

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Bluetooth USB Dongle

Model No. : BUB-103

FCC ID. : FI7BUB-103

Filing Type : Certification

Applicant : **Archtek Telecom Corp.**
4/FL, No. 9, Lane 130 Min Chyuan Road,
Hsin Tien, Taipei, Taiwan, R.O.C.

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SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: May 31, 2003

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Bluetooth USB Dongle

Model No. : BUB-103

FCC ID. : FI7BUB-103

Filing Type : Certification

Applicant : Archtek Telecom Corp.

4/FL, No. 9, Lane 130 Min Chyuan Road,
Hsin Tien, Taipei, Taiwan, R.O.C.

HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the equipment under test was **passed** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on May 23, 2003 at **SPORTON International Inc. LAB.**



K. J. Lin
Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

Archtek Telecom Corp.
4/FL, No. 9, Lane 130 Min Chyuan Road, Hsin Tien, Taipei, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment : Bluetooth USB Dongle
Model No. : BUB-103
FCC ID : FI7BUB-103
Trade Name : SmartLink
Power Supply Type : From PC
AC Power Cord : N/A

1.4. Feature of Equipment under Test

- Complete 2.4GHz radio transceiver and baseband
- Bluetooth™ version 1.1 compliant
- Bluetooth™ qualified
- Small footprint (25mm x 14.5mm x 2.2mm)
- Bluetooth™ Class 2 operation (up to 10 meter range)
 - Class 1 operation available (up to 100 meter range)
- Basic module as SMD type
 - Antenna and interface options available
- Surface mountable
- CSR BlueCore2, single chip Bluetooth™ system
- On-board flash memory (4Mbits or 8Mbits)
- SPI interface can upgrade firmware
- Built-in ROM installed with Widcomm Bluetooth window base protocol stacks
- Park, Sniff, Hold and Sleep low power modes
- Added ESD protection circuit into module supply voltage pins to prevent electrostatic damage
- Detached antenna support
- Shielding mask GND layout design to reduce EMI issue

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

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with notebook and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included LOGITECH USB Mouse, Epson Printer, VIEWSONIC Monitor, COMPAQ PS/2 Keyboard, COMPAQ Notebook and EUT for EMI test.
- c. The following test modes were pretested:
 - Mode 1: CH00 (2402MHz)
 - Mode 2: CH39 (2441MHz)
 - Mode 3: CH78 (2480MHz)
- b. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24800MHz.

2.2. Description of Test System

Support Unit 1. -- USB Mouse (LOGITECH)

FCC ID	: N/A
Model No.	: M-BE58
Serial No.	: SP0041
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Printer (EPSON)

FCC ID	: N/A
Model No.	: STYLUS COLOR S680
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Shielded, 1.35m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- Monitor (VIEWSONIC)

FCC ID : N/A
Model No. : VCDTS21553-3P
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0051
Data Cable : Shielded, 1.7m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

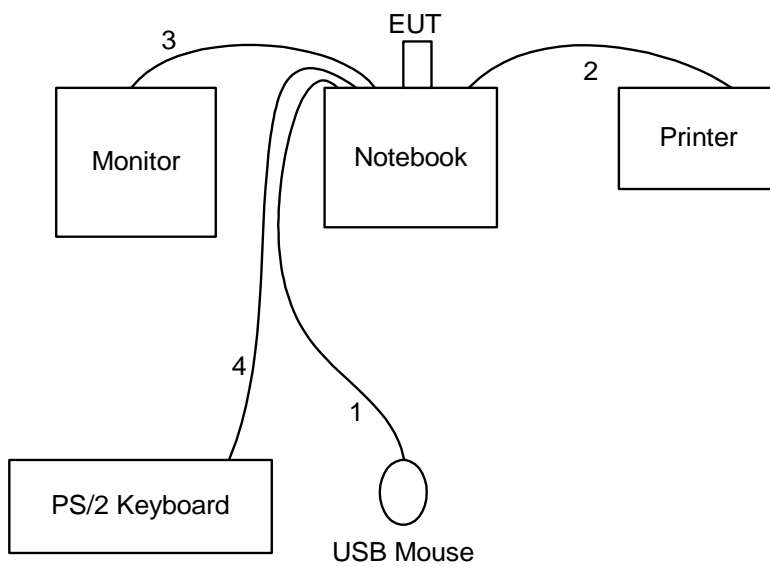
Support Unit 4. -- PS/2 Keyboard (COMPAQ)

FCC ID : N/A
Model No. : 6511-VA
Serial No. : SP0054
Data Cable : Shielded, 1.7m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 5. -- Notebook (COMPAQ)

FCC ID : N/A
Model No. : Presario 1500
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0036
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.3. Connection Diagram of Test System



- 1. The I/O cable is connected from Notebook to the support unit 1.
- 2. The I/O cable is connected from Notebook to the support unit 2.
- 3. The I/O cable is connected from Notebook to the support unit 3.
- 4. The I/O cable is connected from Notebook to the support unit 4.

3. Test Software

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, "Bluetest" was executed to keep transmitting signals at fixed frequency.

4. General Information of Test

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,
Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055
Test Site No : CO01-HY, 03CH03-HY

4.1. Test Voltage

115V/60Hz

4.2. Standard for Methods of Measurement

ANSI C63.4-1992

4.3. Test in Compliance with

FCC Part 15, Subpart C

4.4. Frequency Range Investigated

- a. Conduction: from 150 KHz to 30 MHz
- b. Radiation: from 30 MHz to 24800MHz

4.5. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5. Report of Measurements and Examinations

5.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
<u>15.107/15.207</u>	Conducted Emission	Pass
<u>15.247(a)(1)</u>	Hopping Channel Separation	Pass
<u>15.247(a)(1)(ii)</u>	Number of Hopping Frequency Used	Pass
15.247(a)(1)(ii)	Hopping Channel Bandwidth	Pass
<u>15.247(a)(1)(ii)</u>	Dwell Time of Each Frequency within a 30 Second Period	Pass
<u>15.247(b)</u>	Output Power	Pass
15.247(c)	100KHz Bandwidth of Frequency Band Edges	Pass
<u>15.203</u>	Antenna Requirement	Pass

5.2. Hopping Channel Separation

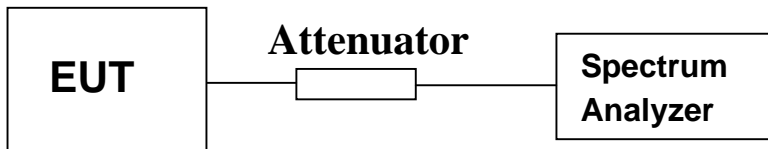
5.2.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.2.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The Hopping Channel Separation is defined as the channel is separated with the next channel.

5.2.3. Test Setup Layout :

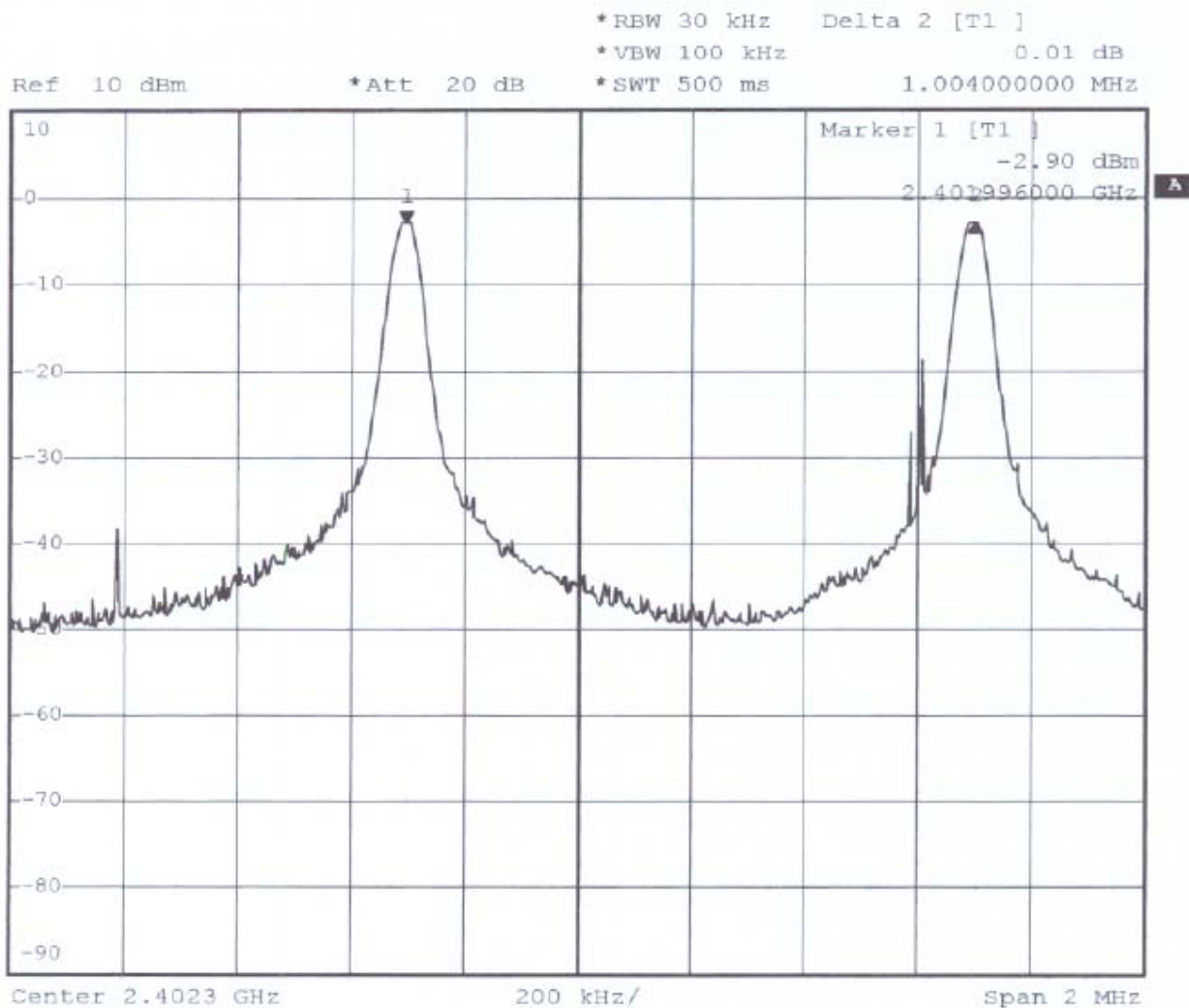


5.2.4. Test Result : The spectrum analyzer plots are attached as below

- Temperature: 27°C
- Relative Humidity: 64 %
- Duty cycle of the equipment during the test X = 36%

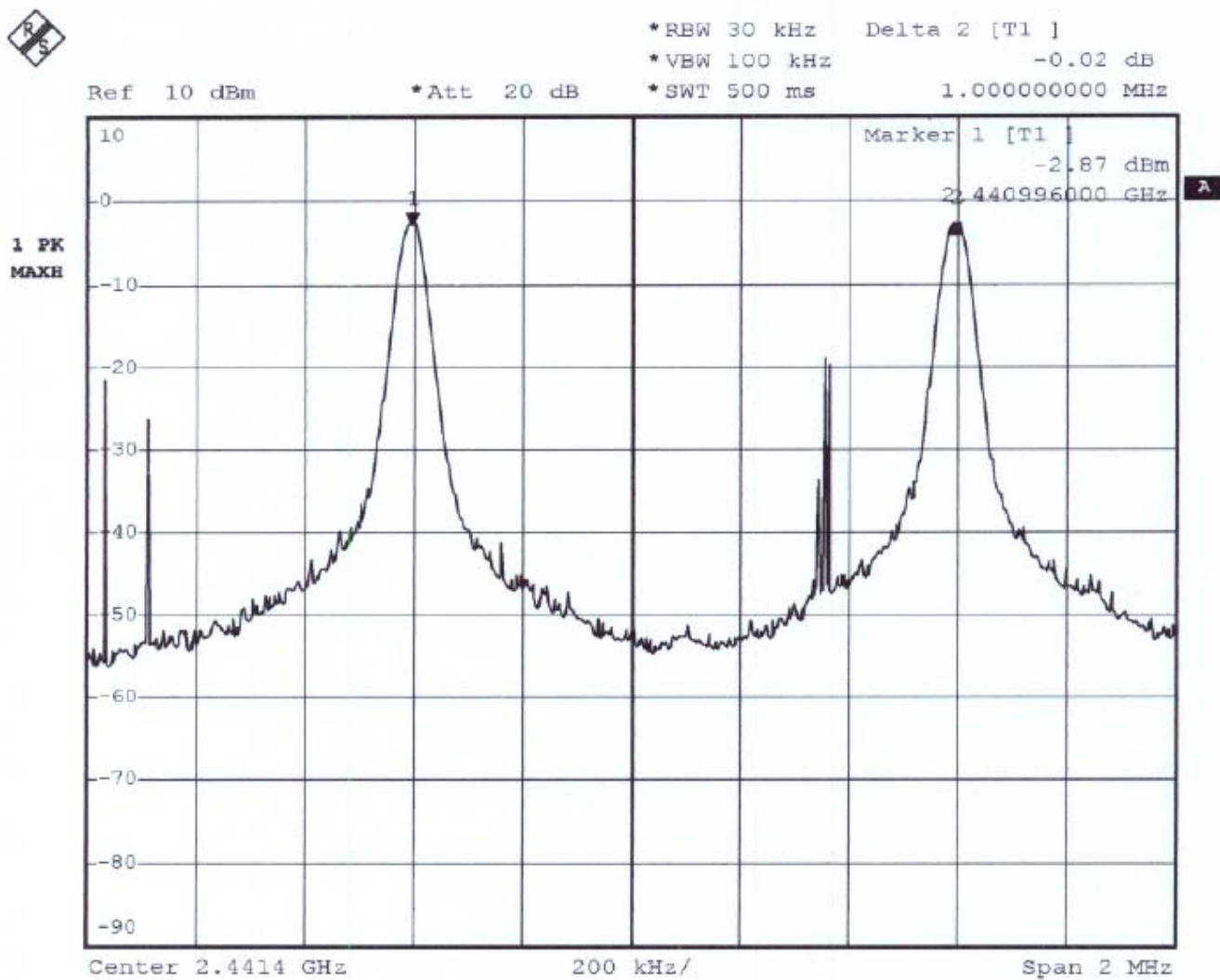
Channel	Frequency (MHz)	Hopping Channel Separation (KHz)	Limits (KHz)	Plot Ref. No.
00	2402	1004.00	25	1
39	2441	1000.00	25	2
78	2480	1000.00	25	3

Plot 1 (Channel 00) :



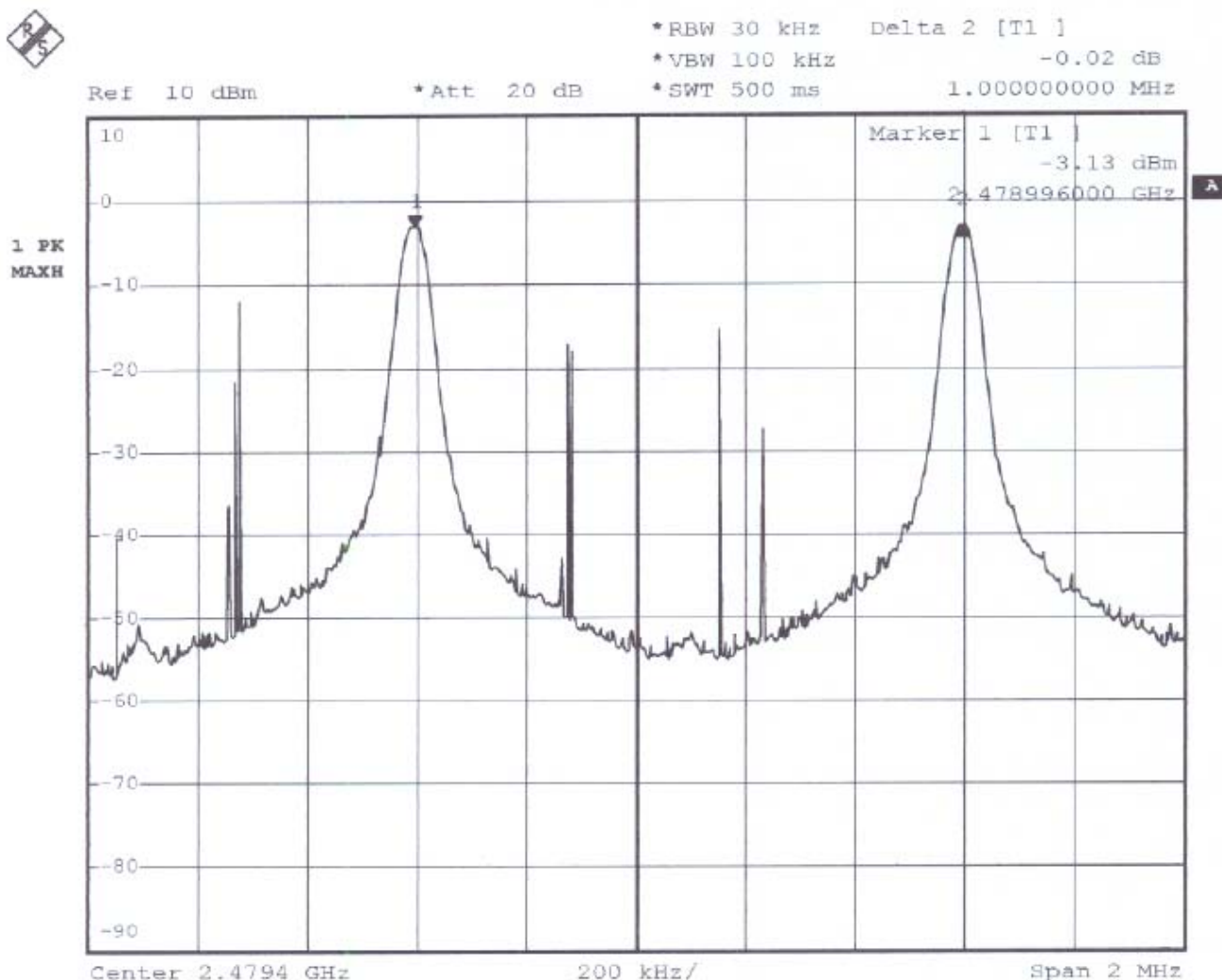
Date: 21.MAY.2003 21:35:59

Plot 2 (Channel 39) :



Date: 21.MAY.2003 21:46:20

Plot 3 (Channel 78) :



Date: 21.MAY.2003 21:50:09

5.2.5. Test Configuration (EUT Operating Condition) :

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies respectively.

5.3. Number of Hopping Frequency

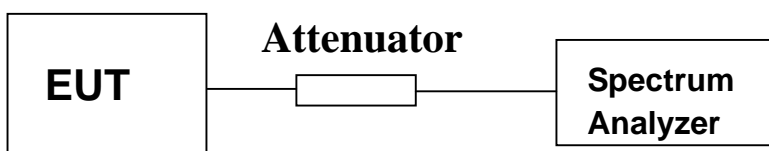
5.3.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.3.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The number of hopping frequency used is defined as the device has the numbers of total channel.

5.3.3. Test Setup Layout :

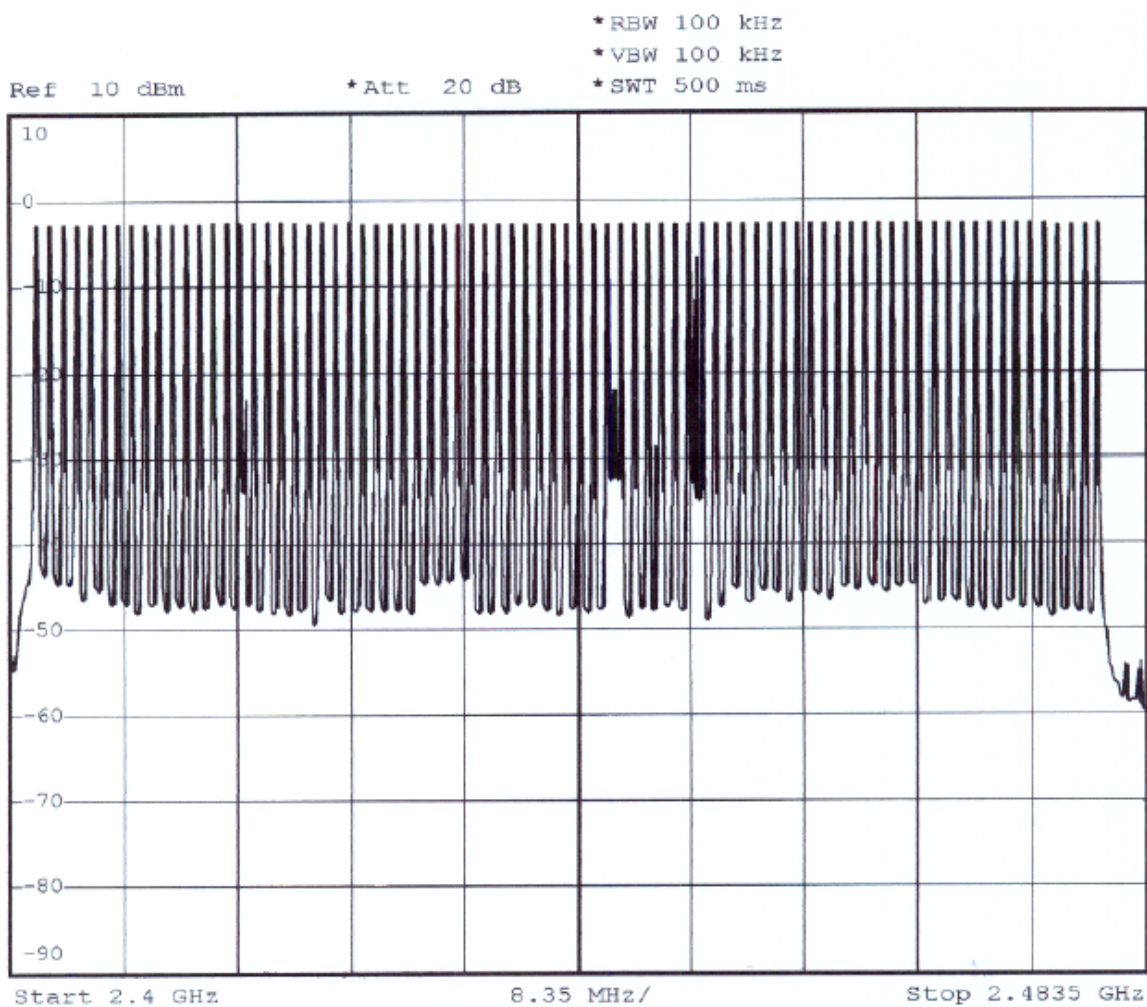


5.3.4. Test Result : See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 64 %
- Duty cycle of the equipment during the test X = 36%

Number of Hopping Frequency (Channel)	Limits (Channel)	Plot Ref. No.
79	75	1

Plot 1 :



Date: 21.MAY.2003 22:00:24

5.4. Hopping Channel Bandwidth

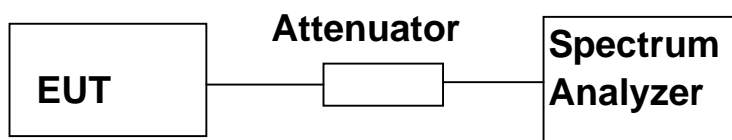
5.4.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.4.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.4.3. Test Setup Layout :

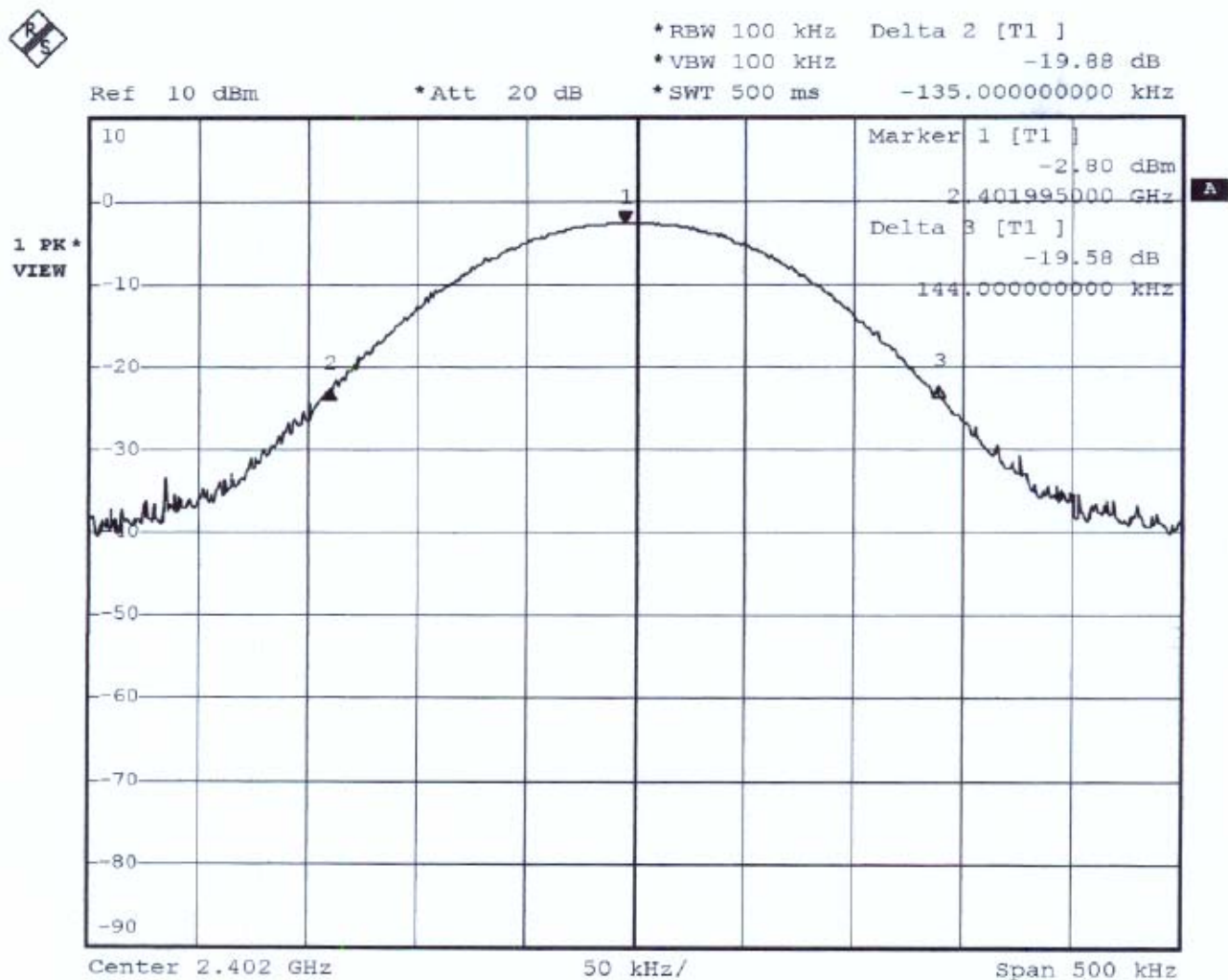


5.4.4. Test Result : See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 64 %
- Duty cycle of the equipment during the test X = 36%

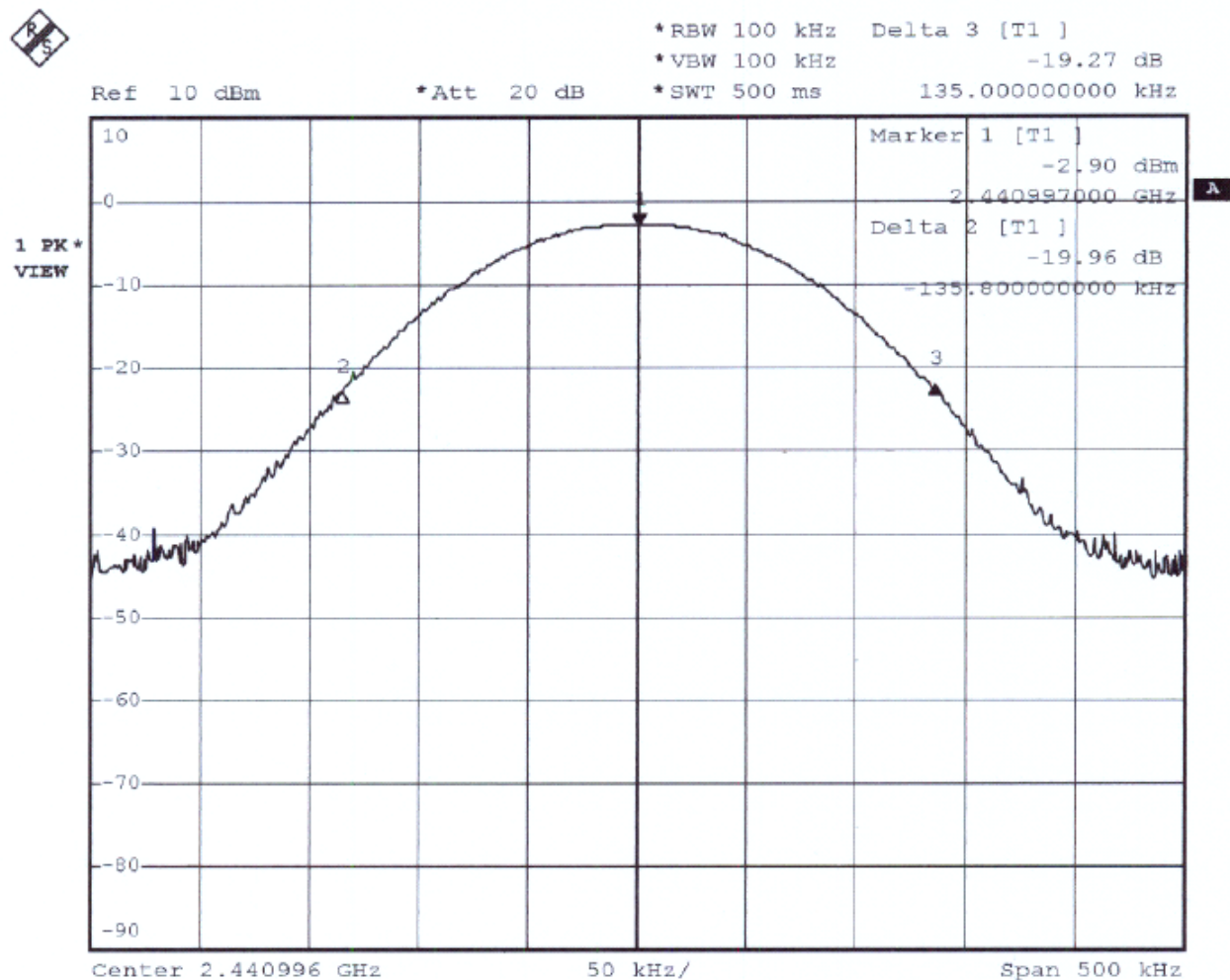
Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	279.000	1.0	1
39	2441	270.800	1.0	2
78	2480	269.000	1.0	3

Plot 1 (Channel 00)



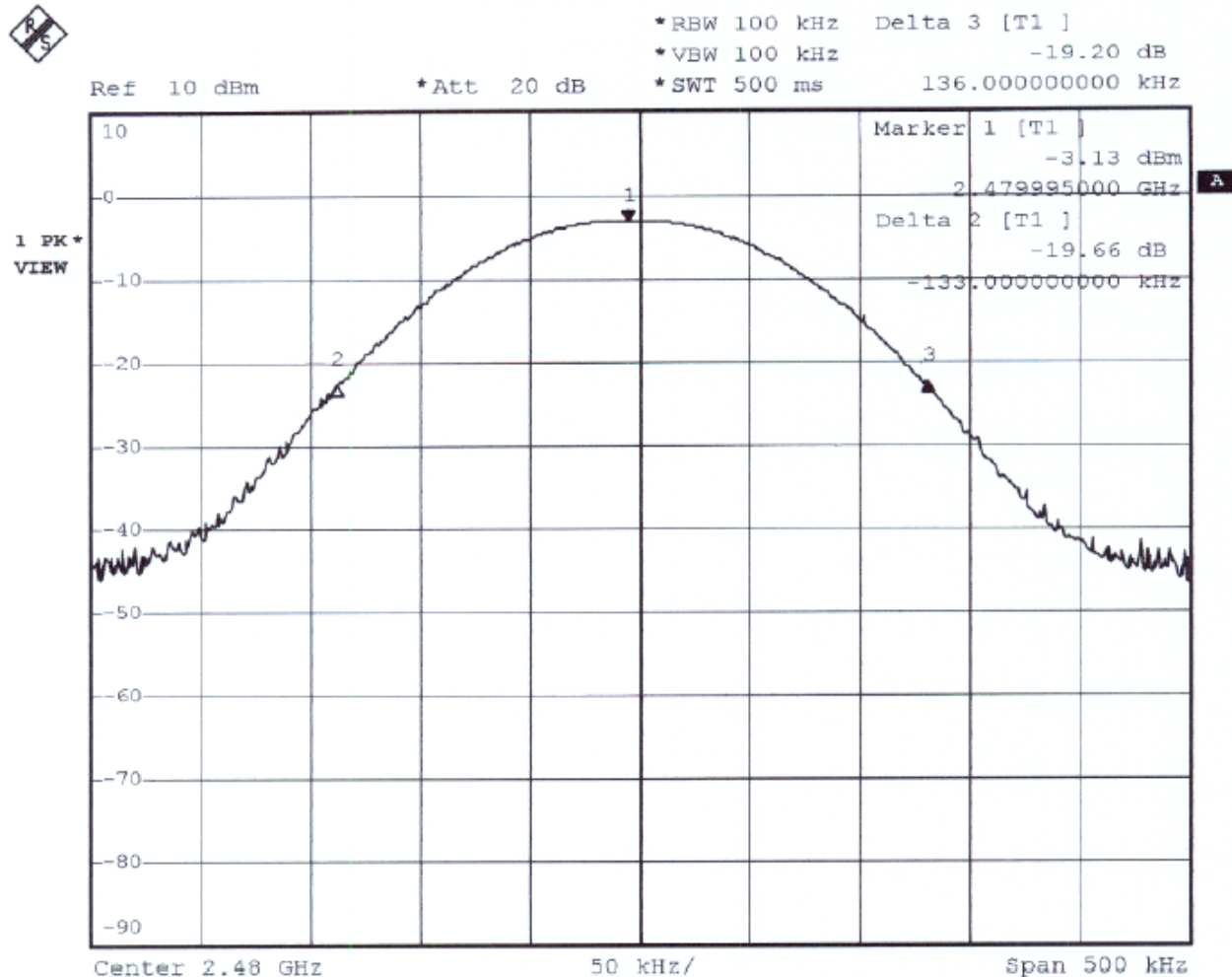
Date: 21.MAY.2003 21:32:40

Plot 2 (Channel 39)



Date: 21.MAY.2003 21:48:09

Plot 3 (Channel 78)



Date: 21.MAY.2003 21:48:52

5.4.5. Test Configuration (EUT Operating Condition) :

Same as Section 5.2.5.

5.5. Dwell Time of Each Frequency within a 30 Seconds Period

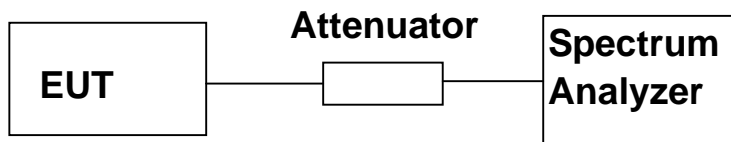
5.5.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.5.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.

5.5.3. Test Setup Layout :

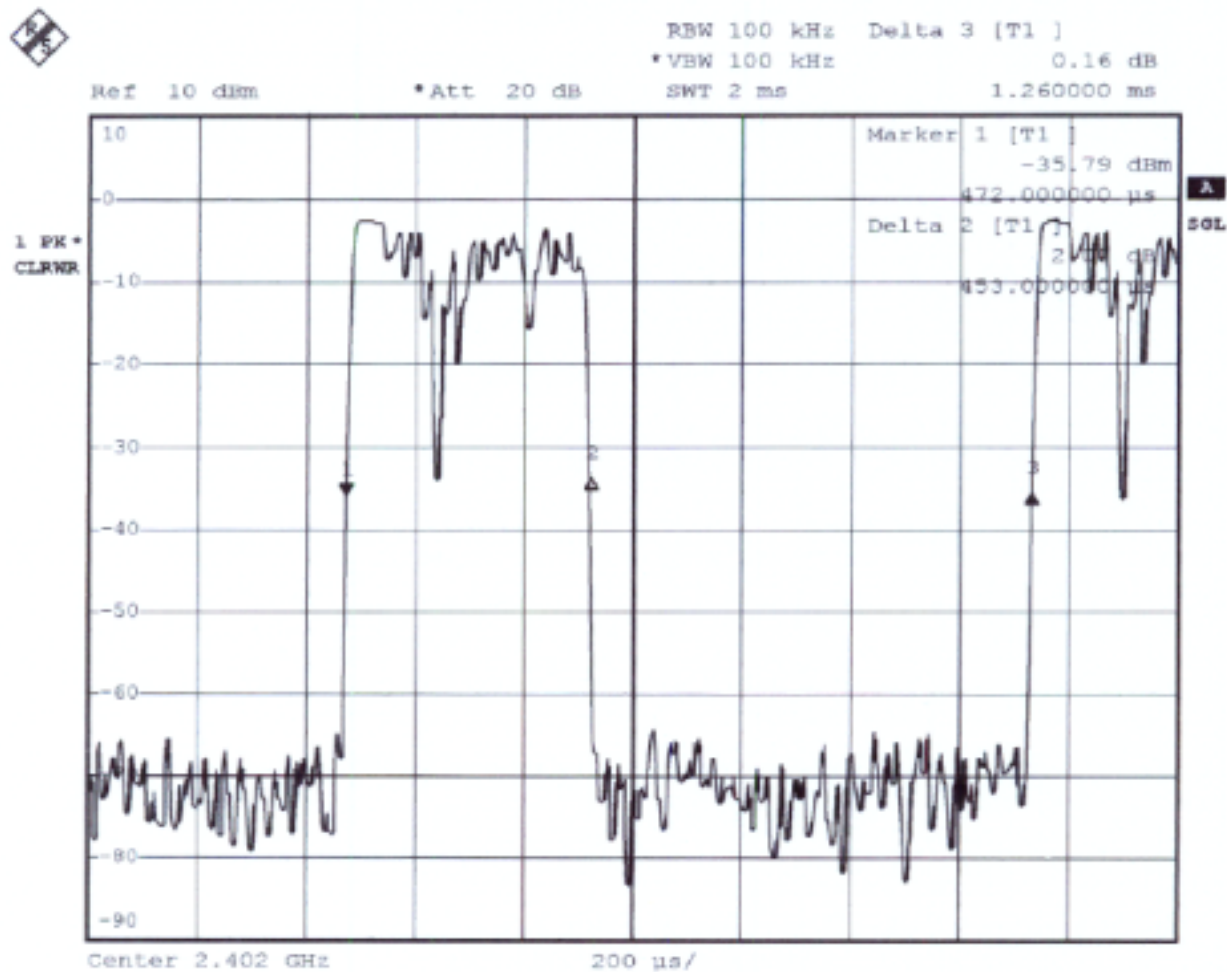


5.5.4. Test Result : See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 64 %
- Duty cycle of the equipment during the test X = 36%

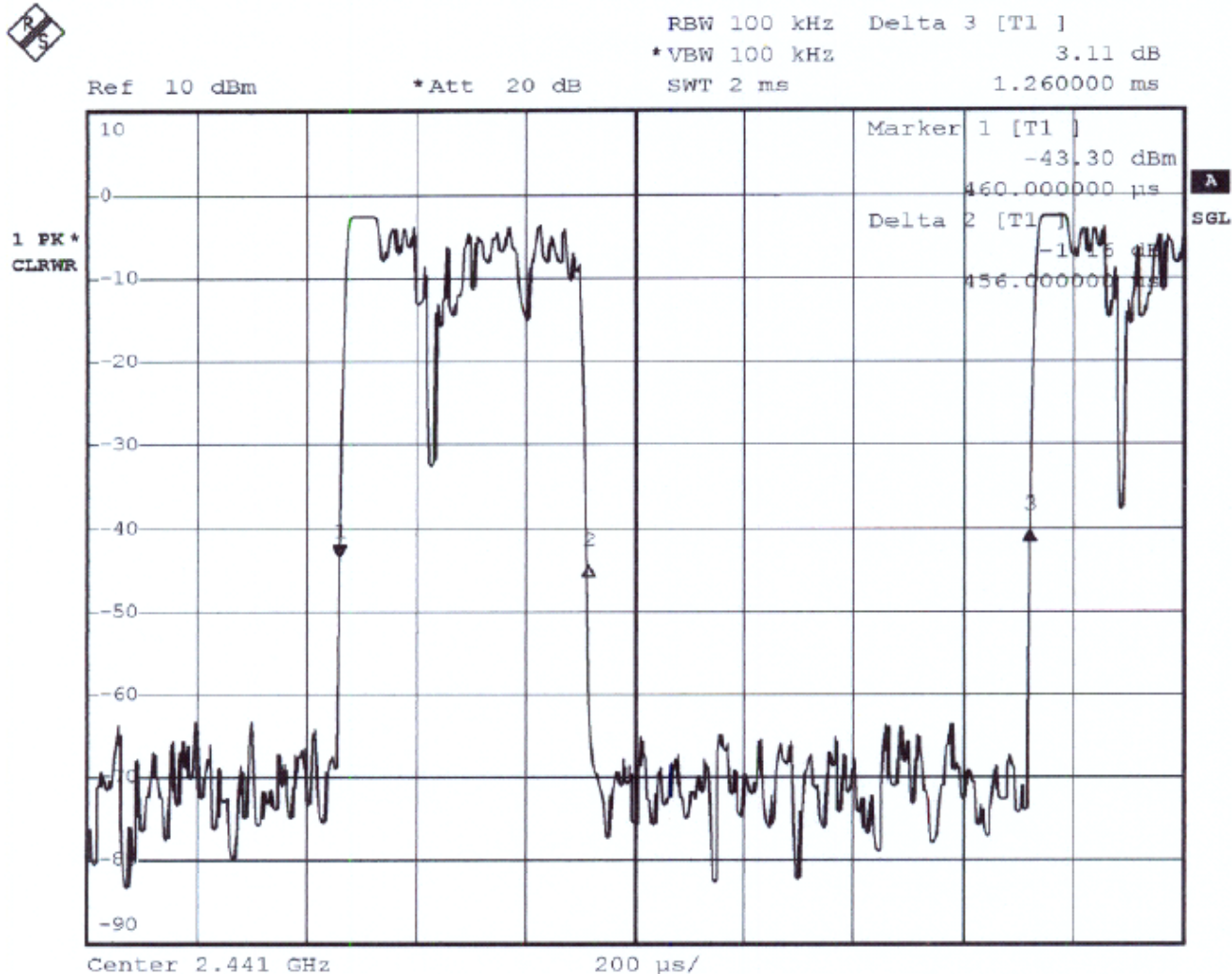
Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)	Plot Ref. No.
00	2402	0.136528029	0.4	1
39	2441	0.137432188	0.4	2
78	2480	0.136226643	0.4	3

Plot 1 (Channel 00)



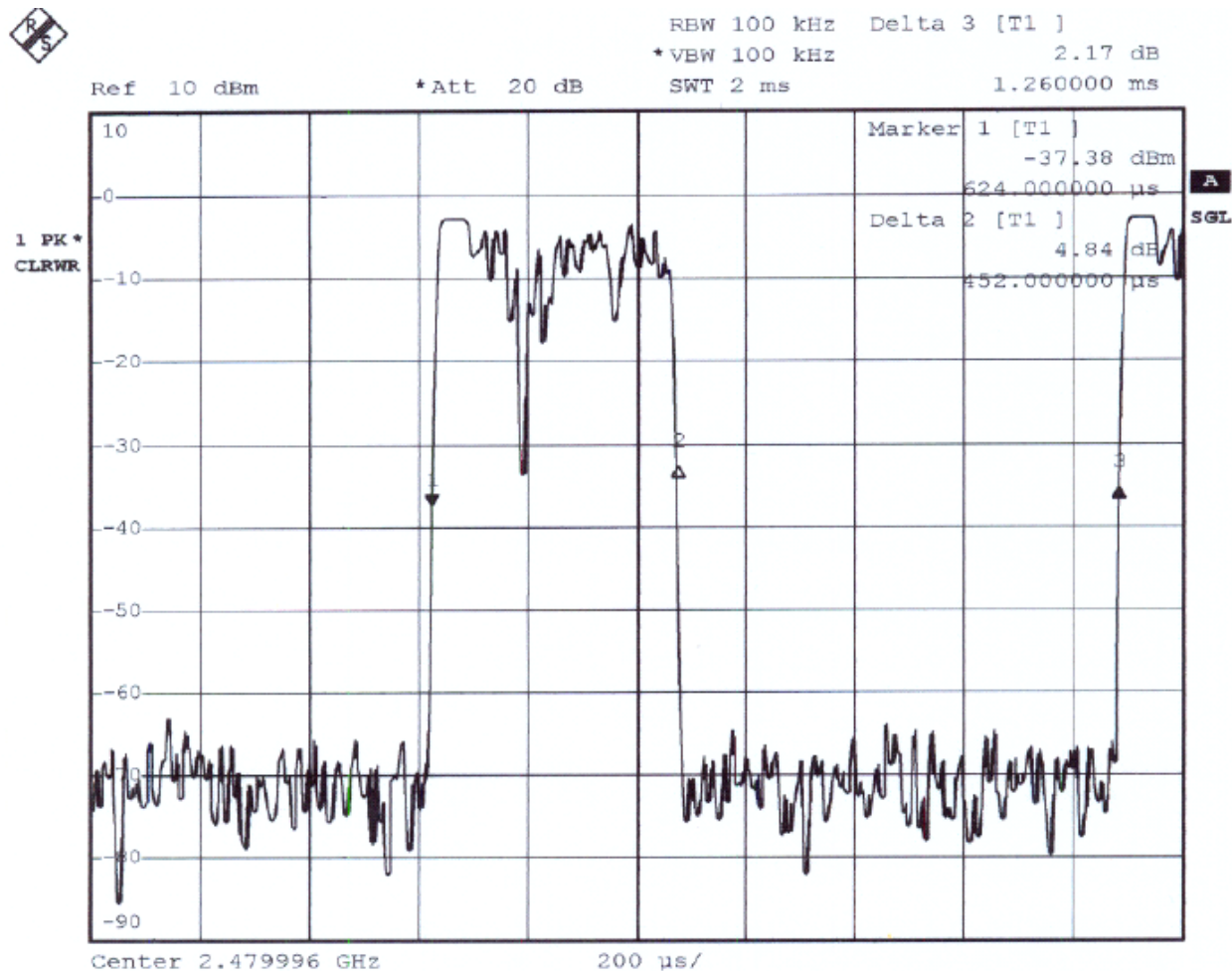
Date: 21.MAY.2003 21:39:10

Plot 2 (Channel 39)



Date: 21.MAY.2003 21:44:33

Plot 3 (Channel 78)



Date: 21.MAY.2003 21:51:11

5.5.5. Test Configuration (EUT Operating Condition) :

Same as Section 5.2.5.

5.6. Output Power

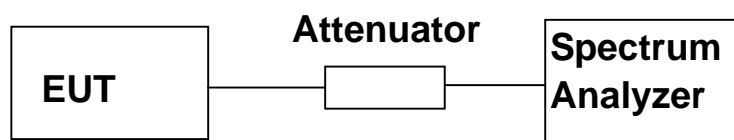
5.6.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.6.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency and set RBW to 1MHz and VBW to 1MHz.

5.6.3. Test Setup Layout :

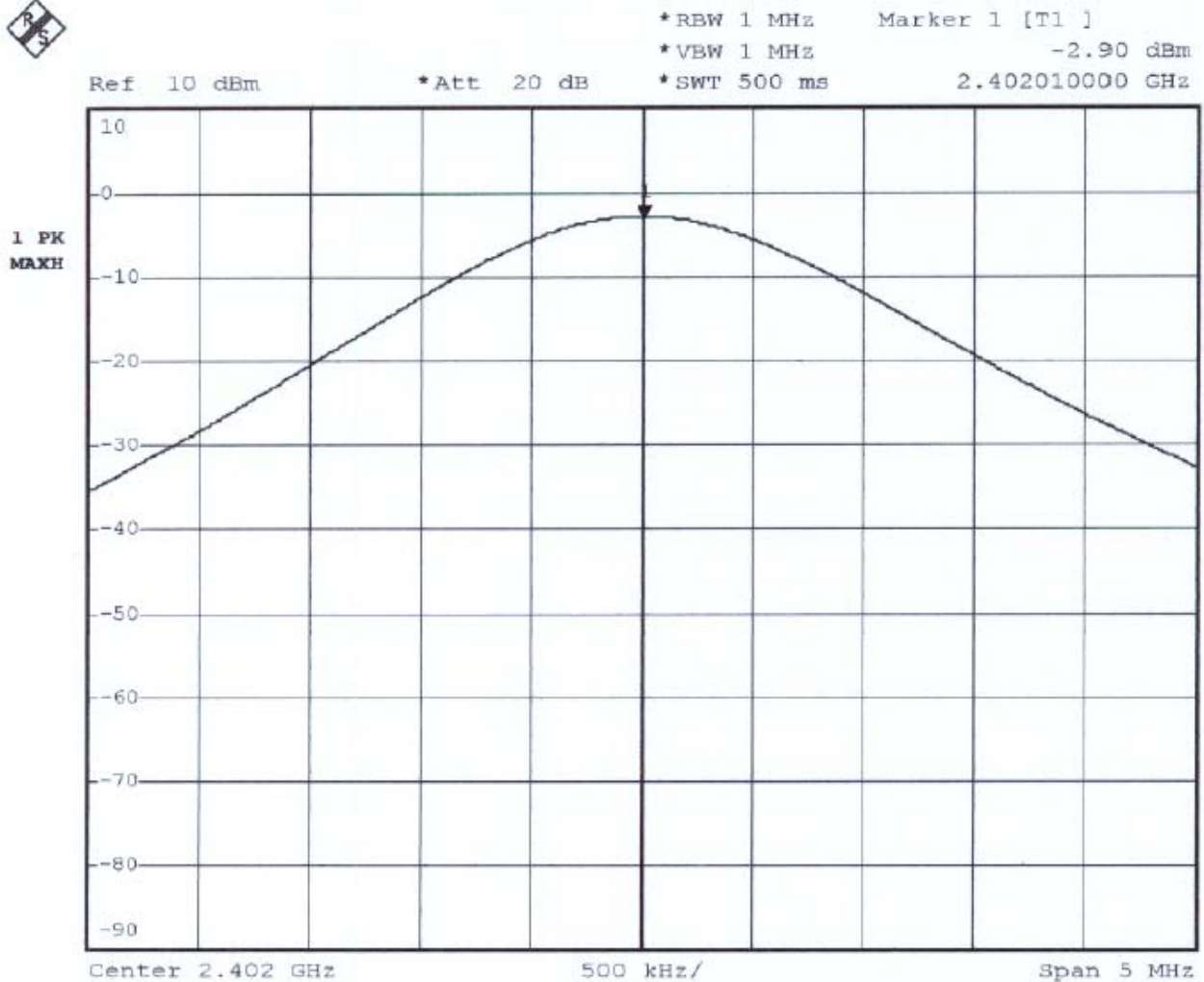


5.6.4. Test Result : See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 64 %
- Duty cycle of the equipment during the test X = 36%

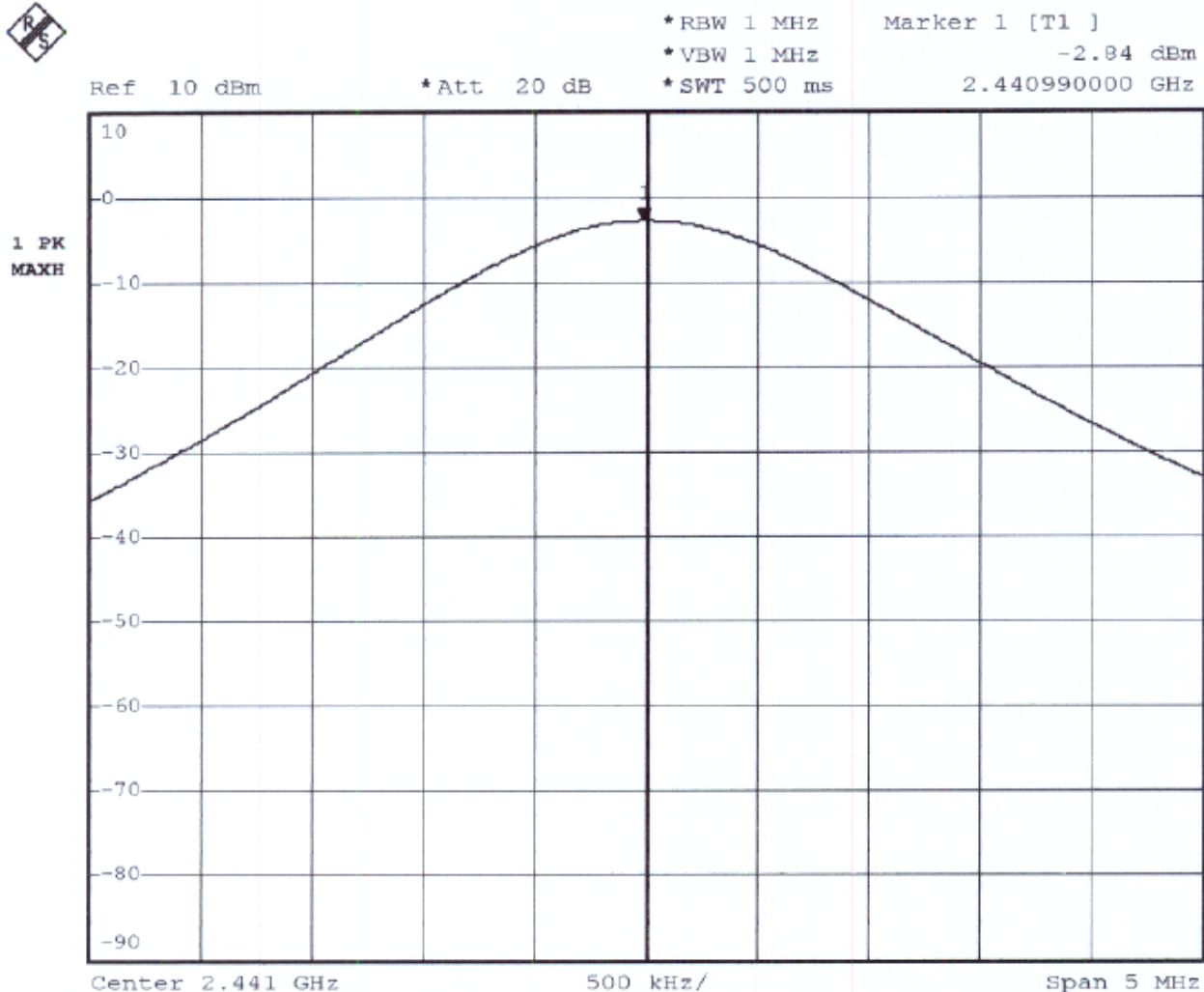
Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
00	2402	2.269864852	3.56	1W/30 dBm
39	2441	2.333458062	3.68	1W/30 dBm
78	2480	2.371373706	3.75	1W/30 dBm

Plot 1 (Channel 00)



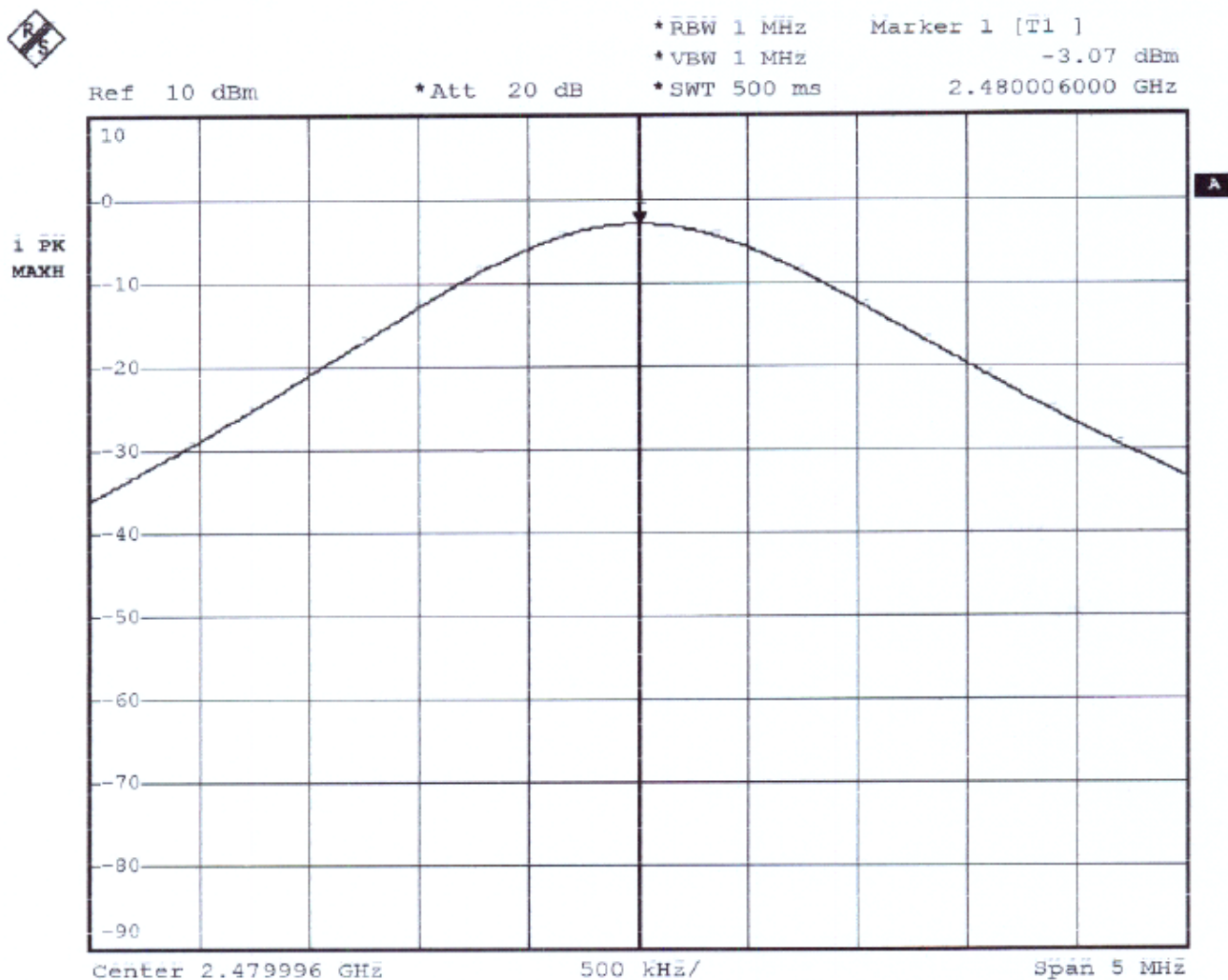
Date: 21.MAY.2003 21:42:40

Plot 2 (Channel 39)



Date: 21.MAY.2003 21:43:18

Plot 3 (Channel 78)



Date: 21.MAY.2003 21:51:55

5.6.5. Test Configuration (EUT Operating Condition) :

Same as Section 5.2.5.

5.7. 100KHz Bandwidth of Frequency Band Edges

5.7.1. Measuring Instruments :

As described in chapter 9 of this test report.

5.7.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3. Test Result :

Test Result in lower band (Channel 00) : PASS
 Test Result in higher band(Channel 78) : PASS

5.7.4. Note on Band edge Emission

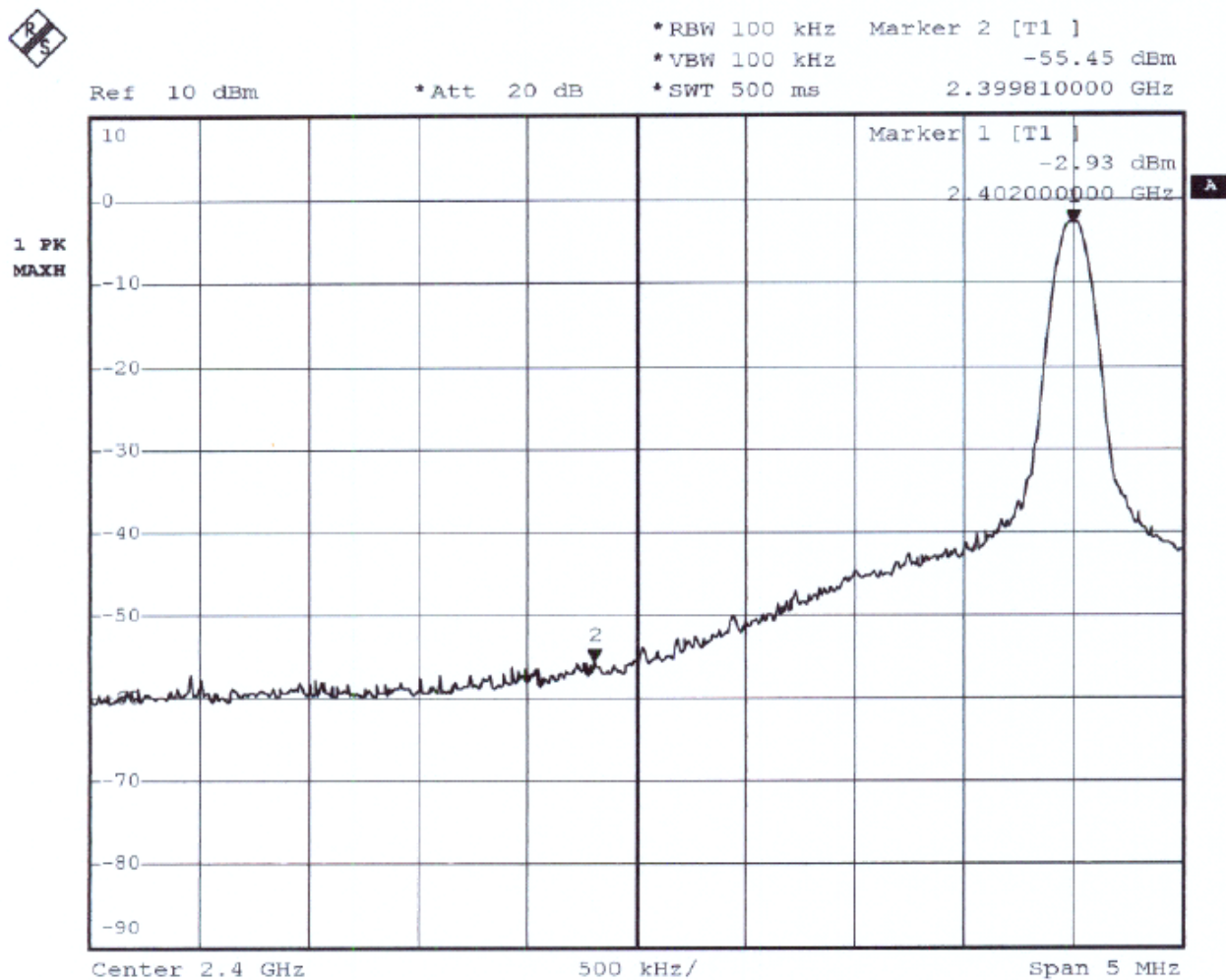
The band edge emission plot on page 30. shows 54.64dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Polarity	The emission of carrier power strength (dB μ V/m)	The maximum field strength in restrict band (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Result
H	90.30	35.66	74.00	-38.34	Peak	Pass
H	89.84	35.20	54.00	-18.80	Average	Pass
V	94.33	39.69	74.00	-34.31	Peak	Pass
V	94.11	39.47	54.00	-14.53	Average	Pass

* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

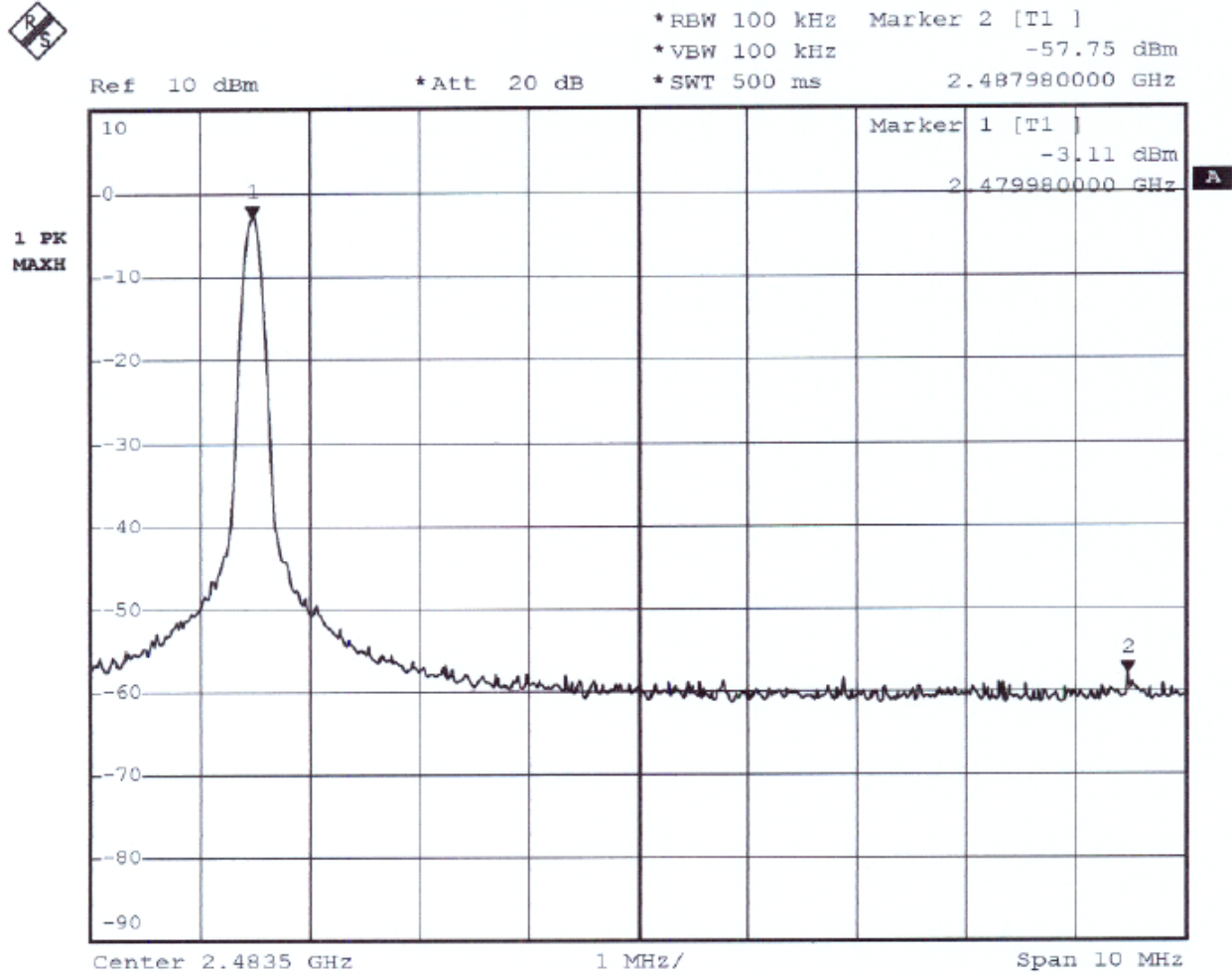
The spectrum analyzer plots are attached as below :

Plot 1 (Channel 00) :



Date: 21.MAY.2003 21:42:17

Plot 2 (Channel 78) :



Date: 21.MAY.2003 21:53:35

Comments : All emissions in those 100kHz bandwidth are attenuated more than 20dB from carrier maximum power.

5.7.5. Test Configuration (EUT Operating Condition) :

The software provided by client to enable the EUT under transmission condition continuously at lowest, and highest channel frequencies respectively.

5.8. Test of Conducted Emission

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.8.1. Major Measuring Instruments :

• Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

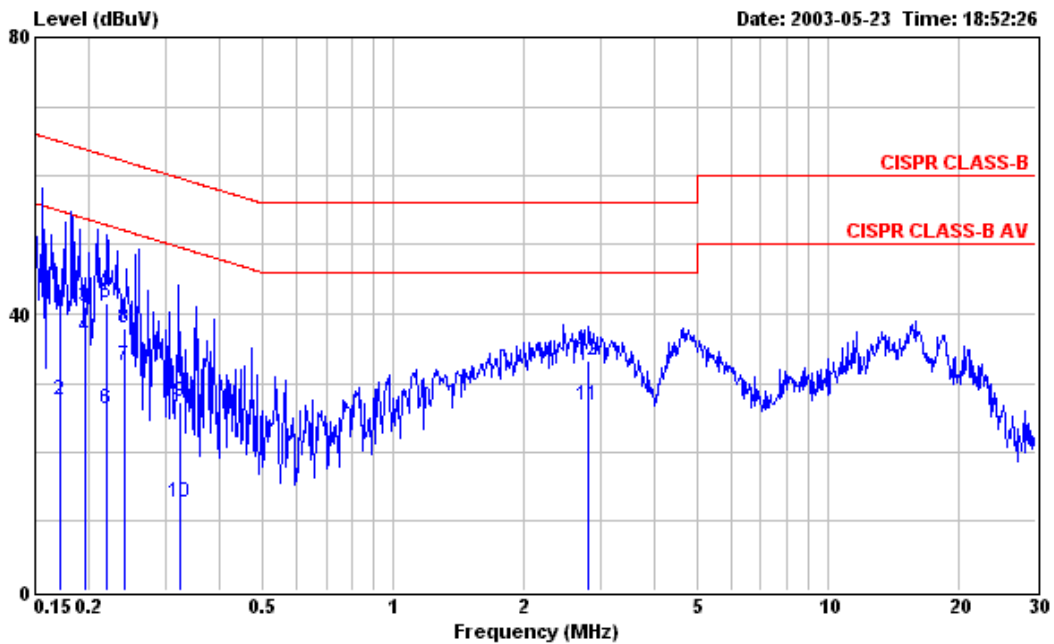
5.8.2. Test Procedures :

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 KHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.8.3. Test Result of Conducted Emission :

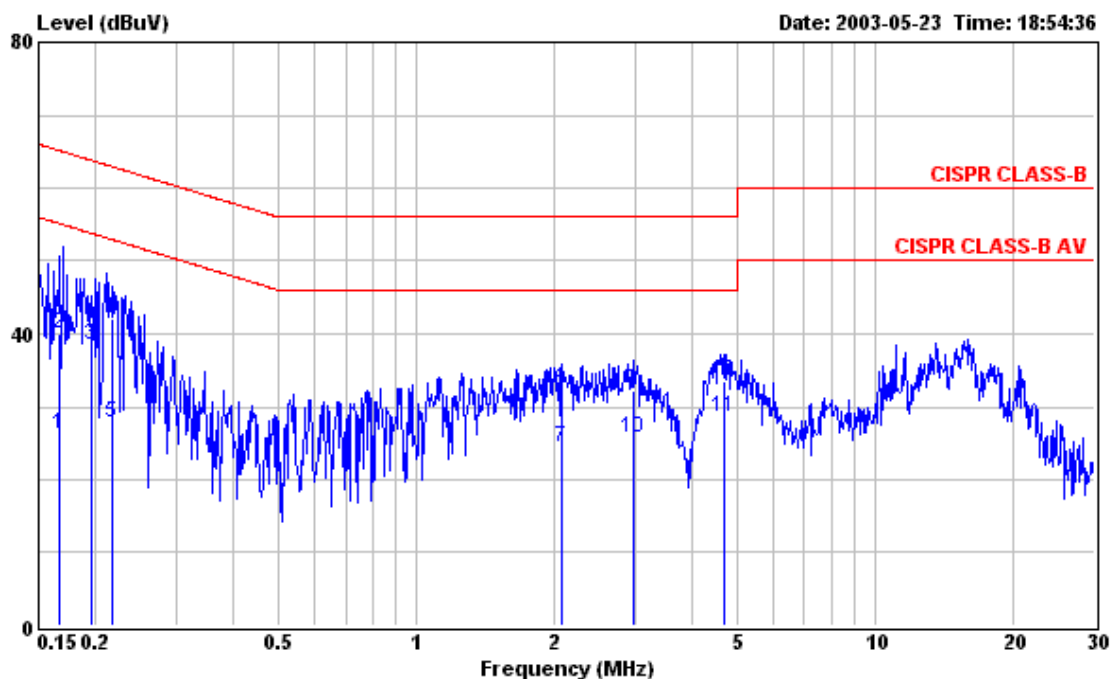
- Test Mode: Mode 1
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 25.9°C
- Relative Humidity: 69 %

The test was passed at the minimum margin that marked by a frame in the following data



Site : CO01-HY
 Condition : CISPR CLASS-B 2003 2001/008 LINE
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH00 2402MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.171	40.58	-24.32	64.90	40.44	0.10	0.04	QP
2	0.171	27.41	-27.49	54.90	27.27	0.10	0.04	Average
3	0.195	41.00	-22.83	63.83	40.86	0.10	0.04	QP
4	0.195	36.75	-17.08	53.83	36.61	0.10	0.04	Average
5	0.220	41.62	-21.20	62.82	41.48	0.10	0.04	QP
6	0.220	26.25	-26.57	52.82	26.11	0.10	0.04	Average
7	0.241	32.60	-19.46	52.06	32.45	0.10	0.05	Average
8	0.241	37.97	-24.09	62.06	37.82	0.10	0.05	QP
9	0.323	27.38	-32.24	59.62	27.23	0.10	0.05	QP
10	0.323	12.80	-36.82	49.62	12.65	0.10	0.05	Average
11	2.811	26.77	-19.23	46.00	26.51	0.10	0.16	Average
12	2.811	33.30	-22.70	56.00	33.04	0.10	0.16	QP



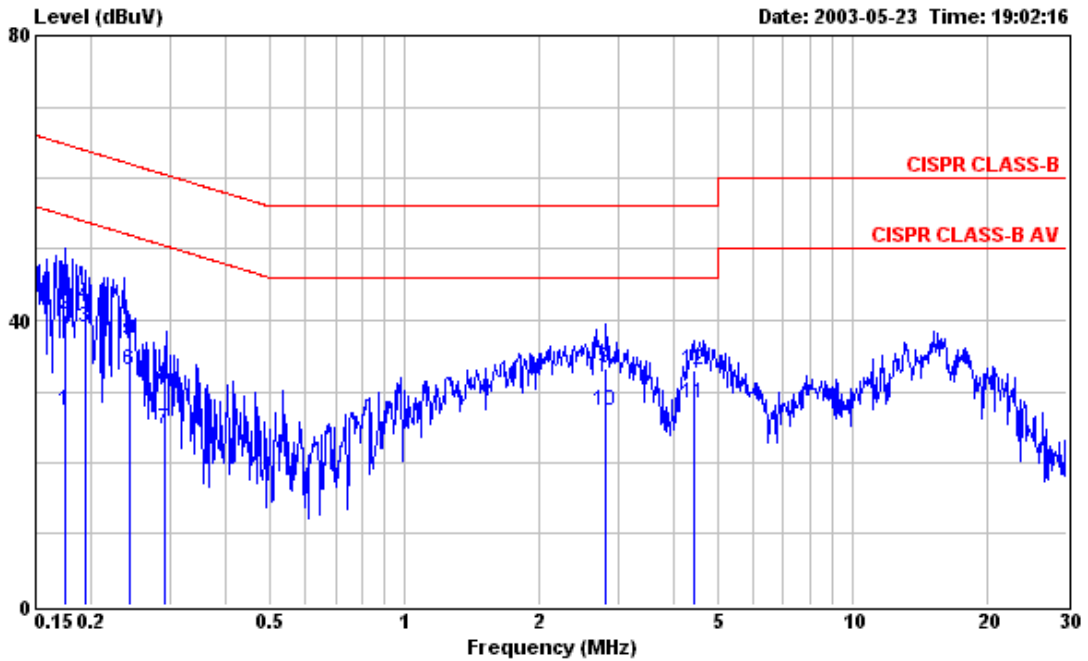
Site : C001-HY
 Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH00 2402MHz

	Over	Limit	Read	Probe	Cable			
Freq	Level	Limit	Line	Level	Factor	Loss		
MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.167	26.26	-28.85	55.11	26.11	0.10	0.05	Average
2	0.167	40.04	-25.07	65.11	39.89	0.10	0.05	QP
3	0.195	38.34	-15.47	53.81	38.20	0.10	0.04	Average
4	0.195	41.40	-22.41	63.81	41.26	0.10	0.04	QP
5	0.217	27.79	-25.14	52.93	27.65	0.10	0.04	Average
6	0.217	42.16	-20.77	62.93	42.02	0.10	0.04	QP
7	2.080	24.46	-21.54	46.00	24.21	0.11	0.14	Average
8	2.080	32.09	-23.91	56.00	31.84	0.11	0.14	QP
9	2.960	32.15	-23.85	56.00	31.83	0.16	0.16	QP
10	2.960	25.83	-20.17	46.00	25.51	0.16	0.16	Average
11	4.700	28.65	-17.35	46.00	28.25	0.20	0.20	Average
12	4.700	33.44	-22.56	56.00	33.04	0.20	0.20	QP

Test Engineer: John
 John Huang

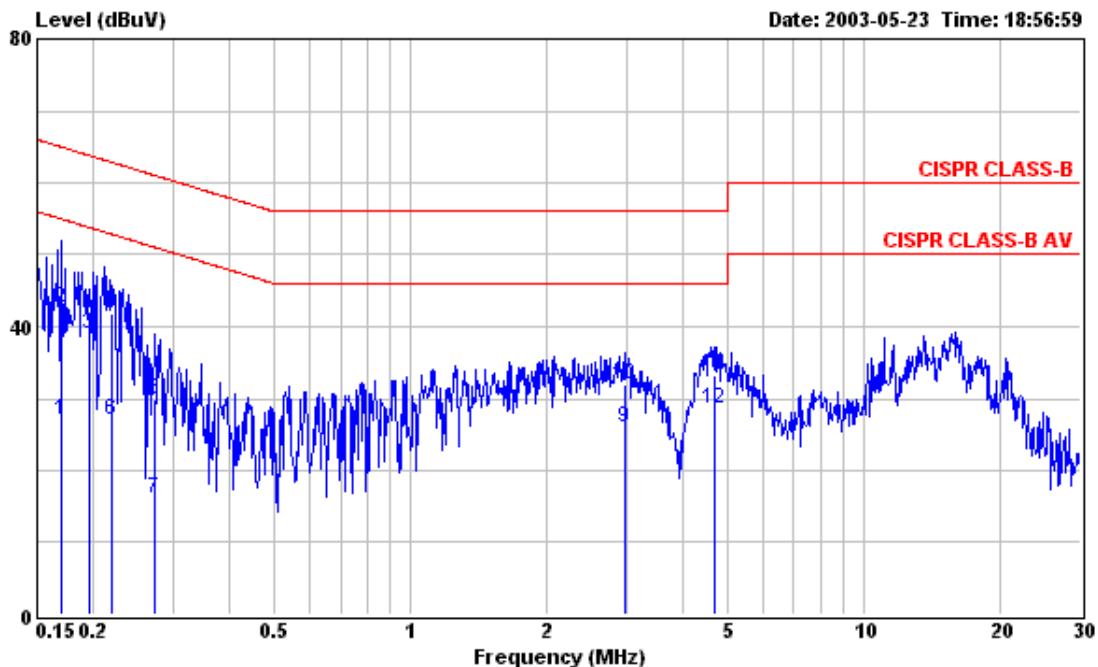
- Test Mode: Mode 2
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 25.9°C
- Relative Humidity: 69 %

The test was passed at the minimum margin that marked by a frame in the following data



Site : C001-HY
 Condition : CISPR CLASS-B 2003 2001/008 LINE
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH39 2441MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.174	27.16	-27.61	54.77	27.02	0.10	0.04	Average
2	0.174	40.86	-23.91	64.77	40.72	0.10	0.04	QP
3	0.194	39.08	-14.77	53.85	38.94	0.10	0.04	Average
4	0.194	42.01	-21.84	63.85	41.87	0.10	0.04	QP
5	0.244	37.24	-24.72	61.96	37.09	0.10	0.05	QP
6	0.244	32.91	-19.05	51.96	32.76	0.10	0.05	Average
7	0.291	24.70	-25.78	50.48	24.55	0.10	0.05	Average
8	0.291	30.68	-29.80	60.48	30.53	0.10	0.05	QP
9	2.811	33.34	-22.66	56.00	33.08	0.10	0.16	QP
10	2.811	27.26	-18.74	46.00	27.00	0.10	0.16	Average
11	4.410	28.35	-17.65	46.00	28.04	0.11	0.20	Average
12	4.410	33.08	-22.92	56.00	32.77	0.11	0.20	QP



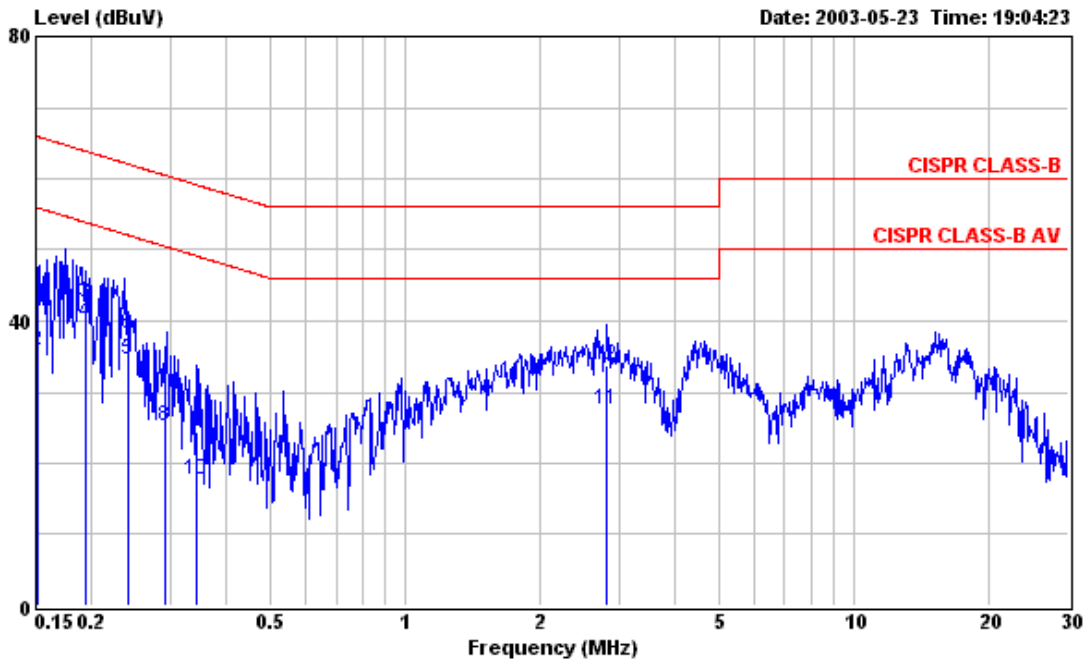
Site : C001-HY
 Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH39 2441MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.169	27.02	-27.99	55.01	26.88	0.10	0.04	Average
2	0.169	42.55	-22.46	65.01	42.41	0.10	0.04	QP
3	0.195	38.93	-14.88	53.81	38.79	0.10	0.04	Average
4	0.195	41.72	-22.09	63.81	41.58	0.10	0.04	QP
5	0.218	41.71	-21.17	62.88	41.57	0.10	0.04	QP
6	0.218	26.98	-25.90	52.88	26.84	0.10	0.04	Average
7	0.273	16.23	-34.80	51.03	16.08	0.10	0.05	Average
8	0.273	29.89	-31.14	61.03	29.74	0.10	0.05	QP
9	2.960	25.95	-20.05	46.00	25.63	0.16	0.16	Average
10	2.960	31.95	-24.05	56.00	31.63	0.16	0.16	QP
11	4.700	33.26	-22.74	56.00	32.86	0.20	0.20	QP
12	4.700	28.60	-17.40	46.00	28.20	0.20	0.20	Average

Test Engineer: John
 John Huang

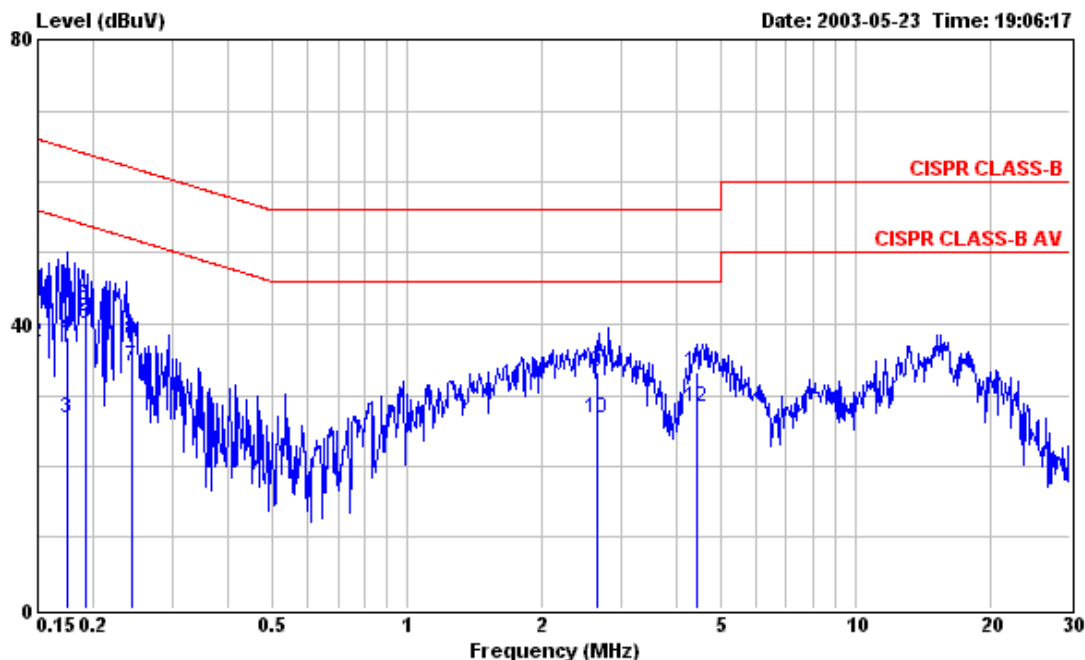
- Test Mode: Mode 3
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 25.9°C
- Relative Humidity: 69 %

The test was passed at the minimum margin that marked by a frame in the following data



Site : C001-HY
 Condition : CISPR CLASS-B 2003 2001/008 LINE
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH78 2472MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.151	44.56	-21.40	65.96	44.41	0.10	0.05	QP
2	0.151	35.85	-20.11	55.96	35.70	0.10	0.05	Average
3	0.193	42.53	-21.37	63.90	42.39	0.10	0.04	QP
4	0.193	39.78	-14.12	53.90	39.64	0.10	0.04	Average
5	0.241	34.48	-17.57	52.05	34.33	0.10	0.05	Average
6	0.241	38.17	-23.88	62.05	38.02	0.10	0.05	QP
7	0.290	29.94	-30.58	60.52	29.79	0.10	0.05	QP
8	0.290	25.11	-25.41	50.52	24.96	0.10	0.05	Average
9	0.341	24.54	-34.64	59.18	24.38	0.10	0.06	QP
10	0.341	17.61	-31.57	49.18	17.45	0.10	0.06	Average
11	2.812	27.51	-18.49	46.00	27.25	0.10	0.16	Average
12	2.812	33.64	-22.36	56.00	33.38	0.10	0.16	QP



Site : C001-HY
 Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
 EUT : USB Dongle
 Power : 110V/60Hz
 Memo : BUB-103
 Memo : TX CH78 2472MHz

	Over	Limit	Read	Probe	Cable		
Freq	Level	Limit	Line	Level	Factor	Loss	Remark
MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.150	45.38	-20.62	66.00	45.23	0.10	0.05 QP
2	0.150	37.35	-18.65	56.00	37.20	0.10	0.05 Average
3	0.174	26.72	-28.05	54.77	26.58	0.10	0.04 Average
4	0.174	38.17	-26.60	64.77	38.03	0.10	0.04 QP
5	0.193	39.87	-14.05	53.92	39.73	0.10	0.04 Average
6	0.193	42.57	-21.35	63.92	42.43	0.10	0.04 QP
7	0.243	34.13	-17.87	52.00	33.98	0.10	0.05 Average
8	0.243	37.62	-24.38	62.00	37.47	0.10	0.05 QP
9	2.661	33.16	-22.84	56.00	32.86	0.14	0.16 QP
10	2.661	26.78	-19.22	46.00	26.48	0.14	0.16 Average
11	4.410	33.31	-22.69	56.00	32.91	0.20	0.20 QP
12	4.410	28.35	-17.65	46.00	27.95	0.20	0.20 Average

Test Engineer: John
 John Huang

5.9. Test of Radiated Emission

Radiated emissions from 30 MHz to 24.8 GHz were measured according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 4.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

5.9.1. Major Measuring Instruments

- Amplifier (MITEQ AFS44)
 - RF Gain 40 dB
 - Signal Input 100 MHz to 26.5 GHz

- Amplifier (HP 8447D)
 - RF Gain 30 dB
 - Signal Input 100 KHz to 1.3 GHz

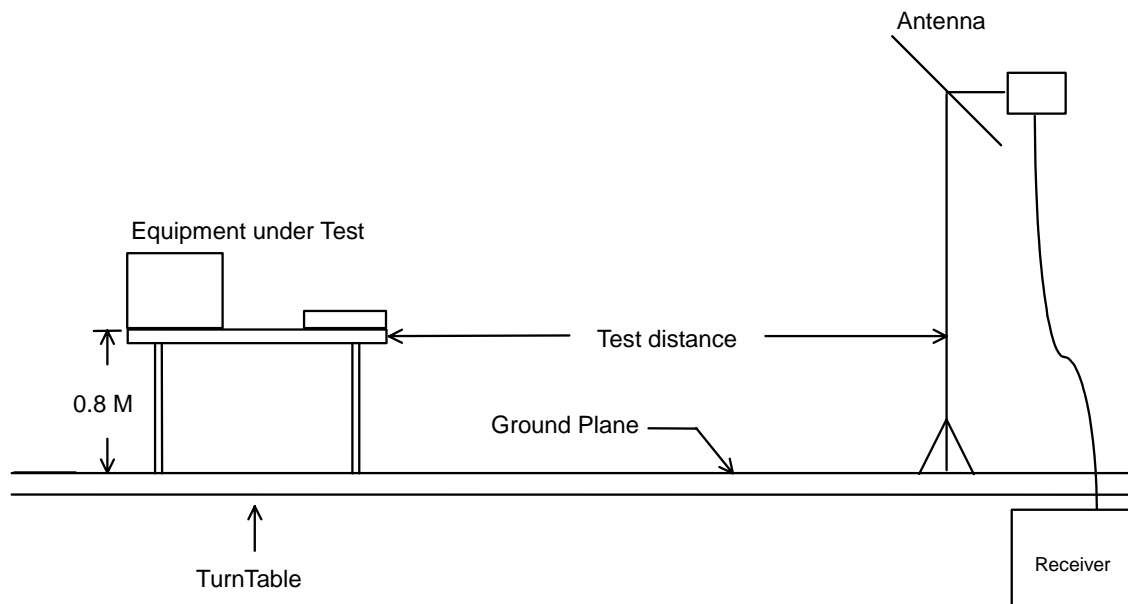
- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 24 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 KHz to 40 GHz

- Test Receiver (SCHAFFNER SCR3501)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 9 K – 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

5.9.2. Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.9.3. Typical Test Setup Layout of Radiated Emission

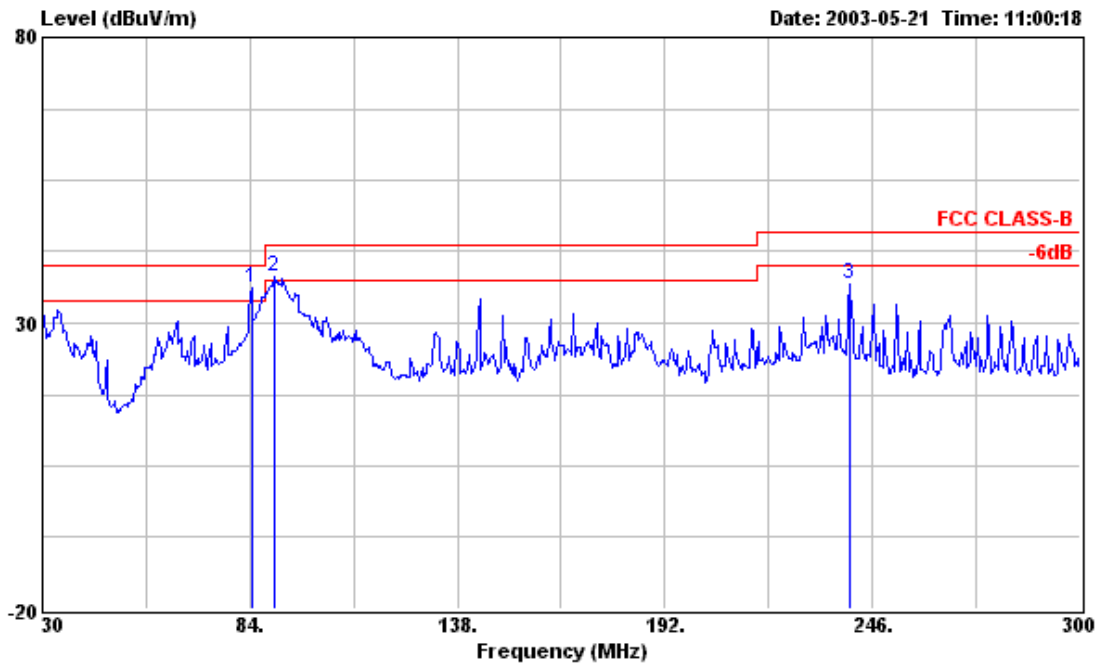


5.9.4. Test Result of Radiated Emission

- Test Mode: Mode 1
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 64 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

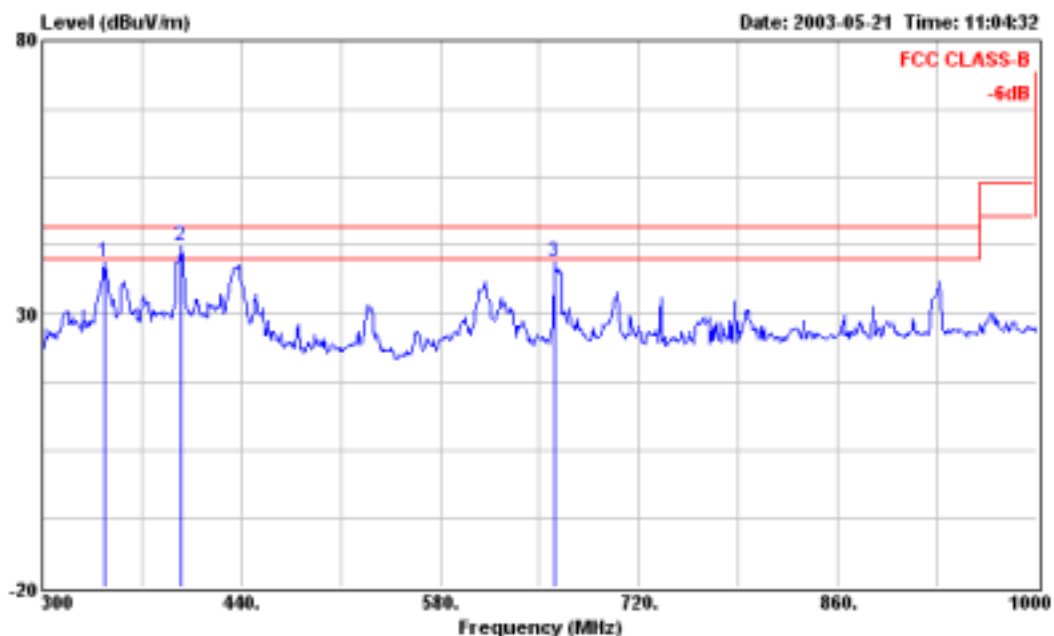
The test was passed at the minimum margin that marked by the frame in the following test record

■ Spurious Emission



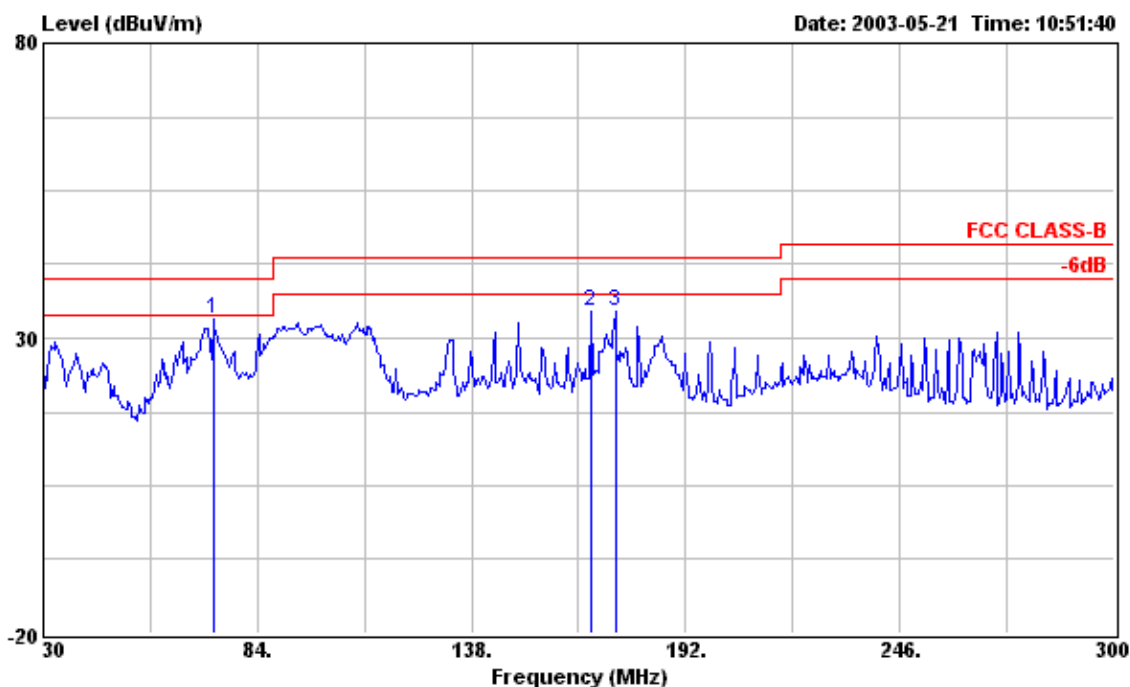
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table	
Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	
1 !	84.540	36.32	-3.68	40.00	54.18	7.40	1.77	27.03 Peak	200	178
2 !	90.210	38.06	-5.44	43.50	54.45	8.80	1.83	27.02 Peak	---	---
3	240.060	36.94	-9.06	46.00	49.53	10.92	3.09	26.60 Peak	---	---



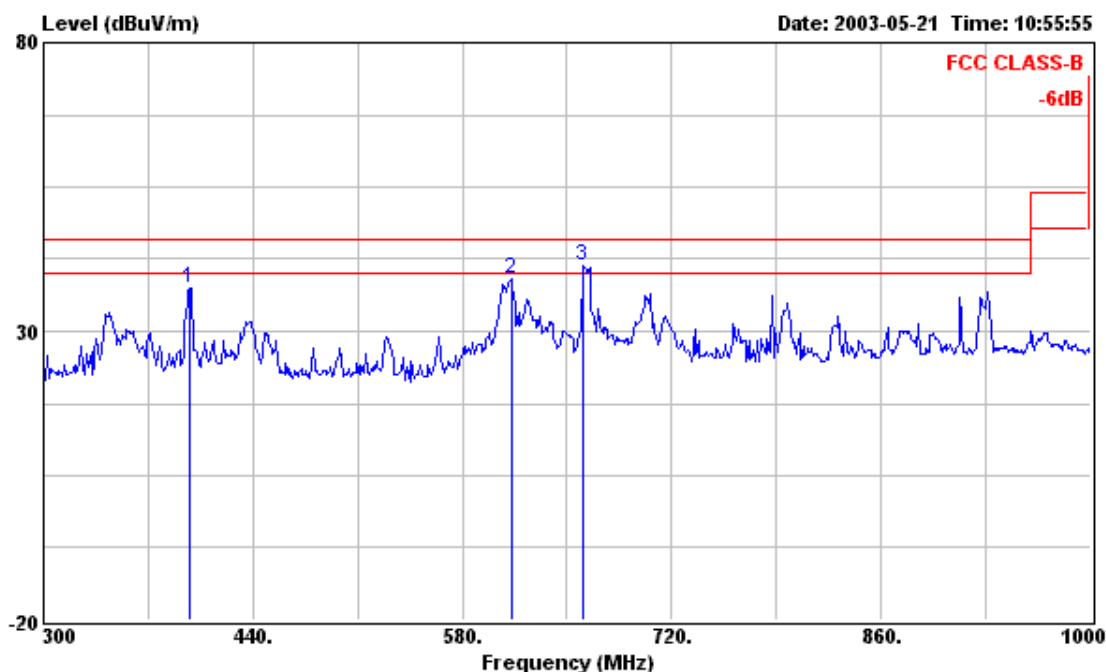
Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		ca	deg
1	343.400	39.38	-6.62	46.00	49.60	12.79	3.77	26.86	Peak	---	---
2	397.300	42.30	-3.70	46.00	50.87	14.54	4.07	27.18	Peak	---	---
3	660.500	39.49	-6.51	46.00	43.88	17.72	5.89	28.00	Peak	---	---



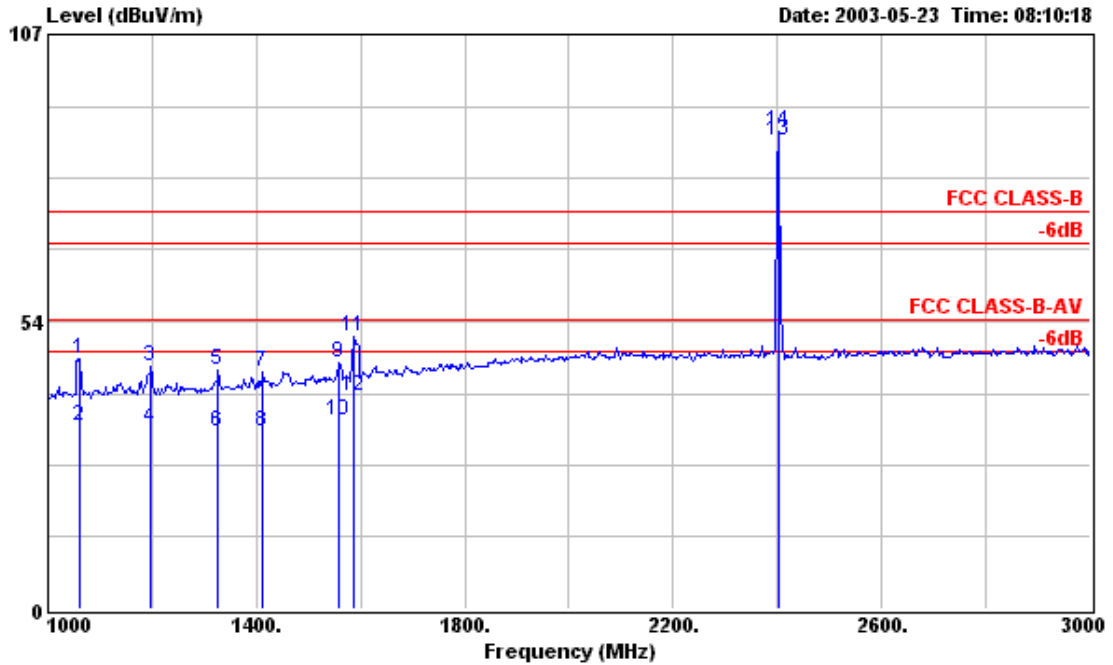
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	72.930	33.09	-6.91	40.00	53.57	4.92	1.65	27.05	Peak	---	---
2	167.970	34.69	-8.81	43.50	51.35	7.54	2.53	26.73	Peak	---	---
3	174.180	34.70	-8.80	43.50	51.29	7.51	2.60	26.70	Peak	---	---



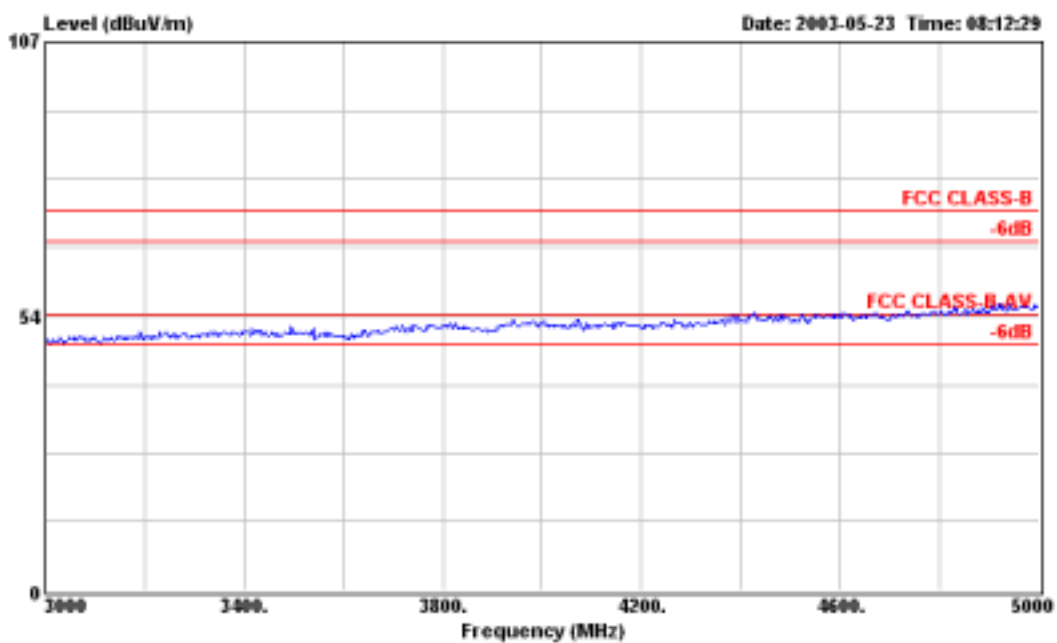
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamplifier	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	398.000	37.58	-8.42	46.00	46.12	14.57	4.08	27.19	Peak	---	---
2	612.900	39.16	-6.84	46.00	44.23	17.38	5.55	28.00	Peak	---	---
3 !	660.500	41.21	-4.79	46.00	45.60	17.72	5.89	28.00	Peak	---	---

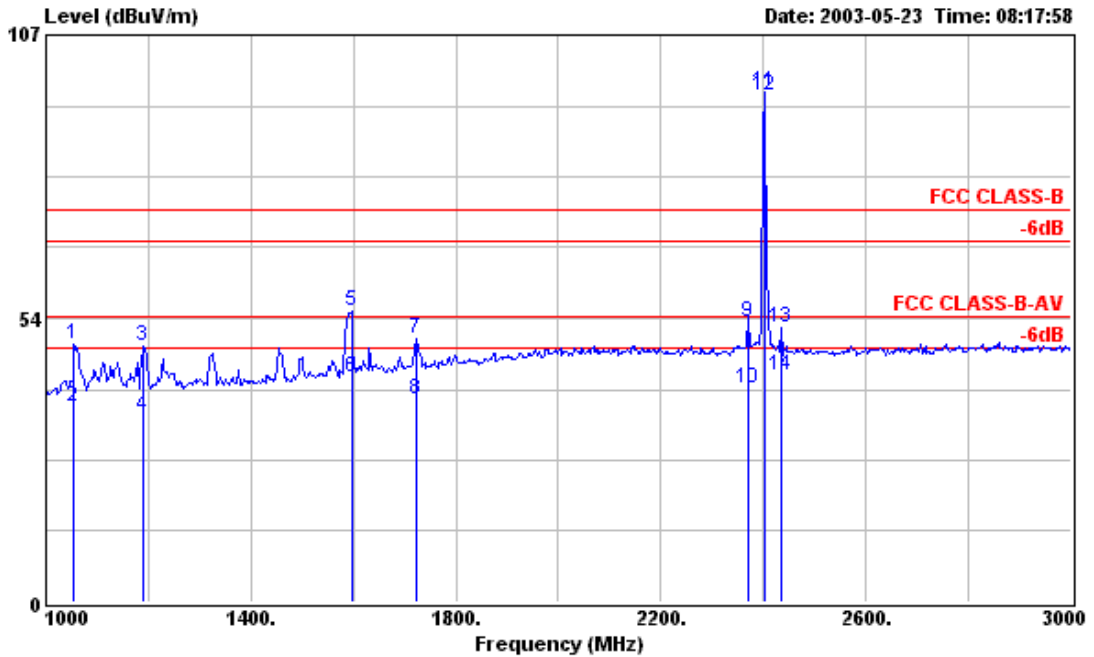


Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1060.000	46.72	-27.28	74.00	55.58	25.08	4.00	37.94	Peak	---	---
2	1060.000	34.11	-19.89	54.00	42.97	25.08	4.00	37.94	Average	---	---
3	1198.000	45.14	-28.86	74.00	53.26	25.64	4.21	37.97	Peak	---	---
4	1198.000	33.71	-20.29	54.00	41.83	25.64	4.21	37.97	Average	---	---
5	1326.000	44.31	-29.69	74.00	51.75	26.15	4.40	37.99	Peak	---	---
6	1326.000	33.10	-20.90	54.00	40.54	26.15	4.40	37.99	Average	---	---
7	1412.000	44.00	-30.00	74.00	50.98	26.50	4.53	38.01	Peak	---	---
8	1412.000	33.13	-20.87	54.00	40.11	26.50	4.53	38.01	Average	---	---
9	1558.000	45.84	-28.16	74.00	51.79	27.34	4.75	38.04	Peak	---	---
10	1558.000	34.98	-19.02	54.00	40.93	27.34	4.75	38.04	Average	---	---
11	1588.000	50.70	-23.30	74.00	56.38	27.56	4.80	38.04	Peak	---	---
12	1588.000	39.44	-14.56	54.00	45.12	27.56	4.80	38.04	Average	---	---

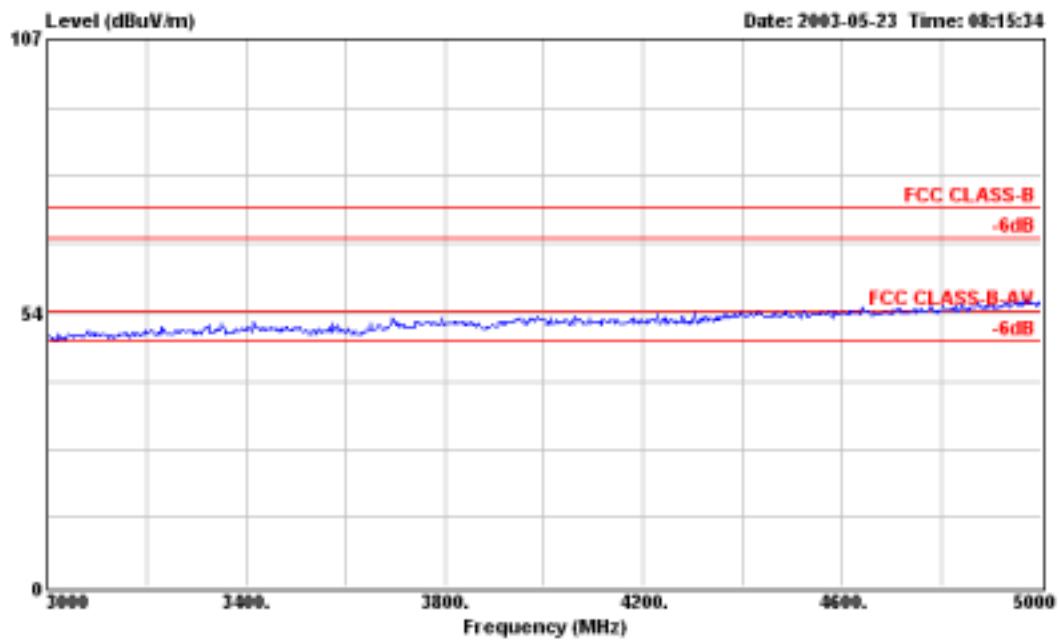


Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH00 2402MHz
: F351606



Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH00 2402MHz
 : F351606

Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1054.000	48.68	-25.32	74.00	57.58	25.05	3.99	37.94	Peak	---
2	1054.000	36.71	-17.29	54.00	45.61	25.05	3.99	37.94	Average	---
3	1190.000	48.42	-25.58	74.00	56.59	25.60	4.20	37.97	Peak	---
4	1190.000	35.06	-18.94	54.00	43.23	25.60	4.20	37.97	Average	---
5	1596.000	54.78	-19.22	74.00	60.40	27.62	4.81	38.05	Peak	---
6	1596.000	42.37	-11.63	54.00	47.99	27.62	4.81	38.05	Average	---
7	1724.000	49.55	-24.45	74.00	54.04	28.57	5.01	38.07	Peak	---
8	1724.000	38.05	-15.95	54.00	42.54	28.57	5.01	38.07	Average	---
9	2372.000	52.76	-21.24	74.00	54.79	30.22	5.92	38.17	Peak	---
10	2372.000	40.29	-13.71	54.00	42.32	30.22	5.92	38.17	Average	---
11	2436.000	51.85	-22.15	74.00	53.87	30.15	6.01	38.18	Peak	---
12	2436.000	42.78	-11.22	54.00	44.80	30.15	6.01	38.18	Average	---



Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 VERTICAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH00 2402MHz
: F351606

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Reading Loss	Limits	Emission	Level	Margin	Detect	
(dBuV)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	
2404.000	H	30.19	5.97	50.97	-	-	87.13	22724.80	A.V.
2404.000	H	30.19	5.97	52.74	-	-	88.90	27861.21	Peak
2404.000	V	30.19	5.97	60.04	-	-	96.20	64565.42	Peak
2404.000	V	30.19	5.97	59.28	-	-	95.44	59156.16	A.V.
4804.000	V/H						-		Peak, A.V.
7206.000	V/H						-		Peak, A.V.
9608.000	V/H						-		Peak, A.V.
12010.000	V/H						-		Peak, A.V.
14412.000	V/H						-		Peak, A.V.
16814.000	V/H						-		Peak, A.V.
19216.000	V/H						-		Peak, A.V.
21618.000	V/H						-		Peak, A.V.
24020.000	V/H						-		Peak, A.V.

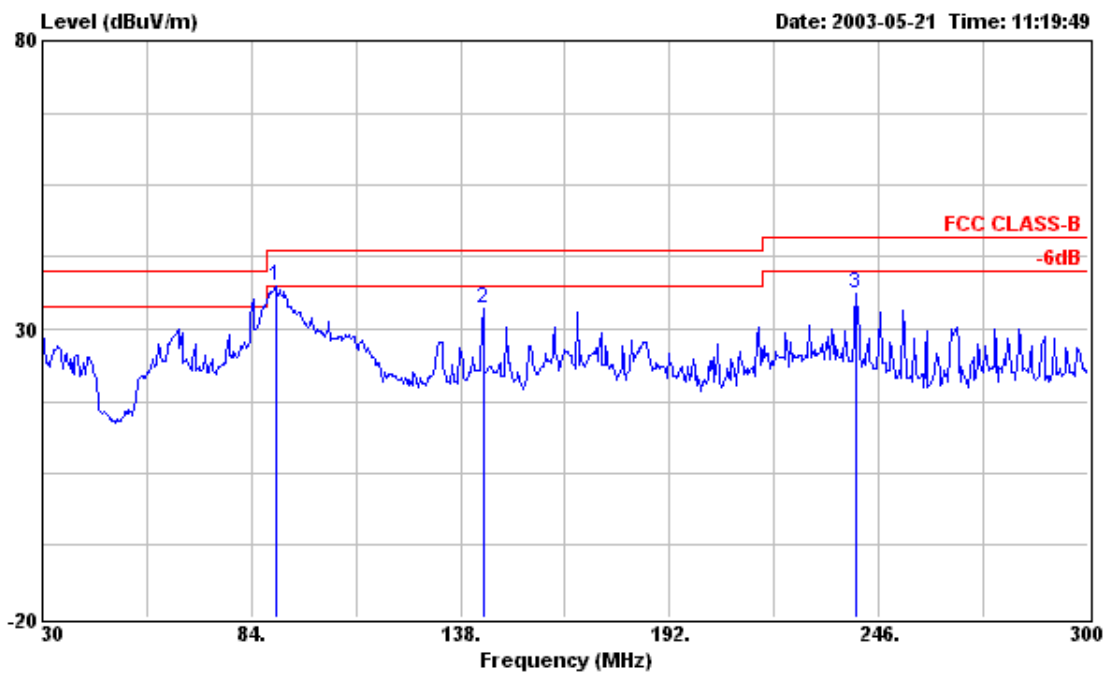
Remark: The emission emitted by the EUT is too low to be measured except the emission listed above

Test Engineer: Murray
Murray Lu

- Test Mode: Mode 2
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 64 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

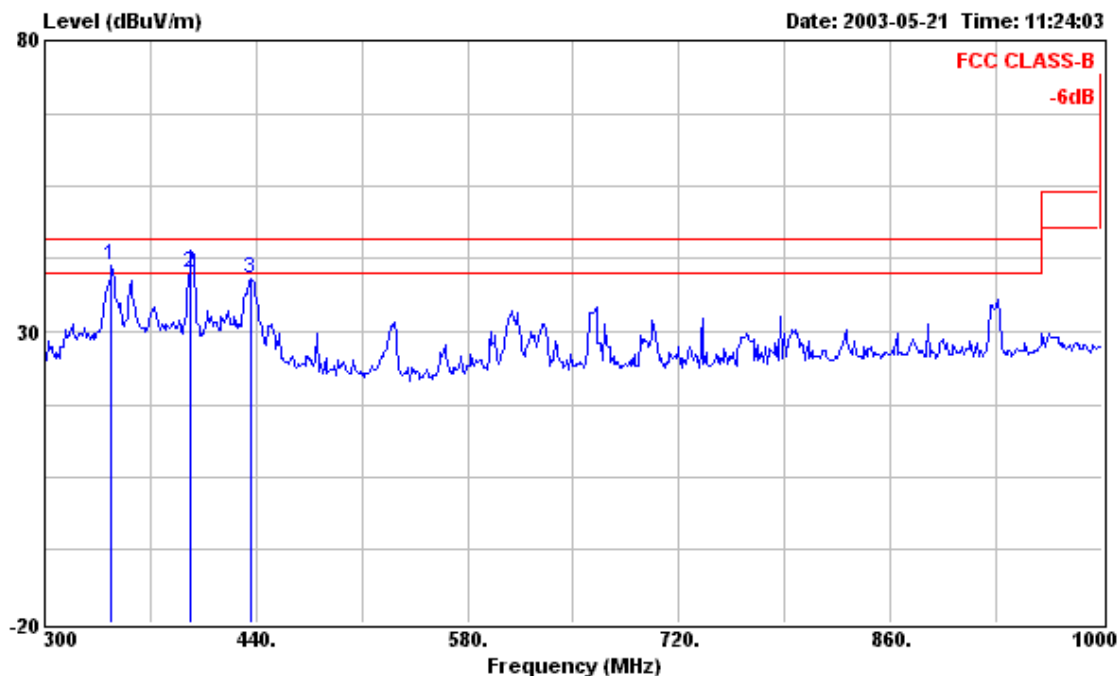
The test was passed at the minimum margin that marked by the frame in the following test record

■ Spurious Emission



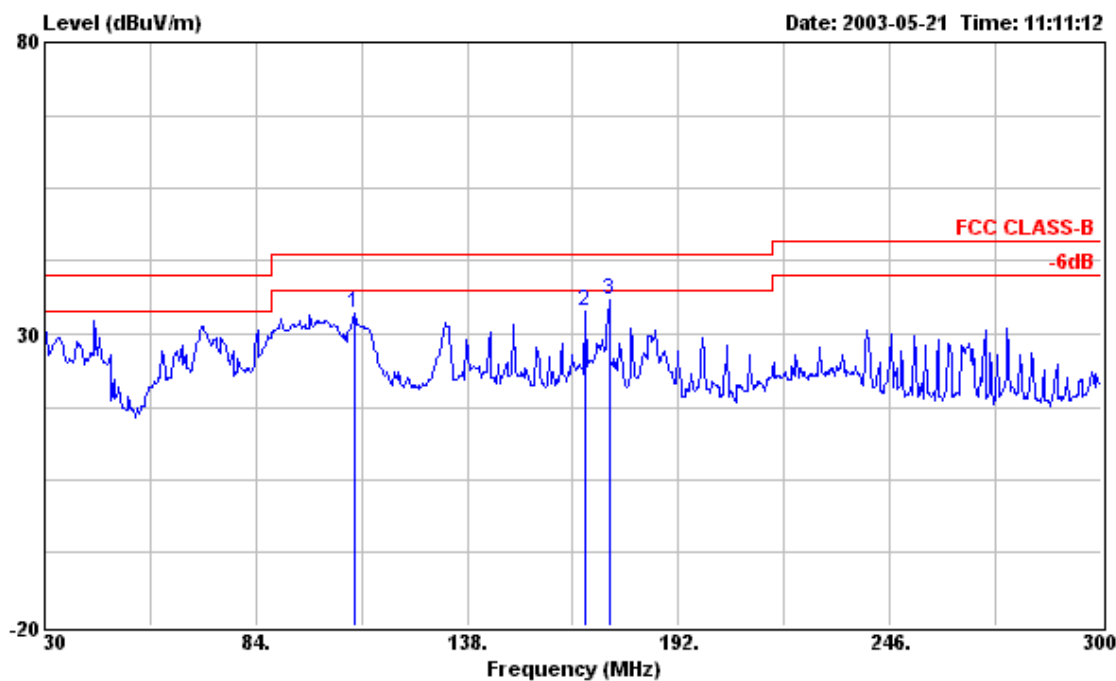
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	90.210	37.40	-6.10	43.50	53.79	8.80	1.83	27.02	Peak	---	---
2	143.940	33.56	-9.94	43.50	48.17	9.93	2.28	26.82	Peak	---	---
3	240.060	36.17	-9.83	46.00	48.76	10.92	3.09	26.60	Peak	---	---



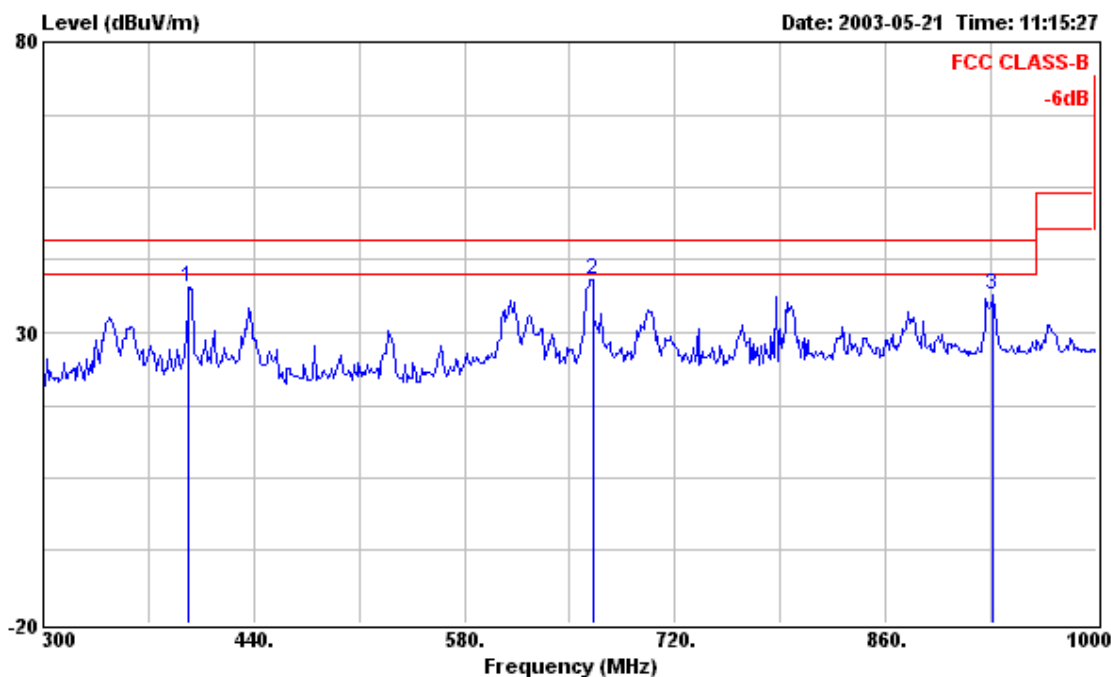
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	344.100	41.39	-4.61	46.00	51.67	12.82	3.77	26.87	Peak	300	95
2	396.600	39.95	-6.05	46.00	48.54	14.52	4.07	27.18	QP	---	---
3	436.500	39.17	-6.83	46.00	47.17	15.14	4.24	27.38	Peak	---	---



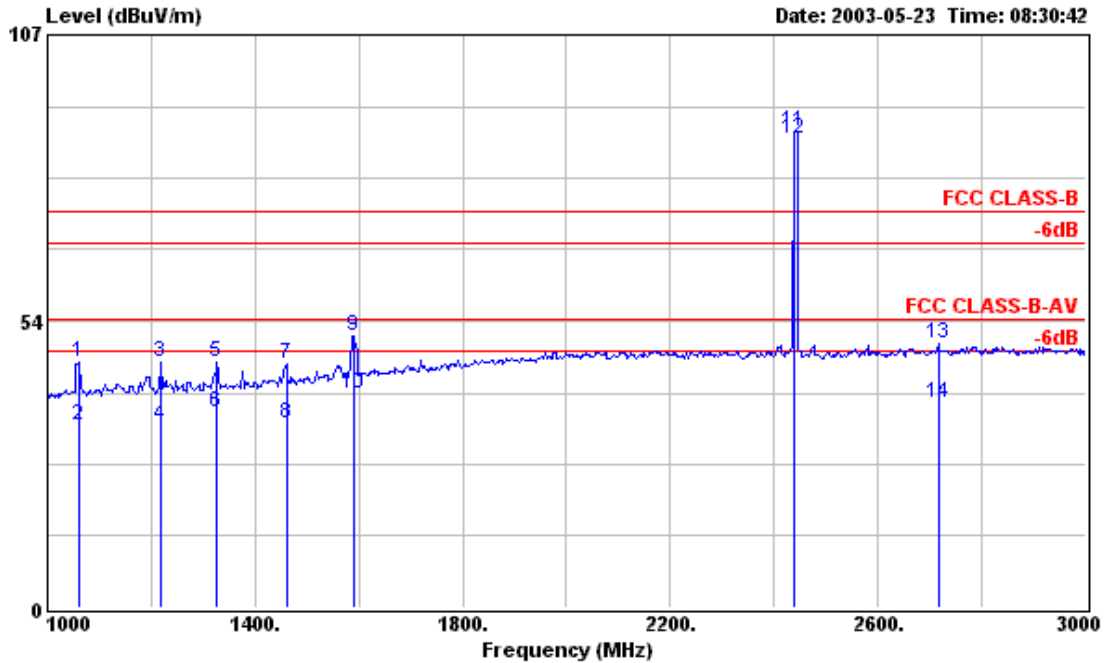
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	109.380	33.59	-9.91	43.50	48.90	9.64	2.01	26.96	Peak	---	---
2	167.970	33.79	-9.71	43.50	50.45	7.54	2.53	26.73	Peak	---	---
3	174.180	35.77	-7.73	43.50	52.36	7.51	2.60	26.70	Peak	---	---



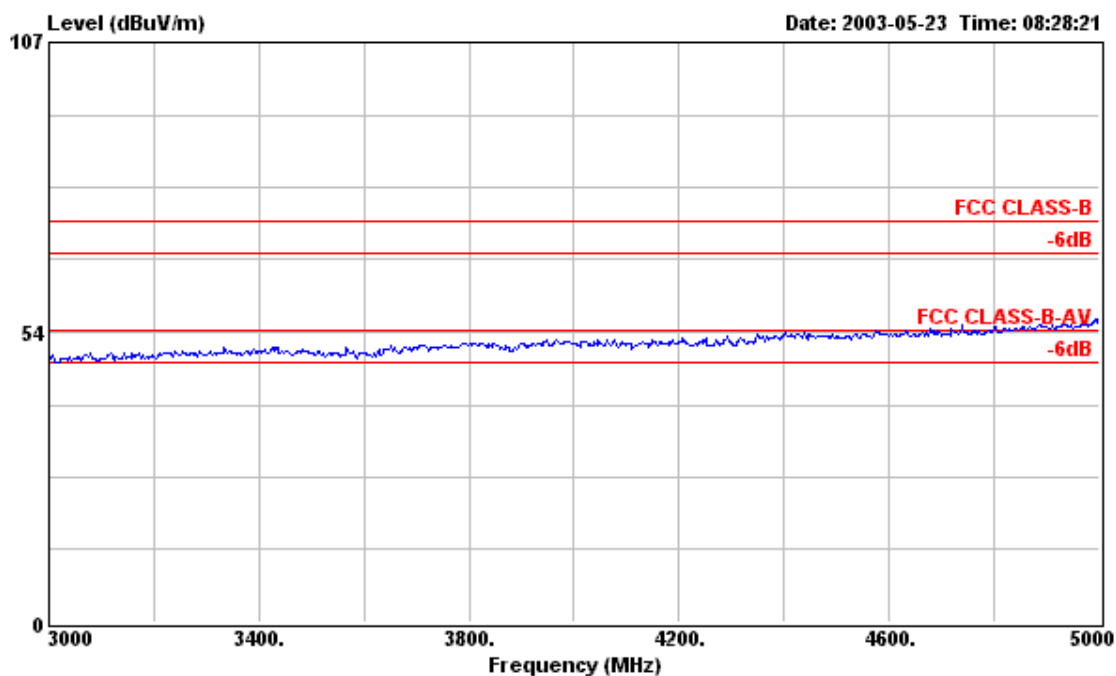
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHz
 : F351606

	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table		
Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos		
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	cm	deg		
1	396.600	37.93	-8.07	46.00	46.52	14.52	4.07	27.18	Peak	---	---
2	665.400	39.03	-6.97	46.00	43.39	17.75	5.89	28.00	Peak	---	---
3	931.400	36.37	-9.63	46.00	37.53	19.52	7.03	27.71	Peak	---	---

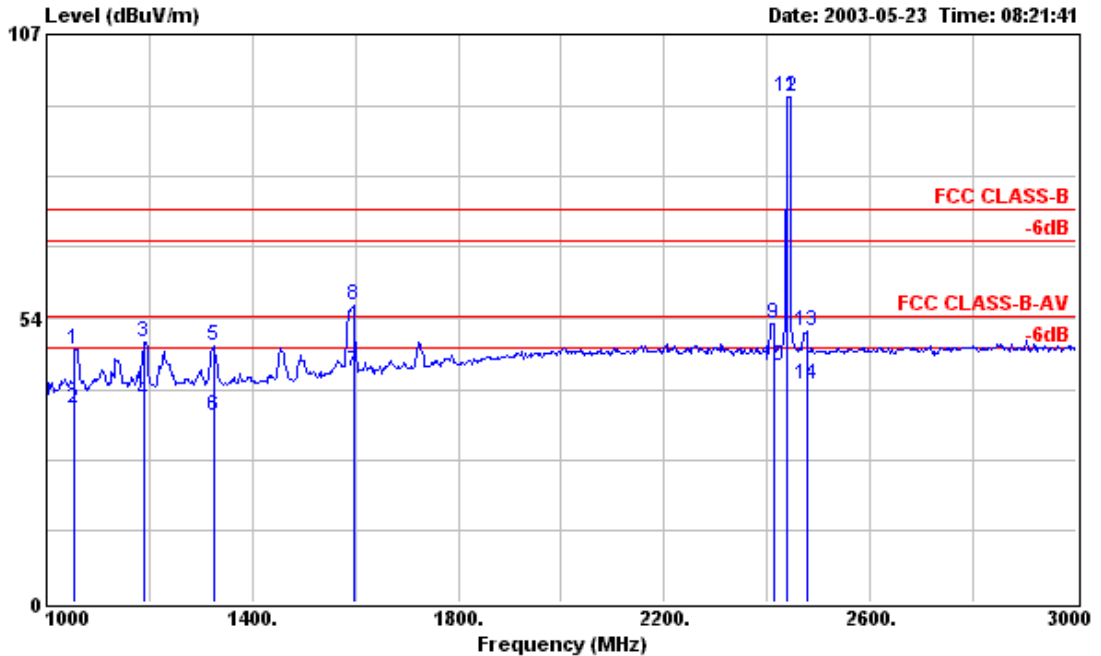


Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHz
 : F351606

Peak No.	Freq (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Probe Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Remark	Ant Pos (cm)	Table Pos (deg)
1	1060.000	45.75	-28.25	74.00	54.61	25.08	4.00	37.94	Peak	---	---
2	1060.000	33.91	-20.09	54.00	42.77	25.08	4.00	37.94	Average	---	---
3	1220.000	45.84	-28.16	74.00	53.85	25.72	4.24	37.97	Peak	---	---
4	1220.000	34.14	-19.86	54.00	42.15	25.72	4.24	37.97	Average	---	---
5	1326.000	45.88	-28.12	74.00	53.32	26.15	4.40	37.99	Peak	---	---
6	1326.000	36.33	-17.67	54.00	43.77	26.15	4.40	37.99	Average	---	---
7	1460.000	45.61	-28.39	74.00	52.33	26.70	4.60	38.02	Peak	---	---
8	1460.000	34.40	-19.60	54.00	41.12	26.70	4.60	38.02	Average	---	---
9	1590.000	50.75	-23.25	74.00	56.42	27.58	4.80	38.05	Peak	---	---
10	1590.000	40.11	-13.89	54.00	45.78	27.58	4.80	38.05	Average	---	---
11	2716.000	49.32	-24.68	74.00	51.01	30.06	6.46	38.21	Peak	---	---
12	2716.000	38.29	-15.71	54.00	39.98	30.06	6.46	38.21	Average	---	---

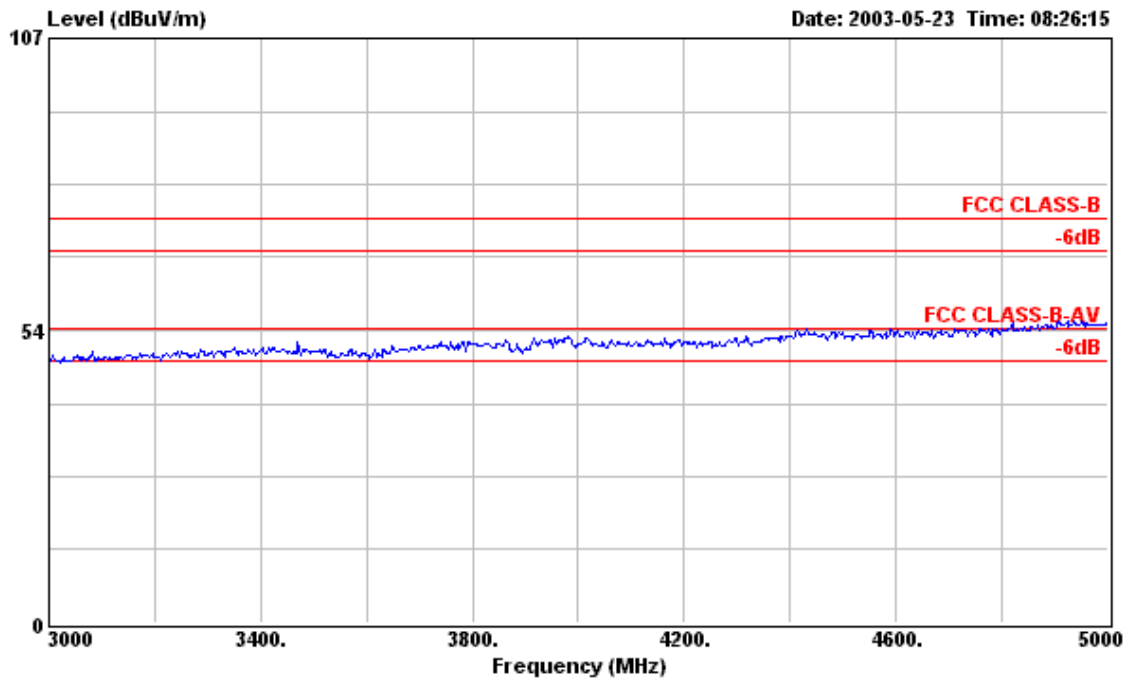


Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH39 2441MHz
: F351606



Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH39 2441MHZ
 : F351606

Peak	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1054.000	47.74	-26.26	74.00	56.64	25.05	3.99	37.94	Peak	---	---
2	1054.000	36.42	-17.58	54.00	45.32	25.05	3.99	37.94	Average	---	---
3	1190.000	49.06	-24.94	74.00	57.23	25.60	4.20	37.97	Peak	---	---
4	1190.000	38.03	-15.97	54.00	46.20	25.60	4.20	37.97	Average	---	---
5	1324.000	48.34	-25.66	74.00	55.79	26.14	4.40	37.99	Peak	---	---
6	1324.000	35.04	-18.96	54.00	42.49	26.14	4.40	37.99	Average	---	---
7	1596.000	43.52	-10.48	54.00	49.14	27.62	4.81	38.05	Average	---	---
8	1596.000	56.05	-17.95	74.00	61.67	27.62	4.81	38.05	Peak	---	---
9	2412.000	52.49	-21.51	74.00	54.50	30.18	5.98	38.17	Peak	---	---
10	2412.000	44.30	-9.70	54.00	46.31	30.18	5.98	38.17	Average	---	---
11	2476.000	50.92	-23.08	74.00	52.93	30.11	6.06	38.18	Peak	---	---
12	2476.000	41.10	-12.90	54.00	43.11	30.11	6.06	38.18	Average	---	---

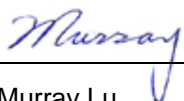


Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 VERTICAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH39 2441MHz
: F351606

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Reading Loss	Limits	Emission	Level	Margin	Detect	
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
2438.000	H	30.15	6.01	52.85	-	-	89.01	28216.30	Peak
2438.000	H	30.15	6.01	51.32	-	-	87.48	23659.20	A.V.
2438.000	V	30.15	6.01	59.14	-	-	95.30	58210.32	Peak
2438.000	V	30.15	6.01	58.96	-	-	95.12	57016.43	A.V.
4882.000	V/H						-		Peak, A.V.
7323.000	V/H						-		Peak, A.V.
9764.000	V/H						-		Peak, A.V.
12205.000	V/H						-		Peak, A.V.
14646.000	V/H						-		Peak, A.V.
17087.000	V/H						-		Peak, A.V.
19528.000	V/H						-		Peak, A.V.
21969.000	V/H						-		Peak, A.V.
24410.000	V/H						-		Peak, A.V.

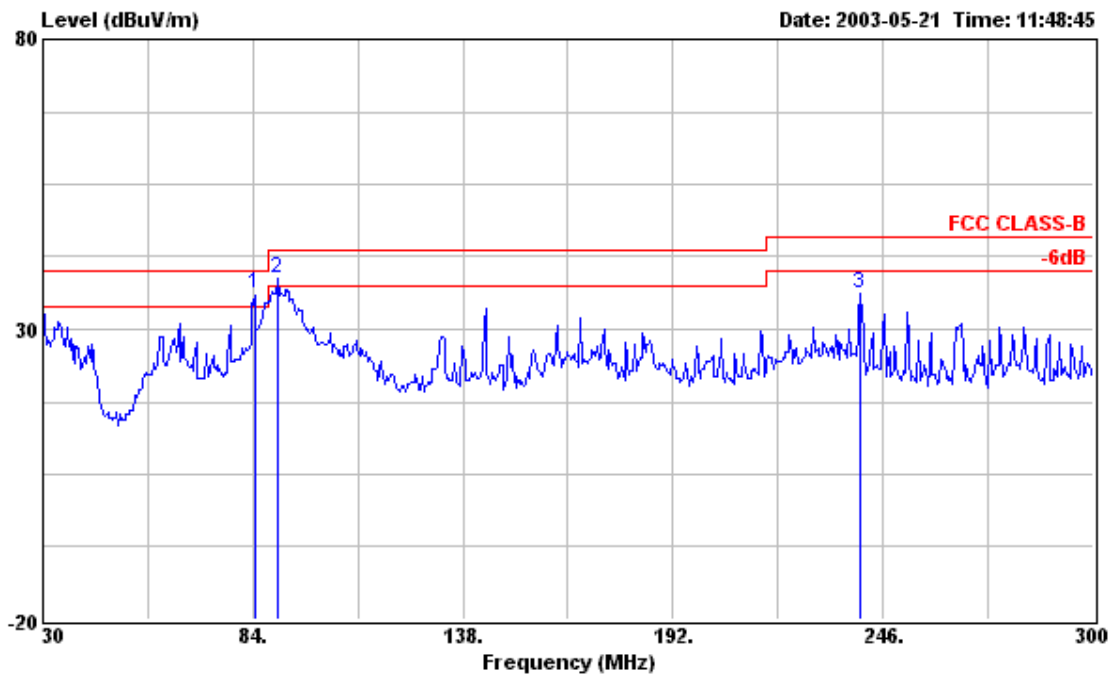
Remark: The emission emitted by the EUT is too low to be measured except the emission listed above

Test Engineer: 
Murray Lu

- Test Mode: Mode 3
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 64 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

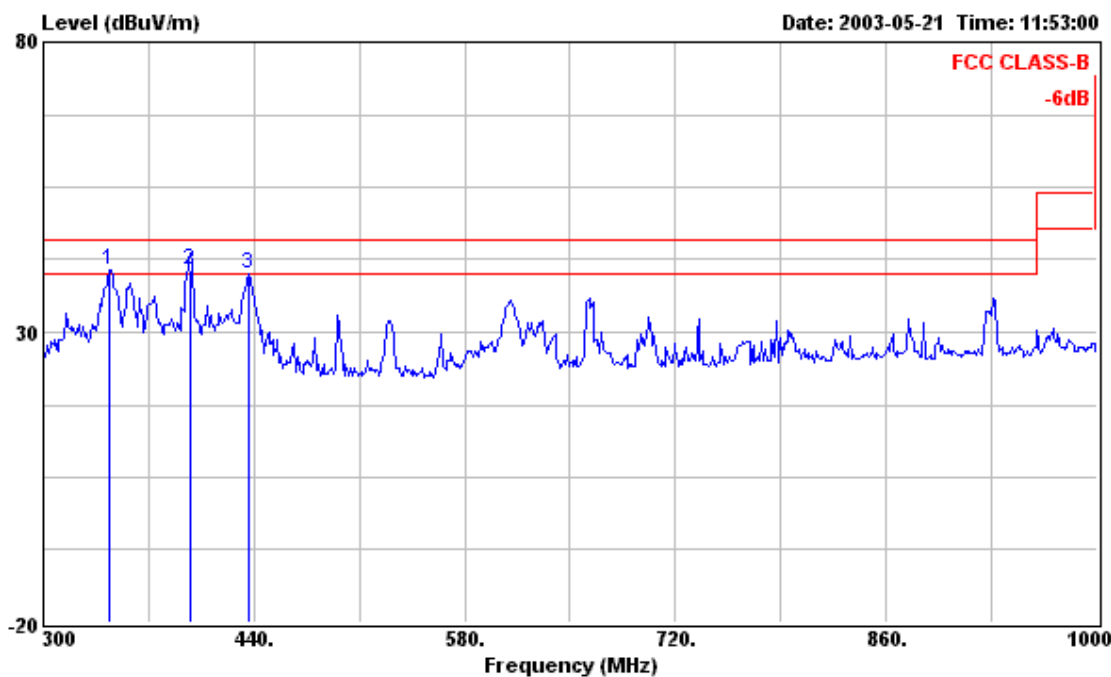
The test was passed at the minimum margin that marked by the frame in the following test record

■ Spurious Emission



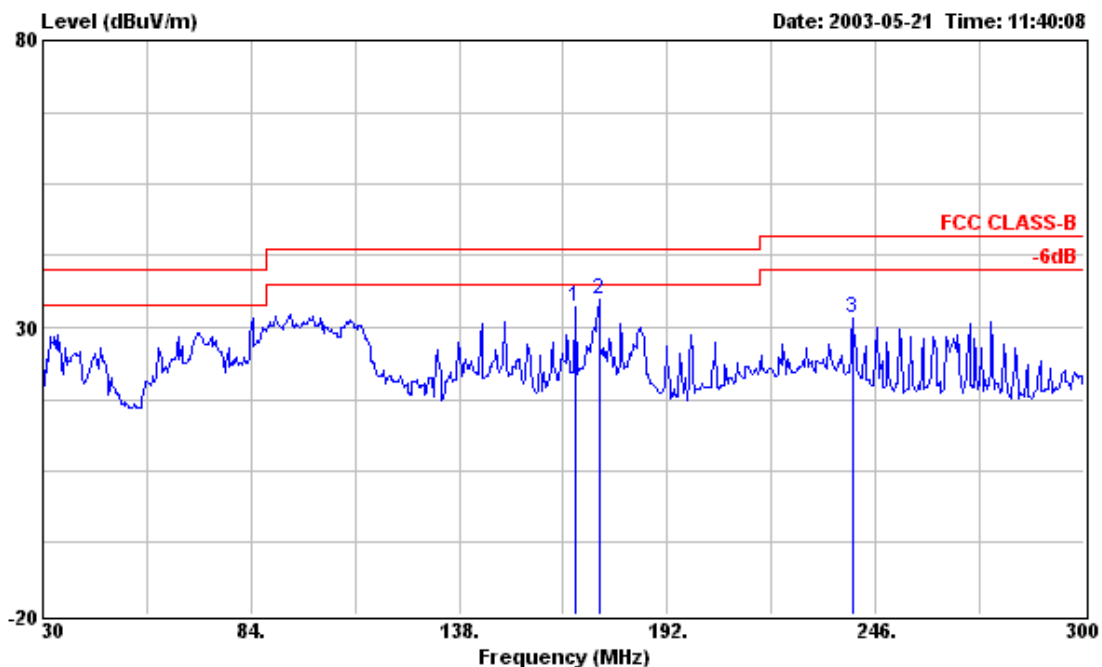
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB	cm	deg
1	84.540	36.01	-3.99	40.00	53.87	7.40	1.77	27.03	Peak	180
2	90.210	38.71	-4.79	43.50	55.10	8.80	1.83	27.02	Peak	---
3	240.060	36.11	-9.89	46.00	48.70	10.92	3.09	26.60	Peak	---



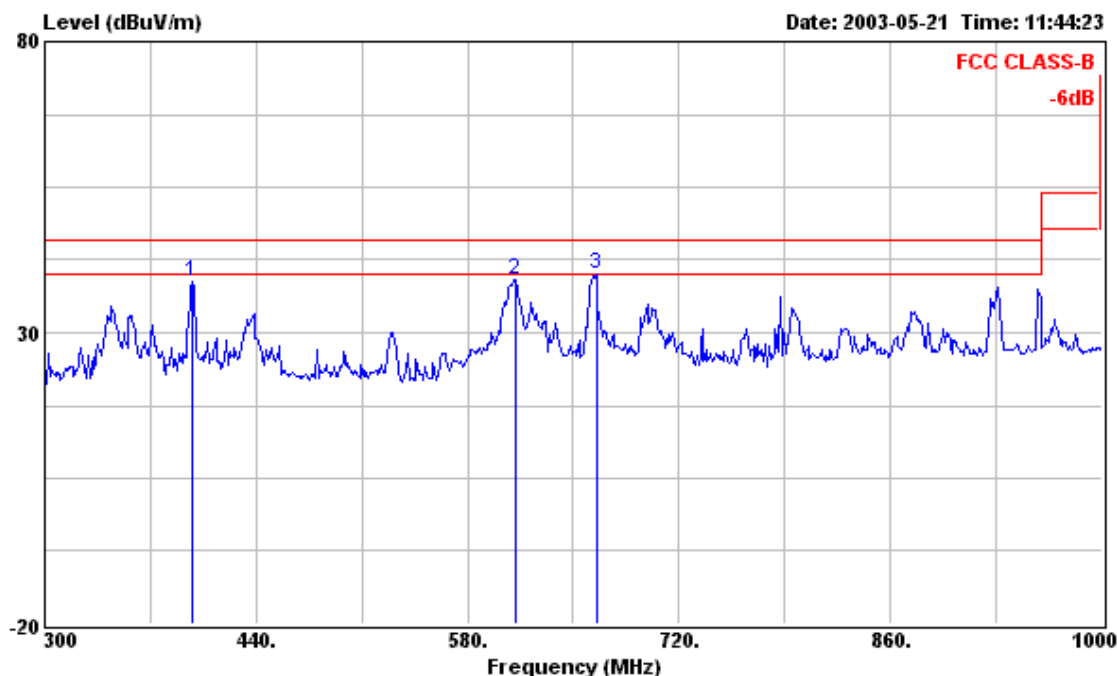
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	344.100	40.87	-5.13	46.00	51.15	12.82	3.77	26.87	Peak	---	---
2 !	397.300	40.65	-5.35	46.00	49.22	14.54	4.07	27.18	QP	---	---
3 !	436.500	40.06	-5.94	46.00	48.06	15.14	4.24	27.38	Peak	---	---



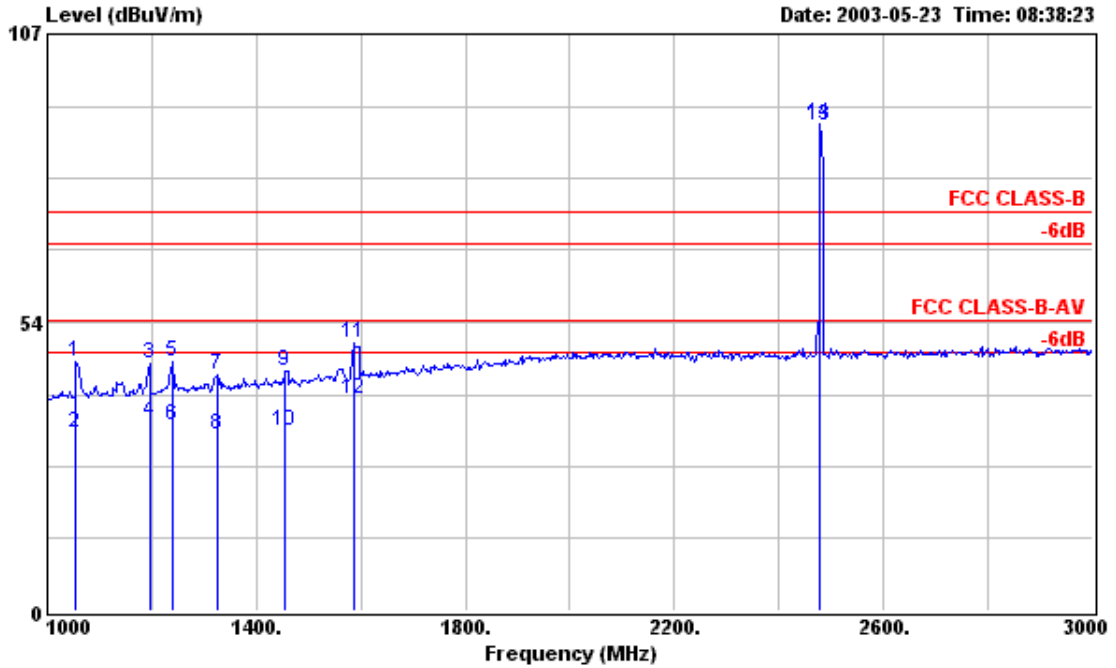
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

Peak	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	167.970	33.70	-9.80	43.50	50.36	7.54	2.53	26.73	Peak	---	---
2	174.180	34.96	-8.54	43.50	51.55	7.51	2.60	26.70	Peak	---	---
3	240.060	31.71	-14.29	46.00	44.30	10.92	3.09	26.60	Peak	---	---



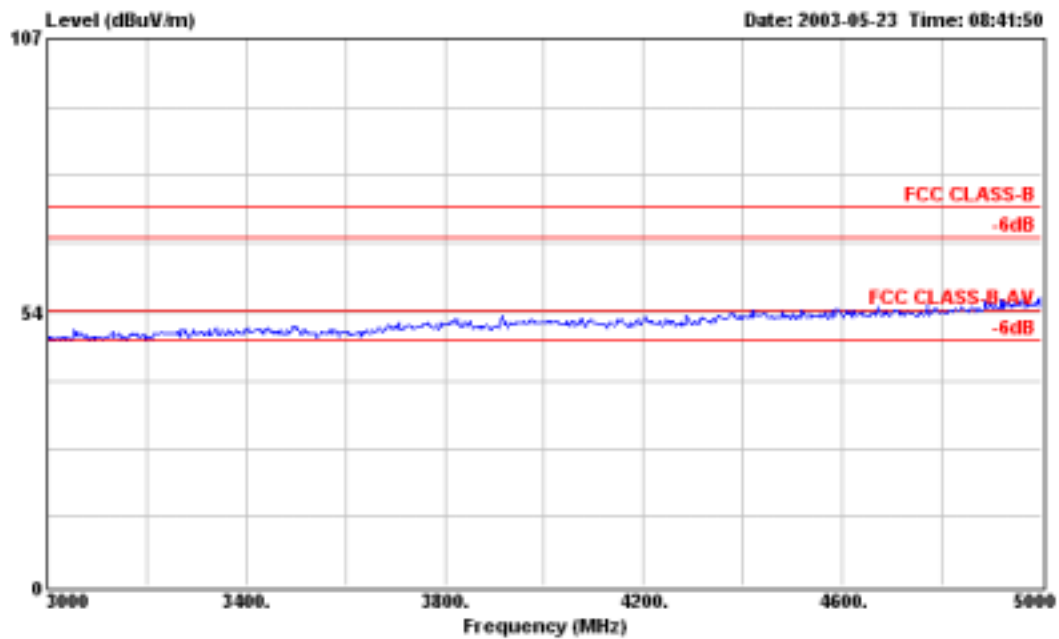
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	397.300	38.72	-7.28	46.00	47.29	14.54	4.07	27.18	Peak	---	---
2	612.200	38.97	-7.03	46.00	44.04	17.38	5.55	28.00	Peak	---	---
3	665.400	39.92	-6.08	46.00	44.28	17.75	5.89	28.00	Peak	---	---

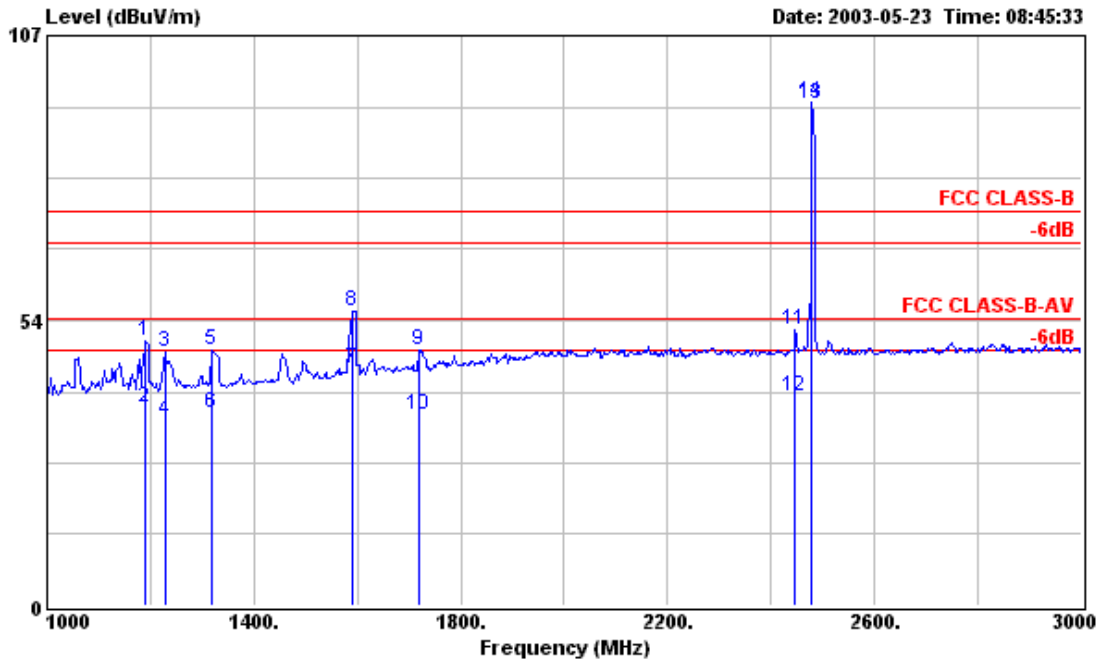


Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1054.000	46.08	-27.92	74.00	54.98	25.05	3.99	37.94	Peak	---	---
2	1054.000	33.08	-20.92	54.00	41.98	25.05	3.99	37.94	Average	---	---
3	1196.000	45.91	-28.09	74.00	54.05	25.63	4.20	37.97	Peak	---	---
4	1196.000	34.96	-19.04	54.00	43.10	25.63	4.20	37.97	Average	---	---
5	1238.000	46.37	-27.63	74.00	54.28	25.80	4.27	37.98	Peak	---	---
6	1238.000	34.54	-19.46	54.00	42.45	25.80	4.27	37.98	Average	---	---
7	1326.000	43.69	-30.31	74.00	51.13	26.15	4.40	37.99	Peak	---	---
8	1326.000	32.65	-21.35	54.00	40.09	26.15	4.40	37.99	Average	---	---
9	1454.000	44.55	-29.45	74.00	51.31	26.67	4.59	38.02	Peak	---	---
10	1454.000	33.25	-20.75	54.00	40.01	26.67	4.59	38.02	Average	---	---
11	1588.000	49.67	-24.33	74.00	55.35	27.56	4.80	38.04	Peak	---	---
12	1588.000	39.18	-14.82	54.00	44.86	27.56	4.80	38.04	Average	---	---

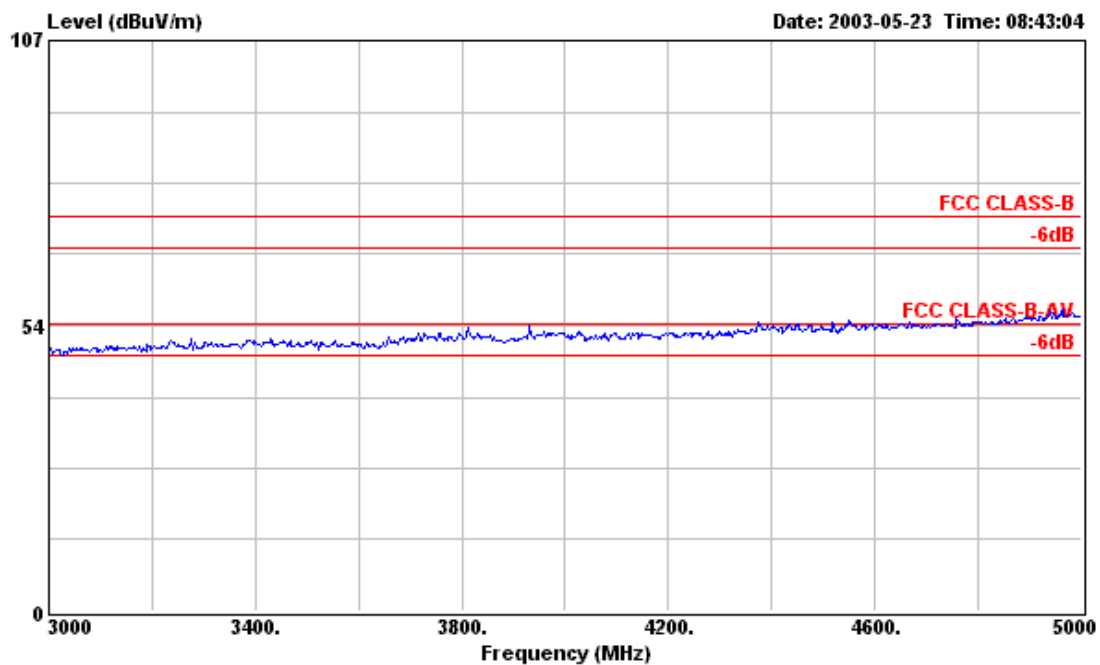


Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 HORIZONTAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH78 2480MHz
: F351606



Site : 03CH03-HY
 Condition : 3m HORN-ANT-10094-0417 VERTICAL
 EUT : USB Dongle
 Power : 110V/60Hz
 MODEL : BUB-103
 MEMO : TX CH78 2480MHz
 : F351606

Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1190.000	49.62	-24.38	74.00	57.79	25.60	4.20	37.97	Peak	---
2	1190.000	37.15	-16.85	54.00	45.32	25.60	4.20	37.97	Average	---
3	1228.000	47.76	-26.24	74.00	55.73	25.76	4.25	37.98	Peak	---
4	1228.000	34.67	-19.33	54.00	42.64	25.76	4.25	37.98	Average	---
5	1318.000	47.79	-26.21	74.00	55.27	26.12	4.39	37.99	Peak	---
6	1318.000	36.16	-17.84	54.00	43.64	26.12	4.39	37.99	Average	---
7	1590.000	44.39	-9.61	54.00	50.06	27.58	4.80	38.05	Average	---
8	1590.000	55.37	-18.63	74.00	61.04	27.58	4.80	38.05	Peak	---
9	1718.000	47.87	-26.13	74.00	52.41	28.53	5.00	38.07	Peak	---
10	1718.000	35.89	-18.11	54.00	40.43	28.53	5.00	38.07	Average	---
11	2446.000	51.86	-22.14	74.00	53.88	30.14	6.02	38.18	Peak	---
12	2446.000	39.10	-14.90	54.00	41.12	30.14	6.02	38.18	Average	---



Site : 03CH03-HY
Condition : 3m HORN-ANT-10094-0417 VERTICAL
EUT : USB Dongle
Power : 110V/60Hz
MODEL : BUB-103
MEMO : TX CH78 2480MHz
: F351606

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Cable Loss	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2478.000	H	30.11	6.06	53.67	-	-	89.84	31045.60		A.V.
2478.000	H	30.11	6.06	54.13	-	-	90.30	32734.07		Peak
2478.000	V	30.11	6.06	57.94	-	-	94.11	50757.47		A.V.
2478.000	V	30.11	6.06	58.16	-	-	94.33	52059.50		Peak
4960.000	V/H						-			Peak, A.V.
7440.000	V/H						-			Peak, A.V.
9920.000	V/H						-			Peak, A.V.
12400.000	V/H						-			Peak, A.V.
14880.000	V/H						-			Peak, A.V.
17360.000	V/H						-			Peak, A.V.
19840.000	V/H						-			Peak, A.V.
22320.000	V/H						-			Peak, A.V.
24800.000	V/H						-			Peak, A.V.

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above

Test Engineer: Murray Lu
Murray Lu

6. Antenna Requirements

The EUT use a undetachable antenna. It is considered meet antenna requirement of FCC.

6.1.1. 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.

6.1.2. Antenna Connected Construction

The maximum Gain antenna used in this product is dipole antenna.

7. RF Exposure

FCC Rules and Regulations Part 1.1307,1.1310,2.1091,2.1093:

RF Exposure Compliance

7.1.1. Limit For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational / Controlled Exposure

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

(B) Limits for General Population / Uncontrolled Exposure

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

F=frequency in MHz

*Plane-wave equivalent power density

7.1.2. MPE Calculations

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{3770}$$

- E = Electric field (V/m)
- P = Peak output power (mW)
- G = Antenna numeric gain (numeric)
- d = Separation distance (m)

Because the EUT is belong to General Population/ Uncontrolled Exposure. So the Limit of Power Density is 10 W/m². We can change the formula to:

$$d = \sqrt{\frac{30 \times P \times G}{3770}}$$

Channel NO.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (W)	Calculated RF Exposure Separation Distance (m)	Minimum RF Exposure Separation Distance (m)
Channel 1	1.66	1.47	3.56	0.0023	0.0051	0.20
Channel 6	1.66	1.47	3.68	0.0023	0.0052	0.20
Channel 11	1.66	1.47	3.75	0.0024	0.0053	0.20

7.1.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation. Proposed RF exposure safety information to include in User's Manual.

8. EMI Suppression Component List

No EMI suppression components.

9. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.00	1000	24.30	3.89
35	13.63	1.08	2000	31.10	5.41
40	11.11	1.18	3000	29.60	6.92
45	10.59	1.24	4000	30.80	8.24
50	6.47	1.30	5000	34.20	9.22
55	5.83	1.38	6000	33.30	10.25
60	5.18	1.44	7000	37.80	11.61
65	4.81	1.52	8000	39.40	11.78
70	4.43	1.59	9000	38.40	12.59
75	5.10	1.68	10000	38.90	13.84
80	5.91	1.75	11000	41.10	14.64
85	7.33	1.77	12000	42.70	14.12
90	8.74	1.83	13000	43.90	16.01
95	9.05	1.85	14000	43.70	13.76
100	9.36	1.90	15000	43.40	14.30
110	9.65	2.01	16000	40.90	15.16
120	9.97	2.06	17000	44.40	15.88
130	10.51	2.16	18000	47.10	16.09
140	10.32	2.24	19000	37.60	16.98
150	9.42	2.34	20000	37.30	16.21
160	8.09	2.42	21000	37.00	20.13
170	7.43	2.56	22000	38.00	19.24
180	7.60	2.62	23000	38.70	19.64
190	7.43	2.67	24000	38.60	20.54
200	7.26	2.76	25000	38.90	20.14
220	9.11	2.92	14000	43.70	13.76
240	10.88	3.09	15000	43.40	14.30
260	11.75	3.23	16000	40.90	15.16
280	11.55	3.38	17000	44.40	15.88
300	11.36	3.51	18000	47.10	16.09
320	12.03	3.63	19000	37.60	16.98
340	12.69	3.73	20000	37.30	16.21
360	13.33	4.03	21000	37.00	20.13
380	14.00	4.00	22000	38.00	19.24
400	14.63	4.09	23000	38.70	19.64
450	15.33	4.31	24000	38.60	20.54
500	16.03	4.64	25000	38.90	20.14
550	16.65	5.09			
600	17.29	5.49			
650	17.64	5.82			
700	18.00	5.94			
750	18.39	6.16			
800	18.79	6.58			
850	19.10	6.72			
900	19.42	6.81			
950	19.58	7.10			
1000	19.75	7.41			

10. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 03, 2002	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Jan. 07, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM009	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 22, 2002	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004/040	9KHz~40GHz	Aug. 07, 2002	Radiation (03CH03-HY)
Receiver	SCHAFFNER	SCR 3501	417	9 KHz –1GHz	Feb. 20, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Aug. 12, 2002	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 02, 2002	Conducted

Calibration Interval of instruments listed above is one year.

11. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty $U_e(y)$	normal	±2.7
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±5.4

$U = \{((1/2)^2+(0.3/2)^2+(2^2+0.5^2+2^2+0.25^2+2^2)/3+(0.54)^2/2)\}^{1/2}=2.2$ for 10m test distance

$U = \{((1/2)^2+(0.3/2)^2+(2^2+3^2+2^2+0.25^2+2^2)/3+(0.54)^2/2)\}^{1/2}=2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	0.2
combined standard uncertainty $U_e(y)$	normal	±1.66
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±3.32

$U = \{(0.3/2)^2 + (2^2+1.5^2+0.2^2)/3+(0.2)^2/2\}^{1/2}=1.66$