



NVLAP LAB CODE 200707-0



# FCC PART 15.247

## MEASUREMENT AND TEST REPORT

For

### Aztech Systems Ltd.

31 Ubi Road 1, Aztech Building, Singapore 408694

**FCC ID: I38-DSL1015EW**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report		<b>Equipment Type:</b> ADSL2+802.11b/g 4 port managed Switch Router
<b>Test Engineer:</b>	Green Xu	<i>Green Xu</i>
<b>Report No.:</b>	RSZ07111202	
<b>Test Date:</b>	2007-11-17 to 2008-01-16	
<b>Report Date:</b>	2008-01-16	
<b>Reviewed By:</b>	Boni Baniqued	<i>Boni Baniqued</i>
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**Note:** This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Aztech Systems Ltd.* 's product, model number: *DSL1015EW* or the "EUT" as referred to in this report is a *ADSL2+802.11b/g 4 port managed Switch Router*, which measures approximately: 15.5 cm L x 19.5 cm W x 3.8 cm H, rated input voltage: DC 12V adapter.

#### Adapter Information:

Model: sys1193-1212-W2,  
Input: 100-240VAC-0.3A MAX,  
20-30VA, 50/60Hz,  
Output: +12VDC, 1.0A Max.

*\* All measurement and test data in this report was gathered from production sample serial number: 0711016 (Assigned by BAEL, Shenzhen). The EUT was received on 2007-11-12.*

### Objective

This Type approval report is prepared on behalf of *Aztech Systems Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203,15.205, 15.209 and 15.247 rules.

### Related Submittal(s)/Grant(s)

No related submittal(s).

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at  
<http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing with the firmware which is provided by the manufacturer, it allow to select the channels and modes.

### Equipment Modifications

No modifications were made to the unit tested.

### Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	PC	ThinkCentre A50	99Y5681	DoC
Logitech	Keyboard	Y-SM48	SY513U68933	DoC
Logitech	Mouse	M-SAW83A	HCA31707689	DoC
IBM	CRT Monitor	6737-66W	23-P3242	BEJT17HD
ProMOS	Memory	V826616J24SATG-C0	BD070964H	N/A
Intel	CPU	Pentium4 2800MHz	N/A	N/A

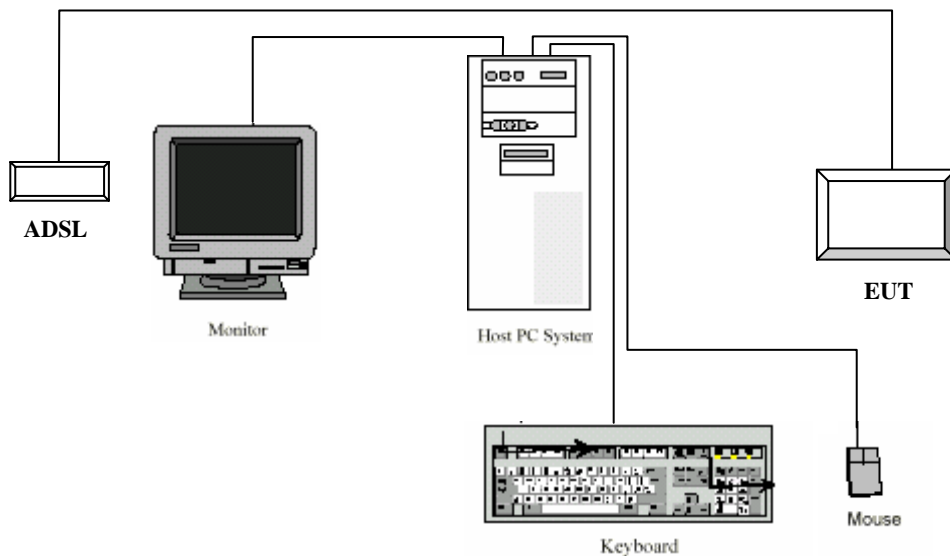
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Intel	Motherboard	D865GKD	11S19R1949ZJ1WCB46J1J4	DoC
IBM	Power	HIPRO-A2307F3T	11S49P2191ZJ1TAR47D1PG	DoC
IBM	Hard Disk	IC35L090AW207-0	VNVC32G3GGS52T	DoC
ALPS	3.5' Floppy	06P5226	11S06P5226ZJ1W25328053	DoC
Hitachi-LG	DVD-Rom	LTN-489S	B4F511412	DoC
Intel	Ethernet	PRO 10/100 VE	N/A	DoC

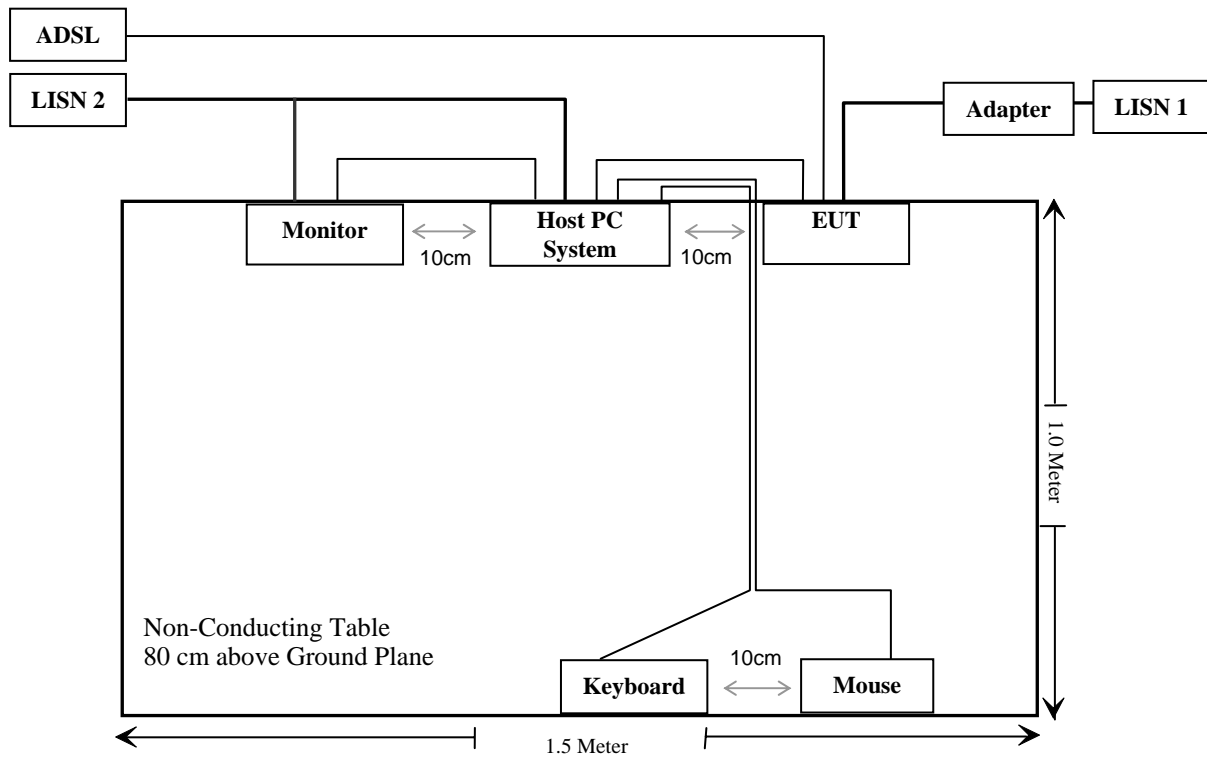
## External I/O Cable

Cable Description	Length (M)	From Port	To
Shielded Detachable K/B Cable	1.50	K/B Port /Host	K/B
Shielded Detachable Mouse Cable	1.50	Mouse Port /Host	Mouse
Shielded Detachable VGA Cable	1.50	VGA Port/Host	Monitor
Unshielded Detachable Adapter Cable	1.85	EUT	Adapter
Unshielded Detachable Network Cable	1.00	EUT	Host PC

## Configuration of Test Setup



### Block Diagram of Test Setup





## SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247 (i), §1.1307 (b)(1)	Maximum Permissible exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205	Restricted Bands	Compliant
§15.209, §15.205, 1§15.247(d)	Radiated Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Bandwidth	Compliant
§15.247(b)(3)	Maximum Peak Output Power	Compliant
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

**§15.247 (i) and §1.1307 (b) (1) - MAXIMUM PERMISSIBLE EXPOSURE (MPE)****Standard Applicable**

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
<b>Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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

**Test Data**

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S: Power density, in mW/cm<sup>2</sup>

P: Power input to the antenna, in mW

G: numeric gain of the antenna

R: distance to the center of the antenna, in cm

**802.11b Mode**

Maximum peak output power at antenna input terminal (dBm): 17.86

Maximum peak output power at antenna input terminal (mW): 61.09

Prediction distance (cm): 20

Prediction frequency (MHz): 2437

Antenna Gain, typical (dBi): 3.5

Maximum Antenna Gain (numeric): 2.24

Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.03

MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 1.0

**802.11g Mode**

Maximum peak output power at antenna input terminal (dBm):	<u>16.08</u>
Maximum peak output power at antenna input terminal (mW):	<u>40.55</u>
Prediction distance (cm):	<u>20</u>
Prediction frequency (MHz):	<u>2437</u>
Antenna Gain, typical (dBi):	<u>3.5</u>
Maximum Antenna Gain (numeric):	<u>2.24</u>
Power density at predication frequency and distance (mW/cm <sup>2</sup> ):	<u>0.02</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm <sup>2</sup> ):	<u>1.0</u>

**Test Result**

The device is compliant with the requirement MPE limit for uncontrolled exposure at predication frequency 1.0 mW/cm<sup>2</sup>. The maximum power density at the distance of 20 cm was 0.03 mW/cm<sup>2</sup>.

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## §15.203 - ANTENNA REQUIREMENT

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### Standard Applicable

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

### Antenna Connector Construction

There is warning information to user Inside **DSL1015EW User's Manual**, one of all warning is the installation should be done by experienced antenna installer. The three antennae used in this product are directional for 802.11b/g with SMA plug reverse connector. The maximum gain is 3.5 dBi for 802.11b & 802.11g which in accordance to about sections, is considered sufficient to comply with the provisions of this section. The EUT under tested meets the criteria of this rule by virtue of having professionally installed, and the EUT is compliant with §15.203.

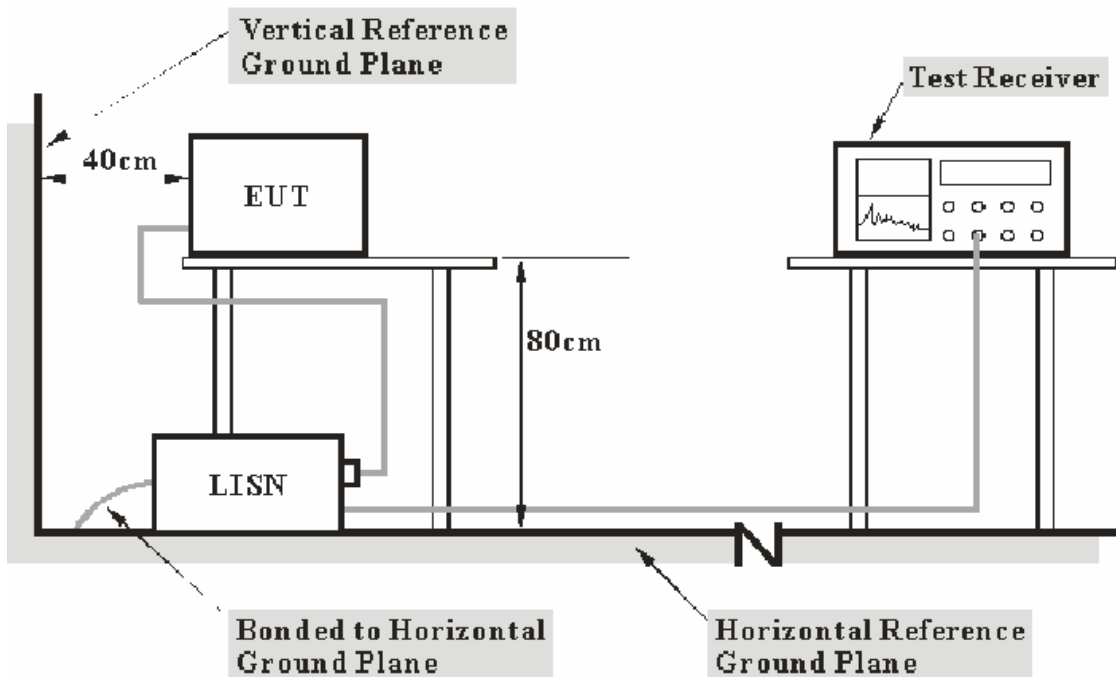
## §15.207 - CONDUCTED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is  $\pm 2.4$  dB.

### EUT Setup



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

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>IF B/W</i>
150 kHz – 30 MHz	9 kHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2007-03-26	2008-03-26
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-26	2008-03-26

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

**15.70 dB at 28.800 MHz** in the **Neutral** conductor mode.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

The testing was performed by Green Xu on 2007-12-30.

Test Mode: Transmitting

Line Conducted Emissions				FCC PART 15.207	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Detector (QP/AV)	Conductor Hot/Neutral	Limit (dB $\mu$ V)	Margin (dB)
28.800	44.30	QP	Neutral	60.00	15.70
4.280	39.30	QP	Hot	56.00	16.70
0.595	28.60	AV	Neutral	46.00	17.40
0.150	48.50	QP	Hot	66.00	17.50
0.890	38.30	QP	Hot	56.00	17.70
4.290	37.80	QP	Neutral	56.00	18.20
0.150	47.60	QP	Neutral	66.00	18.40
0.890	37.20	QP	Neutral	56.00	18.80
0.595	37.10	QP	Neutral	56.00	18.90
0.895	26.40	AV	Hot	46.00	19.60
1.435	36.10	QP	Hot	56.00	19.90
29.860	39.30	QP	Hot	60.00	20.70
24.770	39.30	QP	Neutral	60.00	20.70
1.440	24.80	AV	Hot	46.00	21.20
4.305	24.30	AV	Neutral	46.00	21.70
0.900	23.30	AV	Neutral	46.00	22.70
4.315	21.70	AV	Hot	46.00	24.30
10.690	33.90	QP	Hot	60.00	26.10
29.635	20.70	AV	Hot	50.00	29.30
10.690	20.00	AV	Hot	50.00	30.00
28.815	19.80	AV	Neutral	50.00	30.20
24.700	16.40	AV	Neutral	50.00	33.60
0.150	19.70	AV	Neutral	56.00	36.30
0.150	18.60	AV	Hot	56.00	37.40

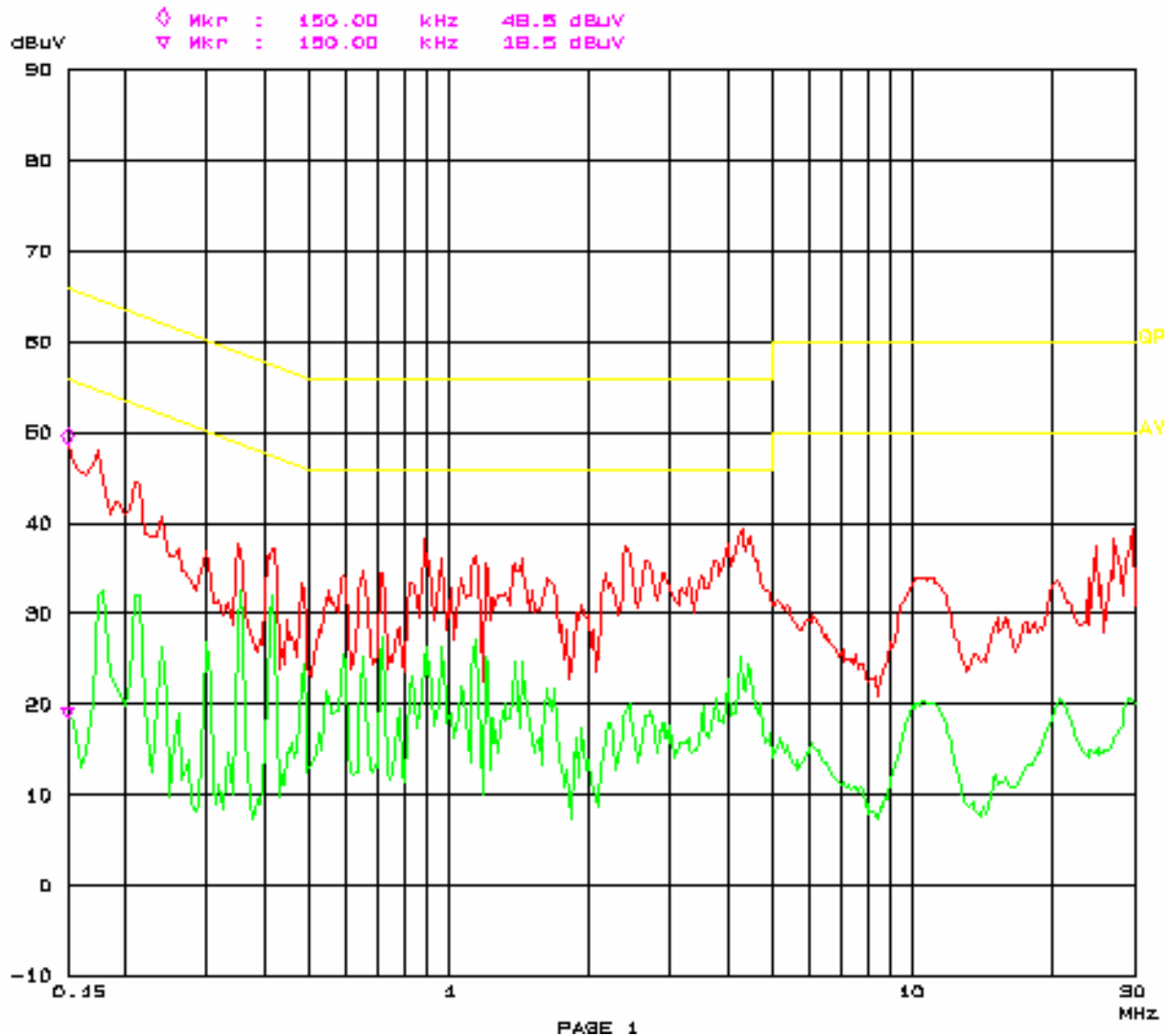
**Plot(s) of Test Data**

Plot(s) of Test Data is presented hereinafter as reference.

# CONDUCTED EMISSION TEST FCC PART15

30. Dec 07 15:28

EUT: ADSL Managed Switch Router  
Manuf: Aztech  
Op Cond: Receiving  
Operator: Green.Xu  
Test Spec: AC120V/60Hz Hot  
Comment: Temp: 25 Humid: 66%

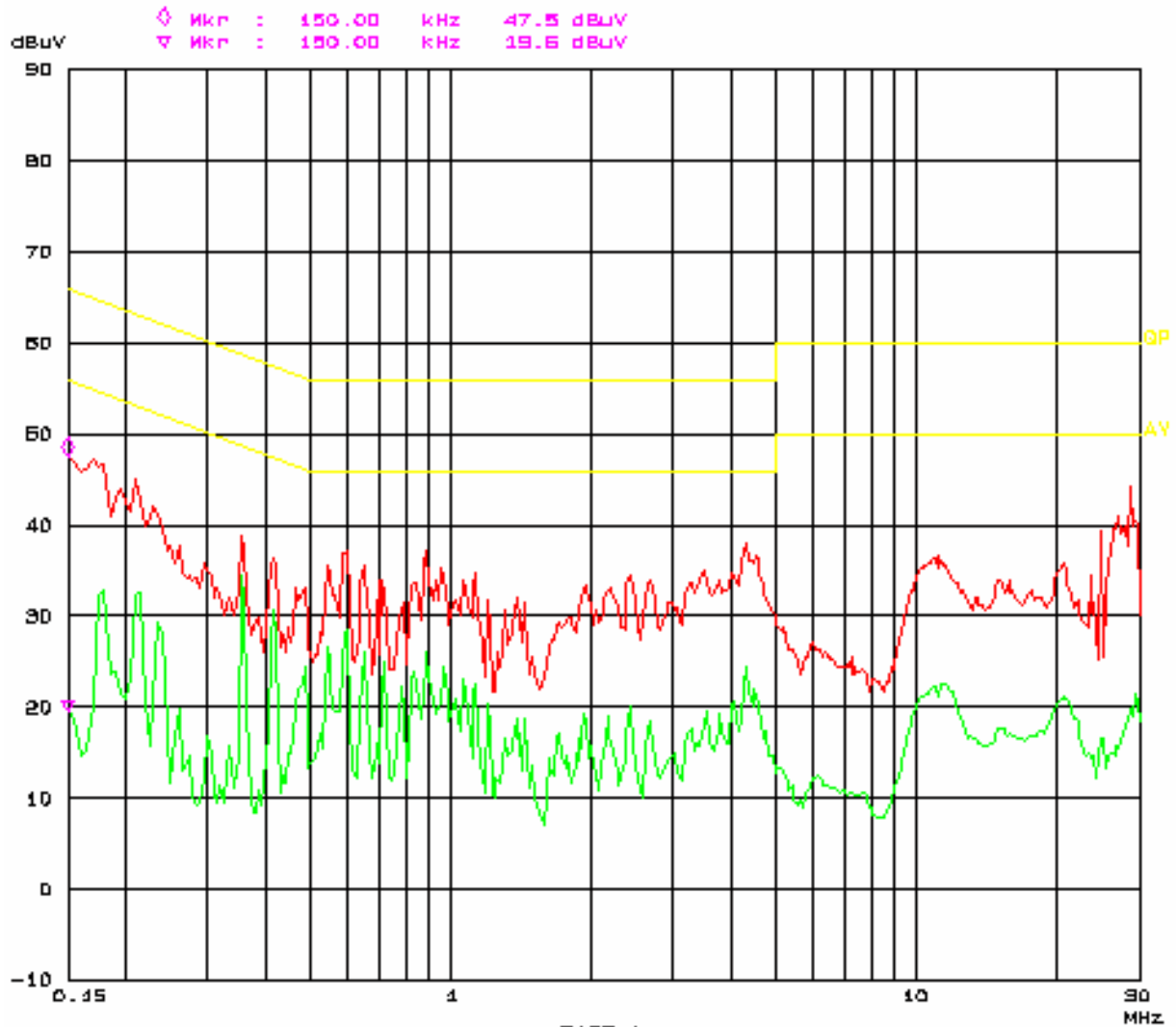




# CONDUCTED EMISSION TEST FCC PART15

30. Dec 07 16:47

EUT: ADSL Managed Switch Router  
Manuf: Aztech  
Op Cond: Receiving  
Operator: Green.Xu  
Test Spec: AC120V/60Hz Neutral  
Comment: Temp: 26 Humd: 66%



## §15.209, §15.205, §15.247(d) - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

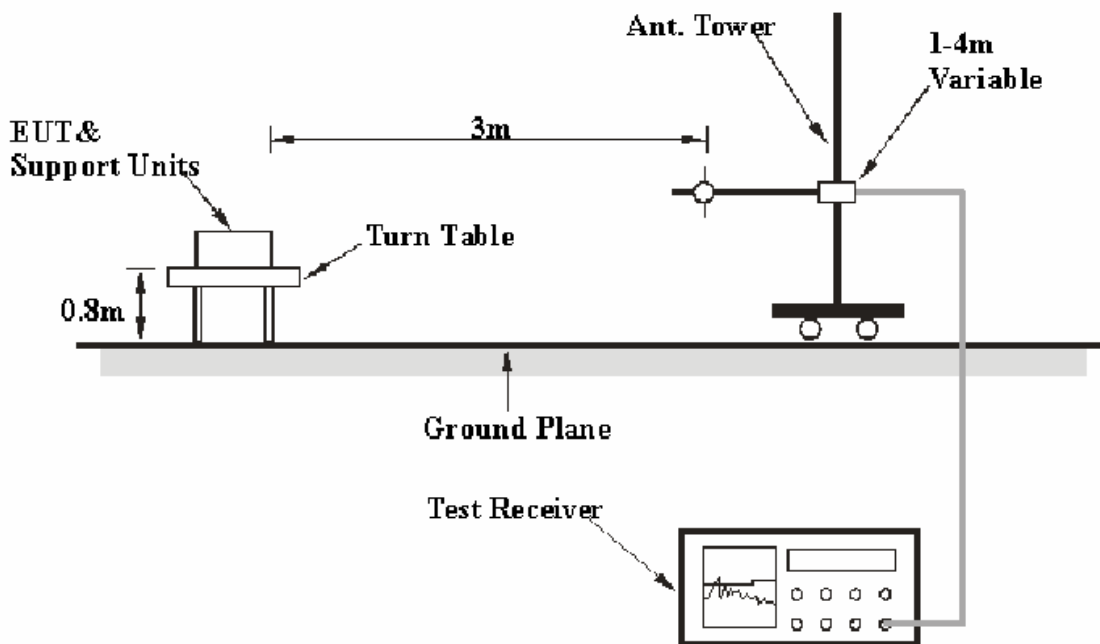
FCC §15.247 (d); §15.209; §15.205.

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is  $\pm 4.0$  dB.

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.109, FCC 15.209 and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25 GHz	1 MHz	3 MHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2007-10-16	2008-10-16
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2007-08-14	2008-08-14
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
Rohde&Schwarz	Spectrum Analyzer	FSEM30	849720/019	2007-05-09	2008-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz and peak and Average detection modes for frequencies above 1GHz.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.109, 15.205, and 15.247, with the worst margin reading of:

### 30 -1000MHz:

**6.5 dB** at **600.053100 MHz** in the **Horizontal** polarization for 802.11b  
**6.7 dB** at **600.054825 MHz** in the **Horizontal** polarization for 802.11g

### Above 1GHz:

**10.3 dB** at **4824.0 MHz** in the **Vertical** polarization (**802.11b Low Channel (2412MHz)**)  
**17.8 dB** at **7311.0 MHz** in the **Vertical** polarization (**802.11b Middle Channel (2437MHz)**)  
**20.5 dB** at **4924.0 MHz** in the **Vertical** polarization (**802.11b High Channel (2462MHz)**)

**17.3 dB** at **7236.0 MHz** in the **Vertical** polarization (**802.11g Low Channel (2412MHz)**)  
**16.5 dB** at **7311.0 MHz** in the **Vertical** polarization (**802.11g Middle Channel (2437MHz)**)  
**21.0 dB** at **4924.0 MHz** in the **Vertical** polarization (**802.11g High Channel (2462MHz)**)

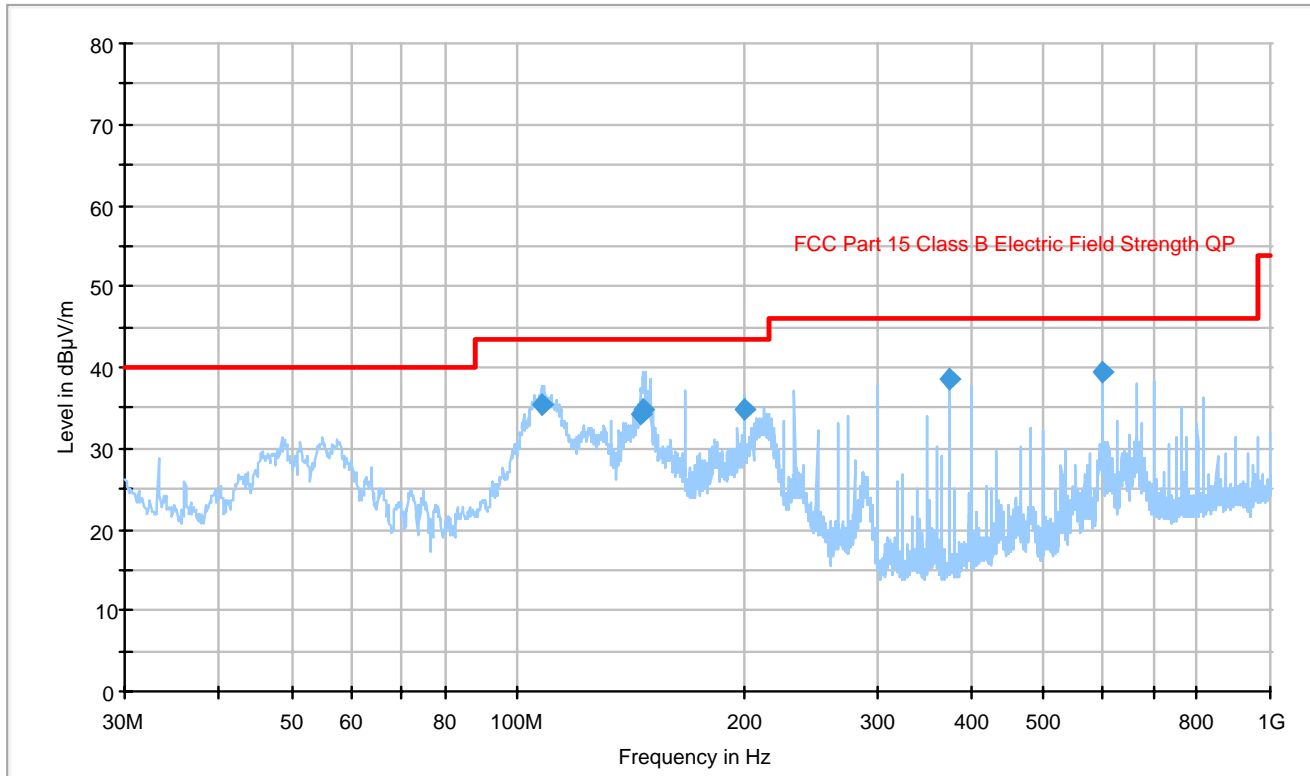
## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

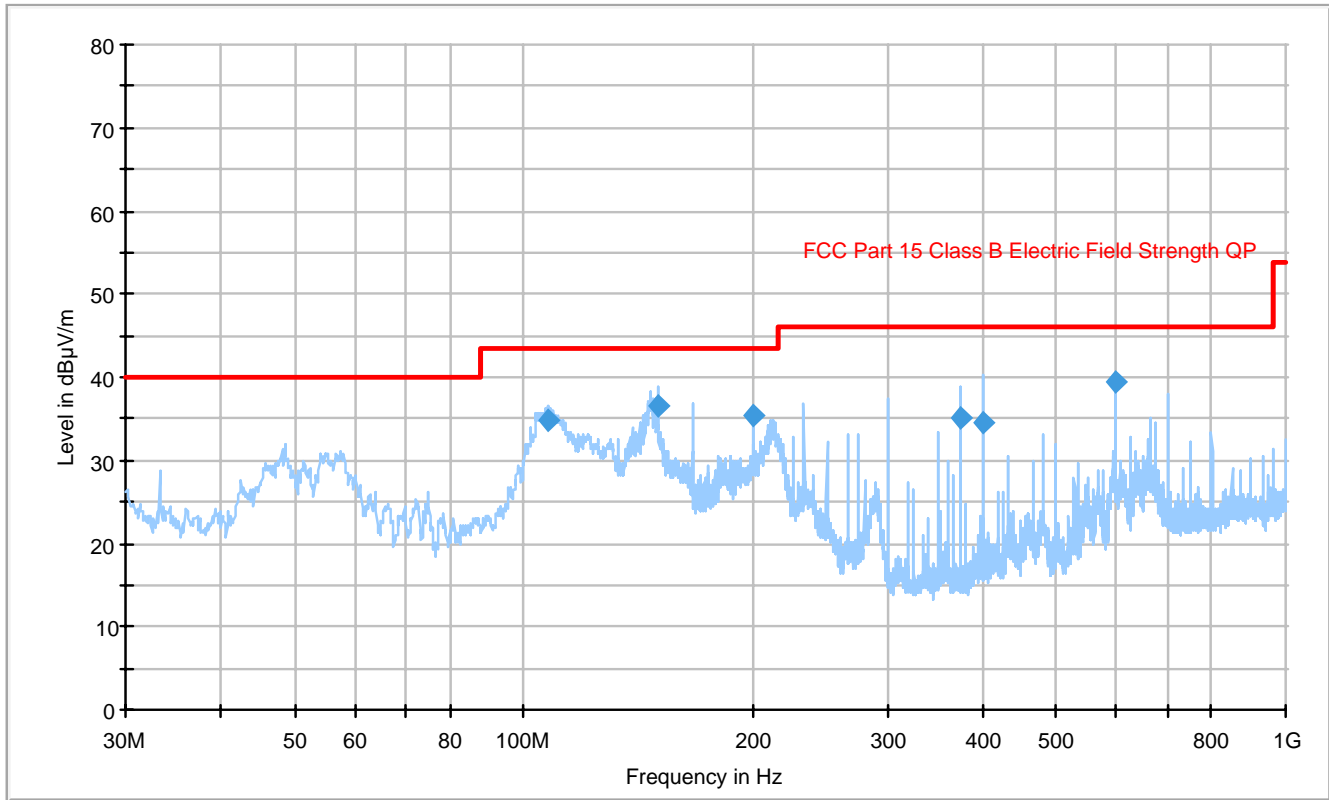
*The testing was performed by Green Xu on 2008-01-11*

802.11b



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
600.053100	39.5	102.0	H	57.0	-16.9	46.0	6.5
375.007100	38.5	214.0	H	5.0	-22.6	46.0	7.6
107.989000	35.5	118.0	V	308.0	-25.4	43.5	8.0
200.009225	34.8	114.0	V	99.0	-24.7	43.5	8.7
146.854925	34.7	114.0	V	254.0	-25.0	43.5	8.8
145.474825	34.1	102.0	V	262.0	-24.9	43.5	9.4

802.11g



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
600.054825	39.3	102.0	H	66.0	-16.9	46.0	6.7
150.028450	36.6	102.0	V	268.0	-25.2	43.5	6.9
200.011175	35.4	102.0	V	285.0	-24.7	43.5	8.1
107.818075	34.7	145.0	V	309.0	-25.5	43.5	8.8
374.991125	35.1	176.0	H	0.0	-22.6	46.0	10.9
400.051725	34.4	102.0	H	0.0	-22.4	46.0	11.6

## 802.11b

Freq. (MHz)	Detector PK/AV	Ant. Polarity (H/V)	Receiver Reading (dBuV)	Pre-Amp. (dB)	Ant. Factor (dB/m)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Test Result
<b>Low Channel (2412MHz)</b>										
4824.0	PK	V	57.06	33.40	35.40	4.64	63.70	74.0	10.3	Pass
4824.0	AV	V	24.83	33.40	35.40	4.64	31.47	54.0	22.5	Pass
7236.0	AV	V	22.75	33.70	37.80	4.51	31.36	54.0	22.6	Pass
7236.0	PK	V	37.46	33.70	37.80	4.51	46.07	74.0	27.9	Pass
<b>Middle Channel (2437MHz)</b>										
7311.0	PK	V	47.50	33.70	37.80	4.60	56.20	74.0	17.8	Pass
4874.0	PK	V	48.76	33.40	35.40	4.60	55.36	74.0	18.6	Pass
7311.0	AV	V	22.83	33.70	37.80	4.60	31.53	54.0	22.5	Pass
4874.0	AV	V	24.46	33.40	35.40	4.60	31.06	54.0	22.9	Pass
<b>HighChannel (2462MHz)</b>										
4924.0	PK	V	46.92	33.40	35.40	4.55	53.47	74.0	20.5	Pass
7386.0	AV	V	22.66	33.70	37.80	4.75	31.51	54.0	22.5	Pass
4924.0	AV	V	24.34	33.40	35.40	4.55	30.89	54.0	23.1	Pass
7386.0	PK	V	35.29	33.70	37.80	4.75	44.14	74.0	29.9	Pass

## 802.11g

Freq. (MHz)	Detector PK/AV	Ant. Polarity (H/V)	Receiver Reading (dBuV)	Pre-Amp. (dB)	Ant. Factor (dB/m)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Test Result
<b>Low Channel (2412MHz)</b>										
7236.0	PK	V	48.14	33.70	37.80	4.51	56.8	74.0	17.3	Pass
4824.0	PK	V	47.74	33.40	35.40	4.64	54.4	74.0	19.6	Pass
7236.0	AV	V	22.87	33.70	37.80	4.51	31.5	54.0	22.5	Pass
4824.0	AV	V	24.55	33.40	35.40	4.64	31.2	54.0	22.8	Pass
<b>Middle Channel (2437MHz)</b>										
7311.0	PK	V	48.76	33.70	37.80	4.60	57.5	74.0	16.5	Pass
4874.0	AV	V	25.19	33.40	35.40	4.60	31.8	54.0	22.2	Pass
7311.0	AV	V	23.01	33.70	37.80	4.60	31.7	54.0	22.3	Pass
4874.0	PK	V	38.19	33.40	35.40	4.60	44.8	74.0	29.2	Pass
<b>HighChannel (2462MHz)</b>										
4924.0	PK	V	46.43	33.40	35.40	4.55	53.0	74.0	21.0	Pass
7386.0	AV	V	22.34	33.70	37.80	4.75	31.2	54.0	22.8	Pass
4924.0	AV	V	24.13	33.40	35.40	4.55	30.7	54.0	23.3	Pass
7386.0	PK	V	36.87	33.70	37.80	4.75	45.7	74.0	28.3	Pass

## §15.247(a) (2) – 6dB BANDWIDTH TESTING

### Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

*The testing was performed by Green Xu on 2008-01-11, 2008-01-12.*

**Test Result:** Pass. Please refer to the following tables and plots.



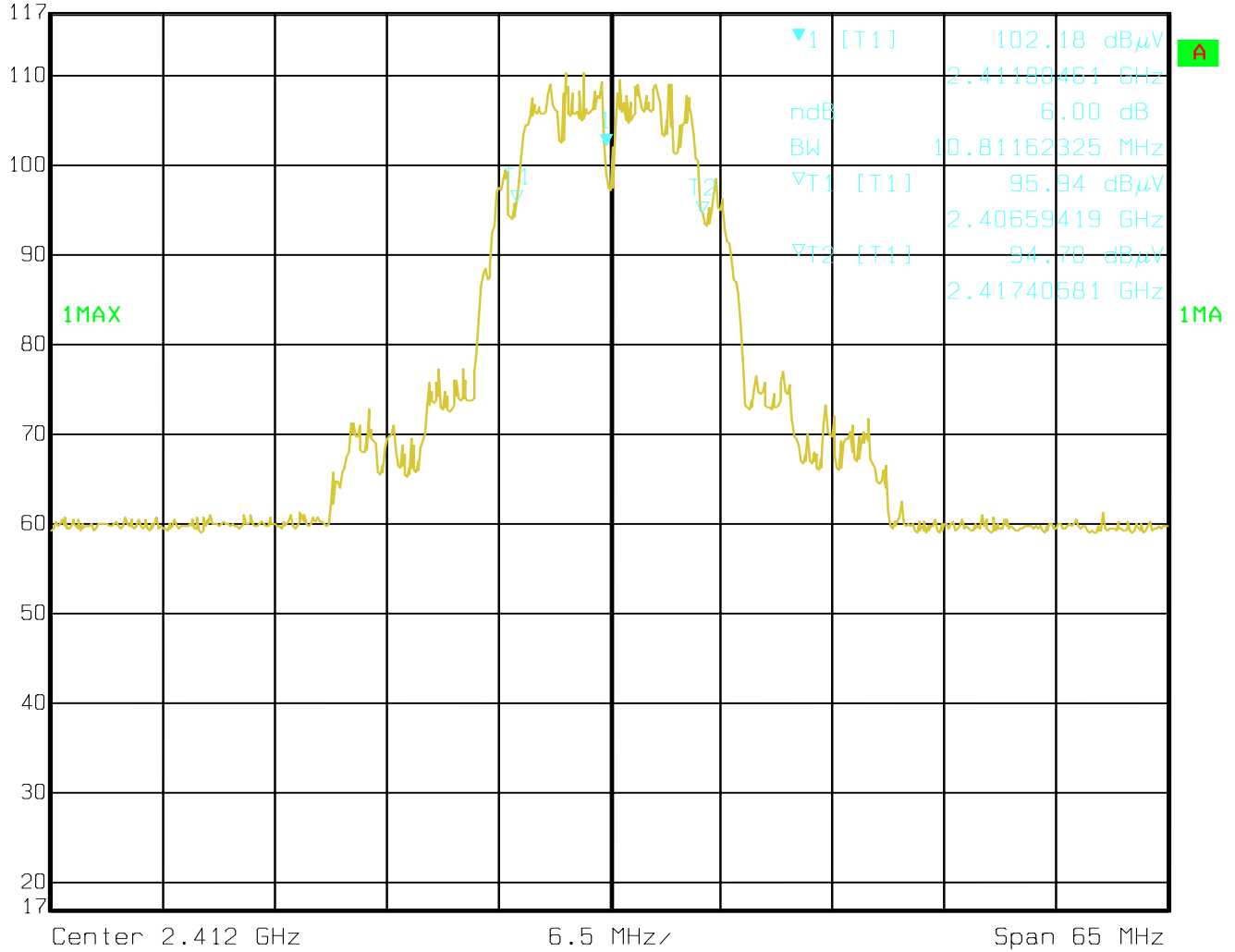
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
<b>802.11b Mode</b>			
Low	2412	10.81	0.5
Mid	2437	10.81	0.5
High	2462	10.81	0.5
<b>802.11g Mode</b>			
Low	2412	16.71	0.5
Mid	2437	16.71	0.5
High	2462	16.83	0.5

802.11b Mode:

Low Channel



Ref Lvl 117 dB $\mu$ V  
 Marker 1 [T1 ndB] 6.00 dB  
 BW 10.81162325 MHz  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 16.5 ms  
 RF Att 40 dB  
 Unit dB $\mu$ V

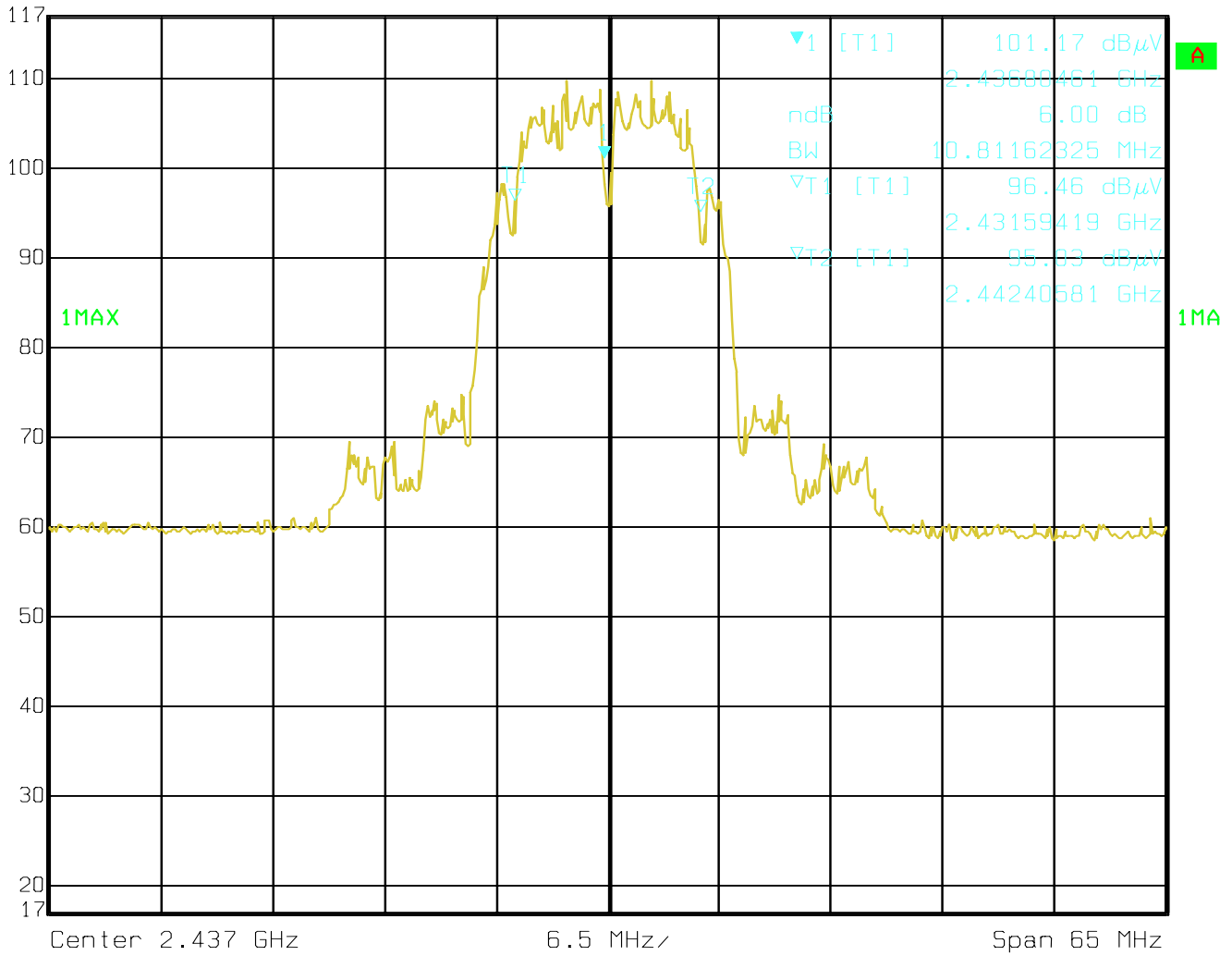


Date: 12.JAN.2008 16:46:51

Middle Channel



Ref Lvl 117 dB $\mu$ V  
 Marker 1 [T1 ndB] 6.00 dB  
 BW 10.81162325 MHz  
 RBW 100 kHz  
 VBW 300 kHz  
 RF Att 40 dB  
 SWT 16.5 ms  
 Unit dB $\mu$ V

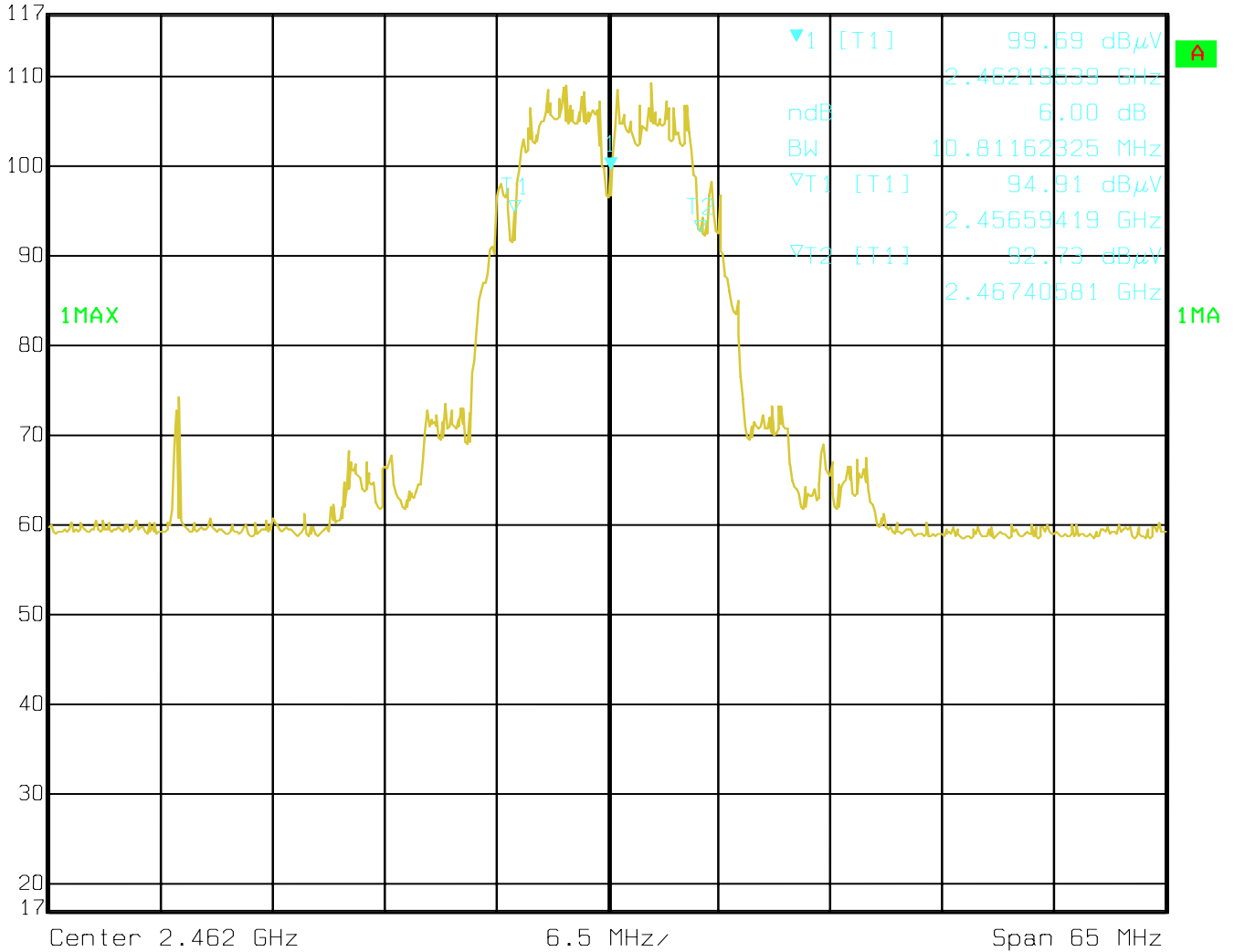


Date: 12.JAN.2008 16:53:42

### High Channel



Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1 ndB] 6.00 dB  
RBW 100 kHz RF Att 40 dB  
VBW 300 kHz  
BW 10.81162325 MHz SWT 16.5 ms Unit dB $\mu$ V



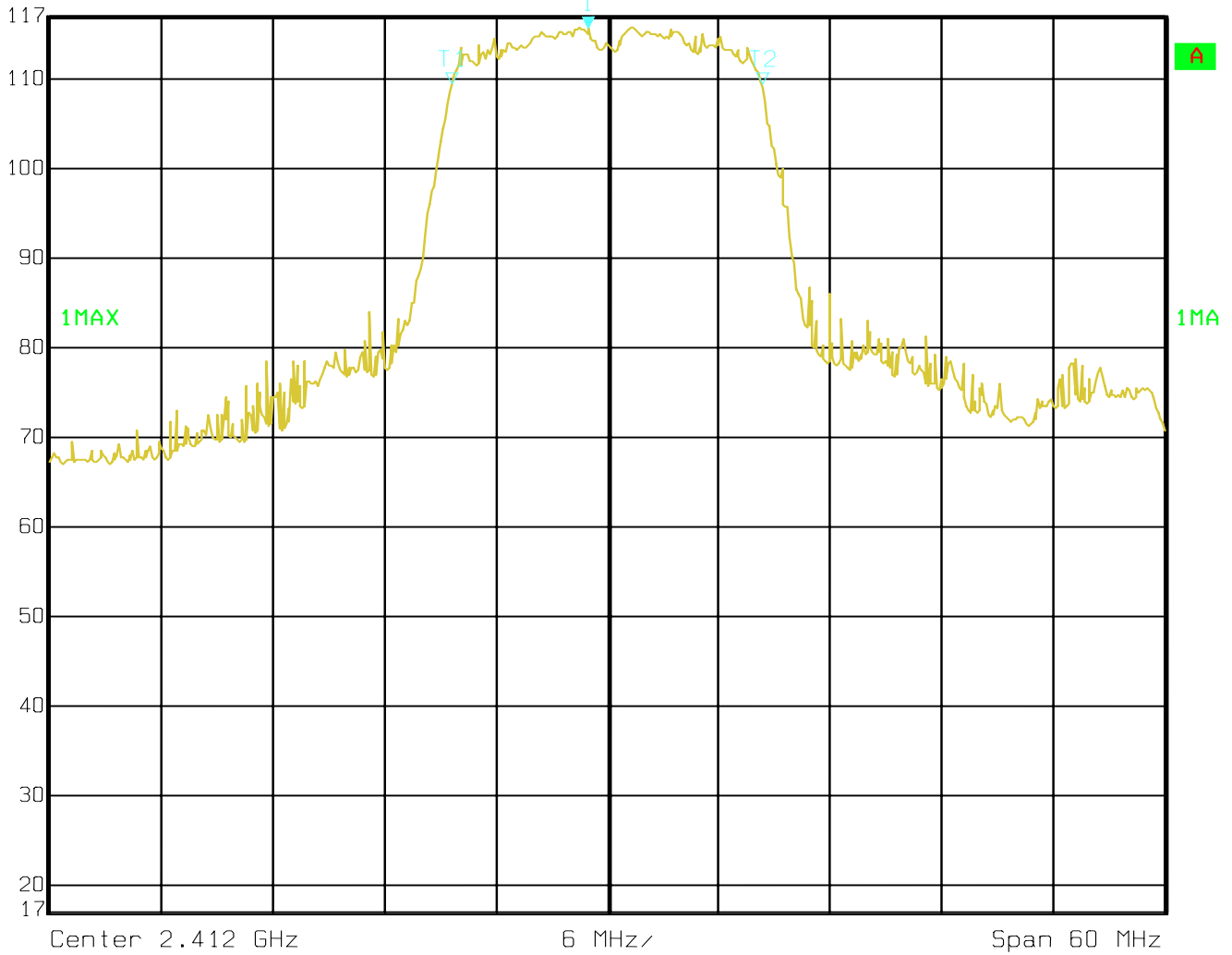
Date: 12.JAN.2008 17:01:02

802.11g Mode:

Low Channel



Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1 ndB] 6.00 dB  
BW 16.71342685 MHz  
RBW 100 kHz  
RF Att 40 dB  
VBW 300 kHz  
SWT 15 ms  
Unit dB $\mu$ V

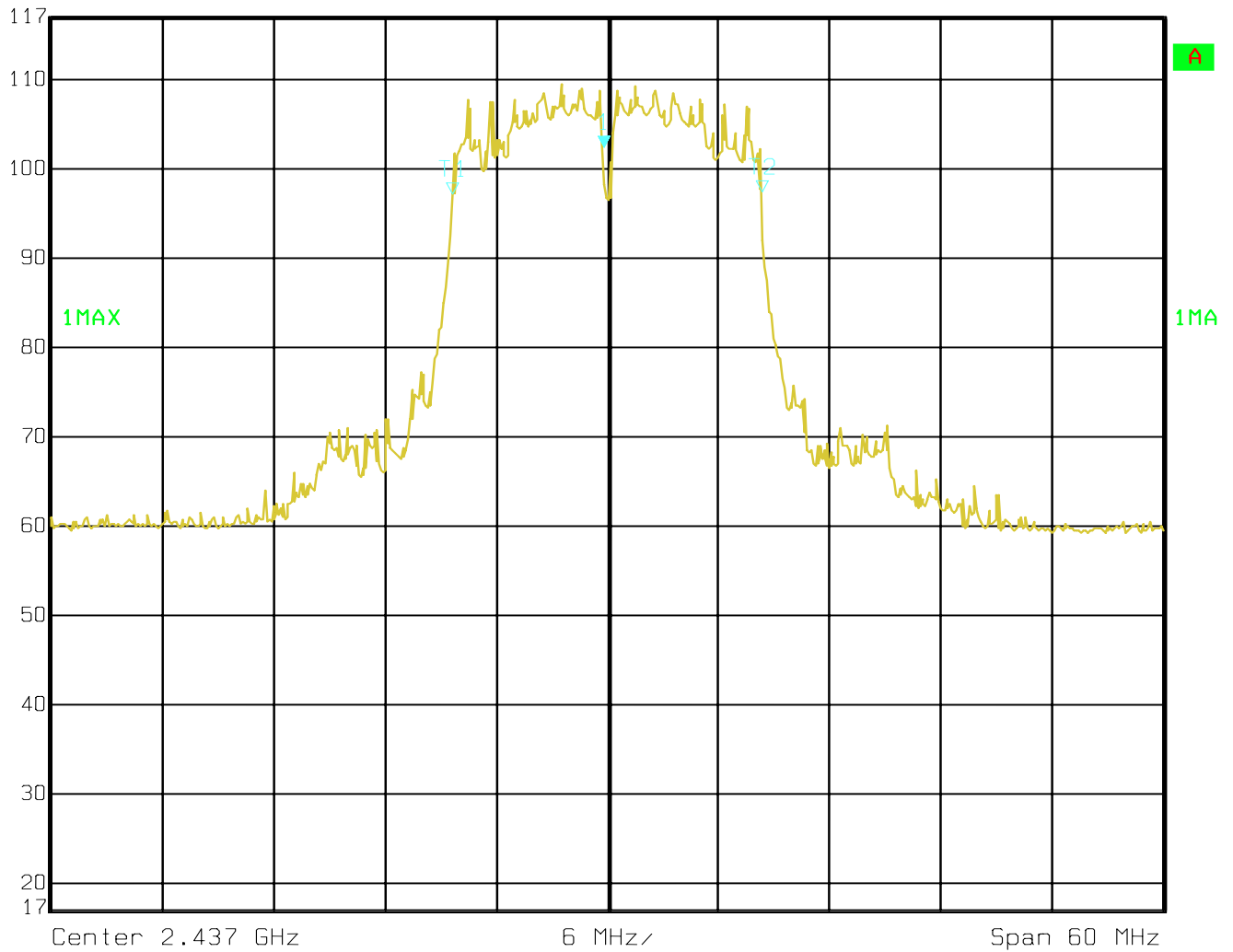


Date: 11.JAN.2008 13:35:08

### Middle Channel



Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1 ndB] 6.00 dB  
BW 16.71342685 MHz  
RBW 100 kHz  
RF Att 40 dB  
VBW 300 kHz  
SWT 15 ms  
Unit dB $\mu$ V

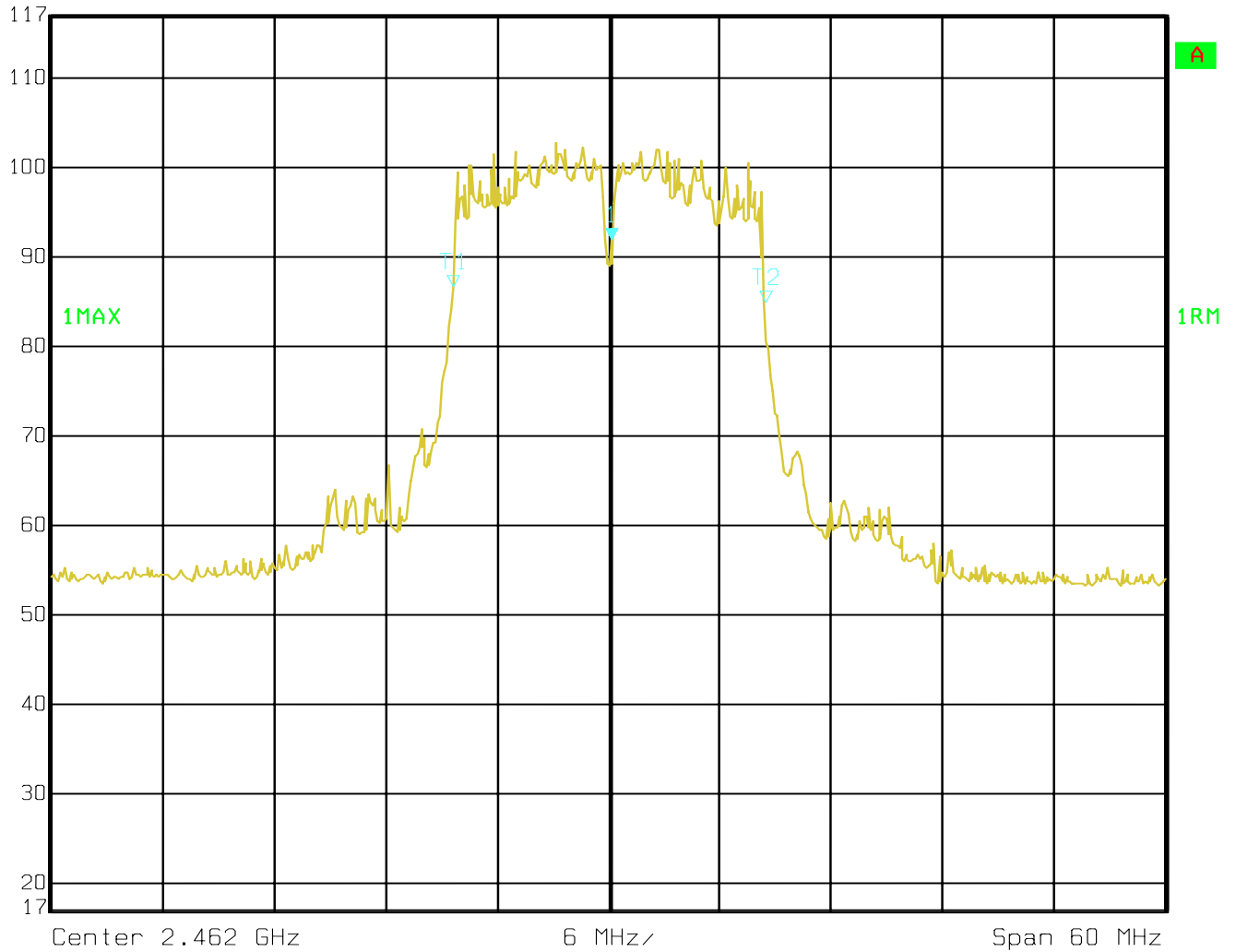


Date: 11.JAN.2008 14:26:04

### High Channel



Ref Lvl	117 dB $\mu$ V	Marker 1 [T1 ndB]	ndB	6.00 dB	RBW	100 kHz	RF Att	40 dB
		BW	16.83366733 MHz		VBW	300 kHz		
					SWT	15 ms	Unit	dB $\mu$ V



Date: 12.JAN.2008 10:20:59

## §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

### Applicable Standard

According to §15.247(b) (3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

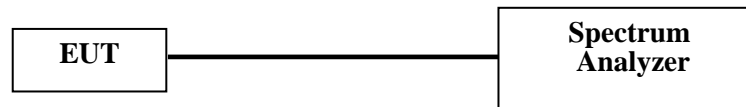
### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
3. Add a correction factor to the display.



### Test Data

#### Environmental Conditions

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

*The testing was performed by Green Xu on 2008-01-12.*

*Test Mode: Transmitting*

**Test Result:** Pass



**802.11b Mode:**

Channel	Channel Frequency (MHz)	Reading Power (dBm)	Pass Loss (dB)	Power Output (dBm)	Limit dBm
Low	2412	13.36	4.5	17.86	30
Mid	2437	12.71	4.6	17.31	30
High	2462	11.86	4.7	16.56	30

**802.11g Mode:**

Channel	Channel Frequency (MHz)	Reading Power (dBm)	Pass Loss (dB)	Power Output (dBm)	Limit dBm
Low	2412	6.08	10.0	16.08	30
Mid	2437	4.29	10.1	14.39	30
High	2462	3.79	10.2	13.99	30

802.11b Mode:

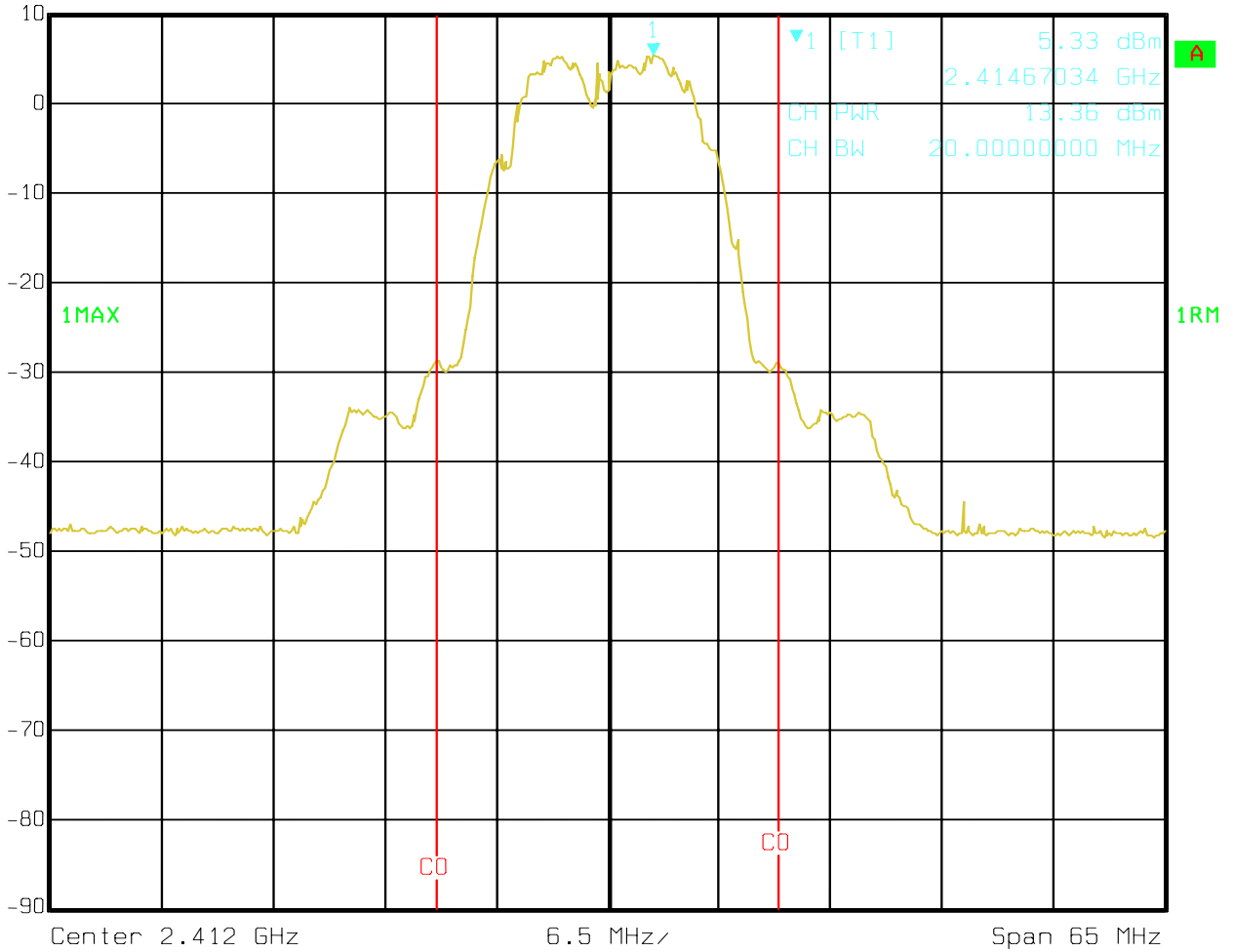
Low Channel



Ref Lvl  
10 dBm

Marker 1 [T1]  
5.33 dBm  
2.41467034 GHz

RBW 1 MHz RF Att 40 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm

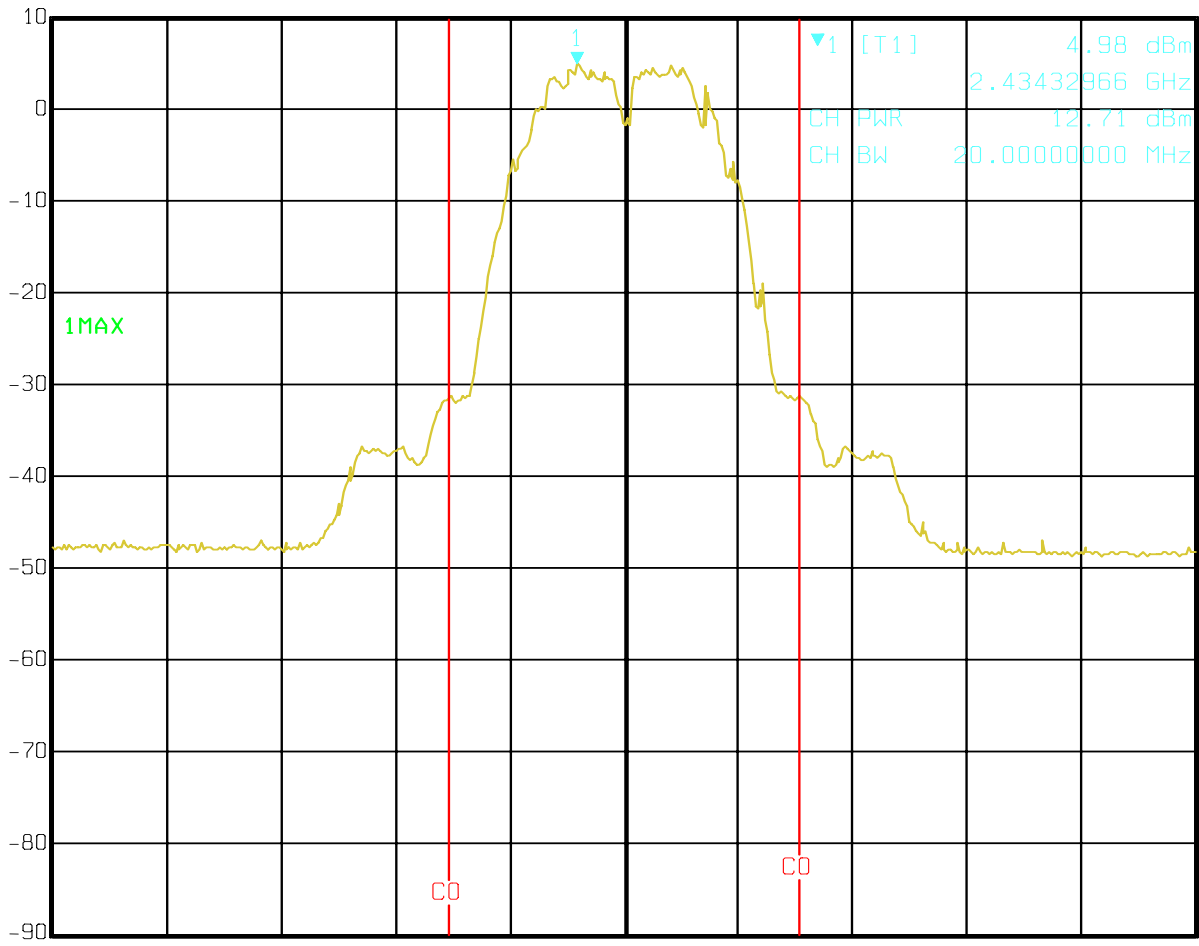


Date: 12.JAN.2008 16:01:23

### Middle Channel



Ref Lvl 10 dBm  
Marker 1 [T1] 4.98 dBm  
2.43432966 GHz  
RBW 1 MHz RF Att 40 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm



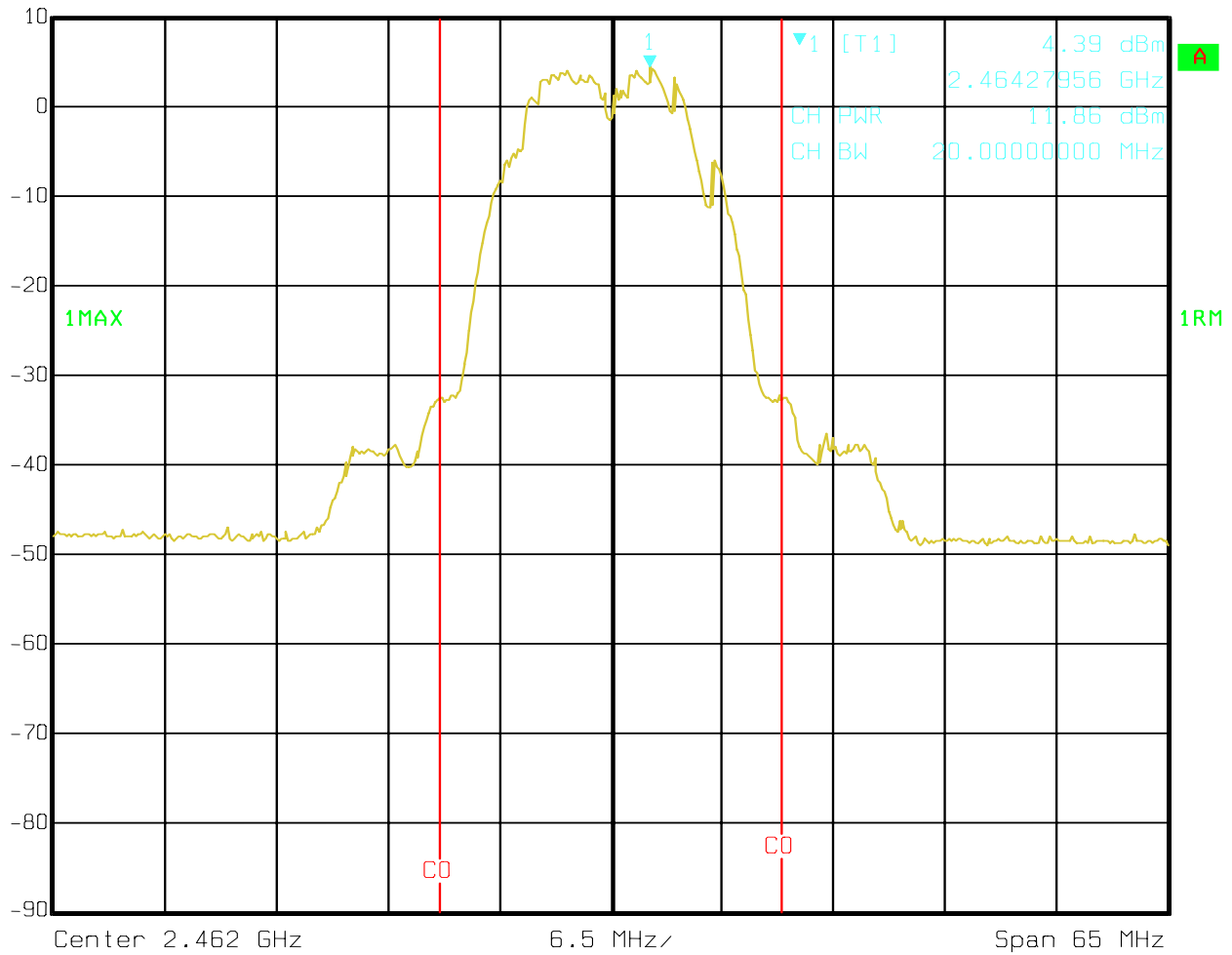
Center 2.437 GHz 6.5 MHz/ Span 65 MHz

Date: 12.JAN.2008 16:14:59

### High Channel



Ref Lvl 10 dBm  
Marker 1 [T1] 4.39 dBm  
2.46427956 GHz  
RBW 1 MHz RF Att 40 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm



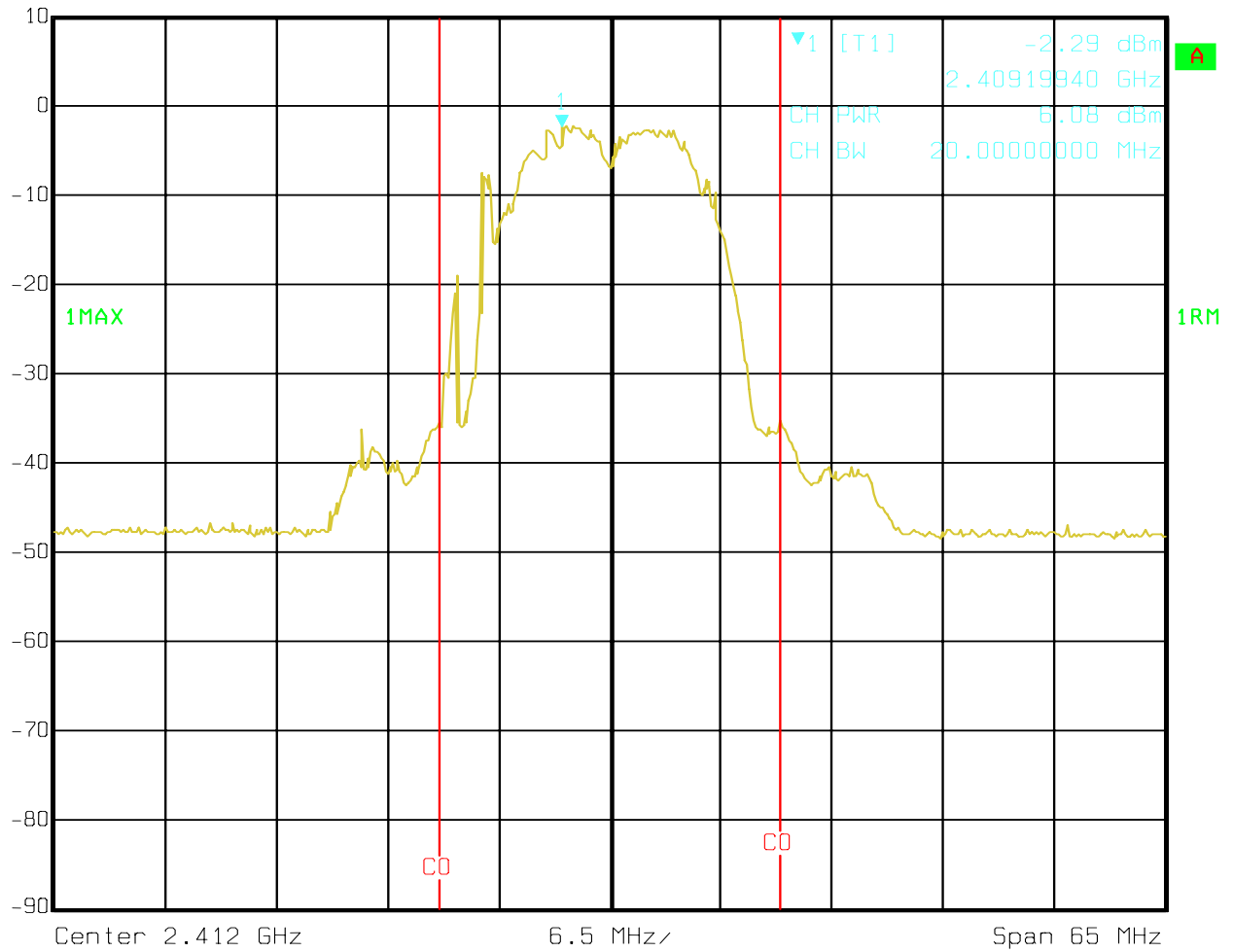
Date: 12.JAN.2008 16:21:44

802.11g Mode:

Low Channel



Ref Lvl 10 dBm  
Marker 1 [T1] -2.29 dBm  
2.40919940 GHz  
RBW 1 MHz RF Att 40 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm

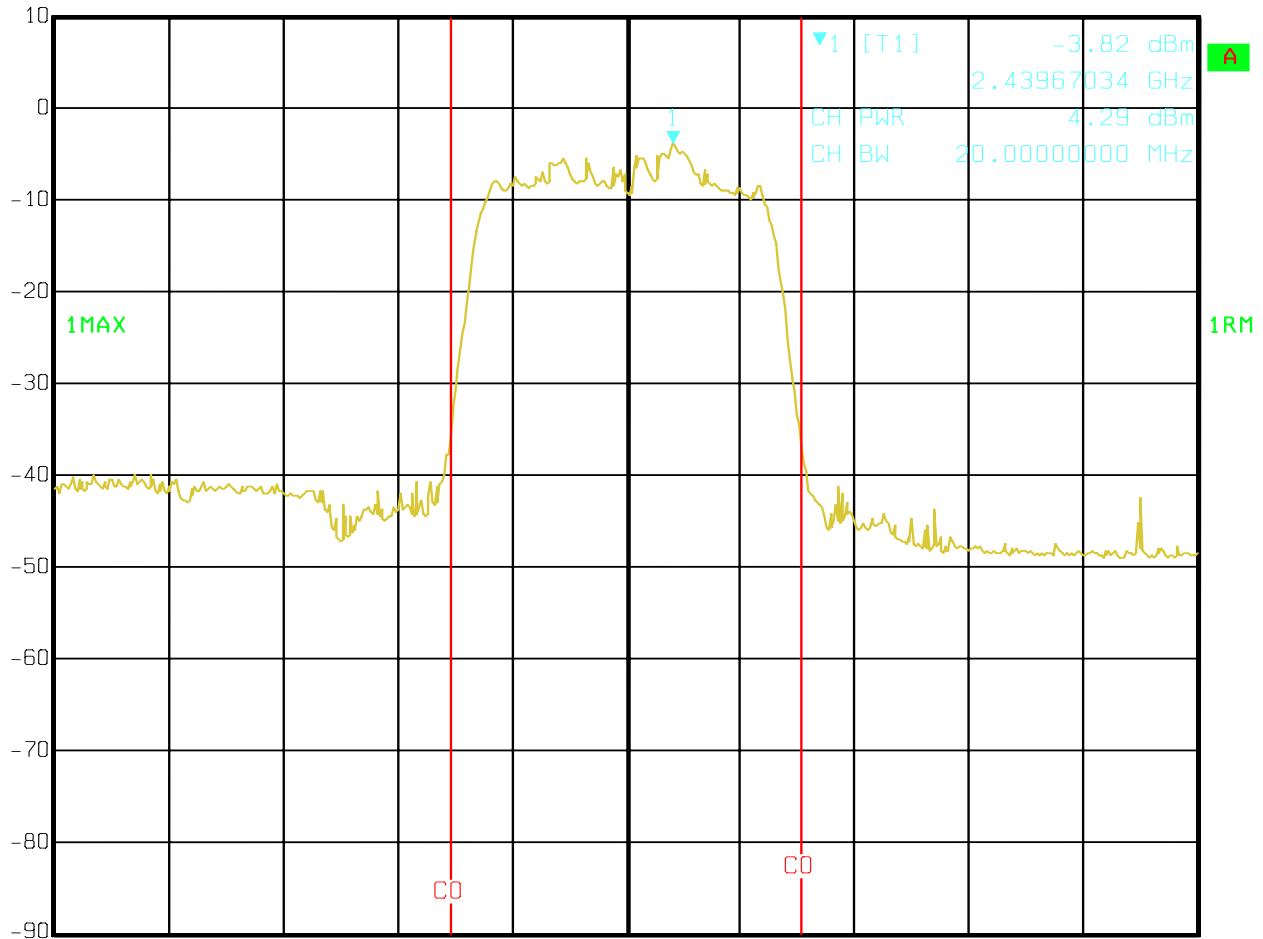


Date: 12.JAN.2008 15:31:24

### Middle Channel



Ref Lvl 10 dBm  
Marker 1 [T1] -3.82 dBm  
2.43967034 GHz  
RBW 1 MHz  
RF Att 40 dB  
VBW 3 MHz  
SWT 5 ms  
Unit dBm



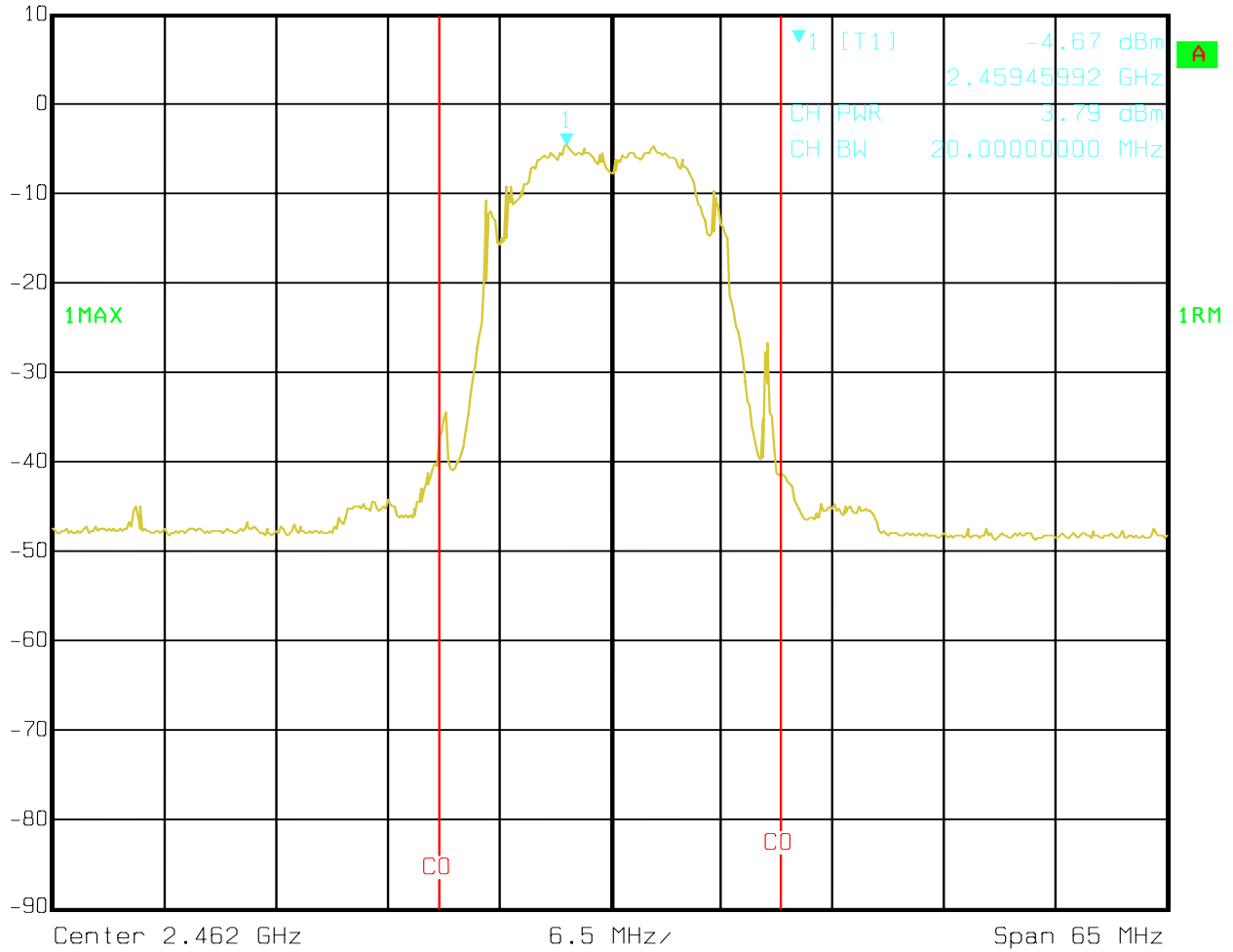
Center 2.437 GHz 6.5 MHz/ Span 65 MHz

Date: 12.JAN.2008 15:45:42

### High Channel



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl -4.67 dBm VBW 3 MHz  
10 dBm 2.45945992 GHz SWT 5 ms Unit dBm



Date: 12.JAN.2008 15:22:42

## **§15.247(d) – 100KHZ BANDWIDTH OF FREQUENCY BAND EDGE**

### **Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### **Test Equipment List and Details**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### **Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.  
**Note:** For Rdstricted Band  
 RBW=1MHz  
 VBW=1 MHz
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

*The testing was performed by Green Xu on 2008-01-12.*

**Test Result:**

<b>Channel Frequency (MHz)</b>	<b>Delta Value (dBc)</b>	<b>Limit (dBc)</b>	<b>Result</b>
<b>802.11b Mode</b>			
2412	49.95	20	PASS
2462	49.04	20	PASS
<b>802.11g Mode</b>			
2412	38.77	20	PASS
2462	43.87	20	PASS

Please refer to following plots.

802.11b Mode:

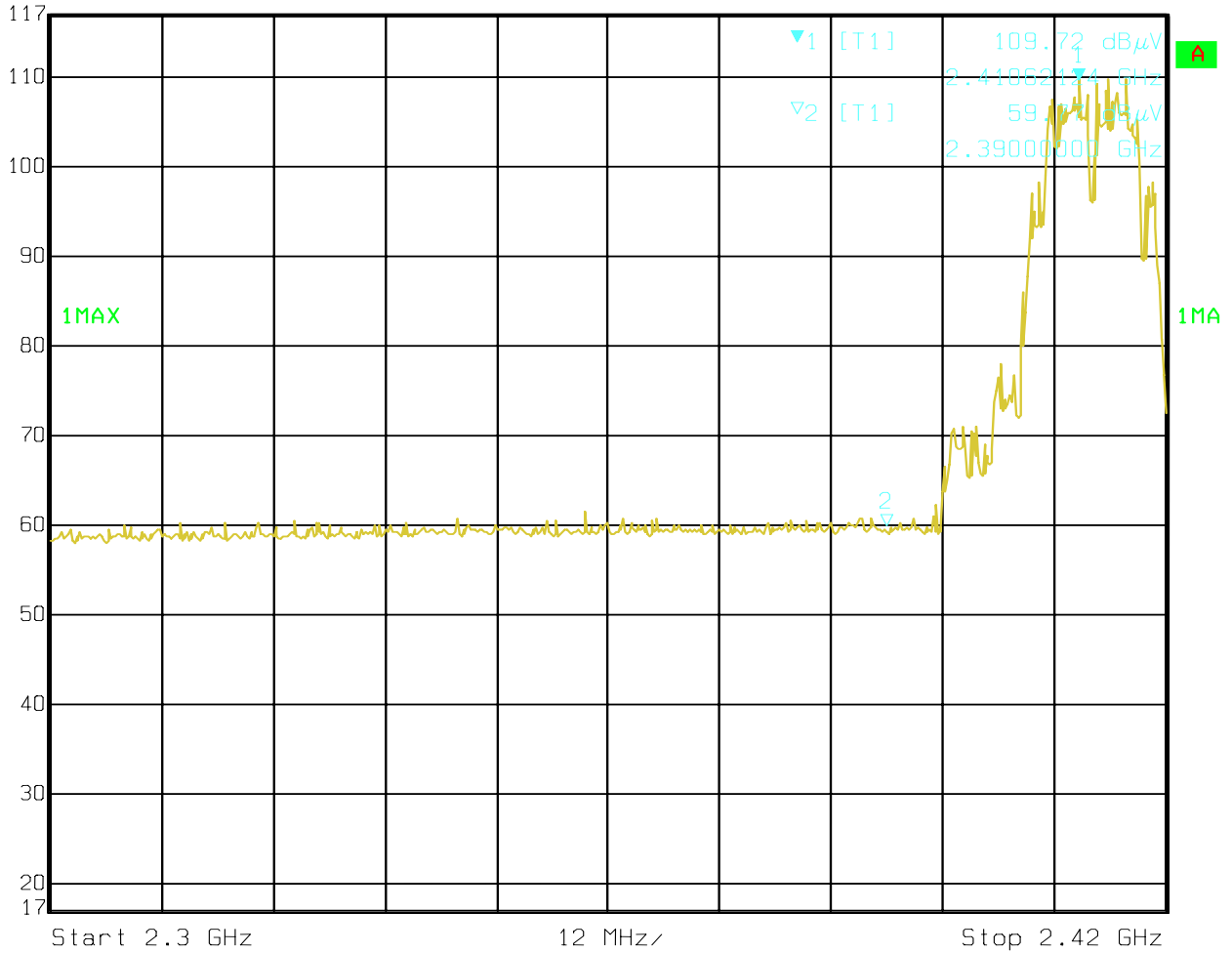
Lowest channel



Ref Lvl  
117 dB $\mu$ V

Marker 1 [T1]  
109.72 dB $\mu$ V  
2.41062124 GHz

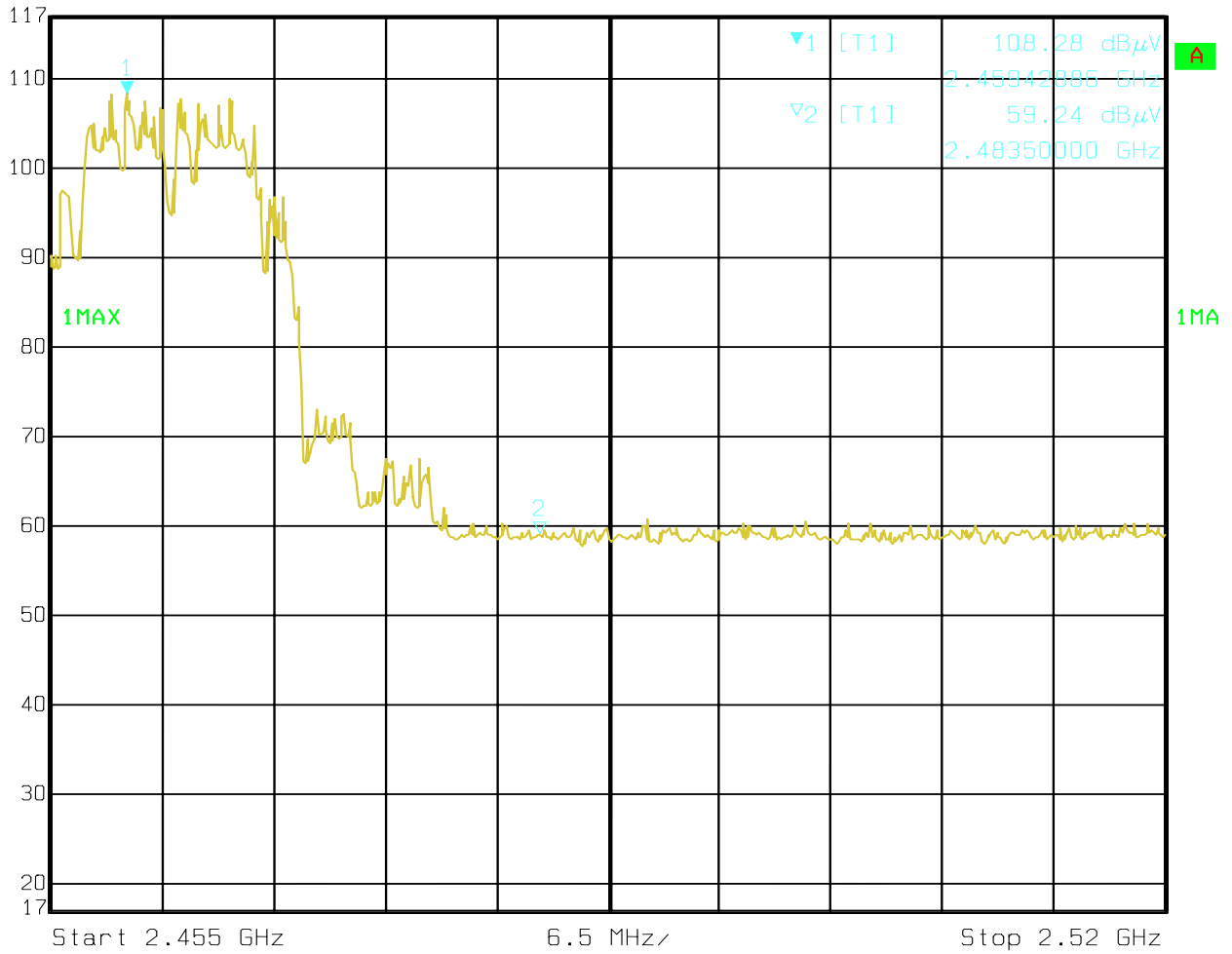
RBW 100 kHz RF Att 40 dB  
VBW 300 kHz  
SWT 30 ms Unit dB $\mu$ V



Date: 12.JAN.2008 17:15:51

### Highest Channel

 Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1] 108.28 dB $\mu$ V 2.45942886 GHz  
RBW 100 kHz RF Att 40 dB  
VBW 300 kHz  
SWT 16.5 ms Unit dB $\mu$ V



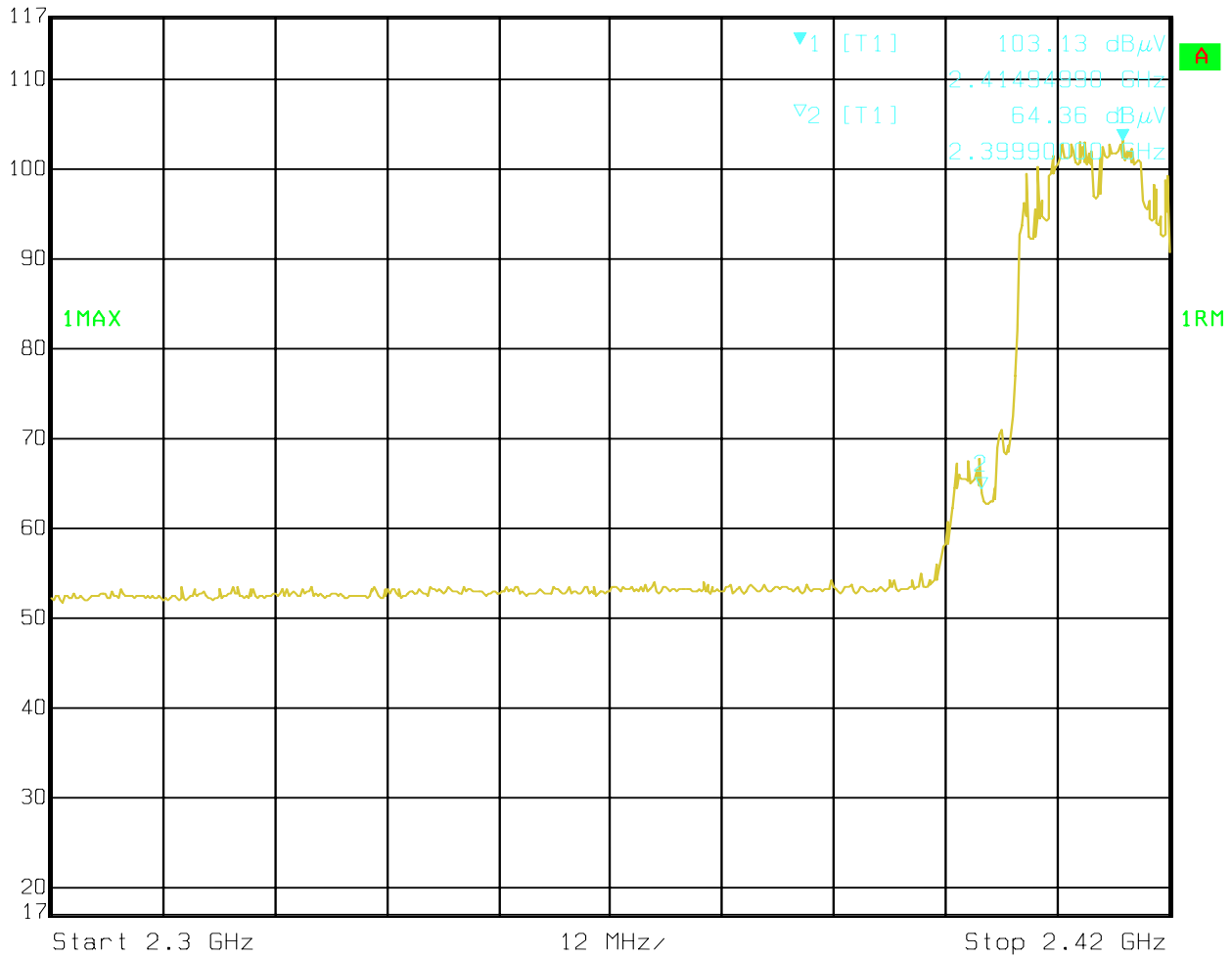
Date: 12.JAN.2008 17:12:07

802.11g Mode:

Lowest Channel



Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1] 103.13 dB $\mu$ V  
2.41494990 GHz  
RBW 100 kHz RF Att 40 dB  
VBW 300 kHz  
SWT 30 ms Unit dB $\mu$ V

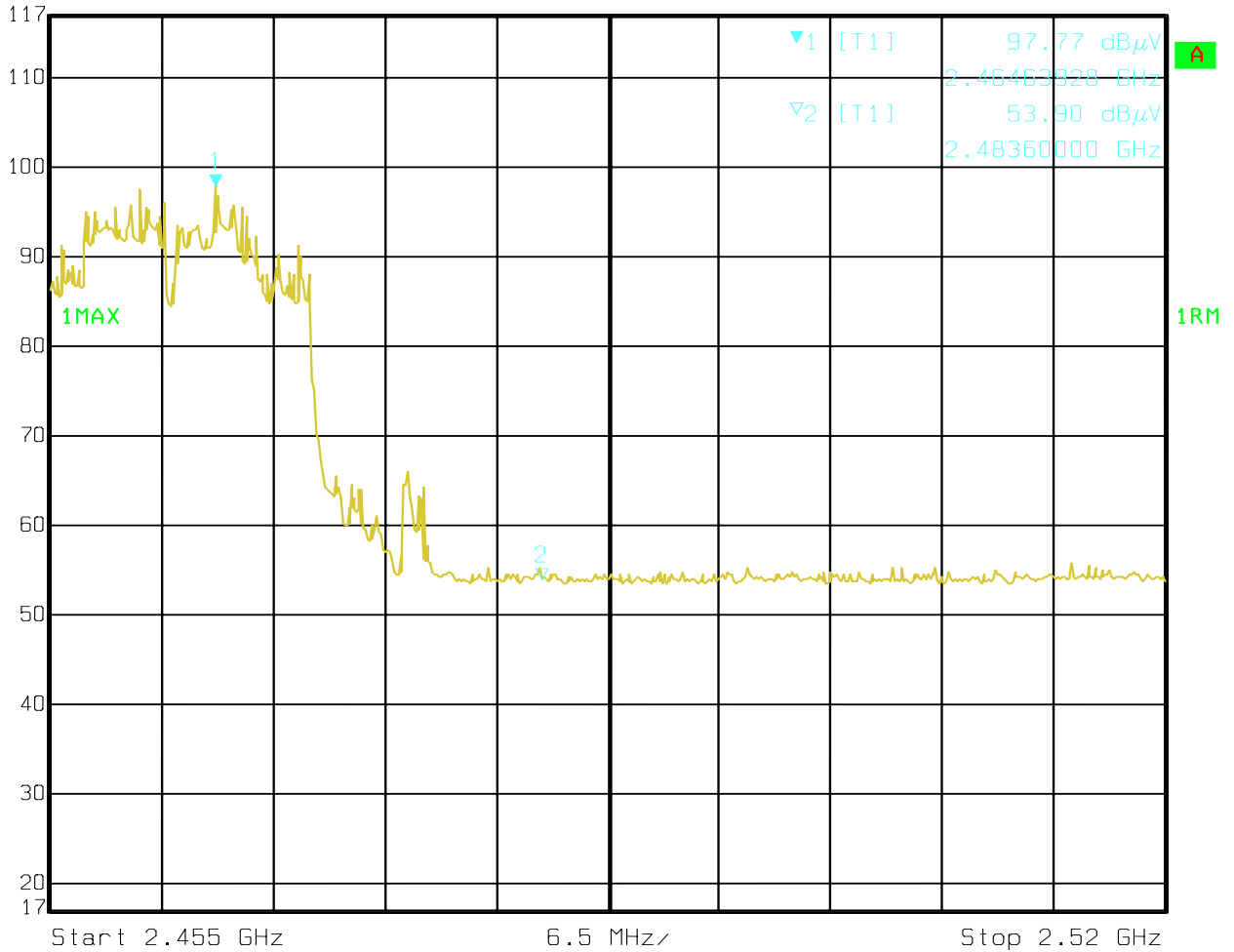


Date: 12.JAN.2008 10:49:42

### Highest Channel



Ref Lvl 117 dB $\mu$ V  
Marker 1 [T1] 97.77 dB $\mu$ V  
2.46463928 GHz  
RBW 100 kHz RF Att 40 dB  
VBW 300 kHz  
SWT 16.5 ms Unit dB $\mu$ V



Date: 12.JAN.2008 14:38:46

**Restricted Bands**

<b>Frequency (GHz)</b>	<b>Emission Frequency (GHz)</b>	<b>Detector Type PK/AV</b>	<b>Emission Level (dBuV/m)</b>	<b>Limit (dBuV/m)</b>	<b>Margin (dB)</b>
<b>802.11b Mode</b>					
2.31	2.39	PK	68.73	74	5.27
		AV	33.29	54	20.71
2.4835	2.50	PK	67.08	74	6.92
		AV	33.49	54	20.51
<b>802.11g Mode</b>					
2.31	2.39	PK	67.20	74	6.80
		AV	33.06	54	20.94
2.4835	2.50	PK	66.40	74	7.60
		AV	33.62	54	20.38

## §15.247(e) - POWER SPECTRAL DENSITY

### Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16

\* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56%
<b>ATM Pressure:</b>	100.0kPa

The testing was performed by Green Xu on 2008-01-12.

Test Mode: Transmitting

Test Result: Pass

Channel	Frequency (MHz)	Spectrum Reading (dBm/3kHz)	Path Loss (dB)	Peak Output Power (dBm/3kHz)	Limit (dBm/3kHz)	RESULT
<b>802.11b Mode</b>						
Low	2412	-16.54	4.5	-12.04	8	PASS
Mid	2437	-16.89	4.6	-12.29	8	PASS
High	2462	-17.90	4.7	-13.20	8	PASS
<b>802.11g Mode</b>						
Low	2412	-20.12	10.0	-10.12	8	PASS
Mid	2437	-23.63	10.1	-13.53	8	PASS
High	2462	-23.99	10.2	-13.79	8	PASS

\*\*\*\*\* END OF REPORT \*\*\*\*\*