

 <p>CERTIFICATE 2518.08</p> <p>MS ISO/IEC 17025 TESTING SAMM NO. 0825</p>
<p><b>MOTOROLA PENANG ADV. COMM. LABORATORY</b> Motorola Solutions Malaysia Sdn. Bhd. Plot 2A Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia.</p>	<p><b>FCC / ISED TEST REPORT</b> Report Revision : Rev.C</p>
<p><b>Date/s Tested</b> : 26-Jul-2021 - 12-Oct-2021 <b>Report Issue Date</b> : 20-Aug-2021 <b>Manufacturer/Location</b> : Motorola Solutions Malaysia Sdn Bhd Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900, Bayan Lepas, Penang, Malaysia</p> <p><b>Requestor</b> : SUBRAMANIAM VASU <b>Product Type</b> : Hand-held <b>Product Version (PMN)</b> : R7 <b>Model Number (HVIN)</b> : AAH06RDN9RA1AN (IC Model: PMUE5722ABB) <b>Frequency Band</b> : 2.412-2.462 GHz <b>Max RF Output Power</b> : 802.11b - 35.48 mWatts 802.11g - 35.48 mWatts 802.11n - 35.48 mWatts</p> <p><b>Applicant Name</b> : Motorola Solutions Inc <b>Applicant Address</b> : 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322</p> <p><b>FCC Registrations</b> : 461337 <b>ISED Registrations</b> : MY0001 <b>Firmware Version (FVIN)</b> : D02.21.04.0057</p> <p><b>The equipment was tested accordance to the requirement listed below:</b></p> <p><b>(2.4GHz Wifi)</b> <b>PASS</b> <b>47CFR Part 15C</b> <b>ISED RSS 247 Issue 2</b></p> 	
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### REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	<b>20-Aug-2021</b>	<b>Gan Boon Teong</b>
Rev. B	Updated power description	<b>4-Sep-2021</b>	<b>Vincent Foong</b>
Rev. C	Updated Power, BE and CE data, radiated AV info	<b>14-Oct-2021</b>	<b>Vincent Foong</b>

## 1.0. General Information

### EUT Description:

<b>Technologies</b>	2.4GHz Wi-Fi
<b>TX Frequency range</b>	2412MHz – 2462MHz
<b>Modulation Type</b>	DSSS, OFDM
<b>Connector type</b>	PROGRAMMING, TEST & ALIGNMENT CABLE
<b>Antenna type</b>	Internal PCB

### 1.1. Channel number and frequency information:

There are two bandwidth systems.

For 20MHz Bandwidth systems (802.11b, 802.11g, 802.11n), use channel 1 ~ channel 11

For 40MHz Bandwidth systems (802.11n), use channel 3 ~ channel 9

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

The EUT contains following accessory devices and data cable:

Item	Brand	Model or P/N
BATTERY PACK,BATT IMPRES LIION TIA4950 IP68 3200T	MOTOROLA	PMNN4810A
CABLE,PORTABLE PROGRAMMING CABLE	MOTOROLA	PMKN4230A
CHARGER TRAVEL	MOTOROLA	NNTN8525A

### General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

**FCC 47 CFR Part 15 Subpart C**  
**KDB 558074 D01 15.247 Meas Guidance v05**  
**ANSI C63.10-2013**

### Deviation from standard

Not applicable as no deviation from standard test method

### Modifications to EUT

For RF conducted measurements a pigtail was soldered out of the board while for radiated measurements there were no modifications to the device

### Test configuration of EUT

All relevant configurations involving radio models and accessories (including chargers, batteries, antennas) were assessed. Only worst case configurations will be included in this report.

## 2.0. Summary of Test Results

FCC Clause	IC Clause	Test Item	Result	Remark	Serial number tested	Tested by
15.247 (a)(2)	RSS-247 5.2(a)	DTS & 99% Channel Bandwidth	Pass	Highest 99% OCB: 802.11b: 13.437 MHz(13M4G1D) 802.11g: 16.749 MHz(16M7D1D) 802.11n: 17.710 MHz(17M7D1D)	P4N0XP0VGL	Gan
15.247 (b)(3)	RSS-247 5.4(d)	Conducted RF Output Power (Average)	Pass	Highest output power: 802.11b: 14.851 dBm(30.56 mW) 802.11g: 14.749 dBm(29.85 mW) 802.11n: 14.863 dBm(30.64 mW)	P4N0XP0VGL	Gan
15.247(e)	RSS-247 5.2(b)	Maximum Power Spectral Density	Pass	Meet the limit requirement.	P4N0XP0VGL	Gan
15.247(d)	RSS-247 5.5	Conducted Spurious Emissions	Pass	Worst case emission: 802.11b: -36.55 dBm 802.11g: -40.11 dBm 802.11n: -39.79 dBm	P4N0XP0VGL	Gan
15.247 (d)	RSS-247 5.5	Band edge Conducted Spurious Emission	Pass	Worst case emission: 802.11b: -48.94 dBm 802.11g: -32.30 dBm 802.11n: -34.02 dBm	P4N0XP0VGL	Gan
15.205, 15.209, 15.247 (d)	RSS-247 5.5	Radiated Emission within Restricted Bands	Pass	Worst case emission: 49.8624 dBuV/m (Margin: 4.1376 dB)	865TXP0006	Amaluddin&Nazrin
15.207	RSS-Gen 8.8	AC Power Line Conducted Emission	NA	Meet the limit requirement	865TXP0006	Iskandar
15.203		Antenna requirement	NA	Internal antenna is not accessible to the enduser	NA	NA

NA → Not Available

## 3.0. Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=1.96) (±)
AC Power Line Conducted Spurious Emission	150kHz ~ 30MHz	3.48 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	5.88 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.84 dB
	18GHz ~ 40GHz	6.02 dB
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82 dB

#### 4.0. Equipment List

##### Bluetooth ATE # 1 (SW Version: Ate Main\_3.1.11)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
CHAMBER	SH-641	92002639	8-Dec-20	8-Dec-21
SPECTRUM ANALYZER	E4440A	MY48250919	2-Sep-19	2-Sep-21
ANALYZER	E4440A	US45303111	14-Jul-21	14-Jul-22
POWER SUPPLY	6652A	3640A02941	22-Jan-21	22-Jan-22
N to N RF Cable # 1	SF126/11N/11N	NA	NA	NA

##### Radiated Emission Station (SW Version: EMC FCC RE v1.6.2)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
DRG HORN FREQ.	SAS-571	719	20-Aug-19	20-Aug-21
DRG HORN FREQ.	SAS-571	566	22-Oct-19	22-Oct-21
POWER SUPPLY	N7976A	MY53410110	24-May-21	24-May-22
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101750	15-Jan-21	15-Jan-22
EMI TEST RECEIVER	ESIB26	827769/009	11-Mar-21	11-Mar-22
5m SEMI-ANECHOIC CHAMBER	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112B	30991	20-Aug-20	20-Aug-21
BILOG ANTENNA	CBL6112B	2964	4-May-21	4-May-22
HYGRO-THERMOMETER	SDL500	A.016800	18-May-21	18-May-22
SYSTEM CONTROLLER	SC104V	050806-1	Not Required	Not Required
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	Not Required	Not Required
ANTENNA POSITIONING TOWER	TLT2	NA	Not Required	Not Required
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	4-Feb-21	4-Feb-22
18 - 40GHz PREAMPLIFIER	MITEQ Hi GAIN SUCOFLEX	2006313	Not Required	Not Required
PREAMPLIFIER	PAM-0118P	361	11-Sep-20	11-Sep-23
LOOP ANTENNA	6502	00208416	15-Sep-20	15-Sep-21

##### Power Line Conducted Emission (SW Version: EMC 32 v10.60.10)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
TEMPERATURE & HUMIDITY LOGGER	TM320	11203258	11-Dec-20	11-Dec-21
V-NETWORK 2-LINE	ENV216V	101039	20-July-19	20-Sep-21
EMI TEST RECEIVER	ESIB40	100307	8-Jan-21	8-Jan-22
PROGRAMMABLE AC SOURCE	61604	616040003502	4-Dec-2020	4-Dec-2021

## 5.0. Test Mode Applicability and Test Channel Detail

The device employs MIMO technology. Below are the possible configurations.

WLAN Configurations		Mode					
		SISO		Spatial Diversity Multiplexing (MIMO)		Cyclic Delay Diversity (MIMO)	
2.4GHz	Antenna	Primary	Secondary	Primary	Secondary	Primary	Secondary
	802.11b	√	√	x	x	x	x
	802.11g	√	√	x	x	x	x
	802.11n (HT20)	√	√	x	x	x	x
802.11n (HT40)	x	x	x	x	x	x	

√ = Support;  
 x = NOT Support

**Note:** This Device supports simultaneous transmission operation, which allows for two SISO or two MIMO channels to operate independent of one another in the 2.4GHz band on each antenna. 802.11n mode is capable of transmitting simultaneously on two antennas using Cyclic Delay Diversity and Spatial Diversity Multiplexing (2x2 MIMO).

The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report.

**Radiated Emission Test (Above 1GHz)**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Date Rate (Mbps)	Mode	Environmental Conditions
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	1	SISO	23.7°C, 69.4%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.7°C, 69.4%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.7°C, 69.4%RH
Test Mode	802.11n (HT40)	3 to 9	3,6,9	OFDM	BPSK	6.5	SISO CDD (MIMO)	NA

**Radiated Emission Test (Below 1GHz)**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Date Rate (Mbps)	Mode	Environmental Conditions
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	1	SISO	23.7°C, 69.4%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.7°C, 69.4%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.7°C, 69.4%RH
Test Mode	802.11n (HT40)	3 to 9	3,6,9	OFDM	BPSK	6.5	SISO CDD (MIMO)	NA

**Power Line Conducted Emission Test**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Date Rate (Mbps)	Environmental Conditions
Application Mode	802.11bgn mixed	1 to 11	AUTO	DSSS, OFDM	AUTO	AUTO	21.2°C, 63.9%RH

**Antenna Port Conducted Measurement:**

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Data Rate (Mbps)	Mode	Environmental Conditions
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	1	SISO	25°C, 50.0%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	25°C, 50.0%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	25°C, 50.0%RH
Test Mode	802.11n (HT40)	1 to 11	3,6,9	OFDM	BPSK	6.5	SISO CDD (MIMO)	NA

**Duty Cycle of Test Signal**

802.11b, 802.11g and 802.11n : Duty cycle of test signal is  $\geq 98\%$ .

802.11g and 802.11n : Duty cycle of test signal is  $\leq 98\%$ .

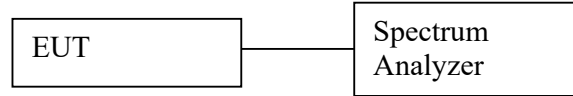
(Refer to Clause 6.3 for duty cycle test signal)



## 6.0. Transmitter Test Parameters

### 6.1. 6dB Channel Bandwidth

#### 6.1.1. Test Setup



- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
  - a. RBW = 100 kHz
  - b. VBW = 300 kHz
  - c. Detector mode = Peak
  - d. Trace = Max hold
  - e. Sweep = auto
- e) Measure the freq different of two frequencies that were attenuated 6dB from peak of the emission & record the frequency difference as the emission bandwidth.
- f) Measure every antenna port by repeat the step above for MIMO measurement.

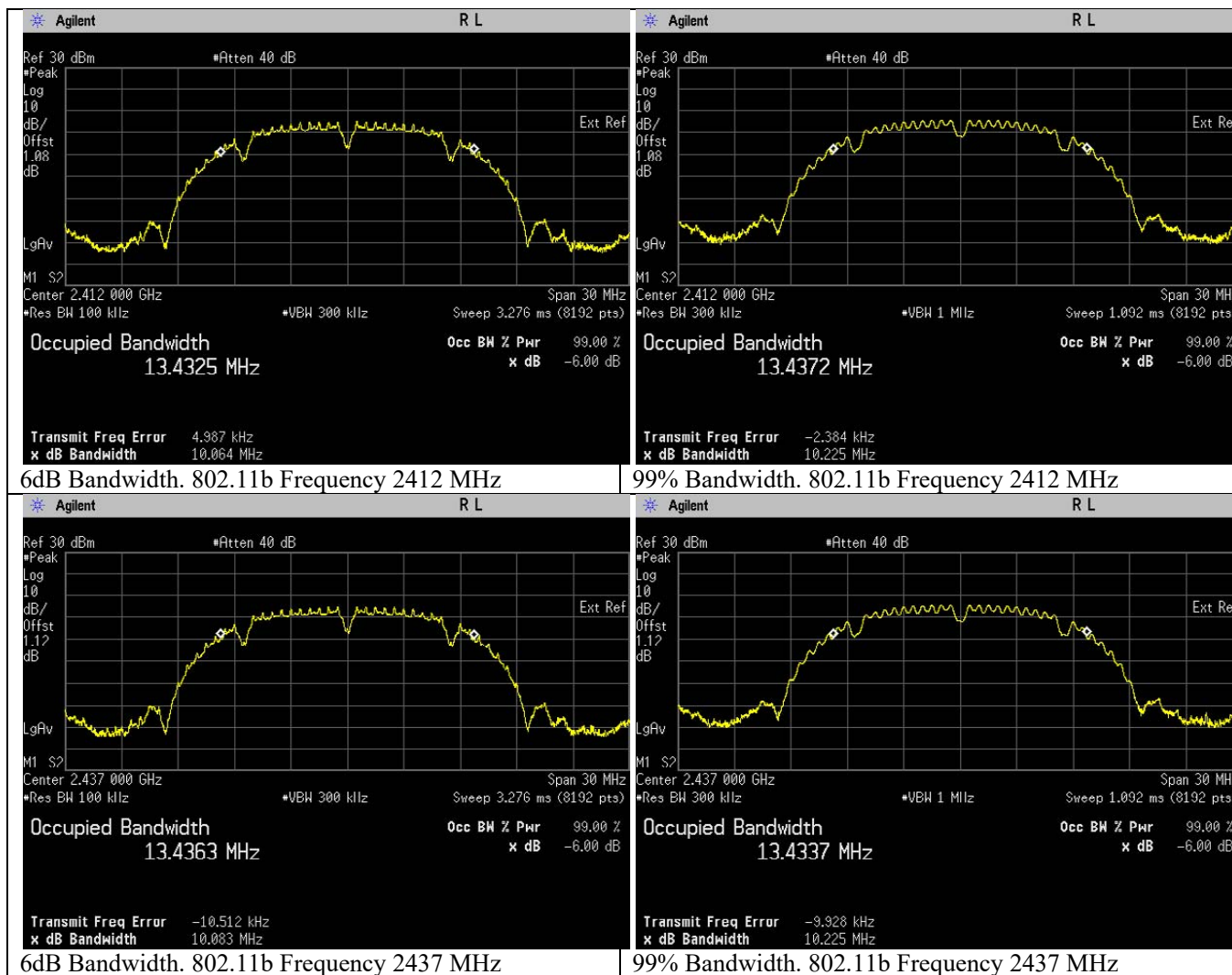
#### 6.1.2. Test Limits:

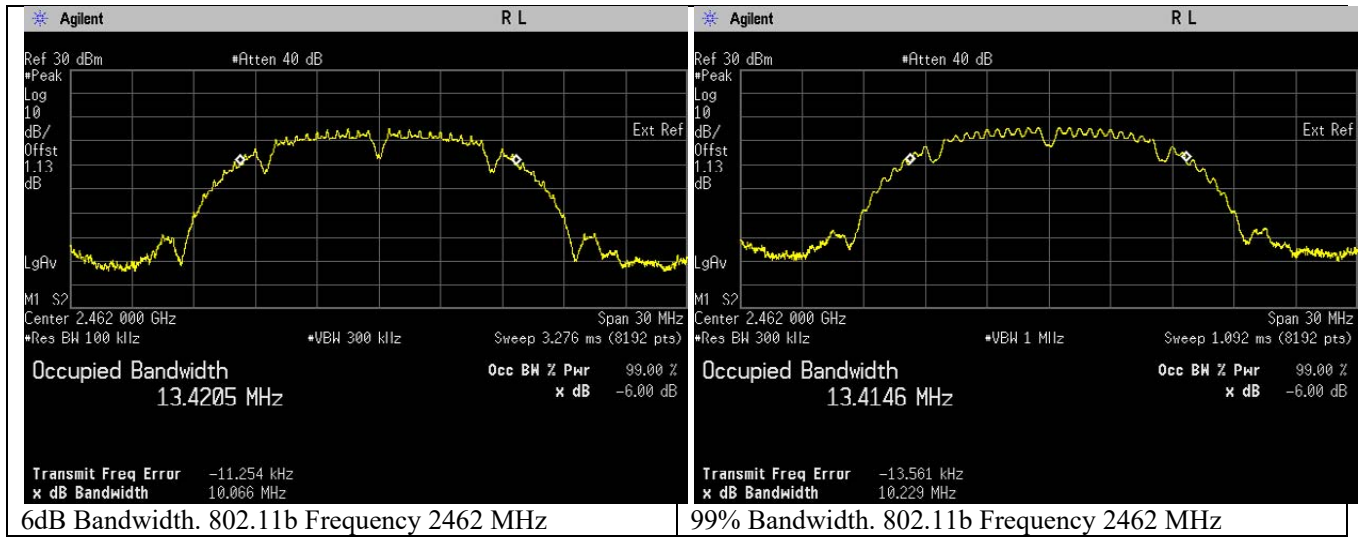
<b>Normal Condition (25 ° C)</b>
<b>≥500 kHz</b>

6.1.3. Test Data:

**802.11 b**

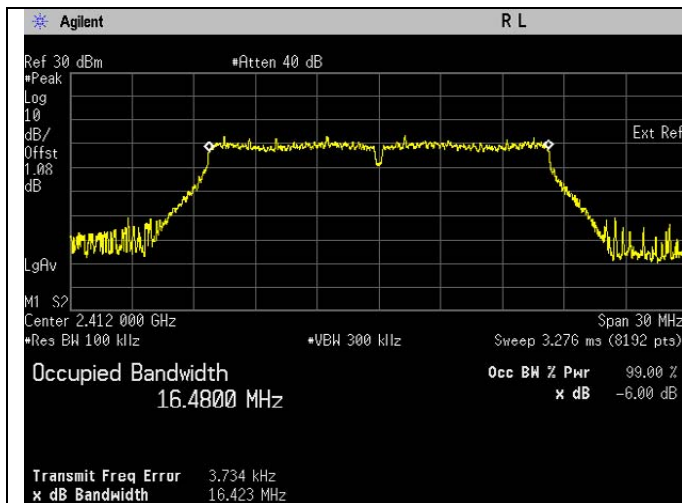
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11b	DSSS	DBPSK	1	2412	10.064	13.437	Pass
802.11b	DSSS	DBPSK	1	2437	10.083	13.434	Pass
802.11b	DSSS	DBPSK	1	2462	10.066	13.415	Pass



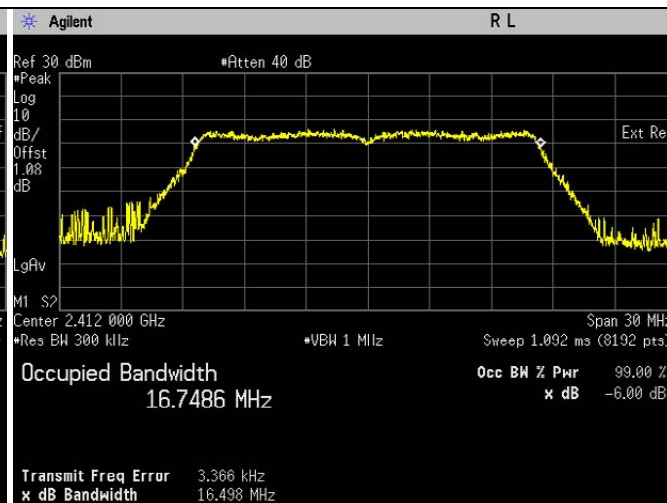


**802.11 g**

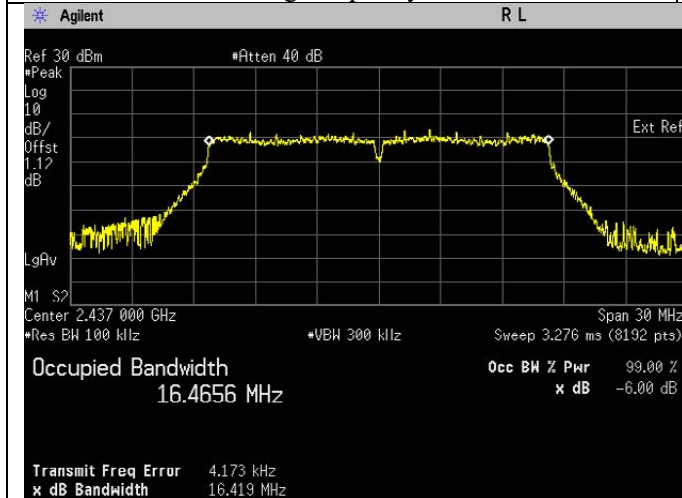
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11g	OFDM	BPSK	6	2412	16.423	16.749	Pass
802.11g	OFDM	BPSK	6	2437	16.419	16.697	Pass
802.11g	OFDM	BPSK	6	2462	16.370	16.739	Pass



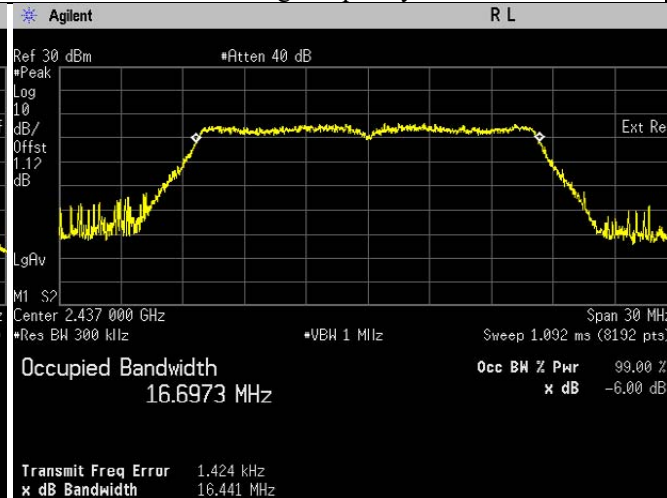
6dB Bandwidth. 802.11g Frequency 2412 MHz



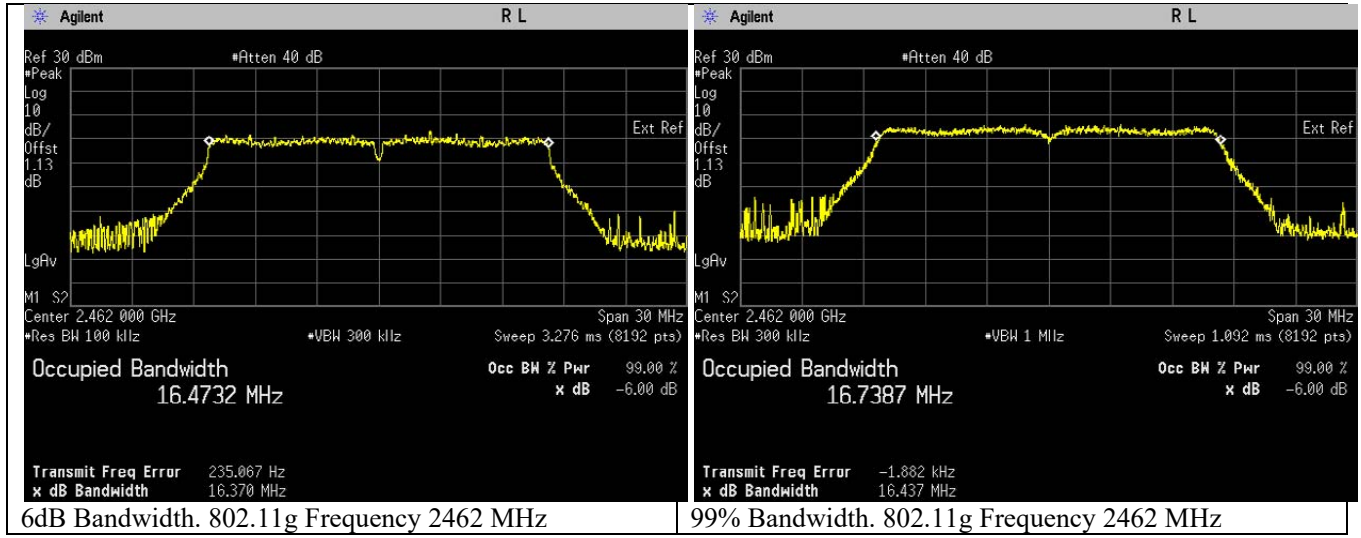
99% Bandwidth. 802.11g Frequency 2412 MHz



6dB Bandwidth. 802.11g Frequency 2437 MHz

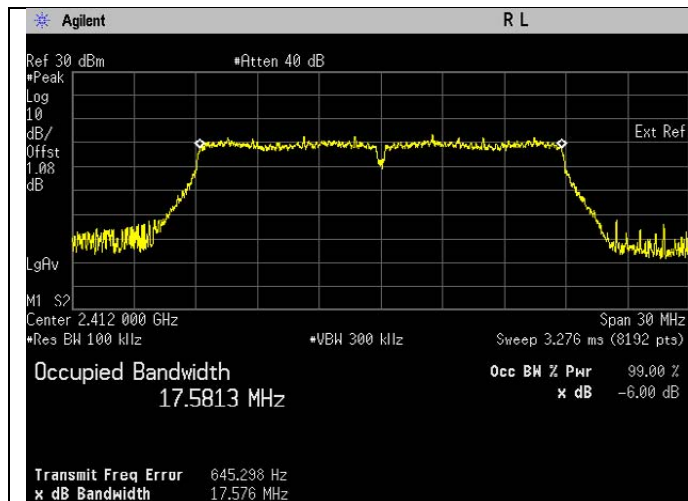


99% Bandwidth. 802.11g Frequency 2437 MHz

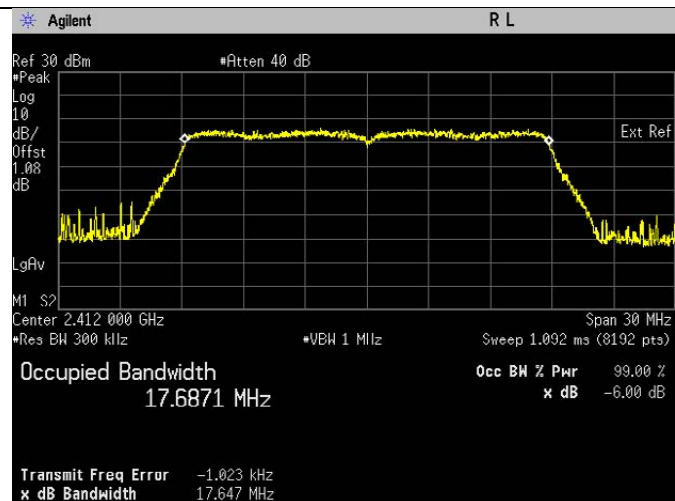


**802.11n (HT20)**

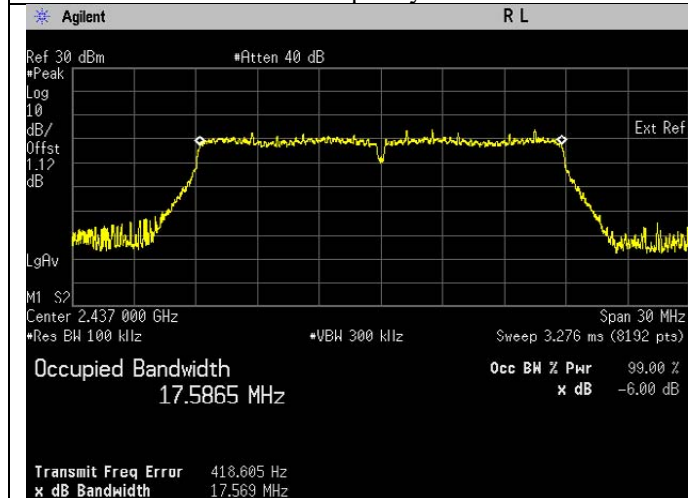
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11n	OFDM	BPSK	6.5	2412	17.576	17.687	Pass
802.11n	OFDM	BPSK	6.5	2437	17.569	17.697	Pass
802.11n	OFDM	BPSK	6.5	2462	17.562	17.710	Pass



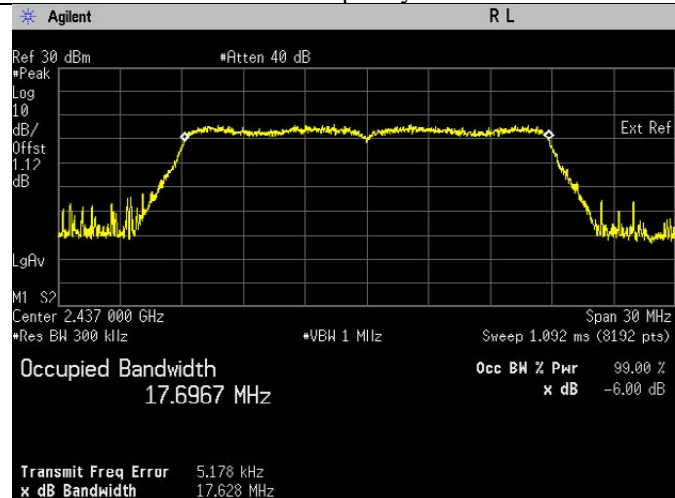
6dB Bandwidth. 802.11n Frequency 2412 MHz



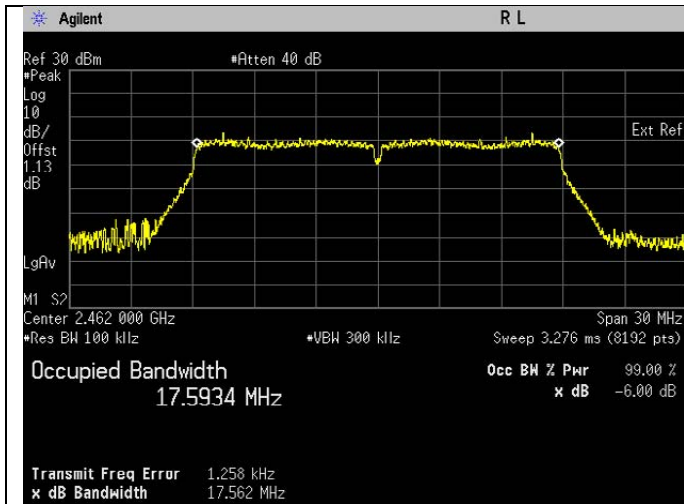
99% Bandwidth. 802.11n Frequency 2412 MHz



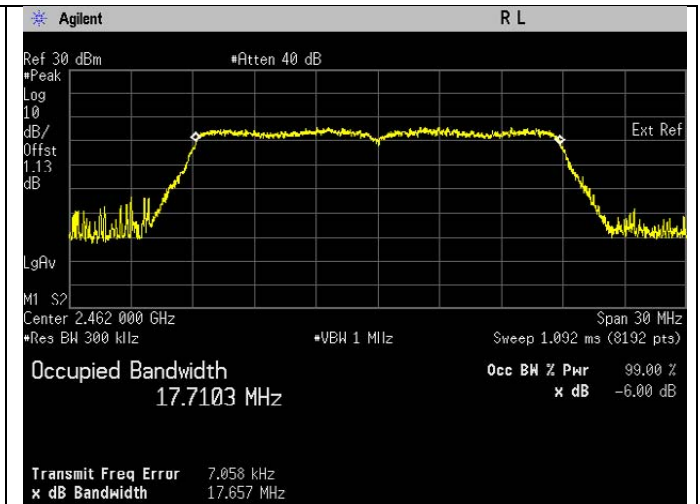
6dB Bandwidth. 802.11n Frequency 2437 MHz



99% Bandwidth. 802.11n Frequency 2437 MHz



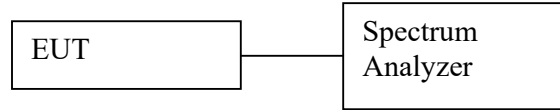
6dB Bandwidth. 802.1 In Frequency 2462 MHz



99% Bandwidth. 802.1 In Frequency 2462 MHz

## 6.2. Conducted RF Output Power

### 6.2.1. Test Setup



#### Average

- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Measure the duty cycle of transmitter output signal.
- d) Setting of Spectrum analyzer :
  - a. Set the RBW = 1% - 5% OBW.
  - b. Set the VBW  $\geq [3 \times \text{RBW}]$ .
  - c. Set the span  $\geq [1.5 \times \text{OBW bandwidth}]$ .
  - d. Detector = Power averaging (RMS).
  - e. Number of points in sweep  $\geq 2 \times \text{span} / \text{RBW}$
  - f. Sweep time = auto
  - g. Trace average at least 100 traces in power averaging (rms) mode
  - h. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges.
  - i. Add  $10 \log (1/x)$ , where x is the duty cycle, to the measured power to compute the average power during the actual transmission times
- e) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.2.2. Test Limits:

<b>Normal Condition (25 ° C)</b>
<b><math>\leq 1 \text{ Watt}(30 \text{ dBm})</math></b>

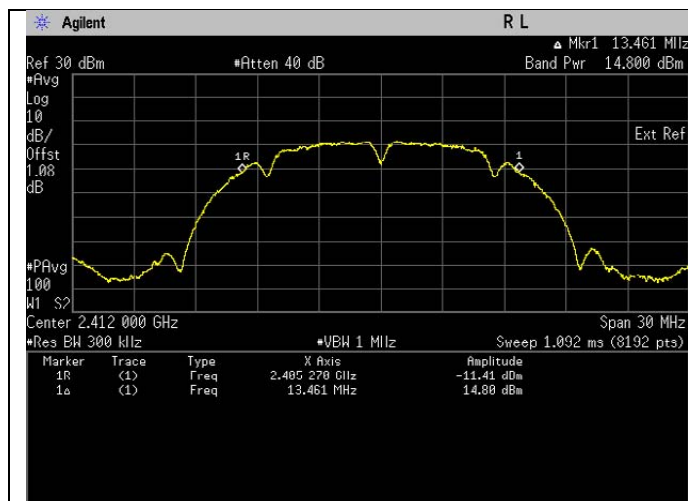


6.2.3. Test Data:

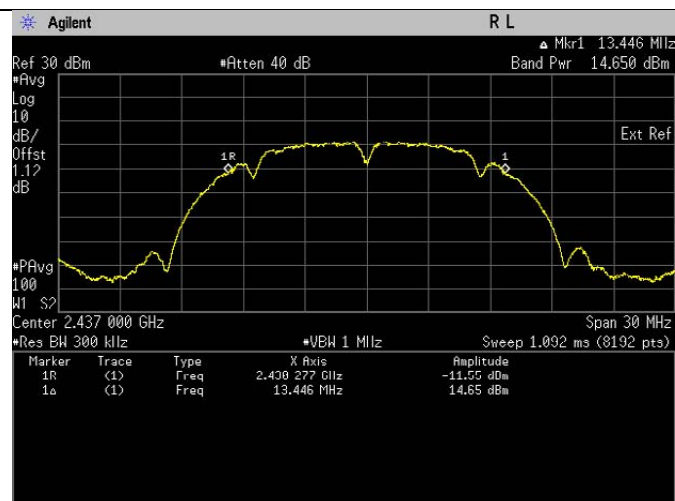
Output Power = Band Power+ Duty Cycle Factor

**802.11b**

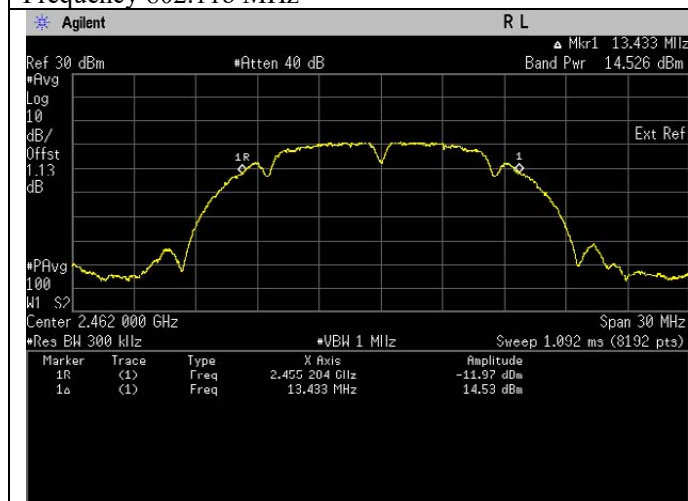
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11b	DSSS	DBPSK	1	2412	14.851	Pass
802.11b	DSSS	DBPSK	1	2437	14.701	Pass
802.11b	DSSS	DBPSK	1	2462	14.577	Pass



Frequency 802.11b MHz



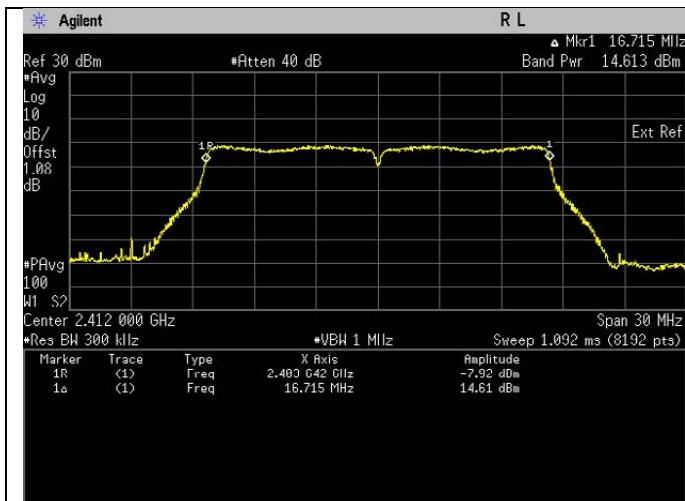
Frequency 802.11b MHz



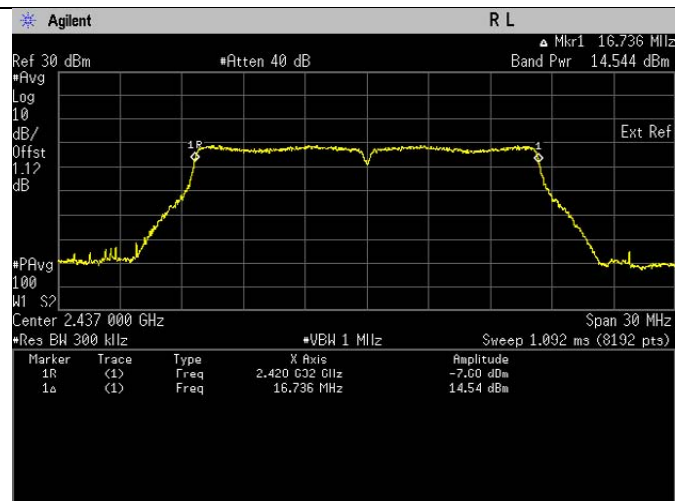
Frequency 802.11b MHz

**802.11g**

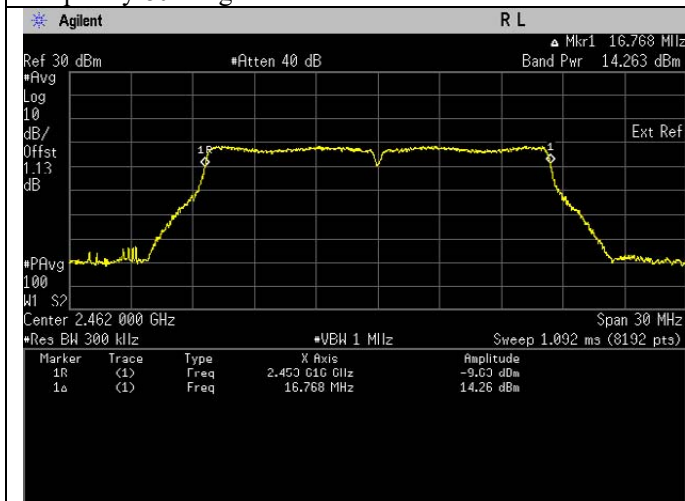
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	14.749	Pass
802.11g	OFDM	BPSK	6	2437	14.680	Pass
802.11g	OFDM	BPSK	6	2462	14.399	Pass



Frequency 802.11g MHz



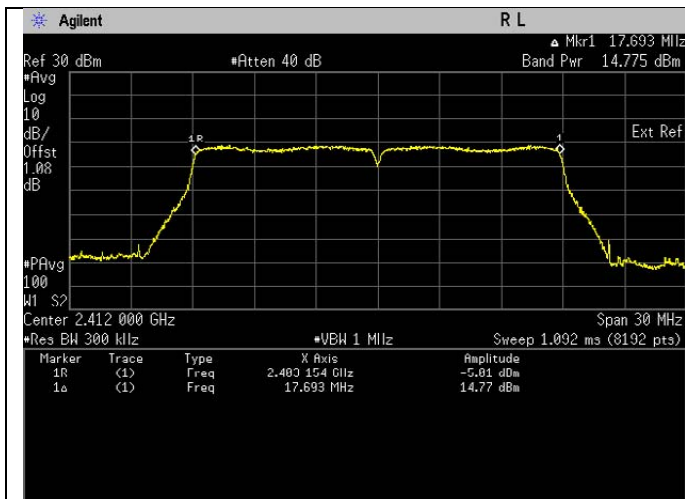
Frequency 802.11g MHz



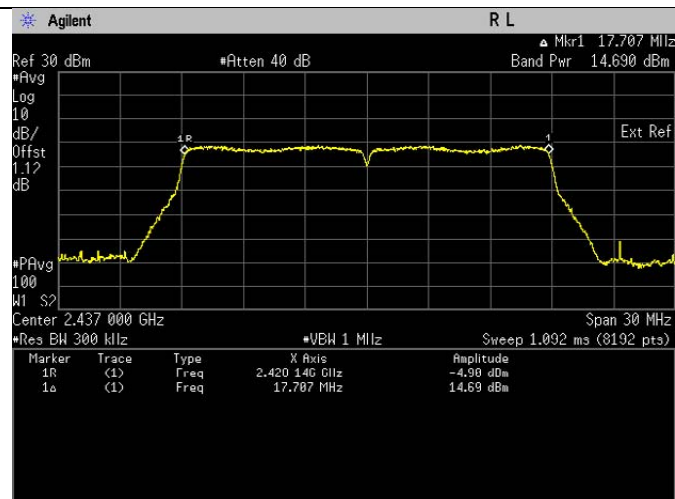
Frequency 802.11g MHz

**802.11n (HT20)**

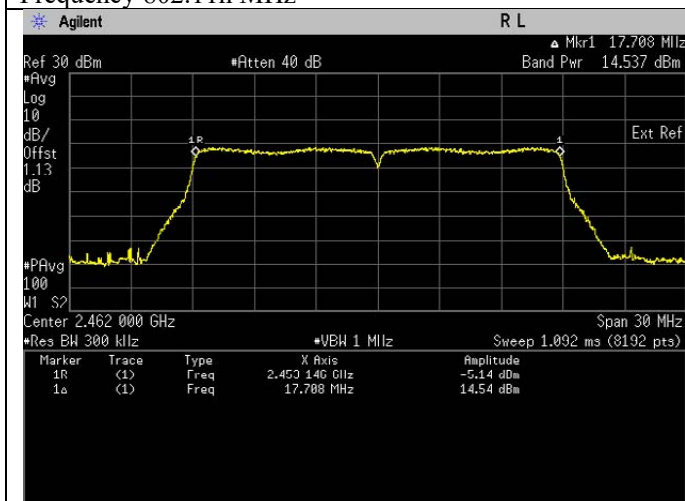
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	14.863	Pass
802.11n	OFDM	BPSK	6.5	2437	14.778	Pass
802.11n	OFDM	BPSK	6.5	2462	14.661	Pass



Frequency 802.11n MHz



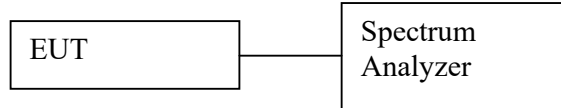
Frequency 802.11n MHz



Frequency 802.11n MHz

### 6.3.Duty Cycle of the test signal

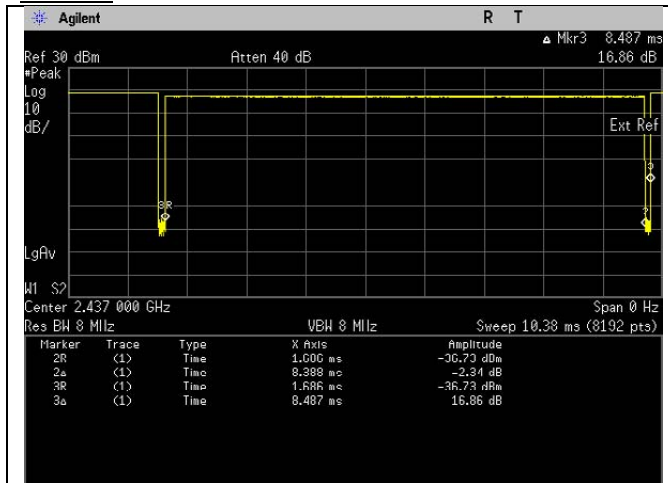
#### 6.3.1. Test Setup



- 1) Check and ensure the spectrum analyzer well calibrate.
- 2) Turn on the DUT and set DUT to transmit maximum power.
- 3) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- 4) Setting of Spectrum analyzer :
  - a. Set the RBW = 10 MHz or the highest RBW available on spectrum analyzer.
  - b. Set the VBW  $\geq$  RBW.
  - c. Set the span  $\geq$  [1.5  $\times$  DTS bandwidth].
  - d. Detector = Peak.
  - e. Sweep time = 10ms or others that allow to measure accurate duty cycle.
  - f. Trace mode = max hold.
  - g. Allow trace to fully stabilize.
- 5) Record the duty cycle as X and save the plot.
- 6) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.3.2. Test Data

#### 802.11b



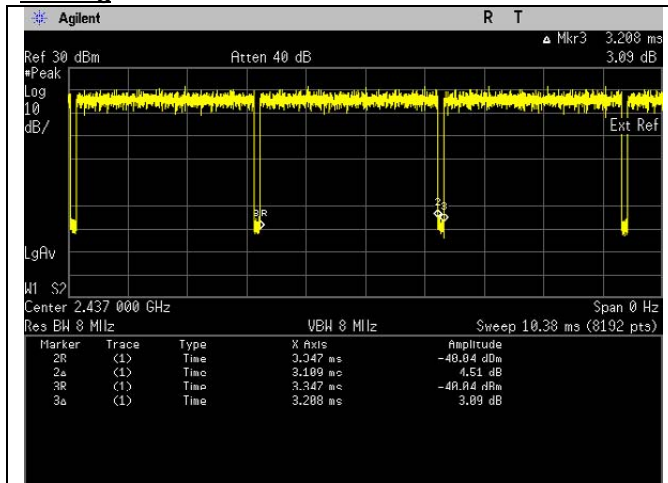
Duty Cycle

On time (ms)	8.388
On + Off Time (ms)	8.487
Duty cycle	0.9883
Duty Cycle factor	0.051

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor =  $10 \cdot \log(1/\text{Duty Cycle})$

#### 802.11g



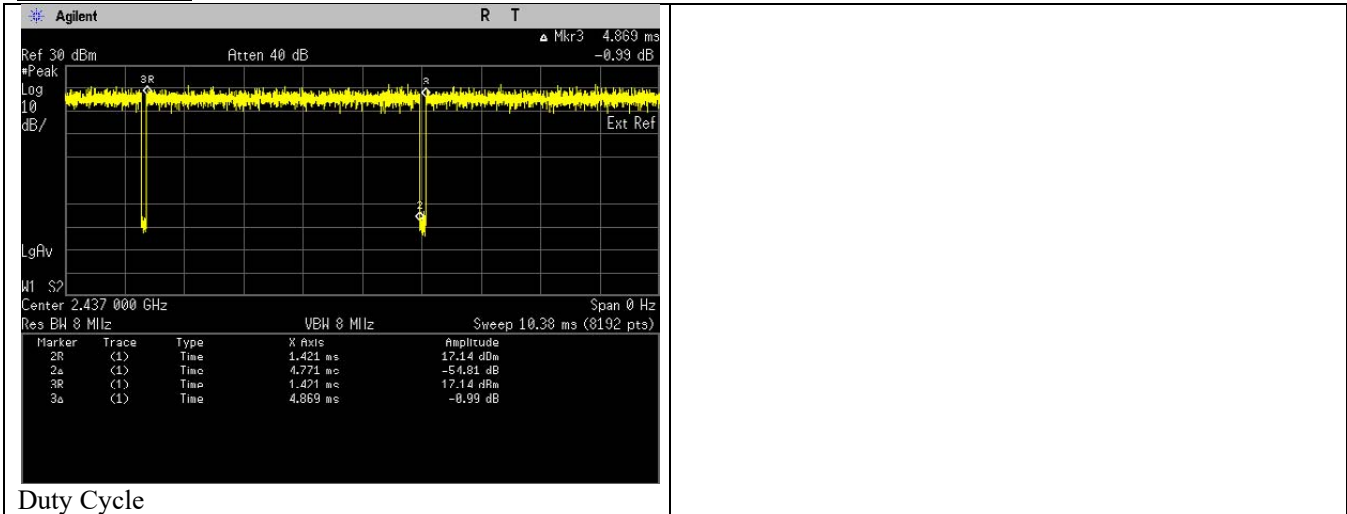
Duty Cycle

On time (ms)	3.109
On + Off Time (ms)	3.208
Duty cycle	0.9691
Duty Cycle factor	0.136

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor =  $10 \cdot \log(1/\text{Duty Cycle})$

**802.11n (HT20)**



Duty Cycle

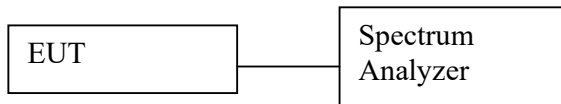
On time (ms)	4.771
On + Off Time (ms)	4.869
Duty cycle	0.9799
Duty Cycle factor	0.088

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor = 10\*log(1/Duty Cycle)

## 6.4. Maximum Peak Power Spectral Density

### 6.4.1. Test Setup



#### Maximum Peak

- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
  - a. Set analyzer center frequency to DTS channel center frequency.
  - b. Set the span to 1.5 times the DTS bandwidth.
  - c. Set the RBW to  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
  - d. Set the VBW  $\geq [3 \times \text{RBW}]$ .
  - e. Detector = peak.
  - f. Sweep time = auto couple.
  - g. Trace mode = max hold.
  - h. Allow trace to fully stabilize.
  - i. Use the peak marker function to determine the maximum amplitude level within the RBW.
  - j. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
- e) Measure every antenna port by repeat the step above for MIMO measurement.

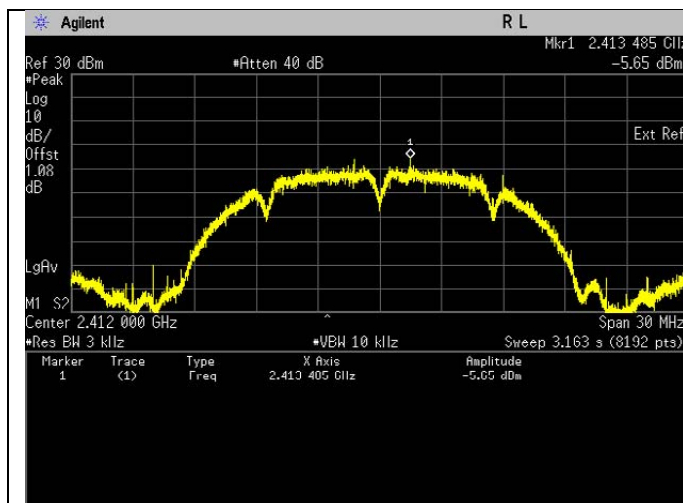
### 6.4.2. Test Limits

<b>Normal Condition (25 ° C)</b>
<b><math>\leq 8 \text{ dBm/3kHz}</math></b>

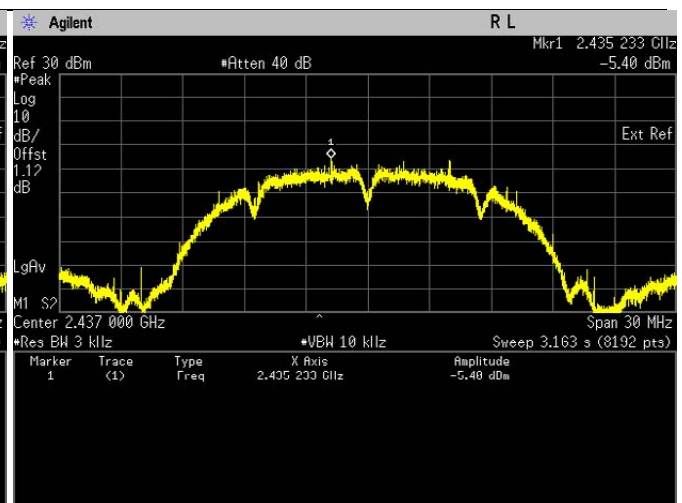
### 6.4.3. Test Result

#### 802.11b

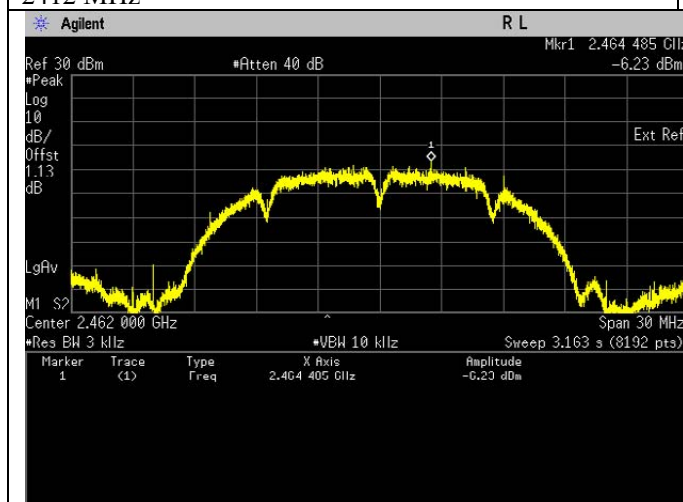
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11b	DSSS	DBPSK	1	2412	-5.65	Pass
802.11b	DSSS	DBPSK	1	2437	-5.40	Pass
802.11b	DSSS	DBPSK	1	2462	-6.23	Pass



Maximum Power Spectral Density. 802.11b Frequency 2412 MHz



Maximum Power Spectral Density. 802.11b Frequency 2437 MHz

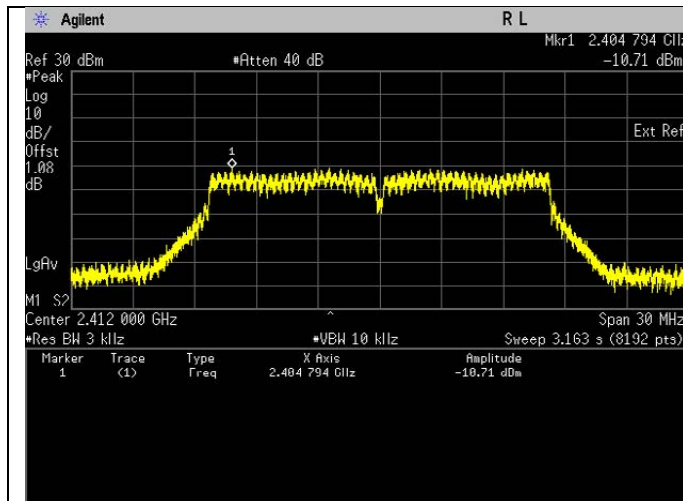


Maximum Power Spectral Density. 802.11b Frequency 2462 MHz

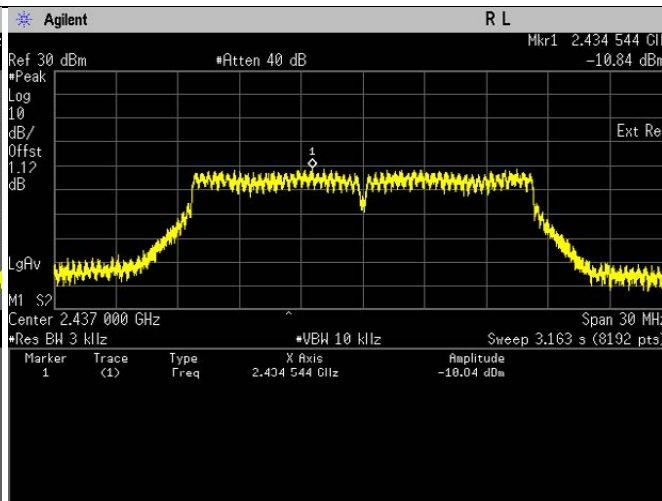


**802.11g**

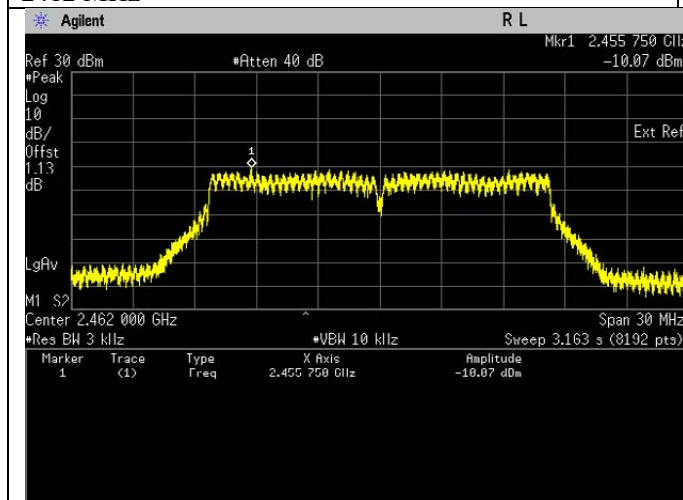
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11g	OFDM	BPSK	6	2412	-10.71	Pass
802.11g	OFDM	BPSK	6	2437	-10.84	Pass
802.11g	OFDM	BPSK	6	2462	-10.07	Pass



Maximum Power Spectral Density. 802.11g Frequency 2412 MHz



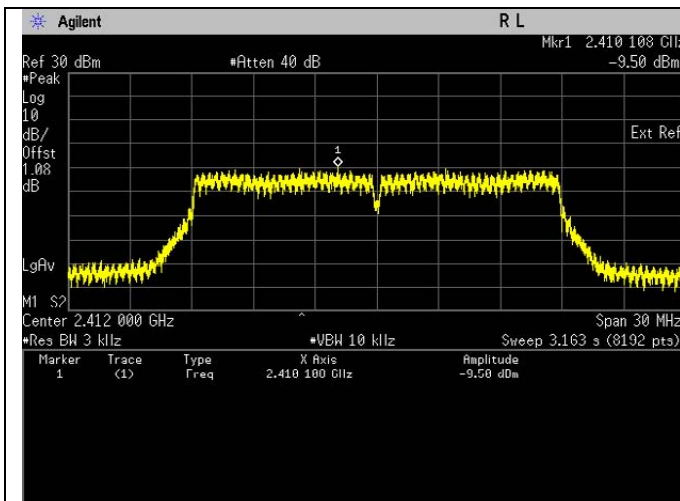
Maximum Power Spectral Density. 802.11g Frequency 2437 MHz



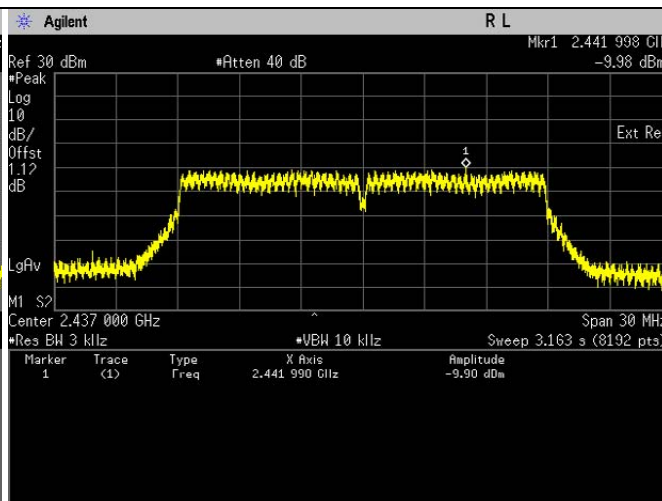
Maximum Power Spectral Density. 802.11g Frequency 2462 MHz

**802.11n (HT20)**

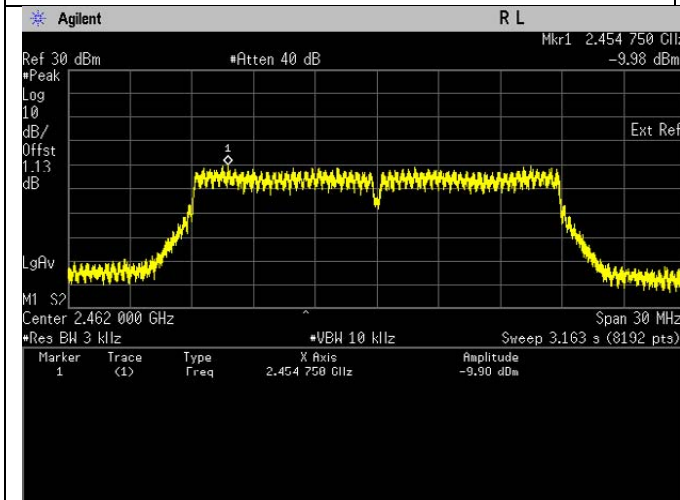
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11n	OFDM	BPSK	6.5	2412	-9.50	Pass
802.11n	OFDM	BPSK	6.5	2437	-9.98	Pass
802.11n	OFDM	BPSK	6.5	2462	-9.98	Pass



Maximum Power Spectral Density. 802.11n Frequency 2412 MHz



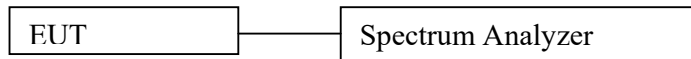
Maximum Power Spectral Density. 802.11n Frequency 2437 MHz



Maximum Power Spectral Density. 802.11n Frequency 2462 MHz

## 6.5. Conducted Spurious Emission

### 6.5.1. Test Setup



- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
  - a. RBW = 100 kHz
  - b. VBW = 300 kHz
  - c. Detector mode = Peak
  - d. Trace = Max Hold
  - e. Sweep = auto
- e) Use the peak marker function to measure highest emission and scan up to 10<sup>th</sup> harmonic.
- f) Measure every antenna port by repeat the step above for MIMO measurement.

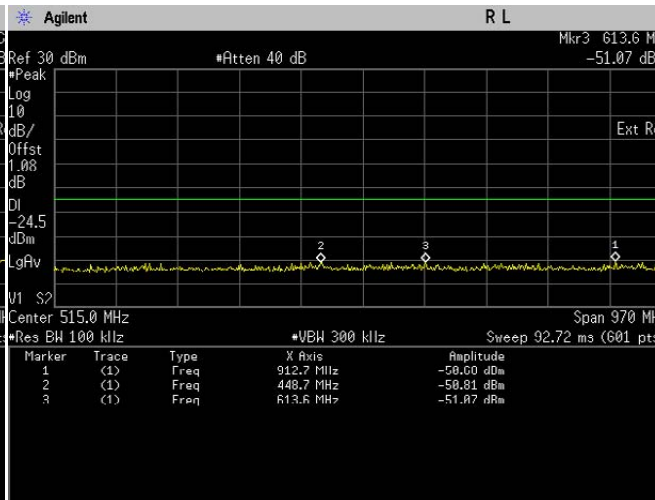
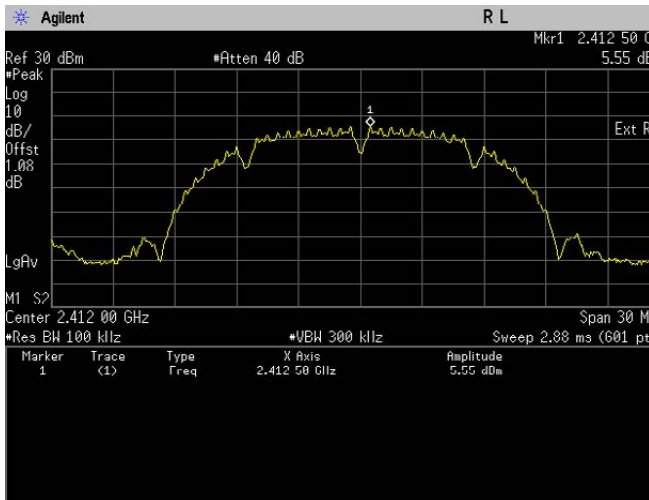
### 6.5.2. Test Limits:

<b>Normal Condition (25 ° C)</b>
<b>Shall be at least 30 dB below peak (max) power.</b>

### 6.5.3. Test Result

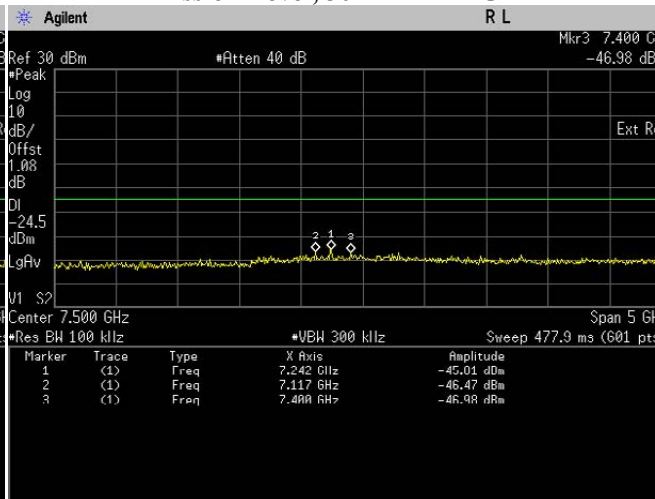
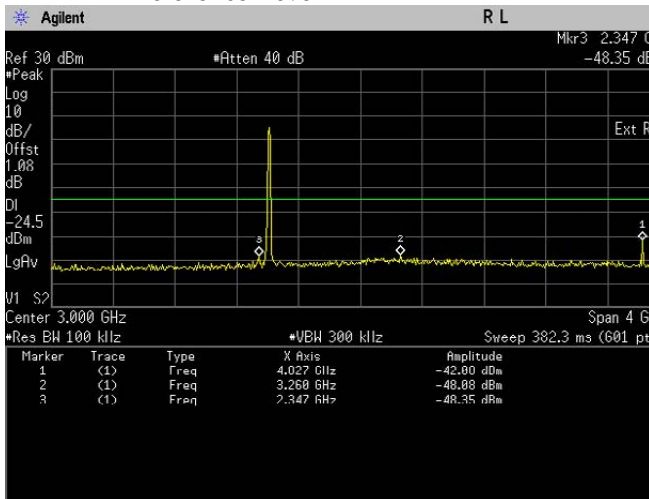
#### 802.11b

Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11b	DSSS	DBPSK	1	2412	14475.00	-36.86	Pass
					24183.00	-41.17	Pass
					24483.00	-41.39	Pass
802.11b	DSSS	DBPSK	1	2437	14625.00	-36.55	Pass
					24242.00	-40.92	Pass
					24883.00	-41.03	Pass
802.11b	DSSS	DBPSK	1	2462	14775.00	-38.14	Pass
					24908.00	-40.93	Pass
					24800.00	-41.01	Pass



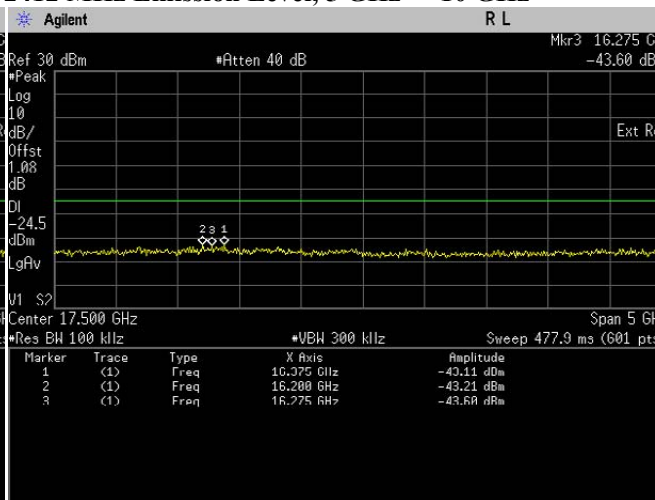
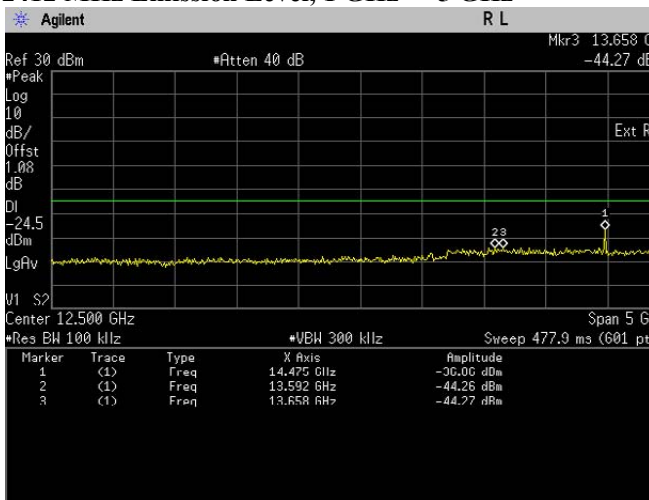
Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Reference Level

Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



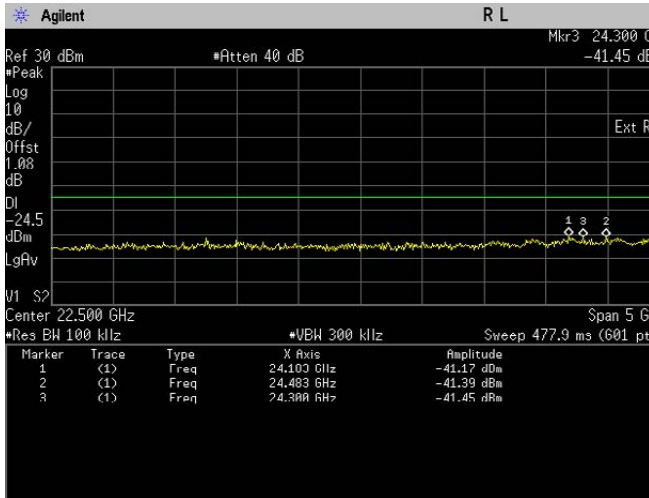
Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz

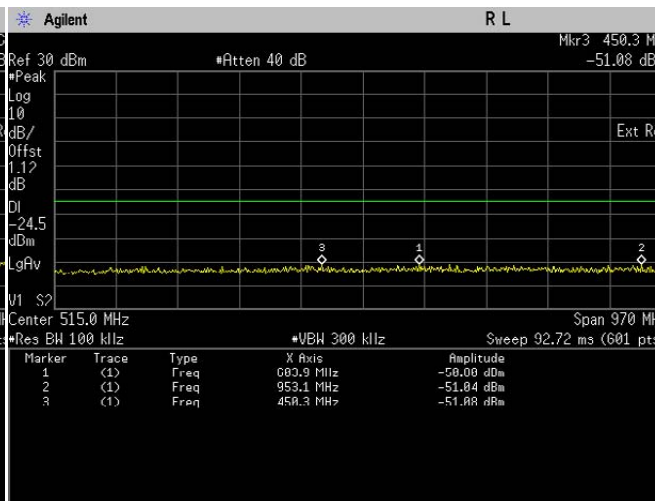
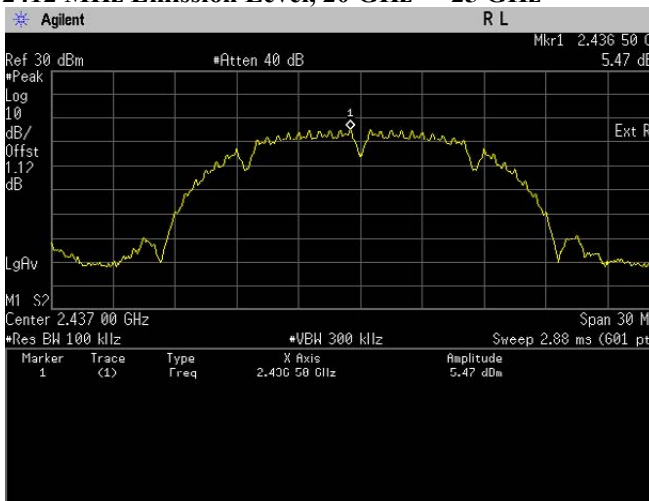


Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 10 GHz -> 15 GHz

Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz

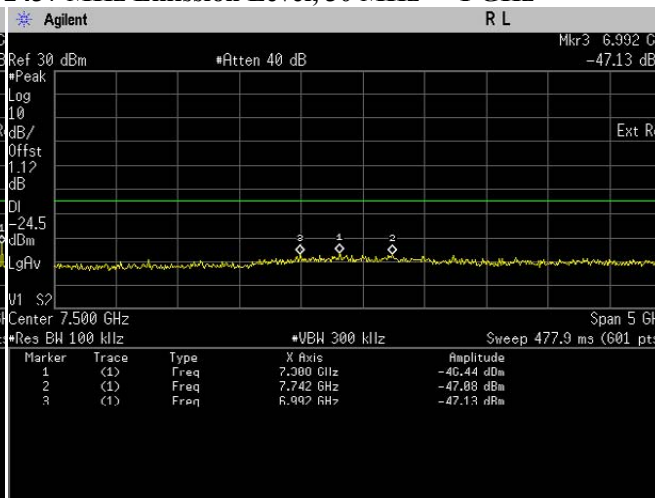
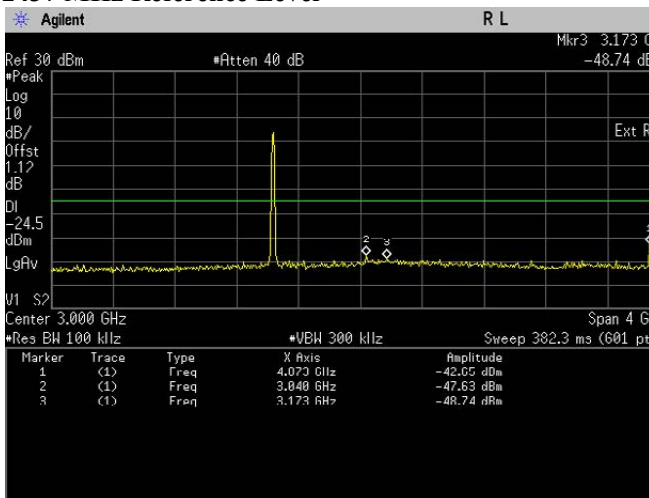


**Conducted Emissions(Average). 802.11b, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz**



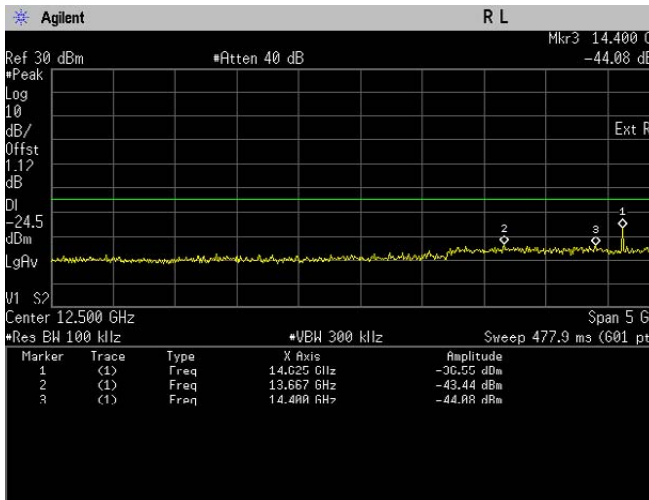
**Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Reference Level**

**Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz**

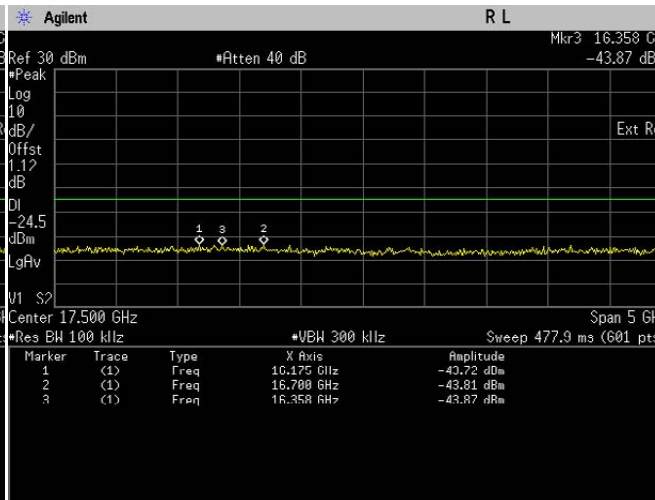


**Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz**

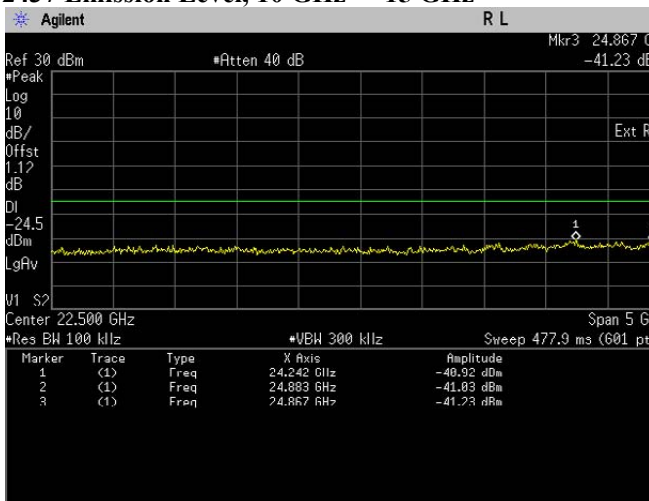
**Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz**



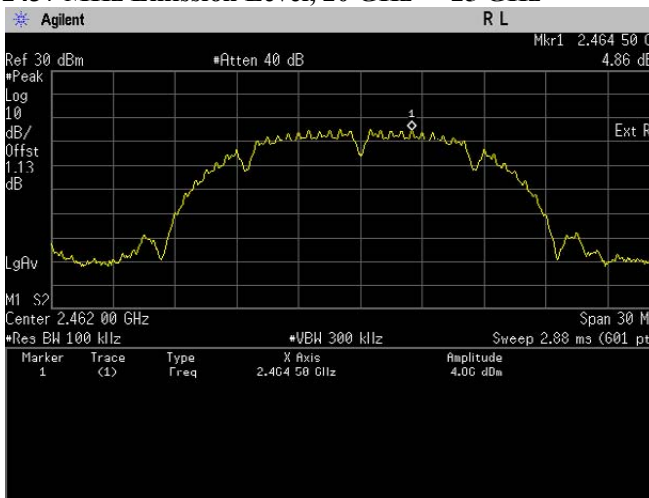
Conducted Emissions(Average). 802.11b, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



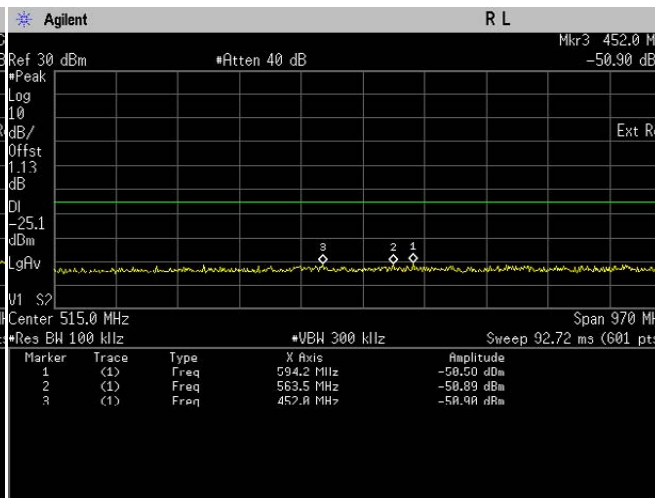
Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



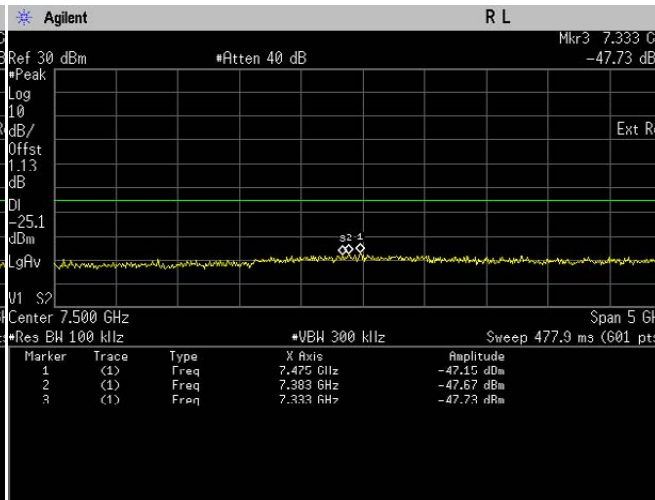
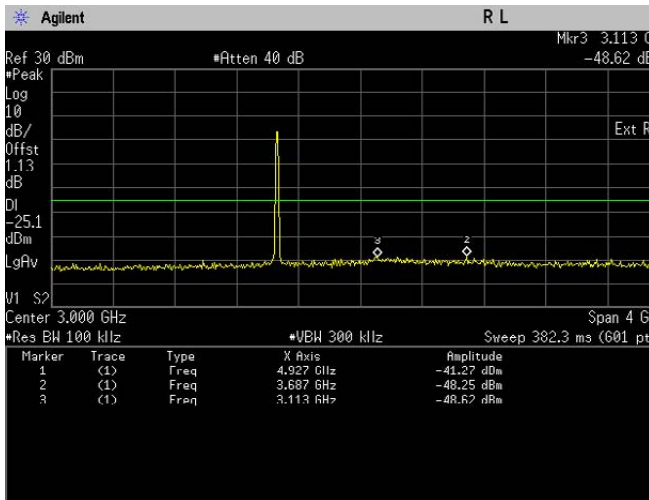
Conducted Emissions(Average). 802.11b, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Reference Level

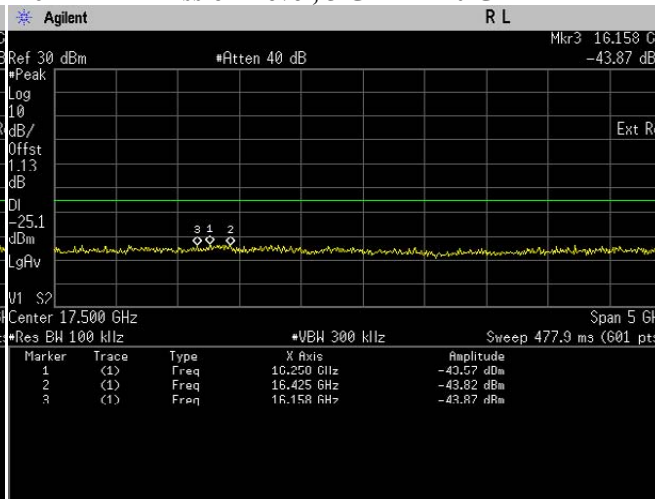
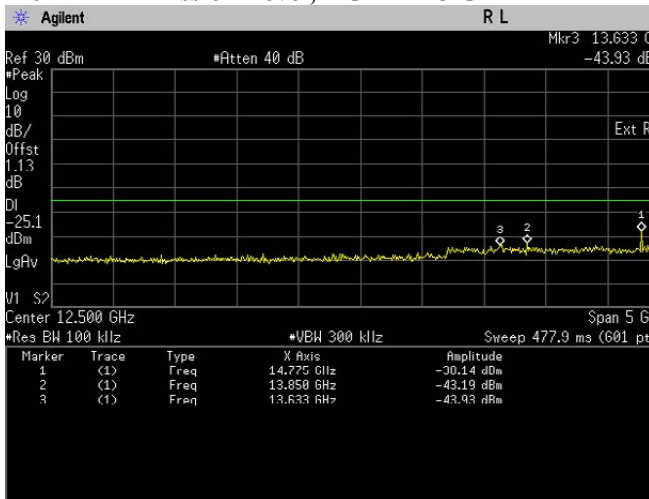


Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



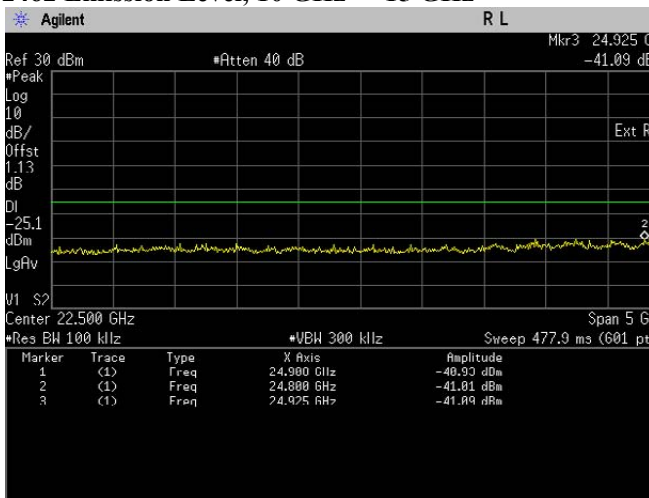
Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 10 GHz -> 15 GHz

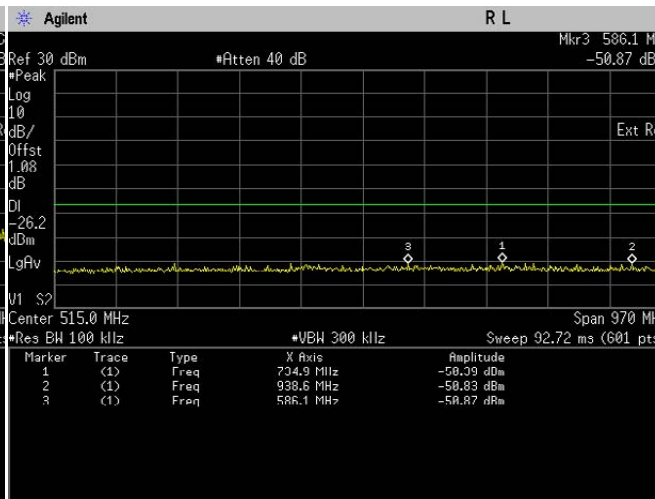
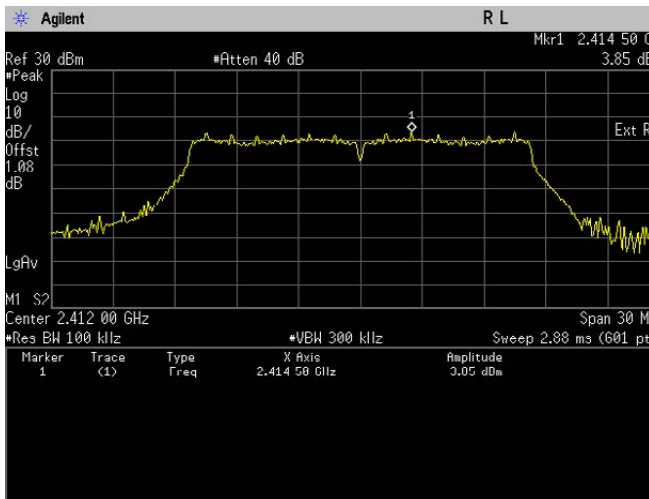
Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions(Average). 802.11b, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

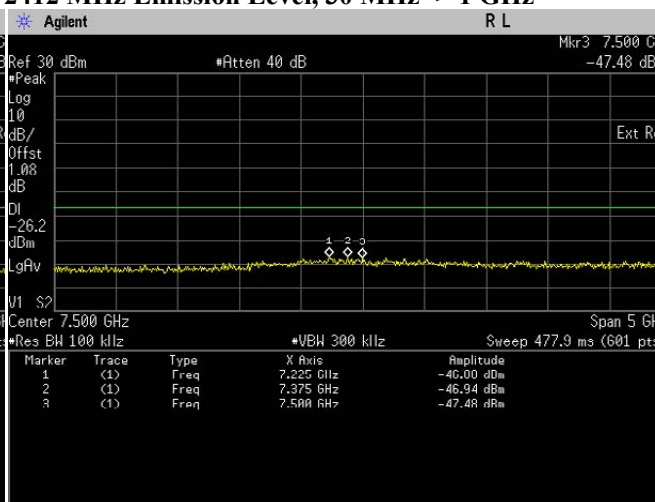
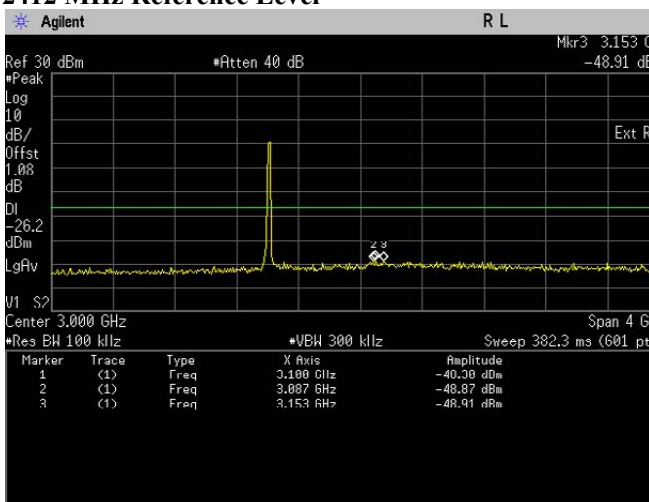
802.11g

Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11g	OFDM	BPSK	6	2412	24942.00	-40.79	Pass
					24875.00	-41.19	Pass
					24908.00	-41.26	Pass
802.11g	OFDM	BPSK	6	2437	24792.00	-41.37	Pass
					24550.00	-41.50	Pass
					24808.00	-41.66	Pass
802.11g	OFDM	BPSK	6	2462	24925.00	-40.11	Pass
					24883.00	-40.97	Pass
					24608.00	-41.07	Pass



Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Reference Level

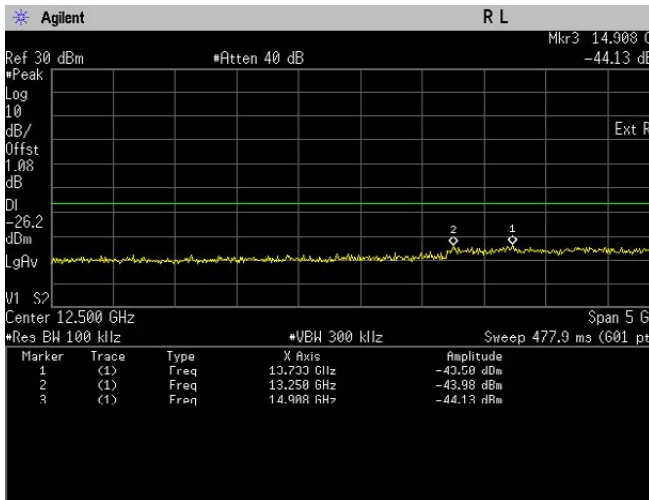
Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



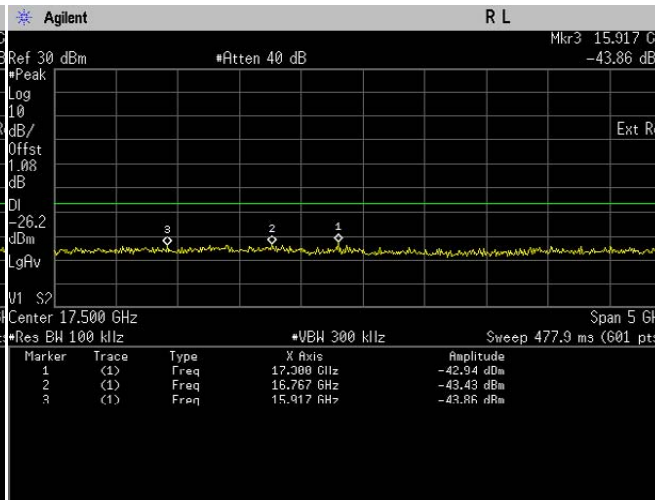
Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz

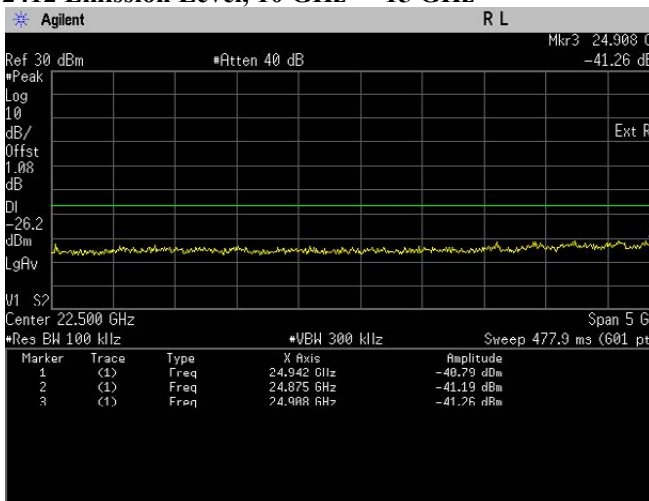




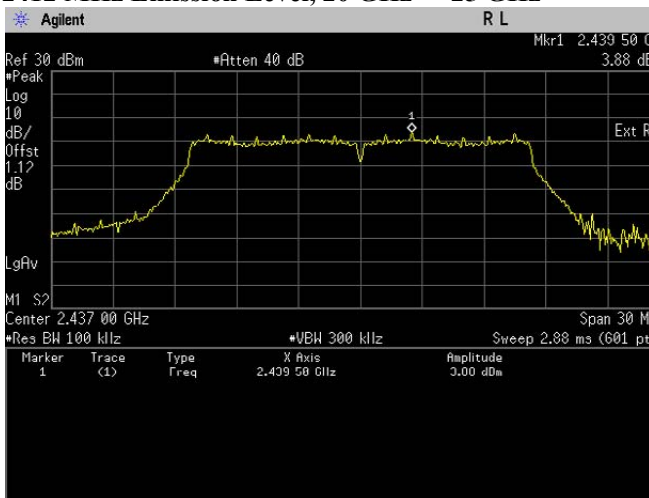
Conducted Emissions(Average). 802.11g, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



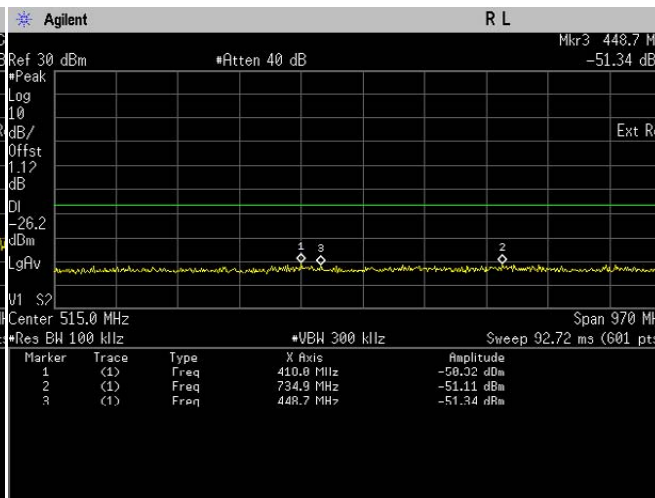
Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



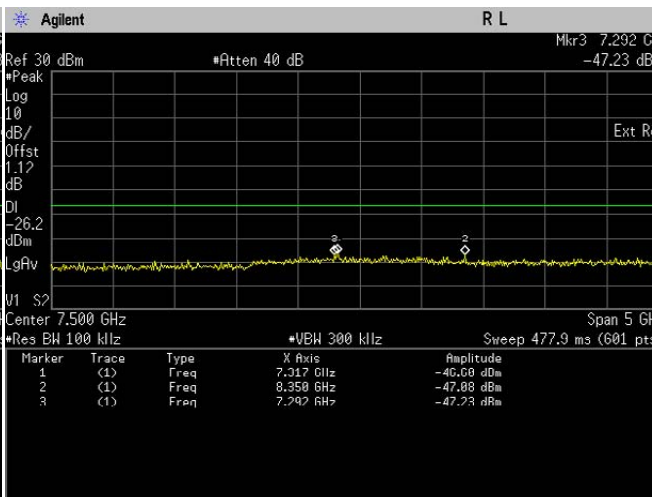
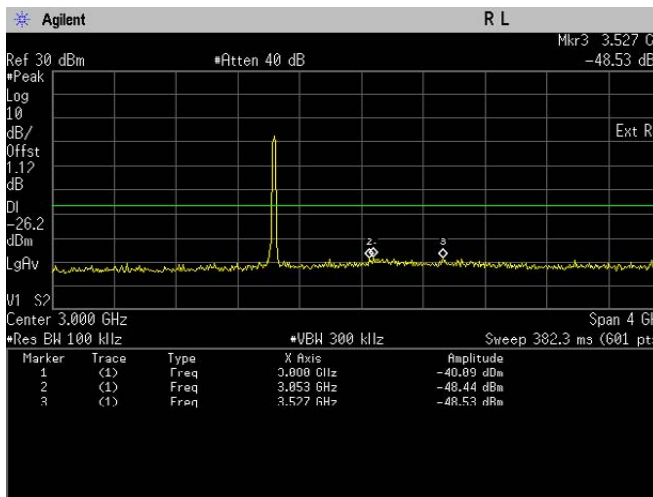
Conducted Emissions(Average). 802.11g, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Reference Level

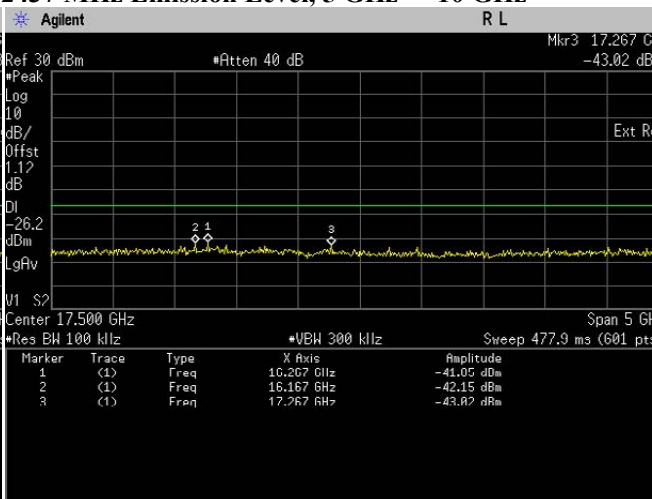
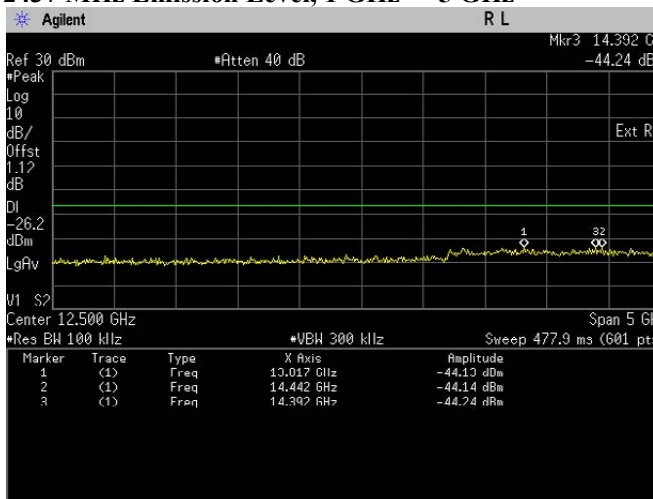


Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



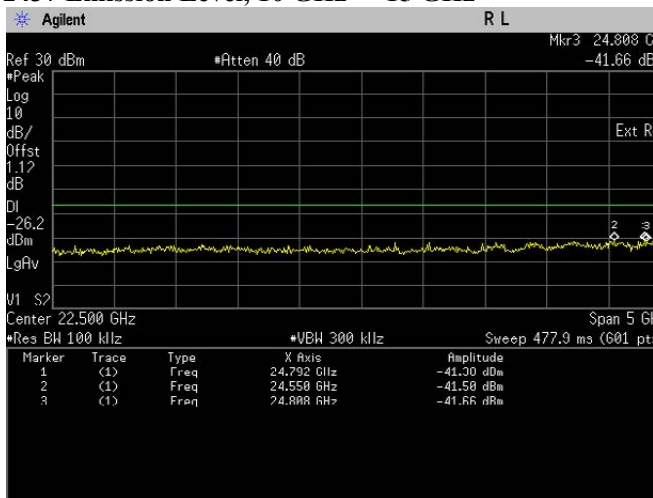
Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz

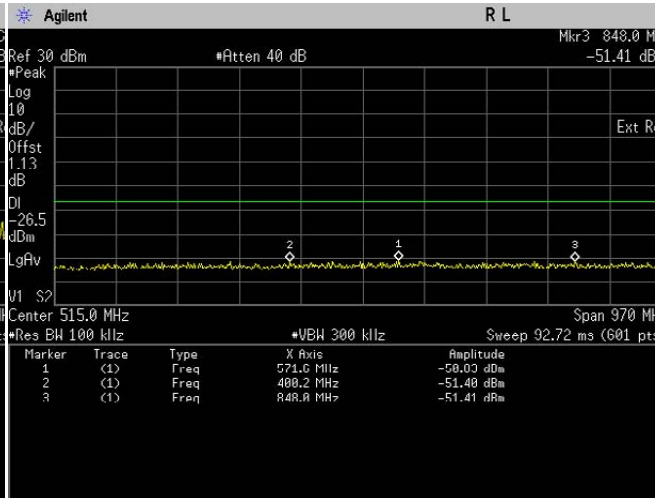
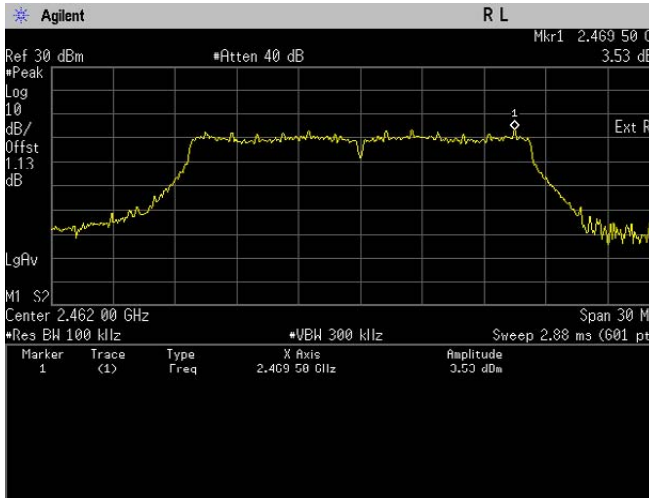


Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 10 GHz -> 15 GHz

Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz

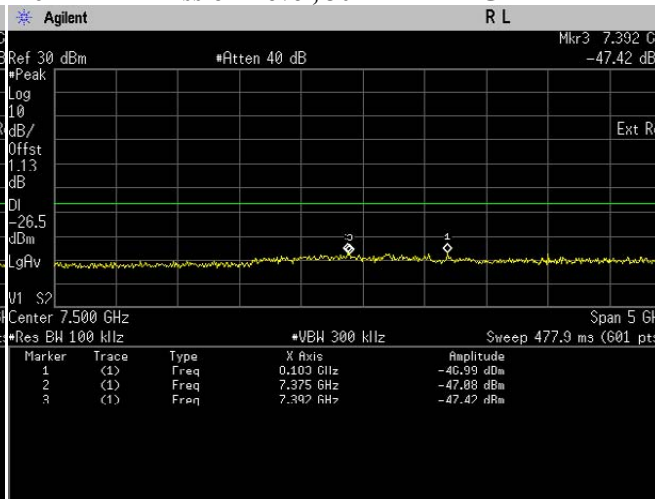
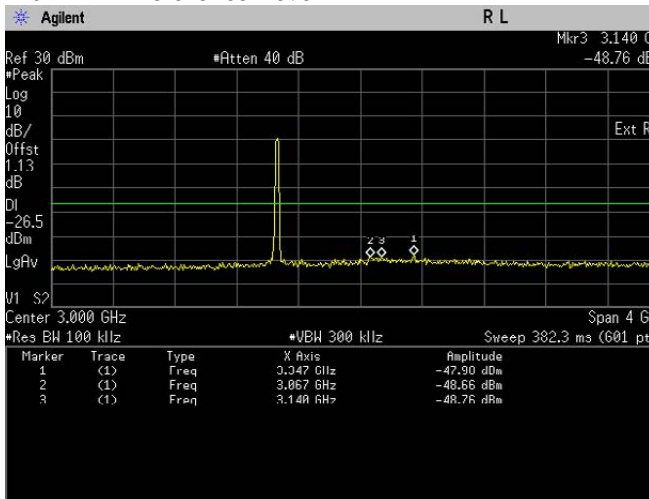


Conducted Emissions(Average). 802.11g, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



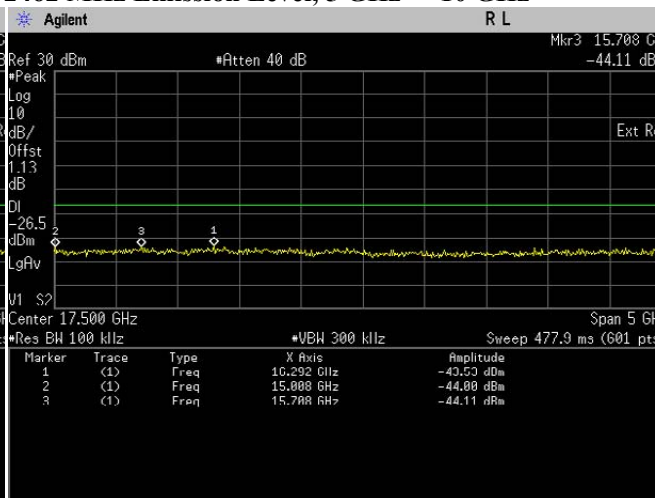
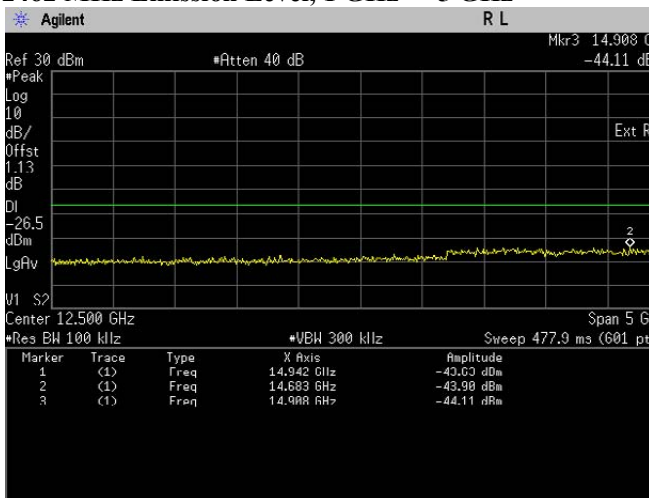
Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Reference Level

Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



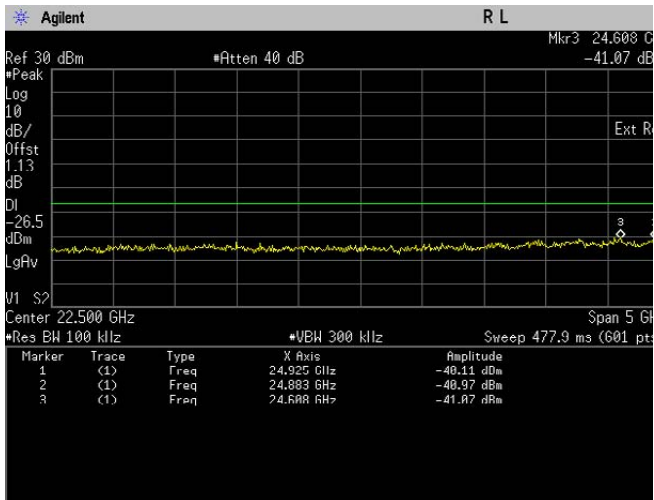
Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Emission Level, 10 GHz -> 15 GHz

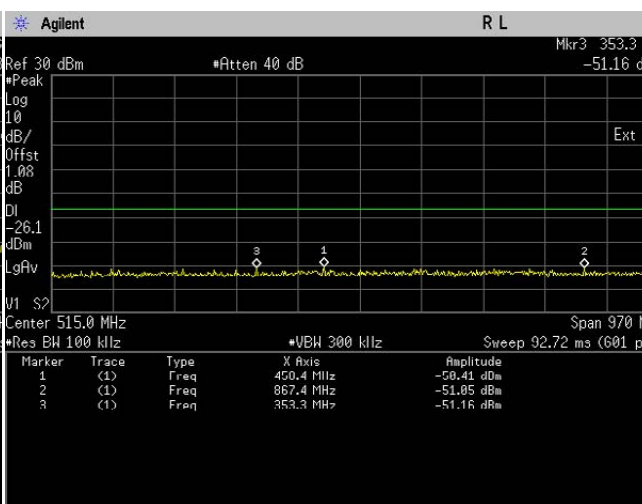
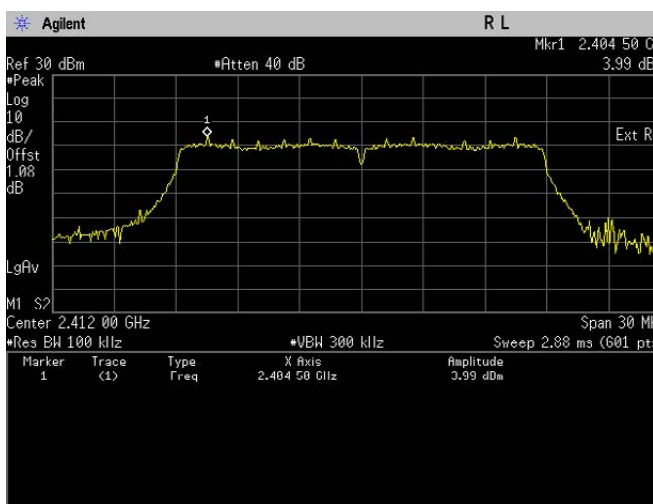
Conducted Emissions(Average). 802.11g, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions(Average). 802.11g, Frequency  
2462 MHz Emission Level, 20 GHz -> 25 GHz

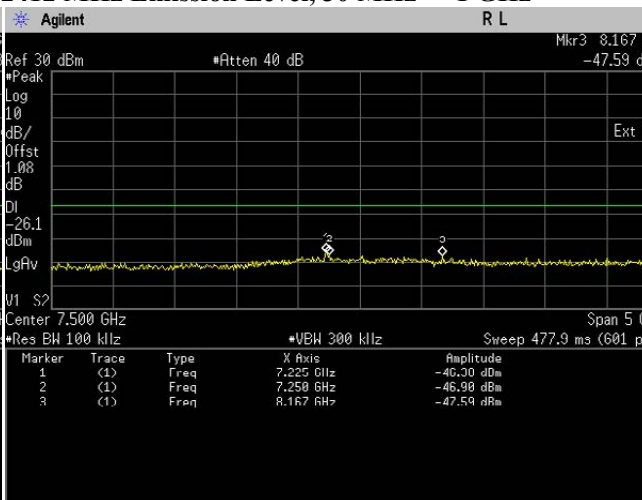
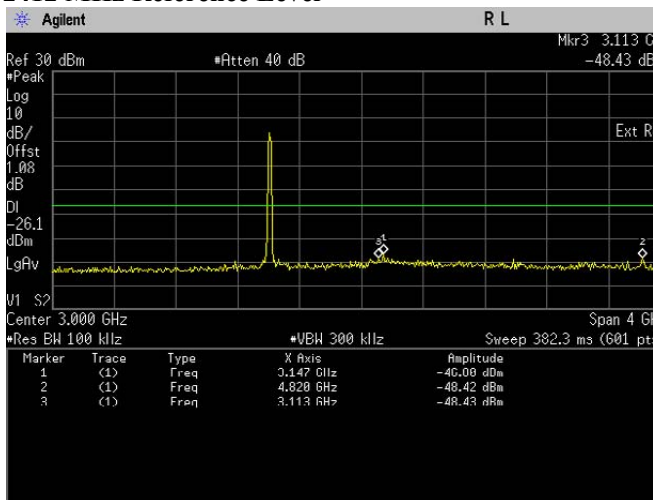
**802.11n (HT20)**

Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	24900.00	-40.04	Pass
					24917.00	-40.68	Pass
					24225.00	-41.09	Pass
802.11n	OFDM	BPSK	6.5	2437	24883.00	-40.17	Pass
					23933.00	-40.99	Pass
					24967.00	-41.13	Pass
802.11n	OFDM	BPSK	6.5	2462	24900.00	-39.79	Pass
					24800.00	-41.79	Pass
					24567.00	-41.83	Pass



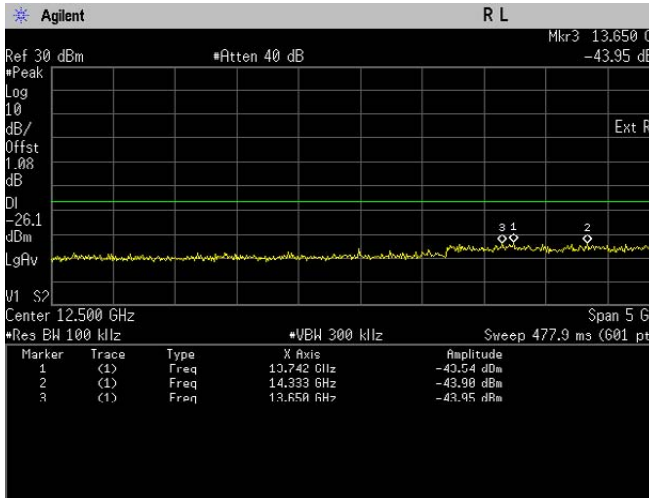
**Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Reference Level**

**Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz**

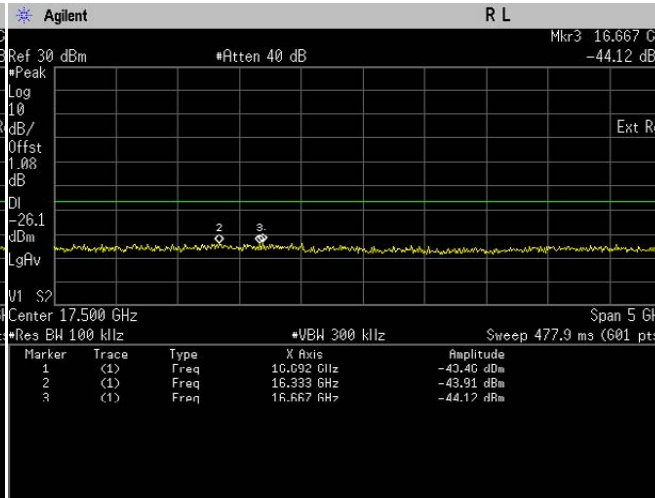


**Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz**

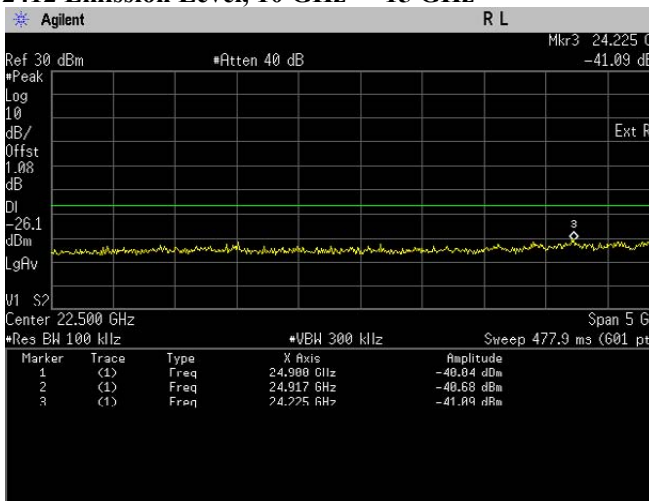
**Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz**



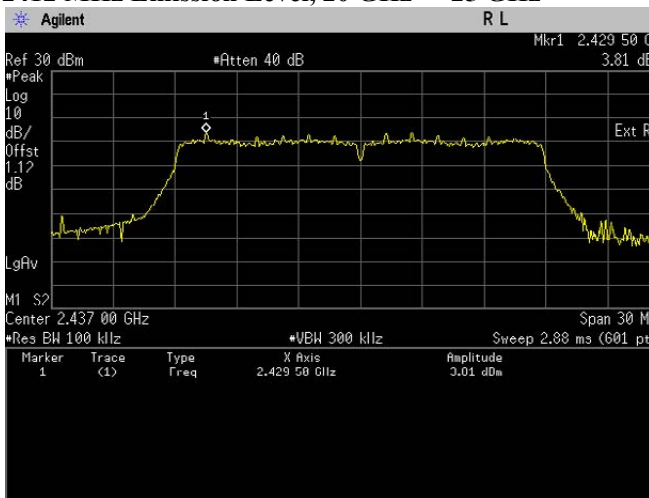
Conducted Emissions(Average). 802.11n, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



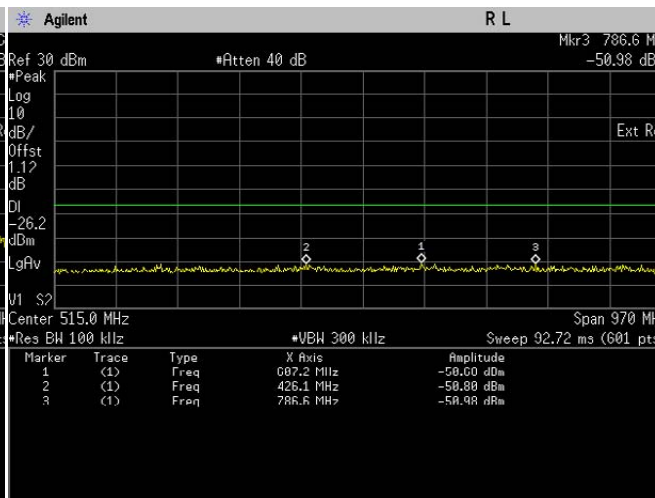
Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



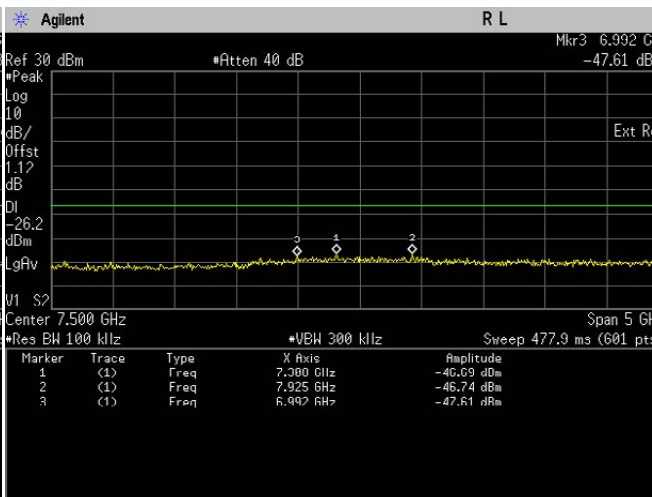
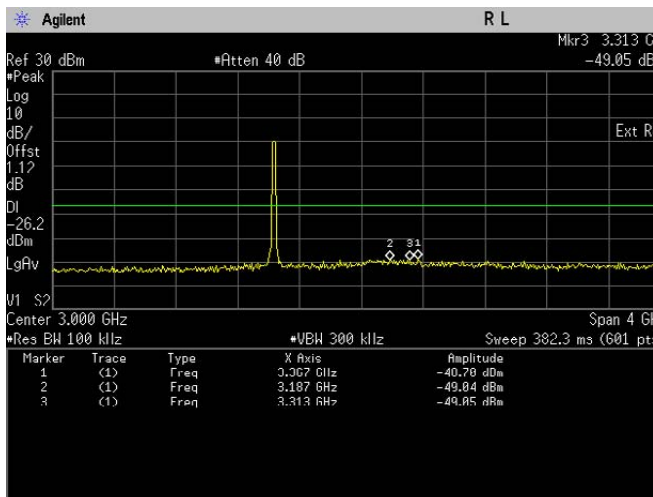
Conducted Emissions(Average). 802.11n, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Reference Level

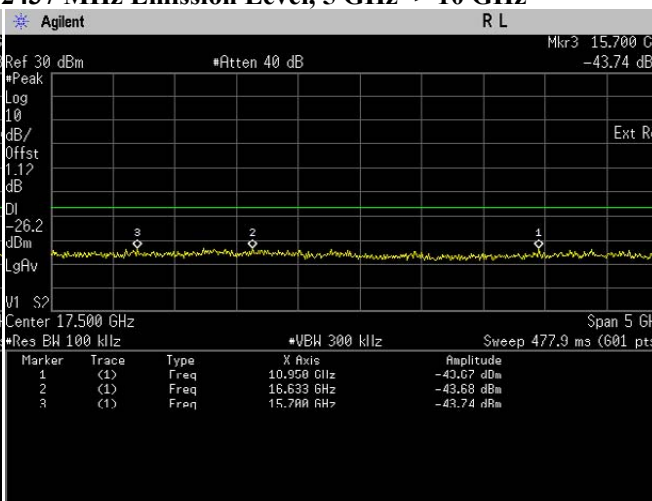
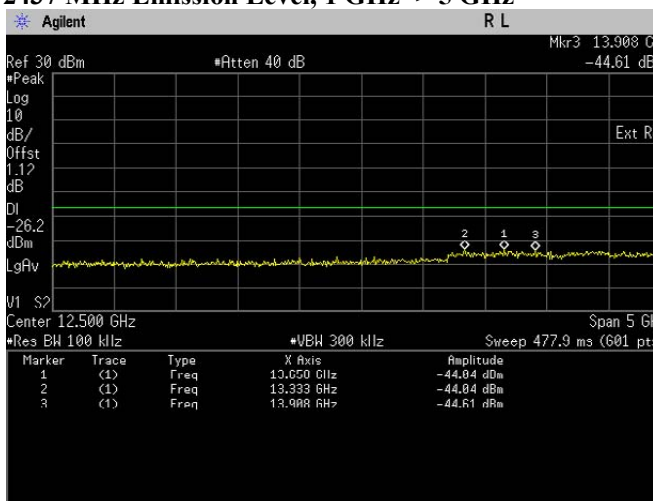


Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



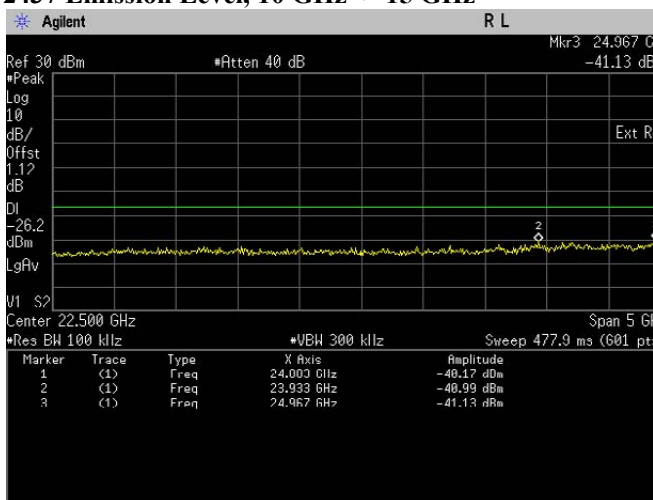
Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz

Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz

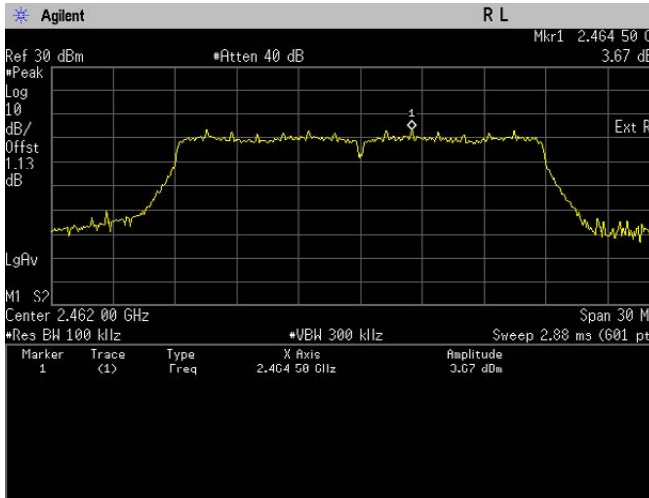


Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 10 GHz -> 15 GHz

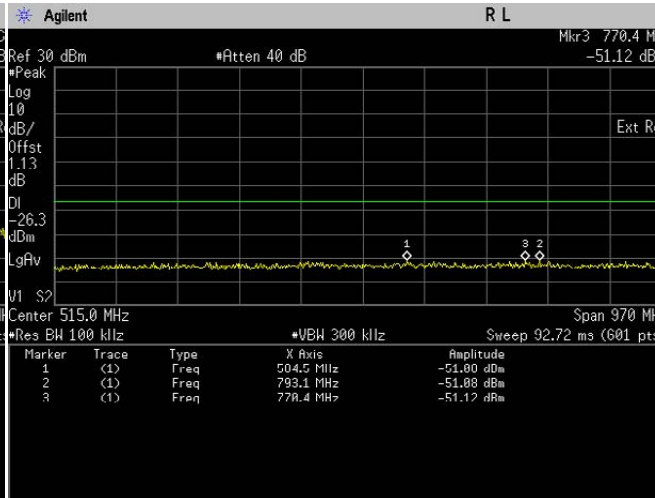
Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



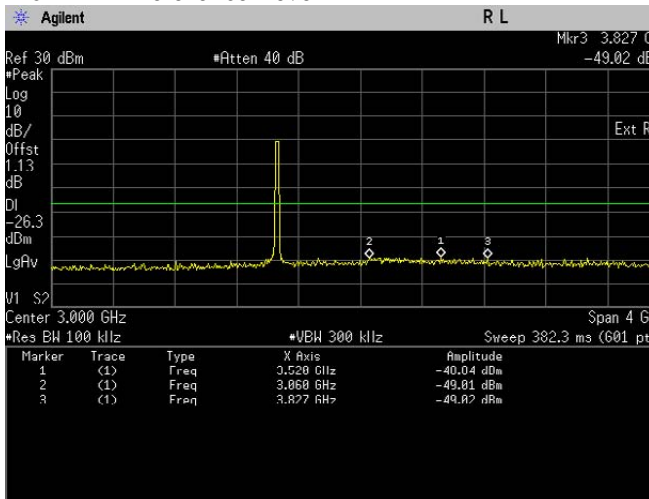
Conducted Emissions(Average). 802.11n, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



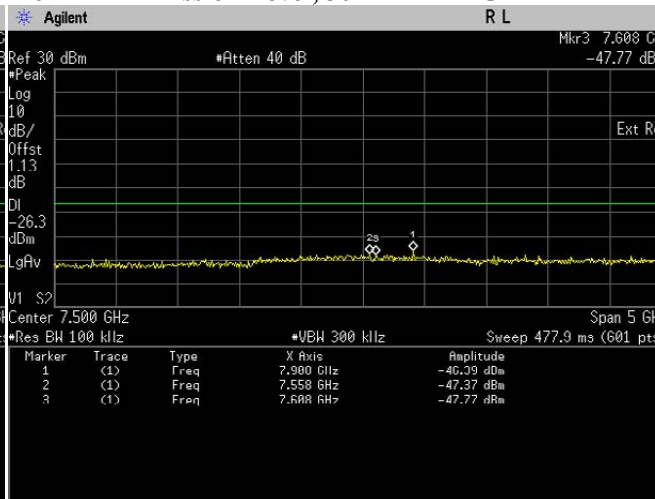
Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Reference Level



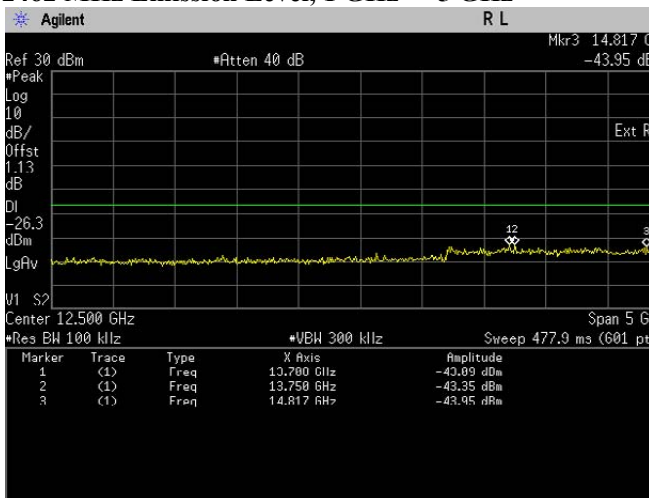
Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



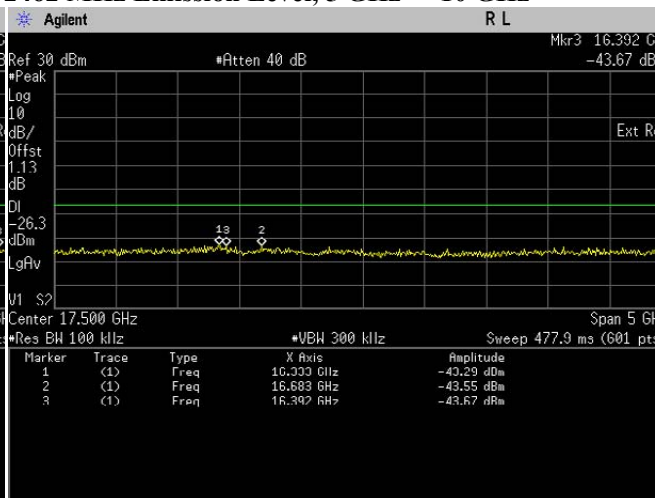
Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz

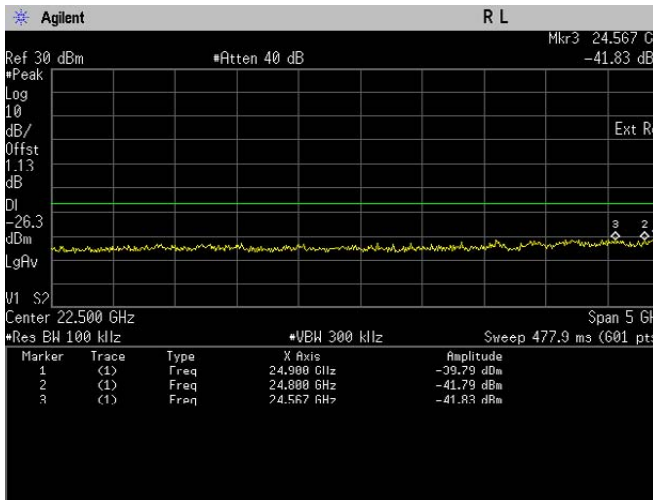


Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Emission Level, 10 GHz -> 15 GHz



Conducted Emissions(Average). 802.11n, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz

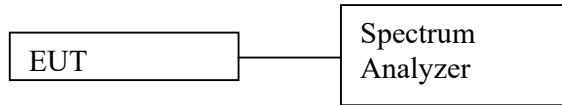




Conducted Emissions(Average). 802.11n, Frequency  
2462 MHz Emission Level, 20 GHz -> 25 GHz

## 6.6. Band edge Conducted Spurious Emission

### 6.6.1. Test Setup



- a) Check and ensure the spectrum analyzer well calibrate.
- b) Turn on the DUT and set DUT to transmit maximum power.
- c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
- d) Setting of Spectrum analyzer :
  - a. RBW = 100 kHz
  - b. VBW = 300 kHz
  - c. Detector mode = Peak
  - d. Trace = Max Hold
  - e. Sweep = auto
- e) Use the peak marker function to measure highest emission.
- f) Measure every antenna port by repeat the step above for MIMO measurement.

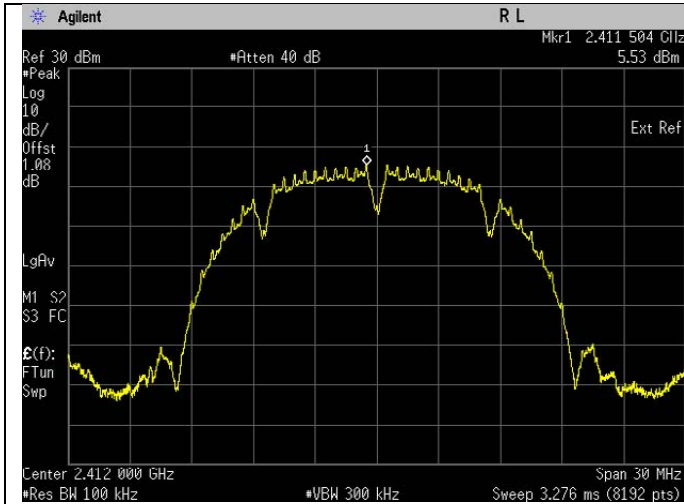
### 6.6.2. Test Limits:

<b>Normal Condition (25 ° C)</b>
<b>Shall be at least 30 dB below peak (max) power.</b>

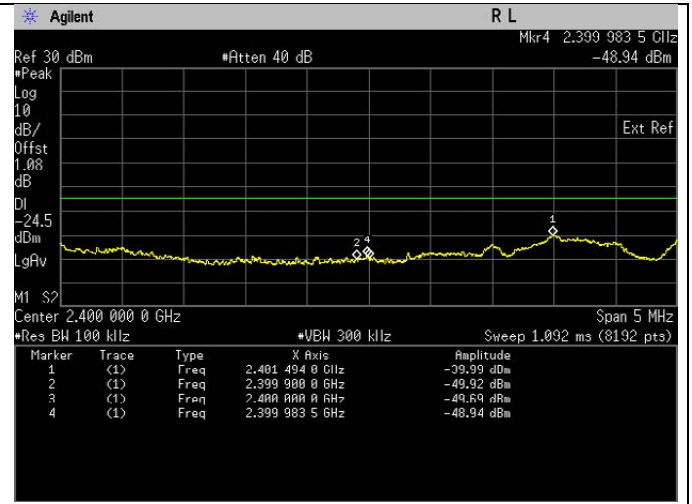
### 6.6.3. Test Result

#### **802.11b**

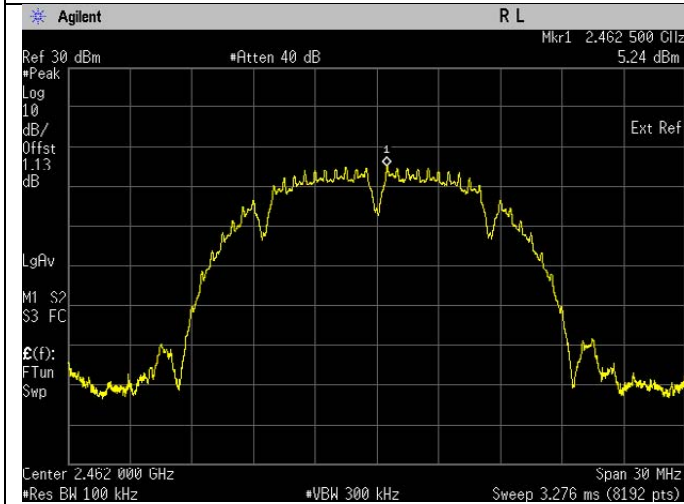
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
802.11b	DSSS	DBPSK	1	2412	2399.98	-48.94	Pass
802.11b	DSSS	DBPSK	1	2462	2483.56	-50.10	Pass



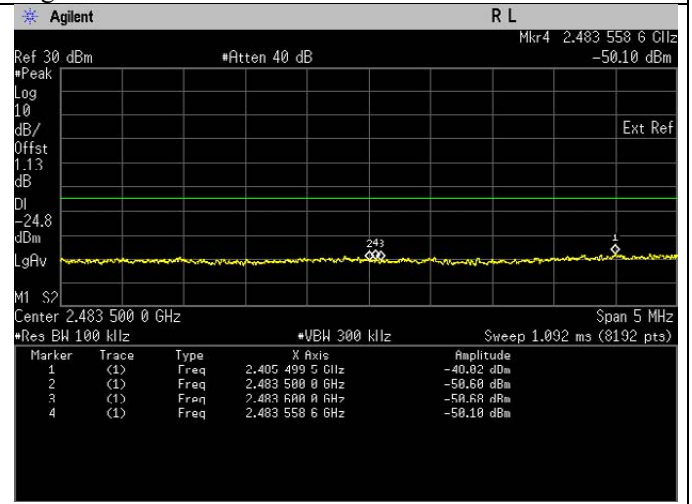
Band Edge(Average). 802.11b Frequency 2412 MHz  
 Reference Level



Band Edge(Average). 802.11b Frequency 2412 MHz Band  
 Edge



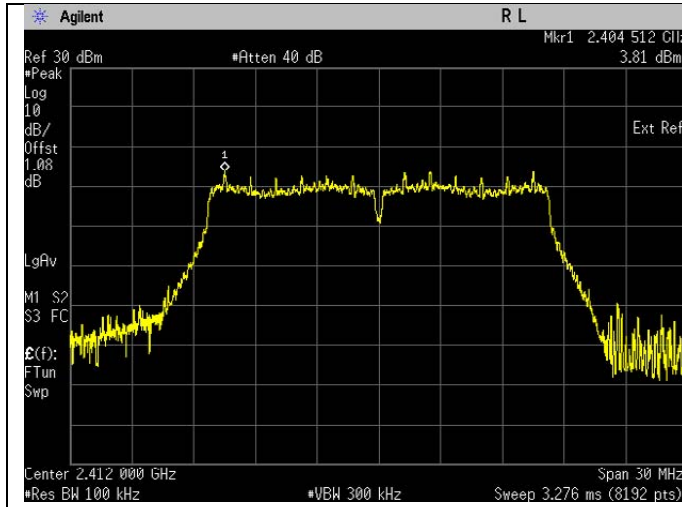
Band Edge(Average). 802.11b Frequency 2462 MHz  
 Reference Level



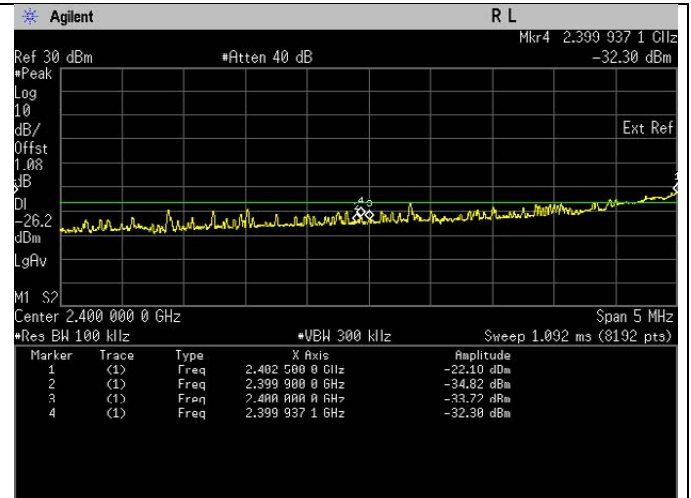
Band Edge(Average). 802.11b Frequency 2462 MHz Band  
 Edge

**802.11g**

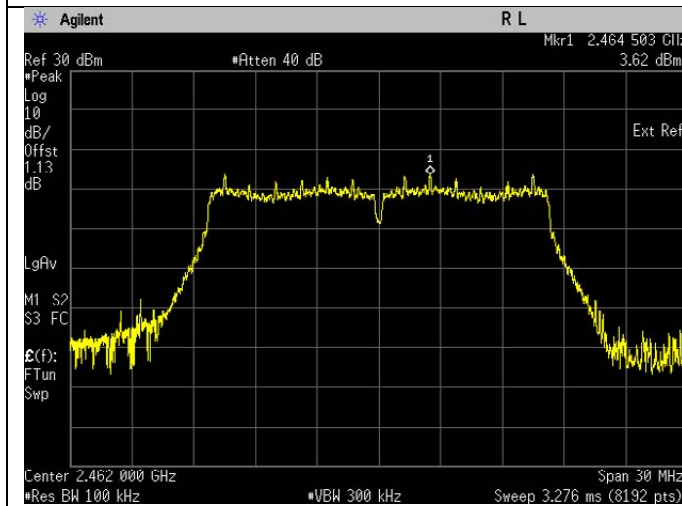
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	2399.94	-32.30	Pass
802.11g	OFDM	BPSK	6	2462	2483.55	-43.49	Pass



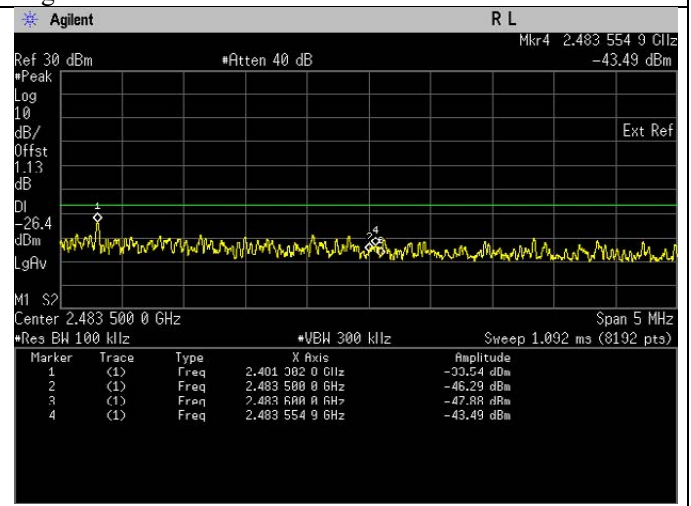
Band Edge(Average). 802.11g Frequency 2412 MHz Reference Level



Band Edge(Average). 802.11g Frequency 2412 MHz Band Edge



Band Edge(Average). 802.11g Frequency 2462 MHz Reference Level



Band Edge(Average). 802.11g Frequency 2462 MHz Band Edge