CONFORMANCE TEST REPORT
FOR
CANADA RSS-210

Report No.: ET94S-12-120-02

Client:	Ezurio Limited
Product:	Embedded Surface Mount Bluetooth Module
Model:	TRBLU24-00100
IC:	1931B-EUSB
Manufacturer/supplier:	Sanmina SCI

Date test item received:	2005/12/14
Date test campaign completed:	2006/07/18
Date of issue:	2006/08/10

Total number of pages of this test report: 84 pages

Total number of pages of photos: External photos 1 pages

Internal photos 1 pages

Setup photos 3 pages

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Client	: Ezurio Limited
Address	: Saturn House, Mercury Park, Wycombe Lane, Wooburn Green HP10 0HH UK
Manufacturer	: Sanmina SCI
Address	: 90 MOO 1 TIWANON RD BANMAI, MUNAG PATHUMTHANI 12000 Thailand
EUT	: Embedded Surface Mount Bluetooth Module
Trade name	: EZURiO
Model No.	: TRBLU24-00100
Comment issues	: (1) The report also apply to model: TRBLU24-00200、TRBLU24-00300、TRBLU24-00400、BISMS02BI (2) The multiple listing recognized without test basis is according to information supplied by manufacturer. A detail documentation of the above models must be verified by legal right organization for the EMC characteristic with relation to the subject model.
Power Source	: Power from USB cable (5.0Vdc)
Regulations applied	: Canada RSS-210 (Issue 6) / RSS-Gen (Issue 1)

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

The compliance test is only certified for the test equipment and the results of the testing report relate only to the item tested. The compliance test of this report was conducted in accordance with the appropriate standards. It's not intention to assure the quality and performance of the product. This report shall not be reproduced except in full, without the approval of ETC. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Laboratory Introduction: Electronics Testing Center, Taiwan is recognized, filed and mutual recognition arrangement as following:

- ISO9001: TüV Product Service
- ISO/IEC 17025: BSMI, CNLA, DGT, NVLAP, CCIBLAC, UL, Compliance
- Filing: FCC, Industry Canada, VCCI
- MRA: Australia, Hong Kong, New Zealand, Singapore, USA, Japan, Korea, China, APLAC through CNLA
- FCC Registration Number: 90588, 91094, 91095
- Open Area Test Site Industry Canada Number: IC2949-1

NVLAP Lab Code 200133-0

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Embedded Surface Mount Bluetooth Module
b) Trade Name : EZURiO
c) Model No. : TRBLU24-00100
d) Power Supply : Power from USB cable (5.0Vdc)

1.2 Characteristics of Device

The EUT is a Embedded Surface Mount Bluetooth Module based on the Bluetooth technology. Bluetooth is a short-range radio link intended to be a cable replacement between portable or fixed electronic devices. Bluetooth operates in the unlicensed ISM Band at 2.4GHz. In this band, 79 RF channels spaced 1MHz apart are defined. The rated output power is 1.84 dBm (1.53 mW).

1.3 Test Methodology

All testing were performed according to the procedures in ANSI C63.4, FCC CFR 47 Part 2, Part 15 and RSS-210 / RSS-Gen.

1.4 Modifiction List of EUT

N/A

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :

A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

Except when the requirements applicable to a given device state otherwise, for any licenee-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network. A description of the method of measurement that is acceptable to Industry Canada is found in RSS-212.

Table 2 - AC Power Lines Conducted Emission Limits

Frequency range (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

*Decreases with the logarithm of the frequency

(2) Radiated Emission Requirement

Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz (Note)

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

Table 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in Hz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

(3) Antenna Requirement

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

(4) 20dB Bandwidth Requirement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(5) Output Power Requirement

For frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels. The transmitter output power shall not exceed 1.0 watt. For all other frequency hopping systems in this band 2400-2483.5 MHz band, the transmitter output power shall not exceed 0.125 watt.

(6) Out of Band Emissions

In any 100 kHz bandwidth outside the operating frequency bands, between 30 MHz and 5 times the carrier frequency, the unwanted emission spectral density shall be either at least 20 dB below the inband spectral density, or shall not exceed the levels specified in Table 3, whichever is less stringent.

(7) Number of Hopping Channels

For frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels.

(8) Channel Carrier Frequencies Seperation

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(9) Dwell Time

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

(10) Power Spectral Density

For frequency hopping systems, the inband density S_i shall be measured with the hopping sequence stopped at the lowest channel and the highest channel in turn, as well as with the hopping running normally. The 20 dB shall be with reference to the lowest of the three S_i values.

2.3 Restricted Bands of Operation

Restricted bands, identified in Table 1, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite down links, radio astronomy, and some Government uses.

Table 1: Restricted Frequency Bands (Note)

MHz
0.090-0.110
2.1735-2.190
3.020-3.026
4.125-4.128
4.17725-4.17775
4.20725-4.20775
5.677-5.683
6.215-6.218
6.26775-6.26825
6.31175-6.31225
8.291-8.294
8.362-8.366
8.37625-8.38675
8.41425-8.41475
12.29-12.293
12.51975-12.52025
12.57675-12.57725
13.36-13.41
16.42-16.423
16.69475-16.69525
16.80425-16.80475
25.5-25.67
37.5-38.25

MHz
73-74.6
74.8-75.2
108-138
156.52475-156.52525
156.7-156.9
240-285
322-335.4
399.9-410
608-614
960-1427
1435-1626.5
1645.5-1646.5
1660-1710
1718.8-1722.2
2200-2300
2310-2390
2655-2900
3260-3267
3332-3339
3345.8-3358
3500-4400
4500-5150
5350-5460

MHz
7250-7750
8025-8500

GHz
9.0-9.2
9.3-9.5
10.6-12.7
13.25-13.4
14.47-14.5
15.35-16.2
17.7-21.4
22.01-23.12
23.6-24.0
31.2-31.8
36.43-36.5
Above 38.6

Note: Certain frequency bands listed in Table 2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as RSS-310.

2.4 Labeling Requirement

Equipment subject to certification under the applicable RSSs, shall be permanently labelled on each item, or as an inseparable combination. The label must contain the following information for full compliance:

(a) the certification number, prefixed by the term "IC:";

(b) the manufacturer's name, trade name or brand name; and

(c) a model name or number.

Equipment for which a certificate has been issued is not considered certified if it is not properly labelled. The information on the Canadian label can be combined with the manufacturer's other labeling requirements. If the device size is too small to put a label, the label can be included in the user's manual, upon agreement with Industry Canada.

2.5 User Information

The user manual for the LPD shall contain the following or equivalent statements in a conspicuous position:

"Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

If the antenna is detachable (selectable by the user), see the user manual requirement in section 7.1.4. The following instructions in the user manual is also required:

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication".

The above statements may be placed on the device instead of in the manual.

The user manual of transmitter devices equipped with a detachable antenna shall contain the following information in a conspicuous location:

"This device has been designed to operate with an antenna having a maximum gain of [x] dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is [y] ohms."

Equipment manufacturers shall provide proper values of x and y to comply with the applicable RSS. Immediately following the above statement, the manufacturer shall provide a list of all antennas acceptable for use with the transmitter.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

For the purposes of this test report ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT during the test. Notebook PC was used to control the RF channel under the hightest, middle and lowest frequency and transmit the maximun RF power. Customer would not use it. But never the less ancillary equipment can influence the test results..

3.2 Devices for Tested System

Device	Manufacture	Model	Cable Description
*Embedded Surface Mount Bluetooth Module	Sanmina SCI	TRBLU24-00100	0.8m*1, Unshielded USB Cable
Notebook PC	ASUS	S1300	3.3m*1, Unshielded Power Line (Adaptor) 1.5m*1, Unshielded Cable

Remark

1. "*" means equipment under test.

2.

Test software:	CSR Bluetest
Power setting (Ext, Int):	(255,63)

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with RSS-210 §2.2 and §2.6.

4.2 Measurement Procedure

A.Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT (X,Y and Z axis):

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antennna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. The axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.
4. The position in which the maximum noise occurred was "Y axis". (Please see the test setup photos)

B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

Figure 1 : Frequencies measured below 1 GHz configuration

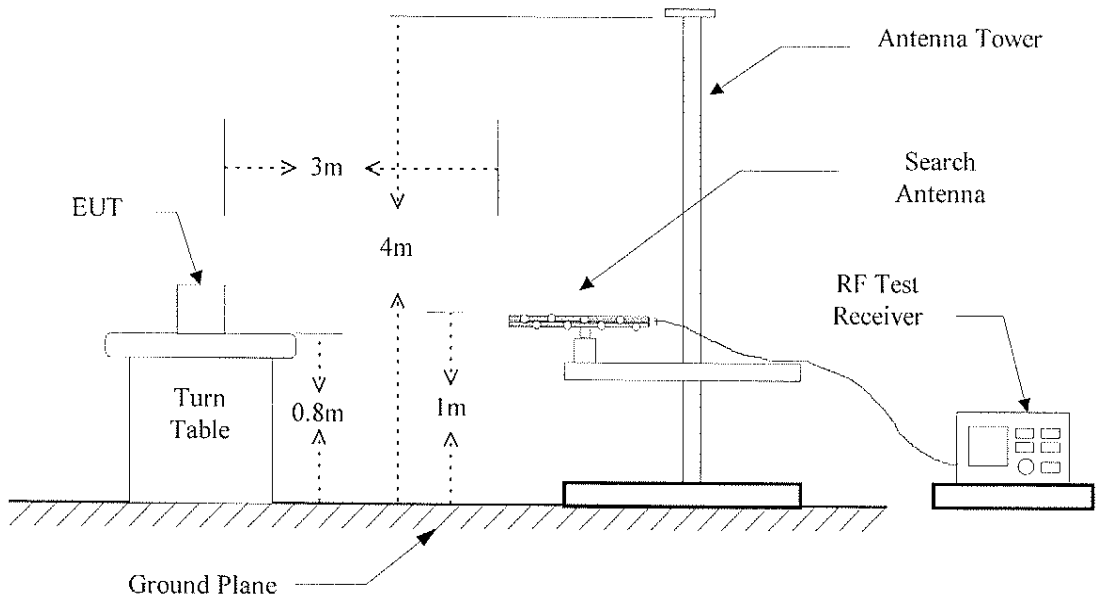
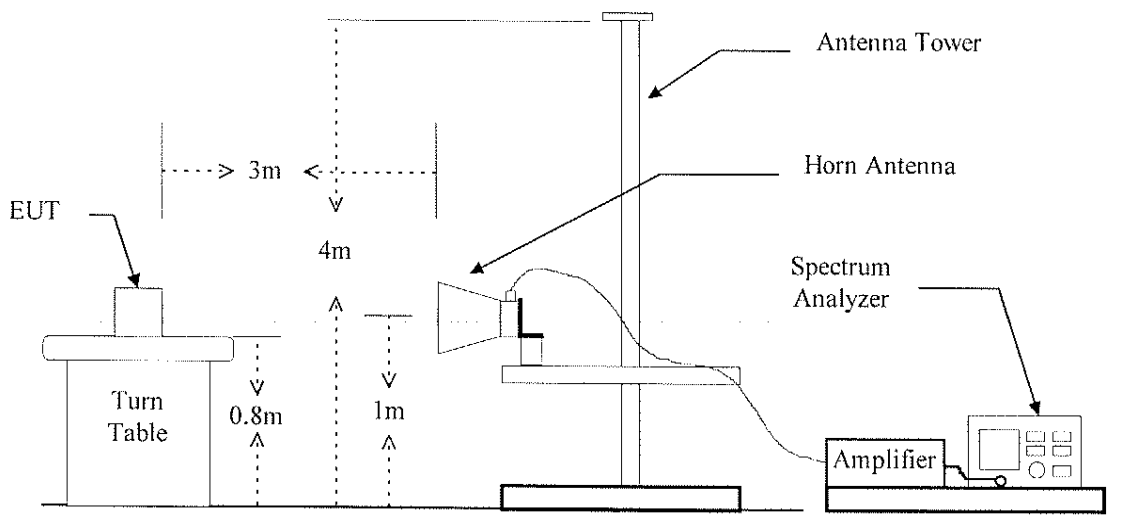


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
EMI Test Receiver	Hewlett-Packard	8546A	12/12/2006
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/02/2006
Horn Antenna	EMCO	3115	06/06/2007
BiLog Antenna	Schaffner	CBL 6112B	06/11/2007
Horn Antenna	EMCO	3116	07/23/2008
Preamplifier	Hewlett-Packard	8449B	09/19/2006

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	300 kHz
	RF Test Receiver	Peak	120 kHz	300 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz

4.4 Radiated Emission Data

4.4.1 RF Portion

a) Channel 0

Operation Mode : Transmitting
Fundamental Frequency : 2402 MHz
Test Date : Jan. 11, 2006 Temperature : 16℃ Humidity : 73%

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
1201.000	---	---	---	---	-12.9	---	---	74.0	54.0
4804.000	---	---	---	---	0.5	---	---	74.0	54.0
12010.000	---	---	---	---	10.5	---	---	74.0	54.0
16216.000	---	---	---	---	13.3	---	---	74.0	54.0

b) Channel 39

Fundamental Frequency : 2441 MHz

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
1220.500	---	---	---	---	-12.9	---	---	74.0	54.0
4882.000	---	---	---	---	0.5	---	---	74.0	54.0
7323.000	---	---	---	---	3.7	---	---	74.0	54.0
12205.000	---	---	---	---	5.8	---	---	74.0	54.0
19528.000	---	---	---	---	13.3	---	---	74.0	54.0

c) Channel 78

Fundamental Frequency : 2480 MHz

Frequency (MHz)	Reading (dBuV) H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak (H/V Max.)	Result @3m (dBuV/m) Ave (H/V Max.)	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave.
1240.000	---	---	---	---	-12.9	---	---	74.0	54.0
4960.000	---	---	---	---	0.5	---	---	74.0	54.0
7440.000	---	---	---	---	3.7	---	---	74.0	54.0
12400.000	---	---	---	---	5.8	---	---	74.0	54.0
19840.000	---	---	---	---	13.3	---	---	74.0	54.0
22320.000	---	---	---	---	13.5	---	---	74.0	54.0

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark "---" means that the emissions level is too low to be measured.
3. Item "Margin" referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

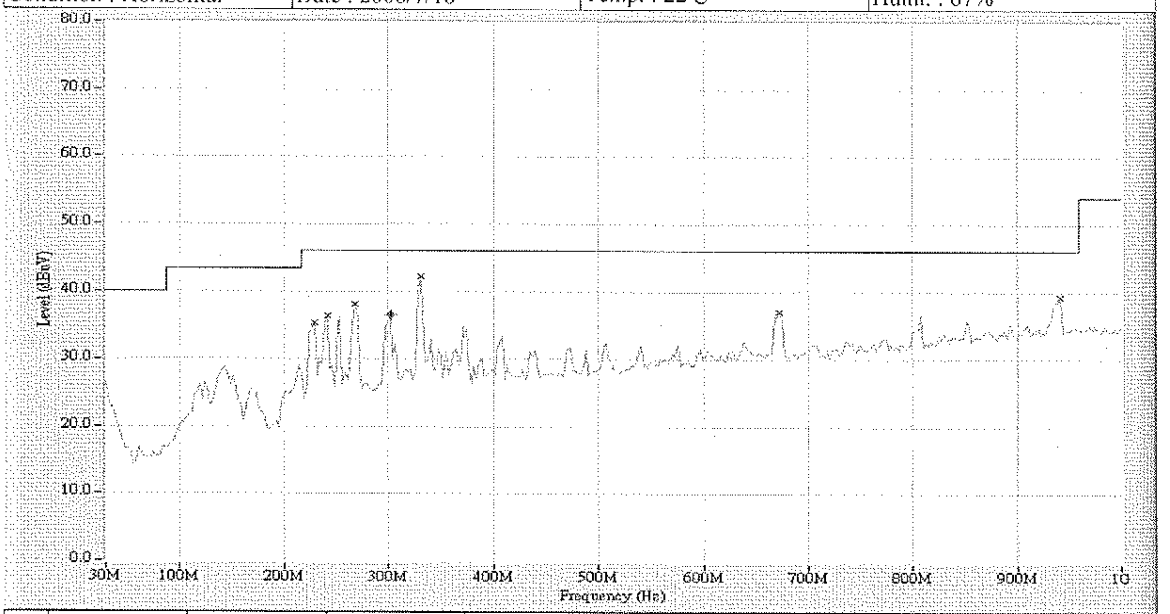
4.4.2 Other Emission

4.4.2.1

Operation Mode: 2402 MHz

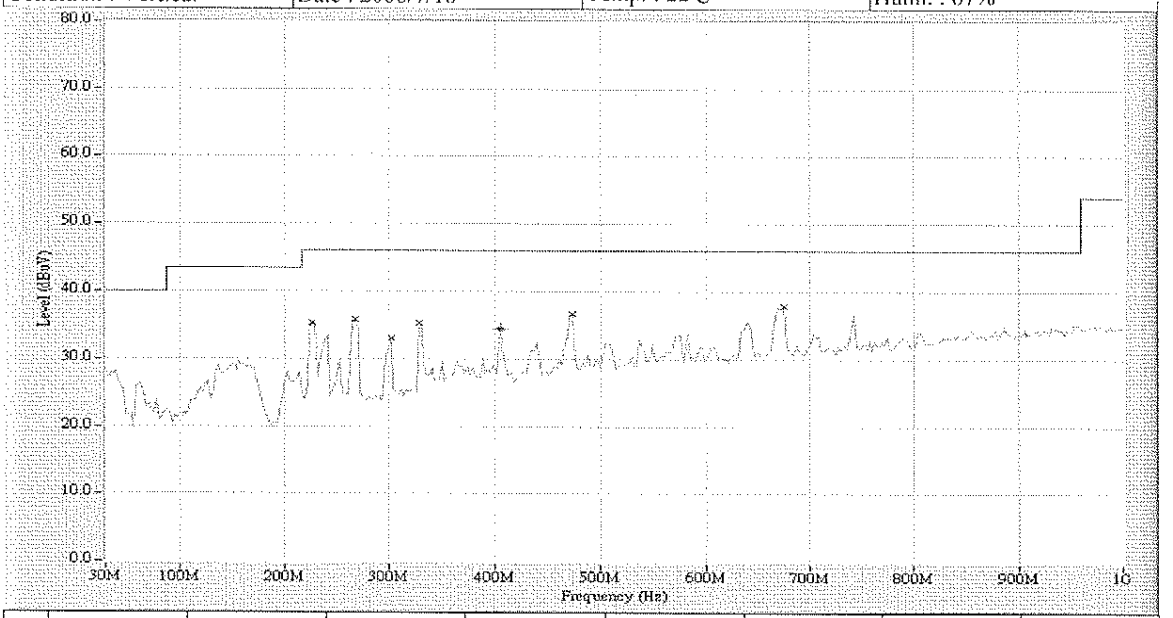
A. below 1GHz

EUT :	Model :	Status : TX_CH0	
Condition : Horizontal	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	228.850	21.4	14.0	35.4	46.0	-10.6	1.0	254
2	240.975	21.8	14.5	36.3	46.0	-9.7	1.1	301
3	267.650	22.9	15.2	38.1	46.0	-7.9	1.2	98
4	301.600	19.9	16.6	36.5	46.0	-9.5	1.0	117
5	330.700	24.8	17.4	42.2	46.0	-3.8	1.2	14
6	672.625	11.9	25.2	37.1	46.0	-8.9	1.2	284
7	941.800	9.7	29.5	39.2	46.0	-6.8	1.1	174

EUT :	Model :	Status : TX_CH0	
Condition : Vertical	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	226.425	21.4	14.0	35.4	46.0	-10.6	1.2	285
2	267.650	20.7	15.2	35.9	46.0	-10.1	1.3	127
3	301.600	16.5	16.6	33.1	46.0	-12.9	1.0	86
4	328.275	17.9	17.4	35.3	46.0	-10.7	1.5	135
5	405.875	15.2	19.3	34.5	46.0	-11.5	1.0	59
6	473.775	15.5	21.3	36.8	46.0	-9.2	1.1	207
7	675.050	12.6	25.3	37.9	46.0	-8.1	1.2	183

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

Note:

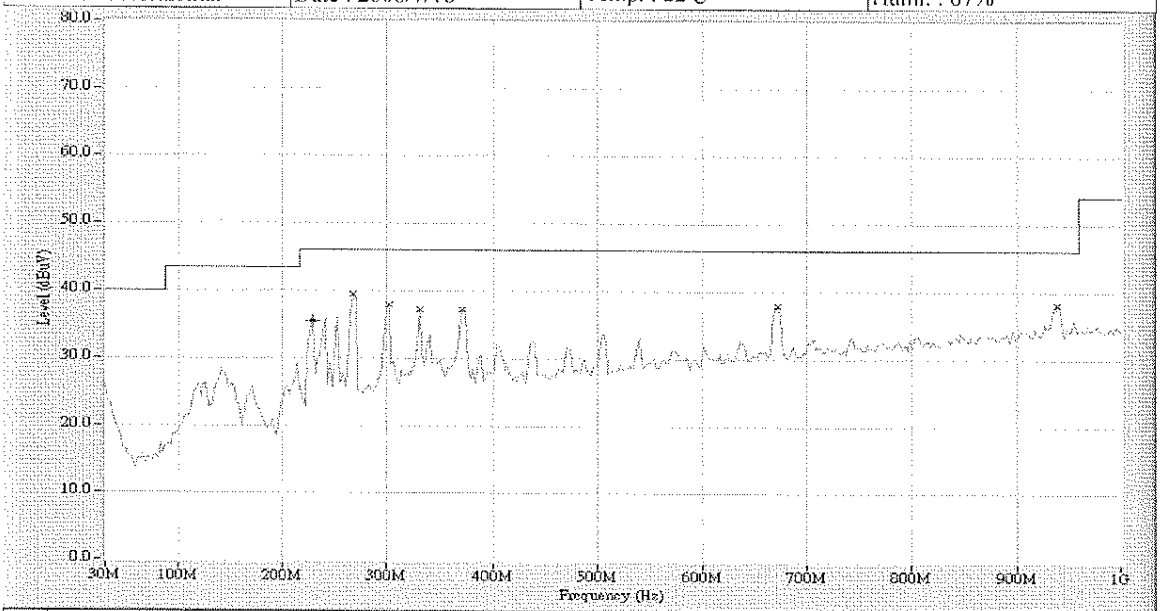
1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "***" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz).
   ±4.1dB (1GHz≦f≦18GHz).

4.4.2.2

Operation Mode: 2441 MHz

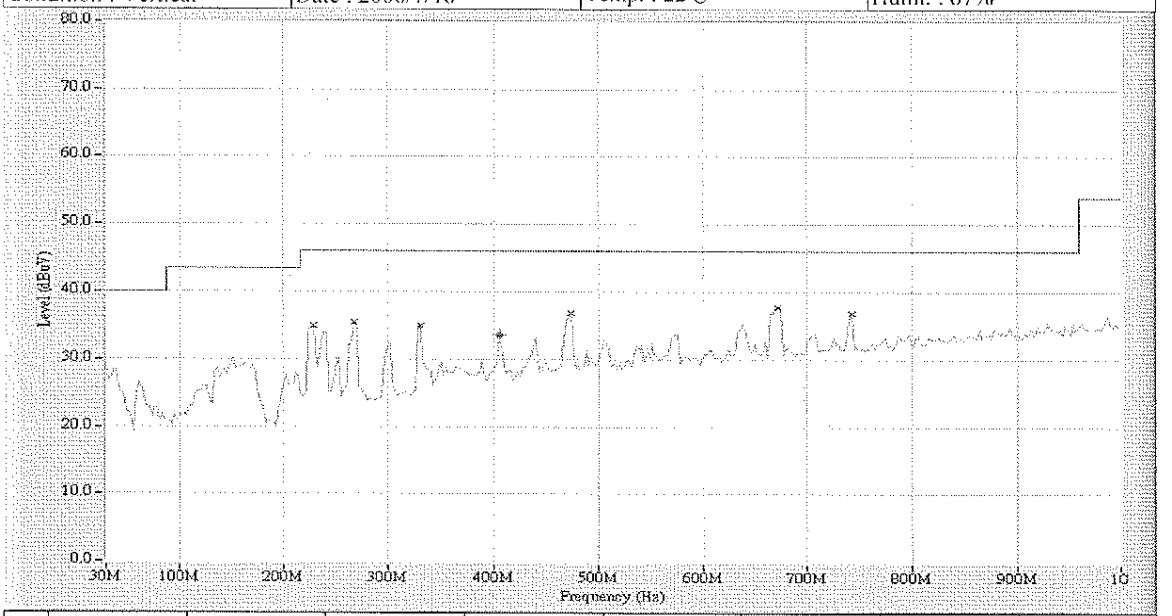
A. below 1GHz

EUT :	Model :	Status : TX_CH39	
Condition : Horizontal	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	228.850	21.4	14.0	35.4	46.0	-10.6	1.3	98
2	267.650	24.3	15.2	39.5	46.0	-6.5	1.1	224
3	301.600	21.4	16.6	38.0	46.0	-8.0	1.2	124
4	330.700	19.9	17.4	37.3	46.0	-8.7	1.0	354
5	371.925	18.5	18.7	37.2	46.0	-8.8	1.5	97
6	672.625	12.6	25.2	37.8	46.0	-8.2	1.2	274
7	939.375	8.6	29.5	38.1	46.0	-7.9	1.3	182

EUT :	Model :	Status : TX_CH39	
Condition : Vertical	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	228.850	21.0	14.0	35.0	46.0	-11.0	1.0	324
2	267.650	20.3	15.2	35.5	46.0	-10.5	1.2	98
3	330.700	17.6	17.4	35.0	46.0	-11.0	1.6	285
4	405.875	14.2	19.3	33.5	46.0	-12.5	1.0	183
5	473.775	15.6	21.3	36.9	46.0	-9.1	1.3	204
6	672.625	12.6	25.2	37.8	46.0	-8.2	1.2	117
7	742.950	10.6	26.3	36.9	46.0	-9.1	1.1	28

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

Note:

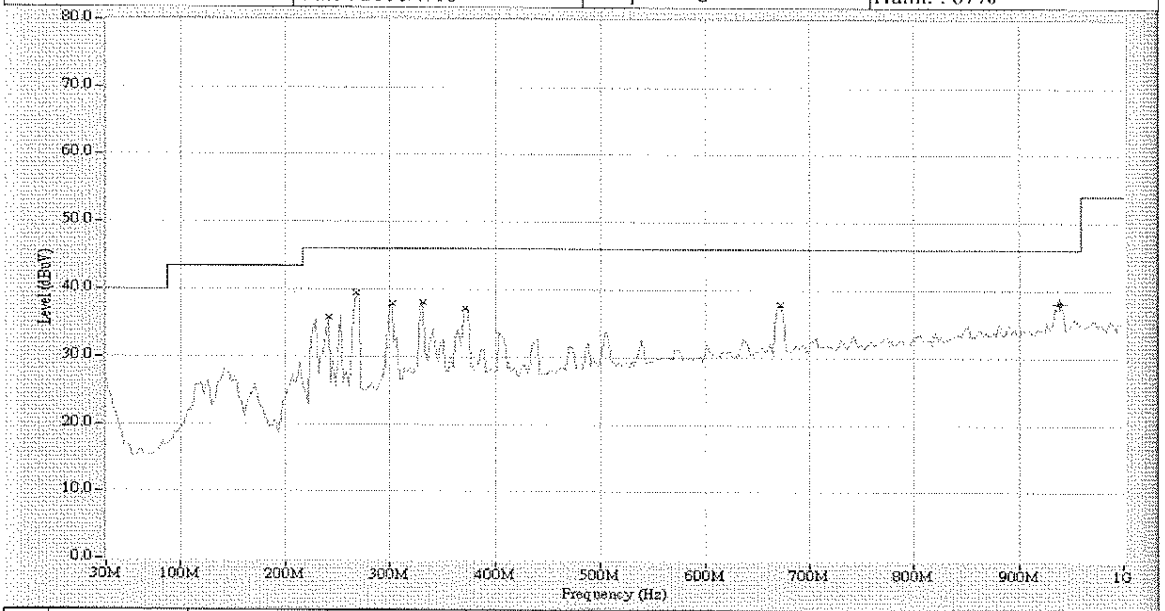
1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "***" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz).
   ±4.1dB (1GHz≦f≦18GHz).

4.4.2.3

Operation Mode: 2480 MHz

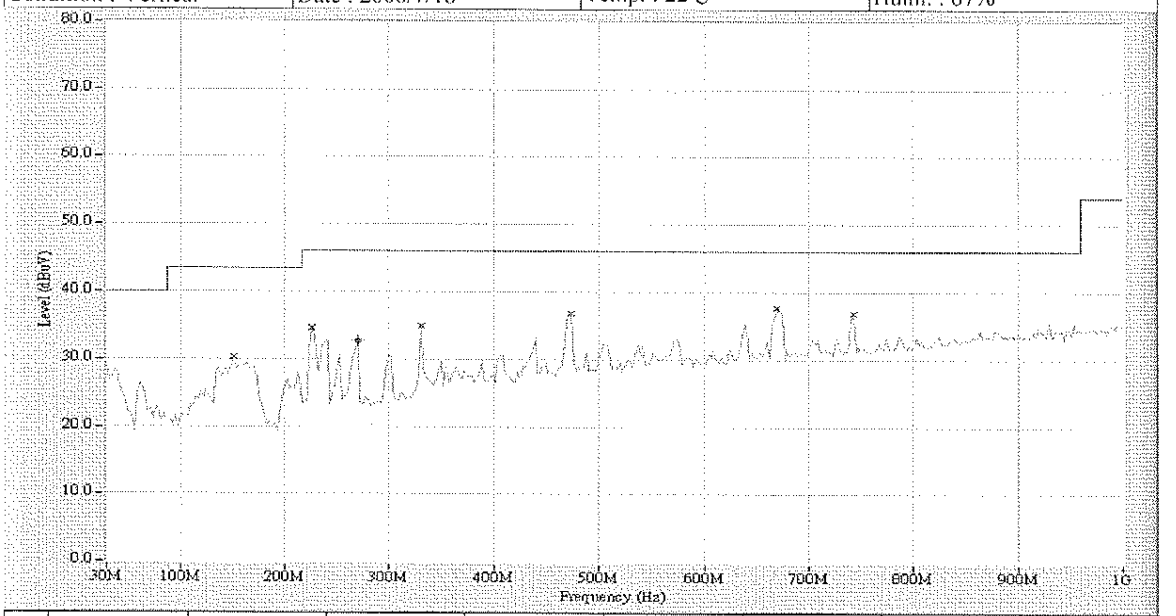
A. below 1GHz

EUT :	Model :	Status : TX_CH78	
Condition : Horizontal	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	240.975	21.4	14.5	35.9	46.0	-10.1	1.3	237
2	267.650	24.3	15.2	39.5	46.0	-6.5	1.2	198
3	301.600	21.4	16.6	38.0	46.0	-8.0	1.0	65
4	330.700	20.7	17.4	38.1	46.0	-7.9	1.2	247
5	371.925	18.5	18.7	37.2	46.0	-8.8	1.1	305
6	672.625	12.6	25.2	37.8	46.0	-8.2	1.4	85
7	939.375	8.6	29.5	38.1	46.0	-7.9	1.0	38

EUT :	Model :	Status : TX_CH78	
Condition : Vertical	Date : 2006/7/18	Temp. : 22℃	Humi. : 67%



	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Ant Height	Table Degree
1	151.250	15.5	14.8	30.3	43.5	-13.2	1.3	35
2	226.425	20.7	14.0	34.7	46.0	-11.3	1.0	287
3	270.075	17.5	15.3	32.8	46.0	-13.2	1.2	196
4	330.700	17.6	17.4	35.0	46.0	-11.0	1.5	85
5	473.775	15.6	21.3	36.9	46.0	-9.1	1.4	224
6	670.200	12.6	25.1	37.7	46.0	-8.3	1.2	295
7	742.950	10.6	26.3	36.9	46.0	-9.1	1.0	175

B. above 1GHz

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG	Margins (dB)
Radiated emission frequencies above 1 GHz to 4.5 GHz were too low to be measured.									

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "***" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz).
   ±4.1dB (1GHz≦f≦18GHz).

4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies

(A)

Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date : Jan. 11, 2006 Temperature : 16℃ Humidity : 73%

Frequency	Reading (dBuV)				Factor	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V		(dB)	Peak	Ave	Peak	Ave.
(MHz)	Peak	Ave	Peak	Ave	Corr.	(H/V Max.)			
2390.000	30.2	20.8	30.1	20.8	30.3	60.5	51.1	74.0	54.0

Note:

The result is the highest value of radiated emission from restrict band of 2310 ~2390 MHz.

(B)

Channel 78

Operation Mode : Transmitting

Fundamental Frequency : 2480 MHz

Test Date : Jan. 11, 2006 Temperature : 16℃ Humidity : 73%

Frequency	Reading (dBuV)				Factor	Result @3m (dBuV/m)		Limit @3m (dBuV/m)	
	H		V		(dB)	Peak	Ave	Peak	Ave.
(MHz)	Peak	Ave	Peak	Ave	Corr.	(H/V Max.)			
2483.500	30.9	21.4	31.0	21.5	30.3	61.3	51.8	74.0	54.0

Note:

The result is the highest value of radiated emission from restrict band of 2483.5 ~2500 MHz.

4.5 Field Strength Calculation

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

Result = Reading + Corrected Factor

where

Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

5 CONDUCTED EMISSION MEASUREMENT

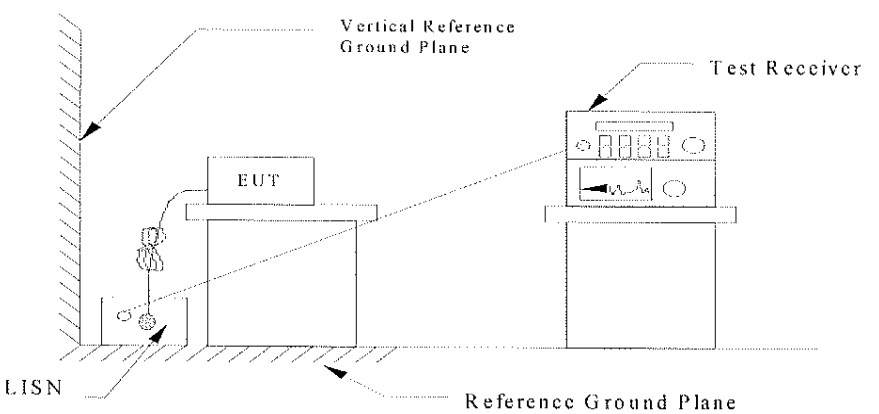
5.1 Standard Applicable

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.
Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

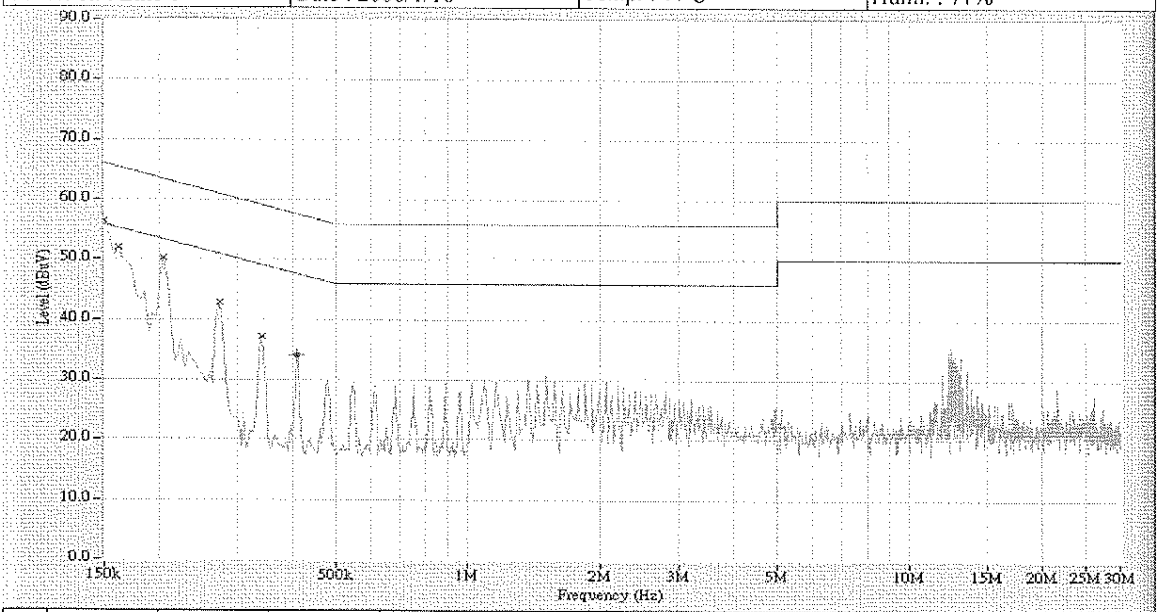
Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

5.3.1

EUT : BLUETOOTH	Model :	Status : TX_CH0	
Condition : Line 1	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%

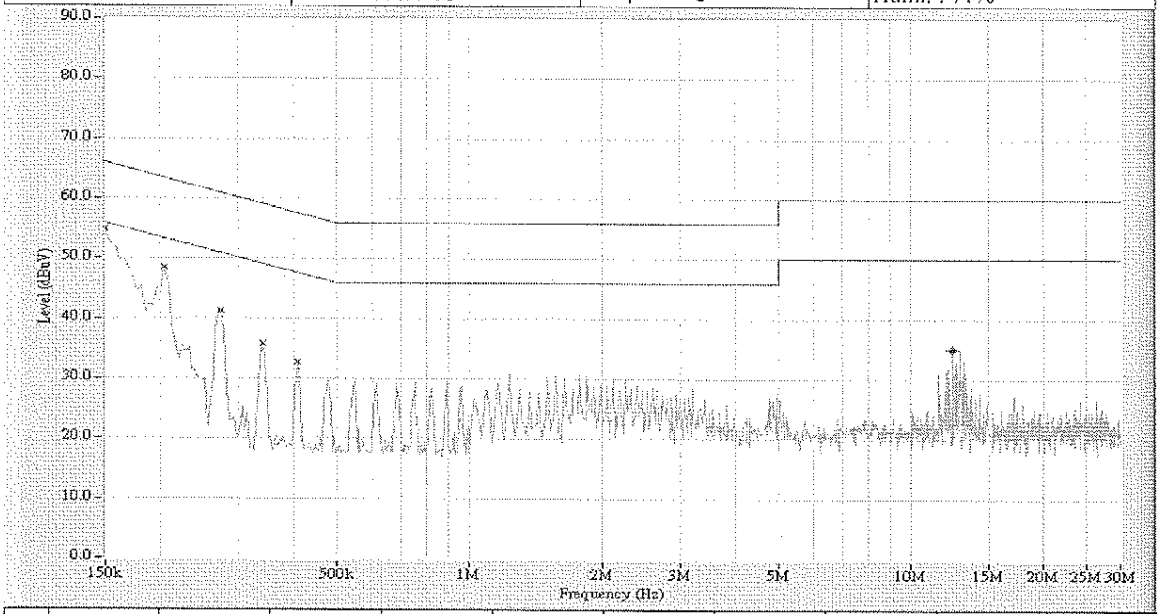


	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.150	52.5	----	0.1	52.6	----	66.0	56.0	-9.4	----
2	0.162	47.9	----	0.1	48.0	----	65.3	55.3	-13.3	----
3	0.205	46.2	----	0.1	46.3	----	63.4	53.4	-13.1	----
4	0.275	39.9	----	0.1	40.0	----	61.0	51.0	-18.0	----
5	0.341	33.1	----	0.1	33.2	----	59.2	49.2	-22.0	----
6	0.408	31.1	----	0.1	31.2	----	57.7	47.7	-23.5	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

EUT : BLUETOOTH	Model :	Status : TX_CH0	
Condition : Line 2	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%



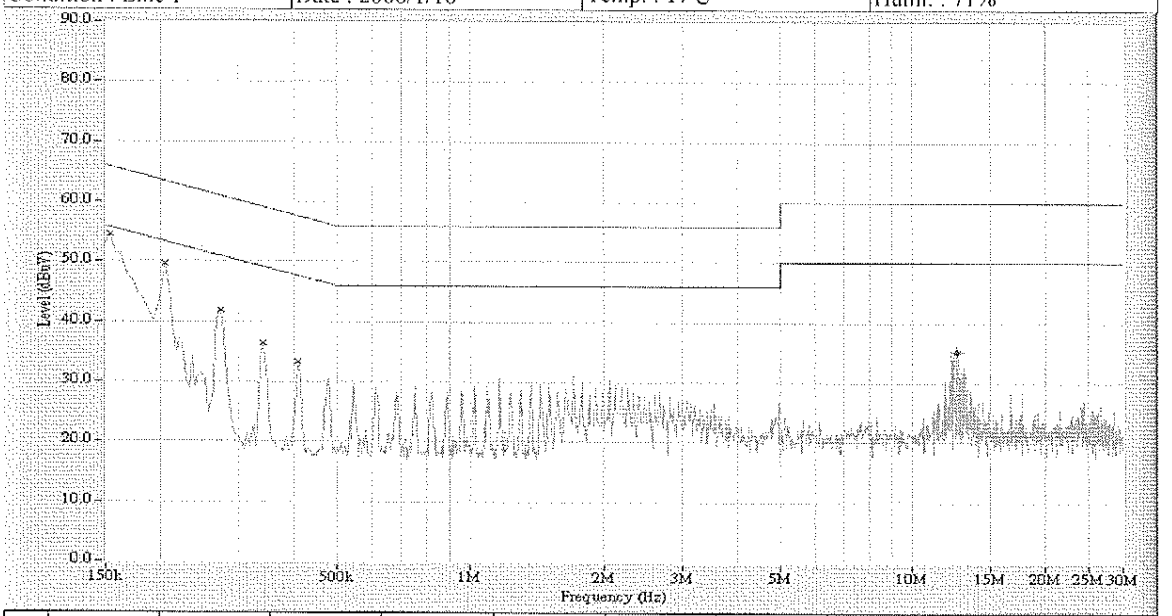
	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.150	50.8	----	0.1	50.9	----	66.0	56.0	-11.1	----
2	0.205	44.5	----	0.1	44.6	----	63.4	53.4	-14.8	----
3	0.275	37.4	----	0.1	37.5	----	61.0	51.0	-19.5	----
4	0.341	31.9	----	0.1	32.0	----	59.2	49.2	-23.2	----
5	0.408	30.6	----	0.1	30.7	----	57.7	47.7	-25.0	----
6	12.430	32.0	----	0.4	32.4	----	60.0	50.0	-24.6	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

5.3.2

EUT : BLUETOOTH	Model :	Status : TX_CH39	
Condition : Line 1	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%

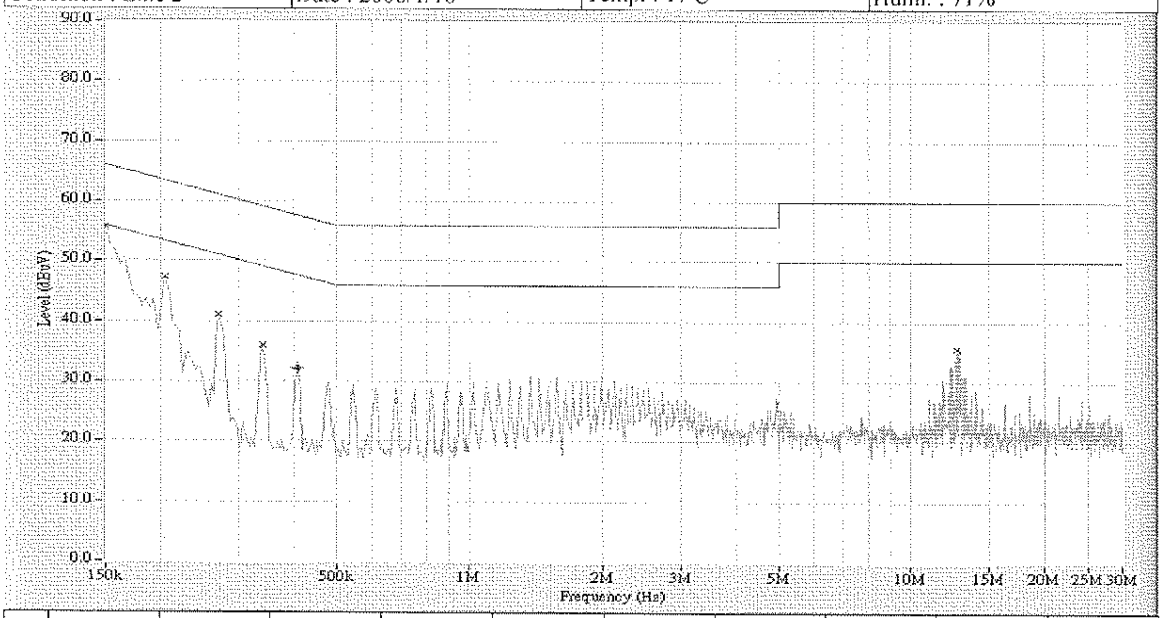


	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.154	51.5	----	0.1	51.6	----	65.8	55.8	-11.2	----
2	0.205	46.7	----	0.1	46.8	----	63.4	53.4	-13.6	----
3	0.275	38.9	----	0.1	39.0	----	61.0	51.0	-19.0	----
4	0.341	32.4	----	0.1	32.5	----	59.2	49.2	-22.7	----
5	0.408	30.3	----	0.1	30.4	----	57.7	47.7	-24.3	----
6	12.637	32.2	----	0.4	32.6	----	60.0	50.0	-24.4	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

EUT : BLUETOOTH	Model :	Status : TX_CH39	
Condition : Line 2	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%



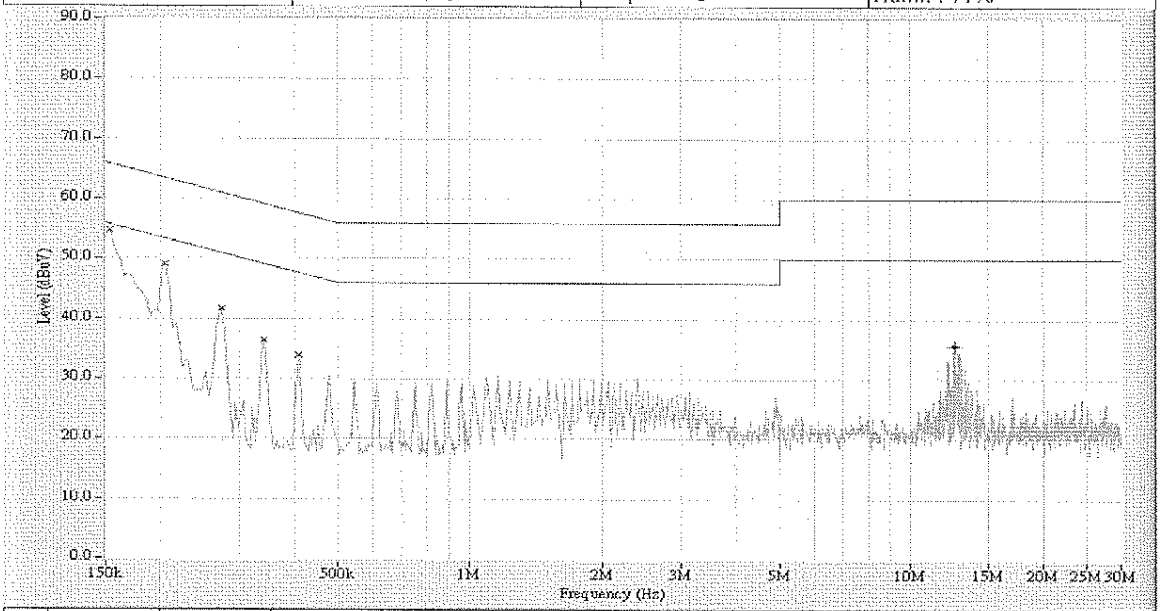
	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.150	50.8	----	0.1	50.9	----	66.0	56.0	-10.1	----
2	0.205	44.3	----	0.1	44.4	----	63.4	53.4	-16.0	----
3	0.271	37.1	----	0.1	37.2	----	61.1	51.1	-19.9	----
4	0.341	32.0	----	0.1	32.1	----	59.2	49.2	-23.1	----
5	0.408	28.2	----	0.1	28.3	----	57.7	47.7	-25.4	----
6	12.699	30.7	----	0.4	31.1	----	60.0	50.0	-23.9	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

5.3.3

EUT : BLUETOOTH	Model :	Status : TX_CH78	
Condition : Line 1	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%

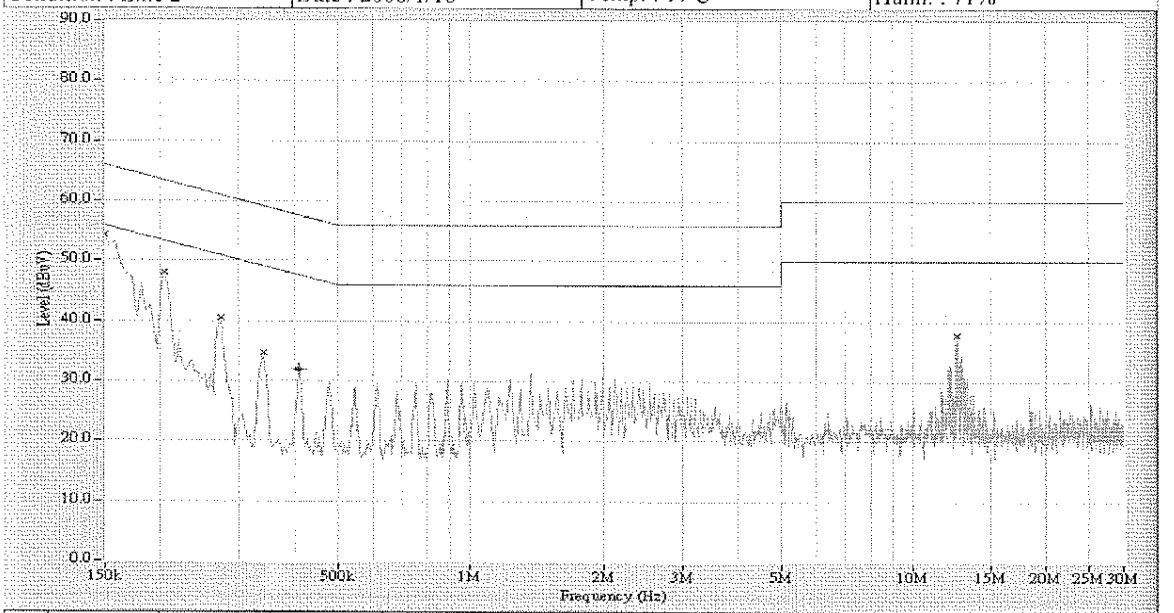


	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.154	50.8	----	0.1	50.9	----	65.8	55.8	-10.9	----
2	0.205	45.1	----	0.1	45.2	----	63.4	53.4	-14.2	----
3	0.275	38.6	----	0.1	38.7	----	61.0	51.0	-19.3	----
4	0.341	33.4	----	0.1	33.5	----	59.2	49.2	-22.7	----
5	0.408	30.8	----	0.1	30.9	----	57.7	47.7	-23.8	----
6	12.566	31.6	----	0.4	32.0	----	60.0	50.0	-24.0	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

EUT : BLUETOOTH	Model :	Status : TX_CH78	
Condition : Line 2	Date : 2006/1/16	Temp. : 17℃	Humi. : 71%



	Freq (MHz)	QP Level (dBuV)	AVG Level (dBuV)	Factor (dB)	QP Result (dBuV)	AVG Result (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)
1	0.150	50.4	----	0.1	50.5	----	66.0	56.0	-11.5	----
2	0.205	44.0	----	0.1	44.1	----	63.4	53.4	-15.3	----
3	0.275	36.5	----	0.1	36.6	----	61.0	51.0	-20.4	----
4	0.341	30.7	----	0.1	30.8	----	59.2	49.2	-24.4	----
5	0.408	27.9	----	0.1	28.0	----	57.7	47.7	-25.7	----
6	12.562	33.8	----	0.4	34.2	----	60.0	50.0	-21.8	----

Note:

1. "***" means the value was too low to be measured.
2. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
3. "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is ±2.5dB.

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

The transmitter antenna shall be integral with the device, or the antenna coupling be so designed that no antenna other than that furnished by the party responsible for compliance shall be used. The antenna design may be such as to allow a broken antenna to be replaced by the user, but the use of a standard jack or electrical connector is prohibited. Further, this requirement does not apply to transmitters that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to transmitters which require unwanted emission measurements after installation.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi shall be added to the measured RF output power before using the power limits specified in this Standard for devices of RF output powers 10 milliwatts or less. In the case of devices of output powers more than 10 milliwatts, the total antenna gain shall be added, except for the case of 6.2.2 (o) on spread spectrum systems.

6.2 Antenna Construction and Directional Gain

The antennas fix on the PCB. The peak gain of antenna used is 2.0 dBi.

7 20dB EMISSION BANDWIDTH MEASUREMENT

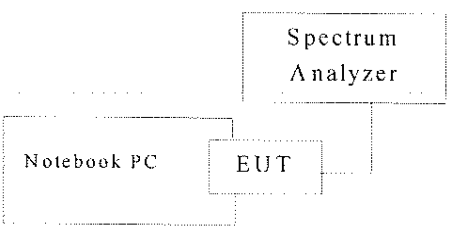
7.1 Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect it to measurement instrument. Then set it to any convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Figure 4: Emission bandwidth measurement configuration.



7.3 Measurement Equipment

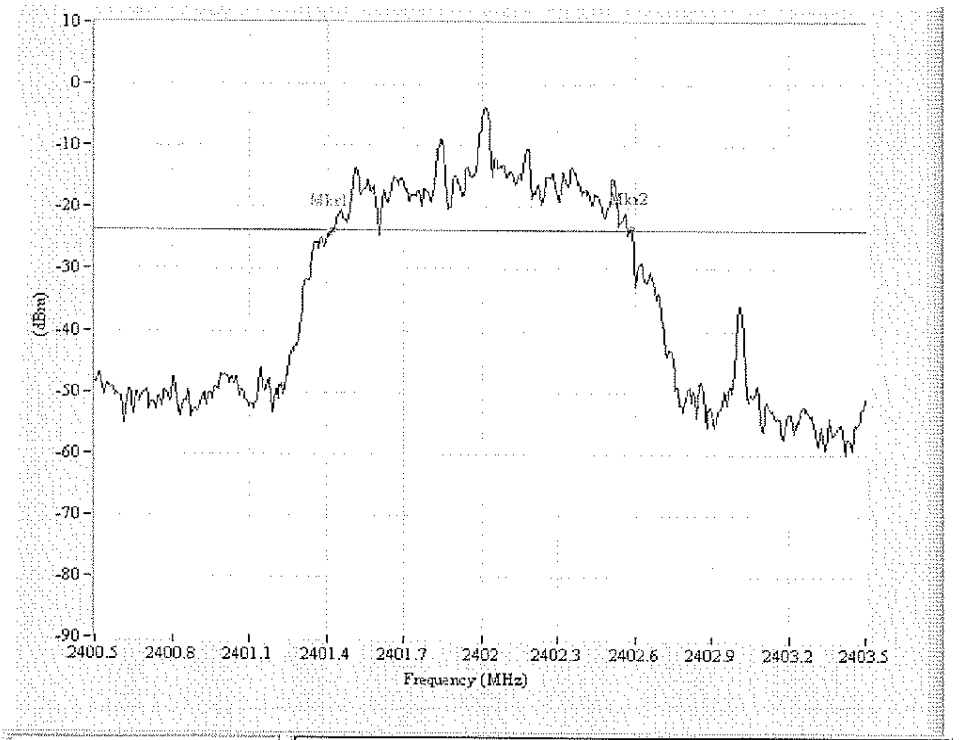
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Agilent	8564EC	09/23/2006

7.4 Measurement Data

Test Date : Jan. 10, 2006 Temperature : 21℃ Humidity : 70%

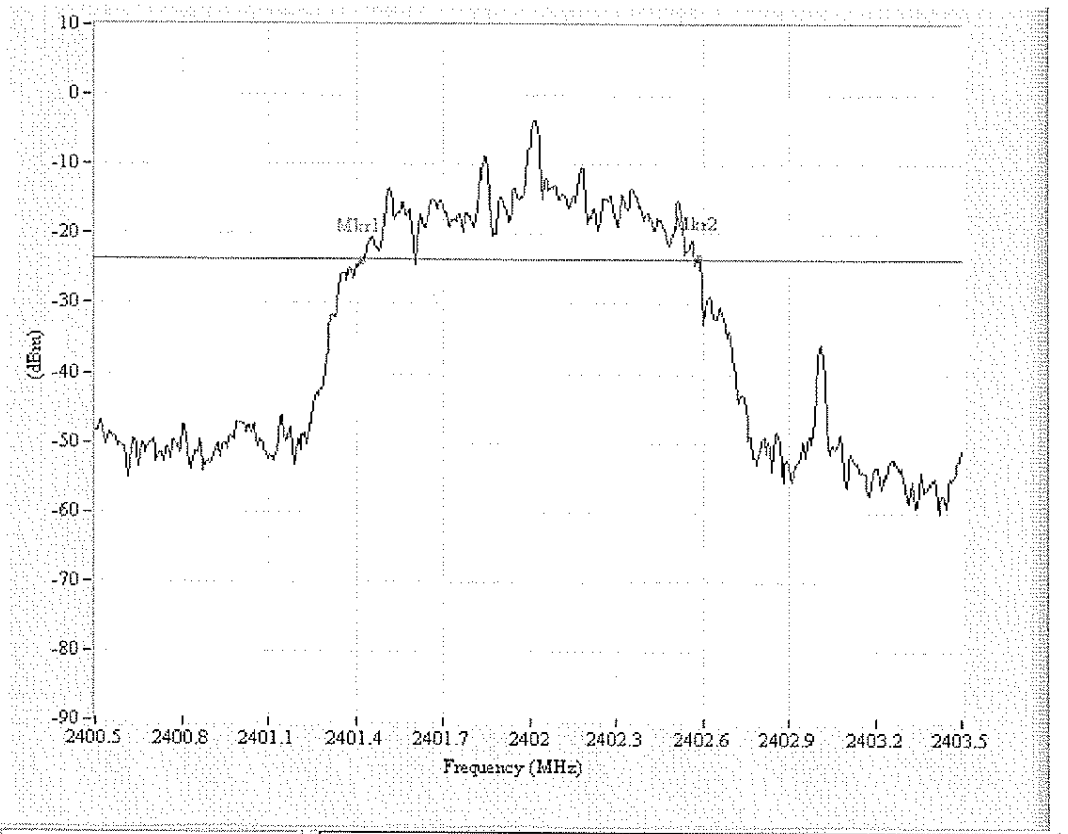
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Chart
0	2402	1.165	Page 35
39	2441	1.165	Page 36
78	2480	1.175	Page 37

Note: Please refer to page 35 to page 37 for chart.



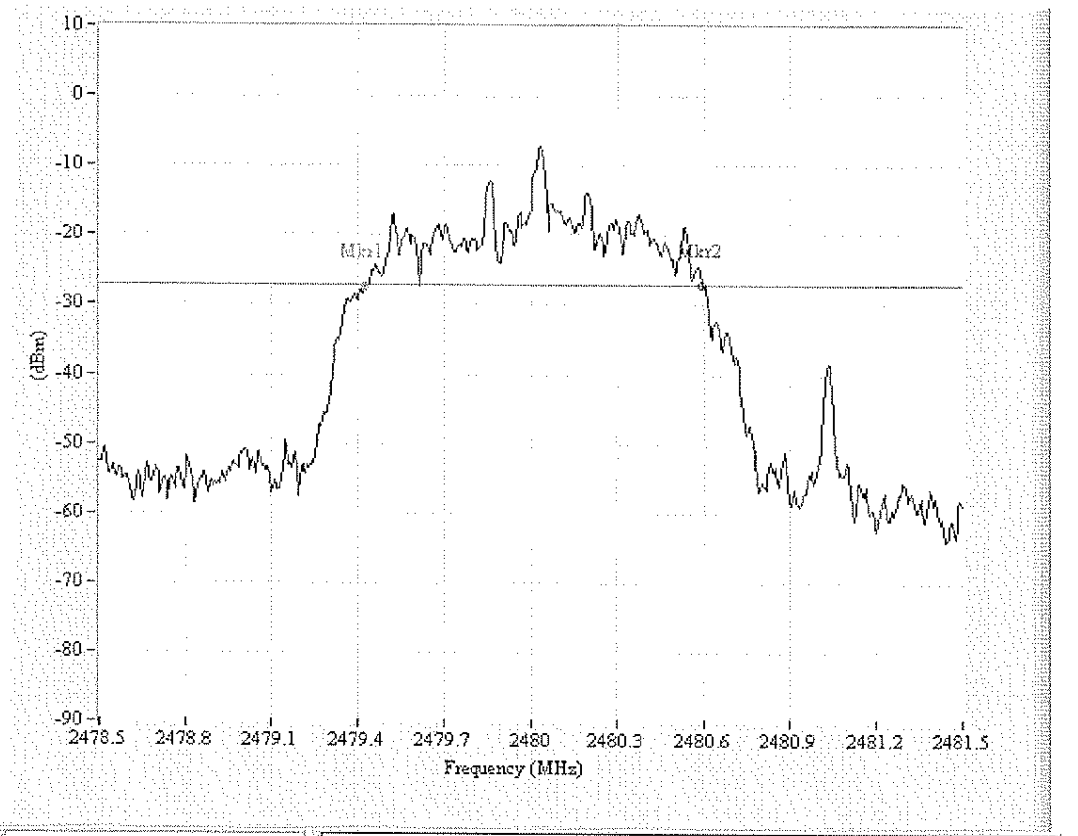
*Center 2402.0000MHz	Display Line -23.660dBm
*SPAN 3.0000MHz	Δ Marker -1.1650MHz 0.330dB
*RBW 10.00kHz	Mkr1 2401.420MHz -23.830dBm
*VBW 30.00kHz	Mkr2 2402.585MHz -23.500dBm
*SWP 75.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: CH0
Note:



*Center 2402.0000MHz	Display Line -23.660dBm
*SPAN 3.0000MHz	Δ Marker -1.1650MHz 0.330dB
*RBW 10.00kHz	Mkr1 2401.420MHz -23.830dBm
*VBW 30.00kHz	Mkr2 2402.585MHz -23.500dBm
*SWP 75.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: CH39
Note:



*Center 2480.0000MHz	Display Line -27.160dBm
*SPAN 3.0000MHz	Δ Marker -1.1750MHz 0.170dB
*RBW 10.00kHz	Mkr1 2479.425MHz -27.330dBm
*VBW 30.00kHz	Mkr2 2480.600MHz -27.160dBm
*SWP 75.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: BT
Purpose: 20dB_BW
Condition: CH78
Note:

8 OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

For frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels. The transmitter output power shall not exceed 1.0 watt. For all other frequency hopping systems in this band 2400-2483.5 MHz band, the transmitter output power shall not exceed 0.125 watt. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

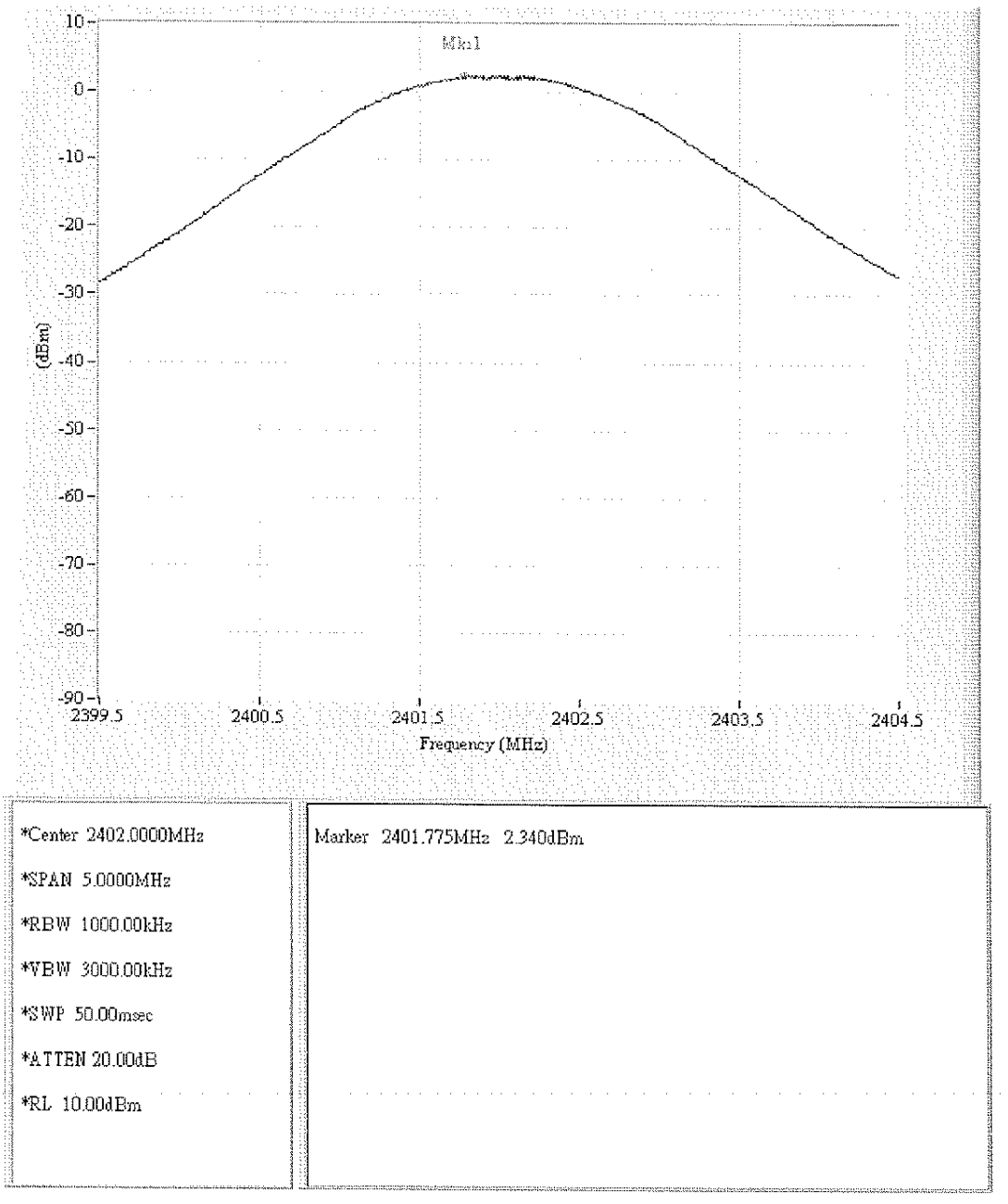
Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Agilent	8564EC	09/23/2006

8.4 Measurement Data

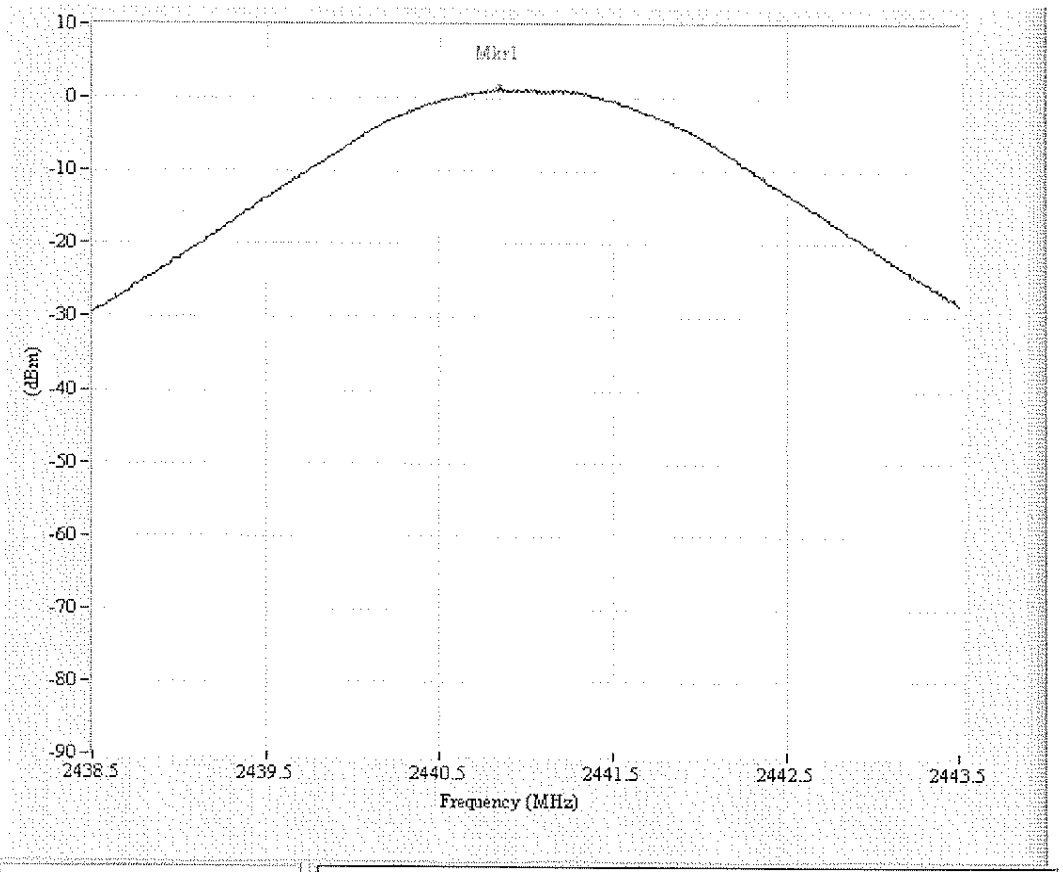
Test Date : Jan. 10, 2006 Temperature : 21℃ Humidity : 70%

Channel	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
0	2402	2.34	0.5	1.84	1.53	125	Page 40
39	2441	1.34	0.5	0.84	1.21	125	Page 41
78	2480	-0.16	0.5	-0.66	0.86	125	Page 42

Note: Please refer to page 40 to page 42 for chart.



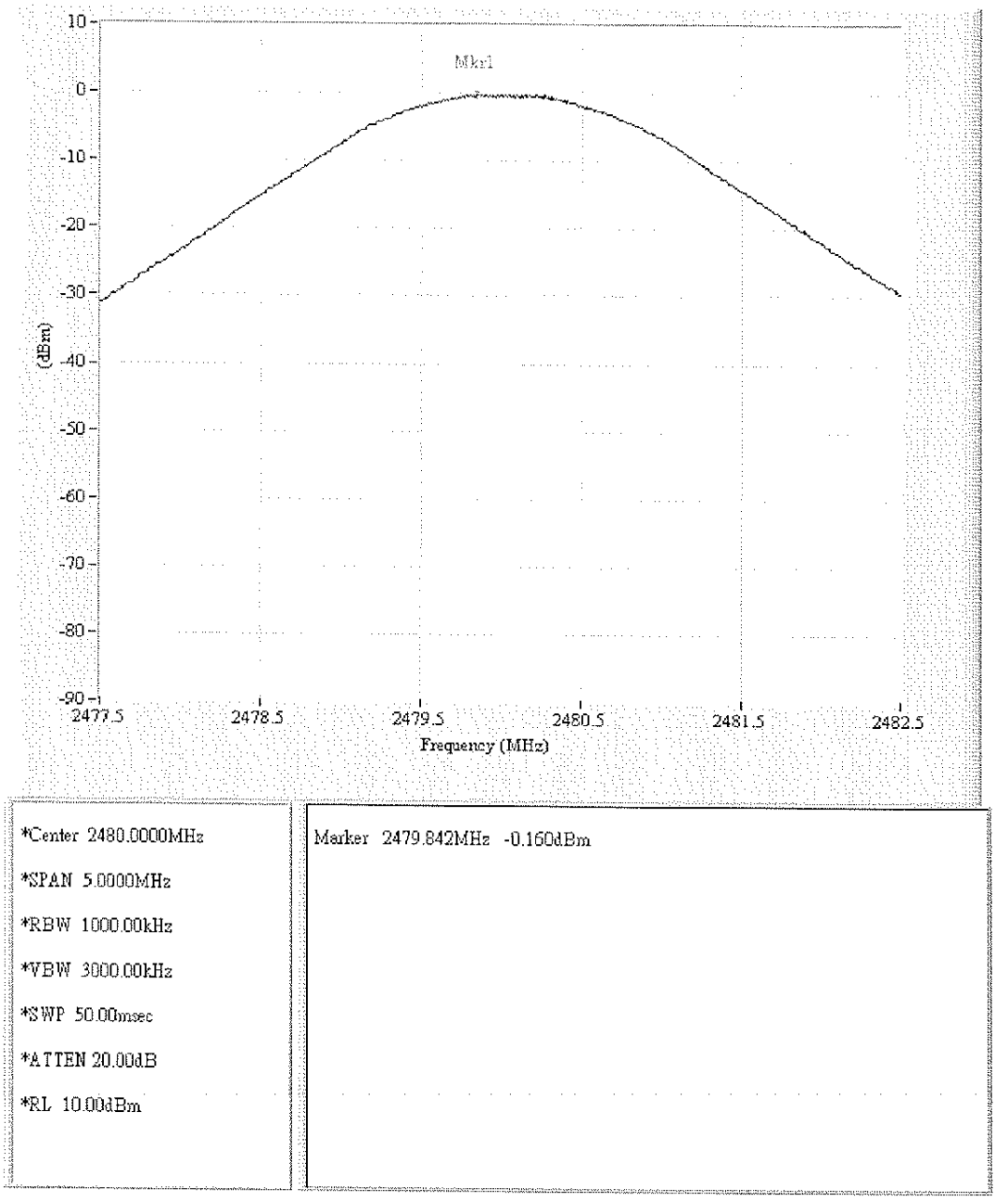
EUT: BLUETOOTH
Purpose: Output_Pwr
Condition: CH0
Note:



*Center 2441.0000MHz
*SPAN 5.0000MHz
*RBW 1000.00kHz
*VBW 3000.00kHz
*SWP 50.00msec
*ATTEN 20.00dB
*RL 10.00dBm

Marker 2440.842MHz 1.340dBm

EUT: BLUETOOTH
Purpose: Output_Pwr
Condition: CH39
Note:



EUT: BLUETOOTH
Purpose: Output_Pwr
Condition: CH78
Note: