FCC TEST REPORT

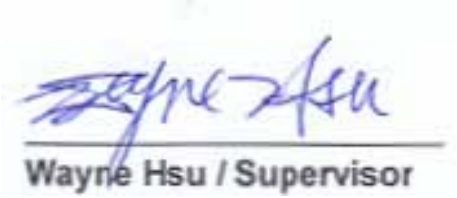
CATEGORY	:	Portable
PRODUCT NAME	:	Class 1 BT Dongle
FCC ID.	:	RU5AWBC1UP
FILING TYPE	:	Certification
MODEL NAME	:	AWBC1U+
TRADE NAME	:	APM
APPLICANT	:	**Asia Pacific Microsystems, Inc.** No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
MANUFACTURER	:	Same as applicant
ISSUED BY	:	**SPORTON INTERNATIONAL INC.** 6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA, NVLAP or any agency of U.S. government.

The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.



NVLAP®
Lab Code: 200079-0

Table of Contents

History of this test report

Original Report Issue Date: Jul. 4, 2005

Report No.: FR483129-30

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

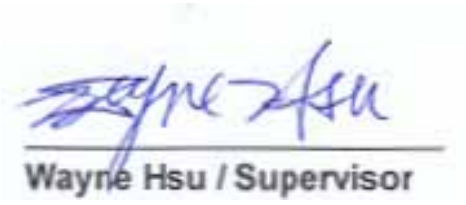
with

47 CFR FCC Part 15 Subpart C (Section 15.247)

PRODUCT NAME	:	Class 1 BT Dongle
MODEL NAME	:	AWBC1U+
APPLICANT	:	**Asia Pacific Microsystems, Inc.** No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
MANUFACTURER	:	Same as applicant

I **HEREBY** CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4-2003 - 2003 and all test are performed according to 47 CFR FCC Part 15. Testing was carried out on Jun. 10, 2005 at SPORTON International Inc. LAB.



1. General Description of Equipment under Test

1.1. Applicant

Asia Pacific Microsystems, Inc.
No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.

1.2. Manufacturer

Same as applicant

1.3. Basic Description of Equipment under Test

This product is a Bluetooth Dongle with wireless solution. The technical data has been listed on section " Features of Equipment under Test ". This product is intended to be plugged in the USB port of the computer.

1.4. Features of Equipment under Test

Items		Description
Type of Modulation	:	GFSK
Number of Channels	:	79
Frequency Band	:	2402MHz ~ 2480MHz
Carrier Frequency	:	See section 1.6 for details
Data Rate	:	1Mbps
Conducted Peak Power	:	6.96dBm
Antenna Type	:	See section 1.5 for details
Testing Duty Cycle	:	36.50%
Power Rating (DC/AC, Voltage)	:	5 VDC from host equipment
Test Power Source	:	110.00V AC
Temperature Range (Operating)	:	0 ~ 40°C

1.5. Antenna Description

1 type of antenna is filed in this project.

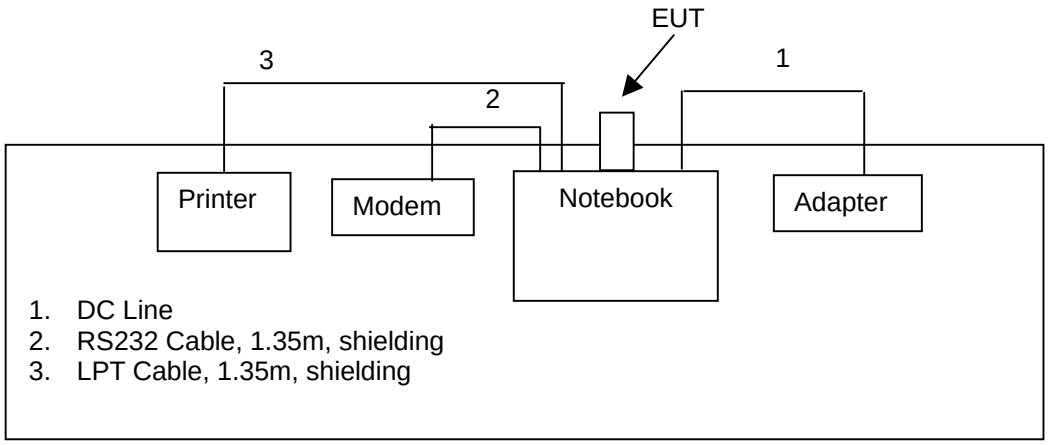
No.	Antenna Type	Gain (dBi)
1	Chip Antenna	4.10dBi

1.6. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	20	2422 MHz	40	2442 MHz	60	2462 MHz
01	2403 MHz	21	2423 MHz	41	2443 MHz	61	2463 MHz
02	2404 MHz	22	2424 MHz	42	2444 MHz	62	2464 MHz
03	2405 MHz	23	2425 MHz	43	2445 MHz	63	2465 MHz
04	2406 MHz	24	2426 MHz	44	2446 MHz	64	2466 MHz
05	2407 MHz	25	2427 MHz	45	2447 MHz	65	2467 MHz
06	2408 MHz	26	2428 MHz	46	2448 MHz	66	2468 MHz
07	2409 MHz	27	2429 MHz	47	2449 MHz	67	2469 MHz
08	2410 MHz	28	2430 MHz	48	2450 MHz	68	2470 MHz
09	2411 MHz	29	2431 MHz	49	2451 MHz	69	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System



2.2. The Test Mode Description

Spurious emission below 1GHz is independent of channel selection, so only channel 78 with GFSK modulation was tested.

AC conduction emission is independent of channel selection, so only channel 78 with GFSK modulation was tested.

2.3. Description of Test Supporting Units

Support unit	Brand	Model No.	Serial No.	FCC ID
Notebook	DELL	PP10L (D505)	SP0031	DoC
Printer	EPSON	LQ-680	SP0046	DoC
Modem	ACEEX	DM141	SP0049	DoC

3. General Information of Test

3.1. Test Facility

Test Site Location	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
	:	TEL 886-3-327-3456
	:	FAX 886-3-318-0055
Test Site No	:	03CH03-HY / TH01-HY / CO04-HY

3.2. Test Conditions

Normal Voltage	:	110.00VAC (host equipment)
Extreme Voltages	:	126.50VAC and 93.5VAC (host equipment)
Normal Temperature	:	20°C
Extreme Temperature	:	0 °C and 40 °C

3.3. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.
ANSI C63.4-2003
47 CFR Part 15 Subpart C (Section 15.247)

3.4. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

3.5. Frequency Range Investigated

Radiated emission test: from 30 MHz to 10th carrier harmonic

3.6. Test Distance

The test distance of radiated emission (30MHz~1GHz) test from antenna to EUT is 3 M.
The test distance of radiated emission (1GHz~10th carrier harmonic) test from antenna to EUT is 3 M.

3.7. Test Software

Test Software Version	Bluetest		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters	2	2	2

4. List of Measurements

4.1. Summary of the Test Results

Applied Standard: 47 CFR Part 15 and Part 2

Paragraph	FCC Rule	Description of Test	Result
5.1	15.247	Hopping Channel Bandwidth	Pass
5.2	15.247	Hopping Channel Separation	Pass
5.3	15.247	Number of Hopping Frequency Used	Pass
5.4	15.247	Dwell Time of Each Frequency	Pass
5.5	15.247	Maximum Peak Output Power	Pass
5.6	15.247	Band Edges Emission	Pass
5.7	15.207	AC Power Line Conducted Emission	Pass
5.8	15.209/15.247	Spurious Radiated Emission	Pass
5.9	15.203/15.247	Antenna Requirement	Pass

5. Test Result

5.1. Test of Hopping Channel Bandwidth

5.1.1. Measuring Instruments

Item 18 of the table on section 6.

5.1.2. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 30KHz and VBW to 100KHz.
3. The channel bandwidth is the spectrum width with level higher than 20dB below the peak level.
4. Repeat above points 1~3 for the middle and highest channel of the EUT.

5.1.3. Test Setup Layout

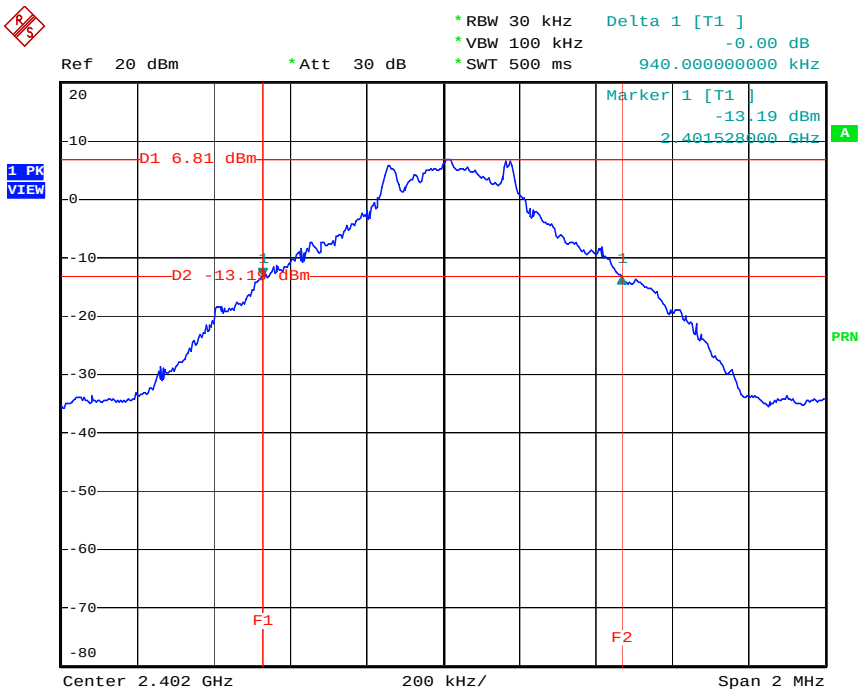
Spectrum Analyzer EUT

5.1.4. Test Result: See spectrum analyzer plots below

Temperature: 25°C
Relative Humidity: 60%
Duty Cycle of the Equipment During the Test: 36.50%
Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Channel Separation (MHz)
GFSK	00	2402 MHz	940.00	1.00
GFSK	39	2441 MHz	924.00	1.00
GFSK	78	2480 MHz	924.00	1.00

Modulation Type: GFSK (Channel 00)：



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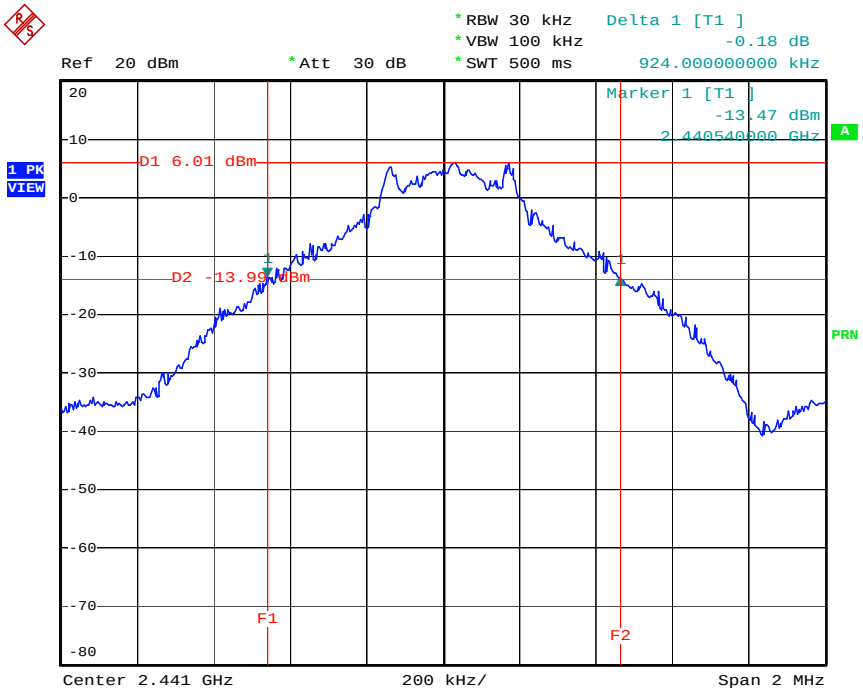
Modulation Type: GFSK (Channel 39)：



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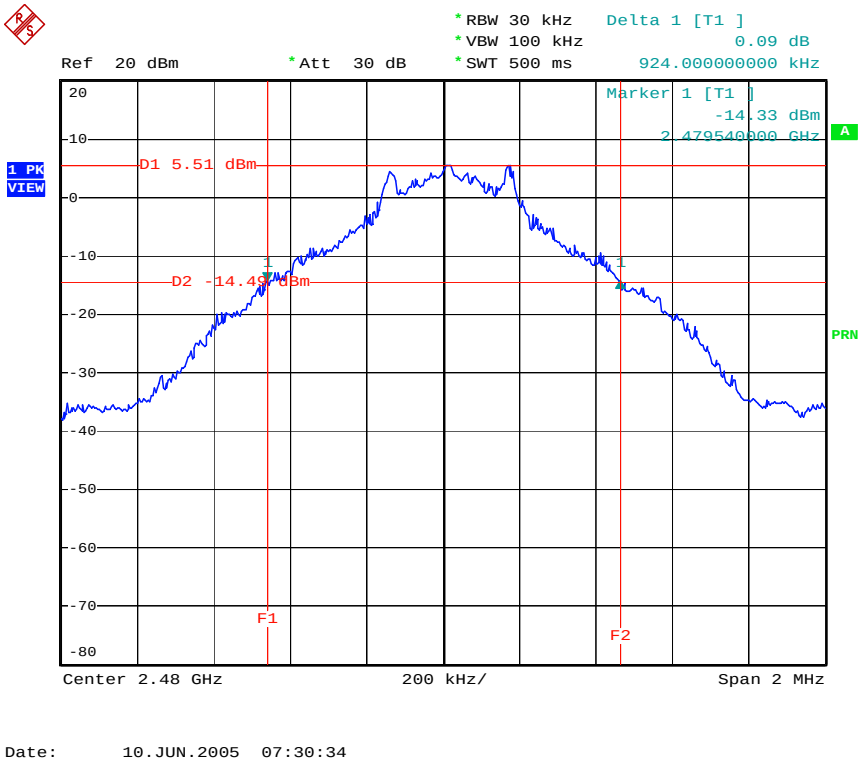
Modulation Type: GFSK (Channel 78)：



5.2. Test of Hopping Channel Separation

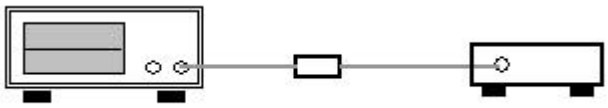
5.2.1. Measuring Instruments

Item 18 of the table on section 6.

5.2.2. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 300KHz.
3. The Hopping Channel Separation is defined as the separation between 2 neighboring hopping frequencies.
4. Repeat above point 1~3 for the middle and highest channel of the EUT.

5.2.3. Test Setup Layout



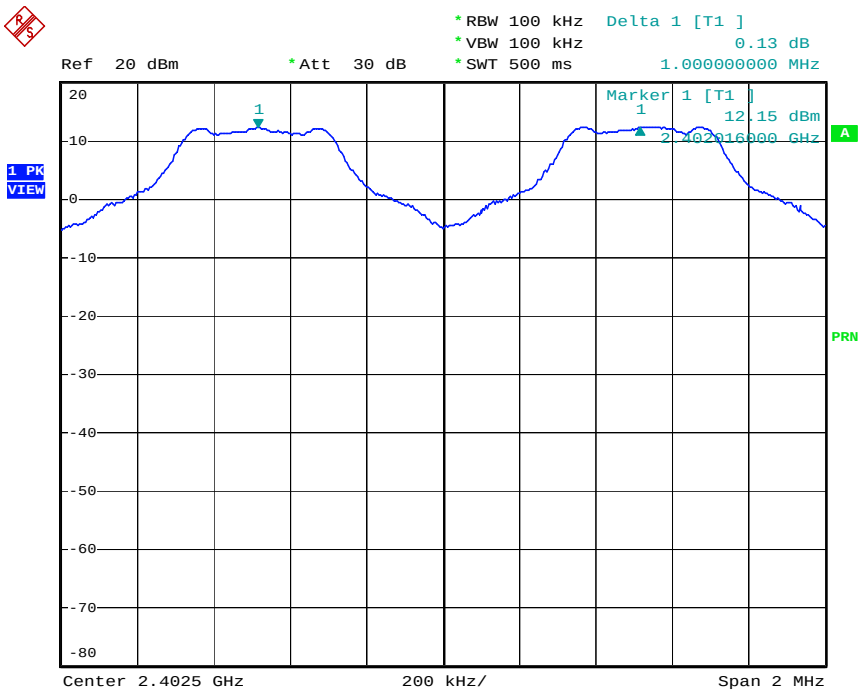
Spectrum Analyzer EUT

5.2.4. Test Result: See spectrum analyzer plots below

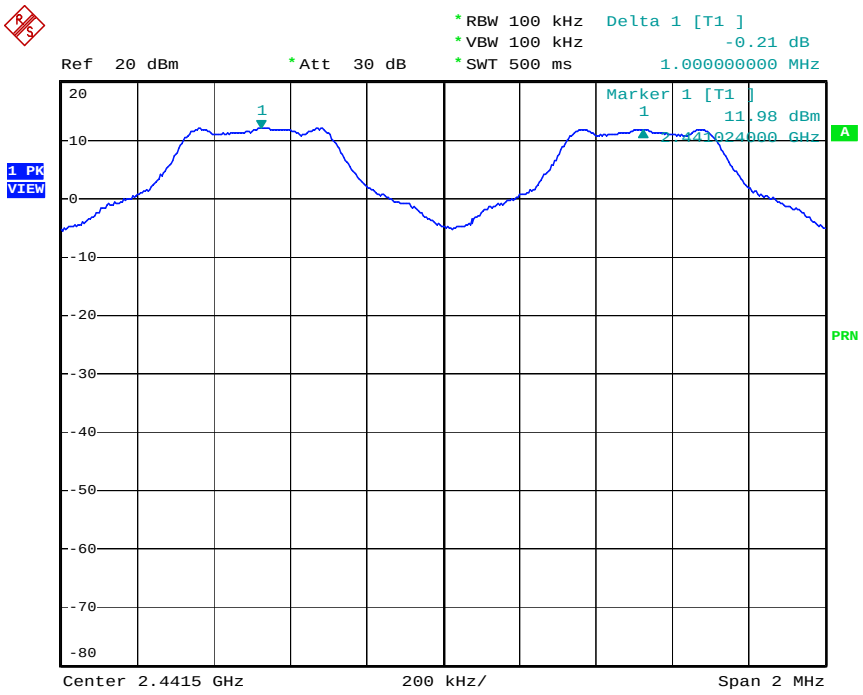
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Channel Separation (MHz)
GFSK	00	2402 MHz	940.00	1.00
GFSK	39	2441 MHz	924.00	1.00
GFSK	78	2480 MHz	924.00	1.00

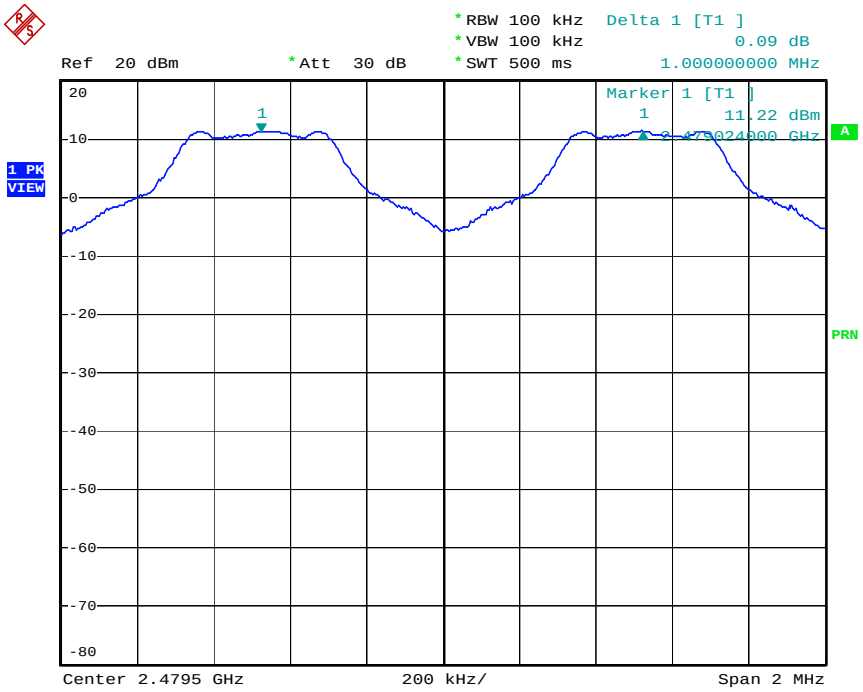
Modulation Type: GFSK (Channel 00)：



Modulation Type: GFSK (Channel 39)：



Modulation Type: GFSK (Channel 78)：



5.3. Test of Number of Hopping Frequency

5.3.1. Measuring Instruments

Item 18 of the table on section 6.

5.3.2. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. Set Detector to Peak, Trace to Max Hold and Sweep Time is Auto.
4. Observe the hopping frequency in 2400MHz~2483.5MHz, there are at least 75 non-overlapping channels.
5. Repeat above 1~3 points for the middle and highest channel of the EUT.

5.3.3. Test Setup Layout

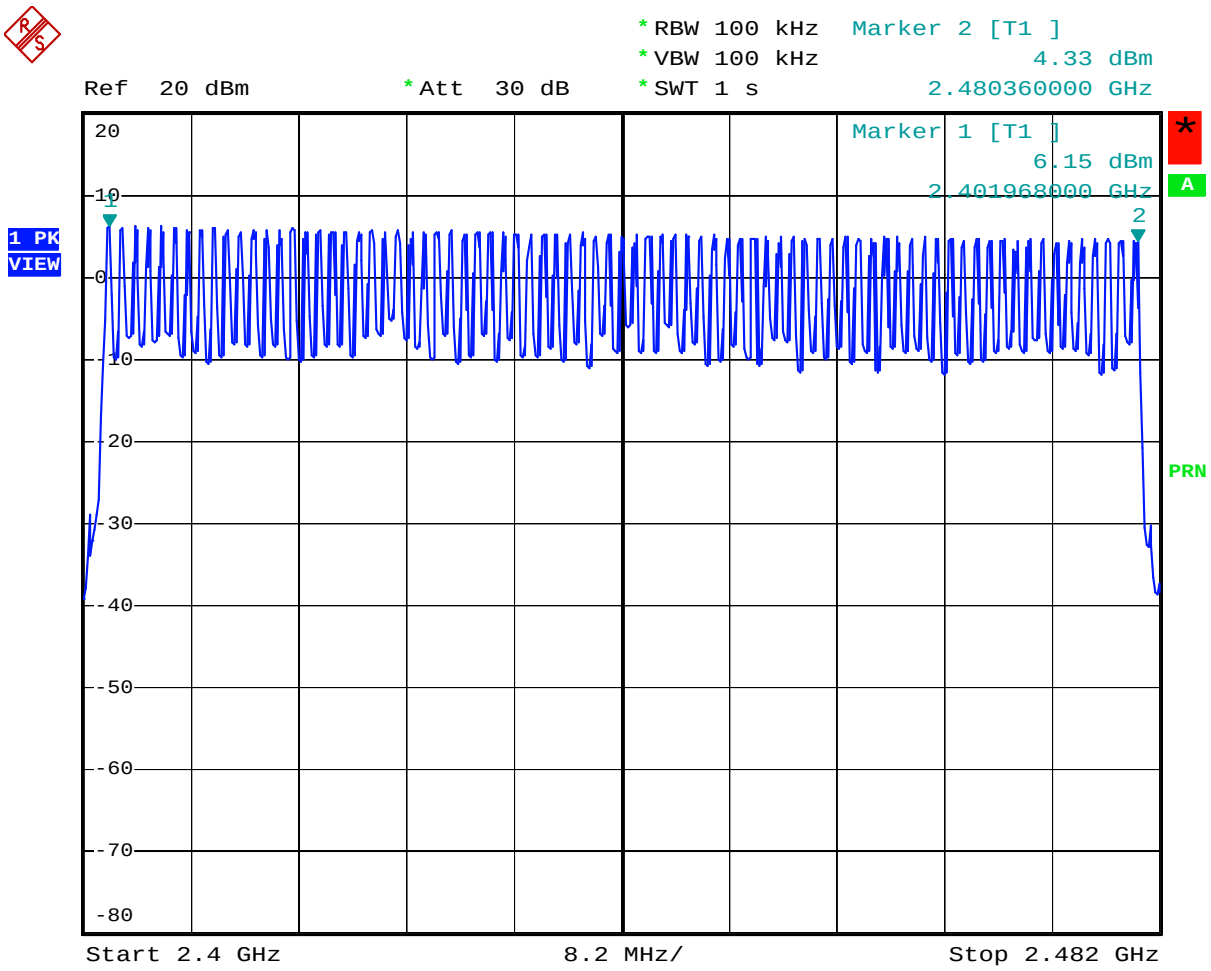
Spectrum Analyzer **EUT**

5.3.4. Test Result: See spectrum analyzer plots below

- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	Number of Hopping Ch. (Channels)	Min. Limit (Channels)
GFSK	00 ~ 78	2402 MHz ~ 2480 MHz	79	75

Modulation Type: GFSK (Channel 00 ~ Channel 78) :



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5.4. Test of Dwell Time of Each Frequency

5.4.1. Measuring Instruments

Item 18 of the table on section 6.

5.4.2. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 1000kHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. Set the EUT for DH5, DH3 and DH1 packet transmitting.
5. Measure the maximum time duration, t , of one single pulse.
6. DH5 Packet permit maximum 3.37 hops per second in each channel. So, the dwell time is the time duration of the pulse times 106.6 within 31.6 seconds.
7. DH3 Packet permit maximum 5.06 hops per second in each channel. So, the dwell time is the time duration of the pulse times 160 within 31.6 seconds.
8. DH1 Packet permit maximum 10.12 hops per second in each channel. So, the dwell time is the time duration of the pulse times 320 within 31.6 seconds.

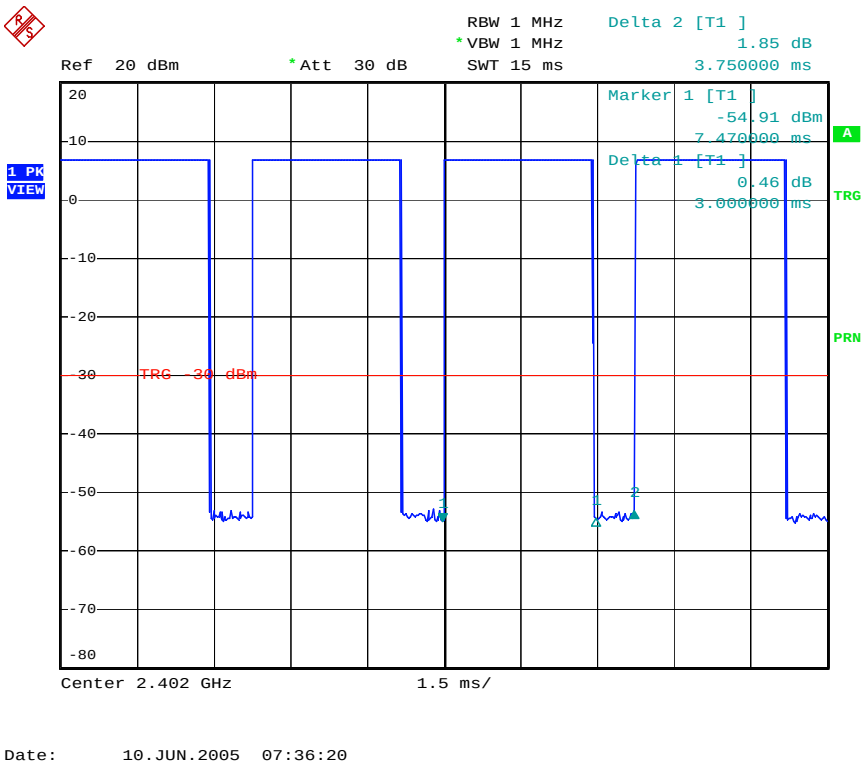
5.4.3. Test Setup Layout

5.4.4. Test Result : See spectrum analyzer plots below

- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Sam Lee

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH5	2402 MHz	3.0000	0.3200	0.4000
DH3	2402 MHz	1.7200	0.2752	0.4000
DH1	2402 MHz	0.4600	0.1472	0.4000
DH5	2441 MHz	3.0000	0.3200	0.4000
DH3	2441 MHz	1.7100	0.2736	0.4000
DH1	2441 MHz	0.4500	0.1440	0.4000
DH5	2480 MHz	2.9900	0.3189	0.4000
DH3	2480 MHz	1.7100	0.2736	0.4000
DH1	2480 MHz	0.4500	0.1440	0.4000

DH5 Modulation Type: GFSK (Channel 00)：



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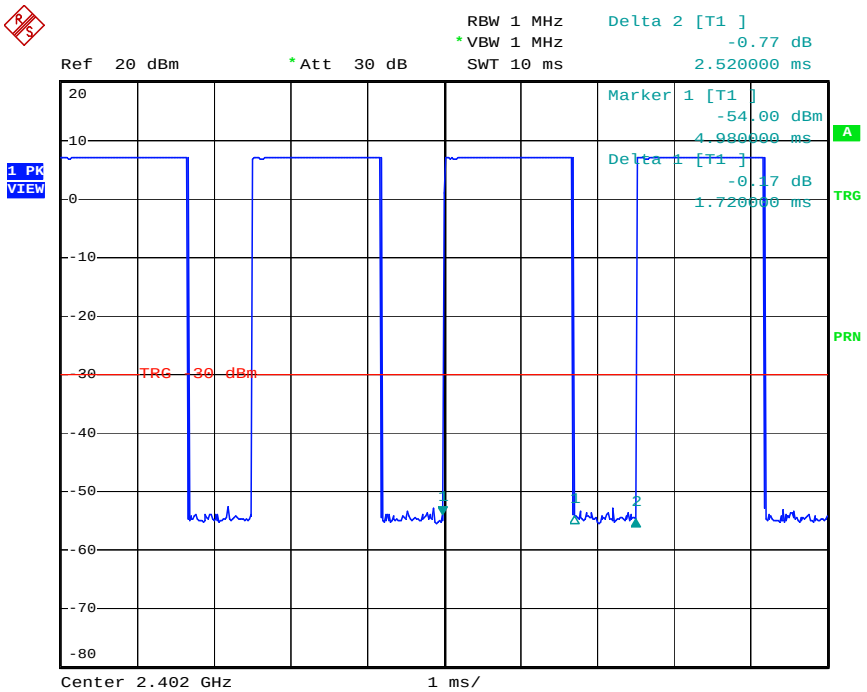
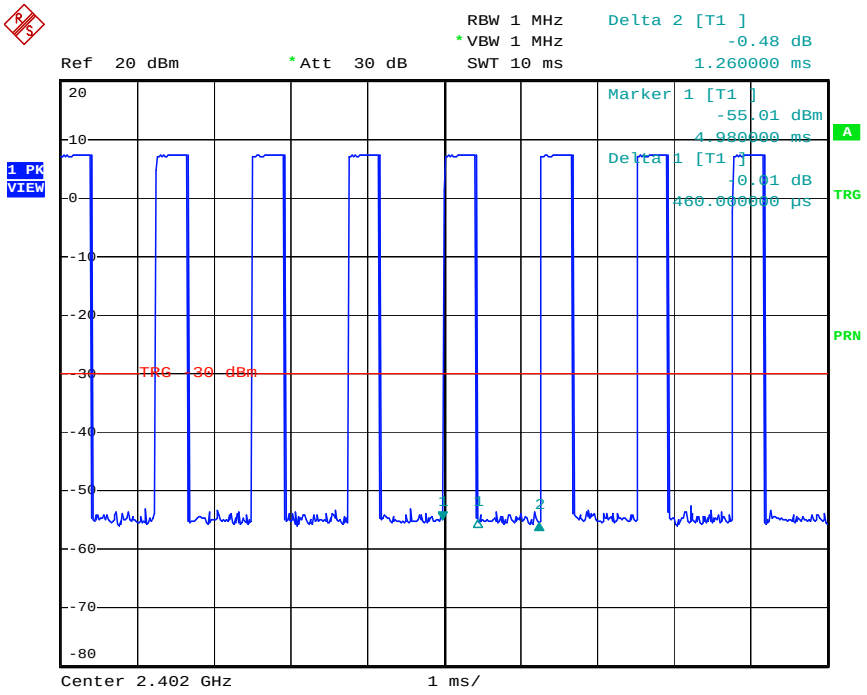
DH3 Modulation Type: GFSK (Channel 00)：



Date: 10.JUN.2005 07:35:24

DH1 Modulation Type: GFSK (Channel 00)：



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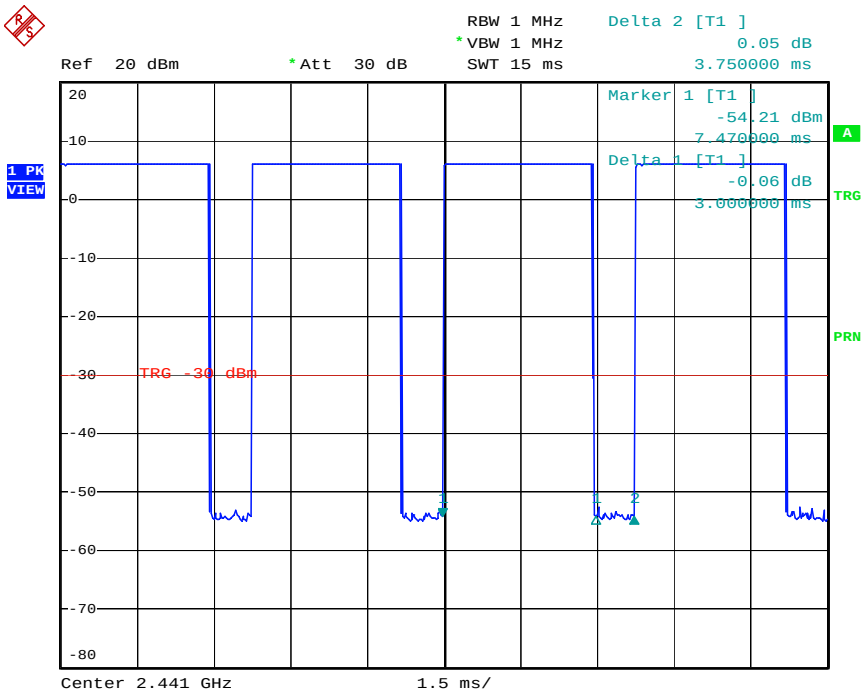
DH5 Modulation Type: GFSK (Channel 39)：



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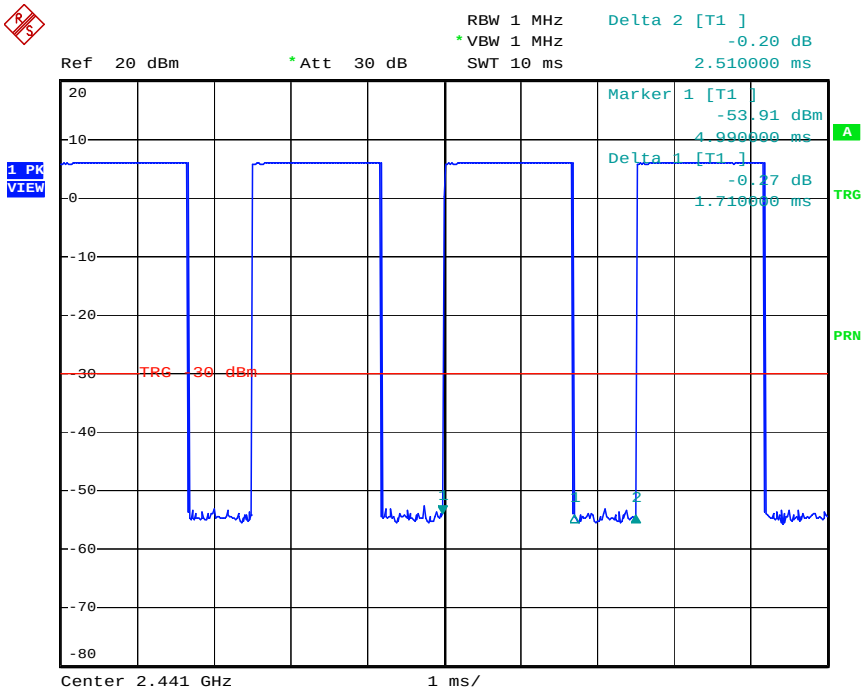
DH3 Modulation Type: GFSK (Channel 39)：



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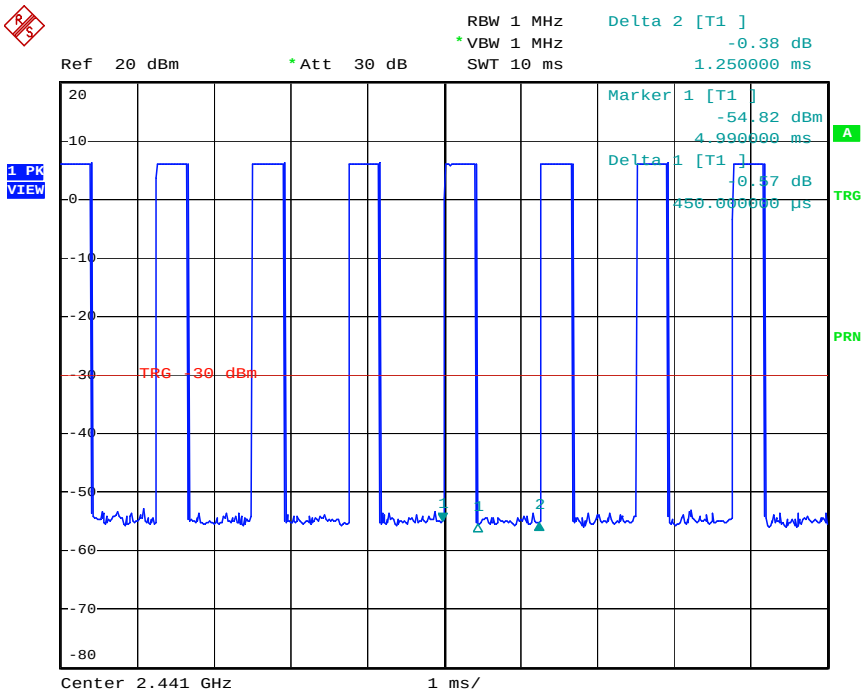
DH1 Modulation Type: GFSK (Channel 39)：



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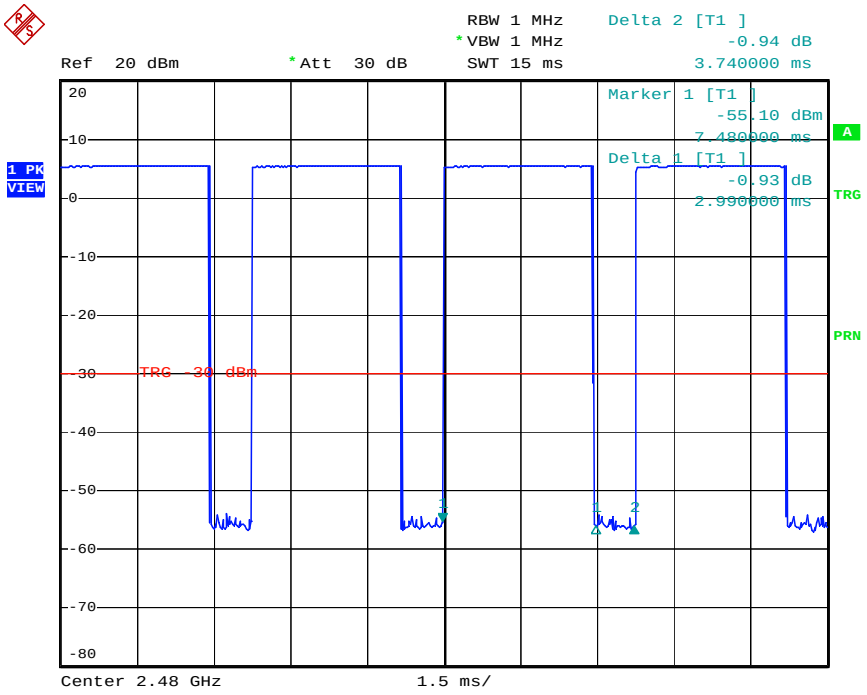
DH5 Modulation Type: GFSK (Channel 78)：



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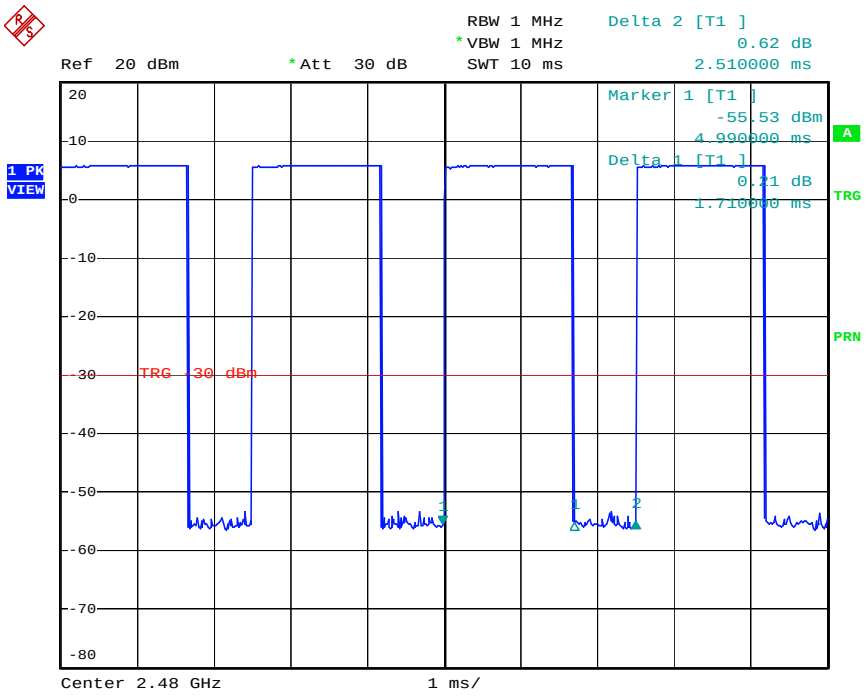
DH3 Modulation Type: GFSK (Channel 78)：



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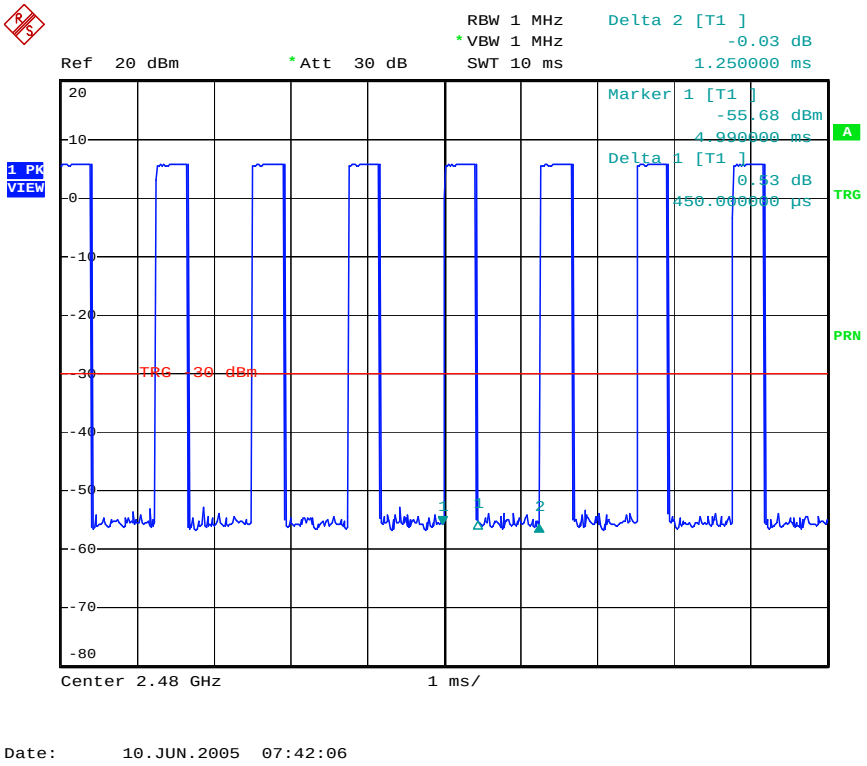
DH1 Modulation Type: GFSK (Channel 78)：



5.5. Maximum Peak Output Power

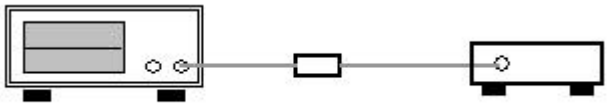
5.5.1. Measuring Instruments

Item 19, 21 of the table on section 6.

5.5.2. Test Procedures

1. The transmitter output was connected to the peak power meter and recorded the peak value.
2. Repeated point 1 for the middle and highest channel of the EUT.

5.5.3. Test Setup Layout



Power Meter EUT

5.5.4. Test Result of Conducted Peak Power

- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
GFSK	00	2402 MHz	6.96	30
GFSK	39	2441 MHz	6.15	30
GFSK	78	2480 MHz	5.97	30

The max output power : GFSK modulation is 6.96 dBm.

5.6. Test of Band Edges Emission

5.6.1. Measuring Instruments

Item 18 of the table on section 6.

5.6.2. Test Procedures

Conducted Measurement

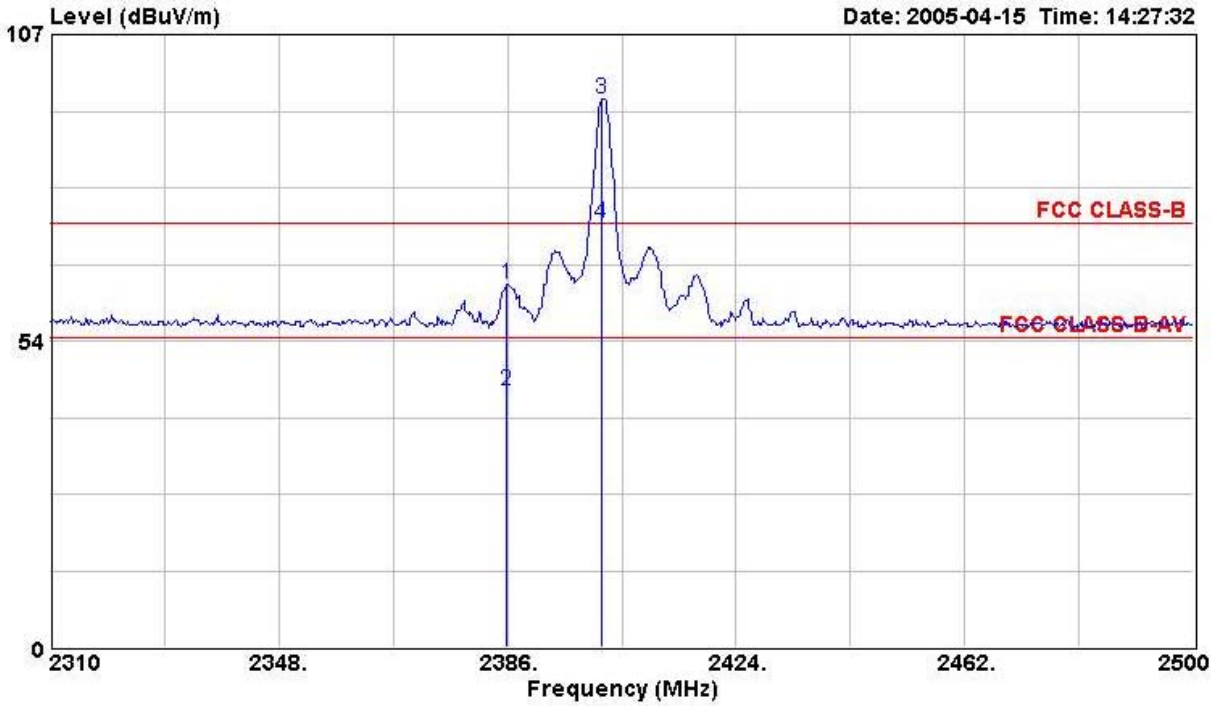
1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

Radiated Measurement

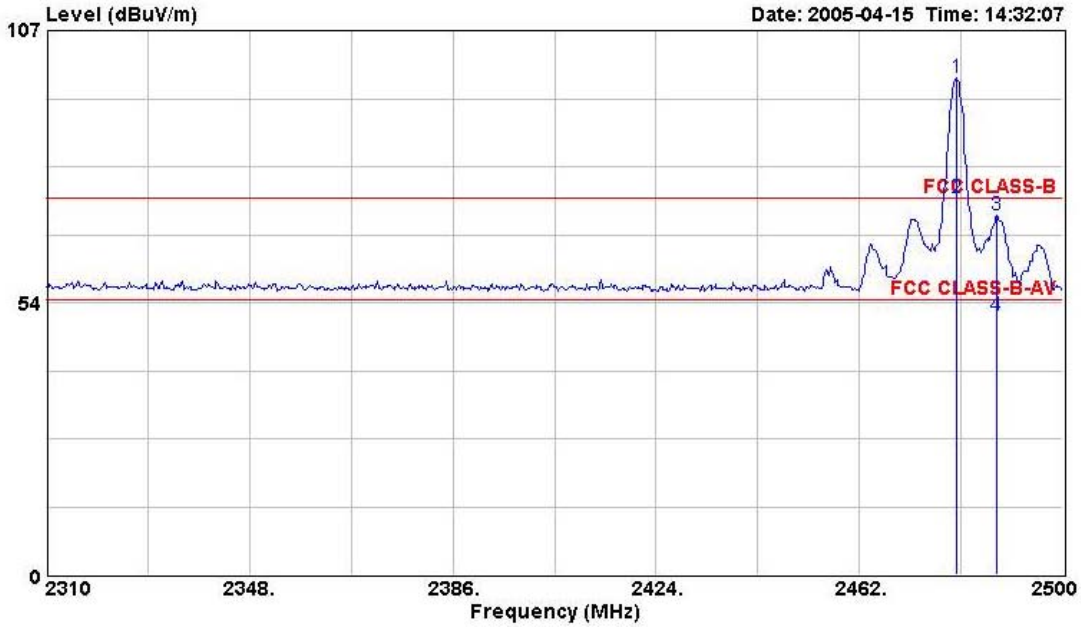
1. Configure the EUT according to ANSI C63.4-2003.
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For band edge emission, use 10Hz VBW and 1MHz RBW for reading under AV and use 1MHz VBW and 1 MHz RBW for reading under PK.

5.6.3. Test Result

- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Sam Lee

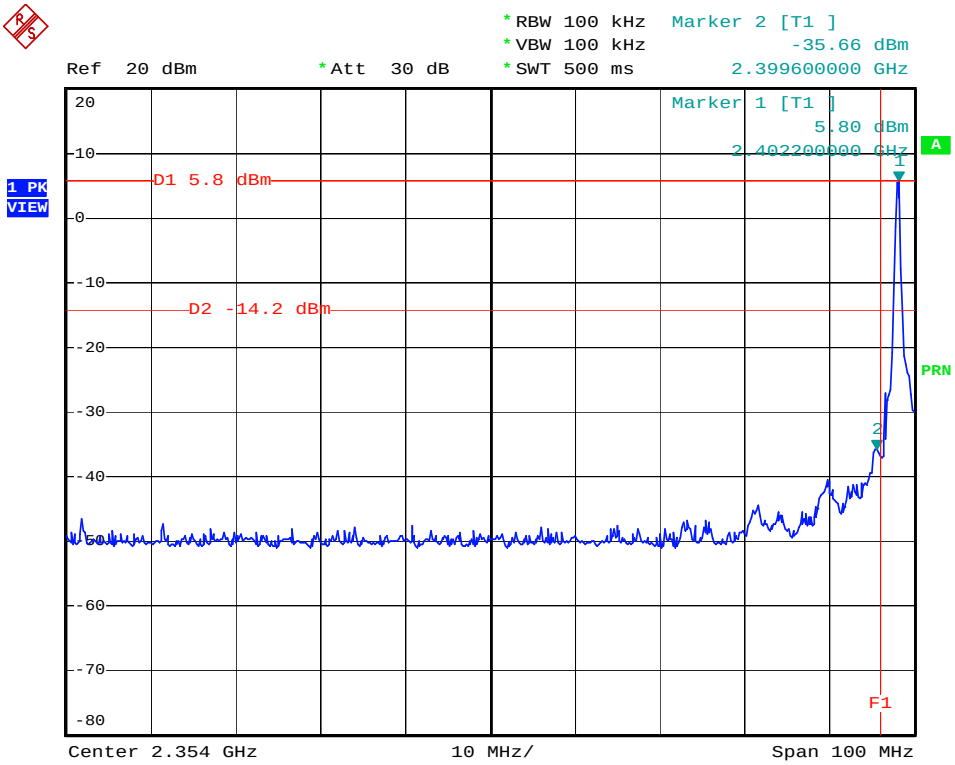


Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
2385.810	63.45	-10.55	31.32	74.00	32.13	1.90	0.00	Peak
2385.810	44.91	-9.09	12.78	54.00	32.13	1.90	0.00	Average

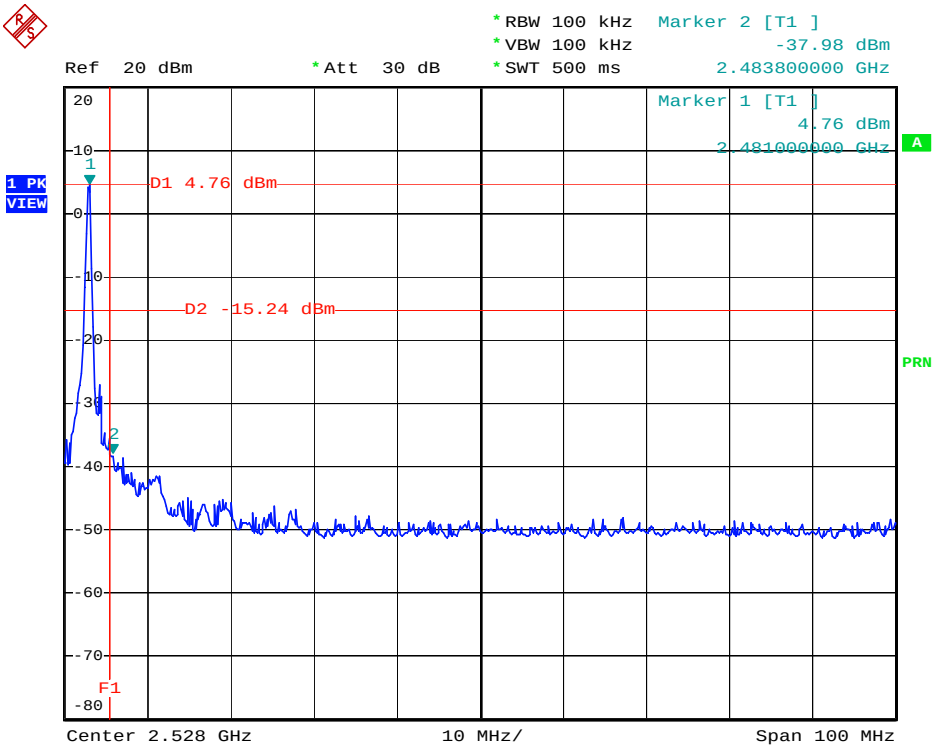


Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
2487.650	70.61	-3.39	38.55	74.00	32.06	1.96	0.00	Peak
2487.650	50.85	-3.15	18.79	54.00	32.06	1.96	0.00	Average

Modulation Type: GFSK (Channel 00)：



Modulation Type: GFSK (Channel 78)：



5.7. Test of AC Power Line Conducted Emission

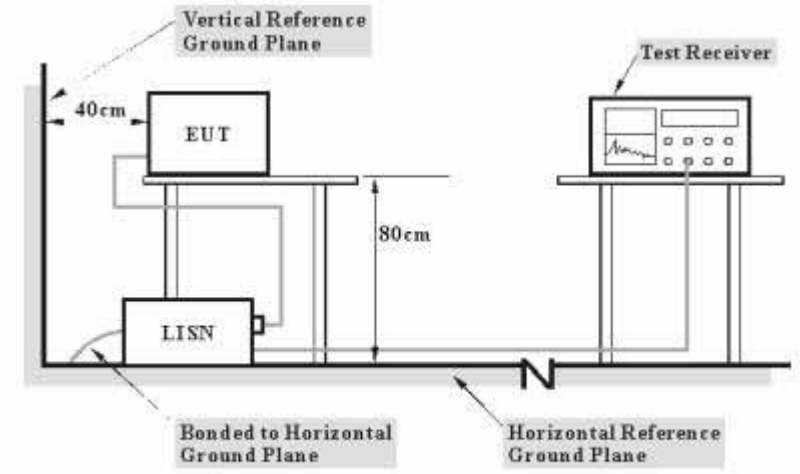
5.7.1. Measuring Instruments

Please reference item 1~5 in chapter 6 for the instruments used for testing.

5.7.2. Test Procedures

1. Configure the EUT according to ANSI C63.4-2003.
2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN)
4. All the support units are connected to the other LISNs. The LISN should provides 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the “H” Patter Generator software to make the supporting equipments stay on working condition.
7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.7.3. Test Setup Layout

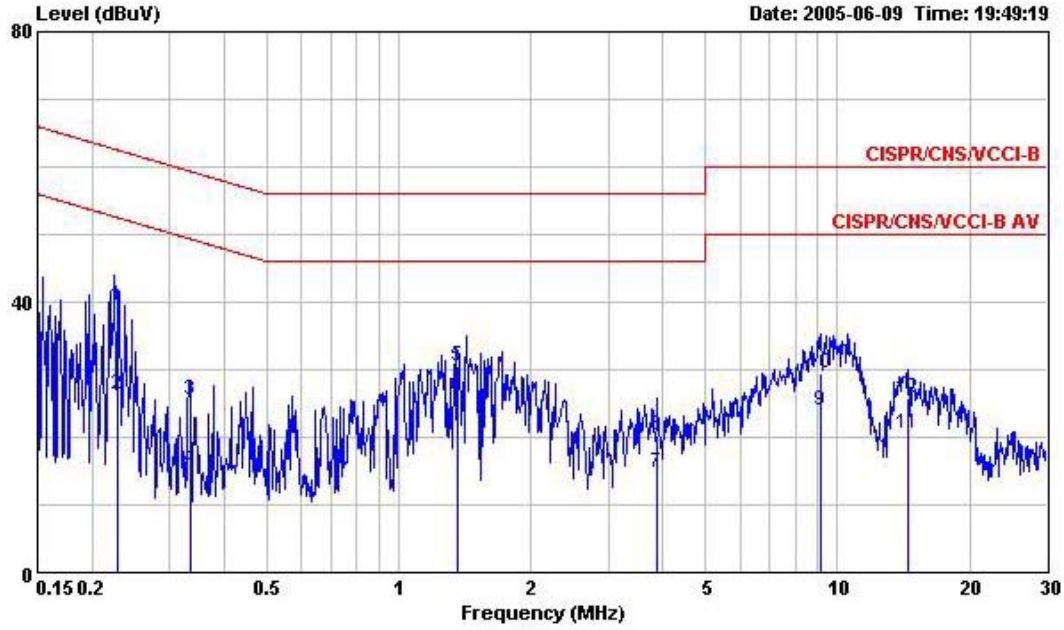


Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

5.7.4. Test Result of Conducted Emission

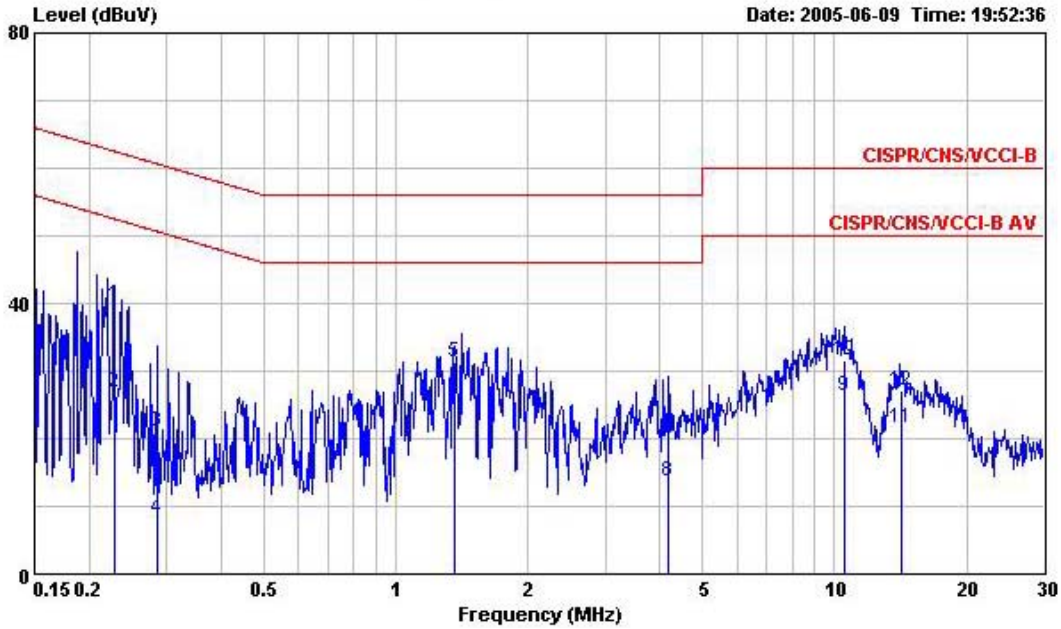
- Temperature: 25°C
- Relative Humidity: 60%
- Test Engineer: Hikaru Chan

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2294730	39.53	-22.94	62.47	39.23	0.06	0.24	QP
2	0.2294730	26.36	-26.11	52.47	26.06	0.06	0.24	Average
3	0.3356200	25.51	-33.80	59.31	25.15	0.06	0.30	QP
4	0.3356200	15.21	-34.10	49.31	14.85	0.06	0.30	Average
5	1.360	30.58	-25.42	56.00	30.02	0.11	0.45	QP
6	1.360	26.13	-19.87	46.00	25.57	0.11	0.45	Average
7	3.881	14.64	-31.36	46.00	14.13	0.21	0.30	Average
8	3.881	20.32	-35.68	56.00	19.81	0.21	0.30	QP
9	9.161	23.97	-26.03	50.00	23.32	0.21	0.44	Average
10	9.161	29.39	-30.61	60.00	28.74	0.21	0.44	QP
11	14.439	20.58	-29.42	50.00	19.31	0.21	1.06	Average
12	14.439	25.73	-34.27	60.00	24.46	0.21	1.06	QP

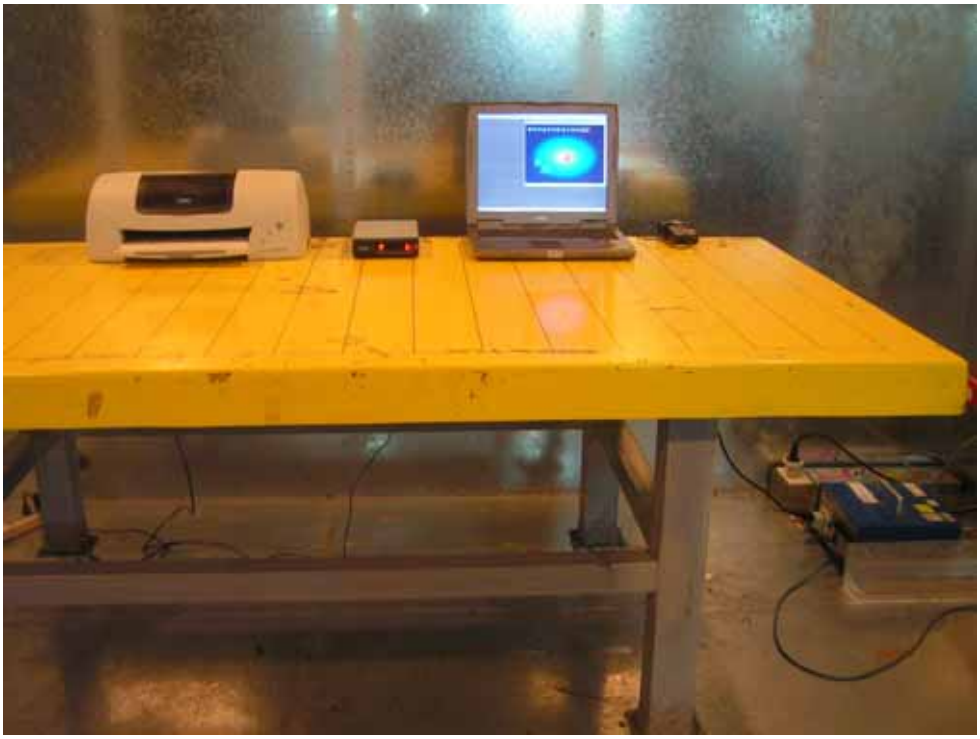
Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2293850	39.66	-22.81	62.47	39.31	0.11	0.24	QP
2	0.2293850	26.95	-25.52	52.47	26.60	0.11	0.24	Average
3	0.2847840	21.05	-39.63	60.68	20.64	0.11	0.30	QP
4	0.2847840	8.08	-42.60	50.68	7.67	0.11	0.30	Average
5	1.362	31.20	-24.80	56.00	30.52	0.23	0.45	QP
6	1.362	26.37	-19.63	46.00	25.69	0.23	0.45	Average
7	4.181	19.45	-36.55	56.00	18.93	0.23	0.29	QP
8	4.181	13.62	-32.38	46.00	13.10	0.23	0.29	Average
9	10.559	26.41	-23.59	50.00	25.41	0.33	0.67	Average
10	10.559	31.59	-28.41	60.00	30.59	0.33	0.67	QP
11	14.141	21.63	-28.37	50.00	20.15	0.33	1.15	Average
12	14.141	27.14	-32.86	60.00	25.66	0.33	1.15	QP

5.7.5. Photographs of Conducted Emission Test Configuration

FRONT VIEW



REAR VIEW

5.8. Test of Spurious Radiated Emission

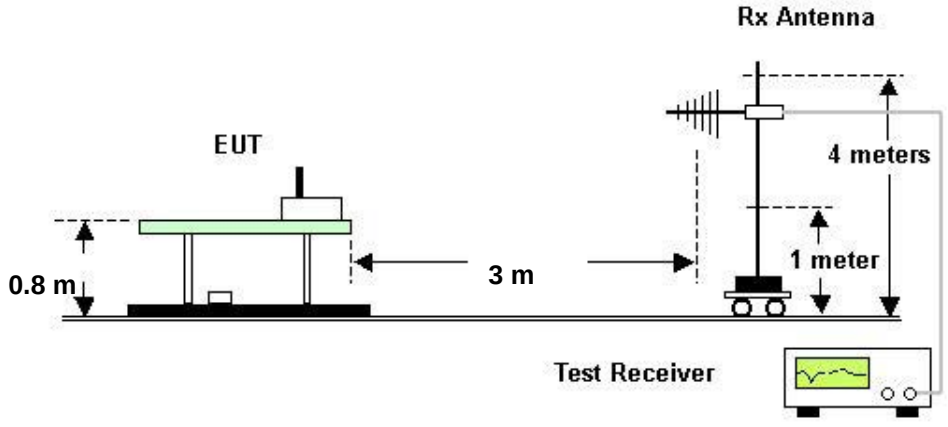
5.8.1. Measuring Instruments

Please reference item 6~17 in chapter 6 for the instruments used for testing.

5.8.2. Test Procedures

1. Configure the EUT according to ANSI C63.4-2003.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. If the emission level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz and average method for above the 1GHz. the reported.
11. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB higher than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

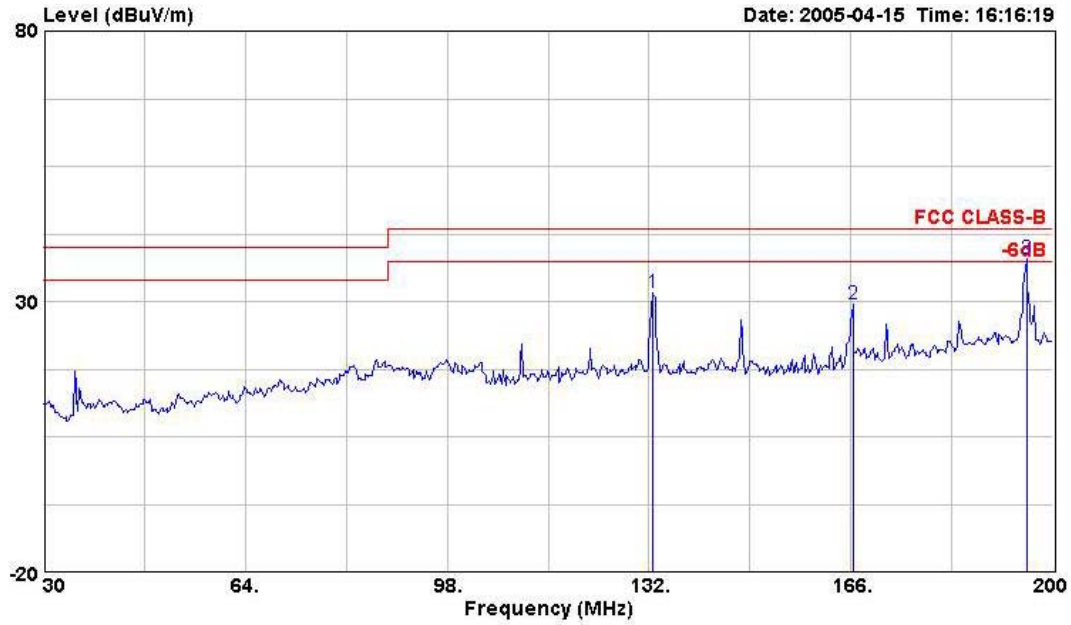
5.8.3. Test Setup Layout



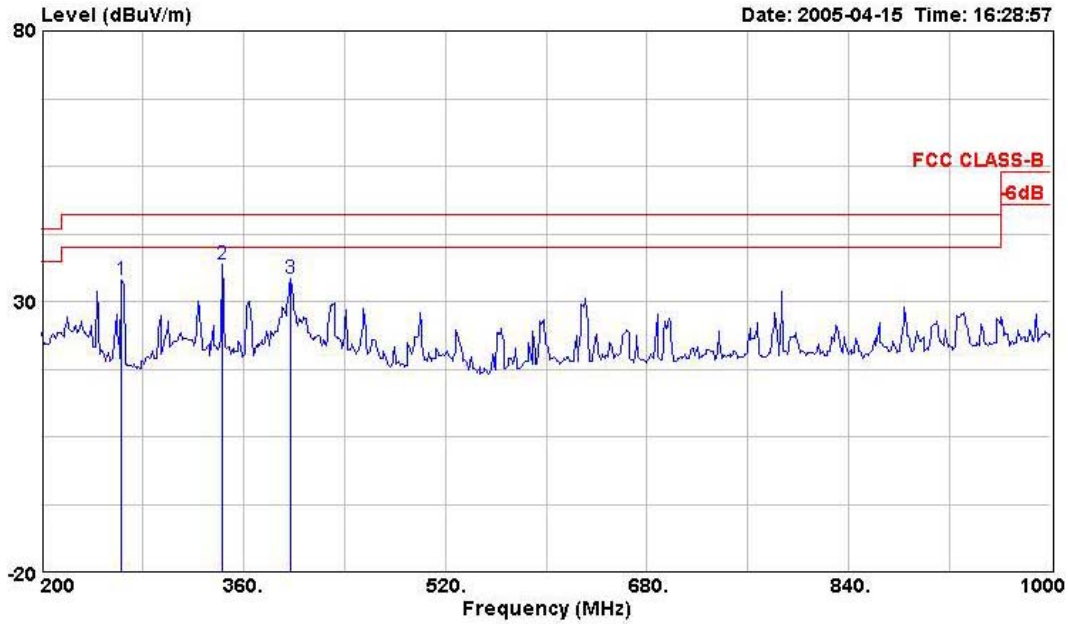
5.8.4. Test Results for CH 78 / 2480 MHz (for emission below 1GHz)

- Modulation Type: GFSK
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Ted Chou

(A) Polarization: Horizontal

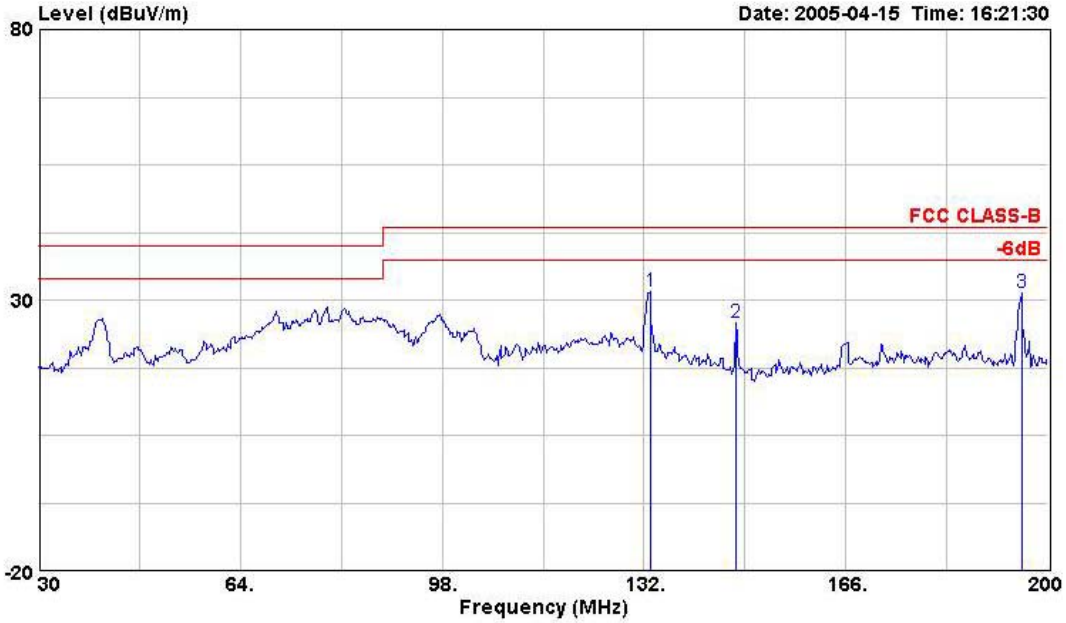


	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	132.510	31.60	-11.90	48.76	43.50	-17.16	1.15	30.71	Peak
2	166.340	29.54	-13.96	45.08	43.50	-15.54	1.28	30.11	Peak
3 !	195.580	37.91	-5.59	51.81	43.50	-13.90	1.30	30.65	Peak

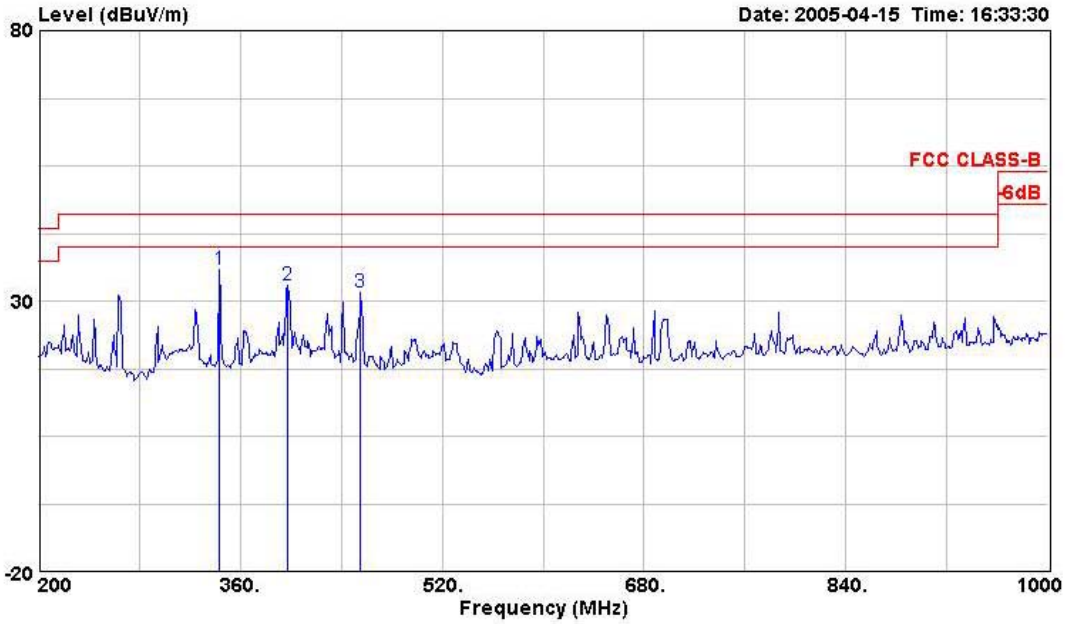


	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	263.200	33.93	-12.07	50.10	46.00	-16.17	1.62	30.48	Peak
2	343.200	36.74	-9.26	50.79	46.00	-14.05	1.78	30.94	Peak
3	397.600	34.11	-11.89	46.59	46.00	-12.48	1.97	31.17	Peak

(B) Polarization: Vertical



	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	133.020	31.60	-11.90	48.75	43.50	-17.15	1.15	30.72	Peak
2	147.470	25.82	-17.68	43.06	43.50	-17.24	1.19	30.50	Peak
3	195.580	31.45	-12.05	45.35	43.50	-13.90	1.30	30.65	Peak



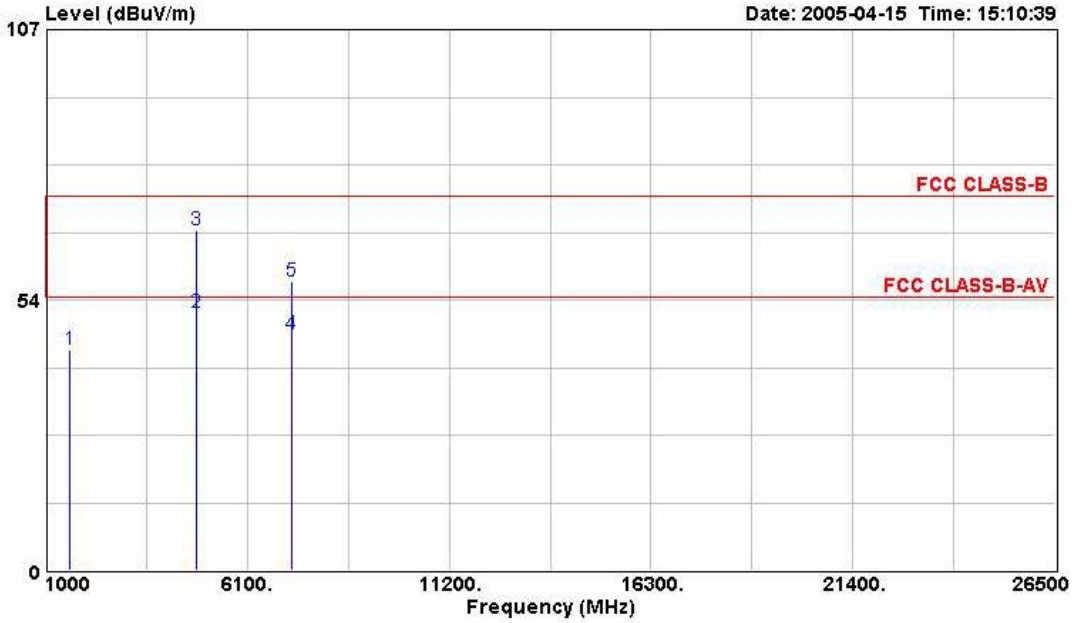
	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	343.200	35.92	-10.08	49.97	46.00	-14.05	1.78	30.94	Peak
2	397.600	32.97	-13.03	45.45	46.00	-12.48	1.97	31.17	Peak
3	455.200	31.58	-14.42	44.22	46.00	-12.64	2.13	31.12	Peak

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.8.5. Test Results for CH 00 / 2402 MHz (for emission above 1GHz)

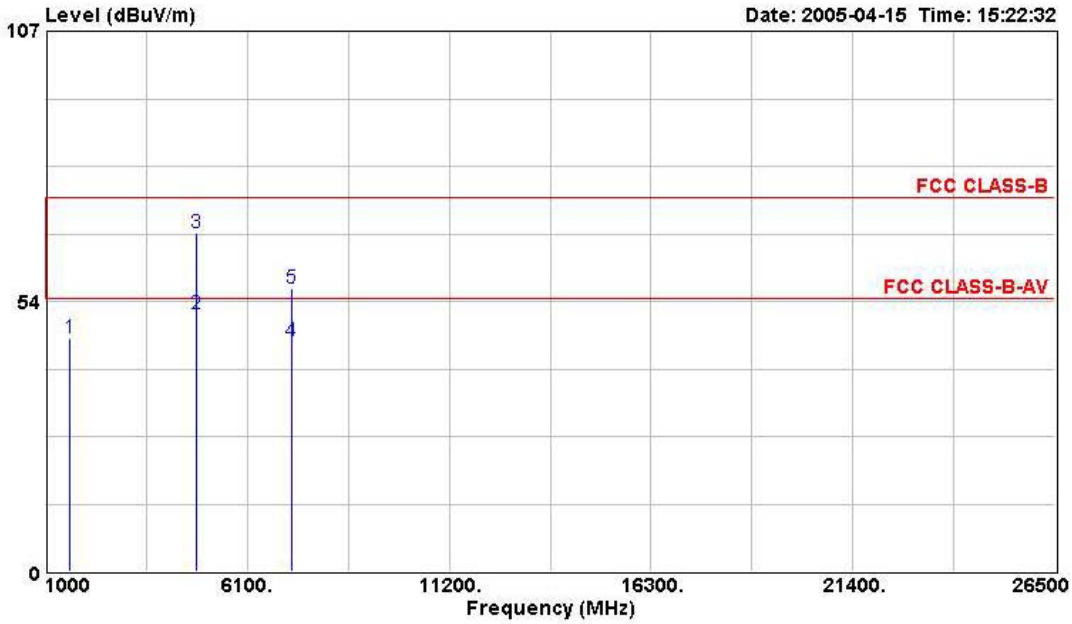
- Modulation Type: GFSK
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Ted Chou

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1592.000	43.70	-30.30	53.33	74.00	-9.62	1.51	39.27	PEAK
2	4804.000	50.89	-3.11	55.16	54.00	-4.27	2.84	40.14	Average
3	4804.000	67.32	-6.68	71.59	74.00	-4.27	2.84	40.14	PEAK
4	7204.000	46.82	-7.18	44.41	54.00	2.41	3.61	39.49	Average
5	7204.000	57.20	-16.80	54.79	74.00	2.41	3.61	39.49	PEAK

(B) Polarization: Vertical



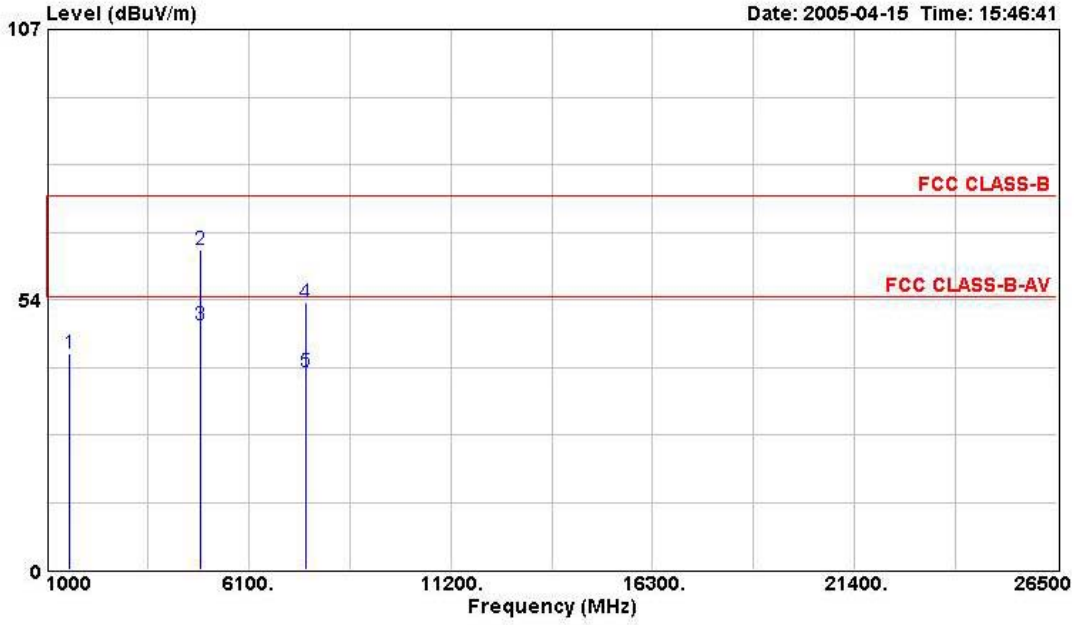
	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1596.000	46.26	-27.74	55.89	74.00	-9.62	1.51	39.27	PEAK
2	4804.000	50.87	-3.13	55.14	54.00	-4.27	2.84	40.14	Average
3	4804.000	67.06	-6.94	71.33	74.00	-4.27	2.84	40.14	PEAK
4	7204.000	45.70	-8.30	43.29	54.00	2.41	3.61	39.49	Average
5	7204.000	55.94	-18.06	53.53	74.00	2.41	3.61	39.49	PEAK

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.8.6. Test Results for CH 39 / 2441 MHz (for emission above 1GHz)

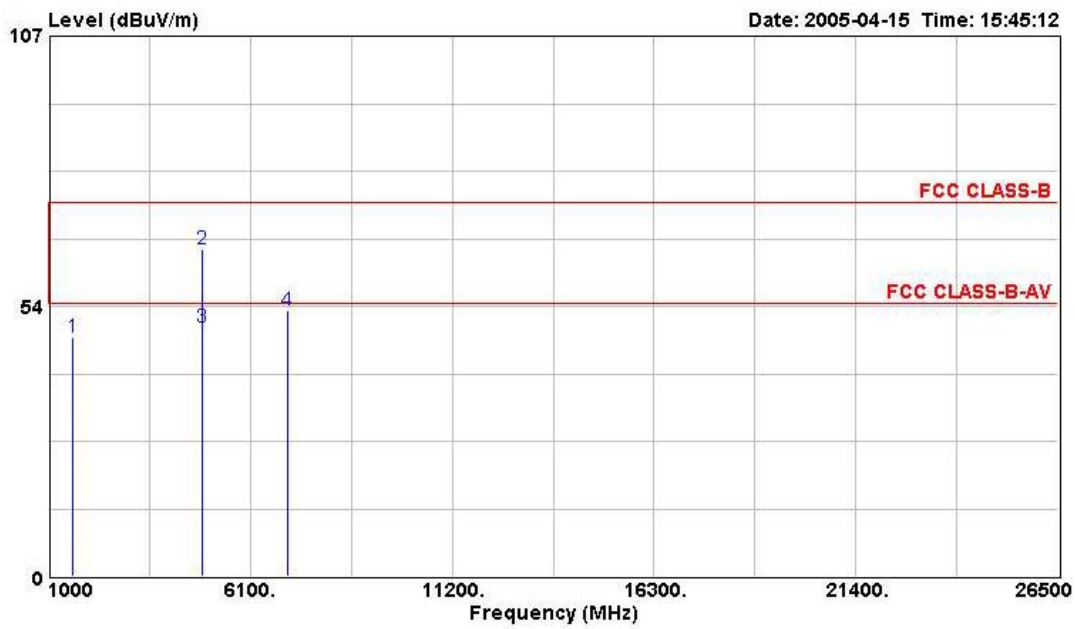
- Modulation Type: GFSK
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Ted Chou

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1590.000	42.91	-31.09	52.53	74.00	-9.62	1.51	39.27	Peak
2	4884.000	63.48	-10.52	67.51	74.00	-4.03	2.87	40.14	PEAK
3	4884.000	48.40	-5.60	52.43	54.00	-4.03	2.87	40.14	Average
4	7532.000	52.83	-21.17	49.80	74.00	3.03	3.73	39.39	PEAK
5	7532.000	39.10	-14.90	36.07	54.00	3.03	3.73	39.39	Average

(B) Polarization: Vertical



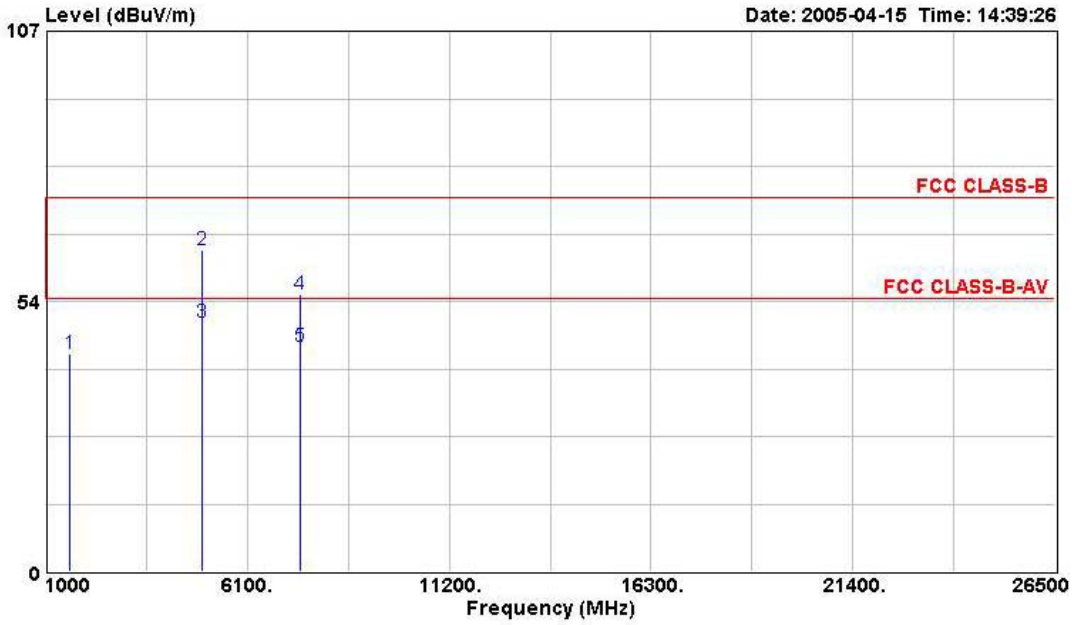
	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1596.000	47.39	-26.61	57.01	74.00	-9.62	1.51	39.27	Peak
2	4884.000	64.81	-9.19	68.84	74.00	-4.03	2.87	40.14	PEAK
3	4884.000	49.30	-4.70	53.33	54.00	-4.03	2.87	40.14	Average
4	7056.000	52.78	-21.22	50.68	74.00	2.10	3.56	39.53	PEAK

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.8.7. Test Results for CH 78 / 2480 MHz (for emission above 1GHz)

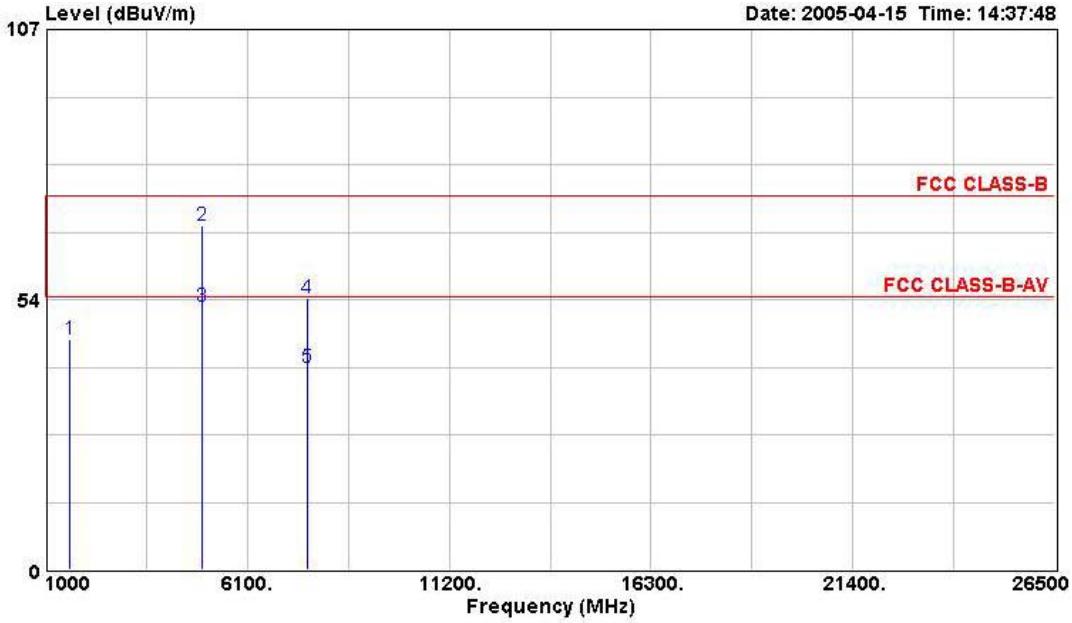
- Modulation Type: GFSK
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Ted Chou

(A) Polarization: Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1596.000	43.19	-30.81	52.81	74.00	-9.62	1.51	39.27	Peak
2	4960.000	63.65	-10.35	67.40	74.00	-3.74	2.91	40.15	PEAK
3	4960.000	49.27	-4.73	53.01	54.00	-3.74	2.91	40.15	Average
4	7440.000	54.81	-19.19	51.91	74.00	2.90	3.69	39.42	PEAK
5	7440.000	44.48	-9.52	41.58	54.00	2.90	3.69	39.42	Average

(B) Polarization: Vertical

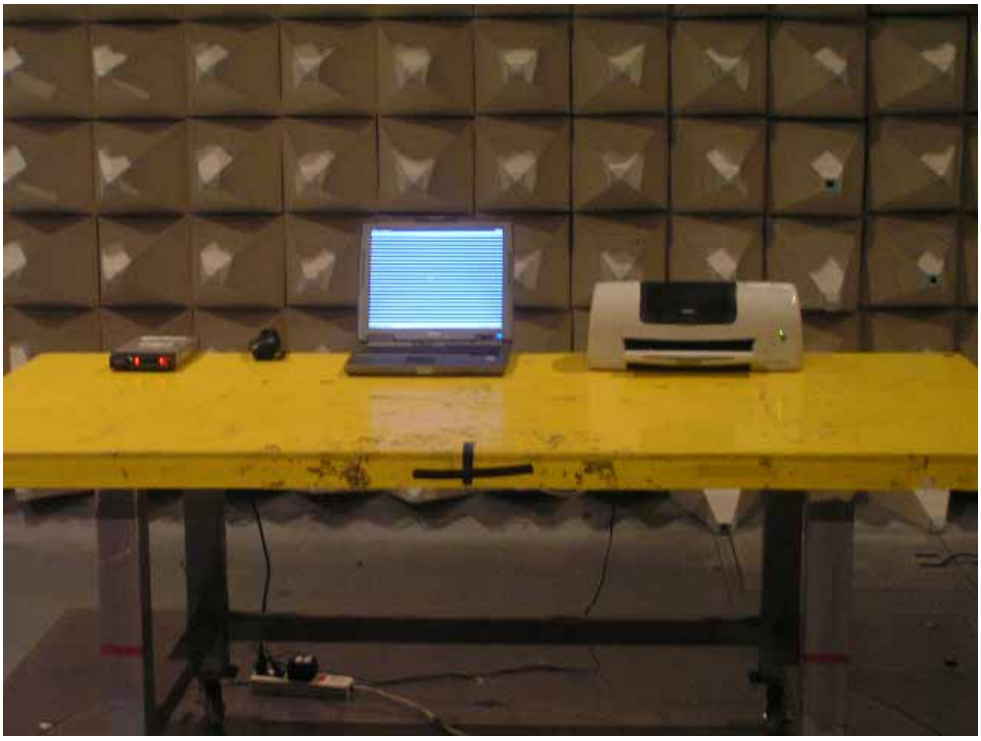


	Freq	Level	Over Limit	Read Level	Limit Line	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB	dB	
1	1596.000	45.59	-28.41	55.21	74.00	-9.62	1.51	39.27	Peak
2	4960.000	68.12	-5.88	71.87	74.00	-3.74	2.91	40.15	PEAK
3	4960.000	52.09	-1.91	55.83	54.00	-3.74	2.91	40.15	Average
4	7612.000	53.91	-20.09	50.84	74.00	3.07	3.76	39.36	PEAK
5	7612.000	40.08	-13.92	37.01	54.00	3.07	3.76	39.36	Average

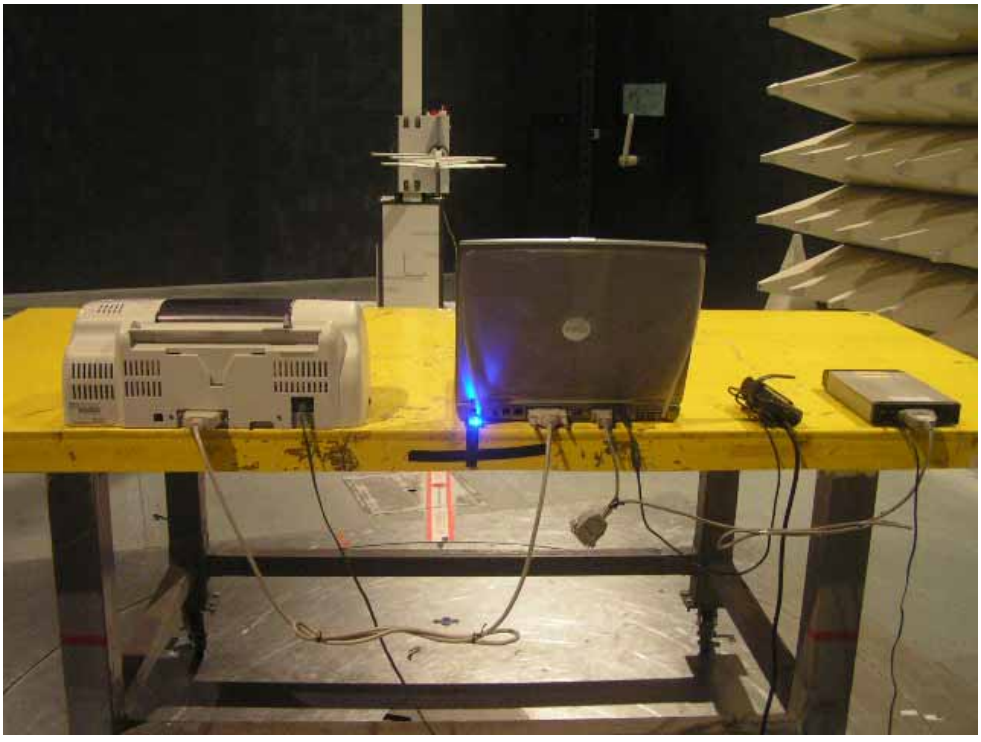
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.8.8. Photographs of Radiated Emission Test Configuration

FRONT VIEW



REAR VIEW



5.9. Antenna Requirements

5.9.1. Standard Applicable

47 CFR Part15 Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
47 CFR Part15 Section 15.247 (b):
If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.9.2. Antenna Connected Construction

There is no antenna connector for chip antenna.

5.10. RF Exposure

5.10.1. Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required. In this section, the power density at 20cm location is calculated to examine if it is lower than the limit.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F = frequency in MHz

*Plane-wave equivalent power density

5.10.2. MPE Calculation Method

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (mW/cm²) $= \frac{E^2}{377}$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$Pd = \frac{30 \times P \times G}{377 \times d^2}$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain

of the used antenna, the RF power density can be obtained.

5.10.3. Calculated Result and Limit

- Modulation Type: GFSK
- Temperature: 25°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 36.50%
- Test Engineer: Ted Chou

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
4.10	1.52	6.9600	4.9659	0.002541	1

6 List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Feb. 19, 2005	Conduction (CO04-HY)
2	LISN	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 15, 2005	Conduction (CO04-HY)
3	LISN (Support Unit)	PIC	NNB-2/16Z	2001/008	9kHz – 30MHz	May 06, 2005	Conduction (CO04-HY)
4	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
5	RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9kHz – 30MHz	Dec. 23, 2004	Conduction (CO04-HY)
6	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 17, 2004	Radiation (03CH03-HY)
7	Spectrum Analyzer	R&S	FSP40	100004	9KHZ~4GHz	Aug. 31, 2004	Radiation (03CH03-HY)
8	Amplifier	Schaffner	CPA9231A	18667	9KHz – 2GHz	Jan. 04, 2005	Radiation (03CH03-HY)
9	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 23, 2004	Radiation (03CH03-HY)
10	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 23, 2004	Radiation (03CH03-HY)
11	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 02, 2004	Radiation (03CH03-HY)
12	Amplifier	MITEQ	AFS44	879984	1GHz~26.5GHz	Mar. 25, 2005	Radiation (03CH03-HY)
13	Horn Antenna	COMPOWER	AH-118	10092	1GHz – 18GHz	Feb. 18, 2005	Radiation (03CH03-HY)
14	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
15	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
16	Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 09, 2004*	Radiation (03CH03-HY)
17	RF Cable-HIGH	SUHNER	SUCOFLES 106	SN30094/6	1GHz~26.5GHz	Mar. 05, 2005	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.
* Calibration Interval of instruments listed above is two year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
18	Spectrum analyzer	R&S	FSP30	100023	9kHz ~ 30GHx	Aug. 02, 2004	Conducted (TH01-HY)
19	Power meter	R&S	NRVS	100444	DC ~ 40GHz	Jun. 15, 2004	Conducted (TH01-HY)
20	Power sensor	R&S	NRV-Z55	100049	DC ~ 40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Apr. 28, 2005	Conducted (TH01-HY)
22	AC power source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Apr. 21, 2005	Conducted (TH01-HY)
23	DC power source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Nov. 28, 2004	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2004	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Jan. 01, 2005	Conducted (TH01-HY)
26	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Jan. 01, 2005	Conducted (TH01-HY)
27	Oscilloscope	Tektronix	TDS1012	CO38515	100MHz / 1GS/s	Apr. 15, 2005	Conducted (TH01-HY)
28	Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Dec. 31, 2004	Conducted (TH01-HY)
29	Data Generator	Tektronix	DG2030	063-2920-50	0.1Hz~400MHz	Jun. 02, 2005	Conducted (TH01-HY)

※ Calibration Interval of instruments listed above is one year.