

Nemko Korea Co., Ltd.

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FCC and IC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, Korea.
(Post code : 16677)
Attn. : Minhyung. Cho

Dates of Issue : January 5, 2015
Test Report No. : NK-15-R-130
Test Site : Nemko Korea Co., Ltd.

FCC ID
IC

A3LWCK730B
649E-WCK730B

Brand Name

SAMSUNG

Contact Person

Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, Korea, 16677.
Minhyung Cho
Telephone No. : +82-31-277-2688

Applied Standard: FCC 47 CFR Part 15C and IC RSS-247 Issue 1
Classification: Digital Transmission System
EUT Type: Wi-Fi/BT Transmitter

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Tested By : Seungyong Shin
Engineer


Reviewed By : Deokha Ryu
Technical Manager

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1. SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15 and IC RSS-247 Issue1.

Responsible Party :	Samsung Electronics Co., Ltd.
Contact Person :	Minhyung Cho
Manufacturer :	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 16677.

- FCC ID : A3LWCK730B
- IC : 649E-WCK730B
- Model: WCK730B
- Brand Name: SAMSUNG
- EUT Type: Wi-Fi/BT Transmitter
- Classification: Digital modulation Transmitter
- Applied Standard: FCC 47 CFR Part 15.247 and IC RSS-247 Issue 1
- Test Procedure(s): ANSI C63.10-2013 and FCC guidance of 558074 D01 v03r03
- Dates of Test: December 14, 2015 ~ January 1, 2016
- Place of Tests: Nemko Korea Co., Ltd.

2. INTRODUCTION

2.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd. FCC ID : A3LWCK730B** and **IC : 649E-WCK730B**

These measurement tests were conducted at **Nemko Korea Co., Ltd. EMC Laboratory** .

The site address 155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-852 KOREA, REPUBLIC OF.

The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 km (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 km (18miles) south-southeast from central Seoul.

It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.

The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.4-2014 according to §2.948.



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Fig. 1. The map above shows the Seoul in Korea vicinity area.

The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

2.2 Accreditation and listing

Accreditation type		Accreditation number
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. 155
	Canada IC Registered site	Site No. 2040E
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	-
	KCC(RRL)Designated Lab.	Registration No. KR0026

3. TEST CONDITIONS & EUT INFORMATION

3.1 Operation During Test

The EUT is the CDD, MIMO transceiver which is module supporting the 802.11a/b/g/n/ac mode (802.11a/b/g/n(40MHz) : 1TX/1RX, 802.11n(20,40MHz)/ac(20,40,80MHz) : 2TX/2RX).

During the test, the EUT was connected to laptop PC and then a test program was executed to operate EUT constantly (duty cycle< 98%). The operating voltage of EUT was 5 Vdc supplied from a USB port on Laptop PC.

The EUT was tested at the lowest channel, middle channel and the highest channel with the maximum output power in accordance with the manufacturer's specifications. The worst data were recorded in the report.

3.1.1 Table of test power setting

Frequency	Mode	2412 MHz ~ 2462 MHz
Power setting Level	802.11b	48
	802.11g	50
	802.11n(20MHz)	41
	802.11n(40MHz)	28

3.1.2 Table of test channels

Frequency band	Mode	Test Channel (CH)	Frequency (MHz)
2.4 GHz	802.11b,g,n(20 MHz)	1	2412
		6	2437
		11	2462
	802.11n(40 MHz)	3	2422
		6	2437
		9	2452

3.1.3 Table of test modes

Test Items	Mode	Data rate (Mbps)	Test Channel (CH)
Conducted Emissions	802.11n(20 MHz)	MCS0	6
Radiated Emissions	802.11n(20 MHz)	MCS0	6
6 dB Bandwidth	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(20 MHz)	MCS0 / MCS8	1/6/11
	802.11n(40 MHz)	MCS0 / MCS8	3/6/9
Maximum conducted Output Power	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(20 MHz)	MCS0 / MCS8	1/6/11
	802.11n(40 MHz)	MCS0 / MCS8	3/6/9
Power Spectral Density	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(20 MHz)	MCS0/ MCS8	1/6/11
	802.11n(40 MHz)	MCS0/ MCS8	3/6/9
Conducted Spurious Emission, Radiated Spurious Emission, Band edge Emission	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(20 MHz)	MCS0 / MCS8	1/6/11
	802.11n(40 MHz)	MCS0 / MCS8	3/6/9

3.1.4 Antenna information:

Frequency band	Mode	Data rate	Antenna TX mode	Support CDD	Support MIMO
2.4 GHz	802.11b,g	All	☒ 1TX, ☐ 2TX	☐ Yes, ☒ No	☐ Yes, ☒ No
	802.11n (20 MHz)	MCS 0~7	☐ 1TX, ☒ 2TX	☒ Yes, ☐ No	☐ Yes, ☒ No
		MCS 8~15	☐ 1TX, ☒ 2TX	☐ Yes, ☒ No	☒ Yes, ☐ No
	802.11n (40 MHz)	MCS 0~7	☒ 1TX, ☒ 2TX	☒ Yes, ☐ No	☐ Yes, ☒ No
		MCS 8~15	☐ 1TX, ☒ 2TX	☐ Yes, ☒ No	☒ Yes, ☐ No

Note :

1. CDD mode is Cyclic Delay Diversity mode.
2. For 802.11n(20 MHz),EUT support CDD mode for MCS0~7 and MIMO mode for MCS8~15.
3. For 802.11n(40 MHz),EUT support SISO,CDD mode for MCS0~7 and MIMO mode for MCS8~15.
4. CDD mode, $N_{SS}=1$, MIMO mode, $N_{SS}=2$, where N_{SS} = number of spatial streams.
5. MIMO mode means SM-MIMO transmission.

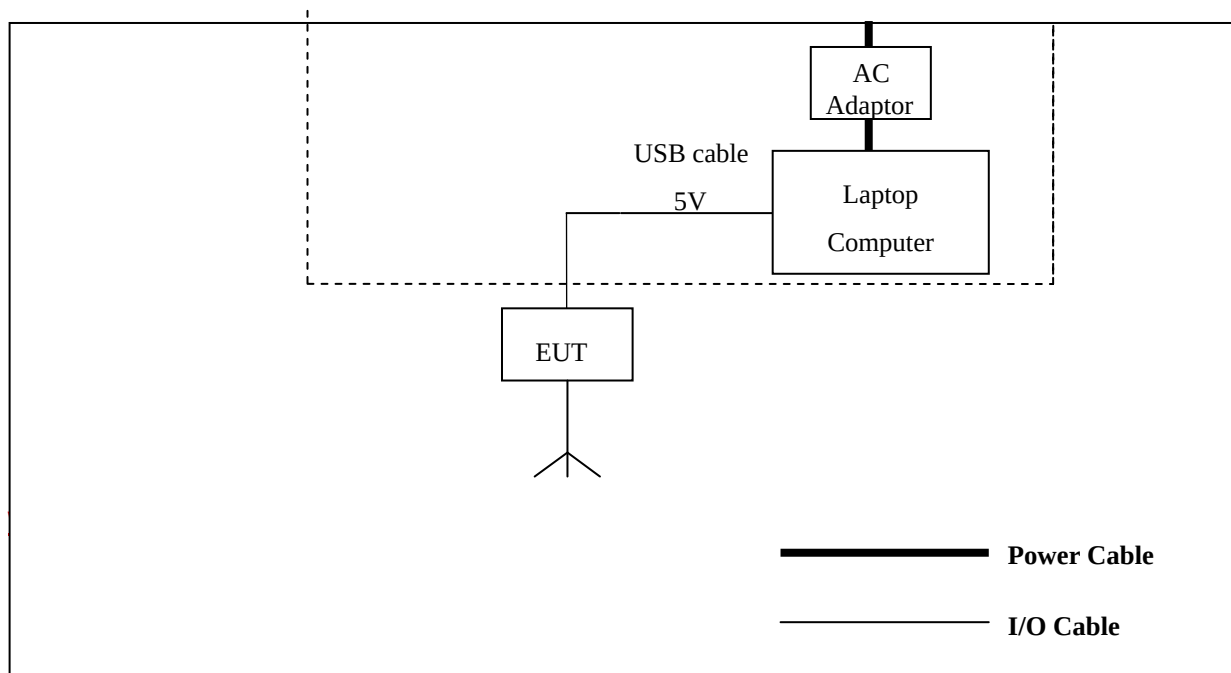
3.1.5. Additional Information Related to Testing

The cable and attenuator loss from 30MHz to 25GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

3.2 Support Equipment

EUT	Samsung Electronics Co., Ltd. Model : WCK730B	S/N: N/A
Laptop Computer	Samsung Electronics Co., Ltd. Model : NT-R55 0.3 m unshielded pin connector cable	FCC DOC S/N : 408L93AP400115W
AC/DC Adapter	Chicony Power Technology Co., Ltd. Model : AD-9019S 1.5 m unshielded power cable	FCC DOC S/N : CNBA4400215ADON81BT01V8

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **Samsung Wi-Fi/BT Transmitter FCC ID: A3LWCK730B, IC: 649E-WCK730B.**

Specifications:

Category	Wi-Fi/BT Transmitter
Model Name	WCK730B
Brand Name	SAMSUNG
Frequency of Operation	802.11b,g,n(20 MHz): 2412 MHz ~ 2462 MHz 802.11n(40 MHz) : 2422 MHz ~ 2452 MHz
Maximum Conducted Output Power	802.11b : 12.33 dBm 802.11g : 12.57 dBm 802.11n(20 MHz) : 12.57 dBm 802.11n(40 MHz) : 10.68 dBm
Channels	802.11b,g,n(20 MHz): 11 CH 802.11n(40 MHz): 7 CH
Antenna Gain (peak)	Ant0 : 3.3 dBi, Ant1 : 3.3 dBi
Antenna Setup	802.11b/g/n(40MHz) : 1TX / 1RX 802.11n(20, 40MHz) : 2TX / 2RX
Modulations	DSSS(BPSK,QPSK,CCK) for 802.11b OFDM(BPSK,QPSK,16QAM,64QAM) for 802.11g/n
Temperature Range	-20 °C ~ +50 °C
Voltage	5.0 Vdc
Dimensions (L x W x H)	About 75 mm x 25 mm X 5 mm
Weight	About 9 g
H/W Status	
S/W Status	
Remarks	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	IC Paragraph No.	Result	Remark
Conducted Emission	15.207	RSS-GEN Issue 4 8.8	Complies	
Radiated Emission	15.209	RSS-GEN Issue 4 8.9	Complies	
6 dB Bandwidth	15.247(a)(2)	RSS-247 Issue 1 5.2	Complies	
Maximum Conducted Output Power	15.247(b)(3)	RSS-247 Issue 1 5.4	Complies	
Power Spectral Density	15.247(e)	RSS-247 Issue 1 5.2	Complies	
Conducted Spurious Emission	15.247(d)	RSS-247 Issue 1 5.5	Complies	
Radiated Spurious Emission	15.247(d)	RSS-247 Issue 1 5.5	Complies	
Maximum Permissible Exposure	1.1307(b)	RSS-102	Complies	

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Wi-Fi/BT Transmitter FCC ID: A3LWCK730B, IC : 649E-WCK730B** is in compliance with Part 15.247 of the FCC Rule and RSS-247 Issue 1 of the IC Specification.

6. ANTENNA REQUIREMENTS

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna of the **Samsung Wireless Samsung Wi-Fi/BT Transmitter FCC ID: A3LWCK730B, IC : 649E-WCK730B** is **permanently attached** and there are no provisions for connection to an external antenna. It complies with the requirement of §15.203.

Directional gain was be calculated according to “**662911 D01 Multiple Transmitter Output v02r01**” and would be found at end of average output power and PSD results in this report.

7. DESCRIPTION OF TESTS

7.1 Conducted Emissions

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure. It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6. A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room Rohde & Schwarz (ESH3-Z5) and (ESH2-Z5) of the 50 ohm/50 μ H Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN (ESH3-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH2-Z5). Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ". If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1 meter length. Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time. The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30). The detector functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission. Each EME reported was calibrated using the R&S signal generator.

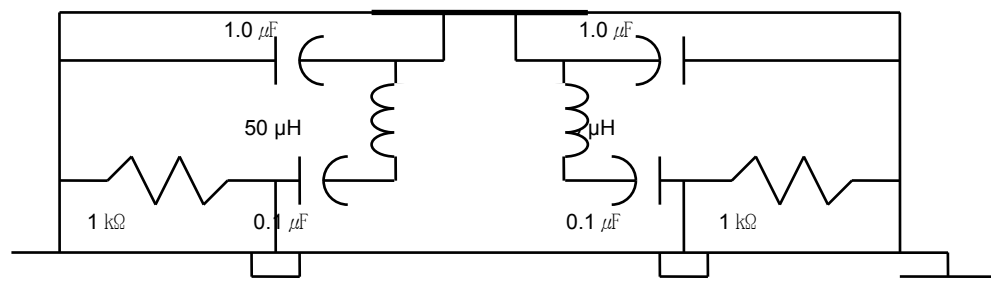


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

The measurement was performed at the test site that is specified in accordance with ANCI C63.10-2013.

The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna(Rohde&Schwarz, HFH2-Z2) and 30 to 1000 MHz using Trilog broadband test antenna(Schwarzbeck, VULB 9163). Above 1 GHz, Horn antenna (Schwarzbeck BBHA 9120D: up to 18 GHz, Q-par Angus QSH20S20 : 18 to 26.5 GHz, QSH22K20: up to 40 GHz) was used.

For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. For emission measurements above 1 GHz, The test equipment was placed on turntable with 1.5 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0° to 360° and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

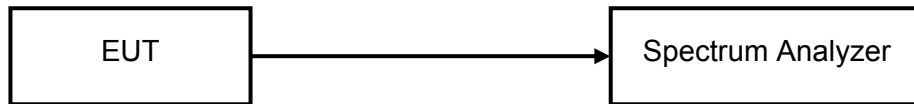
At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection. At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in KDB “558074 D01 DTS Meas Guidance v03r03” in section 12.2.4 and 12.2.5.3. Peak emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3kHz, Detector = Peak, Trace mode = max hold. Allow max hold to run for at least 50 times (1/duty cycle) traces.

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

Radiated Emissions Limits per 47 CFR 15.209(a) and RSS-GEN Issue 4 8.9

7.3 6 dB Bandwidth

Test Setup



Test Procedure

EUTs 6 dB bandwidth is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

RBW = 100 kHz

VBW $\geq$ 3 x RBW

Detector = Peak

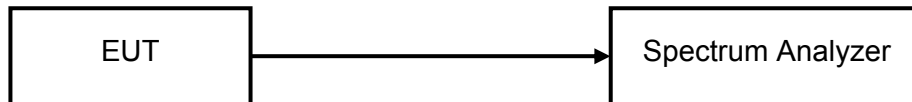
Trace mode = max hold

Sweep = auto couple

The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

7.4 Maximum Conducted Output Power (average)

Test Setup



Test Procedure

EUTs Maximum Conducted Output Power (average) is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

Measure the duty cycle, x , of the transmitter output signal

Span to at least 1.5 times the OBW.

RBW = 1 – 5 % of the OBW, not to exceed 1MHz

VBW $\geq 3 \times$ RBW.

Number of points in sweep $\geq 2 \times$ span / RBW

Sweep time = auto couple

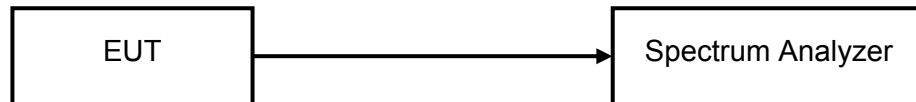
Detector = RMS

Trace average at least 100 traces in power averaging mode.

Add $10 \log (1/x)$, where x is the duty cycle

7.5 Maximum Power Spectral Density (average)

Test Setup



Test Procedure

EUTs Power Spectral Density is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

Center frequency = DTS channel center frequency

Span = at least 1.5 times the DTS bandwidth

RBW : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$

VBW $\geq 3 \times \text{RBW}$

Detector = power averaging (RMS)

Ensure that the number of measurement points = sweep $\geq 2 \times \text{span} / \text{RBW}$

Sweep time = auto couple

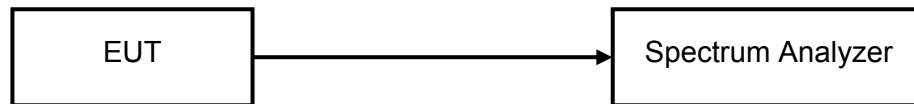
Employ trace averaging (RMS) = minimum of 100 traces

Add $10 \log (1/x)$, where x is the duty cycle

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.6 Conducted Spurious Emissions

Test Setup



Test Procedure

EUTs Conducted spurious emissions are measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.

1) Reference Level

Center frequency = DTS channel center frequency

Span $\geq$ 1.5 times the DTS bandwidth

RBW = 100 kHz

VBW $\geq$ 3 x RBW

Detector = peak

Sweep time = auto couple

Trace mode = max hold

Allow trace to fully stabilize.

The peak search function on the spectrum analyzer is used to determine the maximum PSD level.

2) Unwanted Emissions

Set the center frequency and span to encompass frequency range to be measured.

RBW = 100 kHz

VBW $\geq$ 3 x RBW

Detector = peak

Sweep time = auto couple

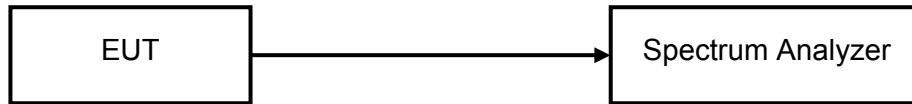
Trace mode = max hold

Allow trace to fully stabilize.

The peak marker function on the spectrum analyzer is used to determine the maximum amplitude level of all unwanted emissions outside of the authorized frequency band. The unwanted emissions are attenuated by at least the minimum requirements specified.

7.7 Duty Cycle

Test Setup



Test Procedure

EUTs duty cycle are measured at middle channel with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.

Center frequency = Center frequency of the transmission

Span = zero

RBW = 3 MHz

VBW = 3 MHz

Detector = peak

Sweep time = 25 ms or 5 ms or 3 ms

Sweep mode = Single

The marker function on the spectrum analyzer is used to determine the duty cycle.

Following the result of the duty cycle measurement according to the above test procedure

	Data rate	On time (ms)	On + Off time (ms)	Duty Cycle (%)	Duty Factor (dB)
b mode	All	12.40	13.05	0.95	0.22
g mode	All	2.07	2.18	0.95	0.22
n(20MHz)mode	MCS0~7	1.91	2.02	0.95	0.24
	MCS8~15	0.98	1.08	0.91	0.42
n(40MHz)mode	MCS0~7	0.91	1.04	0.88	0.58
	MCS8~15	0.50	0.60	0.83	0.79

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207, RSS-Gen Issue 4

Frequency (MHz)	Level(dBμV)		*)Factor (dB)	**) Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average			Q-Peak	Average	Q-Peak	Average
0.15	50.9	22.7	10.4	N	66.0	56.0	15.1	33.3
0.18	59.9	41.8	10.4	N	64.5	54.5	4.6	12.7
0.24	53.5	35.1	10.3	L	62.1	52.1	8.6	17.0
0.30	47.0	29.5	10.4	N	60.2	50.2	13.2	20.7
0.36	42.2	25.0	10.4	N	58.7	48.7	16.5	23.7
0.42	38.4	22.9	10.4	N	57.4	47.4	19.0	24.5

Line Conducted Emissions Tabulated Data

Notes:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
3. *) Factor = LISN + Cable Loss
4. **) LINE : L = Line , N = Neutral
5. The limit is on the FCC Part section 15.207(a) and IC RSS-GEN issue4 8.8.

PLOTS OF EMISSIONS

Conducted Emission at the Mains port (Line)

NEMKO KOREA (NK-15-R-130)

20 Dec 2015 04:51

Conducted Emissions

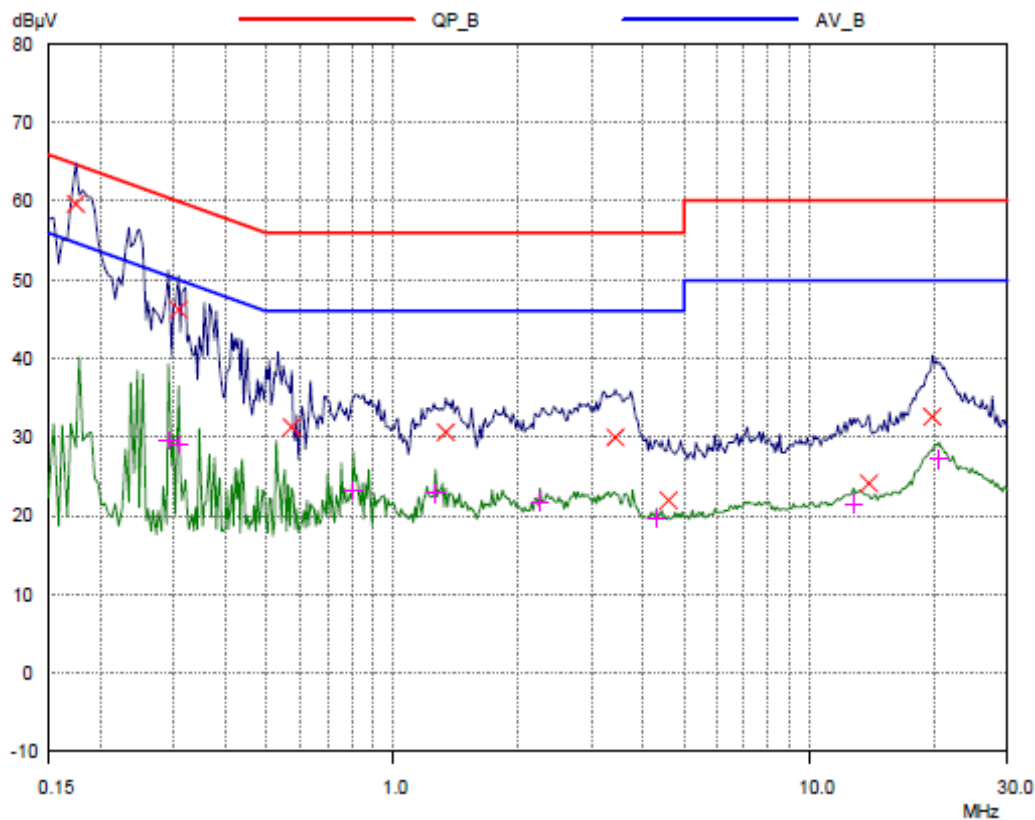
EUT: EUT
Manuf: Samsung Electronics. Co., Ltd.
Op Cond: a.c. 120 V / 60 Hz // Wifi 2.4G
Operator: Wonho. Son
Test Spec: FCC Part 15
Comment: MODEL :
LINE : LINE-PE
Result File: r130l-w2.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB
						Preamp OFF
						OpRge 60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_Z5_Line

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 8
Acc Margin: 60 dB



PLOTS OF EMISSIONS

Conducted Emission at the Mains port (Neutral)

NEMKO KOREA (NK-15-R-130)

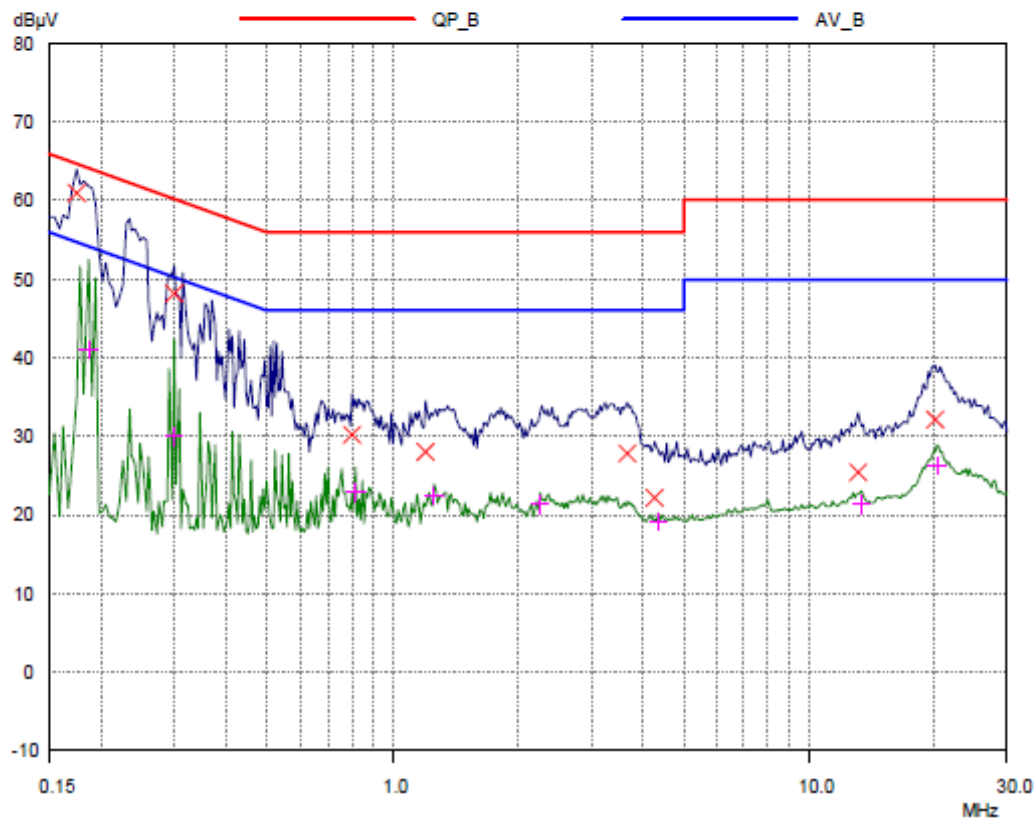
20 Dec 2015 04:38

Conducted Emissions

EUT: EUT
 Manuf: Samsung Electronics. Co., Ltd.
 Op Cond: a.c. 120 V / 60 Hz // Wifi 2.4G
 Operator: Wonho. Son
 Test Spec: FCC Part 15
 Comment: MODEL :
 LINE : NEUTRAL-PE
 Result File: r130n-w2.dat : New Measurement

Scan Settings		(1 Range)		Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB	OFF	60dB	
Transducer	No.	Start	Stop	Name					
	1	150kHz	30MHz	ESH3_Z5_Neutral					

Final Measurement: Detectors: X QP / + AV
 Meas Time: 1sec
 Subranges: 8
 Acc Margin: 60 dB



TEST DATA

8.2 Radiated Emissions

FCC §15.209, RSS-Gen Issue 4

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Heights (cm)	Turntable Angles (°)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
119.87	60.90	H	301	30	-25.5	35.4	43.5	8.1
131.90	65.80	H	230	17	-26.7	39.1	43.5	4.4
143.98	67.20	H	170	24	-27.4	39.8	43.5	3.7
155.95	65.70	H	209	30	-26.9	38.8	43.5	4.7
377.84	51.50	H	100	332	-18.0	33.5	46.0	12.5
454.47	42.70	V	100	136	-16.0	26.7	46.0	19.3

Radiated Measurements at 3meters

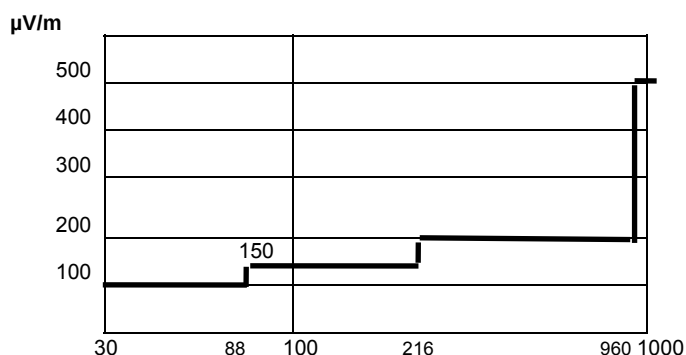


Fig. 3. Limits at 3 meters

Notes:

1. All modes were measured and the worst-case emission was reported.
- 2 The radiated limits are shown on Figure 3.
- Above 1 GHz the limit is 500 μV/m.

MHz

3. *Pol. H = Horizontal, V = Vertical

4. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

5. Measurements using CISPR quasi-peak mode below 1 GHz

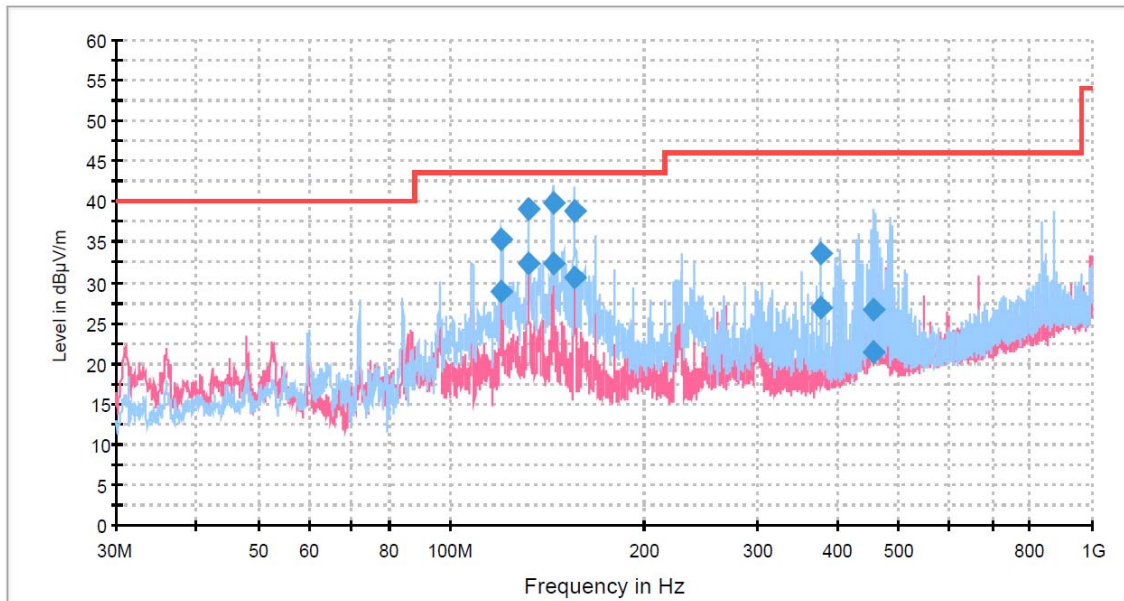
6. The radiated emissions testing were made by rotating through three orthogonal axes.

The worst date was recorded.

7. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

8. The limit is on the RSS-Gen Issue4 8.9

PLOTS OF EMISSIONS



TEST DATA

8.3 6 dB Modulated Bandwidth

FCC §15.247(a)(2), RSS-247 Issue 1 5.2

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11b mode

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2412	8.09	8.12	0.5
Middle	2437	8.11	8.11	0.5
High	2462	8.10	8.12	0.5

802.11g mode

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2412	16.38	16.39	0.5
Middle	2437	16.39	16.40	0.5
High	2462	16.38	16.39	0.5

802.11n(20 MHz) mode - CDD

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2412	17.60	17.66	0.5
Middle	2437	17.62	17.65	0.5
High	2462	17.62	17.67	0.5

802.11n(20 MHz) mode - MIMO

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2412	17.62	17.64	0.5
Middle	2437	17.60	17.67	0.5
High	2462	17.60	17.65	0.5

802.11n(40 MHz) mode - SISO

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2422	36.20	36.39	0.5
Middle	2437	36.39	36.41	0.5
High	2452	36.37	36.41	0.5

802.11n(40 MHz) mode - CDD

Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2422	36.21	36.43	0.5
Middle	2437	36.40	36.42	0.5
High	2452	36.39	36.44	0.5

802.11n(40 MHz) mode - MIMO

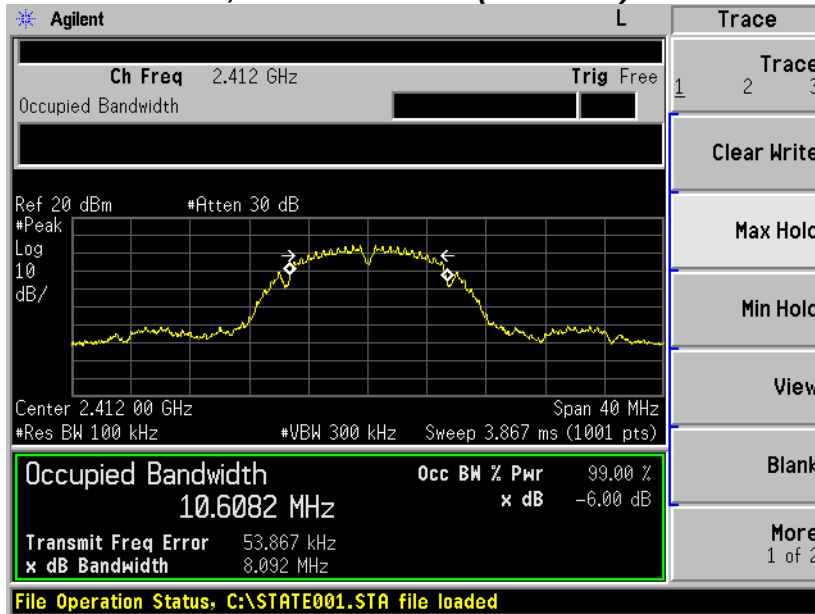
Channel	Frequency(MHz)	Result(MHz)		Limit (MHz)
		Chain 0	Chain 1	
Low	2422	36.40	36.40	0.5
Middle	2437	36.40	36.42	0.5
High	2452	36.38	36.42	0.5

PLOTS OF EMISSIONS

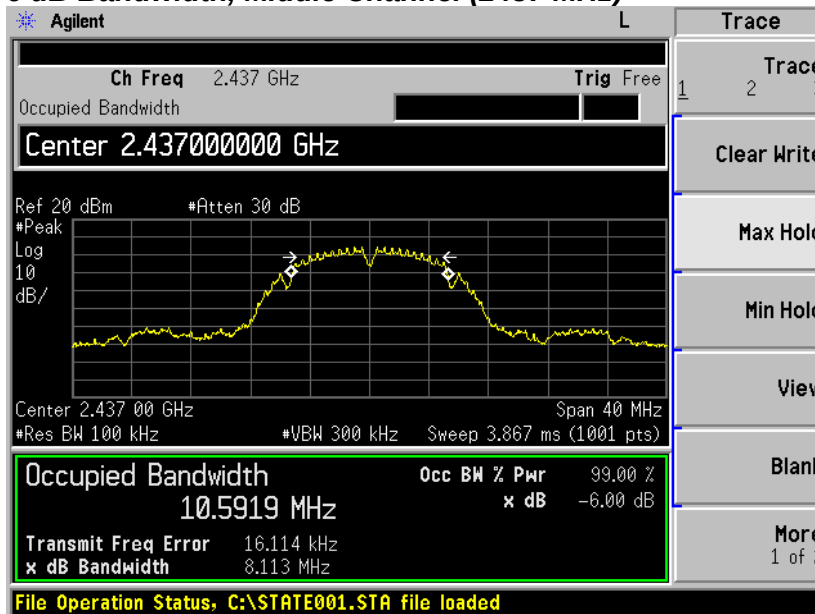
802.11b mode

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

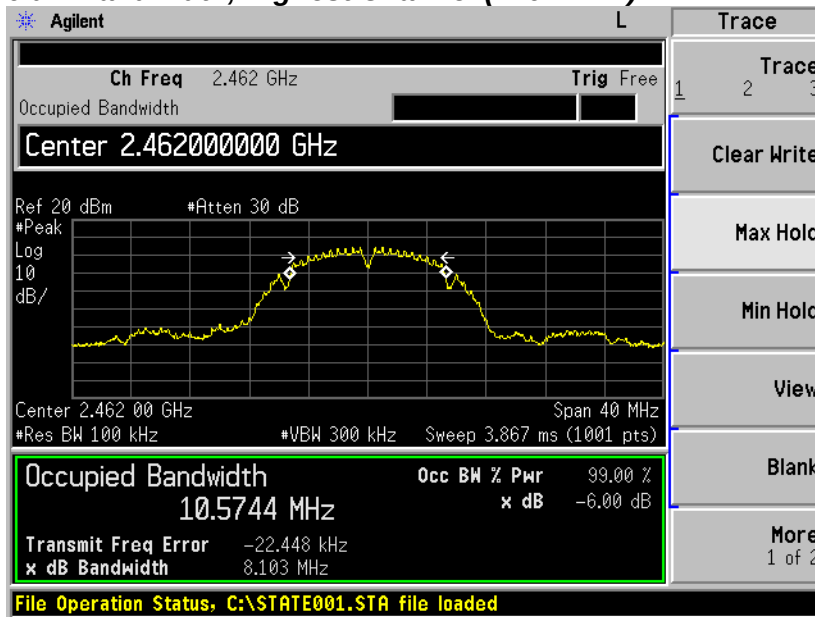


6 dB Bandwidth, Middle Channel (2437 MHz)



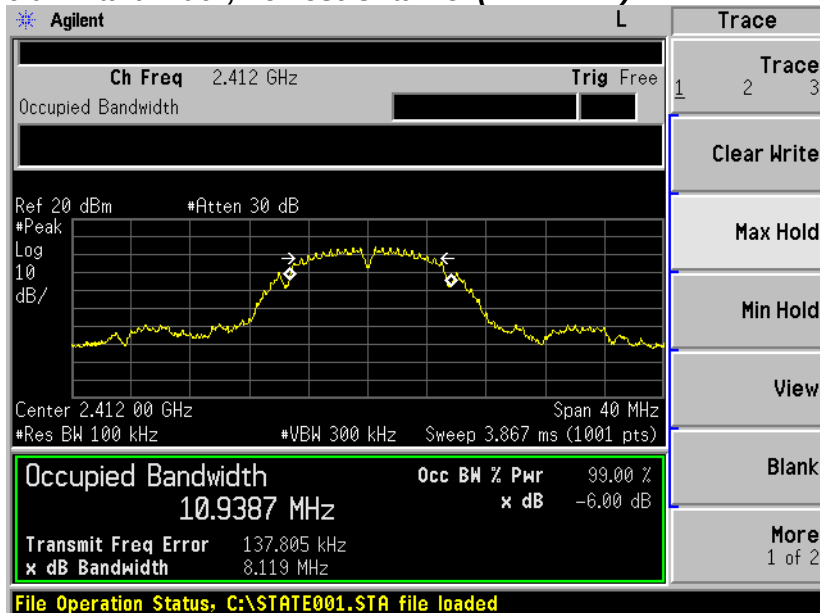
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



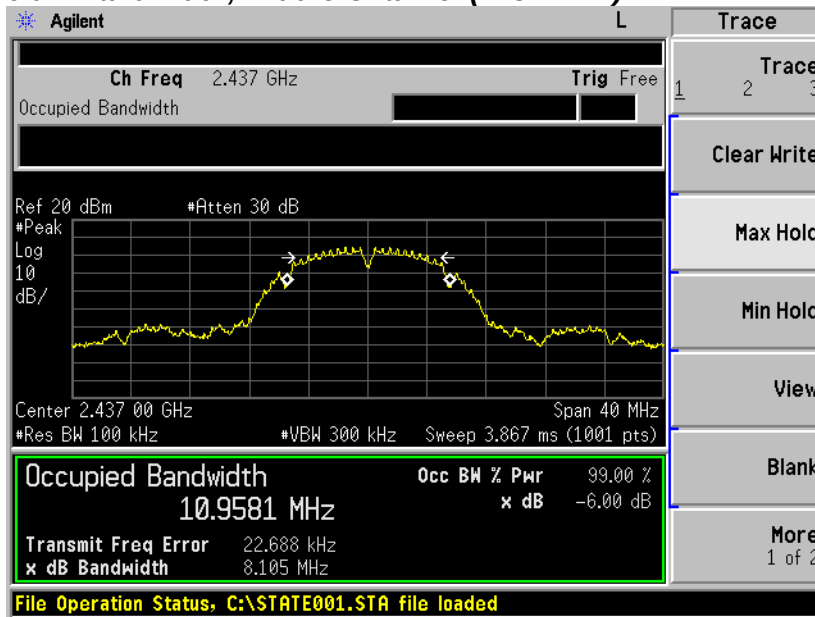
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

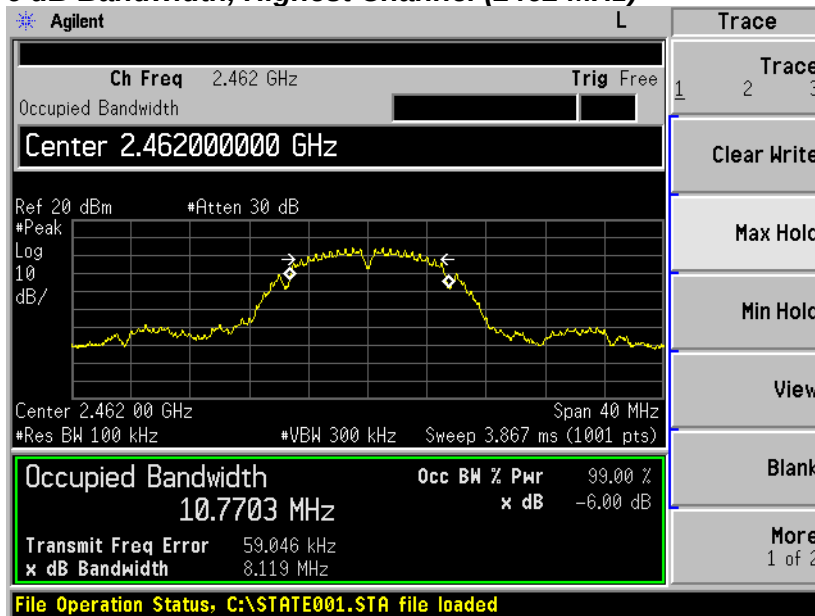


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

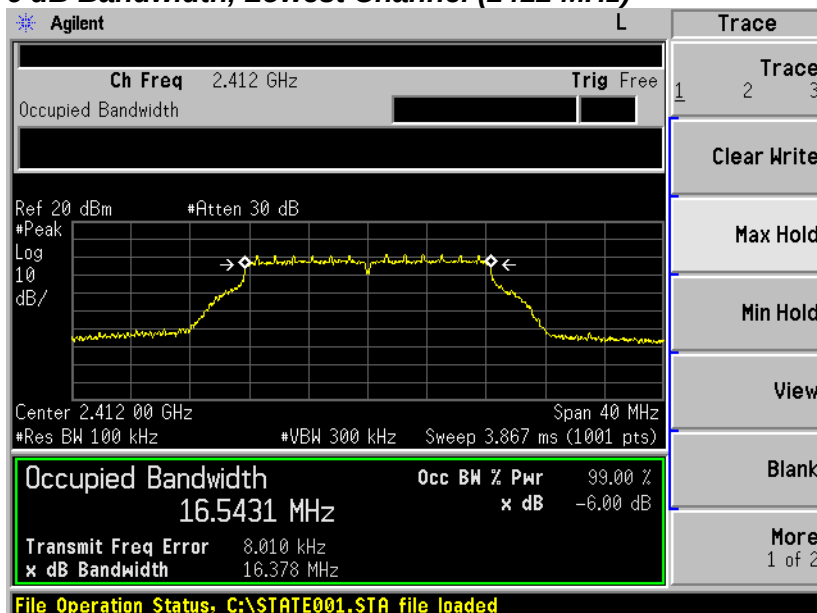


PLOTS OF EMISSIONS

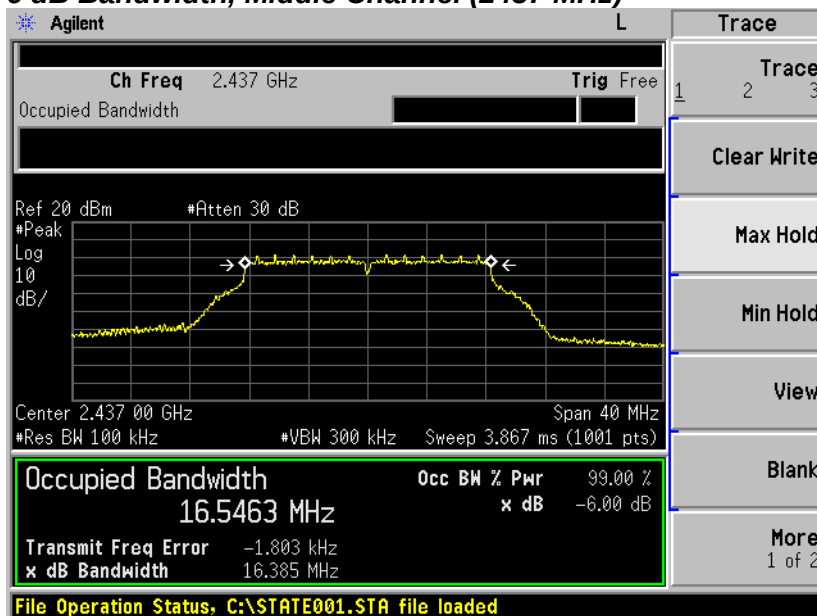
802.11g mode

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

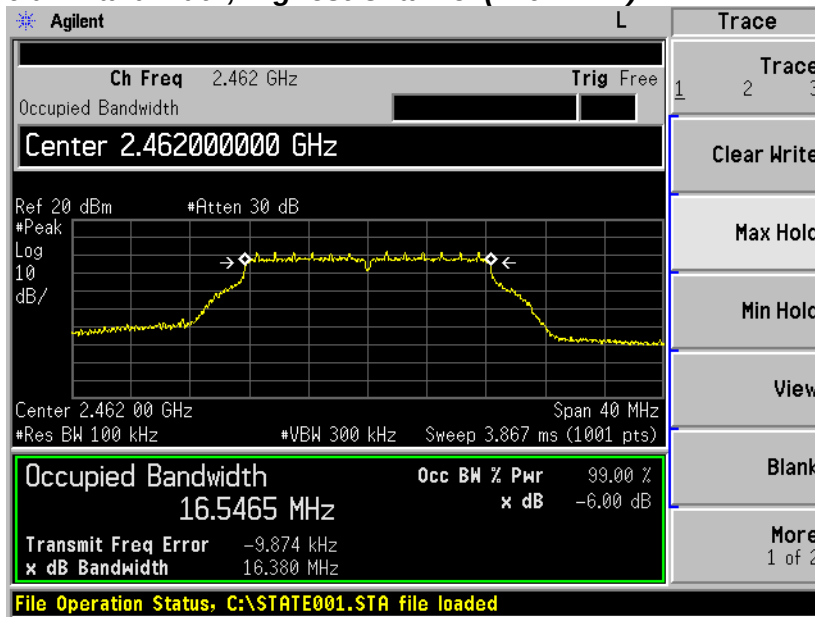


6 dB Bandwidth, Middle Channel (2437 MHz)



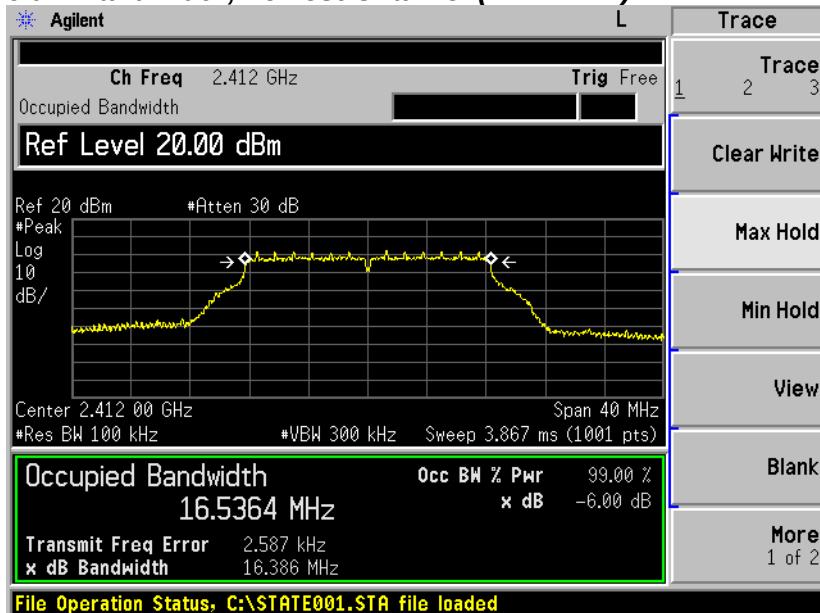
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)

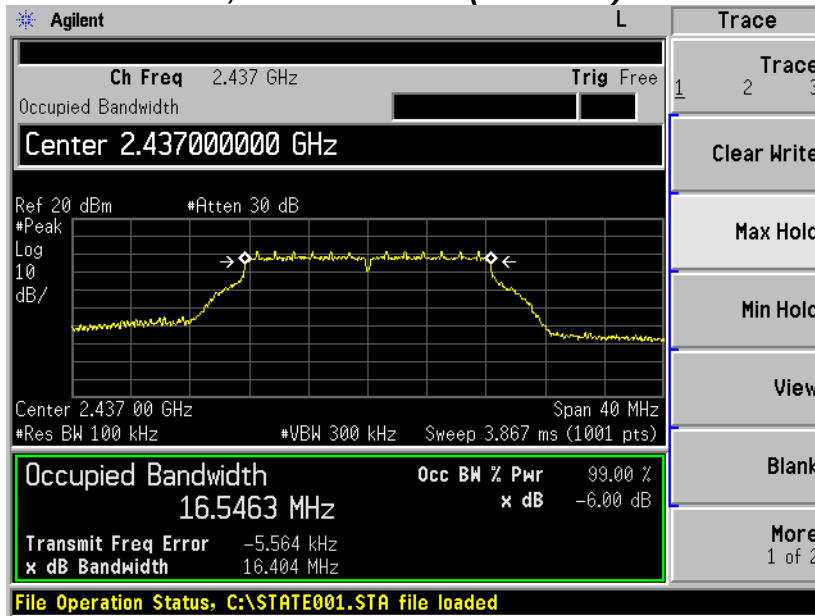


Chain 1

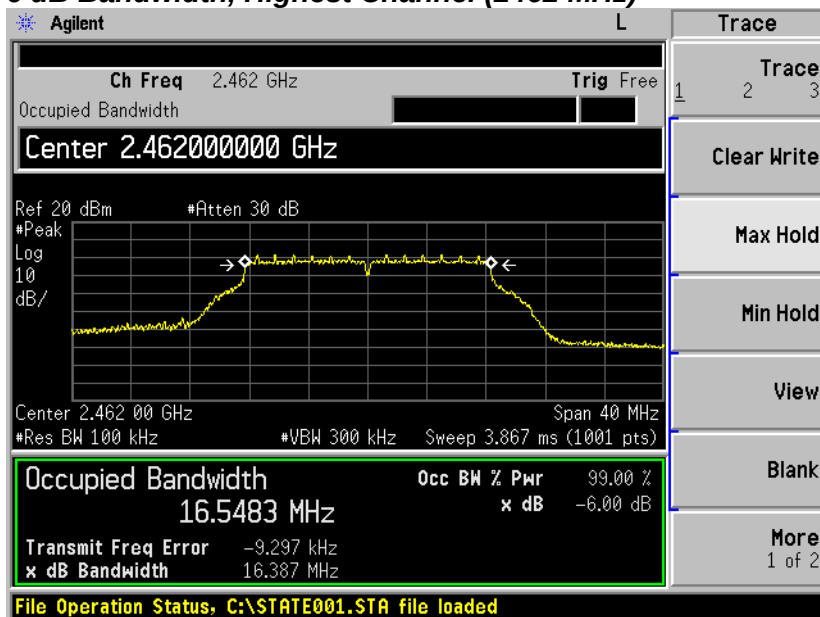
6 dB Bandwidth, Lowest Channel (2412 MHz)



6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

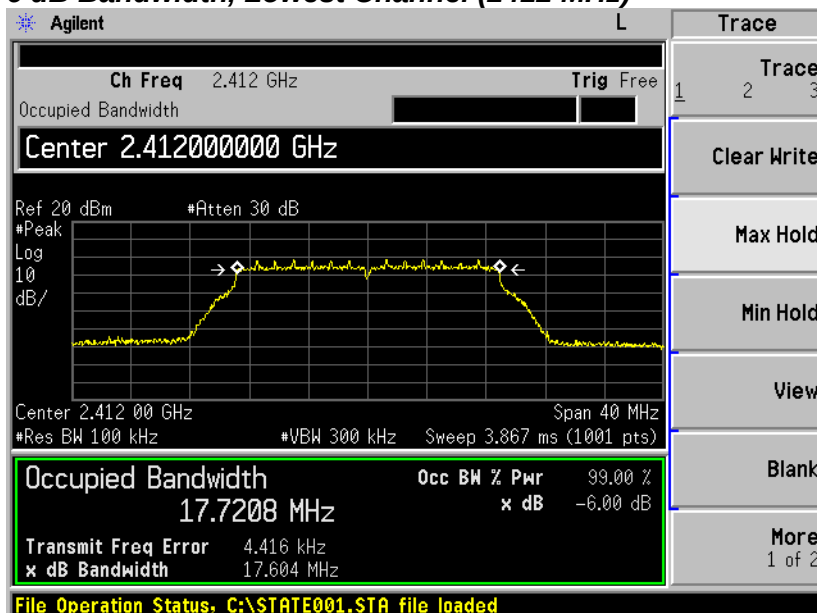


PLOTS OF EMISSIONS

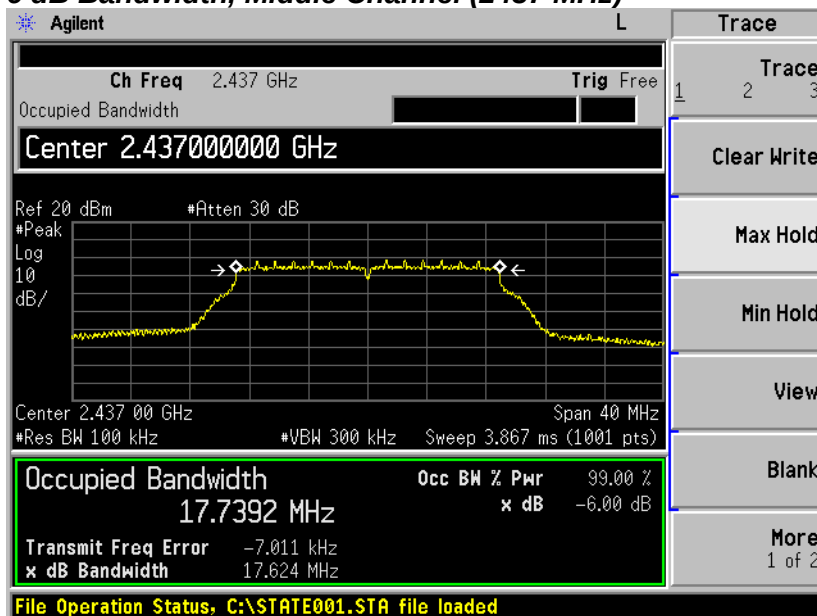
802.11n(20MHz) mode - CDD

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

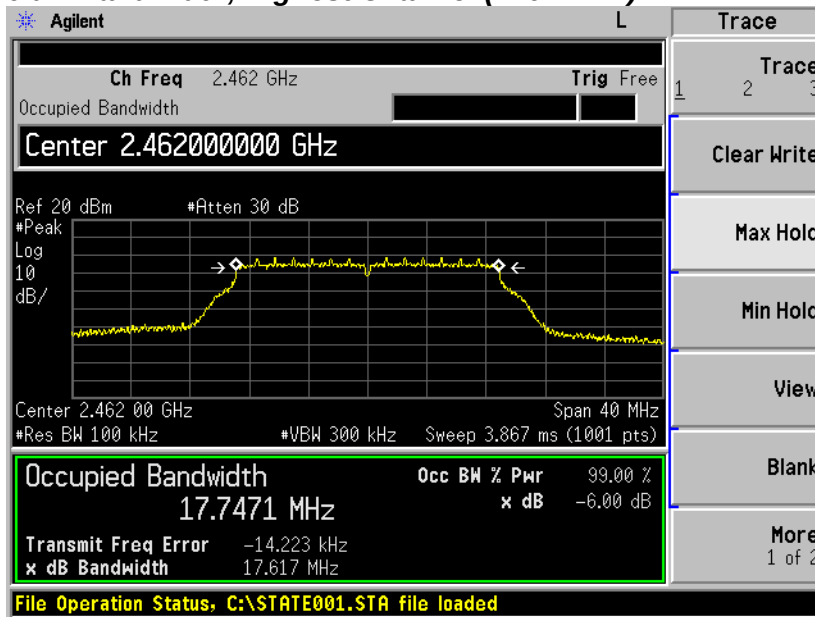


6 dB Bandwidth, Middle Channel (2437 MHz)



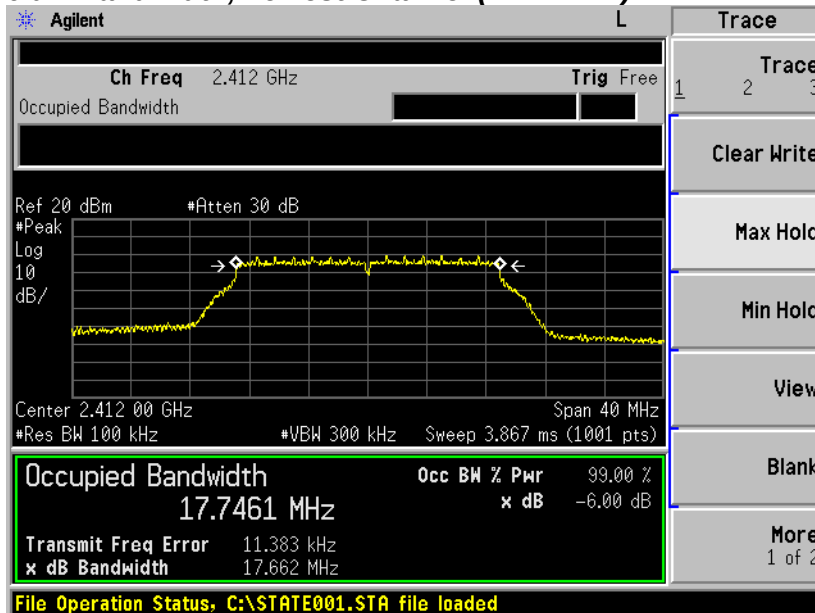
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



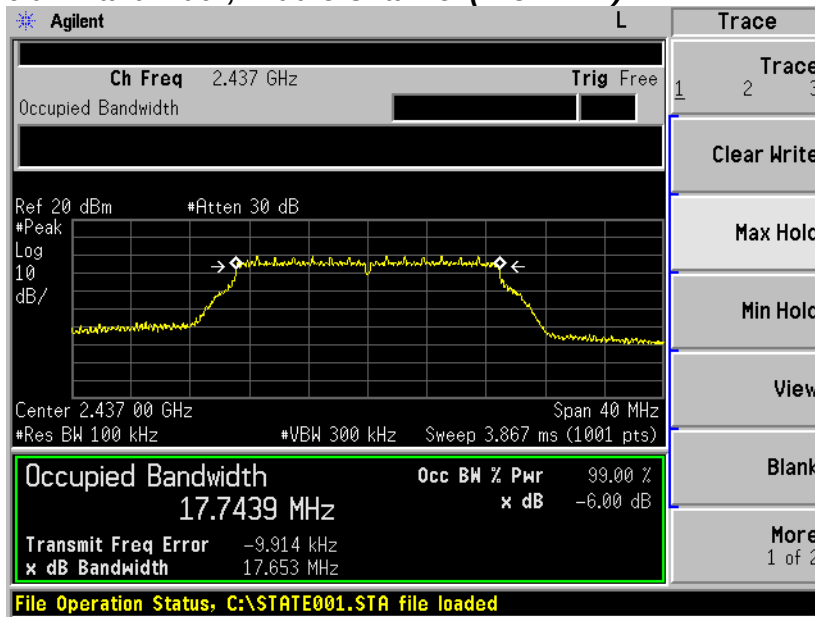
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

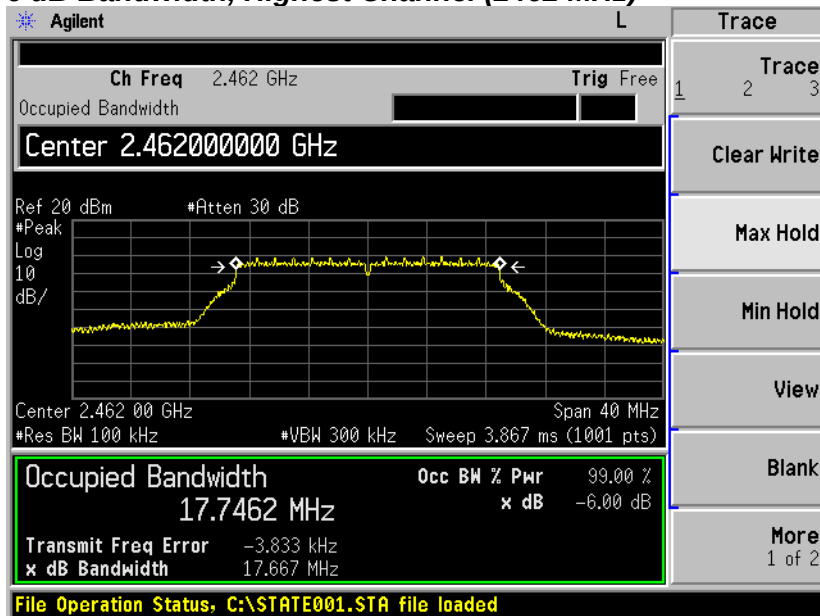


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

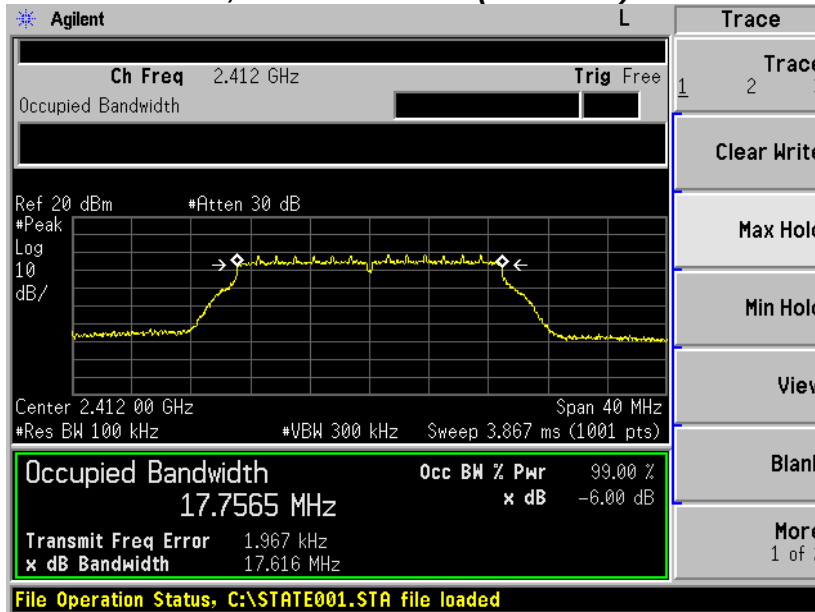


PLOTS OF EMISSIONS

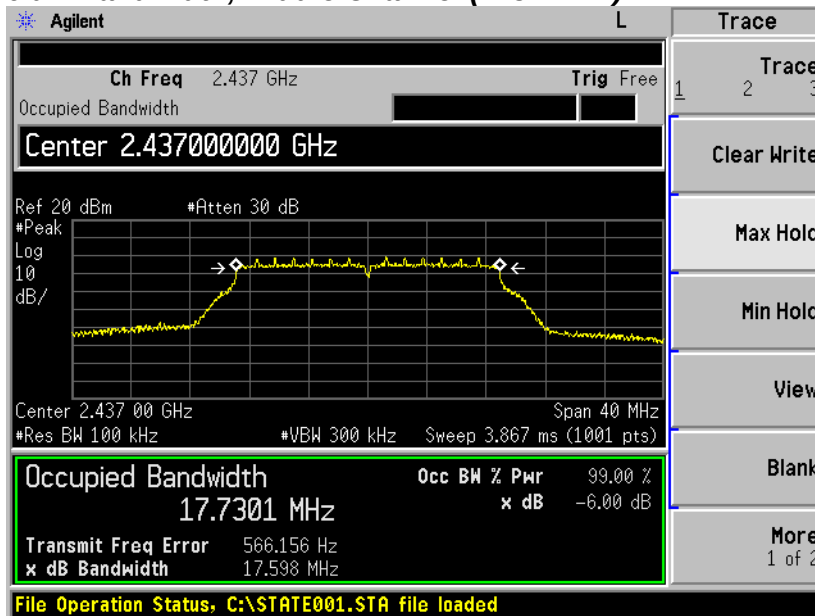
802.11n(20MHz) mode - MIMO

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

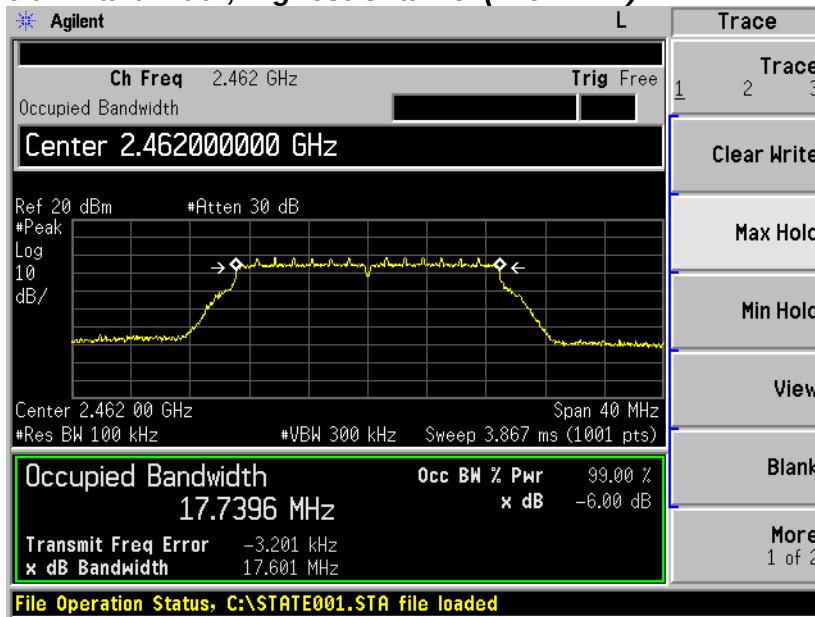


6 dB Bandwidth, Middle Channel (2437 MHz)



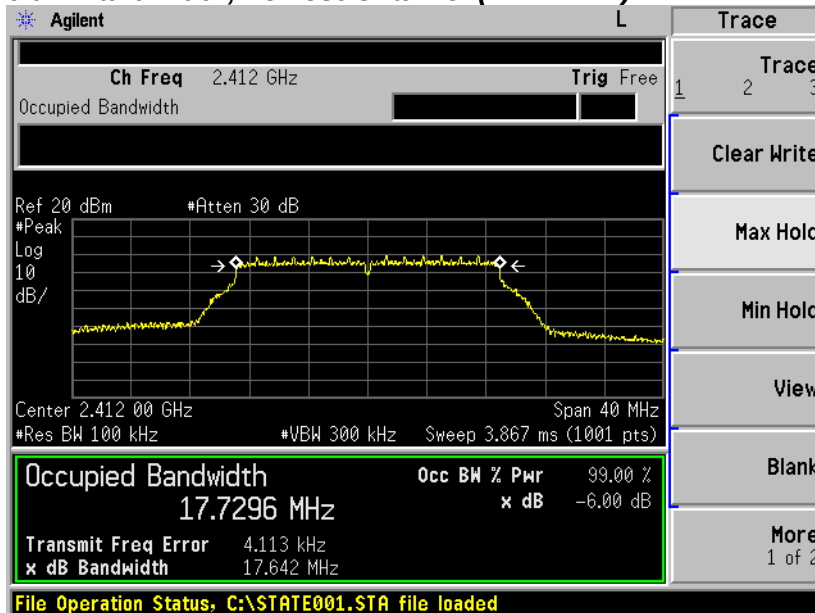
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



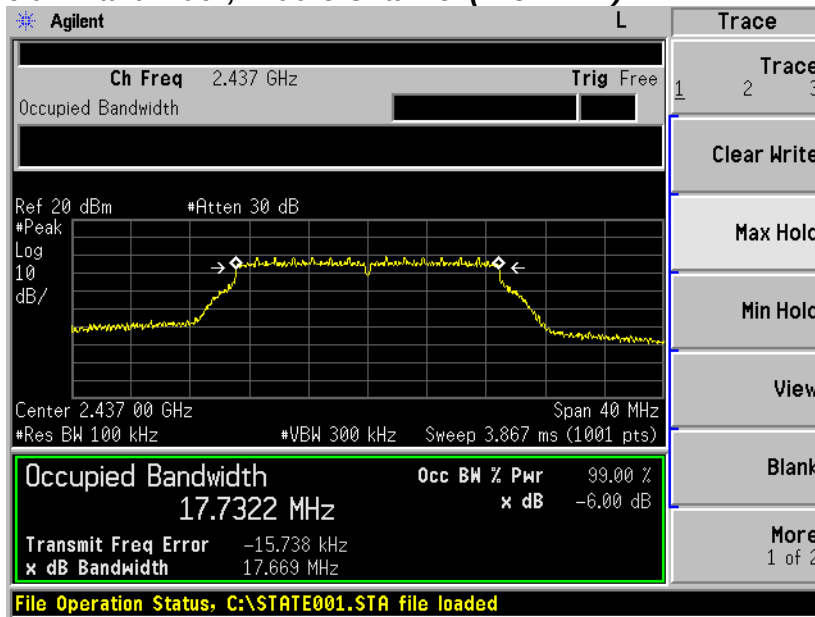
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

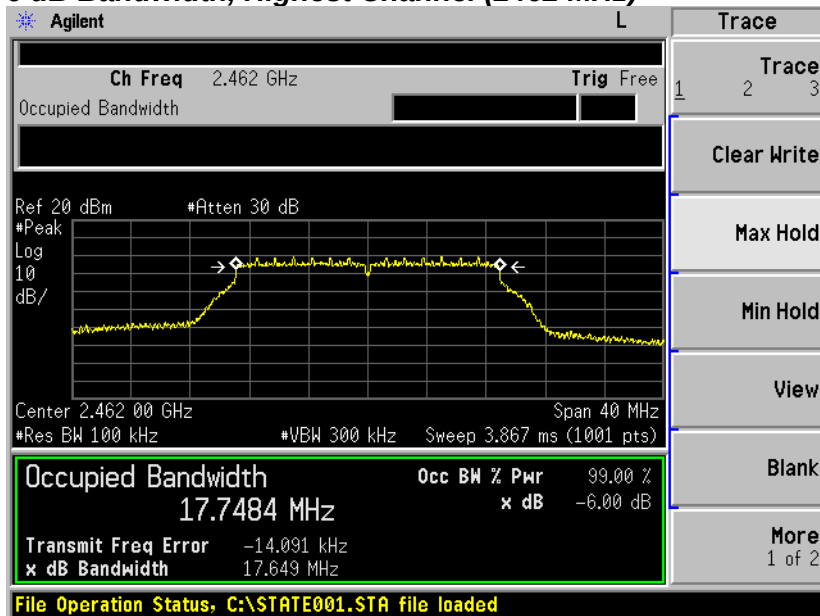


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

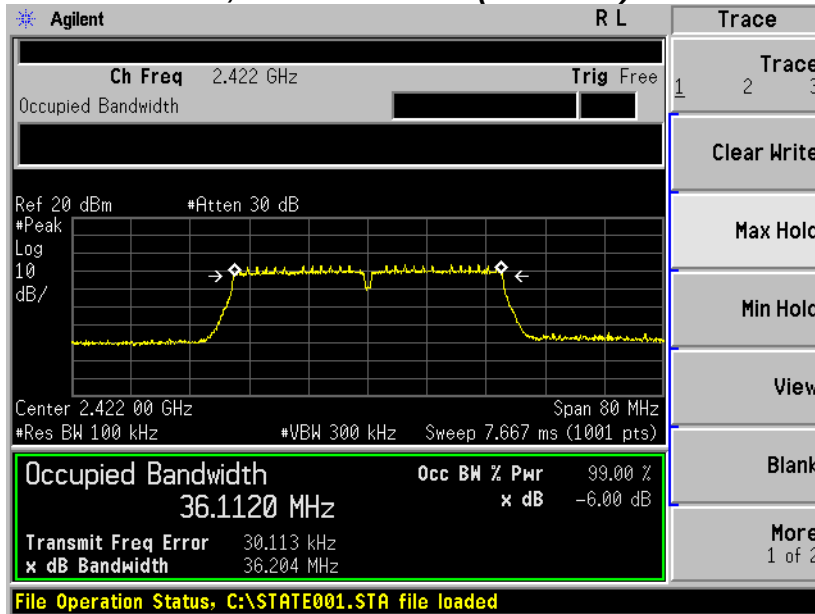


PLOTS OF EMISSIONS

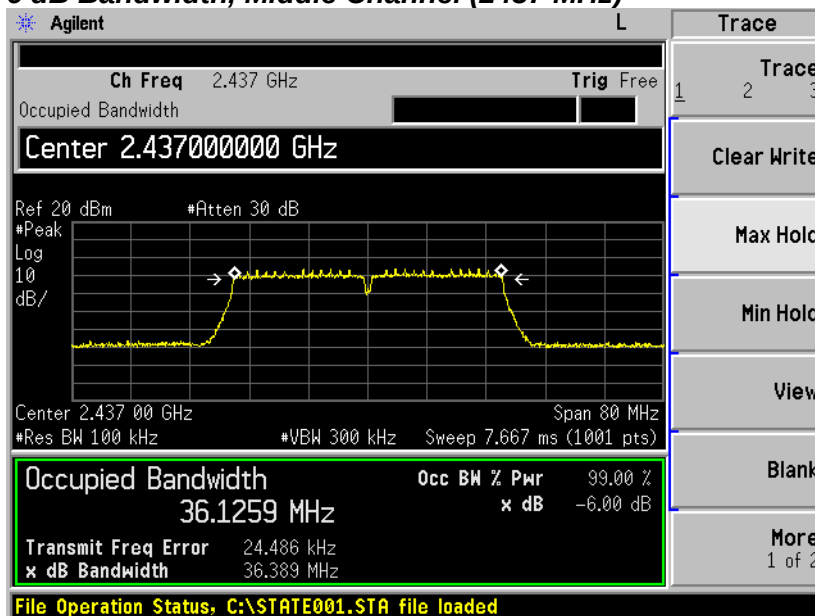
802.11n(40MHz) mode - SISO

Chain 0

6 dB Bandwidth, Lowest Channel (2422 MHz)

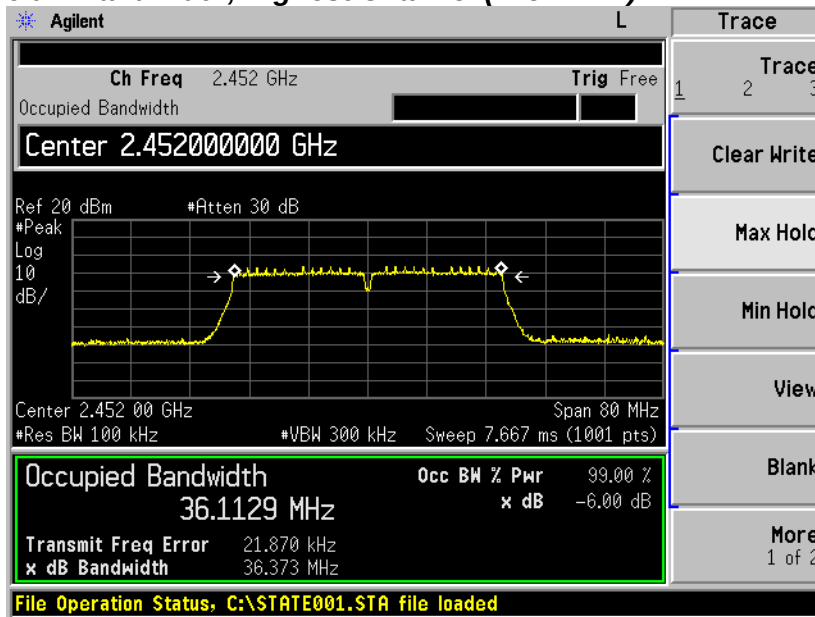


6 dB Bandwidth, Middle Channel (2437 MHz)



PLOTS OF EMISSIONS

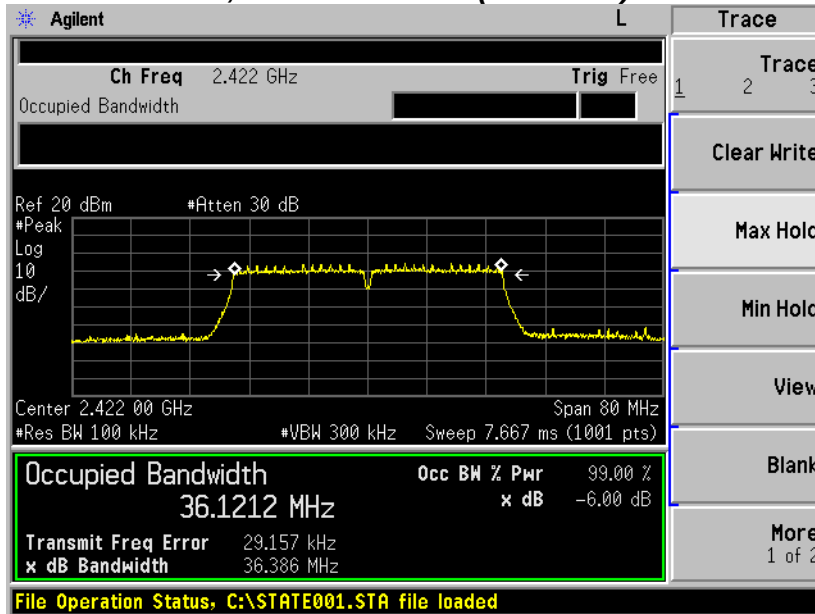
6 dB Bandwidth, Highest Channel (2452 MHz)



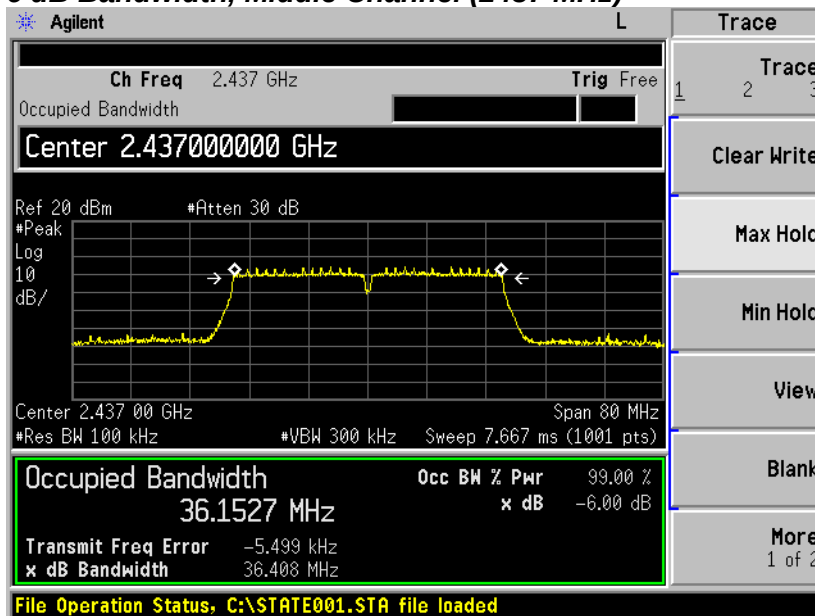
PLOTS OF EMISSIONS

Chain 1

6 dB Bandwidth, Lowest Channel (2422 MHz)

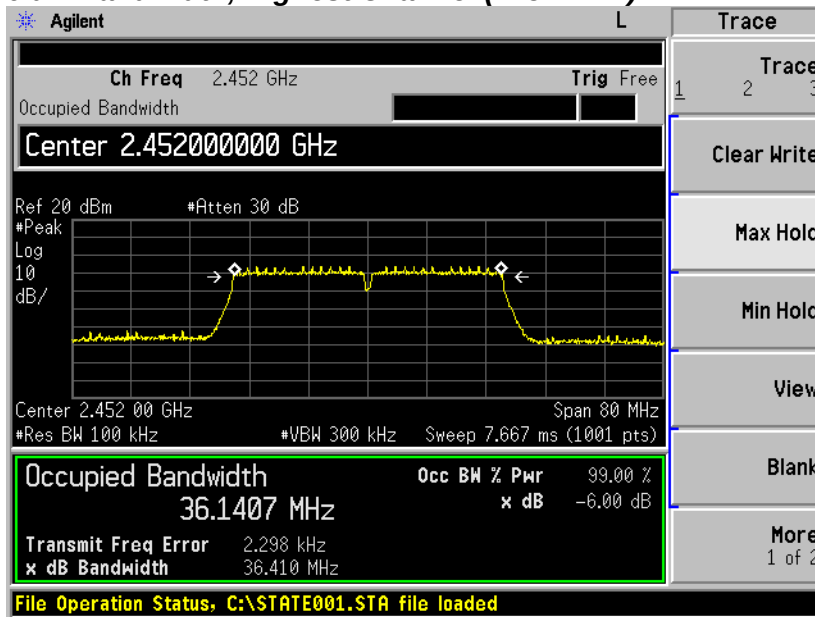


6 dB Bandwidth, Middle Channel (2437 MHz)



PLOTS OF EMISSIONS

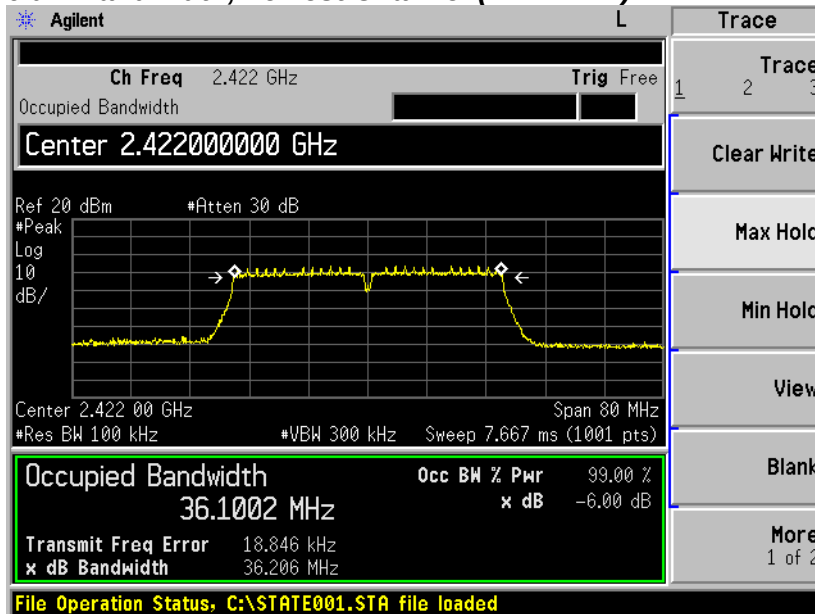
6 dB Bandwidth, Highest Channel (2452 MHz)



802.11n(40MHz) mode - CDD

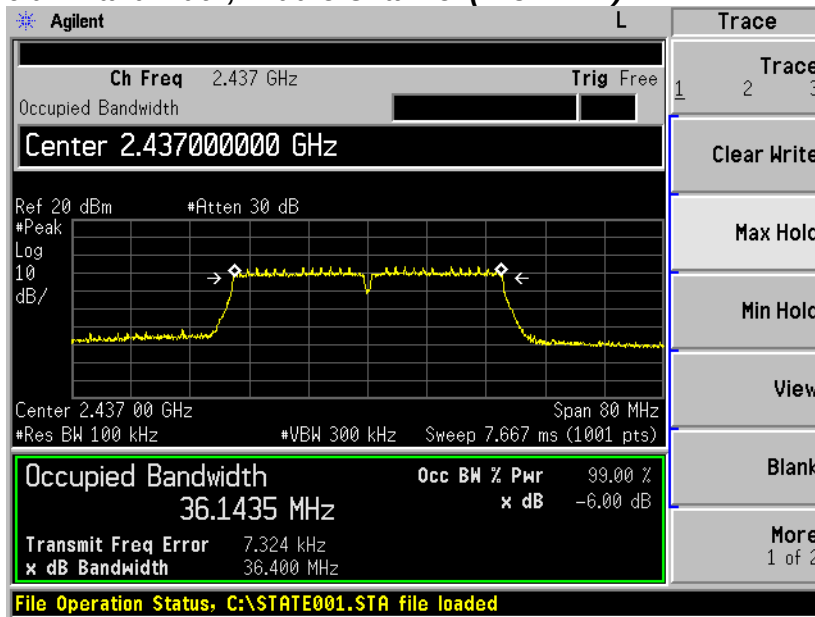
Chain 0

6 dB Bandwidth, Lowest Channel (2422 MHz)

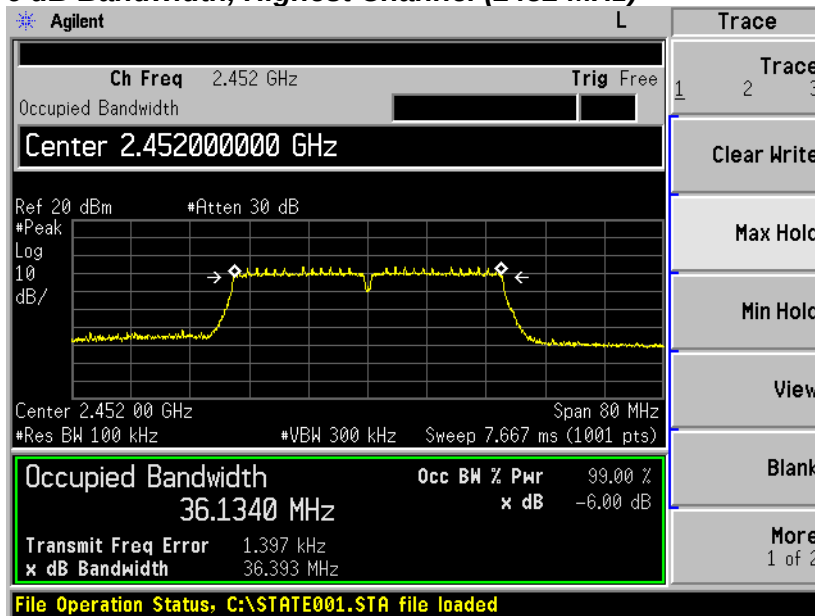


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



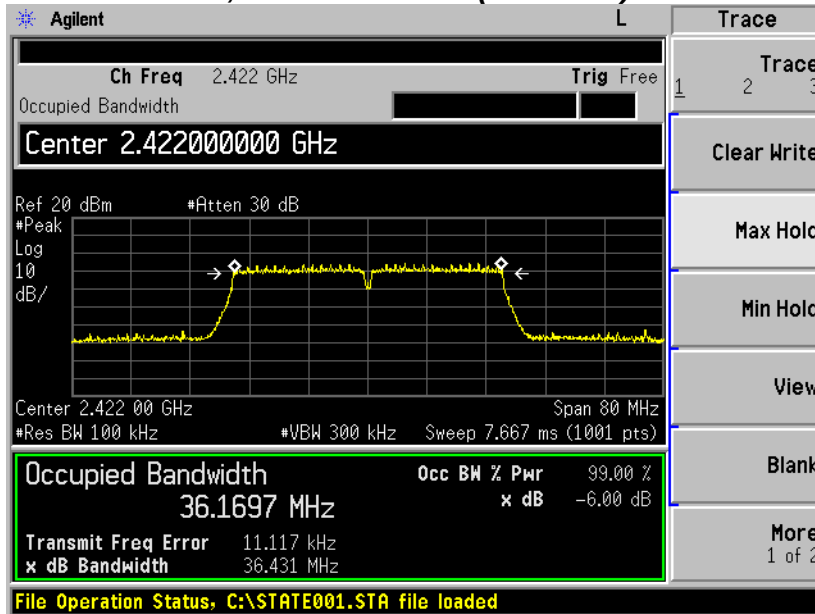
6 dB Bandwidth, Highest Channel (2452 MHz)



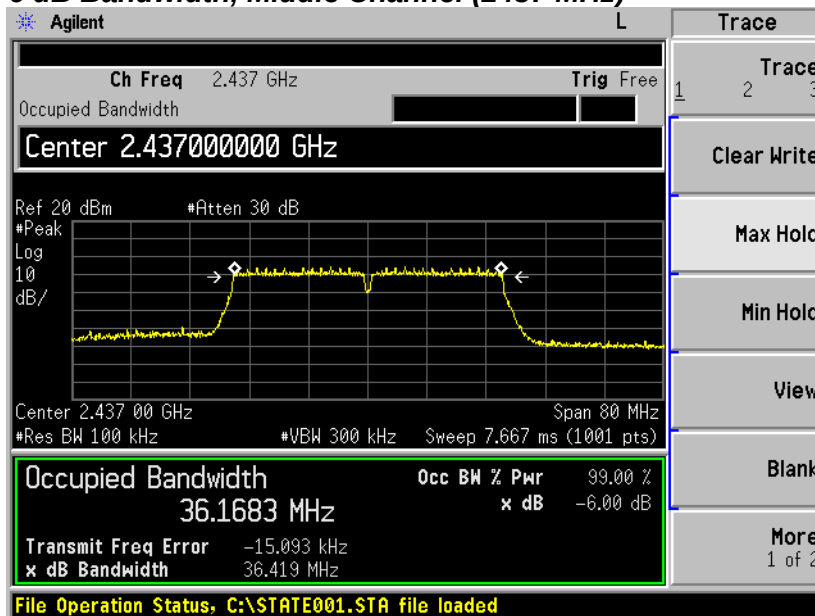
PLOTS OF EMISSIONS

Chain 1

6 dB Bandwidth, Lowest Channel (2422 MHz)

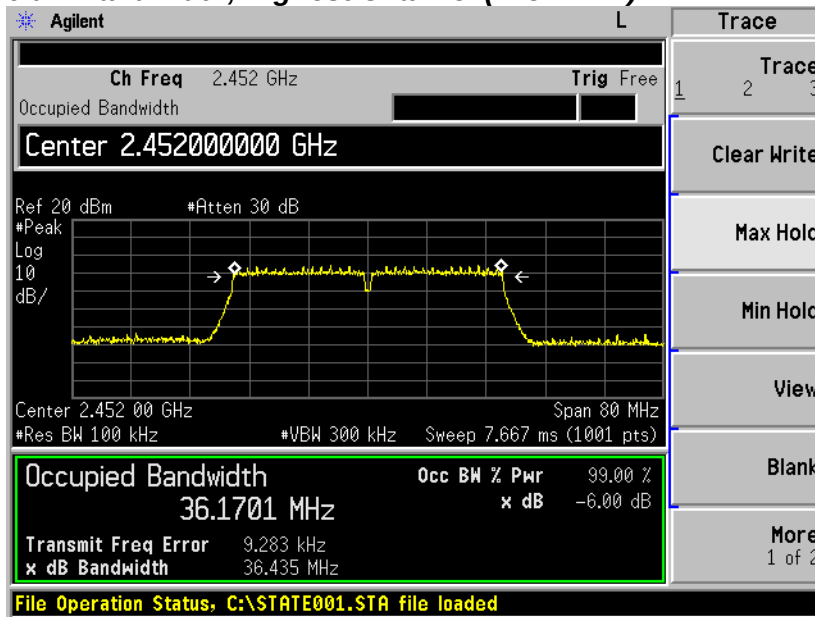


6 dB Bandwidth, Middle Channel (2437 MHz)



PLOTS OF EMISSIONS

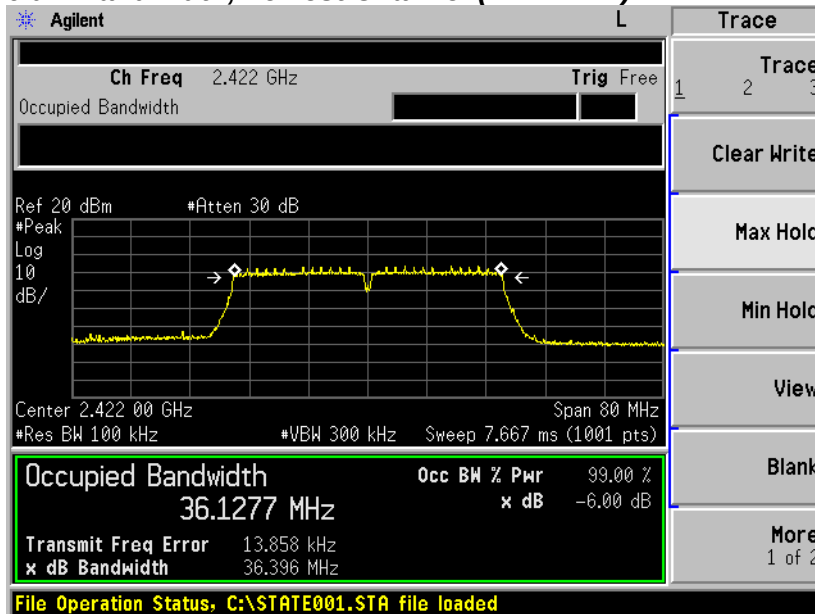
6 dB Bandwidth, Highest Channel (2452 MHz)



802.11n(40MHz) mode - MIMO

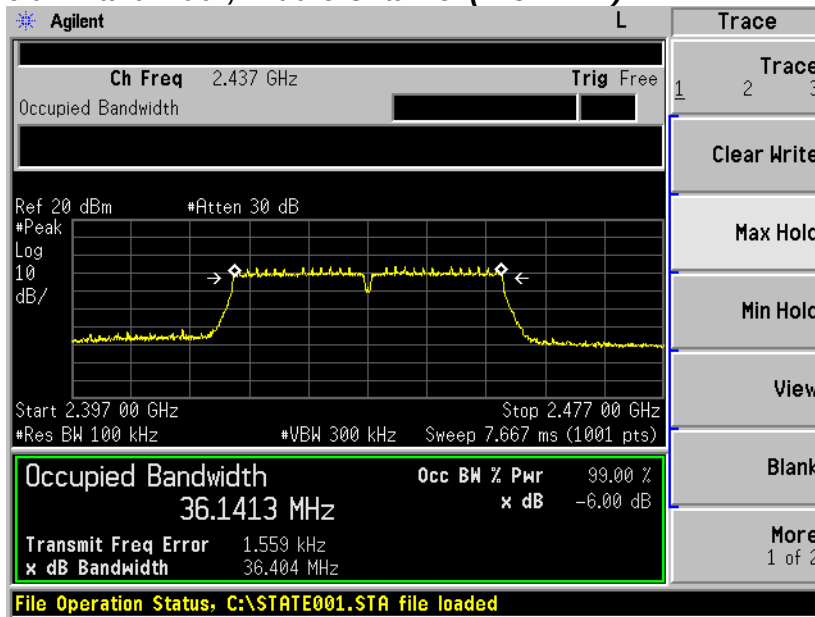
Chain 0

6 dB Bandwidth, Lowest Channel (2422 MHz)

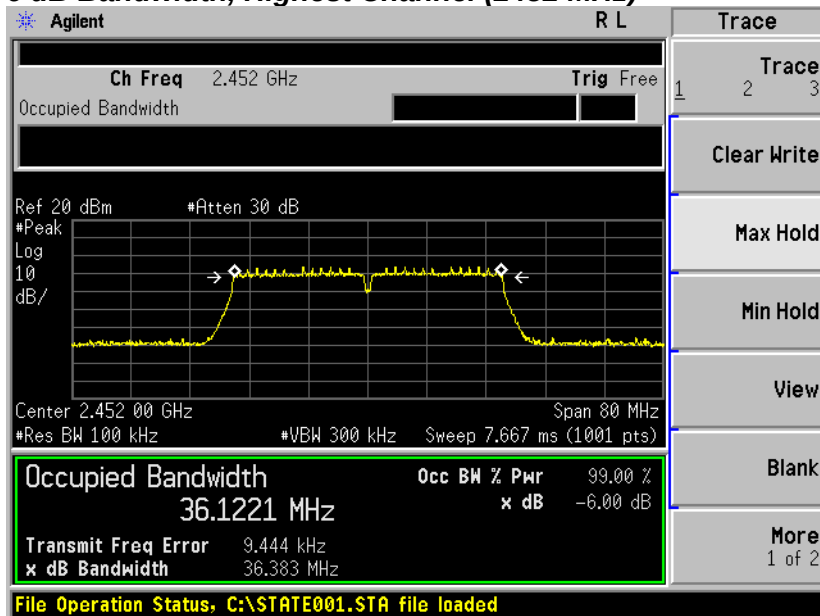


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



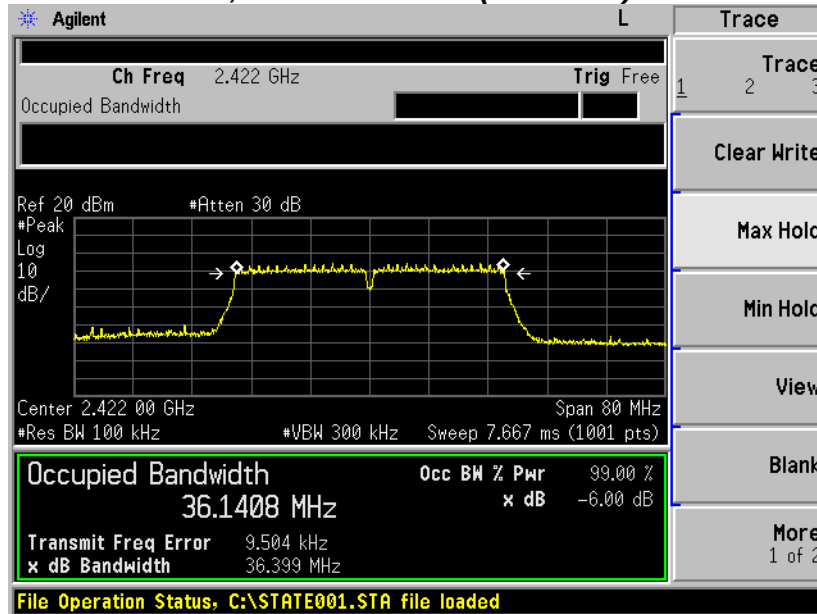
6 dB Bandwidth, Highest Channel (2452 MHz)



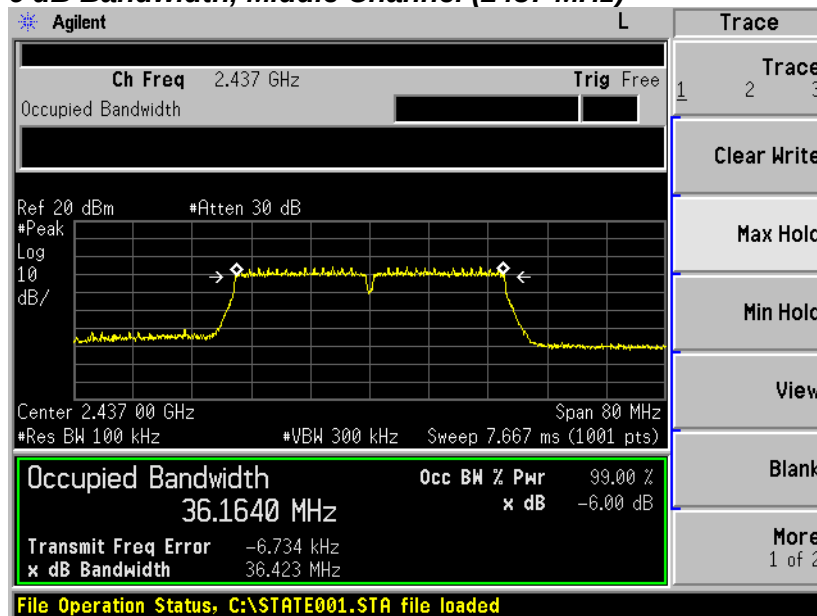
PLOTS OF EMISSIONS

Chain 1

6 dB Bandwidth, Lowest Channel (2422 MHz)

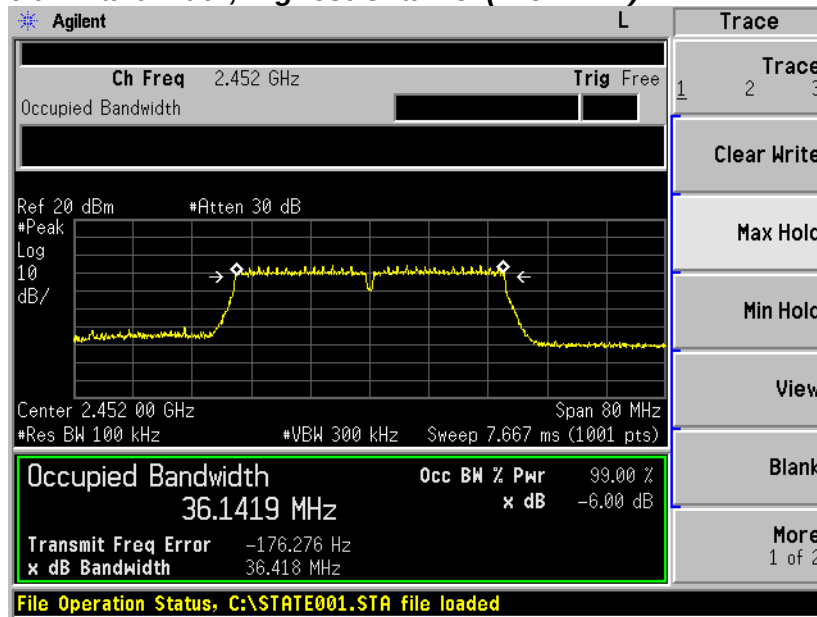


6 dB Bandwidth, Middle Channel (2437 MHz)



PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2452 MHz)



TEST DATA

8.4 Maximum Conducted Output Power (average)

FCC §15.247(a)(2), RSS-247 Issue 1 5.4

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11b

Channel	Frequency (MHz)	Measured conducted power (dBm)		Maximum Conducted Power (dBm)		Limit (dBm)	E.I.R.P (dBm)		E.I.R.P Limit (dBm)
		Chain 0	Chain 1	Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2412	11.58	11.96	11.80	12.18	30.00	15.10	15.48	36.00
Middle	2437	11.67	12.11	11.89	12.33	30.00	15.19	15.63	36.00
Highest	2462	11.71	11.74	11.93	11.96	30.00	15.23	15.26	36.00

802.11g

Channel	Frequency (MHz)	Measured conducted power (dBm)		Maximum Conducted Power (dBm)		Limit (dBm)	E.I.R.P (dBm)		E.I.R.P Limit (dBm)
		Chain 0	Chain 1	Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2412	11.96	12.35	12.18	12.57	30.00	15.48	15.87	36.00
Middle	2437	12.12	12.28	12.34	12.50	30.00	15.64	15.80	36.00
Highest	2462	12.20	12.29	12.42	12.51	30.00	15.72	15.81	36.00

TEST DATA

802.11n(20MHz) - CDD

Channel	Frequency (MHz)	Measured conducted power (dBm)		Duty Factor (dB)	Maximum Conducted Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)
		Chain 0	Chain 1		Total output power			
Lowest	2412	8.67	9.61	0.24	12.42	30.00	15.72	36.00
Middle	2437	8.93	9.57	0.24	12.51	30.00	15.81	36.00
Highest	2462	9.14	9.49	0.24	12.57	30.00	15.87	36.00

802.11n(20MHz) – MIMO

Channel	Frequency (MHz)	Measured conducted power (dBm)		Duty Factor (dB)	Maximum Conducted Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)
		Chain 0	Chain 1		Total output power			
Lowest	2412	8.56	9.48	0.42	12.47	30.00	15.77	36.00
Middle	2437	8.90	9.37	0.42	12.57	30.00	15.87	36.00
Highest	2462	8.95	9.34	0.42	12.57	30.00	15.87	36.00

802.11n(40MHz) - SISO

Channel	Frequency (MHz)	Measured conducted power (dBm)		Maximum Conducted Power (dBm)		Limit (dBm)	E.I.R.P (dBm)		E.I.R.P Limit (dBm)
		Chain 0	Chain 1	Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2422	6.62	7.39	7.20	7.97	30.00	10.50	11.27	36.00
Middle	2437	6.90	7.44	7.48	8.02	30.00	10.78	11.32	36.00
Highest	2452	6.94	7.22	7.52	7.80	30.00	10.82	11.10	36.00

TEST DATA

802.11n(40MHz) - CDD

Channel	Frequency (MHz)	Measured conducted power (dBm)		Duty Factor (dB)	Maximum Conducted Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)
		Chain 0	Chain 1		Total output power			
Lowest	2422	6.73	7.40	0.58	10.67	30.00	13.97	36.00
Middle	2437	6.66	7.28	0.58	10.57	30.00	13.87	36.00
Highest	2452	6.93	7.25	0.58	10.68	30.00	13.98	36.00

802.11n(40MHz) – MIMO

Channel	Frequency (MHz)	Measured conducted power (dBm)		Duty Factor (dB)	Maximum Conducted Power (dBm)	Limit (dBm)	E.I.R.P (dBm)	E.I.R.P Limit (dBm)
		Chain 0	Chain 1		Total output power			
Lowest	2422	6.23	7.03	0.79	10.45	30.00	13.75	36.00
Middle	2437	6.41	6.98	0.79	10.50	30.00	13.80	36.00
Highest	2452	6.43	6.85	0.79	10.45	30.00	13.75	36.00

Note:

1. Maximum Conducted (average) Power = Measured conducted power + Duty Factor
2. Total output power = $10 \log [10^{\{(Chain\ 0\ Power + duty\ factor\}/10\}} + 10^{\{(Chain\ 1\ Power + duty\ factor\}/10\}}]$
3. For CDD transmission, directional gain is. **3.3 dBi**.

For MIMO transmission, directional gain is **3.3 dBi**.

Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.

For power measurements on IEEE 802.11 devices employing CDD, directional gain is as follows,

$$\text{Directional gain} = G_{ANT} + \text{Array Gain} = 3.3 \text{ dBi} + 0 \text{ dB} = 3.3 \text{ dBi}.$$

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all devices employing MIMO, directional gain is as follows,

$$\text{Directional gain} = G_{ANT} + 10 \log(N_{ANT}/N_{SS}) \text{ dBi} = 3.3 \text{ dBi} + 10 \log(2/2) \text{ dB} = 3.3 \text{ dBi}.$$

where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi

For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and $N_{SS}=2$.

3. *E.I.R.P* was calculated by following equation according to KDB412172 D01 Determining ERP and EIRP v01

$$E.I.R.P = P_T + G_T - L_C$$

P_T = Peak outputpower (dBm)

G_T = Gain of the transmitting antenna in dBi, Directional antenna gain is **3.3 dBi**.

L_C = Signal attenuation in the connecting cable between the transmitter and antenna in dB. This factor of an integral antenna is negligible.

4. The following equation was used for spectrum offset:

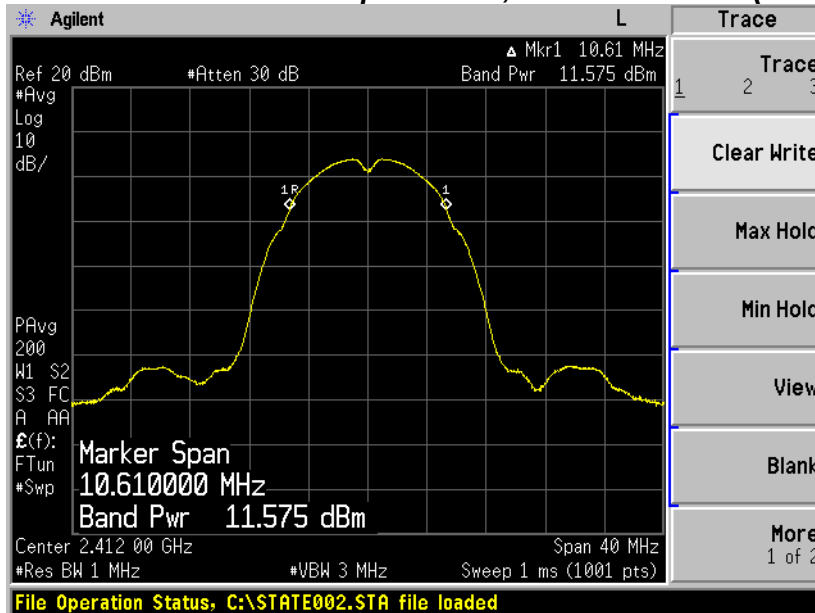
$$\text{Spectrum offset (dB)} = \text{Attenuator (dB)} + \text{Cable Loss (dB)} + \text{SMA Type Connector Loss (dB)}$$

PLOT OF TEST DATA

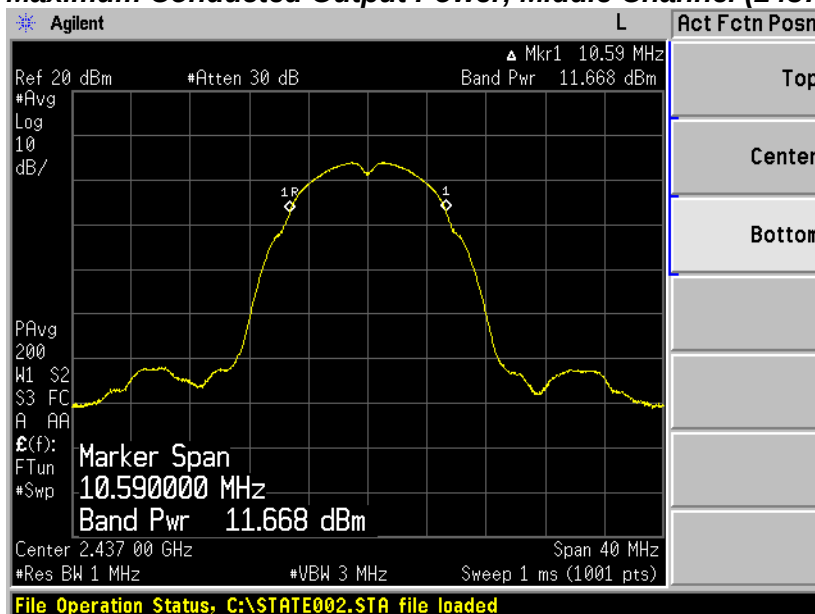
802.11b mode

Chain 0

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

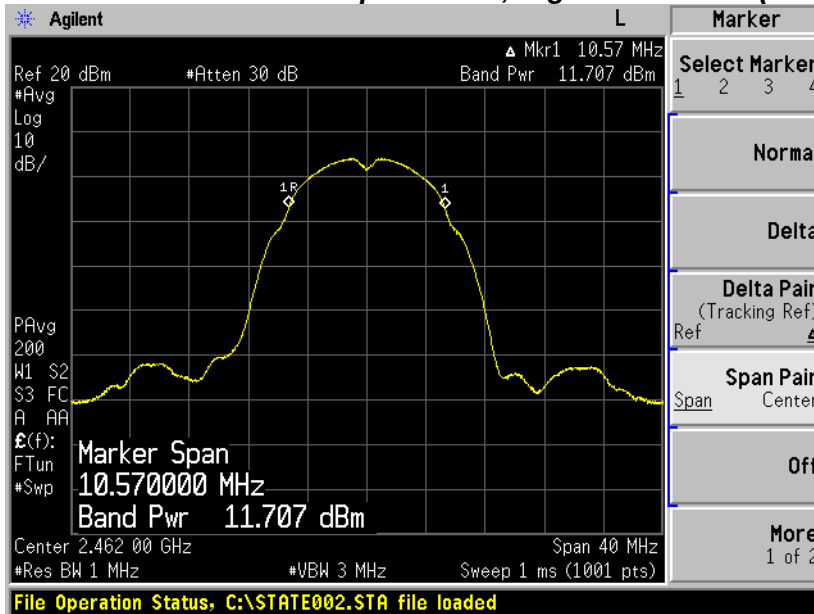


Maximum Conducted Output Power, Middle Channel (2437 MHz)



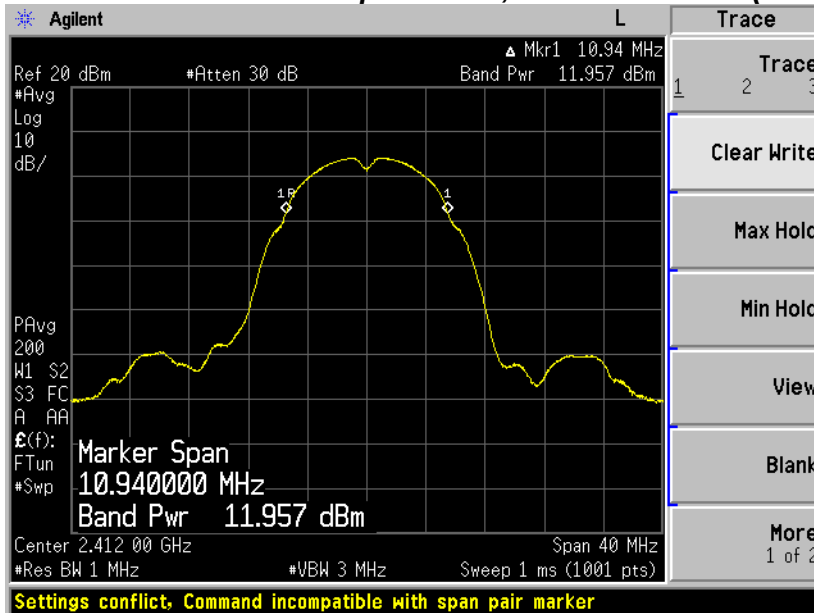
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2462 MHz)



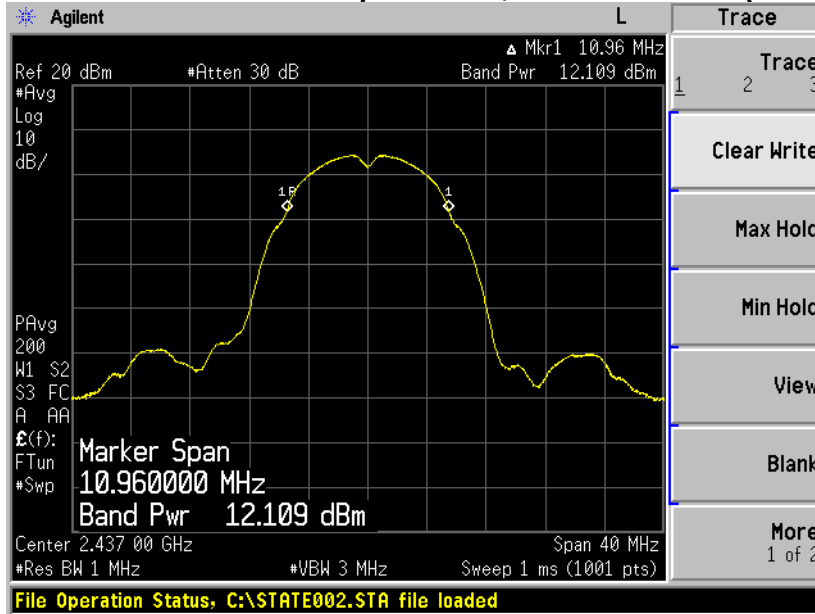
Chain 1

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

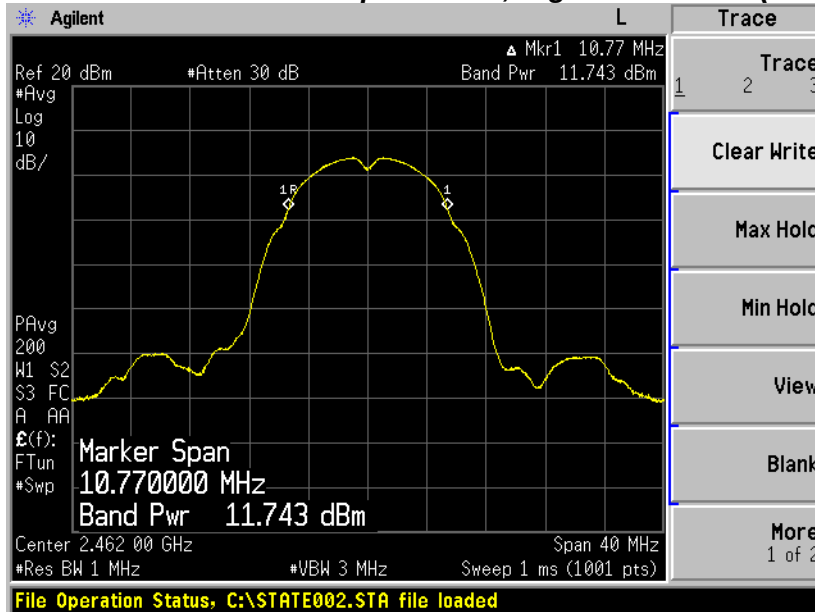


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2462 MHz)

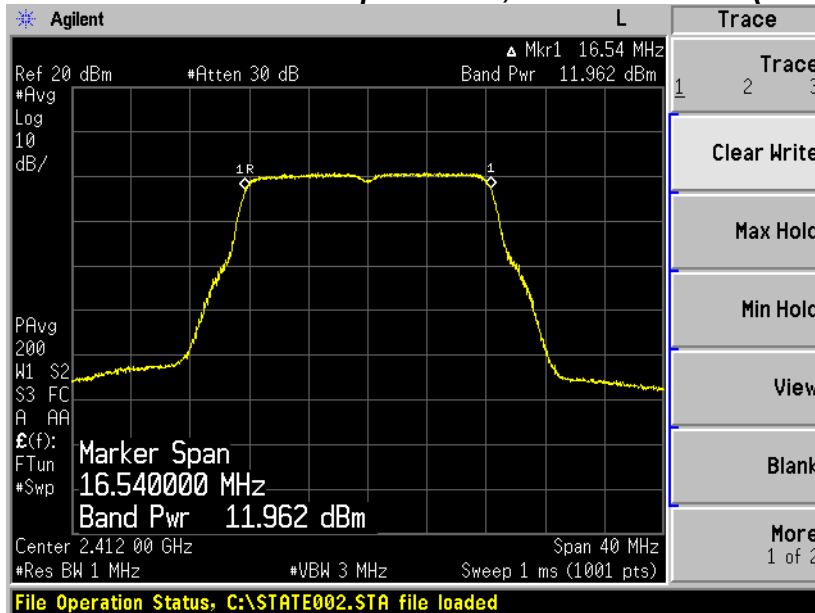


PLOT OF TEST DATA

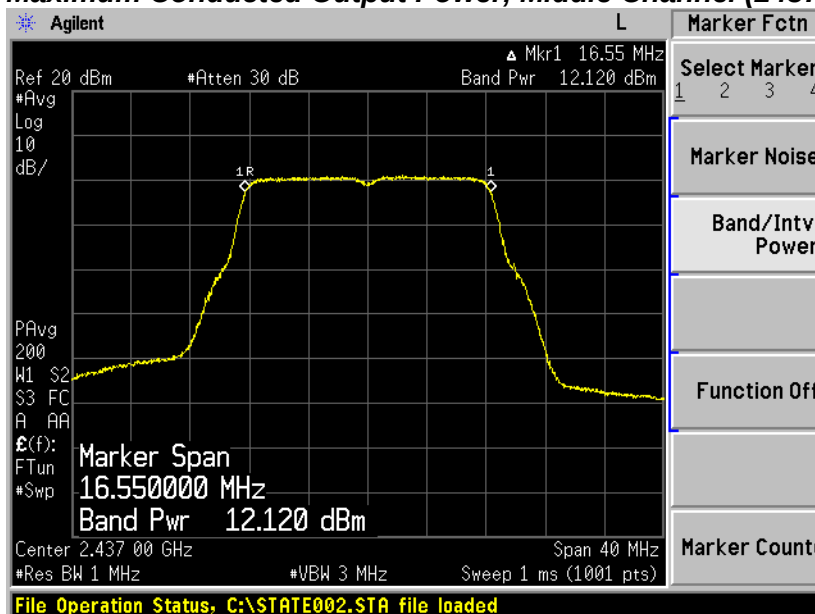
802.11g mode

Chain 0

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

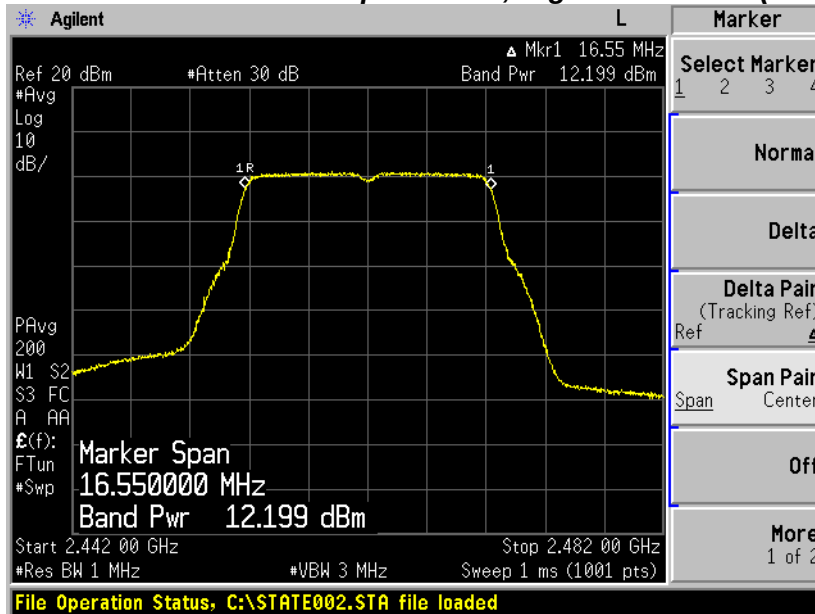


Maximum Conducted Output Power, Middle Channel (2437 MHz)



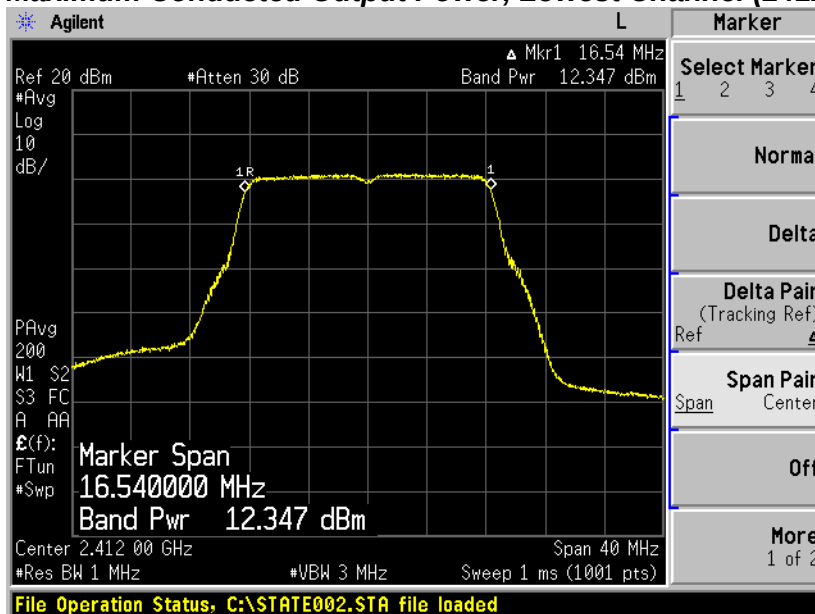
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2462 MHz)



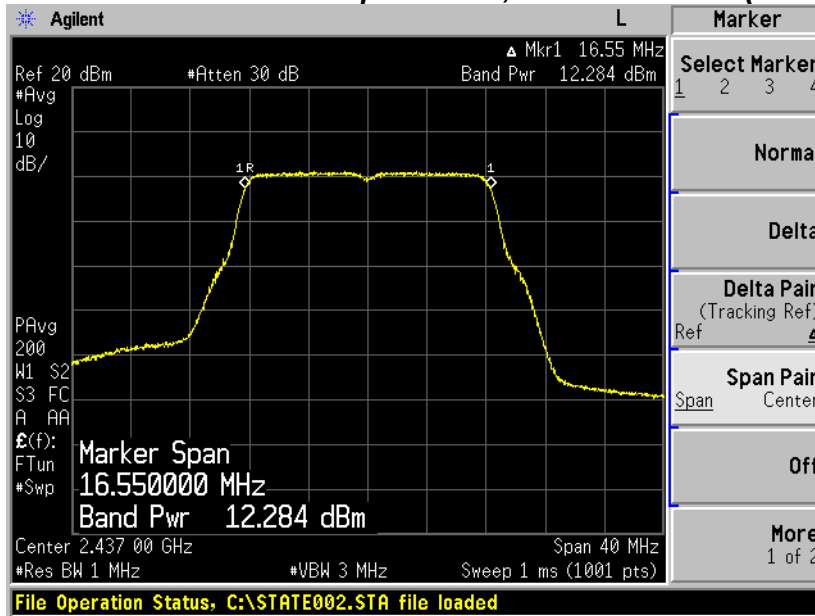
Chain 1

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

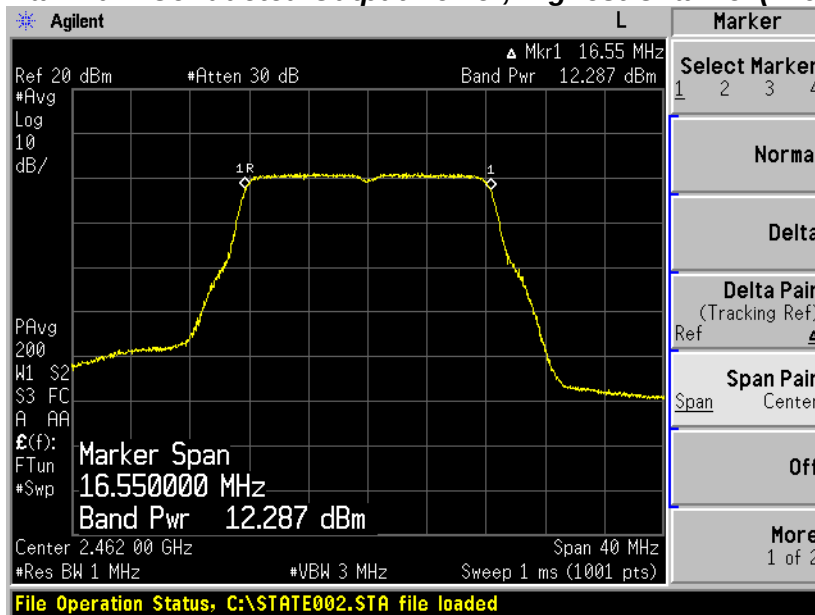


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2462 MHz)

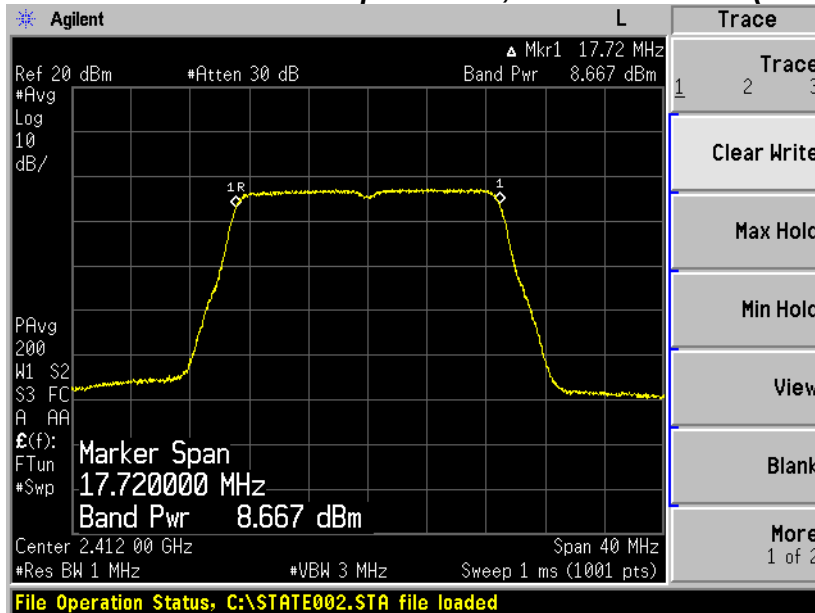


PLOT OF TEST DATA

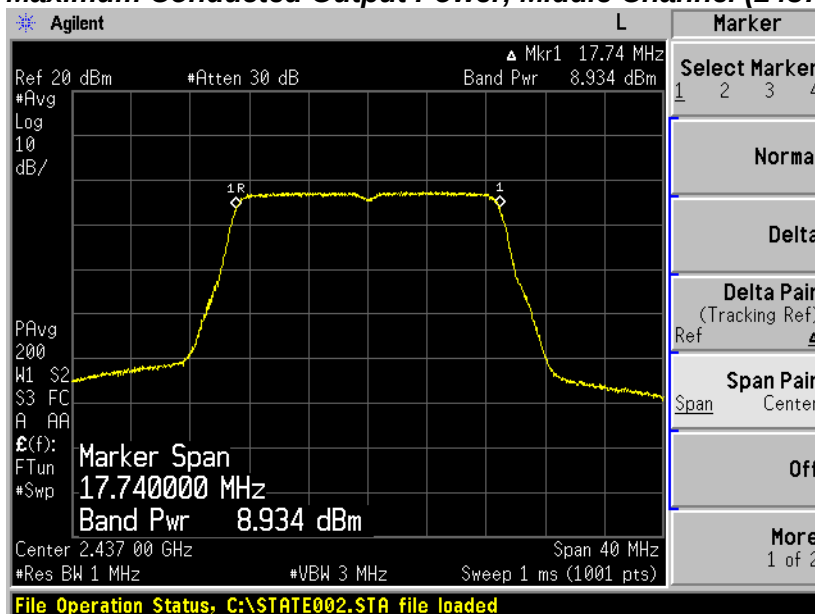
802.11n(20MHz) mode - CDD

Chain 0

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

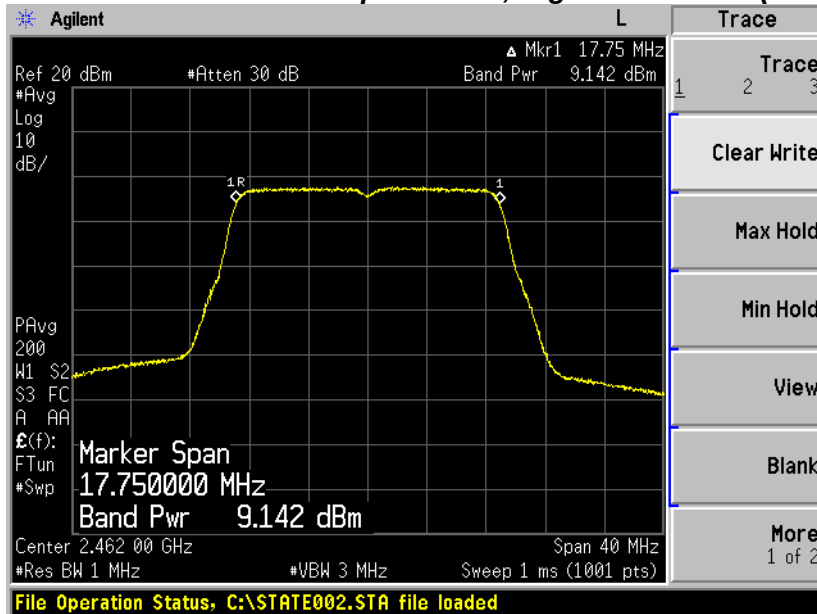


Maximum Conducted Output Power, Middle Channel (2437 MHz)



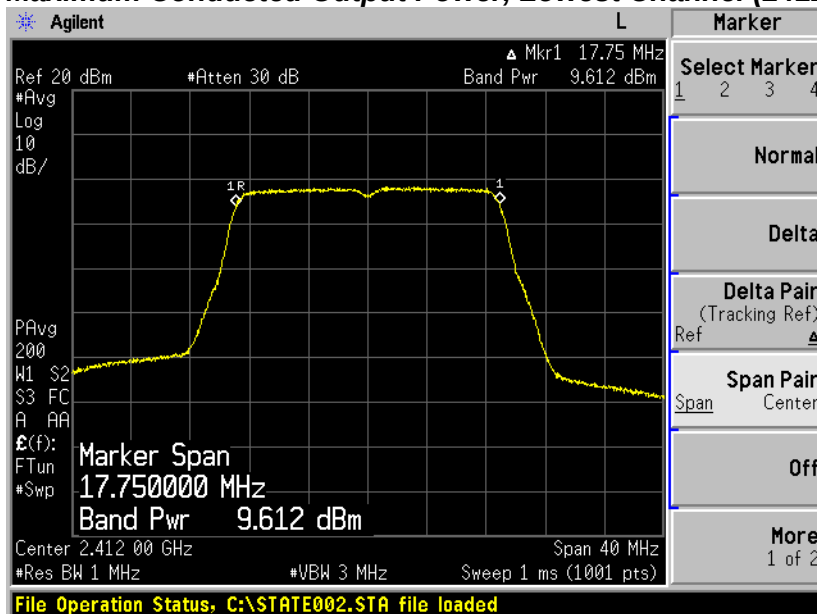
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2462 MHz)



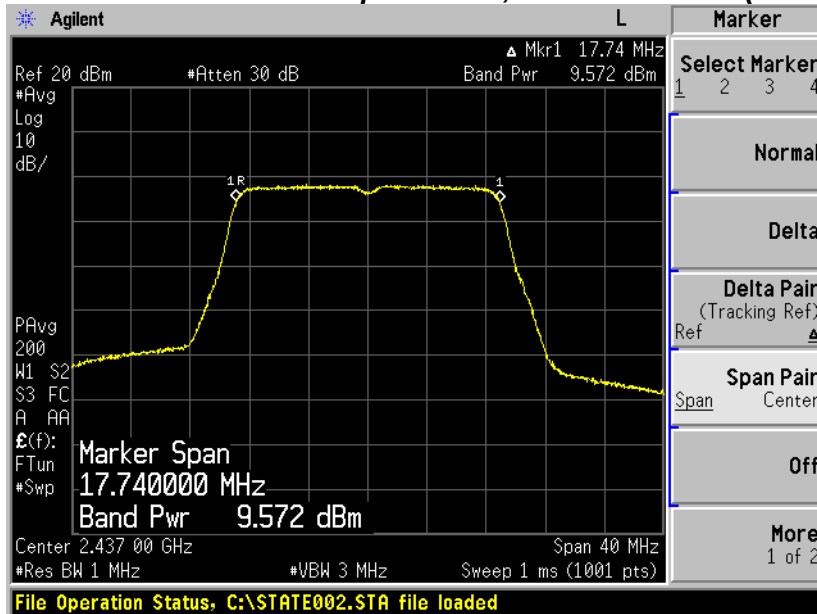
Chain 1

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

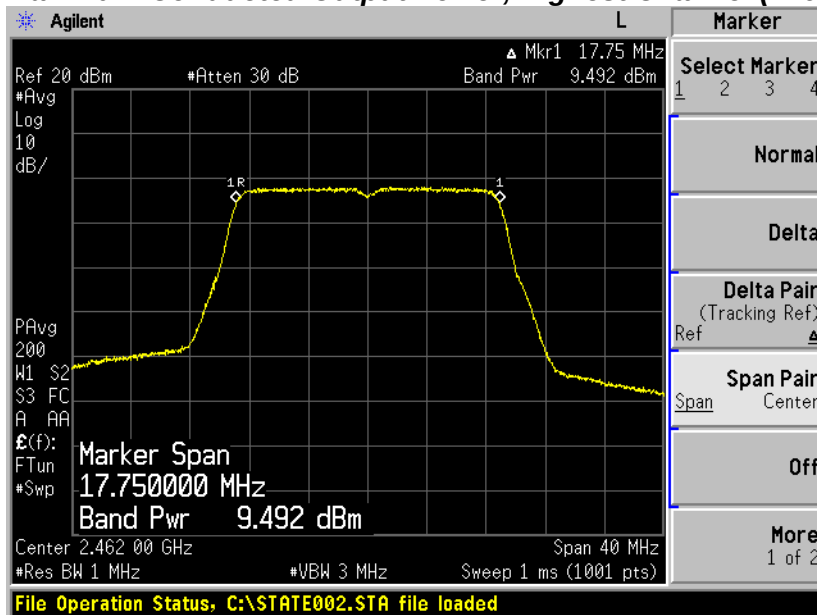


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2462 MHz)

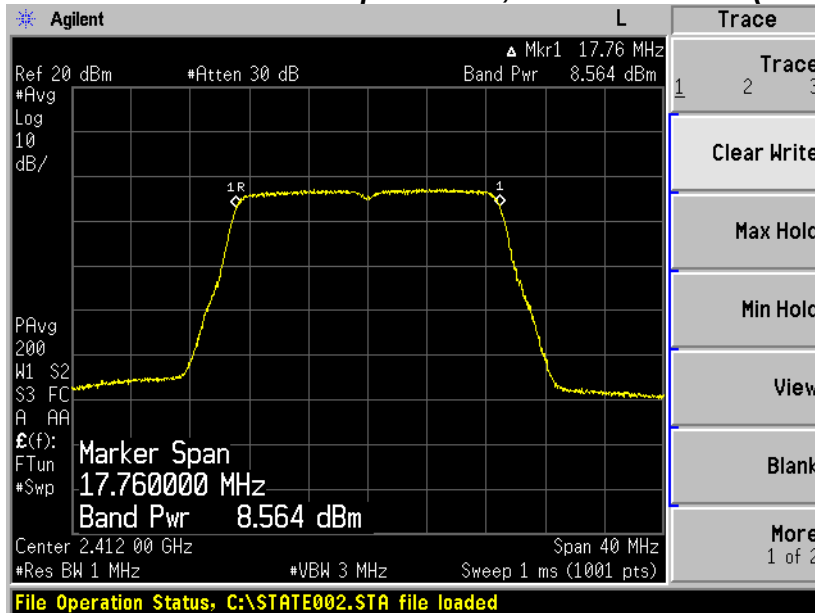


PLOT OF TEST DATA

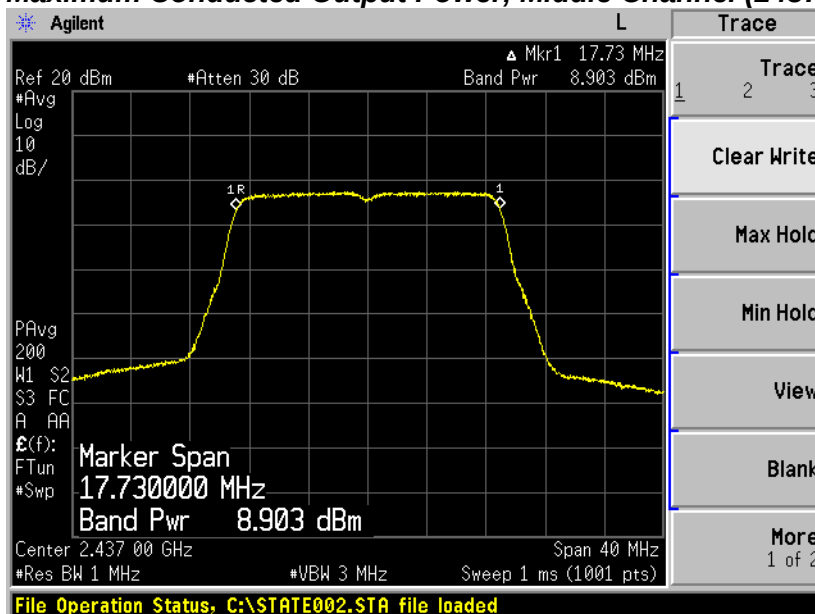
802.11n(20MHz) mode - MIMO

Chain 0

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

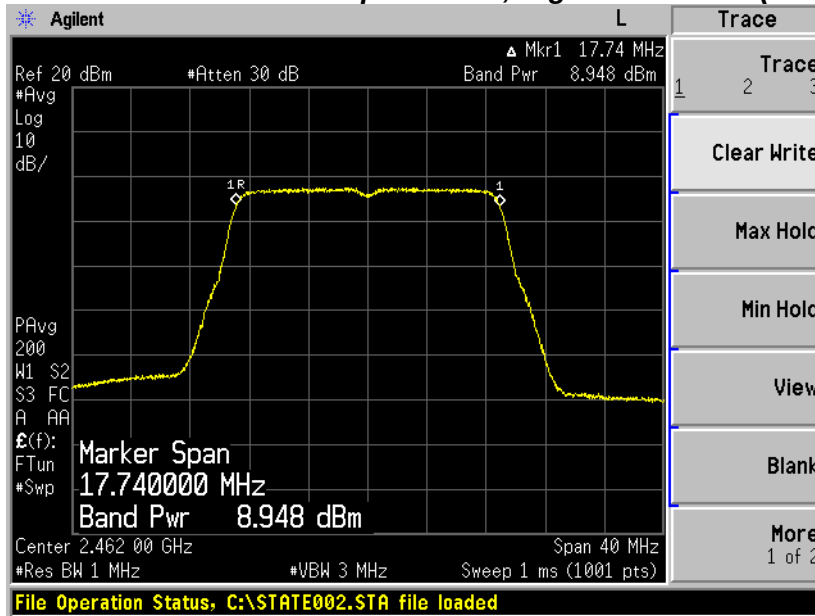


Maximum Conducted Output Power, Middle Channel (2437 MHz)



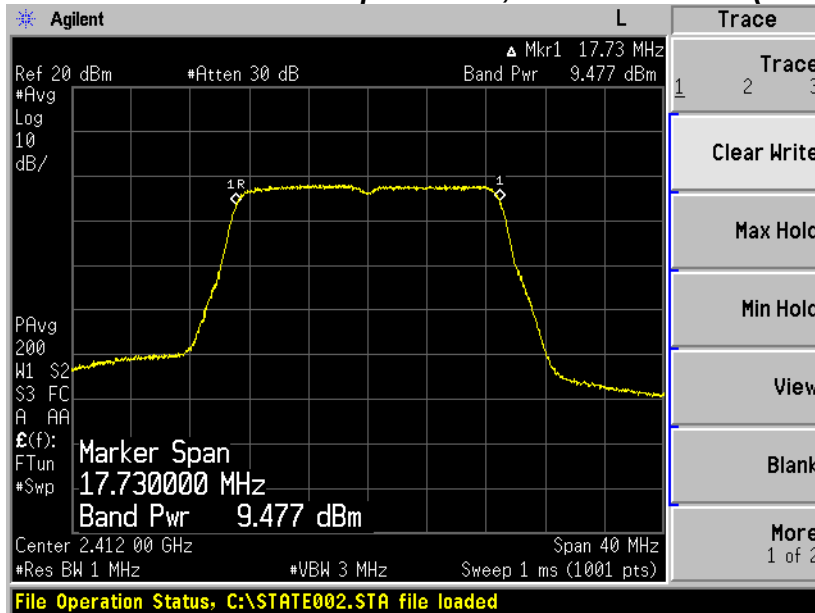
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2462 MHz)



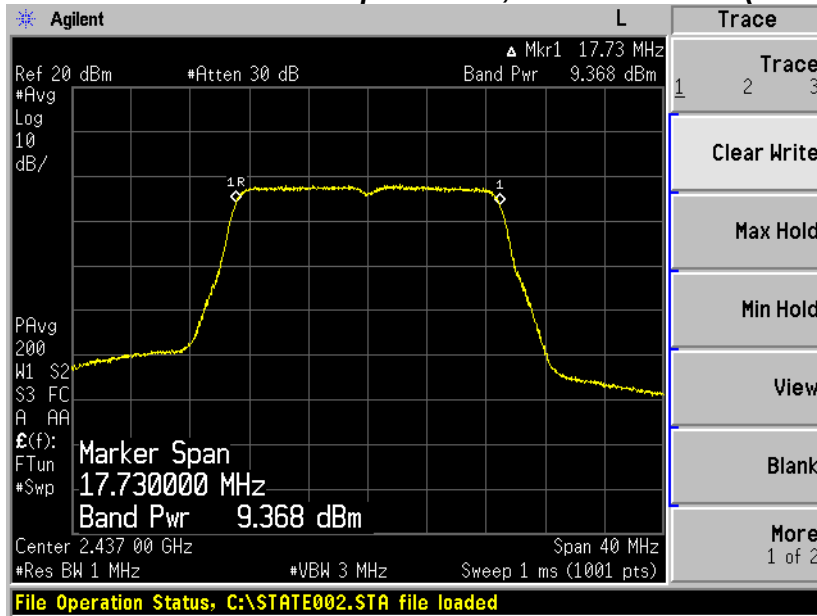
Chain 1

Maximum Conducted Output Power, Lowest Channel (2412 MHz)

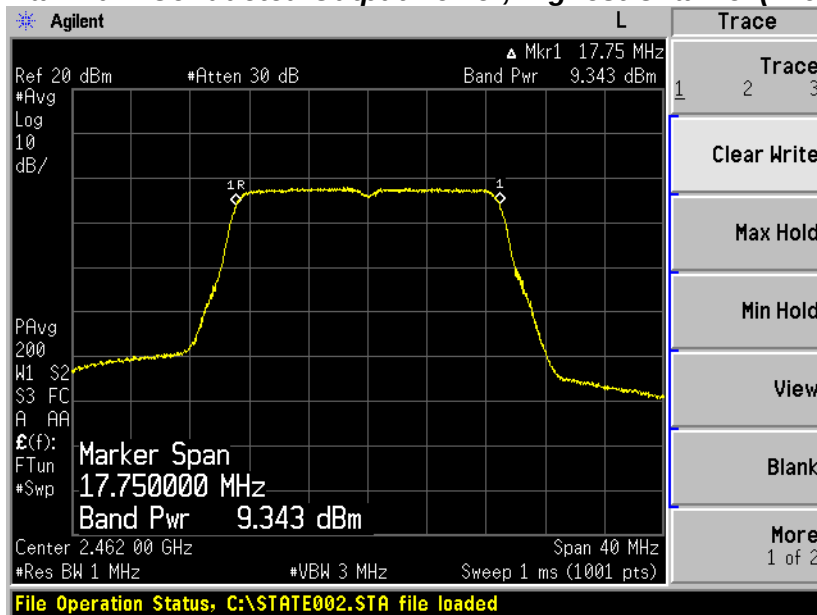


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2462 MHz)

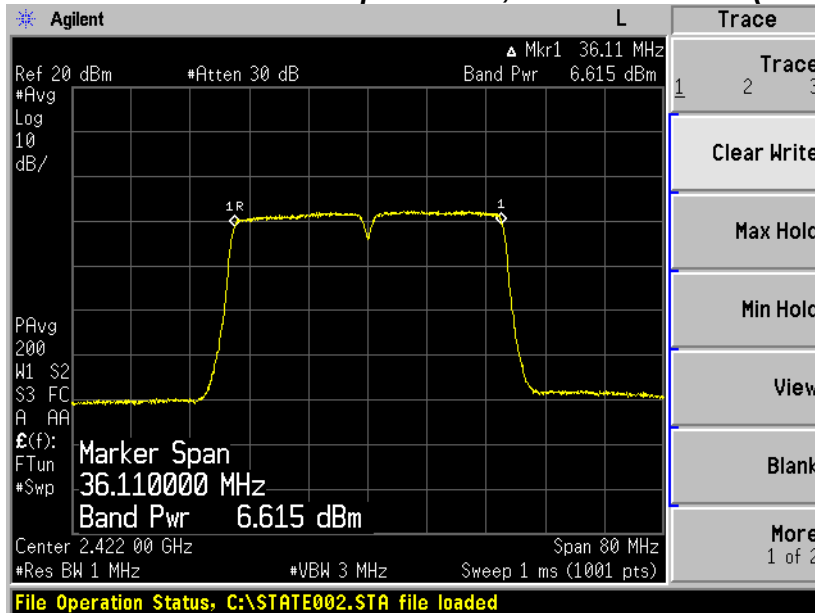


PLOT OF TEST DATA

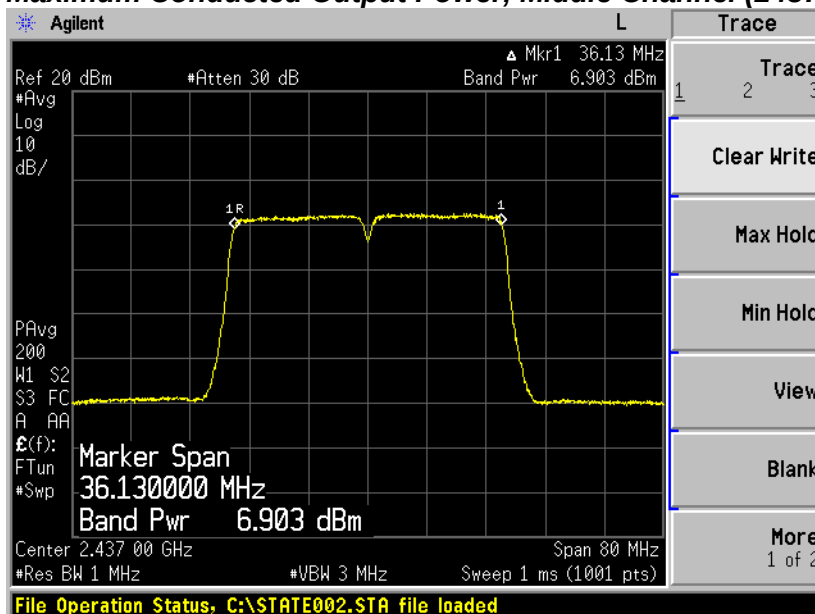
802.11n(40MHz) mode - SISO

Chain 0

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

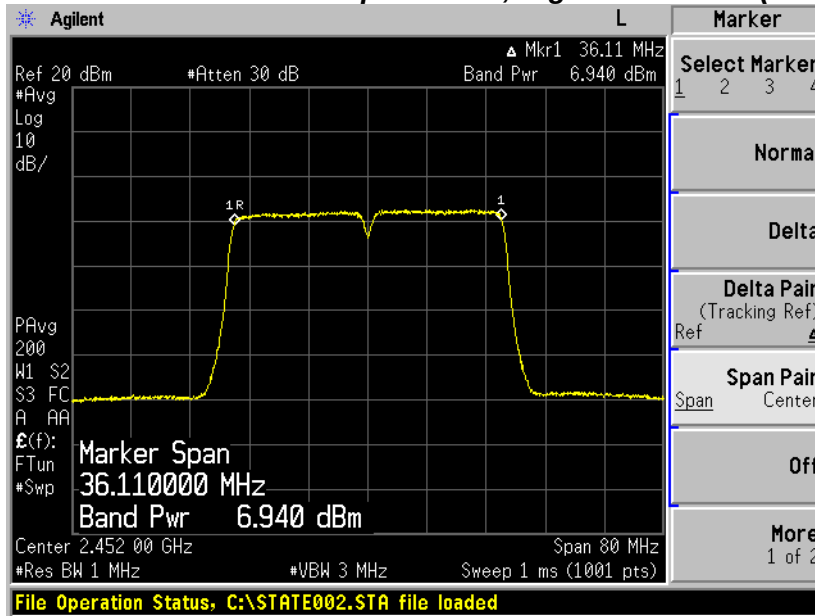


Maximum Conducted Output Power, Middle Channel (2437 MHz)



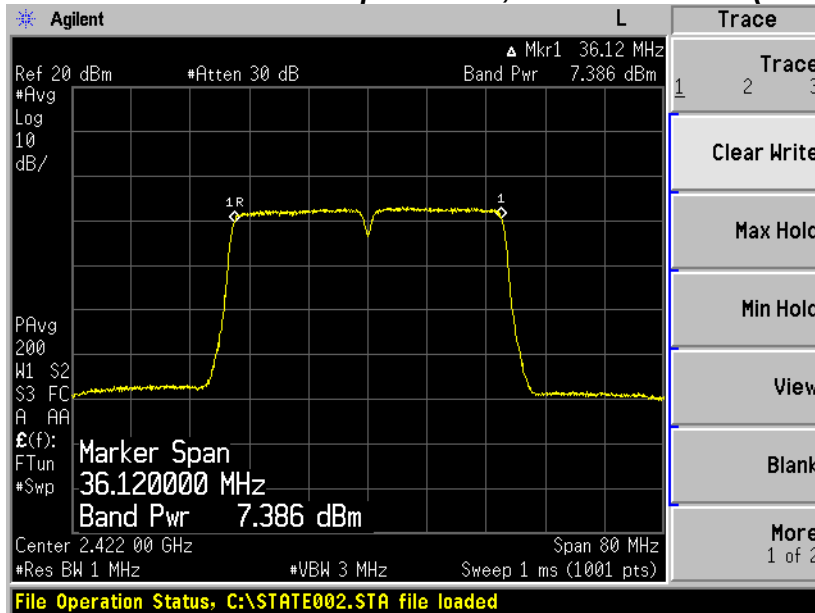
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2452 MHz)



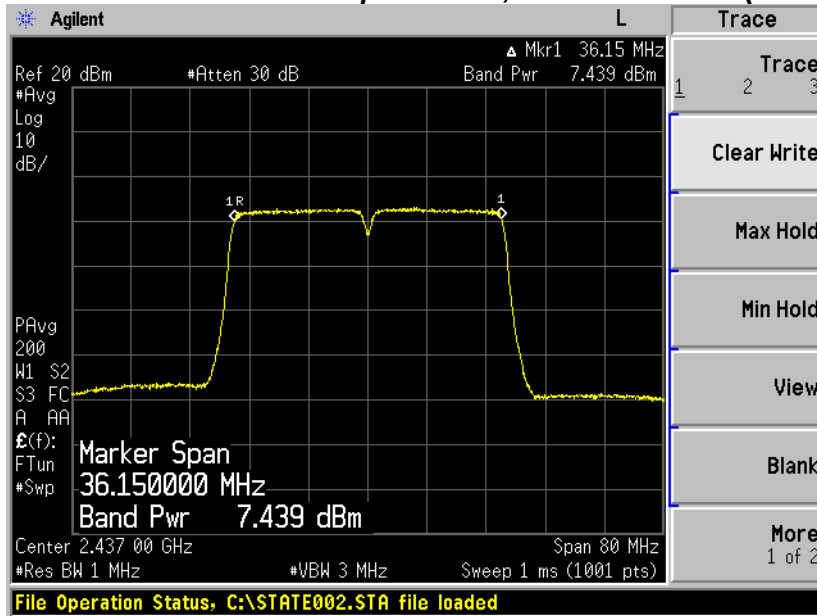
Chain 1

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

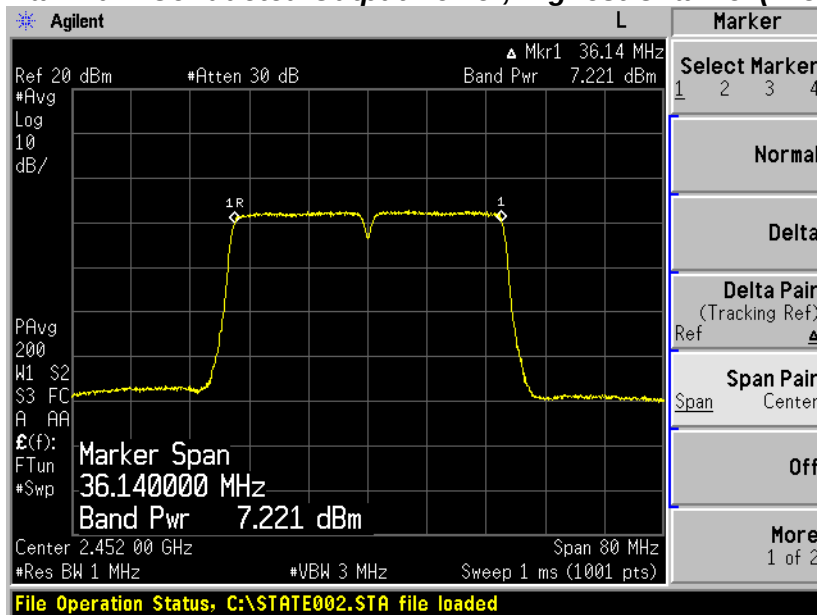


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2452 MHz)

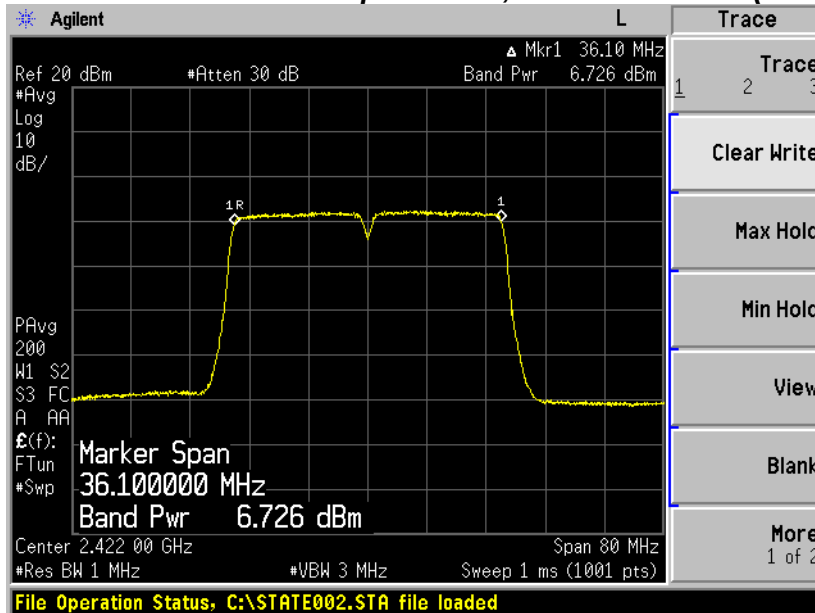


PLOT OF TEST DATA

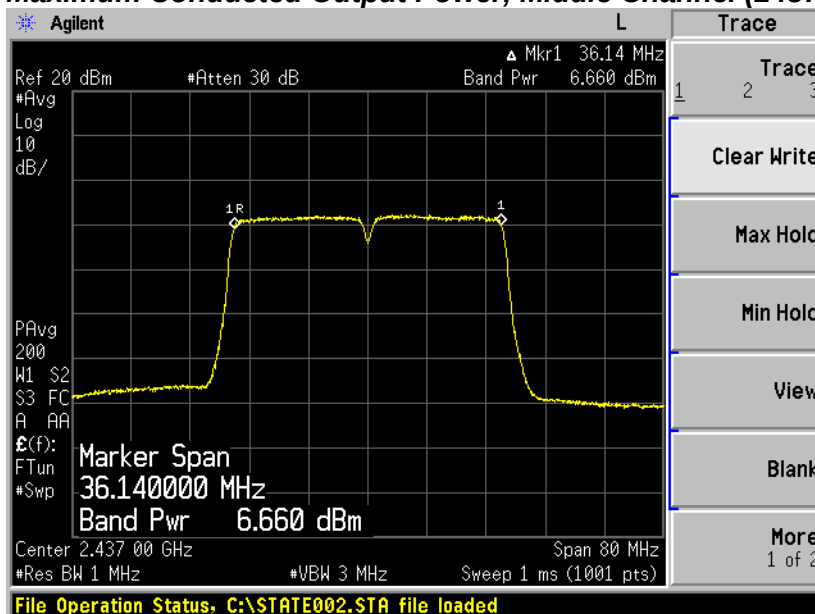
802.11n(40MHz) mode - CDD

Chain 0

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

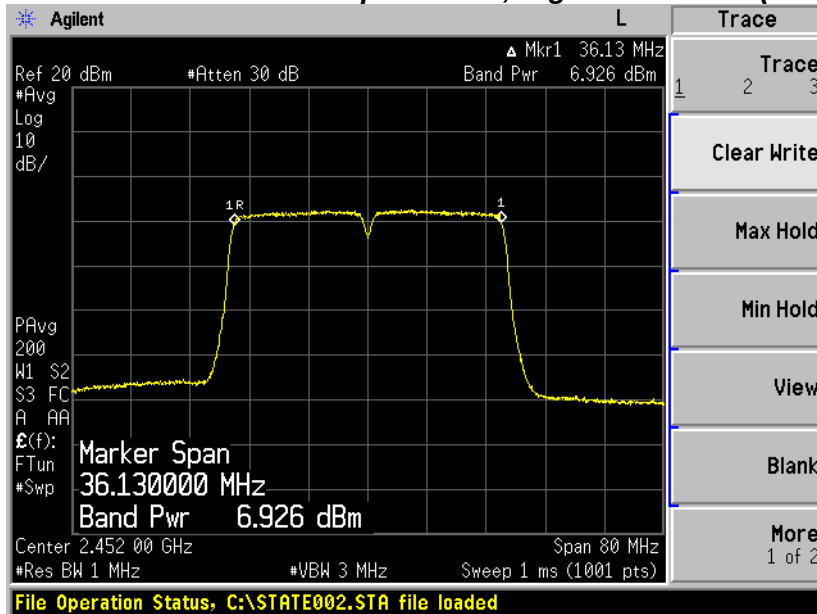


Maximum Conducted Output Power, Middle Channel (2437 MHz)



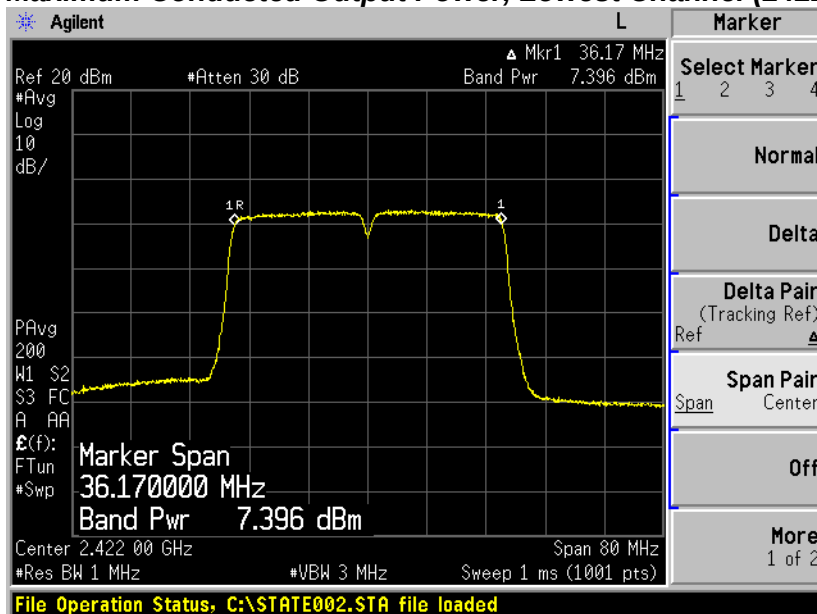
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2452 MHz)



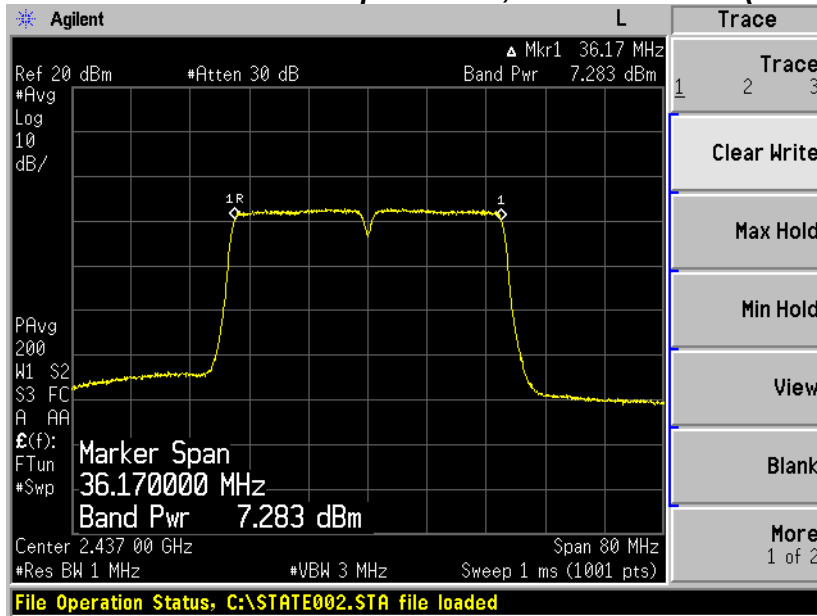
Chain 1

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

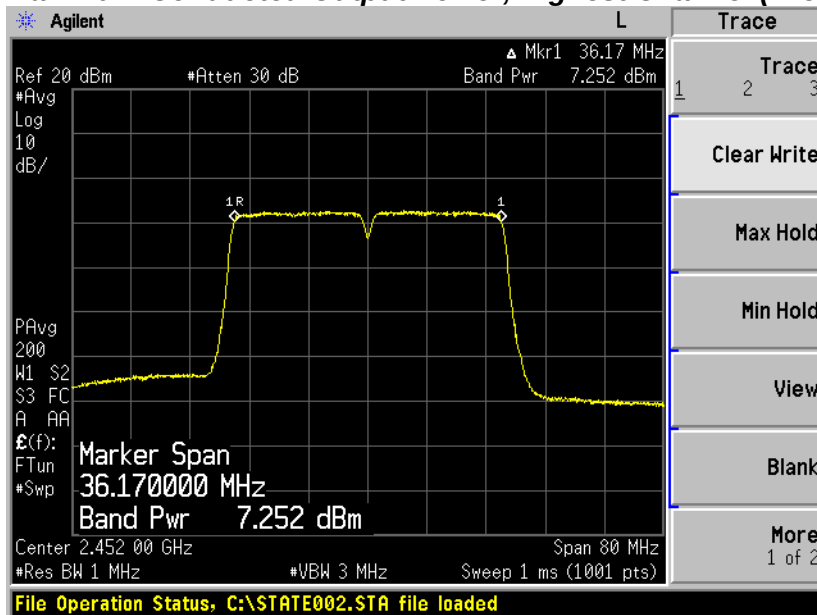


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2452 MHz)

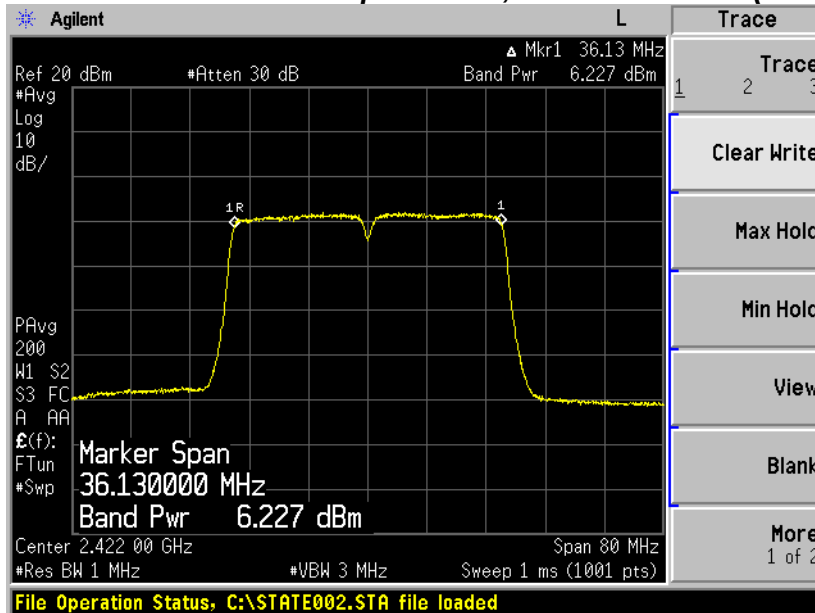


PLOT OF TEST DATA

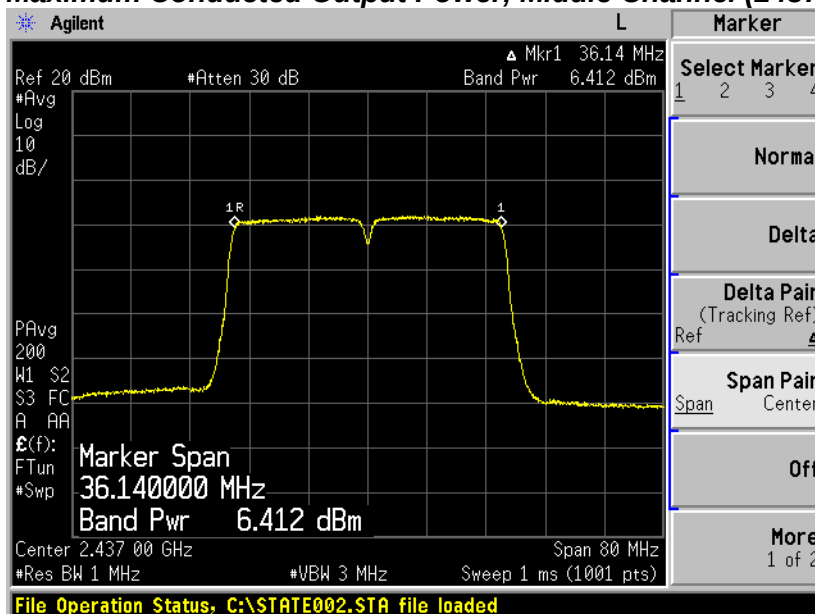
802.11n(40MHz) mode - MIMO

Chain 0

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

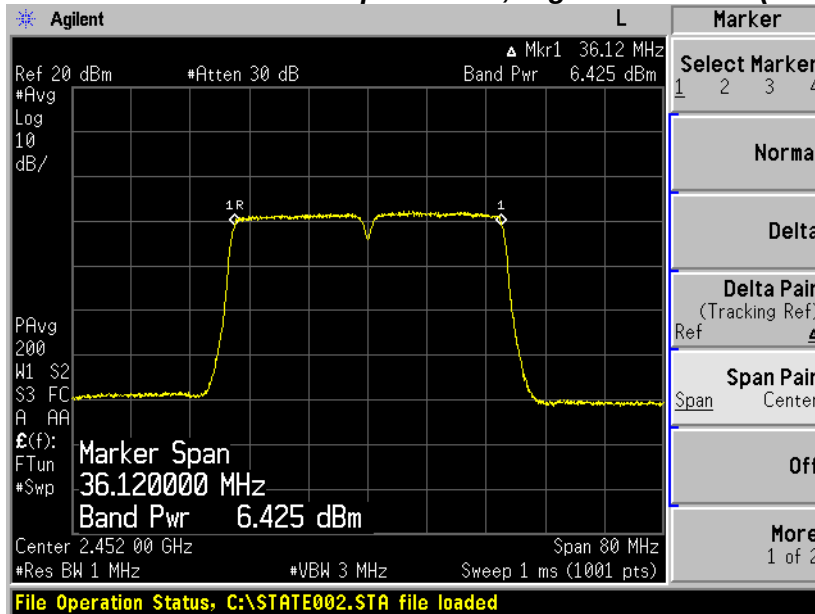


Maximum Conducted Output Power, Middle Channel (2437 MHz)



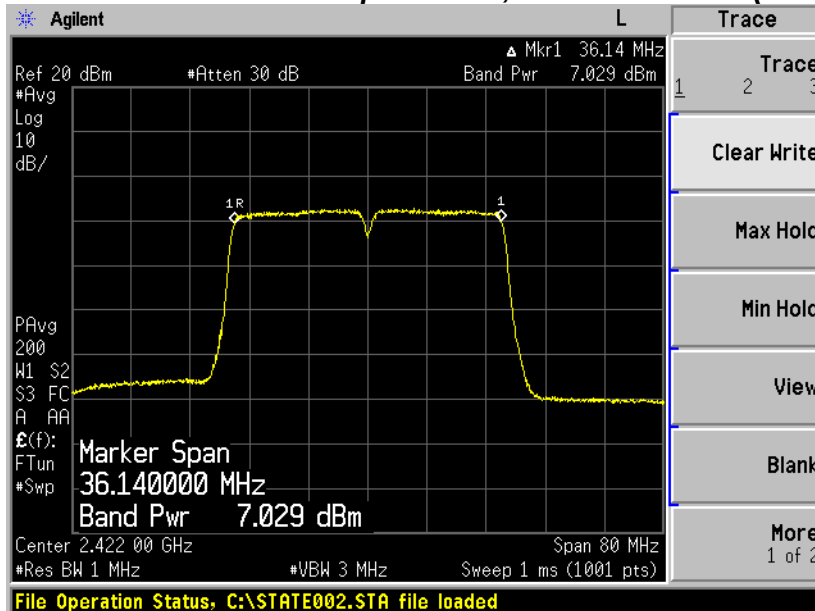
PLOT OF TEST DATA

Maximum Conducted Output Power, Highest Channel (2452 MHz)



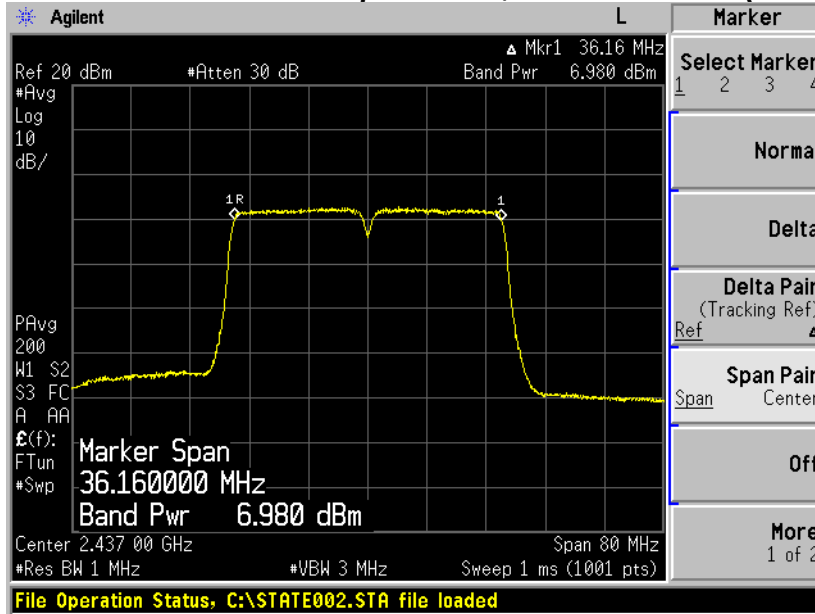
Chain 1

Maximum Conducted Output Power, Lowest Channel (2422 MHz)

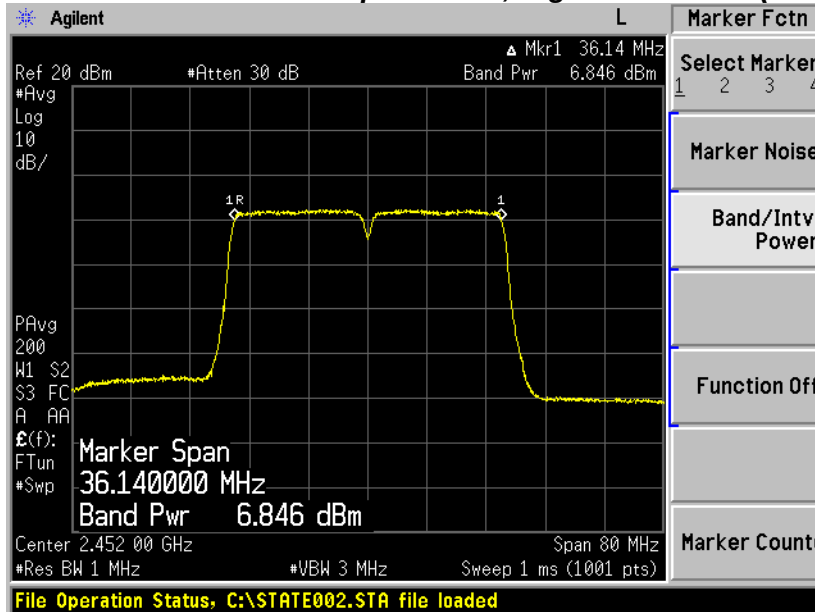


PLOT OF TEST DATA

Maximum Conducted Output Power, Middle Channel (2437 MHz)



Maximum Conducted Output Power, Highest Channel (2452 MHz)



TEST DATA

8.5 Maximum Power Spectral Density (average)

FCC §15.247(e), RSS-247 Issue 1 5.2

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11b

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)		Limit (dBm)
		Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2412	-5.04	-4.99	0.22	-4.82	-4.77	8.00
Middle	2437	-5.03	-4.88	0.22	-4.81	-4.66	8.00
Highest	2462	-4.91	-4.75	0.22	-4.69	-4.53	8.00

802.11g

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)		Limit (dBm)
		Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2412	-8.31	-7.71	0.22	-8.09	-7.49	8.00
Middle	2437	-7.97	-7.88	0.22	-7.75	-7.66	8.00
Highest	2462	-7.87	-7.77	0.22	-7.65	-7.55	8.00

TEST DATA

802.11n(20MHz) - CDD

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)	Limit (dBm)
		Chain 0	Chain 1		Total PSD	
Lowest	2412	-11.83	-10.67	0.24	-7.96	8.00
Middle	2437	-11.52	-11.06	0.24	-8.03	8.00
Highest	2462	-11.16	-11.05	0.24	-7.85	8.00

802.11n(20MHz) - MIMO

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)	Limit (dBm)
		Chain 0	Chain 1		Total PSD	
Lowest	2412	-11.66	-11.02	0.42	-7.90	8.00
Middle	2437	-11.54	-10.67	0.42	-7.65	8.00
Highest	2462	-11.76	-10.88	0.42	-7.87	8.00

802.11n(40MHz) – SISO

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)		Limit (dBm)
		Chain 0	Chain 1		Chain 0	Chain 1	
Lowest	2422	-16.87	-16.15	0.58	-16.29	-15.57	8.00
Middle	2437	-16.38	-16.02	0.58	-15.80	-15.44	8.00
Highest	2452	-16.48	-16.26	0.58	-15.90	-15.68	8.00

TEST DATA

802.11n(40MHz) - CDD

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)	Limit (dBm)
		Chain 0	Chain 1		Total PSD	
Lowest	2422	-16.63	-16.15	0.58	-12.79	8.00
Middle	2437	-16.84	-16.09	0.58	-12.86	8.00
Highest	2452	-16.40	-16.18	0.58	-12.70	8.00

802.11n(40MHz) - MIMO

Channel	Frequency (MHz)	Measured PSD (dBm)		Duty Factor (dB)	Maximum PSD (dBm)	Limit (dBm)
		Chain 0	Chain 1		Total PSD	
Lowest	2422	-16.62	-16.07	0.79	-12.54	8.00
Middle	2437	-16.62	-15.88	0.79	-12.43	8.00
Highest	2452	-16.72	-16.33	0.79	-12.72	8.00

Note:

- Maximum PSD = Measured PSD + Duty Factor
- "Measure and sum spectral maxima across the outputs" was used for measuring in-band Total PSD.

$$\text{Total PSD} = 10 \log [10^{\{(\text{Chain 0 PSD} + \text{duty factor} \} / 10\}} + 10^{\{(\text{Chain 1 PSD} + \text{duty factor} \} / 10\}}]$$
- For CDD transmission, directional gain is. **6.31 dBi**. For MIMO transmission, directional gain is **3.3 dBi**.
Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
For PSD measurements on all devices employing CDD, directional gain is as follows,
Directional gain = G_{ANT} + Array Gain = 3.3 dBi + 3.01 dB = 6.31 dBi

$$\text{Array Gain} = 10 \log(N_{ANT}/N_{SS}) \text{ dB} = 10 \log(2/1) = 3.01 \text{ dB.}$$
where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi.
For CDD mode of this device, $N_{SS}=1$.
For PSD measurements on all devices employing MIMO, directional gain is as follows,
Directional gain = G_{ANT} + $10 \log(N_{ANT}/N_{SS})$ dBi = 3.3 dBi + $10 \log(2/2)$ dB = 3.3 dBi.
where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and $N_{SS}=2$.
- The following equation was used for spectrum offset:

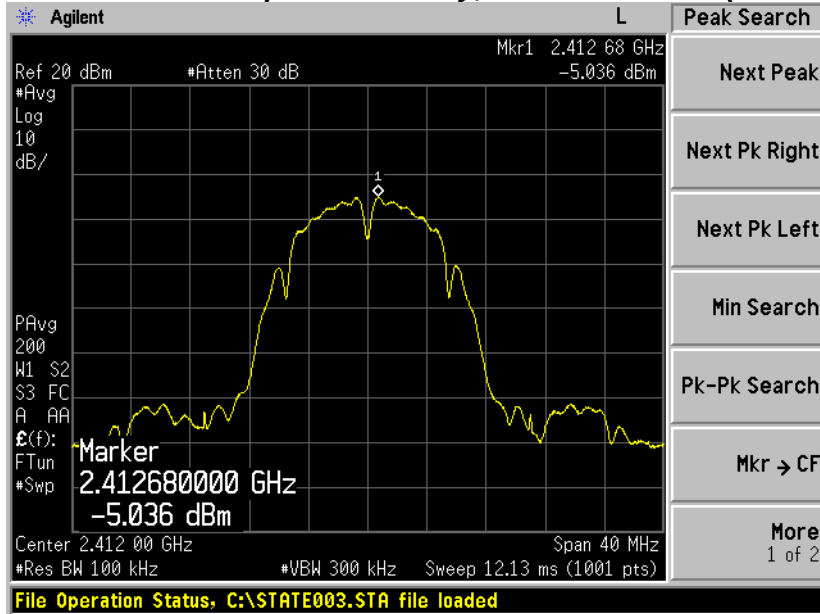
$$\text{Spectrum offset (dB)} = \text{Attenuator (dB)} + \text{Cable Loss (dB)} + \text{SMA Type Connector Loss (dB)}$$

PLOT OF TEST DATA

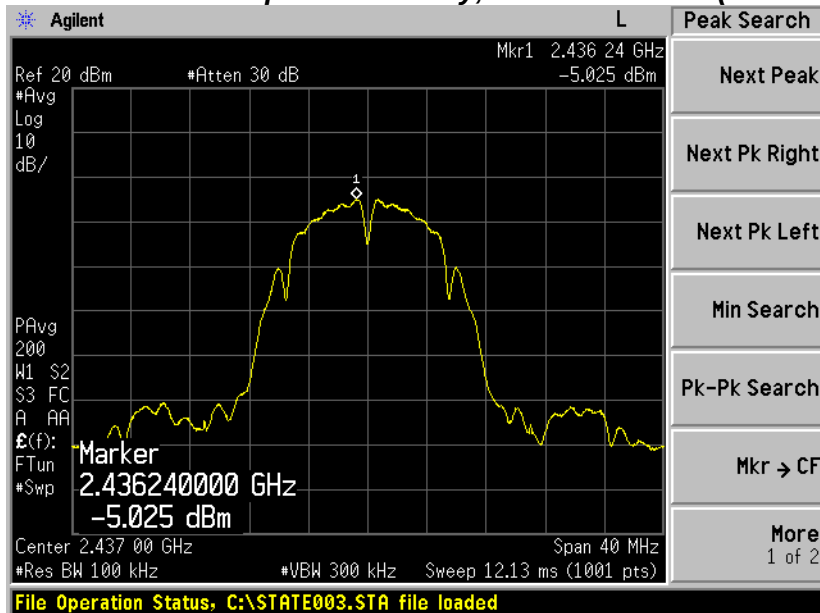
802.11b mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

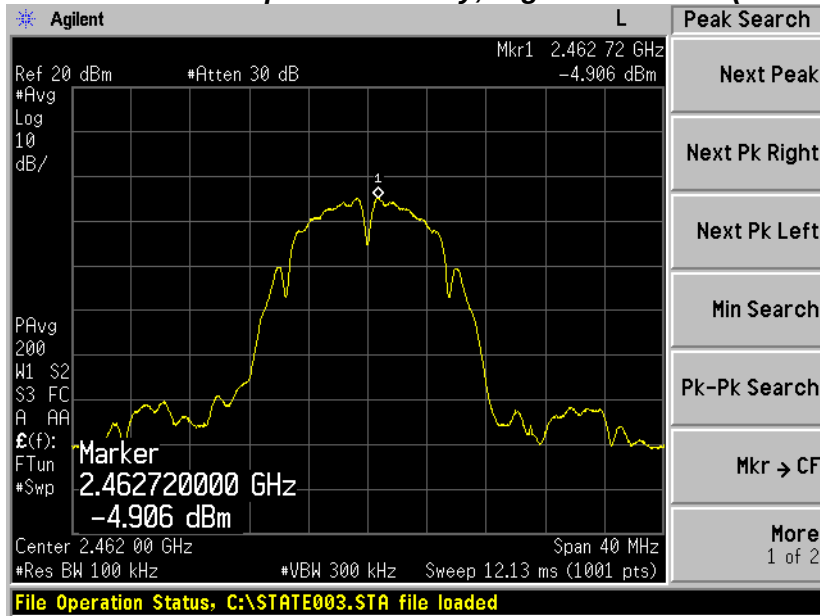


Maximum Power Spectral Density, Middle Channel (2437 MHz)



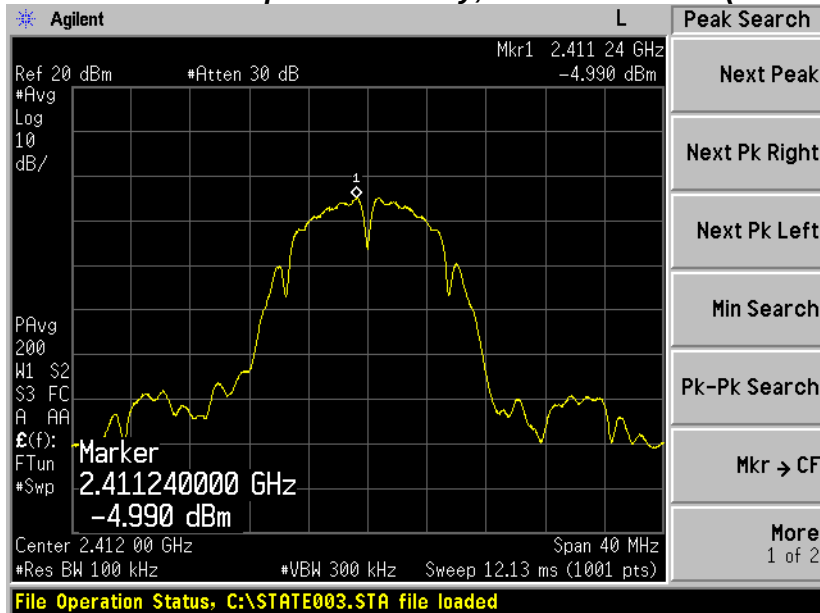
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



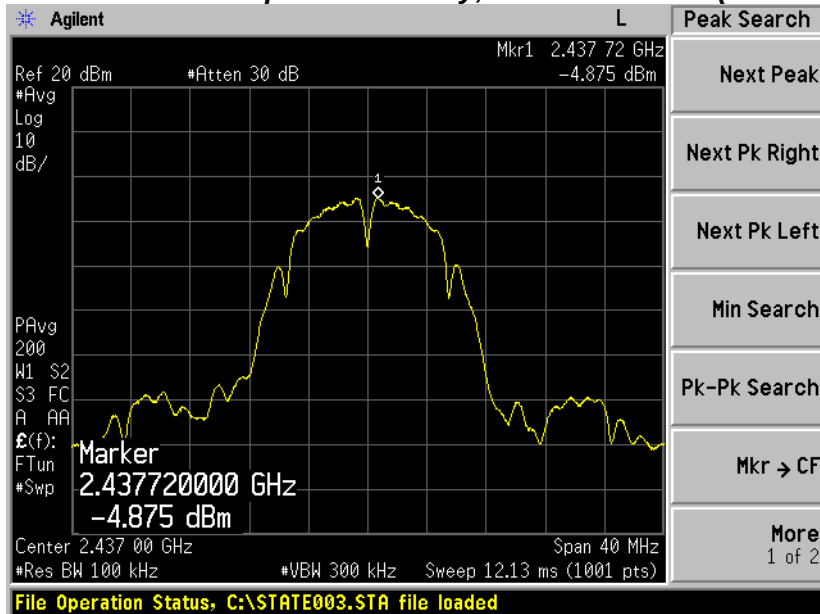
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

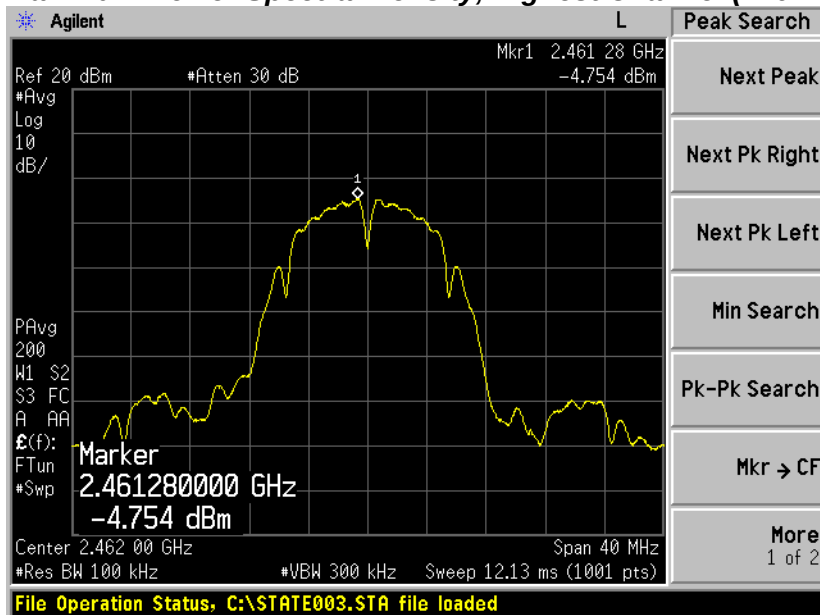


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

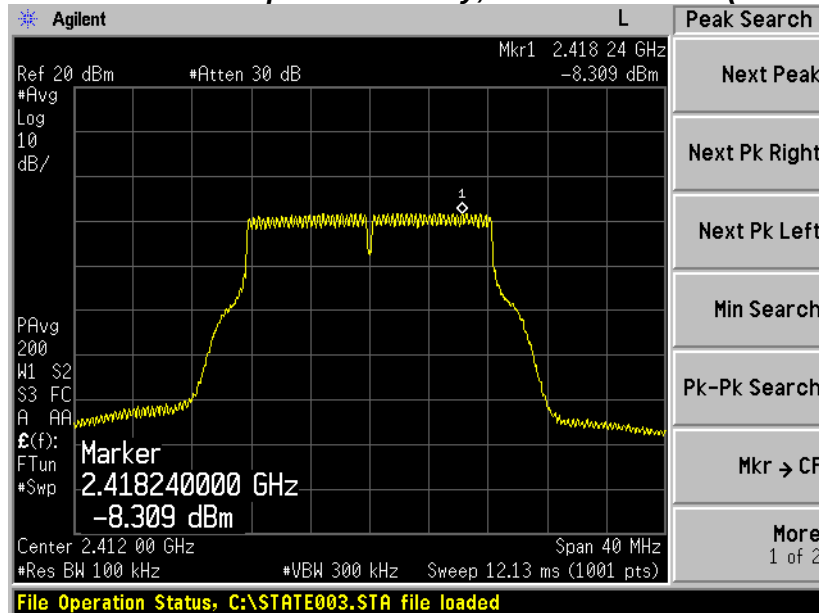


PLOT OF TEST DATA

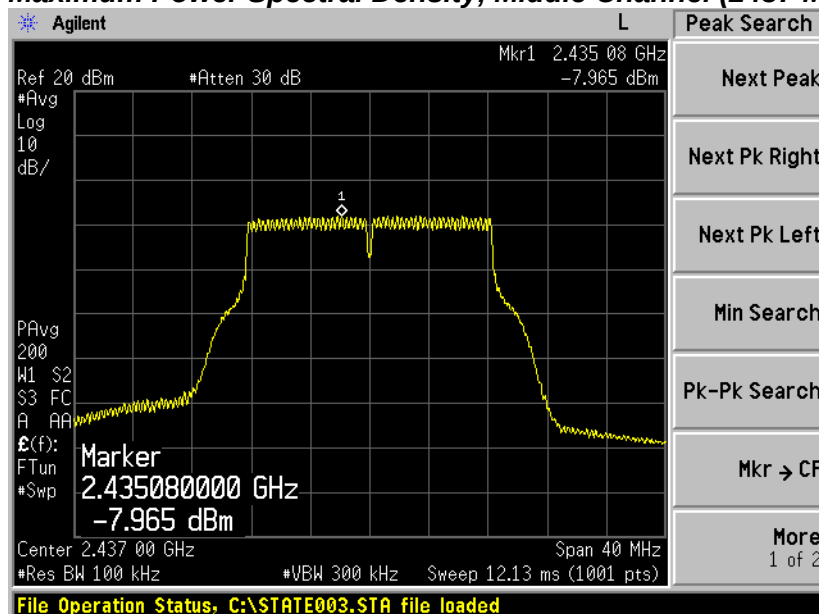
802.11g mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

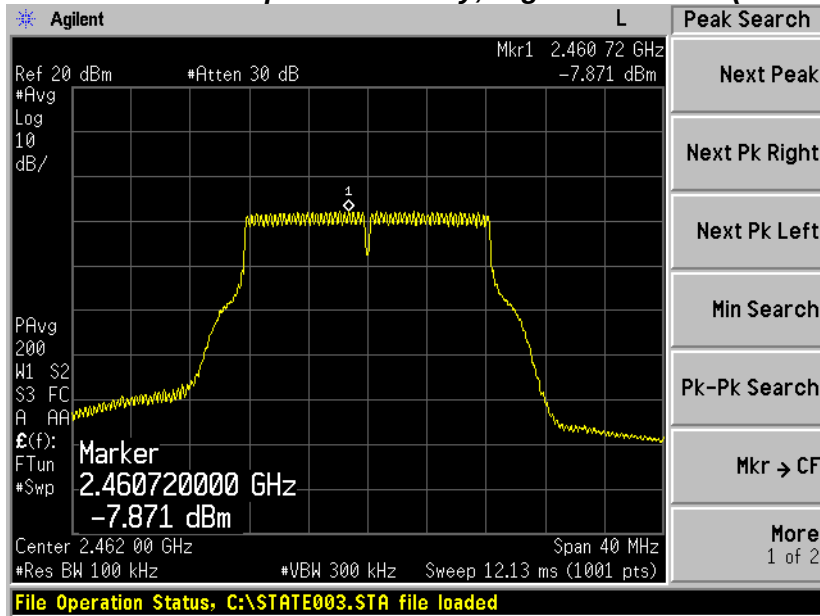


Maximum Power Spectral Density, Middle Channel (2437 MHz)



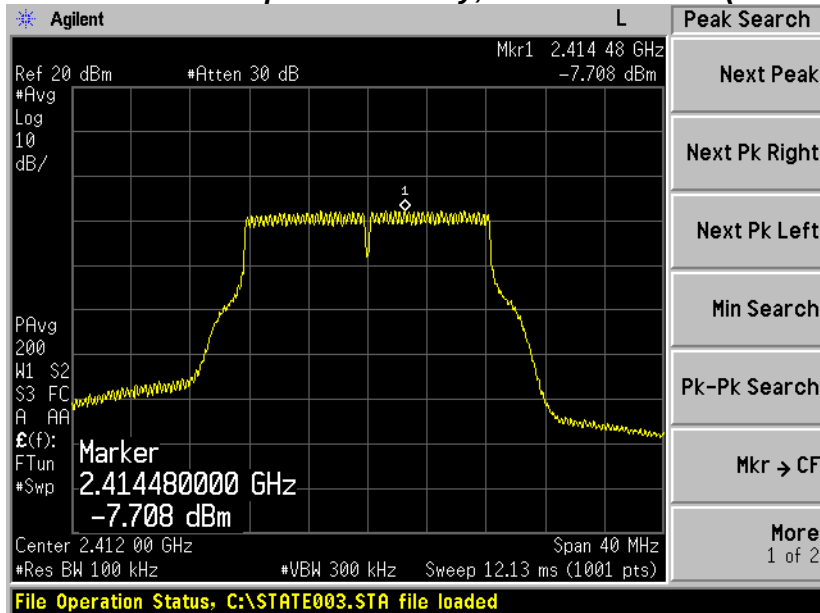
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



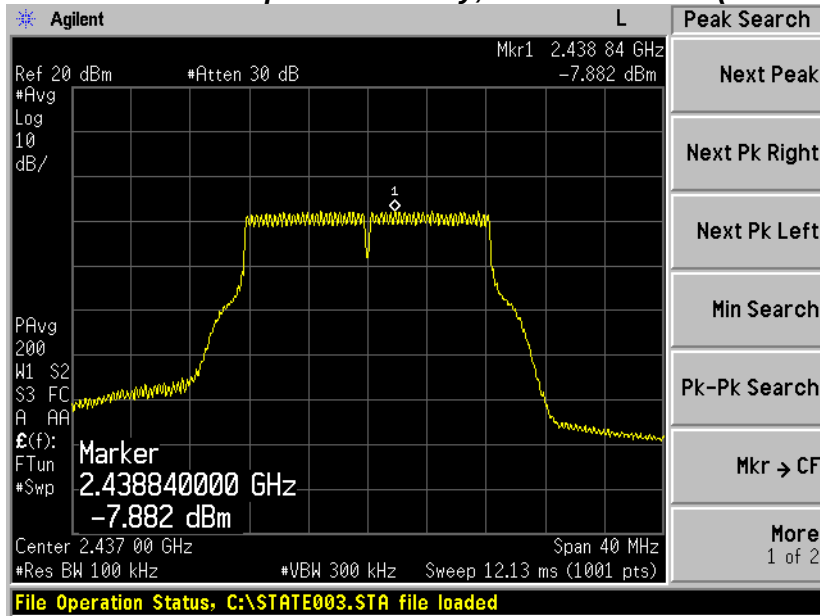
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

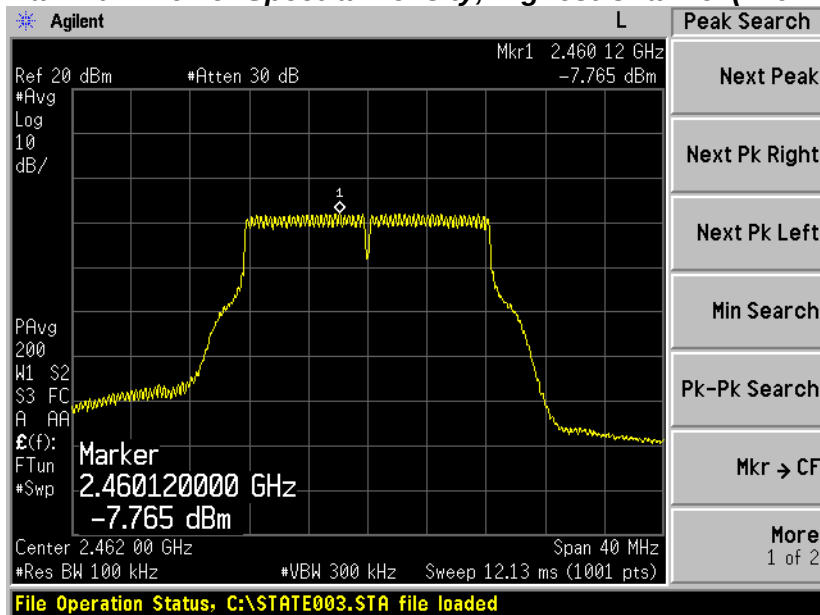


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

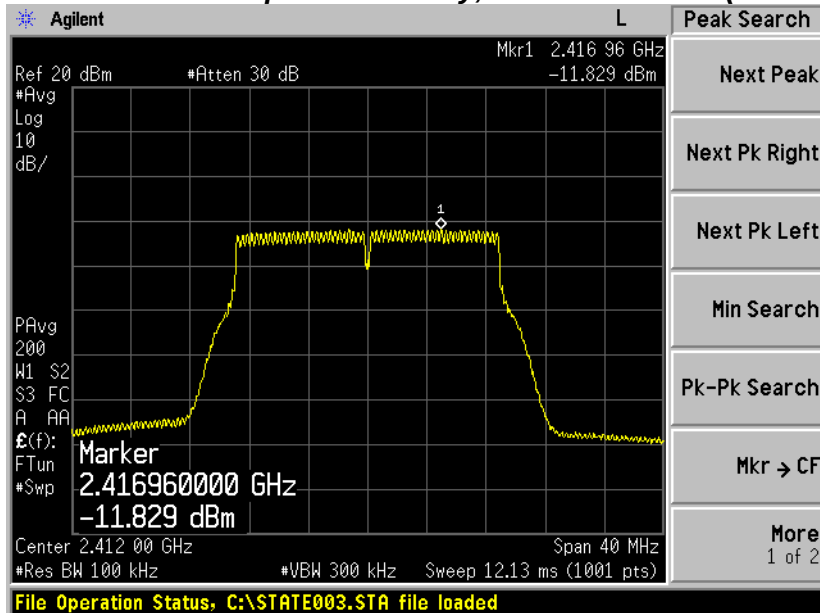


PLOT OF TEST DATA

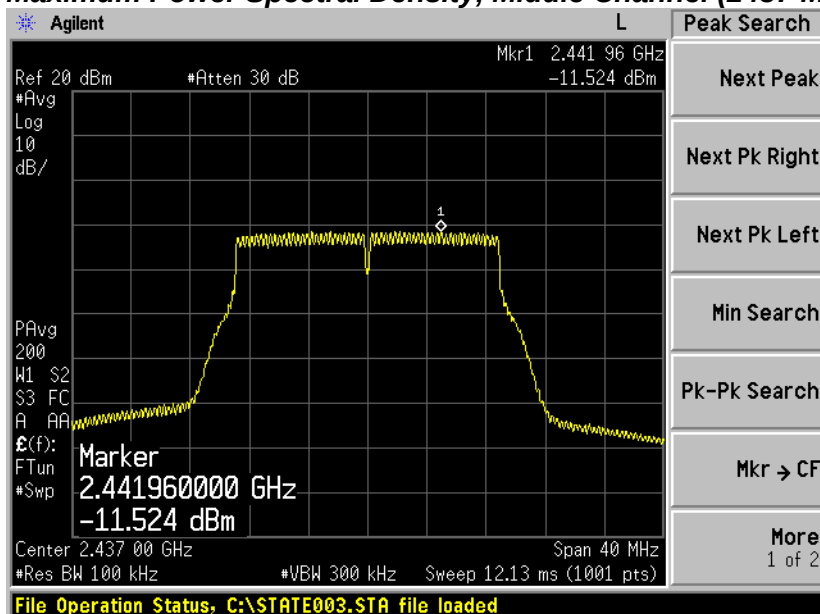
802.11n(20MHz) mode - CDD

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

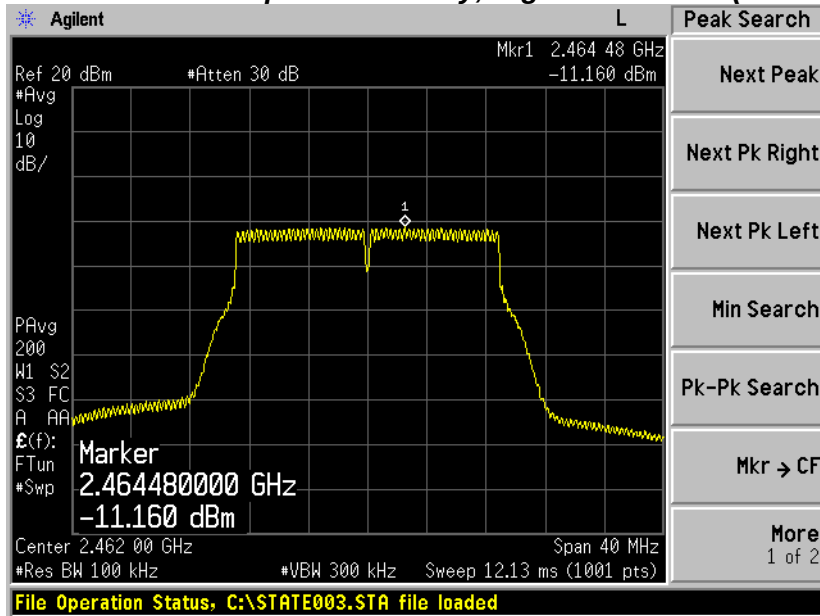


Maximum Power Spectral Density, Middle Channel (2437 MHz)



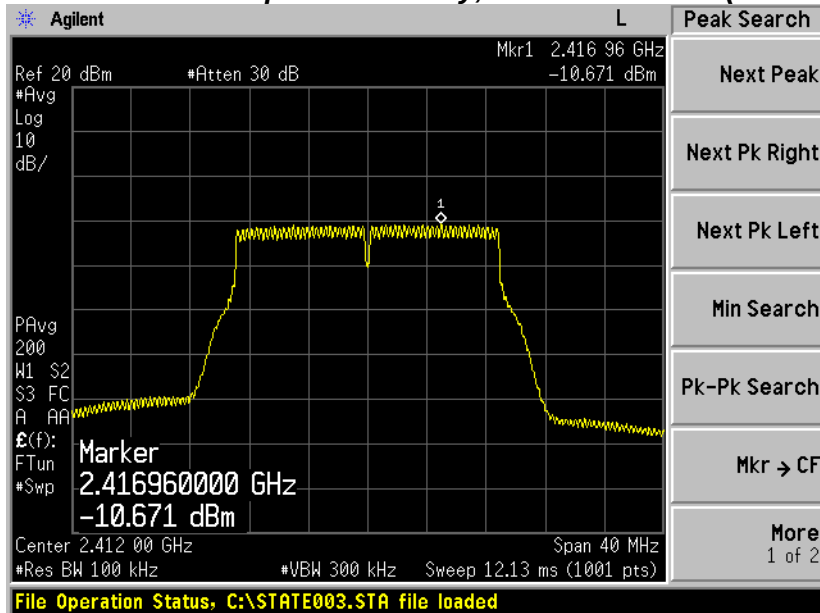
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



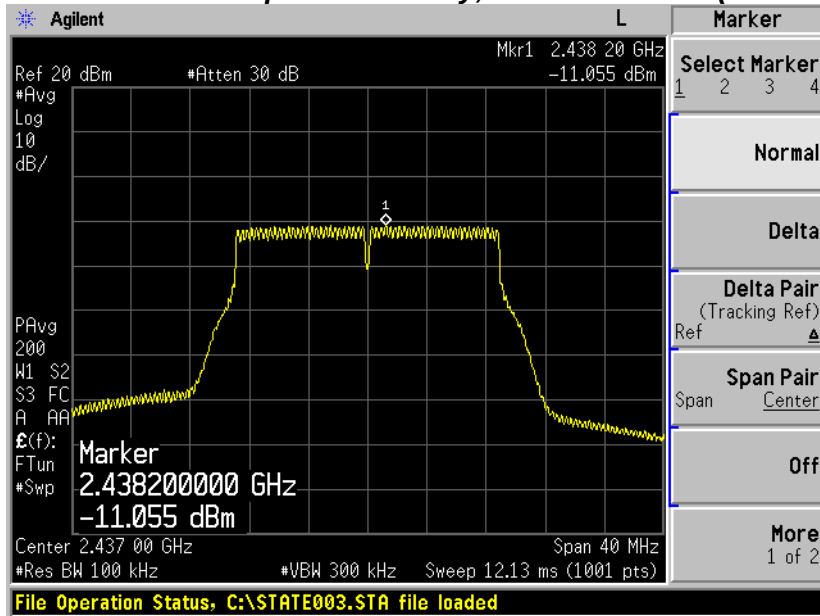
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

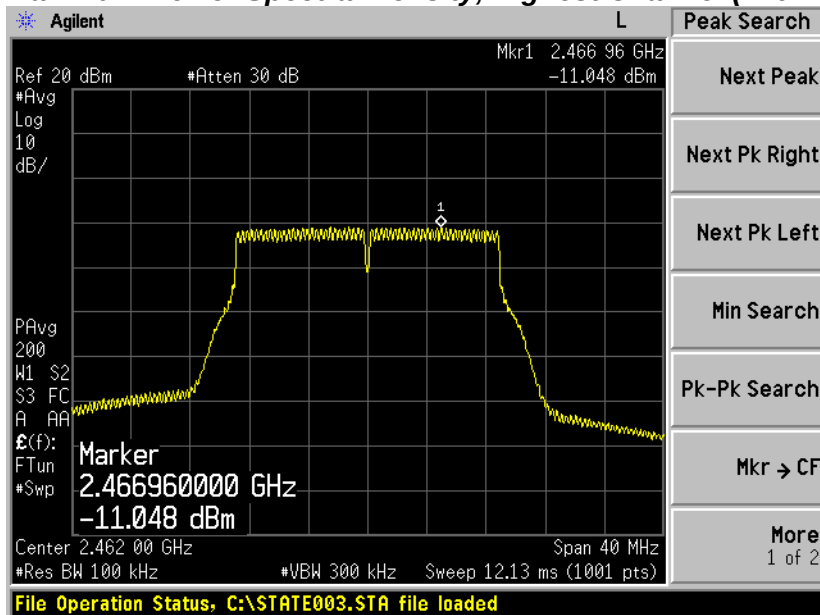


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

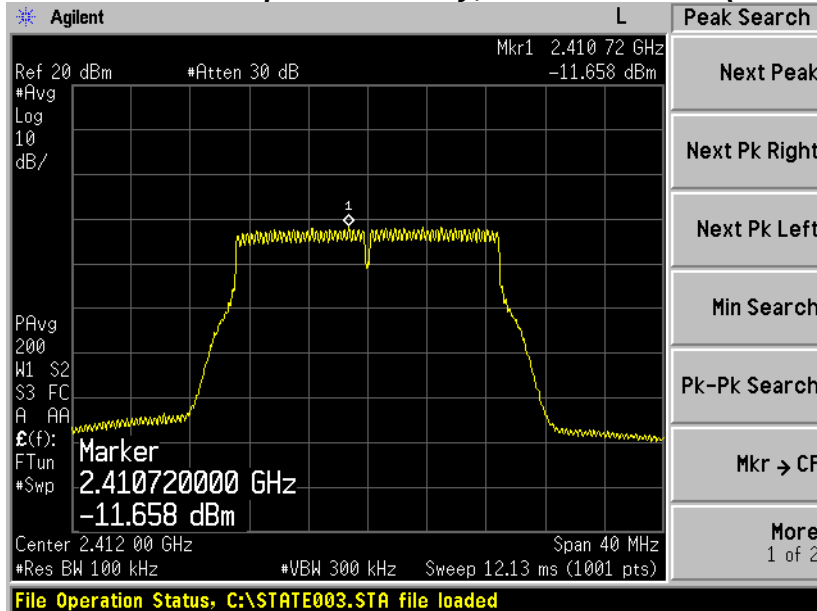


PLOT OF TEST DATA

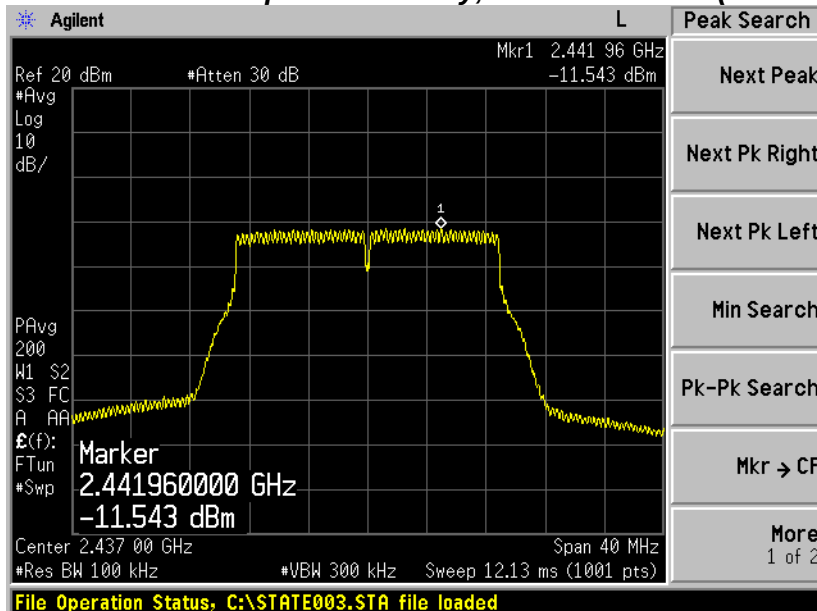
802.11n(20MHz) mode - MIMO

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

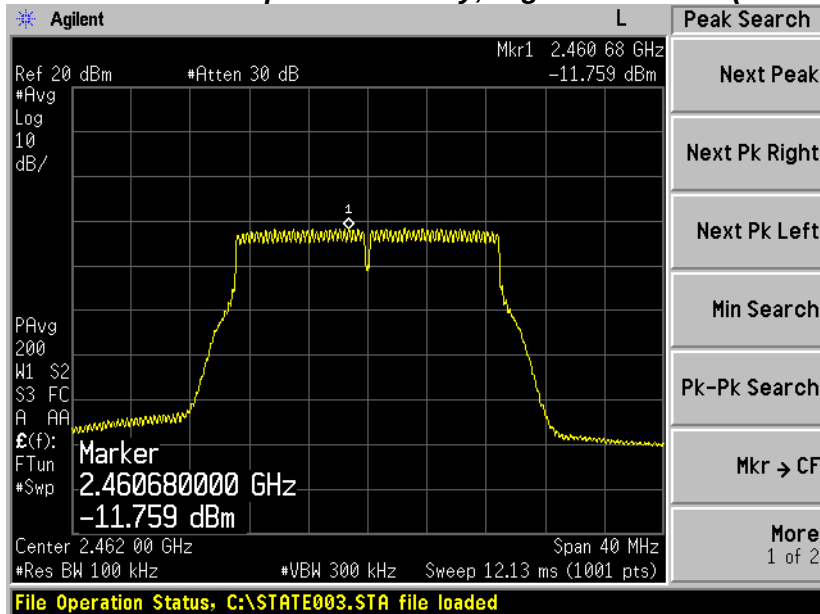


Maximum Power Spectral Density, Middle Channel (2437 MHz)



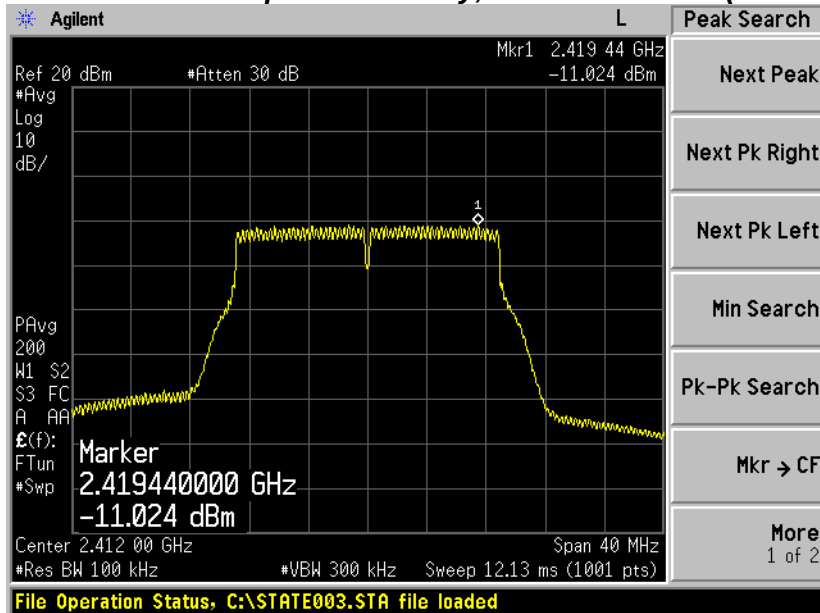
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



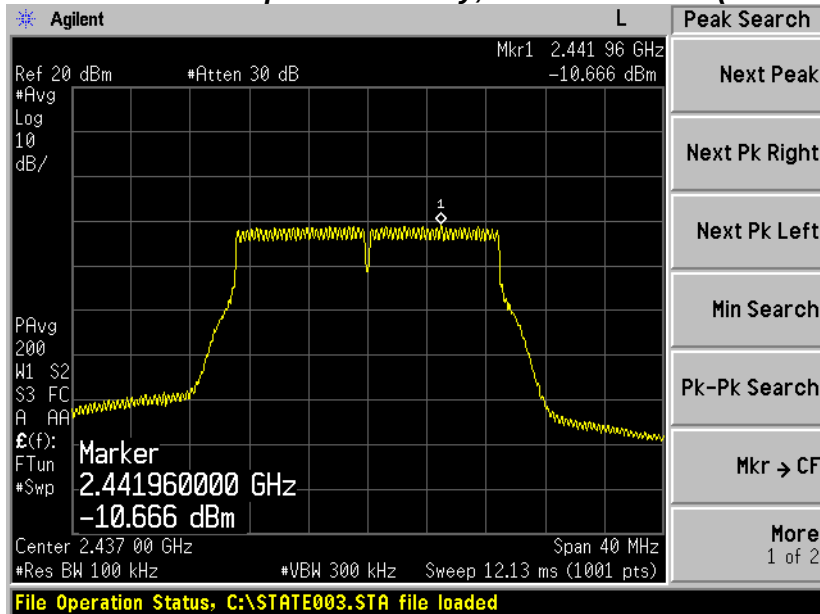
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

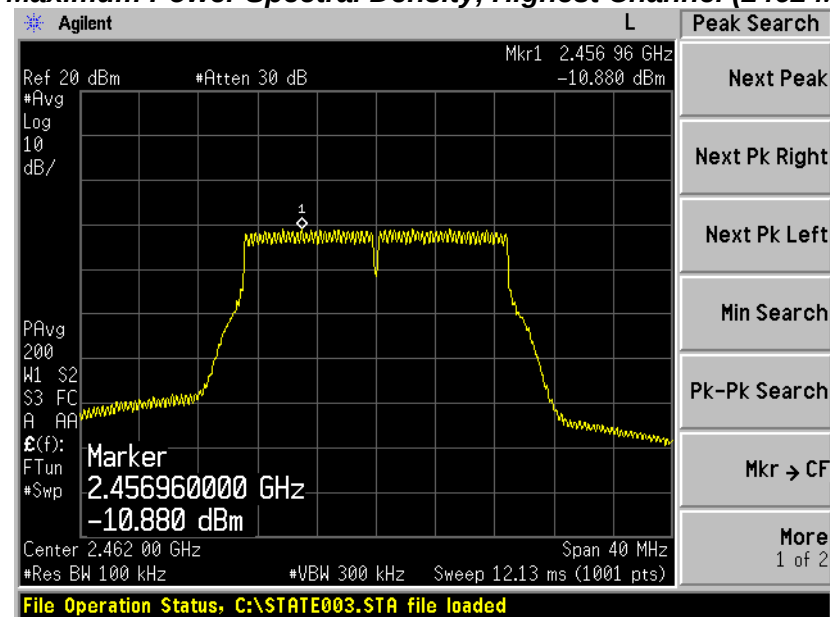


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

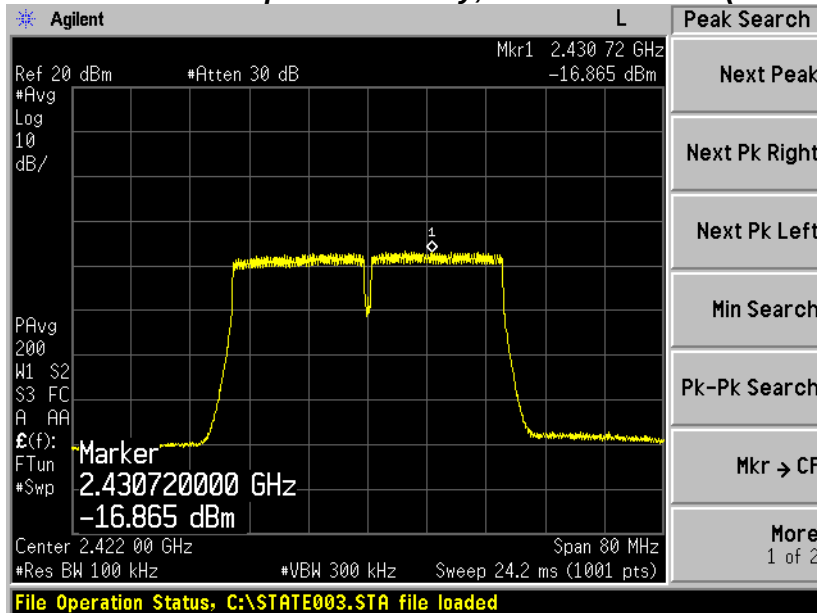


PLOT OF TEST DATA

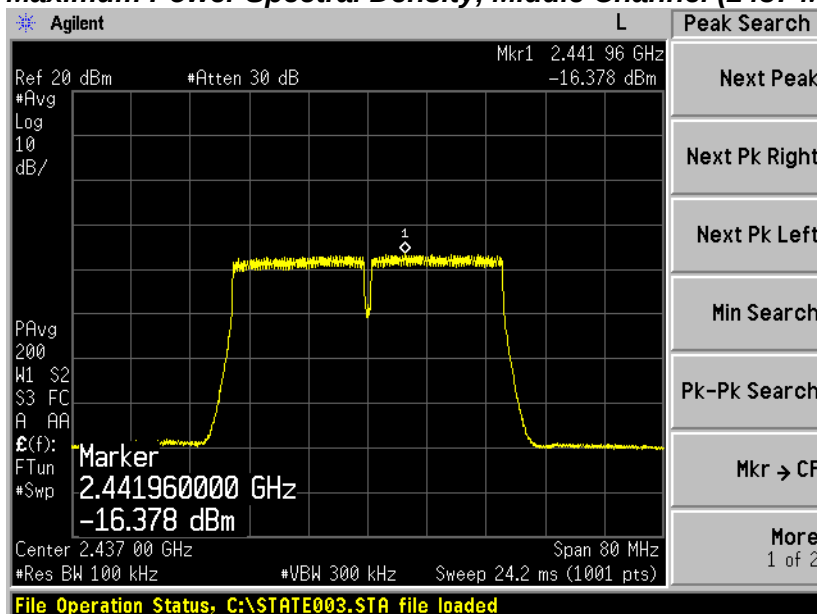
802.11n(40MHz) mode - SISO

Chain 0

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

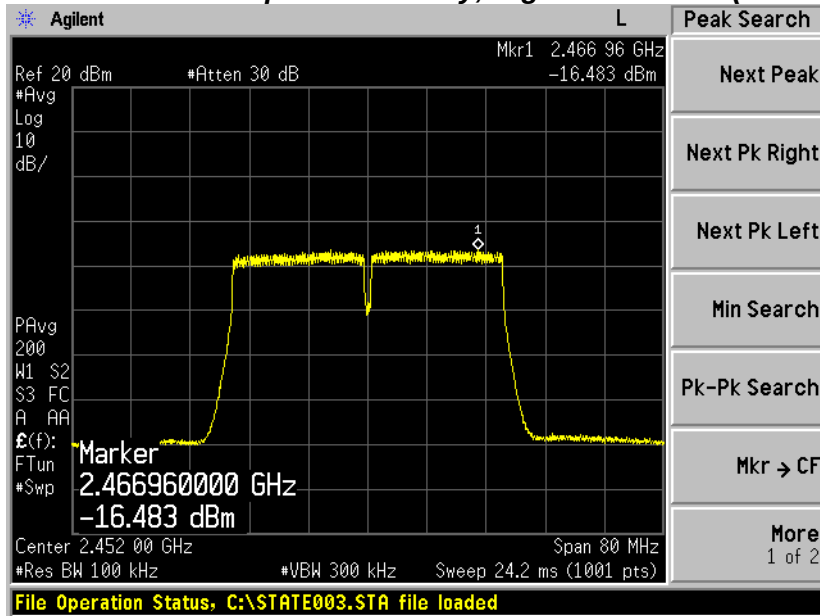


Maximum Power Spectral Density, Middle Channel (2437 MHz)



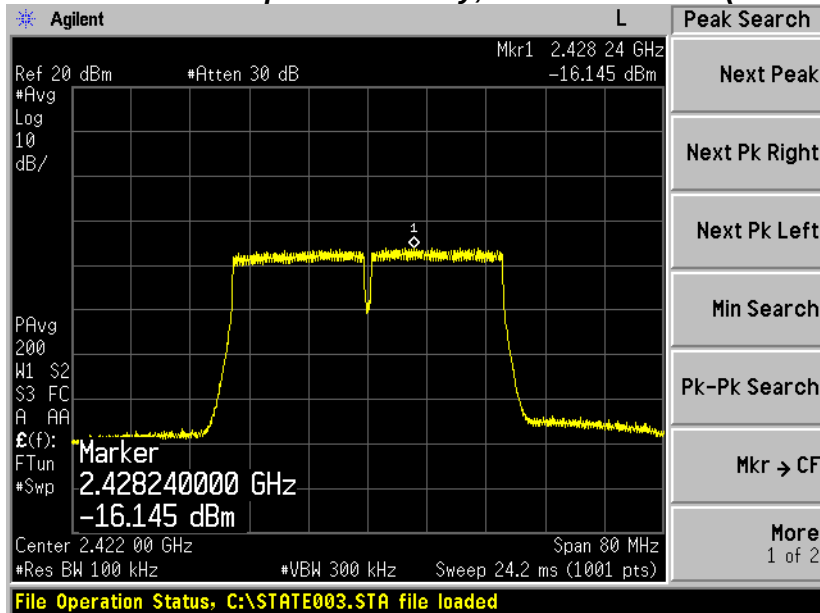
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2452 MHz)



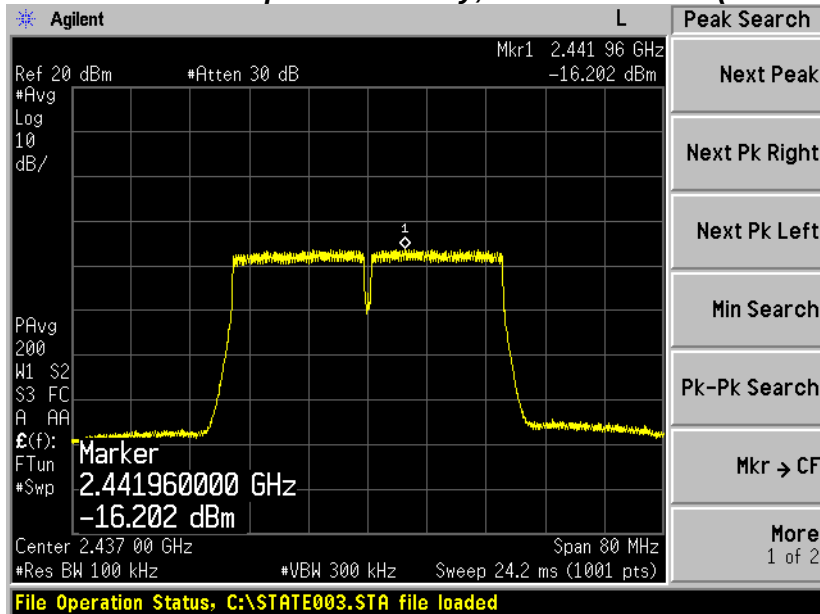
Chain 1

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

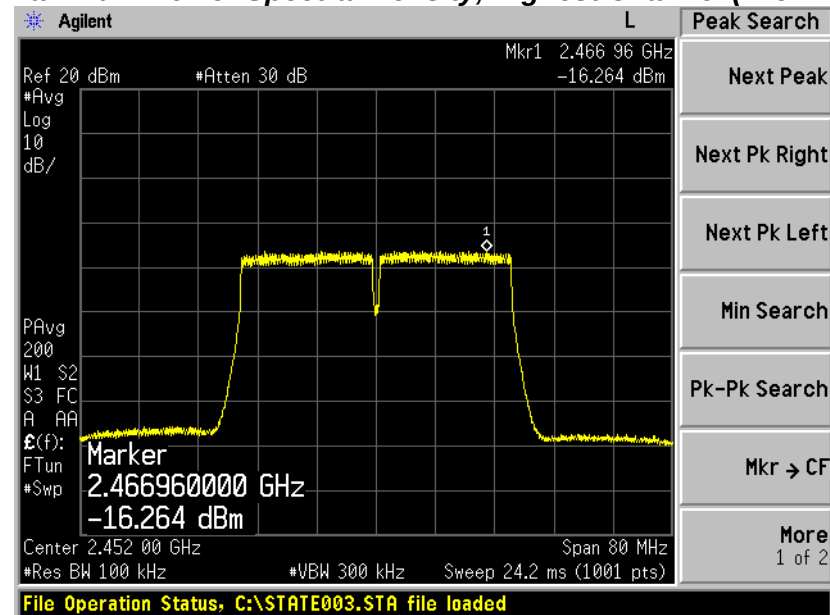


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2452 MHz)

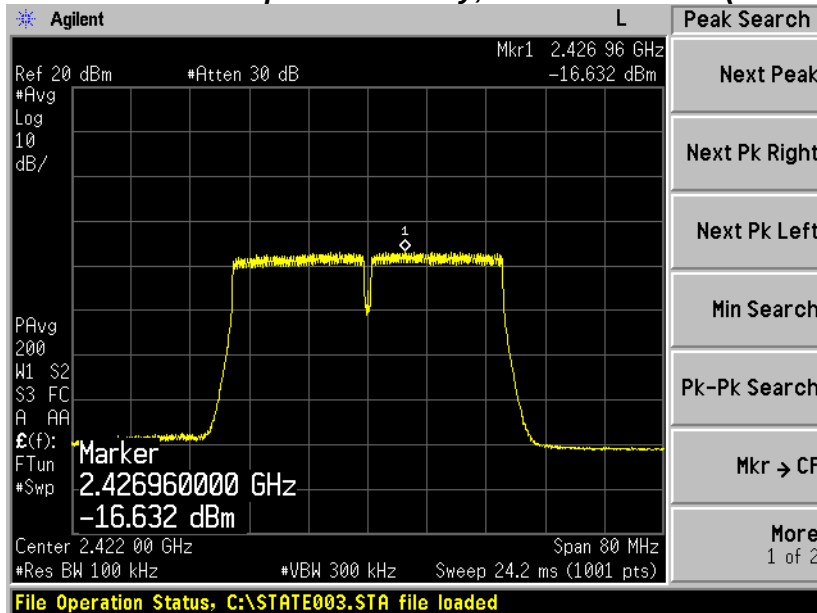


PLOT OF TEST DATA

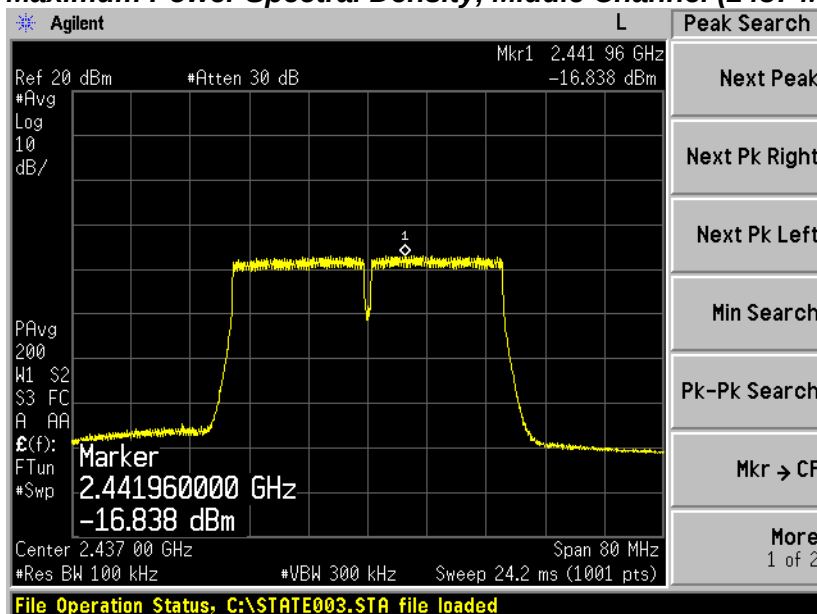
802.11n(40MHz) mode - CDD

Chain 0

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

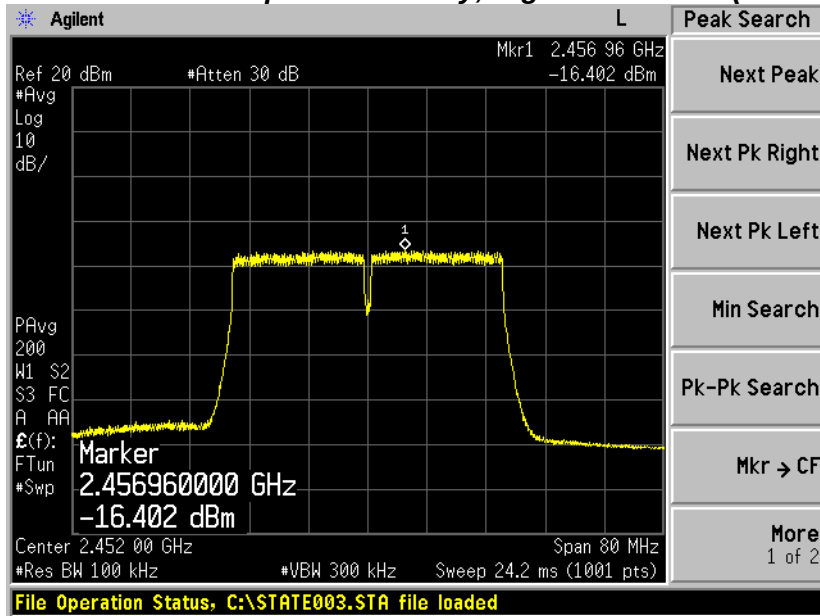


Maximum Power Spectral Density, Middle Channel (2437 MHz)



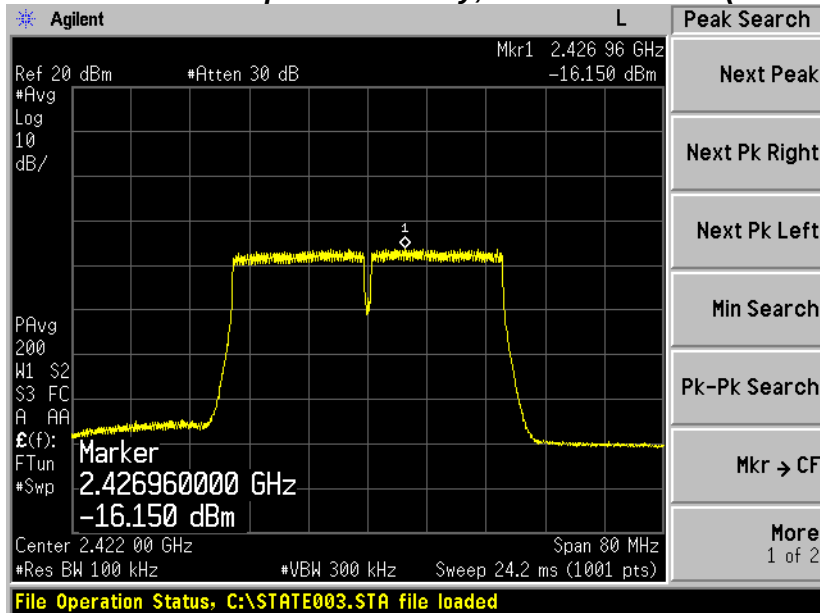
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2452 MHz)



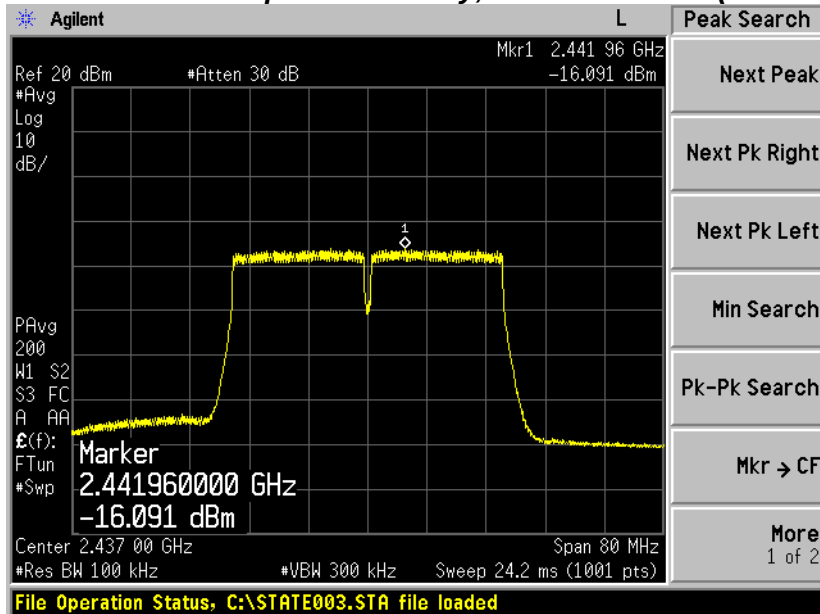
Chain 1

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

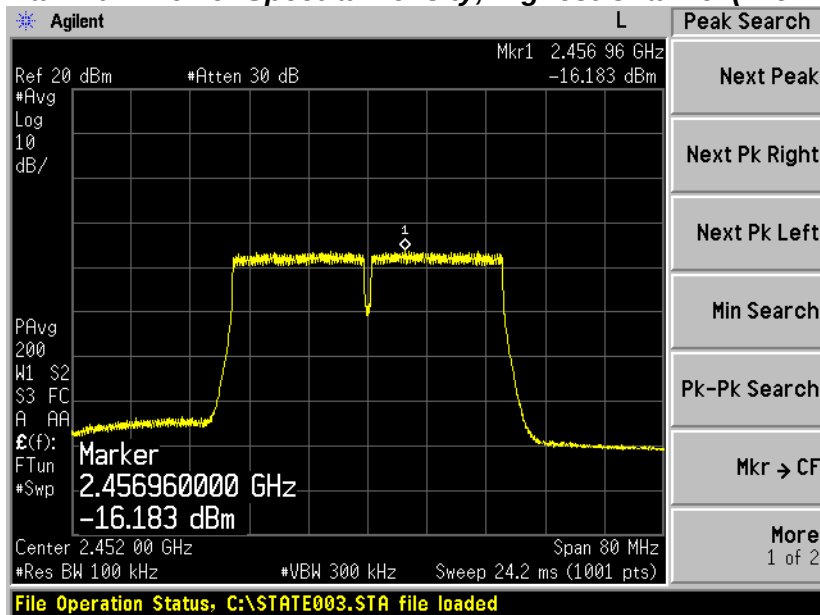


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2452 MHz)

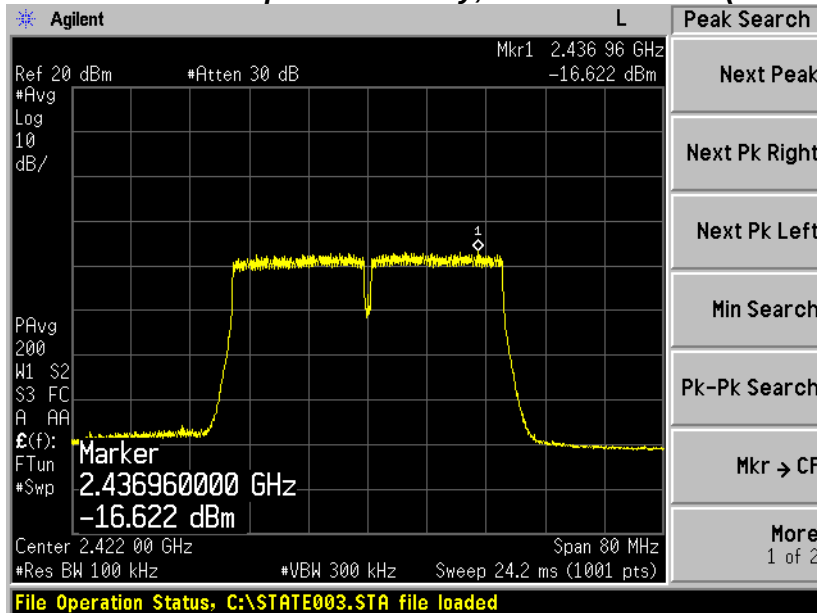


PLOT OF TEST DATA

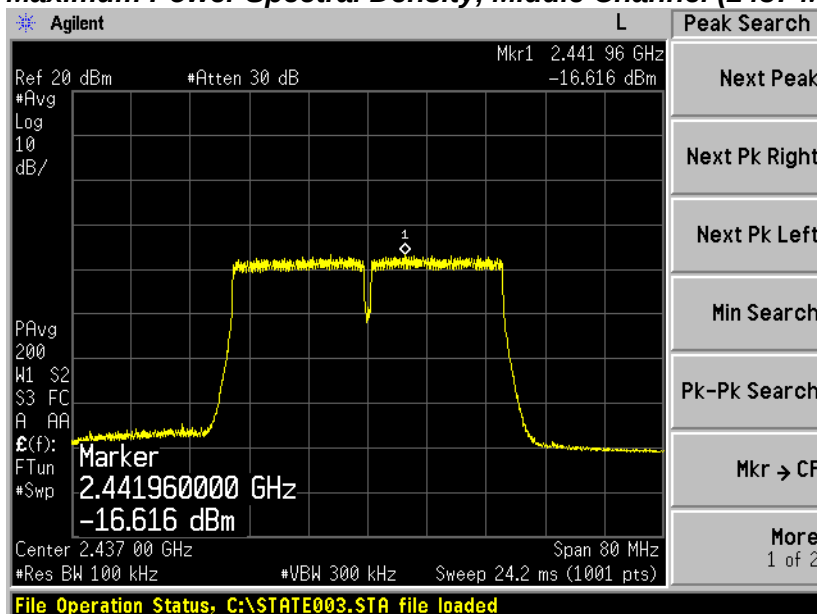
802.11n(40MHz) mode - MIMO

Chain 0

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

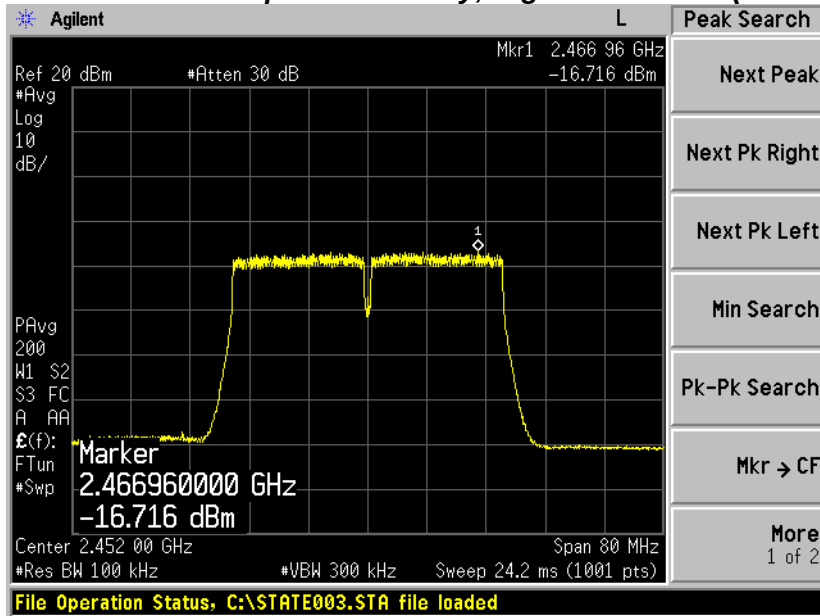


Maximum Power Spectral Density, Middle Channel (2437 MHz)



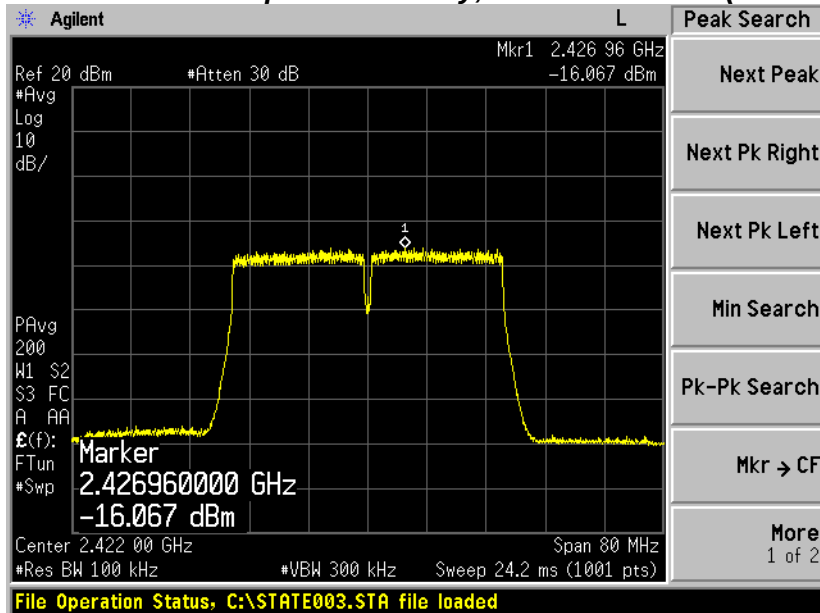
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2452 MHz)



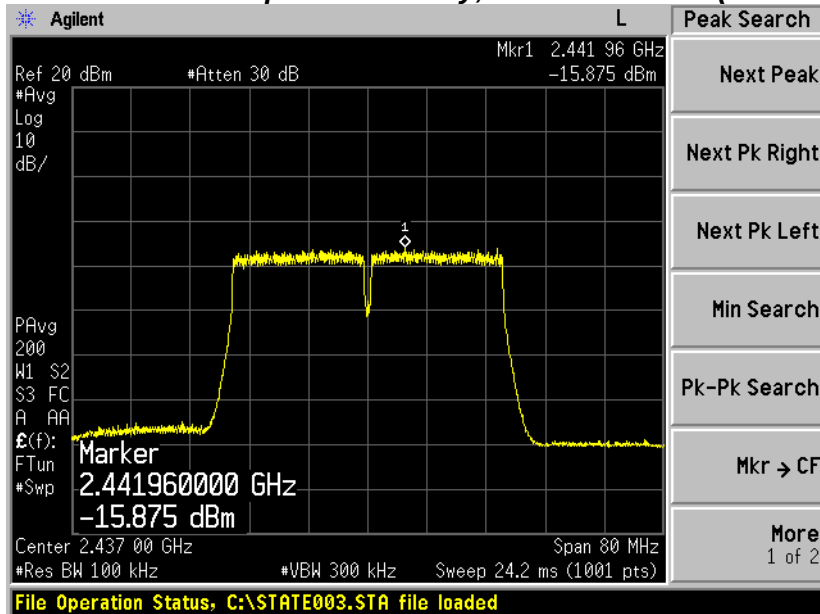
Chain 1

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

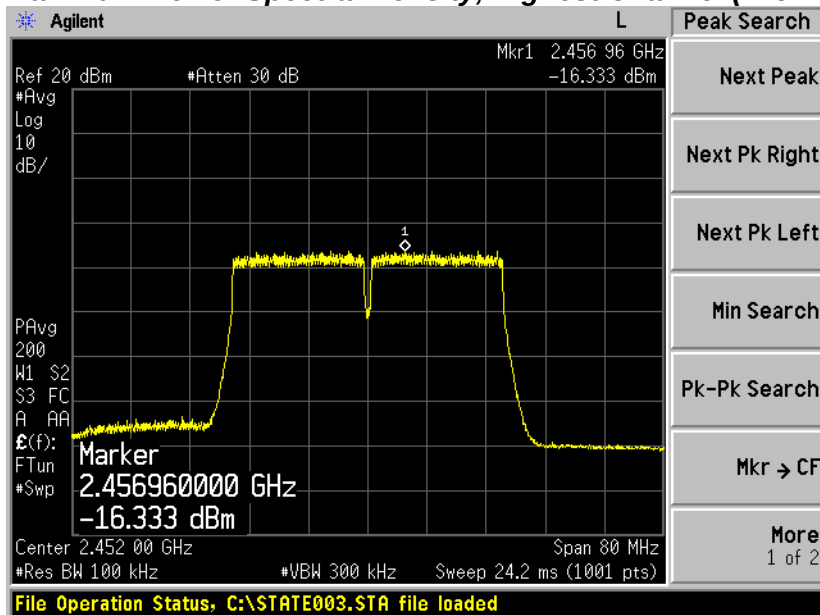


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2452 MHz)



TEST DATA

8.6 Conducted Spurious Emissions

FCC §15.247(d), RSS-247 Issue 1 5.5

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11b mode

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	3.92	4.18	More than 30 dBc	30
Middle	2437	4.09	4.24	More than 30 dBc	30
High	2462	4.24	4.45	More than 30 dBc	30

802.11g mode

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	1.61	1.67	More than 30 dBc	30
Middle	2437	1.70	1.74	More than 30 dBc	30
High	2462	1.93	1.93	More than 30 dBc	30

802.11n(20MHz) mode - CDD

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	-1.54	-0.59	More than 30 dBc	30
Middle	2437	-1.38	-0.90	More than 30 dBc	30
High	2462	-1.28	-1.10	More than 30 dBc	30

TEST DATA

802.11n(20MHz) mode - MIMO

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	-1.48	-0.78	More than 30 dBc	30
Middle	2437	-1.29	-0.95	More than 30 dBc	30
High	2462	-0.81	-0.87	More than 30 dBc	30

802.11n(40MHz) mode - SISO

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2422	-6.44	-5.87	More than 30 dBc	30
Middle	2437	-6.39	-6.09	More than 30 dBc	30
High	2452	-6.32	-5.93	More than 30 dBc	30

802.11n(40MHz) mode - CDD

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2422	-6.62	-5.62	More than 30 dBc	30
Middle	2437	-6.70	-5.85	More than 30 dBc	30
High	2452	-6.44	-5.84	More than 30 dBc	30

802.11n(40MHz) mode - MIMO

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2422	-6.66	-5.69	More than 30 dBc	30
Middle	2437	-6.59	-5.68	More than 30 dBc	30
High	2452	-6.45	-5.98	More than 30 dBc	30

TEST DATA

Notes:

- 1. The cable and attenuator loss from 30 MHz to 25 GHz was reflected in spectrum analyzer with correction factor for the spurious emissions test.*
- 2. The display line shown in the following plots indicates the limit at 30 dB below the fundamental emission level measured in a 100 kHz bandwidth.*
- 3. Out-of-band and spurious emissions tests are performed on each output individually without summing or adding $10\log(N)$ since the measurements are made relative to the in-band emissions on the individual outputs. The worst case output is recorded.*
- 4. During the test, the sweep point was set 8001 for the conducted spurious emissions test and 1001 for the Band Edge test.*
- 5. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)) and was demonstrated with radiated spurious emission measurement in 8.7 clause in this report.*

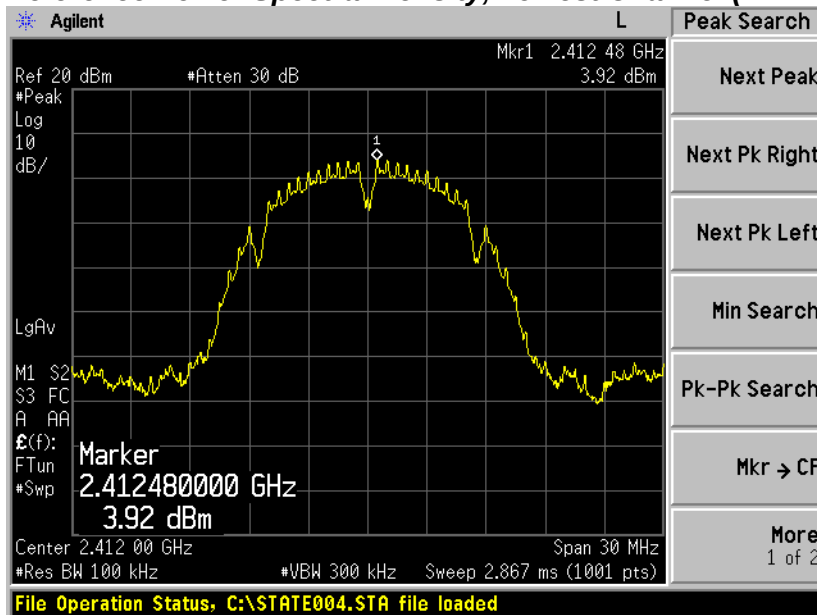
PLOT OF TEST DATA

Reference level

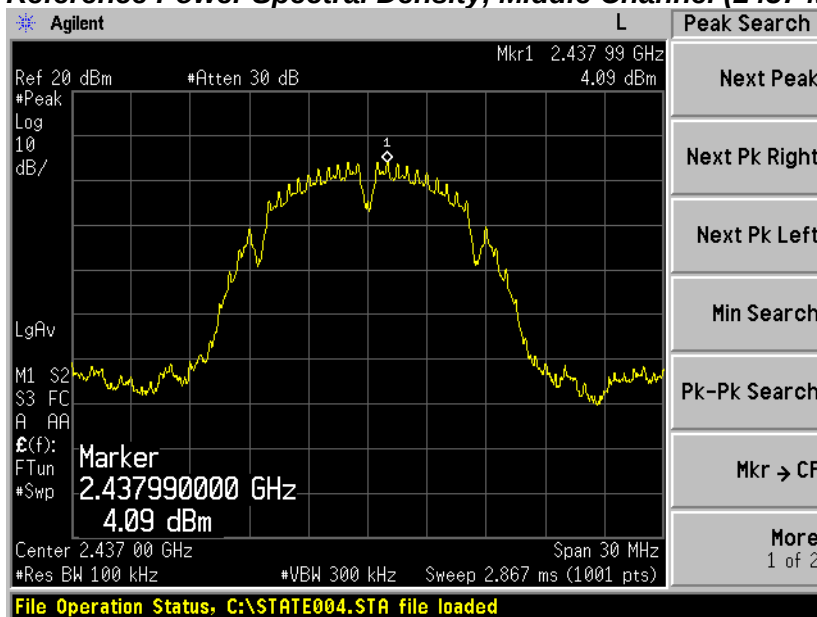
802.11b mode

Chain 0

Reference Power Spectral Density, Lowest Channel (2412 MHz)

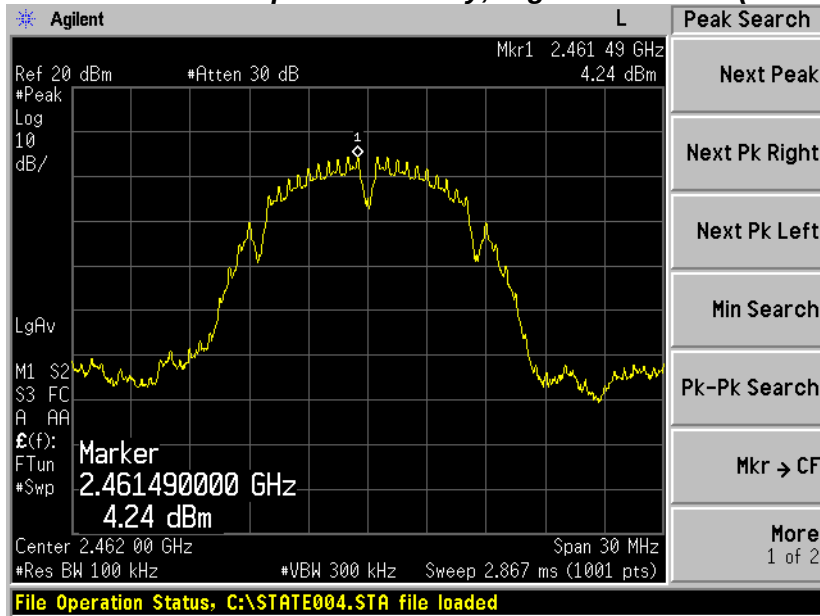


Reference Power Spectral Density, Middle Channel (2437 MHz)



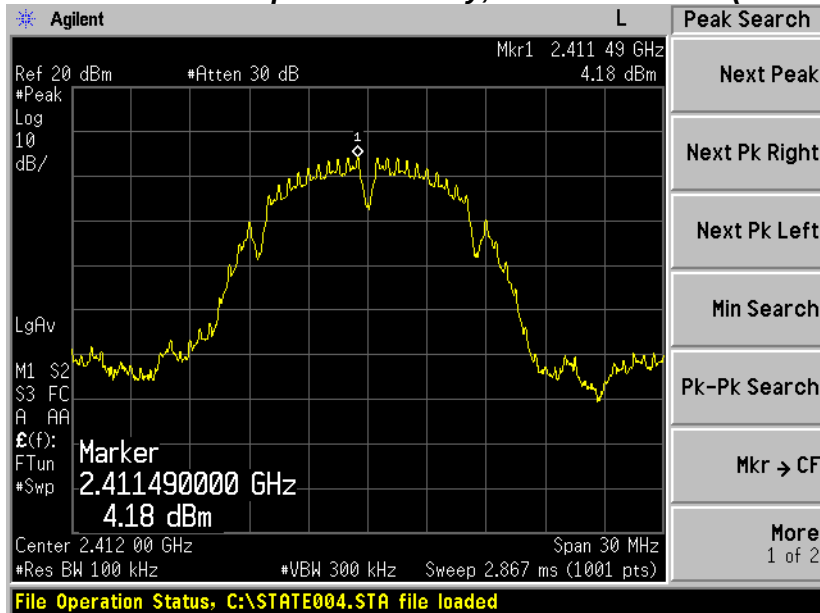
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2462 MHz)



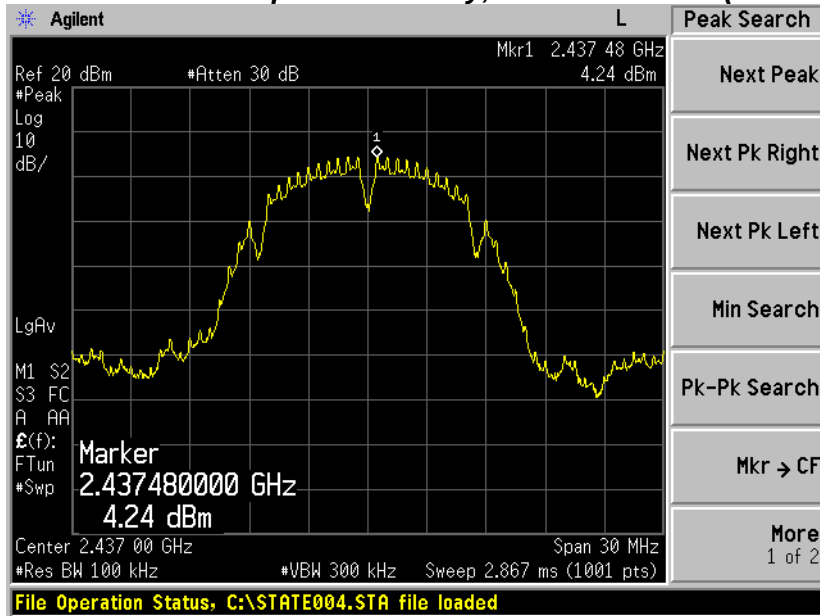
Chain 1

Reference Power Spectral Density, Lowest Channel (2412 MHz)

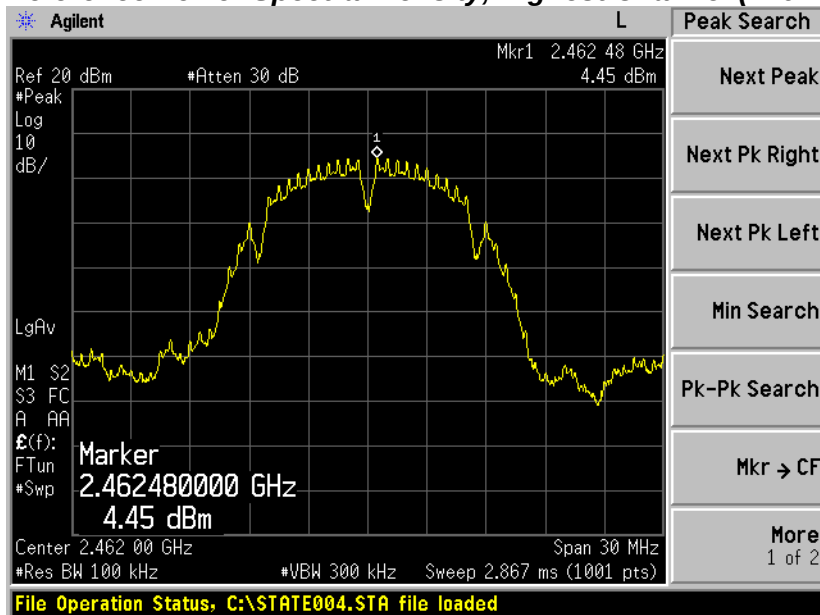


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2462 MHz)

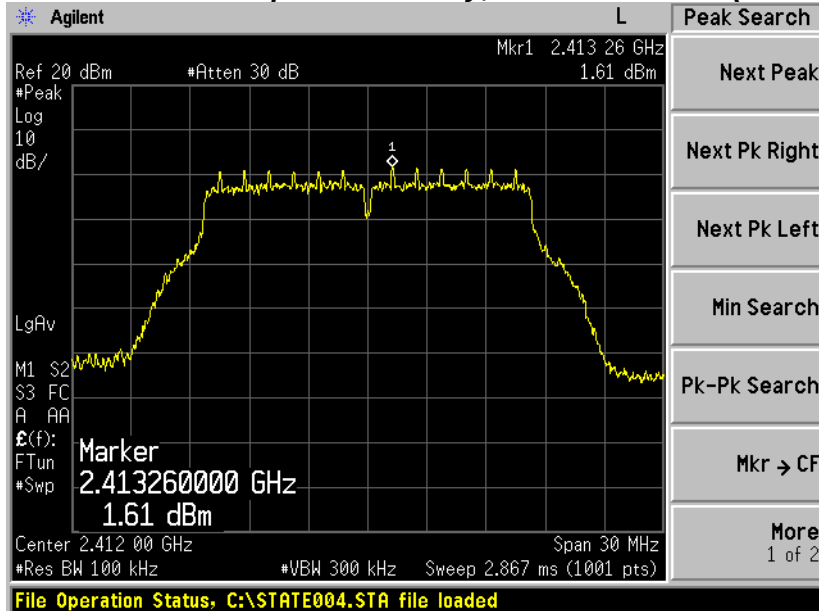


PLOT OF TEST DATA

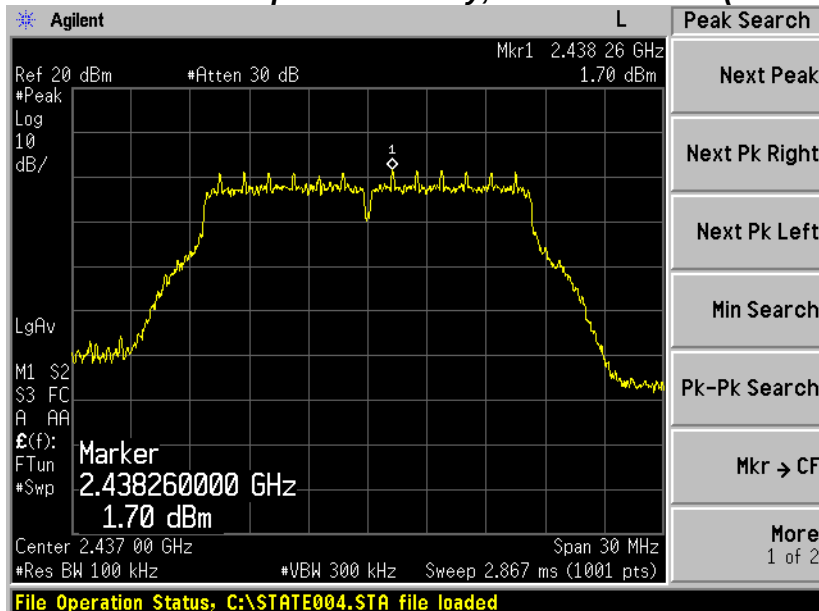
802.11g mode

Chain 0

Reference Power Spectral Density, Lowest Channel (2412 MHz)

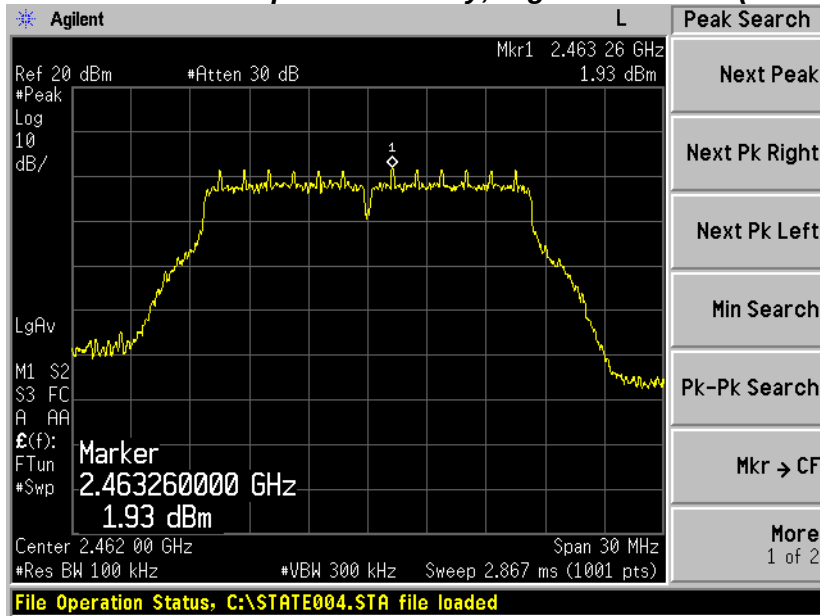


Reference Power Spectral Density, Middle Channel (2437 MHz)



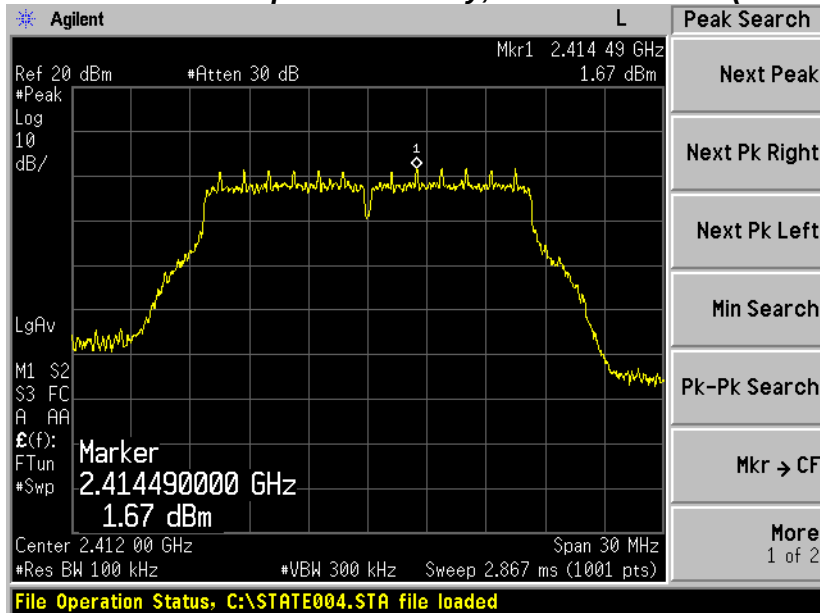
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2462 MHz)



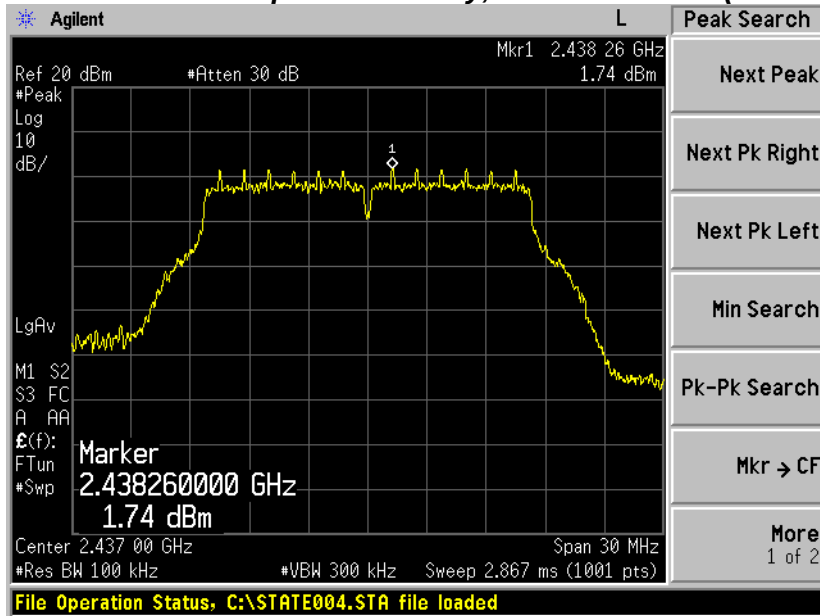
Chain 1

Reference Power Spectral Density, Lowest Channel (2412 MHz)

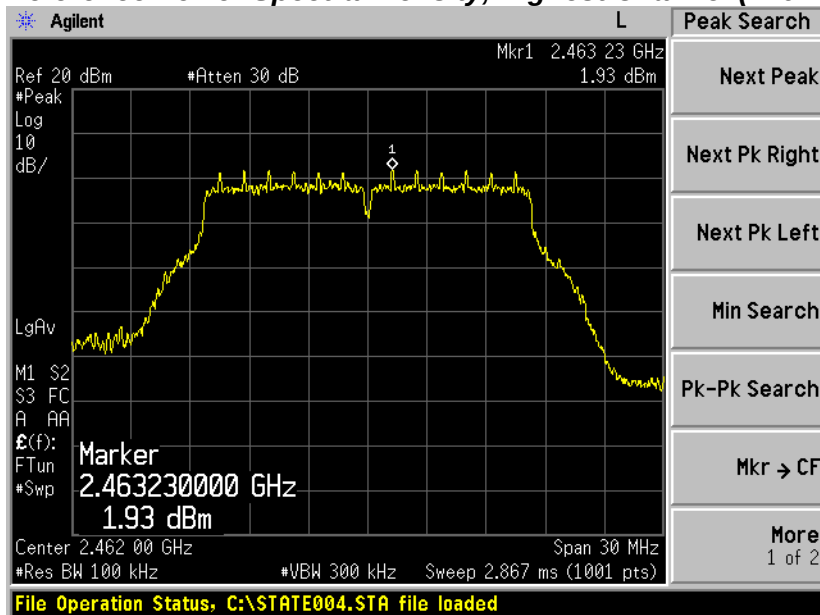


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2462 MHz)

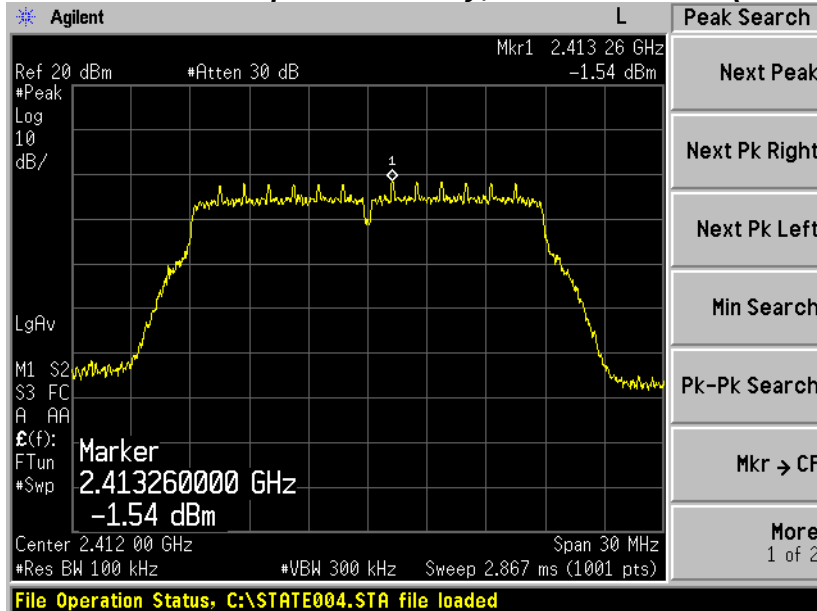


PLOT OF TEST DATA

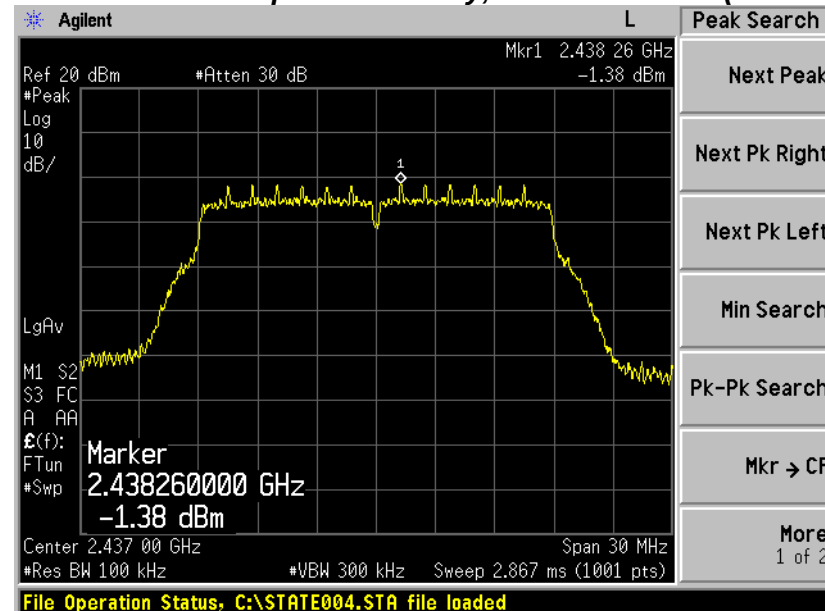
802.11n(20MHz) mode - CDD

Chain 0

Reference Power Spectral Density, Lowest Channel (2412 MHz)

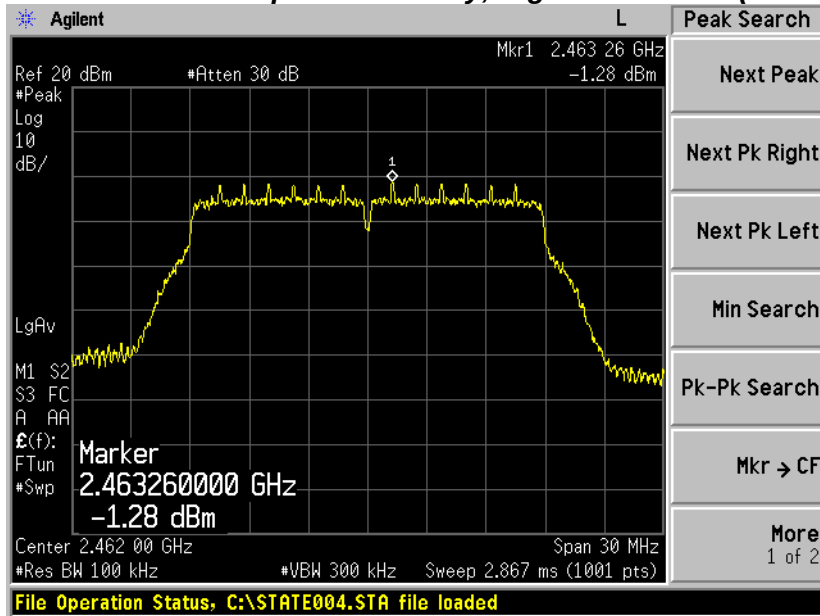


Reference Power Spectral Density, Middle Channel (2437 MHz)



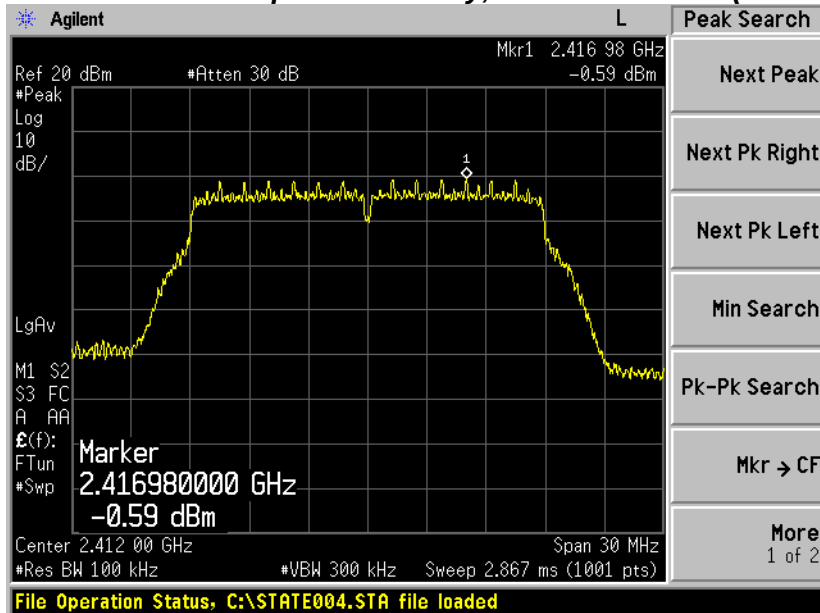
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2462 MHz)



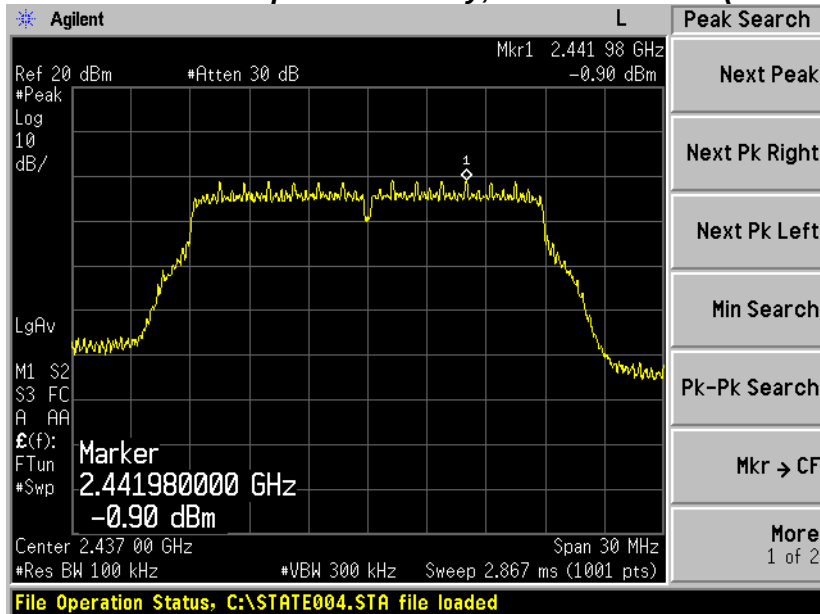
Chain 1

Reference Power Spectral Density, Lowest Channel (2412 MHz)

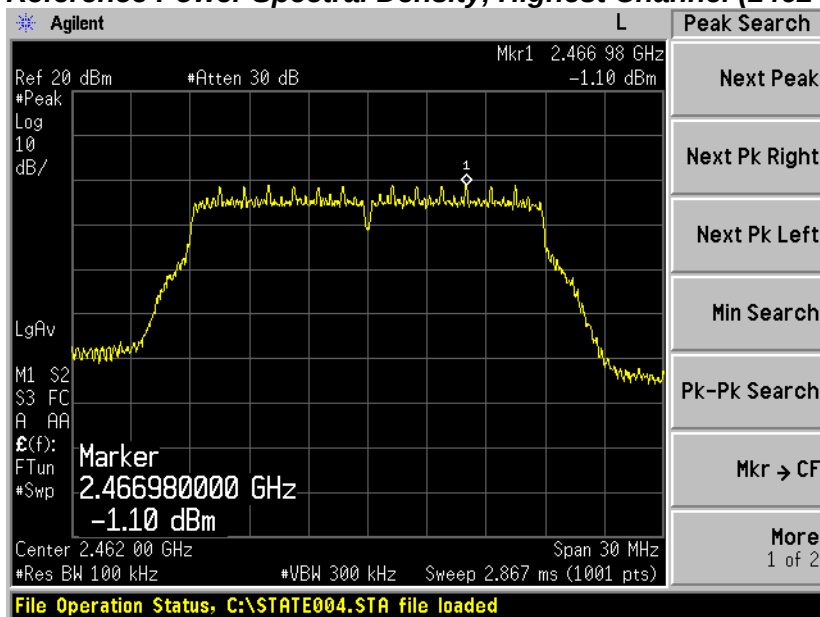


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2462 MHz)

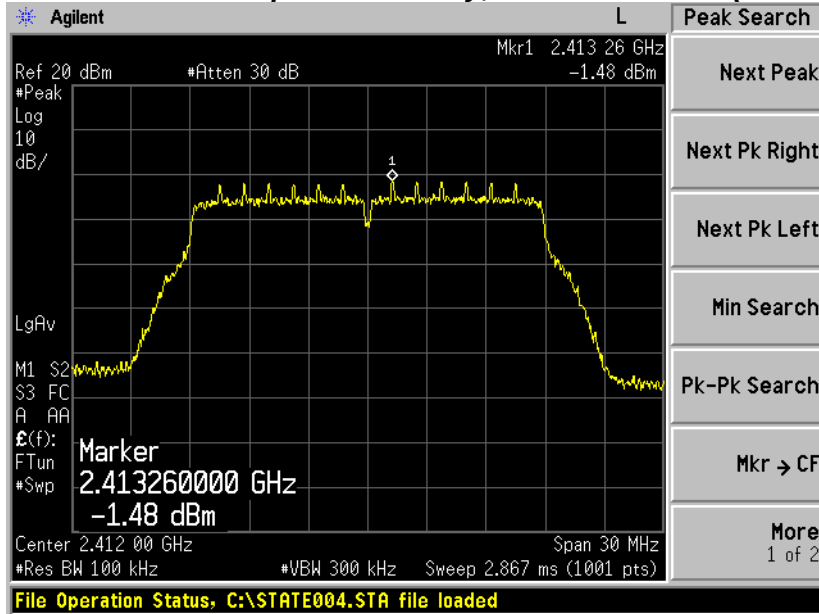


PLOT OF TEST DATA

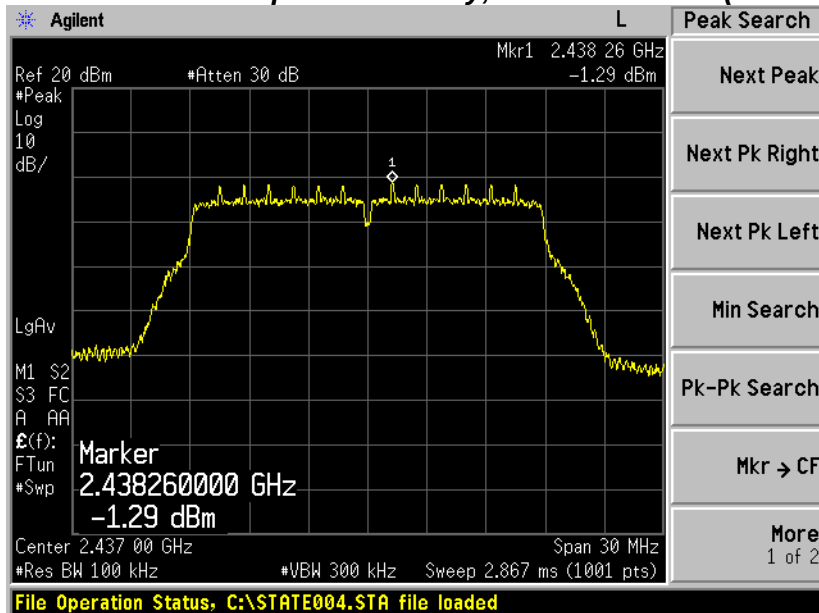
802.11n(20MHz) mode - MIMO

Chain 0

Reference Power Spectral Density, Lowest Channel (2412 MHz)

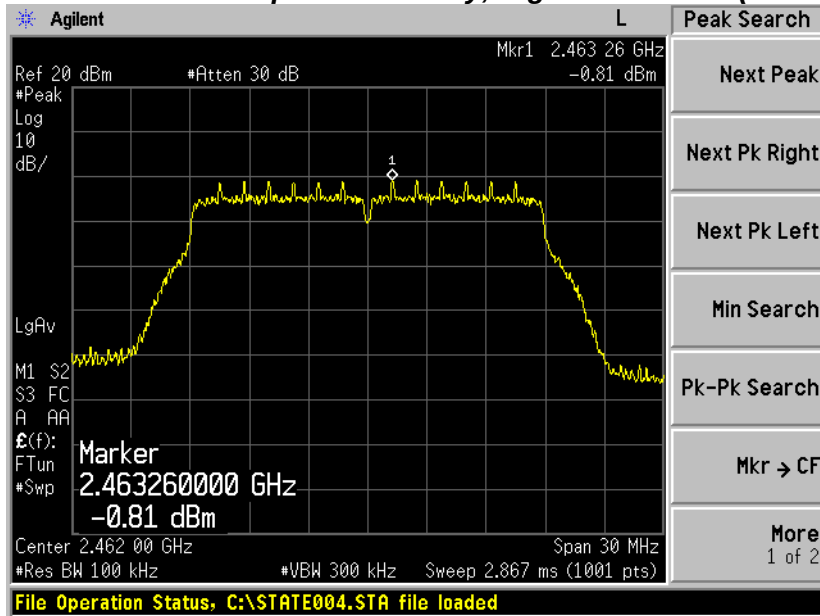


Reference Power Spectral Density, Middle Channel (2437 MHz)



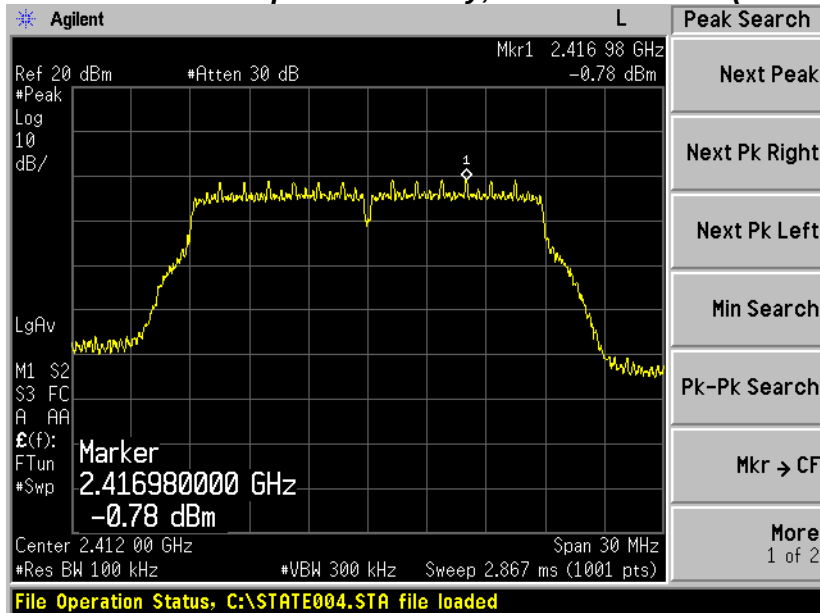
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2462 MHz)



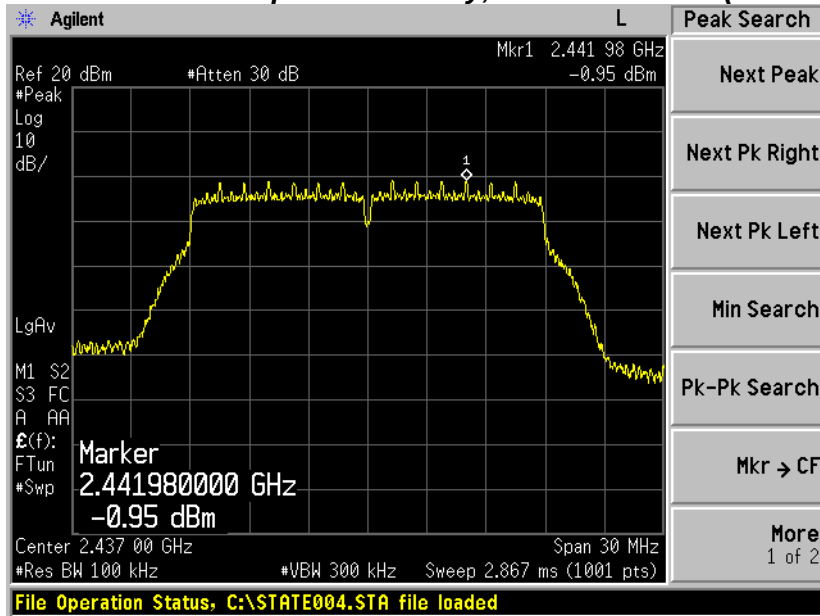
Chain 1

Reference Power Spectral Density, Lowest Channel (2412 MHz)

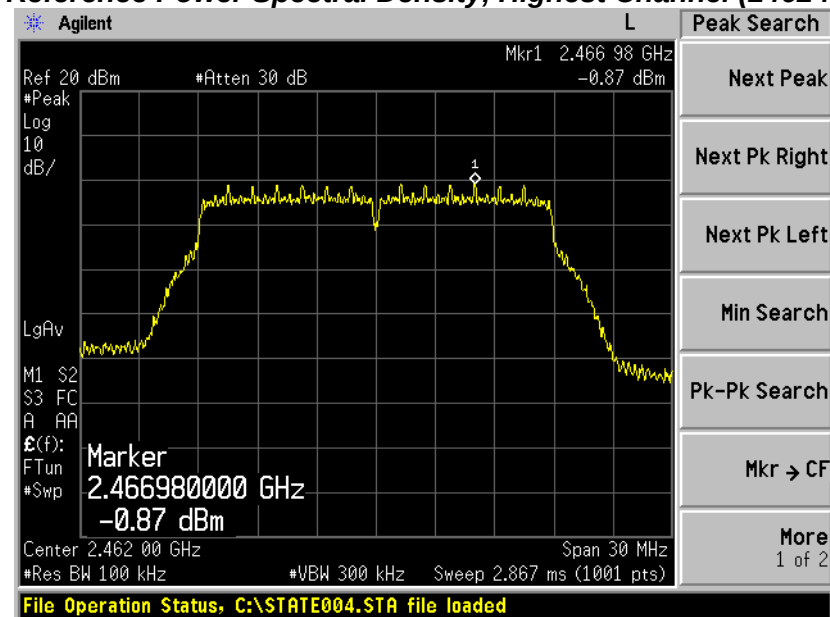


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2462 MHz)

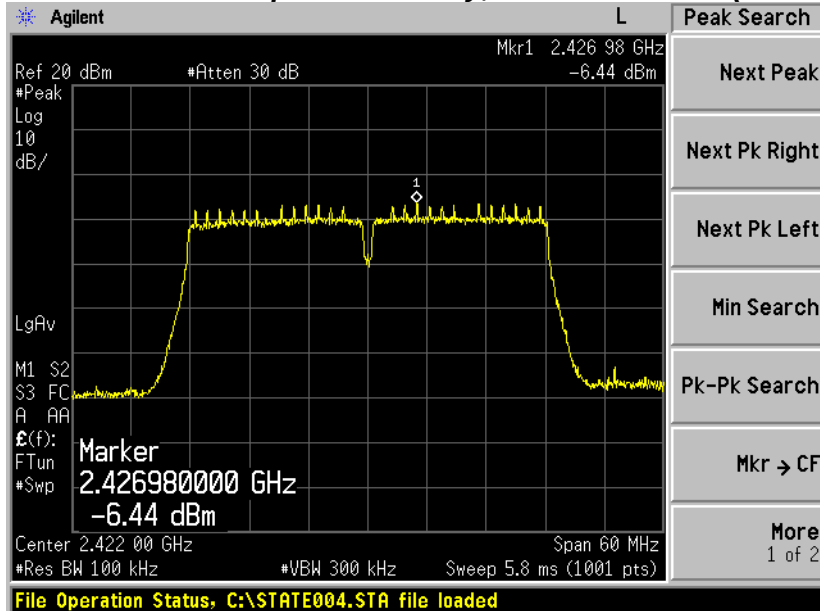


PLOT OF TEST DATA

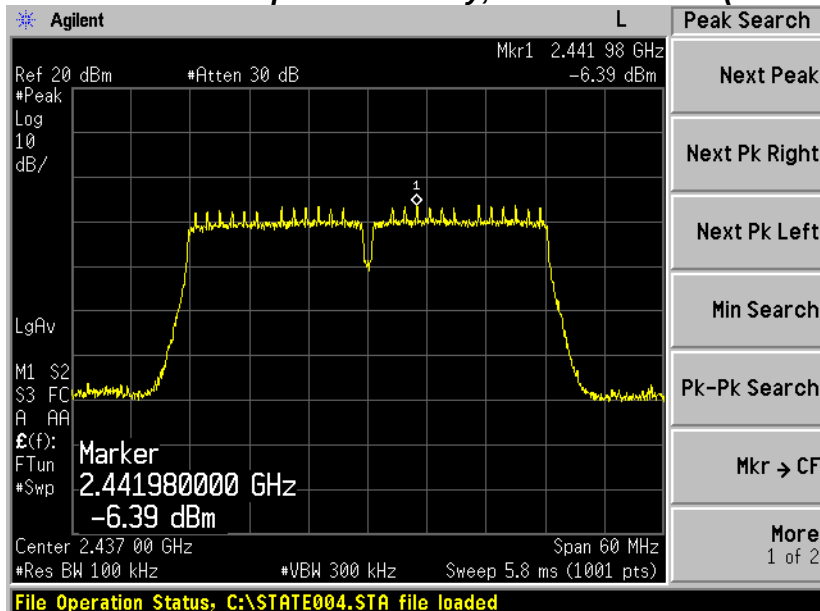
802.11n(40MHz) mode - SISO

Chain 0

Reference Power Spectral Density, Lowest Channel (2422 MHz)

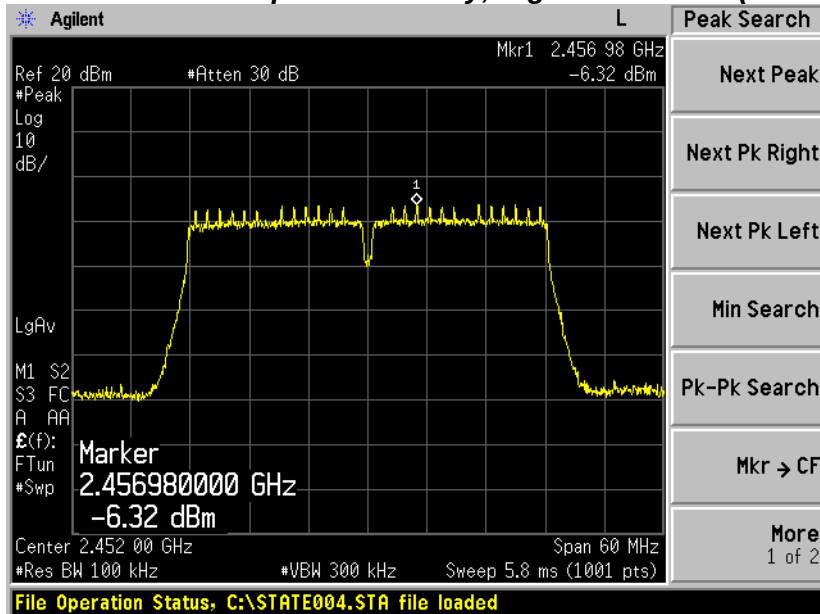


Reference Power Spectral Density, Middle Channel (2437 MHz)



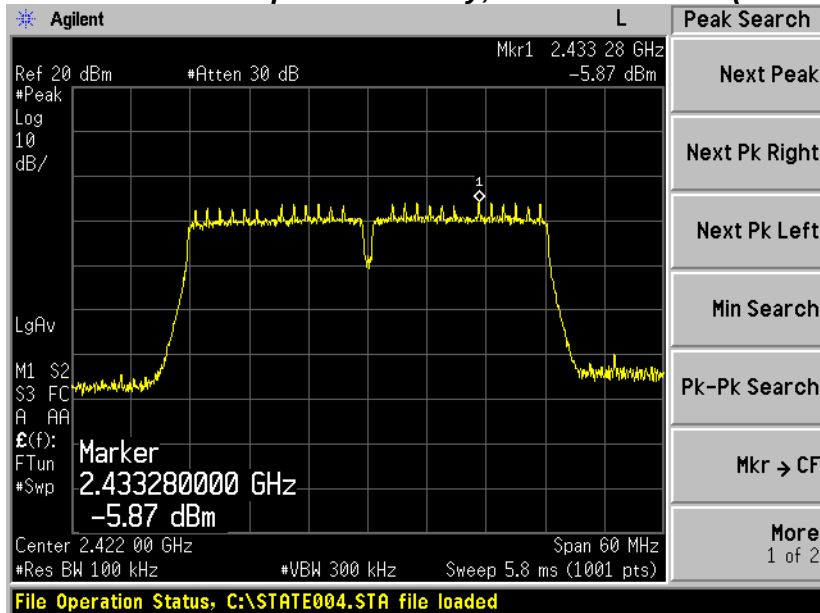
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2452 MHz)



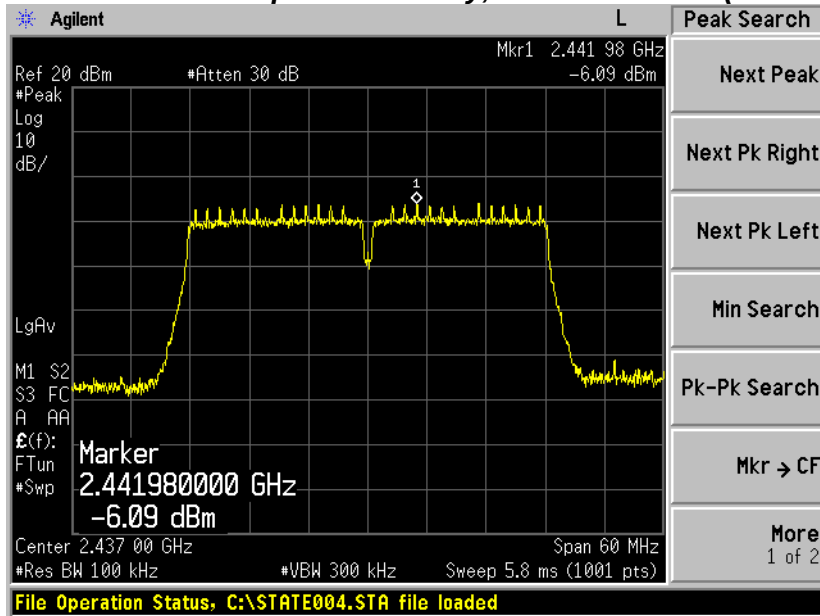
Chain 1

Reference Power Spectral Density, Lowest Channel (2422 MHz)

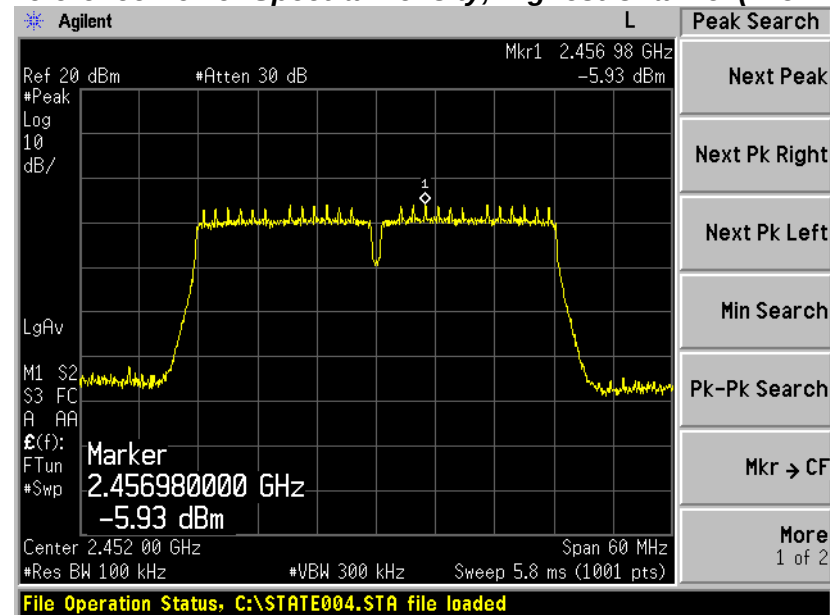


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2452 MHz)

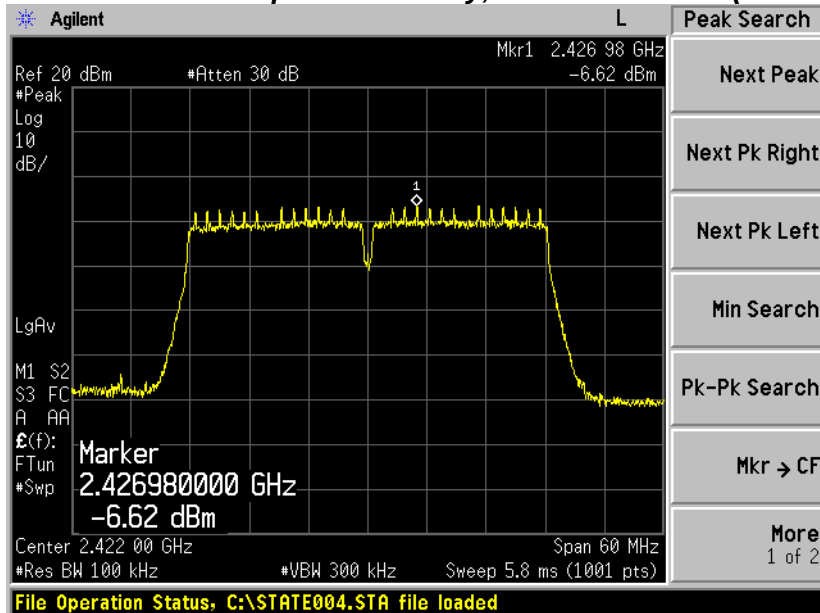


PLOT OF TEST DATA

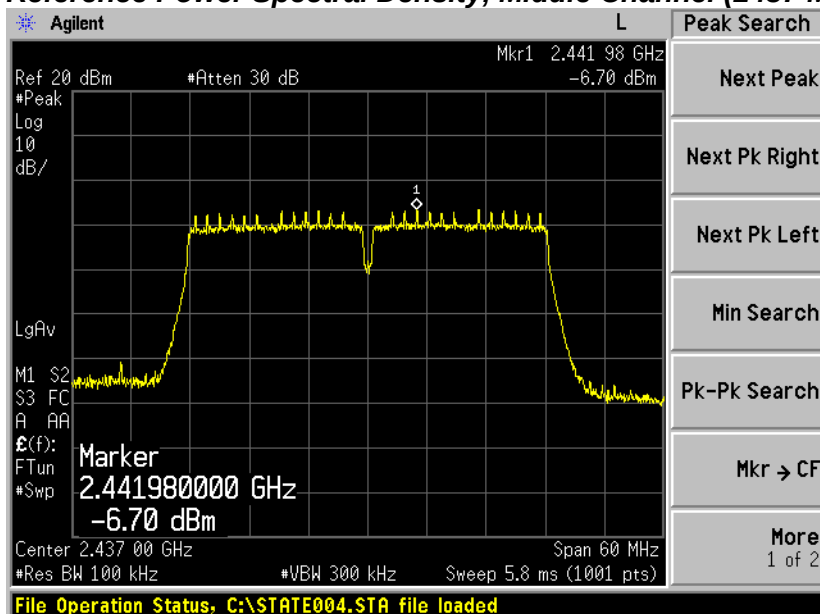
802.11n(40MHz) mode - CDD

Chain 0

Reference Power Spectral Density, Lowest Channel (2422 MHz)

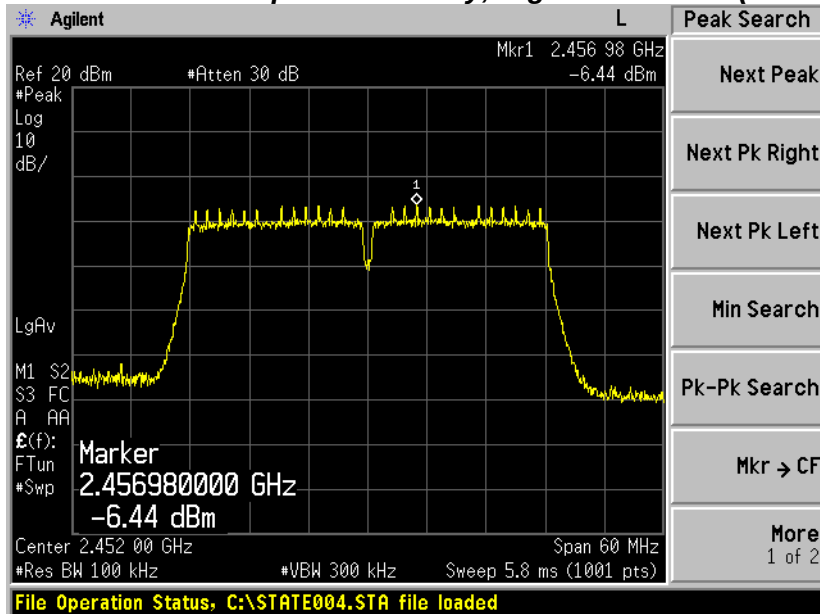


Reference Power Spectral Density, Middle Channel (2437 MHz)



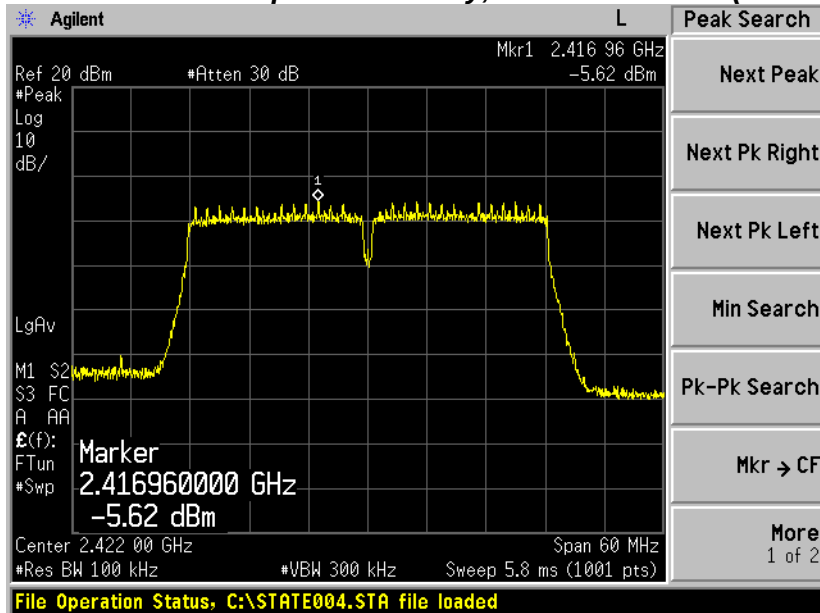
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2452 MHz)



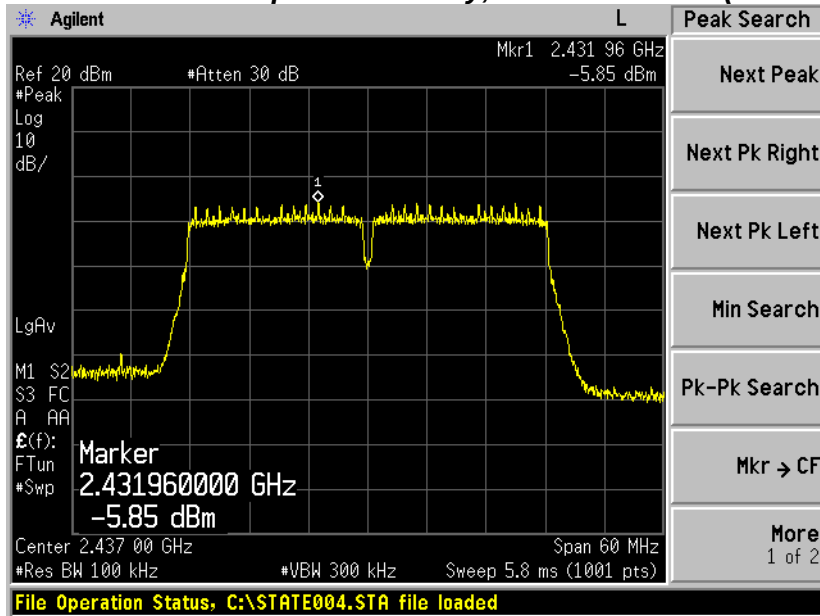
Chain 1

Reference Power Spectral Density, Lowest Channel (2422 MHz)

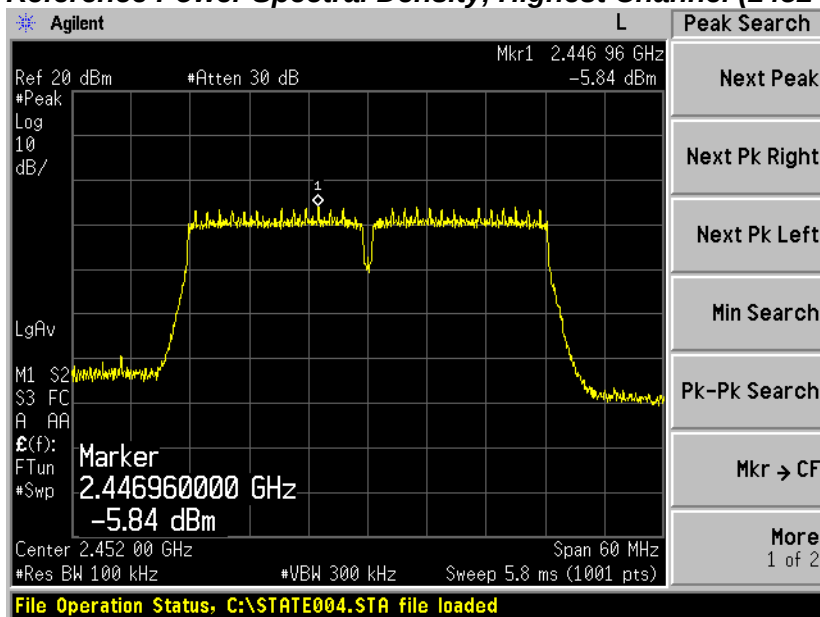


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2452 MHz)

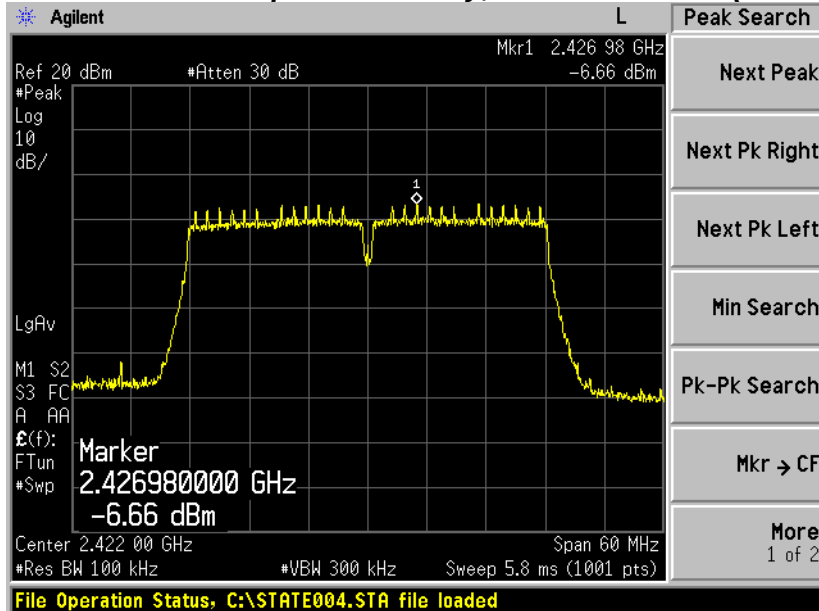


PLOT OF TEST DATA

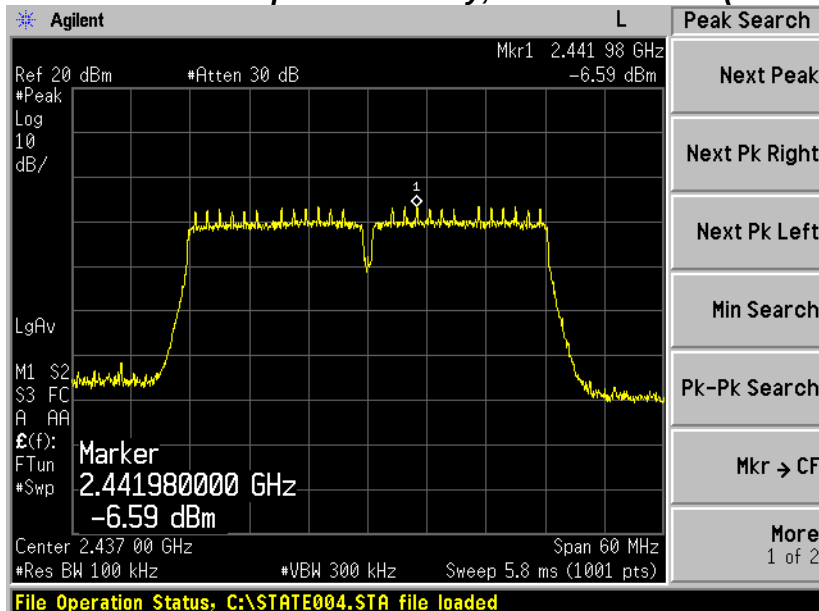
802.11n(40MHz) mode - MIMO

Chain 0

Reference Power Spectral Density, Lowest Channel (2422 MHz)

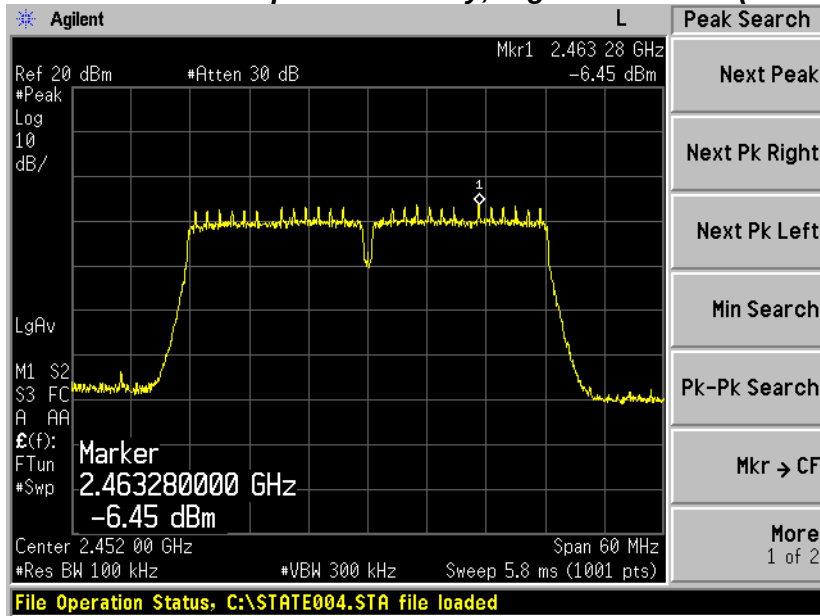


Reference Power Spectral Density, Middle Channel (2437 MHz)



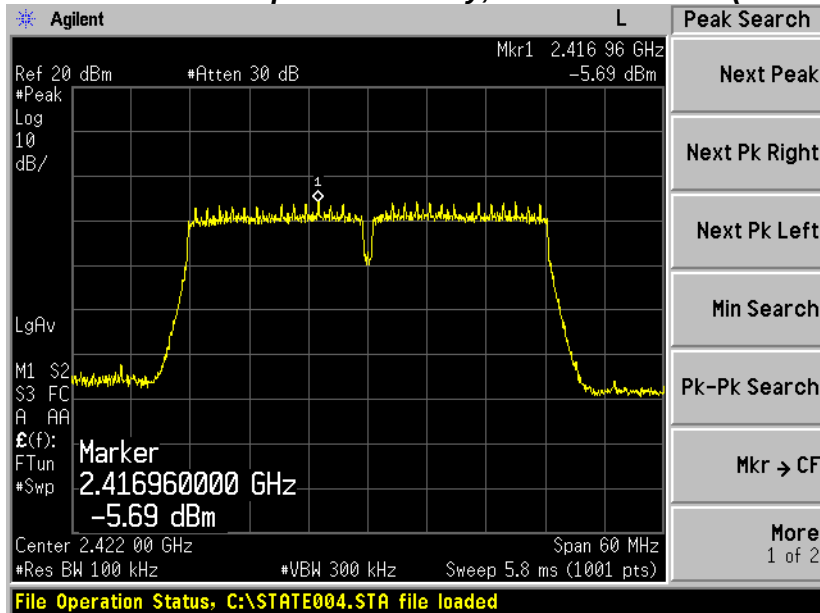
PLOT OF TEST DATA

Reference Power Spectral Density, Highest Channel (2452 MHz)



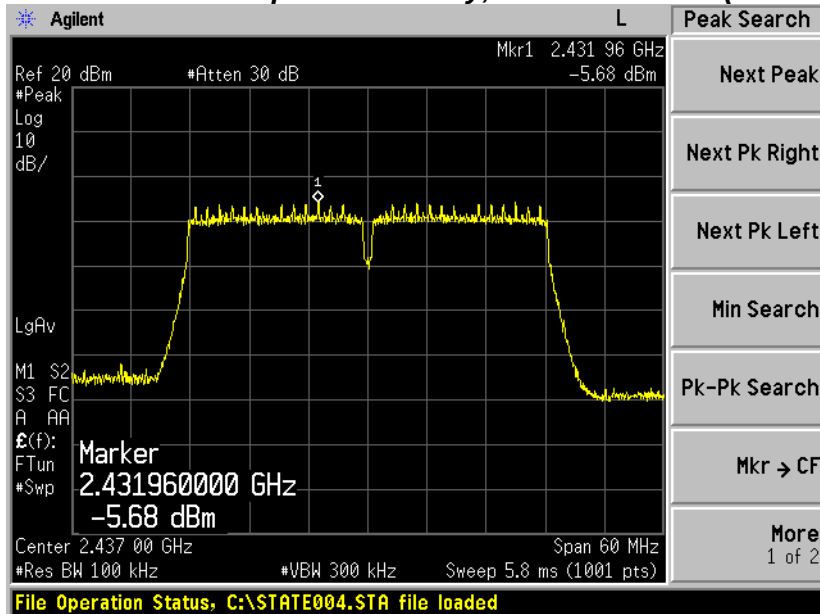
Chain 1

Reference Power Spectral Density, Lowest Channel (2422 MHz)

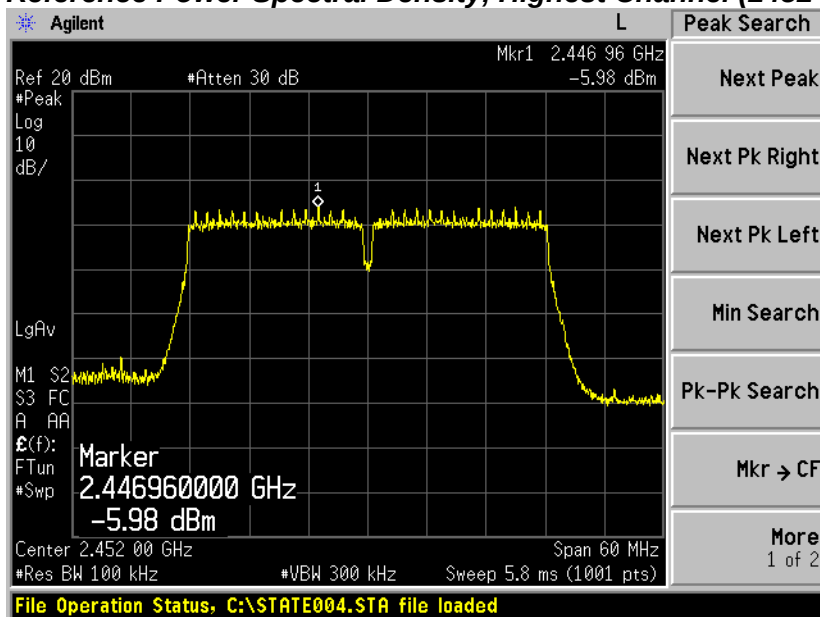


PLOT OF TEST DATA

Reference Power Spectral Density, Middle Channel (2437 MHz)



Reference Power Spectral Density, Highest Channel (2452 MHz)

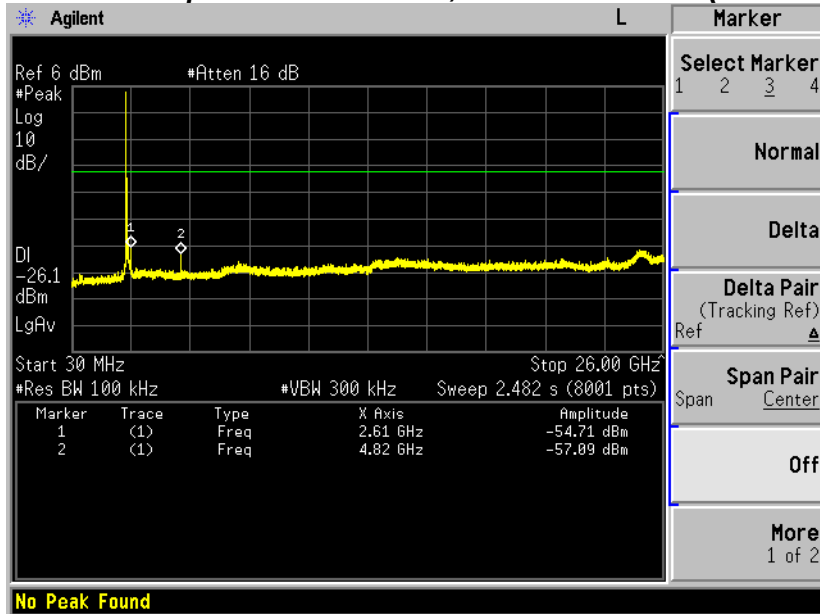


PLOT OF TEST DATA

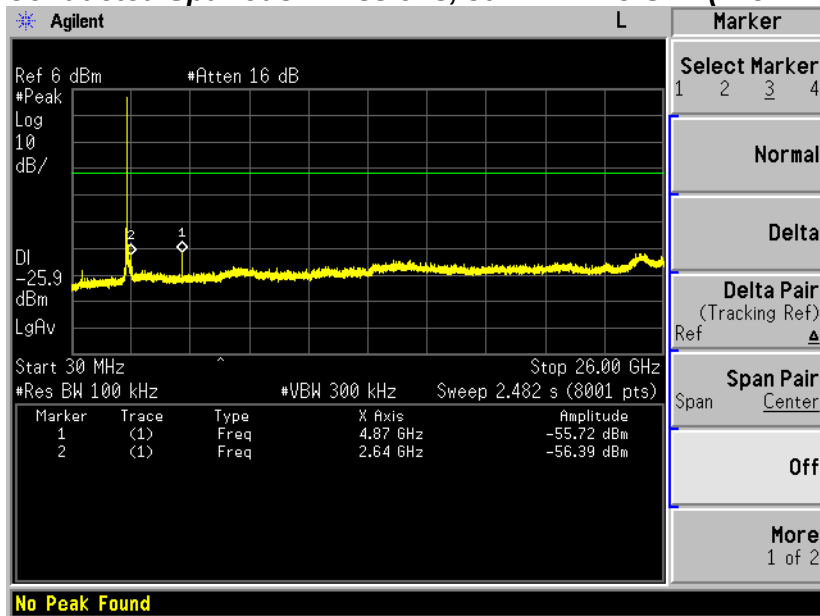
802.11b mode

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

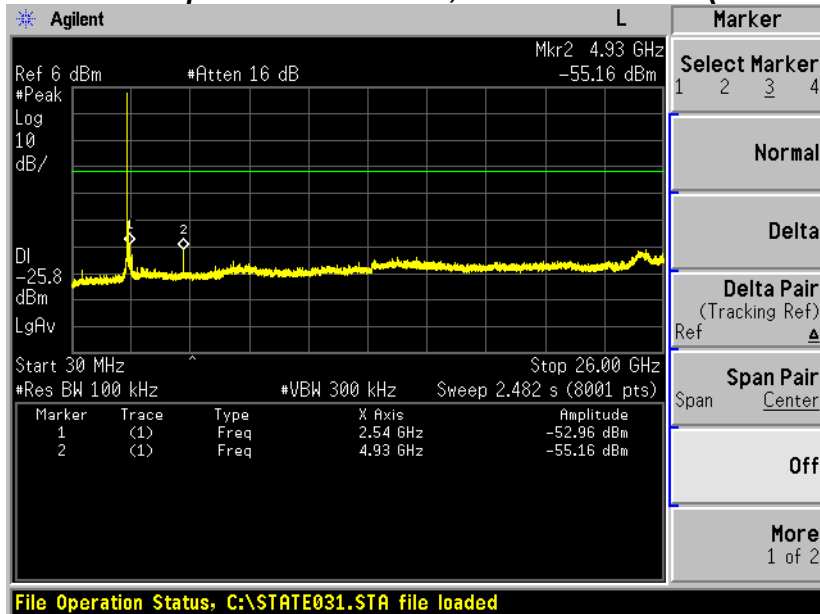


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



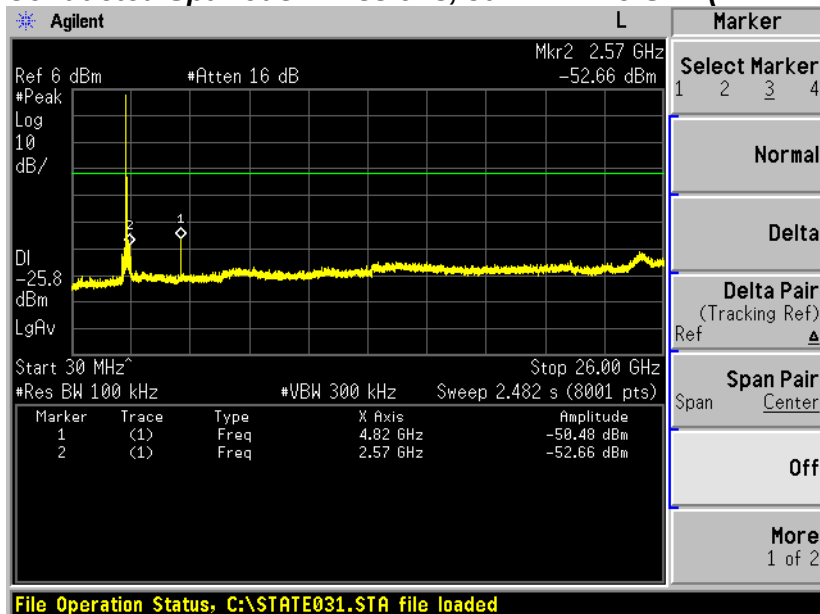
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)



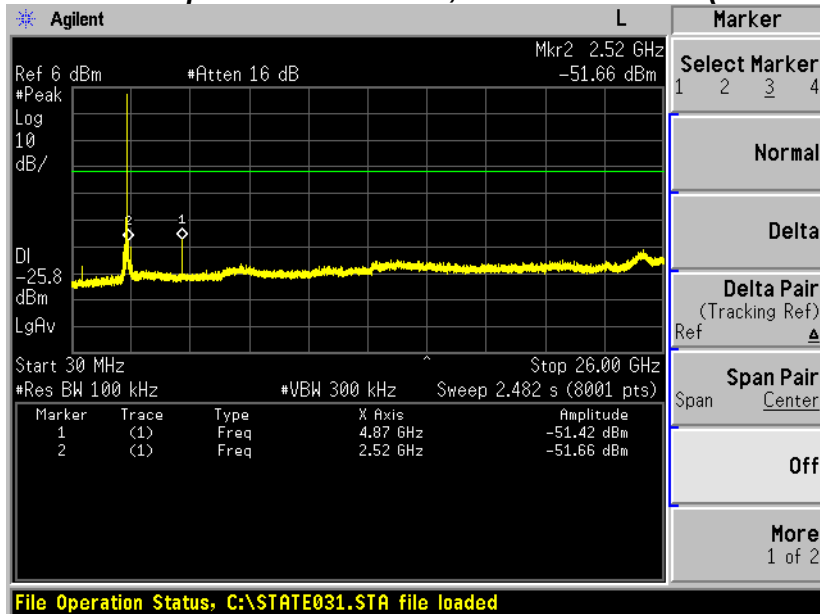
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

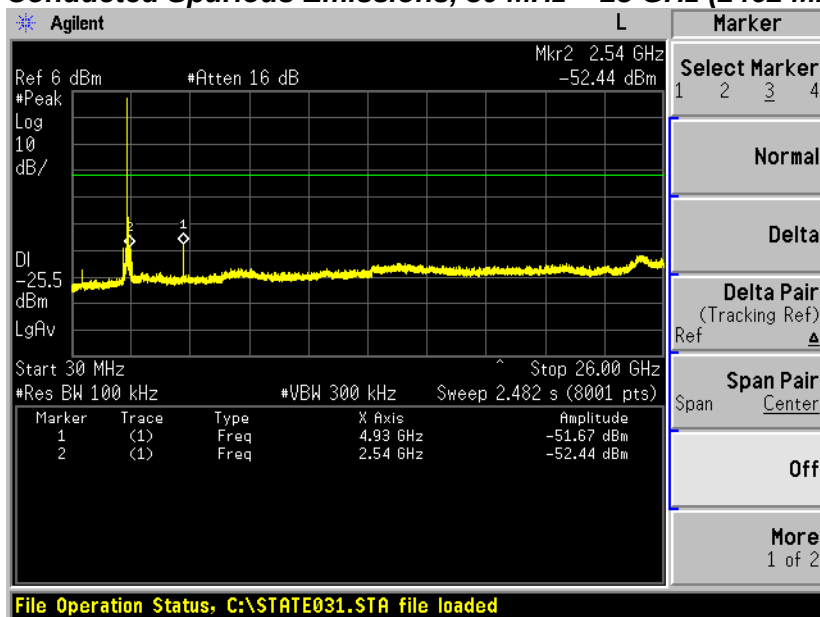


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)

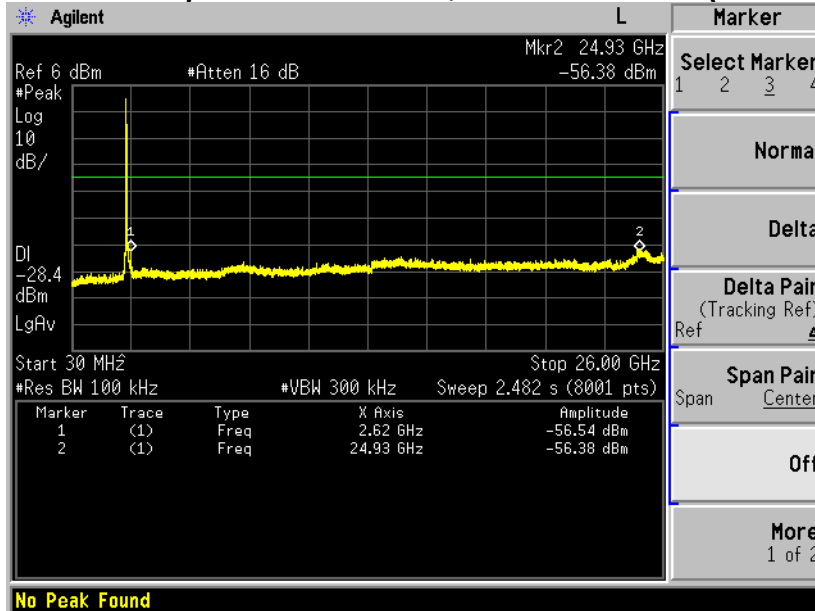


PLOT OF TEST DATA

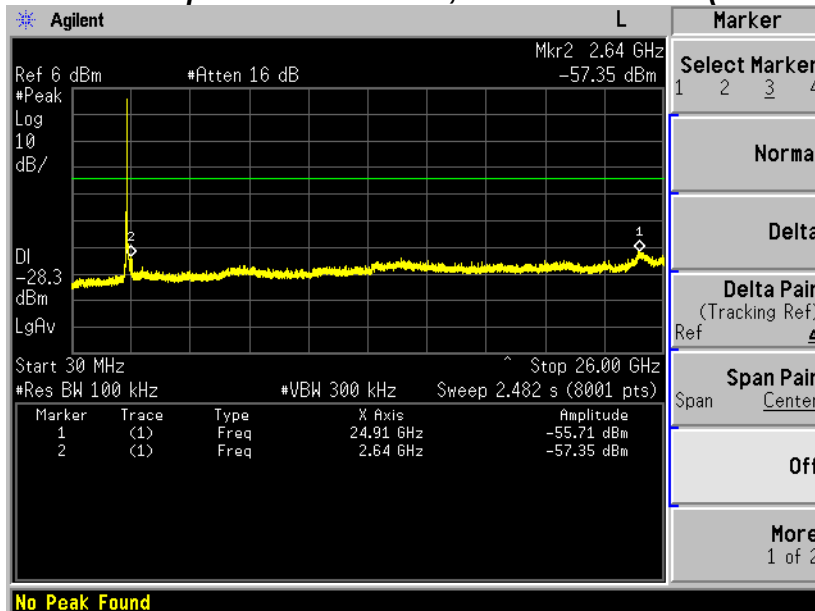
802.11g mode

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

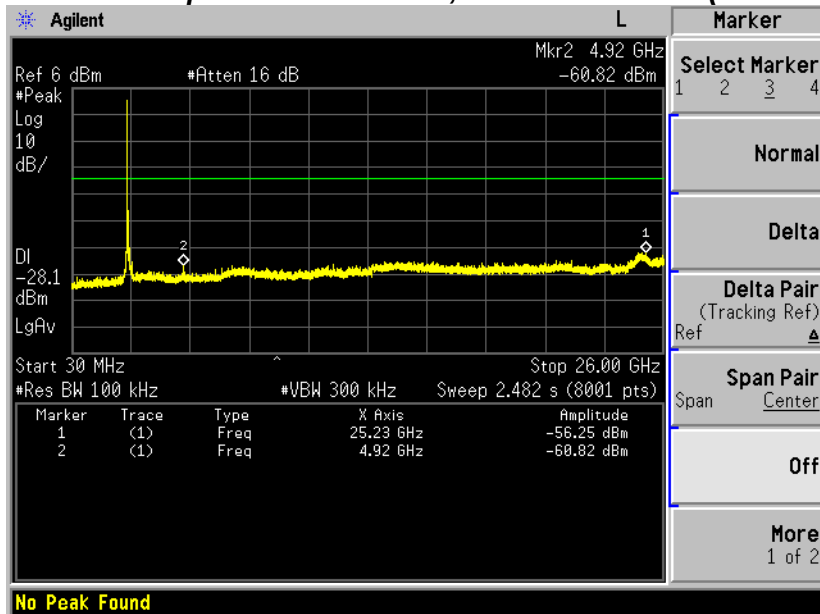


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



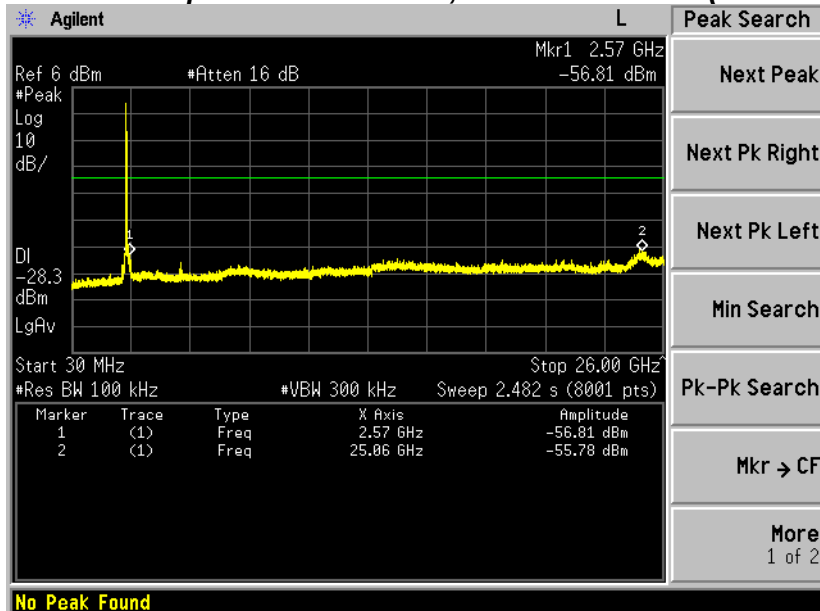
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)



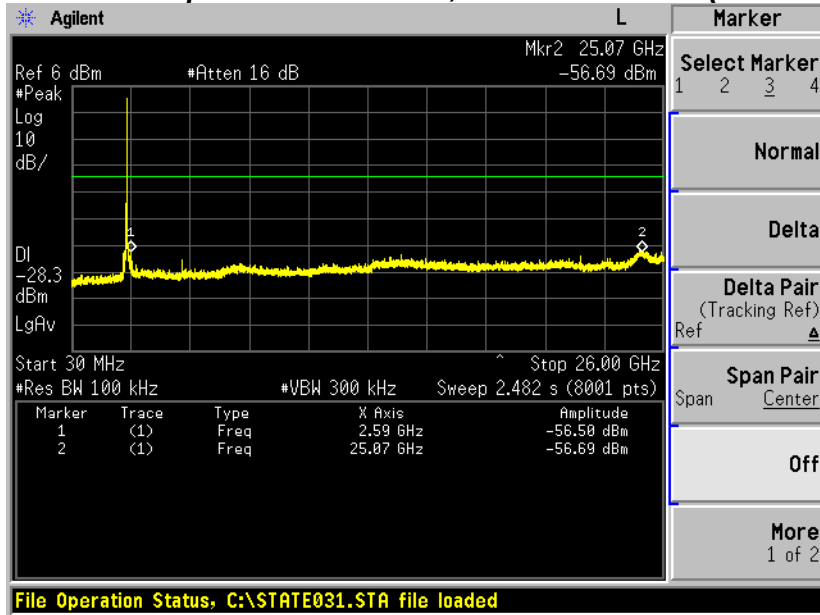
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

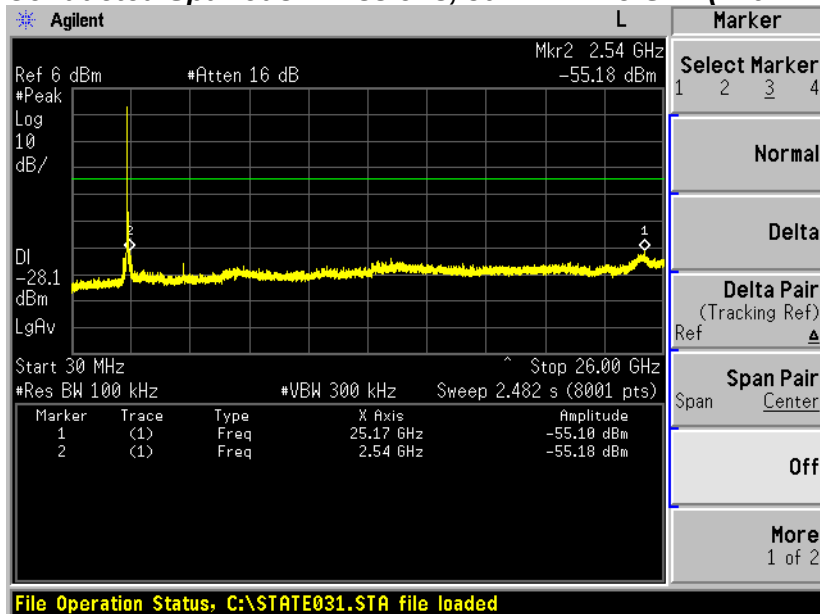


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)

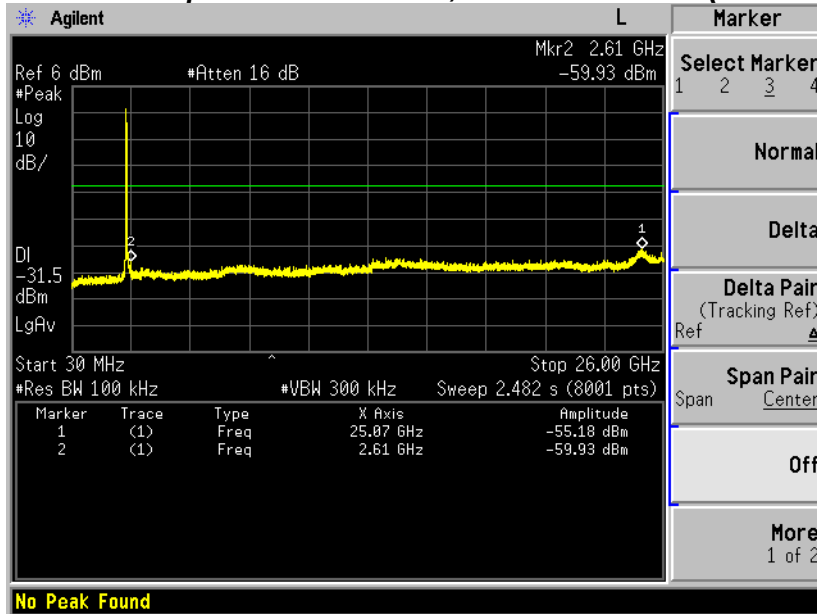


PLOT OF TEST DATA

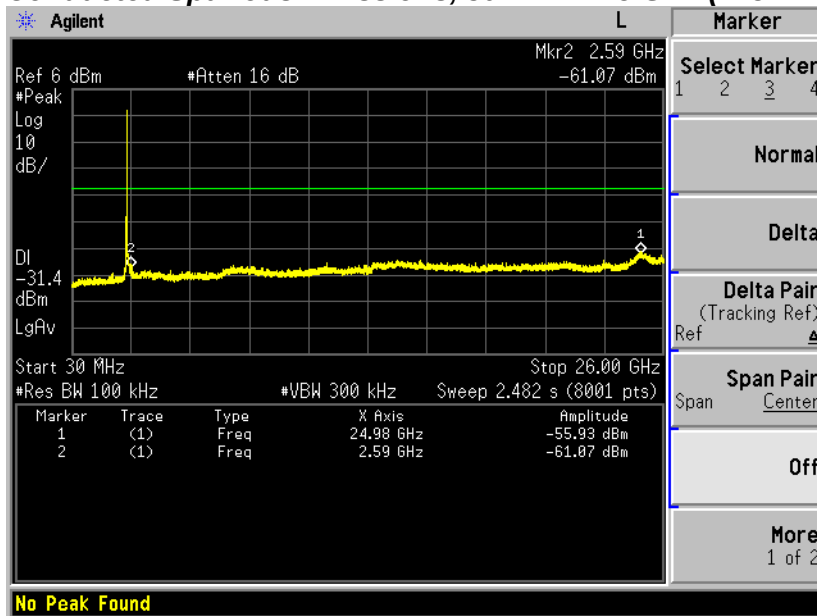
802.11n(20MHz) mode - CDD

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

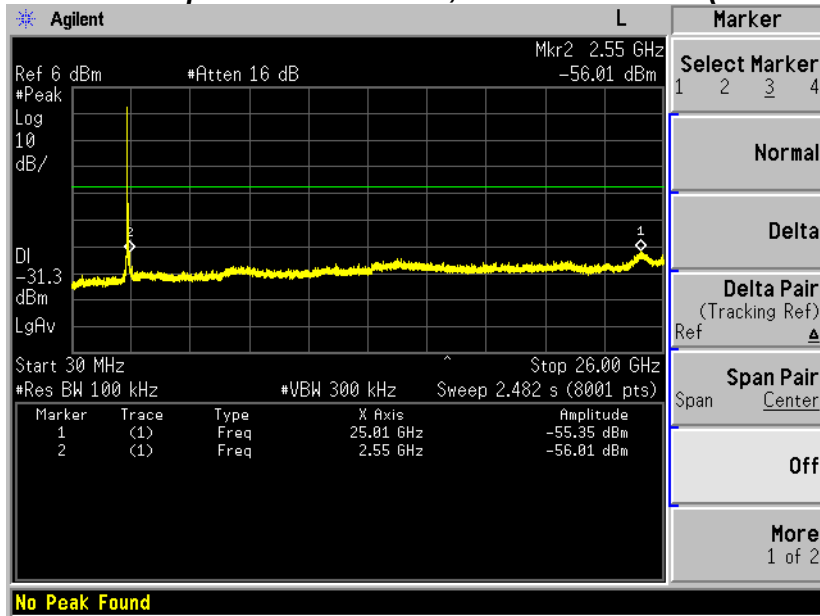


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



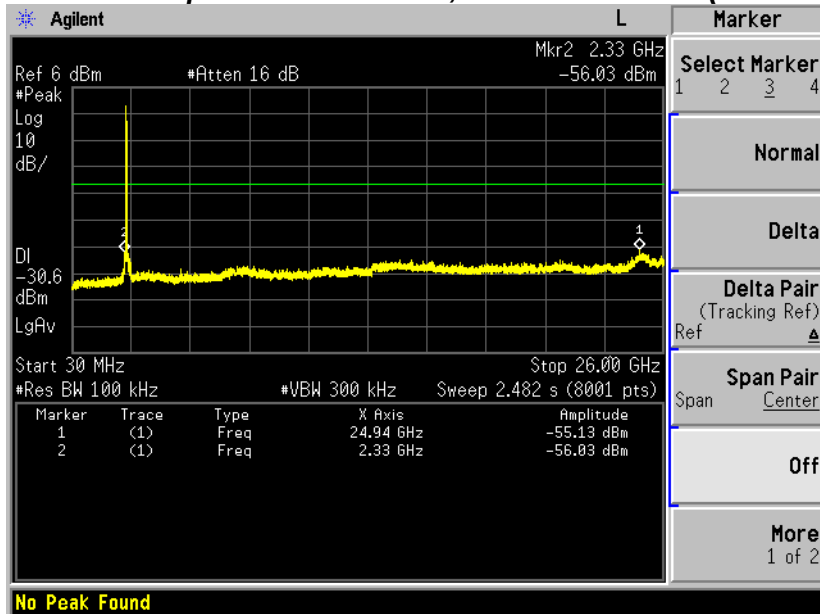
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)



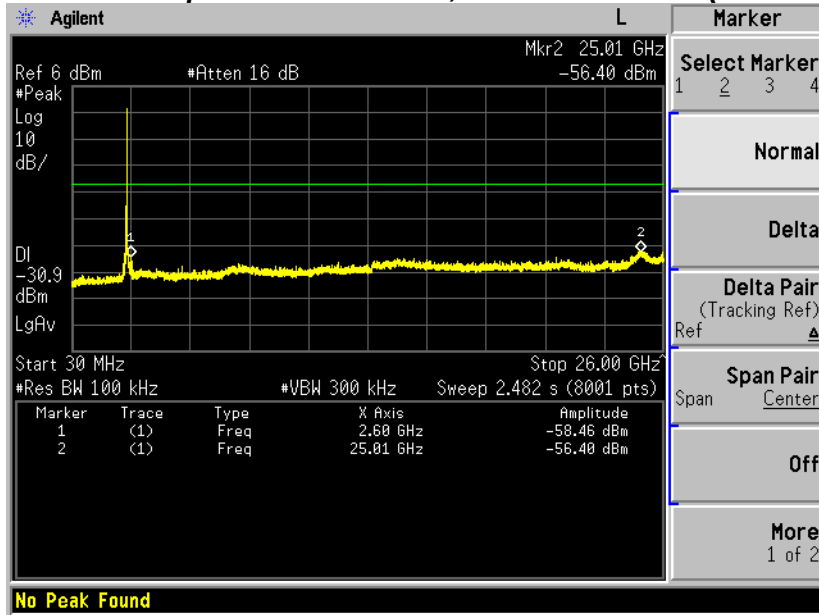
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

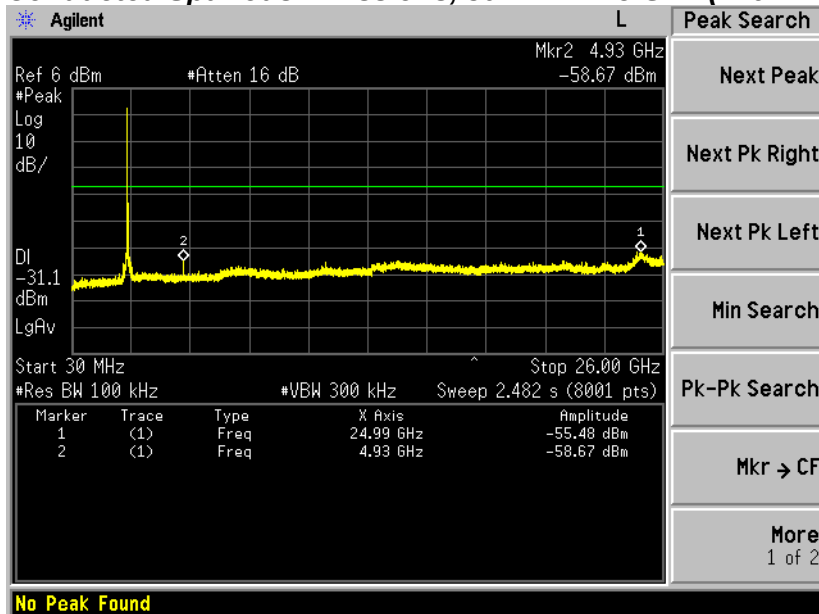


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)

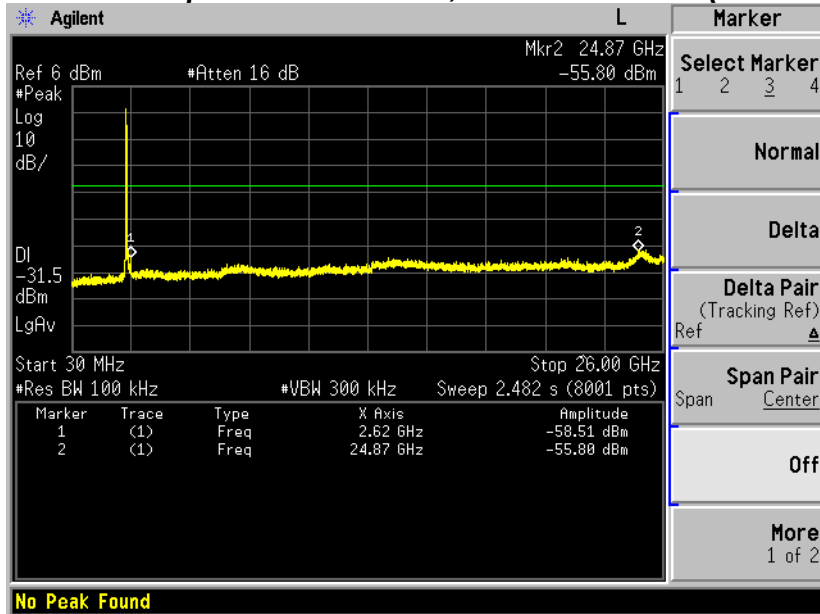


PLOT OF TEST DATA

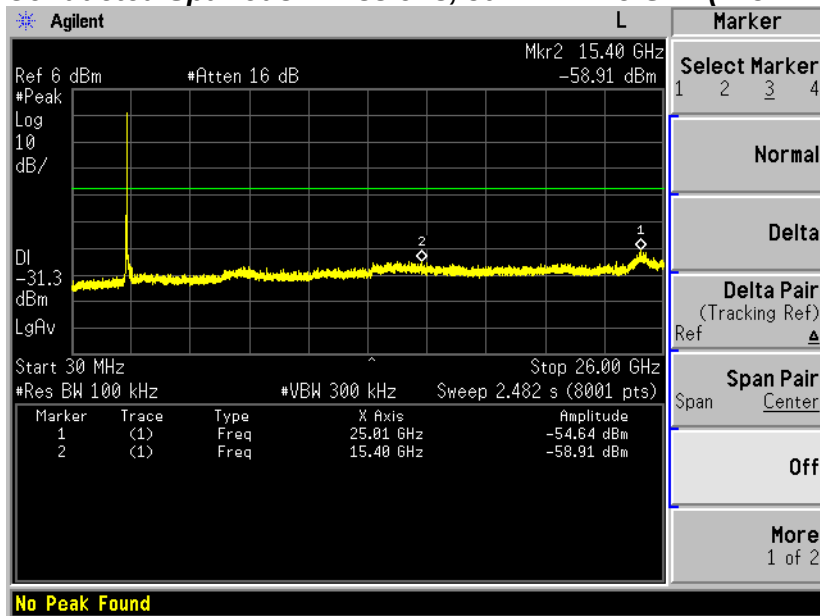
802.11n(20MHz) mode - MIMO

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

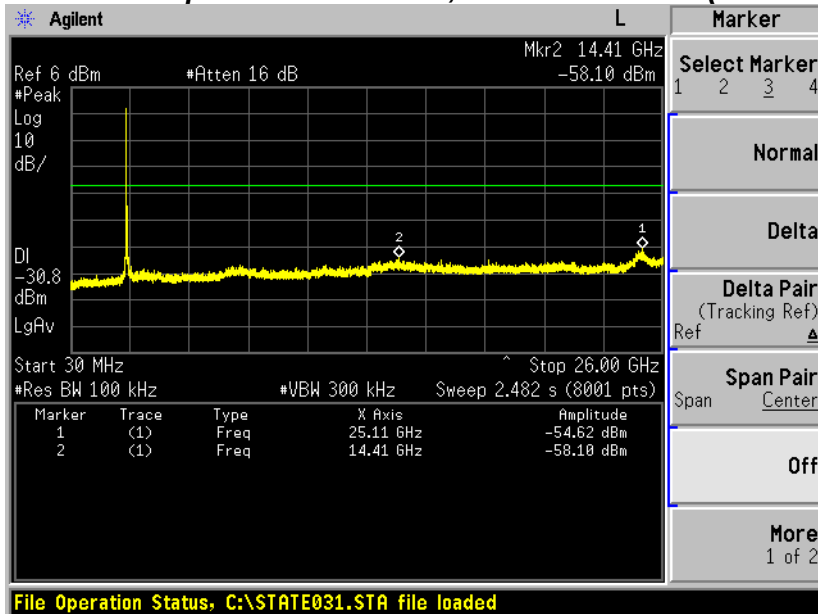


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



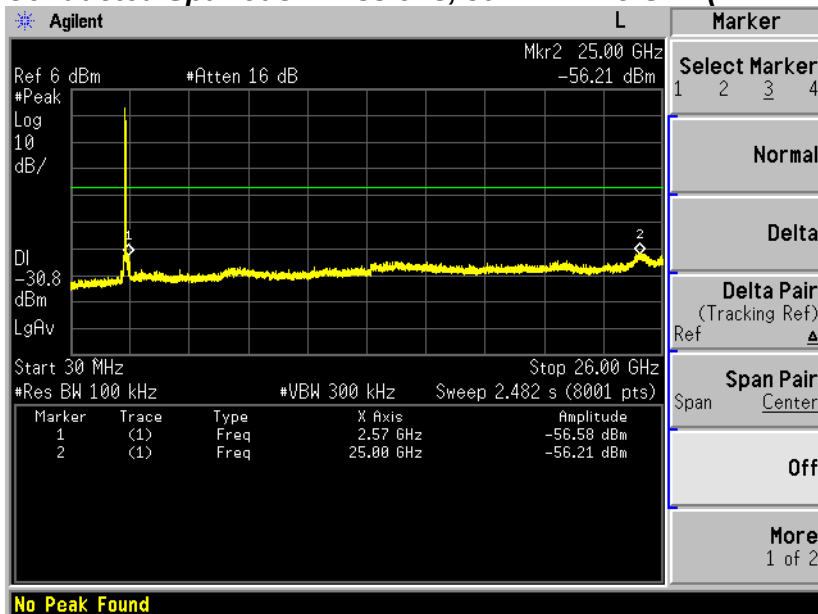
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)



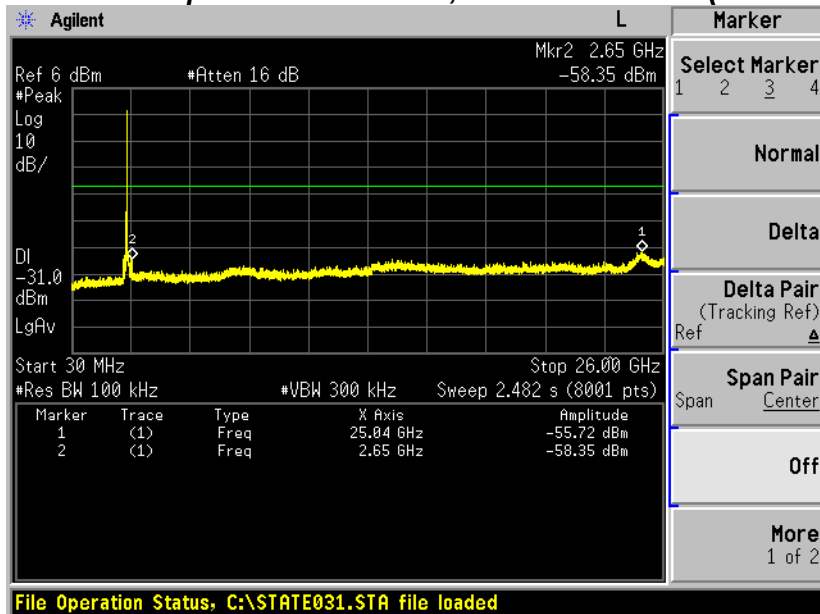
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2412 MHz)

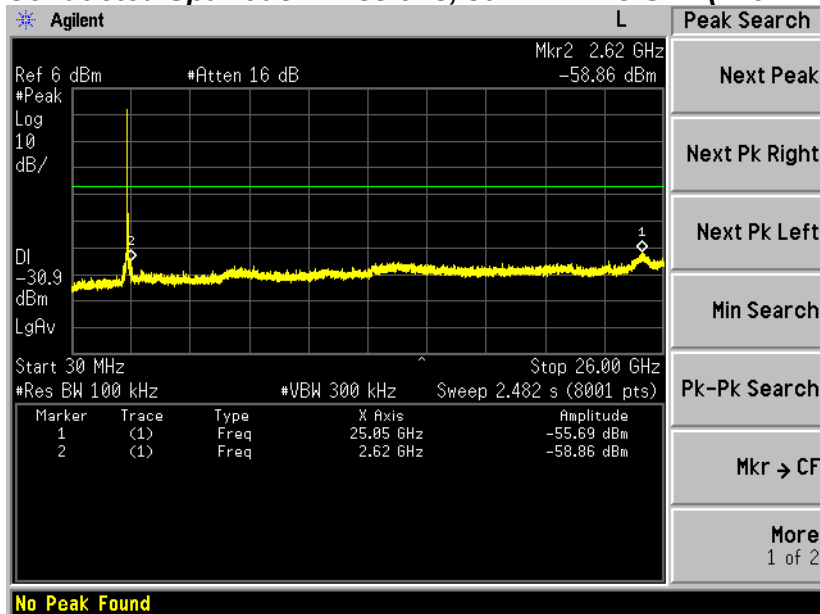


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2462 MHz)

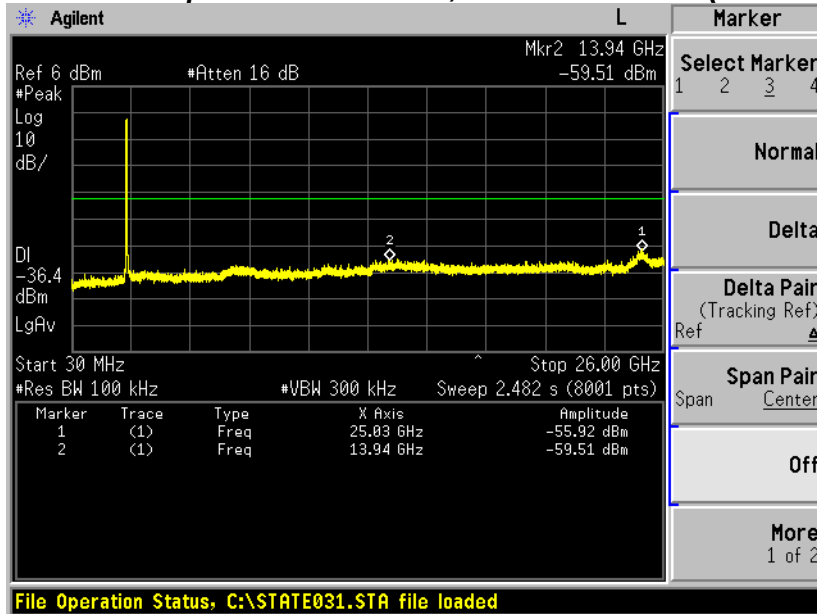


PLOT OF TEST DATA

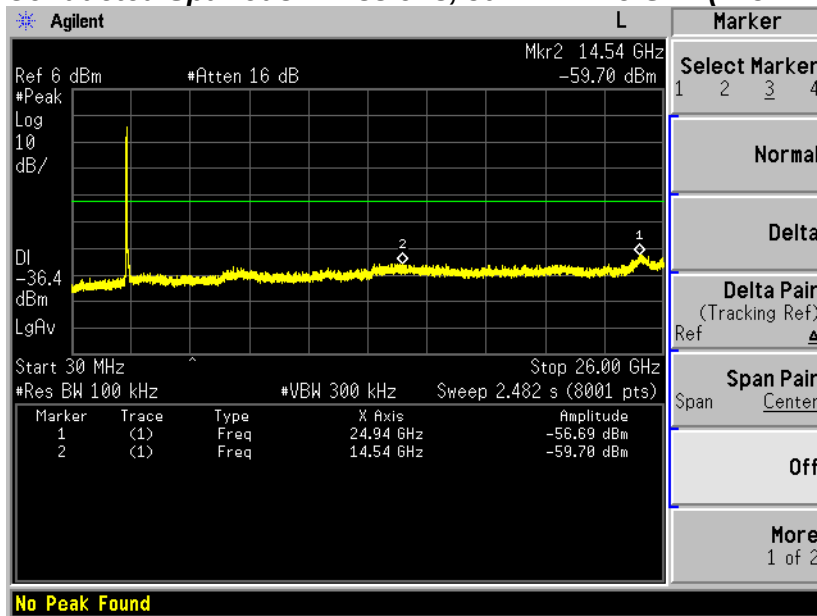
802.11n(40MHz) mode - SISO

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

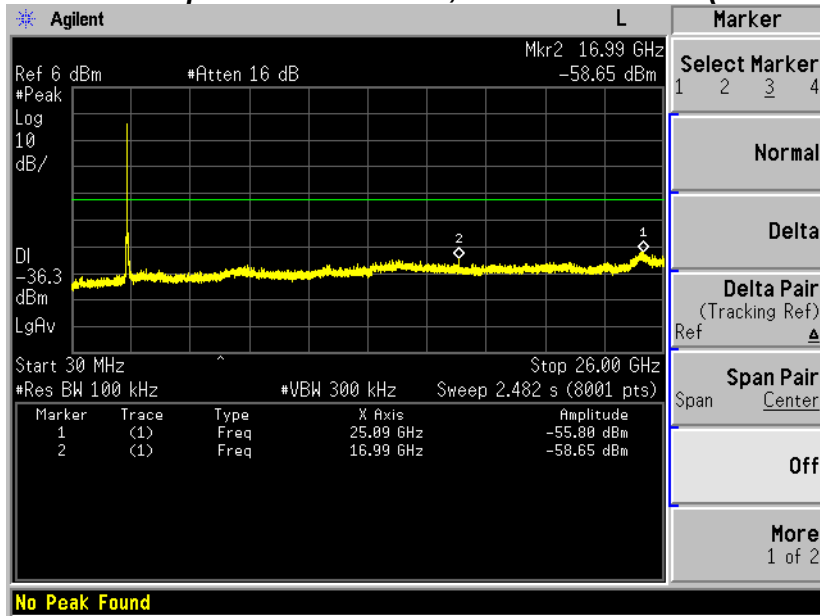


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



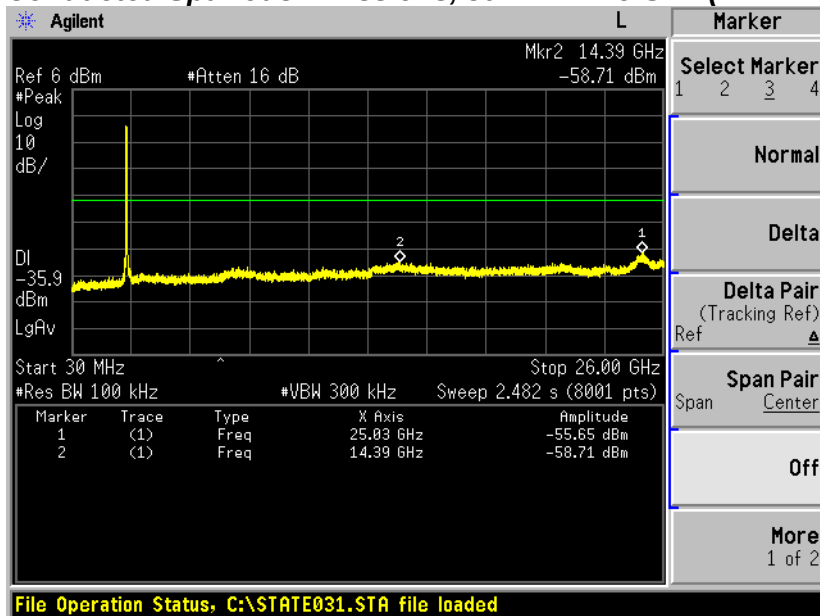
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)



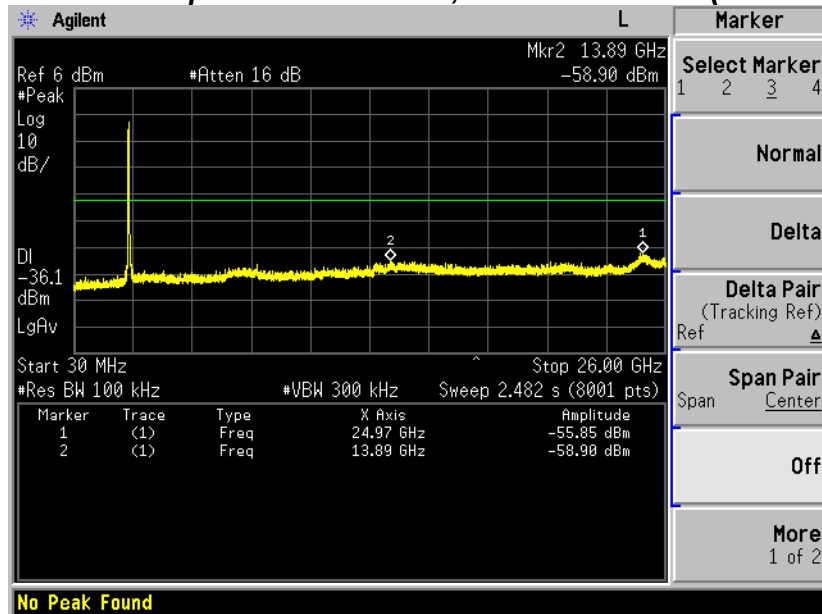
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

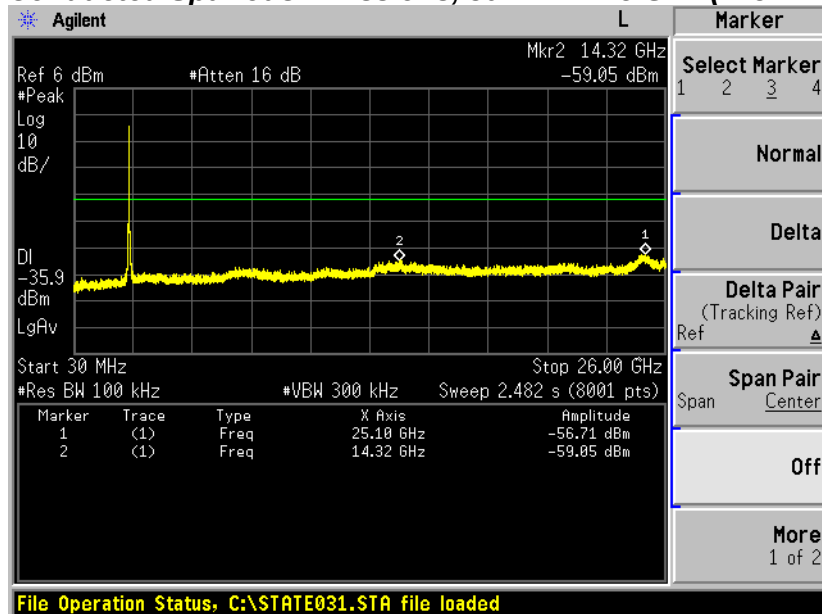


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)

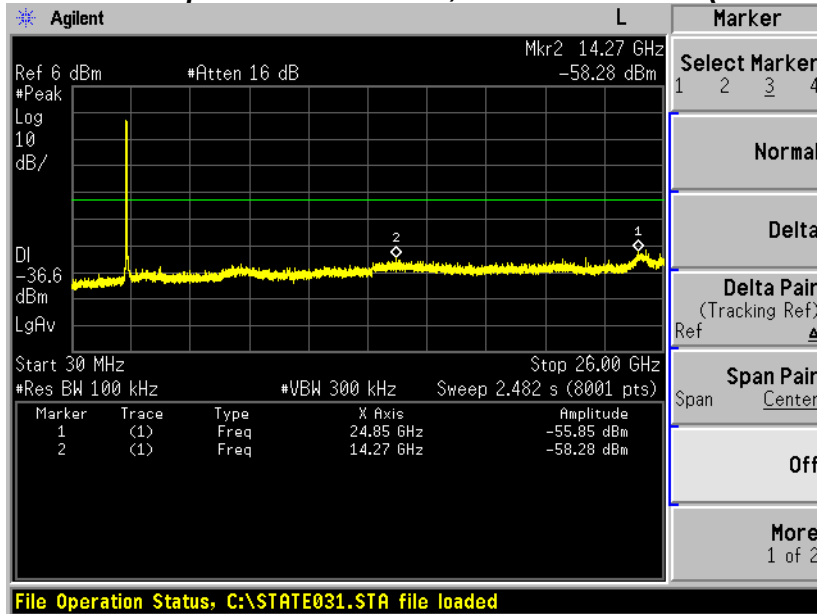


PLOT OF TEST DATA

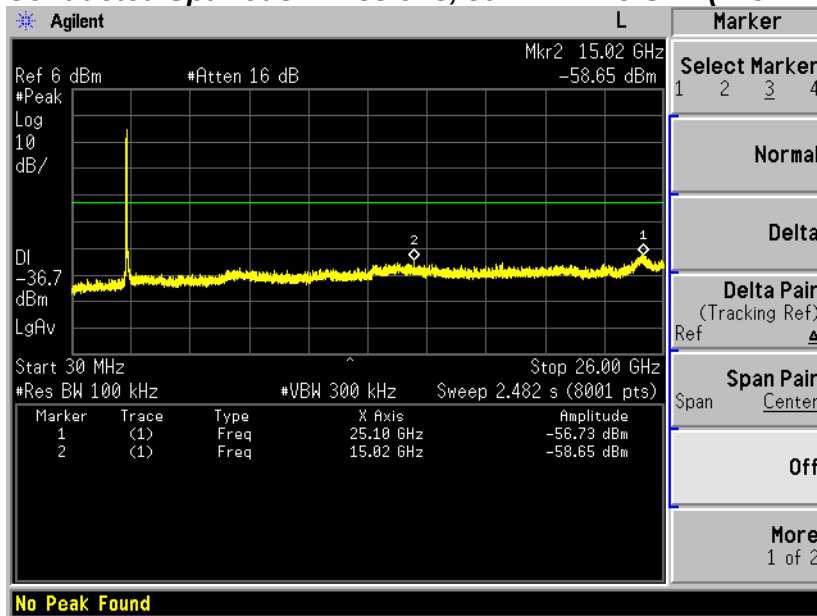
802.11n(40MHz) mode - CDD

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

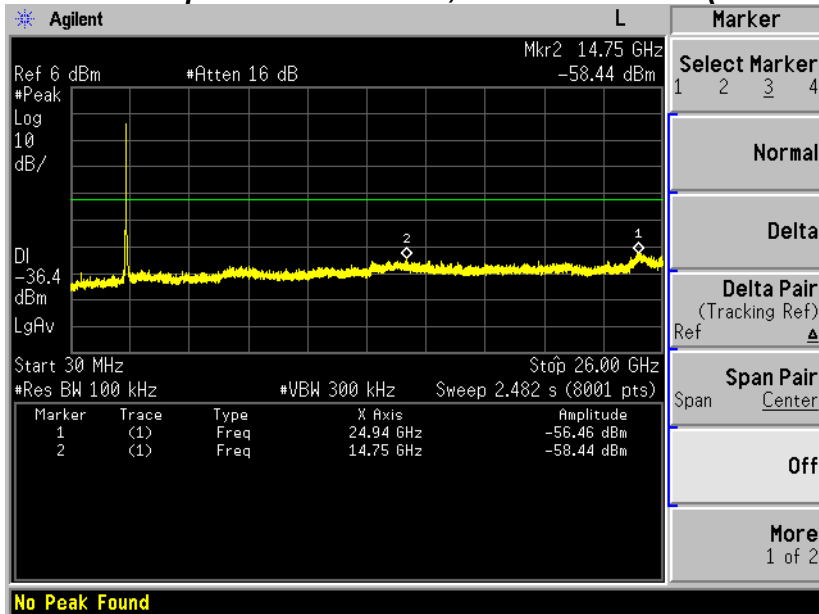


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



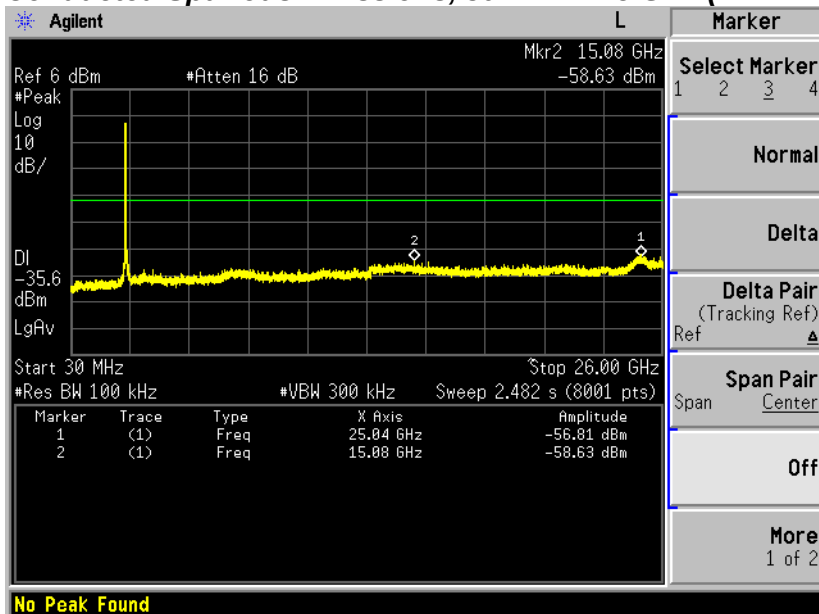
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)



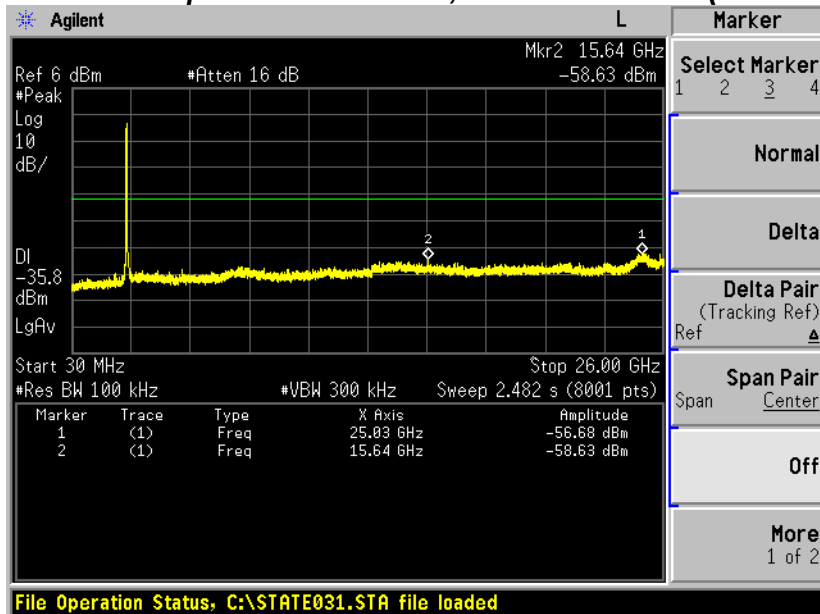
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

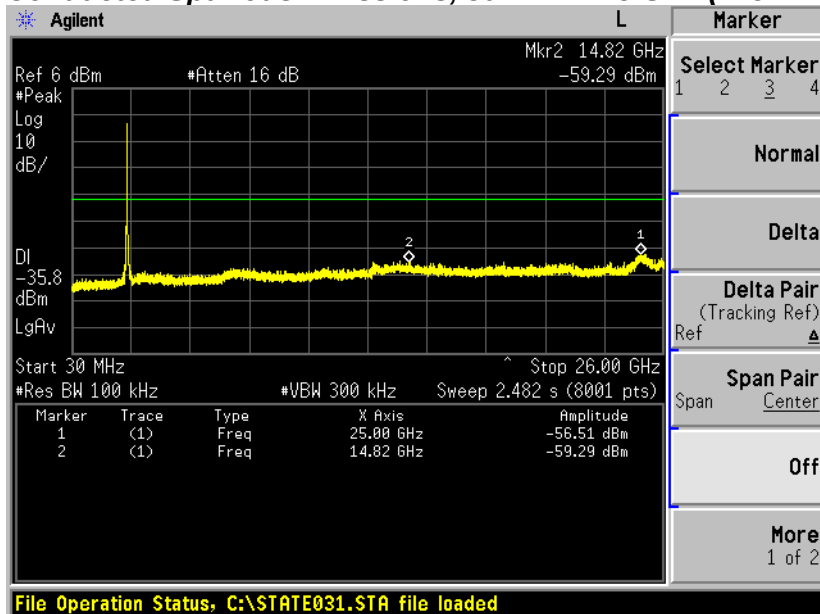


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)

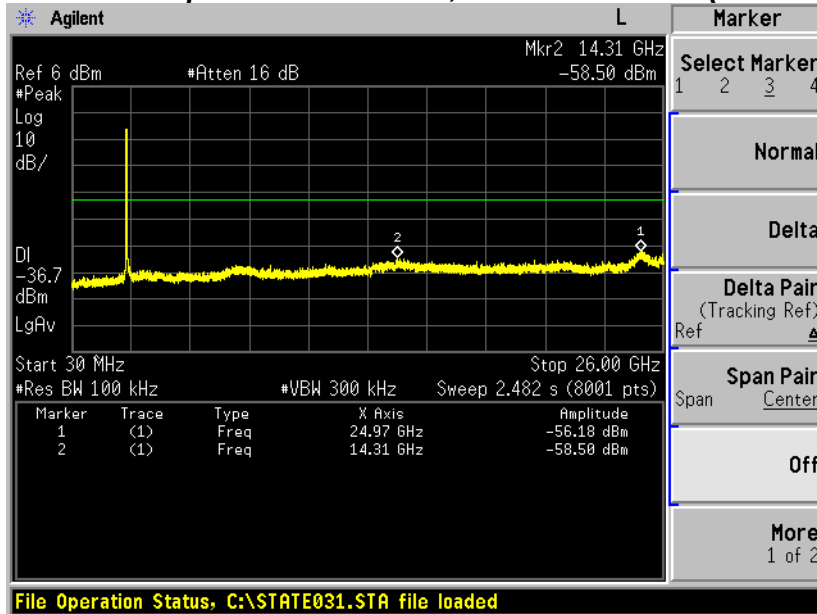


PLOT OF TEST DATA

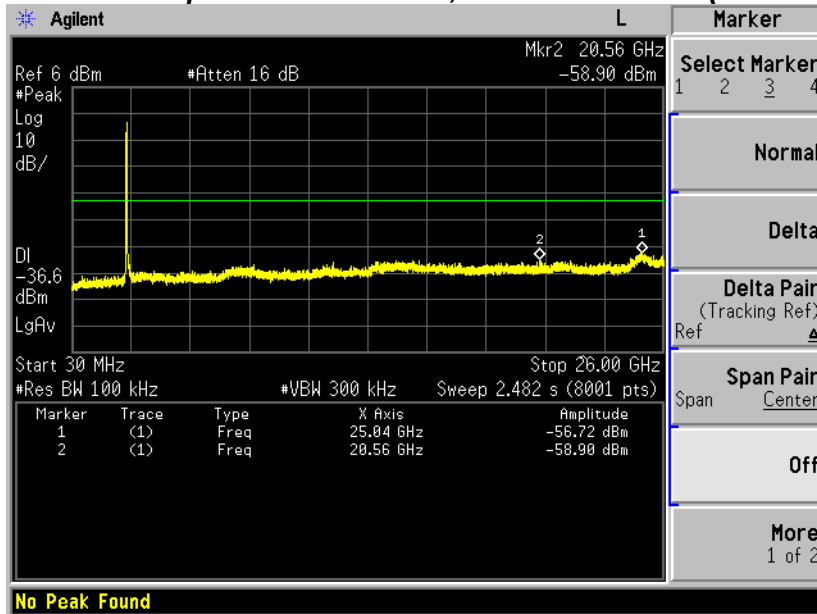
802.11n(40MHz) mode - MIMO

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

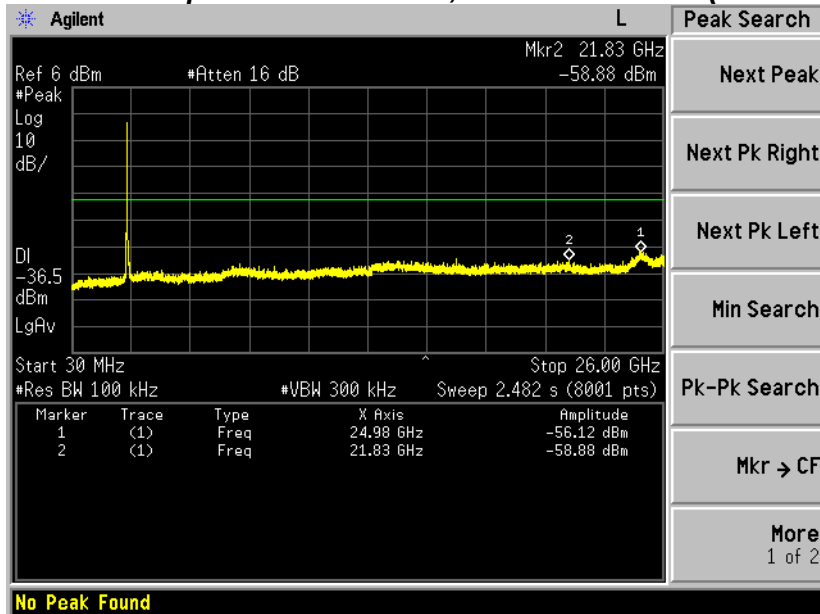


Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



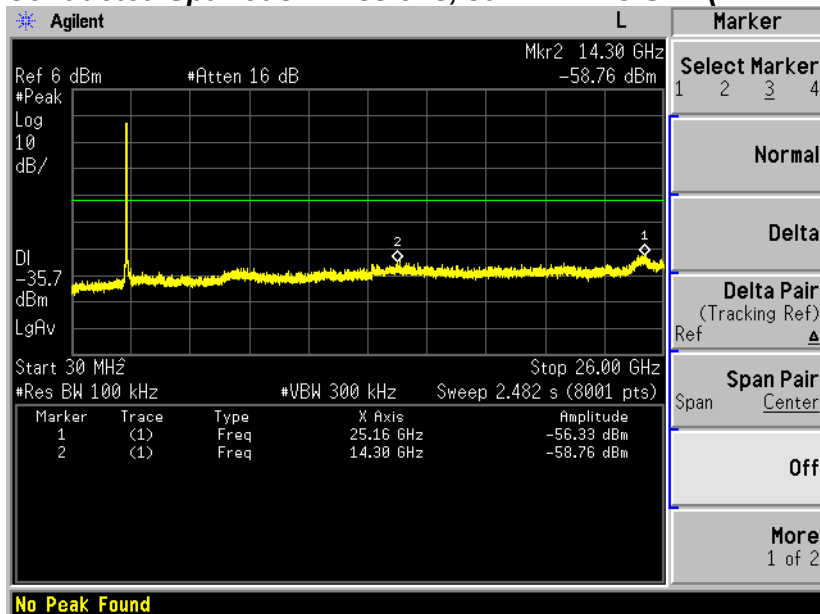
PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)



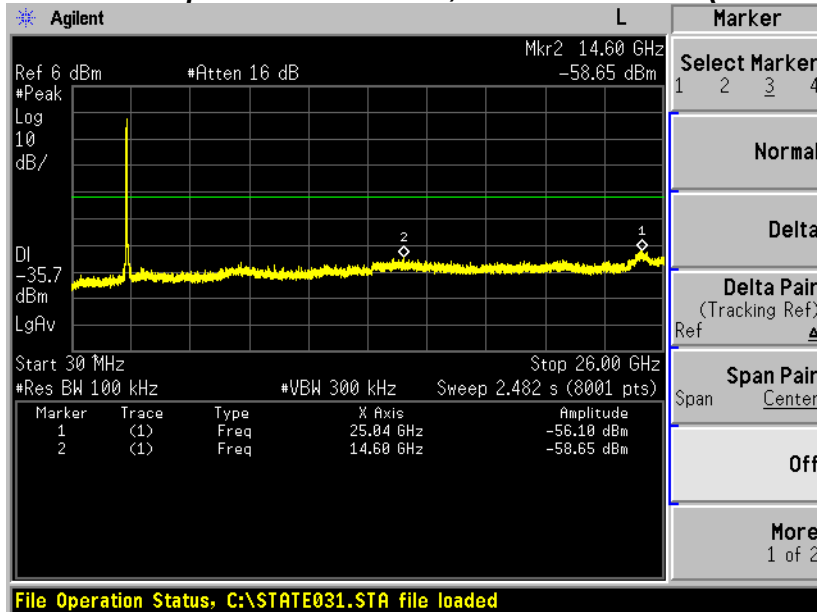
Chain 1

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2422 MHz)

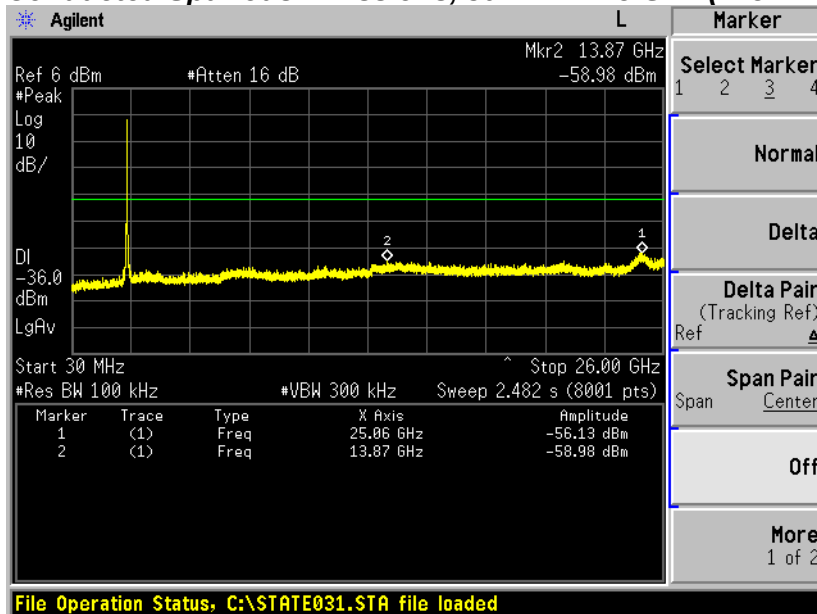


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2437 MHz)



Conducted Spurious Emissions, 30 MHz ~ 25 GHz (2452 MHz)

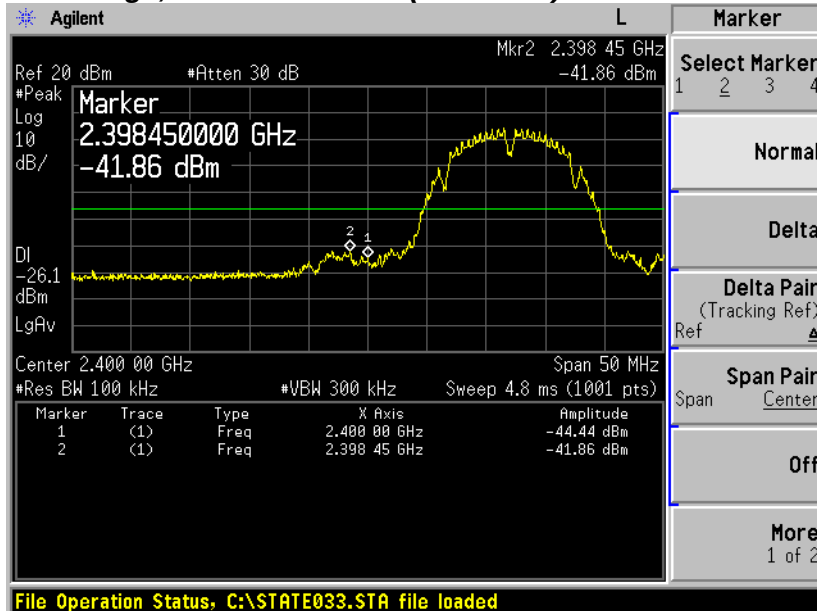


PLOT OF TEST DATA

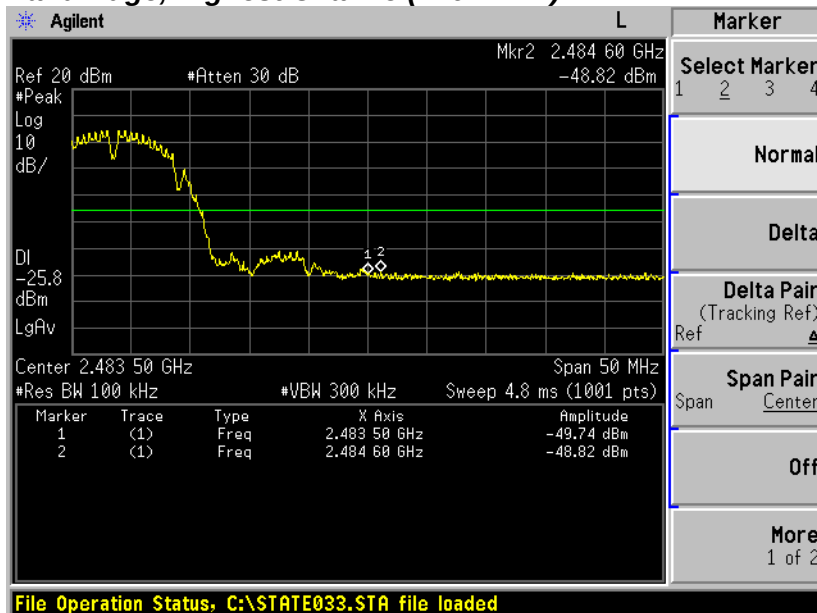
802.11b mode

Chain 0

Band Edge, Lowest Channel (2412 MHz)



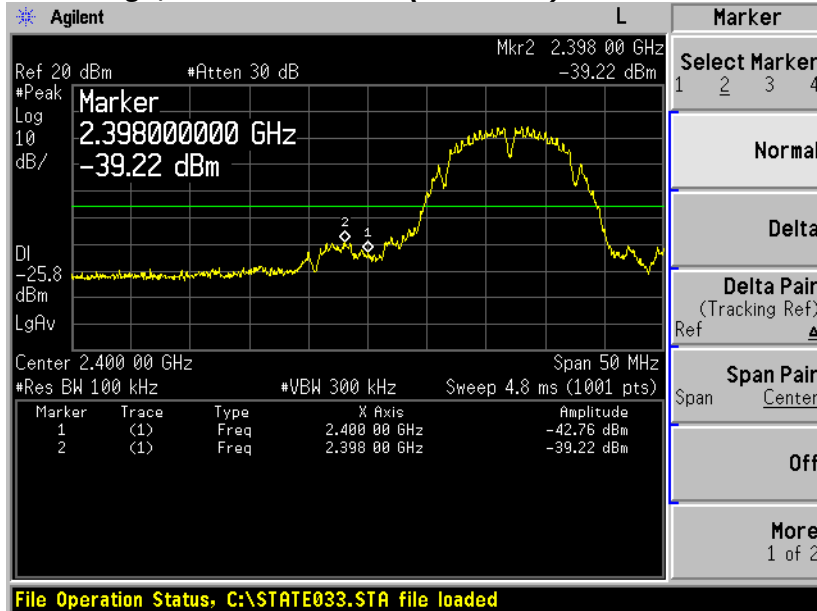
Band Edge, Highest Channel(2462 MHz)



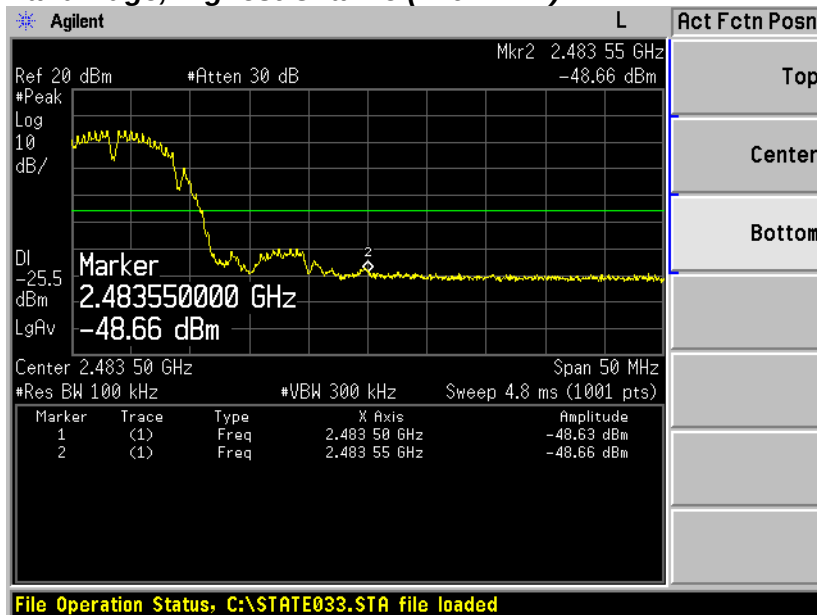
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel(2462 MHz)

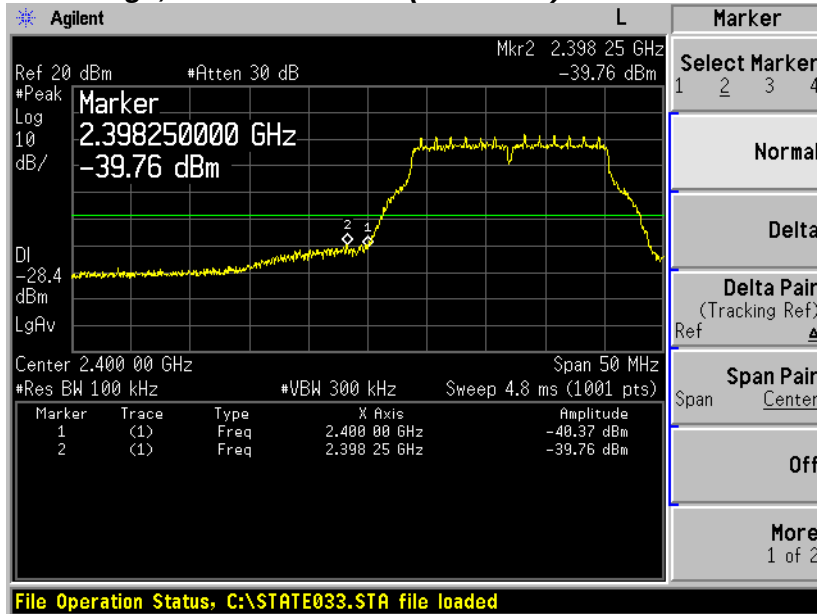


PLOT OF TEST DATA

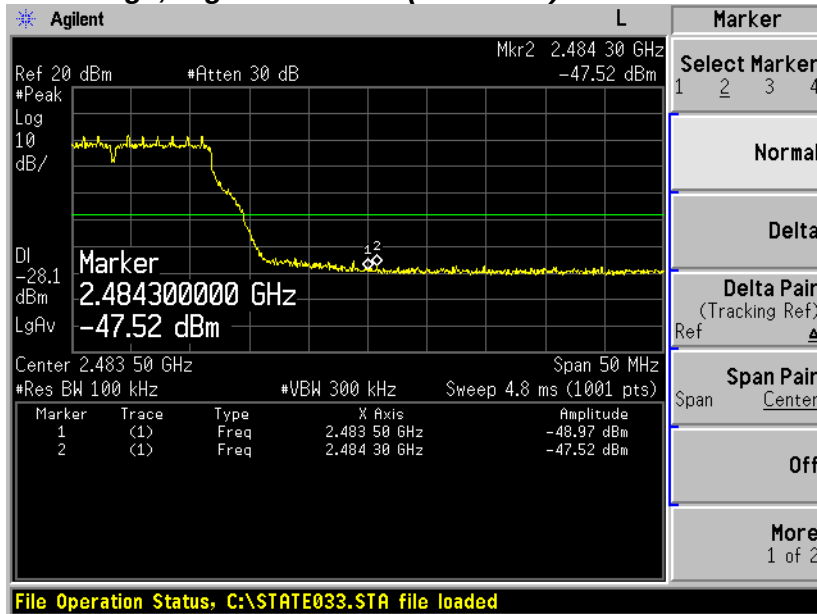
802.11g mode

Chain 0

Band Edge, Lowest Channel (2412 MHz)



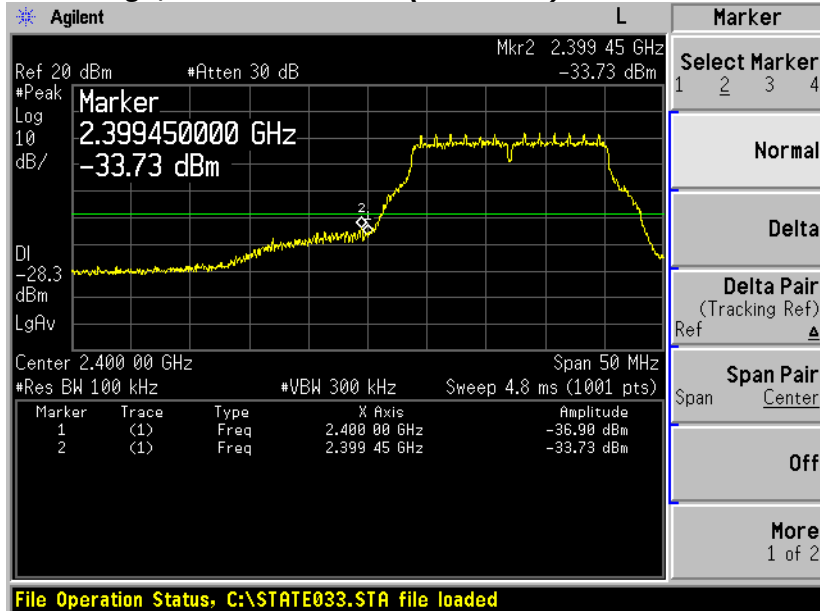
Band Edge, Highest Channel(2462 MHz)



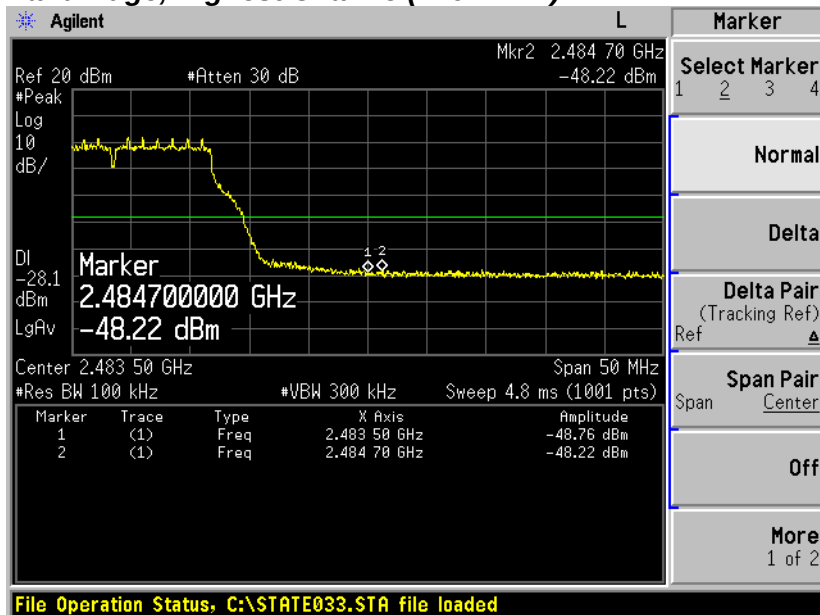
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel(2462 MHz)

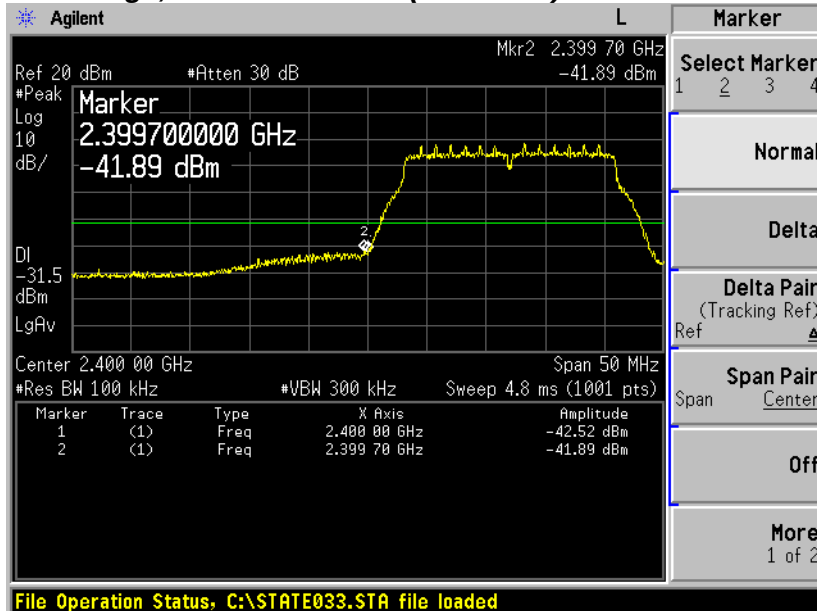


PLOT OF TEST DATA

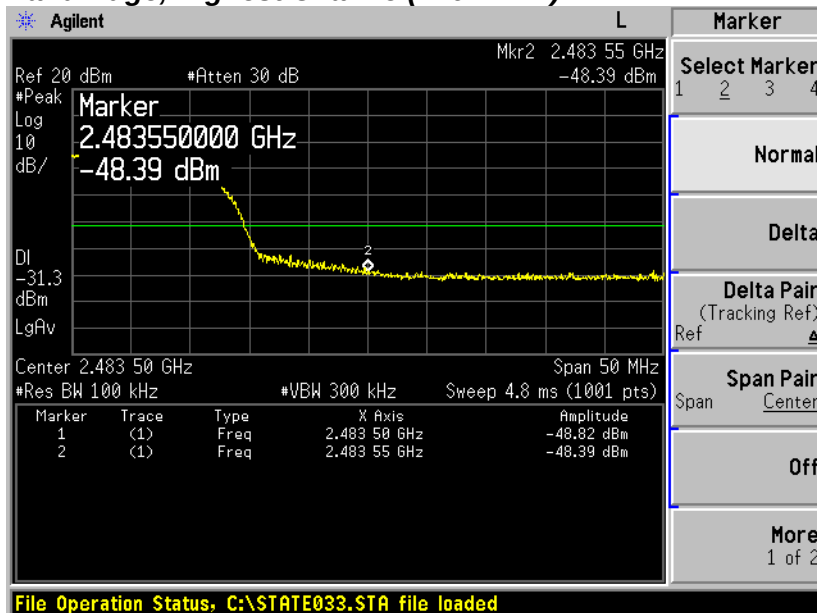
802.11n(20MHz) mode - CDD

Chain 0

Band Edge, Lowest Channel (2412 MHz)



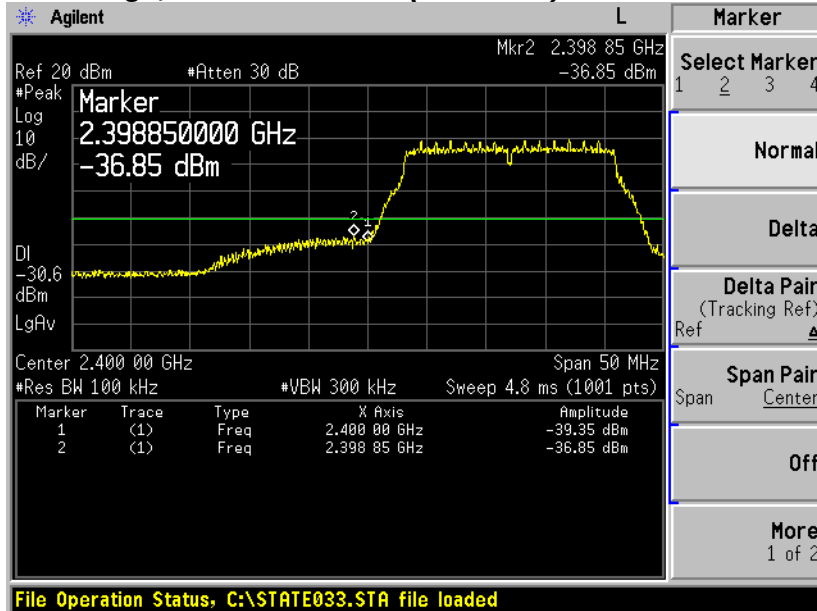
Band Edge, Highest Channel(2462 MHz)



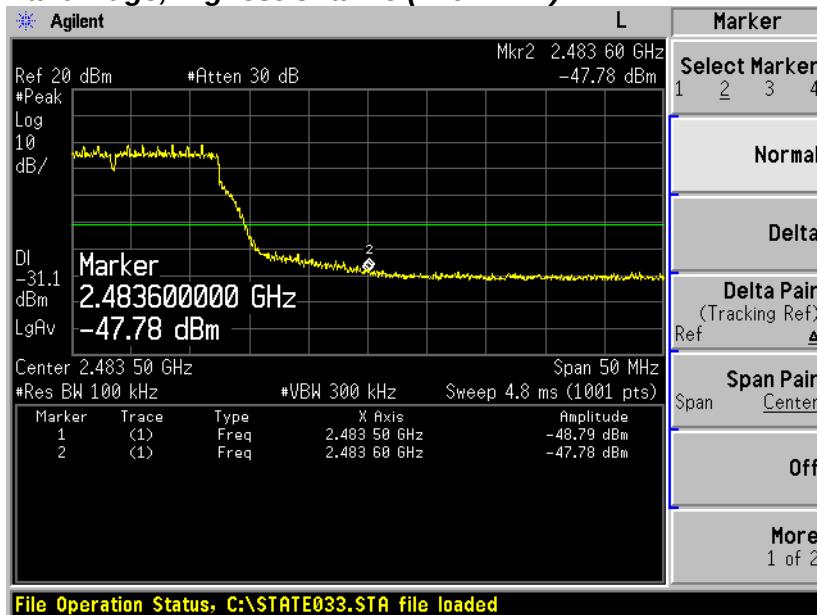
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel(2462 MHz)

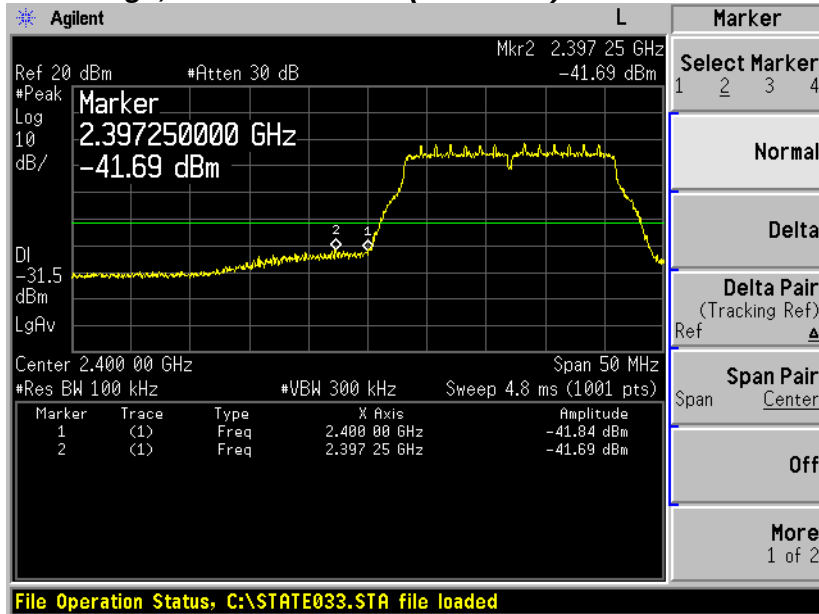


PLOT OF TEST DATA

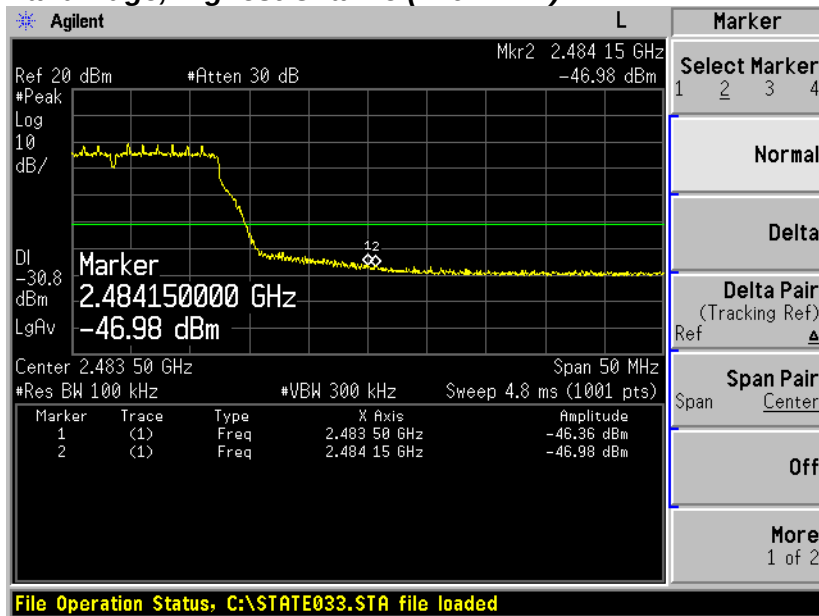
802.11n(20MHz) mode - MIMO

Chain 0

Band Edge, Lowest Channel (2412 MHz)



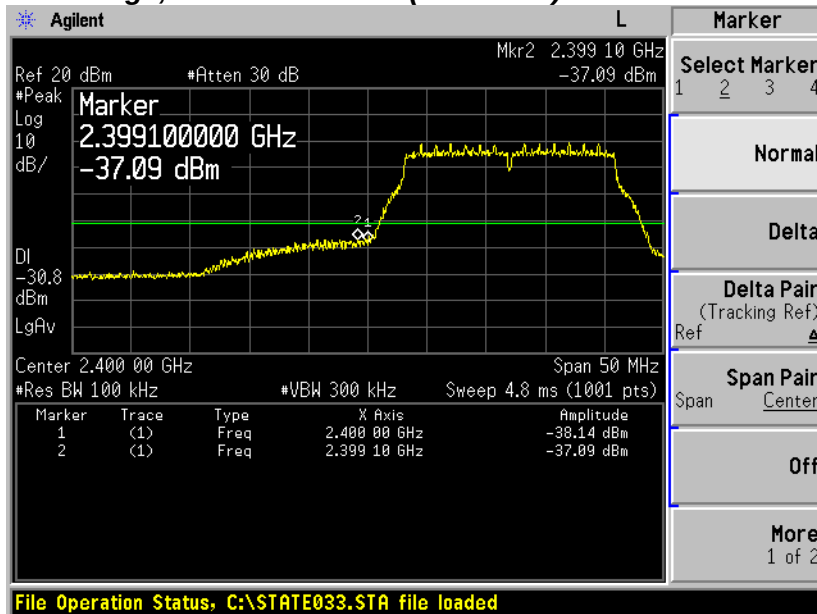
Band Edge, Highest Channel(2462 MHz)



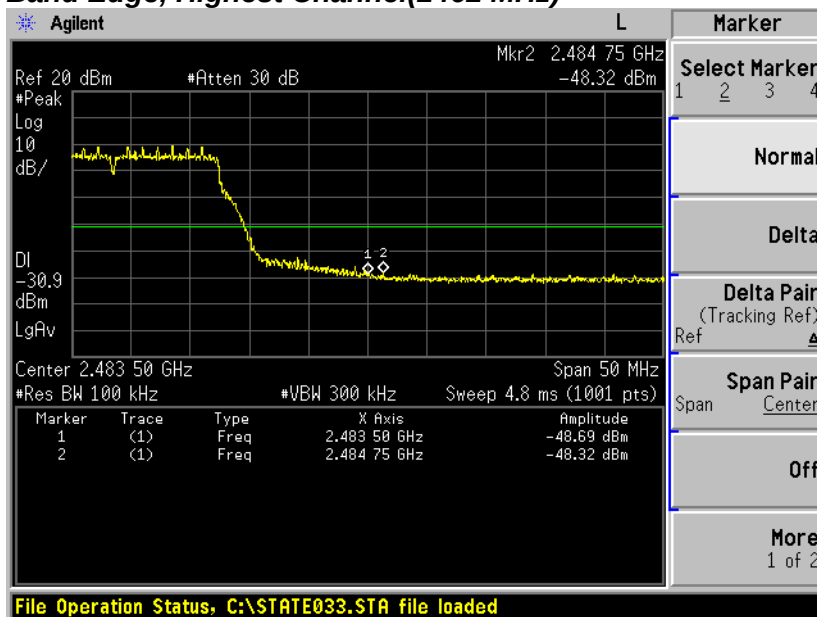
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel(2462 MHz)

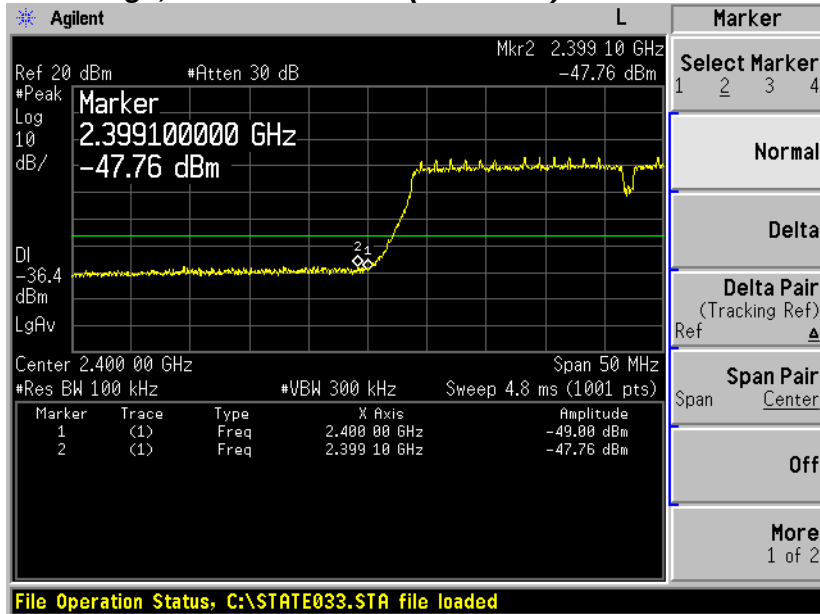


PLOT OF TEST DATA

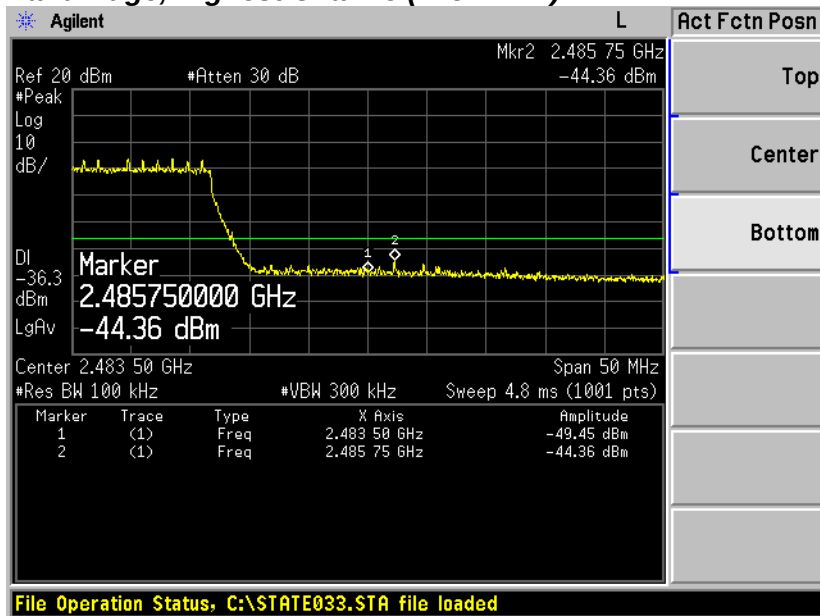
802.11n(40MHz) mode - SISO

Chain 0

Band Edge, Lowest Channel (2422 MHz)



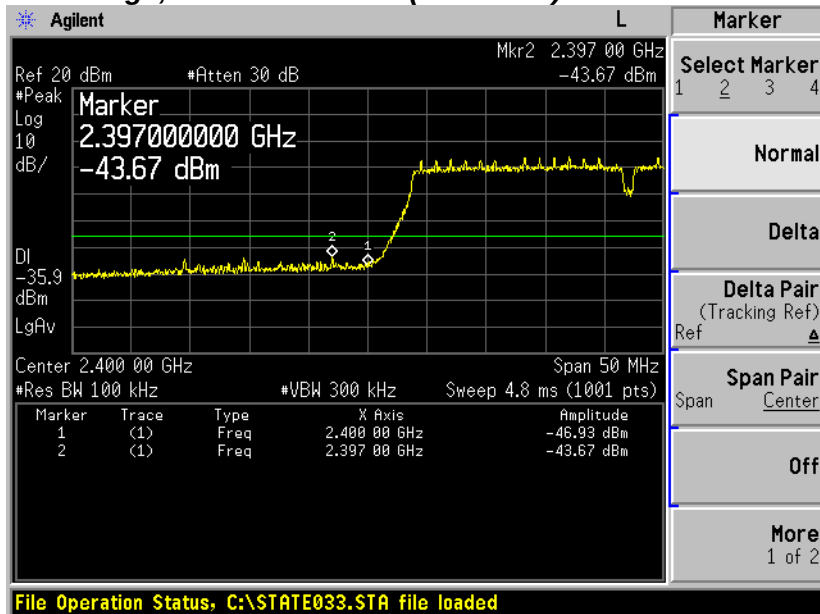
Band Edge, Highest Channel(2452 MHz)



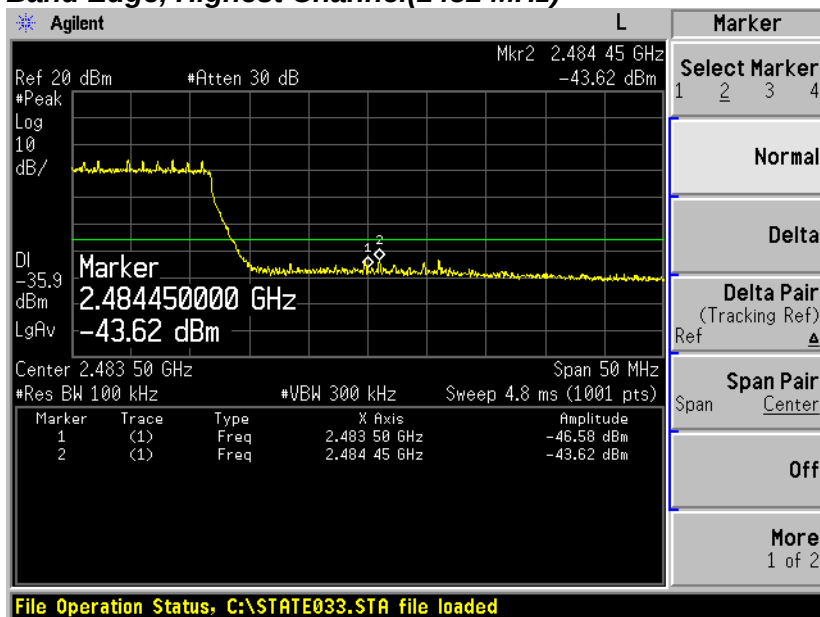
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2422 MHz)



Band Edge, Highest Channel(2452 MHz)

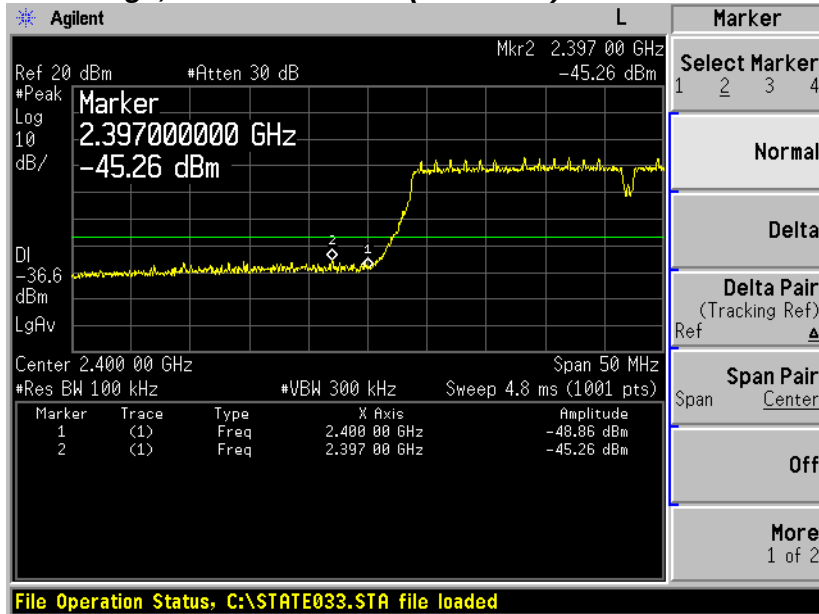


PLOT OF TEST DATA

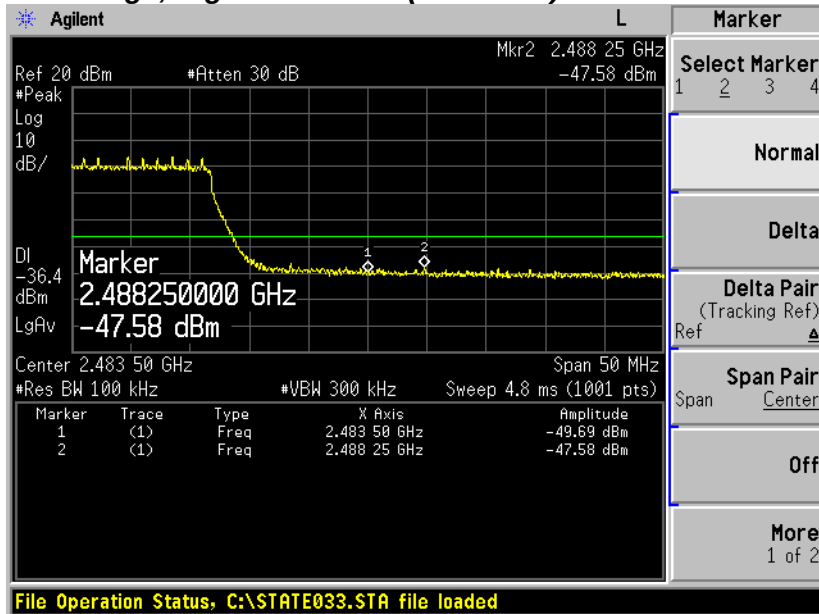
802.11n(40MHz) mode - CDD

Chain 0

Band Edge, Lowest Channel (2422 MHz)



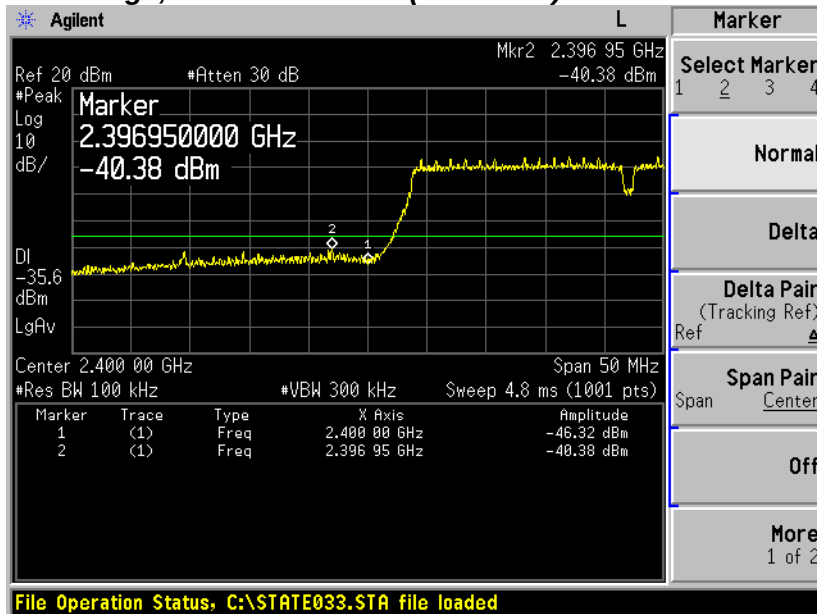
Band Edge, Highest Channel(2452 MHz)



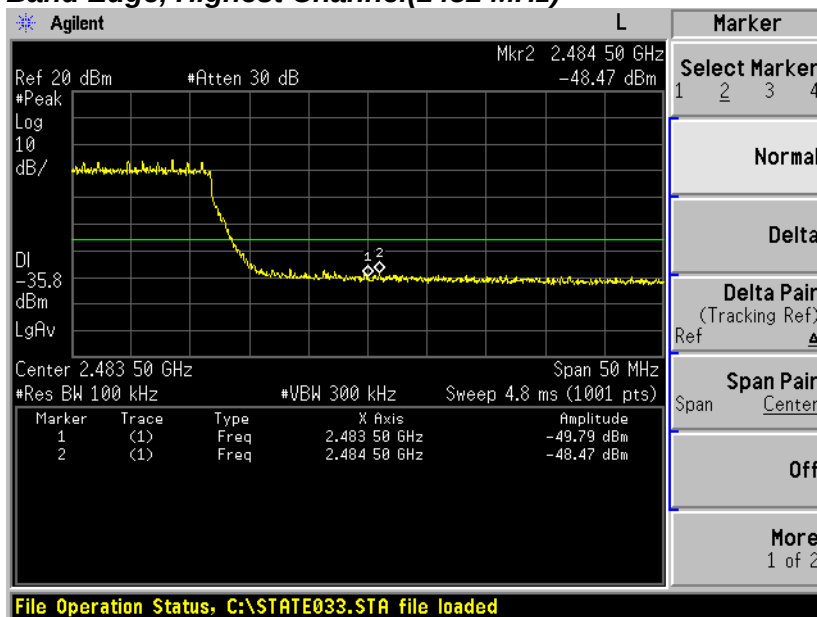
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2422 MHz)



Band Edge, Highest Channel(2452 MHz)

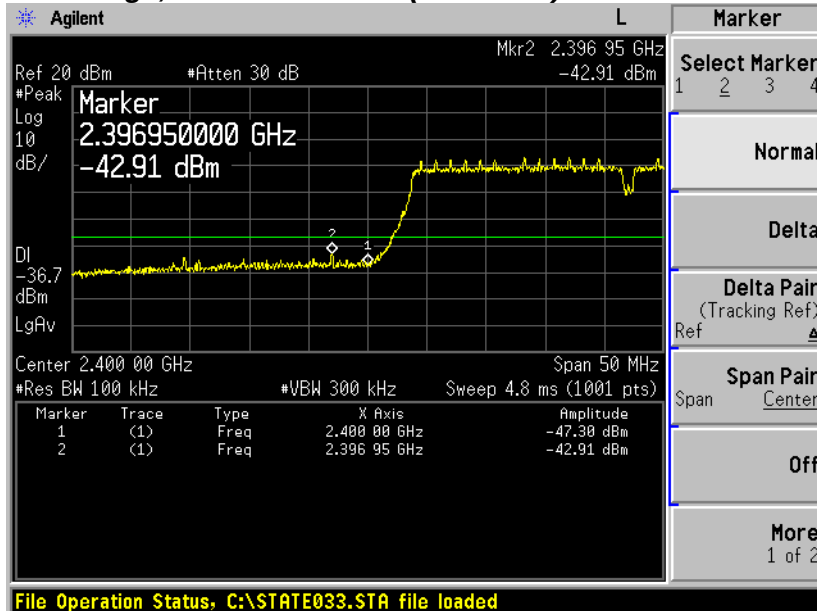


PLOT OF TEST DATA

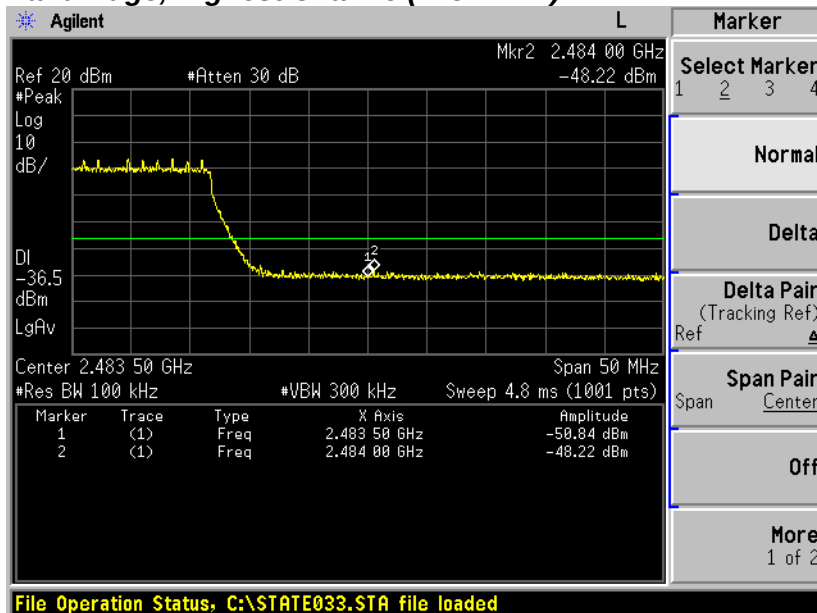
802.11n(40MHz) mode - MIMO

Chain 0

Band Edge, Lowest Channel (2422 MHz)



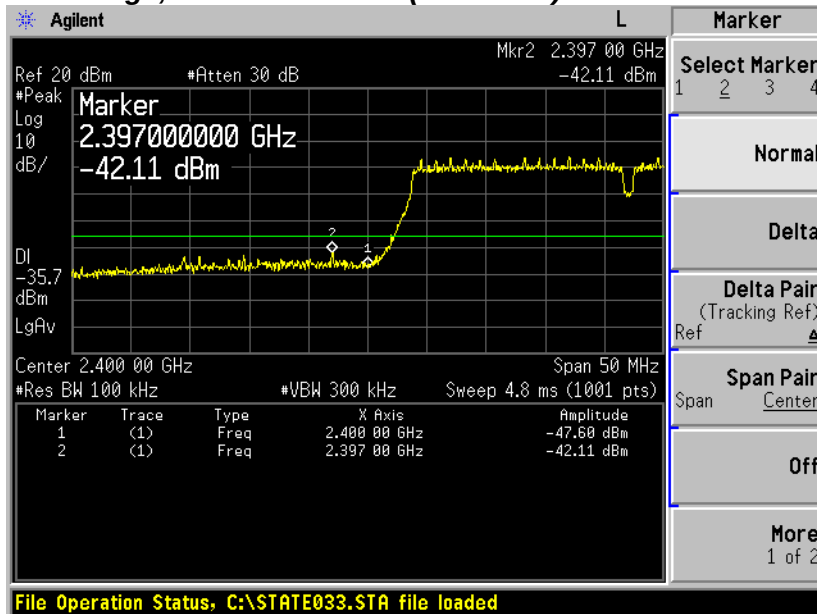
Band Edge, Highest Channel(2452 MHz)



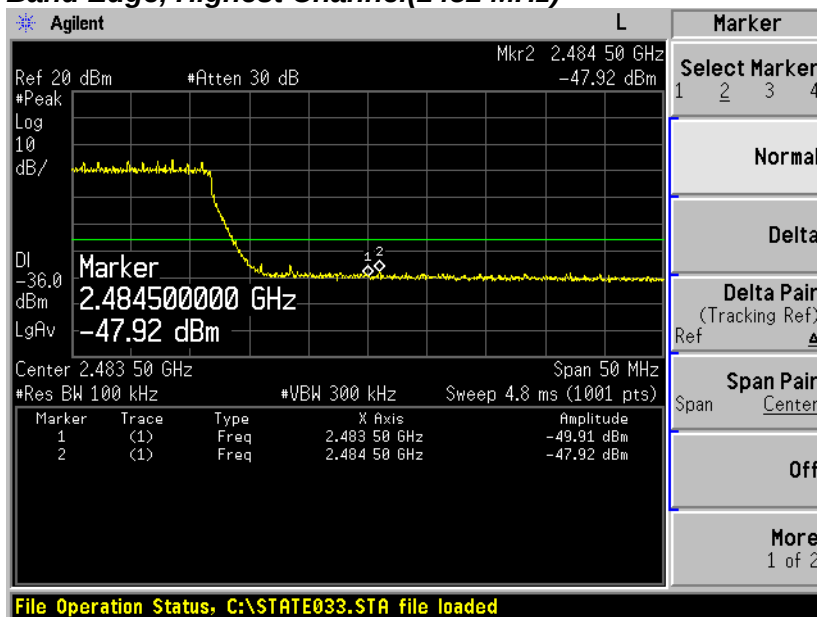
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2422 MHz)



Band Edge, Highest Channel(2452 MHz)



TEST DATA

8.7 Radiated Spurious Emissions

FCC §15.247(d), RSS-247 Issue 1 5.5

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11 b mode

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1701.25	49.3	V	peak	-2.1	N/A	47.2	74.0
1701.25	36.6	V	average	-2.1	N/A	34.5	54.0
2493.50	52.3	V	peak	0.8	N/A	53.1	74.0
2493.50	45.4	V	average	0.8	N/A	46.2	54.0
4823.78	43.6	V	peak	9.5	N/A	53.1	74.0
4823.78	31.7	V	average	9.5	N/A	41.2	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1663.00	56.8	V	peak	-2.2	N/A	54.6	74.0
1663.00	47.7	V	average	-2.2	N/A	45.5	54.0
2896.75	47.9	V	peak	1.9	N/A	49.8	74.0
2896.75	36.2	V	average	1.9	N/A	38.1	54.0
4874.11	41.7	V	peak	9.6	N/A	51.3	74.0
4874.11	32.0	V	average	9.6	N/A	41.6	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1496.50	49.6	H	peak	-2.9	N/A	46.7	74.0
1496.50	38.3	H	average	-2.9	N/A	35.4	54.0
1662.50	51.8	V	peak	-2.2	N/A	49.6	74.0
1662.50	37.7	V	average	-2.2	N/A	35.5	54.0
4924.06	41.7	V	peak	9.8	N/A	51.5	74.0
4924.06	32.7	V	average	9.8	N/A	42.5	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1495.25	50.1	H	peak	-2.9	N/A	47.2	74.0
1495.25	38.7	H	average	-2.9	N/A	35.8	54.0
2490.25	50.4	V	peak	0.4	N/A	50.8	74.0
2490.25	43.3	V	average	0.4	N/A	43.7	54.0
4823.98	42.2	V	peak	9.5	N/A	51.7	74.0
4823.98	34.3	V	average	9.5	N/A	43.8	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1587.25	50.8	H	peak	-2.5	N/A	48.3	74.0
1587.25	36.3	H	average	-2.5	N/A	33.8	54.0
1671.75	50.0	V	peak	-2.2	N/A	47.8	74.0
1671.75	37.4	V	average	-2.2	N/A	35.2	54.0
4874.06	43.7	V	peak	9.6	N/A	53.3	74.0
4874.06	34.3	V	average	9.6	N/A	43.9	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1537.25	49.0	H	peak	-2.7	N/A	46.3	74.0
1537.25	39.5	H	average	-2.7	N/A	36.8	54.0
1664.75	49.8	V	peak	-2.2	N/A	47.6	74.0
1664.75	39.0	V	average	-2.2	N/A	36.8	54.0
4923.84	44.8	V	peak	9.8	N/A	54.6	74.0
4923.84	35.6	V	average	9.8	N/A	45.4	54.0

802.11 g mode

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1662.00	50.3	V	peak	-2.2	N/A	48.1	74.0
1662.00	37.7	V	average	-2.2	N/A	35.5	54.0
3650.63	45.2	V	peak	5.7	N/A	50.9	74.0
3650.63	33.7	V	average	5.7	N/A	39.4	54.0
4811.88	42.7	H	peak	9.4	N/A	52.1	74.0
4811.88	32.4	H	average	9.4	N/A	41.8	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1550.00	51.4	H	peak	-2.7	N/A	48.7	74.0
1550.00	39.1	H	average	-2.7	N/A	36.4	54.0
3845.00	45.0	V	peak	6.2	N/A	51.2	74.0
3845.00	33.2	V	average	6.2	N/A	39.4	54.0
4871.88	42.3	V	peak	9.6	N/A	51.9	74.0
4871.88	32.3	V	average	9.6	N/A	41.9	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1997.50	51.6	V	peak	-1.1	N/A	50.5	74.0
1997.50	41.2	V	average	-1.1	N/A	40.1	54.0
2544.25	50.4	V	peak	0.8	N/A	51.2	74.0
2544.25	40.2	V	average	0.8	N/A	41.0	54.0
4924.38	42.5	V	peak	9.8	N/A	52.3	74.0
4924.38	32.9	V	average	9.8	N/A	42.7	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1498.50	50.3	H	peak	-2.9	N/A	47.4	74.0
1498.50	39.4	H	average	-2.9	N/A	36.5	54.0
2248.75	48.5	V	peak	0.5	N/A	49.0	74.0
2248.75	37.2	V	average	0.5	N/A	37.7	54.0
4823.75	41.4	V	peak	9.5	N/A	50.9	74.0
4823.75	32.9	V	average	9.5	N/A	42.4	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1598.50	51.1	H	peak	-2.5	N/A	48.6	74.0
1598.50	37.0	H	average	-2.5	N/A	34.5	54.0
4122.50	45.3	V	peak	7.0	N/A	52.3	74.0
4122.50	33.3	V	average	7.0	N/A	40.3	54.0
4874.38	41.6	H	peak	9.6	N/A	51.2	74.0
4874.38	32.8	H	average	9.6	N/A	42.4	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1514.50	50.8	H	peak	-2.8	N/A	48.0	74.0
1514.50	38.3	H	average	-2.8	N/A	35.5	54.0
2738.50	48.9	H	peak	1.6	N/A	50.5	74.0
2738.50	36.2	H	average	1.6	N/A	37.8	54.0
4924.38	42.2	V	peak	9.8	N/A	52.0	74.0
4924.38	33.0	V	average	9.8	N/A	42.8	54.0

802.11 n(20MHz) mode - CDD

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1530.25	53.4	V	peak	-2.7	N/A	50.7	74.0
1662.00	40.3	V	average	-2.7	N/A	37.6	54.0
3667.50	45.2	V	peak	5.8	N/A	51.0	74.0
3650.63	34.2	V	average	5.8	N/A	40.0	54.0
4823.75	43.6	H	peak	9.5	N/A	53.1	74.0
4811.88	32.4	H	average	9.5	N/A	41.9	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1662.75	51.9	V	peak	-2.2	N/A	49.7	74.0
1662.75	38.6	V	average	-2.2	N/A	36.4	54.0
3705.63	45.5	V	peak	5.9	N/A	51.4	74.0
3705.63	33.5	V	average	5.9	N/A	39.4	54.0
4874.38	42.5	H	peak	9.6	N/A	52.1	74.0
4874.38	32.6	H	average	9.6	N/A	42.2	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1664.50	54.9	V	peak	-2.2	N/A	52.7	74.0
1664.50	38.4	V	average	-2.2	N/A	36.2	54.0
4288.13	44.6	V	peak	7.8	N/A	52.4	74.0
4288.13	33.1	V	average	7.8	N/A	40.9	54.0
4924.38	41.8	H	peak	9.8	N/A	51.6	74.0
4924.38	32.4	H	average	9.8	N/A	42.2	54.0

802.11 n(20MHz) mode - MIMO

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1560.75	49.8	V	peak	-2.6	N/A	47.2	74.0
1560.75	37.6	V	average	-2.6	N/A	35.0	54.0
4029.38	44.7	V	peak	6.6	N/A	51.3	74.0
4029.38	33.0	V	average	6.6	N/A	39.6	54.0
4823.75	41.5	H	peak	9.5	N/A	51.0	74.0
4823.75	32.3	H	average	9.5	N/A	41.8	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1559.00	49.2	V	peak	-2.6	N/A	46.6	74.0
1559.00	36.7	V	average	-2.6	N/A	34.1	54.0
3695.00	45.2	V	peak	5.8	N/A	51.0	74.0
3695.00	33.5	V	average	5.8	N/A	39.3	54.0
4874.38	42.4	H	peak	9.6	N/A	52.0	74.0
4874.38	32.4	H	average	9.6	N/A	42.0	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1520.25	49.1	V	peak	-2.8	N/A	46.3	74.0
1520.25	36.7	V	average	-2.8	N/A	33.9	54.0
4161.25	44.5	V	peak	7.2	N/A	51.7	74.0
4161.25	33.0	V	average	7.2	N/A	40.2	54.0
4924.38	42.1	H	peak	9.8	N/A	51.9	74.0
4924.38	32.1	H	average	9.8	N/A	41.9	54.0

802.11 n(40MHz) mode - SISO

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1681.00	48.4	V	peak	-2.2	N/A	46.2	74.0
1681.00	38.8	V	average	-2.2	N/A	36.6	54.0
4073.13	44.0	H	peak	6.8	N/A	50.8	74.0
4073.13	32.2	H	average	6.8	N/A	39.0	54.0
4844.38	41.3	V	peak	9.5	N/A	50.8	74.0
4844.38	31.8	V	average	9.5	N/A	41.3	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1669.25	48.5	V	peak	-2.2	N/A	46.3	74.0
1669.25	37.0	V	average	-2.2	N/A	34.8	54.0
4331.88	43.8	H	peak	7.9	N/A	51.7	74.0
4331.88	32.3	H	average	7.9	N/A	40.2	54.0
4874.38	40.6	H	peak	9.6	N/A	50.2	74.0
4874.38	31.6	H	average	9.6	N/A	41.2	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1527.00	48.8	H	peak	-2.8	N/A	46.0	74.0
1527.00	35.7	H	average	-2.8	N/A	32.9	54.0
3783.75	44.0	V	peak	6.1	N/A	50.1	74.0
3783.75	32.3	V	average	6.1	N/A	38.4	54.0
4904.38	41.3	V	peak	9.8	N/A	51.1	74.0
4904.38	31.3	V	average	9.8	N/A	41.1	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1499.00	49.1	V	peak	-2.9	N/A	46.2	74.0
1499.00	37.8	V	average	-2.9	N/A	34.9	54.0
4254.38	44.0	V	peak	7.6	N/A	51.6	74.0
4254.38	31.8	V	average	7.6	N/A	39.4	54.0
4844.38	40.9	H	peak	9.5	N/A	50.4	74.0
4844.38	31.3	H	average	9.5	N/A	40.8	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1546.00	51.3	H	peak	-2.7	N/A	48.6	74.0
1546.00	36.5	H	average	-2.7	N/A	33.8	54.0
3821.25	44.5	H	peak	6.1	N/A	50.6	74.0
3821.25	32.6	H	average	6.1	N/A	38.7	54.0
4873.75	40.3	H	peak	9.6	N/A	49.9	74.0
4873.75	31.4	H	average	9.6	N/A	41.0	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
1671.00	49.5	H	peak	-2.2	N/A	47.3	74.0
1671.00	36.1	H	average	-2.2	N/A	33.9	54.0
3826.25	43.7	V	peak	6.2	N/A	49.9	74.0
3826.25	32.3	V	average	6.2	N/A	38.5	54.0
4904.38	40.7	V	peak	9.8	N/A	50.5	74.0
4904.38	31.6	V	average	9.8	N/A	41.4	54.0

802.11 n(40MHz) mode - CDD

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
2245.75	48.1	V	peak	0.1	N/A	48.2	74.0
2245.75	37.1	V	average	0.1	N/A	37.2	54.0
4846.88	42.6	V	peak	9.5	N/A	52.1	74.0
4846.88	32.7	V	average	9.5	N/A	42.2	54.0
7269.38	42.9	H	peak	16.6	N/A	59.5	74.0
7269.38	32.8	H	average	16.6	N/A	49.4	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1662.75	47.2	V	peak	-2.2	N/A	45.0	74.0
1662.75	35.0	V	average	-2.2	N/A	32.8	54.0
2243.25	45.2	V	peak	0.0	N/A	45.2	74.0
2243.25	33.9	V	average	0.0	N/A	33.9	54.0
3633.75	44.2	H	peak	5.8	N/A	50.0	74.0
3633.75	33.2	H	average	5.8	N/A	39.0	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1497.75	48.4	H	peak	-2.9	N/A	45.5	74.0
1497.75	38.6	H	average	-2.9	N/A	35.7	54.0
1661.75	48.1	V	peak	-2.2	N/A	45.9	74.0
1661.75	38.3	V	average	-2.2	N/A	36.1	54.0
4904.38	41.6	V	peak	9.8	N/A	51.4	74.0
4904.38	32.3	V	average	9.8	N/A	42.1	54.0

802.11 n(40MHz) mode - MIMO

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1495.25	48.9	H	peak	-2.9	N/A	46.0	74.0
1495.25	38.7	H	average	-2.9	N/A	35.8	54.0
1661.25	52.5	V	peak	-2.2	N/A	50.3	74.0
1661.25	28.6	V	average	6.6	N/A	35.2	54.0
4844.38	42.7	V	peak	9.5	N/A	52.2	74.0
4844.38	32.3	V	average	9.5	N/A	41.8	54.0

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1664.50	46.9	V	peak	-2.2	N/A	44.7	74.0
1664.50	35.3	V	average	-2.2	N/A	33.1	54.0
2662.25	45.6	V	peak	0.5	N/A	46.1	74.0
2662.25	34.0	V	average	0.5	N/A	34.5	54.0
3670.00	43.7	H	peak	5.8	N/A	49.5	74.0
3670.00	34.1	H	average	5.8	N/A	39.9	54.0

TEST DATA

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)
1599.25	50.6	H	peak	-2.5	N/A	48.1	74.0
1599.25	38.8	H	average	-2.5	N/A	36.3	54.0
1684.00	50.1	V	peak	-2.2	N/A	47.9	74.0
1684.00	41.1	V	average	-2.2	N/A	38.9	54.0
4903.75	42.3	V	peak	9.8	N/A	52.1	74.0
4903.75	32.3	V	average	9.8	N/A	42.1	54.0

Note(s):

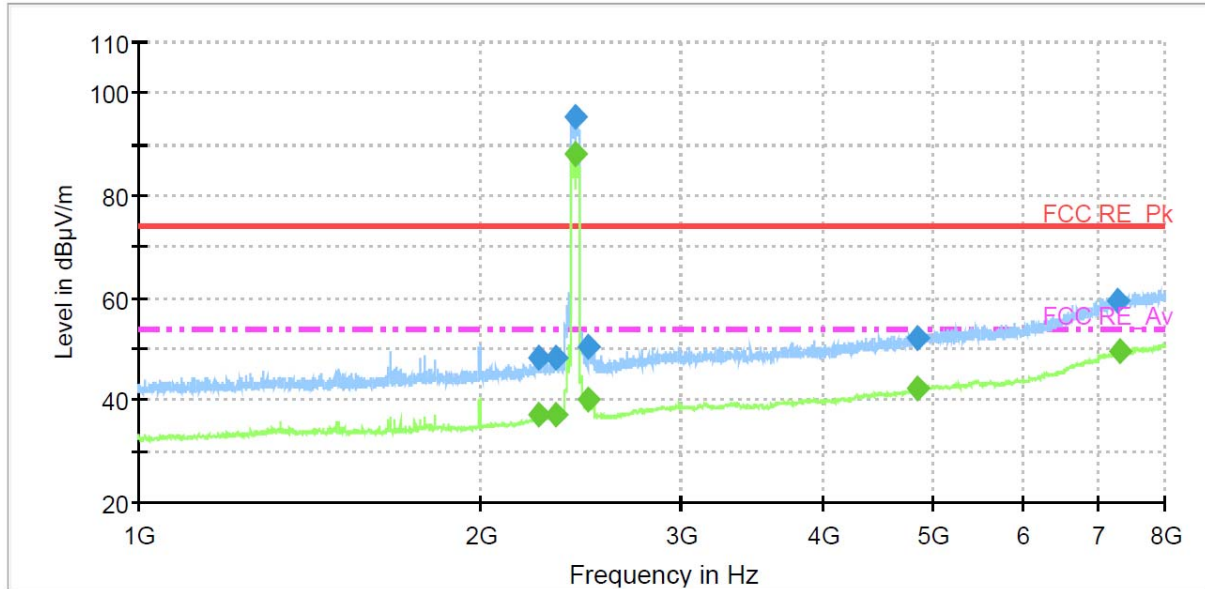
- *Pol. H = Horizontal V = Vertical
- **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
- Duty Factor is not required as specified in clause "12.2.5.3 Average Power Measurement Procedures" at "KDB 558074 D01 DTS Meas Guidance v03r03"
- The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
- Peak emissions were measured using RBW = 1 MHz, VBW = 3MHz, Detector = Peak
- For average measurements, "12.2.5.3 Average Power Measurement Procedures" at "KDB 558074 D01 DTS Meas Guidance v03r03" was used.
Average emissions were measured using RBW = 1 MHz, VBW = 3 kHz, Detector = Peak
- The spectrum was measured from 9 kHz to 10th harmonic and the worst-case emissions were reported. No significant emissions were found beyond the 2nd harmonic for this device.
- n(40MHz) mode CDD was the worst case of b/g/n modes.
- At frequencies above 1 GHz, EUT was placed at a height of 1.5m above the floor on a support according to ANSI 63.10-2013.

PLOTS OF EMISSIONS

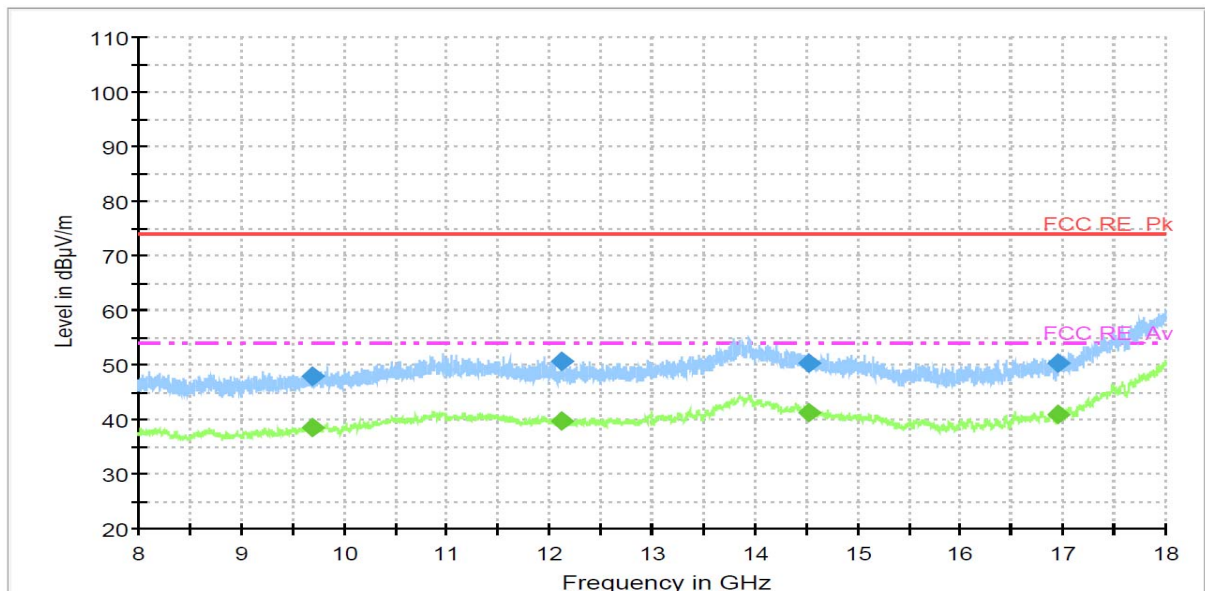
Worst Case

n(40MHz) mode - CDD

Lowest channel : 1 GHz to 8 GHz

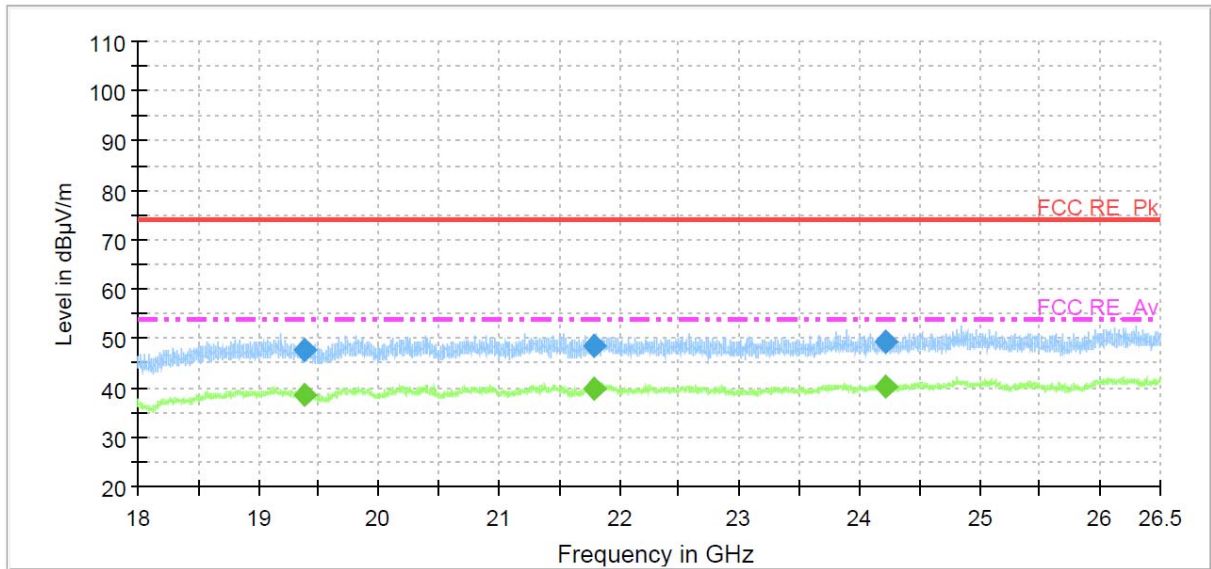


Lowest channel : 8 GHz to 18 GHz



PLOTS OF EMISSIONS

Lowest channel : 18 GHz to 26 GHz



TEST DATA

8.8 Radiated Band Edge

FCC §15.247(d), RSS-247 Issue 1 5.5

Test Mode : Set to Lowest channel and Highest channel

802.11b mode

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBµV/m)	Limit (dBµV/m)
2390.00	46.4	H	peak	0.4	N/A	46.8	74.0
2390.00	37.6	H	average	0.4	N/A	38.0	54.0

Highest Channel

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBµV/m)	Limit (dBµV/m)
2483.50	49.6	H	peak	0.8	N/A	50.4	74.0
2483.50	38.9	H	average	0.8	N/A	39.7	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBµV/m)	Limit (dBµV/m)
2390.00	46.7	H	peak	0.4	N/A	47.1	74.0
2390.00	36.7	H	average	0.4	N/A	37.1	54.0

Highest Channel

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBµV/m)	Limit (dBµV/m)
2483.50	49.7	H	peak	0.8	N/A	50.5	74.0
2483.50	40.3	H	average	0.8	N/A	41.1	54.0

TEST DATA

802.11g mode

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	61.2	H	peak	0.4	N/A	61.6	74.0
2390.00	45.0	H	average	0.4	N/A	45.7	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	40.5	H	peak	0.8	N/A	41.3	74.0
2483.50	54.2	H	average	0.8	N/A	55.3	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	58.2	H	peak	0.4	N/A	58.6	74.0
2390.00	42.9	H	average	0.4	N/A	43.6	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	52.2	H	peak	0.8	N/A	53.0	74.0
2483.50	39.8	H	average	0.8	N/A	40.9	54.0

TEST DATA

802.11n(20MHz) mode - CDD

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	60.6	H	peak	0.4	N/A	61.0	74.0
2390.00	45.8	H	average	0.4	N/A	46.5	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	55.3	H	peak	0.8	N/A	56.1	74.0
2483.50	42.5	H	average	0.8	N/A	43.6	54.0

802.11n(20MHz) mode - MIMO

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	62.6	H	peak	0.4	N/A	63.0	74.0
2390.00	47.7	H	average	0.4	N/A	48.4	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	54.5	H	peak	0.8	N/A	55.3	74.0
2483.50	40.2	H	average	0.8	N/A	41.3	54.0

TEST DATA

802.11n(40MHz) mode - SISO

Chain 0

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	53.1	H	peak	0.4	N/A	53.5	74.0
2390.00	42.1	H	average	0.4	N/A	42.8	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	45.4	H	peak	0.8	N/A	46.2	74.0
2483.50	34.7	H	average	0.8	N/A	35.8	54.0

Chain 1

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	53.0	H	peak	0.4	N/A	53.4	74.0
2390.00	38.9	H	average	0.4	N/A	39.6	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	46.8	H	peak	0.8	N/A	47.6	74.0
2483.50	35.9	H	average	0.8	N/A	37.0	54.0

TEST DATA

802.11n(40MHz) mode - CDD

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	60.6	H	peak	0.4	N/A	61.0	74.0
2390.00	45.8	H	average	0.4	N/A	46.5	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	55.3	H	peak	0.8	N/A	56.1	74.0
2483.50	42.5	H	average	0.8	N/A	43.6	54.0

802.11n(40MHz) mode - MIMO

Simultaneous transmission on two antennas (chain 0 and chain 1)

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2390.00	57.5	H	peak	0.4	N/A	57.9	74.0
2390.00	46.8	H	average	0.4	N/A	47.5	54.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Duty Factor (dB)***	Result (dBμV/m)	Limit (dBμV/m)
2483.50	49.2	H	peak	0.8	N/A	50.0	74.0
2483.50	38.2	H	average	0.8	N/A	39.3	54.0

TEST DATA

Note(s):

1. *Pol. H = Horizontal V = Vertical
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. *** Duty Factor is not required as specified in clause "12.2.5.3 Average Power Measurement Procedures" at "KDB 558074 D01 DTS Meas Guidance v03r03"
4. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
5. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak
6. For average measurements, "12.2.5.3 Average Power Measurement Procedures" at "558074 D01 DTS Meas Guidance v03r03" was used.
Average emissions were measured using RBW = 1 MHz, VBW = 3 kHz, Detector = Peak
7. At frequencies above 1 GHz, EUT was placed at a height of 1.5m above the floor on a support according to ANSI 63.10-2013.

9. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESU 40	100202	Apr. 01 2015	1 year
2	*Test Receiver	R & S	ESCS30	100302	Oct. 06 2015	1 year
3	Attenuator	AGILENT	8491B	57773	Oct. 06 2015	1 year
4	*Attenuator	FAIRVIEW	SA3N5W-06	N/A	Apr. 01 2015	1 year
5	*Attenuator	FAIRVIEW	SA3N5W-10	N/A	Apr. 01 2015	1 year
6	*Attenuator	WEINSCHL	56-10	58765	Apr. 02 2015	1 year
7	*Amplifier	R & S	SCU 01	10030	Apr. 01 2015	1 year
8	*Amplifier	R & S	SCU18	10065	Apr. 01 2015	1 year
9	*Amplifier	R & S	SCU26	10011	Jul. 17 2015	1 year
10	*Amplifier	R & S	SCU40	10008	Aug. 10 2015	1 year
11	*Pre Amplifier	HP	8449B	3008A00107	Jan. 09 2015	1 year
12	Spectrum Analyzer	R & S	FSW43	100732	Apr. 07 2015	1 year
13	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Apr. 01 2015	1 year
14	*Spectrum Analyzer	R&S	FSP40	100361	Jul. 16 2015	1 year
15	DC Power Supply	HP	6574A	US36340190	Jul. 17 2015	1 year
16	*Loop Antenna	R & S	HFH2-Z2	100279	Feb. 13 2014	2 year
17	Wideband Power Sensor	R & S	NRP-Z81	100634	Jul. 17 2015	1 year
18	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-474	Sep. 01 2014	2 year
19	*Horn Antenna	Q-par Angus	QSH20S20	8179	Apr. 30 2015	2 year
20	*Horn Antenna	Q-par Angus	QSH22K20	8180	Apr. 30 2015	2 year
21	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9163	9163-454	Nov. 11 2014	2 year
22	*LISN	R & S	ESH3-Z5	833874/006	Oct. 06 2015	1 year
23	*Controller	INNCO	CO2000-G	CO2000/562/23890210/L	N/A	N/A
24	*Turn Table	INNCO	DT3000-3T	N/A	N/A	N/A
25	*Antenna Mast	INNCO	MA4000-EP	N/A	N/A	N/A
26	*Open Switch And Control Unit	R & S	OSP-120	100015	N/A	N/A
27	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
28	*Position Controller	INNCO	CO2000	12480406/L	N/A	N/A
29	*Turn Table	INNCO	DS1200S	N/A	N/A	N/A
30	*Antenna Mast	INNCO	MA4000	N/A	N/A	N/A
31	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
32	Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A
33	*Open Switch And Control Unit	R & S	OSP-120	100081	N/A	N/A

*) Test equipment used during the test

10. ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

1. Conducted Uncertainty Calculation

Source of Uncertainty	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (dB)
		Value (dB)	Probability Distribution				
Receiver reading	RI	± 0.1	normal 1	1.000	0.1	1	0.1
Attenuation AMN-Receiver	LC	± 0.08	normal 2	2.000	0.04	1	0.04
AMN Voltage division factor	LAMN	± 0.8	normal 2	2.000	0.4	1	0.4
Sine wave voltage	dVSW	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	dVPA	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	dVPR	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	dVNF	± 0.00	-	-	0.00	1	0.00
AMN Impedance	dZ	± 1.80	triangular	2.449	0.73	1	0.73
Ⓐ Mismatch	M	+ 0.70	U-Shaped	1.414	0.49	1	0.49
Ⓑ Mismatch	M	- 0.80	U-Shaped	1.414	- 0.56	1	- 0.56
Measurement System Repeatability	RS	0.05	normal 1	1.000	0.05	1	0.05
Remark	Ⓐ: AMN-Receiver Mismatch : + Ⓑ: AMN-Receiver Mismatch : -						
Combined Standard Uncertainty	Normal			± 1.88			
Expanded Uncertainty U	Normal ($k = 2$)			± 3.76			

2. Radiation Uncertainty Calculation

Source of Uncertainty	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	RS	0.34	normal 1	1.00	0.34	1	0.34
Receiver reading	Ri	± 0.02	normal 2	2.00	0.01	1	0.01
Sine wave voltage	dVsw	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	dVpa	± 0.92	normal 2	2.00	0.46	1	0.46
Pulse repetition rate response	dVpr	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity	dVnf	± 0.50	normal 2	2.00	0.25	1	0.25
Antenna Factor Calibration	AF	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Cable Loss	CL	± 1.00	normal 2	2.00	0.50	1	0.50
Antenna Directivity	AD	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Antenna Factor Height Dependence	AH	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Antenna Phase Centre Variation	AP	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation	Ai	± 0.25	rectangular	$\sqrt{3}$	0.14	1	0.14
Site Imperfections	Si	± 4.00	triangular	$\sqrt{6}$	1.63	1	1.63
Measurement Distance Variation	DV	± 0.60	rectangular	$\sqrt{3}$	0.35	1	0.35
Antenna Balance	Dbal	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Cross Polarisation	DCross	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.18
Mismatch	M	+ 0.98 - 1.11	U-Shaped	$\sqrt{2}$	0.74	1	0.74
EUT Volume Diameter	Vd	0.33	normal 1	1.00	0.33	1	0.11
Remark							
Combined Standard Uncertainty	Normal						
Expanded Uncertainty U	Normal ($k = 2$)						