
FCC Test Report

Report No.: AGC008121201F2

FCC ID : MG3-7010
PRODUCT DESIGNATION : 11n Wireless Bridge(DIGITURK WCD HASHI BRIDGE)
BRAND NAME : UEI
MODE NAME : Hashi
CLIENT : Universal Electronics Inc
DATE OF ISSUE : Jan.14,2013
STANDARD(S) : FCC Part 15 Rules
REPORT VERSION : AGCRT-US-BGN/RF-V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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1. VERIFICATION OF CONFORMITY

Applicant	Universal Electronics Inc
Address	201 E. Sandpointe Ave., 8th Floor, Santa Ana, CA 92627
Manufacturer	SHENZHEN KINGNET ELECTRONICS CO., LTD.
Address	1F north & 2F & 3F north & 4F, Building 5, Civil Science Industry Zone, Pingshan, Taoyuan Street, Nanshan District, Shenzhen, China
Product Designation	11n Wireless Bridge(DIGITURK WCD HASHI BRIDGE)
Brand Name	UEI
Test Model	Hashi
Date of test	Jan.09,2013 to Jan.14,2013
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) 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 requirement of FCC Part 15 Rules requirement.

Prepared By	
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Authorized By	
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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "11n Wireless Bridge". It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.412 GHz to 2.462GHz
Max. Output Power	IEEE 802.11b:15.32dBm,IEEE 802.11g:14.42dBm, IEEE 802.11n(20):13.99dBm,IEEE 802.11n(40):13.05dBm
Modulation	CCK,OFDM,BPSK,DPSK,16-QAM,64-QAM
Data Rate	DSSS(1/2/5.5/11),OFDM(6/9/12/18/24/36/48/54) See section 2.3 for 802.11n
Hardware Version	HASHI A1.0
Software Version	V1.3f
Number of channels	11
Antenna Designation	Integrated Antenna
Antenna Gain	4.0dBi
Power Supply	Normal Voltage: DC 3.7V & Extreme Voltage :DC 3.4V-DC 4.2V

Note: The 2 antennas of this EUT transmit at the time. And we test it by combining 2 antennas.

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

For 40MHZ bandwidth system use Channel 3 to Channel 9

2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPS	NCBPS		NDBPS		Data rate(Mbps)			
					800nsGI		20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
					20MHz	40MHz						
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5		
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0		
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5		
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0		
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0		
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0		
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5		
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0		

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPS	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: MG3-7010** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

Because the EUT received power from DC3.7V lithium battery, so only radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.6. SPECIAL ACCESSORIES

Refer to section 2.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal Operating

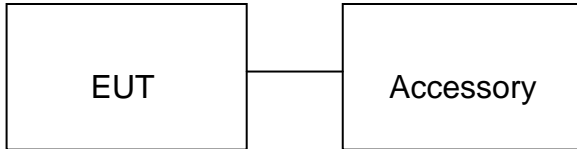
Note:

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency individually.
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report.
3. All test modes were tested, but we only recorded the worst case in this report.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure1: (Normal Operating and continuous TX)



Note: the EUT controlled by PC to work in continuous TX mode and Normal Operating mode.

5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	11n Wireless Bridge	UEI	HASHI	EUT
2	Adapter	Frecom	F05W-050100SPAV	Accessory
3	PC	Dell	INSPIRON	Accessory

Note: the following “EUT” in setup diagram means EUT system.

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

Note: The EUT received power from DC3.7V lithium battery.

6. TEST FACILITY

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2003.
Site Filing	The FCC Registration Number is 259865
Instrument Tolerance	All measuring equipment is in accord with ANSI C63.4 requirements that meet industry regulatory agency and accreditation agency requirement.

ALL TEST EQUIPMENT LIST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power meter	R&S	NRP-Z23	N/A	07/18/2012	07/17/2013
RF attenuator	N/A	RFA20db	N/A	N/A	N/A
AGILENT	Agilent	E4440A	N/A	07/18/2012	07/17/2013
Spectrum Analyzer	Agilent	E4440A	N/A	07/18/2012	06/17/2013
Amplifier	EM	EM30180	0607030	07/18/2012	07/17/2013
Horn Antenna	EM	EM-AH-10180	N/A	07/18/2012	07/17/2013
Horn Antenna	A.H. Systems Inc.	SAS-574	--	07/18/2012	07/17/2013
EMI Test Receiver	Rohde & Schwarz	ESCI	N/A	07/18/2012	07/17/2013
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	07/18/2012	07/17/2013
Loop Antenna	A.H.	SAS-526B	264	07/18/2012	07/17/2013
Isolation Transformer	LETEAC	LTBK	--	07/18/2012	07/17/2013

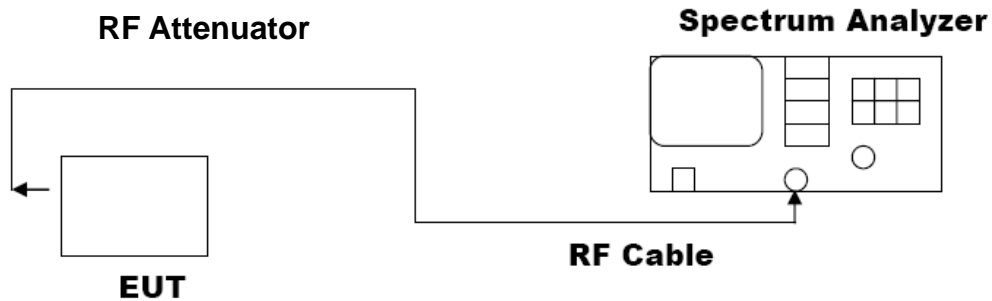
7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Connect EUT RF output port to power meter through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Set the RBW greater than 6DB bandwidth of emission.
5. Record the maximum power from the power meter.
6. The maximum peak power shall be less 1 Watt (30dBm).

Note : The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	PEAK POWER
TEST MODE	802.11b with data rate 1(Ant 1+ Ant 2)

LIMITS AND MEASUREMENT RESULT					
Frequency (GHz)	Peak Power (dBm)Ant 1	Peak Power (dBm) Ant 2	Total Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	12.76	11.81	15.32	30	Pass
2.437	12.14	12.05	15.11	30	Pass
2.462	11.78	11.69	14.75	30	Pass

TEST ITEM	PEAK POWER
TEST MODE	802.11g with data rate 6(Ant 1+ Ant 2)

LIMITS AND MEASUREMENT RESULT					
Frequency (GHz)	Peak Power (dBm)Ant 1	Peak Power (dBm) Ant 2	Total Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	11.29	11.22	14.27	30	Pass
2.437	11.39	11.27	14.34	30	Pass
2.462	11.48	11.35	14.42	30	Pass

TEST ITEM	PEAK POWER
TEST MODE	802.11n 20 with data rate 6.5(Ant 1+ Ant 2)

LIMITS AND MEASUREMENT RESULT					
Frequency (GHz)	Peak Power (dBm)Ant 1	Peak Power (dBm) Ant 2	Total Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	10.58	10.51	13.56	30	Pass
2.437	11.06	10.89	13.99	30	Pass
2.462	10.91	10.74	13.84	30	Pass

TEST ITEM	PEAK POWER
TEST MODE	802.11n 40 with data rate 13.5(Ant 1+ Ant 2)

LIMITS AND MEASUREMENT RESULT					
Frequency (GHz)	Peak Power (dBm)Ant 1	Peak Power (dBm) Ant 2	Total Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	10.03	9.42	12.75	30	Pass
2.437	9.92	9.61	12.78	30	Pass
2.452	10.01	9.98	13.05	30	Pass

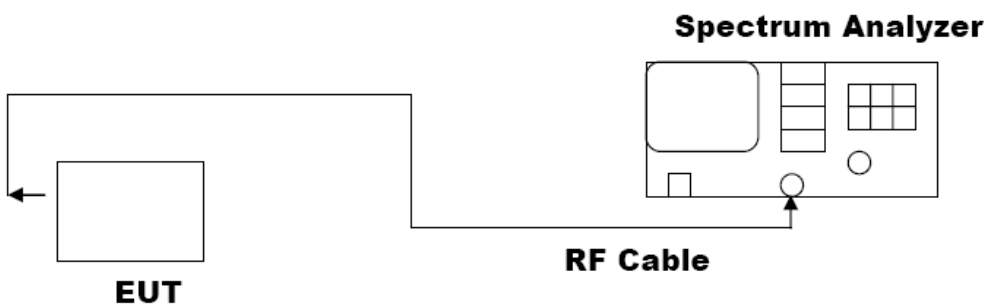
8. 6DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW \geq RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



8.3. LIMITS AND MEASUREMENT RESULTS (The worst case: Ant 1)

TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11b with data rate 11 Ant 1

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	10.048	PASS
	Middle Channel	9.339	PASS
	High Channel	10.025	PASS

TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11g with data rate 54 Ant 1

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	16.381	PASS
	Middle Channel	16.329	PASS
	High Channel	16.400	PASS

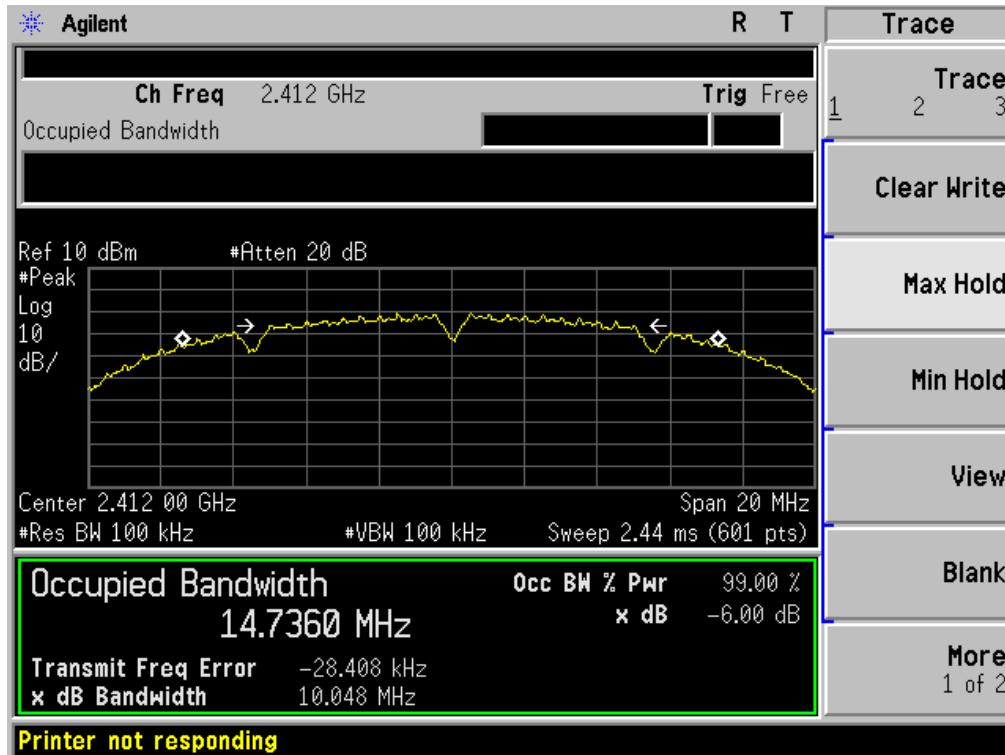
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11n 20 with data rate 65 Ant 1

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	17.571	PASS
	Middle Channel	17.266	PASS
	High Channel	17.283	PASS

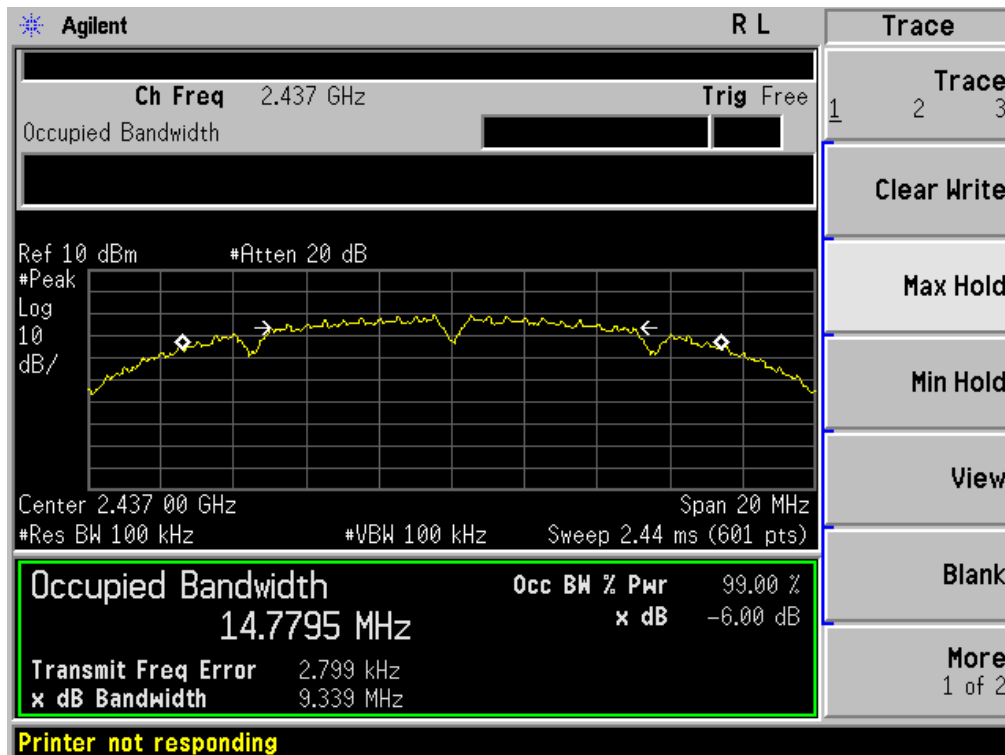
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11n 40 with data rate 135 Ant 1

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	34.924	PASS
	Middle Channel	36.370	PASS
	High Channel	34.459	PASS

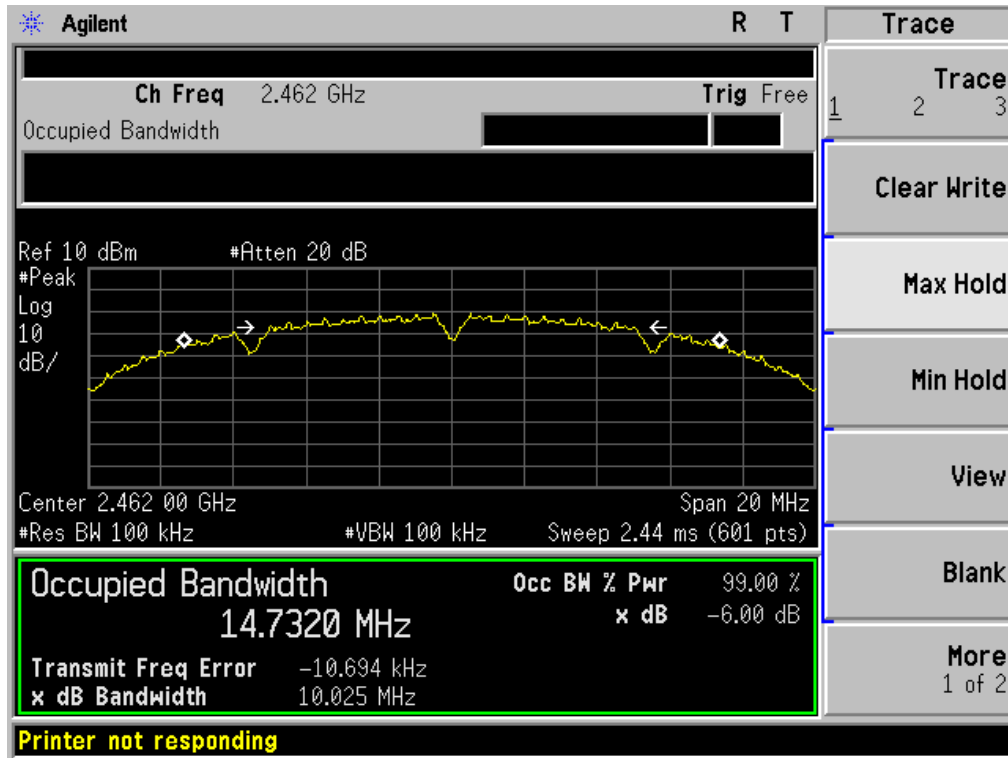
802.11b TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

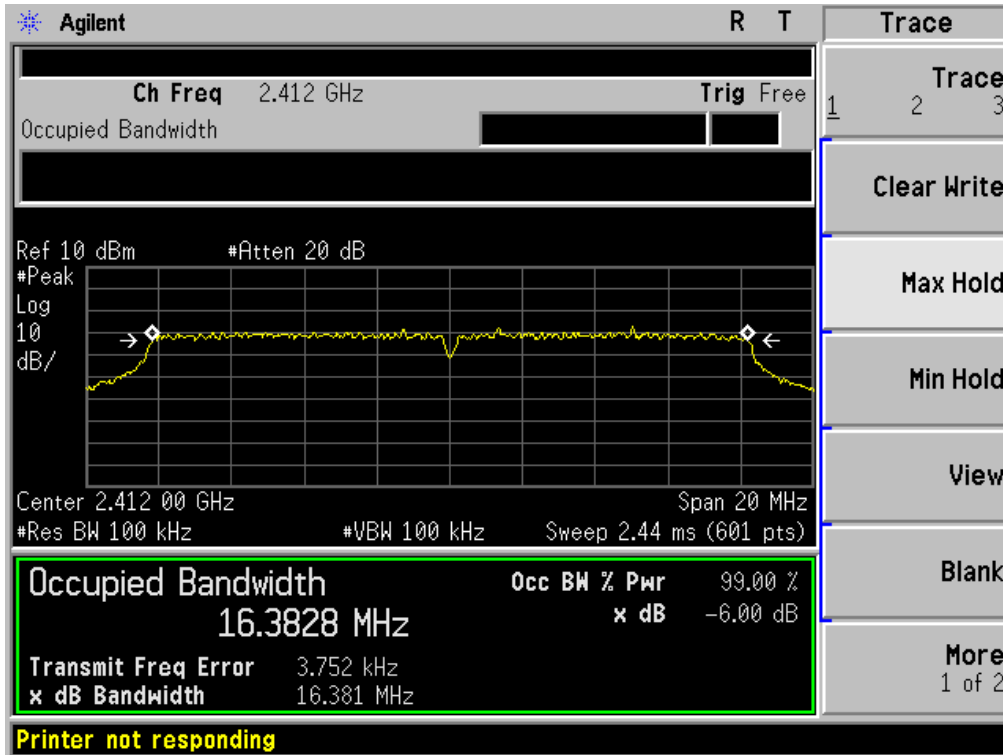


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

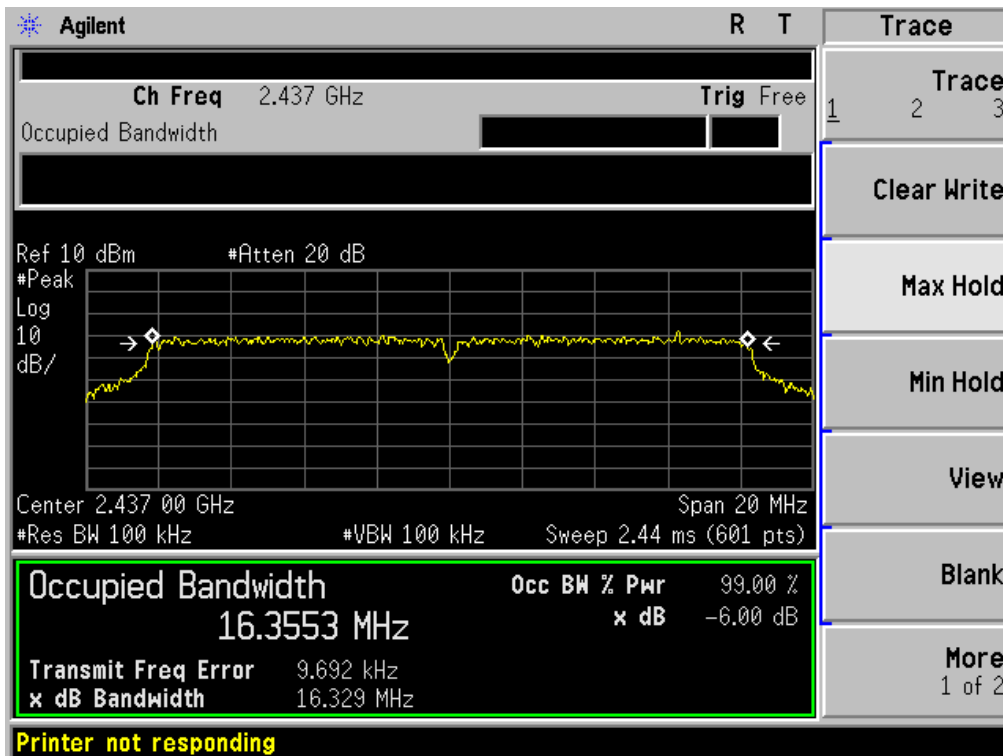


802.11g TEST RESULT

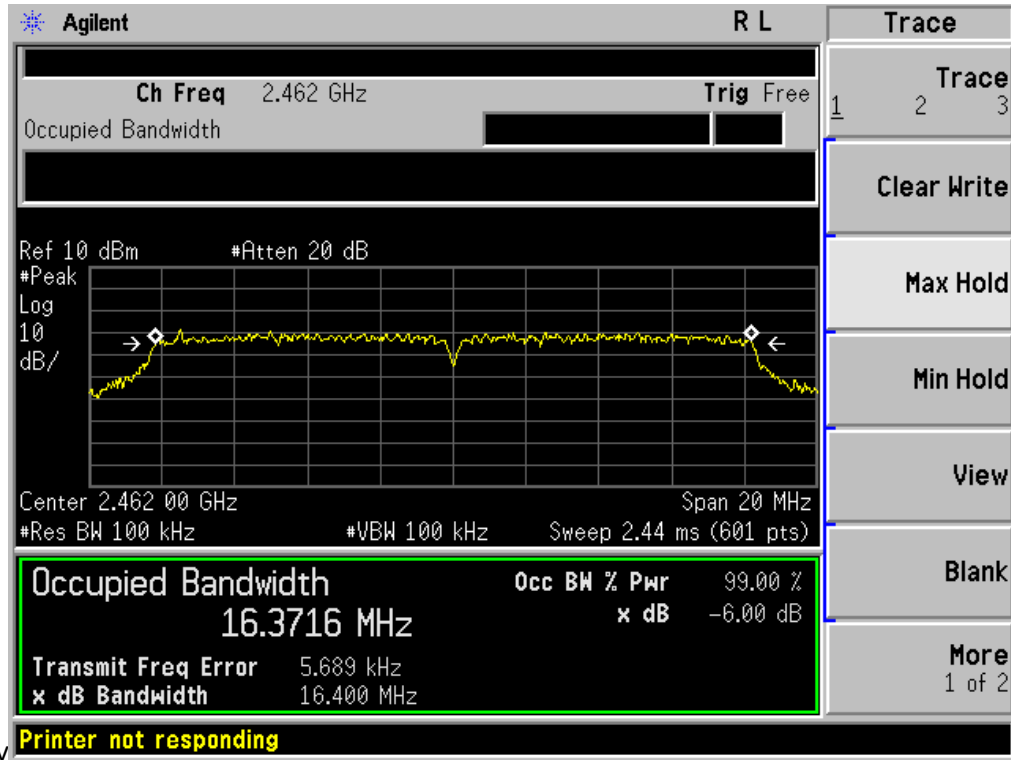
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

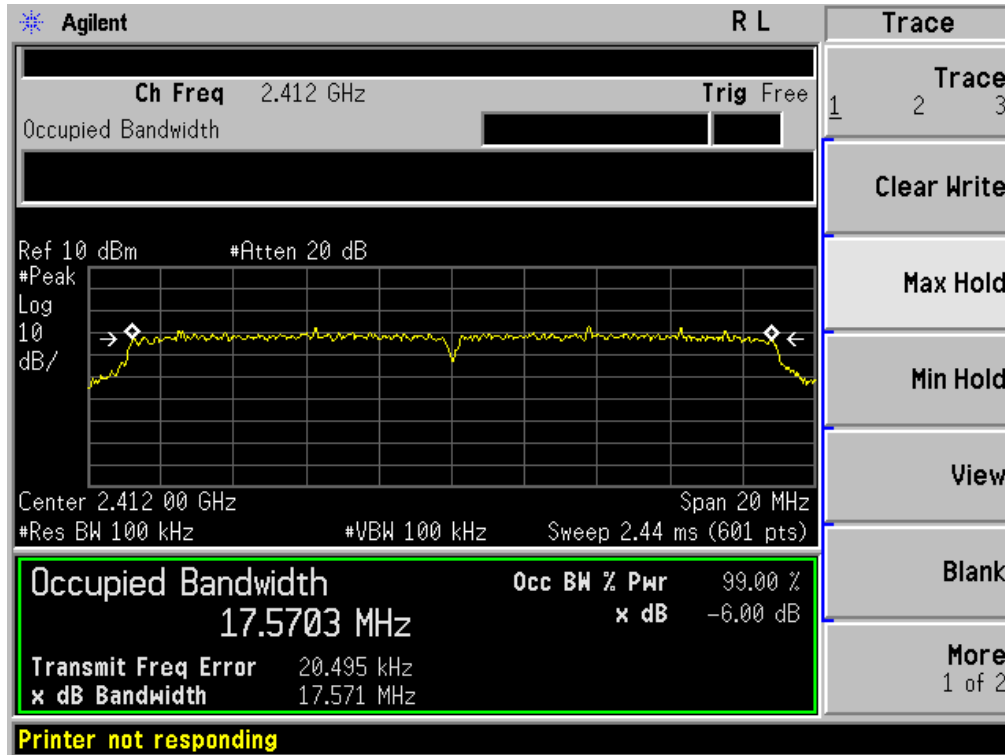


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

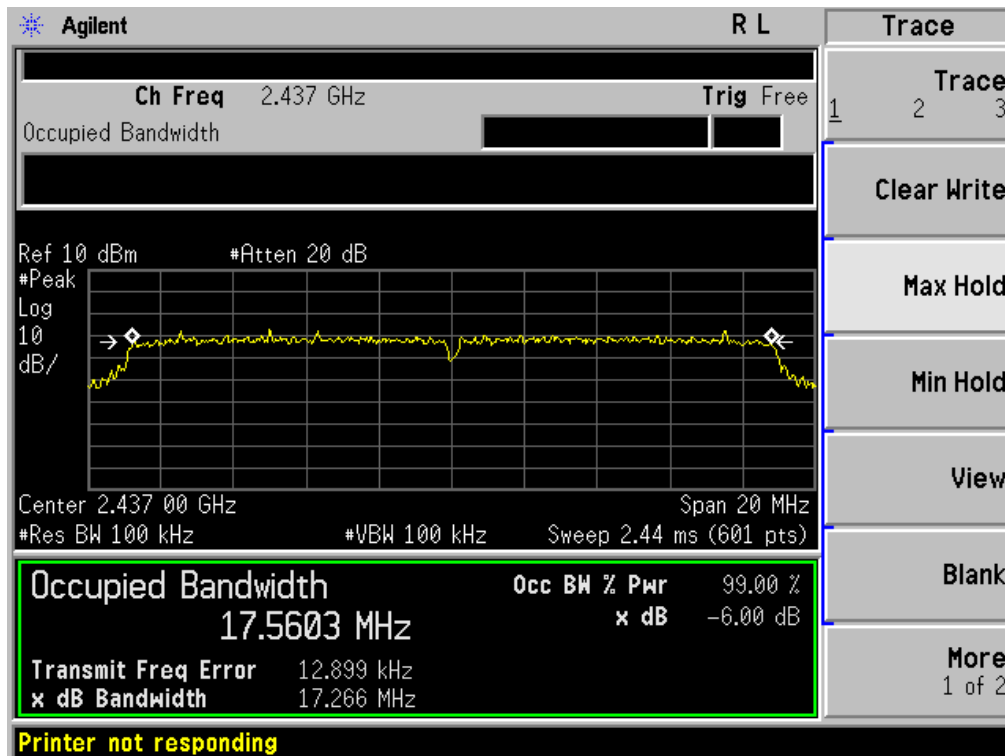


802.11n (20) TEST RESULT

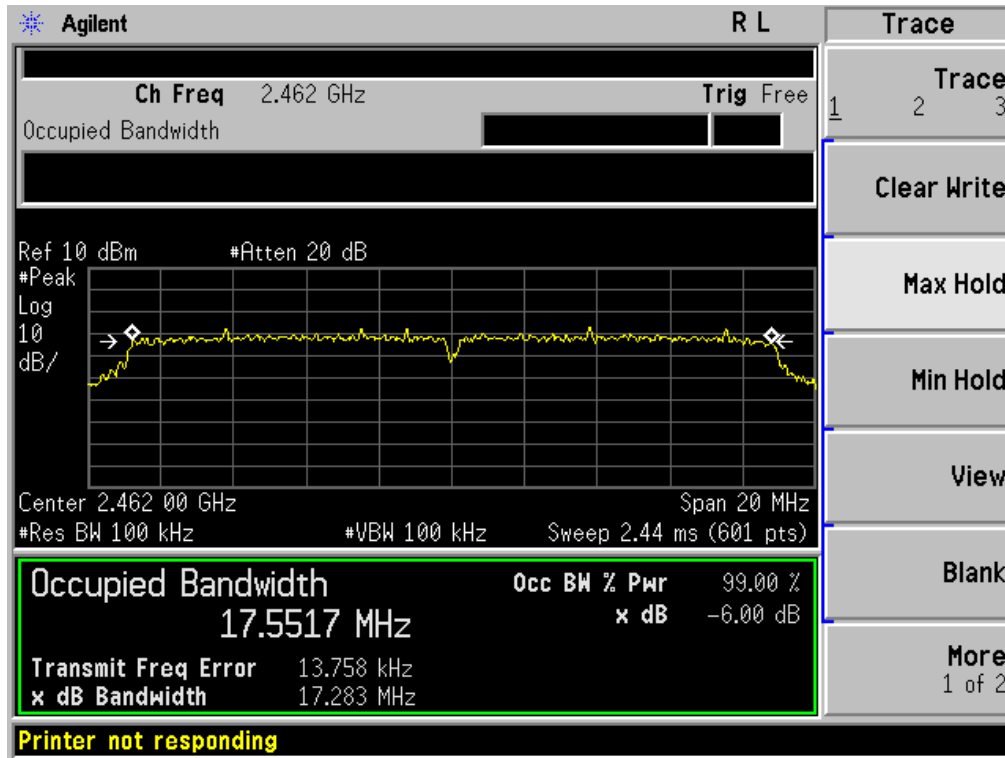
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

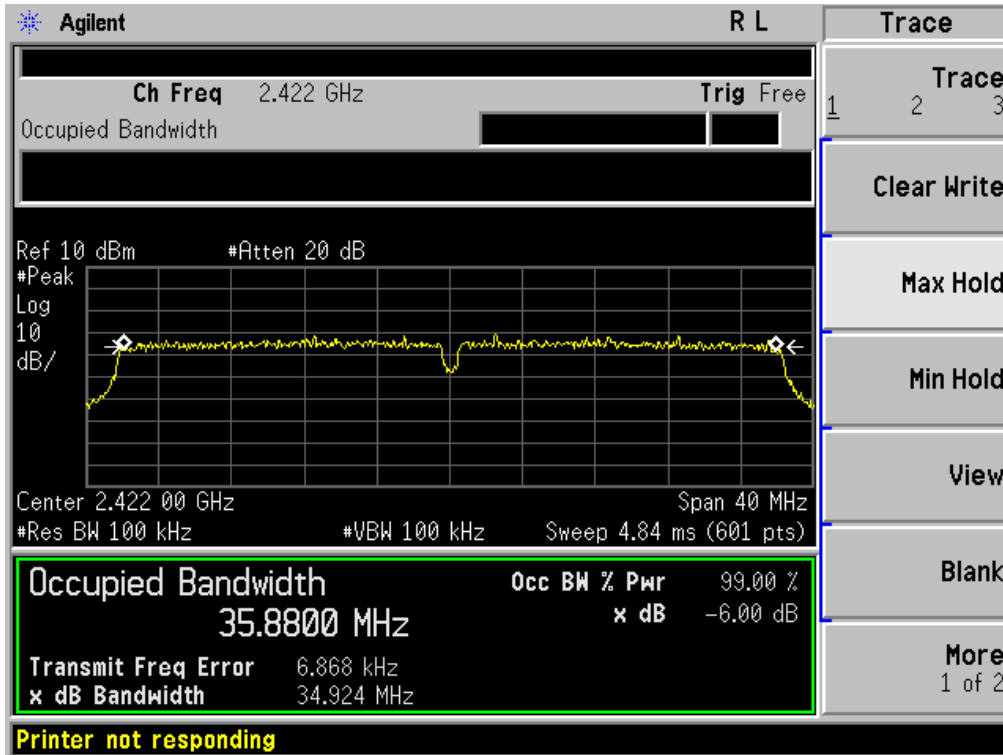


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

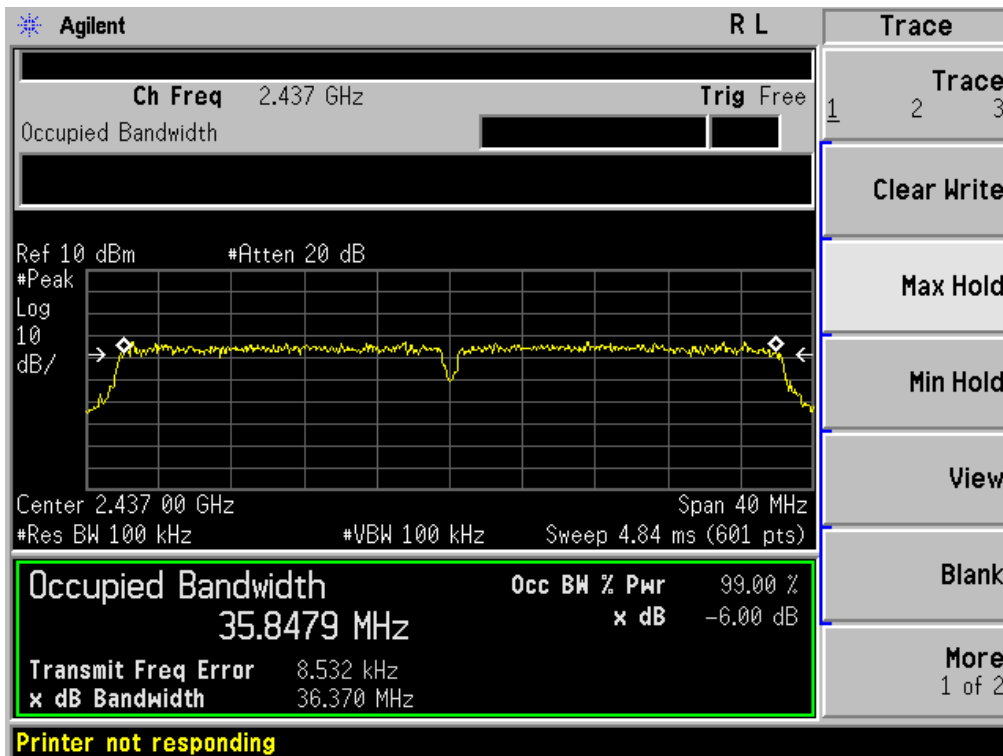


802.11n (40) TEST RESULT

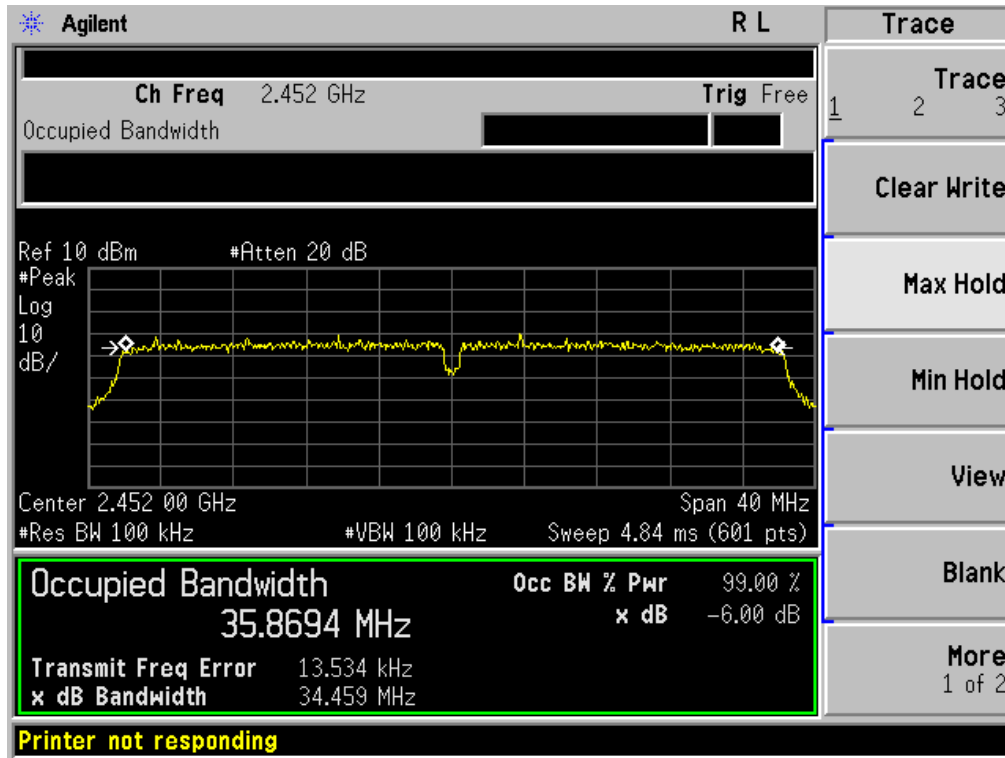
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 3, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 6.2

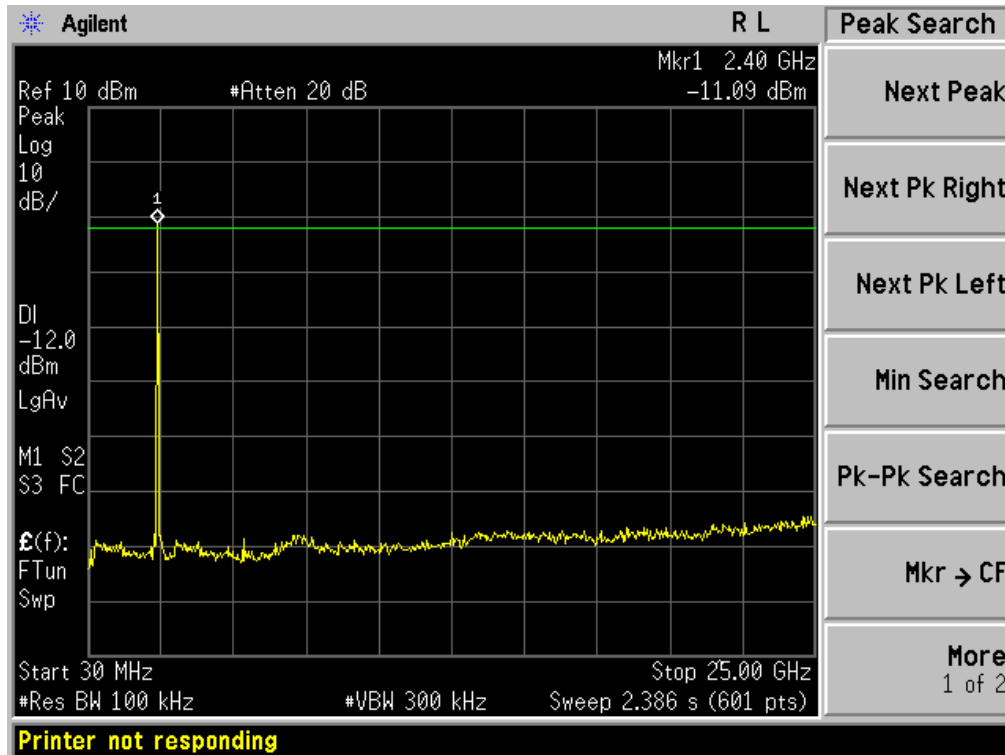
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

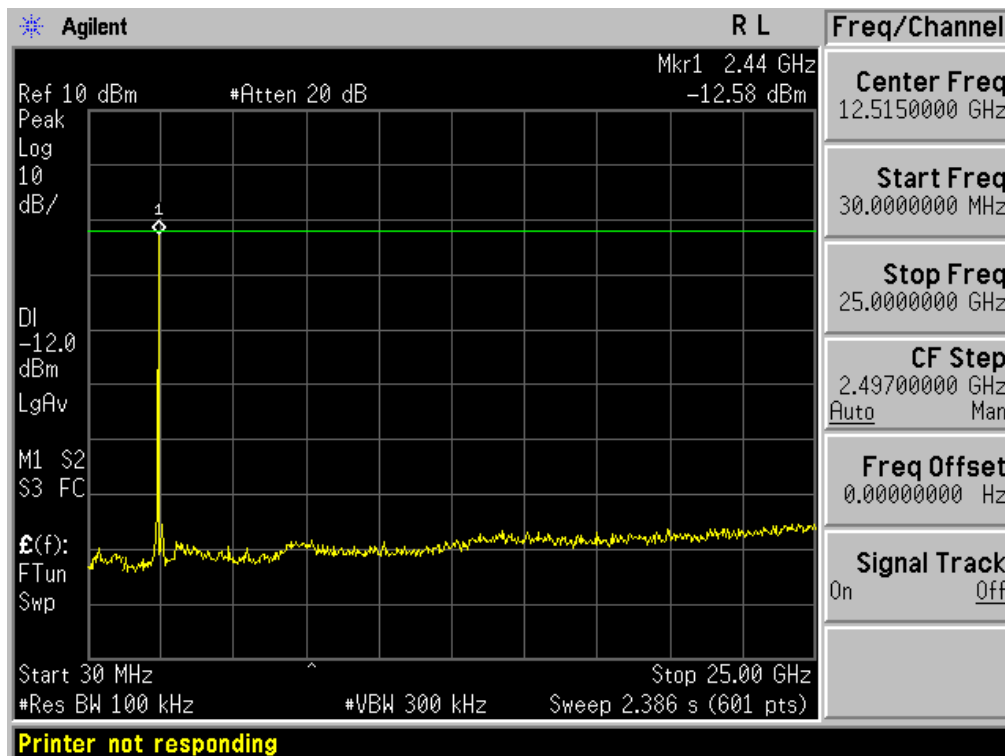
9.4. LIMITS AND MEASUREMENT RESULT (Ant 1+ Ant 2)

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation 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)	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

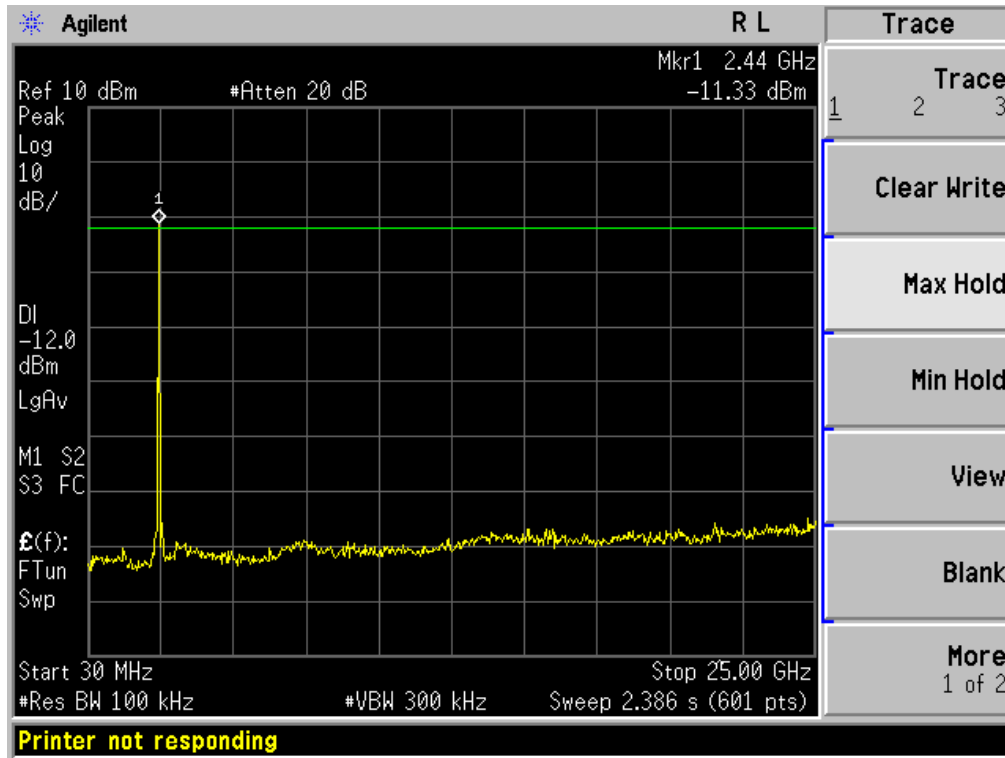
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
 OF 802.11b FOR MODULATION IN LOW CHANNEL



TEST PLOT OF OUT OF BAND EMISSIONS
 OF 802.11b FOR MODULATION IN MIDDLE CHANNEL



TEST PLOT OF OUT OF BAND EMISSIONS
OF 802.11b FOR MODULATION IN HIGH CHANNEL



10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

- (1). The EUT was placed on a turn table which is 0.8m above ground plane.
- (2). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (3). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (4). Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. Set RBW= 100 kHz, VBW \geq 300kHz, SPAN to 5-30 % greater than the EBW, Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = $10\log(3\text{ kHz}/100\text{kHz}) = -15.2\text{ dB}$.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 6.2

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.3

10.4 LIMITS AND MEASUREMENT RESULT

TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11b with data rate 1

Channel No.	Reading Value (dBm) Ant 1	Reading Value (dBm) Ant 2	BWCF (dB)	PSD (dBm) Ant 1	PSD (dBm) Ant 2	Limit (dBm)	Result
Low Channel	3.30	3.12	-15.2	-11.9	-12.08	8	Pass
Middle Channel	3.84	3.51	-15.2	-11.36	-11.69	8	Pass
High Channel	3.43	3.28	-15.2	-11.77	-11.92	8	Pass

TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11g with data rate 6

Channel No.	Reading Value (dBm) Ant 1	Reading Value (dBm) Ant 2	BWCF (dB)	PSD (dBm) Ant 1	PSD (dBm) Ant 2	Limit (dBm)	Result
Low Channel	0.41	0.26	-15.2	-14.79	-14.94	8	Pass
Middle Channel	0.20	0.11	-15.2	-15	-15.09	8	Pass
High Channel	0.52	0.34	-15.2	-14.68	-14.86	8	Pass

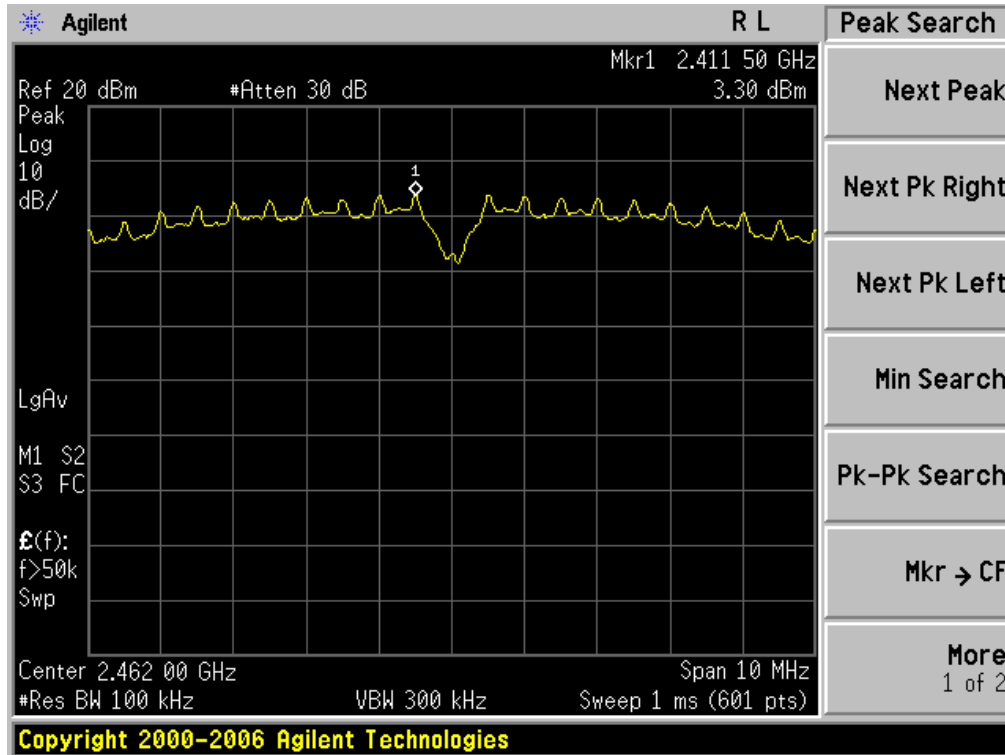
TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11n 20 with data rate 6.5

Channel No.	Reading Value (dBm) Ant 1	Reading Value (dBm) Ant 2	BWCF (dB)	PSD (dBm) Ant 1	PSD (dBm) Ant 2	Limit (dBm)	Result
Low Channel	-1.12	-1.29	-15.2	-16.32	-16.49	8	Pass
Middle Channel	0.10	-0.36	-15.2	-15.1	-15.56	8	Pass
High Channel	0.02	-0.41	-15.2	-15.18	-15.61	8	Pass

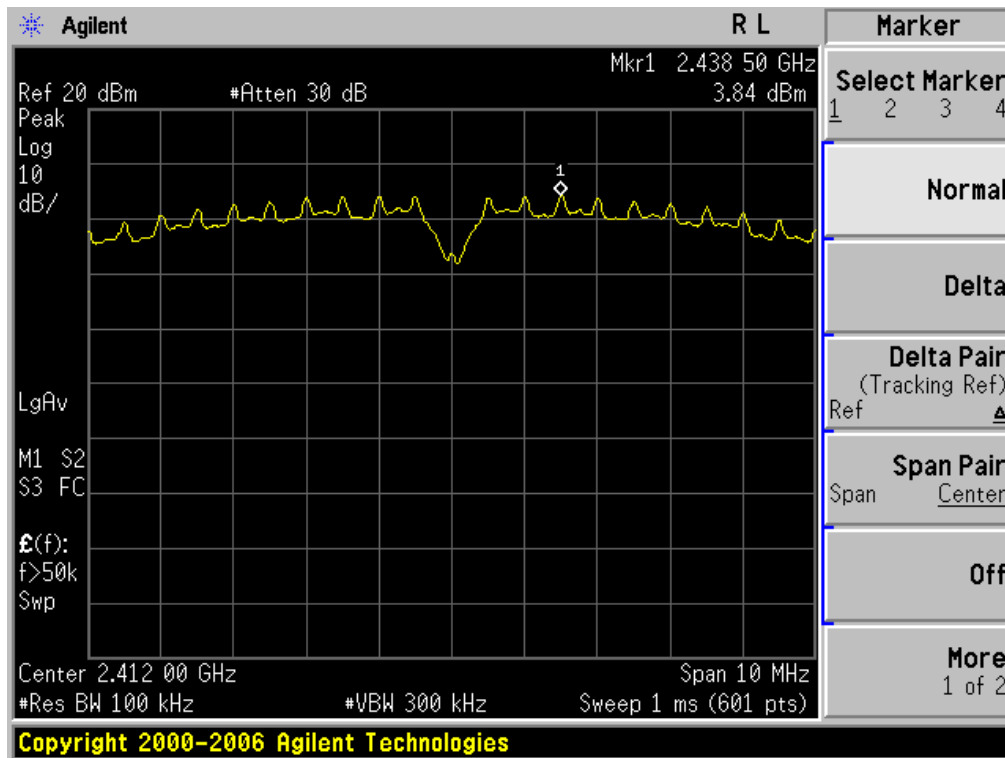
TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11n 40 with data rate 13.5

Channel No.	Reading Value (dBm) Ant 1	Reading Value (dBm) Ant 2	BWCF (dB)	PSD (dBm) Ant 1	PSD (dBm) Ant 2	Limit (dBm)	Result
Low Channel	-5.32	-5.44	-15.2	-20.52	-20.64	8	Pass
Middle Channel	-4.21	-4.49	-15.2	-19.41	-19.69	8	Pass
High Channel	-3.81	-3.98	-15.2	-19.01	-19.18	8	Pass

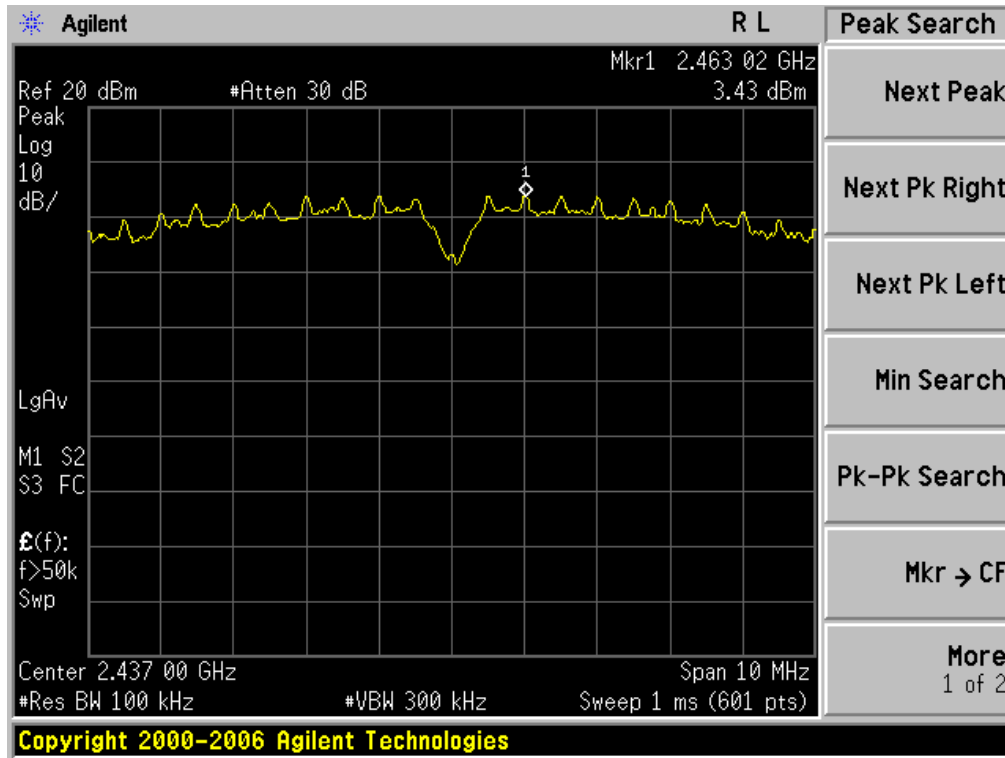
802.11b TEST RESULT
 TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



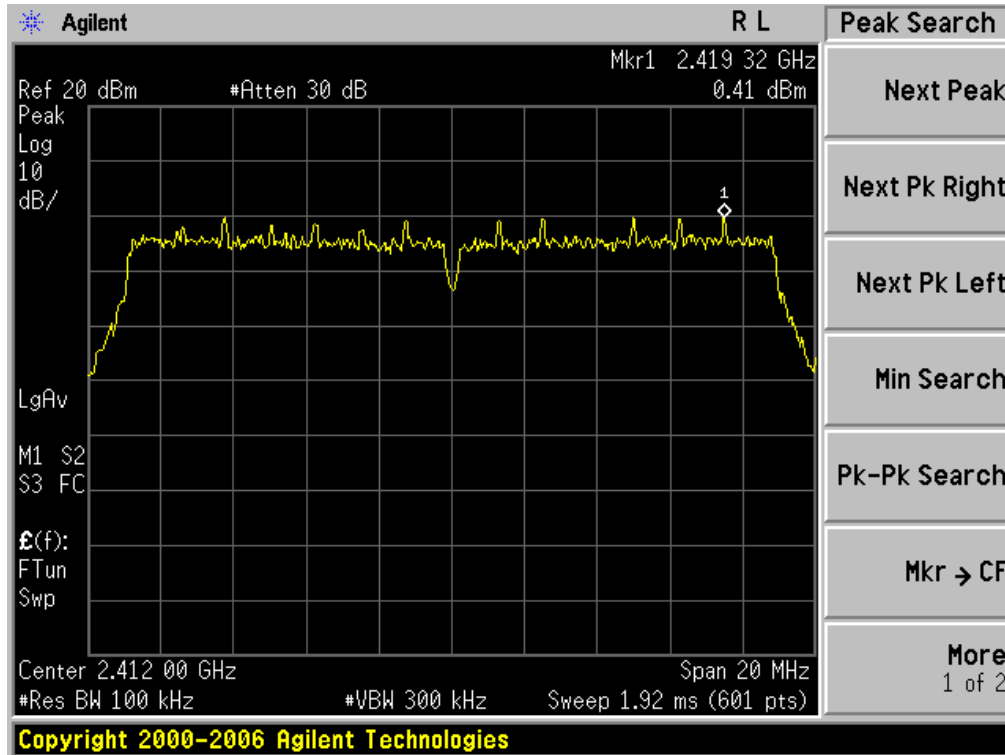
TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



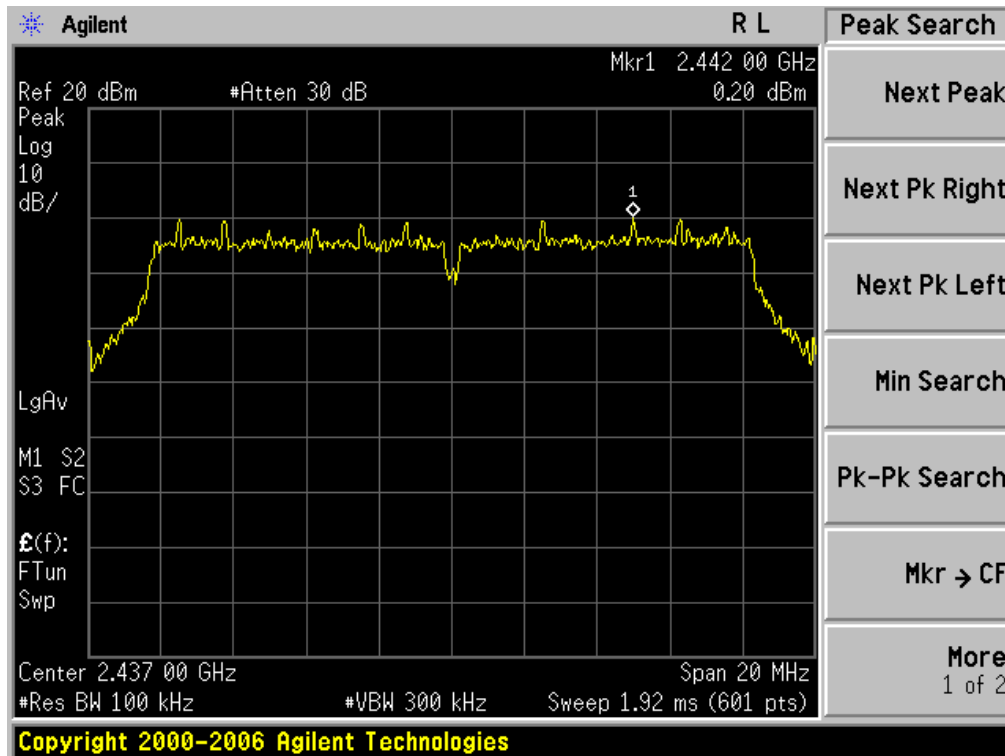
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



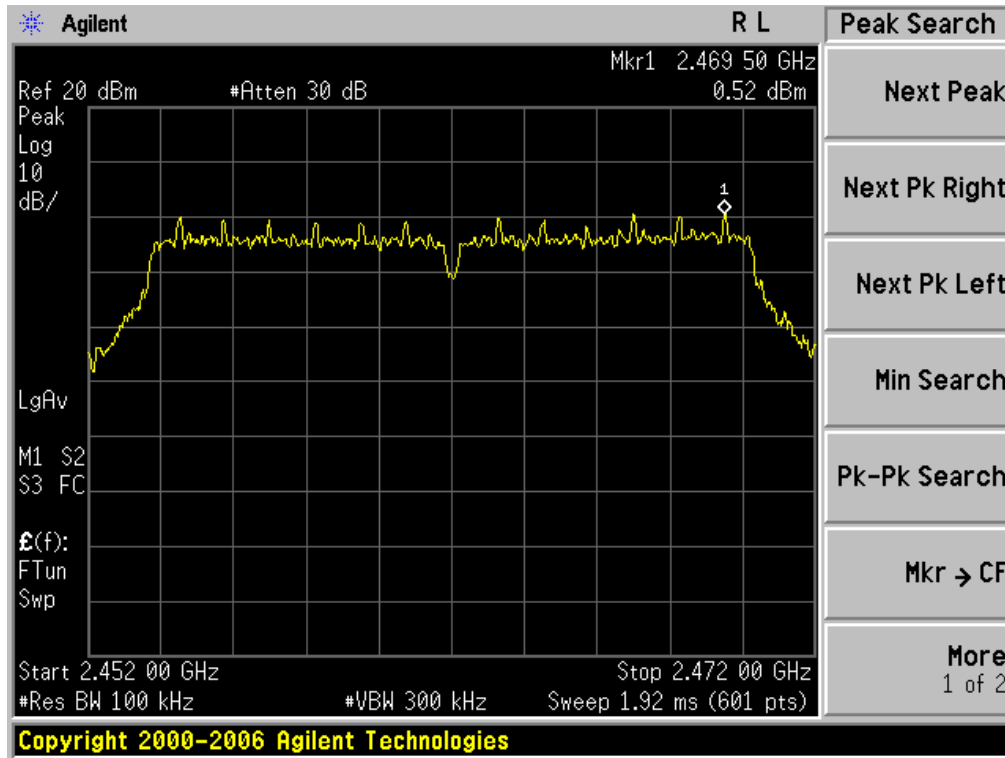
802.11g TEST RESULT
 TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



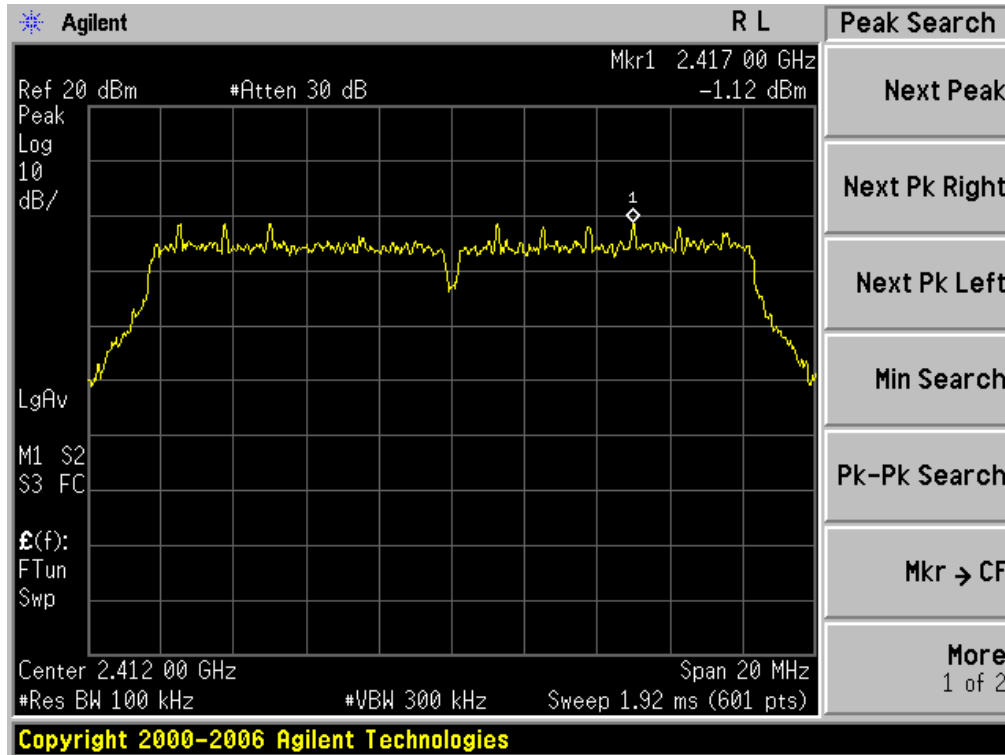
TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



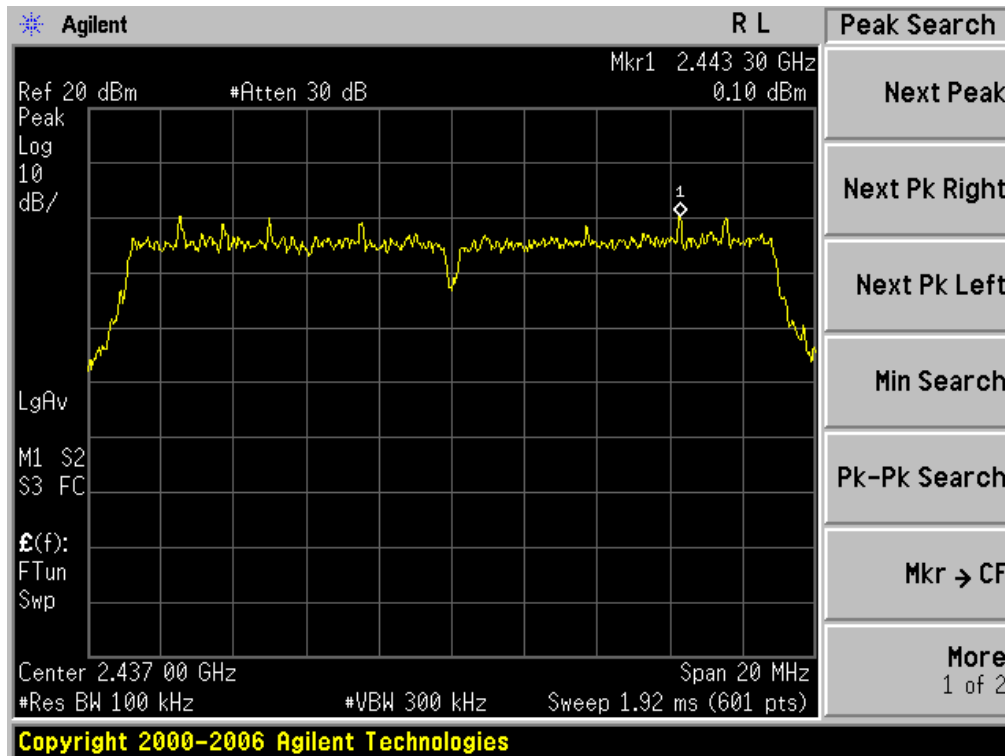
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



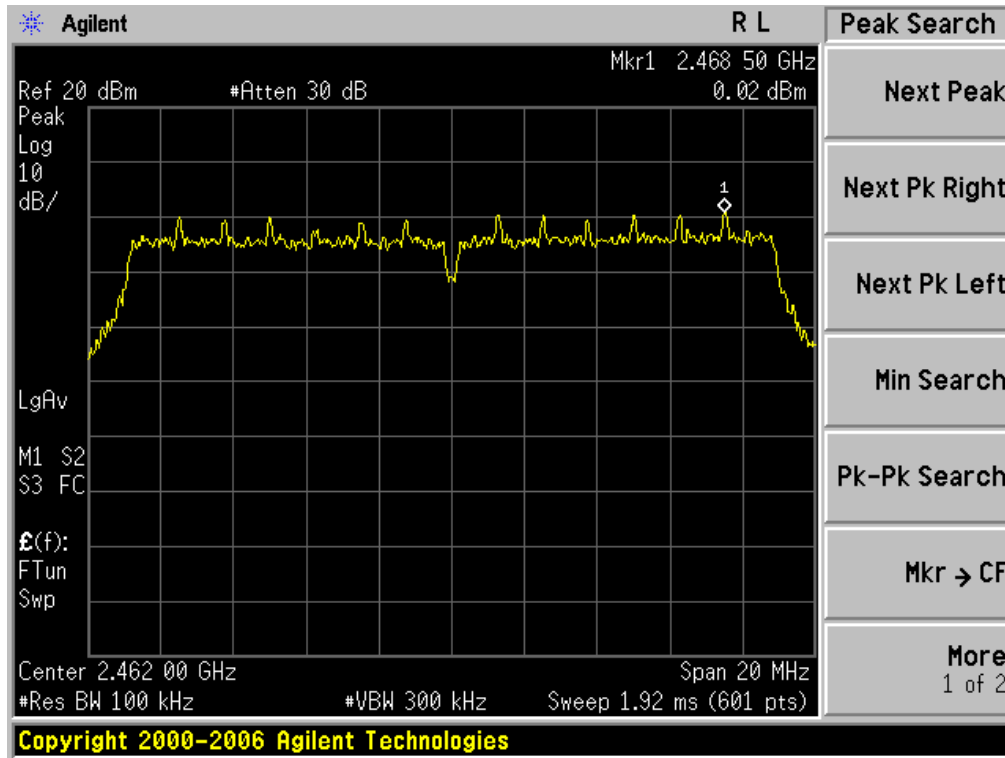
802.11n 20 TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



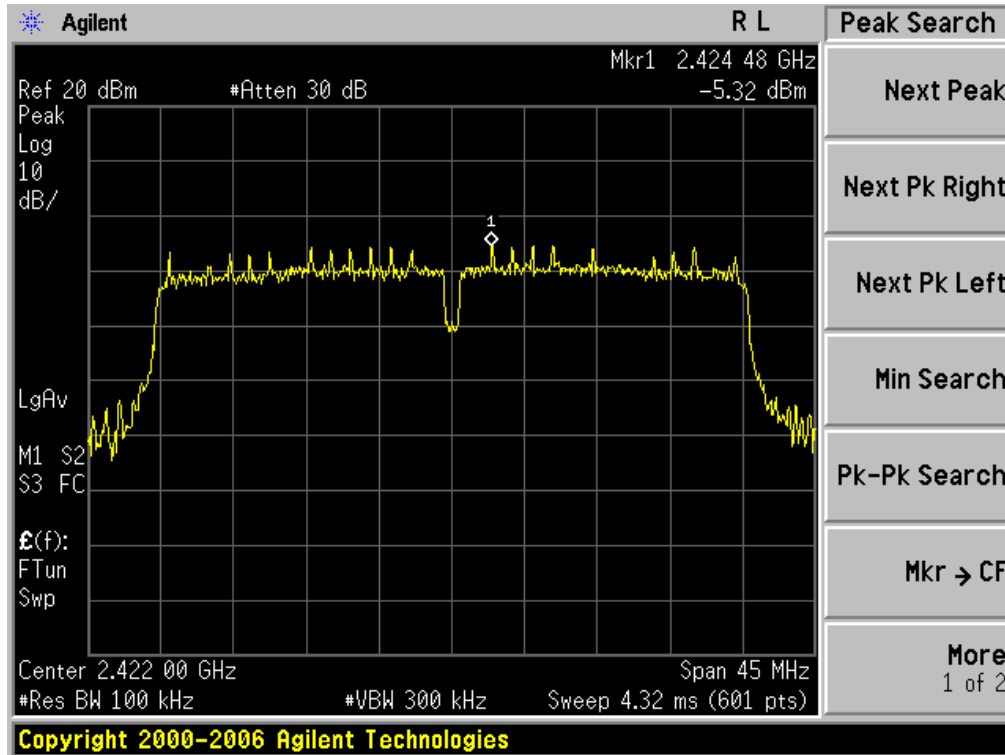
TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



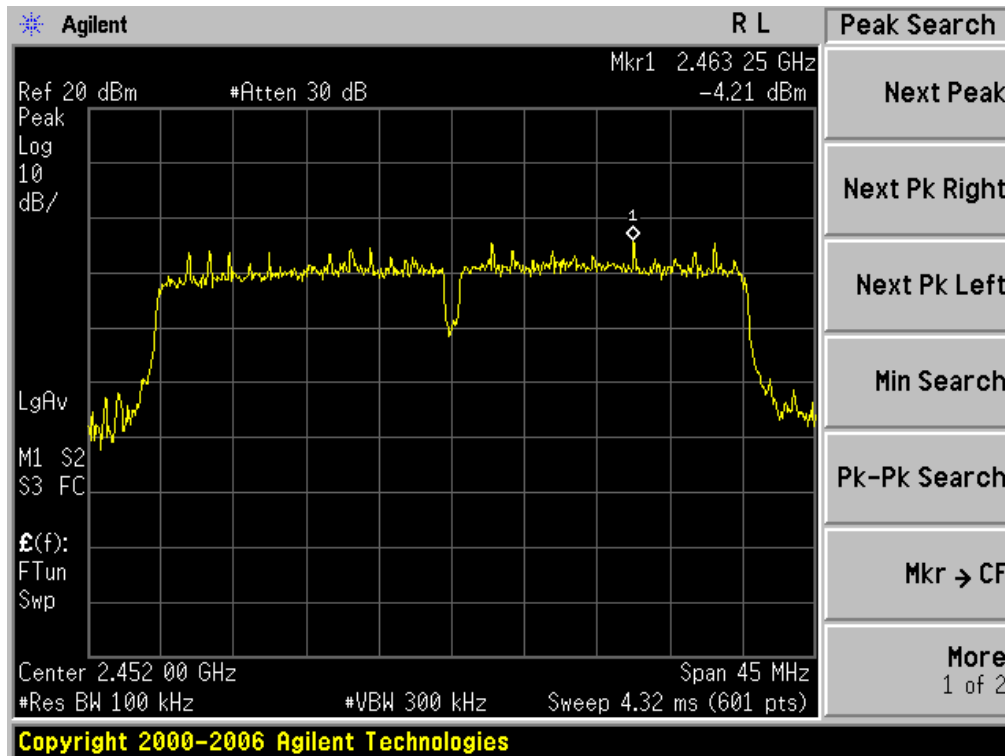
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



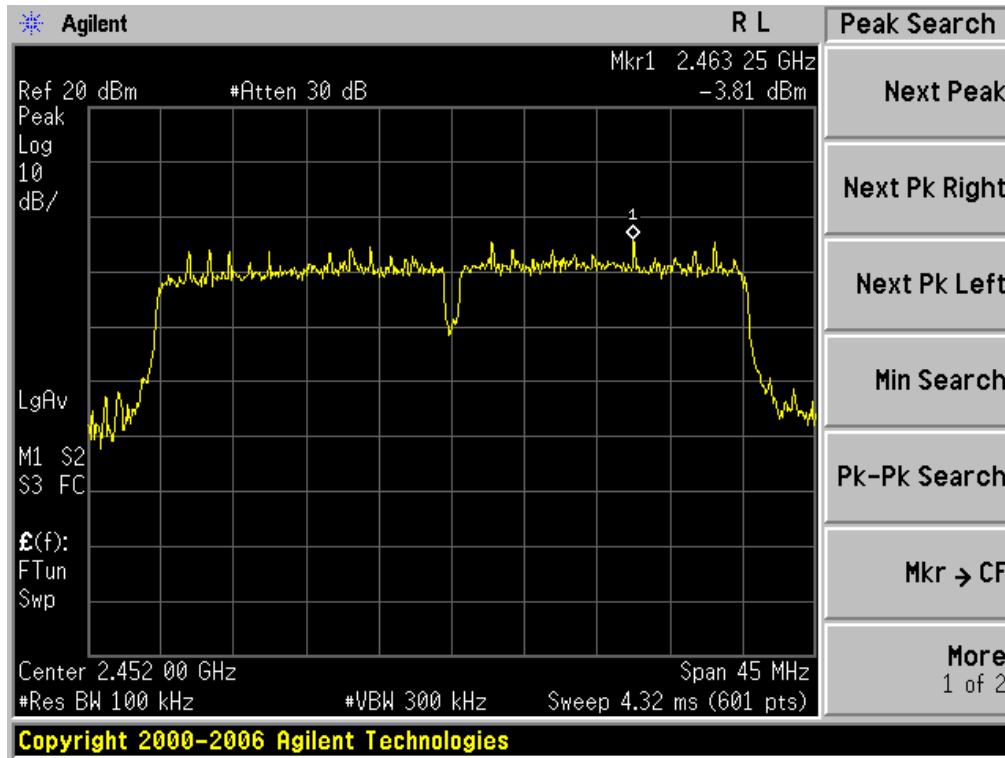
802.11n 40 TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



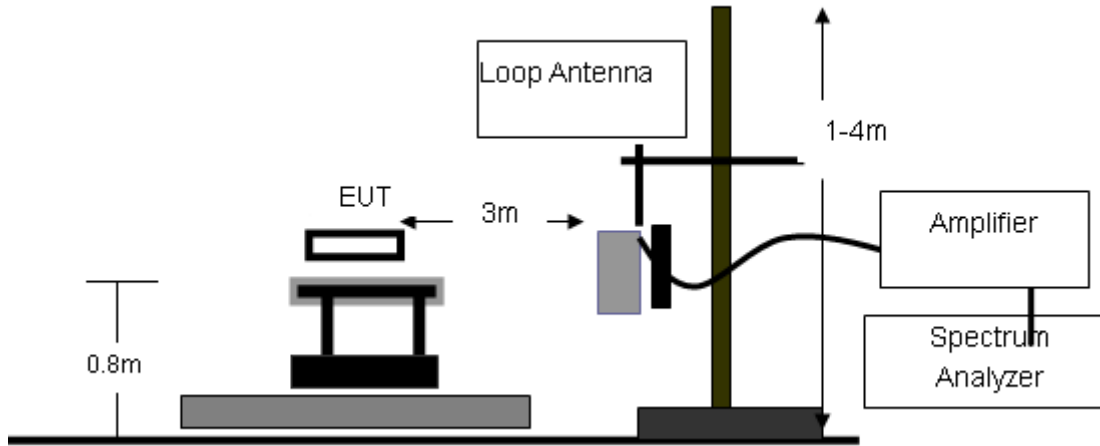
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

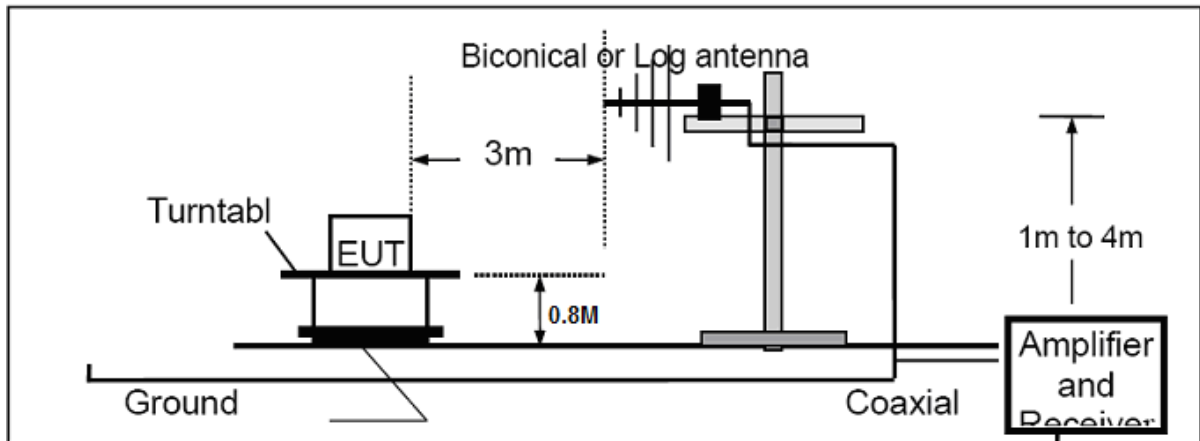
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

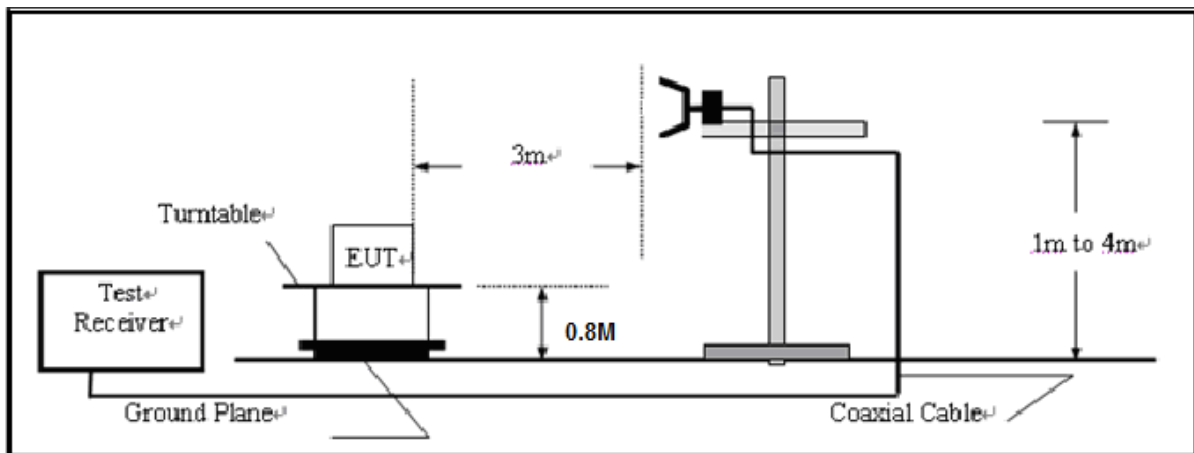
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

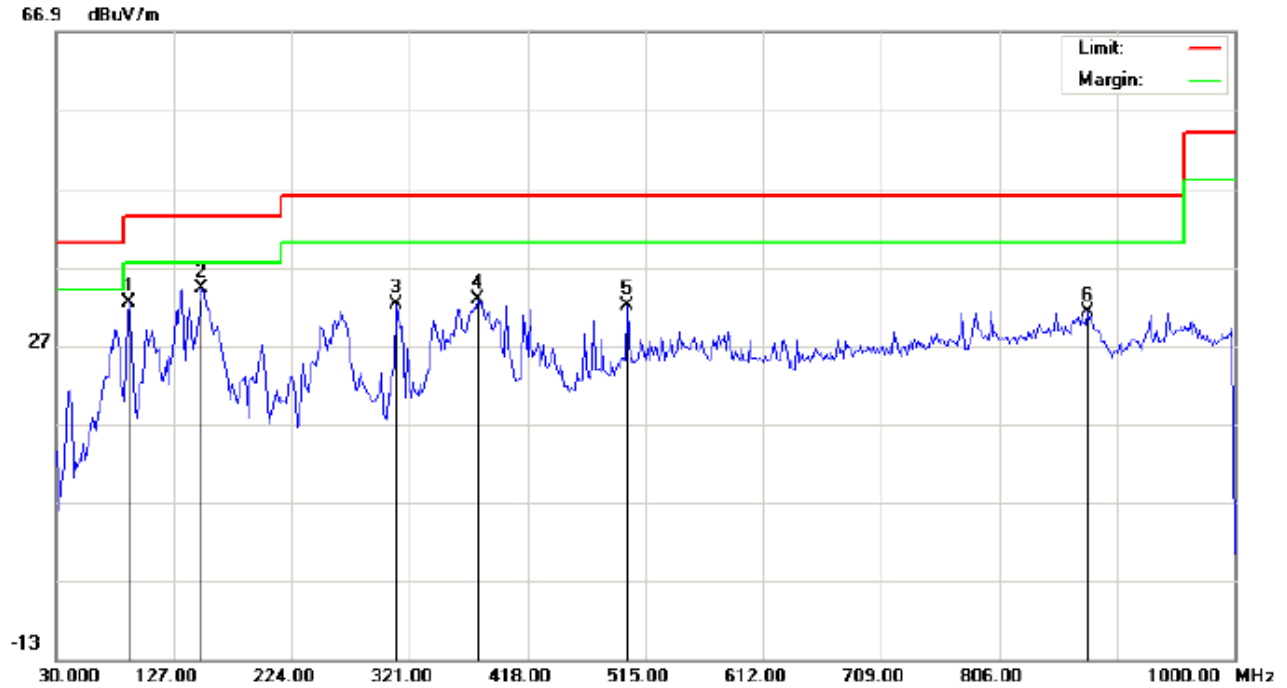
Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ (Ant 1+ Ant 2)	Antenna	Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: Low channel
 Note:

Polarization: *Vertical*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		89.8167	24.10	8.37	32.47	43.50	-11.03	peak			
2	*	149.6333	20.12	14.15	34.27	43.50	-9.23	peak			
3		309.6833	14.66	17.63	32.29	46.00	-13.71	peak			
4		377.5833	13.51	19.22	32.73	46.00	-13.27	peak			
5		500.4500	9.04	22.97	32.01	46.00	-13.99	peak			
6		878.7500	0.92	30.36	31.28	46.00	-14.72	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ (Ant 1+ Ant 2)	Antenna	Horizontal



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: 11n Wireless Bridge
M/N: Hashi
Mode: Middle channel
Note:

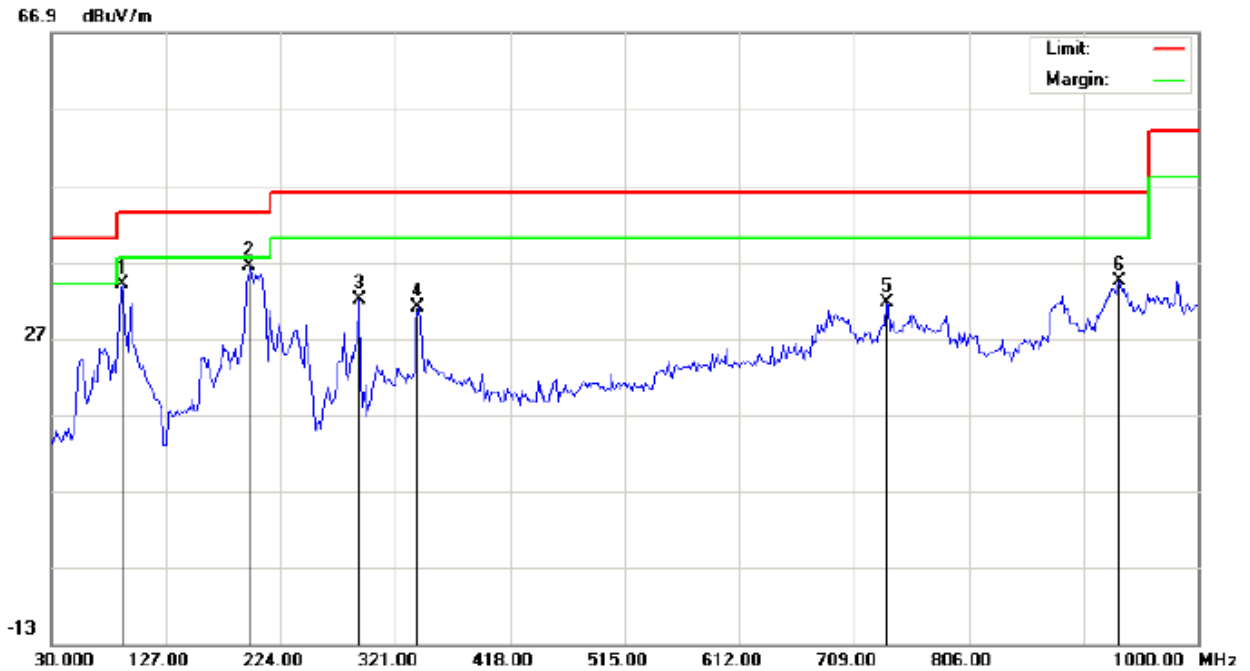
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	76.8833	24.26	7.00	31.26	40.00	-8.74	peak			
2		91.4333	17.05	16.56	33.61	43.50	-9.89	peak			
3		164.1833	18.91	12.69	31.60	43.50	-11.90	peak			
4		217.5331	23.19	11.54	34.73	46.00	-11.27	peak			
5		233.6999	21.56	12.40	33.96	46.00	-12.04	peak			
6		270.8833	14.15	17.22	31.37	46.00	-14.63	peak			
7		977.3667	4.43	26.42	30.85	54.00	-23.15	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ (Ant 1+ Ant 2)	Antenna	Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: Middle channel
 Note:

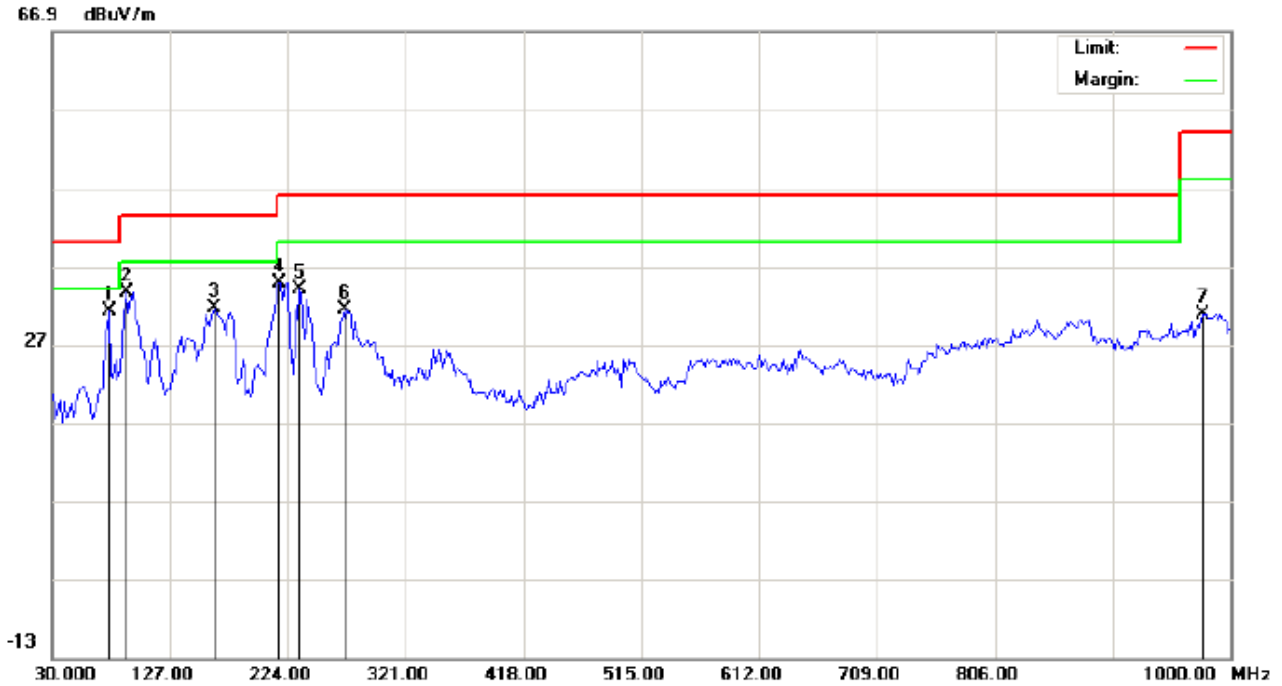
Polarization: *Vertical*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		89.8165	25.69	8.37	34.06	43.50	-9.44	peak			
2	*	198.1331	27.97	8.51	36.48	43.50	-7.02	peak			
3		290.2832	14.97	17.10	32.07	46.00	-13.93	peak			
4		340.3999	11.94	18.98	30.92	46.00	-15.08	peak			
5		736.4832	4.46	27.23	31.69	46.00	-14.31	peak			
6		933.7165	7.37	27.04	34.41	46.00	-11.59	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ (Ant 1+ Ant 2)	Antenna	Horizontal



Site: site #1
 Limit: FCC Class B 3M Radiation
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: Middle channel
 Note:

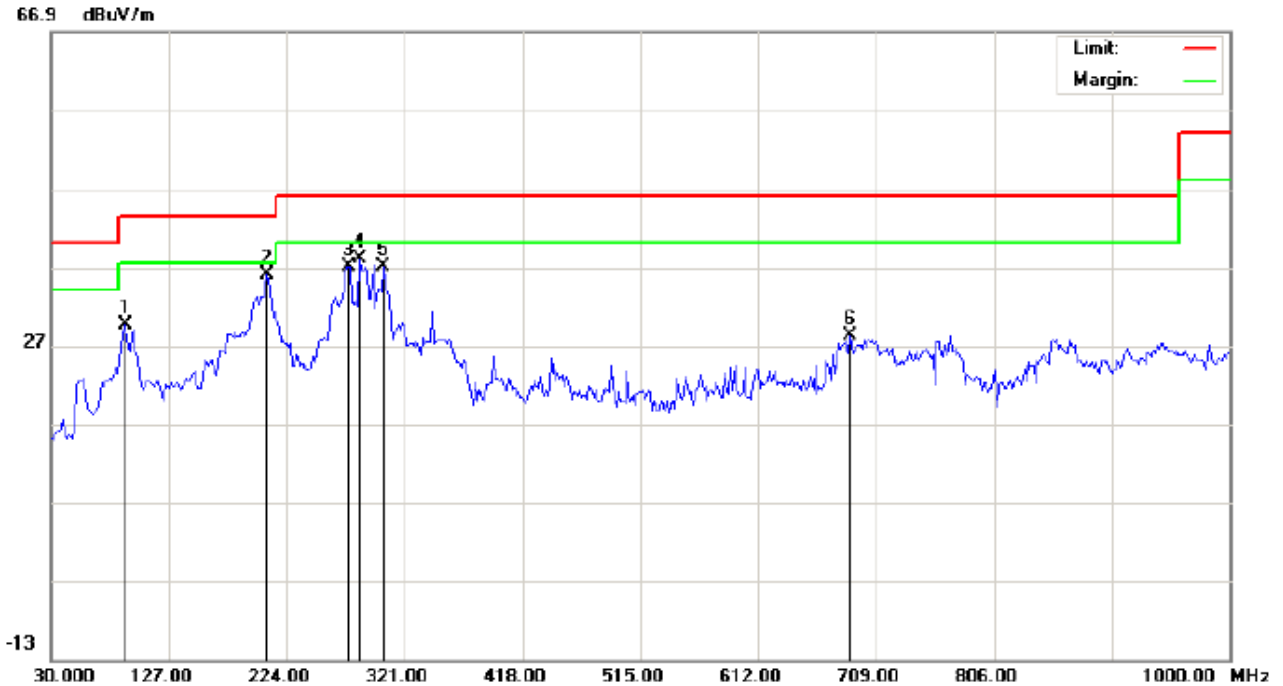
Polarization: *Horizontal*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	76.8833	24.26	7.00	31.26	40.00	-8.74	peak			
2		91.4333	17.05	16.56	33.61	43.50	-9.89	peak			
3		164.1833	18.91	12.69	31.60	43.50	-11.90	peak			
4		217.5331	23.19	11.54	34.73	46.00	-11.27	peak			
5		233.6999	21.56	12.40	33.96	46.00	-12.04	peak			
6		270.8833	14.15	17.22	31.37	46.00	-14.63	peak			
7		977.3667	4.43	26.42	30.85	54.00	-23.15	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ (Ant 1+ Ant 2)	Antenna	Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: High channel
 Note:

Polarization: *Vertical*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		91.4333	22.11	7.58	29.69	43.50	-13.81	peak			
2	*	207.8333	28.12	7.81	35.93	43.50	-7.57	peak			
3		275.7332	20.74	16.35	37.09	46.00	-8.91	peak			
4		283.8167	20.94	17.16	38.10	46.00	-7.90	peak			
5		303.2167	19.81	17.21	37.02	46.00	-8.98	peak			
6		687.9832	2.03	26.14	28.17	46.00	-17.83	peak			

RESULT: PASS

Note: Measurement= Reading + Factor, Over=Measure-Limit.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

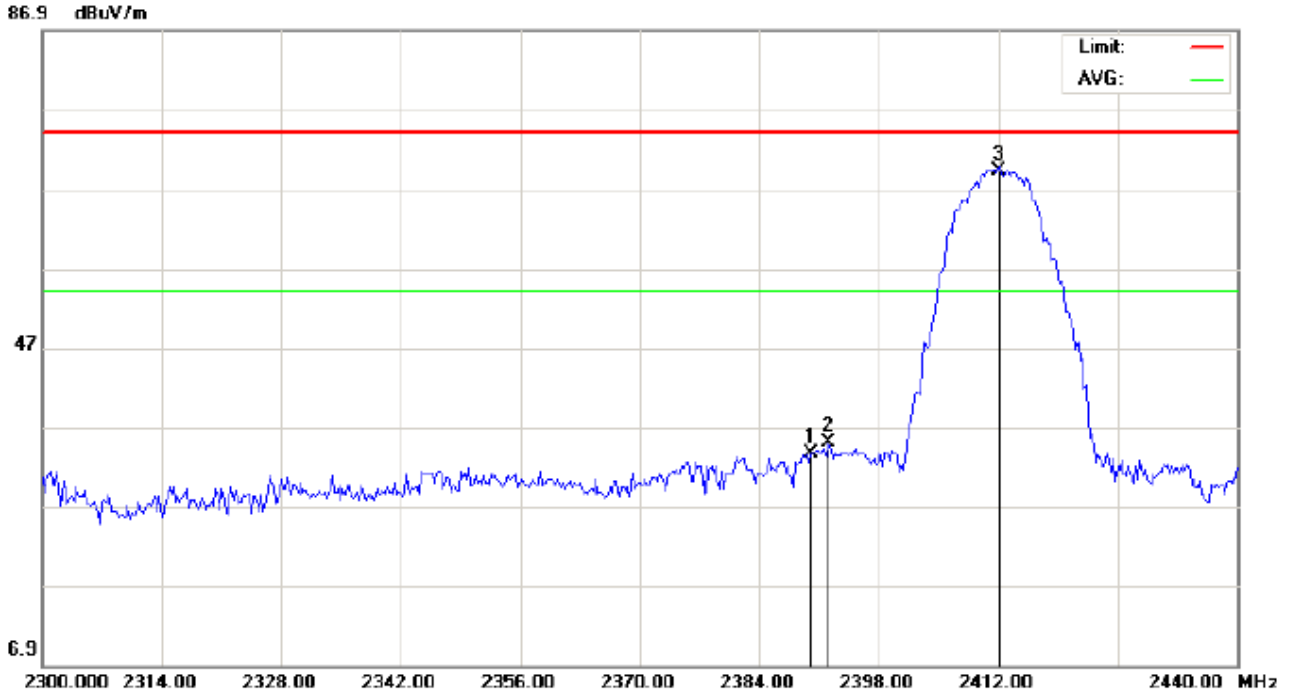
1. Set the EUT Work on the top, the bottom operation frequency individually.
2. Set SPA Start or Stop Frequency = Operation Frequency, $RBW \geq 1\% \text{span}$, $VBW \geq RBW$
3. The band edges was measured and recorded.

12.2. TEST SET-UP

Radiated same as 8.2

12.3. TEST RESULT

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ (Ant 1+ Ant 2)	Antenna	Horizontal



Site: site #1
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: 802.11b Low channel TX
 Note:

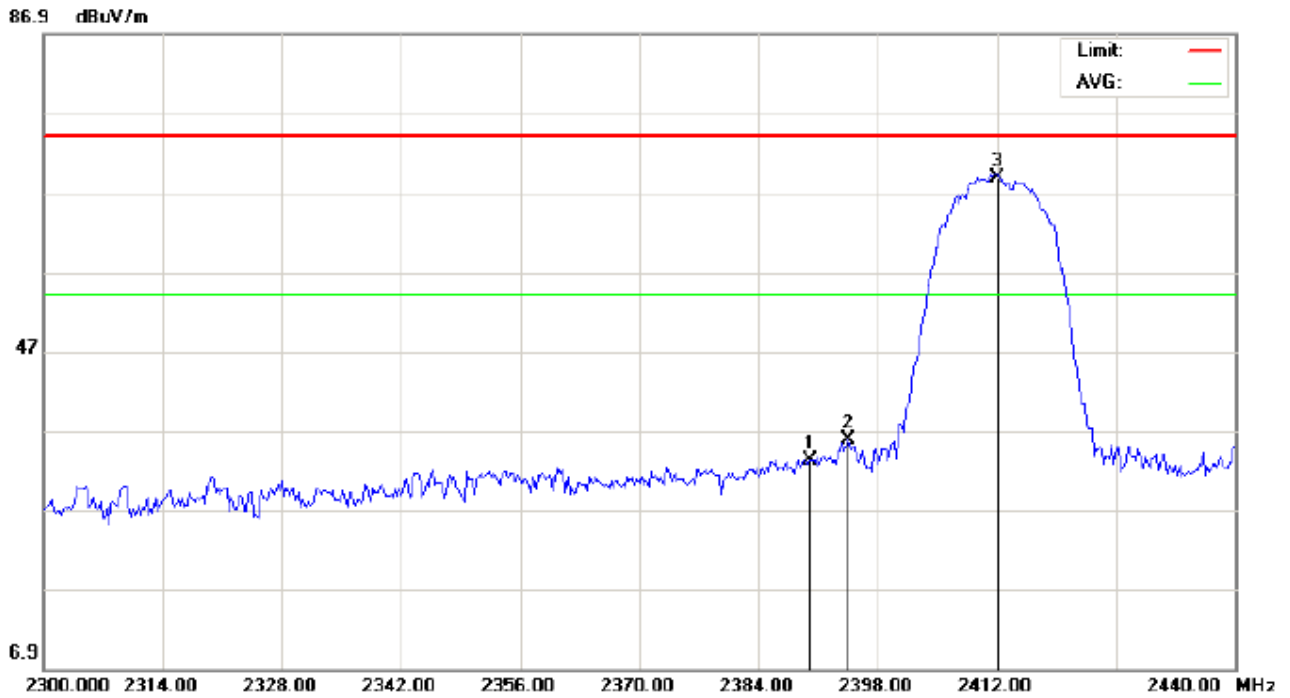
Polarization: *Horizontal*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2390.025	33.60	0.00	33.60	74.00	-40.40	peak			
2		2392.167	34.91	0.00	34.91	74.00	-39.09	peak			
3	*	2412.023	69.23	0.00	69.23	74.00	-4.77	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ (Ant 1+ Ant 2)	Antenna	Vertical

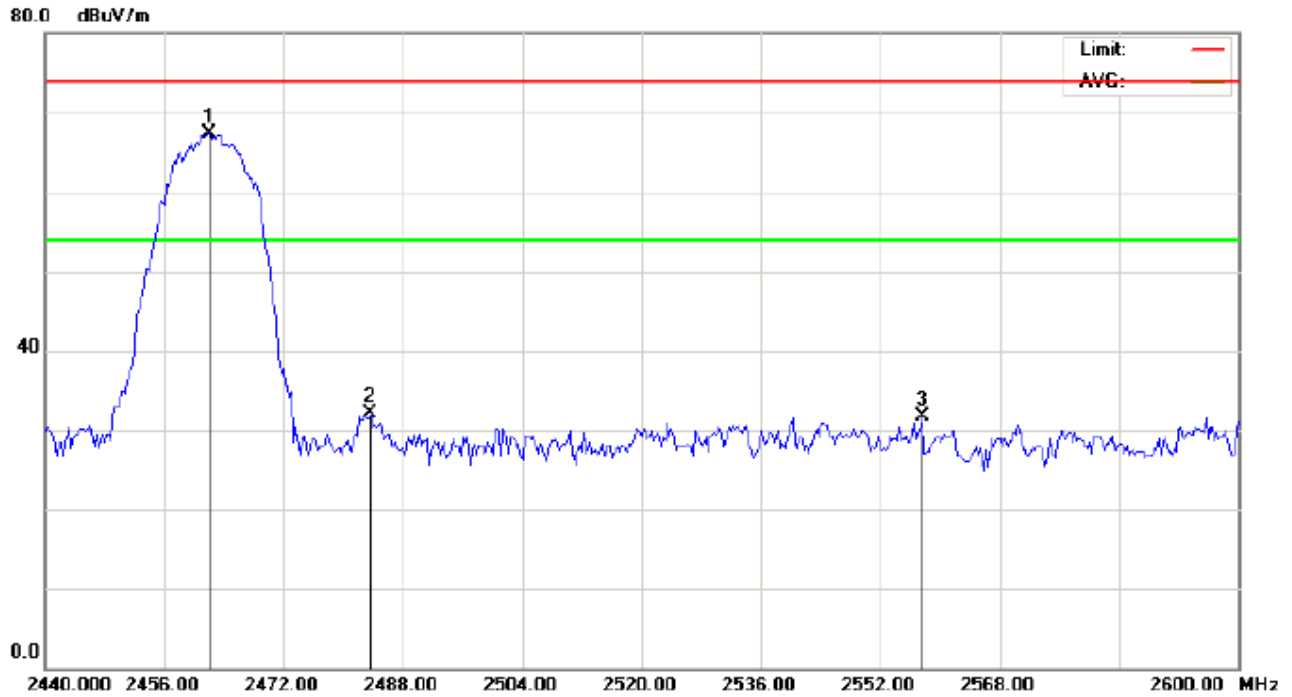


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: 11n Wireless Bridge Distance: 3m
M/N: Hashi
Mode: 802.11b Low channel TX
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2390.002	33.25	0.00	33.25	74.00	-40.75	peak			
2		2394.500	35.73	0.00	35.73	74.00	-38.27	peak			
3	*	2412.012	68.86	0.00	68.86	74.00	-5.14	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ (Ant 1+ Ant 2)	Antenna	Horizontal



Site: site #1
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: 802.11b High channel TX
 Note:

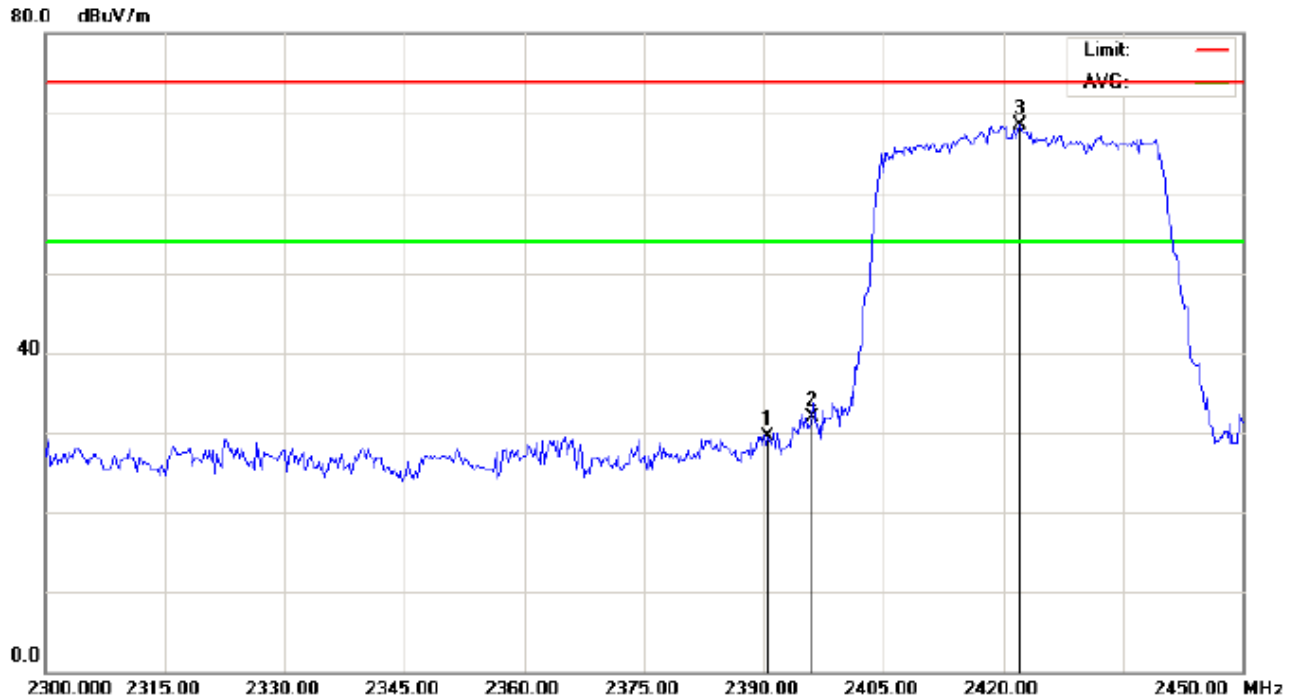
Polarization: *Horizontal*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2462.059	67.26	0.00	67.26	74.00	-6.74	peak			
2		2483.733	32.08	0.00	32.08	74.00	-41.92	peak			
3		2557.600	31.69	0.00	31.69	74.00	-42.31	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ (Ant 1+ Ant 2)	Antenna	Horizontal



Site: site #1
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: 802.11n40 Low channel TX
 Note:

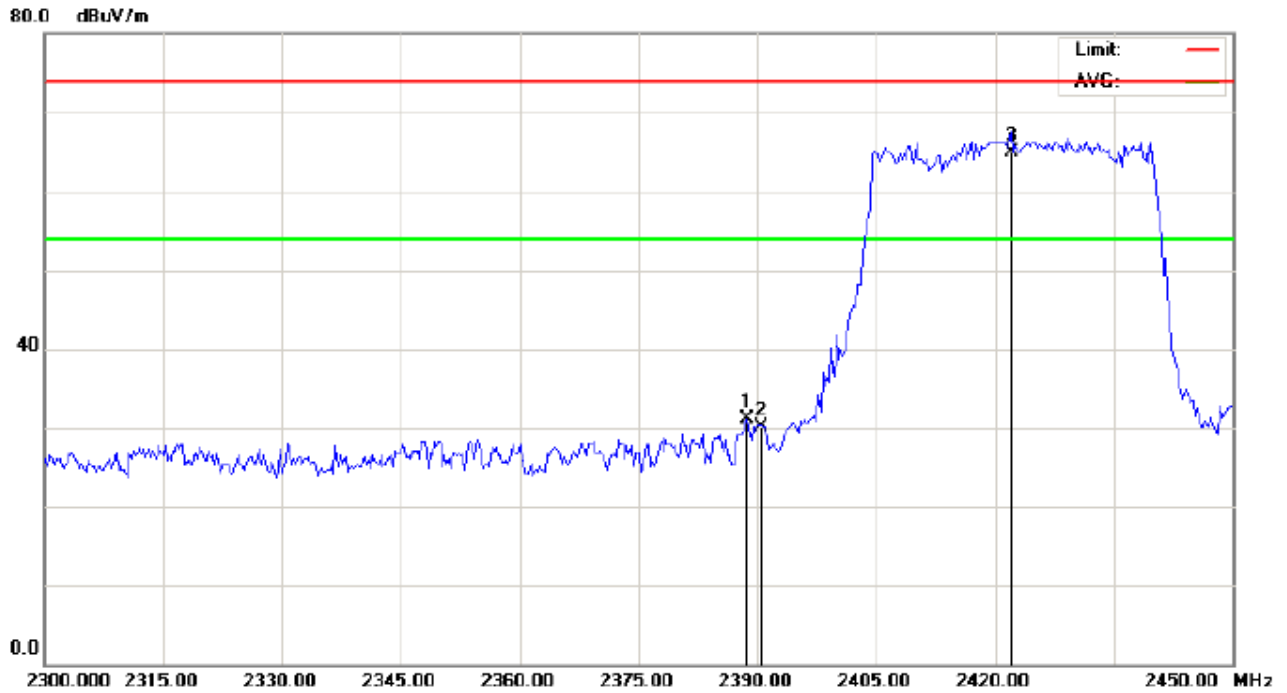
Polarization: *Horizontal*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2390.543	29.47	0.00	29.47	74.00	-44.53	peak			
2		2396.000	31.96	0.00	31.96	74.00	-42.04	peak			
3	*	2422.000	68.41	0.00	68.41	74.00	-5.59	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ (Ant 1+ Ant 2)	Antenna	Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode:802.11n40 Low channel TX
 Note:

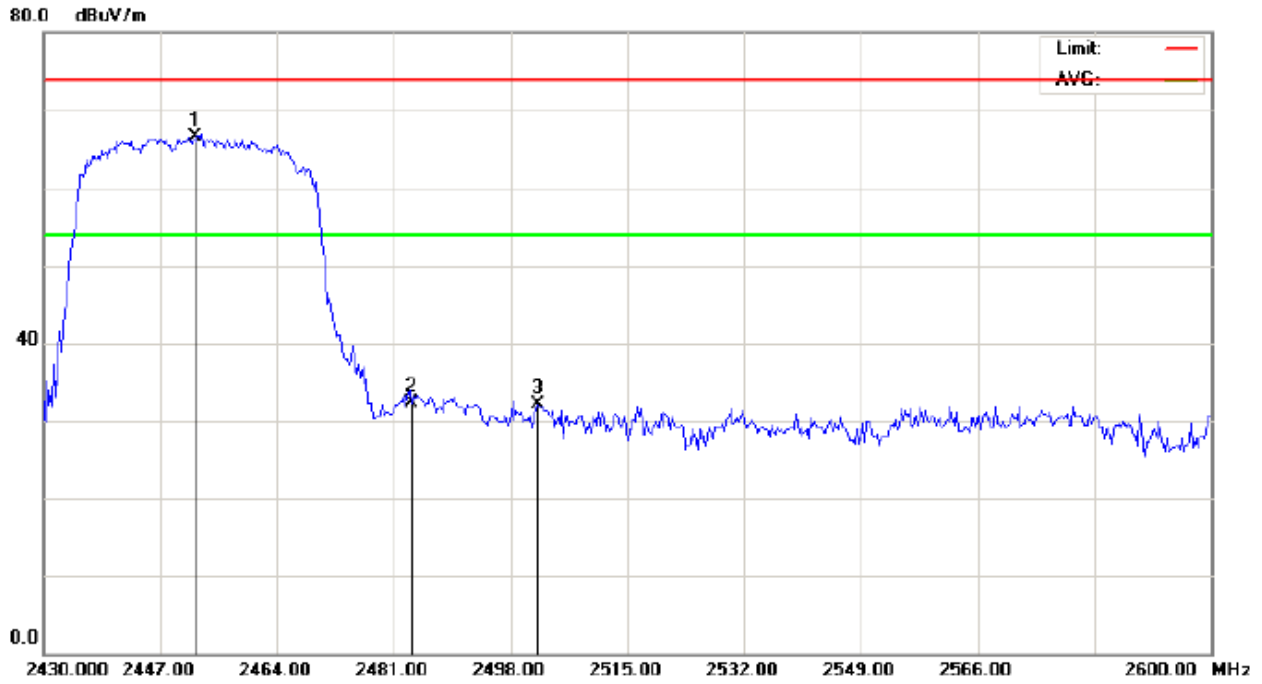
Polarization: *Vertical*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2388.750	31.04	0.00	31.04	74.00	-42.96	peak			
2		2390.514	30.12	0.00	30.12	74.00	-43.88	peak			
3	*	2422.001	64.87	0.00	64.87	74.00	-9.13	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2452MHZ (Ant 1+ Ant 2)	Antenna	Horizontal

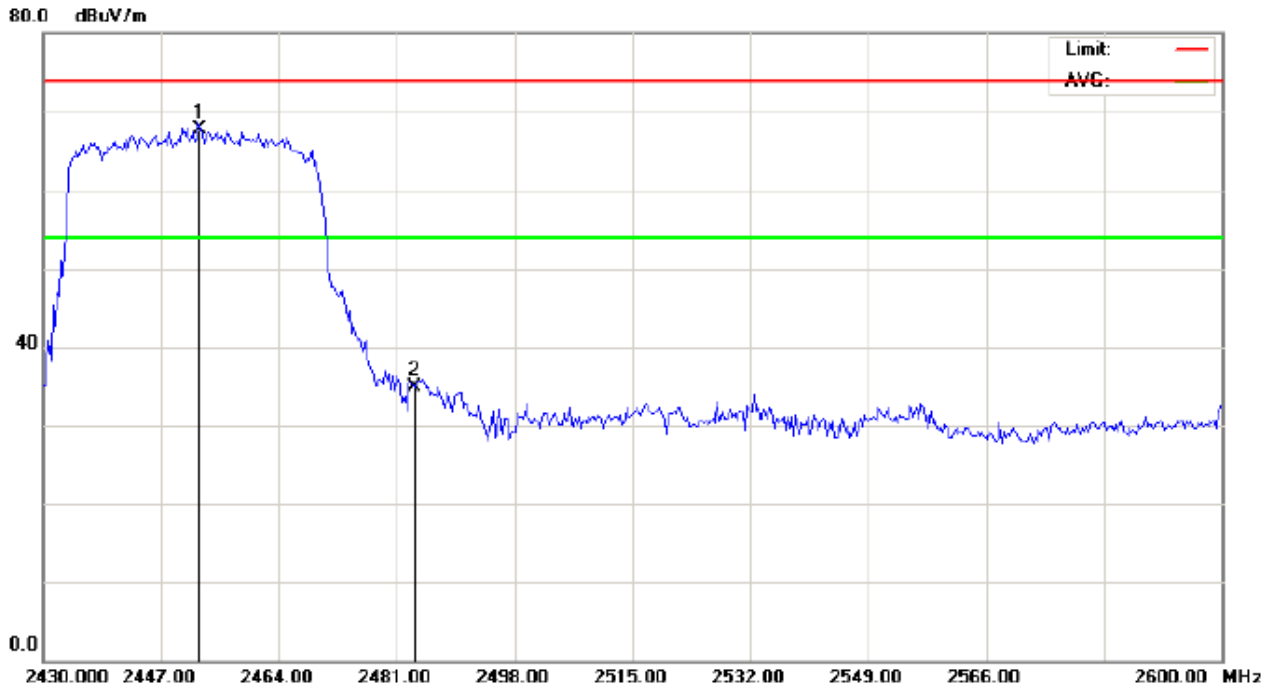


Site: site #1 Polarization: *Horizontal* Temperature: 26
 Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
 EUT: 11n Wireless Bridge Distance: 3m
 M/N: Hashi
 Mode: 802.11n40 High channel TX
 Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2452.007	66.50	0.00	66.50	74.00	-7.50	peak			
2		2483.527	32.23	0.00	32.23	74.00	-41.77	peak			
3		2501.967	32.08	0.00	32.08	74.00	-41.92	peak			

RESULT: PASS

EUT	11n Wireless Bridge	Model Name	Hashi
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2452MHZ (Ant 1+ Ant 2)	Antenna	Vertical



Site: site #1
 Limit: FCC Class B 3M Radiation above 1GHZ(PK)
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: 802.11n40 High channel TX
 Note:

Polarization: *Vertical*
 Power:
 Distance: 3m

Temperature: 26
 Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2452.471	67.66	0.00	67.66	74.00	-6.34	peak			
2		2483.520	34.92	0.00	34.92	74.00	-39.08	peak			

RESULT: PASS

Note: the other modes radiation emission have enough 20dB margin.
 Measurement= Reading + Factor, Over=Measure-Limit.

13. FCC LINE CONDUCTED EMISSION TEST

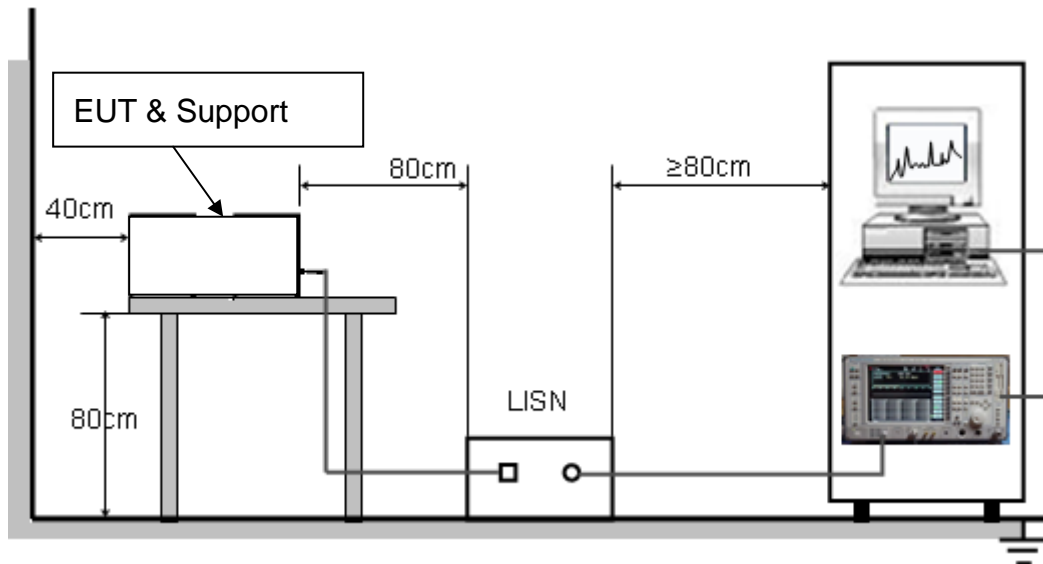
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC5V charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

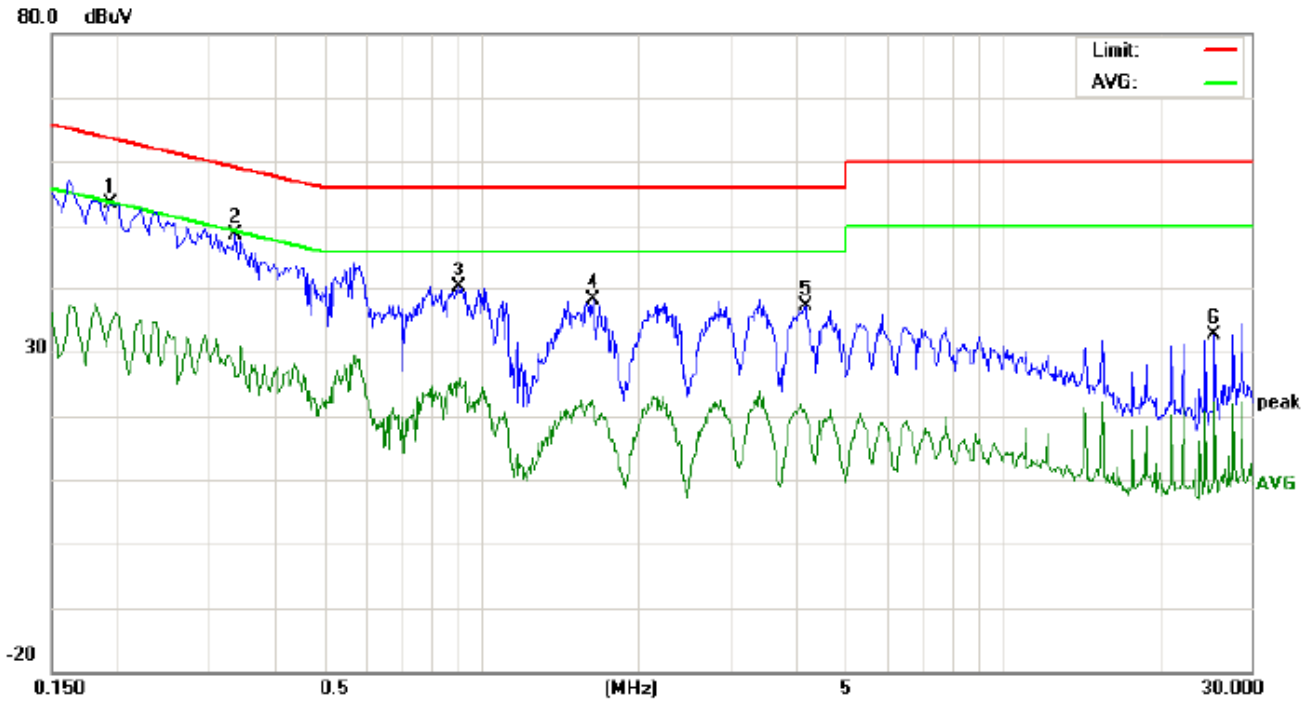
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

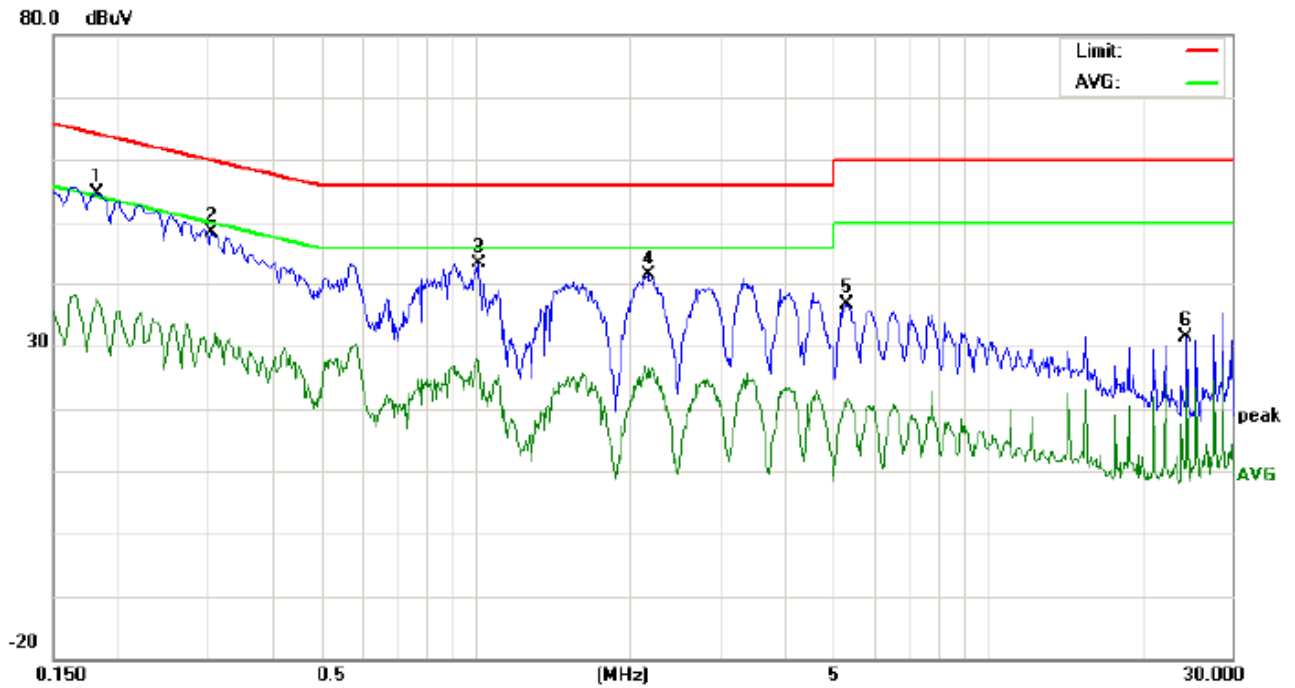
LINE CONDUCTED EMISSION TEST LINE 1-L



Site: Conduction Phase: **L1** Temperature: 26
 Limit: FCC Class B Conduction(QP) Power: Humidity: 60 %
 EUT: 11n Wireless Bridge
 M/N: Hashi
 Mode: Normal Hopping
 Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1940	43.04		23.68	10.21	53.25		33.89	63.86	53.86	-10.61	-19.97	P	
2	0.3379	38.33		15.84	10.31	48.64		26.15	59.25	49.25	-10.61	-23.10	P	
3	0.9060	29.80		14.63	10.41	40.21		25.04	56.00	46.00	-15.79	-20.96	P	
4	1.6420	27.90		11.12	10.33	38.23		21.45	56.00	46.00	-17.77	-24.55	P	
5	4.1860	26.77		9.88	10.35	37.12		20.23	56.00	46.00	-18.88	-25.77	P	
6	25.5459	22.40		11.96	10.11	32.51		22.07	60.00	50.00	-27.49	-27.93	P	

Line Conducted Emission Test Line 2-N



Site: Conduction Phase: **N** Temperature: 26
Limit: FCC Class B Conduction(QP) Power: Humidity: 60 %
EUT: 11n Wireless Bridge
M/N: Hashi
Mode: Normal Hopping
Note:

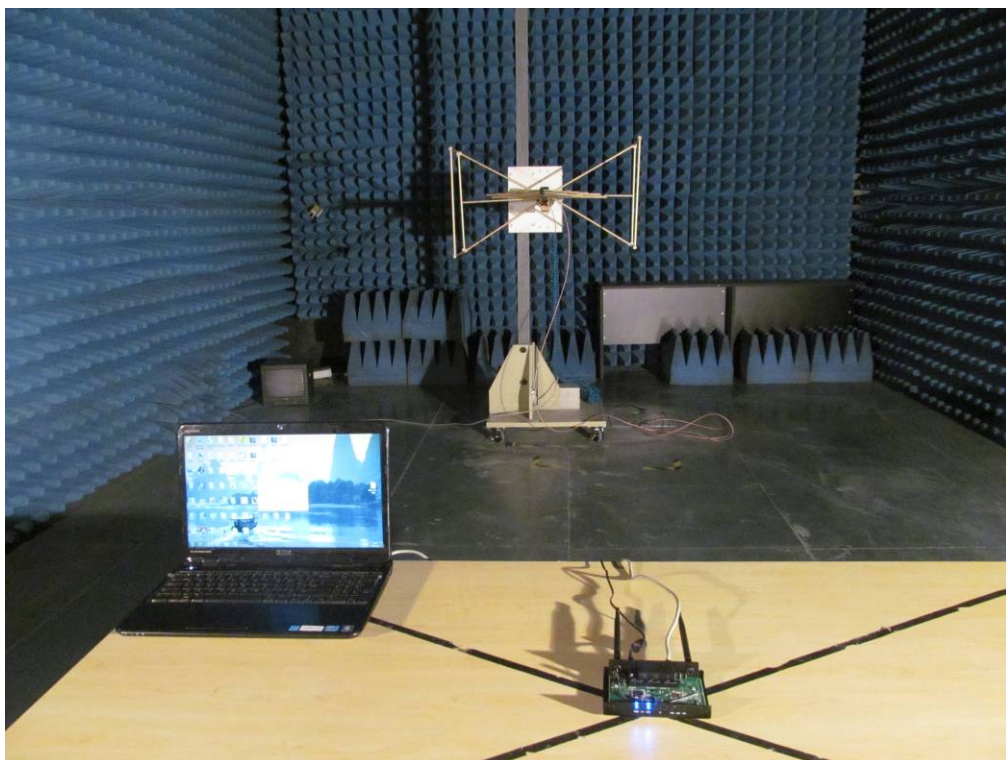
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		dB	Peak	QP	AVG	QP	AVG	QP		
1	0.1819	44.45		27.50	10.20	54.65		37.70	64.39	54.39	-9.74	-16.69	P	
2	0.3060	38.16		19.10	10.29	48.45		29.39	60.08	50.08	-11.63	-20.69	P	
3	1.0140	33.08		17.27	10.37	43.45		27.64	56.00	46.00	-12.55	-18.36	P	
4	2.1700	30.99		16.17	10.29	41.28		26.46	56.00	46.00	-14.72	-19.54	P	
5	5.3140	26.33		10.68	10.25	36.58		20.93	60.00	50.00	-23.42	-29.07	P	
6	24.4340	21.25		13.26	10.11	31.36		23.37	60.00	50.00	-28.64	-26.63	P	

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



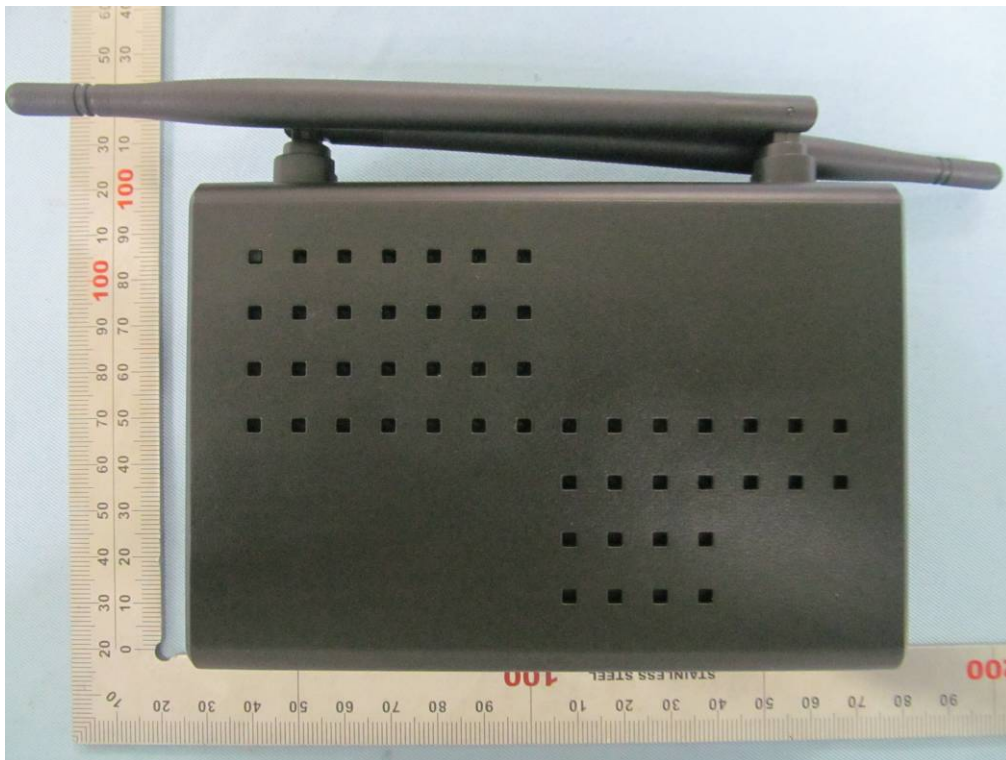


APPENDIX B: PHOTOGRAPHS OF EUT

All VIEW OF EUT



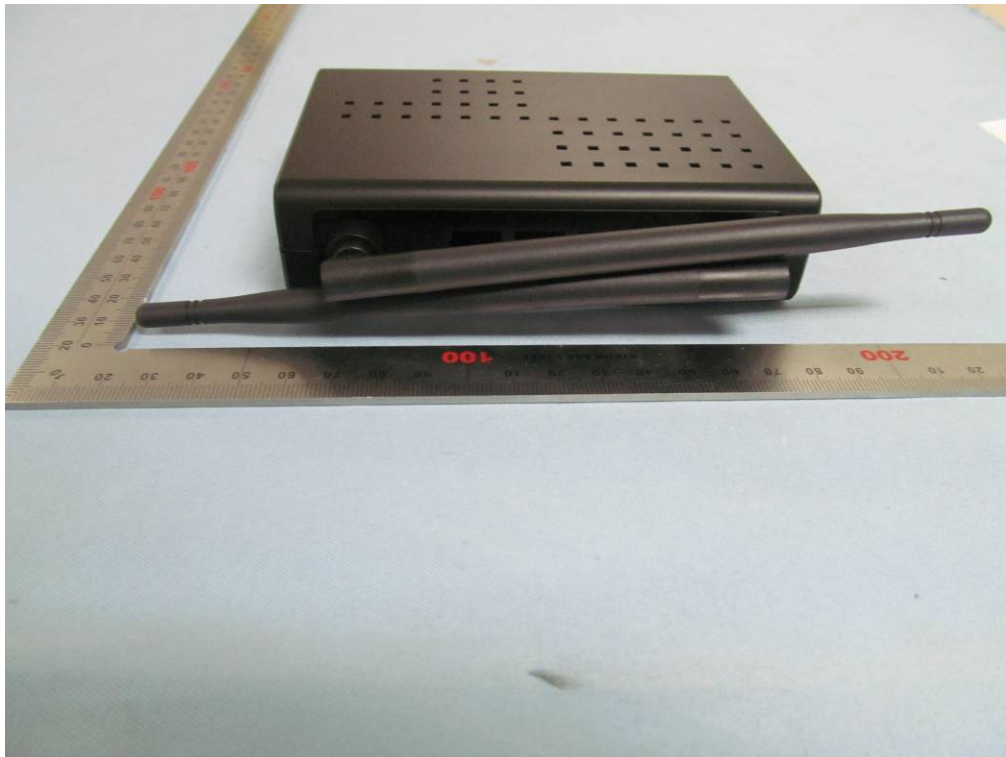
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



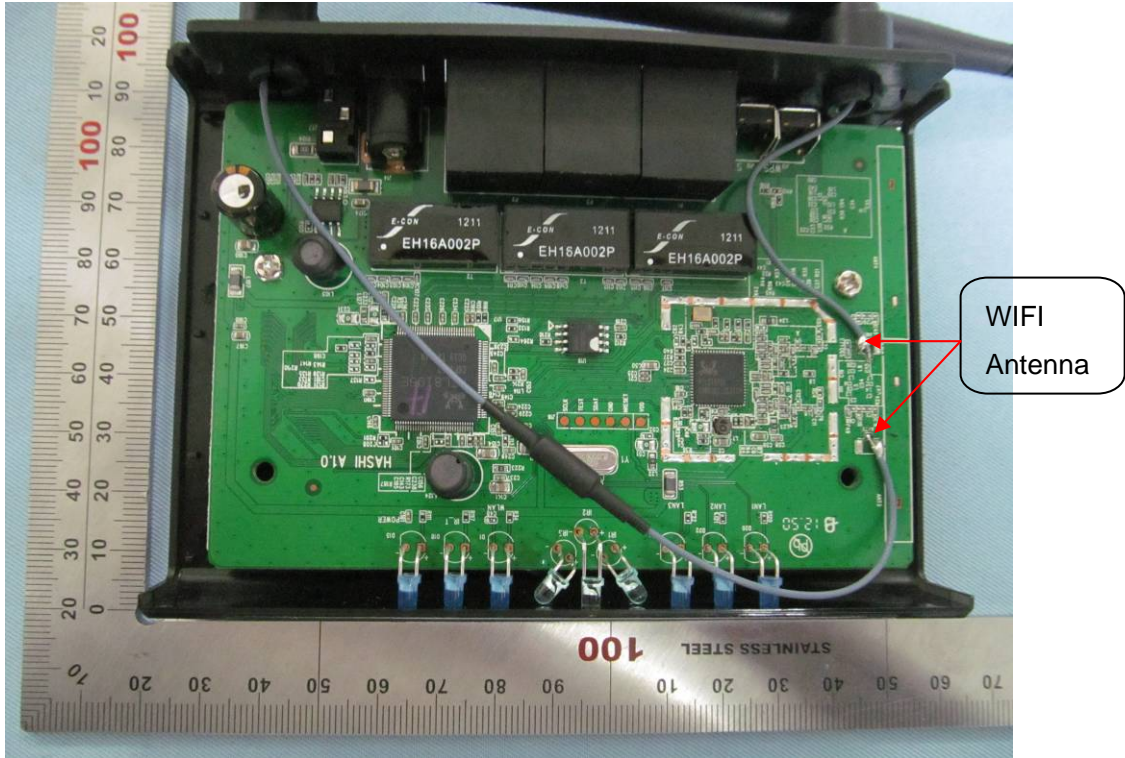
RIGHT VIEW OF EUT



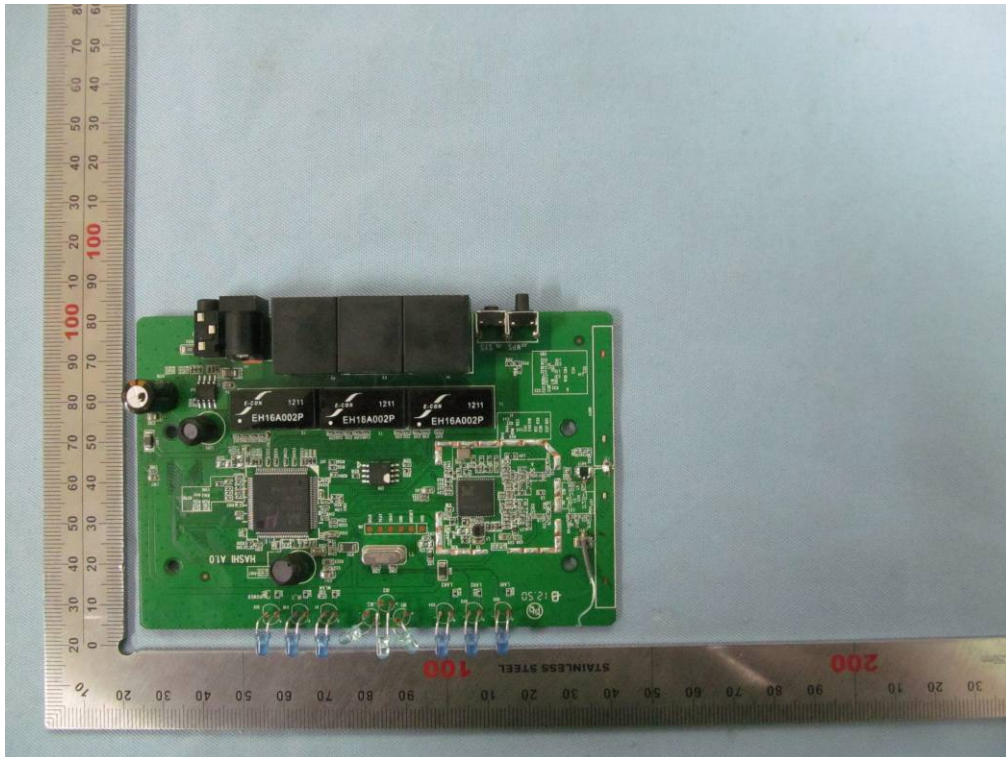
OPEN VIEW OF EUT-1



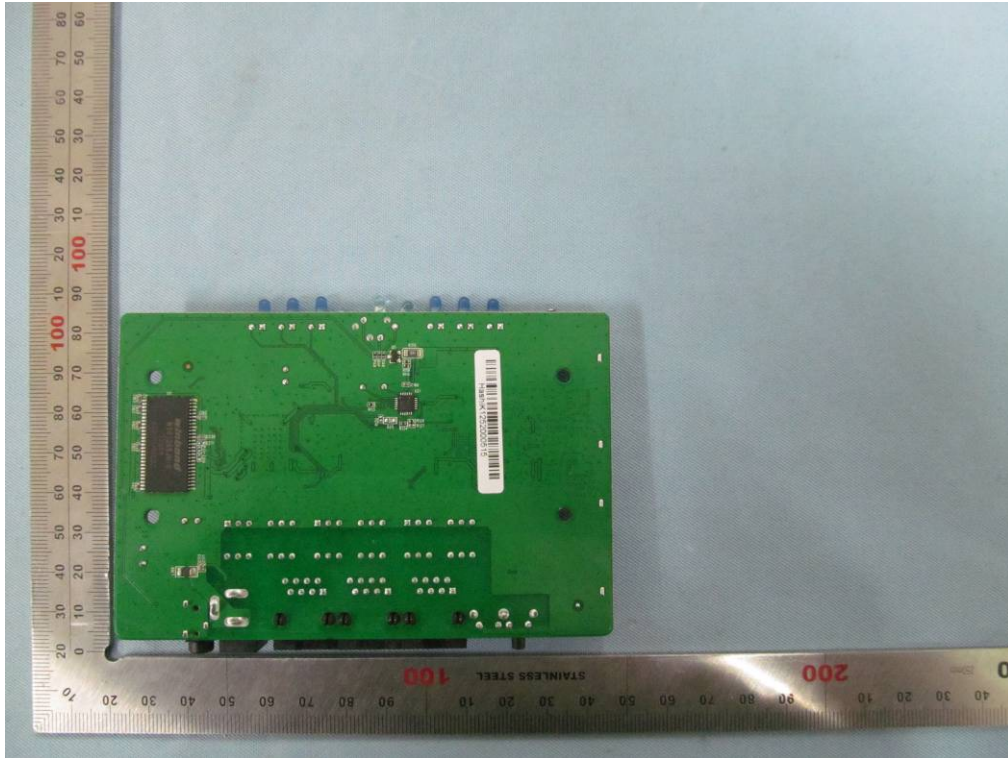
OPEN VIEW OF EUT-2



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----