MOTOROLA SOLUTIONS

MOTOROLA PENANG ADV. COMM. LABORATORY

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

FCC / IC TEST REPORT

Report Revision : Rev.B

Date/s Tested	:	3-June-2017 - 12-June-2017
Report Issue Date	:	17-June-2017
Manufacturer/Location	:	Motorola Solutions - Penang
Requestor	:	MOHAMED AFENDY MOHAMED RAFI
Product Type	:	Portable
Model Number	:	AAH88JCD9SA2AN
Frequency Band	:	2.402 - 2.462 GHz
Rated / Max RF Output Power	:	802.11b - 17.8 mWatts / 25.1 mWatts 802.11g - 6.3 mWatts / 9.2 mWatts 802.11n - 6.3 mWatts / 9.2 mWatts
Applicant Name	:	Motorola Solution Malaysia Sdn Bhd
Applicant Address	:	Innoplex Plot 2A, Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia
FCC Registrations	:	772092
IC Registrations	:	109AK

The equipment was tested accordance to the requirement listed below:

(2.4GHz Wi-Fi) **Part 15C** **IC RSS 247**	**PASS**

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Prepared By:

Jino Lim
Test Personnel

Approved By:

Goh Aik Hong
Responsible Engineer

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	**17-June-2017**	**Jino Lim**
Rev. B	Revise section 6.5.2 and 6.6.2	**12-July-2017**	**Jino Lim**

1.0 General Information

EUT Description:

Technologies	2.4GHz Wi-Fi
TX Frequency range	2412MHz – 2462MHz
Modulation Type	DSSS, OFDM
Input/Output	RF Port
Connector type	PROGRAMMING, TEST & ALIGNMENT CABLE
Antenna type	BT/WIFI MODULE PATCH ANTENNA

1.1 Channel number and frequency information:

11 Channels are provided for 802.11b, 802.11g and 802.11n (HT20)

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**
BATT LIION 2300T (BT100x)	MOTOROLA	PMNN4468A
PROGRAMMING, TEST & ALIGNMENT CABLE	MOTOROLA	-

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:

ANSI C63.10-2013

2.0 Summary of Test Results

FCC Clause	IC Clause	Test Item	Result	Remark
15.247 (b)(2)	RSS-247 5.2(1)	6dB Channel Bandwidth	Pass	NA
15.247 (a)(3)	RSS-247 5.1(4)	Conducted RF Output Power (Peak)	Pass	NA
15.247(e)	RSS-247 5.2(2)	Maximum Power Spectral Density	Pass	NA
15.247(b)	RSS-247 5.5	Conducted Spurious Emissions	Pass	NA
15.247 (d)	RSS-247 5.5	Band edge Conducted Spurious Emission	Pass	NA
15.205, 15.209, 15.247 (d)	RSS-247 5.5	Radiated Emission within Restricted Bands	Pass	NA
15.207	RSS-Gen 8.8	AC Powerline Conducted Emission	NA	Testing is not required, radio shall turn off during charging mode
15.203	-	Antenna requirement	NA	Internal antenna is not accessible to the end-user

3.0 Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.43
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01

4.0 Equipment List

Bluetooth ATE # 1 (SW Version: Ate Main_3.1.9_R1)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
SPECTRUM ANALYZER	E4445A	MY46181597	21-Dec-16	21-Dec-18
POWER SUPPLY	6652A	3541A02403	7-Sep-15	7-Sep-17
SPECTRUM ANALYZER	FSEK30	838495/014	29-Jun-16	29-Jun-18

Radiated Emission Station (SW Version: EMC FCC RE v1.5.1)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
DRG HORN FREQ.	SAS-571	566	4-Sep-16	4-Sep-17
DRG HORN FREQ.	SAS-571	720	2-Mar-17	2-Mar-19
POWER SUPPLY	6674A	3126A00133	12-Nov-15	12-Nov-17
MICROWAVE SIGNAL GENERATOR	SMP04	100127	3-Jul-16	3-Jul-17
EMI TEST RECEIVER	ESIB26	100336	19-Oct-16	19-Oct-17
SIGNAL ANALYZER	FSV40	101103	25-Jun-16	25-Jun-17
5m Semi-anechoic Chamber	S800-HX	J2308	29-Jul-16	29-Jul-17
BILOG ANTENNA	CBL6112B	2950	23-Feb-16	23-Feb-18
BILOG ANTENNA	CBL6112B	2964	3-Feb-17	3-Feb-18
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	14-Oct-16	14-Oct-17
DATA LOGGER	SDL500	A.016776	18-Mar-17	18-Mar-18
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
18 - 40GHz PREAMPLIFIER	BBV9721	9721-007	Not Required	Not Required
LOOP ANTENNA	6502	208416	24-Jun-16	24-Jun-17
PREAMPLIFIER	PAM-0118P	361	Not Required	Not Required

5.0 Test Mode Applicability and Test Channel Detail

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	MODE	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Date Rate (Mbps)
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	11
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5

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	MODE	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	11
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5

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	MODE	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Date Rate (Mbps)
Application Mode	802.11bgn mixed	1 to 11	AUTO	DSSS, OFDM	AUTO	AUTO

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	MODE	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
Test Mode	802.11b	1 to 11	1,6,11	DSSS	QPSK	11
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5

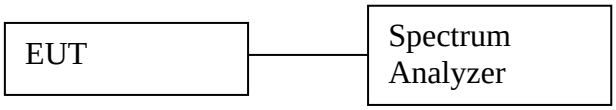
Duty Cycle of Test Signal

802.11b, 802.11g and 802.11n (HT20): Duty cycle of test signal is ≥98%. (Refer to duty cycle test signal)

6.0 Transmitter Test Parameters

6.1 6dB Channel Bandwidth

6.1.1 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. RBW = 100 kHz
   b. VBW = 300 kHz
   c. Detector mode = Peak
   d. Trace = Max hold
   e. Sweep = auto
5) Measure the freq different of two frequencies that were attenuated 6dB from peak of the emission & record the frequency difference as the emission bandwidth.

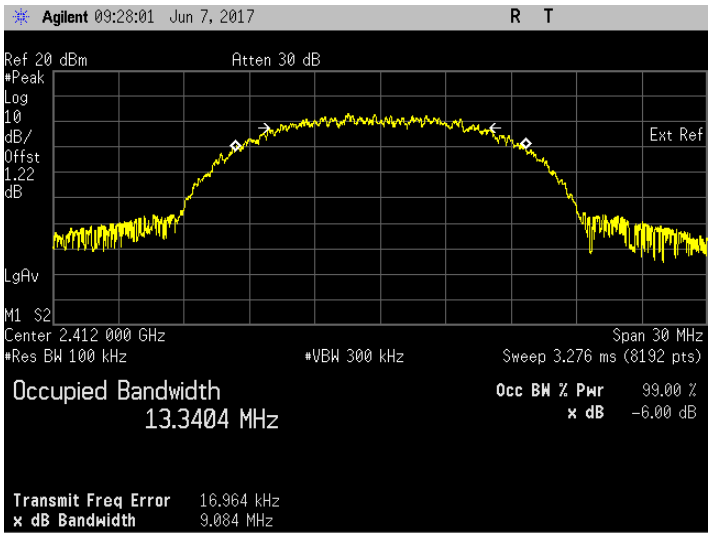
6.1.2 Test Limits:

Normal Condition (25 º C)
≥500 kHz

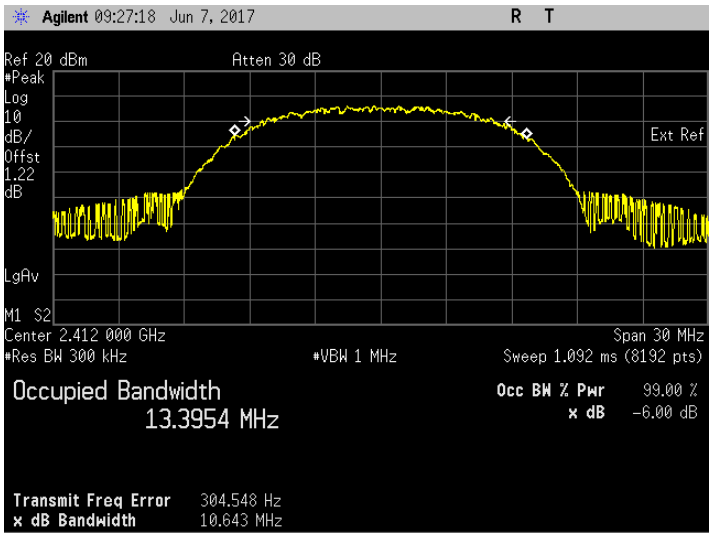
6.1.3 Test Data:

802.11 b

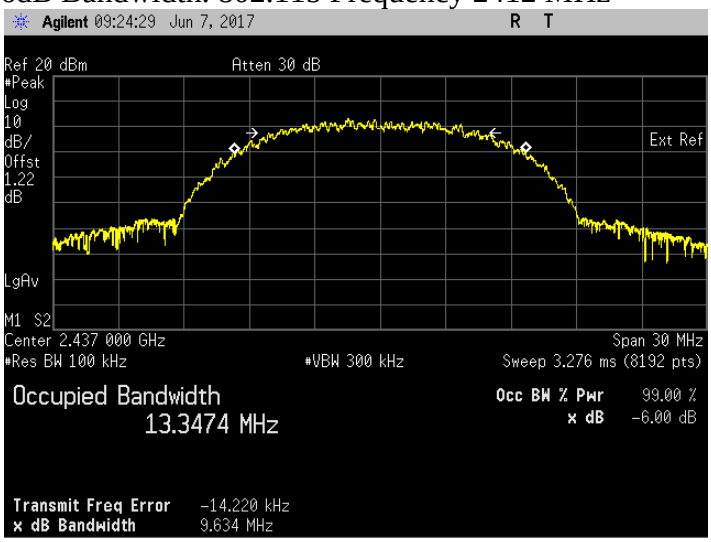
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11b	DSSS	QPSK	11	2412	9.084	13.3954	Pass
802.11b	DSSS	QPSK	11	2437	9.634	13.3967	Pass
802.11b	DSSS	QPSK	11	2462	9.594	13.4001	Pass



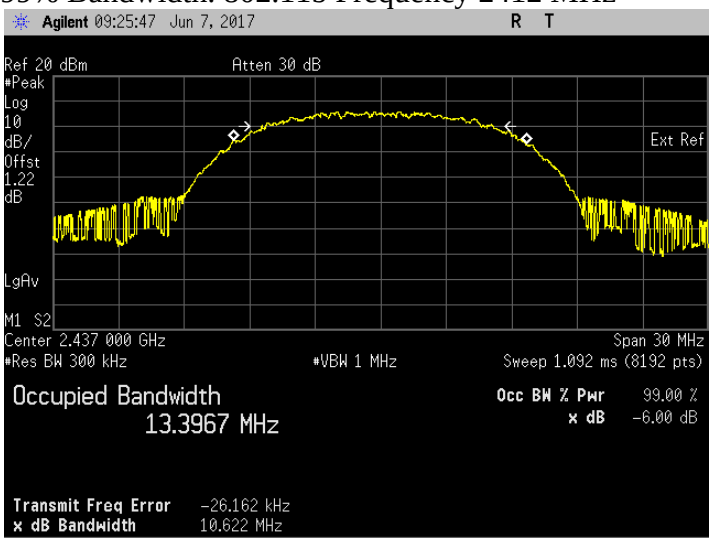
6dB Bandwidth. 802.11b Frequency 2412 MHz



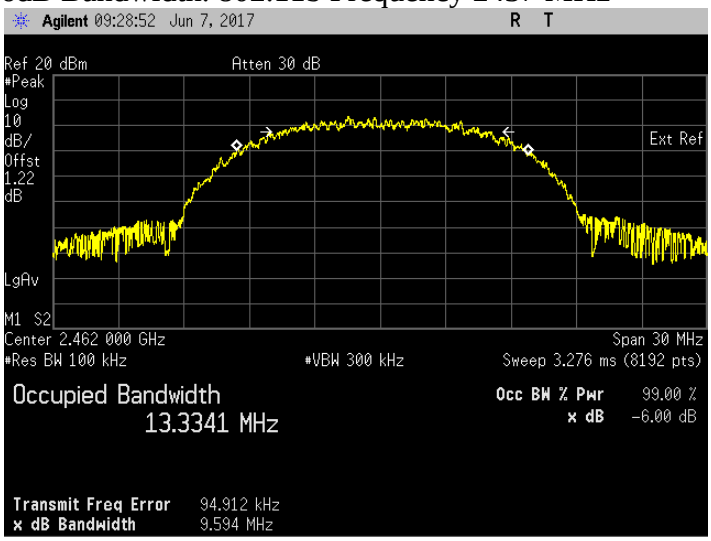
99% Bandwidth. 802.11b Frequency 2412 MHz



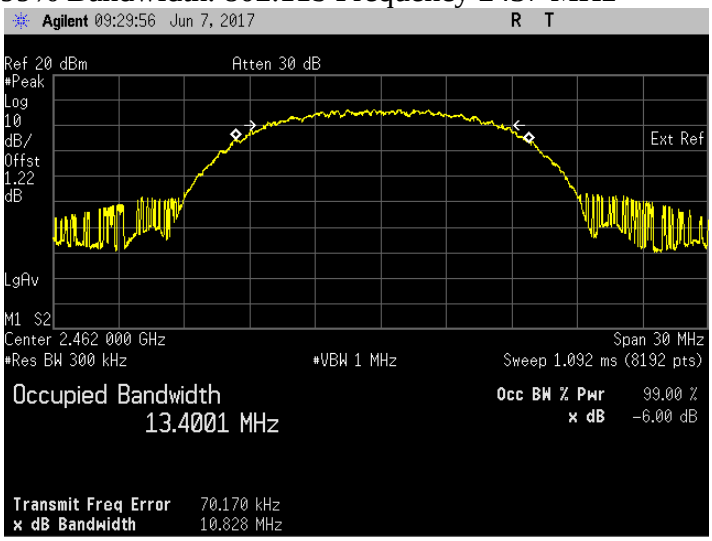
6dB Bandwidth. 802.11b Frequency 2437 MHz



99% Bandwidth. 802.11b Frequency 2437 MHz



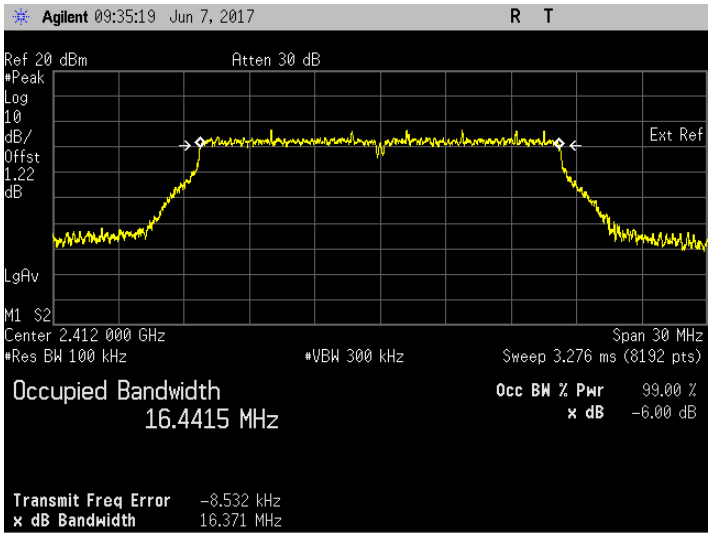
6dB Bandwidth. 802.11b Frequency 2462 MHz



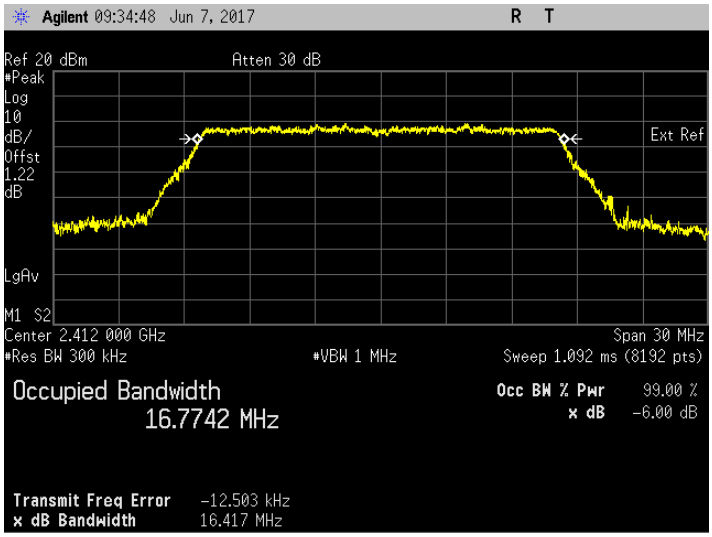
99% Bandwidth. 802.11b Frequency 2462 MHz

802.11 g

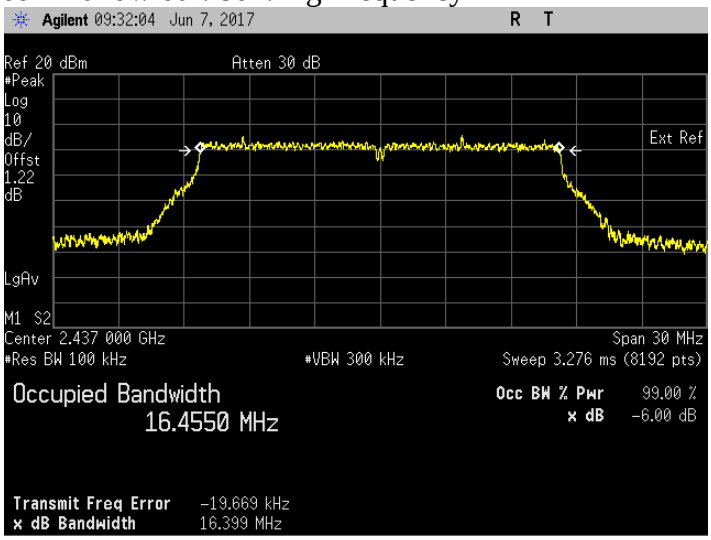
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11g	OFDM	BPSK	6	2412	16.371	16.7742	Pass
802.11g	OFDM	BPSK	6	2437	16.399	16.7821	Pass
802.11g	OFDM	BPSK	6	2462	16.360	16.7769	Pass



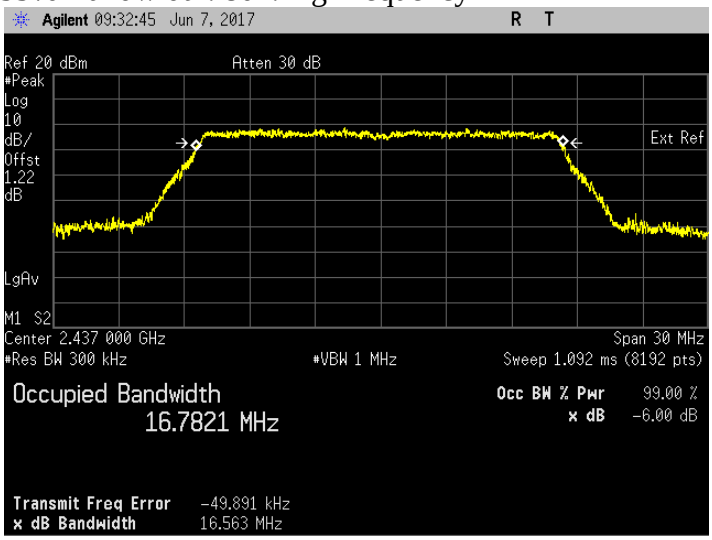
6dB Bandwidth. 802.11g Frequency 2412 MHz



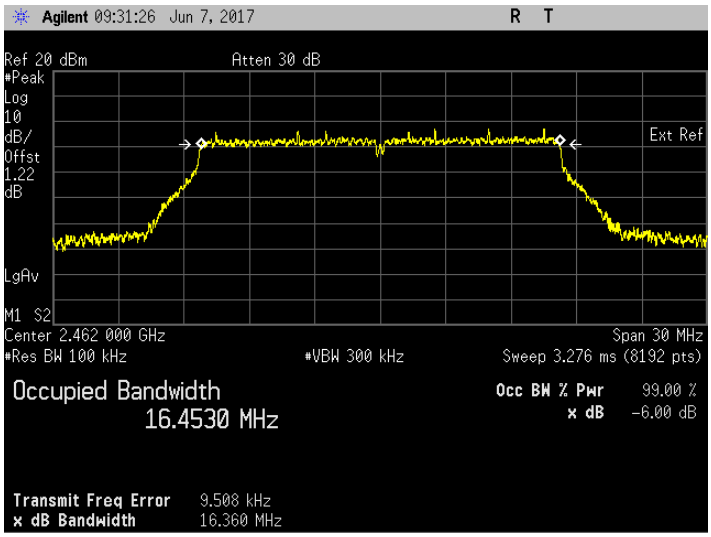
99% Bandwidth. 802.11g Frequency 2412 MHz



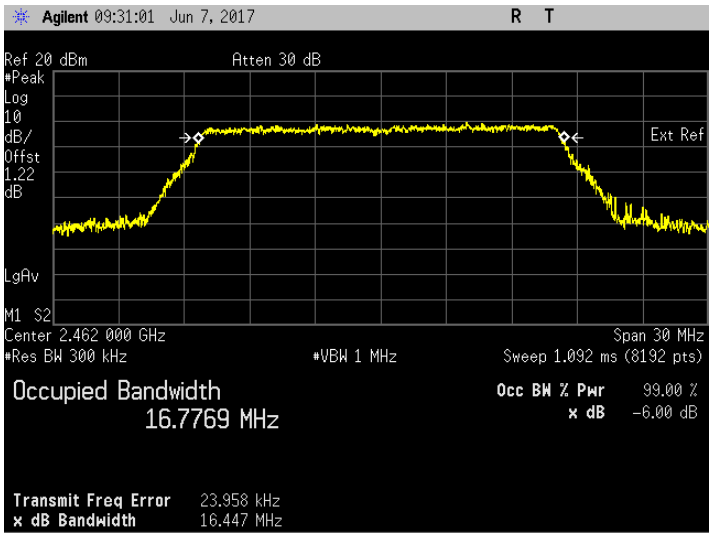
6dB Bandwidth. 802.11g Frequency 2437 MHz



99% Bandwidth. 802.11g Frequency 2437 MHz



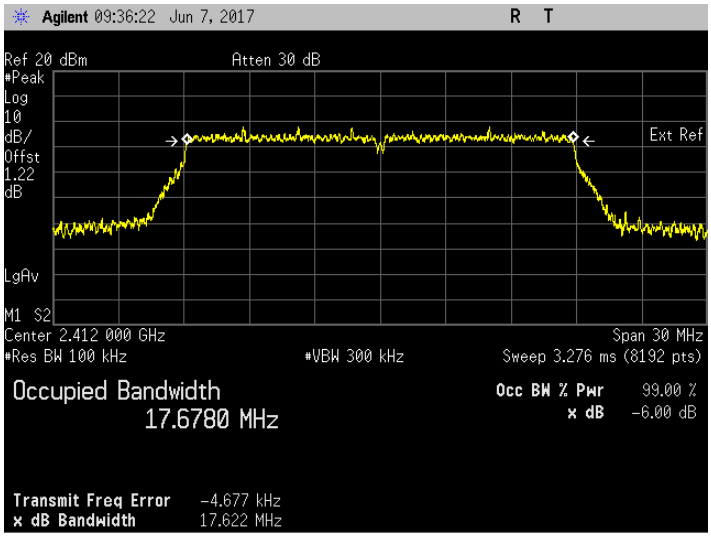
6dB Bandwidth. 802.11g Frequency 2462 MHz



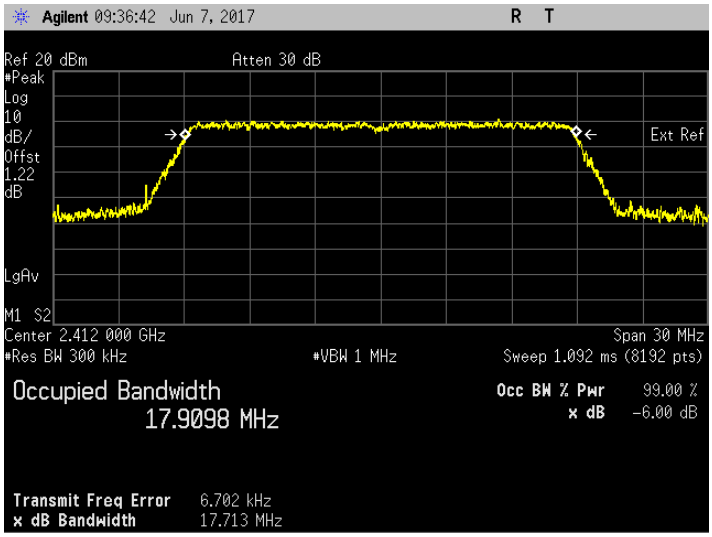
99% Bandwidth. 802.11g Frequency 2462 MHz

802.11n (HT20)

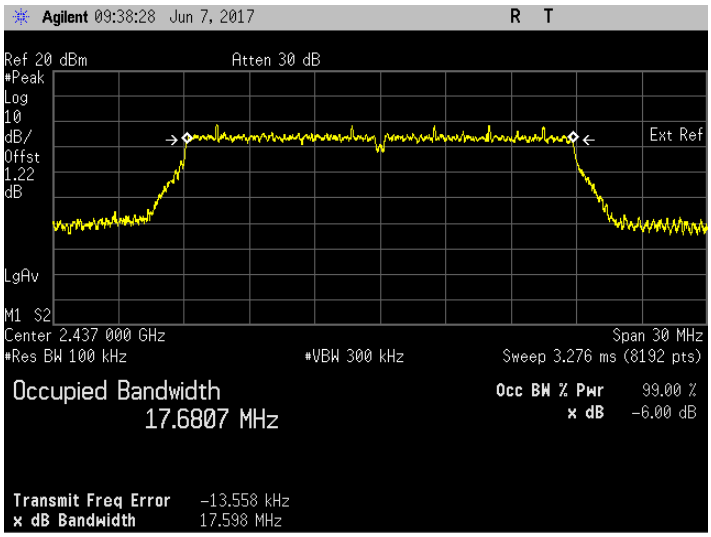
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11n	OFDM	BPSK	6.5	2412	17.622	17.9098	Pass
802.11n	OFDM	BPSK	6.5	2437	17.598	17.9449	Pass
802.11n	OFDM	BPSK	6.5	2462	17.604	17.8985	Pass



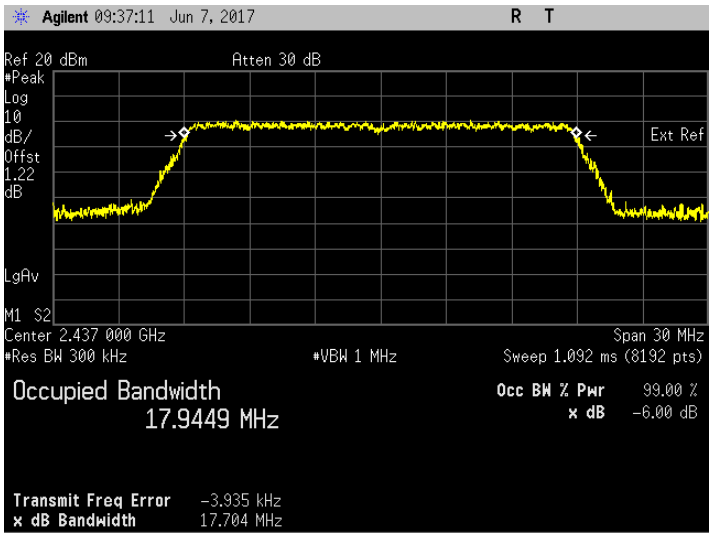
6dB Bandwidth. 802.11n Frequency 2412 MHz



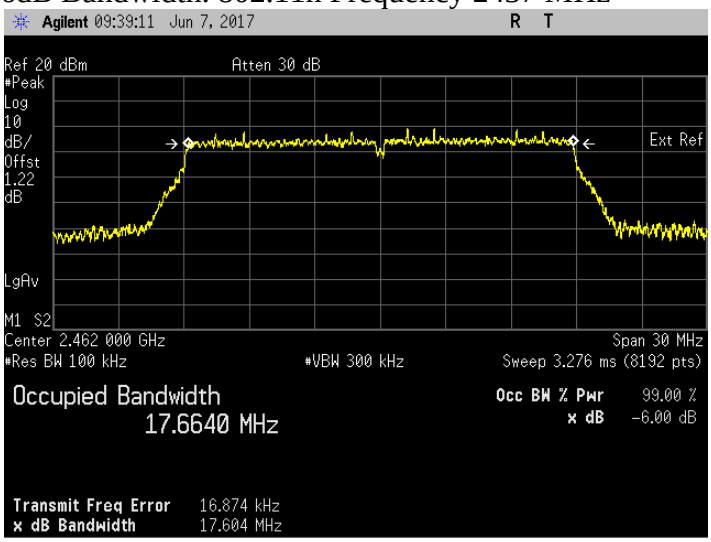
99% Bandwidth. 802.11n Frequency 2412 MHz



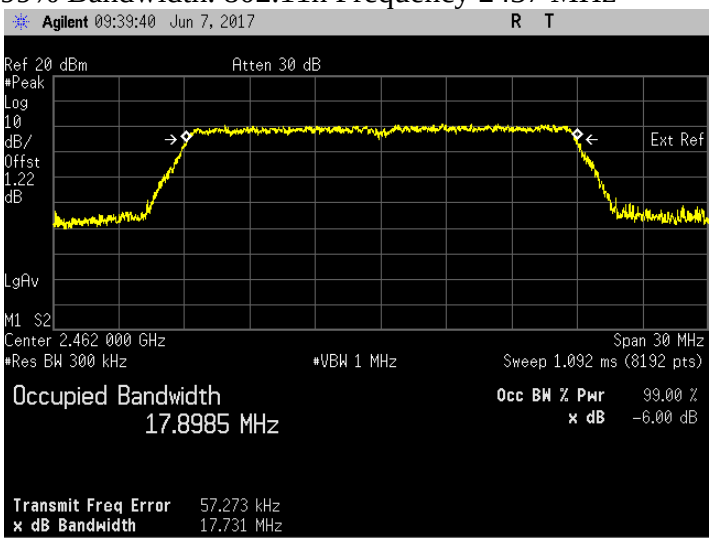
6dB Bandwidth. 802.11n Frequency 2437 MHz



99% Bandwidth. 802.11n Frequency 2437 MHz



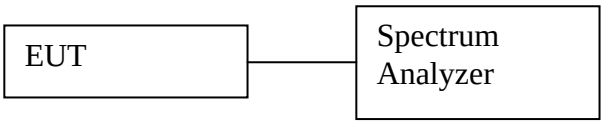
6dB Bandwidth. 802.11n Frequency 2462 MHz



99% Bandwidth. 802.11n Frequency 2462 MHz

6.2 Conducted RF Output Power

6.2.1 Test Setup



Average

1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Measure the duty cycle of transmitter output signal.
4) Setting of Spectrum analyzer :
    a. Set the RBW = 300 kHz.
    b. Set the VBW ≥ [3 × RBW].
    c. Set the span ≥ [1.5 × OBW bandwidth].
    d. Detector = average.
    e. Sweep time = auto couple.
    f. Trace mode = free run.
    g. Allow trace to fully stabilize.
5) Add in duty cycle correction into final test result.
6) Duty cycle correction is calculated as below:
    10 log (1/x)

6.2.2 Test Limits:

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

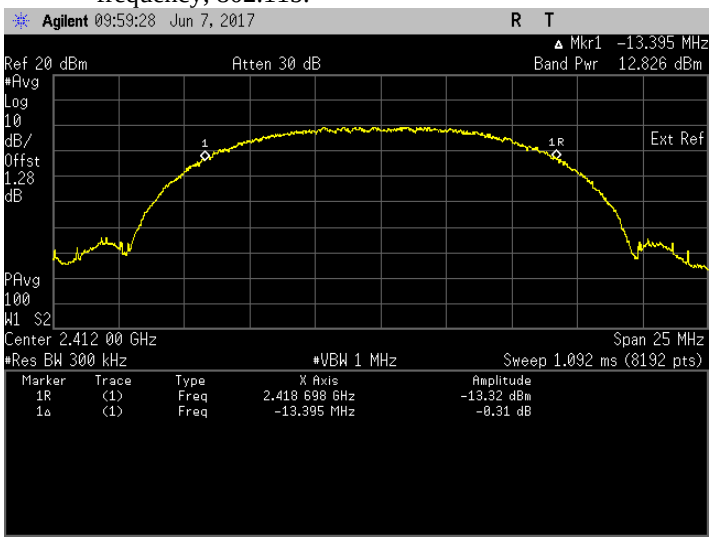
6.2.3 Test Data:

Average

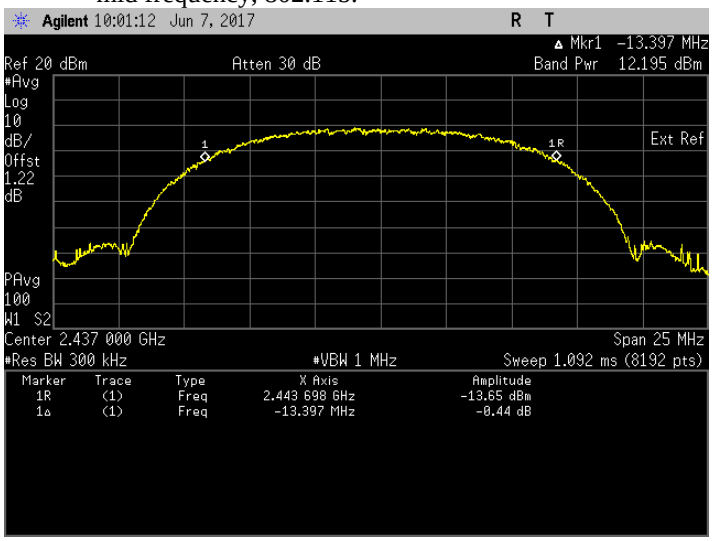
802.11b

Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Output Power (dBm)	Status
802.11b	DSSS	QPSK	11	2412	12.879	Pass
802.11b	DSSS	QPSK	11	2437	12.248	Pass
802.11b	DSSS	QPSK	11	2462	13.125	Pass

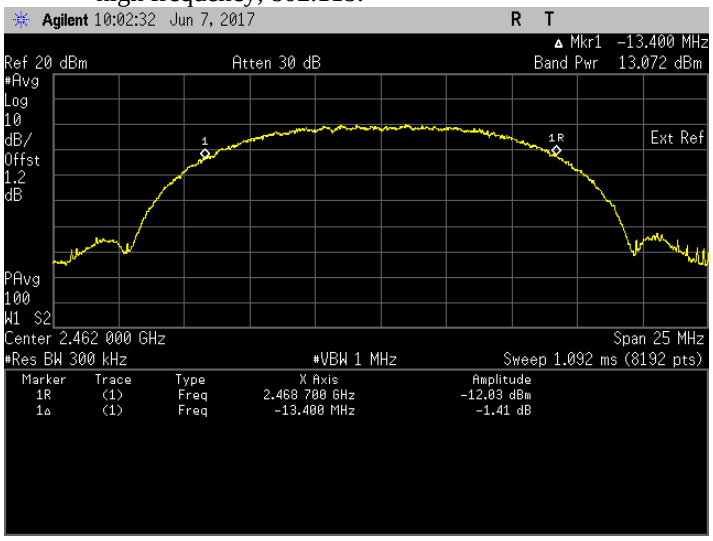
i. The Conducted RF Output Power test with result at low frequency, 802.11b.



ii. The Conducted RF Output Power test with result at mid frequency, 802.11b.



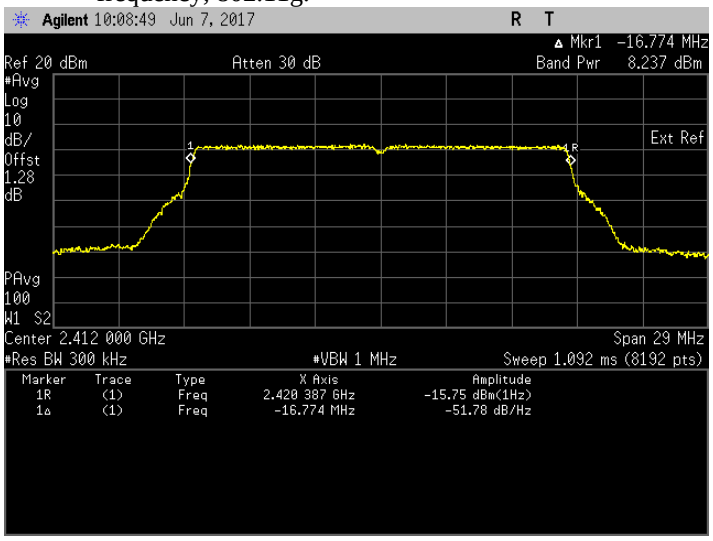
iii. The Conducted RF Output Power test with result at high frequency, 802.11b.



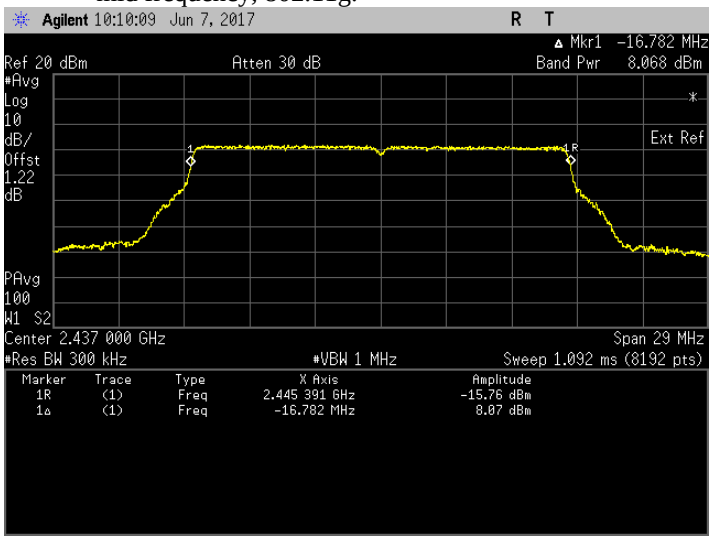
802.11g

Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Output Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	8.269	Pass
802.11g	OFDM	BPSK	6	2437	8.100	Pass
802.11g	OFDM	BPSK	6	2462	8.806	Pass

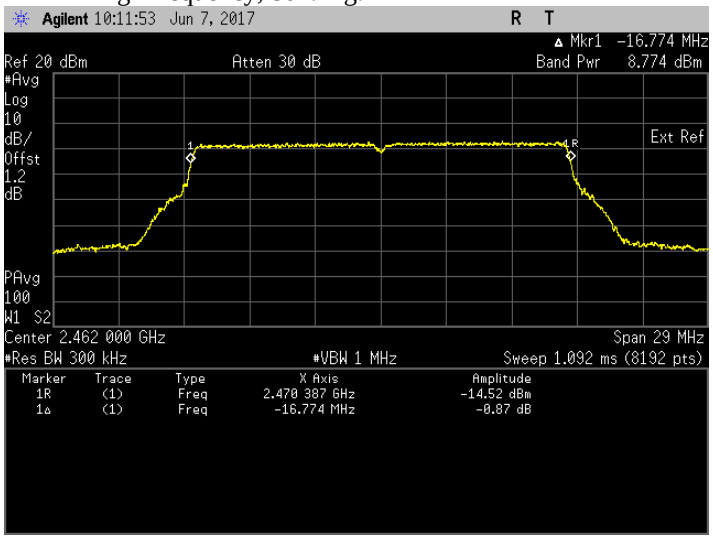
i. The Conducted RF Output Power test with result at low frequency, 802.11g.



ii. The Conducted RF Output Power test with result at mid frequency, 802.11g.



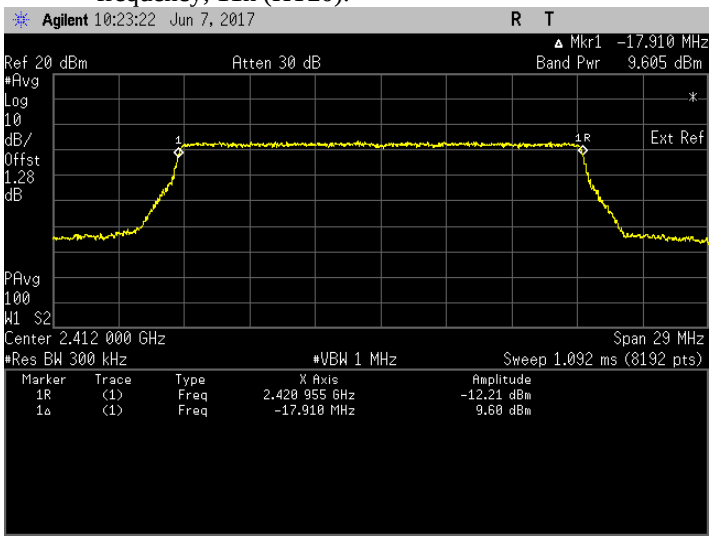
iii. The Conducted RF Output Power test with result at high frequency, 802.11g.



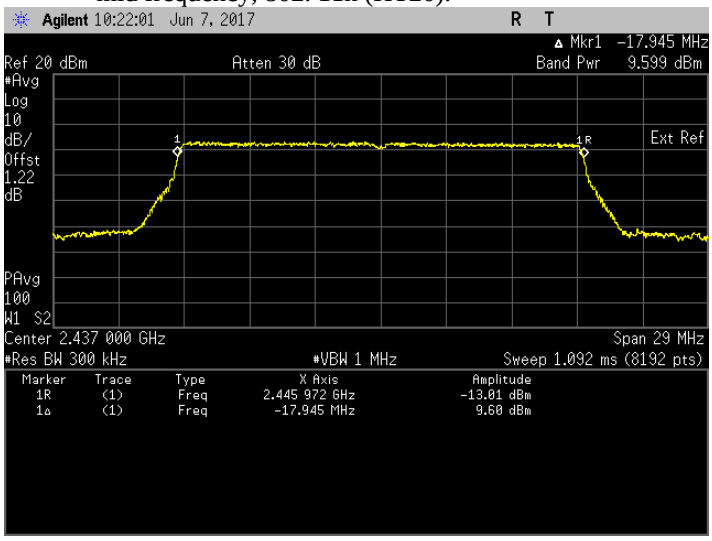
802.11n (HT20)

Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Output Power (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	9.639	Pass
802.11n	OFDM	BPSK	6.5	2437	9.633	Pass
802.11n	OFDM	BPSK	6.5	2462	9.208	Pass

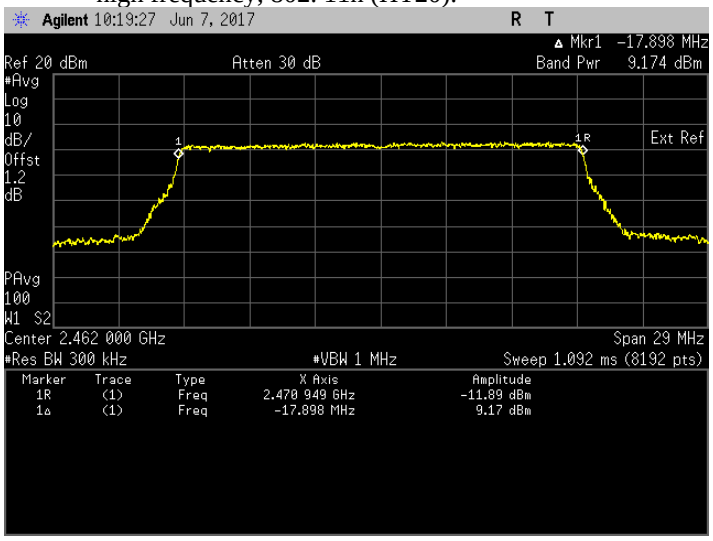
i. The Conducted RF Output Power test with result at low frequency, 11n (HT20).



ii. The Conducted RF Output Power test with result at mid frequency, 802. 11n (HT20).

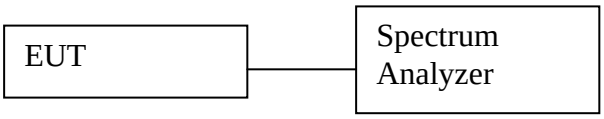


iii. The Conducted RF Output Power test with result at high frequency, 802. 11n (HT20).



6.3 Duty Cycle of the test signal

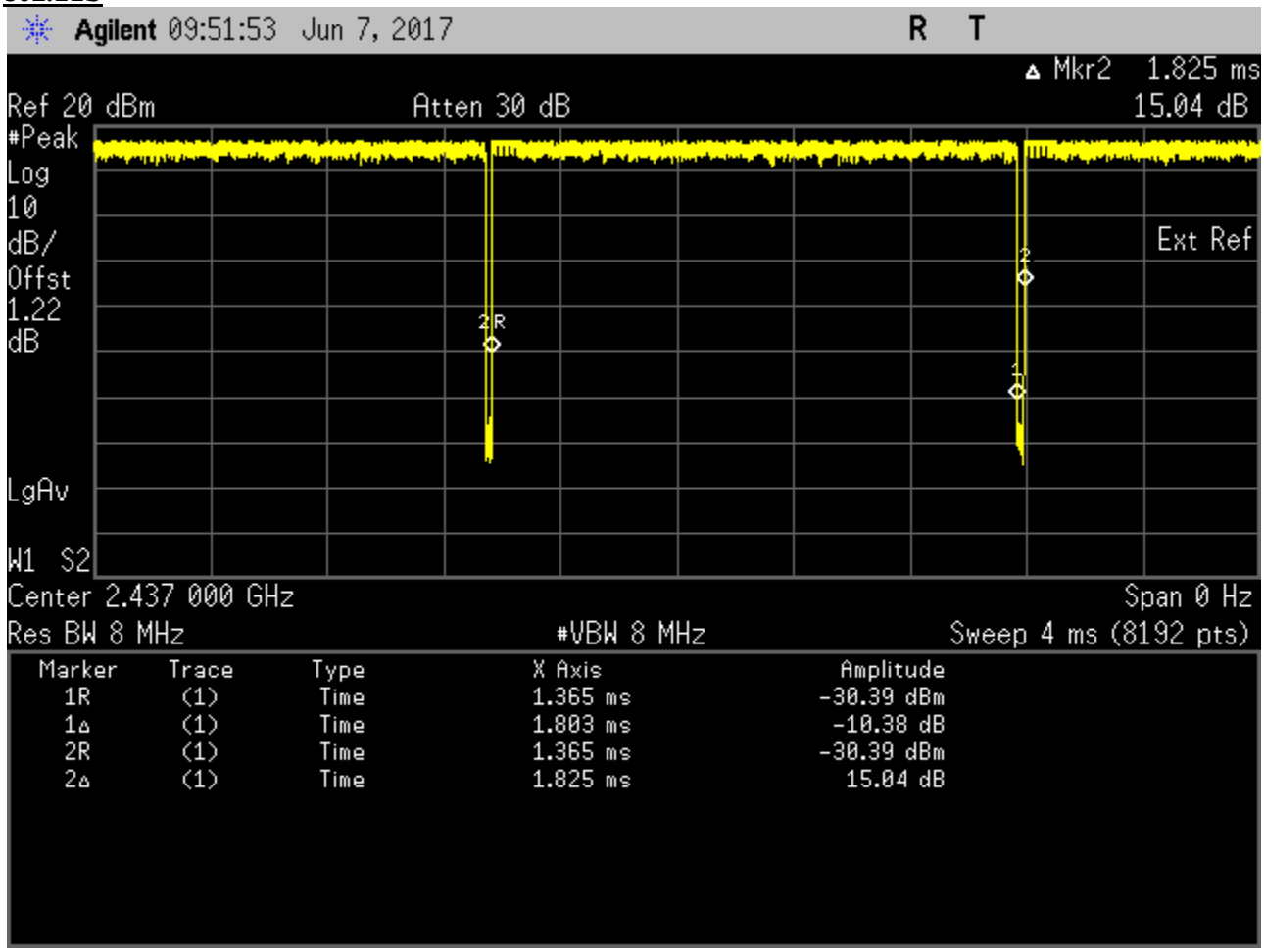
6.3.1 Test Setup



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 ≥ 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.

6.3.2 Test Data

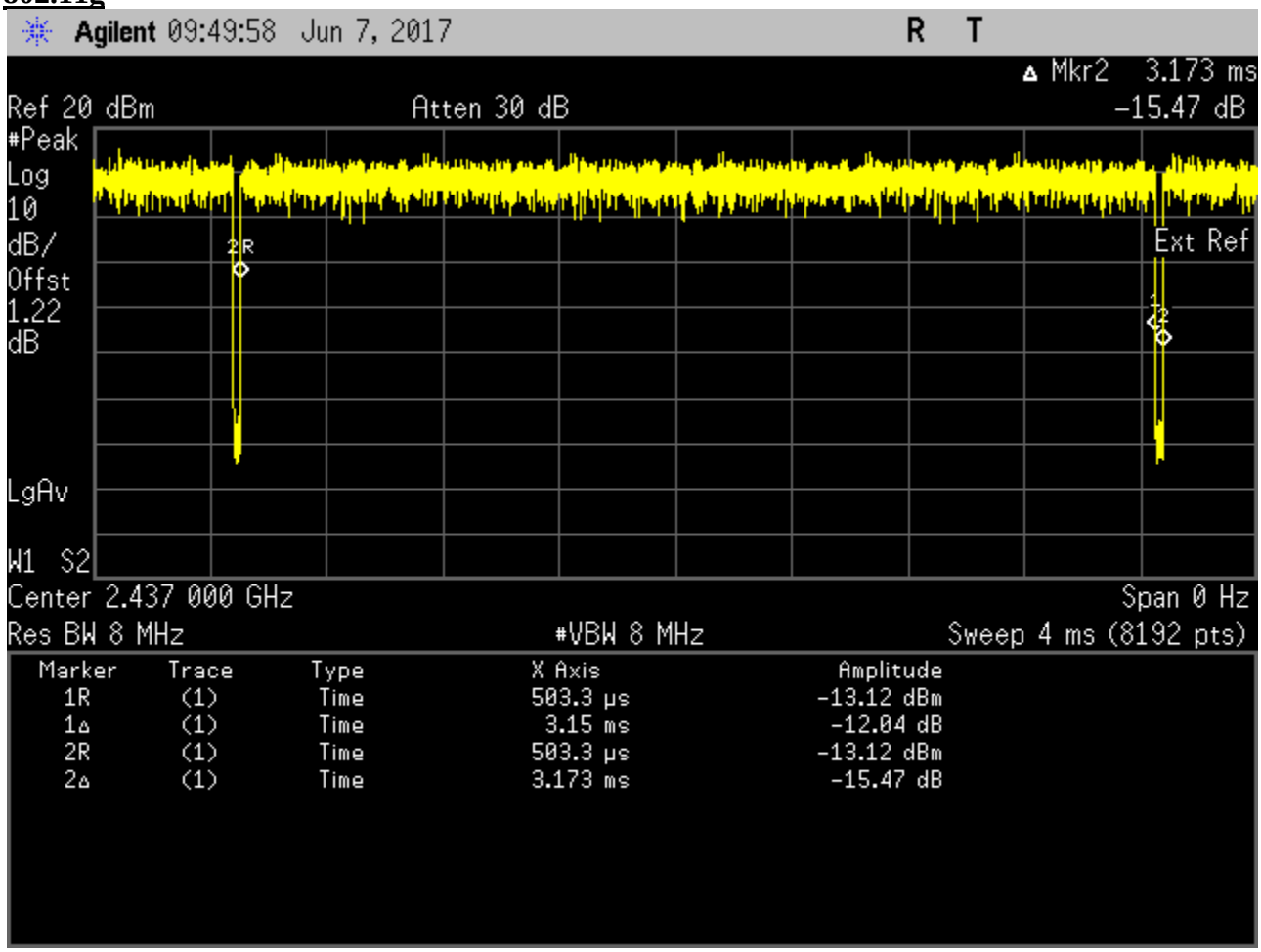
802.11b



On time	1.803	ms
On + off time	1.825	ms
Duty cycle	0.9879	
Duty Cycle factor	0.053	

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

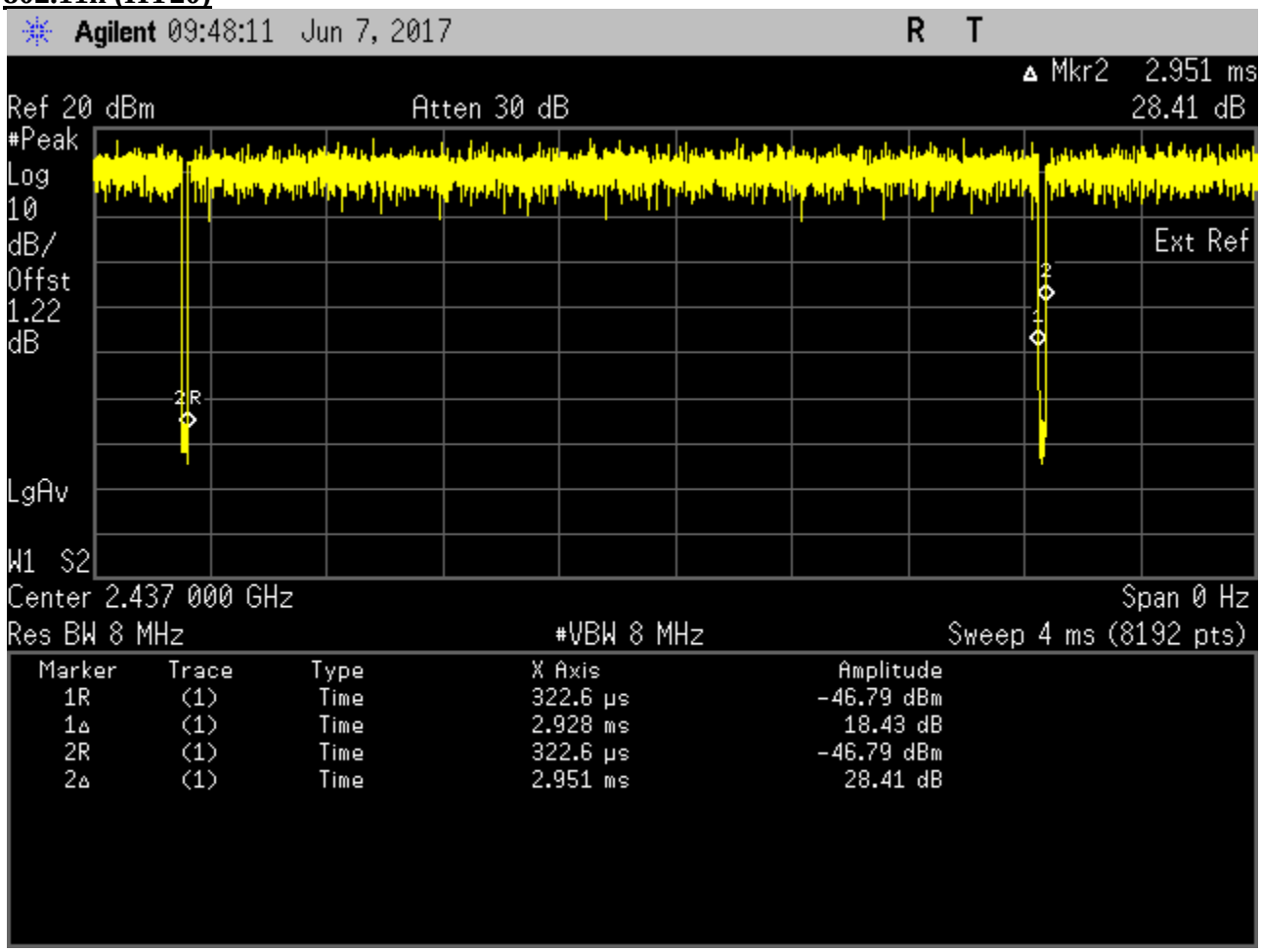
802.11g



On time	3.150	ms
On + off time	3.173	ms
Duty cycle	0.9928	
Duty Cycle factor	0.032	

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

802.11n (HT20)

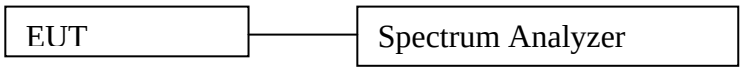


On time	2.928	ms
On + off time	2.951	ms
Duty cycle	0.9922	
Duty Cycle factor	0.034	

*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 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.

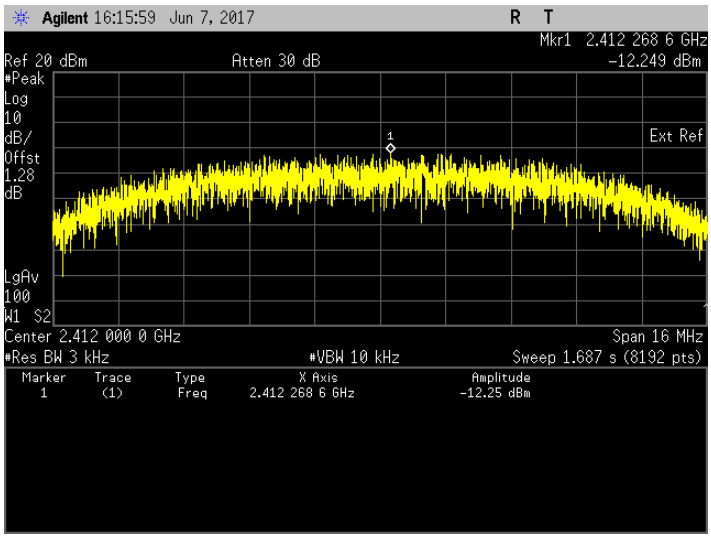
6.4.2 Test Limits:

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

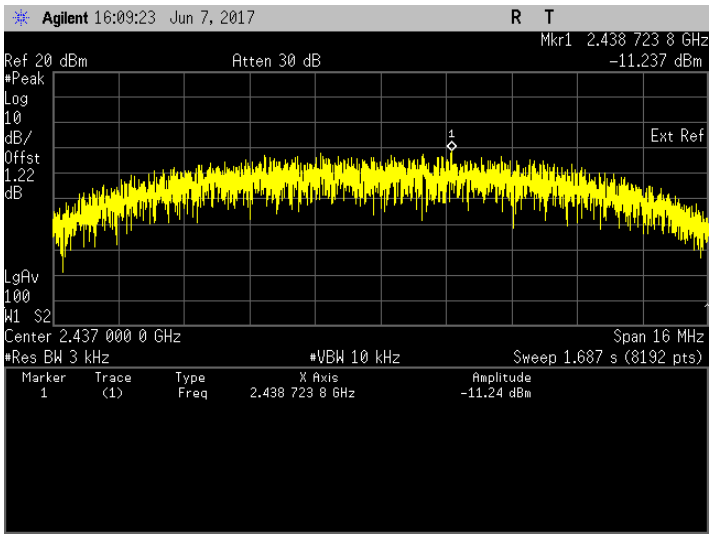
6.4.3 Test Result

802.11b

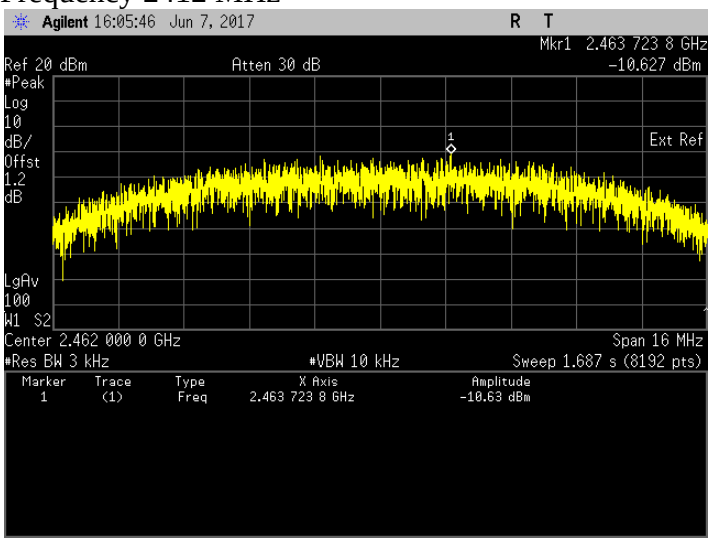
Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Power (dBm/3kHz)	Status
802.11b	DSSS	QPSK	11	2412	-12.249	Pass
802.11b	DSSS	QPSK	11	2437	-11.237	Pass
802.11b	DSSS	QPSK	11	2462	-10.627	Pass



Maximum Power Spectral Density. 802.11b
Frequency 2412 MHz



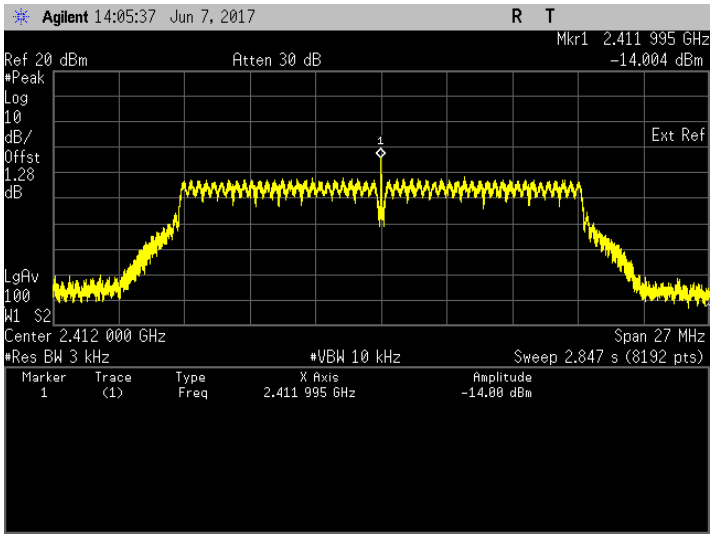
Maximum Power Spectral Density. 802.11b
Frequency 2437 MHz

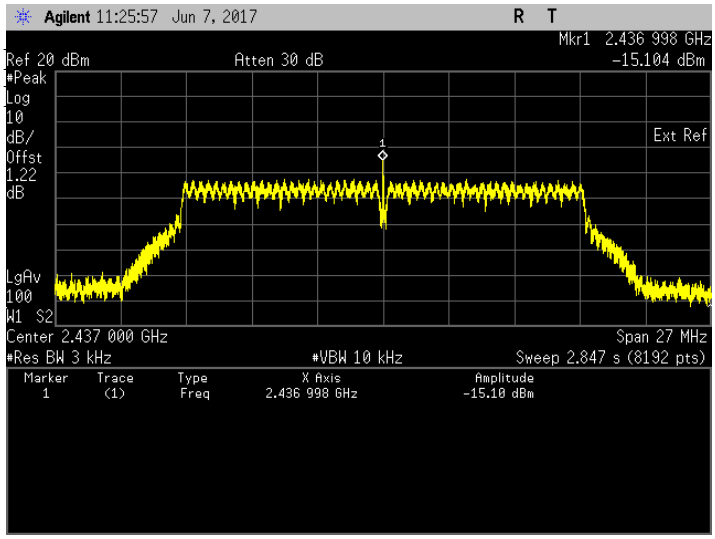


Maximum Power Spectral Density. 802.11b
Frequency 2462 MHz

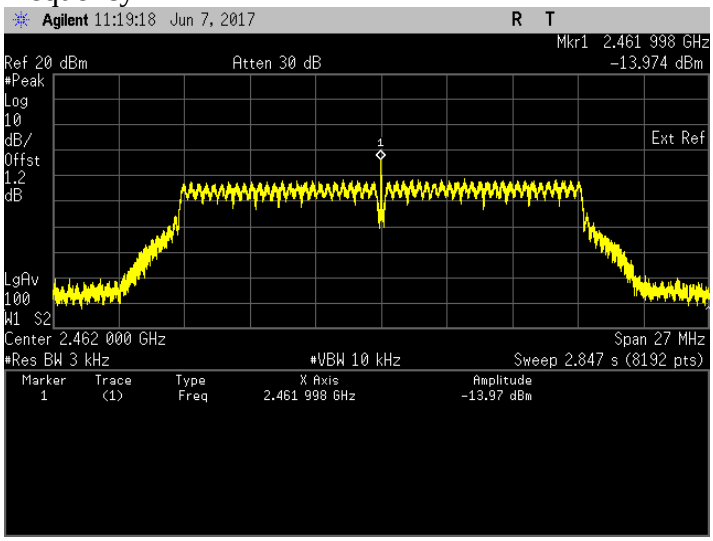
802.11g

Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Power (dBm/3kHz)	Status
802.11g	OFDM	BPSK	6	2412	-14.004	Pass
802.11g	OFDM	BPSK	6	2437	-15.104	Pass
802.11g	OFDM	BPSK	6	2462	-13.974	Pass





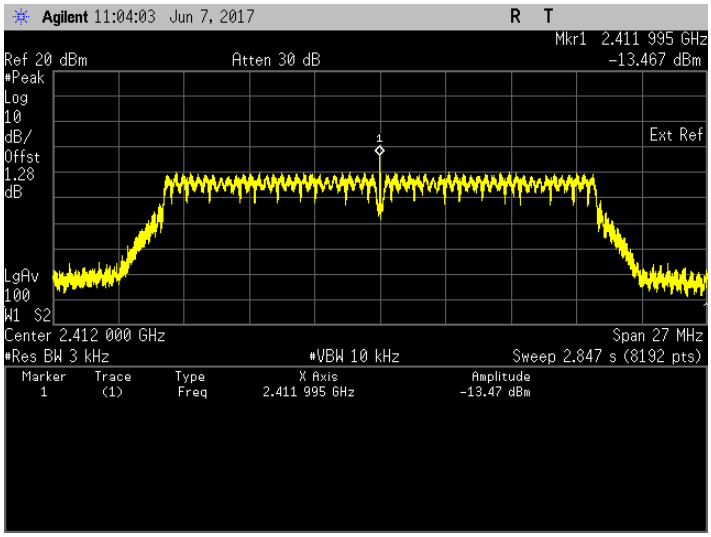
Maximum Power Spectral Density. 802.11g
Frequency 2412 MHz



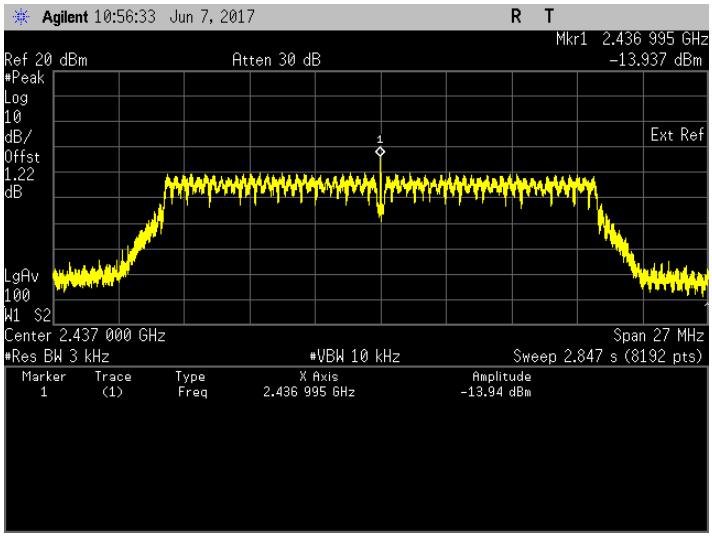
Maximum Power Spectral Density. 802.11g
Frequency 2462 MHz

802.11n (HT20)

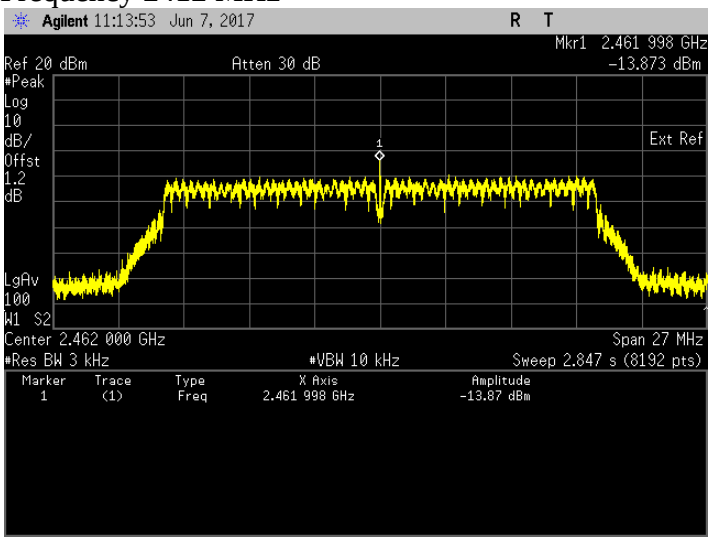
Test Conditions					Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Power (dBm/3kHz)	Status
802.11n	OFDM	BPSK	6.5	2412	-13.467	Pass
802.11n	OFDM	BPSK	6.5	2437	-13.937	Pass
802.11n	OFDM	BPSK	6.5	2462	-13.873	Pass



Maximum Power Spectral Density. 802.11n
Frequency 2412 MHz



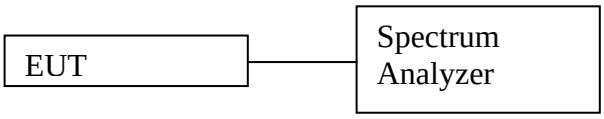
Maximum Power Spectral Density. 802.11n
Frequency 2437 MHz



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 10th harmonic.

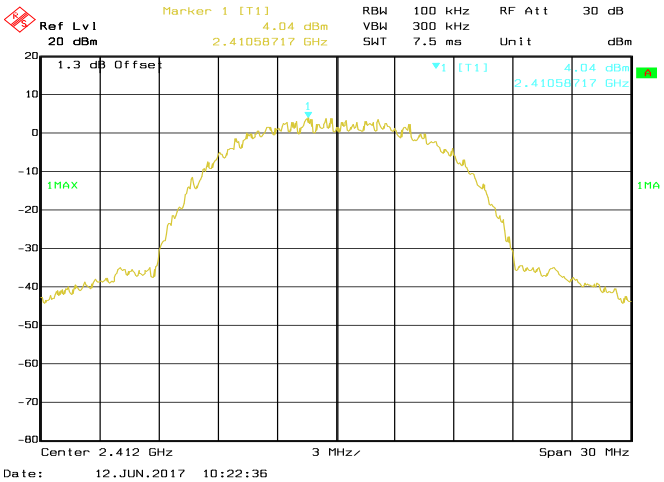
6.5.2 Test Limits:

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

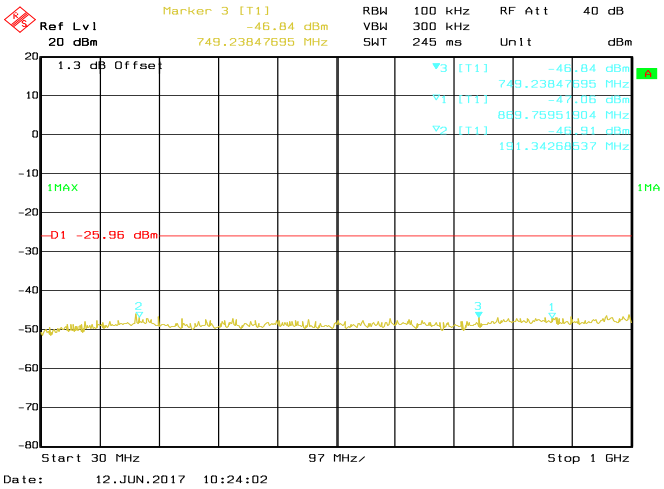
6.5.3 Test Result

802.11b

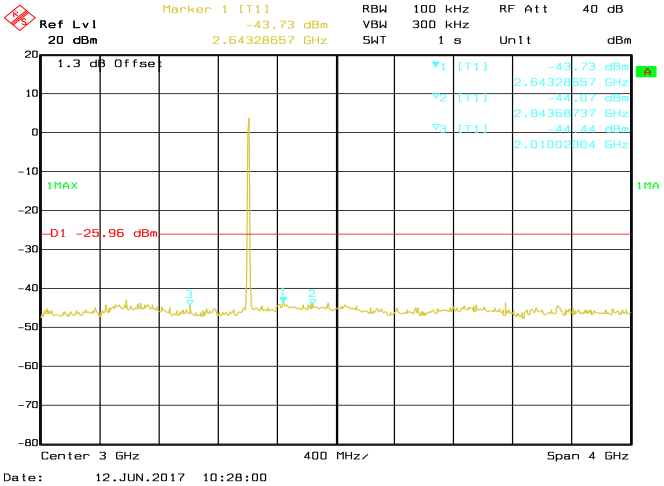
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11b	DSSS	QPSK	2	2412	6993.99	-40.62	Pass
					14198.38	-39.31	Pass
					15671.34	-41.23	Pass
802.11b	DSSS	QPSK	2	2437	6993.99	-40.37	Pass
					14188.38	-40.20	Pass
					15671.34	-41.83	Pass
802.11b	DSSS	QPSK	2	2462	6993.99	-40.27	Pass
					14188.38	-40.11	Pass
					15671.34	-41.73	Pass



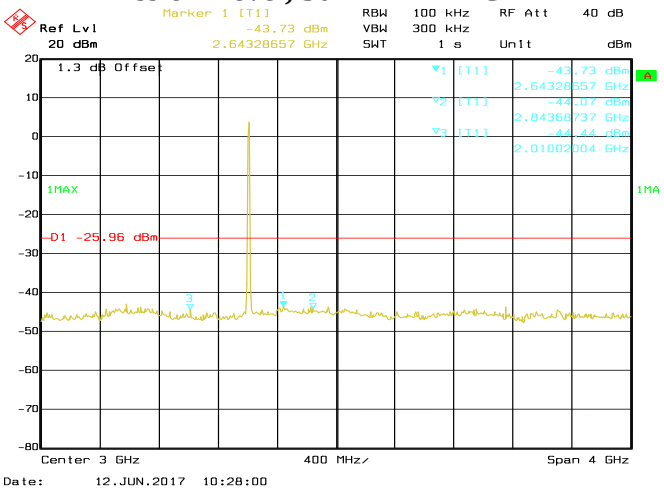
Conducted Emissions. 802.11b, Frequency 2412 MHz Reference Level



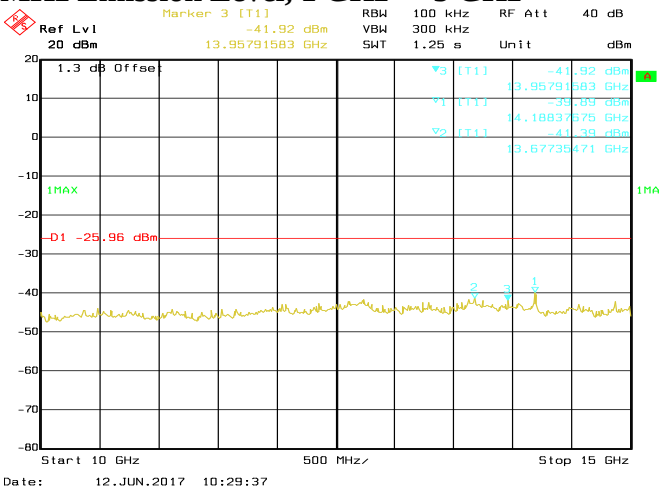
Conducted Emissions. 802.11b, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



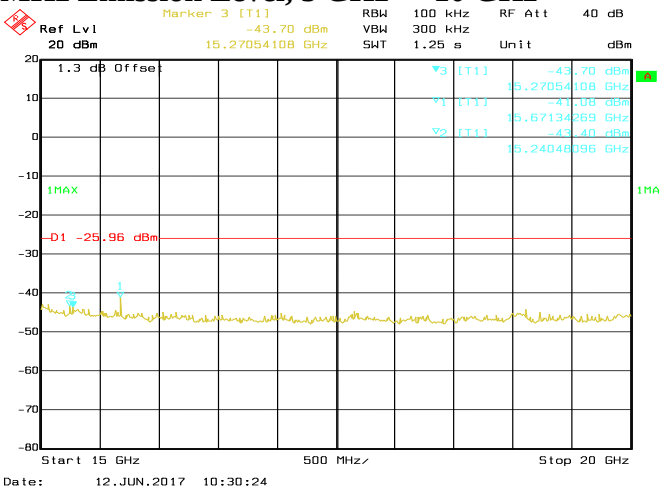
Conducted Emissions. 802.11b, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



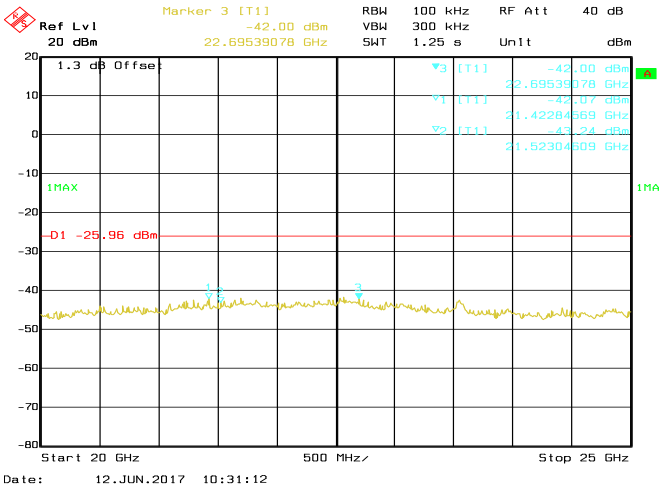
Conducted Emissions. 802.11b, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



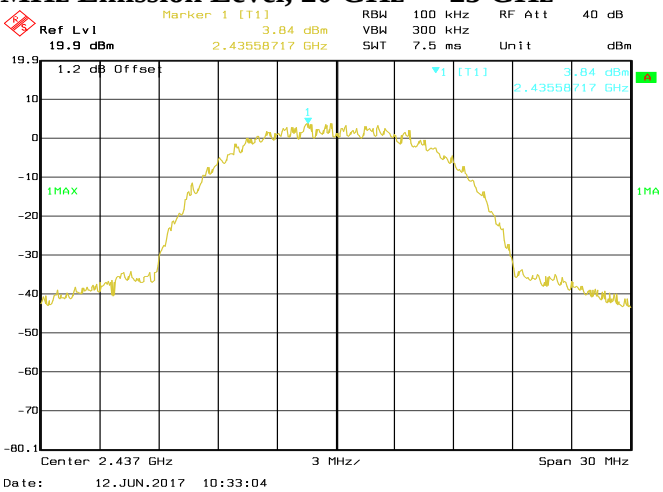
Conducted Emissions. 802.11b, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



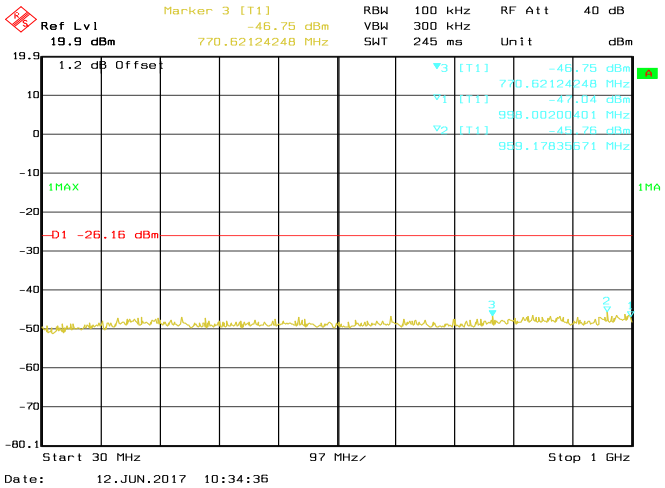
Conducted Emissions. 802.11b, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



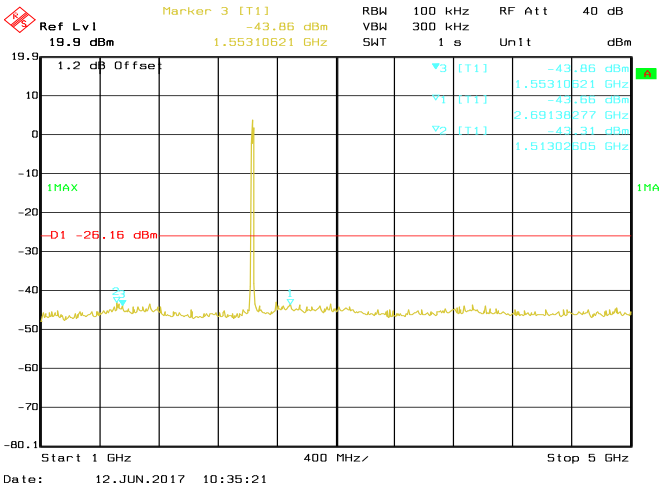
Conducted Emissions. 802.11b, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



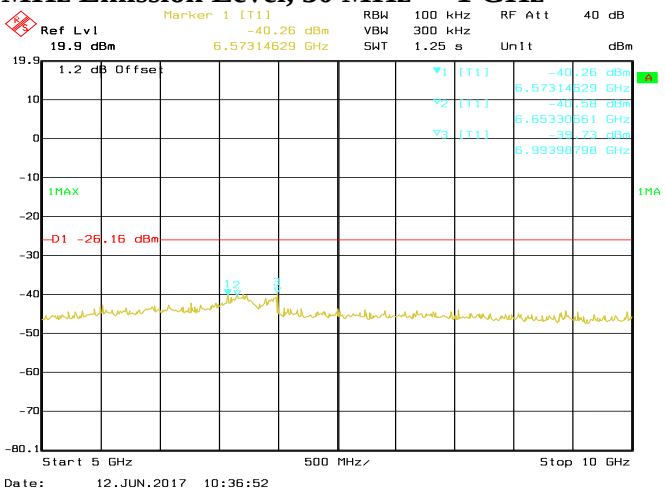
Conducted Emissions. 802.11b, Frequency 2437 MHz Reference Level



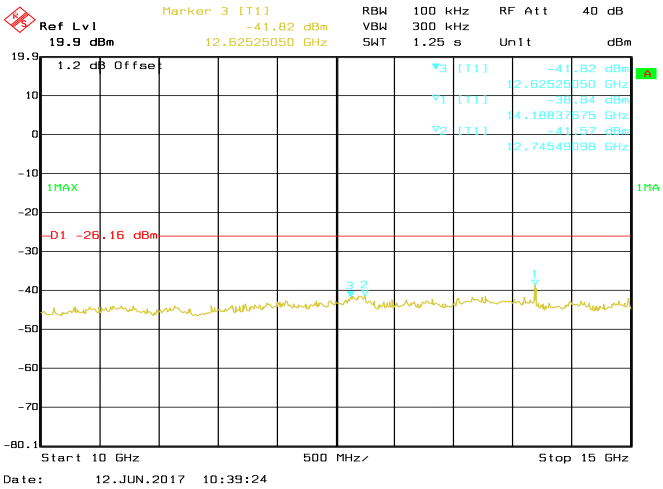
Conducted Emissions. 802.11b, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



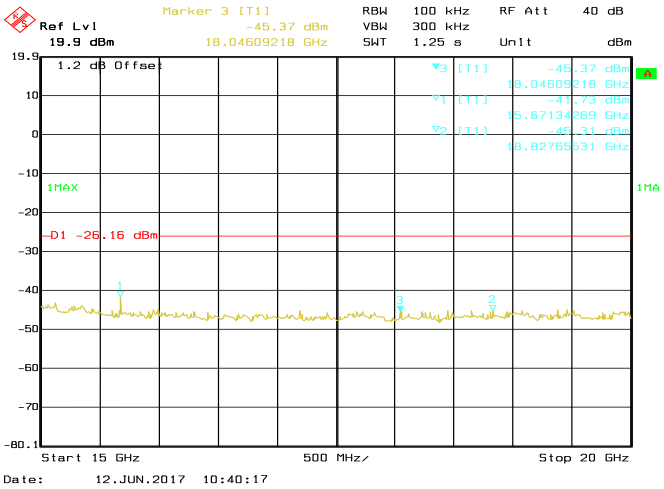
Conducted Emissions. 802.11b, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



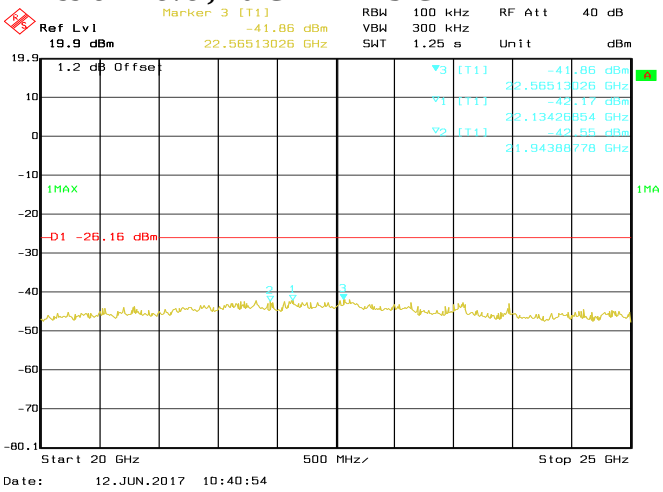
Conducted Emissions. 802.11b, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



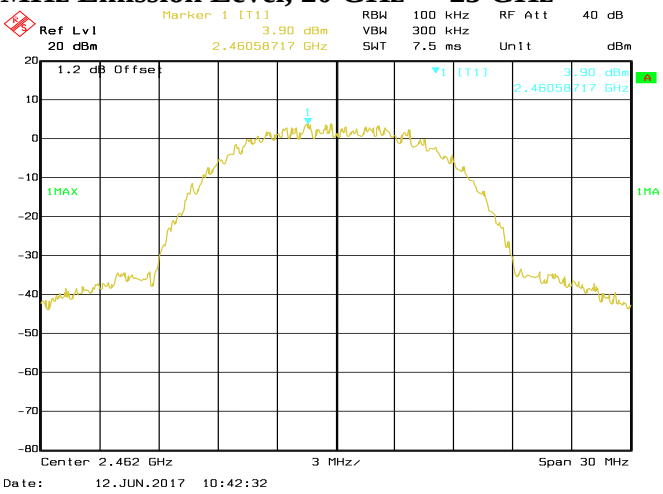
Conducted Emissions. 802.11b, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



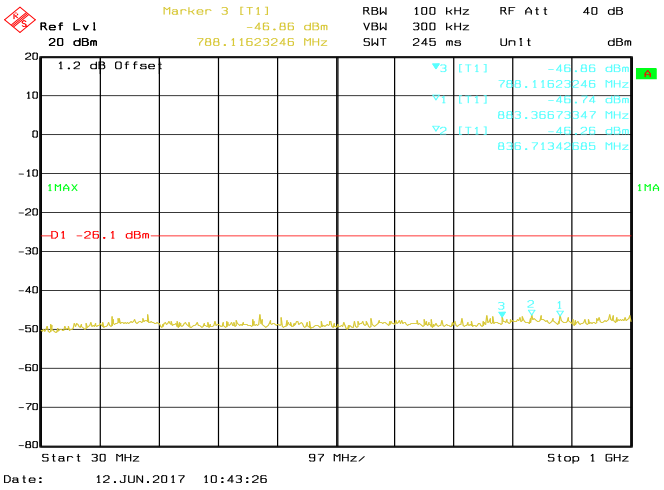
Conducted Emissions. 802.11b, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



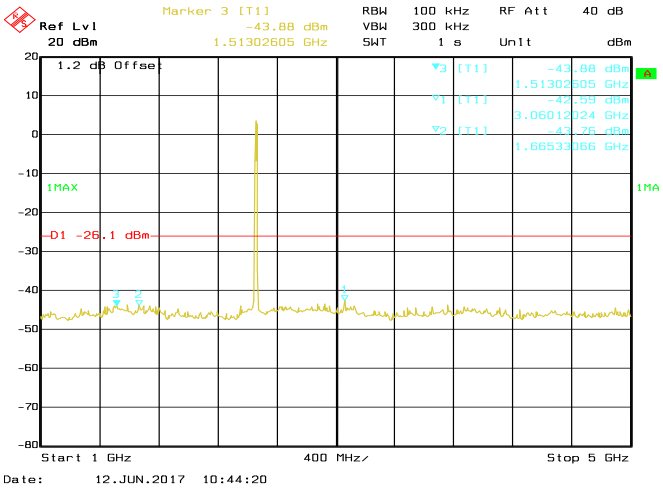
Conducted Emissions. 802.11b, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



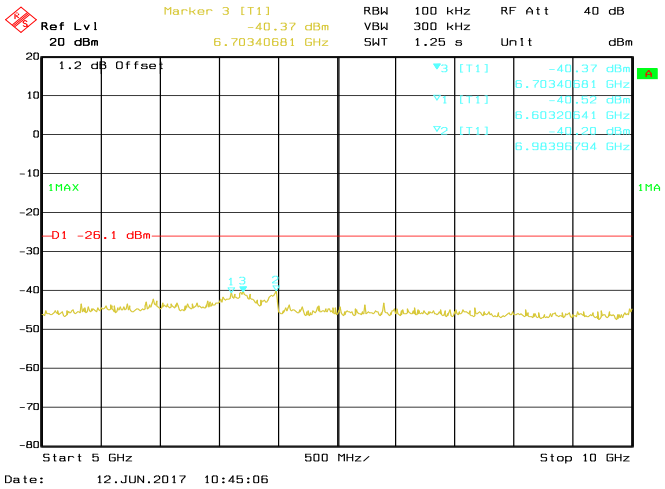
Conducted Emissions. 802.11b, Frequency 2462 MHz Reference Level



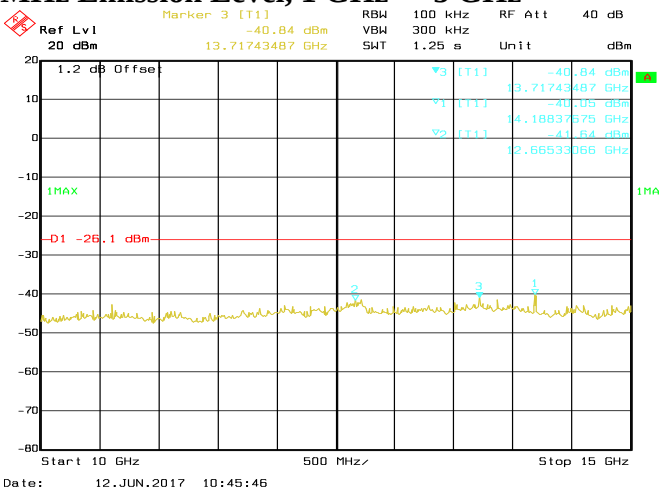
Conducted Emissions. 802.11b, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



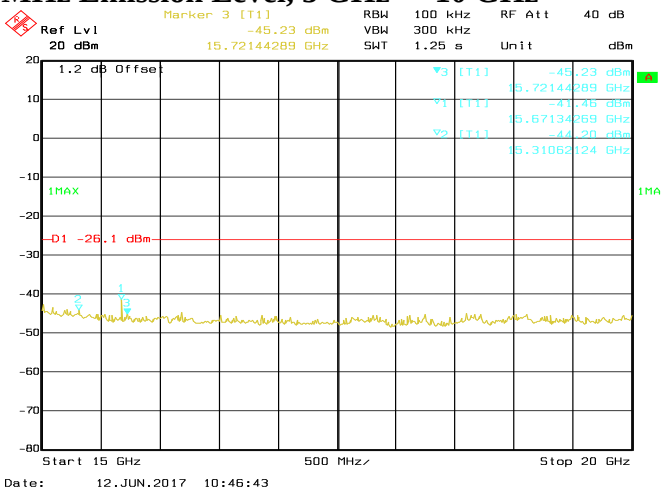
Conducted Emissions. 802.11b, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



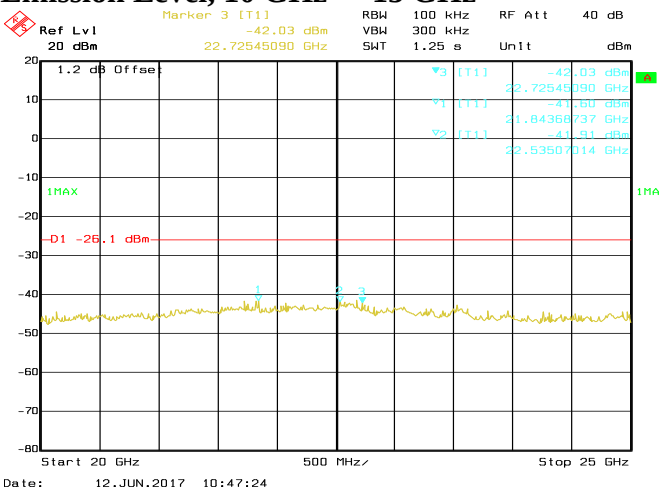
Conducted Emissions. 802.11b, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



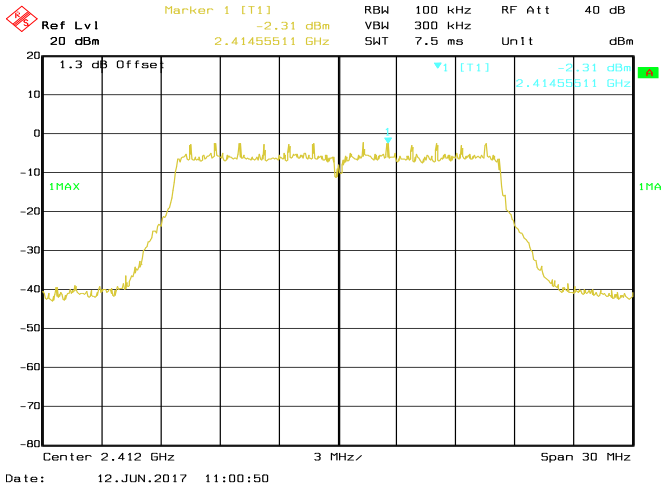
Conducted Emissions. 802.11b, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



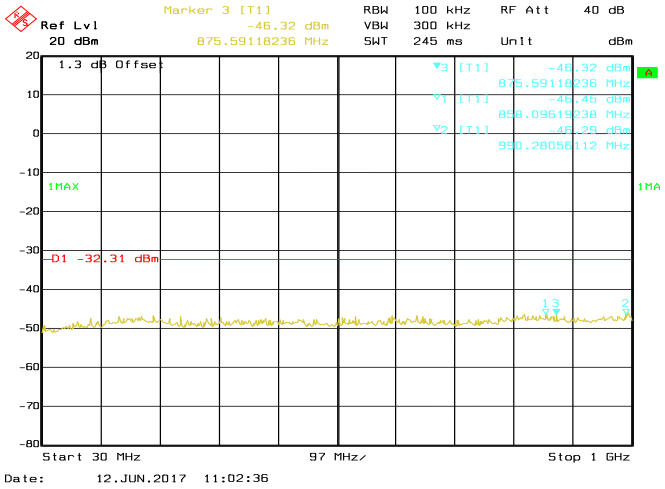
Conducted Emissions. 802.11b, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

802.11g

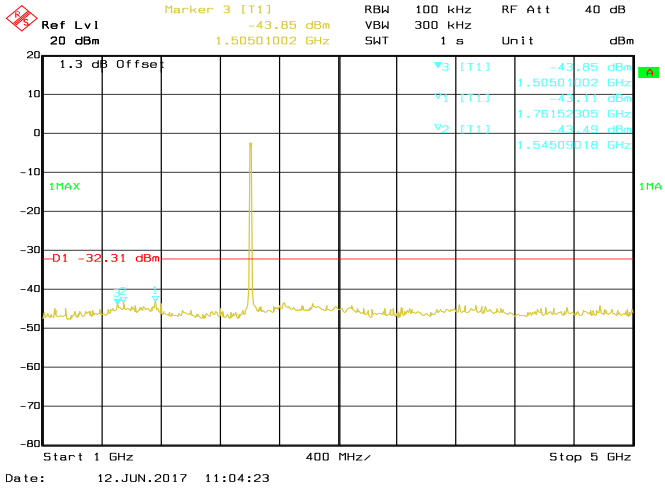
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11g	OFDM	DBPSK	6	2412	6723.45	-50.98	Pass
					14188.38	-49.70	Pass
					15671.34	-51.26	Pass
802.11g	OFDM	DBPSK	6	2437	6633.27	-50.60	Pass
					14188.38	-49.62	Pass
					1567134	-51.36	Pass
802.11g	OFDM	DBPSK	6	2462	6693.38	-49.57	Pass
					14188.38	-49.31	Pass
					15671.34	-51.67	Pass



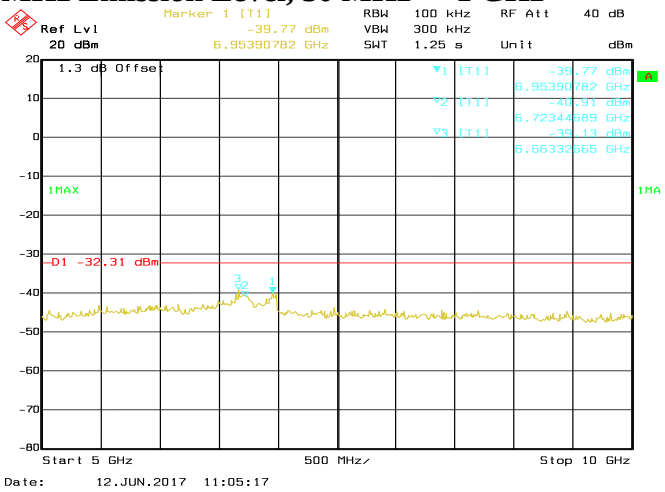
Conducted Emissions. 802.11g, Frequency 2412 MHz Reference Level



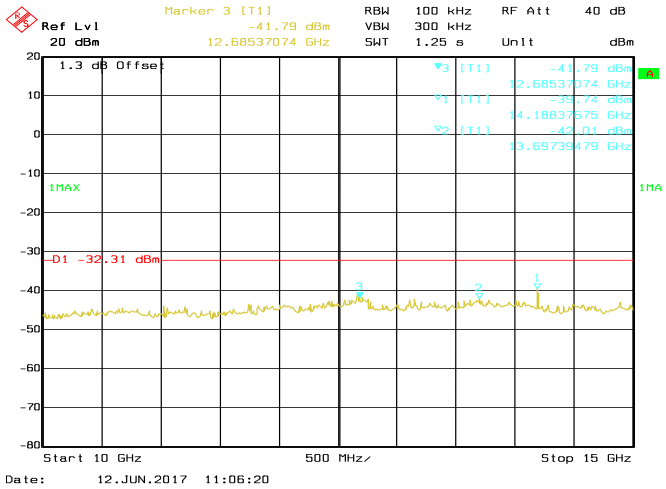
Conducted Emissions. 802.11g, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



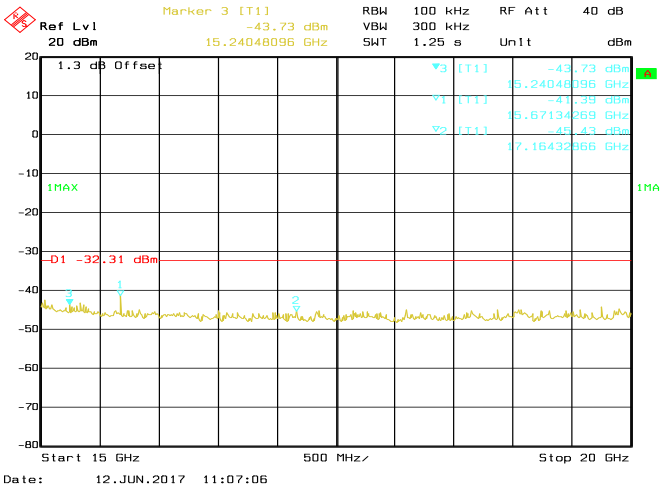
Conducted Emissions. 802.11g, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



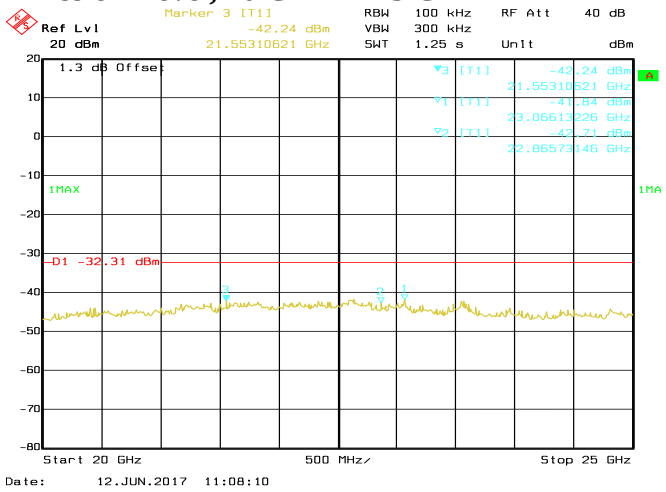
Conducted Emissions. 802.11g, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



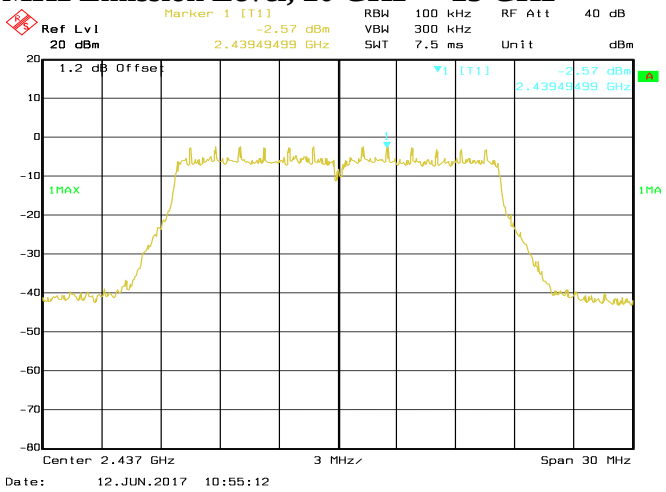
Conducted Emissions. 802.11g, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



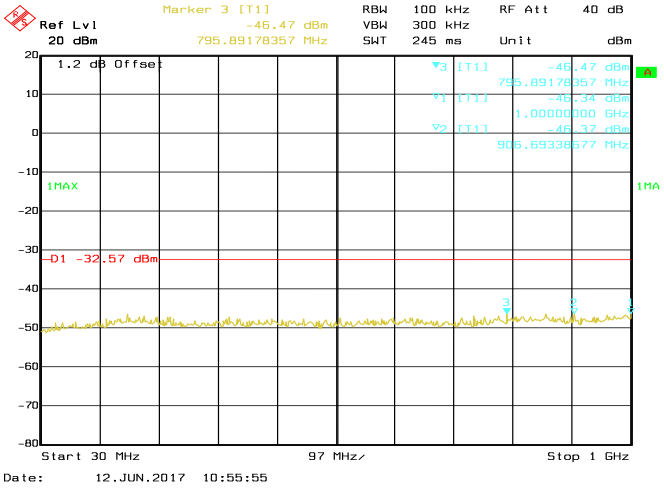
Conducted Emissions. 802.11g, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



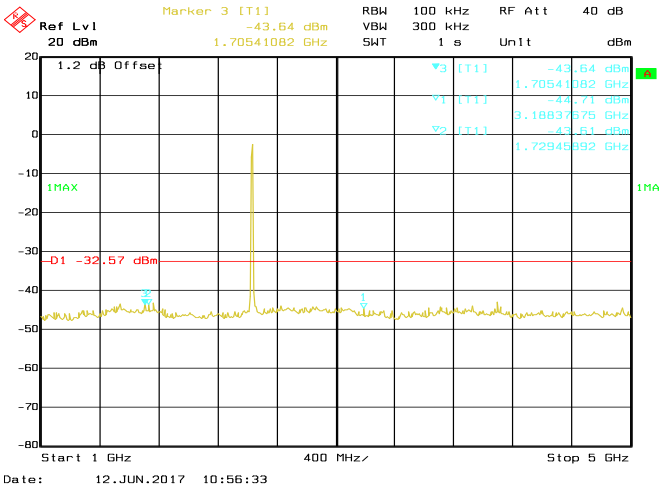
Conducted Emissions. 802.11g, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



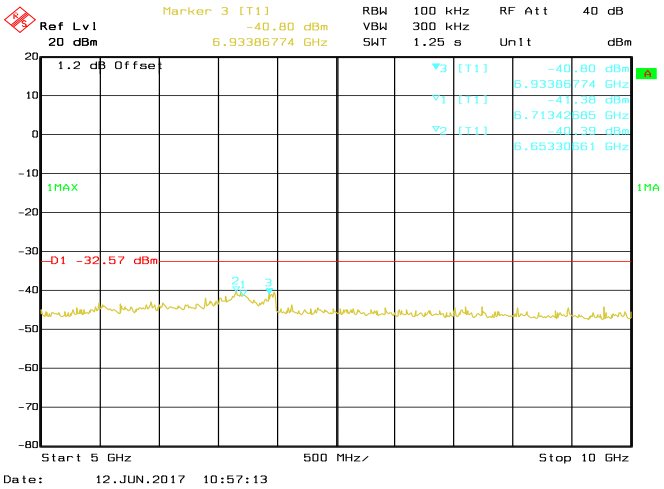
Conducted Emissions. 802.11g, Frequency 2437 MHz Reference Level



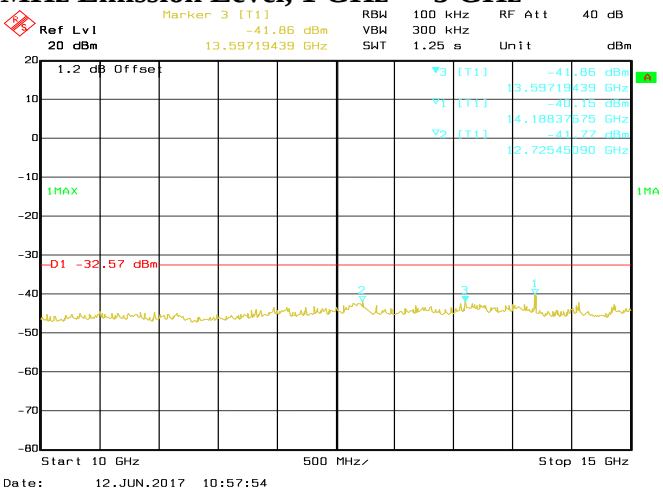
Conducted Emissions. 802.11g, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



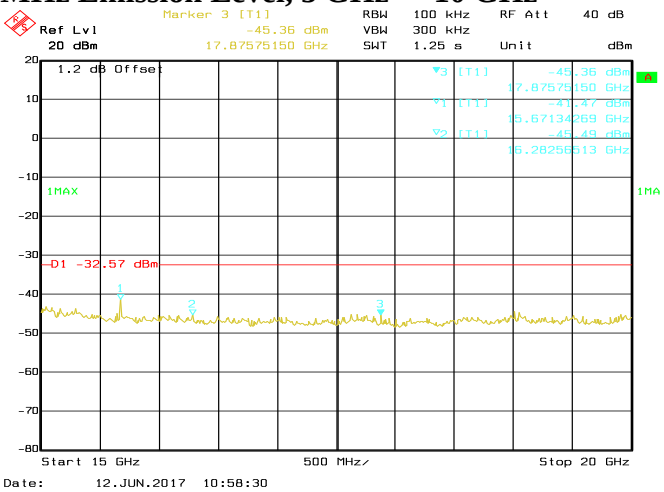
Conducted Emissions. 802.11g, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



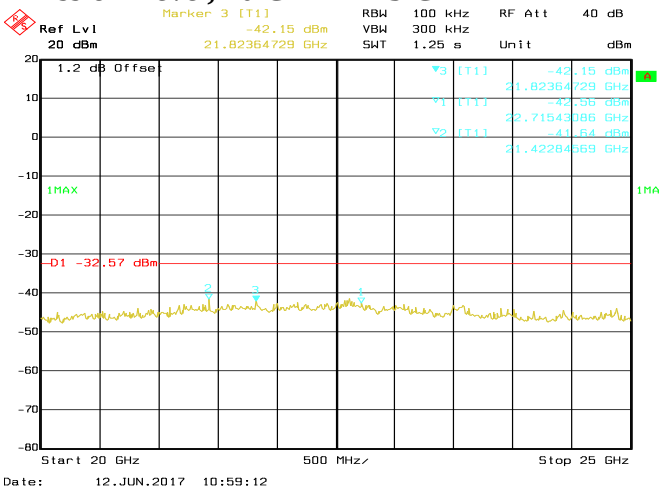
Conducted Emissions. 802.11g, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



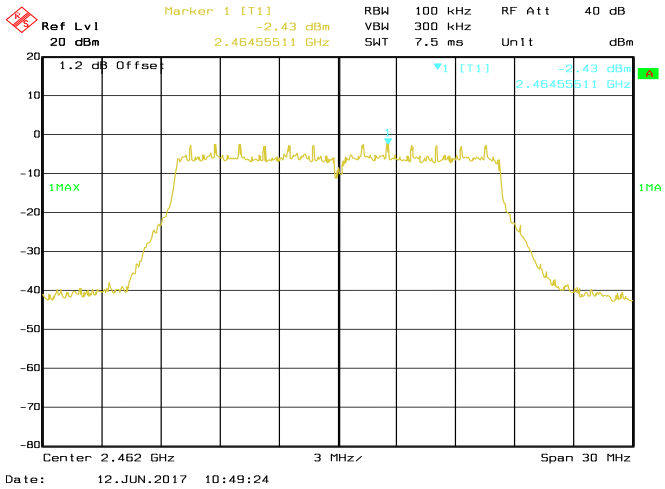
Conducted Emissions. 802.11g, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



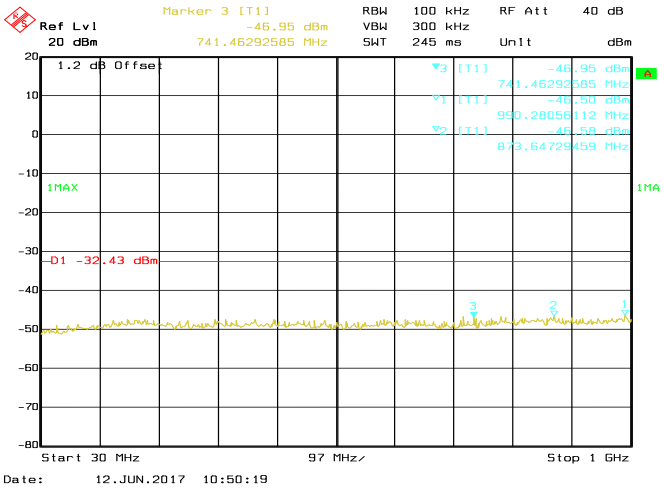
Conducted Emissions. 802.11g, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



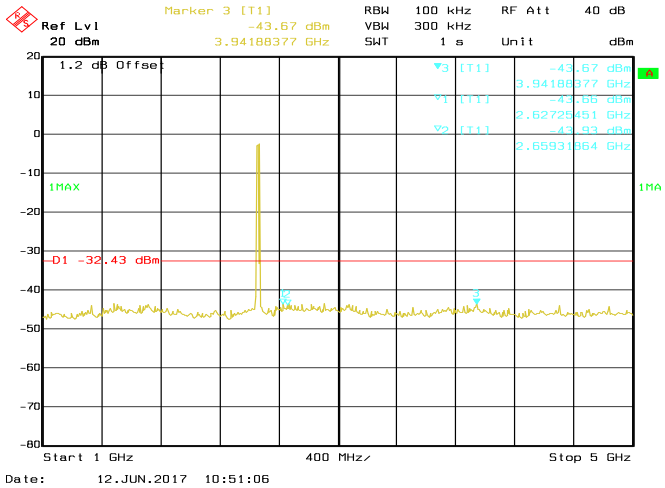
Conducted Emissions. 802.11g, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



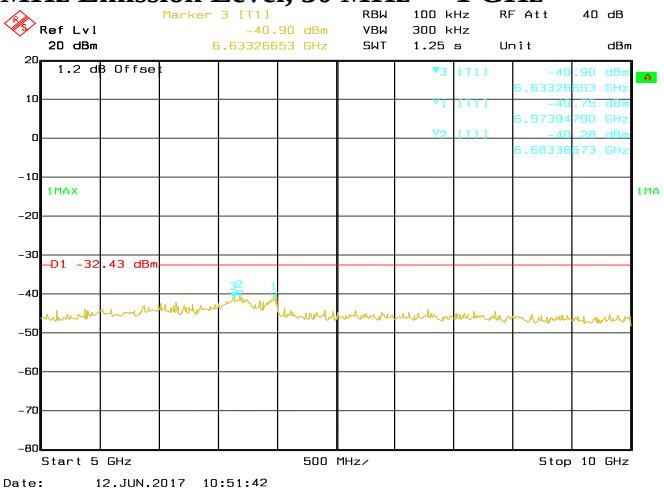
Conducted Emissions. 802.11g, Frequency 2462 MHz Reference Level



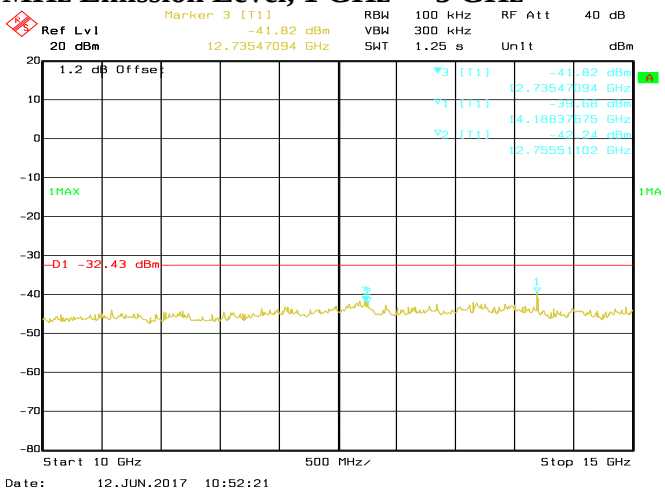
Conducted Emissions. 802.11g, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



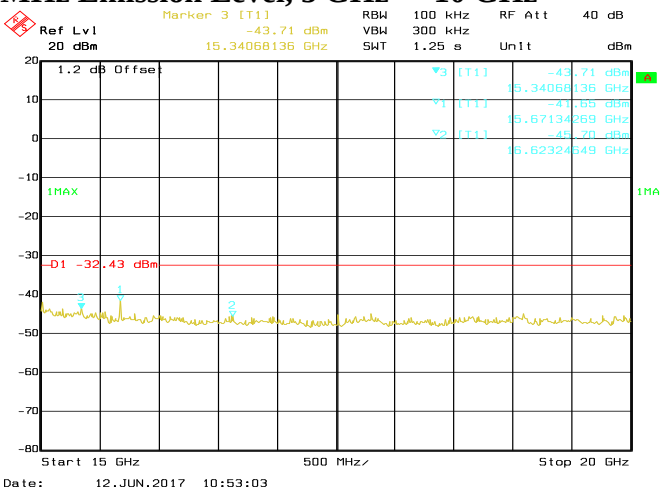
Conducted Emissions. 802.11g, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



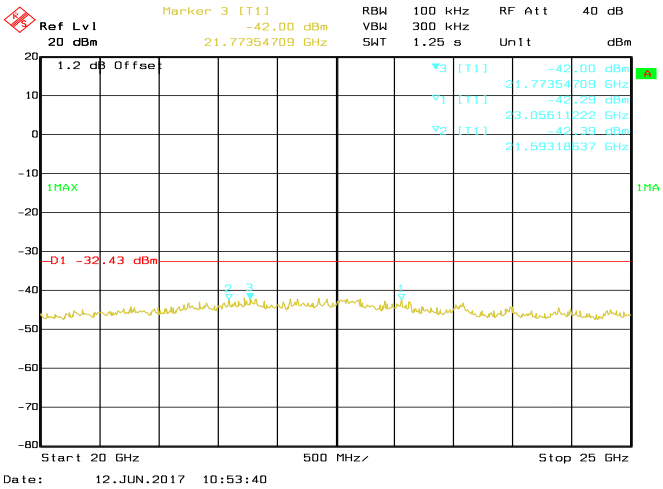
Conducted Emissions. 802.11g, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



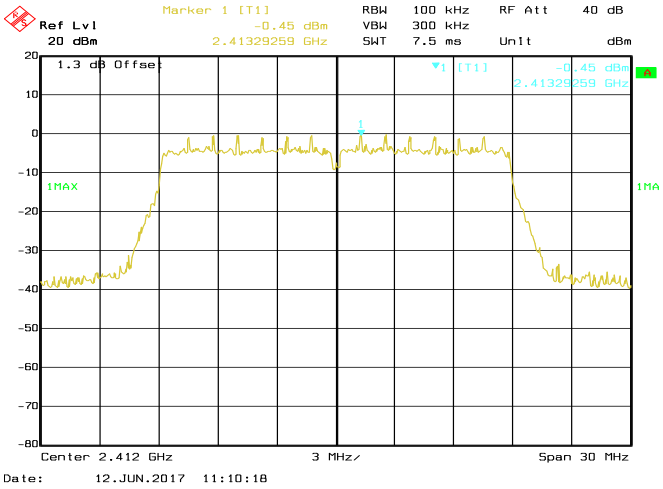
Conducted Emissions. 802.11g, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



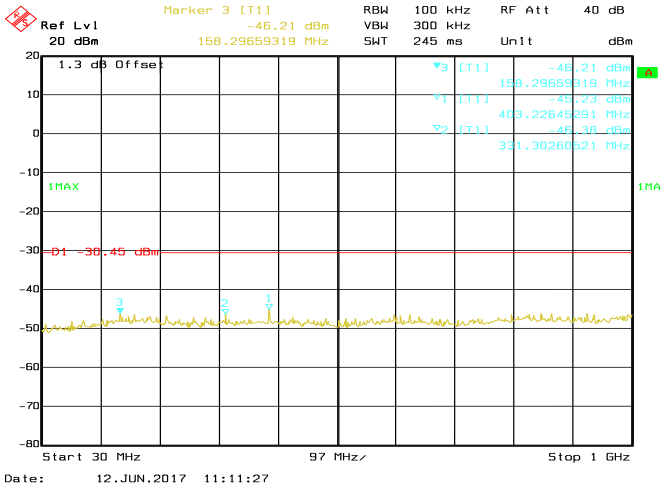
Conducted Emissions. 802.11g, Frequency 2462 MHz Emission Level, 20 GHz -> 25 GHz

802.11n (HT20)

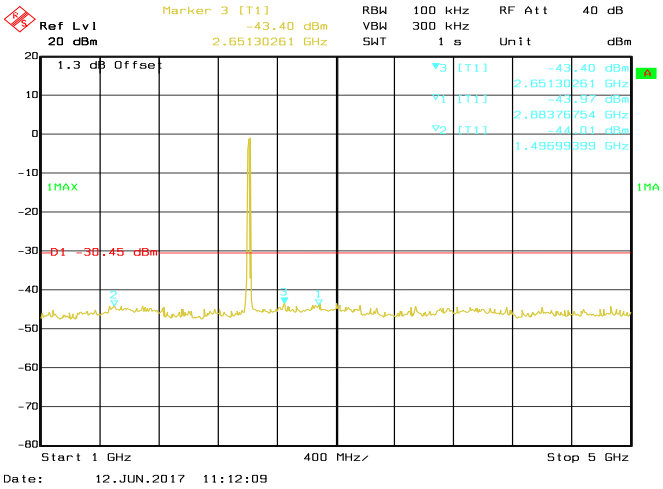
				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
802.11n	OFDM	DBPSK	6.5	2412	6573.15	-50.47	Pass
					14188.38	-49.75	Pass
					15671.34	-51.25	Pass
802.11n	OFDM	DBPSK	6.5	2437	6973.95	-50.72	Pass
					14188.38	-49.58	Pass
					15671.34	-51.75	Pass
802.11n	OFDM	DBPSK	6.5	2462	6663.33	-51.19	Pass
					14188.38	-49.54	Pass
					15671.34	-51.82	Pass



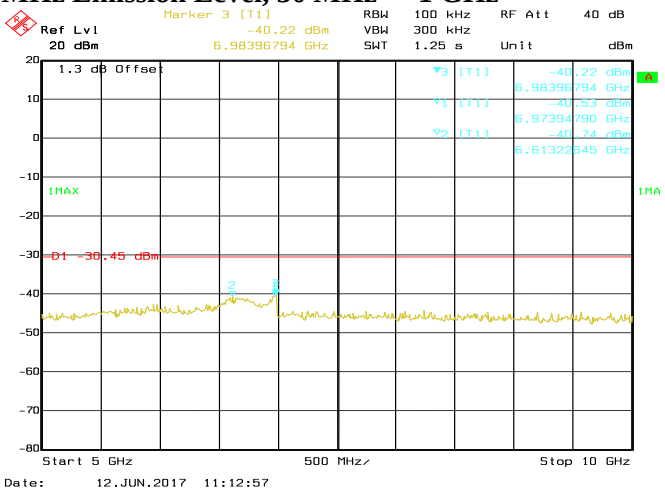
Conducted Emissions. 802.11n, Frequency 2412 MHz Reference Level



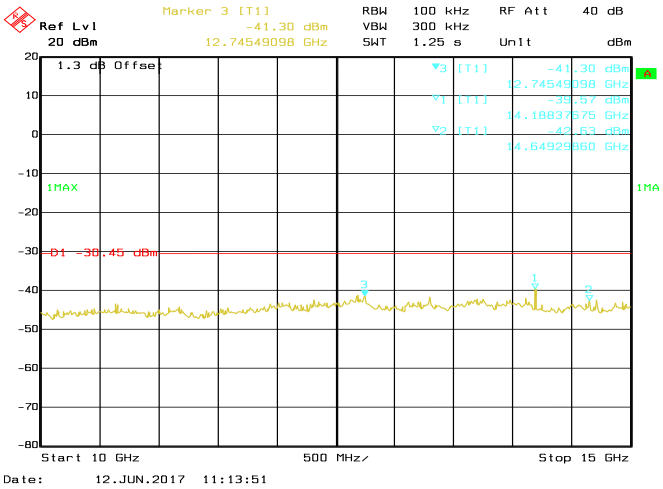
Conducted Emissions. 802.11n, Frequency 2412 MHz Emission Level, 30 MHz -> 1 GHz



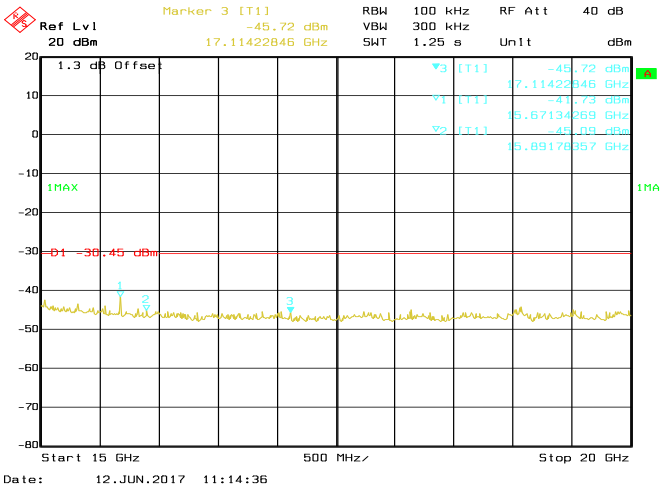
Conducted Emissions. 802.11n, Frequency 2412 MHz Emission Level, 1 GHz -> 5 GHz



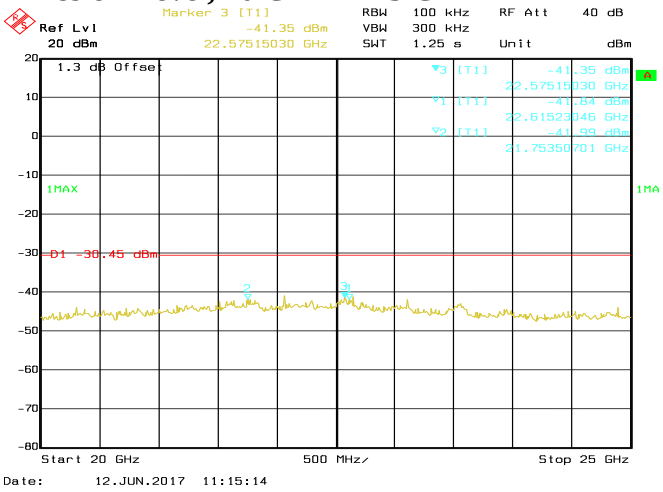
Conducted Emissions. 802.11n, Frequency 2412 MHz Emission Level, 5 GHz -> 10 GHz



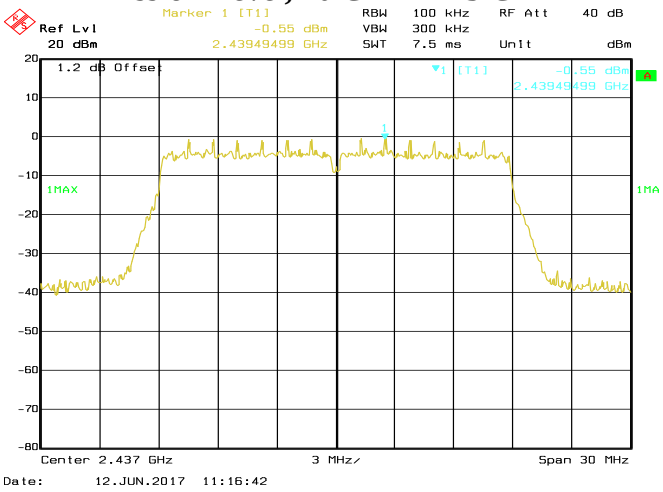
Conducted Emissions. 802.11n, Frequency 2412 Emission Level, 10 GHz -> 15 GHz



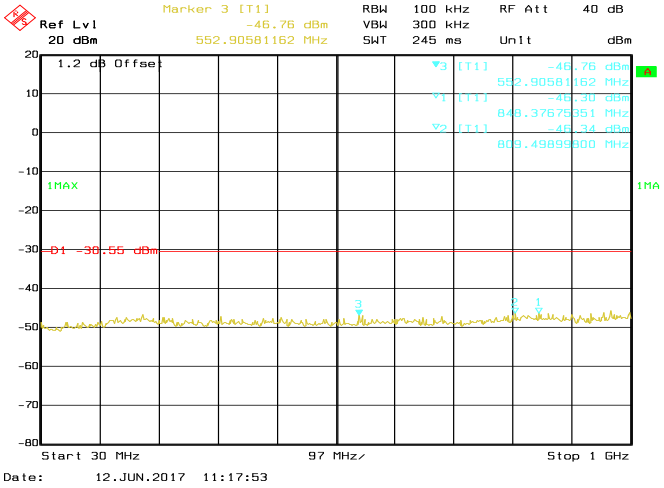
Conducted Emissions. 802.11n, Frequency 2412 MHz Emission Level, 15 GHz -> 20 GHz



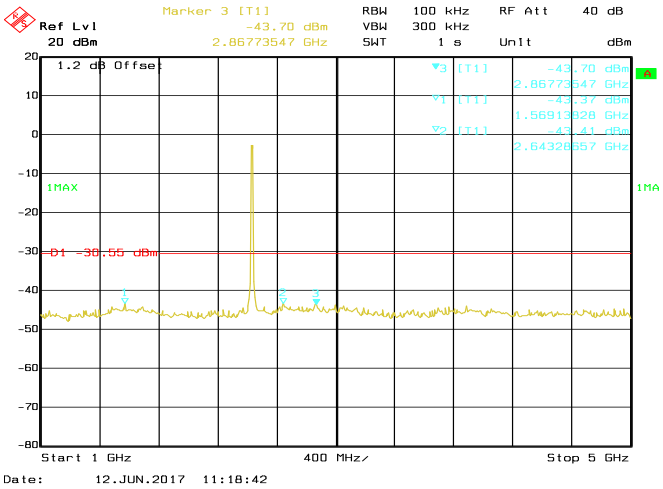
Conducted Emissions. 802.11n, Frequency 2412 MHz Emission Level, 20 GHz -> 25 GHz



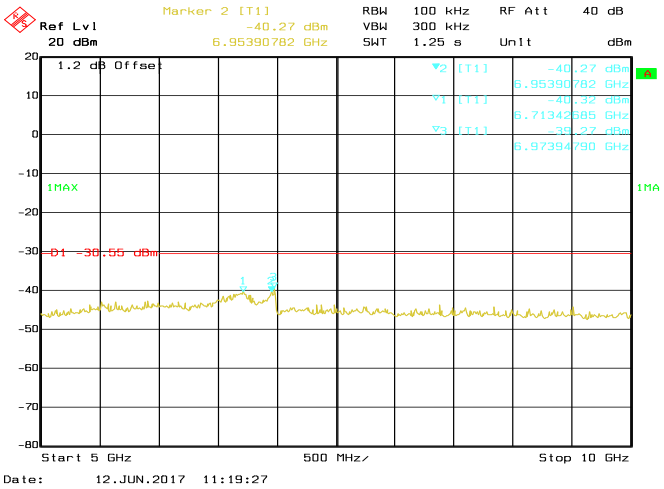
Conducted Emissions. 802.11n, Frequency 2437 MHz Reference Level



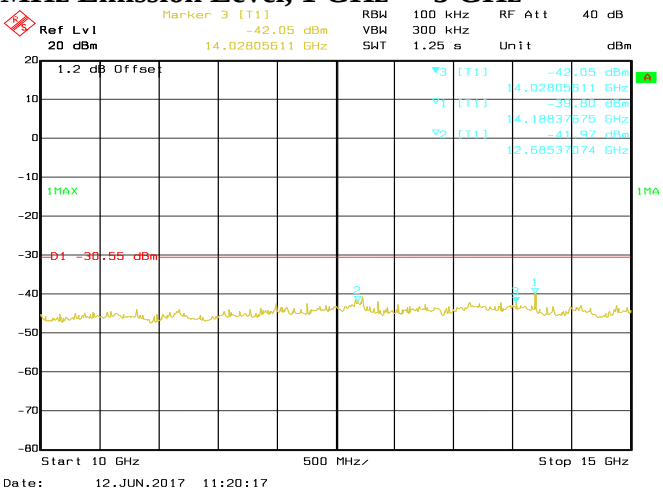
Conducted Emissions. 802.11n, Frequency 2437 MHz Emission Level, 30 MHz -> 1 GHz



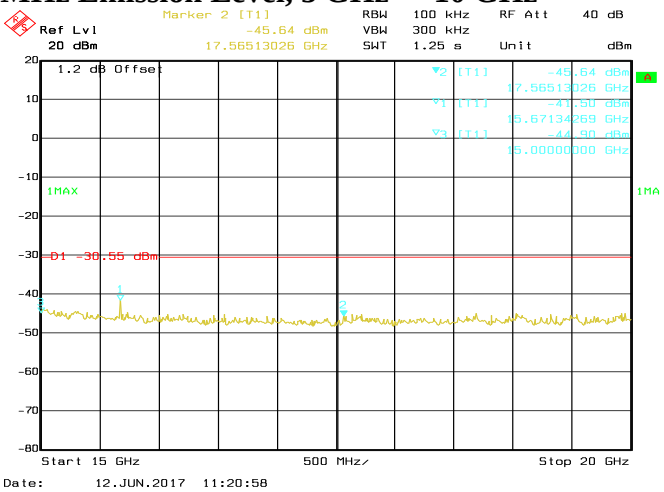
Conducted Emissions. 802.11n, Frequency 2437 MHz Emission Level, 1 GHz -> 5 GHz



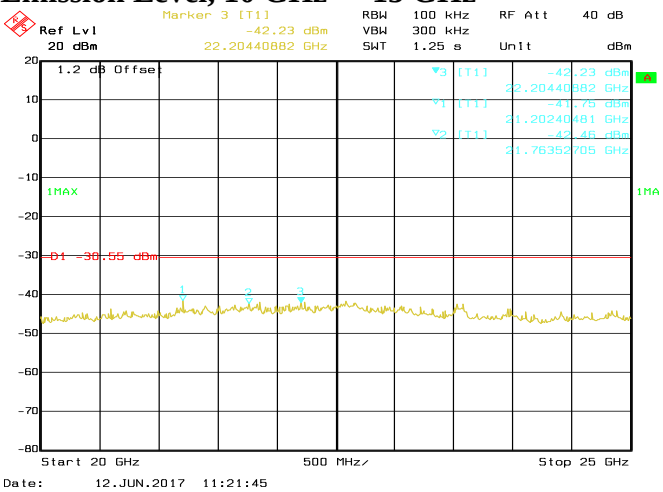
Conducted Emissions. 802.11n, Frequency 2437 MHz Emission Level, 5 GHz -> 10 GHz



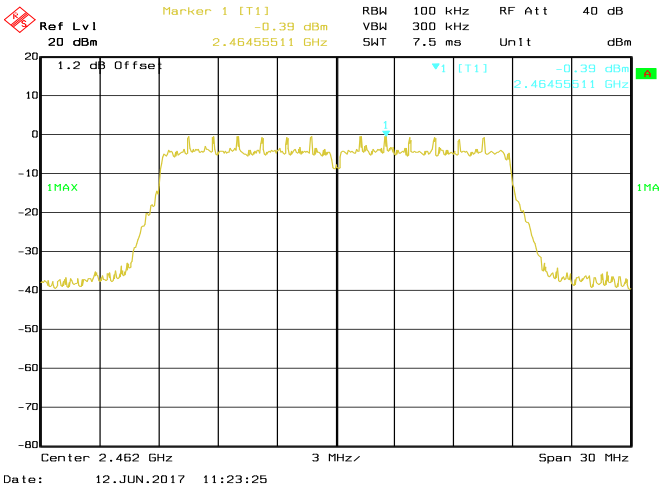
Conducted Emissions. 802.11n, Frequency 2437 Emission Level, 10 GHz -> 15 GHz



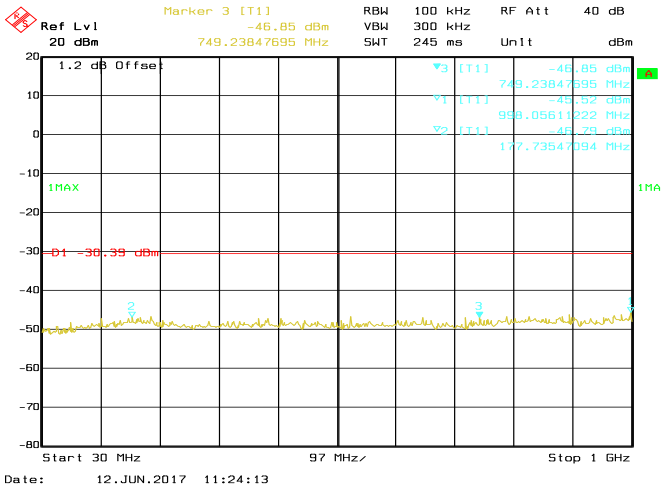
Conducted Emissions. 802.11n, Frequency 2437 MHz Emission Level, 15 GHz -> 20 GHz



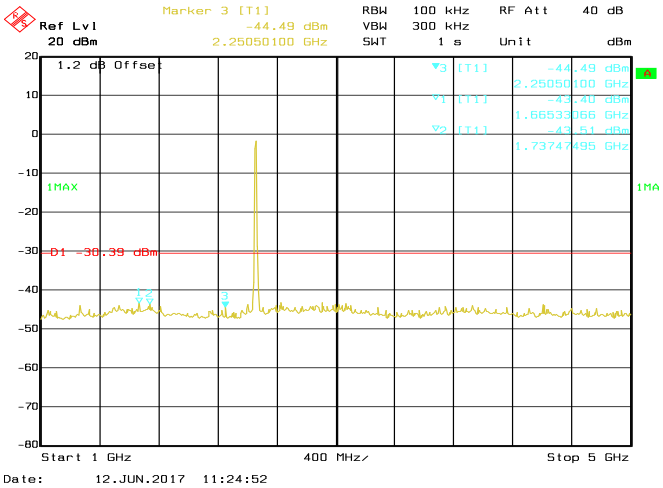
Conducted Emissions. 802.11n, Frequency 2437 MHz Emission Level, 20 GHz -> 25 GHz



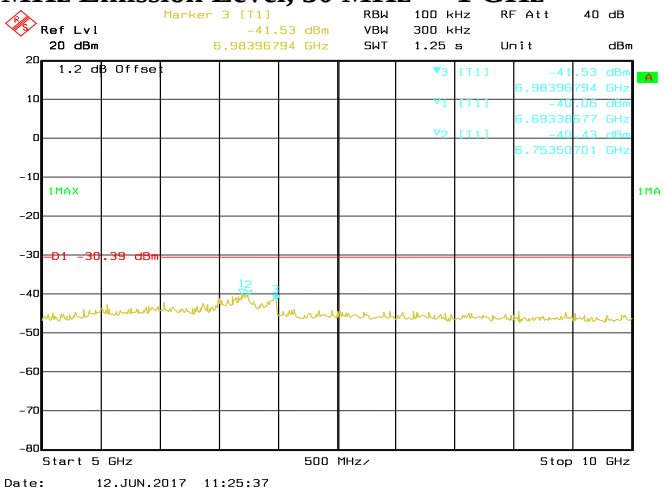
Conducted Emissions. 802.11n, Frequency 2462 MHz Reference Level



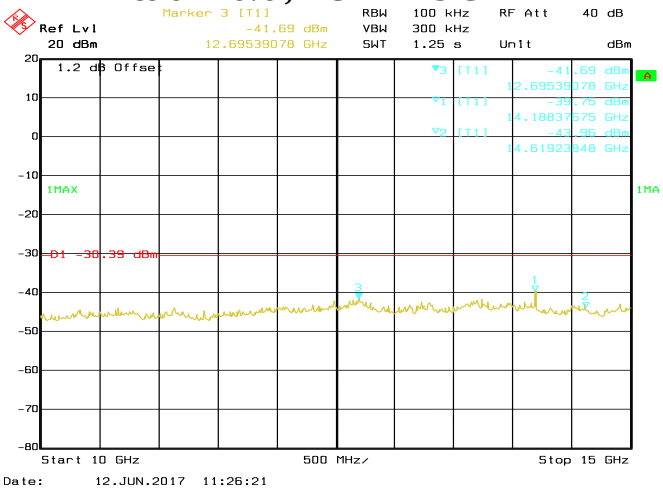
Conducted Emissions. 802.11n, Frequency 2462 MHz Emission Level, 30 MHz -> 1 GHz



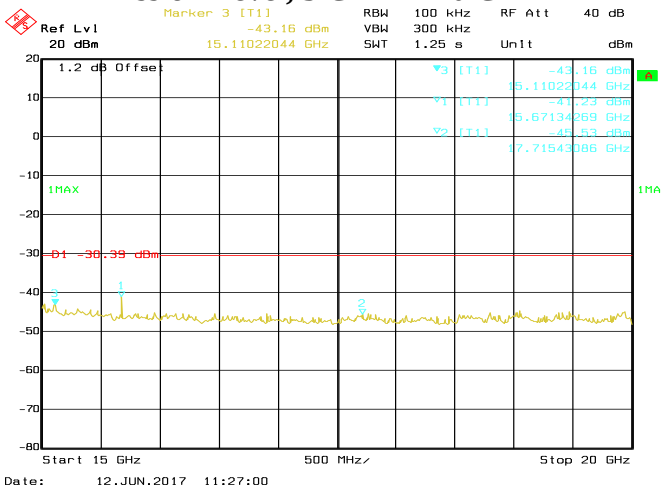
Conducted Emissions. 802.11n, Frequency 2462 MHz Emission Level, 1 GHz -> 5 GHz



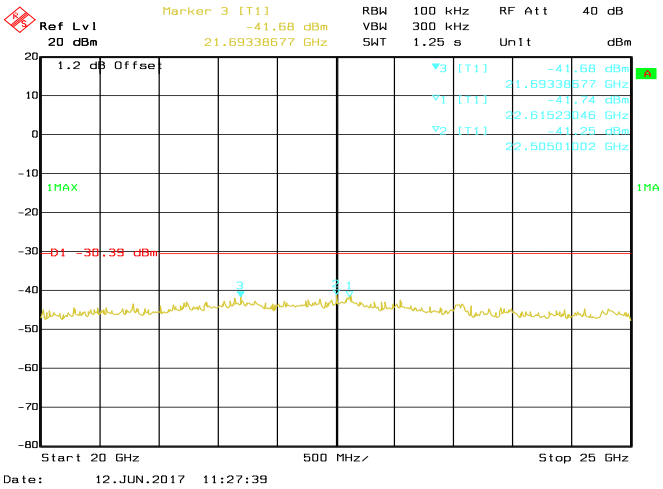
Conducted Emissions. 802.11n, Frequency 2462 MHz Emission Level, 5 GHz -> 10 GHz



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



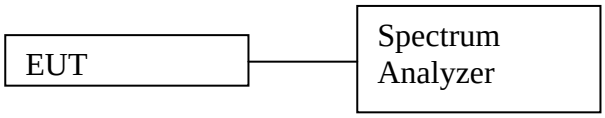
Conducted Emissions. 802.11n, Frequency 2462 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions. 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.

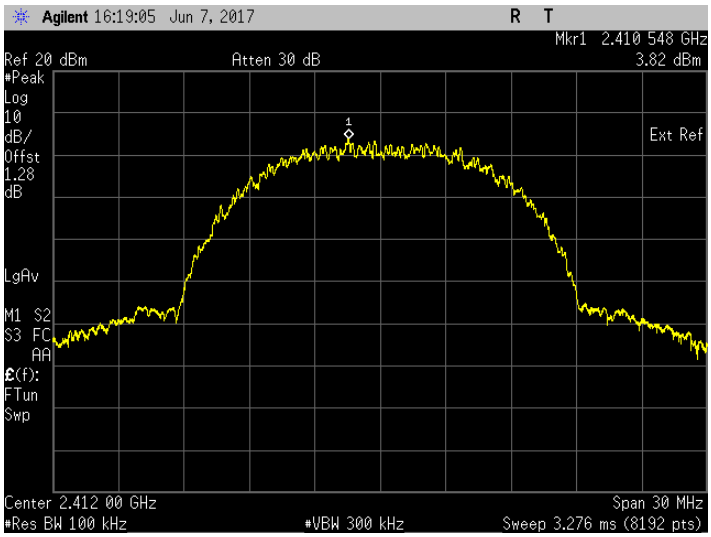
6.6.2 Test Limits:

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

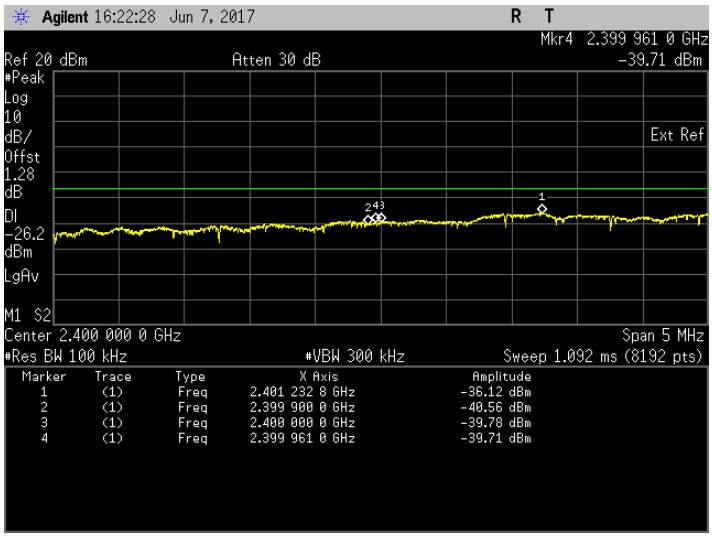
6.6.3 Test Results:

802.11b

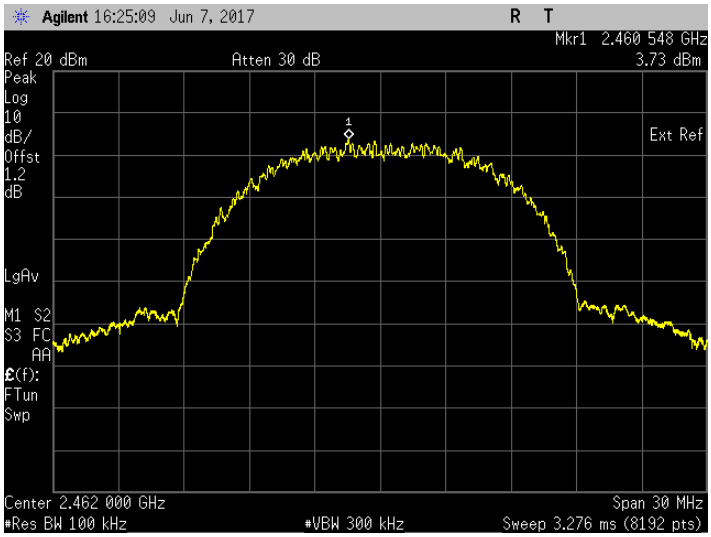
Test Conditions					Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Test Frequency (MHz)	Frequencies (MHz)	Level (dBm)	Status
802.11b	DSSS	QPSK	2	2412	2399.96	-39.71	Pass
802.11b	DSSS	QPSK	2	2462	2483.56	-56.06	Pass



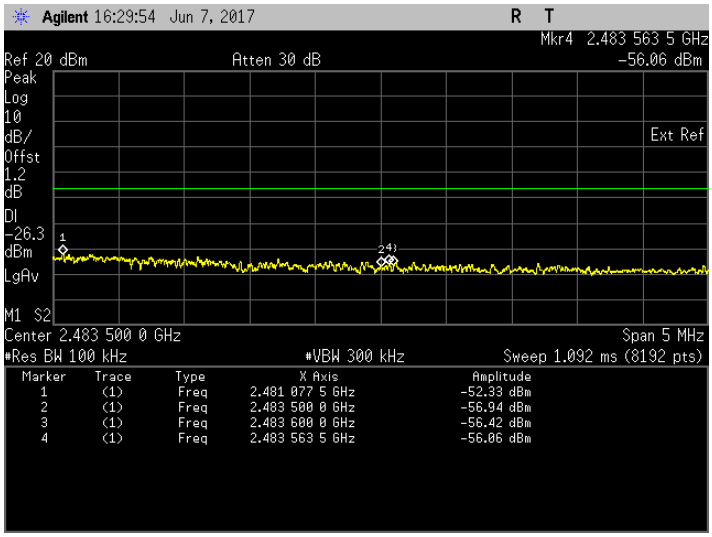
Band Edge. 802.11b Frequency 2412 MHz Reference Level



Band Edge. 802.11b Frequency 2412 MHz Band Edge



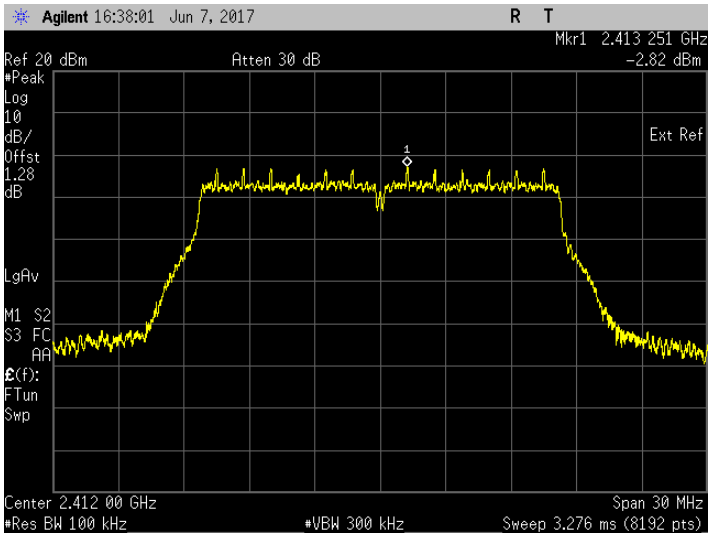
Band Edge. 802.11b Frequency 2462 MHz Reference Level



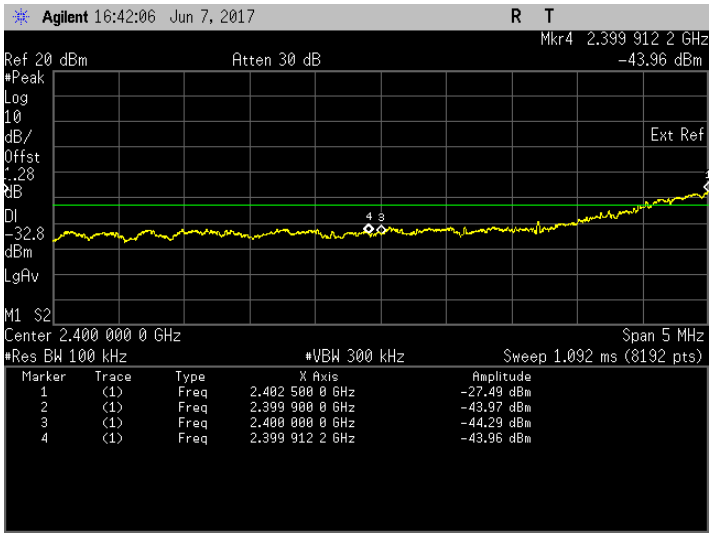
Band Edge. 802.11b Frequency 2462 MHz Band Edge

802.11g

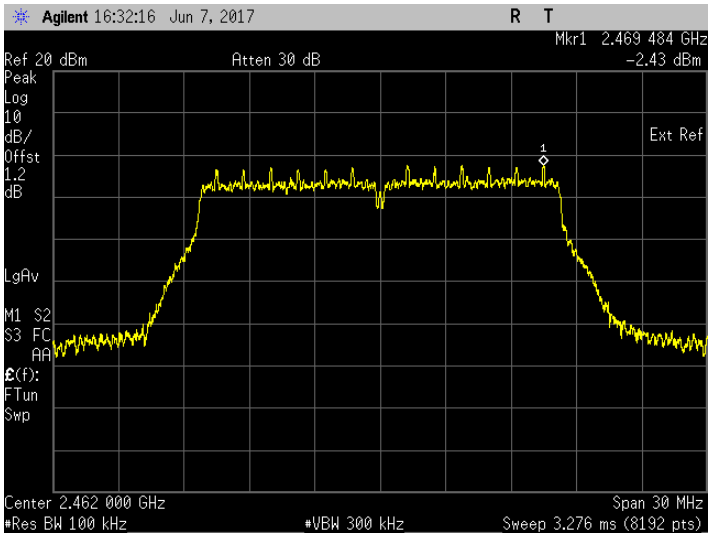
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	2399.91	-43.96	Pass
802.11g	OFDM	BPSK	6	2462	2483.55	-53.50	Pass



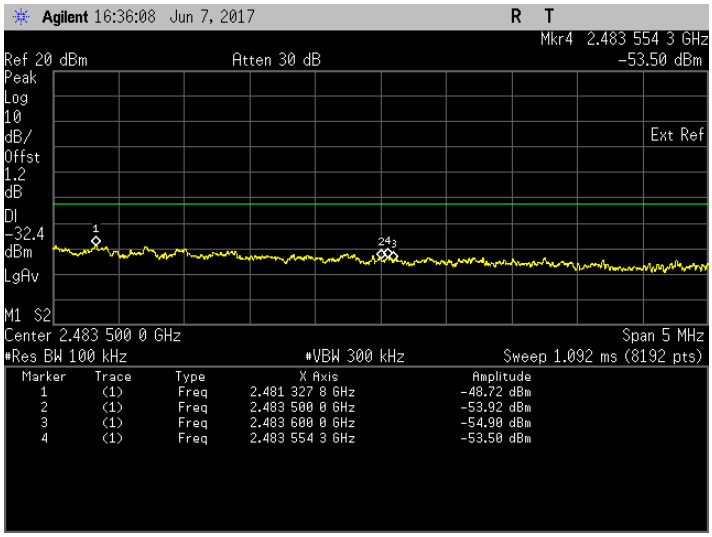
Band Edge. 802.11g Frequency 2412 MHz Reference Level



Band Edge. 802.11g Frequency 2412 MHz Band Edge



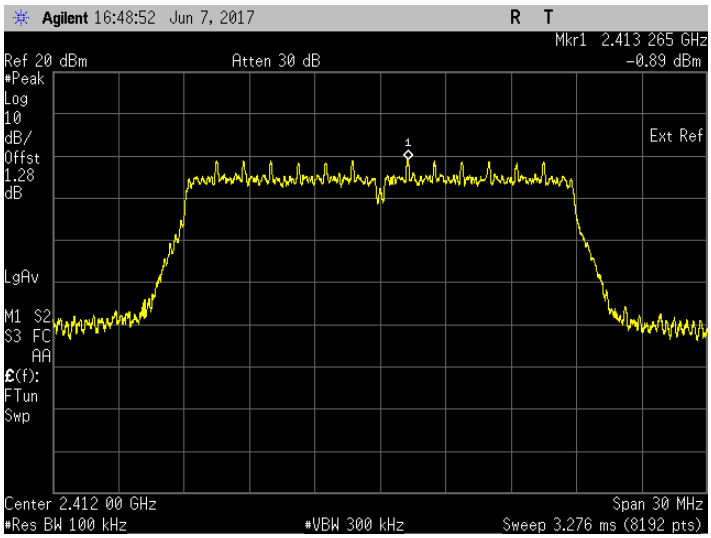
Band Edge. 802.11g Frequency 2462 MHz Reference Level



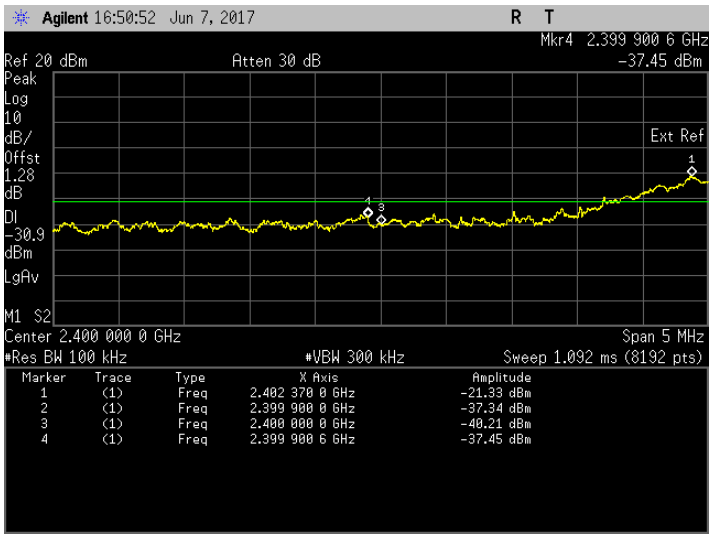
Band Edge. 802.11g Frequency 2462 MHz Band Edge

802.11n (HT20)

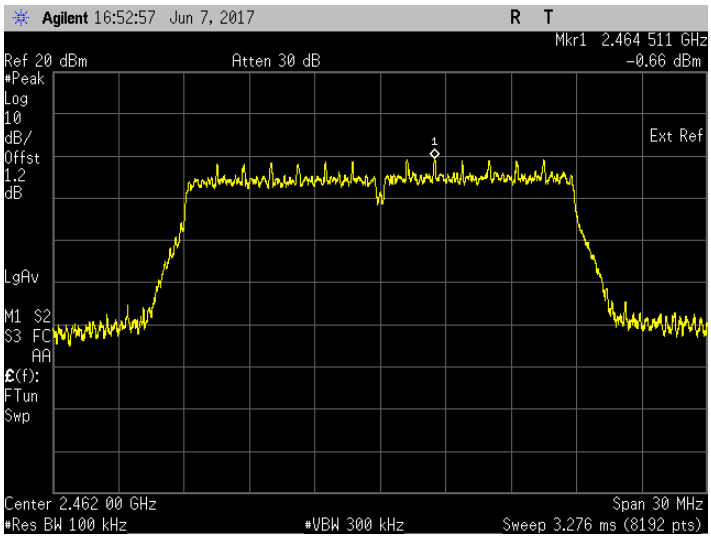
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	2399.90	-37.34	Pass
802.11n	OFDM	BPSK	6.5	2462	2483.54	-45.15	Pass



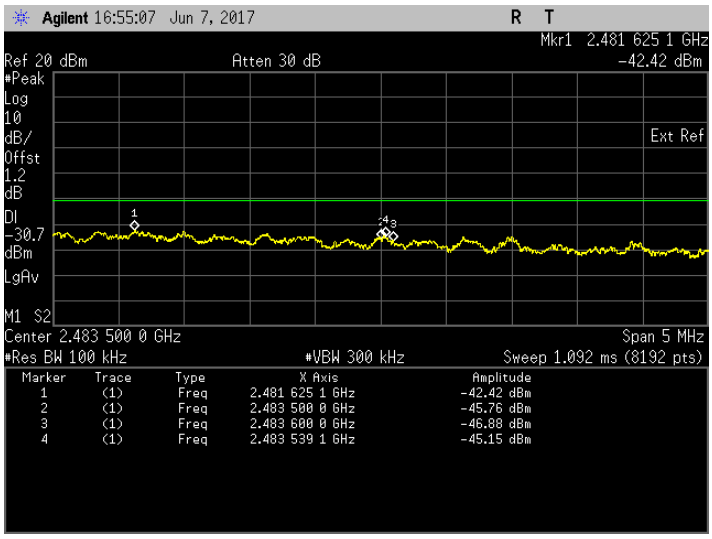
Band Edge. 802.11n Frequency 2412 MHz Reference Level



Band Edge. 802.11n Frequency 2412 MHz Band Edge



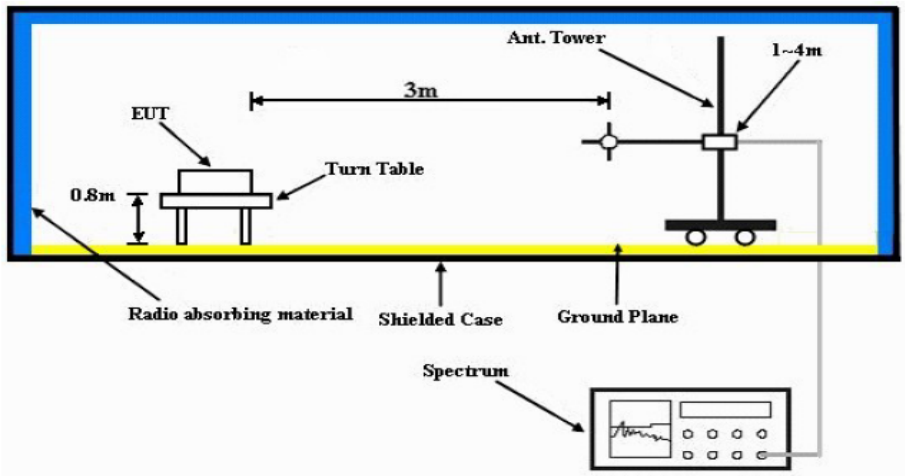
Band Edge. 802.11n Frequency 2462 MHz Reference Level



Band Edge. 802.11n Frequency 2462 MHz Band Edge

6.7 Radiated Emission within restricted bands

6.7.1 Test Setup



a. The EUT is placed on the top of a rotating table 0.8m above the ground (<1GHz) and 1.5m above the ground (>1GHz) at a 3m semi-anechoic chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
b. The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
c. The antenna is Bilog/Horn antenna depend on which frequency range uses, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1m to 4m and the rotatable table is turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode is fall within the range of 10dB from the limit specified, the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Otherwise, the testing could be stopped and the peak values of the EUT would be reported.

NOTE:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1 GHz.
c. All modes of operation were investigated and the worst-case emissions are reported.

6.7.2 Test Limits:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

NOTE:

a. The lower limit shall apply at the transition frequencies.
b. Emission level (dBuV/m) = 20 log Emission level (uV/m).
c. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

6.7.3 Test Data:

Test: WIFI SAC Restricted Band Edge
Model Number: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Low Test Frequency: 2412.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11b)

Restricted Band Edge (Low Channel) tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

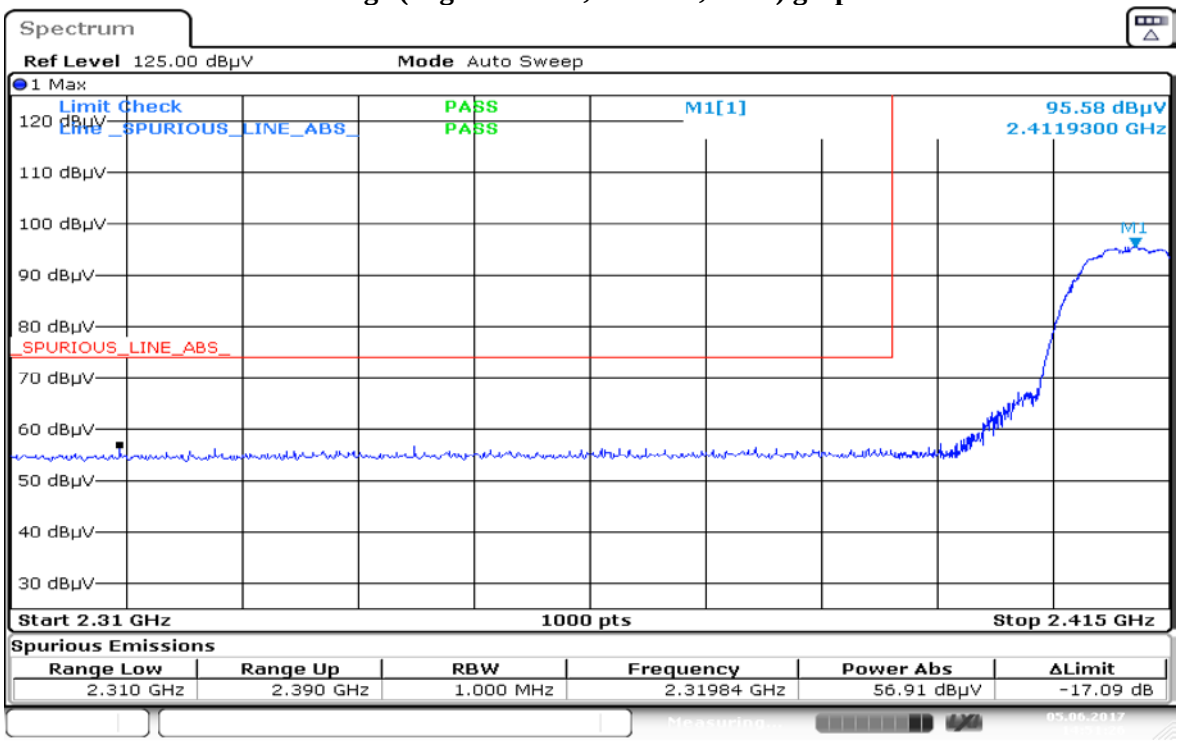
Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC): 23.8
Test Performed by: Nazrin&Qawiman
System MU: 5.01dB

Humidity (%): 70.2
Test Date: Mon, Jun 05, 2017
Duty Cycle (%): > 98%

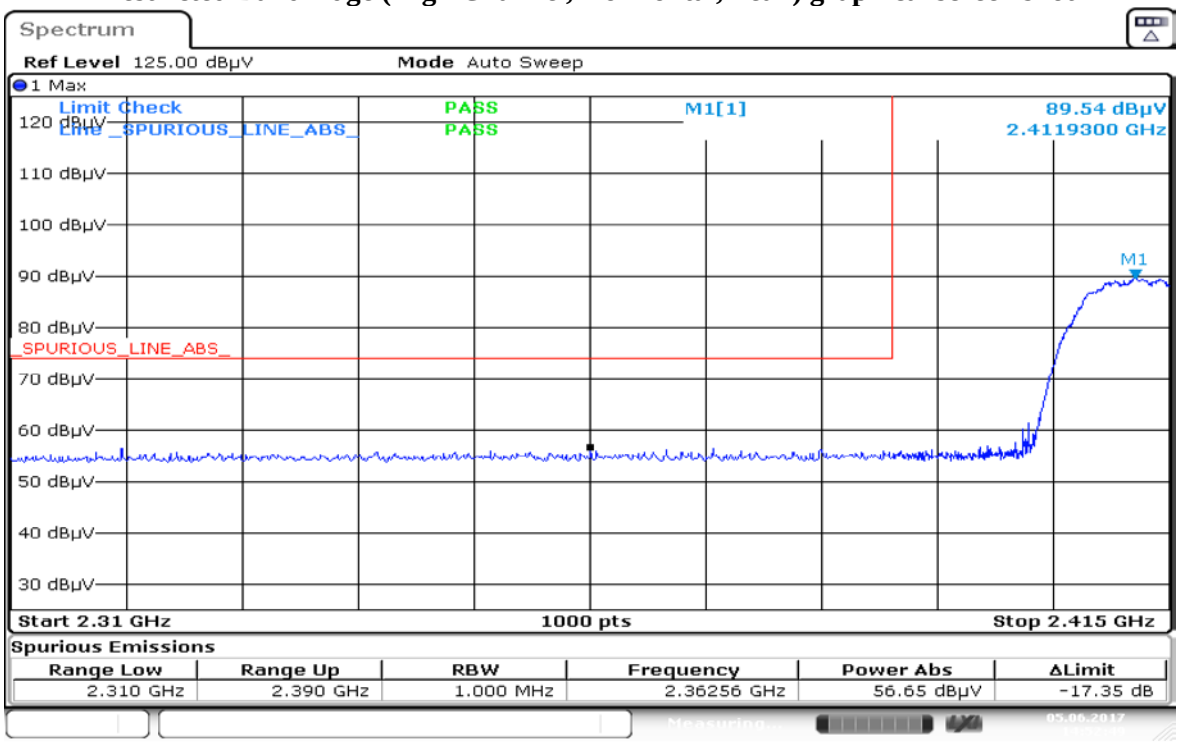
Note: No spurs were found in this test.

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



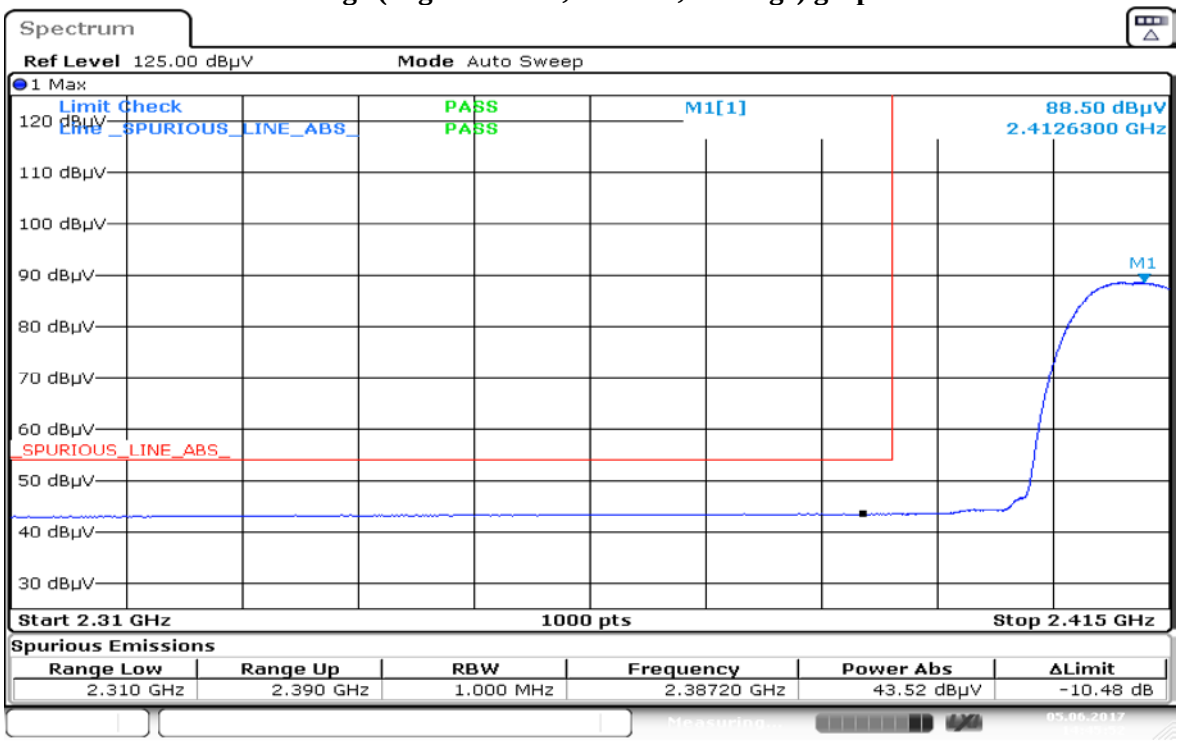
Date: 5.JUN.2017 14:51:27

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



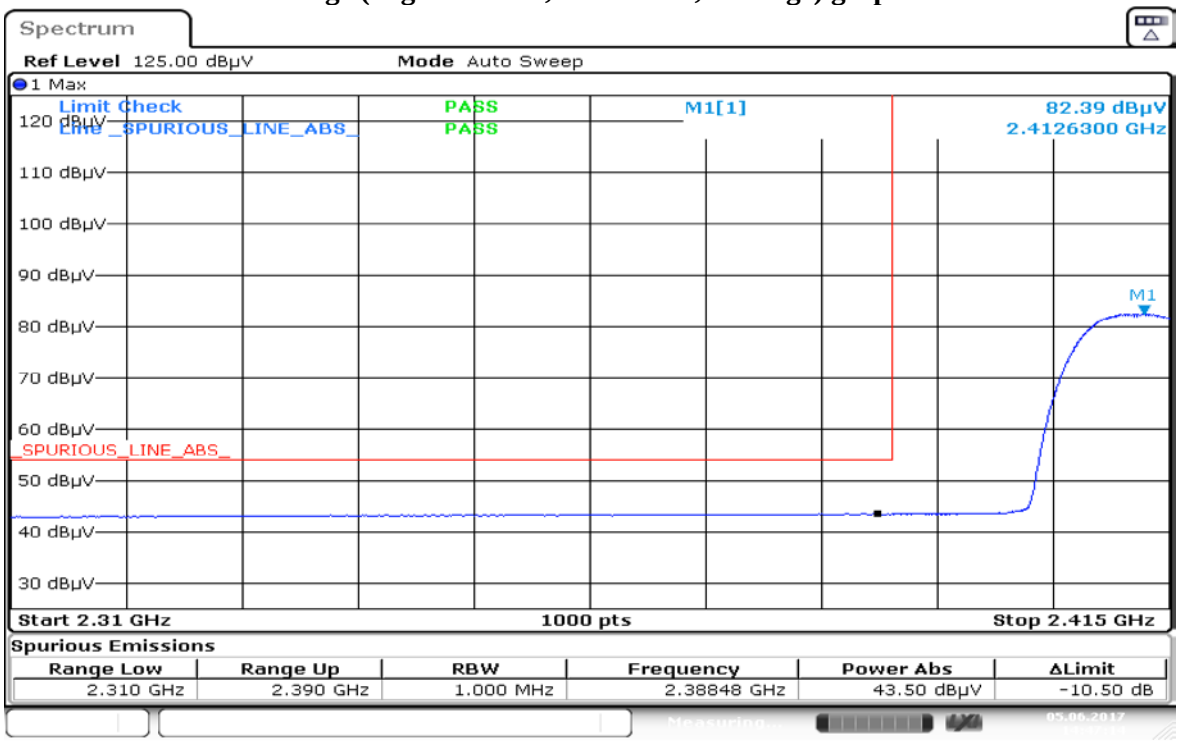
Date: 5.JUN.2017 14:52:49

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 14:45:52

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 14:47:14

Test: WIFI SAC Restricted Band Edge
Model Number: AAH88JCD9SA2AN **S/N: 130TTK0360** **EMC SR ID#: 06406-EMC-00003**
Battery: PMNN4468A **Accessory: NA**
Test Channel: High **Test Frequency: 2462.0000 MHz** **Test Standard: ANSI C63.10-2013**
Worst Case Plane: X-Plane (802.11b)

Restricted Band Edge (High Channel) tabular data

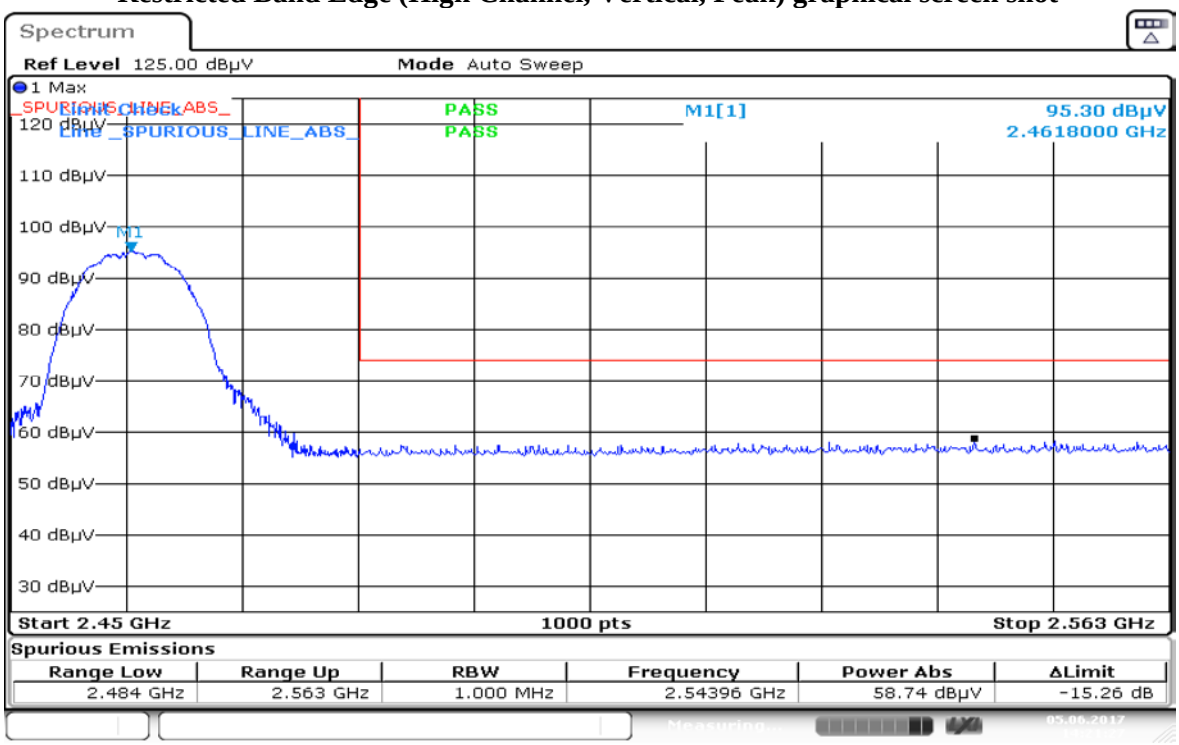
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Mon, Jun 05, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

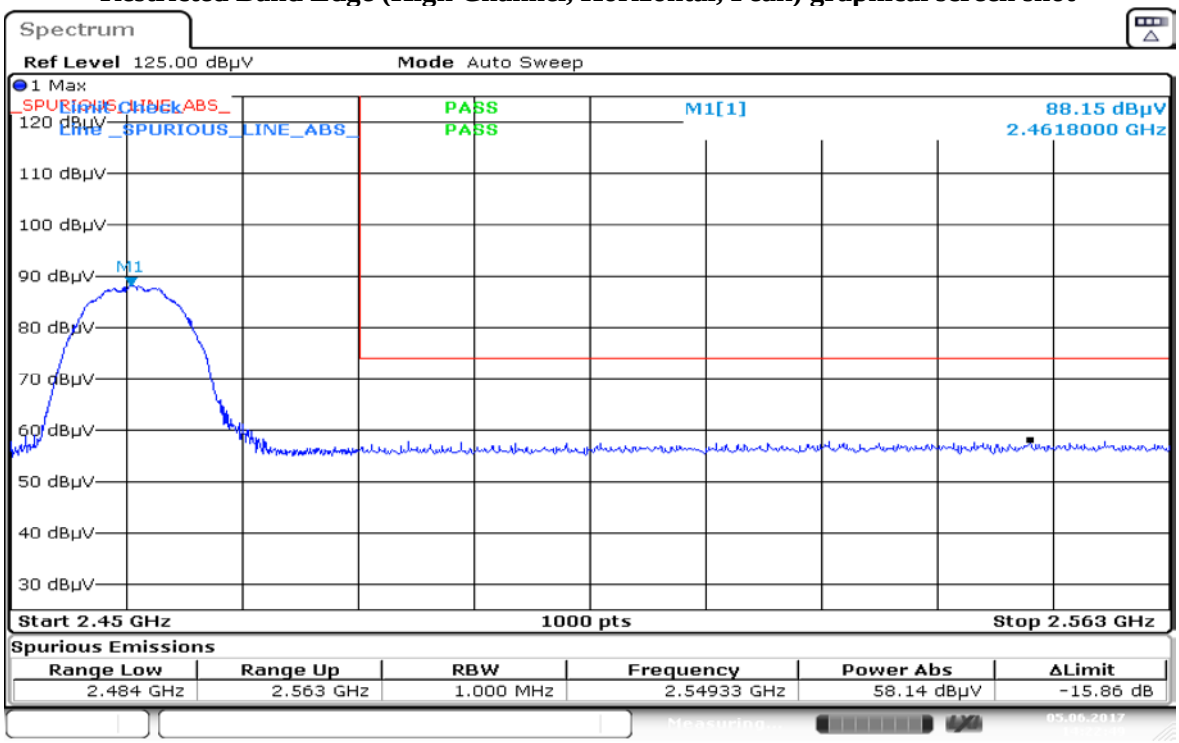
Note: No spurs were found in this test.

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



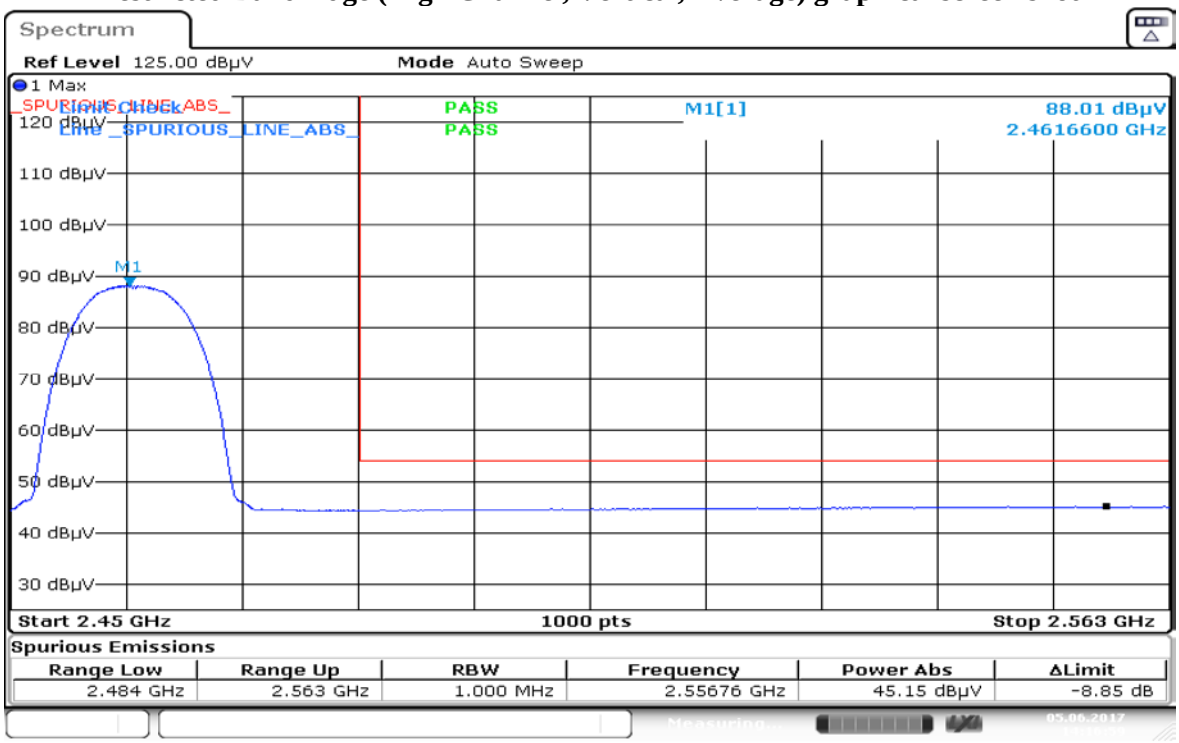
Date: 5.JUN.2017 14:21:27

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



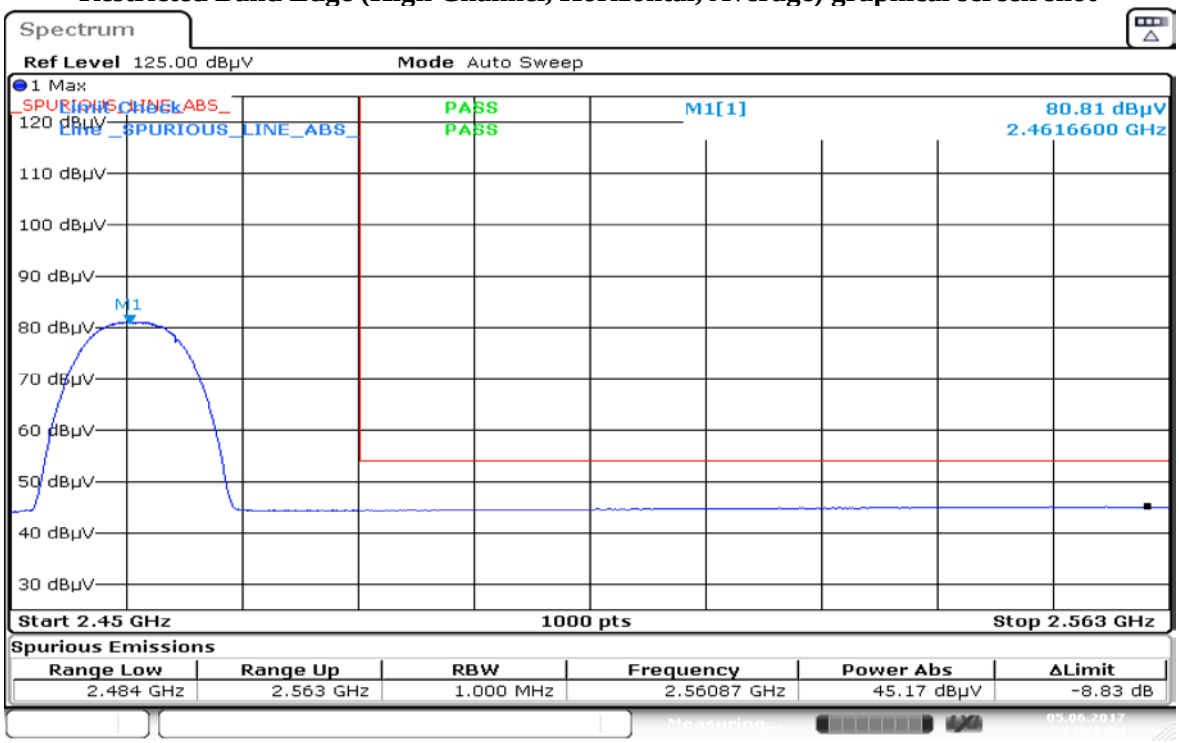
Date: 5.JUN.2017 14:22:49

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 14:16:59

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 14:18:24

Test: WIFI SAC Restricted Band Edge

Model Number: AAH88JCD9SA2AN **S/N: 130TTK0360** **EMC SR ID#: 06406-EMC-00003**

Battery: PMNN4468A **Accessory: NA**

Test Channel: Low **Test Frequency: 2412.0000 MHz** **Test Standard: ANSI C63.10-2013**

Worst Case Plane: X-Plane (802.11g)

Restricted Band Edge (Low Channel) tabular data

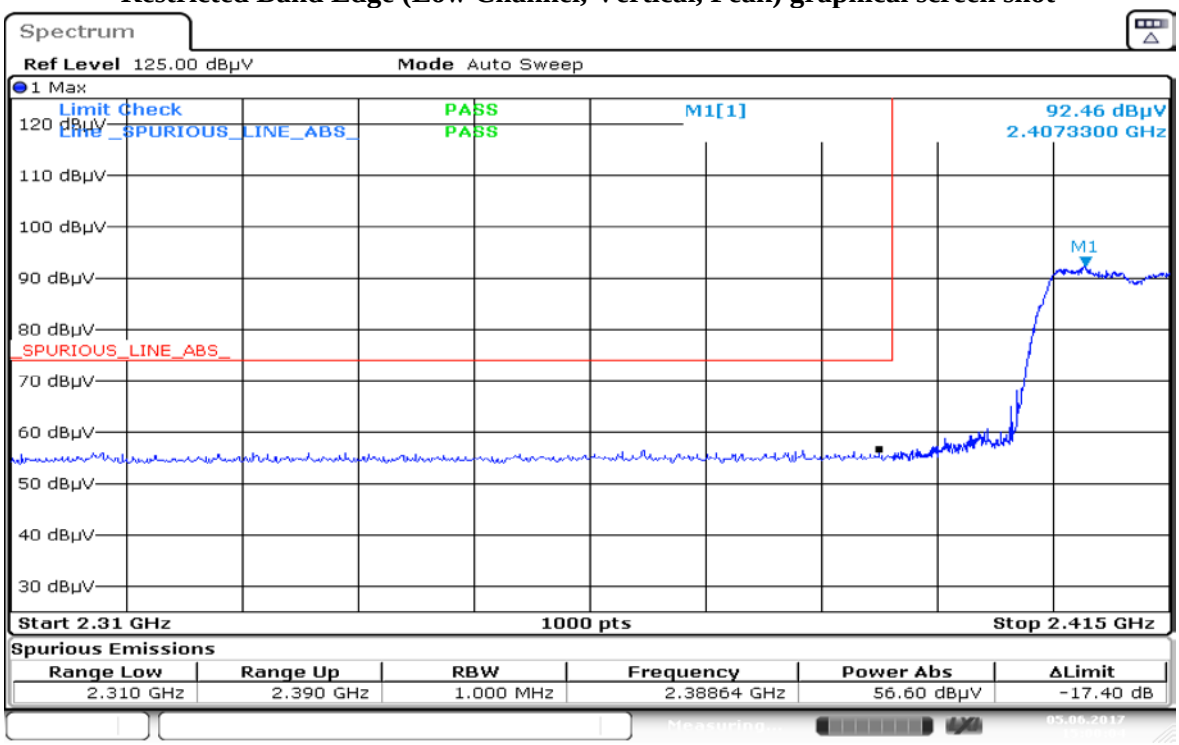
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Mon, Jun 05, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

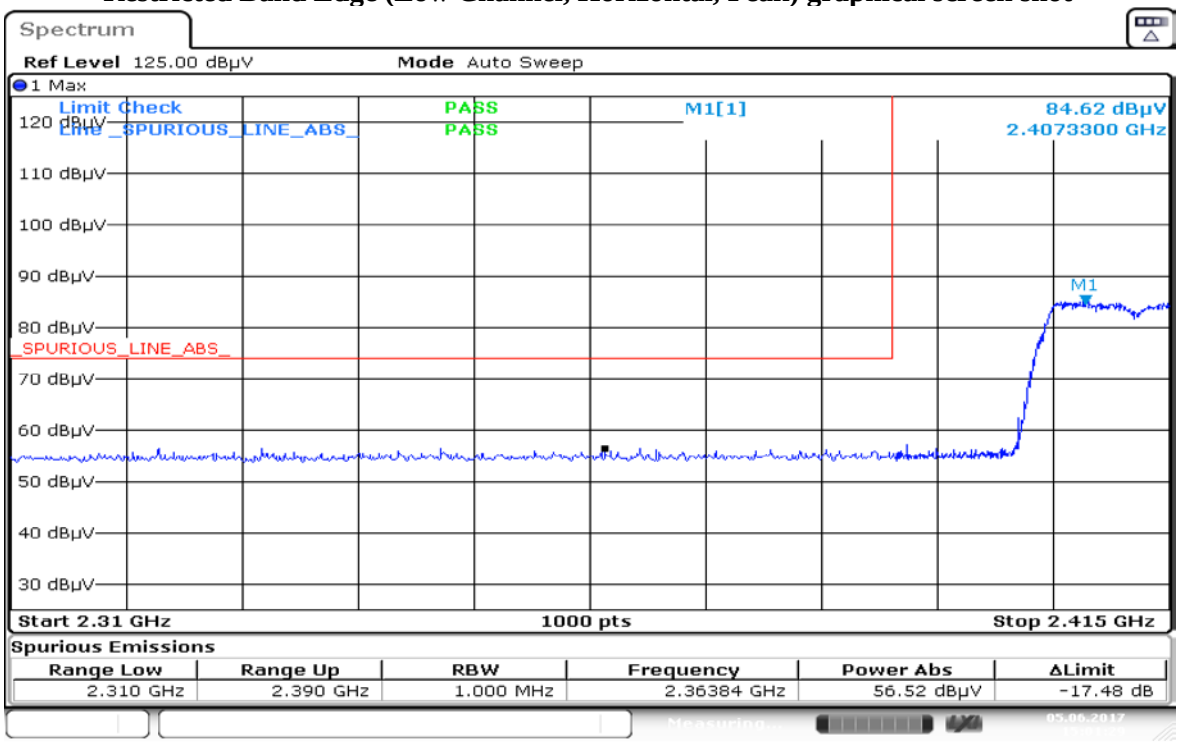
Note: No spurs were found in this test.

Restricted Band Edge (Low Channel, Vertical, Peak) graphical screen shot



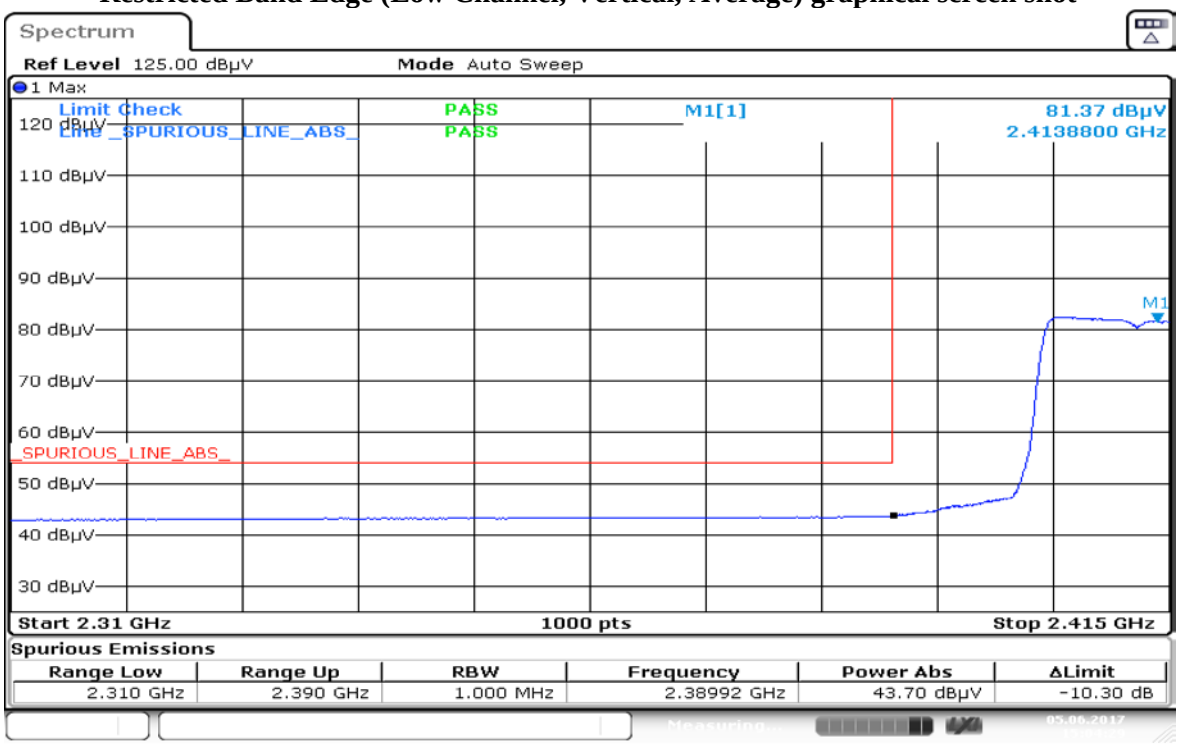
Date: 5.JUN.2017 15:00:04

Restricted Band Edge (Low Channel, Horizontal, Peak) graphical screen shot



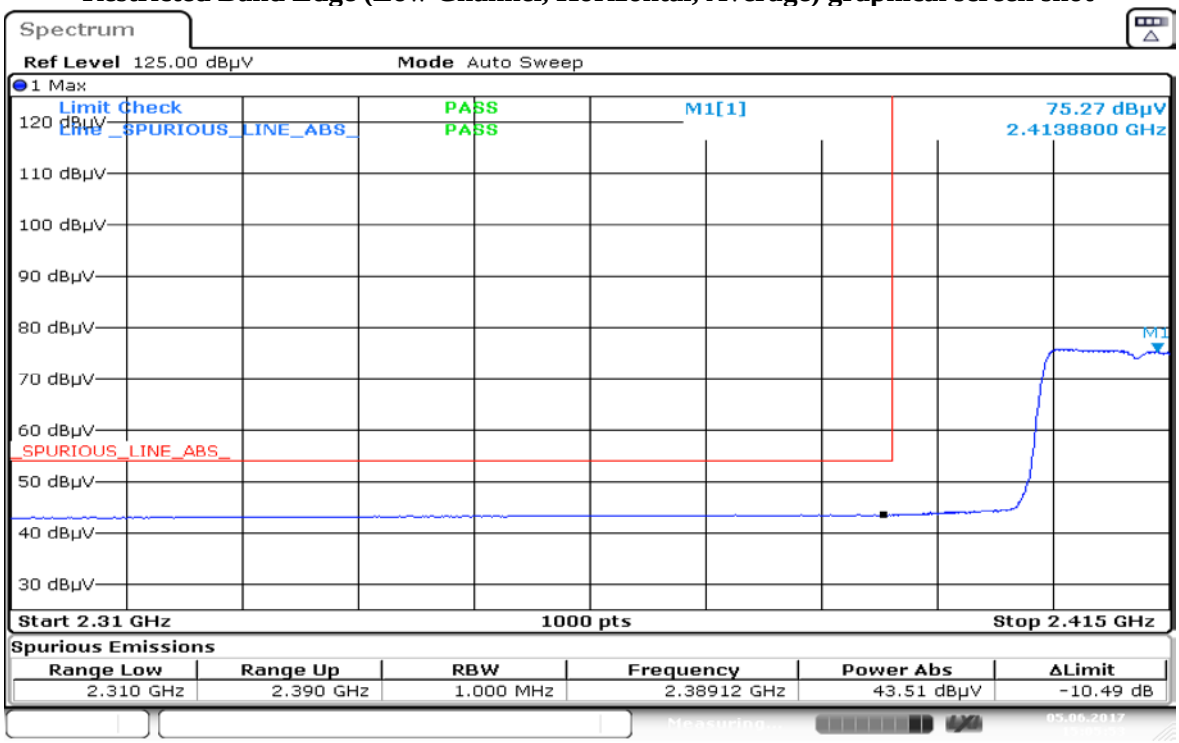
Date: 5.JUN.2017 15:01:29

Restricted Band Edge (Low Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 15:04:29

Restricted Band Edge (Low Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 15:05:54

Test: WIFI SAC Restricted Band Edge

Model Number: AAH88JCD9SA2AN **S/N: 130TTK0360** **EMC SR ID#: 06406-EMC-00003**

Battery: PMNN4468A **Accessory: NA**

Test Channel: High **Test Frequency: 2462.0000 MHz** **Test Standard: ANSI C63.10-2013**

Worst Case Plane: X-Plane (802.11g)

Restricted Band Edge (High Channel) tabular data

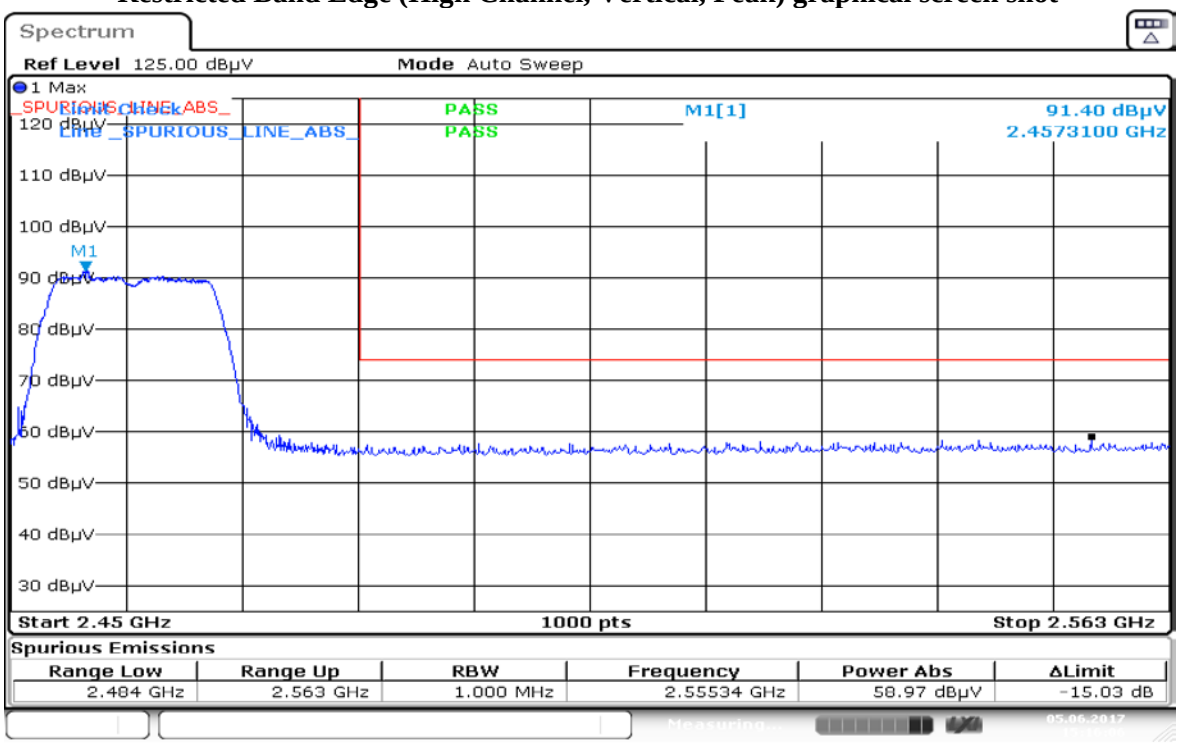
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC):23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Mon, Jun 05, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

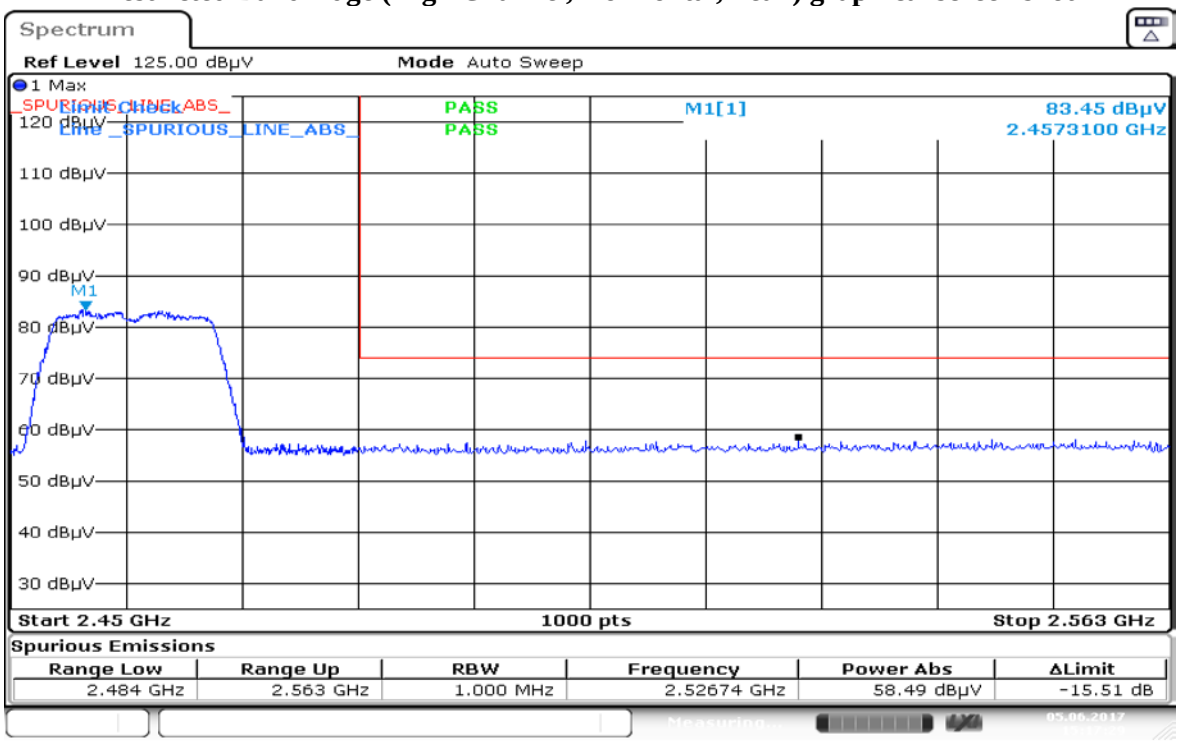
Note: No spurs were found in this test.

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



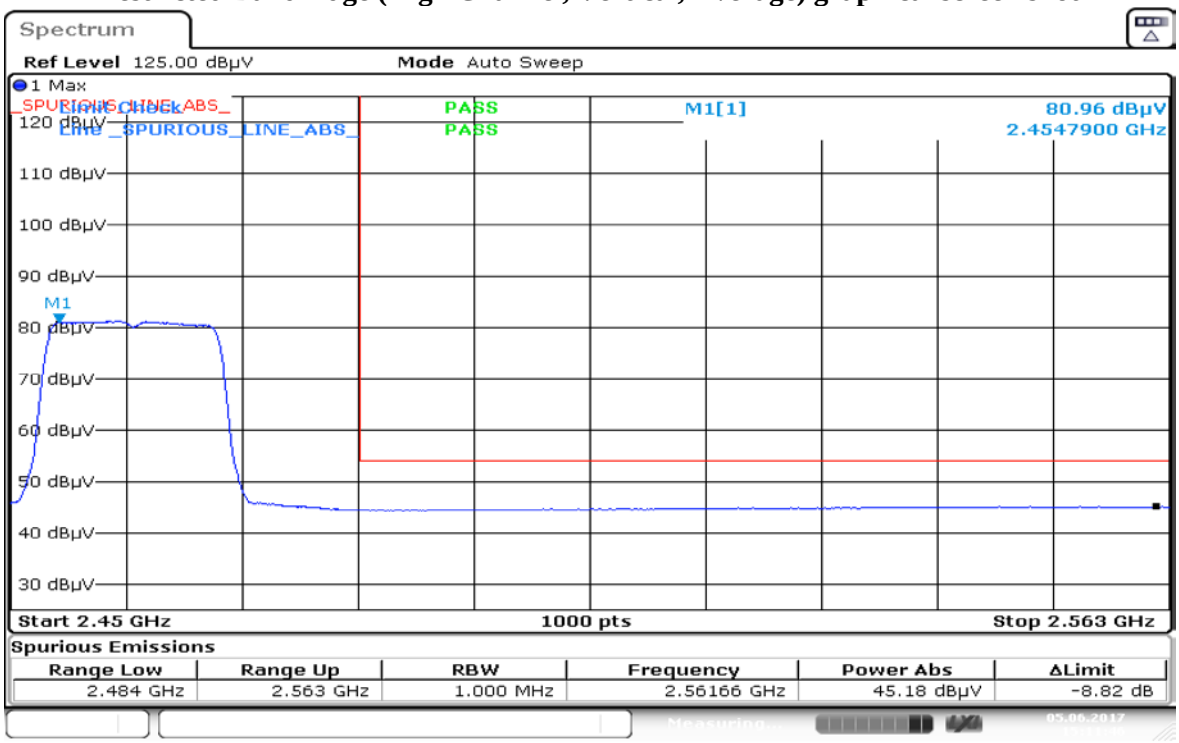
Date: 5.JUN.2017 15:16:07

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



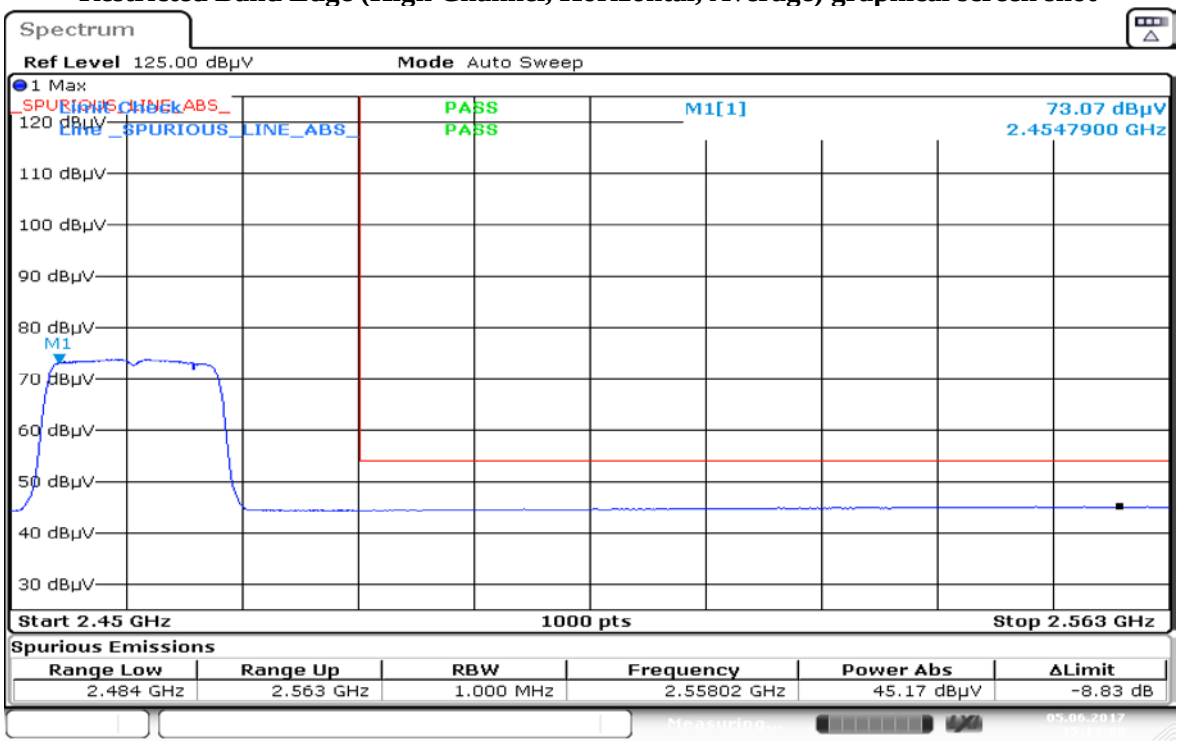
Date: 5.JUN.2017 15:17:29

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 15:11:47

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 15:13:09

Test: WIFI SAC Restricted Band Edge

Model Number: AAH88JCD9SA2AN **S/N: 130TTK0360** **EMC SR ID#: 06406-EMC-00003**

Battery: PMNN4468A **Accessory: NA**

Test Channel: Low **Test Frequency: 2412.0000 MHz** **Test Standard: ANSI C63.10-2013**

Worst Case Plane: X-Plane (802.11n)

Restricted Band Edge (Low Channel) tabular data

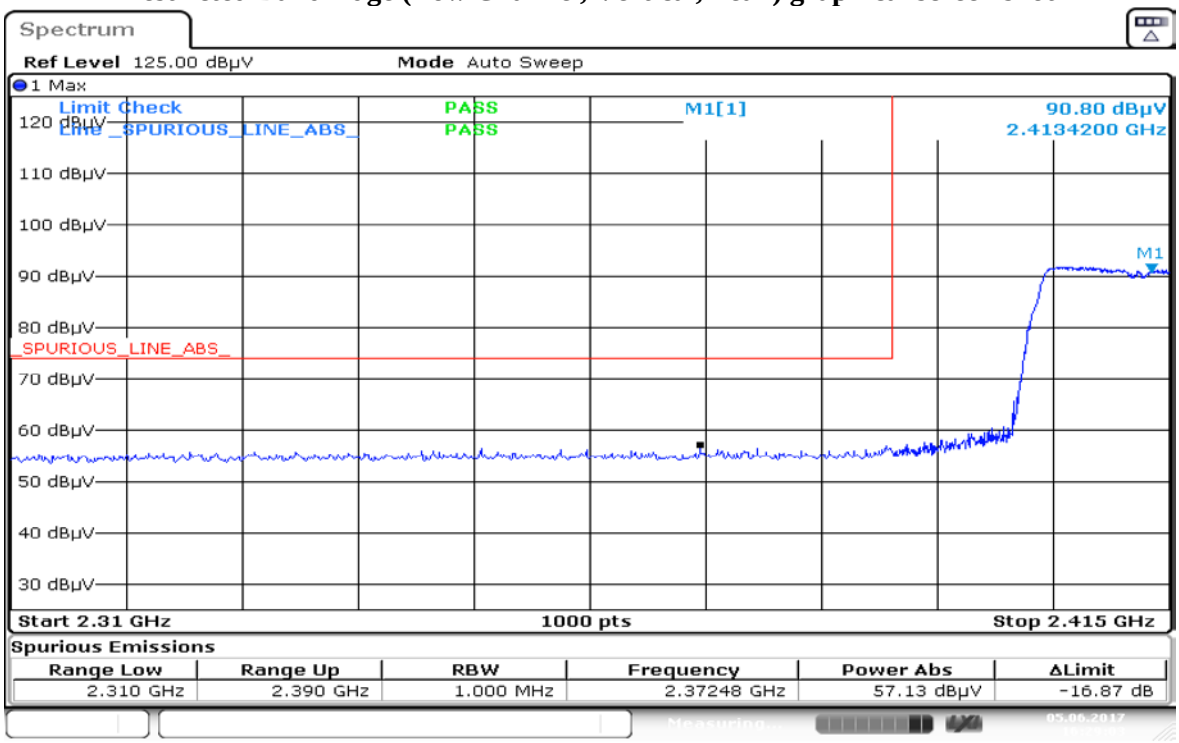
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Mon, Jun 05, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

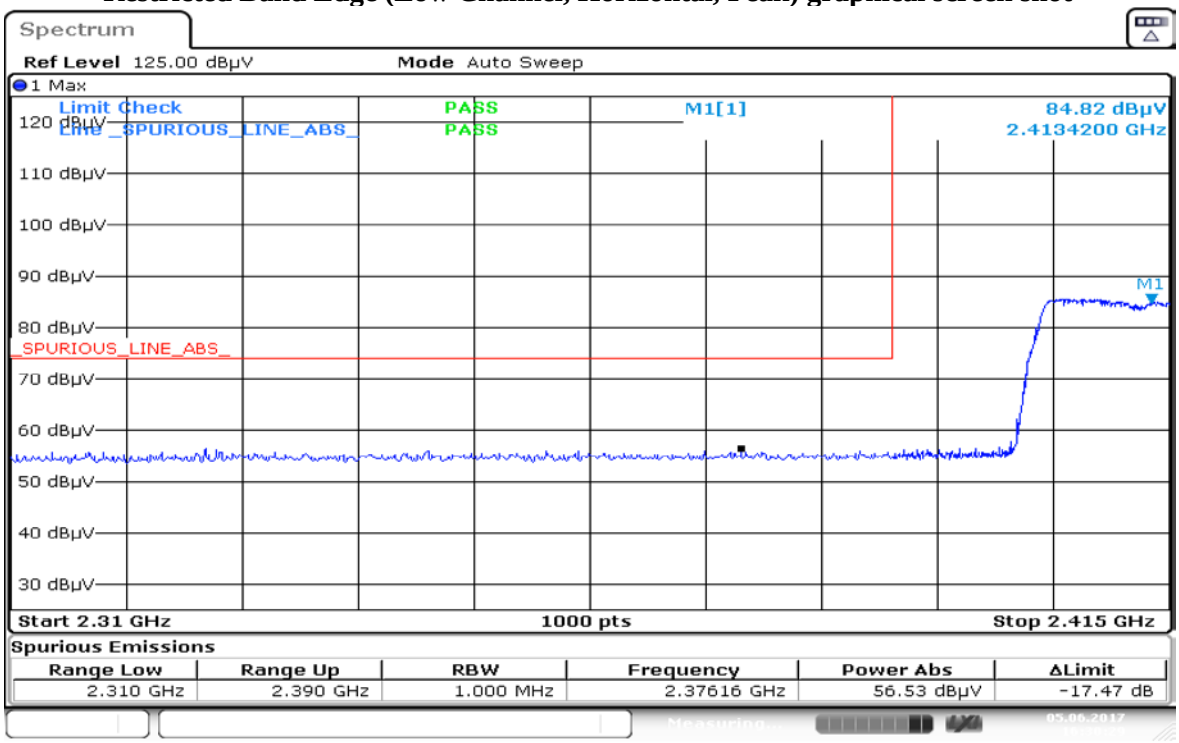
Note: No spurs were found in this test.

Restricted Band Edge (Low Channel, Vertical, Peak) graphical screen shot



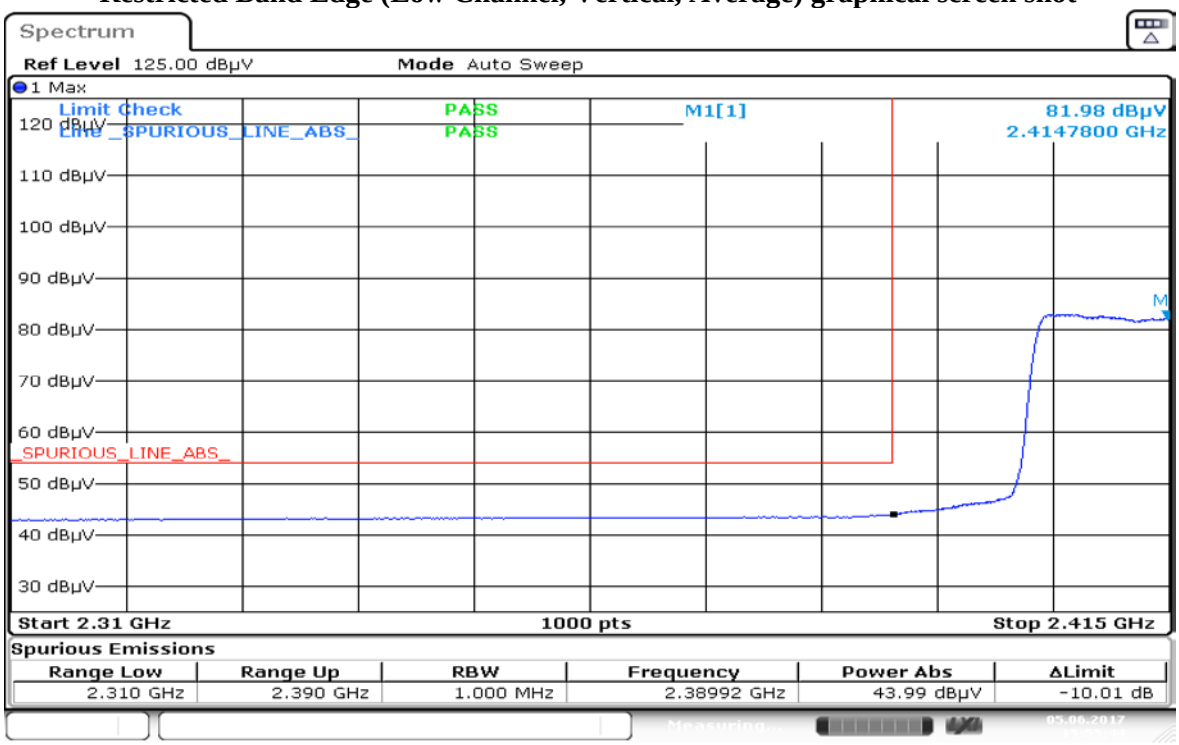
Date: 5.JUN.2017 16:29:04

Restricted Band Edge (Low Channel, Horizontal, Peak) graphical screen shot



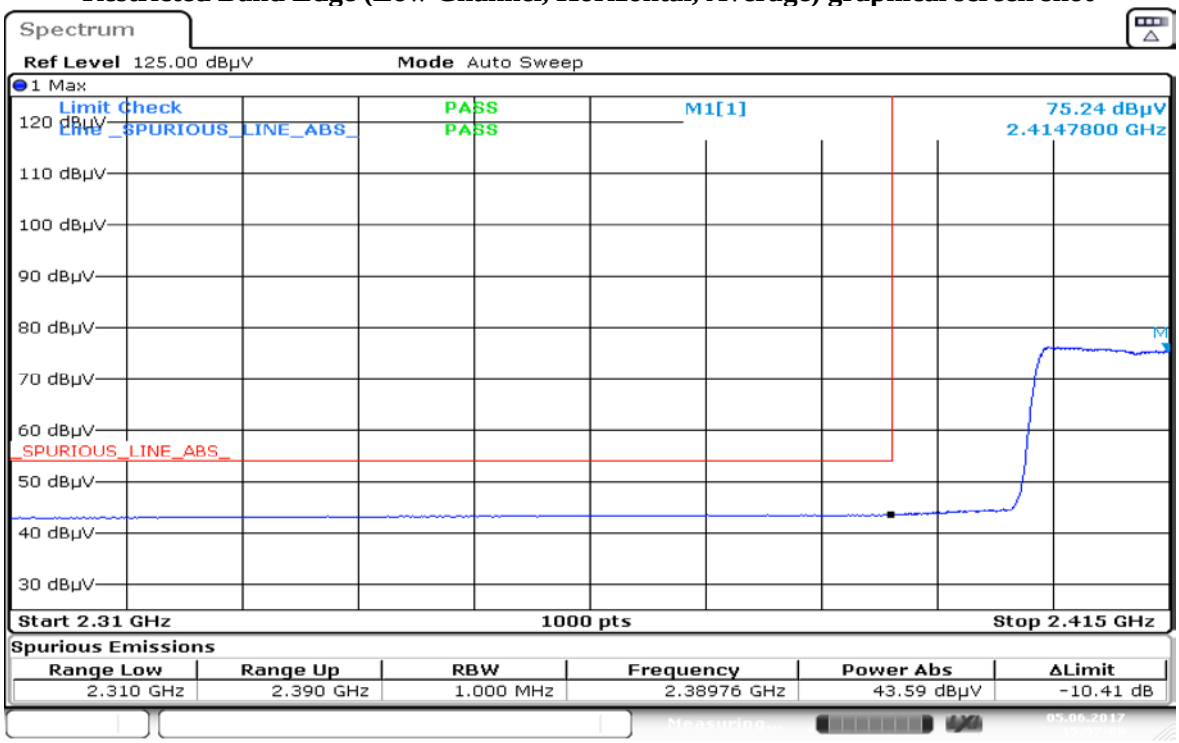
Date: 5.JUN.2017 16:30:29

Restricted Band Edge (Low Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 15:55:44

Restricted Band Edge (Low Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 15:57:09

Test: WIFI SAC Restricted Band Edge
Model Number: AAH88JCD9SA2AN **S/N: 130TTK0360** **EMC SR ID#: 06406-EMC-00003**
Battery: PMNN4468A **Accessory: NA**
Test Channel: High **Test Frequency: 2462.0000 MHz** **Test Standard: ANSI C63.10-2013**
Worst Case Plane: X-Plane (802.11n)

Restricted Band Edge (High Channel) tabular data

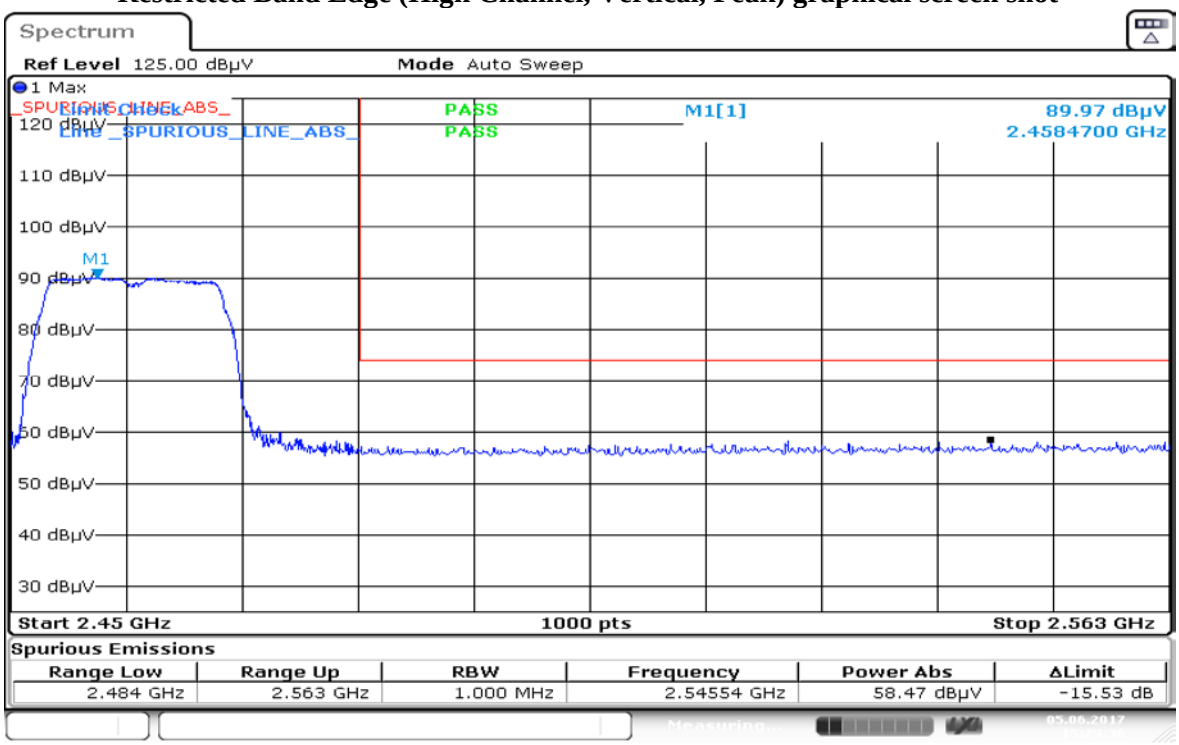
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
Horizontal Radiated Emission Result										

Remarks: Pass Result	Marginal Result	Fail Result

Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Mon, Jun 05, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

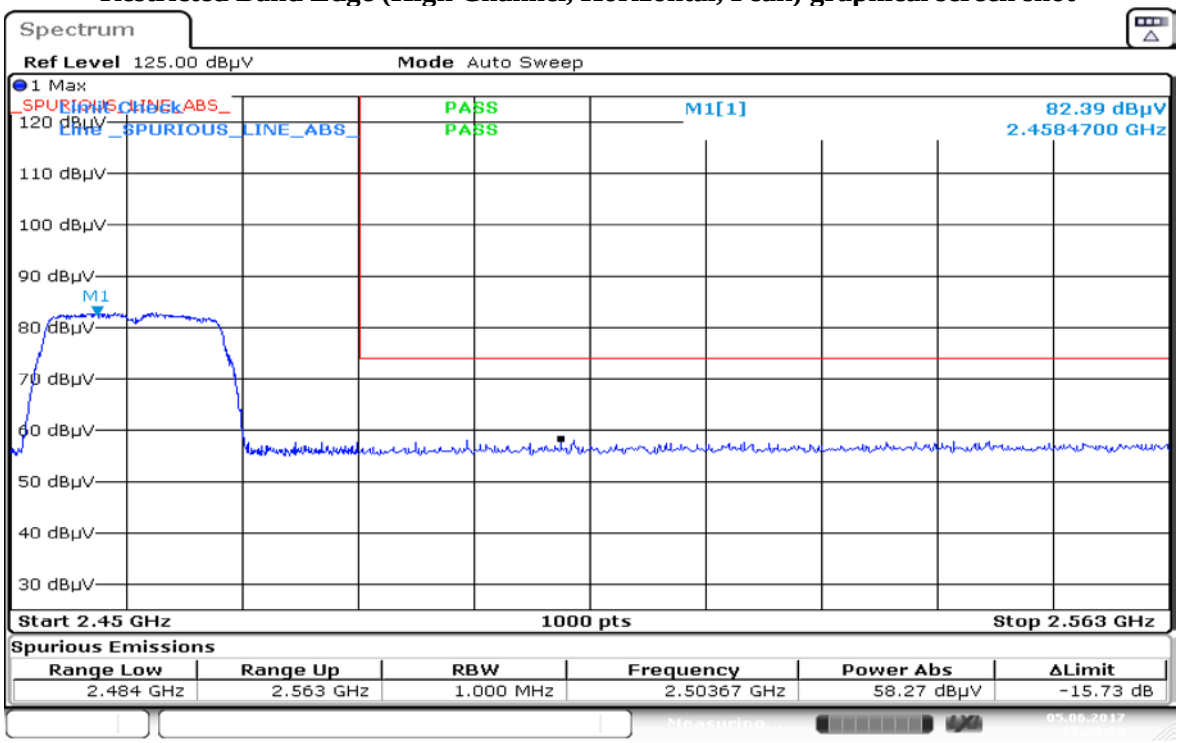
Note: No spurs were found in this test.

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



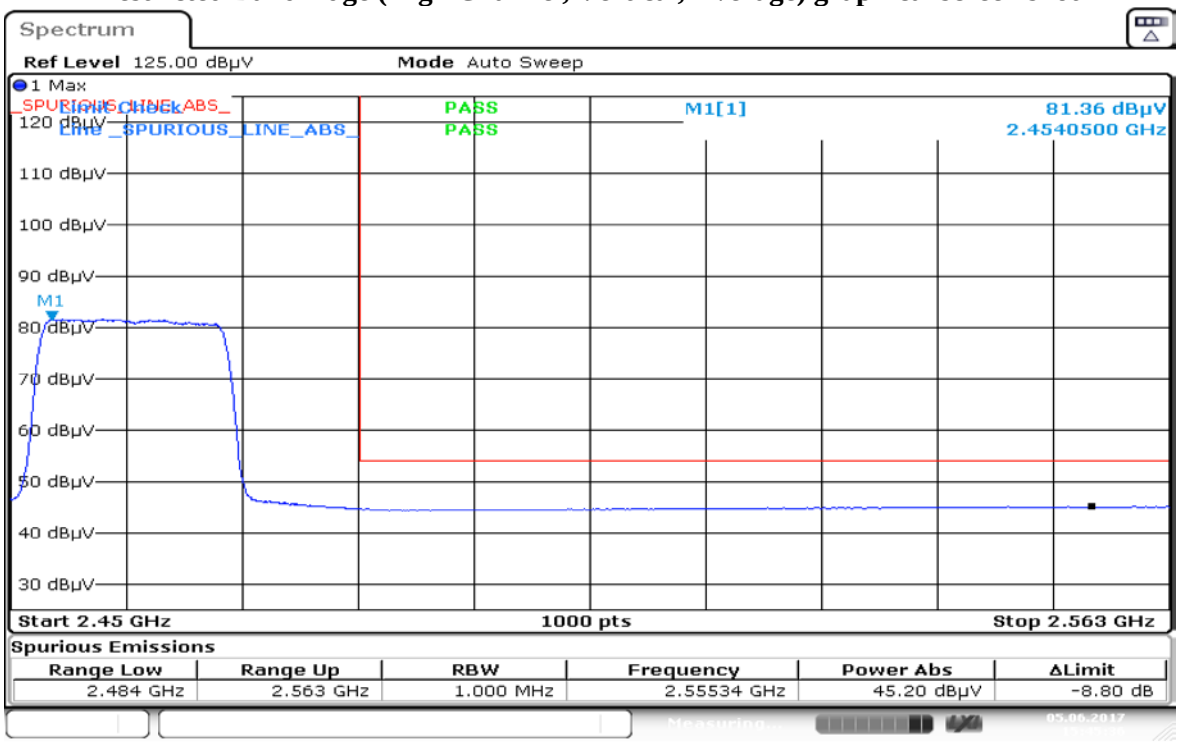
Date: 5.JUN.2017 15:24:37

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



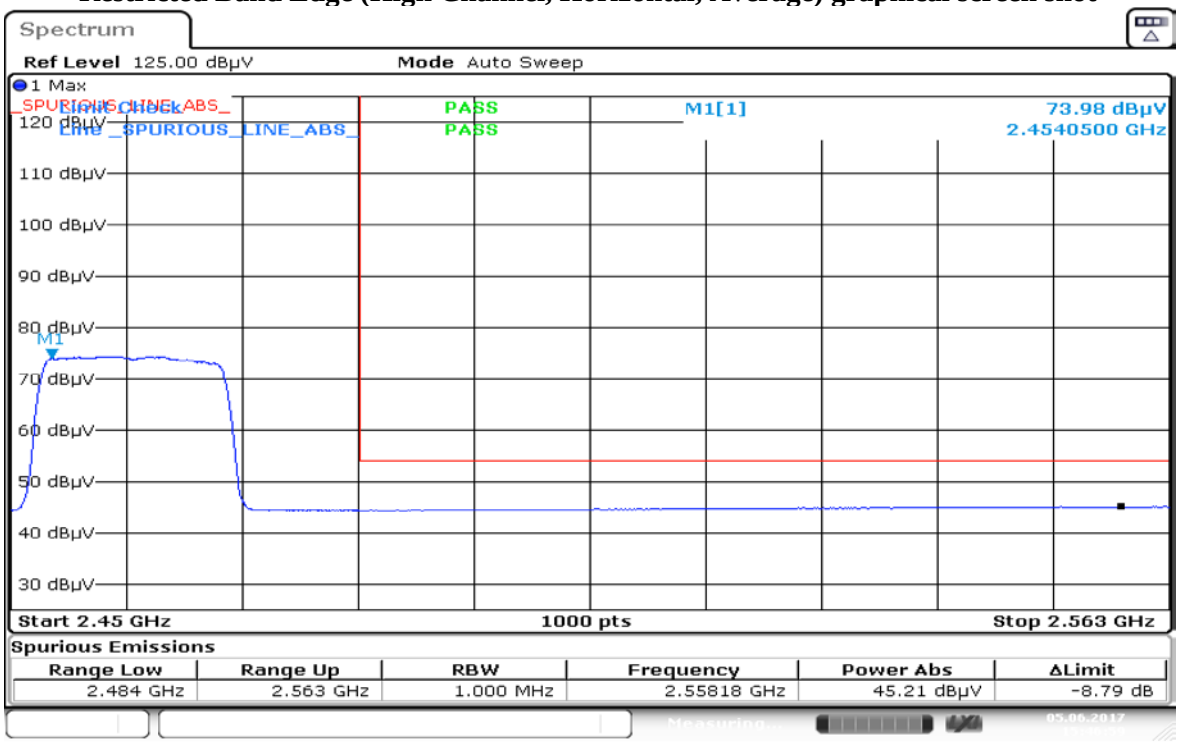
Date: 5.JUN.2017 15:25:59

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



Date: 5.JUN.2017 15:45:37

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



Date: 5.JUN.2017 15:46:59

Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Low Test Frequency: 2412.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11b)

Radiated Emission (Low Channel) tabular data

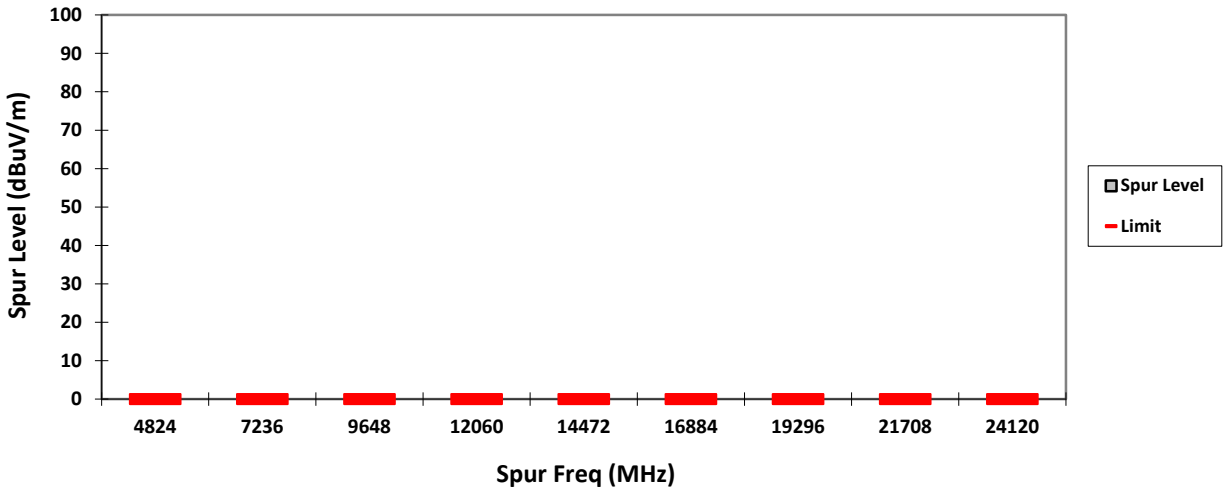
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4824	-	40.1800**	**	-	74	54	-	33.82**	-	-
7236	-	44.9074**	**	-	74	54	-	29.09**	-	-
9648	-	45.7898**	**	-	74	54	-	28.21**	-	-
12060	-	48.5603**	**	-	74	54	-	25.44**	-	-
14472	-	51.9776**	**	-	74	54	-	22.02**	-	-
16884	-	53.9159**	**	-	74	54	-	20.08**	-	-
19296	-	34.2506**	**	-	74	54	-	39.75**	-	-
21708	-	34.6992**	**	-	74	54	-	39.30**	-	-
24120	-	33.6634**	**	-	74	54	-	40.34**	-	-
Horizontal Radiated Emission Result										
4824	-	40.5469**	**	-	74	54	-	33.45**	-	-
7236	-	44.8867**	**	-	74	54	-	29.11**	-	-
9648	-	45.8485**	**	-	74	54	-	28.15**	-	-
12060	-	49.4209**	**	-	74	54	-	24.58**	-	-
14472	-	52.5696**	**	-	74	54	-	21.43**	-	-
16884	-	53.8983**	**	-	74	54	-	20.10**	-	-
19296	-	33.8517**	**	-	74	54	-	40.15**	-	-
21708	-	34.4492**	**	-	74	54	-	39.55**	-	-
24120	-	33.4854**	**	-	74	54	-	40.51**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

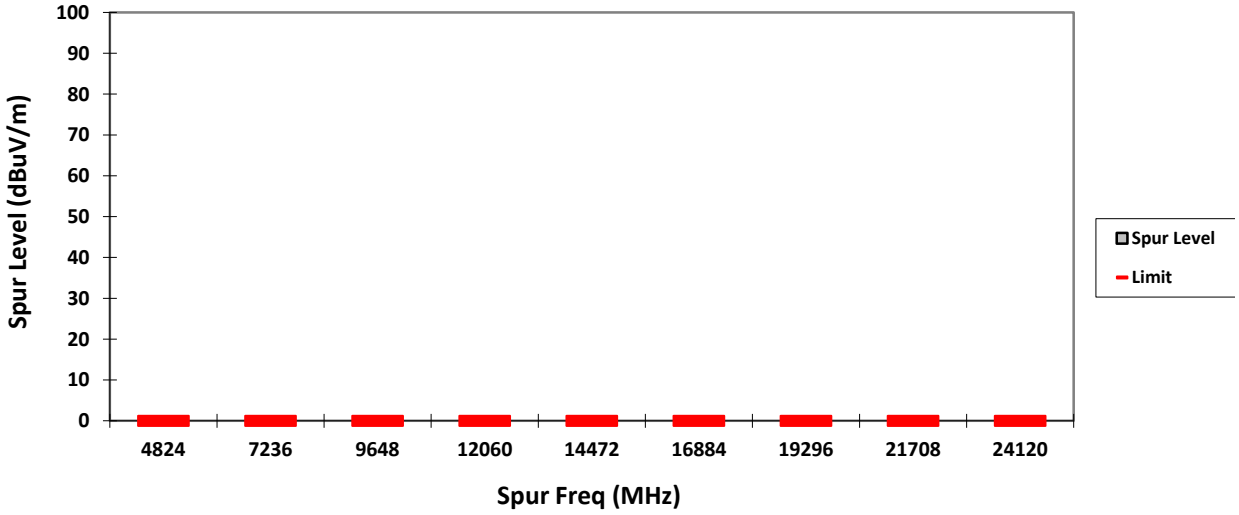
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Wed, Jun 07, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

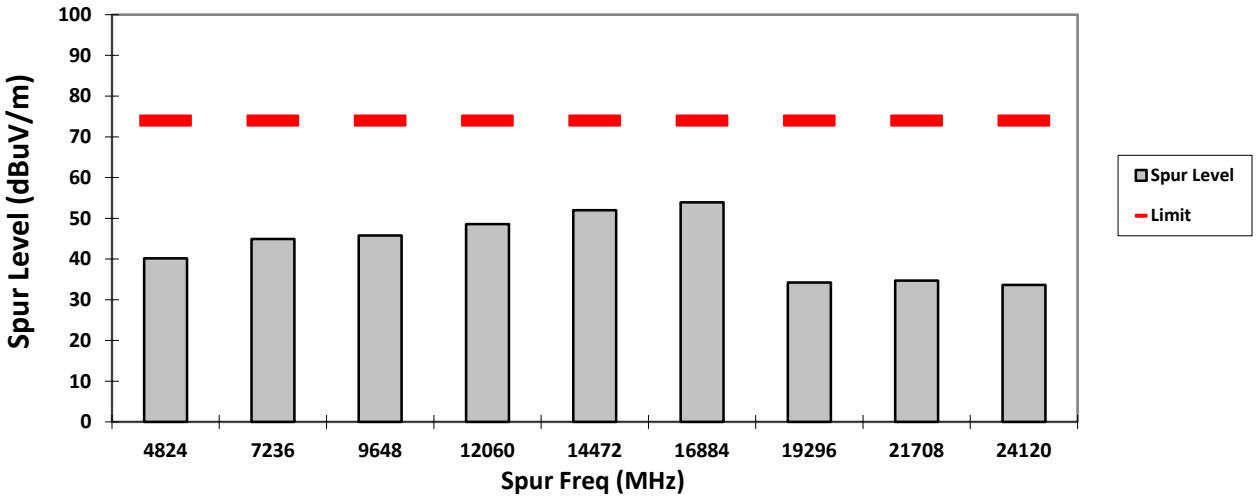
VERTICAL, QPK



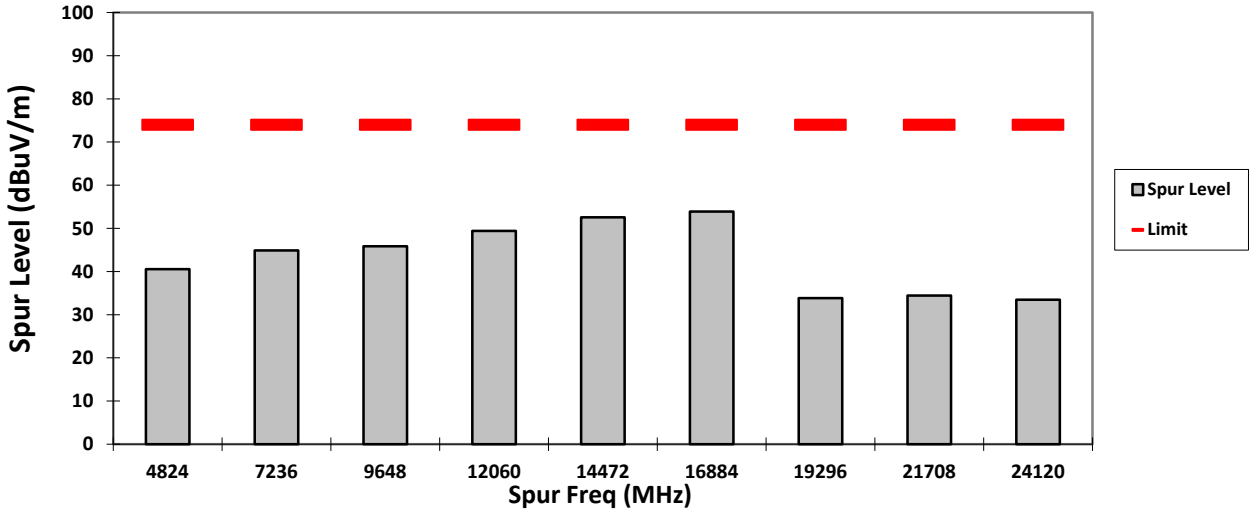
HORIZONTAL, QPK



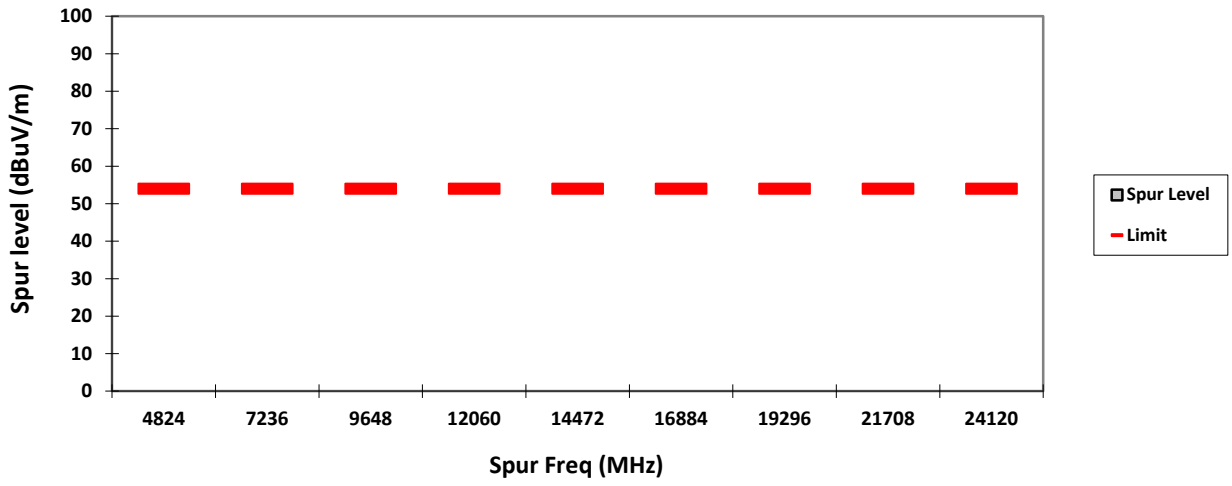
VERTICAL, PK



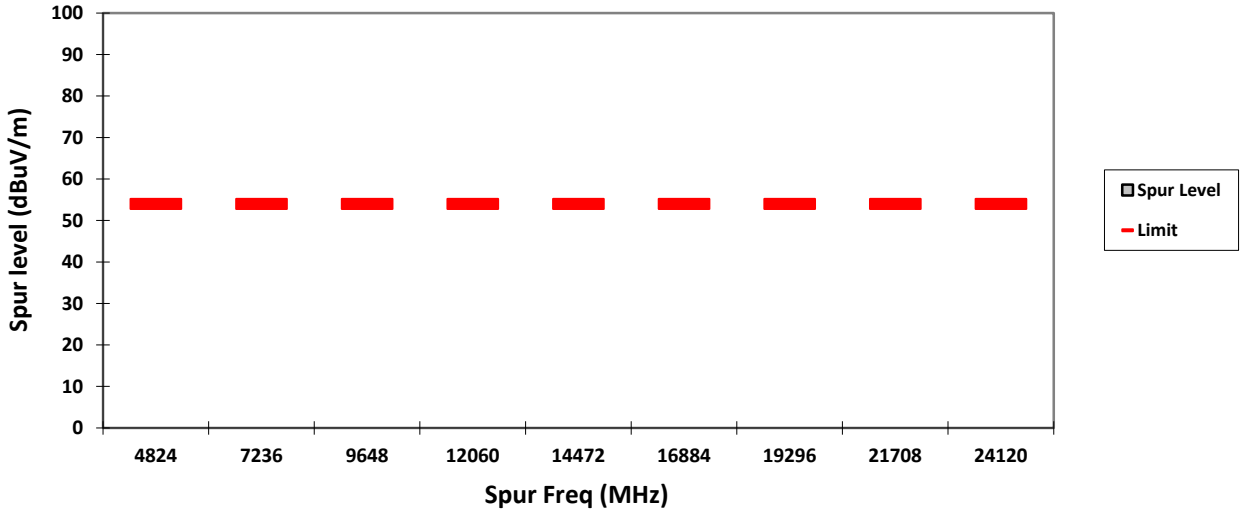
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Mid Test Frequency: 2437.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11b)

Radiated Emission (Mid Channel) tabular data

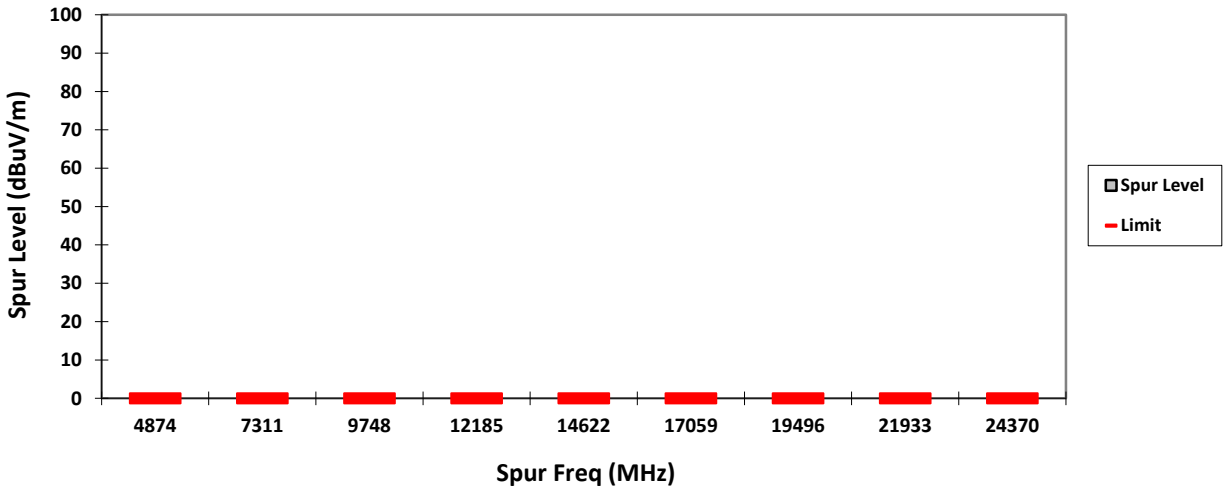
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4874	-	41.1422**	**	-	74	54	-	32.86**	-	-
7311	-	45.0593**	**	-	74	54	-	28.94**	-	-
9748	-	45.2888**	**	-	74	54	-	28.71**	-	-
12185	-	50.1796**	**	-	74	54	-	23.82**	-	-
14622	-	51.9131**	**	-	74	54	-	22.09**	-	-
17059	-	55.1612**	**	-	74	54	-	18.84**	-	-
19496	-	33.3243**	**	-	74	54	-	40.68**	-	-
21933	-	34.8107**	**	-	74	54	-	39.19**	-	-
24370	-	34.1138**	**	-	74	54	-	39.89**	-	-
Horizontal Radiated Emission Result										
4874	-	40.3634**	**	-	74	54	-	33.64**	-	-
7311	-	45.4090**	**	-	74	54	-	28.59**	-	-
9748	-	44.8955**	**	-	74	54	-	29.10**	-	-
12185	-	49.6120**	**	-	74	54	-	24.39**	-	-
14622	-	50.9520**	**	-	74	54	-	23.05**	-	-
17059	-	54.6968**	**	-	74	54	-	19.30**	-	-
19496	-	32.8345**	**	-	74	54	-	41.17**	-	-
21933	-	35.2595**	**	-	74	54	-	38.74**	-	-
24370	-	33.4744**	**	-	74	54	-	40.53**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

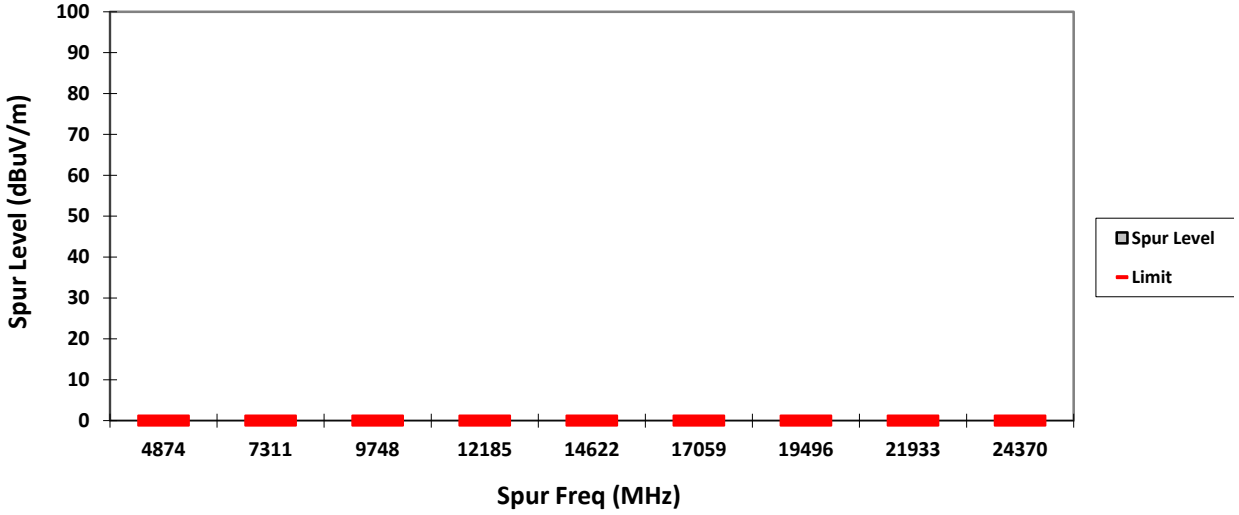
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Wed, Jun 07, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

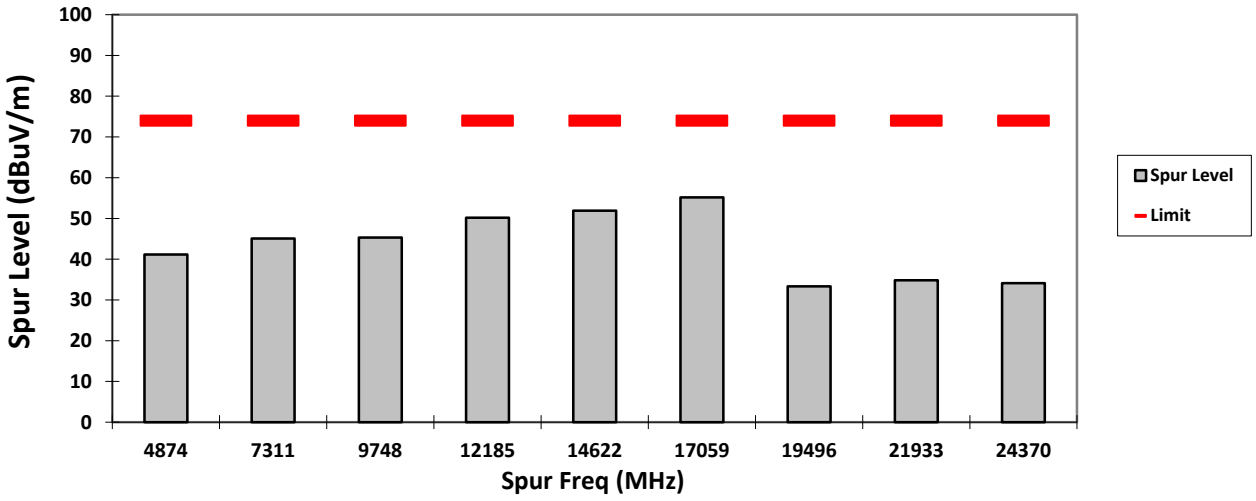
VERTICAL, QPK



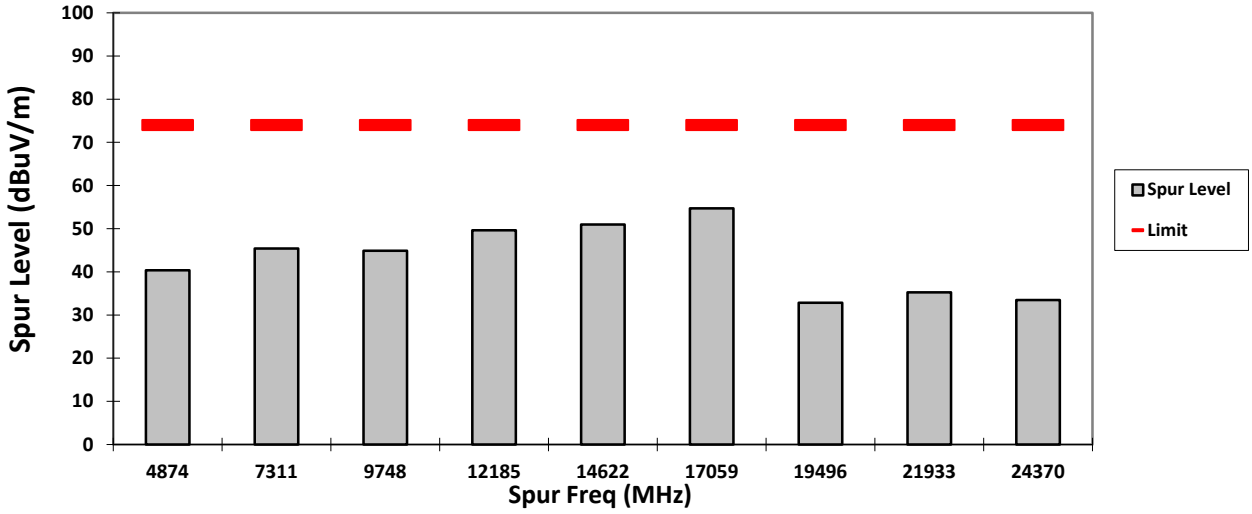
HORIZONTAL, QPK



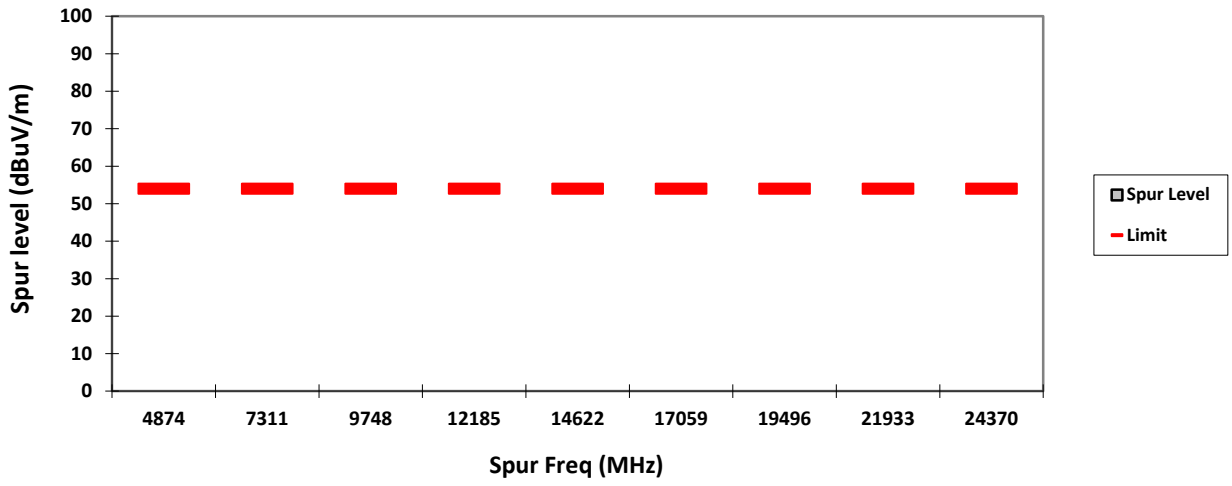
VERTICAL, PK



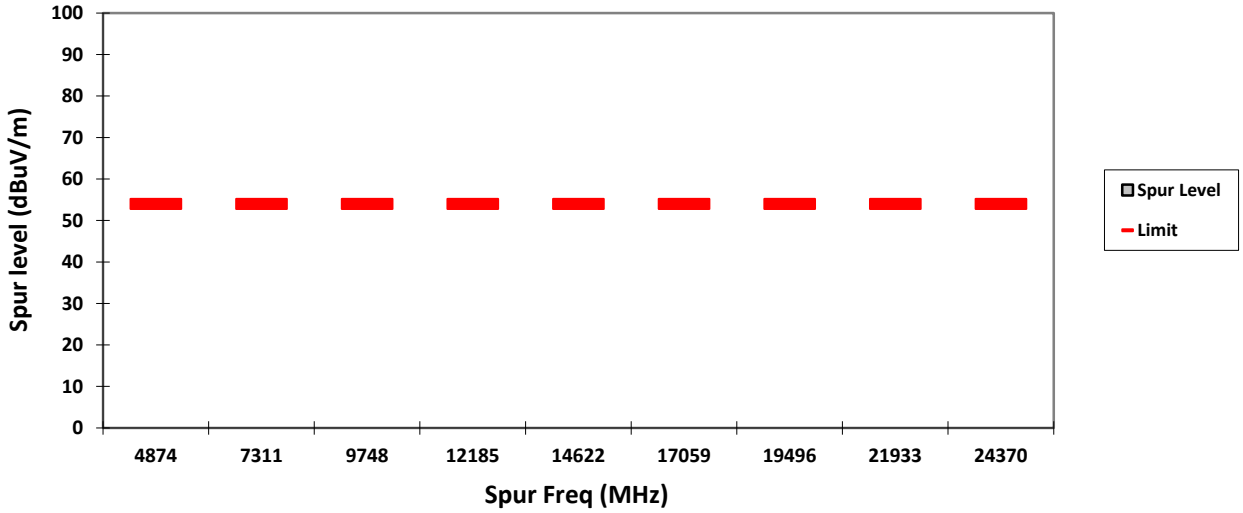
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: High Test Frequency: 2462.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11b)

Radiated Emission (High Channel) tabular data

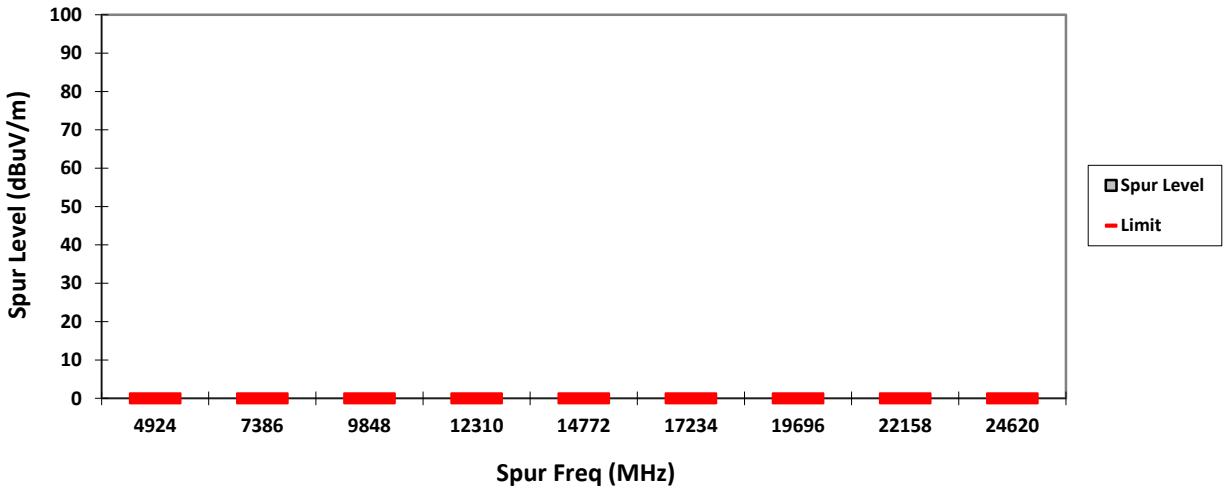
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4924	-	41.4641**	**	-	74	54	-	32.54**	-	-
7386	-	45.0838**	**	-	74	54	-	28.92**	-	-
9848	-	42.9956**	**	-	74	54	-	31.00**	-	-
12310	-	51.3198**	**	-	74	54	-	22.68**	-	-
14772	-	52.1447**	**	-	74	54	-	21.86**	-	-
17234	-	56.5835**	**	-	74	54	-	17.42**	-	-
19696	-	33.5284**	**	-	74	54	-	40.47**	-	-
22158	-	34.2780**	**	-	74	54	-	39.72**	-	-
24620	-	35.5600**	**	-	74	54	-	38.44**	-	-
Horizontal Radiated Emission Result										
4924	-	41.0108**	**	-	74	54	-	32.99**	-	-
7386	-	44.8574**	**	-	74	54	-	29.14**	-	-
9848	-	43.8373**	**	-	74	54	-	30.16**	-	-
12310	-	51.7144**	**	-	74	54	-	22.29**	-	-
14772	-	51.6559**	**	-	74	54	-	22.34**	-	-
17234	-	56.2395**	**	-	74	54	-	17.76**	-	-
19696	-	33.7701**	**	-	74	54	-	40.23**	-	-
22158	-	33.7806**	**	-	74	54	-	40.22**	-	-
24620	-	34.7650**	**	-	74	54	-	39.23**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

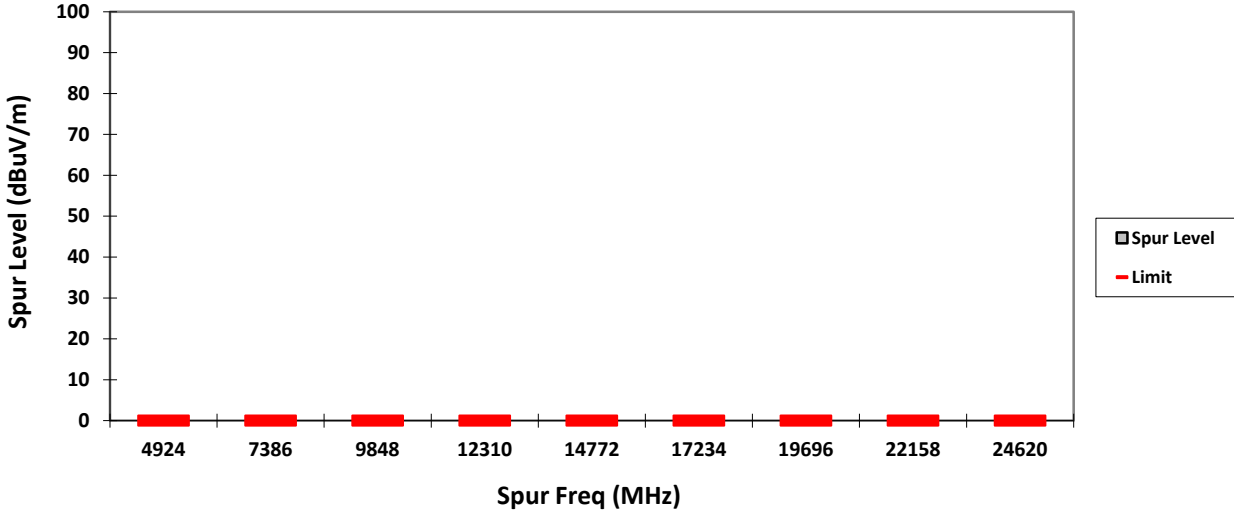
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Wed, Jun 07, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

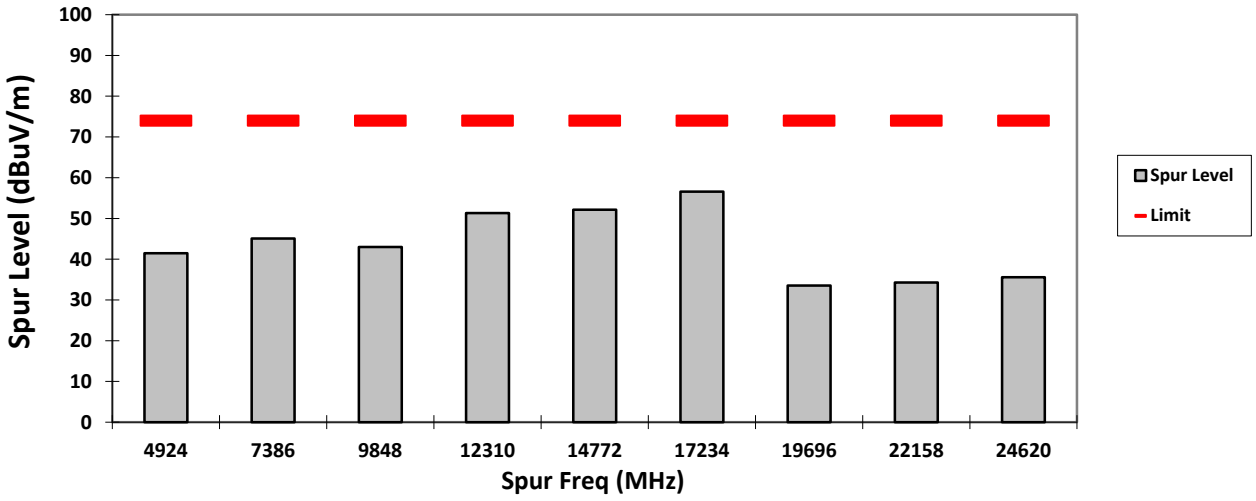
VERTICAL, QPK



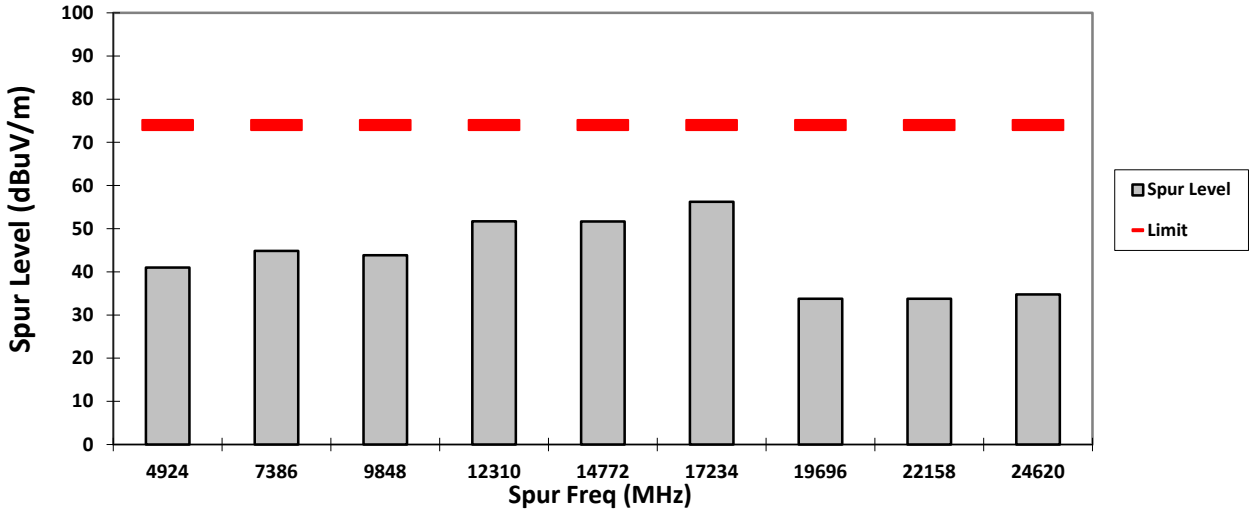
HORIZONTAL, QPK



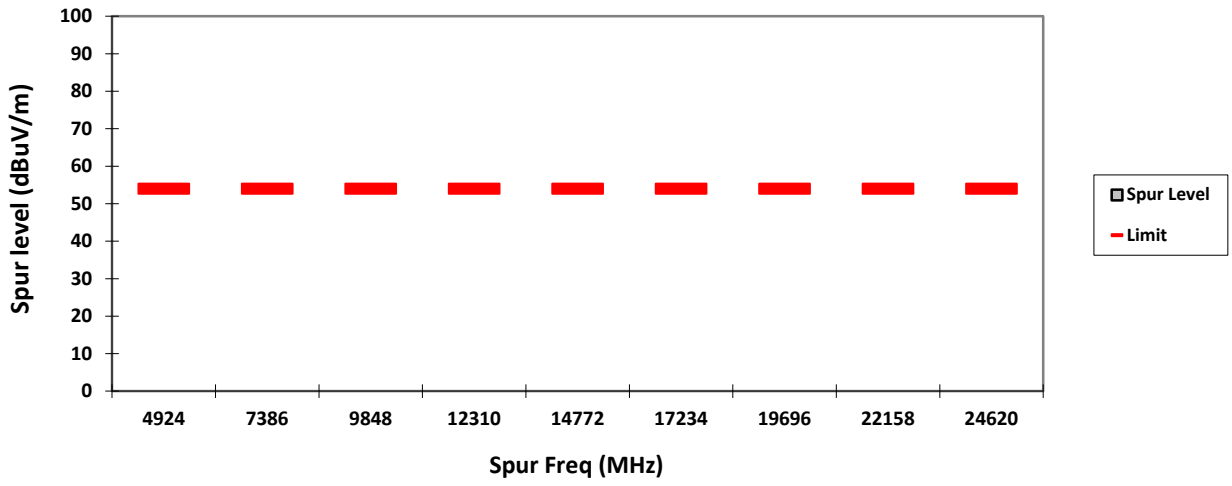
VERTICAL, PK



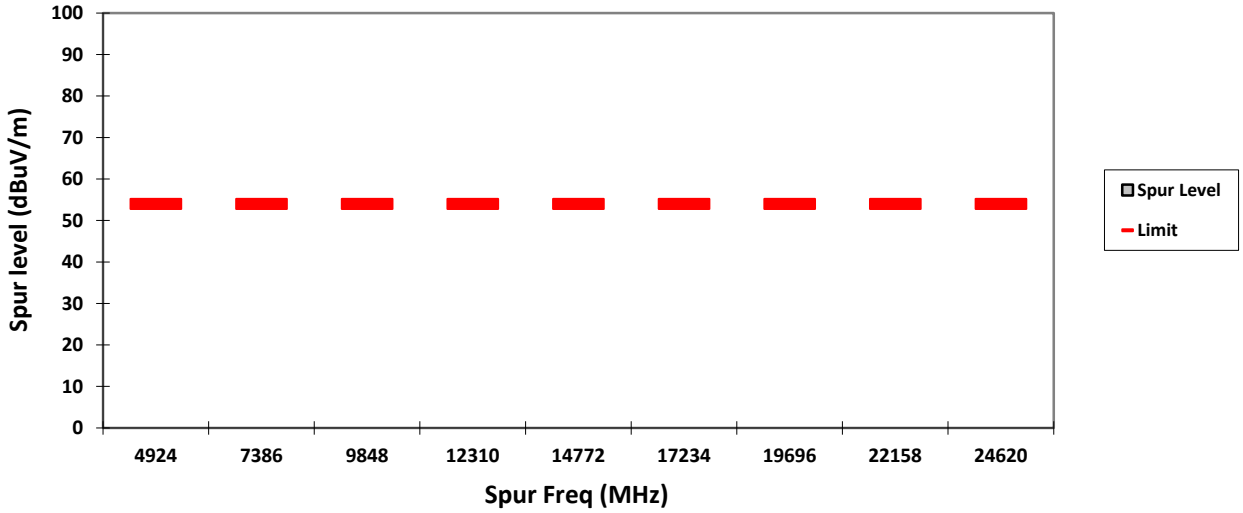
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Low Test Frequency: 2412.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11g)

Radiated Emission (Low Channel) tabular data

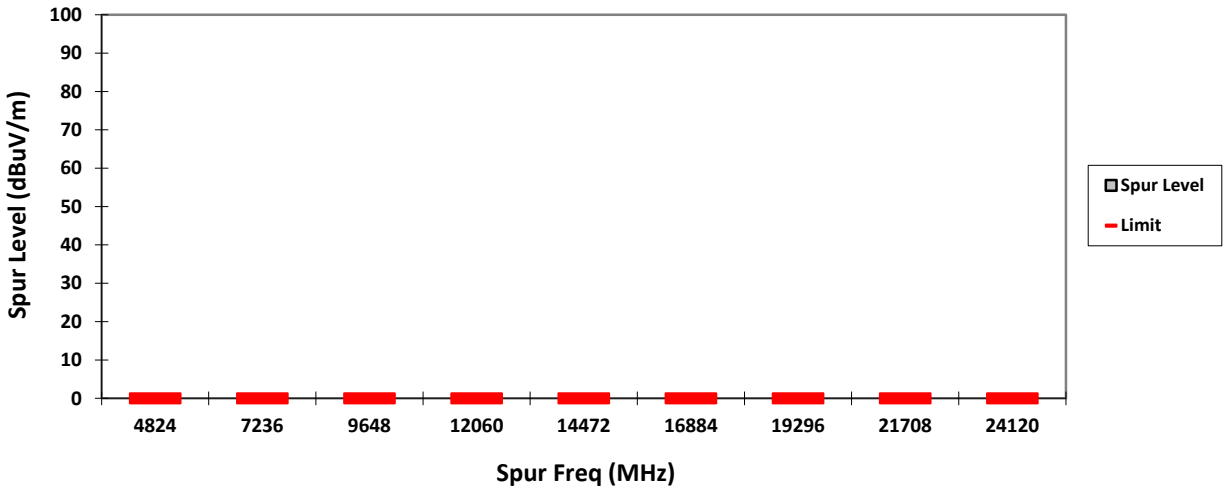
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4824	-	40.4808**	**	-	74	54	-	33.52**	-	-
7236	-	46.2085**	**	-	74	54	-	27.79**	-	-
9648	-	45.8903**	**	-	74	54	-	28.11**	-	-
12060	-	49.2044**	**	-	74	54	-	24.80**	-	-
14472	-	52.5172**	**	-	74	54	-	21.48**	-	-
16884	-	54.4938**	**	-	74	54	-	19.51**	-	-
19296	-	34.0099**	**	-	74	54	-	39.99**	-	-
21708	-	34.0098**	**	-	74	54	-	39.99**	-	-
24120	-	34.0484**	**	-	74	54	-	39.95**	-	-
Horizontal Radiated Emission Result										
4824	-	40.3526**	**	-	74	54	-	33.65**	-	-
7236	-	45.5833**	**	-	74	54	-	28.42**	-	-
9648	-	46.3706**	**	-	74	54	-	27.63**	-	-
12060	-	48.7010**	**	-	74	54	-	25.30**	-	-
14472	-	51.8095**	**	-	74	54	-	22.19**	-	-
16884	-	53.6121**	**	-	74	54	-	20.39**	-	-
19296	-	34.2211**	**	-	74	54	-	39.78**	-	-
21708	-	33.9765**	**	-	74	54	-	40.02**	-	-
24120	-	33.7516**	**	-	74	54	-	40.25**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

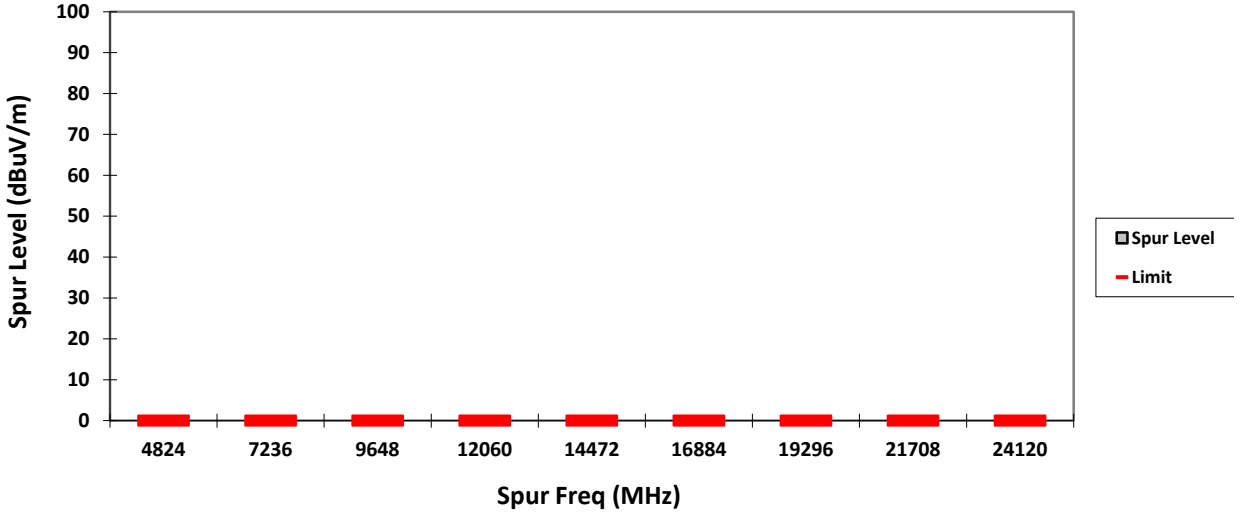
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Wed, Jun 07, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

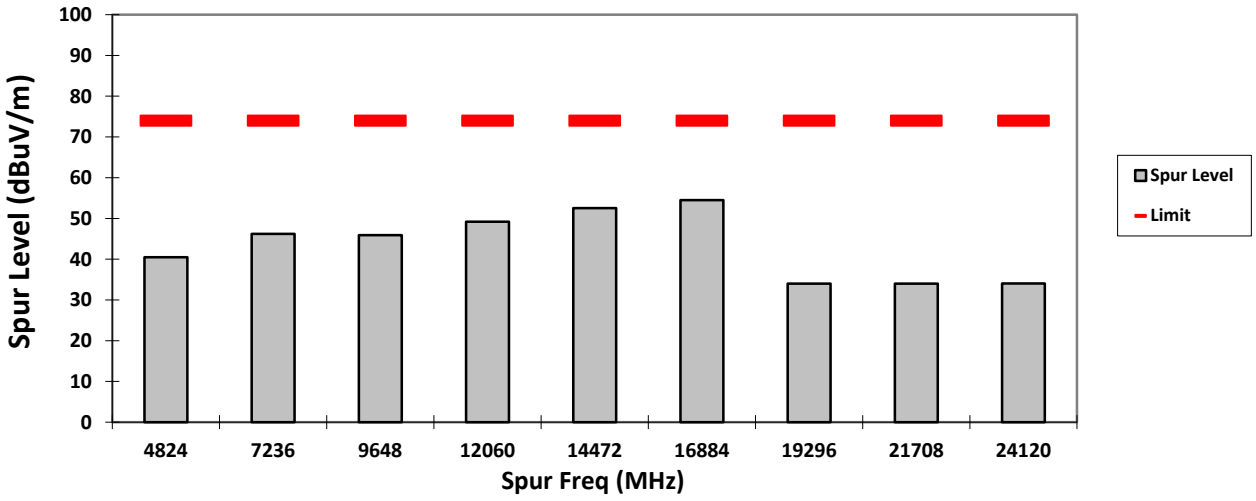
VERTICAL, QPK



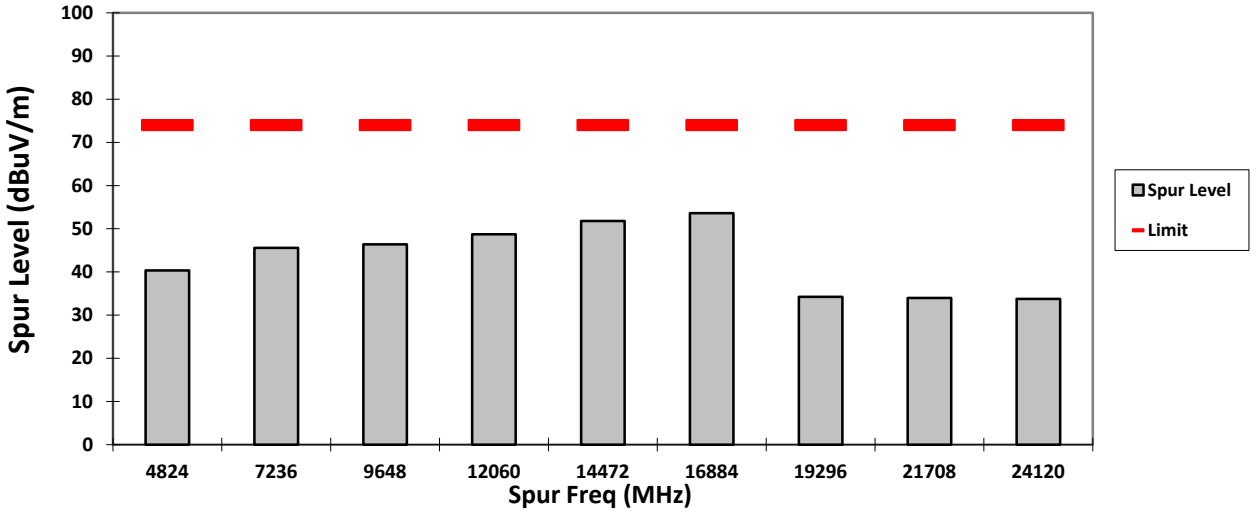
HORIZONTAL, QPK



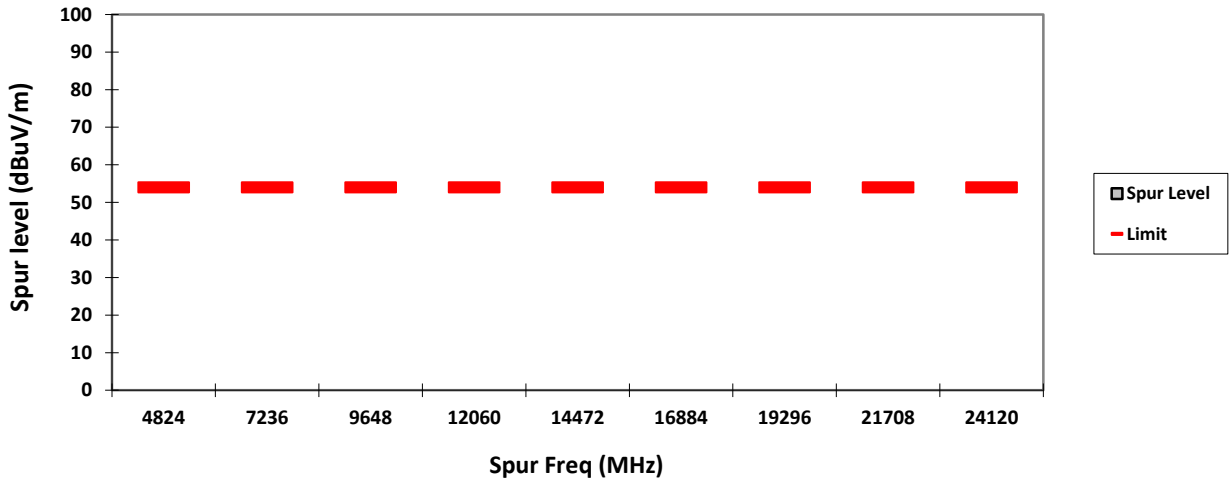
VERTICAL, PK



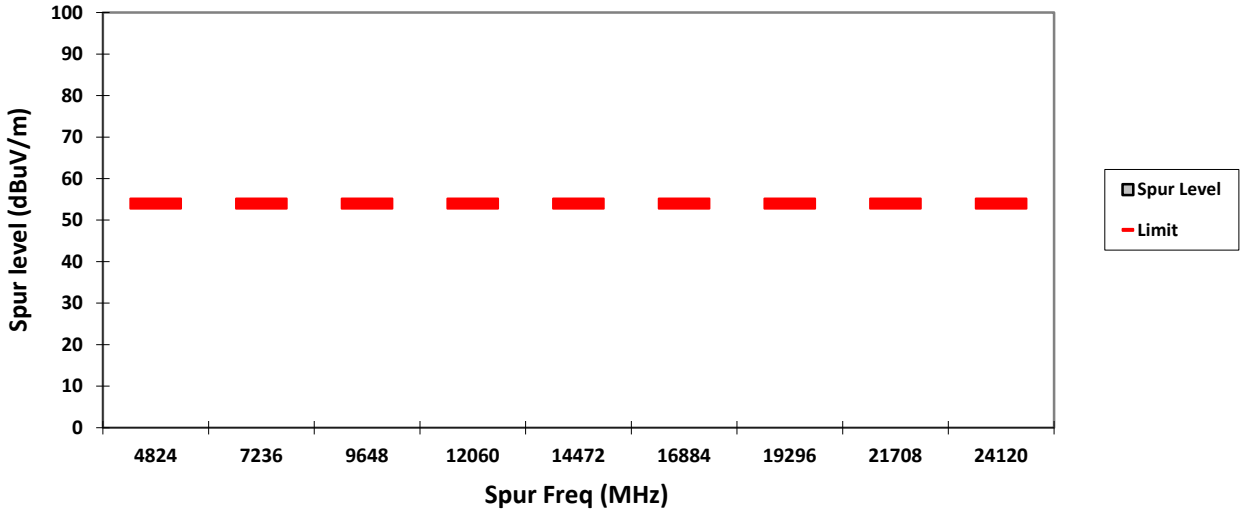
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Mid Test Frequency: 2437.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11g)

Radiated Emission (Mid Channel) tabular data

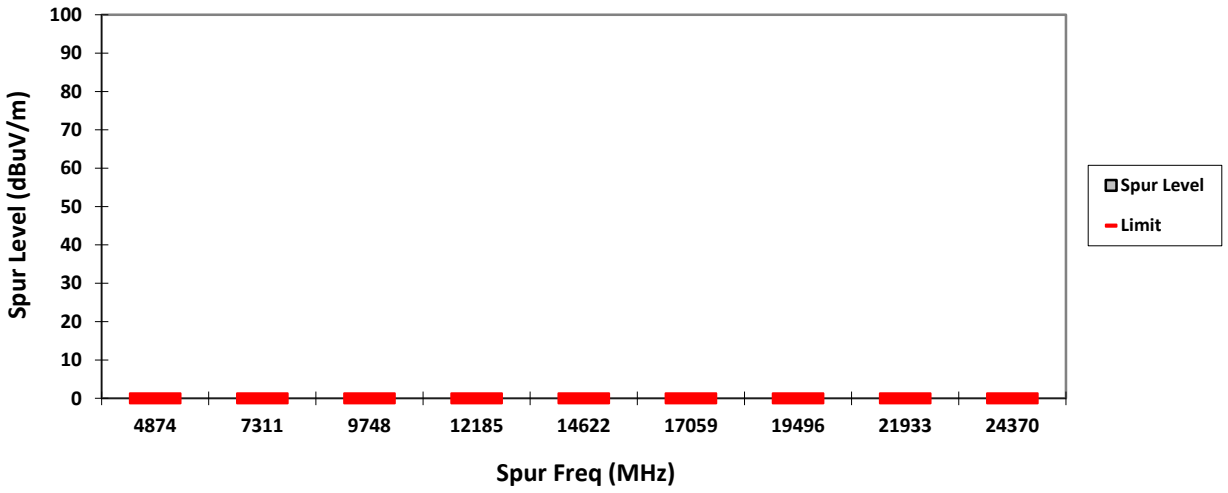
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4874	-	41.2841**	**	-	74	54	-	32.72**	-	-
7311	-	45.6076**	**	-	74	54	-	28.39**	-	-
9748	-	45.2547**	**	-	74	54	-	28.75**	-	-
12185	-	50.4568**	**	-	74	54	-	23.54**	-	-
14622	-	51.9402**	**	-	74	54	-	22.06**	-	-
17059	-	56.4099**	**	-	74	54	-	17.59**	-	-
19496	-	32.7068**	**	-	74	54	-	41.29**	-	-
21933	-	35.3152**	**	-	74	54	-	38.68**	-	-
24370	-	33.4702**	**	-	74	54	-	40.53**	-	-
Horizontal Radiated Emission Result										
4874	-	39.7826**	**	-	74	54	-	34.22**	-	-
7311	-	45.2252**	**	-	74	54	-	28.77**	-	-
9748	-	45.3660**	**	-	74	54	-	28.63**	-	-
12185	-	50.8159**	**	-	74	54	-	23.18**	-	-
14622	-	51.4006**	**	-	74	54	-	22.60**	-	-
17059	-	55.7079**	**	-	74	54	-	18.29**	-	-
19496	-	32.8103**	**	-	74	54	-	41.19**	-	-
21933	-	35.3575**	**	-	74	54	-	38.64**	-	-
24370	-	33.7796**	**	-	74	54	-	40.22**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

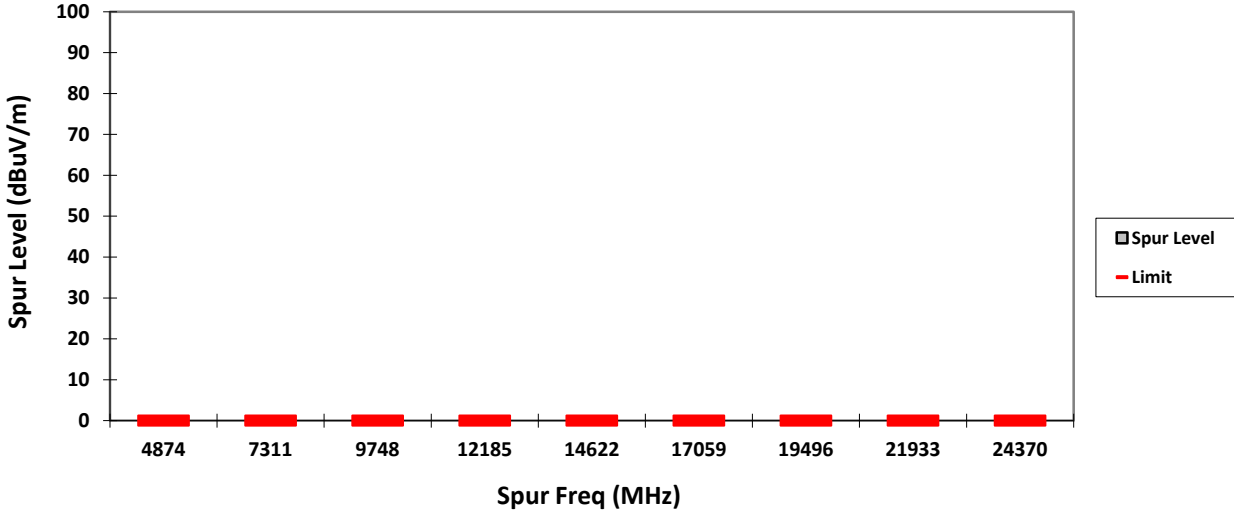
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Wed, Jun 07, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

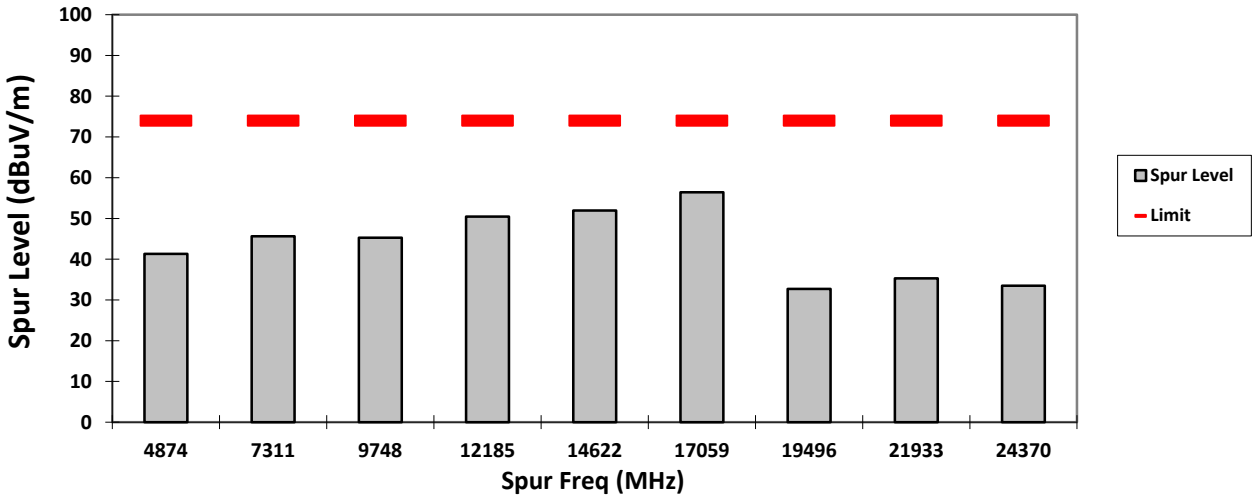
VERTICAL, QPK



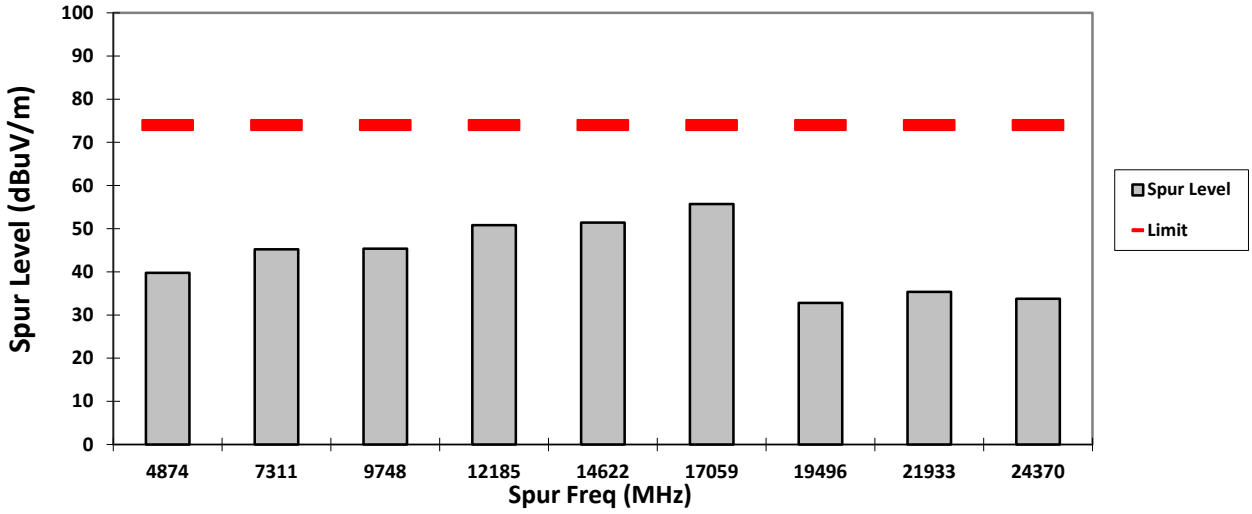
HORIZONTAL, QPK



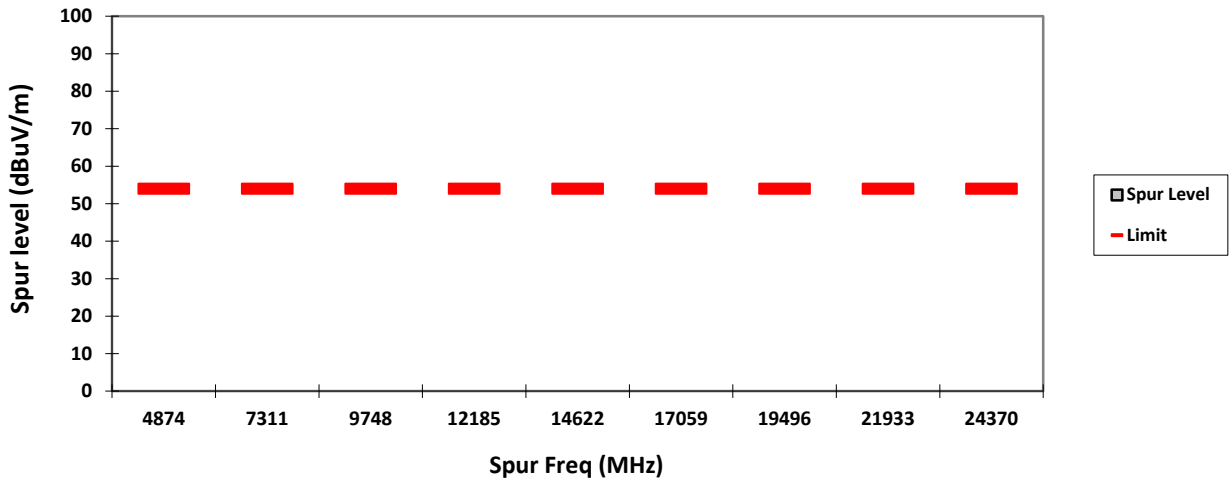
VERTICAL, PK



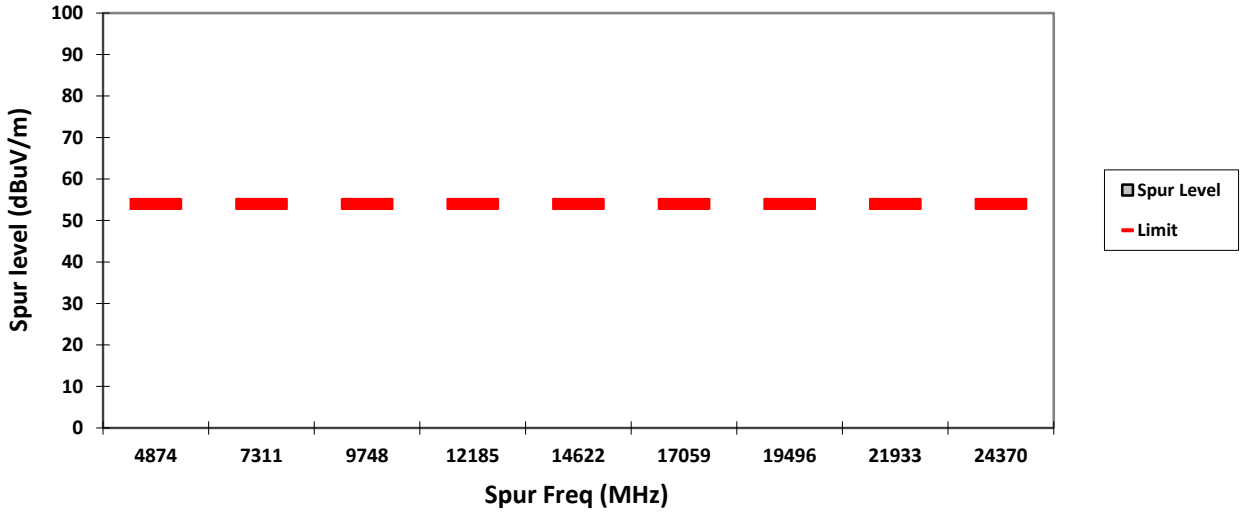
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: High Test Frequency: 2462.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11g)

Radiated Emission (High Channel) tabular data

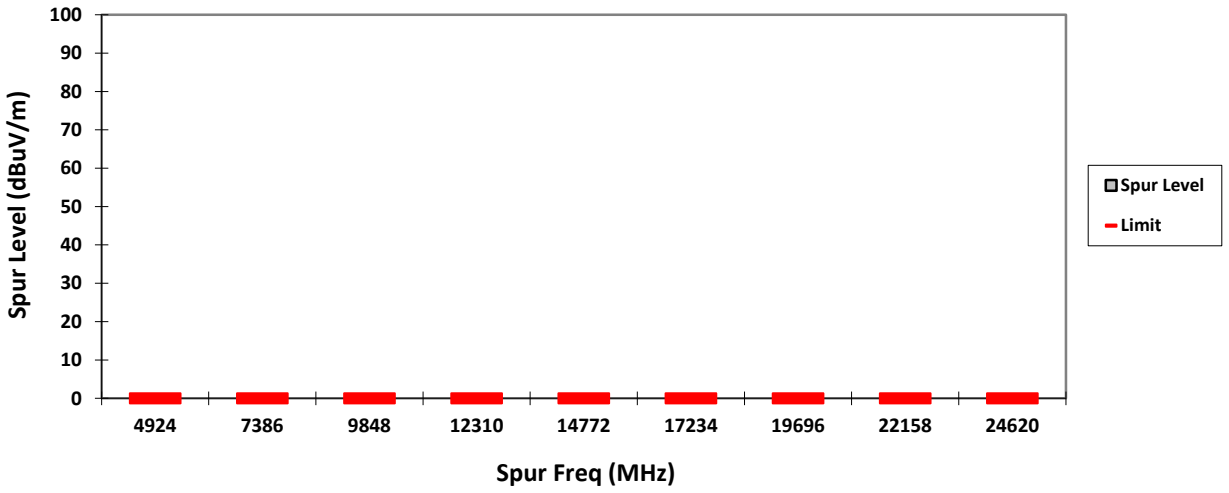
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4924	-	40.7403**	**	-	74	54	-	33.26**	-	-
7386	-	44.5661**	**	-	74	54	-	29.43**	-	-
9848	-	43.8143**	**	-	74	54	-	30.19**	-	-
12310	-	51.5273**	**	-	74	54	-	22.47**	-	-
14772	-	51.9033**	**	-	74	54	-	22.10**	-	-
17234	-	56.5774**	**	-	74	54	-	17.42**	-	-
19696	-	33.4256**	**	-	74	54	-	40.57**	-	-
22158	-	34.5974**	**	-	74	54	-	39.40**	-	-
24620	-	35.1614**	**	-	74	54	-	38.84**	-	-
Horizontal Radiated Emission Result										
4924	-	41.3010**	**	-	74	54	-	32.70**	-	-
7386	-	45.0247**	**	-	74	54	-	28.98**	-	-
9848	-	43.1362**	**	-	74	54	-	30.86**	-	-
12310	-	51.5599**	**	-	74	54	-	22.44**	-	-
14772	-	52.3246**	**	-	74	54	-	21.68**	-	-
17234	-	57.1185**	**	-	74	54	-	16.88**	-	-
19696	-	33.4112**	**	-	74	54	-	40.59**	-	-
22158	-	34.2253**	**	-	74	54	-	39.77**	-	-
24620	-	35.3594**	**	-	74	54	-	38.64**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

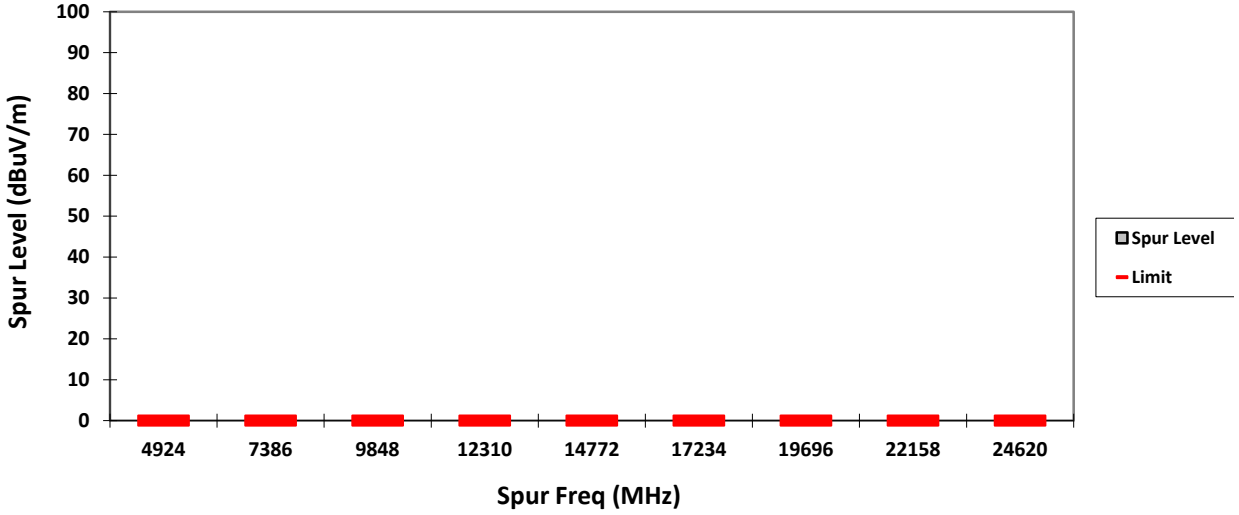
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Thu, Jun 08, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

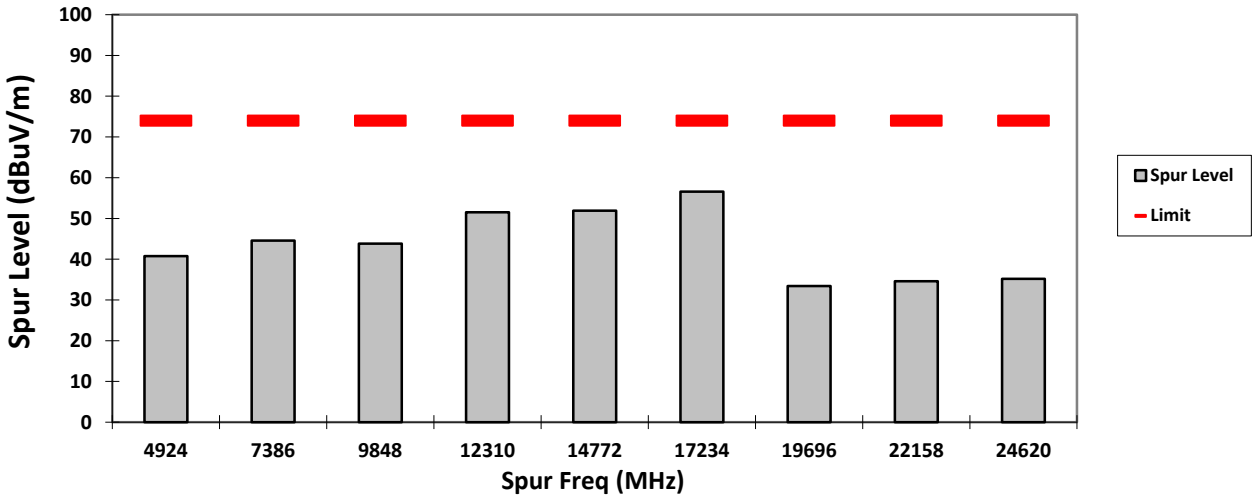
VERTICAL, QPK



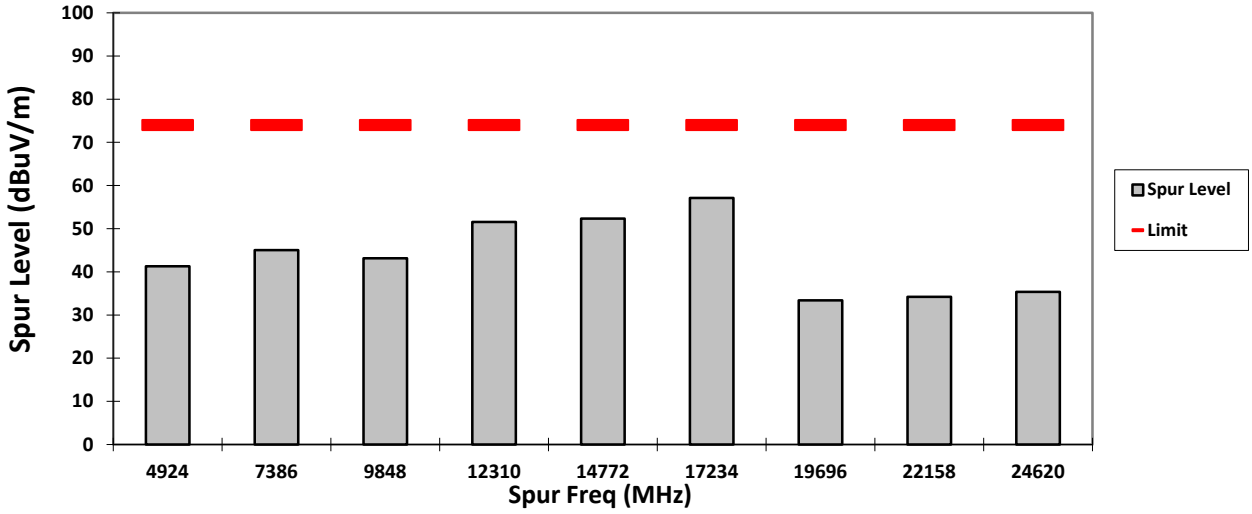
HORIZONTAL, QPK



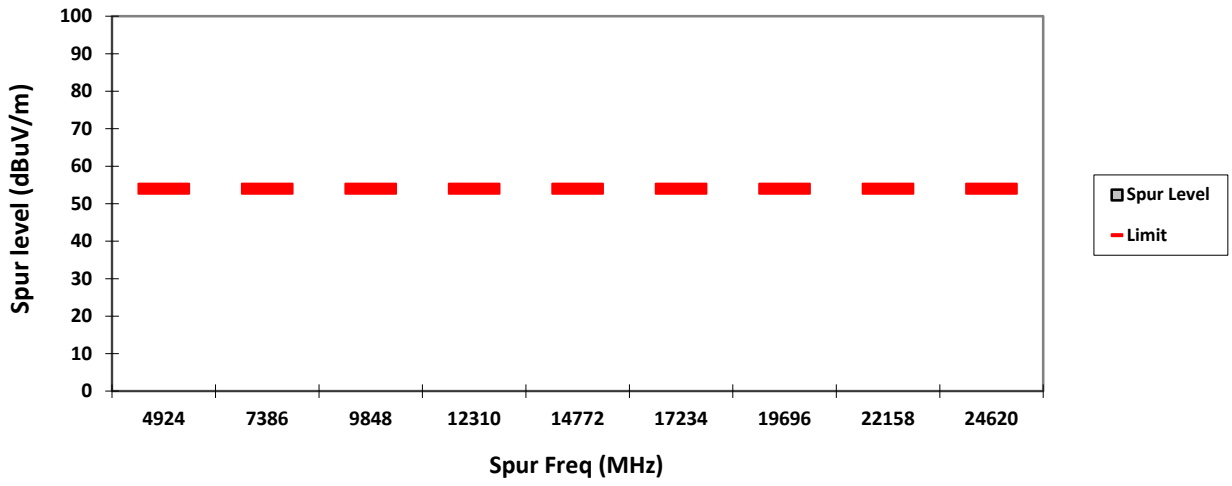
VERTICAL, PK



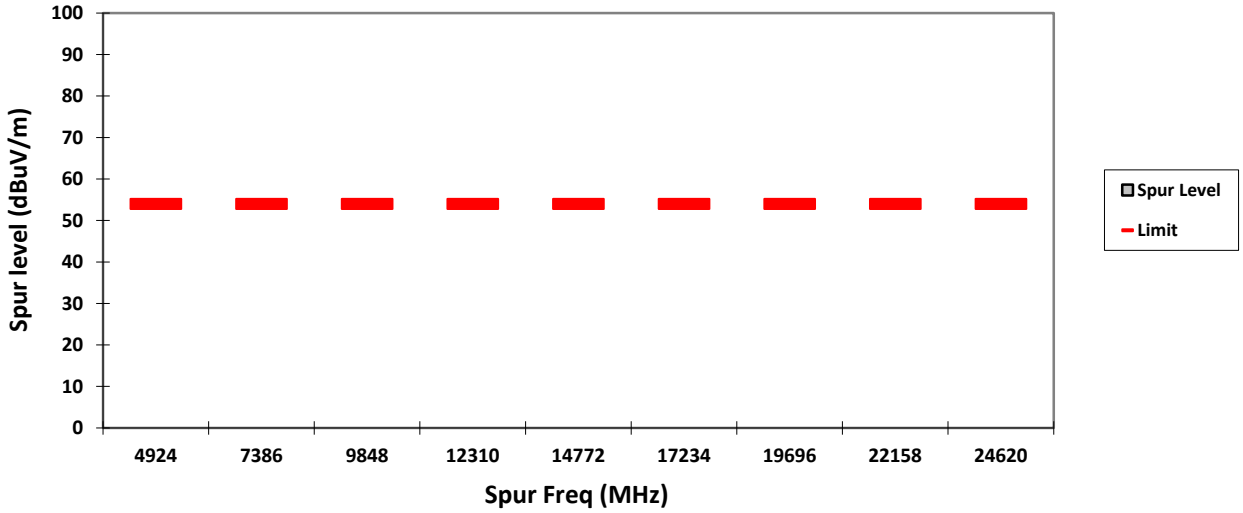
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Low Test Frequency: 2412.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11n)

Radiated Emission (Low Channel) tabular data

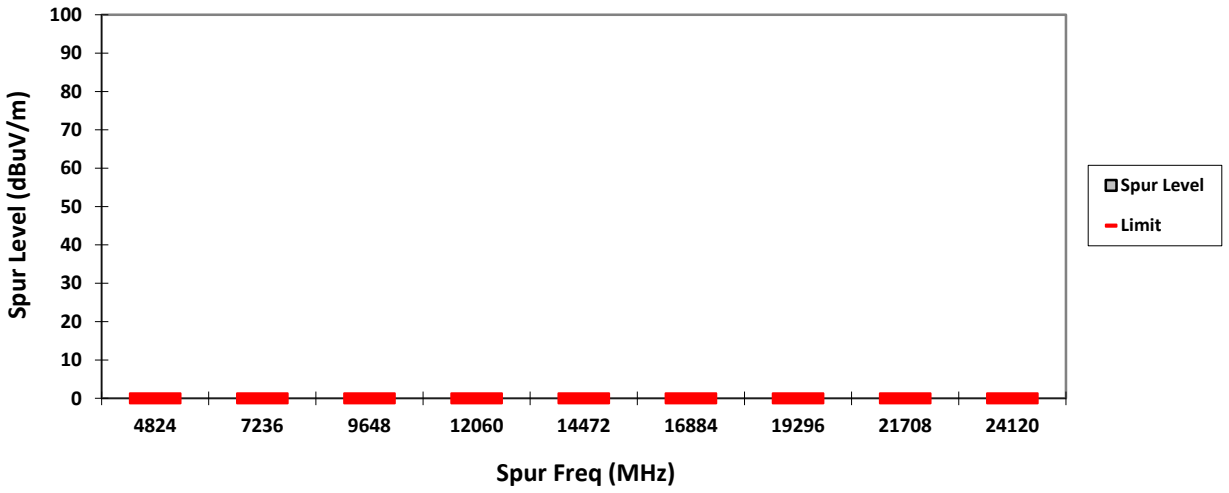
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4824	-	40.3347**	**	-	74	54	-	33.67**	-	-
7236	-	45.3197**	**	-	74	54	-	28.68**	-	-
9648	-	46.1322**	**	-	74	54	-	27.87**	-	-
12060	-	48.7482**	**	-	74	54	-	25.25**	-	-
14472	-	51.7985**	**	-	74	54	-	22.20**	-	-
16884	-	53.7883**	**	-	74	54	-	20.21**	-	-
19296	-	33.2377**	**	-	74	54	-	40.76**	-	-
21708	-	34.4406**	**	-	74	54	-	39.56**	-	-
24120	-	33.9566**	**	-	74	54	-	40.04**	-	-
Horizontal Radiated Emission Result										
4824	-	40.3010**	**	-	74	54	-	33.70**	-	-
7236	-	45.1389**	**	-	74	54	-	28.86**	-	-
9648	-	46.1943**	**	-	74	54	-	27.81**	-	-
12060	-	49.4372**	**	-	74	54	-	24.56**	-	-
14472	-	52.0196**	**	-	74	54	-	21.98**	-	-
16884	-	53.8102**	**	-	74	54	-	20.19**	-	-
19296	-	33.8744**	**	-	74	54	-	40.13**	-	-
21708	-	33.5017**	**	-	74	54	-	40.50**	-	-
24120	-	33.7259**	**	-	74	54	-	40.27**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

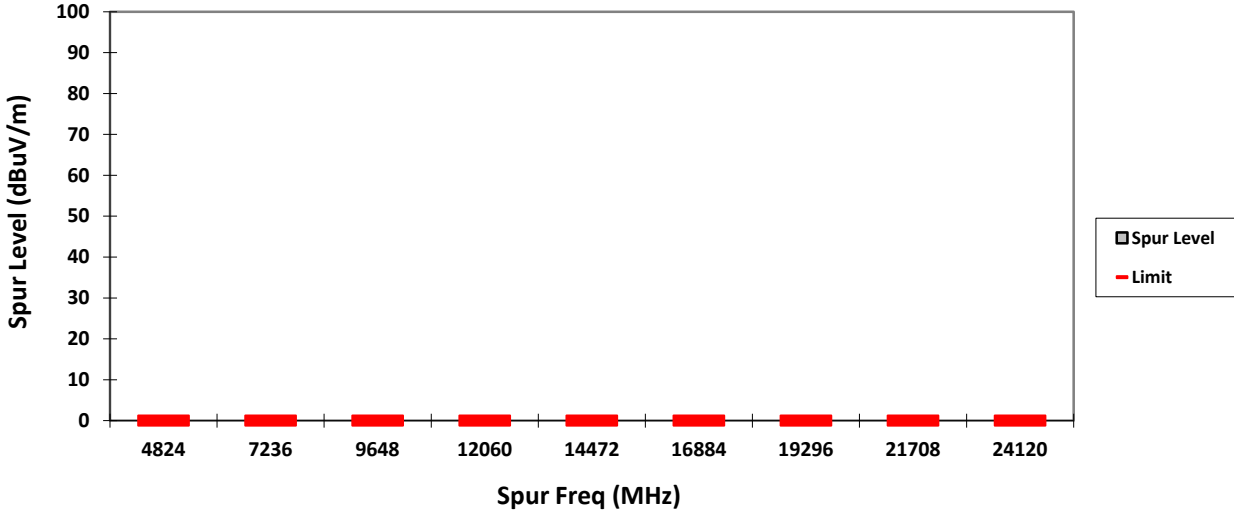
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Thu, Jun 08, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

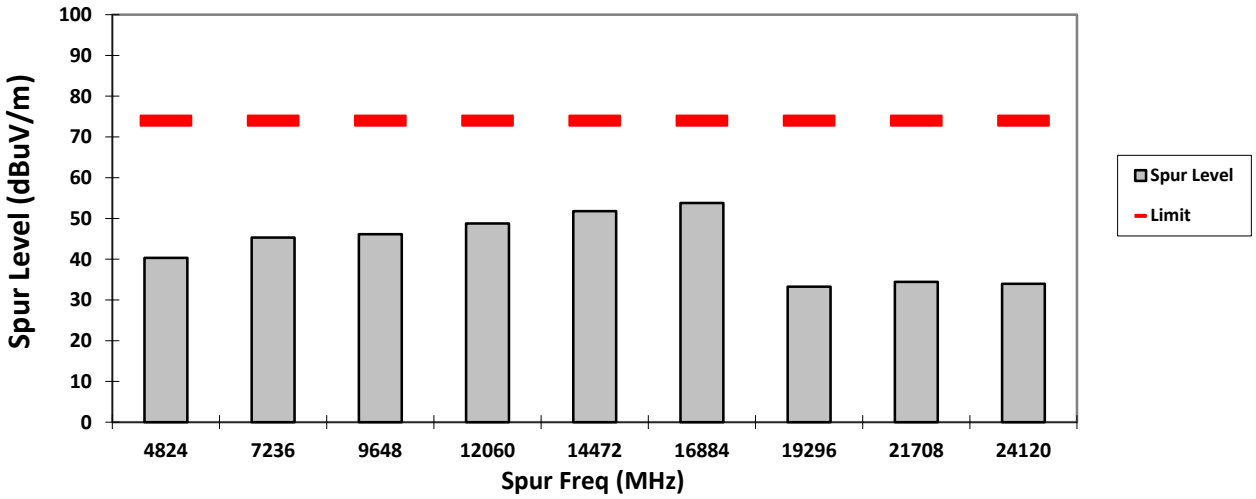
VERTICAL, QPK



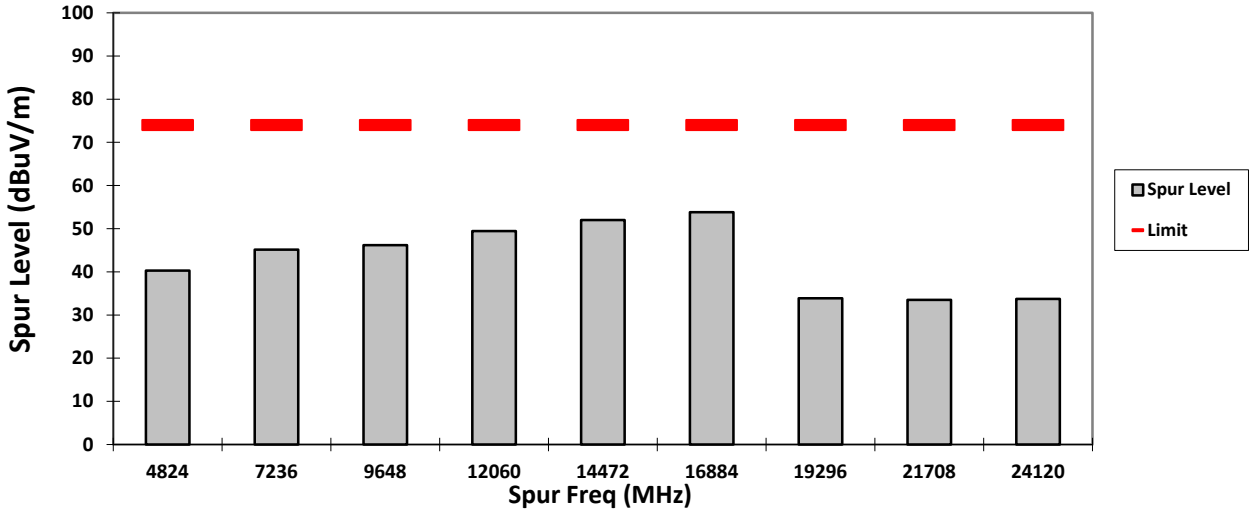
HORIZONTAL, QPK



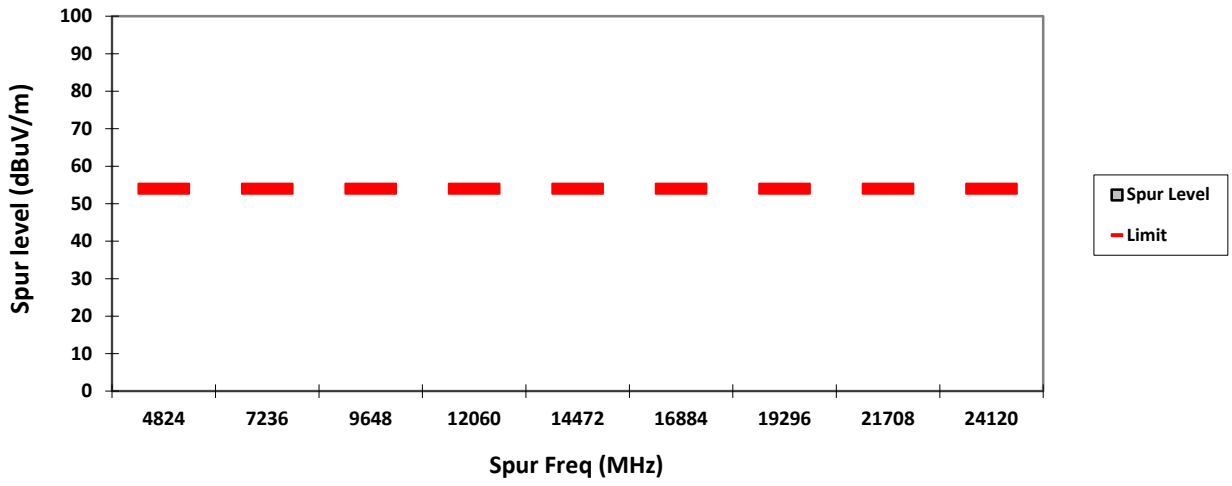
VERTICAL, PK



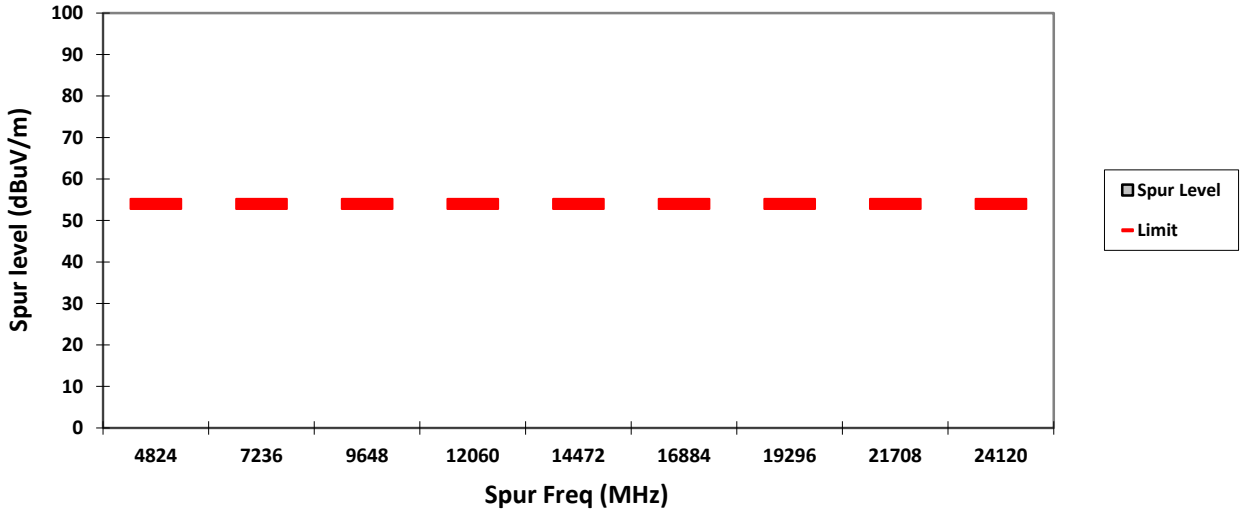
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: Mid Test Frequency: 2437.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11n)

Radiated Emission (Mid Channel) tabular data

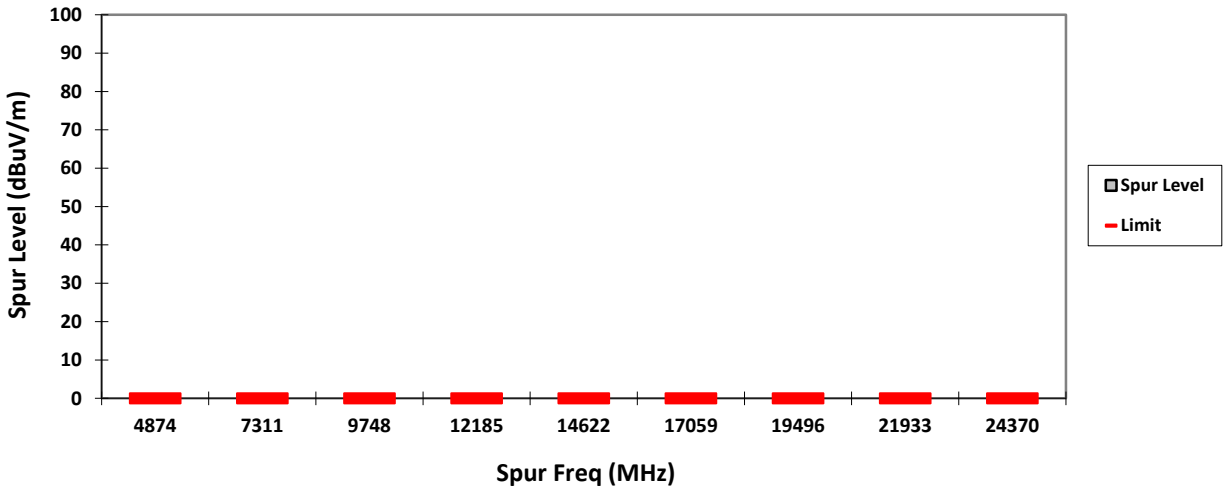
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4874	-	40.5936**	**	-	74	54	-	33.41**	-	-
7311	-	46.0890**	**	-	74	54	-	27.91**	-	-
9748	-	44.9132**	**	-	74	54	-	29.09**	-	-
12185	-	50.6201**	**	-	74	54	-	23.38**	-	-
14622	-	52.0956**	**	-	74	54	-	21.90**	-	-
17059	-	55.0855**	**	-	74	54	-	18.91**	-	-
19496	-	33.4193**	**	-	74	54	-	40.58**	-	-
21933	-	34.9885**	**	-	74	54	-	39.01**	-	-
24370	-	33.6558**	**	-	74	54	-	40.34**	-	-
Horizontal Radiated Emission Result										
4874	-	41.0816**	**	-	74	54	-	32.92**	-	-
7311	-	45.8388**	**	-	74	54	-	28.16**	-	-
9748	-	45.1018**	**	-	74	54	-	28.90**	-	-
12185	-	50.0128**	**	-	74	54	-	23.99**	-	-
14622	-	51.2798**	**	-	74	54	-	22.72**	-	-
17059	-	55.1865**	**	-	74	54	-	18.81**	-	-
19496	-	32.9805**	**	-	74	54	-	41.02**	-	-
21933	-	35.2788**	**	-	74	54	-	38.72**	-	-
24370	-	33.5346**	**	-	74	54	-	40.47**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

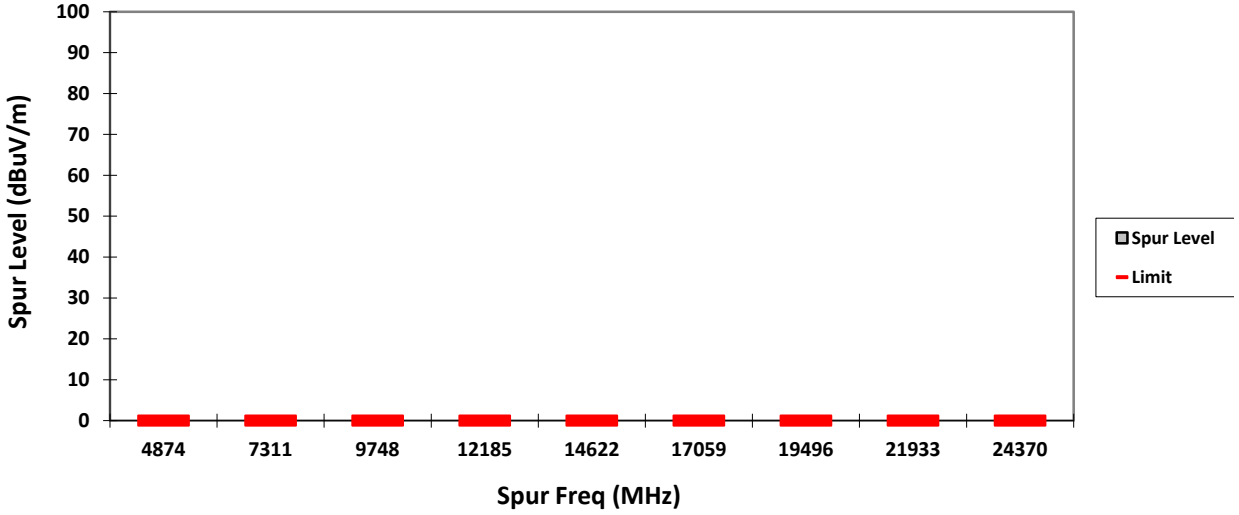
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Thu, Jun 08, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

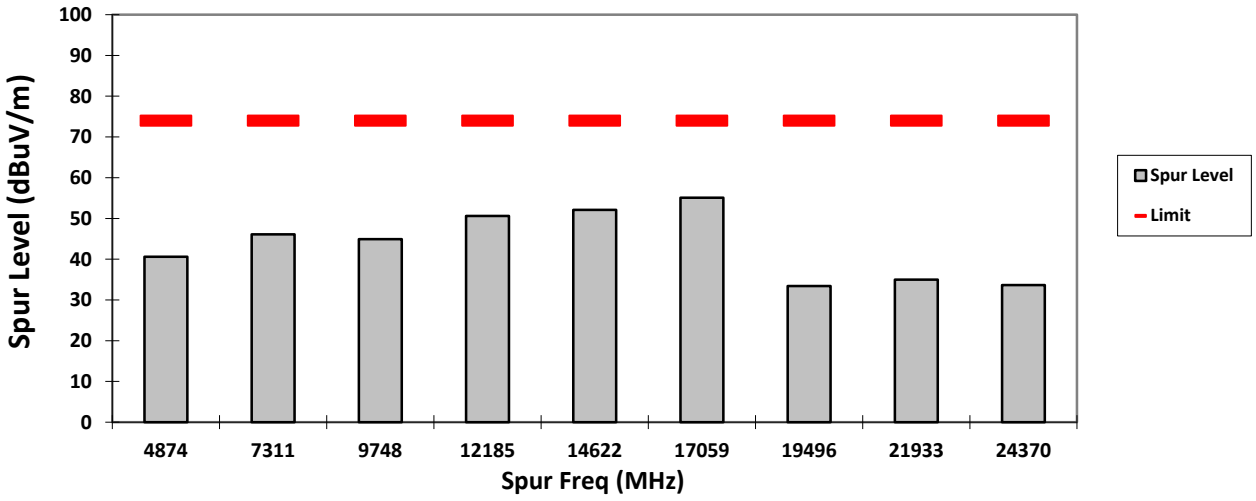
VERTICAL, QPK



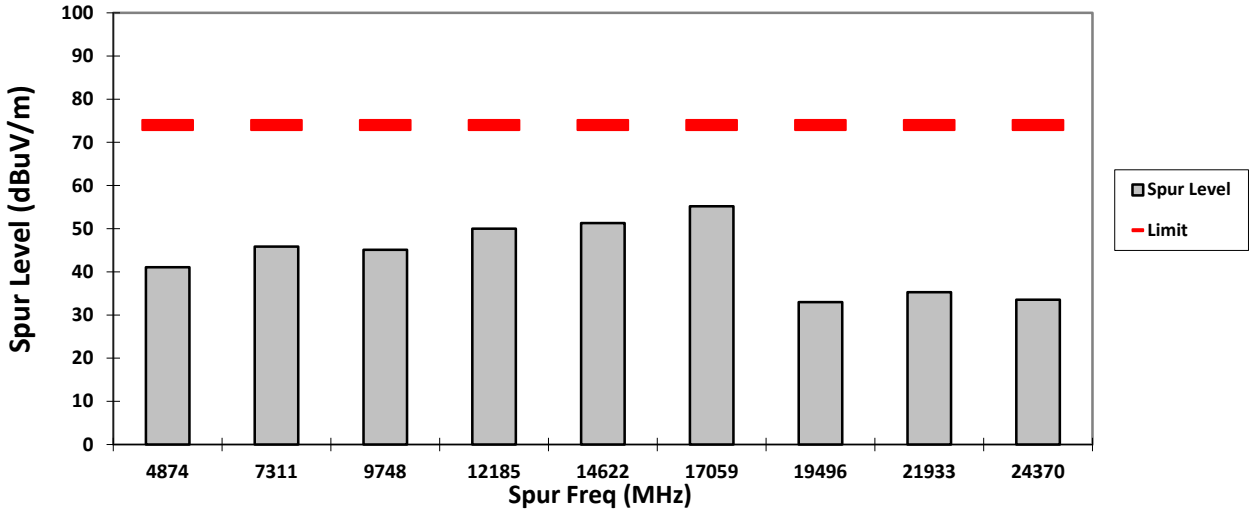
HORIZONTAL, QPK



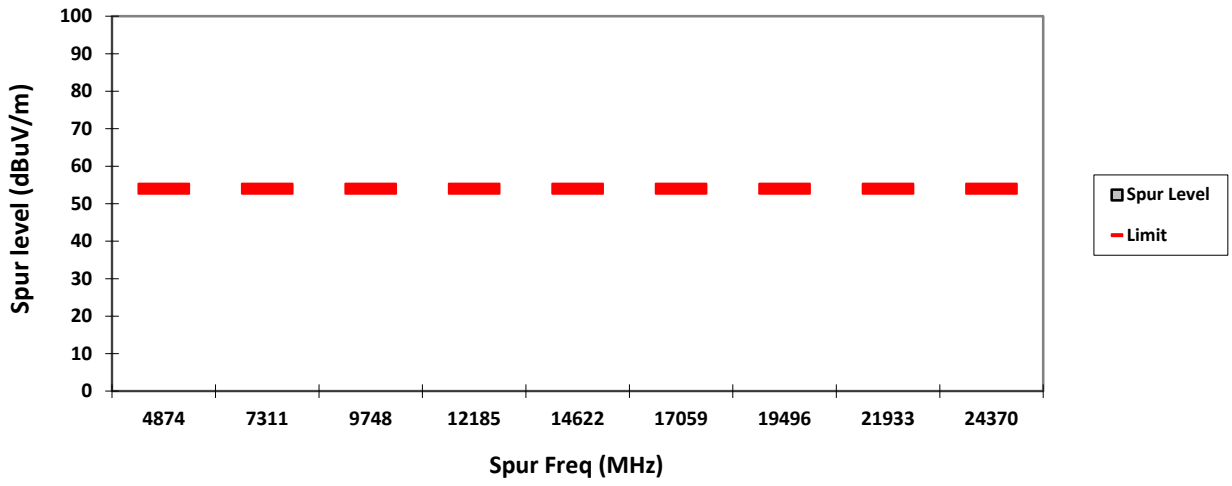
VERTICAL, PK



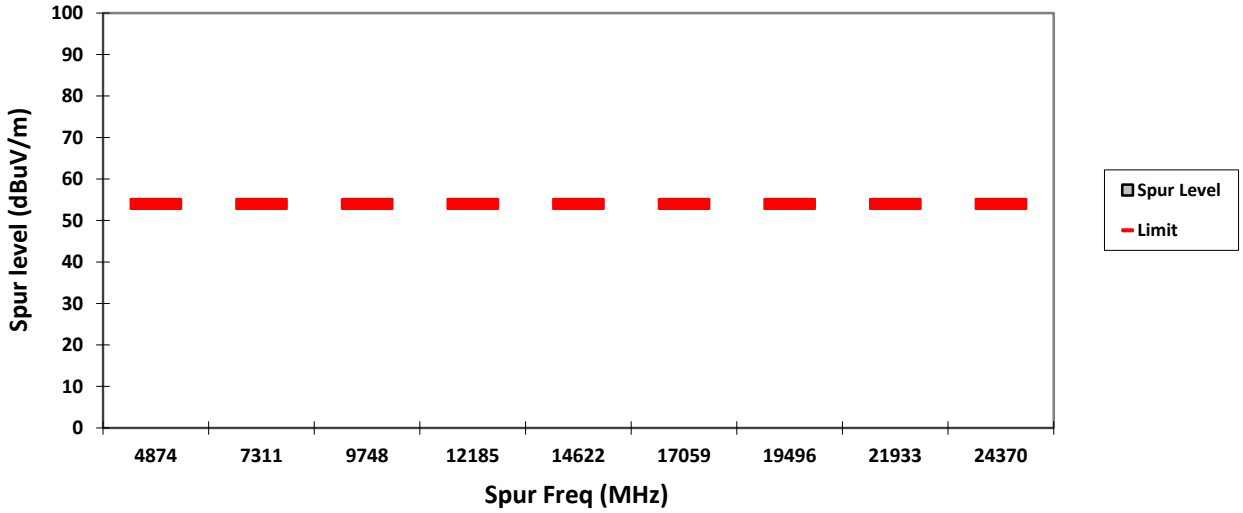
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: WIFI SAC Transmitter Radiated Emission
Model#: AAH88JCD9SA2AN S/N: 130TTK0360 EMC SR ID#: 06406-EMC-00003
Battery: PMNN4468A Accessory: NA
Test Channel: High Test Frequency: 2462.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: X-Plane (802.11n)

Radiated Emission (High Channel) tabular data

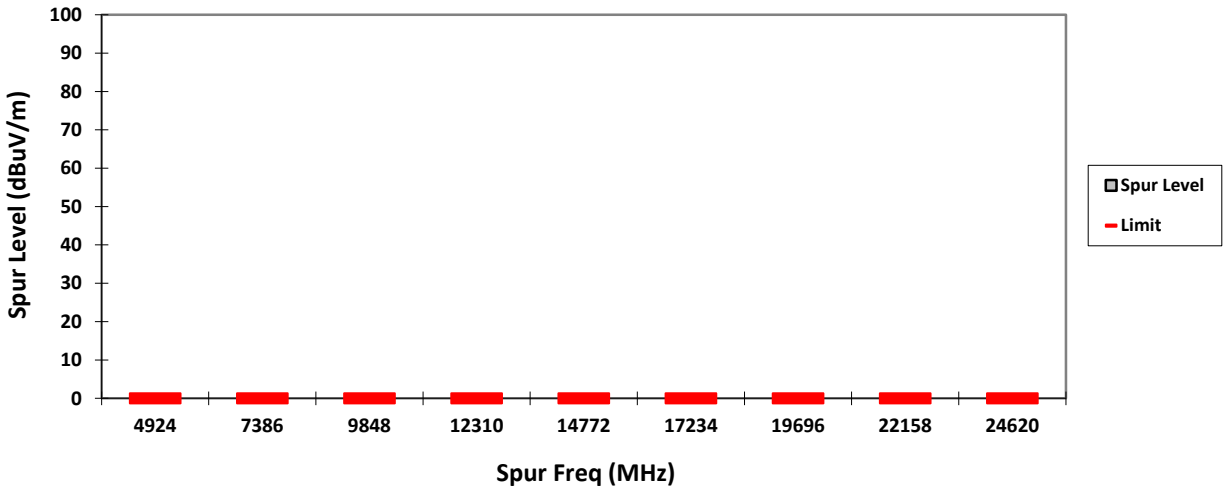
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4924	-	41.0618**	**	-	74	54	-	32.94**	-	-
7386	-	44.7507**	**	-	74	54	-	29.25**	-	-
9848	-	42.6889**	**	-	74	54	-	31.31**	-	-
12310	-	51.3306**	**	-	74	54	-	22.67**	-	-
14772	-	51.2720**	**	-	74	54	-	22.73**	-	-
17234	-	55.8861**	**	-	74	54	-	18.11**	-	-
19696	-	33.5032**	**	-	74	54	-	40.50**	-	-
22158	-	34.1559**	**	-	74	54	-	39.84**	-	-
24620	-	34.6627**	**	-	74	54	-	39.34**	-	-
Horizontal Radiated Emission Result										
4924	-	40.3978**	**	-	74	54	-	33.60**	-	-
7386	-	44.6961**	**	-	74	54	-	29.30**	-	-
9848	-	42.7931**	**	-	74	54	-	31.21**	-	-
12310	-	52.5023**	**	-	74	54	-	21.50**	-	-
14772	-	51.8283**	**	-	74	54	-	22.17**	-	-
17234	-	55.4704**	**	-	74	54	-	18.53**	-	-
19696	-	33.6158**	**	-	74	54	-	40.38**	-	-
22158	-	34.0505**	**	-	74	54	-	39.95**	-	-
24620	-	35.0877**	**	-	74	54	-	38.91**	-	-

Remarks: Pass Result	Marginal Result	Fail Result

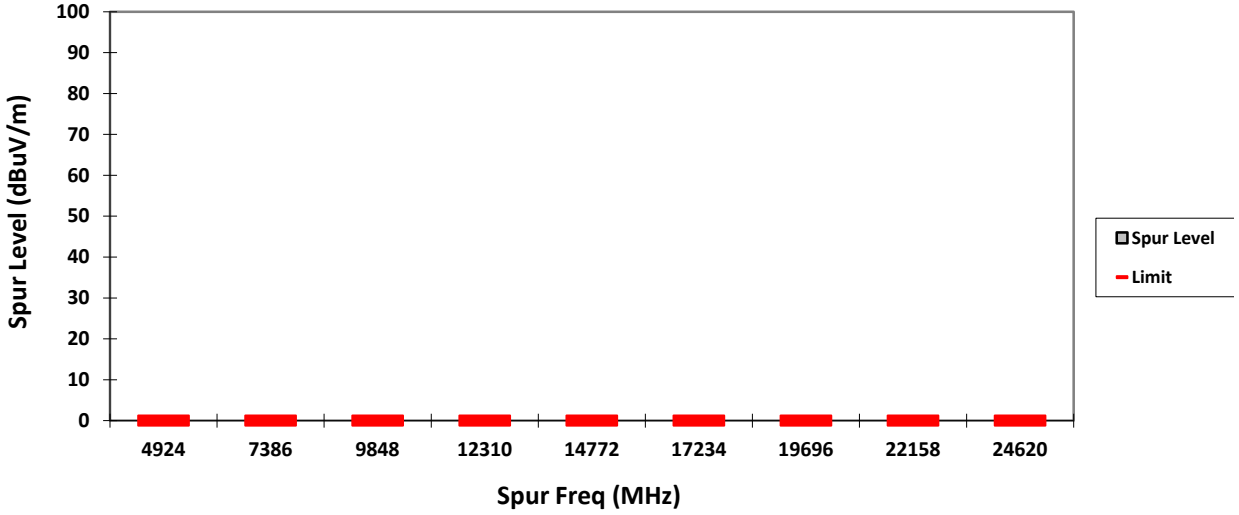
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Thu, Jun 08, 2017**
System MU: 5.01dB **Duty Cycle (%): > 98%**

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

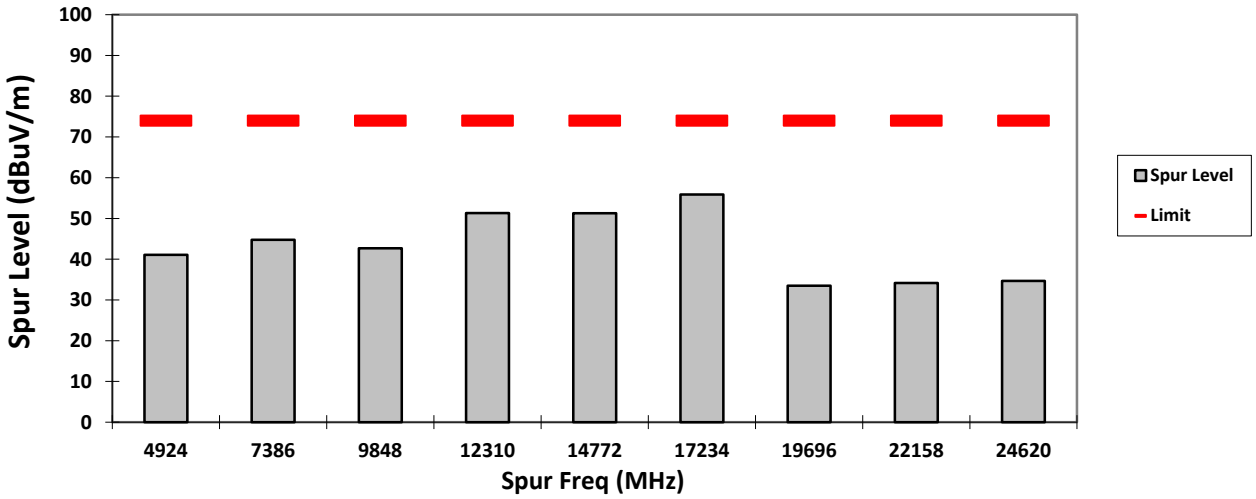
VERTICAL, QPK



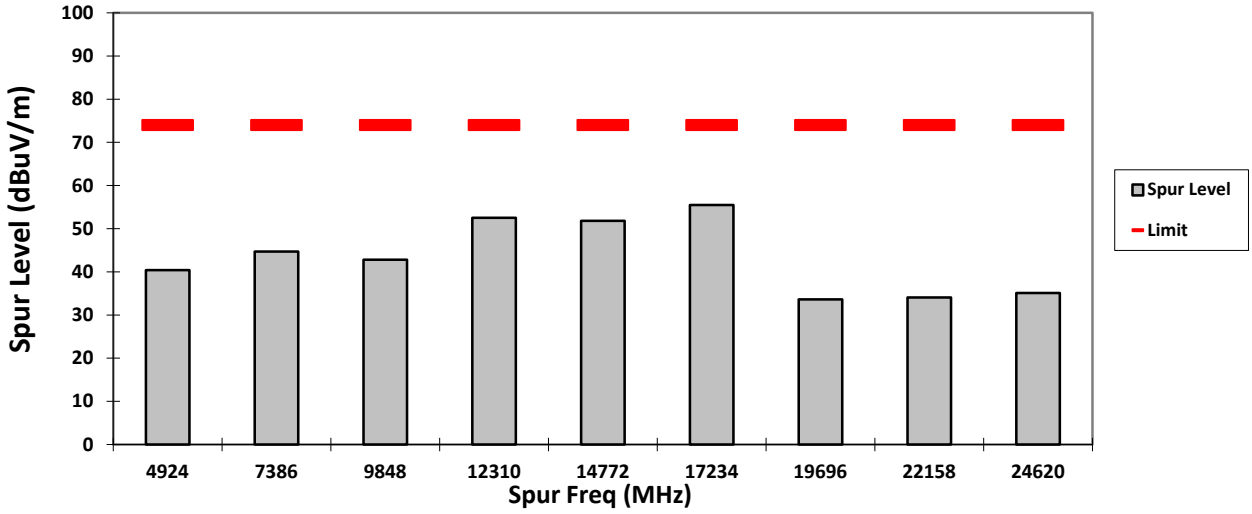
HORIZONTAL, QPK



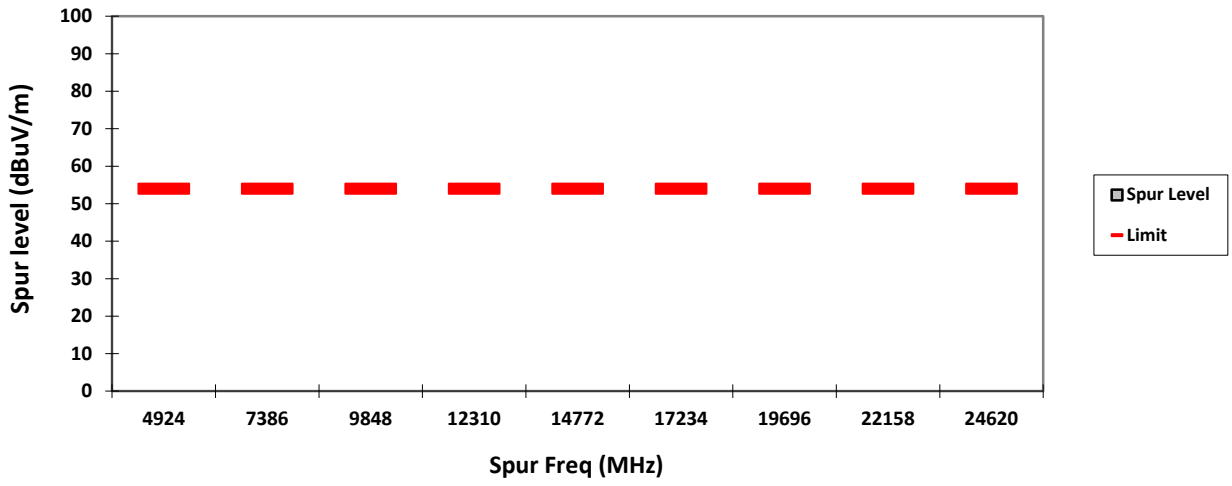
VERTICAL, PK



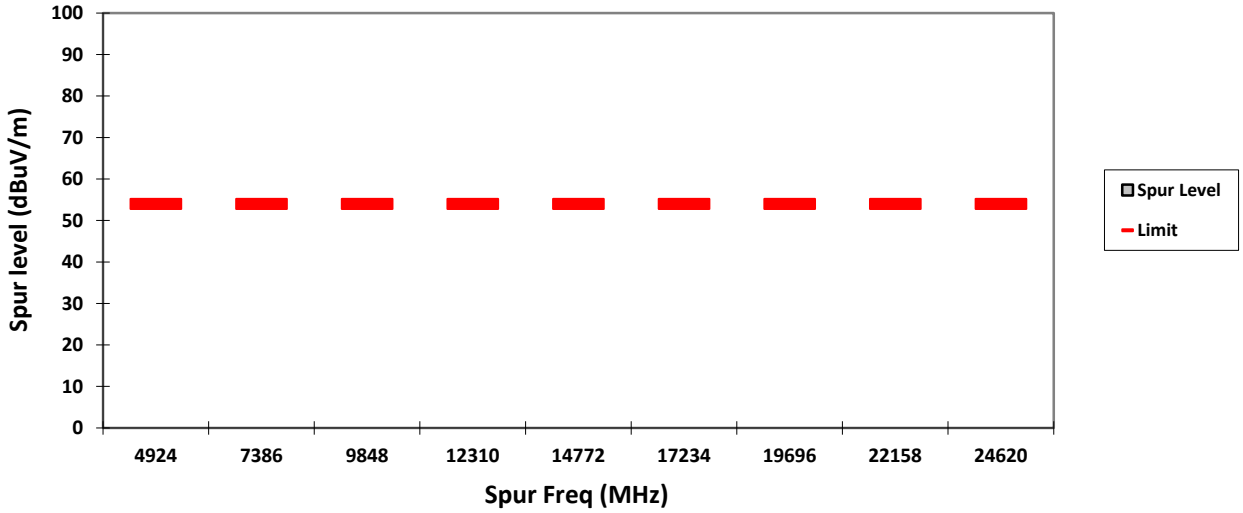
HORIZONTAL, PK



VERTICAL, AV

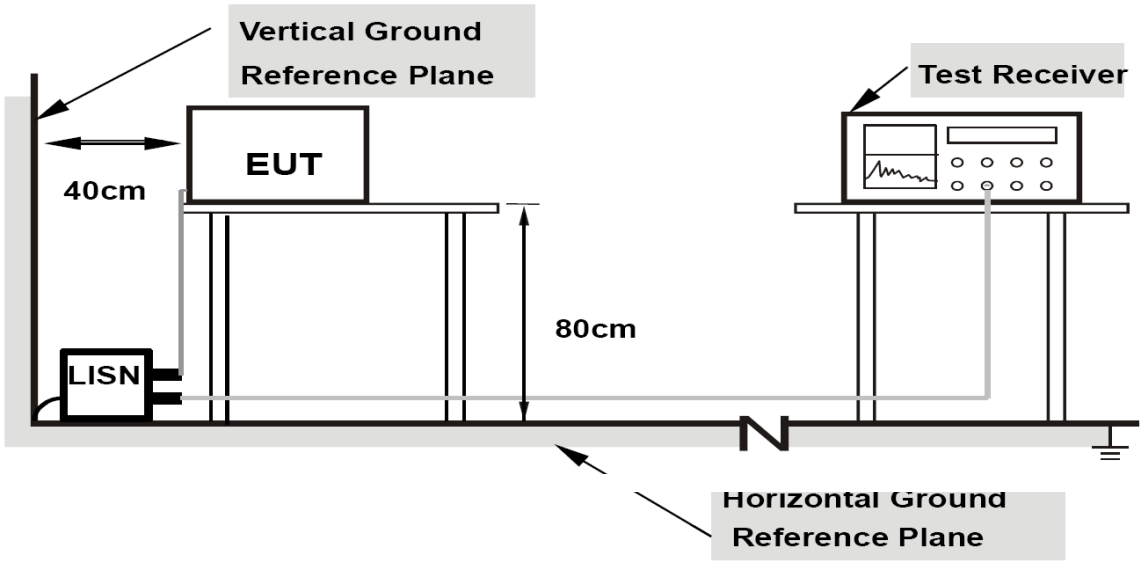


HORIZONTAL, AV



6.8 AC Powerline Conducted Emission

6.8.1 Test Setup



1) Tests were conducted for both Receive and Transmit Mode of the EUT.
2) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
3) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
4) The frequency range from 150 kHz to 30MHz was measured.

6.8.2 Test Limits:

For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.

Limits for conducted disturbance at the mains ports of class A ITE

Frequency range MHz	Limits dB(µV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60
NOTE The lower limit shall apply at the transition frequency.		

Table 1: Limits for Conducted Disturbance at the Mains Ports of Class A ITE.

Limits for conducted disturbance at the mains ports of class B ITE

Frequency range MHz	Limits dB(µV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

Table 2: Limits for Conducted Disturbance at the Mains Ports of Class B ITE

6.8.3 Test Result

Not Applicable. Testing is not required, radio shall turn off during charging mode.