



# FCC TEST REPORT

for

## 47 CFR Part 15 Subpart C

**Equipment** : Bluetooth Stereo Headset  
**Model No.** : MBSH-C3.2  
**FCC ID** : SI4-MBSHC32  
**Filing Type** : Certification  
**Applicant** : **MAVIN TECHNOLOGY INC.**  
3F, NO. 35, Hsin Tai Rd., Chupei City, Hsinchu County 302, Taiwan, R.O.C.

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- The data shown in this test report were carried out on Apr. 08, 2006 at **Sporton International Inc. LAB.**
- Report No.: FR5D2803, Report Version: Rev. 01

Dr. Daniel Lee  
EMC/SAR Director

***SPORTON International Inc.***

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.



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# 1. General Description of Equipment under Test

## 1.1 Applicant

**MAVIN TECHNOLOGY INC.**

3F, NO. 35, Hsin Tai Rd., Chupei City, Hsinchu County 302, Taiwan, R.O.C.

## 1.2 Manufacturer

**MAVIN TECHNOLOGY INC.**

3F, NO. 35, Hsin Tai Rd., Chupei City, Hsinchu County 302, Taiwan, R.O.C.

## 1.3 Basic Description of Equipment under Test

Equipment : Bluetooth Stereo Headset  
 Model No. : MBSH-C3.2  
 FCC ID : SI4-MBSHC32  
 AC Power Cord : AC 120V, Wall-mount, 1.8 meter, 2pin  
 Adapter : DVE, DSA-31S FEU

## 1.4 Feature of Equipment under Test

Product Feature & Specification			
1. Type of Modulation	GFSK		
2. Number of Channels	79 Channels		
3. Frequency Band	2.4GHz~2.4835GHz		
4. Carrier Frequency of each channel	2402MHz+n*1MHz, n=0~78		
5. Channel Spacing	1MHz		
6. Maximum Output Power to Antenna (Normal Condition)	-0.19 dBm		
7. Type of Antenna Connector	N/A		
8. Antenna Type	PCB Antenna		
9. Antenna Gain	0 dBi		
10. Function Type	Transmitter		Transceiver V
11. Power Rating (DC/AC Voltage) :	3.7V		

## 2 Test Configuration of Equipment under Test

### 2.1 Test Manner

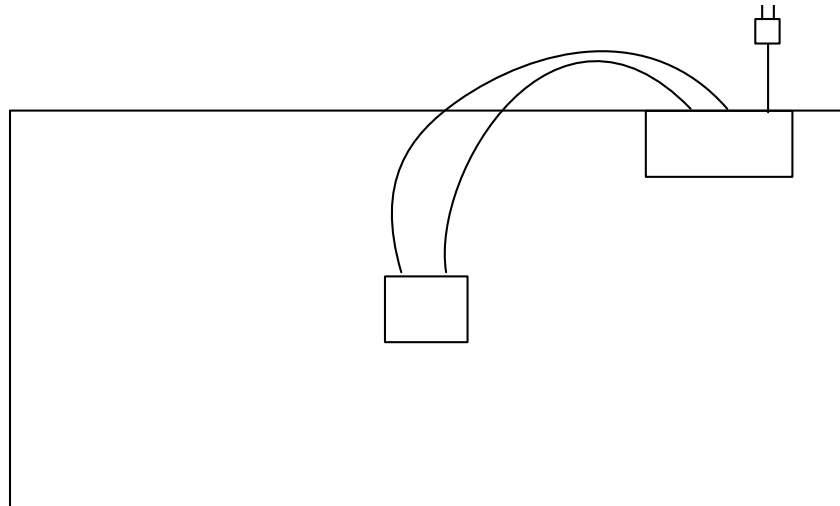
- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
- b. For spurious emission below 1GHz, only one channel of each application was tested because it is not related to channel selection.
- c. The EUT is programmed to transmit signal continuously for all testings.
- d. Frequency range investigated: conduction 150 kHz to 30 MHz, radiation 30 MHz to 25000MHz.

### 2.2 Test Mode

Application	Bluetooth
Radiated Emission	Mode 1: Tx_CH00_2402 MHz Mode 2: Tx_CH39_2441 MHz Mode 3: Tx_CH78_2480 MHz
Conducted Emission	Mode 1: Charging Mode

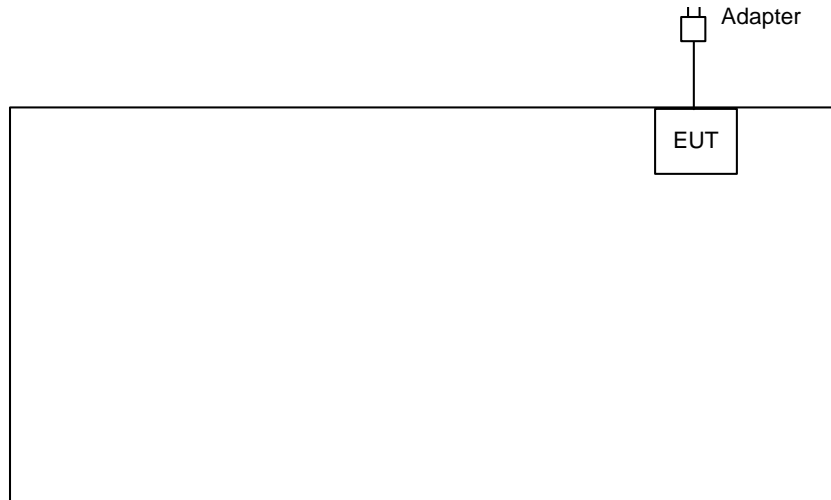
### 2.3 Connection Diagram of Test System

#### Radiated Emission





Conducted Emission



2.4 Ancillary Equipment List

Item	Asset	Trade Name	Model Name	Power Cord
1.	Notebook	DELL	PP05L	N/A
2.	RS232 Cable	N/A	N/A	Aluminum Foil-shielded, 0.5m
3.	USB Cable	N/A	N/A	Weave-shielded, 0.5m



### **3. RF Utility**

Two executive programs "EMCTEST.EXE" under WIN XP, which generates a complete line of continuously repeating " H" pattern were used as the test software.

The programmed RF Utility "Bluetest" is installed in notebook to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testings.



## **4. General Information of Test**

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,  
Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.  
TEL : 886-3-327-3456  
FAX : 886-3-318-0055  
Test Site No : CO01-HY, 03CH06-HY

### **4.1 Test Voltage**

120V/ 60Hz

### **4.2 Standard for Methods of Measurement**

ANSI C63.4-2003

### **4.3 Test in Compliance with**

47 CFR Part 15 Subpart C

### **4.4 Frequency Range Investigated**

- a. Conduction: from 150 KHz to 30 MHz
- b. Radiation: from 30 MHz to 25000 MHz

### **4.5 Test Distance**

The test distance of radiated emission from antenna to EUT is 3 m.





## 5. Test Data and Test Result

### 5.1 List of Measurements and Examinations

#### The Emission Mode: Bluetooth

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
<u>15.247(a)(1)</u>	Hopping Channel Bandwidth	Pass
<u>15.247(a)(1)</u>	Hopping Channel Separation	Pass
<u>15.247(a)(1)(iii)</u>	Number of Hopping Frequency Used	Pass
<u>15.247(a)(1)(iii)</u>	Dwell Time of Each Frequency	Pass
<u>15.247(b)</u>	Output Power	Pass
15.247(c)	100kHz Bandwidth of Frequency Band Edges	Pass
15.209(a)	Radiated Emission	Pass
<u>15.203</u> 15.247(b)(4)	Antenna Requirement	Pass



### 5.2 Band Edges Measurement

#### 5.2.1 Measuring Instruments :

As described in chapter 6 of this test report.

#### 5.2.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 kHz bandwidth from band edge.
3. The band edges was measured and recorded.

#### 5.2.3 Test Result :

- Application Type : BT
- Temperature : 25°C
- Relative Humidity : 58%
- Test Enginner : Anderson
  
- Test Result in BT lower band (Channel 00) : PASS
- Test Result in BT higher band (Channel 78) : PASS

#### 5.2.4 Note on Band Edge Emission :

##### ➤Bluetooth

###### CH00 (Horizontal)

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Preamp Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2384.00	52.41	-21.59	74.00	53.12	30.50	35.44	4.23	100	1	Peak
2384.00	41.81	-12.19	54.00	42.52	30.50	35.44	4.23	100	154	Average

###### CH00 (Vertical)

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Preamp Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2338.00	51.03	-22.97	74.00	51.74	30.52	35.40	4.17	100	359	Peak
2338.00	39.49	-14.51	54.00	40.20	30.52	35.40	4.17	100	359	Average



**CH78 (Horizontal)**

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Preamp Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.50	73.34	-0.66	74.00	74.08	30.41	35.51	4.36	100	360	Peak
2483.50	46.76	-7.24	54.00	47.50	30.41	35.51	4.36	100	156	Average

**CH78 (Vertical)**

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Preamp Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.50	66.19	-7.81	74.00	66.93	30.41	35.51	4.36	100	357	Peak
2483.50	43.75	-10.25	54.00	44.49	30.41	35.51	4.36	104	162	Average

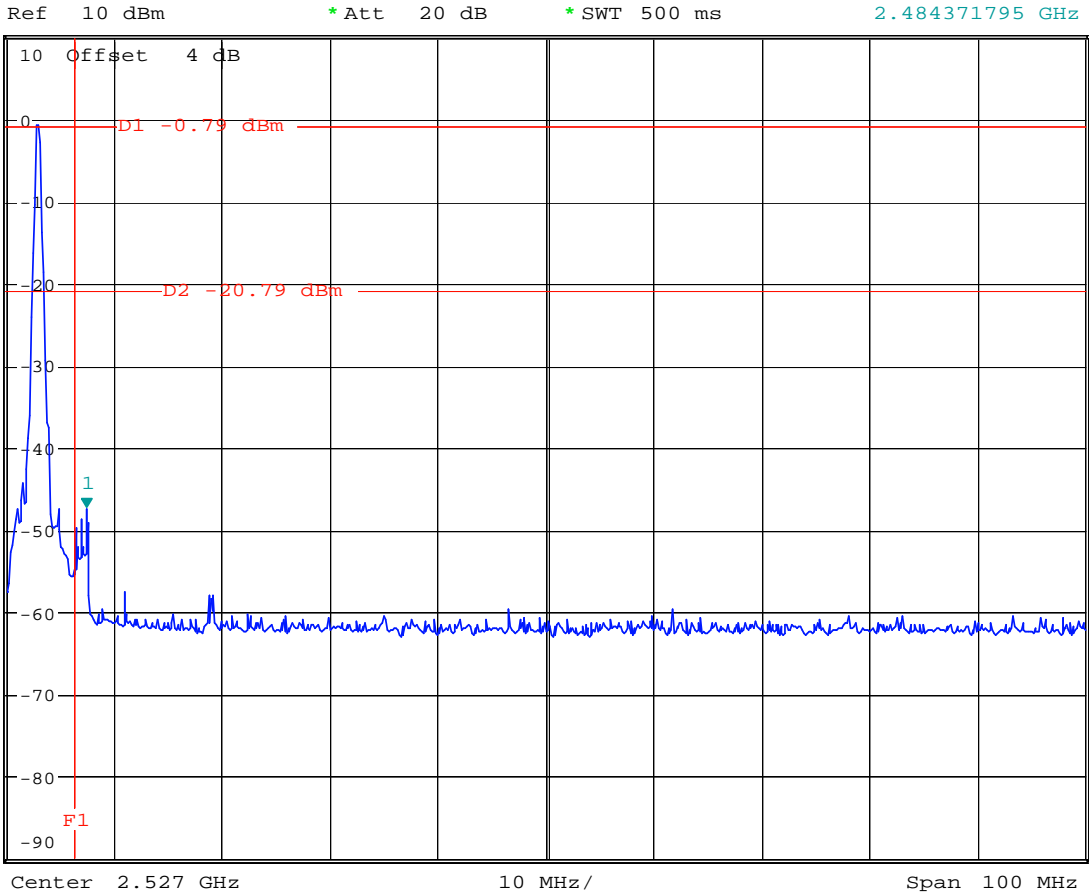




CH78



\* RBW 100 kHz      Marker 1 [T1 ]  
\* VBW 100 kHz      -47.48 dBm  
\* SWT 500 ms      2.484371795 GHz



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### 5.3 Hopping Channel Separation

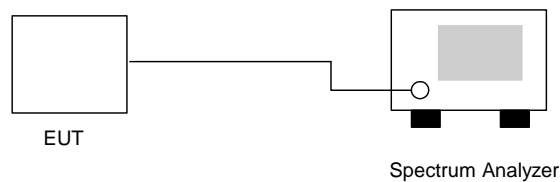
#### 5.3.1 Measuring Instruments :

As described in chapter 9 of this test report.

#### 5.3.2 Test Procedure :

1. The output of EUT was connected to the spectrum analyzer by a low loss cable..
2. Set RBW of spectrum analyzer to 100kHz and VBW to 100kHz.
3. The Hopping Channel Separation is defined as the channel is separated with the next channel.

#### 5.3.3 Test Setup Layout :



#### 5.3.4 Test Result : The spectrum analyzer plots are attached as below

- Application Type : BT
- Temperature : 25°C
- Relative Humidity : 58%
- Test Enginner : Anderson

Channel	Carrier Frequency		Limits ( MHz )	Plot Ref. No.
	Frequency (MHz)	Separation ( MHz )		
00	2402	1.000	0.862	Mode 1
39	2441	1.003	0.833	Mode 2
78	2480	1.000	0.830	Mode 3

Note: Limits =25kHz or the 20dB bandwidth of the hopping channel, which ever is greater



5.3.5 Hopping Channel Separation

Mode 1

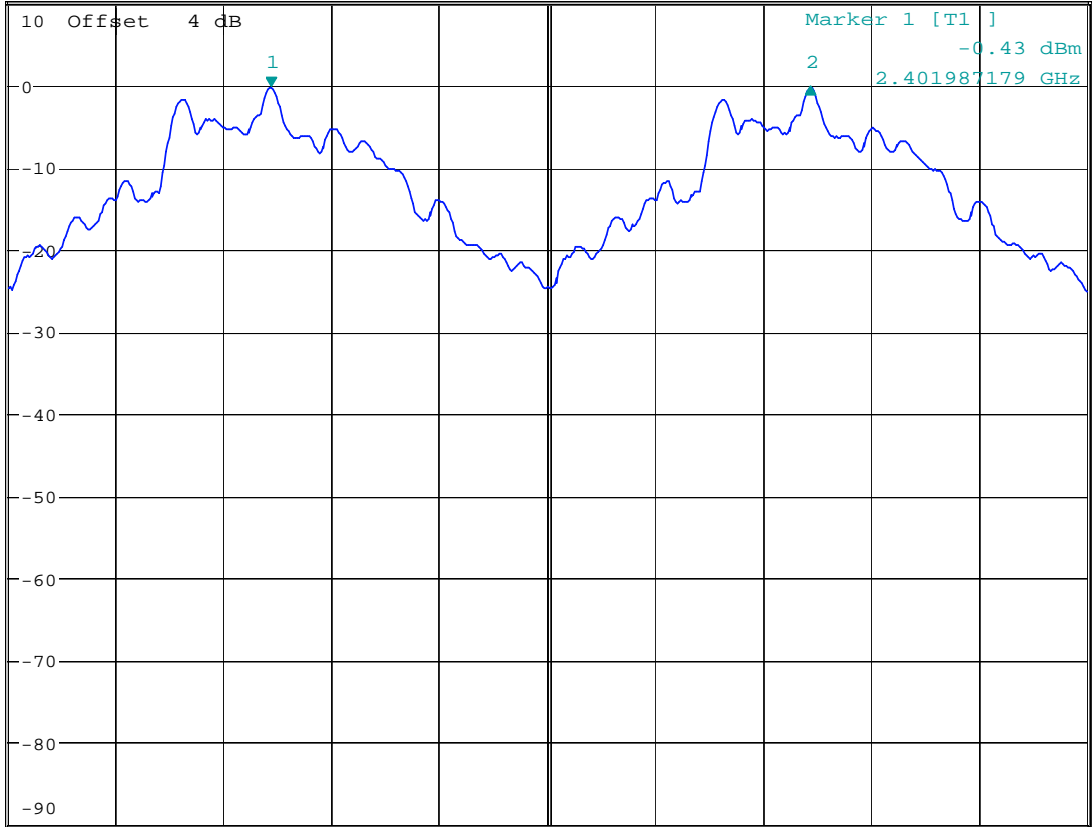


\*RBW 30 kHz Delta 2 [T1 ]  
\*VBW 100 kHz -0.02 dB  
\*SWT 500 ms 1.000000000 MHz

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



Marker 1 [T1 ]  
-0.43 dBm  
2.401987179 GHz

Center 2.4025 GHz

200 kHz/

Span 2 MHz

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Mode 2

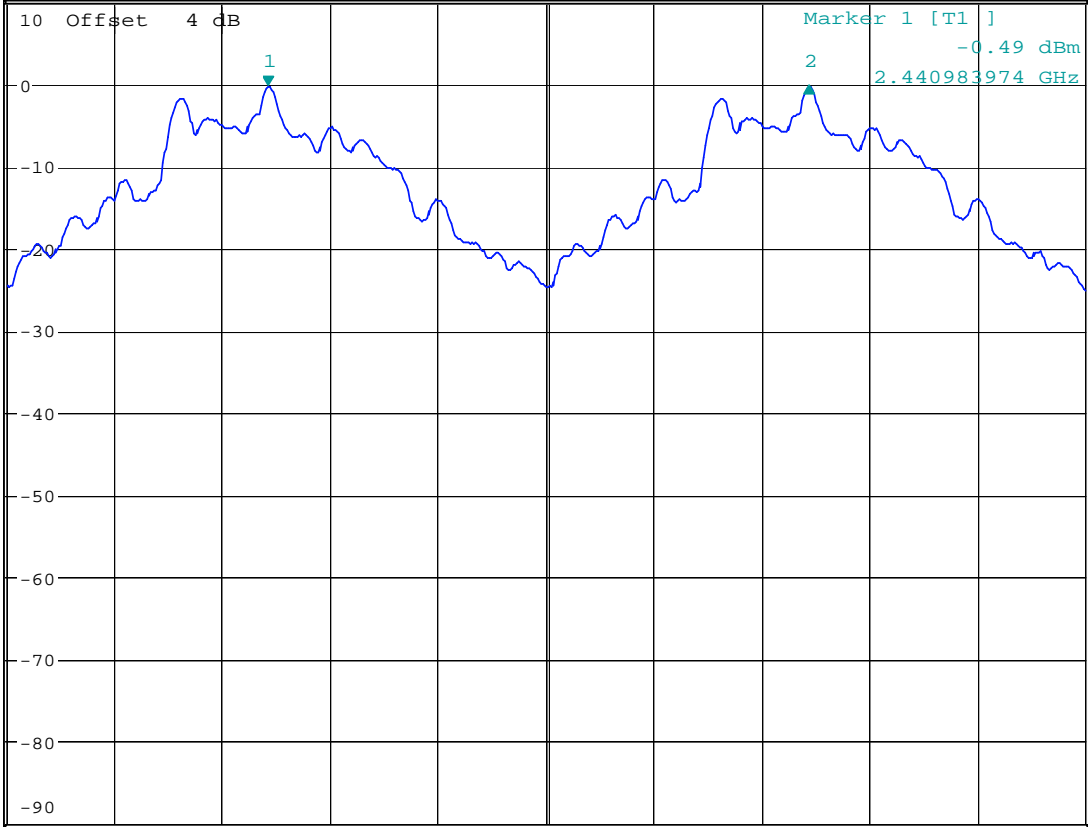


\* RBW 30 kHz      Delta 2 [T1 ]  
 \* VBW 100 kHz      0.06 dB  
 \* SWT 500 ms      1.003205128 MHz

Ref 10 dBm

\* Att 20 dB

1 PK  
MAXH



Center 2.4415 GHz

200 kHz/

Span 2 MHz

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Mode 3

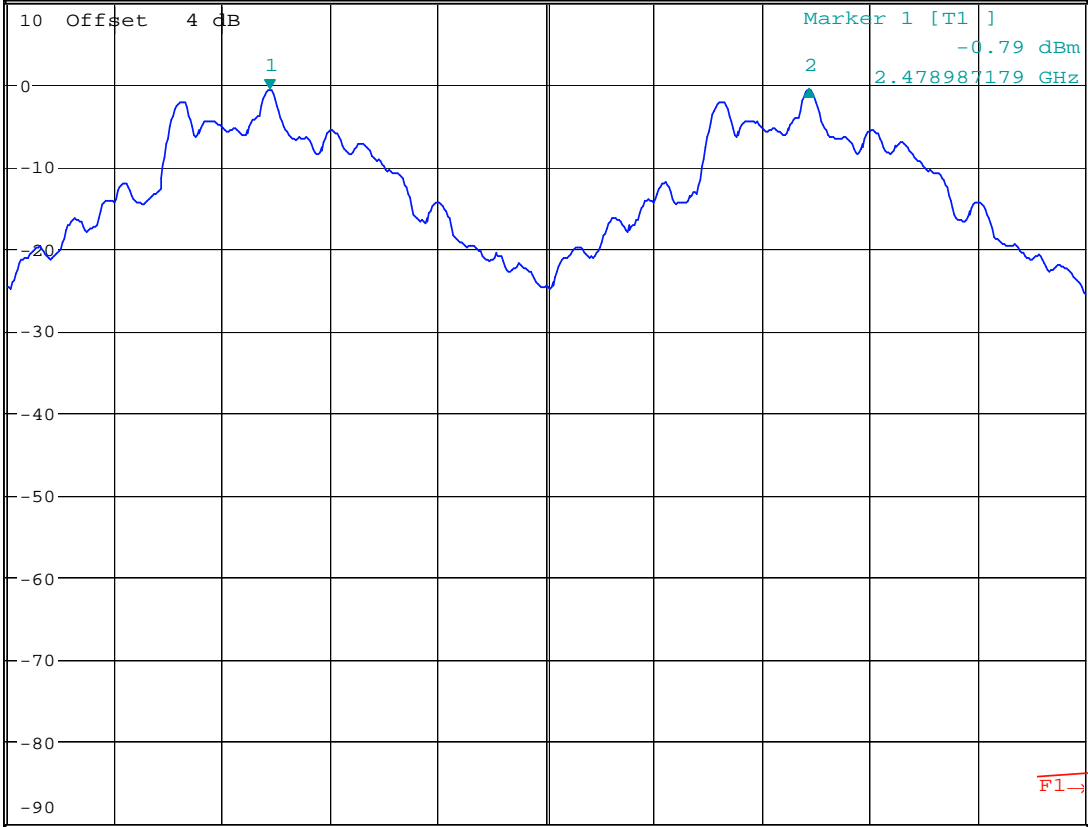


\* RBW 30 kHz      Delta 2 [T1 ]  
\* VBW 100 kHz      0.00 dB  
\* SWT 500 ms      1.000000000 MHz

Ref 10 dBm

\* Att 20 dB

1 PK  
MAXH



Center 2.4795 GHz

200 kHz/

Span 2 MHz

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### 5.4 Number of Hopping Frequency

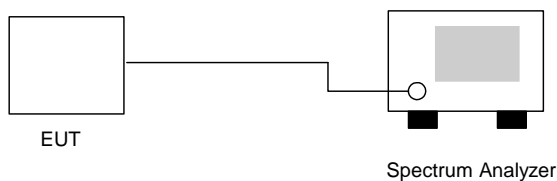
#### 5.4.1 Measuring Instruments :

As described in chapter 9 of this test report.

#### 5.4.2 Test Procedure :

1. The output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 100kHz and VBW to 100kHz.
3. The number of hopping frequency used is defined as the device has the numbers of total channel.

#### 5.4.3 Test Setup Layout :



#### 5.4.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
- Temperature : 25°C,
- Relative Humidity : 58%
- Test Enginner : Anderson

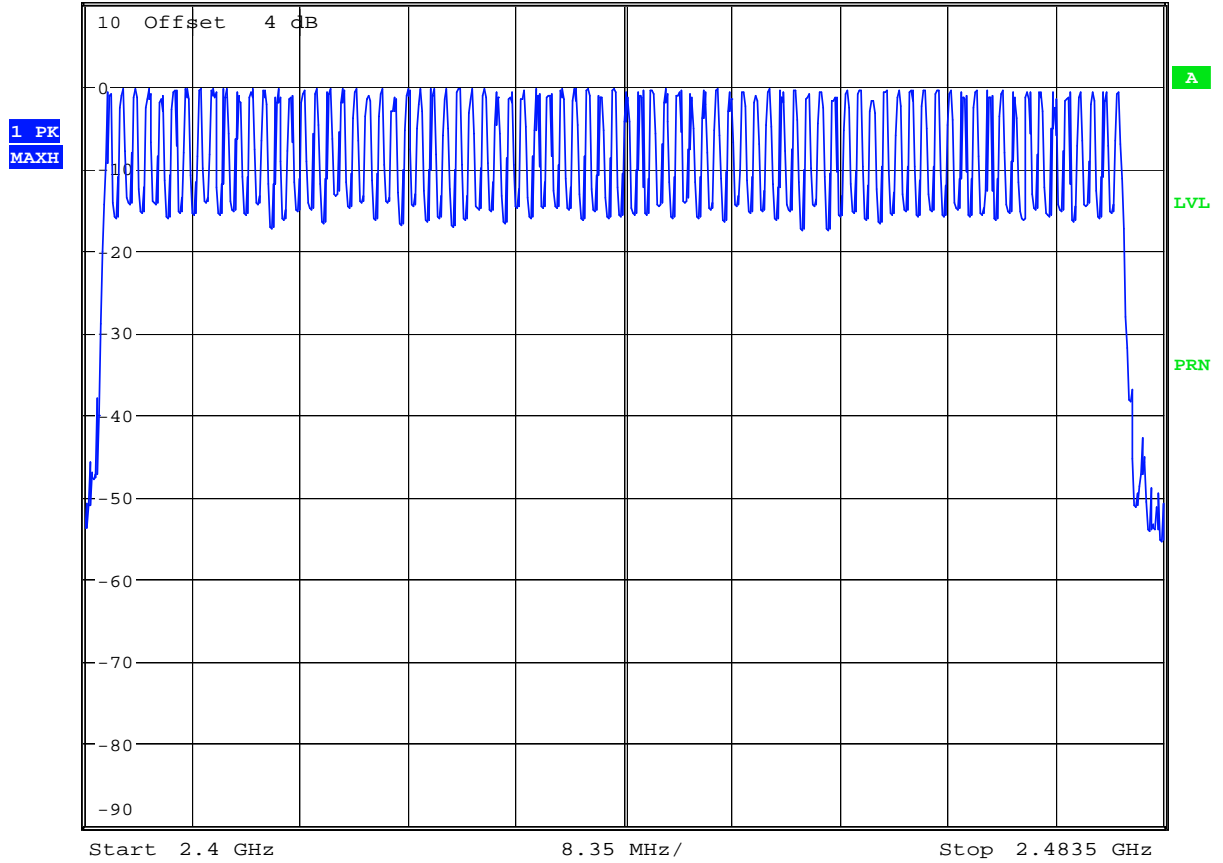
Number of Hopping Frequency (Channel)	Limits (Channel)
79	15



5.4.5 Number of Hopping Frequency



Ref 10 dBm      \* Att 20 dB      \* RBW 100 kHz  
\* VBW 100 kHz  
\* SWT 500 ms



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## 5.5 Hopping Channel Bandwidth

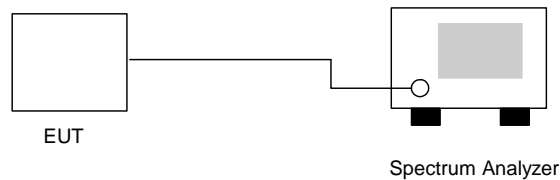
### 5.5.1 Measuring Instruments :

As described in chapter 9 of this test report.

### 5.5.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 30kHz and VBW to 300kHz.
3. The Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

### 5.5.3 Test Setup Layout :



### 5.5.4 Test Result : See spectrum analyzer plots below

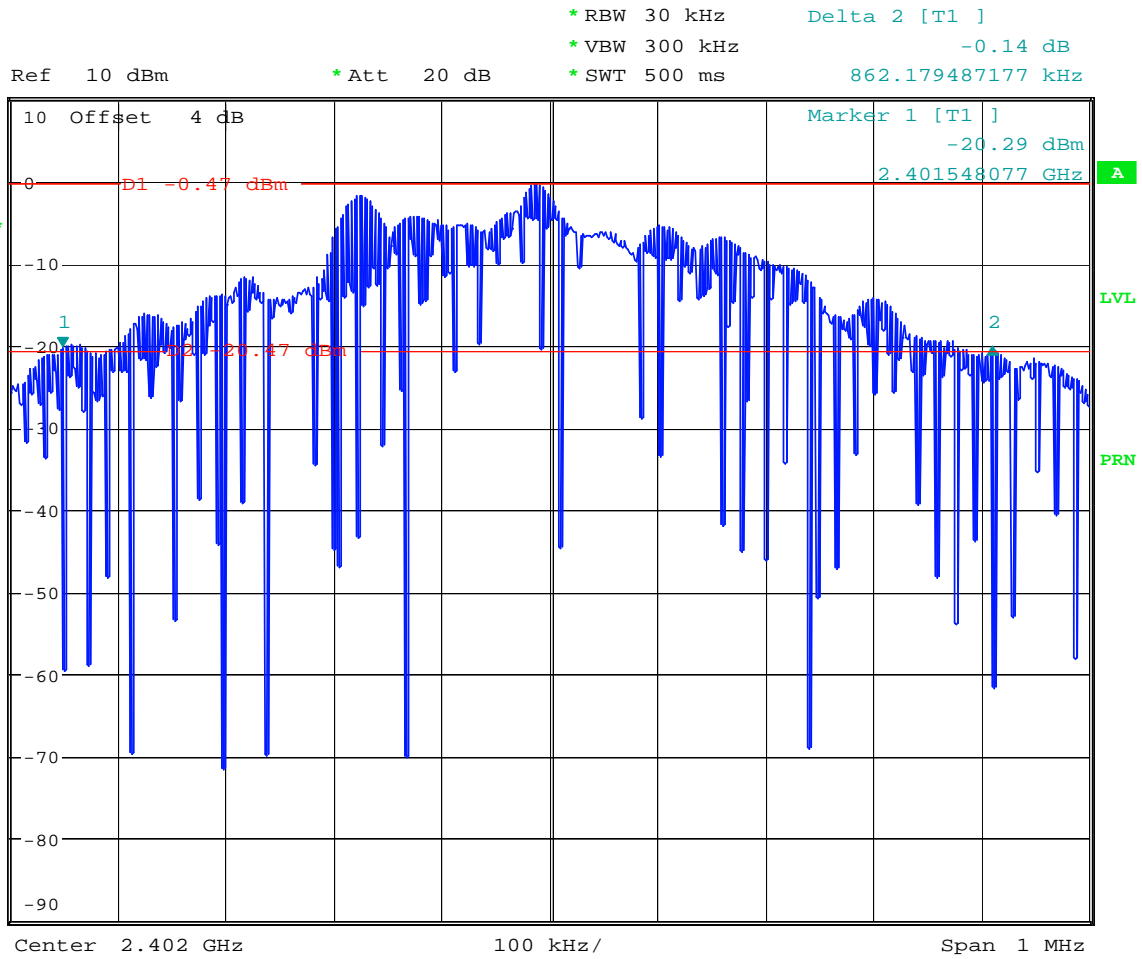
- Application Type : BT
- Temperature : 25°C,
- Relative Humidity : 58%
- Test Enginner : Anderson

Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	0.862	1.000	Mode 1
39	2441	0.833	1.000	Mode 2
78	2480	0.830	1.000	Mode 3



5.5.5 Hopping Channel Bandwidth

Mode 1



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Mode 2

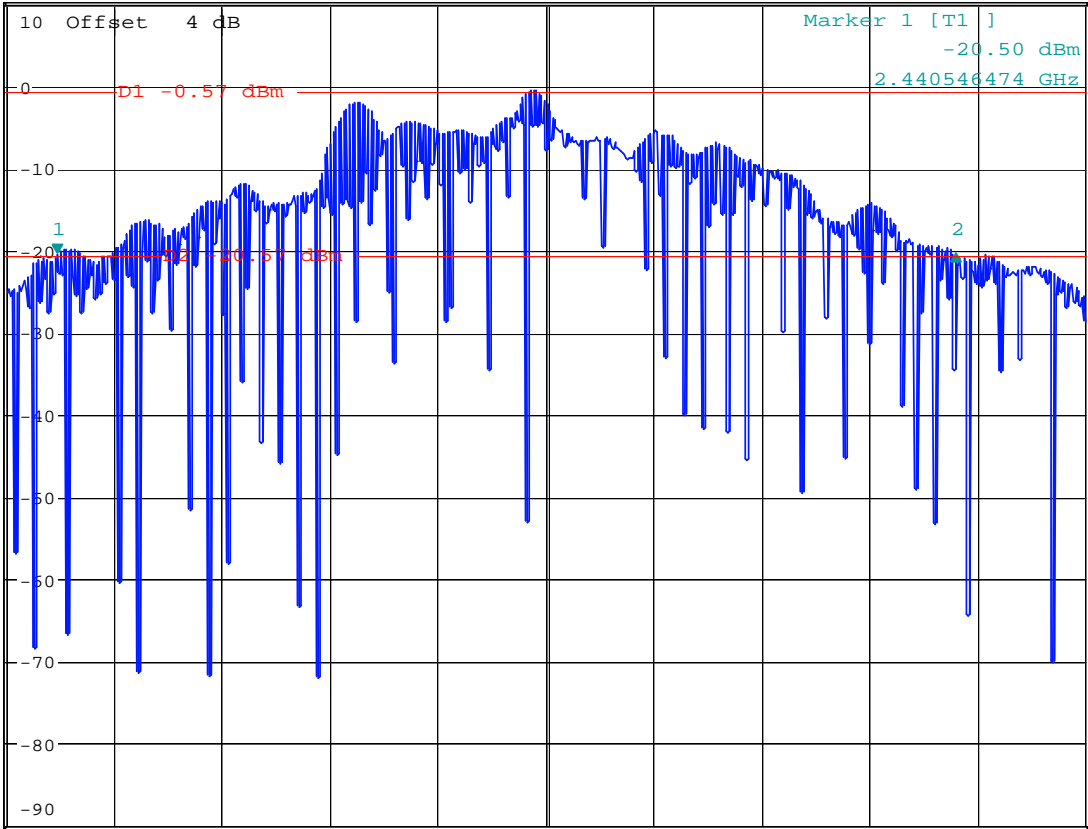


\* RBW 30 kHz      Delta 2 [T1 ]  
 \* VBW 300 kHz      -0.01 dB  
 \* SWT 500 ms      833.333333325 kHz

Ref 10 dBm

\* Att 20 dB

1 PK  
VIEW



Center 2.441 GHz      100 kHz/      Span 1 MHz

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## 5.6 Dwell Time of Each Frequency

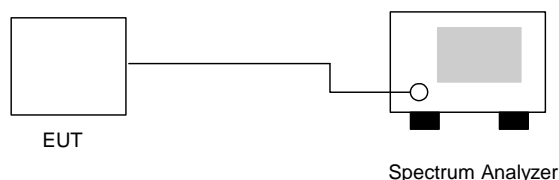
### 5.6.1 Measuring Instruments :

As described in chapter 9 of this test report.

### 5.6.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. The calculate  $= 79 * 0.4 * (1600/79) * t$  (t = the time duration of one single pulse )

### 5.6.3 Test Setup Layout :



### 5.6.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
- Temperature : 25°C
- Relative Humidity : 58%
- Test Enginner : Anderson

Ch00

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	10.1	541.66	0.173	0.4
DH3	5.3	1812.5	0.304	0.4
DH5	3.4	3062.5	0.329	0.4





CH39

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	10.2	544.87	0.176	0.4
DH3	5.3	1820.51	0.305	0.4
DH5	3.4	3046.47	0.327	0.4

CH78

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	10.5	541.66	0.180	0.4
DH3	5.2	1804.48	0.297	0.4
DH5	3.4	3078.52	0.331	0.4

Remark:

1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

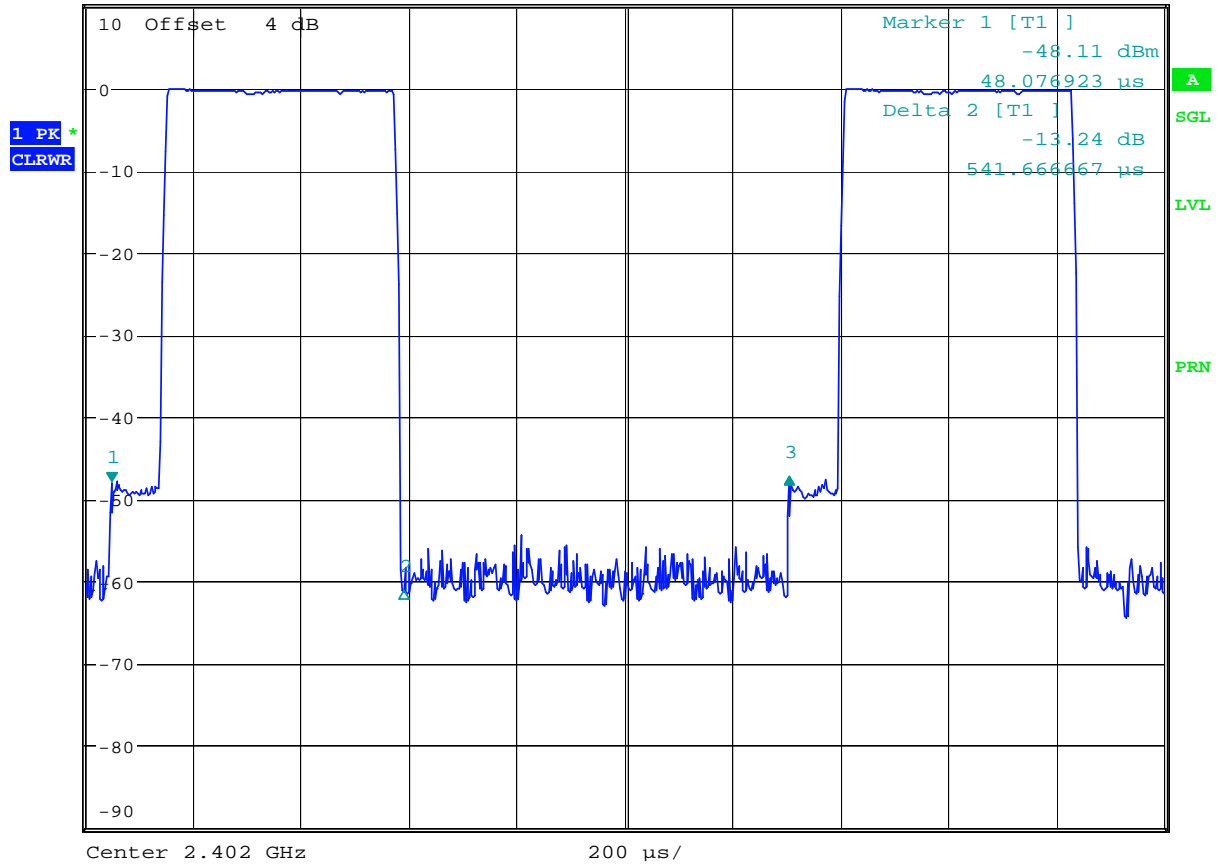


5.6.5 Dwell Time

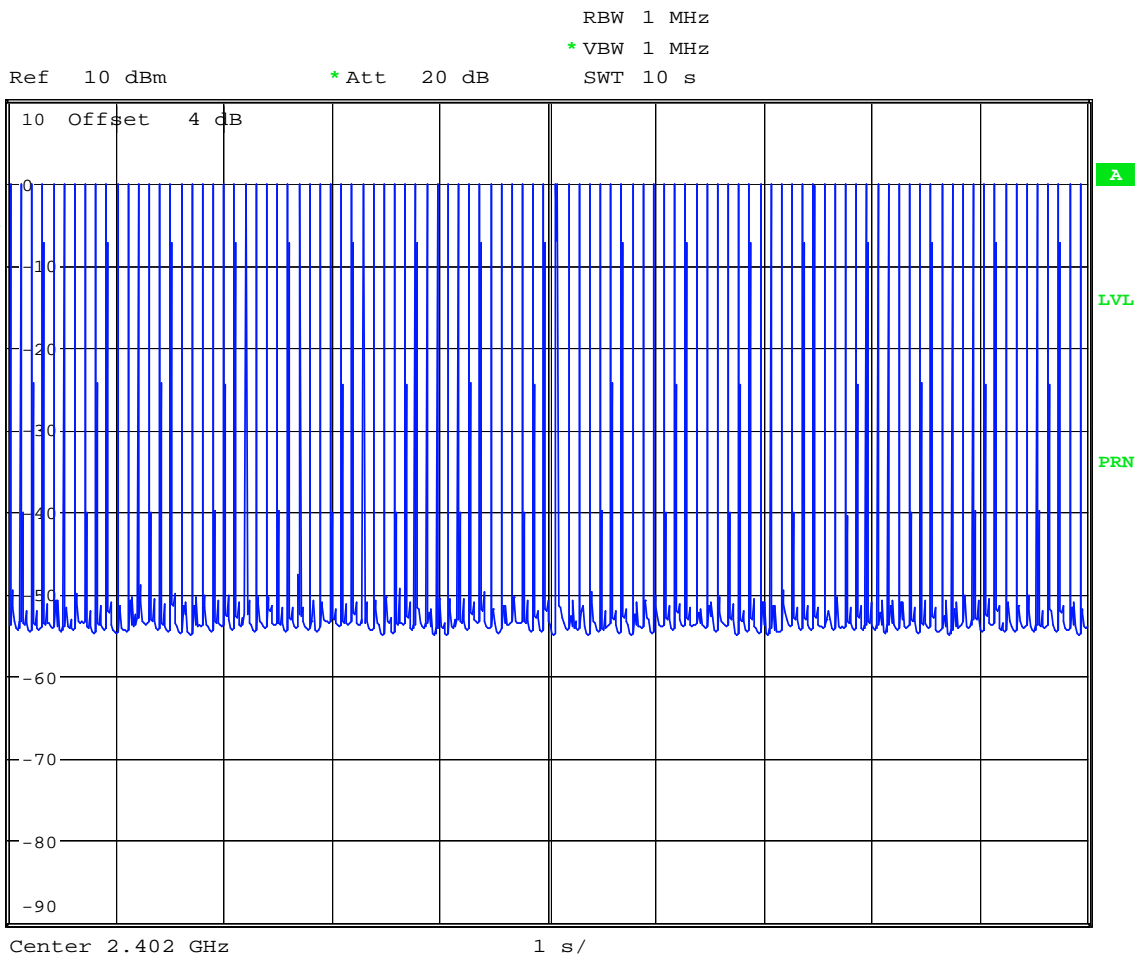
DH1 (CH00)



Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      0.62 dB  
 \* VBW 1 MHz      1.256410 ms  
 SWT 2 ms



Date: 6.JAN.2006 21:29:07



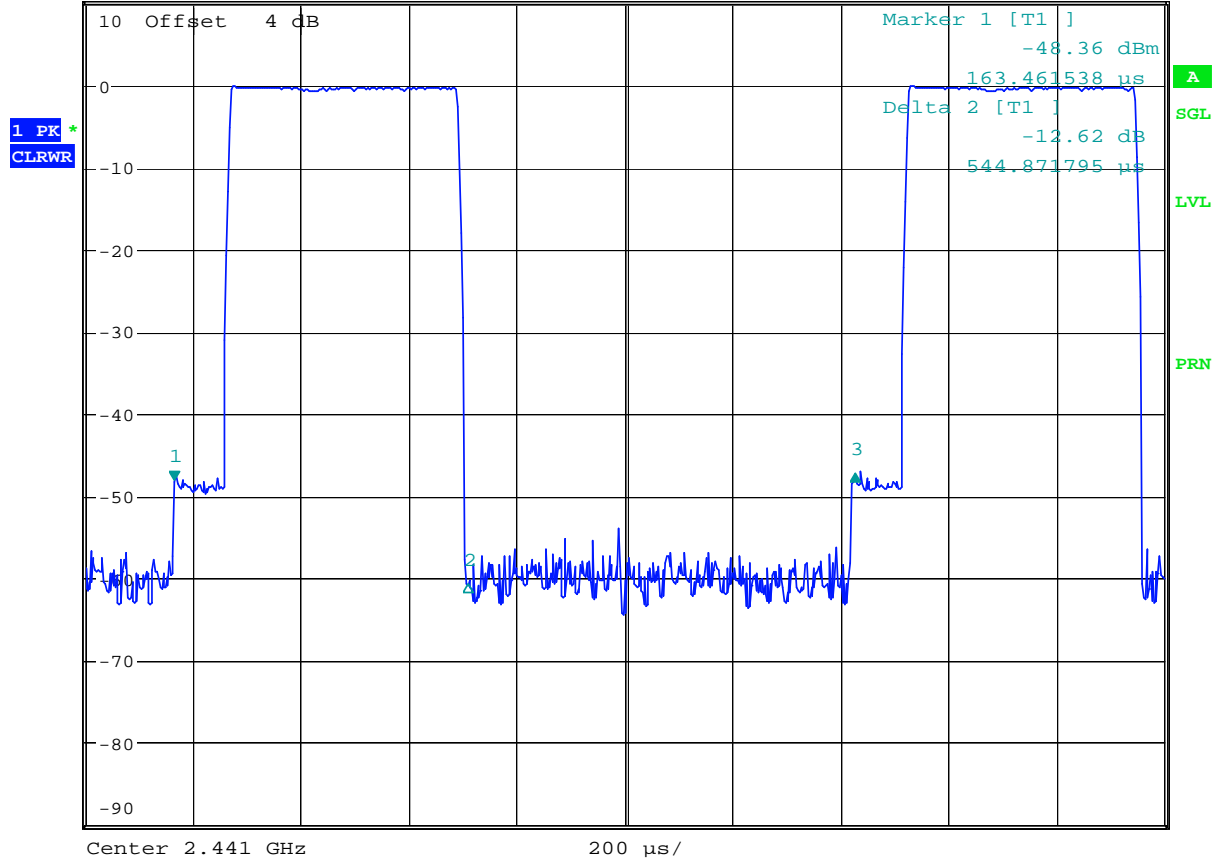
Date: 6.JAN.2006 21:52:03



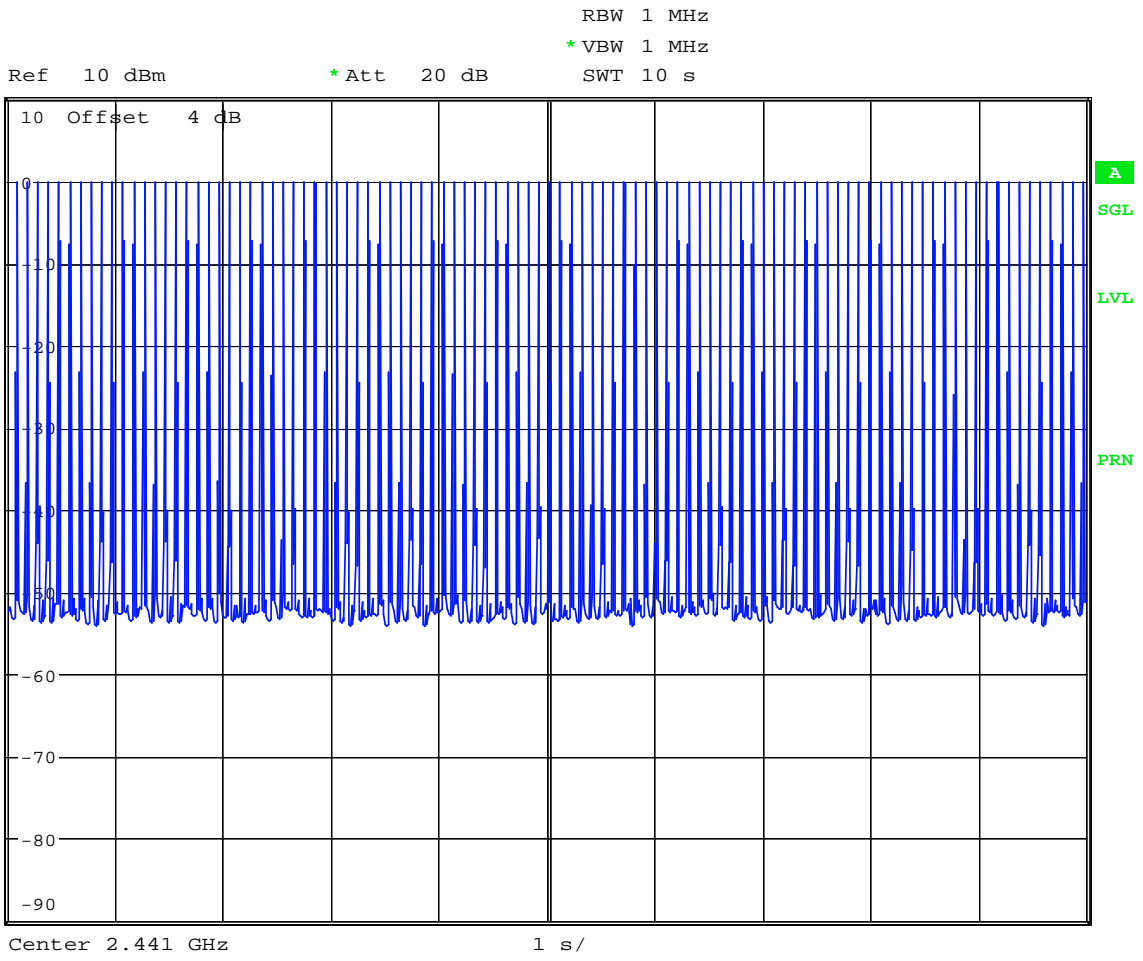
DH1 (CH39)



Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      0.89 dB  
\* VBW 1 MHz      SWT 2 ms      1.262821 ms



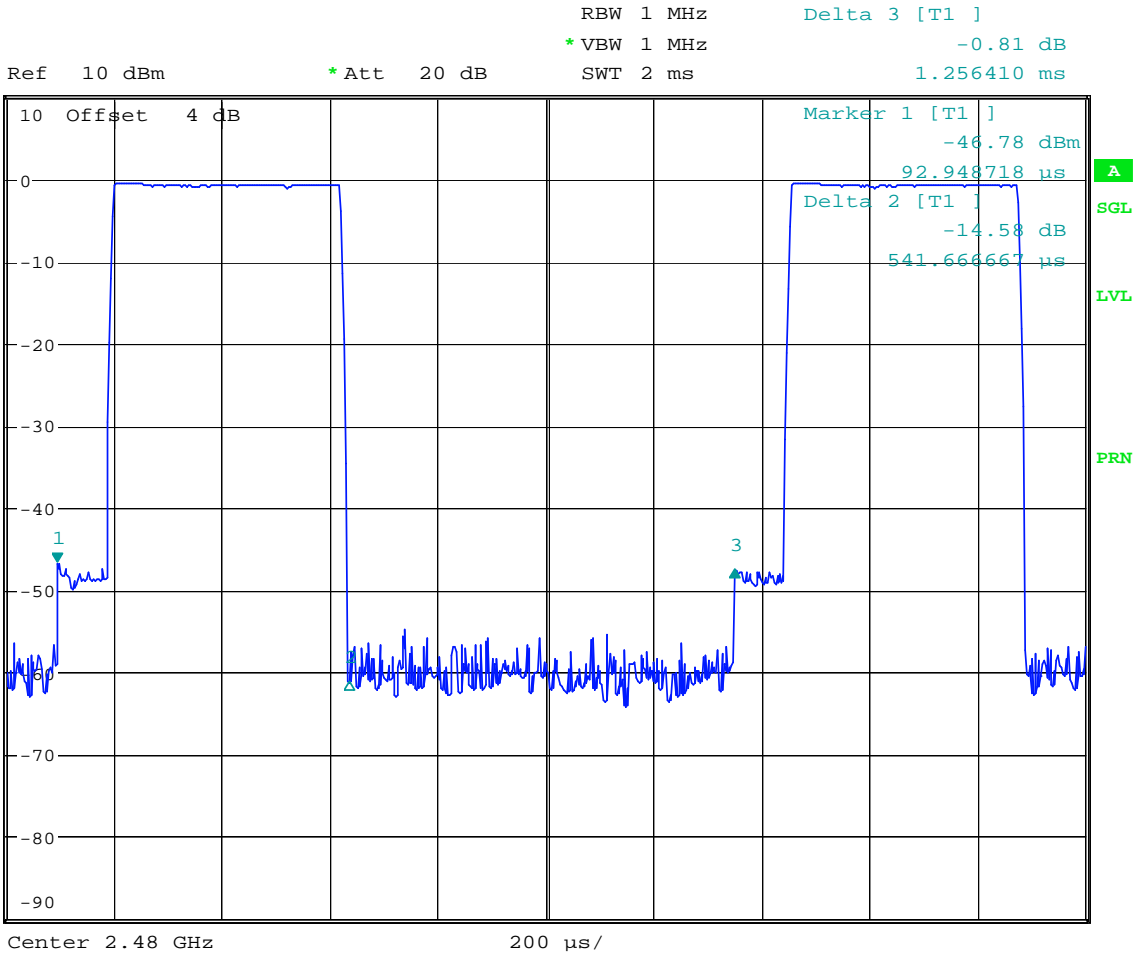
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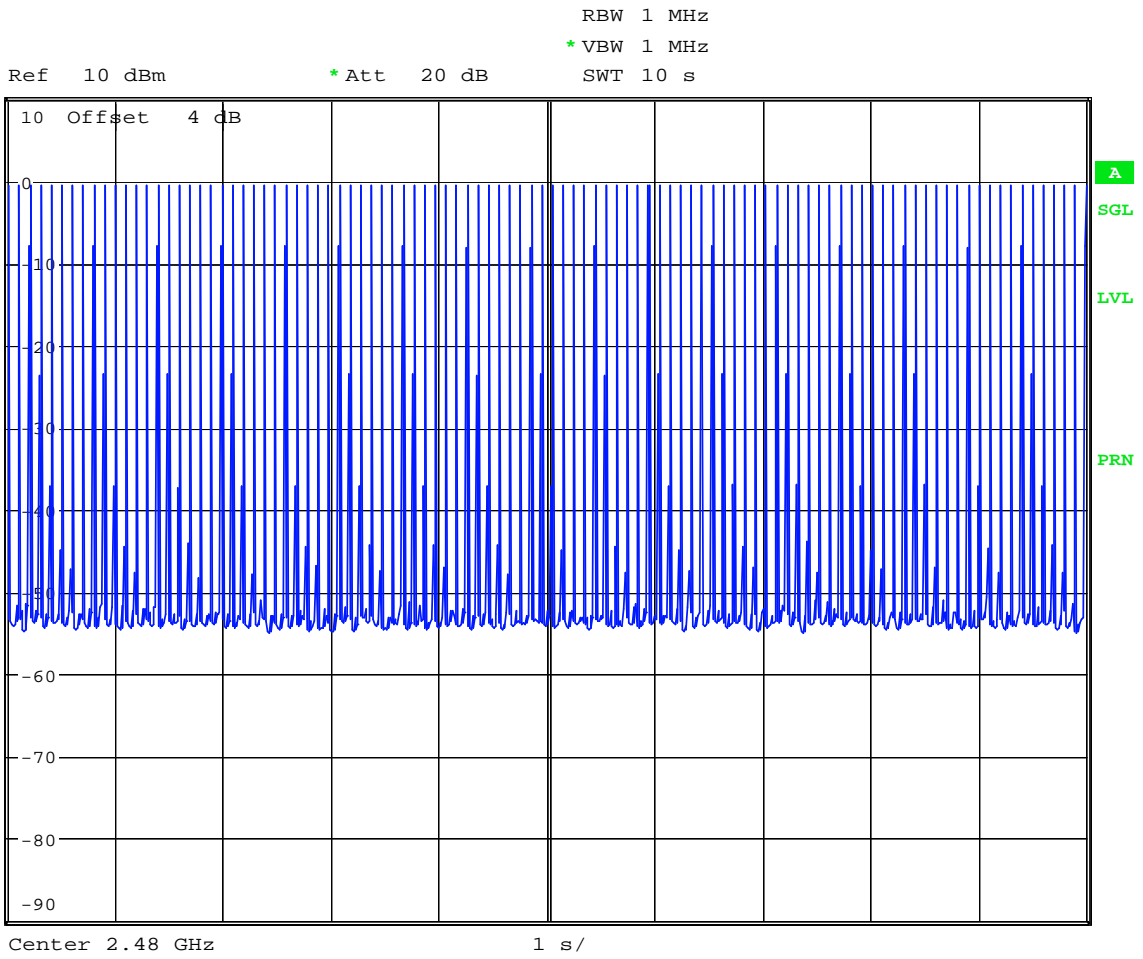
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DH1 (CH78)



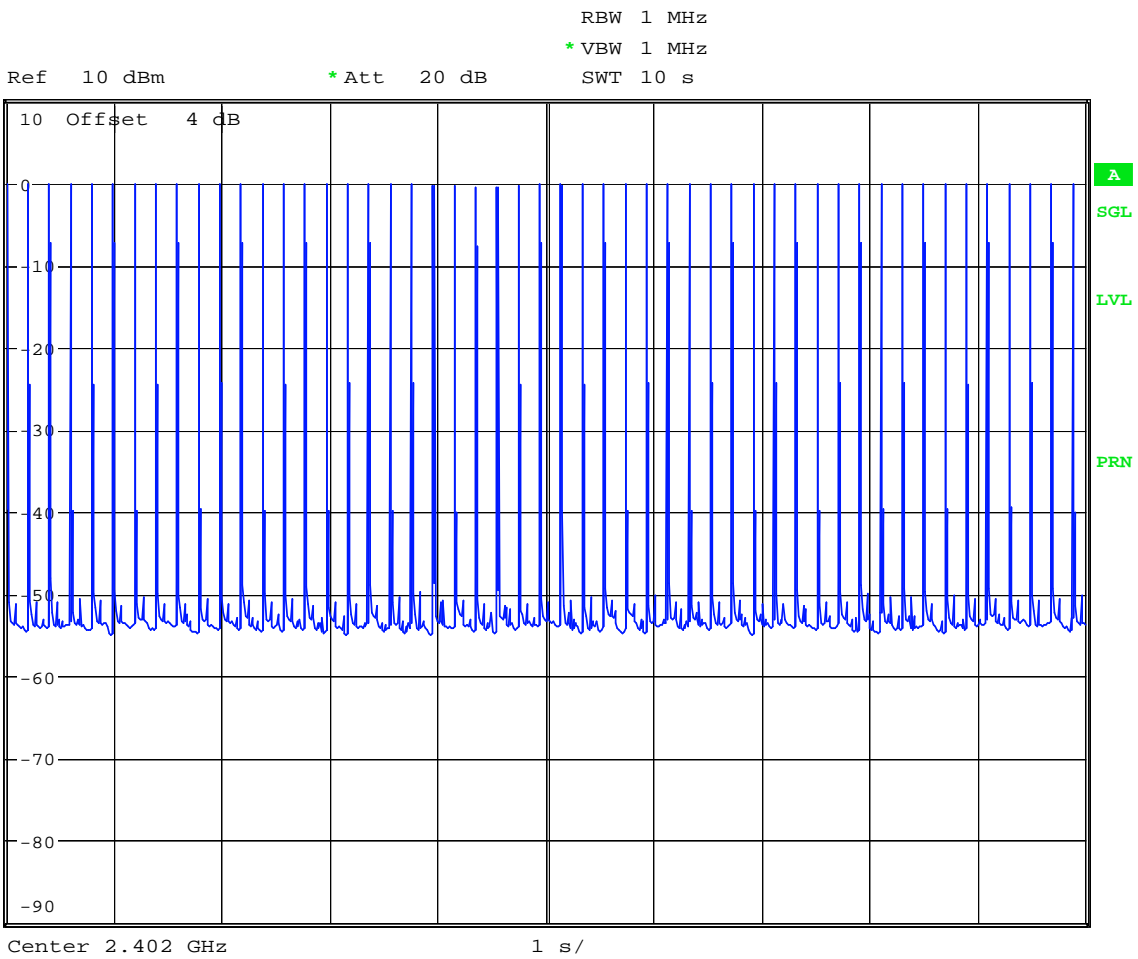
Date: 6.JAN.2006 21:30:21



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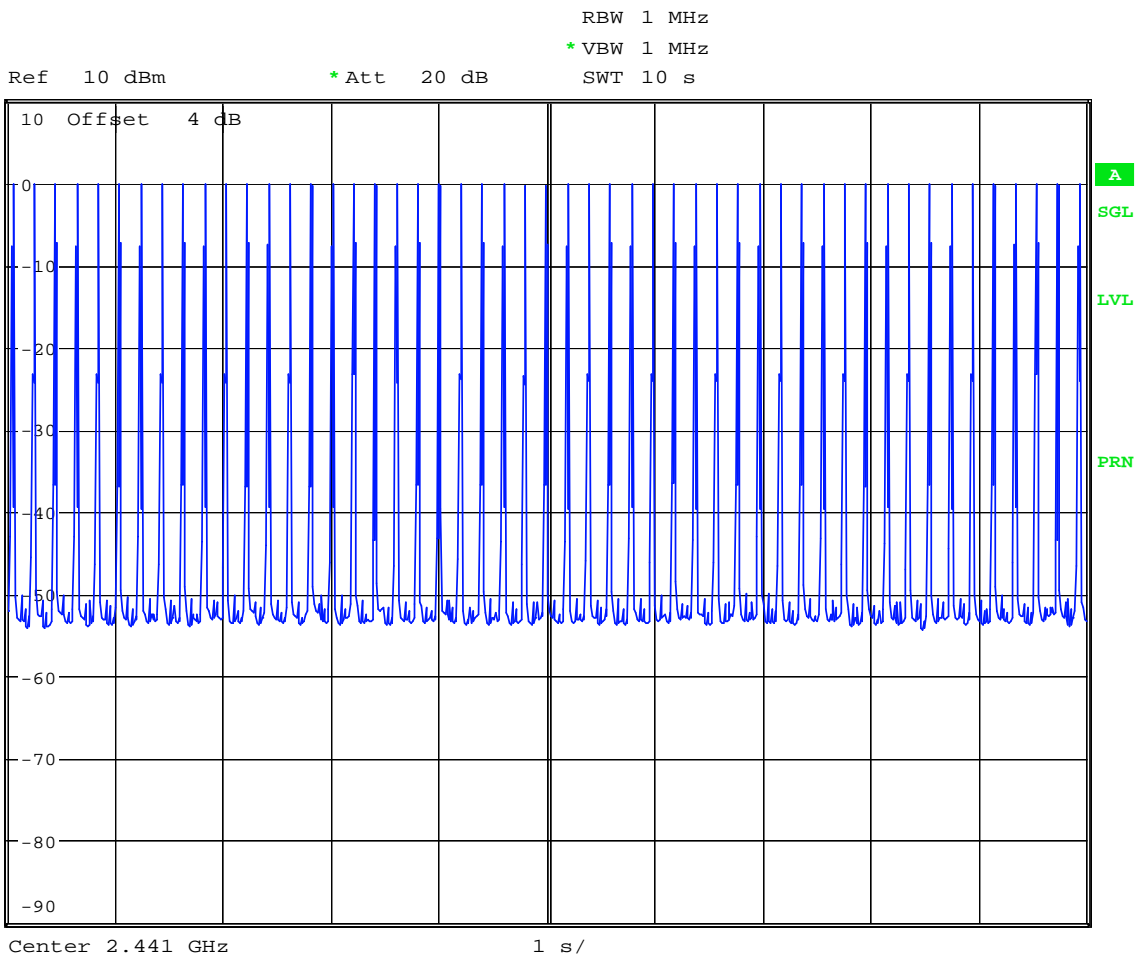






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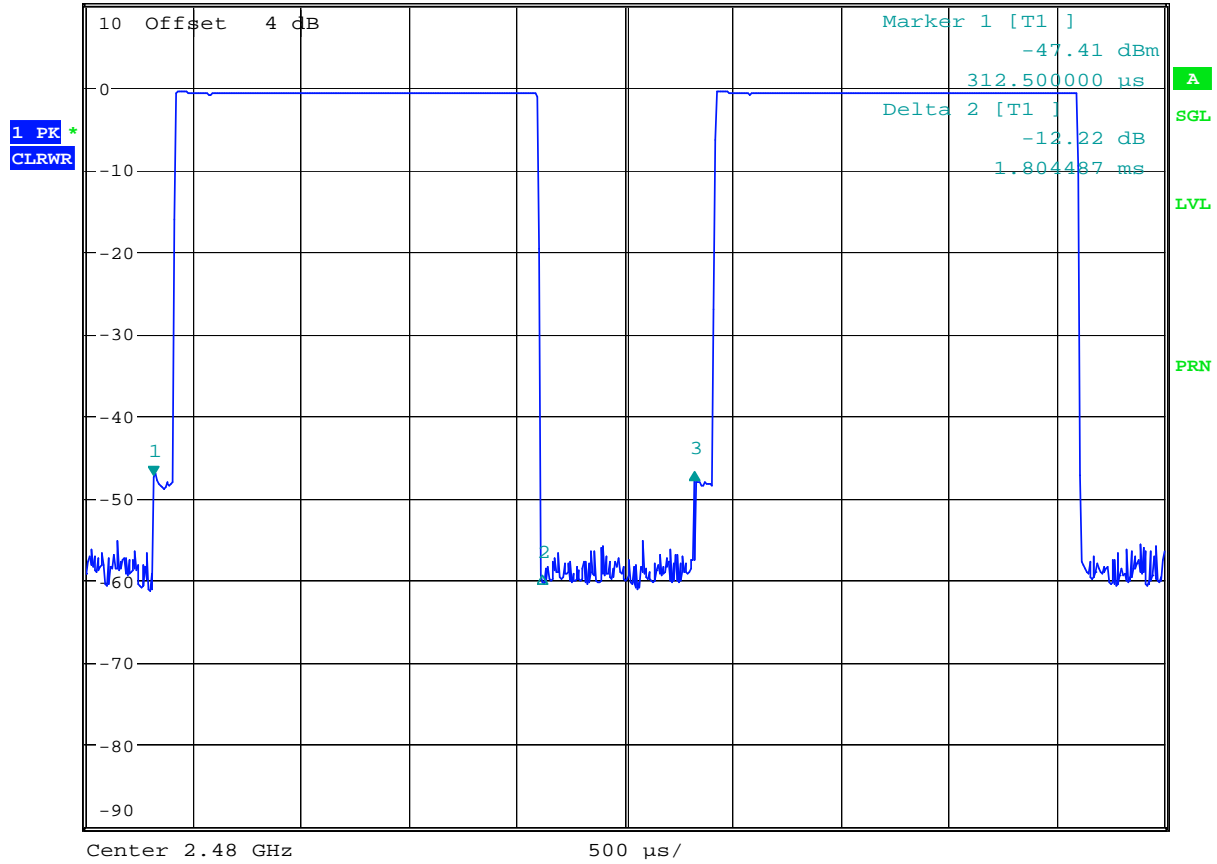
Date: 6.JAN.2006 21:39:56



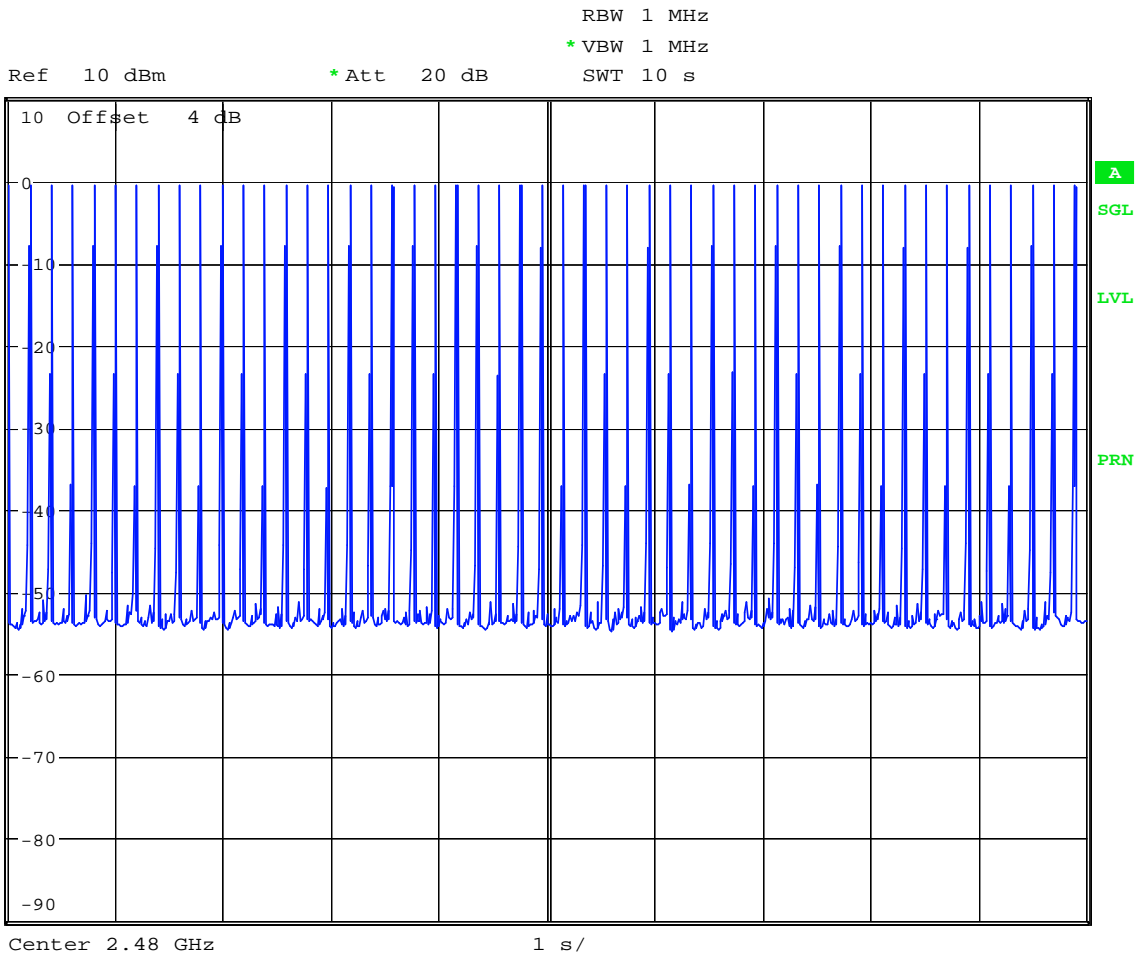
DH3 (CH78)



Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      0.46 dB  
 \* VBW 1 MHz      SWT 5 ms      2.511218 ms



Date: 6.JAN.2006 21:31:17



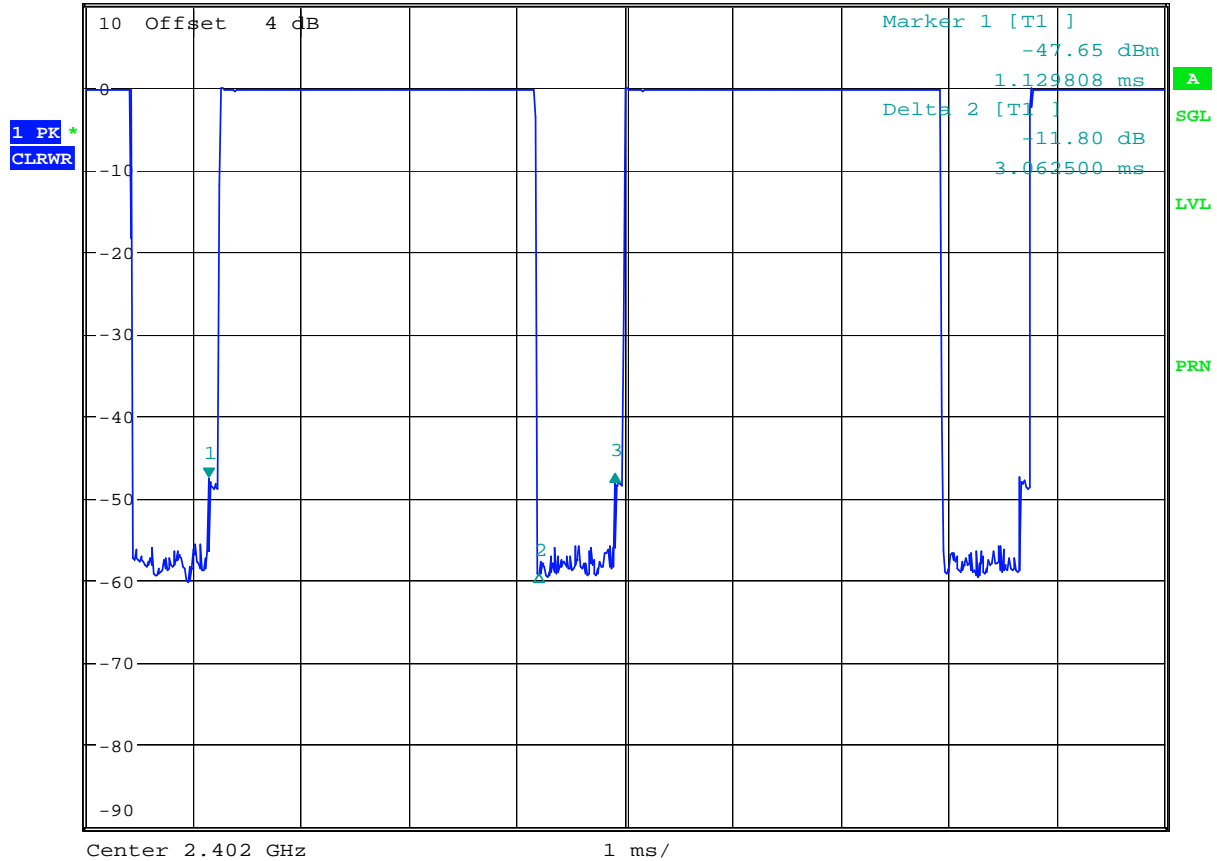
Date: 6.JAN.2006 21:40:53



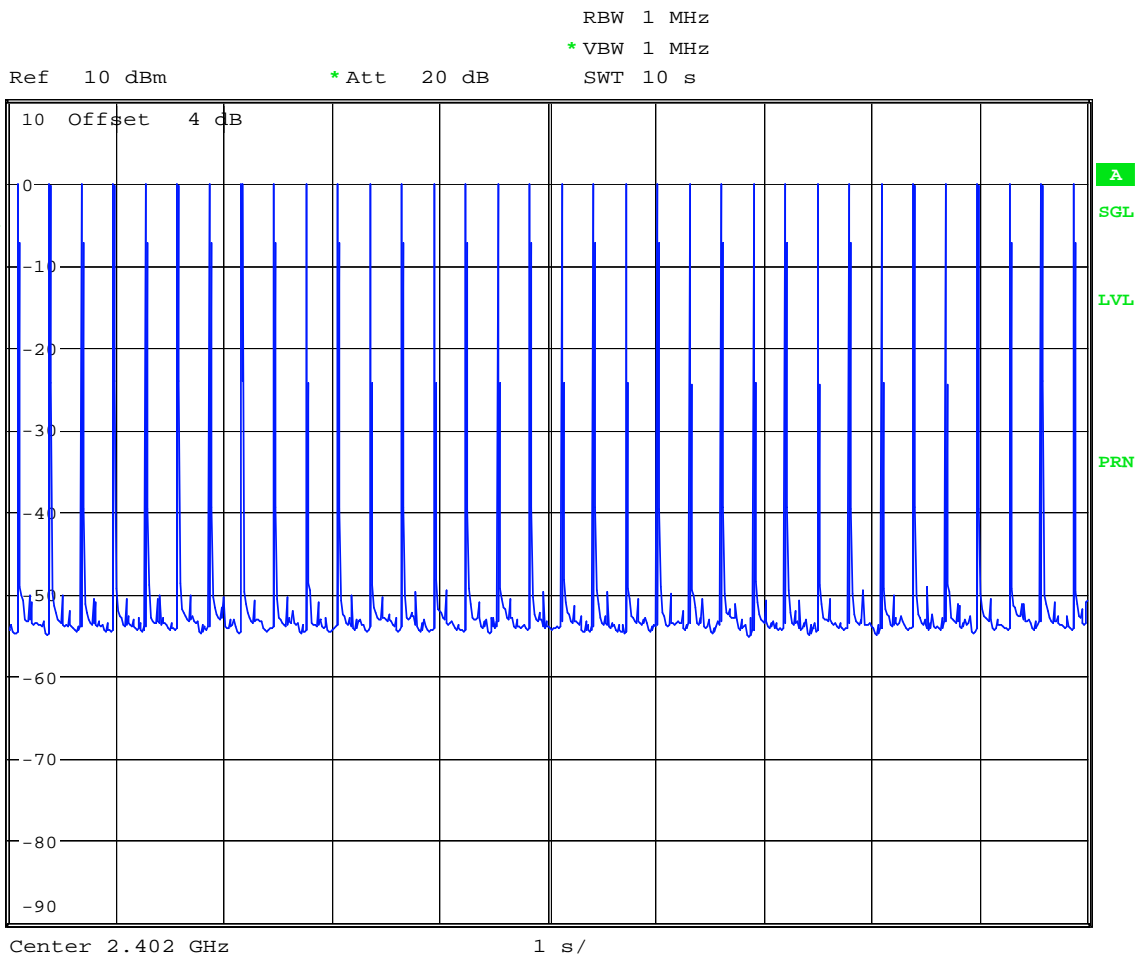
DH5 (CH00)



Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      0.41 dB  
 \* VBW 1 MHz      SWT 10 ms      3.777244 ms



Date: 6.JAN.2006 21:33:26



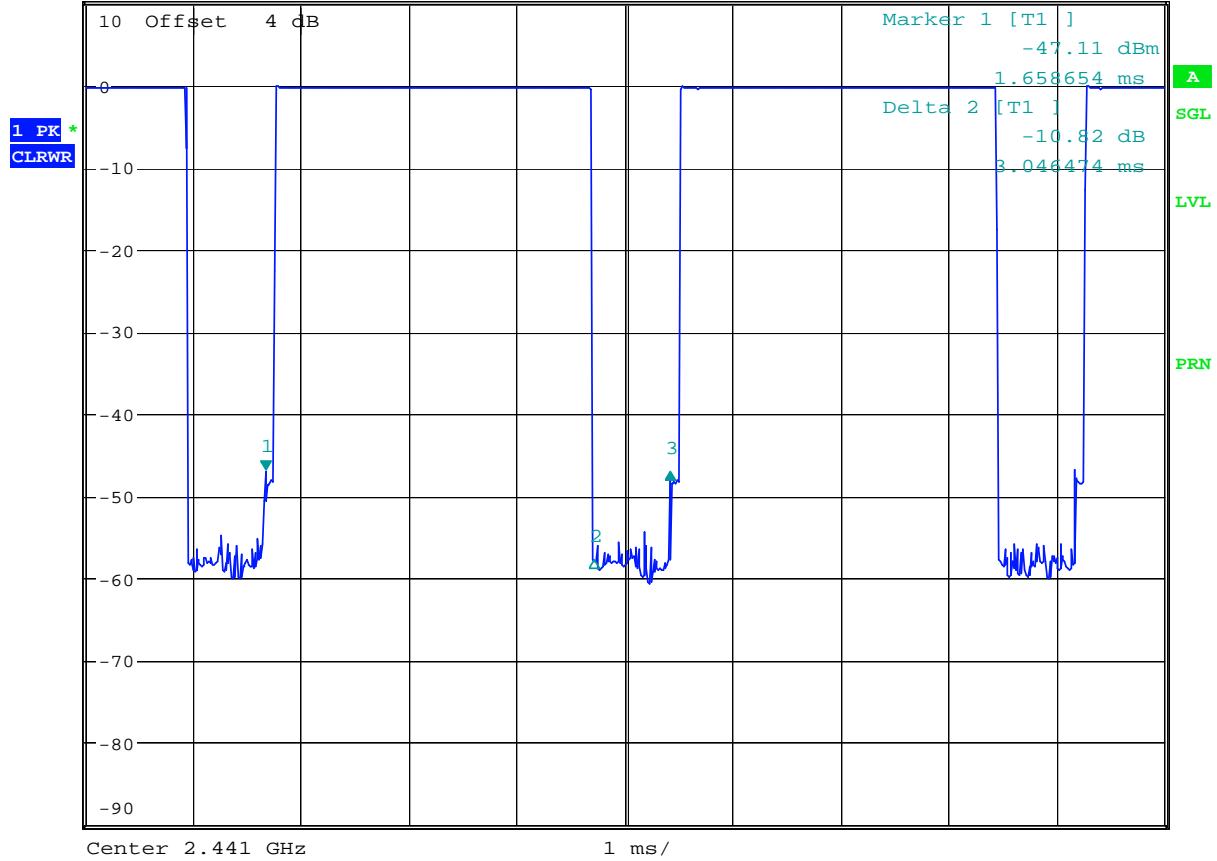
Date: 6.JAN.2006 21:37:29



DH5 (CH39)

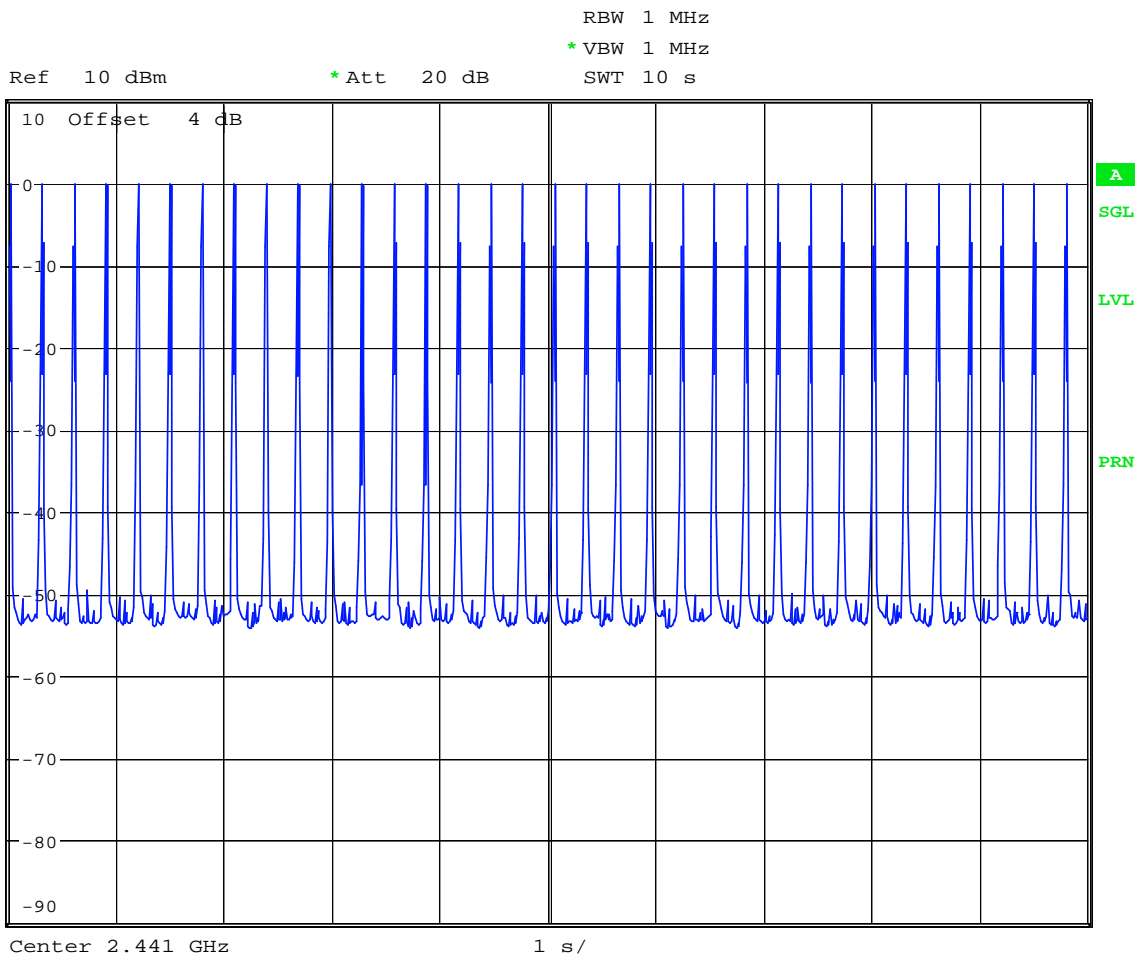


Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      -0.10 dB  
 \* VBW 1 MHz      SWT 10 ms      3.761218 ms



Date: 6.JAN.2006 21:34:01





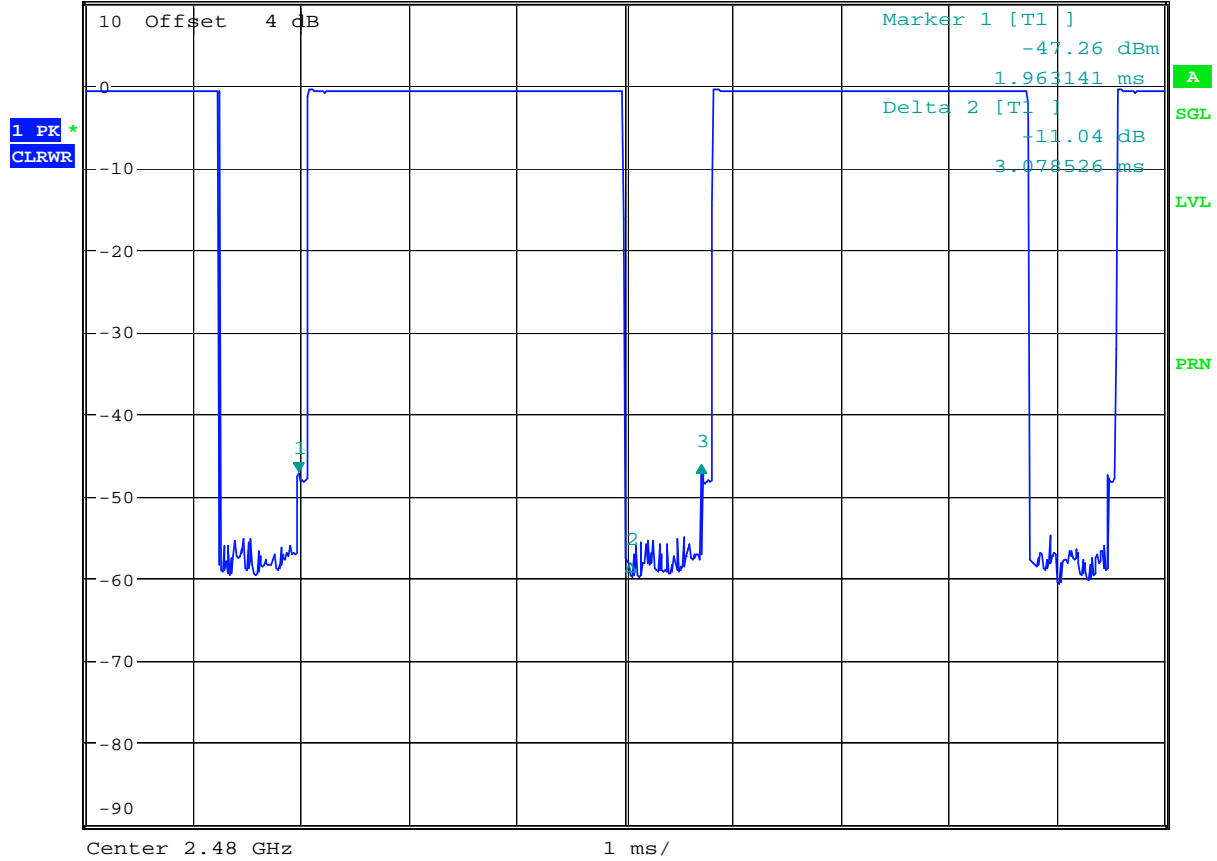
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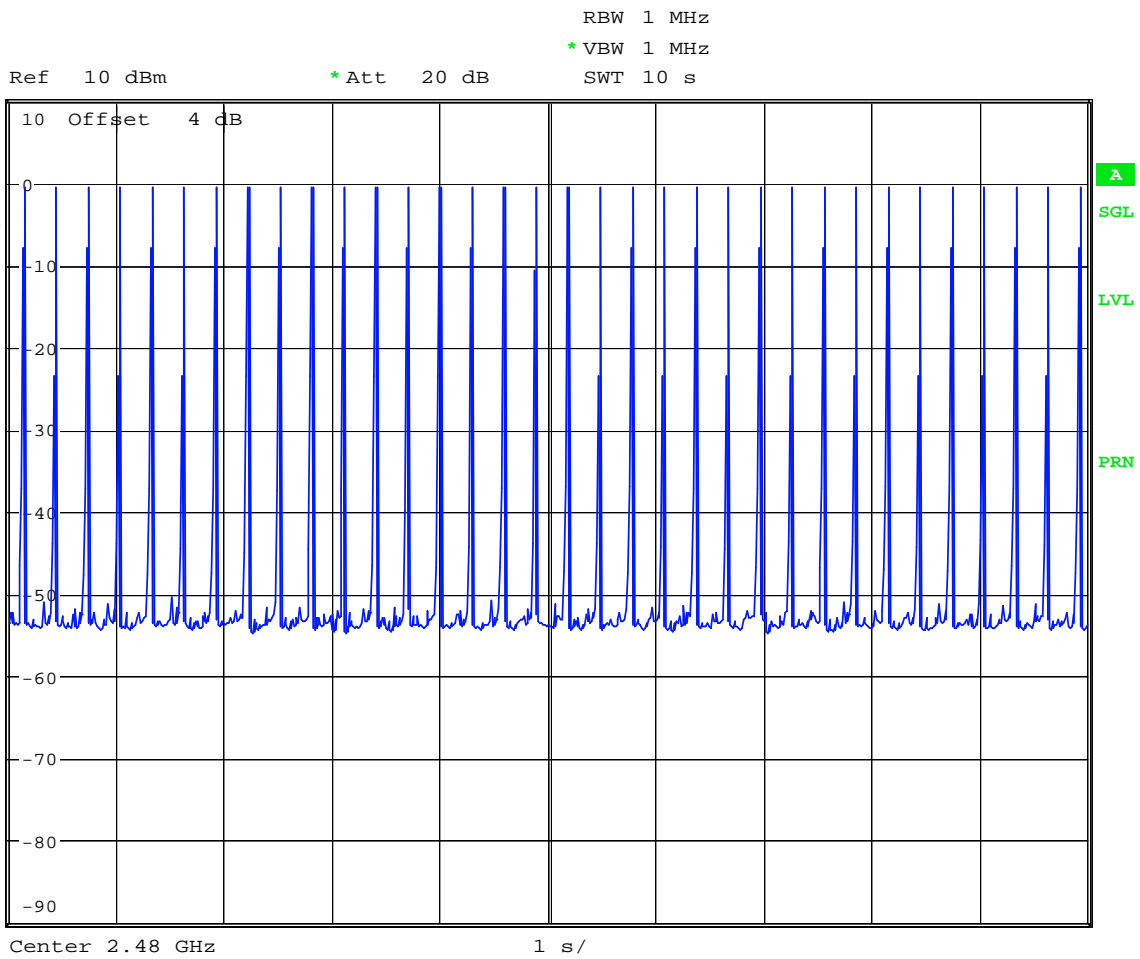
DH5 (CH78)



Ref 10 dBm      \* Att 20 dB      RBW 1 MHz      Delta 3 [T1 ]      0.91 dB  
\* VBW 1 MHz      SWT 10 ms      3.745192 ms



Date: 6.JAN.2006 21:34:43



Date: 6.JAN.2006 21:36:26

### 5.7 Peak Output Power Measurement

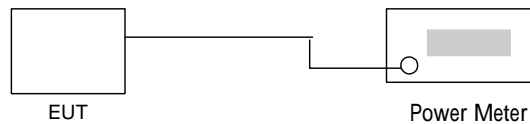
#### 5.7.1 Measuring Instruments :

As described in chapter 6 of this test report.

#### 5.7.2 Test Procedure :

1. The antenna port ( RF output ) of the EUT was connected to the input ( RF input ) of a power meter for WLAN measurement. The power is equal to the reading level on power meter plus cable loss at the EUT antenna terminal.
2. The antenna port(RF output) of the EUT was connected to the input (RF input) of a spectrum analyzer for BT measurement. The cable loss has been offset before testing.

#### 5.7.3 Test Setup Layout :



#### 5.7.4 Test Result :

- Application Type : BT
- Temperature : 25°C
- Relative Humidity : 58 %
- Test Enginner : Anderson

**BT**

Channel	Frequency (MHz)	Measured Output Power (dBm)	Limits (Watt/dBm )
00	2402	-0.21	1W/30 dBm
39	2441	-0.19	1W/30 dBm
78	2480	-0.58	1W/30 dBm

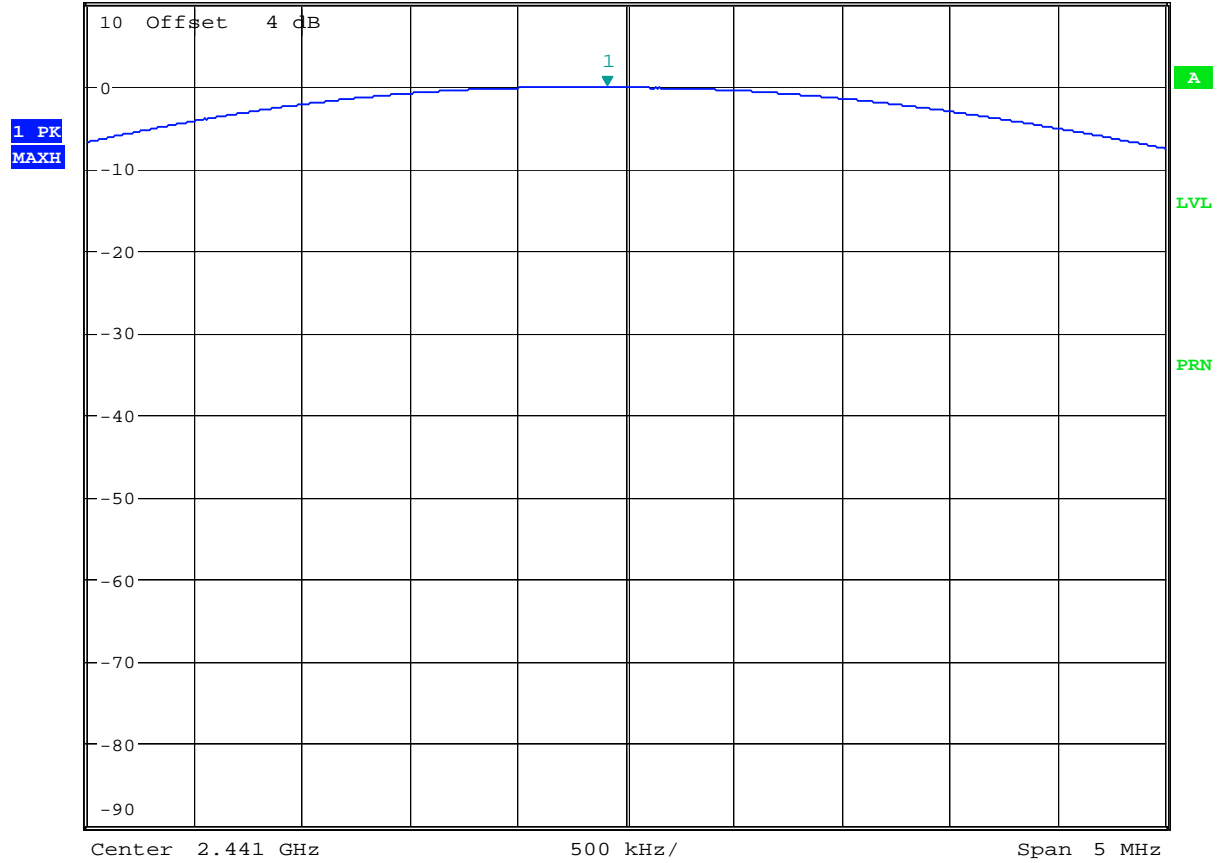




Mode 2: CH39 (2441MHz)



Ref 10 dBm      \* Att 20 dB      \* RBW 3 MHz      Marker 1 [T1 ]  
\* VBW 3 MHz      -0.19 dBm  
\* SWT 500 ms      2.440911859 GHz



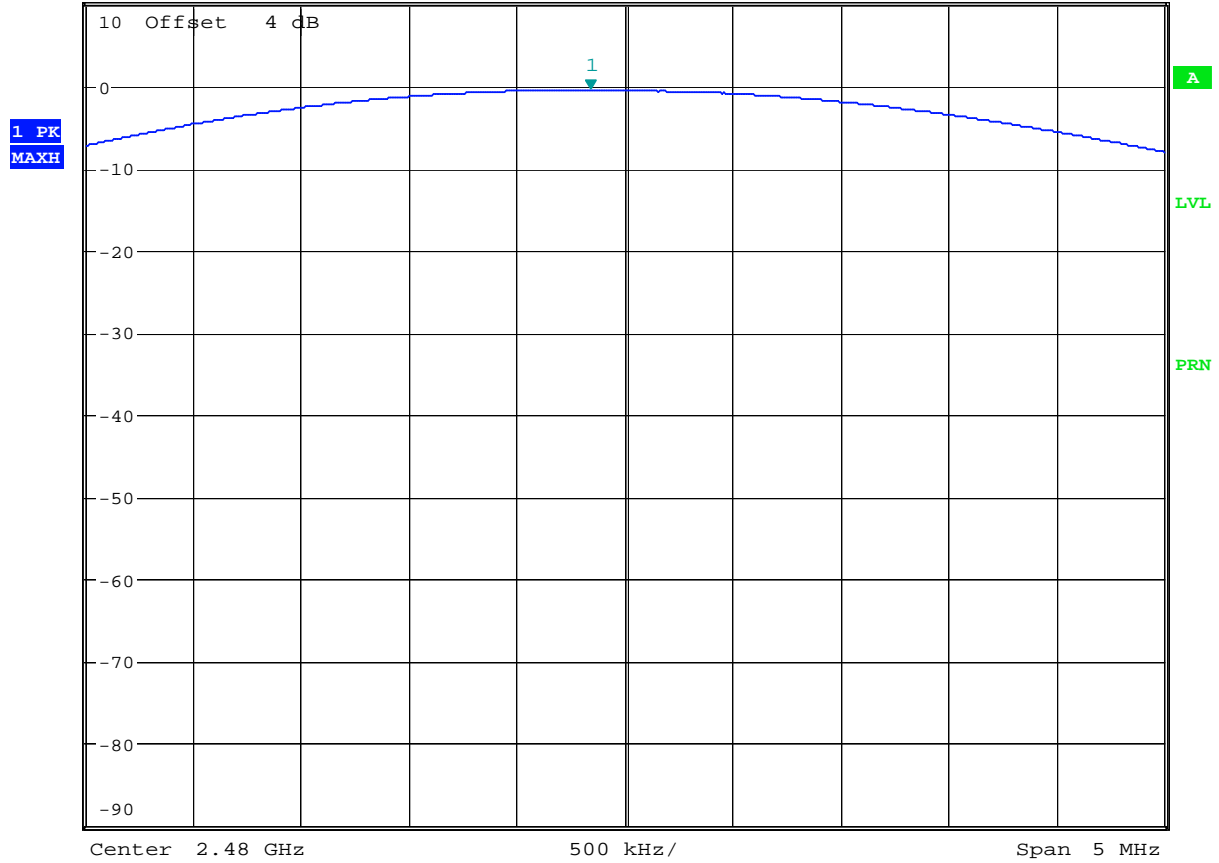
Date: 6.JAN.2006 21:06:06



Mode 3: CH78 (2480MHz)



Ref 10 dBm      \* Att 20 dB      \* RBW 3 MHz      Marker 1 [T1 ]  
 \* VBW 3 MHz      -0.58 dBm  
 \* SWT 500 ms      2.479839744 GHz



Date: 6.JAN.2006 21:17:13



## **5.8 Conducted Emission**

### **5.8.1 Measuring Instruments**

As described in chapter 6 of this test Report.

### **5.8.2 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 port of a line impedance stabilization network (LISN).
- c. All the support units are connected 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.

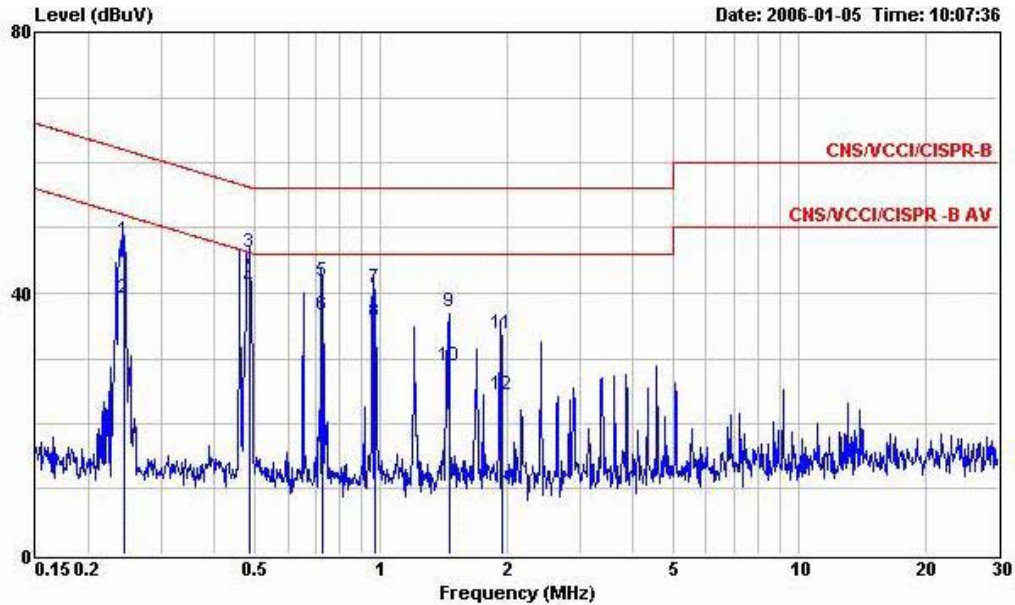




5.8.3 Test Data

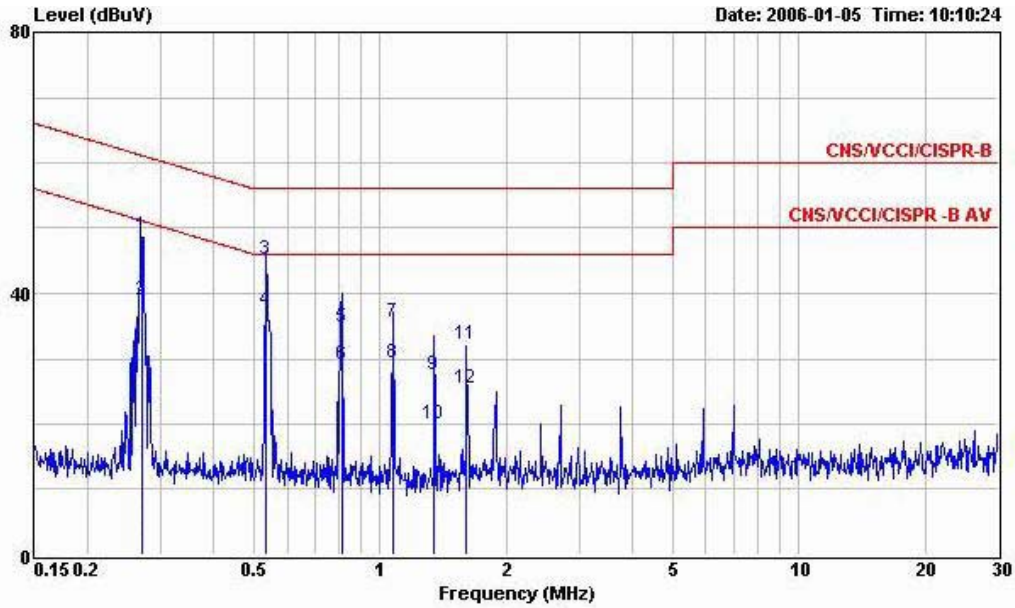
- Temperature : 25 °C
- Relating Humidity : 58 %
- Test Enginner : Anderson
- Test Mode : Mode 1

The test that passed at minimum margin was marked by the frame in the following table.



Site : CO01-HY  
 Condition : CNS/VCCI/CISPR-B 2001/004 200505 LINE  
 EUT : Bluetooth Headset\_BC03-MM-7\*7(Sporty)  
 Power : 120Vac/50Hz  
 Model : FR5D2803  
 Memo : Charging Mode  
 Memo :  
 Memo :

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.243	48.04	-13.97	62.01	47.88	0.06	0.10	QP
2	0.243	39.28	-12.73	52.01	39.12	0.06	0.10	Average
3	0.485	46.20	-10.06	56.26	46.07	0.07	0.06	QP
4	0.485	40.66	-5.60	46.26	40.53	0.07	0.06	Average
5	0.727	41.89	-14.11	56.00	41.73	0.09	0.07	QP
6	0.727	36.51	-9.49	46.00	36.35	0.09	0.07	Average
7	0.971	40.85	-15.15	56.00	40.66	0.11	0.08	QP
8	0.971	35.55	-10.45	46.00	35.36	0.11	0.08	Average
9	1.459	37.12	-18.88	56.00	36.92	0.11	0.09	QP
10	1.459	28.80	-17.20	46.00	28.60	0.11	0.09	Average
11	1.945	33.80	-22.20	56.00	33.59	0.11	0.10	QP
12	1.945	24.54	-21.46	46.00	24.33	0.11	0.10	Average



Site : CO01-HY  
 Condition : CNS/VCCI/CISPR-B 2001/004 200505 NEUTRAL  
 EUT : Bluetooth Headset\_BC03-MM-7\*7(Sporty)  
 Power : 120Vac/60Hz  
 Model : FR5D2803  
 Memo : Charging Mode  
 Memo :  
 Memo :

	Freq	Level	Over	Limit	Read	Probe	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.269	48.74	-12.41	61.15	48.54	0.11	0.09	QP
2	0.269	39.04	-12.11	51.15	38.84	0.11	0.09	Average
3	0.535	45.29	-10.71	56.00	45.07	0.15	0.07	QP
4	0.535	37.49	-8.51	46.00	37.27	0.15	0.07	Average
5	0.809	34.92	-21.08	56.00	34.64	0.20	0.08	QP
6	0.809	29.16	-16.84	46.00	28.88	0.20	0.08	Average
7	1.074	35.52	-20.48	56.00	35.21	0.23	0.08	QP
8	1.074	29.24	-16.76	46.00	28.93	0.23	0.08	Average
9	1.343	27.54	-28.46	56.00	27.22	0.23	0.09	QP
10	1.343	19.92	-26.08	46.00	19.60	0.23	0.09	Average
11	1.610	32.27	-23.73	56.00	31.95	0.23	0.09	QP
12	1.610	25.41	-20.59	46.00	25.09	0.23	0.09	Average



## **5.9 Radiated Emission Measurement**

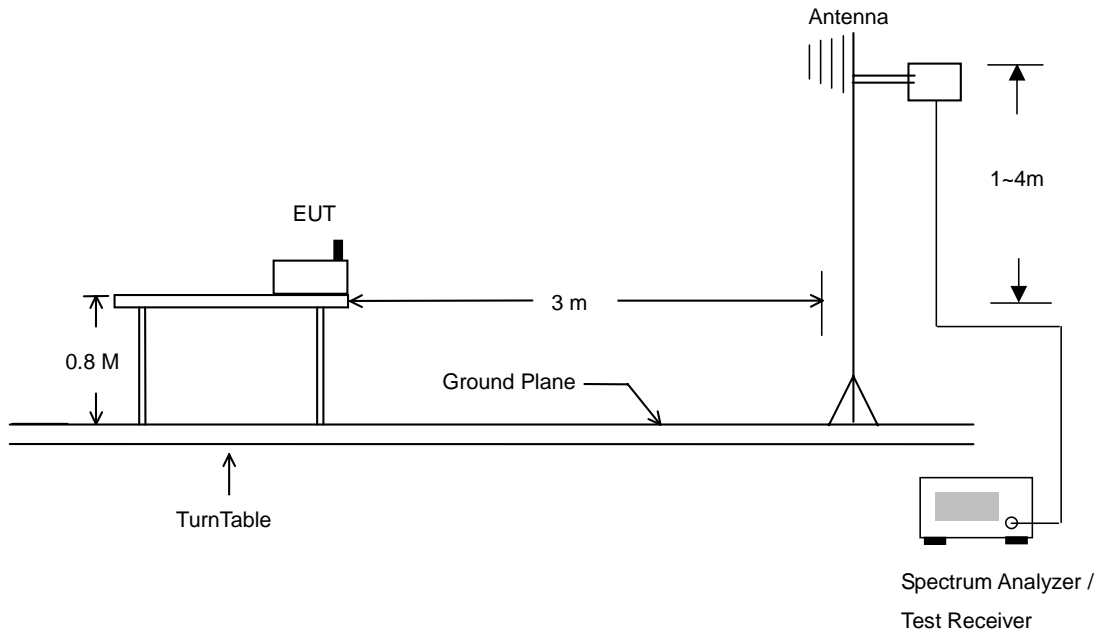
### **5.9.1 Measuring Instruments**

As described in chapter 6 of this Report.

### **5.9.2 Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. 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 for both horizontal polarization and vertical polarization of the antenna.
- e. 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 turntable (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. For testing below 1GHz, 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 will be repeated one by one using the quasi-peak method and reported.
- h. 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 average 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.

5.9.3 Typical Test Setup Layout of Radiated Emission

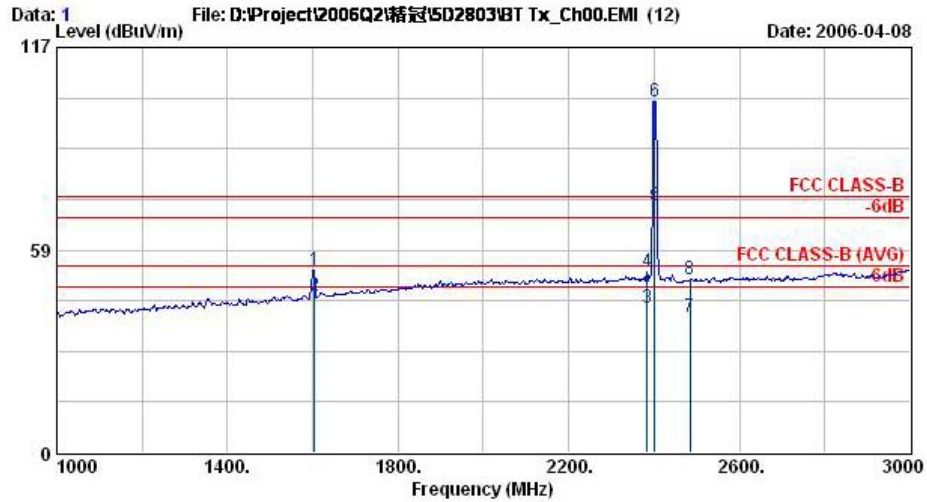




5.9.4 Test Data

- Test Mode : Mode 1
- Polarization : Horizontal

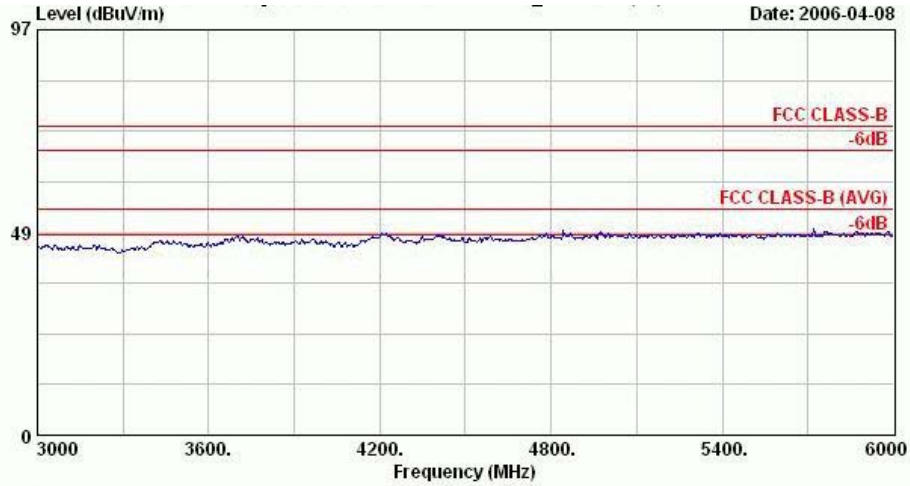
The test that passed at minimum margin was marked by the frame in the following table.



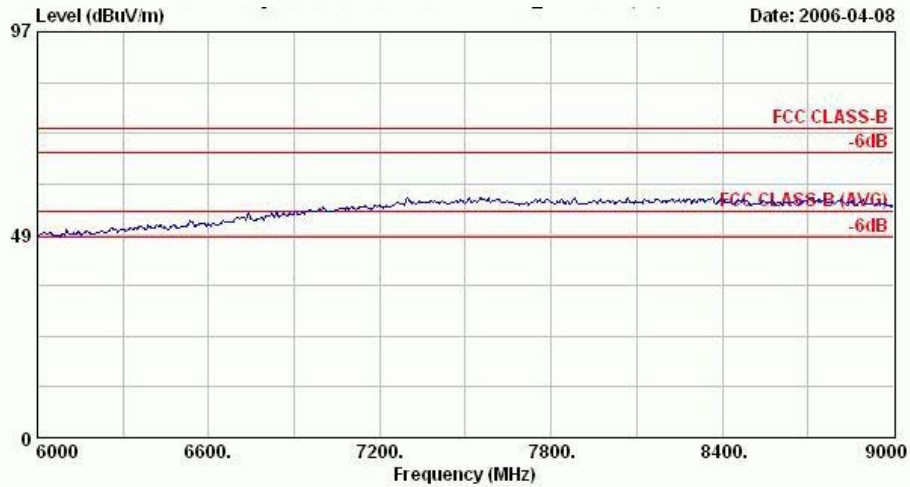
Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch00:2402MHz

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Preamp Factor	Cable Loss	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1 @	1604.00	52.80	-21.20	74.00	57.41	27.50	35.59	3.48	100	1 Peak
2 @	1604.00	45.09	-8.91	54.00	49.70	27.50	35.59	3.48	100	24 Average
3 @	2384.00	41.81	-12.19	54.00	42.52	30.50	35.44	4.23	100	154 Average
4 @	2384.00	52.41	-21.59	74.00	53.12	30.50	35.44	4.23	100	1 Peak
5 @	2402.00	71.40			72.11	30.48	35.46	4.26	100	154 Average
6 @	2402.00	101.43			102.14	30.48	35.46	4.26	100	1 Peak
7 @	2484.00	39.32	-14.68	54.00	40.06	30.41	35.51	4.36	100	154 Average
8 @	2484.00	49.89	-24.11	74.00	50.63	30.41	35.51	4.36	100	1 Peak

Remark: #5 and #6 Fundamental Signal.



Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 HORIZONTAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch00:2402MHz

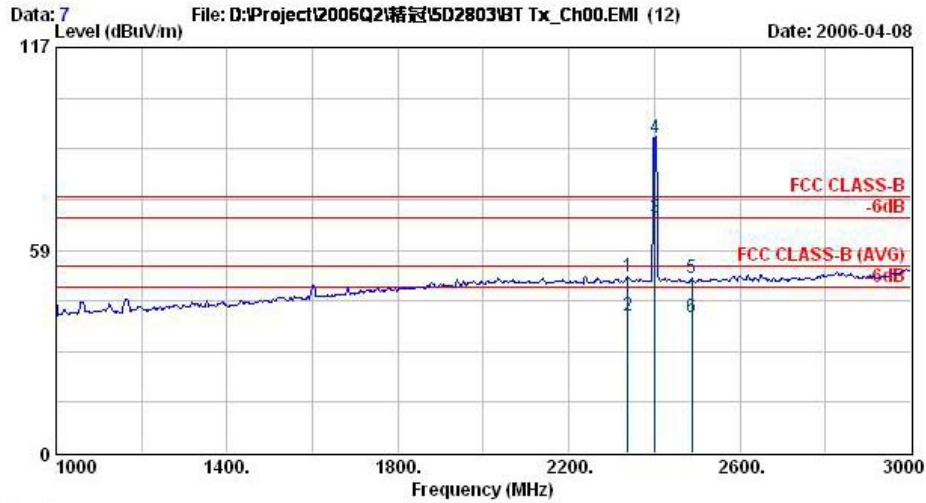


Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 HORIZONTAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch00:2402MHz



- Polarization : Vertical

**The test that passed at minimum margin was marked by the frame in the following table.**

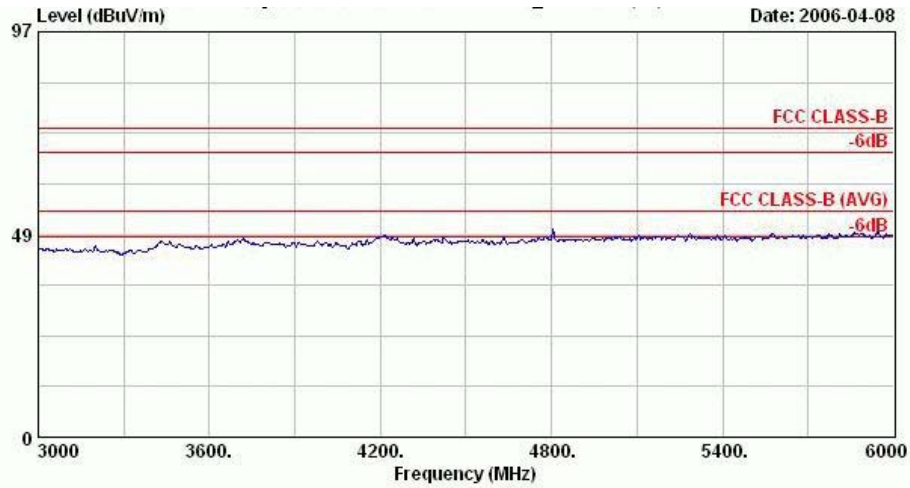


Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch00:2402MHz

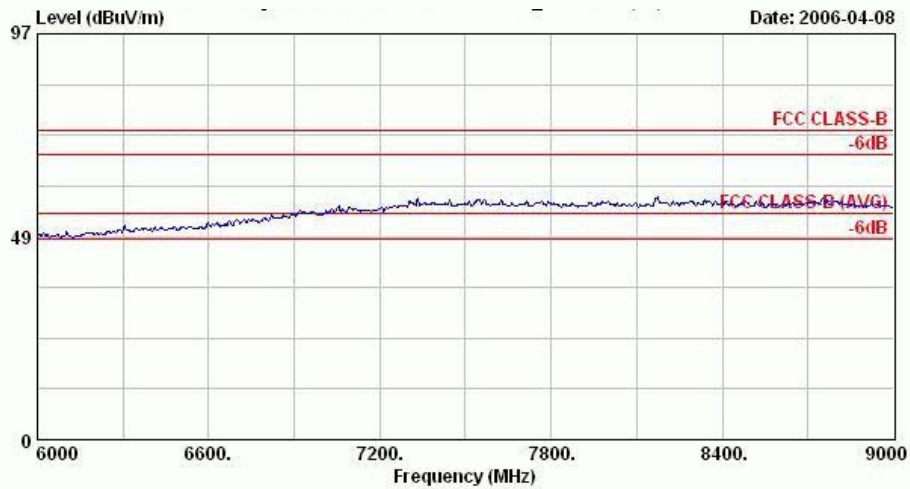
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Preamp Factor	Cable Loss	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	2338.00	51.03	-22.97	74.00	51.74	30.52	35.40	4.17	100	359 Peak
2	2338.00	39.49	-14.51	54.00	40.20	30.52	35.40	4.17	100	359 Average
3 X	2402.00	67.70			68.41	30.48	35.46	4.26	110	163 Average
4 @	2402.00	91.11			91.83	30.48	35.46	4.26	100	359 Peak
5	2488.00	50.26	-23.74	74.00	51.01	30.40	35.51	4.36	100	359 Peak
6	2488.00	39.31	-14.69	54.00	40.06	30.40	35.51	4.36	100	359 Average

Remark: #3 and #4 Fundamental Signal.





Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 VERTICAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch00:2402MHz



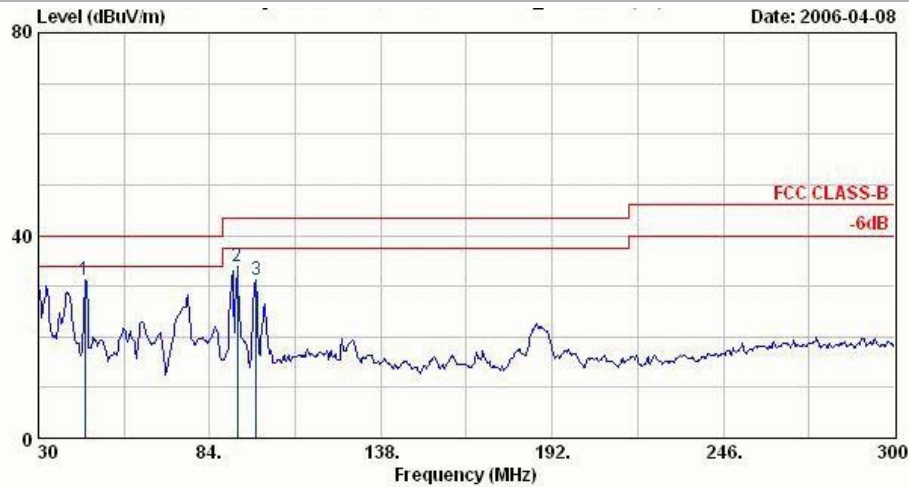
Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 VERTICAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch00:2402MHz





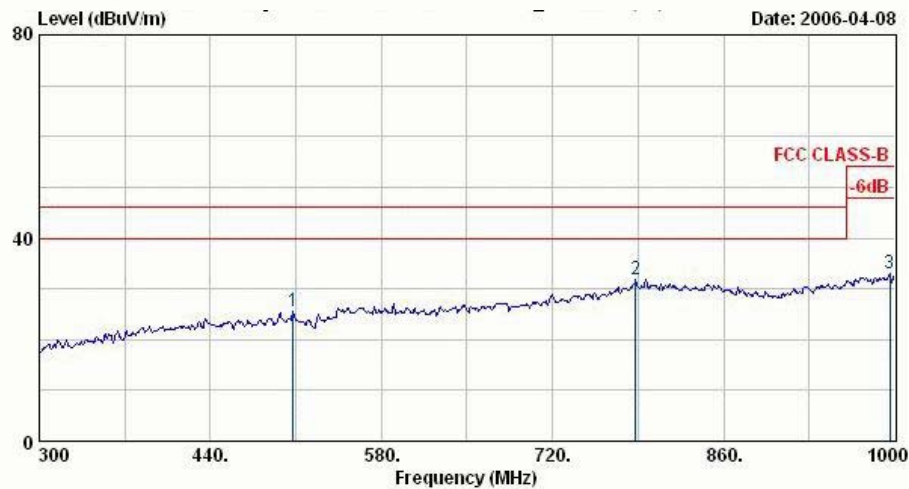
- Test Mode : Mode 2
- Polarization : Horizontal

The test that passed at minimum margin was marked by the frame in the following table.



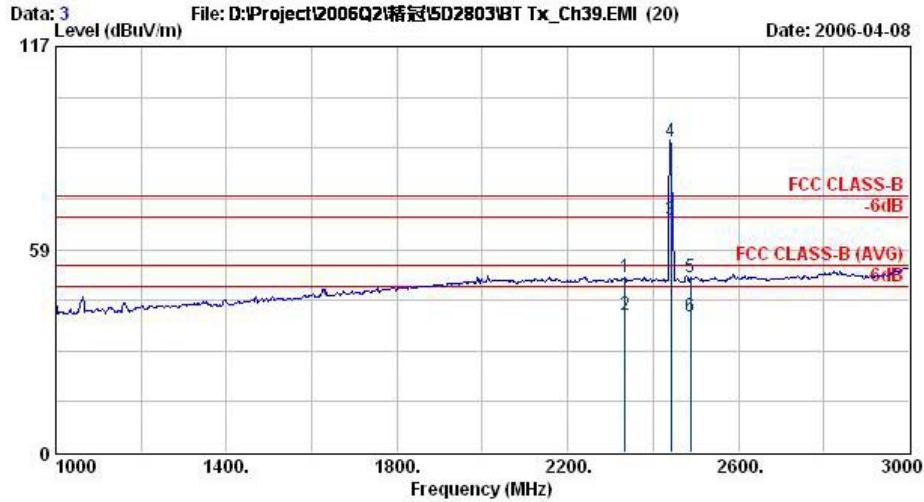
Site : 03CH06-HY  
 Condition : BI-LOG-2004-1122 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	Level	Factor	Factor	Loss	Pos	Pos	
					dBuV	dB/m	dB	dB	cm	deg	
1 @	44.58	31.10	-8.90	40.00	48.99	12.10	31.62	1.63	142	331	Peak
2 @	92.64	33.78	-9.72	43.50	53.45	9.47	31.47	2.34	400	0	Peak
3 @	98.58	31.37	-12.13	43.50	49.95	10.32	31.32	2.42	400	0	Peak



Site : 03CH06-HY  
 Condition : BI-LOG-2004-1122 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

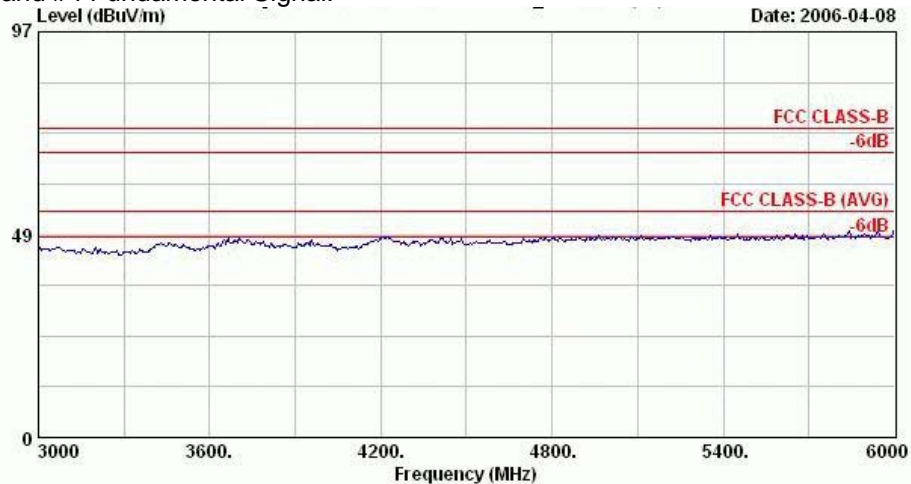
	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	Level	Factor	Factor	Loss	Pos	Pos	
					dBuV	dB/m	dB	dB	cm	deg	
1 @	507.90	25.67	-20.33	46.00	33.38	17.00	30.53	5.81	100	0	Peak
2 @	787.90	31.89	-14.11	46.00	33.07	21.54	30.14	7.42	100	0	Peak
3 @	995.80	32.95	-21.05	54.00	32.20	22.85	30.51	8.41	100	0	Peak



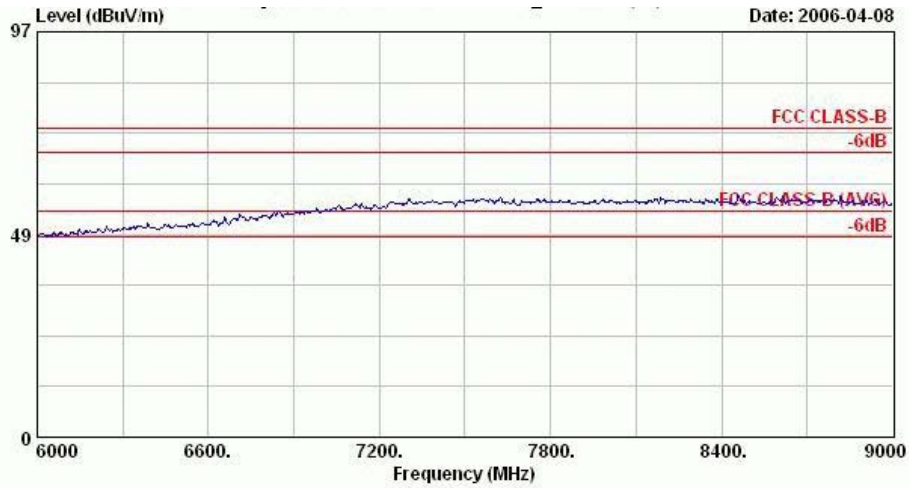
Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR SD2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1 @	2334.00	50.35	-23.65	74.00	51.04	30.54	35.40	4.17	100	359 Peak
2 @	2334.00	39.50	-14.50	54.00	40.20	30.54	35.40	4.17	104	153 Average
3 @	2441.00	66.76			67.49	30.44	35.49	4.33	104	153 Average
4 @	2441.00	89.81			90.54	30.44	35.49	4.33	100	359 Peak
5 @	2488.00	50.40	-23.60	74.00	51.15	30.40	35.51	4.36	100	359 Peak
6 @	2488.00	39.30	-14.70	54.00	40.05	30.40	35.51	4.36	104	153 Average

Remark: #3 and #4 Fundamental Signal.



Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR SD2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

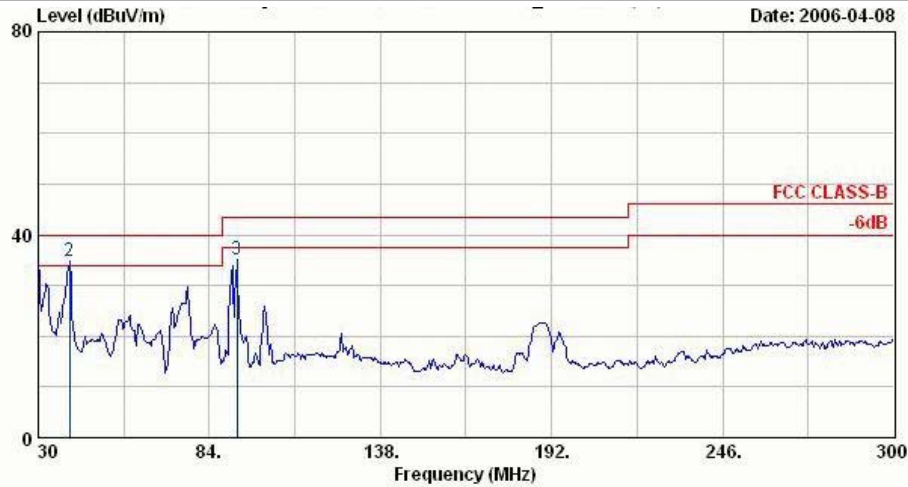


Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 HORIZONTAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch39:2441MHz



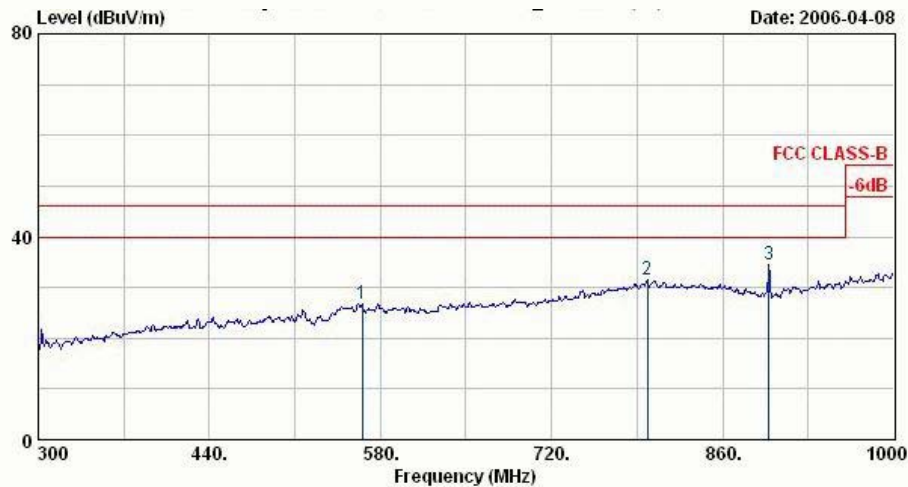
- Polarization : Vertical

The test that passed at minimum margin was marked by the frame in the following table.



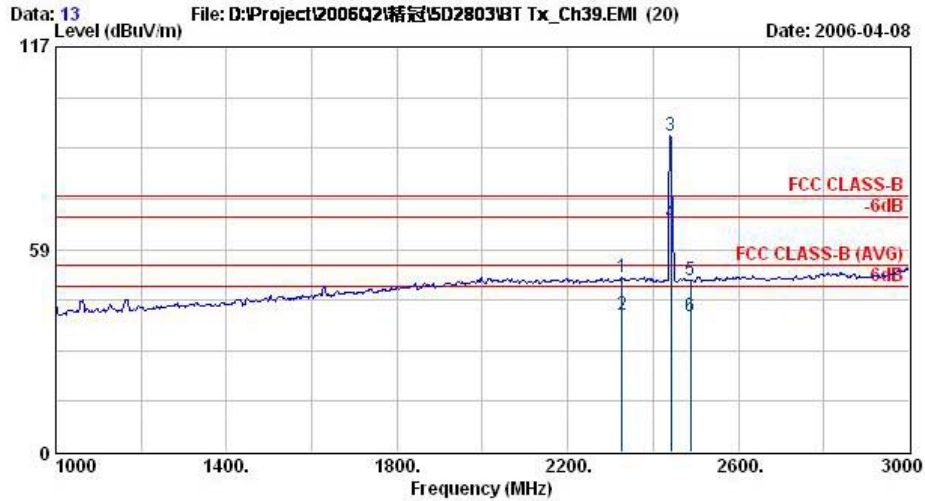
Site : 03CH06-HY  
 Condition : BI-LOG-2004-1122 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	30.00	34.03	-5.97	40.00	45.44	18.73	31.49	1.35	400	0 Peak
2 @	39.99	34.70	-5.30	40.00	50.10	14.83	31.74	1.51	100	244 Peak
3 @	92.64	35.05	-8.45	43.50	54.72	9.47	31.47	2.34	400	0 Peak



Site : 03CH06-HY  
 Condition : BI-LOG-2004-1122 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

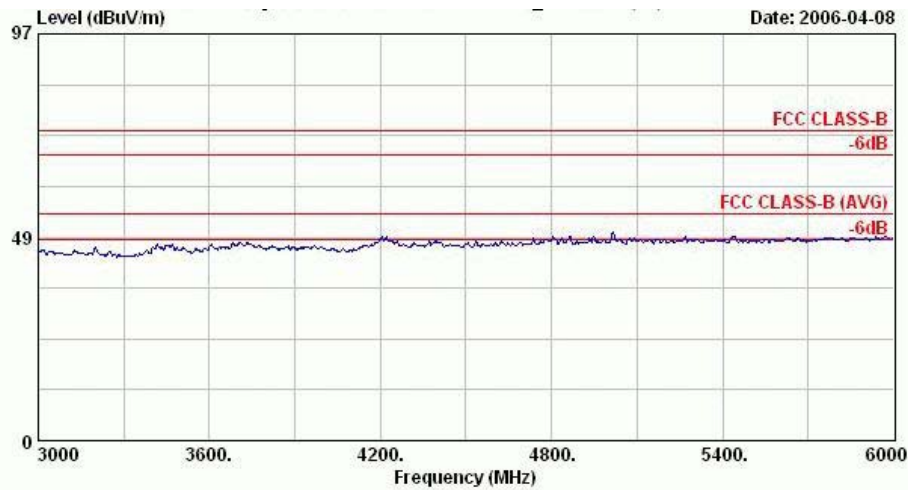
	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	565.30	26.90	-19.10	46.00	32.97	18.46	30.68	6.15	100	0 Peak
2 @	798.40	31.53	-14.47	46.00	32.37	21.84	30.13	7.45	100	0 Peak
3 @	897.80	34.55	-11.45	46.00	37.21	19.98	30.59	7.96	100	0 Peak



Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz

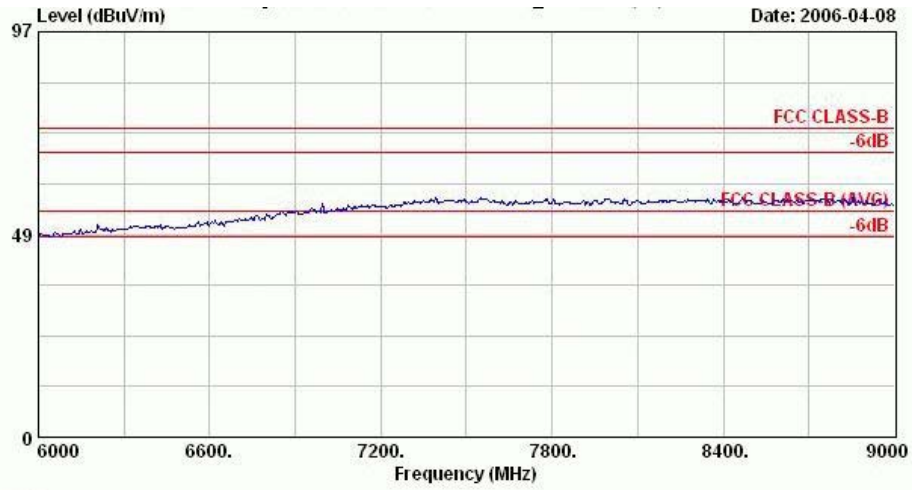
	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2328.00	50.43	-23.57	74.00	51.13	30.54	35.40	4.17	100	6	Peak
2 @	2328.00	39.49	-14.51	54.00	40.19	30.54	35.40	4.17	108	190	Average
3 @	2441.00	91.29			92.01	30.44	35.49	4.33	100	6	Peak
4 @	2441.00	66.06			66.79	30.44	35.49	4.33	108	190	Average
5 @	2488.00	49.64	-24.36	74.00	50.39	30.40	35.51	4.36	100	6	Peak
6 @	2488.00	39.31	-14.69	54.00	40.06	30.40	35.51	4.36	108	190	Average

Remark: #3 and #4 Fundamental Signal.



Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch39:2441MHz





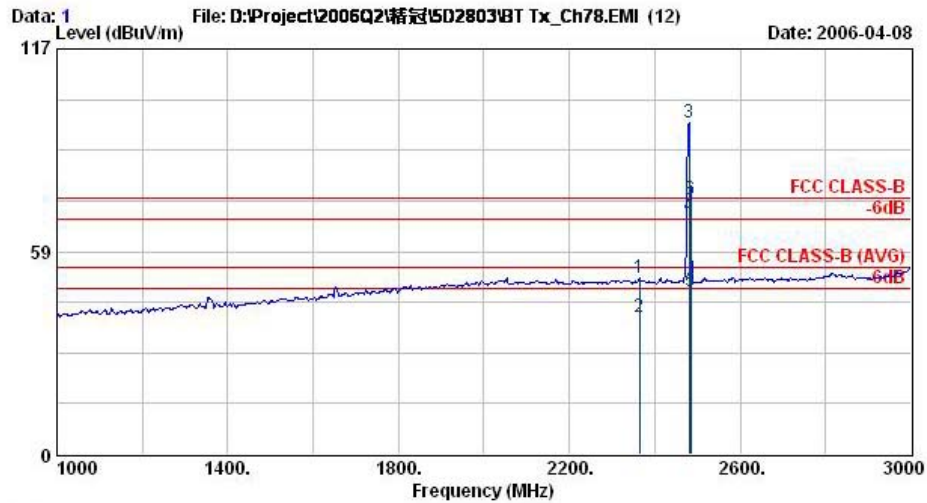
Date: 2006-04-08

Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 VERTICAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch39:2441MHz



- Test Mode : Mode 3
- Polarization : Horizontal

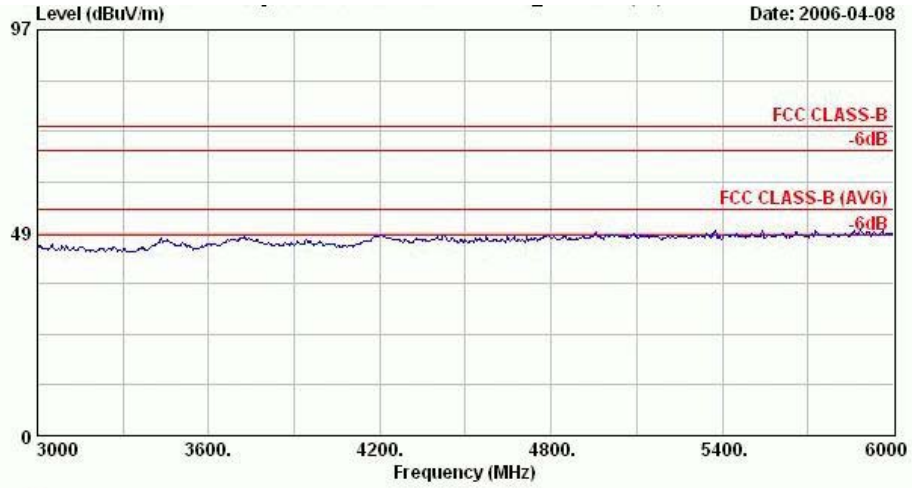
**The test that passed at minimum margin was marked by the frame in the following table.**



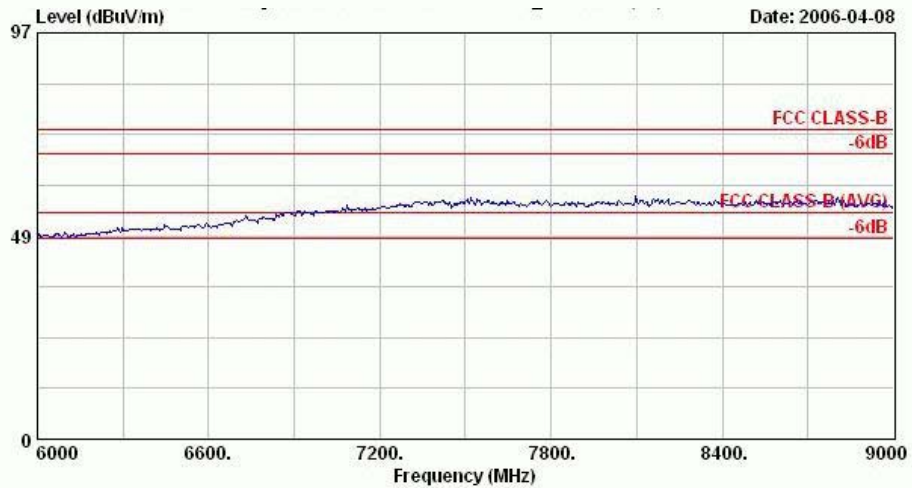
Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 HORIZONTAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch78.2480MHz

	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2364.00	50.74	-23.26	74.00	51.45	30.51	35.42	4.20	100	360	Peak
2 @	2364.00	39.43	-14.57	54.00	40.14	30.51	35.42	4.20	100	156	Average
3 @	2480.00	95.53			96.27	30.41	35.51	4.36	100	360	Peak
4 @	2480.00	68.90			69.64	30.41	35.51	4.36	100	156	Average
5 @	2483.50	46.76	-7.24	54.00	47.50	30.41	35.51	4.36	100	156	Average
6 @	2483.50	73.34	-0.66	74.00	74.08	30.41	35.51	4.36	100	360	Peak

Remark: #3 and #4 Fundamental Signal.



Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 HORIZONTAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch78:2480MHz



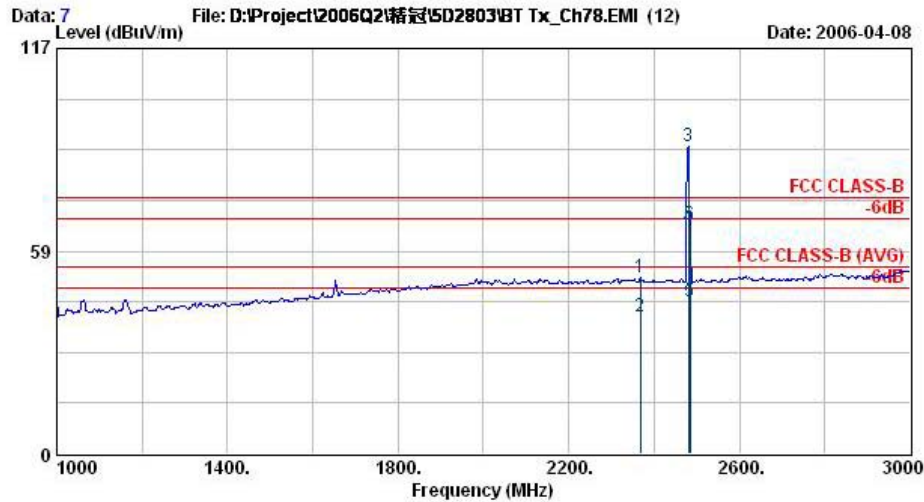
Site : 03CH06-HY  
Condition : HF-ANT-071025-940201 HORIZONTAL  
EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
Power : For Notebook  
Model : FR 5D2803  
Memo : Bluetooth Tx\_Ch78:2480MHz





- Polarization : Vertical

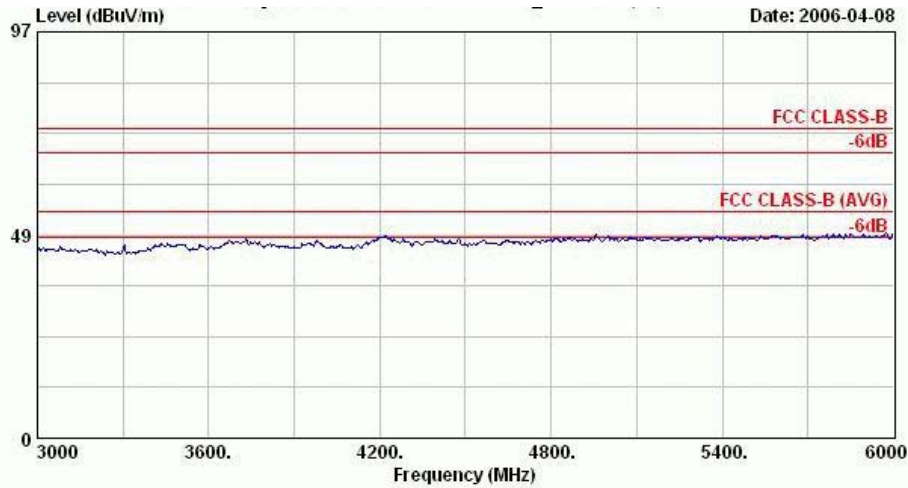
The test that passed at minimum margin was marked by the frame in the following table.



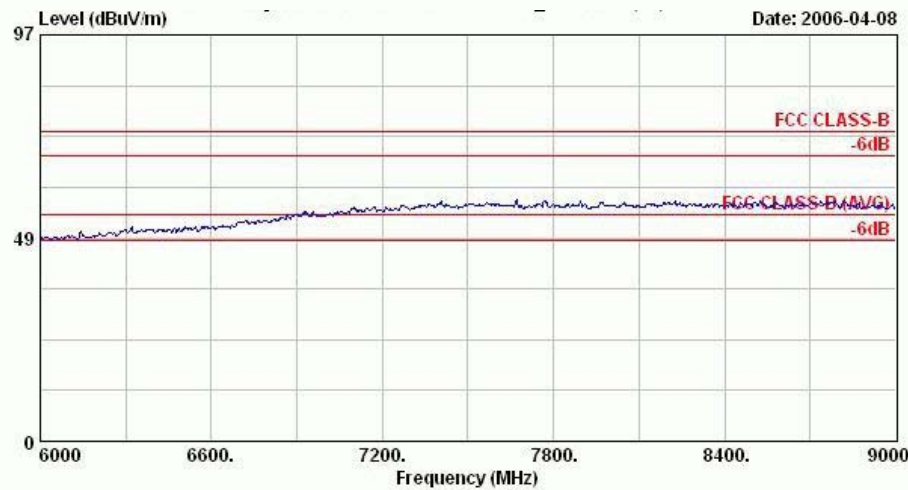
Site : 03CH06-HY  
 Condition : HF-ANT-071025-940201 VERTICAL  
 EUT : Bluetooth Headset\_BC03-MM\_7\*7(Sporty)  
 Power : For Notebook  
 Model : FR 5D2803  
 Memo : Bluetooth Tx\_Ch78:2480MHz

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2368.00	50.99	-23.01	74.00	51.69	30.51	35.44	4.23	100	357	Peak
2 @	2368.00	39.39	-14.61	54.00	40.09	30.51	35.44	4.23	104	162	Average
3 @	2480.00	88.72			89.46	30.41	35.51	4.36	100	357	Peak
4 @	2480.00	65.26			66.00	30.41	35.51	4.36	104	162	Average
5 @	2483.50	43.75	-10.25	54.00	44.49	30.41	35.51	4.36	104	162	Average
6 @	2483.50	66.19	-7.81	74.00	66.93	30.41	35.51	4.36	100	357	Peak

Remark: #3 and #4 Fundamental Signal.



Site : 03CH06-HY  
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Site : 03CH06-HY  
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Memo : Bluetooth Tx\_Ch78:2480MHz

Remark: There is no more obvious spurious emission except the listings above.



## **5.10 Antenna Requirements**

### **5.10.1 Standard Applicable**

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

And according to FCC 47 CFR Section 15.247 (b), if directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

### **5.10.2 Antenna Connected Construction**

The antenna used in this product is PCB antenna. There is no connector on antenna port and it is considered to meet antenna requirement of FCC.

### **5.10.3 Antenna Gain**

The antenna gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 6. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Oct. 19, 2005	Oct. 19, 2006	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/009	9kHz – 30MHz	Apr. 26, 2005	Apr. 26, 2006	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Apr. 20, 2005	Apr. 20, 2006	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450Hz	N/A	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 – 60Hz	N/A	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9kHz – 30MHz	Dec. 22, 2005	Dec. 22, 2006	Conduction (CO01-HY)
Spectrum analyzer	Agilent	E4408B	MY44211030	9KHz-26.5GHz	Jul. 25, 2005	Jul. 24, 2006	Radiation (03CH06-HY)
Receiver	R&S	ESCS30	100356	9KHz-2.75GHz	Jun. 28, 2005	Jun. 27, 2006	Radiation (03CH06-HY)
Controller	CT	SC100	N/A	N/A	N/A	N/A	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Nov. 22, 2004	Nov. 22, 2006	Radiation (03CH06-HY)
Horn Antenna	Com-Power	AH118	071025	1G-18G	Feb. 1, 2005	Feb. 1, 2007	Radiation (03CH06-HY)
SHF-EHF Horn	SCHWARZBECK	BBHA 9170	9170-249	14G - 40G	Jul. 21, 2005	Jul. 20, 2006	Radiation (03CH06-HY)
Amplifier	MITEQ	AMF-6F	997165	26G - 40G	Jul. 21, 2005	Jul. 20, 2006	Radiation (03CH06-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	N/A	Radiation (03CH06-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	N/A	Radiation (03CH06-HY)



## 7. Uncertainty Evaluation

### Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of $x_i$		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.10	Normal(k=2)	0.05
Cable loss	0.10	Normal(k=2)	0.05
AMN insertion loss	2.50	Rectangular	0.63
Receiver Spec	1.50	Rectangular	0.43
Site imperfection	1.39	Rectangular	0.80
Mismatch	+0.34/-0.35	U-shape	0.24
<b>combined standard uncertainty Uc(y)</b>	<b>1.13</b>		
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>2.26</b>		

### Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of $x_i$		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.41	Normal(k=2)	0.21
Antenna factor calibration	0.83	Normal(k=2)	0.42
Cable loss calibration	0.25	Normal(k=2)	0.13
Pre Amplifier Gain calibration	0.27	Normal(k=2)	0.14
RCV/SPA specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site imperfection	1.43	Rectangular	0.83
Mismatch	+0.39/-0.41	U-shaped	0.28
<b>combined standard uncertainty Uc(y)</b>	<b>1.27</b>		
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>2.54</b>		



**Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)**

Contribution	Uncertainty of $x_i$		$u(x_i)$	$C_i$	$C_i * u(x_i)$
	dB	Probability Distribution			
Receiver reading	±0.10	Normal(k=1)	0.10	1	0.10
Antenna factor calibration	±1.70	Normal(k=2)	0.85	1	0.85
Cable loss calibration	±0.50	Normal(k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20 \log(1 - \Gamma_1 * \Gamma_2 * \Gamma_3)$	+0.34/-0.35	U-shaped	0.244	1	0.244
<b>Combined standard uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring uncertainty for a level of confidence of 95% <math>U = 2U_c(y)</math></b>	<b>4.72</b>				