

MEASUREMENT REPORT

of

Bluetooth Mouse

Applicant : Chic Technology Corp.
EUT : Bluetooth Optical Mouse
Model : BMO266
FCC ID : IOWBMO266
Report No. : C3115361

Test by :

Training Research Co., Ltd.

TEL : 886-2-26461146

FAX : 886-2-26461778

No. 15, Lane 530, Pa-Lian RD., Sec. 1, Hsichih City, Taipei Hsien, Taiwan, R.O.C.

CERTIFICATION

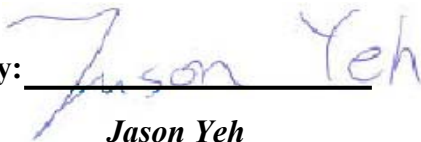
We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 as a reference. All test were conducted by **Training Research Co., Ltd.**, No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart B (Declaration of Conformity) and C Section 15.247.

Applicant : Chic Technology Corp.
Applicant address : 16F, No. 150, Chien-I Road, 235 Chung Ho City, Taipei Hsien, Taiwan, R.O.C.
Product Name : Bluetooth Optical Mouse
Model No. : BMO266
FCC ID : IOWBMO266
Report No. : C3115361
Test Date : January 03, 2005

Prepared by:


Jason Yeh

Approved by:


Jacob Lin**Conditions of issue :**

- (1) **This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.**
- (2) **This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.**
- (3) **This test report, measurements made by TRC are traceable to the NIST only Conducted and Radiated Method.**

★ NVLAP LAB CODE: 200174-0

Section 15.101(a): Equipment authorization of unintentional radiators

This submittal(s) (test report) is intended for FCC ID: **IOWBMO266** filing to comply with Section 15.247 of the FCC Part.15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DOC procedure.

SUMMARY OF TEST RESULT

Standard Section	Test Type and Limit	Result
§15.207	AC Power Conducted Emission	Compliant
§15.247(a)(1)(1)-(ii)	Carrier Frequency Separation Spec.: Min. 25kHz or 20 dB Bandwidth, which ever is greater	Compliant
§15.247(a)(1)(1)-(ii)	Number of Hopping Frequencies Used Spec.: At least 15 channels	Compliant
§15.247(a)(1)(ii)	Time of Occupancy (Dwell Time) Spec.: Max. 0.4 second within 31.6 second	Compliant
§15.247(a)(2)	20dB Bandwidth Spec.: Max. 1MHz	Compliant
§15.247(b)	Peak Out Power Spec.: max. 30dBm	Compliant
§15.247(c)	Band-edge Compliance	Compliant
§15.247(c)	Spurious Radiated Emissions Spec.: Table 15.209	Compliant

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Appendix A Radiated Emissions of Wireless Keyboard and Wireless Mouse

I . GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of applicant in support that the certification in accordance with Part 2 Subpart J and Part 15 Subpart B and C of the Commission's Rules and Regulations.

1.2 Description of EUT

FCC ID	:	IOWBMO266
EUT	:	Bluetooth Optical Mouse
Model No.	:	BMO266
Product name	:	Bluetooth Optical Mouse
Frequency Range	:	2402MHz ~ 2480MHz
Support Channel	:	79 Channels
Power Type	:	Powered by two 1.5VDC AAA batteries
IC model number	:	BCM2040KFB TSQ423P12 Z20593E

1.3 Test method

Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

The EUT's operation frequency are 2402MHz ~ 2480MHz.

During the testing, the EUT is used exclusive program to be transmitting continuously.

During the testing, we are only test the lowest, middle and highest frequencies, as below:

1. Channel 01: 2402MHz
2. Channel 40: 2441MHz
3. Channel 79: 2480MHz

The conduction pretest was found the testing mode: "Channel 01: 2402MHz" was the worst All of the radiation test data were recorded at the test report.

We only recorded the worst case in this report.

During the testing, there are three modes as below:

1. Stand-alone Transmitting.
2. Charging by Adaptor
3. Charging by USB.

The conduction pretest was found out "**#3, Charging by USB**" was the worst case.

The radiation pretest was found out "**#1, Stand-alone Transmitting**" was the worst case.

We only recorded the worst data in this report.

While testing, the EUT was made to transmit continuously and adjusted at a position, which transmitted the maximum emission.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

The testing configuration of test setup is showing in the next page.

1.4 Description of Support Equipment

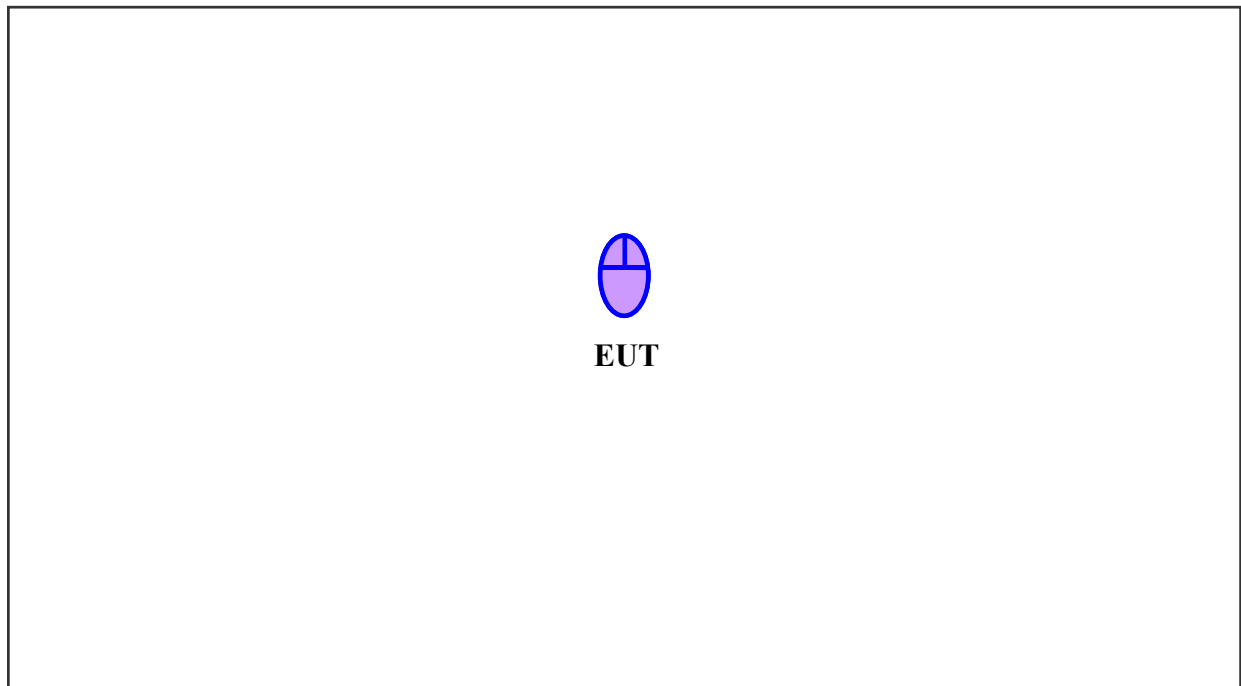
In order to construct the minimum testing, following equipment were used as the support units.

Notebook : **TOSHIBA**
Model No. : PSA10L-3V1JDP
Serial No. : Z3054434P
FCC ID : Doc Approved
Power type : AC 100 –240V 4.0A, 50 ~ 60Hz; DC 15V 4A
Power cord : Non-shielded, 3.80m long, Plastic, No ferrite core

Printer : **HP**
Model No. : C2642A
Serial No. : SG69A196GV
FCC ID : 94C2642X
Power type : 230 VAC, 50Hz
Power cord : Non-shielded, 2m long, no ferrite core
Data cable : Shielded, 1.84m long, no ferrite core

Receiver : **Chic**
Model No. : BT3035B
Serial No. : N/A
FCC ID : Doc Approved
Power type : by PC

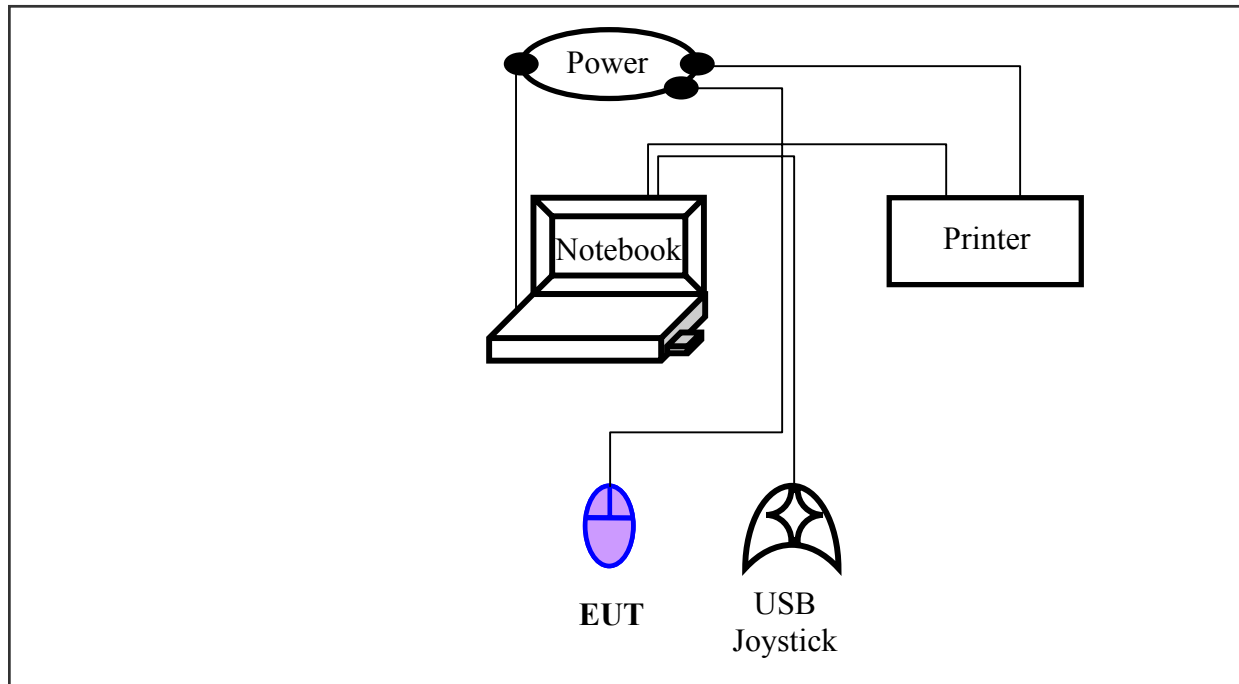
1.5 Configuration of System Under Test (Test mode: #1)



Connections:

EUT:

- *Put two AAA size, 1.5V battery into the battery cell of EUT, powers the subject device.
The EUT does not be connected with any product.
- *Power Jack --- not connect anything.

Configuration of System Under Test (Test mode: #2)**Connections:****Notebook:**

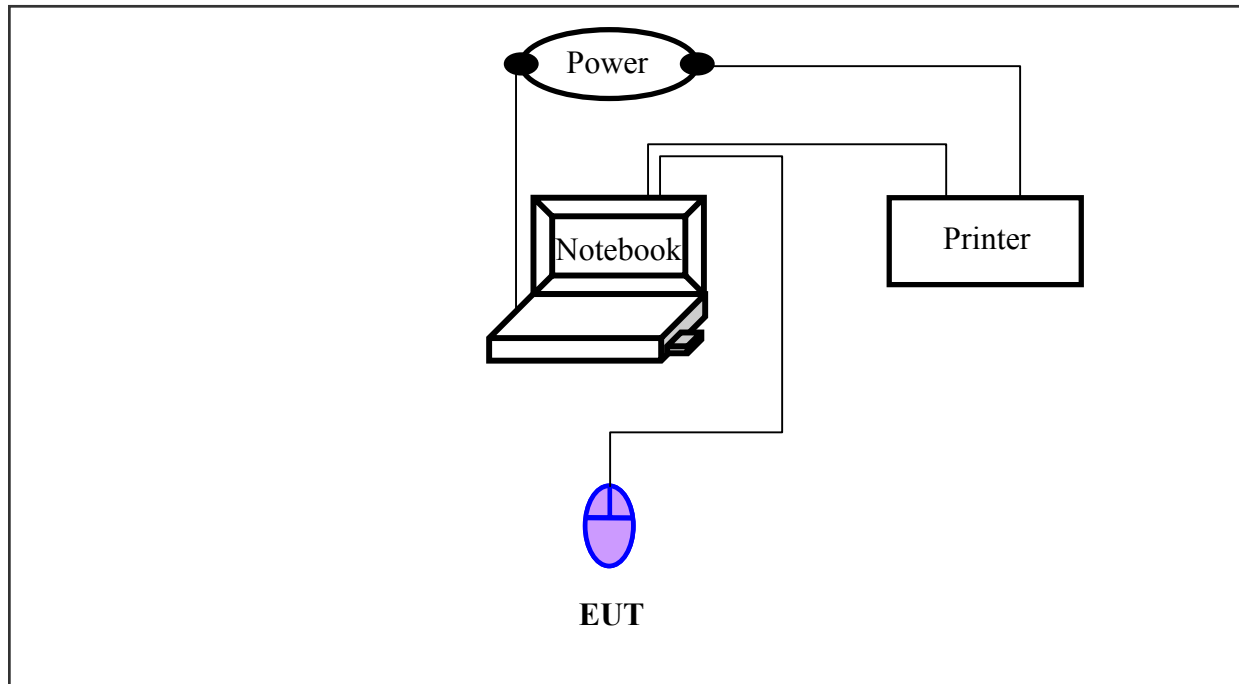
- *Monitor Port --- not connect anything.
- *Printer port --- not connect anything.
- *USB port A --- an USB joystick with 1.8m long, shielded, no ferrite bead data cable.
- *USB port B --- to Receiver
- *LAN port --- not connect anything.
- *Phone Jack --- not connect anything.
- *PCMCIA Port --- not connect anything.

Receiver:

- *USB Jack --- connect to the USB Port B of the PC.

EUT:

- *Put two AAA size, 1.5V battery into the battery cell of EUT, powers the subject device. The EUT does not be connected with any product.
- *Power Jack --- connect with 1.80m length cable to the power source.

Configuration of System Under Test (Test mode: #3)**Connections:****Notebook:**

- *Monitor Port --- not connect anything.
- *Printer port --- not connect anything.
- *USB port A --- to EUT.
- *USB port B --- to Receiver
- *LAN port --- not connect anything.
- *Phone Jack --- not connect anything.
- *PCMCIA Port --- not connect anything.

Receiver:

- *USB Jack --- connect to the USB Port B of the PC.

EUT:

- *Put two AAA size, 1.5V battery into the battery cell of EUT, powers the subject device.
The EUT does not be connected with any product.
- *Power Jack --- connected with 1.55m length data cable to the USB port A of the notebook.

1.6 Verify the Frequency and Channel

CH	0	1	2	3	4	5	6	7	8	9
0		2402	2403	2404	2405	2406	2407	2408	2409	2410
1	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420
2	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430
3	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440
4	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450
5	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460
6	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470
7	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480

Note:

1. This is for confirming that all frequencies are in 2.402GHz to 2.480GHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz.
(The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 2.402GHz to 2.480GHz. So all the items as followed in testing report are need to test these three frequencies:
Top: Channel – 01; Middle: Channel – 40; Bottom: Channel – 79.

1.7 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 and the pre-setup was written on 1.3 test method, the detail setup was written on each test item.

1.8 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter, Anechoic Chamber (FCC Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.9 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

There is a test condition apply in this test item, the test procedure description as <1.3 test method>. Three channels were tested, one in the top (CH1), one in the middle (CH40) and the other in bottom (CH79).

II. Section 15.203: Antenna requirement

A) The EUT has an integrated antenna permanently attached on the PCB, which inside the housing. In addition, there is no external antenna or connector employed. The antenna requirement stated in Sect.15.203 is inapplicable to this EUT.

The antenna specification of list as below:

Antenna Type : Integrated Antenna

Antenna Gain : 1.87dBi (Max.)

III. Section 15.207: Power Line Conducted Emissions for AC Powered Units

3.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150KHz to 30MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.3

There is a test condition apply in this test item, the test procedure description as <1.3 test method>. Three channels were tested, one in the top (CH1), one in the middle (CH40) and the other in bottom (CH79).

3.2 List of Test Instruments

Instrument Name	Model	Brand	Serial No.	Calibration Date
				Next time
EMI Receiver	8546A	HP	3520A00242	08/05/05
RF Filter Section	85460A	HP	3448A00217	08/05/05
LISN (EUT)	LISN-01	TRC	99-05	09/21/05
LISN (Support E.)	LISN-01	TRC	9912-03, 04	10/21/05
Pre-amplifier	15542 ZFL-500	Mini – Circuits	0 0117	05/20/05
6dB Attenuator	MCL BW-S6W2	Mini – Circuits	9915 – Conducted	05/20/05
10dB Attenuator	A5542 VAT010	Mini – Circuits	0215 – Conducted	05/20/05
Coaxial Cable (2 meter)	A30A30-0058-50FS-2M	Jyebao	SMA-08	05/20/05
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-09	05/20/05
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-01	05/20/05
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-02	05/20/05
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	05/20/05

3.3 Test Results of Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord. The test data only recorded worst case in report.

Test Conditions: Temperature : 25 °C Humidity : 73 % RH

Test Mode: Charging by USB

<i>Power Connected Emissions</i>					<i>FCC Class B</i>		
<i>Conductor</i>	<i>Frequency (KHz)</i>	<i>Peak (dBμV)</i>	<i>QP (dBμV)</i>	<i>Average (dBμV)</i>	<i>QP-limit (dBμV)</i>	<i>AVG-limit (dBμV)</i>	<i>Margin (dB)</i>
Line 1	173.00	43.45	---	---	65.34	55.34	-11.89
	182.00	40.42	---	---	65.09	55.09	-14.66
	201.00	44.15	---	---	64.54	54.54	-10.39
	608.00	34.60	---	---	56.00	46.00	-11.40
	673.00	35.28	---	---	56.00	46.00	-10.72
	1348.00	33.61	---	---	56.00	46.00	-12.39
	4820.00	33.63	---	---	56.00	46.00	-12.37
	7440.00	32.74	---	---	60.00	50.00	-17.26
	14080.00	30.11	---	---	60.00	50.00	-19.89
Line 2	155.00	50.60	---	---	65.86	55.86	-5.26
	201.00	48.37	---	---	64.54	54.54	-6.17
	233.00	42.40	---	---	63.63	53.63	-11.22
	340.00	36.34	---	---	60.57	50.57	-14.23
	404.00	34.22	---	---	58.74	48.74	-14.52
	673.00	35.00	---	---	56.00	46.00	-11.00
	4700.00	33.04	---	---	56.00	46.00	-12.96
	7320.00	31.83	---	---	60.00	50.00	-18.17
	18850.00	28.25	---	---	60.00	50.00	-21.75

IV. Section 15.247 (a): Technical description of the EUT

Frequency Hopping Spectrum System is a spread spectrum system in which the carrier has been modulated by a *high speed spreading code* and an *information data stream* with its *known hopping algorithm* and *avoidance method*. The high speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal. In the *operational description* demonstrates the operation principles of the base-band processor employed by the EUT, shows that which is a complete FHSS base-band processor and meets the definition of the *Frequency Hopping Spectrum System*.

V. Section 15.247(a)(1): Carrier Frequency Separation

5.1 Test Condition

The EUT must have its hopping function enabled. Use the following spectrum analyzer setting

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) bandwidth (RBW) $\geq$ 1% of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = Auto

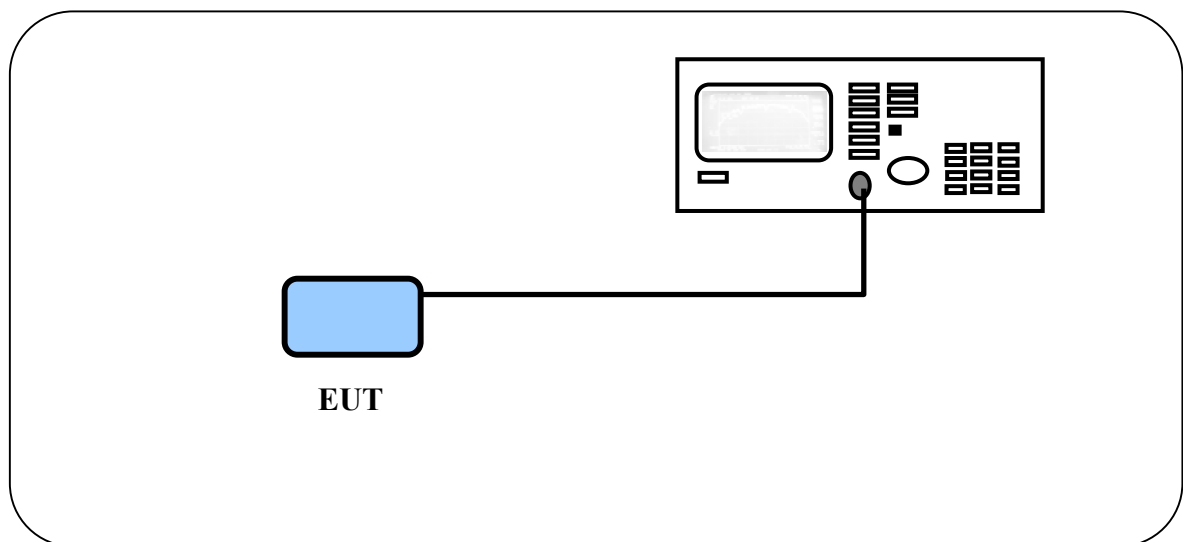
Detector Function = peak

Trace = max hold

Setting up procedure is written on 1.3 test method.

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channel. The limit is specified in one of the subparagraphs of this section. Submit this plot.

5.2 Test Instruments Configuration



Test Configuration of carrier frequency separation

5.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/04	09/30/05

5.4 Measurement Results

Channel separation	Limit	Result
MHz	KHz	PASS
1.002	$\geq 25\text{KHz}/20\text{dB bandwidth}$	

Channel Separation: 1.002MHz



VI. Section 15.247(a)(1)(ii) Number of Hopping Frequencies

6.1 Test Condition

The EUT must have its Hopping function enabled. Use the following spectrum analyzer setting:

Span = the frequency band of operation

RBW $\geq$ 1% of the span

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

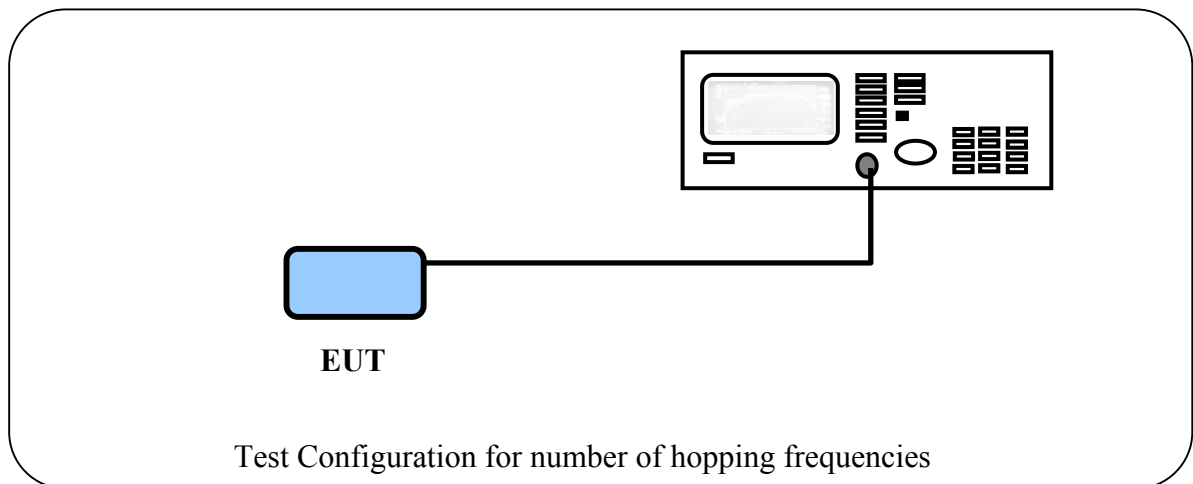
Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections. In order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this section. Submit this plots.

6.2 List of Test Instruments

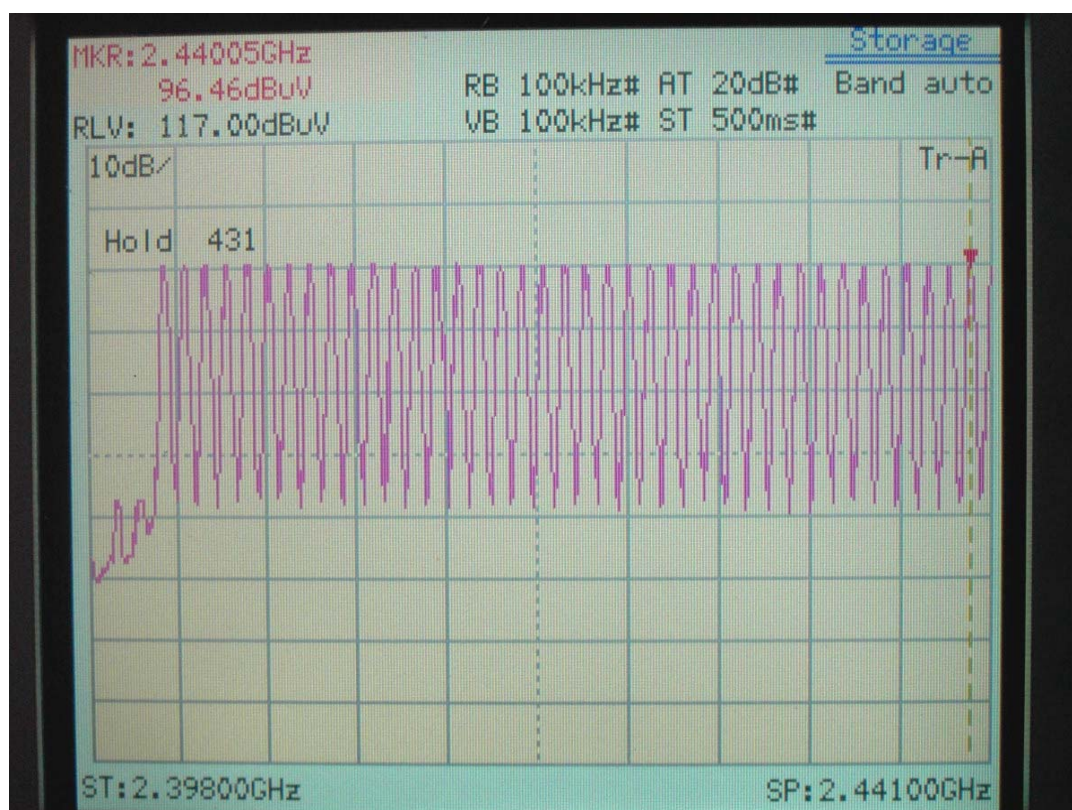
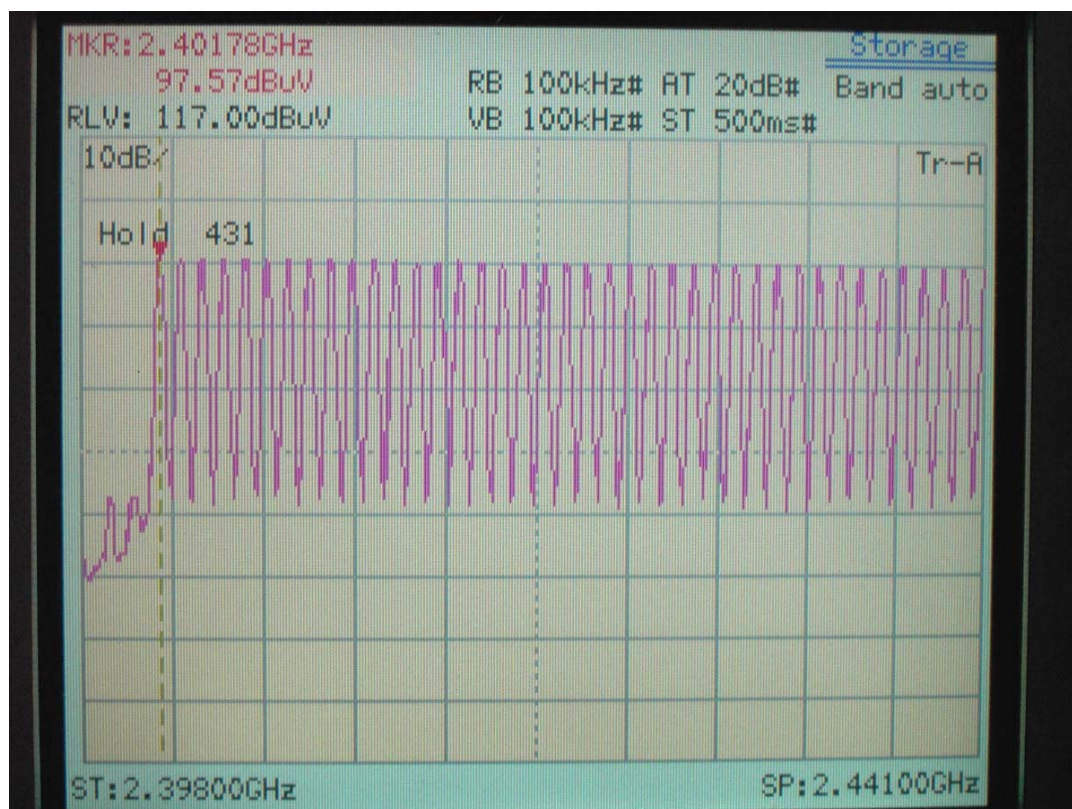
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/04	09/30/05

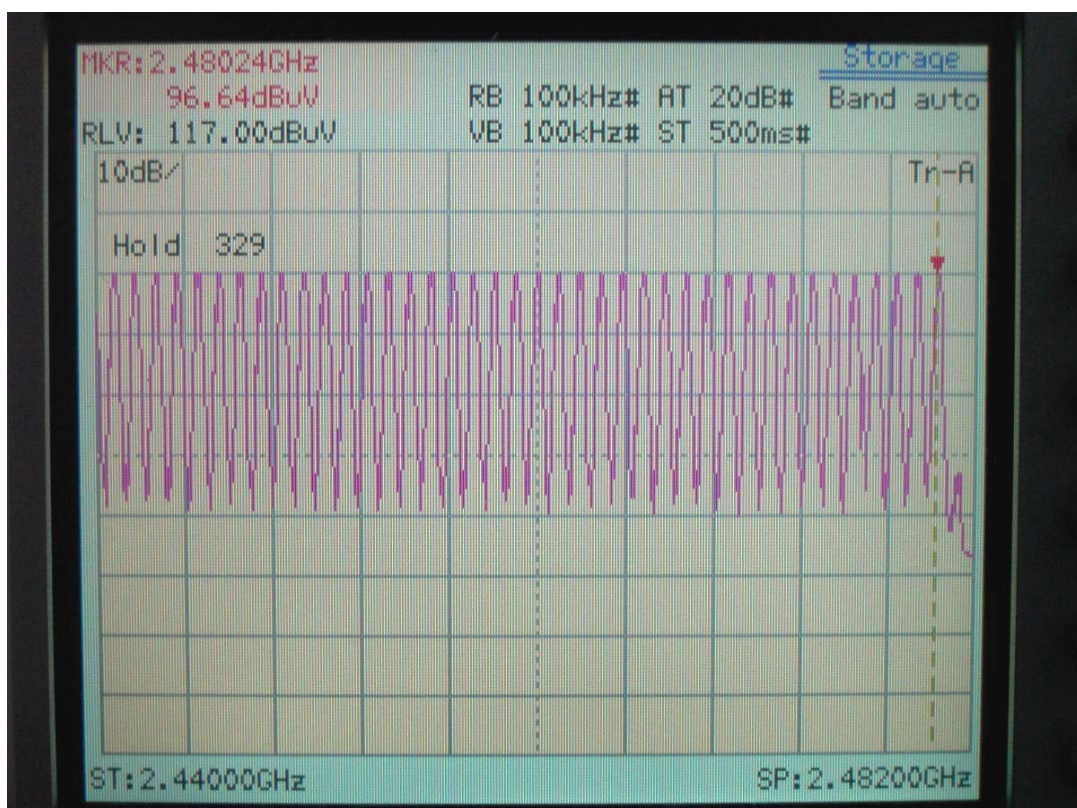
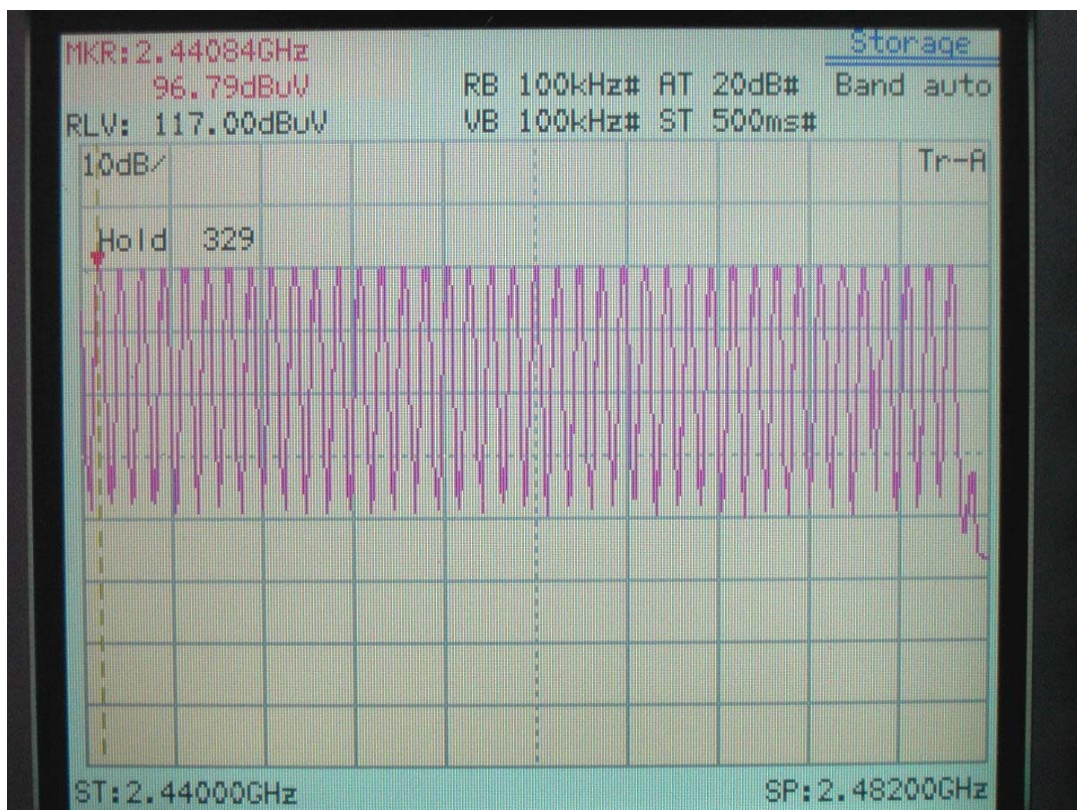
6.3 Test Instruments Configuration



6.4 Measurement Results

Top No of Hopping Channel	Limit (CH)	Measurement result (CH)	Result
	15	79	PASS





VII. Section 15.247(a)(1)(ii) Time of Occupancy (Dwell Time)

7.1 Test Condition

The EUT must have its hopping function enabled. Use the following spectrum analyzer setting:

Span = zero span, centered on a hopping channel

RBW = 1M

VBW $\geq$ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

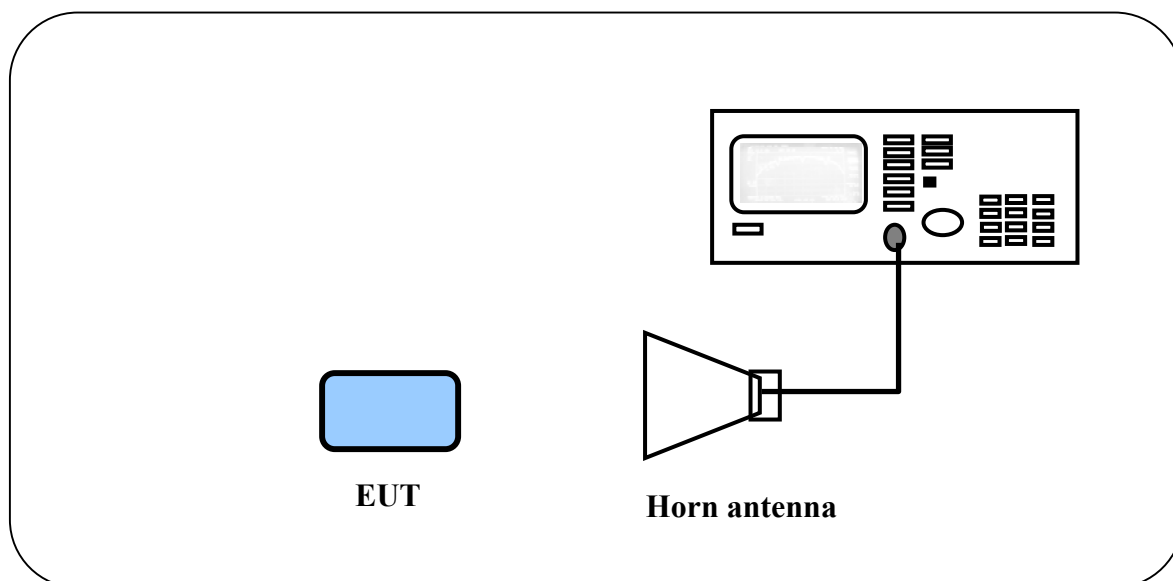
Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

7.2 List of Test Instruments

Instrument Name	Model	Brand	Serial No.	Next time
Spectrum Analyzer	8564E	H P	3720A00840	08/13/05
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/05
Microwave Preamplifier	84125C	HP	US36433002	08/13/05
Horn Antenna	3115	EMCO	9704 – 5178	12/12/04

7.3 Test Instruments Configuration

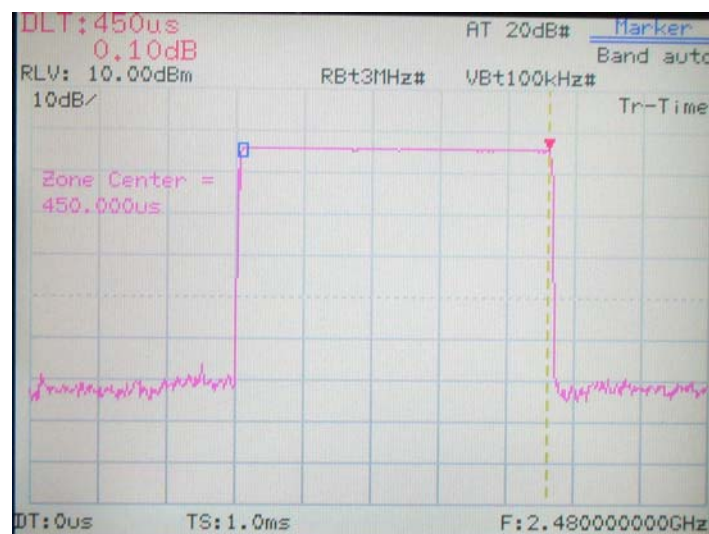
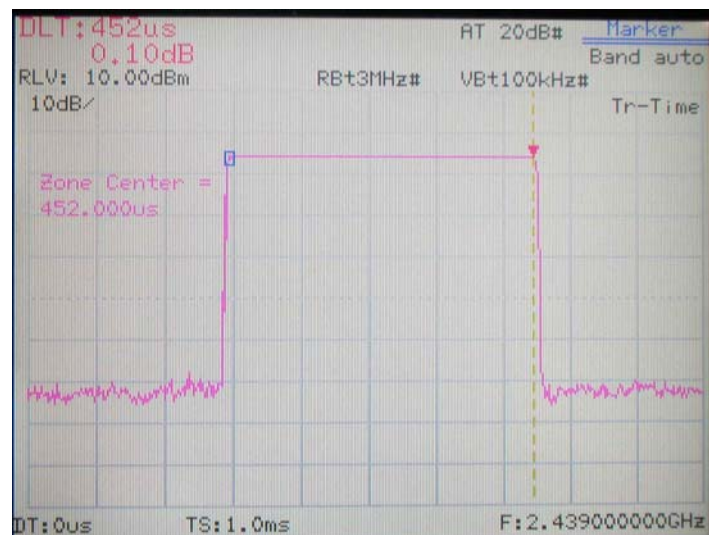
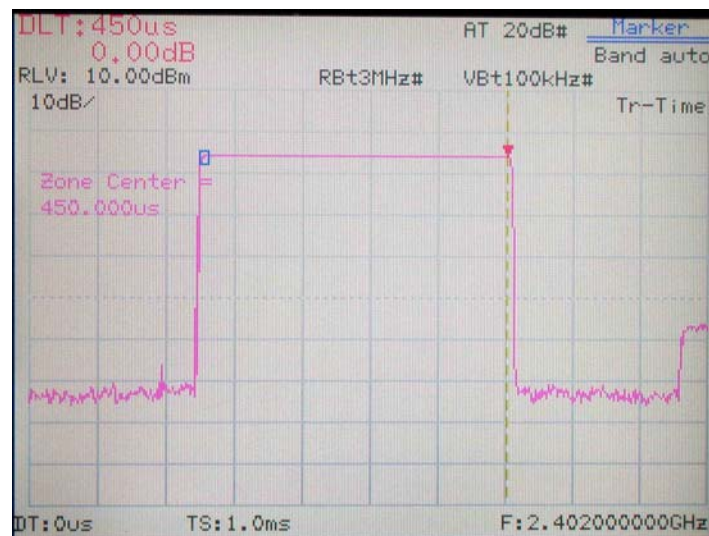


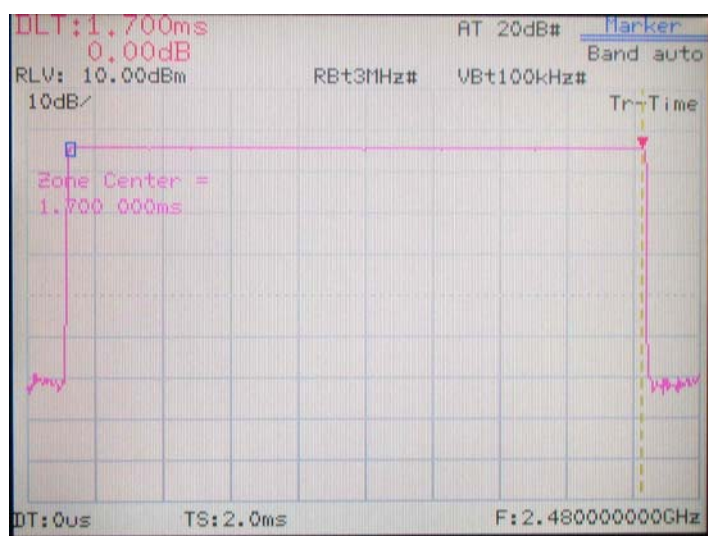
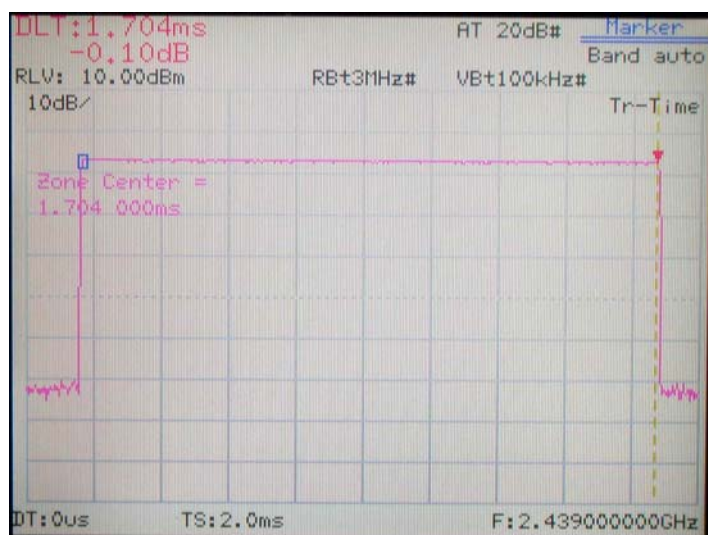
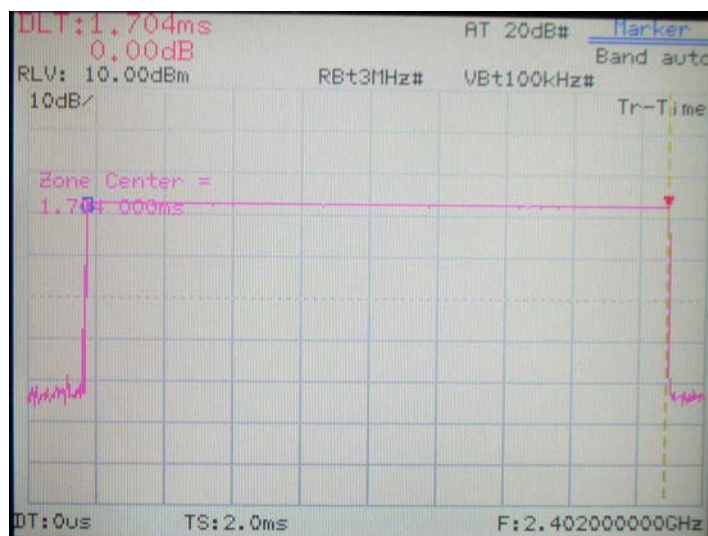
7.4 Test Results

CH	DH1-Packet (ms)	DH3-Packet (ms)	DH5-Packet (ms)	Limit (ms)
01	$0.450 \times 31.6 \times 10.12 = 143.91$	$1.704 \times 31.6 \times 5.06 = 272.46$	$2.950 \times 31.6 \times 3.37 = 314.15$	400.00
40	$0.452 \times 31.6 \times 10.12 = 144.55$	$1.704 \times 31.6 \times 5.06 = 272.46$	$2.950 \times 31.6 \times 3.37 = 314.15$	400.00
79	$0.450 \times 31.6 \times 10.12 = 143.91$	$1.700 \times 31.6 \times 5.06 = 271.82$	$2.940 \times 31.6 \times 3.37 = 313.09$	400.00

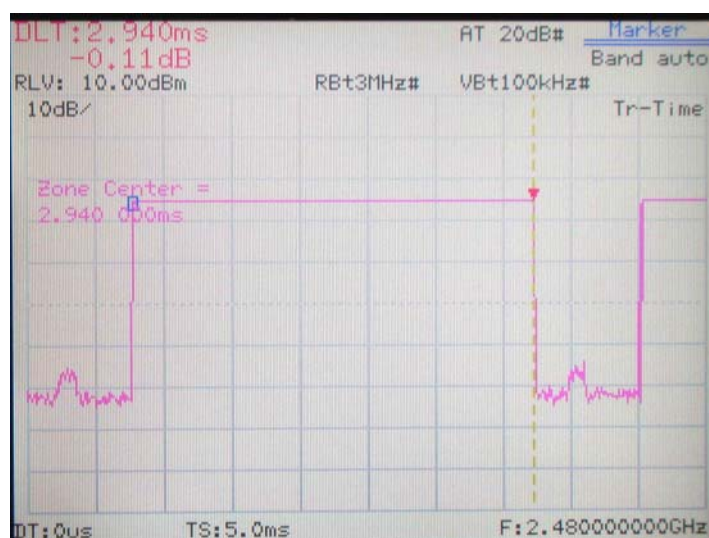
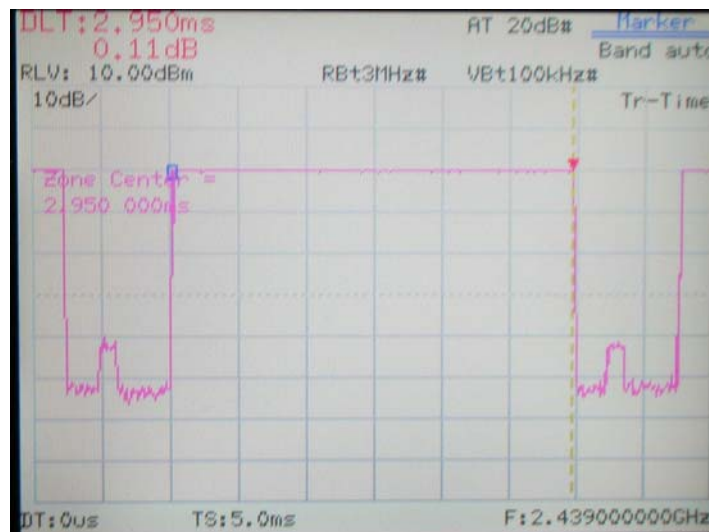
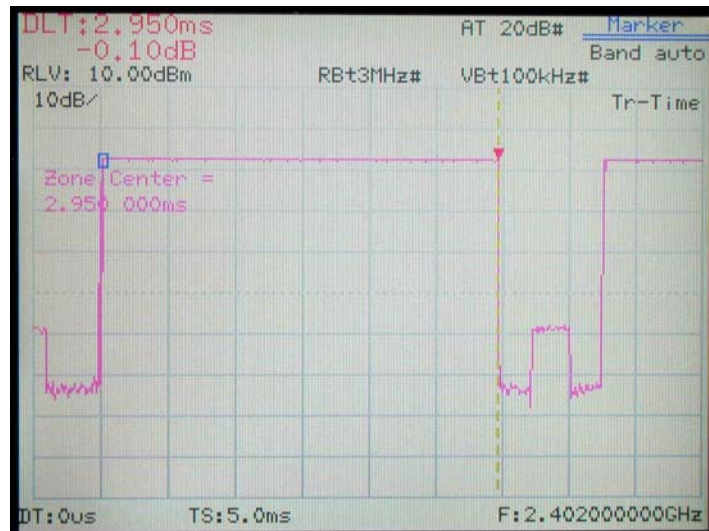
Note :

1. $0.4 \times 79 = 31.6$ s
2. DH1: $1600 \div 79 \div 2 = 10.12$ ms
3. DH3: $1600 \div 79 \div 4 = 5.06$ ms
4. DH5: $1600 \div 79 \div 6 = 3.37$ ms
5. Show as following page.

DH1-Packet :

DH3-Packet :

DH5-Packet :



XIII. Section 15.247(a)(1)(ii) 20dB Bandwidth

8.1 Test Condition

Use the following spectrum analyzer setting:

Span = the frequency band of operation

RBW $\geq$ 1% of the emission bandwidth

VBW $\geq$ RBW

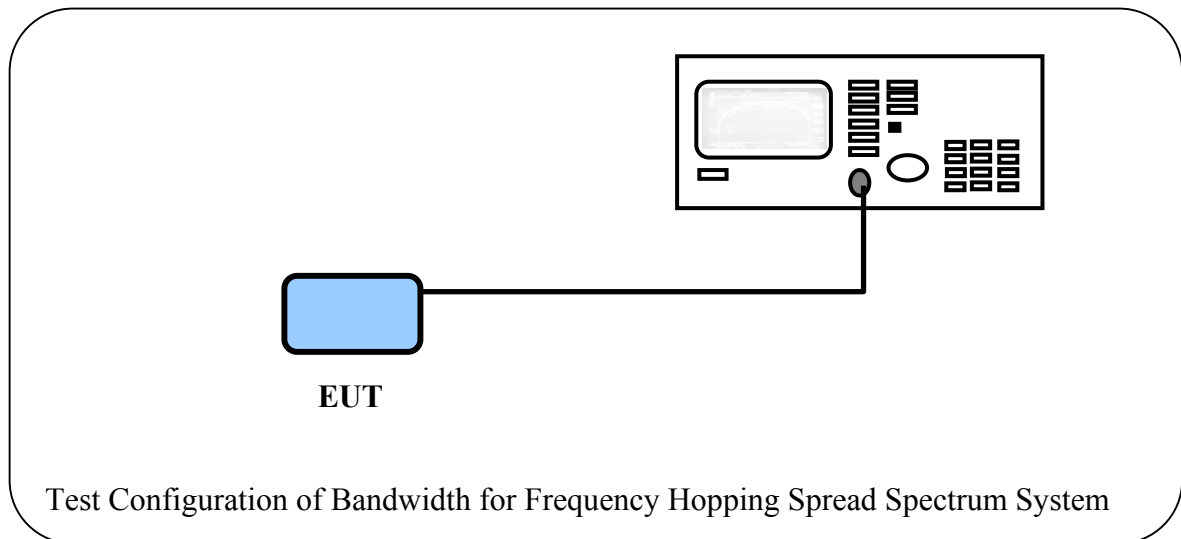
Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this section. Submit this plot(s).

8.2 Test Instruments Configuration



8.3 List of Test Instruments

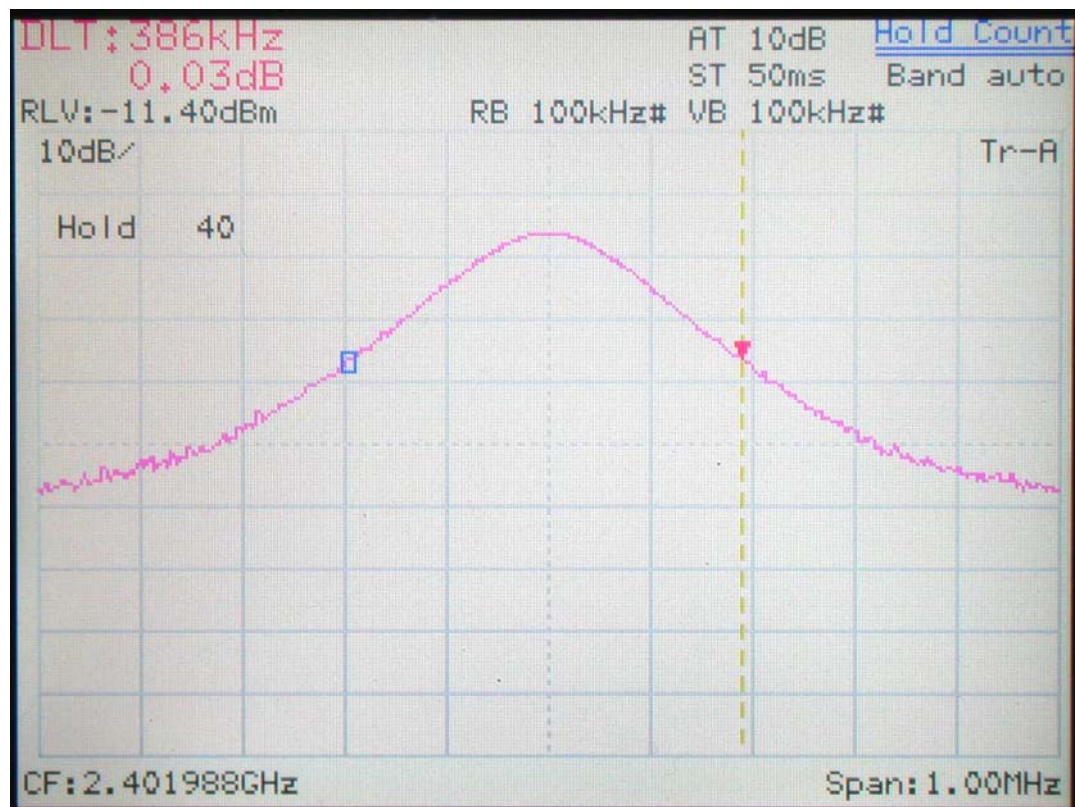
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/04	09/30/05

8.4 Test Results

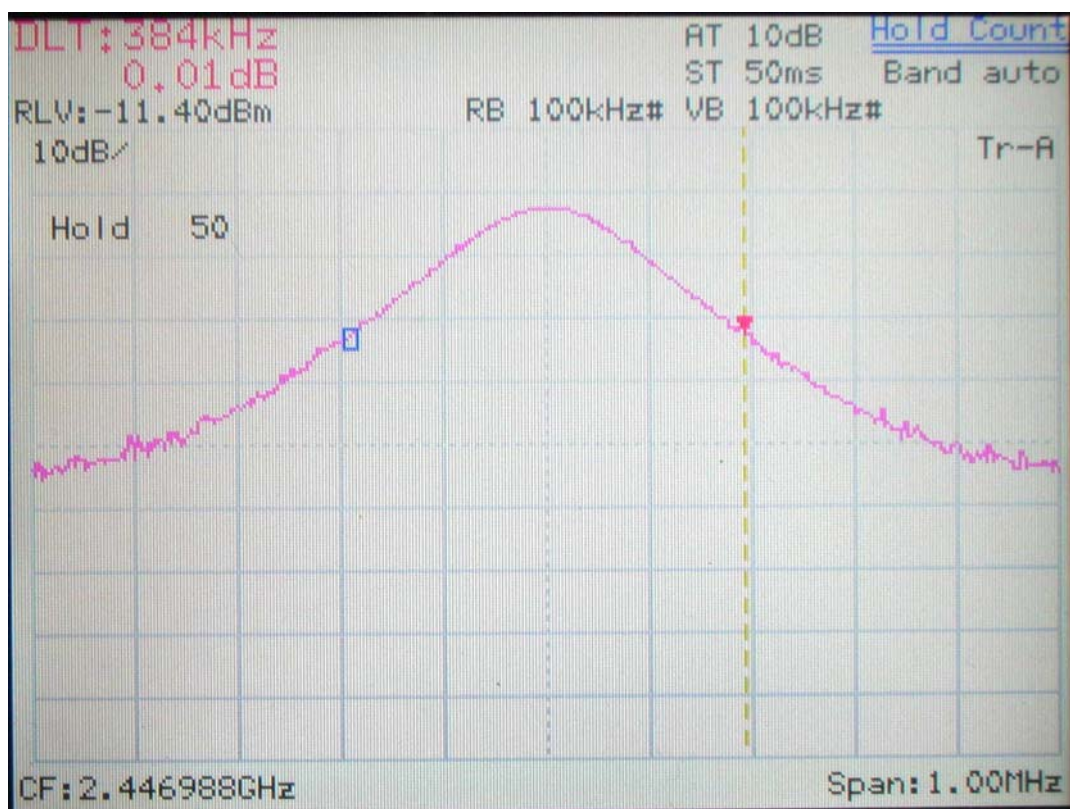
Channel	Bandwidth (KHz)	Bandwidth Limit (KHz)	Result
Channel 01	386	1000	PASS
Channel 40	384	1000	PASS
Channel 79	396	1000	PASS

Note: The data in the above table are summarizing the following attachment spectrum analyzer.

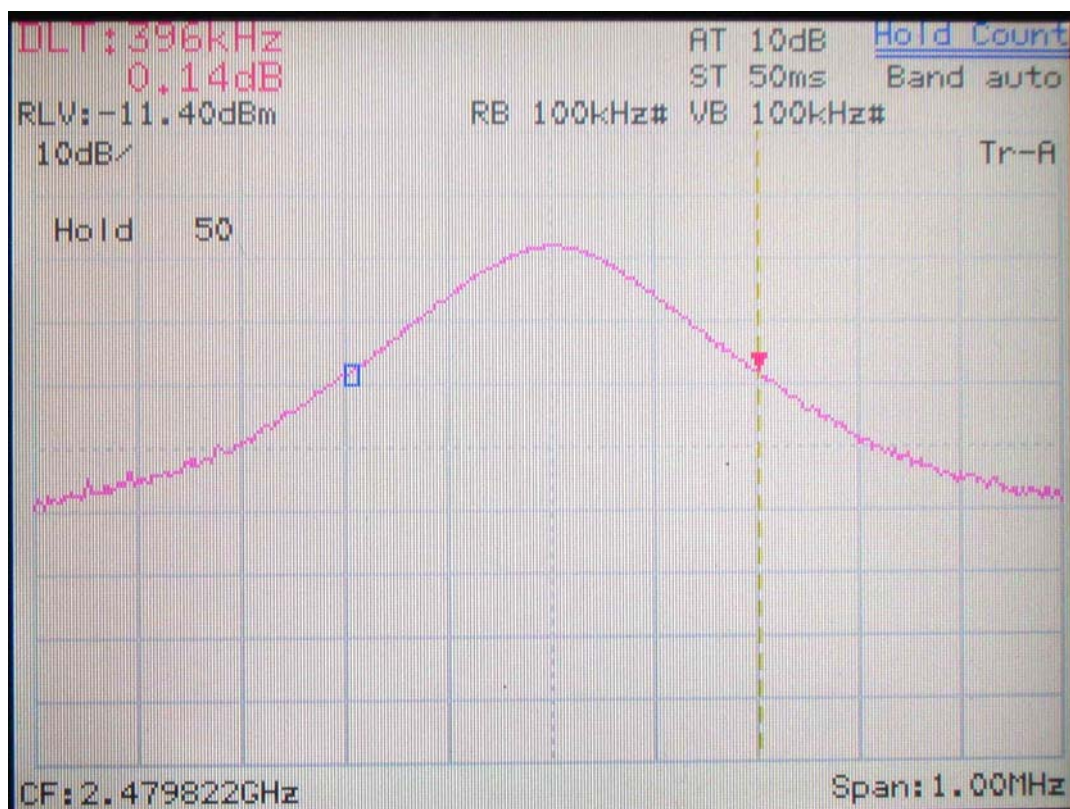
Bandwidth of Channel 01:



Bandwidth of Channel 40:

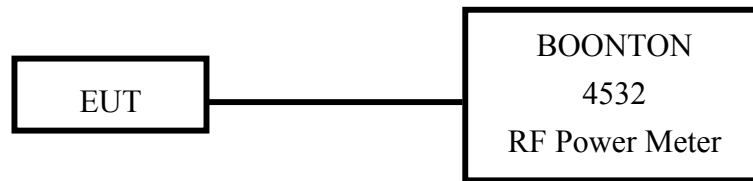


Bandwidth of Channel 79:



IX. Section 15.247(b) Peak Output Power

9.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every test. The values of the output power of the EUT will shown in the dBm directly are the transmitter output peak power. Recording as follows.

9.2 List of Test Instruments

Instrument Name	Model	Brand	Serial No.	Calibration Date
				Next time
RF Power Meter	4532	BOONTON	117501	04/16/05
Peak Power Sensor	57340	BOONTON	2698	04/16/05

9.3 Test Result

Formula:

RF output power of EUT + |Cable loss| = Output peak power

Channel	RF Output	Cable Loss	Output peak power	Limit	Margin
	dBm	dBm	dBm	dBm	dB
CH 01	1.48	1.00	2.48	30	-27.52
CH 40	-2.42	1.00	-1.42	30	-31.42
CH 79	-2.13	1.00	-1.13	30	-31.13

X. Section 15.247(c) Band-edge Compliance

10.1 Test Condition

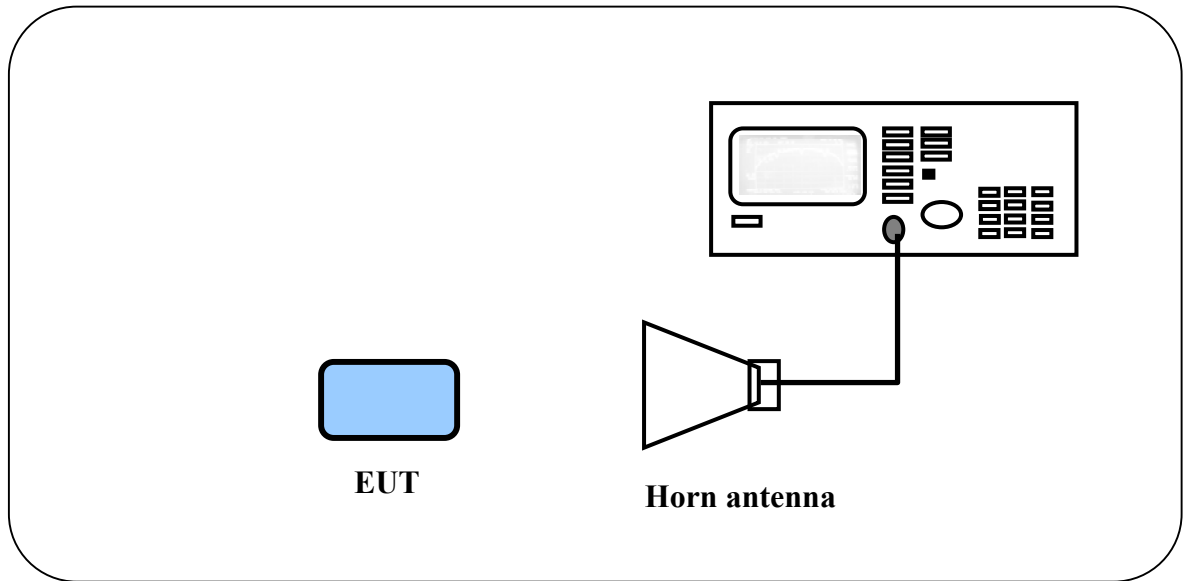
If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either *at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a)*,

We perform this section by the *radiated manner*, the RBW is set to 100kHz and VBW>RBW. We'd made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured*. If the emissions fall in the restricted bands stated in the Part15.205(a) must also *comply with the radiated emission limits specified in Part15.209(a)*. (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)

10.2 List of Test Instruments

				<u>Calibration Date</u>
<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Serial No.</u>	<u>Next time</u>
Spectrum Analyzer	8564E	H P	3720A00840	08/13/05
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/05
Microwave	84125C	HP	US36433002	08/13/05
Preamplifier				
Horn Antenna	3115	EMCO	9704 – 5178	12/12/04

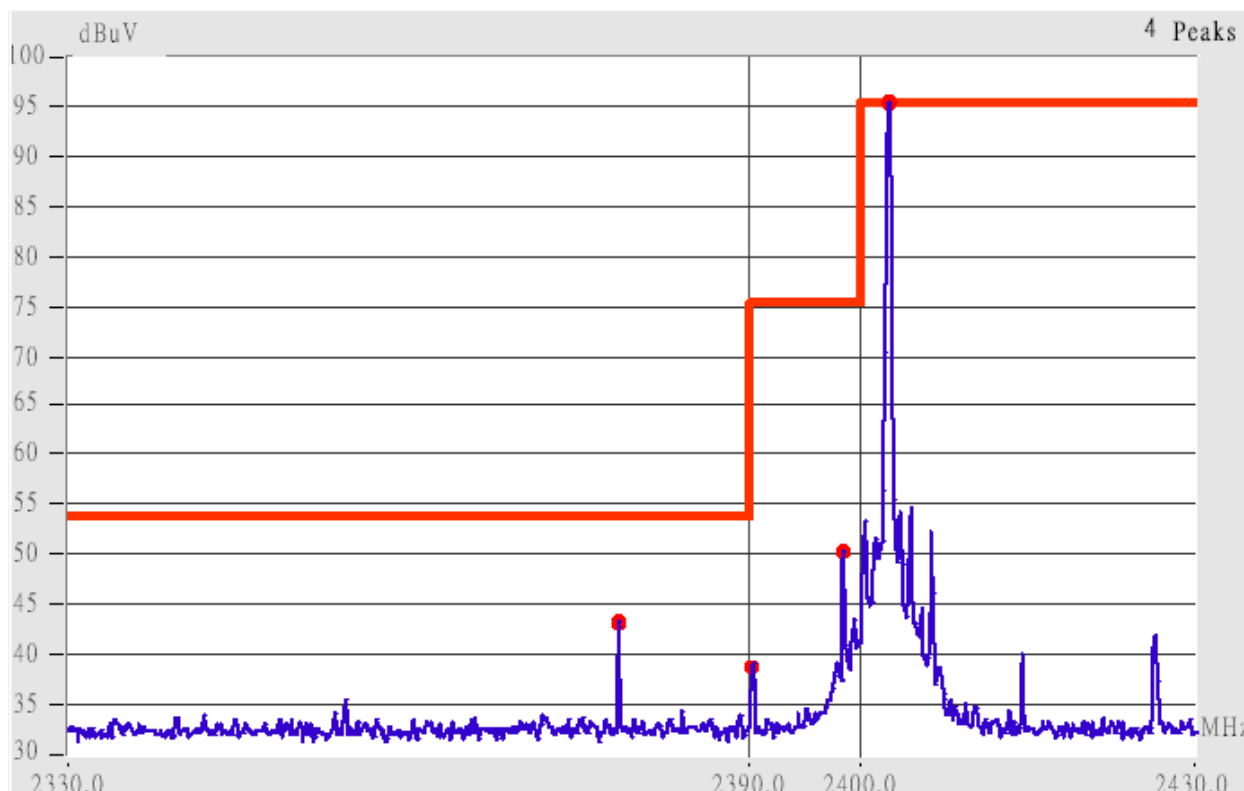
10.3 Test Instruments Configuration



10.4 Test Result of the Bandedge

The following pages show our observations referring to the channel 1 and 79 respectively.

Channel 01

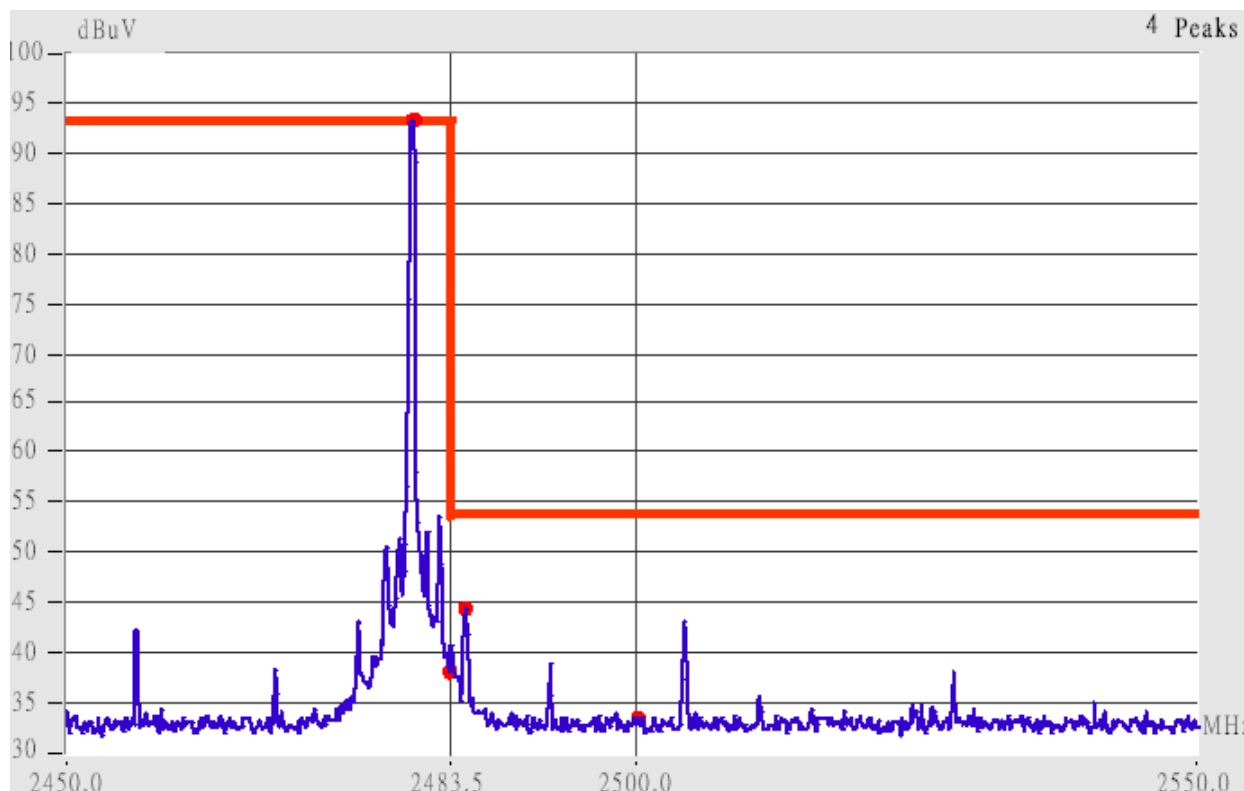


This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					Corrected Amplitude (dBμV/m)		Class B		
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table ()	Factors (dB)	Peak	Average	Limit (dBμV/m)		Margin (dB)
							Peak	Ave.	
2378.15	Hor	1.00	159	9.15	47.48	---	73.96	53.96	-6.48
2390.02	Hor	1.00	152	9.18	43.18	---	73.96	53.96	-10.78
2378.10	Ver	1.00	32	9.15	44.65	---	73.96	53.96	-9.31
2390.02	Ver	1.00	151	9.18	42.68	---	73.96	53.96	-11.28

Channel 79



This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 79.

3. The lobe left by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					Corrected Amplitude (dBμV/m)		Class B		
Frequency (MHz)	Ant. P.	Ant. H. (m)	Table (°)	Factors (dB)	Peak	Average	Limit (dBμV/m)		Margin (dB)
							Peak	Ave.	
2483.50	Hor	1.00	283	9.44	50.28	---	73.96	53.96	-3.68
2491.96	Hor	1.00	277	9.47	46.13	---	73.96	53.96	-7.83
2500.01	Hor	1.00	188	9.49	43.82	---	73.96	53.96	-10.14
2483.50	Ver	1.00	240	9.44	46.11	---	73.96	53.96	-7.85
2499.60	Ver	1.00	322	9.49	45.82	---	73.96	53.96	-8.14
2500.01	Ver	1.00	309	9.49	42.66	---	73.96	53.96	-11.30

XI. Section 15.247(c) Spurious Radiated Emissions

11.1 Test Condition and Setup

We'd performed the test by the *radiated emission skill*: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we'd set the spectrum analyzer's 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT. Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, SCHWARZECK whole range Small Biconical Antenna (Model No.: UBAA9114 & BBVU9135) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/HP Horn Antenna (Model 3115 / 84125-80008) for 1G - 25GHz.

At each frequency, the EUT was rotated 360 degrees, stand on three orthogonal planes respectively and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the top (CH1), one in the middle (CH40) and the other in bottom (CH79). The setting up procedure is recorded on <1.3 test method>

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dB μ V/m) is determined by algebraically adding the measured reading in dB μ V, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

$$F_{Ia} \text{ (dB}\mu\text{V/m)} = F_{Ir} \text{ (dB}\mu\text{V)} + \text{Correction Factors}$$

F_{Ia} : Actual Field Intensity

F_{Ir} : Reading of the Field Intensity

$$\text{Correction Factors} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

For frequency between 1GHz to 25GHz

$$F_{Ia} \text{ (dB}\mu\text{V/m)} = F_{Ir} \text{ (dB}\mu\text{V)} + \text{Correction Factor}$$

F_{Ia} : Actual Field Intensity

F_{Ir} : Reading of the Field Intensity

$$\text{Correction Factors} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

11.2 List of Test Instruments

Instrument Name	Model	Brand	Serial No.	Calibration Date
				Next time
EMI Receiver	8546A	HP	3520A00242	08/05/05
RF Filter Section	85460A	HP	3448A00217	08/05/05
Small Biconical Antenna	UBAA9114 & BBVU9135	SCHWARZECK	127	09/21/05
Pre-amplifier	PA1F	TRC	1FAC	05/20/05
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	05/20/05
Coaxial Cable (Double shielded, 15 meter)	A30A30-0058-50FS-15M	JYEBAO	SMA-01	05/20/05
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	JYEBAO	SMA-02	05/20/05
Spectrum Analyzer	8564E	HP	3720A00840	08/13/05
Microwave Preamplifier	84125C	HP	US36433002	08/13/05
Horn Antenna	3115	EMCO	9104-3668	12/18/04
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	09/18/05
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	09/18/05
Horn Antenna	1196E (3115)	HP (EMCO)	9704-5178	12/12/04
Pre-amplifier	PA2F	TRC	2F1GZ	03/20/05
Coaxial Cable (3 miter)	A30A30-0058-50FST118	JYEBAO	MSA-05	03/20/05
Coaxial Cable (1 meter)	A30A30-0058-50FST118	JYEBAO	MSA-04	03/20/05

11.3 Test Result of Spurious Radiated Emissions

The highest peak values of radiated emissions from the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following. (worst case)

Test Conditions: Temperature : 20 ° C Humidity : 88 % RH

Test mode: BT Channel 01 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBμV/m)	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
601.4150	24.90	1.22	290	9.83	34.73	46.02	-11.29
801.1393	21.23	0.98	0	14.13	35.36	46.02	-10.66
988.0180	15.55	1.00	195	17.83	33.38	53.98	-20.60

Test mode: BT Channel 01 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBμV/m)	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
168.0020	41.68	1.00	63	-5.82	35.86	43.52	-7.66
171.8225	26.58	1.00	279	-5.77	20.81	43.52	-22.71
801.0400	20.16	0.99	133	14.13	34.29	46.02	-11.73
997.9000	15.62	1.00	351	17.89	33.51	53.98	-20.47

Note:

1. Margin = Amplitude – Limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction Factor = Antenna factor + (Cable Loss – Amplitude gain) + Switching Box Loss

Test mode: Channel 01 1GHz to 25GHz [Horizontal]

Frequency	Ant. H.	Table	Amplitude		Correction	Corrected		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dBμV		dB/m	dBμV/m		dBμV/m		dB
*1602.08	1.00	258	36.33	---	14.30	50.63	---	***	53.96	-3.33
1820.83	1.00	285	40.00	---	10.89	50.89	---	***	53.96	-3.07
2425.00	1.00	169	37.67	---	9.28	46.95	---	***	53.96	-7.01
7215.62	1.00	162	24.07	---	21.39	45.46	---	***	53.96	-8.50
9608.12	1.00	177	24.24	---	23.05	47.29	---	***	53.96	-6.67
*12012.71	1.00	350	26.08	---	21.40	47.48	---	***	53.96	-6.48
14411.25	1.00	204	30.41	---	19.45	49.86	---	***	53.96	-4.10

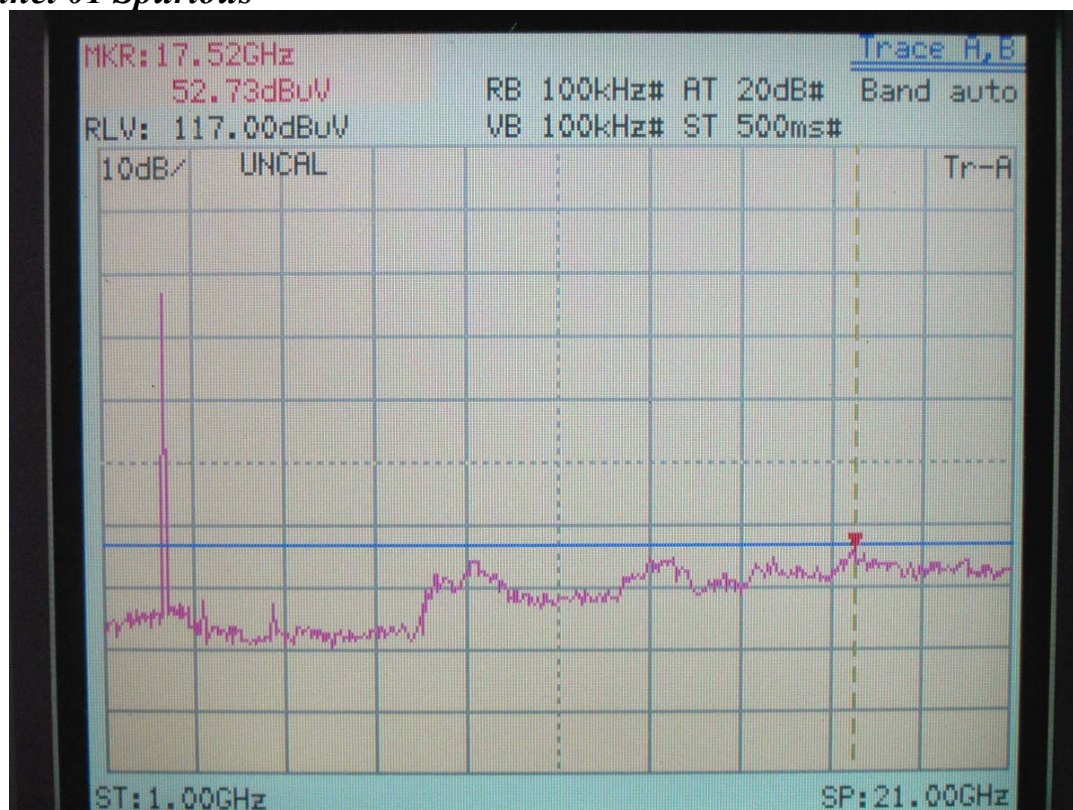
Test mode: Channel 01 1GHz to 25GHz [Vertical]

Frequency	Ant. H.	Table	Amplitude		Correction	Corrected		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dBμV		dB/m	dBμV/m		dBμV/m		dB
*1689.58	1.00	96	35.67	---	12.93	48.60	---	***	53.96	-5.36
1820.83	1.00	128	38.50	---	10.89	49.39	---	***	53.96	-4.57
1922.92	1.00	320	35.17	---	9.29	44.46	---	***	53.96	-9.50
7209.58	1.00	198	24.41	---	21.37	45.78	---	***	53.96	-8.18
9608.12	1.00	119	25.24	---	23.05	48.29	---	***	53.96	-5.67
*12012.71	1.00	225	25.74	---	21.40	47.14	---	***	53.96	-6.82
14411.25	1.00	19	30.41	---	19.45	49.86	---	***	53.96	-4.10

Note:

1. Margin = Corrected - Limit.
2. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF radiated emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
3. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.
4. The “*” means in the restricted bands of operation.

Channel 01 Spurious



Test mode: BT Channel 40 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
598.5700	24.40	1.19	242	9.75	34.15	46.02	-11.87
816.1360	20.78	2.34	63	14.52	35.30	46.02	-10.72
997.6400	25.36	2.28	41	17.89	43.25	53.98	-10.73

Test mode: BT Channel 40 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
168.0030	37.33	0.97	79	-5.82	31.51	43.52	-12.01
171.8180	27.89	1.01	264	-5.77	22.12	43.52	-21.40
801.7610	21.52	0.99	190	14.15	35.67	46.02	-10.35
999.6740	15.58	1.00	351	17.90	33.48	53.98	-20.50

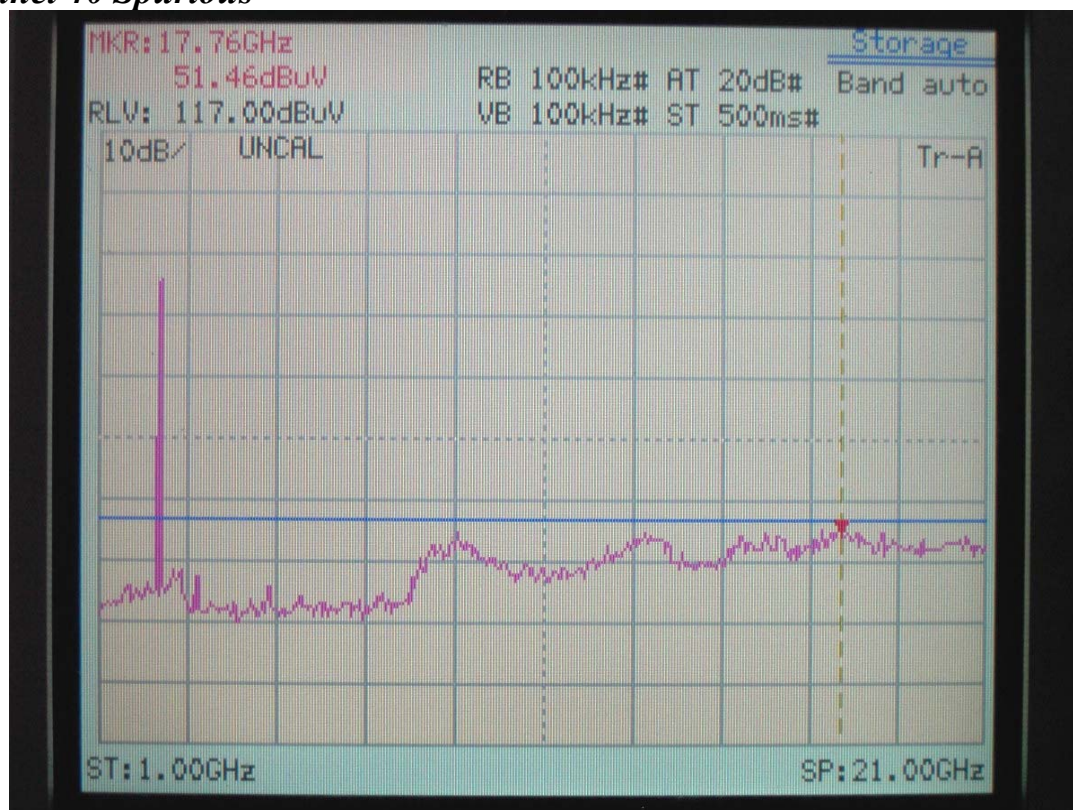
Test mode: Channel 40 1GHz to 25GHz [Horizontal]

Frequency	Ant. H.	Table	Amplitude		Correction	Corrected		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dB μ V		dB/m	dB μ V/m		dB μ V/m		dB
1627.08	1.00	267	38.16	---	13.91	52.07	---	***	53.96	-1.89
1820.83	1.00	83	38.00	---	10.89	48.89	---	***	53.96	-5.07
2462.50	1.00	172	36.17	---	9.38	45.55	---	***	53.96	-8.41
*4877.50	1.00	318	28.74	---	15.01	43.75	---	***	53.96	-10.21
*7318.33	1.00	142	24.24	---	21.66	45.90	---	***	53.96	-8.06
9759.17	1.00	296	24.91	---	23.19	48.10	---	***	53.96	-5.86
*12193.96	1.00	297	27.24	---	20.61	47.85	---	***	53.96	-6.11
14634.79	1.00	75	30.57	---	18.60	49.17	---	***	53.96	-4.79

Test mode: Channel 40 1GHz to 25GHz [Vertical]

Frequency	Ant. H.	Table	Amplitude		Correction	Corrected		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dB μ V		dB/m	dB μ V/m		dB μ V/m		dB
1820.83	1.00	98	38.33	---	10.89	49.22	---	***	53.96	-4.74
2154.17	1.00	177	35.00	---	8.52	43.52	---	***	53.96	-10.44
*2310.42	1.00	93	34.50	---	8.96	43.46	---	***	53.96	-10.50
*4877.50	1.00	239	30.91	---	15.01	45.92	---	***	53.96	-8.04
*7318.33	1.00	57	23.41	---	21.66	45.07	---	***	53.96	-8.89
9759.17	1.00	249	24.58	---	23.19	47.77	---	***	53.96	-6.19
*12193.96	1.00	279	27.40	---	20.61	48.01	---	***	53.96	-5.95
14634.79	1.00	56	30.91	---	18.60	49.51	---	***	53.96	-4.45

Channel 40 Spurious



Test mode: BT Channel 79 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
528.0053	31.56	0.99	186	7.53	39.09	46.02	-6.93
600.0090	32.65	1.45	0	9.80	42.45	46.02	-3.57
816.0360	18.21	0.99	37	14.52	32.73	46.02	-13.29
961.9600	12.03	1.97	34	17.67	29.70	53.98	-24.28

Test mode: BT Channel 79 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ()			Limit (dBμV/m)	Margin (dB)
172.5570	24.96	1.00	249	-5.72	19.24	43.52	-24.28
721.6840	12.13	1.05	11	12.94	25.07	46.02	-20.95
798.7100	20.69	0.97	129	14.11	34.80	46.02	-11.22
802.1860	22.21	1.01	139	14.16	36.37	46.02	-9.65

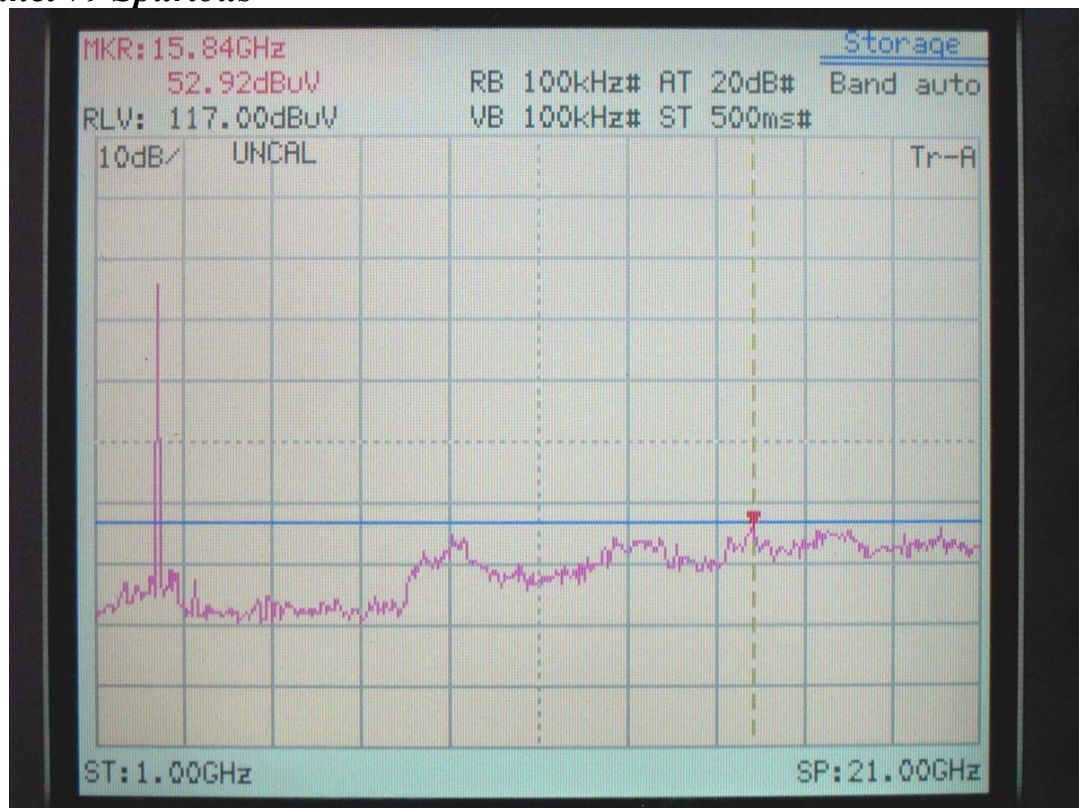
Test mode: Channel 79 1GHz to 25GHz [Horizontal]

Frequency	Ant. H.	Table	Amplitude		Correction Factor	Corrected Amplitude		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dBμV		dB/m	dBμV/m		dBμV/m		dB
1654.17	1.00	259	40.00	---	13.49	53.49	---	***	53.96	-0.47
1822.92	1.00	112	36.00	---	10.85	46.85	---	***	53.96	-7.11
*2333.33	1.00	155	36.17	---	9.02	45.19	---	***	53.96	-8.77
*4962.08	1.00	107	29.57	---	15.42	44.99	---	***	53.96	-8.97
*7445.21	1.00	123	23.40	---	21.86	45.26	---	***	53.96	-8.70
9922.29	1.00	279	23.74	---	23.03	46.77	---	***	53.96	-7.19
*12399.37	1.00	220	27.08	---	20.40	47.48	---	***	53.96	-6.48
14882.50	1.00	219	29.24	---	18.10	47.34	---	***	53.96	-6.62

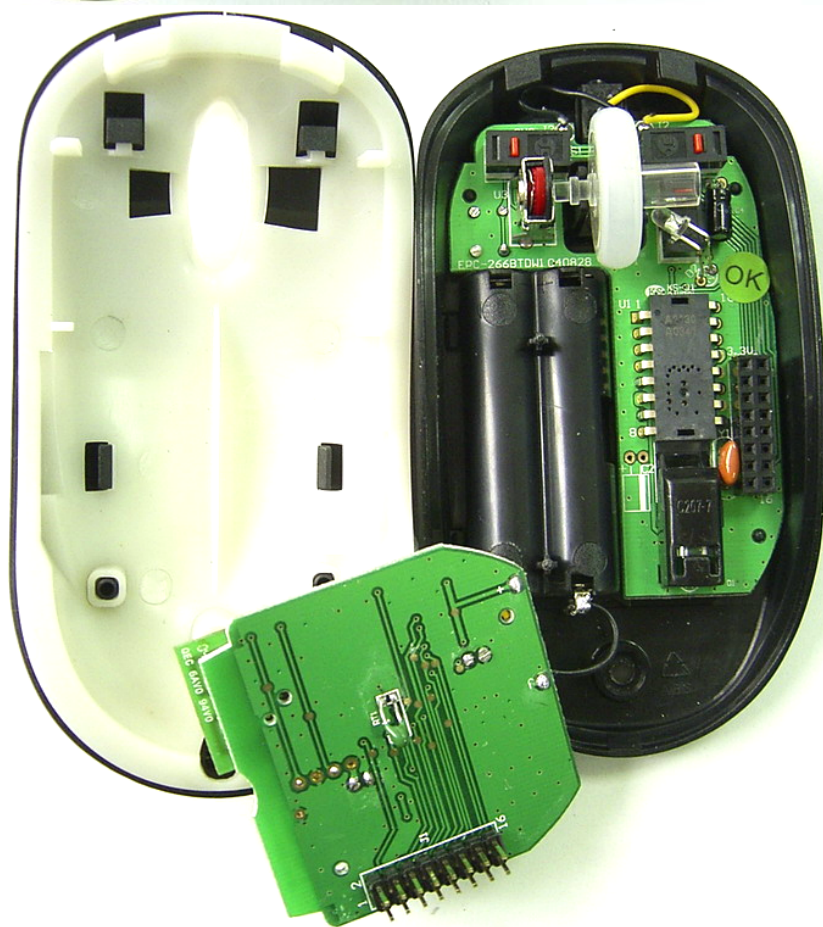
Test mode: Channel 79 1GHz to 25GHz [Vertical]

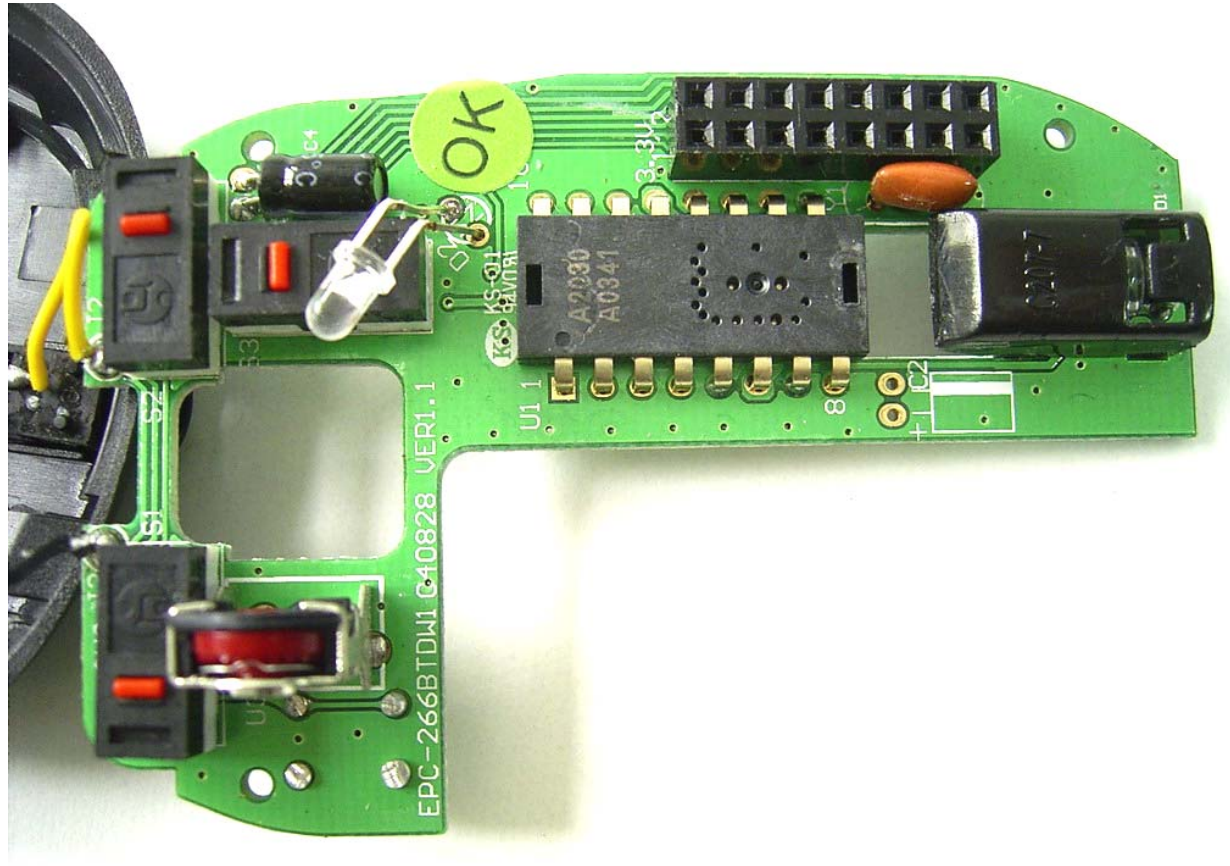
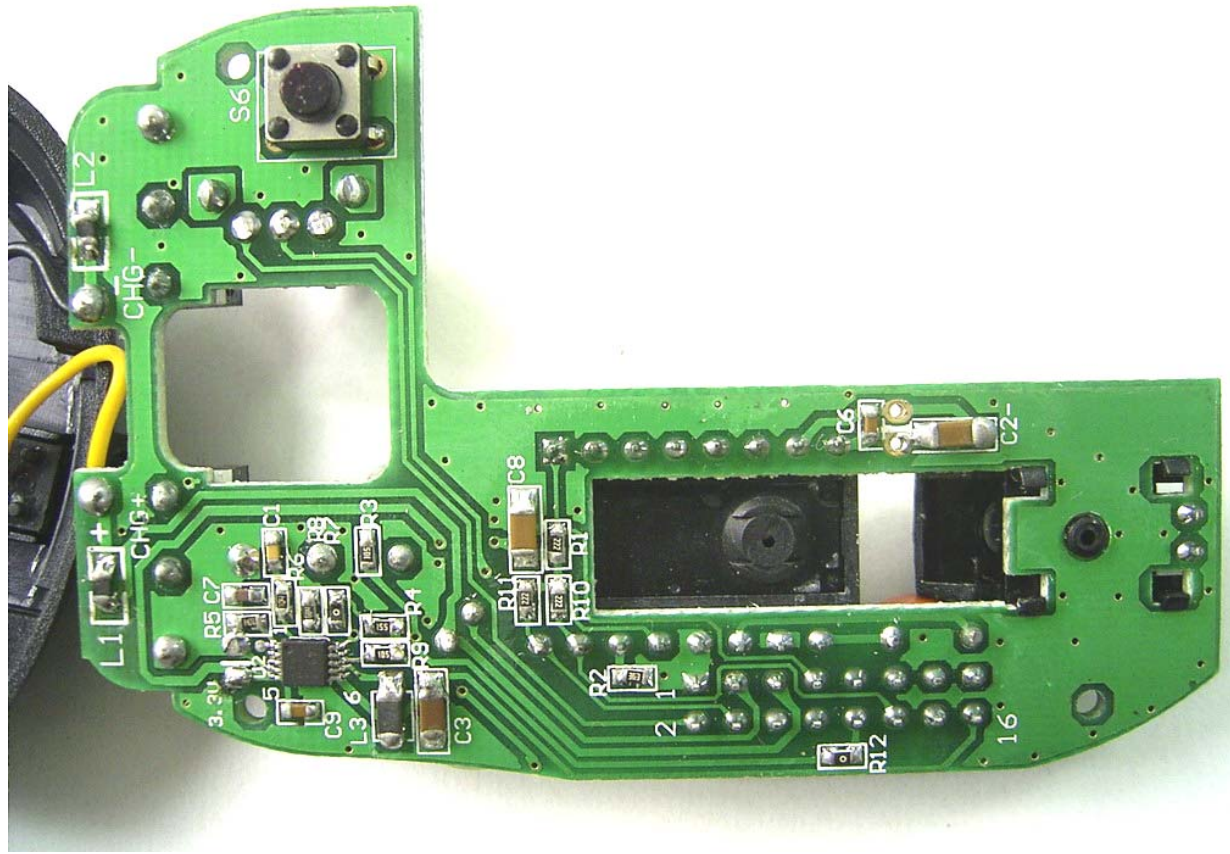
Frequency	Ant. H.	Table	Amplitude		Correction Factor	Corrected Amplitude		Limit		Margin
			Peak / Ave.			Peak / Ave.		Peak / Ave.		
MHz	m	degree	dBμV		dB/m	dBμV/m		dBμV/m		dB
1654.17	1.00	289	35.50	---	13.49	48.99	---	***	53.96	-4.97
1820.83	1.00	323	35.50	---	10.89	46.39	---	***	53.96	-7.57
*2733.33	1.00	186	35.33	---	9.93	45.26	---	***	53.96	-8.70
*4956.04	1.00	267	32.07	---	15.39	47.46	---	***	53.96	-6.50
*7439.17	1.00	123	23.57	---	21.85	45.42	---	***	53.96	-8.54
9922.29	1.00	205	23.74	---	23.03	46.77	---	***	53.96	-7.19
*12399.37	1.00	307	25.41	---	20.40	45.81	---	***	53.96	-8.15
14882.50	1.00	27	29.07	---	18.10	47.17	---	***	53.96	-6.79

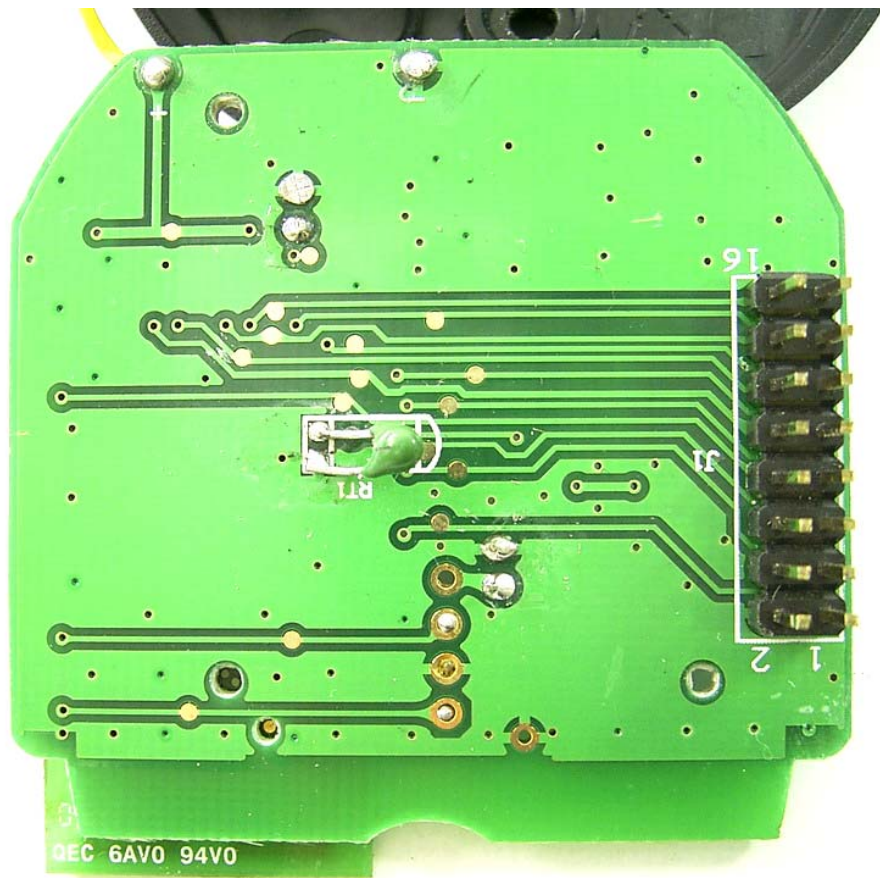
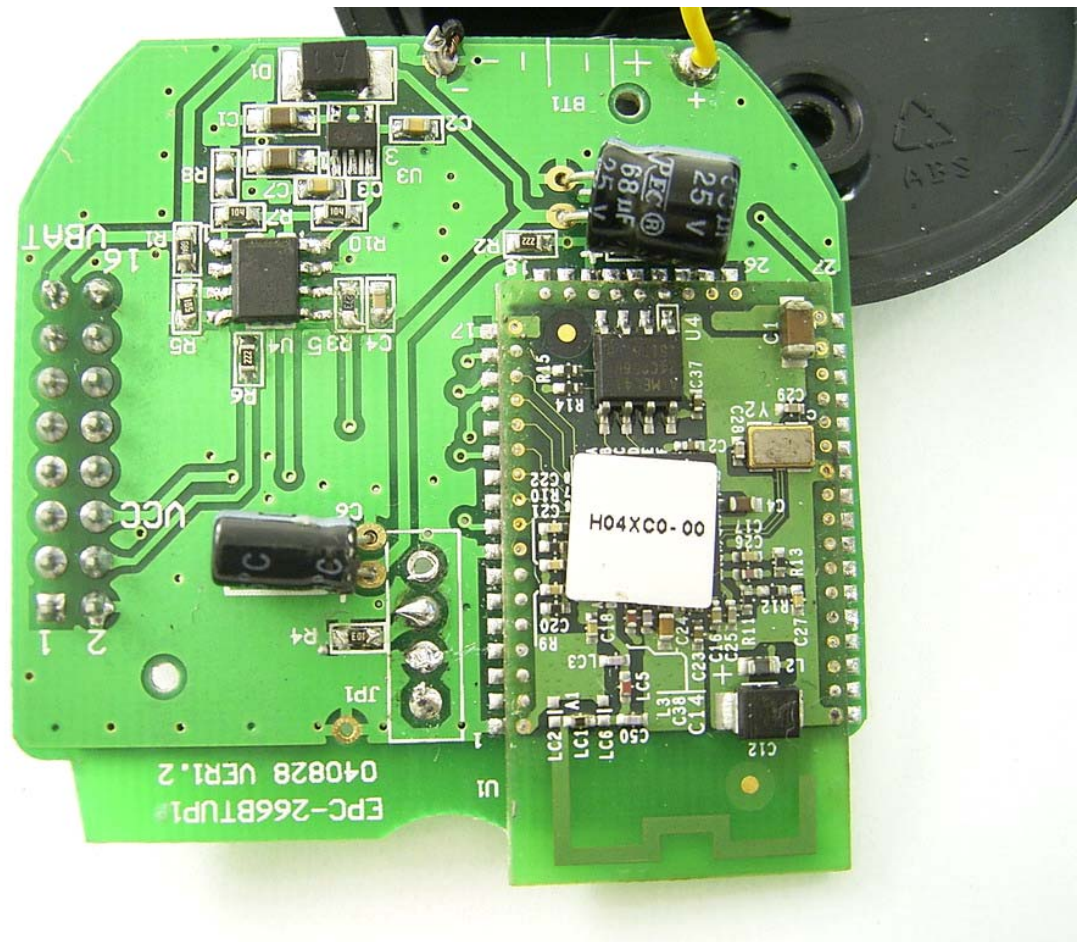
Channel 79 Spurious



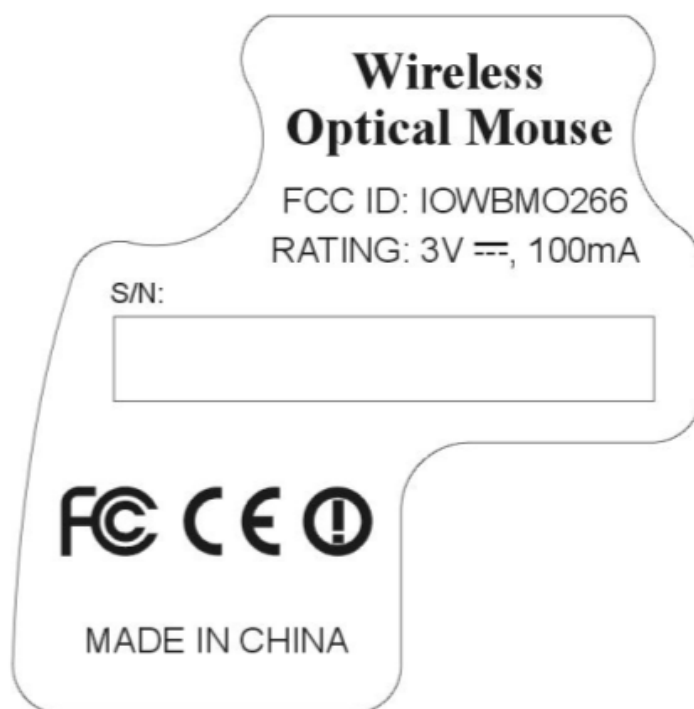








LABEL Format:



LABEL Size: 55.4 x 33.09 mm

LABEL Position:

