MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

MS ISO/IEC 17025
TESTING
SAMM NO. 0825

MOTOROLA PENANG ADV. COMM. LABORATORY

Motorola Solutions Malaysia Sdn. Bhd.
Plot 2A Medan Bayan Lepas,
Mukim 12, S.W.D. 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT

Report Revision : Rev.D

Date/s Tested	:	01-Jun-2021 - 16-Jun-2021
Report Issue Date	:	13-Jul-2021
Manufacturer/Location	:	Motorola Solutions Malaysia Sdn Bhd Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900, Bayan Lepas, Penang, Malaysia
Requestor	:	LIM KK
Product Type	:	Hand-held
Product Version (PMN)	:	Curve
Model Number (HVIN)	:	DLR110NBHLAA (HVIN:DLR110NB1)
Frequency Band	:	2.412-2.462 GHz
Max RF Output Power	:	802.11b - 63.1 mWatts 802.11g - 31.62 mWatts 802.11n20 - 25.12 mWatts 802.11n40 - 17.78 mWatts
Applicant Name	:	Motorola Solutions Inc
Applicant Address		8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322
FCC Registrations	:	461337
ISED Registrations	:	MY0001
Firmware Version (FVIN)	:	D01.00.11

The equipment was tested accordance to the requirement listed below:

(2.4GHz Wifi) **47CFR Part 15C** **ISED RSS 247 Issue 2**	**PASS**

Prepared By:

GAN BOON TEONG
Test Personnel

Approved Signatory:

VINCENT FOONG CHUEN KIT
Responsible Engineer

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	**13-Jul-2021**	**Gan Boon Teong**
Rev. B	Simplified summary table	**15-Jul-2021**	**Vincent Foong**
Rev. C	Added ISED HVIN	**6-Aug-2021**	**Vincent Foong**
Rev. D	Updated model number to Curve	**18-Aug-2021**	**Vincent Foong**

1.0. General Information

EUT Description:

Technologies	2.4GHz Wi-Fi
TX Frequency range	2412MHz – 2462MHz
Modulation Type	DSSS, OFDM
Connector type	PROGRAMMING, TEST & ALIGNMENT CABLE
Antenna type	IFA WIFI ANTENNA

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
Curve SUC TRAY	MOTOROLA	PMPN4586A
BATTERY PACK,BATTERY PACK, BATT LIION 2500T	MOTOROLA	PMNN4578A

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

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: 14.674 MHz(14M7G1D) 802.11g: 16.811 MHz(16M8D1D) 802.11n20: 17.861 MHz(17M9D1D) 802.11n40: 35.860 MHz(35M9D1D)	55017XJ0046	Gan
15.247 (b)(3)	RSS-247 5.4(d)	Conducted RF Output Power (Peak)	Pass	Highest output power: 802.11b: 17.951 dBm (62.39 mW) 802.11g: 14.490 dBm (28.12mW) 802.11n20: 13.786 dBm (23.91mW) 802.11n40: 12.317 dBm (17.05mW)	55017XJ0046	Gan
15.247(e)	RSS-247 5.2(b)	Maximum Power Spectral Density	Pass	Meet the limit requirement.	55017XJ0046	Gan
15.247(d)	RSS-247 5.5	Conducted Spurious Emissions	Pass	Worst case emission: -37.68 dBm	55017XJ0046	Gan
15.247 (d)	RSS-247 5.5	Band edge Conducted Spurious Emission	Pass	Worst case emission: -34.33 dBm	55017XJ0046	Gan
15.205, 15.209, 15.247 (d)	RSS-247 5.5	Radiated Emission within Restricted Bands	Pass	Worst case emission: 49.217dBuV/m	55017XJ0059	Qawiman&Nazrin
15.207	RSS-Gen 8.8	AC Power Line Conducted Emission	NA	Testing is not required, radio shall turn off during charging mode	NA	NA
15.203		Antenna requirement	NA	Internal antenna is not accessible to the enduser	NA	NA

NA → Not Available

3.0. Measurement Uncertainty

Measurement	Frequency	Expended 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
Frequency Stability	9kHz ~ 12.75GHz	0.0085 ppm
Audio Frequency Response / Low Pass Filter Response	300Hz – 20kHz	4.09 %
Modulation Limiting	300Hz – 3kHz	1.15 %
Occupied Bandwidth	9kHz ~ 12.75GHz	2.82 dB
Band Edge Conducted Spurious Emission	9kHz ~ 12.75GHz	2.82 dB
Transient Frequency Behavior	9kHz ~ 12.75GHz	5.4 ms
Adjacent Channel Power	9kHz ~ 12.75GHz	2.82 dB

2.1. 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
POWER SUPPLY	6652A	3640A02941	22-Jan-21	22-Jan-22
SPECTRUM ANALYZER	E4445A	MY45301089	7-Sep-19	7-Sep-21
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	6031A	MY41000626	23-Jul-20	23-Jul-21
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	2950	8-Jul-19	8-Jul-21
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	BBHA9170143	15-Jul-20	15-Jul-21
18 - 40GHz PREAMPLIFIER	MITEQ Hi GAIN SUCOFLEX	2006313	Not Required	Not Required
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-22
LOOP ANTENNA	6502	00208416	15-Sep-20	15-Sep-21

3.0. 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)	
	Antenna	Primary	Secondary	Primary	Secondary	Primary	Secondary
2.4GHz	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	23.4°C, 68.6%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.4°C, 68.6%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.4°C, 68.6%RH
Test Mode	802.11n (HT40)	3 to 9	3,6,9	OFDM	BPSK	13.5	SISO CDD (MIMO)	23.4°C, 68.6%RH

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	23.4°C, 68.6%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.4°C, 68.6%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.4°C, 68.6%RH
Test Mode	802.11n (HT40)	3 to 9	3,6,9	OFDM	BPSK	13.5	SISO CDD (MIMO)	23.4°C, 68.6%RH

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	NA

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, 54.8%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	25°C, 54.8%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	25°C, 54.8%RH
Test Mode	802.11n (HT40)	1 to 11	3,6,9	OFDM	BPSK	13.5	SISO CDD (MIMO)	25°C, 54.8%RH

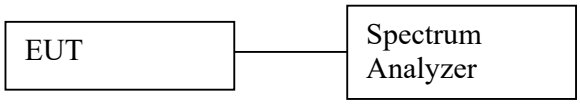
Duty Cycle of Test Signal

802.11b: Duty cycle of test signal is ≥98%.
802.11g and 802.11n Duty cycle of test signal is ≤98%.
(Refer to Clause 6.3 for duty cycle test signal)

4.0. Transmitter Test Parameters

4.1. 6dB Channel Bandwidth

4.1.1. 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.

4.1.2. Test Limits:

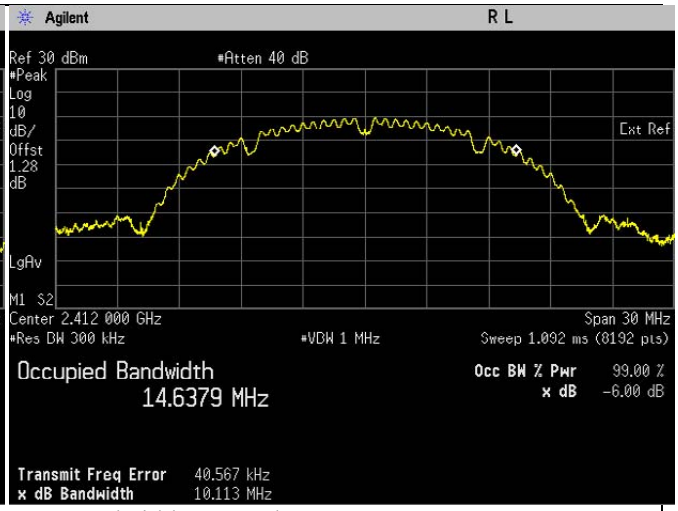
Normal Condition (25 º C)
≥500 kHz

4.1.3. **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	9.556	14.638	Pass
802.11b	DSSS	DBPSK	1	2437	9.501	14.674	Pass
802.11b	DSSS	DBPSK	1	2462	9.095	14.673	Pass

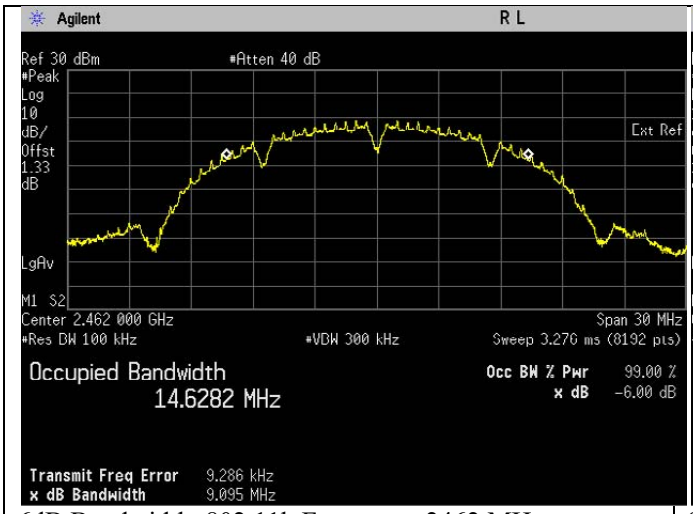
6dB Bandwidth. 802.11b Frequency 2412 MHz



99% Bandwidth. 802.11b Frequency 2412 MHz

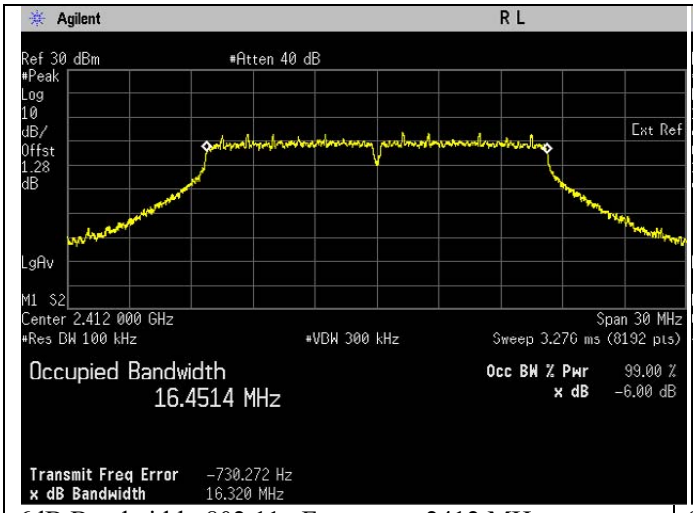
6dB Bandwidth. 802.11b Frequency 2437 MHz

99% Bandwidth. 802.11b Frequency 2437 MHz

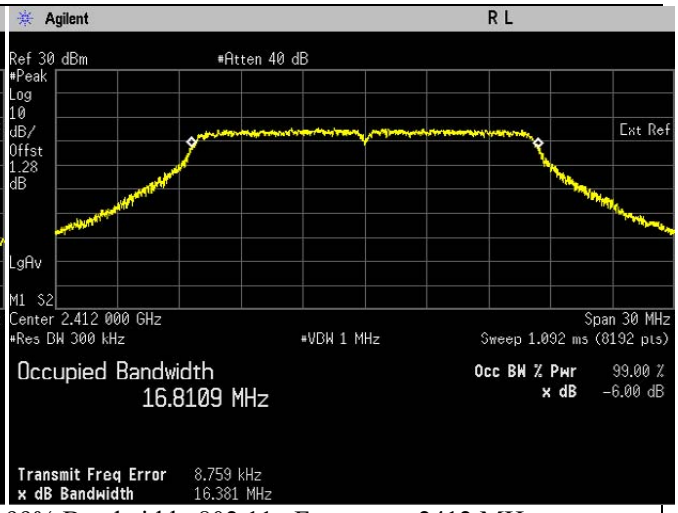
	
6dB Bandwidth. 802.11b Frequency 2462 MHz	99% Bandwidth. 802.11b Frequency 2462 MHz

802.11 g

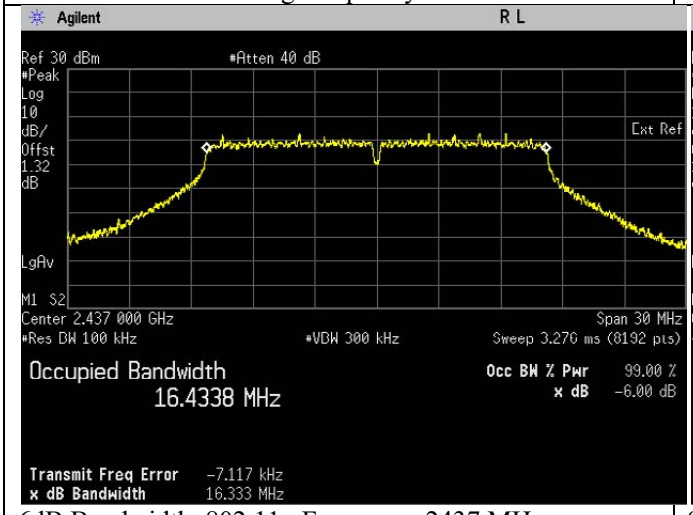
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11g	OFDM	BPSK	6	2412	16.320	16.811	Pass
802.11g	OFDM	BPSK	6	2437	16.333	16.776	Pass
802.11g	OFDM	BPSK	6	2462	16.315	16.716	Pass



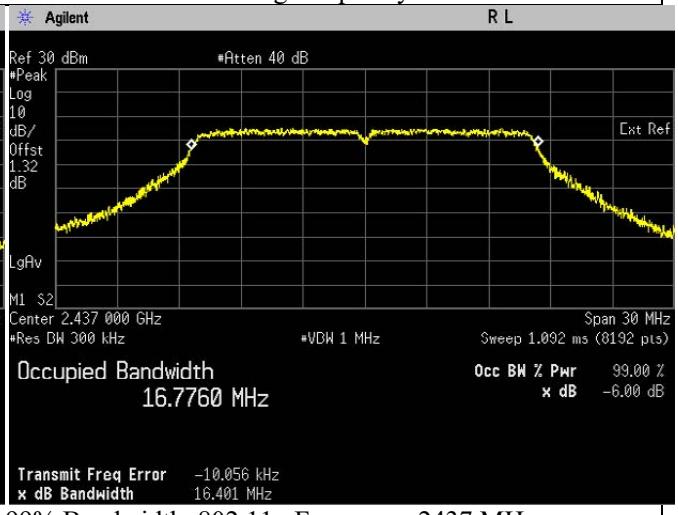
6dB Bandwidth. 802.11g Frequency 2412 MHz



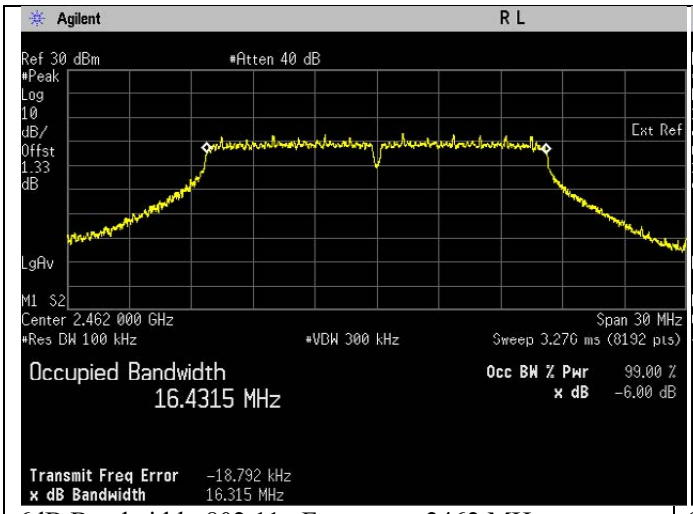
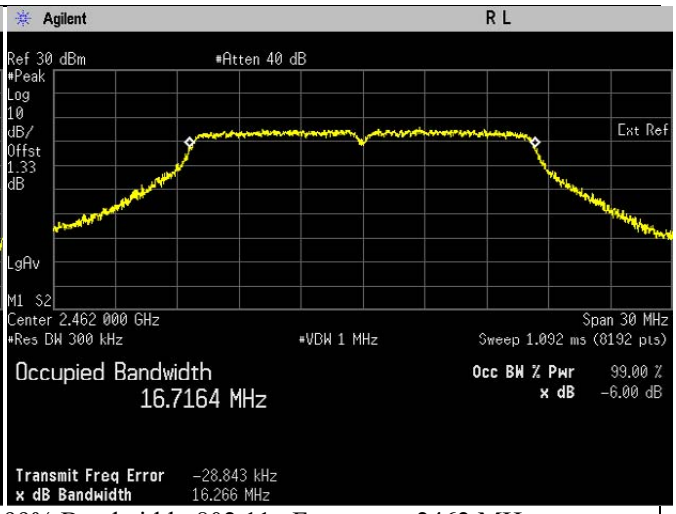
99% Bandwidth. 802.11g Frequency 2412 MHz



6dB Bandwidth. 802.11g Frequency 2437 MHz

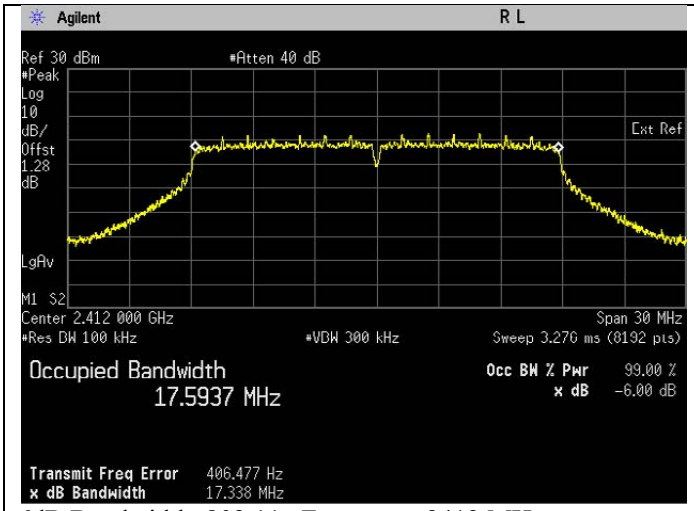


99% Bandwidth. 802.11g Frequency 2437 MHz

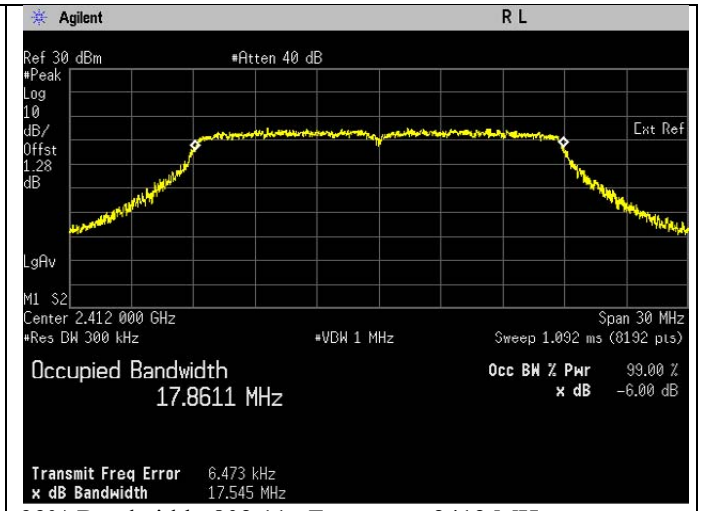
	
6dB Bandwidth. 802.11g Frequency 2462 MHz	99% Bandwidth. 802.11g Frequency 2462 MHz

802.11n (HT20)

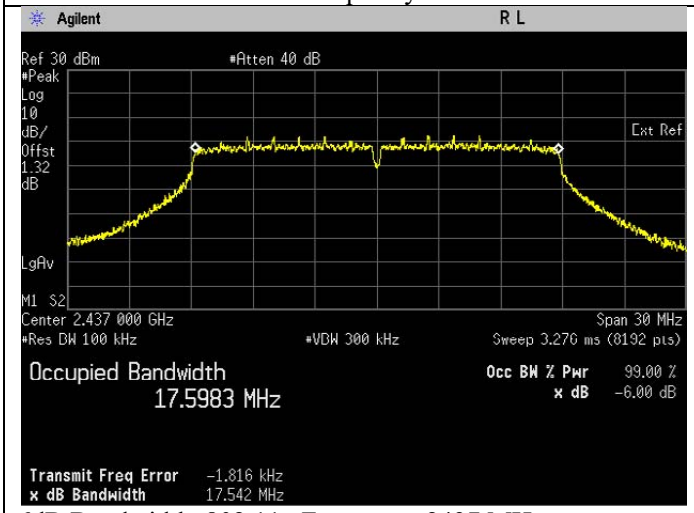
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11n	OFDM	BPSK	6.5	2412	17.338	17.861	Pass
802.11n	OFDM	BPSK	6.5	2437	17.542	17.842	Pass
802.11n	OFDM	BPSK	6.5	2462	17.044	17.822	Pass



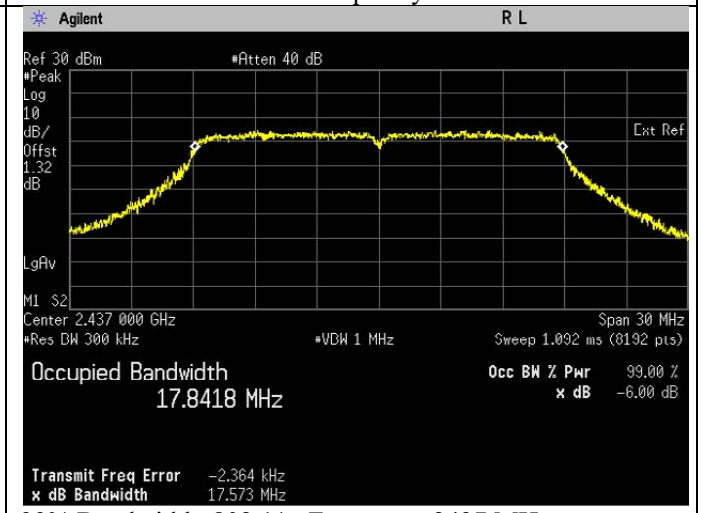
6dB Bandwidth. 802.11n Frequency 2412 MHz



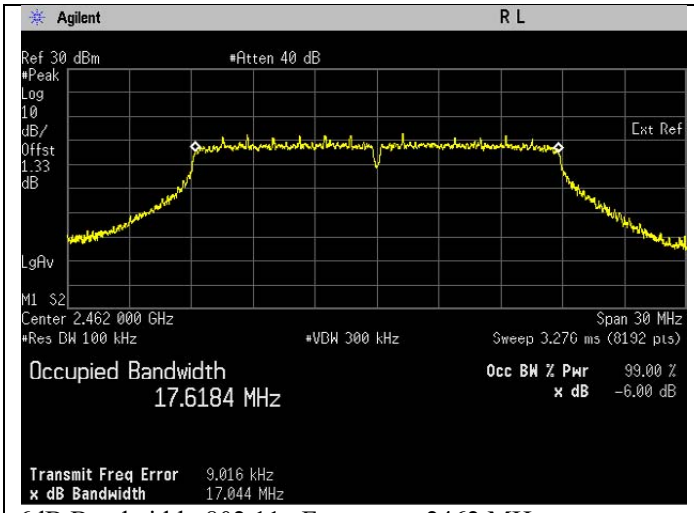
99% Bandwidth. 802.11n Frequency 2412 MHz



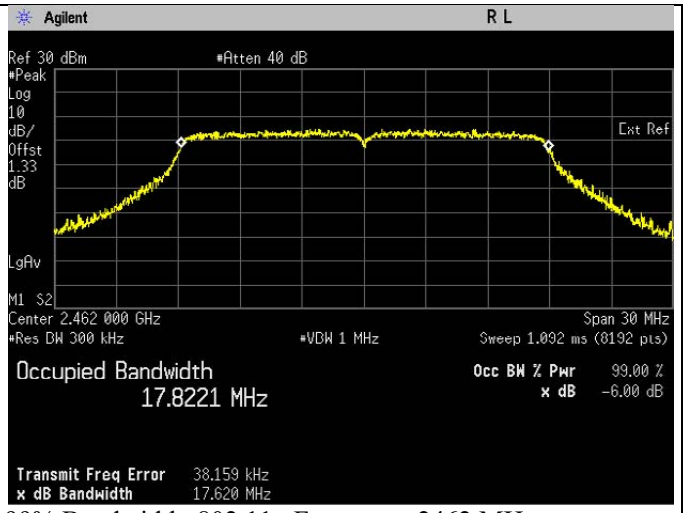
6dB Bandwidth. 802.11n Frequency 2437 MHz



99% Bandwidth. 802.11n Frequency 2437 MHz



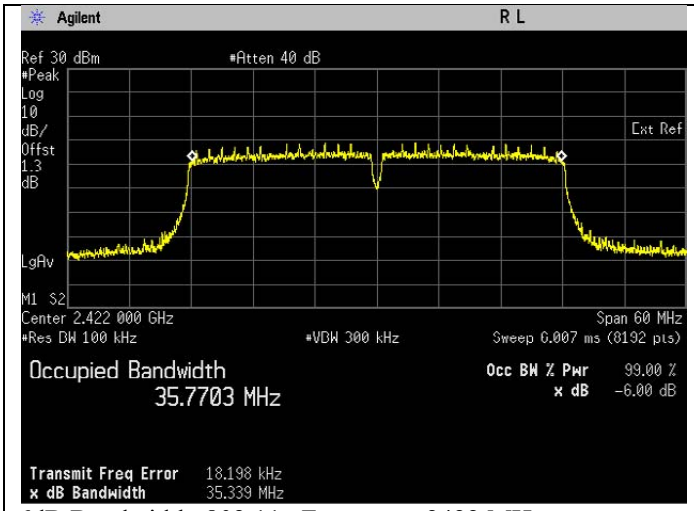
6dB Bandwidth. 802.11n Frequency 2462 MHz



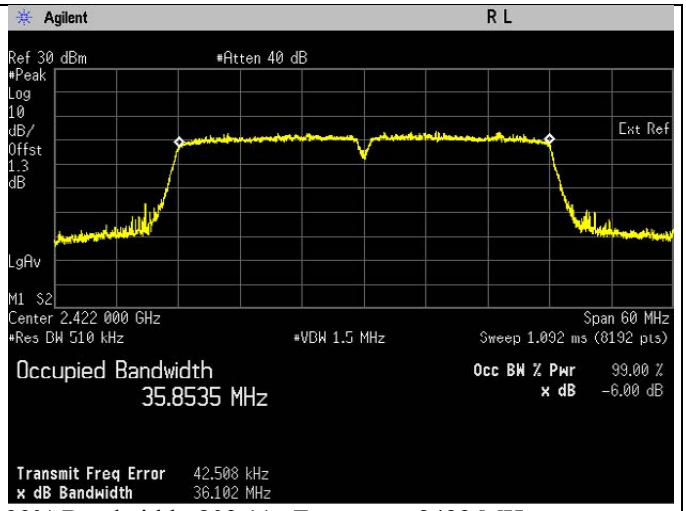
99% Bandwidth. 802.11n Frequency 2462 MHz

802.11n (HT40)

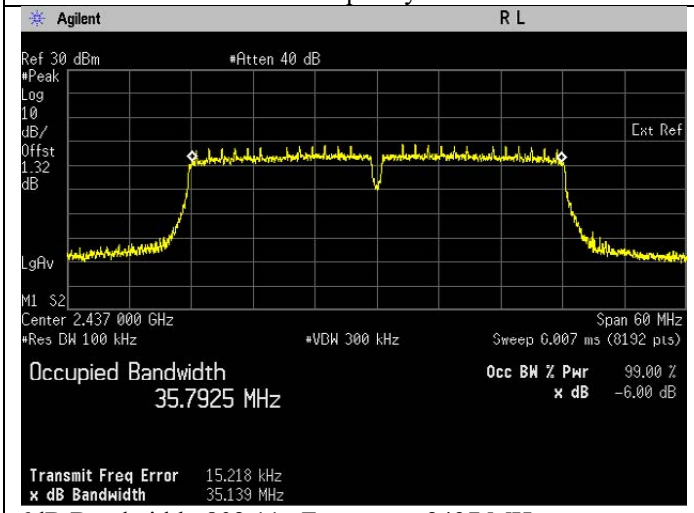
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11n	OFDM	BPSK	13.5	2422	35.339	35.854	Pass
802.11n	OFDM	BPSK	13.5	2437	35.139	35.860	Pass
802.11n	OFDM	BPSK	13.5	2452	35.137	35.844	Pass



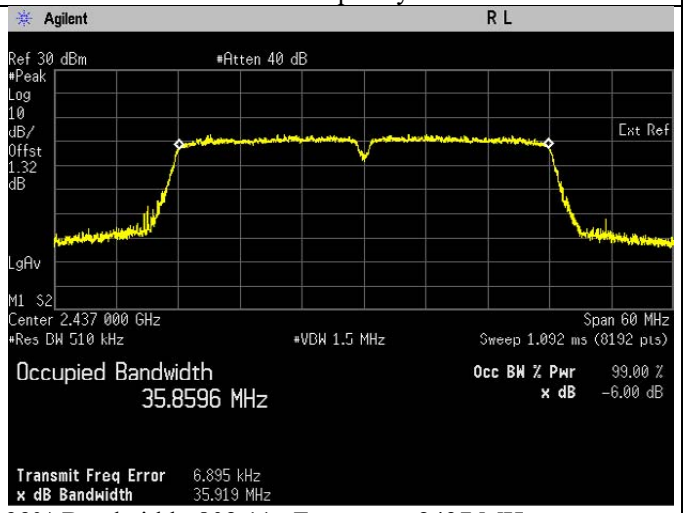
6dB Bandwidth. 802.11n Frequency 2422 MHz



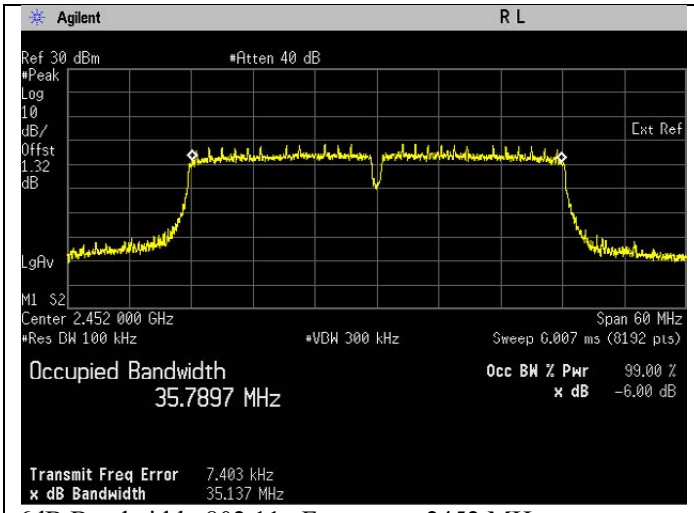
99% Bandwidth. 802.11n Frequency 2422 MHz



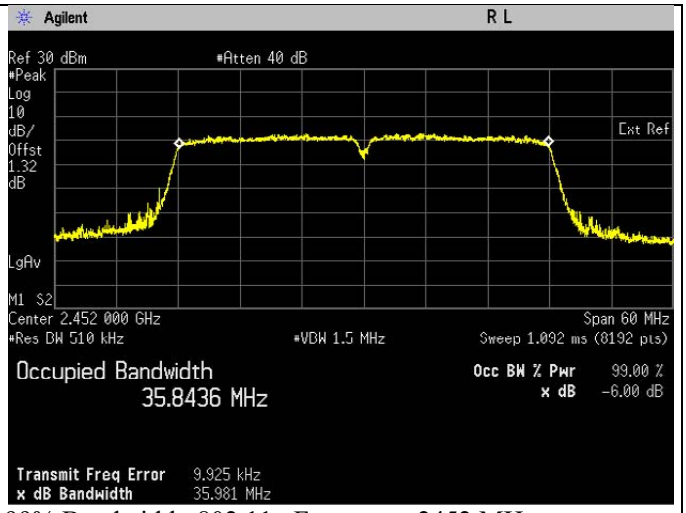
6dB Bandwidth. 802.11n Frequency 2437 MHz



99% Bandwidth. 802.11n Frequency 2437 MHz



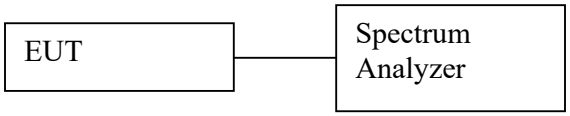
6dB Bandwidth. 802.11n Frequency 2452 MHz



99% Bandwidth. 802.11n Frequency 2452 MHz

4.2. Conducted RF Output Power

4.2.1. 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 = 1MHz.
    b. Set the VBW ≥ [3 × RBW].
    c. Set the span ≥ [1.5 × OBW bandwidth].
    d. Detector = peak.
    e. Sweep time = auto couple.
    f. Trace mode = max hold.
    g. Allow trace to fully stabilize.
e) Add in duty cycle correction into final test result.
f) Duty cycle correction is calculated as below:
    10 log (1/x)
g) Measure every antenna port by repeat the step above for MIMO measurement.

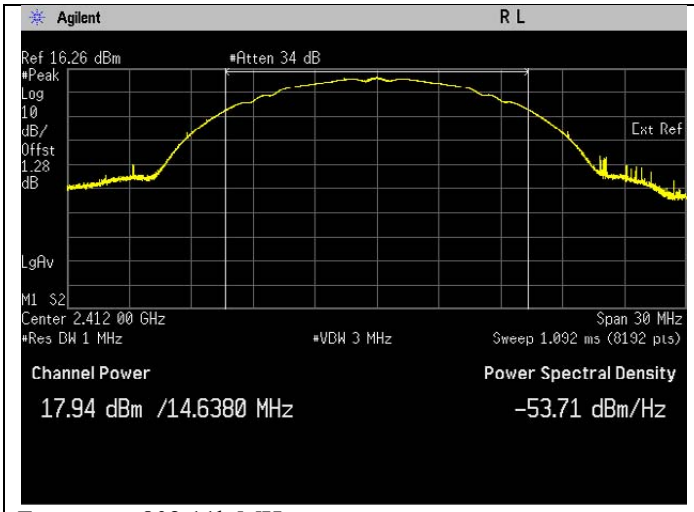
4.2.2. Test Limits:

Normal Condition (25 º C)
≤1 Watt(30 dBm)

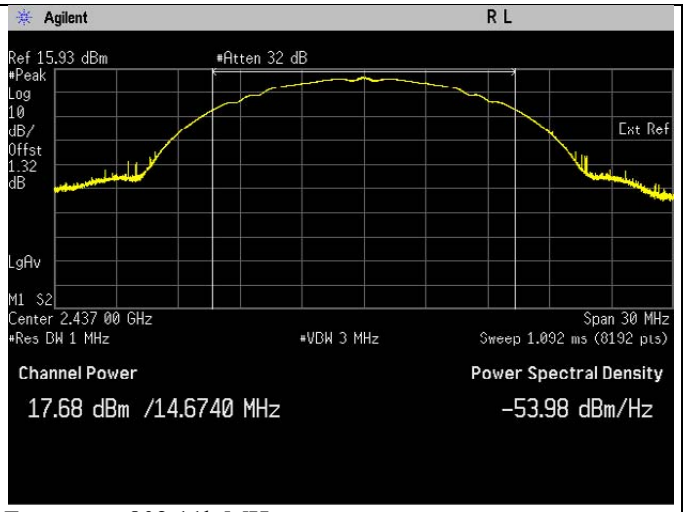
4.2.3. **Test Data:**

802.11b

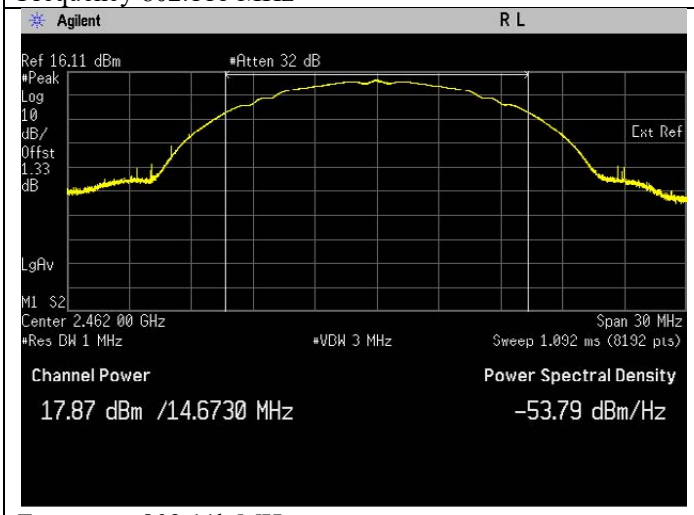
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11b	DSSS	DBPSK	1	2412	17.951	Pass
802.11b	DSSS	DBPSK	1	2437	17.680	Pass
802.11b	DSSS	DBPSK	1	2462	17.865	Pass



Frequency 802.11b MHz



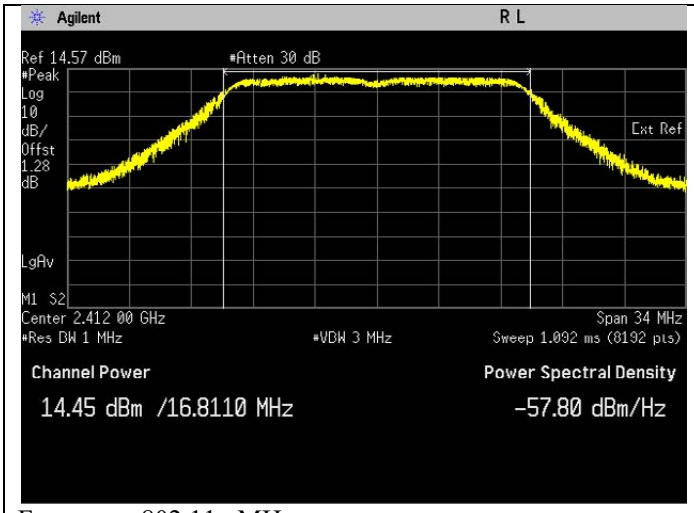
Frequency 802.11b MHz



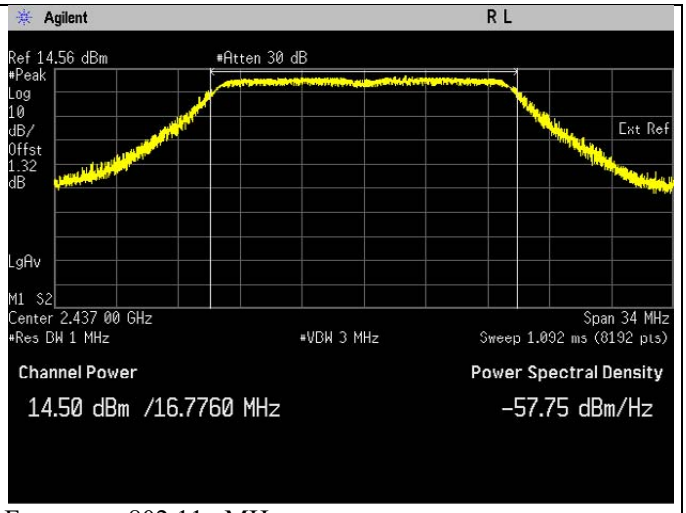
Frequency 802.11b MHz

802.11g

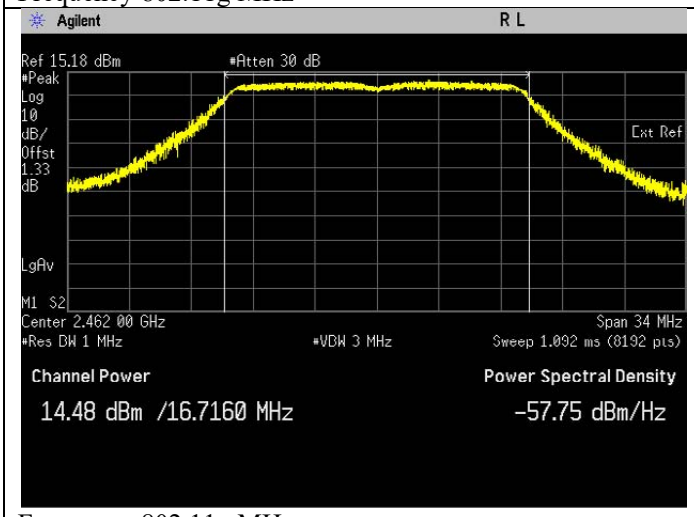
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	14.474	Pass
802.11g	OFDM	BPSK	6	2437	14.489	Pass
802.11g	OFDM	BPSK	6	2462	14.490	Pass



Frequency 802.11g MHz



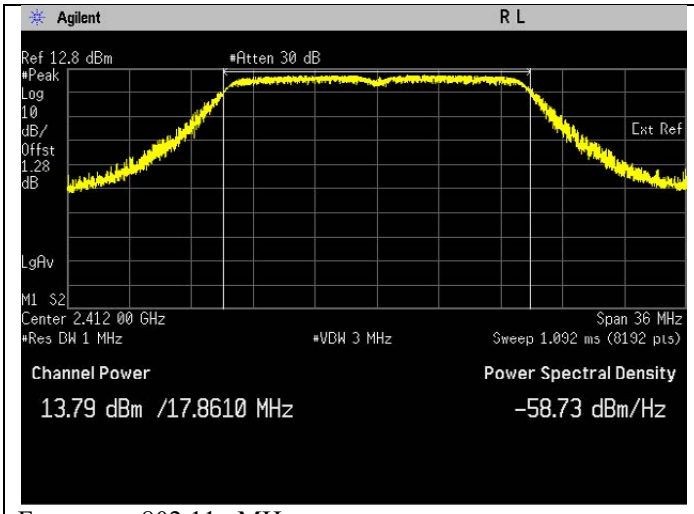
Frequency 802.11g MHz



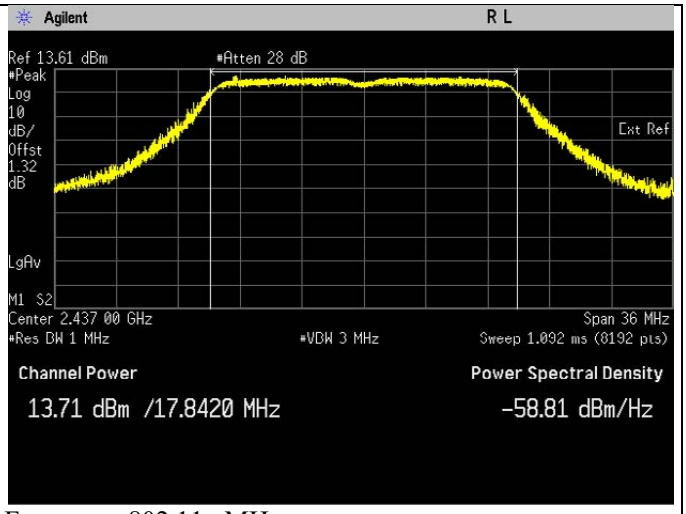
Frequency 802.11g MHz

802.11n (HT20)

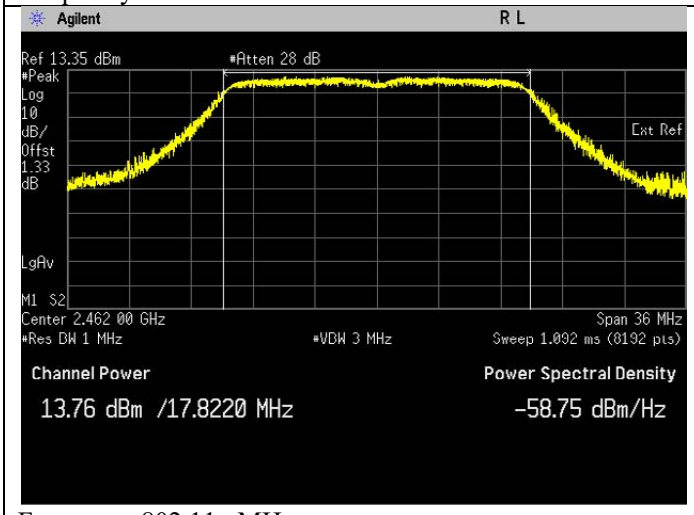
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	13.768	Pass
802.11n	OFDM	BPSK	6.5	2437	13.720	Pass
802.11n	OFDM	BPSK	6.5	2462	13.786	Pass



Frequency 802.11n MHz



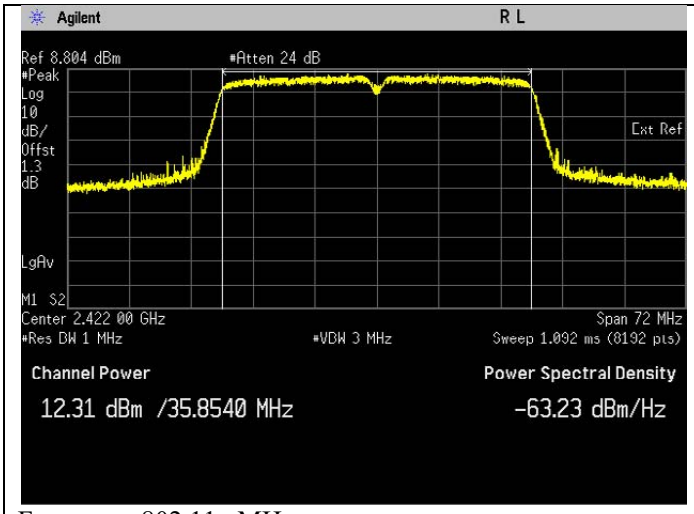
Frequency 802.11n MHz



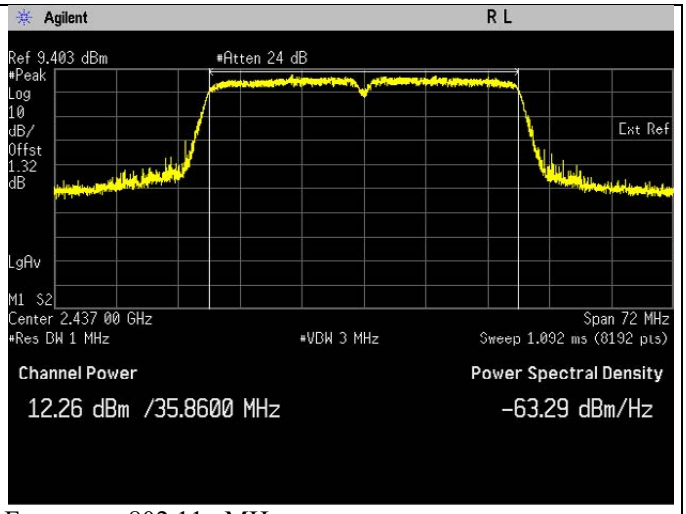
Frequency 802.11n MHz

802.11n (HT40)

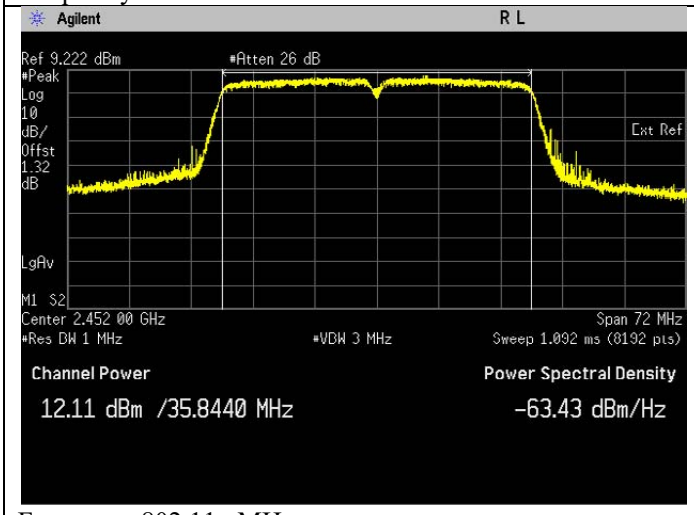
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11n	OFDM	BPSK	13.5	2422	12.317	Pass
802.11n	OFDM	BPSK	13.5	2437	12.244	Pass
802.11n	OFDM	BPSK	13.5	2452	12.097	Pass



Frequency 802.11n MHz



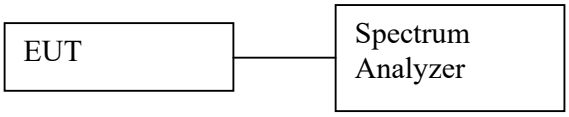
Frequency 802.11n MHz



Frequency 802.11n MHz

4.3.Duty Cycle of the test signal

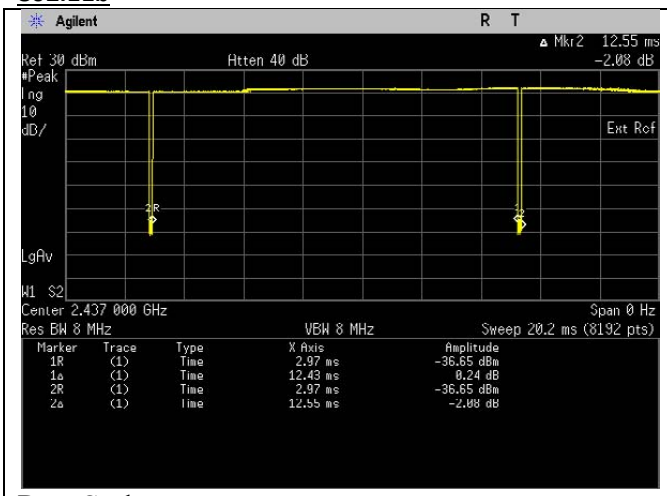
4.3.1. Test Setup



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 ≥ RBW.
    c. Set the span ≥ [1.5 × 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.

4.3.2. **Test Data**

802.11b

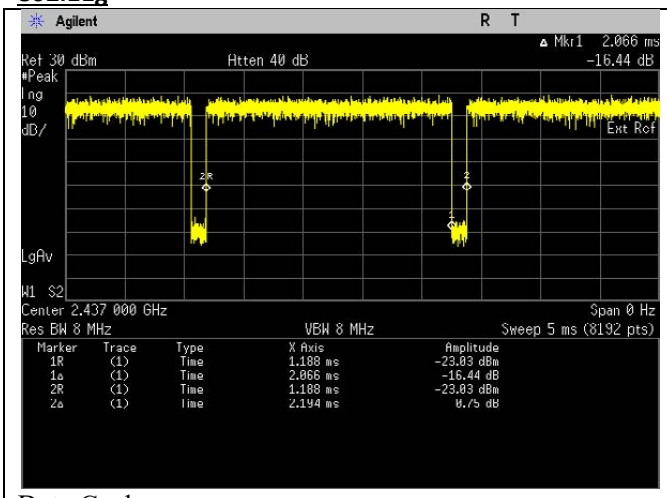


Duty Cycle

On time (ms)	12.45
On + Off Time (ms)	12.55
Duty cycle	0.9904
Duty Cycle factor	0.042

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

802.11g

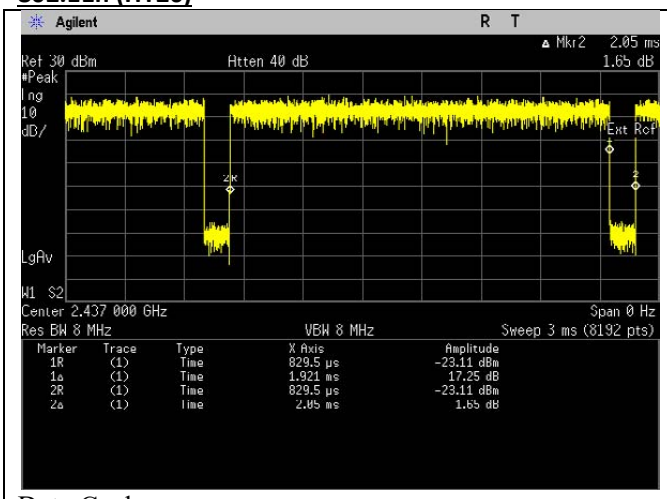


Duty Cycle

On time (ms)	2.066
On + Off Time (ms)	2.194
Duty cycle	0.9417
Duty Cycle factor	0.261

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

802.11n (HT20)

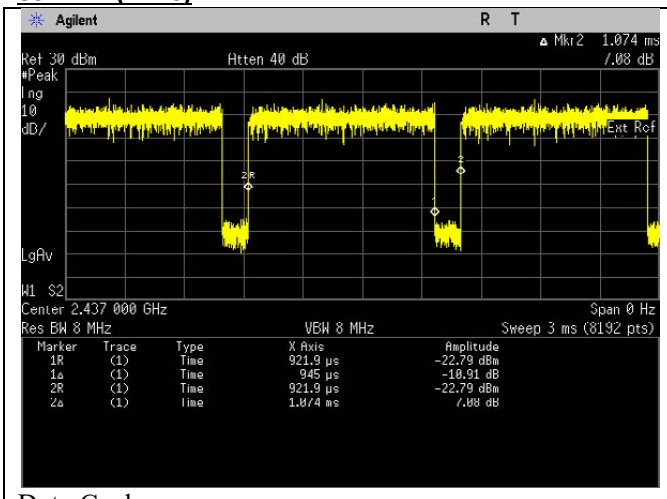


Duty Cycle

On time (ms)	1.921
On + Off Time (ms)	2.05
Duty cycle	0.9371
Duty Cycle factor	0.282

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

802.11n (HT40)



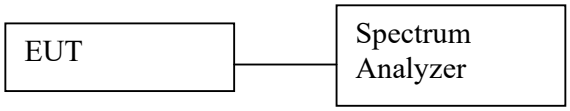
Duty Cycle

On time (ms)	0.945
On + Off Time (ms)	1.074
Duty cycle	0.8799
Duty Cycle factor	0.556

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

4.4. Maximum Peak Power Spectral Density

4.4.1. 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 kHz ≤ RBW ≤ 100 kHz.
    d. Set the VBW ≥ [3 × 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.

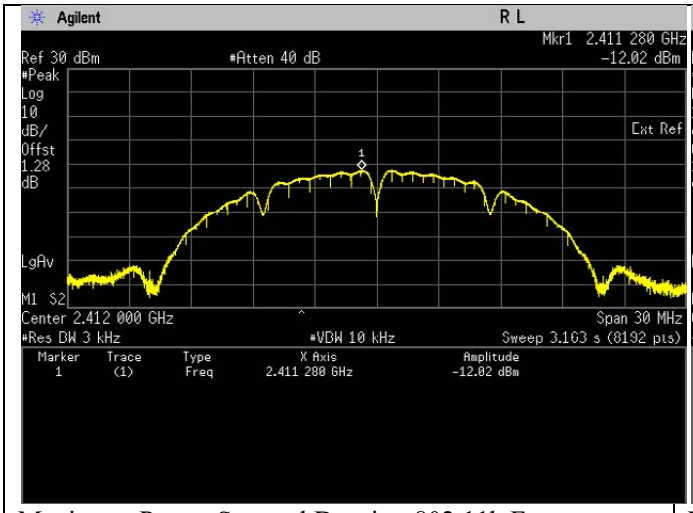
4.4.2. Test Limits

Normal Condition (25 º C)
≤ 8 dBm/3kHz

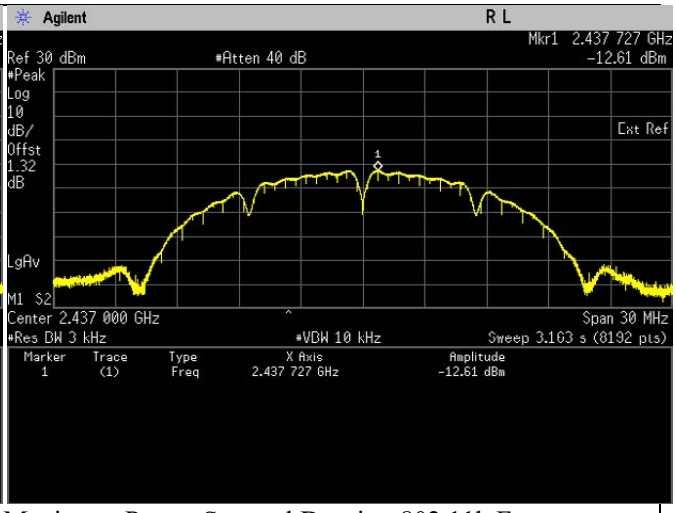
4.4.3. **Test Result**

802.11b

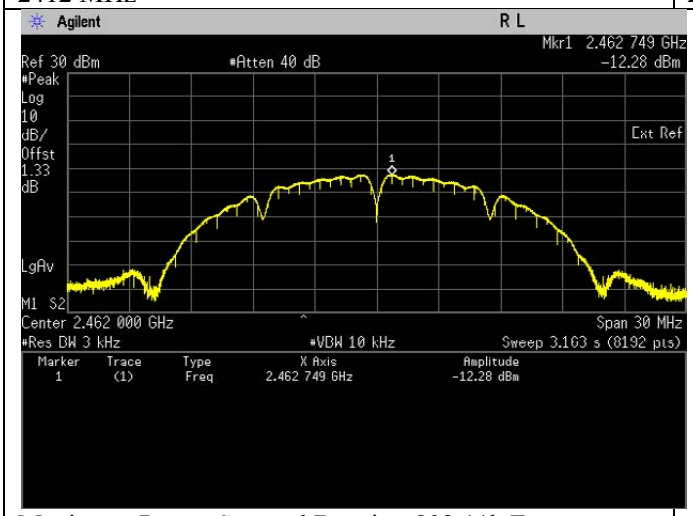
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11b	DSSS	DBPSK	1	2412	-12.02	Pass
802.11b	DSSS	DBPSK	1	2437	-12.61	Pass
802.11b	DSSS	DBPSK	1	2462	-12.28	Pass



Maximum Power Spectral Density. 802.11b Frequency 2412 MHz



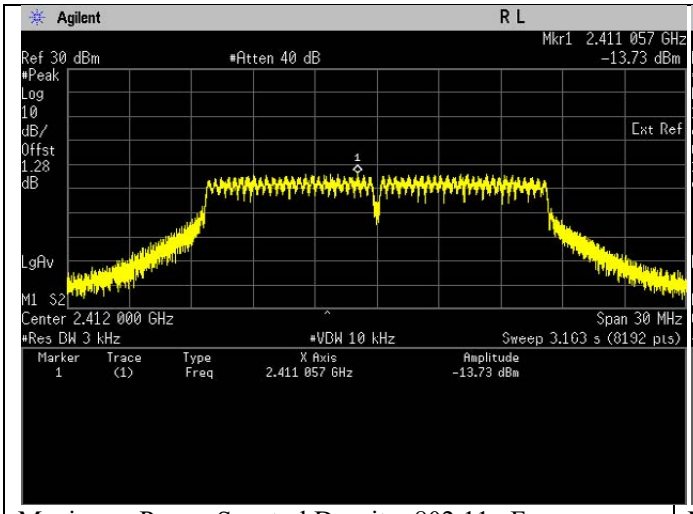
Maximum Power Spectral Density. 802.11b Frequency 2437 MHz



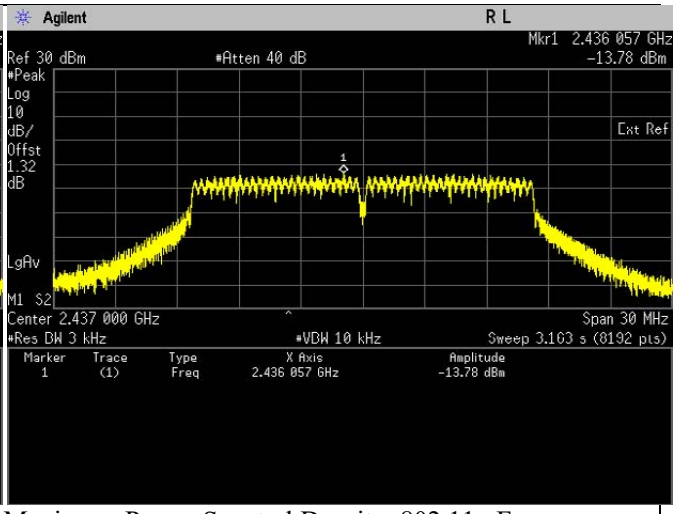
Maximum Power Spectral Density. 802.11b Frequency 2462 MHz

802.11g

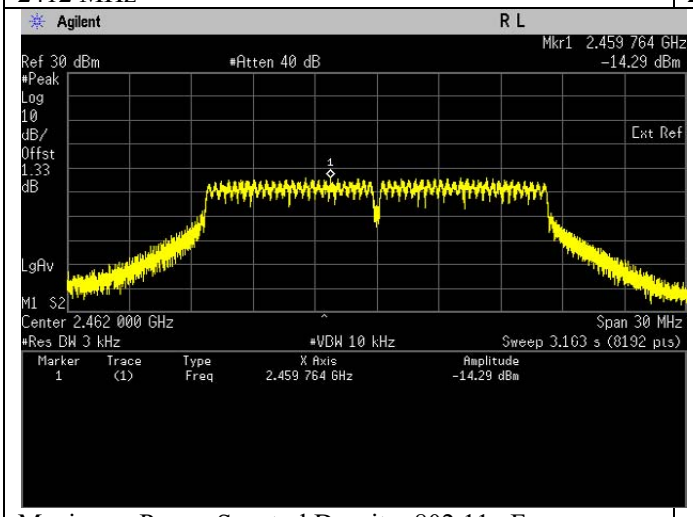
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11g	OFDM	BPSK	6	2412	-13.73	Pass
802.11g	OFDM	BPSK	6	2437	-13.78	Pass
802.11g	OFDM	BPSK	6	2462	-14.29	Pass



Maximum Power Spectral Density. 802.11g Frequency 2412 MHz



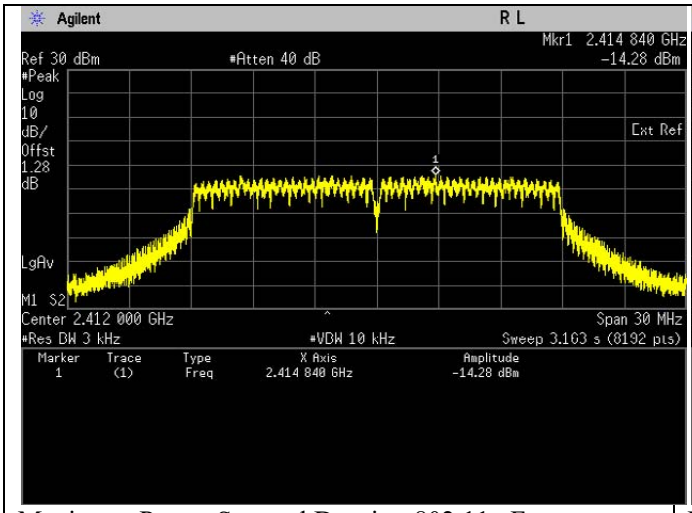
Maximum Power Spectral Density. 802.11g Frequency 2437 MHz



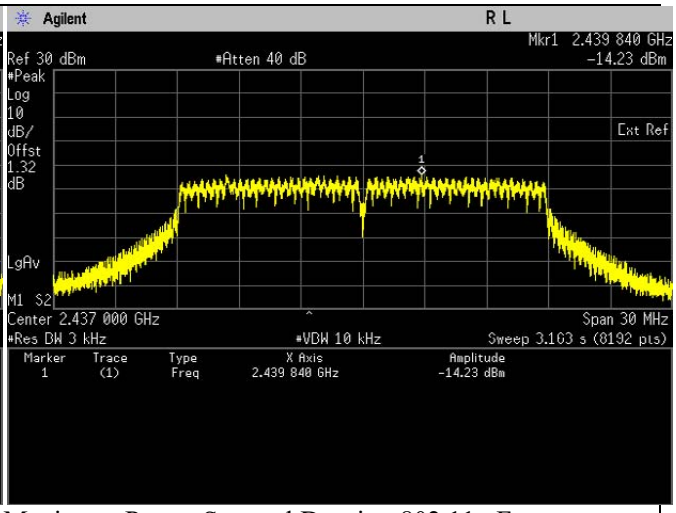
Maximum Power Spectral Density. 802.11g Frequency 2462 MHz

802.11n (HT20)

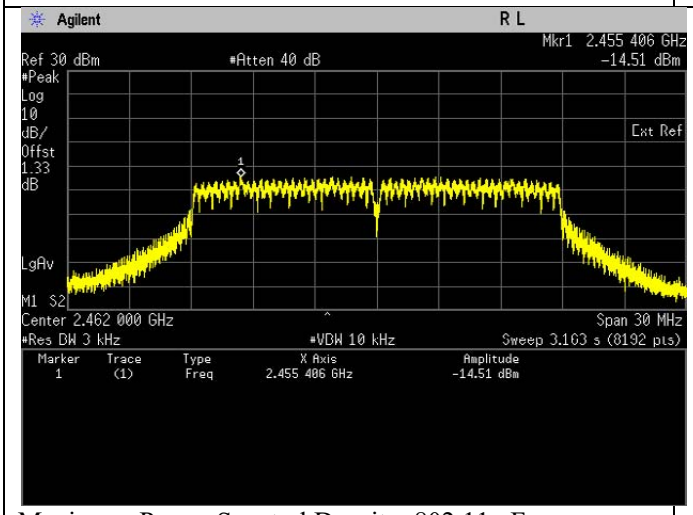
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11n	OFDM	BPSK	6.5	2412	-14.28	Pass
802.11n	OFDM	BPSK	6.5	2437	-14.23	Pass
802.11n	OFDM	BPSK	6.5	2462	-14.51	Pass



Maximum Power Spectral Density. 802.11n Frequency 2412 MHz



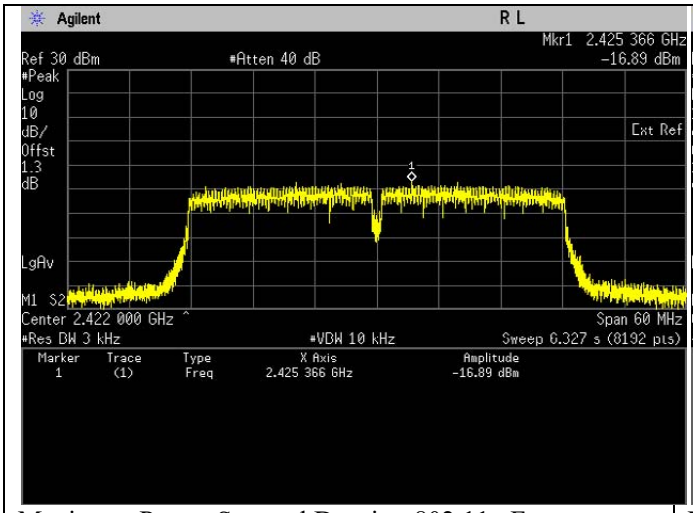
Maximum Power Spectral Density. 802.11n Frequency 2437 MHz



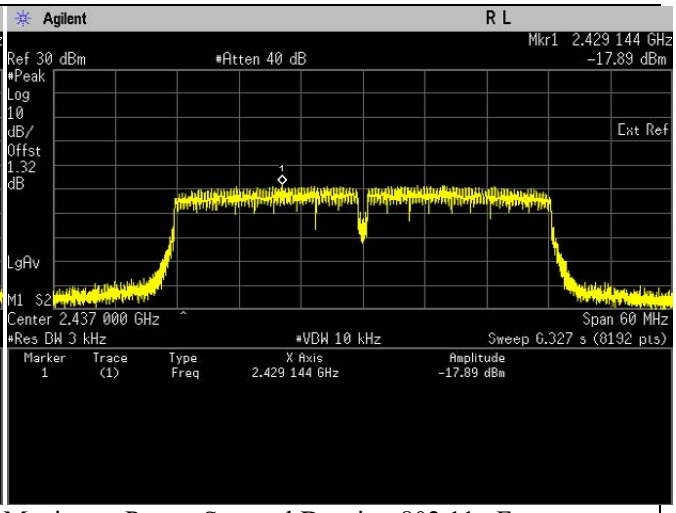
Maximum Power Spectral Density. 802.11n Frequency 2462 MHz

802.11n (HT40)

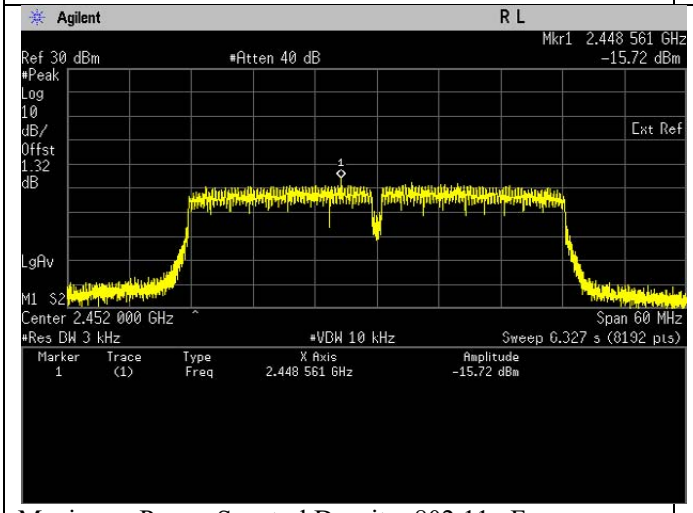
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Power (dBm/3kHz)	Status
802.11n	OFDM	BPSK	13.5	2422	-16.89	Pass
802.11n	OFDM	BPSK	13.5	2437	-17.89	Pass
802.11n	OFDM	BPSK	13.5	2452	-15.72	Pass



Maximum Power Spectral Density. 802.11n Frequency 2422 MHz



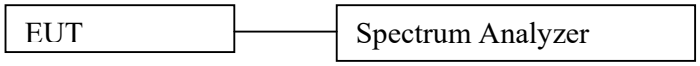
Maximum Power Spectral Density. 802.11n Frequency 2437 MHz



Maximum Power Spectral Density. 802.11n Frequency 2452 MHz

4.5. Conducted Spurious Emission

4.5.1. 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 10th harmonic.
f) Measure every antenna port by repeat the step above for MIMO measurement.

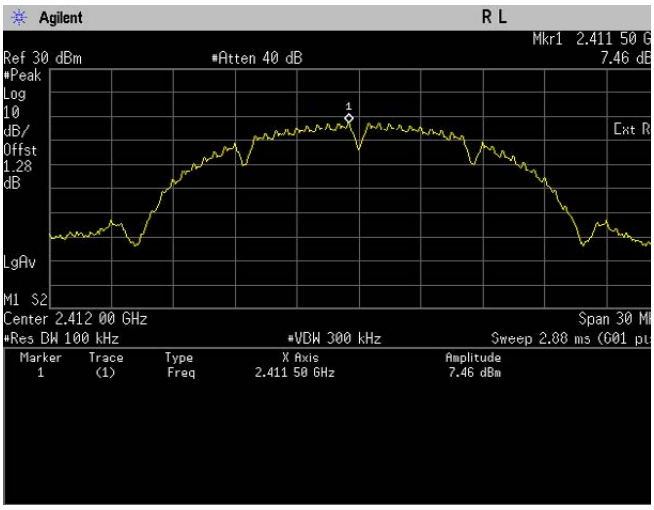
4.5.2. Test Limits:

Normal Condition (25 ° C)
Shall be at least 20 dB below peak (max) power.

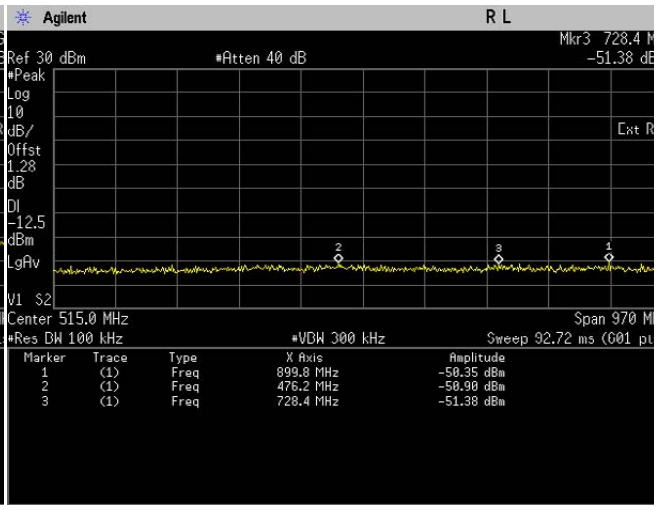
4.5.3. Test Result

802.11b

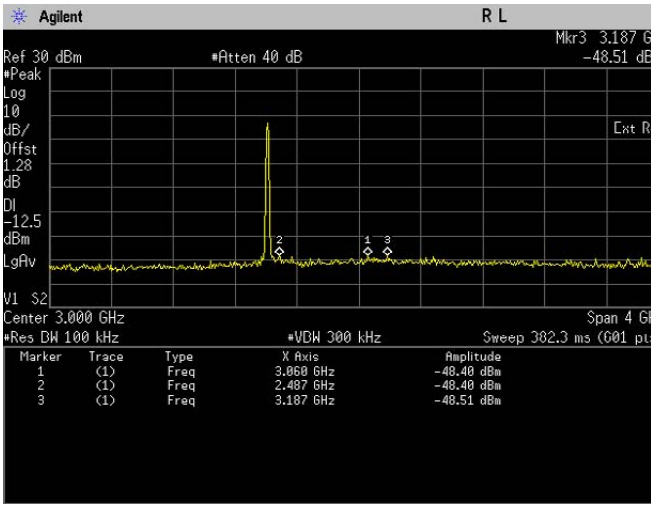
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11b	DSSS	DBPSK	1	2412	16300.00	-40.01	Pass
					16333.00	-40.39	Pass
					16267.00	-40.83	Pass
802.11b	DSSS	DBPSK	1	2437	16300.00	-38.46	Pass
					16233.00	-40.19	Pass
					16200.00	-40.52	Pass
802.11b	DSSS	DBPSK	1	2462	16192.00	-39.88	Pass
					16300.00	-39.94	Pass
					16233.00	-40.60	Pass



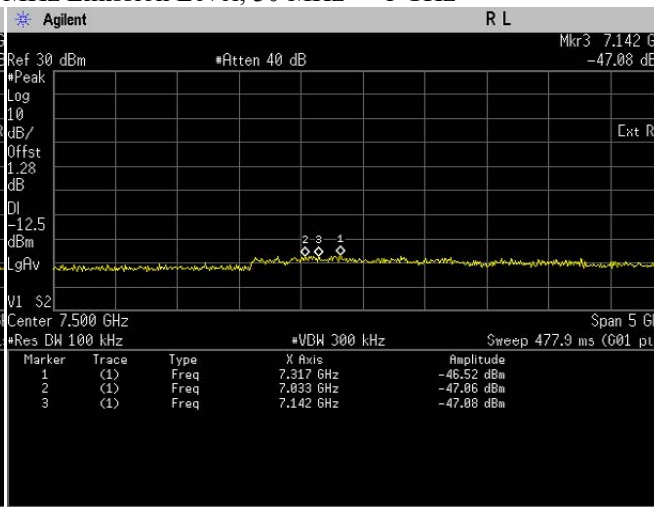
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Reference Level



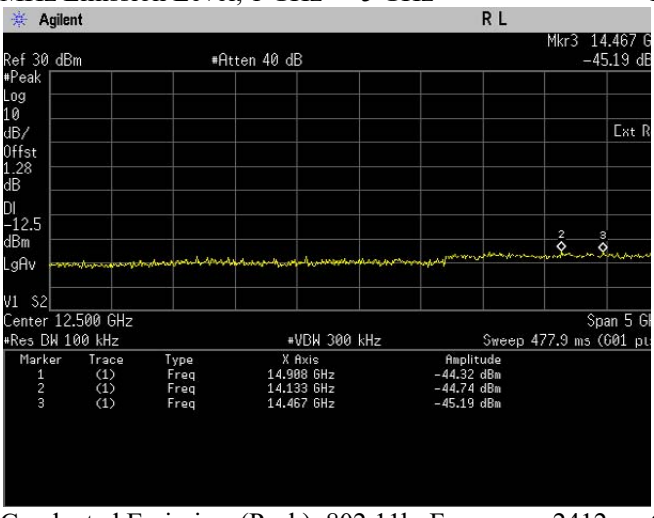
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



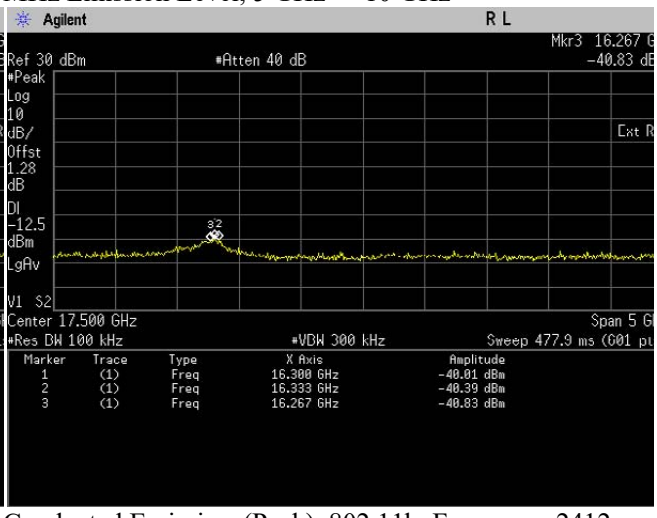
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



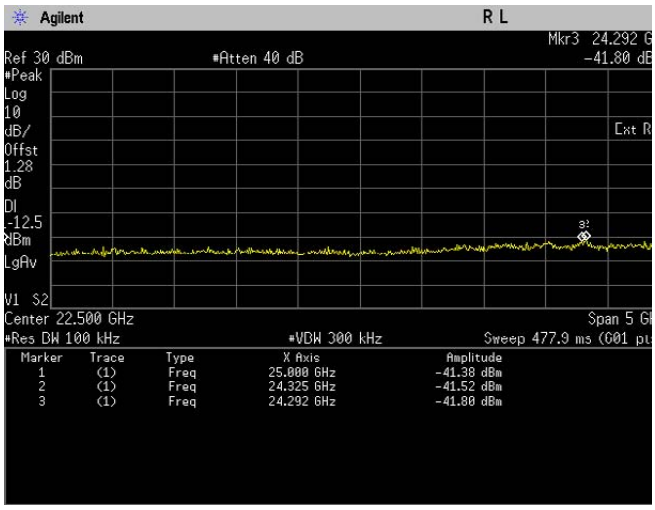
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



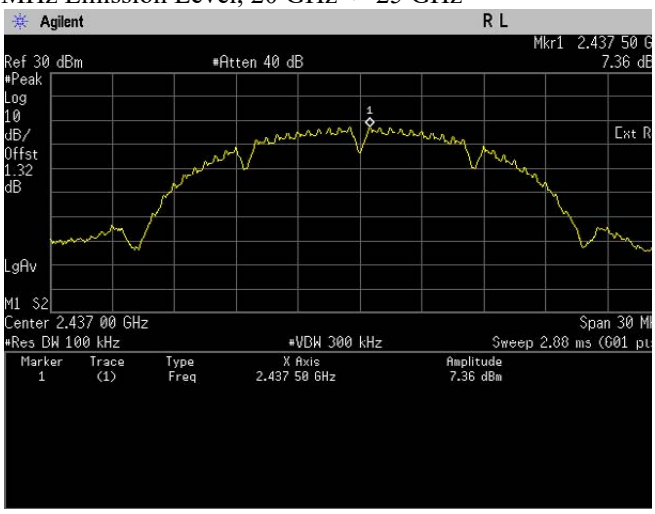
Conducted Emissions(Peak). 802.11b, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



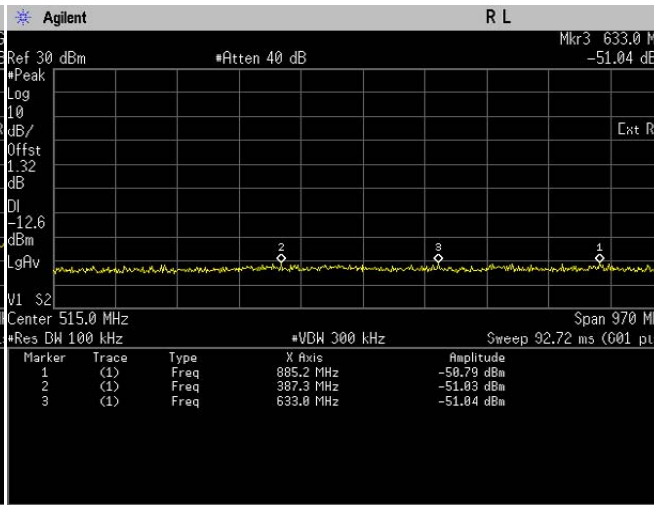
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



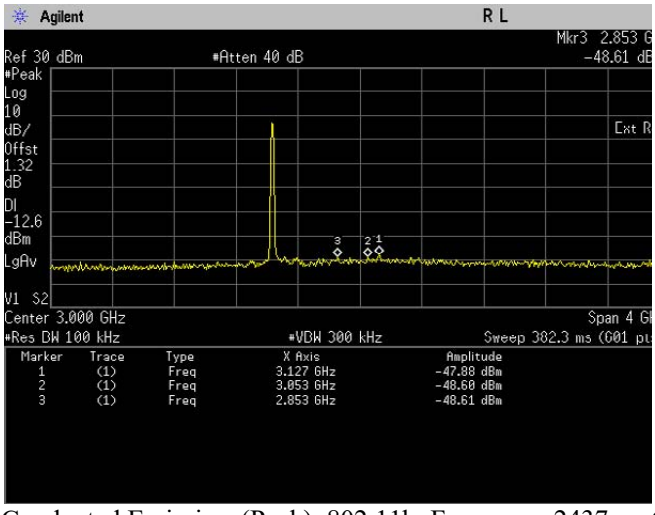
Conducted Emissions(Peak). 802.11b, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



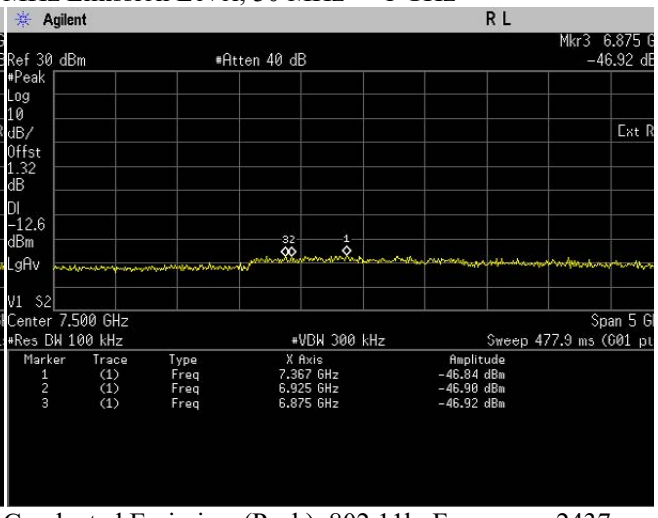
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Reference Level



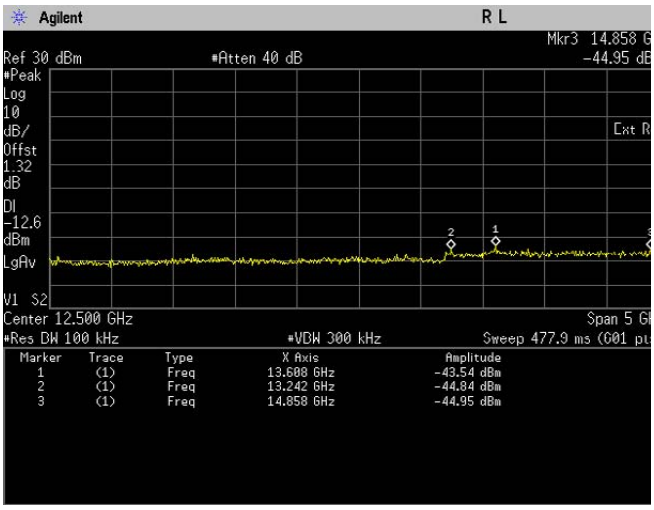
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



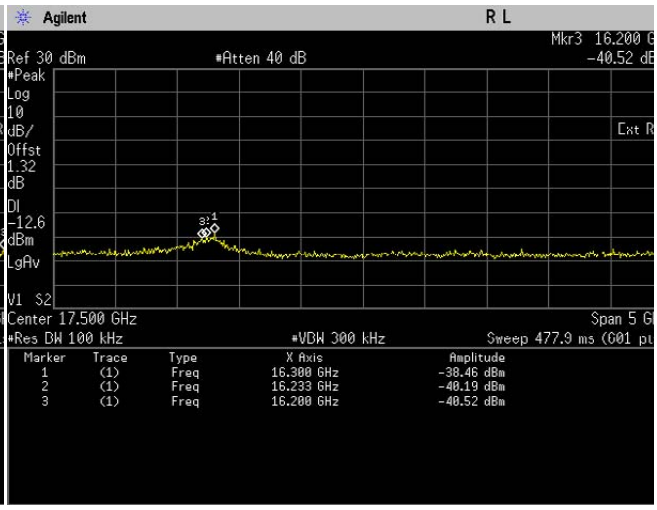
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



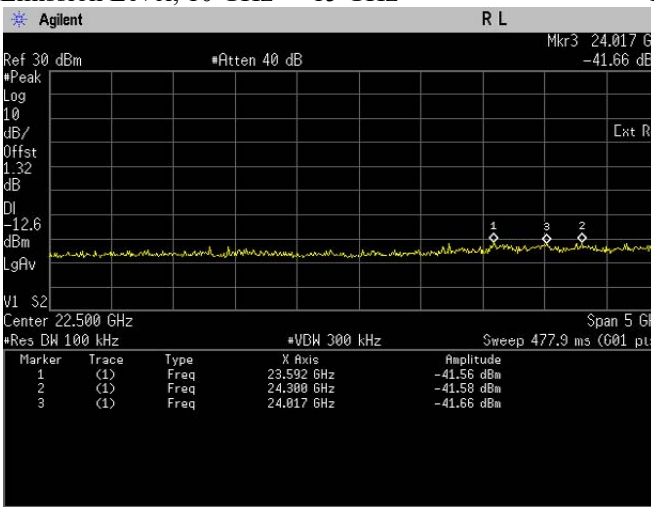
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



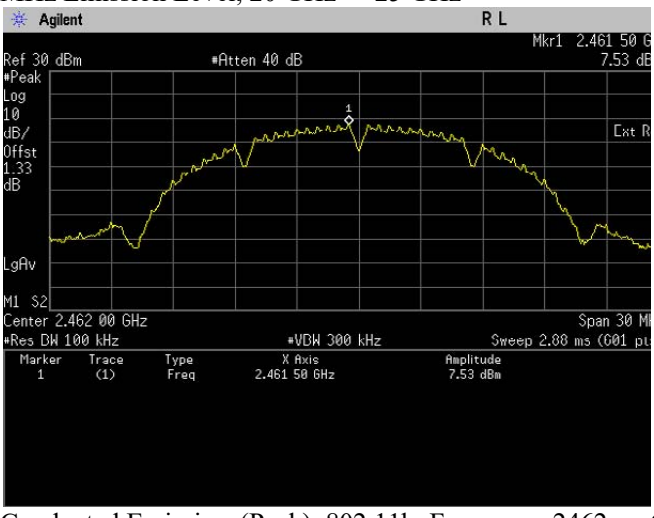
Conducted Emissions(Peak). 802.11b, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



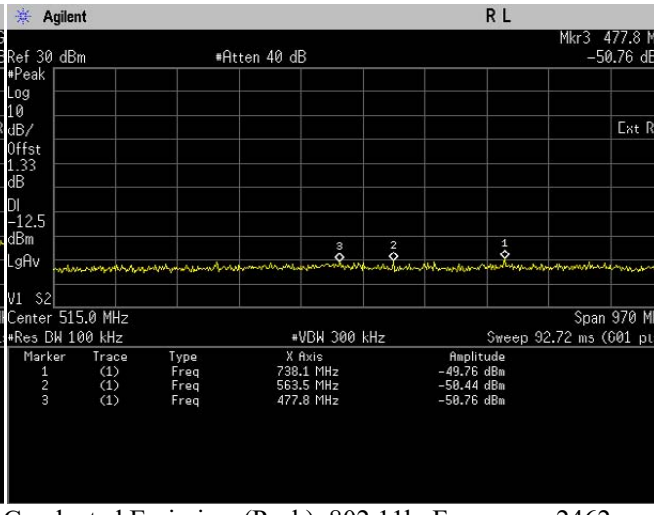
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



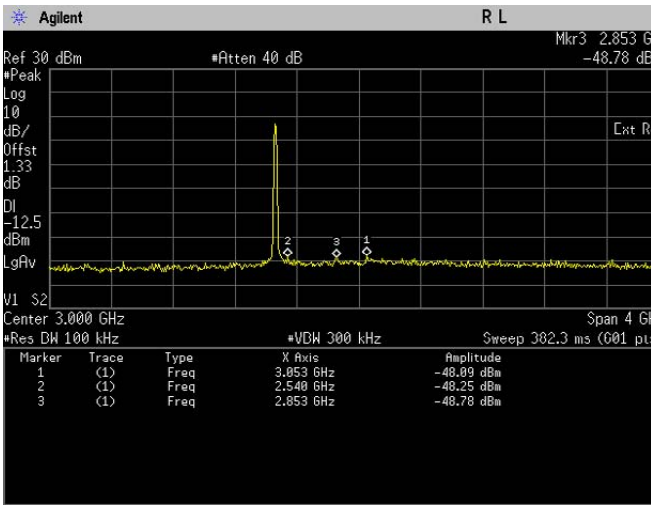
Conducted Emissions(Peak). 802.11b, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



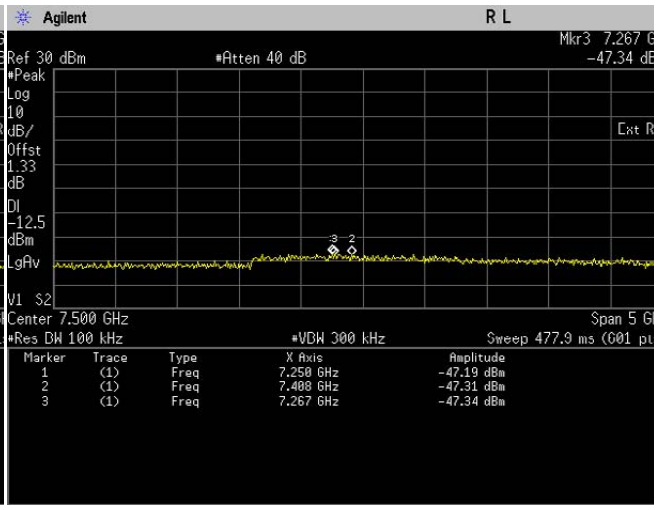
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Reference Level



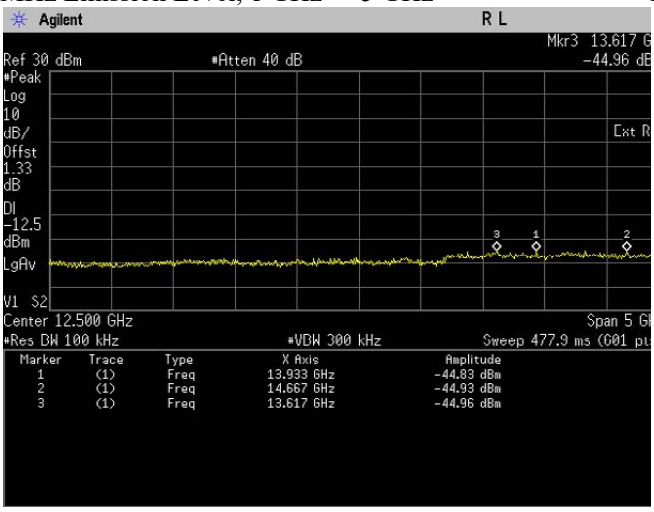
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



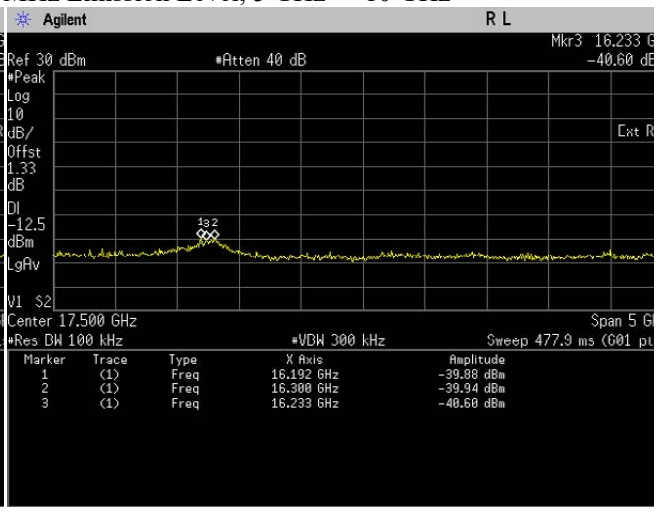
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



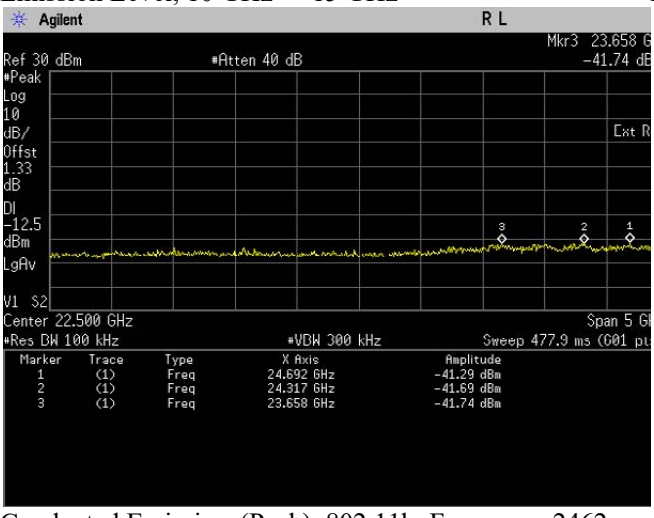
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



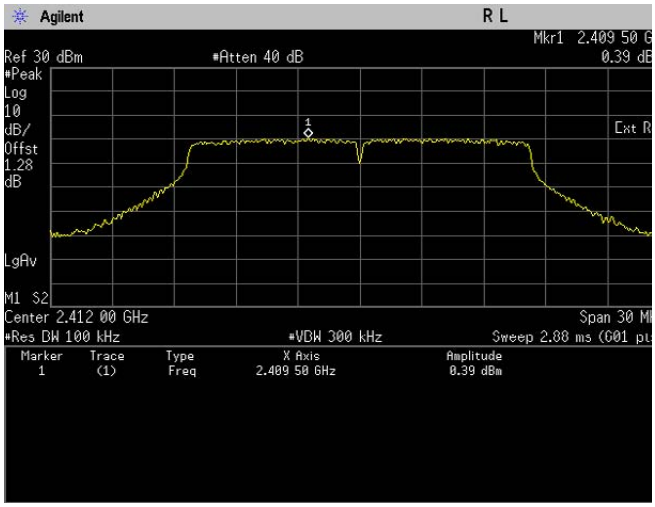
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



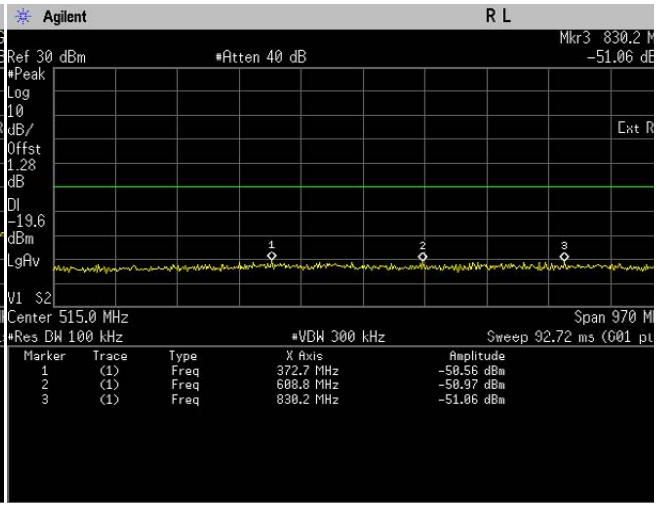
Conducted Emissions(Peak). 802.11b, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

802.11g

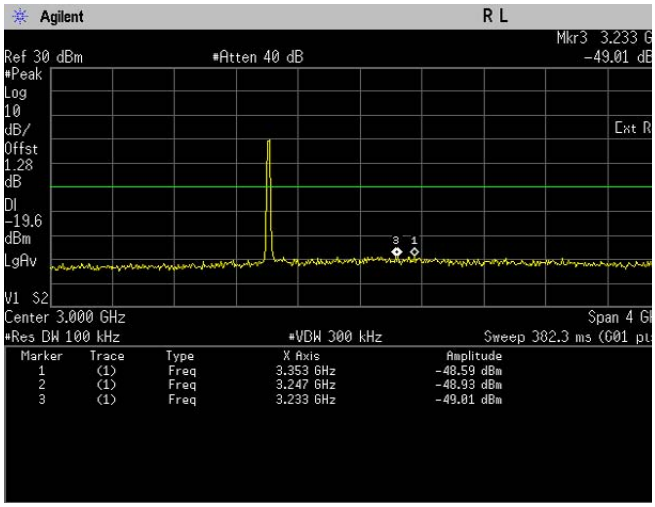
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11g	OFDM	BPSK	6	2412	16217.00	-39.58	Pass
					16308.00	-40.09	Pass
					16183.00	-40.28	Pass
802.11g	OFDM	BPSK	6	2437	16333.00	-39.88	Pass
					16300.00	-40.11	Pass
					16208.00	-40.22	Pass
802.11g	OFDM	BPSK	6	2462	16308.00	-39.48	Pass
					16258.00	-39.98	Pass
					24317.00	-40.12	Pass



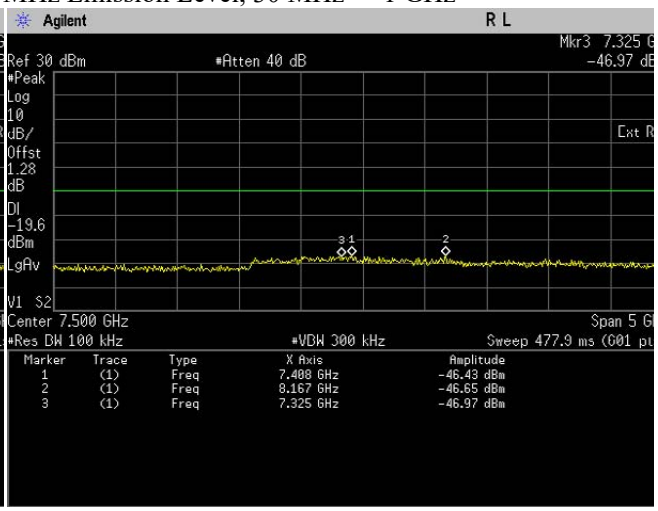
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Reference Level



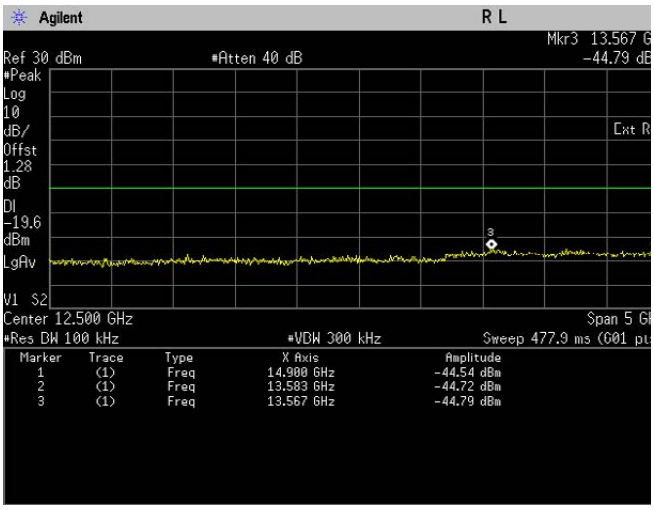
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



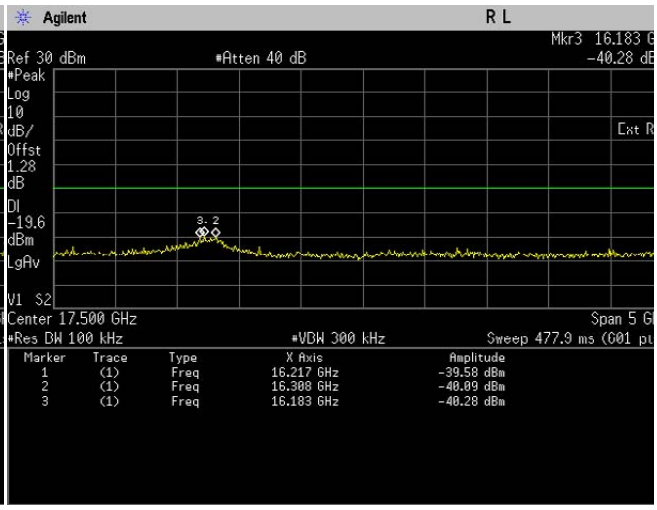
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



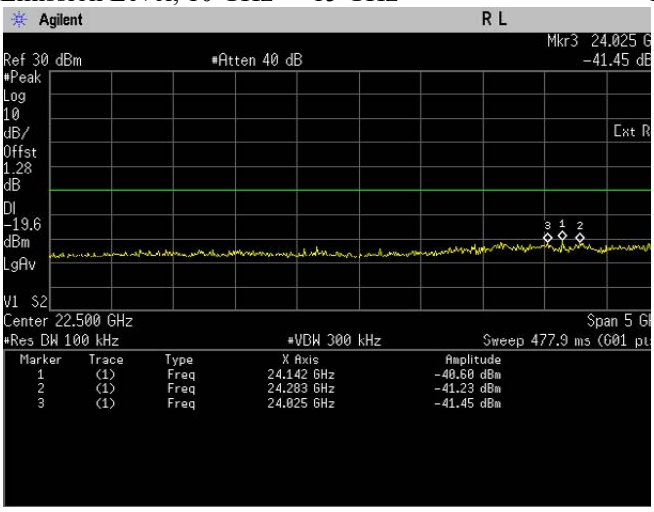
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



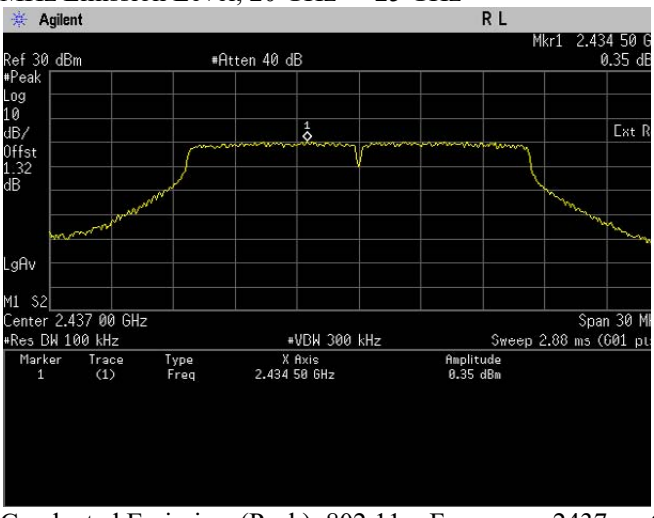
Conducted Emissions(Peak). 802.11g, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



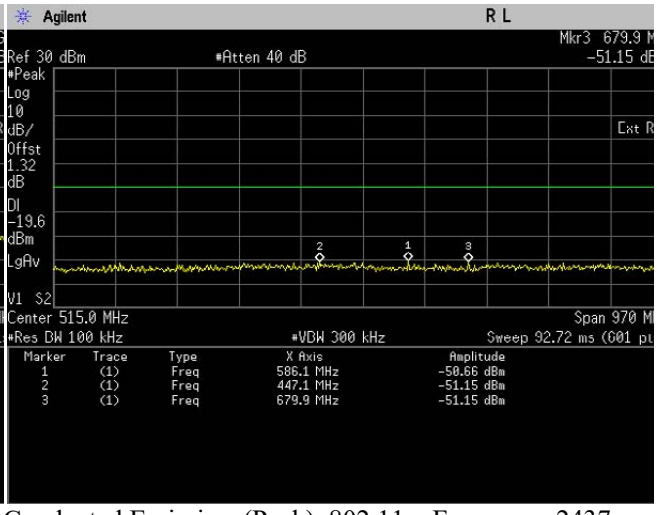
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



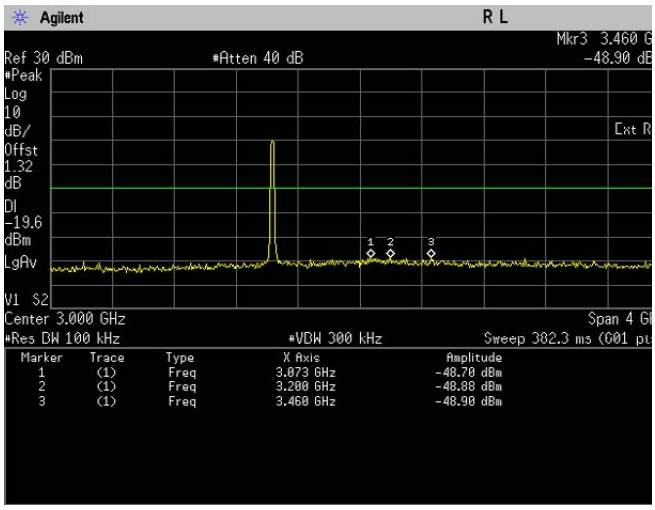
Conducted Emissions(Peak). 802.11g, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



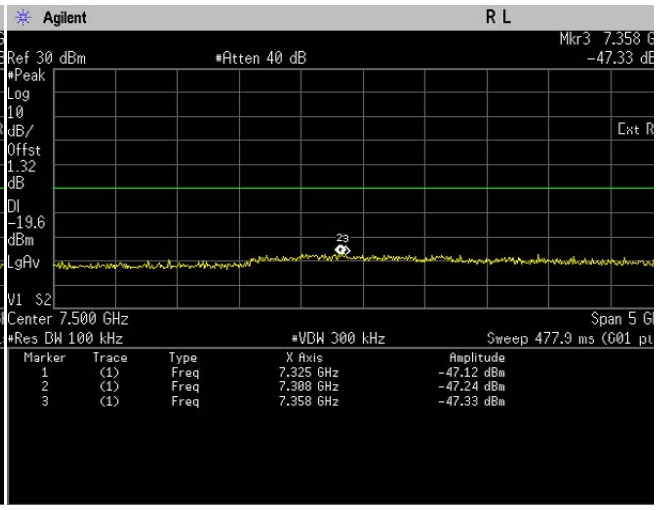
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Reference Level



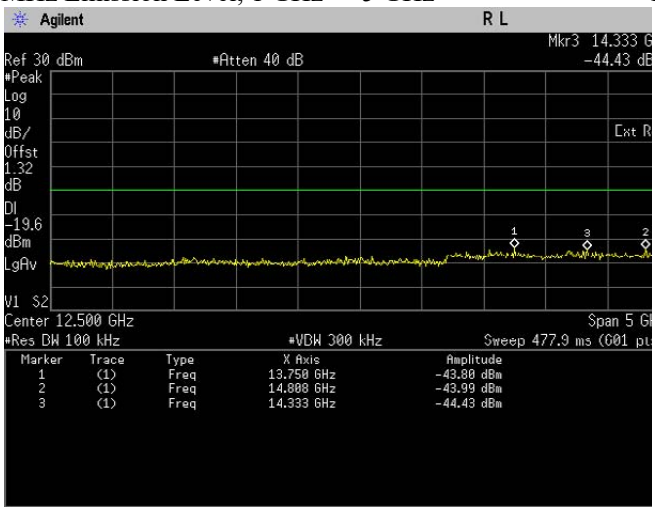
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



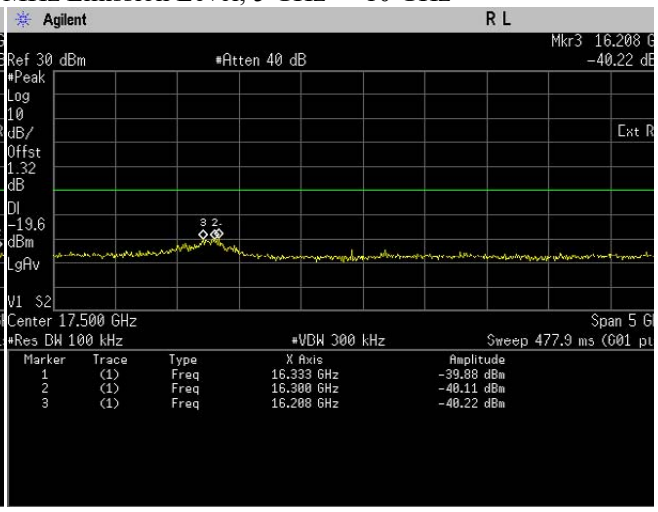
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



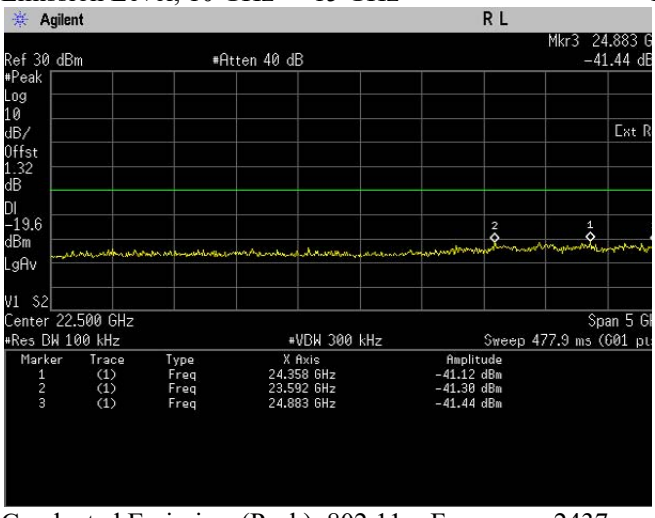
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



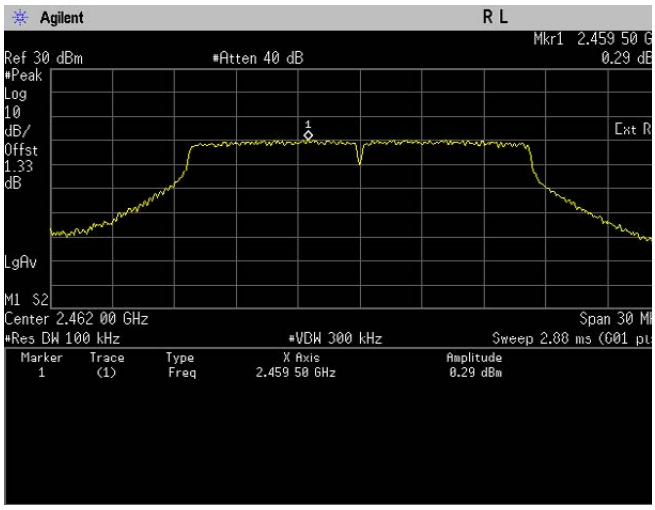
Conducted Emissions(Peak). 802.11g, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



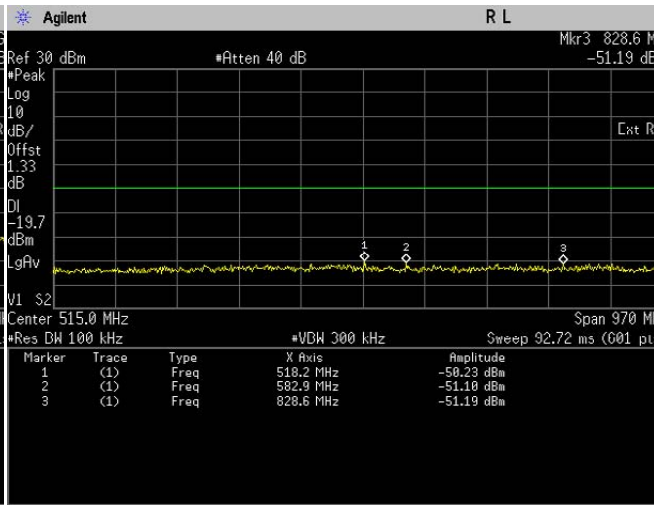
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



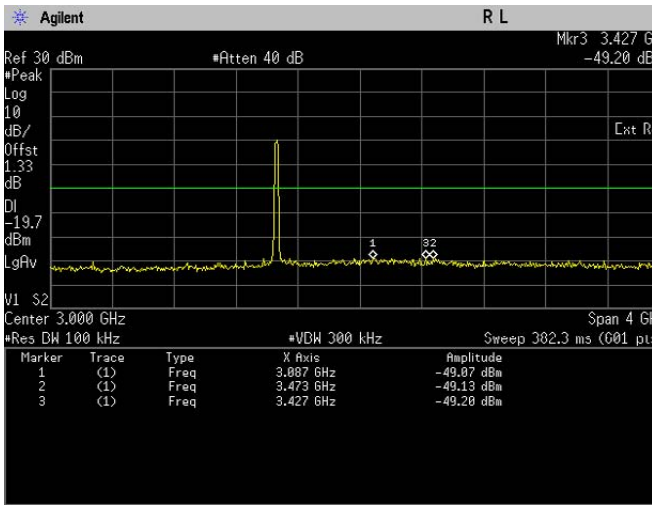
Conducted Emissions(Peak). 802.11g, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



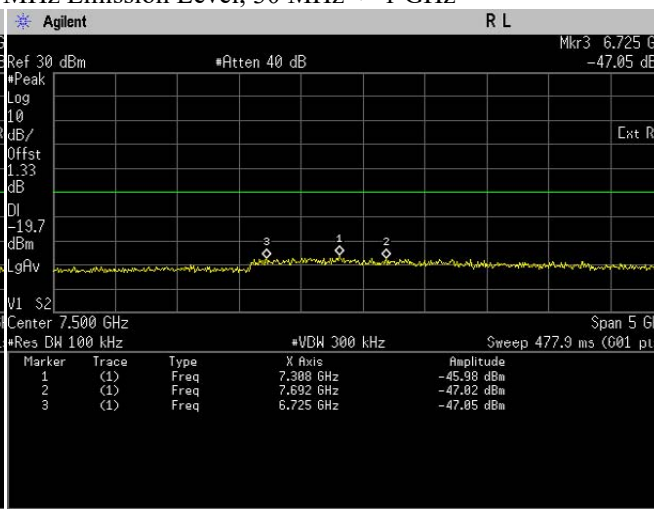
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Reference Level



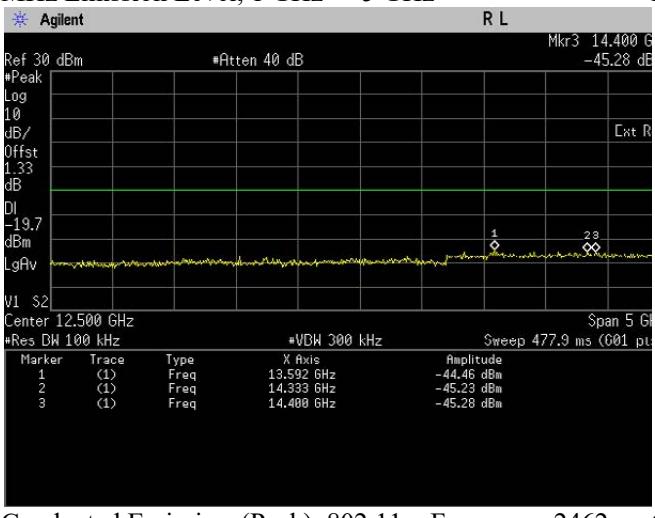
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



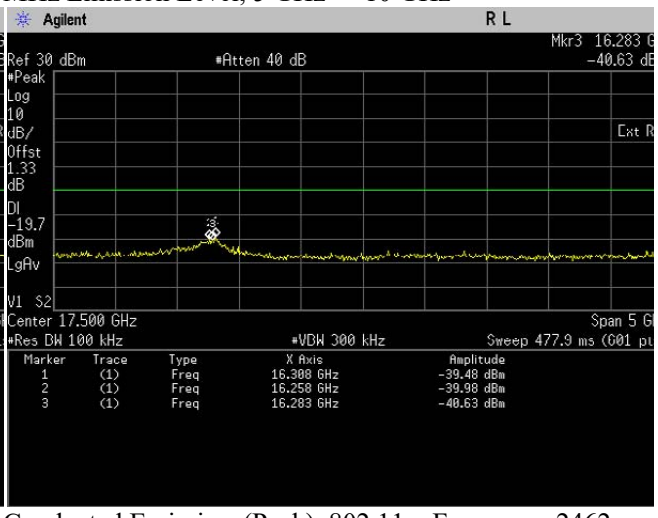
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



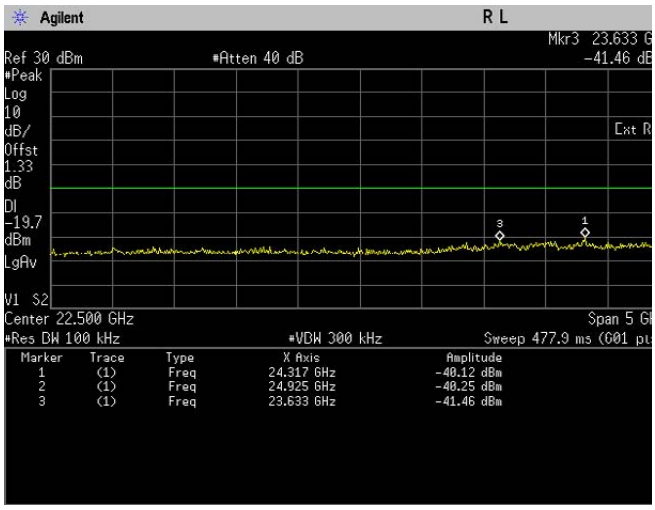
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



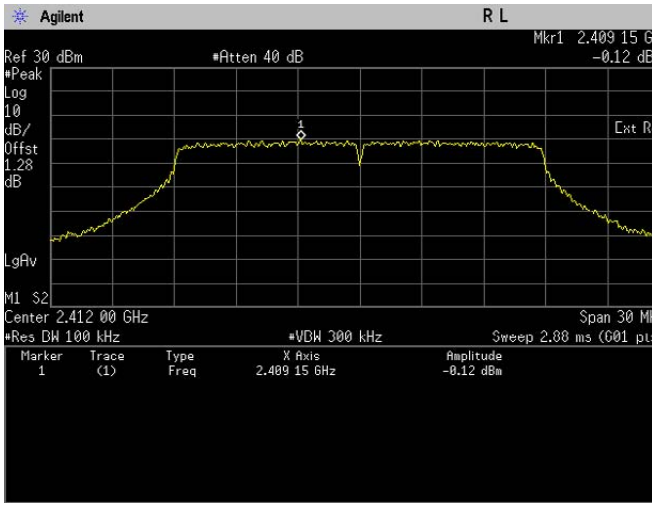
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



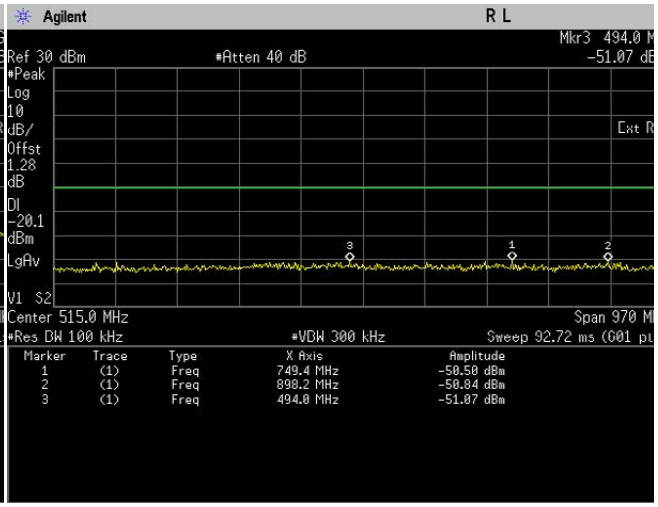
Conducted Emissions(Peak). 802.11g, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

802.11n (HT20)

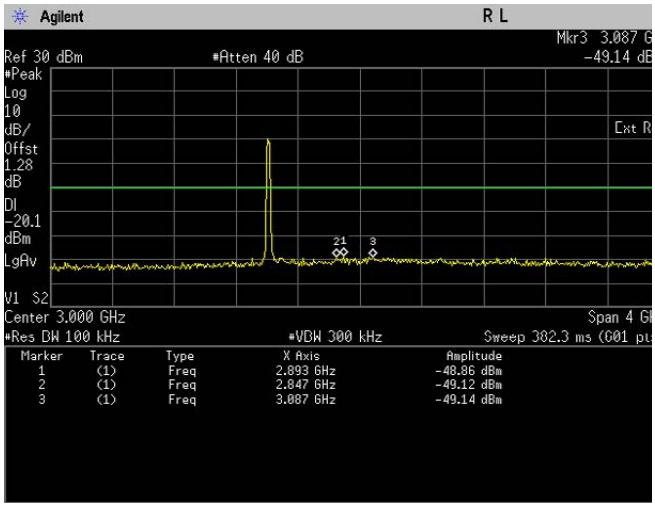
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	16317.00	-39.90	Pass
					16258.00	-40.03	Pass
					16275.00	-40.48	Pass
802.11n	OFDM	BPSK	6.5	2437	16317.00	-38.91	Pass
					16267.00	-39.26	Pass
					16250.00	-39.84	Pass
802.11n	OFDM	BPSK	6.5	2462	16233.00	-38.92	Pass
					16283.00	-40.13	Pass
					16258.00	-40.34	Pass



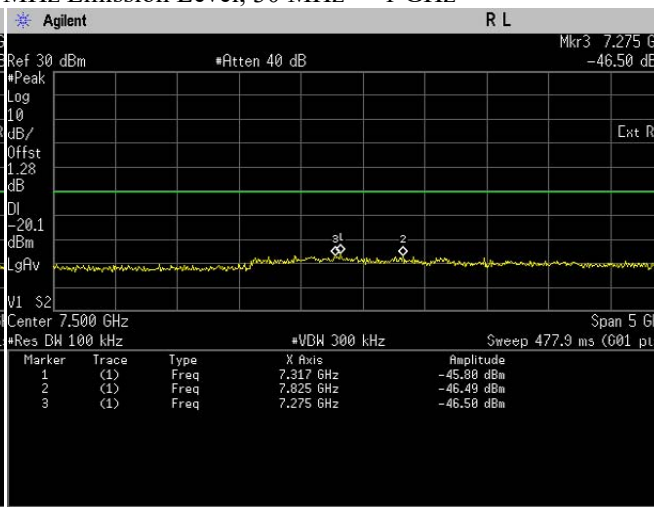
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Reference Level



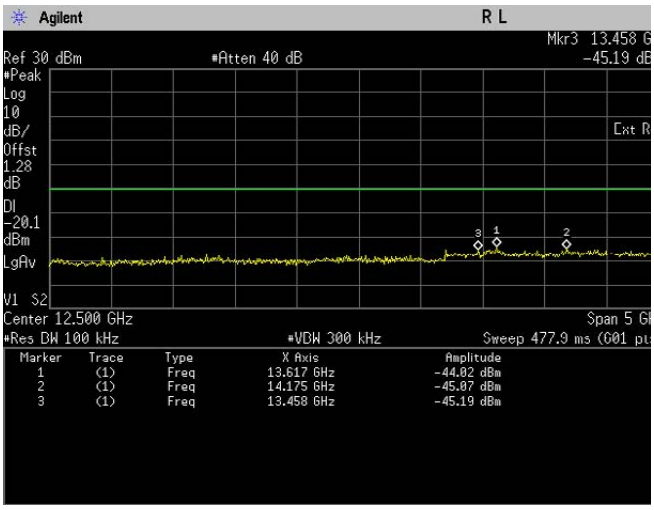
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



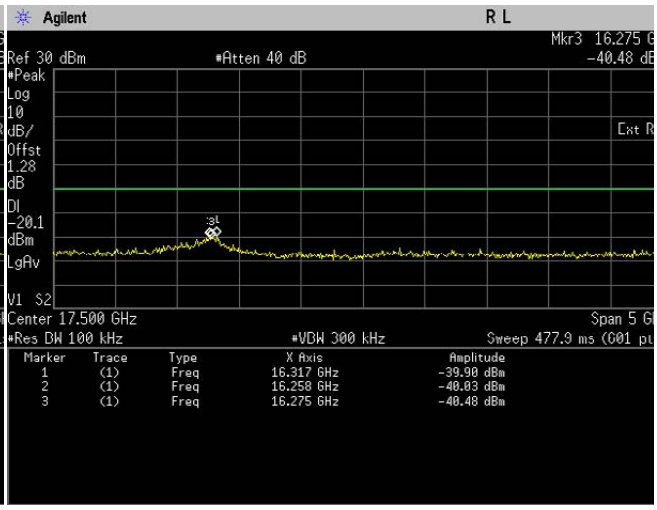
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



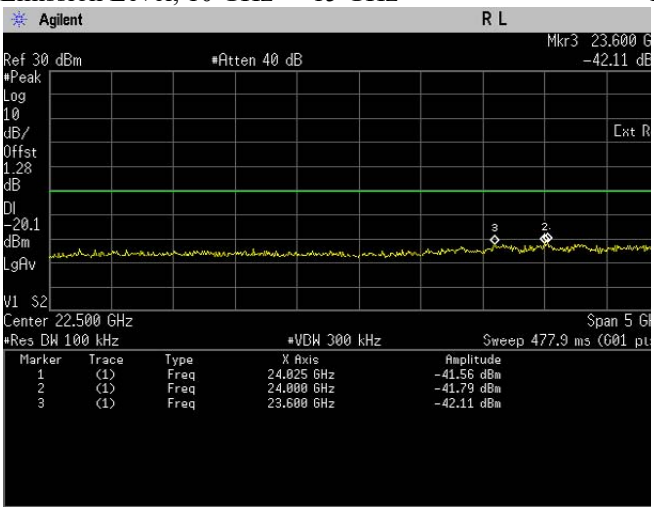
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



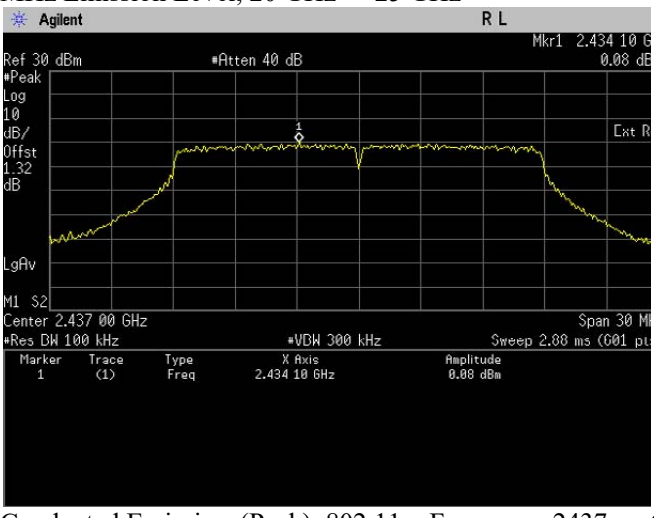
Conducted Emissions(Peak). 802.11n, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



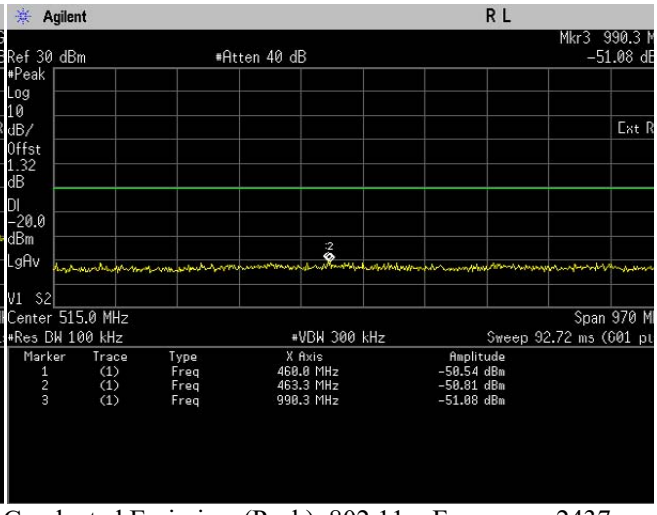
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



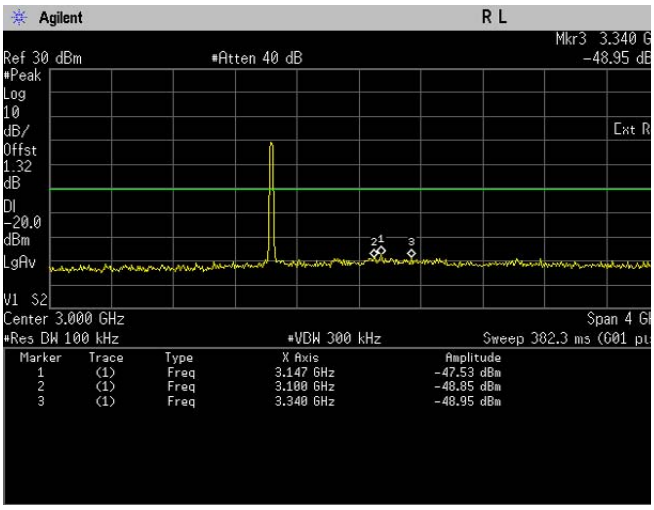
Conducted Emissions(Peak). 802.11n, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



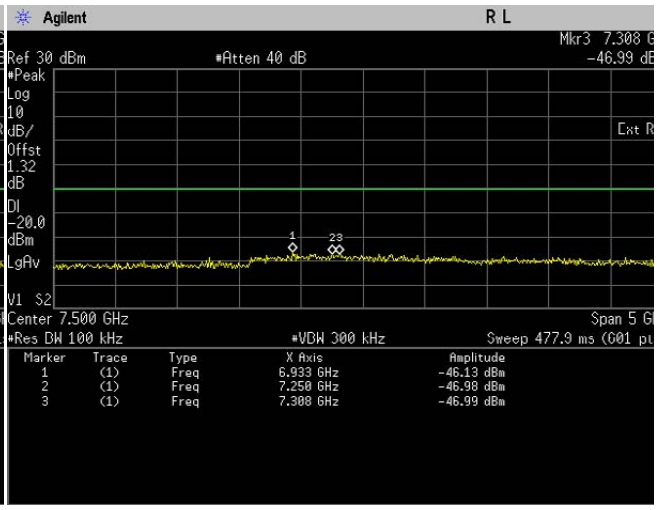
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Reference Level



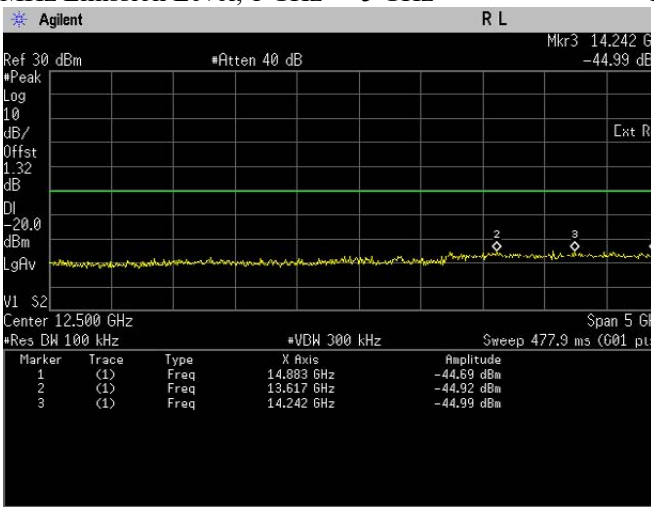
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



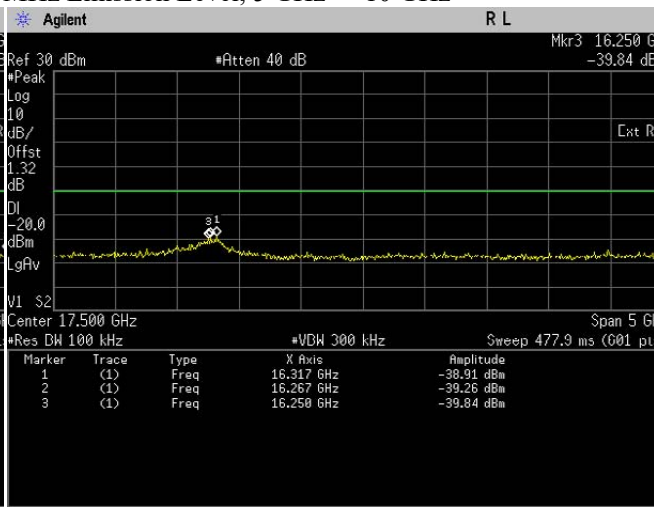
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



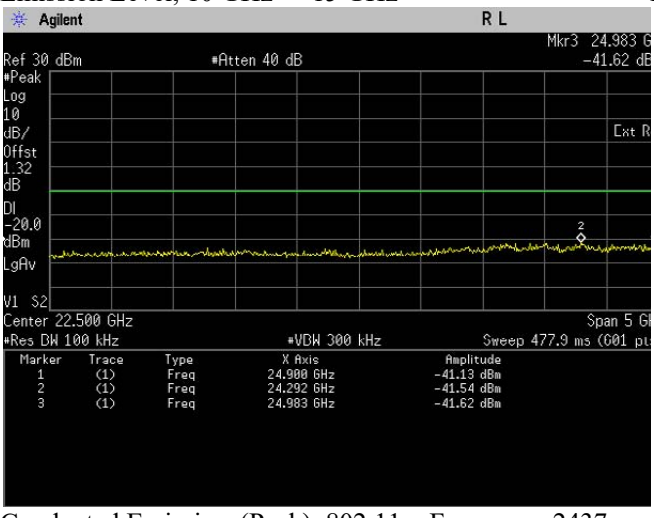
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



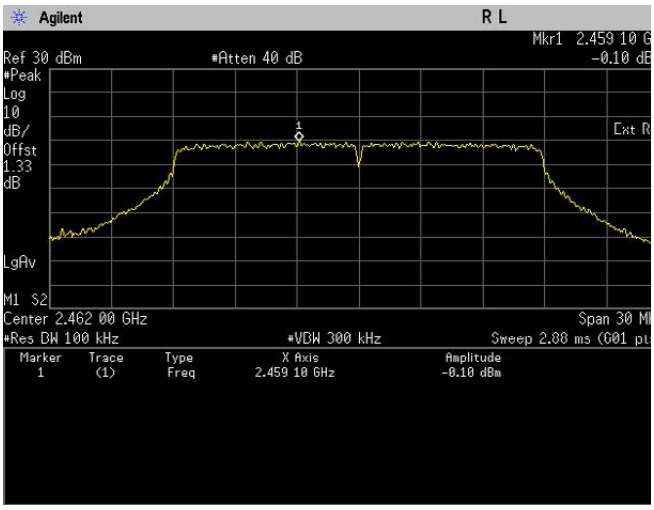
Conducted Emissions(Peak). 802.11n, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



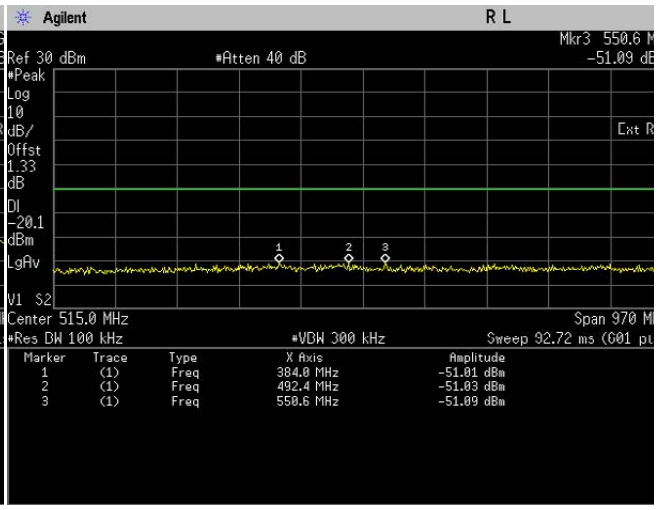
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



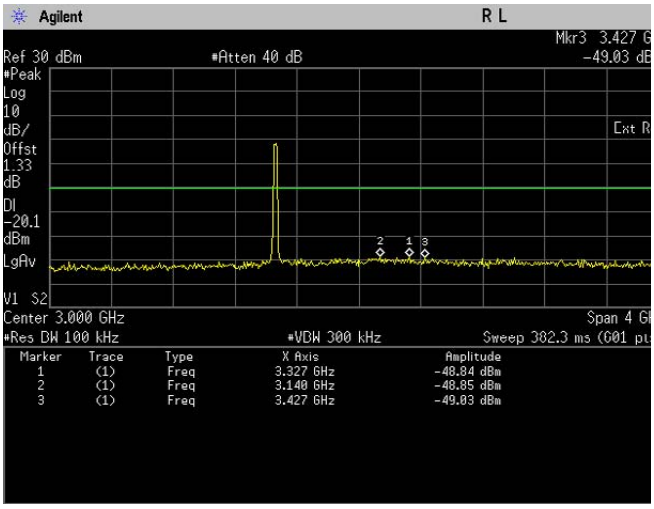
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



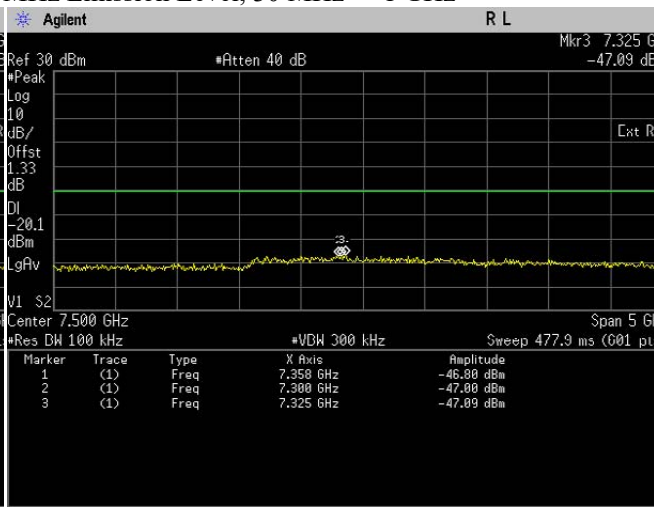
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Reference Level



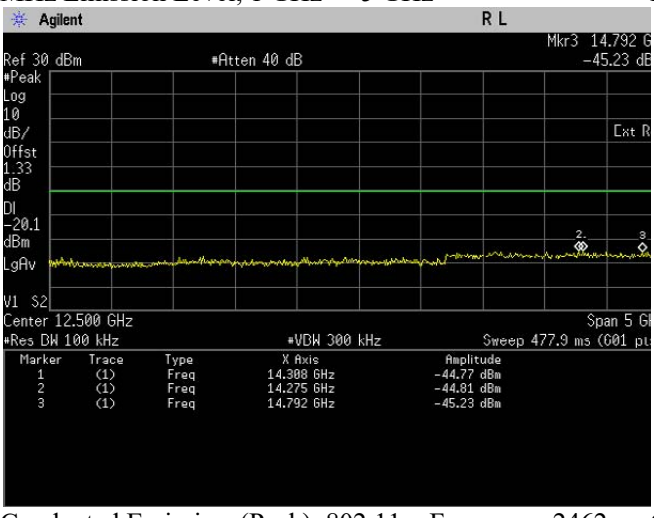
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



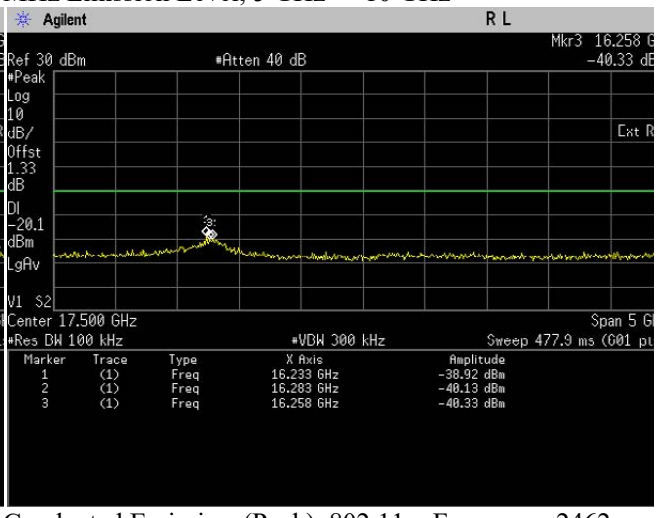
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



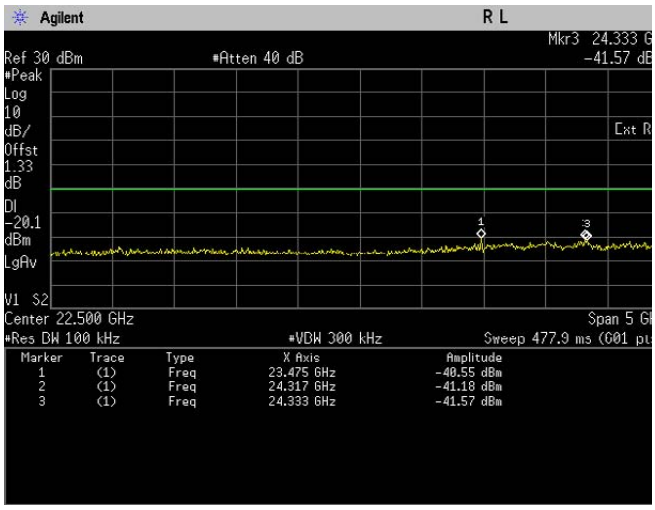
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



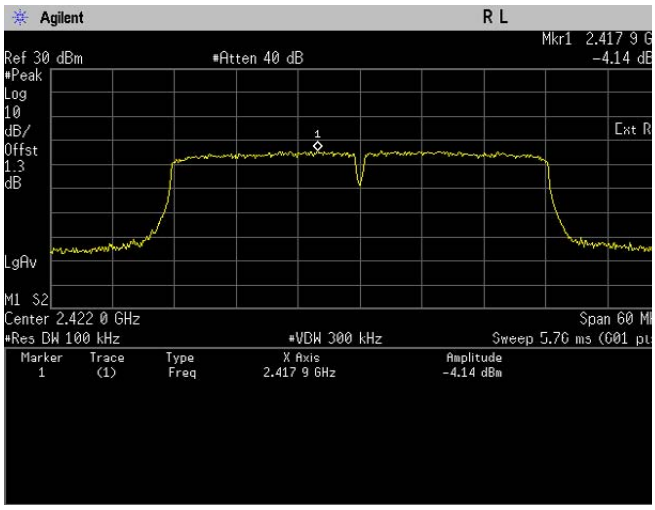
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



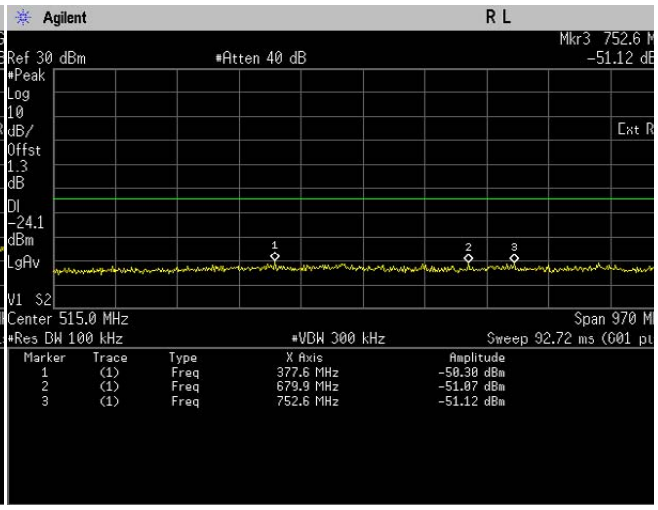
Conducted Emissions(Peak). 802.11n, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

802.11n (HT40)

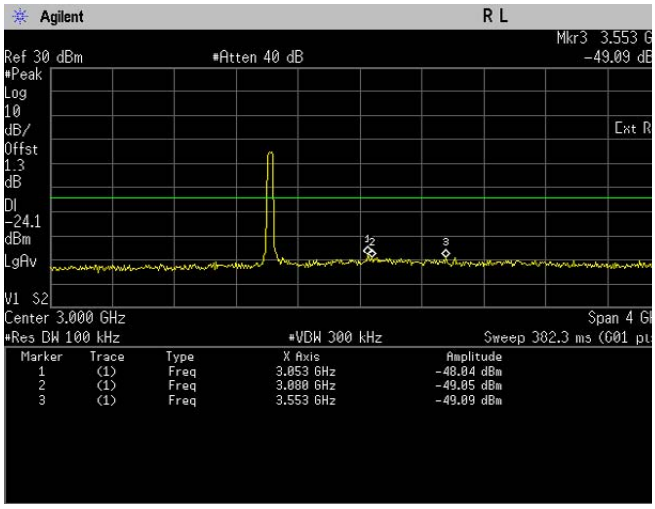
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11n	OFDM	BPSK	13.5	2422	16283.00	-40.43	Pass
					16308.00	-40.44	Pass
					16225.00	-40.56	Pass
802.11n	OFDM	BPSK	13.5	2437	16300.00	-37.68	Pass
					16258.00	-40.21	Pass
					16325.00	-40.29	Pass
802.11n	OFDM	BPSK	13.5	2452	16242.00	-40.30	Pass
					16308.00	-40.42	Pass
					16208.00	-40.58	Pass



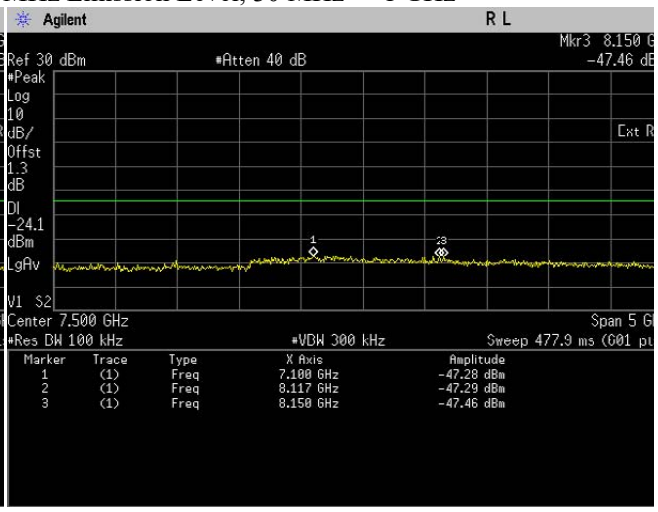
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Reference Level



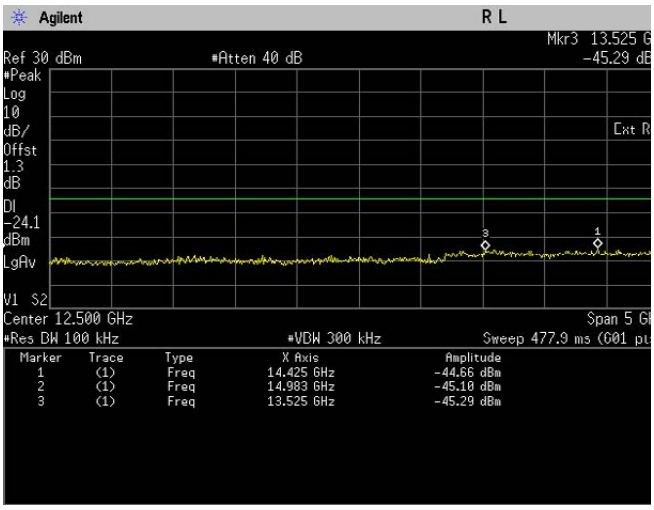
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Emission Level, 30 MHz -> 1 GHz



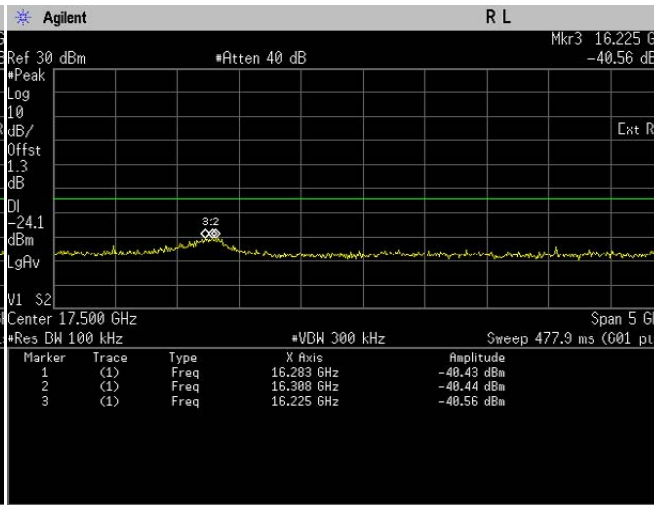
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Emission Level, 1 GHz -> 5 GHz



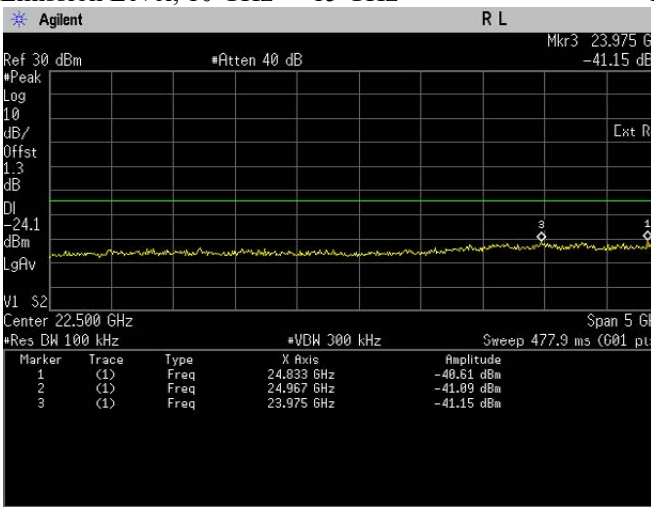
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Emission Level, 5 GHz -> 10 GHz



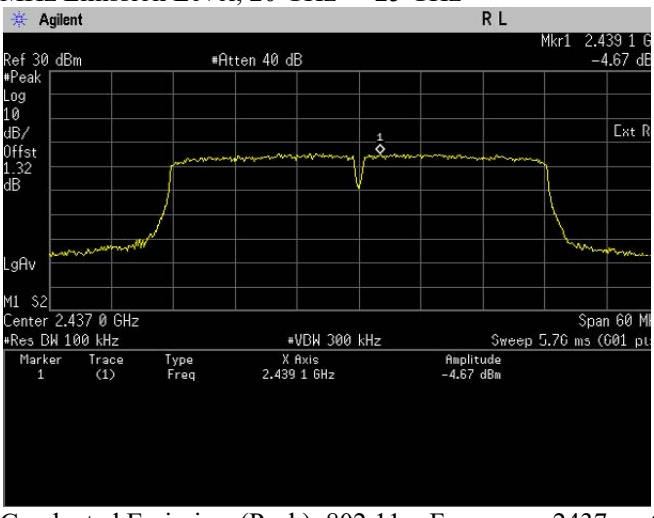
Conducted Emissions(Peak). 802.11n, Frequency 2422 Emission Level, 10 GHz -> 15 GHz



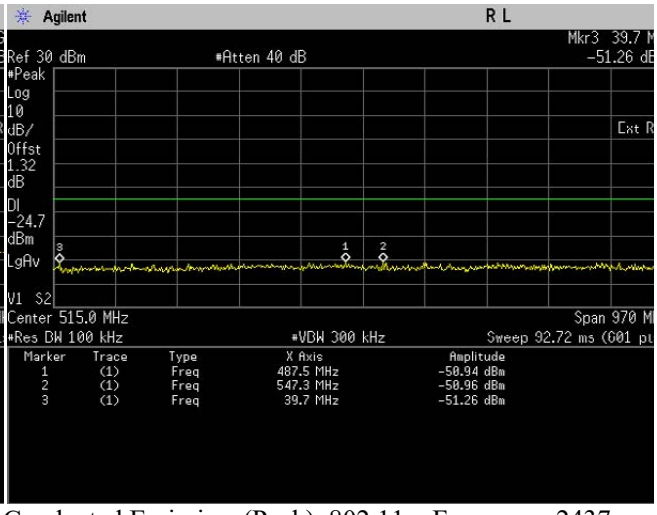
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Emission Level, 15 GHz -> 20 GHz



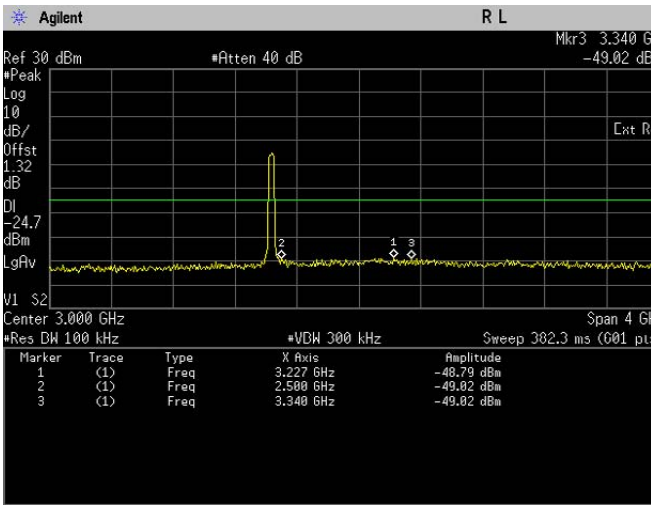
Conducted Emissions(Peak). 802.11n, Frequency 2422 MHz Emission Level, 20 GHz -> 25 GHz



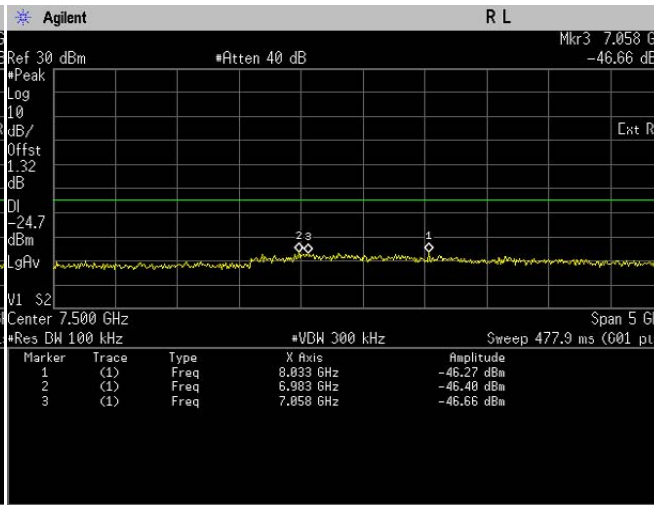
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Reference Level



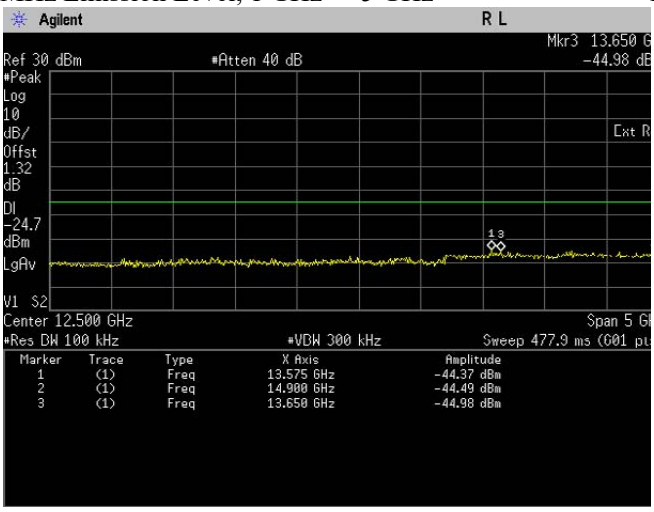
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



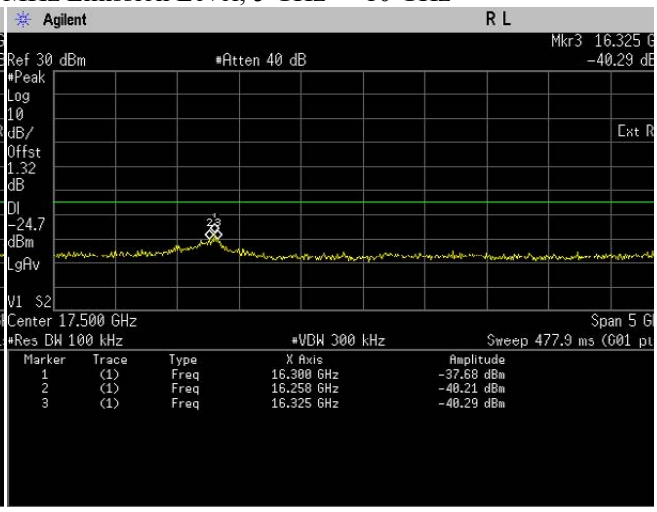
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



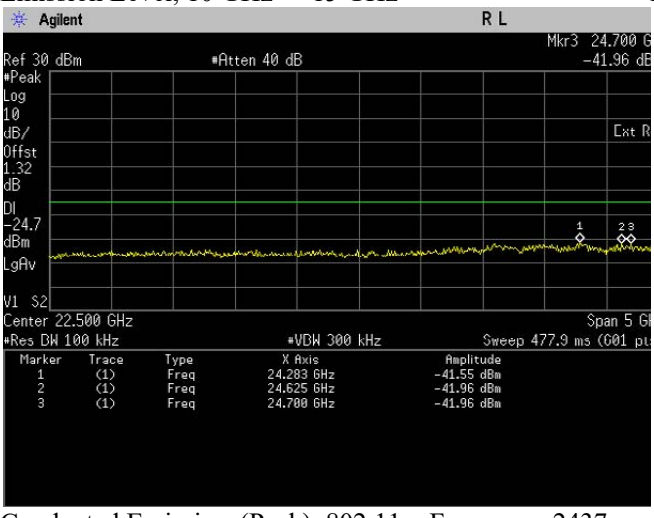
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



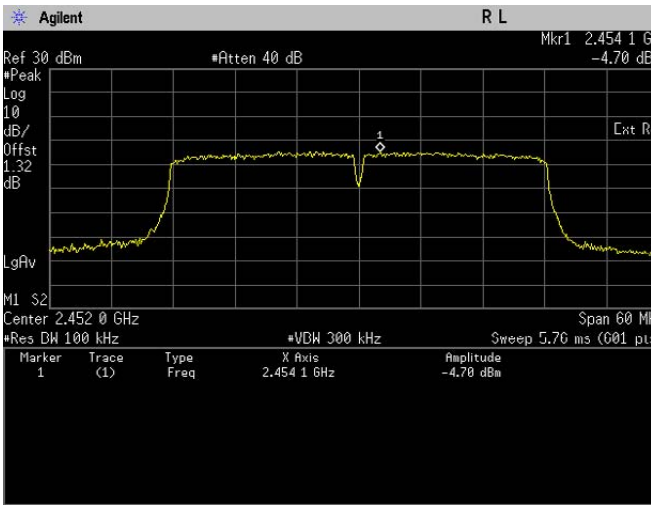
Conducted Emissions(Peak). 802.11n, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



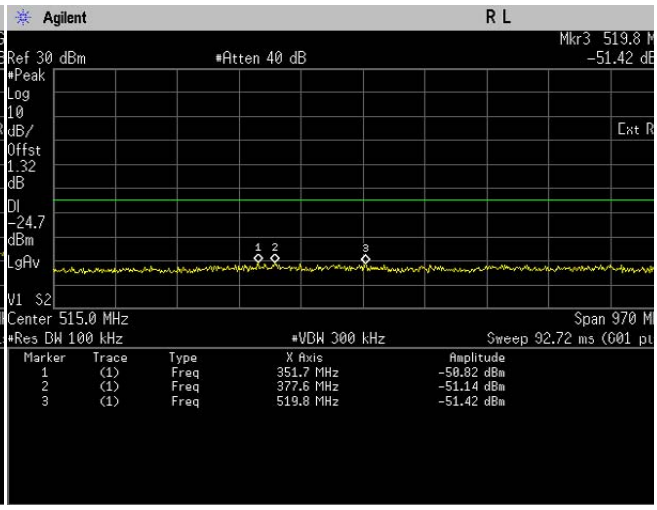
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



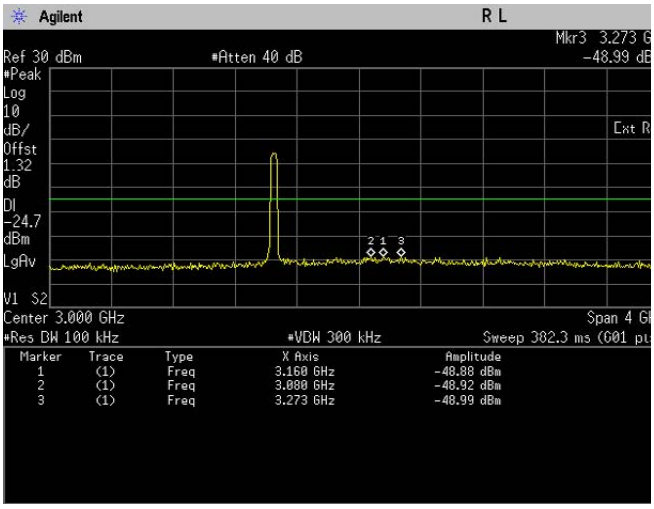
Conducted Emissions(Peak). 802.11n, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



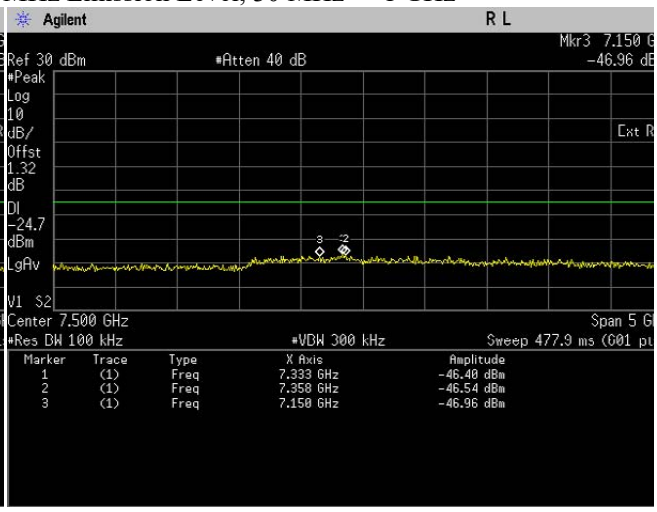
Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Reference Level



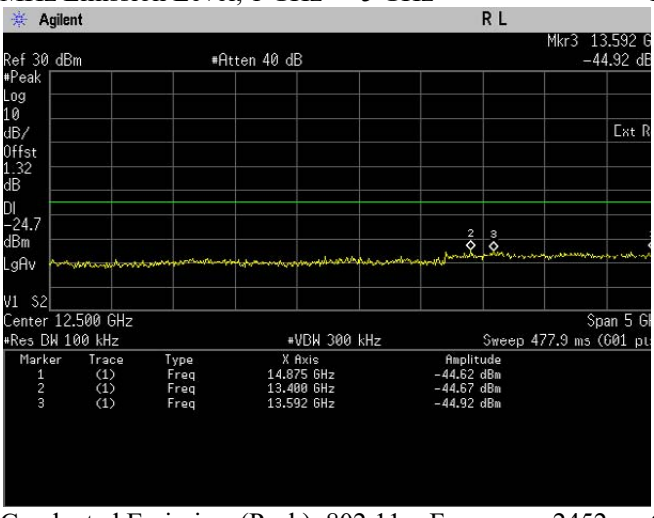
Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Emission Level, 30 MHz -> 1 GHz



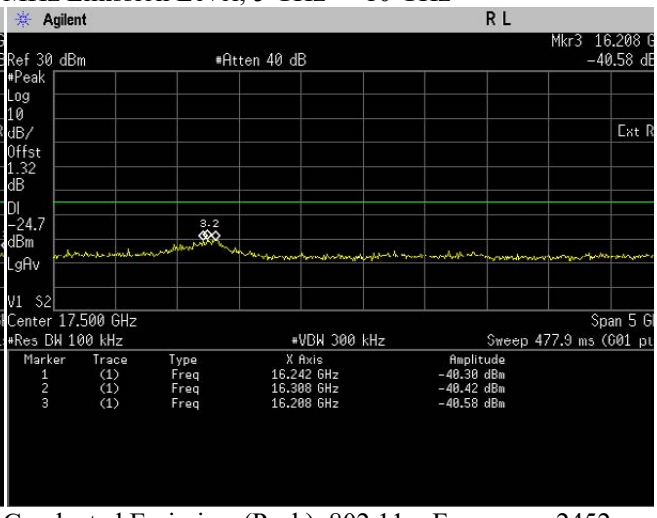
Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Emission Level, 1 GHz -> 5 GHz



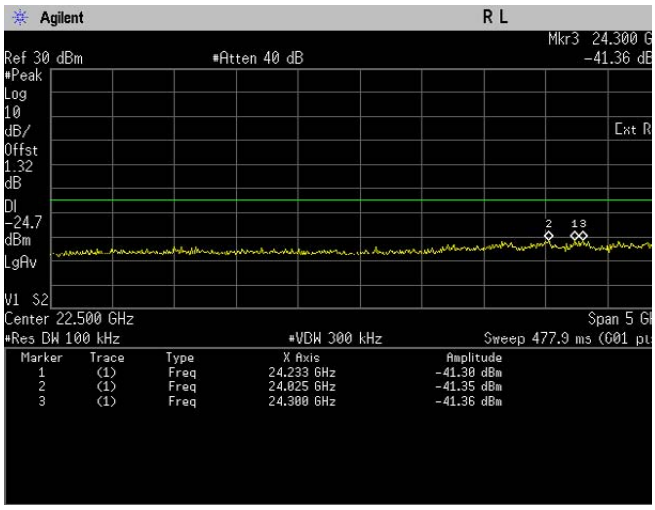
Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions(Peak). 802.11n, Frequency 2452 Emission Level, 10 GHz -> 15 GHz



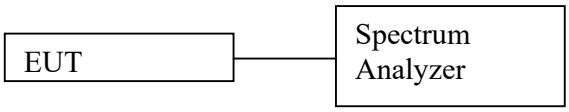
Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions(Peak). 802.11n, Frequency 2452 MHz Emission Level, 20 GHz -> 25 GHz

4.6. Band edge Conducted Spurious Emission

4.6.1. 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.

4.6.2. Test Limits:

Normal Condition (25 º C)
Shall be at least 30 dB below peak (max) power.

4.6.3. 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	2399.99	-33.65	Pass
802.11b	DSSS	DBPSK	1	2462	2483.50	-46.54	Pass