TEST REPORT

Report No. :	ICM04002
Date :	6th April 2004
Applicant :	TAIYO YUDEN CO.,LTD.
	8-1 Sakae-cho , Takasaki-shi , Gunma ,370-8522 Japan.
EUT :	Bluetooth USB Adapter
FCC ID :	RYYUD23011
Model No. :	EYSF2CSUU
Serial No. :	0010C61f9bac, 0010C61f9baf
Receipt date of tested sample :	24th March 2004
Date of measurement :	25th , 29th March 2004 (Radiated Emission)
	1st April 2004 (Conducted Emission)
Test location :	TAIYO YUDEN CO.,LTD. EMC CENTER
	5607-2, Nakamuroda,Haruna-machi,
	Gunma-Gun,Gunma, 370-3347,Japan.
Applied standard :	47 CFR Part 15 Subpart C Section15.207 , Section 15.247
	RSS-210 Issue 5 November 2001
Procedure :	ANSI C63.4-2001 , RSS212
Test results:	PASS

Approved by : Manager / Kenzo Furuta

Reviewed by : Chief Engineer / Takeshi Matsumura

Table of Contents

1 Test report

(1) This report summarizes the result of a single investigation and test result relate only to tested sample.
(2) The report shall not be reproduced except in full without the written approval of the TAIYO YUDEN CO.,LTD.
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2 General Information

2.1 Product Description

The pre-production sample of the TAIYO YUDEN CO.,LTD. Bluetooth USB Adapter was tested as **E**quipment **U**nder **T**est.

EUT	: Bluetooth USB Adapter
Model No.	: EYSF2CSUU
Serial No.	: 0010C61f9bac , 0010C61f9baf
FCC ID	: RYYUD23011

EUT is attached to the PC provided with the USB port, and it is a wireless applications to communicate with other Bluetooth devices.
This is operated within the bands 2400 – 2483.5MHz frequency hopping intentional radiators that comply with the section 15.247. It provides 79 channels. And it adopts an AFH function to prevent interference with other wireless applications. Refer to APPENDIX 1.
It is manufactured in accordance with the technical specifications in Part 1, Part 2 and Part 15, Subpart C of the Code of Federal Regulations 47 as a following part.

1.1307 (b)(1), 15.205(a), (b)
1.1310 Table 1B, 15.207(a) to (d)
2.1033 (a), (b), 15.209(a) to (f)
15.201 (b),15.247 (a)-(1), (a)-(1)-(ii), (b), (c),(d),(f)
15.203

2.2 Summary of Test and Inspection Result

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
1	Conducted Emission	ANSI C63.4:2001	15.207	-	N/A	15.2 dB VB(AV) 2.97 MHz	Pass
2	Carrier Frequency Separation	ANSI C63.4:2001 Public Notice DA00-705	15.247(a)(1)	Conducted	N/A	-	Pass
3	20dB Bandwidth		15.247(a)(1)(i)		N/A	-	Pass
4	Number of Hoping Frequency		15.247(a)(1)(iii)		N/A	-	Pass
5	Dwell time		15.247(a)(1)(iii)		N/A	-	Pass
6	Maximum peak Output Power		15.247(b)(1)		N/A	-	Pass
7	Band Edge Compliance		15.247(c)		N/A	-	Pass
8	Radiated Emission		15.247(c)	Radiated	N/A	6.8 dB Vertical 48.01MHz	Pass

2.3 Test Methodology

Interference measurements were made in accordance with ANSI C63.4-2001 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. Radiate testing in the range of 30 MHz to 18GHz was performed at an antenna to EUT distance of 3 meters under the 15.209 (e). And radiate testing in the range of 18 GHz to 25 GHz (10th harmonic of the highest fundamental frequency, 15.209 (f) and 15.33 (a) (1) for the spectrum investigation) was performed at an antenna to EUT distance of 1 meters under the 15.209 (e) .

2.4 Test Facility

1. FCC 47CFR, Part 15, Section 15.247 and RSS210 regulation test was performed on the shielded room and radiated interference field strength test was performed on the 10 meter semi-anechoic chamber located at TAIYO YUDEN CO.,LTD. EMC Center, 5607-2 Nakamuroda Haruna-Machi Gunma-Gun Gunma, 370-3347 Japan.
2. This Laboratory is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) by United States Department of Commerce, National Institute of Standard and Technology (NIST) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations.
3. These criteria encompass the requirements of ISO/IEC 17025:1999 and the relevant requirements of ISO 9002:1994 as suppliers of calibration or test results. Accreditation awarded for specific services, listed on the Scope of Accreditation for: ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS FCC. (NVLAP LAB CODE: 200607-0).
4. This laboratory is listed by Federal Communications Commission, Equipment Authorization Division (Registration Number: 606514) and listed by Industry Canada.(No.4389-1)
5.

3 System Test Configuration

3.1 Justification

1. Emission tests were performed with no deviation from the ANSI C63.4-2001 and FCC 47CFR, Part 15, Section 15.247 regulation tests were performed with no deviation from the FCC Public Notice DA00-75 released March 30, 2000.
2. The system was configured for testing a typical fashion. (as a customer would normally use it.)
3. Radiate testing in the range of 1 GHz to 25 GHz was investigated with the spectrum (peak detector function) under the FCC regulation section 15.209 (e) and 15.35 (b). The test performed at an antenna to EUT distance of 1 meter. The level of any unwanted emissions from EUT did not exceed the level of the fundamental emission (Compliance with 15.209 (c)). And test result found to be compliance with FCC regulation section 15.209 (a) Radiated emission limits (500 micro-volts/meter). Data is presented for the “worst case” measurements, that E.U.T was normal operated.
4. Radiate testing in the range of 30 MHz to 1000 MHz was performed at an antenna to EUT distance of 3 meters under the 15.209 (e) and 15.31(f)(1).
5. All tests were performed with the representative channel operation as follows.

a. Lowest frequency channel : CH0 2402MHz
b. Middle frequency channel : CH39 2442MHz
c. Highest frequency channel : CH78 2480MHz

3.2 Operating modes

Mode	Explanation of the mode
Transmitting mode	Signal packet type : DH5 Signal pattern : PRBS9

DH5	Description : A 5 slot, Data High rate, ACL type packet. Supports a data payload of 0 to 339 bytes with CRC, no FEC, and fully transmits within five consecutive 625 microsecond transmission slots. Makes up the front half of a 5/1 multi-slot Frame.
PRBS9	A periodic Pseudo Random Bit Sequence. 2^9 -1

3.3 List of accessories

	Product name	M/N	S/N	Manufacturer	Notes	FCC ID / DoC
a	Personal Computer	D51C	T251KN82Z0196	Compaq	-	DoC
b	Monitor	317U	826BE43KD054	Compaq	-	ID:H4ICM5017
c	keyboard	KB-0133	B55830EBU0151X	Compaq	PC Bundle	DoC
d	mouse	-	F466B0MN3O	Compaq	PC Bundle	ID: JNZ211443

3.4 Interface cable

	Cable Type	M/N	Connection	Ferrite core	Shielded	Material of connector	Length	Treatment for the extra length
1	RGB cable	-	b---c	"b" side	Yes	Metal	1.5m	folded back and forth in the center
2	AC cable	-	b	-	No	Plastic	2.4m	-
3	AC cable	-	c	-	No	Plastic	2.0m	-
4	Keyboard cable	-	b	-	No	Plastic	1.9m	-
5	Mouse cable	-	b	-	No	Plastic	1.8m	-

3.5 Special Accessories

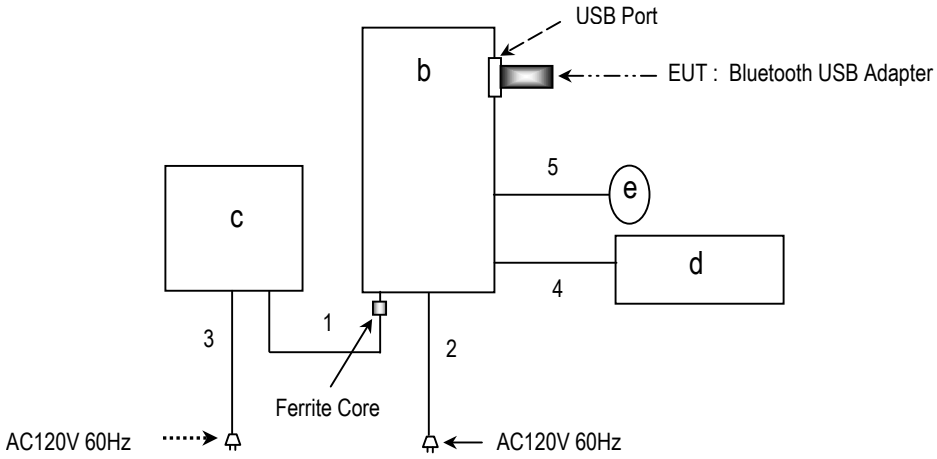
None

3.6 Equipment Modifications

No modification has been carried out by the test laboratory.

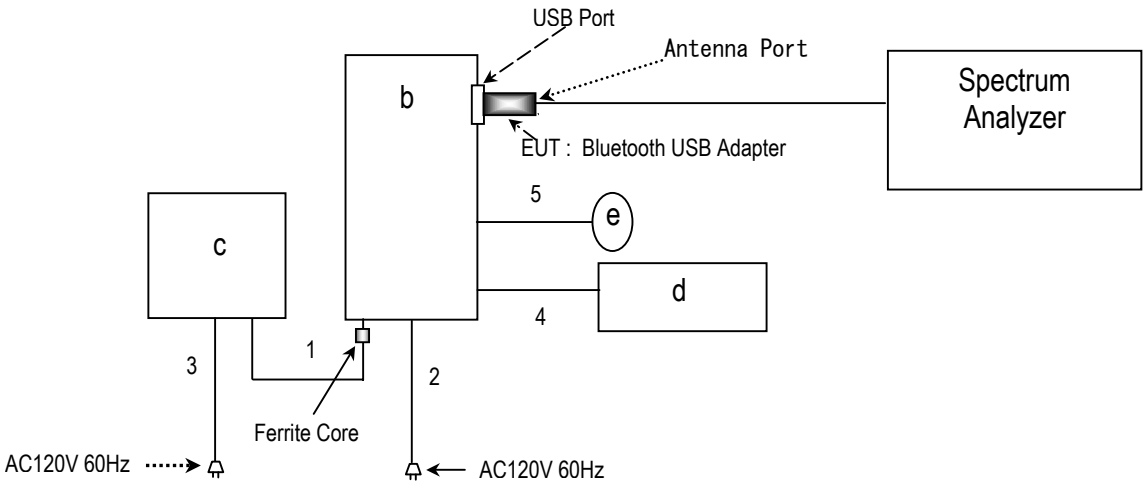
3.7 Configuration of Tested System

Radiated Emission Test and Conducted Emission Test



These numbers and the marks in the picture above are corresponding to the numbers and the mark in Figure 3.4 and 3.5 on page 6.

Operation within the bands 2400-2483.5MHz



4 Antenna Requirement

The EUT provide a permanently attached antenna and it found to be compliance with FCC regulation section 15.203.
Refer to Section 8.2 Internal Photos.

5 Conducted Emission Test

5.1 Test Setup

The test setup was made according to ANSI STD C63.4-2001 clause 7 in the Shielded room.
The rear of non-conductive wooden table top was placed 0.4 m from a vertical metal reference plane that one of the wall.
Rears of the peripherals were all aligned and flush with rear of non-conductive wooden tabletop.
The height of this table was 0.8 m and 1.5 m wide x 1.0 m deep size.
The spacing between the each equipment was 10 cm.
Connection of the PC connected EUT USB Adapter to the artificial mains network (LISN) was required.
The distance between the closet surface of the EUT and the closet surface of the artificial mains network (LISN) was 0.8 m.
Connection of the all other equipment to the second artificial mains network (LISN) was required. The distance between the peripherals and the closet surface of the second artificial mains network (LISN) was minimum 0.8 m.
The second artificial mains network is terminated with 50 ohm terminator. Where a mains flexible cord is provided by the manufacture this is 2.0 m long and excess cable was folded back and forth as far as possible to 0.8 m so as to from a bundle not exceeding 0.4 m in length. Interconnecting cables of table top equipment that hang closer than 0.4 m to the floor ground plane were folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.
The measurement has been conducted with both line and neutral power supply polarization.
The maximum voltage emission was verified with the cable routing and the location of the peripherals.
The highest voltage emission has been recorded.
For further description of the configuration refer to the photographs of this report.

Detector Mode: Quasi-Peak and Average
Bandwidth: 10kHz

5.2 Test Instrumentation

Facility/ Equipment	Manufacturer	Model No.	Serial No.	Frequency Range	Next Calibration Due
Shielded room	TDK Co.,Ltd	DA-06912	-	-	-
EMI Test Receiver	R&S	ESHS 10	100005	0.9-30MHz	29th..7.2004.
LISN	KYORITSU ELECTRICAL WORK	KNW-407	8-680-1	-	18th.3.2005.
Cable	SUHNER	RG223	CE-1	0.15-30MHz	7th.4.2004.
		RG223	CE-2	0.15-30MHz	7th.4.2004.
		RG2214	CE-3	0.15-30MHz	7th.4.2004.
Attenetor	KYORITSU	KPD-602	5K325	0.15-30MHz	23rd.9.2004.
RF Selector	TDK Co.,Ltd	NS4900	0302-009	-	7th.4.2004.
Software	TOYO Corporationcnica	EP5/CE Ver.2.0	0208085	-	-

5.3 Conducted Emission Calculation

The basic equation with a sample calculation is as follows:

c.f.= CF + AL
CE = RA + c.f.

Where c.f. = Correction Factor (dB)
CE = Conducted Emission (Emission Level - Result) (dBuV)
RA = Receiver Amplitude (Reading Level) (dBuV)
CF = Cable Attenuation Loss (dB)
AL = Attenuator Loss (dB)

Assume a receiver reading of 27.3 dB μ V is obtained. The Factor of 3.4dB is added, giving a terminal voltage of 30.7 dB μ V. The 30.7 dB μ V value was mathematically converted to its corresponding level in μ V.

CE = 27.3 + 3.4 = 30.7 dB μ V

Level in μ V = Common Antilogarithm [(30.7 dB μ V)/20] = 34.8 μ V

5.4 Test Results

Conducted Emission 2402MHz

Serial No. : 0010C61f9bac
Power : AC 120V 60Hz
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 20℃
Humidity : 35%
Remarks : It was measured at AC port of Personal Computer " B " with EUT USB Adapter connected.

VA

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
0.20	3.3	34.8	34.1	63.8	53.8	38.1	25.7	37.4	16.4
2.87	3.4	27.2	26.5	56.0	46.0	30.6	25.4	29.9	16.1
2.96	3.4	27.7	27.3	56.0	46.0	31.1	24.9	30.7	15.3
4.25	3.5	26.8	26.5	56.0	46.0	30.3	25.7	30.0	16.0
9.19	3.7	29.0	23.5	60.0	50.0	32.7	27.3	27.2	22.8
9.29	3.7	34.0	29.7	60.0	50.0	37.7	22.3	33.4	16.6

VB

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
2.87	3.3	27.5	26.9	56.0	46.0	30.8	25.2	30.2	15.8
2.97	3.3	27.9	27.5	56.0	46.0	31.2	24.8	30.8	15.2
4.25	3.4	27.5	27.1	56.0	46.0	30.9	25.1	30.5	15.5
9.29	3.5	34.3	30.1	60.0	50.0	37.8	22/2	33.6	16.4

Test Result : Pass

Conducted Emission 2441MHz

Serial No. : 0010C61f9bac
Power : AC 120V 60Hz
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 20℃
Humidity : 35%
Remarks : It was measured at AC port of Personal Computer " B " with EUT USB Adapter connected.

VA

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
0.20	3.3	34.7	34.2	63.8	53.8	38.0	25.8	37.5	16.3
2.87	3.4	27.4	26.4	56.0	46.0	30.8	25.2	29.8	16.2
2.96	3.4	27.8	27.2	56.0	46.0	31.2	24.8	30.6	15.4
4.25	3.5	26.8	26.5	56.0	46.0	30.3	25.7	30.0	16.0
9.19	3.7	29.0	23.5	60.0	50.0	32.7	27.3	27.2	22.8
9.29	3.7	34.1	29.8	60.0	50.0	37.8	22.2	33.5	16.5

VB

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
2.87	3.3	27.9	27.0	56.0	46.0	31.2	24.8	30.3	15.7
2.97	3.3	27.4	27.2	56.0	46.0	30.7	25.3	30.5	15.5
4.25	3.4	28.0	27.3	56.0	46.0	31.4	24.6	30.7	15.3
9.29	3.5	34.7	30.3	60.0	50.0	38.2	21.8	33.8	16.2

Test Result : Pass

Conducted Emission 2480MHz

Serial No. : 0010C61f9bac
Power : AC 120V 60Hz
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 20℃
Humidity : 35%
Remarks : It was measured at AC port of Personal Computer " B " with EUT USB Adapter connected.

VA

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
0.20	3.3	34.7	34.2	63.8	53.8	38.0	25.8	37.5	16.3
2.87	3.4	28.0	26.8	56.0	46.0	31.4	24.6	30.2	15.8
2.96	3.4	28.0	27.2	56.0	46.0	31.4	24.6	30.6	15.4
4.25	3.5	26.5	26.0	56.0	46.0	30.0	26.0	29.5	16.5
9.19	3.7	29.0	23.5	60.0	50.0	32.7	27.3	27.2	22.8
9.29	3.7	34.1	29.8	60.0	50.0	37.8	22.2	33.5	16.5

VB

Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Conducted Emission [dB(μV)]			
		QP	AV	QP	AV	QP	Margin [dB]	AV	Margin [dB]
2.87	3.3	27.8	27.0	56.0	46.0	31.1	24.9	30.3	15.7
2.97	3.3	28.0	27.1	56.0	46.0	31.3	24.7	30.4	15.6
4.25	3.4	29.0	28.0	56.0	46.0	32.4	23.6	31.4	14.6
9.29	3.5	34.8	30.3	60.0	50.0	38.3	21.7	33.8	16.2

Test Result : Pass

6 Radiated Emission Test

6.1 Test Setup

The test setup was made according to ANSI STD C63.4-2001 clause 8 on the 10 meter semi-anechoic chamber, which allows a 3 or 1 m distance measurement.
EUT was placed on non-conductive table (foam polystyrene). The height of this table was 0.8 m.
The measurement has been conducted with both horizontal and vertical antenna polarization.
The turntable has been fully rotated. The highest radiation of the equipment has been recorded.
For further description of the configuration refer to the pictures of this report.

Distance between equipment and antenna : 3m (30MHz to 18GHz)
: 1m (18GHz to 25GHz)

Spectrum Analyzer Setting

30～1000MHz	Detector : Quasi-Peak Bandwidth : 120kHz
1～25GHz	Detector : Peak and Average Bandwidth : 1MHz

6.2 Test Instrumentation

Facility/ Equipment	Manufacturer	Model No.	Serial No.	Frequency Range	Next Calibration Due
10m anechoic chamber	TDK Co.,Ltd	DA-06912	-	-	21st.2.2005.
EMI Test Receiver	R&S	ESCS 30	100148	30-1000MHz	23rd.9.2004.
Spectrum Analyzer	Agilent Technologies	8563E	3416A02230	30-1000MHz	15th.6.2003.
		E4446A	US42070181	1-40GHz	11th.2.2005.
Amplifier		8449B	3008A00571	1-26.5GHz	8th.7.2004.
		8447D	2944A06812	30-1000MHz	7th.4.2004.
RF Selector	TDK Co.,Ltd	NS4900	0302-010	-	7th.4.2004.
RF Cable	SUHNER	RG214	RG 1 【512815】	30-1000MHz	7th.4.2004.
		RG214	RG 3 【513176】	30-1000MHz	7th.4.2004.
		RG214	RG 8 【512815】	30-1000MHz	7th.4.2004.
		RG214	RG 5 【513176】	30-1000MHz	7th.4.2004.
		RG214	RG 6 【512291】	30-1000MHz	7th.4.2004.
		SUCOFLEX 106	SU1 [28334/6]	1-18GHz	7th.4.2004.
		SUCOFLEX 104	SU2 [204313/4]	1-18GHz	7th.4.2004.
	HP	85381C	No.3	18-25GHz	7th.4.2004.
		85381C	No.5	18-25GHz	7th.4.2004.
Attenetor	KYORITSU	KPD-602	220142	30-1000MHz	7th.4.2004.
Antenna	Schwarzbeck	BBA9106	No.4	30-300MHz	15th.4.2004.
		UHALP9108-A	160	300-1000MHz	15th.4.2004
	EMCO	3115	9403-4232	1-18GHz	14th.8.2005.
		3116	9311-2227	18-40GHz	19th.8.2005.
Software	TOYO Corporationcnica	EP5/RE Ver.2.0	0208086	-	-

6.3 Radiated Emission Calculation

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

c.f.= AF + CF +AL – AG - DF
RE = RA + c.f.

Where c.f. = Correction Factor (dB/m)
RE = Radiated Emission (Emission Level - Result) (dBuV/m)
RA = Receiver Amplitude (Reading Level) (dBuV)
AF = Antenna Factor (dB/m)
CF = Cable Attenuation Loss (dB)
AG = Amplifier Gain (dB)
AL = Attenuator Loss (dB)
DF = Distance Factor
Distance between equipment and antenna:3m = 0(dB)
Distance between equipment and antenna:1m = 9.5(dB)

Assume a receiver reading of 43.4 dB μ V is obtained. The Correction Factor of –10.2 dB/m is added, giving a Radiated Emission of 33.2 dB μ V/m. The 33.2 dB μ V/m value was mathematically converted to its corresponding level in μ V/m.

RE = 43.4 + (-10.2) = 33.2 dB μ V/m

Level in μ V/m = Common Antilogarithm [(33.2 dB μ V/m)/20] = 45.7 μ V/m

6.4 Test Results

6.4.1 Frequency Range 30MHz to 1GHz

Spurious Emission (Radiated) 2402MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

Frequency [MHz]	Factor [dB]	Meter Reading [dB(uV)]		Limits [dB(uV)/m]	Radiated Emission (QP) [dB(uV)/m]			
		Horizontal	Vertical		Horizontal	Margin [dB]	Vertical	Margin [dB]
35.11	-7.2	-	38.5	40.0	-	-	31.3	8.7
48.01	-10.2	-	43.4	40.0	-	-	33.2	6.8
79.10	-15.4	-	44.0	40.0	-	-	28.6	11.4
104.37	-10.5	-	44.6	43.5	-	-	34.1	9.4
222.90	-3.5	42.1	-	46.0	38.6	7.4	-	-
816.16	2.5	33.5	-	46.0	36.0	10.0	-	-

Test Result : Pass

Spurious Emission (Radiated) 2441MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

Frequency [MHz]	Factor [dB]	Meter Reading [dB(uV)]		Limits [dB(uV)/m]	Radiated Emission (QP) [dB(uV)/m]			
		Horizontal	Vertical		Horizontal	Margin [dB]	Vertical	Margin [dB]
35.10	-7.2	-	37.8	40.0	-	-	30.6	9.4
48.01	-10.2	-	43.4	40.0	-	-	33.2	6.8
79.10	-15.4	-	44.1	40.0	-	-	28.7	11.3
104.37	-10.5	-	44.6	43.5	-	-	34.1	9.4
222.90	-3.5	42.1	-	46.0	38.6	7.4	-	-
816.20	2.5	33.6	-	46.0	36.1	9.9	-	-

Test Result : Pass

Spurious Emission (Radiated) 2480MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

Frequency [MHz]	Factor [dB]	Meter Reading [dB(uV)]		Limits [dB(uV)/m]	Radiated Emission (QP) [dB(uV)/m]			
		Horizontal	Vertical		Horizontal	Margin [dB]	Vertical	Margin [dB]
35.10	-7.2	-	38.8	40.0	-	-	31.6	9.4
48.01	-10.2	-	43.6	40.0	-	-	33.4	6.8
79.32	-15.4	-	44.3	40.0	-	-	28.9	11.3
104.37	-10.5	-	44.5	43.5	-	-	34.0	9.4
222.95	-3.5	42.2	-	46.0	38.7	7.3	-	-
816.16	2.5	33.6	-	46.0	36.1	9.9	-	-

Test Result : Pass

6.4.2 Frequency Range 1GHz to 25GHz

Spurious Emission (Radiated) 2402MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

*	Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Emission Level [dB(μV/m)]			
			Peak	Average	Peak	Average	Peak	Margin [dB]	Average	Margin [dB]
H	2399.99	-7.2	55.3	44.0	74.0	54.0	48.1	25.9	36.8	17.2
V	2399.99	-7.2	54.2	43.0	74.0	54.0	47.0	19.8	35.8	18.2
V	4804.00	0.3	45.3	32.5	74.0	54.0	45.6	28.4	32.8	21.2
V	7206.00	4.2	45.8	32.5	74.0	54.0	50.0	24.0	36.7	17.3
V	9608.00	7.4	45.6	33.3	74.0	54.0	53.0	21.0	40.7	13.3
V	19216.00	12.8	43.6	30.6	74.0	54.0	56.4	17.6	43.4	10.6
V	21618.00	11.9	45.2	31.0	74.0	54.0	57.1	16.9	42.9	11.1

*: Antenna polarization : H = Horizontal , V = Vertical

Test Result : Pass

Spurious Emission (Radiated) 2441MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

*	Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Emission Level [dB(μV/m)]			
			Peak	Average	Peak	Average	Peak	Margin [dB]	Average	Margin [dB]
V	4882.00	0.6	45.9	32.2	74.0	54.0	46.5	27.4	32.8	21.2
V	7323.00	4.4	45.2	32.8	74.0	54.0	49.6	24.4	37.2	16.8
V	9764.00	7.2	46.0	33.2	74.0	54.0	53.2	20.8	40.4	33.6
V	19528.00	12.6	43.6	30.7	74.0	54.0	56.2	17.8	43.3	10.7
V	21969.00	12.1	43.8	31.0	74.0	54.0	55.9	18.2	43.1	10.9
V	24410.00	13.2	46.8	33.6	74.0	54.0	60	14.0	46.8	7.2

*: Antenna polarization : H = Horizontal , V = Vertical

Test Result : Pass

Spurious Emission (Radiated) 2480MHz

Serial No. : 0010C61f9bac
Power : DC 5V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Test Distance : 3m
Temperature : 23 ℃
Humidity : 35%

*	Frequency [MHz]	Factor [dB]	Meter Reading [dB(μV)]		Limits [dB(μV)]		Emission Level [dB(μV/m)]			
			Peak	Average	Peak	Average	Peak	Margin [dB]	Average	Margin [dB]
H	2484.65	-7.0	48.7	35.6	74.0	54.0	41.7	32.3	28.6	25.4
V	2484.63	-7.0	54.7	42.4	74.0	54.0	47.7	26.3	35.4	18.6
V	4960.00	0.9	45.7	32.5	74.0	54.0	46.6	27.4	33.4	20.6
H	7440.00	4.6	47.3	34.6	74.0	54.0	51.9	22.1	39.2	14.8
V	7440.00	4.6	47.6	36.0	74.0	54.0	52.2	21.8	40.6	13.4
V	9920.00	7.5	45.7	32.8	74.0	54.0	53.2	20.8	40.3	13.7
V	19840.00	12.5	44.2	31.2	74.0	54.0	56.4	17.6	43.7	10.3
V	22320.00	12.5	44.0	31.2	74.0	54.0	56.5	17.5	43.7	10.3

*: Antenna polarization : H = Horizontal , V = Vertical

Test Result : Pass

7 20dB Bandwidth

7.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

Spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 30kHz
VBW : 30kHz
SPAN : 2MHz
SWEEP TIME : AUTO

7.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

7.3 Test Results

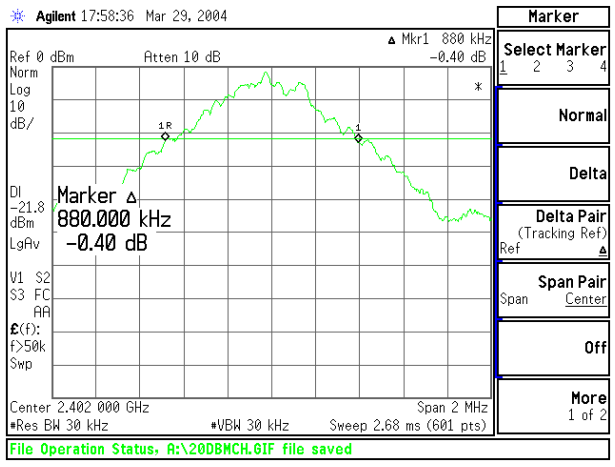
Serial No. : 0010C61f9baf
Power : DC 5.0V (Supply by USB Port)
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (a)(1)(i)

CH	Freqency [MHz]	20dB Bandwidth [MHz]	Limit [MHz]
0ch(Lowest)	2402.0	0.880	1.0
39ch(Middle)	2441.0	0.880	1.0
78ch(Highest)	2480.0	0.820	1.0

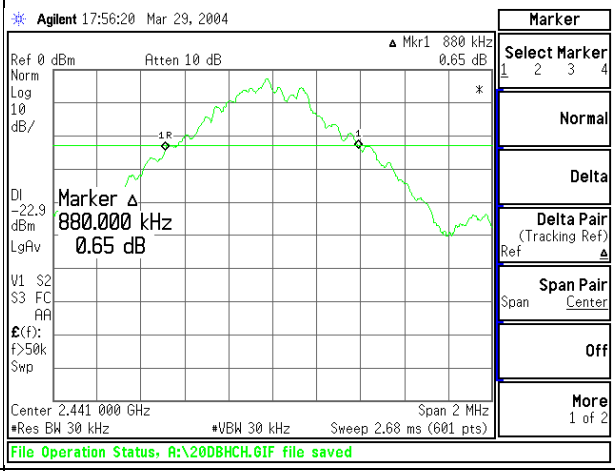
Test Results : Pass

Data of 20dB Bandwidth

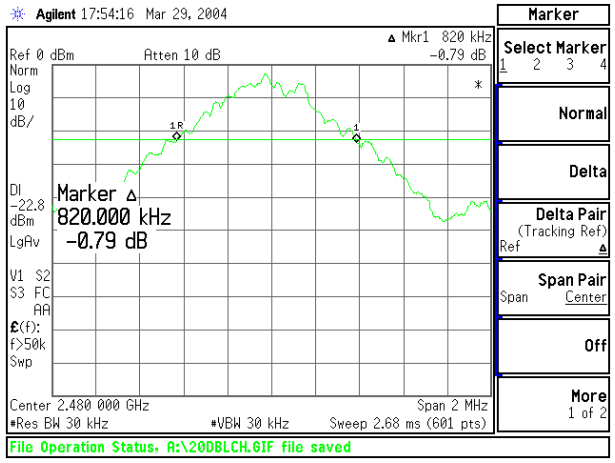
0ch(Lowest) 2402MHz



39ch(Middle) 2441MHz



78ch(Highest) 2480MHz



8 Carrier Frequency Separation

8.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

Spectrum Analyzer setting : -
DETECTOR MODE :PEAK
RBW : 100kHz
VBW : 300kHz
SPAN : 3MHz
SWEEP TIME : AUTO

8.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

8.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V (Supply by USB Port)
Mode : Transmitting mode , Frequency Hopping (79ch)
Transmitting mode , Adoptive Frequency Hopping (20ch)
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.209 (a)(1)

Transmitting mode , Frequency Hopping (79ch)

Channel	Channel Separation [MHz]	Limit
Low frequency (0ch-1ch)	0.950	>20dB Bandwidth and 25[KHz]
Middle frequency (38ch-39ch)	1.030	>20dB Bandwidth and 25[KHz]
High frequency (77ch-78ch)	0.990	>20dB Bandwidth and 25[KHz]

Transmitting mode , Adoptive Frequency Hopping (20ch)

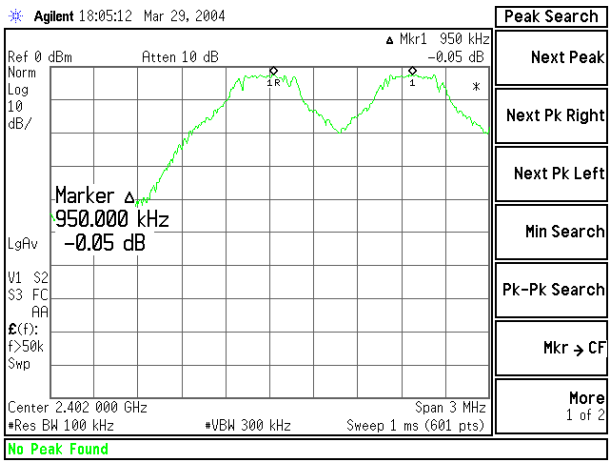
Channel	Channel Separation [MHz]	Limit
Low frequency	1.005	>20dB Bandwidth and 25[KHz]
Middle frequency	1.005	>20dB Bandwidth and 25[KHz]
High frequency	1.005	>20dB Bandwidth and 25[KHz]

Test Results: Pass

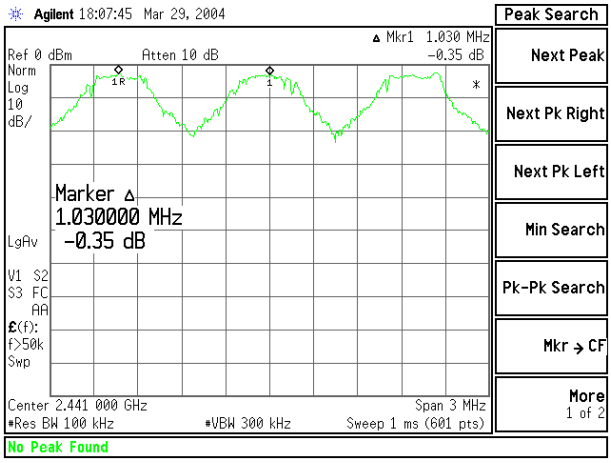
Data of Carrier Frequency Separation

Frequency Hopping (79ch)

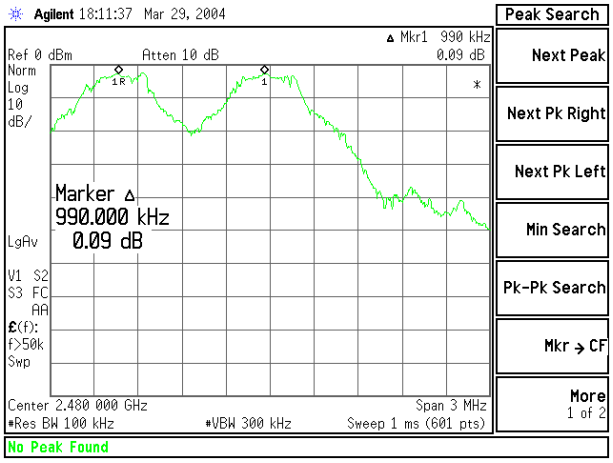
Low frequency (0ch-1ch)



Middle frequency (38ch-39ch)



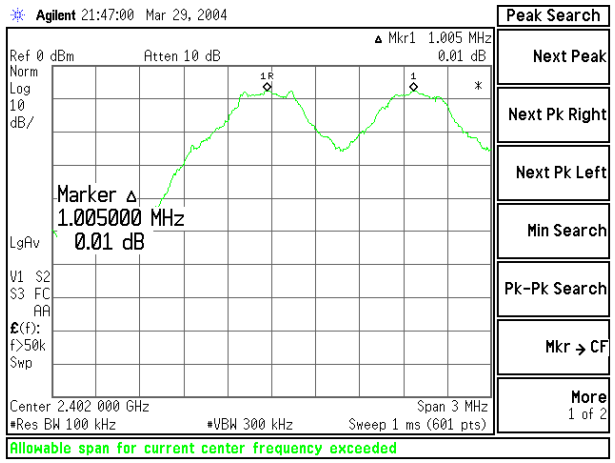
High frequency (77ch-78ch)



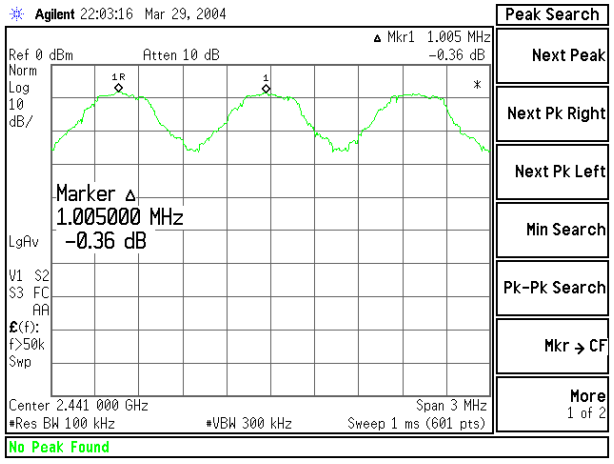
Data of Carrier Frequency Separation

Adoptive Frequency Hopping (20ch)

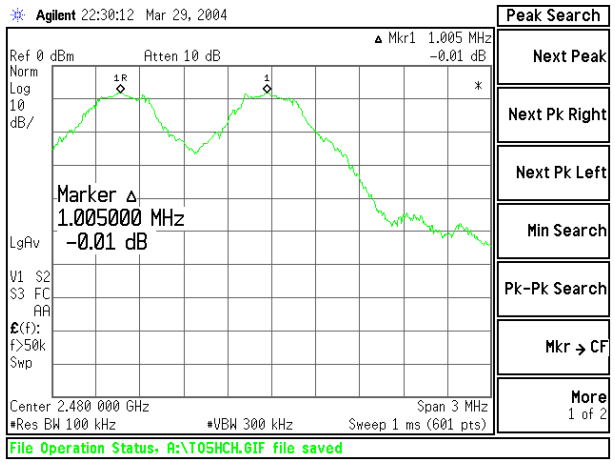
Low frequency



Middle frequency



High frequency



9 Number of Hopping Frequency

9.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 300kHz
VBW : 300kHz
SWEEP TIME : AUTO

9.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

9.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V (Supply by USB Port)
Mode : Transmitting mode , Frequency Hopping (79ch)
Transmitting mode , Adoptive Frequency Hopping (20ch)
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (a)(1)(iii)

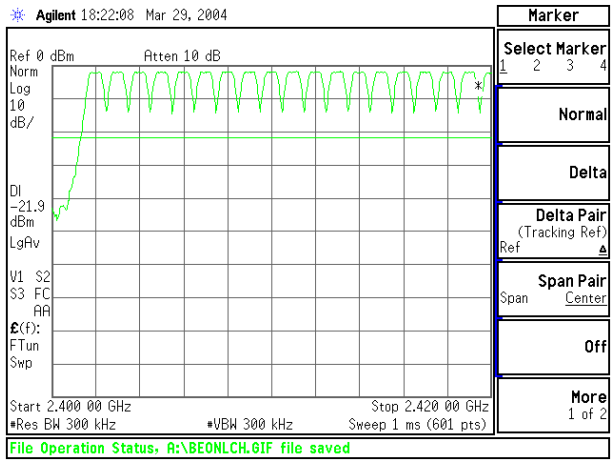
Mode	Number of channel [time]	Limit [time]
Transmitting mode Frequency Hopping (79ch)	79	≧ 75
Transmitting mode Adoptive Frequency Hopping (20ch)	20	≧ 15

Test Results : Pass

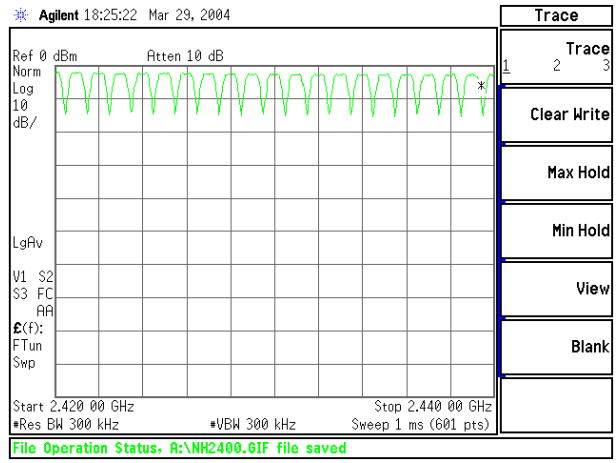
Data of Number of Hopping Frequency

Frequency Hopping (79ch)

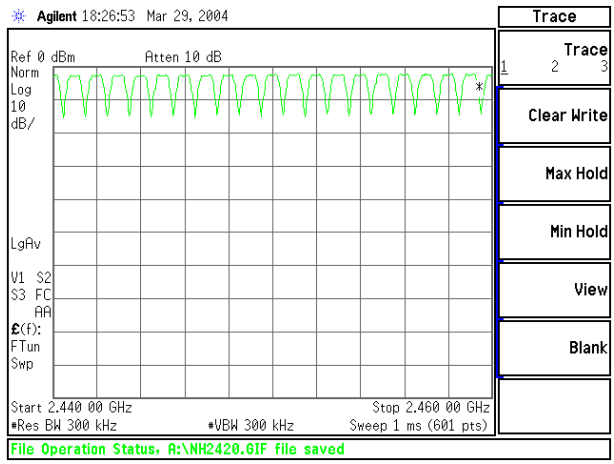
(1/4)



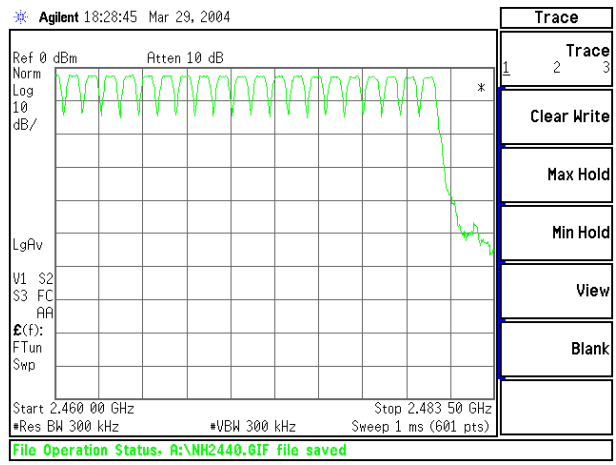
(2/4)



(3/4)



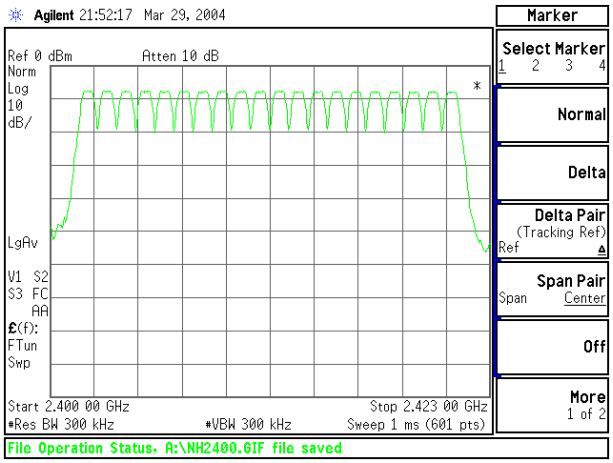
(4/4)



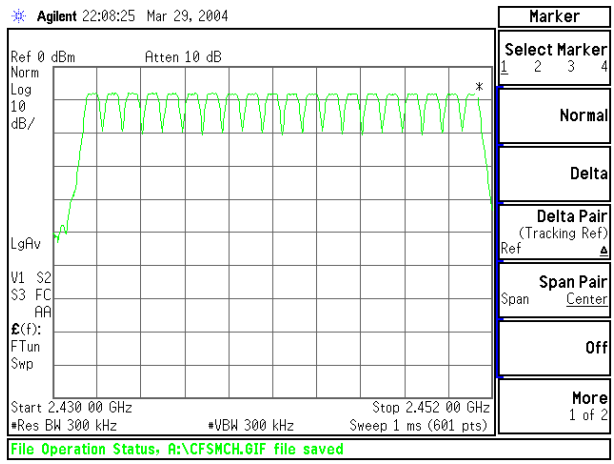
Data of Number of Hopping Frequency

Adoptive Frequency Hopping (20ch)

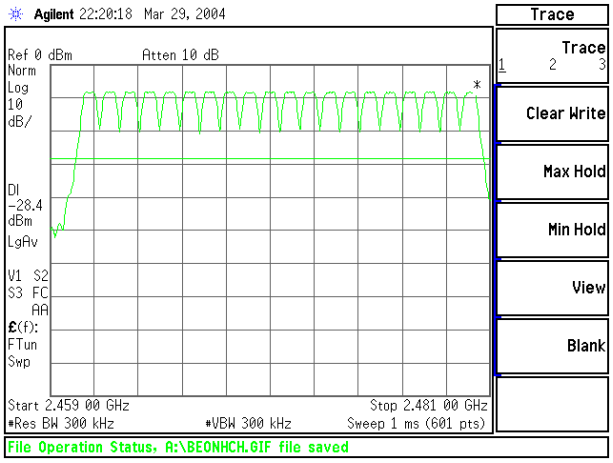
Low frequency



Middle frequency



High frequency



10 Dwell Time

10.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

Spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 1MHz
VBW : 1MHz
SPAN : 0Hz
SWEEP TIME : AUTO

10.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

10.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V (Supply by USB Port)
Mode : Transmitting mode , Frequency Hopping (79ch)
Transmitting mode , Adoptive Frequency Hopping (20ch)
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (a)(1)(iii)

Frequency Hopping (79ch)

Packet	Dwell time [ms]	Limit [ms]
DH1	139.78	400
DH3	273.97	400
DH5	314.14	400

Adoptive Frequency Hopping (20ch)

Packet	Dwell time [ms]	Limit [ms]
DH1	138.67	400
DH3	272.00	400
DH5	316.44	400

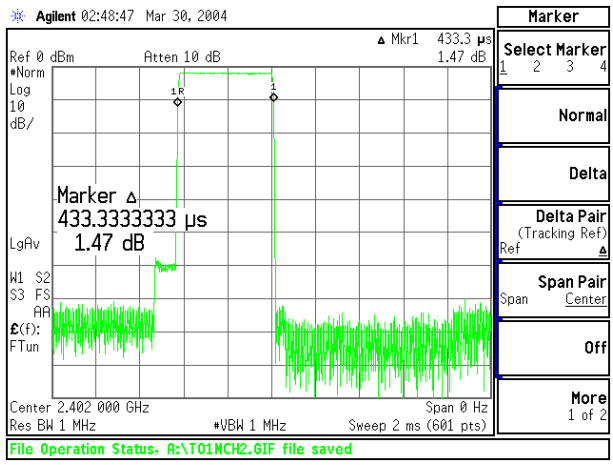
Test Results: Pass

Data of Dwell Time (Frequency Hopping (79ch))

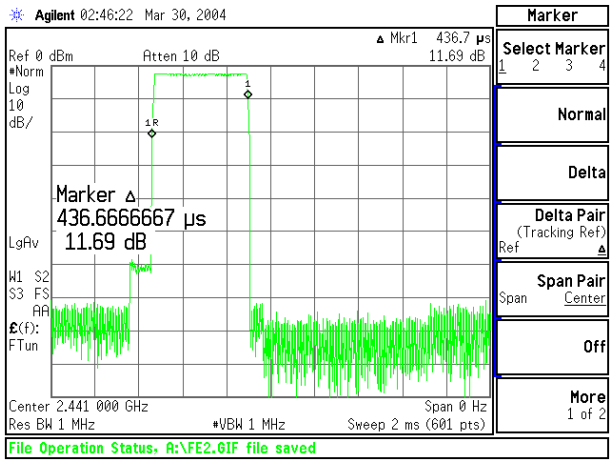
Time of occupancy (Dwell Time) for packet type DH1.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH1 packet needs 1 time slot for transmitting and 1 time slot for receiving.
In a DH1 packet, it hops 800 times for transmitting per 1 second.
The number of hopping channel is 79.
The number of times that appears in 1 channel per 1 second is as follows.
800/79=10.13 (times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 79 = 31.6 seconds
The number of times that appears in 1 channel per 31.6 seconds is as follows.
10.13 x 31.6 = 320.11 (times)
Transmitting time is 436.67μs (see next plot).
Then dwell time is 320.11 x 436.67us = 139.78ms per 31.6 seconds.

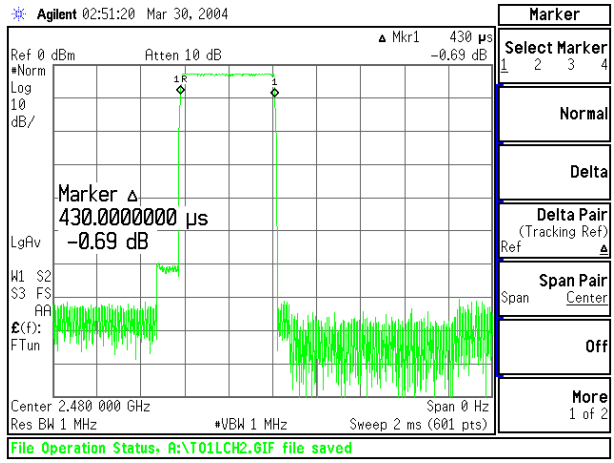
0ch(Lowest) 2402MHz



39ch(Middle) 2441MHz



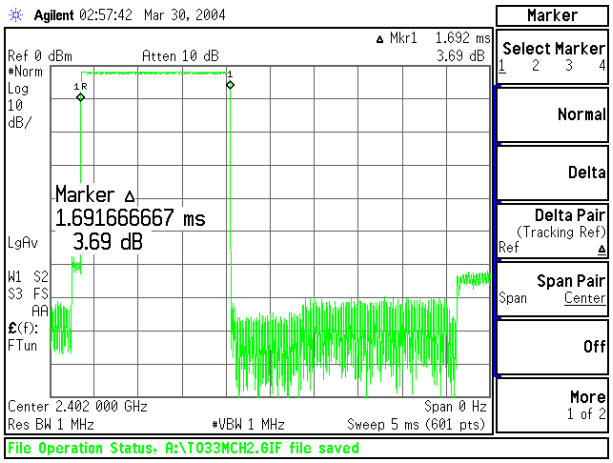
78ch(Highest) 2480MHz



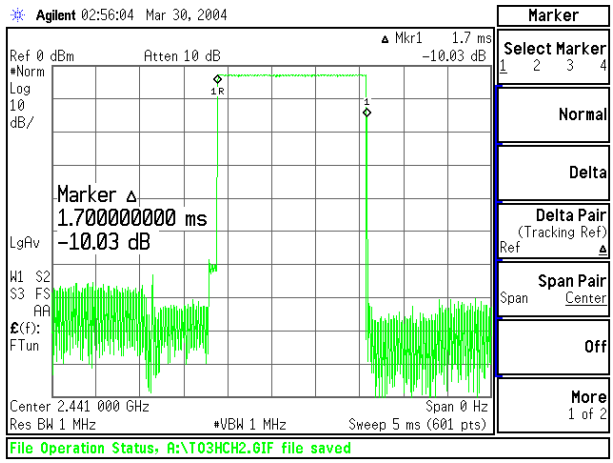
Time of occupancy (Dwell Time) for packet type DH3.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH3 packet needs 3 times slot for transmitting and 1 time slot for receiving.
In a DH3 packet, it hops 400 times for transmitting per 1 second.
The number of hopping channel is 79.
The number of times that appears in 1 channel per 1 second is as follows.
400/79=5.1 (times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 79 = 31.6 seconds
The number of times that appears in 1 channel per 31.6 seconds is as follows.
5.1 x 31.6 = 161.16 (times)
Transmitting time is 1.70ms (see next plot).
Then dwell time is 161.16 x 1.70ms = 273.97ms per 31.6 seconds.

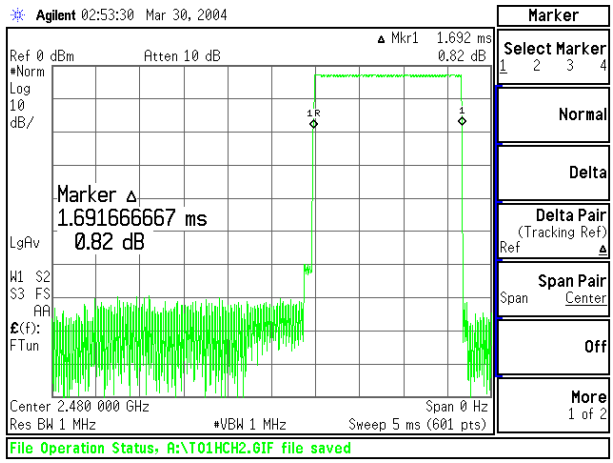
0ch(Lowest) 2402MHz



39ch(Middle) 2441MHz



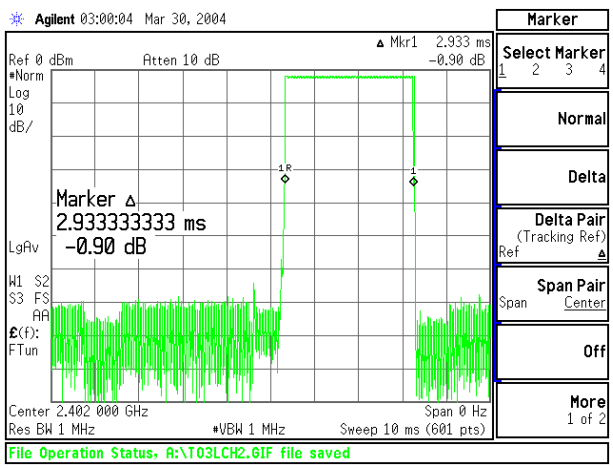
78ch(Highest) 2480MHz



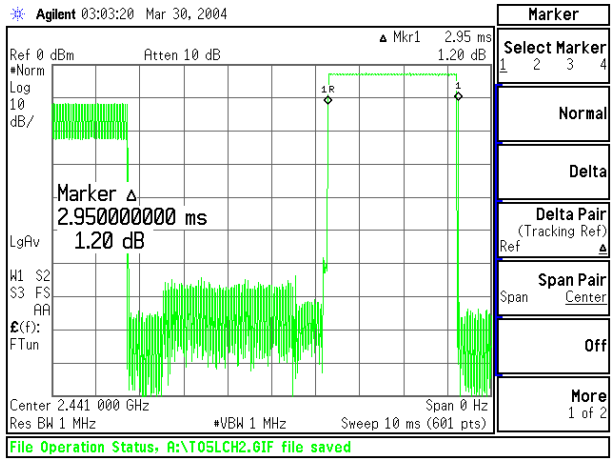
Time of occupancy (Dwell Time) for packet type DH5.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH5 packet needs 5 times slot for transmitting and 1 time slot for receiving.
In a DH5 packet, it hops 266.67 times for transmitting per 1 second.
The number of hopping channel is 79.
The number of times that appears in 1 channel per 1 second is as follows.
266.67/79=3.37 (times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 79 = 31.6 seconds
The number of times that appears in 1 channel per 31.6 seconds is as follows.
3.37 x 31.6 = 106.49 (times)
Transmitting time is 2.95ms (see next plot).
Then dwell time is 106.49 x 2.95ms = 314.14ms per 31.6 seconds.

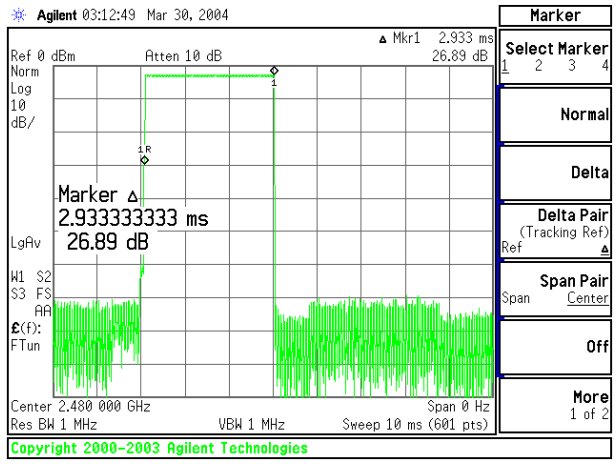
0ch(Lowest) 2402MHz



39ch(Middle) 2441MHz



78ch(Highest) 2480MHz

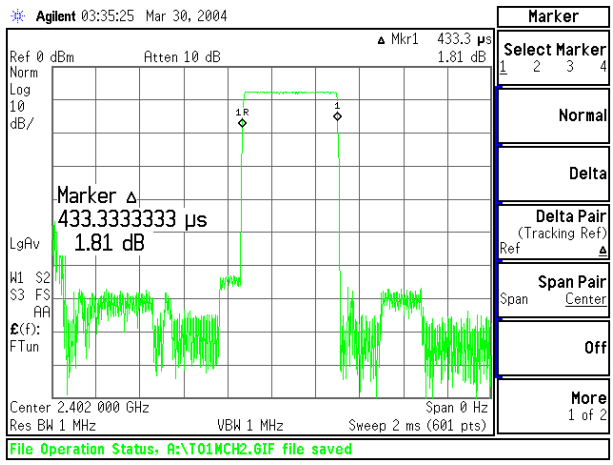


Data of Dwell Time (Adoptive Frequency Hopping 20ch)

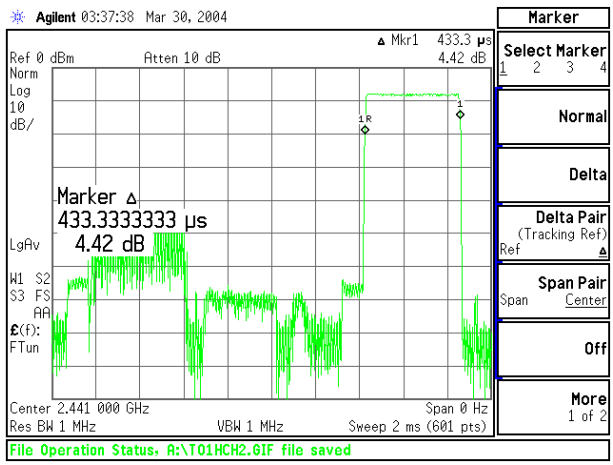
Time of occupancy (Dwell Time) for packet type DH1.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH1 packet needs 1 time slot for transmitting and 1 time slot for receiving.
In a DH1 packet, it hops 800 times for transmitting per 1 second.
The number of hopping channel is 20.
The number of times that appears in 1 channel per 1 second is as follows.
800/20=40(times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 20 = 8 seconds
The number of times that appears in 1 channel per 8 seconds is as follows.
40 x 8 = 320 (times)
Transmitting time is 433.33μs (see next plot).
Then dwell time is 320 x 433.33us = 138.67ms per 8 seconds.

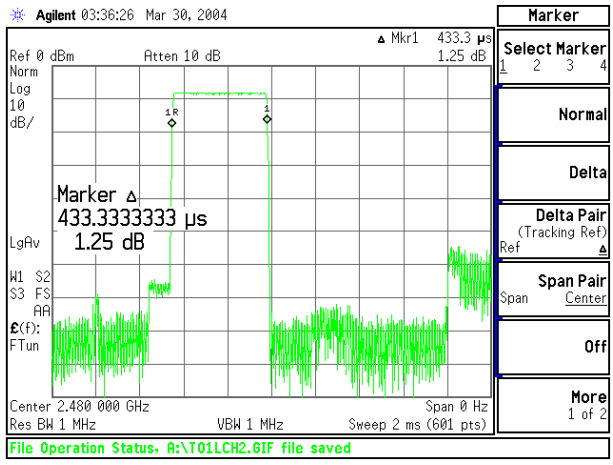
2402MHz



2441MHz



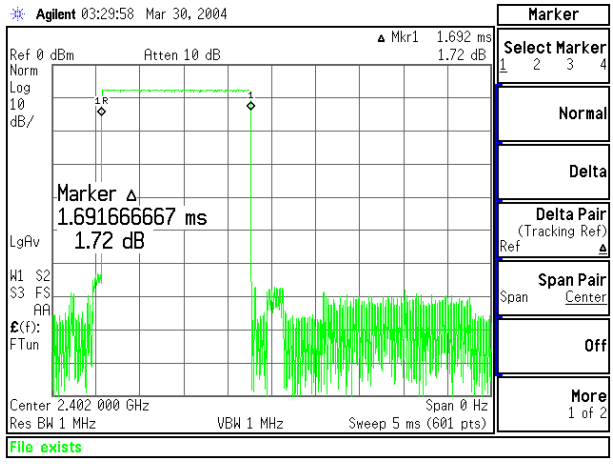
2480MHz



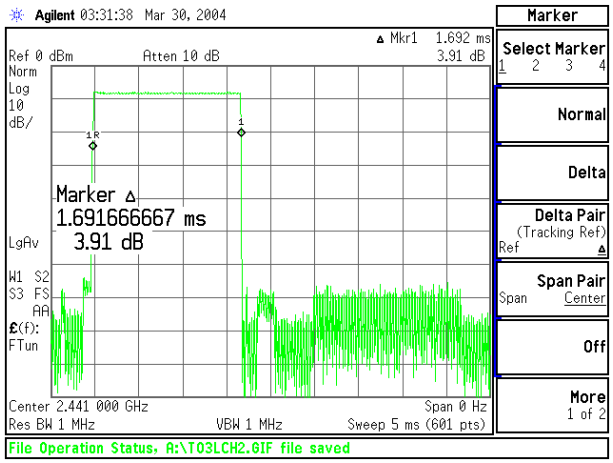
Time of occupancy (Dwell Time) for packet type DH3.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH3 packet needs 3 times slot for transmitting and 1 time slot for receiving.
In a DH3 packet, it hops 400 times for transmitting per 1 second.
The number of hopping channel is 20.
The number of times that appears in 1 channel per 1 second is as follows.
400/20=20 (times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 20 = 8 seconds
The number of times that appears in 1 channel per 8 seconds is as follows.
20 x 8 = 160 (times)
Transmitting time is 1.70ms (see next plot).
Then dwell time is 160 x 1.70ms = 272.00ms per 8 seconds.

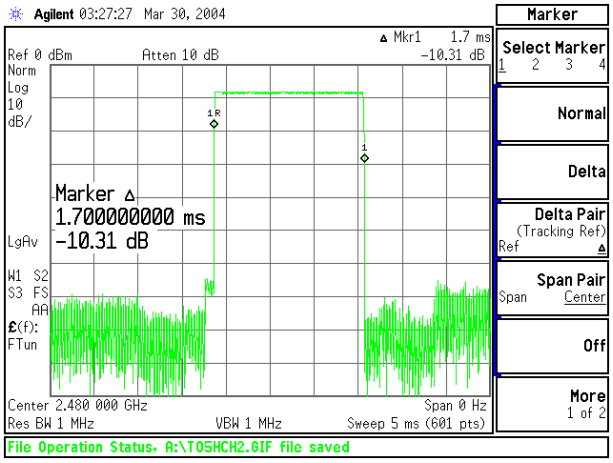
2402MHz



2441MHz



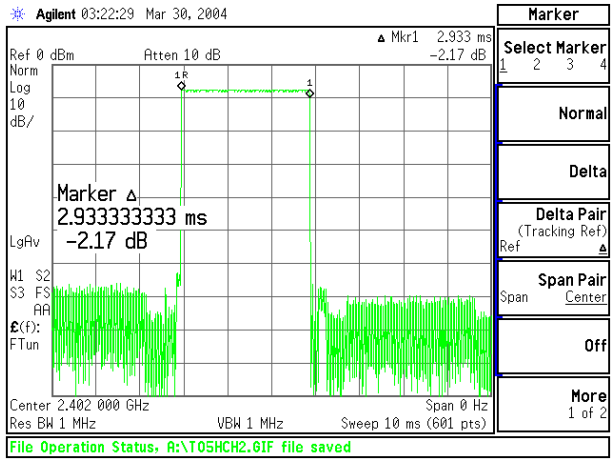
2480MHz



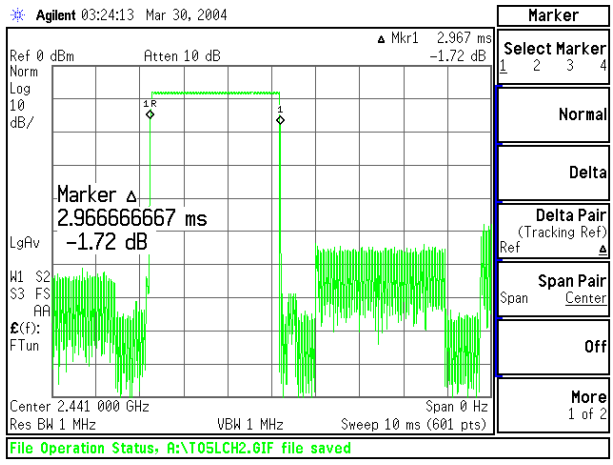
Time of occupancy (Dwell Time) for packet type DH5.

FH hop rate of Bluetooth system is 1600hops per 1 second.
A DH5 packet needs 5 times slot for transmitting and 1 time slot for receiving.
In a DH5 packet, it hops 266.67 times for transmitting per 1 second.
The number of hopping channel is 20.
The number of times that appears in 1 channel per 1 second is as follows.
266.67/20=13.33 (times)
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed 0.4 x 20 = 8 seconds
The number of times that appears in 1 channel per 8 seconds is as follows.
13.33 x 8 = 106.67 (times)
Transmitting time is 2.97ms (see next plot).
Then dwell time is 106.67 x 2.97ms = 316.44ms per 8 seconds.

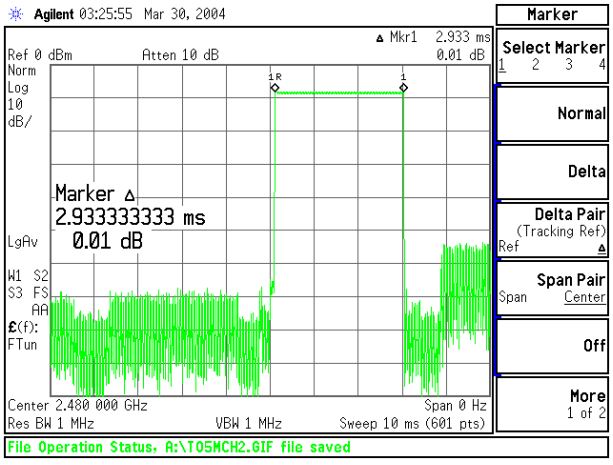
2402MHz



2441MHz



2480MHz



11 Maximum Peak Output Power

11.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 300kHz
VBW : 300kHz
SWEEP TIME : AUTO

11.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

11.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (b)(1)

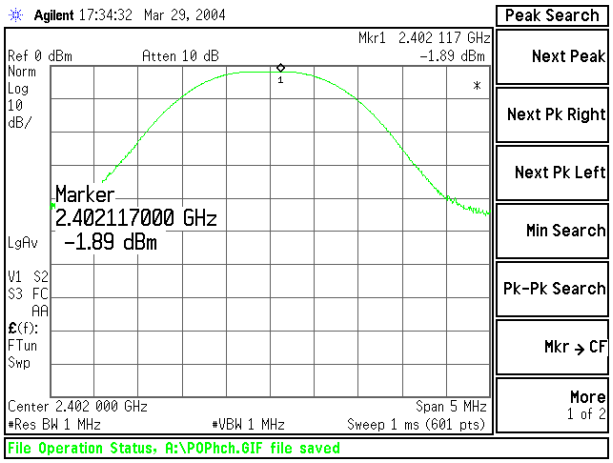
CH	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
0ch(Lowest)	2402.0	-1.89	0.50	-1.39	30.0
39ch(Middle)	2441.0	-2.55	0.58	-1.97	30.0
78ch(Highest)	2480.0	-2.64	0.59	-2.05	30.0

Sample Calculation:
Result = Reading + Cable Loss

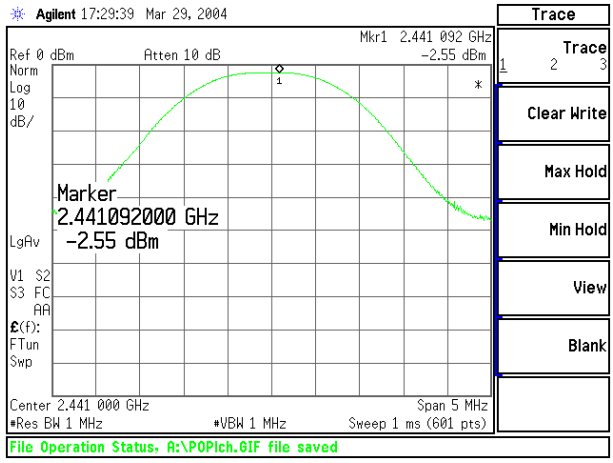
Test Results : Pass

Maximum Peak Output Power

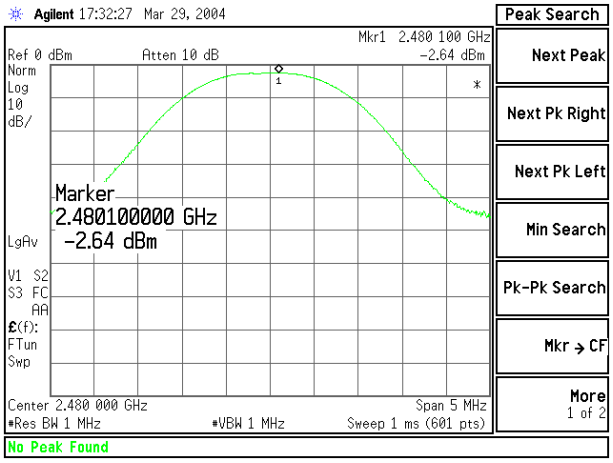
0ch(Lowest) 2402MHz



39ch(Middle) 2441MHz



78ch(Highest) 2480MHz



12 Band Edge Compliance

12.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

Spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 100kHz
VBW : 100kHz
SWEEP TIME : AUTO

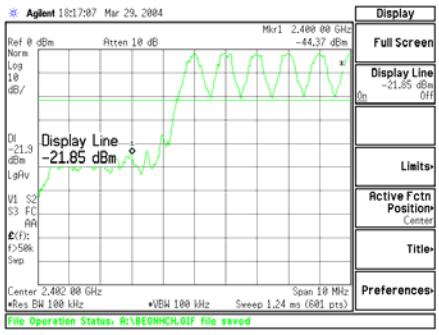
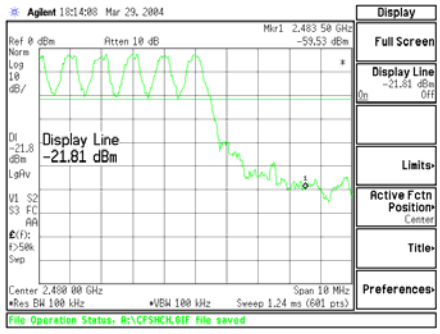
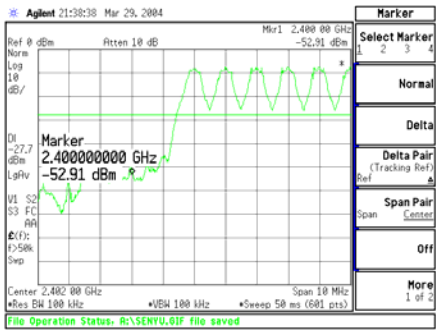
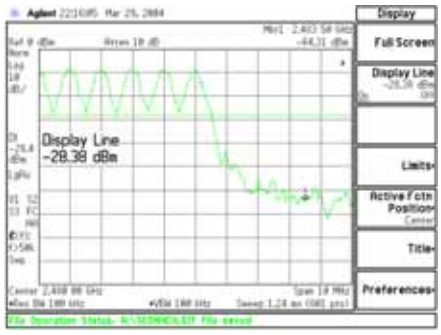
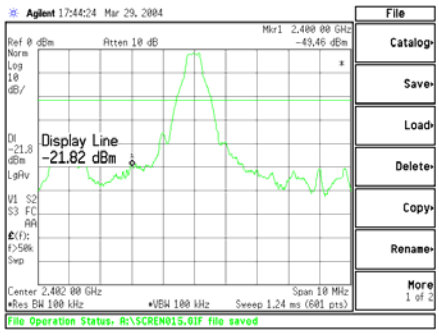
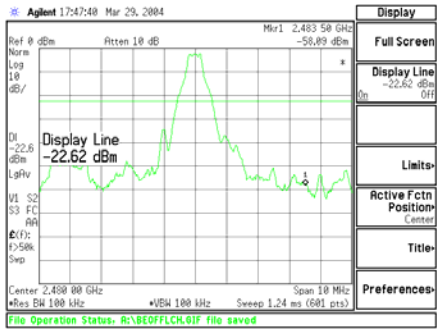
12.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	2005.2.

12.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V
Mode : Transmitting mode , Frequency Hopping (79ch)
Transmitting mode , Adoptive Frequency Hopping (20ch)
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (c)

The spectrum data are attached below. Display line indicates the 20dB offset below highest level. It shows compliance with the requirement in part 15.247(c)

Frequency Hopping 79ch (2402MHz)	Frequency Hopping 79ch (2480MHz)
	
Adoptive Frequency Hopping 20ch (2402MHz)	Adoptive Frequency Hopping 20ch (2480MHz)
	
Non Frequency Hopping (0ch(Lowest) 2402MHz)	Non Frequency Hopping (78ch(Highest) 2480MHz)
	

Test Results : Pass

13 Spurious RF Conducted Emission

13.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

spectrum analyzer setting : -
DETECTOR : PEAK
RBW : 100kHz
VBW : 100kHz
SWEEP TIME : AUTO

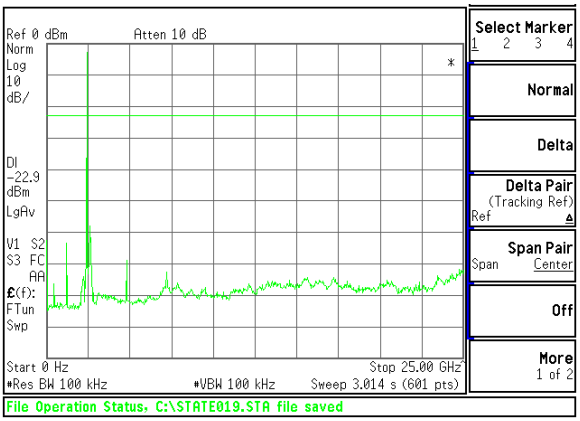
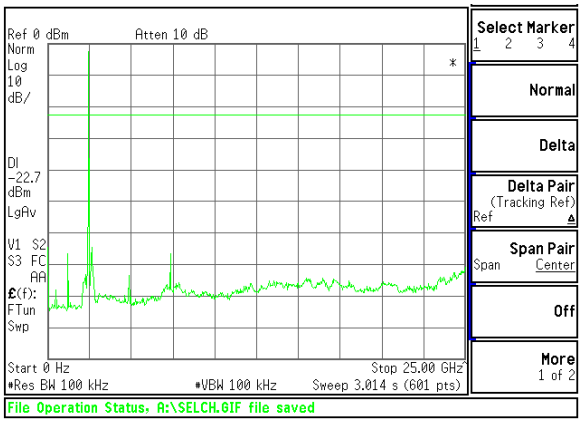
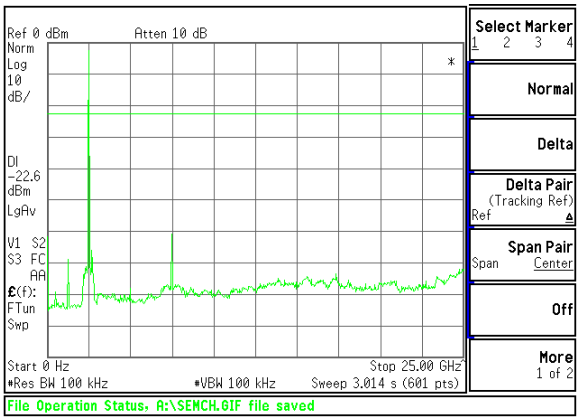
13.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Next Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	2005.2.

13.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V
Mode : Transmitting mode , Non Frequency Hopping
Temperature : 22 ℃
Humidity : 42%
Regulation : FCC Part15 C §15.247 (c)

The spectrum data are attached below. Display line indicates the 20dB offset below highest level.
It shows compliance with the requirement in part 15.247(c)

0ch(Lowest) 2402MHz	39ch(Middle) 2441MHz
	
78ch(Highest) 2480MHz	
	

Test Results : Pass

14 EIRP Calculation from Peak Power

15.247 (b)(5): Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

EIRP Calculation :

A	B	C	D	E
Specified Antenna Gain (dBi)	Minimum Cable Losses (dB)	Total Antenna Gain (dBi)	Max. RF Output Power at Antenna Terminal (dBm)	**Total EIRP (dBm)**
2.5	0	2.5	-1.39	**1.11**

Calculation : C = A + B, E = C + D

Note : Cable losses was very small and it can not measured due to the antenna and the transmitting circuit was connected by printed circuit.

Remarks: The output power, EIRP, of this device is less than the low threshold level.

EIRP = 1.11dBm = 1.29mW
The low threshold level = 60/Frequency(GHz) mW = 60/2.4 mW = 25mW

15 99% Occupied Bandwidth

15.1 Test Setup

The spectrum analyzer was connected directly to the transmitter output.

spectrum analyzer setting : -
DETECTOR MODE : PEAK
RBW : 300kHz
VBW : 300kHz
SPAN : 300MHz
SWEEP TIME : AUTO

15.2 Test Instrument

Equipment	Manufacture	Model No.	Serial No.	Calibration Due
Spectrum Analyzer	Agilent	E8444A	US42070181	11th.2.2005.

15.3 Test Results

Serial No. : 0010C61f9baf
Power : DC 5.0V (Supply by USB Port)
Mode : Transmitting mode ,Frequency Hopping (79ch)
Transmitting mode , Adoptive Frequency Hopping (20ch)
Temperature : 22 ℃
Humidity : 42%

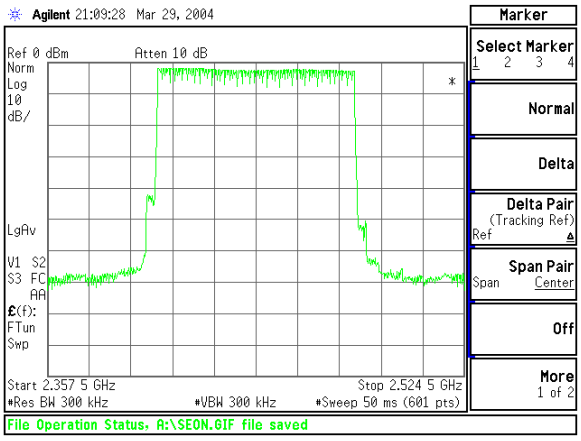
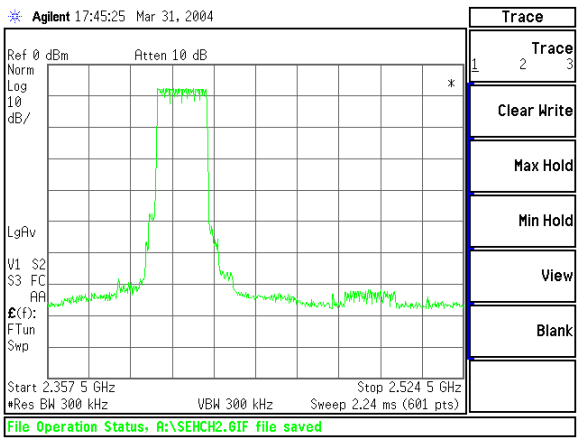
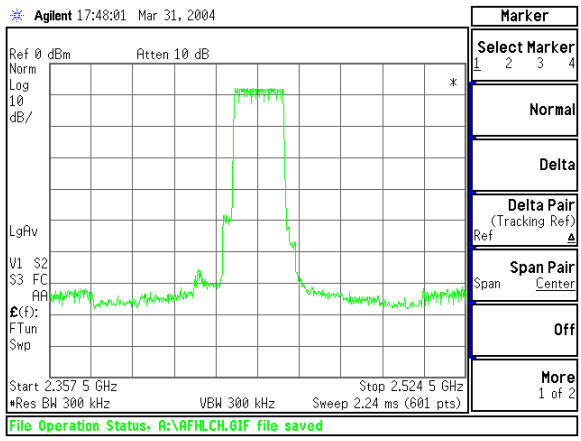
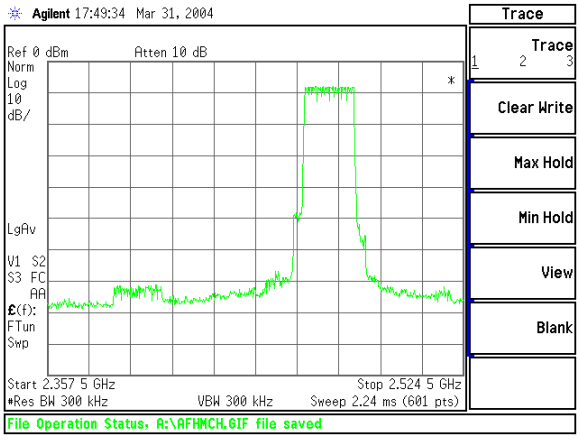
Transmitting mode , Frequency Hopping (79ch)

78.49MHz

Transmitting mode , Adoptive Frequency Hopping (20ch)

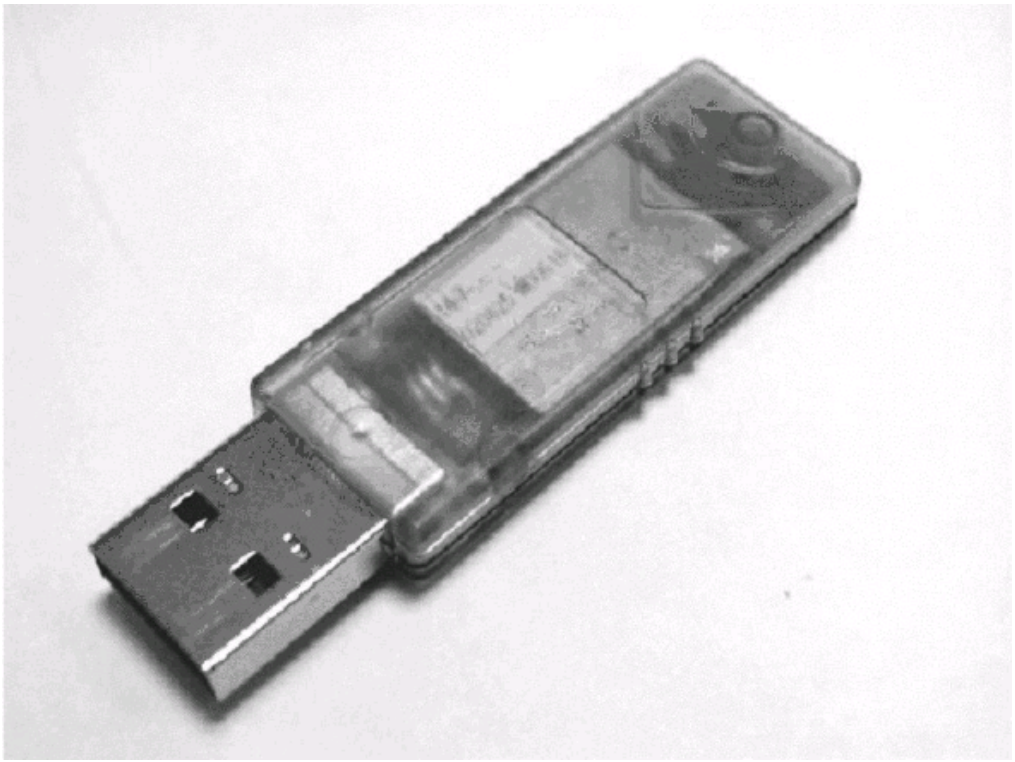
CH	99% Occupied Bandwidth [MHz]
Low frequency	19.48
Middle frequency	19.48
High frequency	19.21

Data of 99% Occupied Bandwidth

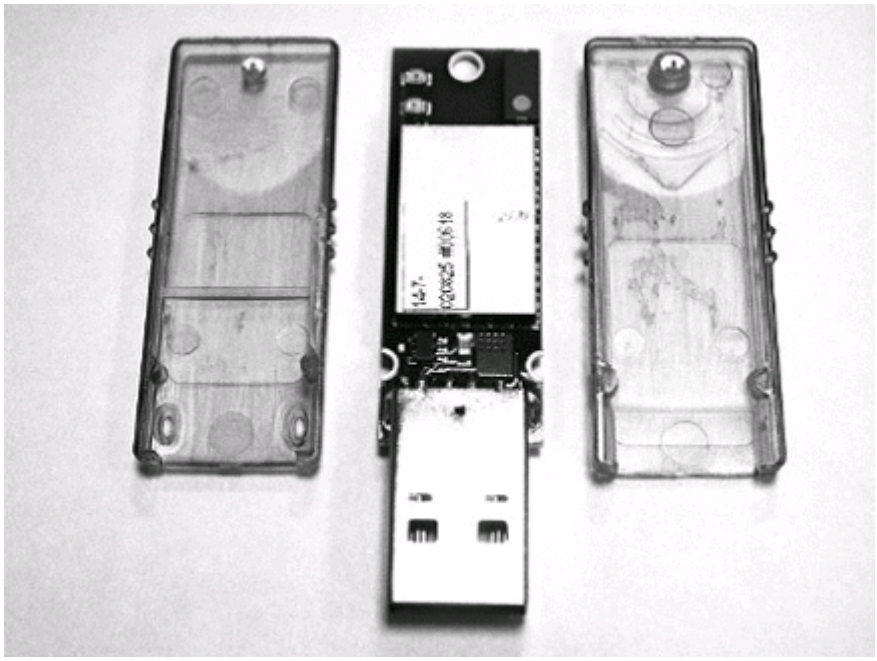
Frequency Hopping (79ch)	Adoptive Frequency Hopping (20ch , Low frequency)
	
Adoptive Frequency Hopping (20ch , Middle frequency)	Adoptive Frequency Hopping (20ch , High frequency)
	

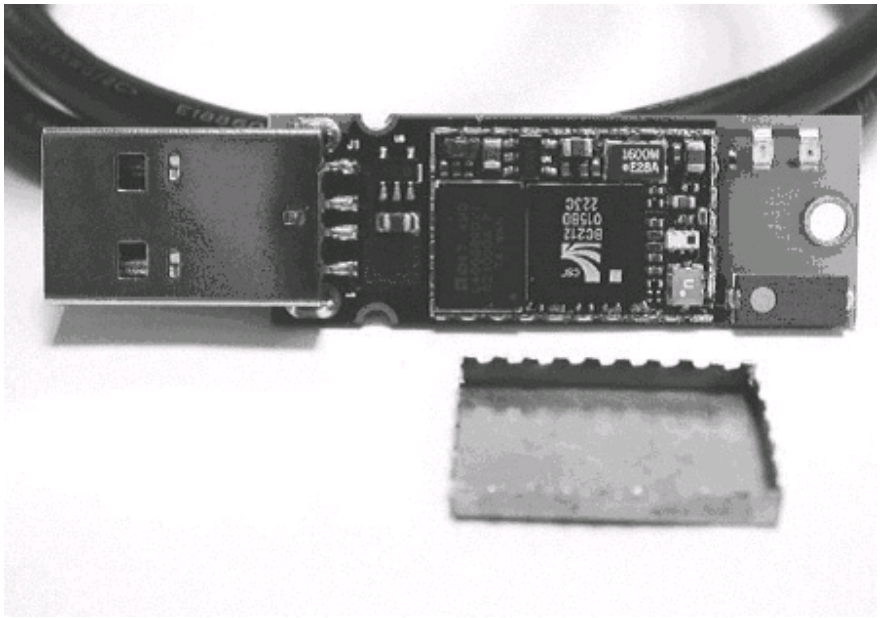
16 PHOTOS OF TESTED EUT

16.1 External Photos



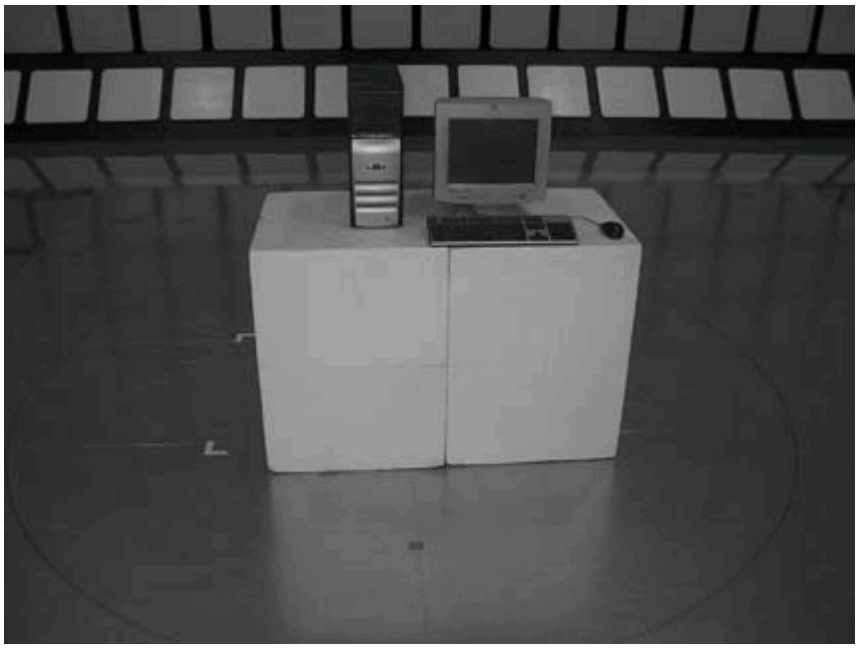
16.2 Internal Photos





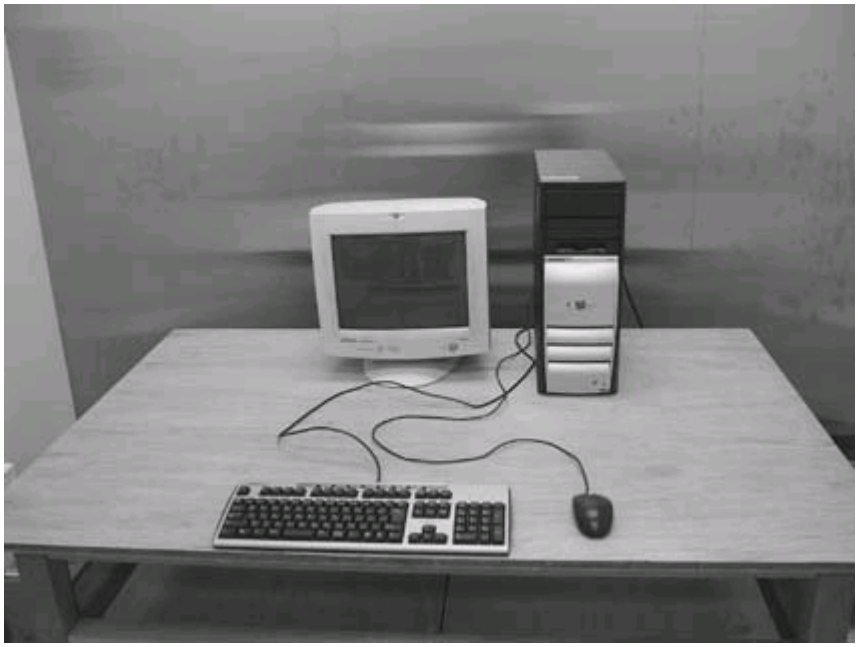
17 PHOTOS OF TEST SETUP

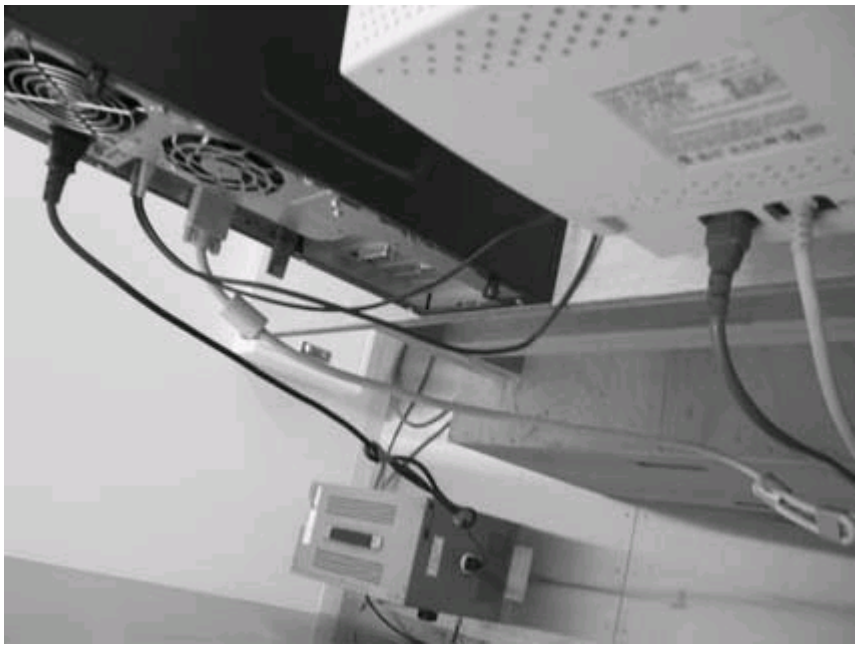
17.1 Photos of Radiated Measurement



This photo shows the instruments arrangement under testing, which records the maximum level of the radiation noise level.

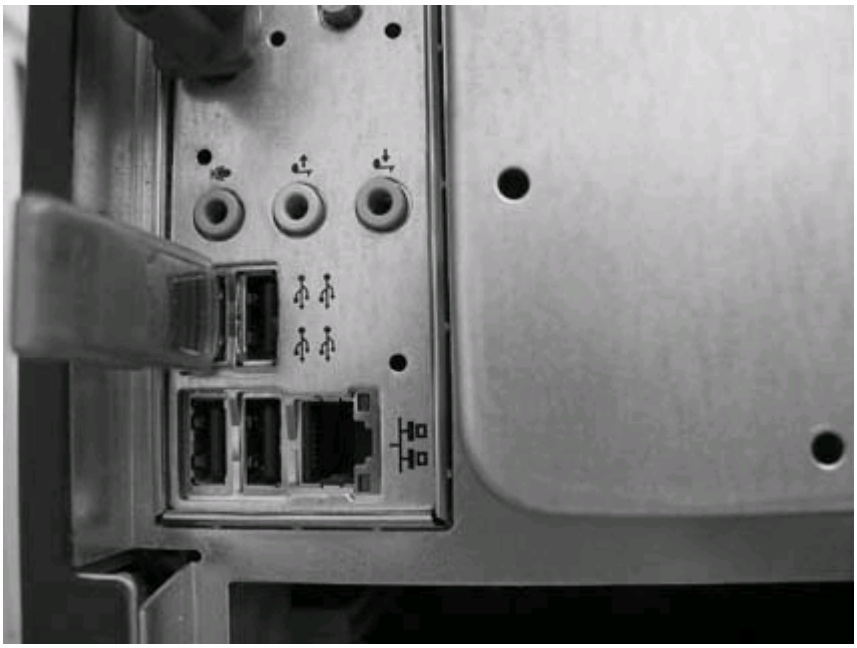
17.2 Photos of Conducted Measurement





This photo shows the instruments arrangement under testing, which records the maximum level of the radiation noise level.

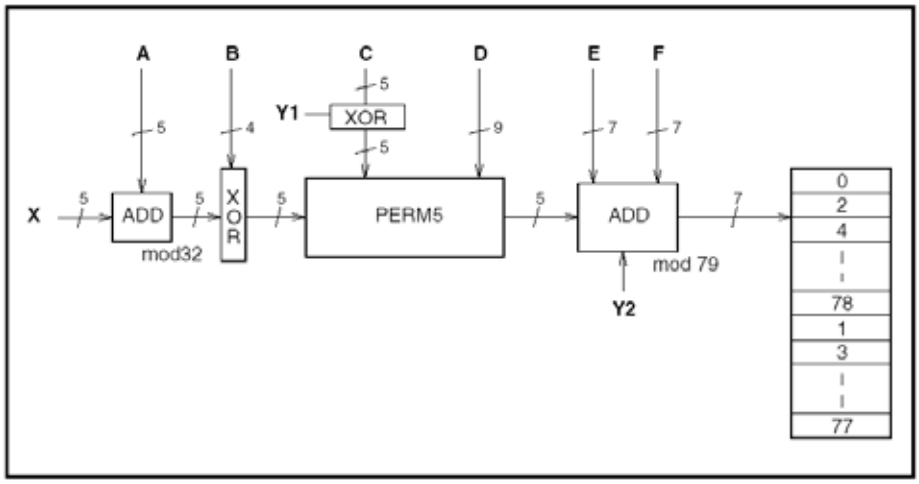
17.3 Location of USB Adapter



This photo shows the instruments arrangement under testing.

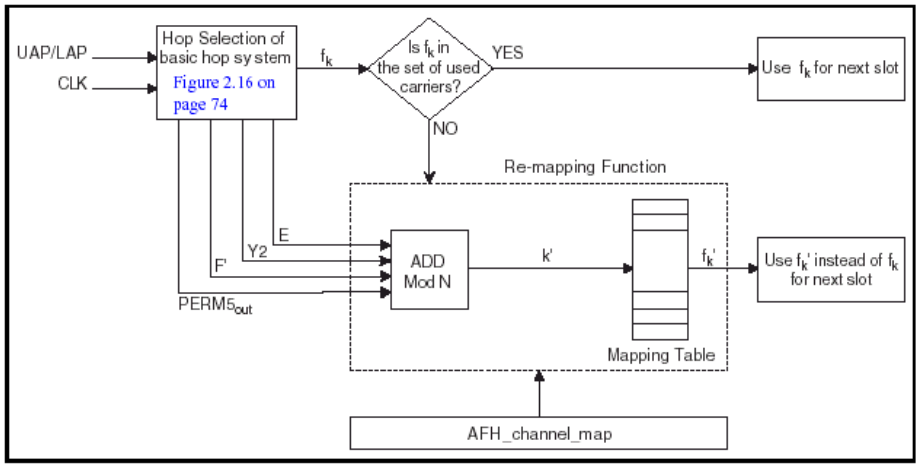
APPENDIX 1
About AFH-Hopping Sequence

AFH-Hopping Sequence is provided for in the Bluetooth Spec 1.2. Here is an outline below.
1.In the case of 79Hopping



Due to the above flow, 32 hops are made into 5 ways. Then, the sign of the sign head 160 is formed. The remainder that is worked out by dividing with 79 is assigned to Hopping Channel.
Each parameter of the above figure uses the value calculated from the Bluetooth clock and the Bluetooth address which are shown in the next page.

2.In the case of AFH-Hopping



Also in the case of AFH, the fundamental sign adopt the sign head 160 that is the same as the case of 79Hopping. Hopping Pattern uses the value that is worked out by dividing with the number of AFH-Channel's. Then, available Hopping becomes even as well as 79Hopping.
The selection of the communication Channel is done by the communication error rate and the receiving signal strength. Frequency is determined by pairing the channel and the value which is divided by the number of AFH-Channel one-to-one.

It is decided in the specifications that Communication Channel has to have “20Channels” at least. However, if the number of communication Channel is controlled to be under 20 back to 79Channel-Hopping, and select the communication Channel again.

3.The parameter list which decides Hopping-Pattern

	Page scan / Interlaced Page Scan / Inquiry scan / Interlaced Inquiry Scan	Page/Inquiry	Master/Slave page response and Inquiry response	Connection state
X	$CLKN_{16-12}$ / $(CLKN_{16-12}+16) mod 32$ / Xir_{4-0} / $Xir_{4-0}+16) mod 32$	Xp_{4-0} / Xi_{4-0}	$Xprm_{4-0}$ / $Xprs_{4-0}$ / Xir_{4-0}	CLK_{6-2}
Y1	0	$CLKE_1$ / $CLKN_1$	$CLKE_1$ / $CLKN_1$ / 1	CLK_1
Y2	0	$32 \times CLKE_1$ / $32 \times CLKN_1$	$32 \times CLKE_1$ / $32 \times CLKN_1$ / 32×1	$32 \times CLK_1$
A	A_{27-23}	A_{27-23}	A_{27-23}	$A_{27-23} \oplus CLK_{25-21}$
B	A_{22-19}	A_{22-19}	A_{22-19}	A_{22-19}
C	$A_{8,6,4,2,0}$	$A_{8,6,4,2,0}$	$A_{8,6,4,2,0}$	$A_{8,6,4,2,0} \oplus CLK_{20-16}$
D	A_{18-10}	A_{18-10}	A_{18-10}	$A_{18-10} \oplus CLK_{15-7}$
E	$A_{13,11,9,7,5,3,1}$	$A_{13,11,9,7,5,3,1}$	$A_{13,11,9,7,5,3,1}$	$A_{13,11,9,7,5,3,1}$
F	0	0	0	$16 \times CLK_{27-7} \bmod 79$
F'	n/a	n/a	n/a	$16 \times CLK_{27-7} \bmod N$