



**CONFORMANCE TEST REPORT  
FOR  
FCC 47 CFR, Part 15 Subpart C**

**Report No.: ET94S-04-060**

Client: Antonio Precise Products Manufactory Ltd.  
Product: Bluetooth Neckband Stereo Headphones  
Model: BH92  
FCC ID: QLM0090410  
Manufacturer/supplier: Antonio Precise Products Manufactory Ltd.

Date test item received: 2005/04/08  
Date test campaign completed: 2005/04/18  
Date of issue: 2005/04/20




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*Internal photos 2 pages*

*Setup photos 4 pages*

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## TEST REPORT CERTIFICATION

Client : Antonio Precise Products Manufactory Ltd.

Address : 3/F, Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science, Shatin, H.K.

Manufacturer : Antonio Precise Products Manufactory Ltd.

Address : 3/F, Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science, Shatin, H.K.

EUT : Bluetooth Neckband Stereo Headphones

Trade name : ----

Model No. : BH92

Power Source : Adapter Model No.: SA106A-0512-6  
Input: 100-240Vac, 50-60Hz, 0.25A  
Output: DC 5.5Vdc, 0.5A

Regulations applied : FCC 47 CFR, Part 15 Subpart C (2004)

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# 1 GENERAL INFORMATION

## 1.1 Product Description

- a) Type of EUT : Bluetooth Neckband Stereo Headphones
- b) Trade Name : ----
- c) Model No. : BH92
- d) Power Supply : Adapter Model No.: SA106A-0512-6  
Input: 100-240Vac, 50-60Hz, 0.25A  
Output: DC 5.5Vdc, 0.5A

## 1.2 Characteristics of Device

The EUT is a Bluetooth Neckband Stereo Headphones based on the Bluetooth technology. Bluetooth is a short-range radio link intended to be a cable replacement between portable or fixed electronic devices. Bluetooth operates in the unlicensed ISM Band at 2.4GHz. In this band, 79 RF channels spaced 1MHz apart are defined. The rated output power is 1.82 dBm ( 1.23 mW).

## 1.3 Test Methodology

All testing were performed according to the procedures in ANSI C63.4 an FCC CFR 47 Part 2 and Part 15.

## 1.4 Modifiction List of EUT

N/A

## 1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

## 2 PROVISIONS APPLICABLE

### 2.1 Definition

**Unintentional radiator:**

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

**Class A Digital Device:**

A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

**Class B Digital Device :**

A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

**Intentional radiator:**

A device that intentionally generates and emits radio frequency energy by radiation or induction.

## 2.2 Requirement for Compliance

### (1) Conducted Emission Requirement

For unintentional device, according to §15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Quasi Peak dB $\mu$ V	Average dB $\mu$ V
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

\*Decreases with the logarithm of the frequency.

For intentional device, according to §15.207(a) Line Conducted Emission Limits is same as above table.

### (2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dB $\mu$ V/m	Radiated $\mu$ V/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

### (3) Antenna Requirement

For intentional device, according to §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.

**(4) 20dB Bandwidth Requirement**

For frequency hopping systems, according to 15.247(a)(1), hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

**(5) Output Power Requirement**

For frequency hopping systems, according to 15.247(1), operating in the 2400-2483.5MHz band employing at least 75 hopping channels. The maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**(6) 100 kHz Bandwidth of Frequency Band Edges Requirement**

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

**(7) Number of Hopping Channels**

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels.

**(8) Channel Carrier Frequencies Separation**

According to 15.247(a)(1)(iii), the frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

**(9) Dwell Time**

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

**(10) Power Spectral Density**

According to 15.247(d), for bluetooth device, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

## 2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

\*\* : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

## 2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## 2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

### 3. SYSTEM TEST CONFIGURATION

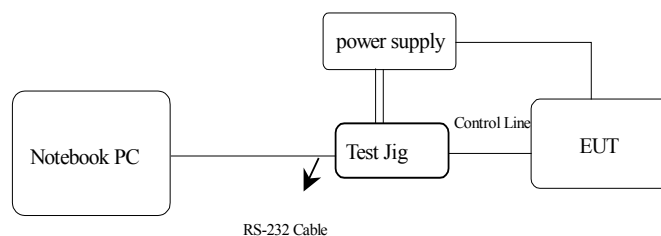
#### 3.1 Justification

For the purposes of this test report ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT during the test. Notebook PC was used to control the RF channel under the highest, middle and lowest frequency and transmit the maximum RF power. Customer would not use it. But never the less ancillary equipment can influence the test results..

#### 3.2 Devices for Tested System

Device	Manufacture	Model	Cable Description
*Bluetooth Neckband Stereo Headphones	Antonio Precise Products Manufactory Ltd.	BH92	----
Notebook PC	ASUS	L7300	3.3m, Unshielded Power Line (Adaptor) 1.7m, Unshielded Signal Line (RS232)
Power Supply	GW	GPC 3030D	1.7m, Unshielded DC Power Line 1.8m, Unshielded AC Power Code
Test Jig	----	----	0.2m*1, Unshielded Signal Line 1.1m, Unshielded DC Power Line

Remark “\*” means equipment under test.



After programmed EUT, REMOVE the Test Jig and Notebook.

## 4 RADIATED EMISSION MEASUREMENT

### 4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with §15.109(a).

For intentional radiators, according to §15.247 (a), operation under this provision is limited to frequency hopping and digitally modulated, and the out band emission shall be comply with §15.247 (c)

### 4.2 Measurement Procedure

#### A.Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT (X,Y and Z axis):

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. The axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.
4. The position in which the maximum noise occurred was “Y axis”. (Please see the test setup photos)

#### B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

Figure 1 : Frequencies measured below 1 GHz configuration

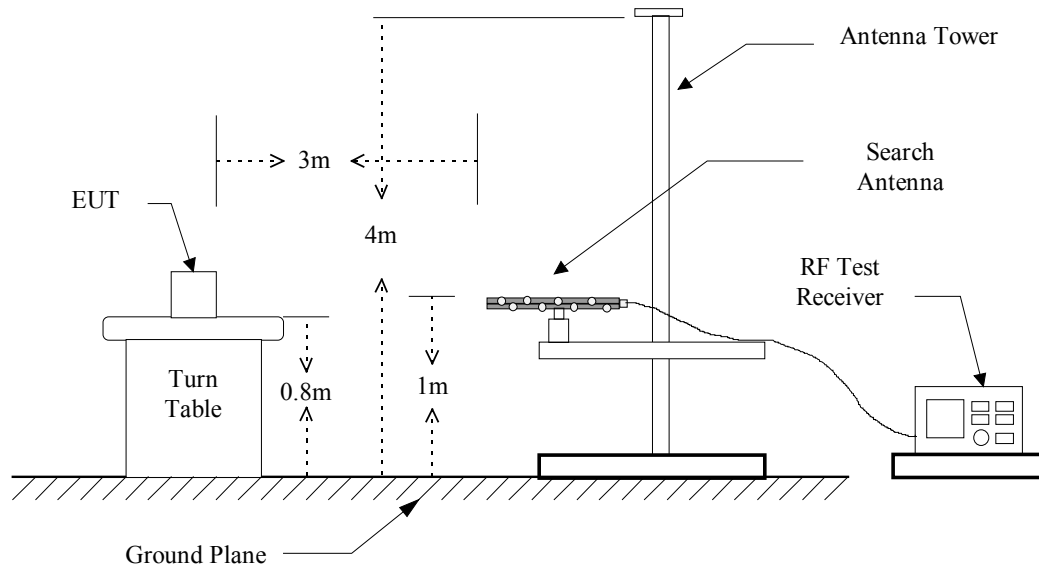
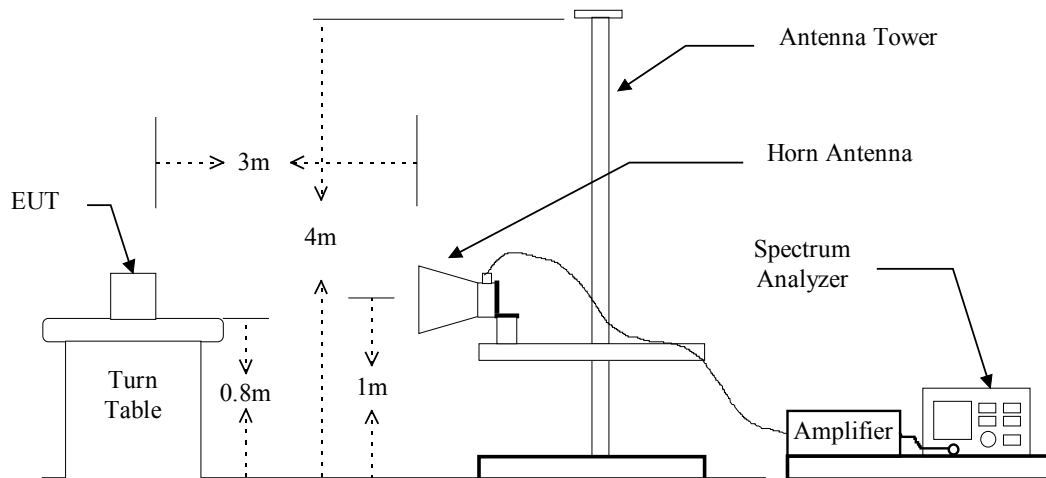


Figure 2 : Frequencies measured above 1 GHz configuration



### 4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
EMI Test Receiver	Hewlett-Packard	8546A	08/27/2005
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005
Horn Antenna	EMCO	3115	06/05/2005
LogBicone Antenna	Schwarzbeck	9160	10/28/2005
Horn Antenna	EMCO	3116	06/28/2005
Preamplifier	Hewlett-Packard	8449B	09/04/2005

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz

## 4.4 Radiated Emission Data

### 4.4.1 RF Portion

#### a) Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Apr. 15, 2005

Temperature : 23°C

Humidity : 64%

Frequency (MHz)	Reading (dBuV)				Factor (dB) Corr.	Result @3m (dBuV/m) Peak Ave (H/V Max.)		Limit @3m (dBuV/m) Peak Ave.	
	H Peak	H Ave	V Peak	V Ave		Peak	Ave	Peak	Ave.
1201.000	52.6	36.7	56.1	39.4	-13.9	42.2	25.5	74.0	54.0
4804.000	46.2	32.8	48.1	41.1	-4.6	43.5	36.5	74.0	54.0
12010.000	---	---	---	---	2.9	---	---	74.0	54.0
16216.000	---	---	---	---	3.8	---	---	74.0	54.0

#### b) Channel 39

Fundamental Frequency : 2441 MHz

Frequency (MHz)	Reading (dBuV)				Factor (dB) Corr.	Result @3m (dBuV/m) Peak Ave (H/V Max.)		Limit @3m (dBuV/m) Peak Ave.	
	H Peak	H Ave	V Peak	V Ave		Peak	Ave	Peak	Ave.
1220.500	51.6	37.3	52.3	39.8	-13.9	38.4	25.9	74.0	54.0
4882.000	45.7	39.2	53.3	40.8	-4.6	48.7	36.2	74.0	54.0
7323.000	46.2	33.8	46.6	34.7	-1.0	45.6	33.7	74.0	54.0
12205.000	47.1	33.6	47.5	33.8	2.9	50.4	36.7	74.0	54.0
19528.000	---	---	---	---	4.5	---	---	74.0	54.0

#### c) Channel 78

Fundamental Frequency : 2480 MHz

Frequency (MHz)	Reading (dBuV)				Factor (dB) Corr.	Result @3m (dBuV/m) Peak Ave (H/V Max.)		Limit @3m (dBuV/m) Peak Ave.	
	H Peak	H Ave	V Peak	V Ave		Peak	Ave	Peak	Ave.
1240.00	51.7	36.7	51.9	38.2	-13.9	38.0	24.3	74.0	54.0
4960.000	51.7	38.0	57.7	40.6	-4.6	53.1	36.0	74.0	54.0
7440.000	46.5	32.4	46.0	32.2	-1.0	45.5	31.4	74.0	54.0
12400.000	---	---	---	---	2.9	---	---	74.0	54.0
19840.000	---	---	---	---	4.5	---	---	74.0	54.0
22320.000	---	---	---	---	1.3	---	---	74.0	54.0

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark “---” means that the emissions level is too low to be measured.
3. Item “Margin” referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

**4.4.2 Other Emission**

## 4.4.2.1

Operation Mode: 2402 MHz

Test Date : Apr. 15, 2005      Temperature : 23°C      Humidity : 64%

<b>Emission Frequency ( MHz )</b>	<b>H / V</b>	<b>READING (dBuV)</b>	<b>CORR'd Factor ( dB )</b>	<b>Result (dBuV)</b>	<b>Limit (dBuV/m)</b>	<b>Margins ( dB )</b>
36.790	V	11.4	13.2	24.6#	40.0	-15.4
65.890	V	9.6	11.6	21.2#	40.0	-18.8
114.390	H	10.9	12.5	23.4#	43.5	-20.1
114.390	V	11.8	12.5	24.3#	43.5	-19.2
145.430	V	10.2	15.1	25.3#	43.5	-18.2
201.690	H	5.9	13.0	18.9#	43.5	-24.6
242.430	H	7.8	14.6	22.4#	46.0	-23.6
261.830	V	11.3	14.6	25.9#	46.0	-20.1
288.990	H	9.1	16.8	25.9#	46.0	-20.1
552.830	H	7.8	22.9	30.7#	46.0	-15.3
805.030	H	12.4	27.6	40.0#	46.0	-6.0
805.030	V	12.1	27.6	39.7#	46.0	-6.3

Note :

1. Remark “\*\*\*” means that the emissions level is too low to be measured.
2. Remark “#” means the noise was low, so record the peak value.
3. Item “Margin” referred to Q.P. limit while there is only peak result.

## 4.4.2.2

Operation Mode: 2441 MHz

Test Date : Apr. 15, 2005      Temperature : 23°C      Humidity : 64%

<b>Emission Frequency ( MHz )</b>	<b>H / V</b>	<b>READING (dBuV)</b>	<b>CORR'd Factor ( dB )</b>	<b>Result (dBuV)</b>	<b>Limit (dBuV/m)</b>	<b>Margins ( dB )</b>
65.890	V	9.2	11.6	20.8#	40.0	-19.2
114.390	V	11.4	12.5	23.9#	43.5	-19.6
119.240	H	9.4	13.5	22.9#	43.5	-20.6
145.430	H	6.9	15.1	22.0#	43.5	-21.5
148.340	V	7.4	15.1	22.5#	43.5	-21.0
211.390	V	7.3	13.0	20.3#	43.5	-23.2
256.980	H	9.0	14.6	23.6#	46.0	-22.4
295.780	H	7.8	16.8	24.6#	46.0	-21.4
533.430	H	8.2	22.3	30.5#	46.0	-15.5
591.630	V	7.5	23.8	31.3#	46.0	-14.7
817.640	V	13.3	27.8	41.1	46.0	-4.9
819.580	H	13.9	27.8	41.7	46.0	-4.3

Note :

1. Remark “\*\*\*” means that the emissions level is too low to be measured.
2. Remark “#” means the noise was low, so record the peak value.
3. Item “Margin” referred to Q.P. limit while there is only peak result.

## 4.4.2.3

Operation Mode: 2480 MHz

Test Date : Apr. 15, 2005      Temperature : 23°C      Humidity : 64%

<b>Emission Frequency ( MHz )</b>	<b>H / V</b>	<b>READING (dBuV)</b>	<b>CORR'd Factor ( dB )</b>	<b>Result (dBuV)</b>	<b>Limit (dBuV/m)</b>	<b>Margins ( dB )</b>
67.830	V	4.5	11.6	16.1#	40.0	-23.9
116.330	H	9.5	13.5	23.0#	43.5	-20.5
119.240	V	10.0	13.5	23.5#	43.5	-20.0
143.490	H	5.4	15.1	20.5#	43.5	-23.0
213.330	H	6.5	13.7	20.2#	43.5	-23.3
261.830	V	9.3	14.6	23.9#	46.0	-22.1
281.230	H	8.6	15.7	24.3#	46.0	-21.7
300.630	V	8.6	16.8	25.4#	46.0	-20.6
356.890	V	8.9	18.1	27.0#	46.0	-19.0
693.480	H	6.5	26.1	32.6#	46.0	-13.4
832.190	H	13.8	27.8	41.6	46.0	-4.4
834.130	V	13.5	27.8	41.3	46.0	-4.7

Note :

1. Remark “\*\*\*” means that the emissions level is too low to be measured.
2. Remark “#” means the noise was low, so record the peak value.
3. Item “Margin” referred to Q.P. limit while there is only peak result.

**4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies**

(A)

Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Apr. 15, 2005

Temperature : 23°C

Humidity : 64%

Frequency (MHz)	Reading (dBuV)				Factor (dB) Corr.	Result @3m (dBuV/m) Peak Ave (H/V Max.)		Limit @3m (dBuV/m) Peak Ave.	
	H Peak	V Ave	H Peak	V Ave		Peak	Ave	Peak	Ave.
2390.000	27.6	13.9	25.9	14.9	28.3	55.9	43.2	74.0	54.0

Note:

The result is the highest value of radiated emission from restrict band of 2310 ~2390 MHz.

(B)

Channel 78

Operation Mode : Transmitting

Fundamental Frequency : 2480 MHz

Test Date : Apr. 15, 2005

Temperature : 23°C

Humidity : 64%

Frequency (MHz)	Reading (dBuV)				Factor (dB) Corr.	Result @3m (dBuV/m) Peak Ave (H/V Max.)		Limit @3m (dBuV/m) Peak Ave.	
	H Peak	V Ave	H Peak	V Ave		Peak	Ave	Peak	Ave.
2483.500	25.3	15.2	27.0	15.4	28.3	55.3	43.7	74.0	54.0

Note:

The result is the highest value of radiated emission from restrict band of 2483.5 ~2500 MHz.

**4.5 Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

where

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

## 5 CONDUCTED EMISSION MEASUREMENT

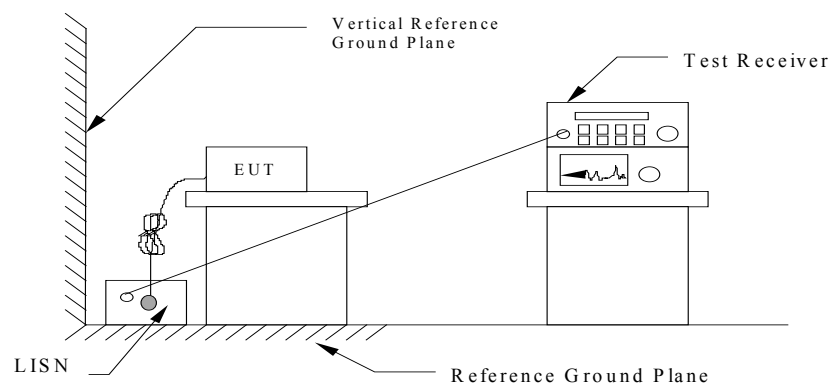
### 5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

### 5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



**5.3 Conducted Emission Data**

## 5.3.1

Operation Mode: 2402 MHz

Test Date : Apr. 18, 2005

Temperature : 23°C

Humidity : 62%

Freq. (MHz)	Meter Reading (dBuV)				Factor (dB)	Result (dBuV)				Limit (dBuV)		Margins (dB)
	Q.P Value		AVG. Value			Q.P Value		AVG. Value		Q.P Value	AVG. Value	Q.P. or AVG.
	L1	L2	L1	L2		L1	L2	L1	L2			
0.275	34.8	***	----	----	0.2	35.0	***	----	----	61.0	51.0	-26.0
0.334	43.8	***	----	----	0.2	44.0	***	----	----	59.4	49.4	-15.4
0.338	***	37.9	----	----	0.2	***	38.1	----	----	59.3	49.3	-21.2
0.390	53.1	***	42.5	----	0.2	53.3	***	42.7	----	58.1	48.1	-4.8
0.391	***	46.5	----	32.7	0.2	***	46.7	----	32.9	58.0	48.0	-11.3
0.416	44.5	***	----	----	0.2	44.7	***	----	----	57.5	47.5	-12.8
0.443	39.8	***	----	----	0.2	40.0	***	----	----	57.0	47.0	-17.0
0.451	***	40.9	----	----	0.2	***	41.1	----	----	56.9	46.9	-15.8
0.498	***	38.9	----	----	0.2	***	39.1	----	----	56.0	46.0	-16.9
0.904	***	28.9	----	----	0.2	***	29.1	----	----	56.0	46.0	-26.9
2.039	***	26.8	----	----	0.2	***	27.0	----	----	56.0	46.0	-29.0
2.301	31.8	***	----	----	0.2	32.0	***	----	----	56.0	46.0	-24.0

Note:

1. “\*\*\*” means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. “#” means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.
5. Please refer to page 22 to page 23 for chart.

## Conducted Emission Test

## Peak Value

EUT:

Manuf:

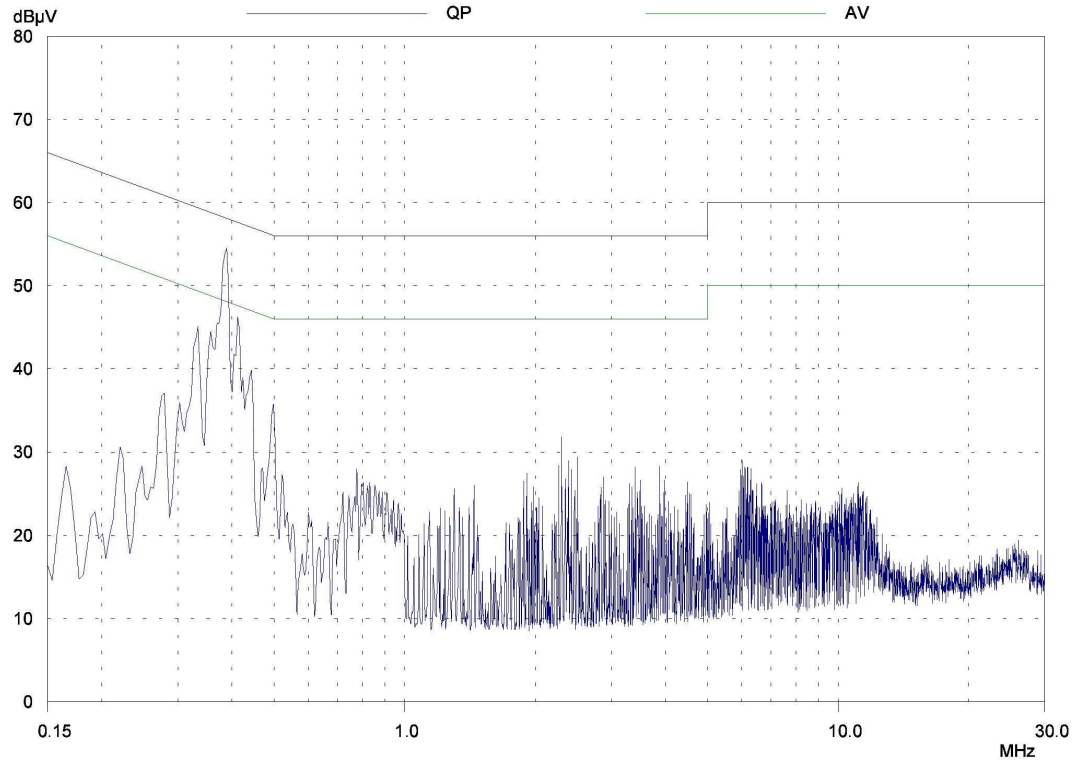
Op Cond: TX\_CH0

Operator: MARK

Test Spec: FCC

Comment: L1

Prescan Measurement:      Detector:      X PK  
                                 Meas Time:    see scan settings  
                                 Peaks:        8  
                                 Acc Margin:   30 dB



## Conducted Emission Test

## Peak Value

EUT:

Manuf:

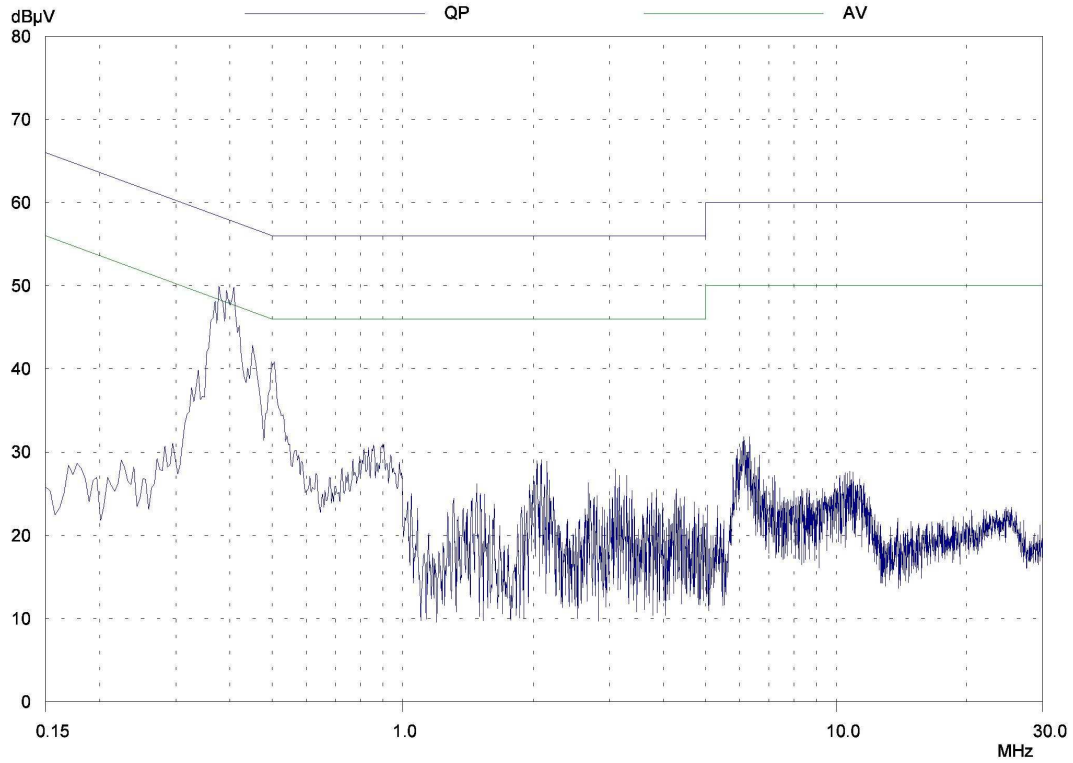
Op Cond: TX\_CH0

Operator: MARK

Test Spec: FCC

Comment: L2

Prescan Measurement:      Detector:      X PK  
                                 Meas Time:    see scan settings  
                                 Peaks:        8  
                                 Acc Margin:   30 dB



## 5.3.2

Operation Mode: 2441 MHz

Test Date : Apr. 18, 2005

Temperature : 23°C

Humidity : 62%

Freq. (MHz)	Meter Reading (dBuV)				Factor (dB)	Result (dBuV)				Limit (dBuV)		Margins (dB)
	Q.P Value		AVG. Value			Q.P Value		AVG. Value		Q.P Value	AVG. Value	Q.P. or AVG.
	L1	L2	L1	L2		L1	L2	L1	L2			
0.326	42.0	***	----	----	0.2	42.2	***	----	----	59.6	49.6	-17.4
0.357	45.1	***	----	----	0.2	45.3	***	----	----	58.8	48.8	-13.5
0.370	***	42.3	----	----	0.2	***	42.5	----	----	58.5	48.5	-16.0
0.378	53.8	***	44.8	----	0.2	54.0	***	45.0	----	58.3	48.3	-3.3
0.385	***	46.1	----	31.5	0.2	***	46.3	----	31.7	58.2	48.2	-11.9
0.435	44.6	***	----	----	0.2	44.8	***	----	----	57.2	47.2	-12.4
0.460	***	42.0	----	----	0.2	***	42.2	----	----	56.7	46.7	-14.5
0.490	35.3	***	----	----	0.2	35.5	***	----	----	56.2	46.2	-20.7
0.512	***	39.6	----	----	0.2	***	39.8	----	----	56.0	46.0	-16.2
0.910	***	29.0	----	----	0.2	***	29.2	----	----	56.0	46.0	-26.8
2.328	29.3	***	----	----	0.2	29.5	***	----	----	56.0	46.0	-26.5
6.212	***	31.2	----	----	0.2	***	31.4	----	----	60.0	50.0	-28.6

Note:

1. “\*\*\*” means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. “#” means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.
5. Please refer to page 25 to page 26 for chart.

## Conducted Emission Test

## Peak Value

EUT:

Manuf:

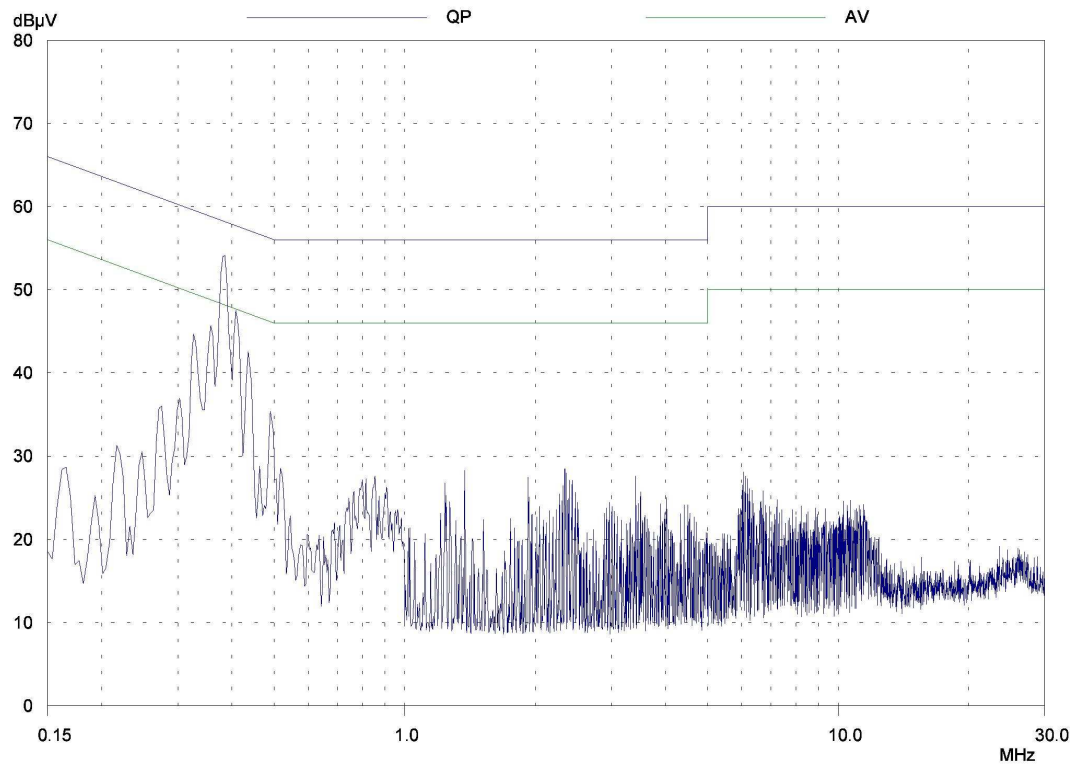
Op Cond: TX\_CH39

Operator: MARK

Test Spec: FCC

Comment: L1

Prescan Measurement:      Detector:      X PK  
                                 Meas Time:    see scan settings  
                                 Peaks:        8  
                                 Acc Margin:   30 dB



## Conducted Emission Test

## Peak Value

EUT:

Manuf:

Op Cond:

TX\_CH39

Operator:

MARK

Test Spec:

FCC

Comment:

L2

Prescan Measurement:

Detector:

X PK

Meas Time:

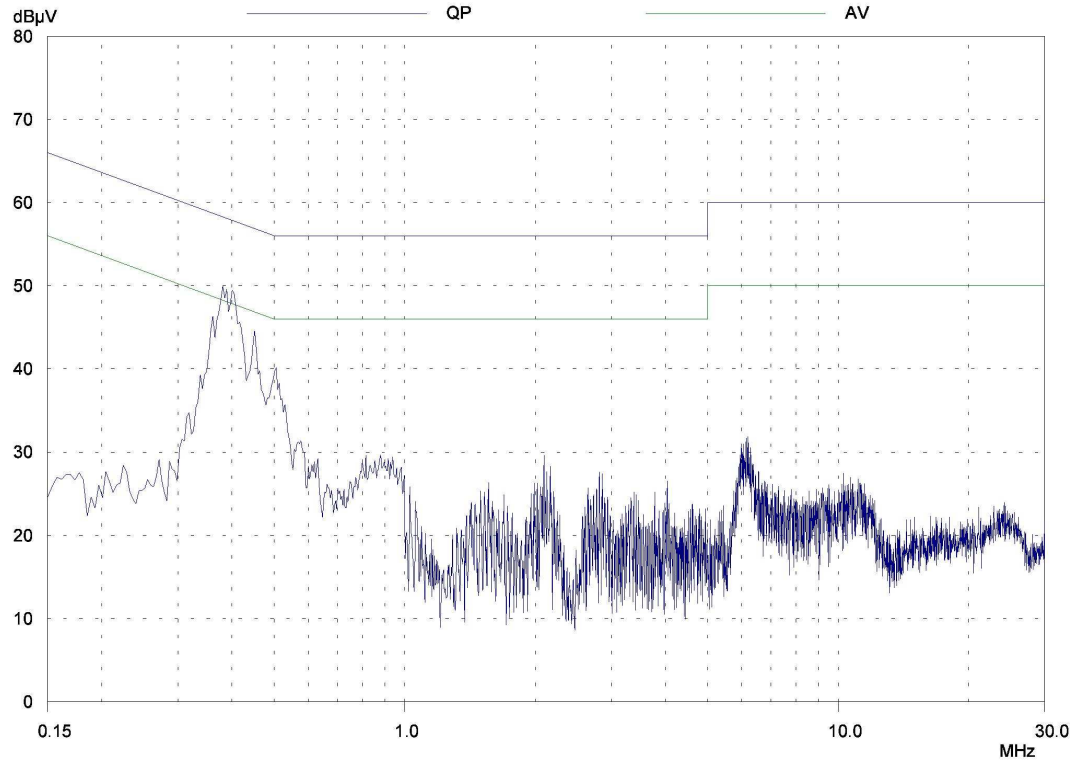
see scan settings

Peaks:

8

Acc Margin:

30 dB



## 5.3.3

Operation Mode: 2480 MHz

Test Date : Apr. 18, 2005

Temperature : 23°C

Humidity : 62%

Freq. (MHz)	Meter Reading (dBuV)				Factor (dB)	Result (dBuV)				Limit (dBuV)		Margins (dB)
	Q.P Value		AVG. Value			Q.P Value		AVG. Value		Q.P Value	AVG. Value	Q.P. or AVG
	L1	L2	L1	L2		L1	L2	L1	L2			
0.306	38.9	***	----	----	0.2	39.1	***	----	----	60.1	50.1	-21.0
0.361	43.5	***	25.7	----	0.2	43.7	***	25.9	----	58.7	48.7	-15.0
0.373	46.2	***	28.4	----	0.2	46.4	***	28.6	----	58.4	48.4	-12.0
0.391	***	46.6	----	31.3	0.2	***	46.8	----	31.5	58.0	48.0	-11.2
0.435	42.3	***	----	----	0.2	42.5	***	----	----	57.2	47.2	-14.7
0.463	***	40.3	----	----	0.2	***	40.5	----	----	56.6	46.6	-16.1
0.505	32.0	35.5	----	----	0.2	32.2	35.7	----	----	56.0	46.0	-20.3
0.814	27.6	***	----	----	0.2	27.8	***	----	----	56.0	46.0	-28.2
0.916	***	27.4	----	----	0.2	***	27.6	----	----	56.0	46.0	-28.4
1.563	***	24.8	----	----	0.2	***	25.0	----	----	56.0	46.0	-31.0
6.305	***	30.6	----	----	0.2	***	30.8	----	----	60.0	50.0	-29.2

Note:

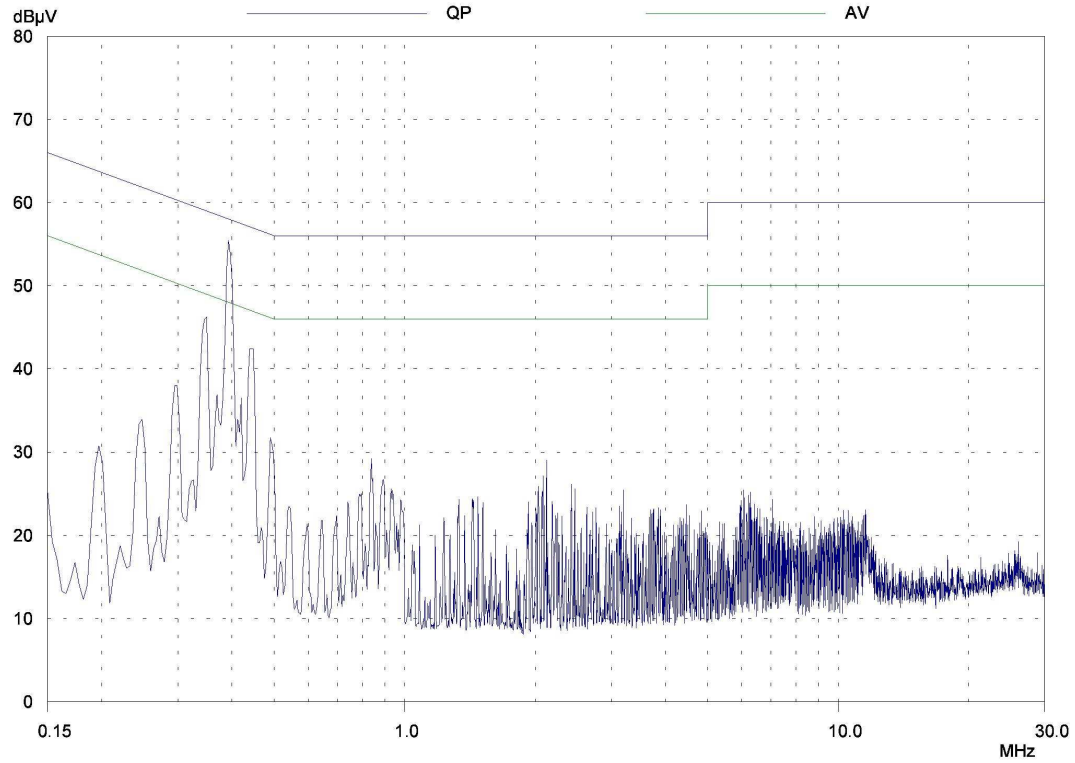
1. “\*\*\*” means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. “#” means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is  $\pm 2.5$ dB.
5. Please refer to page 28 to page 29 for chart.

## Conducted Emission Test

## Peak Value

EUT: BT HEADSET  
Manuf:  
Op Cond: TX\_CH78  
Operator: MARK  
Test Spec: FCC  
Comment: L1

Prescan Measurement: Detector: X PK  
Meas Time: see scan settings  
Peaks: 8  
Acc Margin: 30 dB

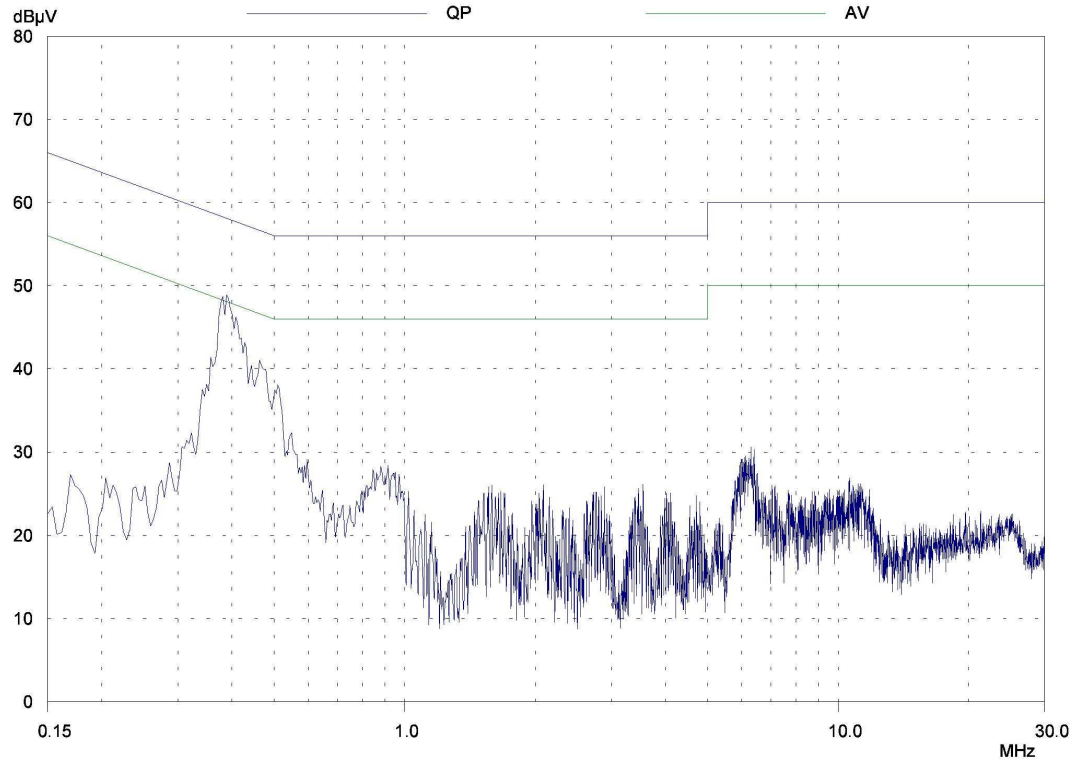


## Conducted Emission Test

## Peak Value

EUT: BT HEADSET  
Manuf:  
Op Cond: TX\_CH78  
Operator: MARK  
Test Spec: FCC  
Comment: L2

Prescan Measurement: Detector: X PK  
Meas Time: see scan settings  
Peaks: 8  
Acc Margin: 30 dB



## 5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{LISN FACTOR (Included Cable Loss)}$$

Assume a receiver reading of 22.5 dB  $\mu$  V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB  $\mu$  V.

$$\text{RESULT} = 22.5 + 0.1 = 22.6 \text{ dB } \mu \text{ V}$$

$$\begin{aligned} \text{Level in } \mu \text{ V} &= \text{Common Antilogarithm}[(22.6 \text{ dB } \mu \text{ V})/20] \\ &= 13.48 \mu \text{ V} \end{aligned}$$

## 5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test.

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESCS30	03/31/2006
Line Impedance Stabilization network	EMCO	3825	11/09/2005
Line Impedance Stabilization network	Rolf Heine	NNB-2/16Z	03/31/2006

## 6 ANTENNA REQUIREMENT

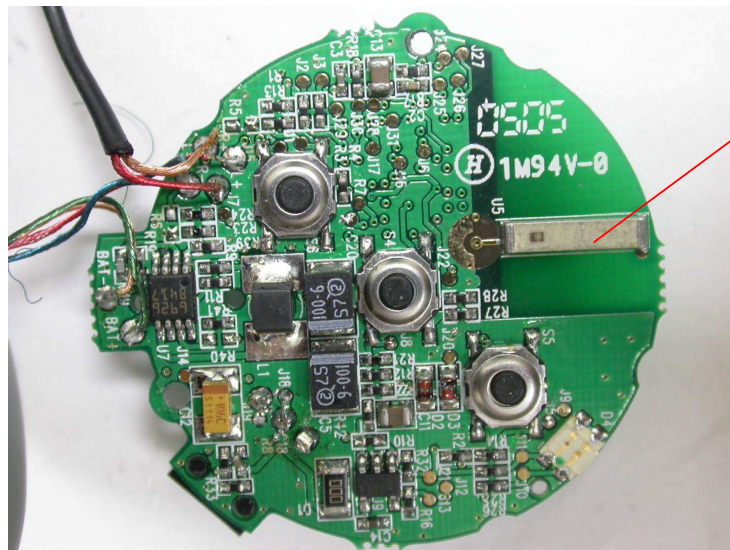
### 6.1 Standard Applicable

For intentional device, according to §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 §15.247 (b), if Receiving antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 6.2 Antenna Construction and Directional Gain

Highly efficient chip antennas fix on the PCB. The peak gain of antenna used is 3.0 dBi.



Antenna

## 7 20dB EMISSION BANDWIDTH MEASUREMENT

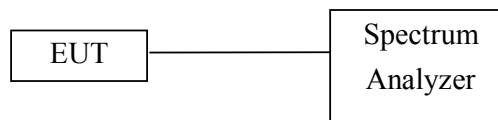
### 7.1 Standard Applicable

According to 15.247(a)(1), for frequency hopping systems, hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

### 7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect it to measurement instrument. Then set it to any 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.

Figure 4: Emission bandwidth measurement configuration.



### 7.3 Measurement Equipment

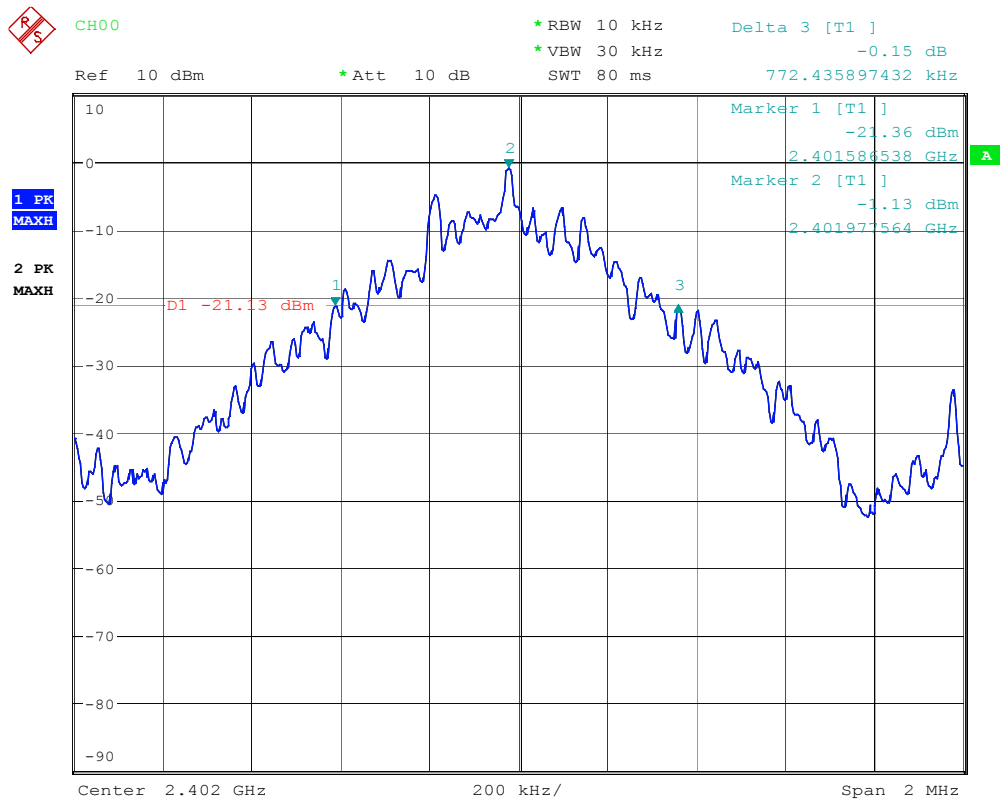
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

## 7.4 Measurement Data

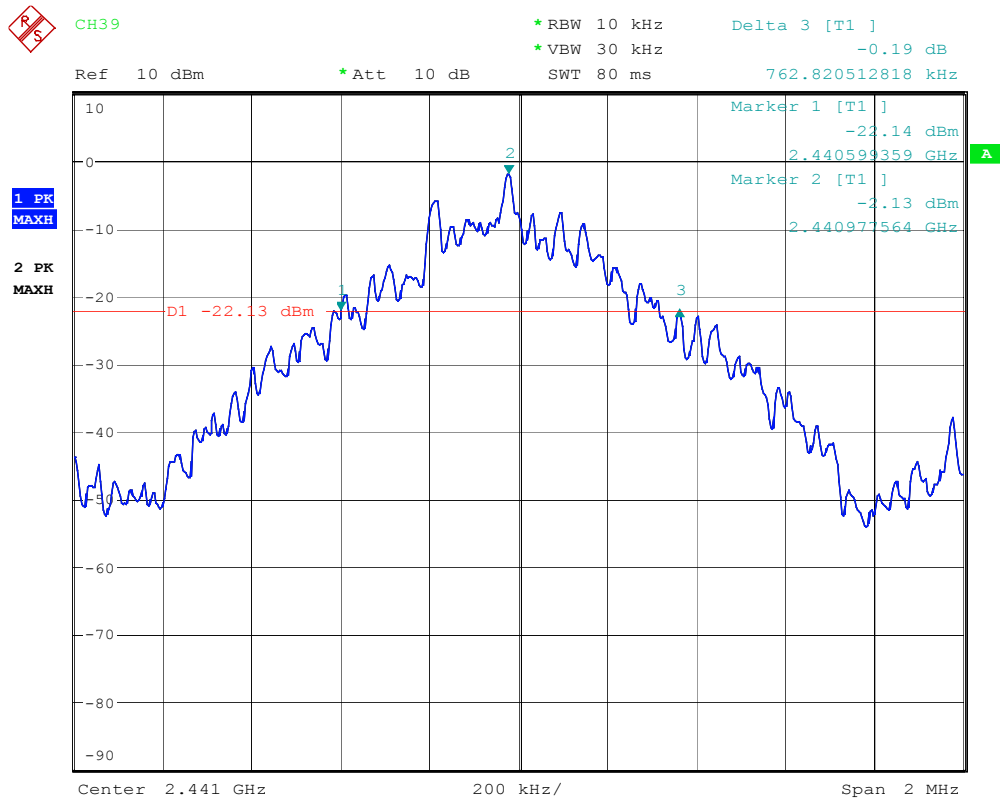
Test Date : Apr. 14, 2005Temperature : 23 °CHumidity: 60%

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Chart
0	2402	0.772	Page 34
39	2441	0.763	Page 35
78	2480	0.715	Page 36

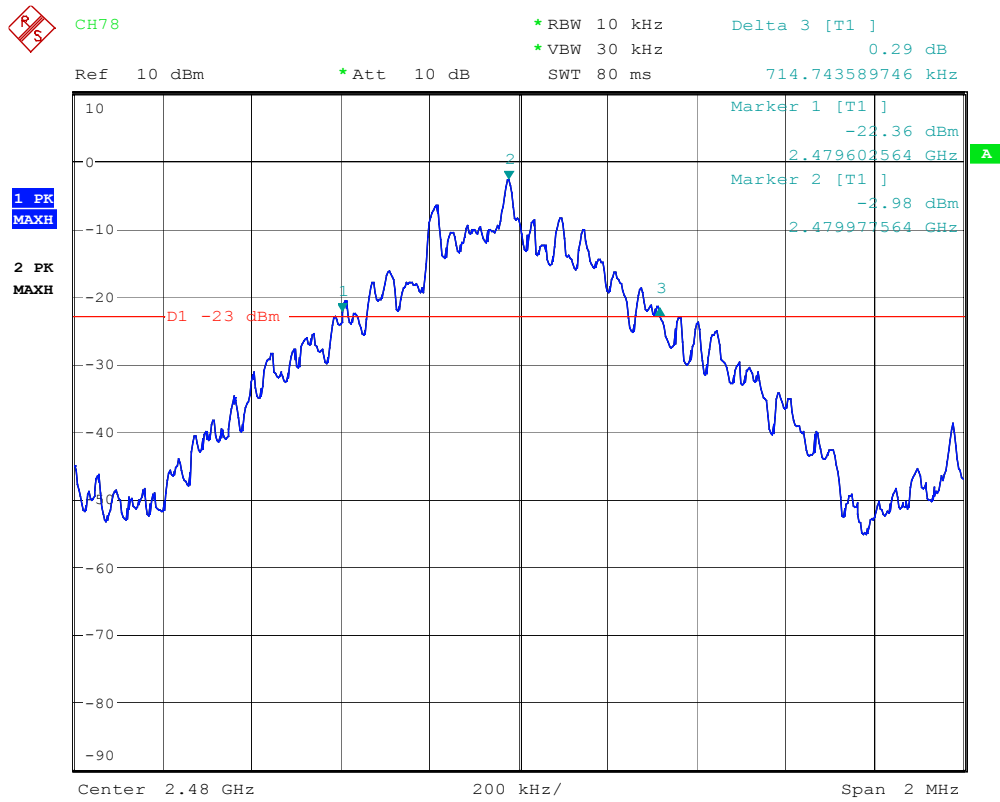
*Note: Please refer to page 34 to page 36 for chart.*



Date: 26.APR.2005 10:41:50



Date: 26.APR.2005 10:39:15



Date: 26.APR.2005 10:37:14

## 8 OUTPUT POWER MEASUREMENT

### 8.1 Standard Applicable

For frequency hopping system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If Receiving antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any 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.

### 8.3 Measurement Equipment

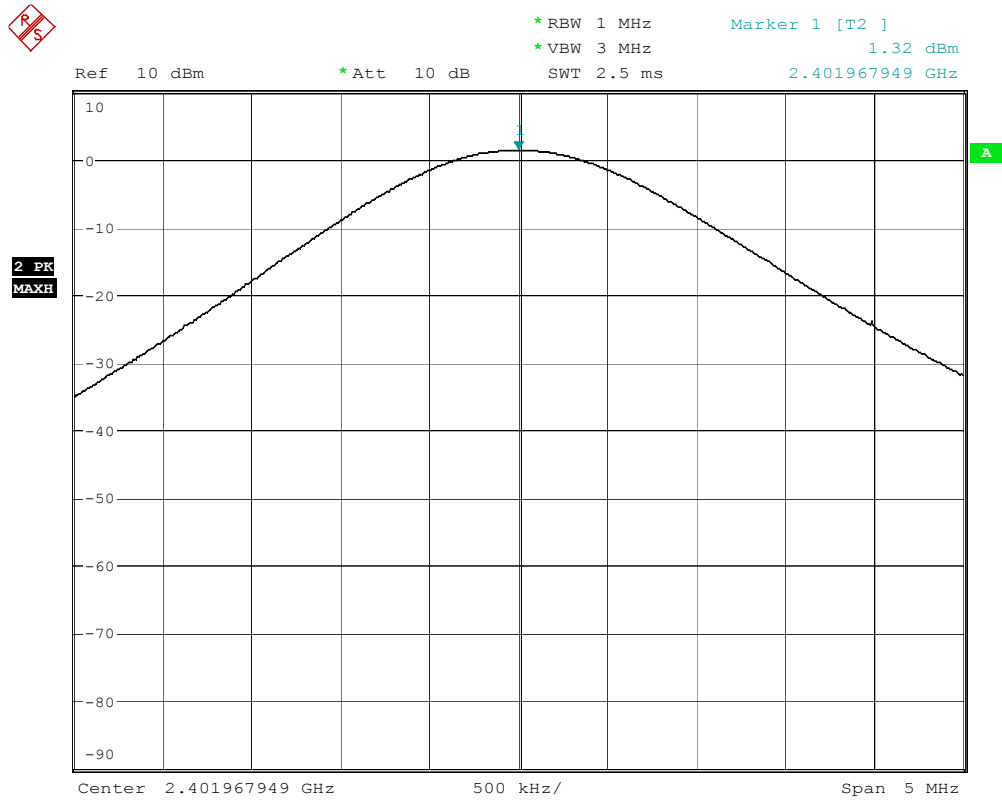
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

## 8.4 Measurement Data

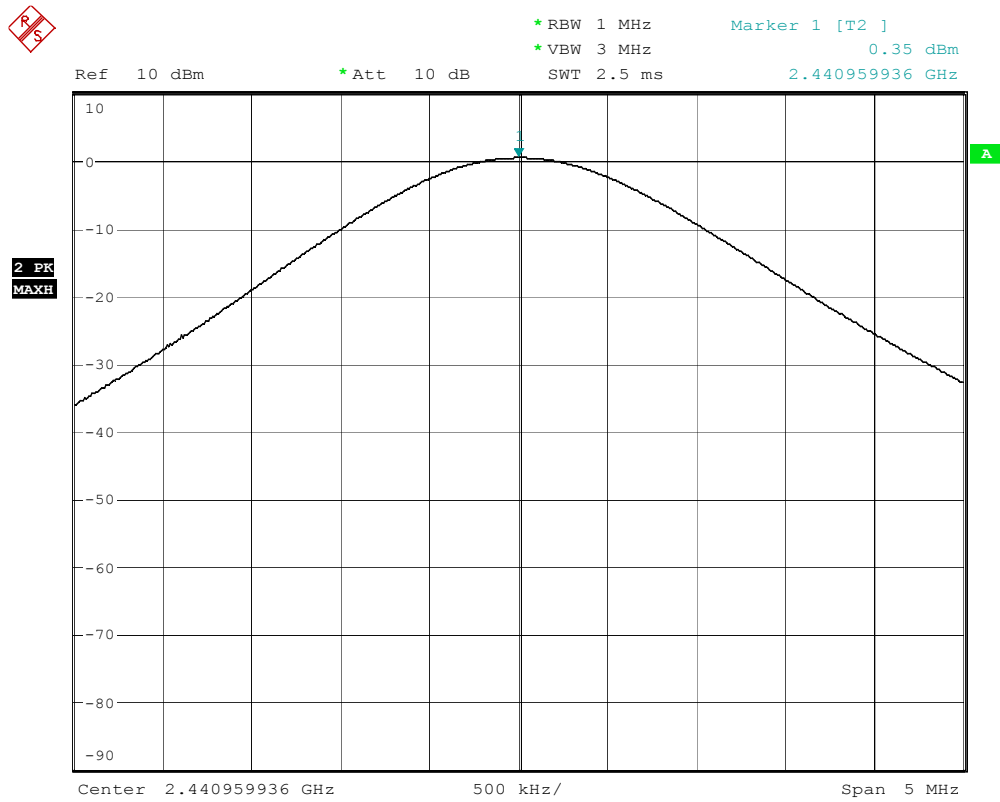
Test Date : Apr. 14, 2005Temperature : 23 °CHumidity: 60%

Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
0	2402	1.32	0.5	1.82	1.23	1000	Page 39
39	2441	0.35	0.5	0.85	1.10	1000	Page 40
78	2480	-0.36	0.5	0.14	1.02	1000	Page 41

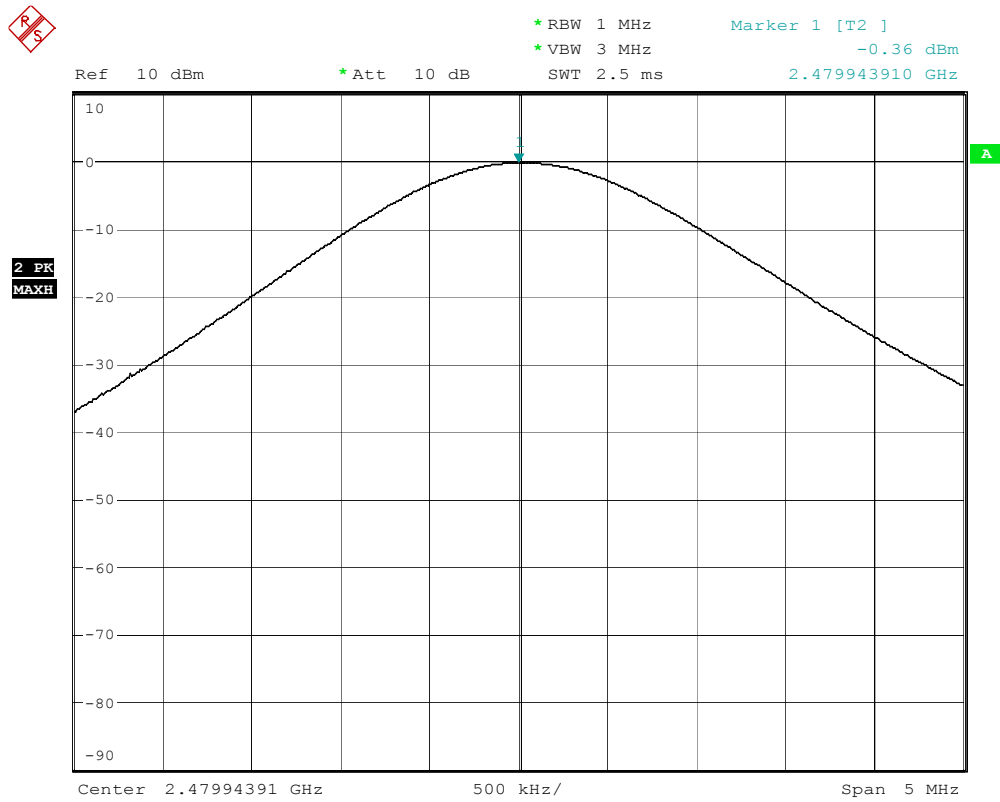
***Note: Please refer to page 39 to page 41 for chart.***



Date: 12.APR.2005 20:18:31



Date: 12.APR.2005 20:17:29



Date: 12.APR.2005 20:16:24

## 9 OUT-OF-BAND RF CONDUCTED SPURIOUS EMISSION MEASUREMENT

### 9.1 Standard Applicable

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

### 9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW 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.

### 9.3 Measurement Equipment

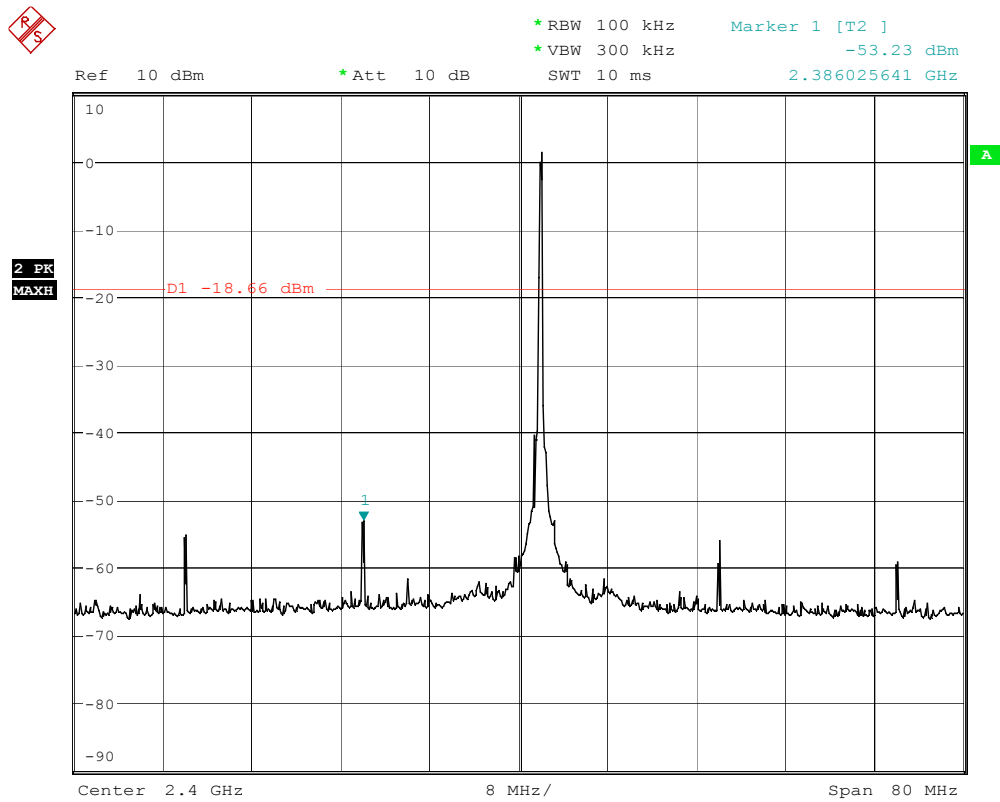
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

## 9.4 Measurement Data

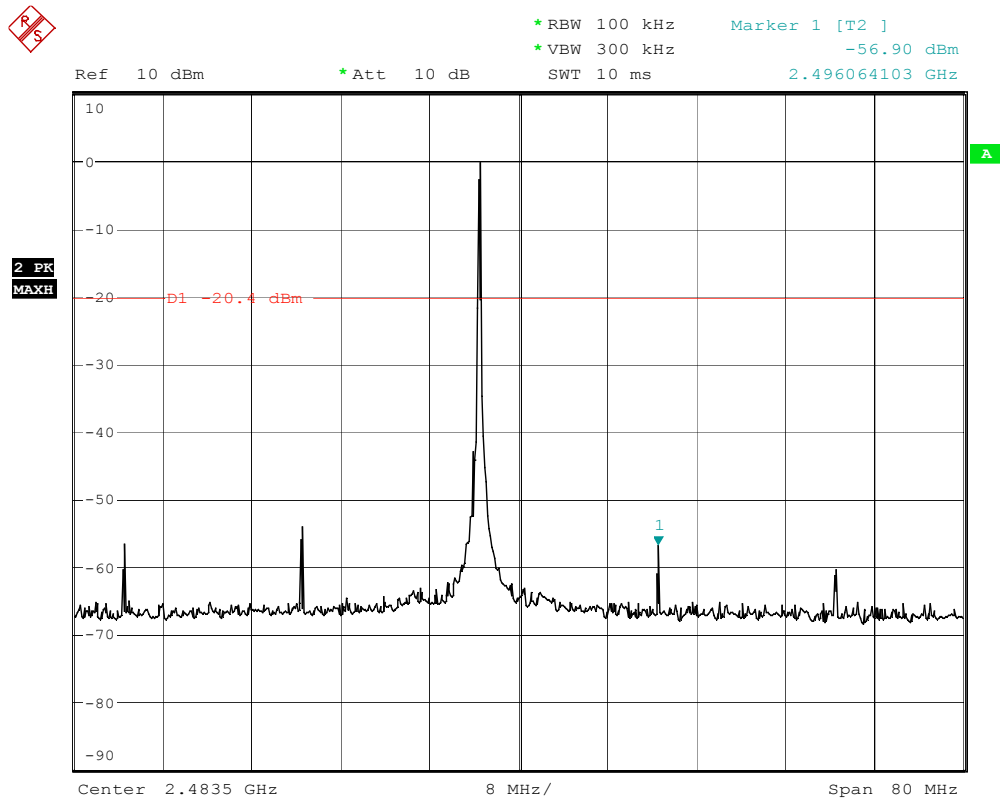
Test Date : Apr. 14, 2005Temperature : 23 °CHumidity: 60%

Channel	Test Frequency Range	Note	Chart
0	2360 MHz - 2440 MHz	Lower Band Edge	Page 44
78	2443.5 MHz - 2523.5 MHz	Upper Band Edge	Page 45
0	30 MHz - 25 GHz		Page 46
39	30 MHz - 25 GHz		Page 47
78	30 MHz - 25 GHz		Page 48

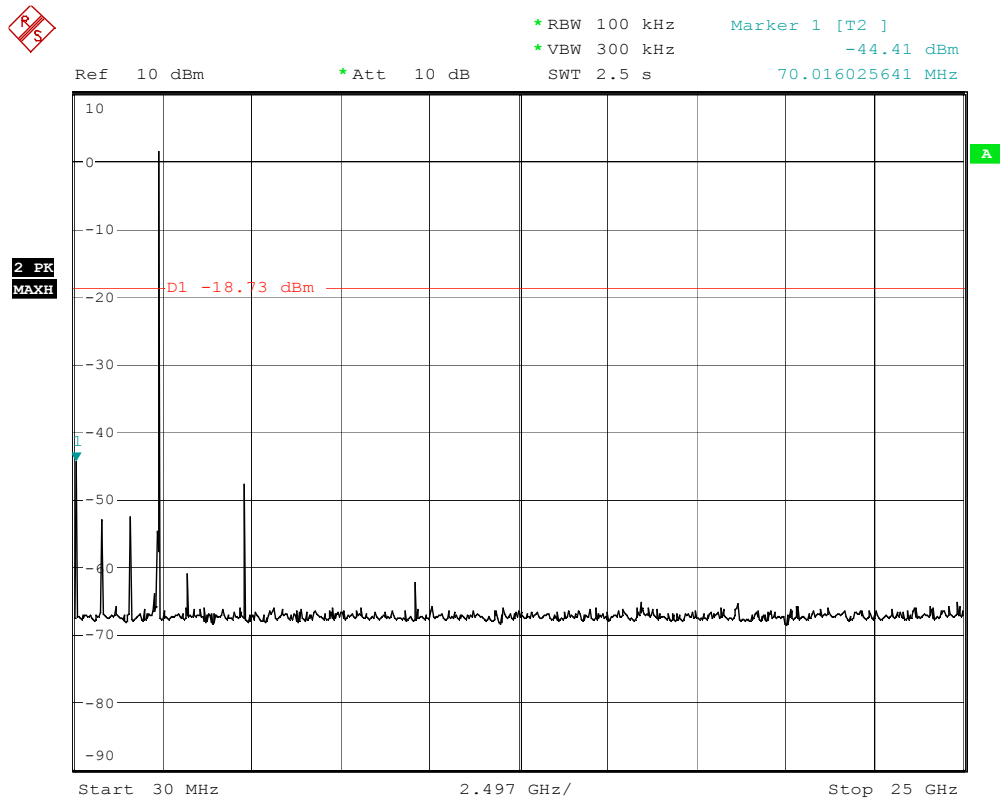
*Note: Please refer to page 44 to page 48 for chart.*



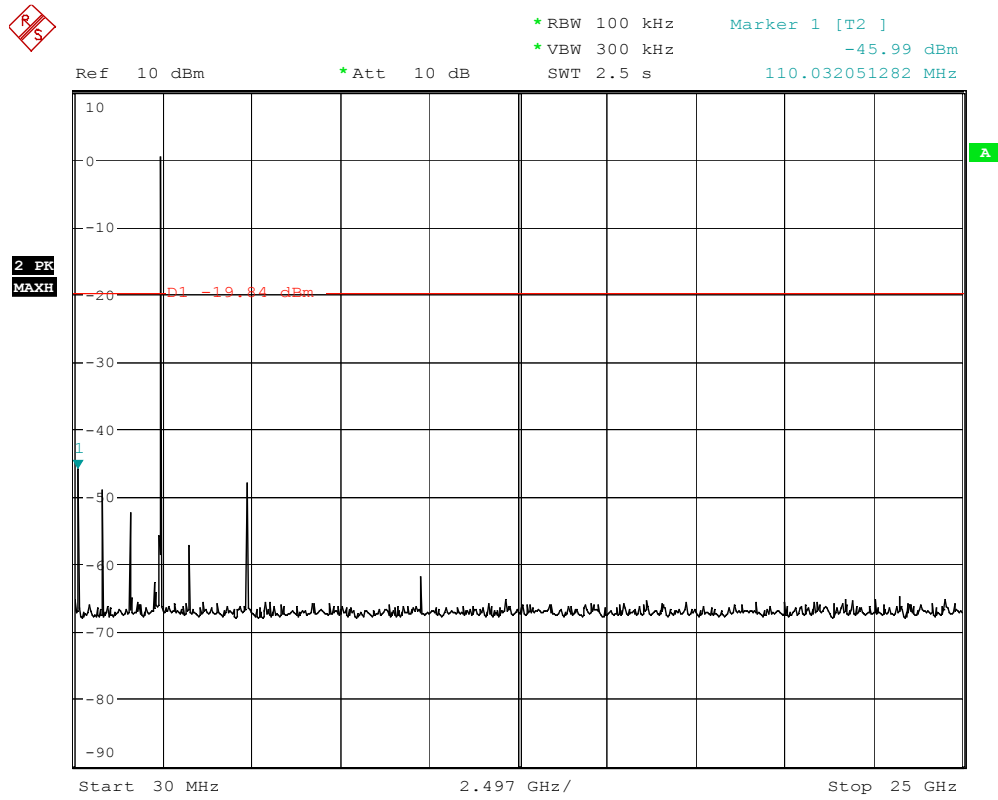
Date: 12.APR.2005 20:27:36



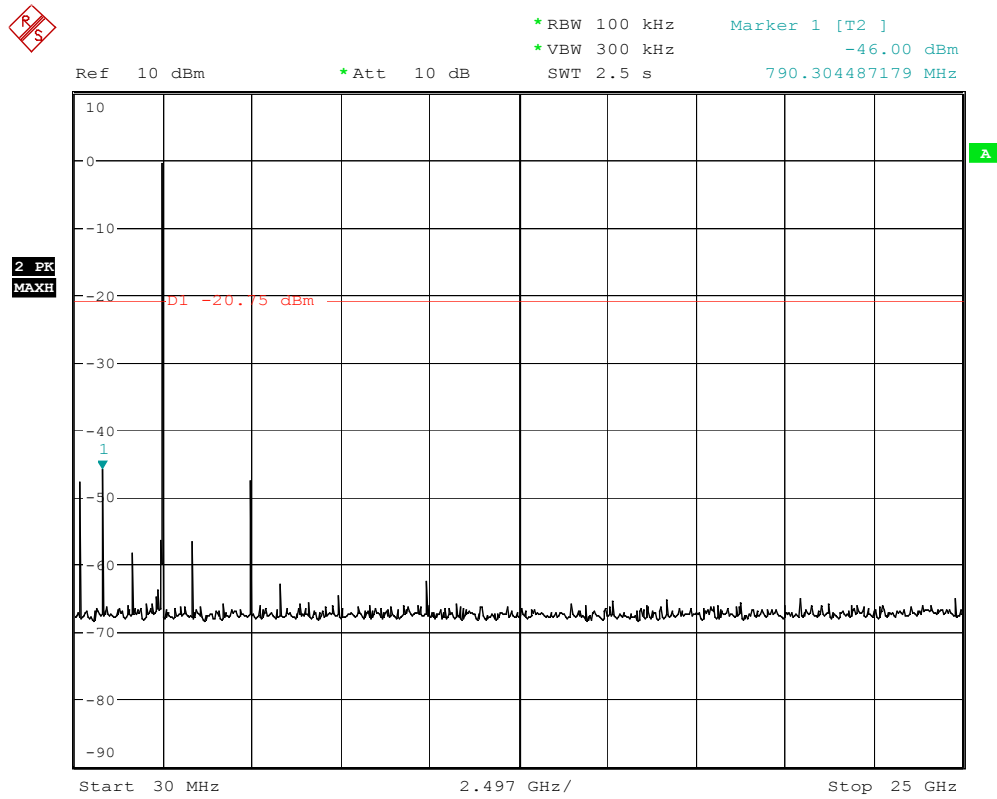
Date: 12.APR.2005 20:30:24



Date: 12.APR.2005 21:23:11



Date: 12.APR.2005 21:24:35



Date: 12.APR.2005 21:25:25

## 10 NUMBER of HOPPING CHANNELS

### 10.1 Standard Applicable

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels

### 10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. 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.

### 10.3 Measurement Equipment

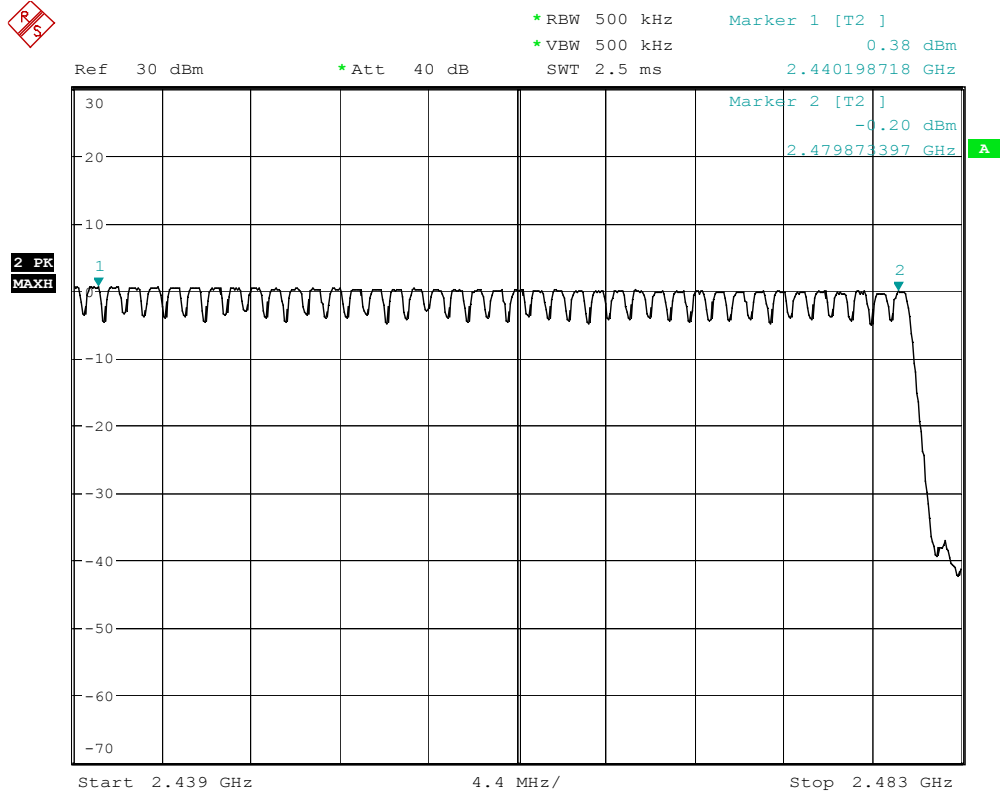
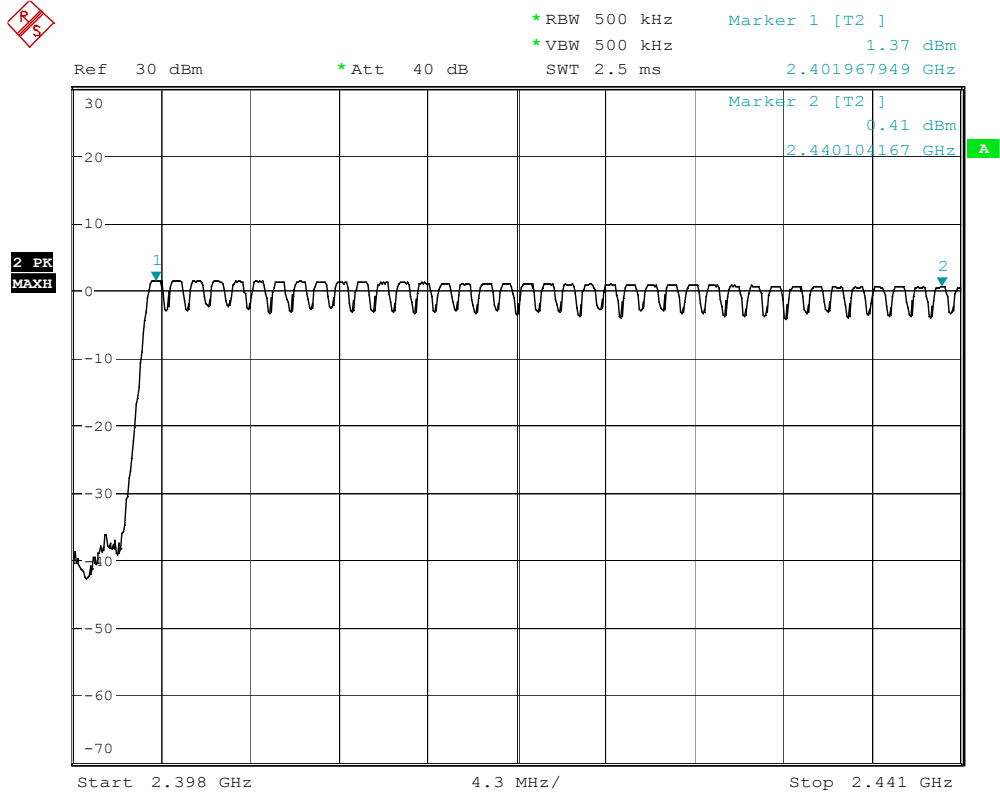
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

### 10.4 Measurement Data

Test Date : Apr. 14, 2005      Temperature : 23 °C      Humidity: 60%

Number of hopping channels = 79 channels

***Note: Please refer to page 50 for chart***



## 11 HOPPING CHANNEL CARRIER FREQUENCY SEPARATED

### 11.1 Standard Applicable

According to 15.247(a)(1), the frequency hopping system shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

### 11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any 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.

### 11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

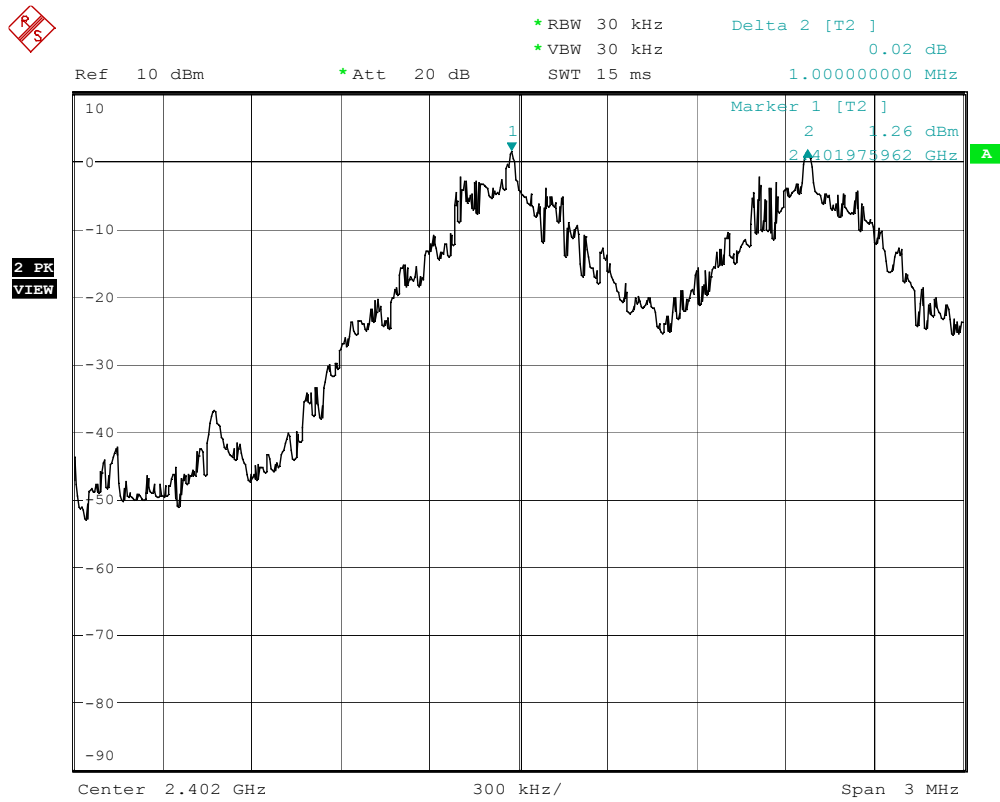
## 11.4 Measurement Data

Test Date : Apr. 14, 2005Temperature : 23 °CHumidity: 60%

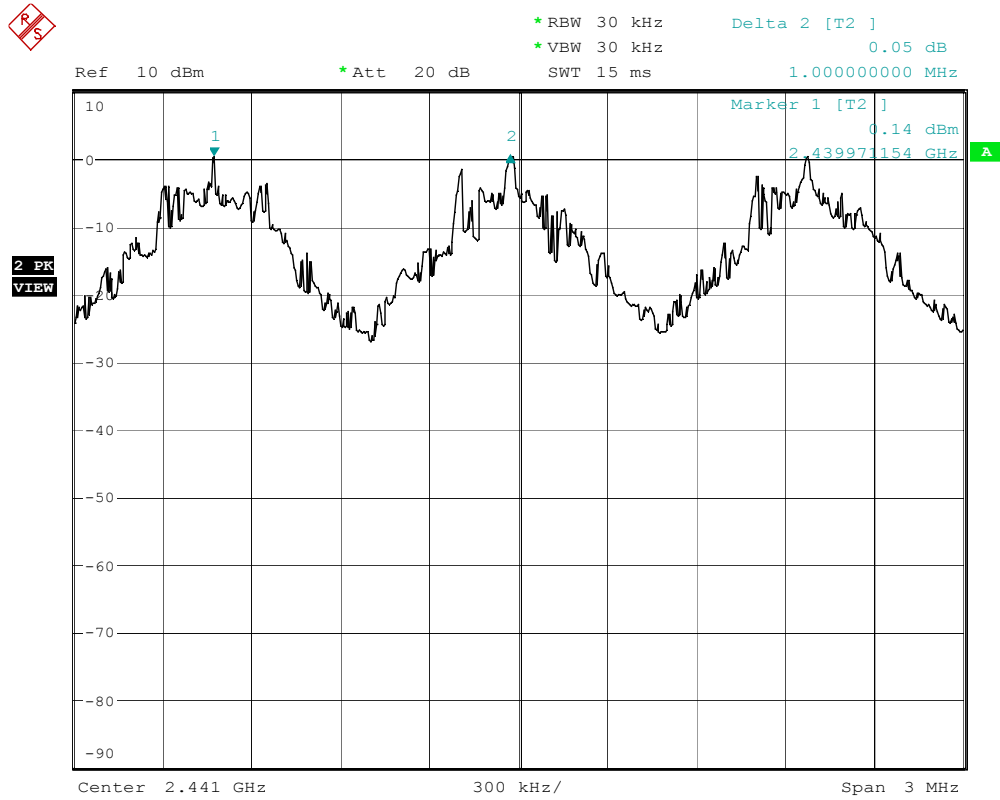
- a) 2402MHz channel separation is 1MHz
- b) 2441MHz channel separation is 1MHz
- c) 2480MHz channel separation is 1MHz

Channel	Frequency (MHz)	Hopping Channel Carrier Frequency Separated (MHz)	Chart
0	2402	1	Page 53
39	2441	1	Page 54
78	2480	1	Page 55

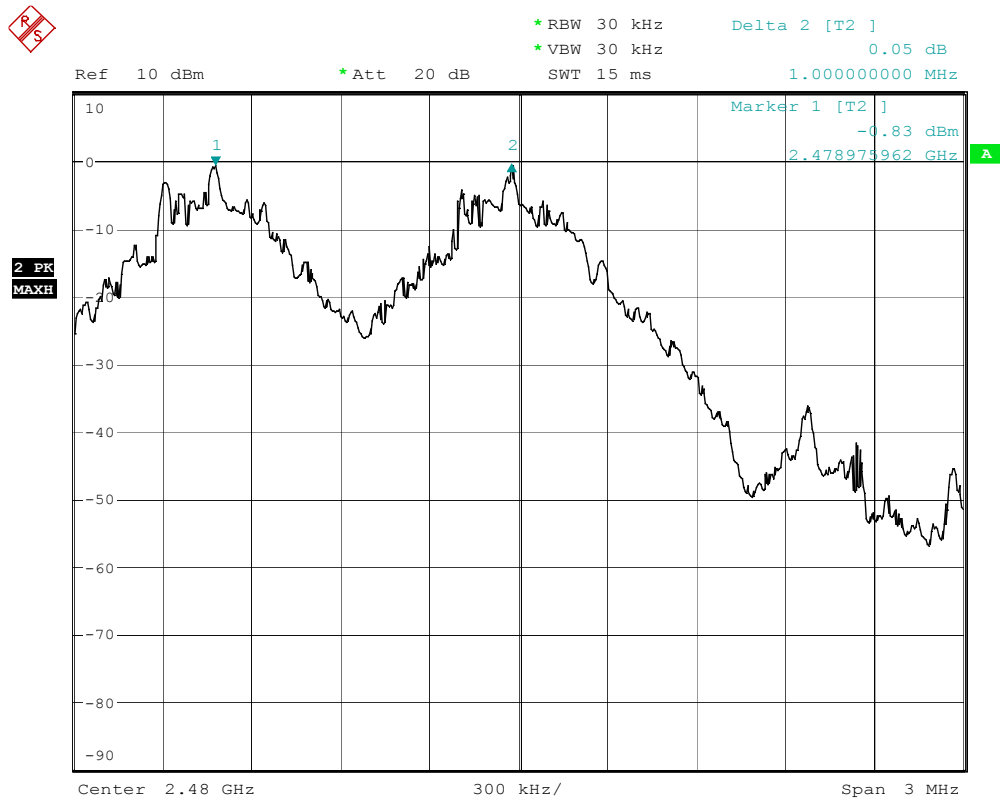
***Note: Please refer to page 53 to page 55 for chart.***



Date: 12.APR.2005 22:30:34



Date: 12.APR.2005 22:32:45



Date: 12.APR.2005 22:35:35

## 12 POWER SPECTRAL DENSITY

### 12.1 Standard Applicable

According to 15.247(d), for bluetooth device, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

### 12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 3kHz, VBW to 30 kHz, sweep 300kHz and sweep time 100 sec.
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.

### 12.3 Measurement Equipment

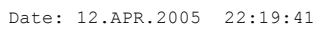
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

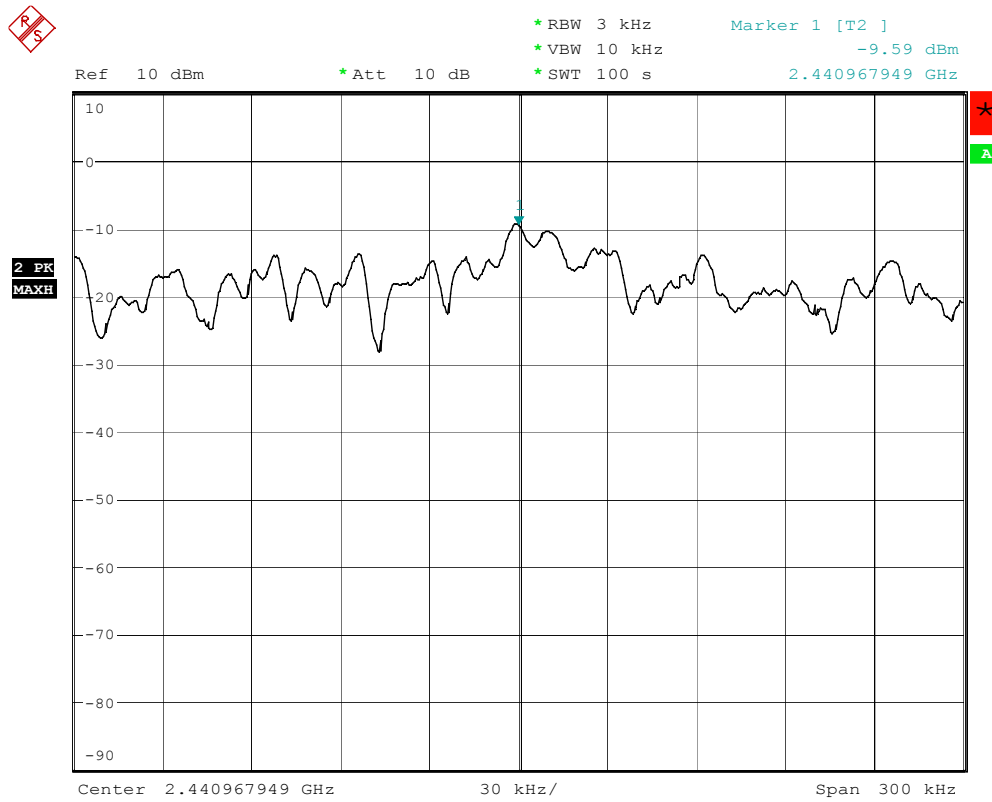
## 12.4 Measurement Data

Test Date : Apr. 14, 2005Temperature : 23 °CHumidity: 60%

Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Power Spectral Density (dBm)	FCC Limit (dBm)	Chart
0	2402	-8.43	0.5	-7.93	8	Page 58
39	2441	-9.59	0.5	-9.09	8	Page 59
78	2480	-10.68	0.5	-10.18	8	Page 60

*Note: Please refer to page 58 to page 60 for chart.*





Date: 12.APR.2005 22:17:07



## 13 Dwell Time

### 13.1 Standard Applicable

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

### 13.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4.

### 13.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSU46	10/03/2005

### 13.4 Measurement Data

Test Date : Apr. 14, 2005

Temperature : 23 °C

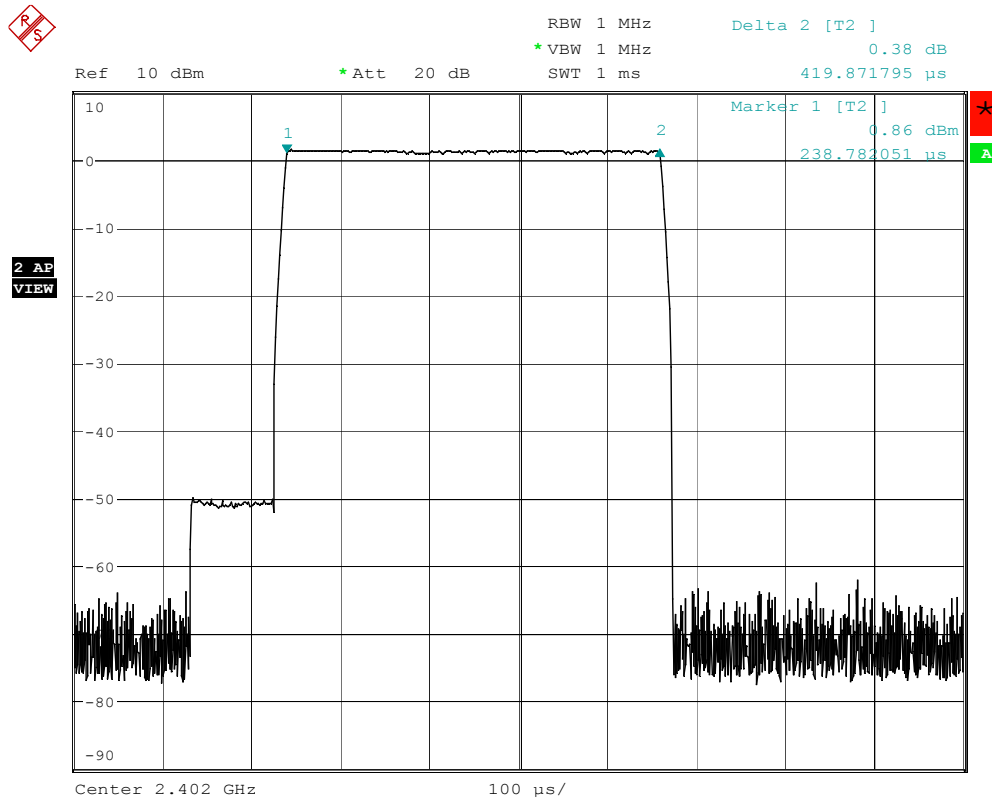
Humidity: 60%

#### 13.4.1 DH1

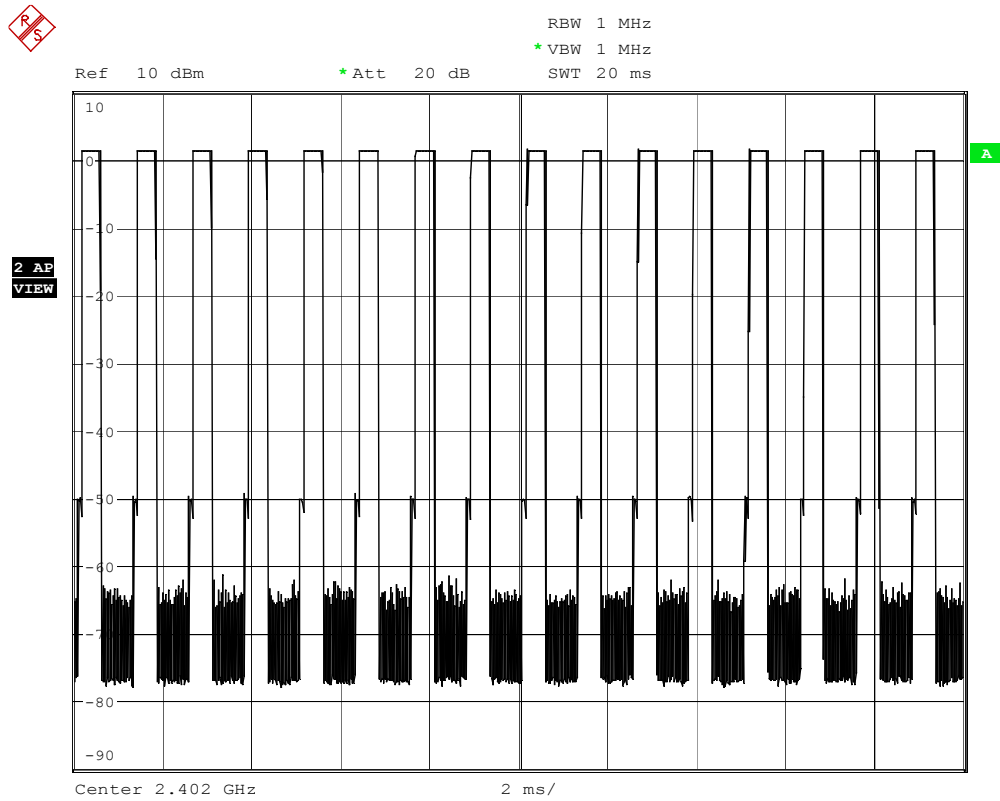
Test period=0.4(second/channel)× 79 channel=31.6sec

- a) 2402MHz dwell time=  $419.9 \text{ us} \times \frac{800}{79} \times 31.6 = 134.368 \text{ ms}$
- b) 2441MHz dwell time=  $421.5 \text{ us} \times \frac{800}{79} \times 31.6 = 134.880 \text{ ms}$
- c) 2480MHz dwell time=  $416.7 \text{ us} \times \frac{800}{79} \times 31.6 = 133.344 \text{ ms}$

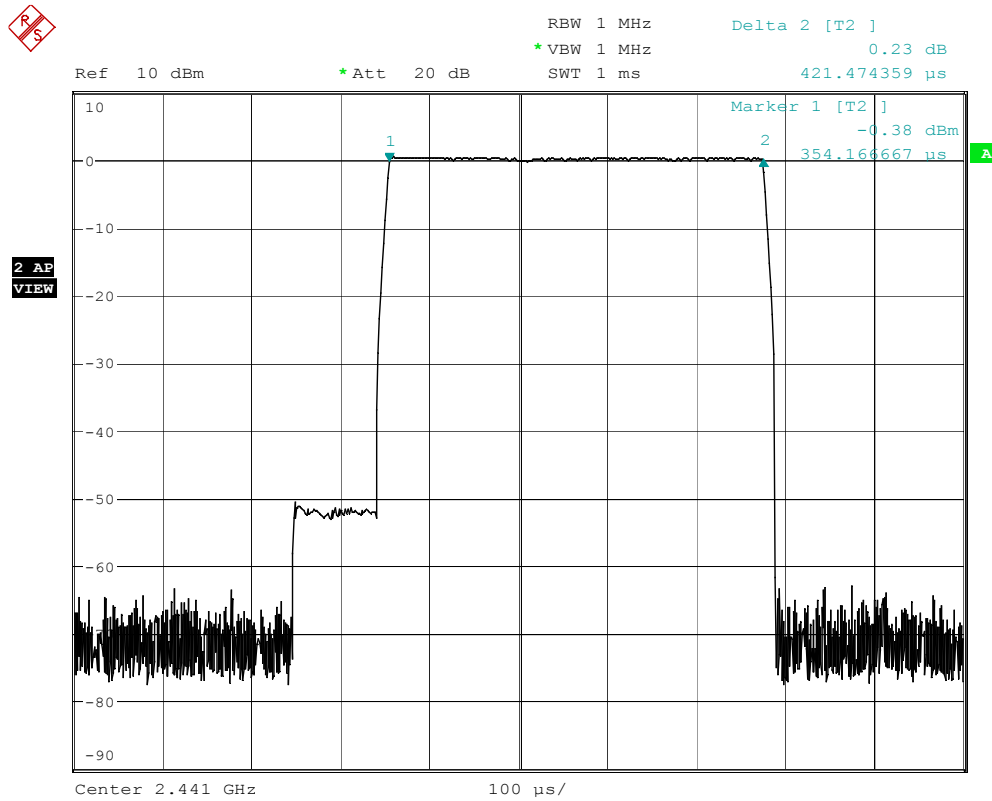
**Note:** Please refer to page 62 to page 67 for chart.



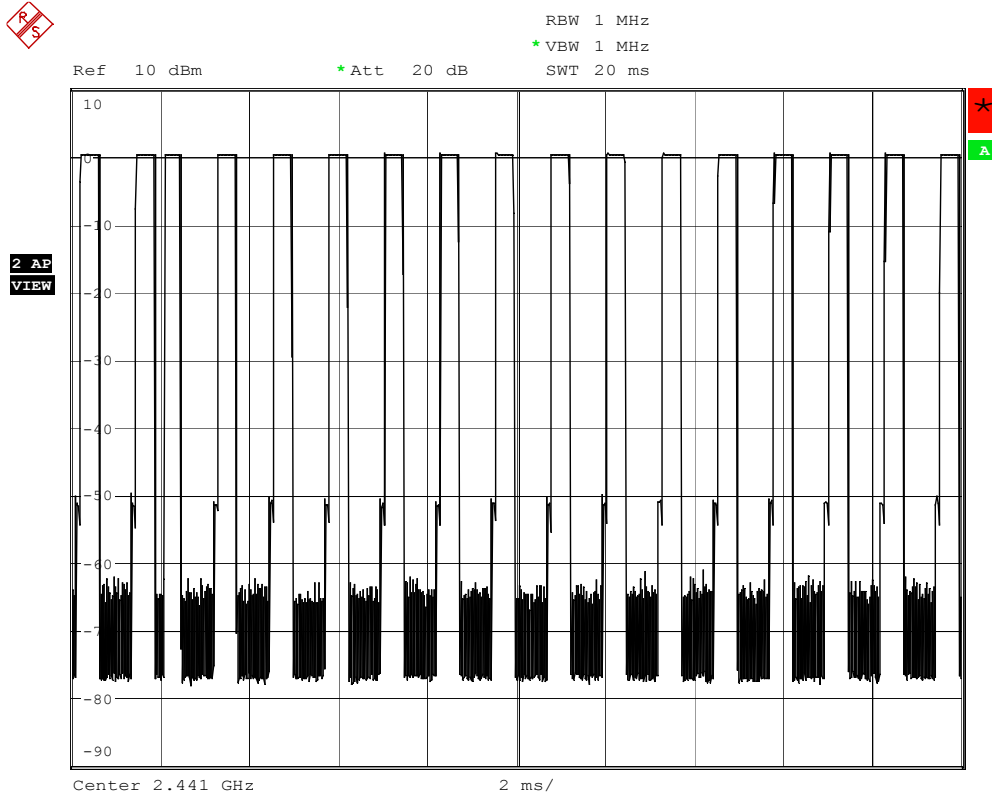
Date: 12.APR.2005 22:44:28



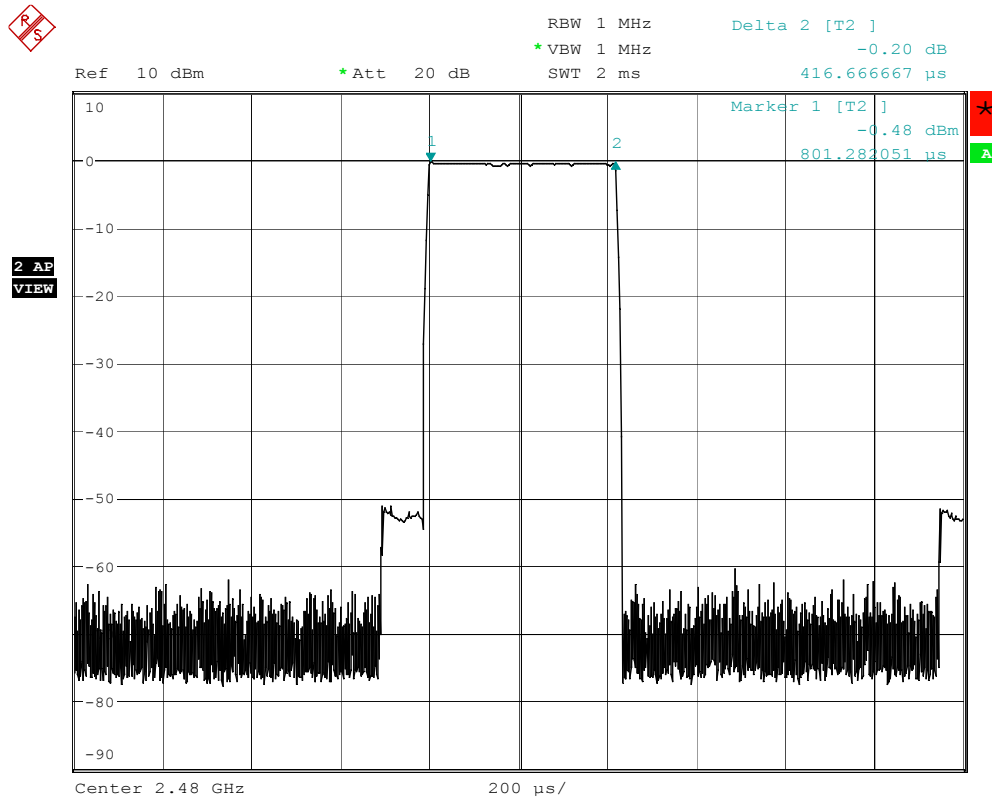
Date: 12.APR.2005 22:42:08



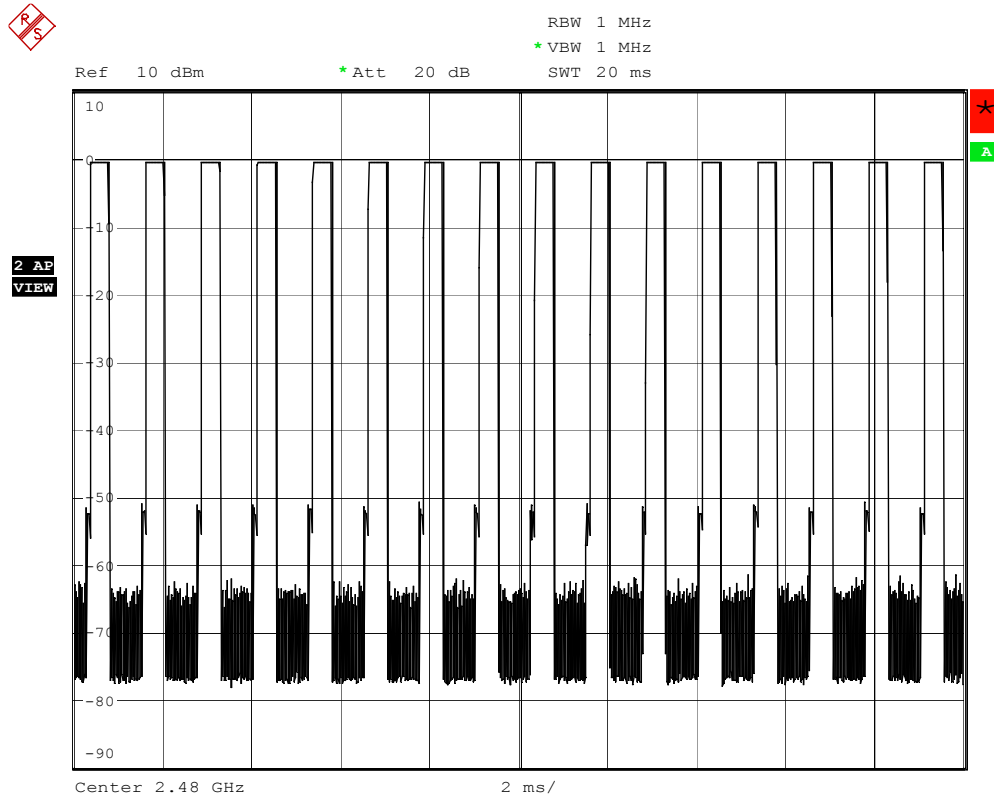
Date: 12.APR.2005 22:45:57



Date: 12.APR.2005 22:47:36



Date: 12.APR.2005 22:51:05



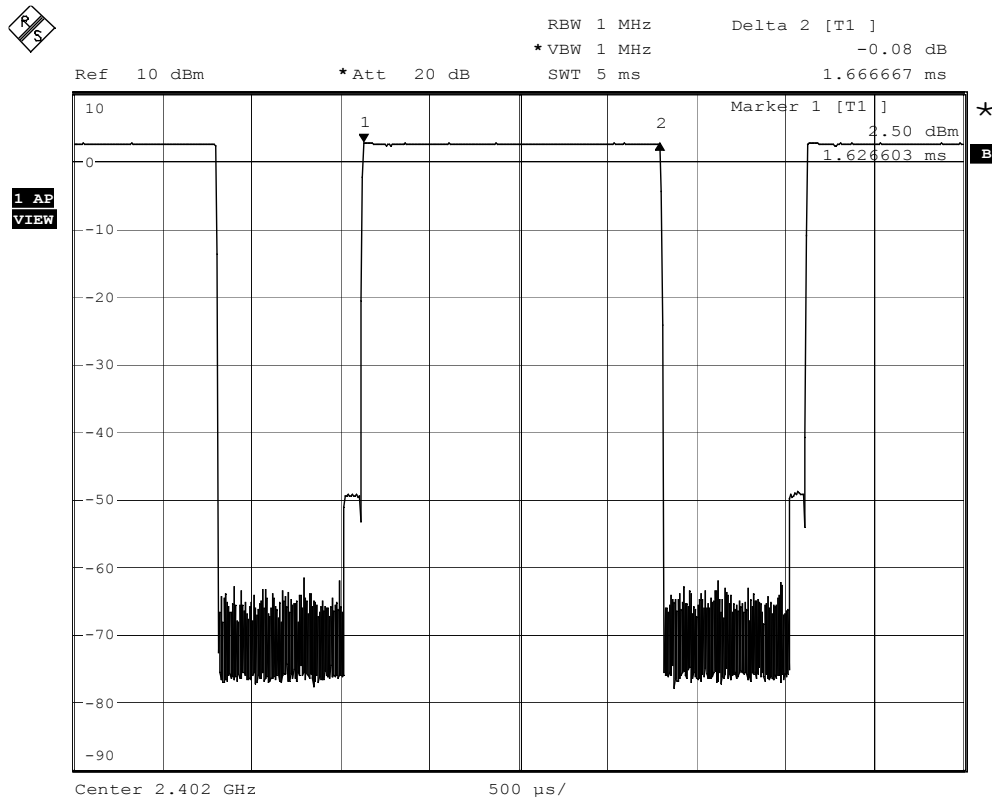
Date: 12.APR.2005 22:49:16

## 13.4.2 DH3

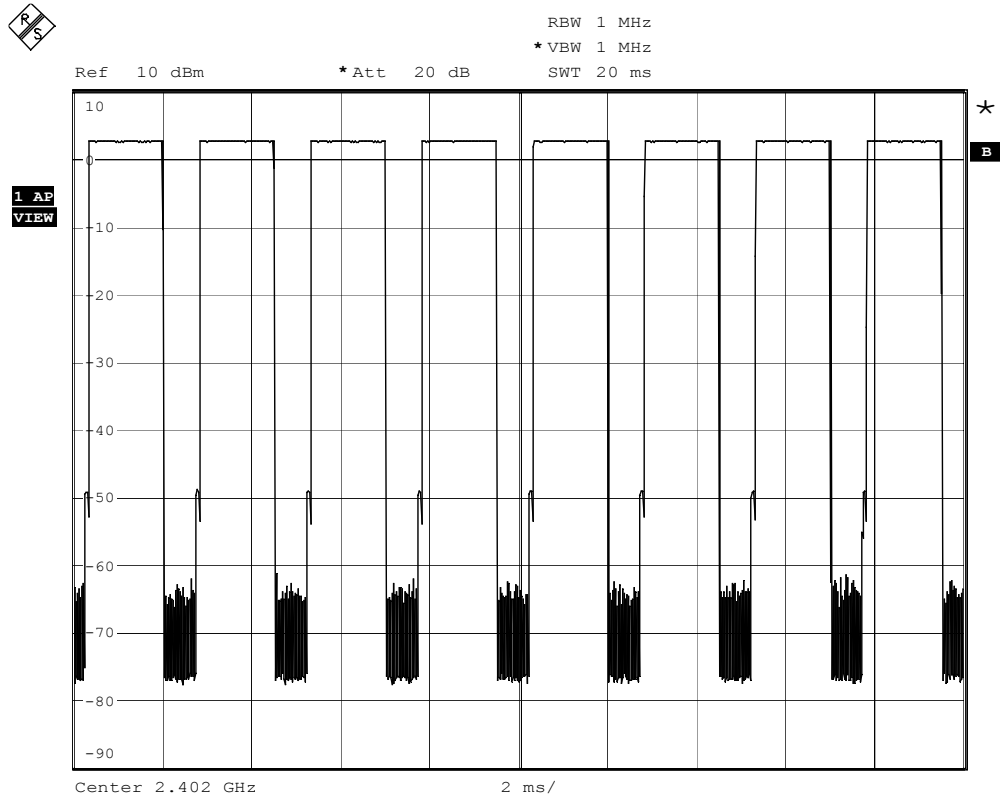
Test period=0.4(second/channel)× 79 channel=31.6sec

- a) 2402MHz dwell time=  $1.667 \text{ ms} \times \frac{400}{79} \times 31.6 = 266.720 \text{ ms}$
- b) 2441MHz dwell time=  $1.667 \text{ ms} \times \frac{400}{79} \times 31.6 = 266.720 \text{ ms}$
- c) 2480MHz dwell time=  $1.659 \text{ ms} \times \frac{400}{79} \times 31.6 = 265.440 \text{ ms}$

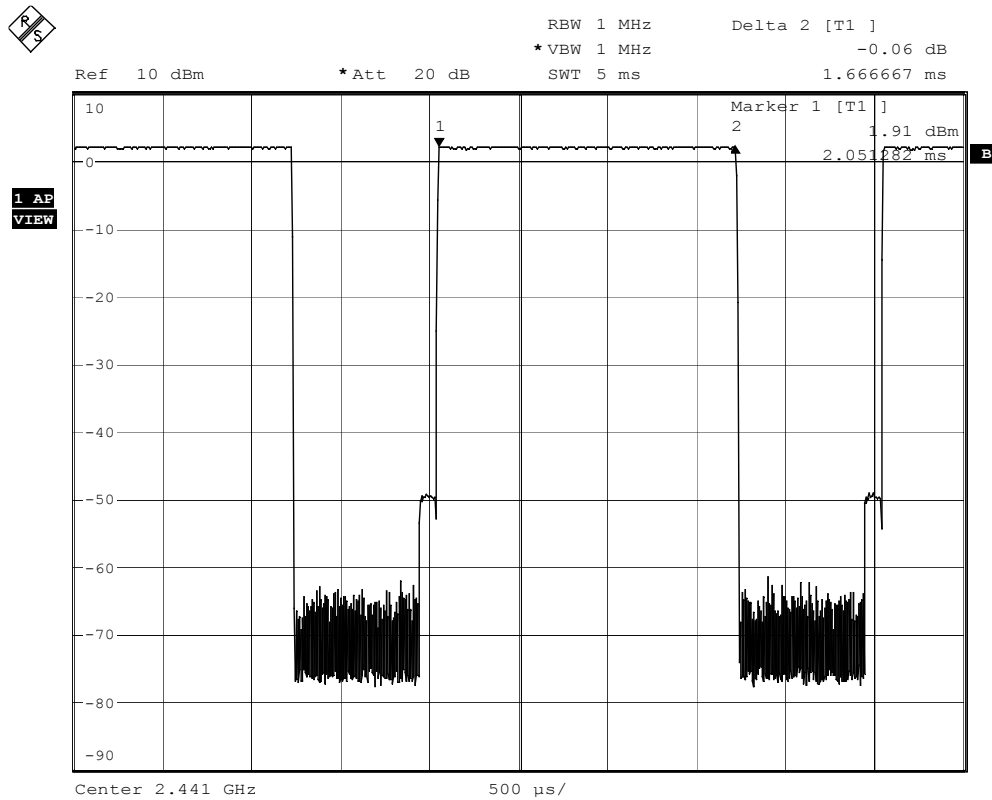
**Note:** Please refer to page 69 to page 74 for chart.



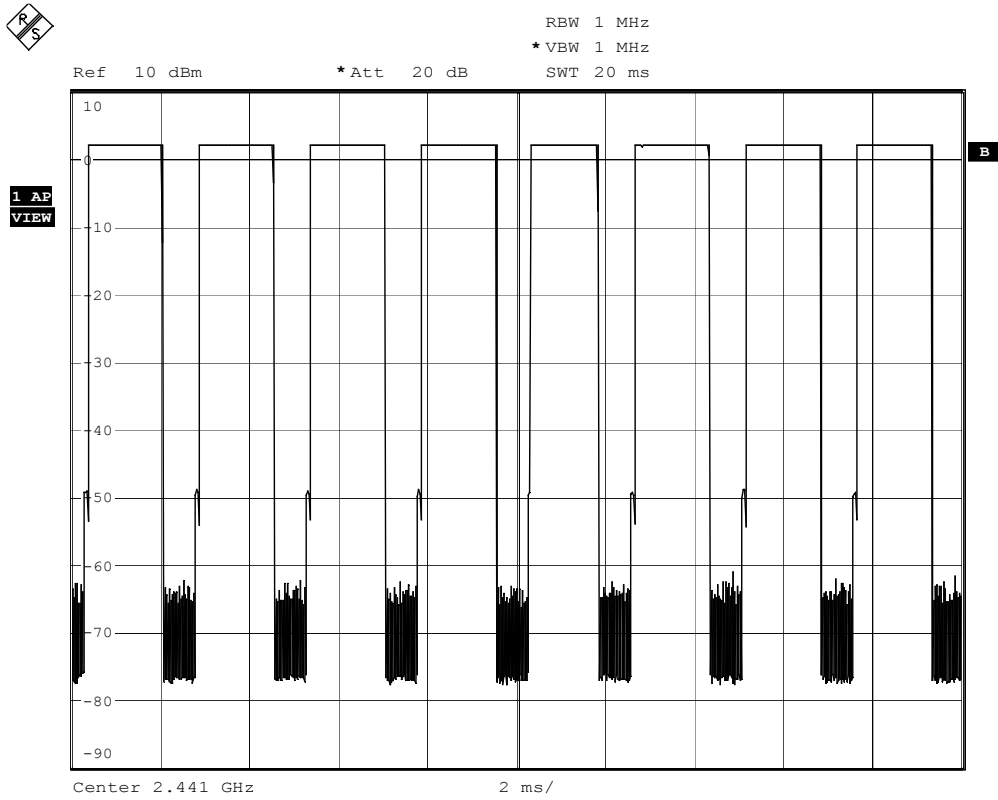
Date: 17.APR.2005 11:07:14



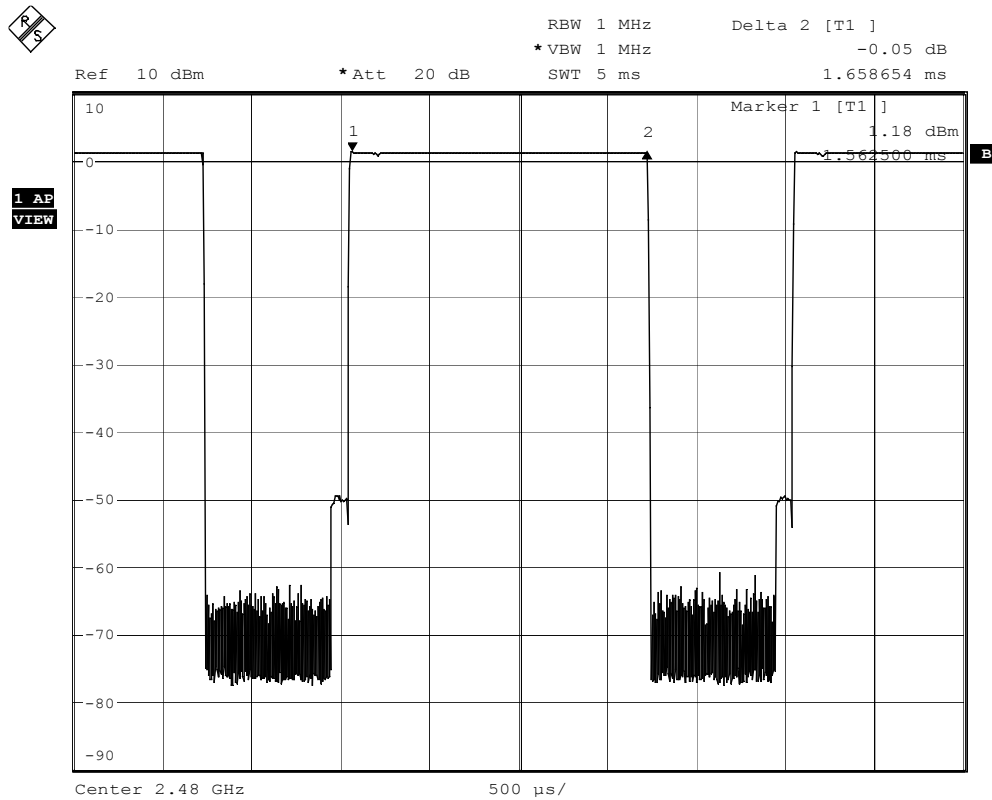
Date: 17.APR.2005 10:56:05



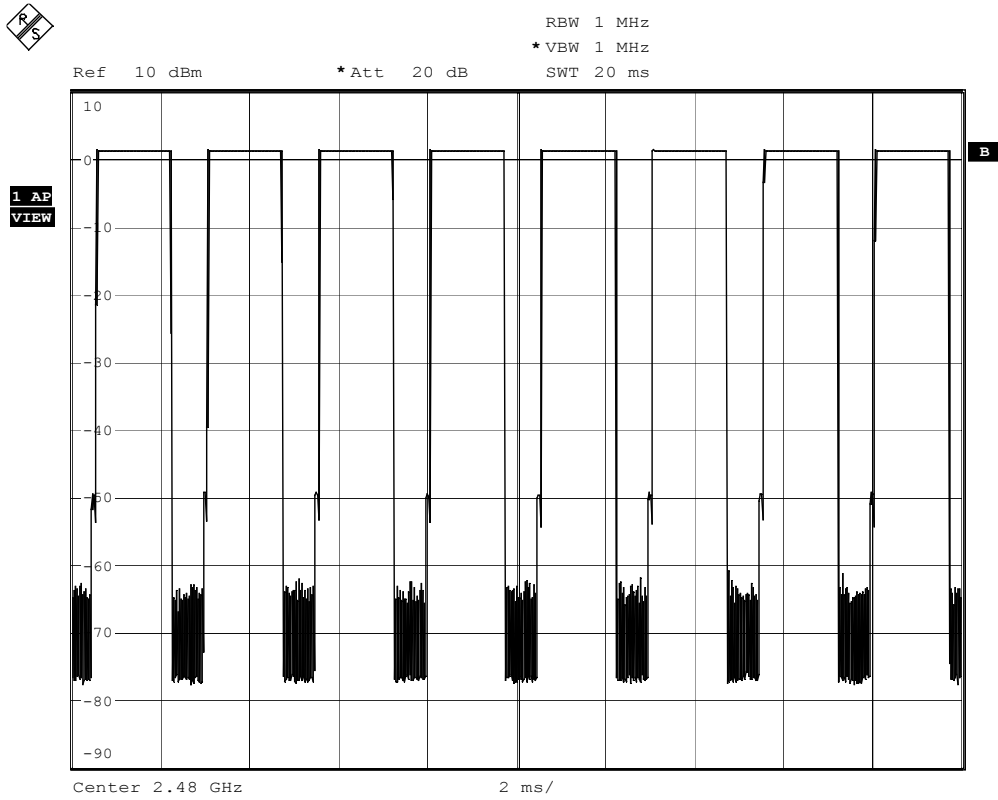
Date: 17.APR.2005 11:05:16



Date: 17.APR.2005 10:58:16



Date: 17.APR.2005 11:03:21



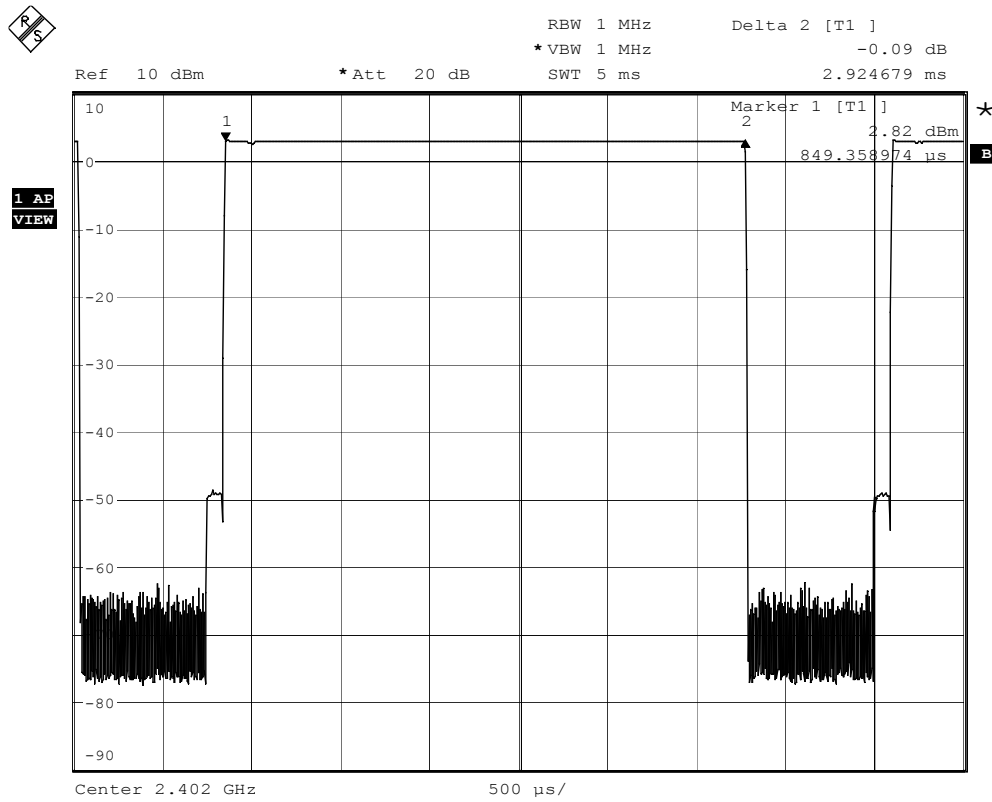
Date: 17.APR.2005 10:59:39

## 13.4.3 DH5

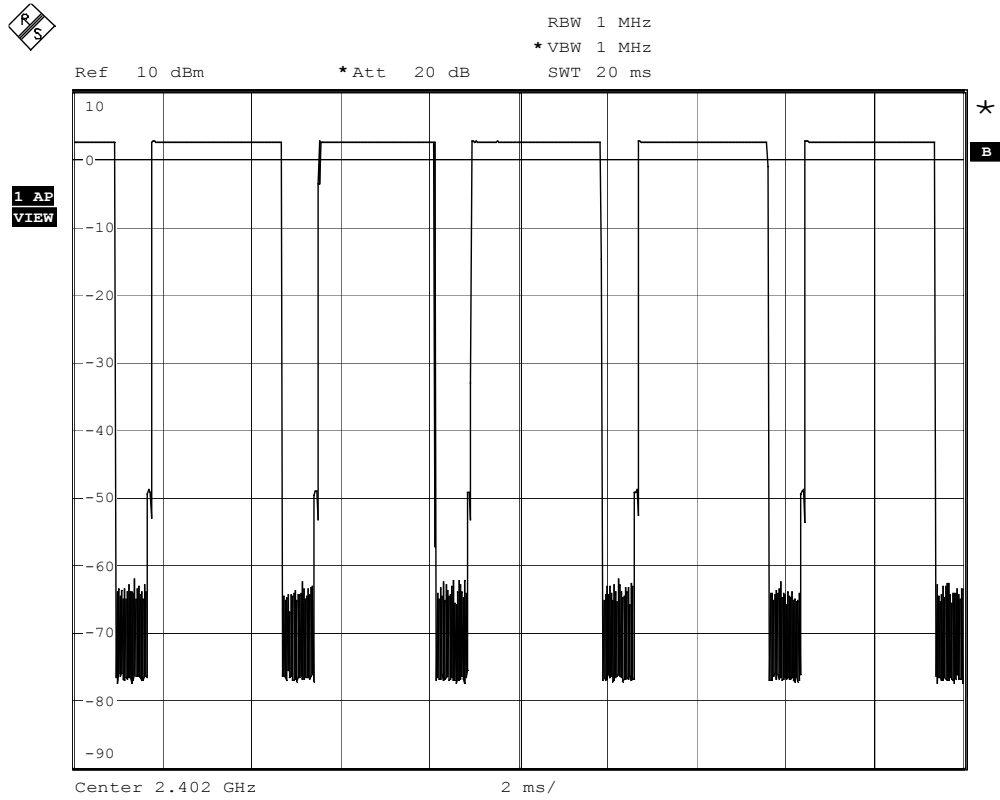
Test period=0.4(second/channel)× 79 channel=31.6sec

- a) 2402MHz dwell time=  $2.925 \text{ ms} \times \frac{250}{79} \times 31.6 = 292.5 \text{ ms}$
- b) 2441MHz dwell time=  $2.917 \text{ ms} \times \frac{250}{79} \times 31.6 = 291.7 \text{ ms}$
- c) 2480MHz dwell time=  $2.925 \text{ ms} \times \frac{250}{79} \times 31.6 = 292.5 \text{ ms}$

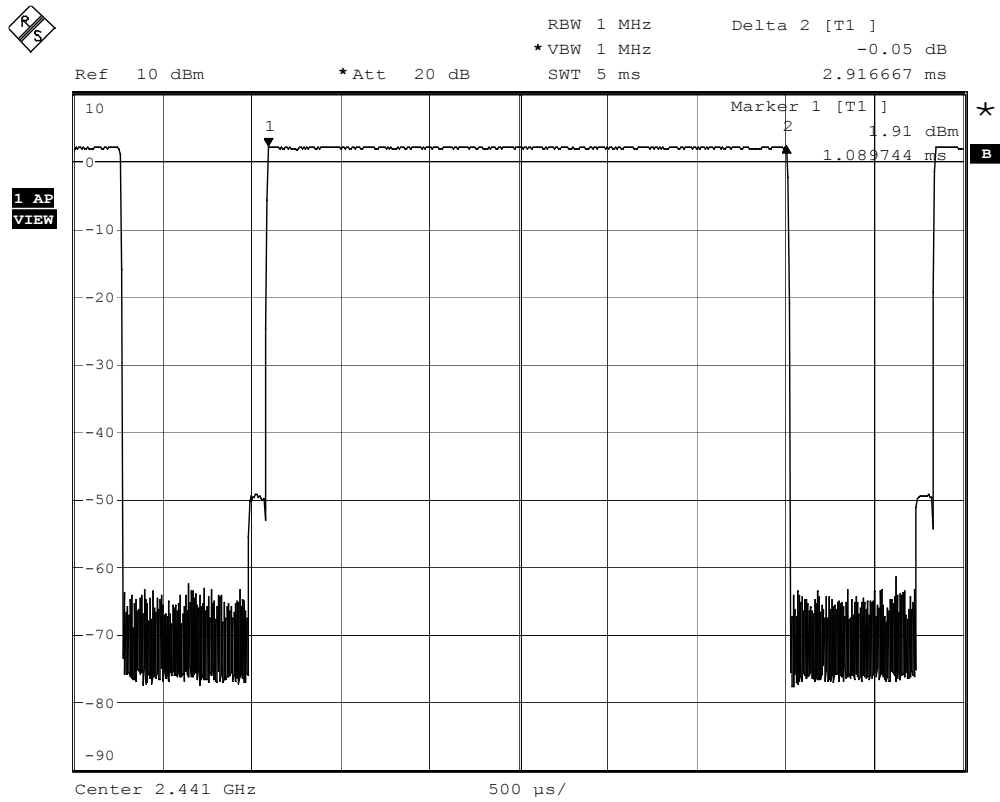
**Note:** Please refer to page 76 to page 81 for chart.



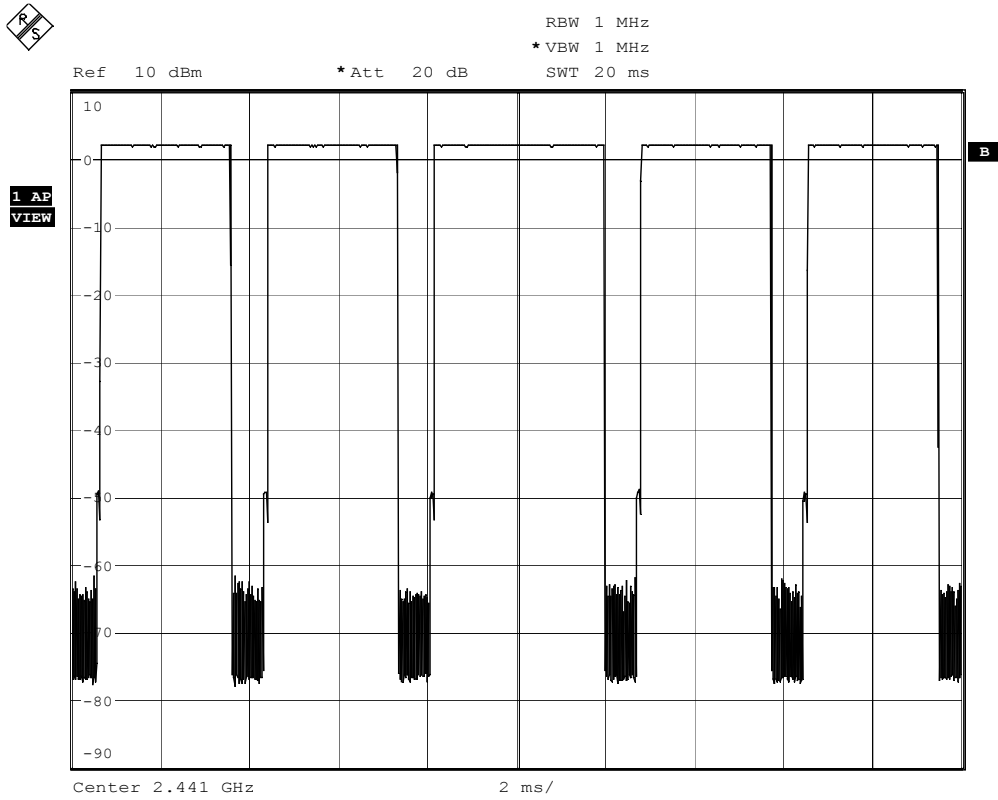
Date: 17.APR.2005 11:08:45



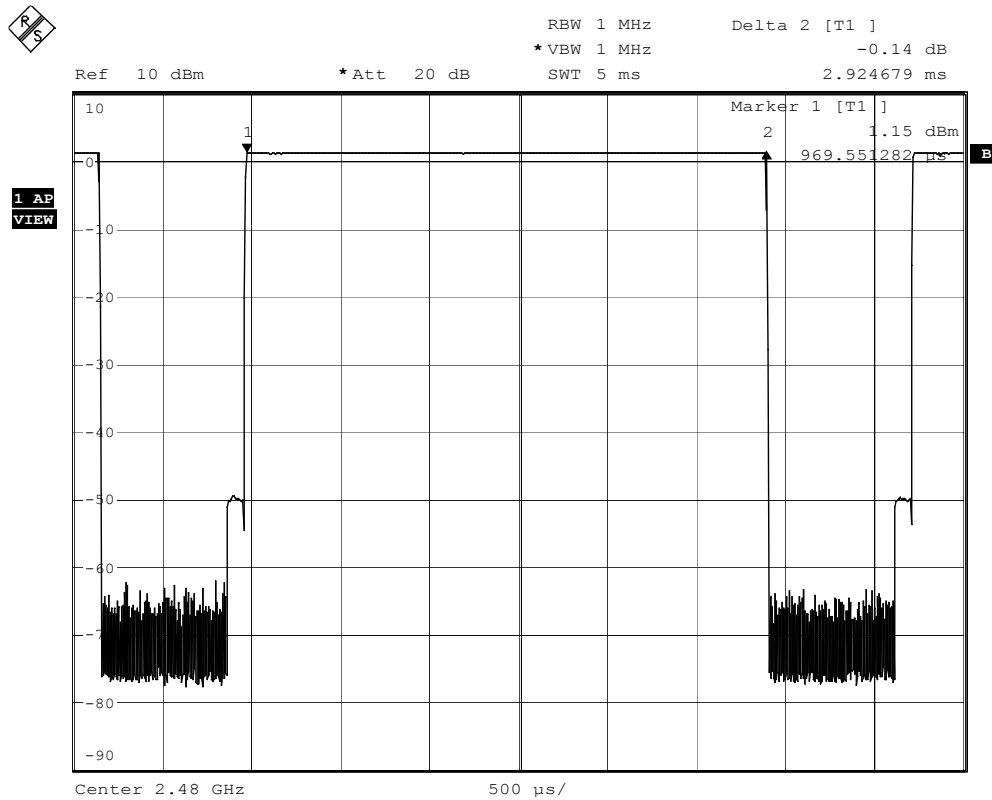
Date: 17.APR.2005 11:17:24



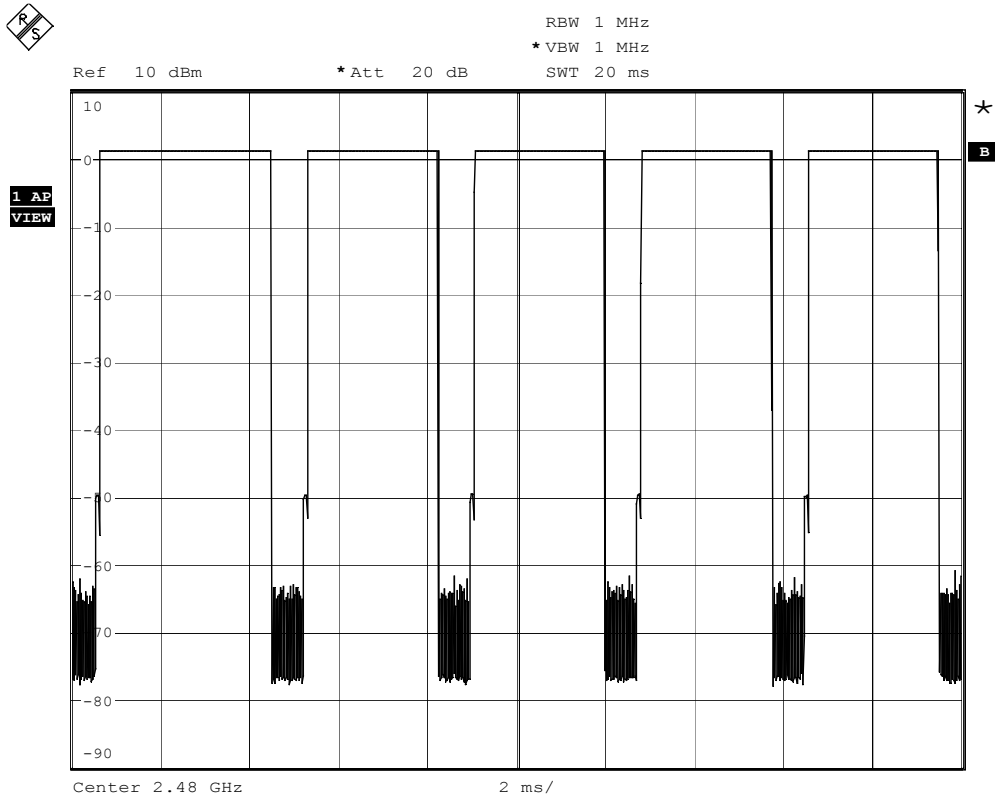
Date: 17.APR.2005 11:22:13



Date: 17.APR.2005 11:18:48



Date: 17.APR.2005 11:23:04



Date: 17.APR.2005 11:23:46