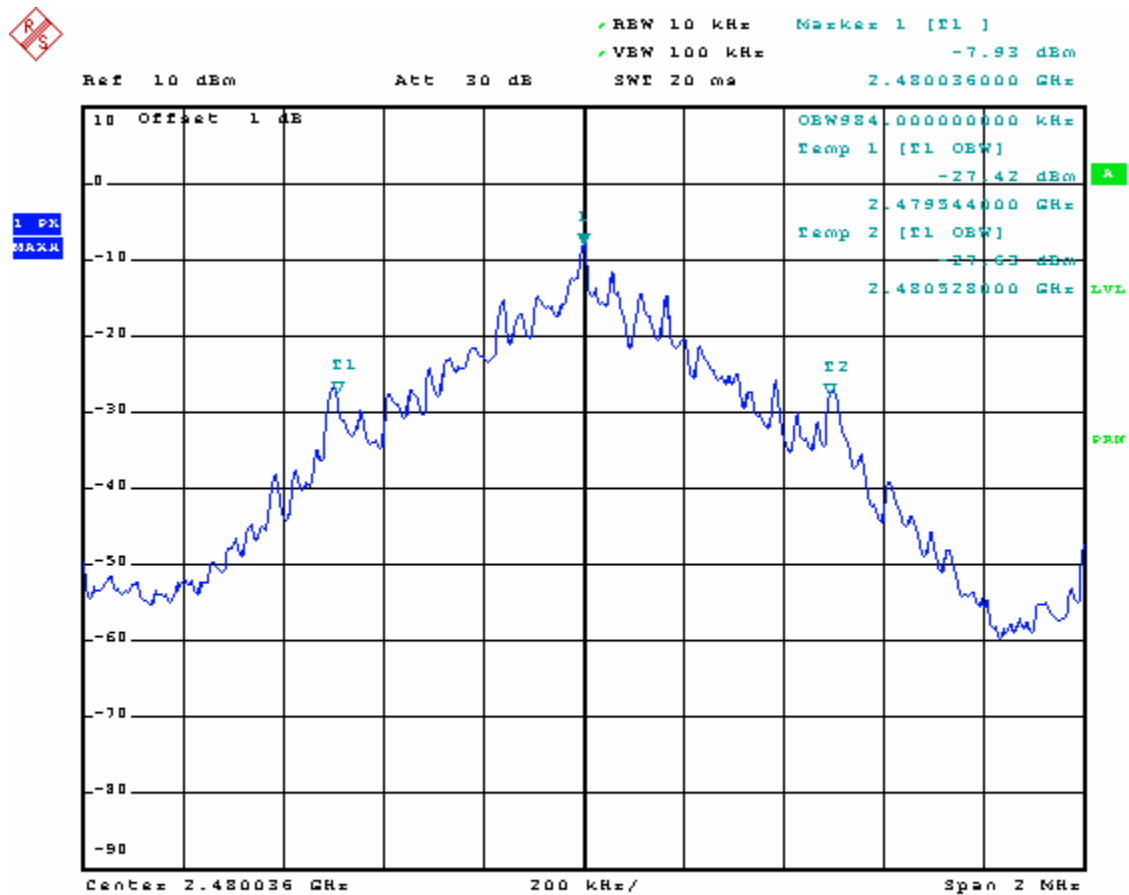
Comment: Occupied Bandwidth, Tx1
 Date: 23.AUG.2008 13:37:11

Plot 2.5



Comment: Occupied Bandwidth, Tx1
Date: 23.AUG.2008 13:38:38

Plot 2.6



Comment: Occupied Bandwidth, Tx1
Date: 23.AUG.2008 13:42:10

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.

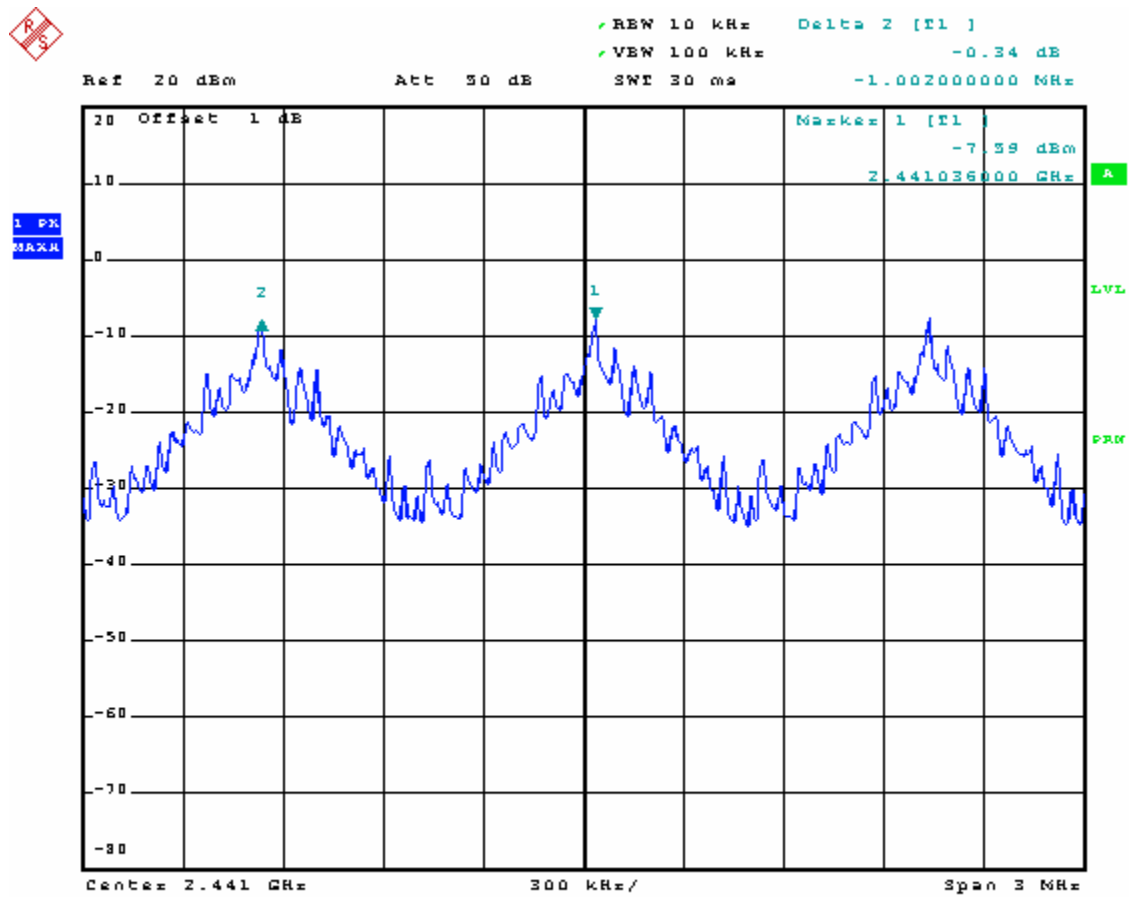
Procedure

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 for the test result.
The channel separation is 1.002 MHz.

Plot 3.1



Comment: Carrier frequency separation, Tx1
Date: 23.AUG.2008 14:01:42

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

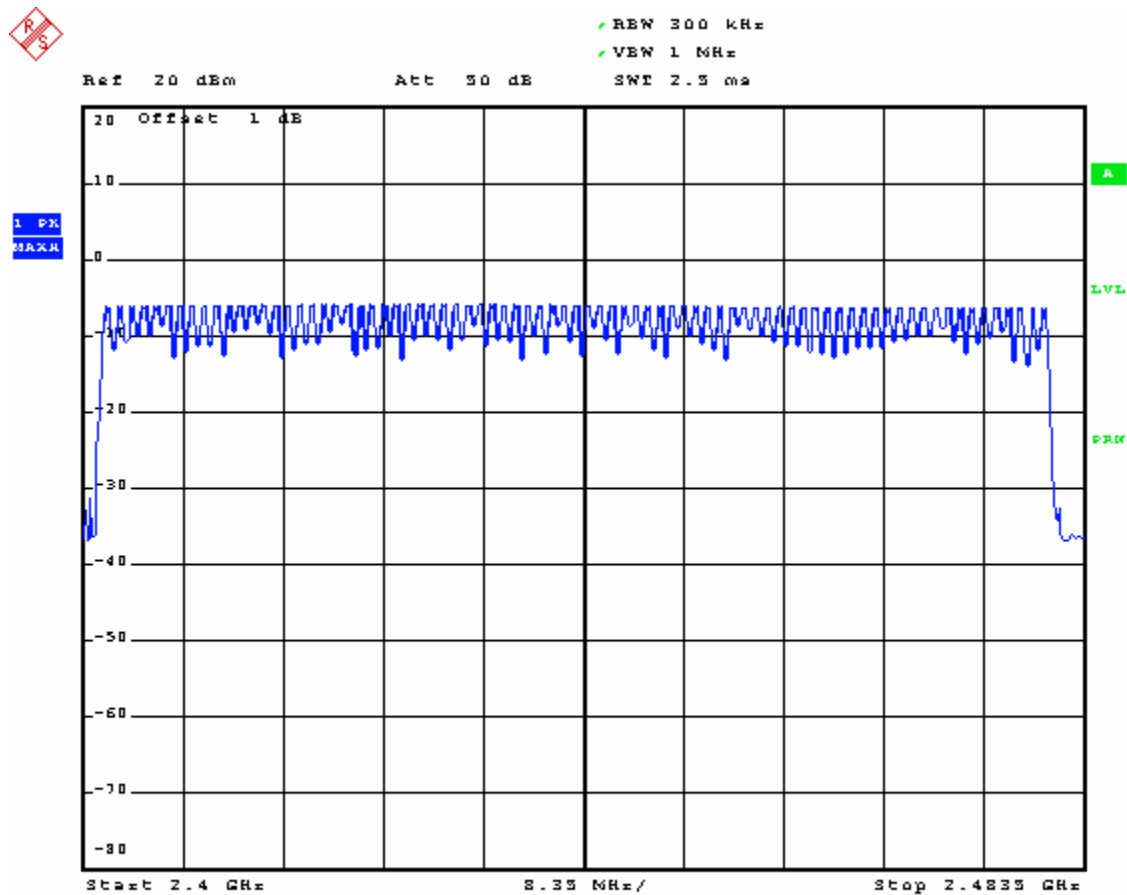
With the analyzer set to MAX HOLD, readings were taken for 2 - 3 minutes The channel peaks so recorded and compared to the minimum number of channels required in the regulation.

Test Results

Number of hopping channels	79
----------------------------	----

Refer to attached spectrum analyzer charts: Plot 4.1.

Plot 4.1



Comment: Number of hopping channels, 1x1
Date: 23.AUG.2008 14:16:02

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 SPANS, 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.

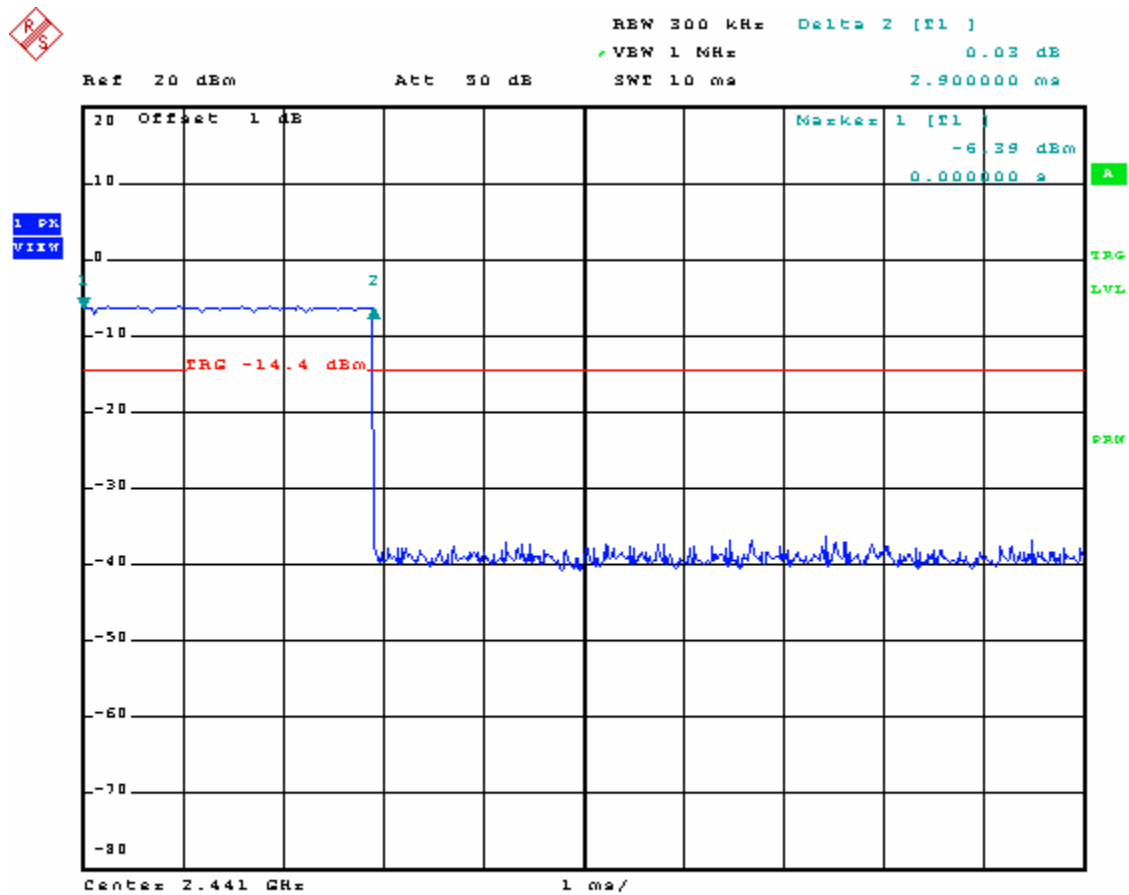
Test Results

Occupancy Time (see plots 5.1 and 5.2)

$0.0029 * 13 * 10 = 0.377$ sec.

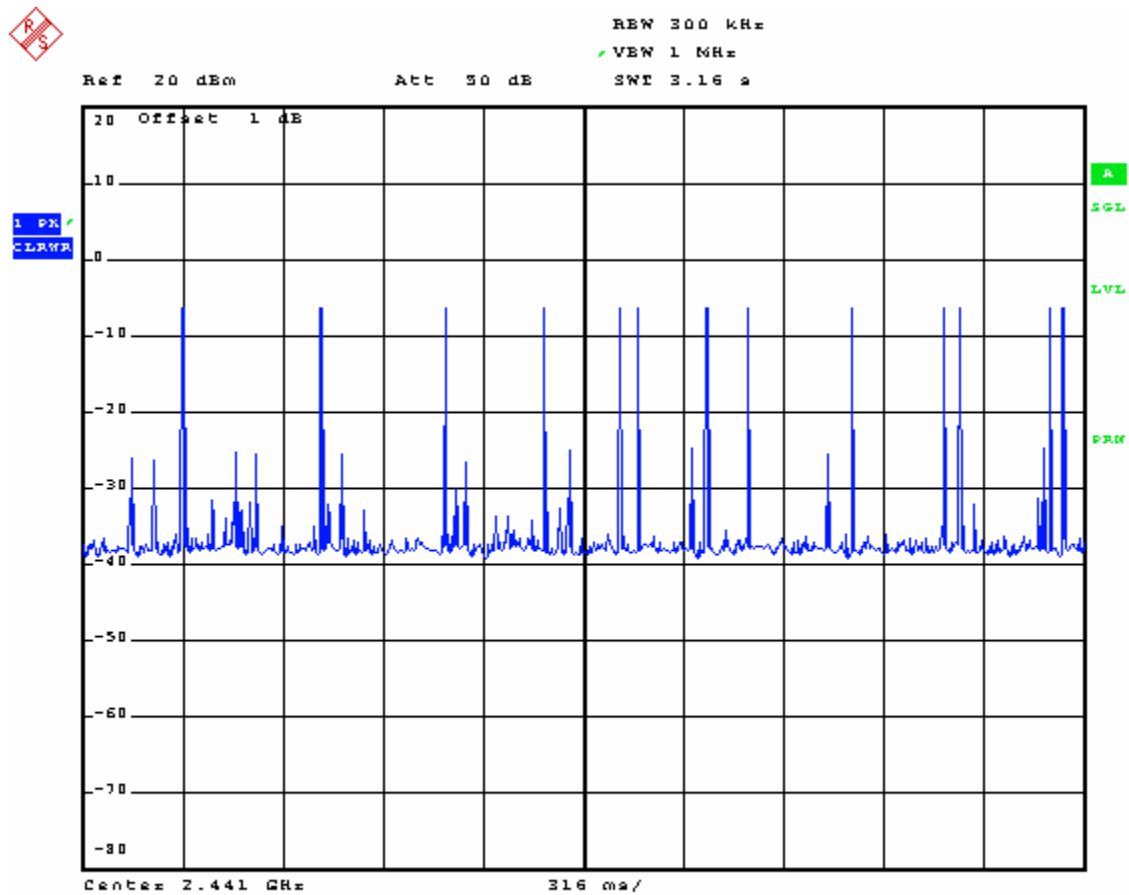
Refer to attached spectrum analyzer plots 5.1-5.2 for details.

Plot 5.1



Comment: Dwell time, Fx1
 Date: 23.AUG.2008 14:26:03

Plot 5.2



Comment: Dwell time, 1x1
 Date: 23.AUG.2008 14:30:20

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:

Transmitter 1 (Tx1)

Description	Comments	Plot number
In-band Emissions, F=2402 MHz		6.1
In-band Emissions, F=2441 MHz		6.5
In-band Emissions, F=2480 MHz		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

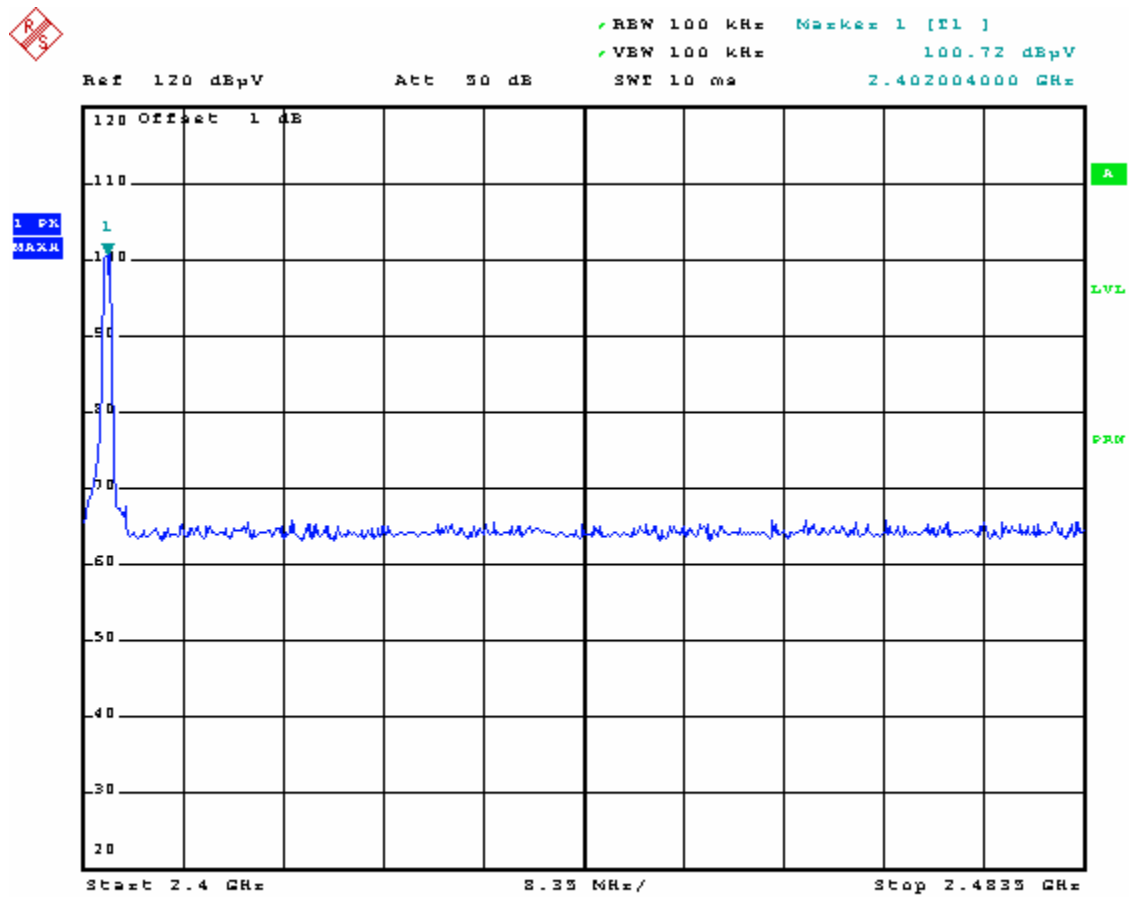
The attenuation is more than 20 dB.

Transmitter 1 (Tx2)

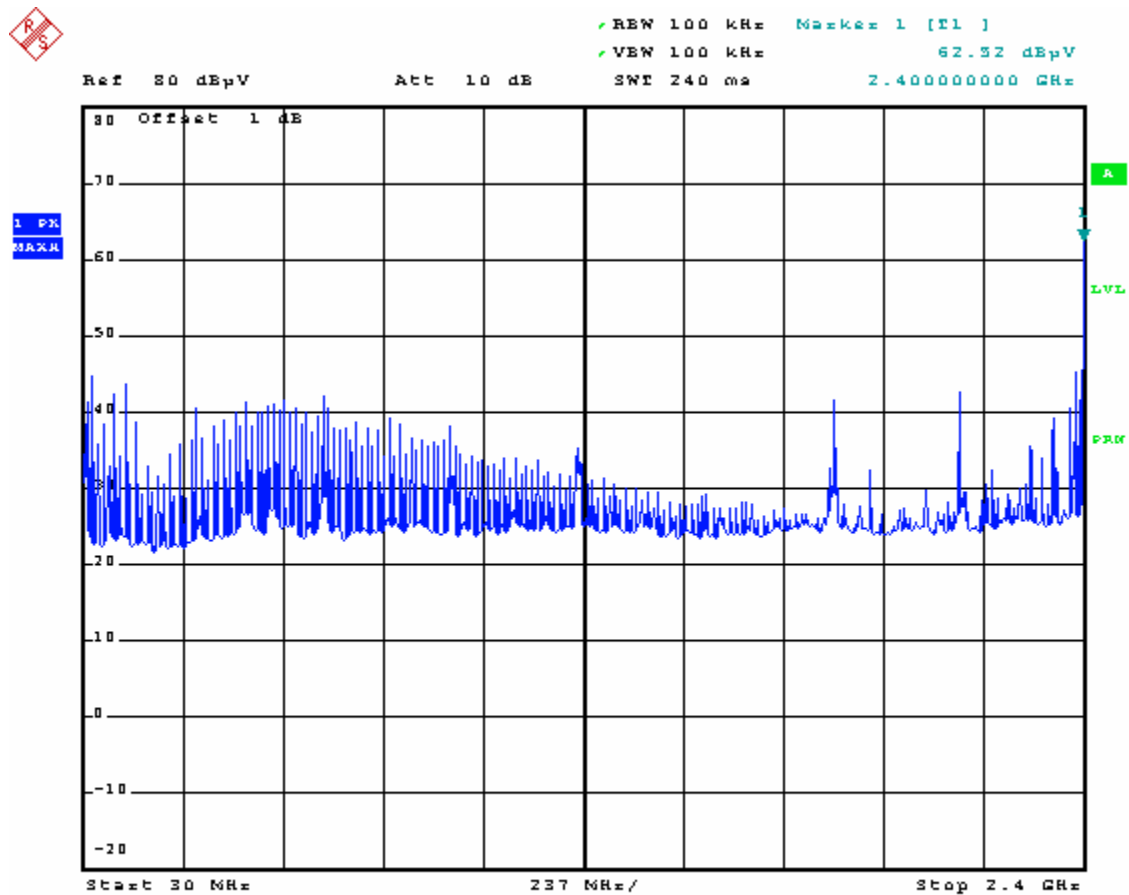
Description	Comments	Plot number
In-band Emissions, F=2402 MHz		6.17
In-band Emissions, F=2441 MHz		6.21
In-band Emissions, F=2480 MHz		6.25
Emissions on the low band-edge frequency	Fixed channel, 2402 MHz	6.29
Emissions on the low band-edge frequency	Hopping mode	6.30
Emissions on the high band-edge frequency	Fixed channel, 2480 MHz	6.31
Emissions on the high band-edge frequency	Hopping mode	6.32
Out-of-band low Channel Emissions	Fixed channel, 2402 MHz	6.18 – 6.20
Out-of-band middle Channel Emissions	Fixed channel, 2441 MHz	6.22 – 6.24
Out-of-band high Channel Emissions	Fixed channel, 2480 MHz	6.26 – 6.28

The attenuation is more than 20 dB.

Plot 6.1

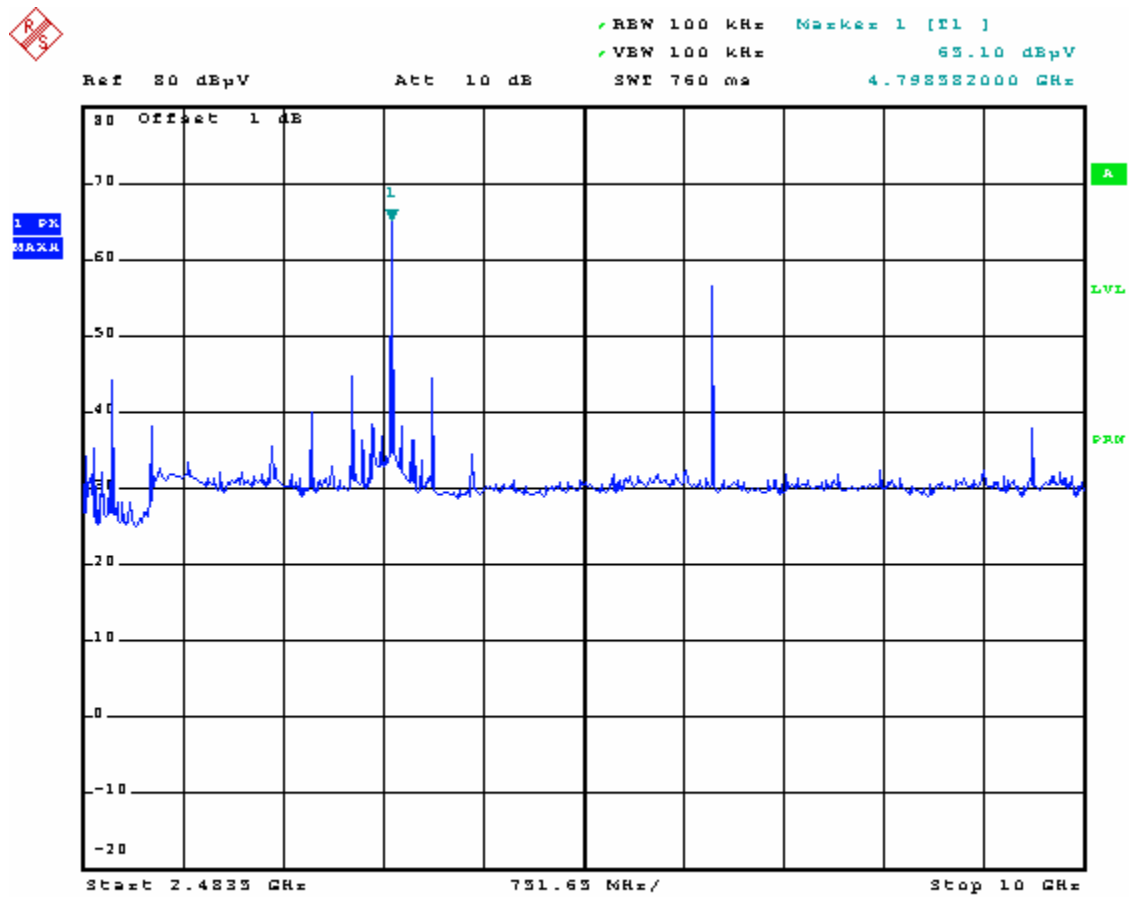


Plot 6.2



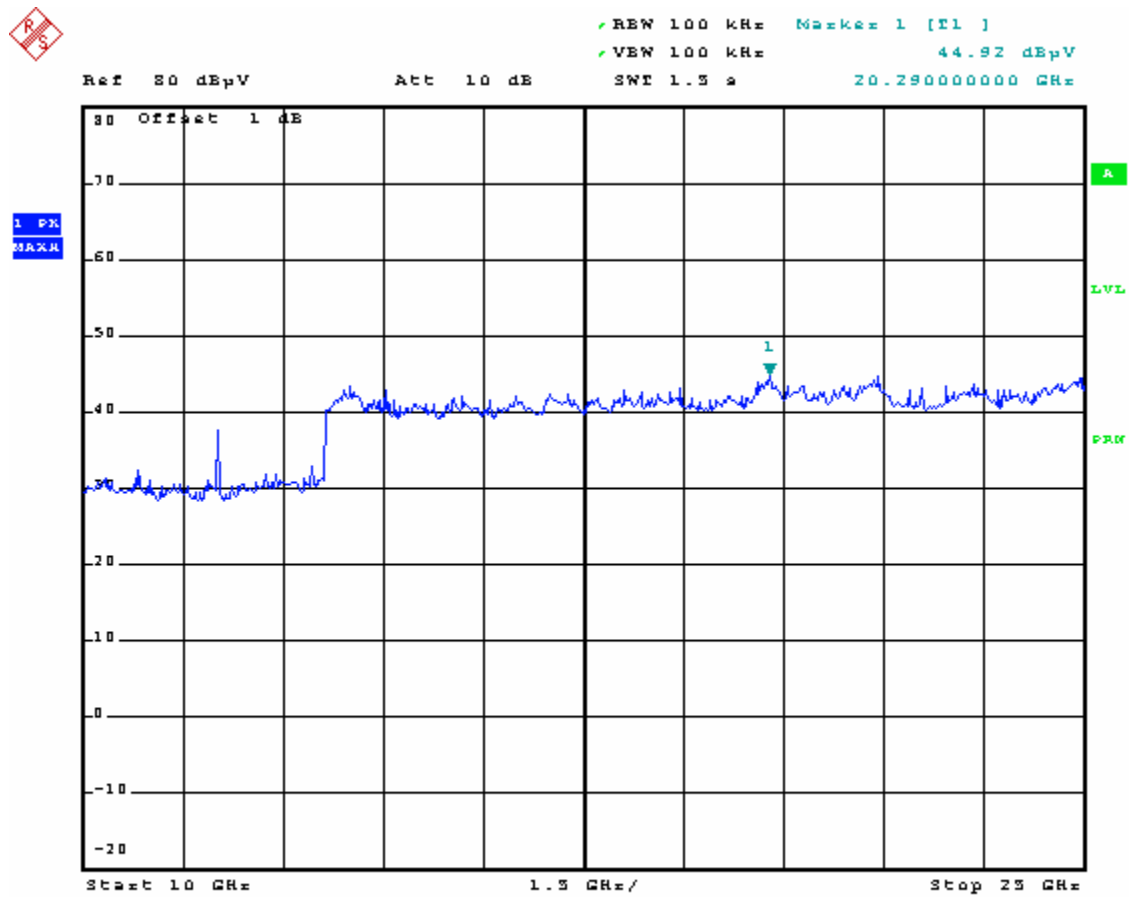
Comment: Spurious emissions, Freq 2402MHz, Tx1
Date: 23.AUG.2008 14:44:40

Plot 6.3



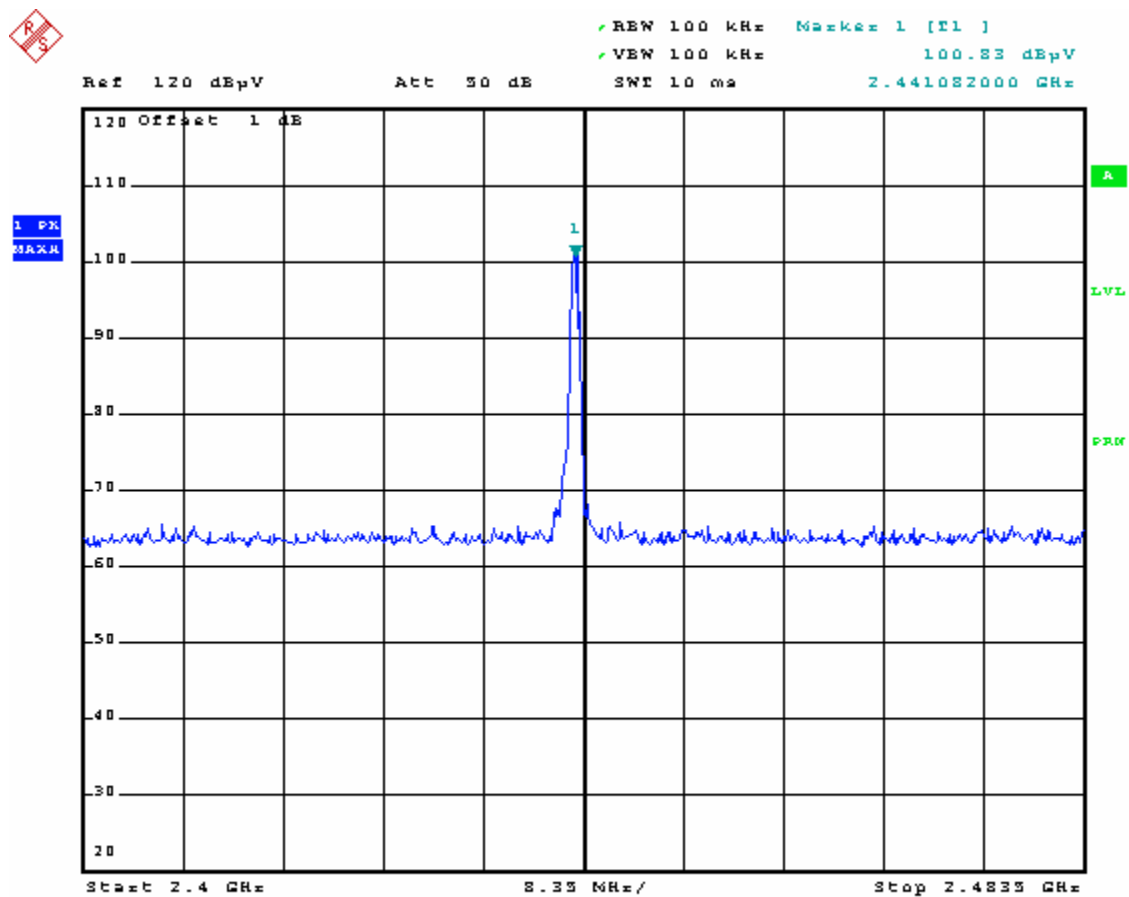
Comment: Spurious emissions, Freq 2402MHz, Tx1
Date: 23.AUG.2008 14:43:33

Plot 6.4



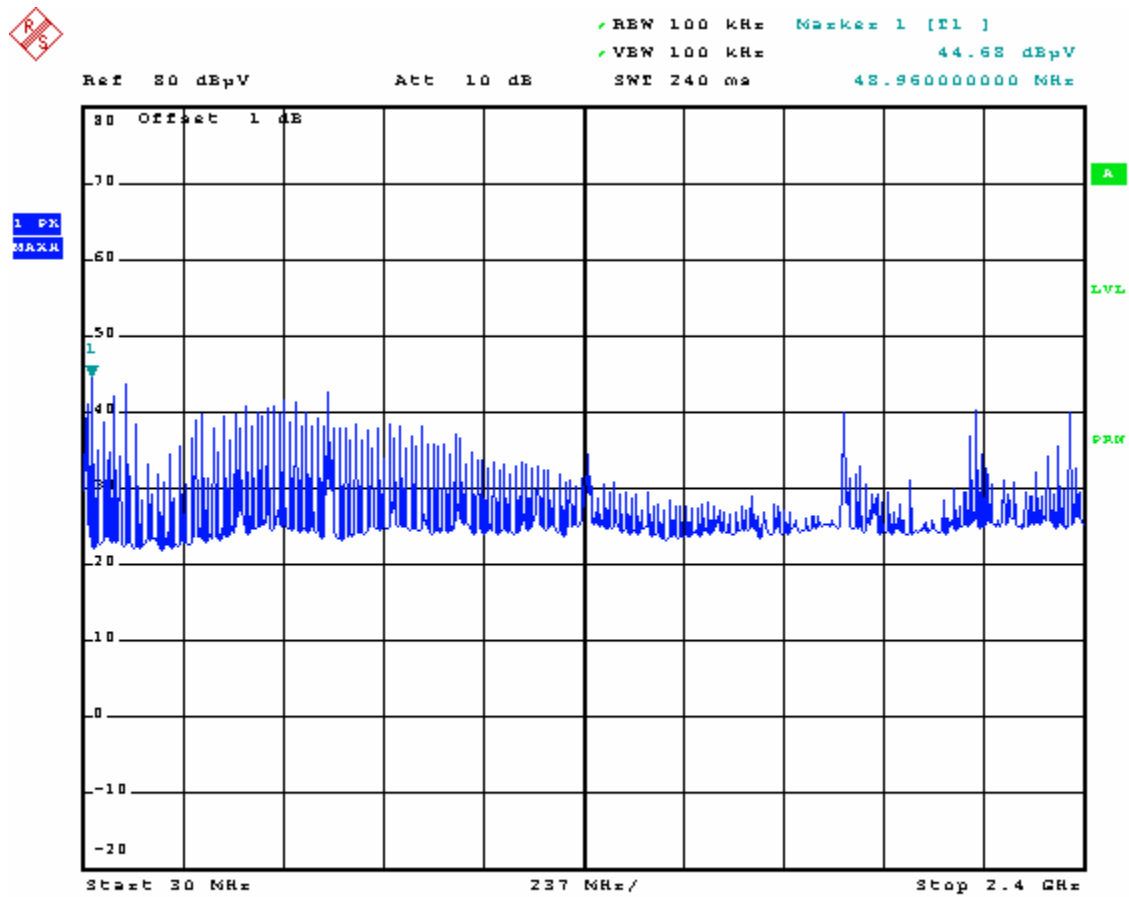
Comment: Spurious emissions, Freq 2402MHz, Tx1
 Date: 23.AUG.2008 14:47:00

Plot 6.5



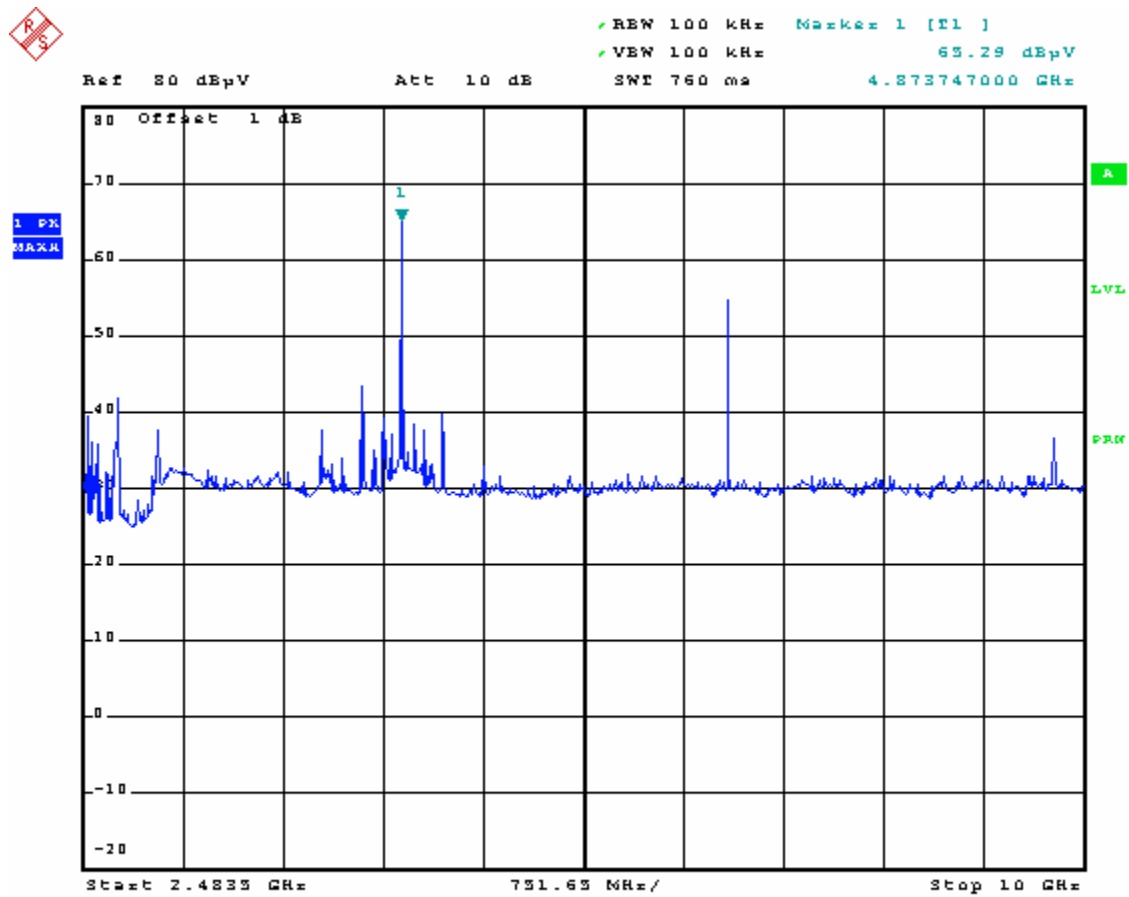
Comment: In-band emissions, Freq 2441MHz, Tx1
Date: 25.AUG.2008 14:39:27

Plot 6.6



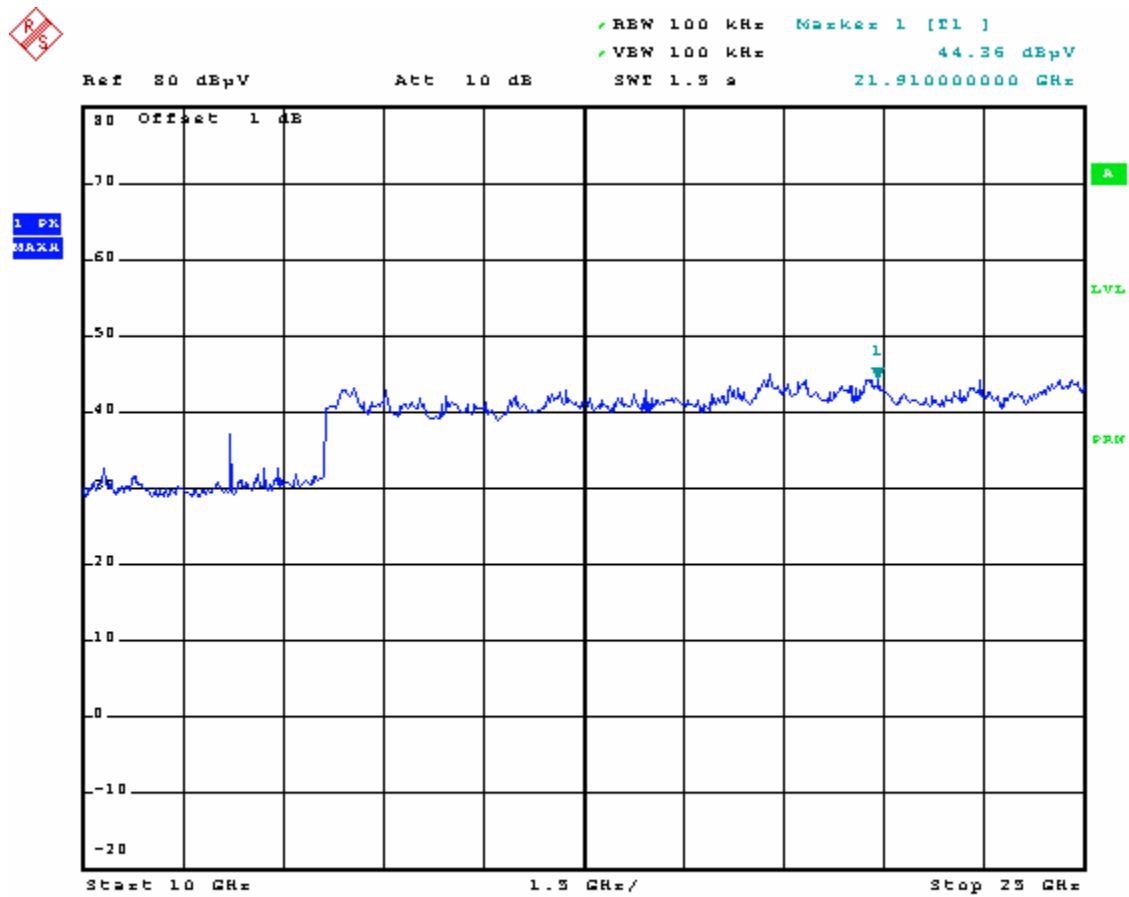
Comment: Spurious emissions, Freq 2441MHz, Tx1
Date: 23.AUG.2008 16:06:30

Plot 6.7



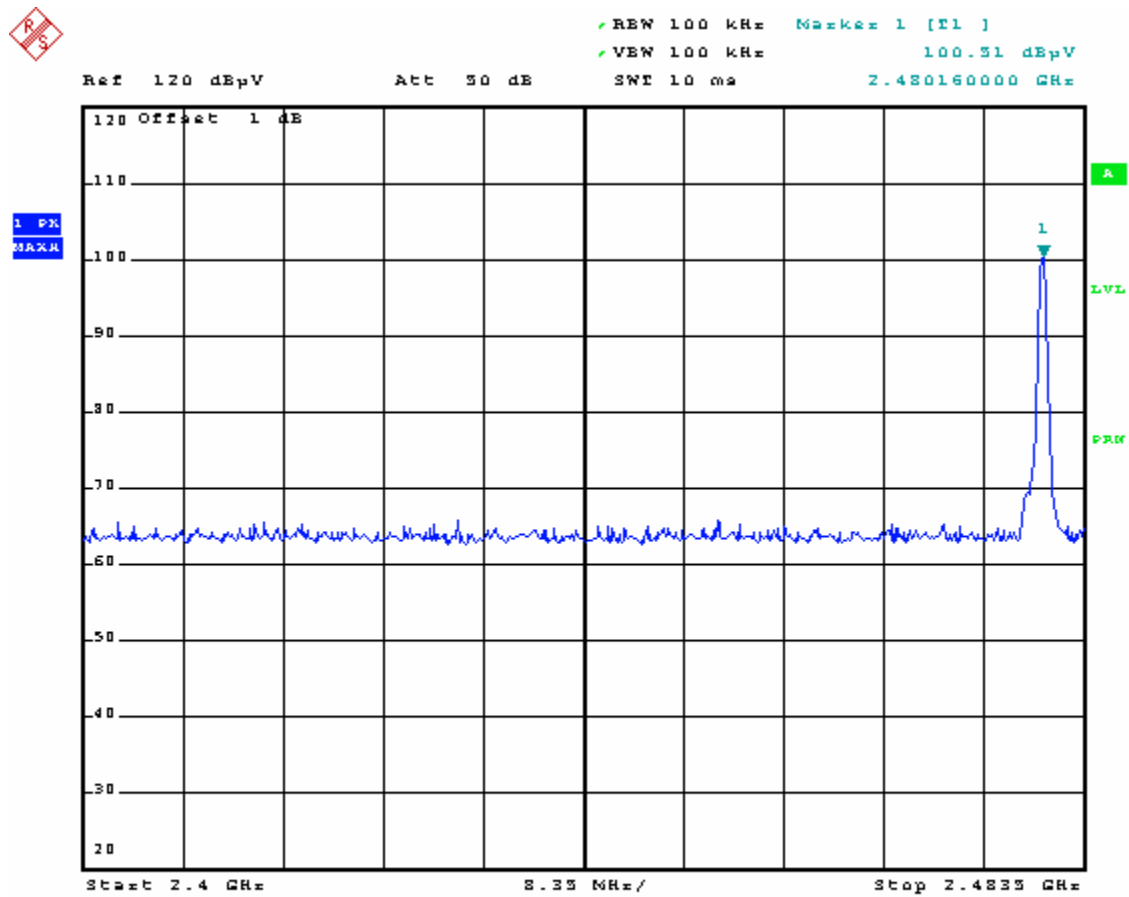
Comment: Spurious emissions, Freq 2441MHz, Tx1
Date: 23.AUG.2008 16:07:42

Plot 6.8



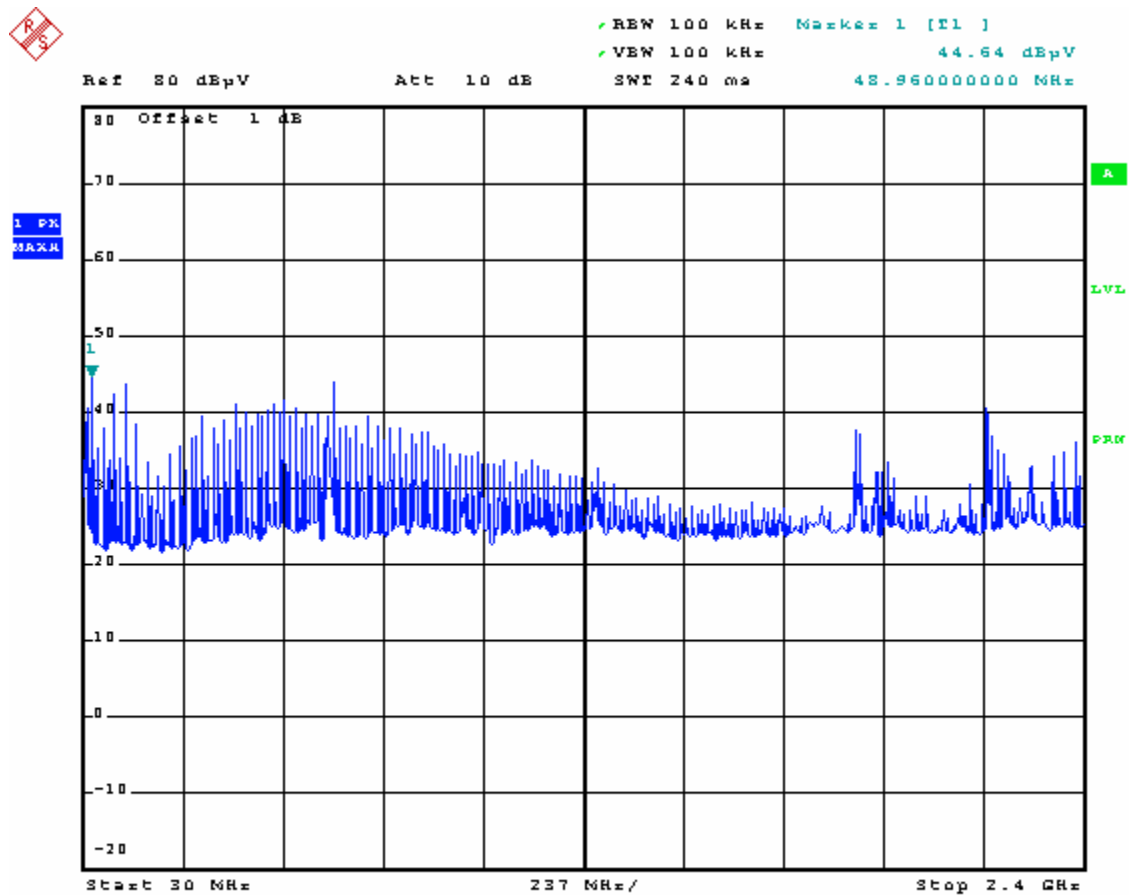
Comment: Spurious emissions, Freq 2441MHz, Tx1
 Date: 23.AUG.2008 16:08:36

Plot 6.9



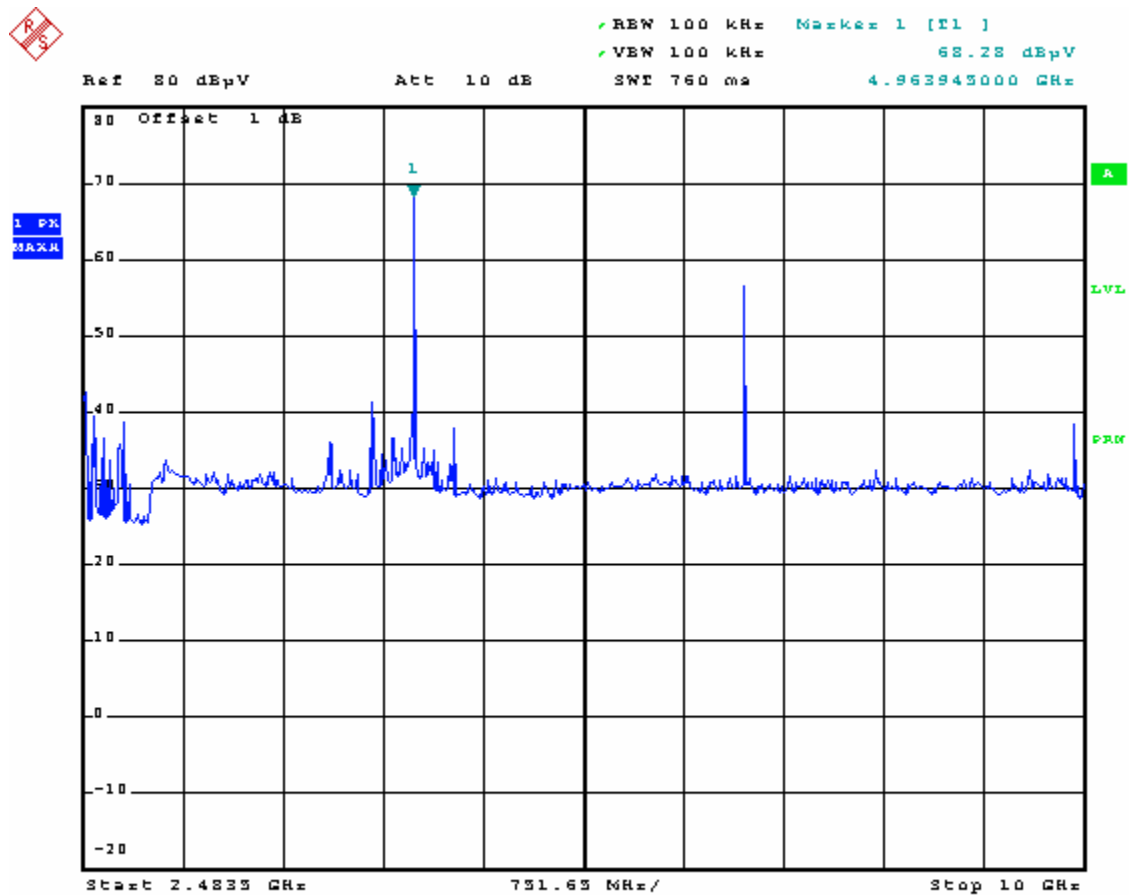
Comment: In-band emissions, Freq 2480MHz, Tx1
Date: 23.AUG.2008 14:40:47

Plot 6.10



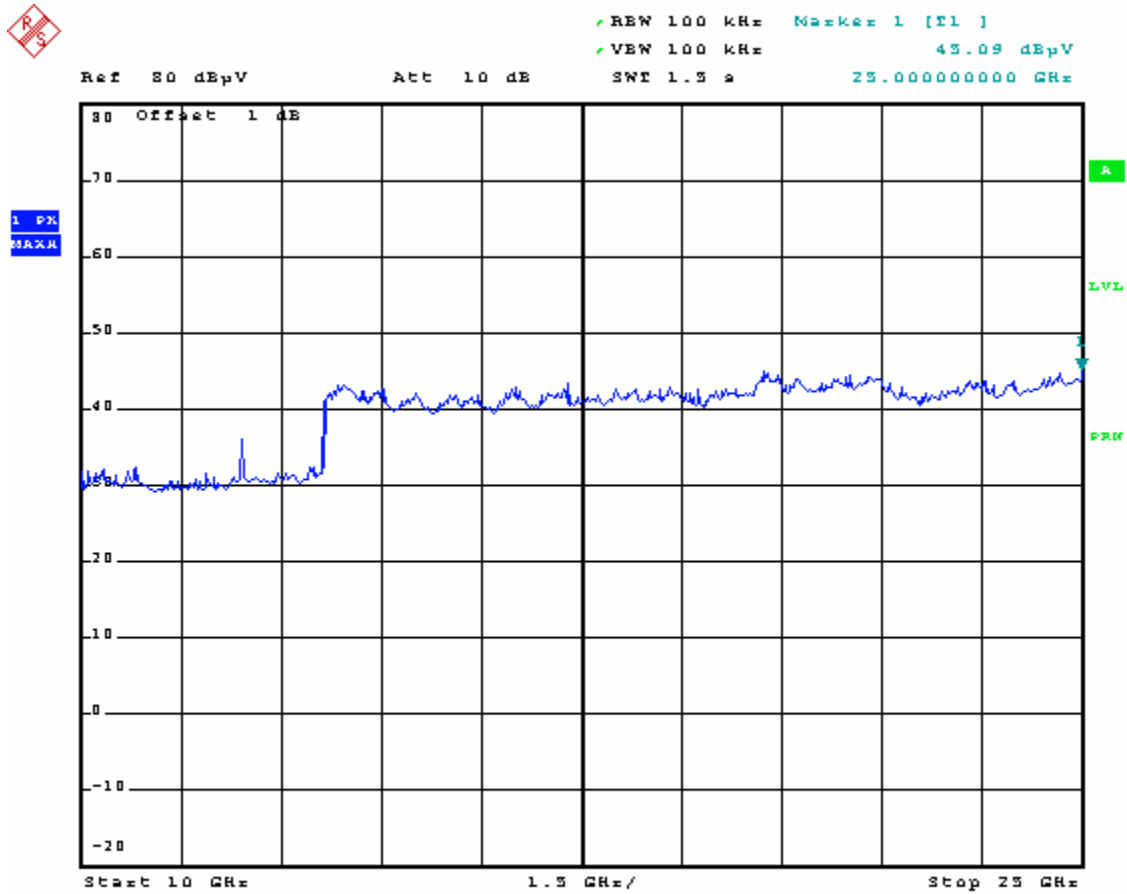
Comment: Spurious emissions, Freq 248MHz, Tx1
Date: 23.AUG.2008 16:10:18

Plot 6.11



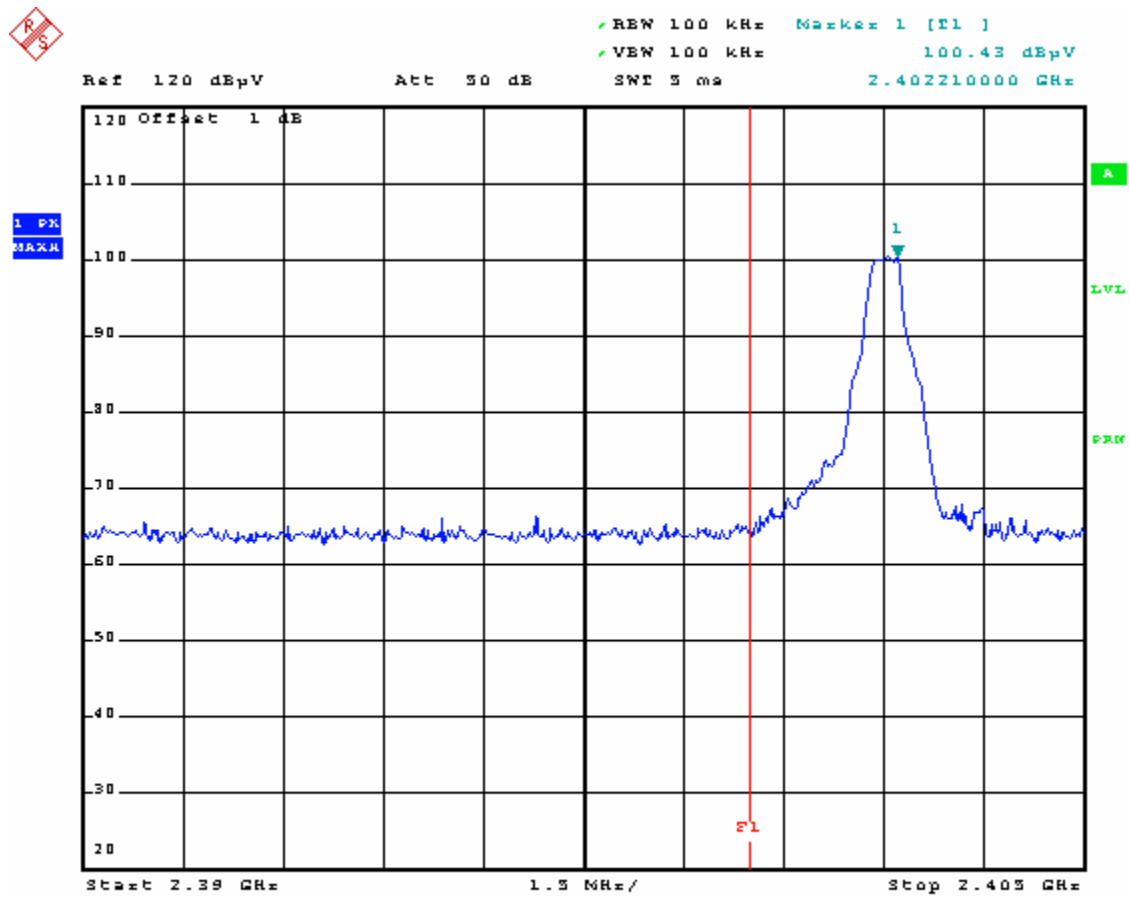
Comment: Spurious emissions, Freq 2480MHz, Tx1
 Date: 23.AUG.2008 16:11:13

Plot 6.12



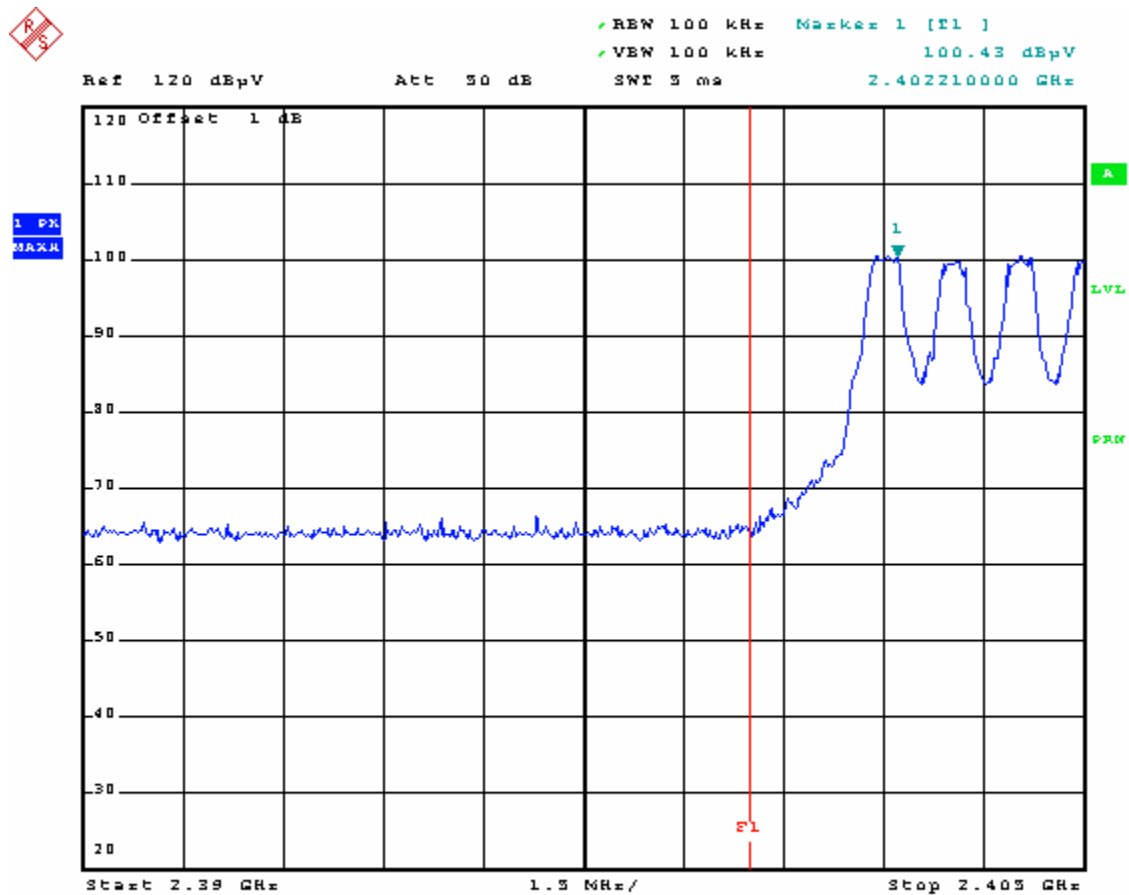
Comment: Spurious emissions, Freq 2480MHz, Tx1
 Date: 23.AUG.2008 16:12:39

Plot 6.13



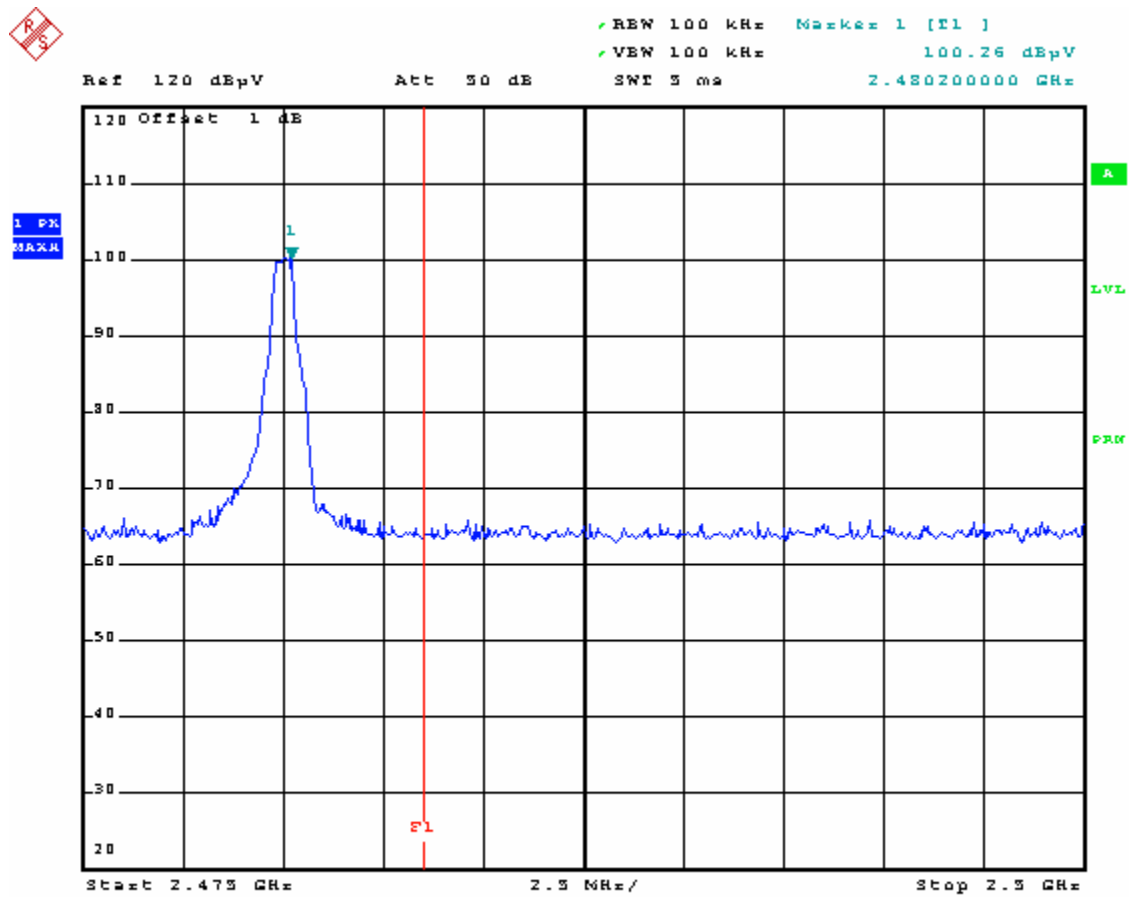
Comment: Spurious emissions, Freq 2402MHz, Fx1
Date: 23.AUG.2008 16:26:28

Plot 6.14



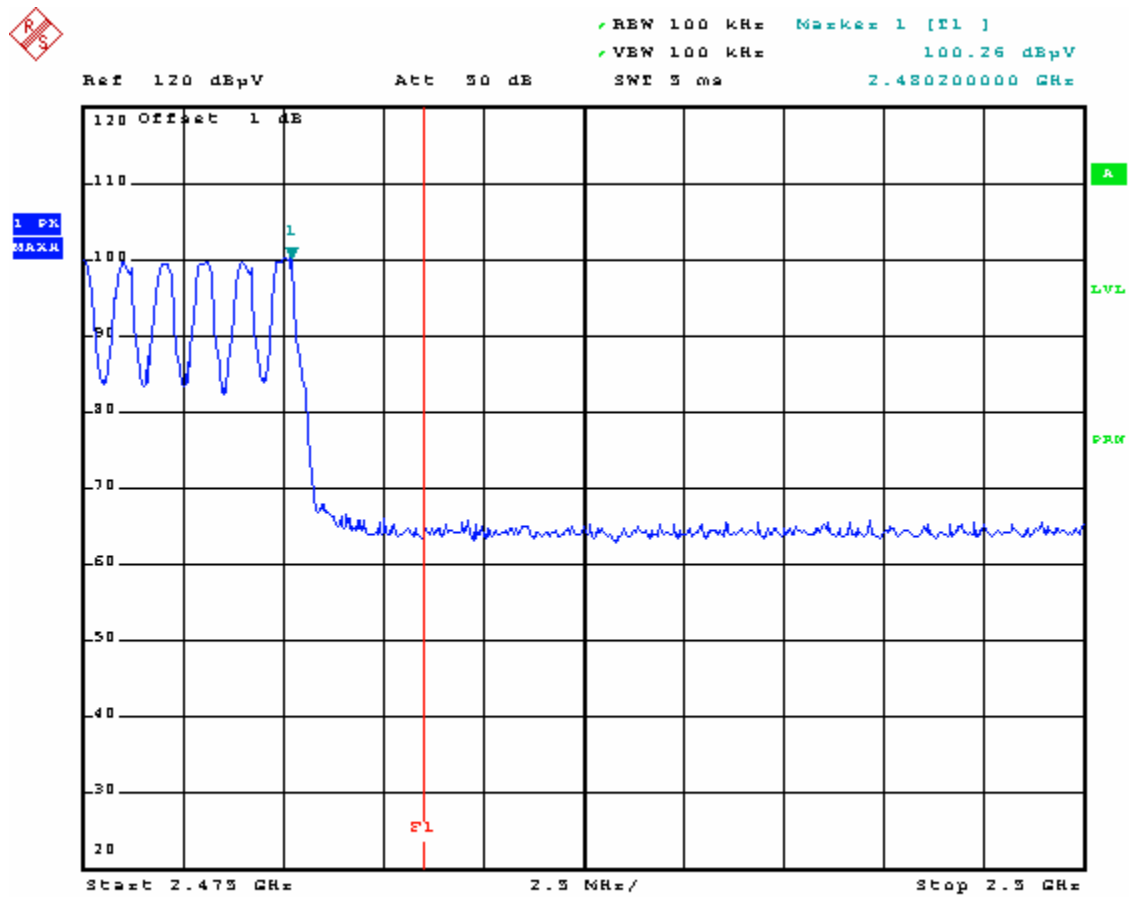
Comment: Spurious emissions, Freq 2402MHz, Fx1
 Date: 23.AUG.2008 16:28:12

Plot 6.15



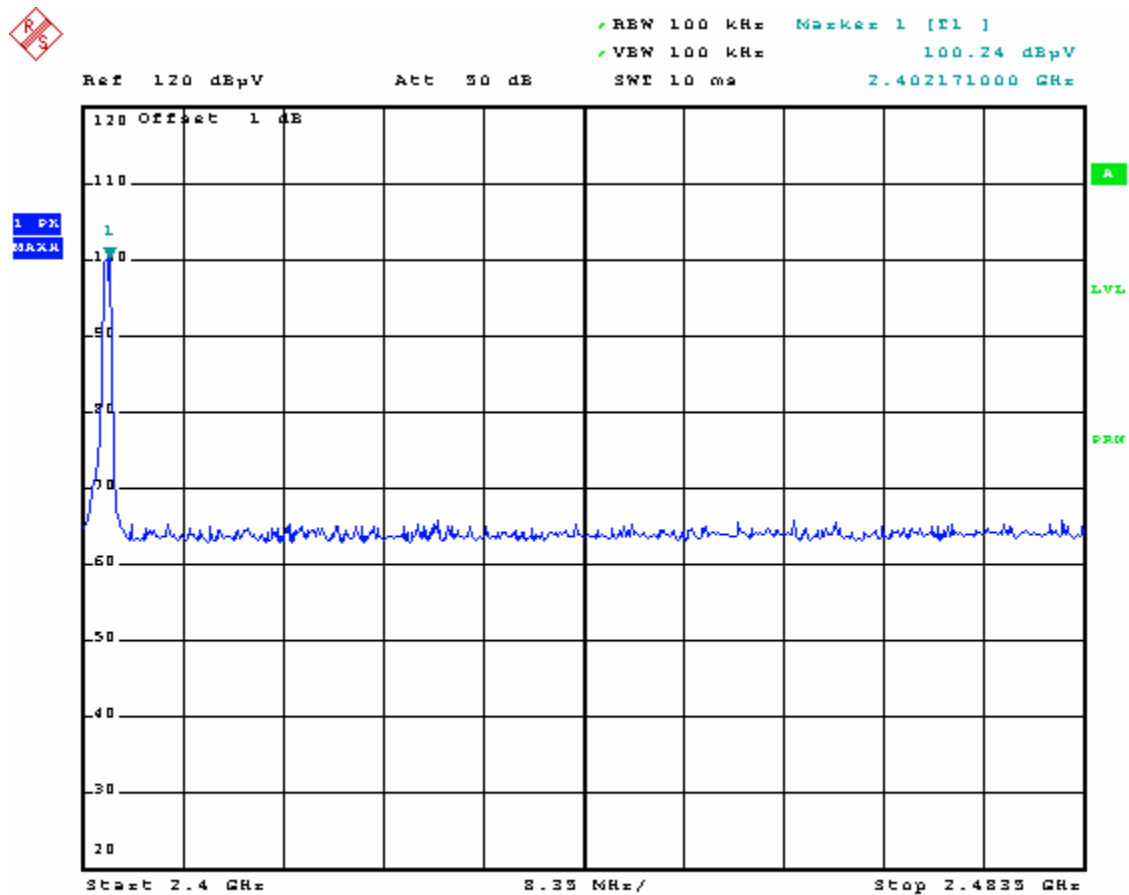
Comment: Spurious emissions, Freq 2480MHz, Fx1
 Date: 23.AUG.2008 16:21:26

Plot 6.16



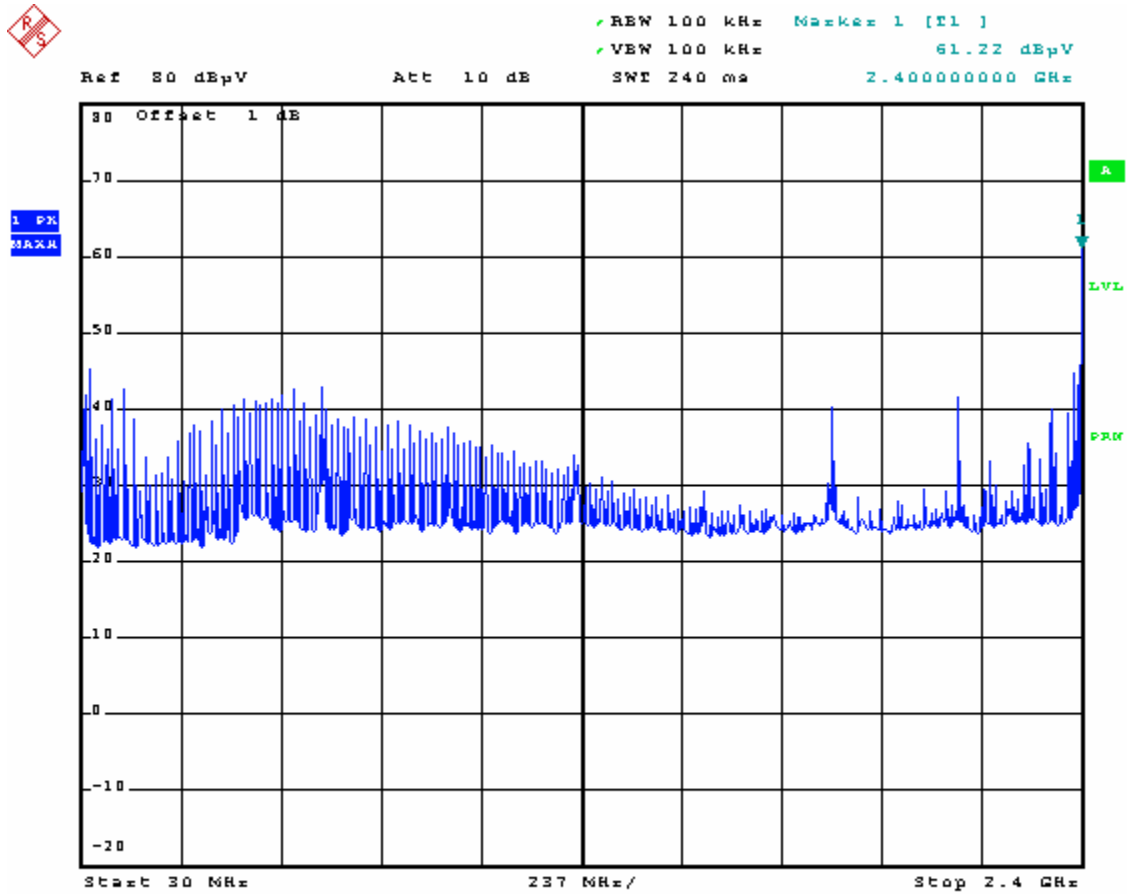
Comment: Spurious emissions, Freq 2480MHz, Fx1
Date: 23.AUG.2008 16:23:17

Plot 6.17



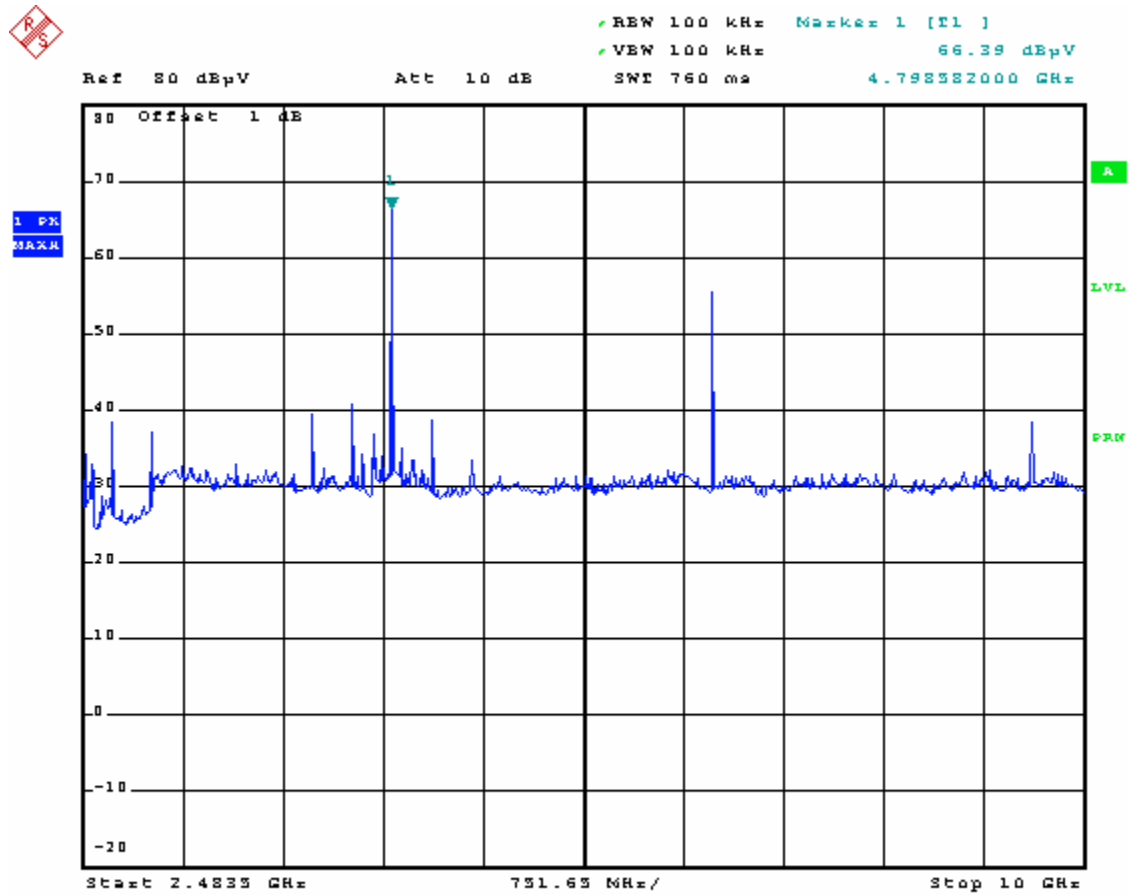
Comment: In-band emissions, Sseq 2402MHz, Tx2
Date: 23.AUG.2008 16:43:24

Plot 6.18



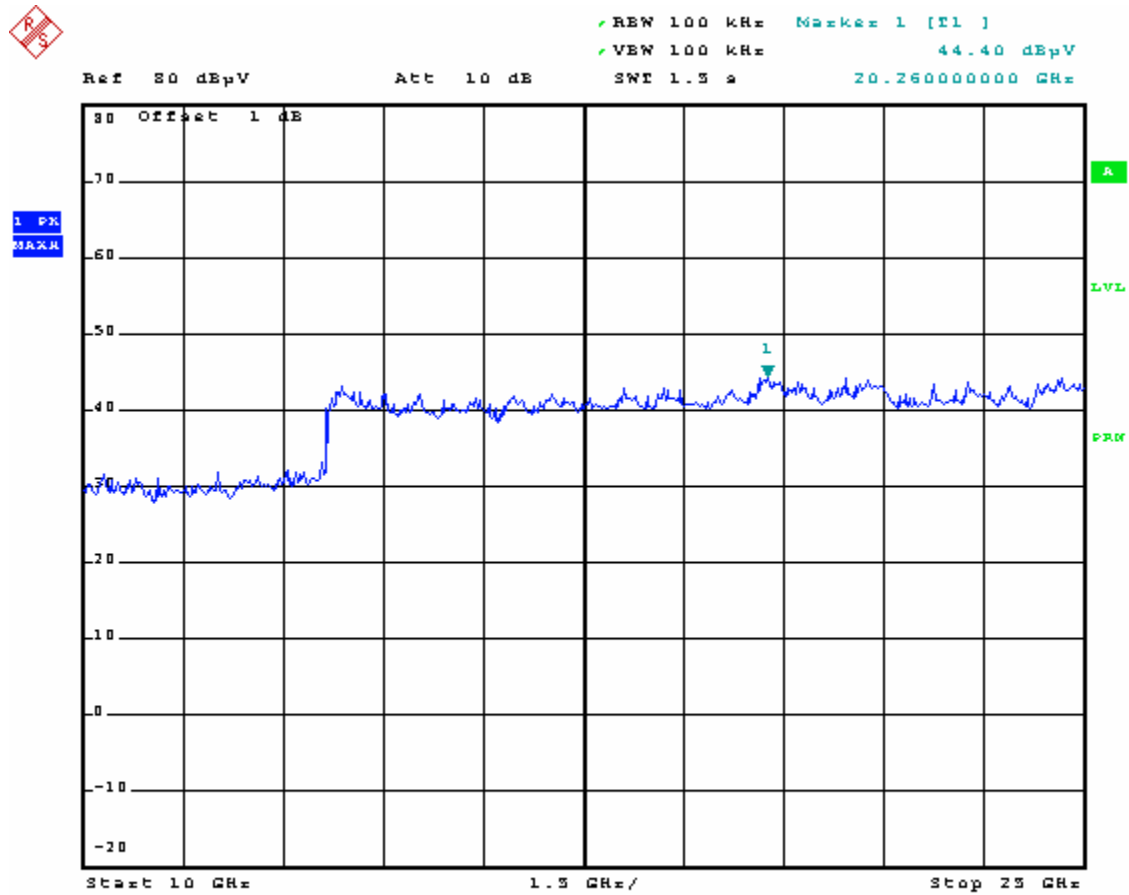
Comment: Spurious emissions, Freq 2402MHz, Tx2
Date: 23.AUG.2008 16:57:48

Plot 6.19



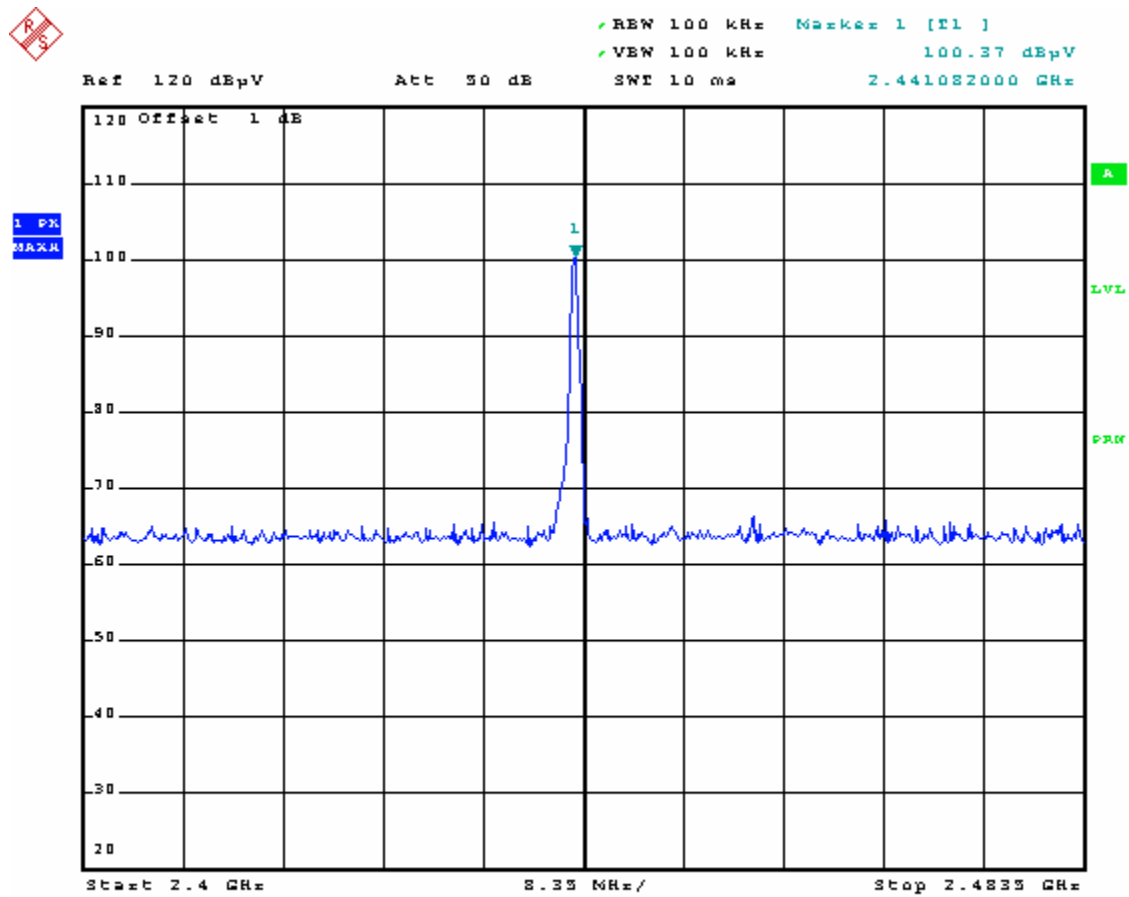
Comment: Spurious emissions, Freq 2402MHz, Tx2
Date: 23.AUG.2008 16:58:51

Plot 6.20



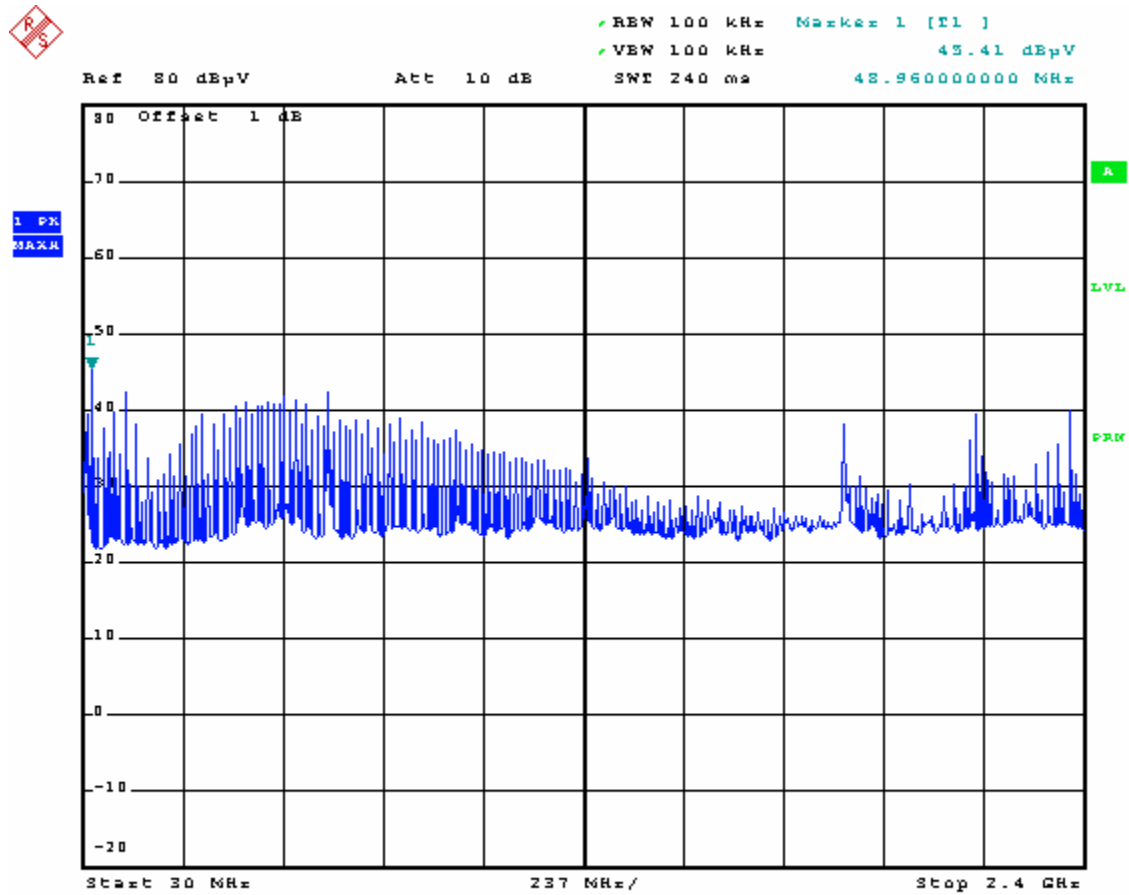
Comment: Spurious emissions, Freq 2402MHz, Tx2
Date: 23.AUG.2008 16:59:33

Plot 6.21



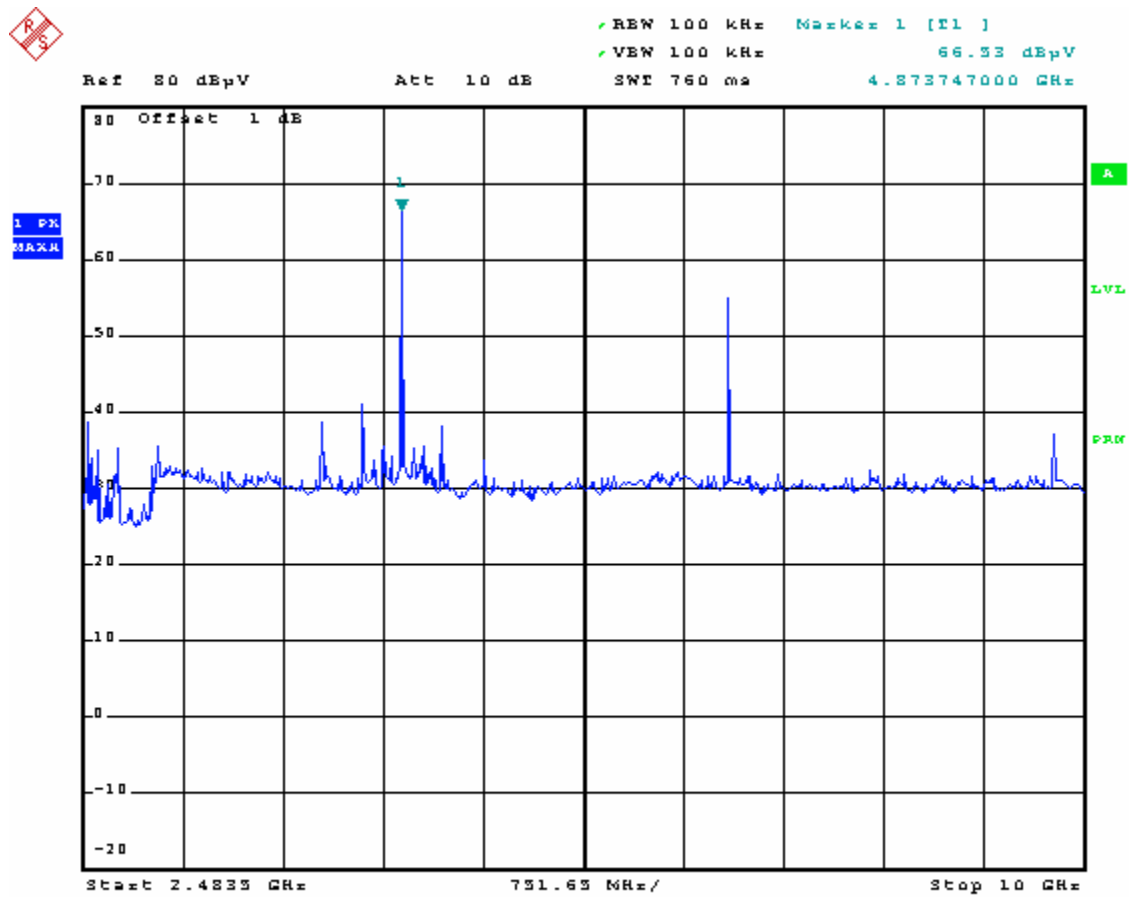
Comment: In-band emissions, Freq 2441MHz, Tx2
Date: 23.AUG.2008 16:44:32

Plot 6.22



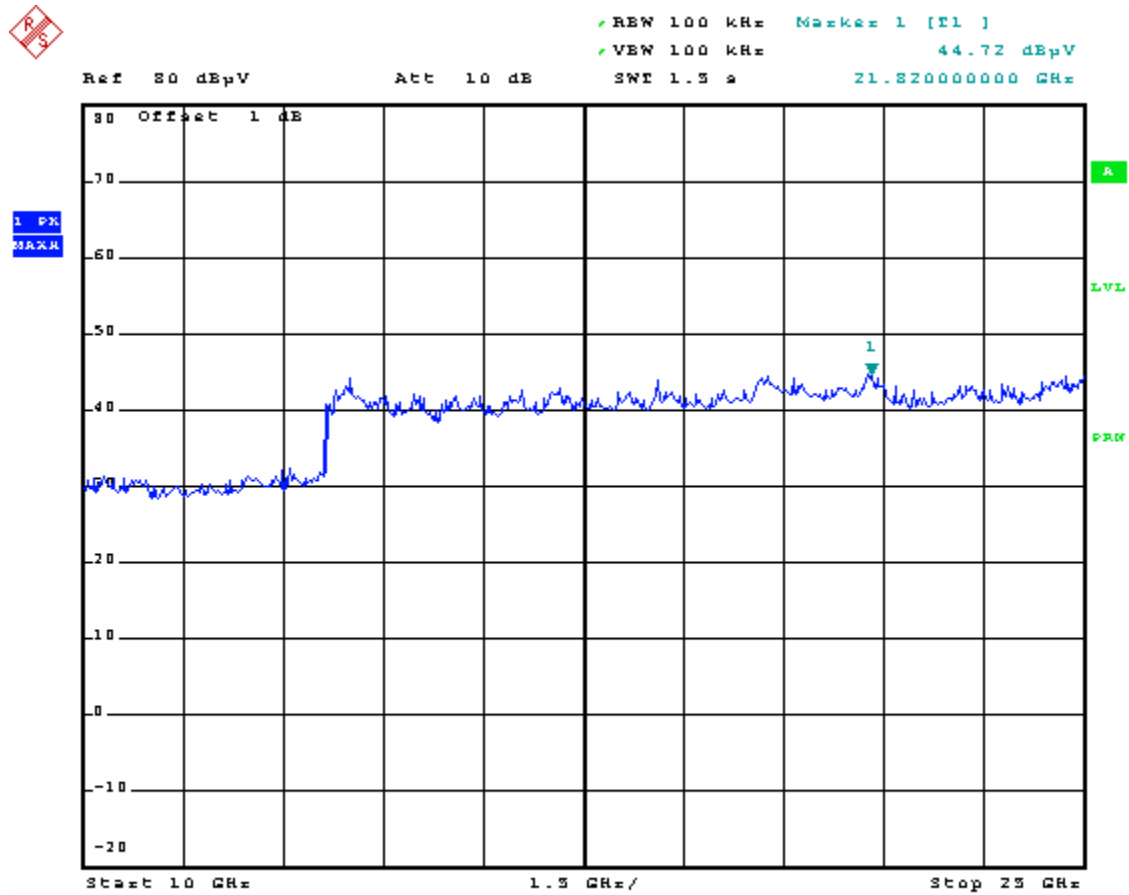
Comment: Spurious emissions, Freq 2441MHz, Tx2
Date: 23.AUG.2008 17:01:04

Plot 6.23



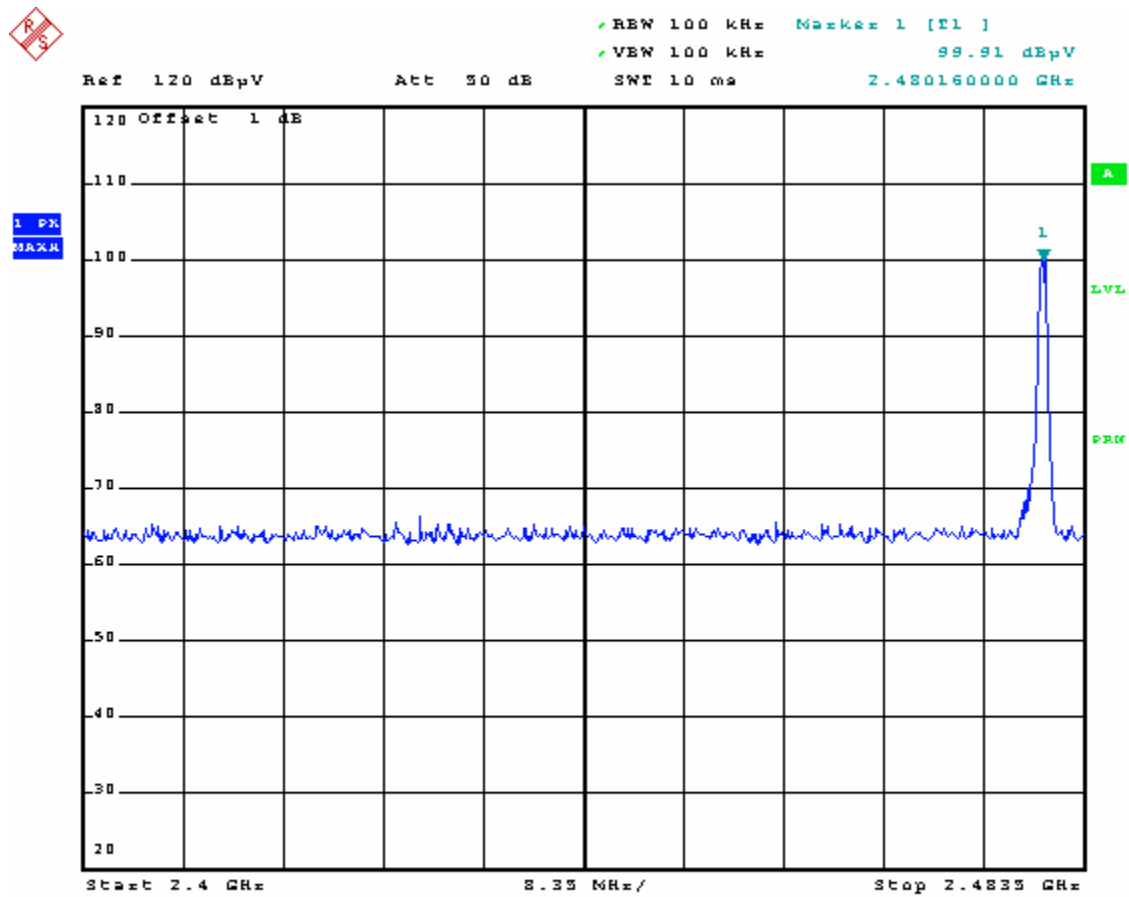
Comment: Spurious emissions, Freq 2441MHz, Tx2
Date: 23.AUG.2008 17:02:16

Plot 6.24



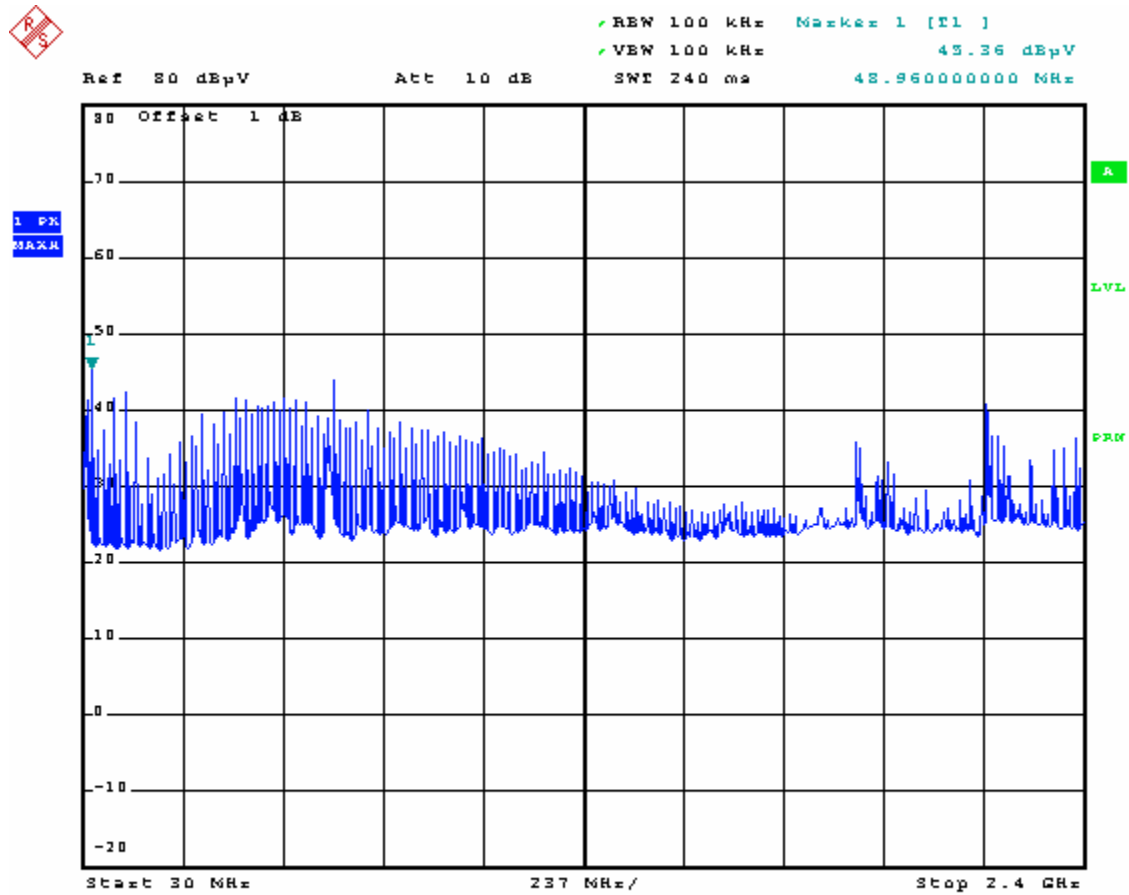
Comment: Spurious emissions, Freq 2441MHz, Tx2
Date: 23.AUG.2008 17:02:58

Plot 6.25



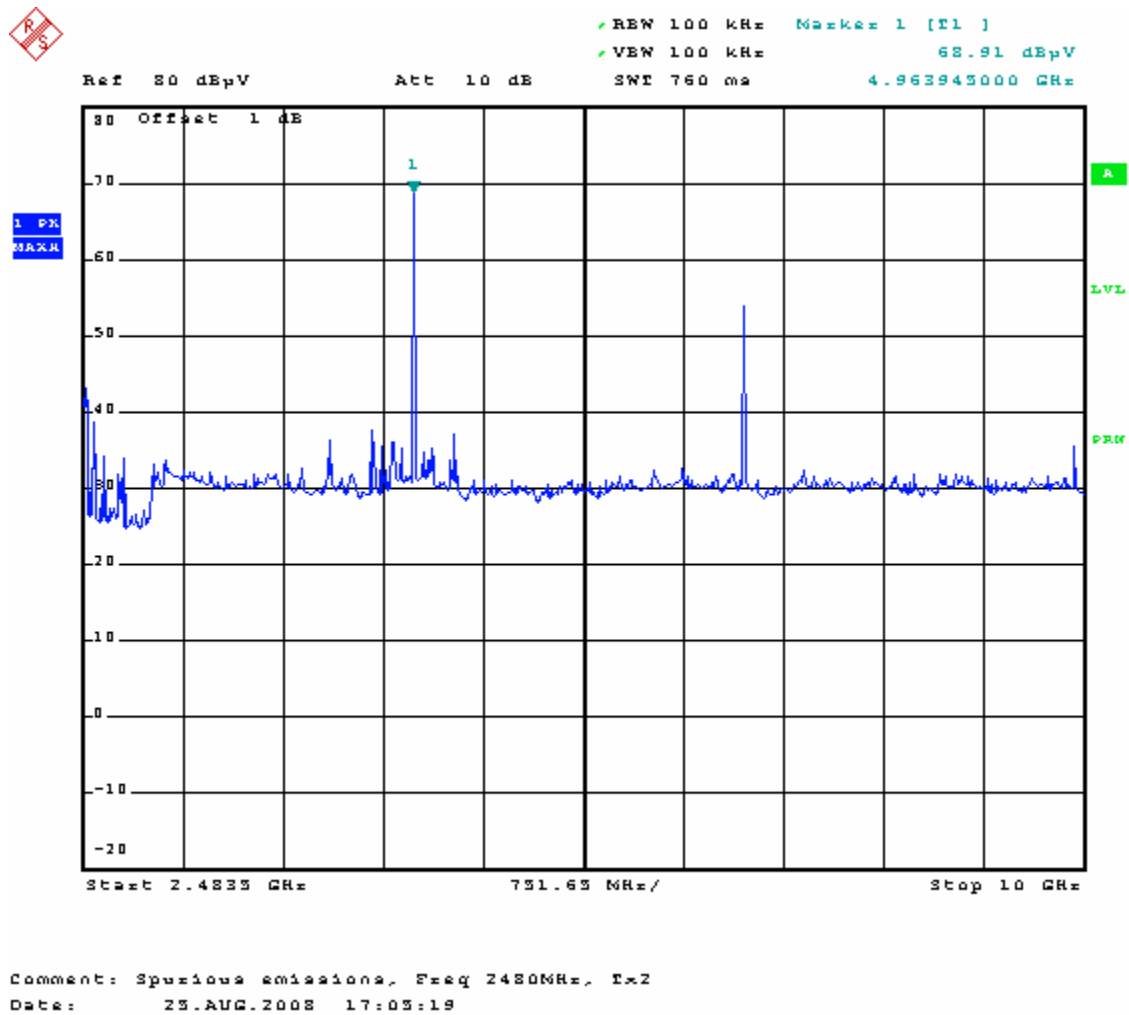
Comment: In-band emissions, Freq 2480MHz, Tx2
Date: 23.AUG.2008 16:46:55

Plot 6.26

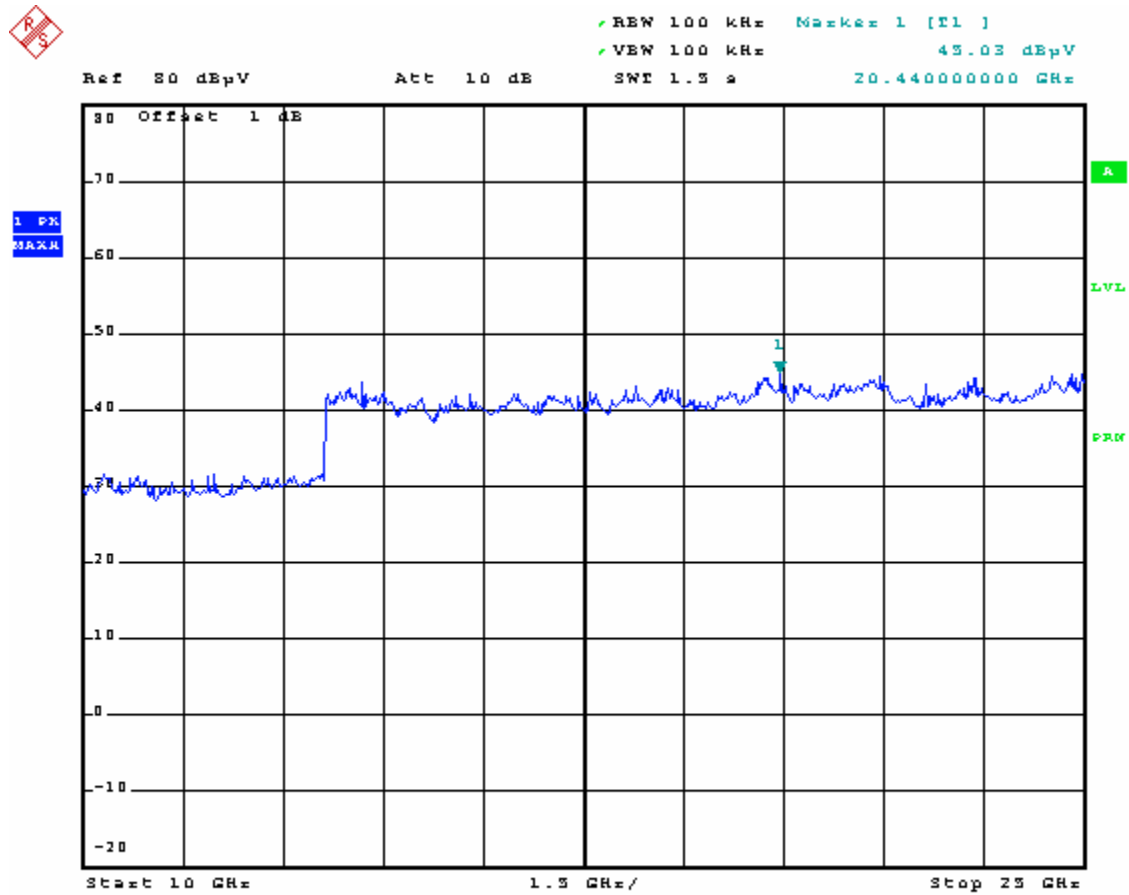


Comment: Spurious emissions, Freq 2480MHz, Tx2
Date: 23.AUG.2008 17:04:33

Plot 6.27

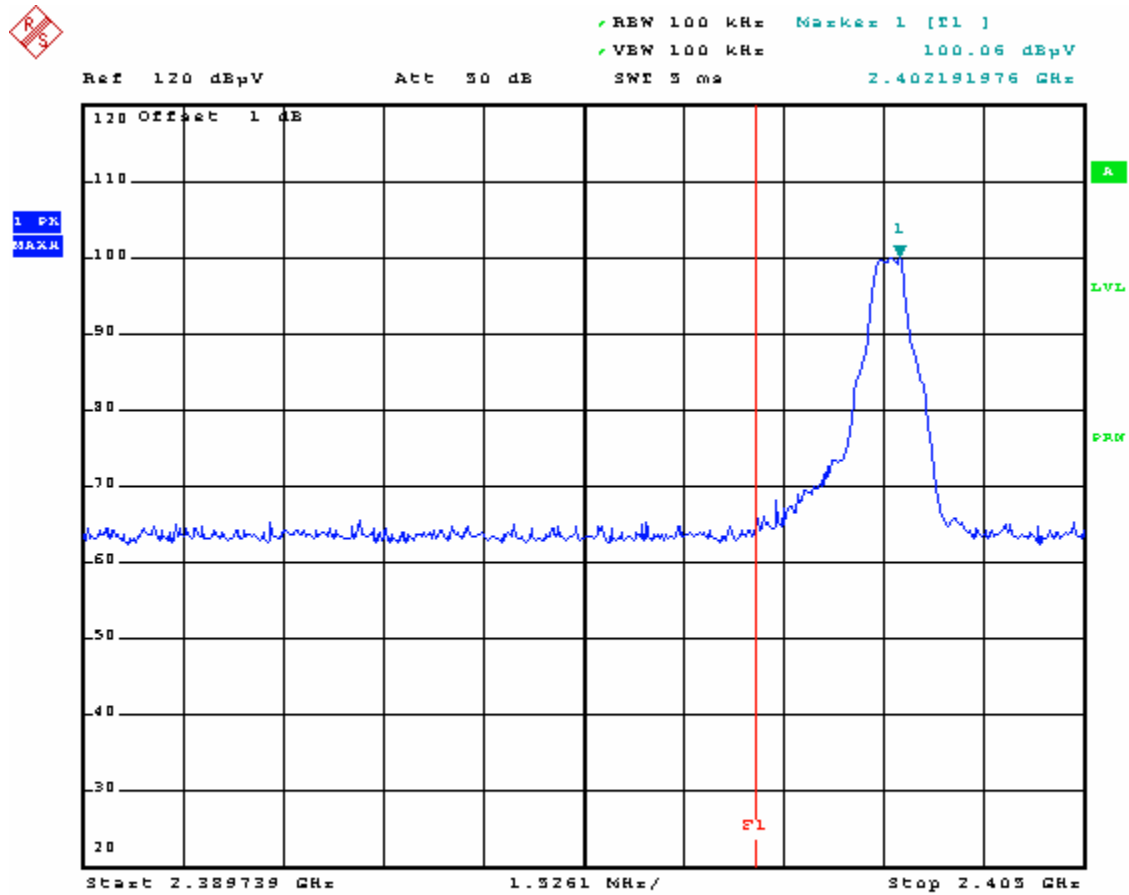


Plot 6.28

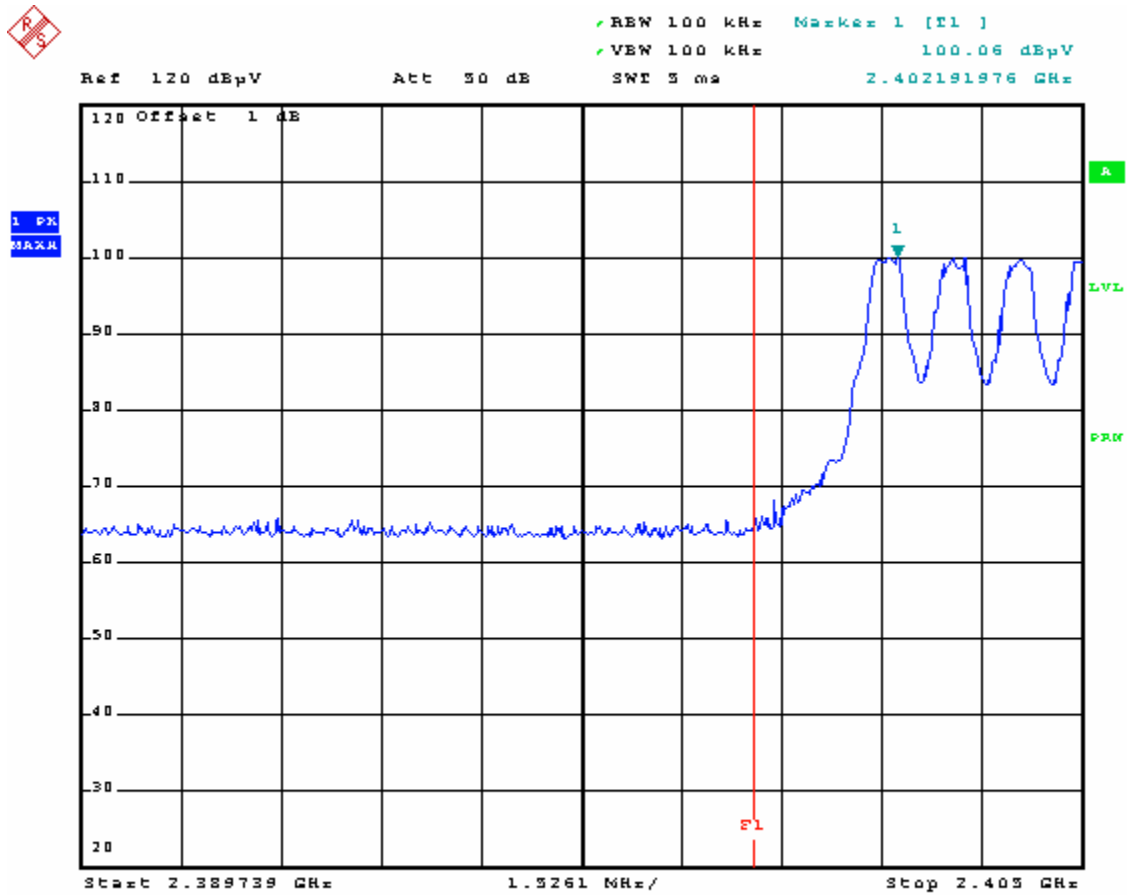


Comment: Spurious emissions, Freq 2480MHz, Tx2
Date: 23.AUG.2008 17:03:59

Plot 6.29

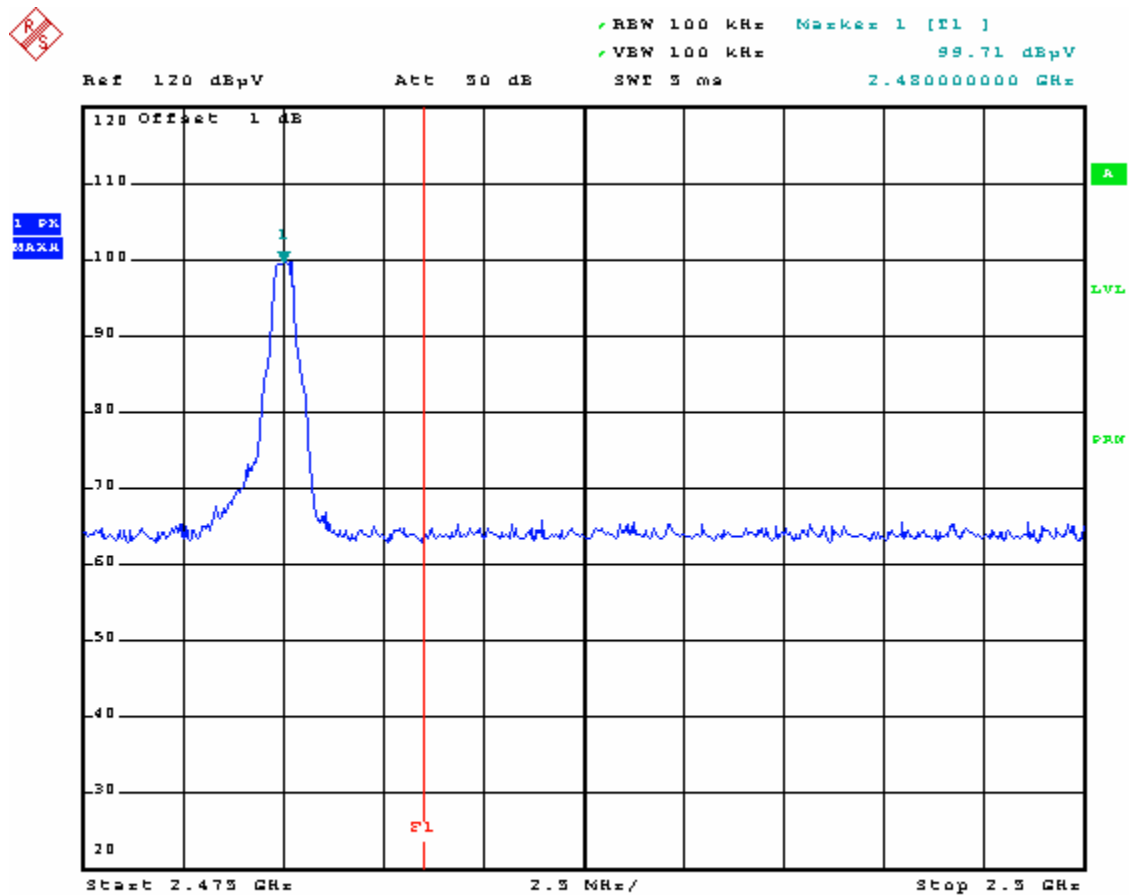


Plot 6.30



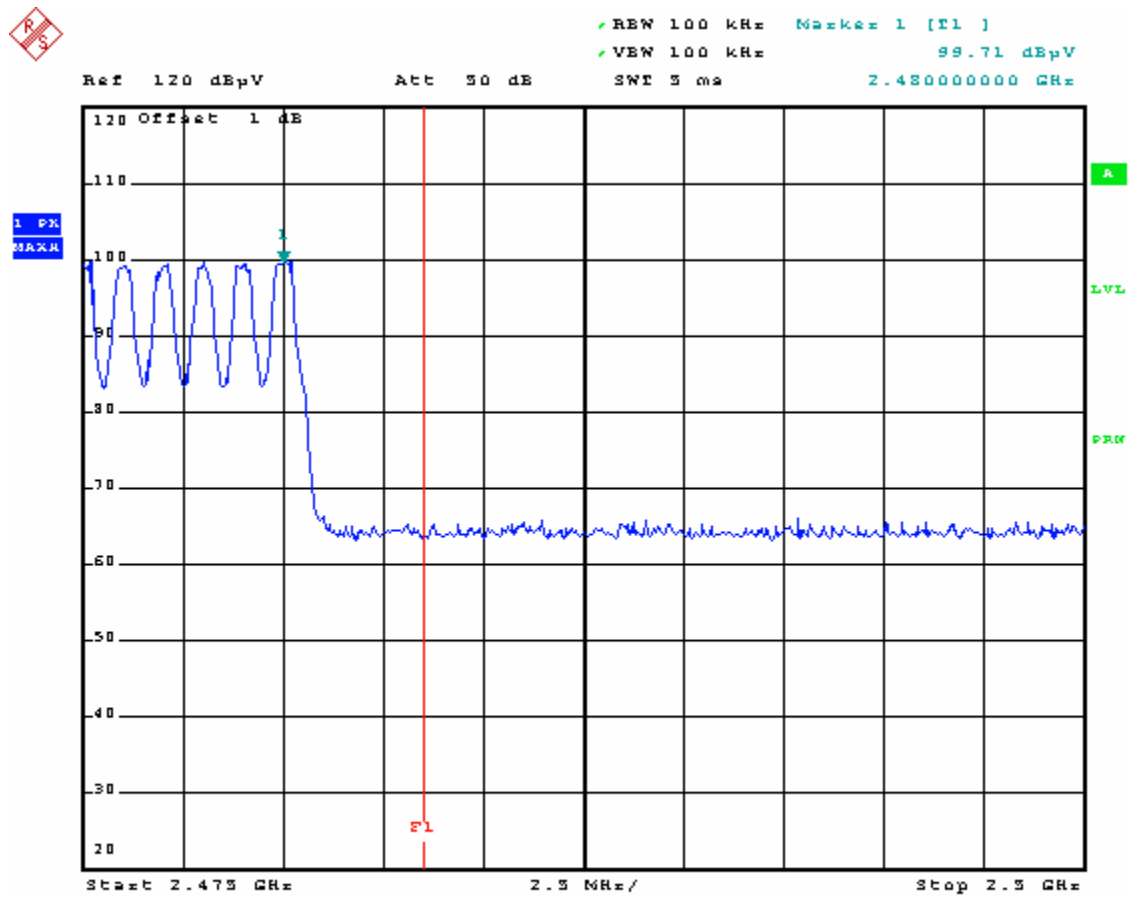
Comment: Spurious emissions, Freq 2402MHz, Tx2
Date: 29.AUG.2008 16:41:33

Plot 6.31



Comment: Spurious emissions, Freq 2480MHz, Tx2
Date: 23.AUG.2008 16:50:16

Plot 6.32



Comment: Spurious emissions, Freq 2480MHz, Tx2
Date: 23.AUG.2008 16:52:53

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(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) 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(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(1/\text{m})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}(\mu\text{V}/\text{m})$$

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

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 – 8.6. 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 0.7 dB.

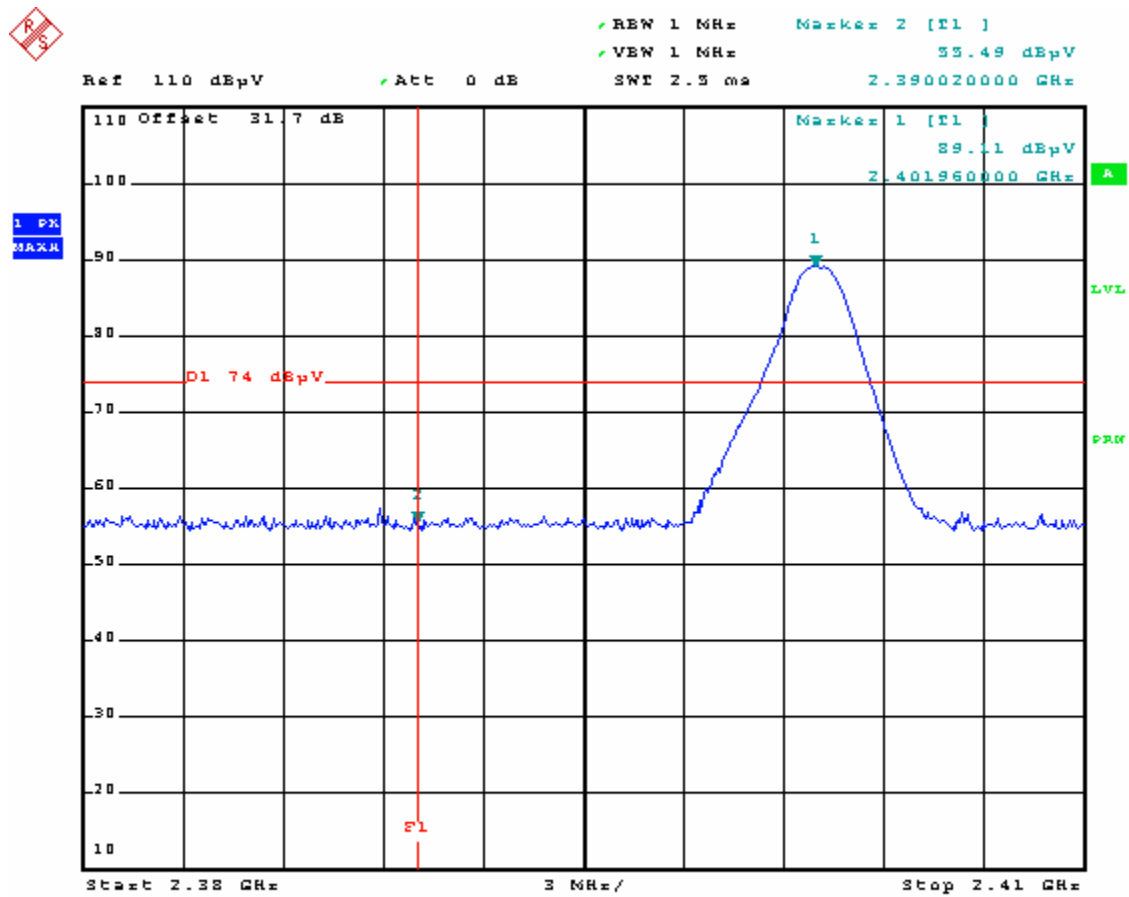
Test Result	
FCC Part 15.247 Radiated Emission in Restricted Bands	
Temperature: 20 C	Advanced Medical Optics
Humidity: 50 %	Model: Advanced Control Pedal Slave
Test distance = 3 m	
Test date: August 26, 2008	

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	57.1	-25.8	--	33.0	64.3	74	-9.7
12010	Peak	35.6	-20.8	--	39.2	54.0	74	-20.0
4804	Aver	44.5	-25.8	2.3	33.0	49.4	54	-4.6
12010	Aver	23.0	-20.8	2.3	39.2	39.1	54	-14.9
Tx at 2441 MHz								
4882	Peak	56.6	-25.2	--	33.2	64.6	74	-9.4
7323	Peak	47.5	-22.6	--	36.1	61.0	74	-13.0
12205	Peak	36.1	-21.0	--	39.0	54.1	74	-19.9
4882	Aver	46.4	-25.2	2.3	33.2	52.1	54	-1.9
7323	Aver	39.0	-22.6	2.3	36.1	50.2	54	-3.8
12205	Aver	23.3	-21.0	2.3	39.0	39.0	54	-15.0
Tx at 2480 MHz								
4960	Peak	56.1	-24.9	--	33.4	64.6	74	-9.4
7440	Peak	48.7	-22.6	--	36.4	62.5	74	-11.5
12400	Peak	35.2	-21.3	--	38.7	52.6	74	-21.4
4960	Aver	47.1	-24.9	2.3	33.4	53.30	54	-0.7
7440	Aver	39.6	-22.6	2.3	36.4	51.10	54	-2.9
12400	Aver	22.2	-21.3	2.3	38.7	37.30	54	-16.7

* See Appendix A for Duty cycle measurement.

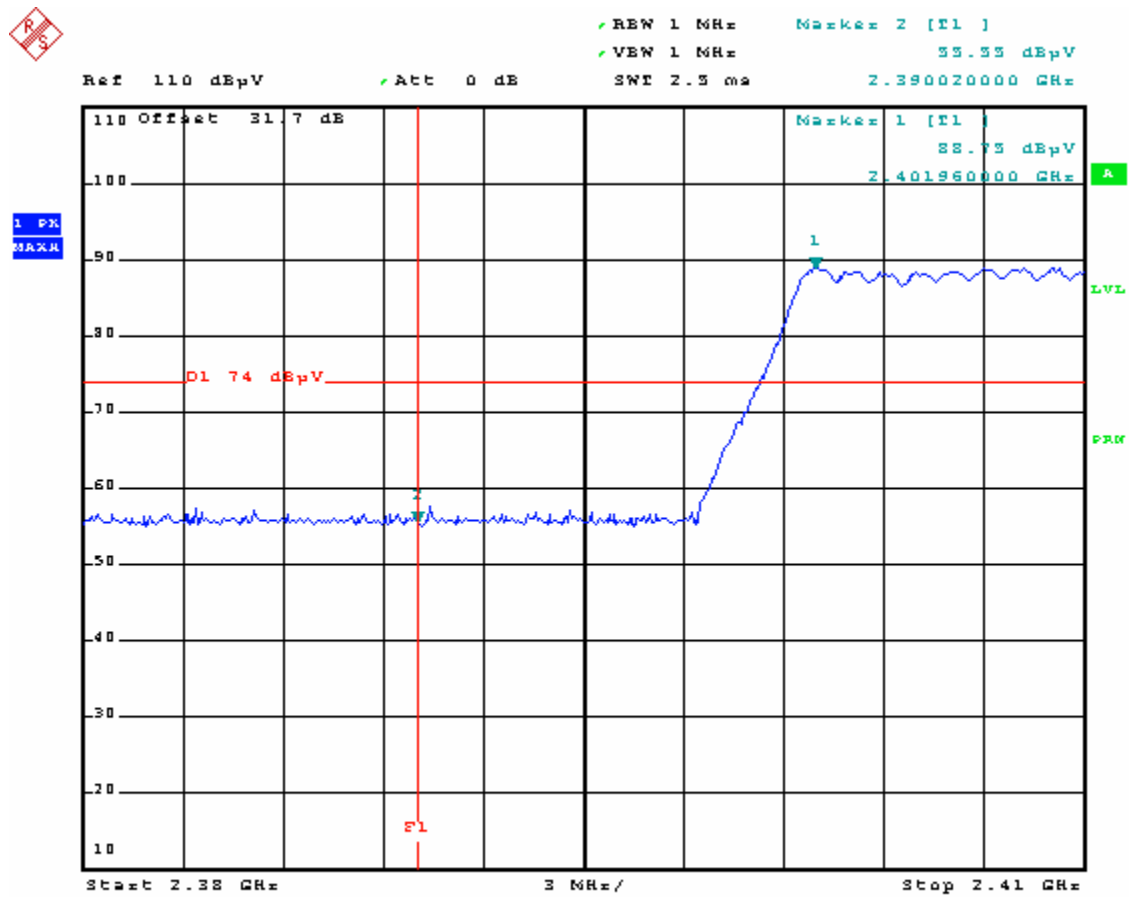
- a) RBW = 1 MHz, VBW = 1 MHz - for peak measurements
RBW = 1MHz, VBW = 100 Hz - for average measurements
- b) Correction Factor: Pre-amplifier gain + Cable loss + HP-Filter loss

Plot 8.1



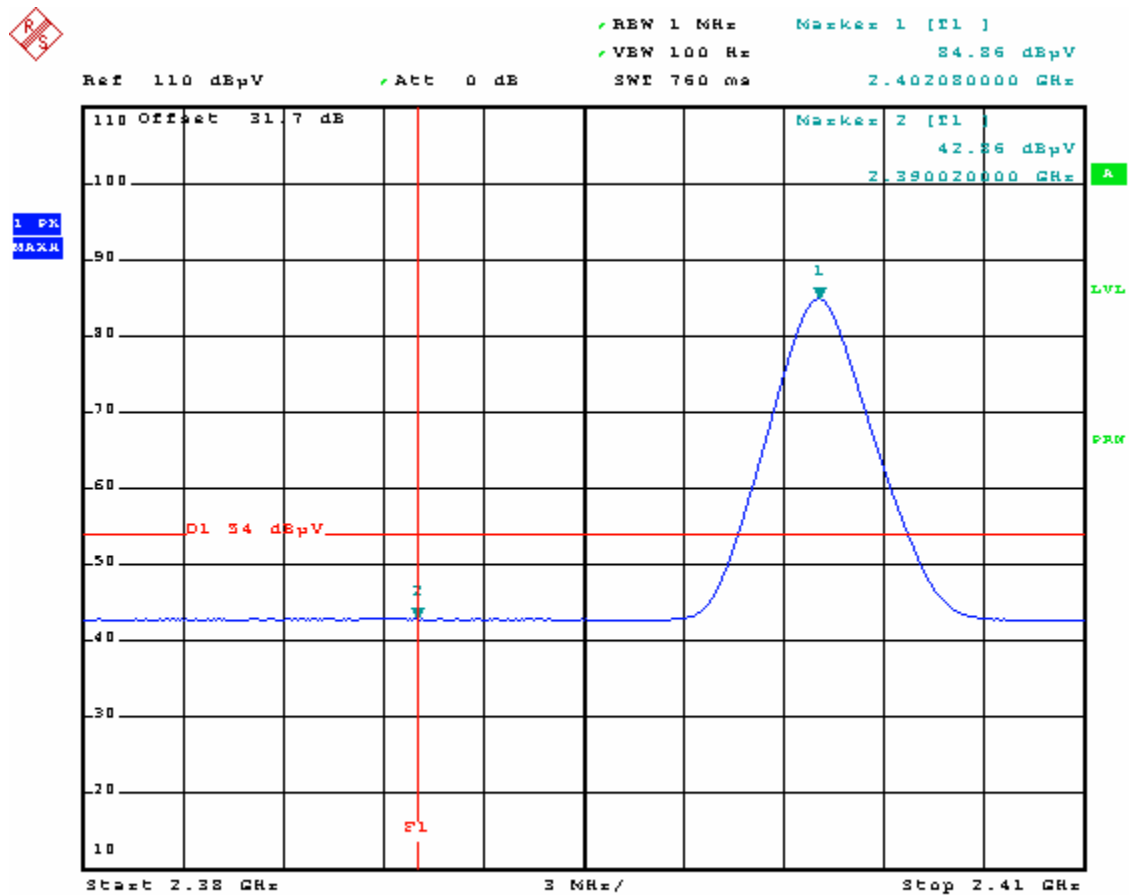
Comment: Emissions on band-edge frequency, peak, freq 2402MHz
Date: 29.AUG.2008 08:03:23

Plot 8.2



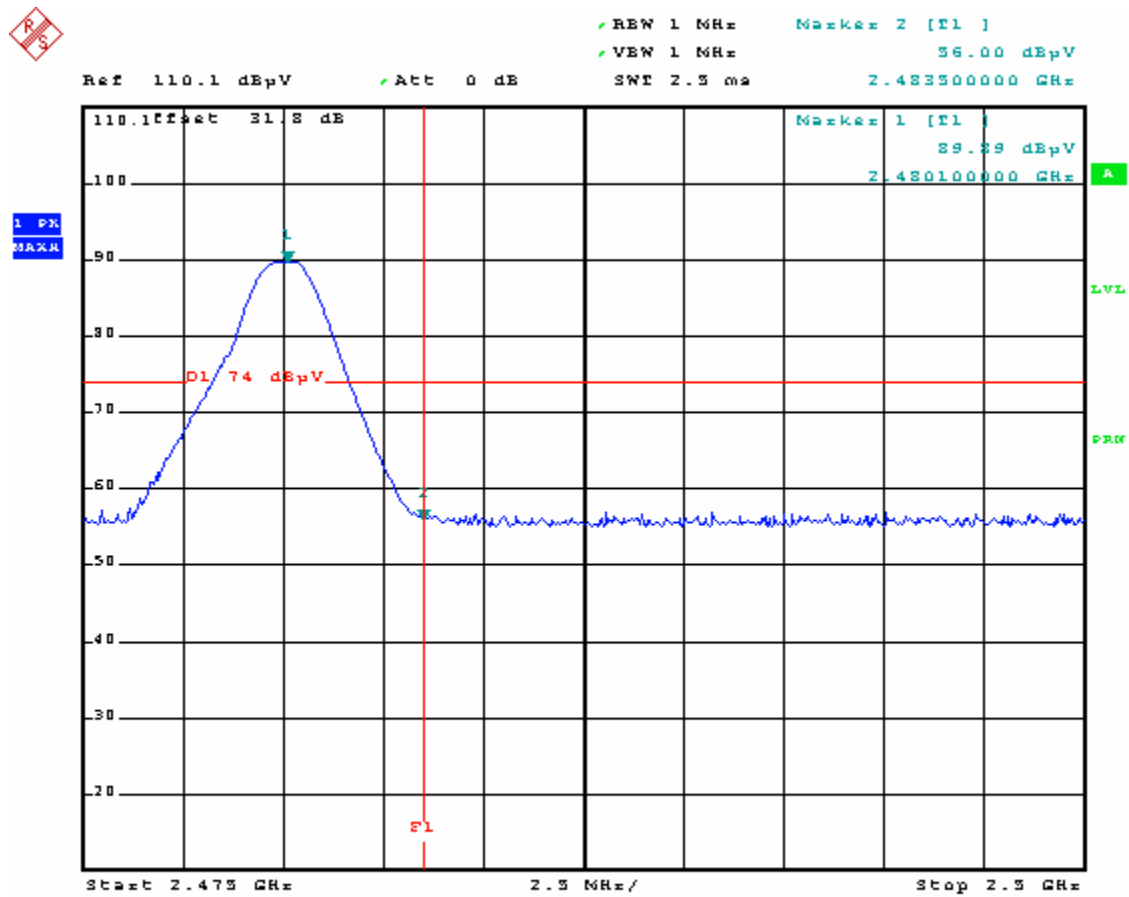
Comment: Emissions on band-edge frequency, peak, freq 2402MHz
Date: 29.AUG.2008 08:31:09

Plot 8.3



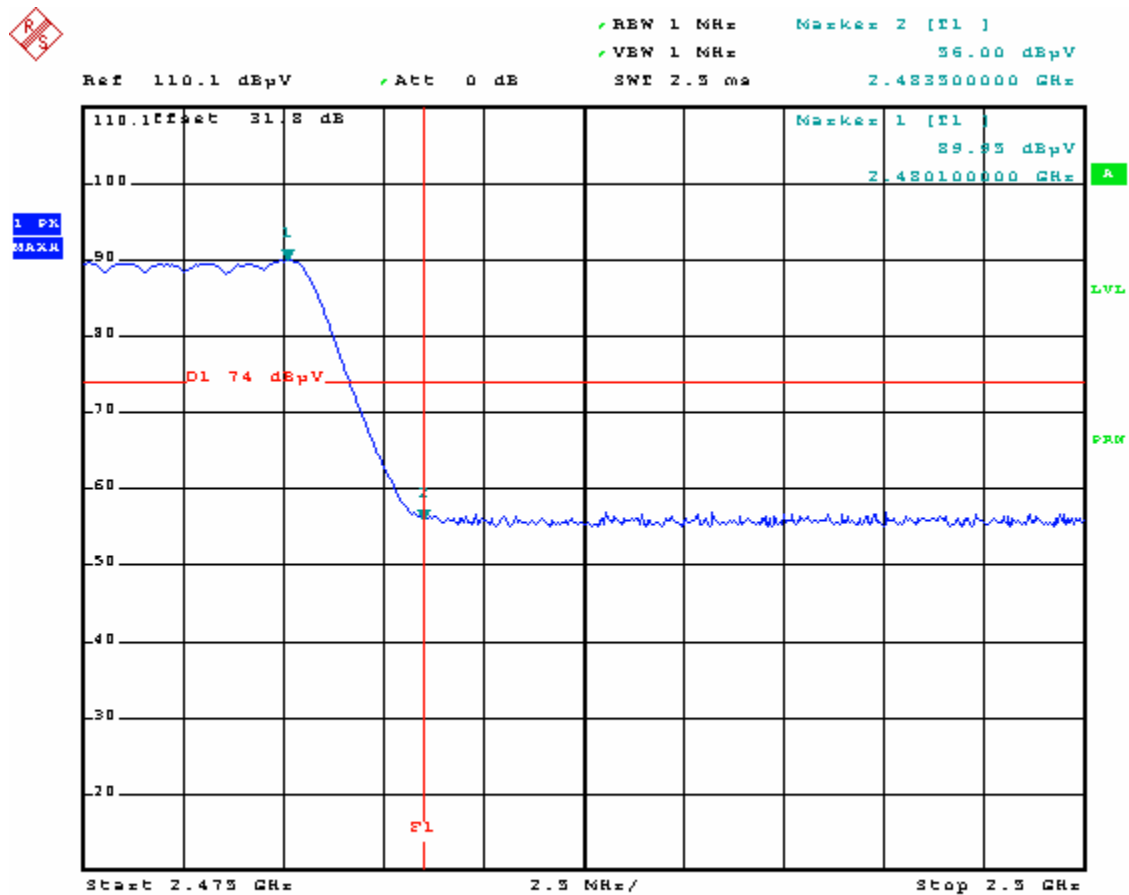
Comment: Emissions on band-edge frequency, average, freq 2402MHz
Date: 29.AUG.2008 08:36:43

Plot 8.4



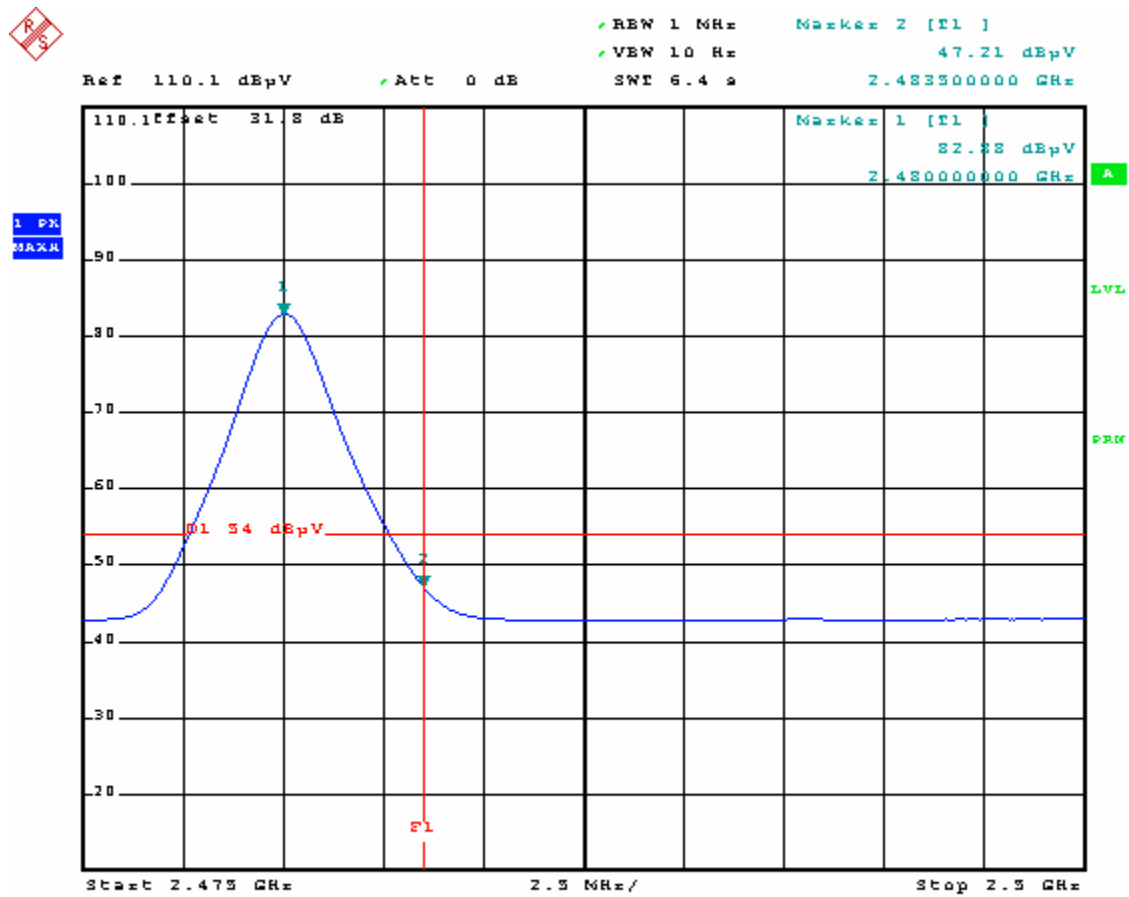
Comment: Emissions on band-edge frequency, peak, freq 2480MHz
Date: 29.AUG.2008 08:54:16

Plot 8.5



Comment: Emissions on band-edge frequency, peak, freq 2480MHz
Date: 29.AUG.2008 08:56:19

Plot 8.6



Comment: Emissions on band-edge frequency, average, freq 2480MHz
Date: 29.AUG.2008 09:01:22

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 5.5dB for Class B.

Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (Pk-Horizontal)

Operator: KK
08:10:16 PM, Tuesday, August 26, 2008
Model Number: Advanced Control Pedal Slave
Company: Advanced Medical Optics

Frequency (MHz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA dB(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
34.0417	26.7	40.0	-13.3	36.0	0.6	32.0	10.5	11.6
112.45	30.6	43.5	-12.9	45.2	1.1	32.0	10.5	5.7
145.592	25.8	43.5	-17.7	35.5	1.2	32.0	10.5	10.5
149.633	29.0	43.5	-14.5	38.2	1.3	32.0	10.5	11.0
153.675	30.2	43.5	-13.3	40.3	1.3	32.0	10.5	10.2
294.325	26.8	46.0	-19.2	33.6	1.8	32.0	10.5	12.9
302.408	29.1	46.0	-16.9	35.4	1.8	32.0	10.5	13.4
310.492	29.9	46.0	-16.1	35.2	1.8	32.0	10.5	14.3
318.575	30.2	46.0	-15.8	34.5	1.9	32.0	10.5	15.3
458.417	31.3	46.0	-14.7	33.3	2.3	32.2	10.5	17.5
689.6	33.9	46.0	-12.1	32.2	2.8	32.5	10.5	20.9
702.533	33.5	46.0	-12.5	31.8	2.8	32.5	10.5	20.9
715.467	33.8	46.0	-12.2	31.9	2.9	32.5	10.5	21.1
728.4	36.6	46.0	-9.4	34.4	2.9	32.5	10.5	21.4
754.267	37.2	46.0	-8.8	34.5	2.9	32.5	10.5	21.6
780.133	35.6	46.0	-10.4	33.1	3.0	32.4	10.5	21.4
949.075	37.3	46.0	-8.7	31.7	3.3	31.4	10.5	23.2
975.75	37.8	54.0	-16.2	31.4	3.4	31.1	10.5	23.6

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

Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (Pk-Vertical)

Operator: KK

Model Number: Advanced Control Pedal Slave

08:16:36 PM, Tuesday, August 26, 2008

Company: Advanced Medical Optics

Frequency (MHz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA dB(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
110.833	38.0	43.5	-5.5	52.8	1.1	32.0	10.5	5.5
153.675	32.1	43.5	-11.4	42.1	1.3	32.0	10.5	10.2
458.417	30.3	46.0	-15.7	32.5	2.3	32.2	10.5	17.2
974.133	34.8	54.0	-19.2	28.3	3.4	31.1	10.5	23.8

Test Mode: Rx mode

Temperature: 20 C

Humidity : 50 %

4.10 AC Line Conducted Emission
FCC 15.207:

Not Applicable. EUT does not contain AC power ports. EUT is battery powered.

5.0 RF Exposure evaluation

The EUT is a Bluetooth device used in portable application, less than 20 cm from any body part of the user or near by persons. Therefore, it must comply with SAR requirement.

The peak conducted power is 0.27 mW, the average power (with Duty Cycle of 77%, see Appendix A for Duty cycle measurement) is 0.21 mW. Antenna is fix-mounted, 4.1dBi gain. Therefore, EIRP is $0.21 * 2.6 = 0.54$ mW.

Taking into consideration that two transmitters are transmitting simultaneously, the sum of EIRP is 1.1 mW. Since that level is less than the threshold level which is 25 mW for 2.4 GHz, the device is considered to be in compliance with SAR requirement without testing.

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
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	10/02/08
Spectrum Analyzer	R & S	FSP40	036612004	12	10/01/08
BI-Log Antenna	EMCO	3143	9509-1160	12	09/05/08
Horn Antenna	EMCO	3115	8812-3049	12	7/29/09
Pre-Amplifier	Sonoma Inst.	310	185634	12	09/26/08
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	7/28/09

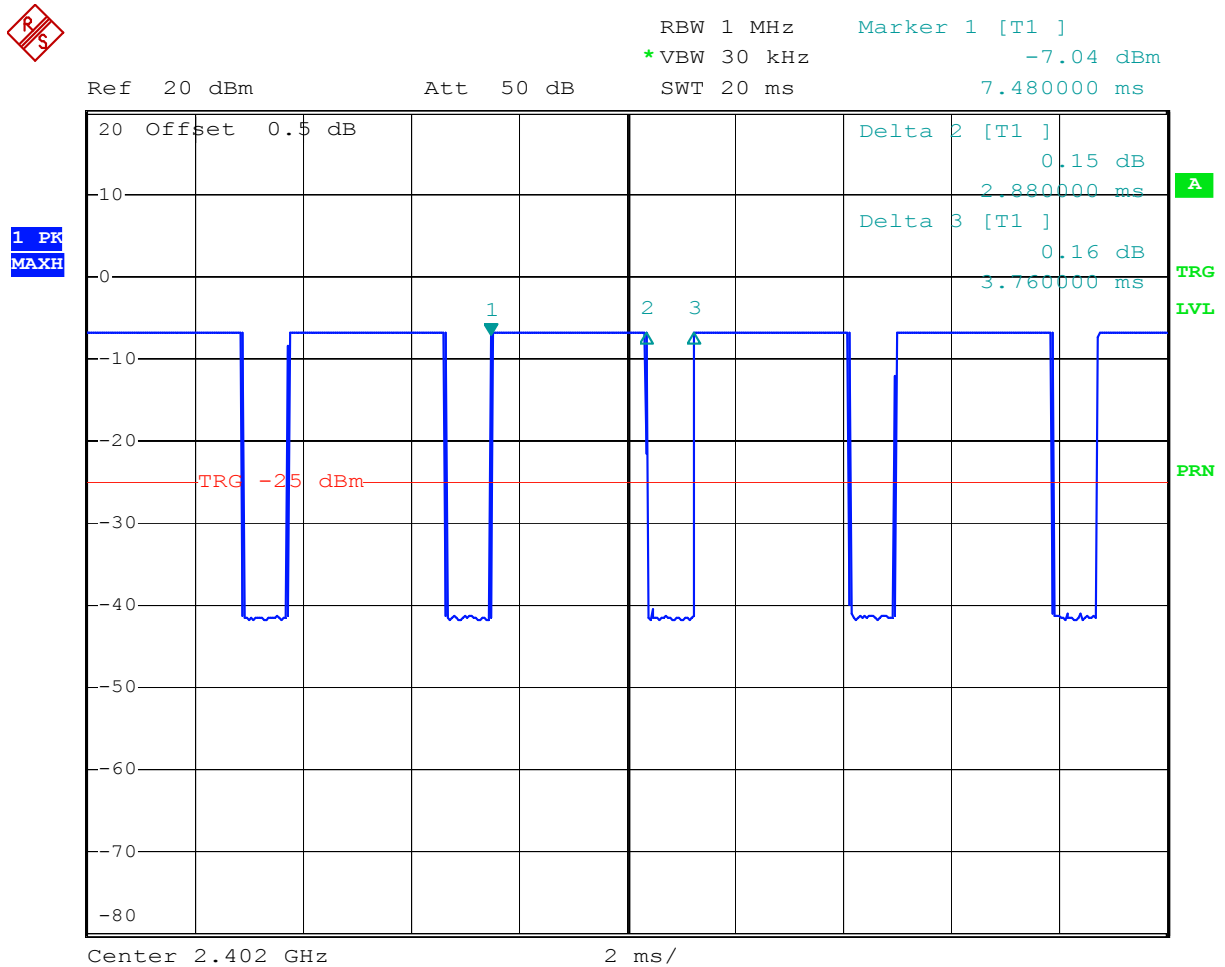
No Calibration required

7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3164295, 3164837	KK	October 01, 2008	Original document

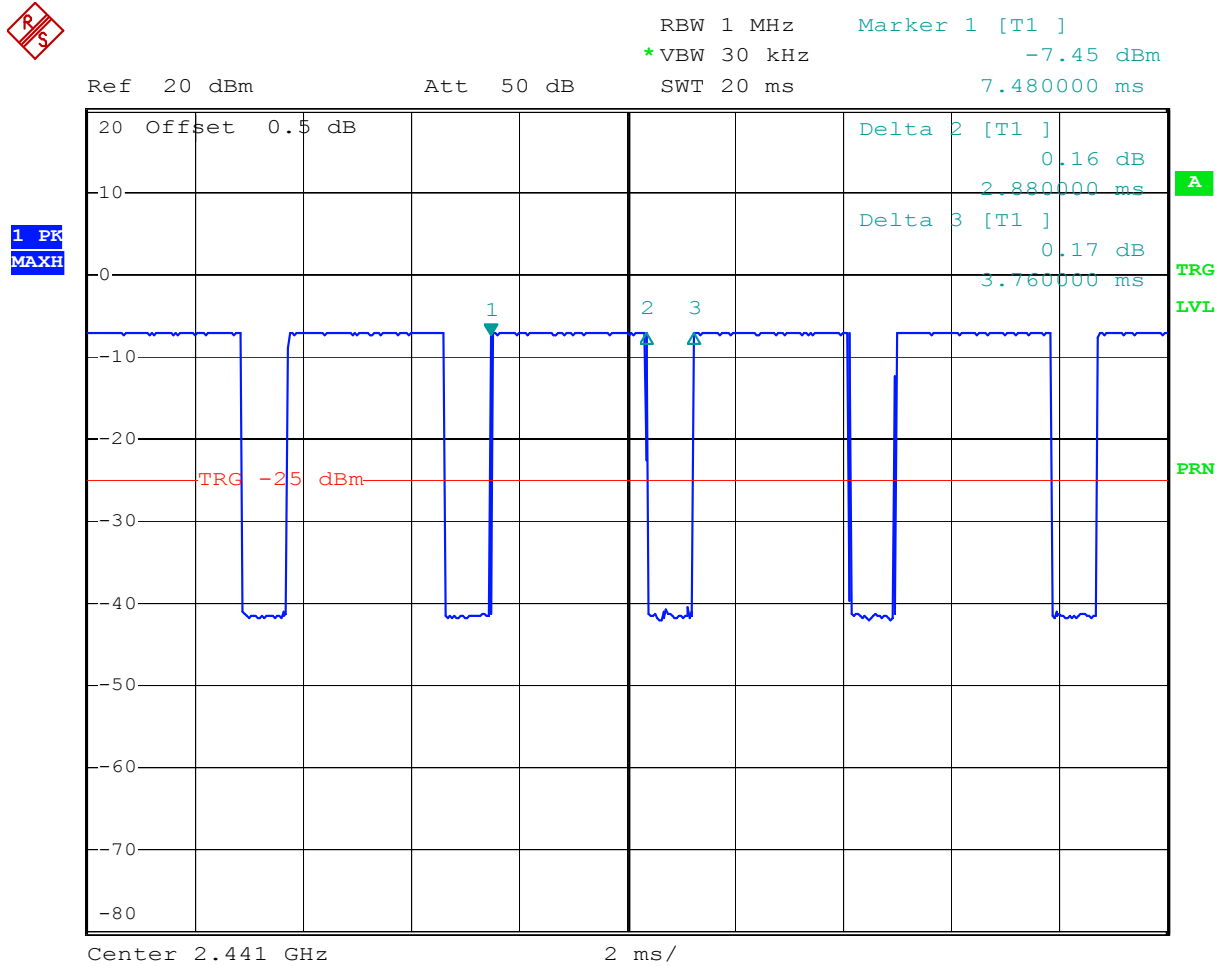
8.0 Appendix A –Graphs for Duty cycle measurement

Graph A1
Advanced Control Pedal Slave



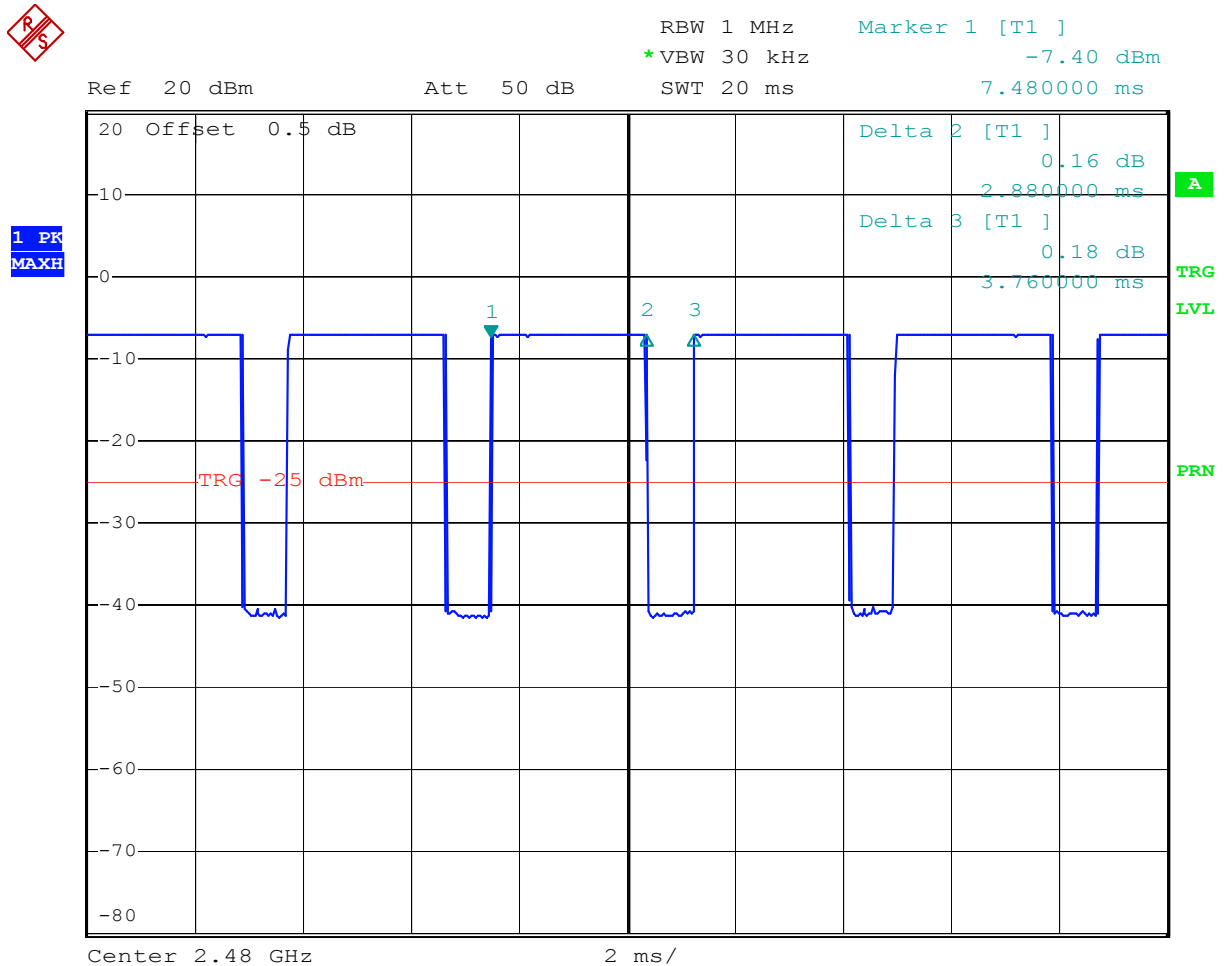
Comment: Duty cycle, freq 2402MHz, Tx1
Date: 28.AUG.2008 11:51:18

Graph A2
Advanced Control Pedal Slave



Comment: Duty cycle, freq 2441MHz, Tx1
Date: 28.AUG.2008 11:52:01

Graph A3
Advanced Control Pedal Slave



Comment: Duty cycle, freq 2480MHz, Tx1
Date: 28.AUG.2008 11:52:43