



FCC / IC TEST REPORT

for

47 CFR Part 15 Subpart C and RSS-210 Issue 6

Equipment : Personal Navigation Device
Trade Name : Pioneer
Model No. : AVIC-S1
FCC ID : P4QAVIC-S1
IC ID : 2420C-AVICS1
Filing Type : Certification
Applicant : **Mitac International Corporation**
6th FL., NO. 187, TIDING BLVD., SEC. 2, TAIPEI, TAIWAN, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
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- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**
- The data shown in this test report were carried out on May 06, 2006 at **Sporton International Inc. LAB.**
- Report No.: FR642514, Report Version: Rev. 01

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Report Version: Rev. 01



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History of this test report

Report Issue Date: May 10, 2006

Report No.	Description



1. General Description of Equipment under Test

1.1 Applicant

Mitac International Corporation

6th FL., NO. 187, TIDING BLVD., SEC. 2, TAIPEI, TAIWAN, R.O.C.

1.2 Manufacturer

Mitac Computer (KunShan) Co., Ltd.

No. 269, 2nd Road, Export Processing Zone, Changjiang South Road, KunShan, JiangSu prov. China

1.3 Basic Description of Equipment under Test

Equipment	: Personal Navigation Device
Trade Name	: Pioneer
Model No.	: AVIC-S1
FCC ID	: P4QAVIC-S1
IC ID	: 2420C-AVICS1
Power Supply Type	: Switching
AC Power Cord	: AC 120V, Non-shielded, Wall-mount, 1.2 meter, 2 pin

**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)	0.55 dBm		
7.	Type of Antenna Connector	N/A		
8.	Antenna Type	PIFA Antenna		
9.	Antenna Gain	-1.5 dBi		
10.	Function Type	Transmitter		Transceiver V
11.	Power Rating (DC/AC Voltage) :	3.7V / 1200mA		



2 Test Configuration of Equipment under Test

2.1 Test Manner

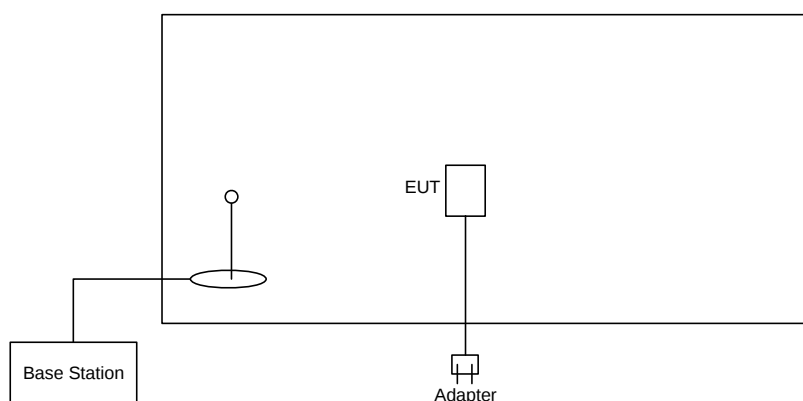
- The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
- For spurious emission below 1GHz, only one channel of each application was tested because it is not related to channel selection.
- The EUT is programmed to transmit signal continuously for all testings.
- 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: GPS Rx + BT Link + TMC + MP3 Player + DC Charger + Adapter Mode 2: GPS Rx + BT Link + TMC + MP3 Player + DC Charger + USB Link

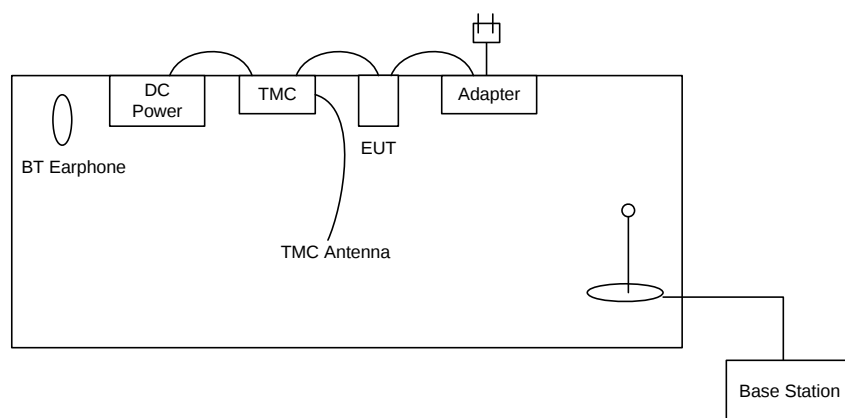
2.3 Connection Diagram of Test System

Radiated Emission

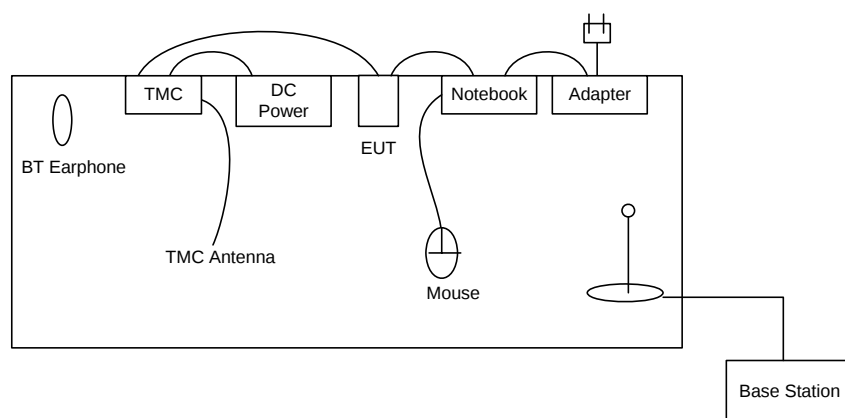


Conducted Emission

<Mode 1>



<Mode 2>


2.4 Ancillary Equipment List

Item	Asset	Trade Name	Model Name	Power Cord
1.	Notebook	DELL	D400	Non-shielded
2.	Base Station	R&S	CMU200	N/A
3.	(USB)Mouse	Microsoft	B75-00093	Non-shielded, 1.8 m
4.	Bluetooth Earphone	Free Style	JD-100	N/A
5.	GPS Station	T&E	GP-50	N/A
6.	Earphone	N/A	N/A	N/A
7.	DC Power Supply	GW	GPC-60300	N/A
8.	USB Cable	N/A	N/A	Weave-shielded, 1 m



3. RF Utility

The programmed RF Utility is installed in EUT 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 and RSS-210 Issue 6

4.4 Frequency Range Investigated

a. 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	IC Rule	Description of Test	Result
15.207	6.2.2 (o)(a3)	Conducted Emission	Pass
<u>15.247(a) (1)</u>	6.2.2 (o)(a3)	Hopping Channel Bandwidth	Pass
15.247(a)(1)	6.2.2 (o)(a3)	Hopping Channel Separation	Pass
15.247(a)(1)(iii)	6.2.2 (o)(a3)	Number of Hopping Frequency Used	Pass
15.247(a)(1)(iii)	6.2.2(o)(a3) & Amendment 1	Dwell Time of Each Frequency	Pass
15.247(b)	6.2.2 (o)(e1)	Output Power	Pass
15.247(c)	6.6 & 7.4	100kHz Bandwidth of Frequency Band Edges	Pass
15.209(a)	6.2.2 (o)(e1)	Radiated Emission	Pass
15.203 15.247(b)(4)	6.2.2 (o)(e2) & 6.2.2 (o)(a3)	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 : 24°C
- Relative Humidity : 55%
- Test Enginner : James
- 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	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	(cm)	(deg)	
2390.00	50.02	-23.98	74.00	50.96	30.26	4.26	35.46	100	360	Peak
2390.00	39.04	-14.96	54.00	39.98	30.26	4.26	35.46	100	346	Average

CH00 (Vertical)

Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	(cm)	(deg)	
2390.00	49.85	-24.15	74.00	50.78	30.26	4.26	35.46	100	0	Peak
2390.00	38.68	-15.32	54.00	39.62	30.26	4.26	35.46	100	279	Average

**CH78 (Horizontal)**

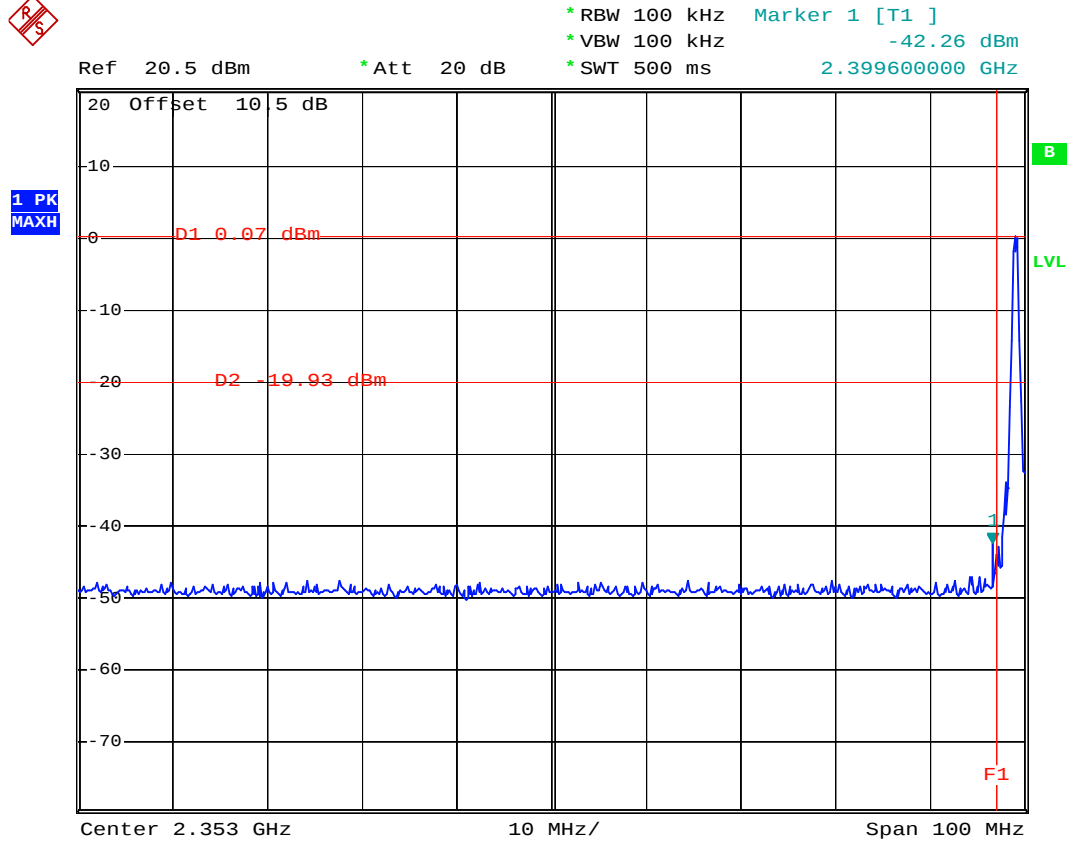
Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	(cm)	(deg)	
2483.50	64.90	-9.10	74.00	65.76	30.29	4.36	35.51	100	257	Peak
2483.50	48.15	-5.85	54.00	49.01	30.29	4.36	35.51	100	360	Average

CH78 (Vertical)

Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	(cm)	(deg)	
2483.50	65.80	-8.20	74.00	66.66	30.29	4.36	35.51	100	0	Peak
2483.50	49.33	-4.67	54.00	50.19	30.29	4.36	35.51	100	348	Average

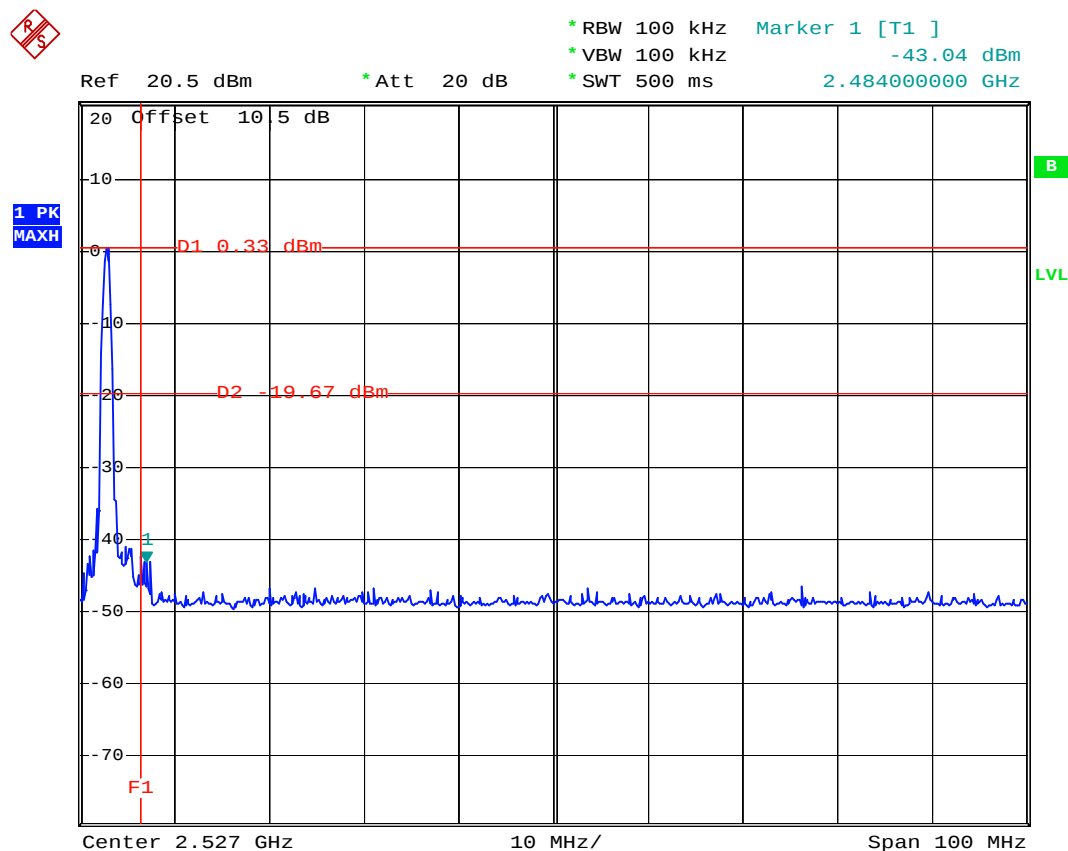
**5.2.5 20dB Band Edge**

CH00



Date: 4.MAY.2006 15:24:59

CH78



Date: 4.MAY.2006 15:23:49

5.3 Hopping Channel Separation

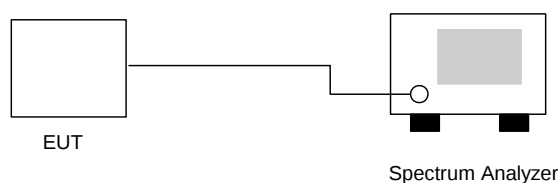
5.3.1 Measuring Instruments :

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

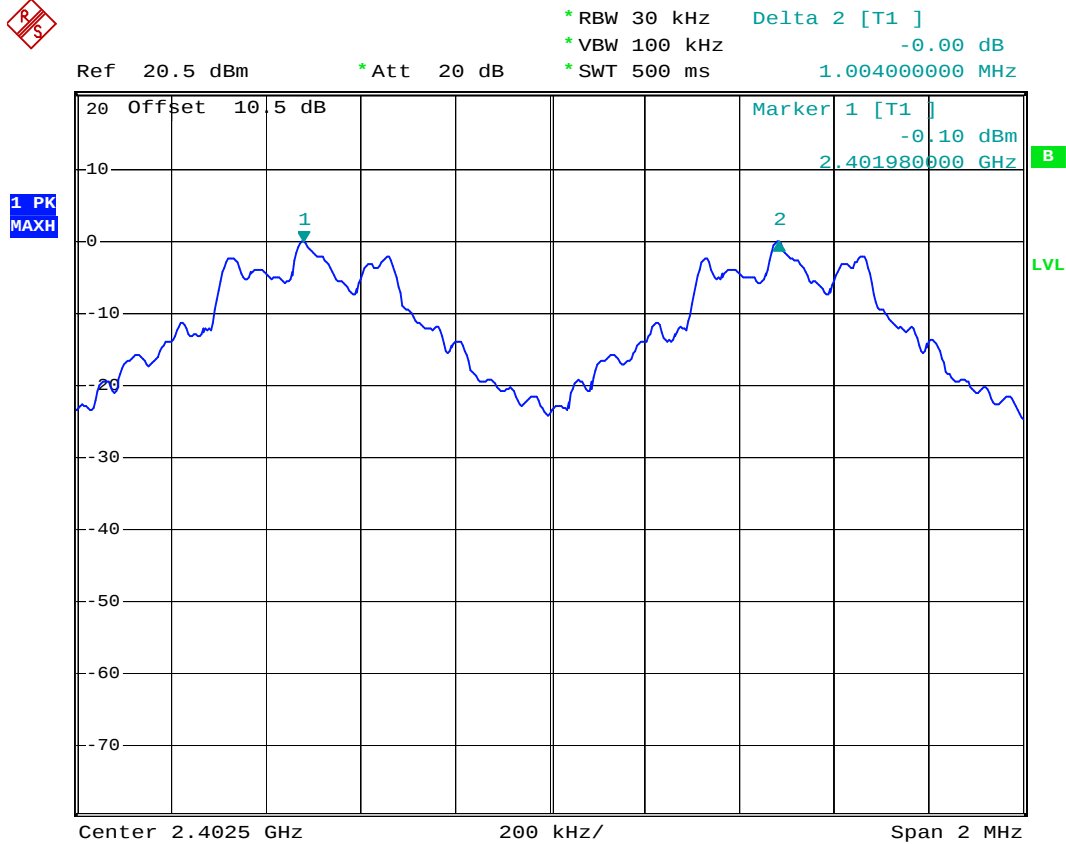
- Application Type : BT
- Temperature : 24°C
- Relative Humidity : 55%
- Test Enginner : James

		Carrier Frequency		Limits	Plot
Channel	Frequency (MHz)	Separation (MHz)		(MHz)	Ref. No.
00	2402	1.004		0.834	Mode 1
39	2441	0.996		0.832	Mode 2
78	2480	1.004		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**

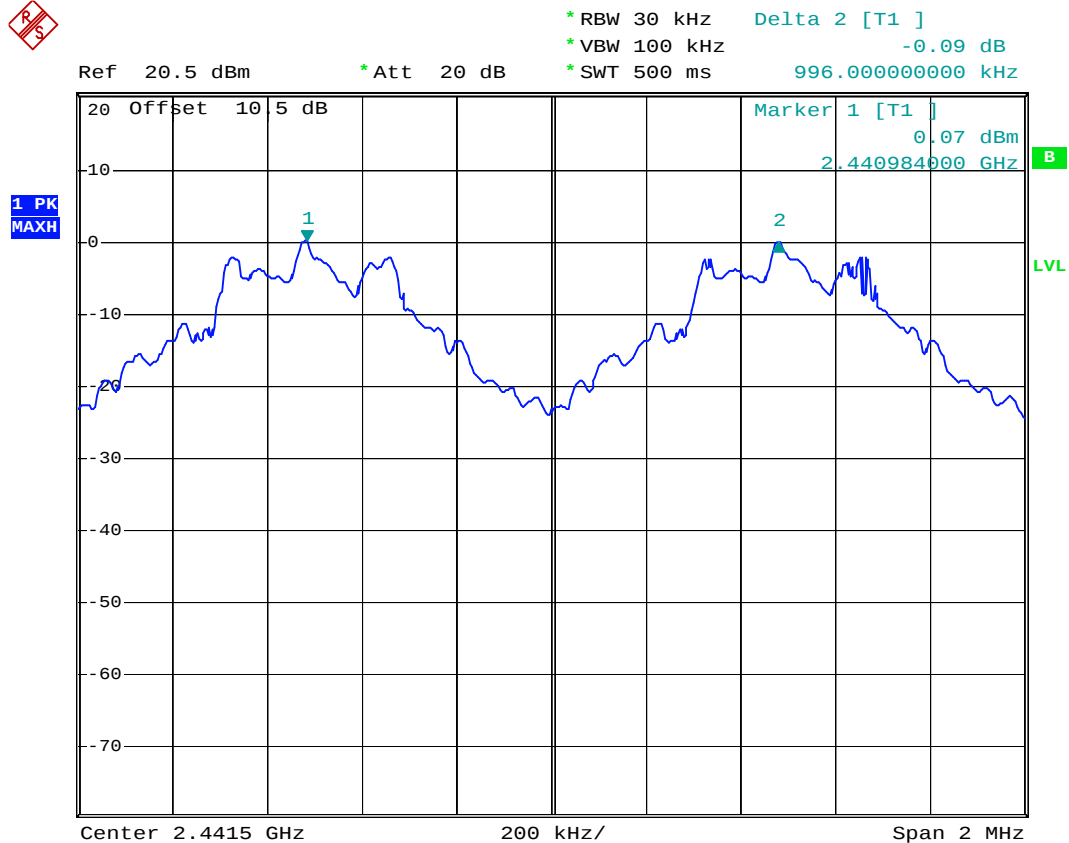
Mode 1



Date: 4.MAY.2006 15:28:01



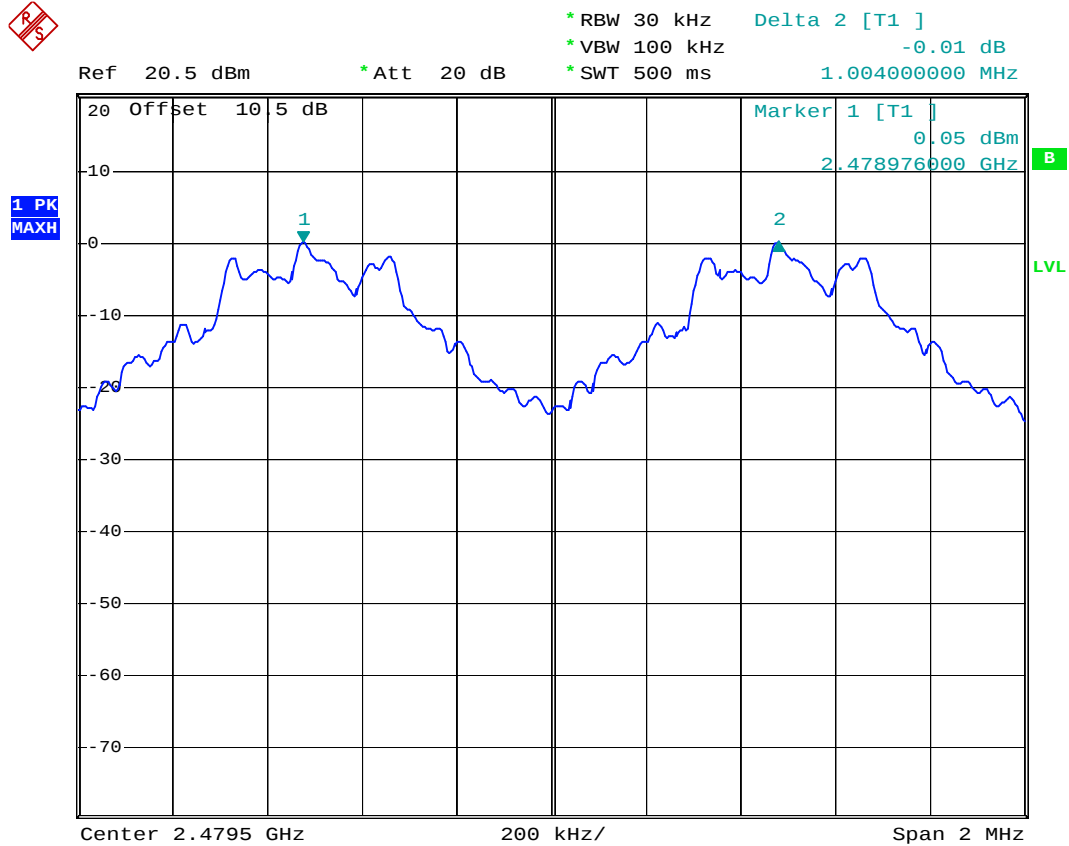
Mode 2



Date: 4.MAY.2006 15:29:33



Mode 3



Date: 4.MAY.2006 15:31:58

5.4 Number of Hopping Frequency

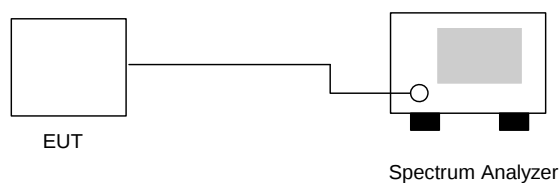
5.4.1 Measuring Instruments :

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.

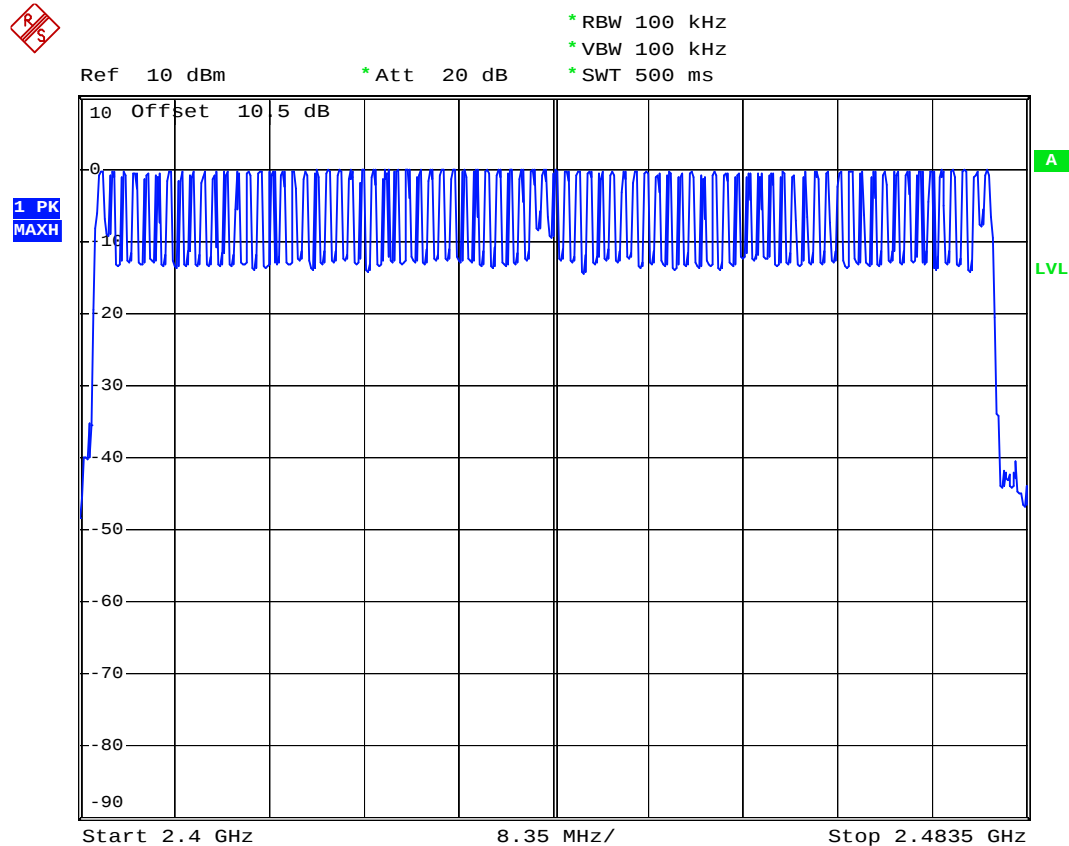
5.4.3 Test Setup Layout :



5.4.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
- Temperature : 24°C,
- Relative Humidity : 55%
- Test Enginner : James

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

**5.4.5 Number of Hopping Frequency**

Date: 4.MAY.2006 16:30:23

5.5 Hopping Channel Bandwidth

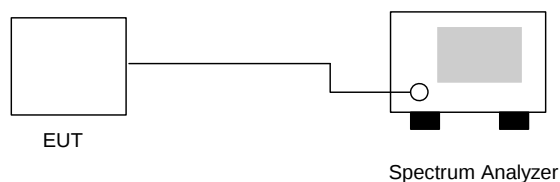
5.5.1 Measuring Instruments :

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 :



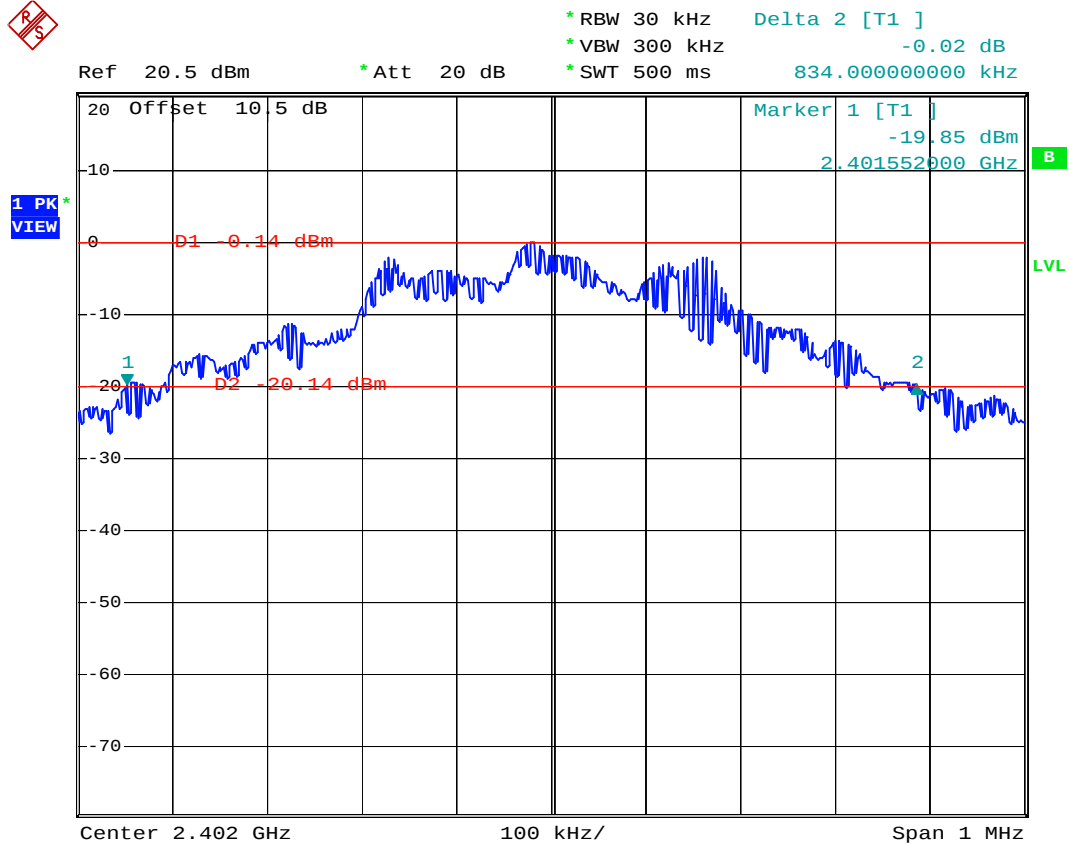
5.5.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
- Temperature : 24°C,
- Relative Humidity : 52%
- Test Enginner : Andy

Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	0.834	1.000	Mode 1
39	2441	0.832	1.000	Mode 2
78	2480	0.830	1.000	Mode 3

**5.5.5 Hopping Channel Bandwidth**

Mode 1



Date: 4.MAY.2006 15:19:31

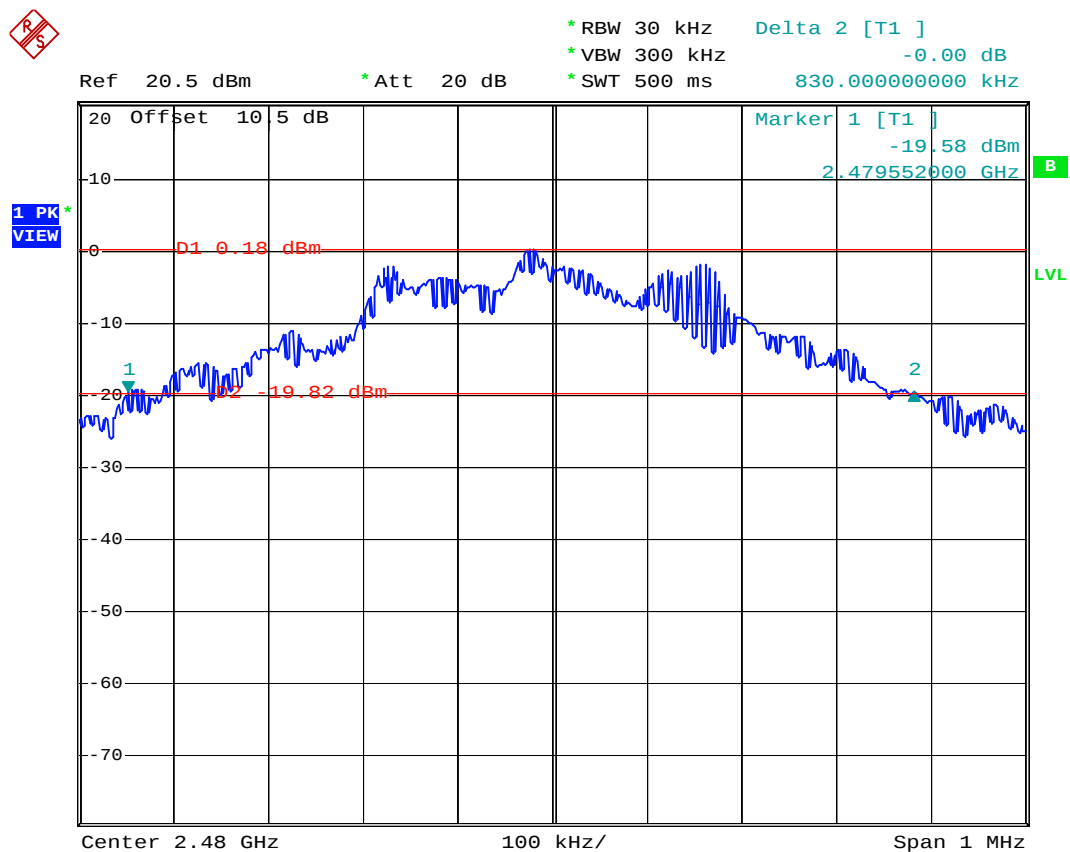


Mode 2



Date: 4.MAY.2006 15:20:35

Mode 3



Date: 4.MAY.2006 15:22:02

5.6 Dwell Time of Each Frequency

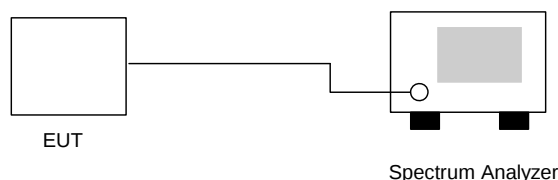
5.6.1 Measuring Instruments :

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 : 24°C
- Relative Humidity : 55%
- Test Enginner : James

Ch00

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	8.1	532	0.136	0.4
DH3	4.4	1802	0.251	0.4
DH5	3.6	3052	0.347	0.4

**CH39**

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	7.9	532	0.133	0.4
DH3	4.7	1792	0.266	0.4
DH5	2.9	3072	0.282	0.4

CH78

Package Mode	Average Hopping Channel	Package Transfer Time (us)	Dwell Time (s)	Limit (s)
DH1	8.3	532	0.140	0.4
DH3	3.7	1792	0.210	0.4
DH5	3.4	3072	0.330	0.4

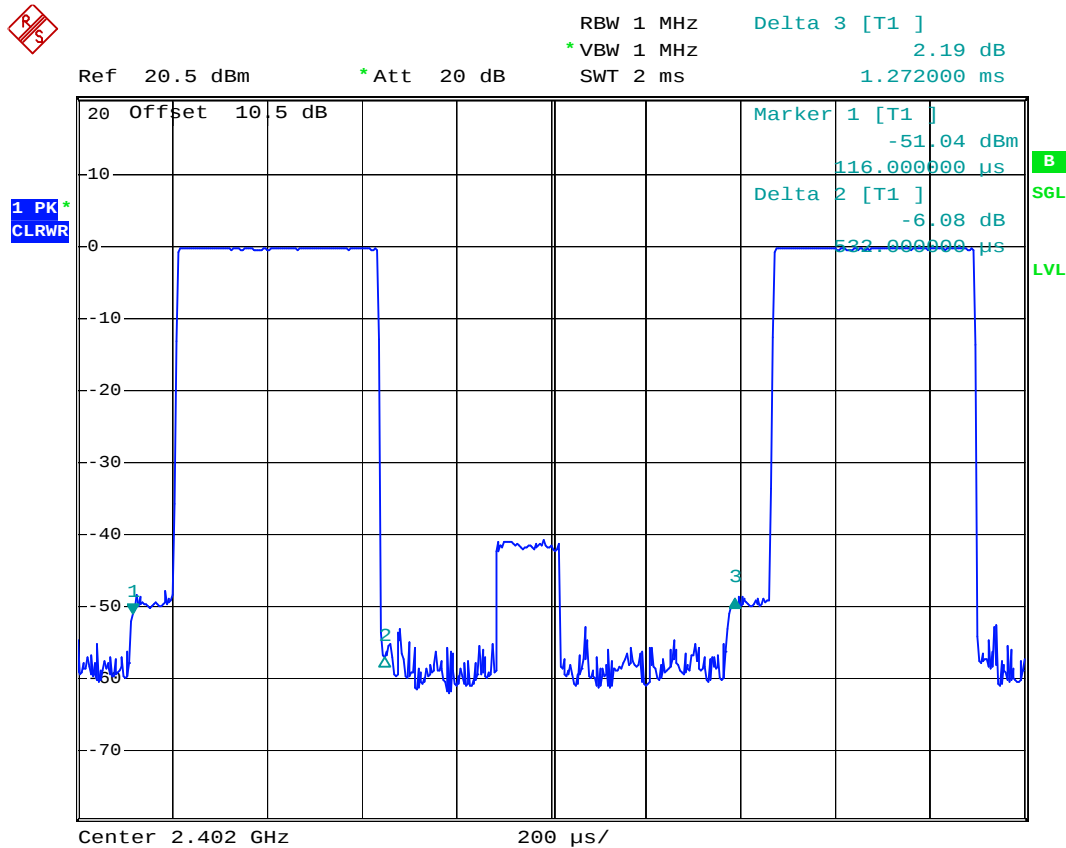
Remark:

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

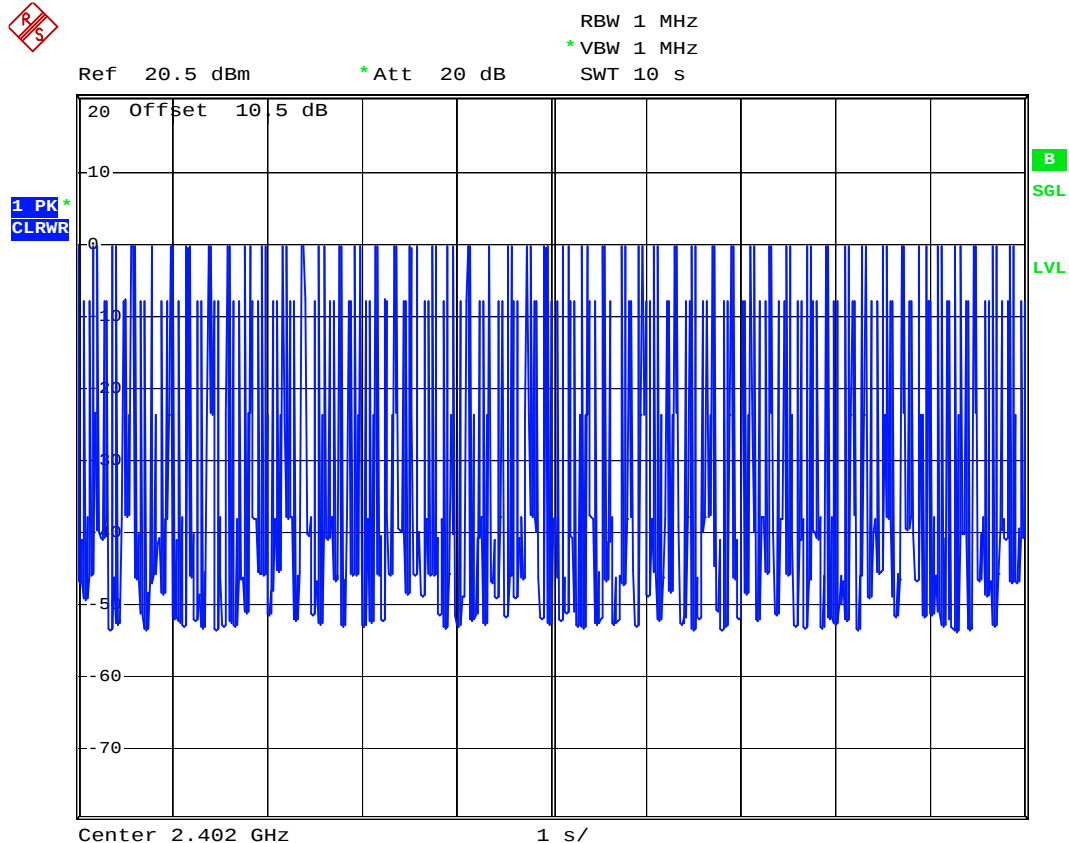


5.6.5 Dwell Time

DH1 (CH00)



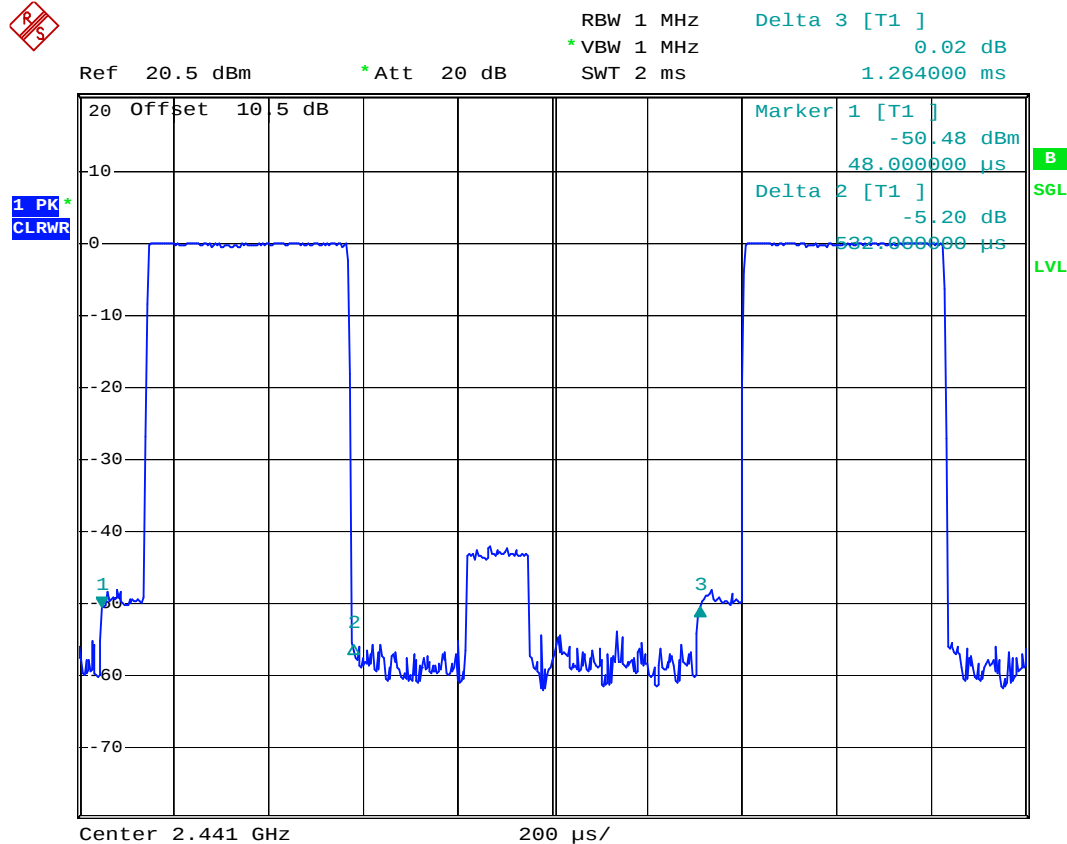
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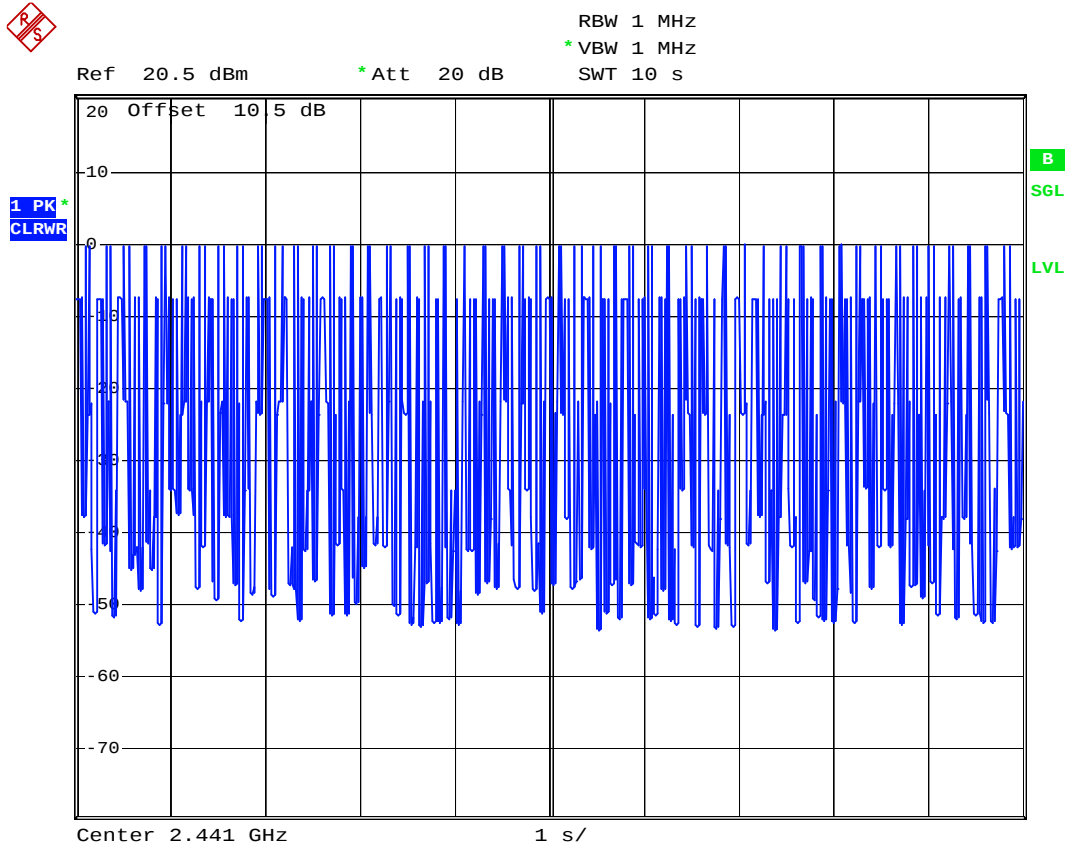
Date: 4.MAY.2006 15:42:28



DH1 (CH39)



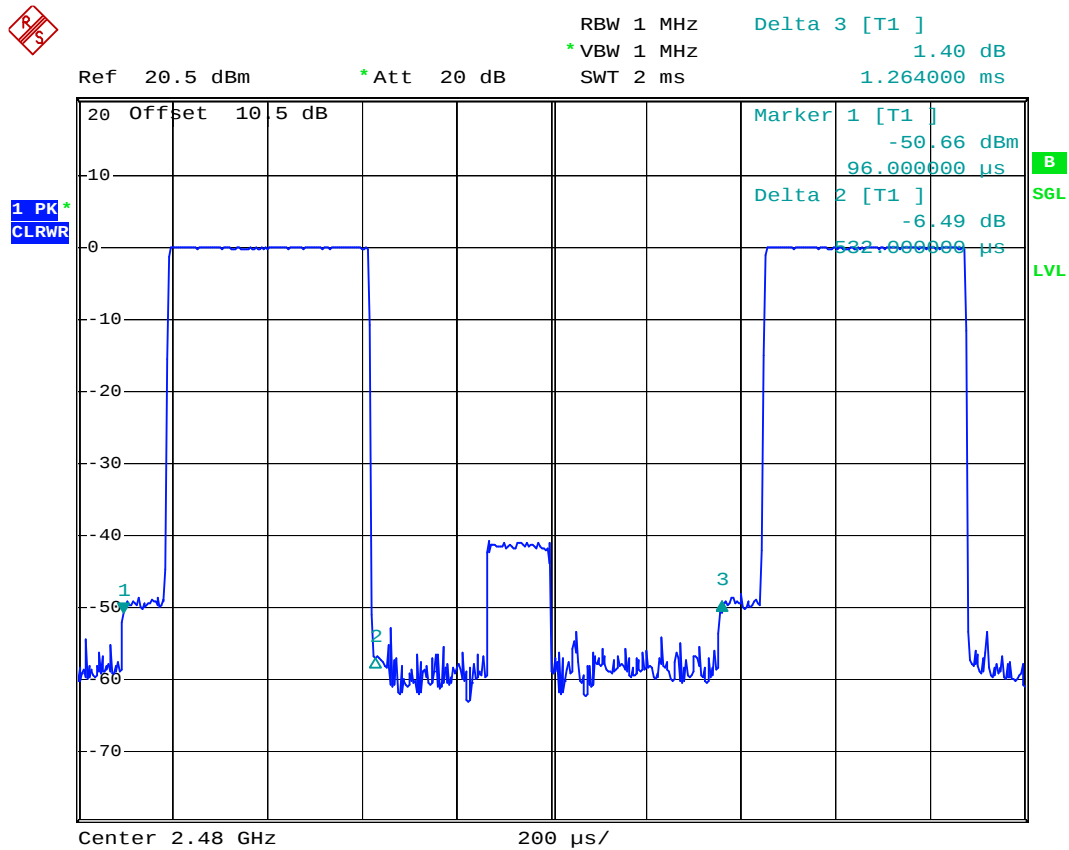
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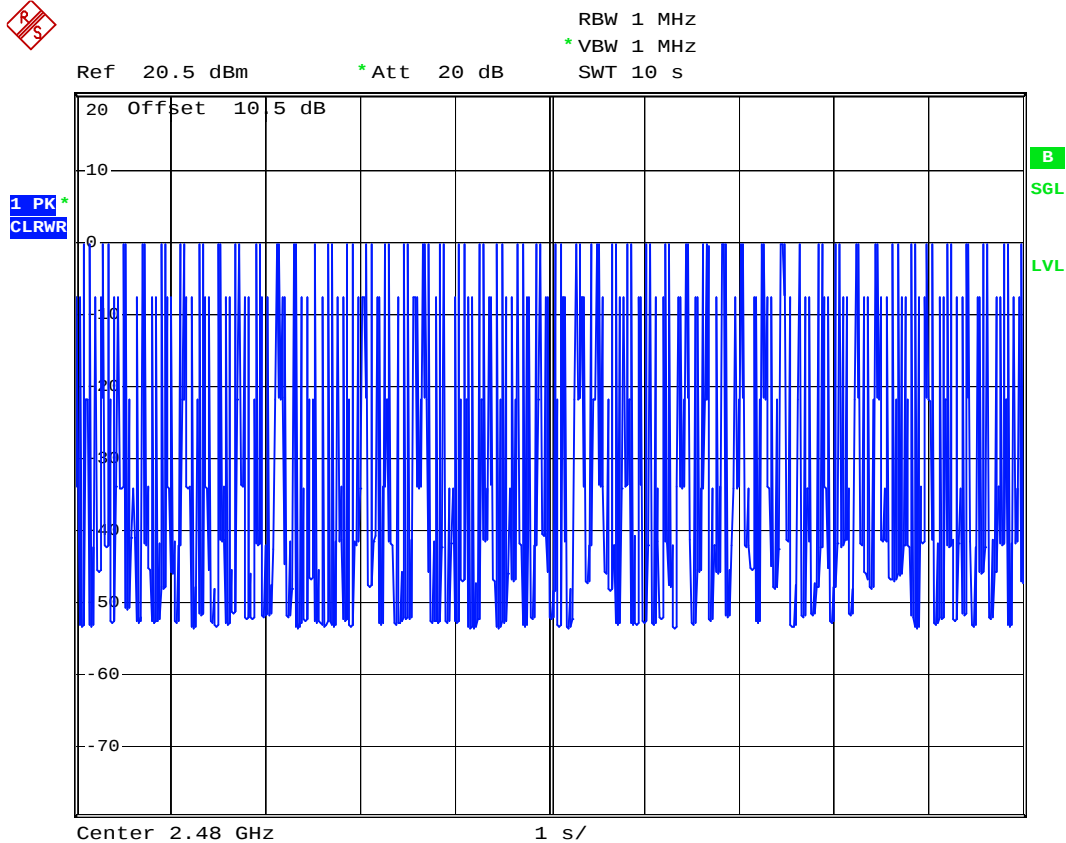
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DH1 (CH78)



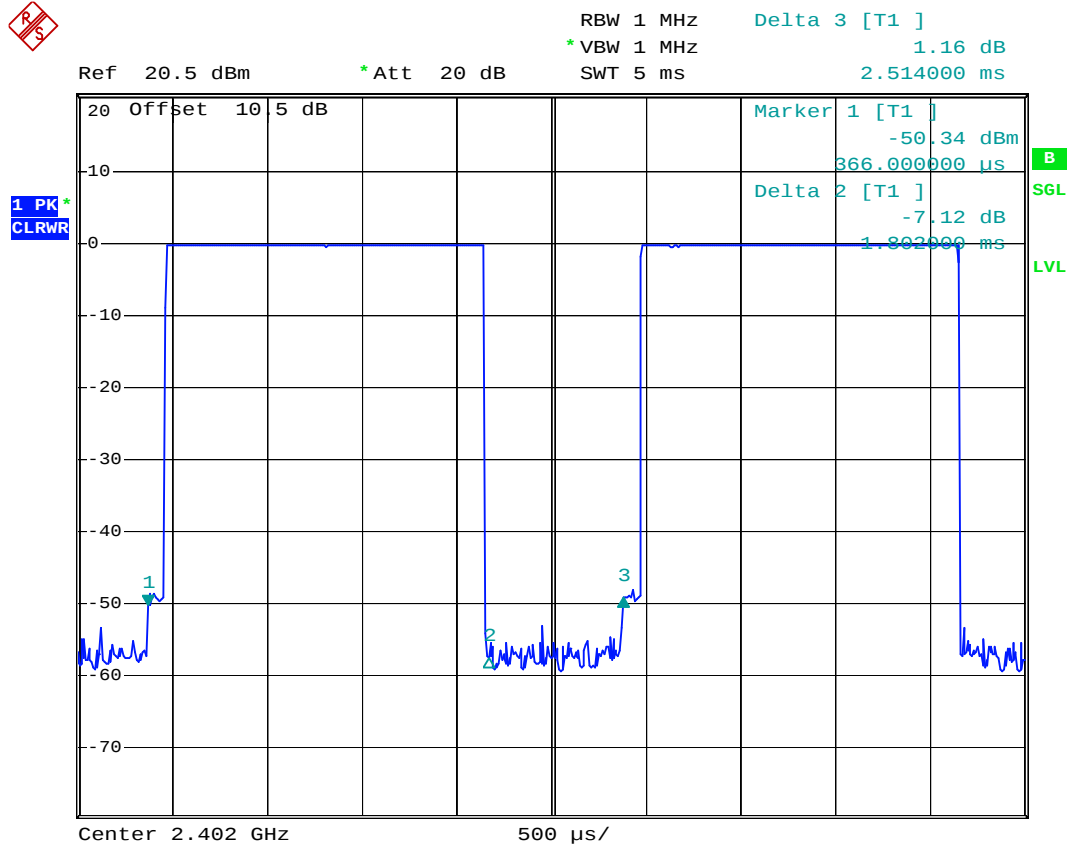
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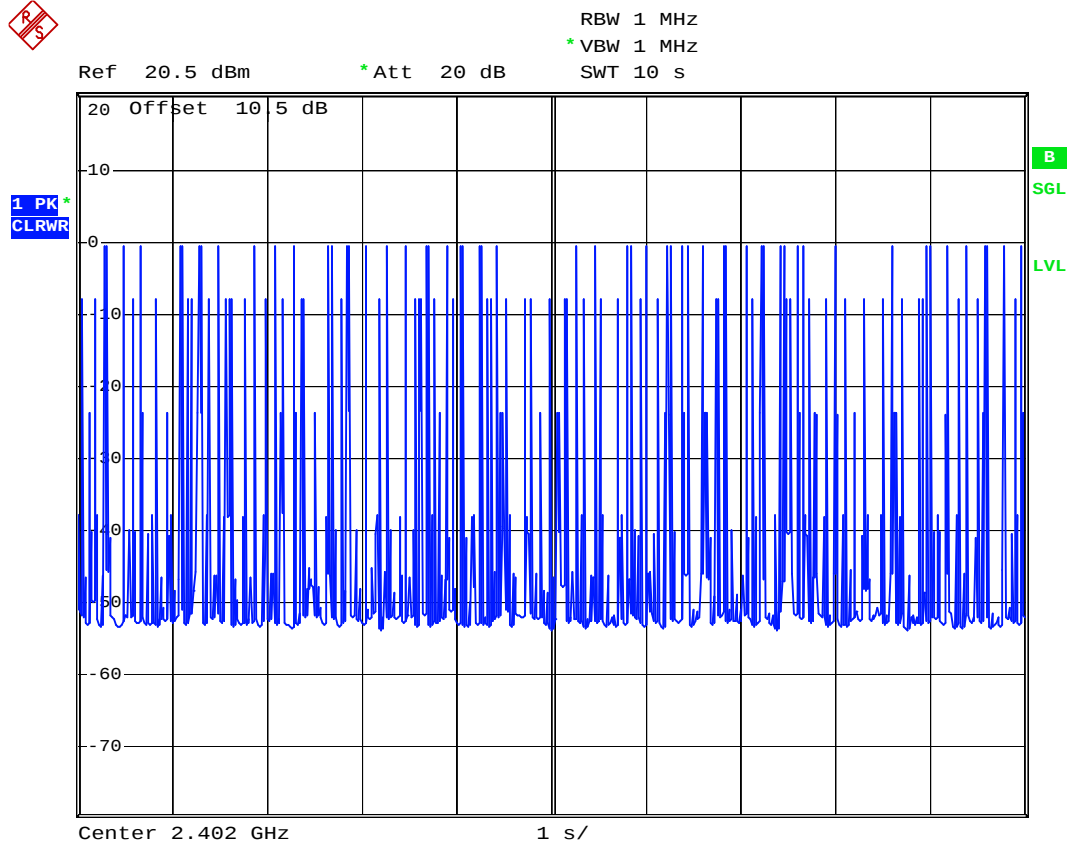
Date: 4.MAY.2006 15:46:40



DH3 (CH00)



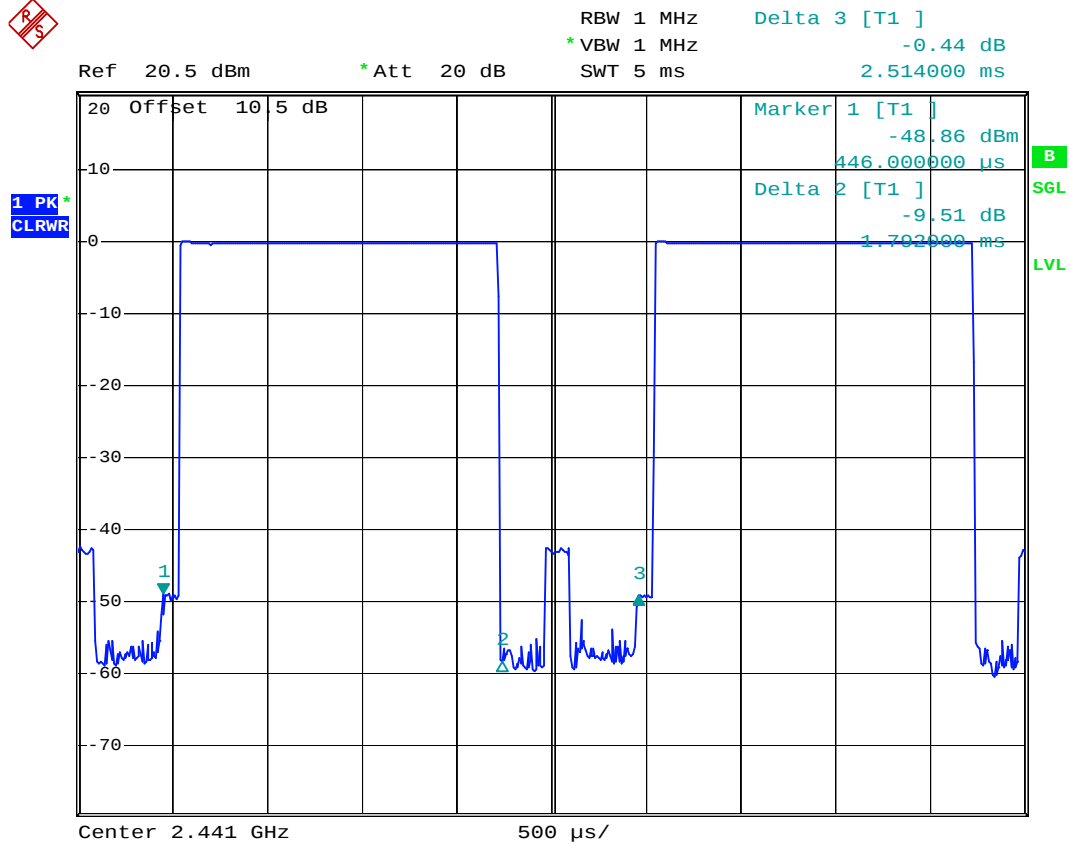
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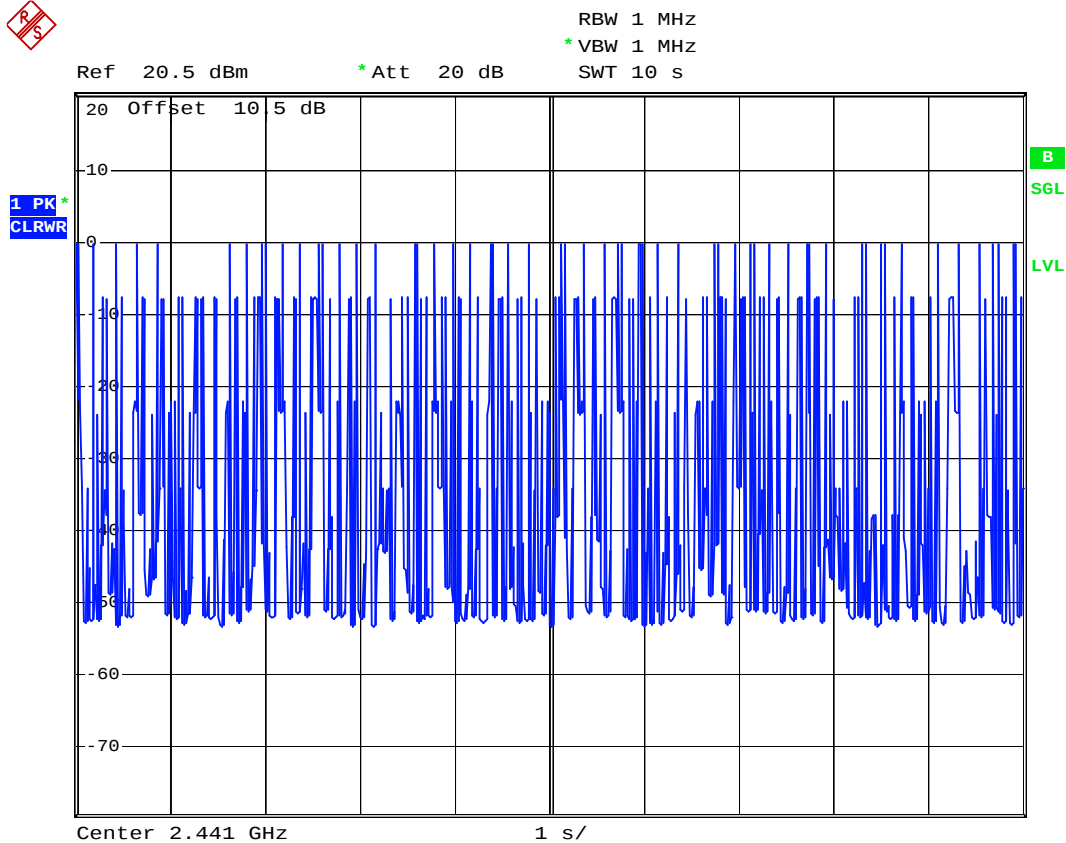
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DH3 (CH39)



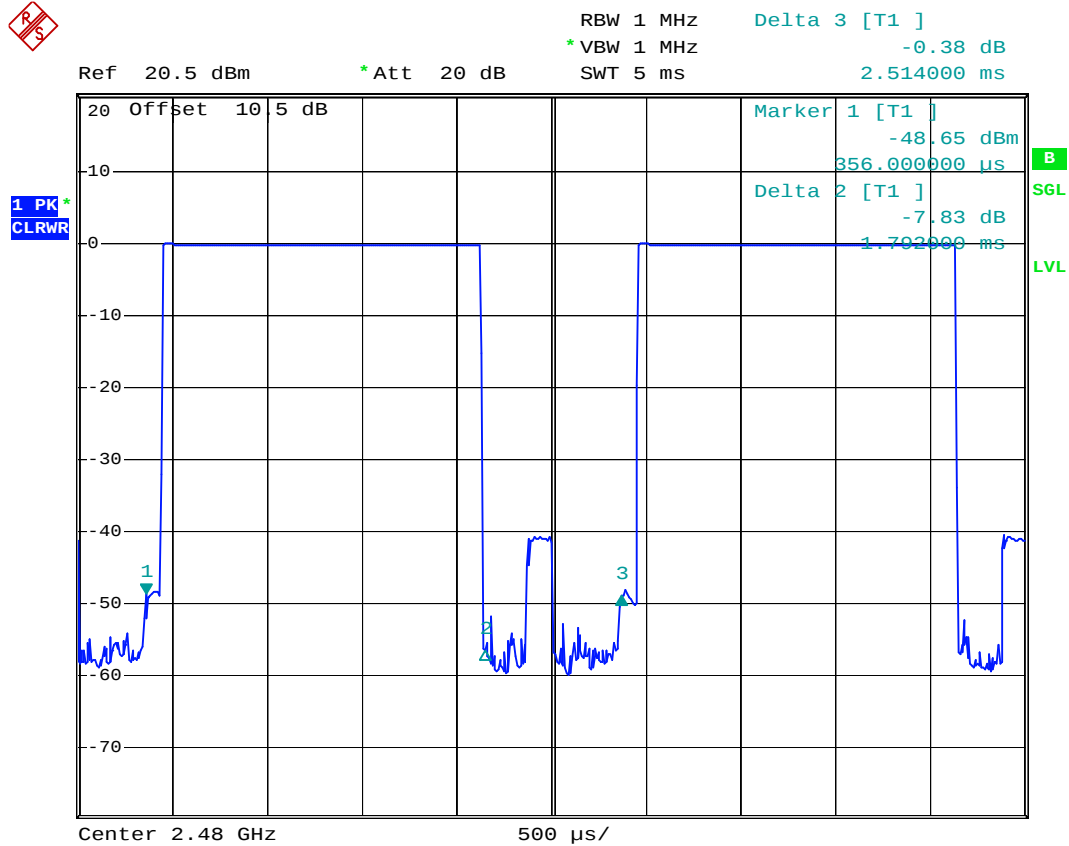
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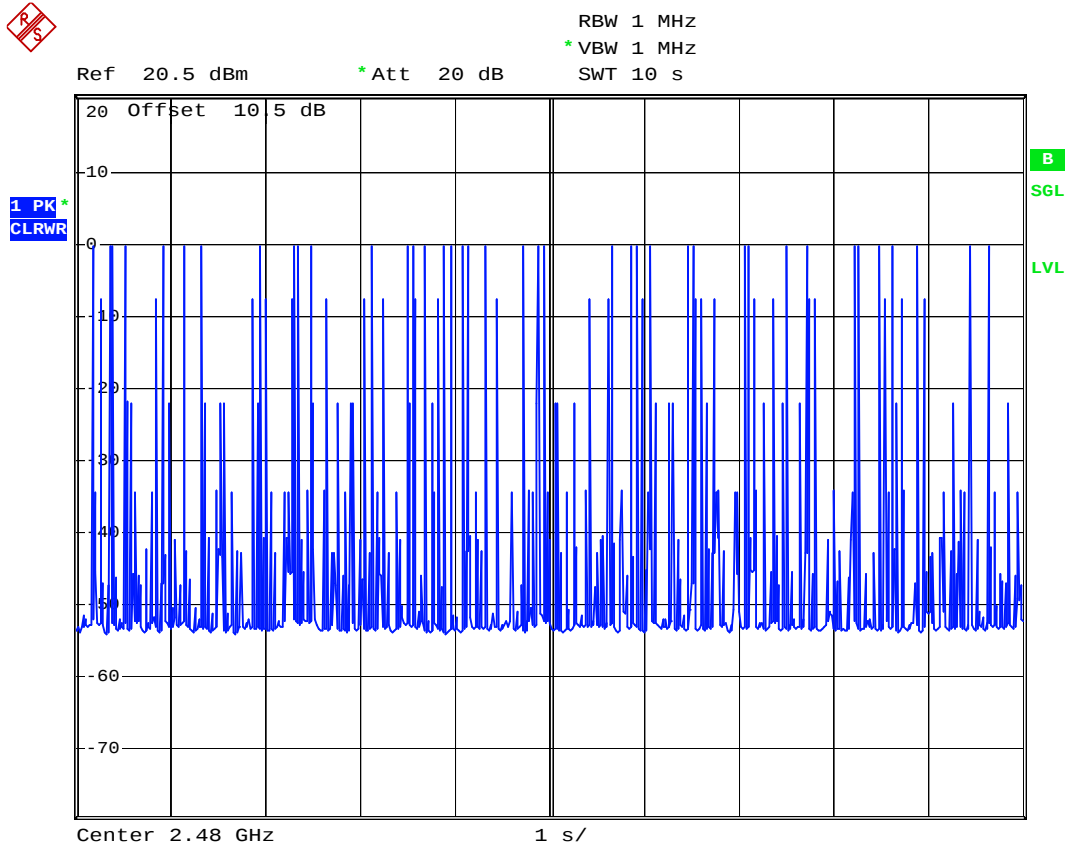
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DH3 (CH78)



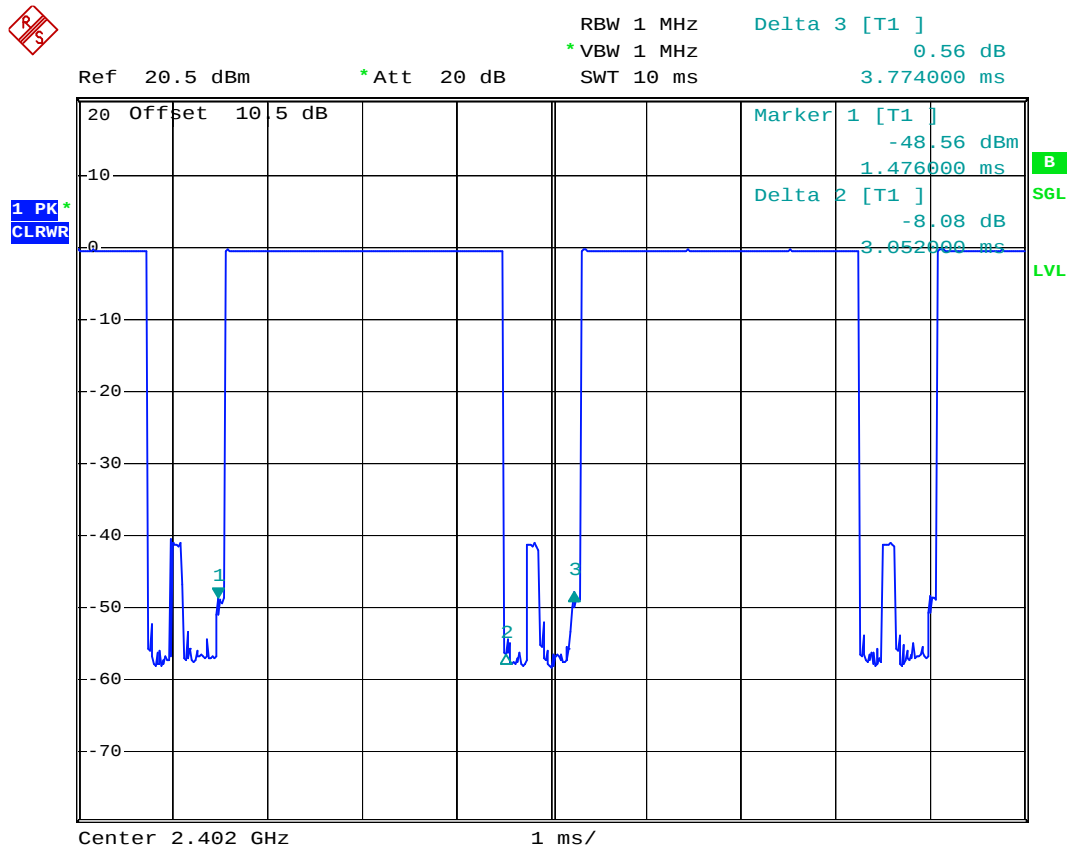
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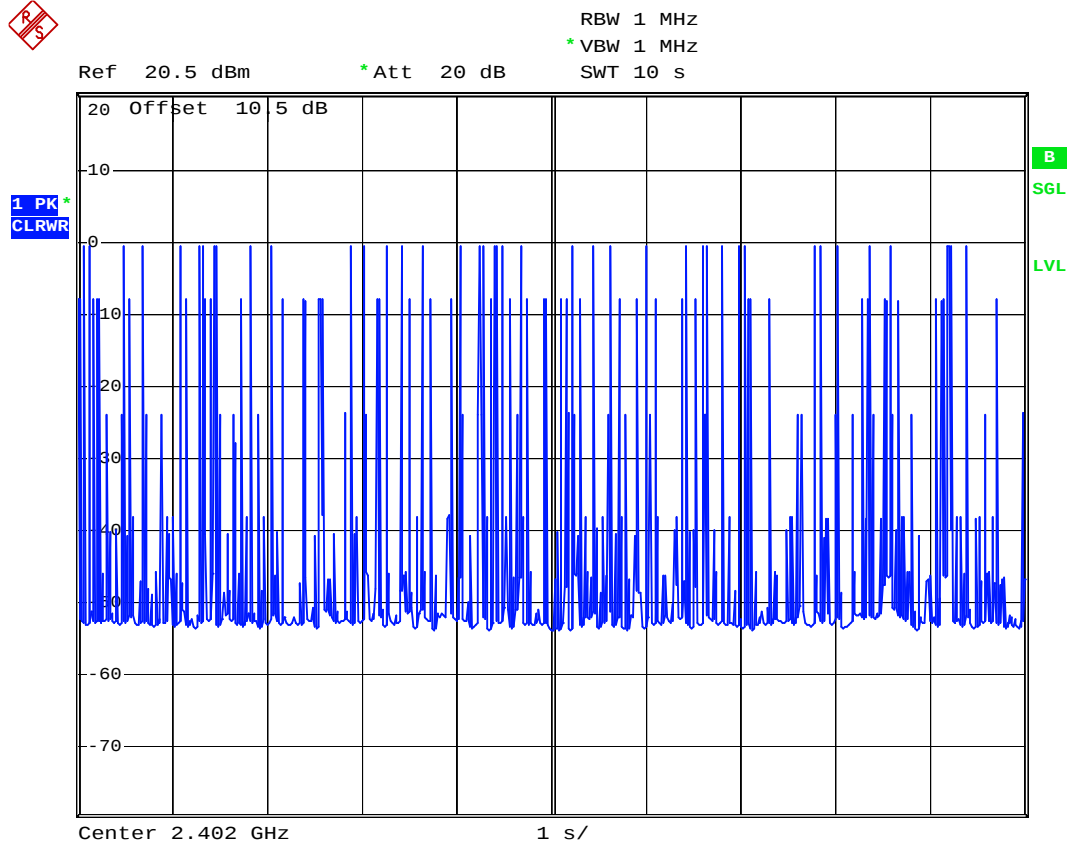
Date: 4.MAY.2006 15:54:23



DH5 (CH00)



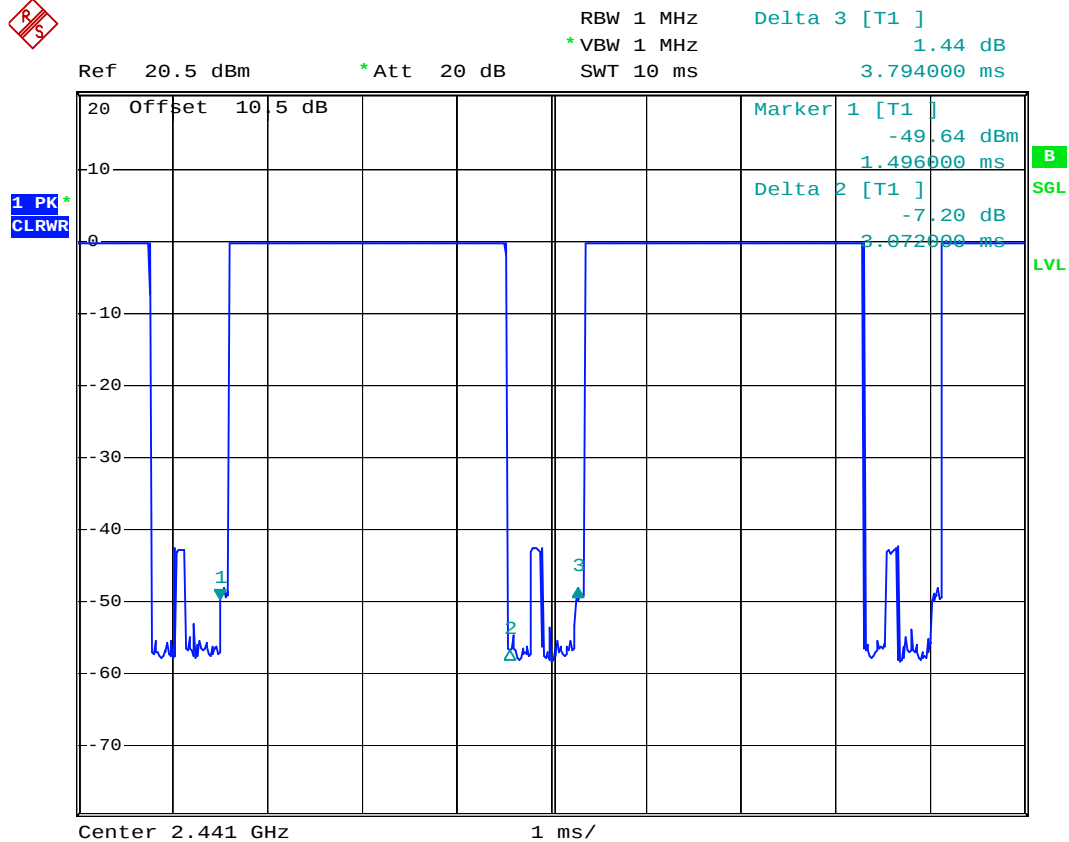
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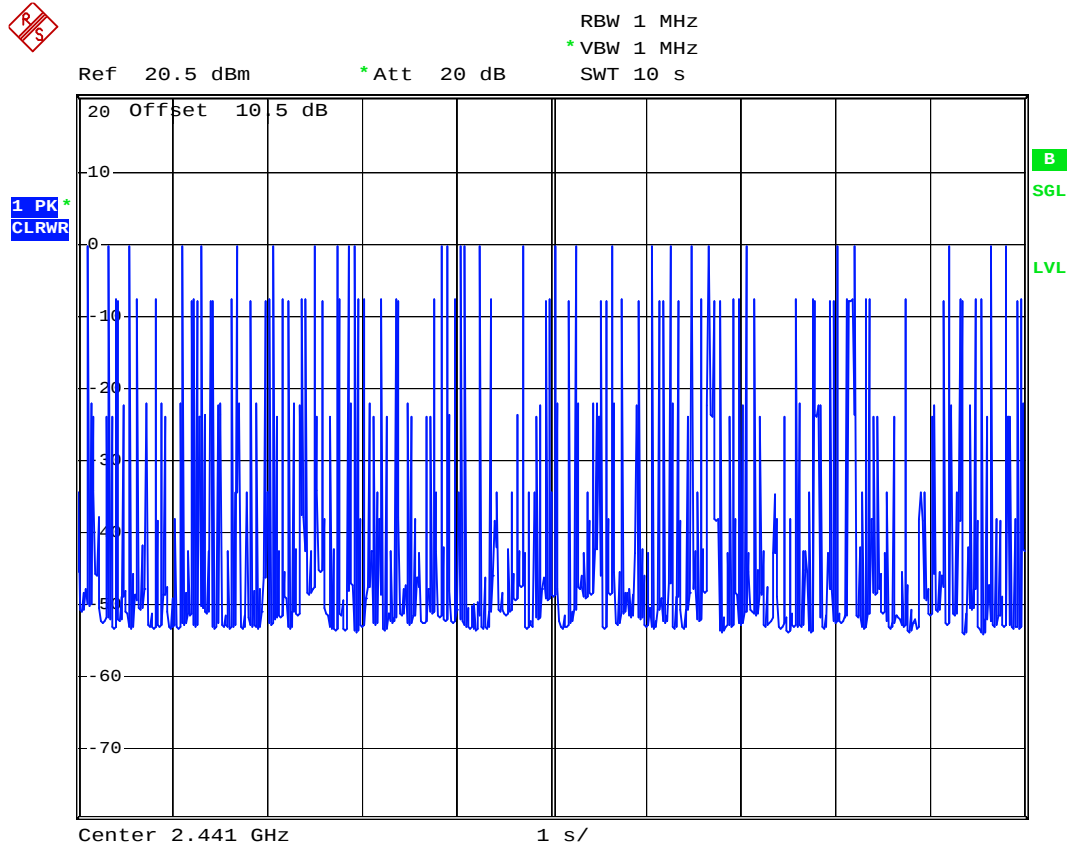
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DH5 (CH39)



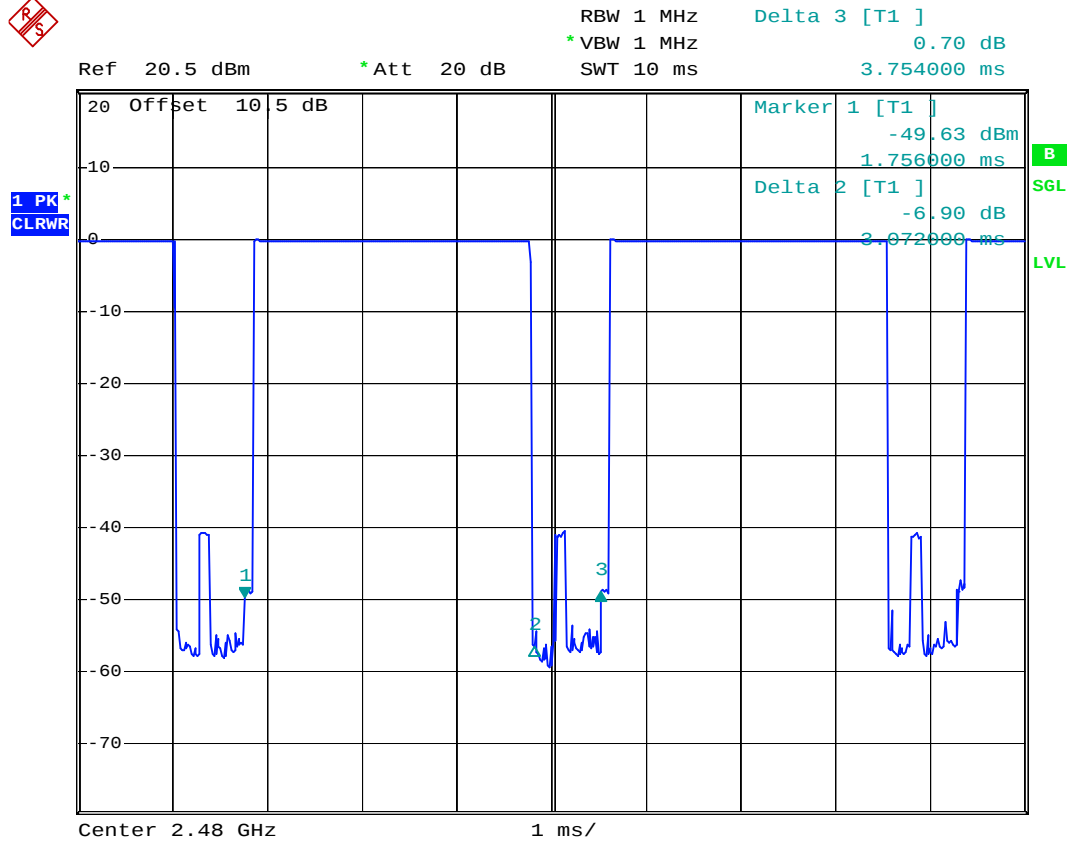
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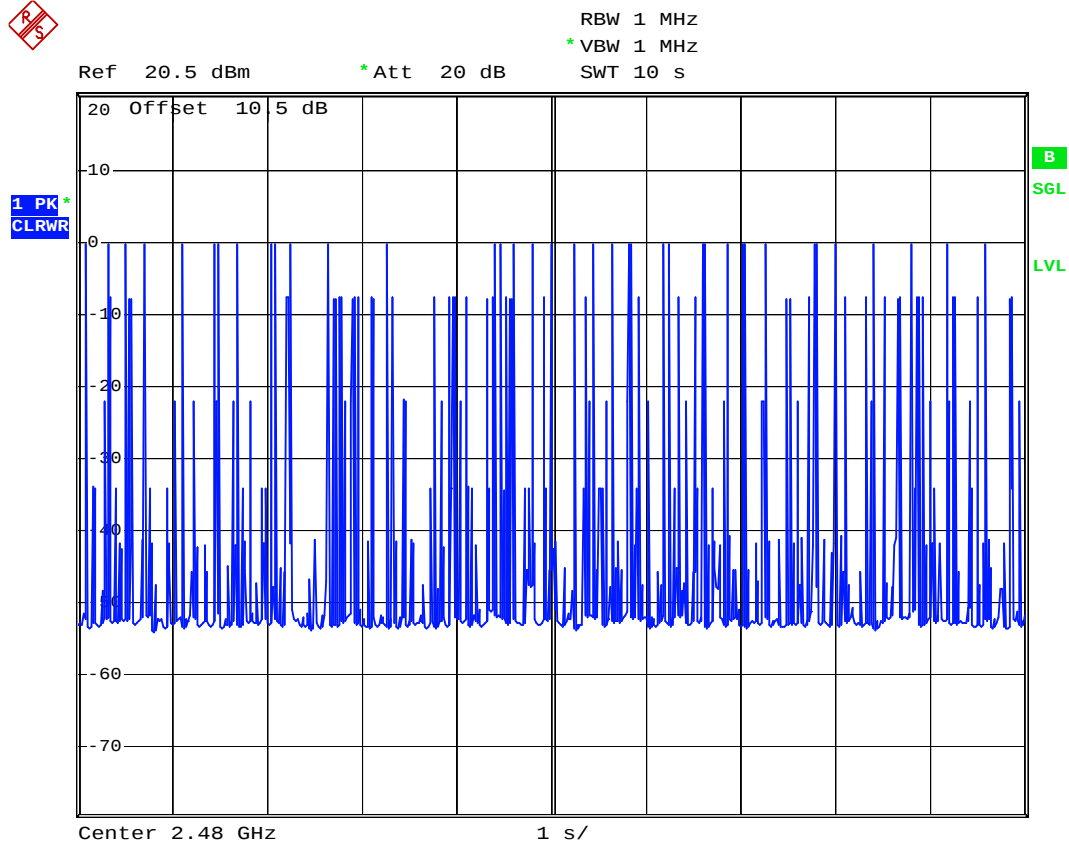
Date: 4.MAY.2006 15:56:06



DH5 (CH78)



Date: 4.MAY.2006 15:40:39



Date: 4.MAY.2006 15:56:48

5.7 Peak Output Power Measurement

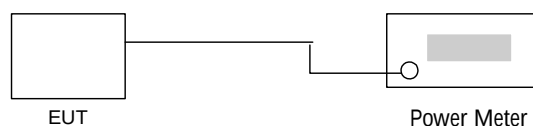
5.7.1 Measuring Instruments :

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 :

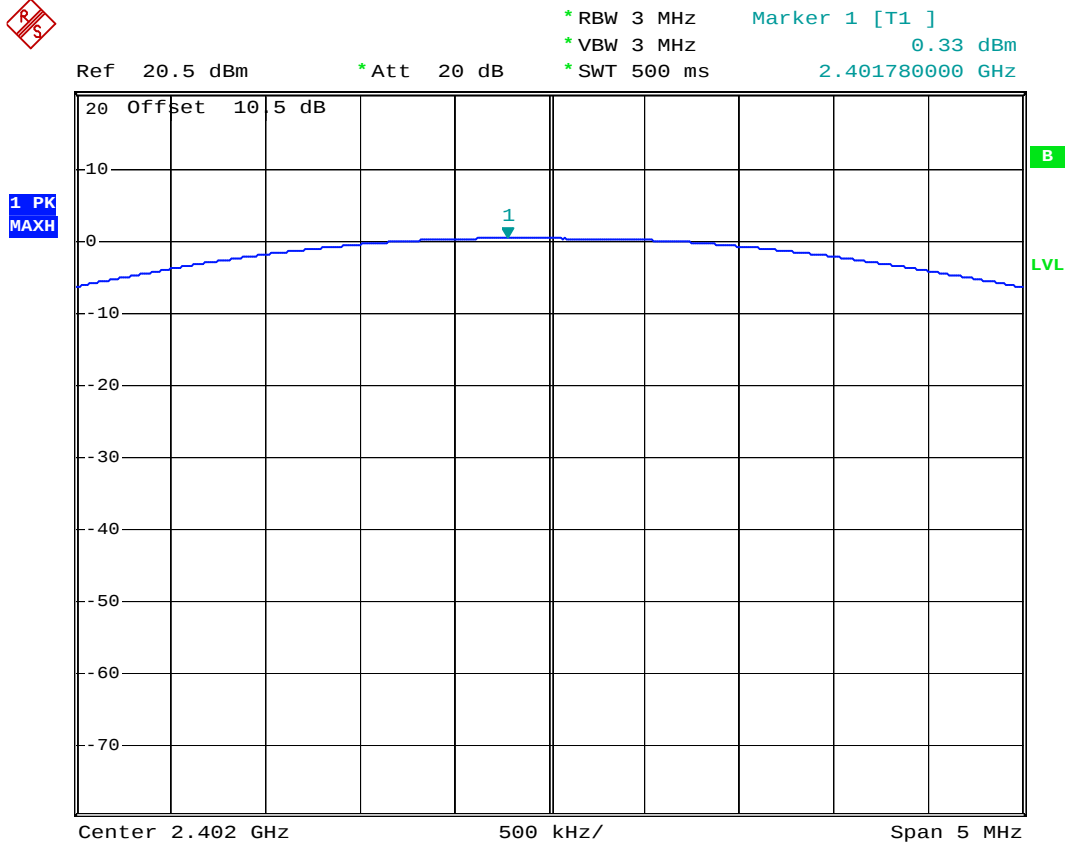
- Application Type : BT
- Temperature : 24°C
- Relative Humidity : 55 %
- Test Enginner : James

Channel	Frequency (MHz)	Measured Output Power (dBm)	Limits (Watt/dBm)
00	2402	0.33	1W/30 dBm
39	2441	0.46	1W/30 dBm
78	2480	0.55	1W/30 dBm



5.7.5 Output Power

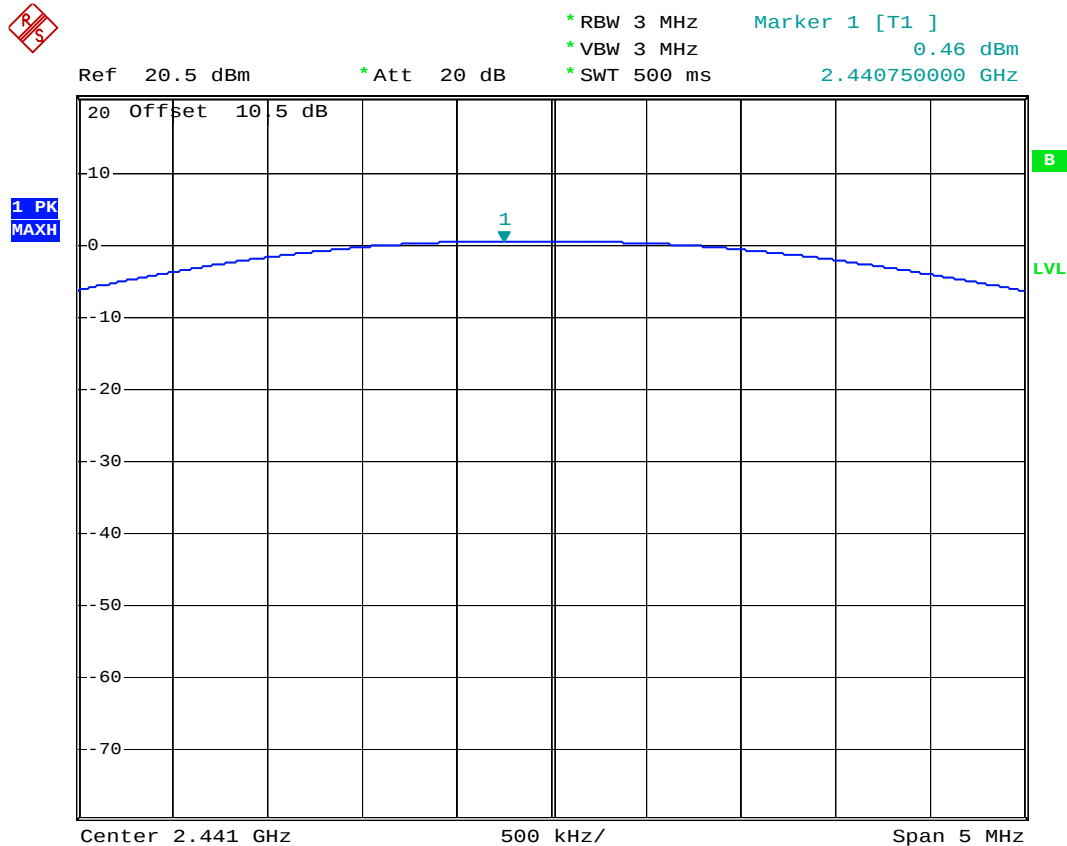
Mode 1: CH00 (2402MHz)



Date: 4.MAY.2006 15:16:12



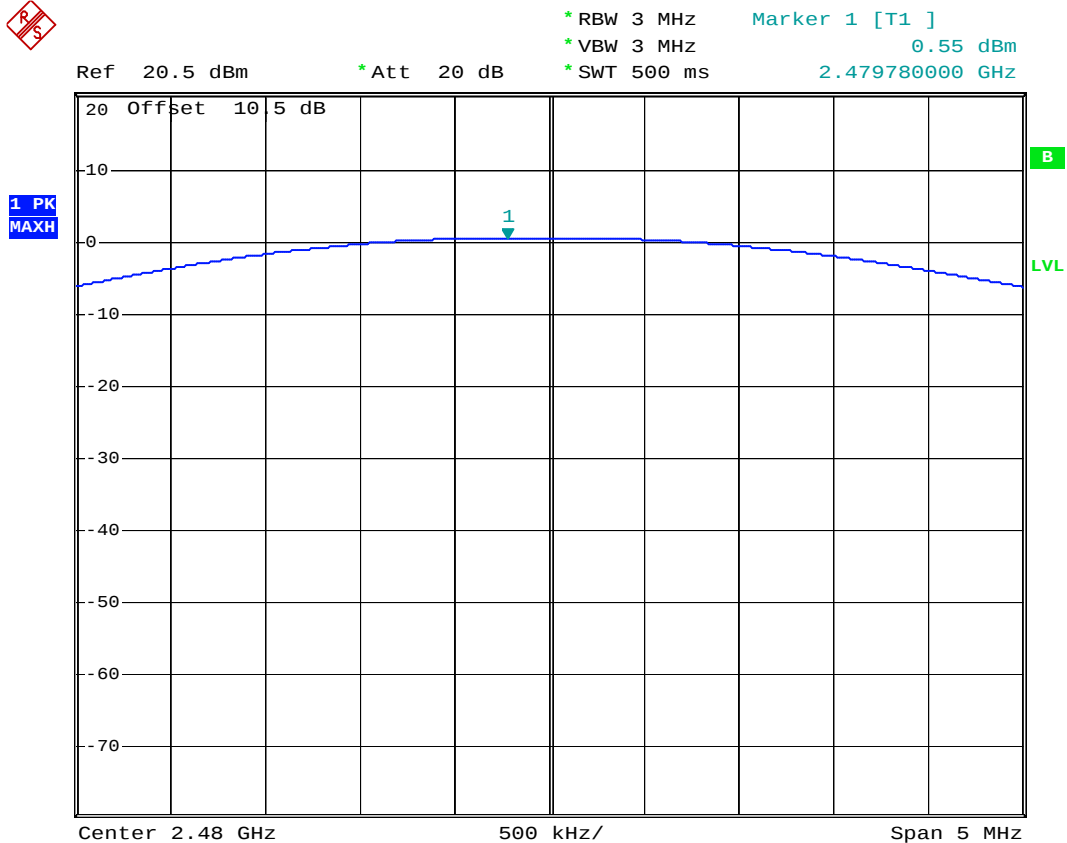
Mode 2: CH39 (2441MHz)



Date: 4.MAY.2006 15:17:01



Mode 3: CH78 (2480MHz)



Date: 4.MAY.2006 15:17:32



5.8 Conducted Emission

5.8.1 Measuring Instruments

As described in chapter 6 of this test Report.

5.8.2 Test Procedures :

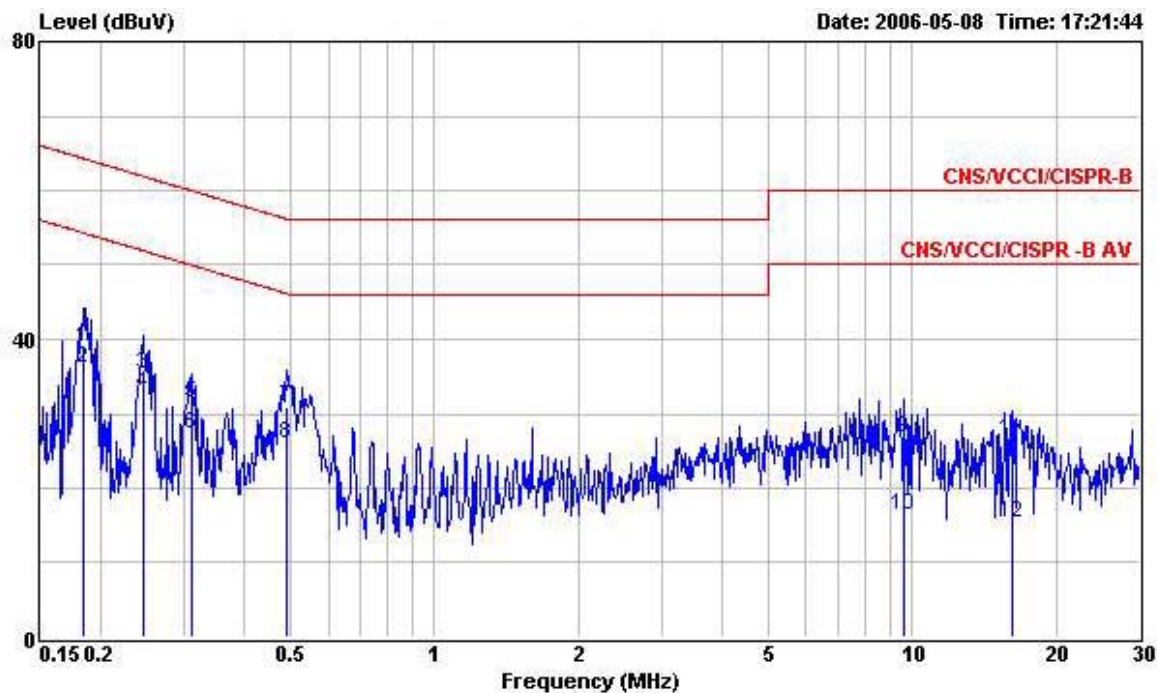
- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power port of a line impedance stabilization network (LISN).
- c. All the support units are connected to the other LISN.
- 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

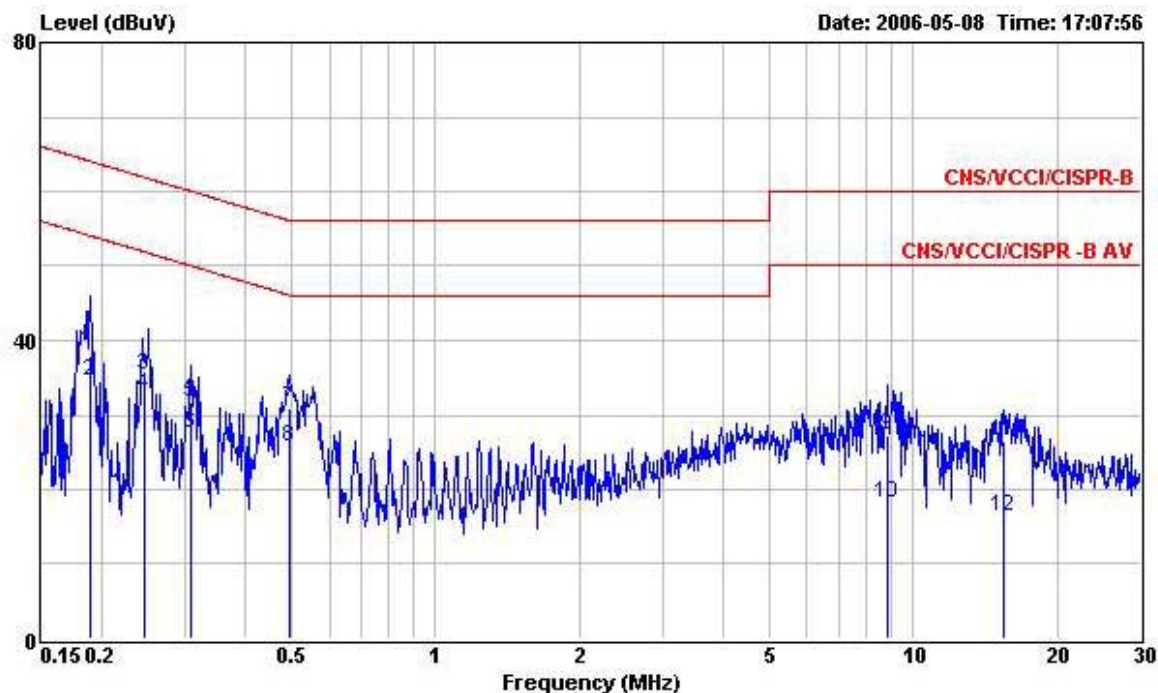
- Temperature : 24 °C
- Relative Humidity : 55 %
- Test Engineer : James
- Test Mode : Mode 1

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



Site : site
 Condition : CNS/VCCI/CISPR-B 2001/004 200604 LINE
 EUT : GPS BLUETOOTH PDA
 Power : 120V/60Hz
 Model : FD642514
 Memo : GPS Rx+BT LINK+TMC+DC CHARGER
 Memo : +ADAPTER+MP3
 Memo :

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.184	38.98	-25.32	64.30	38.82	0.10	0.06	QP
2	0.184	36.22	-18.08	54.30	36.06	0.10	0.06	Average
3	0.247	35.32	-26.54	61.86	35.15	0.10	0.07	QP
4	0.247	32.81	-19.05	51.86	32.64	0.10	0.07	Average
5	0.310	31.39	-28.58	59.97	31.22	0.10	0.07	QP
6	0.310	27.26	-22.71	49.97	27.09	0.10	0.07	Average
7	0.491	30.99	-25.16	56.15	30.82	0.10	0.07	QP
8	0.491	26.10	-20.05	46.15	25.93	0.10	0.07	Average
9	9.600	26.67	-33.33	60.00	26.23	0.30	0.14	QP
10	9.600	16.37	-33.63	50.00	15.93	0.30	0.14	Average
11	16.140	26.47	-33.53	60.00	25.97	0.33	0.17	QP
12	16.140	15.36	-34.64	50.00	14.86	0.33	0.17	Average



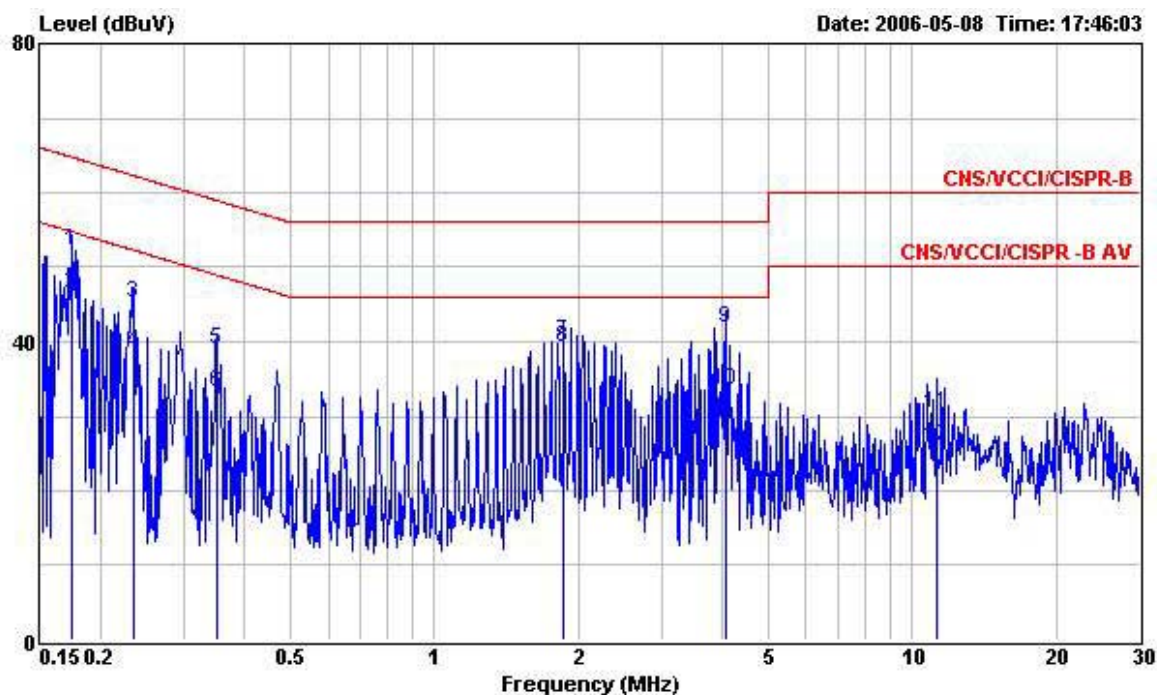
Site : site
 Condition : CNS/VCCI/CISPR-B 2001/004 200604 NEUTRAL
 EUT : GPS BLUETOOTH PDA
 Power : 120V/60Hz
 Model : FD642514
 Memo : GPS Rx+BT LINK+TMC+DC CHARGER
 Memo : +ADAPTER+MP3
 Memo :

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.189	37.82	-26.26	64.08	37.66	0.10	0.06	QP
2	0.189	34.66	-29.42	64.08	34.50	0.10	0.06	Average
3	0.246	35.36	-26.53	61.89	35.19	0.10	0.07	QP
4	0.246	32.81	-29.08	61.89	32.64	0.10	0.07	Average
5	0.307	31.69	-28.36	60.05	31.52	0.10	0.07	QP
6	0.307	27.48	-32.57	60.05	27.31	0.10	0.07	Average
7	0.494	31.03	-25.07	56.10	30.86	0.10	0.07	QP
8	0.494	25.70	-30.40	56.10	25.53	0.10	0.07	Average
9	8.820	27.33	-32.67	60.00	27.00	0.19	0.14	QP
10	8.820	18.23	-41.77	60.00	17.90	0.19	0.14	Average
11	15.470	26.42	-33.58	60.00	25.95	0.31	0.16	QP
12	15.470	16.25	-43.75	60.00	15.78	0.31	0.16	Average



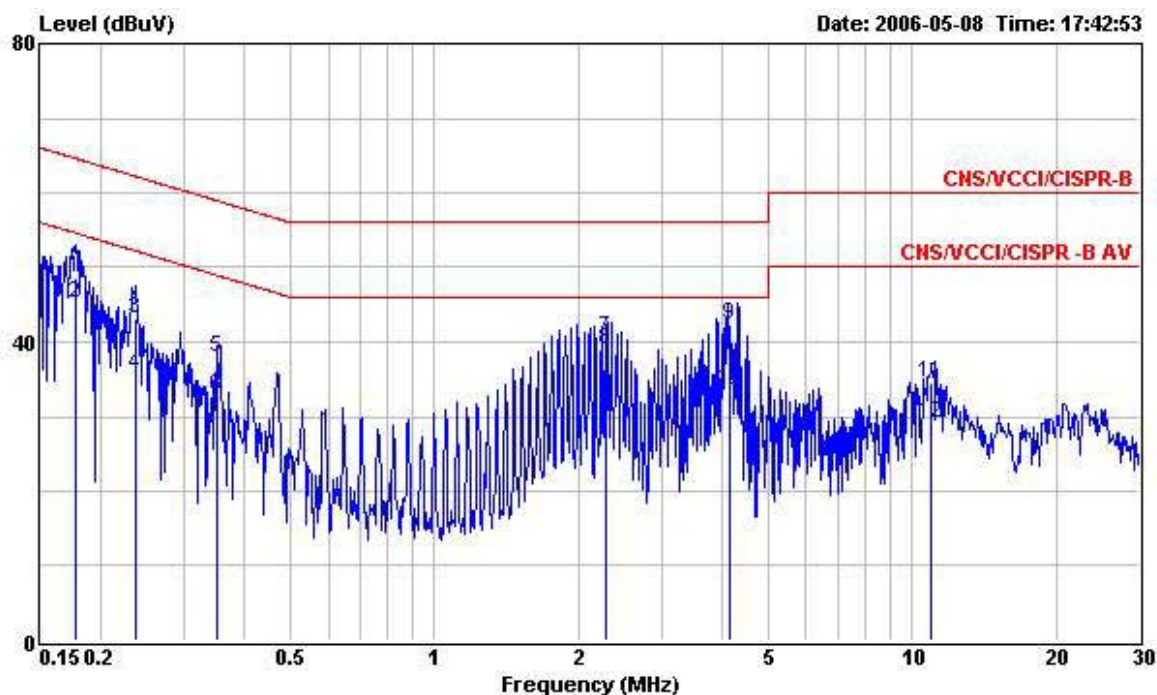
- Temperature : 24 °C
- Relative Humidity : 55 %
- Test Engineer : James
- Test Mode : Mode 2

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



Site : site
 Condition : CNS/VCCI/CISPR-B 2001/004 200604 LINE
 EUT : GPS BLUETOOTH PDA
 Power : 120V/60Hz
 Model : FD642514
 Memo : GPS Rx+BT LINK+TMC+DC CHARGER
 Memo : +USB LINK+MP3
 Memo :

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.174	52.33	-12.44	64.77	52.17	0.10	0.06	QP
2	0.174	46.59	-8.18	54.77	46.43	0.10	0.06	Average
3	0.235	45.28	-16.99	62.27	45.12	0.10	0.06	QP
4	0.235	38.56	-13.71	52.27	38.40	0.10	0.06	Average
5	0.350	38.87	-20.09	58.96	38.69	0.10	0.08	QP
6	0.350	33.24	-15.72	48.96	33.06	0.10	0.08	Average
7	1.865	39.99	-16.01	56.00	39.78	0.10	0.11	QP
8	1.865	39.24	-6.76	46.00	39.03	0.10	0.11	Average
9	4.082	41.89	-14.11	56.00	41.57	0.20	0.12	QP
10	4.082	33.46	-12.54	46.00	33.14	0.20	0.12	Average
11	11.246	30.52	-29.48	60.00	30.07	0.30	0.15	QP
12	11.246	26.04	-23.96	50.00	25.59	0.30	0.15	Average



Site : site
 Condition : CNS/VCCI/CISPR-B 2001/004 200604 NEUTRAL
 EUT : GPS BLUETOOTH PDA
 Power : 120V/60Hz
 Model : FD642514
 Memo : GPS Rx+BT LINK+TMC+DC CHARGER
 Memo : +USB LINK+MP3
 Memo :

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.178	48.57	-16.01	64.58	48.41	0.10	0.06	QP
2	0.178	45.32	-19.26	64.58	45.16	0.10	0.06	Average
3	0.237	43.06	-19.14	62.20	42.90	0.10	0.06	QP
4	0.237	35.65	-26.55	62.20	35.49	0.10	0.06	Average
5	0.352	37.98	-20.94	58.92	37.80	0.10	0.08	QP
6	0.352	32.83	-26.09	58.92	32.65	0.10	0.08	Average
7	2.280	40.50	-15.50	56.00	40.28	0.10	0.12	QP
8	2.280	38.84	-17.16	56.00	38.62	0.10	0.12	Average
9	4.150	42.37	-13.63	56.00	42.15	0.10	0.12	QP
10	4.150	33.54	-22.46	56.00	33.32	0.10	0.12	Average
11	10.990	34.47	-25.53	60.00	34.11	0.22	0.14	QP
12	10.990	29.18	-30.82	60.00	28.82	0.22	0.14	Average



5.9 Radiated Emission Measurement

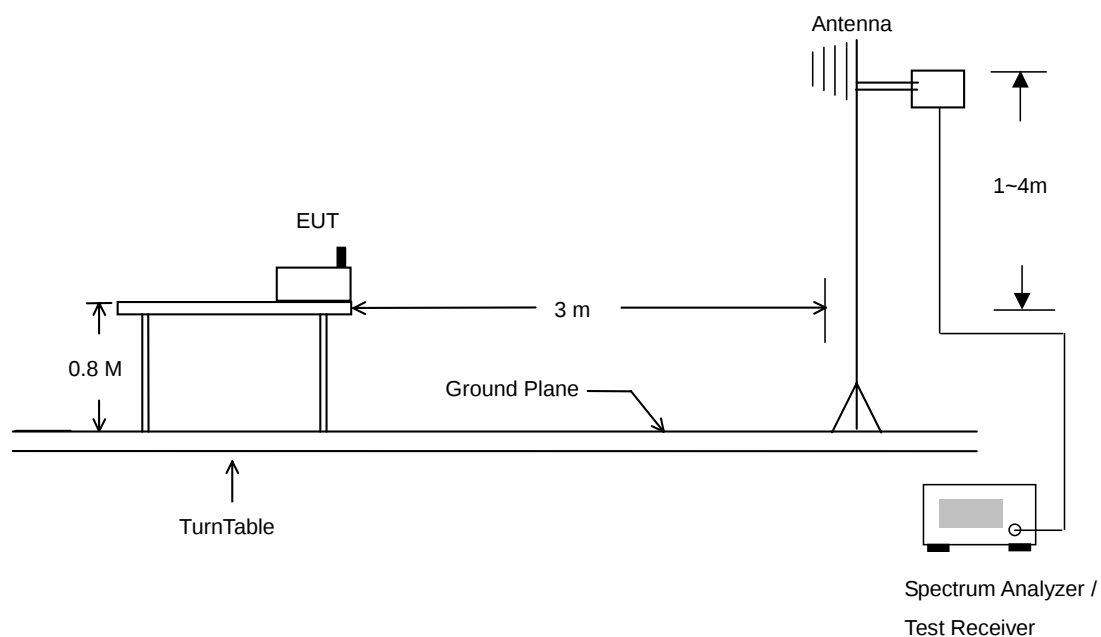
5.9.1 Measuring Instruments

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

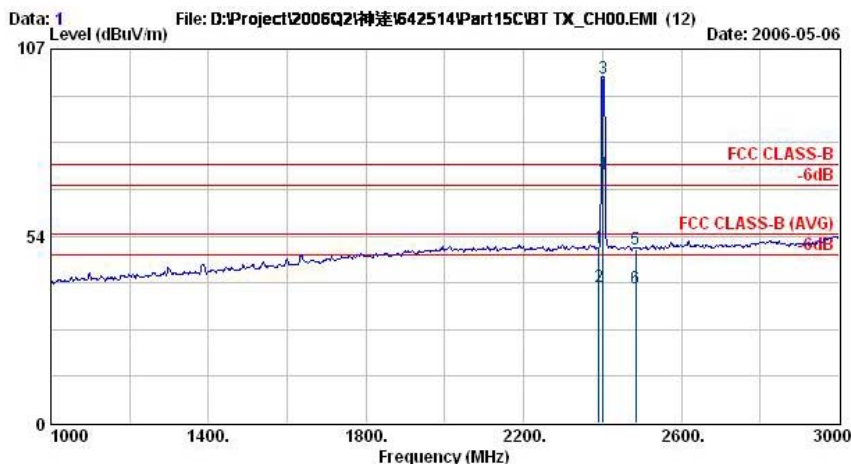




5.9.4 Test Data

- Test Mode : Mode 1
- Polarization : Horizontal

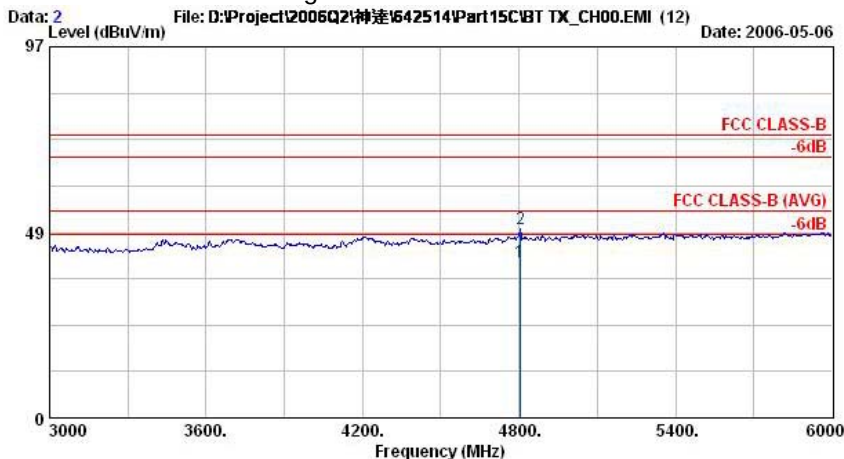
■ The test that passed at minimum margin was marked by the frame in the following table.



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

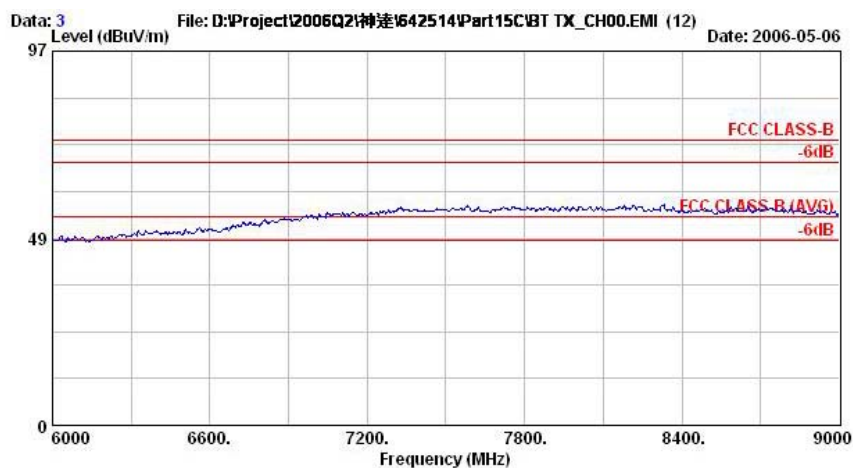
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					dBuV	dB/m	dB	cm	deg	
1 @	2390.00	50.02	-23.98	74.00	50.96	30.26	4.26	35.46	100	360 Peak
2 @	2390.00	39.04	-14.96	54.00	39.98	30.26	4.26	35.46	100	346 Average
3 @	2402.00	98.84			99.78	30.26	4.26	35.46	100	360 Peak
4 @	2402.00	71.18			72.12	30.26	4.26	35.46	100	346 Average
5 @	2483.50	49.91	-24.09	74.00	50.77	30.29	4.36	35.51	100	360 Peak
6 @	2483.50	38.51	-15.49	54.00	39.37	30.29	4.36	35.51	100	346 Average

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					dBuV	dB/m	dB	cm	deg	
1 @	4804.00	40.91	-13.09	54.00	37.91	32.88	6.21	36.10	166	165 Average
2 @	4806.00	49.24	-24.76	74.00	46.24	32.88	6.21	36.10	100	360 Peak



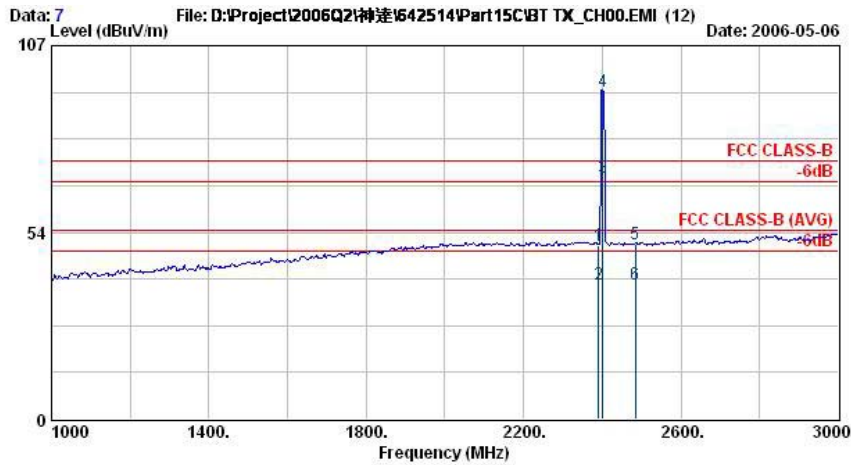
Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

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



- Polarization : Vertical

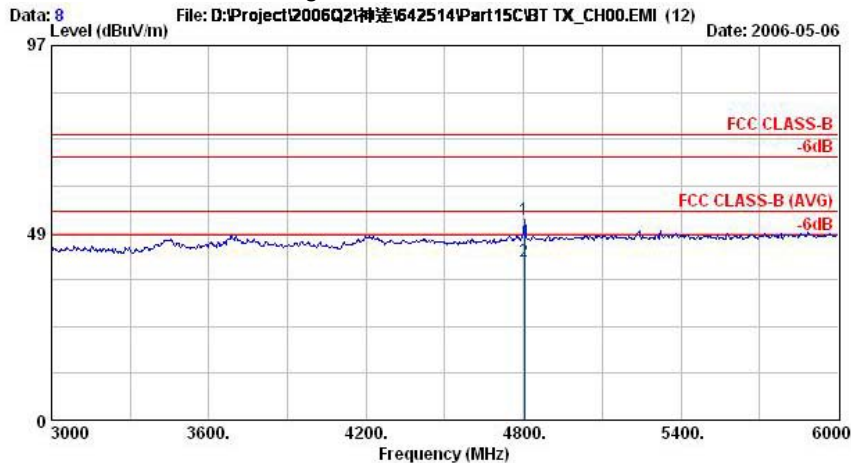
■ The test that passed at minimum margin was marked by the frame in the following table.



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

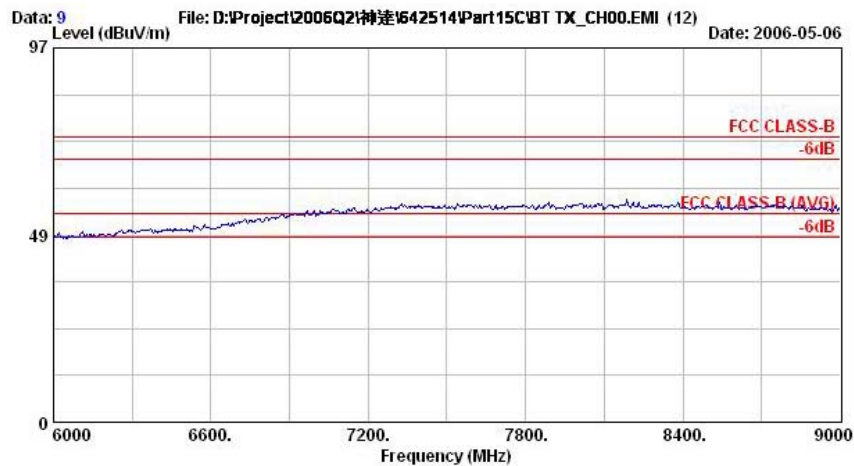
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 @	2390.00	49.85	-24.15	74.00	50.78	30.26	4.26	35.46	100	0 Peak
2 @	2390.00	38.68	-15.32	54.00	39.62	30.26	4.26	35.46	100	279 Average
3 @	2402.00	69.36			70.30	30.26	4.26	35.46	100	279 Average
4 @	2402.00	93.93			94.87	30.26	4.26	35.46	100	0 Peak
5 @	2483.50	50.30	-23.70	74.00	51.16	30.29	4.36	35.51	100	0 Peak
6 @	2483.50	38.54	-15.46	54.00	39.40	30.29	4.36	35.51	100	279 Average

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 @	4804.00	52.08	-21.92	74.00	49.09	32.88	6.21	36.10	100	360 Peak
2 @	4804.00	41.29	-12.71	54.00	38.29	32.88	6.21	36.10	100	140 Average



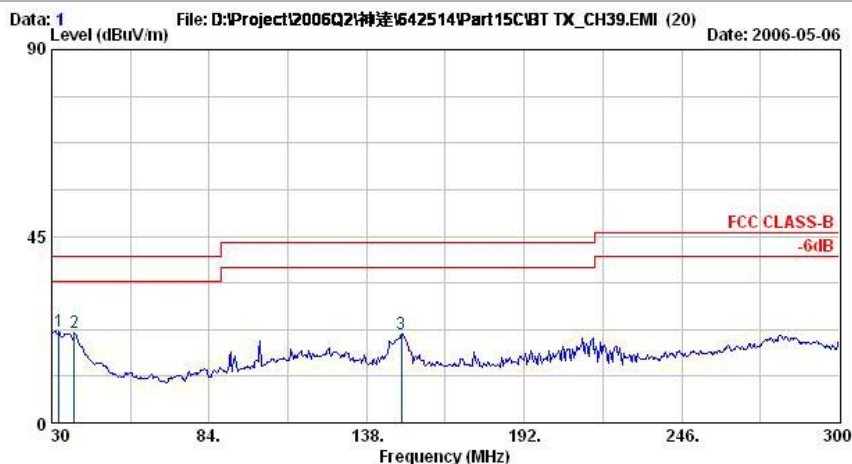
Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch00,2402MHz
Plane : E1

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



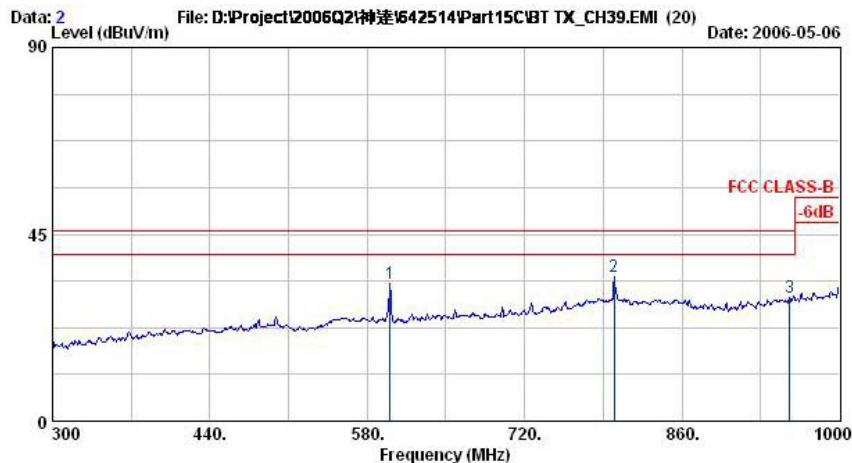
- Test Mode : Mode 2
- Polarization : Horizontal

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



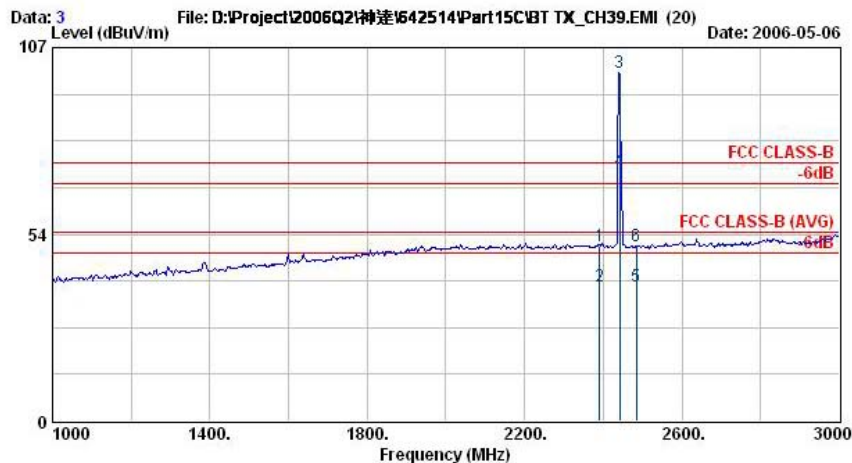
Site : 03CH06-HY
Condition : BI-LOG-2004-1122 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	32.43	22.25	-17.75	40.00	35.09	17.73	1.01	31.58	400	0
2 @	37.83	21.74	-18.26	40.00	36.55	15.73	1.19	31.73	400	0
3 @	149.88	21.48	-22.02	43.50	41.84	8.90	2.19	31.46	400	0



Site : 03CH06-HY
Condition : BI-LOG-2004-1122 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

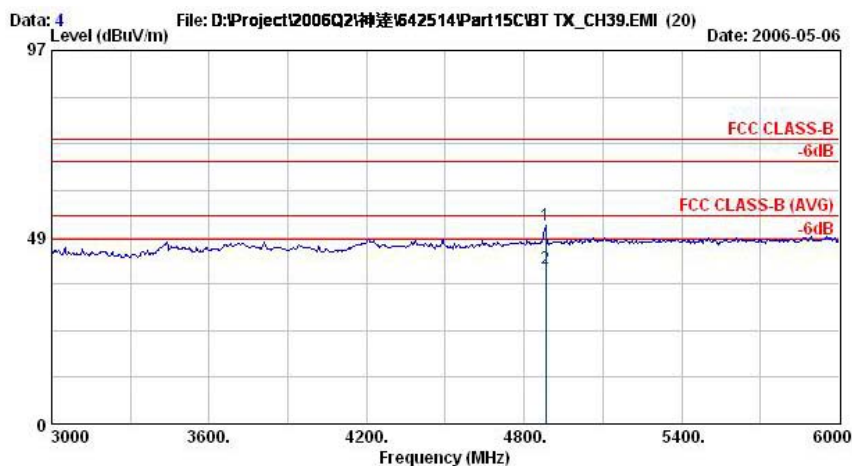
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	600.30	33.08	-12.92	46.00	41.13	17.94	4.65	30.64	100	0
2 @	799.80	34.72	-11.28	46.00	37.32	21.90	5.62	30.12	100	195
3 @	955.90	29.90	-16.10	46.00	32.60	21.65	6.07	30.41	100	0



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

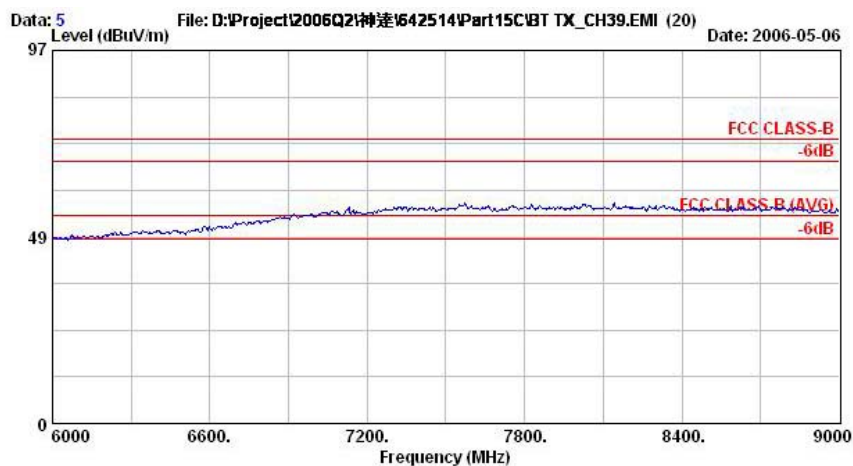
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					Factor					
1 @	2390.00	50.17	-23.83	74.00	51.10	30.26	4.26	35.46	100	360 Peak
2 @	2390.00	38.57	-15.43	54.00	39.51	30.26	4.26	35.46	100	341 Average
3 @	2441.00	99.81			100.69	30.28	4.33	35.49	100	360 Peak
4 @	2441.00	71.55			72.44	30.28	4.33	35.49	100	341 Average
5 @	2483.50	38.56	-15.44	54.00	39.42	30.29	4.36	35.51	100	341 Average
6 @	2483.50	50.10	-23.90	74.00	50.96	30.29	4.36	35.51	100	360 Peak

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					Factor					
1 @	4882.00	51.46	-22.54	74.00	48.18	33.14	6.30	36.16	200	0 Peak
2 @	4882.00	40.48	-13.52	54.00	37.20	33.14	6.30	36.16	159	160 Average



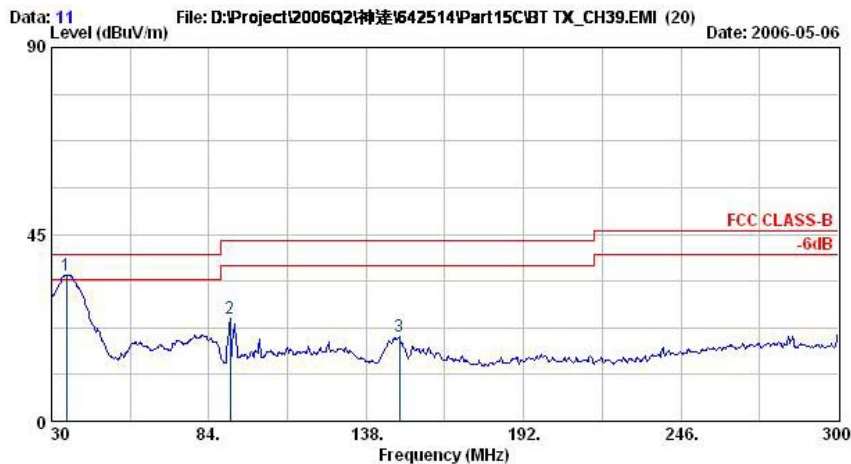
Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

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



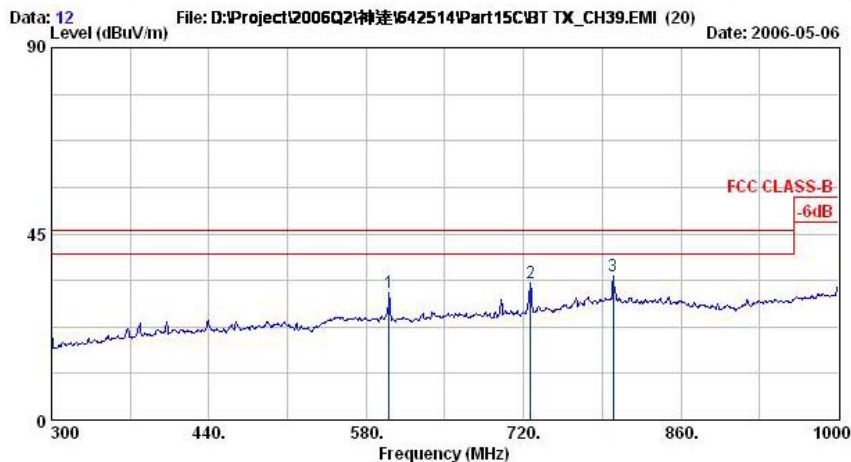
▪ Polarization : Vertical

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



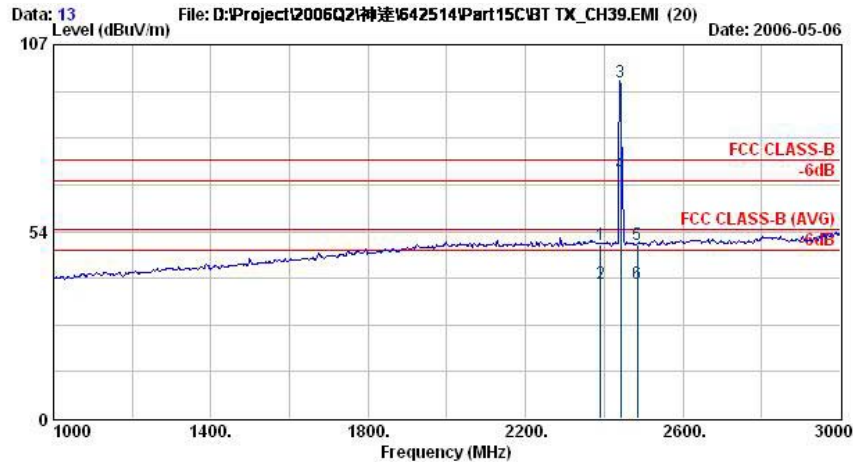
Site : 03CH06-HY
Condition : BI-LOG-2004-1122 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					dBuV	dB/m	dB	dB	cm	deg
1 @	35.13	35.29	-4.71	40.00	48.78	17.07	1.08	31.64	400	0 Peak
2 @	91.29	24.66	-18.84	43.50	45.32	9.18	1.68	31.52	400	0 Peak
3 @	149.34	20.28	-23.22	43.50	40.45	9.09	2.20	31.46	400	0 Peak



Site : 03CH06-HY
Condition : BI-LOG-2004-1122 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

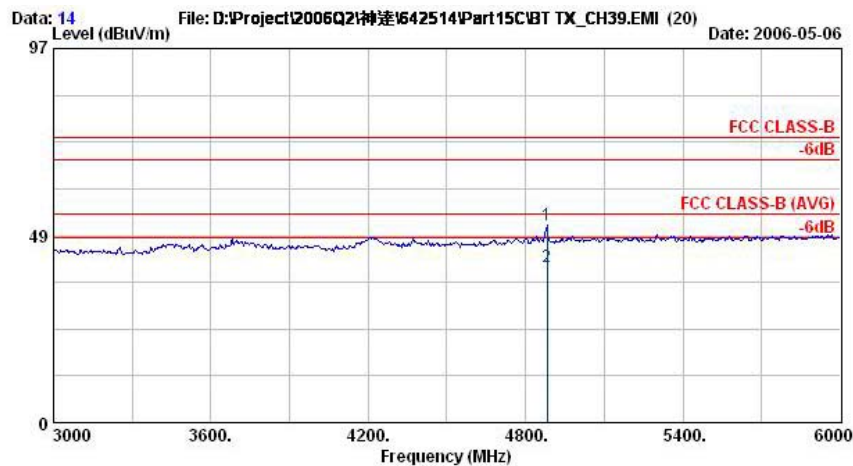
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					dBuV	dB/m	dB	dB	cm	deg
1 @	600.30	30.68	-15.32	46.00	38.73	17.94	4.65	30.64	100	0 Peak
2 @	726.30	32.99	-13.01	46.00	38.73	19.79	5.00	30.53	100	0 Peak
3 @	799.80	34.73	-11.27	46.00	37.33	21.90	5.62	30.12	100	0 Peak



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

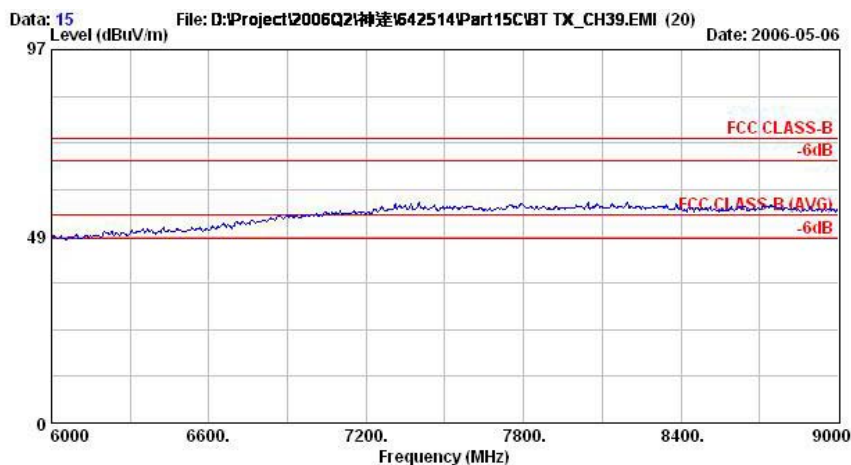
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	2390.00	49.80	-24.20	74.00	50.74	30.26	4.26	35.46	100	0 Peak
2 @	2390.00	38.56	-15.44	54.00	39.50	30.26	4.26	35.46	100	275 Average
3 @	2441.00	96.36			97.25	30.28	4.33	35.49	100	0 Peak
4 @	2441.00	69.96			70.85	30.28	4.33	35.49	100	275 Average
5 @	2483.50	49.89	-24.11	74.00	50.75	30.29	4.36	35.51	100	0 Peak
6 @	2483.50	38.62	-15.38	54.00	39.48	30.29	4.36	35.51	100	275 Average

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	4882.00	51.19	-22.81	74.00	47.91	33.14	6.30	36.16	200	360 Peak
2 @	4882.00	40.30	-13.70	54.00	37.02	33.14	6.30	36.16	100	171 Average



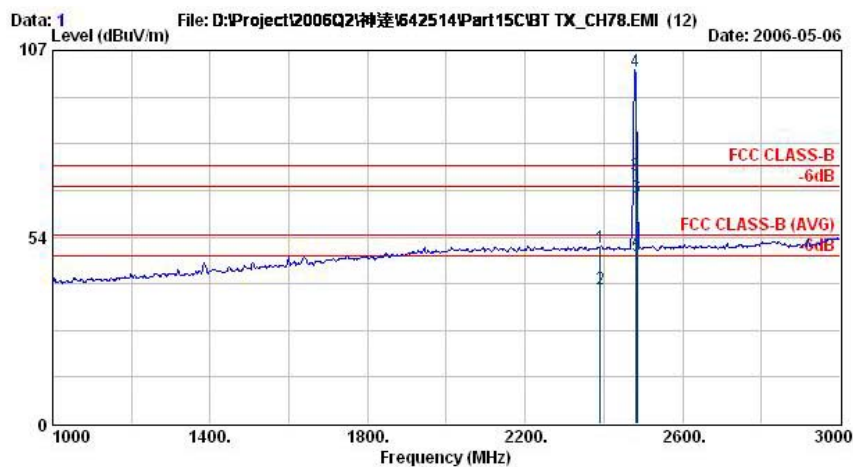
Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch39,2441MHz
Plane : E1

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



- Test Mode : Mode 3
- Polarization : Horizontal

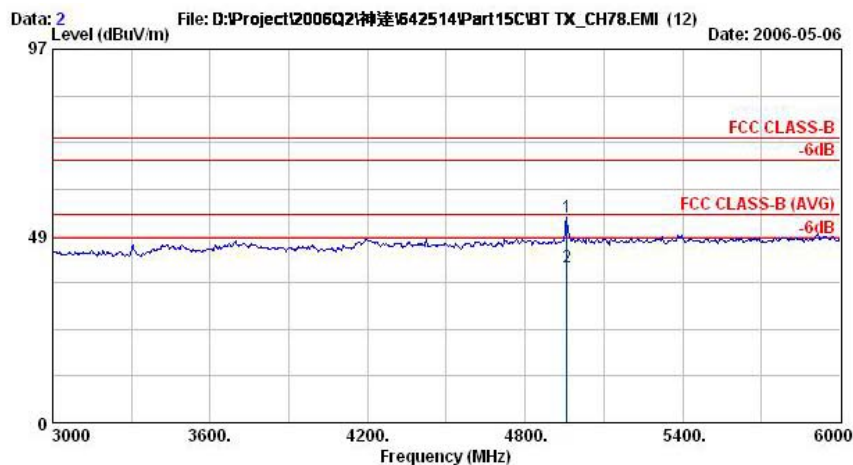
■ The test that passed at minimum margin was marked by the frame in the following table.



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78,2480MHz
Plane : E1

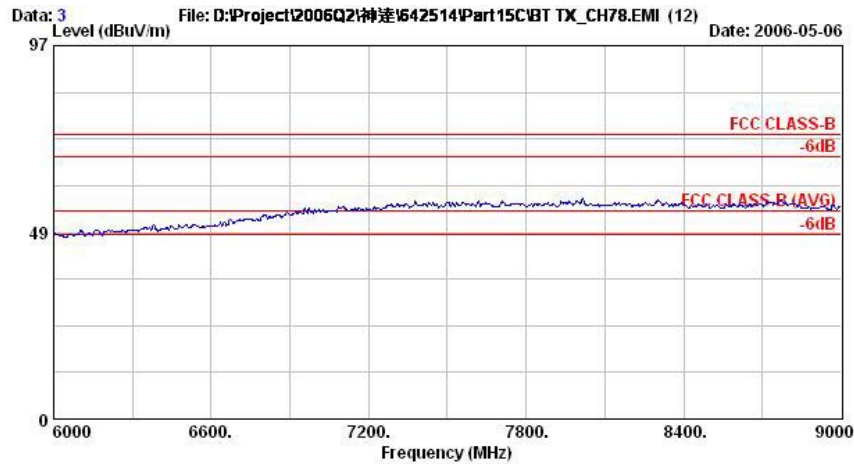
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 @	2390.00	50.45	-23.55	74.00	51.38	30.26	4.26	35.46	100	360 Peak
2 @	2390.00	38.53	-15.47	54.00	39.47	30.26	4.26	35.46	100	257 Average
3 @	2480.00	71.25			72.11	30.29	4.36	35.51	100	257 Average
4 @	2480.00	101.22			102.08	30.29	4.36	35.51	100	360 Peak
5 @	2483.50	48.15	-5.85	54.00	49.01	30.29	4.36	35.51	100	257 Average
6 @	2483.50	64.90	-9.10	74.00	65.76	30.29	4.36	35.51	100	360 Peak

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78,2480MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 @	4960.00	53.41	-20.59	74.00	49.78	33.47	6.39	36.23	100	360 Peak
2 @	4960.00	40.43	-13.57	54.00	36.80	33.47	6.39	36.23	100	94 Average



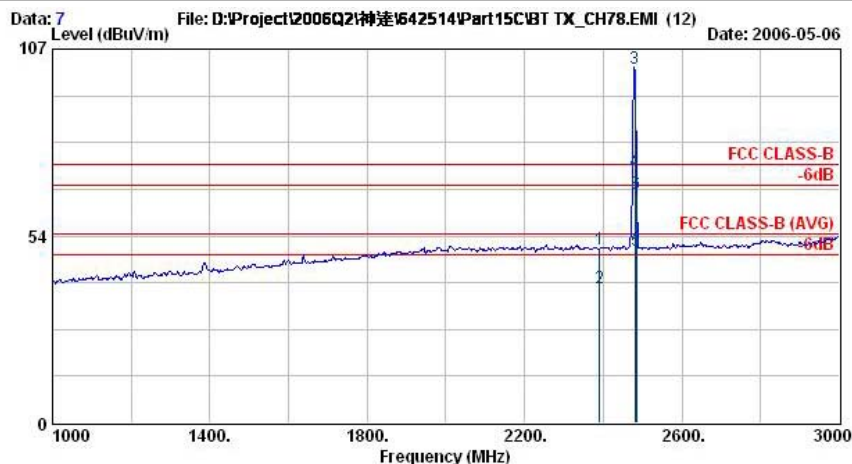
Site : 03CH06-HY
Condition : HF-ANT-060410 VERTICAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78,2480MHz
Plane : E1

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



- Polarization : Vertical

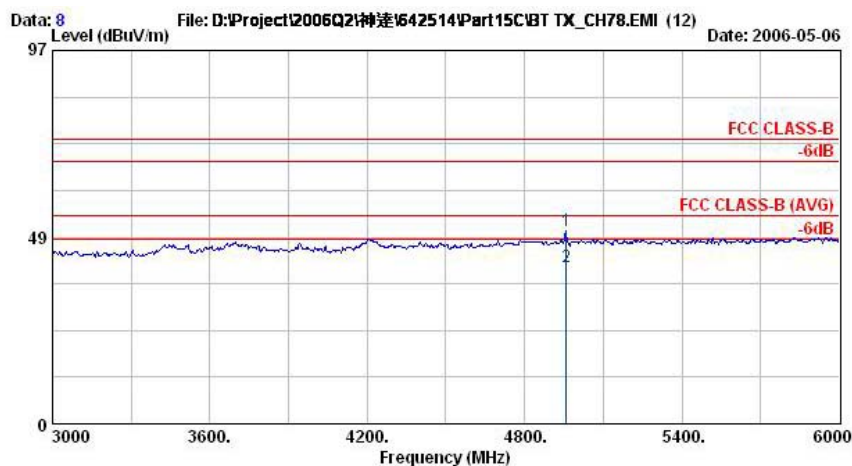
■ The test that passed at minimum margin was marked by the frame in the following table.



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78,2480MHz
Plane : E1

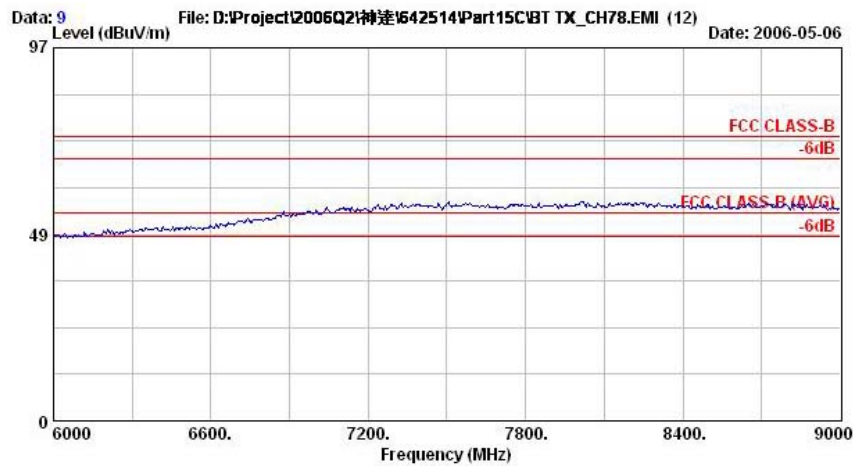
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	2390.00	49.69	-24.31	74.00	50.62	30.26	4.26	35.46	100	0 Peak
2 @	2390.00	38.52	-15.48	54.00	39.46	30.26	4.26	35.46	100	348 Average
3 @	2480.00	101.59			102.45	30.29	4.36	35.51	100	0 Peak
4 @	2480.00	72.07			72.93	30.29	4.36	35.51	100	348 Average
5 @	2483.50	49.33	-4.67	54.00	50.19	30.29	4.36	35.51	100	348 Average
6 @	2483.50	65.80	-8.20	74.00	66.66	30.29	4.36	35.51	100	0 Peak

Remark: #3 and #4 Fundamental Signal



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78,2480MHz
Plane : E1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	4960.00	49.98	-24.02	74.00	46.35	33.47	6.39	36.23	100	0 Peak
2 @	4960.00	40.85	-13.15	54.00	37.22	33.47	6.39	36.23	179	122 Average



Site : 03CH06-HY
Condition : HF-ANT-060410 HORIZONTAL
EUT : GPS (BT) PDA
Power : 120Vac/60Hz
Model : FR 642514
Memo : Bluetooth Tx_Ch78_2480MHz
Plane : E1

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 PIFA antenna for Bluetooth and patch antenna for GPS. 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	100132	9kHz – 2.75GHz	Jun. 28, 2005	Jun. 28, 2006	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/008	9kHz – 30MHz	Mar. 29, 2006	Mar. 29, 2007	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9kHz – 30MHz	Apr. 19, 2006	Apr. 19, 2007	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
combined standard uncertainty Uc(y)	1.13		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	2.26		

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
combined standard uncertainty Uc(y)	1.27		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	2.54		

**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
Combined standard uncertainty $U_c(y)$	2.36				
Measuring uncertainty for a level of confidence of 95% $U = 2U_c(y)$	4.72				