

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Square Inc.

POS Terminal

SPD1-XX

FCC ID: 2AF3K-SPD1

Prepared for : Square Inc.

1455 Market St. Suite 600 San Francisco, California United
States 94103

Prepared By : Audix Technology (Shenzhen) Co., Ltd.

No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

Tel: (0755) 26639496

Report Number : ACS-F18215

Date of Test : Sep.18~29, 2018

Date of Report : Oct.12, 2018

TABLE OF CONTENTS

Description	Page
1. SUMMARY OF STANDARDS AND RESULTS	1-1
1.1. Description of Standards and Results	1-1
2. GENERAL INFORMATION	2-1
2.1. Description of Device (EUT)	2-1
2.2. Tested Supporting System Details	2-3
2.3. Block diagram of connection between the EUT and simulators	2-3
2.4. Test Information	2-3
2.5. Test Facility	2-4
2.6. Measurement Uncertainty (95% confidence levels, k=2)	2-4
3. POWER LINE CONDUCTED EMISSION TEST	3-1
3.1. Test Equipments	3-1
3.2. Block Diagram of Test Setup	3-1
3.3. Power Line Conducted Emission Test Limits	3-1
3.4. Configuration of EUT on Test	3-2
3.5. Operating Condition of EUT	3-2
3.6. Test Procedure	3-2
3.7. Power Line Conducted Emission Test Results	3-2
4. RADIATED EMISSION TEST	4-1
4.1. Test Equipment	4-1
4.2. Block Diagram of Test Setup	4-2
4.3. Radiated Emission Limit	4-3
4.4. EUT Configuration on Test	4-3
4.5. Operating Condition of EUT	4-4
4.6. Test Procedure	4-4
4.7. Radiated Emission Test Results	4-4
5. CONDUCTED SPURIOUS EMISSIONS	5-1
5.1. Test Equipment	5-1
5.2. Limit	5-1
5.3. Test Procedure	5-1
5.4. Test result	5-1
6. BAND EDGE COMPLIANCE TEST	6-1
6.1. Test Equipment	6-1
6.2. Limit	6-1
6.3. Test Procedure	6-1
6.4. Test Results	6-1
7. 6dB Bandwidth Test	7-1
7.1. Test Equipment	7-1
7.2. Limit	7-1
7.3. Test Procedure	7-1
7.4. Test Results	7-1
8. OUTPUT POWER TEST	8-1
8.1. Test Equipment	8-1
8.2. Limit (FCC Part 15C 15.247 b(3))	8-1
8.3. Test Procedure	8-1
8.4. Test Results	8-2
9. POWER SPECTRAL DENSITY TEST	9-1
9.1. Test Equipment	9-1

9.2.	Limit	9-1
9.3.	Test Procedure.....	9-1
9.4.	Test Results	9-1
10.	ANTENNA REQUIREMENT	10-1
10.1.	Standard Applicable	10-1
10.2.	Antenna Connected Construction.....	10-1
11.	DEVIATION TO TEST SPECIFICATIONS	11-1
12.	PHOTOGRAPH OF TEST.....	12-1
12.1.	Photos of Power Line Conducted Emission Test	12-1
12.2.	Photos of Radiated Emission Test.....	12-2
13.	PHOTOS OF EUT.....	13-1

TEST REPORT CERTIFICATION

Applicant : Square Inc.
Manufacturer : Square Inc.
Product : POS Terminal
FCC ID : 2AF3K-SPD1
(A) Model No. : SPD1-XX
(B) Serial No. : N/A
(C) Test Voltage : DC 20V From Adapter Input AC 120V/60Hz

Tested for comply with:
FCC CFR 47 Part 15 Subpart C

Test procedure used:
ANSI C63.10: 2013
KDB 558074 D01v05

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements. The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC and IC requirements. This report contains data that are not covered by the NVLAP accreditation.

This Report is made under FCC Part 2.1075. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Sep.18~29, 2018 Report of date: Oct.12, 2018

Prepared by : Monica Liu Reviewed by : Sunny Lu
Monica Liu / Assistant Sunny Lu / Deputy Manager



Approved & Authorized Signer :

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission	FCC Part 15: 15.207	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.205	PASS
Band Edge Compliance	FCC Part 15: 15.247(d)	PASS
Conducted spurious emissions	FCC Part 15: 15.247(d)	PASS
6dB Bandwidth	FCC Part 15: 15.247(a)(2)	PASS
Peak Output Power	FCC Part 15: 15.247(b)(3)	PASS
Power Spectral Density	FCC Part 15: 15.247(e)	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product	: POS Terminal
Model No.	: SPD1-XX
FCC ID	: 2AF3K-SPD1
Radio	: IEEE802.11 a/b/g/n/ac; Bluetooth V3.0+EDR; Bluetooth V4.2; NFC
Operation Frequency	: IEEE 802.11a: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT20: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT40: 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz IEEE 802.11ac VHT80: 5210MHz, 5290MHz; 5530MHz—5610MHz; 5775MHz IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE802.11nHT20: 2412MHz—2462MHz; 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE802.11nHT40: 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz Bluetooth : 2402-2480MHz NFC: 13.56MHz
Modulation Technology	: IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11a/g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac VHT20, VHT40, VHT80: OFDM(16QAM, 64QAM, 256QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM,QPSK,BPSK) Bluetooth V3.0+EDR: GFSK, $\pi/4$ DQPSK,8-DPSK Bluetooth V4.2:GFSK NFC: ASK

Antenna : PIFA Antenna,
Assembly Gain Bluetooth: 1.99dBi
WIFI 2.4GHz: ANT 0:1.99dBi; ANT 1: 4.06dBi
WIFI 5GHz:
Band 1: ANT 0: 3.07dBi; ANT 1: 5.05dBi
Band 2: ANT 0: 3.07dBi; ANT 1: 5.05dBi
Band 3: ANT 0: 3.38dBi; ANT 1: 6.18dBi
Band 4: ANT 0: 2.96dBi; ANT 1: 6.58dBi

Applicant : Square Inc.
1455 Market St. Suite 600 San Francisco, California United States 94103

Manufacturer : Square Inc.
1455 Market St. Suite 600 San Francisco, California United States 94103

Factory : Fu Tai Hua Industry (ShenZhen) Co., Ltd.
5/F, Building 11, G Area, No. 2, 2nd Donghuan Road, Longhua District,
Shenzhen, Guangdong Province, P.R. China

Rechargeable : Manufacturer: Getac Technology(Kunshan) Co., Ltd. M/N: 2ICR19/66;
Li-ion Battery Output: DC 7.2V, 3135mAh(22.57Wh).

Power Adapter : Manufacturer: Dongguan Fuqiang Electronics Co., Ltd., M/N: SWD4-01;
Input: 100-240V~, 50/60Hz, 1.4A;
Output: 5V dc, 3.0A; 9V dc, 3.0A; 15V dc, 3.0A; 20V dc, 3.0A;
Cable: Unshielded, Detachable, 1.2m

Accessory Hub : Manufacturer: Square, Inc., M/N: SHD3-01;
Cable: Unshielded, Detachable, 1.25m

Power Cable : Unshielded, Detachable, 1.3m

Date of Test : Sep.18~29, 2018

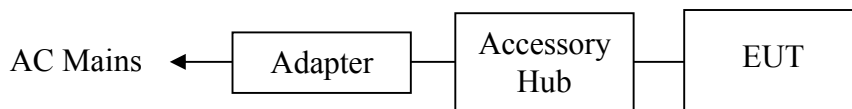
Date of Receipt : Sep.15, 2018

Sample Type : Prototype production

2.2. Tested Supporting System Details

[None]

2.3. Block diagram of connection between the EUT and simulators



(EUT: POS Terminal)

2.4. Test Information

A special test software was used to control EUT work in Continuous TX mode(The duty cycle of the test signal is 100%), and select test channel, wireless mode and data rate.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps)(see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11n HT20	MCS0	Low :CH1	2412
	MCS0	Middle: CH6	2437
	MCS0	High: CH11	2462
Note: 1. According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			
Note: 2. This device support Antenna switched diversity and can not working at the same time, choose Ant 0 which has the maximum power for the radiated emission and band edge compliance test.			

2.5. Test Facility

Site Description

Name of Firm	: Audix Technology (Shenzhen) Co., Ltd. No. 6, Kefeng Road, Science & Technology Park, Nanshan District , Shenzhen, Guangdong, China
EMC Lab.	Certificated by Industry Canada : Registration Number: IC 5183A-1 Valid Date: May.07, 2020 Certificated by DAkkS, Germany : Registration No: D-PL-12151-01-00 Valid Date: Dec.07, 2021 Accredited by NVLAP, USA : NVLAP Code: 200372-0 Valid Date: Mar.31, 2019 Certificated by FCC USA. : Designation No.: CN5022 Valid Date: Mar.31, 2019

2.6.Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 1 Conduction	3.6dB (150kHz to 30MHz)
Uncertainty for Radiation Emission test in 3m chamber	4.0dB(30~200MHz, Polarization: H)
	4.0dB(30~200MHz, Polarization: V)
	4.4dB(200M~1GHz, Polarization: H)
	4.4dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber	5.0dB (1~6GHz, Distance: 3m)
	5.4dB (6~18GHz, Distance: 3m)
	5.4dB (Above 18GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.6dB
Uncertainty for Conduction Spurious emission test	2.0dB
Uncertainty for Output power test	0.8dB
Uncertainty for Bandwidth test	83kHz
Uncertainty for DC power test	0.1 %
Uncertainty for test site temperature and humidity	0.6℃
	3%

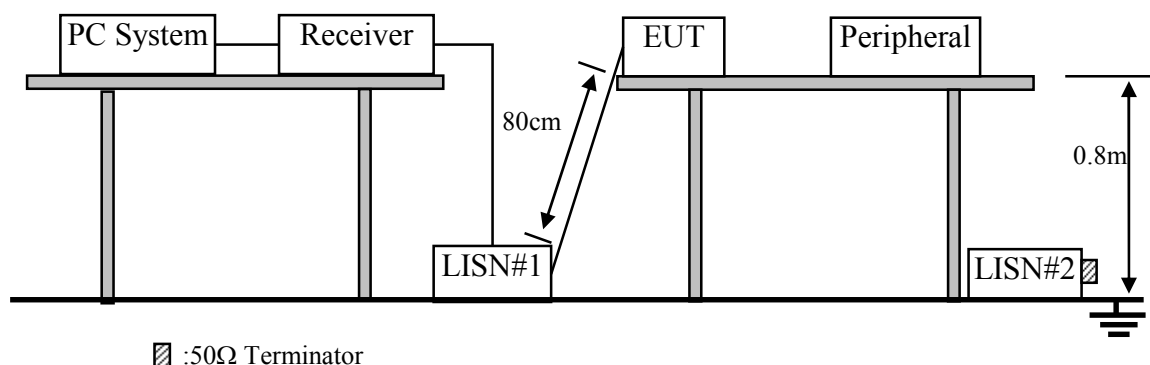
3. POWER LINE CONDUCTED EMISSION TEST

3.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room	AUDIX	N/A	N/A	May.17,18	1 Year
2.	Test Receiver	Rohde & Schwarz	ESCI	100842	Apr.23,18	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Jan.12.18	1 Year
4.	L.I.S.N.#2	Kyoritsu	K NW-403D	8-1750-2	Apr.23,18	1 Year
5.	Terminator	Hubersuhner	50Ω	No.1	Apr.23,18	1 Year
6.	Terminator	Hubersuhner	50Ω	No.2	Apr.23,18	1 Year
7.	RF Cable	Fujikura	RG55/U	No.2	Apr.23.18	1Year
8.	Coaxial Switch	Anritsu	MP59B	6201397223	Apr.23,18	1 Year
9.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

3.2. Block Diagram of Test Setup



3.3. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3.4. Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4.1. POS Terminal (EUT)

Model No. : SPD1-01

Serial No. : N/A

3.4.2. Support Equipment: As Tested Supporting System Details, in Section 2.2.

3.5. Operating Condition of EUT

3.5.1. Setup the EUT and simulator as shown as Section 3.2.

3.5.2. Turn on the power of all equipments.

3.5.3. PC run test software to control EUT work in Tx (WiFi 2.4GHz) mode.

3.6. Test Procedure

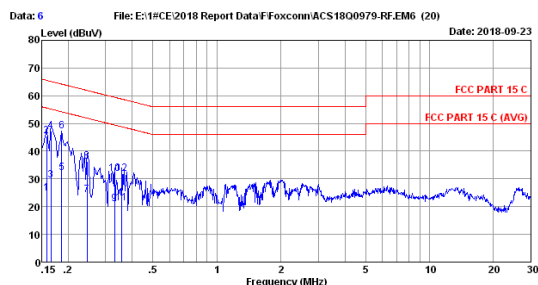
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via PC connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESCI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.7. Power Line Conducted Emission Test Results

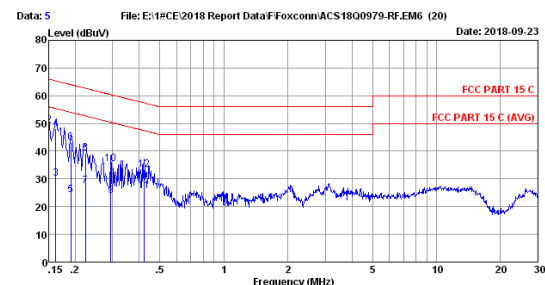
PASS. (All emissions not reported below are too low against the prescribed limits.)



Site no :1# CE Data No :6
 Dis./Lism :2018 LISN ENV216-L
 Limit :FCC PART 15 C
 Env./Ins. :21.0°C/55% Engineer :Apple
 EUT :POS Terminal M/N:SPD1-01
 Power Rating :AC 120V/60Hz
 Test Mode :WIFI 2.4G

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.158	9.56	0.15	15.20	24.91	55.56	30.65	Average
2	0.158	9.56	0.15	35.73	45.44	65.56	20.12	QP
3	0.166	9.53	0.19	19.80	29.52	55.16	25.64	Average
4	0.166	9.53	0.19	37.60	47.32	65.16	17.84	QP
5	0.186	9.53	0.19	22.60	32.32	54.20	21.88	Average
6	0.186	9.53	0.19	37.65	47.37	64.20	16.83	QP
7	0.246	9.35	0.19	14.70	24.24	51.91	27.67	Average
8	0.246	9.35	0.19	26.73	36.27	61.91	25.64	QP
9	0.330	9.20	0.19	11.50	20.89	49.44	28.55	Average
10	0.330	9.20	0.19	22.49	31.88	59.44	27.56	QP
11	0.358	9.35	0.19	11.70	21.24	48.78	27.54	Average
12	0.358	9.35	0.19	22.38	31.92	58.78	26.86	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no :1# CE Data No :5
 Dis./Lism :2018 LISN ENV216-N
 Limit :FCC PART 15 C
 Env./Ins. :21.0°C/55% Engineer :Apple
 EUT :POS Terminal M/N:SPD1-01
 Power Rating :AC 120V/60Hz
 Test Mode :WIFI 2.4G

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.49	0.15	19.70	29.34	56.00	26.66	Average
2	0.150	9.49	0.15	39.70	49.34	66.00	16.66	QP
3	0.162	9.49	0.19	20.30	29.98	55.36	25.38	Average
4	0.162	9.49	0.19	38.50	48.18	65.36	17.18	QP
5	0.190	9.48	0.19	14.60	24.27	54.02	29.75	Average
6	0.190	9.48	0.19	33.43	43.10	64.02	20.92	QP
7	0.223	9.47	0.19	17.90	27.56	52.70	25.14	Average
8	0.223	9.47	0.19	29.53	39.19	62.70	23.51	QP
9	0.294	9.44	0.19	14.40	24.03	50.41	26.38	Average
10	0.294	9.44	0.19	25.69	35.32	60.41	25.09	QP
11	0.422	9.41	0.19	16.00	25.60	47.41	21.81	Average
12	0.422	9.41	0.19	23.90	33.50	57.41	23.91	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION TEST

4.1. Test Equipment

4.1.1. For frequency range 30MHz~1000MHz (In 3m Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber	AUDIX	N/A	N/A	Jun.19,18	1 Year
2.	Signal Analyzer	Rohde & Schwarz	FSV30	104051	Apr.23,18	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.23,18	1 Year
4.	Amplifier	HP	8447D	2648A04738	Apr.23,18	1 Year
5.	Tri-log-Broadband Antenna	Schwarzbeck	VULB 9168	710	Aug.22,18	1 Year
6.	Loop Antenna	Chase	HLA6120	1062	Oct.17,17	1 Year
7.	RF Cable	SPUMA	CFD400NL-LW	No.3	Sep.02,18	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.23,18	1 Year
9.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A

Note: N/A means Not applicable.

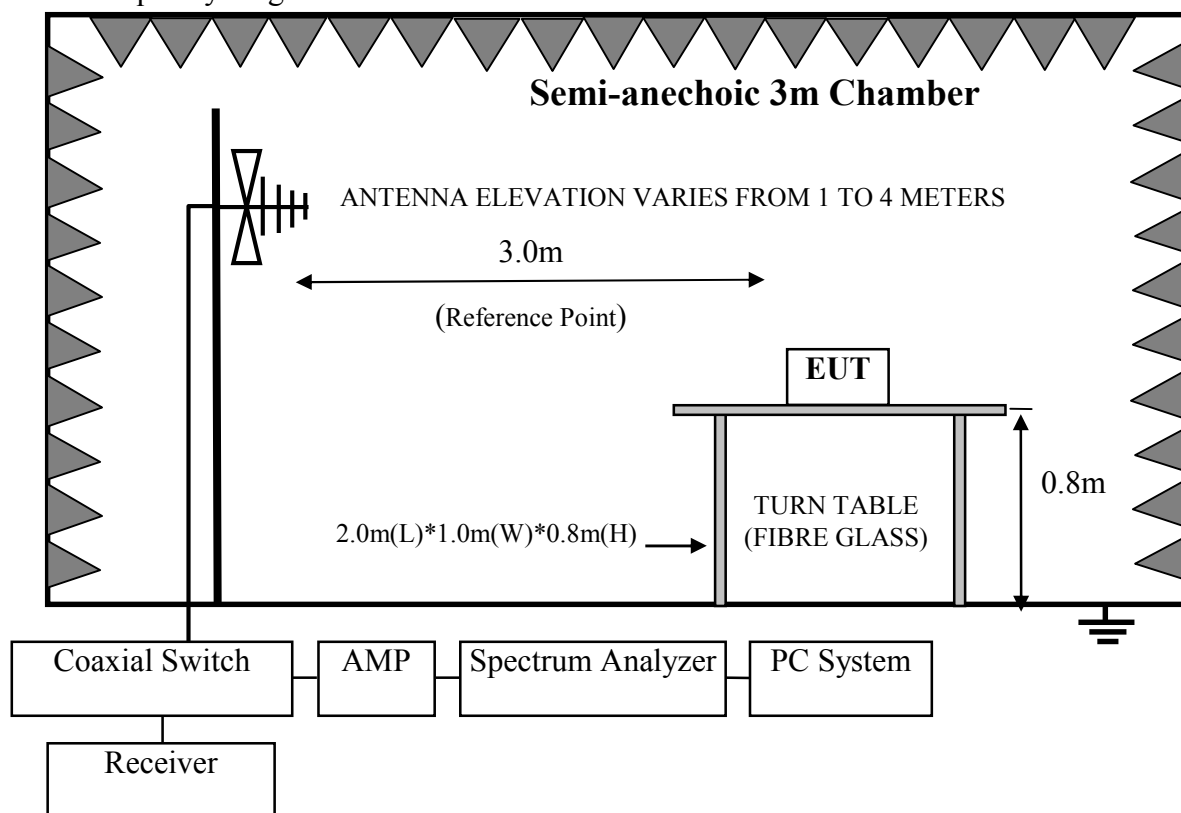
4.1.2. For frequency range 1GHz~40GHz (In 3m Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Chamber	AUDIX	N/A	N/A	May.17,18	1 Year
2.	EMC Analyzer	Agilent	N9030A	MY51380221	Sep.08,18	1 Year
3.	Horn Antenna	ETS	3115	9510-4580	Dec.01,17	1 Year
4.	Amplifier	Agilent	8449B	3008A00863	Apr.23,18	1 Year
5.	Amplifier	EMCI	EMC184040SE	980507	Jul.07,18	1 Year
6.	RF Cable	Hubersuhner	EMC102-KM-KM-3500	170702	Oct.15,17	1 Year
7.	RF Cable	Hubersuhner	N/A	No.5	Oct.15,17	1 Year
8.	Horn Antenna	ETS	3116	00060089	Dec.03,17	1 Year
9.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A

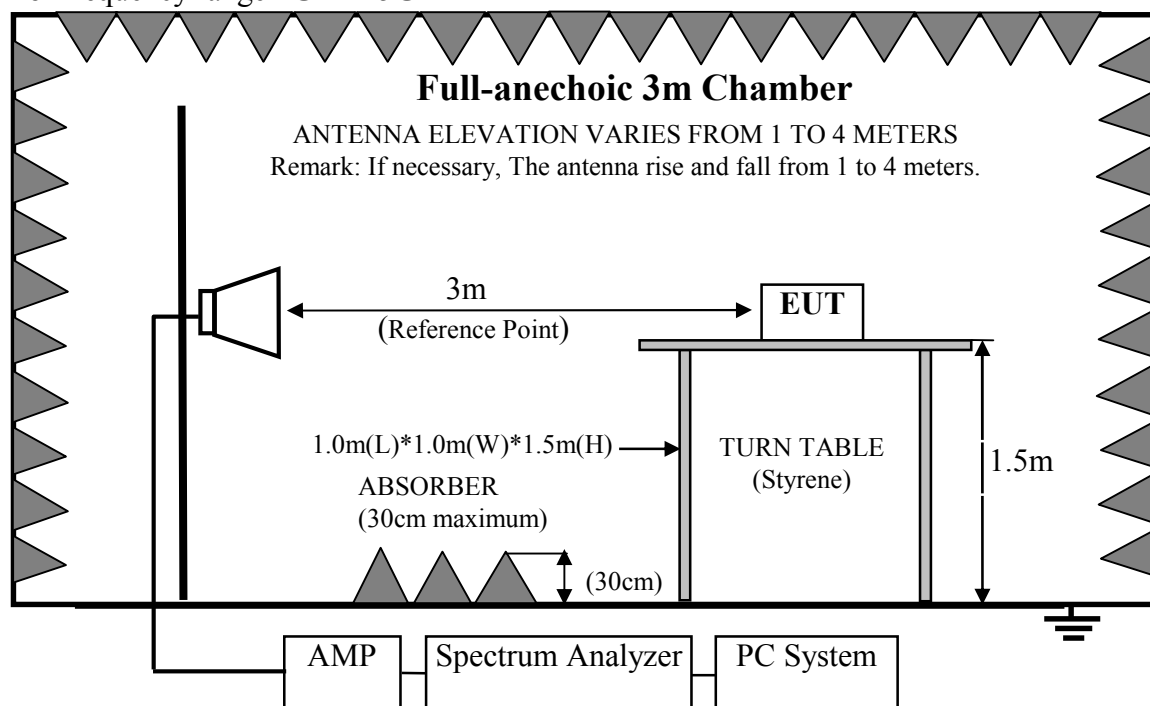
Note: N/A means Not applicable.

4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range 1GHz-25GHz



4.3. Radiated Emission Limit

4.3.1. 15.247&209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark : (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.3.2. 15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.4. EUT Configuration on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

4.4.1. POS Terminal (EUT)

Model No. : SPD1-01

Serial No. : N/A

4.4.2. Support Equipment: As Tested Supporting System Details, in Section 2.2.

4.5. Operating Condition of EUT

- 4.5.1. Setup the EUT and simulator as shown as Section 4.2.
- 4.5.2. Turn on the power of all equipments.
- 4.5.3. Let EUT work in Tx(WiFi 2.4GHz) mode

4.6. Test Procedure

Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horn antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna are set on test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as test photo indicated.

The bandwidth of the EMI test receiver (R&S ESR7) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.7. Radiated Emission Test Results

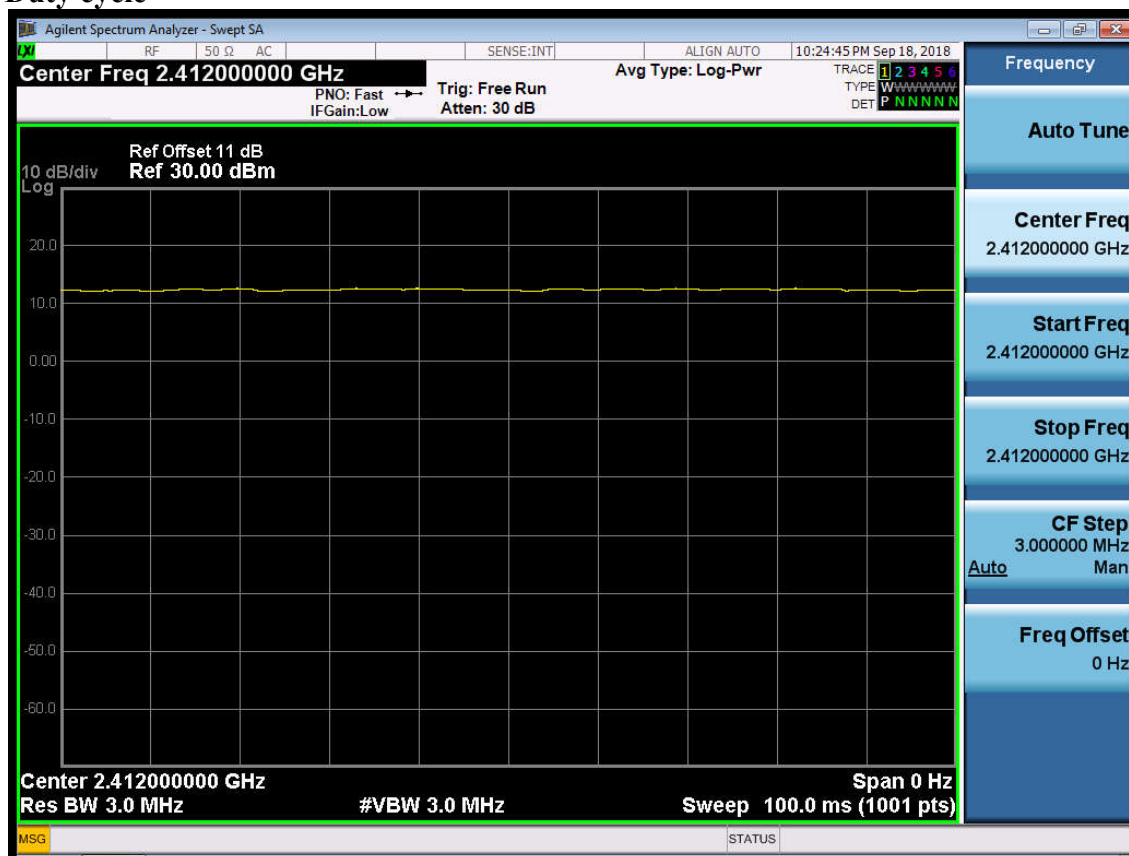
PASS.

All the emissions from 30MHz to 25 GHz were comply with 15.209 limits.

Note 1: For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

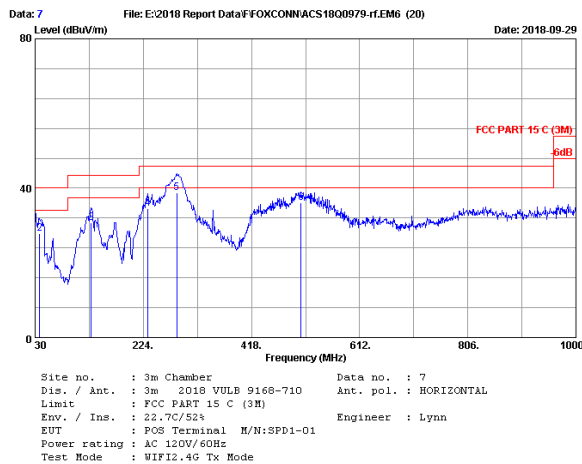
Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

Duty cycle



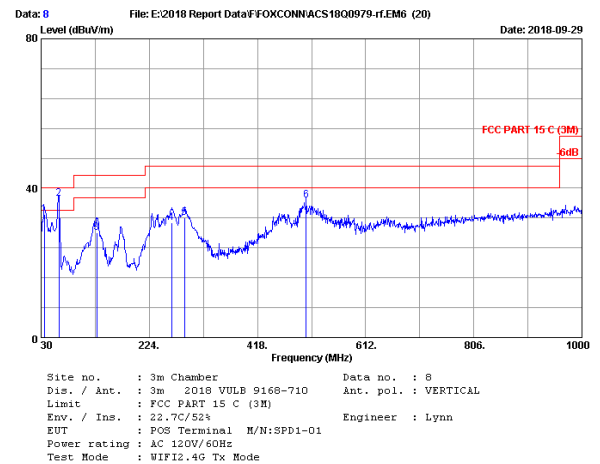
Note: The duty cycle of the test signal is 100%.

Frequency: 30MHz~1GHz



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	19.10	0.58	11.41	31.09	40.00	8.91	QP
2	37.760	19.74	0.65	7.56	27.95	40.00	12.05	QP
3	130.880	18.02	1.26	11.45	30.73	43.50	12.77	QP
4	232.730	17.68	1.93	14.88	34.49	46.00	11.51	QP
5	284.140	19.48	2.34	17.03	38.85	46.00	7.15	QP
6	507.240	24.04	3.41	8.55	36.00	46.00	10.00	QP

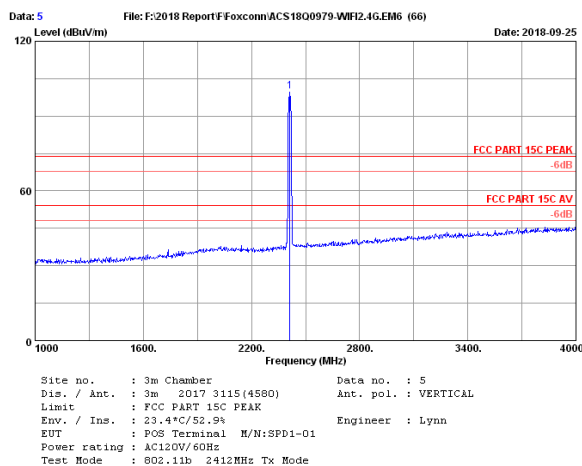
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	35.820	19.58	0.63	12.71	32.92	40.00	7.08	QP
2	62.010	19.42	0.81	16.90	37.13	40.00	2.87	QP
3	129.910	17.90	1.25	8.94	28.09	43.50	15.41	QP
4	263.770	18.43	2.18	10.04	30.65	46.00	15.35	QP
5	287.050	19.54	2.37	10.10	32.01	46.00	13.99	QP
6	505.300	24.00	3.40	9.34	36.74	46.00	9.26	QP

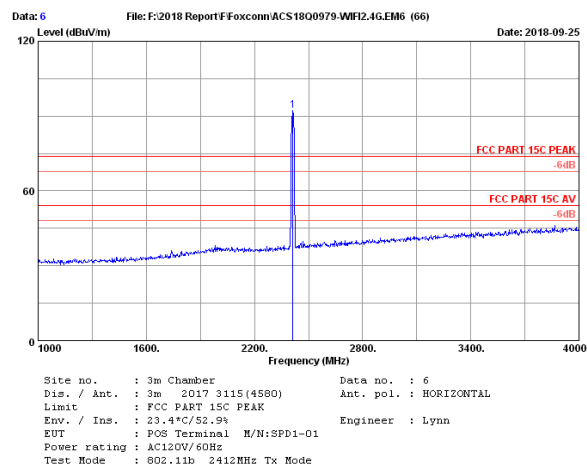
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Frequency: 1GHz~18GHz



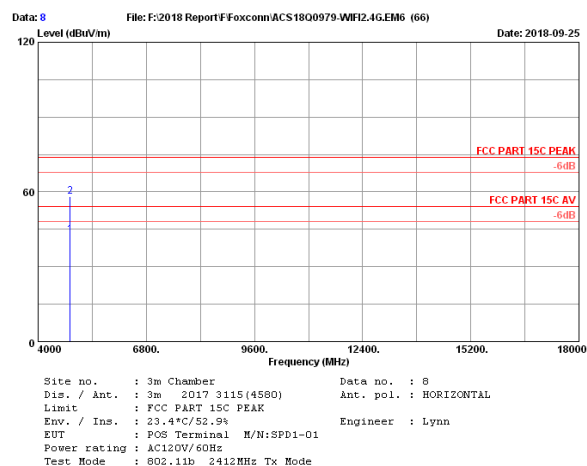
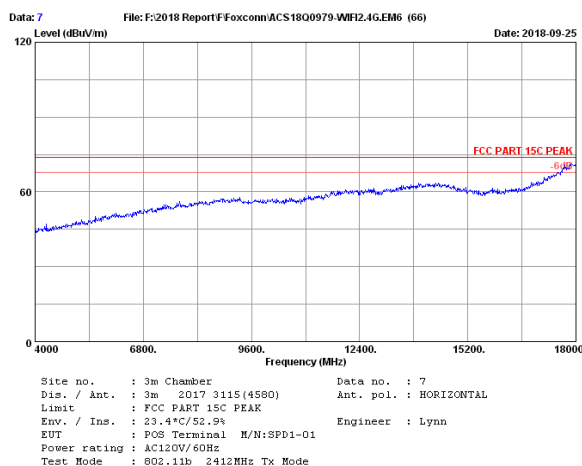
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.87	10.31	94.15	32.53	99.80	74.00	-25.80	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading - Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



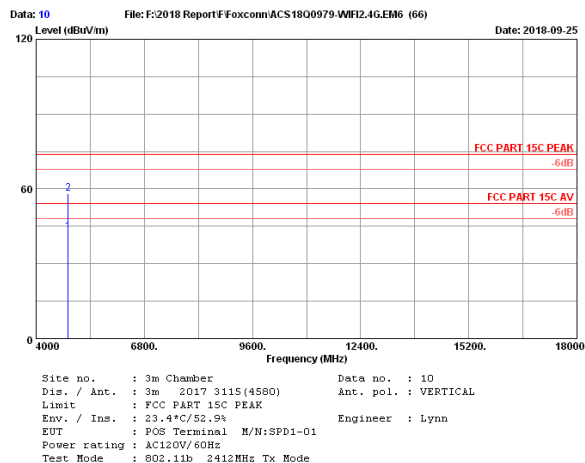
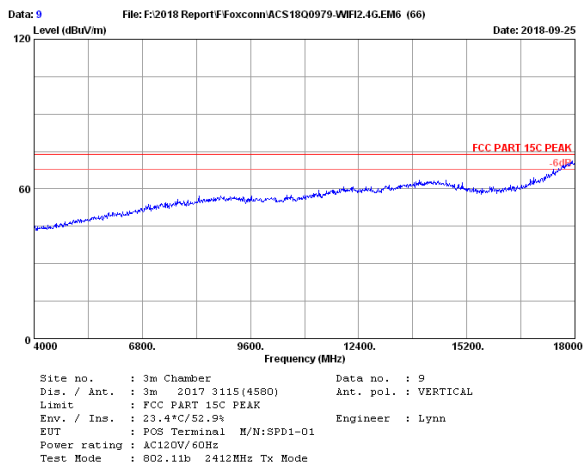
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.87	10.31	86.64	32.53	92.29	74.00	-18.29	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading - Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



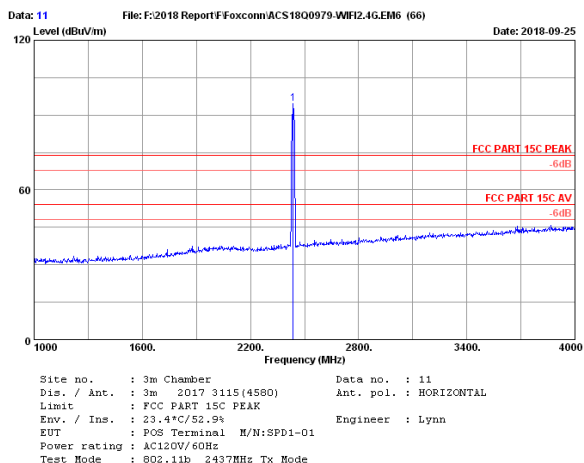
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4824.00	32.66	14.56	26.29	30.79	42.72	54.00	11.28	Average
2	4824.00	32.66	14.56	41.83	30.79	58.26	74.00	15.74	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading - Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



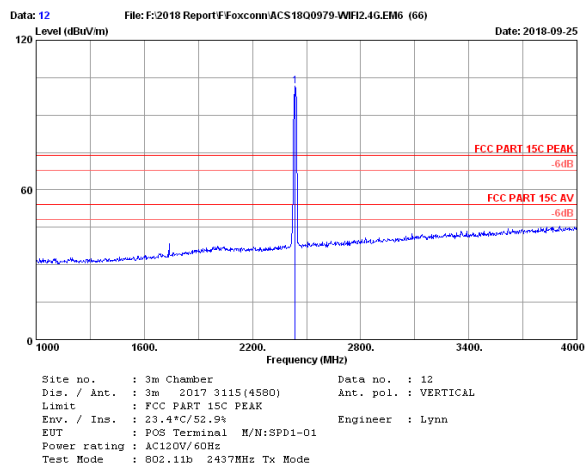
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4824.00	32.66	14.56	26.28	30.79	42.71	54.00	11.29	Average
2	4824.00	32.66	14.56	41.61	30.79	56.24	74.00	15.76	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



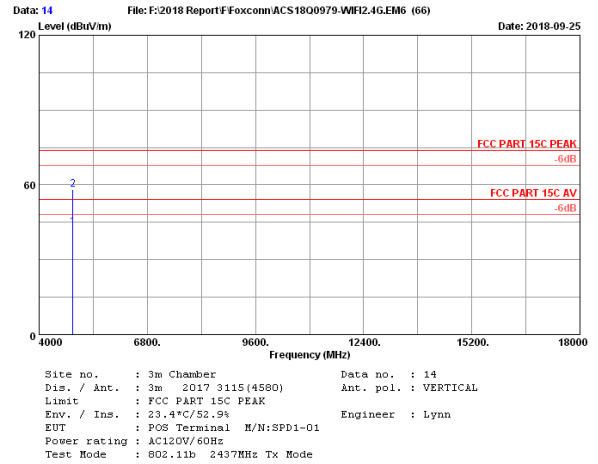
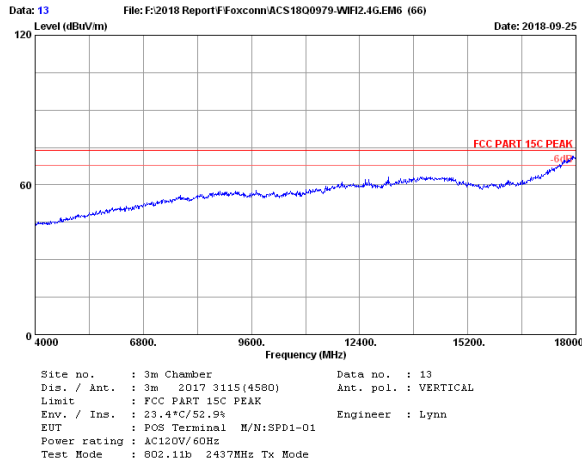
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	88.79	32.53	94.68	74.00	-20.68	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



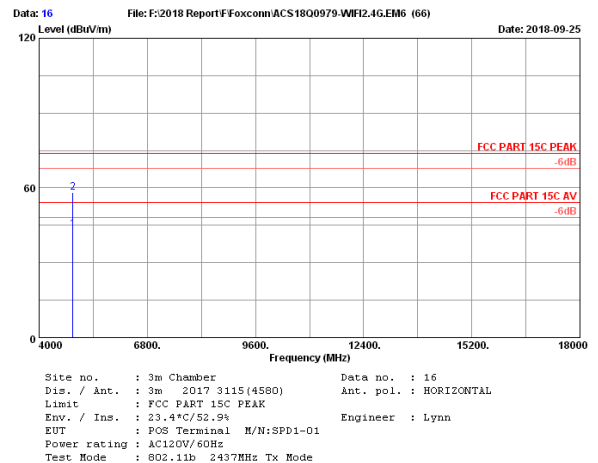
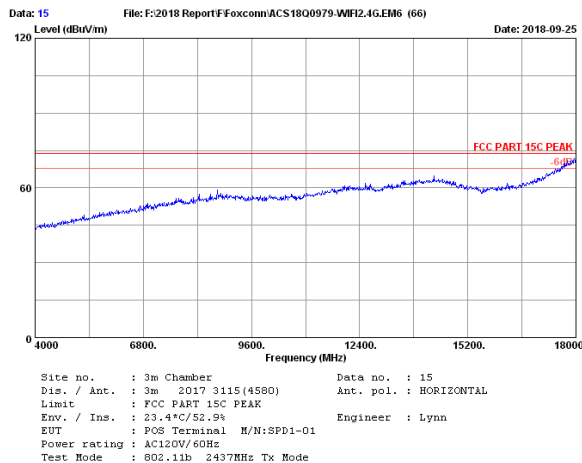
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	95.59	32.53	101.48	74.00	-27.48	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



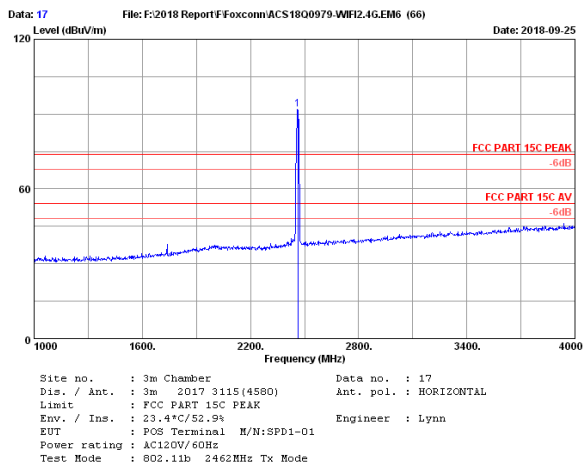
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4874.00	32.76	14.63	26.47	30.76	43.10	54.00	10.90	Average
2	4874.00	32.76	14.63	41.59	30.76	58.22	74.00	15.78	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



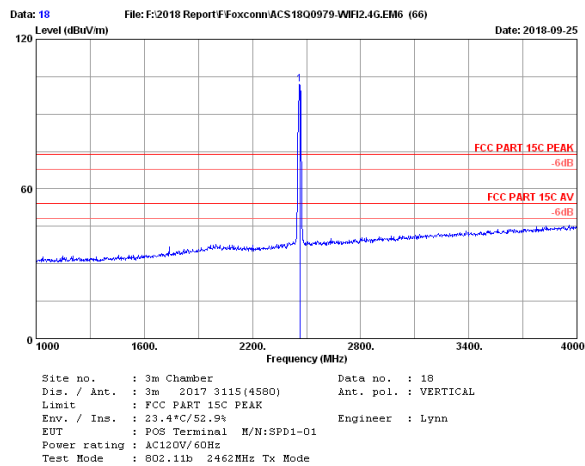
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4874.00	32.76	14.63	26.71	30.76	43.34	54.00	10.66	Average
2	4874.00	32.76	14.63	41.65	30.76	58.28	74.00	15.72	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



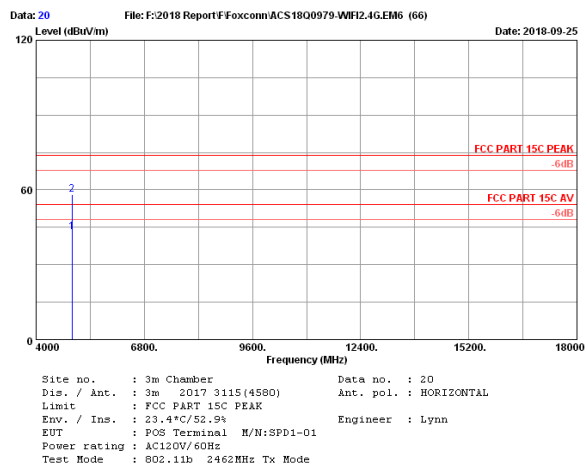
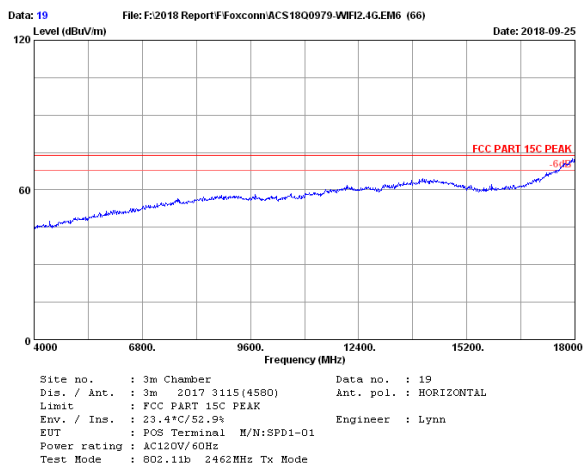
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	85.74	32.51	91.78	74.00	-17.78	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



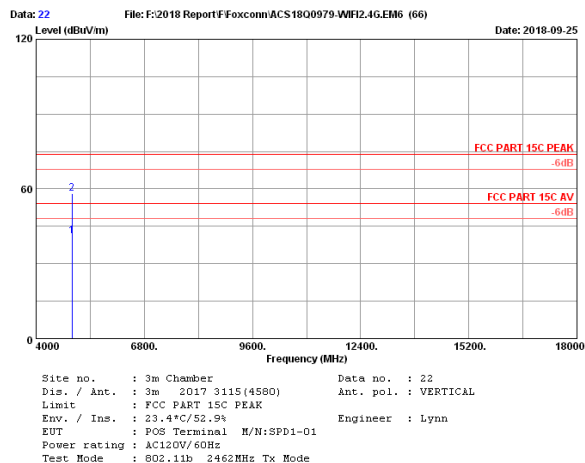
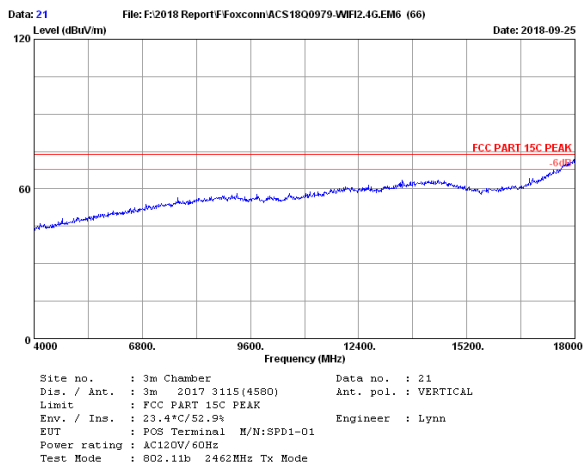
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	95.75	32.51	101.79	74.00	-27.79	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



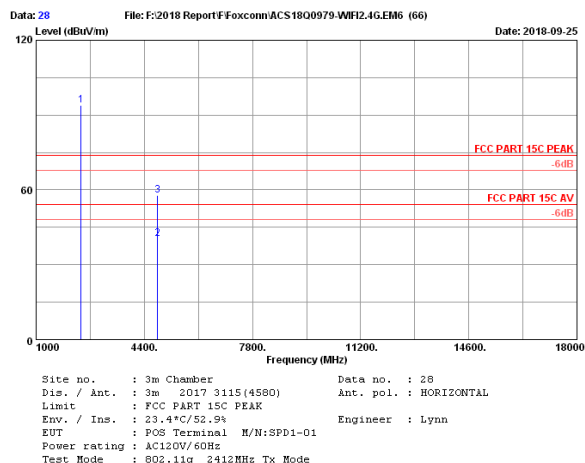
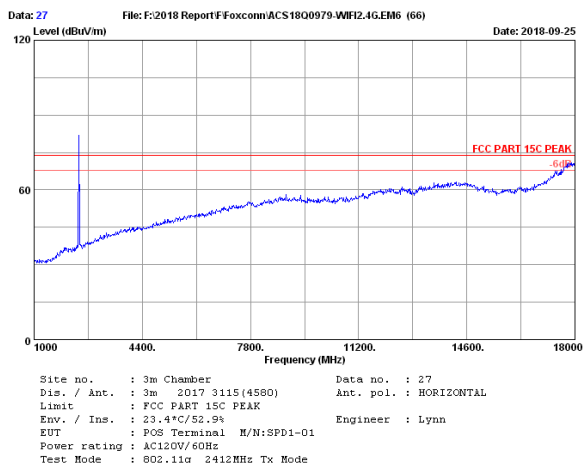
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading factor (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4924.00	32.86	14.71	26.39	30.73	43.23	54.00	10.77	Average
2	4924.00	32.86	14.71	41.26	30.73	58.10	74.00	15.90	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



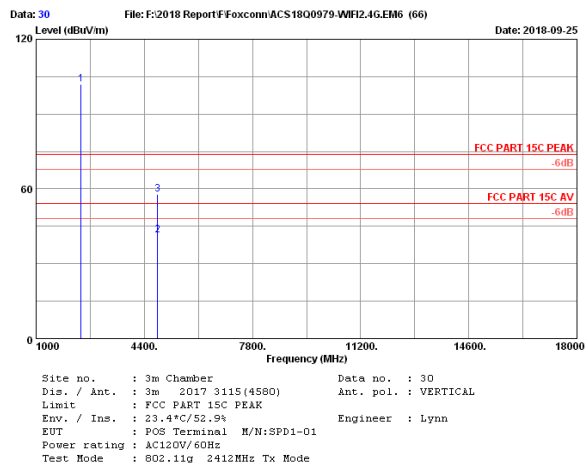
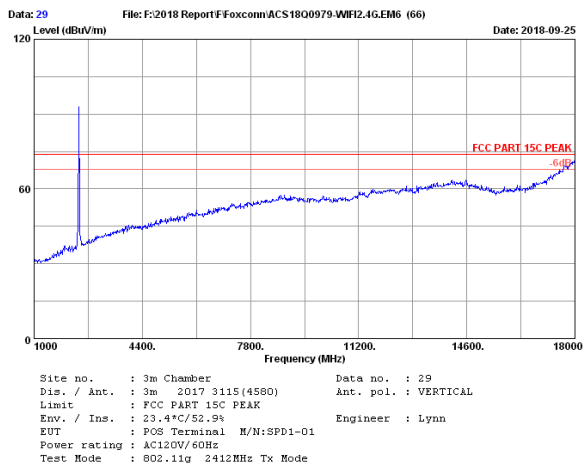
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	4924.00	32.66	14.71	24.12	30.73	40.96	54.00	13.04	Average
2	4924.00	32.66	14.71	41.32	30.73	56.16	74.00	15.84	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



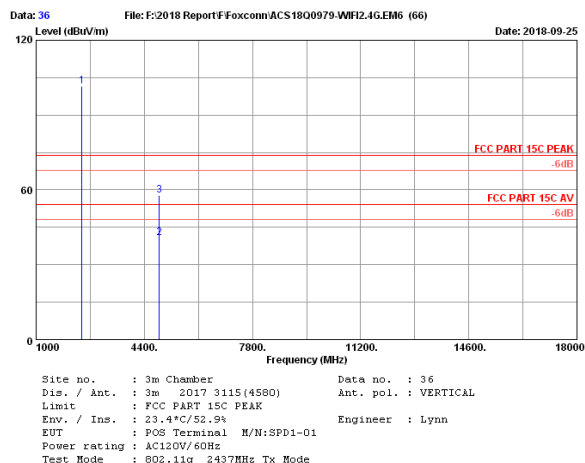
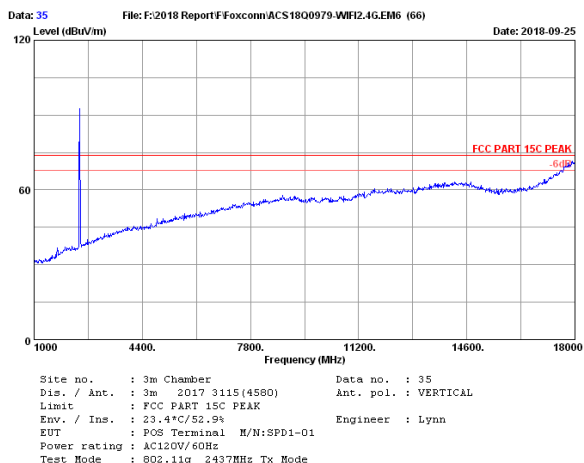
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.87	10.31	88.36	32.53	94.01	74.00	-20.01	Peak
2	4824.00	32.66	14.56	24.04	30.79	40.47	54.00	13.53	Average
3	4824.00	32.66	14.56	41.26	30.79	57.69	74.00	16.31	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



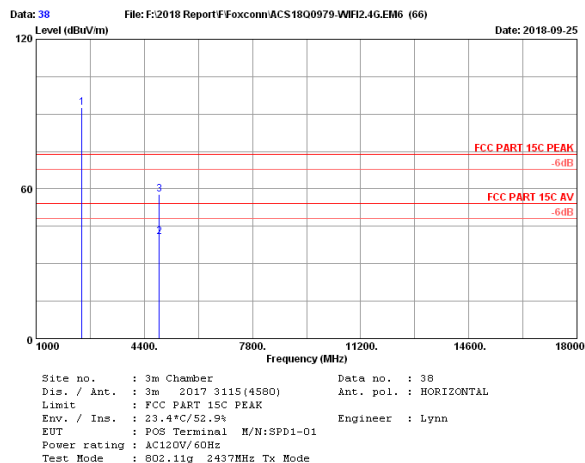
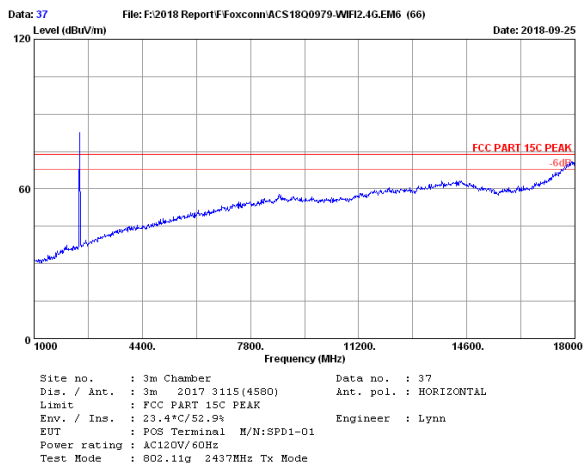
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.67	10.31	96.25	32.53	101.90	74.00	-27.90	Peak
2	4824.00	32.66	14.56	25.11	30.79	41.54	54.00	12.46	Average
3	4824.00	32.66	14.56	41.26	30.79	57.69	74.00	16.31	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



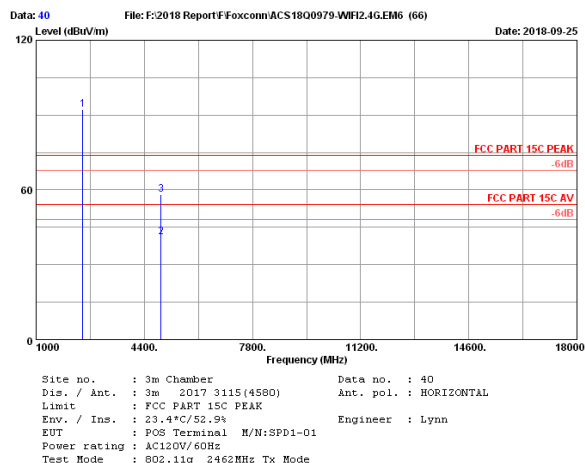
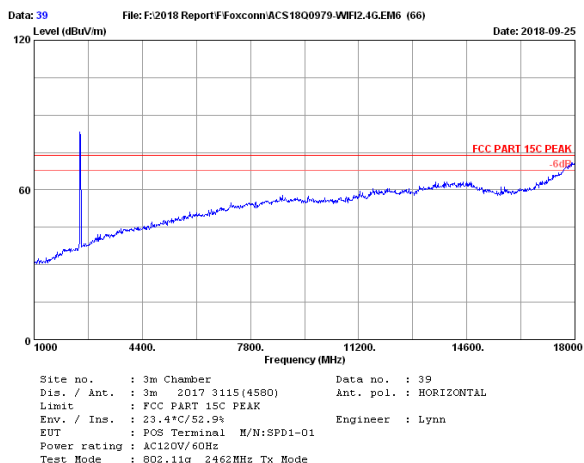
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	95.77	32.53	101.66	74.00	-27.66	Peak
2	4874.00	32.76	14.63	24.17	30.76	40.80	54.00	13.20	Average
3	4874.00	32.76	14.63	41.18	30.76	57.81	74.00	16.19	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



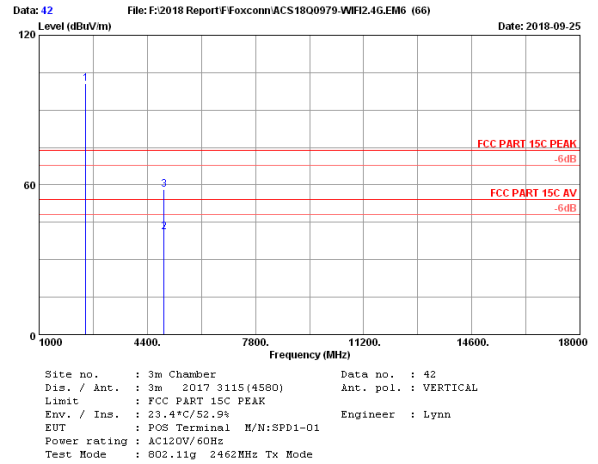
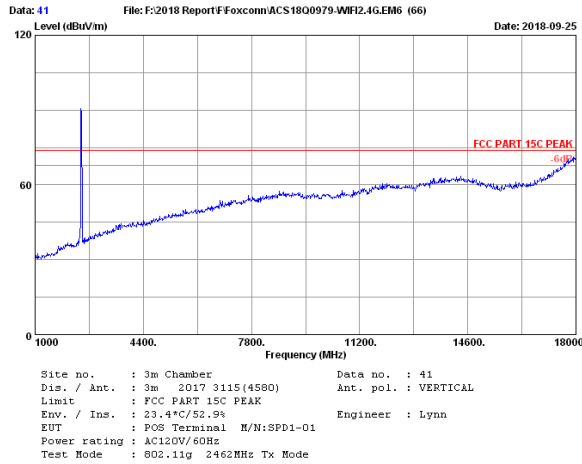
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	86.63	32.53	92.52	74.00	-18.52	Peak
2	4874.00	32.76	14.63	24.15	30.76	40.78	54.00	13.22	Average
3	4874.00	32.76	14.63	41.36	30.76	57.99	74.00	16.01	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



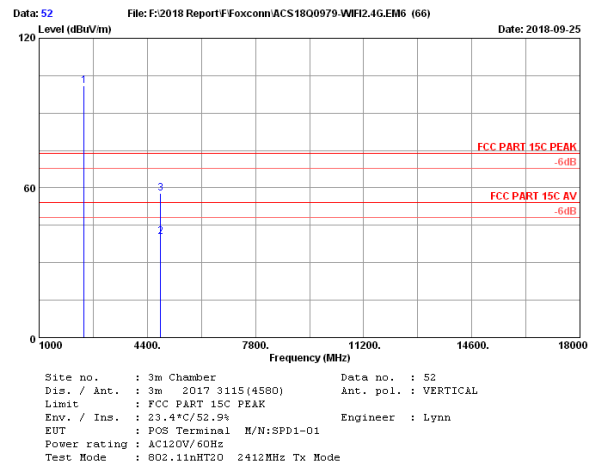
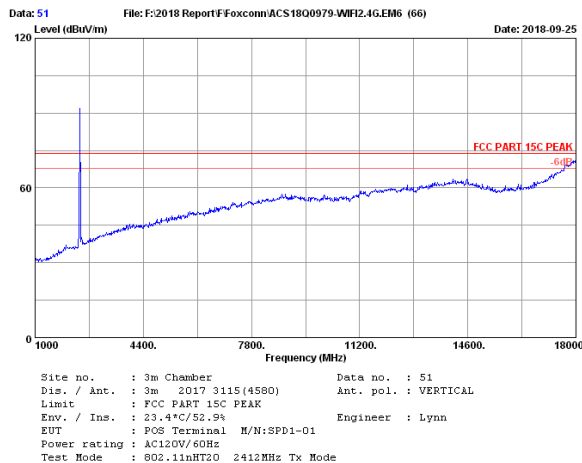
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	86.11	32.51	92.15	74.00	-18.15	Peak
2	4924.00	32.86	14.71	24.23	30.73	41.07	54.00	12.93	Average
3	4924.00	32.86	14.71	41.27	30.73	58.11	74.00	15.89	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



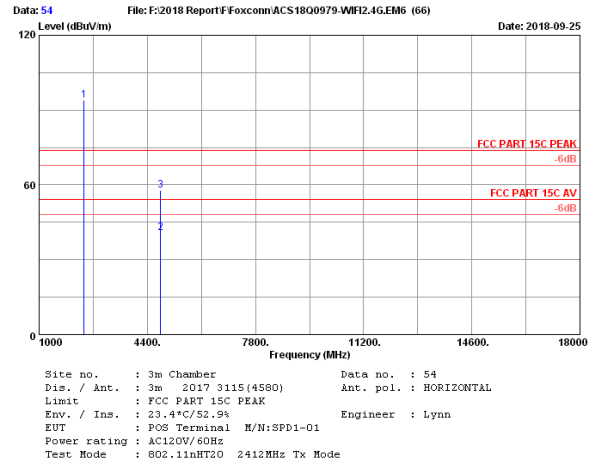
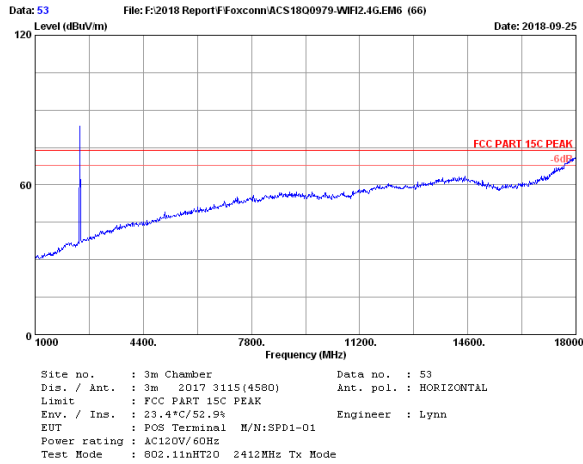
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	94.61	32.51	100.65	74.00	-26.65	Peak
2	4924.00	32.86	14.71	24.18	30.73	41.02	54.00	12.98	Average
3	4924.00	32.86	14.71	41.36	30.73	58.20	74.00	15.80	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



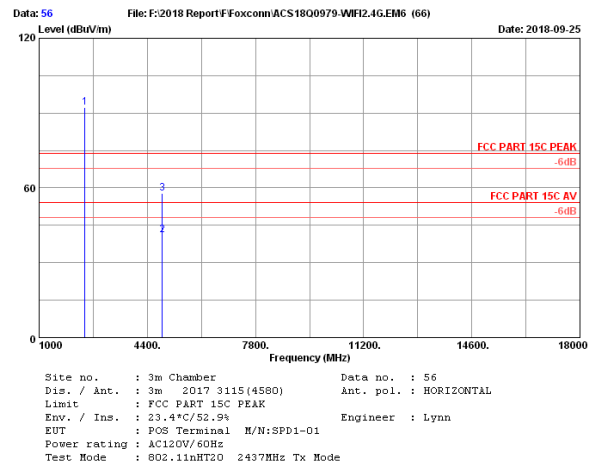
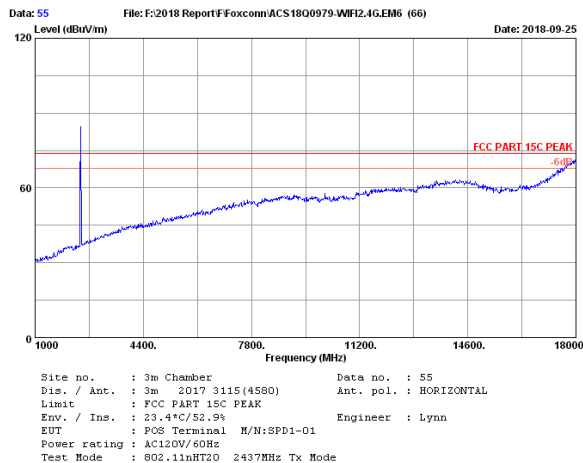
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.87	10.31	95.36	32.53	101.01	74.00	-27.01	Peak
2	4824.00	32.66	14.56	24.06	30.79	40.49	54.00	13.51	Average
3	4824.00	32.66	14.56	41.31	30.79	57.74	74.00	16.26	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



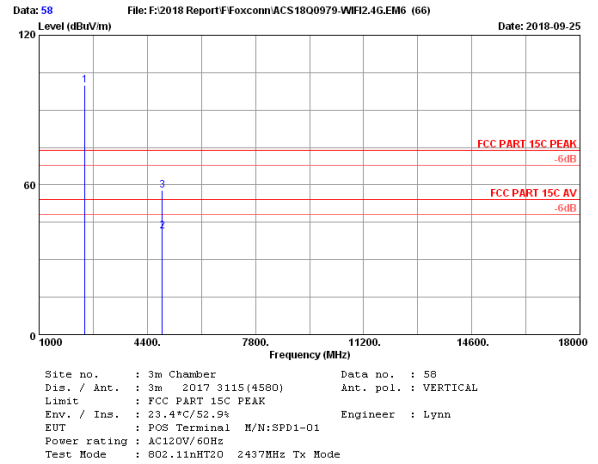
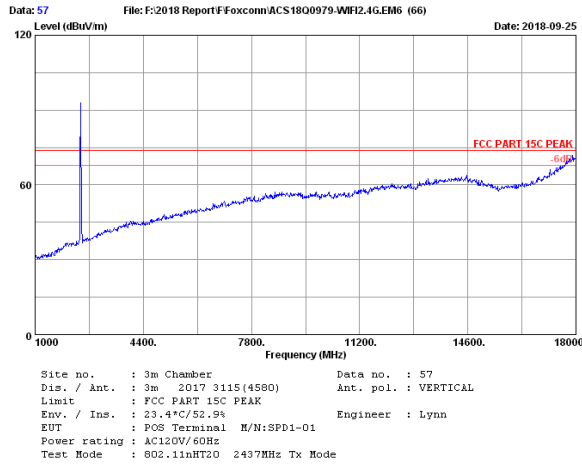
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2412.00	27.67	10.31	88.26	32.53	95.91	74.00	-19.91	Peak
2	4824.00	32.66	14.56	24.35	30.79	40.78	54.00	13.22	Average
3	4824.00	32.66	14.56	41.52	30.79	57.95	74.00	16.05	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



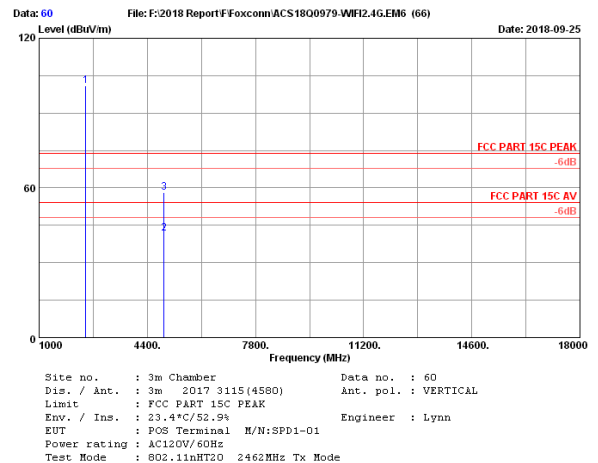
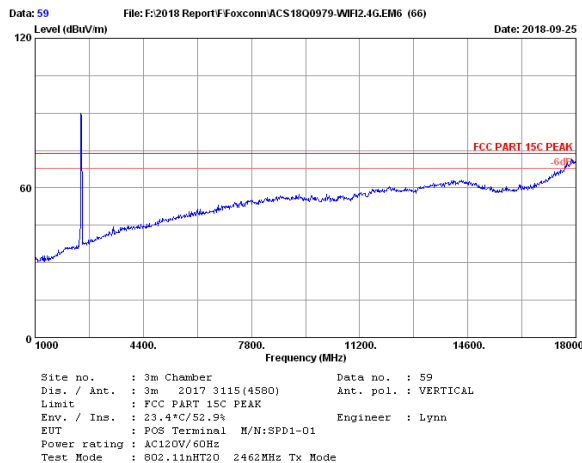
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	86.35	32.53	92.24	74.00	-18.24	Peak
2	4874.00	32.76	14.63	24.34	30.76	40.97	54.00	13.03	Average
3	4874.00	32.76	14.63	41.08	30.76	57.71	74.00	16.29	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



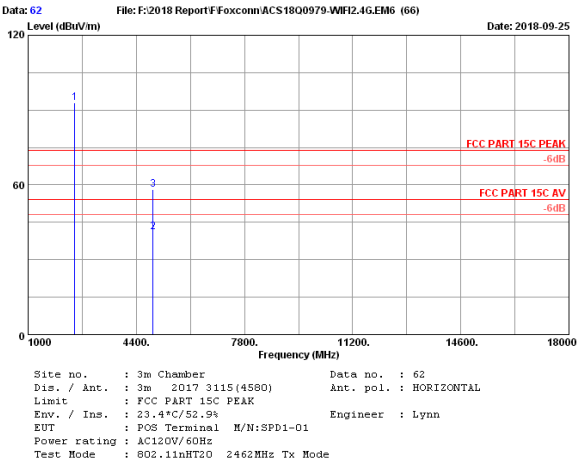
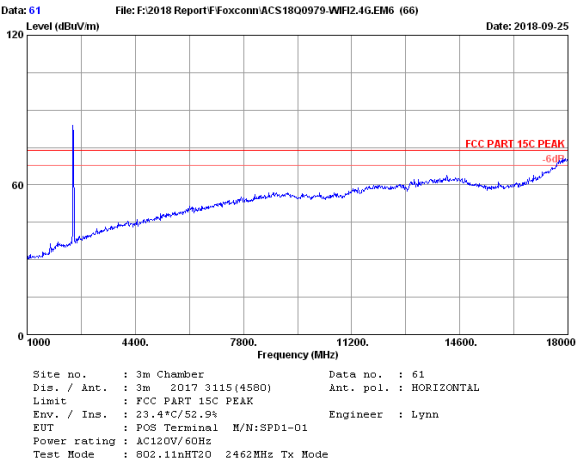
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2437.00	28.04	10.38	94.21	32.53	100.10	74.00	-26.10	Peak
2	4874.00	32.76	14.63	24.82	30.76	41.45	54.00	12.55	Average
3	4874.00	32.76	14.63	41.18	30.76	57.81	74.00	16.19	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	94.83	32.51	100.87	74.00	-26.87	Peak
2	4924.00	32.86	14.71	24.91	30.73	41.75	54.00	12.25	Average
3	4924.00	32.86	14.71	41.27	30.73	58.11	74.00	15.89	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.00	28.13	10.42	86.81	32.51	92.85	74.00	-19.85	Peak
2	4924.00	32.86	14.71	24.42	30.73	41.26	54.00	12.74	Average
3	4924.00	32.86	14.71	41.20	30.73	58.04	74.00	15.96	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.
2. The emission levels that are 20dB below the official
limit are not reported.

5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Sep.08,18	1 Year
2.	Attenuator	Agilent	8491B	MY39262165	Oct.14,17	1 Year
3.	RF Cable	Hubersuhner	141	NO.1	Oct.14,17	1 Year

5.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.3. Test Procedure

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions with peak detector.

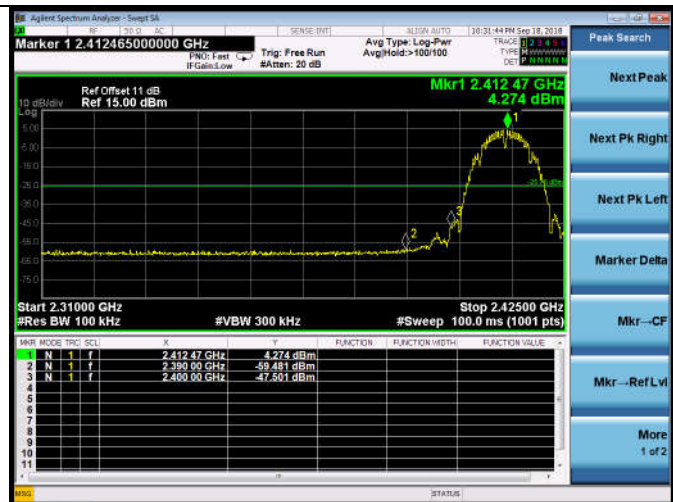
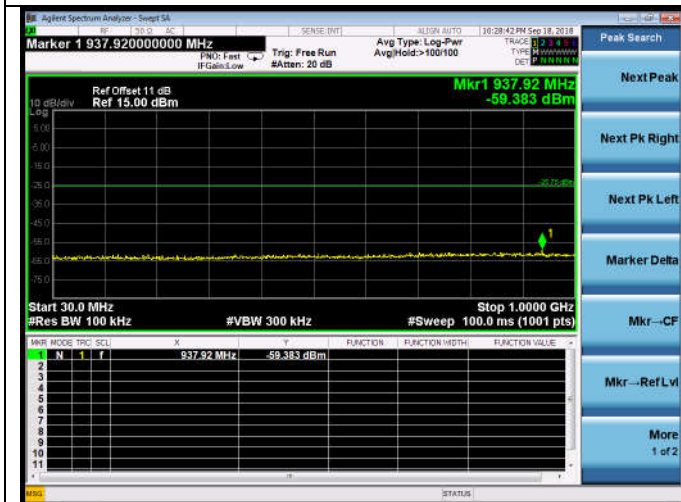
5.4. Test result

PASS (The testing data was attached in the next pages.)

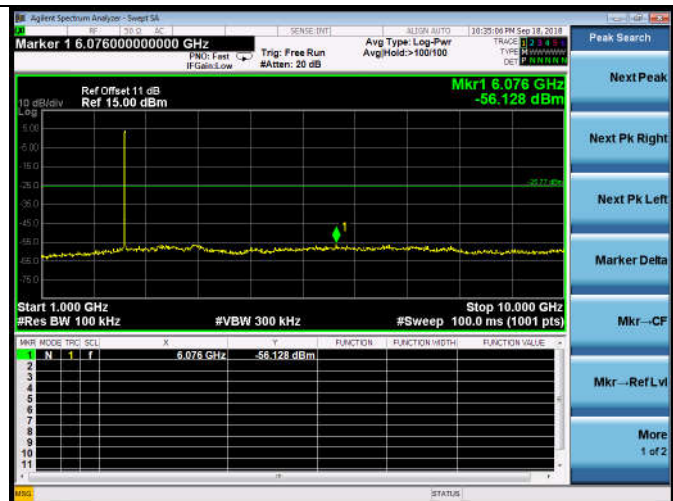
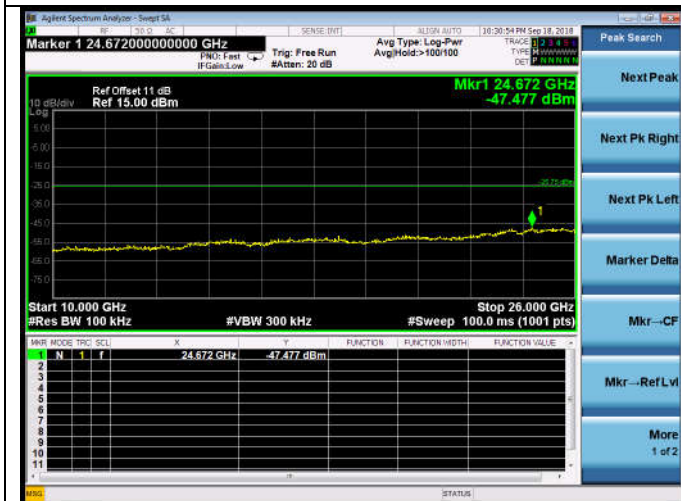
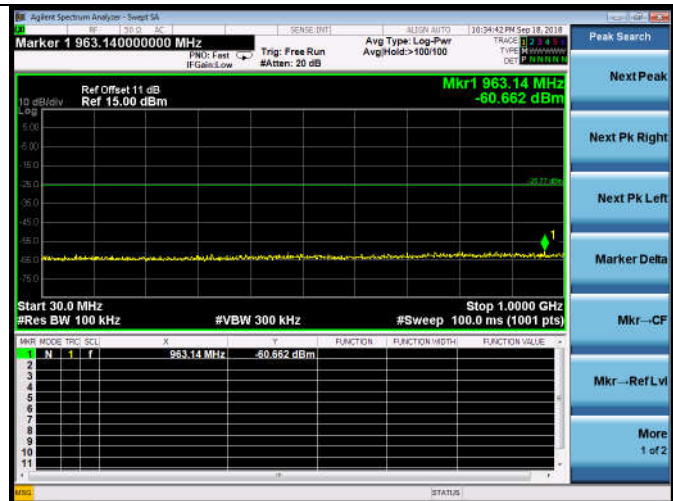
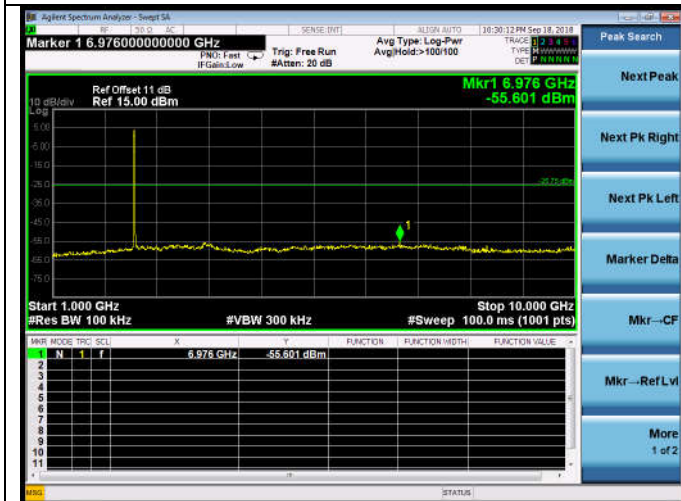
ANT0:

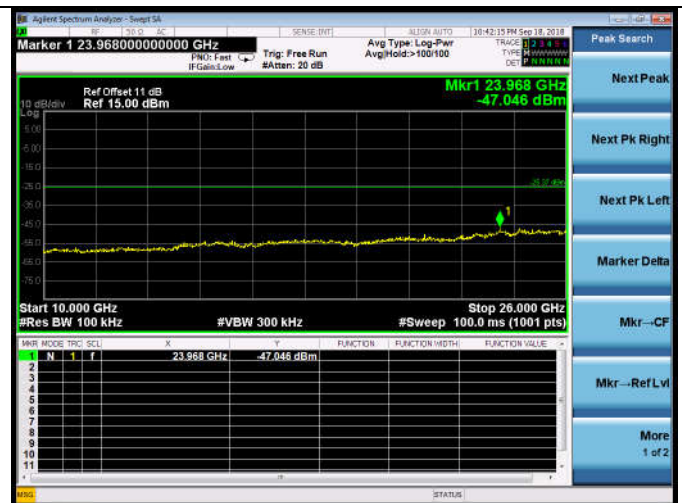
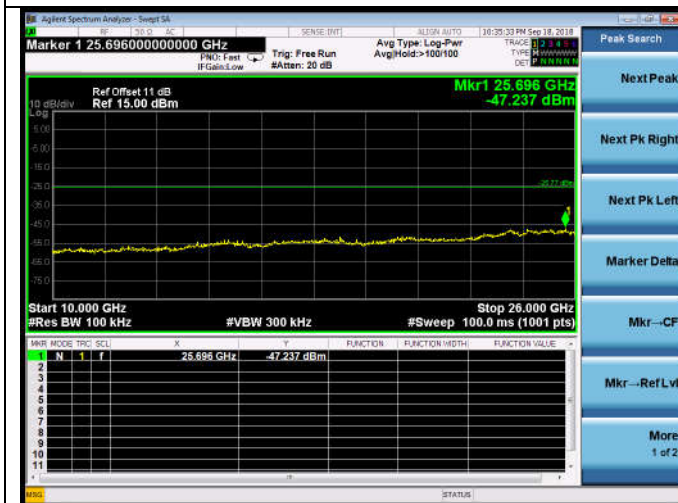
Test Mode: IEEE 802.11b

Test CH1: 2412MHz

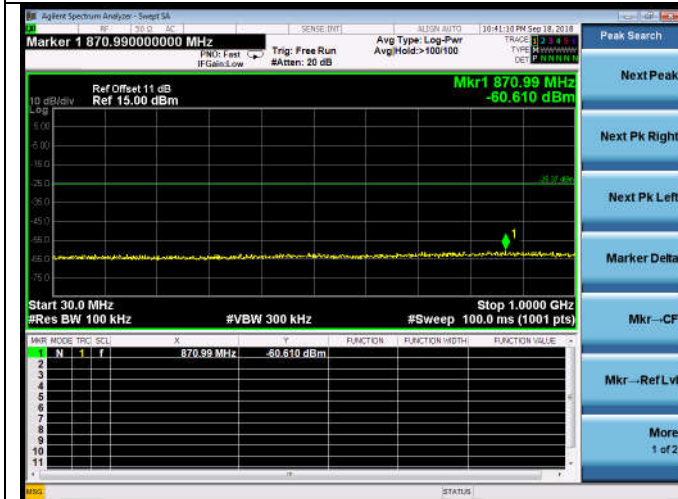


Test CH6: 2437MHz

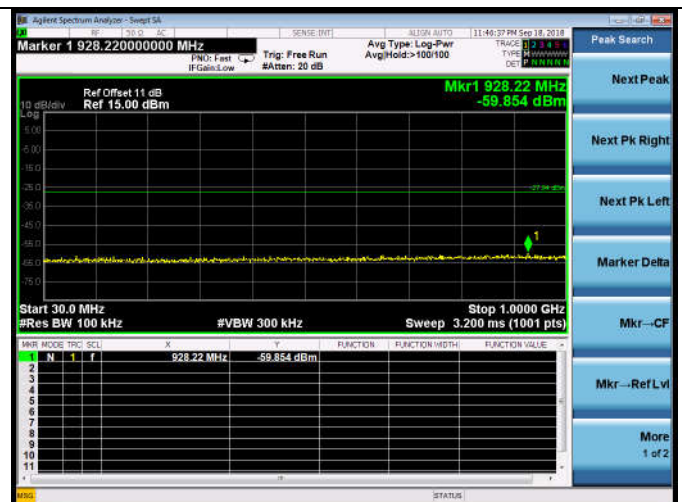
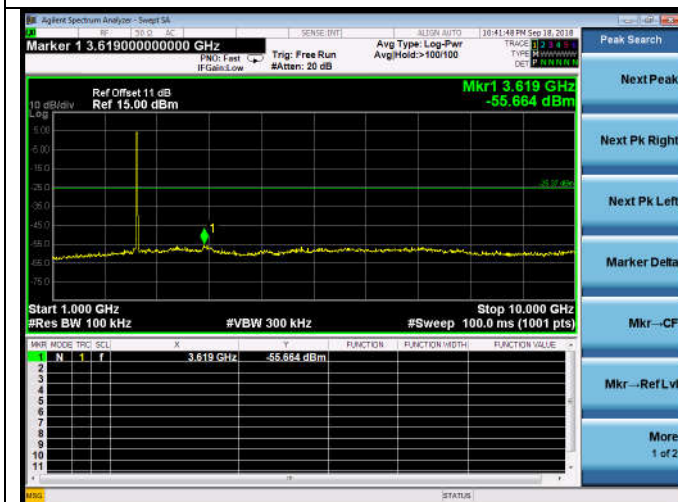




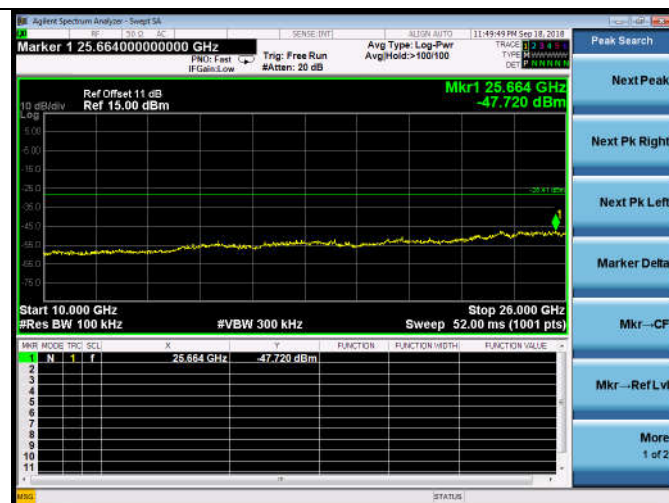
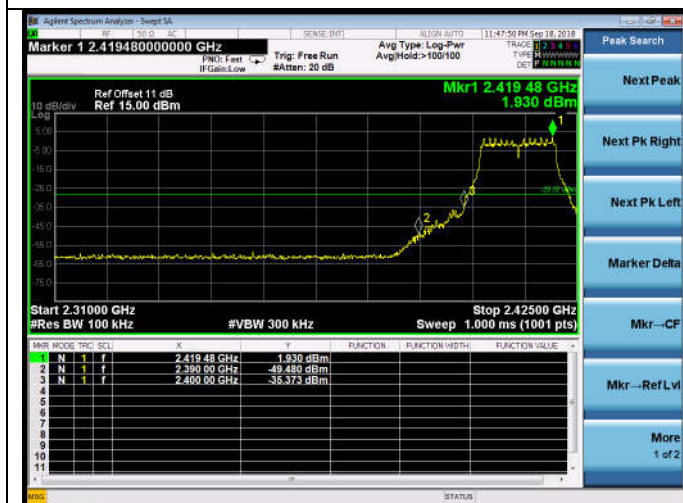
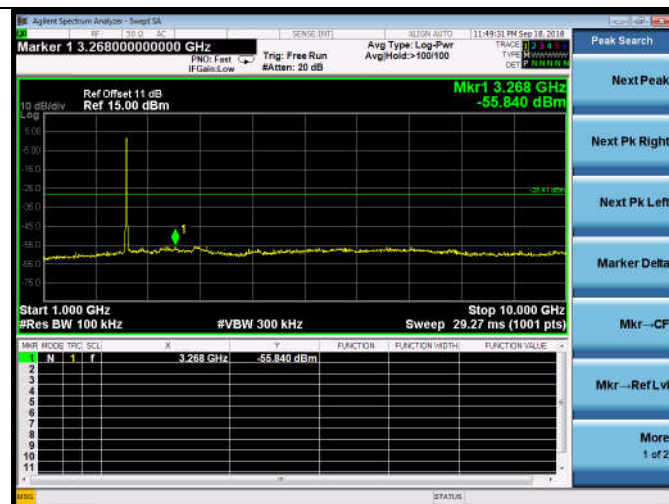
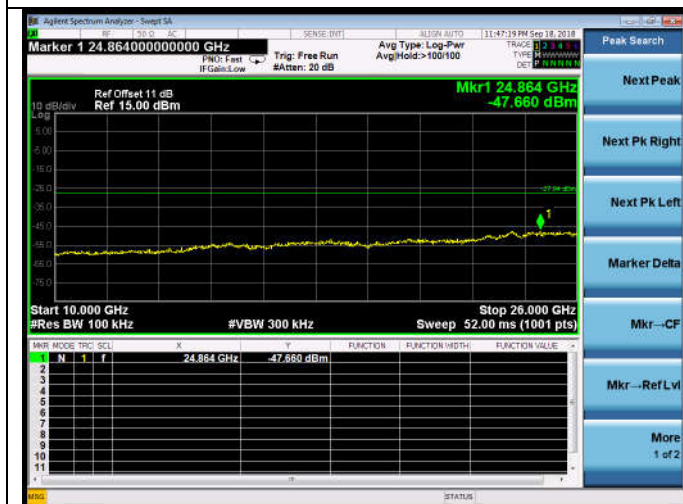
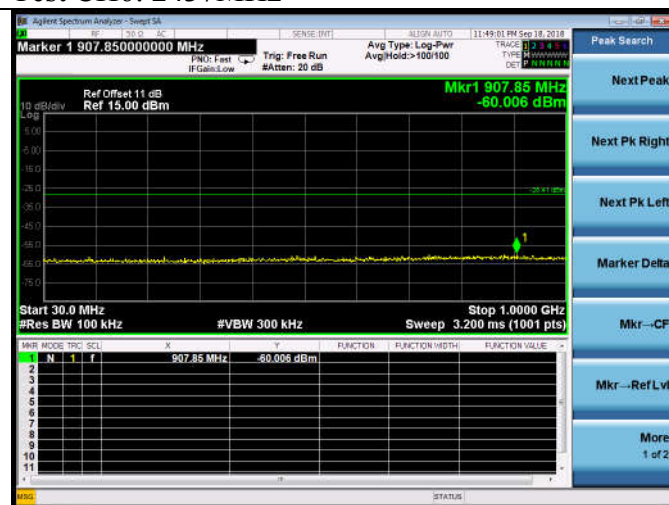
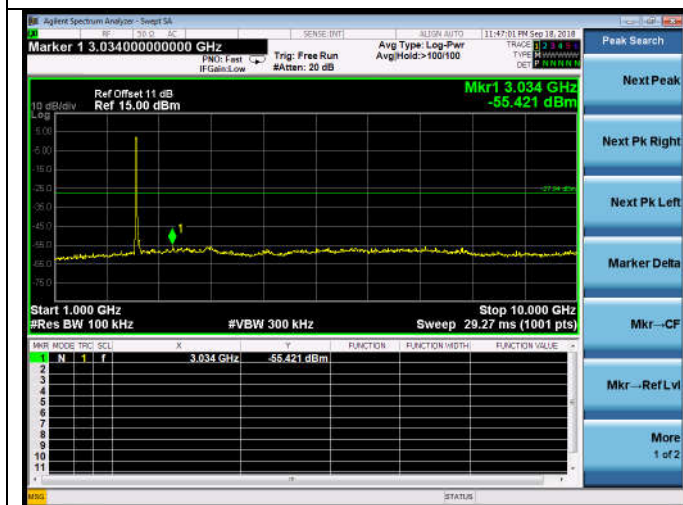
Test CH11: 2462MHz



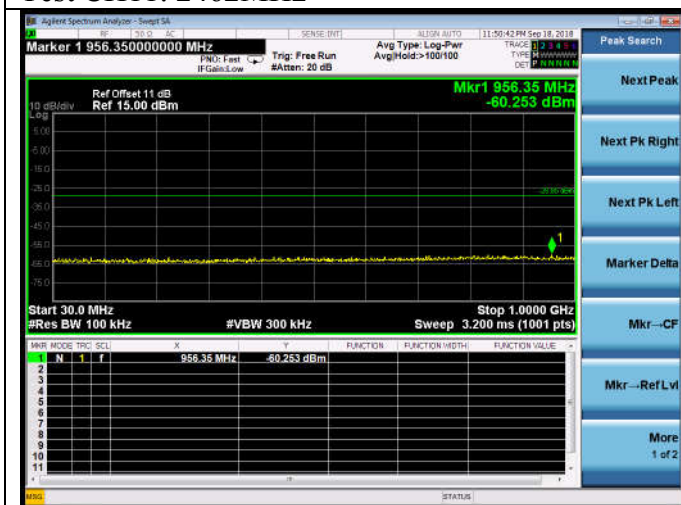
Test Mode: IEEE 802.11g Test CH1: 2412MHz



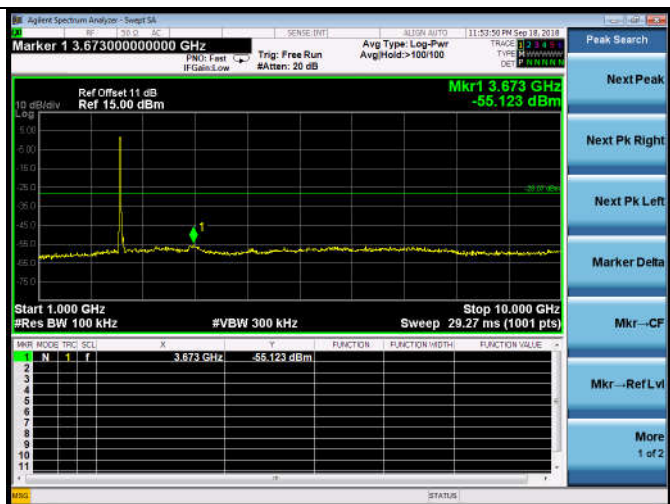
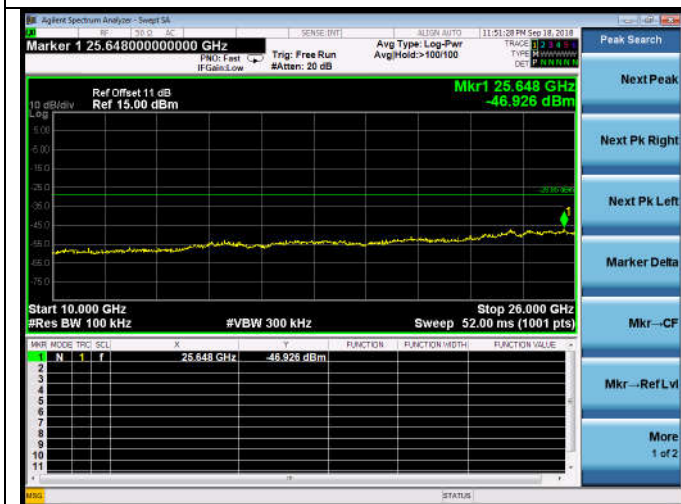
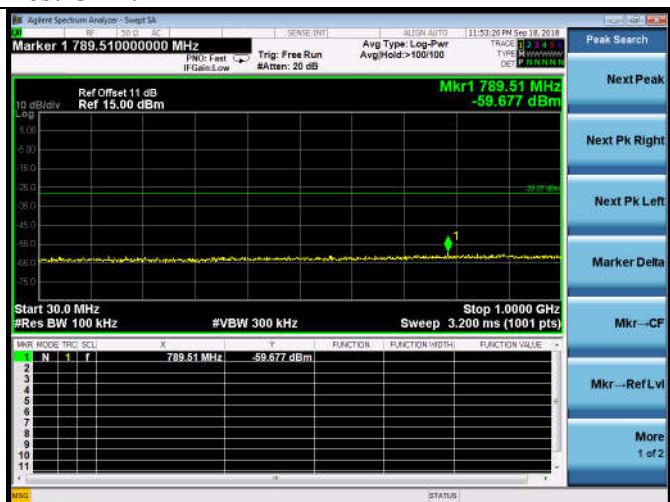
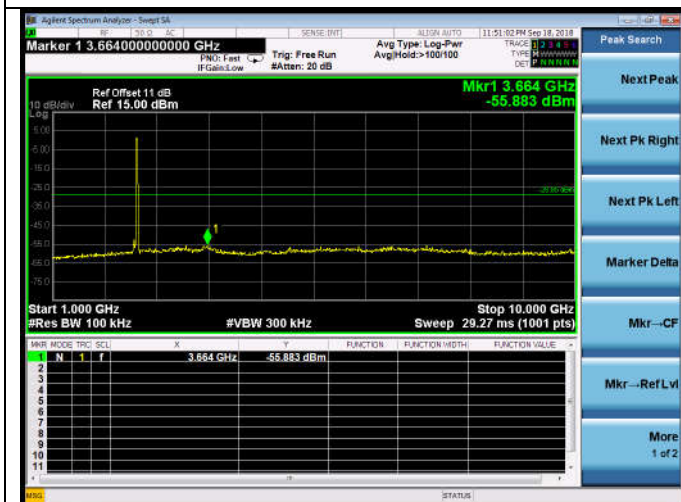
Test CH6: 2437MHz

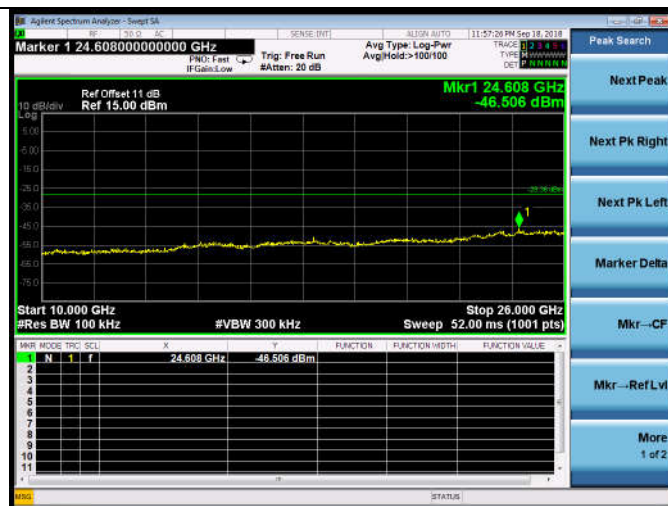
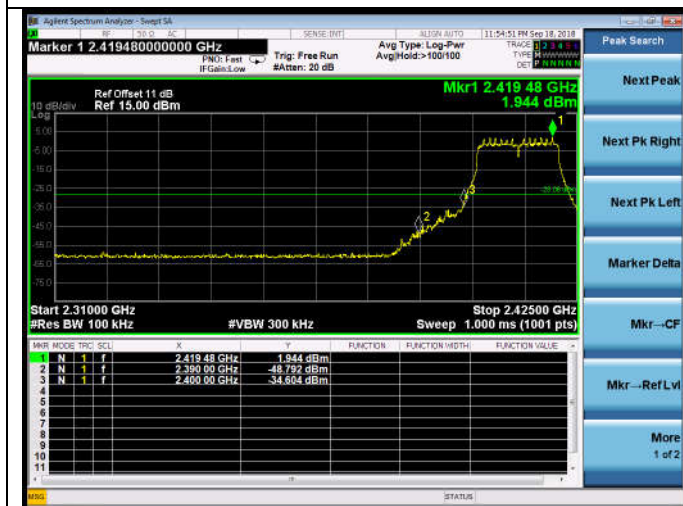
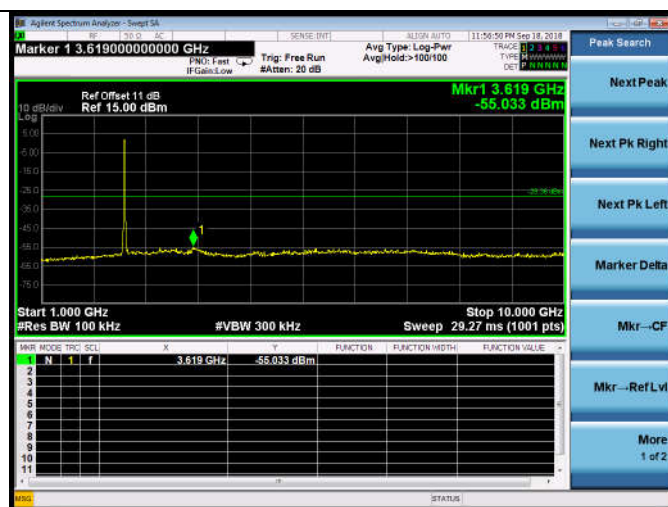
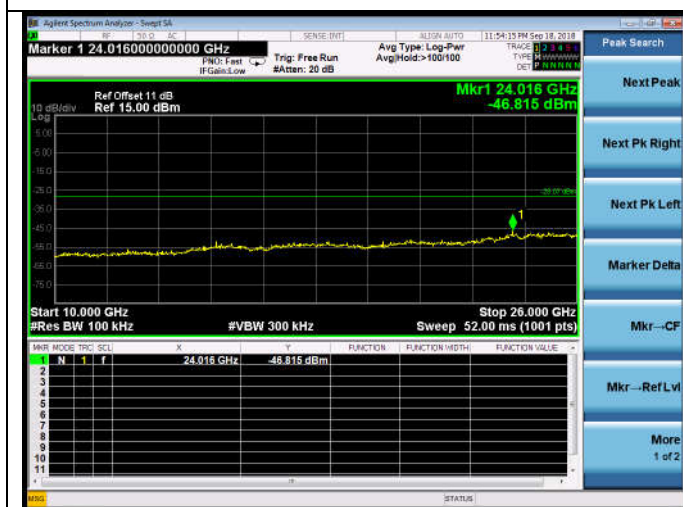


Test CH11: 2462MHz

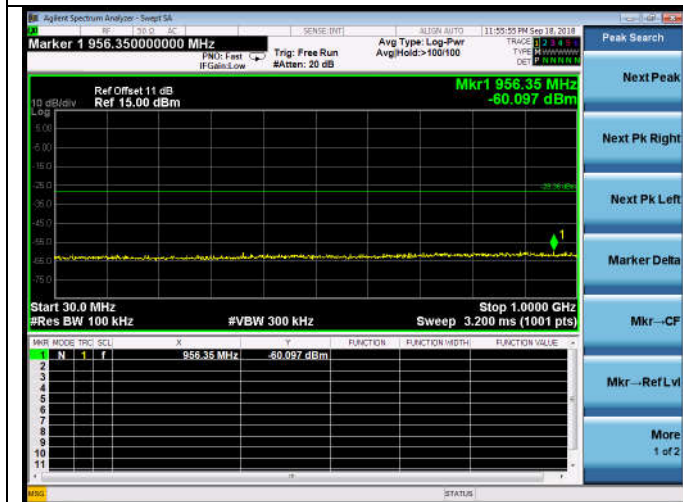


Test Mode: IEEE 802.11n HT20 Test CH1: 2412MHz

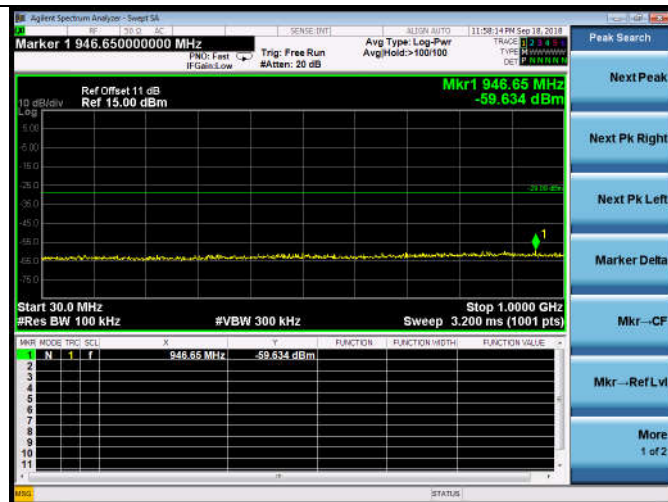


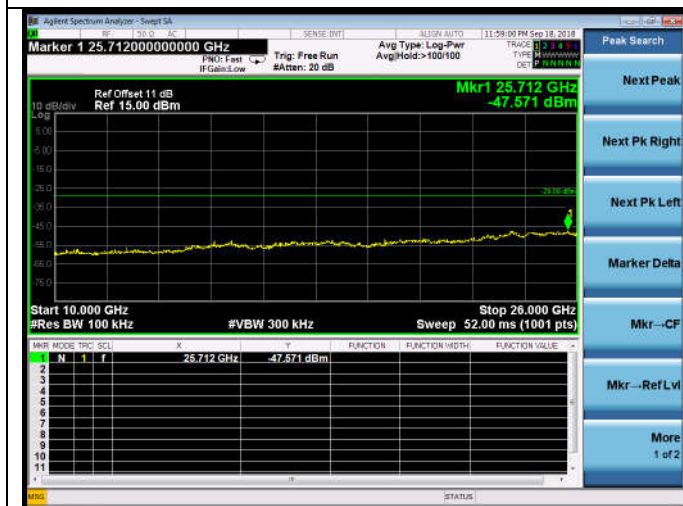
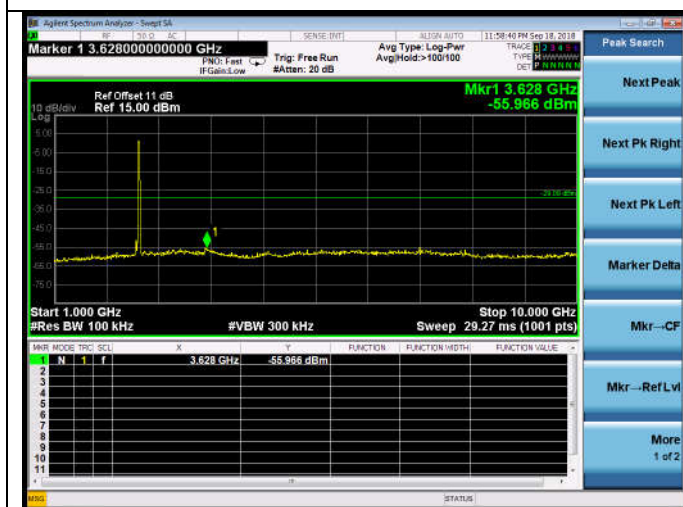


Test CH6: 2437MHz



Test CH11: 2462MHz

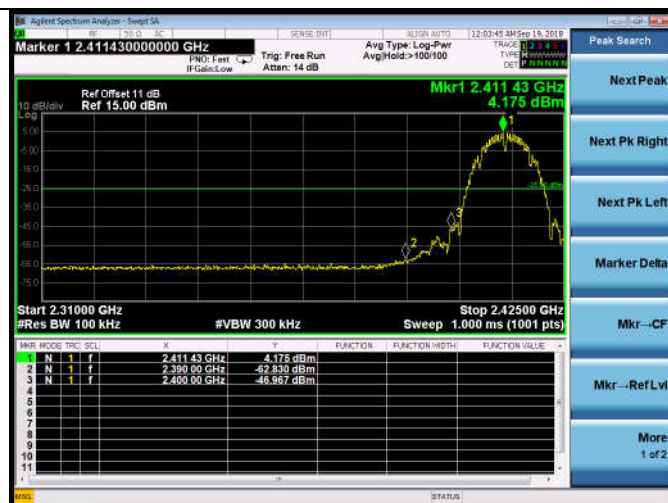
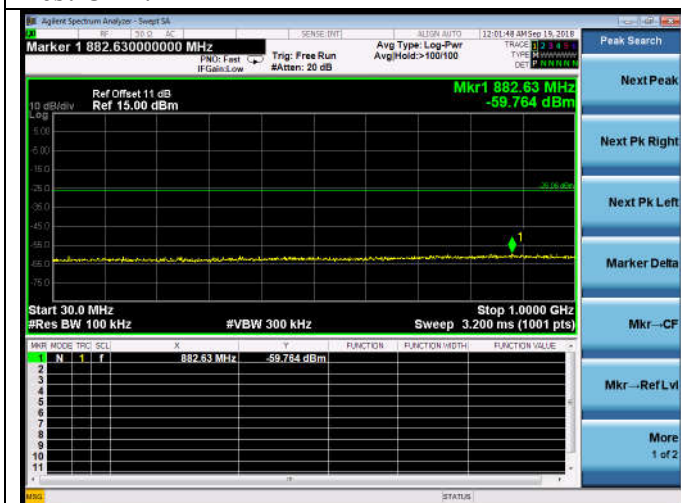




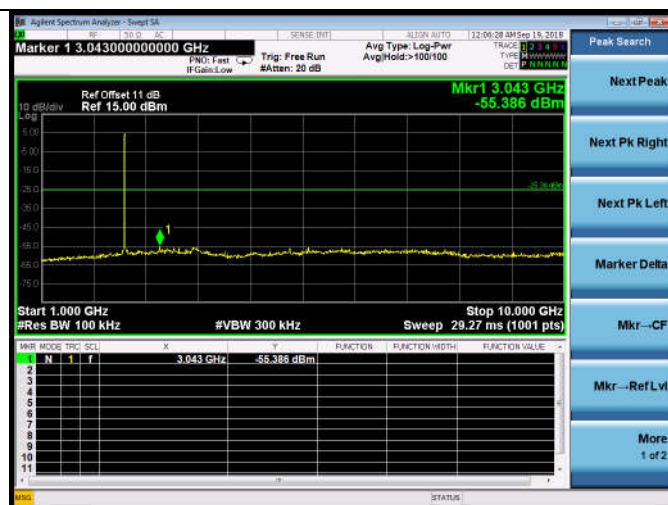
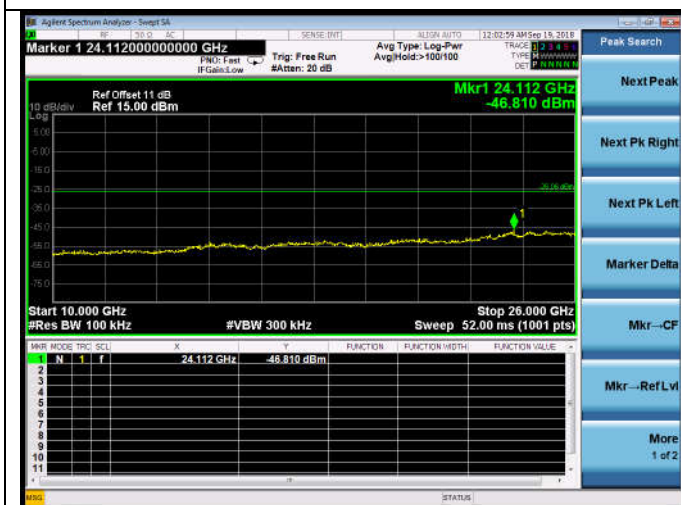
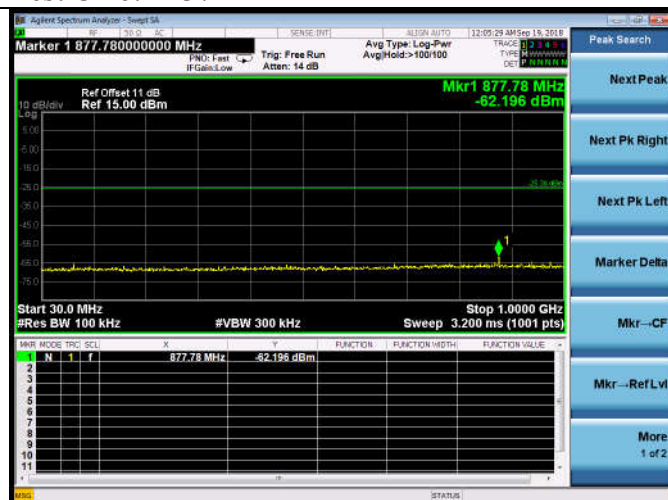
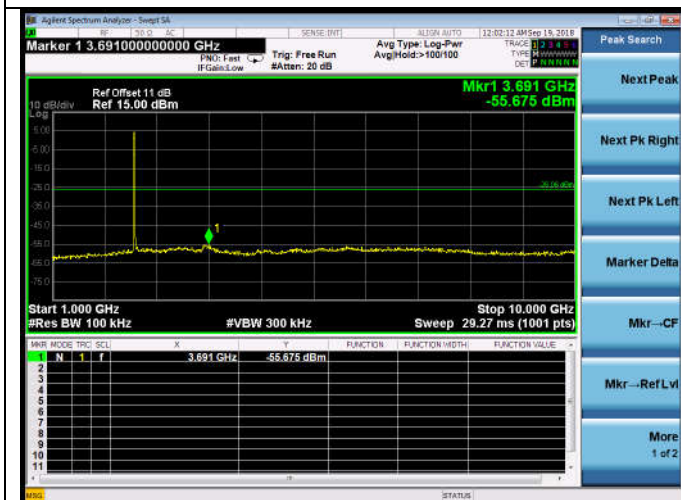
ANT1:

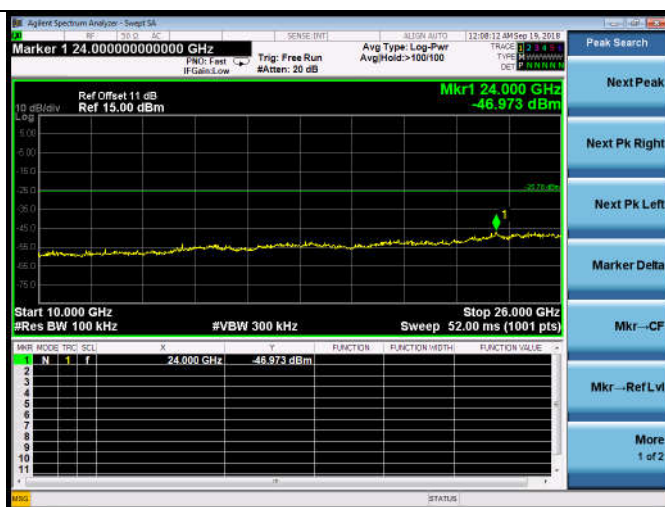
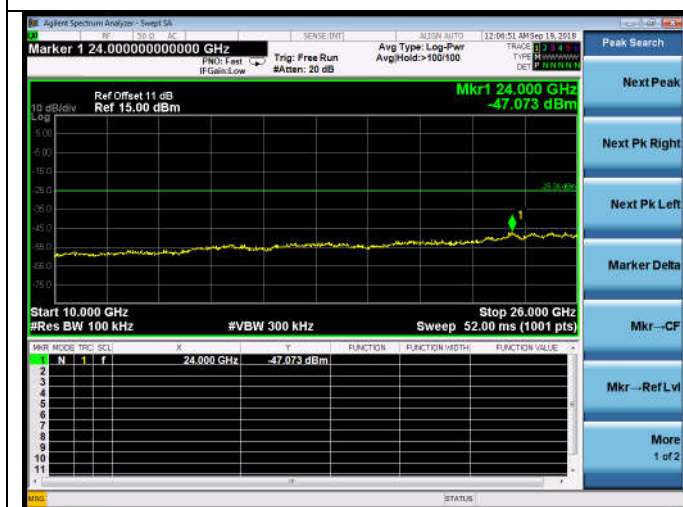
Test Mode: IEEE 802.11b

Test CH1: 2412MHz

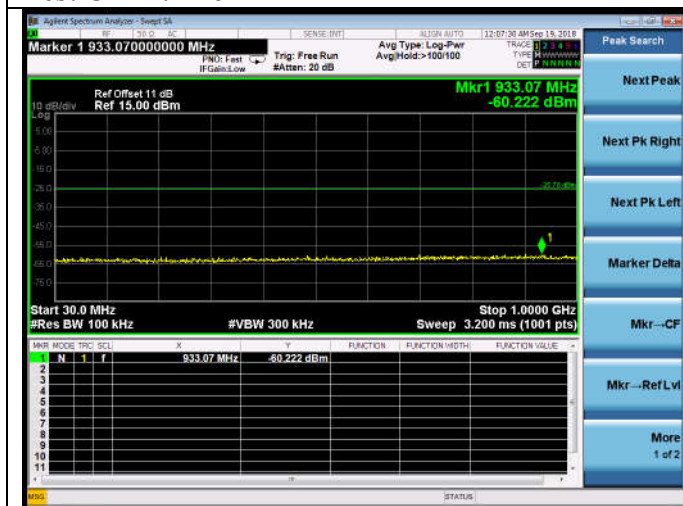


Test CH6: 2437MHz

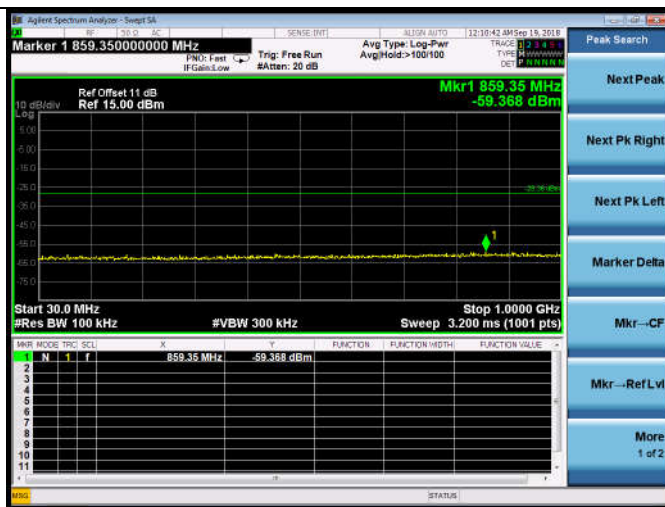
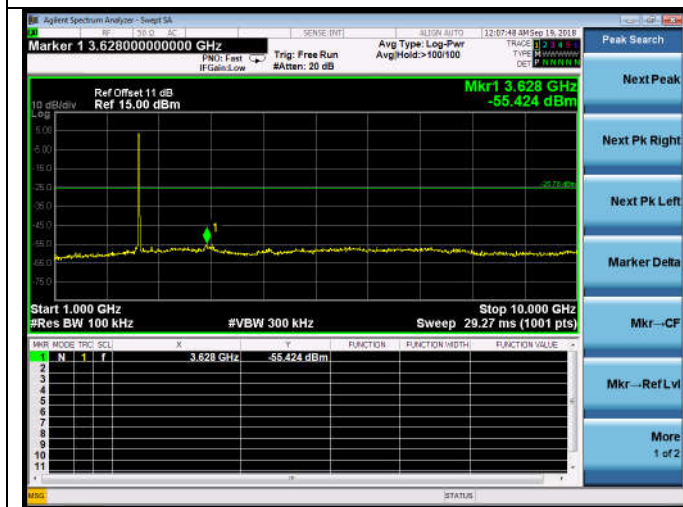




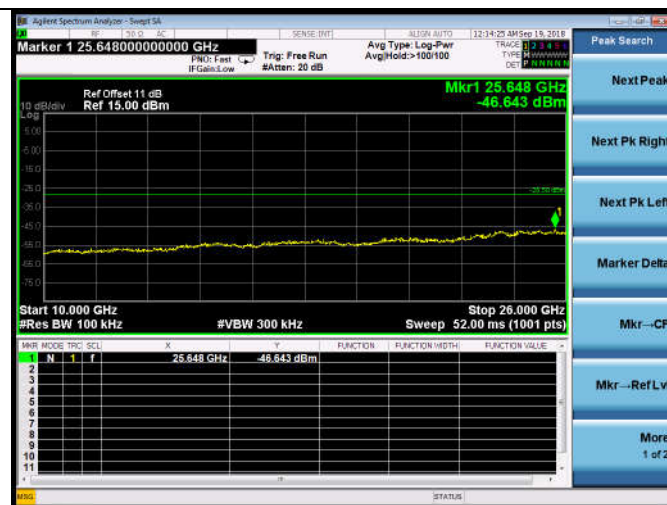
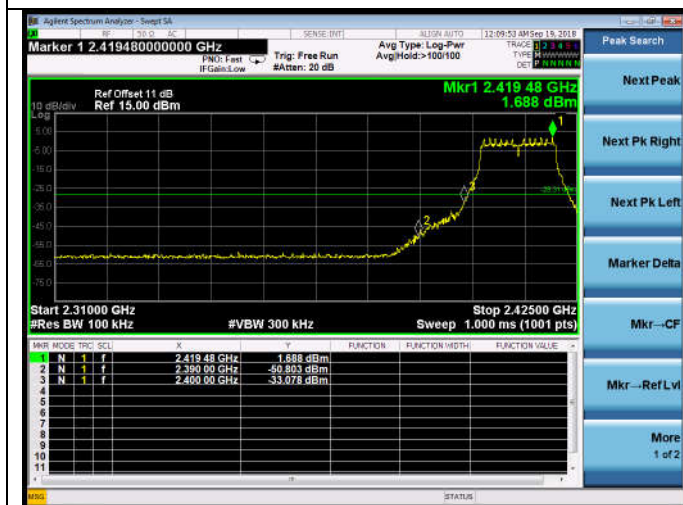
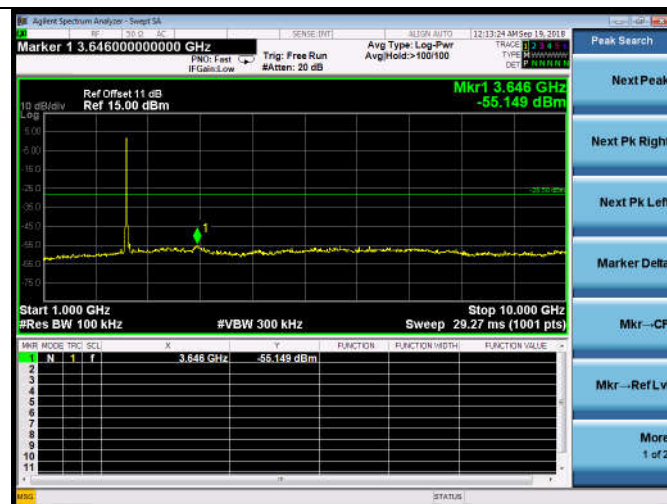
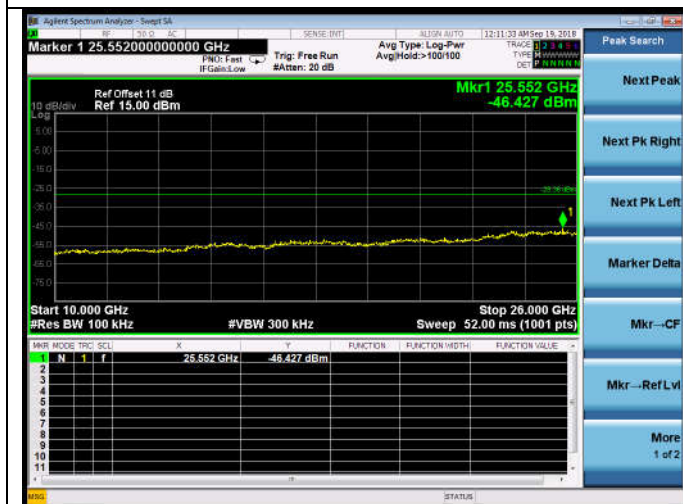
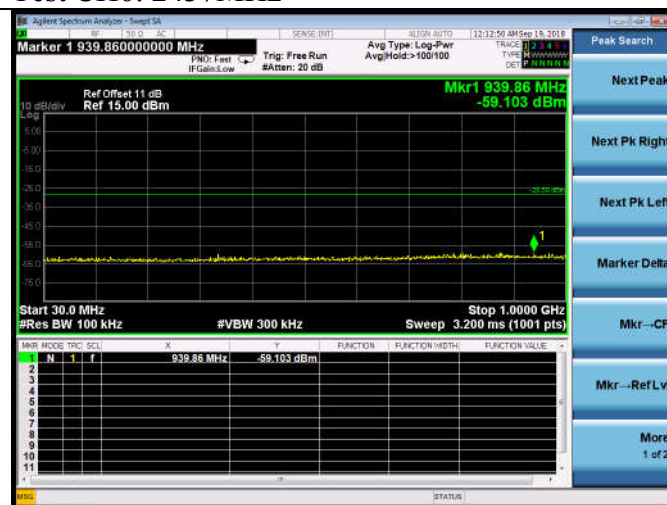
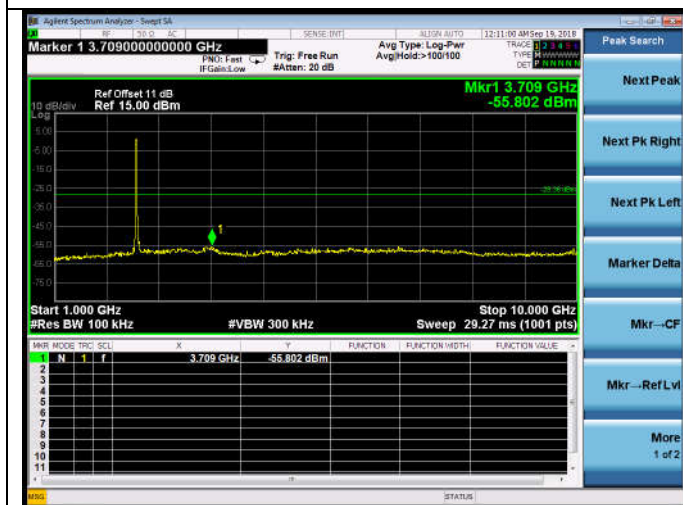
Test CH11: 2462MHz



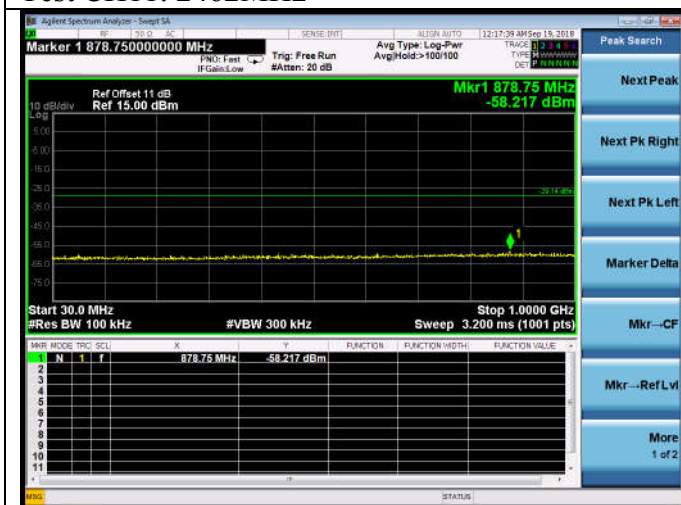
Test Mode: IEEE 802.11g Test CH1: 2412MHz



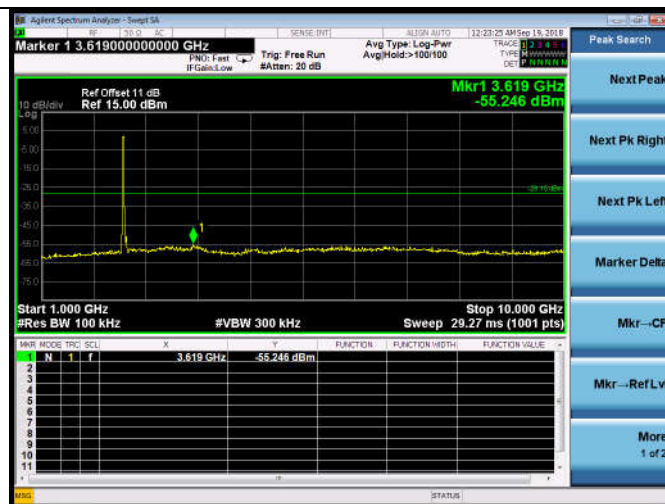
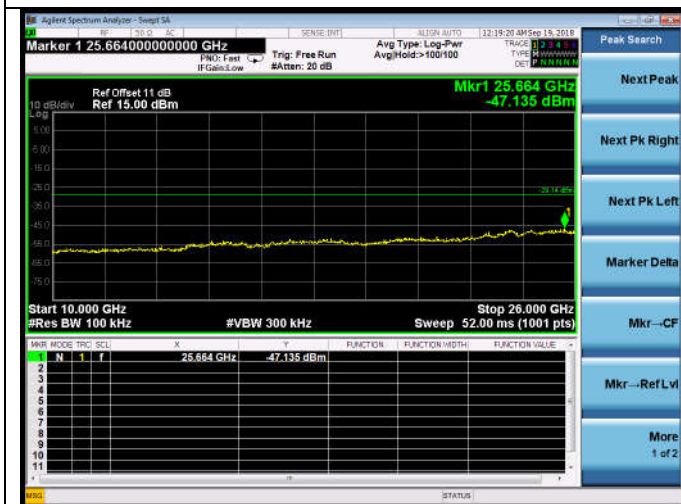
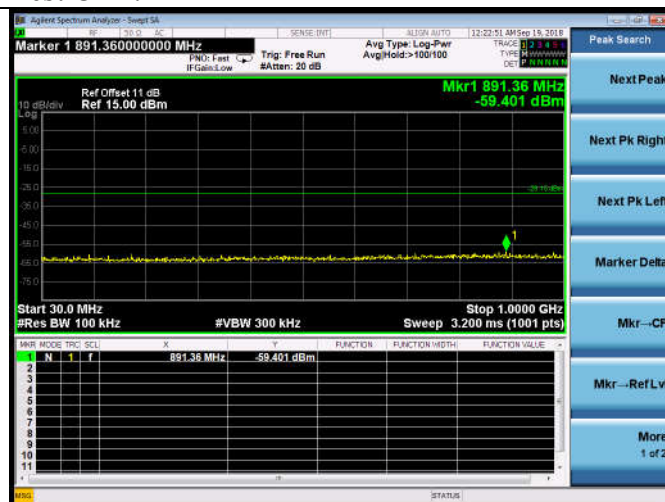
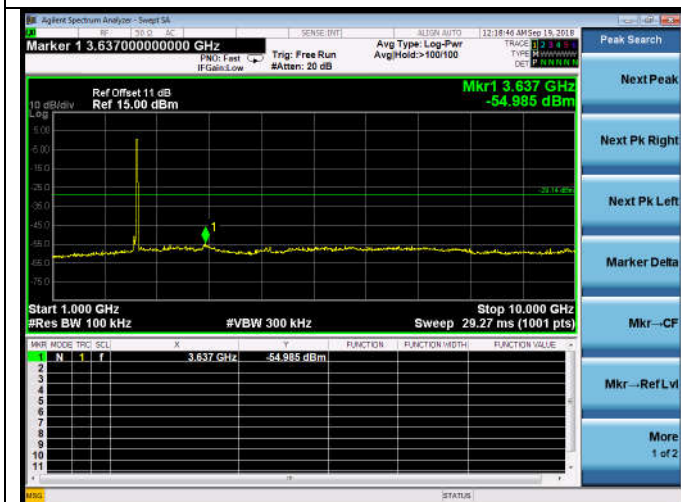
Test CH6: 2437MHz

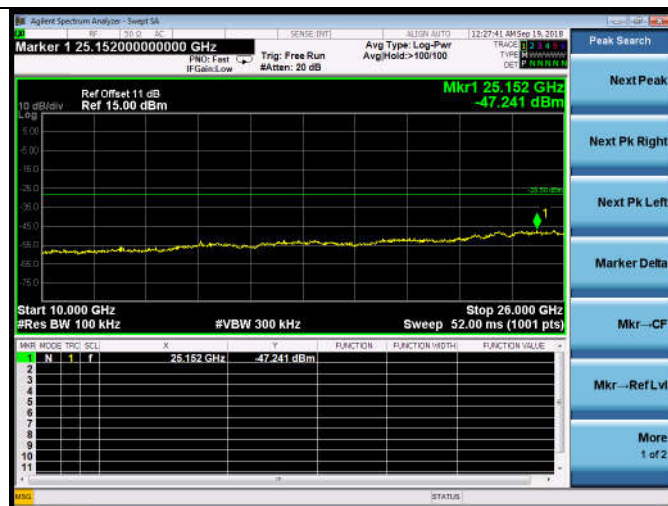
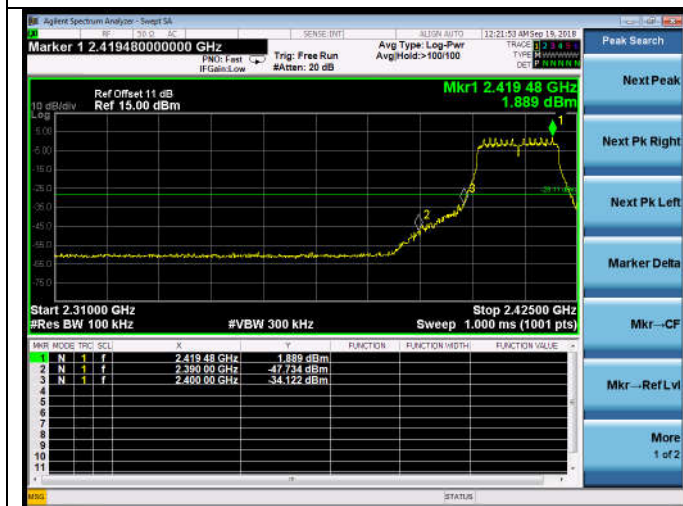
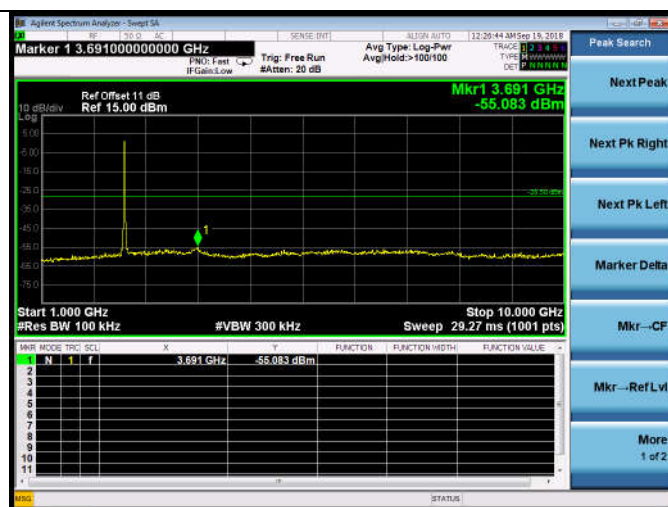
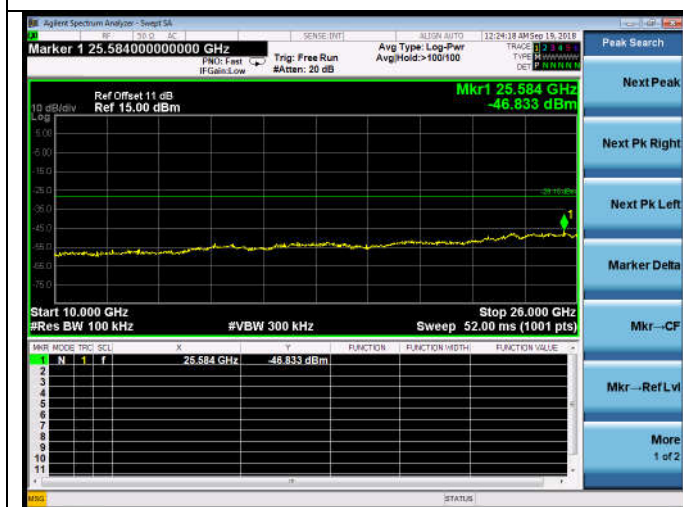


Test CH11: 2462MHz

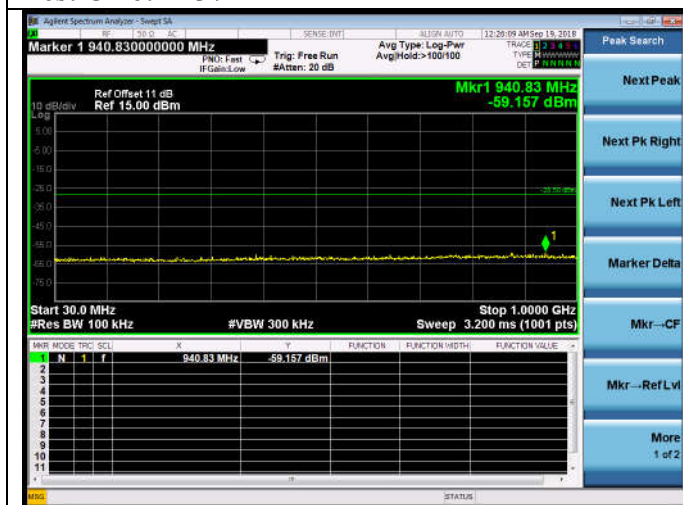


Test Mode: IEEE 802.11n HT20 Test CH1: 2412MHz





Test CH6: 2437MHz



Test CH11: 2462MHz

