



FCC Test Report

Report No.: AGC02099140701FE04

FCC ID : 2ACX4MPP14001

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : Pico Projector

BRAND NAME : Bebona

MODEL NAME : MPP-14001

CLIENT : Xiamen Bebona Electronics Technology Co., Ltd.

DATE OF ISSUE : Aug.12, 2014

STANDARD(S) : FCC Part 15.247

TEST PROCEDURE(S) : KDB 558074 v03r02

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.12, 2014	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Xiamen Bebona Electronics Technology Co., Ltd.
Address	4F,Complex Bldg.,NO.215 Yuehua Road,Xiamen,Fujian Province, China
Manufacturer	Nanjing Wanlida Technology Co., Ltd.
Address	Nanjing Wanlida Industrial Zone,Zhang Zhou, Fujian Province, China
Product Designation	Pico Projector
Brand Name	Bebona
Test Model	MPP-14001
Date of test	Aug.04, 2014 to Aug.11,2014
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BGN/RF (2013-03-01)

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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Aug.12, 2014

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Pico Projector”. 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~2.462GHz
Output Power	IEEE 802.11b:11.13dBm, IEEE 802.11g:9.22dBm, IEEE 802.11n(20):8.68dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11
Hardware Version	8757C
Software Version	N/A
Antenna Designation	Integrated Antenna
Antenna Gain	2.0dBi
Power Supply	DC3.7V by Built-in Li-ion Battery

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

2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS	NDBPS	Data rate(Mbps)
							800nsGI
					20MHz	20MHz	20MHz
0	1	BPSK	1/2	1	52	26	6.5
1	1	QPSK	1/2	2	104	52	13.0
2	1	QPSK	3/4	2	104	78	19.5
3	1	16-QAM	1/2	4	208	104	26.0
4	1	16-QAM	3/4	4	208	156	39.0
5	1	64-QAM	2/3	6	312	208	52.0
6	1	64-QAM	3/4	6	312	234	58.5
7	1	64-QAM	5/6	6	312	260	65.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	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: 2ACX4MPP14001** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

Both conducted and 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.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v03r02.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

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:

Transmit by 802.11b with Data rate (1/2/5.5/11)

Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54)

Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)

Note:

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configuration:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Pico Projector	Bebona	MPP-14001	EUT
2	Battery	YOKU	BT-D019	Accessory
3	Adapter	HUONIU	HNC050300U	Accessory

Note: All the accessories have been used during the test in conduction emission test.

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.

ALL TEST EQUIPMENT LIST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Probe	R&S	NRP-Z23	100323	07/25/2014	07/24/2015
Power Meter	Agilent	N1911A	MY45100361	04/20/2014	04/20/2015
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	07/25/2014	07/24/2015
Amplifier	EM	EM30180	0607030	02/27/2014	02/26/2015
Horn Antenna	EM	EM-AH-10180	67	04/19/2014	04/18/2015
Horn Antenna	A.H. Systems Inc.	SAS-574	--	07/25/2014	07/24/2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/25/2014	07/24/2015
Biological Antenna	A.H. Systems Inc.	SAS-521-4	26	06/06/2014	06/05/2015
Loop Antenna	A.H.	SAS-526B	264	07/13/2014	07/12/2015
LISN	R&S	ESH3-Z5	8389791009	07/25/2014	07/24/2015
Radiation Cable 1	Sat	RE1	R003	06/04/2014	06/03/2015
Radiation Cable 2	Sat	RE2	R002	06/04/2014	06/03/2015
Conduction Cable	Sat	CE1	C001	06/04/2014	06/03/2015

7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

For peak power test:

1. Use a direct connection between the antenna port of the transmitter and the power meter, through suitable attenuation
2. Set the bandwidth of the power meter is 40MHz
3. Record the peak value

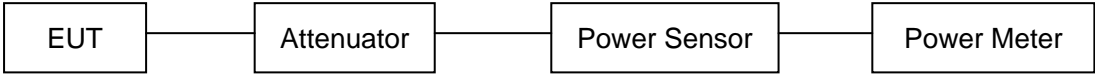
For average power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.
5. The maximum peak power shall be less 1 Watt (30dBm).

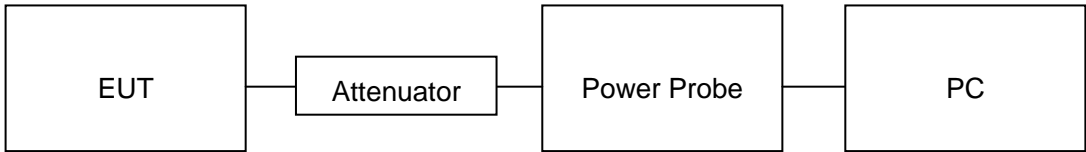
Note : The EUT was tested according to KDB 558074v03r02 for compliance to FCC 47CFR 15.247 requirements.

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

PEAK POWER TEST SETUP



AVERAGE POWER SETUP



7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	PEAK POWER
TEST MODE	802.11b with data rate 1

LIMITS AND MEASUREMENT RESULT				
Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	9.15	11.13	30	Pass
2.437	9.1	11.08	30	Pass
2.462	9.07	11.05	30	Pass

TEST ITEM	PEAK POWER
TEST MODE	802.11g with data rate 6

LIMITS AND MEASUREMENT RESULT				
Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	7.2	9.18	30	Pass
2.437	7.24	9.22	30	Pass
2.462	7.08	9.06	30	Pass

TEST ITEM	PEAK POWER
TEST MODE	802.11n 20 with data rate 6.5

LIMITS AND MEASUREMENT RESULT				
Frequency (GHz)	Average Power (dBm)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	6.58	8.56	30	Pass
2.437	6.63	8.61	30	Pass
2.462	6.7	8.68	30	Pass

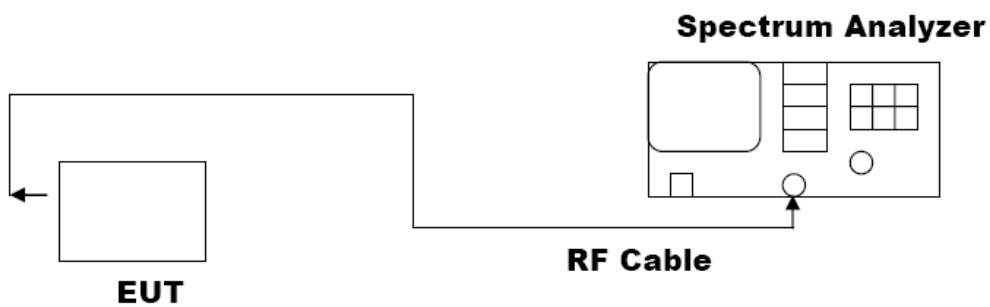
8. 6DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. 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 $\geq 3 \times$ 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

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

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	10.067	PASS
	Middle Channel	9.128	PASS
	High Channel	9.132	PASS

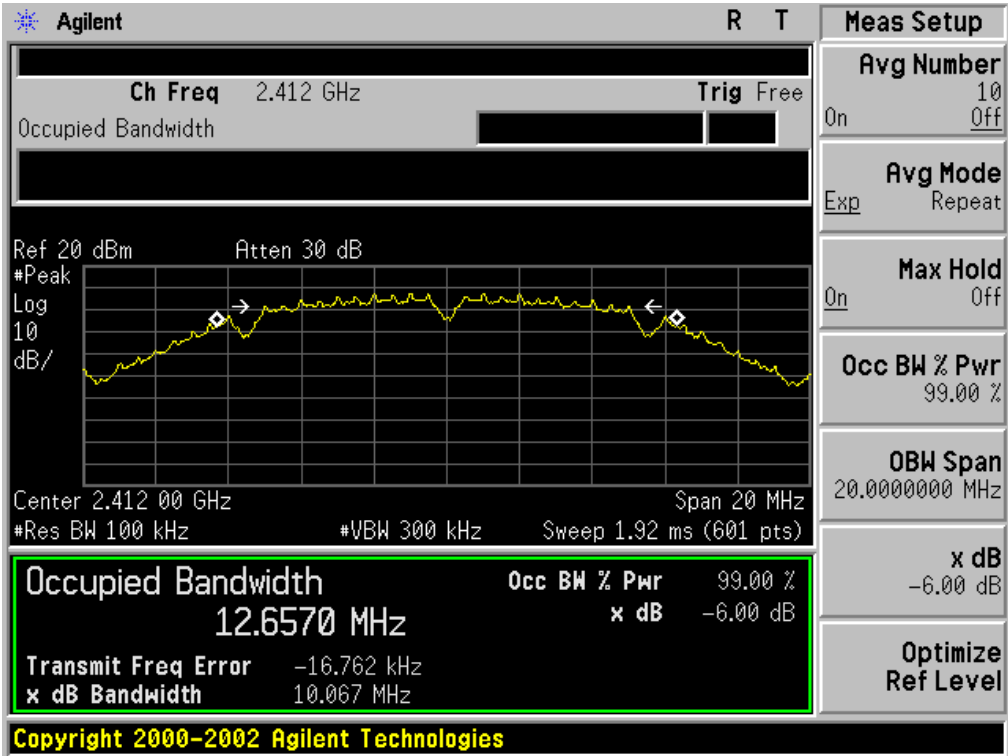
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11g with data rate 54

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	15.389	PASS
	Middle Channel	16.096	PASS
	High Channel	15.145	PASS

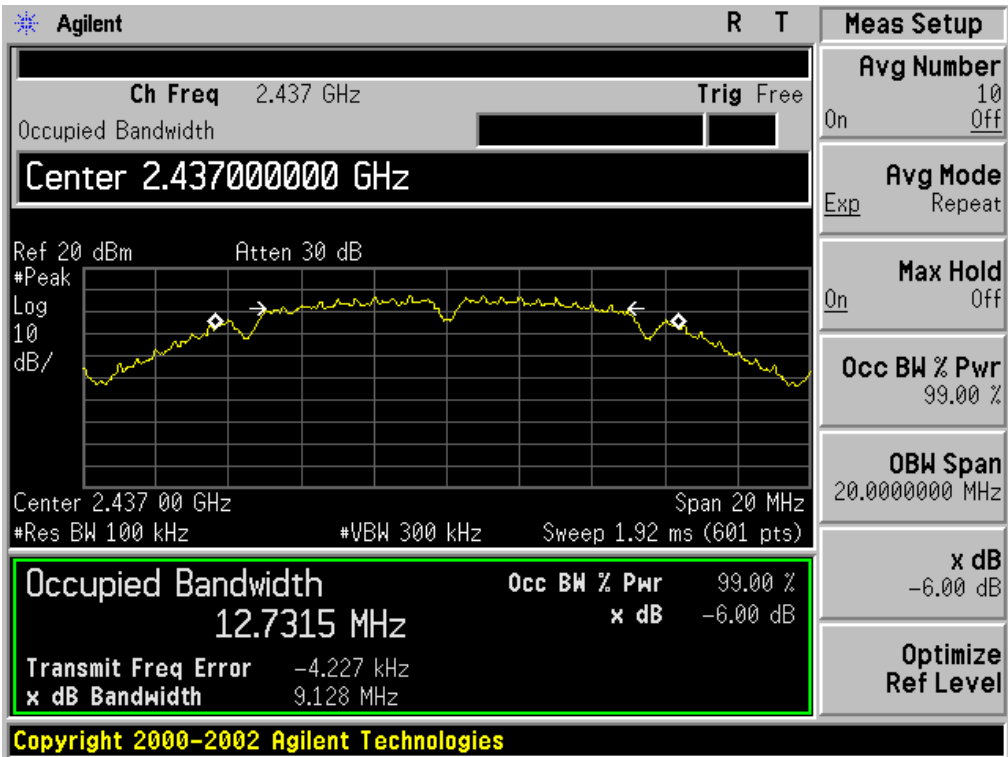
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11n 20 with data rate 65

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	16.992	PASS
	Middle Channel	17.311	PASS
	High Channel	15.122	PASS

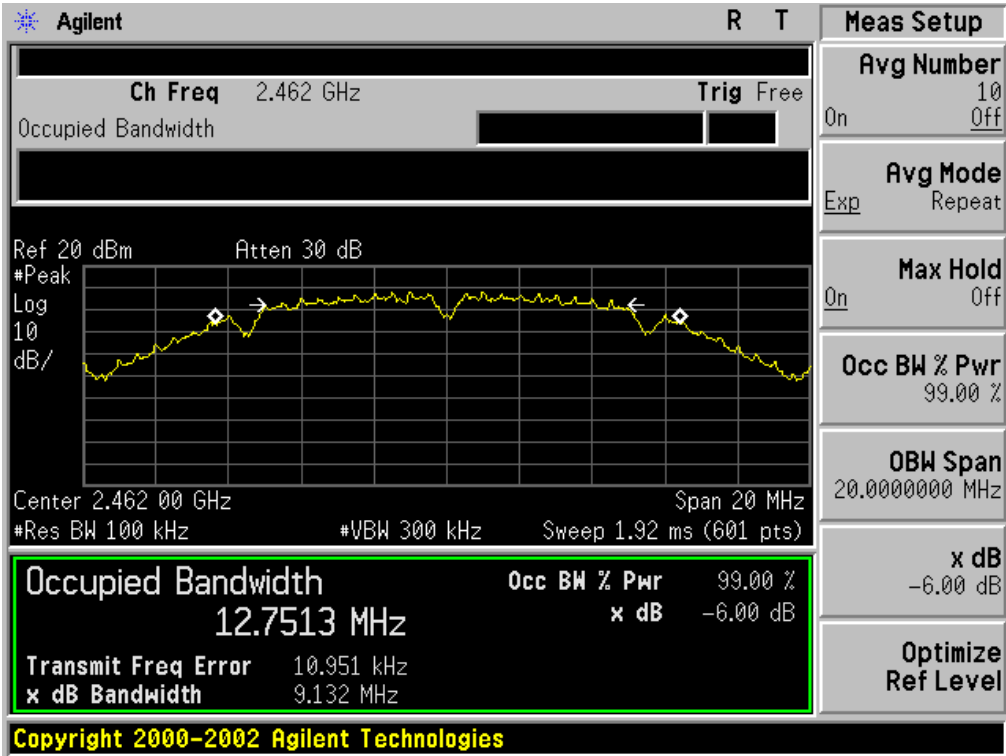
802.11b TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

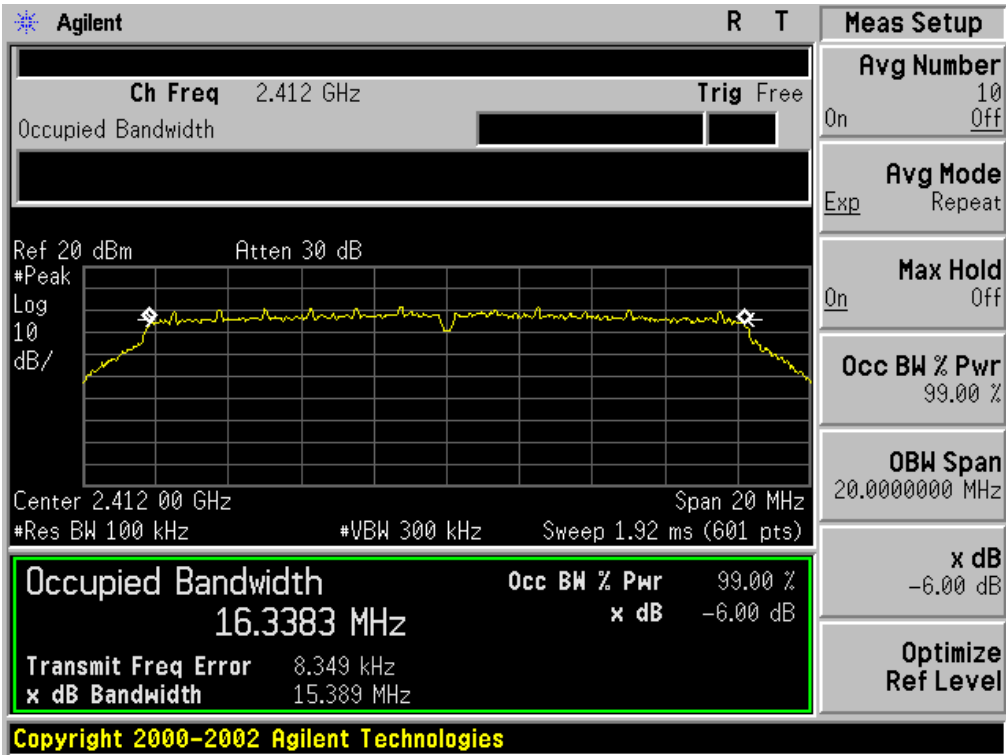


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

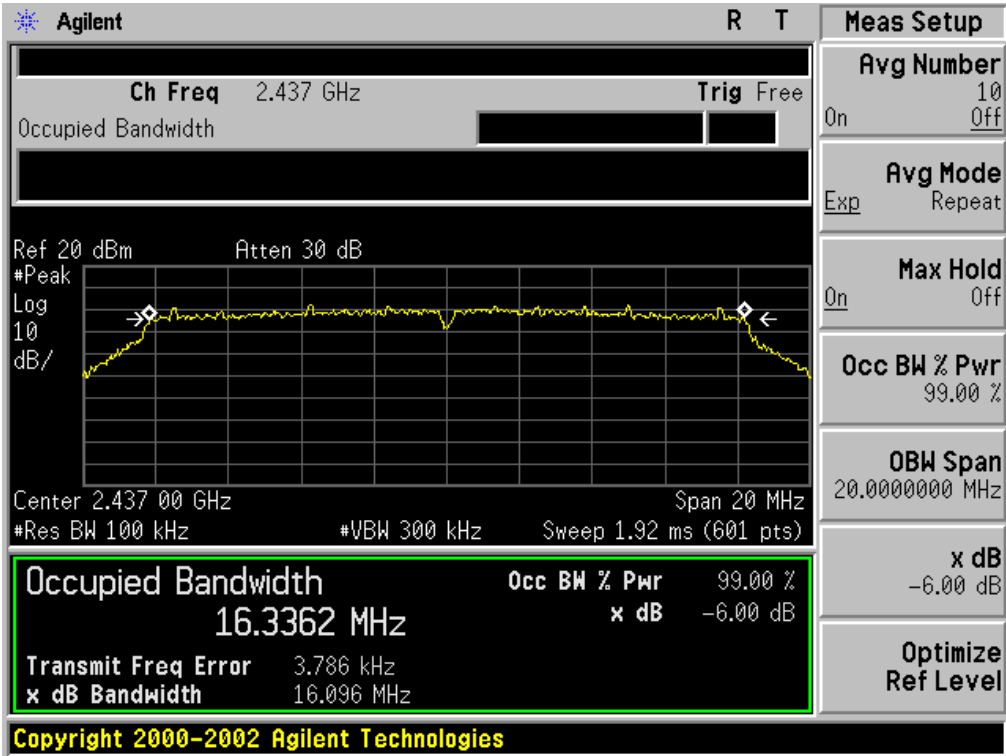


802.11g TEST RESULT

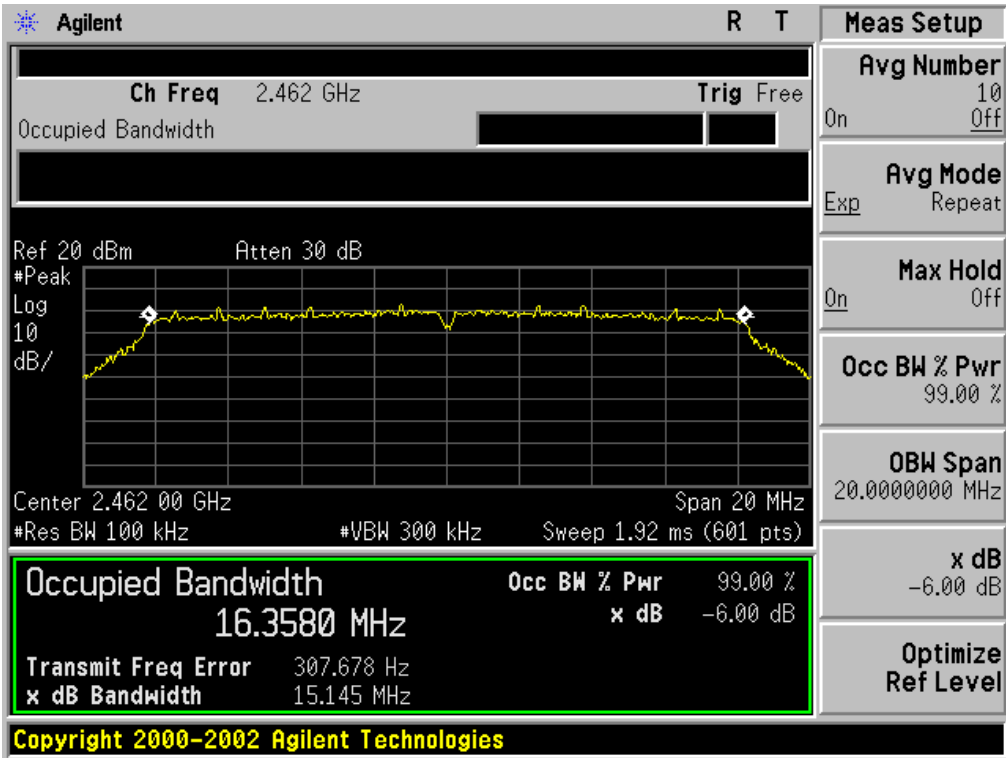
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



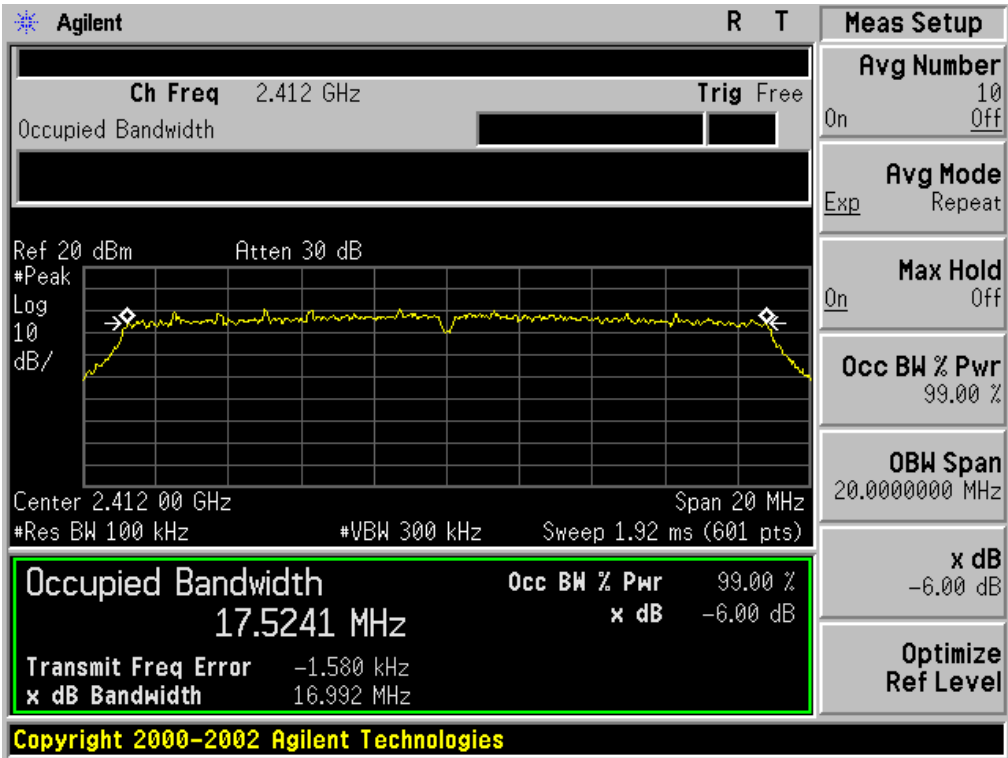
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



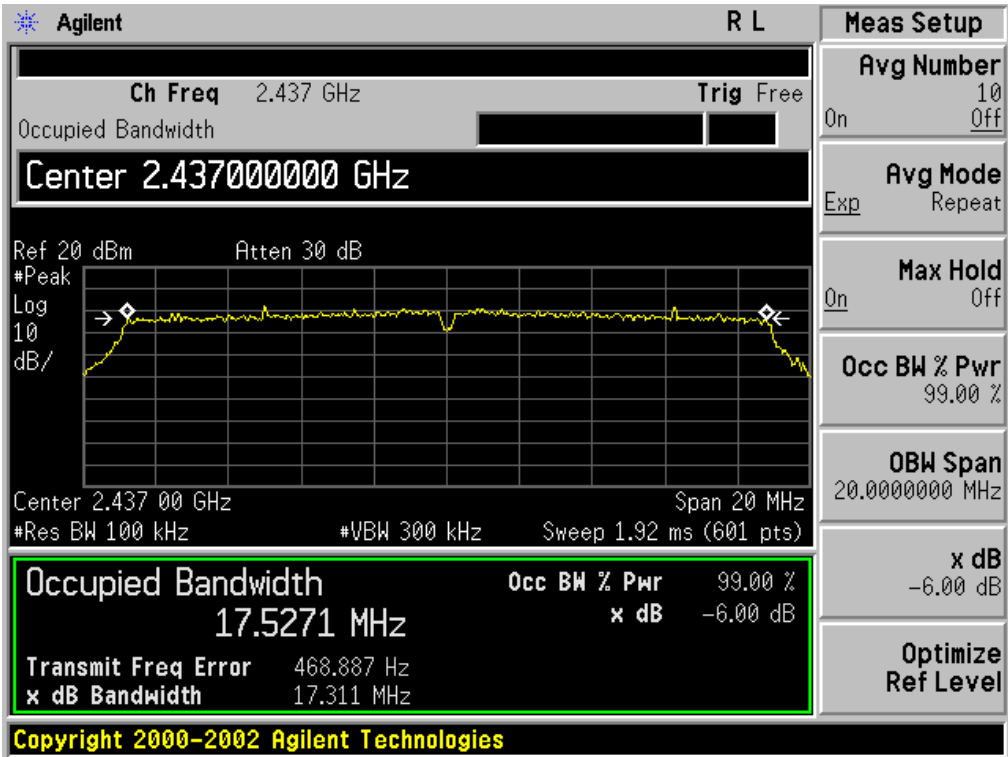
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



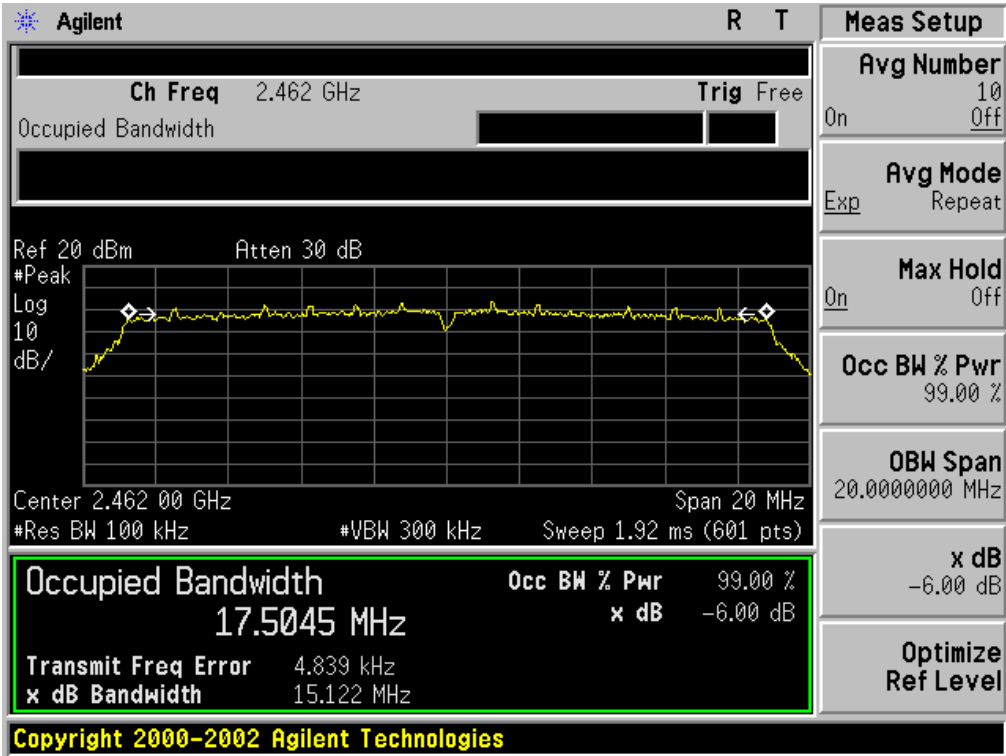
802.11n (20) TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. 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.

Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

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

The same as described in section 8.2.

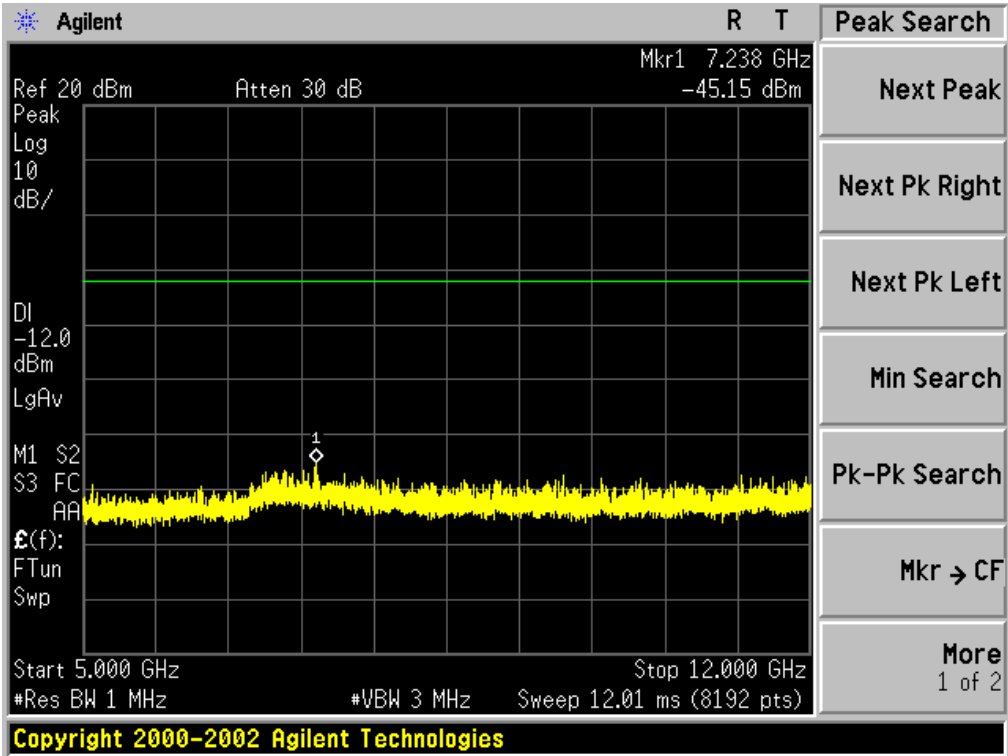
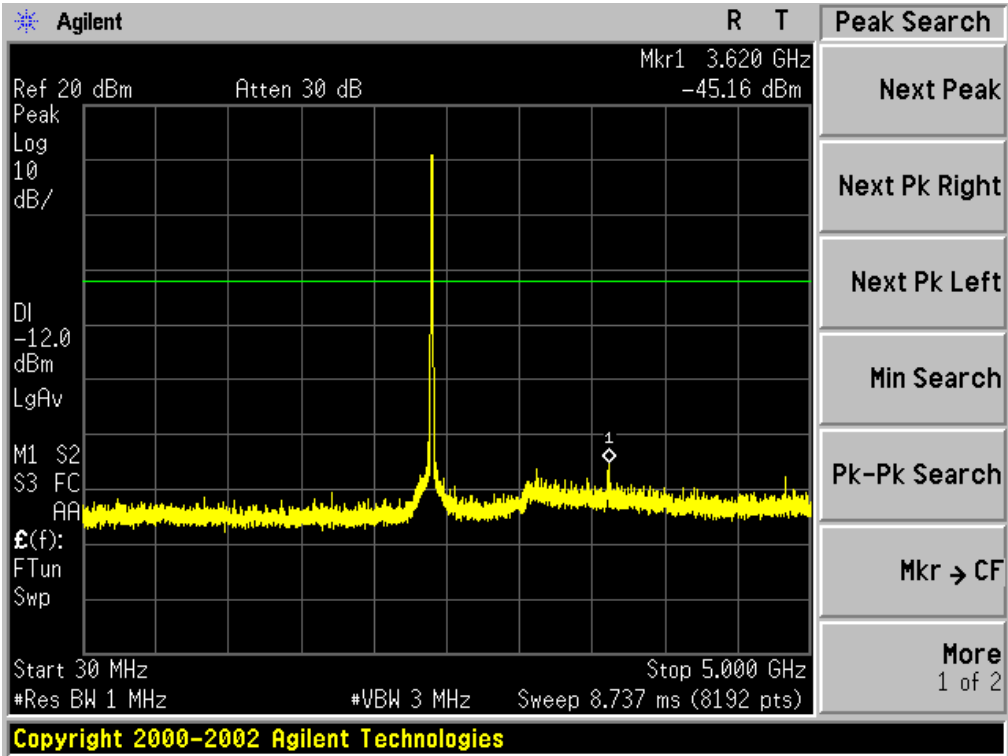
9.3. MEASUREMENT EQUIPMENT USED

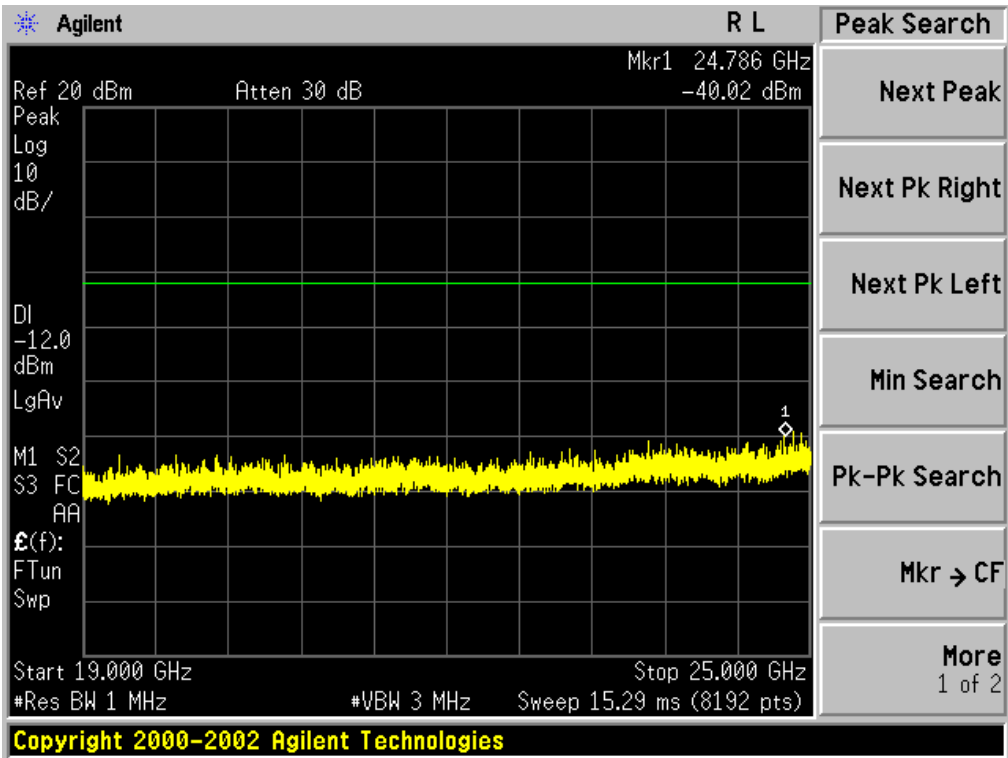
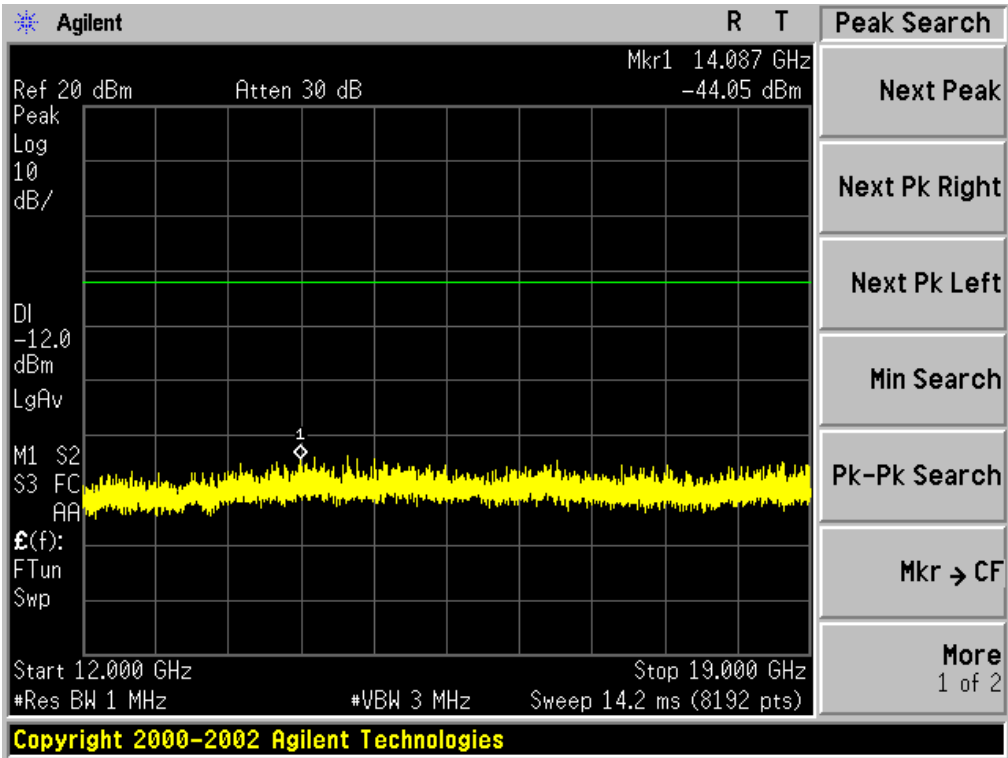
The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

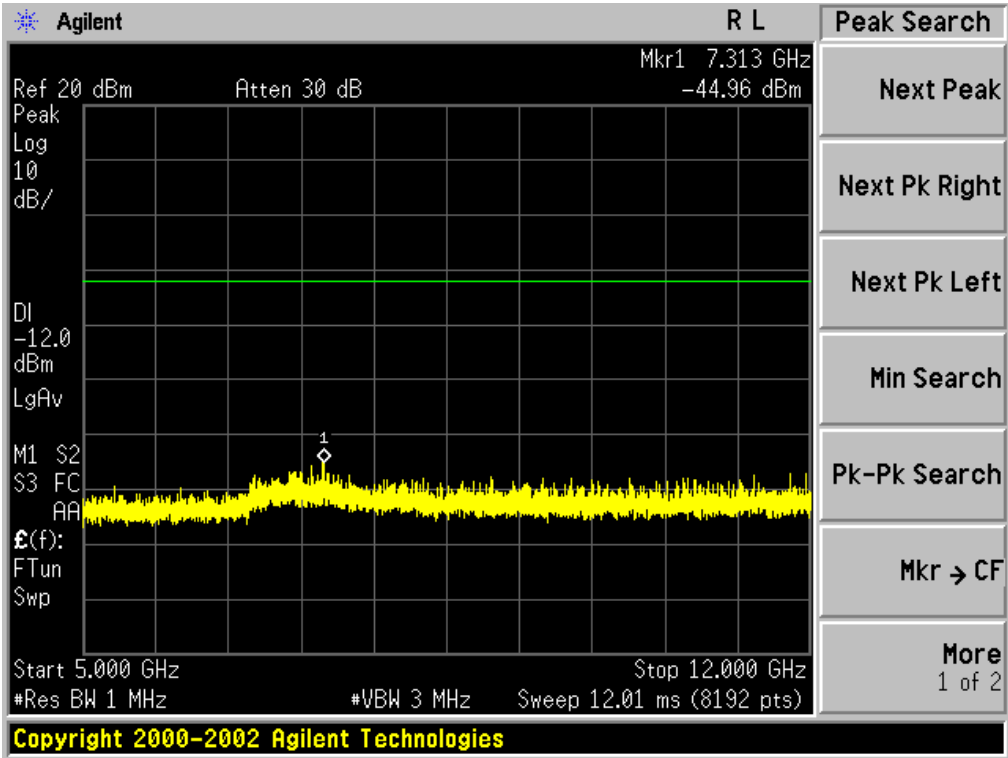
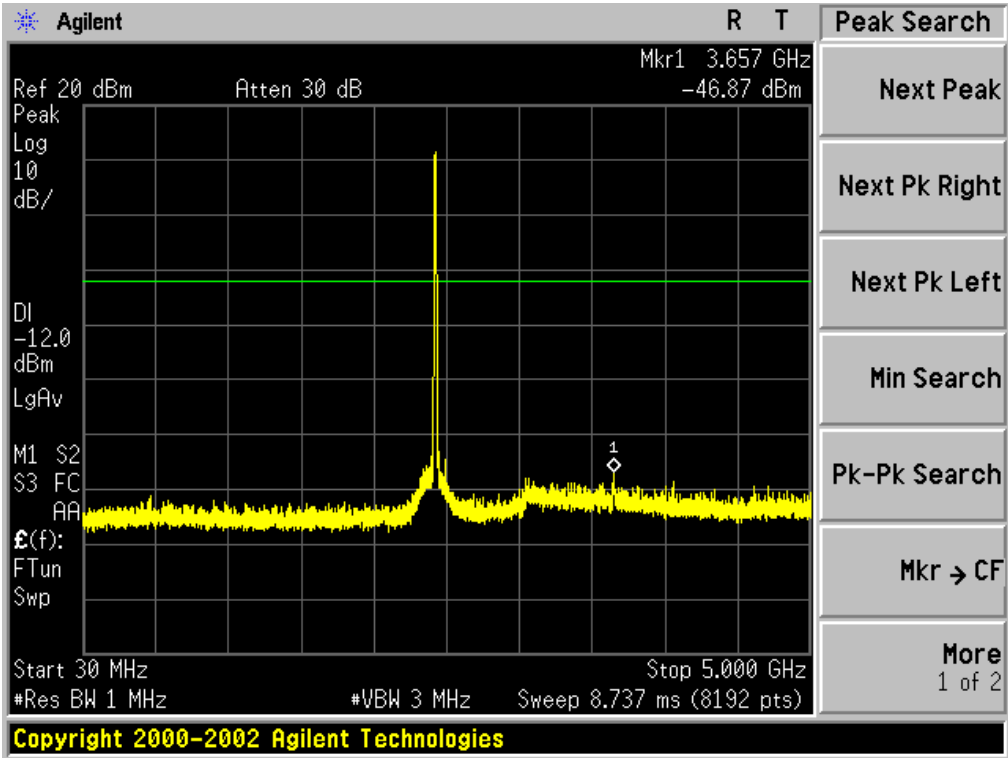
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below 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

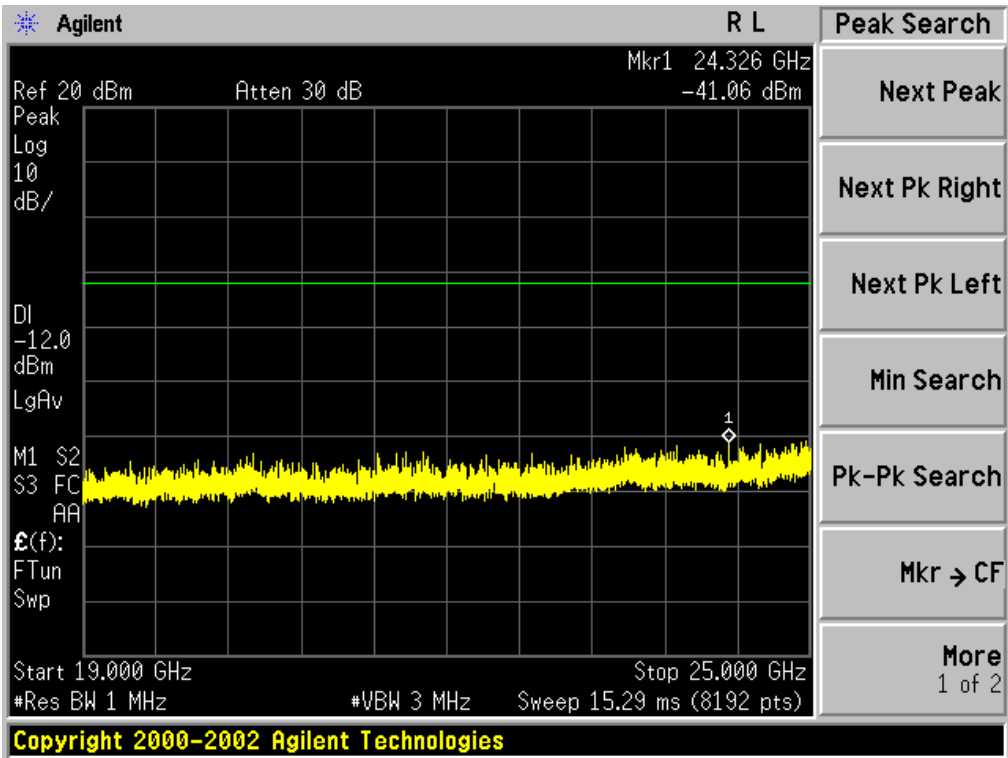
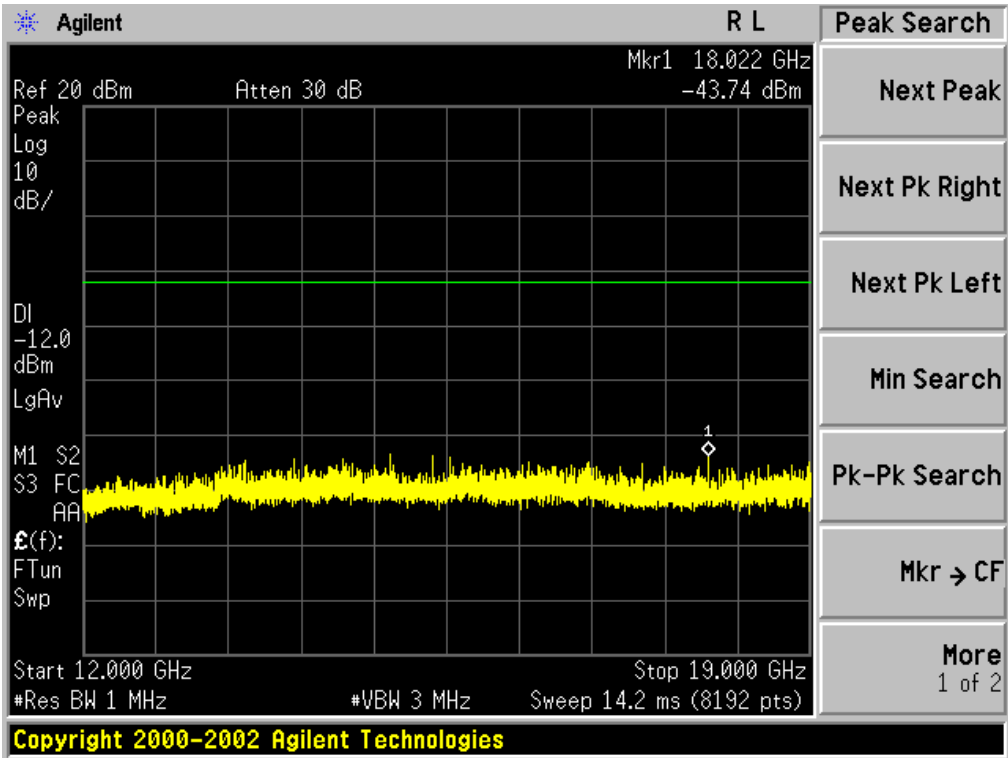
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11b FOR MODULATION IN LOW CHANNEL



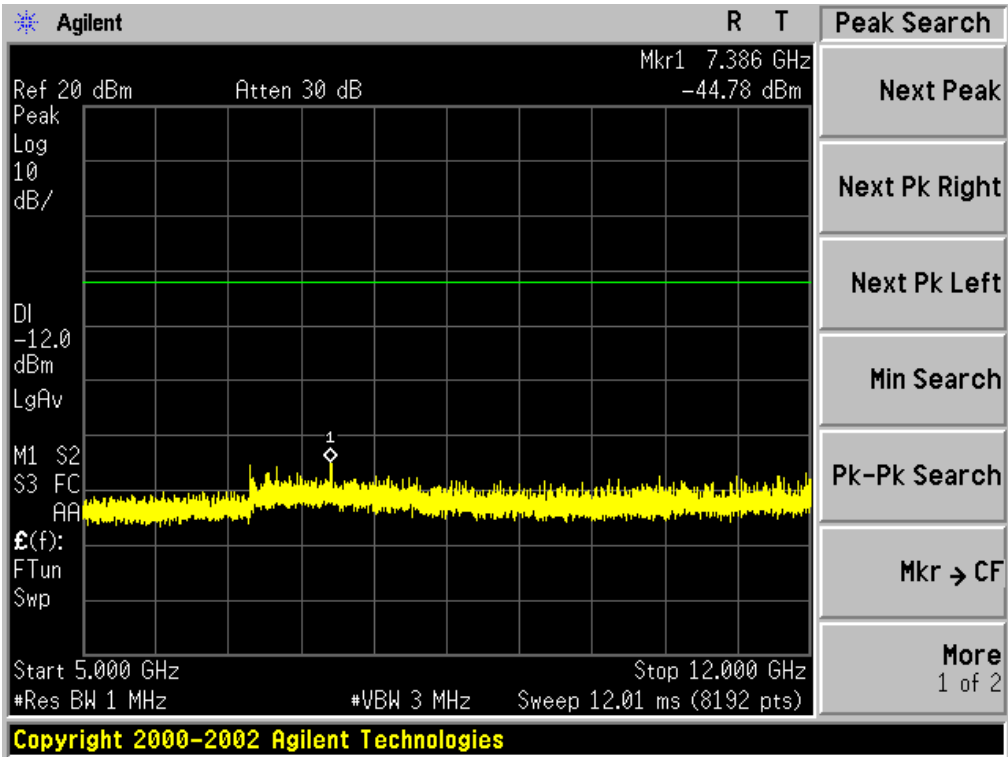
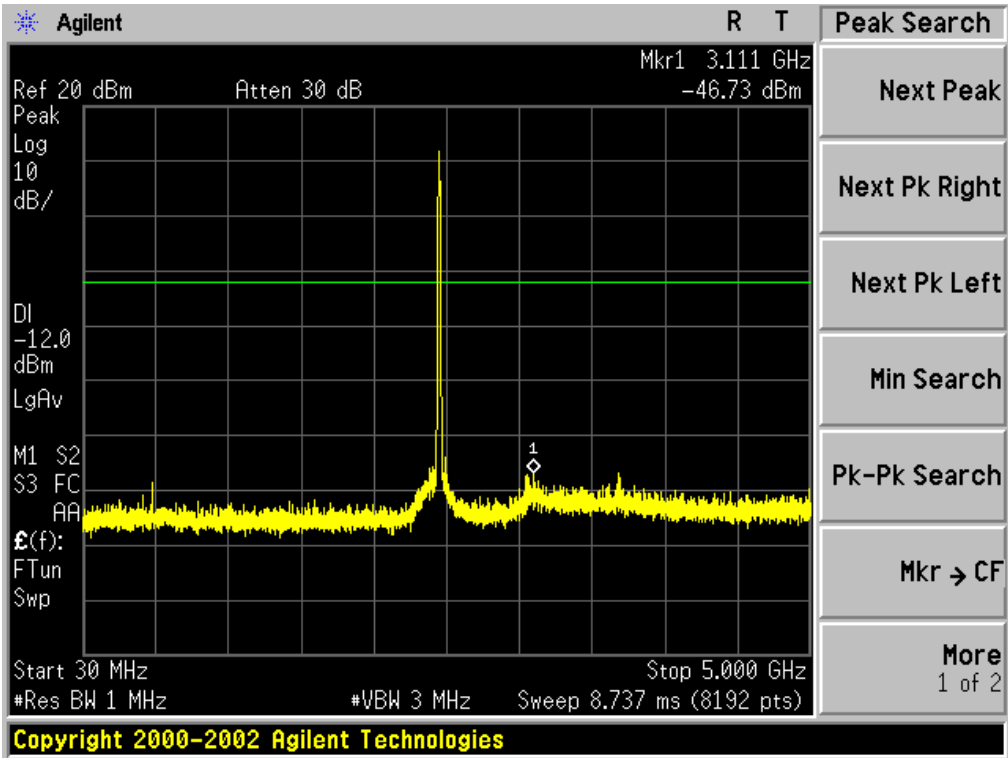


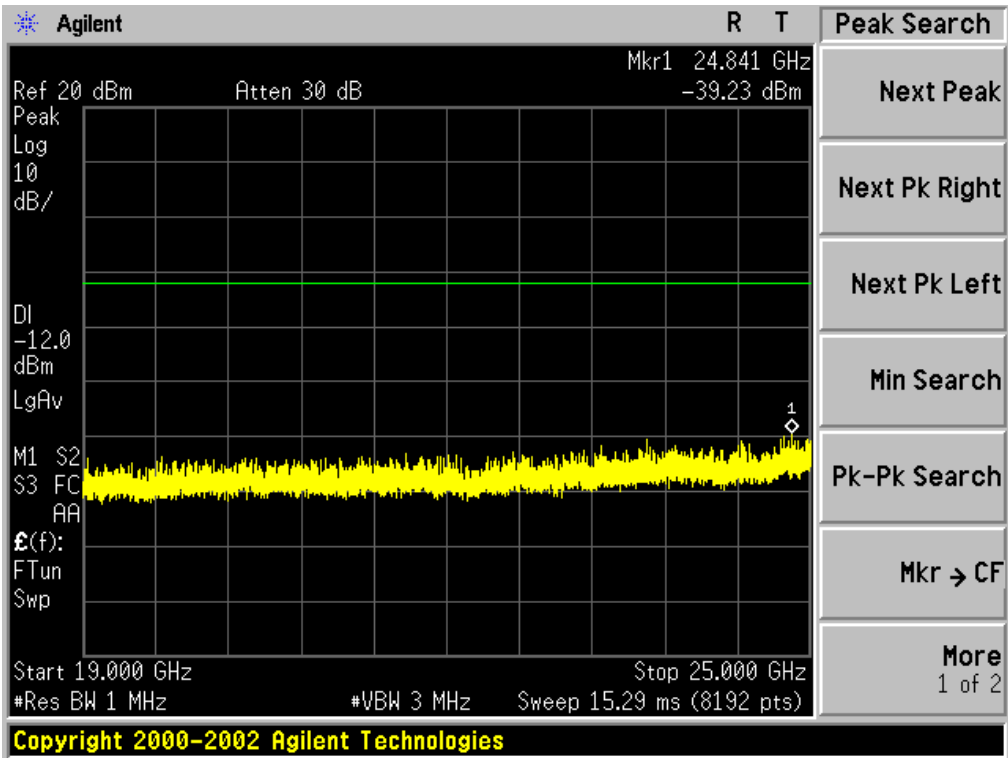
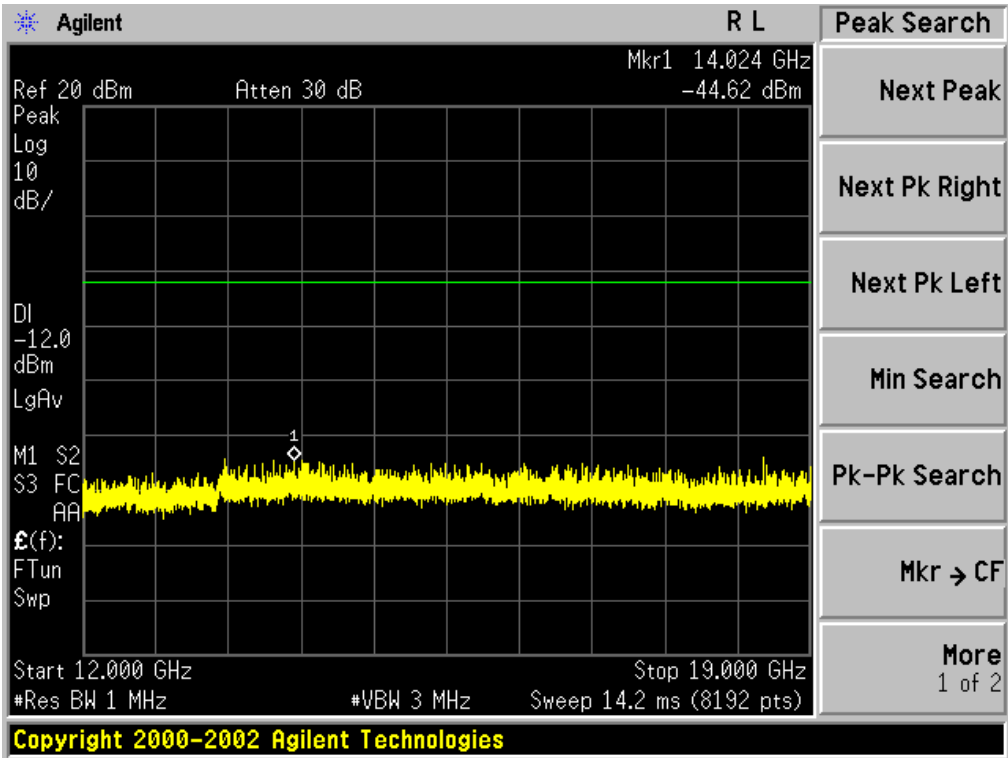
TEST PLOT OF OUT OF BAND EMISSIONS
OF 802.11b FOR MODULATION IN MIDDLE CHANNEL





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





10. MAXIMUM CONDUCTED OUTPUT PEAK POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

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

Channel No.	PSD (dBm)	Limit (dBm)	Result
Low Channel	-6.08	8	Pass
Middle Channel	-6.61	8	Pass
High Channel	-5.25	8	Pass

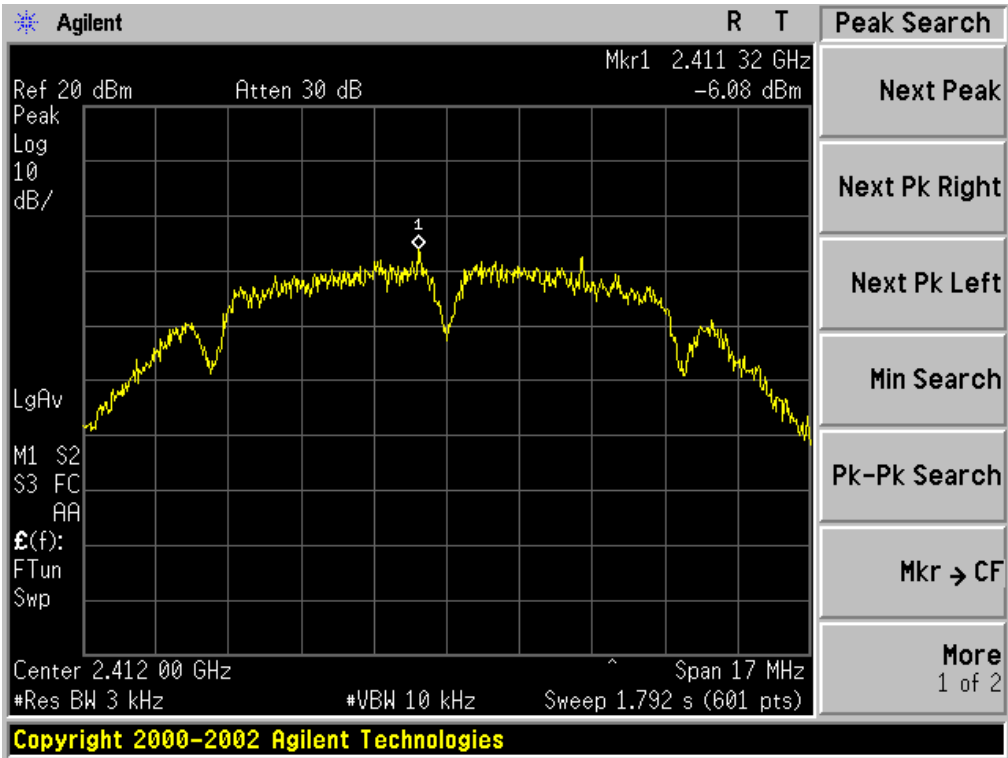
TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11g with data rate 6

Channel No.	PSD (dBm)	Limit (dBm)	Result
Low Channel	-12.64	8	Pass
Middle Channel	-11.54	8	Pass
High Channel	-11.92	8	Pass

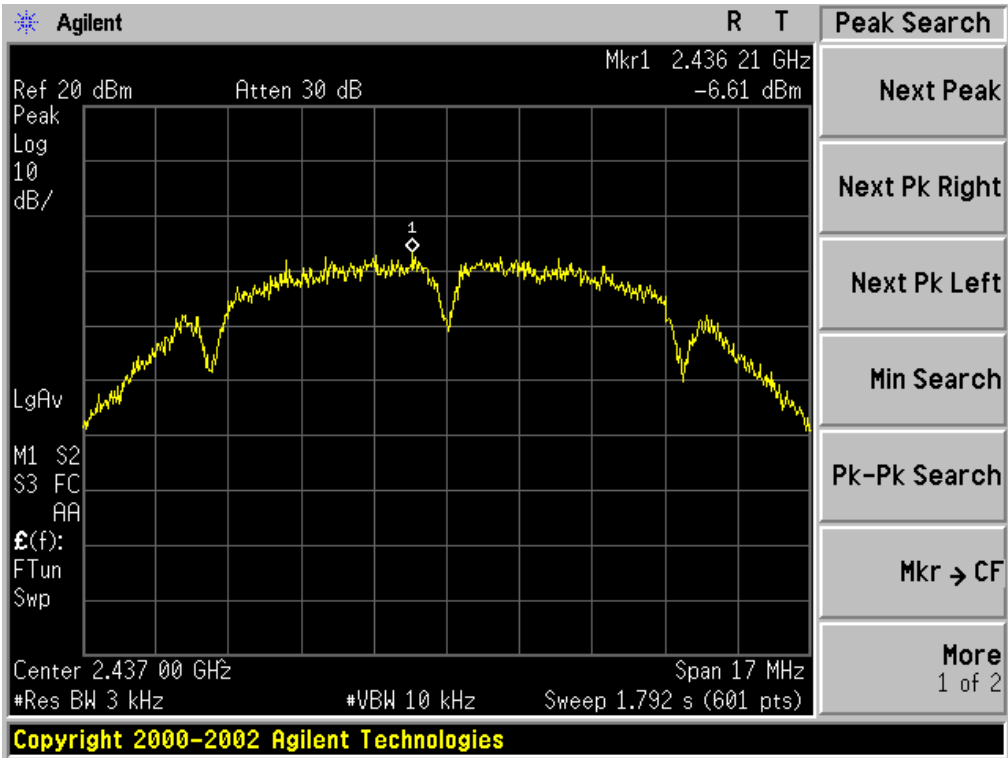
TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11n 20 with data rate 6.5

Channel No.	PSD (dBm)	Limit (dBm)	Result
Low Channel	-12.87	8	Pass
Middle Channel	-12.34	8	Pass
High Channel	-10.4	8	Pass

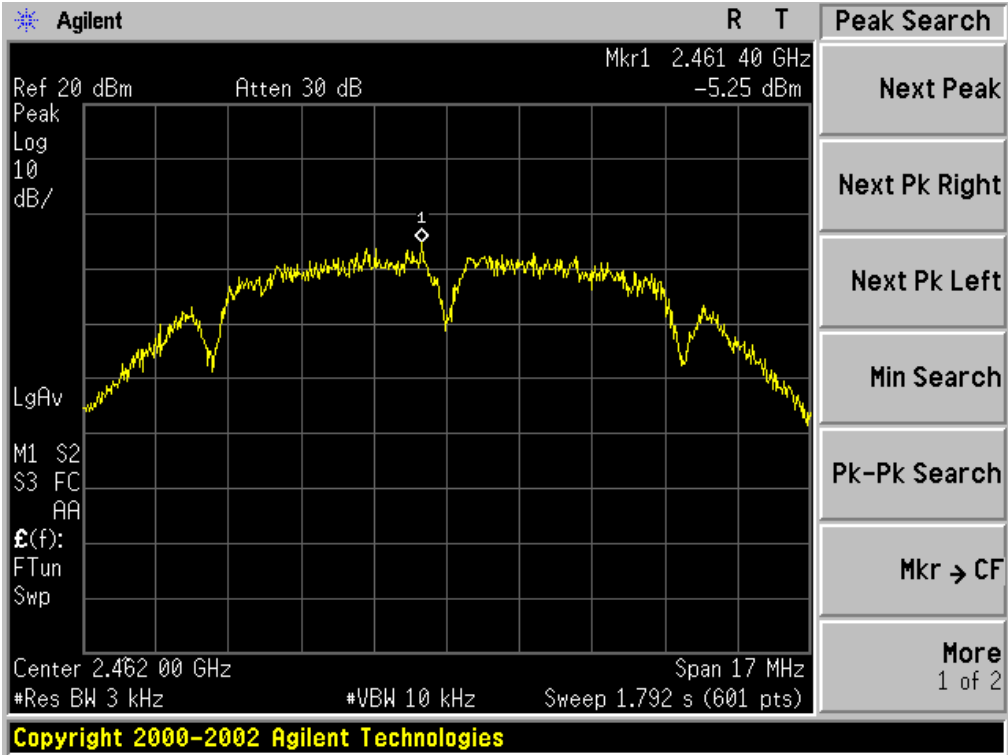
802.11b TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

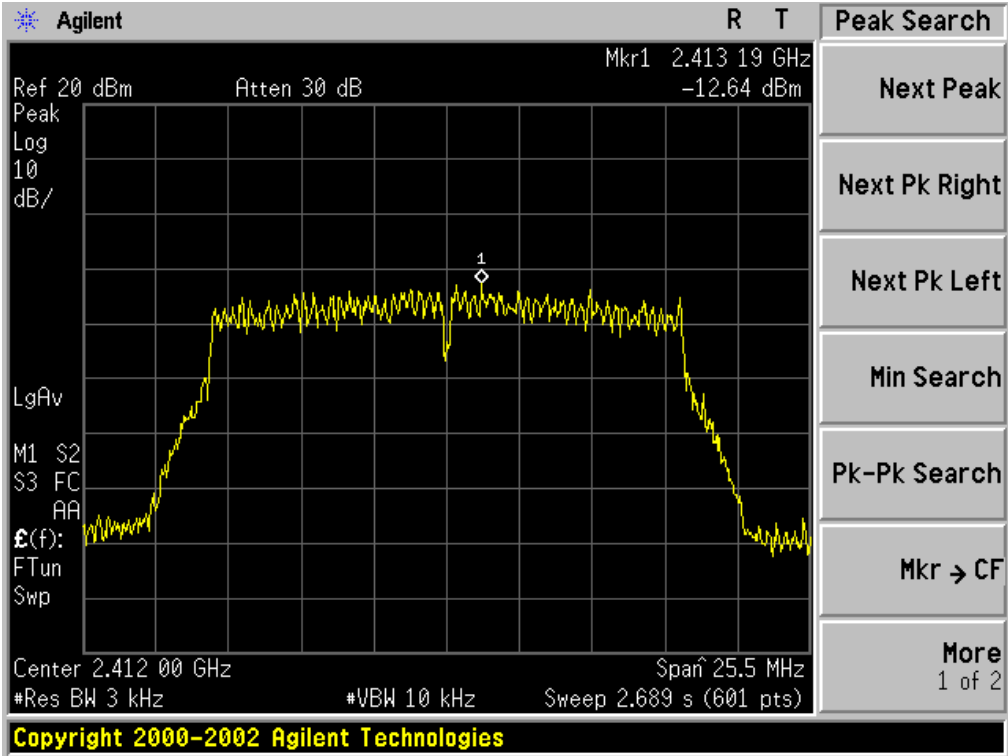


TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL

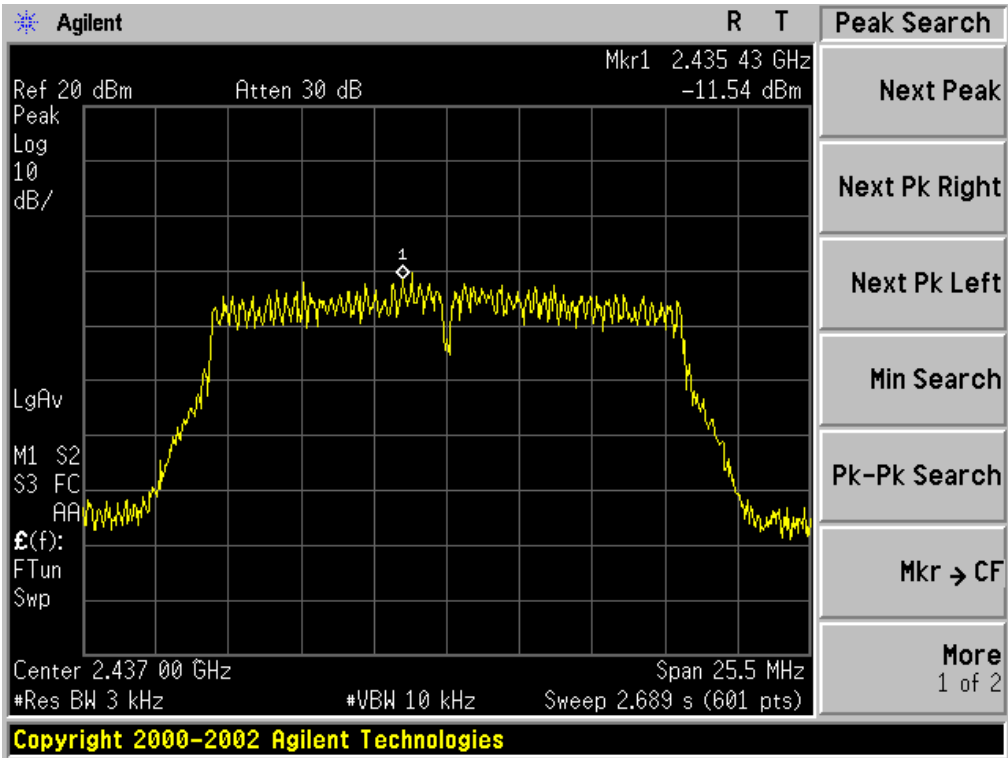


802.11g TEST RESULT

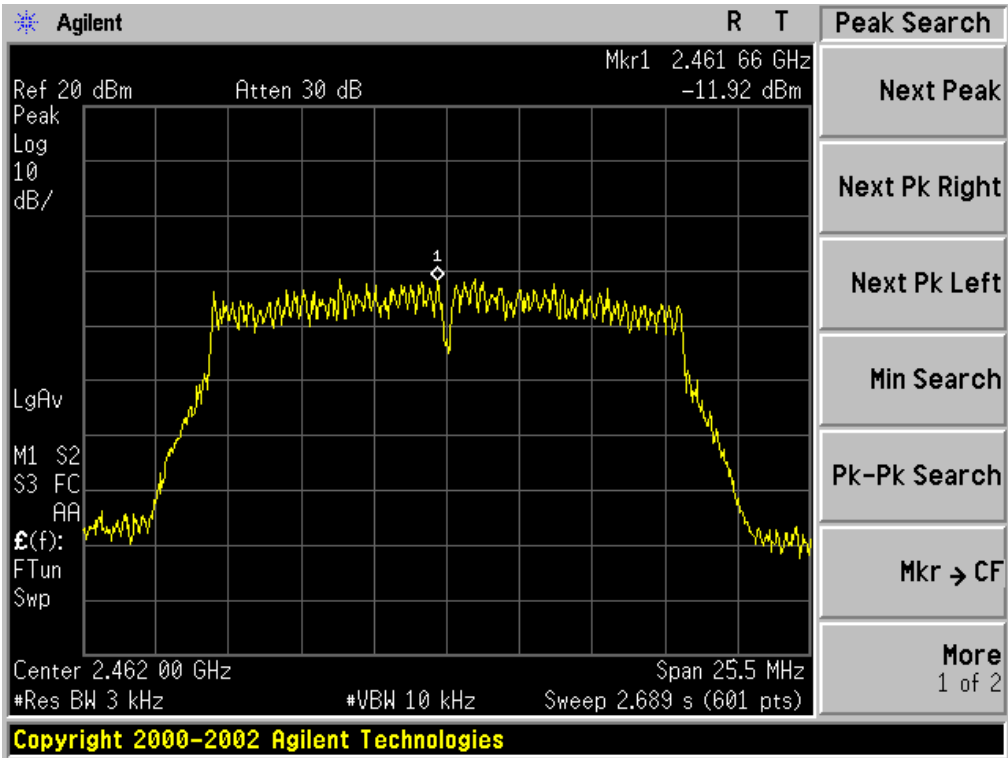
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



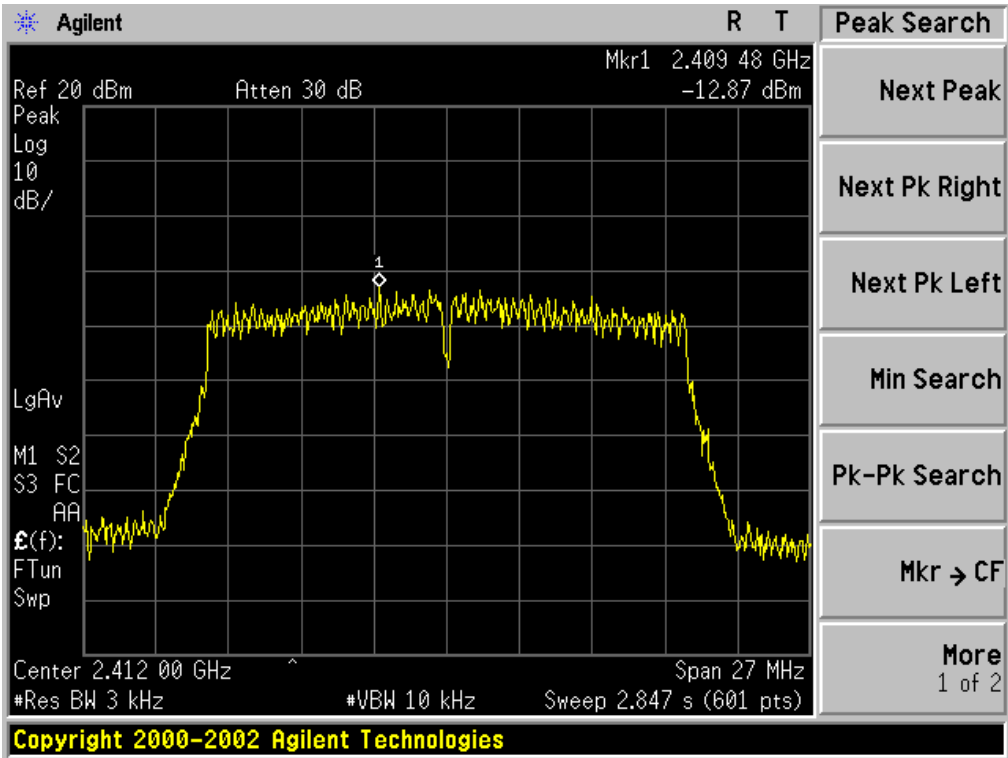
TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



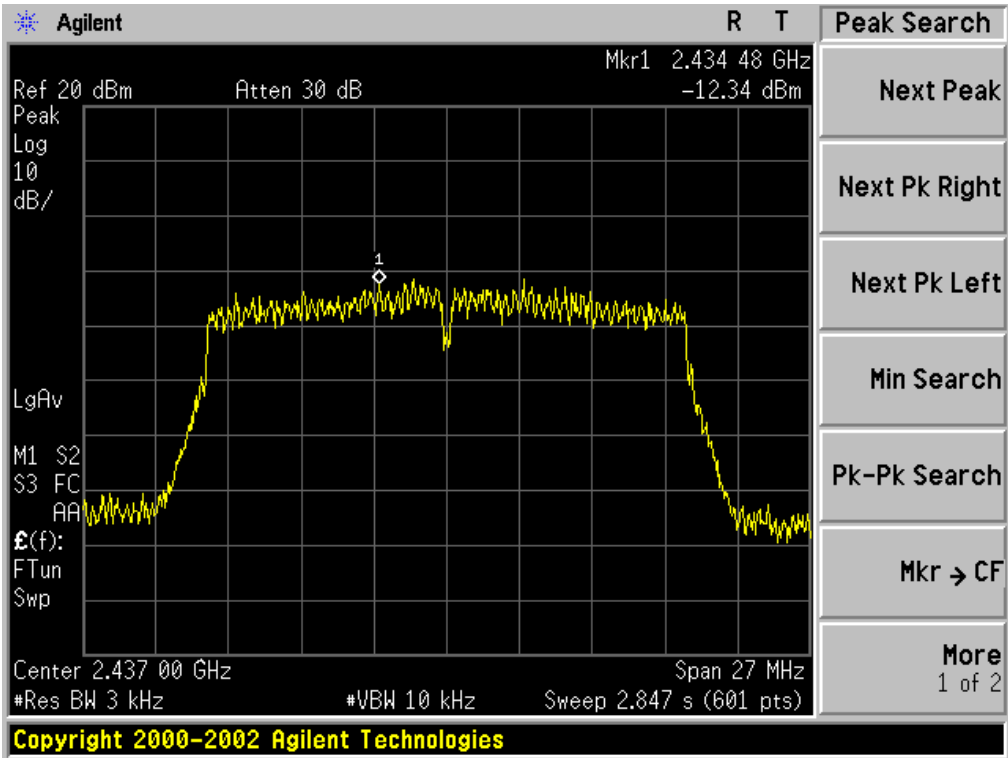
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



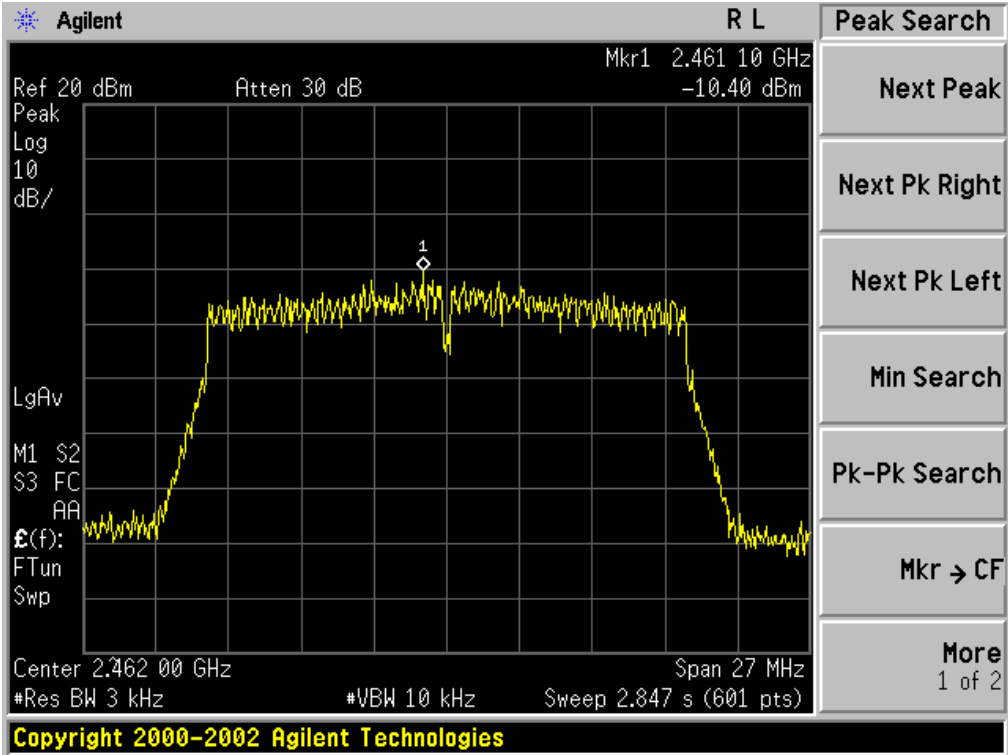
802.11n 20 TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



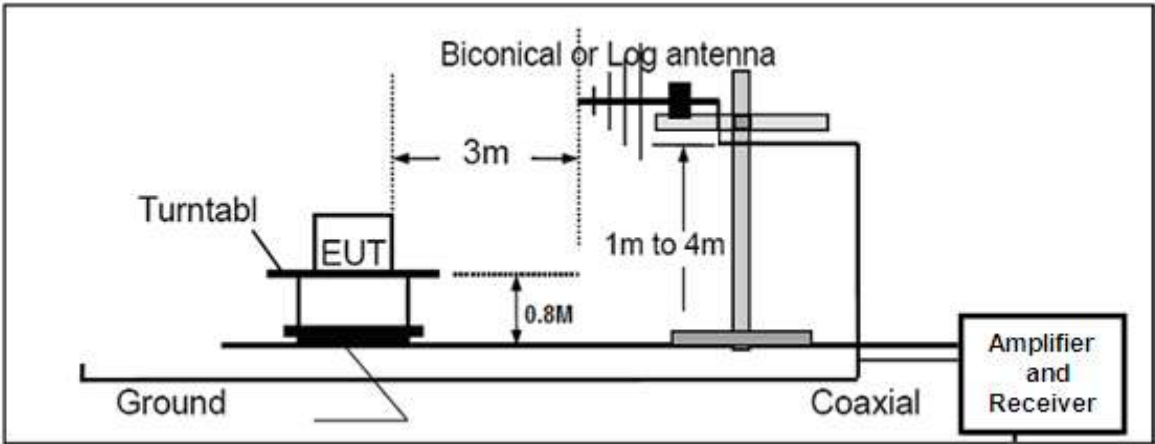
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

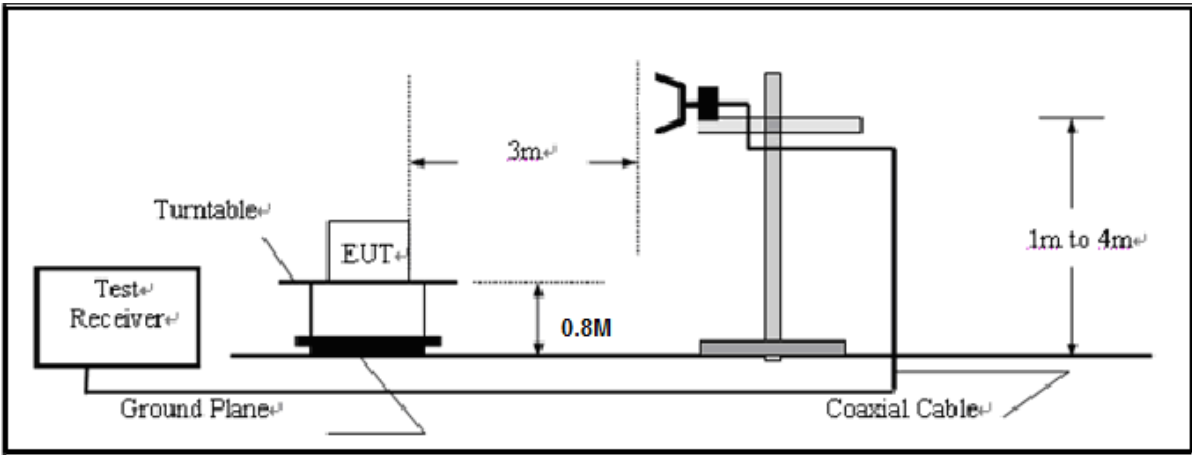
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 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.

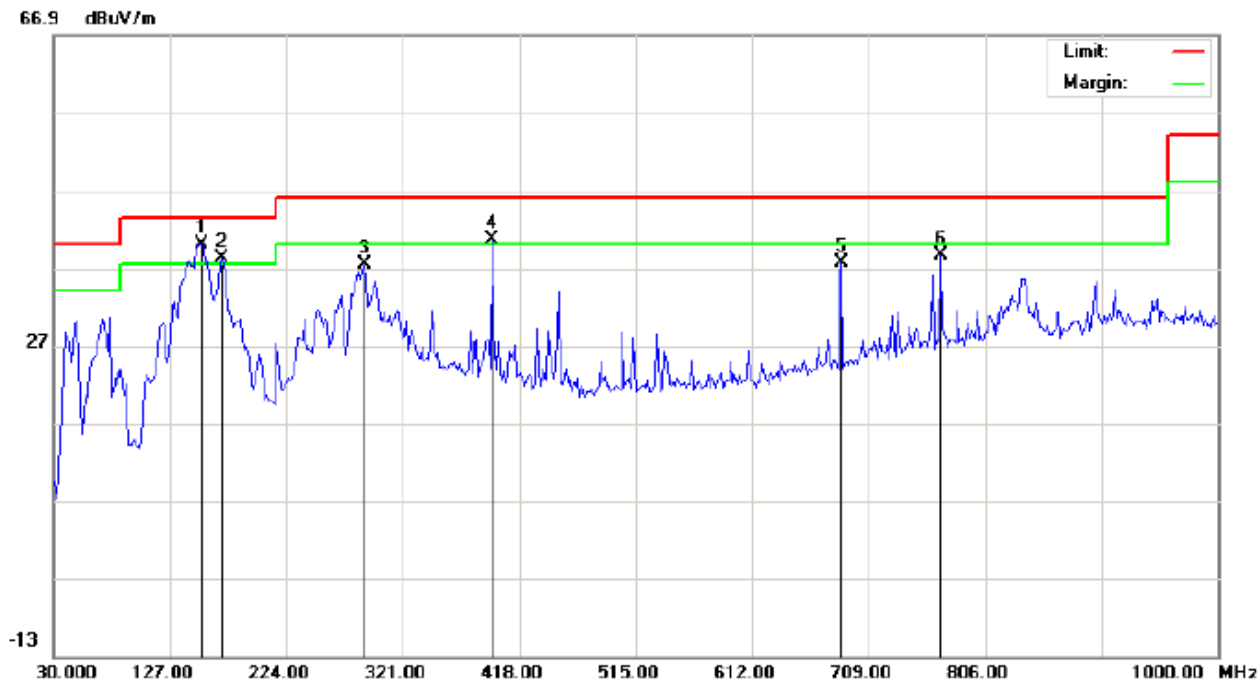
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION BELOW 1GHZ

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Pico Projector
M/N: MPP-14001
Mode: Low Channel TX
Note:

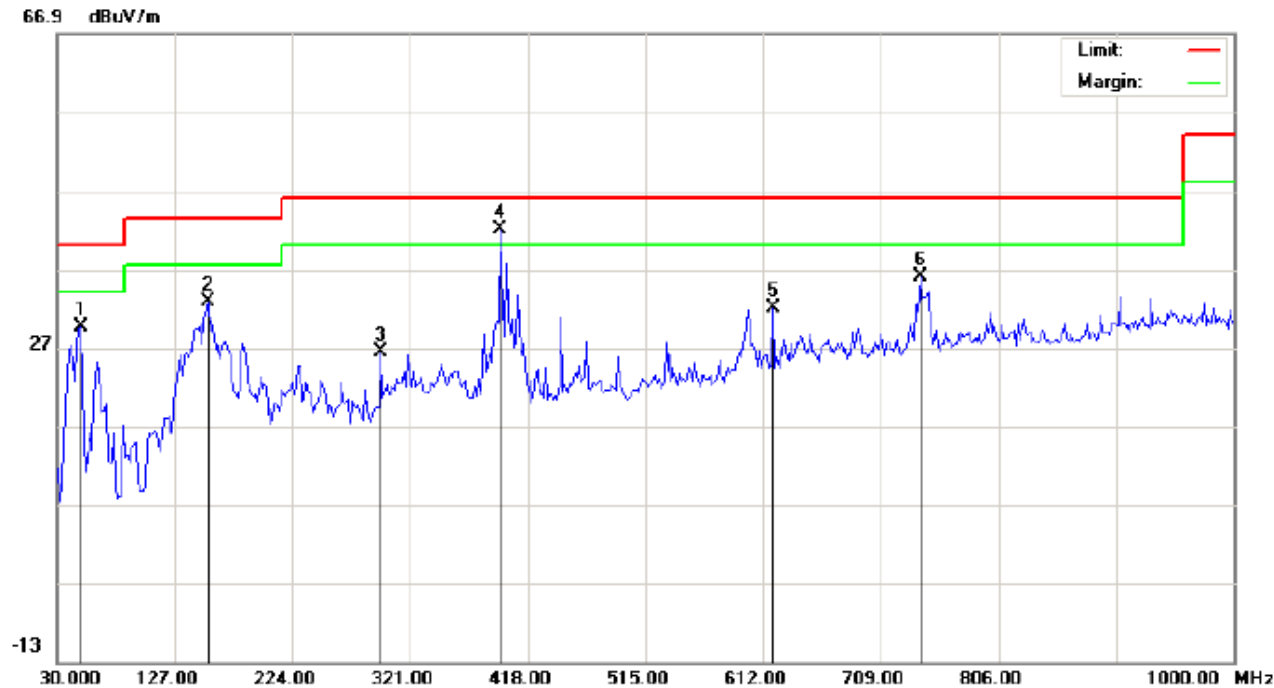
Polarization: **Horizontal**
Power: AC 120V/60Hz
Distance:

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	*	152.8667	24.64	15.28	39.92	43.50	-3.58	peak			
2	!	170.6500	23.58	14.66	38.24	43.50	-5.26	peak			
3		288.6667	22.34	15.07	37.41	46.00	-8.59	peak			
4	!	395.3667	21.54	19.04	40.58	46.00	-5.42	peak			
5		686.3667	12.81	24.82	37.63	46.00	-8.37	peak			
6		768.8167	11.64	26.89	38.53	46.00	-7.47	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Vertical



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Pico Projector
M/N: MPP-14001
Mode: Low Channel TX
Note:

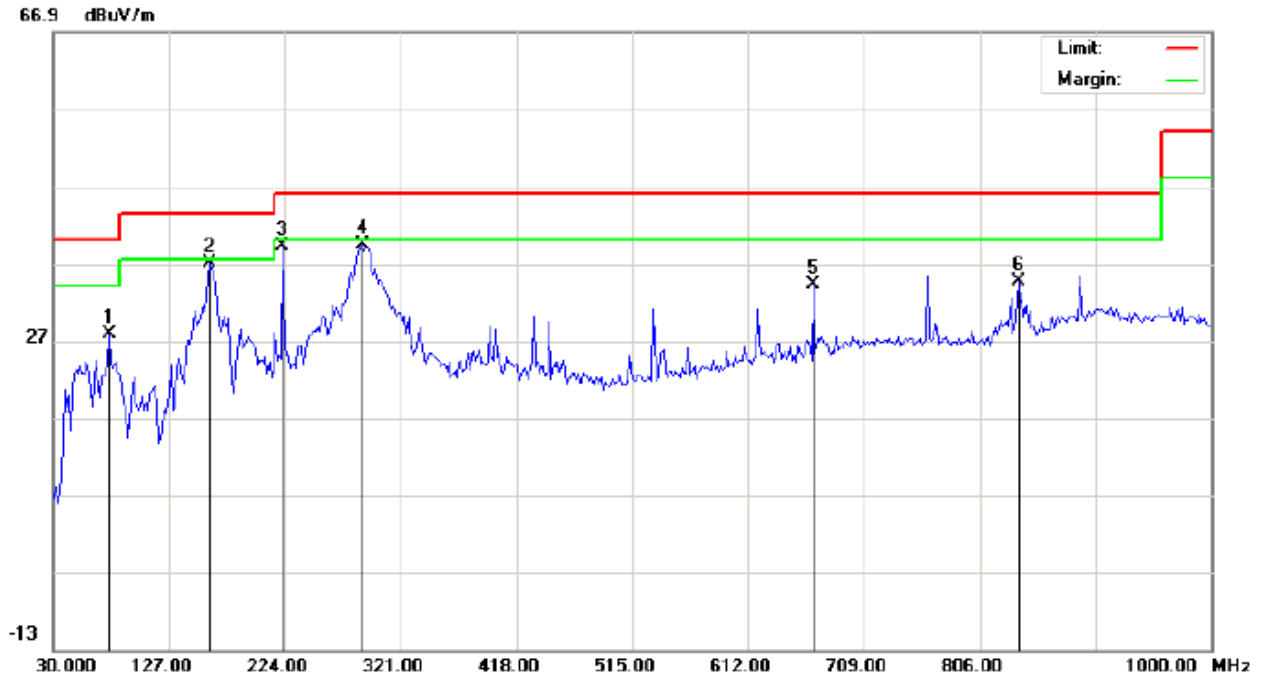
Polarization: **Vertical**
Power: AC 120V/60Hz
Distance:

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		49.4000	21.23	8.28	29.51	40.00	-10.49	peak			
2		154.4833	17.46	15.29	32.75	43.50	-10.75	peak			
3		296.7500	11.09	15.31	26.40	46.00	-19.60	peak			
4	*	395.3667	23.03	19.04	42.07	46.00	-3.93	peak			
5		620.0833	8.79	23.18	31.97	46.00	-14.03	peak			
6		741.3333	9.64	26.38	36.02	46.00	-9.98	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Horizontal



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Pico Projector
M/N: MPP-14001
Mode: Middle Channel TX
Note:

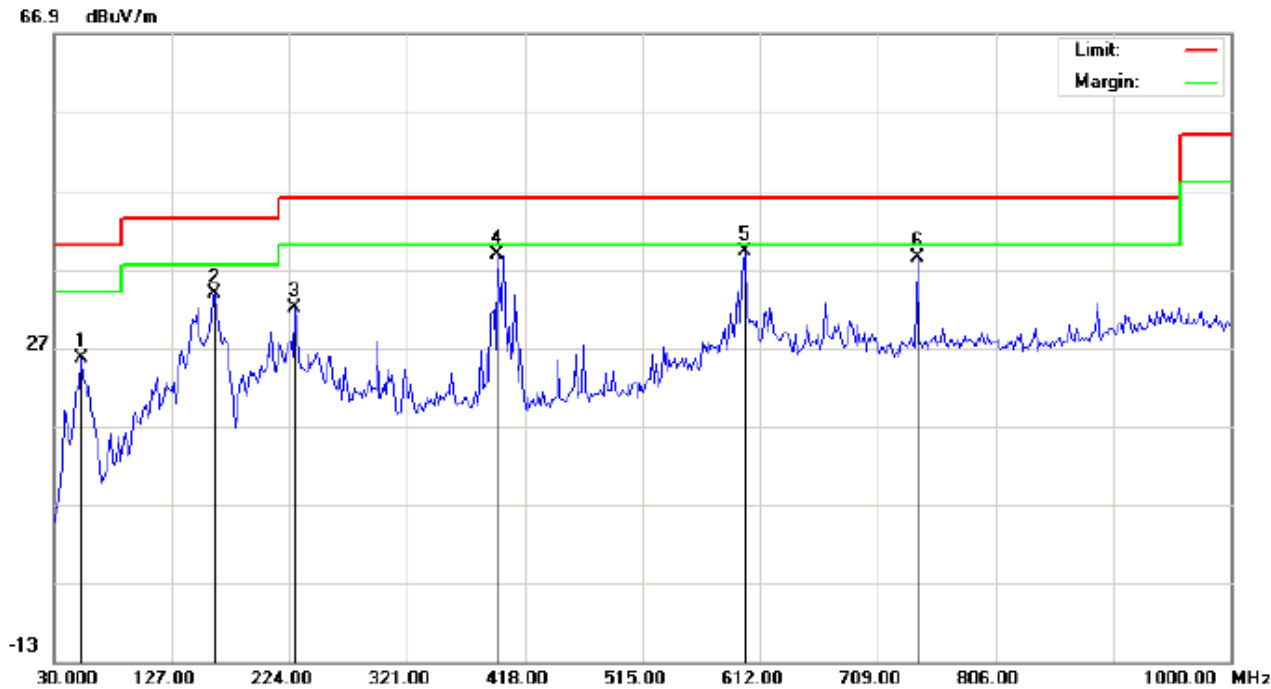
Polarization: **Horizontal**
Power: AC 120V/60Hz
Distance:

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	17.80	9.94	27.74	40.00	-12.26	peak			
2	*	160.9500	21.96	15.13	37.09	43.50	-6.41	peak			
3		222.3833	26.36	12.85	39.21	46.00	-6.79	peak			
4		288.6667	24.38	15.07	39.45	46.00	-6.55	peak			
5		666.9666	9.93	24.30	34.23	46.00	-11.77	peak			
6		838.3333	7.33	27.31	34.64	46.00	-11.36	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Vertical

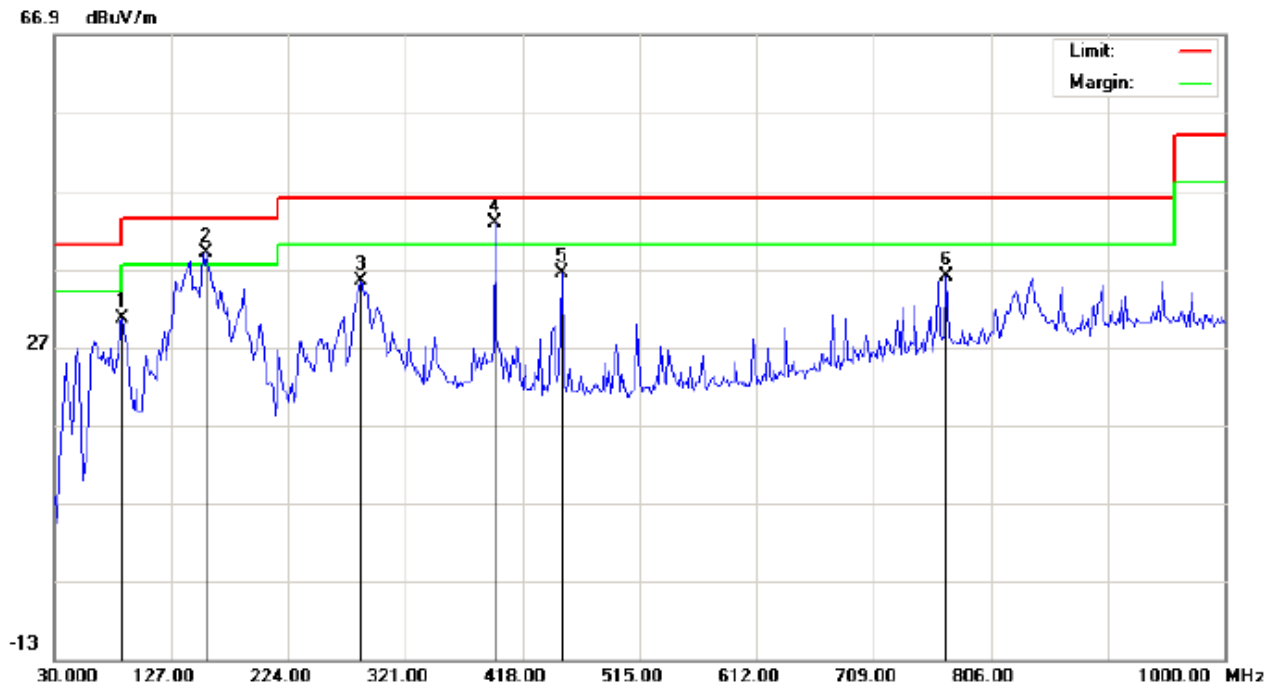


Site: site #1	Polarization: Vertical	Temperature: 26
Limit: FCC Class B 3M Radiation	Power: AC 120V/60Hz	Humidity: 60 %
EUT: Pico Projector	Distance:	
M/N: MPP-14001		
Mode: Middle Channel TX		
Note:		

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		52.6333	14.40	11.22	25.62	40.00	-14.38	peak			
2		162.5667	19.00	14.78	33.78	43.50	-9.72	peak			
3		228.8500	18.92	13.10	32.02	46.00	-13.98	peak			
4		395.3667	19.82	19.04	38.86	46.00	-7.14	peak			
5	*	599.0667	15.53	23.71	39.24	46.00	-6.76	peak			
6		741.3333	12.09	26.38	38.47	46.00	-7.53	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: Pico Projector

M/N: MPP-14001

Mode: High Channel TX

Note:

Polarization: **Horizontal**

Power: AC 120V/60Hz

Distance:

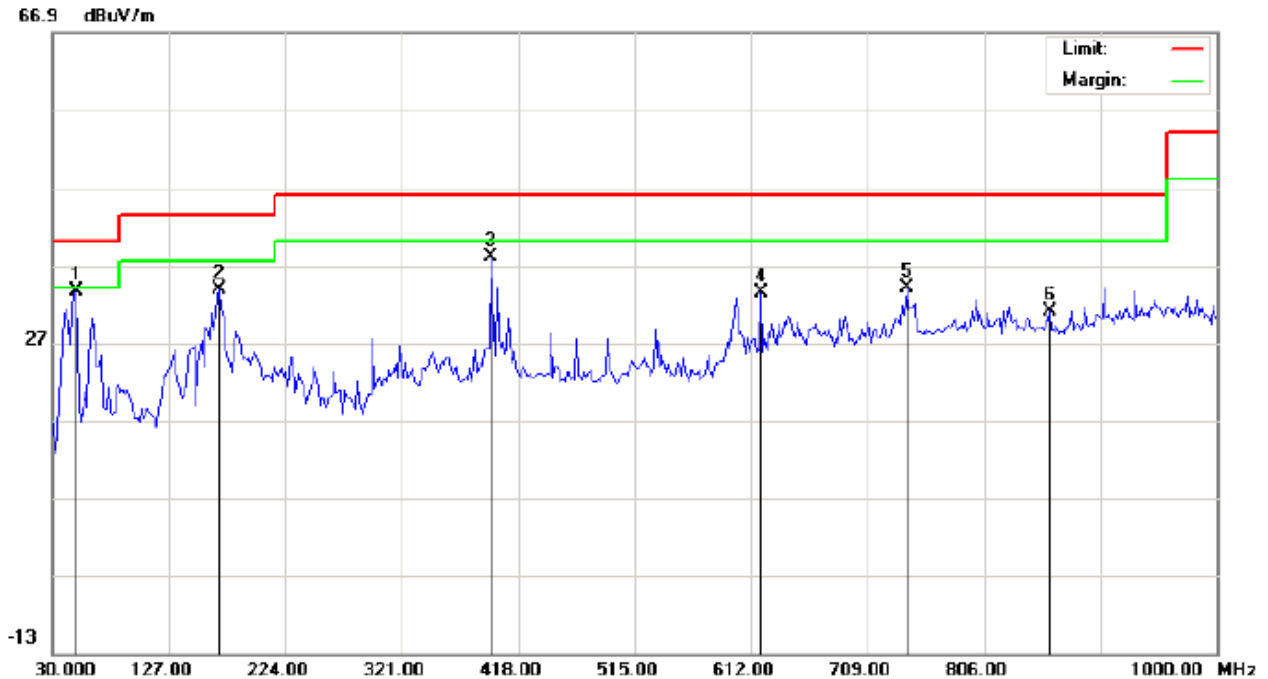
Temperature: 26

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		86.5833	26.46	4.16	30.62	40.00	-9.38	peak			
2	!	156.1000	23.73	15.30	39.03	43.50	-4.47	peak			
3		283.8167	20.56	14.92	35.48	46.00	-10.52	peak			
4	*	395.3667	23.69	19.04	42.73	46.00	-3.27	peak			
5		450.3333	15.89	20.59	36.48	46.00	-9.52	peak			
6		768.8167	9.21	26.89	36.10	46.00	-9.90	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 60 %

EUT: Pico Projector

Distance:

M/N: MPP-14001

Mode: High Channel TX

Note:

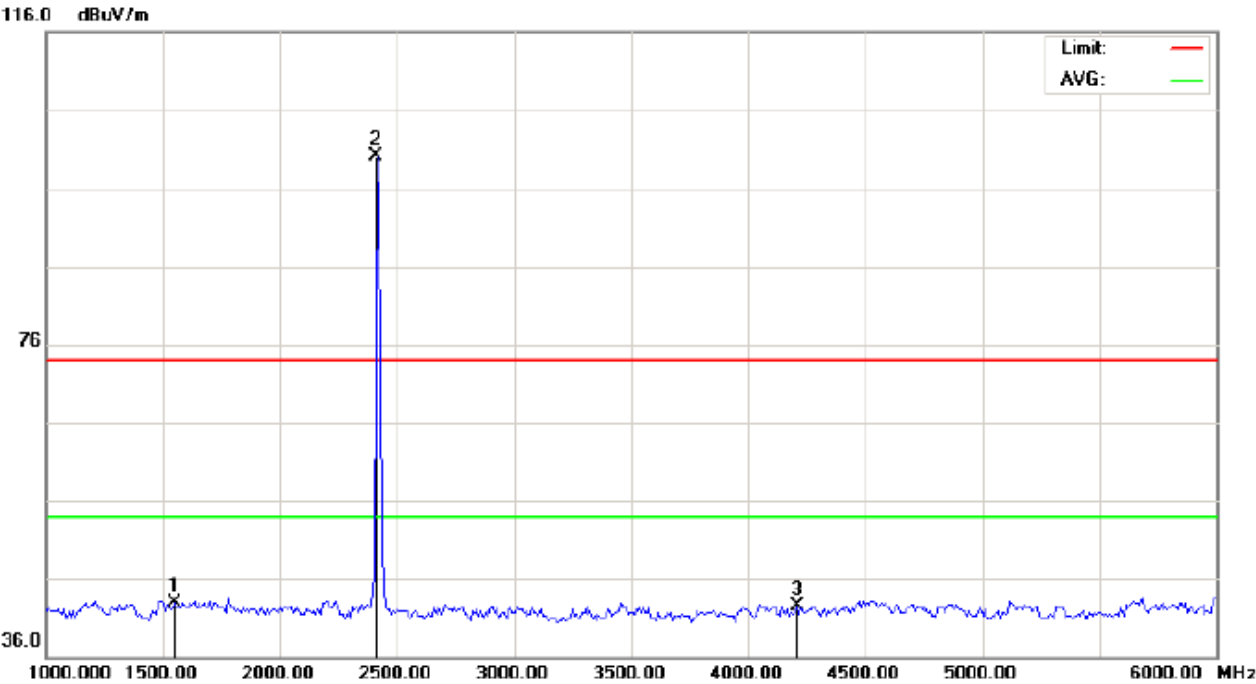
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	49.4000	25.23	8.28	33.51	40.00	-6.49	peak			
2		169.0333	18.96	14.76	33.72	43.50	-9.78	peak			
3		395.3667	19.03	19.04	38.07	46.00	-7.93	peak			
4		620.0833	10.29	23.18	33.47	46.00	-12.53	peak			
5		741.3333	7.64	26.38	34.02	46.00	-11.98	peak			
6		860.9667	3.46	27.60	31.06	46.00	-14.94	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION ABOVE 1GHZ

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Horizontal

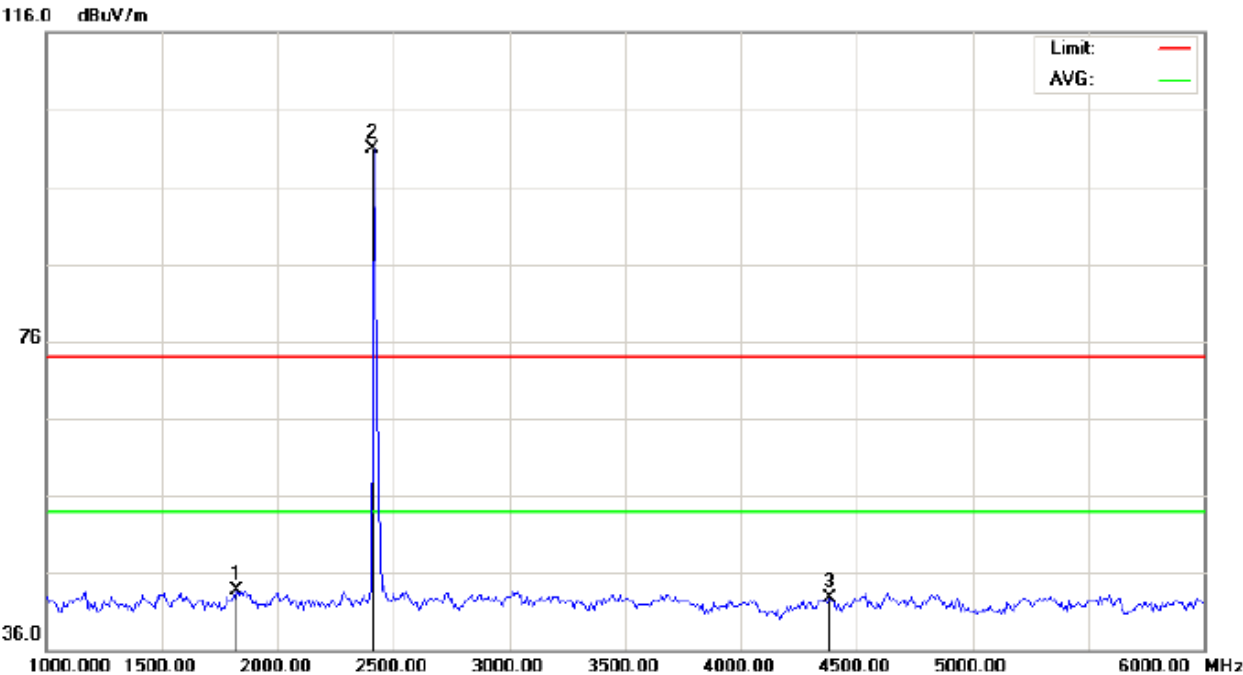


Site: site #1	Polarization: Horizontal	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Pico Projector	Distance: 3m	
M/N: MPP-14001		
Mode: 802.11b Low Channel TX		
Note:		

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		1550.000	57.77	-14.85	42.92	74.00	-31.08	peak			
2	*	2412.000	109.78	-9.67	100.11	74.00	26.11	peak			
3		4208.333	46.59	-4.10	42.49	74.00	-31.51	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Vertical

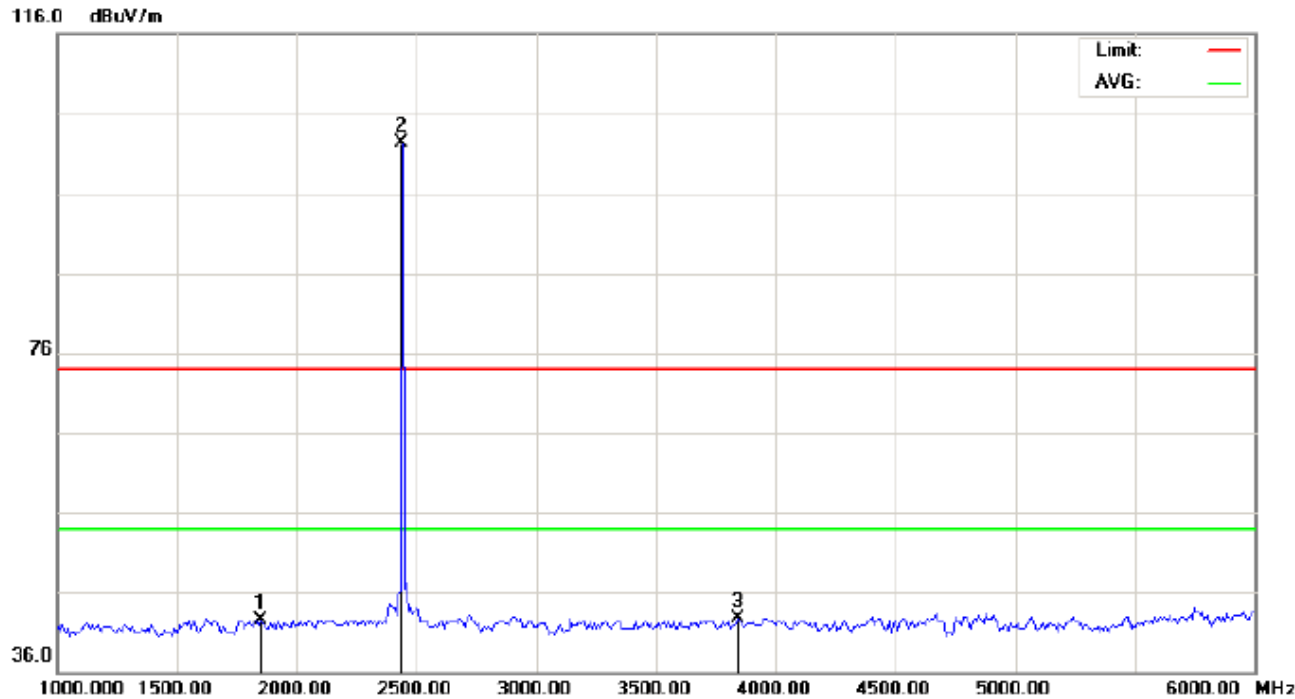


Site: site #1 Polarization: *Vertical* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Pico Projector Distance: 3m
M/N: MPP-14001
Mode: 802.11b Low Channel TX
Note:

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		1825.000	55.74	-11.96	43.78	74.00	-30.22	peak			
2	*	2412.000	110.57	-9.67	100.90	74.00	26.90	peak			
3		4383.333	46.27	-3.51	42.76	74.00	-31.24	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Horizontal

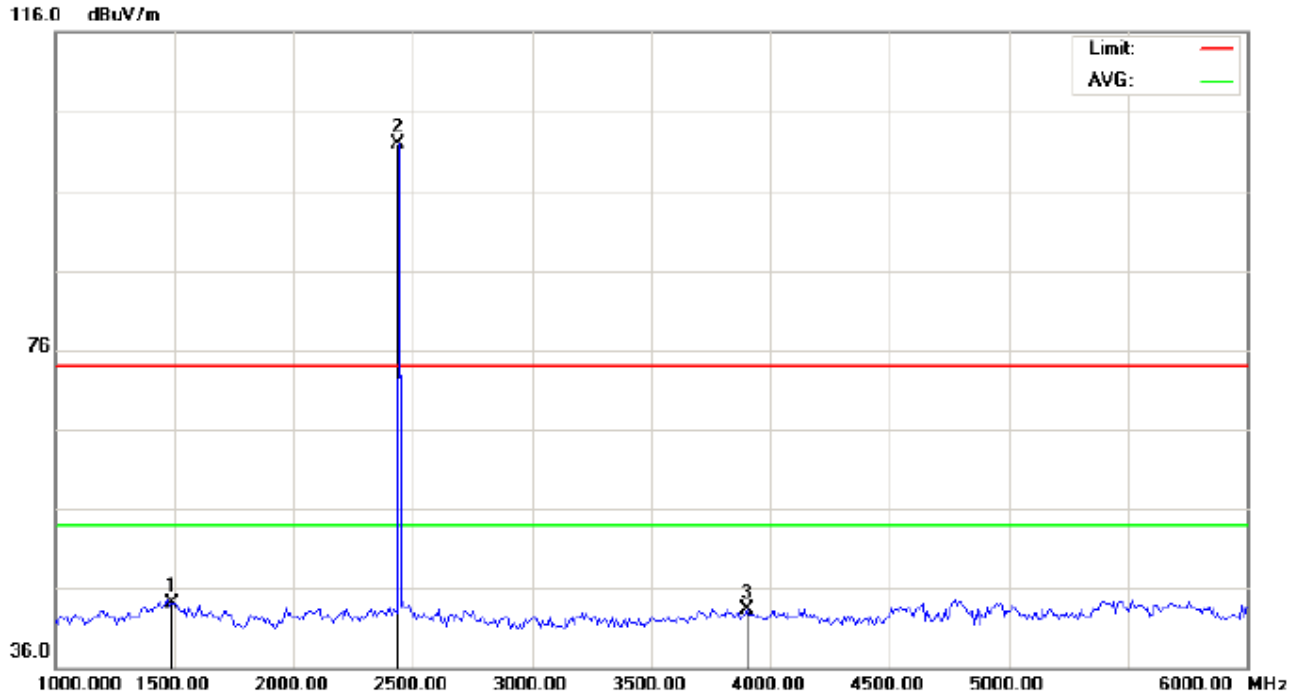


Site: site #1	Polarization: <i>Horizontal</i>	Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK)	Power:	Humidity: 60 %
EUT: Pico Projector	Distance: 3m	
M/N: MPP-14001		
Mode: 802.11b Middle Channel TX		
Note:		

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		1850.000	54.17	-11.70	42.47	74.00	-31.53	peak			
2	*	2437.000	111.85	-9.64	102.21	74.00	28.21	peak			
3		3841.667	48.47	-5.79	42.68	74.00	-31.32	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Vertical

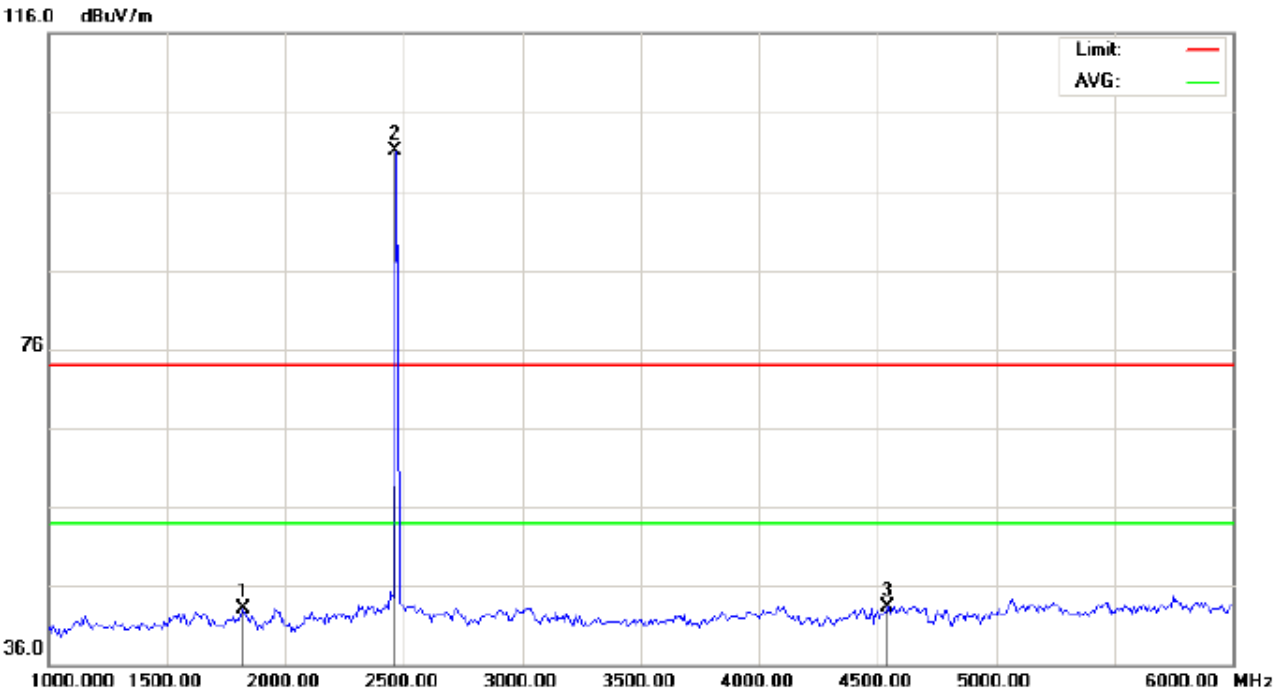


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Pico Projector Distance: 3m
M/N: MPP-14001
Mode: 802.11b Middle Channel TX
Note:

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		1491.667	59.55	-15.38	44.17	74.00	-29.83	peak			
2	*	2437.000	111.64	-9.64	102.00	74.00	28.00	peak			
3		3900.000	48.75	-5.43	43.32	74.00	-30.68	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Horizontal

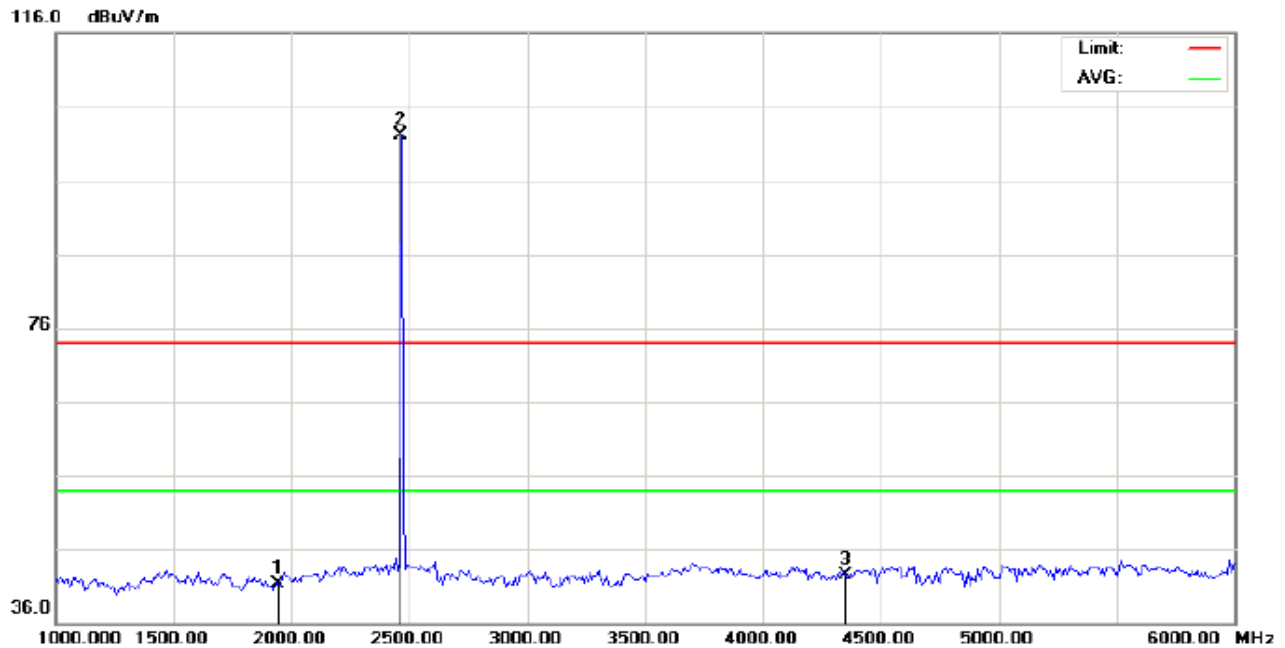


Site: site #1 Polarization: *Horizontal* Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Pico Projector Distance: 3m
M/N: MPP-14001
Mode: 802.11b High Channel TX
Note:

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		1825.000	55.06	-11.96	43.10	74.00	-30.90	peak			
2	*	2462.000	110.74	-9.61	101.13	74.00	27.13	peak			
3		4541.667	46.38	-3.00	43.38	74.00	-30.62	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: Pico Projector

M/N: MPP-14001

Mode: 802.11b 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		1941.667	51.96	-10.73	41.23	74.00	-32.77	peak			
2	*	2462.000	111.68	-9.61	102.07	74.00	28.07	peak			
3		4350.000	46.19	-3.62	42.57	74.00	-31.43	peak			

RESULT: PASS**Note:** The other modes radiation emissions have more than 20dB margin.

All modes radiation emission from 6GHz to 25GHz at least have 20dB margin.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

1) Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2) Conducted Emissions at the bang edge

a) The transmitter output was connected to the spectrum analyzer

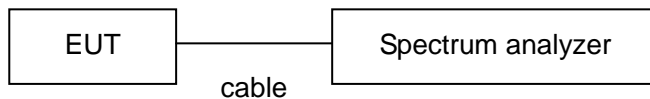
b) Set RBW=100kHz, VBW=300kHz

c) Suitable frequency span including 100kHz bandwidth from band edge

12.2. TEST SET-UP

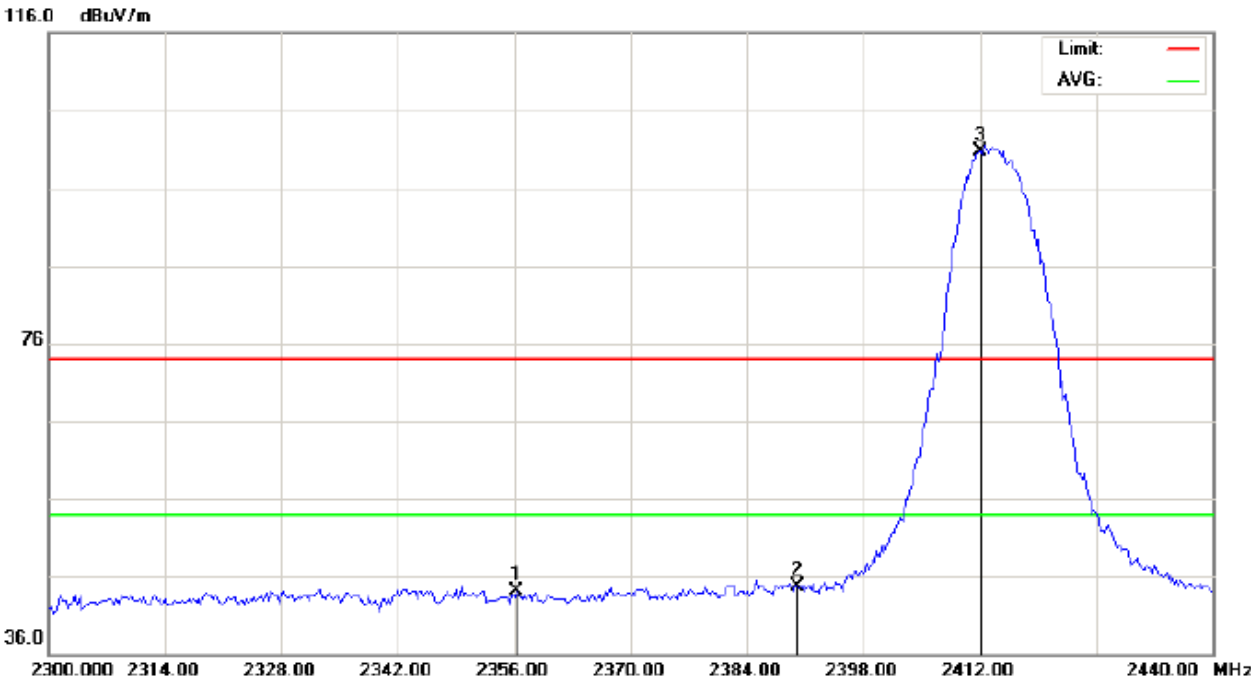
Radiated same as 11.2

Conducted set up



12.3. Radiated Test Result

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: Pico Projector

M/N: MPP-14001

Mode: 802.11b Low Channel TX

Note:

Polarization: *Horizontal*

Power:

Distance: 3m

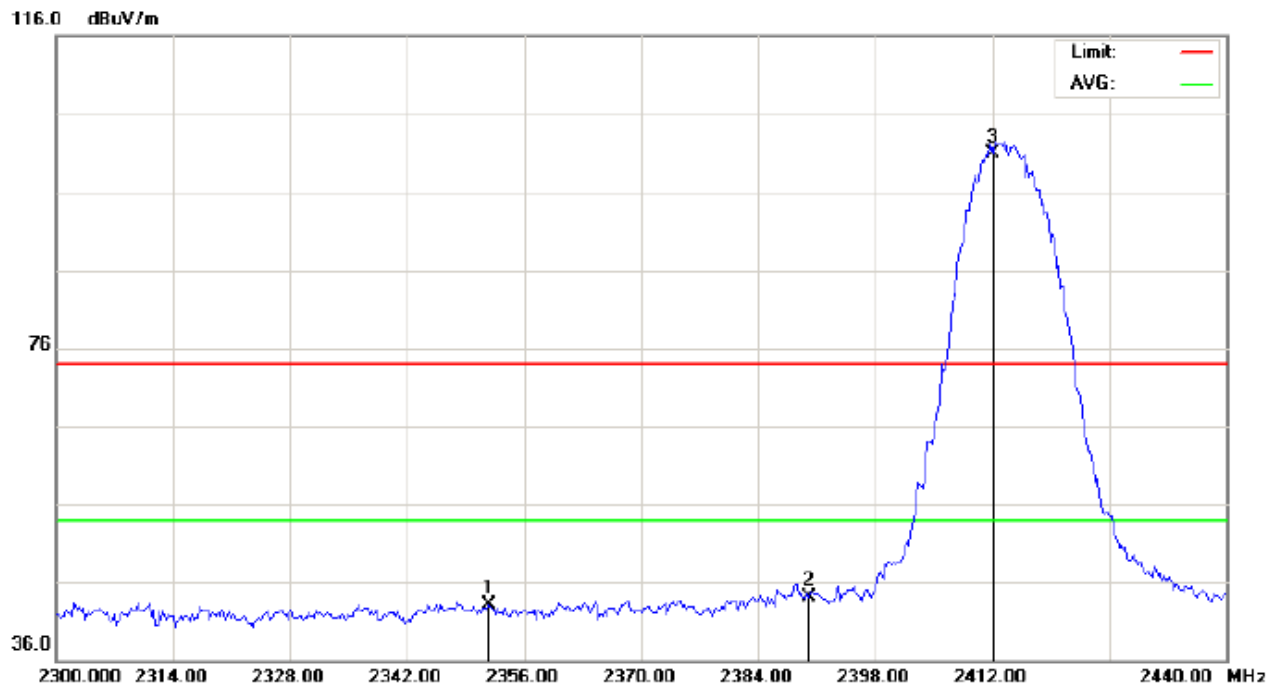
Temperature: 26

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		2356.233	53.83	-9.73	44.10	74.00	-29.90	peak			
2		2390.000	54.40	-9.69	44.71	74.00	-29.29	peak			
3	*	2412.000	110.36	-9.67	100.69	74.00	26.69	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical

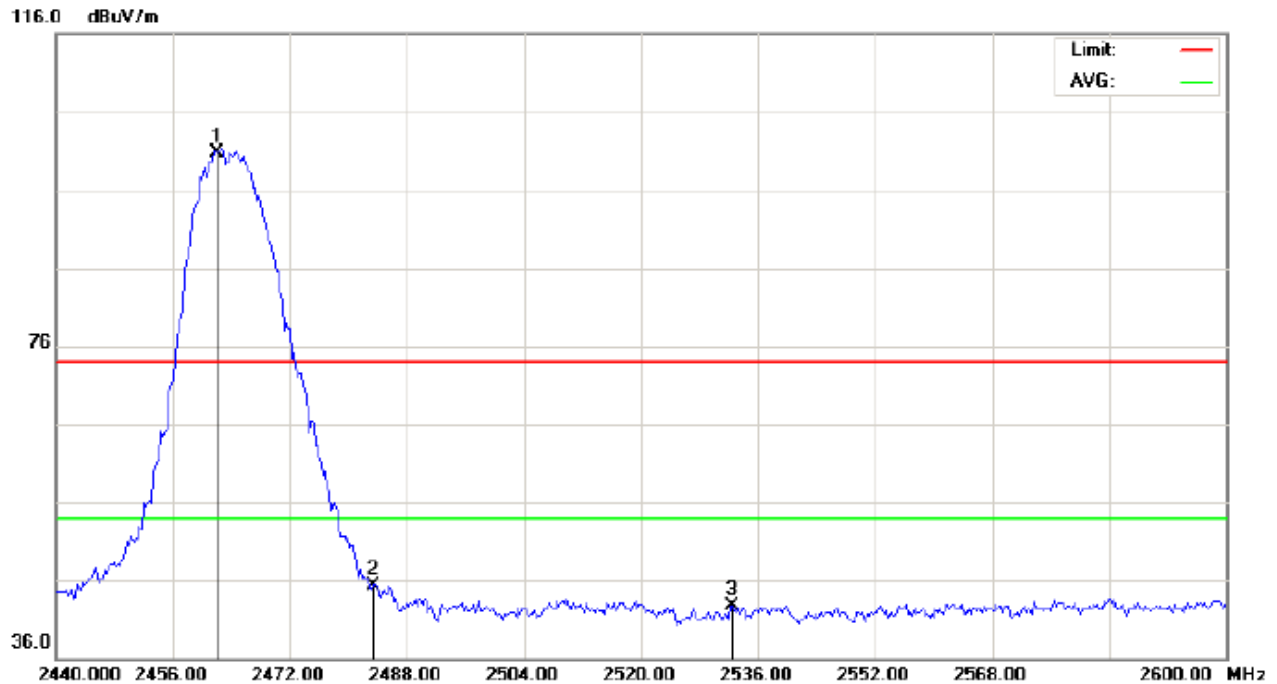


Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Pico Projector Distance: 3m
M/N: MPP-14001
Mode: 802.11b Low Channel TX
Note:

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		2351.800	52.82	-9.73	43.09	74.00	-30.91	peak			
2		2390.000	53.77	-9.69	44.08	74.00	-29.92	peak			
3	*	2412.000	110.58	-9.67	100.91	74.00	26.91	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal

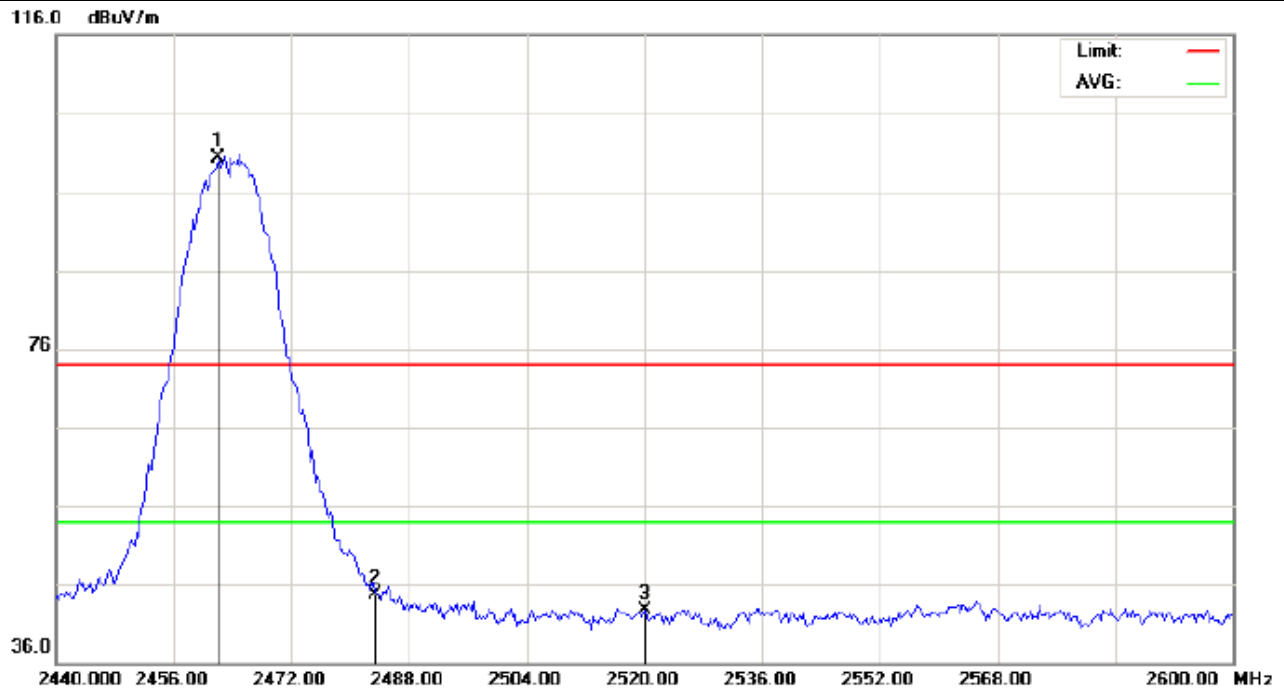


Site: site #1 Polarization: **Horizontal** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %
EUT: Pico Projector Distance: 3m
M/N: MPP-14001
Mode: 802.11b High Channel TX
Note:

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	2462.000	110.39	-9.61	100.78	74.00	26.78	peak			
2		2483.500	54.81	-9.59	45.22	74.00	-28.78	peak			
3		2532.533	52.24	-9.49	42.75	74.00	-31.25	peak			

RESULT: PASS

EUT	Pico Projector	Model Name	MPP-14001
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: Pico Projector

Distance: 3m

M/N: MPP-14001

Mode: 802.11b High Channel TX

Note:

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	2462.000	109.92	-9.61	100.31	74.00	26.31	peak			
2		2483.500	54.22	-9.59	44.63	74.00	-29.37	peak			
3		2520.000	52.13	-9.52	42.61	74.00	-31.39	peak			

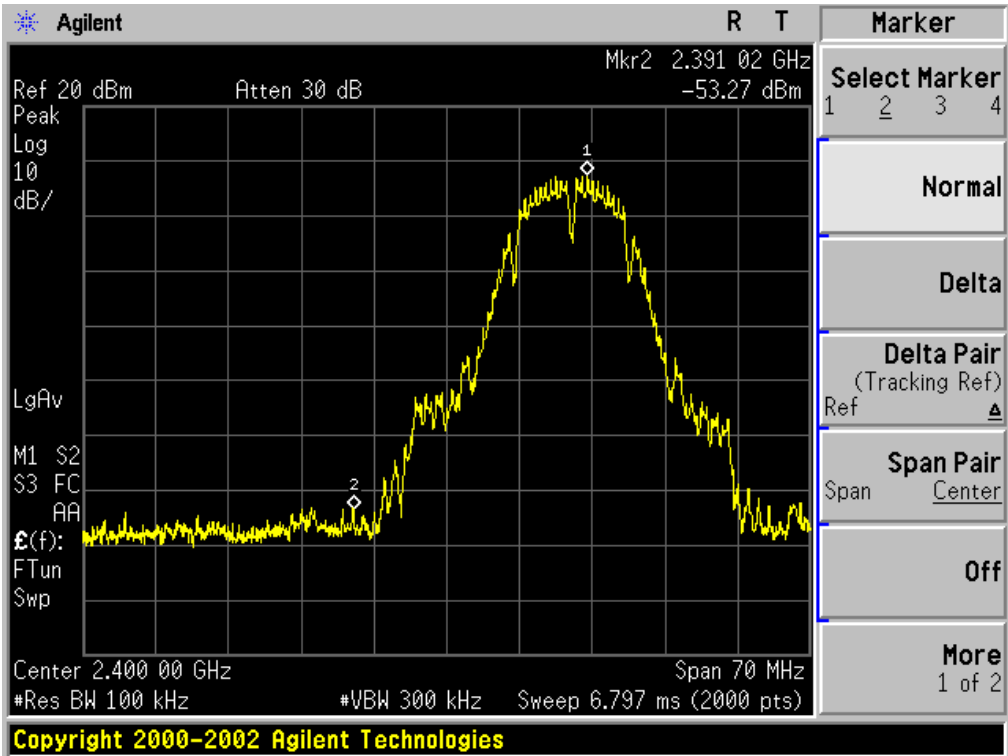
RESULT: PASS**Note:** The other modes radiation emission have enough 20dB margin.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

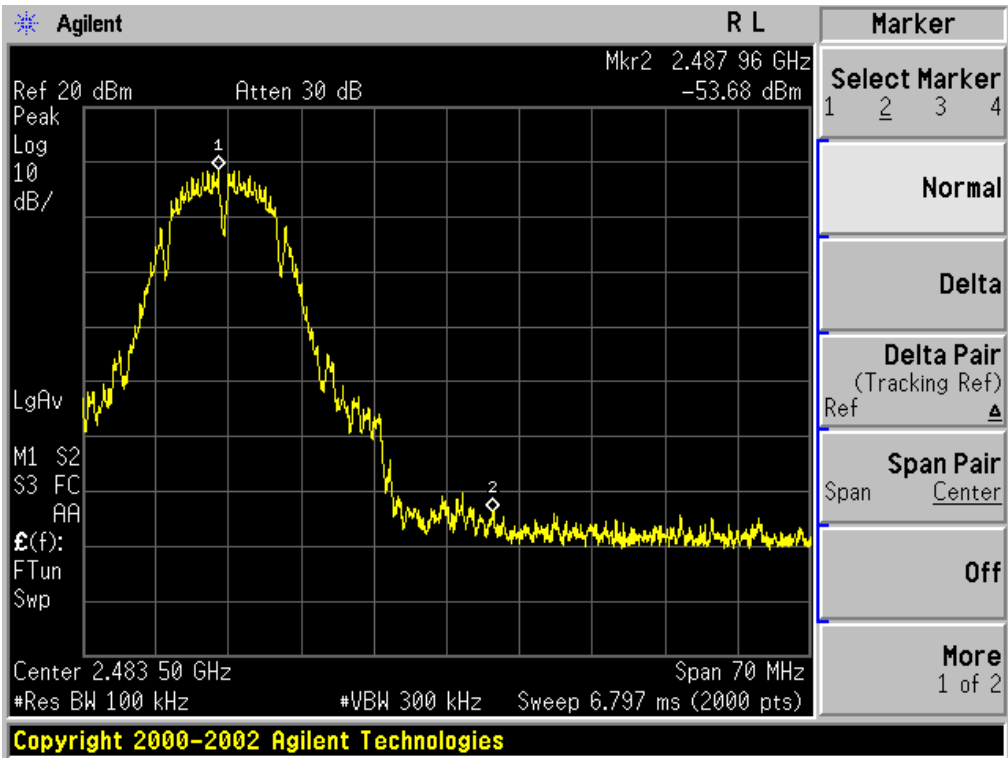
The "Factor" value can be calculated automatically by software of measurement system.

12.4. Conducted Test Result

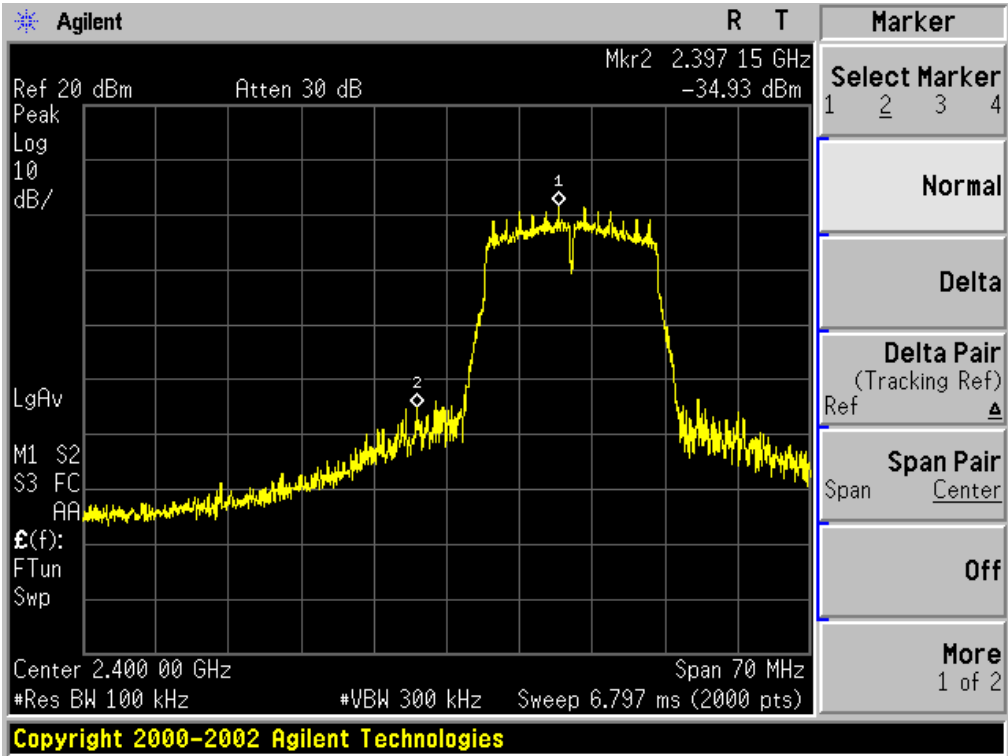
802.11b-CH1



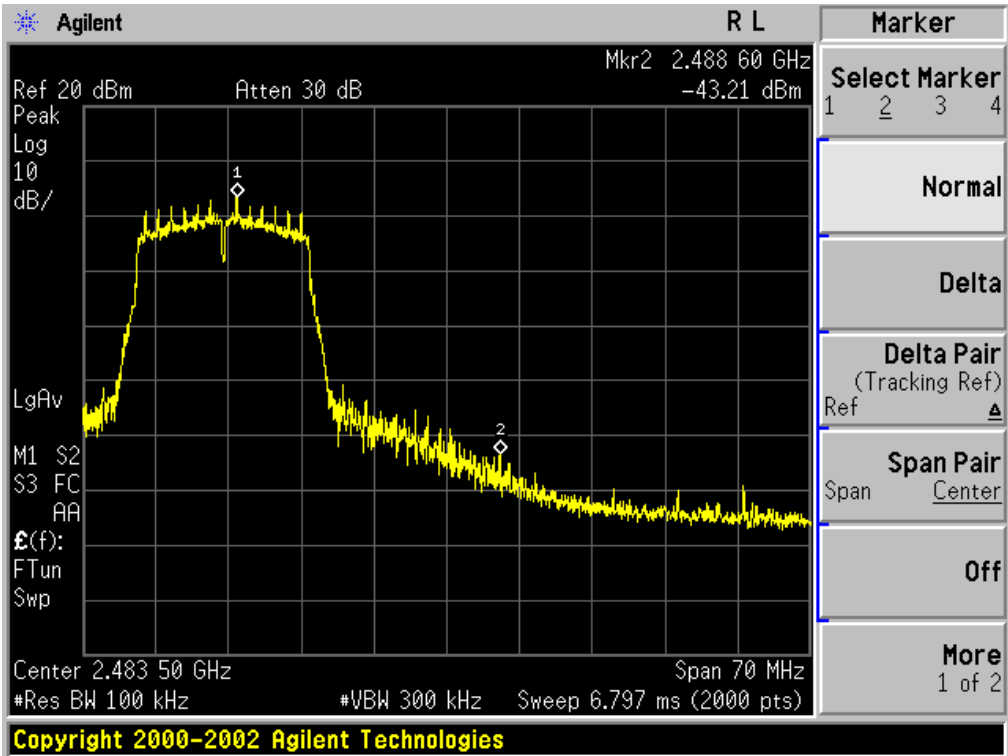
802.11b-CH11



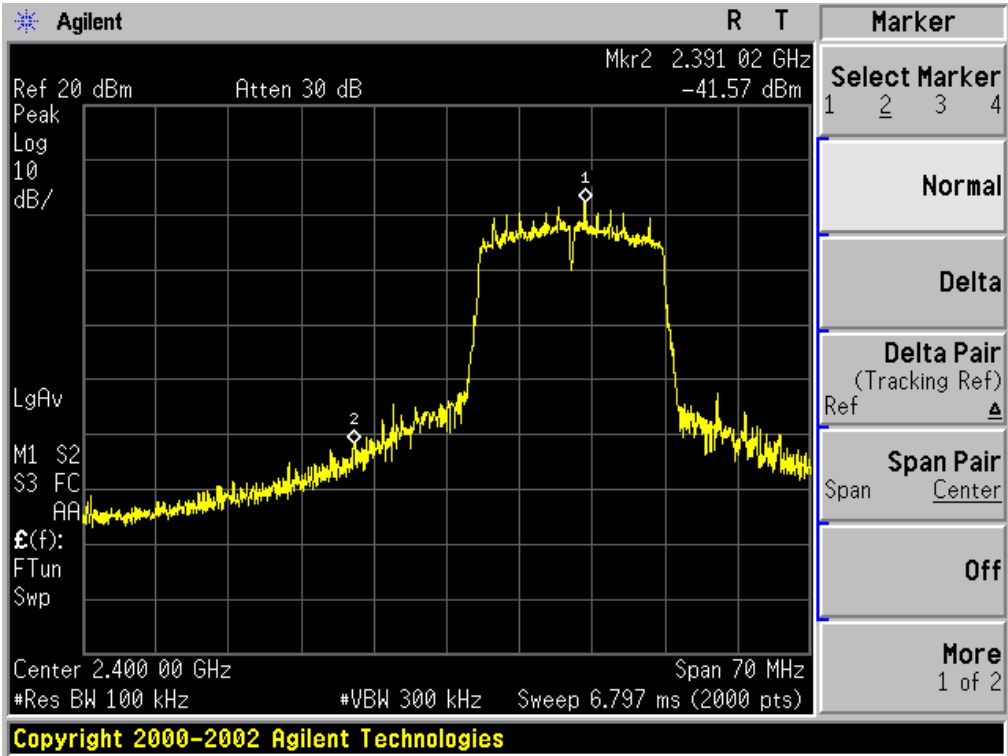
802.11g- CH1



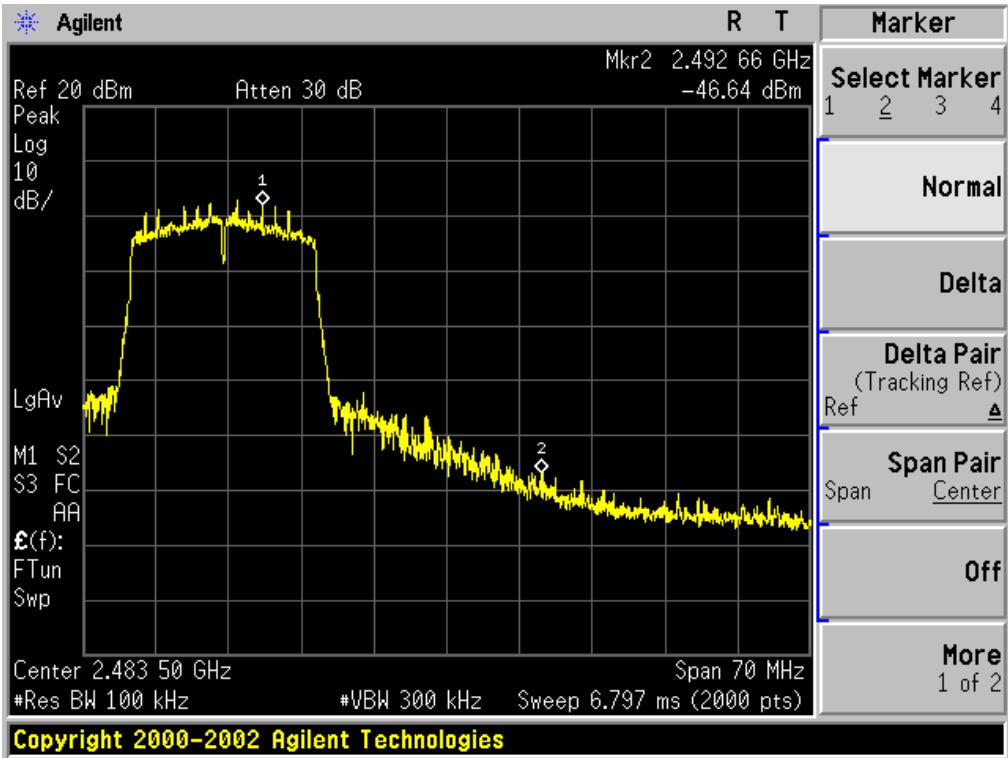
802.11g- CH11



802.11n-CH1



802.11n-CH11



13. FCC LINE CONDUCTED EMISSION TEST

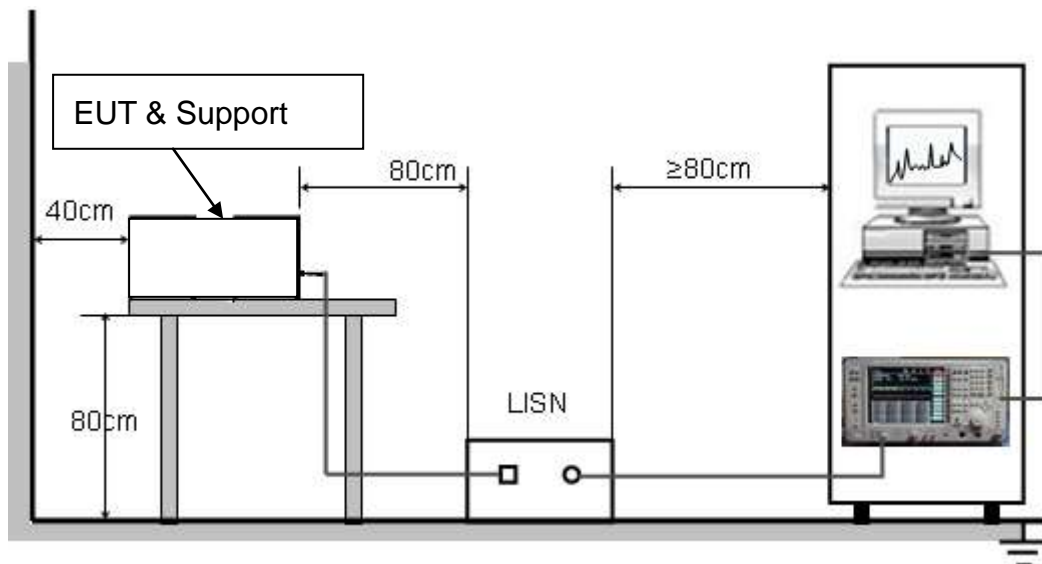
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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 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.

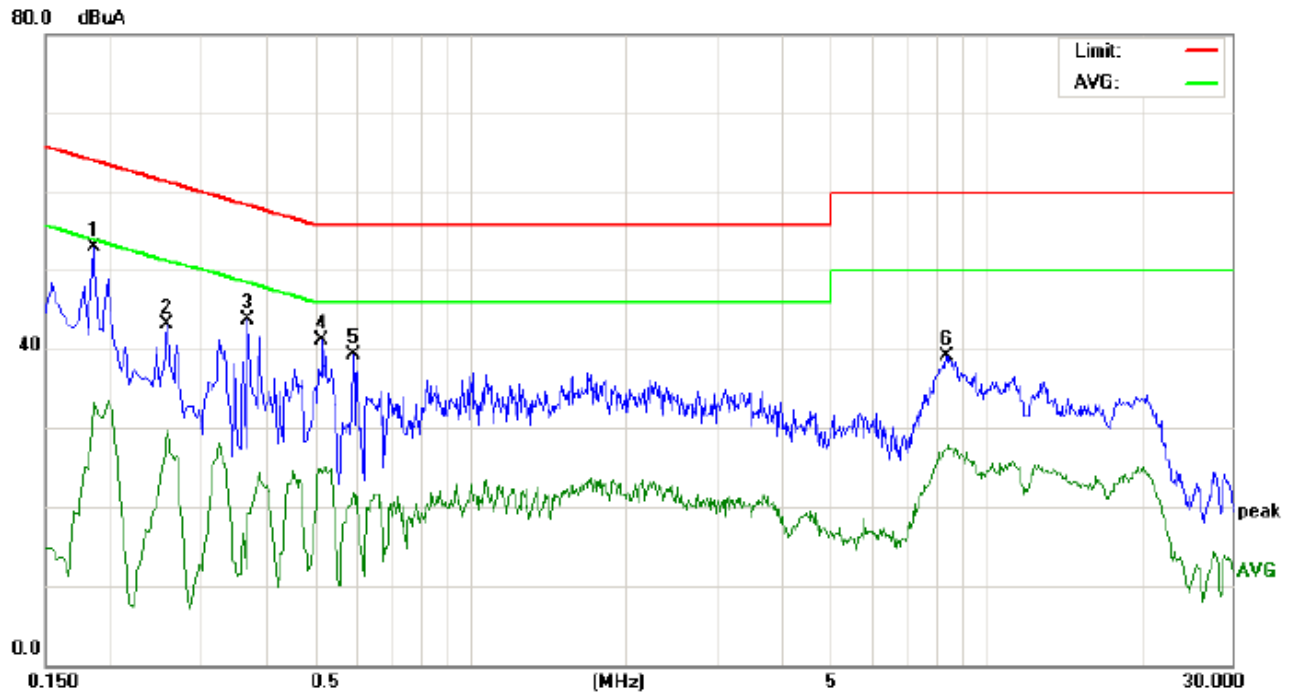
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

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



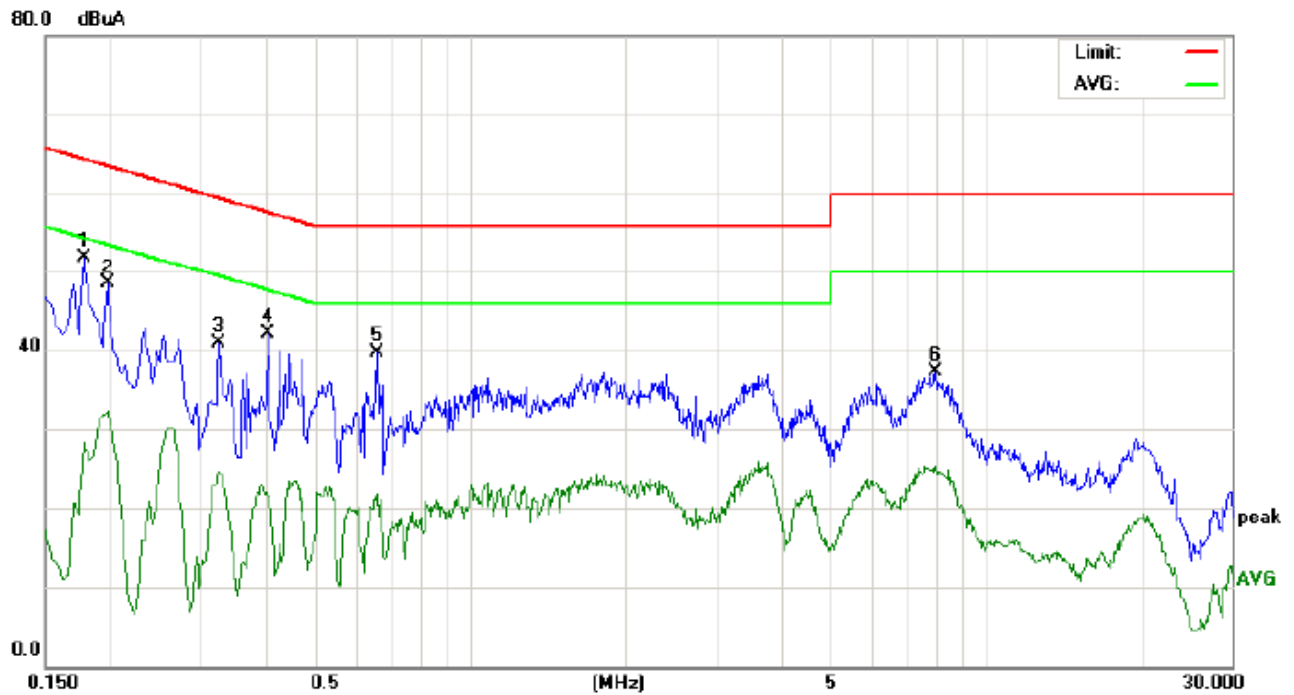
Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: Pico Projector
M/N: MPP-14001
Mode: Normal Operating(WIFI)
Note:

Phase: **L1**
Power: AC 120V/60Hz

Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuA)			Correct Factor	Measurement (dBuA)			Limit (dBuA)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1860	53.20		33.26	0.00	53.20		33.26	64.21	54.21	-11.01	-20.95	P	
2	0.2580	43.14		29.80	0.00	43.14		29.80	61.49	51.49	-18.35	-21.69	P	
3	0.3700	43.62		19.34	0.00	43.62		19.34	58.50	48.50	-14.88	-29.16	P	
4	0.5180	41.06		24.68	0.00	41.06		24.68	56.00	46.00	-14.94	-21.32	P	
5	0.5940	39.30		21.92	0.00	39.30		21.92	56.00	46.00	-16.70	-24.08	P	
6	8.4020	39.11		27.22	0.00	39.11		27.22	60.00	50.00	-20.89	-22.78	P	

Line Conducted Emission Test Line 2-N



Site: Conduction Phase: **N** Temperature: 26
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60 %
EUT: Pico Projector
M/N: MPP-14001
Mode: Normal Operating(WIFI)
Note:

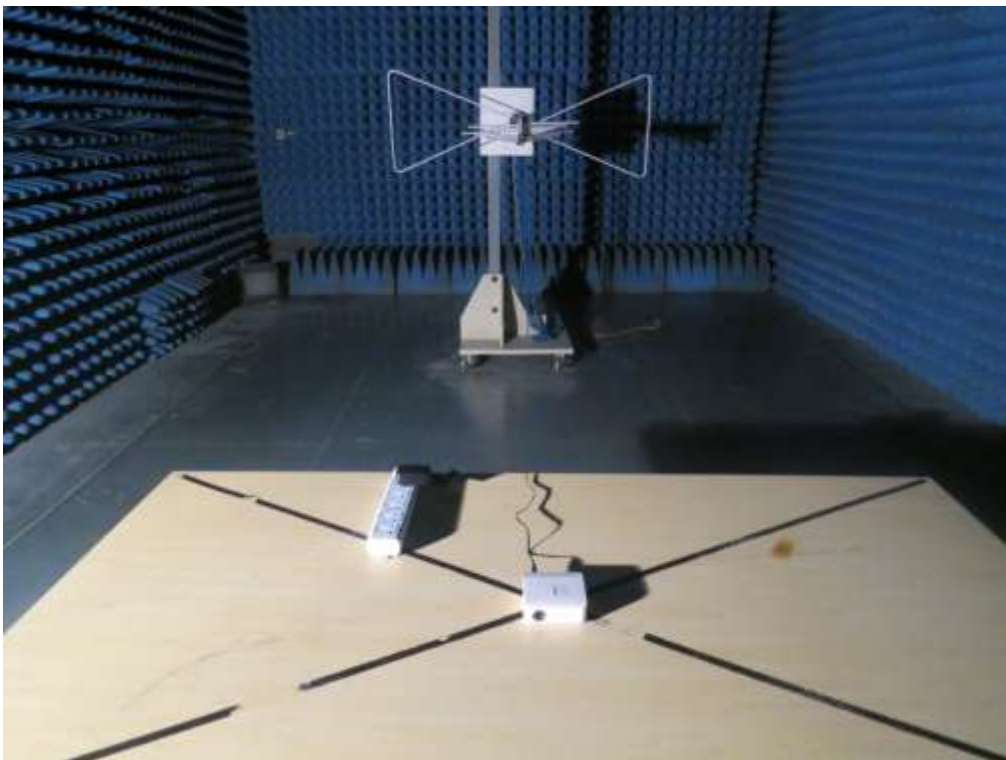
No.	Freq. (MHz)	Reading_Level (dBuA)			Correct Factor	Measurement (dBuA)			Limit (dBuA)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1780	51.81		28.23	0.00	51.81		28.23	64.57	54.57	-12.76	-26.34	P	
2	0.1980	48.52		32.29	0.00	48.52		32.29	63.69	53.69	-15.17	-21.40	P	
3	0.3260	40.82		24.64	0.00	40.82		24.64	59.55	49.55	-18.73	-24.91	P	
4	0.4060	42.03		21.73	0.00	42.03		21.73	57.73	47.73	-15.70	-26.00	P	
5	0.6580	39.71		21.84	0.00	39.71		21.84	56.00	46.00	-16.29	-24.16	P	
6	8.0140	37.26		25.32	0.00	37.26		25.32	60.00	50.00	-22.74	-24.68	P	

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP

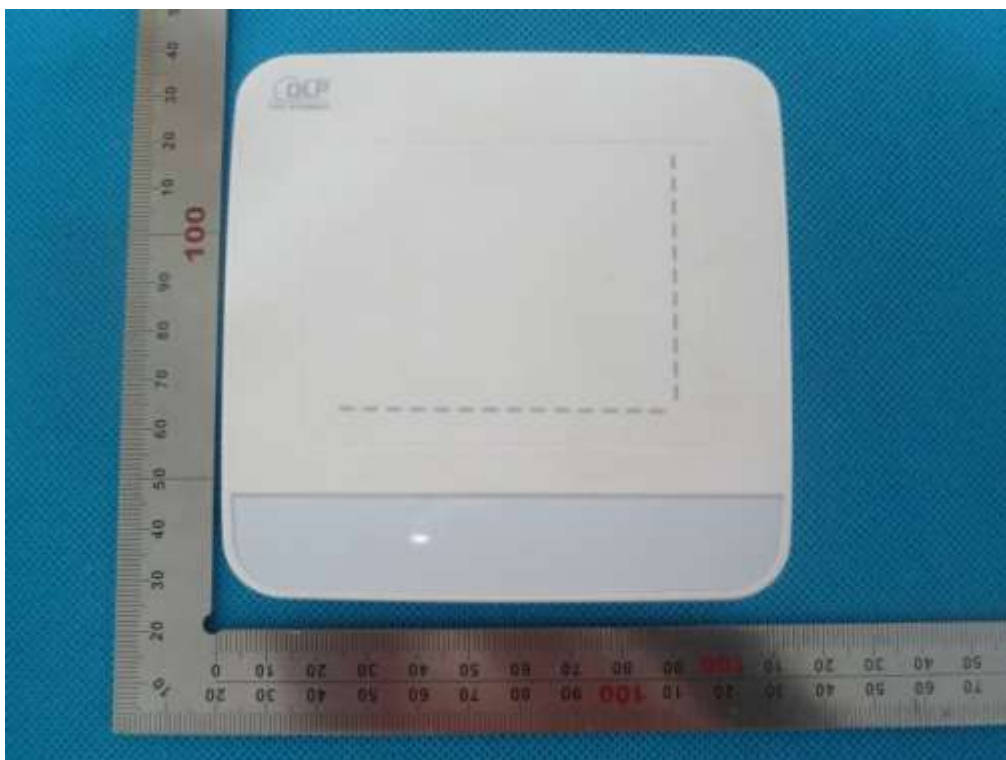


APPENDIX B: PHOTOGRAPHS OF EUT

All VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



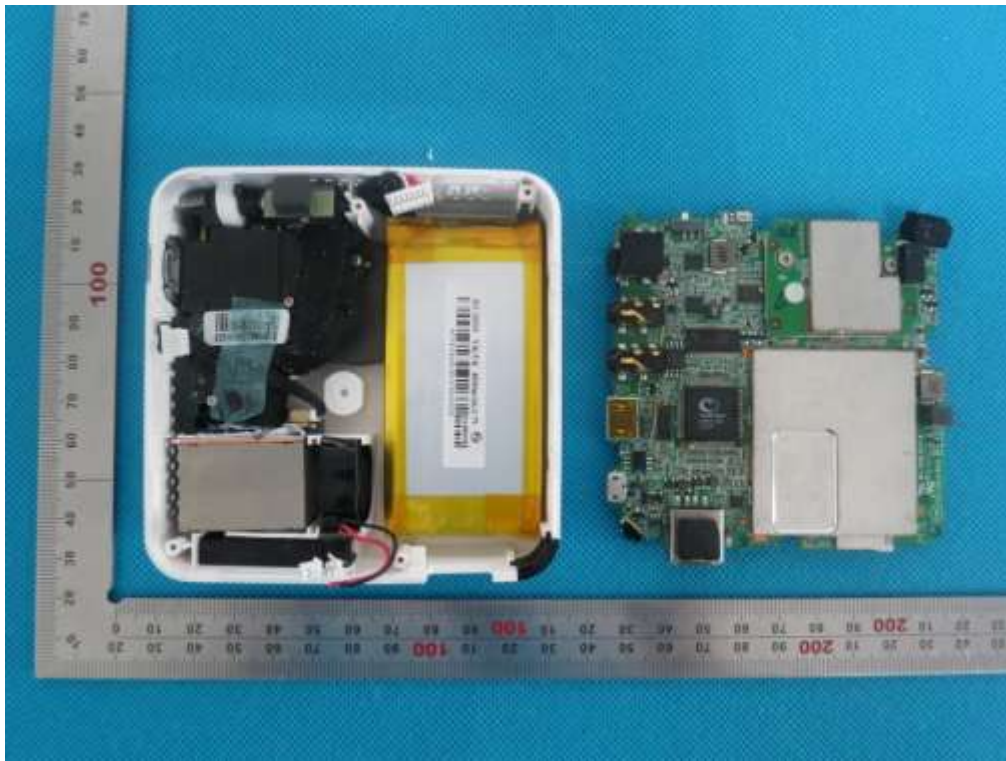
RIGHT VIEW OF EUT



OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1



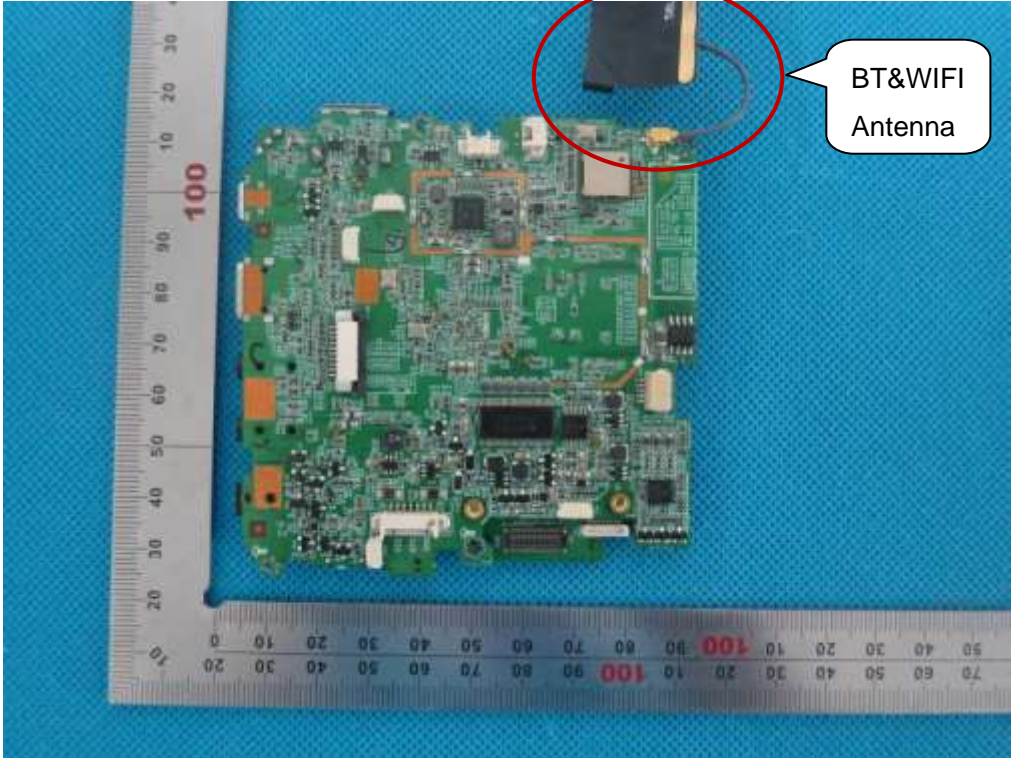
INTERNAL VIEW OF EUT-2



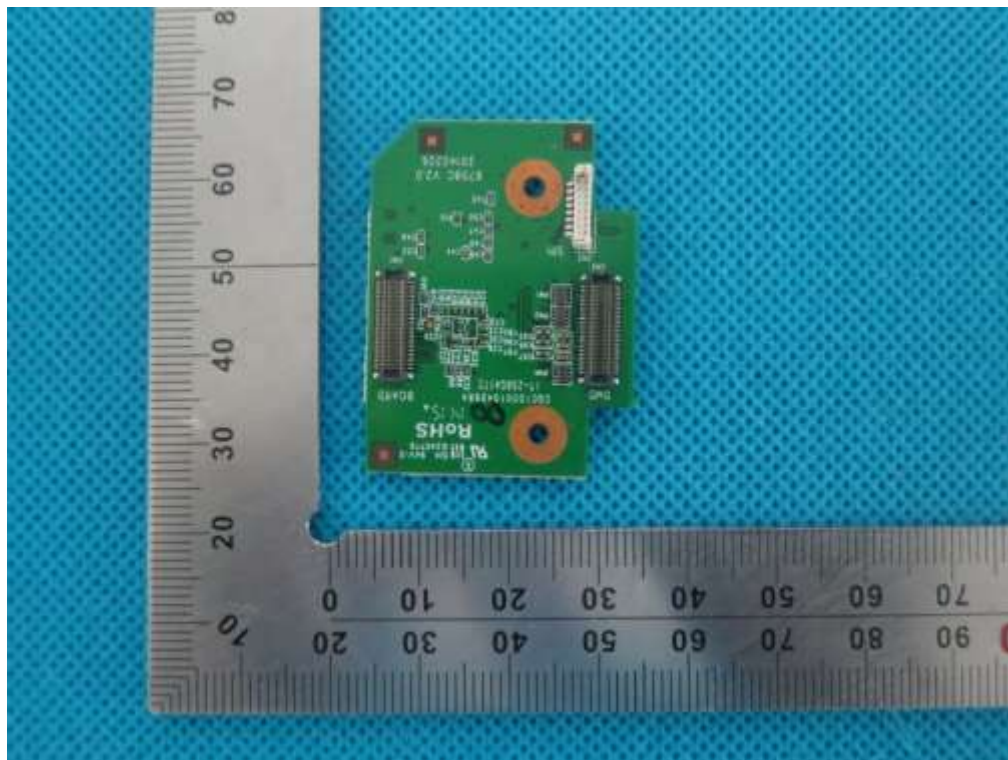
INTERNAL VIEW OF EUT-3



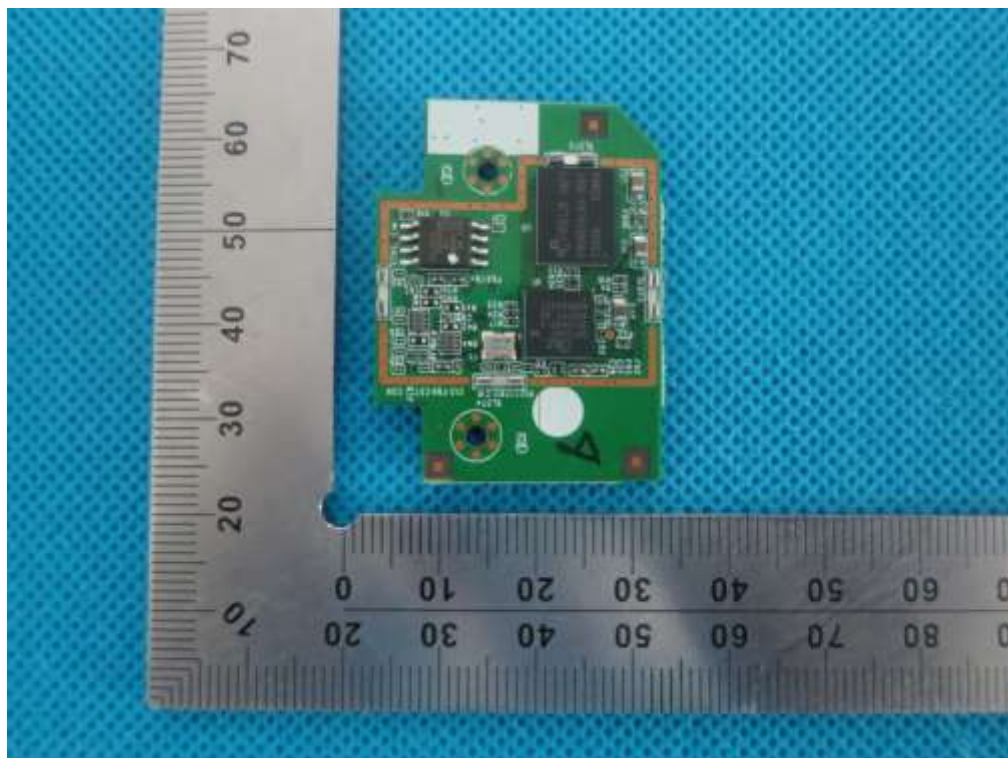
INTERNAL VIEW OF EUT-4



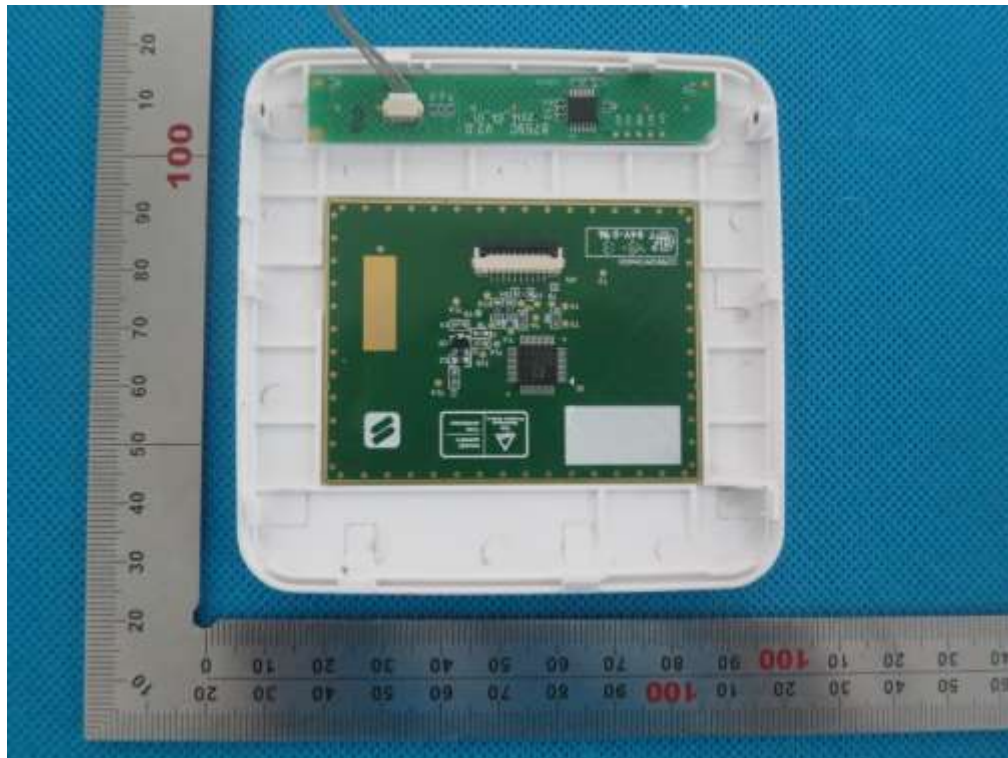
INTERNAL VIEW OF EUT-5



INTERNAL VIEW OF EUT-6



INTERNAL VIEW OF EUT-7



INTERNAL VIEW OF EUT-8



----END OF REPORT----