FCC PART 15.407

TEST AND MEASUREMENT REPORT

For

Ruckus Wireless, Inc.

350 West Java Drive, Sunnyvale, CA 94089, USA

FCC ID: S9GT504
Model: T504

Report Type:	**Product Type:**
Original Report	802.11a/b/g/n/ac Access Point

Prepared By: Rui Zhou

Report Number: R1409183-407 W58

Report Date: 2015-02-19

Reviewed By: Bo Li
RF Lead

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Avenue,
Sunnyvale, CA 94089, USA
Tel: (408) 732-9162
Fax: (408) 732-9164

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1409183-407 W58	Initial	2015-02-19

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Ruckus Wireless, Inc.*, and their product FCC ID: S9GT504 or the "EUT" as referred to in this report. The EUT is an 802.11a/b/g/n/ac access point.

1.2 Mechanical Description of EUT

The EUT measures approximately 394 mm (L) x 216 mm (W) x 68 mm (H) and weighs approximately 2.5 kg.

The test data gathered are from typical production sample, serial number: *25140600007*

1.3 Objective

This report is prepared on behalf of *Ruckus Wireless, Inc.* in accordance with FCC CFR47 §15.407.

The objective is to determine compliance with FCC Part 15.407 for Output Power, Antenna Requirements, AC Line Conducted Emissions, Bandwidth, power spectral density, Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, 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.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025:2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009 and KDB-789033 D02 General UNII Test Procedures New Rules v01

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test utility used was *T504 ART* was provided by Ruckus Wireless Inc., and was verified by *Rui Zhou* to comply with the standard requirements being tested against.

2.3 Special Equipment

N/A

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E5420	CHZCMQ1

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Ruckus	Main Board (SANTORINI)	ASM 120-11266-001 rev.3.1	RUK03828
Ruckus	Cable Modem Board	2PB-C30600B0MWR	-
Ruckus	BIAS-T PCB(Power and RF Splitter) Board	FAQ 100-11273-001REV 3	-
Ruckus	Power Supply Board	10007275 REV E	-

2.7 Interface Ports and Cables

Cable Description	Length (m)	From	To
Ethernet Cable	1m	Laptop	EUT
RF Cable x2	<1m	EUT	PSA

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Ruckus	AC Power Supply	MPBS-12020000	740-64129-011

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.407(f), §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207	AC Power Line Conducted Emissions	Compliant
§15.209(a), 15.407(b)	Spurious Radiated Emissions	Compliant
§15.407(a)	Emission Bandwidth	Compliant
§407(a)	Output Power Measurement	Compliant
§2.1051, §15.407(b)	Band Edges	Compliant
§15.407(a)	Power Spectral Density	Compliant
§2.1051, §15.407(b)	Spurious Emissions at Antenna Terminals	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	N/A

4 FCC §2.1091 & §15.407(f) - RF Exposure

4.1 Applicable Standard

According to FCC §15.407(f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

5 GHz Band:

Maximum peak output power at antenna input terminal (dBm):	24.26
Maximum peak output power at antenna input terminal (mW):	266.7
Prediction distance (cm):	20
Prediction frequency (MHz):	5795
Maximum Antenna Gain, typical (dBi):	5
Maximum Antenna Gain (numeric):	3.162
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.1679
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

2.4 GHz:

Maximum peak output power at antenna input terminal (dBm):	24.92
Maximum peak output power at antenna input terminal (mW):	310.46
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	1.995
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.123
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

According to KDB 447498 D01 General RF Exposure Guidance v05r02, EUT has two 2.4 GHz band antenna and two 5 GHz band antenna. The power density for 2.4 GHz band is 0.123 (refer to T504 2.4 GHz band report R1409183-247). So the sum of MPE ratio for four antennas is: 0.1231 + 0.1679 = 0.2909, which is smaller than 1.0. So the colocation exposure exclusion applies.

5 FCC §15.203 – Antenna Requirements

5.3 Applicable Standard

According to FCC §15.203, 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.4 Antenna Description

The device has 2.4/5 GHz internal antennas. The Antenna gain is 3 dBi at 2.4 GHz and 5 dBi at 5 GHz. Please refer to the internal photos.

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1 Decreases with the logarithm of the frequency.

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

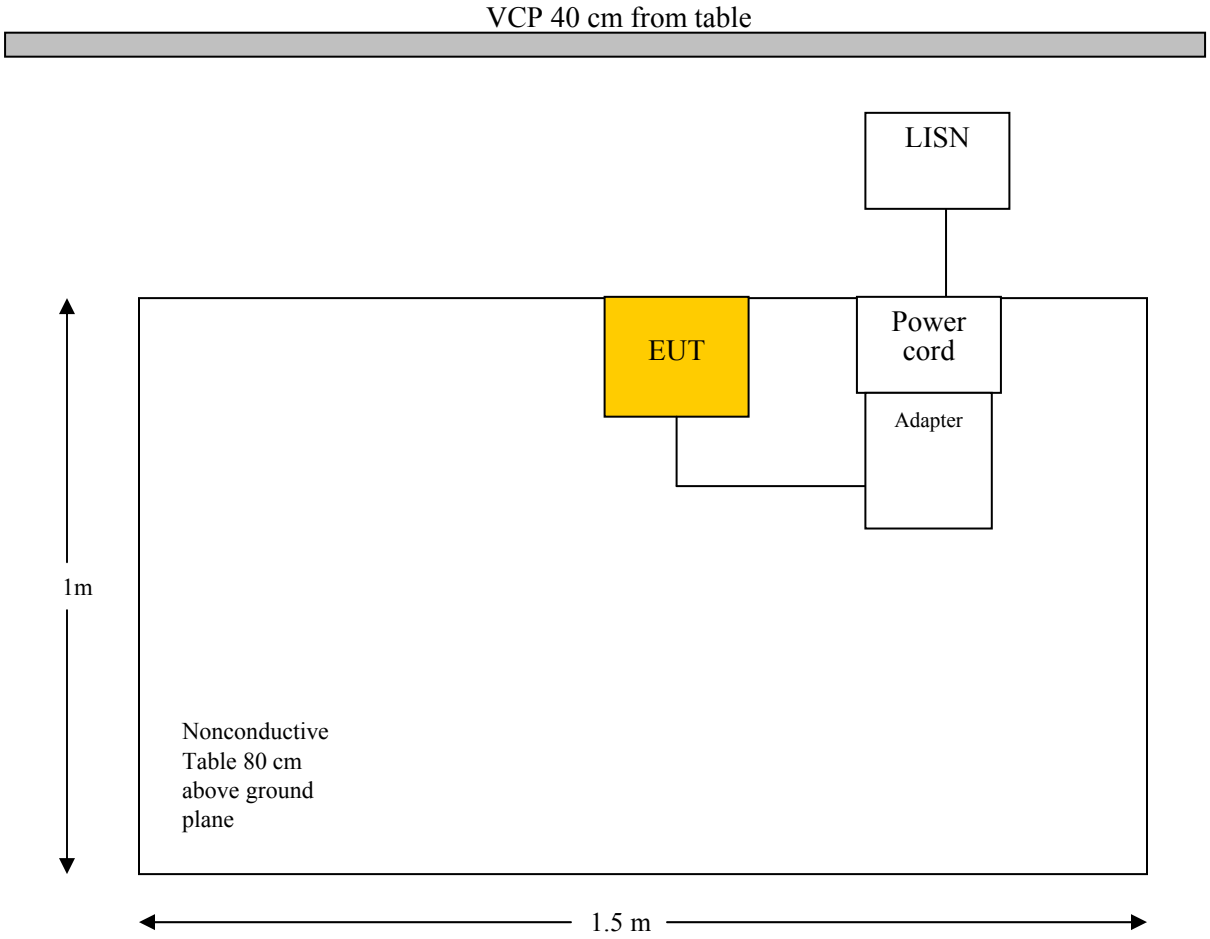
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2014-03-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511213	2014-07-14	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

6.7 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Rui Zhou on 2014-10-15 in 5 m chamber 3.

6.8 Summary of Test Results

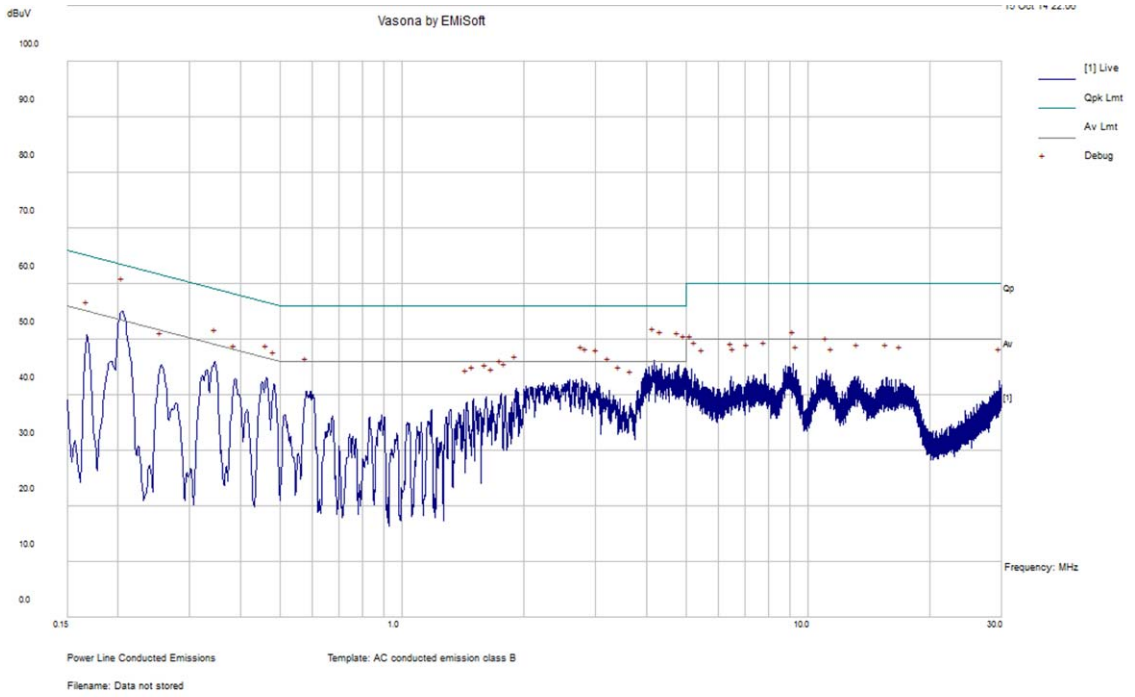
According to the recorded data in following table, the EUT complied with the FCC Part 15 standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-11.84	0.194769	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

Note: The EUT is transmitting at worst case: 2.4 GHz and 5 GHz colocation.

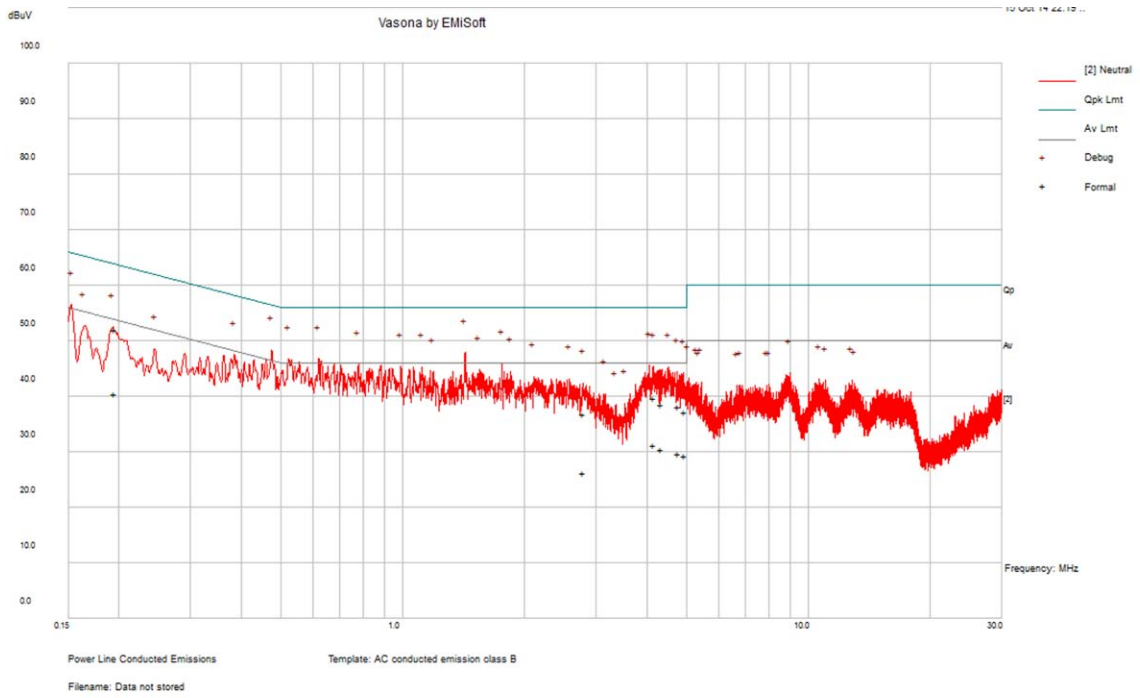
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.194769	51.99	Line	63.83	-11.84	QP
4.170098	39.75	Line	56	-16.25	QP
4.34813	38.59	Line	56	-17.41	QP
4.786835	38.25	Line	56	-17.75	QP
4.972067	37.28	Line	56	-18.72	QP
2.782478	36.82	Line	56	-19.18	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.194769	40.56	Line	53.83	-13.27	Ave.
4.170098	31.27	Line	46	-14.73	Ave.
4.34813	30.44	Line	46	-15.56	Ave.
4.786835	29.84	Line	46	-16.16	Ave.
4.972067	29.32	Line	46	-16.68	Ave.
2.782478	26.22	Line	46	-19.78	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.469209	34.95	Neutral	56.53	-21.57	QP
1.415133	35.01	Neutral	56	-20.99	QP
0.637149	25.41	Neutral	56	-30.59	QP
0.518499	27.96	Neutral	56	-28.04	QP
0.152601	43.04	Neutral	65.86	-22.81	QP
1.752492	35.42	Neutral	56	-20.58	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.469209	23.65	Neutral	46.53	-22.87	Ave.
1.415133	22.71	Neutral	46	-23.29	Ave.
0.637149	10.16	Neutral	46	-35.84	Ave.
0.518499	16.15	Neutral	46	-29.85	Ave.
0.152601	17.99	Neutral	55.86	-37.87	Ave.
1.752492	22.74	Neutral	46	-23.26	Ave.

7 FCC §15.209 & §15.407(b) - Spurious Radiated Emissions

7.3 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/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 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	3
Above 960	500	3

Note 1: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC Part 15.407 (b)

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

7.4 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C/15E limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.5 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

7.7 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2014-07-24	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2014-04-26	1 year
Agilent	Pre-amplifier	8449B	3008A01978	2014-02-04	1 year
WiseWave	Horn Antenna	ARH-4223-02	10555-01	2012-08-09	3 Years
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2013-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-10-28	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

7.8 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Rui Zhou on 2014-10-15 in 5 m chamber 3.

7.9 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.205, 15.209 and 15.407 standard's radiated emissions limits, and had the worst margin of:

30 MHz-1 GHz

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-3.44	31.693	Vertical	2.4 GHz and 5 GHz Colocation

Above 1 GHz

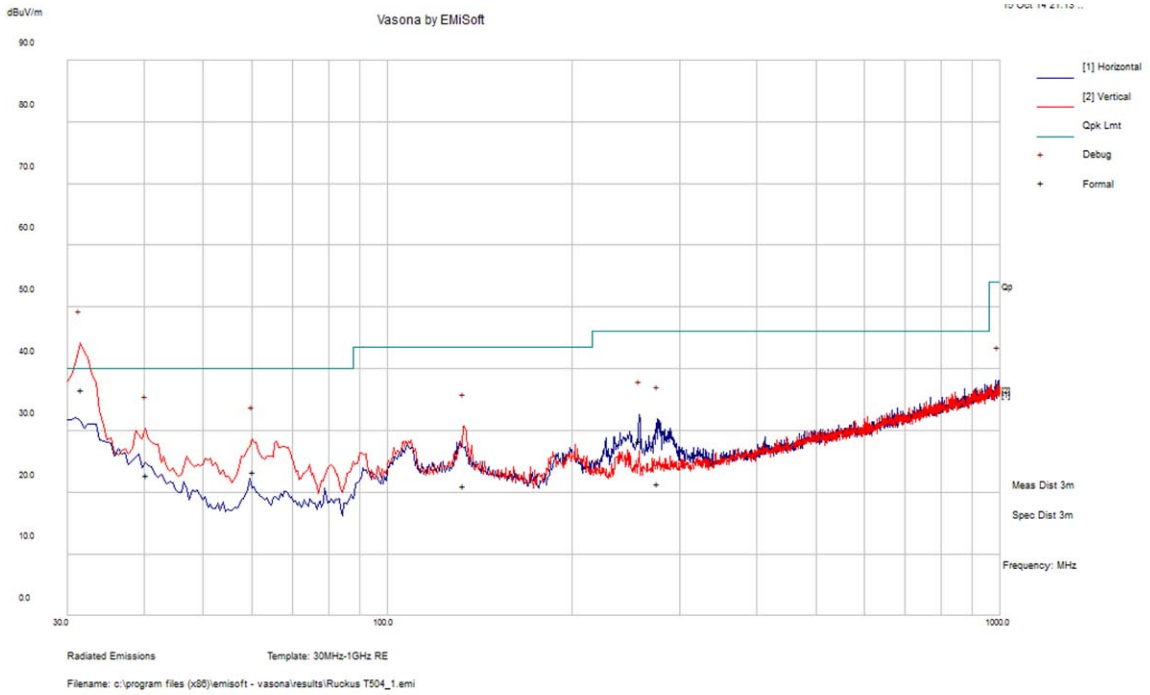
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-1.62	17235	Horizontal	1 - 40 GHz

Please refer to the following table and plots for specific test result details

7.10 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz

Note: The EUT is 2.4 GHz and 5 GHz Colocation.



Worst-Case:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment (PK/QP/Ave)
31.693	36.56	124	V	266	40	-3.44	QP
40.366	22.78	106	V	255	40	-17.22	QP
60.27425	23.31	108	V	112	40	-16.69	QP
133.0018	21.04	118	V	328	43.5	-22.46	QP
257.4115	28.29	129	H	139	46	-17.71	QP
275.671	21.42	148	H	140	46	-24.58	QP

2) 1–40 GHz

W58 Band

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
11490	45.15	0	100	V	39.1	6.2	33.87	56.58	74	-17.42	Peak
11490	45.98	0	100	H	39.1	6.2	33.87	57.41	74	-16.59	Peak
11490	33.19	0	100	V	39.1	6.2	33.87	44.62	54	-9.38	Ave
11490	33.21	0	100	H	39.1	6.2	33.87	44.64	54	-9.36	Ave
17235	47.98	0	100	V	46.3	8.3	33.82	68.76	74	-5.24	Peak
17235	47.81	0	100	H	46.3	8.3	33.82	68.59	74	-5.41	Peak
17235	32.02	0	100	V	45.3	8.3	33.82	51.8	54	-2.2	Ave
17235	32.07	0	100	H	45.3	8.3	33.82	51.85	54	-2.15	Ave
22980	48.55	0	100	V	35.22	9.7	34.79	58.68	74	-15.32	Peak
22980	48.25	0	100	H	35.22	9.7	34.79	58.38	74	-15.62	Peak
22980	35.62	0	100	V	35.22	9.7	34.79	45.75	54	-8.25	Ave
22980	35.65	0	100	H	35.22	9.7	34.79	45.78	54	-8.22	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	45.80	0	100	V	39.4	6.2	33.87	57.53	74	-16.47	Peak
11570	46.10	0	100	H	39.4	6.2	33.87	57.83	74	-16.17	Peak
11570	34.14	0	100	V	39.4	6.2	33.87	45.87	54	-8.13	Ave
11570	33.68	0	100	H	39.4	6.2	33.87	45.41	54	-8.59	Ave
17355	48.04	0	100	V	48.3	8.4	33.82	70.92	74	-3.08	Peak
17355	48.56	0	100	H	48.3	8.4	33.82	71.44	74	-2.56	Peak
17355	31.94	0	100	V	45.3	8.4	33.82	51.82	54	-2.18	Ave
17355	32.01	0	100	H	45.3	8.4	33.82	51.89	54	-2.11	Ave
23140	48.19	0	100	V	35.27	9.4	34.74	58.12	74	-15.88	Peak
23140	47.62	0	100	H	35.27	9.4	34.74	57.55	74	-16.45	Peak
23140	35.26	0	100	V	35.27	9.4	34.74	45.19	54	-8.81	Ave
23140	34.74	0	100	H	35.27	9.4	34.74	44.67	54	-9.33	Ave
High Channel 5825 MHz, measured at 3 meters											
11650	44.95	0	100	V	39.4	6.2	34.27	56.28	74	-17.72	Peak
11650	45.58	0	100	H	39.4	6.2	34.27	56.91	74	-17.09	Peak
11650	33.06	0	100	V	39.4	6.2	34.27	44.39	54	-9.61	Ave
11650	32.52	0	100	H	39.4	6.2	34.27	43.85	54	-10.15	Ave
17475	47.54	0	100	V	45.3	8.4	33.78	67.46	74	-6.54	Peak
17475	46.98	0	100	H	45.3	8.4	33.78	66.90	74	-7.10	Peak
17475	31.69	0	100	V	45.3	8.4	33.78	51.61	54	-2.39	Ave
17475	31.65	0	100	H	45.3	8.4	33.78	51.57	54	-2.43	Ave
23300	48.68	0	100	V	35.3	9.7	34.71	58.97	74	-15.03	Peak
23300	48.78	0	100	H	35.3	9.7	34.71	59.07	74	-14.93	Peak
23300	36.60	0	100	V	35.3	9.7	34.71	46.89	54	-7.11	Ave
23300	35.82	0	100	H	35.3	9.7	34.71	46.11	54	-7.89	Ave

802.11n-HT 20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
11490	46.10	0	100	V	39.1	6.2	33.87	57.53	74	-16.47	Peak
11490	46.21	0	100	H	39.1	6.2	33.87	57.64	74	-16.36	Peak
11490	34.08	0	100	V	39.1	6.2	33.87	45.51	54	-8.49	Ave
11490	33.67	0	100	H	39.1	6.2	33.87	45.10	54	-8.90	Ave
17235	48.82	0	100	V	46.3	8.3	33.82	69.60	74	-4.40	Peak
17235	48.68	0	100	H	46.3	8.3	33.82	69.46	74	-4.54	Peak
17235	32.02	0	100	V	45.3	8.3	33.82	51.80	54	-2.20	Ave
17235	32.60	0	100	H	45.3	8.3	33.82	52.38	54	-1.62	Ave
22980	47.97	0	100	V	35.22	9.7	34.79	58.10	74	-15.90	Peak
22980	47.64	0	100	H	35.22	9.7	34.79	57.77	74	-16.23	Peak
22980	35.47	0	100	V	35.22	9.7	34.79	45.60	54	-8.40	Ave
22980	35.26	0	100	H	35.22	9.7	34.79	45.39	54	-8.61	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	44.98	0	100	V	39.4	6.2	33.87	56.71	74	-17.29	Peak
11570	45.14	0	100	H	39.4	6.2	33.87	56.87	74	-17.13	Peak
11570	32.86	0	100	V	39.4	6.2	33.87	44.59	54	-9.41	Ave
11570	32.47	0	100	H	39.4	6.2	33.87	44.20	54	-9.80	Ave
17355	47.05	0	100	V	48.3	8.4	33.82	69.93	74	-4.07	Peak
17355	46.91	0	100	H	48.3	8.4	33.82	69.79	74	-4.21	Peak
17355	31.85	0	100	V	45.3	8.4	33.82	51.73	54	-2.27	Ave
17355	31.94	0	100	H	45.3	8.4	33.82	51.82	54	-2.18	Ave
23140	49.16	0	100	V	35.27	9.4	34.74	59.09	74	-14.91	Peak
23140	48.68	0	100	H	35.27	9.4	34.74	58.61	74	-15.39	Peak
23140	36.12	0	100	V	35.27	9.4	34.74	46.05	54	-7.95	Ave
23140	35.75	0	100	H	35.27	9.4	34.74	45.68	54	-8.32	Ave
High Channel 5825 MHz, measured at 3 meters											
11650	45.20	0	100	V	39.4	6.2	34.27	56.53	74	-17.47	Peak
11650	46.90	0	100	H	39.4	6.2	34.27	58.23	74	-15.77	Peak
11650	33.50	0	100	V	39.4	6.2	34.27	44.83	54	-9.17	Ave
11650	33.58	0	100	H	39.4	6.2	34.27	44.91	54	-9.09	Ave
17475	48.86	0	100	V	45.3	8.4	33.78	68.78	74	-5.22	Peak
17475	48.42	0	100	H	45.3	8.4	33.78	68.34	74	-5.66	Peak
17475	31.43	0	100	V	45.3	8.4	33.78	51.35	54	-2.65	Ave
17475	31.72	0	100	H	45.3	8.4	33.78	51.64	54	-2.36	Ave
23300	48.10	0	100	V	35.3	9.7	34.71	58.39	74	-15.61	Peak
23300	47.67	0	100	H	35.3	9.7	34.71	57.96	74	-16.04	Peak
23300	35.21	0	100	V	35.3	9.7	34.71	45.50	54	-8.50	Ave
23300	34.89	0	100	H	35.3	9.7	34.71	45.18	54	-8.82	Ave

802.11n-HT40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz, measured at 3 meters											
11510	45.61	0	100	V	39.1	4.07	33.87	54.91	74	-19.09	Peak
11510	46.29	0	100	H	39.1	4.07	33.87	55.59	74	-18.41	Peak
11510	33.93	0	100	V	39.1	4.07	33.87	43.23	54	-10.77	Ave
11510	33.34	0	100	H	39.1	4.07	33.87	42.64	54	-11.36	Ave
17265	48.59	0	100	V	48.3	5.17	33.82	68.24	74	-5.76	Peak
17265	48.20	0	100	H	48.3	5.17	33.82	67.85	74	-6.15	Peak
17265	32.12	0	100	V	45.3	5.17	33.82	48.77	54	-5.23	Ave
17265	32.46	0	100	H	45.3	5.17	33.82	49.11	54	-4.89	Ave
23020	48.19	0	100	V	35.21	6.04	34.79	54.65	74	-19.35	Peak
23020	47.64	0	100	H	35.21	6.04	34.79	54.10	74	-19.90	Peak
23020	35.23	0	100	V	35.21	6.04	34.79	41.69	54	-12.31	Ave
23020	35.06	0	100	H	35.21	6.04	34.79	41.52	54	-12.48	Ave
High Channel 5795 MHz, measured at 3 meters											
11590	45.27	0	100	V	39.4	4.07	34.27	54.47	74	-19.53	Peak
11590	46.29	0	100	H	39.4	4.07	34.27	55.49	74	-18.51	Peak
11590	34.13	0	100	V	39.4	4.07	34.27	43.33	54	-10.67	Ave
11590	33.60	0	100	H	39.4	4.07	34.27	42.80	54	-11.20	Ave
17385	48.90	0	100	V	50.5	5.17	33.78	70.79	74	-3.21	Peak
17385	47.89	0	100	H	50.5	5.17	33.78	69.78	74	-4.22	Peak
17385	32.13	0	100	V	45.3	5.17	33.78	48.82	54	-5.18	Ave
17385	32.37	0	100	H	45.3	5.17	33.78	49.06	54	-4.94	Ave
23180	48.39	0	100	V	35.27	6.04	34.71	54.99	74	-19.01	Peak
23180	48.16	0	100	H	35.27	6.04	34.71	54.76	74	-19.24	Peak
23180	35.48	0	100	V	35.27	6.04	34.71	42.08	54	-11.92	Ave
23180	35.57	0	100	H	35.27	6.04	34.71	42.17	54	-11.83	Ave

802.11ac-VHT80 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5775 MHz, measured at 3 meters											
11550	45.71	0	100	V	39.1	4.07	33.87	55.01	74	-18.99	Peak
11550	46.78	0	100	H	39.1	4.07	33.87	56.08	74	-17.92	Peak
11550	33.29	0	100	V	39.1	4.07	33.87	42.59	54	-11.41	Ave
11550	33.56	0	100	H	39.1	4.07	33.87	42.86	54	-11.14	Ave
17325	48.40	0	100	V	48.3	5.17	33.82	68.05	74	-5.95	Peak
17325	48.76	0	100	H	48.3	5.17	33.82	68.41	74	-5.59	Peak
17325	31.63	0	100	V	45.3	5.17	33.82	48.28	54	-5.72	Ave
17325	31.35	0	100	H	45.3	5.17	33.82	48.00	54	-6.00	Ave
23100	48.30	0	100	V	35.21	6.04	34.79	54.76	74	-19.24	Peak
23100	47.47	0	100	H	35.21	6.04	34.79	53.93	74	-20.07	Peak
23100	35.57	0	100	V	35.21	6.04	34.79	42.03	54	-11.97	Ave
23100	34.71	0	100	H	35.21	6.04	34.79	41.17	54	-12.83	Ave

8 FCC §15.407(e) – Emission Bandwidth

8.3 Applicable Standards

FCC §15.407(a)

8.4 Measurement Procedure

The measurements are base on FCC KDB 789033 D01 General UNII Test Procedures v01r03: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section C: Emission bandwidth and section D: 99 Percent Occupied Bandwidth

8.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.*

8.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Rui Zhou from 2014-10-15 at RF site.

8.7 Test Results

Please refer to the following tables and plots.

W58 Band

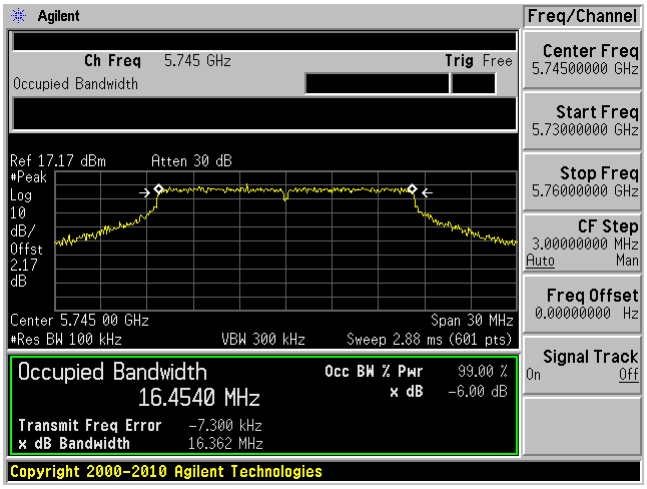
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)		Results
		J0	J1	J0	J1	
802.11a mode						
Low	5745	16.362	16.429	16.454	16.4409	Compliant
Middle	5785	16.532	16.51	16.4607	16.4573	Compliant
High	5825	16.549	16.538	16.4371	16.4347	Compliant
802.11n-HT20 mode						
Low	5745	17.732	17.799	17.6231	17.6455	Compliant
Middle	5785	17.814	17.784	17.6559	17.6583	Compliant
High	5825	17.82	17.738	17.6827	17.6908	Compliant
802.11n-HT40 mode						
Low	5755	36.48	36.466	36.2222	36.2013	Compliant
High	5795	36.515	36.391	36.2225	36.2043	Compliant
802.11ac-VHT80 mode						
-	5775	75.917	75.531	75.5048	75.5163	Compliant

W58 Band

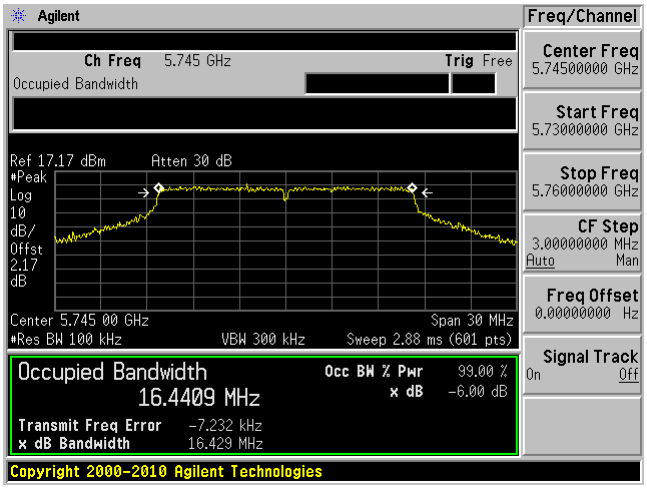
802.11a Mode

Low Channel, 5745 MHz

Chain 0

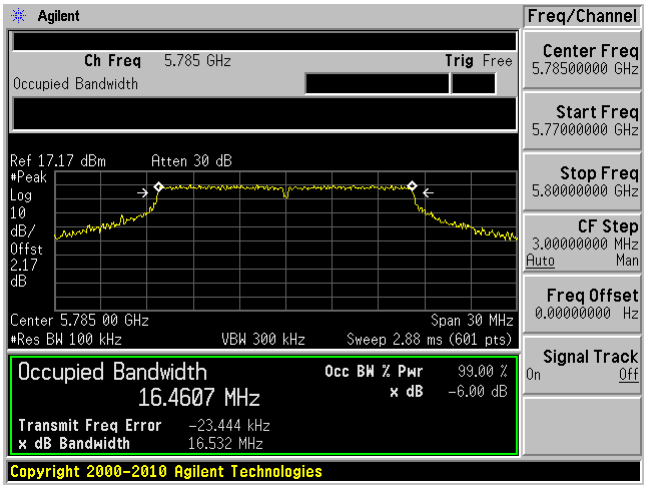


Chain 1

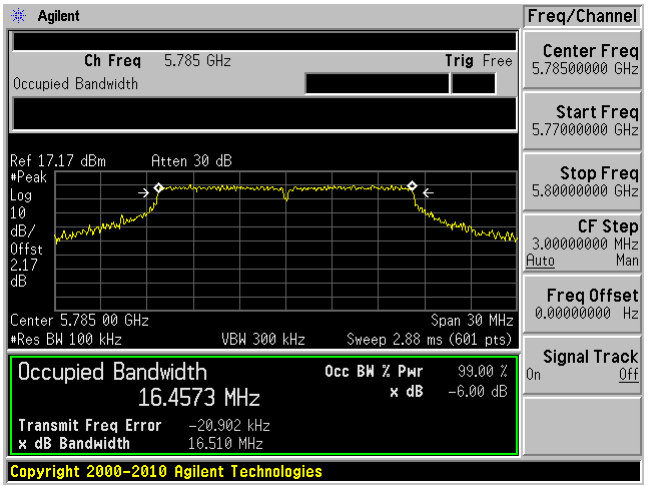


Middle Channel, 5785 MHz

Chain 0

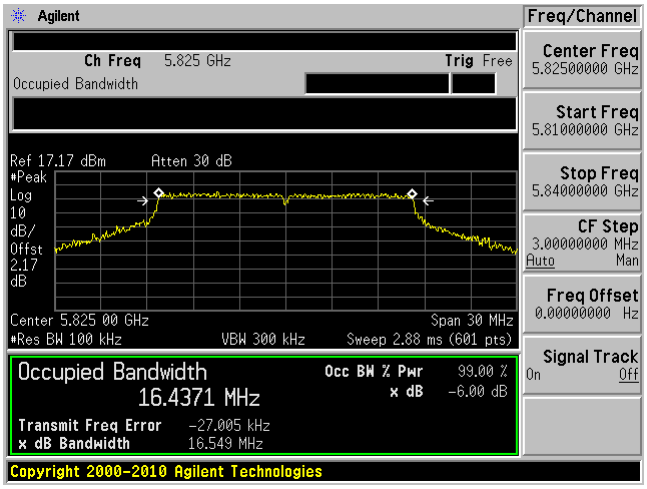


Chain 1

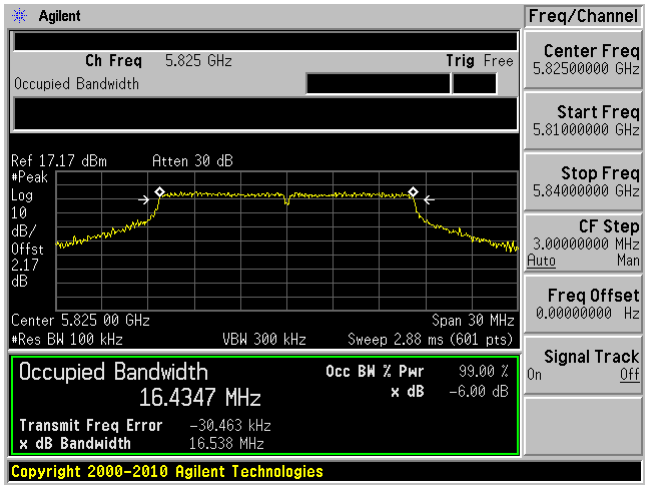


High Channel, 5825 MHz

Chain 0



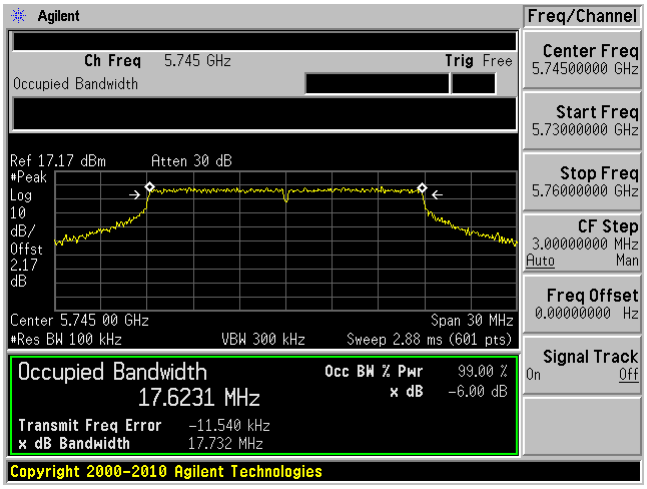
Chain 1



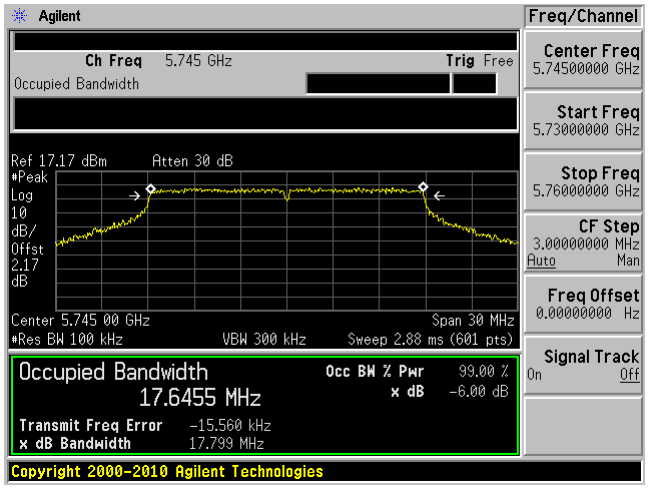
802.11n-HT 20 Mode

Low Channel 5745 MHz

Chain 0

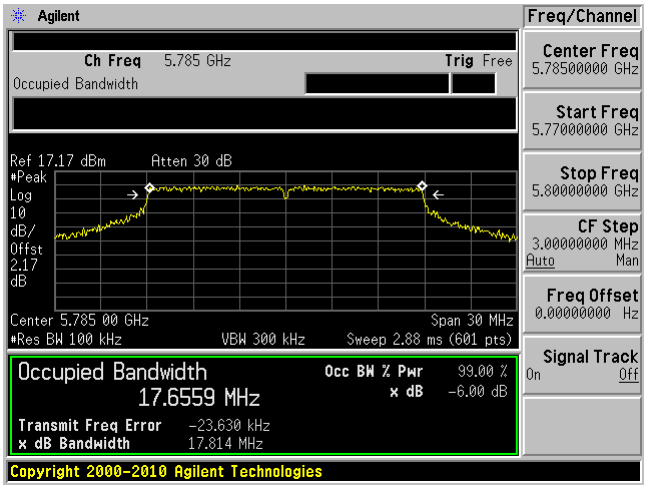


Chain 1

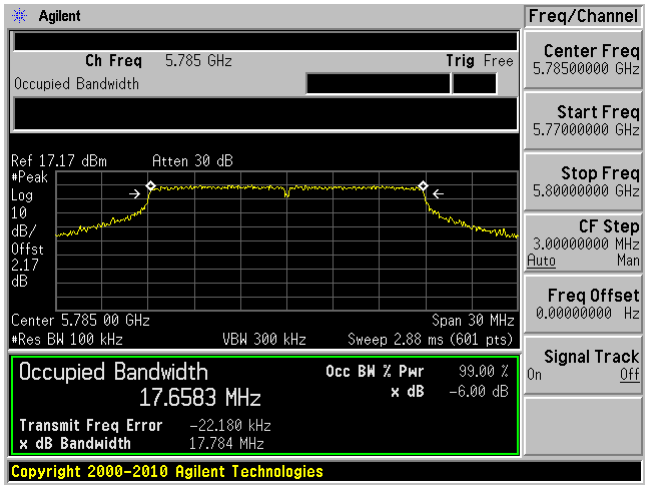


Middle Channel 5785 MHz

Chain 0

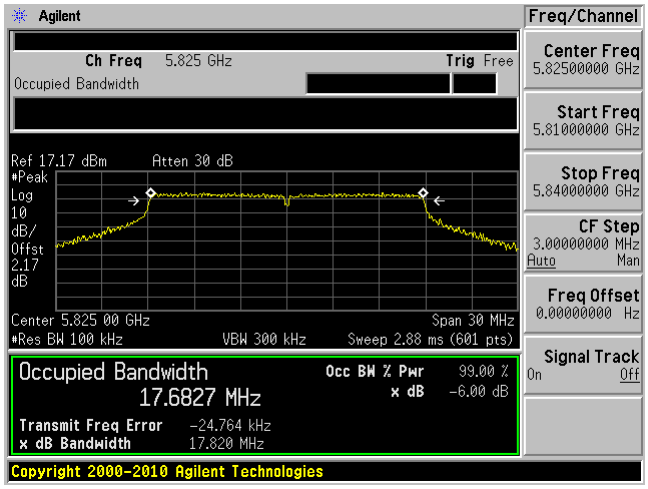


Chain 1

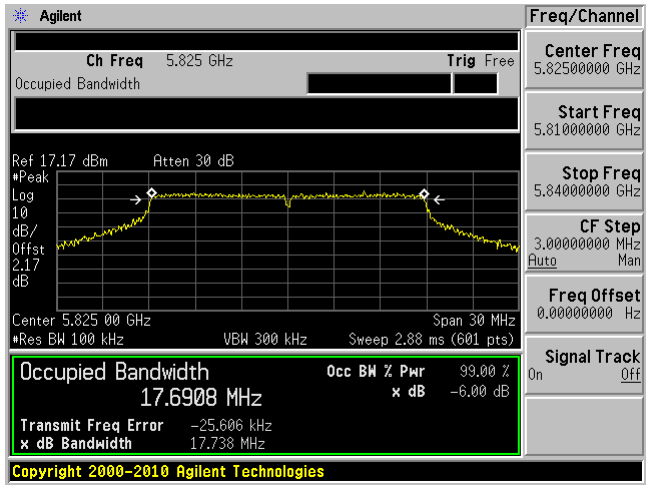


High Channel, 5825 MHz

Chain 0



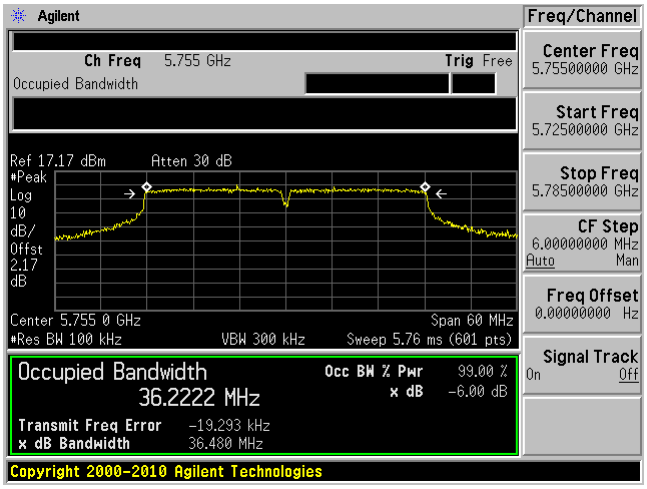
Chain 1



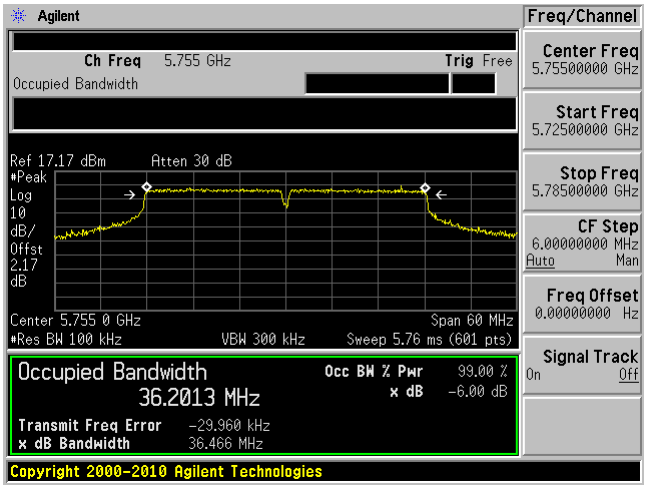
802.11n-HT40 Mode

Low Channel 5755 MHz

Chain 0

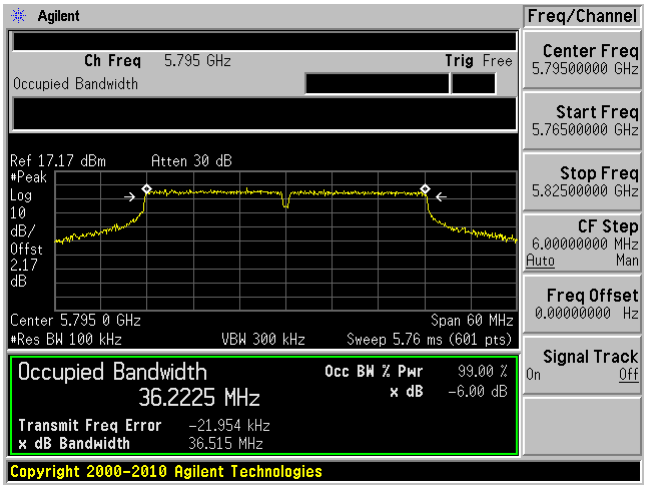


Chain 1

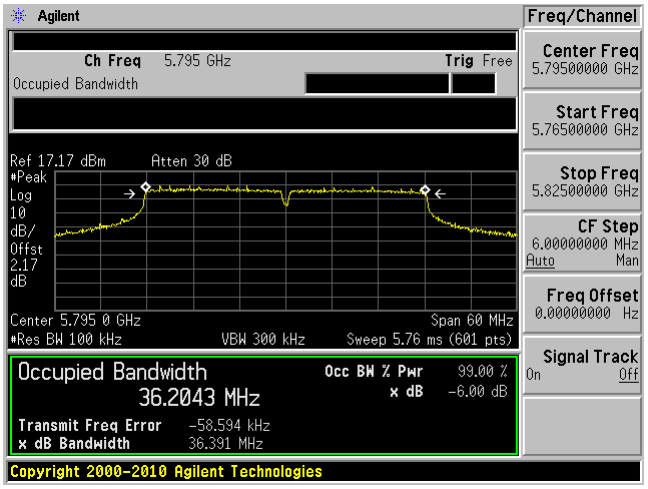


High Channel 5795 MHz

Chain 0

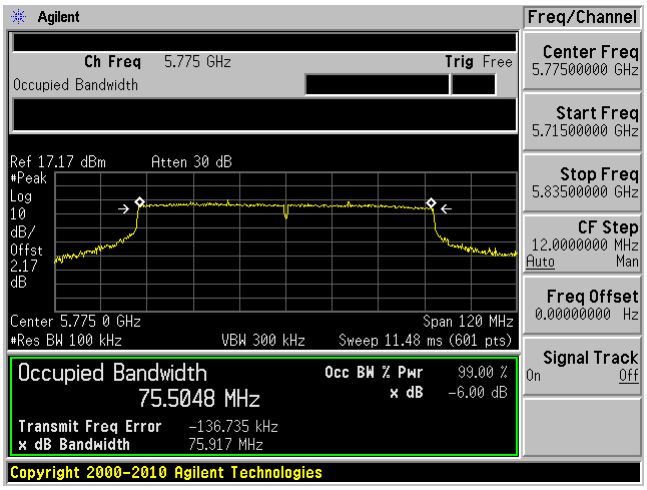


Chain 1

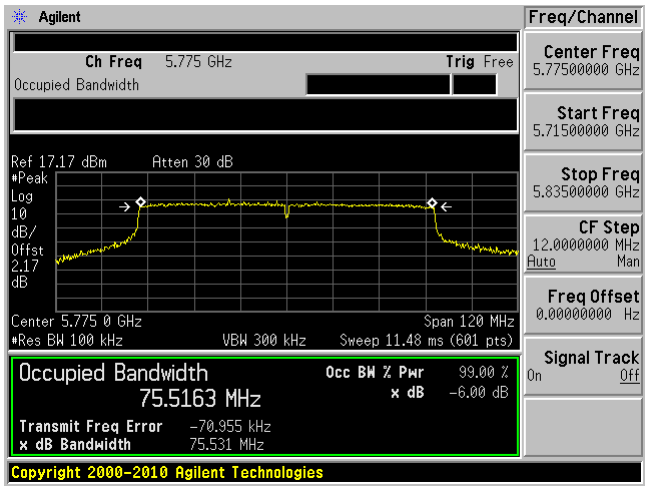


802.11ac-VHT80 Mode

Chain 0



Chain 1



9 FCC §407(a) – Output Power

9.3 Applicable Standards

According to FCC §15.407(a)

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.4 Measurement Procedure

Test measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORAMTION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

9.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.*

9.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Rui Zhou from 2014-10-15 at RF site.

9.7 Test Results

W58 Band

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	Limit (dBm)	Result	Power Setting
		Chain J0	Chain J1				
802.11a mode							
Low	5745	18.8	19.05	21.94	30	Pass	20
Middle	5785	19.71	19.78	22.76	30	Pass	21
High	5825	14.88	15.59	18.26	30	Pass	16
802.11n-HT20 mode							
Low	5745	19.3	19.69	22.51	30	Pass	20
Middle	5785	20.22	20.23	23.24	30	Pass	21
High	5825	14.73	15.25	18.01	30	Pass	16
802.11n-HT40 mode							
Low	5755	19.39	19.54	22.48	30	Pass	20
High	5795	21.26	21.24	24.26	30	Pass	target
802.11ac-VHT80 mode							
-	5775	14.86	14.94	17.91	30	Pass	16

10 FCC §15.407(b) - Out of Band Emissions

10.3 Applicable Standard

According to FCC §15.407(b)

(b)(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.
(b)(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

10.4 Measurement Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORAMTION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

10.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.*

10.6 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-10-15 at RF site.

10.7 Test Results

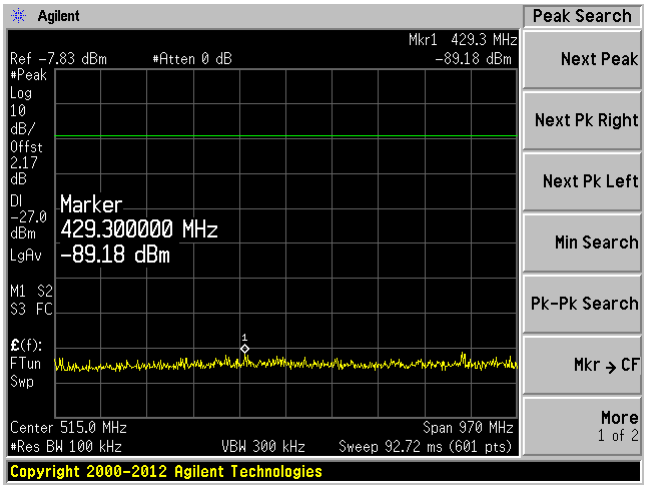
Please refer to the following plots.

Note: the offset include the attenuation, cable loss and the magin between limit line and the emission covers antenna gain and other requirements in the KDB 789033.

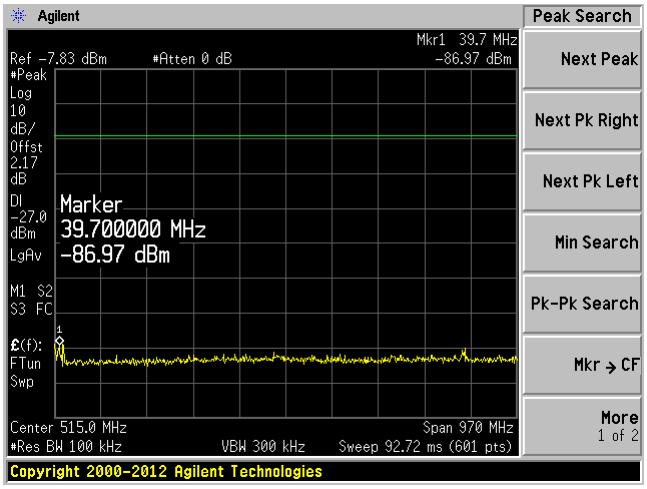
Conducted Spurious Emission from 30 MHz - 40 GHz, 5.8 GHz Band

802.11a Mode Low Channel 5745MHz

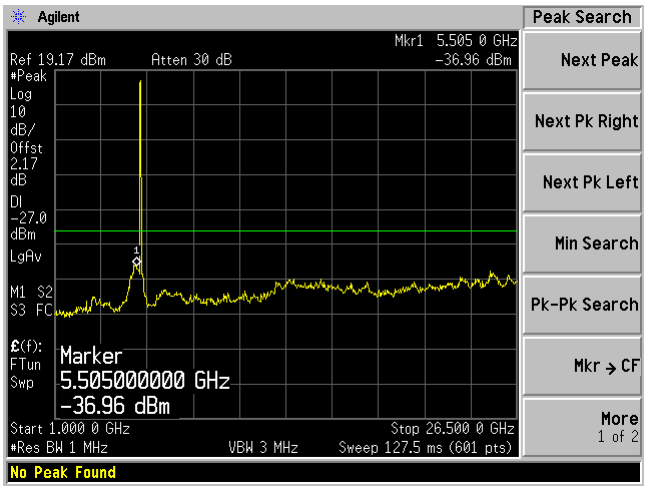
Chain 0, Plot: 30 MHz – 1 GHz



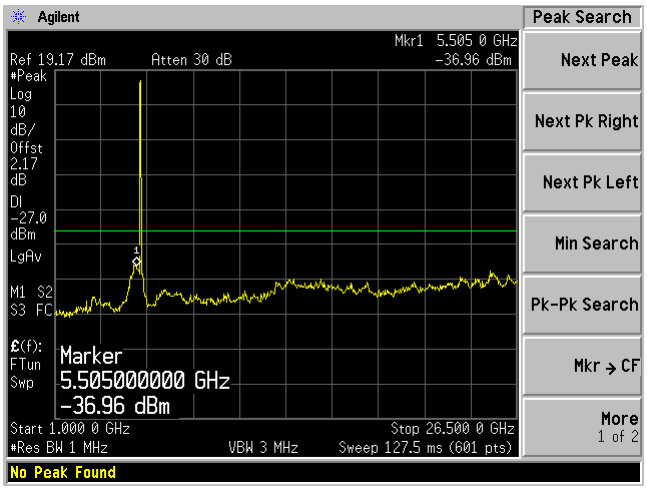
Chain 1, Plot: 30 MHz – 1 GHz



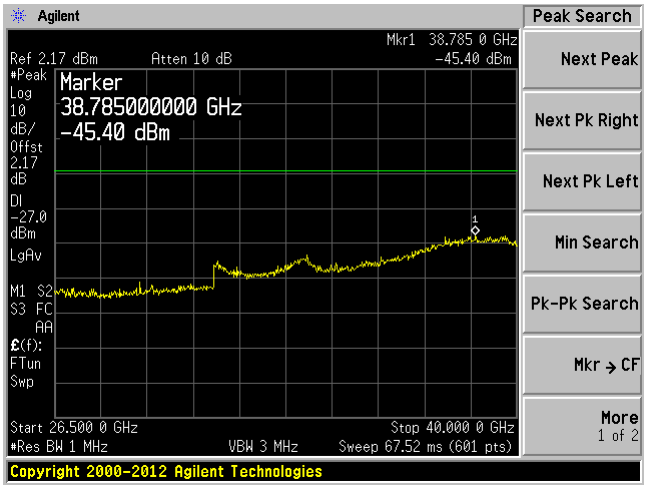
Chain 0, Plot: 1 GHz –26 GHz



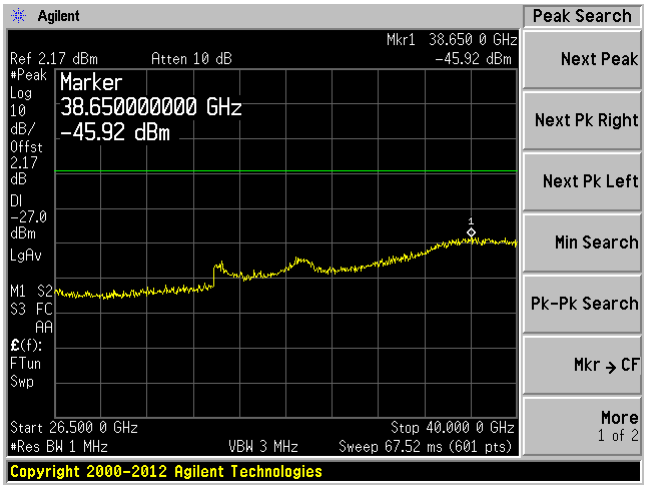
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



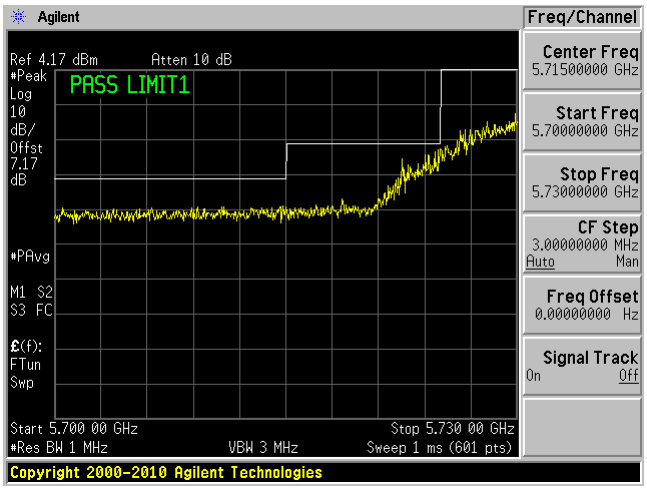
Chain 1, Plot: 26 GHz – 40 GHz



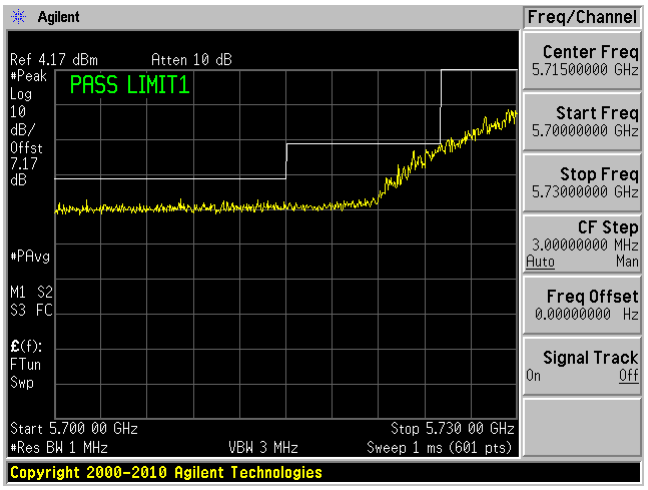
10 MHz Band Edge Emission Mask

802.11a, Low Channel, 5745 MHz

Chain 0

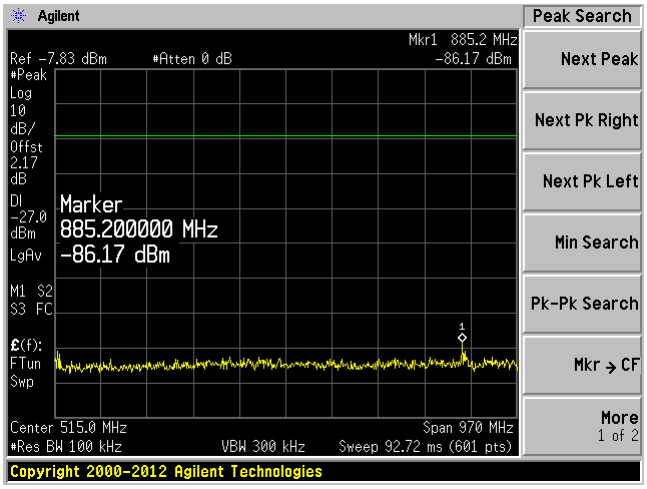


Chain 1

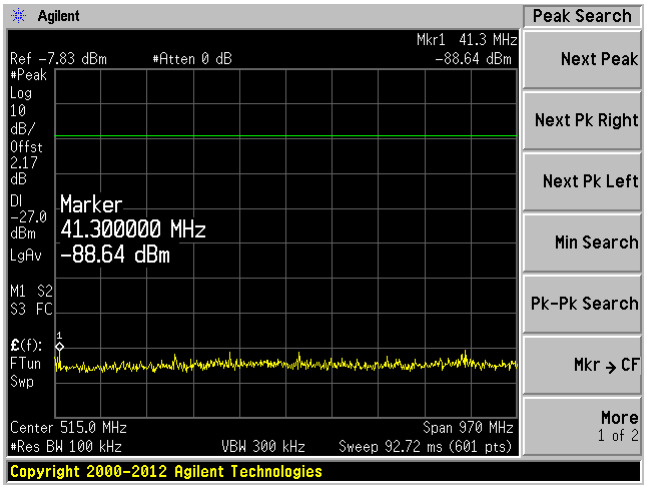


802.11a Mode Mid Channel 5785 MHz

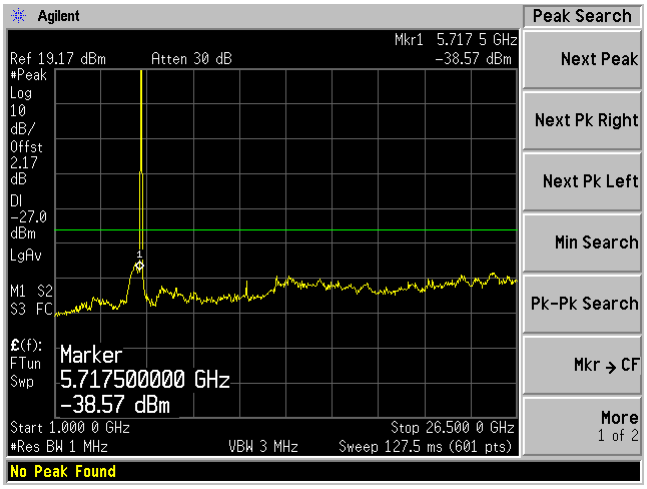
Chain 0, Plot: 30 MHz – 1 GHz



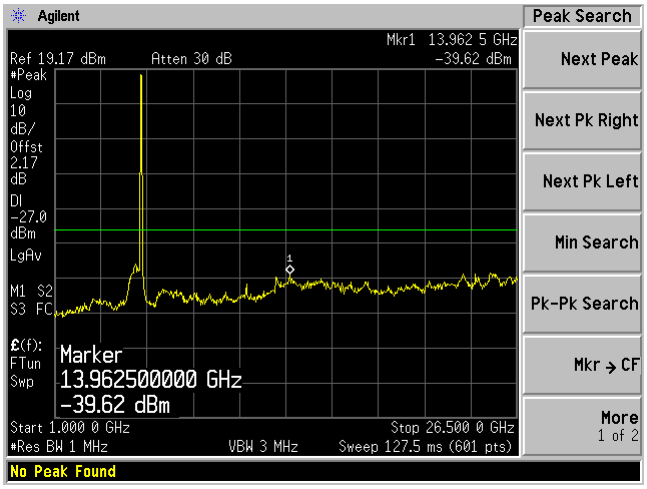
Chain 1, Plot: 30 MHz – 1 GHz



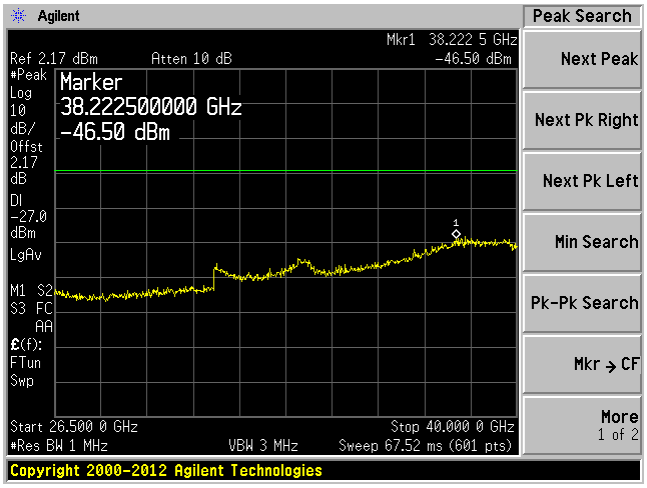
Chain 0, Plot: 1 GHz –26 GHz



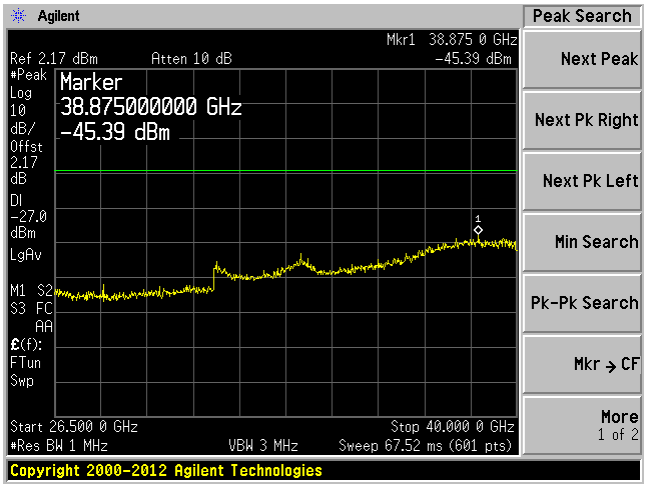
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz

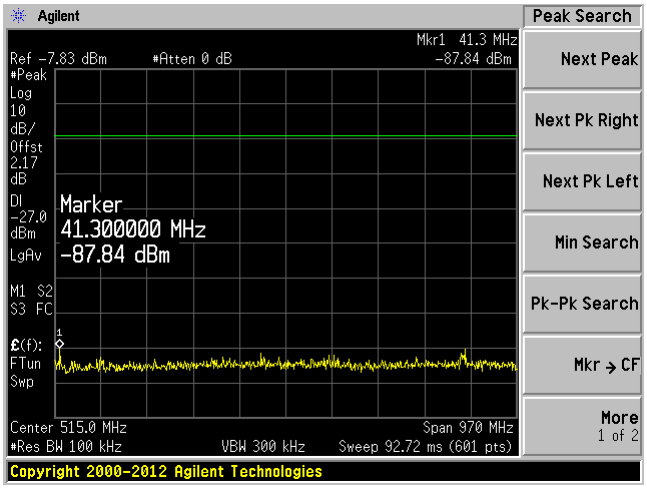


Chain 1, Plot: 26 GHz – 40 GHz

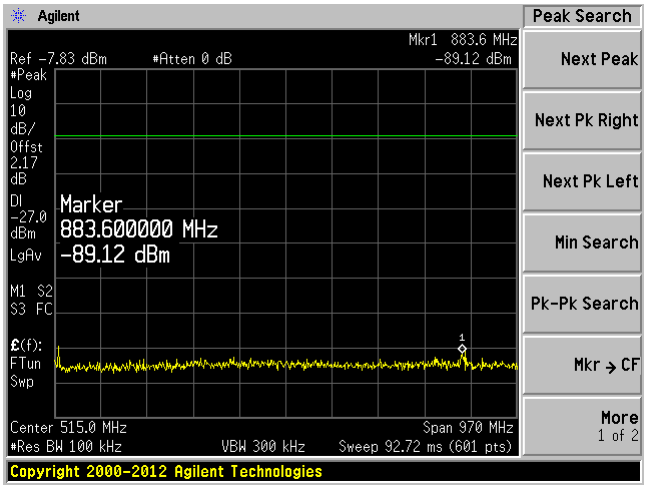


802.11a Mode High Channel 5825 MHz

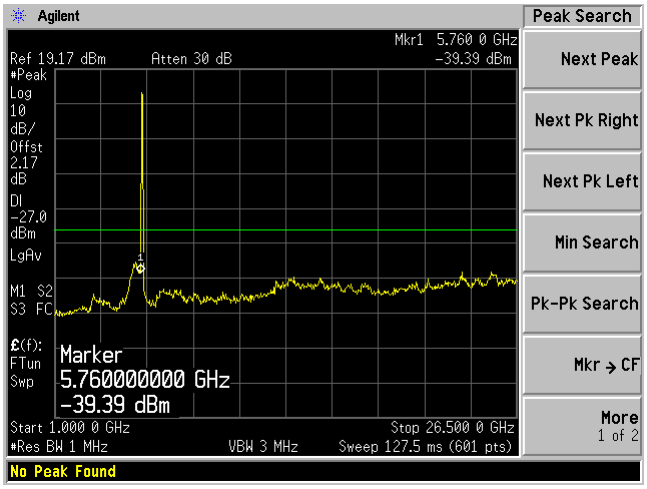
Chain 0, Plot: 30 MHz – 1 GHz



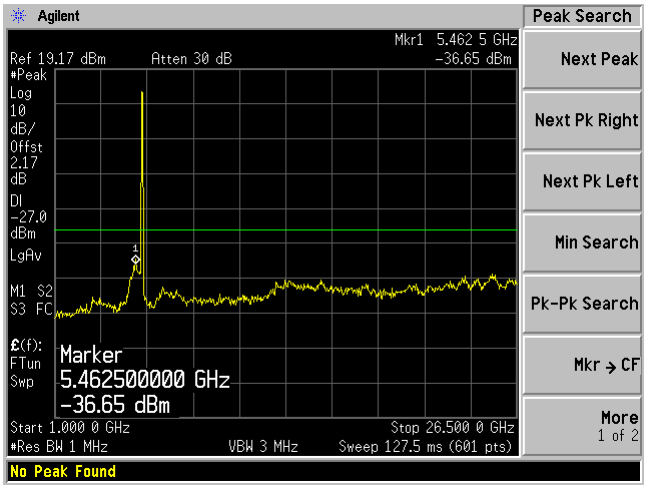
Chain 1, Plot: 30 MHz – 1 GHz



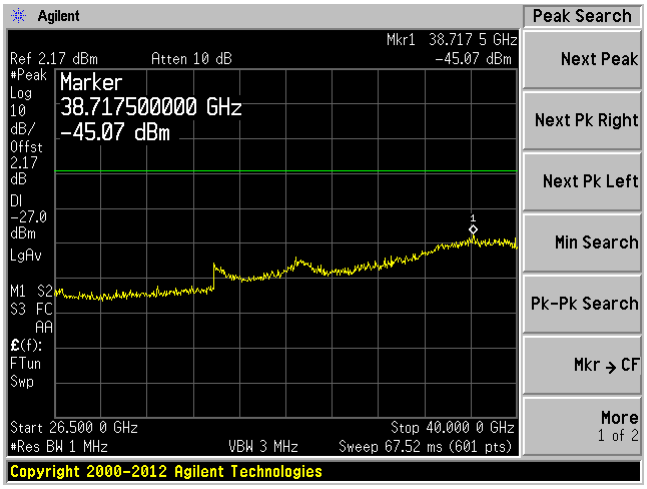
Chain 0, Plot: 1 GHz –26 GHz



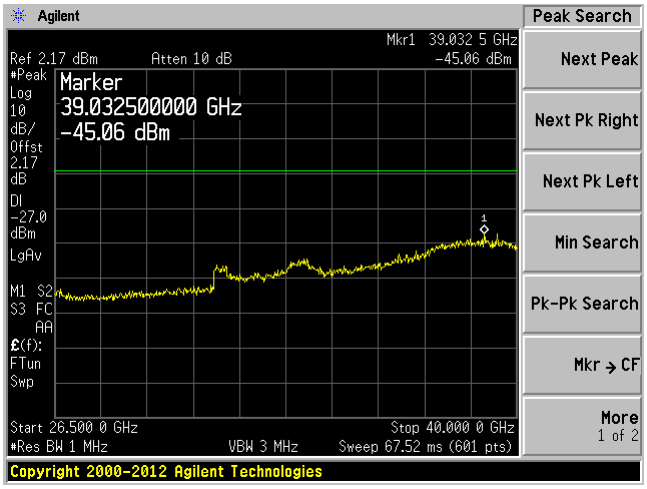
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



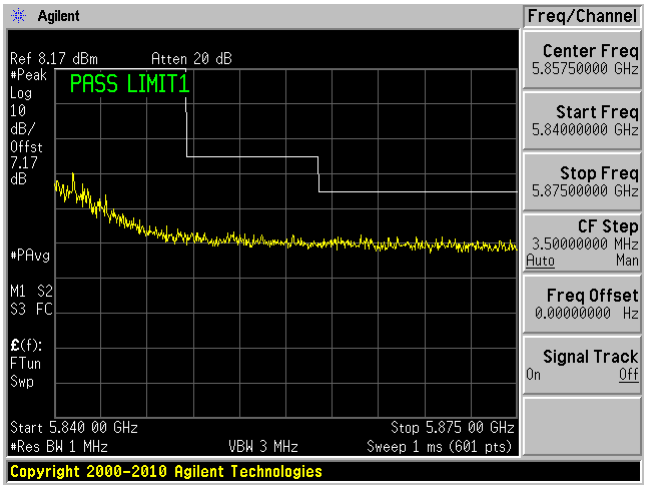
Chain 1, Plot: 26 GHz – 40 GHz



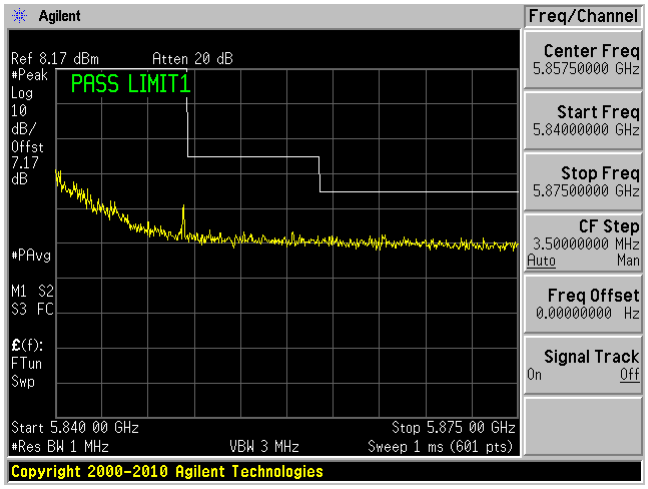
10 MHz Band Edge Emission Mask

802.11a, High Channel, 5825 MHz

Chain 0

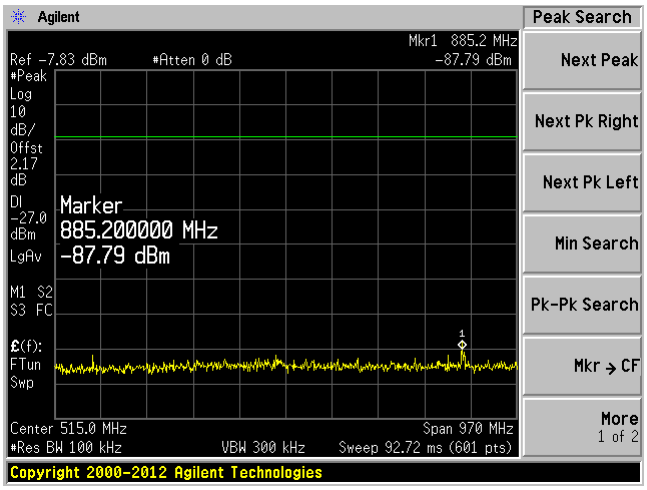


Chain 1

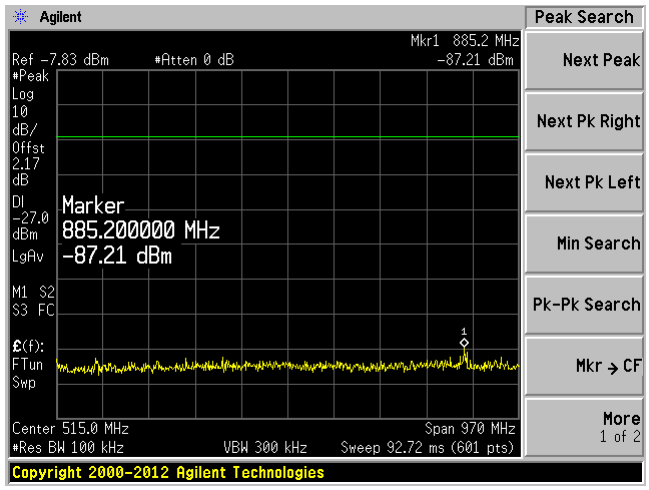


802.11n-HT20 Mode Low Channel 5745MHz

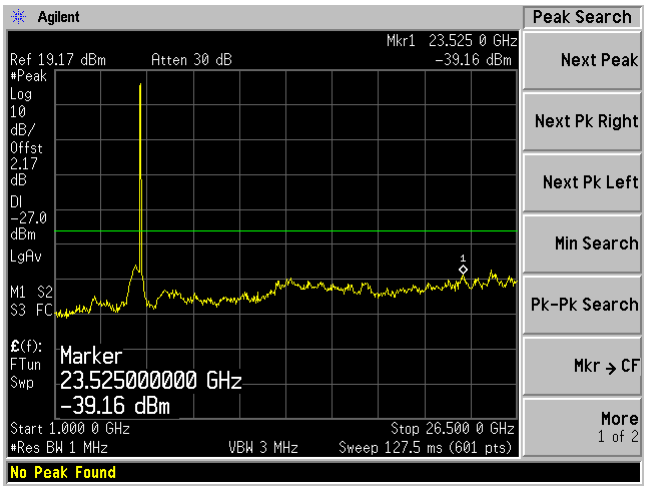
Chain 0, Plot: 30 MHz – 1 GHz



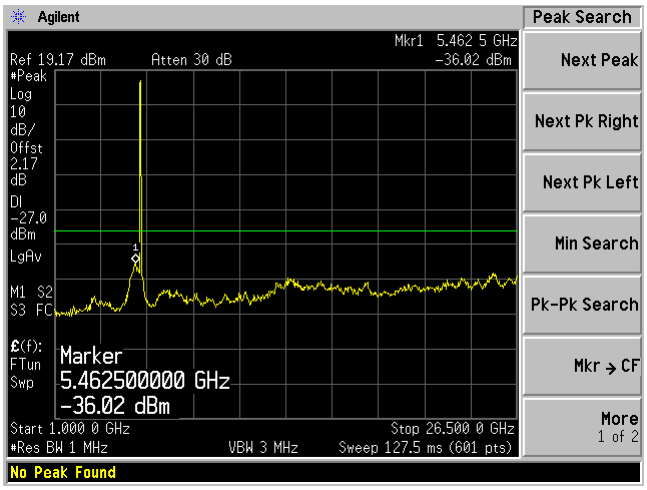
Chain 1, Plot: 30 MHz – 1 GHz



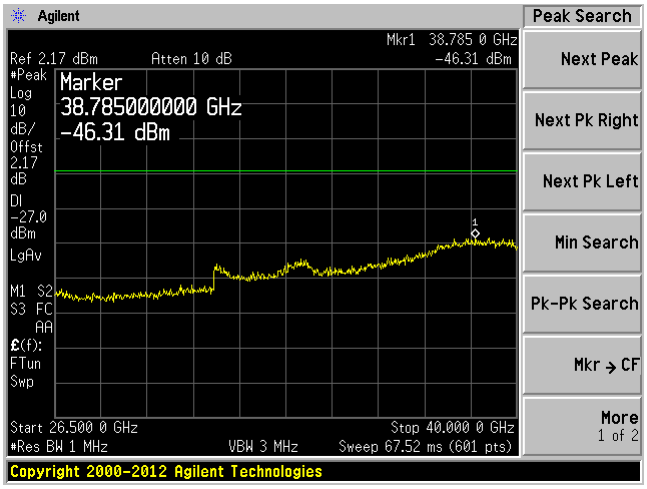
Chain 0, Plot: 1 GHz –26 GHz



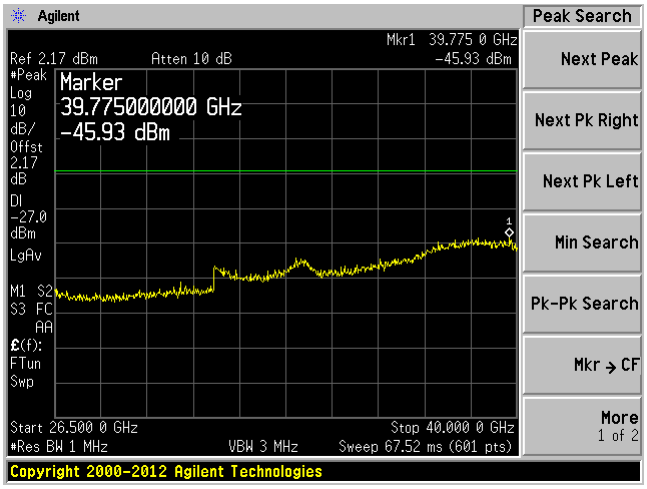
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



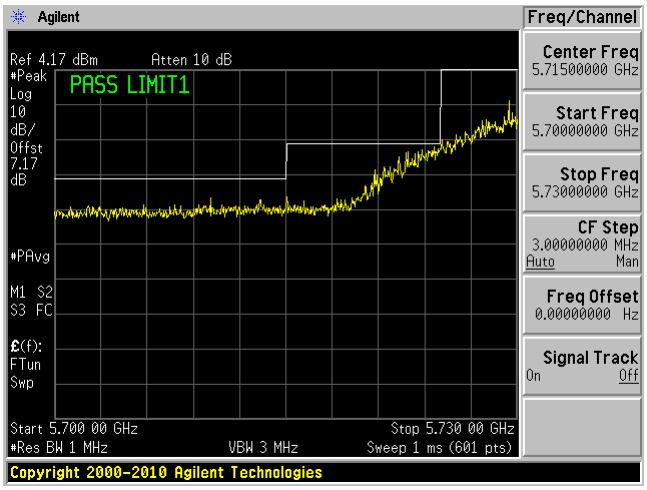
Chain 1, Plot: 26 GHz – 40 GHz



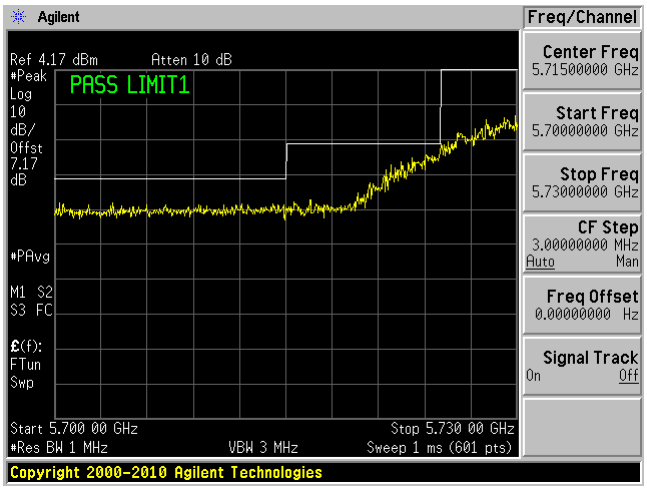
10 MHz Band Edge Emission Mask

802.11n-HT 20, Low Channel 5745 MHz

Chain 0

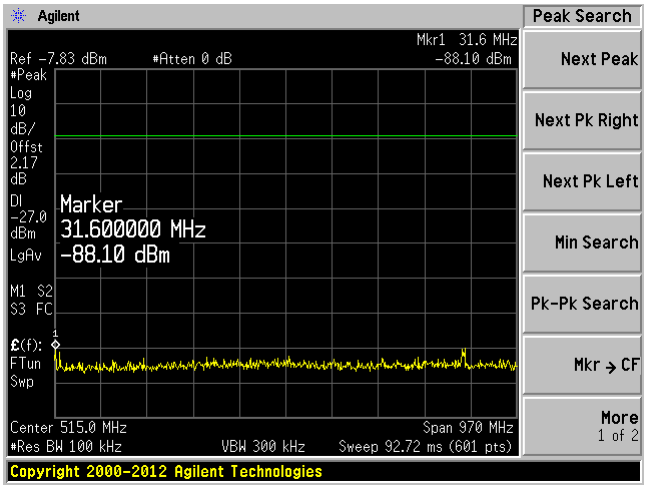


Chain 1

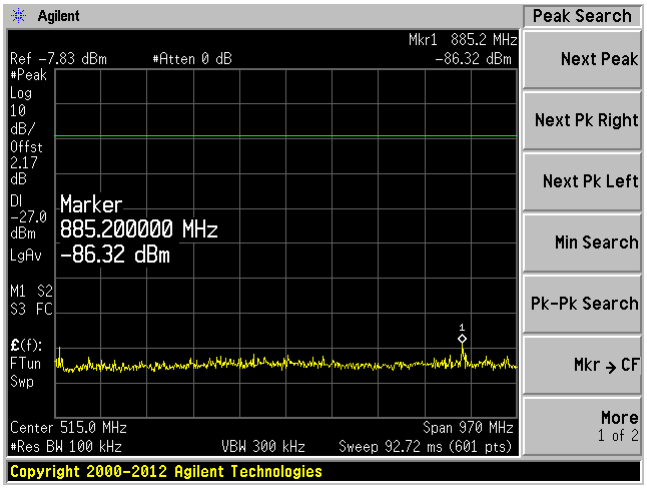


802.11n-HT20 Mode Mid Channel 5785MHz

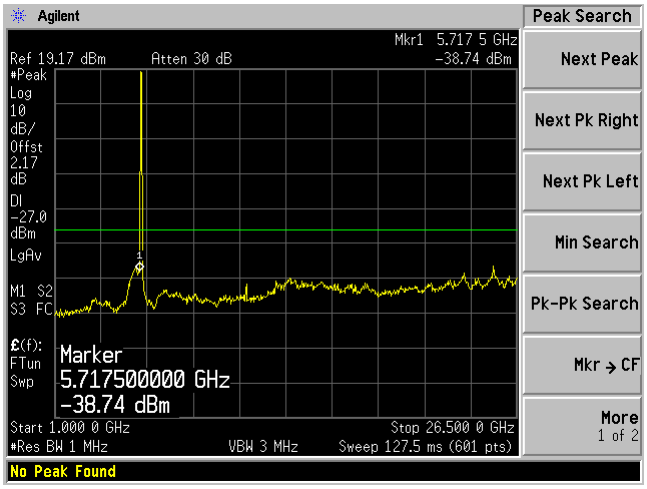
Chain 0, Plot: 30 MHz – 1 GHz



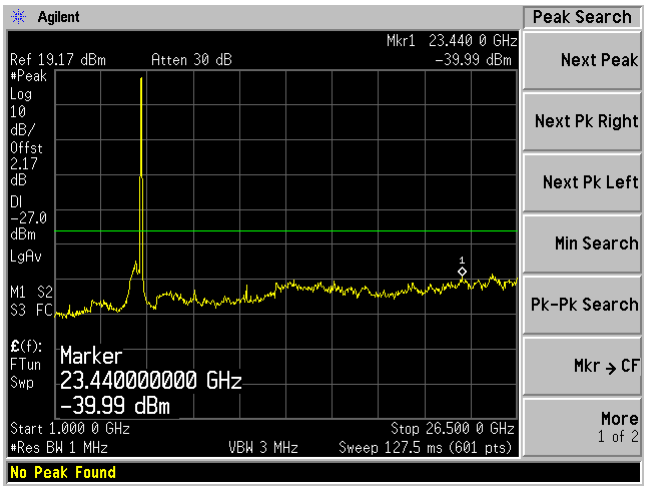
Chain 1, Plot: 30 MHz – 1 GHz



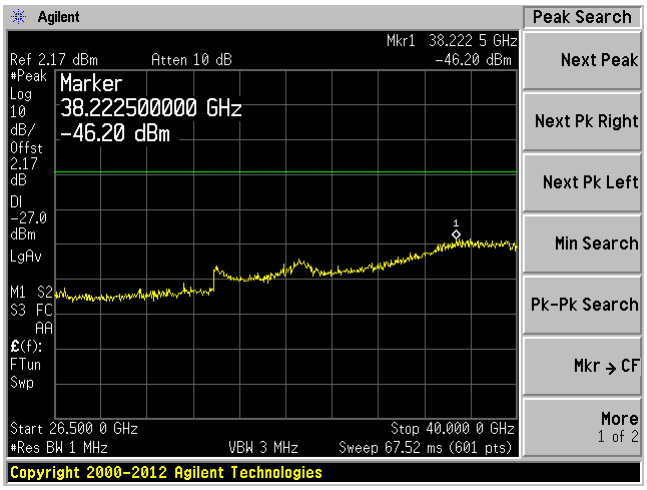
Chain 0, Plot: 1 GHz –26 GHz



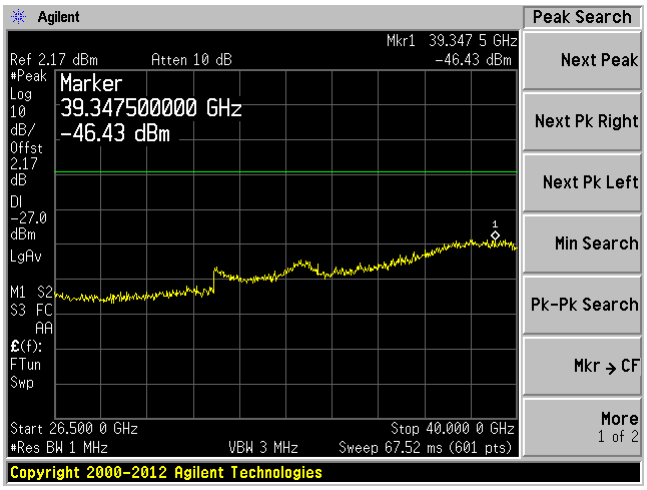
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz

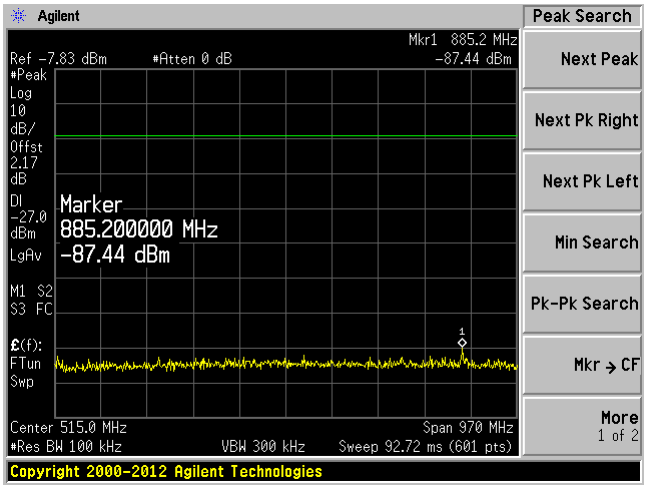


Chain 1, Plot: 26 GHz – 40 GHz

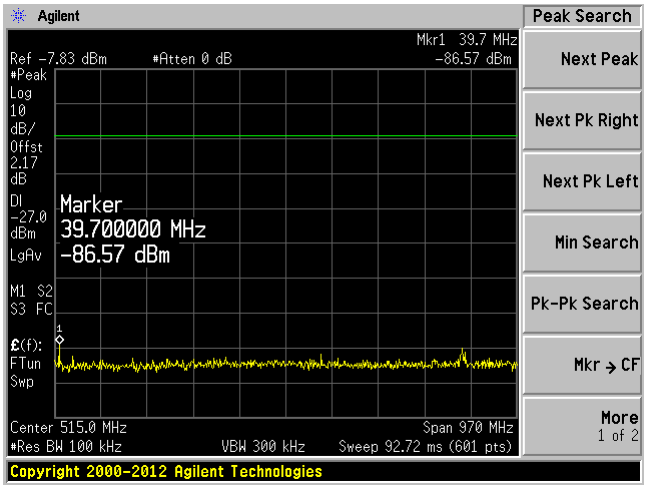


802.11 n-HT20 Mode High Channel 5825 MHz

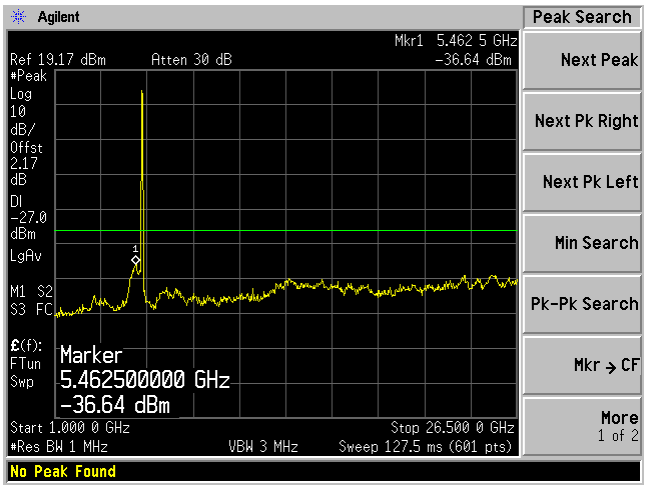
Chain 0, Plot: 30 MHz – 1 GHz



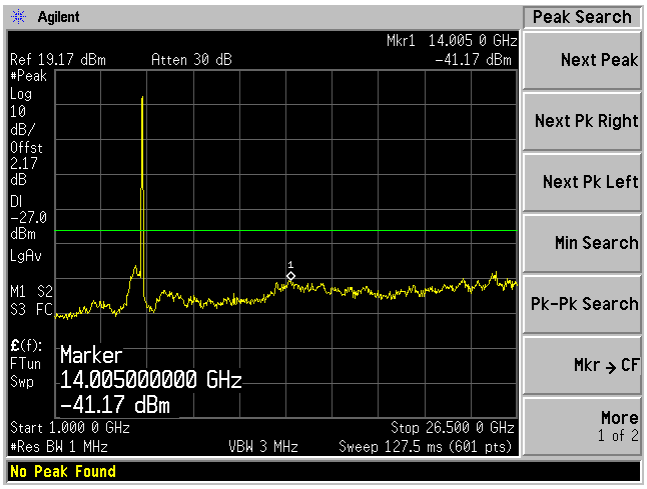
Chain 1, Plot: 30 MHz – 1 GHz



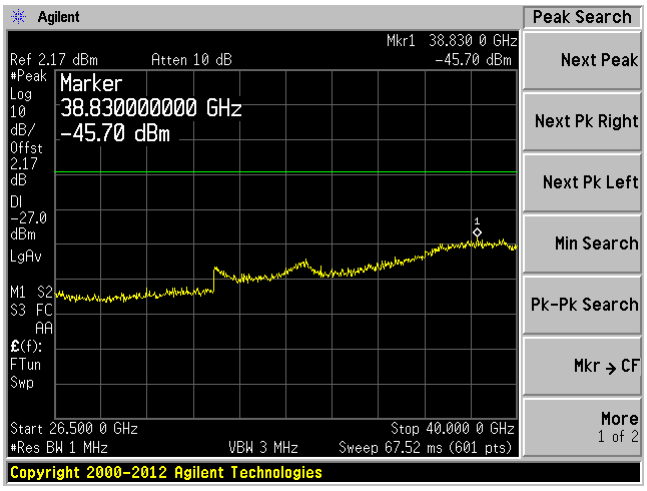
Chain 0, Plot: 1 GHz –26 GHz



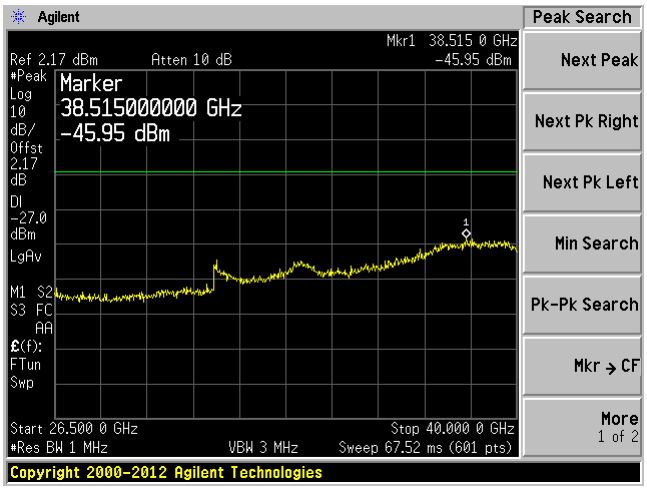
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



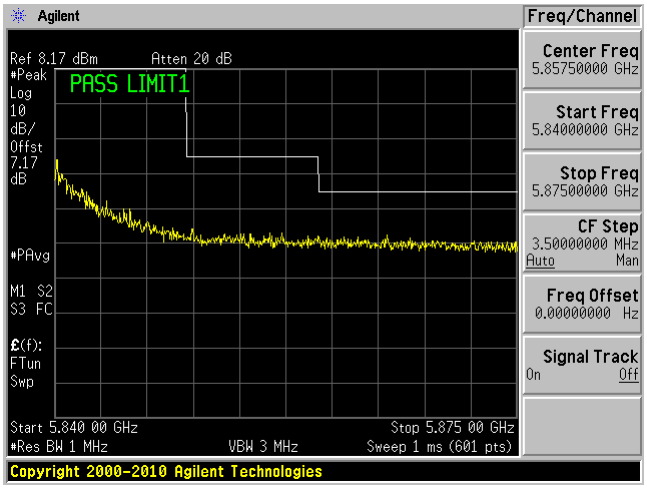
Chain 1, Plot: 26 GHz – 40 GHz



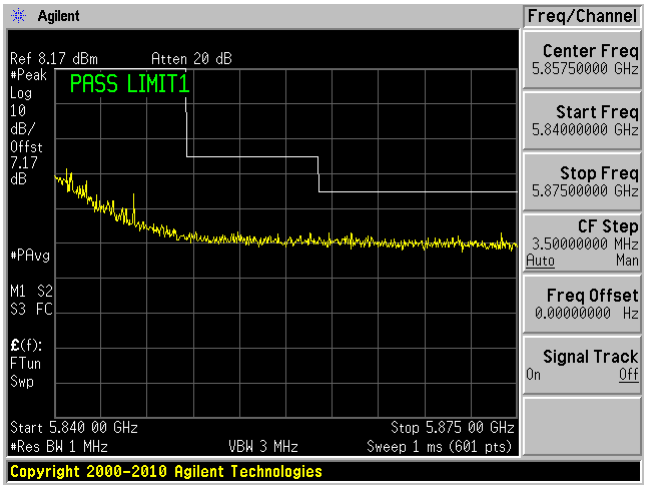
10 MHz Band Edge Emission Mask

802.11n-HT20, High Channel, 5825 MHz

Chain 0

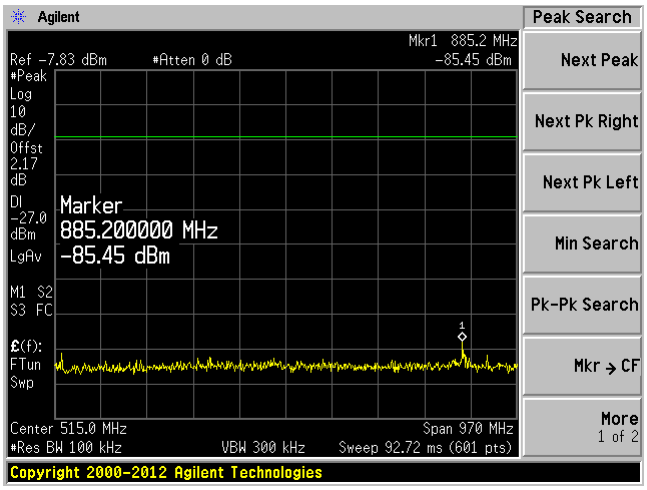


Chain 1

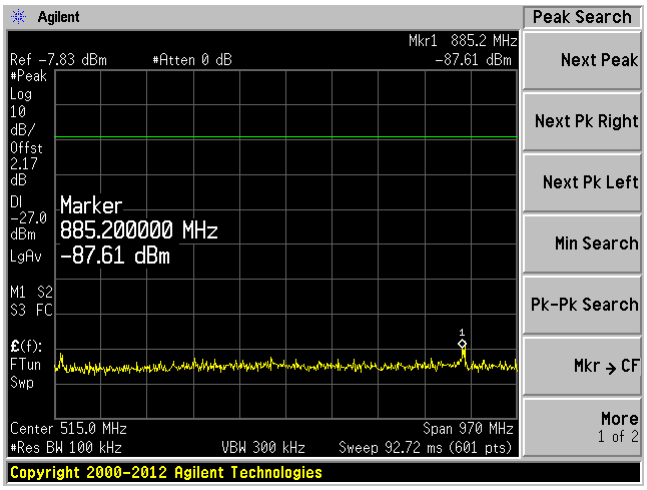


802.11 n-HT40 Mode Low Channel 5755MHz

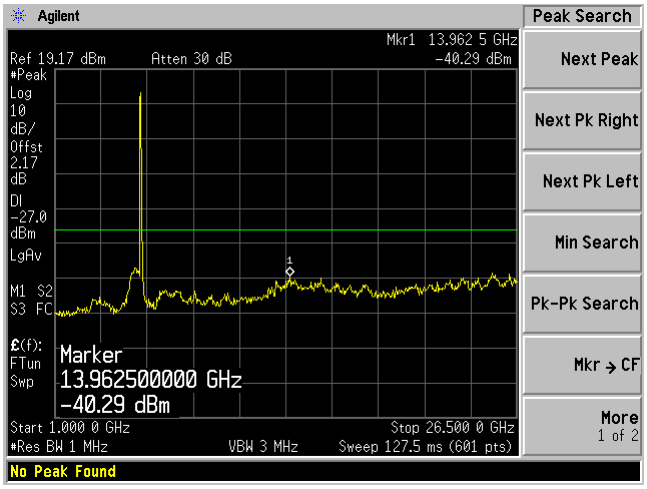
Chain 0, Plot: 30 MHz – 1 GHz



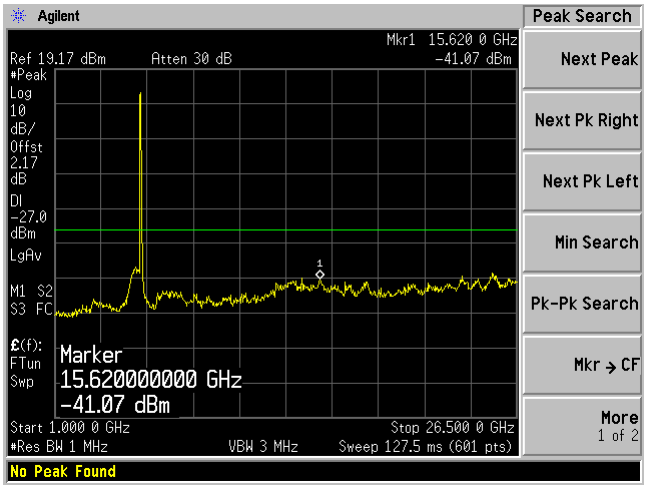
Chain 1, Plot: 30 MHz – 1 GHz



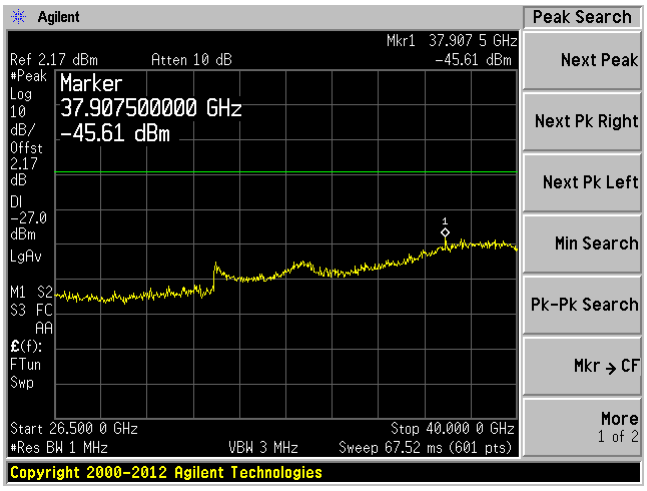
Chain 0, Plot: 1 GHz –26 GHz



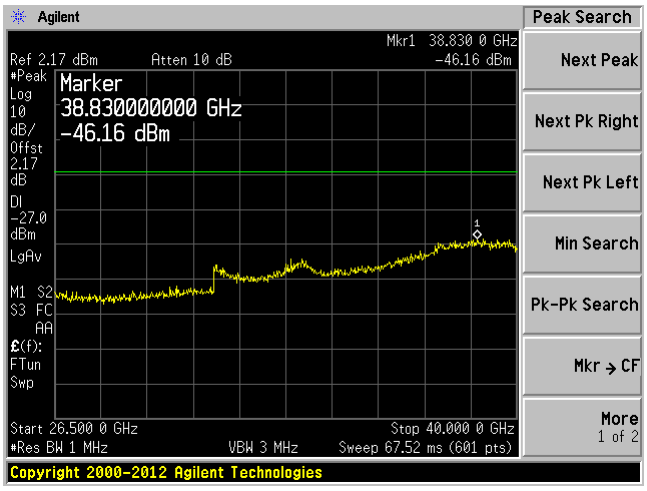
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



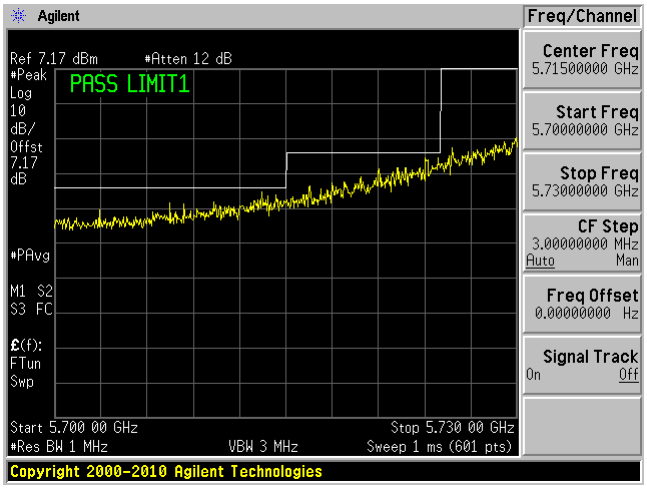
Chain 1, Plot: 26 GHz – 40 GHz



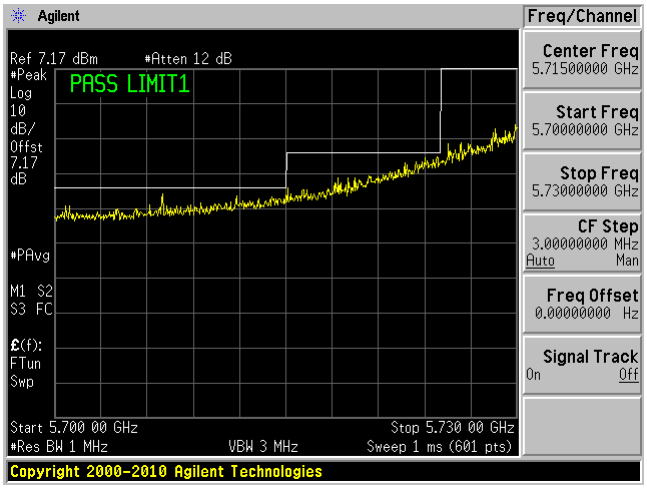
10 MHz Band Edge Emission Mask

802.11n-HT40, Low Channel 5755 MHz

Chain 0

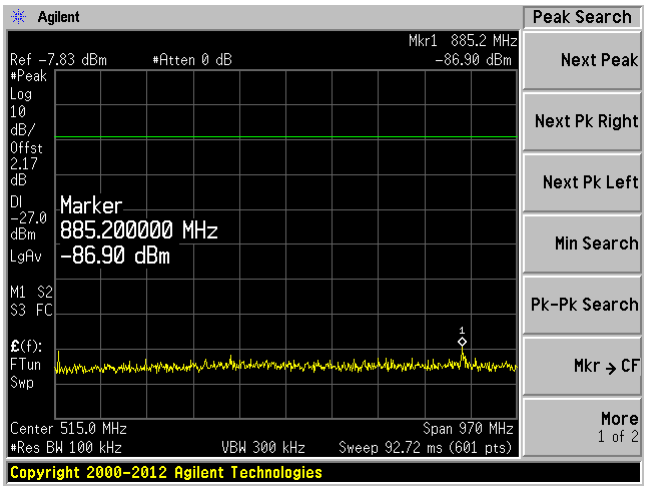


Chain 1

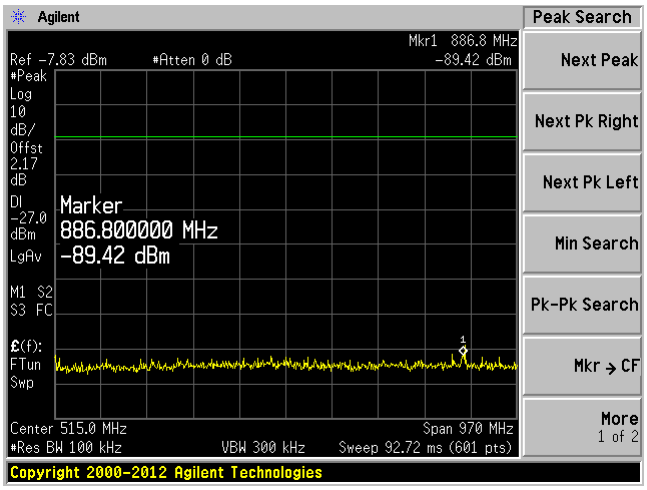


802.11 n-HT40 Mode High Channel 5795 MHz

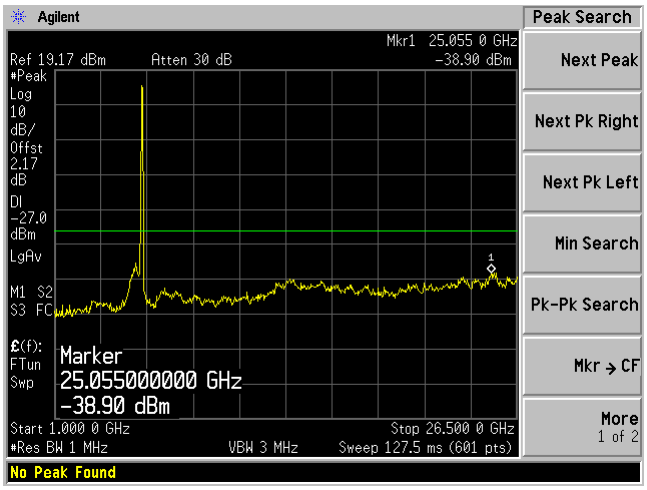
Chain 0, Plot: 30 MHz – 1 GHz



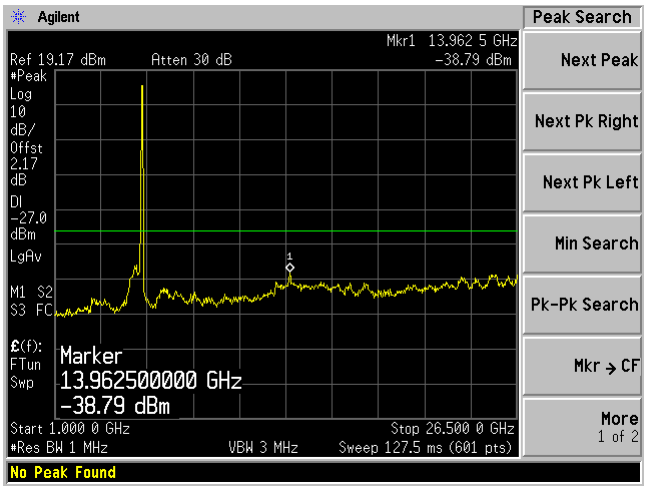
Chain 1, Plot: 30 MHz – 1 GHz



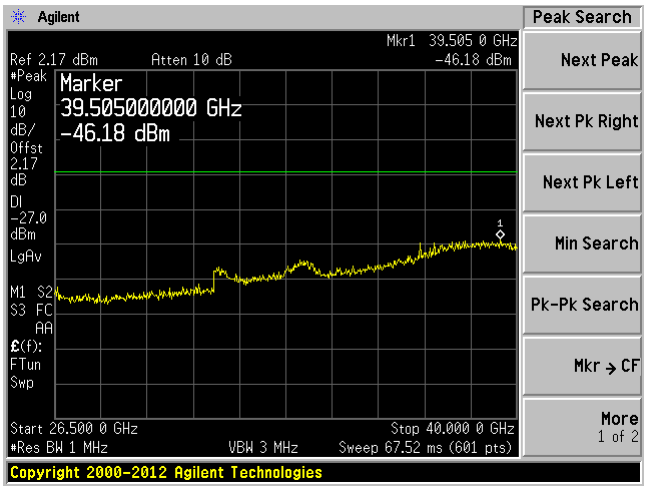
Chain 0, Plot: 1 GHz –26 GHz



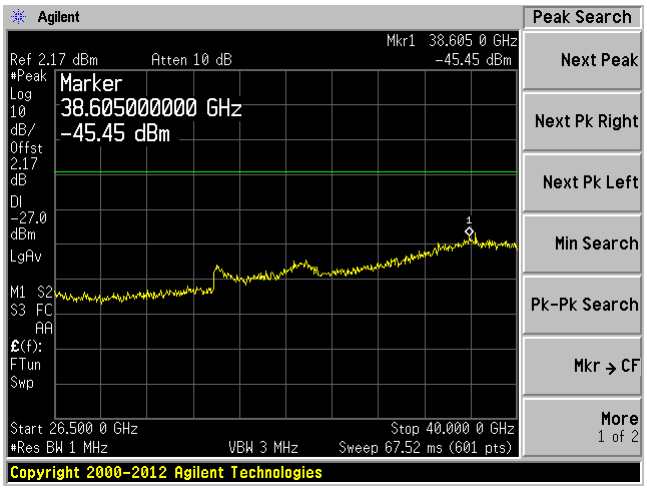
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



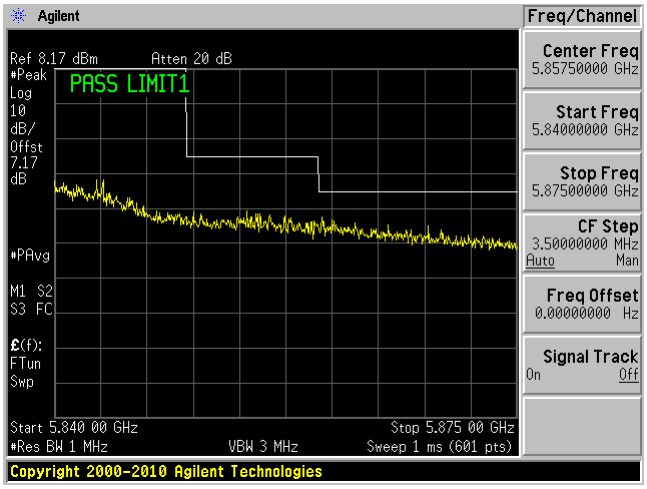
Chain 1, Plot: 26 GHz – 40 GHz



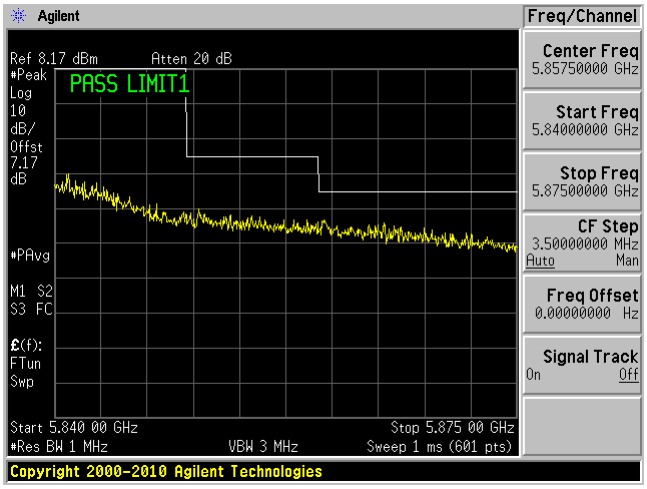
10 MHz Band Edge Emission Mask for

802.11n-HT40, High Channel 5795 MHz

Chain 0

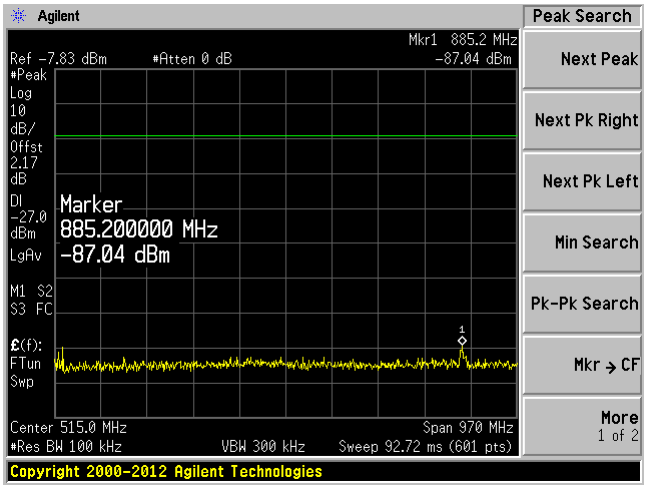


Chain 1

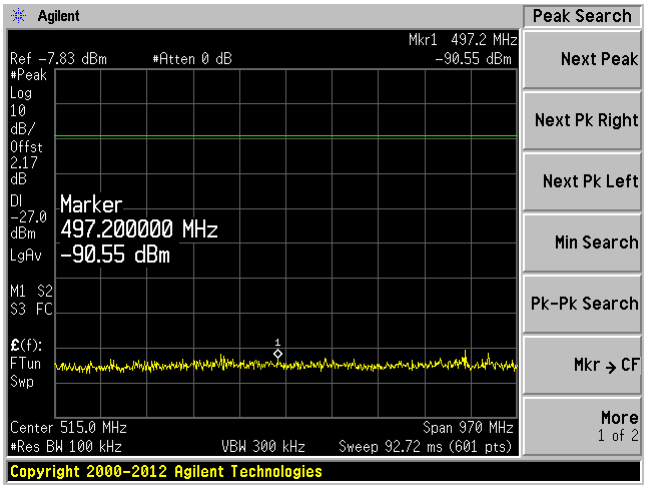


802.11 ac-VHT80 Mode 5755 MHz

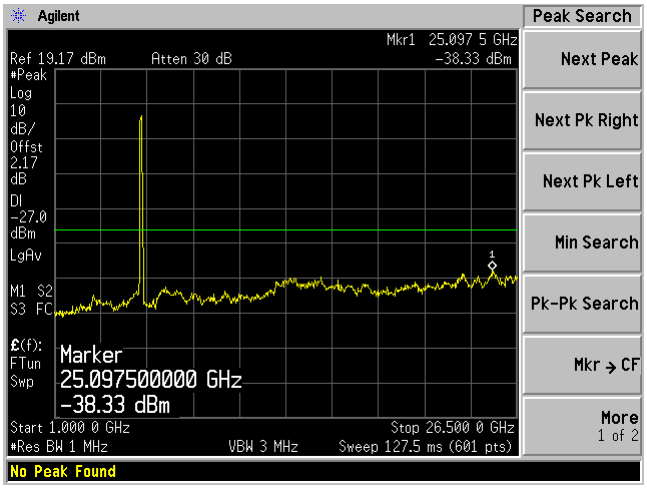
Chain 0, Plot: 30 MHz – 1 GHz



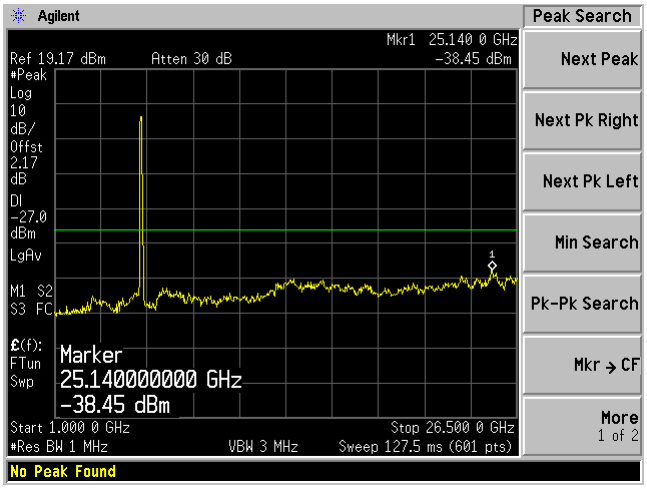
Chain 1, Plot: 30 MHz – 1 GHz



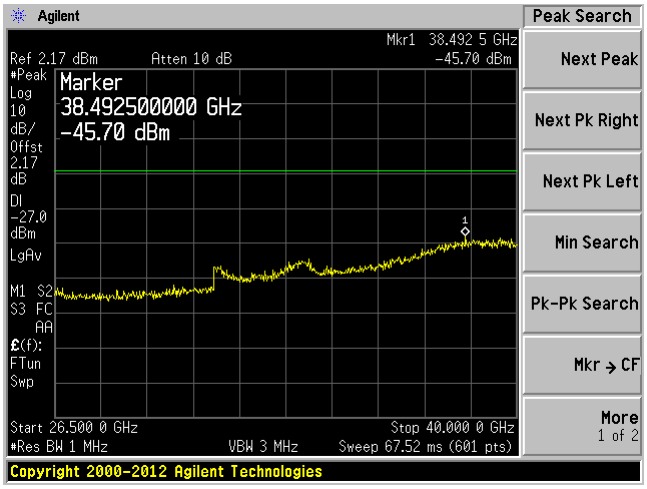
Chain 0, Plot: 1 GHz –26 GHz



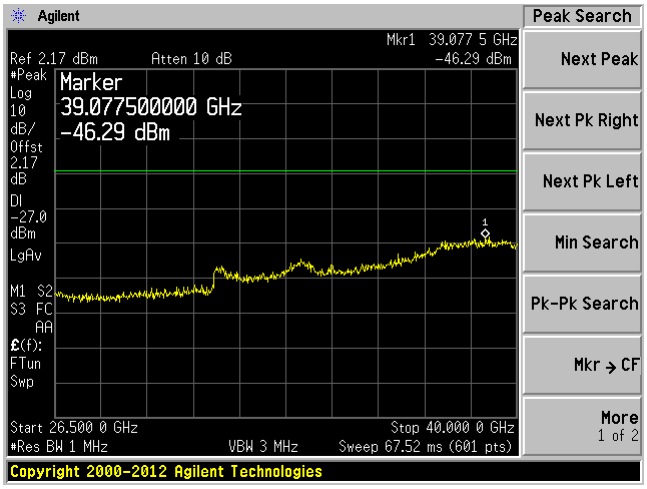
Chain 1, Plot: 1 GHz – 26 GHz



Chain 0, Plot: 26 GHz –40 GHz



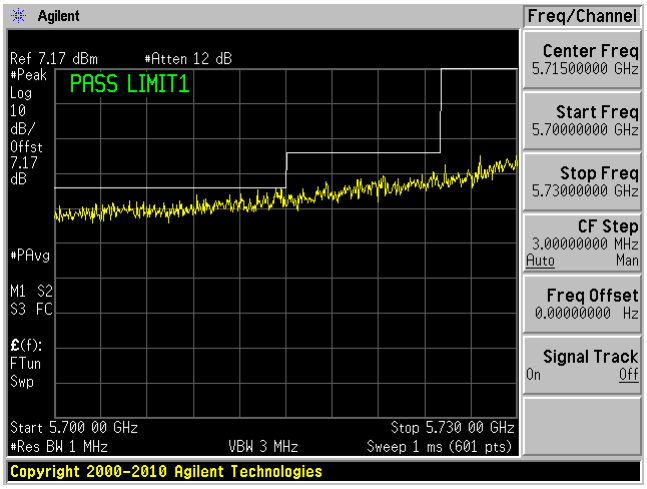
Chain 1, Plot: 26 GHz – 40 GHz



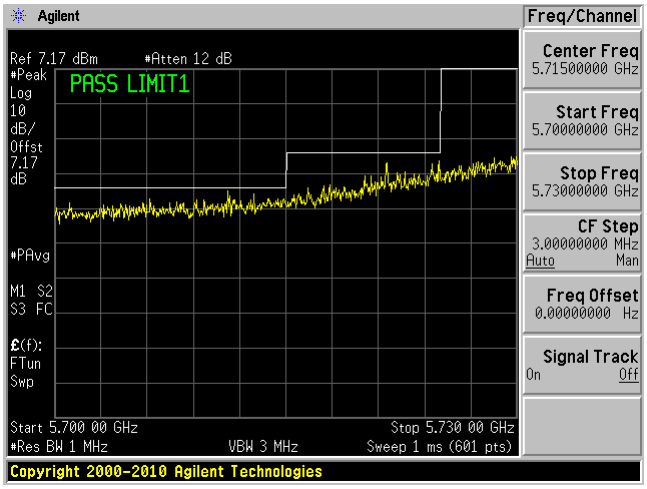
10 MHz Band Edge Emission Mask

802.11ac-VHT40, 5755 MHz Lower Band Edge

Chain 0

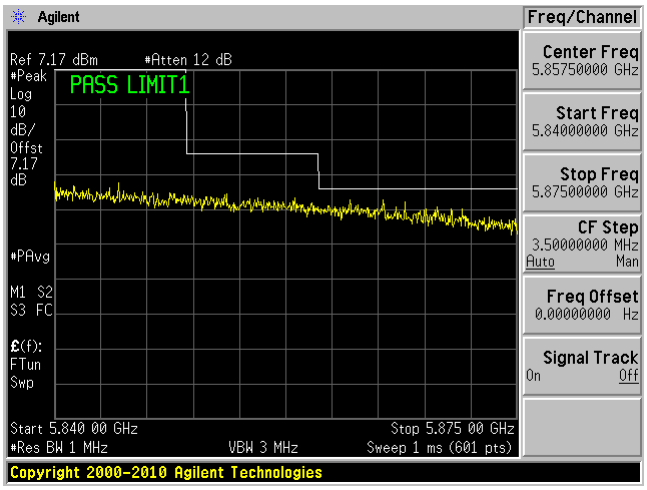


Chain 1

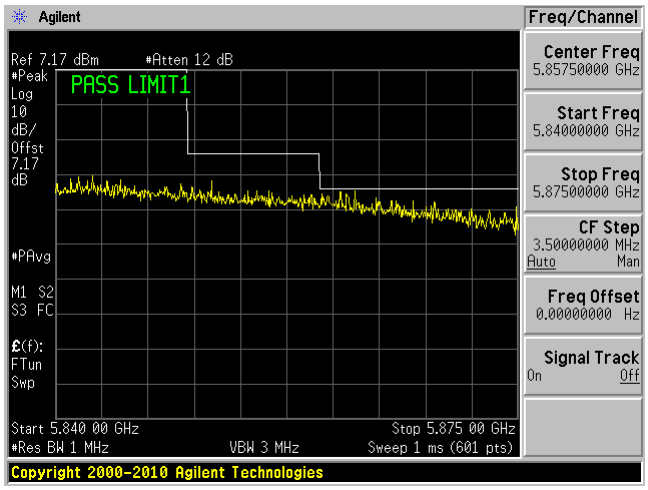


802.11ac-VHT40, 5755 MHz Higher Band Edge

Chain 0



Chain 1



11 FCC §15.407(a) - Power Spectral Density

11.3 Applicable Standards

According to FCC §15.407(a)

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.4 Measurement Procedure

The measurements are base on FCC KDB 789033 D01 General UNII Test Procedures v01r03: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F:
Peak power spectral density (PPSD)

11.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.*

11.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Rui Zhou from 2014-10-15 at RF site.

11.7 Test Results

Please refer to the following tables and plots.

Note: The PSA's RBW=100 kHz and a 10*log(5) factor is added to compare the limit as 30dBm/500kHz for W58 Band.

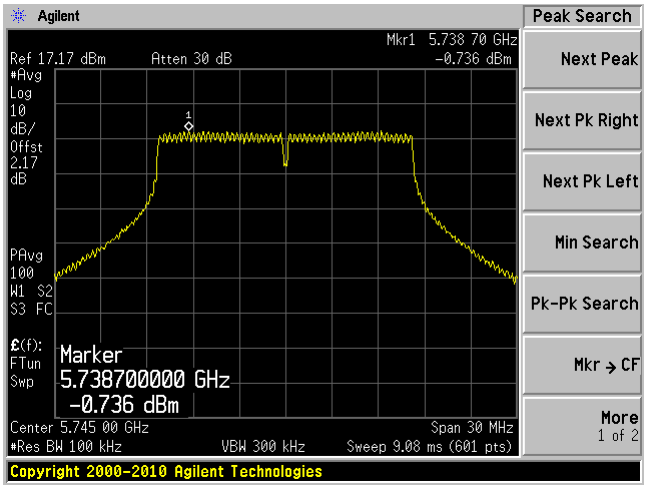
5.8 GHz Band

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total PSD (dBm)	Limit (dBm)
802.11a mode					
Low	5745	-0.74	-0.74	6.99	9.26
Middle	5785	0.23	-0.07	6.99	10.09
High	5825	-4.55	-4.88	6.99	5.29
802.11n-HT20 mode					
Low	5745	-1.07	-1.05	6.99	8.94
Middle	5785	-0.29	-0.31	6.99	9.70
High	5825	-5.48	-5.37	6.99	4.57
802.11n-HT40 mode					
Low	5755	-4.61	-4.46	6.99	5.47
High	5795	-2.62	-2.60	6.99	7.39
802.11ac-VHT80 mode					
-	5755	-12.28	-12.40	6.99	-2.34

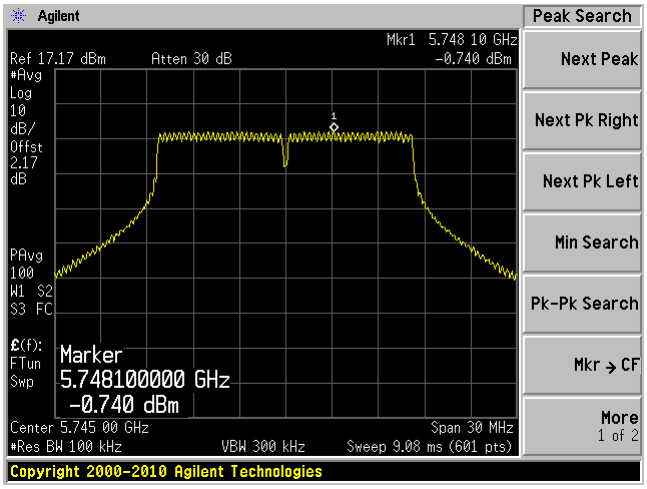
W58 Band

802.11a, Low Channel, 5745 MHz

Chain 0

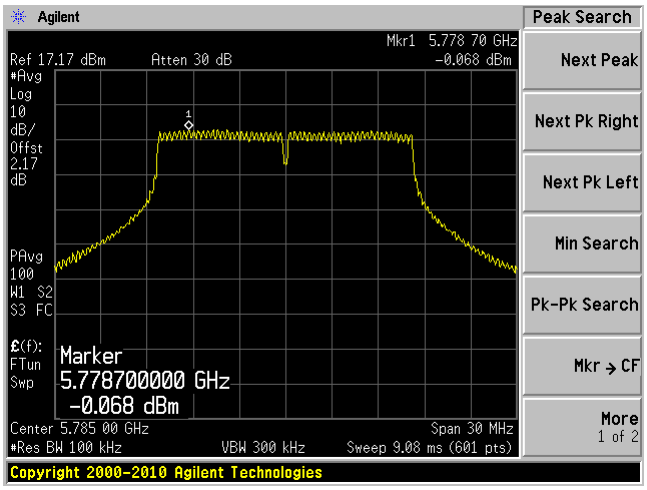


Chain 1

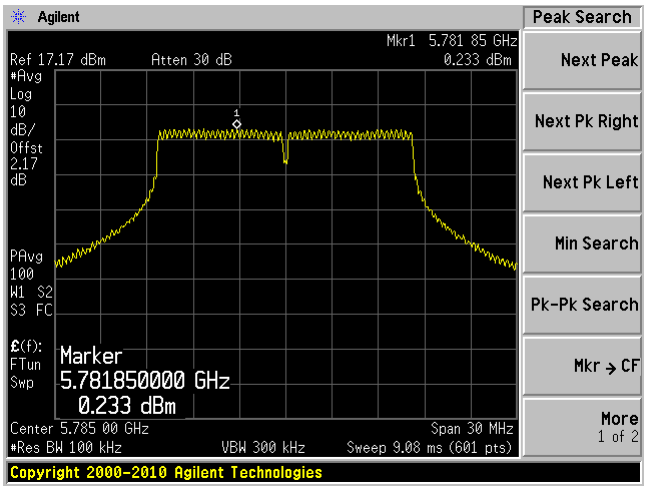


802.11a, Middle Channel, 5785 MHz

Chain 0

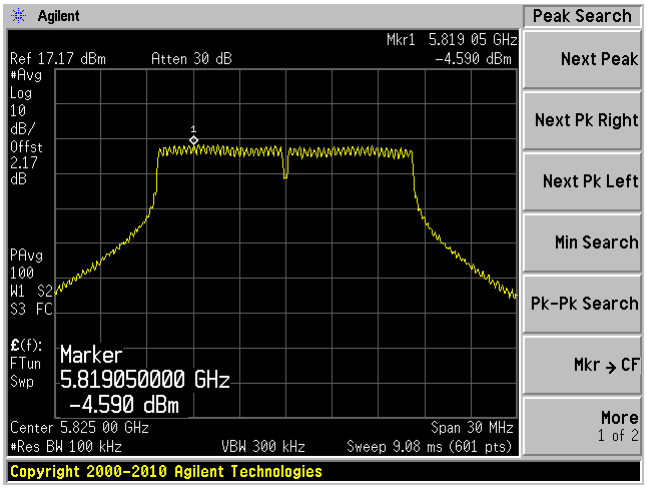


Chain 1

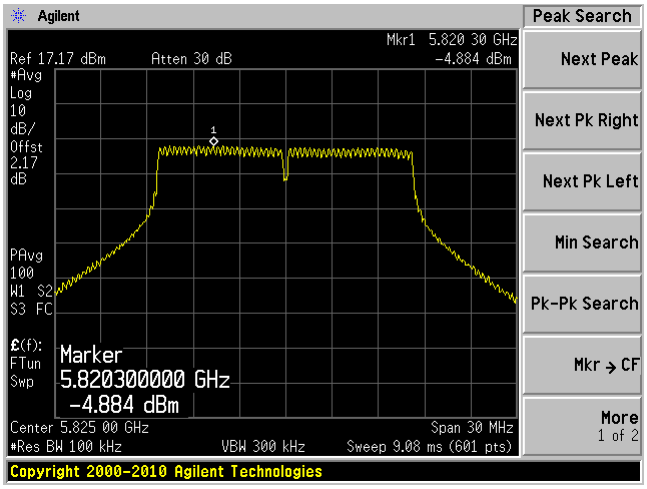


802.11a, High Channel, 5825 MHz

Chain 0

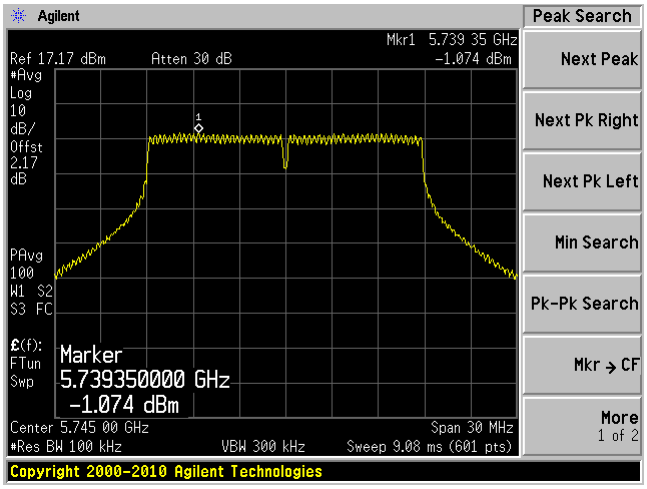


Chain 1

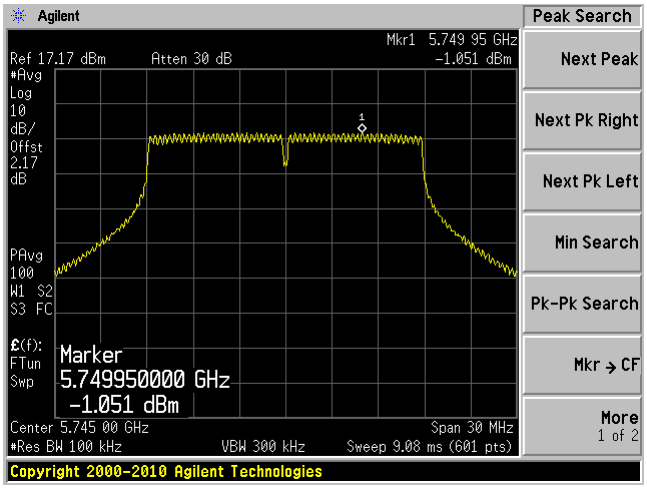


802.11n-HT20, Low Channel 5745 MHz

Chain 0

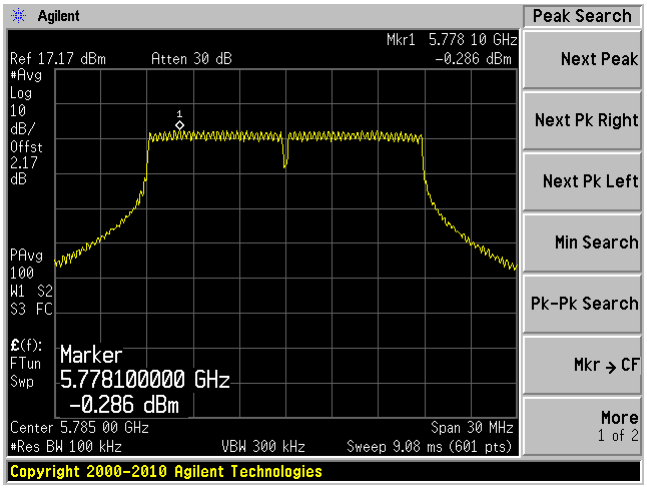


Chain 1

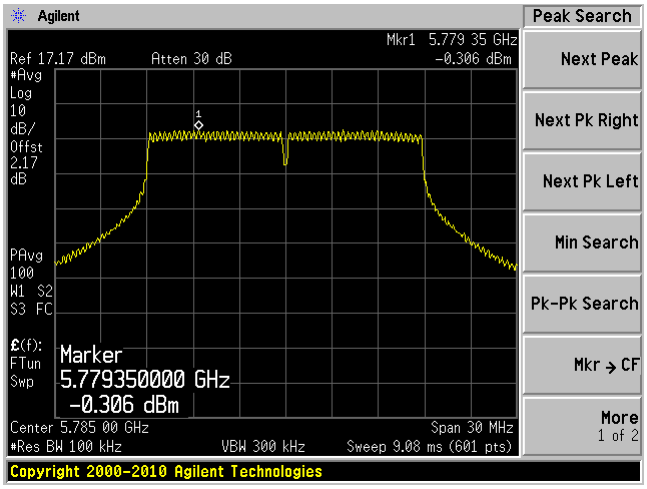


802.11n-HT20, Middle Channel 5785 MHz

Chain 0

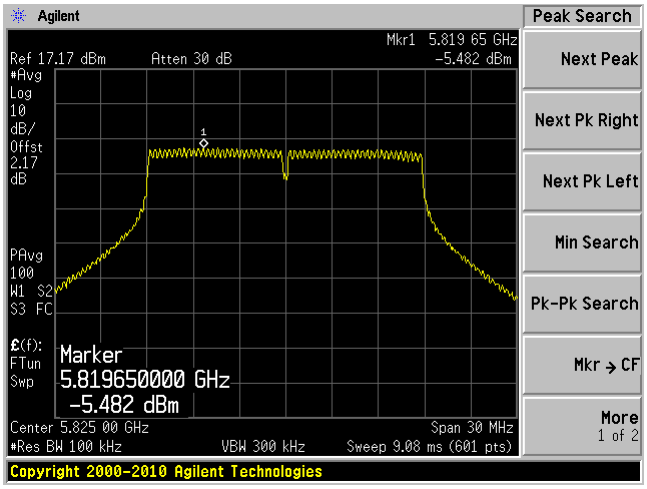


Chain 1

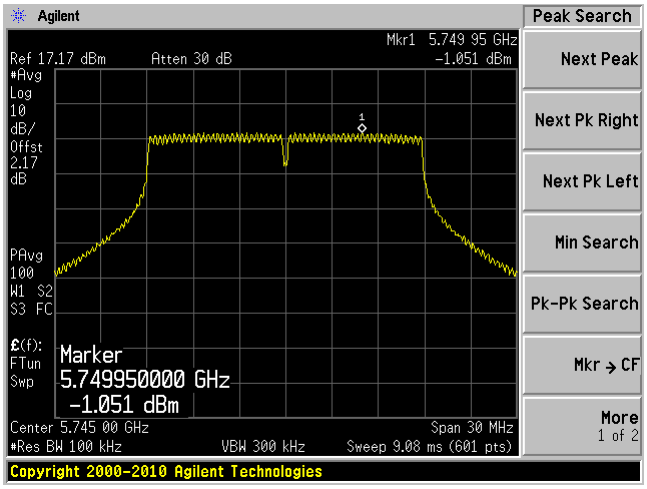


802.11n-HT20, High Channel, 5825 MHz

Chain 0

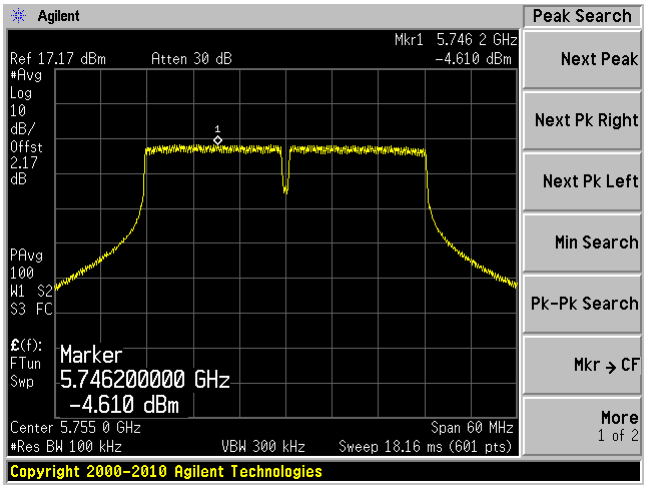


Chain 1

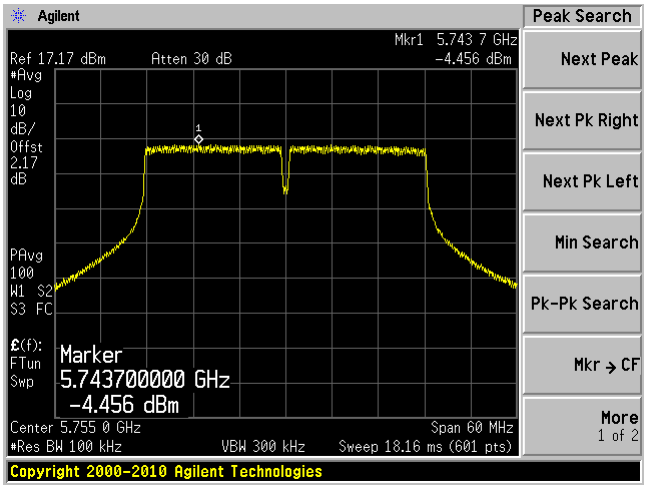


802.11n-HT40, Low Channel 5755 MHz

Chain 0

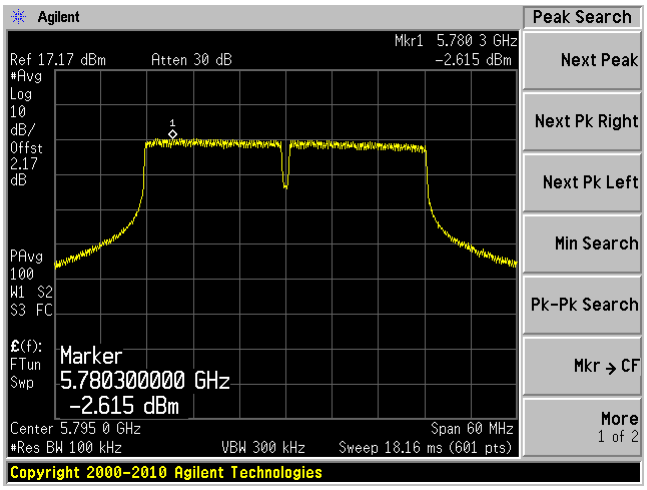


Chain 1

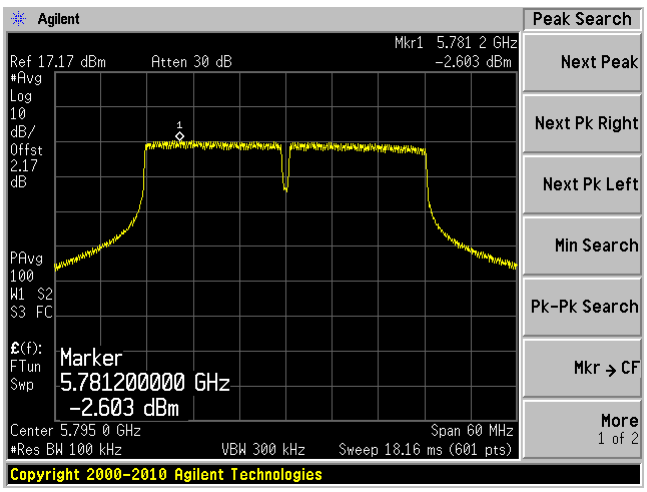


802.11n-HT40, High Channel 5795 MHz

Chain 0

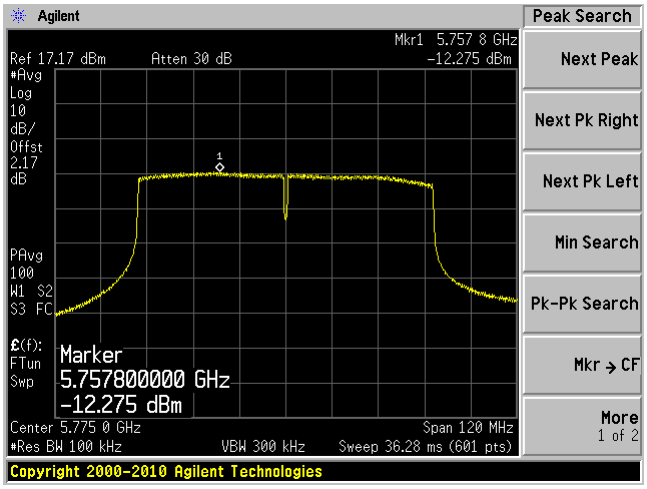


Chain 1



802.11ac-VHT80, 5775 MHz

Chain 0



Chain 1