TEST REPORT

Product Name	：Bluetooth USB Dongle
Model Number	：UBTCR3C2T
Brand Name	：Billionton
FCC ID	：NLF-UBTCR3C2T
Applicant	：Billionton Systems Inc.
Address	：No. 21, Sui-Lih Rd, Hsin-Chu, 300, Taiwan
Received Date	：October 07, 2004
Tested Date	：October 07 ~ November 04, 2004

Notes：
1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to testing, and be invalid as seperately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the data issued.
5. The report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

0240
ILAC MRA

NVLAP LAB CODE 200118-0

Test Report Certification

Product Name : Bluetooth USB Dongle
Model Number : UBTCR3C2T
Brand Name : Billionton
FCC ID : NLF-UBTCR3C2T
Applicant : Billionton Systems Inc.

Measurement Standard :

FCC 47 C.F.R. Part 15, Subpart B and Subpart C (2004), ANSI C63.4 (2003)

Tested By : Chris Huang , **Date** : November 08, 2004
(Chris Huang)

Approved By : Chieh-De Tsai , **Date** : November 08, 2004
(Chieh-De Tsai, Manager)

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

TABLE OF CONTENTS

TITLE PAGE NO.

TABLE OF CONTENTS

TITLE PAGE NO.

1. GENERAL INFORMATION

1.1 Description of EUT & Power

Product Name	Bluetooth USB Dongle
Model Number	UBTCR3C2T
EUT Description	2.4GHz Class II Frequency Hopping Spread Spectrum Data Transceiver for Bluetooth USB Dongle
Frequency Range	2402 MHz to 2480MHz
Channel Number	79
Channel Spacing	1MHz
Air Data Rate	723Kbps
Type of Modulation	Frequency Hopping Spread Spectrum
Frequency Selection	BY SOFTWARE
Antenna Type	Chip Antenna, Antenna Gain : -0.21dBi.
Power Source	5VDC (From USB interface of Notebook)

Multiple List :

Company	Address	Product Name	Model Name
Billionton Systems Inc.	No. 21, Sui-Lih Rd, Hsin-Chu, 300, Taiwan	Bluetooth USB Dongle	UBTCR3C2T-B
------	No. 21, Sui-Lih Rd, Hsin-Chu, 300, Taiwan	Bluetooth USB Dongle	UBTCR3C2T-N
Cadmus Mirco Inc.	1840 Carlos Ave., Ontario CA 91761	Bluetooth USB Dongle	UBTCR3C2T-C
Ziga	1840 Carlos Ave., Ontario CA 91761	Bluetooth USB Dongle	UBTCR3C2T-Z
CARECA ITALIA S.P.A.	VIA BORSELLINO, 14 42010 ARCETO DI SCANDIANO REGGIO EMILLA 42019 ITALY	Bluetooth USB Dongle	UBTCR3C2T-N-HA
SITECOM EUROPE B.V.	LICHTENAUERLAAN 222, BRAINPARK 2, ROTTERDAM, 3062ME NETHERLANDS	Bluetooth USB Dongle	UBTCR3C2T-N-SC
2L INTERNATIONAL	DATABANKWEG 7-3821 AL AMERSFOORT PO BOX 150-3800 AD AMERSFOORT, NETHERLANDS	Bluetooth USB Dongle	UBTCR3C2T-N-2L
MEDION AKTIEGESELLSCHAFT-GERMANY	GANSEMARKT 16-18 ESSEN GM 45127 GERMANY	Bluetooth USB Dongle	UBTCR3C2T-N-MD
CITYCOM CORP.	3F, NO. 532, SEC. 2, JHONGSHAN RD., JHONGHE CITY, TAIPEI HSIEN, TAIWAN, R.O.C.	Bluetooth USB Dongle	UBTCR3C2T-N-CTC
DATAMATIC S.P.A	VIA AGORDAT, 34 MILANO MI 20124 ITALY	Bluetooth USB Dongle	UBTCR3C2T-N-DM
ASBISC ENTERPRISES LIMITED	63 KOLONAKIOU STREET, CY-4013 LIMASSOL, CYPRUS 4013 CYPRUS	Bluetooth USB Dongle	UBTCR3C2T-N-CYT
DSG Retail Ltd.	Dixons House, 200 The Campus, Maylands Avenue, Hemel Hempstead, Hertfordshire, HP2 71G, United Kingdom.	Bluetooth USB Dongle	UBTCR3C2T-B-DX
VIVANCO AG	EWIGE WEIDE 15 22926 AHRENSBURG GERMANY	Bluetooth USB Dongle	UBTCR3C2T-N-VV

1.2 Description of Peripherals

（1）Notebook PC

MANUFACTURER	：COMPAQ CORP.
MODEL NUMBER	：N800V
SERIAL NUMBER	：5Y33KSQZM0YV 1YR
INPUT POWER	：18.5VDC,65W,3.5A
OUTPUT POWER	：----------

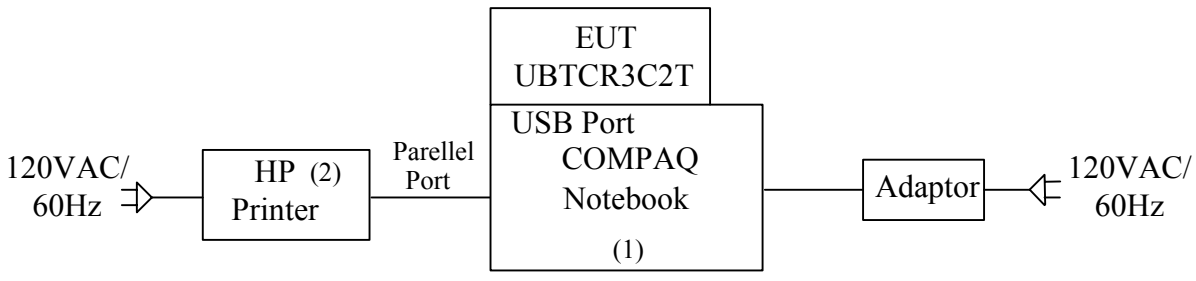
Adapter

MANUFACTURER	：COMPAQ CORP.
MODEL NUMBER	：PPP009H
SERIAL NUMBER	：2Y18650504
INPUT POWER	：100-240VAC 50/60Hz,1.6A
OUTPUT POWER	：18.5VDC, 65W, 3.5A

（2）Printer

MANUFACTURER	：HP CORP.
MODEL NUMBER	：C6431D
SERIAL NUMBER	：CN19T6S011
FCC ID	：DOC
POWER SOURCE	：100~240VAC,50/60Hz,0.7A
SIGNAL CABLE	：Shielded , Undetachable , 1.8m

1.3 EUT & Peripherals Setup Diagram



The indicated numbers (1)(2)…..,please refer to item 1.2

1.4 EUT Operating Procedure

(1) Turn on the power of all equipment.
(2) Notebook runs a test program CSR Blue Suite (Bluetest) to set channel.
(3) TX mode : select TXDATA1 to Execute.
RX mode : select RXDATA1 to Execute.

1.5 Description of Laboratory

SITE DESCRIPTION

FCC Certificate NO.	: 90585
BSMI Certificate NO.	: SL2-IN-E-0002
NVLAP Lab Code	: 200118-0
CNLA Certificate NO.	: CNLA-ZL97018
VCCI Certificate NO.	: R-1189, C-1250
TÜV Rheinland Certificate NO.	: 10008375

NAME OF SITE ：Ecom Sertech Corp. Hsin-Chu Lab.
(Spin-off from ITRI / ERSO on Apr. 01, 2003)

SITE LOCATION ：Rm.258, Bldg.17, NO.195 , Sec. 4, Chung Hsing Rd.,
Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.

1.6 Summary of Test Results

The EUT has been tested according to the following specifications : （1 ~ 79 Channel）

APPLIED STANDARD：47 CFR Part 15, Subpart B and Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
15.107 15.207	AC Power Conducted Emission Limit: Sec1.5.107	PASS	Meet the requirement of limit
15.109 15.205 15.209	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit
15.247(a)(1)	Transmitter 20dB Bandwidth	N/A	Meet the requirement of limit
15.247(b)(1)	Maximum Peak Output Power Limit: max. 125mW	PASS	Meet the requirement of limit
15.247(a)(1)	Carrier Frequency Separation Limit: 2/3 of the 20dB bandwidth	PASS	Meet the requirement of limit
15.247(a)(1)(iii)	Number of Hopping Frequency Limit: at least 15 channels	PASS	Meet the requirement of limit
15.247(a)(1)(iii)	Time of Occupancy (dwell time) Limit: 0.4sec within 31.6sec	PASS	Meet the requirement of limit
15.247(d)	Band Edge Compliance	PASS	Meet the requirement of limit
15.247(d)	Out of Band Measurements	PASS	Meet the requirement of limit

2. CONDUCTED POWERLINE TEST

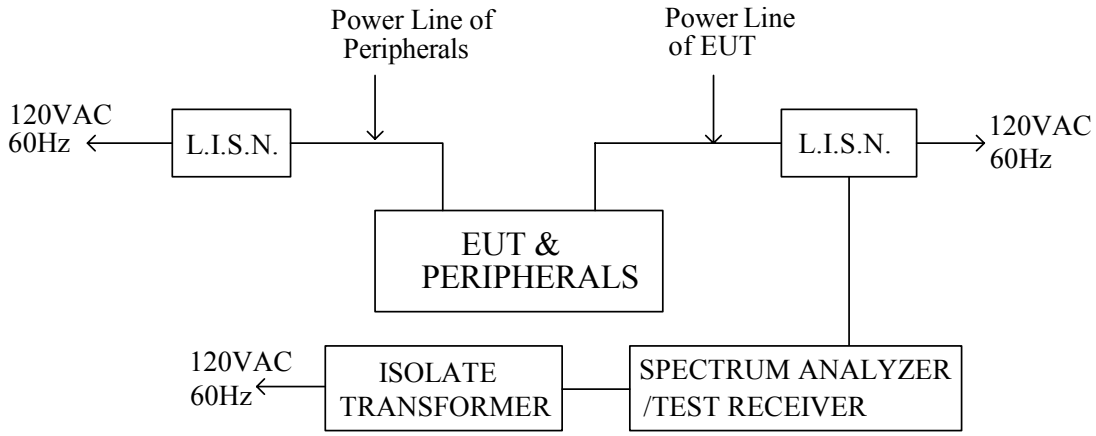
For intentional device, according to § 15.207(a) Line Conducted Emission Limit is required to verify the EUT.

2.1 Test Equipments

The following test equipments are used during the conducted powerline tests：

Manufacturer or Type	Model No.	Serial No.	Date of Calibration	Calibration Period	Remark
HP SPECTRUM ANALYZER & DISPLAY	8594E	3801A05627	April 26, 2004	1 Year	PRETEST
SOLAR ISOLATION TRANSFORMER	7032-1	N/A	N/A	N/A	FINAL
EMCO L.I.S.N.	3850/2	9311-1025 9401-1028	January 08, 2004 For Characteristic impedance May 18, 2004 For Insertion loss	1 Year	FINAL
R & S TEST RECEIVER	ESHS 30	838550/003	February 11, 2004	1 Year	FINAL
KEENE SHIELDED ROOM	5983	No.1	N/A	N/A	FINAL
R & S PULSE LIMIT	EHS3Z2	357.8810.52	July 10, 2004	1 Year	FINAL
N TYPE COAXIAL CABLE	----------	----------	July 10, 2004	1 Year	FINAL
50Ω TERMINATOR	----------	----------	July 10, 2004	1 Year	FINAL

2.2 Test Setup



2.3 Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμv)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

For intentional device, according to § 15.207(a) Line Conducted Emission Limit is same as above table.

2.4 Test Procedure

The test procedure is performed in a 12ft×12ft×8ft(L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chasis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chasis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

2.5 Uncertainty of Conducted Emission

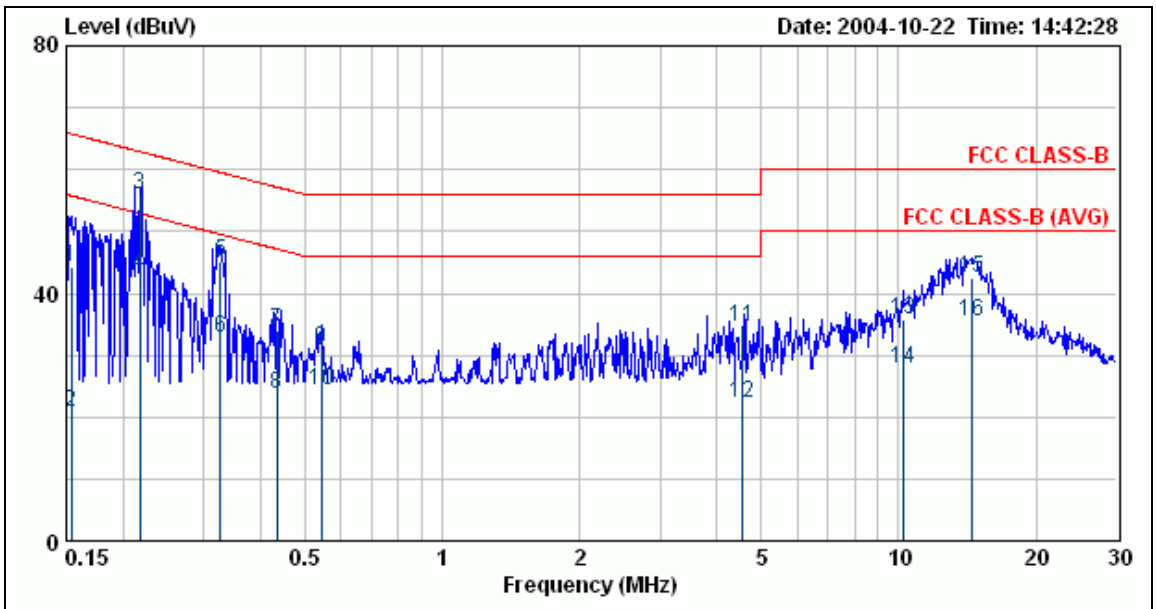
The uncertainty of conducted emission is ±1.36dB.

2.6 Line Conducted RF Voltage Measurement

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	Billionton Systems Inc.	**Test Date**	2004/10/22
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	22.5℃, 75%

LINE



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dBuV	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.154	0.10	44.24	20.80	44.34	20.90	65.78	55.78	-21.44	-34.88
0.217	0.10	55.77	42.98	55.87	43.08	62.92	52.92	-7.05	-9.84
0.327	0.10	45.05	32.67	45.15	32.77	59.53	49.53	-14.38	-16.76
0.435	0.10	33.90	23.63	34.00	23.73	57.16	47.16	-23.16	-23.43
0.542	0.10	30.92	24.17	31.02	24.27	56.00	46.00	-24.98	-21.73
4.546	0.20	34.43	22.04	34.63	22.24	56.00	46.00	-21.37	-23.76
10.233	0.50	35.27	27.44	35.77	27.94	60.00	50.00	-24.23	-22.06
14.440	0.54	41.89	34.82	42.43	35.36	60.00	50.00	-17.57	-14.64

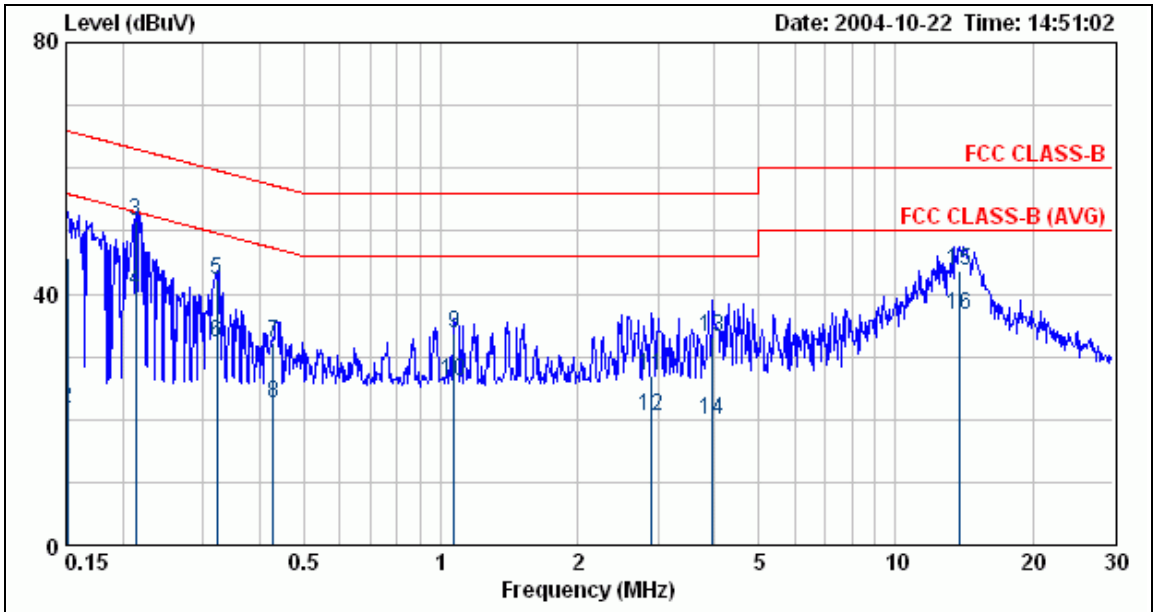
REMARKS：

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value
3. The EUT can be operated in transmitting, stand-by and receiving mode. After preliminary scan, EUT in transmitting mode has highest emission. The EUT was set in transmitting mode at finial test to get the worst case test results.
4. According to technical experience, all spurious emission at channel 1, 40 and 79 are almost the same below 1GHz, so the spurious emission test result of the channel 1 was chosen as representative in finial test.

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	Billionton Systems Inc.	**Test Date**	2004/10/22
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	22.5℃, 75%

NEUTRAL



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dBuV	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.151	0.20	45.53	21.47	45.73	21.67	65.96	55.96	-20.23	-34.29
0.214	0.20	51.39	40.19	51.59	40.39	63.05	53.05	-11.46	-12.66
0.321	0.20	41.97	31.93	42.17	32.13	59.67	49.67	-17.50	-17.54
0.428	0.20	32.10	22.50	32.30	22.70	57.29	47.29	-24.99	-24.59
1.071	0.20	33.43	25.88	33.63	26.08	56.00	46.00	-22.37	-19.92
2.900	0.20	26.88	20.20	27.08	20.40	56.00	46.00	-28.92	-25.60
3.964	0.20	32.90	19.75	33.10	19.95	56.00	46.00	-22.90	-26.05
13.841	0.58	43.02	35.93	43.60	36.51	60.00	50.00	-16.40	-13.49

REMARKS：

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value
3. The EUT can be operated in transmitting, stand-by and receiving mode. After preliminary scan, EUT in transmitting mode has highest emission. The EUT was set in transmitting mode at finial test to get the worst case test results.
4. According to technical experience, all spurious emission at channel 1, 40 and 79 are almost the same below 1GHz, so the spurious emission test result of the channel 1 was chosen as representative in finial test.

2.7 Photos of Conduction Test

3. 20dB BANDWIDTH FOR HOPPING

Test Requirement: 15.247(a)(1)

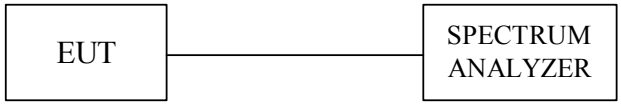
3.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3.2 Test Setup



3.3 Limits of 20db Bandwidth Measurement

Limit : N/A

3.4 Test Procedure

The 20dB bandwidth was measured with a spectrum analyzer connected to RF antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

3.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is ± 10KHz.

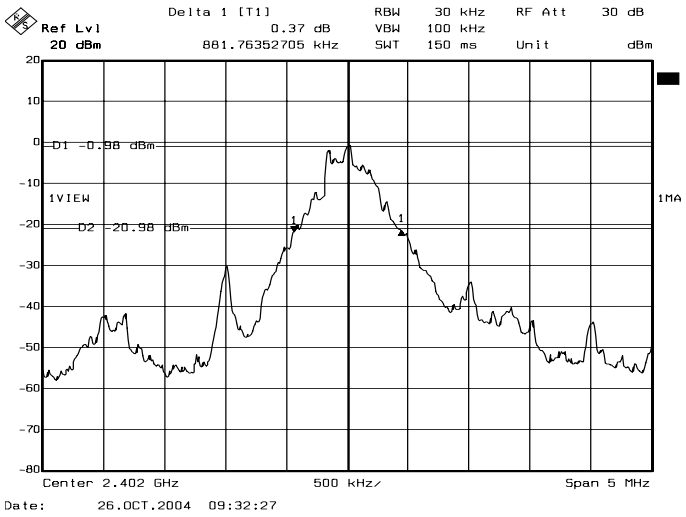
3.6 Test Results

Refer to attached spectrum analyzer data chart.

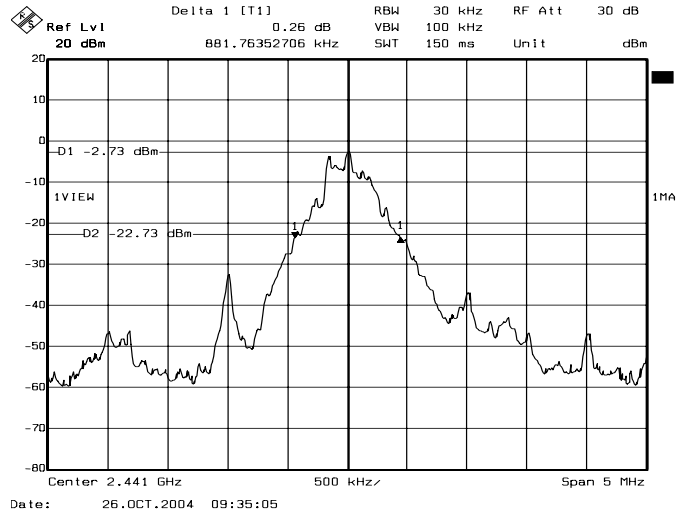
Input Power (System)	5VDC (From USB interface of Notebook)	**Environmental Conditions**	25℃, 53%RH
Tested By	Chris Huang		

Channel	**Channel Frequency (MHz)**	**20dB Bandwidth (MHz)**	**Pass / Fail**
01(Low)	2402	0.88176	N/A
40(Mid)	2441	0.88176	N/A
79(High)	2480	0.88176	N/A

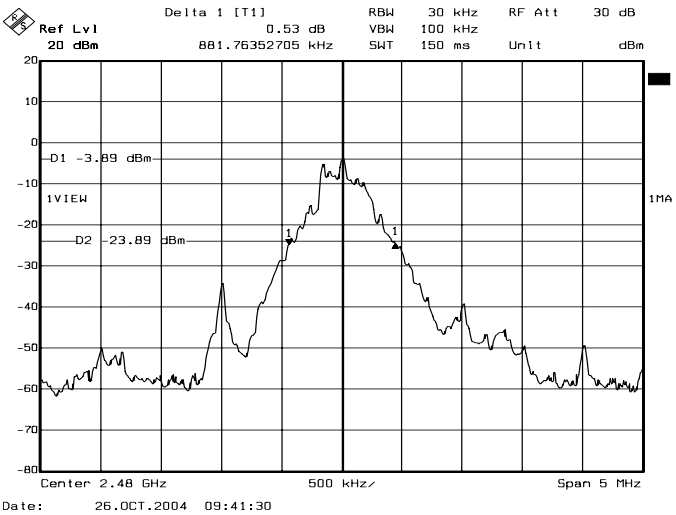
3.7 Photo of 20db Bandwidth Measurement



Channel Low



Channel Middle



Channel High

4. MAXIMUM PEAK OUTPUT POWER

Test Requirement: 15.247(b)(1)

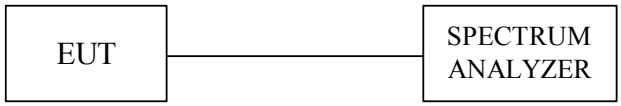
4.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.2 Test Setup



4.3 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 125mW for frequency hopping systems operating in 2400~2483.5 MHz employing at least 15 hopping channels.

4.4 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal see 4.7 for the measurement set up.

4.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is ± 1.82dB.

4.6 Test Results

Input Power (System)	5VDC (From USB interface of Notebook)	**Environmental Conditions**	25℃, 53%RH
Tested By	Chris Huang		

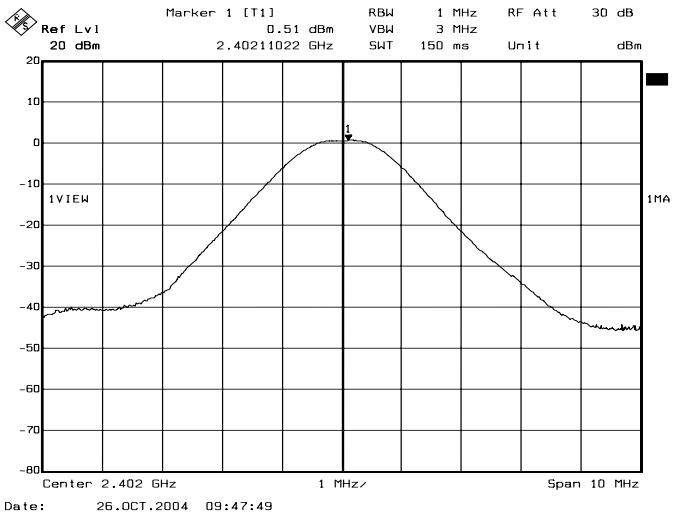
Cable loss = 0.5dB

Channel	**Channel Frequency (MHz)**	**Peak Power Output (dBm)**	**Peak Power Limit (dBm)**	**Pass / Fail**
01(Low)	2402	1.01	20.97	PASS
40(Mid)	2441	-1.17	20.97	PASS
79(High)	2480	-3.06	20.97	PASS

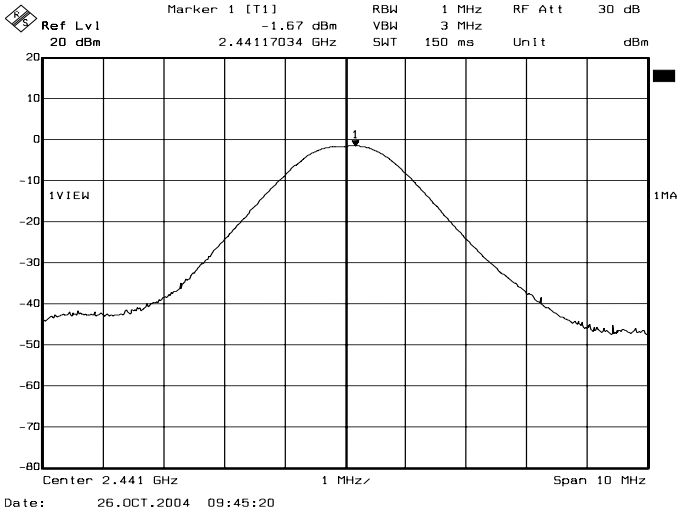
Note :

The result was calculated as follow :
Peak Power Output = Peak Power Reading + Cable loss

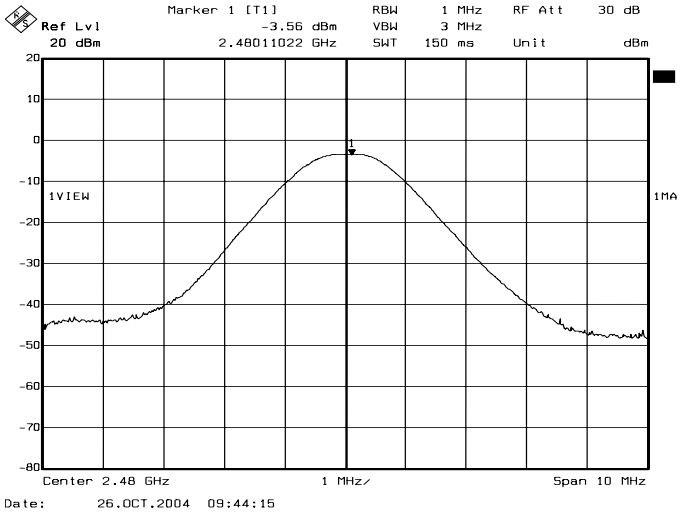
4.7 Photo of Maximum Peak Output Power



Channel Low



Channel Middle



Channel High

5. HOPPING CHANNEL SEPARATION

Test Requirement: 15.247(a)(1)

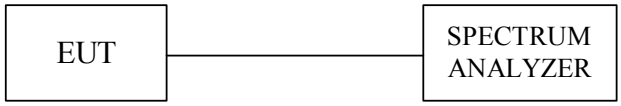
5.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

5.2 Test Setup



5.3 Limits of Hopping Channel Separation

According to 15.247(a) (1), frequency hopping system operating in 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

5.4 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.

Repeat above procedures until all frequencies measured were complete.

5.5 Uncertainty of Conducted Emission

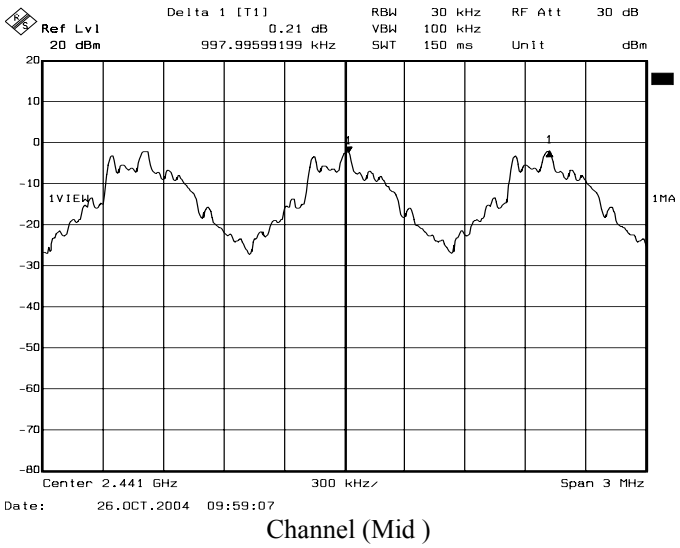
The uncertainty of conducted emission is ± 10KHz.

5.6 Test Results

Refer to section 3, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth	Result
2441MHz (Mid)	997.99 kHz	587.84 kHz	25 kHz	PASS

5.7 Photo of Hopping Channel Separation



Channel (Mid)

6. NUMBER OF HOPPING FREQUENCY USED

Test Requirement: 15.247(a)(1)(iii)

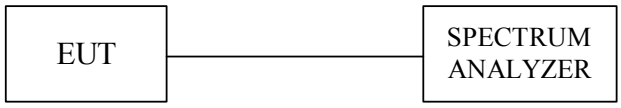
6.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.2 Test Setup



6.3 Limits of Number of Hopping Frequency Used

According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5MHz bands shall use at least 15 hopping frequencies

6.4 Test Procedure

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument.Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

6.5 Uncertainty of Conducted Emission

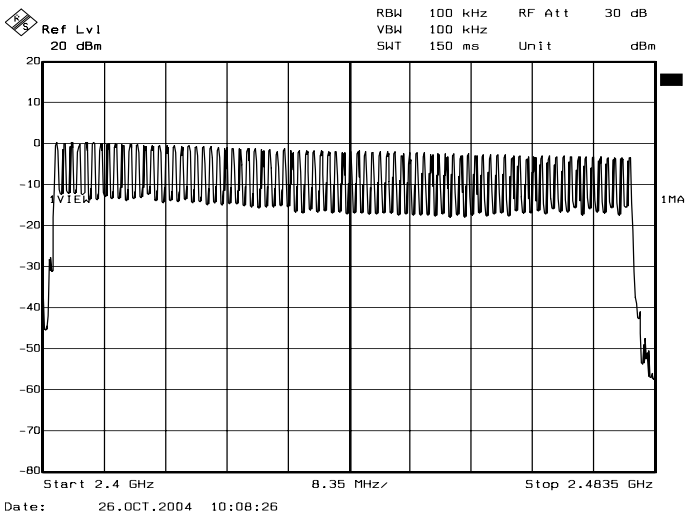
The uncertainty is not applicable.

6.6 Test Results

Refer to the attached plot.

There are 79 hopping frequencies in a hopping sequence.

6.7 Photo of Number of Hopping Frequency Used



7. DWELL TIME ON EACH CHANNEL

Test Requirement: 15.247(a)(1)(iii)

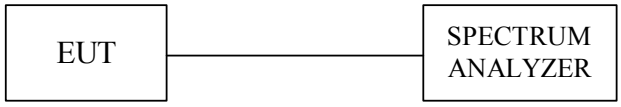
7.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.2 Test Setup



7.3 Limits of Dwell Time on Each Channel

According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than **0.4** second within a 31.6 second period.

7.4 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The Bluetooth USB Dongle has 3 type of payload, DH1, DH3 and DH5. The hopping rate differ with different payloads. The longer the payload is, the slower the hopping rate is.

7.5 Uncertainty of Conducted Emission

The uncertainty of time is ± 5.25ms.

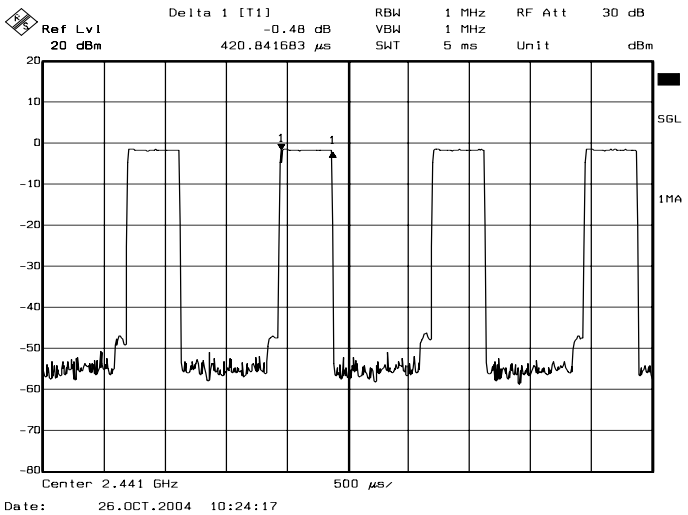
7.6 Test Results

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6
Refer to the attached graph.
The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

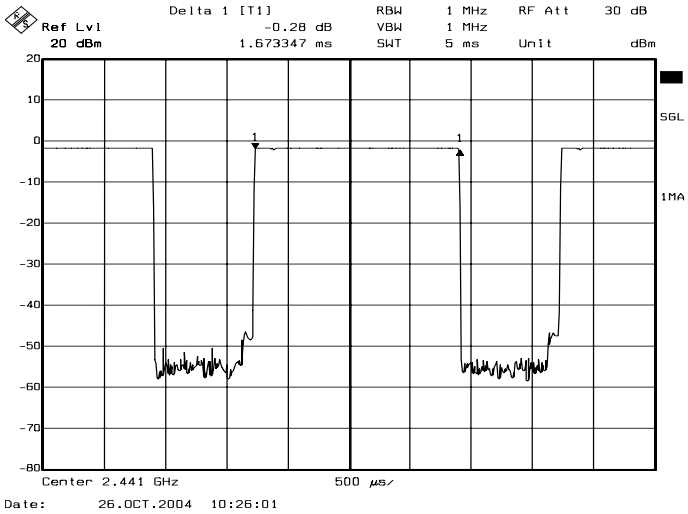
Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.42	134.40	400	PASS
2441MHz	DH3	1.67	267.20	400	PASS
2441MHz	DH5	2.26	241.07	400	PASS

DH1 Dwell time = 0.42 ms ×（1600÷2）÷ 79 × 31.6 = 134.40 (ms)
DH3 Dwell time = 1.67 ms ×（1600÷4）÷ 79 × 31.6 = 267.20 (ms)
DH5 Dwell time = 2.26 ms ×（1600÷6）÷ 79 × 31.6 = 241.07 (ms)

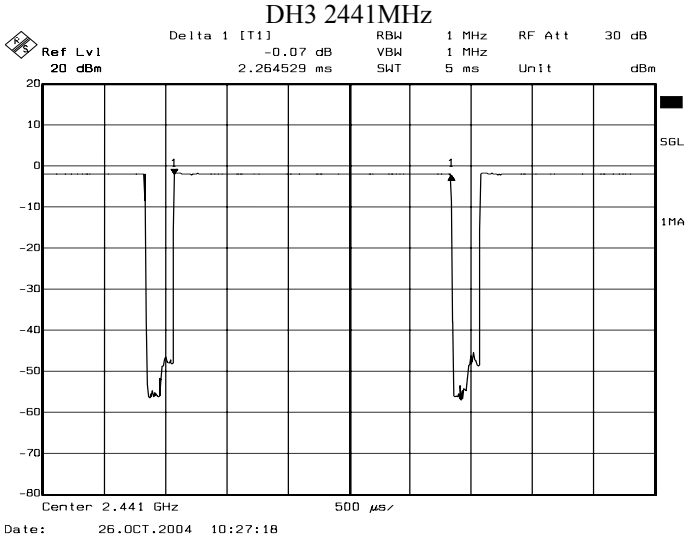
7.7 Photo of Dwell Time on Each Channel



DH1 2441MHz



DH3 2441MHz



DH5 2441MHz

8. BAND EDGE SPURIOUS EMISSIONS

Test Requirement: 15.247(d)

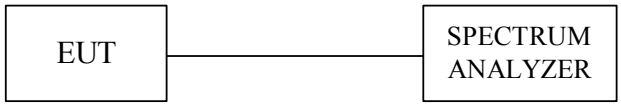
8.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

Note：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.2 Test Setup



8.3 Limits of Band edge Measurements

The emission not fallen in restricted bands should be 20dB below the highest emission level of operating band (in 100KHz Resolution Bandwidth).

For the emissions fallen in the restricted bands listed in section 15.205, the maximum permitted average field strength should meet the requirement listed in section 15.209.

8.4 Test Procedure

Section 15.247(d): Spurious emissions. The following tests are required:
Set the span wide enough to capture the peak level of the emission operating on the channel closest to the band edge. Set the RBW and VBW and maxhold the trace. Allow the trace to stabilize. Enable the marker-delta function, then use the marker-delta value function to move the marker to the peak of the in-band emission submit the plot.

8.5 Uncertainty of Conducted Emission

The uncertainty of Frequency : ± 100kHz.
The uncertainty of Amplitude : ± 2dB.

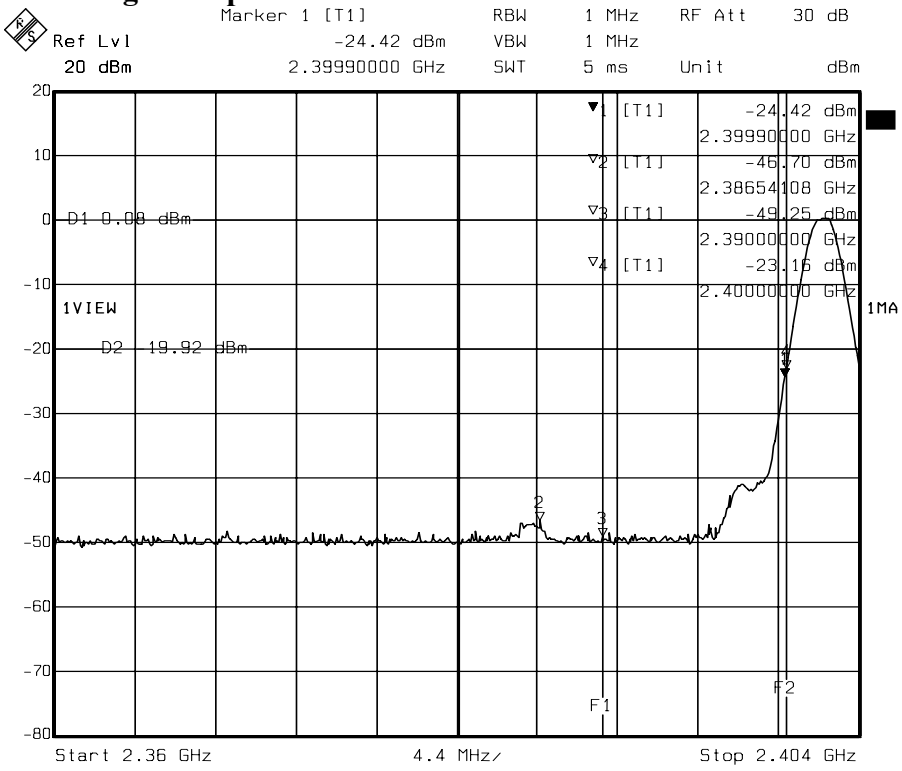
8.6 Test Results

Band edge		Measured radiated band edge field strength (dBuV/m)		Radiated band edge field strength limit (dBuV/m)		Test result
		Horizontal	Vertical	Horizontal	Vertical	
2399.90	PK	63.56	66.41	74.00	74.00	PASS
	AVG	62.93	66.10	67.43	70.60	
2483.50	PK	37.77	39.74	74.00	74.00	PASS
	AVG	37.29	39.34	54.00	54.00	

Note :
Radiated band edge field strength is measured with FCC recommended mark-delta method.
Measured radiated band edge field strength Test Results = Radiated fundamental emission field strength - DELTA.
DELTA = Relative measurement between conducted measured peak level of fundamental emission and relevant band edge emission. Please refer to 8.7 photo of conducted band edge Measurement.

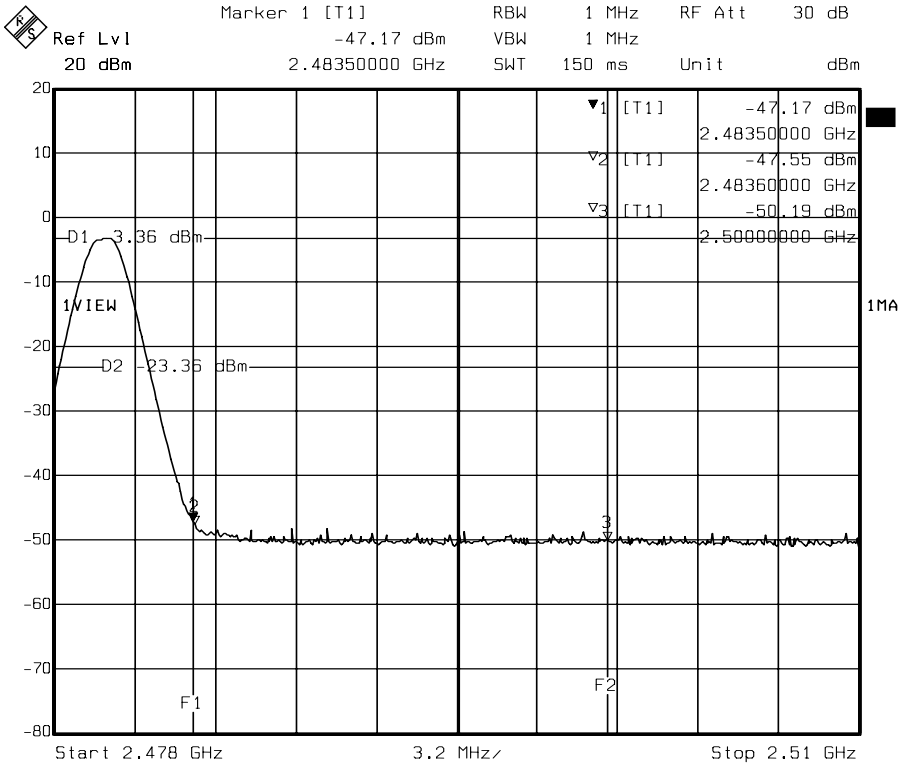
8.7 Photo of Band edge Measurement

Band edge Compliance of RF Conducted Emissions



Date: 26.OCT.2004 11:16:17

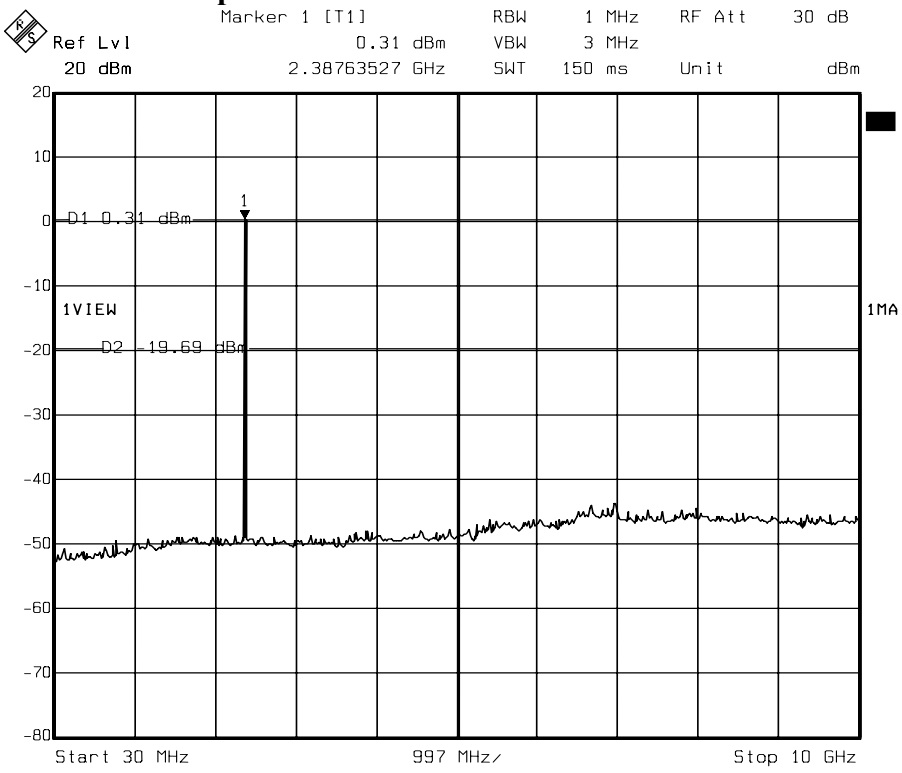
FRONT



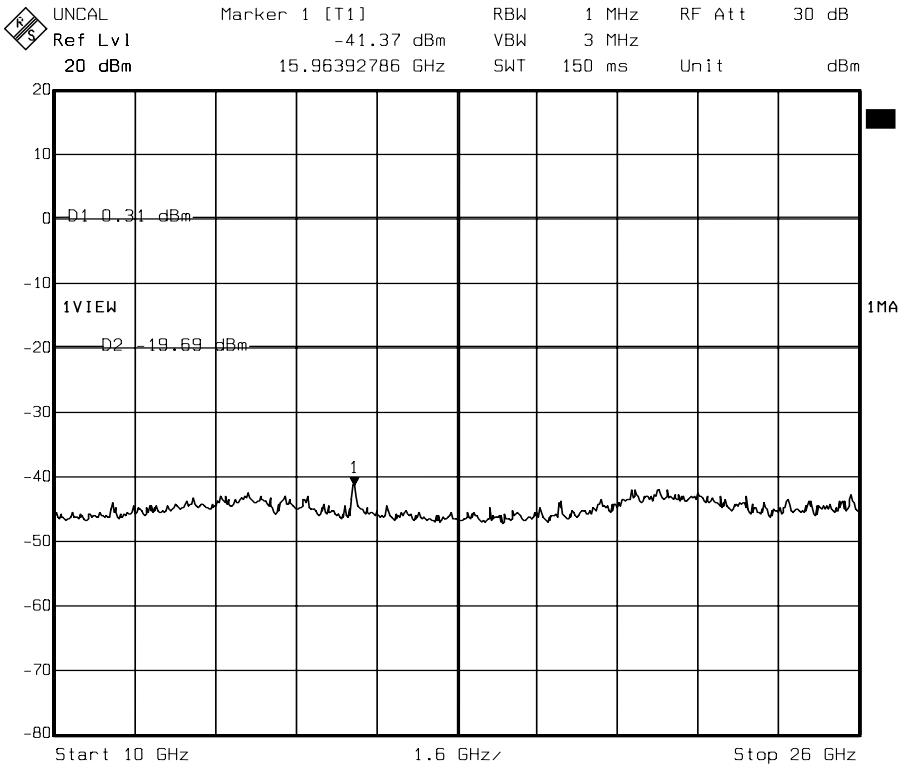
Date: 26.OCT.2004 11:22:26

REAR

Out-of-band Spurious Emissions-conducted measurement



Date: 26.OCT.2004 11:25:43



Date: 26.OCT.2004 11:29:10

9. OUT OF BAND SPURIOUS EMISSIONS -RADIATED MEASUREMENTS

Test Requirement: 15.247(d)

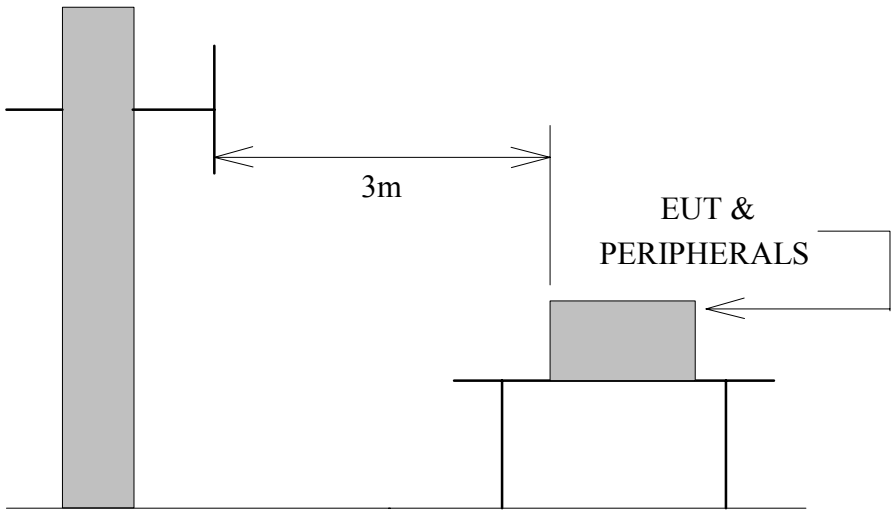
9.1 Test Equipments

The following test equipments are utilized in making the measurements contained in this report.

Manufacturer or Type	Model No	Serial No	Date of Calibration	Calibration Period	Remark
CHASE BI-LOG ANTENNA	CBL6112B	2421	May 07, 2004	1 Year	FINAL
R/S SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004	1 Year	FINAL
OPEN SITE	----------	No.2	May 07, 2004	1 Year	FINAL
N TYPE COAXIAL CABLE	CHA9525	4	July 13, 2004	1 Year	FINAL
Horn Antenna	AH-118	10089	February 25, 2004	1 Year	FINAL
HP Pre-amplifier	8449B	3008A01471	November 18, 2003	1 Year	FINAL
HP High pass filter	84300/80038	011	CAL. ON USE	1 Year	FINAL
Horn Antenna	AH-840	03077	February 25, 2004	1 Year	FINAL

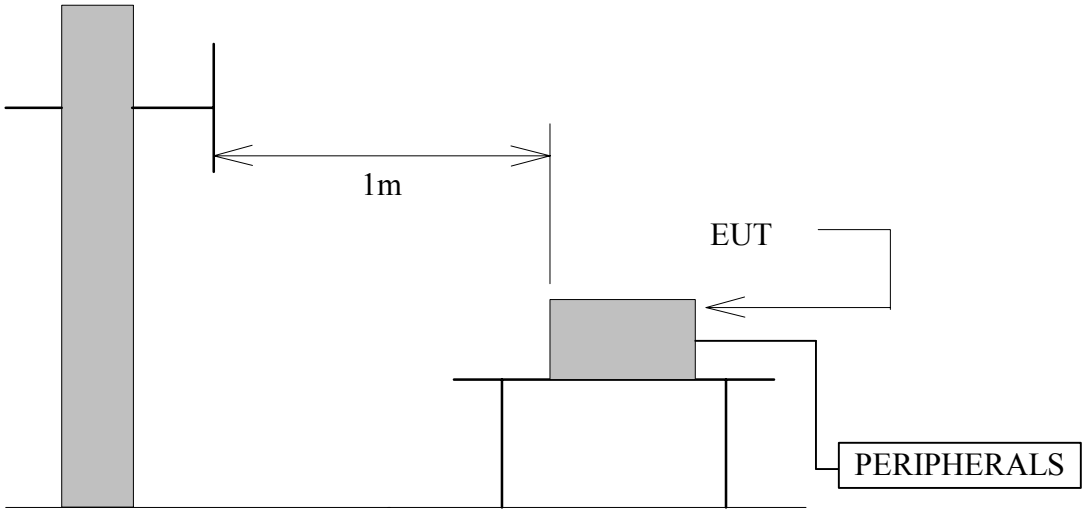
9.2 Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission below 1GHz.



Antenna Elevation Variable

The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



Antenna Elevation Variable

9.3 Radiation Limit

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/M)	Radiated (μV/M)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

9.4 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. During performing radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1GHz, the EUT was set 1 meters away from the interference-receiving antenna.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

9.5 Uncertainty of Radiated Emission

The uncertainty of radiated emission is ±2.72dB.

9.6 Radiated RF Noise Measurement

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.
All readings are quasi-peak values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/18
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	22.5℃, 80%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
134.99	12.45	2.35	1.60	5.60	43.50	16.40	20.40
252.03	12.75	4.02	1.20	2.30	46.00	17.97	19.07
359.99	16.45	4.63	3.50	4.80	46.00	24.58	25.88
399.99	18.41	4.85	6.90	4.00	46.00	30.16	27.26
499.99	17.83	5.19	2.90	3.20	46.00	25.92	26.22
703.04	19.53	6.29	-0.50	-0.40	46.00	25.32	25.42
1000.00	21.84	7.66	*	*	54.00	*	*

REMARKS：

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. The EUT can be operated in transmitting, stand-by and receiving mode. After preliminary scan, EUT in transmitting mode has highest emission. The EUT was set in transmitting mode at finial test to get the worst case test results.
4. According to technical experience, all spurious emission at channel 1, 40 and 79 are almost the same below 1GHz, so the spurious emission test result of the channel 1 was chosen as representative in finial test.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH01 (2402 MHz) RX (Low)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2400.58	47.05	31.80	3.58	35.30	9.50	0.00	37.63	74	-36.37	P	1.0
2400.58	38.56	31.80	3.58	35.30	9.50	0.00	29.14	54	-24.86	A	1.0
4801.16	45.02	34.29	5.08	35.14	9.50	0.00	39.74	74	-34.26	P	1.0
4801.16	33.52	34.29	5.08	35.14	9.50	0.00	28.24	54	-25.76	A	1.0
7201.58	45.87	39.82	6.72	35.66	9.50	0.00	47.25	74	-26.75	P	1.0
7201.58	33.25	39.82	6.72	35.66	9.50	0.00	34.63	54	-19.37	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH01 (2402 MHz) RX (Low)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2400.49	49.46	31.80	3.58	35.30	9.50	0.00	40.04	74	-33.96	P	1.0
2400.49	37.39	31.80	3.58	35.30	9.50	0.00	27.97	54	-26.03	A	1.0
4801.10	44.86	34.29	5.08	35.14	9.50	0.00	39.58	74	-34.42	P	1.0
4801.10	32.63	34.29	5.08	35.14	9.50	0.00	27.35	54	-26.65	A	1.0
7201.61	45.45	39.82	6.72	35.66	9.50	0.00	46.83	74	-27.17	P	1.0
7201.61	33.23	39.82	6.72	35.66	9.50	0.00	34.61	54	-19.39	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH40 (2441 MHz) RX (Mid)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2439.45	46.98	31.76	3.59	35.30	9.50	0.00	37.53	74	-36.47	P	1.0
2439.45	37.02	31.76	3.59	35.30	9.50	0.00	27.57	54	-26.43	A	1.0
4878.68	44.25	34.80	5.10	35.20	9.50	0.00	39.45	74	-34.55	P	1.0
4878.68	33.02	34.80	5.10	35.20	9.50	0.00	28.22	54	-25.78	A	1.0
7318.98	45.06	39.77	6.80	35.64	9.50	0.00	46.49	74	-27.51	P	1.0
7318.98	33.15	39.77	6.80	35.64	9.50	0.00	34.58	54	-19.42	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH40 (2441 MHz) RX (Mid)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2439.12	46.22	31.76	3.59	35.30	9.50	0.00	36.77	74	-37.23	P	1.0
2439.12	37.61	31.76	3.59	35.30	9.50	0.00	28.16	54	-25.84	A	1.0
4878.59	44.18	34.80	5.10	35.20	9.50	0.00	39.38	74	-34.62	P	1.0
4878.59	32.44	34.80	5.10	35.20	9.50	0.00	27.64	54	-26.36	A	1.0
7319.05	45.02	39.77	6.80	35.64	9.50	0.00	46.45	74	-27.55	P	1.0
7319.05	33.19	39.77	6.80	35.64	9.50	0.00	34.62	54	-19.38	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH79 (2480 MHz) RX (High)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2478.56	47.00	31.72	3.61	35.30	9.50	0.00	37.53	74	-36.47	P	1.0
2478.56	36.97	31.72	3.61	35.30	9.50	0.00	27.50	54	-26.50	A	1.0
4957.06	44.95	35.32	5.13	35.27	9.50	0.00	40.63	74	-33.37	P	1.0
4957.06	32.56	35.32	5.13	35.27	9.50	0.00	28.24	54	-25.76	A	1.0
7435.36	44.98	39.73	6.88	35.61	9.50	0.00	46.47	74	-27.53	P	1.0
7435.36	33.05	39.73	6.88	35.61	9.50	0.00	34.54	54	-19.46	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Receiver was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH79 (2480 MHz) RX (High)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
2478.72	46.95	31.72	3.61	35.30	9.50	0.00	37.48	74	-36.52	P	1.0
2478.72	37.06	31.72	3.61	35.30	9.50	0.00	27.59	54	-26.41	A	1.0
4957.02	44.56	35.32	5.13	35.27	9.50	0.00	40.24	74	-33.76	P	1.0
4957.02	33.01	35.32	5.13	35.27	9.50	0.00	28.69	54	-25.31	A	1.0
7435.52	45.03	39.73	6.88	35.61	9.50	0.00	46.52	74	-27.48	P	1.0
7435.52	33.15	39.73	6.88	35.61	9.50	0.00	34.64	54	-19.36	A	1.0

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain.
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation as follow :
   Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit
5. The test limit is 3M limit.
6. The frequency was searched to 18GHz.
7. The other emission levels were very low against the limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH01 (2402 MHz) TX (Low)				Measurement Distance at 1m Horizontal polarity							
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
* 2389.90	27.29	31.81	3.57	0.00	9.50	0.00	53.17	74	-20.83	P	1.00
* 2389.90	14.85	31.81	3.57	0.00	9.50	0.00	40.73	54	-13.27	A	1.00
2402.17	62.19	31.80	3.58	0.00	9.50	0.00	88.06	Fundamental Frequency		P	1.00
2402.17	61.56	31.80	3.58	0.00	9.50	0.00	87.43			A	1.00
* 4804.34	48.44	34.31	5.08	35.14	9.50	2.08	45.27	74	-28.73	P	1.00
* 4804.34	38.61	34.31	5.08	35.14	9.50	2.08	35.44	54	-18.56	A	1.00
7206.34	45.35	39.82	6.72	35.66	9.50	2.00	48.73	74	-25.27	P	1.00
7206.34	33.24	39.82	6.72	35.66	9.50	2.00	36.62	54	-17.38	A	1.00
9607.05	46.65	38.54	8.28	36.37	9.50	0.64	48.23	74	-25.77	P	1.00
9607.05	35.12	38.54	8.28	36.37	9.50	0.64	36.70	54	-17.30	A	1.00
* 12010.85	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14413.02	------	------	------	------	9.50	0.60	------	------	------	------	1.00
16815.19	------	------	------	------	9.50	0.39	------	------	------	------	1.00
* 19217.36	------	------	------	------	9.50	1.86	------	------	------	------	1.00
21619.53	------	------	------	------	9.50	0.85	------	------	------	------	1.00
24021.70	------	------	------	------	9.50	3.07	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH01 (2402 MHz) TX (Low)				Measurement Distance at 1m			Vertical polarity				
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
* 2389.90	27.59	31.81	3.57	0.00	9.50	0.00	53.47	74	-20.53	P	1.00
* 2389.90	14.92	31.81	3.57	0.00	9.50	0.00	40.80	54	-13.20	A	1.00
2402.19	65.04	31.80	3.58	0.00	9.50	0.00	90.91	Fundamental Frequency		P	1.00
2402.19	64.73	31.80	3.58	0.00	9.50	0.00	90.60			A	1.00
* 4804.48	47.34	34.31	5.08	35.14	9.50	2.08	44.17	74	-29.83	P	1.00
* 4804.48	37.03	34.31	5.08	35.14	9.50	2.08	33.86	54	-20.14	A	1.00
7206.07	44.85	39.82	6.72	35.66	9.50	2.00	48.23	74	-25.77	P	1.00
7206.07	33.82	39.82	6.72	35.66	9.50	2.00	37.20	54	-16.80	A	1.00
9607.76	46.55	38.54	8.28	36.37	9.50	0.64	48.13	74	-25.87	P	1.00
9607.76	35.16	38.54	8.28	36.37	9.50	0.64	36.74	54	-17.26	A	1.00
* 12010.95	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14413.14	------	------	------	------	9.50	0.60	------	------	------	------	1.00
16815.33	------	------	------	------	9.50	0.39	------	------	------	------	1.00
* 19217.52	------	------	------	------	9.50	1.86	------	------	------	------	1.00
21619.71	------	------	------	------	9.50	0.85	------	------	------	------	1.00
24021.90	------	------	------	------	9.50	3.06	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH40 (2441 MHz) TX (Mid)				Measurement Distance at 1m Horizontal polarity							
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
2441.15	60.89	31.76	3.59	0.00	9.50	0.00	86.74	Fundamental Frequency		P	1.00
2441.15	60.56	31.76	3.59	0.00	9.50	0.00	86.41			A	1.00
* 4881.99	46.83	34.82	5.10	35.21	9.50	1.77	43.82	74	-30.18	P	1.00
* 4881.99	36.30	34.82	5.10	35.21	9.50	1.77	33.29	54	-20.71	A	1.00
* 7323.02	44.58	39.77	6.80	35.64	9.50	2.00	48.02	74	-25.98	P	1.00
* 7323.02	32.78	39.77	6.80	35.64	9.50	2.00	36.22	54	-17.78	A	1.00
9764.01	46.05	38.52	8.34	36.62	9.50	0.54	47.33	74	-26.67	P	1.00
9764.01	35.21	38.52	8.34	36.62	9.50	0.54	36.49	54	-17.51	A	1.00
* 12205.75	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14646.90	------	------	------	------	9.50	0.58	------	------	------	------	1.00
17088.05	------	------	------	------	9.50	0.54	------	------	------	------	1.00
* 19529.20	------	------	------	------	9.50	2.23	------	------	------	------	1.00
21970.35	------	------	------	------	9.50	0.71	------	------	------	------	1.00
24411.50	------	------	------	------	9.50	2.44	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH40 (2441 MHz) TX (Mid)				Measurement Distance at 1m			Vertical polarity				
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
2441.19	64.30	31.76	3.59	0.00	9.50	0.00	90.15	Fundamental Frequency		P	1.00
2441.19	63.78	31.76	3.59	0.00	9.50	0.00	89.63			A	1.00
* 4882.06	46.99	34.82	5.10	35.21	9.50	1.77	43.98	74	-30.02	P	1.00
* 4882.06	36.05	34.82	5.10	35.21	9.50	1.77	33.04	54	-20.96	A	1.00
* 7325.25	43.29	39.77	6.80	35.63	9.50	2.00	46.73	74	-27.27	P	1.00
* 7325.25	31.67	39.77	6.80	35.63	9.50	2.00	35.11	54	-18.89	A	1.00
9763.90	46.00	38.52	8.34	36.62	9.50	0.54	47.28	74	-26.72	P	1.00
9763.90	34.36	38.52	8.34	36.62	9.50	0.54	35.64	54	-18.36	A	1.00
* 12205.95	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14647.14	------	------	------	------	9.50	0.58	------	------	------	------	1.00
17088.33	------	------	------	------	9.50	0.54	------	------	------	------	1.00
* 19529.52	------	------	------	------	9.50	2.23	------	------	------	------	1.00
21970.71	------	------	------	------	9.50	0.71	------	------	------	------	1.00
24411.90	------	------	------	------	9.50	2.44	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH79 (2480 MHz) TX (High)				Measurement Distance at 1m			Horizontal polarity				
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
2480.16	62.47	31.72	3.61	0.00	9.50	0.00	88.30	Fundamental Frequency		P	1.00
2480.16	61.99	31.72	3.61	0.00	9.50	0.00	87.82			A	1.00
* 2483.60	26.70	31.72	3.61	0.00	9.50	0.00	52.53	74	-21.47	P	1.00
* 2483.60	14.82	31.72	3.61	0.00	9.50	0.00	40.65	54	-13.35	A	1.00
* 4959.97	49.16	35.34	5.13	35.27	9.50	1.46	46.32	74	-27.68	P	1.00
* 4959.97	39.66	35.34	5.13	35.27	9.50	1.46	36.82	54	-17.18	A	1.00
* 7440.21	45.30	39.72	6.88	35.61	9.50	2.00	48.79	74	-25.21	P	1.00
* 7440.21	33.25	39.72	6.88	35.61	9.50	2.00	36.74	54	-17.26	A	1.00
9920.18	46.40	38.51	8.39	36.87	9.50	0.45	47.37	74	-26.63	P	1.00
9920.18	34.52	38.51	8.39	36.87	9.50	0.45	35.49	54	-18.51	A	1.00
* 12400.80	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14880.96	------	------	------	------	9.50	0.40	------	------	------	------	1.00
17361.12	------	------	------	------	9.50	0.64	------	------	------	------	1.00
* 19841.28	------	------	------	------	9.50	2.54	------	------	------	------	1.00
* 22321.44	------	------	------	------	9.50	0.70	------	------	------	------	1.00
24801.60	------	------	------	------	9.50	1.88	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emissions not reported are much lower than the prescribed limits. Readings are both peak and average values.

Company	Billionton Systems Inc.	**Test Date**	2004/10/07
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.1℃ , 72%

CH79 (2480 MHz) TX (High)				Measurement Distance at 1m			Vertical polarity				
Freq.	Reading	AF	Cable	Pre-amp	Dist	Filter	Level	Limit	Margin	Mark	Height
(MHz)	(dBμV)	(dBμV)	(dB)	(dB)	dB	dB	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	(Meter)
2480.21	64.44	31.72	3.61	0.00	9.50	0.00	90.27	Fundamental Frequency		P	1.00
2480.21	64.04	31.72	3.61	0.00	9.50	0.00	89.87			A	1.00
* 2483.60	28.21	31.72	3.61	0.00	9.50	0.00	54.04	74	-19.96	P	1.00
* 2483.60	14.99	31.72	3.61	0.00	9.50	0.00	40.82	54	-13.18	A	1.00
* 4959.70	47.30	35.33	5.13	35.27	9.50	1.46	44.45	74	-29.55	P	1.00
* 4959.70	36.70	35.33	5.13	35.27	9.50	1.46	33.85	54	-20.15	A	1.00
* 7440.02	45.65	39.72	6.88	35.61	9.50	2.00	49.14	74	-24.86	P	1.00
* 7440.02	33.42	39.72	6.88	35.61	9.50	2.00	36.91	54	-17.09	A	1.00
9920.16	46.52	38.51	8.39	36.87	9.50	0.45	47.49	74	-26.51	P	1.00
9920.16	34.85	38.51	8.39	36.87	9.50	0.45	35.82	54	-18.18	A	1.00
* 12401.05	------	------	------	------	9.50	0.80	------	------	------	------	1.00
14881.26	------	------	------	------	9.50	0.39	------	------	------	------	1.00
17361.47	------	------	------	------	9.50	0.64	------	------	------	------	1.00
* 19841.68	------	------	------	------	9.50	2.54	------	------	------	------	1.00
* 22321.89	------	------	------	------	9.50	0.70	------	------	------	------	1.00
24802.10	------	------	------	------	9.50	1.88	------	------	------	------	1.00

Note :
1. The measurement was searched to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter : High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark “*” means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
   Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.

9.7 Photos of Open Site

10. ANTENNA REQUIREMENT

10.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2 Antenna Connected Construction

The antenna used in this product is chip antenna. The maximum Gain of this antenna is only -0.21dBi.

Appendix A

A. POWER SPECTRAL DENSITY MEASUREMENT

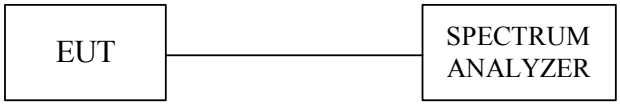
A.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Calibration Period
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004	1 Year

Note：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

A.2 Test Setup



A.3 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm/3KHz.

A.4 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3KHz RBW and 30KHz VBW, set sweep time=span / 3KHz.
The power spectral density was measured and recorded.
The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

A.5 Uncertainty of Conducted Emission

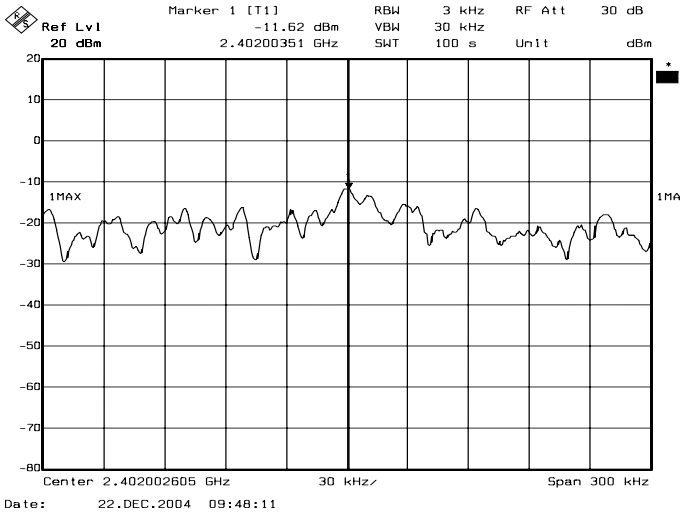
The uncertainty of conducted emission is ± 1.82dB.

A.6 Test Results

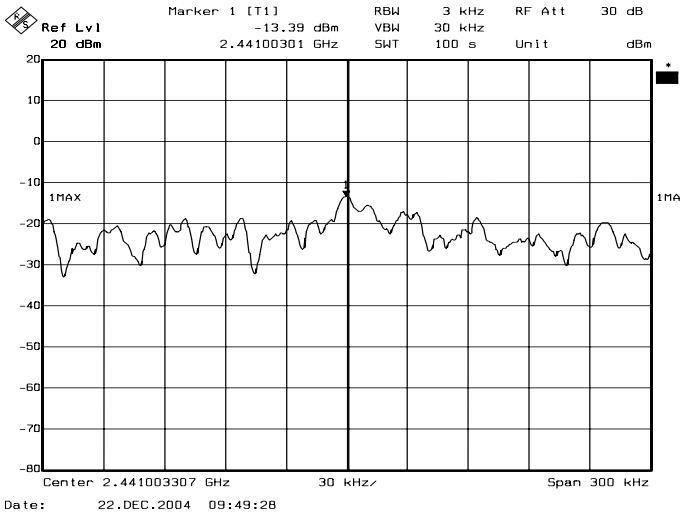
Company	Billionton Systems Inc.	**Test Date**	2004/12/22
Product Name	Bluetooth USB Dongle	**Test By**	Chris Huang
Model Name	UBTCR3C2T	**TEMP & Humidity**	23.3℃, 72%

Channel	**Channel Frequency (MHz)**	**Final RF Power Level in 3KHz BW (dBm)**	**Maxmum Limit (dBm)**	**Pass / Fail**
01(Low)	2402	-11.62	8	PASS
40(Mid)	2441	-13.39	8	PASS
79(High)	2480	-15.53	8	PASS

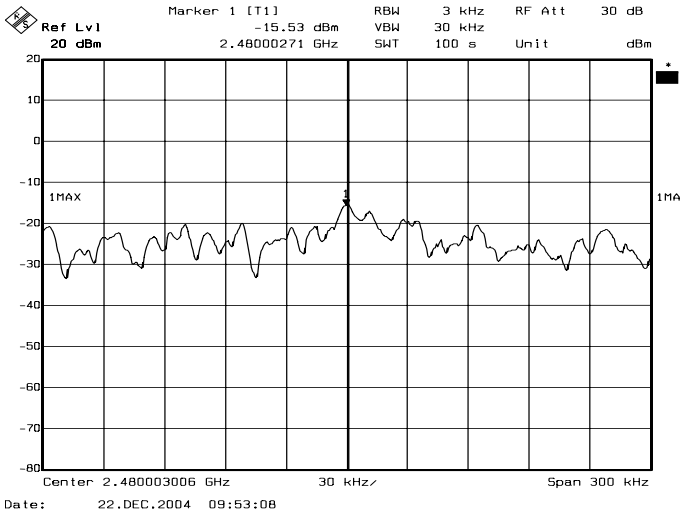
A.7 Photo of Power Spectral Density Measurement



Channel Low



Channel Middle



Channel High