

FCC TEST REPORT

according to

FCC Rules and Regulations

Part 15 Subpart C

Applicant	Socket Communications, Inc.
Address	37400 Central Court Newark, CA 94560 U.S.A.
Equipment	Class 1 Bluetooth USB Adapter
Model No.	Class 1 Bluetooth USB Adapter
FCC ID	LUBUSB-1
Trade Name	Socket

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of **Exclusive Certification Corp.** the test report shall not be reproduced except in full.

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CERTIFICATE OF COMPLIANCE

according to

FCC Rules and Regulations

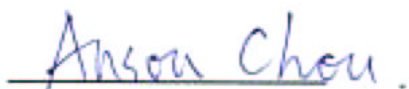
Part 15 Subpart C

Applicant	Socket Communications, Inc
Address	37400 Central Court Newark, CA 94560 U.S.A.
Equipment	Class 1 Bluetooth USB Adapter
Model No.	Class 1 Bluetooth USB Adapter
FCC ID	LUBUSB-1

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4**. The equipment was **passed** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2002)**. The test was carried out on Oct. 18, 2004 at *Exclusive Certification Corp.*

Signature



Anson Chou / Manager

1. Report of Measurements and Examinations

1.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209	. Radiated Emission	Pass
15.247(a)(1)(iii)	. Channel Carrier Frequencies Separation	Pass
15.247(a)(1)	. 20dB Bandwidth Measurement	Pass
15.247(a)(1)(iii)	. Dwell Time	Pass
15.247(b)(1)	. Number of Hopping Channels	Pass
15.247(b)	. Peak Output Power Measurement Data	Pass
15.247(c)	. Band Edges Measurement Data	Pass
15.247(d)	. Power Spectral Density Measurement Data	Pass

Test by: Jerry

1.2. Antenna Requirements

1.2.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

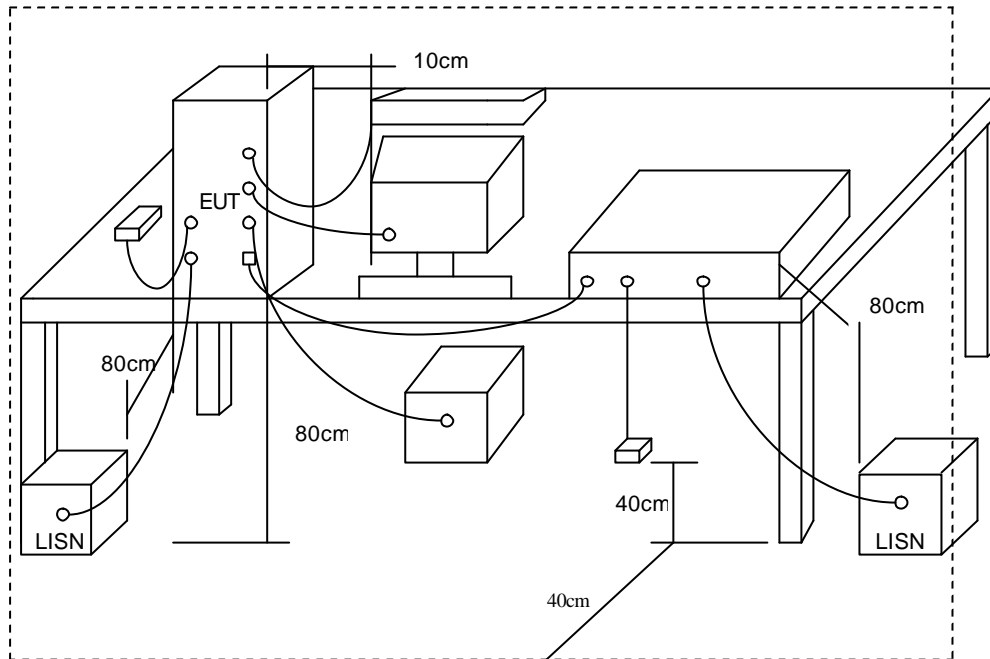
1.3. Test of Conducted Emission

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2003 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 1.3.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

1.3.1. Test Procedures

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connecting to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

1.3.2. Typical Test Setup Layout of Conducted Emission



1.3.3. Conducted Emission Requirement

Except for A digital devices, for equipment that is designed to be connected to the public utility (AC) power line on any frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150KHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the Radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

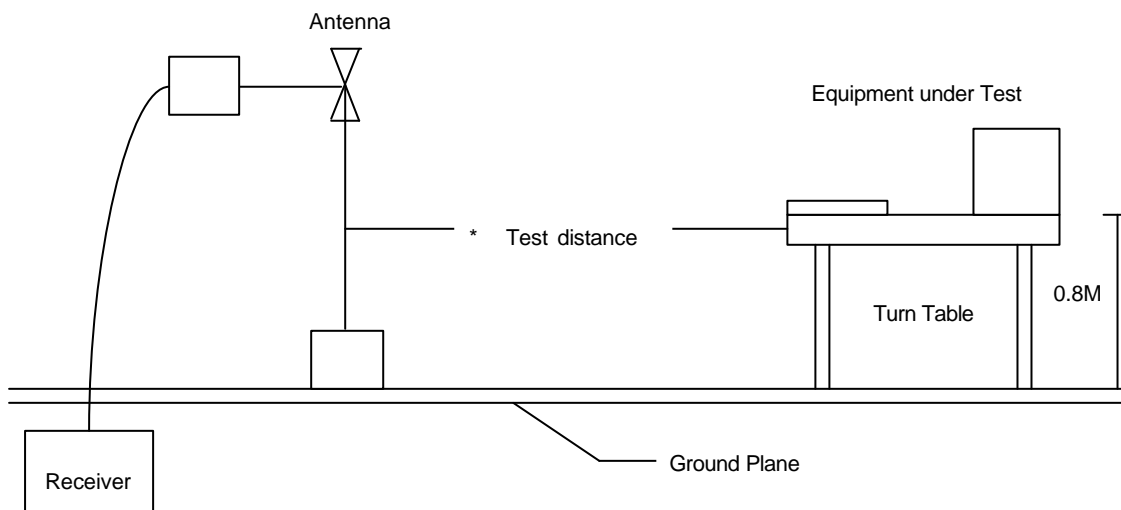
1.4. Test of Radiated Emission

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2003. The EUT was placed, 0.8 meter above the ground plane, as shown in section 1.4.2. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1.4.1. Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

1.4.2. Typical Test Setup Layout of Radiated Emission



1.5. Channel Carrier Frequencies Separation

1.5.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.5.2. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measurement frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set spectrum analyzer maximum hold to measure channel carrier frequency , then adjust channel carrier frequency to adjacent channel.
4. Repeat above procedure until all measured frequencies were complete.

1.5.2. Test Setup Layout :



1.6. 20dB Bandwidth Measurement Data

1.6.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.6.2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

1.6.2. Test Setup Layout :



1.7. Dwell Time

1.7.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.7.2.

1.7.2. Test Setup Layout :



1.8. Number of Hopping Channels

1.8.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.8.2. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set EUT to hopping operating mode and set spectrum analyzer maximum to measure the number of hopping channels.

1.8.2. Test Setup Layout :



1.9. Peak Output Power Measurement Data

1.9.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.9.2. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

1.9.2. Test Setup Layout :



1.10. Band Edges Measurement Data

1.10.1. Test Procedure :

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in 1.10.2. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

1.10.2. Test Setup Layout :



2. Test Configuration of Equipment under Test

2.1. Test Mode and Test Software

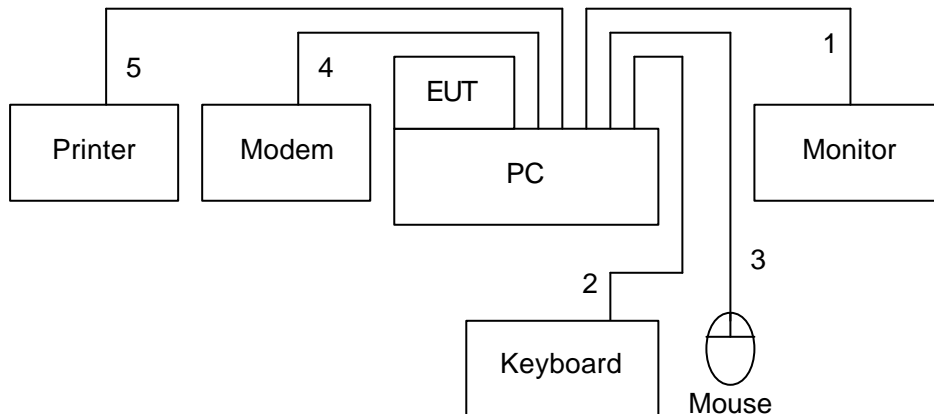
The following test mode and test software was performed for conduction and radiation test:

- CH LO: 2402MHz • CH MID: 2441MHz • CH HI: 2480MHz
- An executive programs, "Blue test" Application under WIN XP.

2.2. Description of Test System

Device	Manufacturer	Model No.	Description
PC	IBM	IGV	Power Cable, Unshielding 1.8 m
Monitor	SlimAGE	510A	Power Cable, Adapter Unshielding 1.8 m Data Cable, VGA shielding 1.35 m
Keyboard	IBM	KB-0225	Data Cable, PS2 shielding 1.85 m
Mouse	IBM	MO28VO	Data Cable, USB shielding 1.85 m
Notebook	IBM	R40(2723-BV1)	Power Cable, Adapter Unshielding 1.8 m
Modem	ACEXX	DM-1414	Power Cable, Adapter Unshielding 1.8 m Data Cable, Unshielding 1.35 m
Printer	HP	Desk Jet400	Power Cable, Adapter Unshielding 1.8 m Data Cable, PRINT shielding 1.6 m

2.3. Connection Diagram of Test System



1. The I/O cable is connected from PC to the Monitor.
2. The I/O cable is connected from PC to the Keyboard.
3. The I/O cable is connected from PC to the Mouse.
4. The I/O cable is connected from PC to the Modem.
5. The I/O cable is connected from PC to the Printer.

2.4. Feature of Equipment under Test

- Wireless interface with your telephone through Bluetooth
- Full- duplex with echo cancellation using the DSP
- Background noise reduction
- Voice dialing through the phone
- Voice memo (duration 64 sec)

2.5. RF Module Specifications

Host/Radio Interface	USB/Bluetooth
Type of Modulation	GFSK
Number of Channels	79
Frequency Band	2402~2480MHz
Carrier Frequency of each channel	2402,2403,.....2480MHz
Bandwidth of each channel	1MHz
Maximum Output Power to Antenna	13dBm
IF & L.O. frequency	Near Zero IF, 2402+ K MHz K=0~78
Type of Antenna Connector (Ex: SMA,TNC, MCX, MMCX, UFC.....etc)	N.A.
Antenna Type / Class and Gain	Chip antenna / 0~2dBi
Function Type	Transceiver
Power Rating (DC/AC , Voltage)	200mA / 5V
Basic function of product	Wireless data transmission
Temperature Range (Operating)	-20~60

2.6. History of this test report

This report had been revised as below:

- (1) Modified the antenna gain on page 15.
- (2) Move the description of RF Exposure.
- (3) Correct and resupply the measurements and notes on page 27-29 and page 50.

3. General Information of Test

Test Site:	Exclusive Certification Corp. 4F-2, No. 28, Lane 78, Xing-Ai Rd. Nei-hu, Taipei City 114 Taiwan R.O.C.
Test Site Location (OATS1-SD):	No.68-1, Shihbachongsi, shihding Township, Taipei County 223, Taiwan, R.O.C.
Test Voltage:	AC 110V/ 60Hz for PC
Test in Compliance with:	ANSI C63.4-2003 FCC Part 15 Subpart C
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 24620MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

4. Test Result and Data

4.1. Antenna Requirement

4.1.1. Antenna Construction and Directional Gain

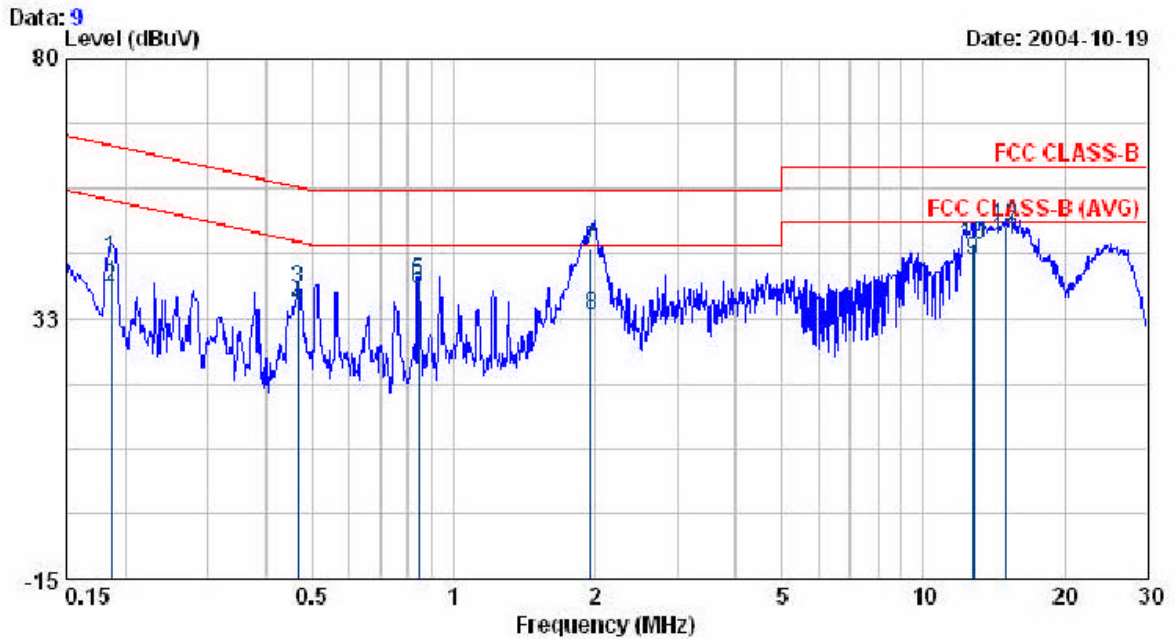
Antenna type: Highly efficient special antennas fix on the PCB.

Antenna Gain: 2 dBi.

4.2. Test Result of Conducted Emission

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH L0
 Memo :

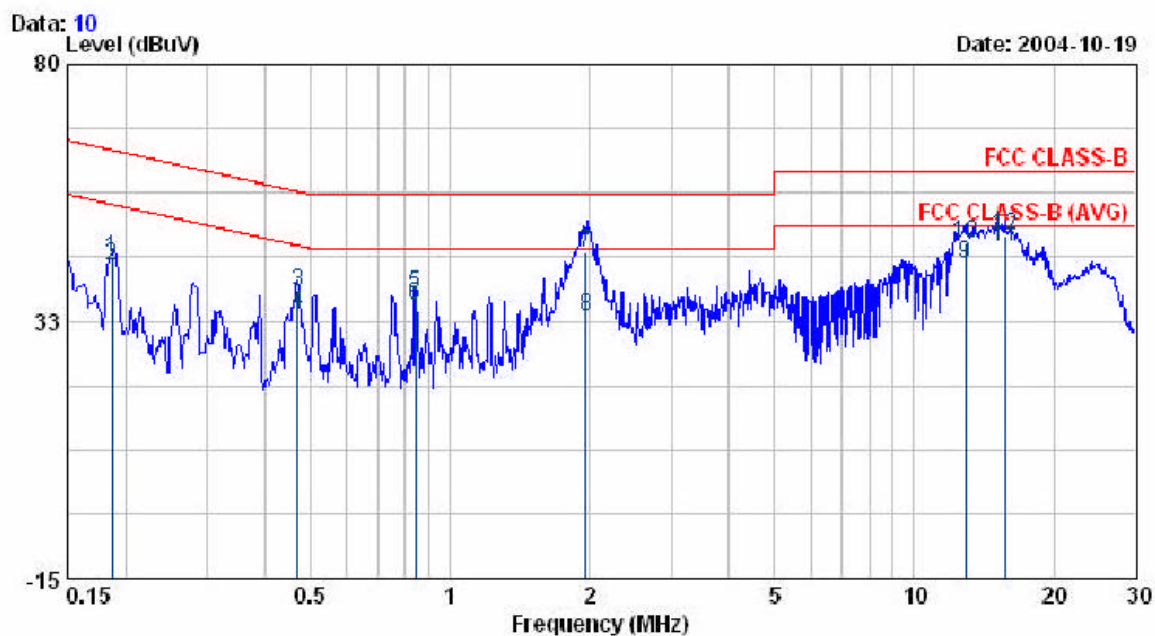
Pol/Phase : NEUTRAL
 Temperature : 26 °C
 Humidity : 58 %



Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.188	42.90	0.41	43.31	64.14	-20.83	QP
0.188	37.81	0.41	38.22	54.14	-15.92	AVERAGE
0.469	37.34	0.47	37.81	56.53	-18.73	QP
0.469	34.21	0.47	34.68	46.53	-11.86	AVERAGE
0.844	38.69	0.50	39.19	56.00	-16.81	QP
0.844	37.36	0.50	37.86	46.00	-8.14	AVERAGE
1.965	44.83	0.54	45.37	56.00	-10.63	QP
1.965	32.36	0.54	32.90	46.00	-13.10	AVERAGE
12.760	42.45	0.74	43.19	50.00	-6.81	AVERAGE
12.760	45.21	0.74	45.95	60.00	-14.05	QP
14.996	46.12	0.75	46.87	50.00	-3.13	AVERAGE
14.996	48.46	0.75	49.21	60.00	-10.79	QP

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH L0
 Memo :

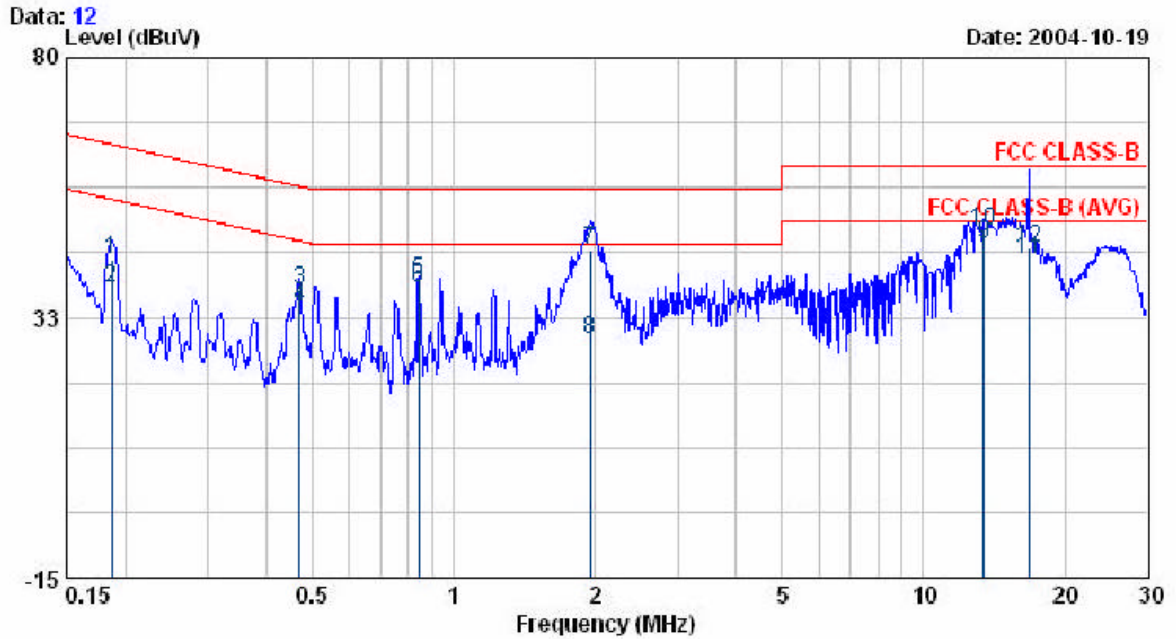
Pol/Phase : LINE
 Temperature : 26 °C
 Humidity : 58 %



Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.187	43.61	0.41	44.02	64.15	-20.13	QP
0.187	42.28	0.41	42.69	64.15	-11.46	AVERAGE
0.469	37.26	0.47	37.73	56.53	-18.80	QP
0.469	33.62	0.47	34.09	56.53	-12.44	AVERAGE
0.843	37.18	0.50	37.68	56.00	-18.32	QP
0.843	35.11	0.50	35.61	56.00	-10.39	AVERAGE
1.965	44.78	0.54	45.32	56.00	-10.68	QP
1.965	32.82	0.54	33.36	56.00	-12.64	AVERAGE
12.906	42.32	0.70	43.02	50.00	-6.98	AVERAGE
12.906	46.34	0.70	47.04	60.00	-12.96	QP
15.721	45.37	0.77	46.14	50.00	-3.86	AVERAGE
15.721	47.41	0.77	48.18	60.00	-11.82	QP

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH MID
 Memo :

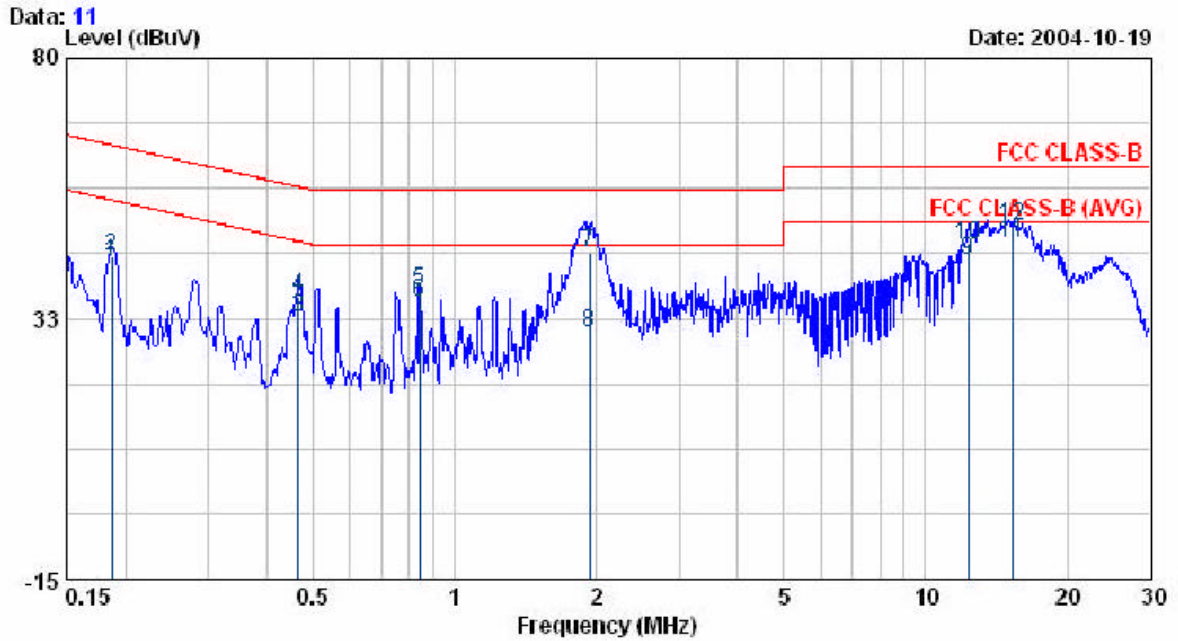
Pol/Phase : NEUTRAL
 Temperature : 26 °C
 Humidity : 58 %



Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.187	42.78	0.41	43.19	64.15	-20.96	QP
0.187	37.65	0.41	38.06	54.15	-16.09	AVERAGE
0.470	37.11	0.47	37.58	56.52	-18.94	QP
0.470	33.84	0.47	34.31	46.52	-12.21	AVERAGE
0.843	38.63	0.50	39.13	56.00	-16.87	QP
0.843	37.32	0.50	37.82	46.00	-8.18	AVERAGE
1.953	44.34	0.54	44.88	56.00	-11.12	QP
1.953	28.11	0.54	28.65	46.00	-17.35	AVERAGE
13.491	45.04	0.75	45.79	50.00	-4.21	AVERAGE
13.491	47.67	0.75	48.42	60.00	-11.58	QP
16.739	42.28	0.80	43.08	50.00	-6.92	AVERAGE
16.739	44.52	0.80	45.32	60.00	-14.68	QP

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH MID
 Memo :

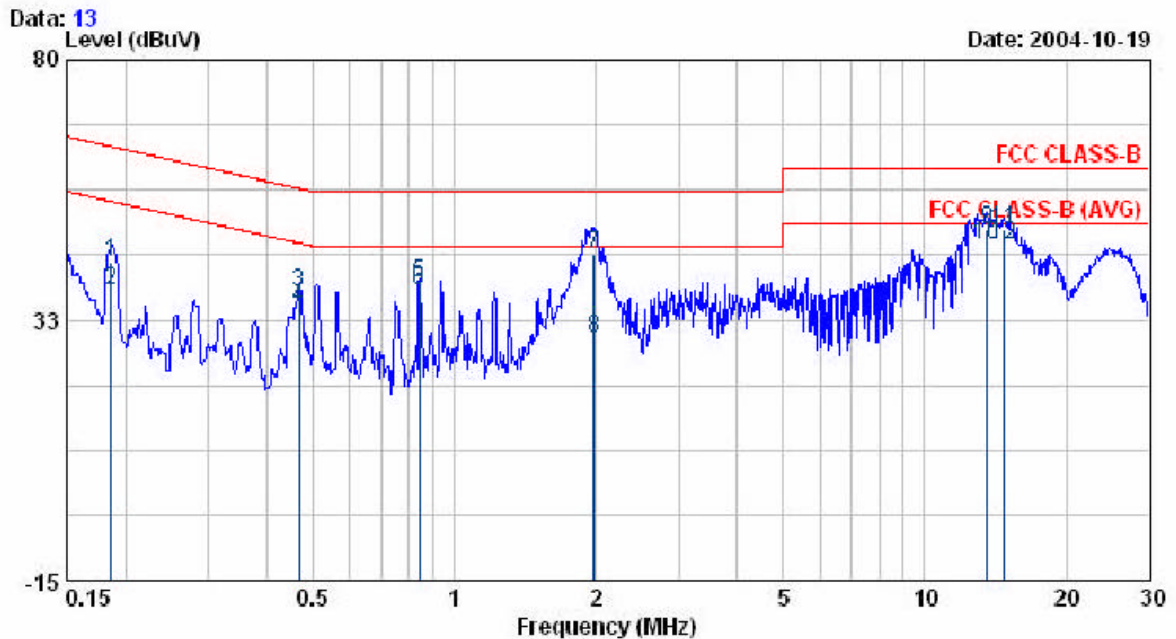
Pol/Phase : LINE
 Temperature : 26 °C
 Humidity : 58 %



Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.187	42.23	0.41	42.64	54.16	-11.52	AVERAGE
0.187	43.54	0.41	43.95	64.16	-20.21	QP
0.466	32.08	0.47	32.55	46.58	-14.03	AVERAGE
0.466	35.97	0.47	36.44	56.58	-20.14	QP
0.843	37.09	0.50	37.59	56.00	-18.41	QP
0.843	35.02	0.50	35.52	46.00	-10.48	AVERAGE
1.941	44.07	0.54	44.61	56.00	-11.39	QP
1.941	29.19	0.54	29.73	46.00	-16.27	AVERAGE
12.333	42.34	0.69	43.03	50.00	-6.97	AVERAGE
12.333	45.22	0.69	45.91	60.00	-14.09	QP
15.364	45.60	0.76	46.36	50.00	-3.64	AVERAGE
15.364	48.54	0.76	49.30	60.00	-10.70	QP

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH HI
 Memo :

Pol/Phase : NEUTRAL
 Temperature : 26 °C
 Humidity : 58 %



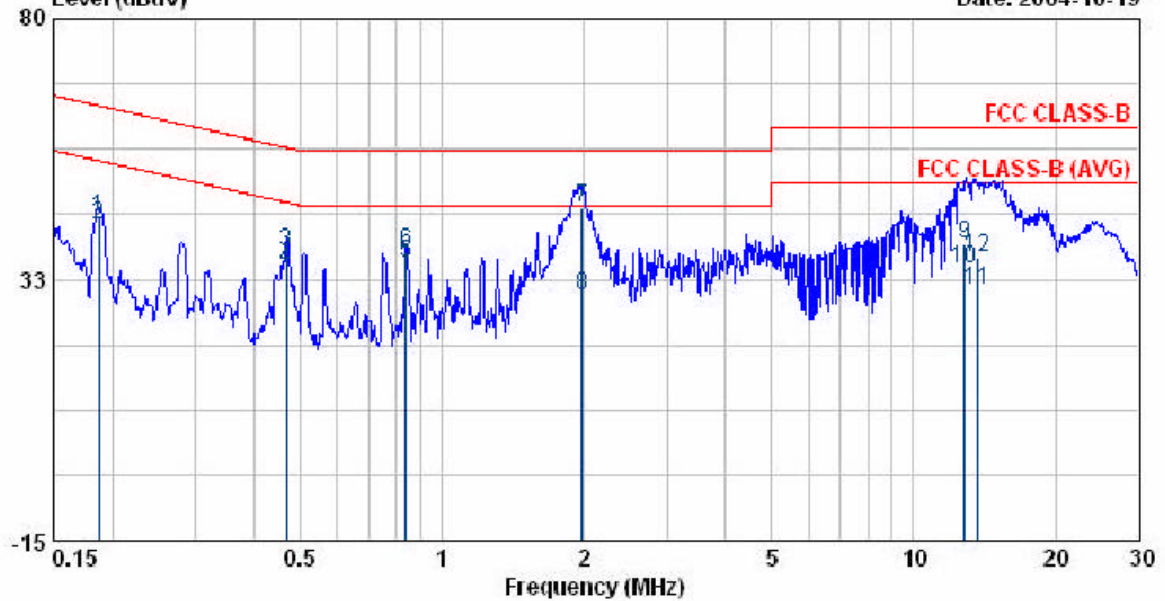
Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.187	42.63	0.41	43.04	64.18	-21.13	QP
0.187	37.49	0.41	37.90	54.18	-16.27	AVERAGE
0.468	37.19	0.47	37.66	56.54	-18.89	QP
0.468	34.20	0.47	34.67	46.54	-11.88	AVERAGE
0.843	38.63	0.50	39.13	56.00	-16.87	QP
0.843	37.30	0.50	37.80	46.00	-8.20	AVERAGE
1.978	44.10	0.54	44.64	56.00	-11.36	QP
1.978	28.48	0.54	29.02	46.00	-16.98	AVERAGE
13.566	48.13	0.75	48.88	60.00	-11.12	QP
13.566	45.55	0.75	46.30	50.00	-3.70	AVERAGE
14.724	48.22	0.75	48.97	60.00	-11.03	QP
14.724	45.61	0.75	46.36	50.00	-3.64	AVERAGE

EUT : Class 1 Bluetooth USB Adaptor
 Power : 110V 60Hz (for pc)
 Test Mode : CH HI
 Memo :

Pol/Phase : LINE
 Temperature : 26 °C
 Humidity : 58 %

Data: 14
 Level (dBuV)

Date: 2004-10-19



Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.187	43.38	0.41	43.79	64.15	-20.36	QP
0.187	41.97	0.41	42.38	54.15	-11.77	AVERAGE
0.467	37.02	0.47	37.49	56.57	-19.08	QP
0.467	33.96	0.47	34.43	46.57	-12.14	AVERAGE
0.841	34.83	0.50	35.33	46.00	-10.67	AVERAGE
0.841	37.19	0.50	37.69	56.00	-18.31	QP
1.978	44.87	0.54	45.41	56.00	-10.59	QP
1.978	29.04	0.54	29.58	46.00	-16.42	AVERAGE
12.846	38.28	0.70	38.98	60.00	-21.02	QP
12.846	33.74	0.70	34.44	50.00	-15.56	AVERAGE
13.675	30.00	0.72	30.72	50.00	-19.28	AVERAGE
13.675	35.91	0.72	36.63	60.00	-23.37	QP

Test by:

Carol

4.2.1. Photographs of Conducted Emission Test

FRONT VIEW

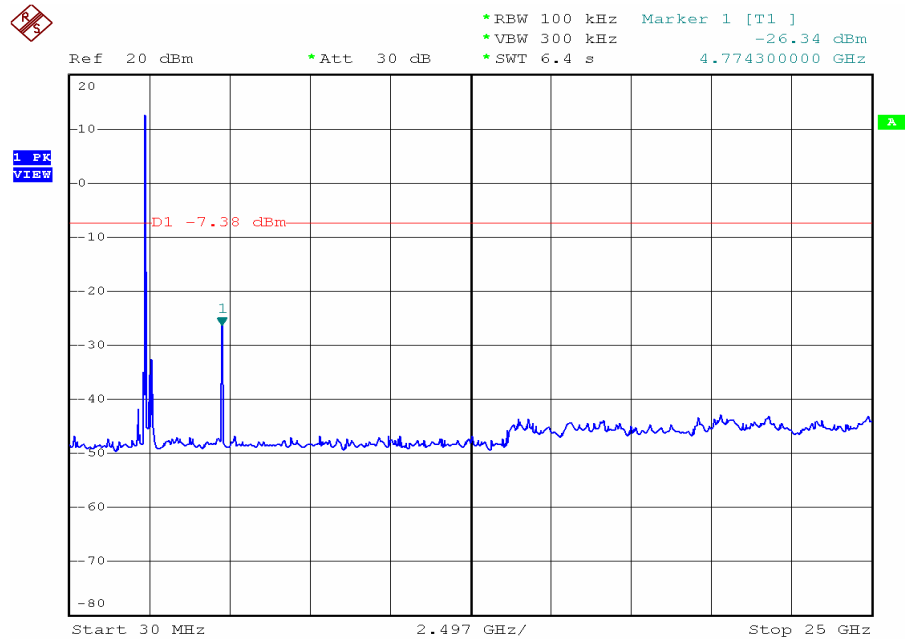


REAR VIEW

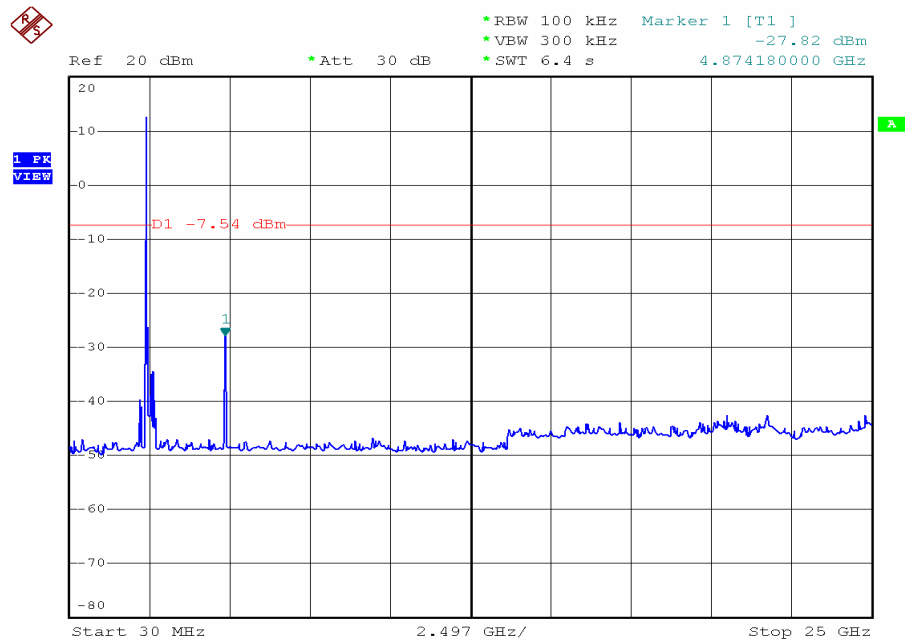


4.3. RF Portion

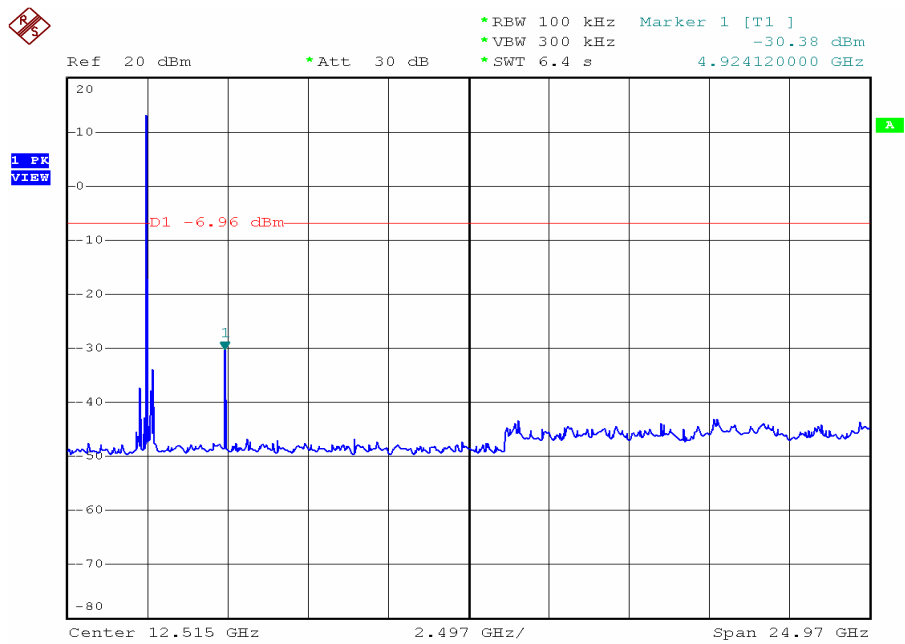
4.3.1. Test Result of Conducted Emission



Date: 18.OCT.2004 13:05:30



Date: 18.OCT.2004 13:06:56



Date: 18.OCT.2004 13:07:51

4.3.2. Test Result of Radiated Emission

a) Emission frequencies below 1 GHz Channel 0

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
514.03	H	17.0	22.3	39.3	46	-6.7	Peak	205	1.1
706.09	H	12.9	26.6	39.5	46	-6.5	Peak	210	1.0
900.09	H	10.1	30.4	40.5	46	-5.5	Peak	205	1.2
87.23	V	22.4	10.1	32.5	40	-7.5	Peak	270	1.0
284.14	V	19.9	16.5	36.4	46	-9.6	Peak	275	1.0
819.58	V	11.4	27.6	39.0	46	-7.0	Peak	270	1.0

b) Emission frequencies above 1 GHz Channel 0

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
2210.13	H	52.3	-3.4	48.9	74	-25.1	Peak	79	1.1
2226.08	H	51.5	-3.4	48.1	74	-25.9	Peak	80	1.1
2242.05	H	54.2	-3.4	50.8	74	-23.2	Peak	79	1.1
4804.00	H	58.0	3.8	61.8	74	12.2	Peak	75	1.2
4804.00	H	41.2	3.8	45.0	54	-9.0	Ave	75	1.2
2210.13	V	50.3	-3.4	46.9	74	-27.1	Peak	79	1.1
2226.08	V	49.9	-3.4	46.5	74	-27.5	Peak	80	1.1
2242.05	V	52.4	-3.4	49.0	74	-25.0	Peak	79	1.1
4804.00	V	56.5	3.8	60.3	74	-13.7	Peak	75	1.2
4804.00	V	41.5	3.8	45.3	54	-8.7	Ave	75	1.2

Notes:

1. Result = Meter Reading + Corrected Factor.
2. Corrected Factor = Antenna Factor + Cable Loss – Amplifier.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Peak detection at frequency below 1GHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and Quasi-peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emission is too low to be measured.
7. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel , based upon Bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to : $20\log(3.125/100) = -30\text{dB}$.
8. Average value = peak reading – $20\log(\text{duty cycle})$

a) Emission frequencies below 1 GHz Channel 39

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
514.03	H	17.2	22.3	39.5	46	-6.5	Peak	200	1.1
706.09	H	13.4	26.6	40.0	46	-6.0	Peak	205	1.0
900.09	H	9.6	30.4	40.0	46	-6.0	Peak	200	1.0
87.23	V	22.1	10.1	32.2	40	-7.8	Peak	275	1.0
284.14	V	19.6	16.5	36.1	46	-9.9	Peak	270	1.0
819.58	V	11.8	27.6	39.4	46	-6.6	Peak	268	1.0

b) Emission frequencies above 1 GHz Channel 39

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
2249.05	H	56.2	-3.4	52.8	74	-21.2	Peak	75	1.1
2265.02	H	52.7	-3.4	49.3	74	-24.7	Peak	79	1.1
2281.00	H	55.8	-3.4	52.4	74	-21.6	Peak	75	1.1
2313.00	H	52.0	-3.4	48.6	74	-25.4	Peak	75	1.1
4882.00	H	61.0	3.8	64.8	74	-9.2	Peak	75	1.2
4882.00	H	42.2	3.8	46.0	54	-8.0	Ave	75	1.2
2249.05	V	54.2	-3.4	50.8	74	-23.2	Peak	75	1.1
2265.02	V	50.7	-3.4	47.3	74	-26.7	Peak	79	1.1
2281.00	V	53.6	-3.4	50.2	74	-23.8	Peak	75	1.1
2313.00	V	50.1	-3.4	46.7	74	-27.3	Peak	79	1.1
4882.00	V	59.5	3.8	63.3	74	-10.7	Peak	75	1.2
4882.00	V	42.5	3.8	46.3	54	-7.7	Ave	75	

Notes:

1. Result = Meter Reading + Corrected Factor.
2. Corrected Factor = Antenna Factor + Cable Loss – Amplifier.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Peak detection at frequency below 1GHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and Quasi-peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emission is too low to be measured.
7. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel , based upon Bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to : $20\log(3.125/100) = -30\text{dB}$.
8. Average value = peak reading – $20\log(\text{duty cycle})$

a) Emission frequencies below 1 GHz Channel 78

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
514.03	H	17.23	22.3	39.53	46	-6.47	Peak	200	1.1
706.09	H	12.70	26.6	39.30	46	-6.70	Peak	210	1.0
900.09	H	10.60	30.4	41.00	46	-5.00	Peak	213	1.2
87.23	V	23.20	10.1	33.30	40	-6.70	Peak	265	1.0
284.14	V	20.40	16.5	36.90	46	-9.10	Peak	278	1.0
819.58	V	11.90	27.6	39.50	46	-6.50	Peak	279	1.0

b) Emission frequencies above 1 GHz Channel 78

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result@3m (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)	Remark	Table Deg.	Ant High (m)
2288.05	H	58.0	-3.4	54.6	74	-19.4	Peak	75	1.1
2288.05	H	41.3	-3.4	37.9	54	-16.1	Ave	75	1.1
2320.00	H	58.3	-3.4	54.9	74	-19.1	Peak	75	1.1
2320.00	H	41.5	-3.4	38.1	54	-15.9	Ave	75	1.1
2352.00	H	53.7	-3.4	50.3	74	-23.1	Peak	79	1.1
4960.00	H	58.2	3.8	62.0	74	-12.0	Peak	75	1.2
4960.00	H	41.7	3.8	45.5	54	-8.5	Ave	75	1.2
2288.05	V	55.8	-3.4	52.4	74	-21.6	Peak	75	1.1
2320.00	V	56.3	-3.4	52.9	74	-21.1	Peak	75	1.1
2352.00	V	50.8	-3.4	47.4	74	-26.6	Peak	79	1.1
4960.00	V	58.2	3.8	62.0	74	-12.0	Peak	75	1.2
4960.00	V	41.7	3.8	45.5	54	-8.5	Ave	75	1.2

Notes:

1. Result = Meter Reading + Corrected Factor.
2. Corrected Factor = Antenna Factor + Cable Loss – Amplifier.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Peak detection at frequency below 1GHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and Quasi-peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emission is too low to be measured.
7. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel , based upon Bluetooth theory the transmitter is on 0.625*5 per 247 ms per channel. Therefore, the duty cycle be equal to : $20\log(3.125/100) = -30\text{dB}$.
8. Average value = peak reading – $20\log(\text{duty cycle})$

4.3.3. Photographs of Radiated Emission Test

FRONT VIEW



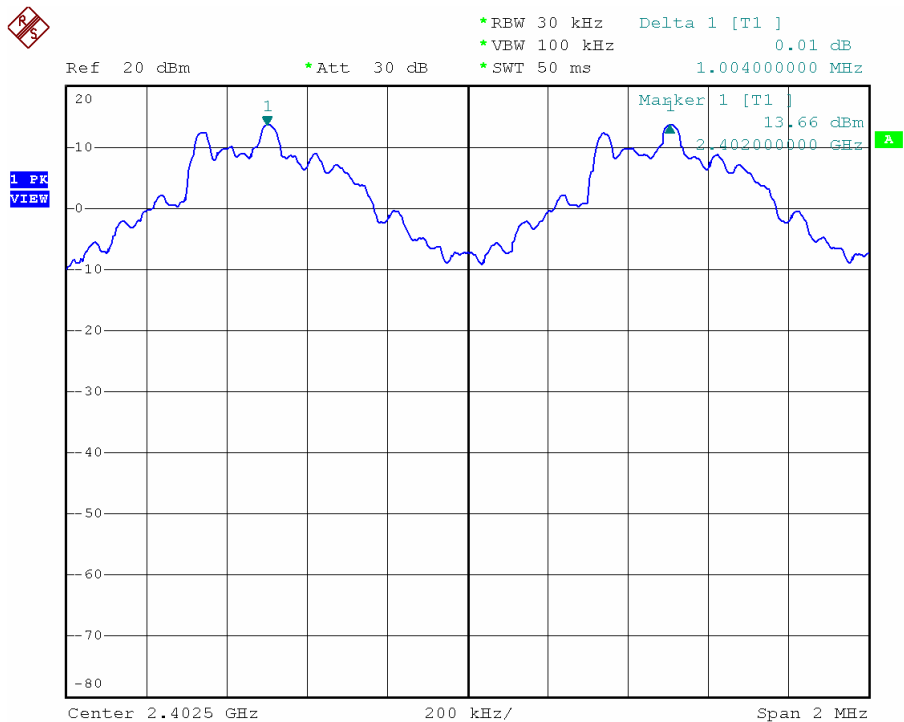
REAR VIEW



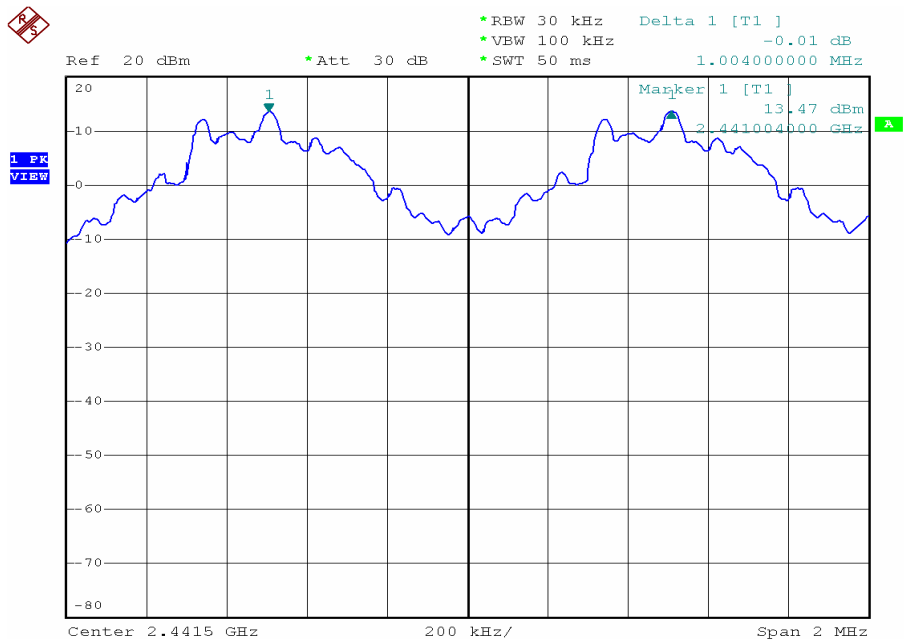
4.4. Channel Carrier Frequencies Separation

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

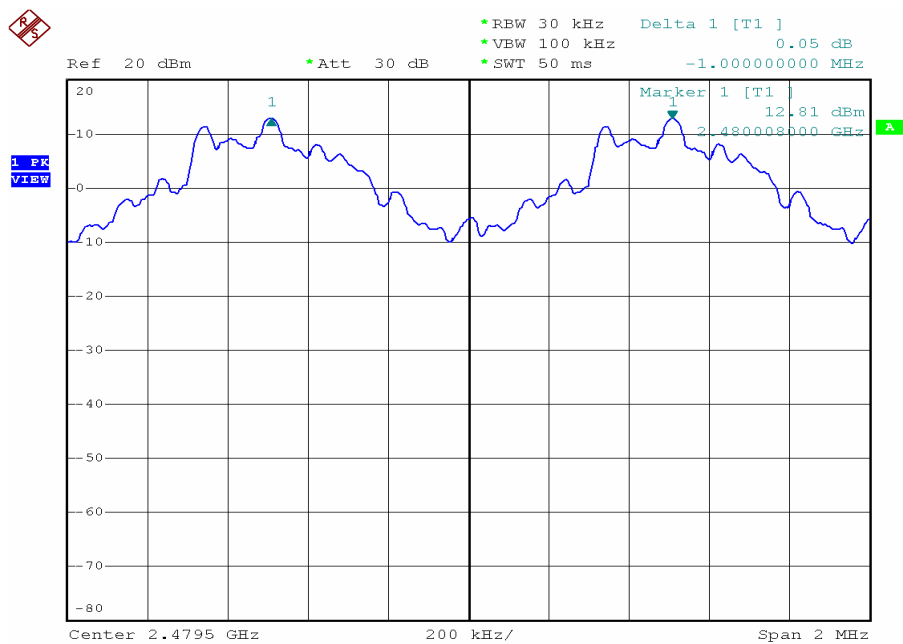
- | | | |
|-----------------------------------|--------------|-----|
| a) 2402 MHz Channel Separation is | <u>1.004</u> | MHz |
| b) 2441 MHz Channel Separation is | <u>1.004</u> | MHz |
| c) 2480 MHz Channel Separation is | <u>1.000</u> | MHz |



Date: 18.OCT.2004 11:33:44



Date: 18.OCT.2004 11:32:05



Date: 18.OCT.2004 11:30:54

4.5. 20dB Bandwidth Measurement Data

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

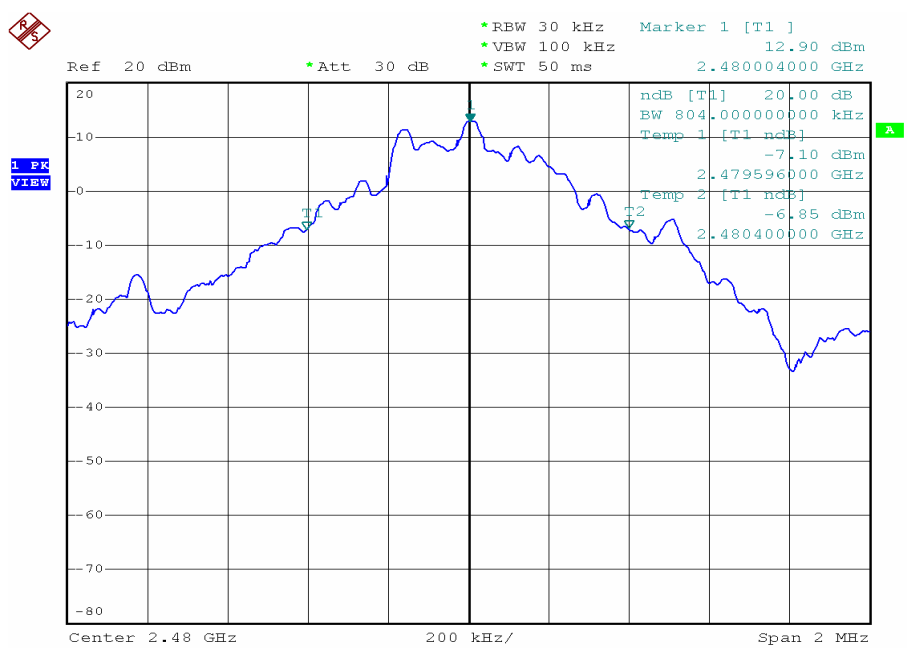
a) Channel 0: 20dB Emission Bandwidth is	<u>800</u>	KHz
b) Channel 39: 20dB Emission Bandwidth is	<u>796</u>	KHz
c) Channel 78: 20dB Emission Bandwidth is	<u>804</u>	KHz



Date: 18.OCT.2004 11:37:25



Date: 18.OCT.2004 11:58:08



Date: 18.OCT.2004 12:00:42

4.6. Dwell Time

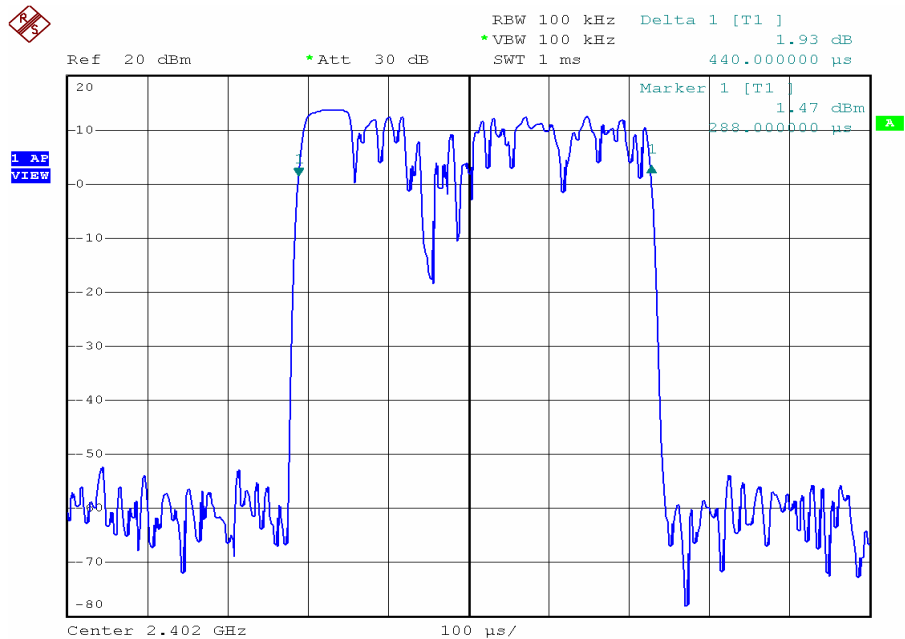
Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec

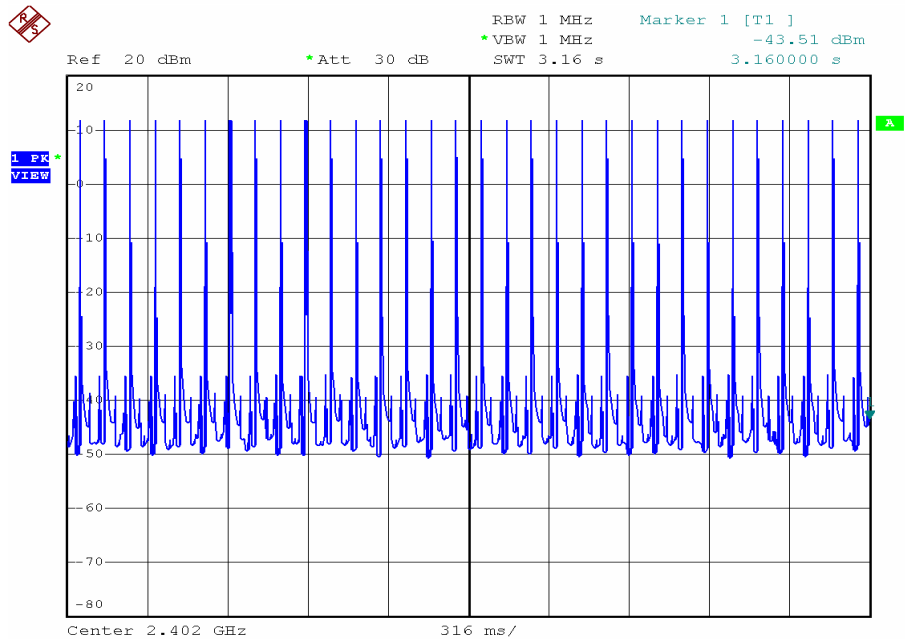
$$\text{a) 2402 MHz Dwell Time is} = 0.440\text{ms} \times \frac{31.6}{3.16} \times 32 = 140.80\text{ms}$$

$$\text{b) 2441 MHz Dwell Time is} = 0.440\text{ms} \times \frac{31.6}{3.16} \times 32 = 140.80\text{ms}$$

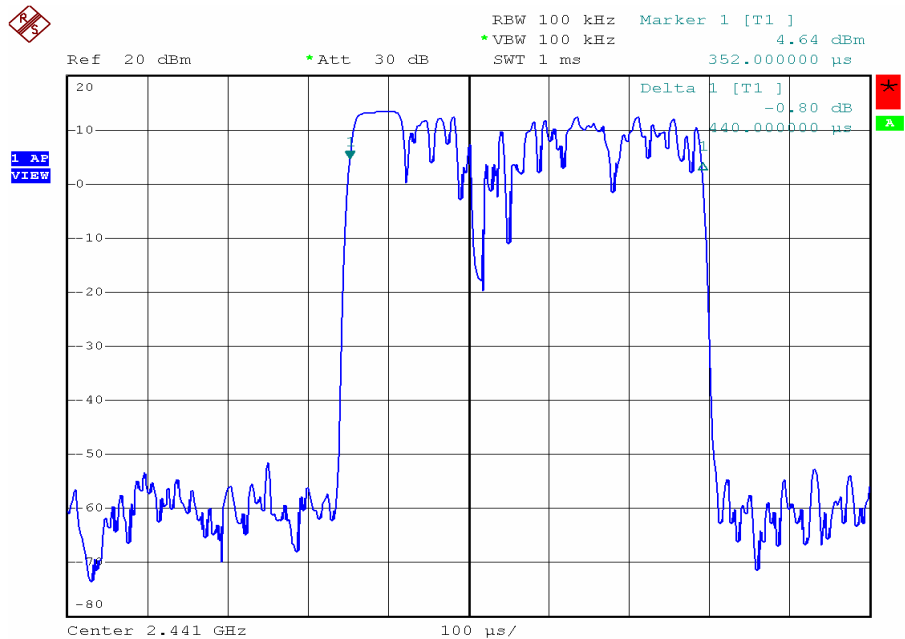
$$\text{c) 2480 MHz Dwell Time is} = 0.438\text{ms} \times \frac{31.6}{3.16} \times 32 = 140.16\text{ms}$$



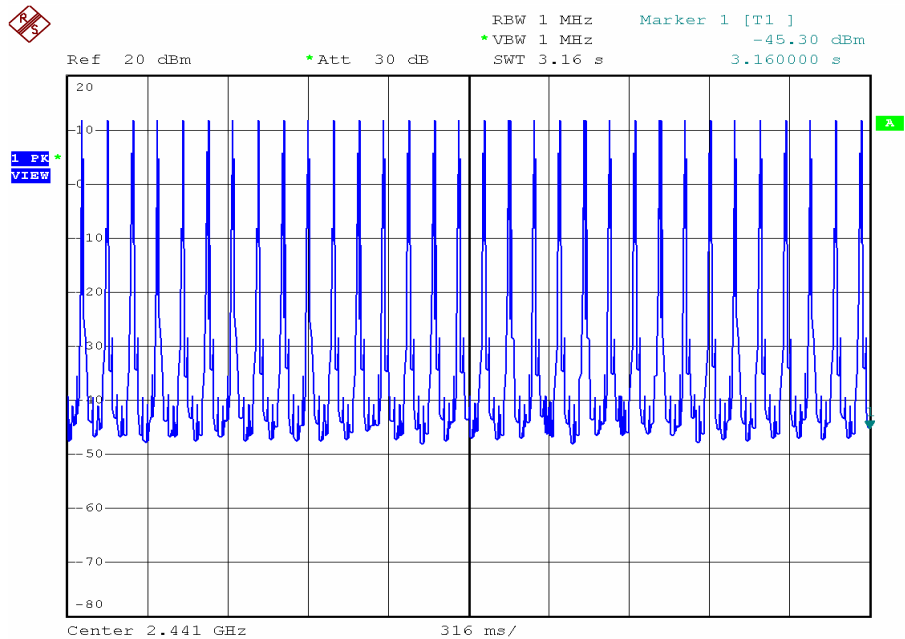
Date: 18.OCT.2004 14:25:37



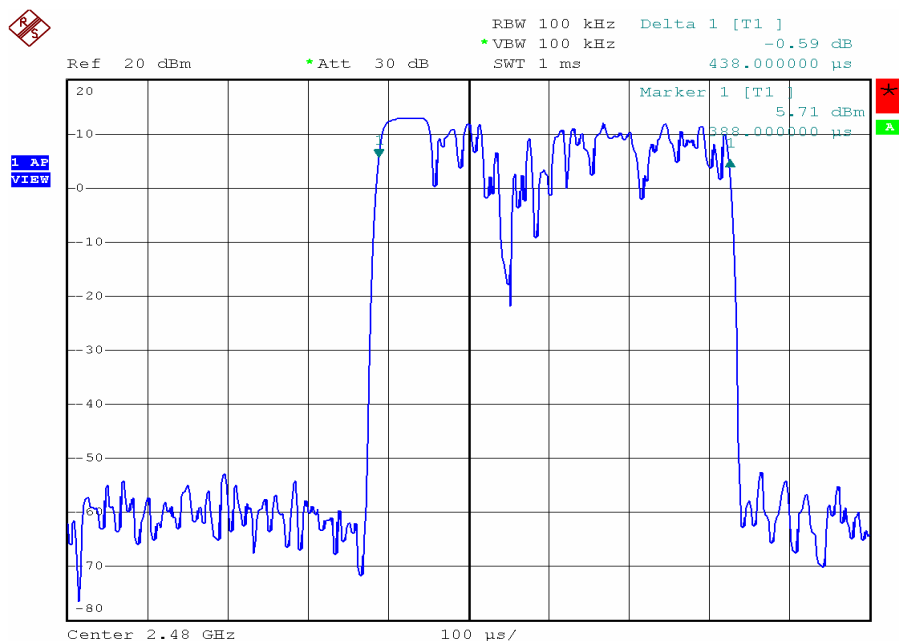
Date: 18.OCT.2004 18:27:02



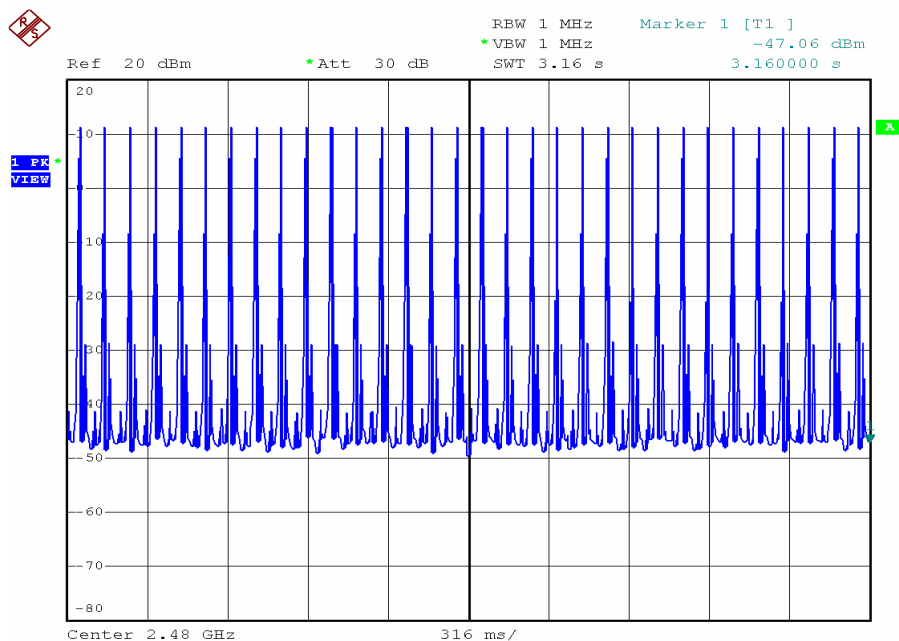
Date: 18.OCT.2004 14:27:09



Date: 18.OCT.2004 18:26:41



Date: 18.OCT.2004 14:28:07

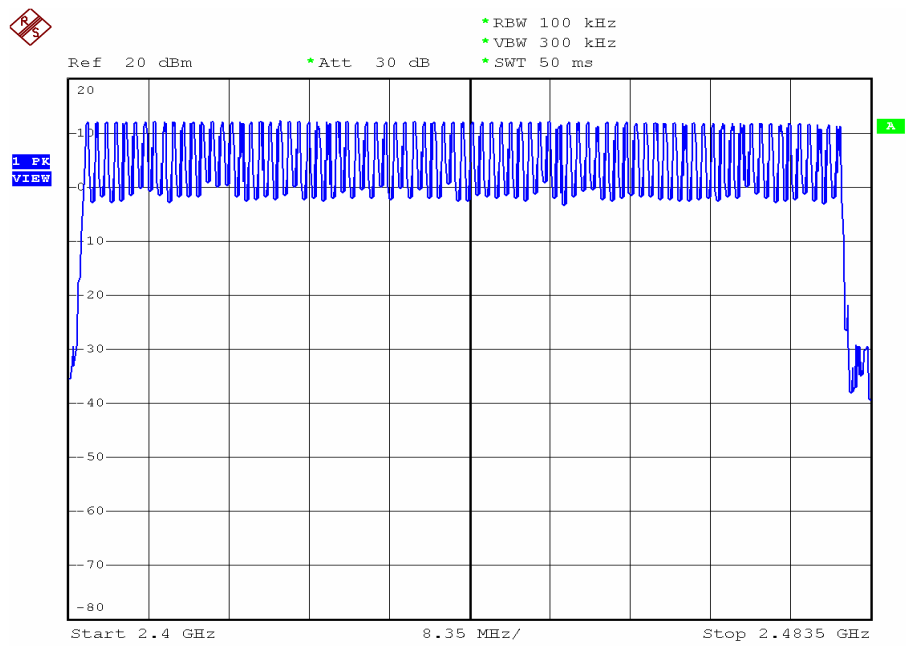


Date: 18.OCT.2004 18:26:16

4.7. Number of Hopping Channels

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

Number of hopping channels 79 Channels

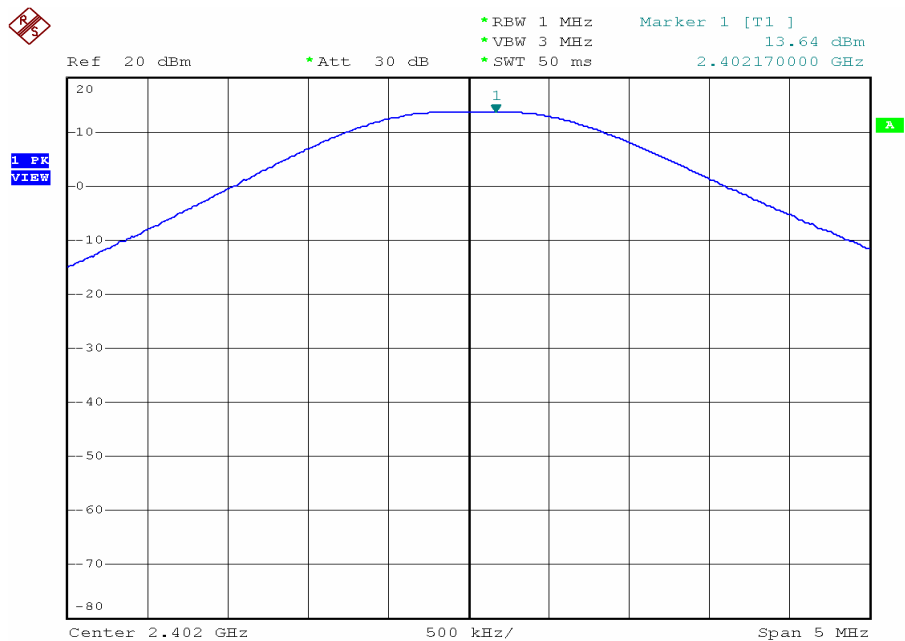


Date: 18.OCT.2004 18:08:27

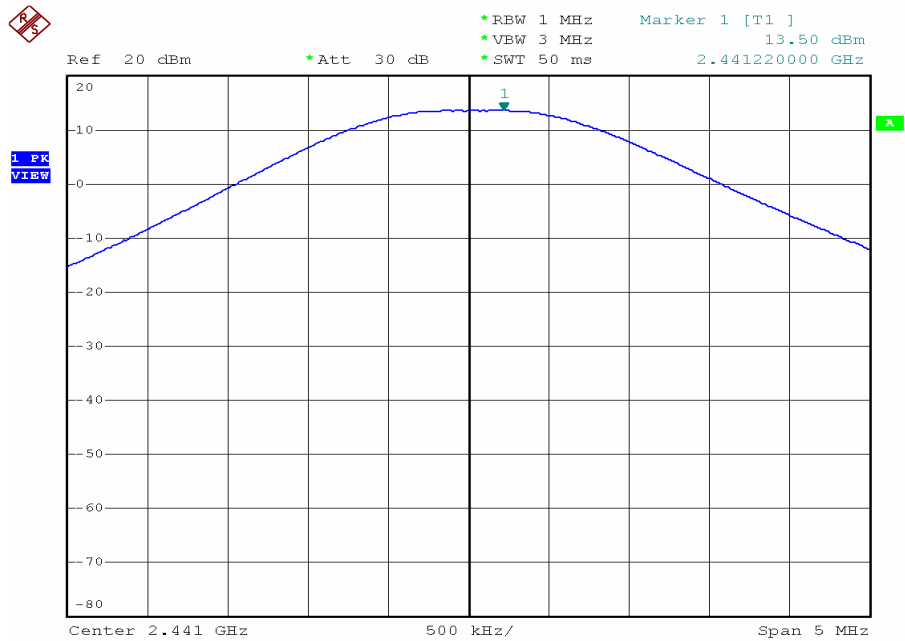
4.8. Peak Output Power Measurement Data

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

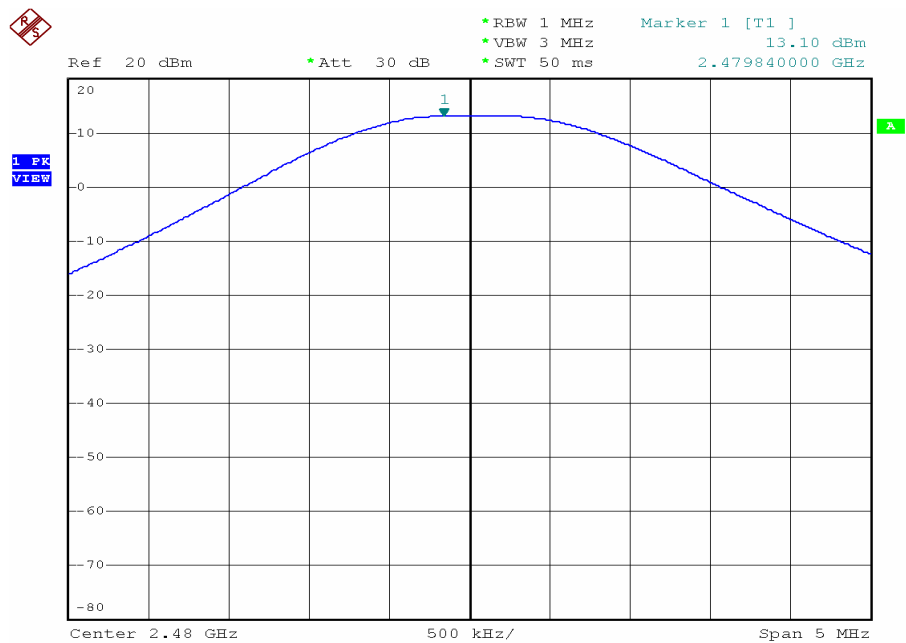
a) Channel 0: Output Peak Power is	<u>13.64</u>	dBm or	<u>23.12</u>	mW
b) Channel 39: Output Peak Power is	<u>13.50</u>	dBm or	<u>22.39</u>	mW
c) Channel 78: Output Peak Power is	<u>13.10</u>	dBm or	<u>20.42</u>	mW



Date: 18.OCT.2004 13:46:12



Date: 18.OCT.2004 13:45:16

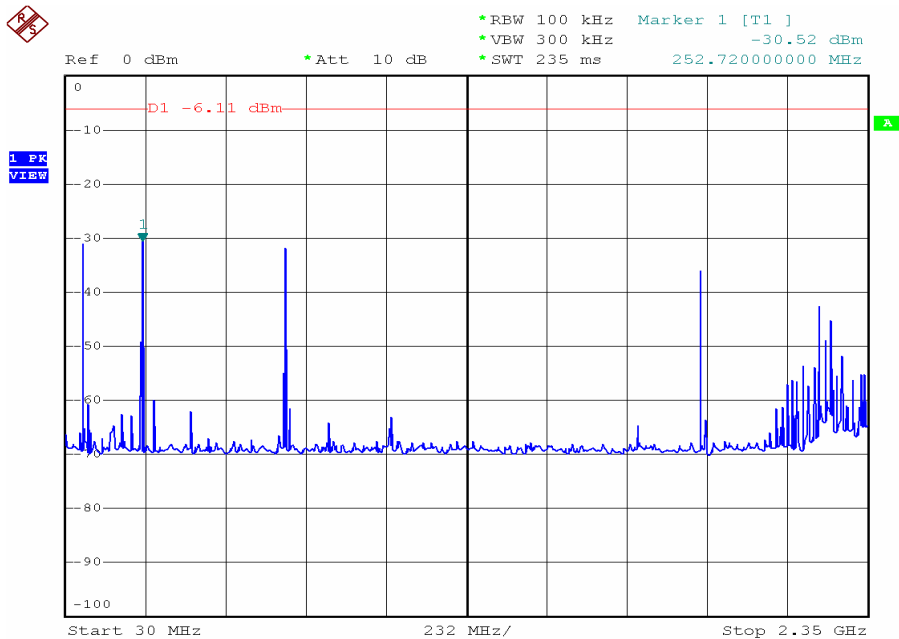


Date: 18.OCT.2004 14:16:58

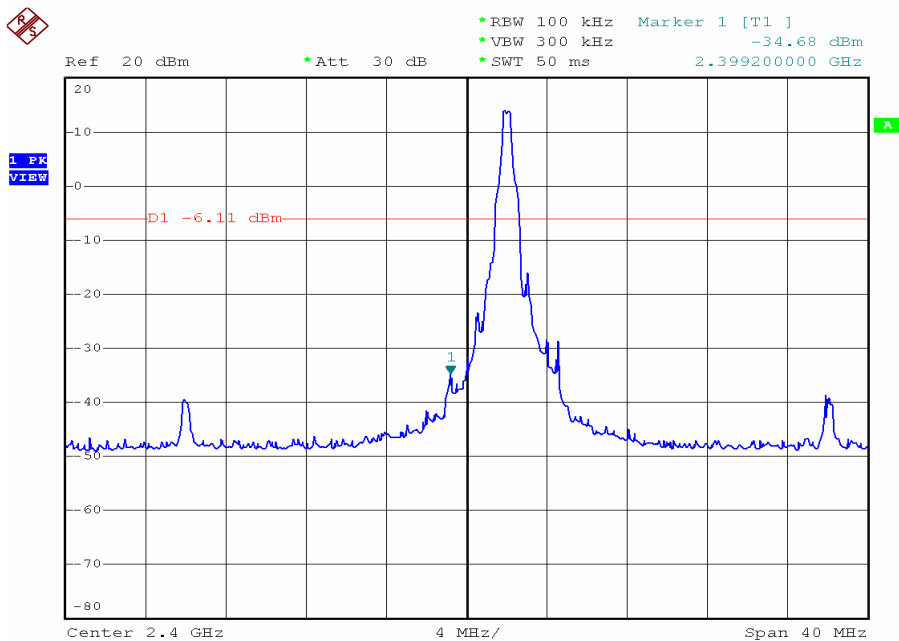
4.9. Band Edges Measurement Data

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

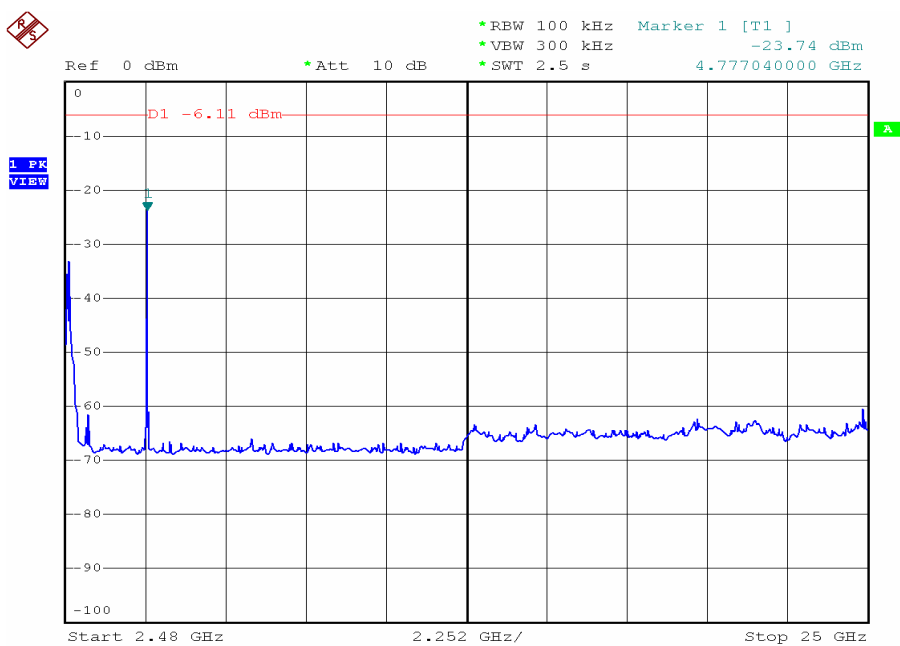
- a) Lower Band Edge: maximum value is -23.74 dBm that is attenuated more than 20dB
- b) Upper Band Edge: maximum value is -27.89 dBm that is attenuated more than 20dB



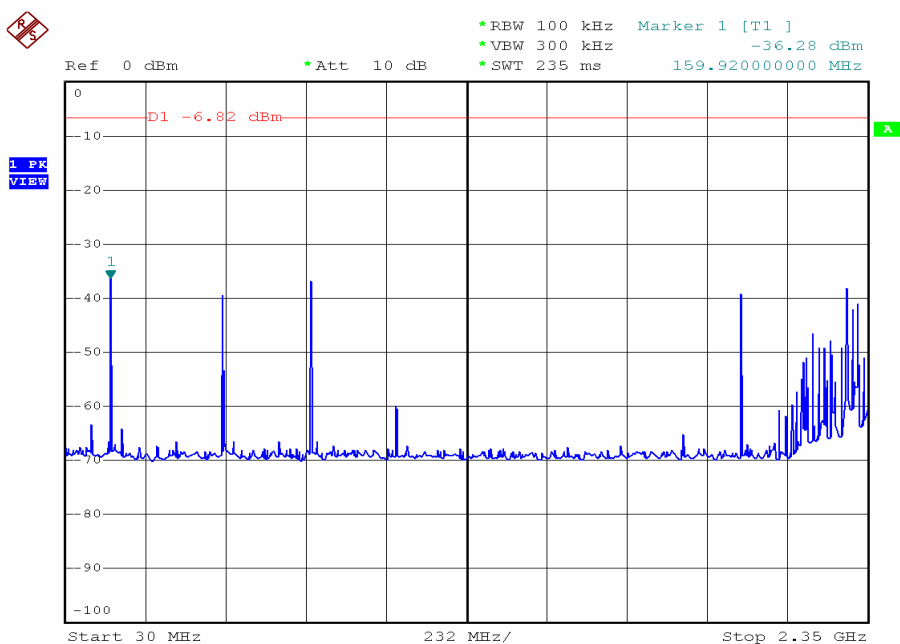
Date: 18.OCT.2004 12:21:56



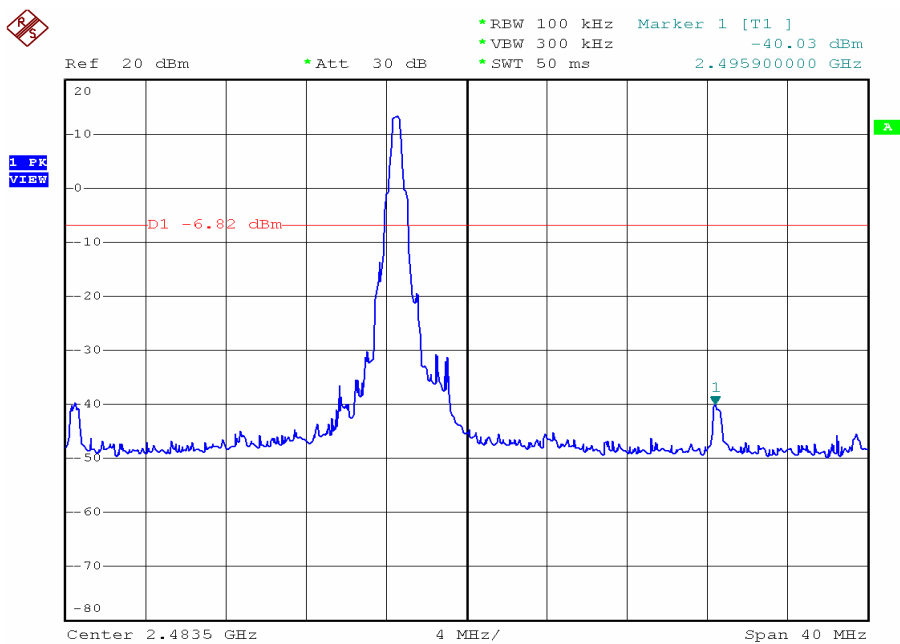
Date: 18.OCT.2004 12:15:47



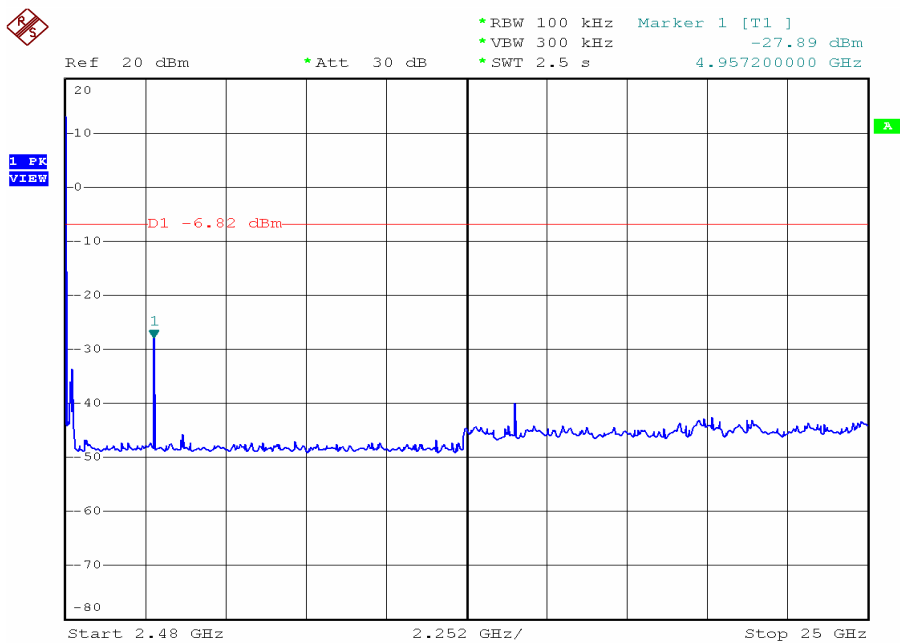
Date: 18.OCT.2004 12:29:35



Date: 18.OCT.2004 12:32:50



Date: 18.OCT.2004 12:31:51



Date: 18.OCT.2004 12:37:53

4.9.1. Restrict Band Emission Measurement Data

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

a) Channel 0

Fundamental Frequency: 2402 MHz

Frequency (MHz)	Meter Reading	Factor	Level (dBV)	Polarization	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table Deg. (Deg.)	Ant High (m)
						Peak	Ave.			
2390.0	65.2	-3.3	61.9	H	Peak	74	54	-12.1	75	1.2
2390.0	47.8	-3.3	44.5	H	Ave.	74	54	-9.5	75	1.2
2390.0	63.3	-3.3	60.0	V	Peak	74	54	-14.0	79	1.2
2390.0	46.8	-3.3	43.5	V	Ave.	74	54	-10.5	79	1.2

b) Channel 78

Fundamental Frequency: 2441 MHz

Frequency (MHz)	Meter Reading	Factor	Level (dBV)	Polarization	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table Deg. (Deg.)	Ant High (m)
						Peak	Ave.			
2483.5	48.5	-3.2	45.3	H	Peak	74	54	-8.7	85	1.2
2483.5	---	---	---	H	Ave.	74	54	---	---	---
2483.5	48.4	-3.2	45.2	V	Peak	74	54	-8.8	81	1.2
2483.5	---	---	---	V	Ave.	74	54	---	---	---

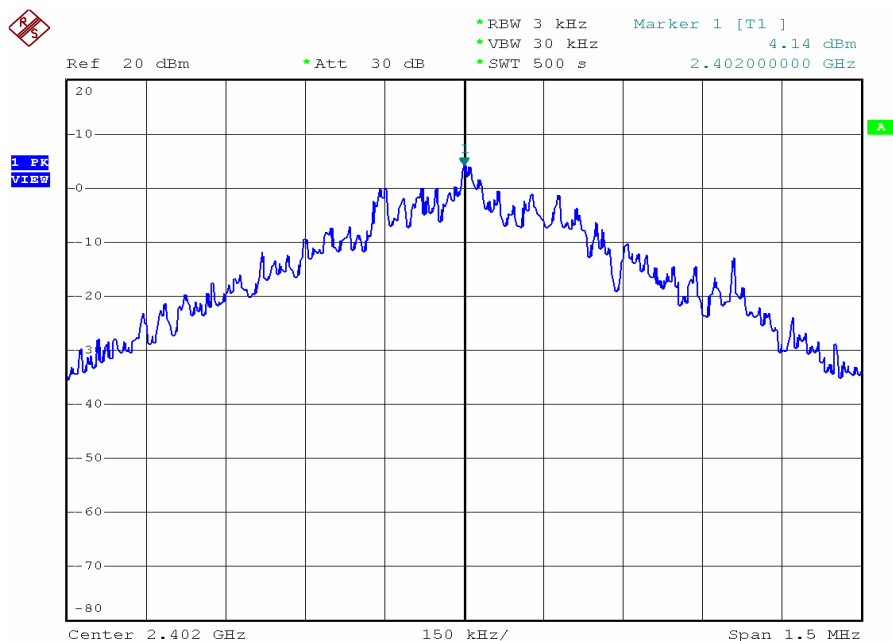
Notes:

1. Level = Meter Reading + Factor.
2. Factor = Antenna Factor + Cable Loss – Amplifier.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and Quasi-peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.

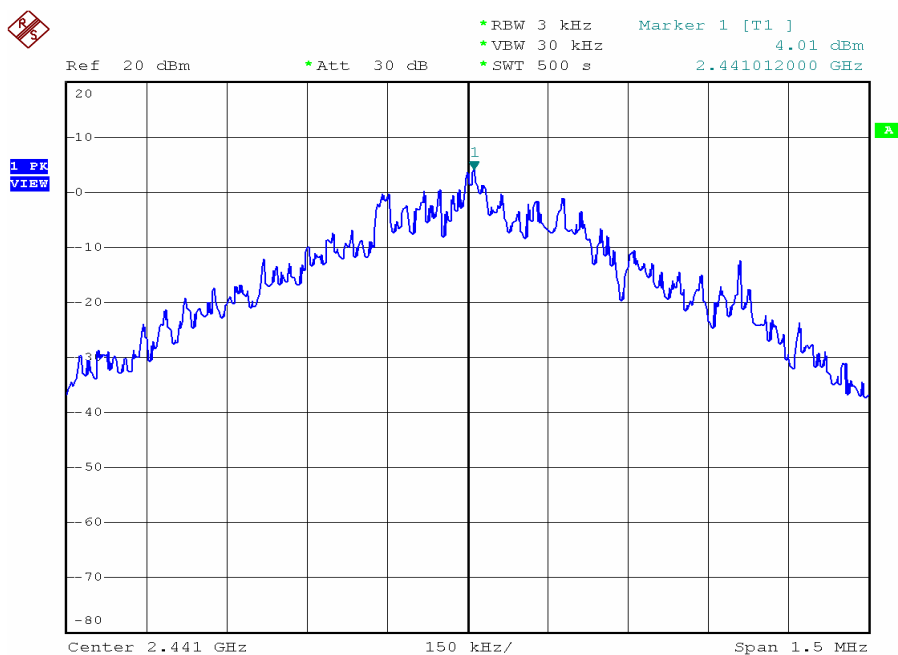
4.10. Power Spectral Density Measurement Data

Test Date: Oct. 18, 2004 Temperature: 25 Humidity: 55%

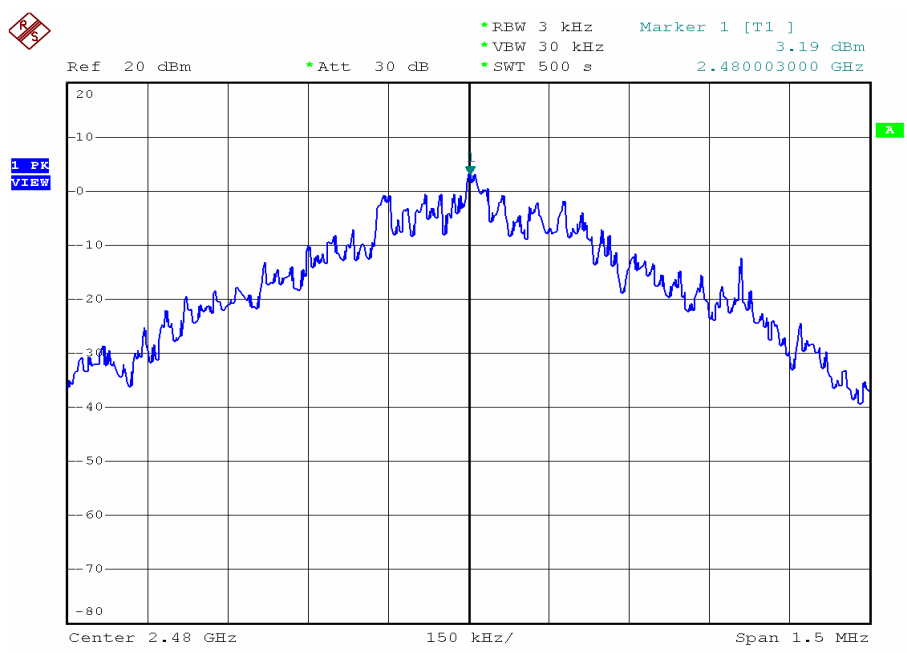
a) Channel 0: Maximum Power Density of 3 kHz Bandwidth is	<u>4.14</u>	<u>dBm</u>
b) Channel 39: Maximum Power Density of 3 kHz Bandwidth is	<u>4.01</u>	<u>dBm</u>
c) Channel 78: Maximum Power Density of 3 kHz Bandwidth is	<u>3.19</u>	<u>dBm</u>



Date: 18.OCT.2004 16:01:23



Date: 18.OCT.2004 16:24:22



Date: 18.OCT.2004 16:53:28

5. List of Measuring Equipment Used

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Valid Date.
1	Bilog Antenna	CBL6111C	Schaffner	2762	2004/11/03
2	Preamplifier	RFP4002	Schaffner	010	2004/11/03
3	Receiver	SCR3501	Schaffner	437	2004/11/03
4	Signal Generator	8648B	HP	3629U00612	2006/02/09
5	Spectrum Analyzer	8594E	HP	3520A01913	2005/01/15
6	Amplifier	8447D	Agilent	2443A04650	2005/02/02
7	Amplifier	8447D	Agilent	2944A10531	2005/06/30
8	Series Power Meter	E4416A	Agilent	GB41292146	2005/10/11
9	Power Sensor	E9327A	Agilent	US40441392	2005/10/11
10	Dipole Antenna	AD-100	COM-Power	721011	2004/12/02
11	Dipole Antenna	AD-100	COM-Power	721010	2004/12/02
12	Spectrum Analyzer	R3131A	Advantest	131000021	2004/11/24
13	Spectrum Analyzer	FSP40	R&S	100047	2004/12/16
14	Preamplifier	8449B	Agilent	3008A01954	2005/01/04
15	Horn Antenna	3115	EMCO	31601	2005/01/13
16	Horn Antenna	3115	EMCO	31589	2005/01/13
17	Horn Antenna	3116	EMCO	31970	2005/01/29
18	Horn Antenna	3116	EMCO	31974	2005/01/29
19	EMI Receiver	8546A	HP	3807A00454	2005/02/12
20	RF Filter Section	85460A	HP	3704A00386	2005/02/12
21	Signal Generator	83640A	HP	2927A00107	2006/04/02
22	Attenuator	8491B	Agilent	50703	2004/12/16
23	Attenuator	8491B	Agilent	50705	2004/12/16
24	Temperature Chamber	TMJ-9712	T Machine	T-12-040111	2005/02/05
25	High Pass Filter	84300-80038	HP	002	N/A
26	High Pass Filter	84300-80038	HP	006	N/A
27	DC Power Supply	GPD-3030	GM	7020936	N/A
28	AC Power Converter	AFC-11005	APC	F103120008	N/A