



**FCC 47 CFR PART 15 SUBPART C**

**TEST REPORT**

**For**

**FORYOU MULTIMEDIA ELECTRONICS CO., LTD.**

**PICO PROJECTOR**

**Model: v8, v7, v6**

**Trade Name:N/A**

**FCC ID: PUZV8V7V6**

**Report No. : ST1208005F**

*Prepared for*

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*Prepared by*

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# 1. TEST RESULT CERTIFICATION

**Applicant:** FORYOU MULTIMEDIA ELECTRONICS., LTD.

**Address:** North Shangxia Road,Dongjiang Hi-Tech Industry Park,Huizhou,Guangdong Province,516005,Pr.China

**Equipment Under Test:** PICO PROJECTOR

**Trade Name:** N/A

**Model:** V8,V7,V6

**Date of Test:** Aug 16-Oct 18, 2012

**Date of issue:** Oct 18,2012

**Report No. :** ST1208005F

**FCC ID :** PUZV8V7V6

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC Part 15 Subpart C	No non-compliance noted

Summary of Measurement			
Test Item	Test Requirement	Standard Paragraph	Result
Peak Output Power	FCC PART15	15. 247	Compliance
6dB Bandwidth	FCC PART15	15. 247	Compliance
Power Spectral Density	FCC PART15	15. 247	Compliance
Conducted spurious emissions	FCC PART15	15. 247	Compliance
Band edge Requirement	FCC PART15	15. 209&15. 247	Compliance
Radiation Emission	FCC PART15	15. 209&15. 247	Compliance
Antenna Requirement	FCC PART15	15. 203	Compliance
Power Line Conducted Emission	FCC PART15	15. 207	Compliance



**We hereby certify that:**

The above equipment was tested by SINTEK LABORATORY CO., LTD.

The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

*Approved by:*

*Reviewed by:*

A handwritten signature in black ink that reads "Tom Li".

A handwritten signature in black ink that reads "Sabon".



## 2. EUT DESCRIPTION

<b>Product</b>	PICO PROJECTOR
<b>Trade Name</b>	N/A
<b>Model Number</b>	V8,V7.V6
<b>Model Discrepancy</b>	Just model named different
<b>Power Supply</b>	DC 9.0V
<b>Radio Technology</b>	IEEE802.11b/g
<b>Frequency Range</b>	2412MHz—2462MHz
<b>Antenna Specification</b>	The EUT'S antenna is integrated on the main PCB
<b>Number of Channels</b>	11Channels
<b>Antenna Requirement</b>	Requirement(s): 47 CFR §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. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) Antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.  <b>The EUT'S antenna is fixed on the main PCB / Gain: 0.21dBi</b>

*Note: This submittal(s) (test report) is intended for FCC ID: PUZV8V7V6 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.*

### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.247 and KDB 558074 D01 DTS Meas Guidance v02.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.247 under the FCC Rules Part 15 Subpart C.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003, Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max emission, the relative positions of this hand-held transmitter (EUT) were rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### 3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel with highest data rate (worst case) are chosen for full testing

A special test software was used to control EUT work in Continuous TX mode (100% duty cycle), and select test channel, wireless mode, and data rate.

Mode	Channel	
	Frequency (MHz)	
IEEE 802.11b	Low CH1	2412
	Middle CH6	2437
	High CH11	2462
IEEE 802.11g	Low CH1	2412
	Middle CH6	2437
	High CH11	2462





#### **4. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at No. 7, Xinshidai industrial, Guantian Village, Shiyan Town, Baoan District Shenzhen, China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3 LABORATORY ACCREDITATIONS AND LISTING**

Site on file with the FCC: The certificate registration number is 963441 for 3&10M OATS

Site listed with the VCCI: The certificate registration number is R-2023 and c-2178 for 3&10M OATS



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Equipment	Model#	Serial#	Trade Name	Data Cable	Power Cord
1.						

**Notes:**

*All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6dB BANDWIDTH

#### LIMIT

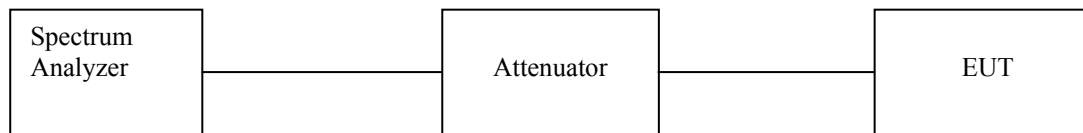
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 KHz.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	AGILENT	E4407B	MY41441082	06/12/2012	06/12/2013
RF Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### Test Configuration



#### TEST PROCEDURE

Connect EUT' s antenna output to Spectrum Analyzer by RF cable though a attenuator.

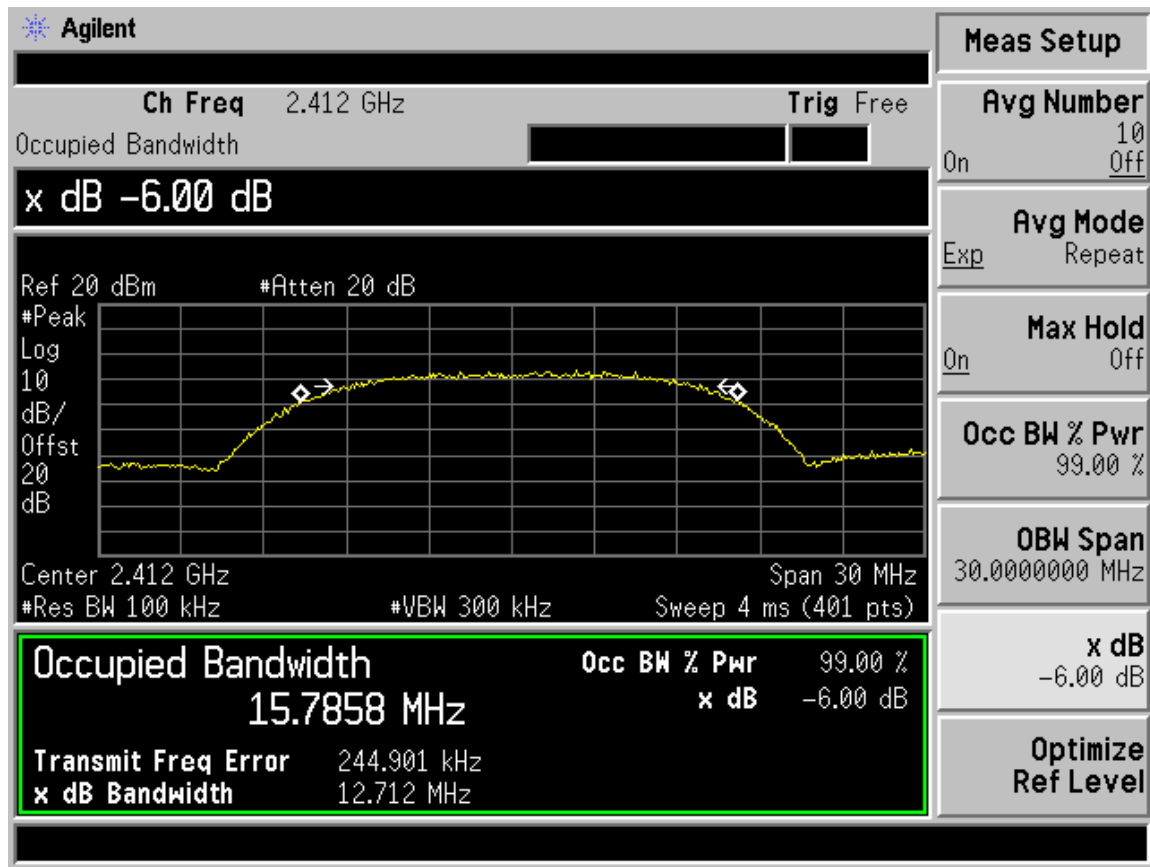
Measure out each mode and each band the bandwidth of the fundamental frequency was measured by spectrum analyzer use the test procedure described in KDB558074 clause 7.2 Option 2

#### TEST RESULTS

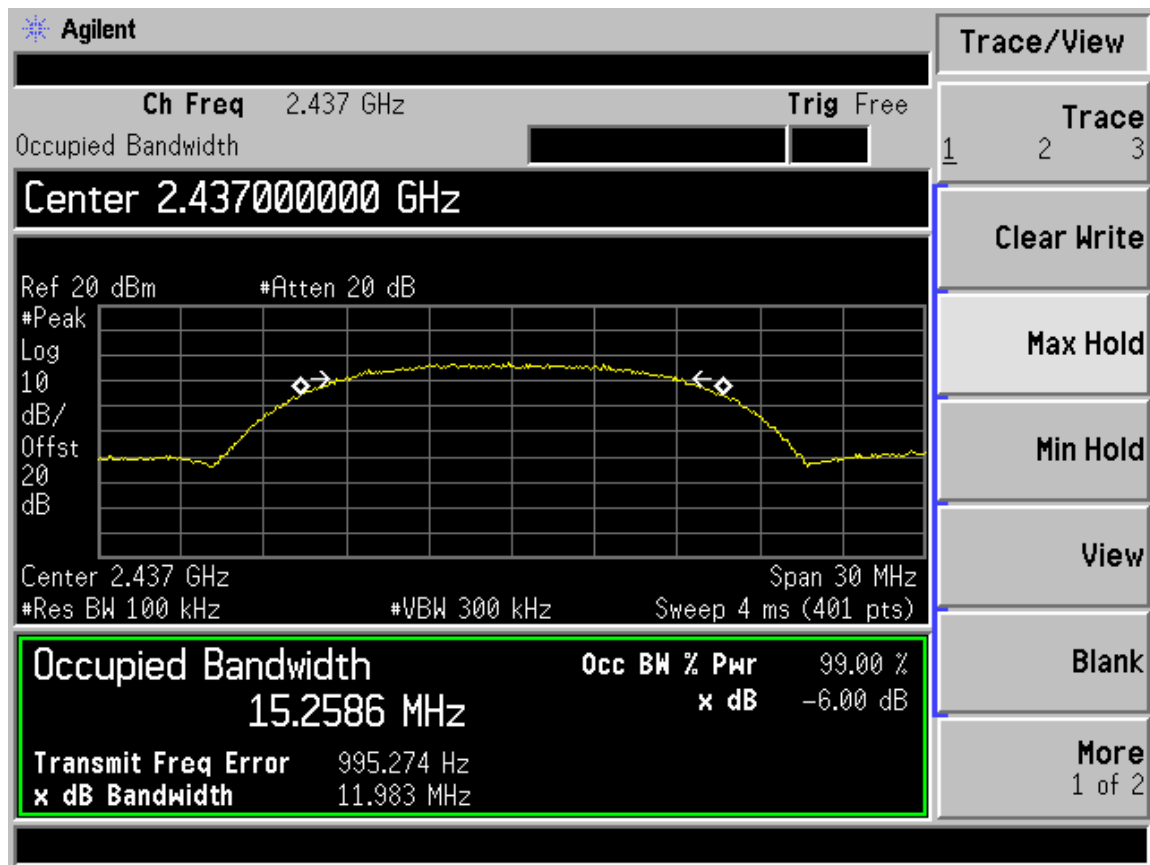
<b>EUT:</b> Pico Projector			
<b>Test Date :</b> 2012/10/18		<b>Test Engineer :</b> leon	
Mode	Channel	Result(MHz)	Limit(KHz)
11b	CH1	12.712	>500KHz
	CH6	11.983	>500KHz
	CH11	11.783	>500KHz
11g	CH1	13.913	>500KHz
	CH6	15.128	>500KHz
	CH11	15.108	>500KHz
Conclusion: PASS			

Refer to attach spectrum analyzer data chart

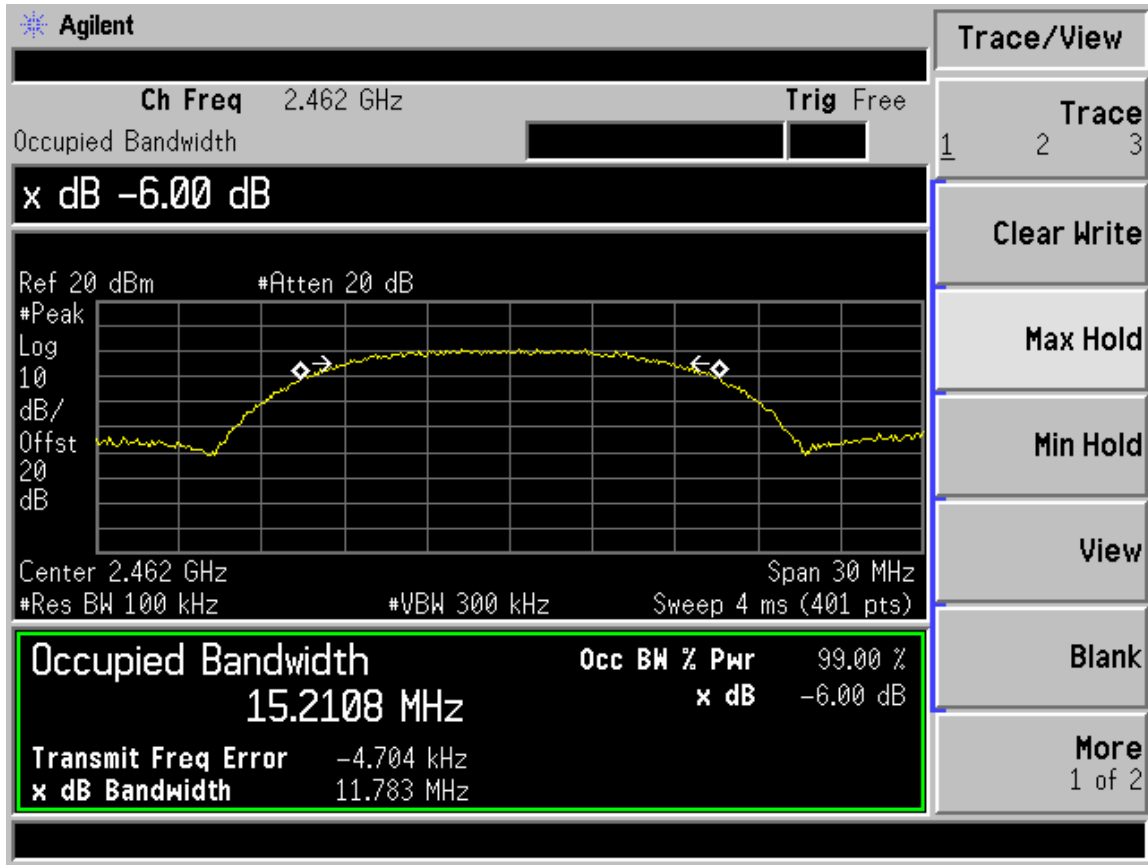
802.11b CH1



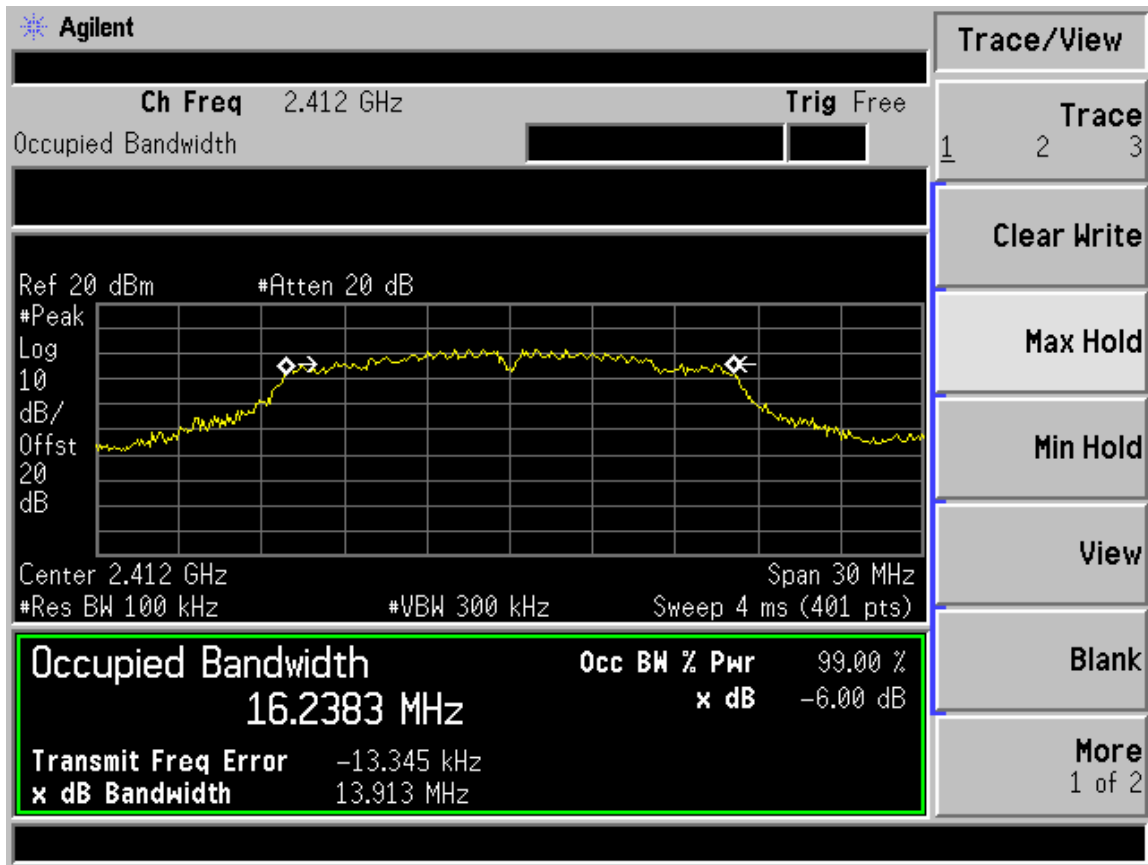
802.11b CH6



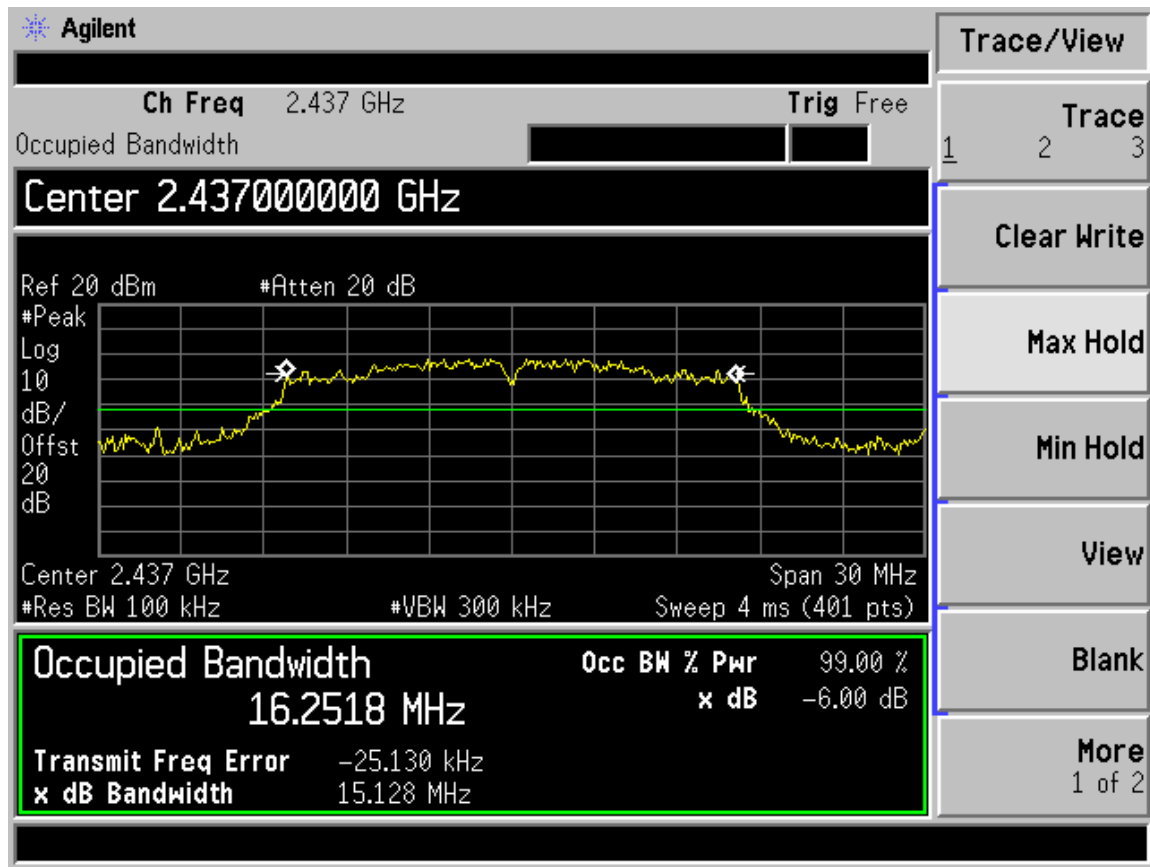
802.11b CH11



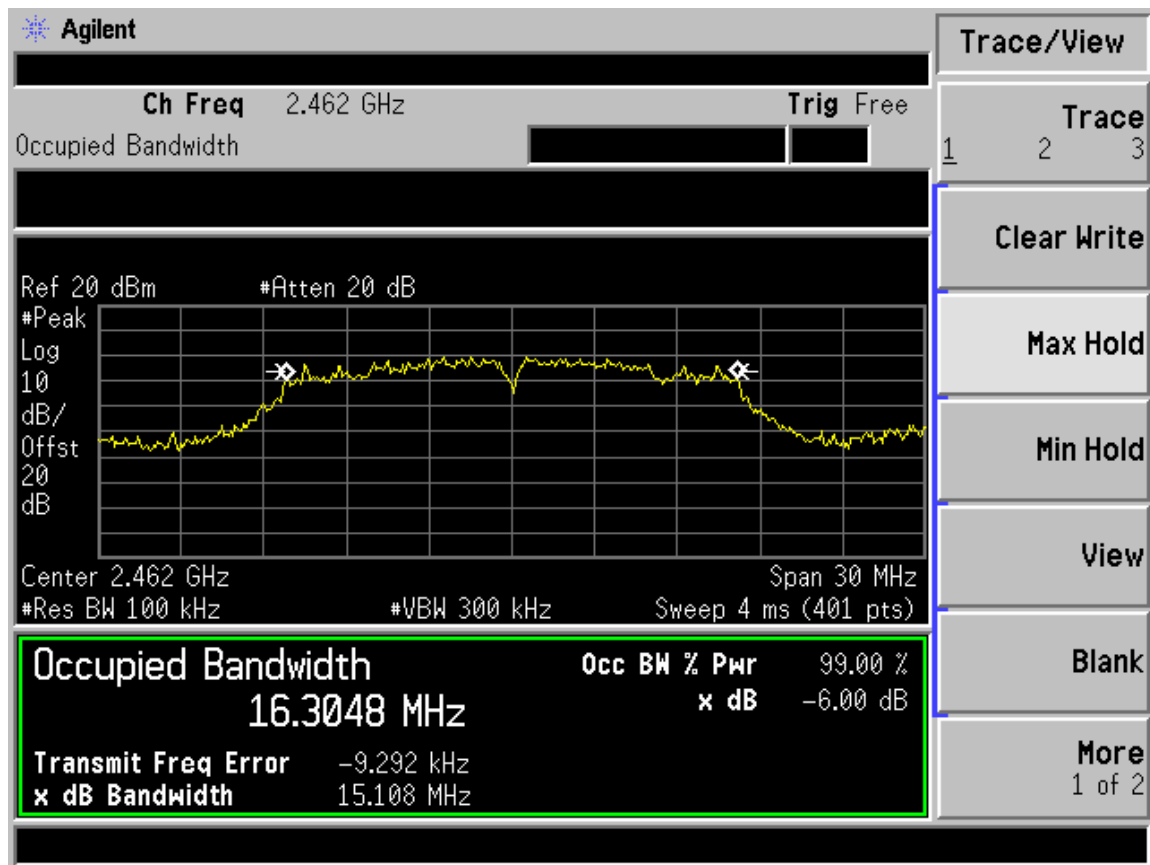
802.11g CH1



802.11g CH6



802.11g CH11



## 7.2 MAXIMUM PEAK OUTPUT POWER

### LIMIT

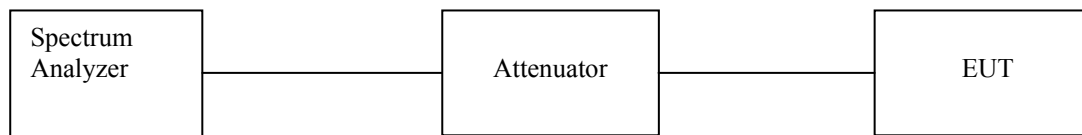
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	AGILENT	E4407B	MY41441082	06/12/2012	06/12/2013
RF Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

Connect EUT's antenna output to Spectrum Analyzer by RF cable through an attenuator.

Measure out each mode and each band's peak output power of EUT using the test procedure described in KDB558074 clause 8.1.2 Option 2 (channel integration method)

### TEST RESULTS

EUT: Pico Projector				
Test Date : 2012/10/18			Test Engineer : leon	
Mode	Channel	Result	Limit(dBm)	Margin(dB)
		PK Output Power(dBm)		
11b	CH1	6.42	30	-23.58
	CH6	10.69	30	-19.31
	CH11	9.78	30	-20.22
11g	CH1	6.56	30	-23.44
	CH6	7.06	30	-22.94
	CH11	6.17	30	-23.83

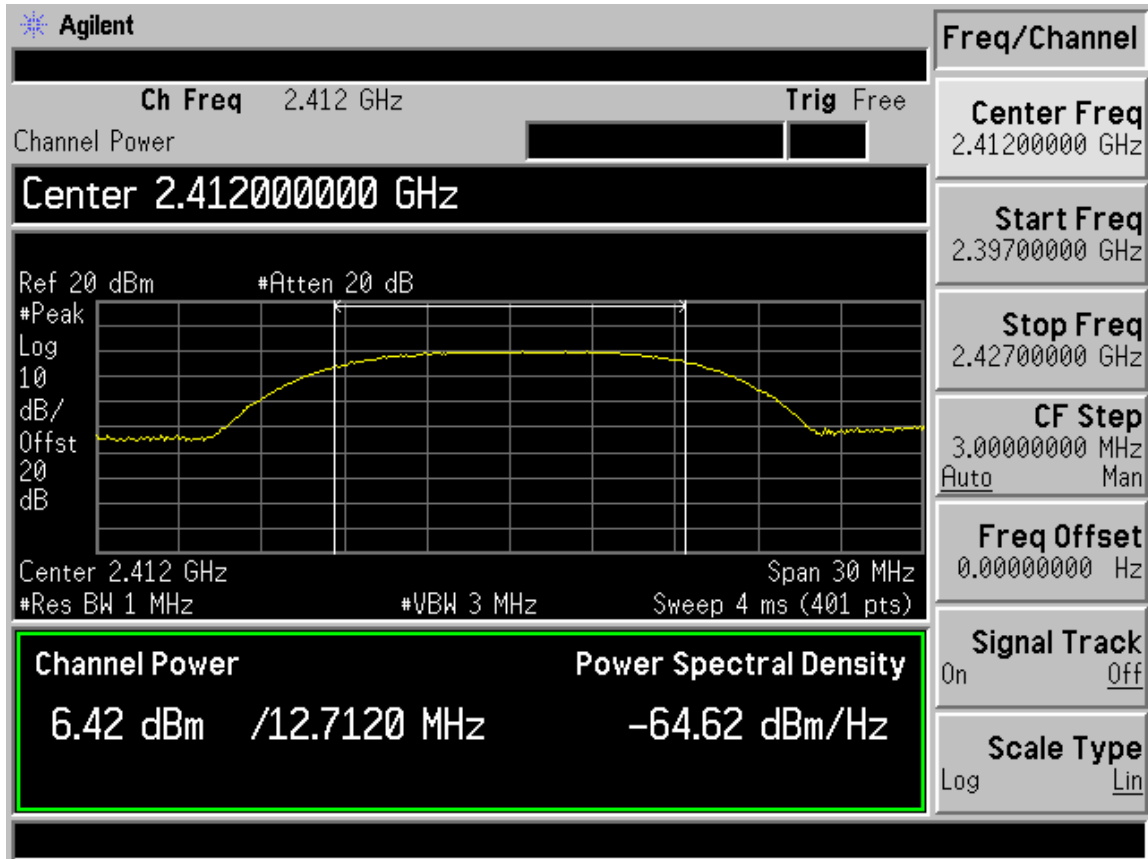
Conclusion: PASS

Refer to attach spectrum analyzer data chart

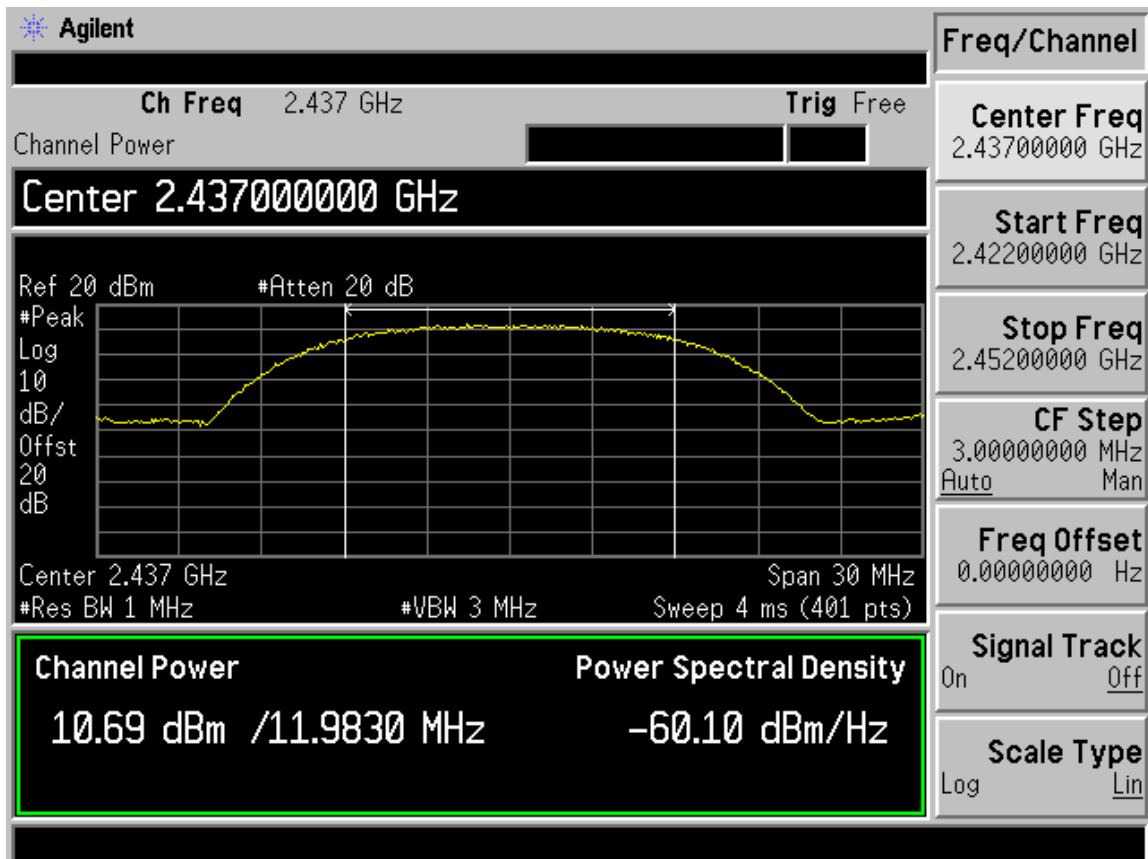




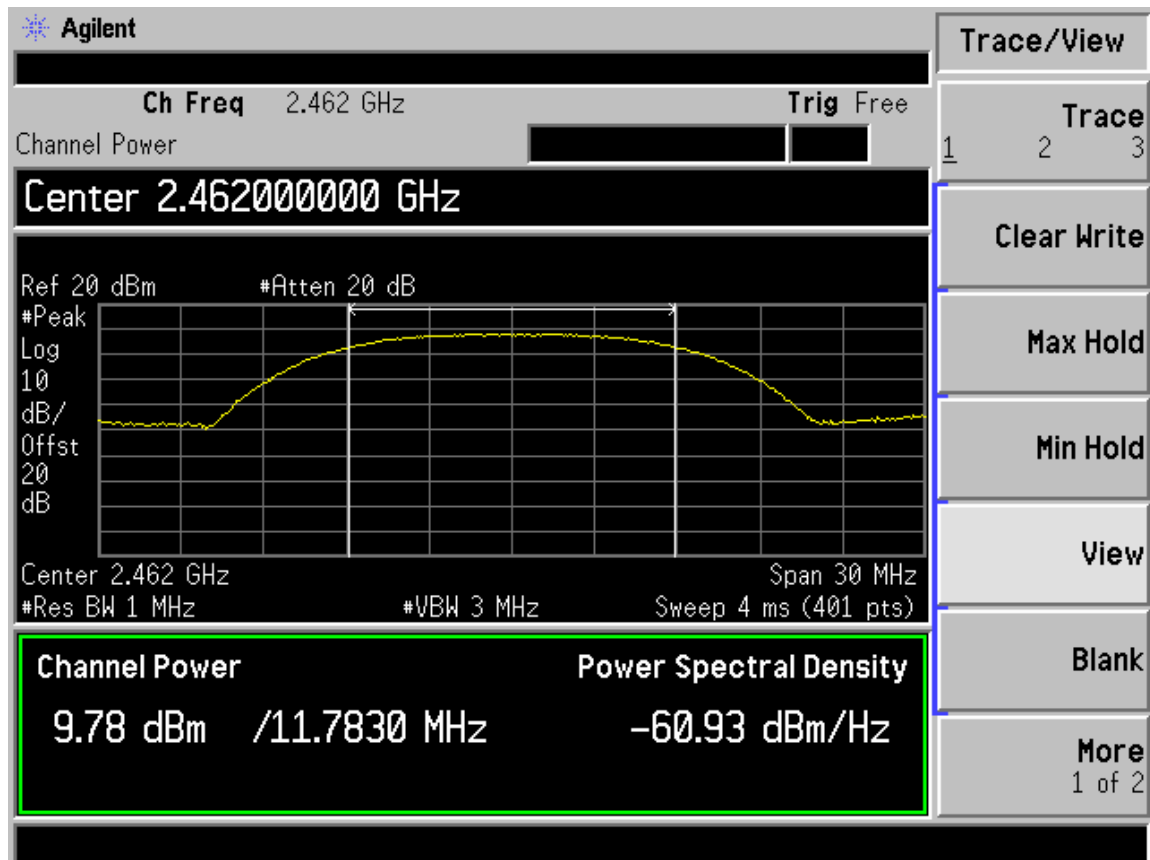
802.11b CH1



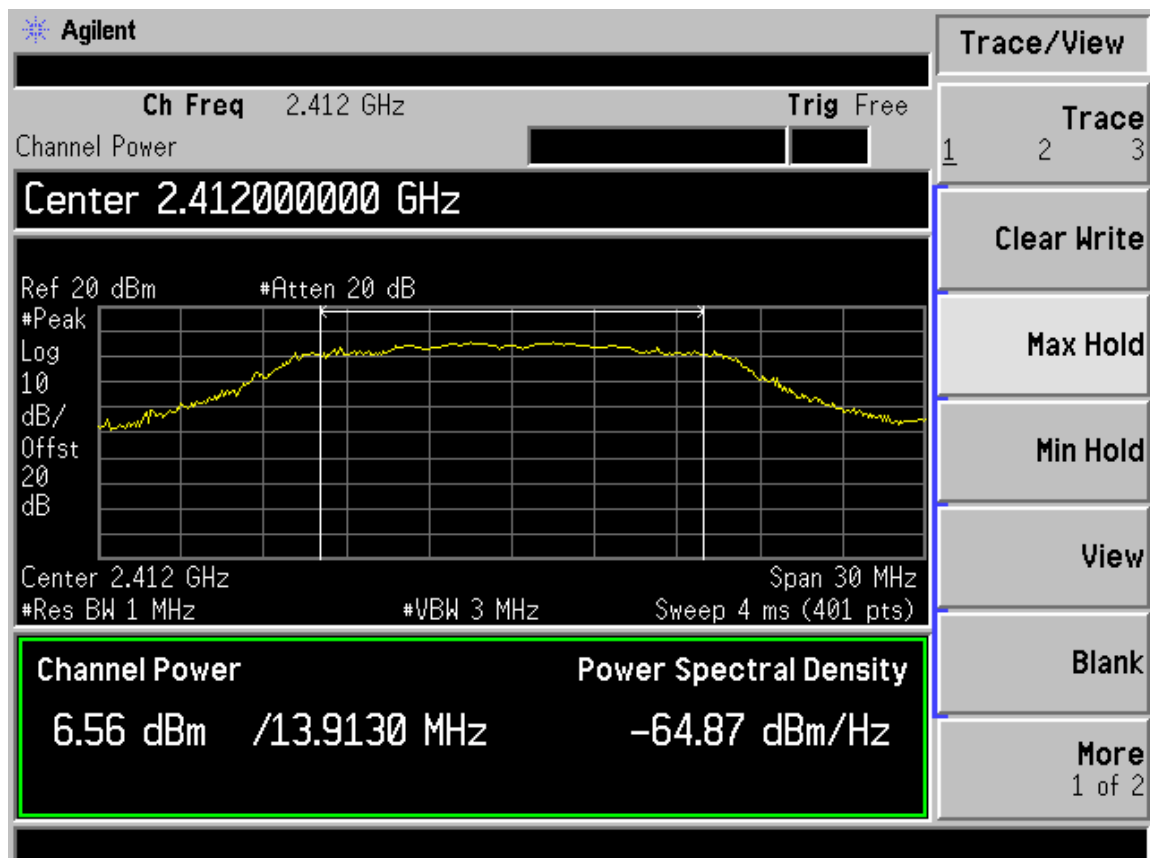
802.11b CH6



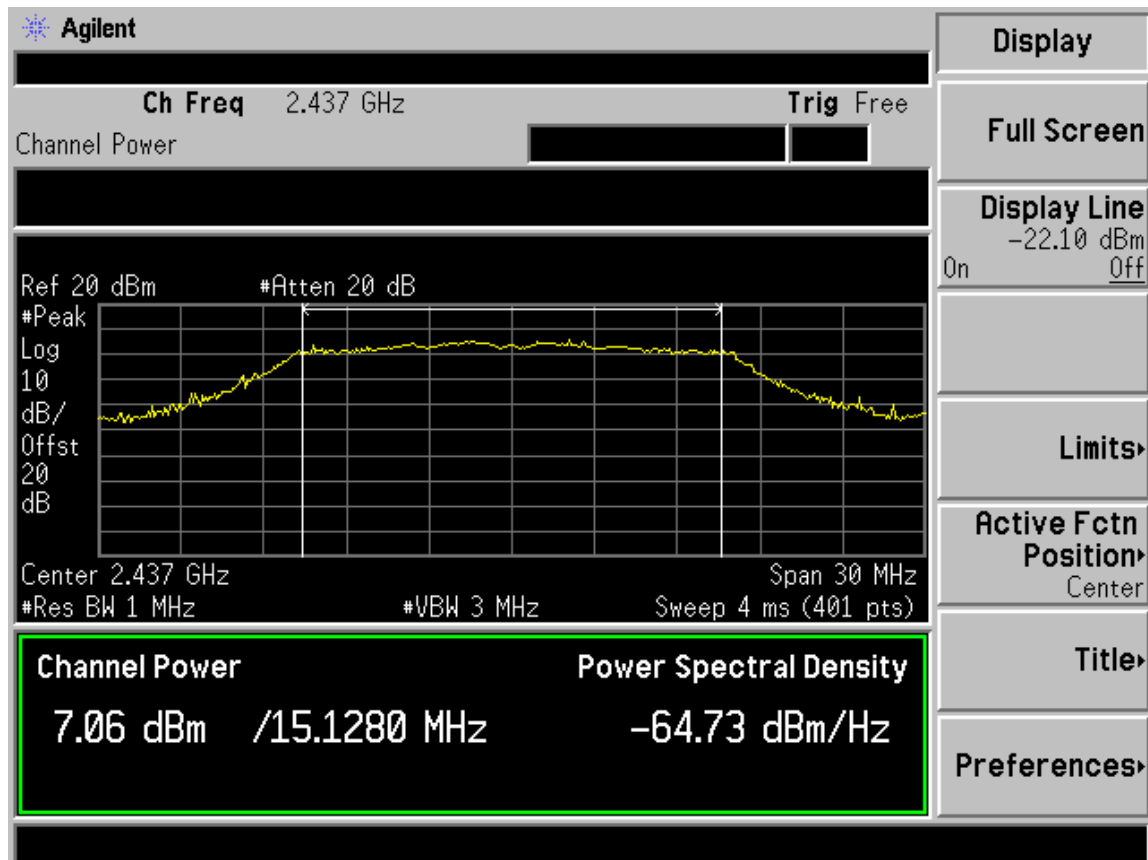
802.11b CH11



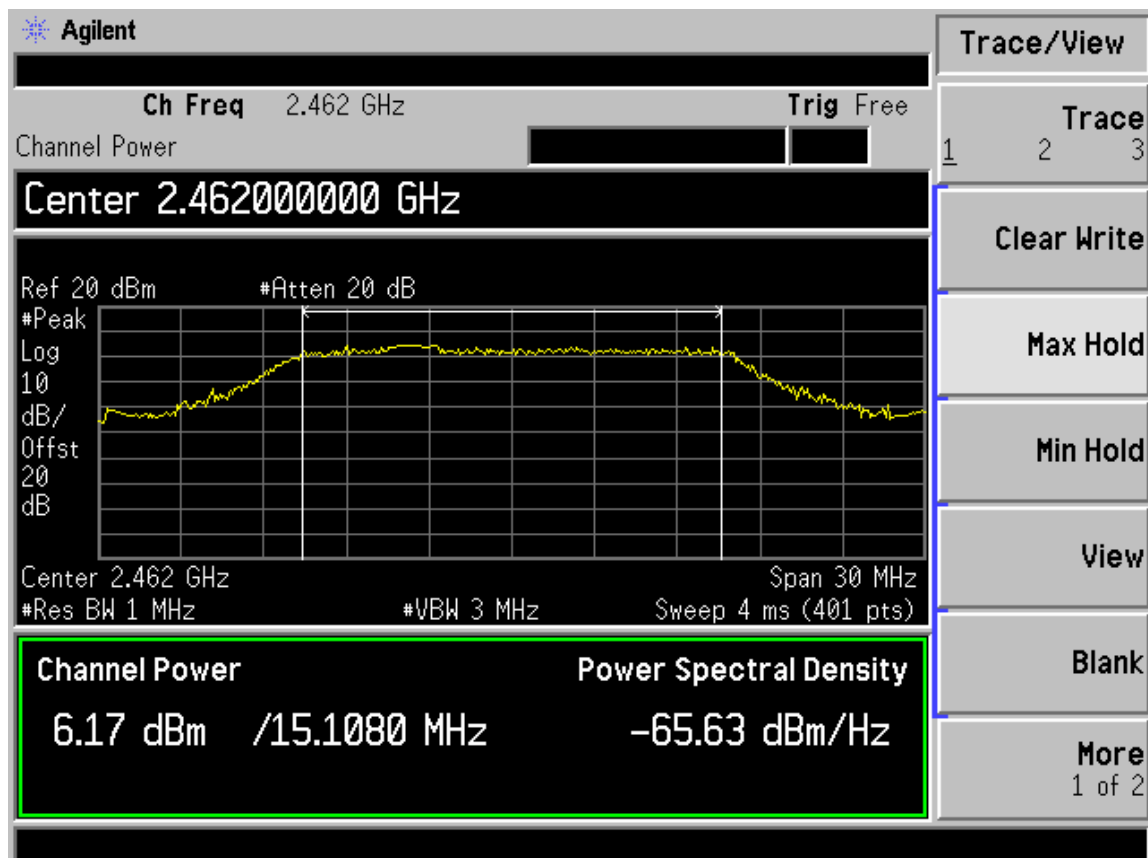
802.11g CH1



802.11g CH6



802.11g CH11



### 7.3 POWER SPECTRAL DENSITY

#### LIMIT

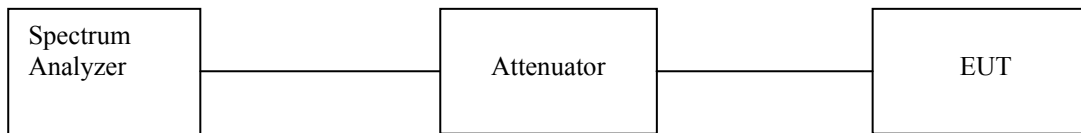
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	AGILENT	E4407B	MY41441082	06/12/2012	06/12/2013
RF Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### Test Configuration



#### TEST PROCEDURE

Connect EUT's antenna output to Spectrum Analyzer by RF cable through an attenuator.

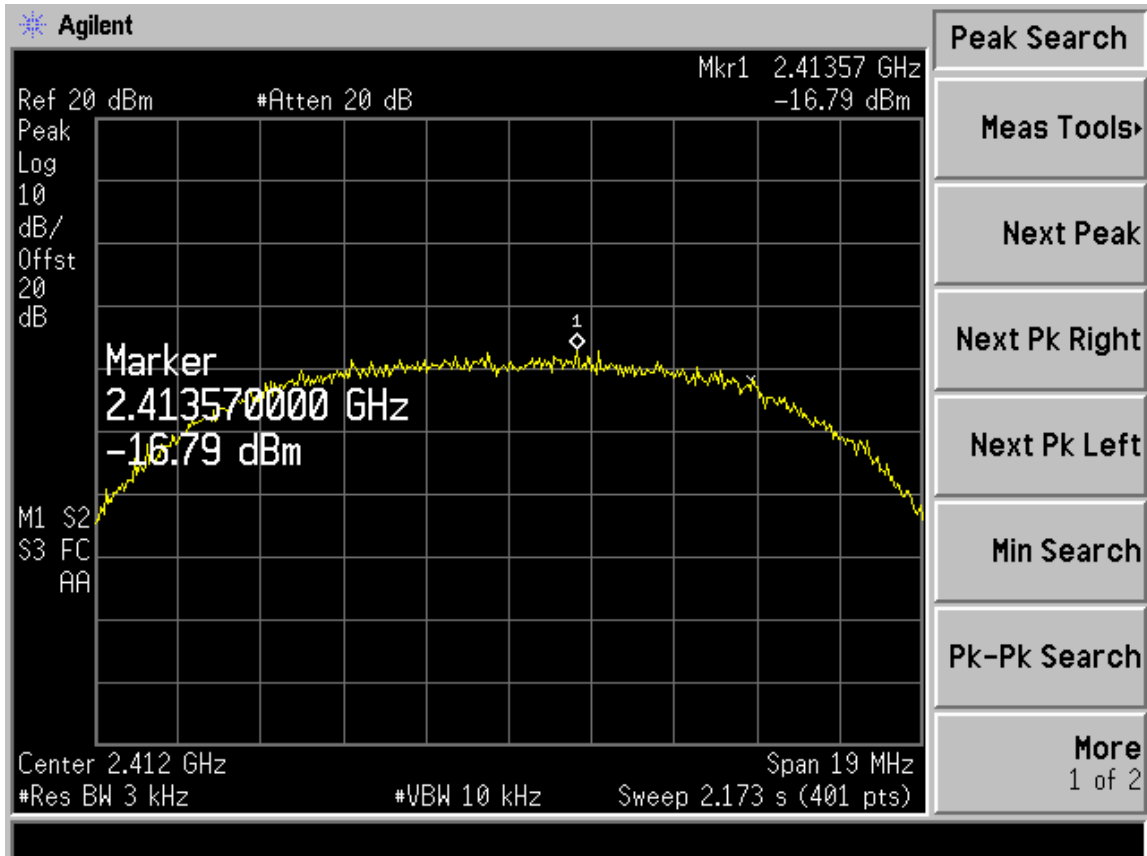
Use the test procedure described in KDB558074 clause 9.1 Option 1 : measurement procedure PKPSD to measure out each test mode and channel's power density with 3KHz.

#### TEST RESULTS

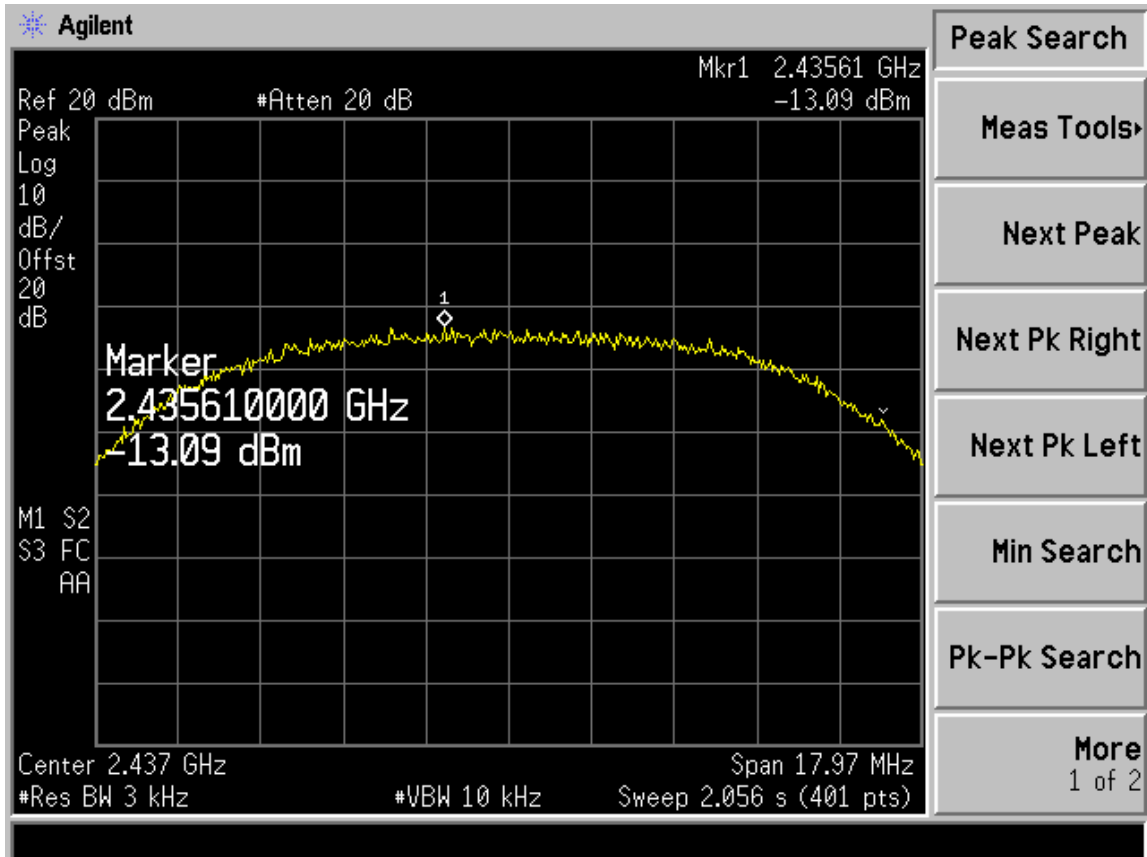
EUT: Pico Projector			
Test Date : 2012/10/18		Test Engineer :leon	
Mode	Channel	Power density (dBm/3KHz)	Limit (dBm/3KHz)
11b	CH1	-16.79	8.00
	CH6	-13.09	8.00
	CH11	-13.23	8.00
11g	CH1	-11.24	8.00
	CH6	-14.30	8.00
	CH11	-12.56	8.00
Conclusion:PASS			

Refer to attach spectrum analyzer data chart

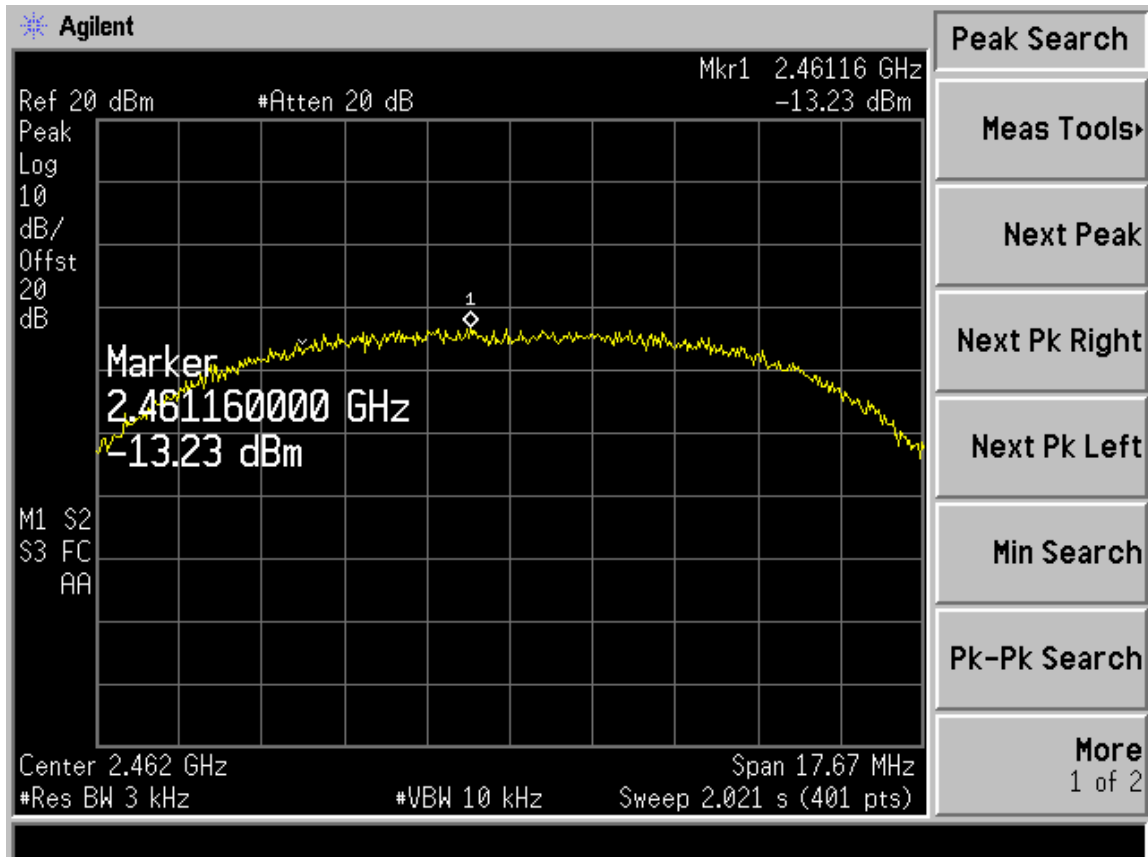
802.11b CH1



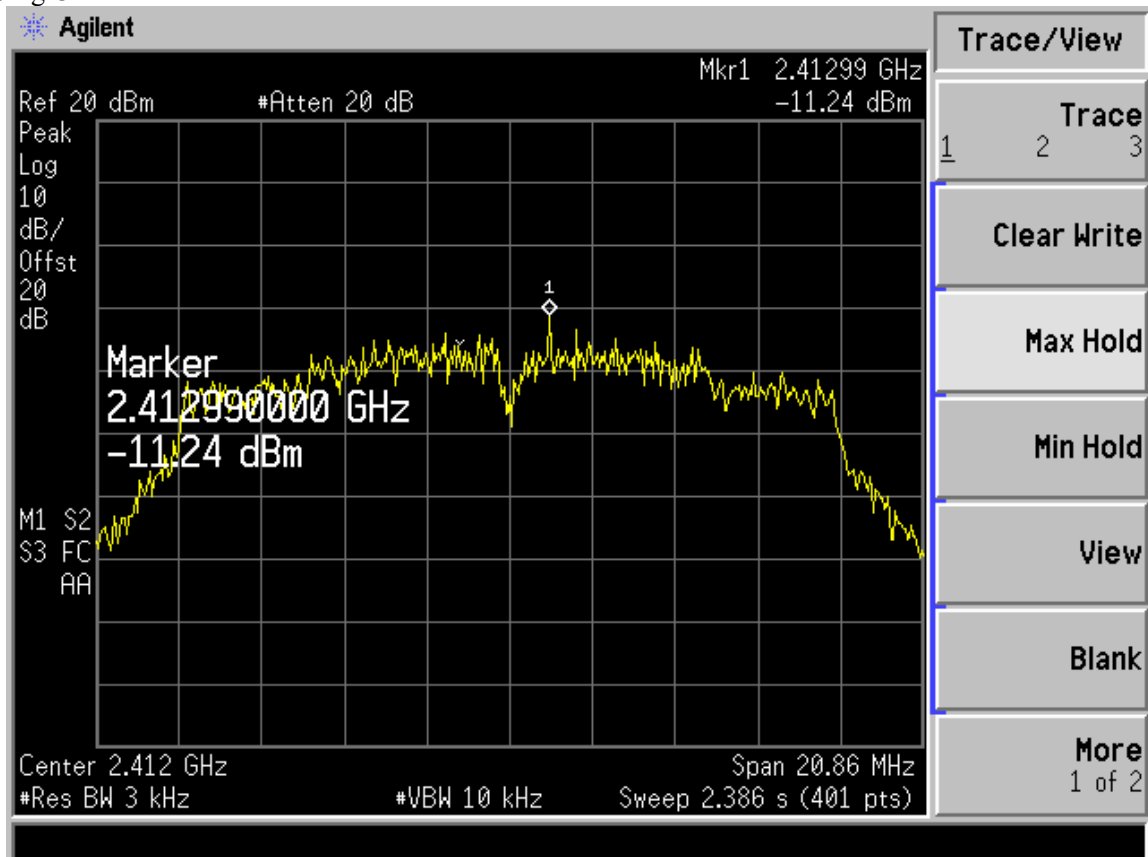
802.11b CH6



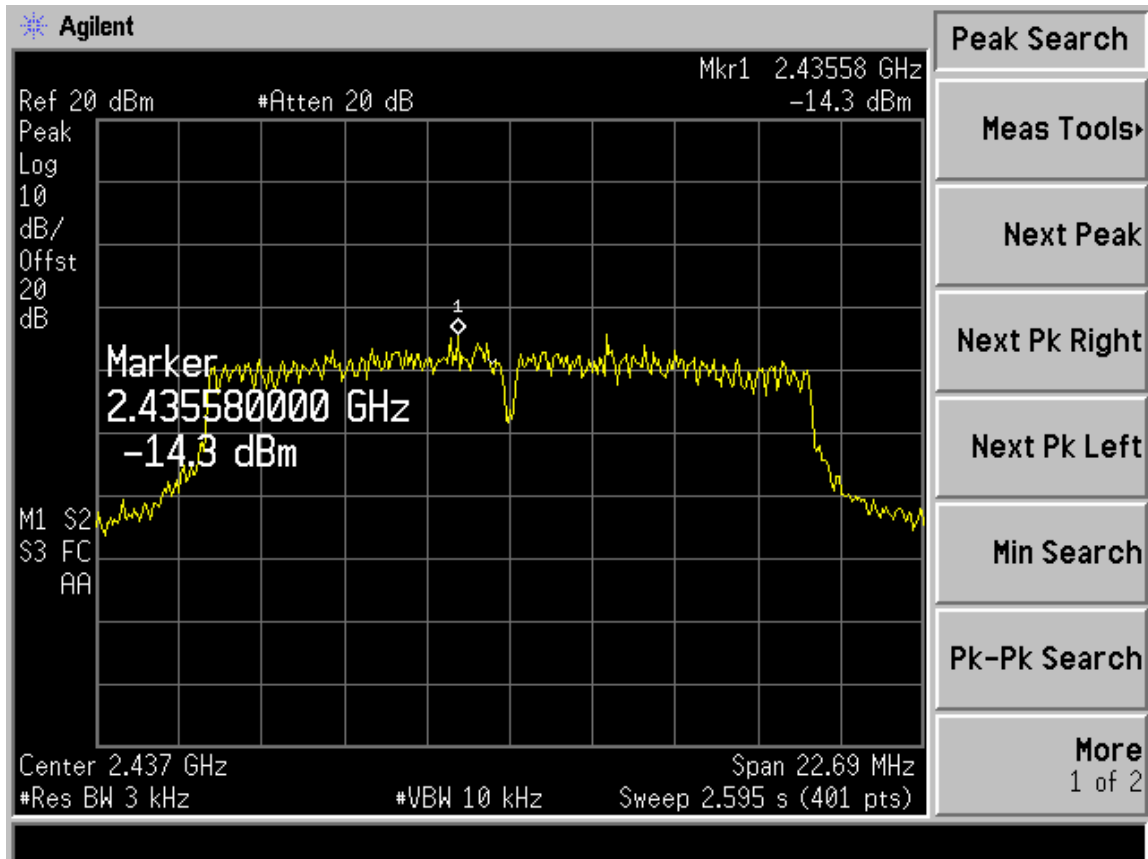
802.11b CH11



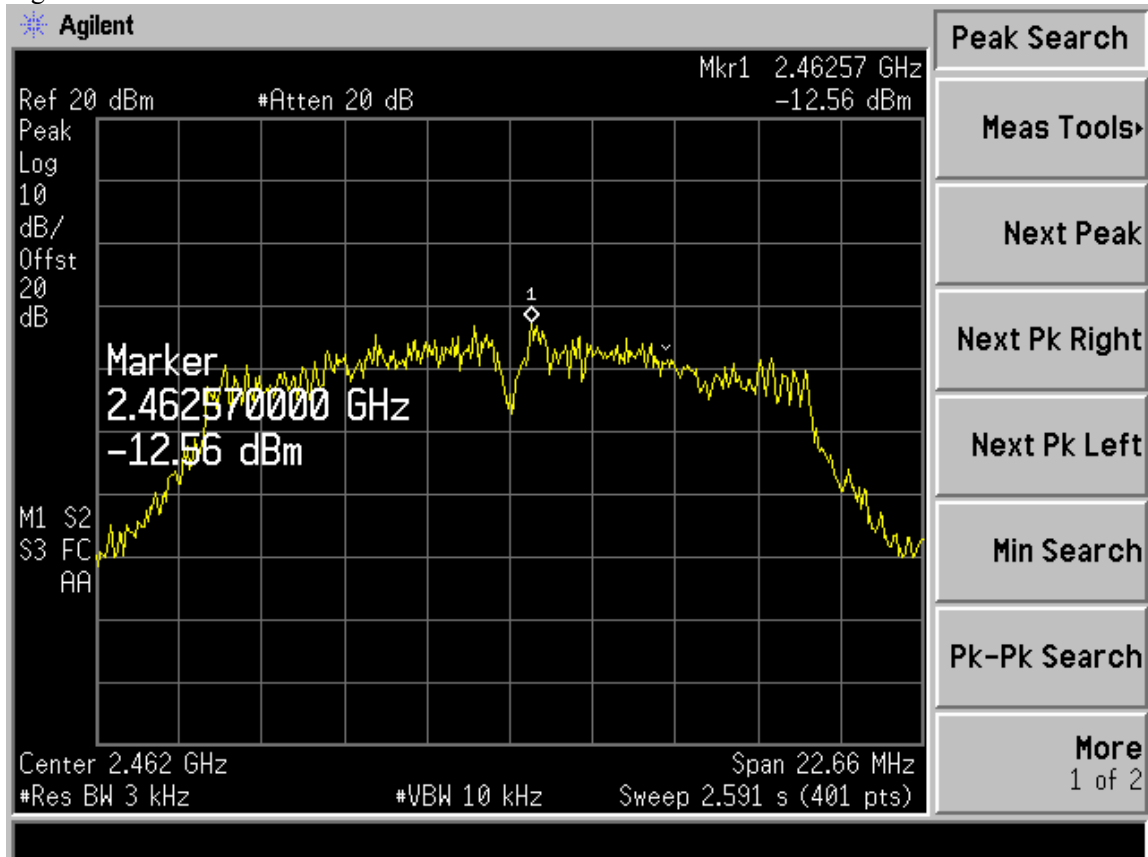
802.11g CH1



802.11g CH6



802.11g CH11



## 7.4 CONDUCTED SPURIOUS EMISSIONS

### LIMIT

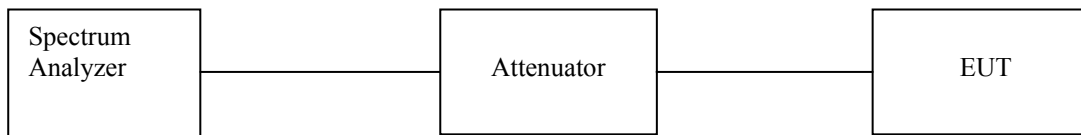
In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. Attenuation below the general limits specified in Section 15.209(a) is not required.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	AGILENT	E4407B	MY41441082	06/12/2012	06/12/2013
RF Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

Connect EUT's antenna output to Spectrum Analyzer by RF cable through an attenuator.

Use the test procedure described in KDB558074 clause 10.1 to measure out all the emissions within any 100kHz bandwidth of device.

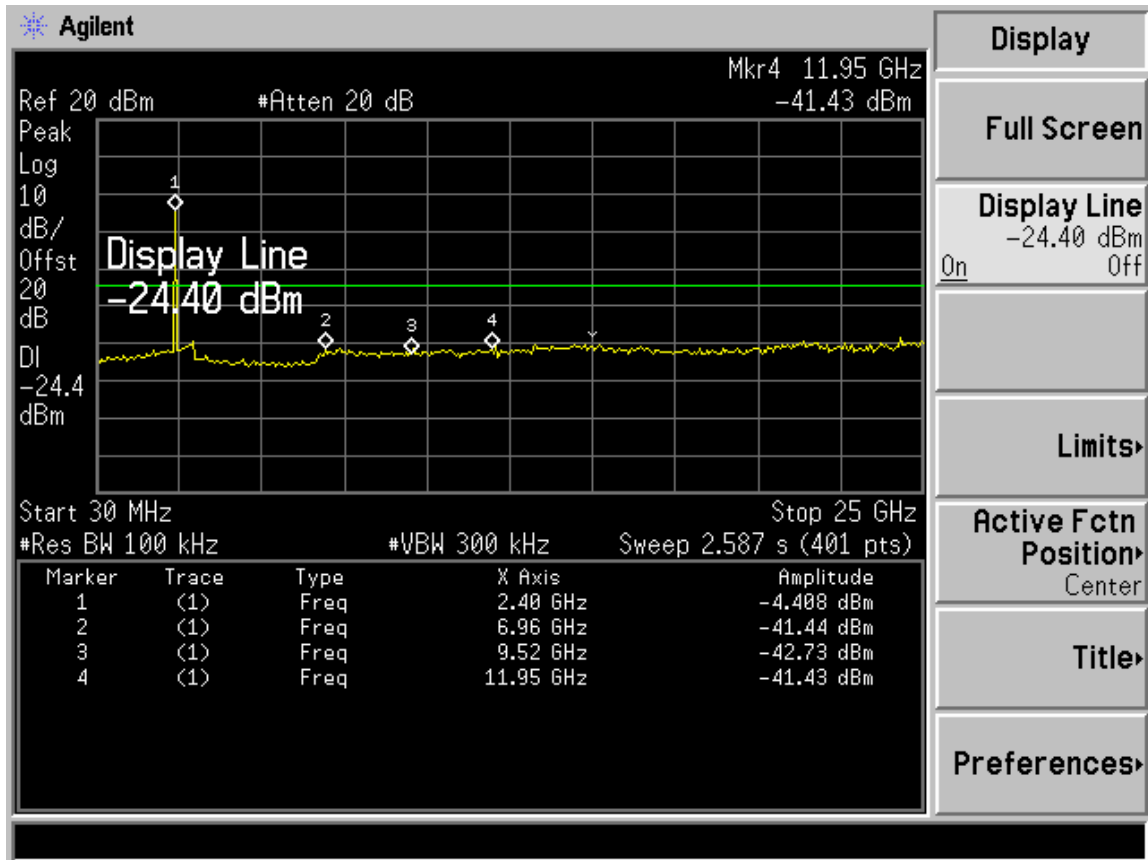
### TEST RESULTS

<b>EUT:</b> Pico Projector		
<b>Test Date :</b> 2012/10/18		<b>Test Engineer :</b> leon
Mode	CH	Conducted spurious emissions test results
11b	CH1	PASS
	CH6	PASS
	CH11	PASS
11g	CH1	PASS
	CH6	PASS
	CH11	PASS

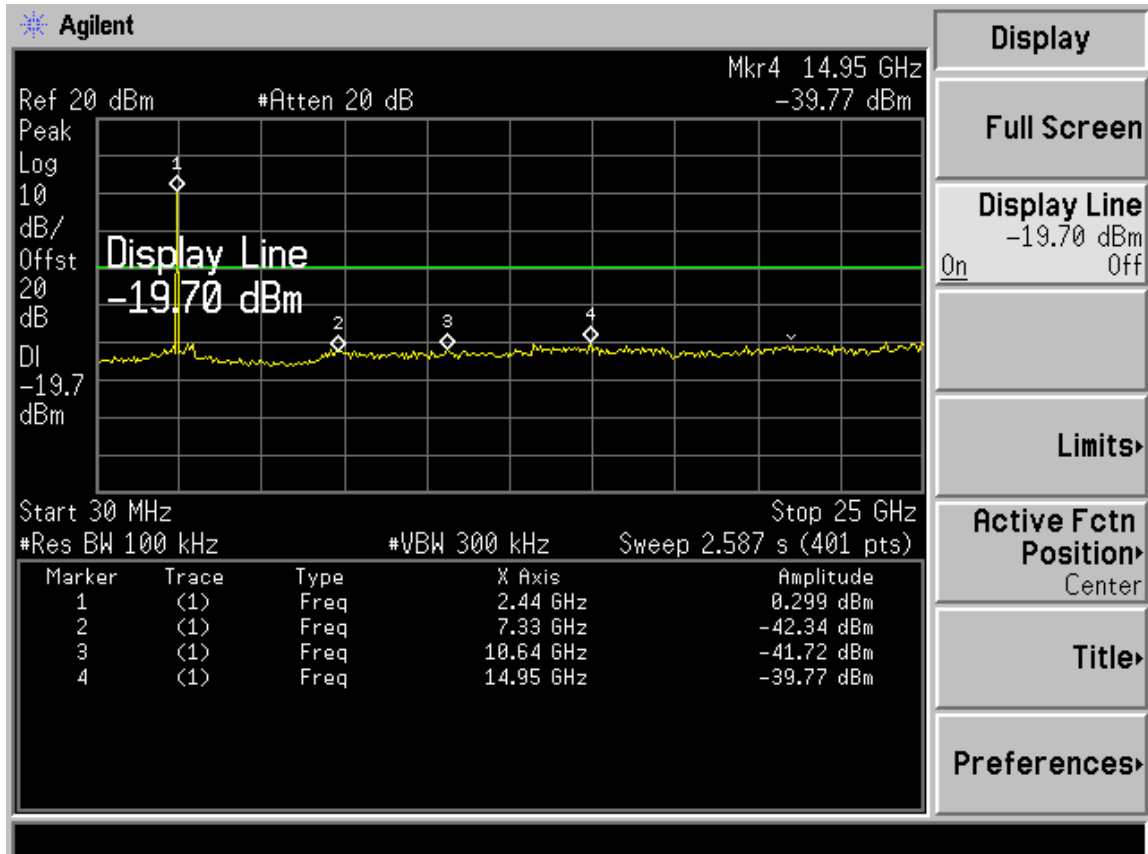
Refer to attach spectrum analyzer data chart



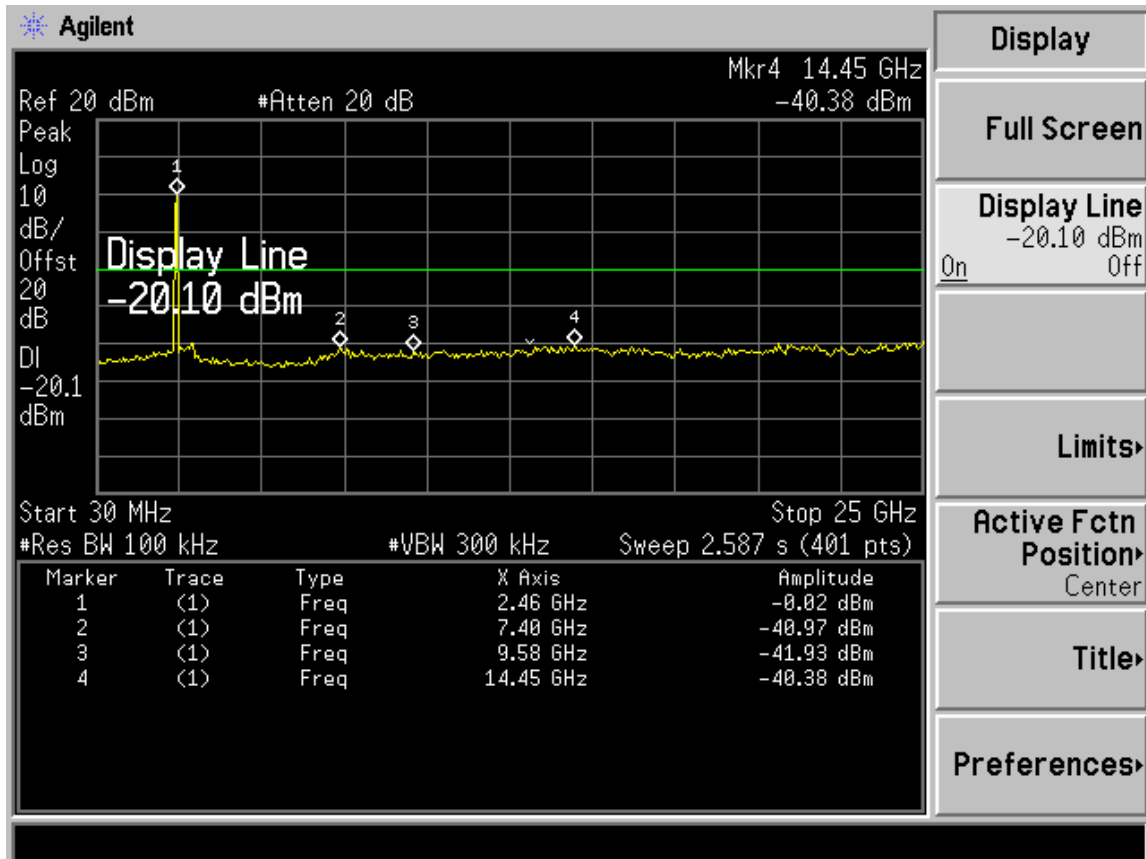
802.11b CH1



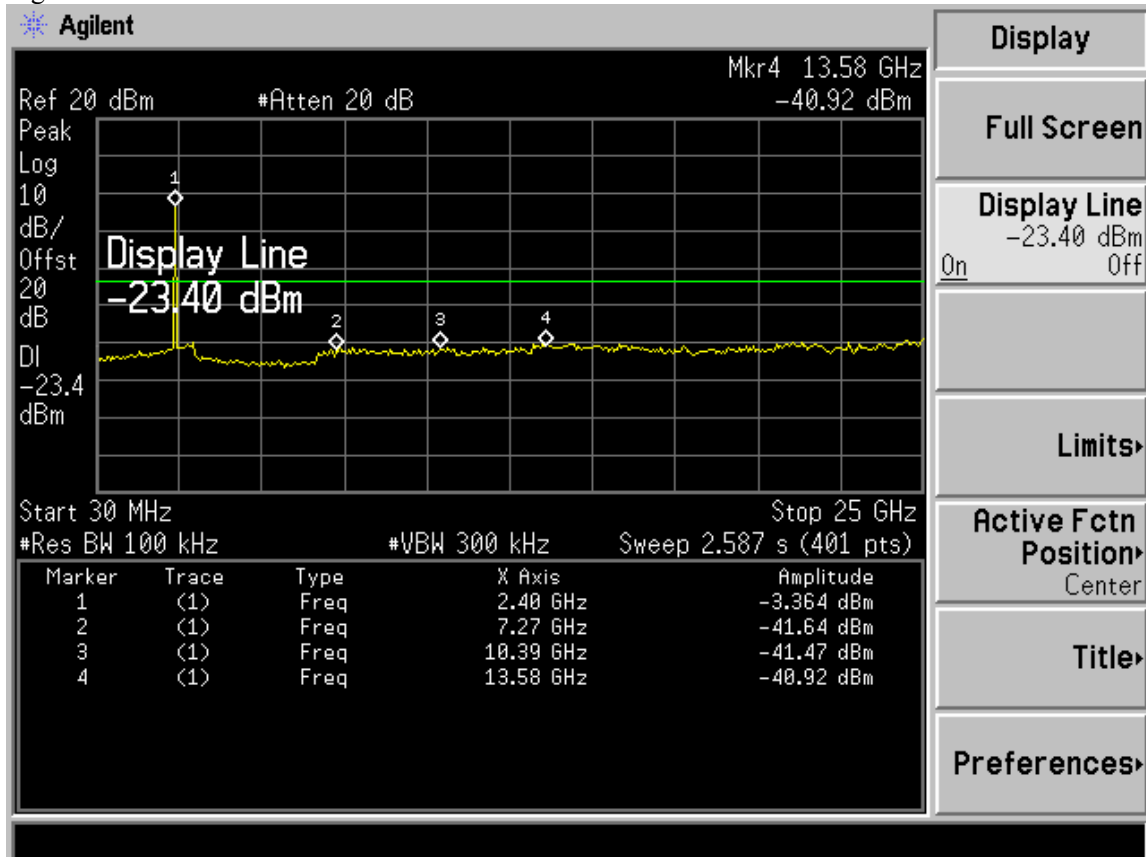
802.11b CH6



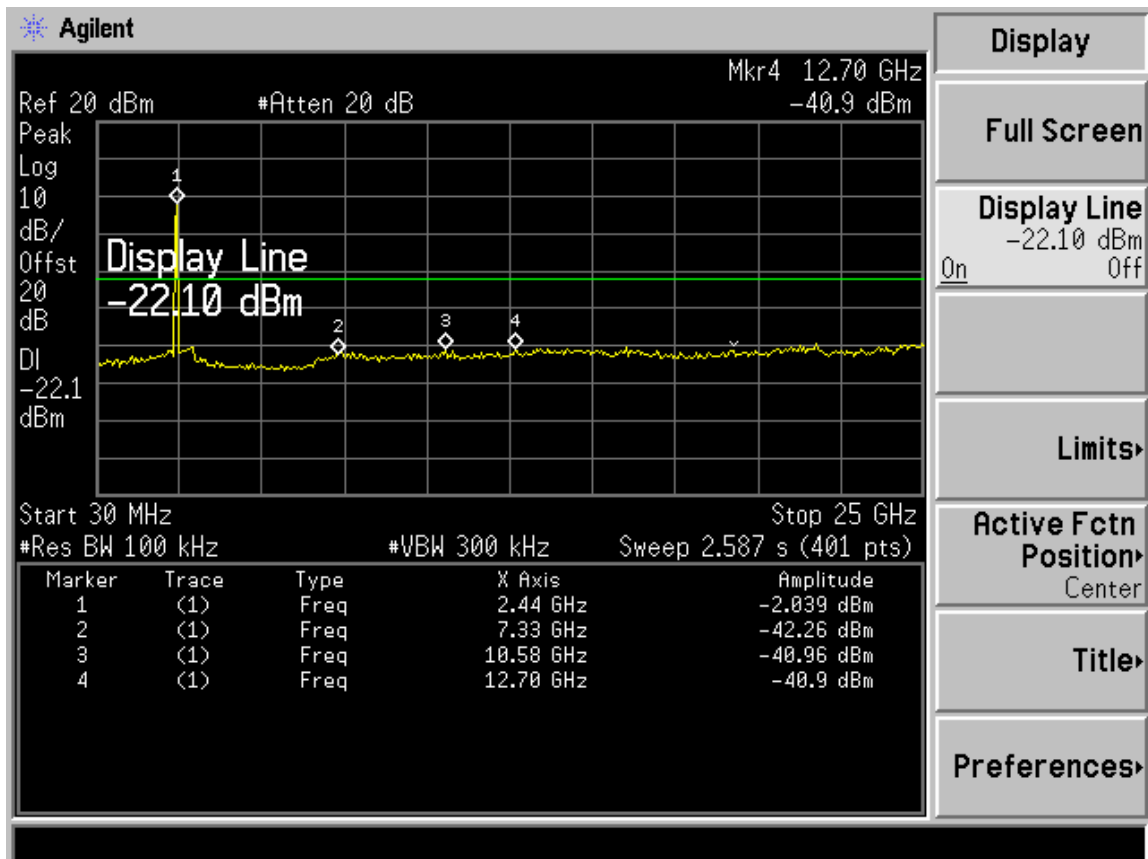
802.11b CH11



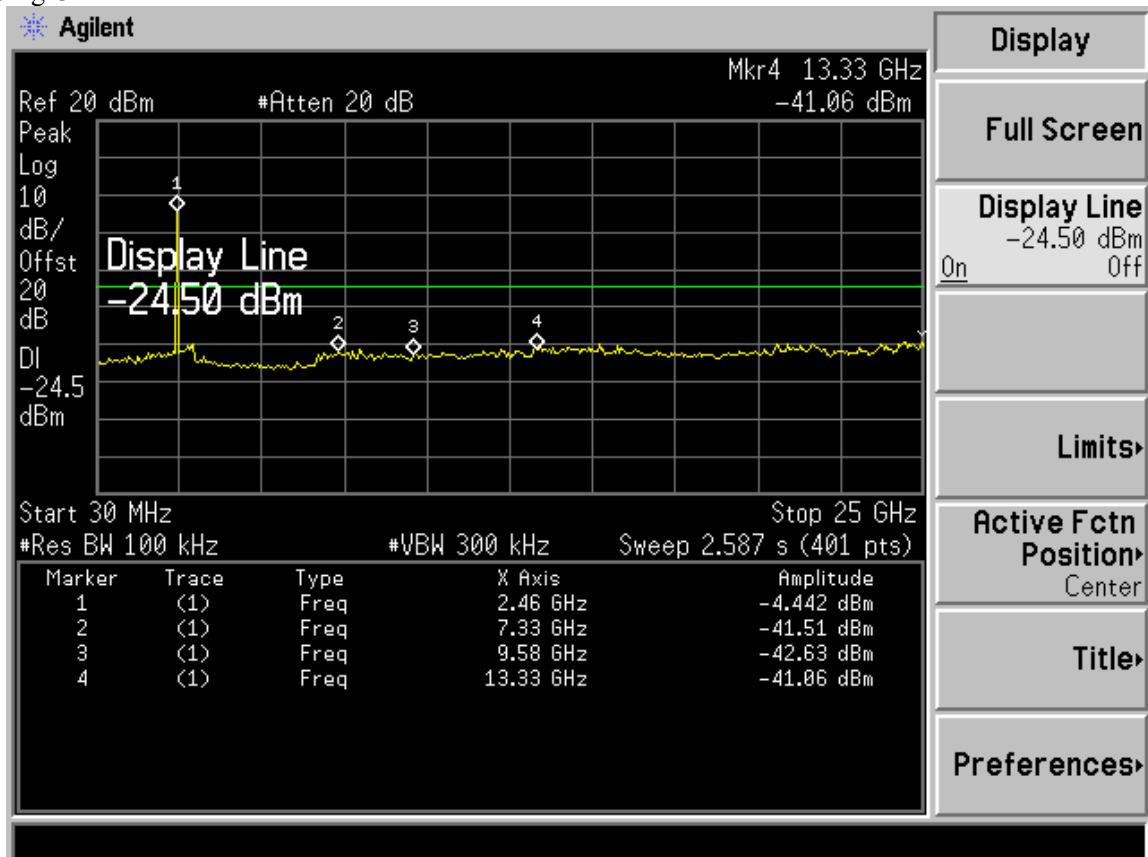
802.11g CH1



802.11g CH6



802.11g CH11



## 7.5BAND EDGES MEASUREMENT

### LIMIT

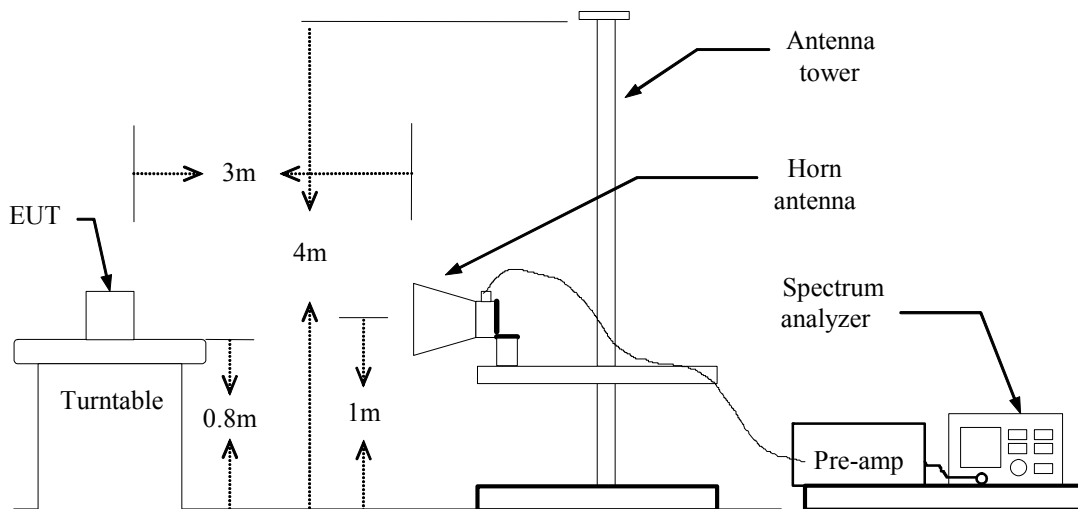
All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	AGILENT	E4407B	MY41441082	06/12/2012	06/12/2013
Turn Table	SINTEK	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SINTEK	N/A	N/A	N.C.R	N.C.R
Controller	SINTEK	N/A	N/A	N.C.R	N.C.R
Horn antenna	EMCO	3115	9602-4659	06/12/2012	06/12/2013
Pre-Amplifier	HP	8449B	3008B00965	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The EUT is placed on a turntable, which is 0.8m above the ground plane.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
5. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
6. PEAK: RBW/VBW=1MHz / Sweep=AUTO
7. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured. with highest data rate (worst case) are chosen for full testing.
8. The cable loss, antenna Factor was inputted into spectrum analyzer as amplitude offset

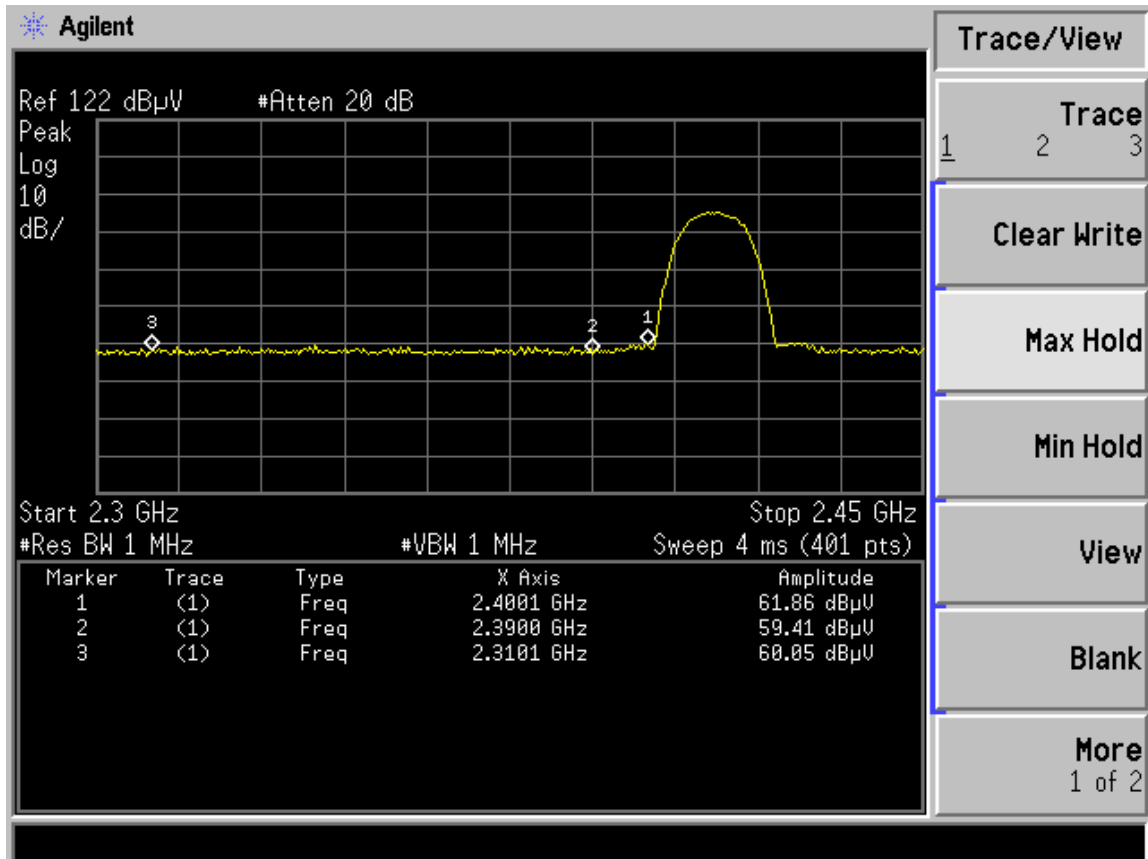
## TEST RESULTS

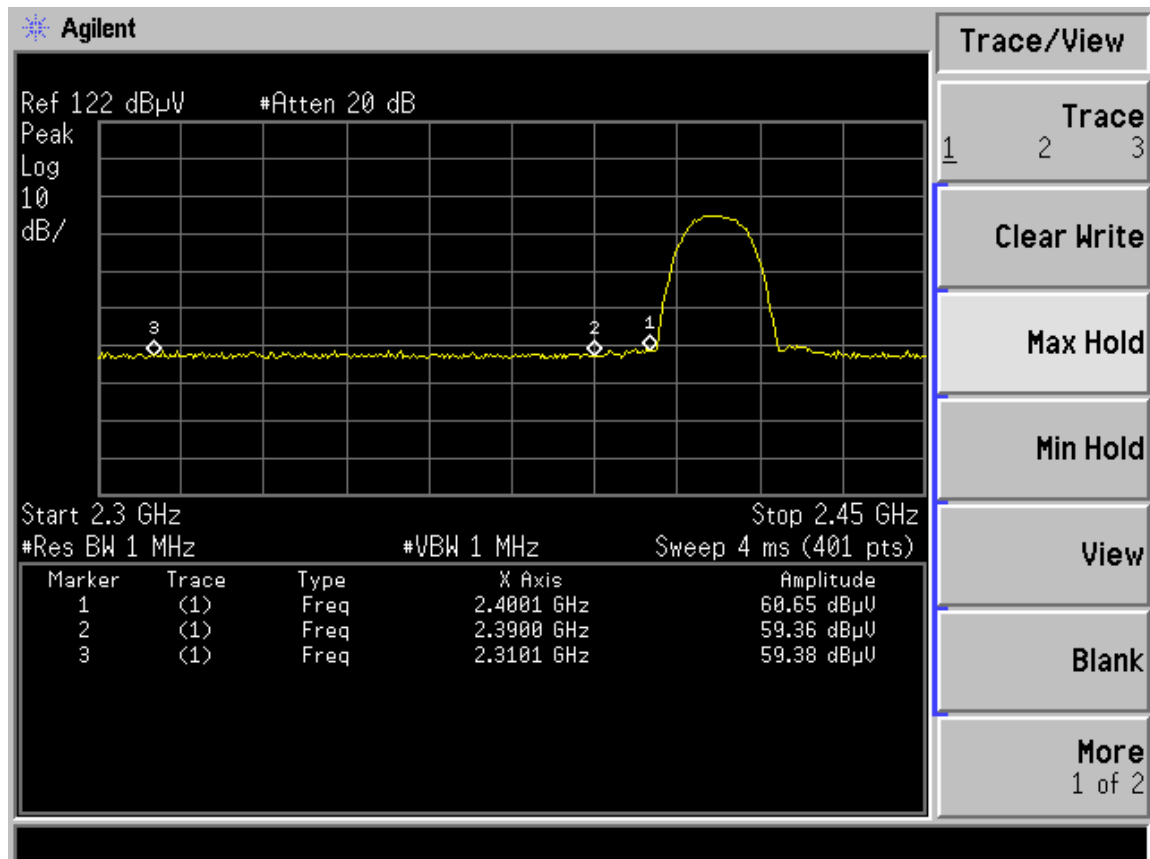
Low band edge:

Test mode		BAND EDGES MEASUREMENT					
		Frequency (GHz)	Actual FS		PK Limit (dBuV/m)	AVG Limit (dBuV/m)	Test results
			PK (dBuV/m)	AVG (dBuV/m)			
802.11b CH1	VER	2.400000	61.86	---	74	54	PASS
802.11b CH1	HOR	2.400000	60.65	---	74	54	PASS
802.11g CH1	VER	2.400000	70.35	---	74	54	PASS
802.11g CH1	HOR	2.400000	70.63	---	74	54	PASS

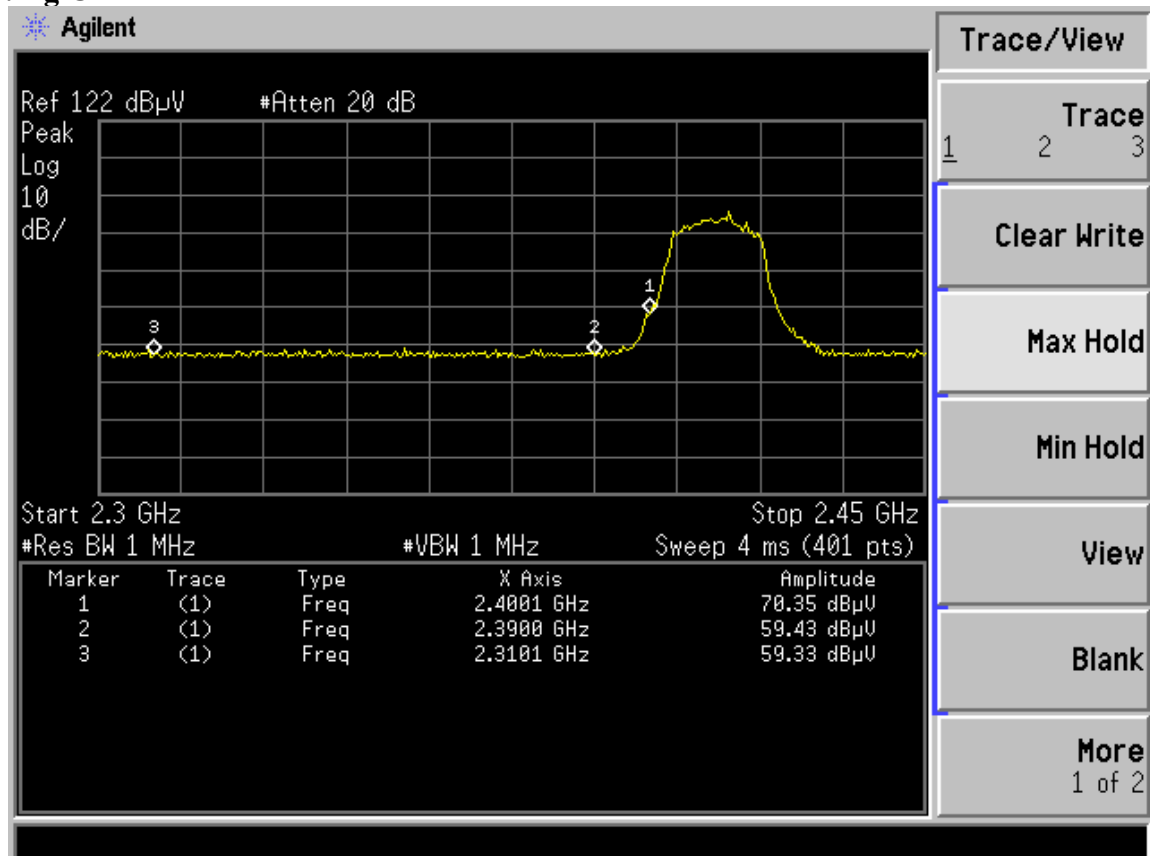
Refer to attach spectrum analyzer data chart  
**Band Edges (Detector mode: Peak)**

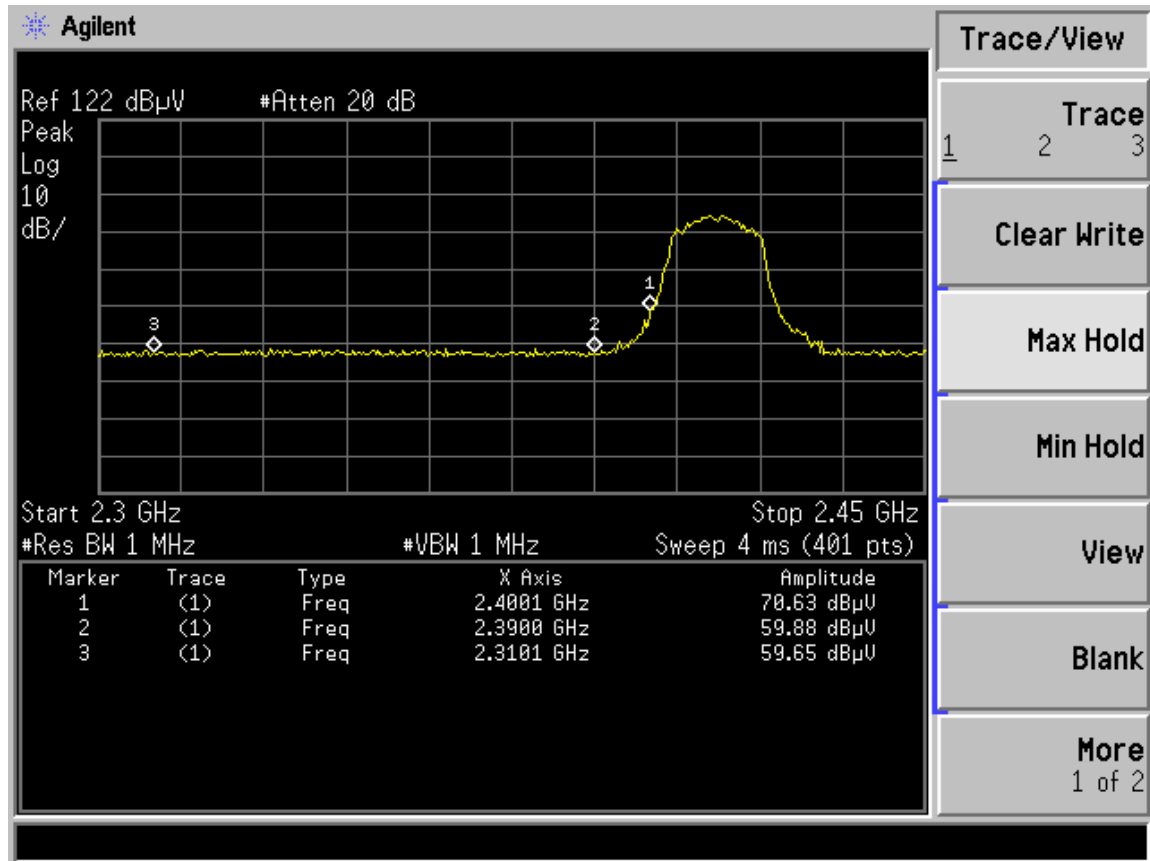
### 802.11b CH1





### 802.11g CH1





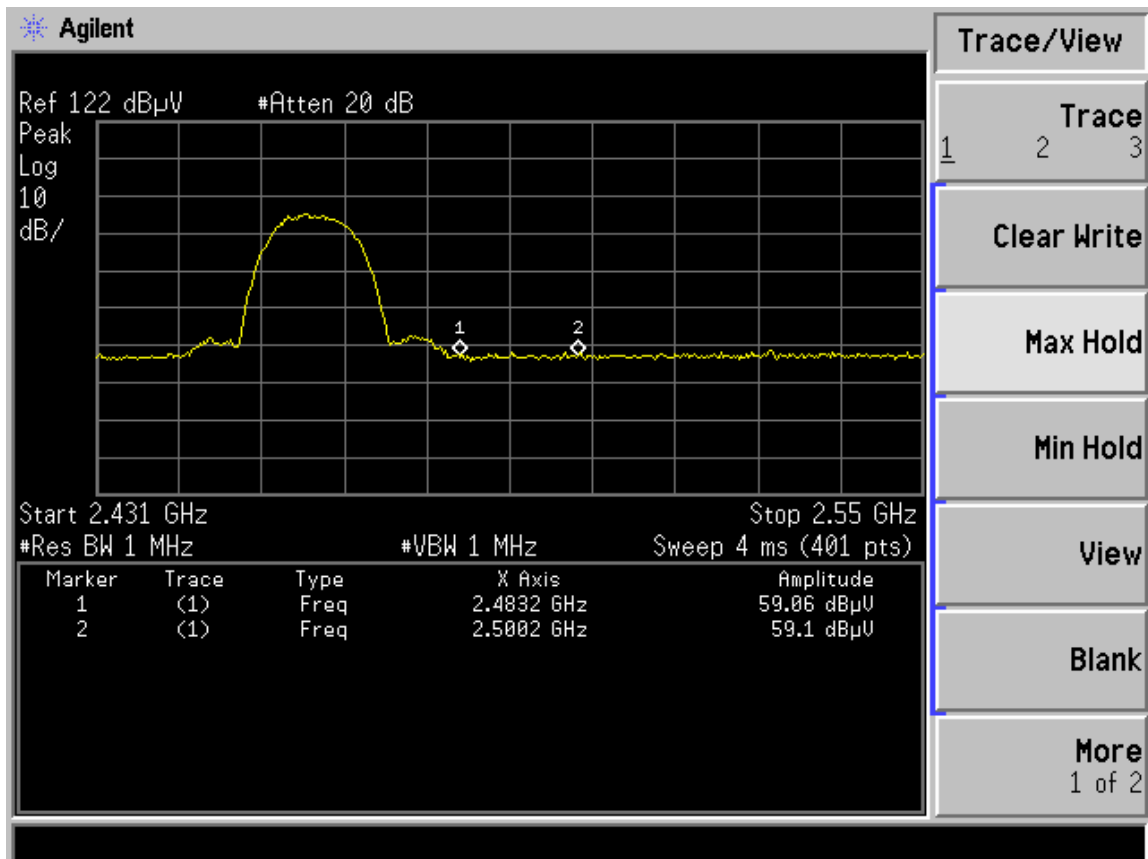
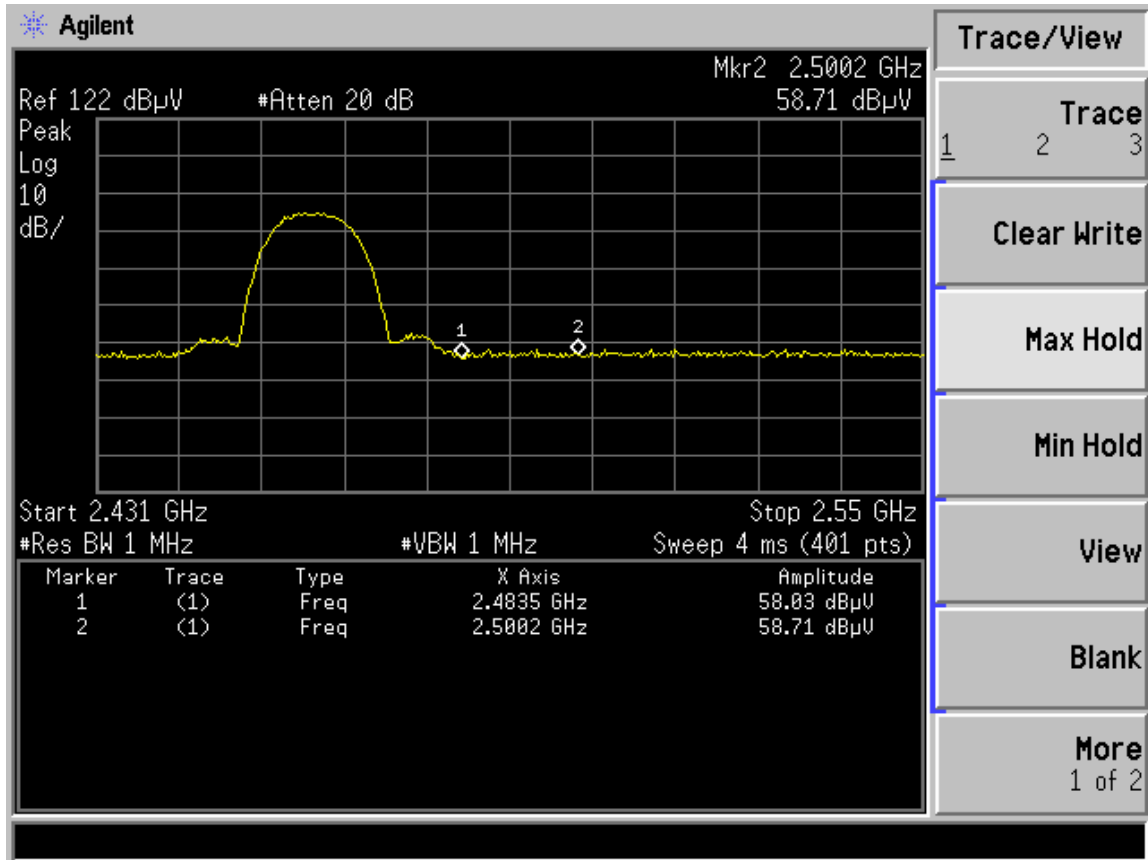
High band edge:

Test mode		BAND EDGES MEASUREMENT					
		Frequency (GHz)	Actual FS		PK Limit (dBuV/m)	AVG Limit (dBuV/m)	Test results
			PK (dBuV/m)	AVG (dBuV/m)			
802.11b CH11	VER	2.483600	58.03	---	74	54	PASS
802.11b CH11	HOR	2.483600	59.06	---	74	54	PASS
802.11g CH11	VER	2.483800	59.16	---	74	54	PASS
802.11g CH11	HOR	2.483000	59.60	---	74	54	PASS

Refer to attach spectrum analyzer data chart

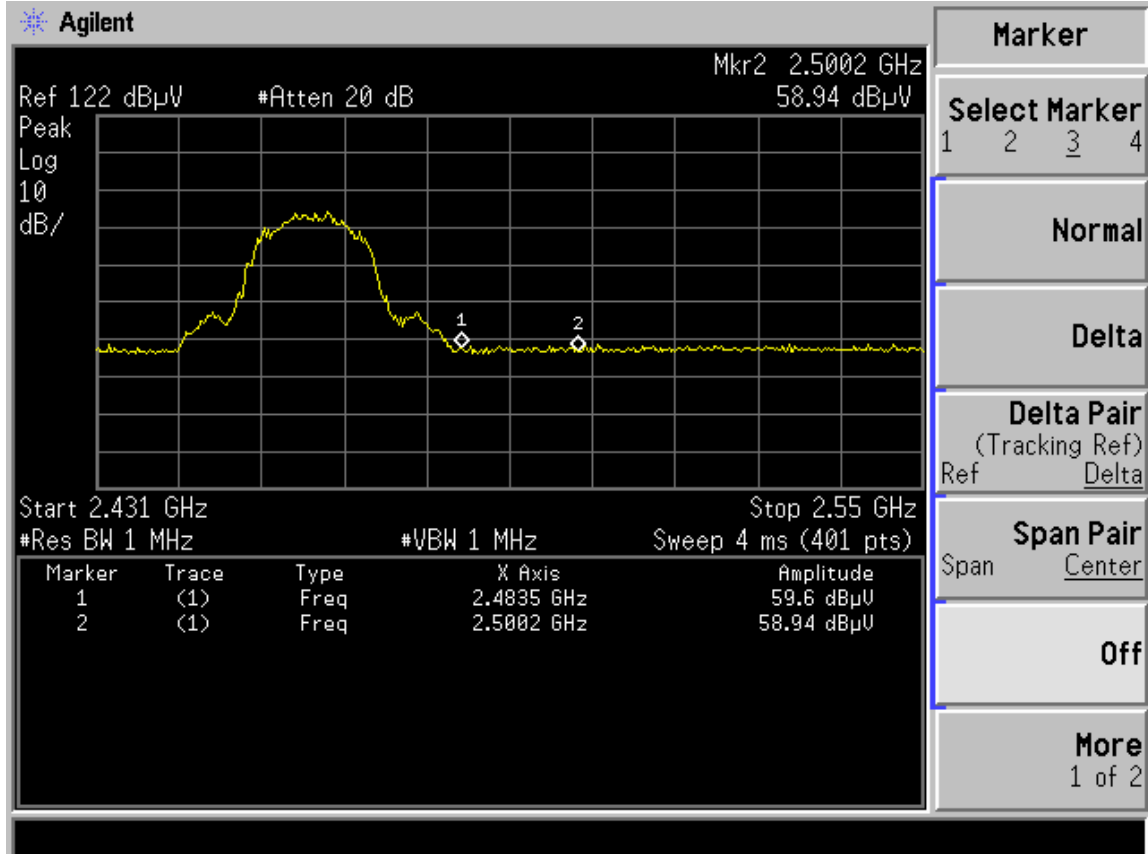
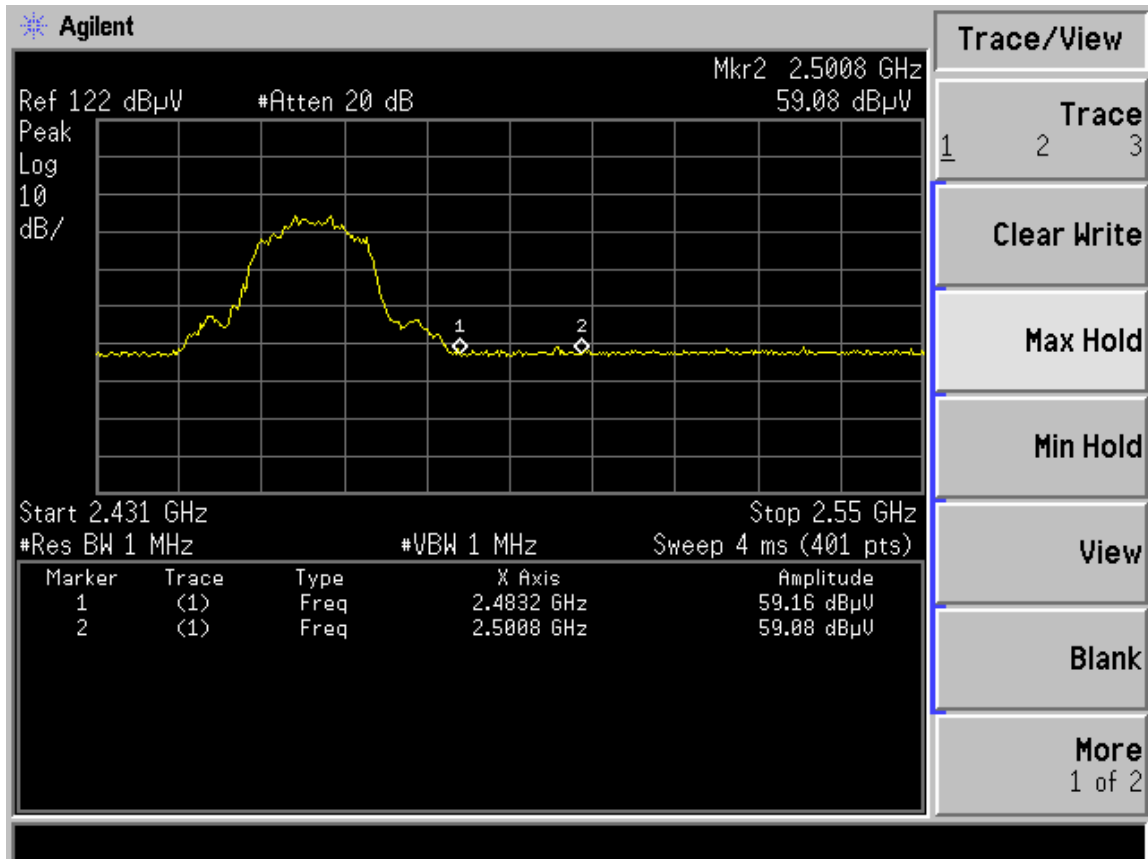
**Band Edges (Detector mode: Peak)**

802.11b CH11



802.11g CH11





## 7.6 RADIATED EMISSIONS

### LIMIT

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

**FCC PART 15 subpart C section 15.209 :**

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**FCC PART 15 subpart C section 15.247:**

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
960-1000	500	54
Above 1000	54dB $\mu\text{V/m}$ (Average) 74dB $\mu\text{V/m}$ (peak)	

### MEASUREMENT EQUIPMENT USED

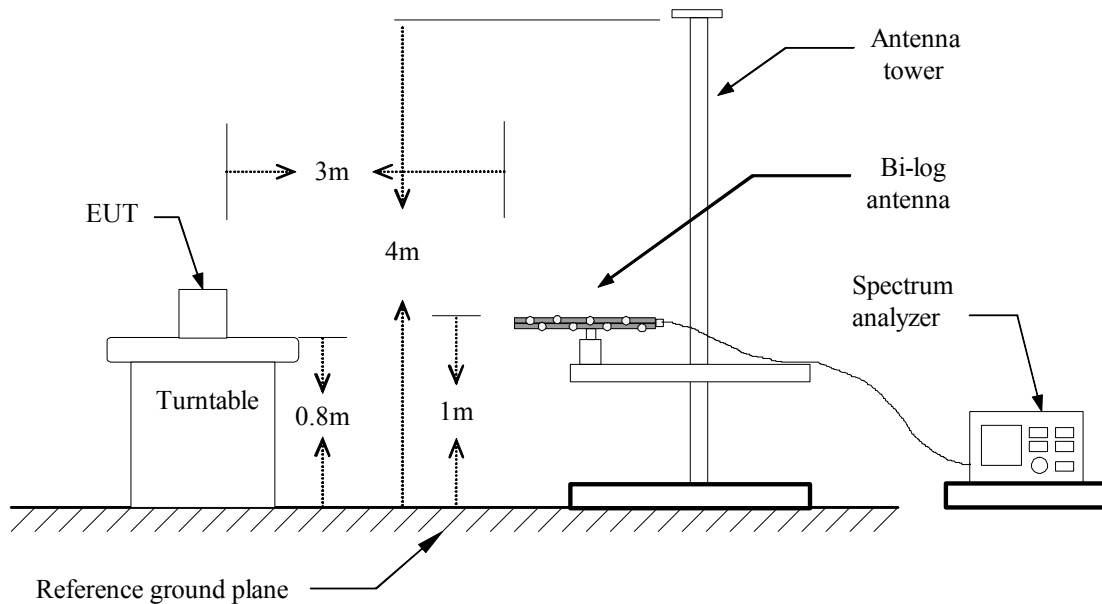
Open Area Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
Spectrum Analyzer	ADVANTEST	R3271A	85060231	06/12/2012	06/12/2013
Spectrum Analyzer	ADVANTEST	R3132	140301570	06/12/2012	06/12/2013
EMI Test Receiver	SCHAFFNER	SCR3501	464	06/12/2012	06/12/2013
Pre-Amplifier	COM-POWER	PA-103	161062	06/12/2012	06/12/2013
Bilog Antenna	SCHAFFNER	CBL6111C	2775	06/12/2012	06/12/2013
Turn Table	SINTEK	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SINTEK	N/A	N/A	N.C.R	N.C.R

Controller	SINTEK	N/A	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Horn antenna	EMCO	3115	9602-4659	06/12/2012	06/12/2013
Pre-Amplifier	HP	8449B	3008B00965	06/12/2012	06/12/2013

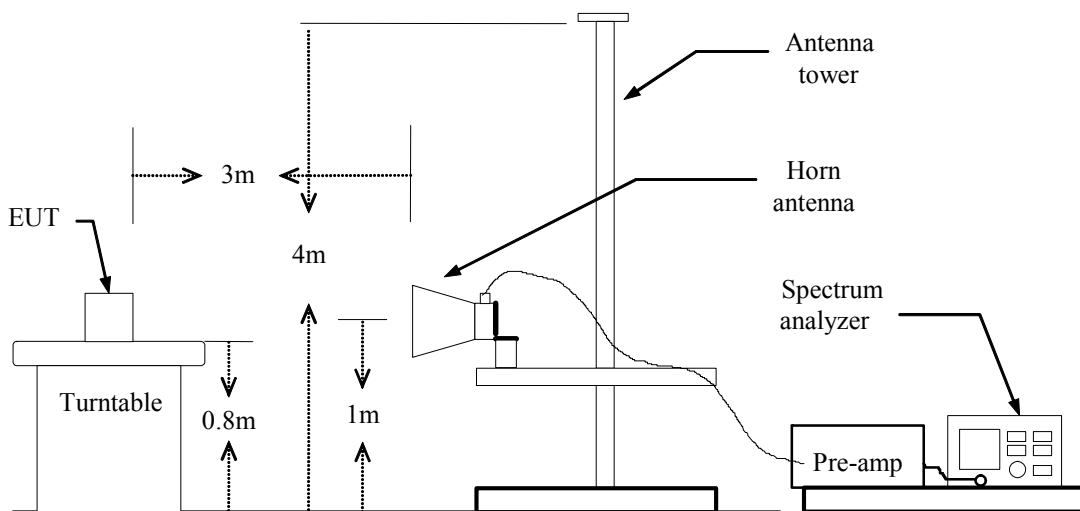
**Remark:** Each piece of equipment is scheduled for calibration once a year.

**Test Configuration**

**Below 1 GHz**



**Above 1 GHz**



## TEST PROCEDURE

The EUT is placed on a turntable, which is 0.8m above ground plane.

The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Repeat above procedures until the measurements for all frequencies are complete.

## TEST RESULTS

### Below 1 GHz

**Operation Mode:** Normal

**Test Date:** August 29, 2012

**Temperature:** 20°C

**Tested by:** Laura

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. H/V	Reading (RA) (dBuV)	Corr.Factor (CF) (dB)	Measured (FS) (dBuV/m)	Limits (QP) (dBuV/m)	Safe Margins (dBuV/m)	Detector Mode (PK/QP)
166.77	V	22.53	15.75	38.28	43.50	-5.22	P
213.33	V	21.53	16.37	37.90	43.50	-5.60	P
232.73	V	20.36	16.67	37.03	46.00	-8.97	P
332.64	V	22.36	15.68	38.04	46.00	-7.96	P
499.48	V	15.23	22.09	37.32	46.00	-8.68	P
666.32	V	15.53	25.14	40.67	46.00	-5.33	P
165.80	H	25.36	10.93	36.29	43.50	-7.21	P
232.73	H	28.36	13.04	41.40	46.00	-4.60	P
290.93	H	23.36	17.64	41.00	46.00	-5.00	P
332.64	H	23.36	17.68	41.04	46.00	-4.96	P
666.32	H	16.36	25.14	41.50	46.00	-4.50	P
833.16	H	15.36	27.98	43.34	46.00	-2.66	P

### **Notes:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



**Above 1 GHz**  
 IEEE 802.11b CH1

**Operation Mode:** Ch low (2412MHz)

**Test Date:** August 29, 2012

**Temperature:** 20°C

**Tested by:** Laura

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2412.00	V	72.10	---	33.57	105.54	---	---	---	---	Peak
4824.10	V	19.92	---	35.24	55.16	---	74.00	54.00	-18.84	Peak
7236.33	V	12.84	---	34.63	57.47	---	74.00	54.00	-16.53	Peak
N/A										
N/A										
N/A										
N/A										
2412.00	H	70.51	---	33.11	103.272	---	---	---	---	Peak
4824.10	H	19.50	---	36.85	56.35	---	74.00	54.00	-17.65	Peak
7236.33	H	16.10	---	35.47	61.57	---	74.00	54.00	-12.43	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2412MHz is the fundamental emission of device and exclude to comply with the limit show in here.
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



IEEE 802.11b CH6

**Operation Mode:** Ch mid (2437MHz)

**Test Date:** August 29, 2012

**Temperature:** 20°C

**Tested by:** Laura

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2437.03	V	71.86	---	33.35	105.21	---	---	---	---	Peak
4874.06	V	20.41	---	35.16	55.57	---	74.00	54.00	-20.41	Peak
7311.12	V	21.01	---	37.63	58.64	---	74.00	54.00	-16.36	Peak
N/A										
N/A										
N/A										
N/A										
2437.03	H	75.72	---	33.29	109.01	---	---	---	---	Peak
4874.06	H	22.04	---	34.45	56.49	---	74.00	54.00	-17.51	Peak
7311.12	H	20.55	---	35.50	56.05	---	74.00	54.00	-17.95	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2437MHz is the fundamental emission of device and exclude to comply with the limit show in here.
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



IEEE 802.11b CH11

**Operation Mode:** Ch high (2462MHz)  
**Temperature:** 20°C  
**Humidity:** 70 % RH

**Test Date:** August 29, 2012  
**Tested by:** Laura  
**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2462.15	V	69.74	---	33.41	103.15	---	---	---	---	Peak
4924.30	V	18.96	---	35.25	54.21	---	74.00	54.00	-19.79	Peak
9848.60	V	15.91	---	39.43	55.34	---	74.00	54.00	-18.66	Peak
N/A										
N/A										
N/A										
N/A										
2462.15	H	73.91	---	35.21	107.12	---	---	---	---	Peak
4924.30	H	21.03	---	34.45	55.48	---	74.00	54.00	-18.52	Peak
9848.60	H	20.45	---	35.66	56.11	---	74.00	54.00	-17.89	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2462MHz is the fundamental emission of device and exclude to comply with the limit show in here
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



IEEE 802.11g CH1

**Operation Mode:** Ch low (2412MHz)

**Test Date:** August 29, 2012

**Temperature:** 20°C

**Tested by:** Laura

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2412.00	V	68.10	---	34.32	102.42	---	---	---	---	Peak
4824.10	V	22.26	---	35.34	57.60	---	74.00	54.00	-16.40	Peak
9648.33	V	17.30	---	39.23	56.53	---	74.00	54.00	-17.47	Peak
N/A										
N/A										
N/A										
N/A										
2412.00	H	60.30	---	33.32	98.42	---	---	---	---	Peak
4824.10	H	20.18	---	34.56	54.74	---	74.00	54.00	-19.26	Peak
9648.33	H	19.48	---	35.84	55.32	---	74.00	54.00	-18.68	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2412MHz is the fundamental emission of device and exclude to comply with the limit show in here.
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.





IEEE 802.11g CH6

**Operation Mode:** Ch mid (2437MHz)

**Test Date:** August 29, 2012

**Temperature:** 20°C

**Tested by:** Laura

**Humidity:** 70 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2437.03	V	70.58	---	33.65	104.23	---	---	---	---	Peak
4874.06	V	18.81	---	35.58	54.40	---	74.00	54.00	-19.60	Peak
9848.12	V	19.51	---	37.63	57.14	---	74.00	54.00	-16.86	Peak
N/A										
N/A										
N/A										
N/A										
2437.03	H	63.95	---	33.39	97.34	---	---	---	---	Peak
4874.06	H	18.95	---	36.15	55.00	---	74.00	54.00	-19.00	Peak
9848.12	H	20.21	---	36.16	56.37	---	74.00	54.00	-17.63	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2437MHz is the fundamental emission of device and exclude to comply with the limit show in here.
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



IEEE 802.11g CH11

**Operation Mode:** Ch high (2462MHz)  
**Temperature:** 20°C  
**Humidity:** 70 % RH

**Test Date:** August 29, 2012  
**Tested by:** Laura  
**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2462.15	V	63.21	---	33.84	97.05	---	---	---	---	Peak
4924.30	V	18.87	---	35.24	54.11	---	74.00	54.00	-19.89	Peak
9848.60	V	16.83	---	38.24	55.07	---	74.00	54.00	-18.93	Peak
N/A										
N/A										
N/A										
N/A										
2462.15	H	68.88	---	33.24	102.12	---	---	---	---	Peak
4924.30	H	21.06	---	34.65	55.71	---	74.00	54.00	-18.29	Peak
9848.60	H	19.87	---	36.97	56.87	---	74.00	54.00	-17.13	Peak
N/A										
N/A										
N/A										
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. 2462MHz is the fundamental emission of device and exclude to comply with the limit show in here
5. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

## 7.7 POWER LINE CONDUCTED EMISSIONS

### LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	LAST CAL.	Calibration Due
EMI Test Receiver	SCHAFFNER	SCR3501	464	06/12/2012	06/12/2013
Spectrum Analyzer	ADVANTEST	R3132	140301570	06/12/2012	06/12/2013
LISN	COM-POWER	LI115	2027	06/12/2012	06/12/2013
LISN	COM-POWER	LI115	2029	06/12/2012	06/12/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration

The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4: 2003

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

*The EUT is set to transmit in a continuous mode.*

### TEST PROCEDURE

The EUT was placed on a table, which is 0.8m above ground plane.

Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

Repeat above procedures until all frequency measured were complete.

## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

FREQ KHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
185.15	57	---	30.25	65	55	-7.99	-24.74	L1
268.4	45.45	---	---	62.62	52.62	-17.16	-7.16	L1
310.95	40.38	---	---	61.4	51.4	-21.02	-11.02	L1
364.6	39.39	---	---	59.87	49.87	-20.48	-10.48	L1
549.6	33.51	---	---	56	46	-22.49	-12.49	L1
21039.88	30.98	---	---	60	50	-29.02	-19.02	L1
183.3	58.41	---	30.2	65.05	55.05	-6.64	-24.85	L2
244.35	48.76	---	---	63.3	53.3	-14.55	-4.55	L2
366.45	40.21	---	---	59.82	49.82	-19.6	-9.6	L2
501.5	36.75	---	---	56	46	-19.25	-9.25	L2
18591.574	30.58	---	---	60	50	-29.42	-19.42	L2
28151.769	32.83	---	---	60	50	-27.17	-17.17	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

**\*\*NOTE:** “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.





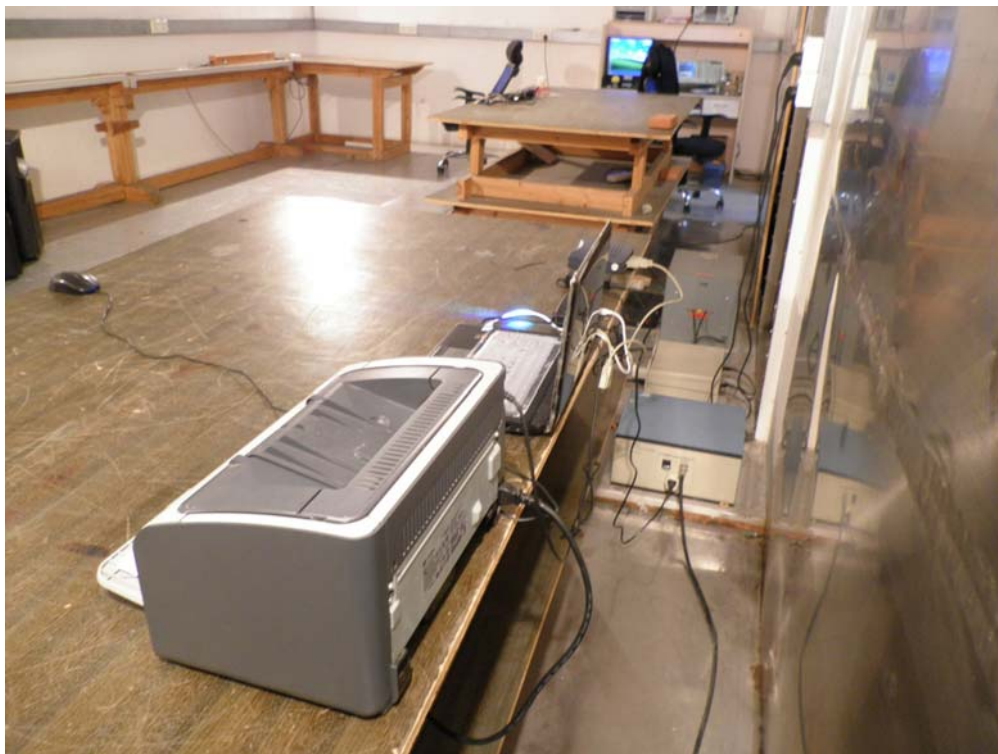


## 8. APPENDIX 1 PHOTOGRPHS OF TEST SETUP

### Radiated Emission Set up Photos



## LINE CONDUCTED EMISSION TEST



**END OF REPORT**