

APPLICATION FOR CERTIFICATION

On Behalf of
HAICOM Electronics Corp.

Bluetooth Slipper

Model : HI-401BT

FCC ID : RU8HI401BT

Prepared for : HAICOM Electronics Corp.
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TEST REPORT CERTIFICATION

Applicant : HAICOM Electronics Corp.
 Manufacturer : HAICOM Electronics Corp.
 EUT Description : Bluetooth Slipper
 FCC ID : RU8HI401BT
 (A) MODEL NO. : HI-401BT
 (B) SERIAL NO. : N/A
 (C) POWER SUPPLY : DC 3.7V Battery
 (D) TEST VOLTAGE : AC 230V, 50Hz (Via Power Adapter)

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, Dec. 2003
 AND FCC / ANSI C63.4-2001
 (FCC CFR 47 Part 15C, §15.205, §15.207, §15.209 and §15.247)

The device described above was tested by Audix Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits both radiated and conducted emissions.

The measurement results are contained in this test report and Audix Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Corporation.

Date of Test : Jan. 08 ~ 29, 2004

Prepared by : Tina Huang Mar. 25, 2004
 (Tina Huang/Clerk)

Test Engineer : Ben Cheng Mar. 25, 2004
 (Ben Cheng/Assistant Manager)

Approve & Authorized Signer : Leon Liu Mar. 25, 2004
 (Leon Liu/Assistant General Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Bluetooth Slipper
Model Number	:	HI-401BT
FCC ID	:	RU8HI401BT
Applicant	:	HAICOM Electronics Corp. 3F-10, 130, Jiang-Kang Rd., Chung-Ho, Taipei, Taiwan.
Manufacturer	:	HAICOM Electronics Corp. 3F-10, 130, Jiang-Kang Rd., Chung-Ho, Taipei, Taiwan.
Radio Technology	:	FHSS Modulation
Fundamental Range	:	2400MHz ~ 2483.5MHz
Channel Number	:	79
Antenna Gain	:	2dBi
Battery	:	HAiCOM, M/N 401-BTT, 3.7V, 1600mAh
Multi-Mode Foldable GPS Receiver	:	HAiCOM, M/N HI-303E, Input: 3.3V, 120mAh FCC By DoC
AC/DC Adapter	:	SEMDITECH, M/N TC-DU-1394 Input: 100-240VAC, 50-60Hz, 0.2A Output: 0.5VDC, 1.5A Power Cord: Non-Shielded, Undetachable, 1.5m
Date of Receipt of Sample	:	Dec. 11, 2003
Date of Test	:	Jan. 08 ~ 29, 2004

1.2. Tested Supporting System Details

【FOR CONDUCTED EMISSION MEASUREMENT】

1.2.1. NOTEBOOK PC

Model Number	:	2001
Serial Number	:	9145H0180C1190008BM
BSMI ID	:	4100500B
Manufacturer	:	Acer
Bluetooth Class2	:	J3, M/N 9410-001-100
Module		
AC Adapter	:	LITE-ON, M/N PA-1600-02 S/N 1231914CA, BSMI ID:3882A964 I/P: 100-240VAC, 1.5A, 50-60Hz O/P: 19VDC, 3.16A
Power Cord	:	DC Power Cord: Shielded, Undetachable, 1.8m, Non-Shielded, Detachable, 1.8m

【FOR RADIATED EMISSION MEASUREMENT】

1.2.2. NOTEBOOK PC

Model Number	:	2001
Serial Number	:	9145H0180C1190008BM
BSMI ID	:	4100500B
Manufacturer	:	Acer
AC Adapter	:	LITE-ON, M/N PA-1600-02 S/N 1231914CA, BSMI ID:3882A964 I/P: 100-240VAC, 1.5A, 50-60Hz O/P: 19VDC, 3.16A
		DC Power Cord: Shielded, Undetachable, 1.8m,
COM/LPT Cable	:	Shielded, Detachable, 0.15m
Data Cable	:	Non-Shielded, Detachable, 1.7m
Data Cable	:	Non-Shielded, Detachable, 1.8m
Power Cord	:	Non-Shielded, Detachable, 1.8m

1.2.3. DC POWER SUPPLY

Model Number	:	GPS-4303
Serial Number	:	CI80523
Manufacturer	:	Goodwill
DC Power Cord*3	:	Non-Shielded, Detachable, 0.6m

1.2.4. FIXTURE

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	Audix
Data Cable	:	Non-Shielded, Detachable, 0.45m

【FOR RF MEASUREMENT】

1.2.5. NOTEBOOK PC

Model Number	:	2001
Serial Number	:	9145H0180C1190008BM
BSMI ID	:	4100500B
Manufacturer	:	Acer
AC Adapter	:	LITE-ON, M/N PA-1600-02 S/N 1231914CA, BSMI ID:3882A964 I/P: 100-240VAC, 1.5A, 50-60Hz O/P: 19VDC, 3.16A DC Power Cord: Shielded, Undetachable, 1.8m,
COM/LPT Cable	:	Shielded, Detachable, 0.15m
Data Cable	:	Non-Shielded, Detachable, 1.7m
Data Cable	:	Non-Shielded, Detachable, 1.8m
Power Cord	:	Non-Shielded, Detachable, 1.8m

1.2.6. DC POWER SUPPLY

Model Number	:	GPQ-3030
Serial Number	:	0032517
Manufacturer	:	Goodwill
DC Power Cord	:	Non-Shielded, Detachable, 1.5m

1.2.7. FIXTURE

Model Number	:	N/A
Serial Number	:	N/A
Manufacturer	:	HAICOM Electronics Corp.
Data Cable*2	:	Non-Shielded, Detachable, 0.45m
Data Cable	:	Non-Shielded, Detachable, 0.5m

1.3. Description of Test Facility

Name of Firm : Audix Corporation
Technical Division EMC Department

Location : No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
Taipei Hsien 24443, Taiwan, R.O.C.

Test Facility : **No. 2 Shielding Room & Immunity Test Site**
No. 53-11, Tin-Fu Tsun, Lin-Kou,
Taipei Hsien, Taiwan, R.O.C.

Semi-Anechoic Chamber
No. 67-4, Tin-Fu Tsun, Lin-Kou,
Taipei Hsien, Taiwan, R.O.C.

May 16, 2003 Re-File on
Federal Communication Commission
Registration Number: 90993

NVLAP Lab. Code : 200077-0
(NVLAP is a NATA accredited body under Mutual Recognition Agreement)

DAR-Registration No. : DAT-P-145/03-01

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	$\pm 2.66\text{dB}$
Radiation Test (Distance: 3m)	30MHz~300MHz	+4.26dB / -4.22dB
	300MHz~1000MHz	+5.28dB / -4.0dB

Remark : Uncertainty = $k_{uc}(y)$

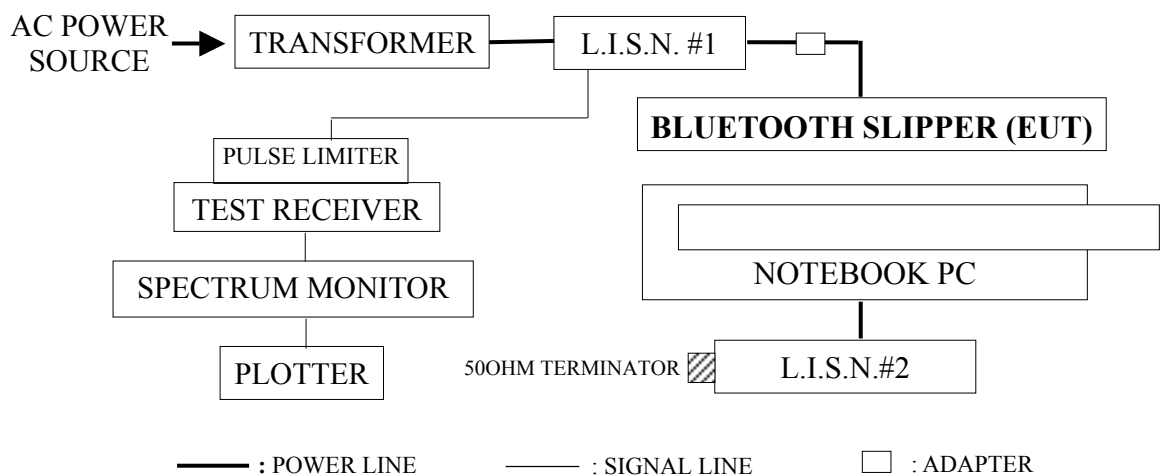
2. CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment are used during the power line conducted tests :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESH3	893044/015	Jul. 05, 03'	Jul. 04, 04'
2.	L.I.S.N. # 1	Kyoritsu	KNW-407	8-881-13	Apr. 16, 03'	Apr. 15, 04'
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	Apr. 16, 03'	Apr. 15, 04'
4.	Pulse Limiter	R & S	ESH3-Z2	003	Jun. 18, 03'	Jun. 17, 04'

2.2. Block Diagram of Test Setup



2.3. Conducted Limits (§15.207 Class B)

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV*	56 ~ 46 dBμV*
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

- Remark:
- * Decreases with the logarithm of the frequency.
 - If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT and simulator as shown on 2.2.
- 2.4.2. Turned on the power of all equipment.
- 2.4.3. The Notebook run the test software “My Bluetooth Place” to receiving and transmitting satellite signal through the EUT (Bluetooth Slipper, battery was on charging status) during all testing.

2.5. Test Procedure

The EUT was put on table which was above the ground by 80cm and its AC Adapter connected to the power mains through a line impedance stabilization network (L.I.S.N. #1) and the other peripheral devices power cord were connected to the power mains through a line impedance stabilization network (L.I.S.N. #2) This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to FCC ANSI C63.4-2001 on conducted measurement.

The bandwidth of R&S Test Receiver ESH3 was set at 10kHz.

The frequency range from 150kHz to 30MHz was checked.

EUT via AC adapter with 120V/60Hz supplying voltage were performed during conducted measurement, all the test results are attached in section 2.6.

2.6. Conducted Emission Measurement Results

PASSED. All emissions not reported below are too low against the prescribed limits.

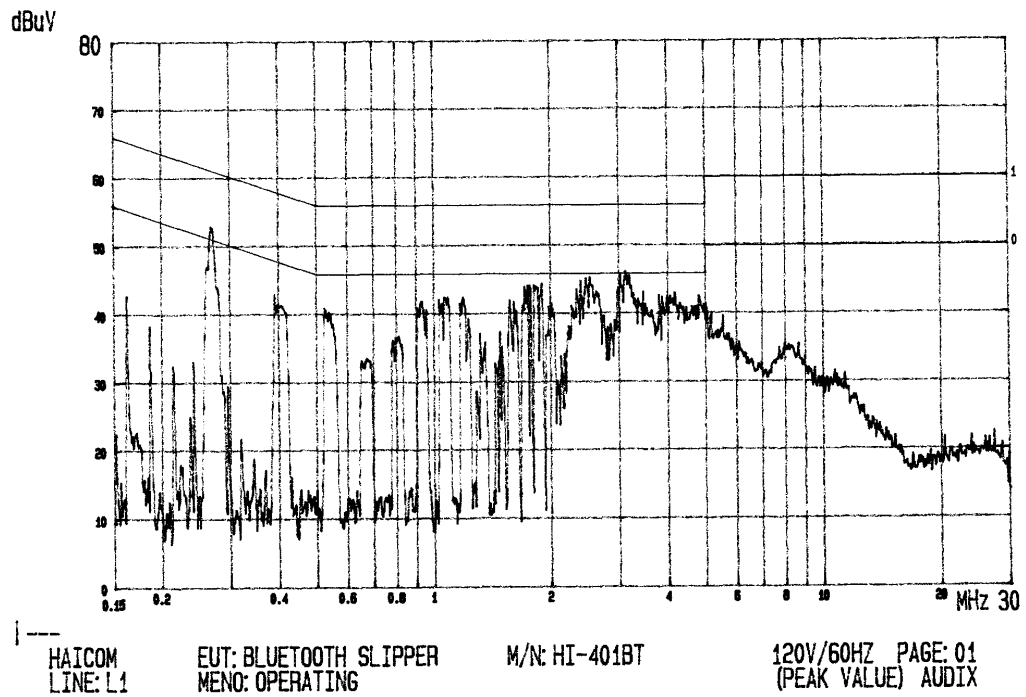
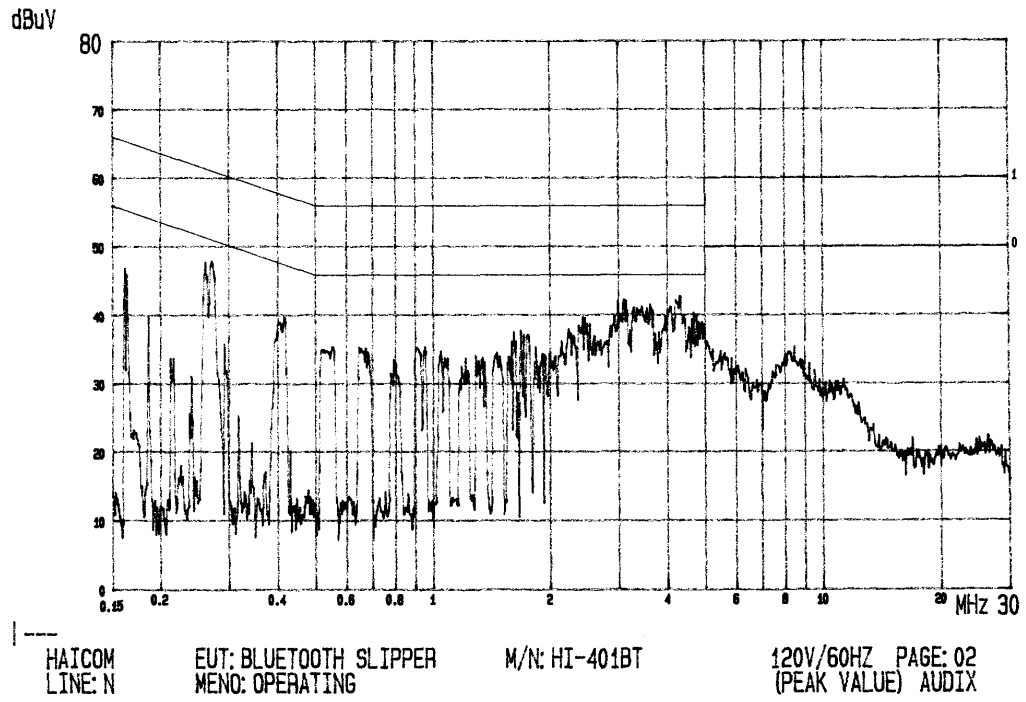
Date of Test : Jan. 08, 2004 Temperature : 21°C

EUT : Bluetooth Slipper Humidity : 47%

Frequency (MHz)	Factor dB	Reading (dBμV)		Measurement (dBμV)		Limits (dBμV)		Margin dB	
		Phase Neutral							
		Q.P.	Average	Q.P.	Average	Q.P.	Average	Q.P.	Average
0.1609	0.4	44.1	*	44.5	*	65.4	55.4	20.9	*
0.2687	0.4	45.1	*	45.5	*	61.1	51.1	15.6	*
0.4128	0.5	36.8	*	37.3	*	57.6	47.6	20.3	*
0.9034	0.5	33.4	*	33.9	*	56.0	46.0	22.1	*
2.4004	0.5	36.2	*	36.7	*	56.0	46.0	19.3	*
4.2758	0.8	38.4	*	39.2	*	56.0	46.0	16.8	*

Frequency (MHz)	Factor dB	Reading (dBμV)		Measurement (dBμV)		Limits		Margin	
		Phase Line				(dBμV)		dB	
		Q.P.	Average	Q.P.	Average	Q.P.	Average	Q.P.	Average
0.2687	0.4	50.0	25.4	50.4	25.8	61.1	51.1	10.7	25.3
0.3892	0.4	40.2	*	40.6	*	58.0	48.0	17.4	*
0.5287	0.5	36.8	*	37.3	*	56.0	46.0	18.7	*
1.0842	0.5	39.2	*	39.7	*	56.0	46.0	16.3	*
2.5014	0.5	42.1	*	42.6	*	56.0	46.0	13.4	*
3.0919	0.5	41.8	*	42.3	*	56.0	46.0	13.7	*

- Remark :
1. All readings are Quasi-Peak and Average values.
 2. Measurement = Factor (Insertion Loss + Cable Loss) + Reading.
 3. Margin = Limits – Measurement.
 4. The “*” means above Q.P. values have met both limits, they are not necessary to measure with average detector.



3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment are used during the radiated emission tests :

3.1.1. 30MHz~1000MHz Frequency

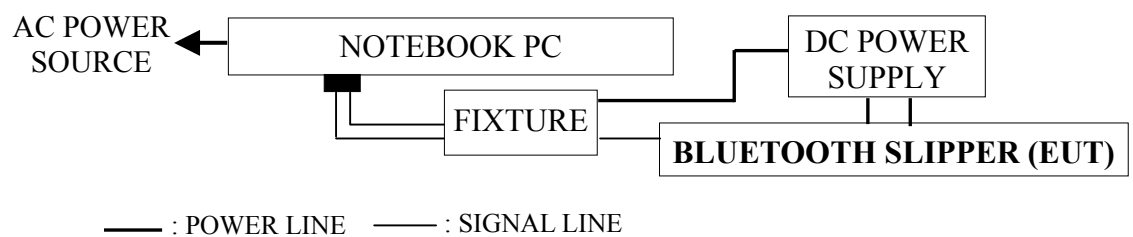
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Sep.24, 03'	Sep.23, 04'
2.	Test Receiver	R & S	ESVP	879691/036	Jul.16, 03'	Jul.15, 04'
3.	Pre-Amplifier	HP	8447D	2944A06305	Mar.04, 03'	Mar.03, 04'
4.	Broadband Antenna	Schwarzbeck	BBA 9106	A3L	Feb.23, 03'	Feb.22, 04'
5.	Broadband Antenna	Schwarzbeck	UHALP9108-A	0138	Feb.23, 03'	Feb.22, 04'

3.1.2. Above 1GHz frequency

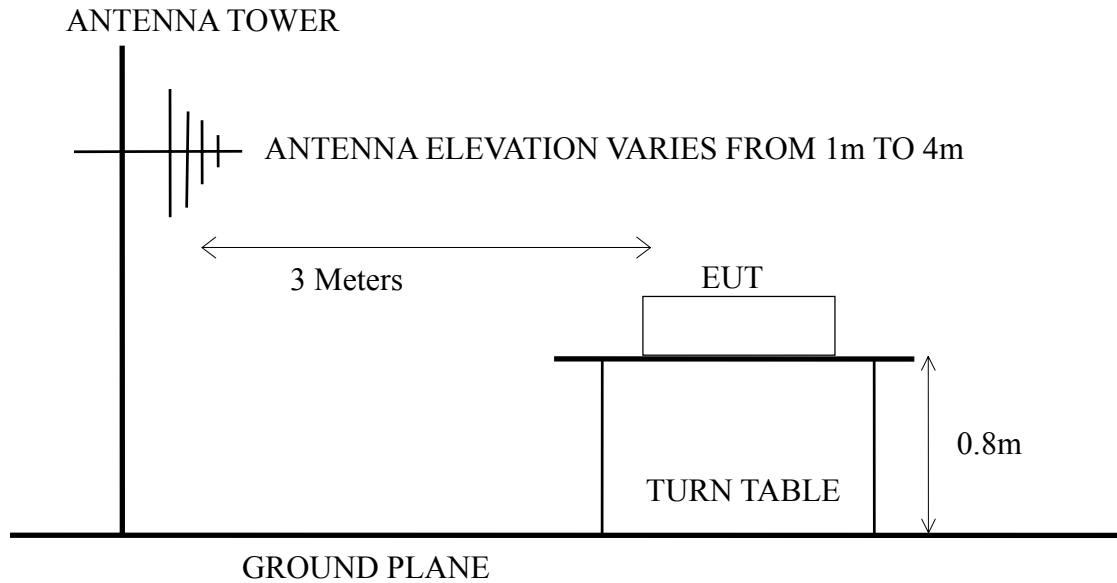
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	HP	8593EM	3826A00248	Sep.24, 03'	Sep.23, 04'
2.	Amplifier (1GHz ~26.5GHz)	HP	8449B	3008A00529	Jan.28, 03'	Jan.27, 04'
3.	Horn Antenna (1GHz ~ 18GHz)	EMCO	3115	9112-3775	Apr.21, 03'	Apr.20, 04'
4.	High Pass Filter	HP	84300-80038	005	Dec. 04, 03'	Dec. 03, 04'

3.2. Test Setup

3.2.1. Block Diagram of connection between EUT and simulators



3.2.2. Semi-Anechoic Chamber (3m) Setup Diagram



3.3. Radiated Emission Limits (§15.209 Class B)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000(*5)	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = $20 \log$ Emission level ($\mu\text{V/m}$)
 - (2) The tighter limit applies at the edge between two frequency bands.
 - (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 - (4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
 - (4) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

3.4. Operating Condition of EUT

The configuration of EUT and its simulators are same as those used in conducted measurement. Please refer to 2.4.

3.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna such as calibrated biconical and log- periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2001 regulation.

The bandwidth of the R&S Test Receiver ESVP was set at 120kHz.
The bandwidth of the HP Spectrum Analyzer 8564EC was set at 1MHz.

The frequency range from 30MHz to 25GHz was checked.

The EUT with test voltage of AC 120V/60Hz and with following test mode were done during 30MHz~1000MHz frequency range and all the test results are listed in section 3.6.1. The above 1GHz frequency range test results are listed in section 3.6.2.

Mode	Operation Mode	Type of Network	Frequency
1.	Transmitting	Bluetooth (FHSS)	Channel 0: 2402MHz
2.			Channel 39: 2441MHz
3.			Channel 79: 2480MHz
4.	Receiving	Bluetooth (FHSS)	Channel 0: 2402MHz
5.			Channel 39: 2441MHz
6.			Channel 79: 2480MHz

The EUT with following test mode were done during restricted bands and all the test results are listed in section 3.6.3. (The restricted bands defined in part 15.205(a))

Mode	Operation Mode	Type of Network	Frequency
1.	Transmitting	Bluetooth (FHSS)	Channel 0: 2402MHz
2.			Channel 79:2480MHz

3.6. Radiated Emission Measurement Results

PASSED. All the emissions not reported below are too low against the official limits.

3.6.1. 30MHz to 1000MHz Frequency Range Measurement Results

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 0: 2402MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	17.31	35.30	43.50	8.20
144.480	20.60	2.60	12.53	35.73	43.50	7.77
160.140	21.20	2.70	13.50	37.40	43.50	6.10
191.730	21.90	3.00	12.15	37.05	43.50	6.45
431.600	17.20	5.20	15.70	38.10	46.00	7.90
501.600	18.30	6.52	13.22	38.04	46.00	7.96
563.900	19.10	6.61	14.86	40.57	46.00	5.43
600.300	19.50	6.30	10.78	36.58	46.00	9.42
633.900	19.80	6.30	11.56	37.66	46.00	8.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	9.34	32.90	40.00	7.10
160.140	21.20	2.70	10.79	34.69	43.50	8.81
213.330	22.91	3.10	9.53	35.54	43.50	7.96
241.680	25.16	3.40	10.04	38.60	46.00	7.40
497.400	17.84	6.40	15.76	40.00	46.00	6.00
696.900	20.80	6.50	11.37	38.67	46.00	7.33
799.800	21.60	6.90	7.34	35.84	46.00	10.16
898.500	23.04	7.30	7.62	37.96	46.00	8.04

Remark : 1. All reading are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 39: 2441MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	18.31	36.30	43.50	7.20
144.480	20.60	2.60	13.53	36.73	43.50	6.77
160.140	21.20	2.70	12.50	36.40	43.50	7.10
191.730	21.90	3.00	12.15	37.05	43.50	6.45
431.600	17.20	5.20	16.70	39.10	46.00	6.90
501.600	18.30	6.52	14.22	39.04	46.00	6.96
563.900	19.10	6.61	13.86	39.57	46.00	6.43
600.300	19.50	6.30	12.78	38.58	46.00	7.42
633.900	19.80	6.30	12.56	38.66	46.00	7.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	10.34	33.90	40.00	6.10
160.140	21.20	2.70	11.79	35.69	43.50	7.81
213.330	22.91	3.10	10.53	36.54	43.50	6.96
241.680	25.16	3.40	9.04	37.60	46.00	8.40
497.400	17.84	6.40	15.76	40.00	46.00	6.00
696.900	20.80	6.50	10.37	37.67	46.00	8.33
799.800	21.60	6.90	9.34	37.84	46.00	8.16
898.500	23.04	7.30	8.62	38.96	46.00	7.04

Remark : 1. All reading are Quasi-Peak values.
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 79: 2480MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	16.31	34.30	43.50	9.20
144.480	20.60	2.60	13.53	36.73	43.50	6.77
160.140	21.20	2.70	13.50	37.40	43.50	6.10
191.730	21.90	3.00	11.15	36.05	43.50	7.45
431.600	17.20	5.20	15.70	38.10	46.00	7.90
501.600	18.30	6.52	14.22	39.04	46.00	6.96
563.900	19.10	6.61	13.86	39.57	46.00	6.43
600.300	19.50	6.30	11.78	37.58	46.00	8.42
633.900	19.80	6.30	10.56	36.66	46.00	9.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	11.34	34.90	40.00	5.10
160.140	21.20	2.70	11.79	35.69	43.50	7.81
213.330	22.91	3.10	10.53	36.54	43.50	6.96
241.680	25.16	3.40	9.04	37.60	46.00	8.40
497.400	17.84	6.40	16.76	41.00	46.00	5.00
696.900	20.80	6.50	10.37	37.67	46.00	8.33
799.800	21.60	6.90	6.34	34.84	46.00	11.16
898.500	23.04	7.30	6.62	36.96	46.00	9.04

Remark : 1. All reading are Quasi-Peak values.
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 0: 2402MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	18.31	36.30	43.50	7.20
144.480	20.60	2.60	13.53	36.73	43.50	6.77
160.140	21.20	2.70	12.50	36.40	43.50	7.10
191.730	21.90	3.00	13.15	38.05	43.50	5.45
431.600	17.20	5.20	14.70	37.10	46.00	8.90
501.600	18.30	6.52	14.22	39.04	46.00	6.96
563.900	19.10	6.61	13.86	39.57	46.00	6.43
600.300	19.50	6.30	11.78	37.58	46.00	8.42
633.900	19.80	6.30	12.56	38.66	46.00	7.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	10.34	33.90	40.00	6.10
160.140	21.20	2.70	11.79	35.69	43.50	7.81
213.330	22.91	3.10	10.53	36.54	43.50	6.96
241.680	25.16	3.40	11.04	39.60	46.00	6.40
497.400	17.84	6.40	14.76	39.00	46.00	7.00
696.900	20.80	6.50	10.37	37.67	46.00	8.33
799.800	21.60	6.90	9.34	37.84	46.00	8.16
898.500	23.04	7.30	8.62	38.96	46.00	7.04

Remark : 1. All reading are Quasi-Peak values.
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 39: 2441MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	19.31	37.30	43.50	6.20
144.480	20.60	2.60	14.53	37.73	43.50	5.77
160.140	21.20	2.70	13.50	37.40	43.50	6.10
191.730	21.90	3.00	11.15	36.05	43.50	7.45
431.600	17.20	5.20	14.70	37.10	46.00	8.90
501.600	18.30	6.52	15.22	40.04	46.00	5.96
563.900	19.10	6.61	11.86	37.57	46.00	8.43
600.300	19.50	6.30	14.78	40.58	46.00	5.42
633.900	19.80	6.30	14.56	40.66	46.00	5.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	11.34	34.90	40.00	5.10
160.140	21.20	2.70	12.79	36.69	43.50	6.81
213.330	22.91	3.10	9.53	35.54	43.50	7.96
241.680	25.16	3.40	11.04	39.60	46.00	6.40
497.400	17.84	6.40	14.76	39.00	46.00	7.00
696.900	20.80	6.50	12.37	39.67	46.00	6.33
799.800	21.60	6.90	12.34	40.84	46.00	5.16
898.500	23.04	7.30	7.62	37.96	46.00	8.04

Remark : 1. All reading are Quasi-Peak values.
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 79: 2480MHz

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
96.690	15.99	2.00	19.31	37.30	43.50	6.20
144.480	20.60	2.60	12.53	35.73	43.50	7.77
160.140	21.20	2.70	13.50	37.40	43.50	6.10
191.730	21.90	3.00	10.15	35.05	43.50	8.45
431.600	17.20	5.20	17.70	40.10	46.00	5.90
501.600	18.30	6.52	12.22	37.04	46.00	8.96
563.900	19.10	6.61	14.86	40.57	46.00	5.43
600.300	19.50	6.30	14.78	40.58	46.00	5.42
633.900	19.80	6.30	11.56	37.66	46.00	8.34

Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
31.890	22.46	1.10	9.34	32.90	40.00	7.10
160.140	21.20	2.70	10.79	34.69	43.50	8.81
213.330	22.91	3.10	11.53	37.54	43.50	5.96
241.680	25.16	3.40	10.04	38.60	46.00	7.40
497.400	17.84	6.40	14.76	39.00	46.00	7.00
696.900	20.80	6.50	10.37	37.67	46.00	8.33
799.800	21.60	6.90	8.34	36.84	46.00	9.16
898.500	23.04	7.30	9.62	39.96	46.00	6.04

Remark : 1. All reading are Quasi-Peak values.
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

3.6.2. Above 1GHz Frequency Range Measurement Results

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 0: 2402MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	16.50	46.00	74.00	28.00
	1149.342	25.27	4.49	16.87	46.63	74.00	27.37
	1298.684	25.33	4.83	16.27	46.43	74.00	27.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.23	4.31	21.34	50.88	74.00	23.12
	1255.056	25.31	4.69	19.69	49.69	74.00	24.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 39: 2441MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	17.50	47.00	74.00	27.00
	1149.342	25.27	4.49	15.87	45.63	74.00	28.37
	1298.684	25.33	4.83	17.27	47.43	74.00	26.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.23	4.31	22.34	51.88	74.00	22.12
	1255.056	25.31	4.69	19.69	49.69	74.00	24.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 79: 2480MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	17.50	47.00	74.00	27.00
	1149.342	25.27	4.49	15.87	45.63	74.00	28.37
	1298.684	25.33	4.83	15.27	45.43	74.00	28.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.23	4.31	20.34	49.88	74.00	24.12
	1255.056	25.31	4.69	20.69	50.69	74.00	23.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 0: 2402MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	17.50	47.00	74.00	27.00
	1149.342	25.27	4.49	17.87	47.63	74.00	26.37
	1298.684	25.33	4.83	17.27	47.43	74.00	26.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.23	4.31	20.34	49.88	74.00	24.12
	1255.056	25.31	4.69	20.69	50.69	74.00	23.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. ‘*’ The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 39: 2441MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	18.50	48.00	74.00	26.00
	1149.342	25.27	4.49	16.87	46.63	74.00	27.37
	1298.684	25.33	4.83	18.27	48.43	74.00	25.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.32	4.31	21.34	50.97	74.00	23.03
	1255.056	25.31	4.69	20.69	50.69	74.00	23.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Receiving Mode, Channel 79: 2480MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	1045.306	25.22	4.28	18.50	48.00	74.00	26.00
	1149.342	25.27	4.49	16.87	46.63	74.00	27.37
	1298.684	25.33	4.83	16.27	46.43	74.00	27.57

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	1062.086	25.23	4.31	21.34	50.88	74.00	23.12
	1255.056	25.31	4.69	18.69	48.69	74.00	25.31

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Measurement was up to 25GHz, but the emissions level were too low against the official limit and not report.
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

3.6.3. Restricted Bands Measurement Results

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 0: 2402MHz

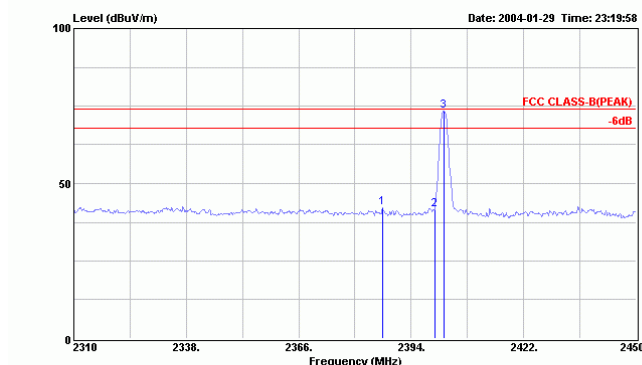
	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak *	2386.860	28.60	6.34	7.26	42.20	74.00	31.80
	2399.900	28.62	6.36	6.64	41.62	74.00	32.38
	2402.260	28.63	6.36	38.30	73.29	74.00	0.71
Average *	2336.040	28.50	6.28	-5.36	29.42	54.00	24.58
	2399.900	28.62	6.36	-6.24	28.74	54.00	25.26
	2402.260	28.63	6.36	-1.61	33.38	54.00	20.62

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2390MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Data#: 10 File#: C:\G921292-H.EMI

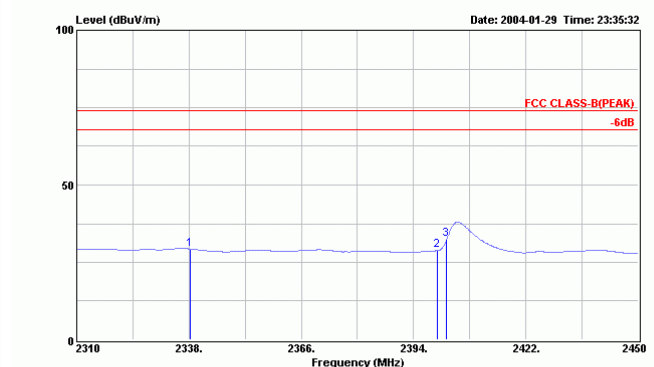


Trace: 9
 Site : Anechoic Chamber
 Condition : FCC CLASS-B (PEAK) 3m 3115 HORIZONTAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2402MHz-OUT
 ENVIRONMENT : 16°C/67%



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Data#: 16 File#: C:\G921292-H.EMI



Trace: 16
 Site : Anechoic Chamber
 Condition : FCC CLASS-B (PEAK) 3m 3115 HORIZONTAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2402MHz-OUT
 ENVIRONMENT : 16°C/67%

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 0: 2402MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak *	2331.560	28.49	6.27	7.88	42.64	74.00	31.36
	2399.900	28.62	6.36	6.64	41.62	74.00	32.38
	2402.260	28.63	6.36	38.30	73.29	74.00	0.71
Average *	2338.280	28.51	6.28	-5.46	29.33	54.00	24.67
	2399.900	28.62	6.36	-6.17	28.81	54.00	25.19
	2402.260	28.63	6.36	-2.39	32.60	54.00	21.40

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2390MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

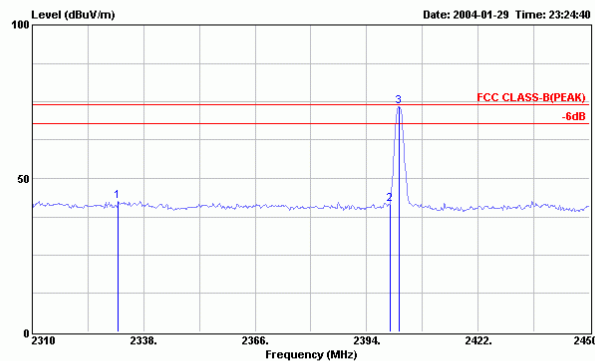


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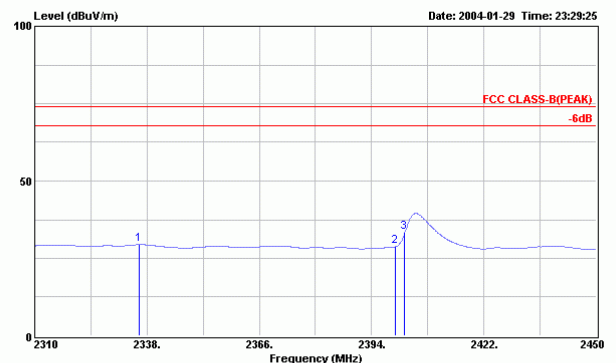
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Data#: 12 File#: C:\G921292-H.EMI



Trace: 11
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 VERTICAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2402MHz-OUT
 ENVIRONMENT : 16°C/67%

Data#: 14 File#: C:\G921292-H.EMI



Trace: 13
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 VERTICAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2402MHz-OUT
 ENVIRONMENT : 16°C/67%

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 79: 2480MHz

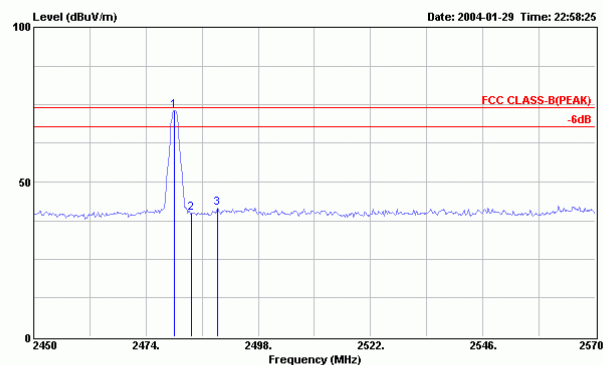
	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
Peak	2480.000	28.77	6.45	37.98	73.20	74.00	0.80
*	2483.600	28.78	6.45	4.58	39.81	74.00	34.19
*	2489.360	28.79	6.46	6.21	41.46	74.00	32.54
Average	2480.720	28.77	6.45	1.54	36.76	54.00	17.24
*	2483.600	28.78	6.45	6.99	42.22	54.00	11.78
*	2483.610	28.78	6.45	6.87	42.10	54.00	11.90

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2483.5-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Data#: 2 File#: C:\G921292-H.EMI

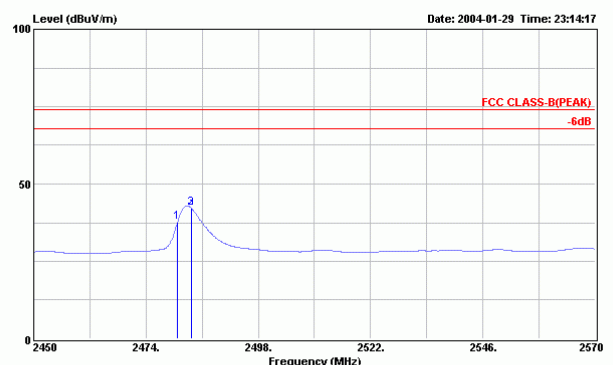


Trace: 1
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 HORIZONTAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2480MHz-OUT
 ENVIRONMENT : 16°C/67%



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Data#: 8 File#: C:\G921292-H.EMI



Trace: 7
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 HORIZONTAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2480MHz-OUT
 ENVIRONMENT : 16°C/67%

Date of Test : Jan. 29, 2004 Temperature : 16°C

EUT : Bluetooth Slipper Humidity : 67%

Test Mode : Transmitting Mode, Channel 79: 2480MHz

	Emission Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
Peak	2480.000	28.77	6.45	37.56	72.78	74.00	1.22
*	2483.600	28.78	6.45	4.49	39.72	74.00	34.28
*	2492.480	28.79	6.46	5.76	41.01	74.00	32.99
Average	2480.720	28.77	6.45	2.53	37.75	54.00	16.25
*	2483.600	28.78	6.45	7.02	42.25	54.00	11.75
*	2483.610	28.78	6.45	6.87	42.10	54.00	11.90

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. High frequency section (spurious in the restricted band 2483.5-2500MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

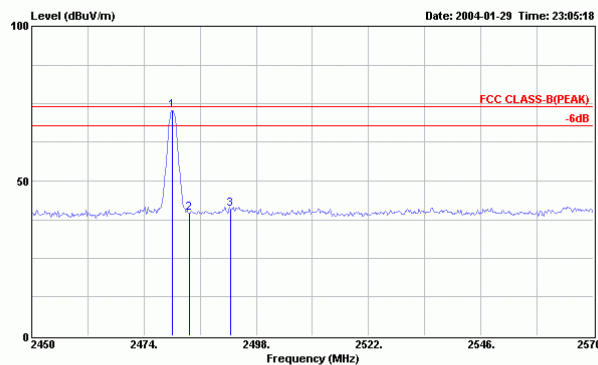


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 Email:ttenc@ttenc.com.tw
 Web:www.ttenc.com.tw



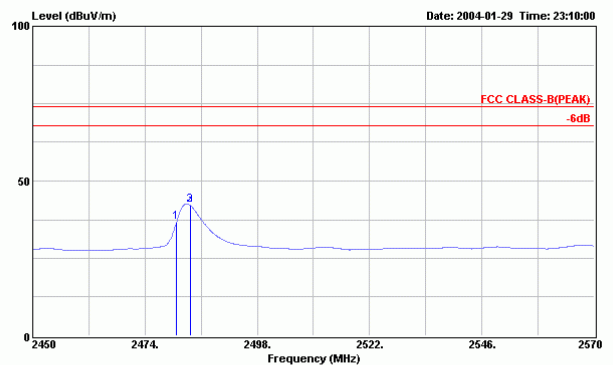
EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
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 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttenc@ttenc.com.tw
 Web:www.ttenc.com.tw

Data#: 4 File#: C:\G921292-H.EMI



Trace: 3
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 VERTICAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2480MHz-OUT
 ENVIRONMENT : 16°C/67%

Data#: 6 File#: C:\G921292-H.EMI



Trace: 5
 Site : Anechoic Chamber
 Condition : FCC CLASS-B(PEAK) 3m 3115 VERTICAL
 EUT : Bluetooth Slipper
 MEMO : M/N:HI-401BT
 POWER : DC 3.3V TX:2480MHz-OUT
 ENVIRONMENT : 16°C/67%

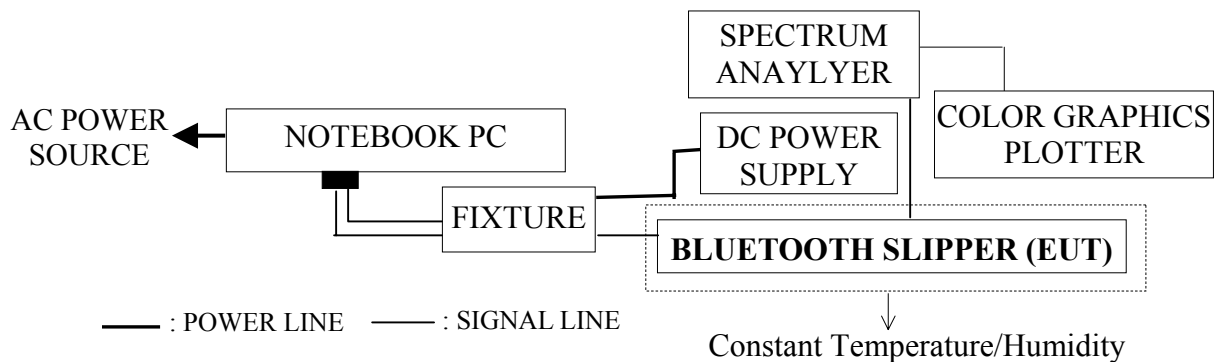
4. CARRIER FREQUENCY SEPARATION MEASUREMENT

4.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

4.2. Block Diagram of Test Setup



4.3. Specification Limits (§15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

4.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the center frequency (2441MHz) was measure by spectrum analyzer with 30kHz RBW and 100kHz VBW. The video bandwidth not to be smaller than resolution bandwidth, the peak was mark on adjacent bandwidth, the between of peak is carrier frequency separation.

4.5. Test Results

PASSED. The testing data was attached in the next pages.

- 2441MHz adjacent channel of right carrier frequency separation: 995kHz ◦
(Refer to Figure 1)
- 2441MHz adjacent channel of left carrier frequency separation: 1.065MHz ◦
(Refer to Figure 2.)

Figure 1. (Adjacent Channel of Right Carrier Frequency Separation, 2441MHz)

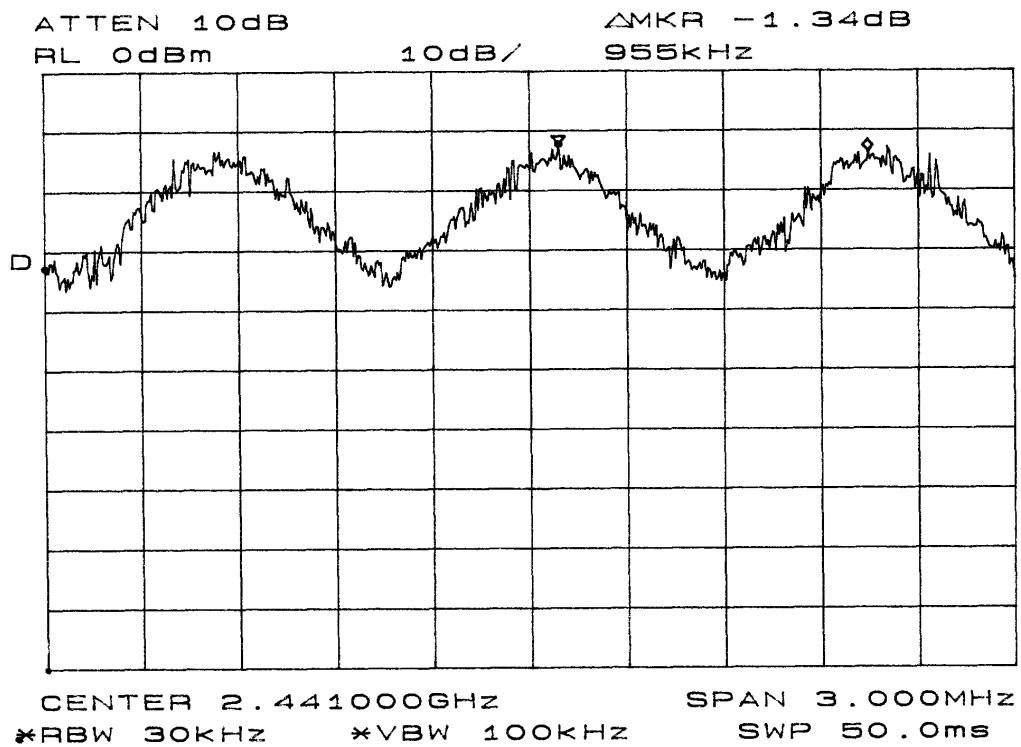
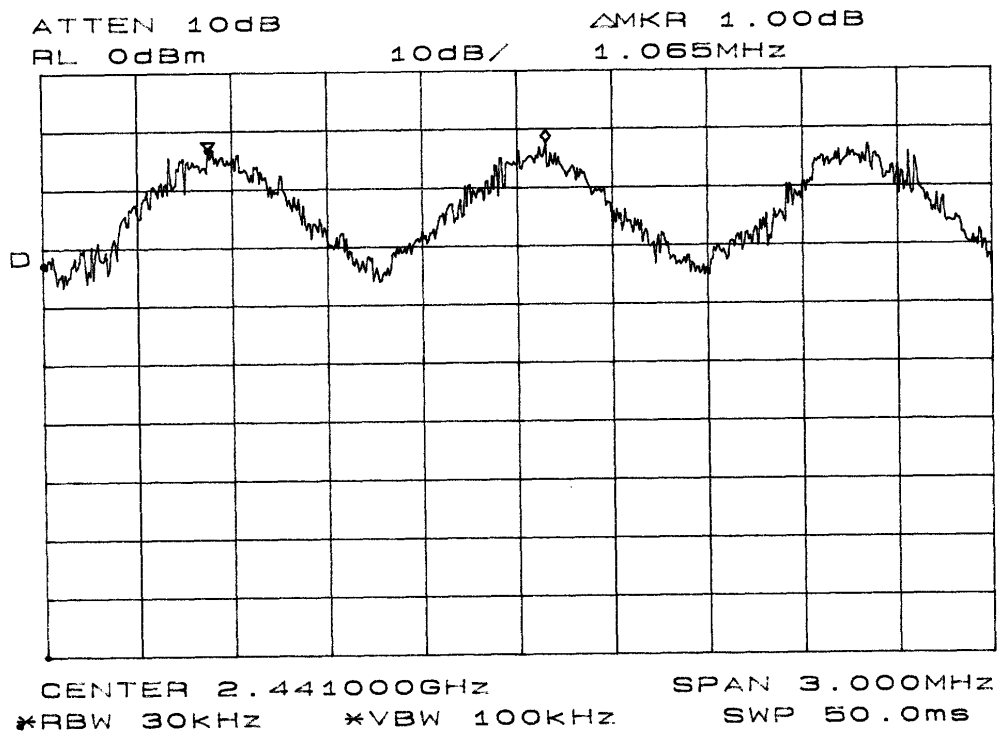


Figure 2. (Adjacent Channel of Left Carrier Frequency Separation, 2441MHz)



5. 20dB BANDWIDTH MEASUREMENT

5.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

5.2. Block Diagram of Test Setup

The same as section.4.2.

5.3. Specification Limits (§15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

5.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 10kHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

Channel	Frequency	20dB Bandwidth	Refer to Figure
0	2402MHz	873kHz	Figure 3.
39	2441MHz	873kHz	Figure 4.
78	2480MHz	877kHz	Figure 5.

The maximum 20dB bandwidth shall be at maximum 1000kHz

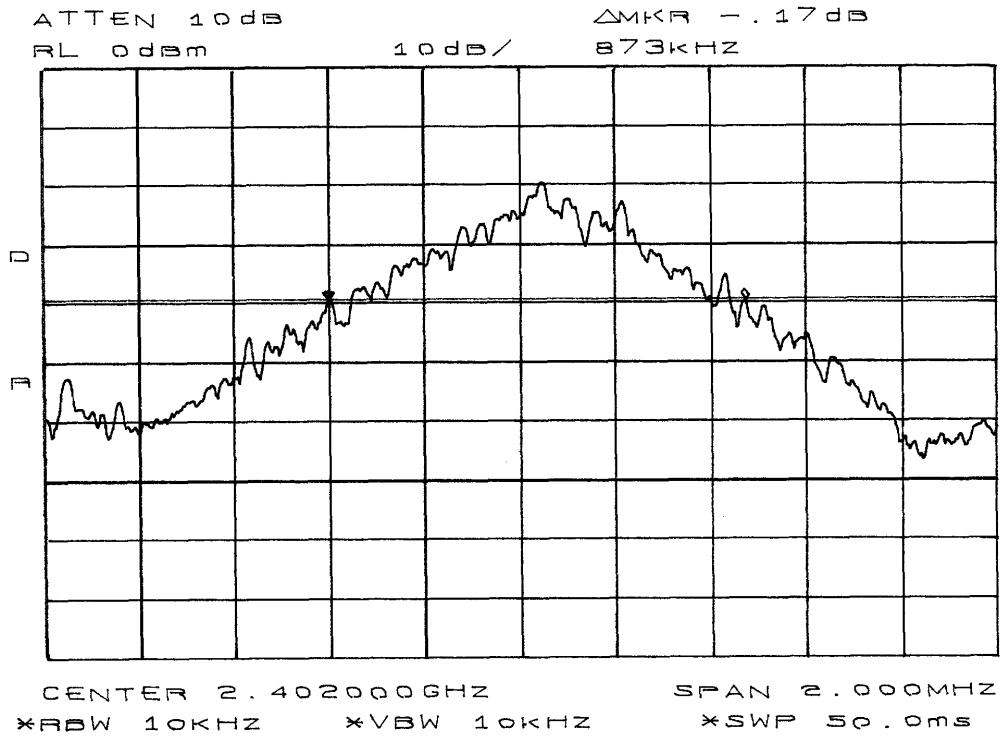
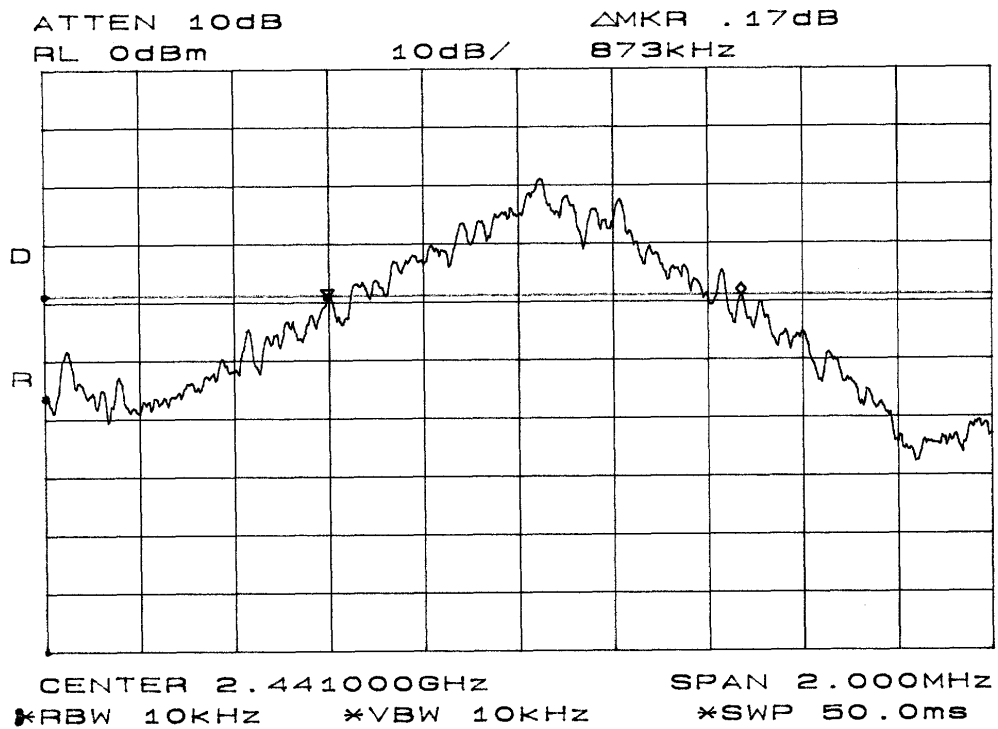
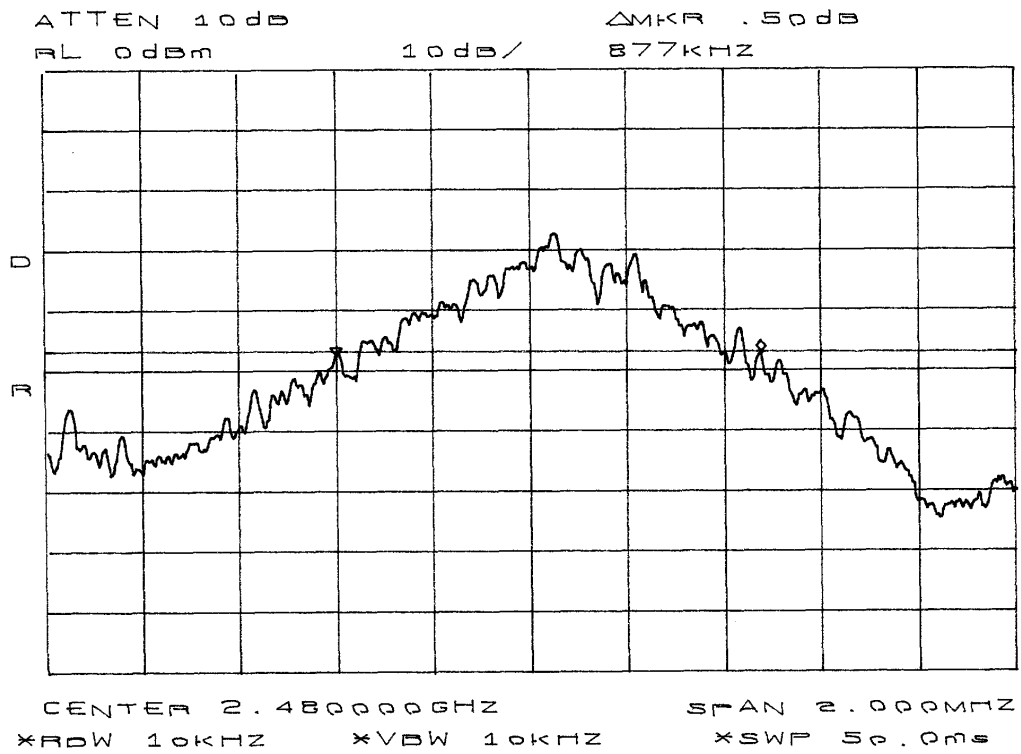
Figure 3. (20dB Bandwidth, Test Channel 0: 2402MHz)**Figure 4. (20dB Bandwidth, Test Channel 39: 2441MHz)**

Figure 5. (20dB Bandwidth, Test Channel 79: 2480MHz)

6. TIME OF OCCUPANCY

6.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

6.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1MHz RBW and 1MHz VBW. $VBW \geq RBW$; Span=zero span.

Centered on a hopping channel sweep=as necessary to capture the entire dwell time per hopping channel ; Detector function=peak ; Trace=Max hold

6.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

Duty cycle: 79 channels*0.4 seconds = 31.6 seconds

DH1 : A The system makes worst case 1600 hops per second or 1 time slot has a length of 625us with 79 channels. A DH1 packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 time per second and so for 31.6 seconds you have 320 time of appearance.

Each Tx-time per appearance is 408.3us.

$10.13 \text{ time} * 31.6 \text{ seconds} * 0.4083\text{ms} = 130.70\text{ms} (<400\text{ms})$

(Refer to Figure 6)

B.For each 5 seconds of 50 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$50 \text{ channels} * 31.6 \text{ seconds} / 5 * 0.4083\text{ms} = 129.02\text{ms} (<400\text{ms})$

(Refer to Figure 7)

DH3 : A The system makes worst case 1600 hops per second or 1 time slot has a length of 625us with 79 channels. A DH3 packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 time per second and so for 31.6 seconds you have 161 time of appearance.

Each Tx-time per appearance is 1666.7us.

$5.1 \text{ time} * 31.6 \text{ seconds} * 1.6667\text{ms} = 268.60\text{ms} (<400\text{ms})$

(Refer to Figure 8)

B.For each 5 seconds of 25 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$25 \text{ channels} * 31.6 \text{ seconds} / 5 * 1.6667\text{ms} = 263.33\text{ms} (<400\text{ms})$

(Refer to Figure 9)

DH5 : A The system makes worst case 1600 hops per second or 1 time slot has a length of 625us with 79 channels. A DH5 packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 266.7 hops per second with 79 channels. So you have each channel 3.37 time per second and so for 31.6 seconds you have 106 time of appearance.

Each Tx-time per appearance is 2916.7us.

$3.37 \text{ time} * 31.6 \text{ seconds} * 2.9167\text{ms} = 310.60\text{ms} (<400\text{ms})$

(Refer to Figure 10)

B.For each 5 seconds of 17 channels appearance, the longest time of occupancy for each of 31.6 seconds is:

$17 \text{ channels} * 31.6 \text{ seconds} / 5 * 2.9167\text{ms} = 313.37\text{ms} (<400\text{ms})$

(Refer to Figure 11)

Figure 6. (Time of Occupancy, DH1)

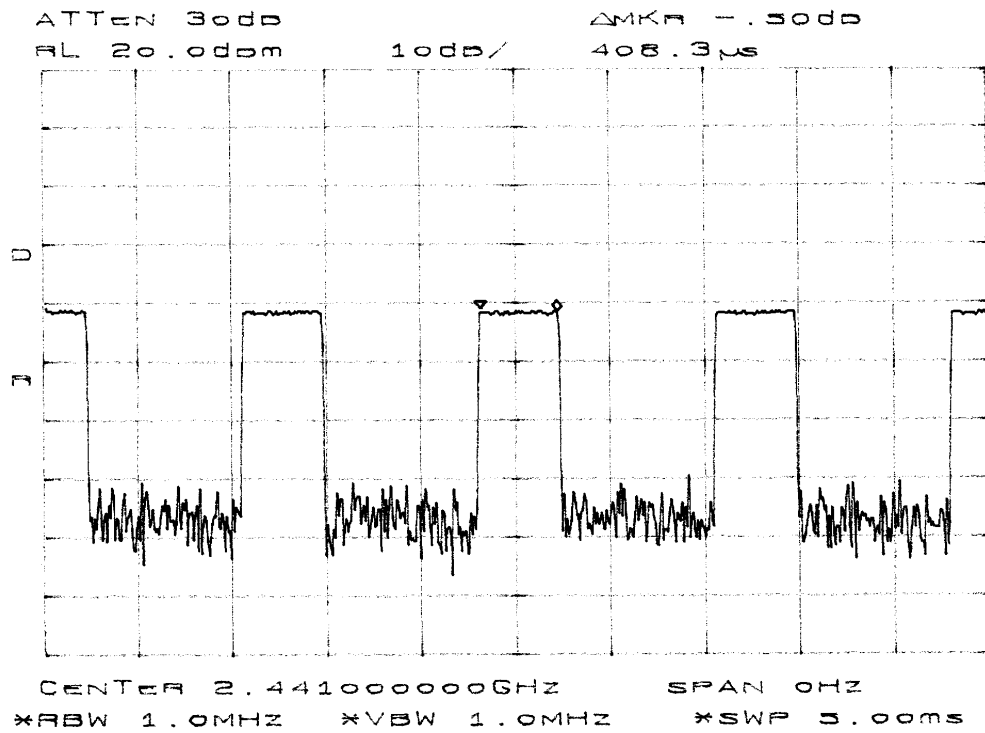


Figure 7. (Time of Occupancy, DH1)

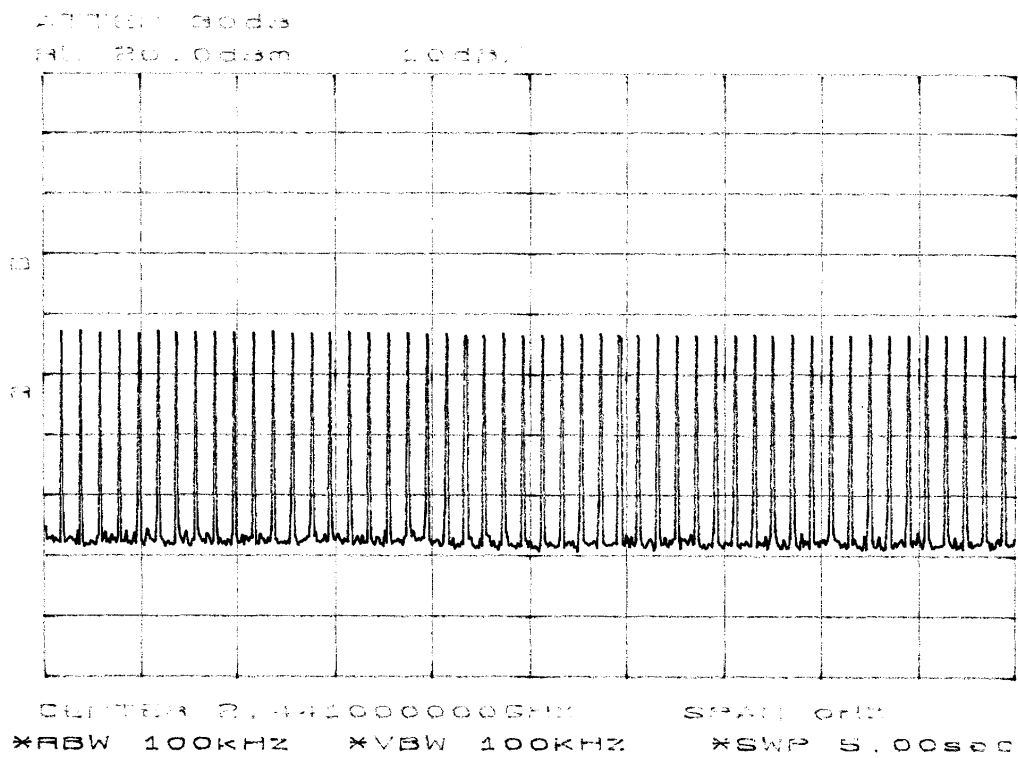


Figure 8. (Time of Occupancy, DH3)

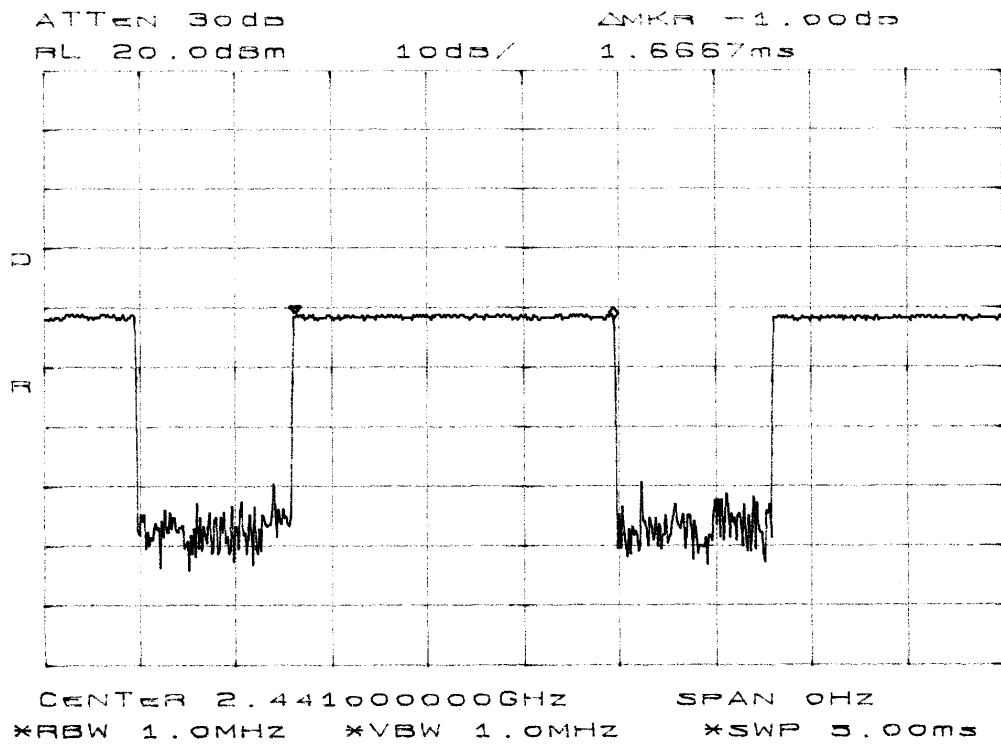


Figure 9. (Time of Occupancy, DH3)

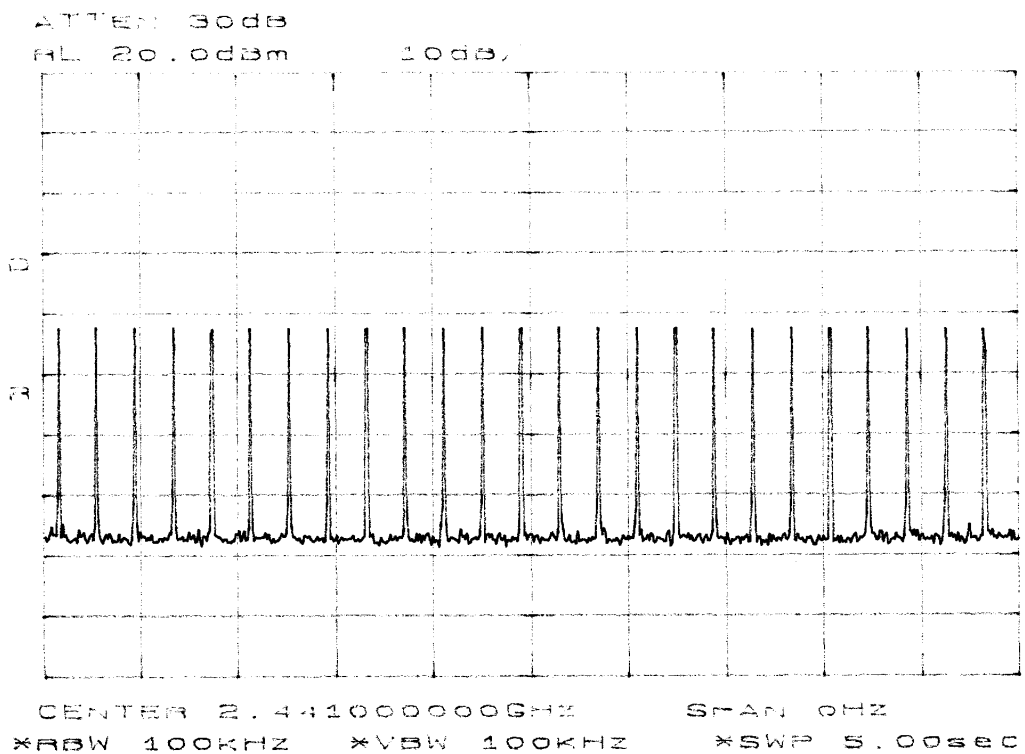


Figure 10. (Time of Occupancy, DH5)

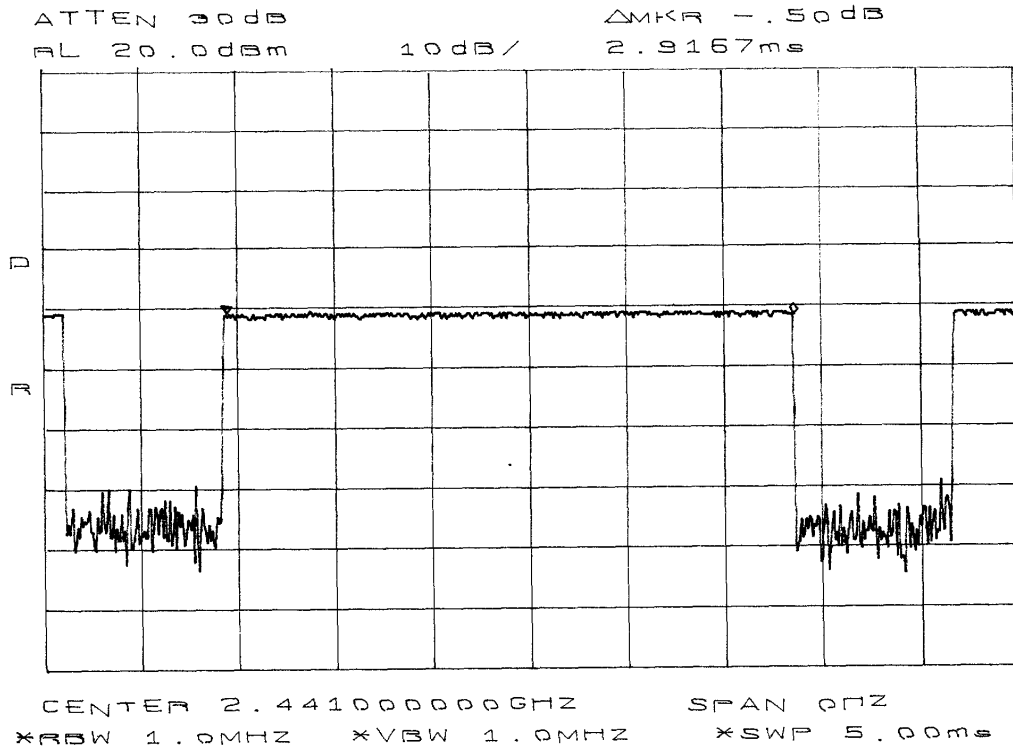
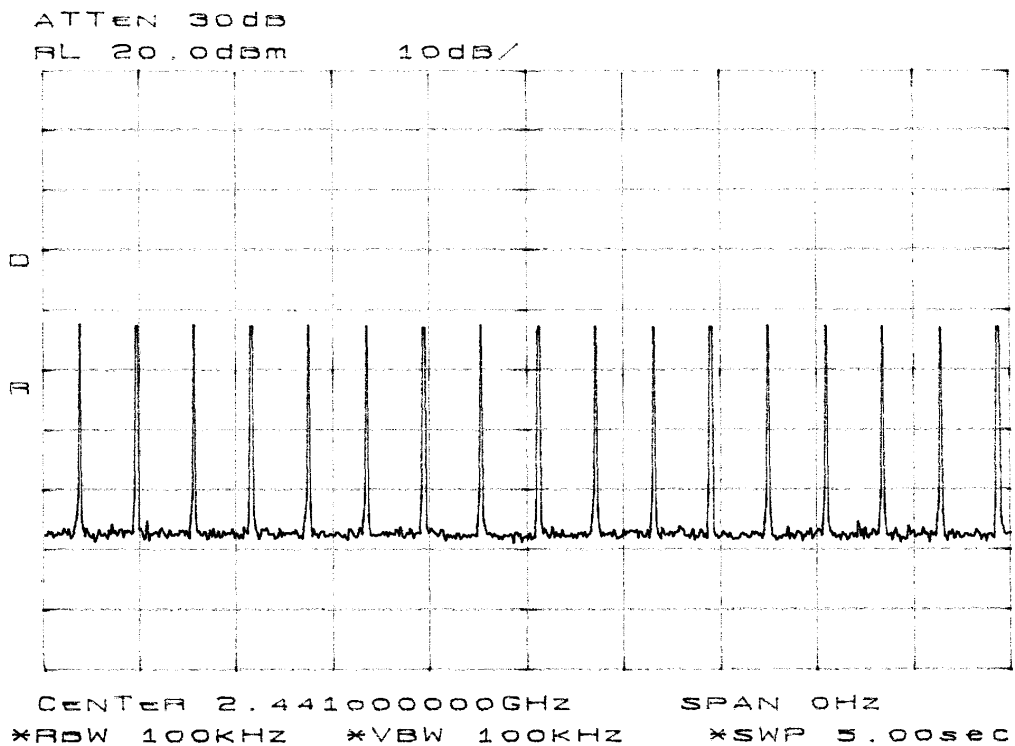


Figure 11. (Time of Occupancy, DH5)



7. NUMBER OF HOPPING CHAMMELS

7.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems which use fewer than 75 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

7.4. Test Procedure

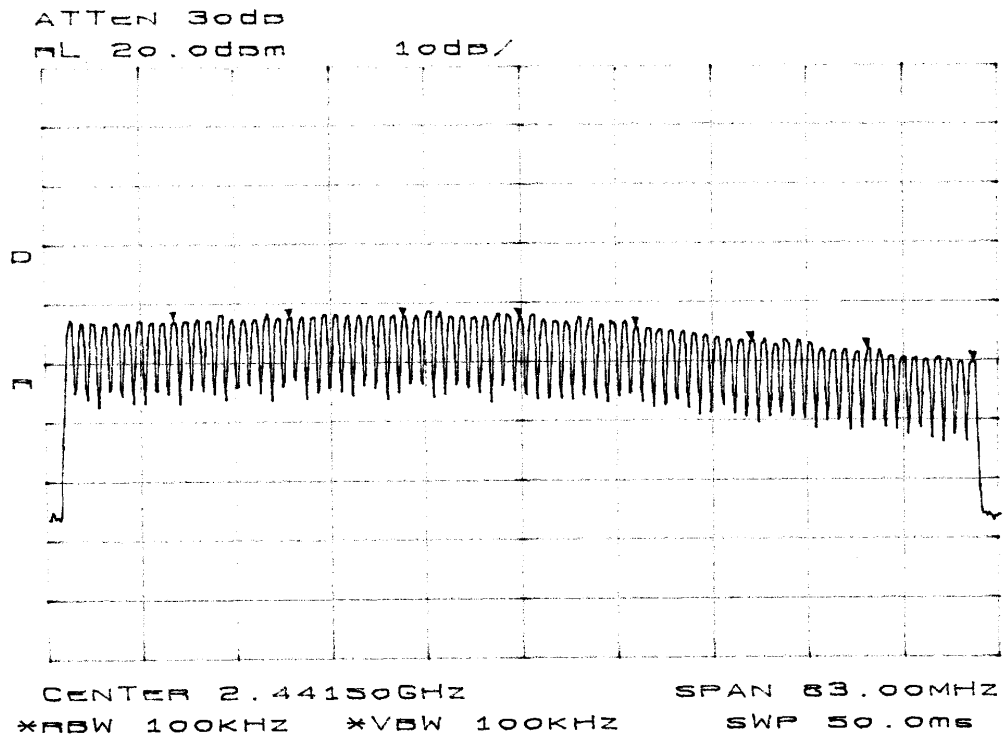
The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. Sweep=Auto ; Detector function=peak ; Trace=Max hold

7.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

The number hopping channel is 79. (Refer to Figure 12)

Figure 12. (Number of Hopping Channel)

8. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

8.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(b)-(1))

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 1Watt. (30dBm)

8.4. Test Procedure

The transmitter output was connected to the spectrum analyzer.

Span= approximately 5 times the 20dB bandwidth, centered on a hopping channel.

RBW > the 20dB bandwidth of the emission being measured.

VBW ≥ RBW ; Sweep=auto; Detector function=peak ; Trace=Max hold

8.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

Channel	Frequency	Peak Output Power	Limit	Refer to Figure
1	2402MHz	-11.83dBm	30dBm	Figure 13.
39	2441MHz	-11.00dBm	30dBm	Figure 14.
78	2480MHz	-17.67dBm	30dBm	Figure 15.

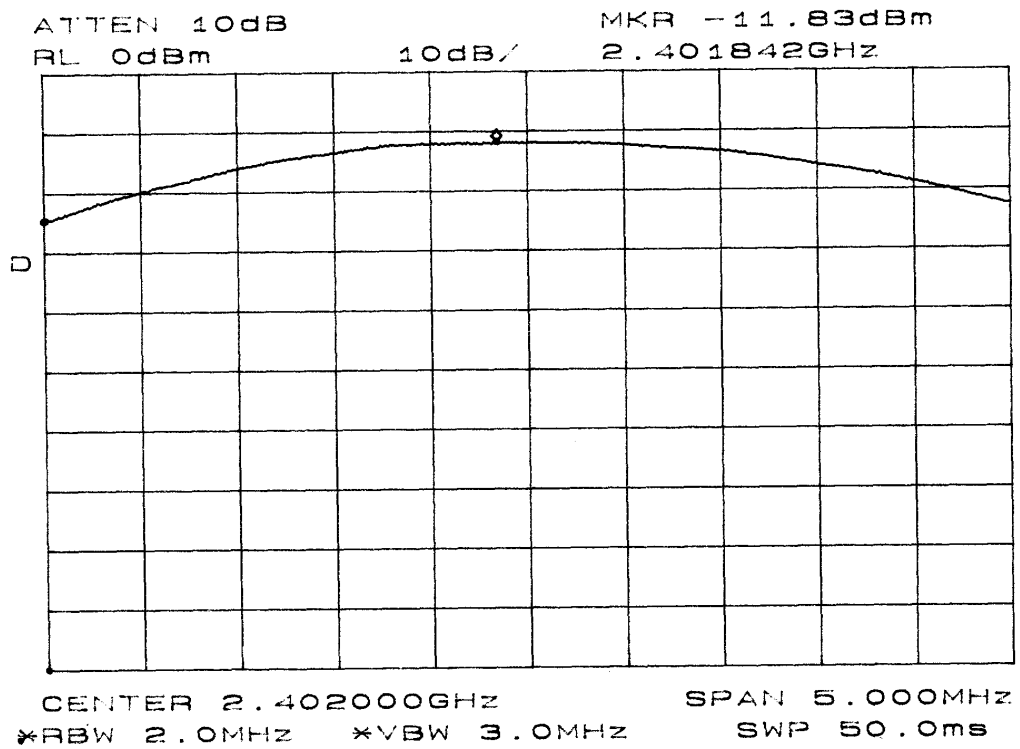
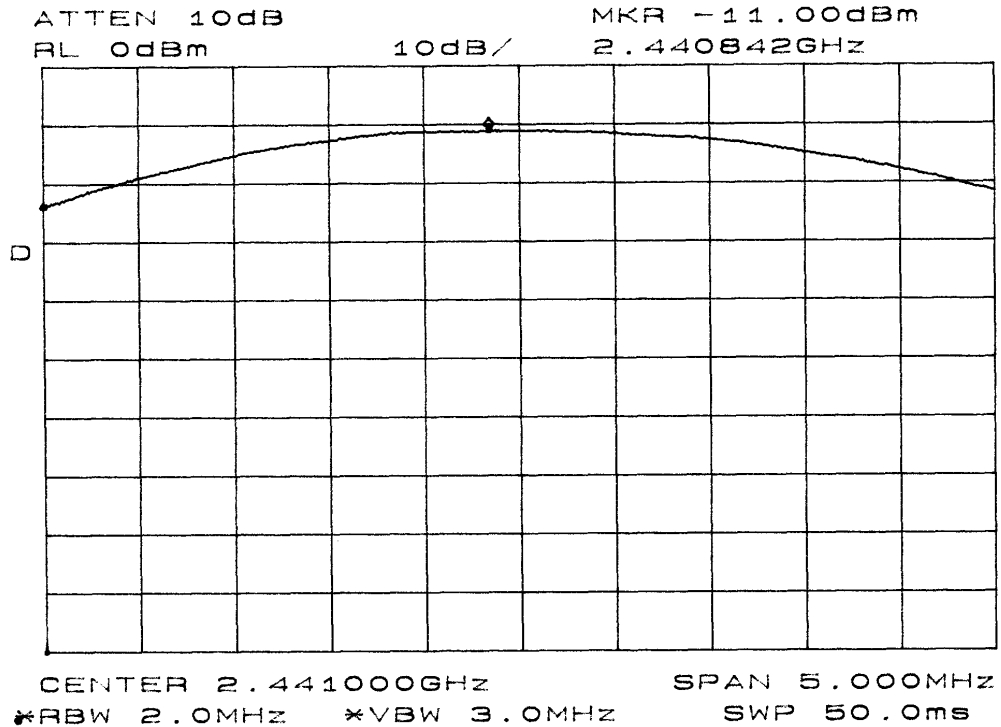
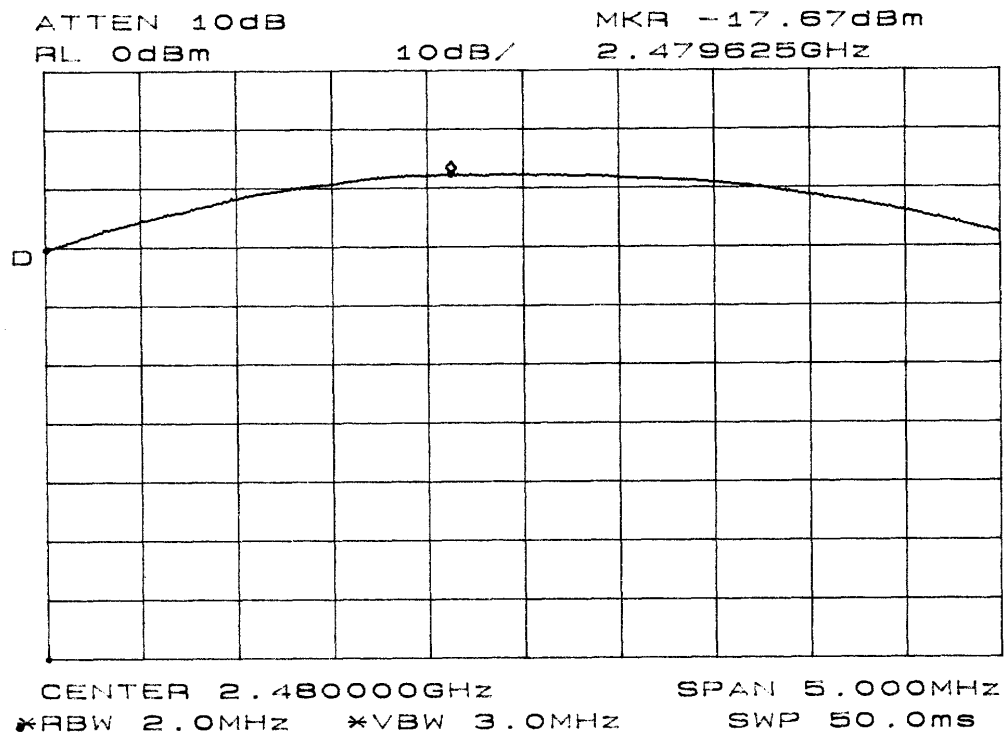
Figure 13. (Peak Output Power, Channel 0: 2402MHz)**Figure 14. (Peak Output Power, Test Channel 39: 2441MHz)**

Figure 15. (Peak Output Power, Test Channel 78: 2480MHz)

9. EMISSION LIMITATIONS MEASUREMENT

9.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

9.2. Block Diagram of Test Setup

The same as section.4.2.

9.3. Specification Limits (§15.247(c))

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(※ This test result attaching to §3.6.3)

9.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

9.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

1. 2402MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -63.67dBm is max value that is lower than 20dB of primary channel.
(Refer to figure 16.)
2. 2441MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -57.17dBm is max value that is lower than 20dB of primary channel.
(Refer to figure 17)
3. 2480MHz: During 30MHz~25GHz bandwidth. In the 2.4GHz, the -67.50dBm is max value that is lower than 20dB of primary channel.
(Refer to figure 18)

Note: The peak above the limit line is the carrier frequency.

Figure 16. (Emission Limitations, Test Channel 0: 2402MHz)

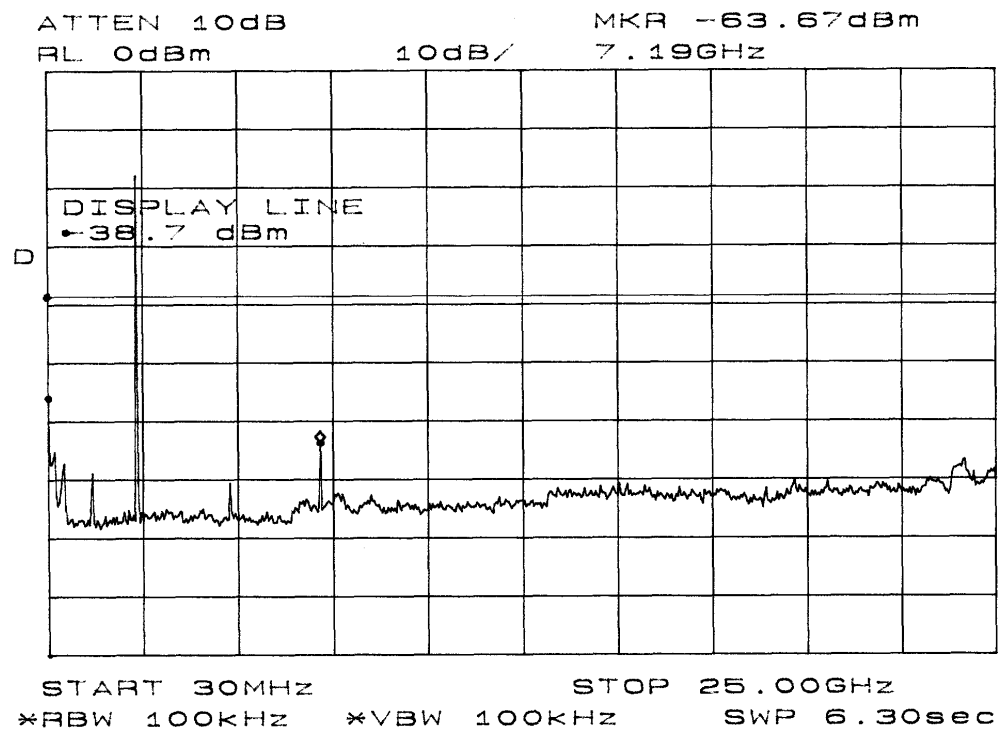


Figure 17. (Emission Limitations, Test Channel 39: 2441MHz)

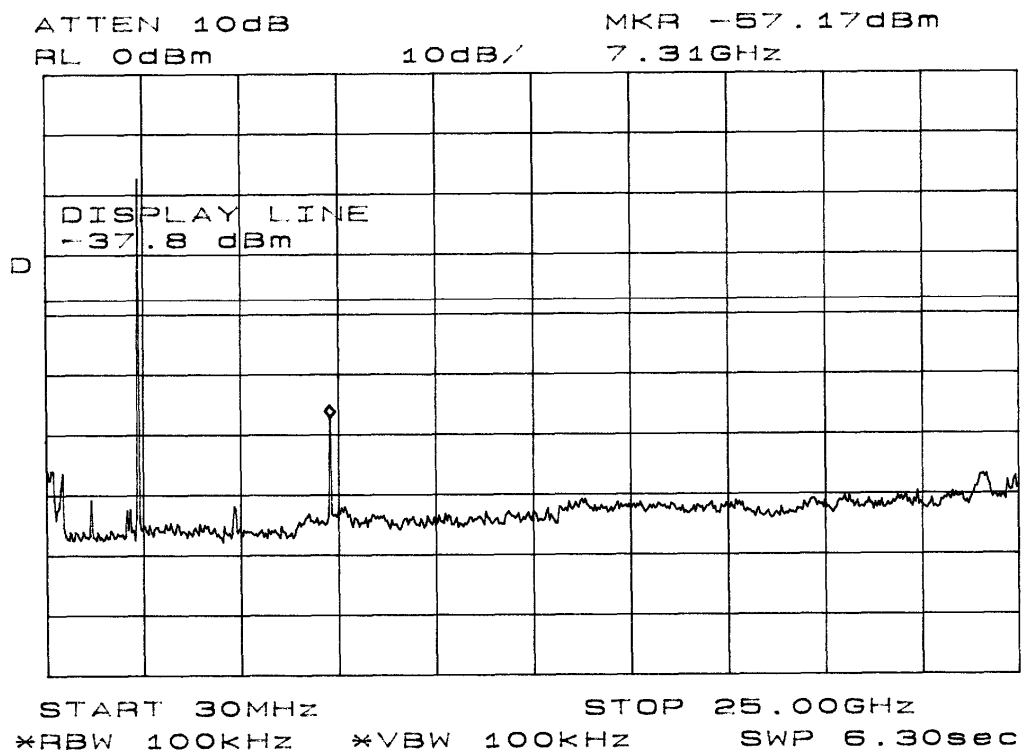
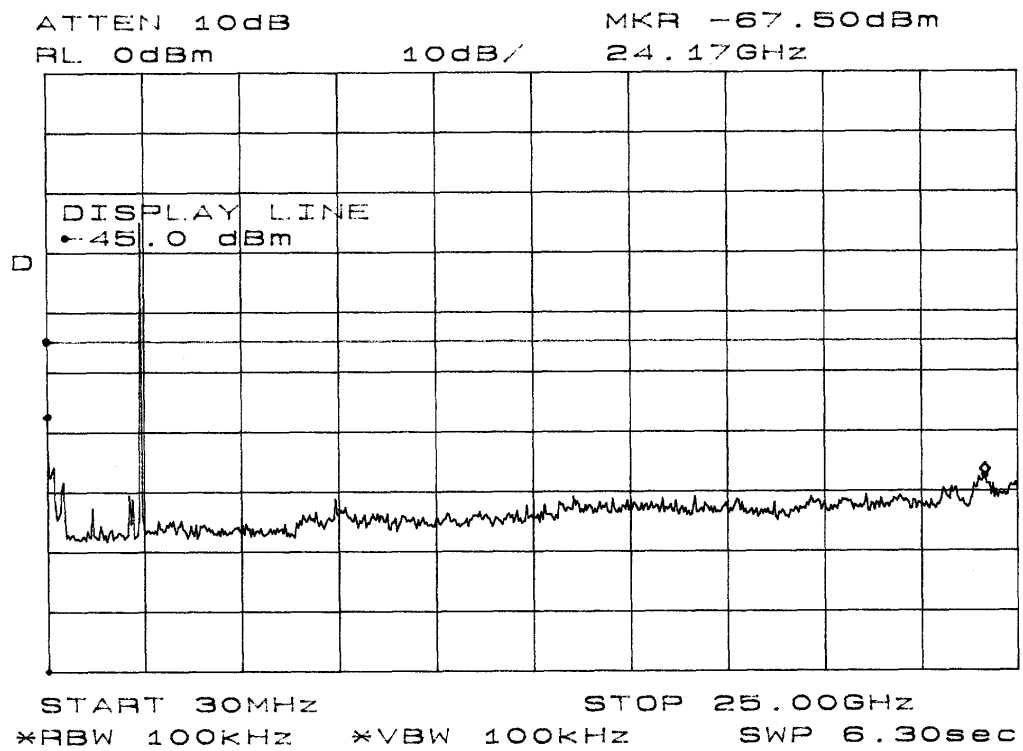


Figure 18. (Emission Limitations, Test Channel 79: 2480MHz)

10.BAND EDGES MEASUREMENT

10.1.Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

10.2.Block Diagram of Test Setup

The same as section.4.2.

10.3.Specification Limits (§15.247(c))

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)). (※ This test result attaching to §3.6.3)

10.4.Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

10.5.Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

1. Upper Band edge : The highest emission level is – 57.83dBm on 2.4000GHz ◦
(Refer to Figure 19.)
2. Below Band edge: The highest emission level is – 53.83dBm on 2.4848GHz ◦
(Refer to Figure 20.)

Figure 19. (Band Edges, Upper Band Edges)

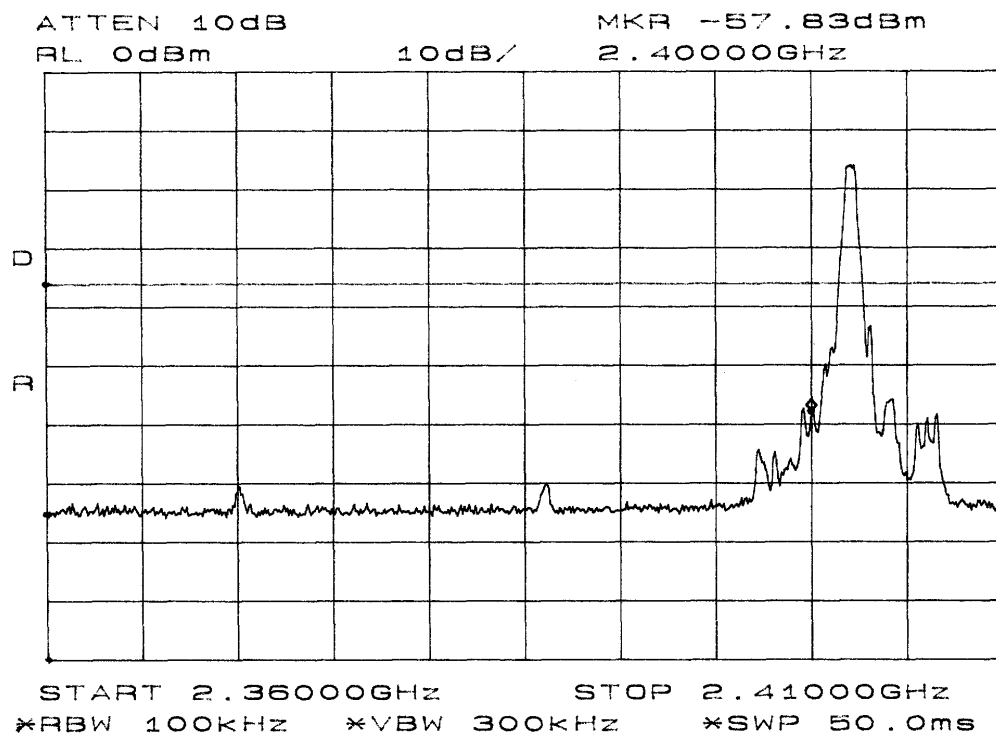
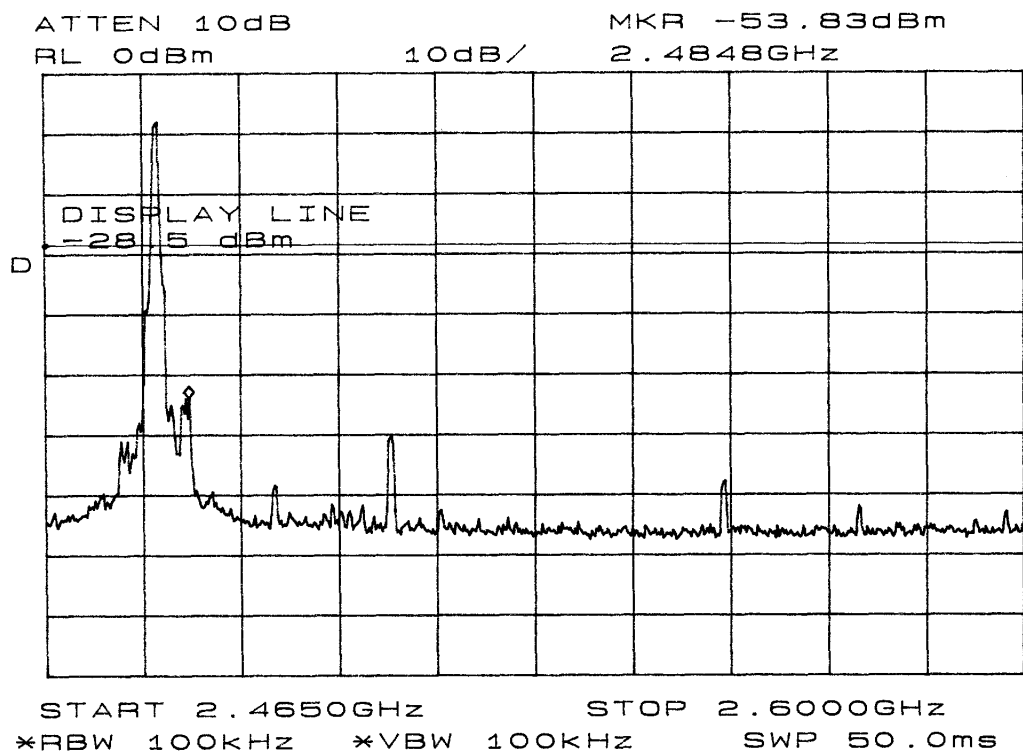


Figure 20. (Band Edges, Below Band Edges)



11. POWER SPECTRAL DENSITY MEASUREMENT

11.1. Test Equipment

The following test equipment were used during the bandwidth test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	8564EC	3946A00249	Aug. 27, 03'	Aug. 26. 04'

11.2. Block Diagram of Test Setup

The same as section.4.2.

11.3. Specification Limits (§15.247(d))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

11.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 3kHz VBW, set sweep time = span/3kHz.

11.5. Test Results

PASSED. The testing data was attached in the next pages.

(Test Date: Jan. 29, 2004, Temperature: 19°C, Humidity: 63%)

Channel	Frequency	Power Spectral Density	Limit	Refer to Figure
0	2402MHz	-17.67dBm	8dBm	Figure 21.
39	2441MHz	-16.50dBm	8dBm	Figure 22.
78	2480MHz	-19.33dBm	8dBm	Figure 23.

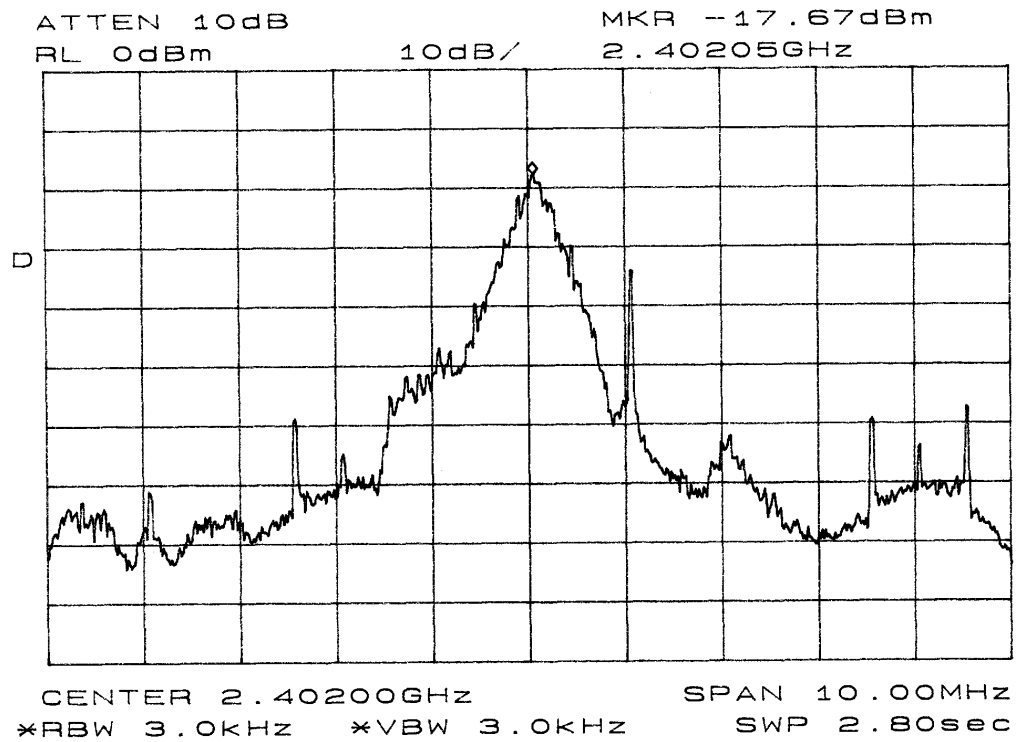
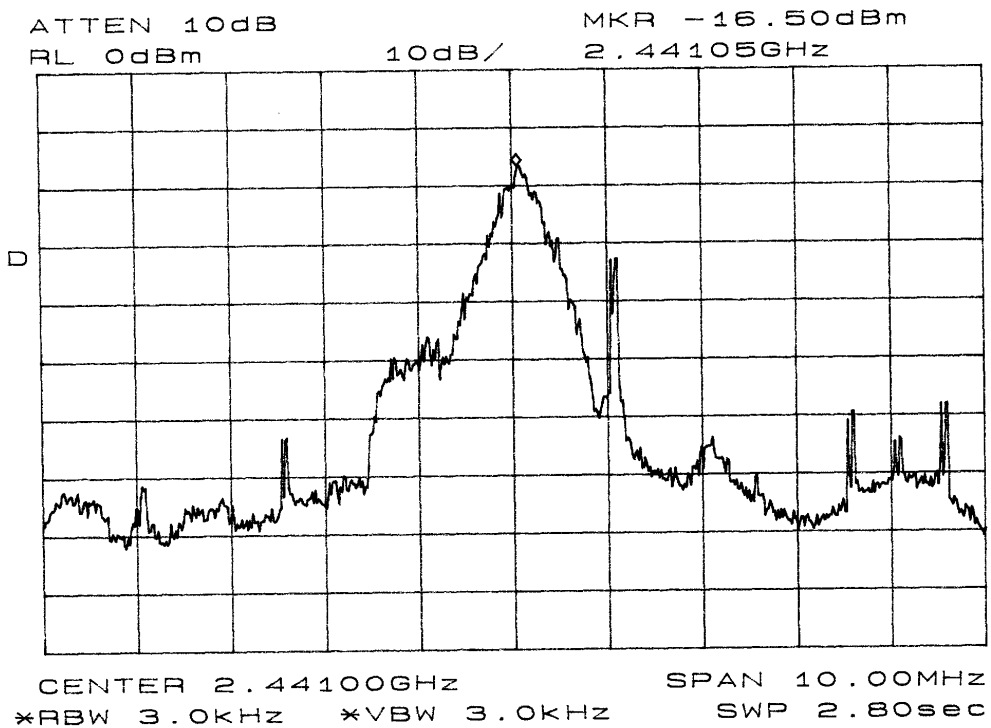
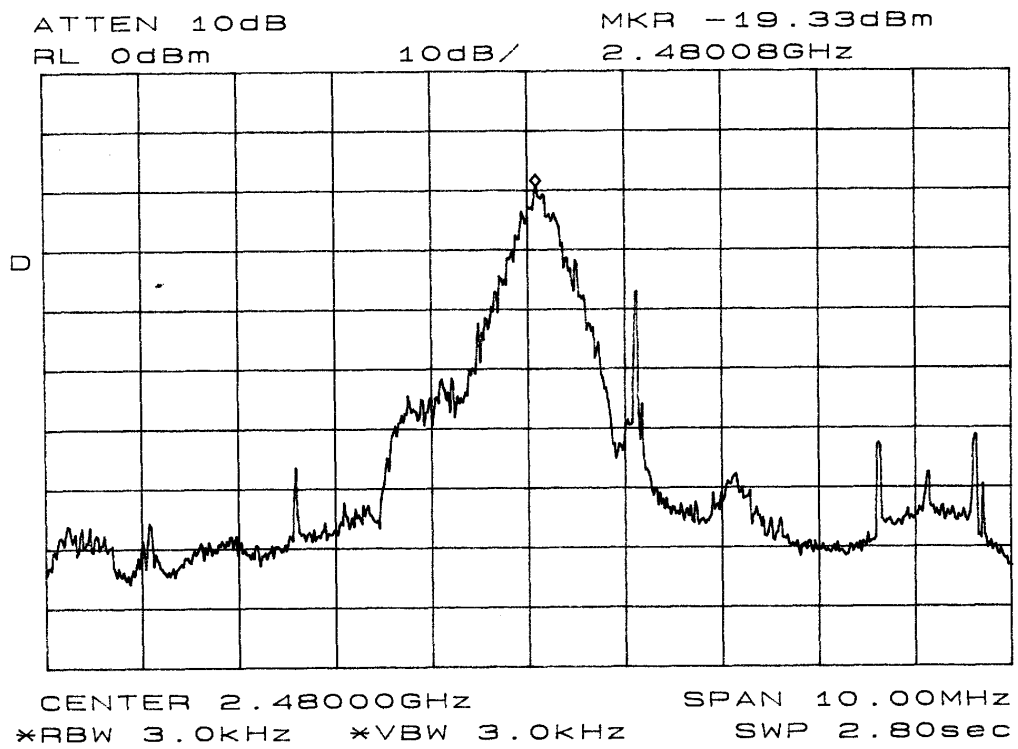
Figure 21. (Power Spectral Density, Test Channel 0: 2402MHz)**Figure 22. (Power Spectral Density, Test Channel 39: 2441MHz)**

Figure 23. (Power Spectral Density, Test Channel 79: 2480MHz)

12.DEVIATION TO TEST SPECIFICATIONS

【NONE】

13. PHOTOGRAPHS

13.1. Photos of Conducted Emission Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

13.2.Photos of Radiated Measurement at Semi-Anechoic Chamber



FRONT VIEW OF RADIATED MEASUREMENT



BACK VIEW OF RADIATED MEASUREMENT

13.3.Photos of Measurement for Section 4 ~ 11

