Lab Code: 200707-0

FCC PART 15.247

TEST REPORT

For

Deliberant LLC

138 Mountain Brook Dr Canton, GA 30115 United States

FCC ID: UB8-APC5MIV2

Report Type:	Product Type:
Original Report	Broadband Digital Transmission System

Test Engineer:	Jim Huang
Report Number:	RSZ111019006-00
Report Date:	2011-12-09
Reviewed By:	Alvin Huang EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Deliberant LLC*'s product, model number: *APC 5Mi V2 (FCC ID: UB8-APC5MIV2)* (the "EUT") in this report is a *Broadband Digital Transmission System*, which was measured approximately: 12.3 cm (L) x 8.5 cm (W) x 2.0 cm (H), rated input voltage: DC 18V from adapter.

Adapter information (PoE Adapter):
Model: PP1807V1
Input: 100-240VAC 50-60Hz 0.3A
Output: 18VDC 0.7A

** All measurement and test data in this report was gathered from production sample serial number: 0101101500000021 (Assigned by Applicant). The EUT was received on 2011-10-19.*

Objective

This Type approval report is prepared on behalf of *Deliberant LLC* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

No Related Submittal(s).

Test Methodology

All measurements contained in this report were conducted 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.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11a, 802.11n-HT20 and 802.11n-HT40 mode, Channel lists as below:

Channel	Frequency (MHz)	Comments
149	5745	802.11a & 802.11n-HT20
153	5765	
157	5785	
161	5805	
165	5825	
151	5755	802.11n-HT40
159	5795	

Channel 149,153,157,161&165 are for 802.11a & 802.11n-HT20 mode, EUT was tested with Channel 149, 157 & 165.

For 802.11n-HT40 mode, EUT was tested with Channel 151 & 159.

EUT Exercise Software

PUTTY, provided by client
The test was performed under:
802.11a: Data rate: 6Mbps
802.11n-HT20: Data rate: 6.5Mbps
802.11n-HT40: Data rate: 13.5 Mbps

Equipment Modifications

No modification was made to the unit tested.

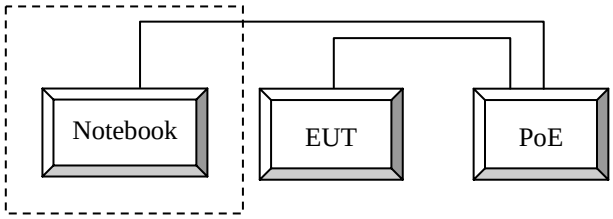
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Notebook	D600	00045-438-852-864

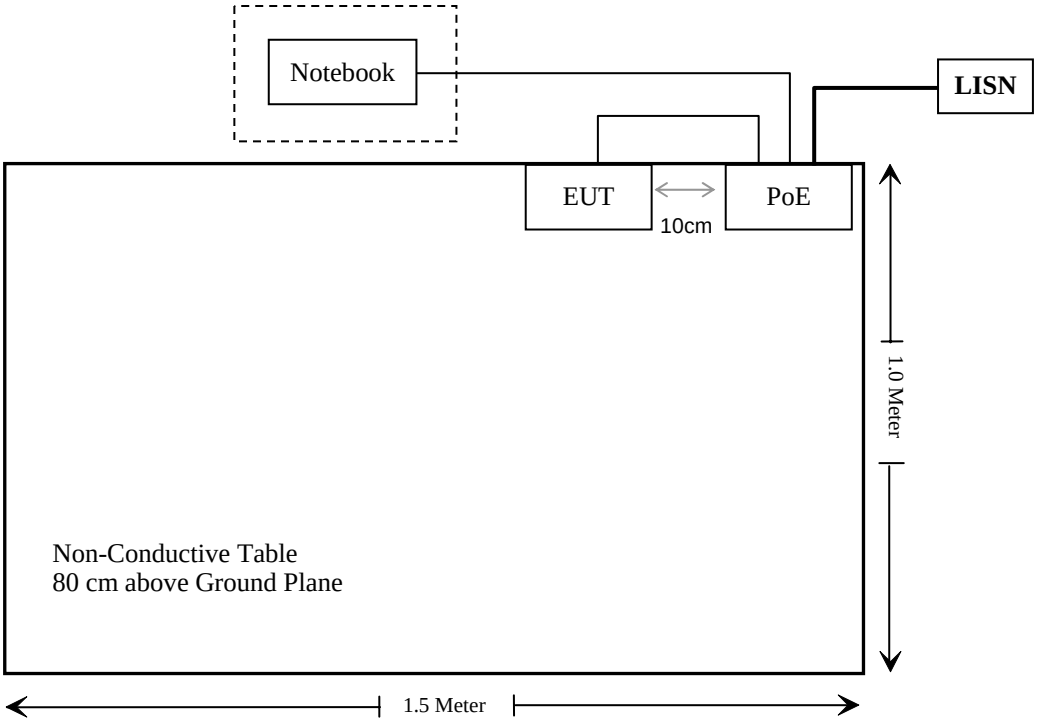
External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Detachable Power Cable	0.7	PoE Adapter	LISN
Shielded Detachable RJ45 Cable	1.00	EUT	PoE

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a),	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to FCC 15.247(i) and subpart §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 Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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)**
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;

MPE Calculation:

Predication of MPE limit at a given distance

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

Where: S = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g. mW);
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 (appropriate units, e.g., cm);

Calculated Data:

Mode	**Frequency (MHz)**	**Antenna Gain**		**Conducted Power**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
		(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
802.11a	5745	5	3.16	27.97	626.61	265	0.002245	1.0
802.11n-HT20	5745	5	3.16	27.58	572.80	265	0.002052	1.0
802.11n-HT40	5795	5	3.16	28.42	695.02	265	0.002490	1.0

Result: The device meets FCC MPE limit at 265 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT is professionally installed equipment, which with two omni-directional antennas, external antenna (SMA connector) and the maximum of antenna gain is 5dBi; please refer to the EUT external photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ±2.4 dB (k=2, 95% level of confidence).
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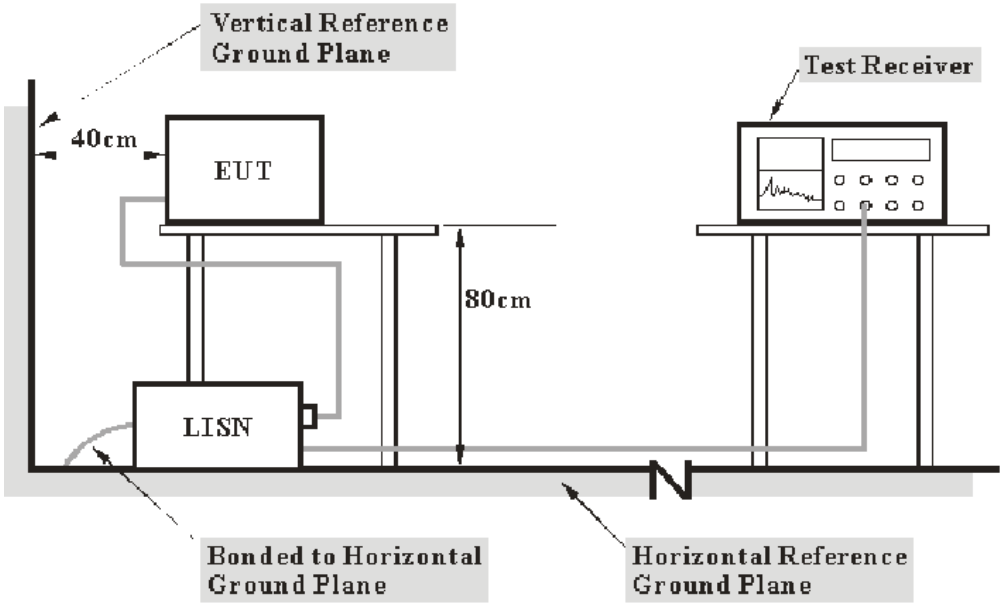
EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245	2011-03-03	2012-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-03-09	2012-03-08

*** Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

5.66 dB at **0.160 MHz** in the **Neutral** conducted mode

Test Data

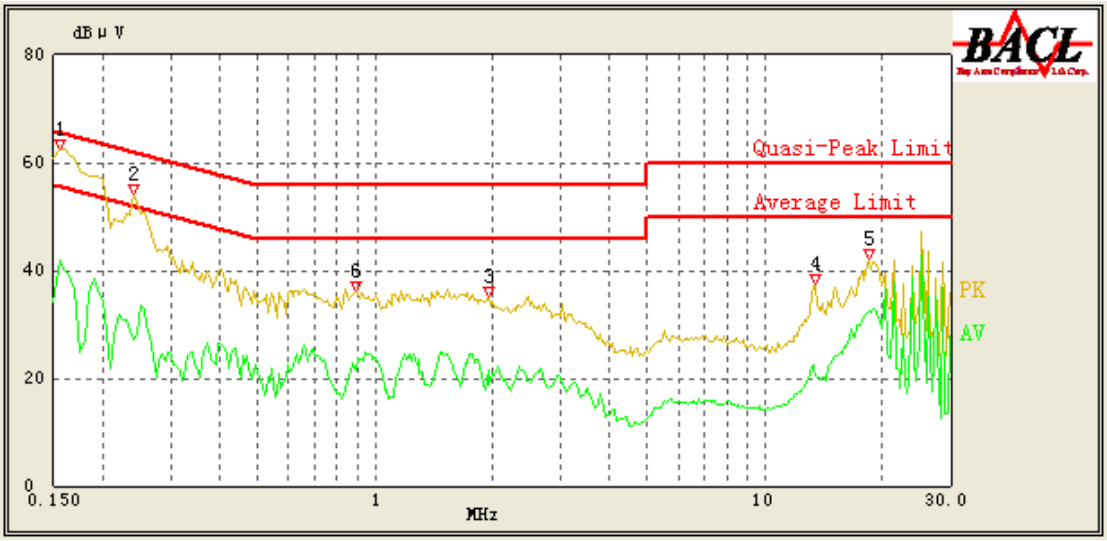
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-18.

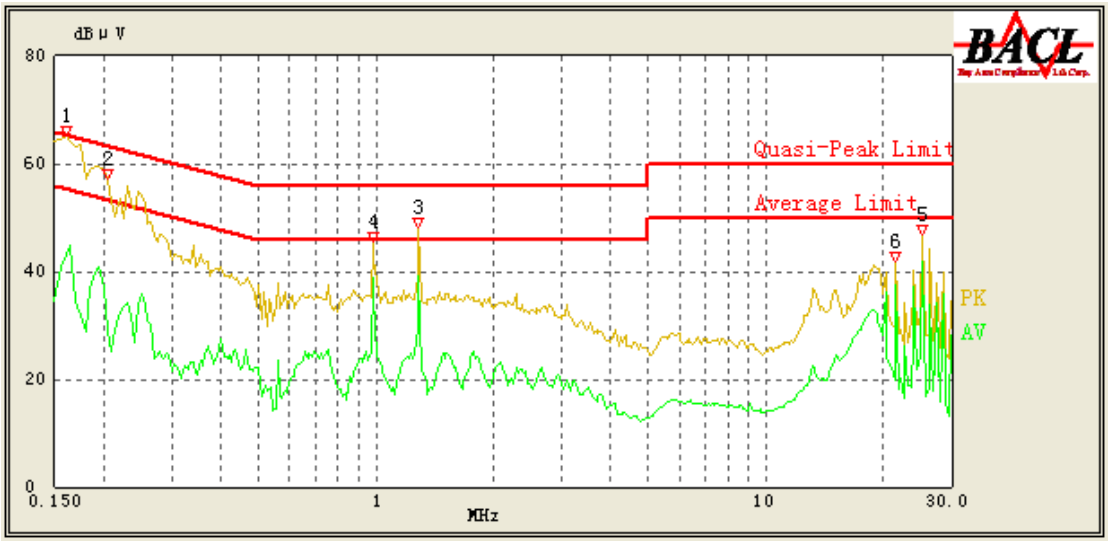
Test Mode: Transmitting

AC 120 V, 60 Hz, Line:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Corrected Result (dBµV)**	**Correction Factor (dB)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (QP/Ave.)**
0.155	58.89	10.23	65.86	6.97	QP
0.155	41.75	10.23	55.86	14.11	Ave.
18.615	32.58	11.51	50.00	17.42	Ave.
0.240	44.27	10.23	63.43	19.16	QP
18.615	36.20	11.51	60.00	23.80	QP
0.895	31.69	10.24	56.00	24.31	QP
1.955	21.63	10.33	46.00	24.37	Ave.
0.890	21.45	10.24	46.00	24.55	Ave.
0.240	27.19	10.23	53.43	26.24	Ave.
13.410	33.32	11.29	60.00	26.68	QP
1.955	28.69	10.33	56.00	27.31	QP
13.380	21.36	11.28	50.00	28.64	Ave.

AC 120V, 60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Corrected Result (dBµV)**	**Correction Factor (dB)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (QP/Ave.)**
0.160	60.05	10.23	65.71	5.66	QP
1.285	39.26	10.27	46.00	6.74	Ave.
0.980	38.68	10.24	46.00	7.32	Ave.
25.150	41.90	12.27	50.00	8.10	Ave.
0.160	43.20	10.23	55.71	12.51	Ave.
21.565	37.44	11.75	50.00	12.56	Ave.
0.205	48.68	10.23	64.43	15.75	QP
0.980	32.87	10.24	56.00	23.13	QP
1.285	31.61	10.27	56.00	24.39	QP
0.205	28.91	10.23	54.43	25.52	Ave.
21.565	22.66	11.75	60.00	37.34	QP
25.150	17.55	12.27	60.00	42.45	QP

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

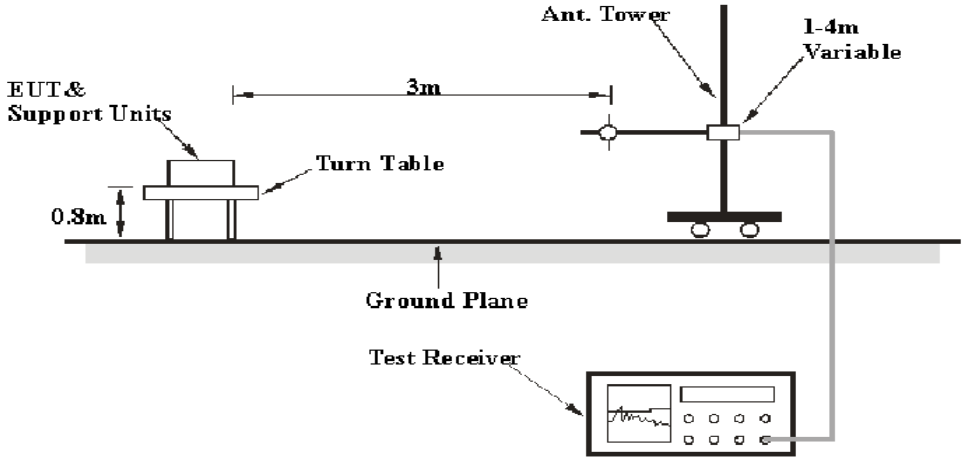
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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.

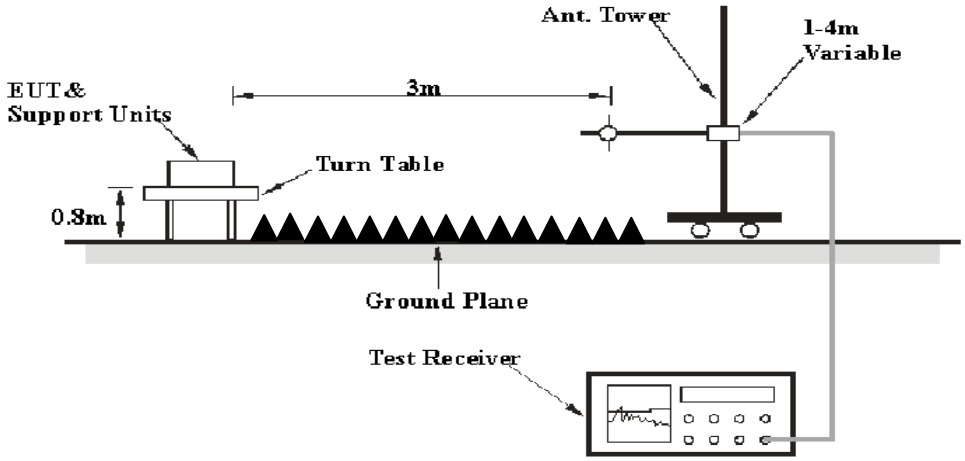
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ±4.0 dB(k=2, 95% level of confidence) .

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	***RBW***	***Video B/W***	***Detector***
30MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 40 GHz	1 MHz	3 MHz	PK
1000 MHz – 40 GHz	1 MHz	10 Hz	Ave

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2011-08-02	2012-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2011-11-11	2012-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-03-11	2012-03-10
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07
Agilent	Spectrum Analyzer	8564E	3943A01781	2011-04-12	2012-04-11
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2011-05-05	2012-05-04

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz and peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, with the worst margin reading of:

0.7 dB at **53.866000 MHz** in the **Vertical** polarization

Test Data

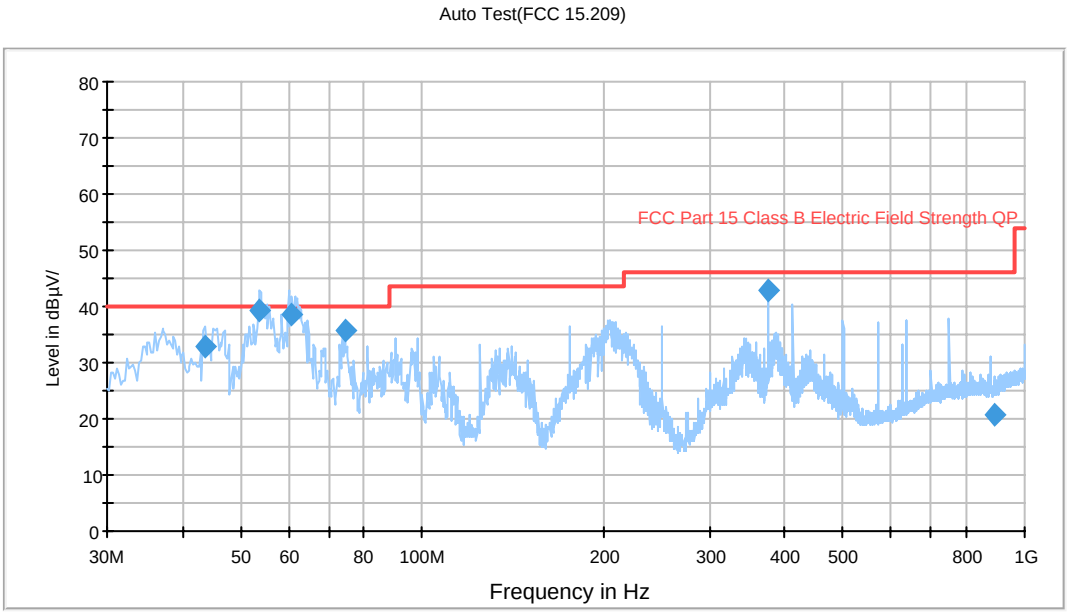
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-18 and 2011-12-09.

1) Below 1 GHz:

Test Mode: Transmitting (worse case)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degree)	Limit (dBµV/m)	Margin (dB)
53.866000	39.3	102.0	V	144.0	40.0	0.7*
60.837000	38.6	102.0	V	205.0	40.0	1.4*
374.999500	42.9	101.0	H	95.0	46.0	3.1*
74.591000	35.6	101.0	V	206.0	40.0	4.4
43.806750	33.0	101.0	V	131.0	40.0	7.0
891.126250	20.9	176.0	V	160.0	46.0	25.1

* Within measurement uncertainty.

2) Above 1 GHz: (worse case)

802.11a Mode:

Indicated		Detector (PK/Ave.)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
Low Channel (5745 MHz)												
11490	23.03	Ave.	15	1.1	H	41.4	6.69	26.20	44.92	54	9.08	harmonic
11490	23.27	Ave.	227	1.1	V	40.4	6.69	26.20	44.16	54	9.84	harmonic
11490	41.55	PK	15	1.1	H	41.4	6.69	26.20	63.44	74	10.56	harmonic
11490	42.23	PK	227	1.1	V	40.4	6.69	26.20	63.12	74	10.88	harmonic
5460	23.13	Ave.	154	1.1	H	36.7	4.49	26.70	37.62	54	16.38	spurious
5460	43.56	PK	23	1.1	V	35.9	4.49	26.70	57.25	74	16.75	spurious
5460	23.55	Ave.	23	1.1	V	35.9	4.49	26.70	37.24	54	16.76	spurious
5460	42.02	PK	154	1.1	H	36.7	4.49	26.70	56.51	74	17.49	spurious
Middle Channel (5785 MHz)												
11570	22.86	Ave.	132	1.2	H	41.4	6.71	26.20	44.77	54	9.23	harmonic
11570	23.47	Ave.	152	1.1	V	40.4	6.71	26.20	44.38	54	9.62	harmonic
11570	40.45	PK	132	1.2	H	41.4	6.71	26.20	62.36	74	11.64	harmonic
11570	41.44	PK	152	1.1	V	40.4	6.71	26.20	62.35	74	11.65	harmonic
High Channel (5825 MHz)												
11650	22.63	Ave.	173	1.1	H	41.4	6.71	26.20	44.54	54	9.46	harmonic
11650	22.92	Ave.	228	1.2	V	40.4	6.71	26.20	43.83	54	10.17	harmonic
11650	40.53	PK	173	1.1	H	41.4	6.71	26.20	62.44	74	11.56	harmonic
11650	41.05	PK	228	1.2	V	40.4	6.71	26.20	61.96	74	12.04	harmonic

802.11n-HT20 Mode:

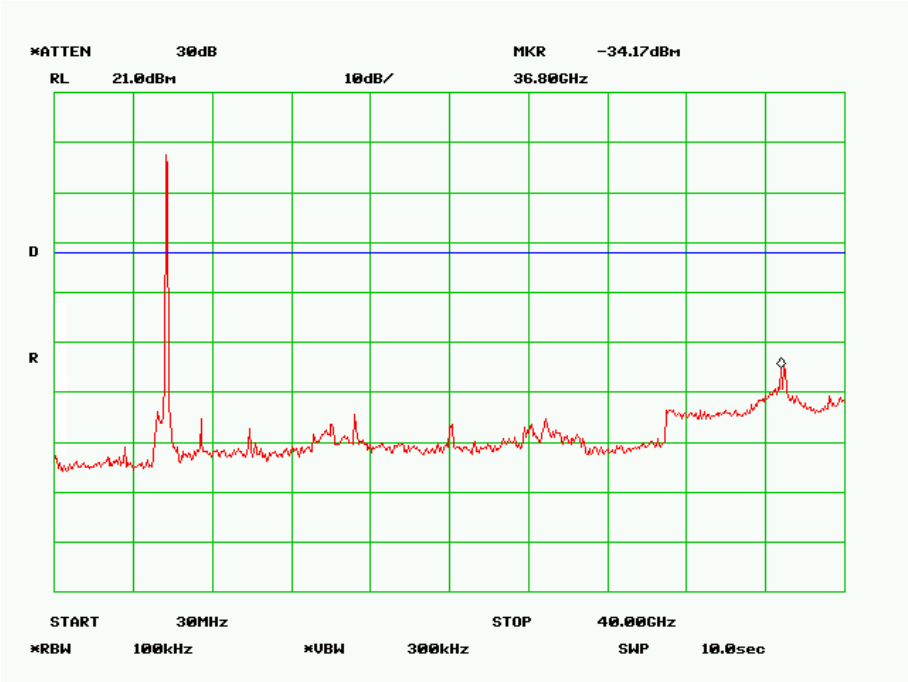
Indicated		Detector (PK/Ave.)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
Low Channel (5745 MHz)												
11490	23.25	Ave.	138	1.2	H	41.4	6.69	26.20	45.14	54	8.86	harmonic
11490	23.43	Ave.	45	1.1	V	40.4	6.69	26.20	44.32	54	9.68	harmonic
11490	41.84	PK	138	1.2	H	41.4	6.69	26.20	63.73	74	10.27	harmonic
11490	42.36	PK	45	1.1	V	40.4	6.69	26.20	63.25	74	10.75	harmonic
5460	23.28	Ave.	325	1.0	H	36.7	4.49	26.70	37.77	54	16.23	spurious
5460	43.41	PK	11	1.1	V	35.9	4.49	26.70	57.1	74	16.9	spurious
5460	23.33	Ave.	11	1.1	V	35.9	4.49	26.70	37.02	54	16.98	spurious
5460	42.13	PK	325	1.0	H	36.7	4.49	26.70	56.62	74	17.38	spurious
Middle Channel (5785 MHz)												
11570	22.92	Ave.	112	1.2	H	41.4	6.71	26.20	44.83	54	9.17	harmonic
11570	23.63	Ave.	225	1.1	V	40.4	6.71	26.20	44.54	54	9.46	harmonic
11570	41.56	PK	225	1.1	V	40.4	6.71	26.20	62.47	74	11.53	harmonic
11570	40.38	PK	112	1.2	H	41.4	6.71	26.20	62.29	74	11.71	harmonic
High Channel (5825 MHz)												
11650	22.68	Ave.	185	1.1	H	41.4	6.71	26.20	44.59	54	9.41	harmonic
11650	23.22	Ave.	32	1.1	V	40.4	6.71	26.20	44.13	54	9.87	harmonic
11650	40.56	PK	185	1.1	H	41.4	6.71	26.20	62.47	74	11.53	harmonic
11650	41.15	PK	32	1.1	V	40.4	6.71	26.20	62.06	74	11.94	harmonic

802.11n-HT40 Mode:

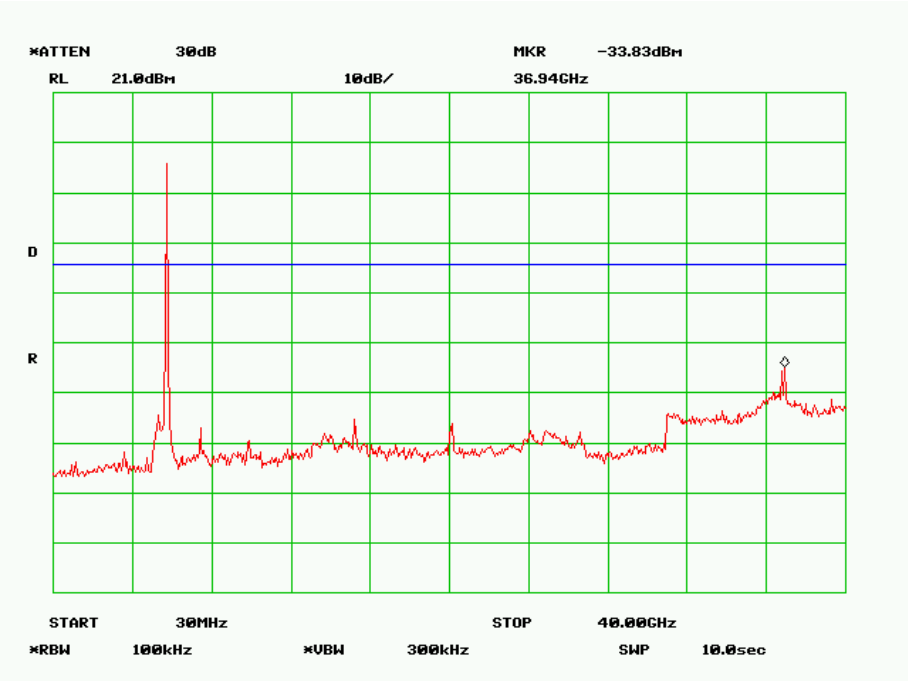
Indicated		Detector (PK/Ave)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
Channel 151 (5755 MHz)												
11510	22.67	Ave.	0	1.5	H	41.4	6.69	26.2	44.56	54	9.44	harmonic
11510	42.35	PK	0	1.5	H	41.4	6.69	26.2	64.24	74	9.76	harmonic
11510	42.16	PK	15	1.5	V	40.4	6.69	26.2	63.05	74	10.95	harmonic
11510	22.15	Ave.	15	1.5	V	40.4	6.69	26.2	43.04	54	10.96	harmonic
5460	44.03	PK	180	1.5	V	35.9	4.49	26.7	57.72	74	16.28	spurious
5460	43.15	PK	136	1.5	H	36.7	4.49	26.7	57.64	74	16.36	spurious
5460	23.15	Ave.	180	1.5	V	35.9	4.49	26.7	36.84	54	17.16	spurious
5460	22.3	Ave.	136	1.5	H	36.7	4.49	26.7	36.79	54	17.21	spurious
Channel 159 (5795 MHz)												
11590	21.43	Ave.	164	1.1	H	41.4	6.71	26.2	43.34	54	10.66	harmonic
11590	22.04	Ave.	155	1.1	V	40.4	6.71	26.2	42.95	54	11.05	harmonic
11590	41.79	PK	155	1.1	V	40.4	6.71	26.2	62.70	74	11.30	harmonic
11590	40.78	PK	164	1.1	H	41.4	6.71	26.2	62.69	74	11.31	harmonic

Antenna Port Conducted Spurious Emissions:

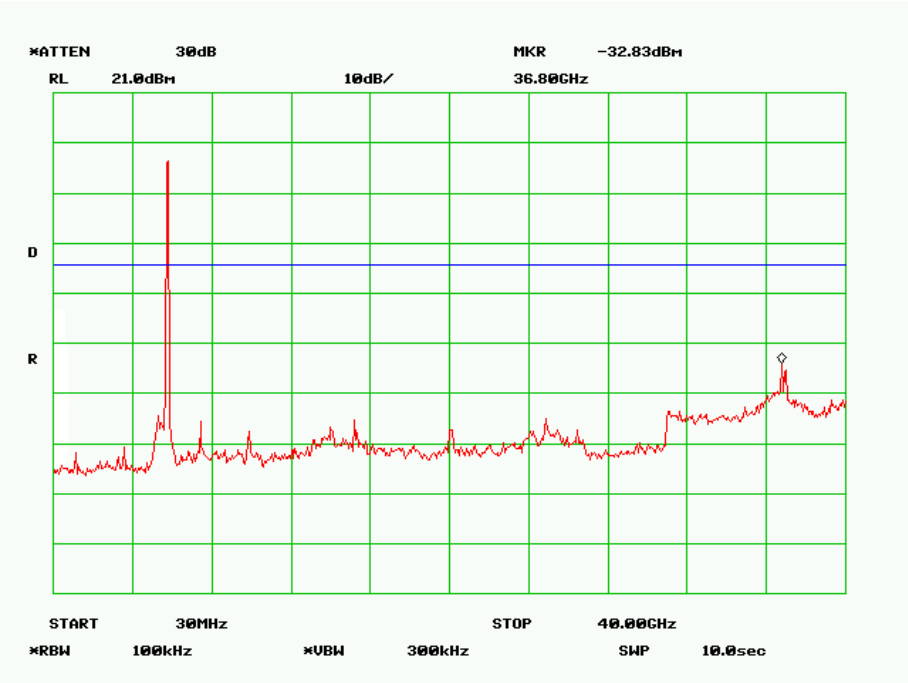
802.11a Low Channel, TX0



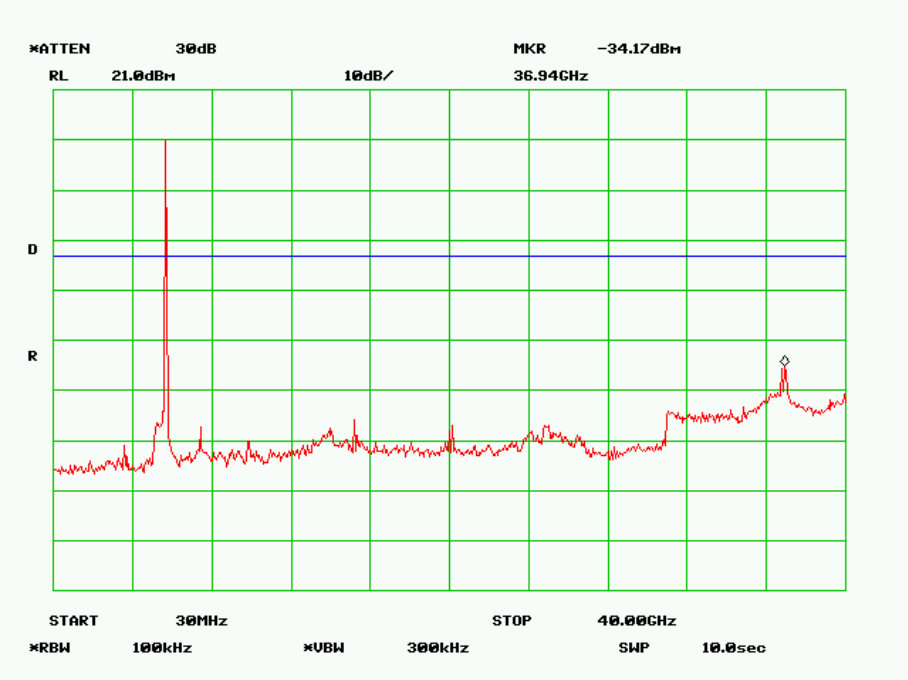
802.11a Middle Channel, TX0



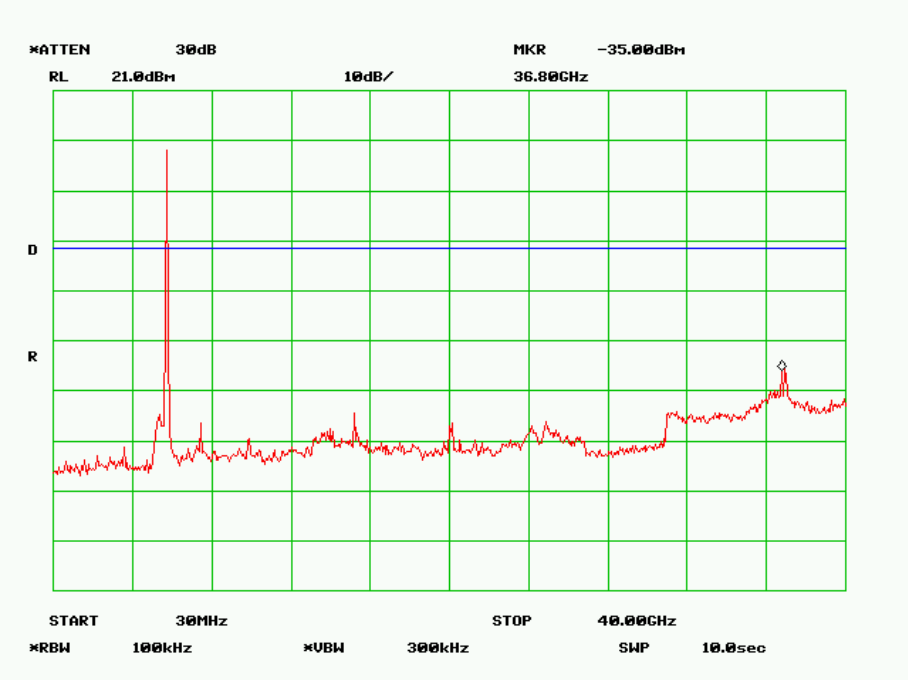
802.11a High Channel, TX0



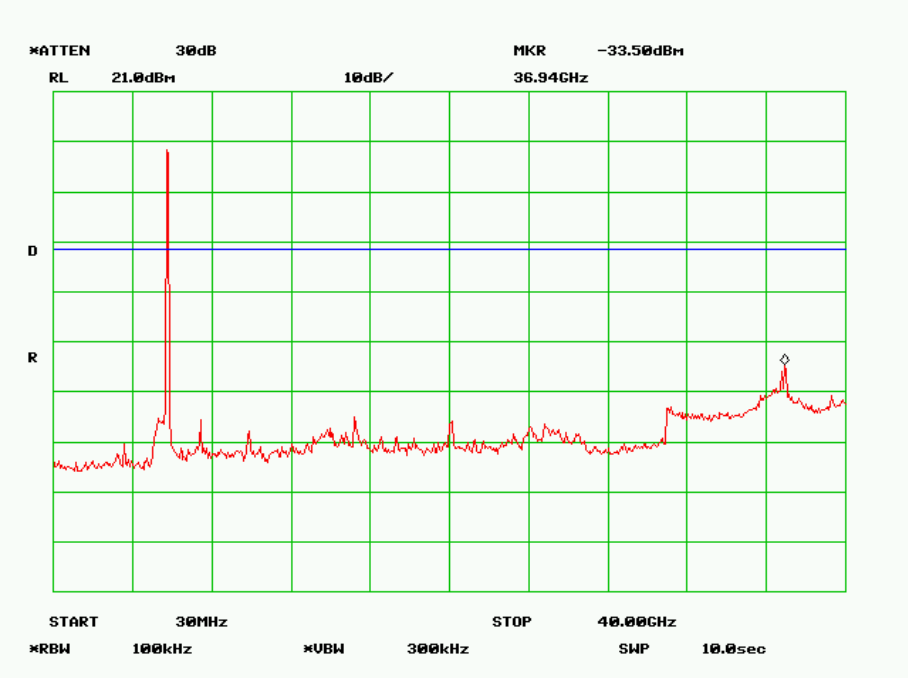
802.11a Low Channel, TX1



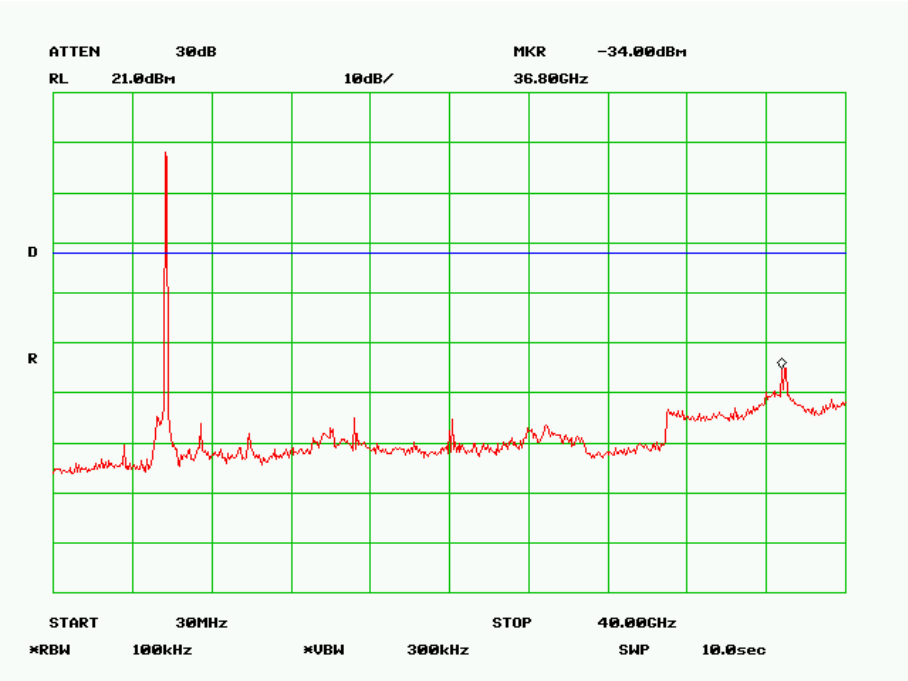
802.11a Middle Channel, TX1



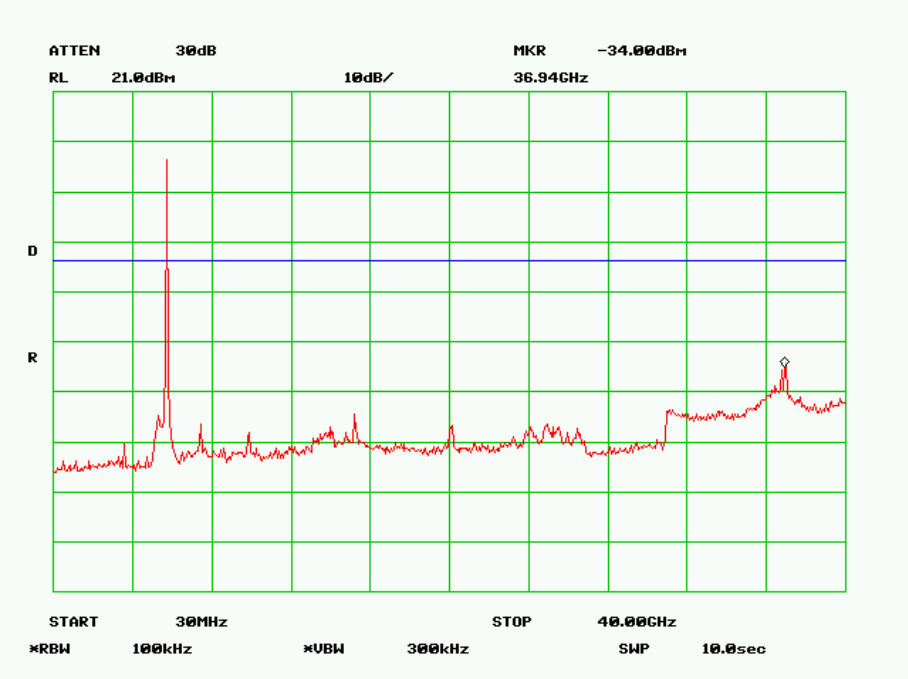
802.11a High Channel, TX1



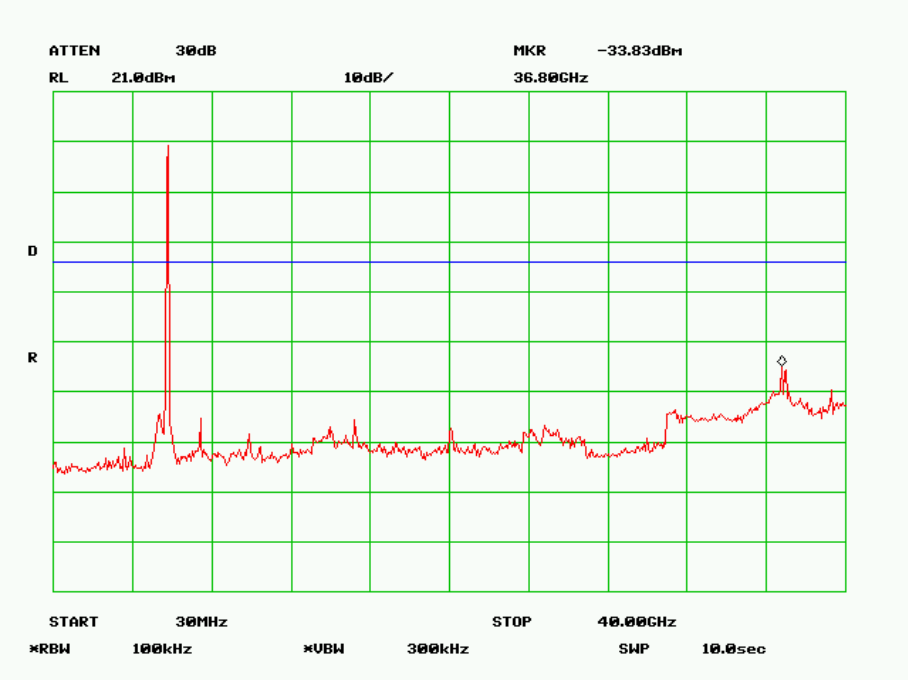
802.11n-HT20 Low Channel, TX0



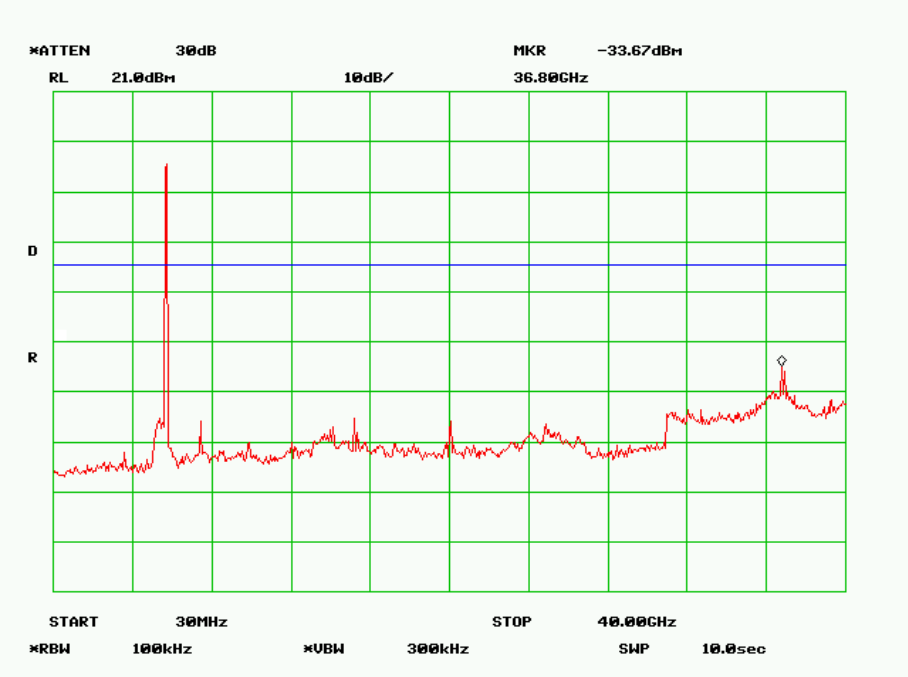
802.11n-HT20 Middle Channel, TX0



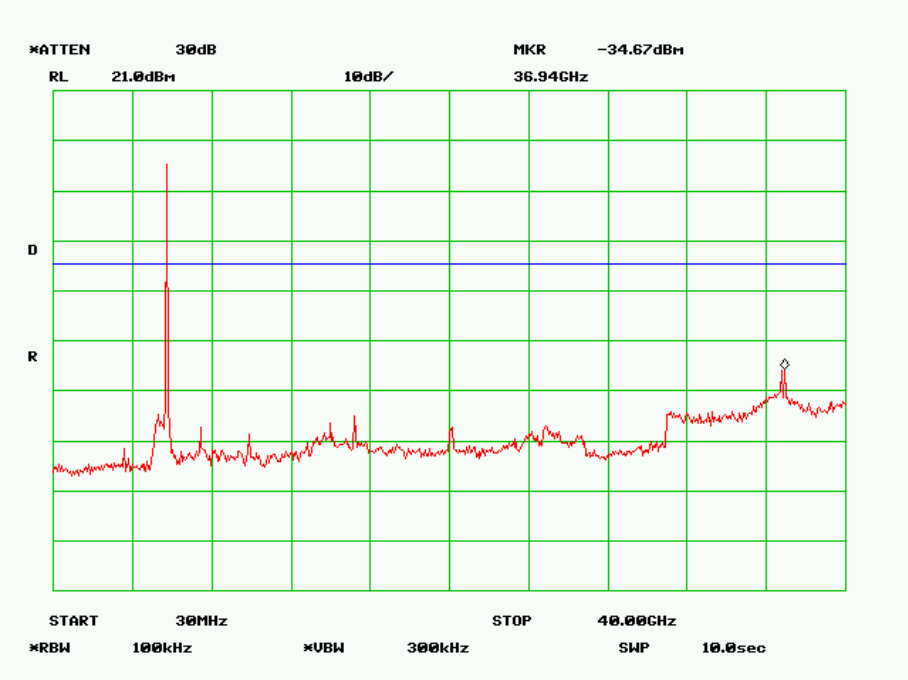
802.11n-HT20 High Channel, TX0



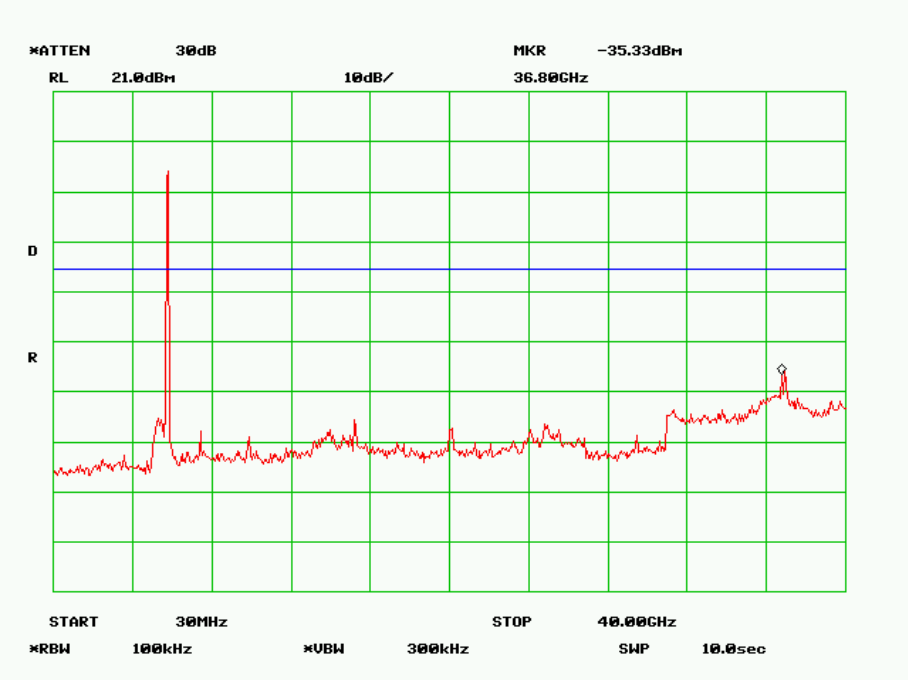
802.11n-HT20 Low Channel, TX1



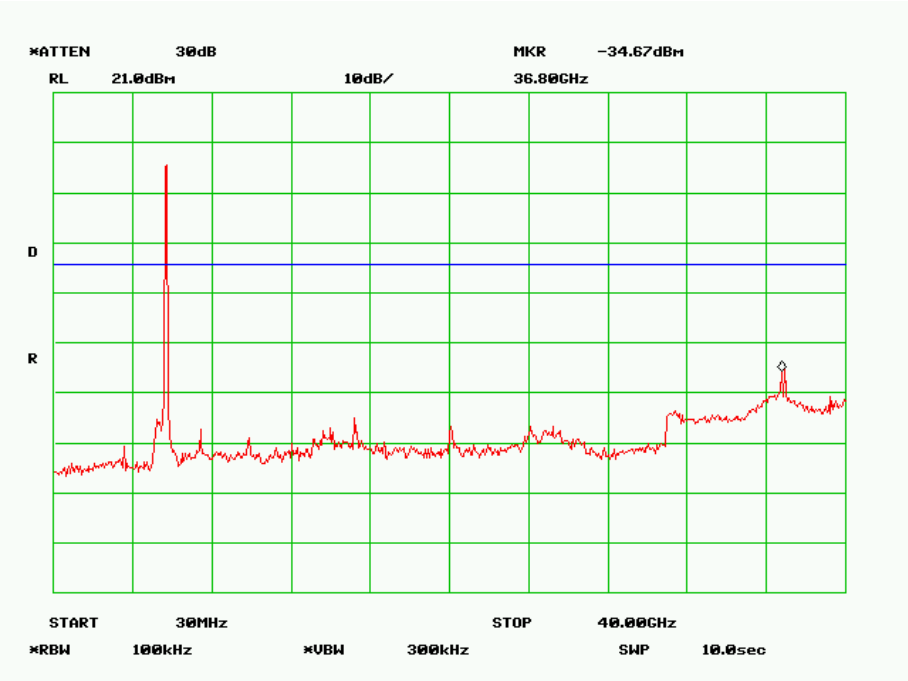
802.11n-HT20 Middle Channel, TX1



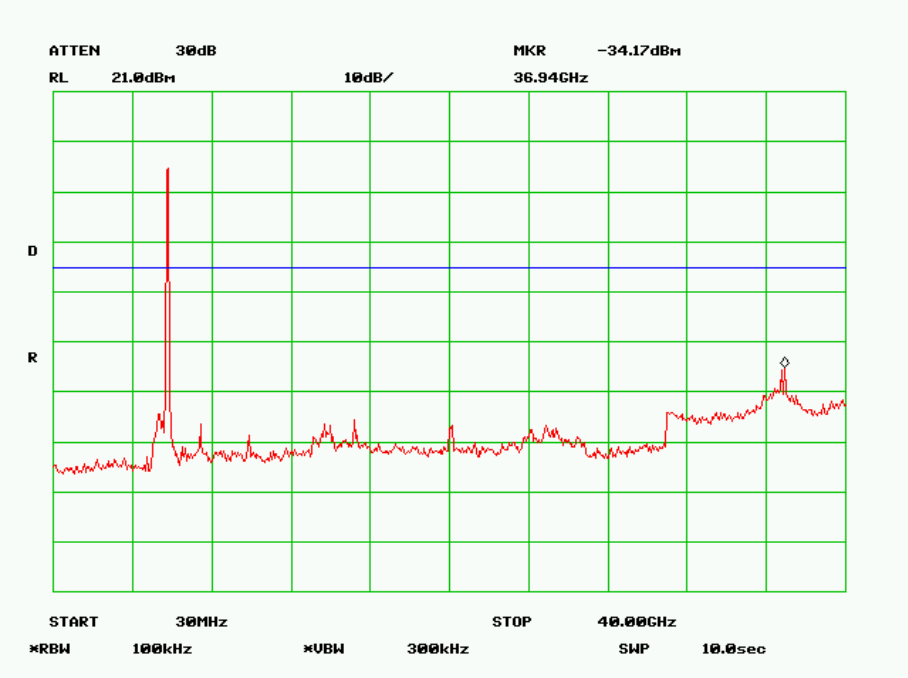
802.11n-HT20 High Channel, TX1



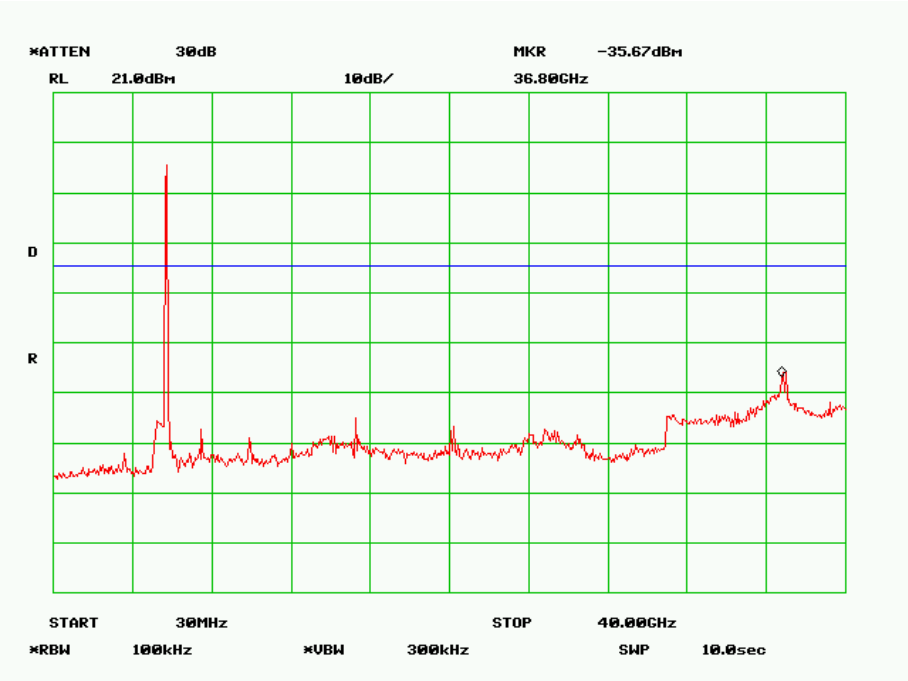
802.11n-HT40 Channel 151, TX0



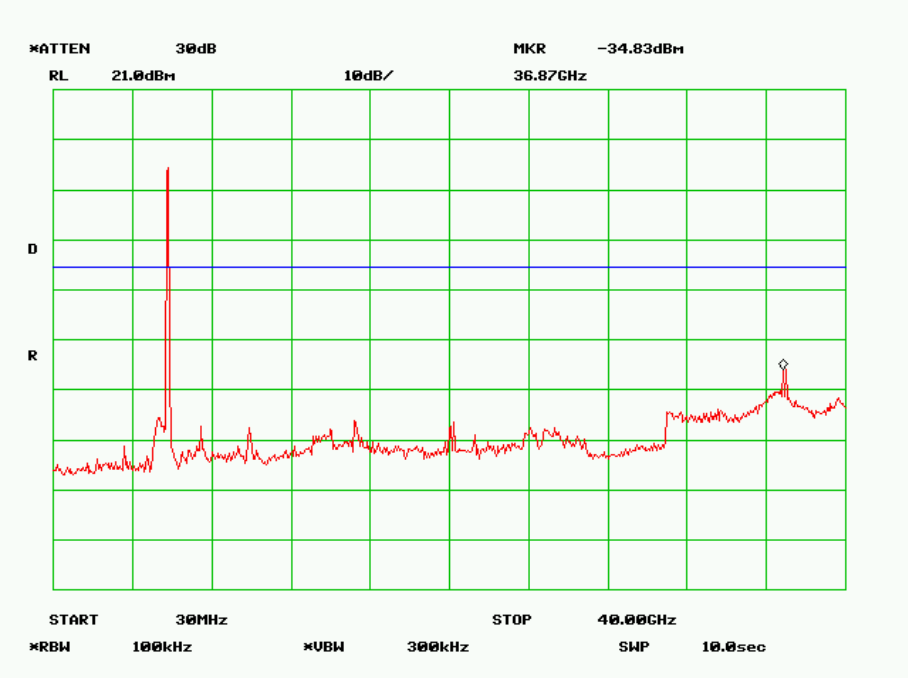
802.11n-HT40 Channel 159, TX0



802.11n-HT40 Channel 151, TX1



802.11n-HT40 Channel 159, TX1



FCC §15.247(a) (2) – 6 dB BANDWIDTH TESTING

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

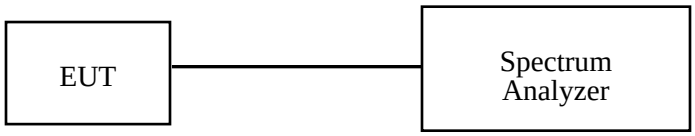
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.0kPa

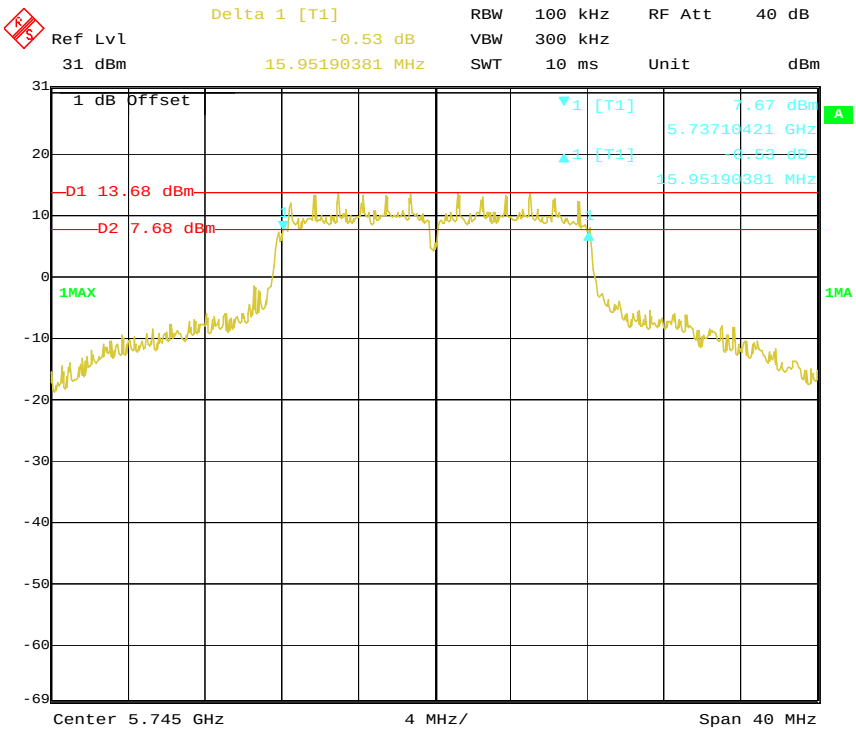
The testing was performed by Jim Huang on 2011-11-03 to 2011-12-05.

Test Result: Pass.

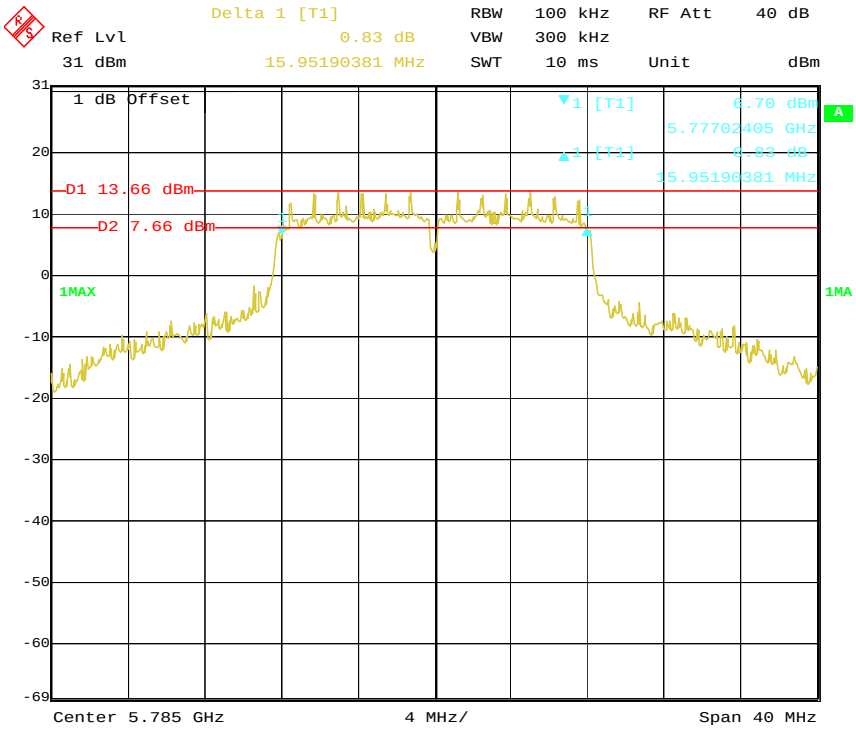
Please refer to the following tables and plots.

Channel	Channel Frequency (MHz)	Antenna Port	6dB Bandwidth (MHz)	FCC Part 15.247 Limit (kHz)
802.11a mode (BW=20MHz)				
Low	149(5745 MHz)	TX0	15.95	>500
		TX1	15.95	>500
Middle	157(5785 MHz)	TX0	15.95	>500
		TX1	15.95	>500
High	165(5825 MHz)	TX0	15.95	>500
		TX1	15.95	>500
802.11n-HT20 mode (BW=20MHz)				
Low	149(5745 MHz)	TX0	16.27	>500
		TX1	16.59	>500
Middle	157(5785 MHz)	TX0	16.43	>500
		TX1	16.59	>500
High	165(5825 MHz)	TX0	16.27	>500
		TX1	16.59	>500
802.11n-HT40 mode (BW=40MHz)				
/	151(5755 MHz)	TX0	35.27	>500
		TX1	35.27	>500
/	159(5795 MHz)	TX0	35.27	>500
		TX1	35.27	>500

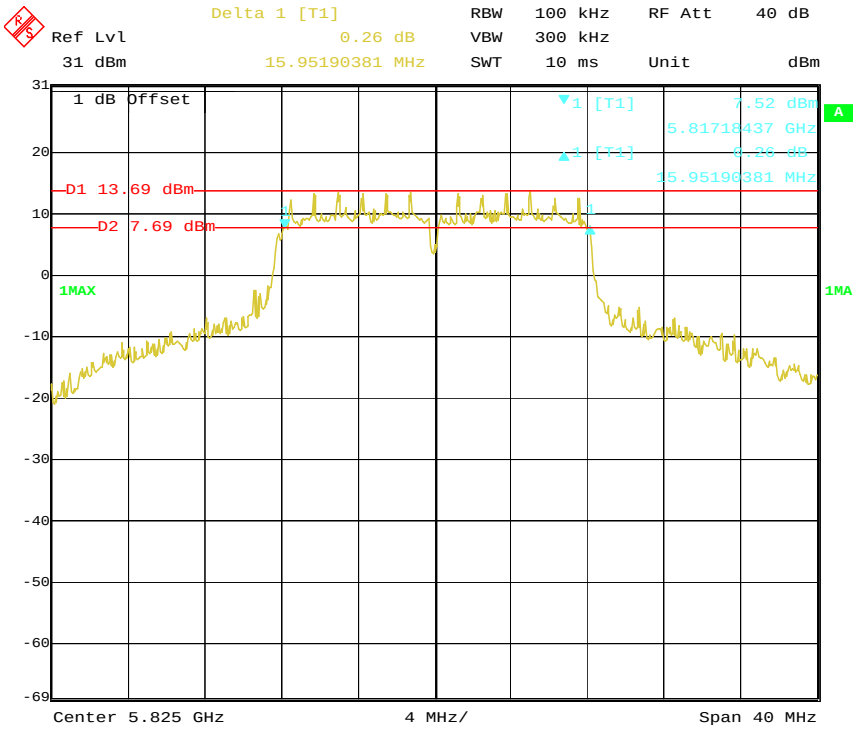
802.11a Low Channel, TX0



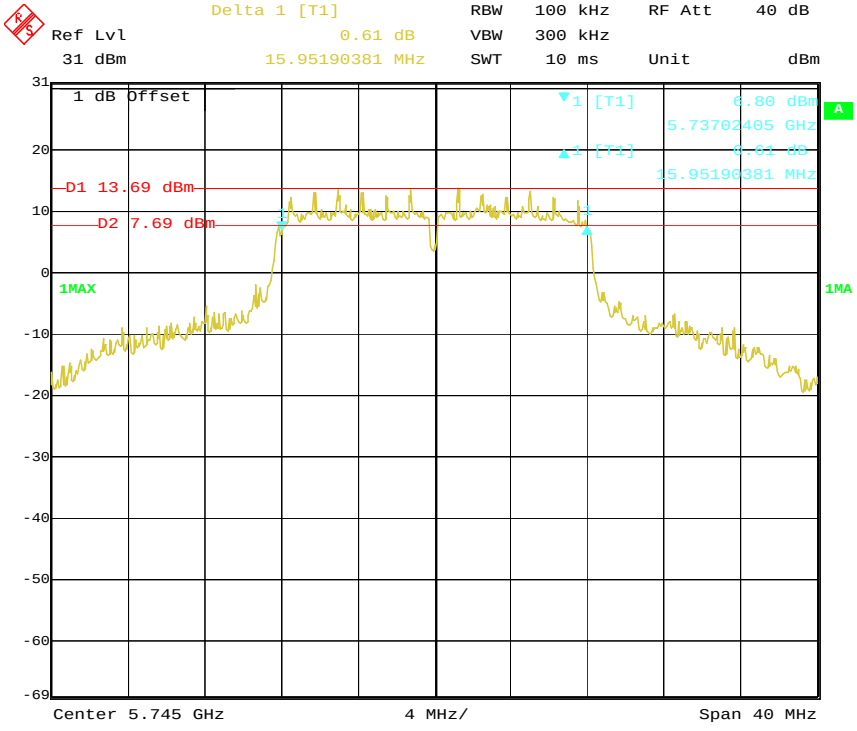
802.11a Middle Channel, TX0



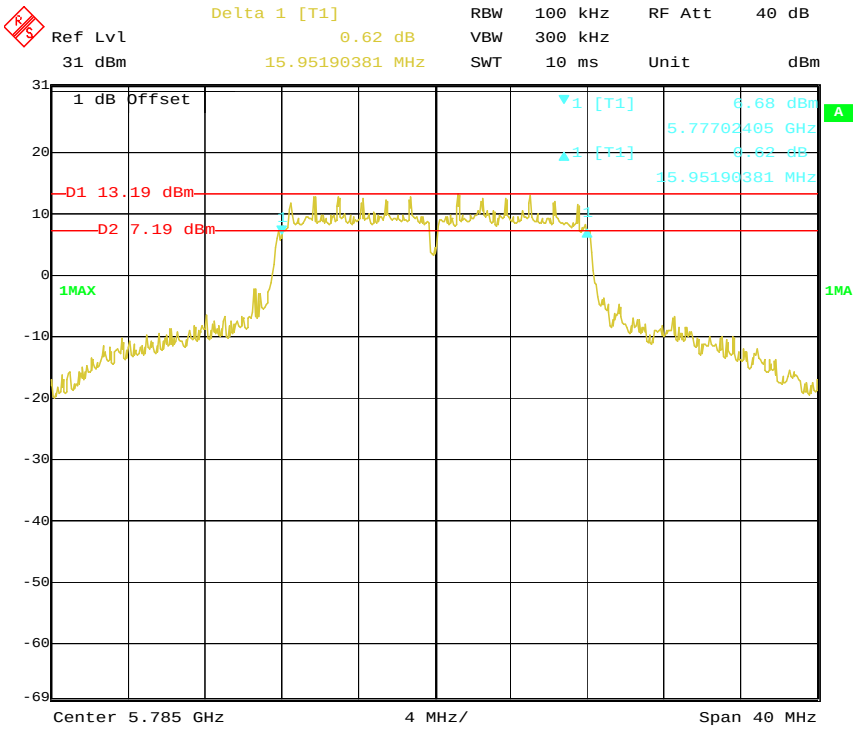
802.11a High Channel, TX0



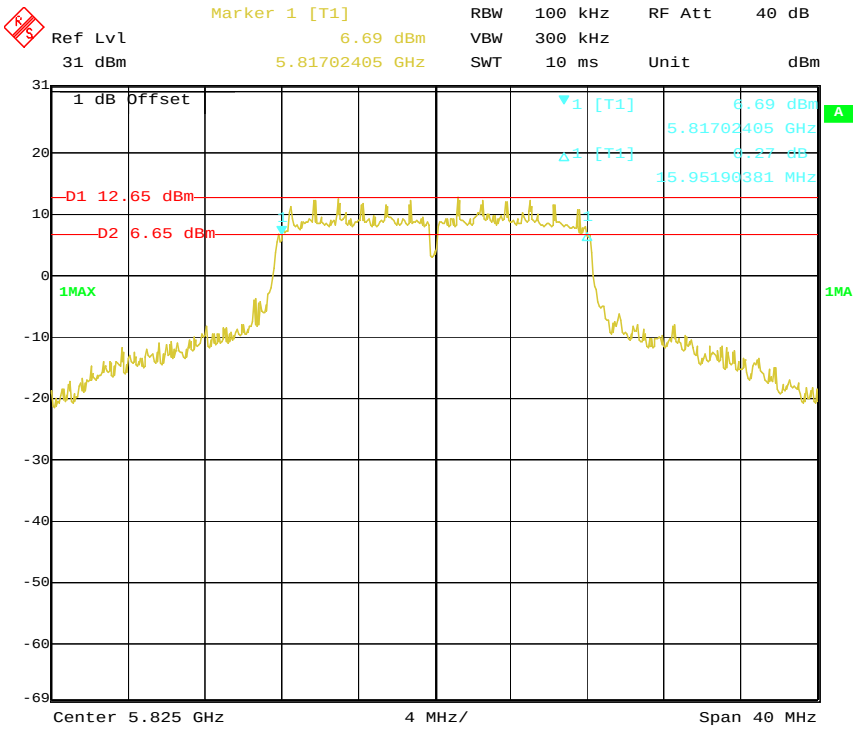
802.11a Low Channel, TX1



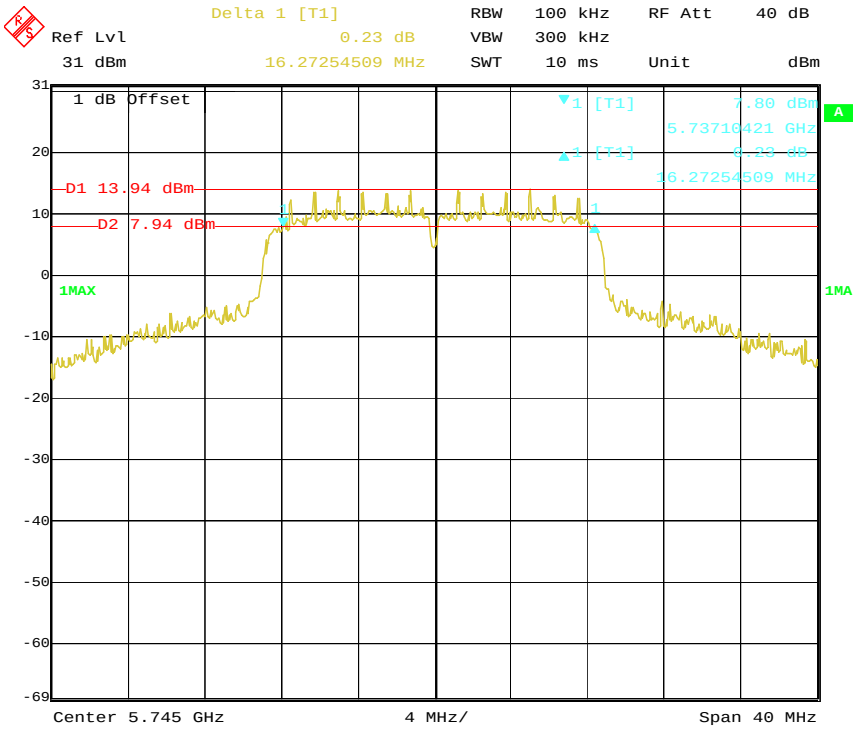
802.11a Middle Channel, TX1



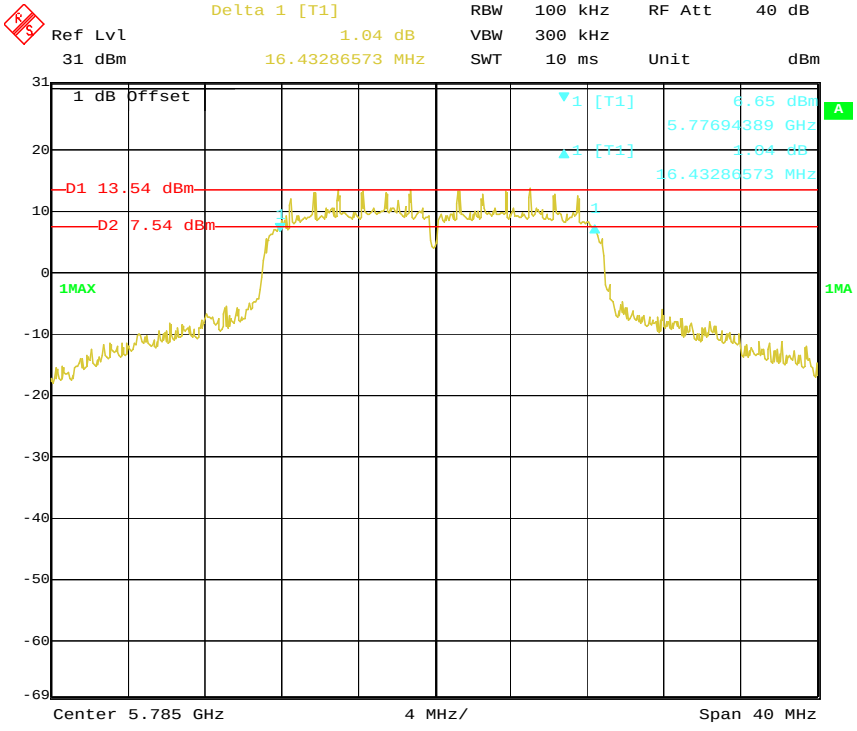
802.11a High Channel, TX1



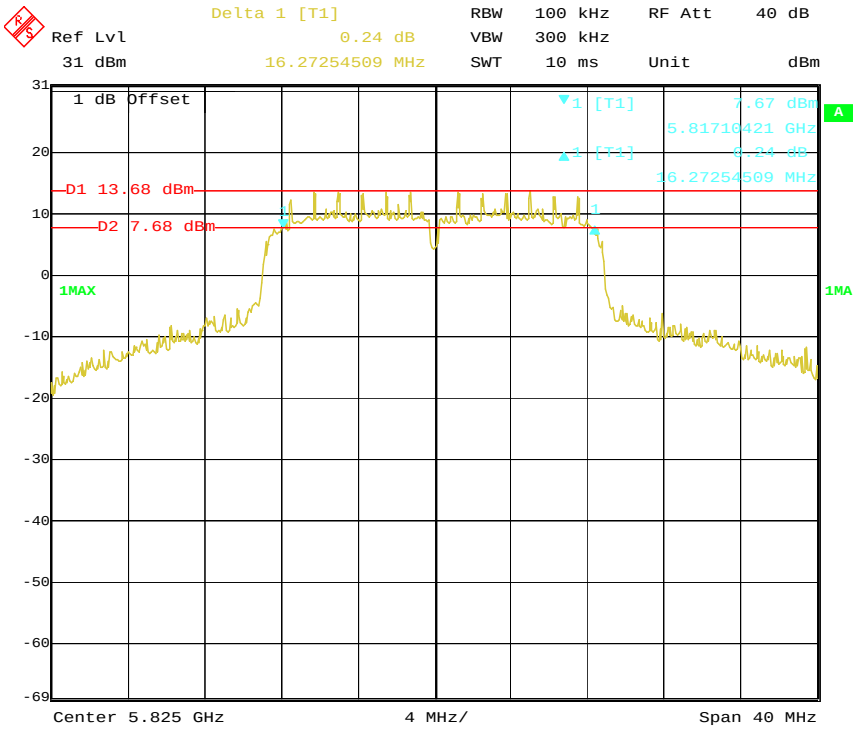
802.11n-HT20 Low Channel, TX0



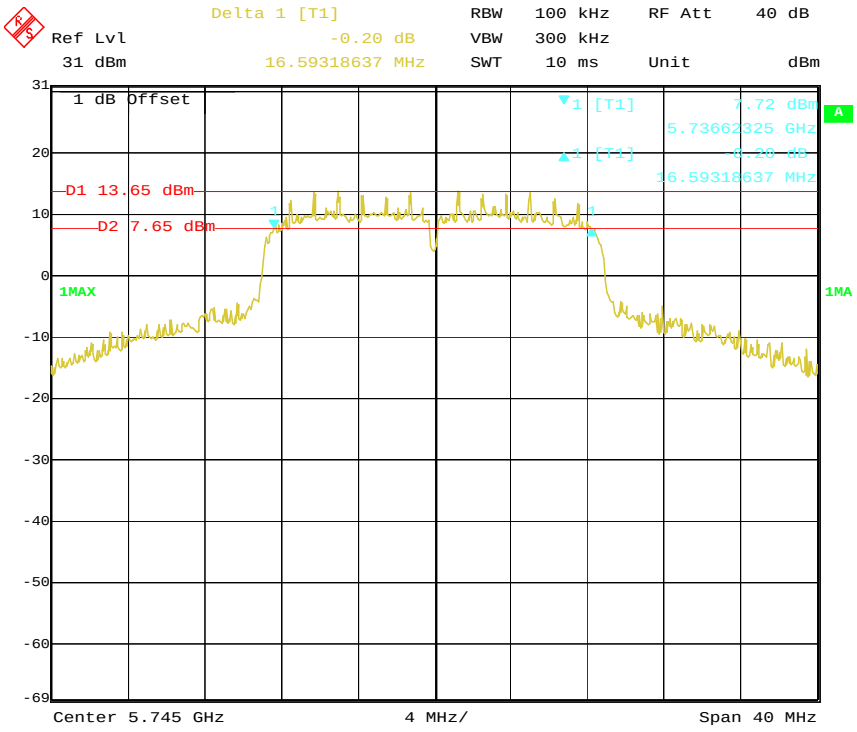
802.11n-HT20 Middle Channel, TX0



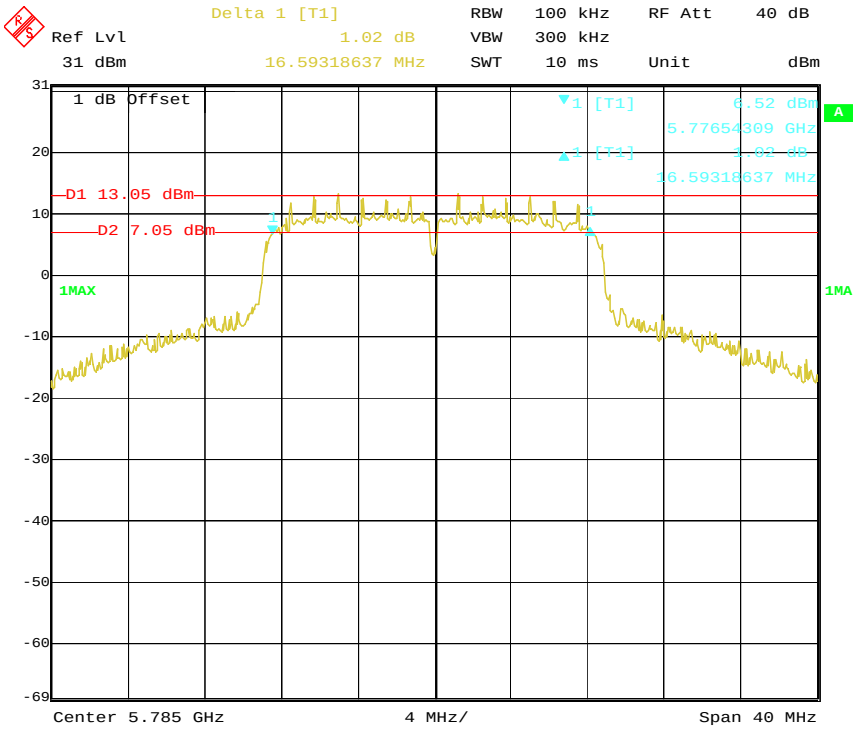
802.11n-HT20 High Channel, TX0



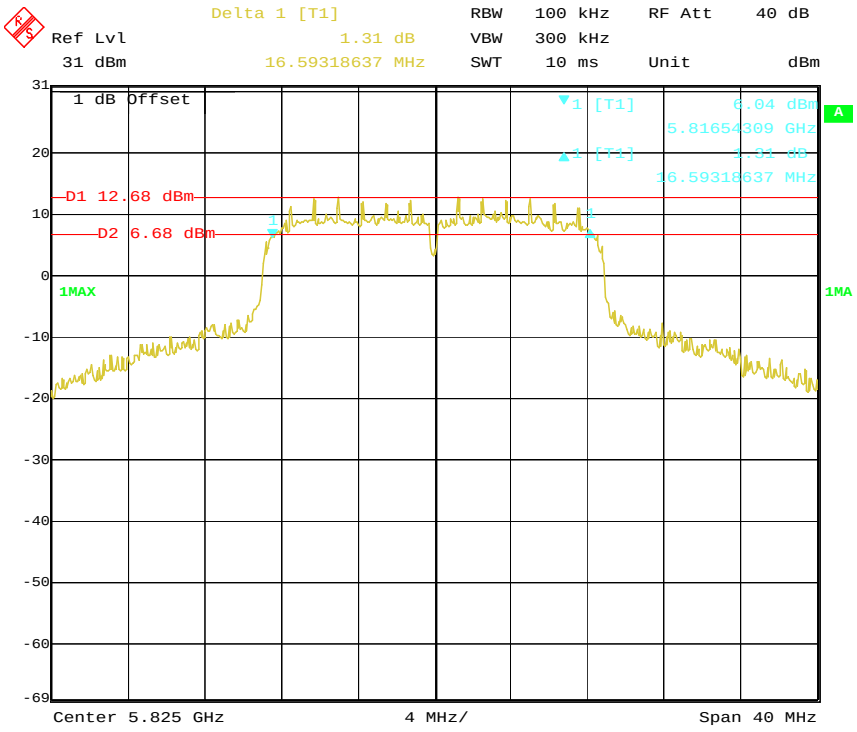
802.11n-HT20 Low Channel, TX1



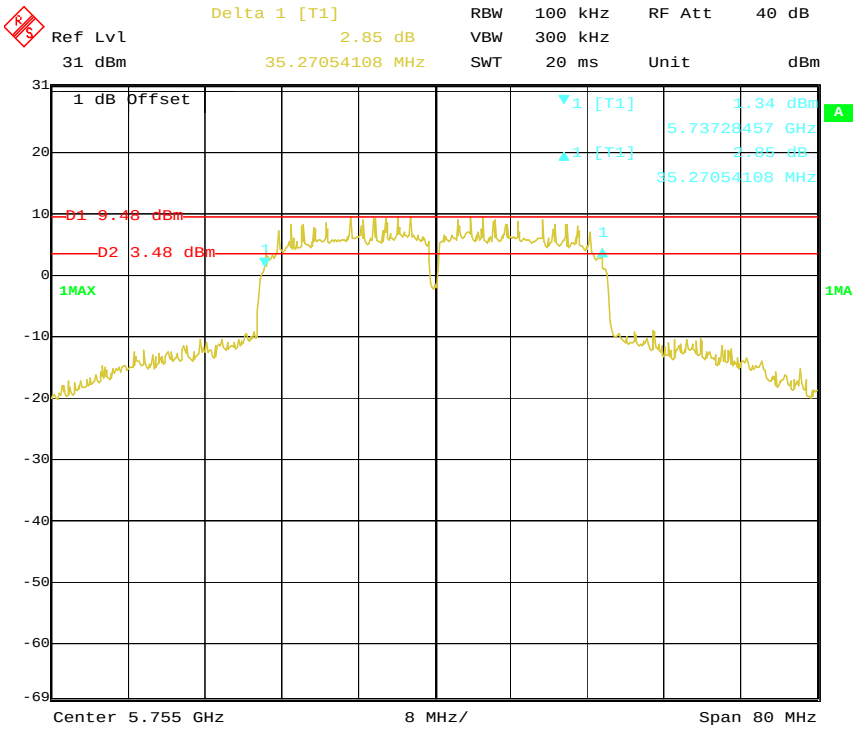
802.11n-HT20 Middle Channel, TX1



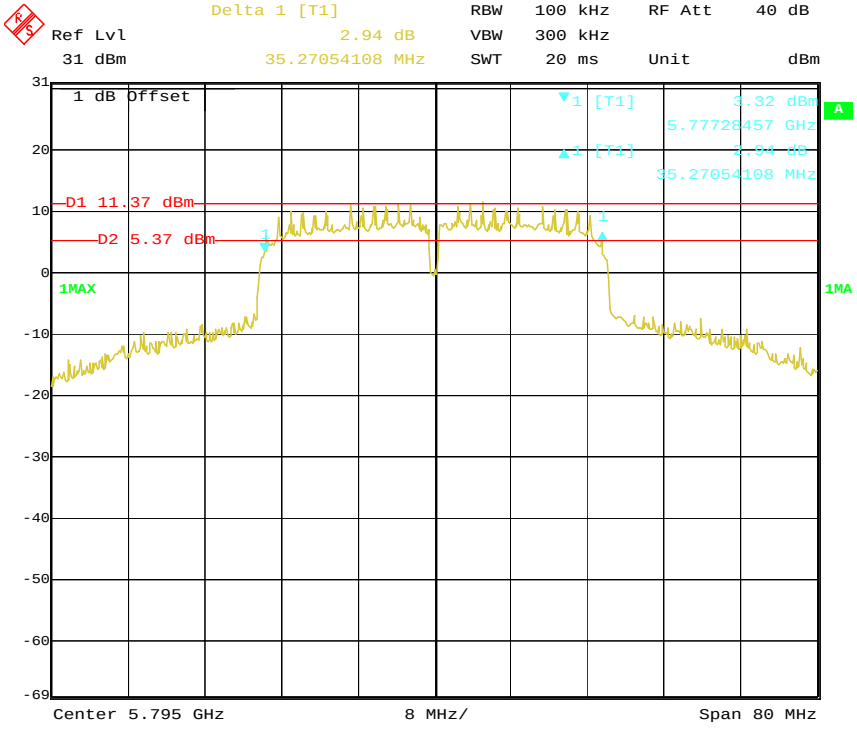
802.11n-HT20 High Channel, TX1



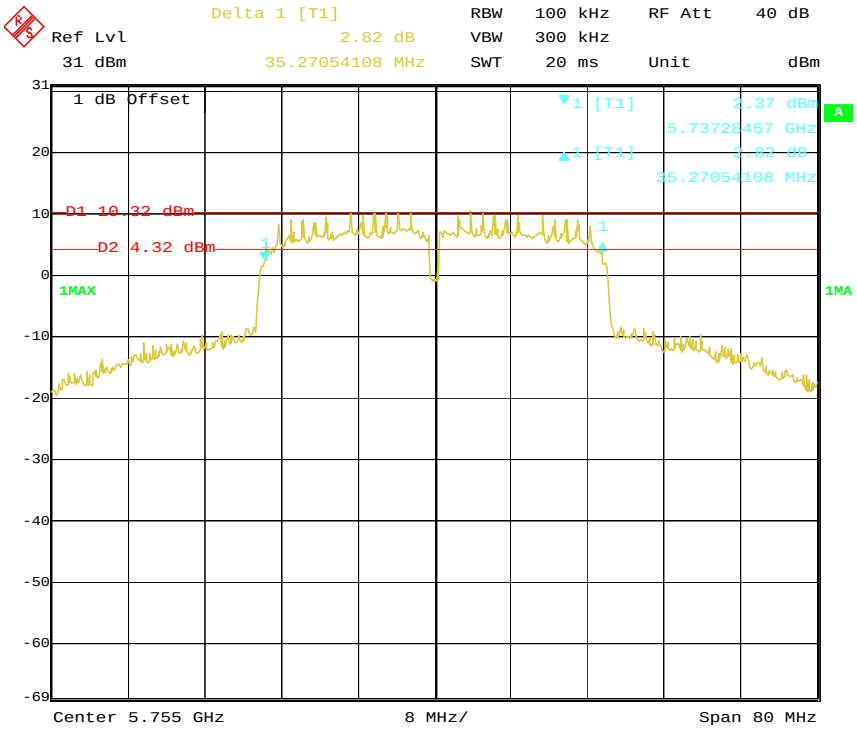
802.11n-HT40 Channel 151, TX0



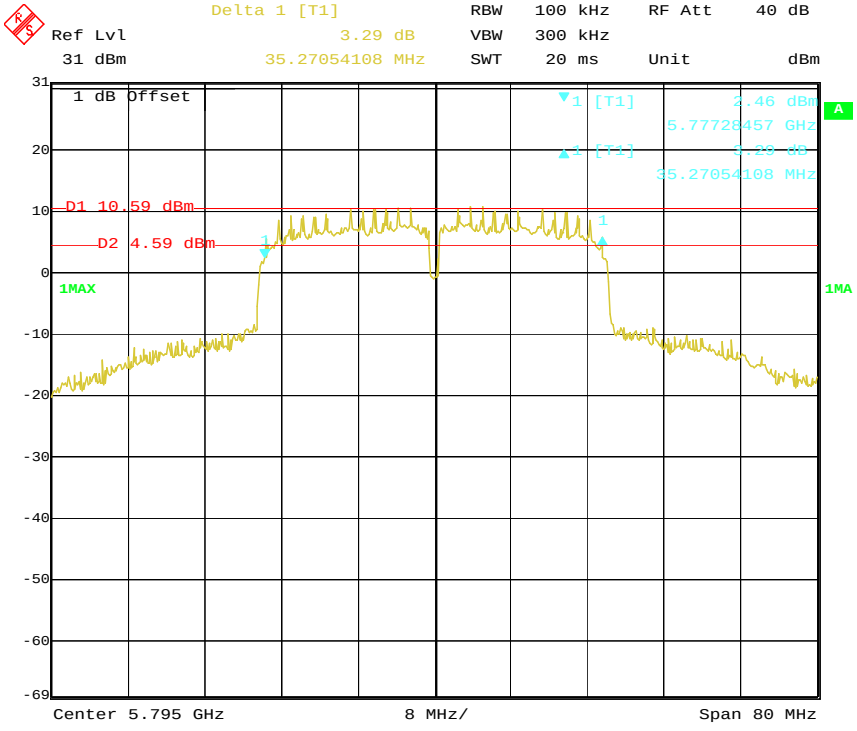
802.11n-HT40 Channel 159, TX0



802.11n-HT40 Channel 151, TX1



802.11n-HT40 Channel 159, TX1



FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

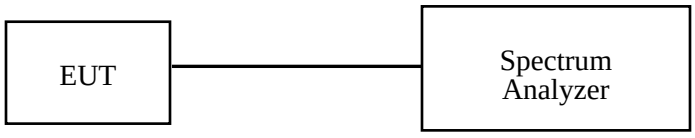
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

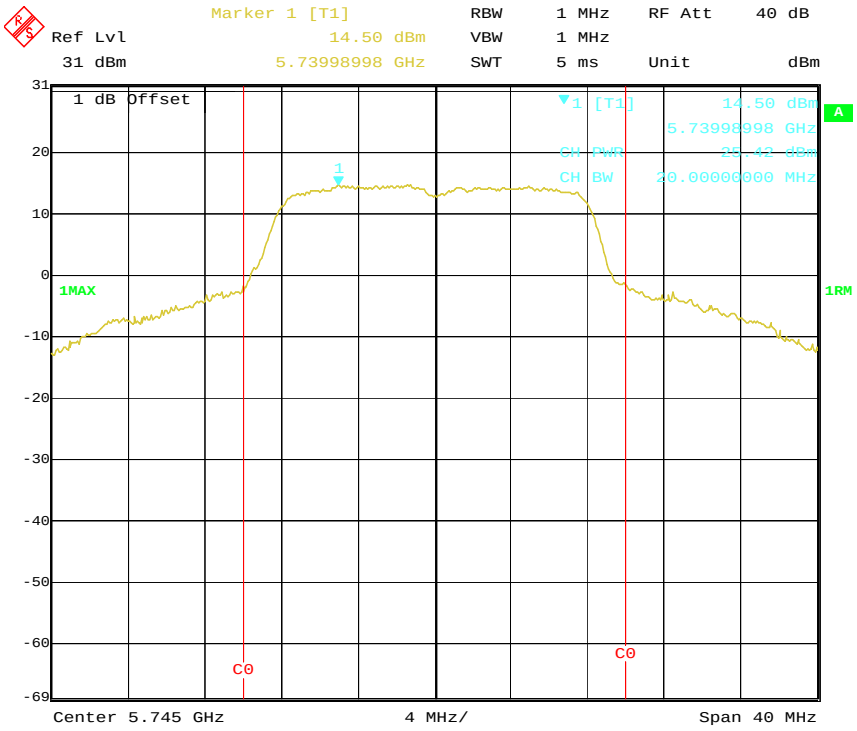
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-03 to 2011-12-05.

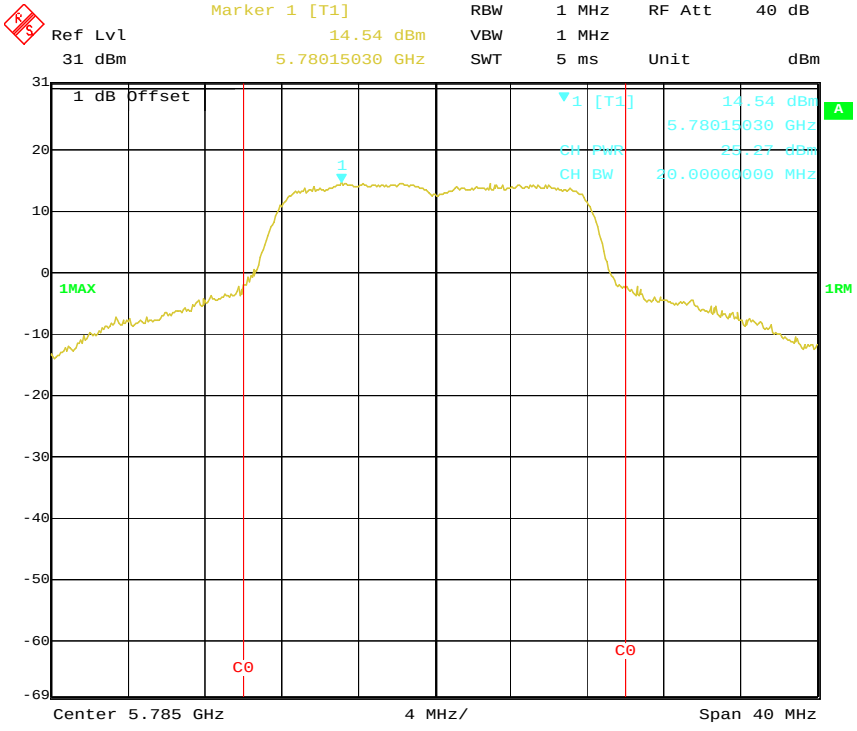
Test Mode: Transmitting

Channel	Frequency (MHz)	Antenna Port	Reading Power (dBm)	Calculated Total Power (dBm)	Limit (dBm)	Result
802.11a mode						
Low	149(5745 MHz)	TX0	25.42	28.43	30	Pass
		TX1	25.43			
Middle	157(5785 MHz)	TX0	25.27	28.18	30	Pass
		TX1	25.07			
High	165(5825 MHz)	TX0	25.30	28.09	30	Pass
		TX1	24.86			
802.11n-HT20 mode						
Low	149(5745 MHz)	TX0	25.61	28.56	30	Pass
		TX1	25.50			
Middle	157(5785 MHz)	TX0	25.34	28.19	30	Pass
		TX1	25.01			
High	165(5825 MHz)	TX0	25.40	28.05	30	Pass
		TX1	24.66			
802.11n-HT40 mode						
/	151(5755 MHz)	TX0	24.32	27.69	30	Pass
		TX1	25.01			
/	159(5795 MHz)	TX0	25.64	28.42	30	Pass
		TX1	25.17			

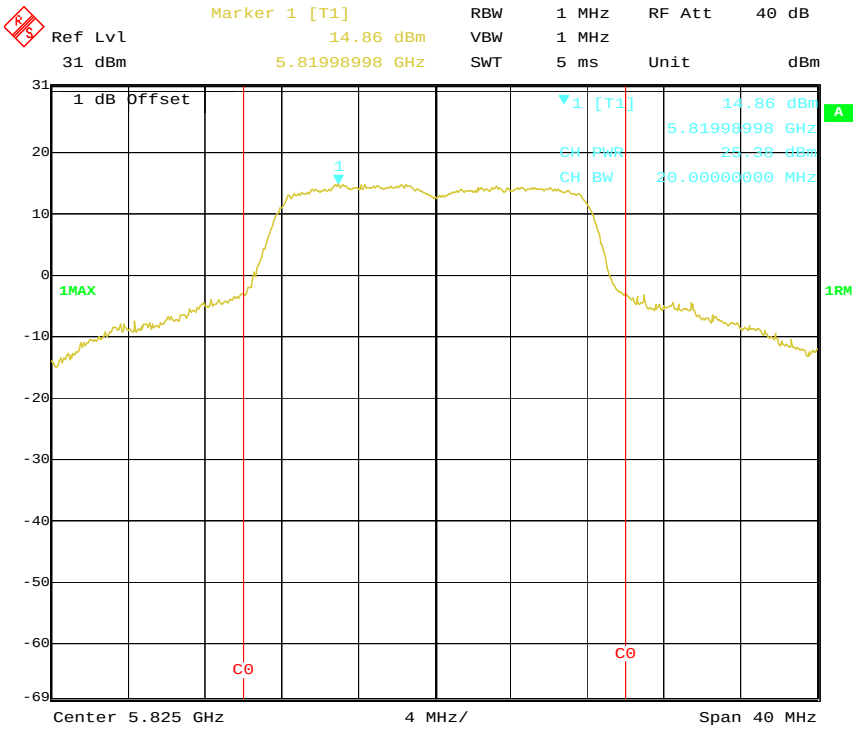
802.11a RF Output Power, Low Channel, TX0



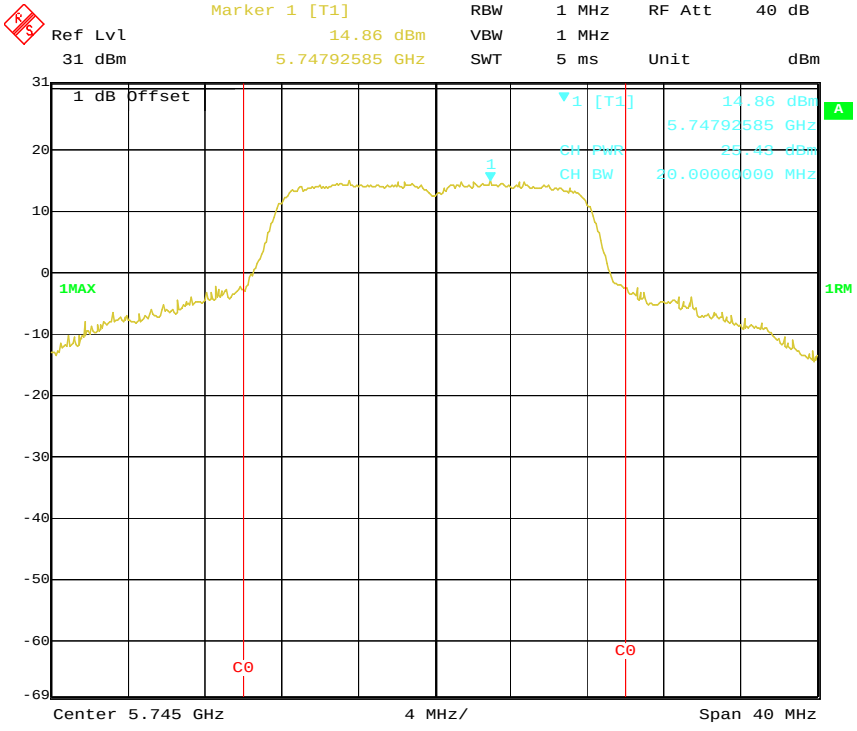
802.11a RF Output Power, Middle Channel, TX0



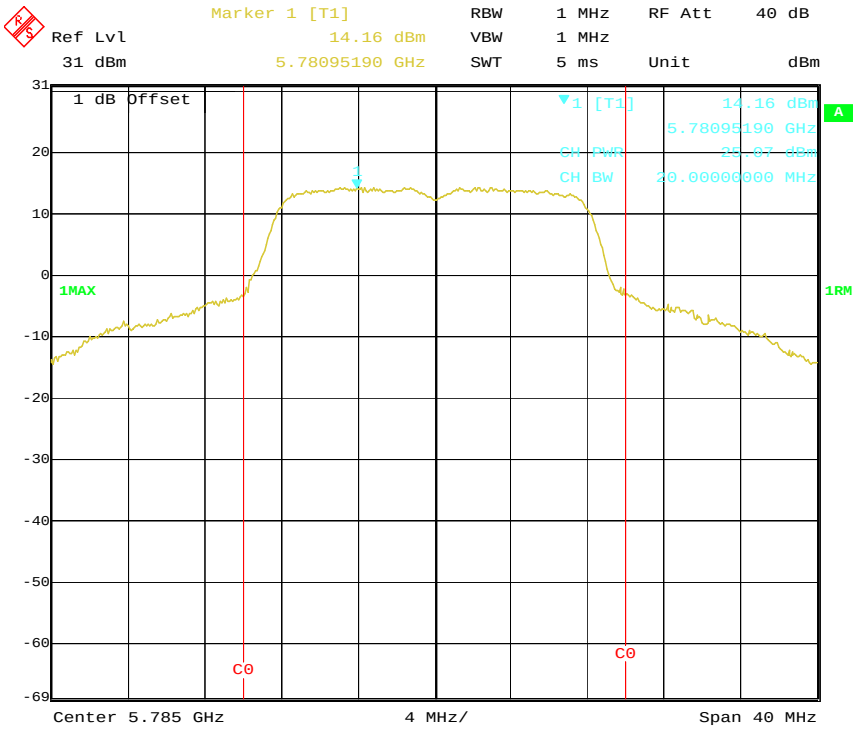
802.11a RF Output Power, High Channel, TX0



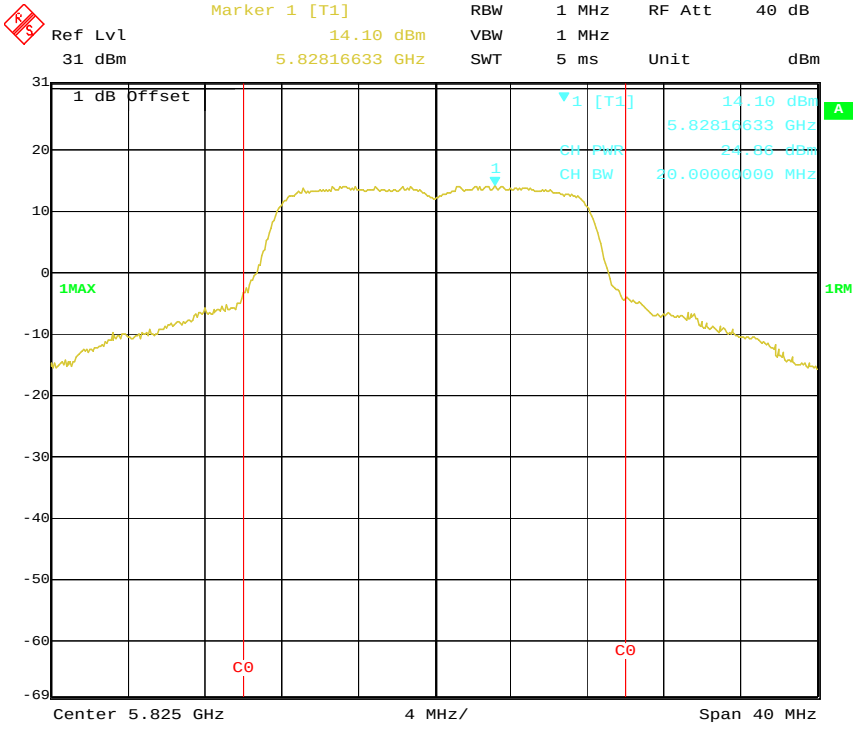
802.11a RF Output Power, Low Channel, TX1



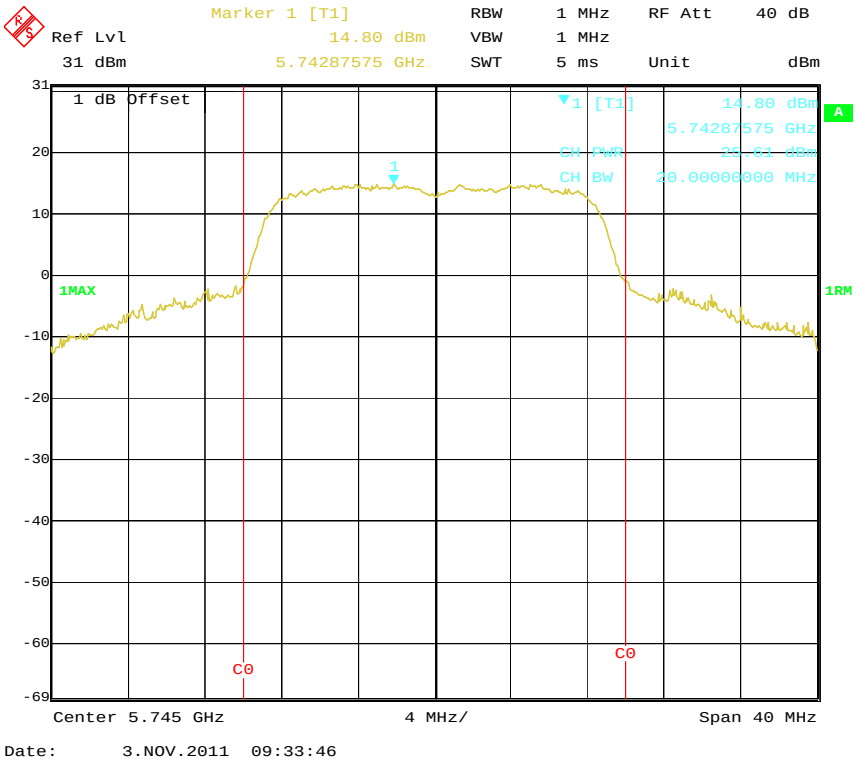
802.11a RF Output Power, Middle Channel, TX1



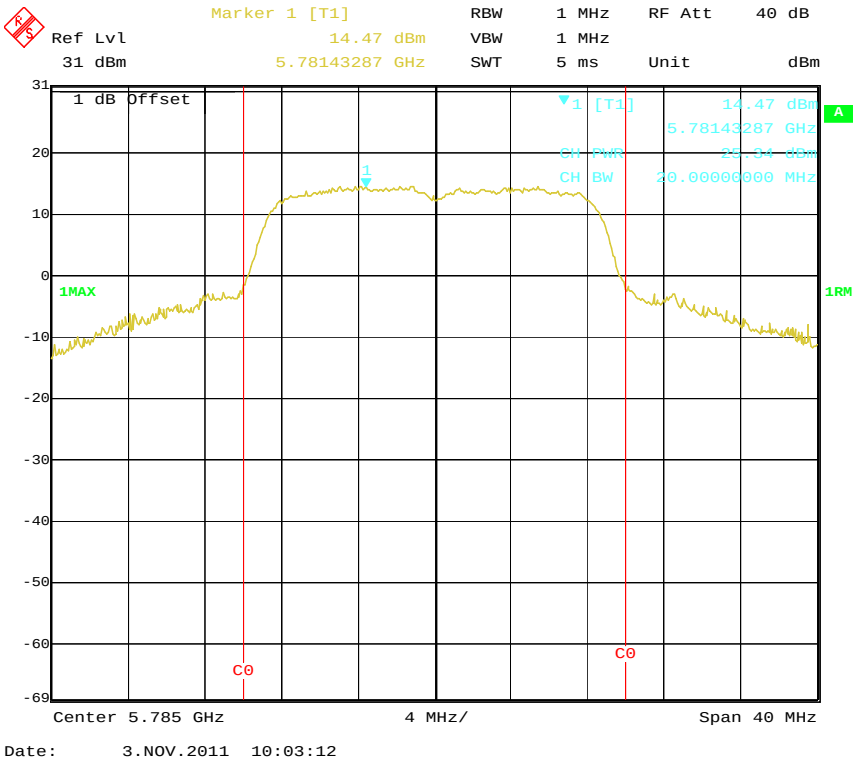
802.11a RF Output Power, High Channel. TX1



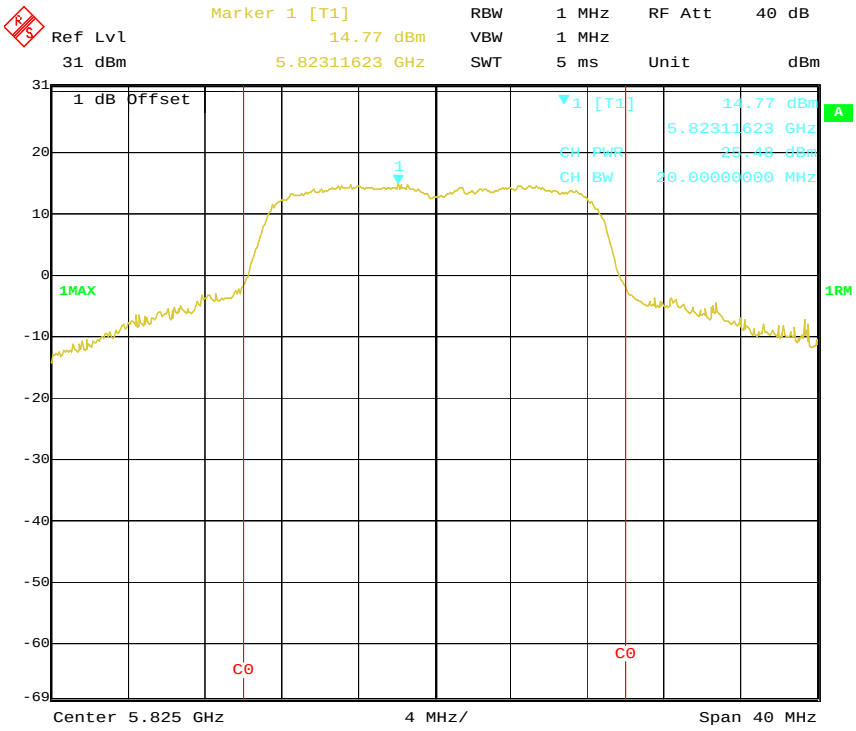
802.11n-HT20 RF Output Power, Low Channel, TX0



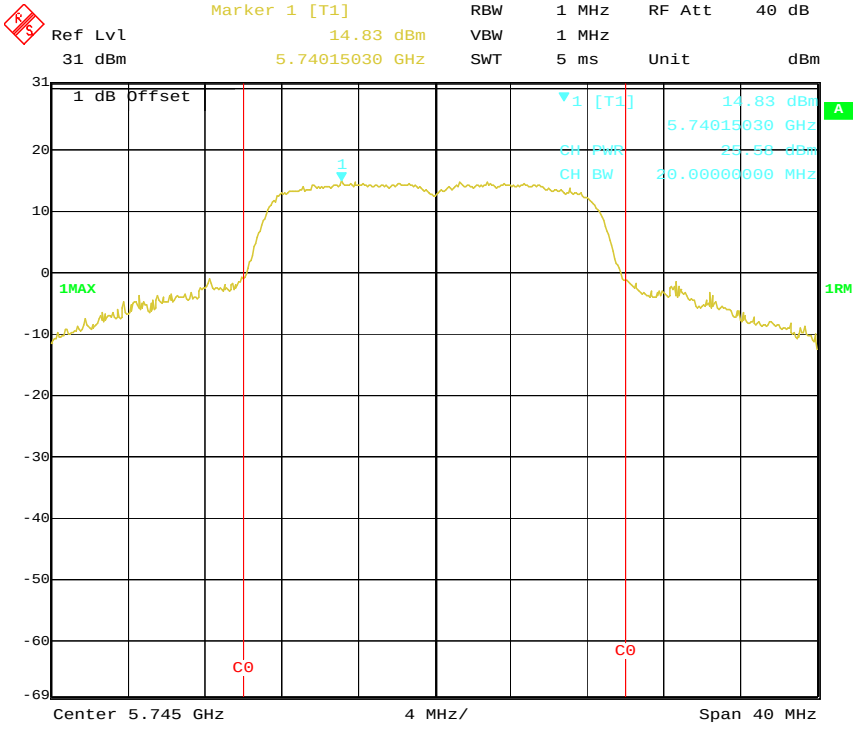
802.11n-HT20 RF Output Power, Middle Channel, TX0



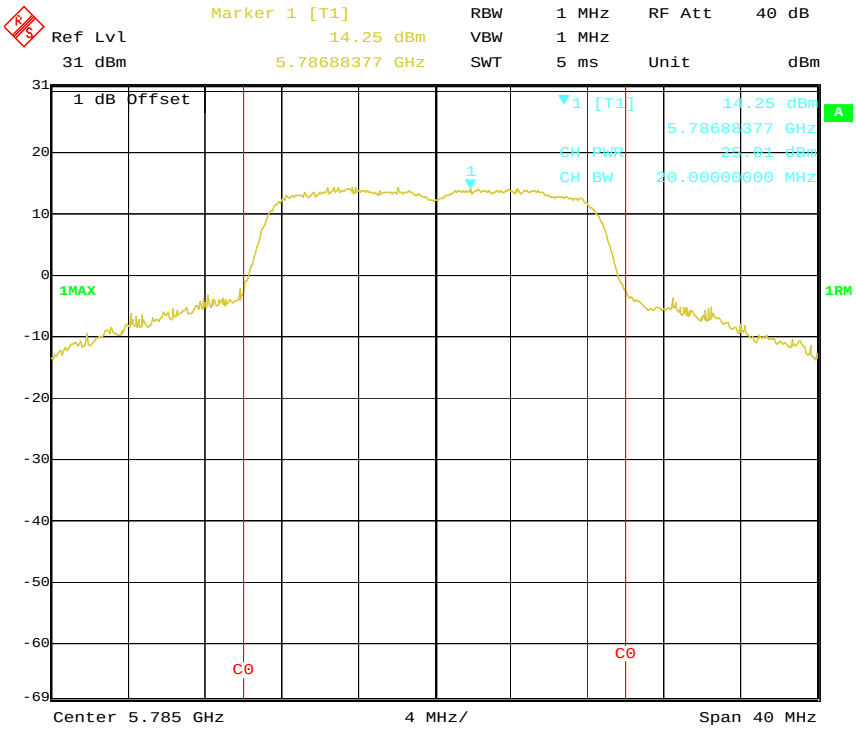
802.11n-HT20 RF Output Power, High Channel, TX0



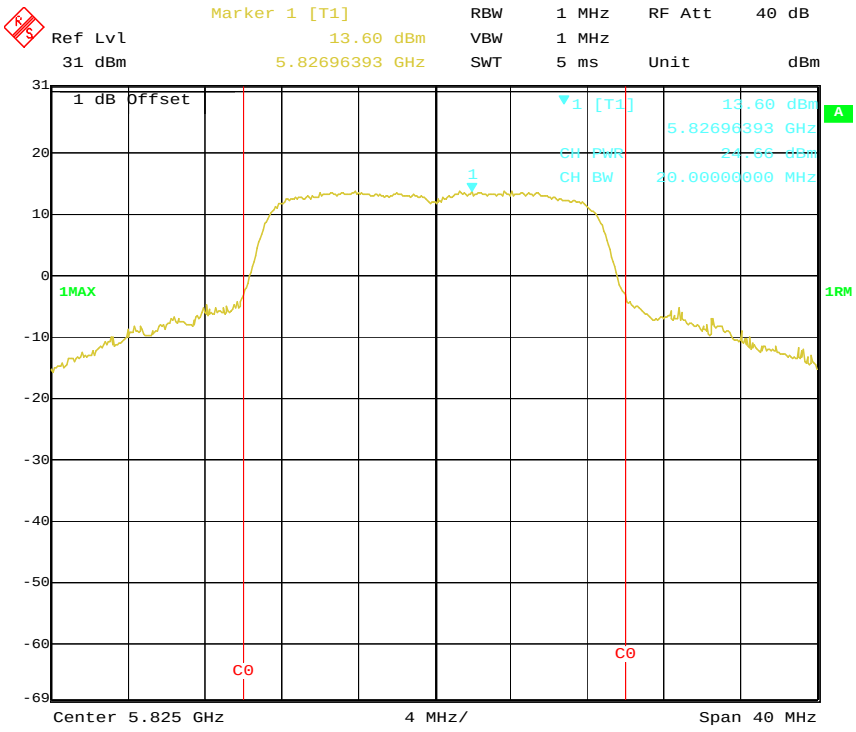
802.11n-HT20 RF Output Power, Low Channel, TX1



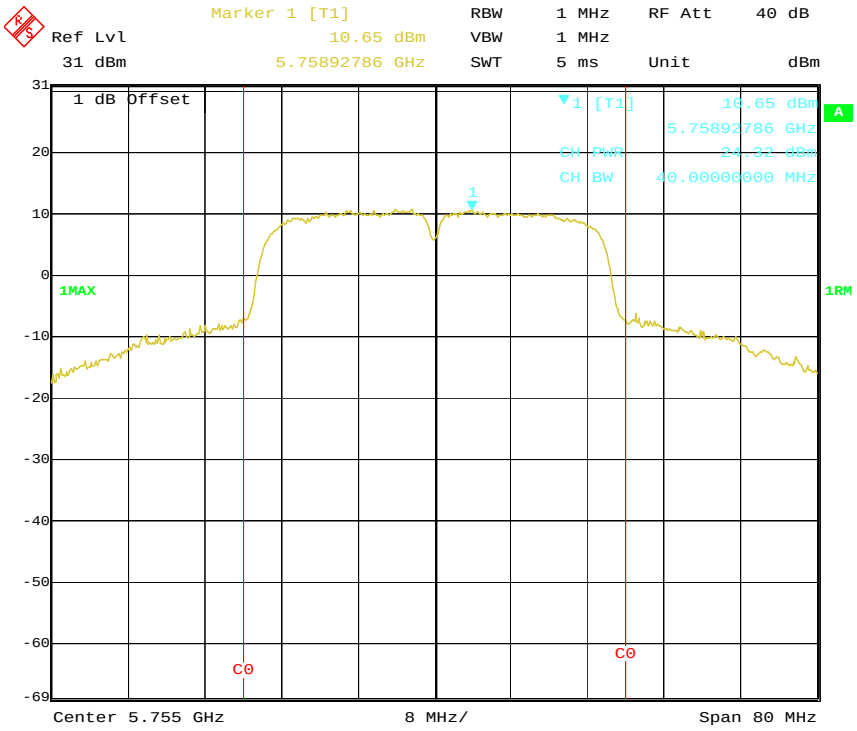
802.11n-HT20 RF Output Power, Middle Channel, TX1



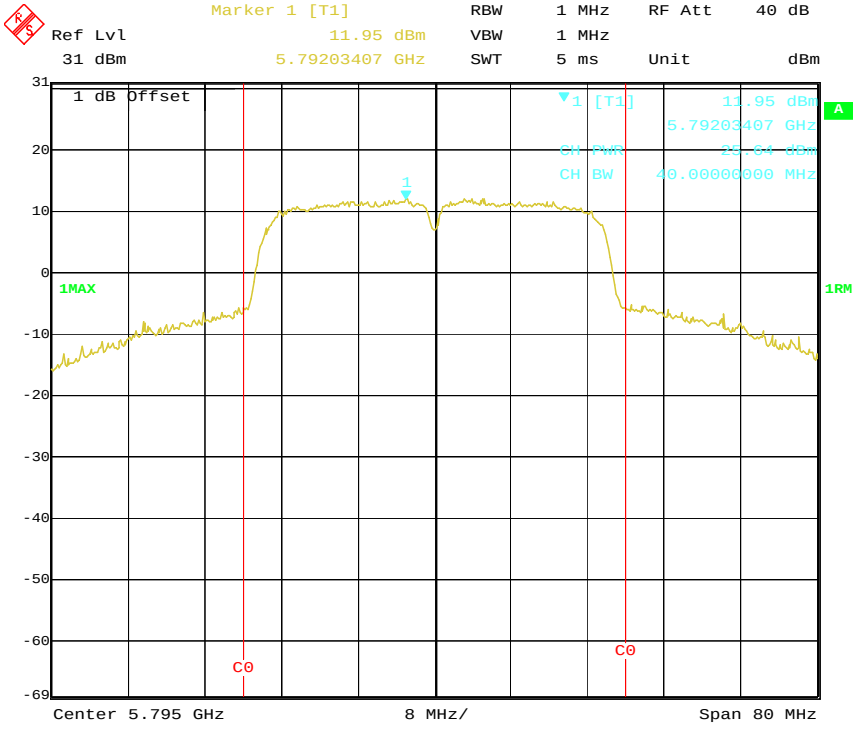
802.11n-HT20 RF Output Power, High Channel, TX1



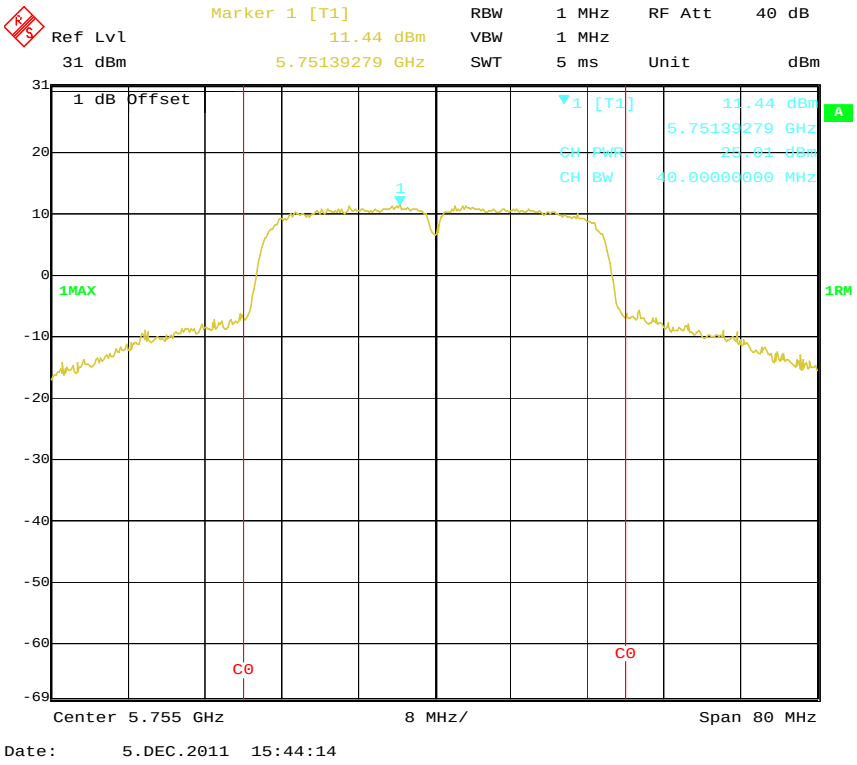
802.11n-HT40 RF Output Power, Channel 151, TX0



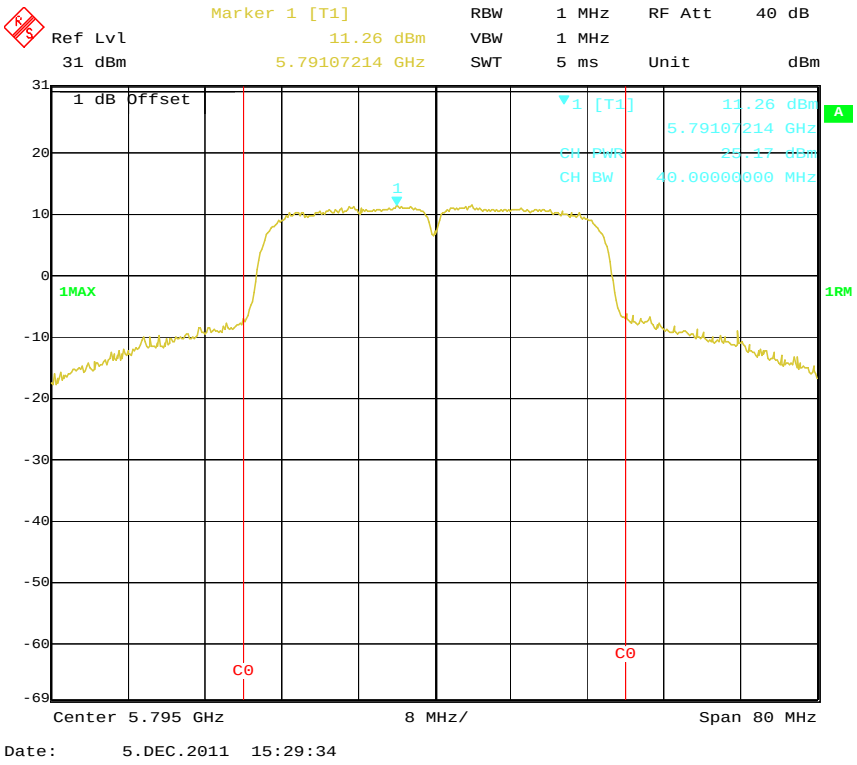
802.11n-HT40 RF Output Power, Channel 159, TX0



802.11n-HT40 RF Output Power, Channel 151, TX1



802.11n-HT40 RF Output Power, Channel 159, TX1



FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 1 MHz and VBW of spectrum analyzer to 1 MHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-03 to 2011-12-05.

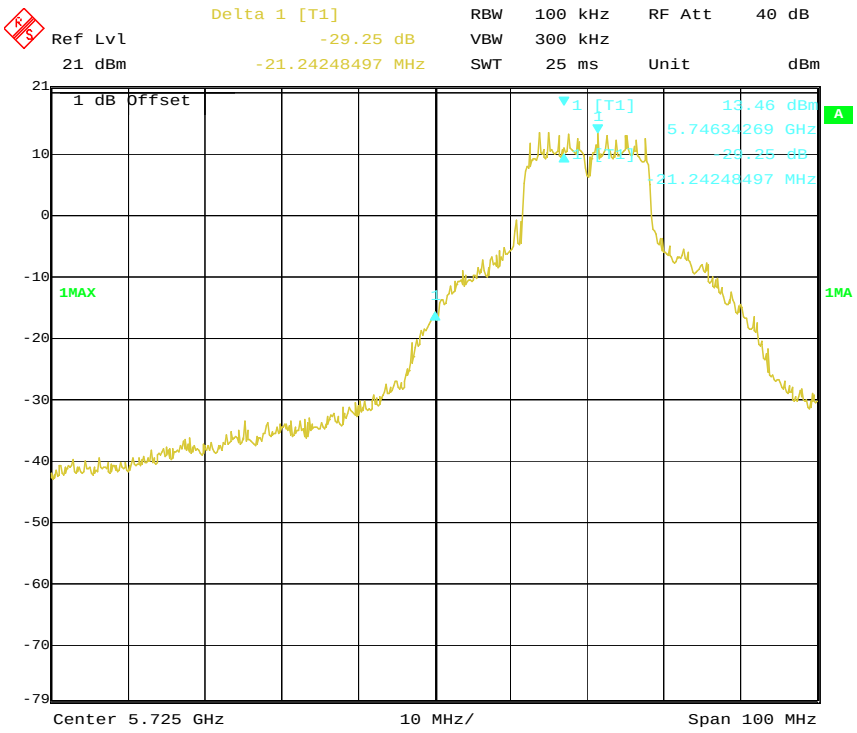
.

Test Result: *Compliance*

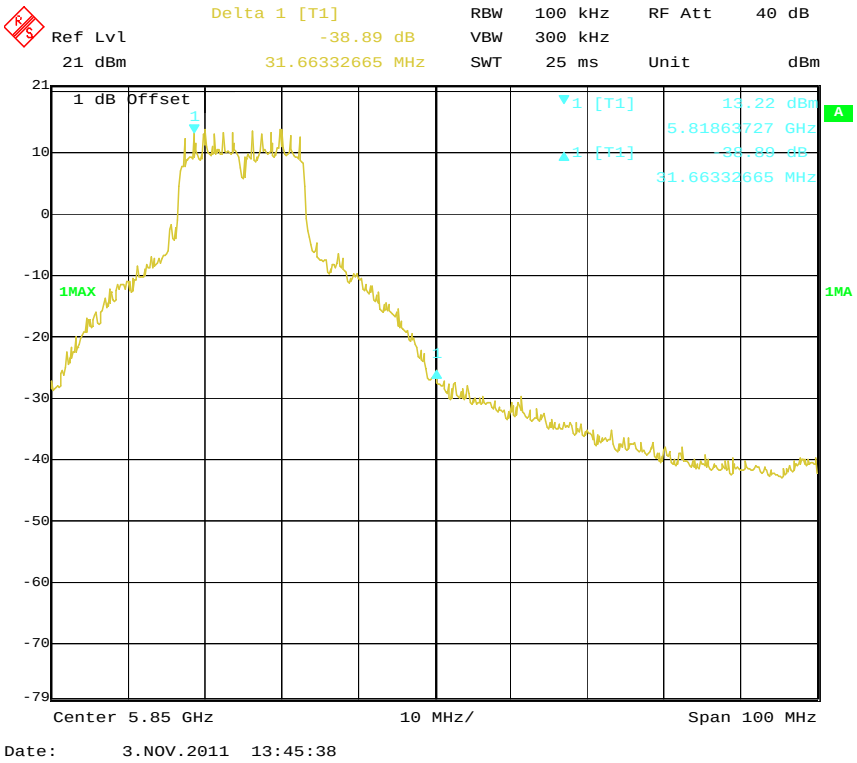
Frequency (MHz)	Antenna Port	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
802.11a mode (BW=20MHz)				
5725	TX0	29.25	>20	Pass
	TX1	27.68	>20	Pass
5850	TX0	38.89	>20	Pass
	TX1	39.56	>20	Pass
802.11n-HT20 mode (BW=20MHz)				
5725	TX0	26.37	>20	Pass
	TX1	27.10	>20	Pass
5850	TX0	36.80	>20	Pass
	TX1	38.37	>20	Pass
802.11n-HT40 mode (BW=40MHz)				
5725	TX0	21.24	>20	Pass
	TX1	21.29	>20	Pass
5850	TX0	36.20	>20	Pass
	TX1	37.96	>20	Pass

Please refer to following plots.

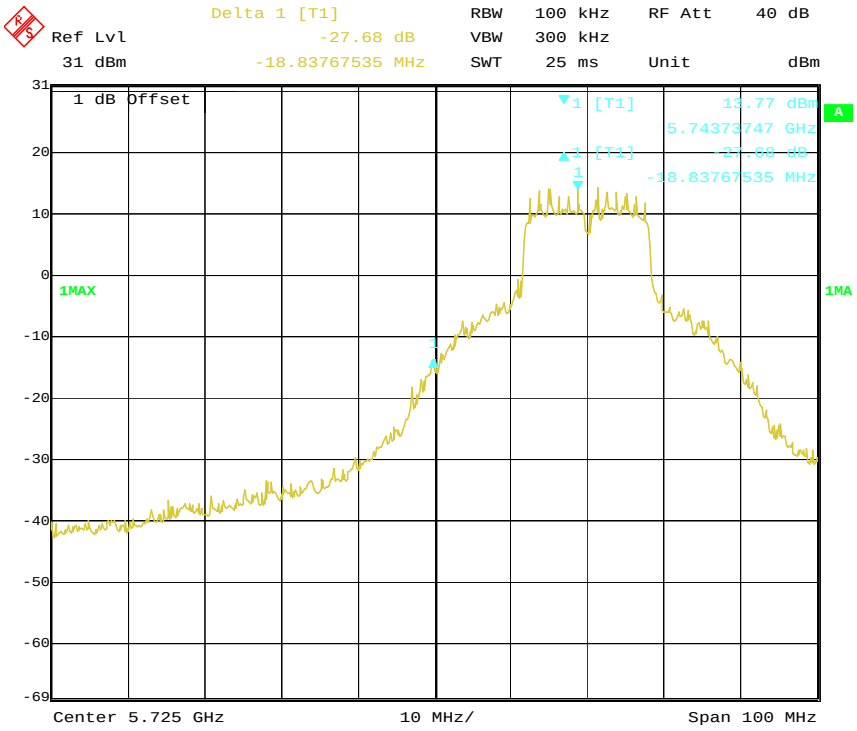
802.11a: Band Edge, Left Side, TX0



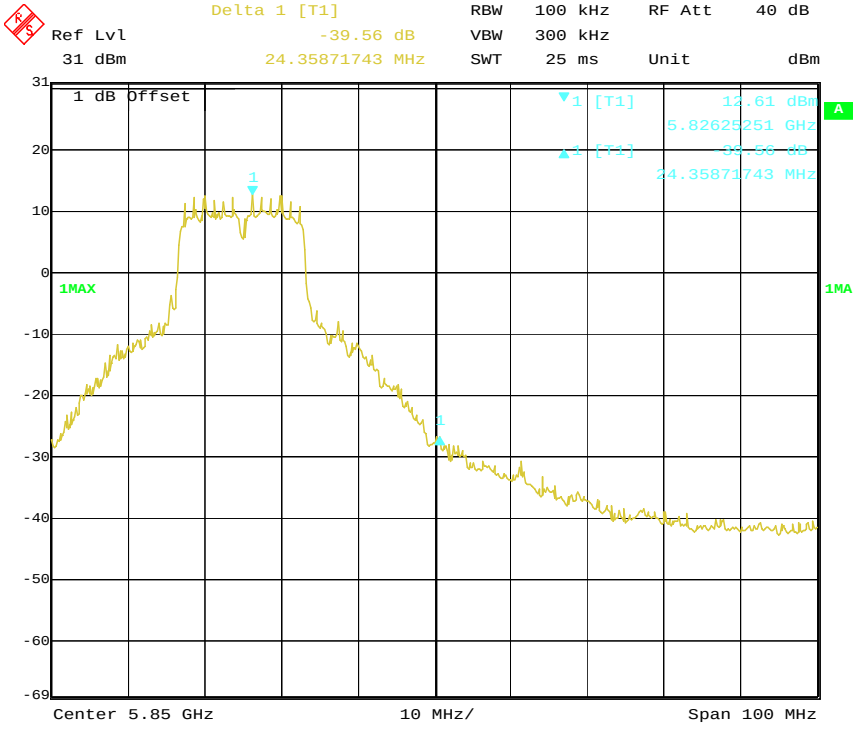
802.11a: Band Edge, Right Side, TX0



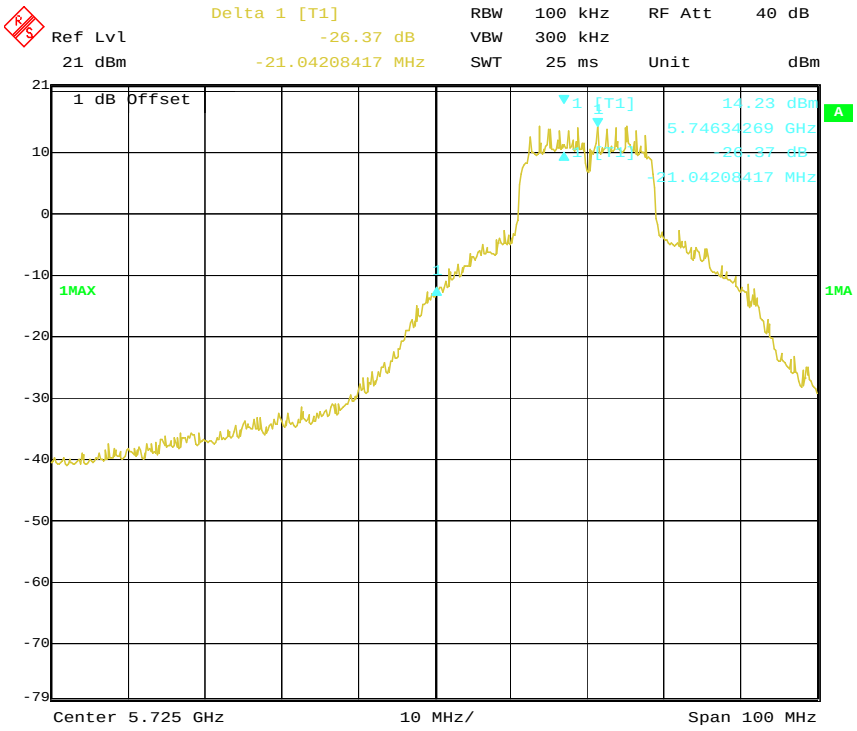
802.11a: Band Edge, Left Side, TX1



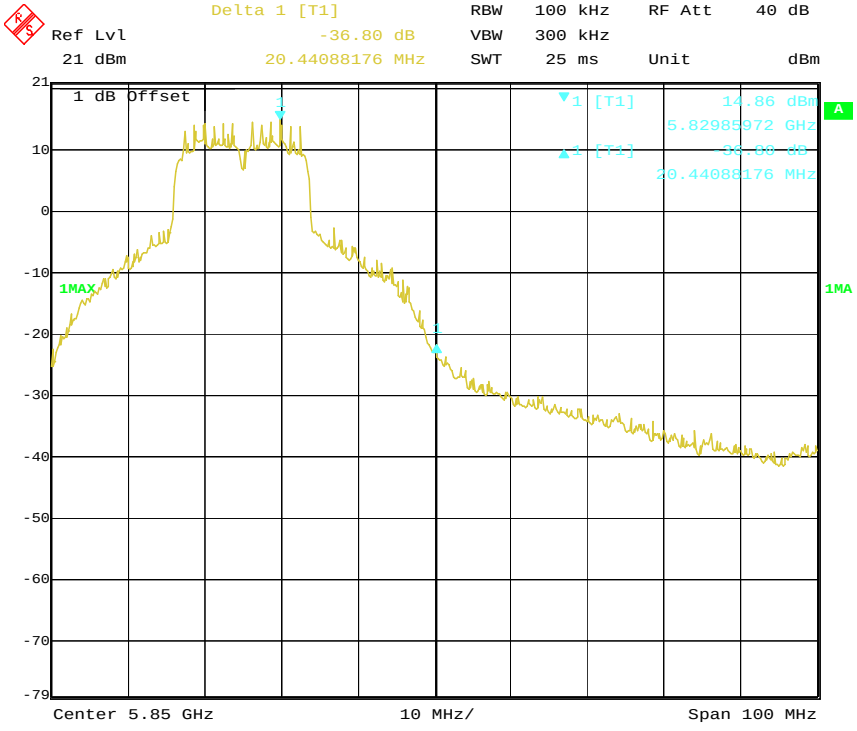
802.11a: Band Edge, Right Side, TX1



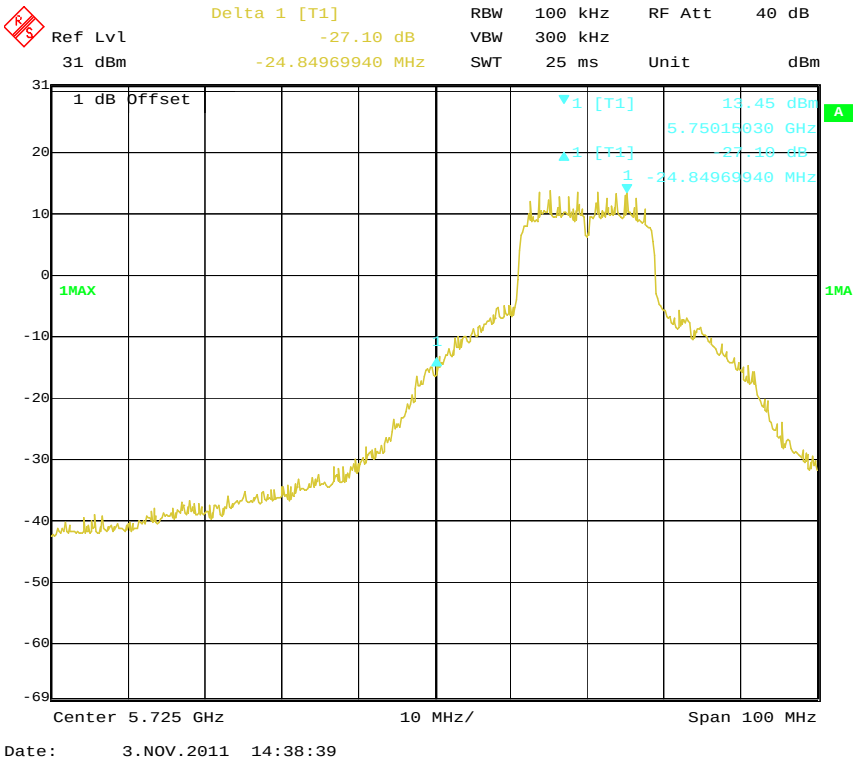
802.11n-HT20: Band Edge, Left Side, TX0



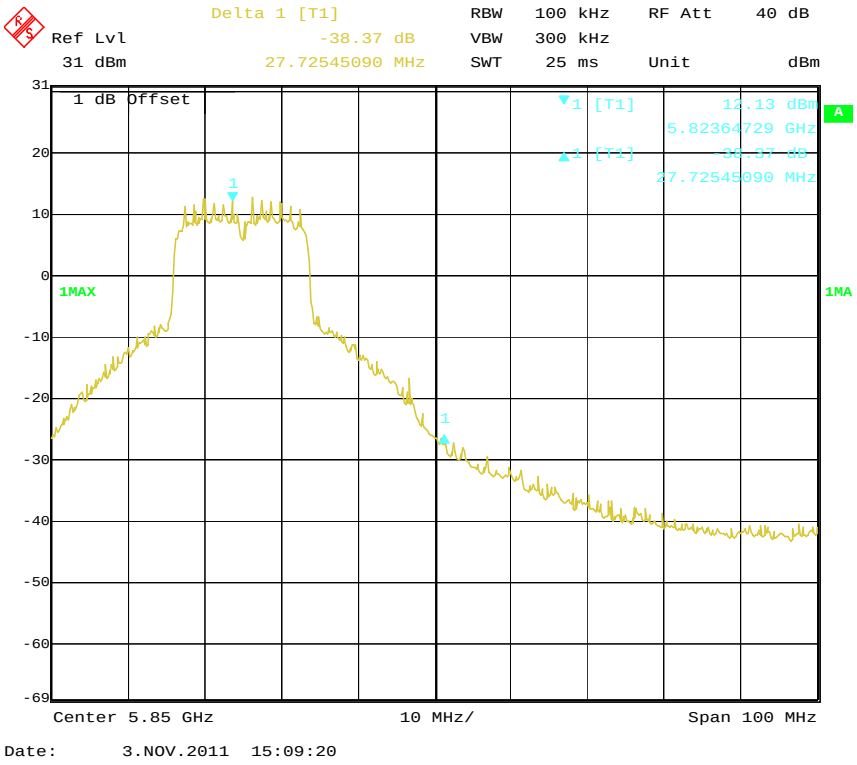
802.11n-HT20: Band Edge, Right Side, TX0



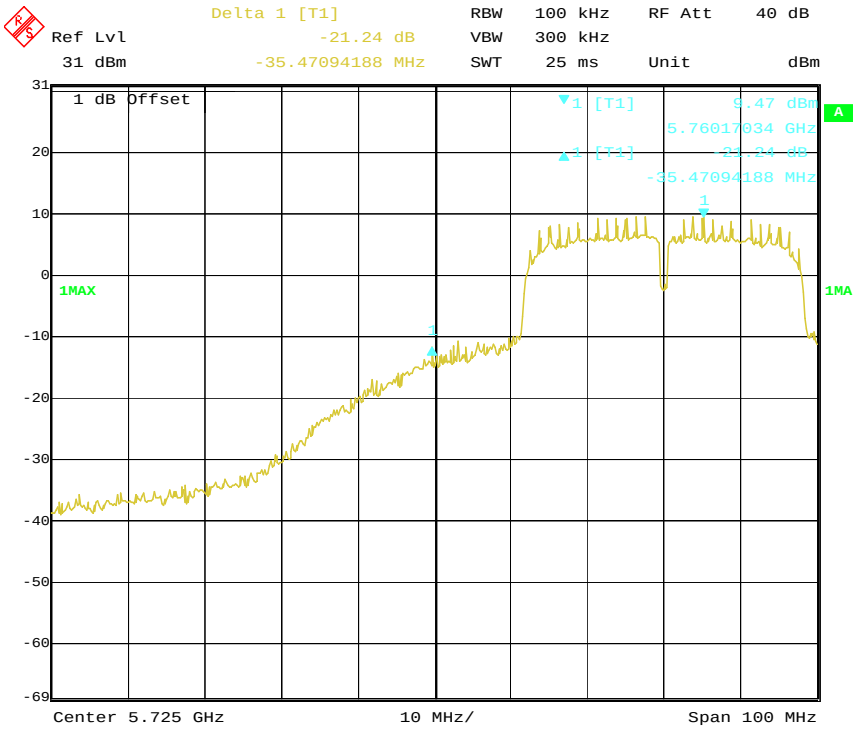
802.11n-HT20: Band Edge, Left Side, TX1



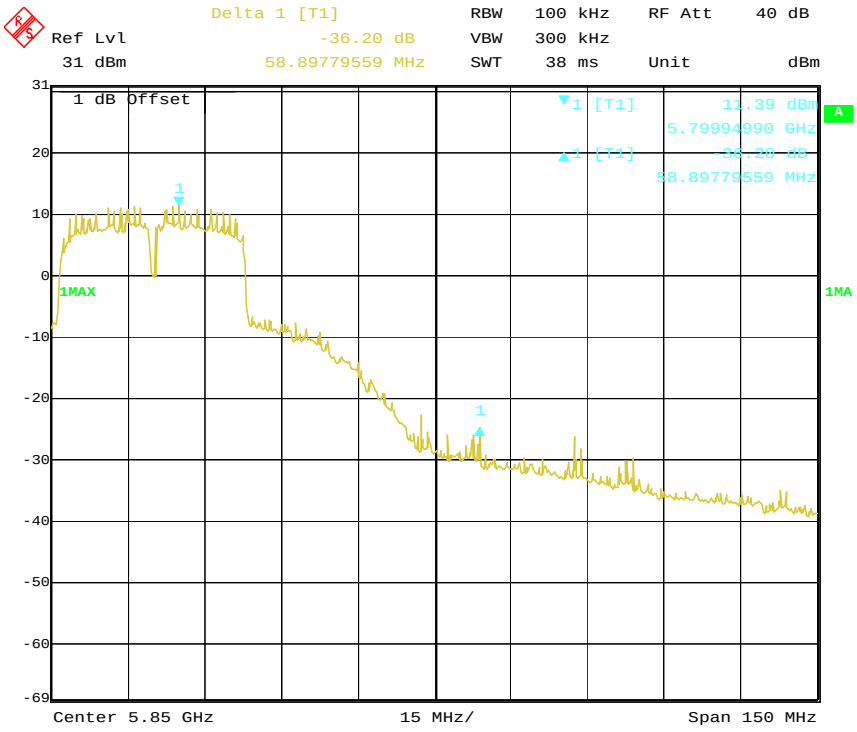
802.11n-HT20: Band Edge, Right Side, TX1



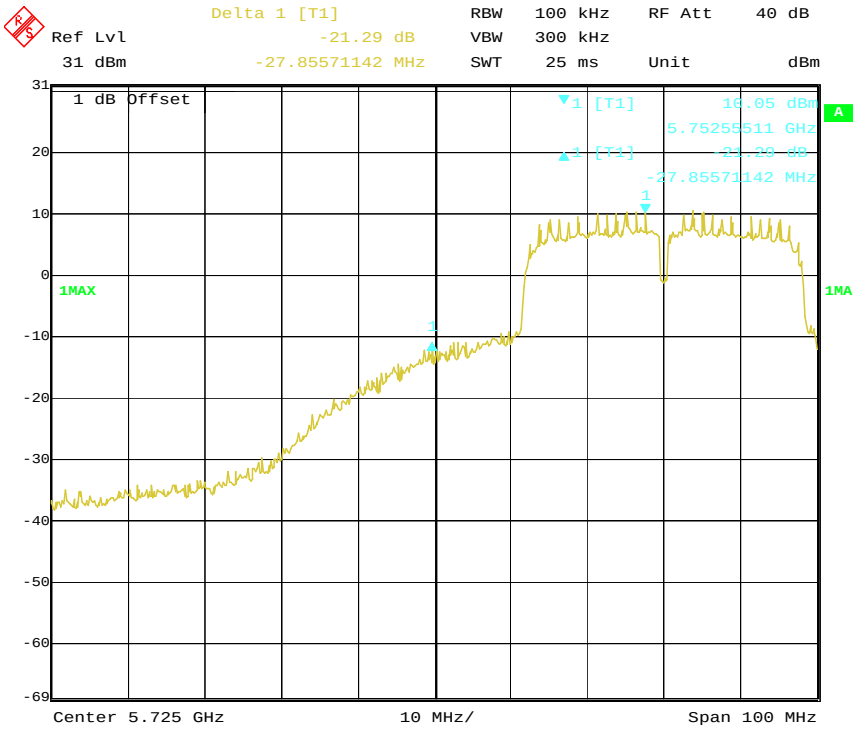
802.11n-HT40: Band Edge, Left Side, TX0



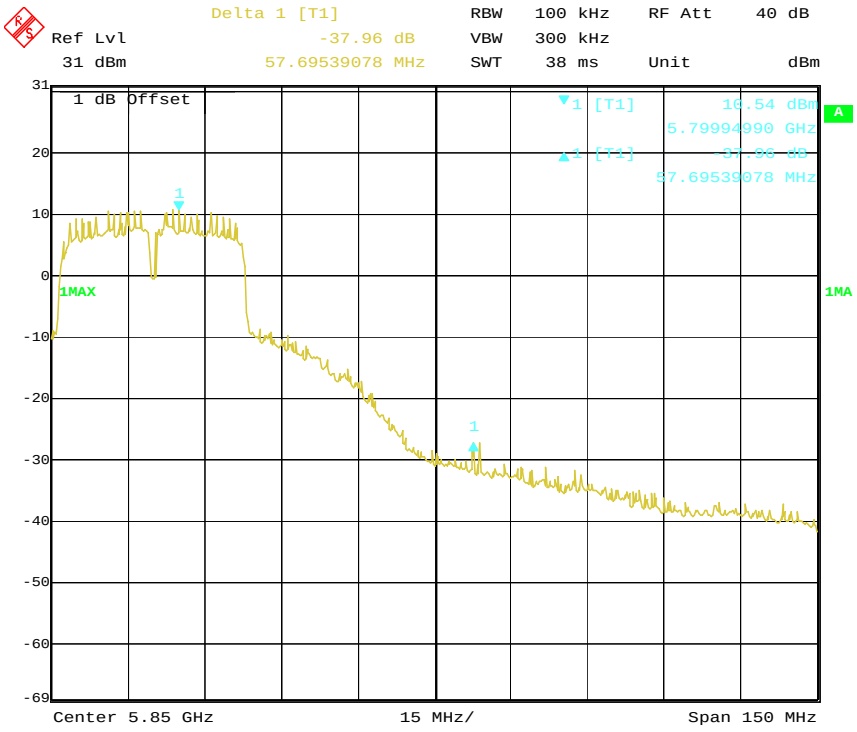
802.11n-HT40: Band Edge, Right Side, TX0



802.11n-HT40: Band Edge, Left Side, TX1



802.11n-HT40: Band Edge, Right Side, TX1



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-02 and 2011-12-05.

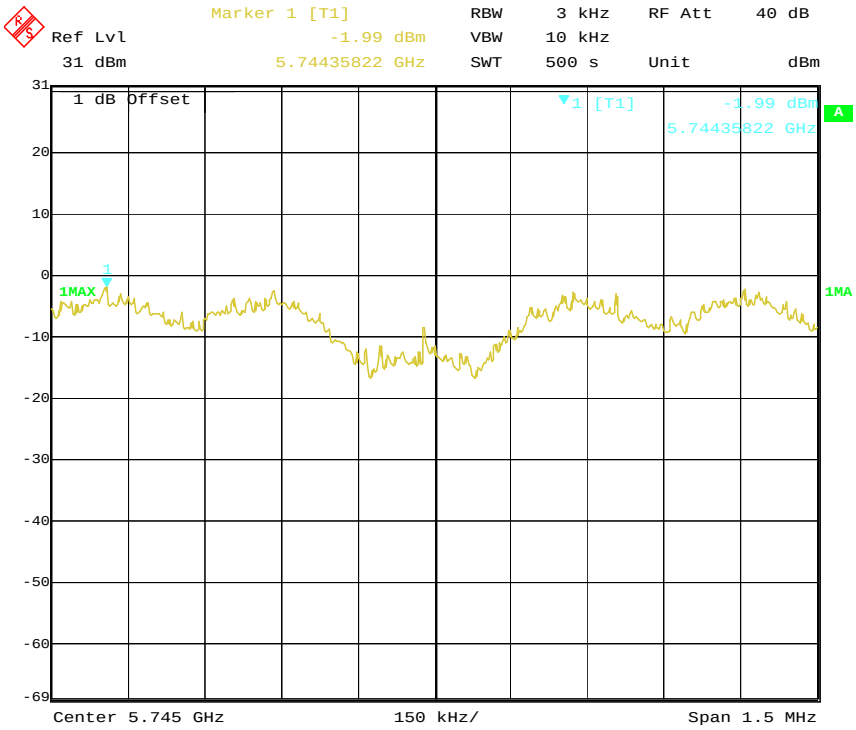
.

Test Mode: Transmitting

Test Result: Pass

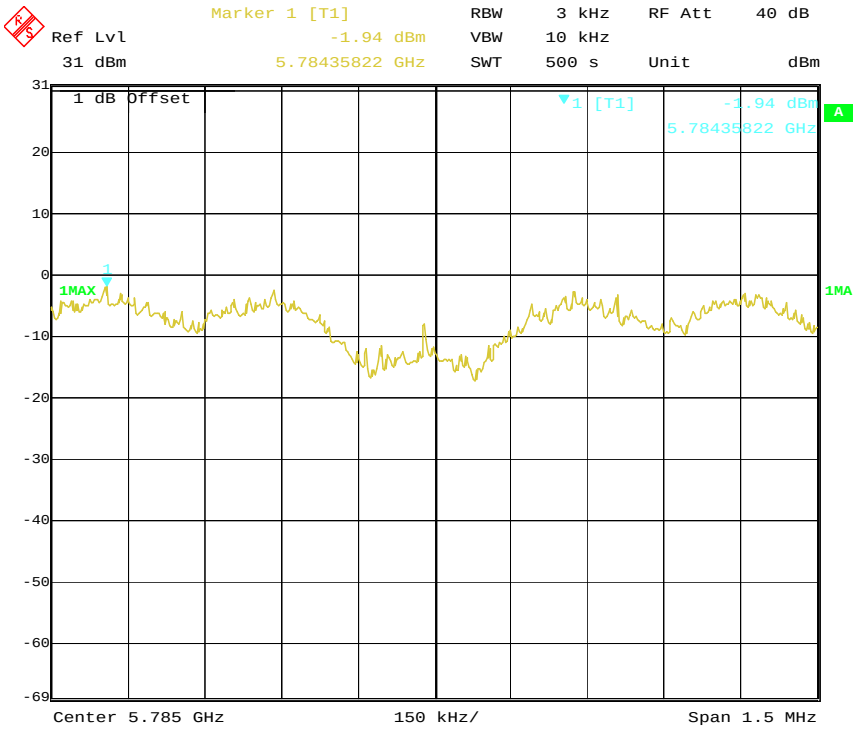
Channel	Frequency (MHz)	Antenna Port	Reading Power Spectral Density (dBm)	Calculated Power Spectral Density (dBm)	Limit (dBm)	Result
802.11a mode (BW=20MHz)						
Low	149(5745 MHz)	TX0	-1.99	0.62	8	Pass
		TX1	-2.82			
Middle	157(5785 MHz)	TX0	-1.94	0.73	8	Pass
		TX1	-2.65			
High	165(5825 MHz)	TX0	-2.21	0.45	8	Pass
		TX1	-2.95			
802.11n-HT20 mode (BW=20MHz)						
Low	149(5745 MHz)	TX0	-2.42	0.38	8	Pass
		TX1	-2.84			
Middle	157(5785 MHz)	TX0	-2.81	-0.09	8	Pass
		TX1	-3.41			
High	165(5825 MHz)	TX0	-2.91	0.05	8	Pass
		TX1	-3			
802.11n-HT40 mode (BW=40MHz)						
/	151(5755 MHz)	TX0	-2.63	-0.57	8	Pass
		TX1	-4.80			
/	159(5795 MHz)	TX0	-3.84	-1.12	8	Pass
		TX1	-4.45			

Power Spectral Density, 802.11a Low Channel, TX0



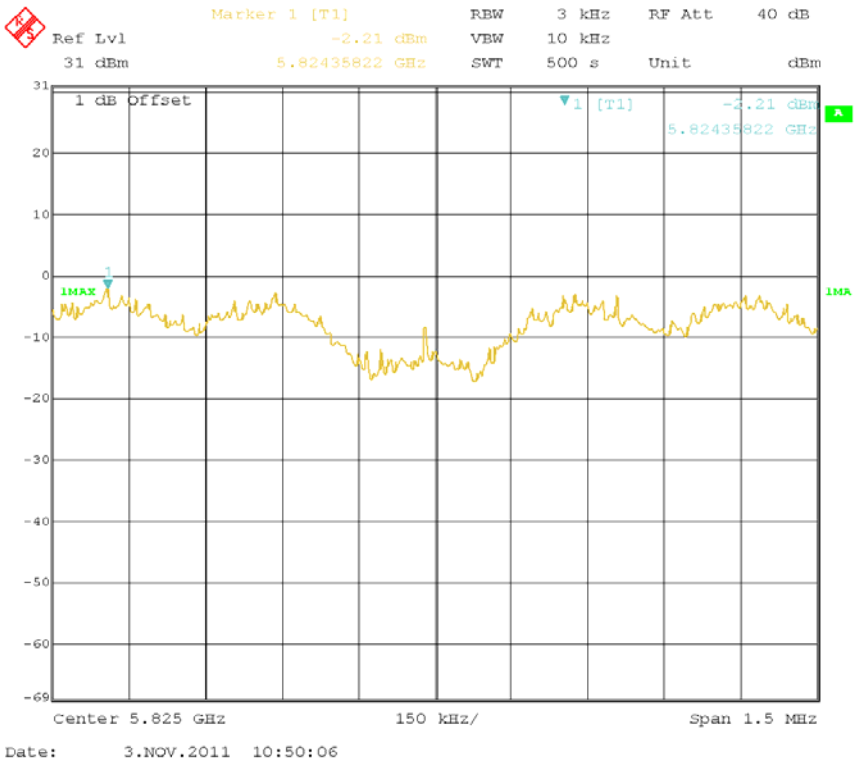
Date: 3.NOV.2011 11:23:01

Power Spectral Density, 802.11a Middle Channel, TX0

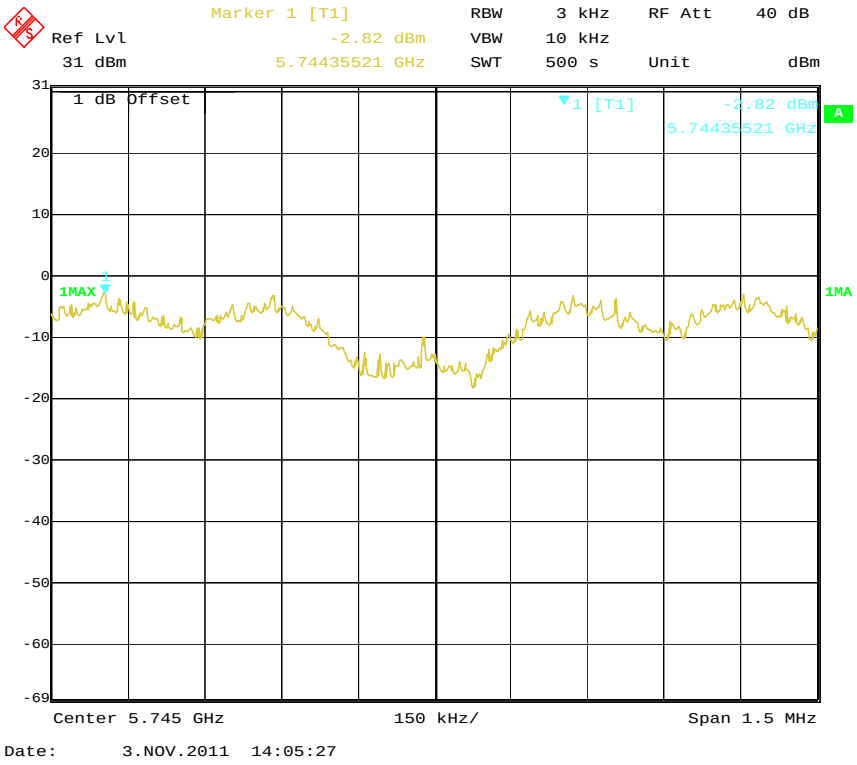


Date: 3.NOV.2011 11:03:23

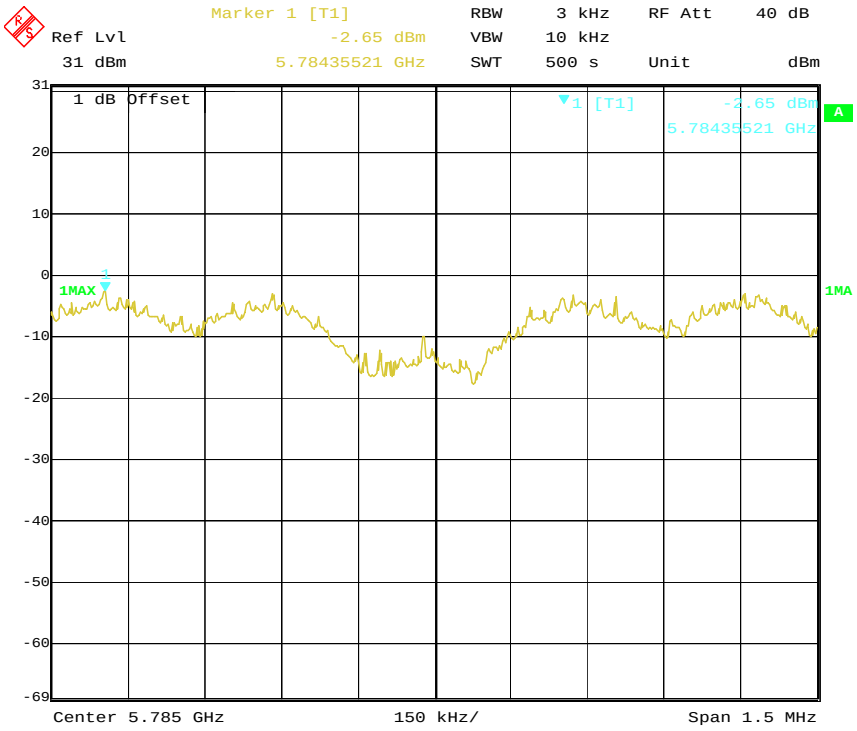
Power Spectral Density, 802.11a High Channel, TX0



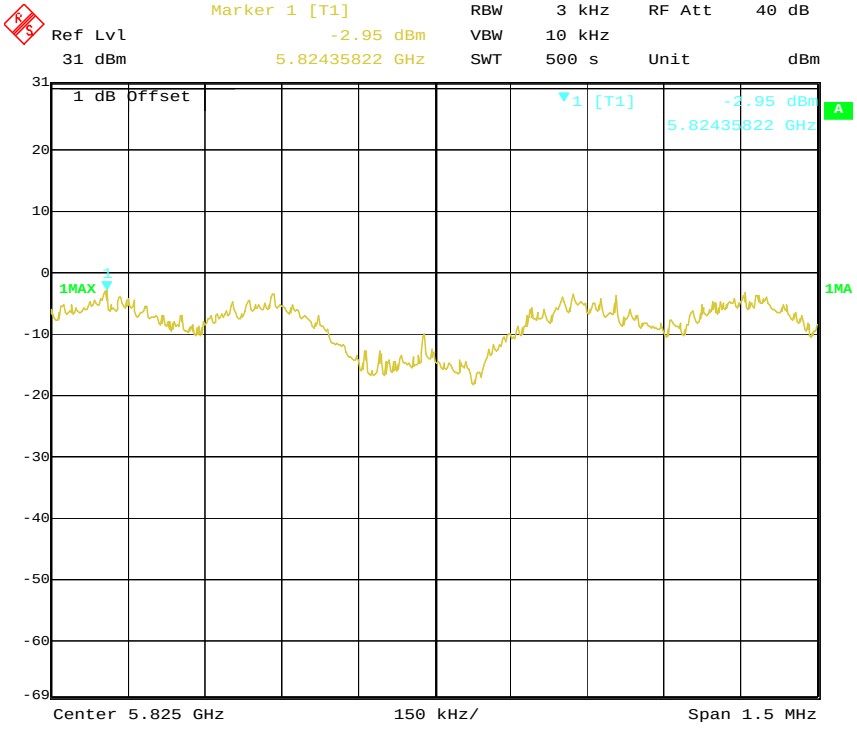
Power Spectral Density, 802.11a Low Channel, TX1



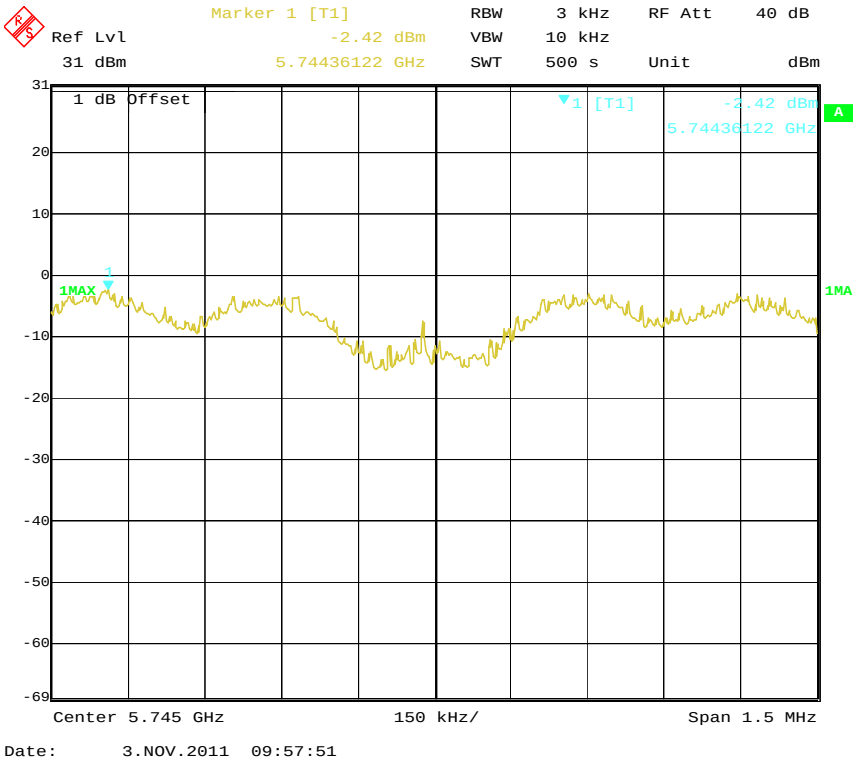
Power Spectral Density, 802.11a Middle Channel, TX1



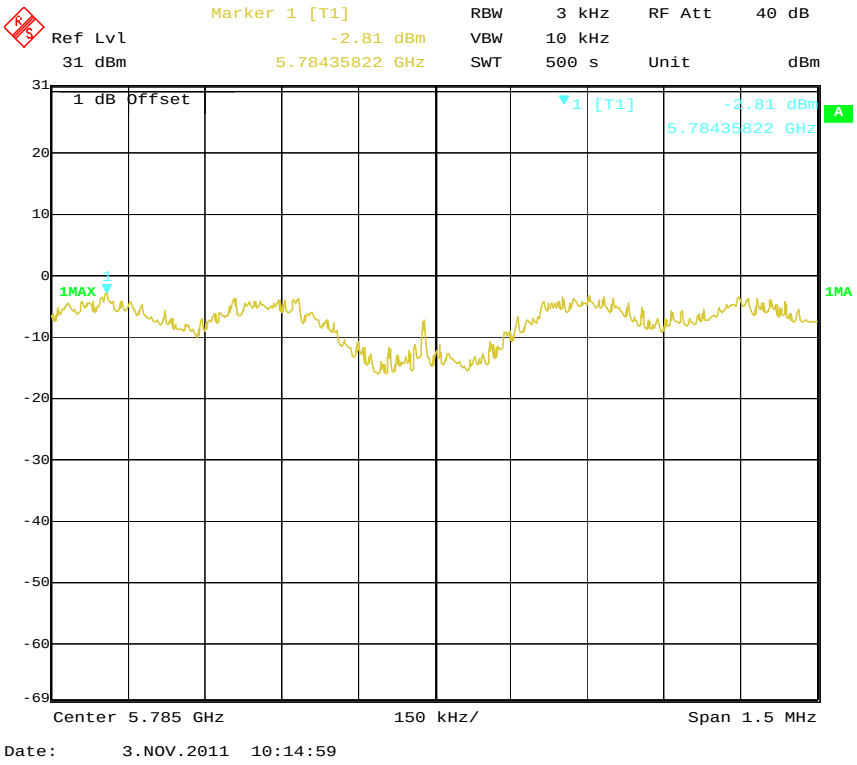
Power Spectral Density, 802.11a High Channel, TX1



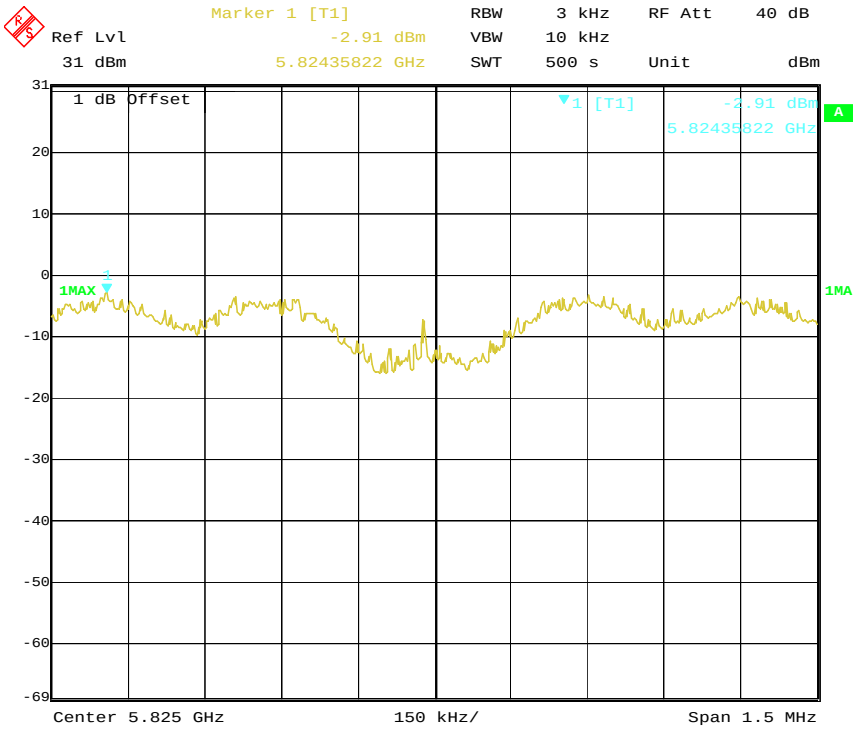
Power Spectral Density, 802.11n-HT20 Low Channel, TX0



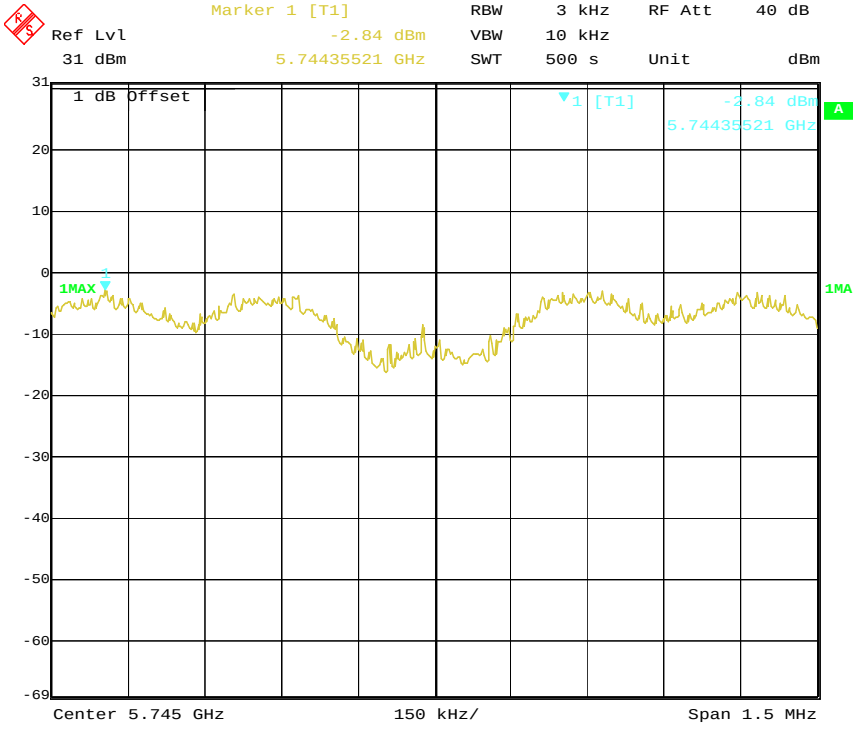
Power Spectral Density, 802.11n-HT20 Middle Channel, TX0



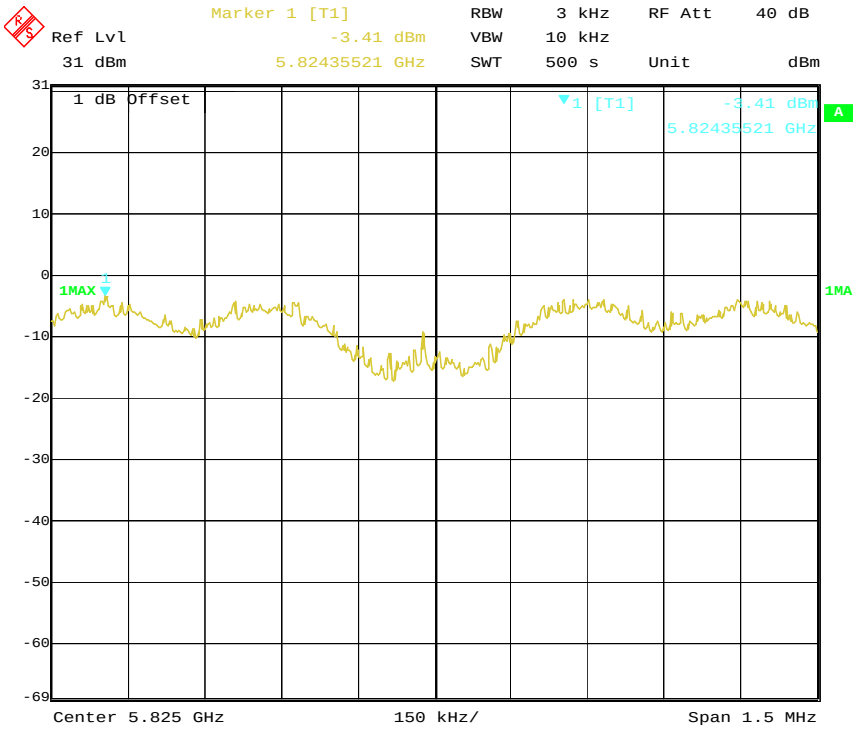
Power Spectral Density, 802.11n-HT20 High Channel, TX0



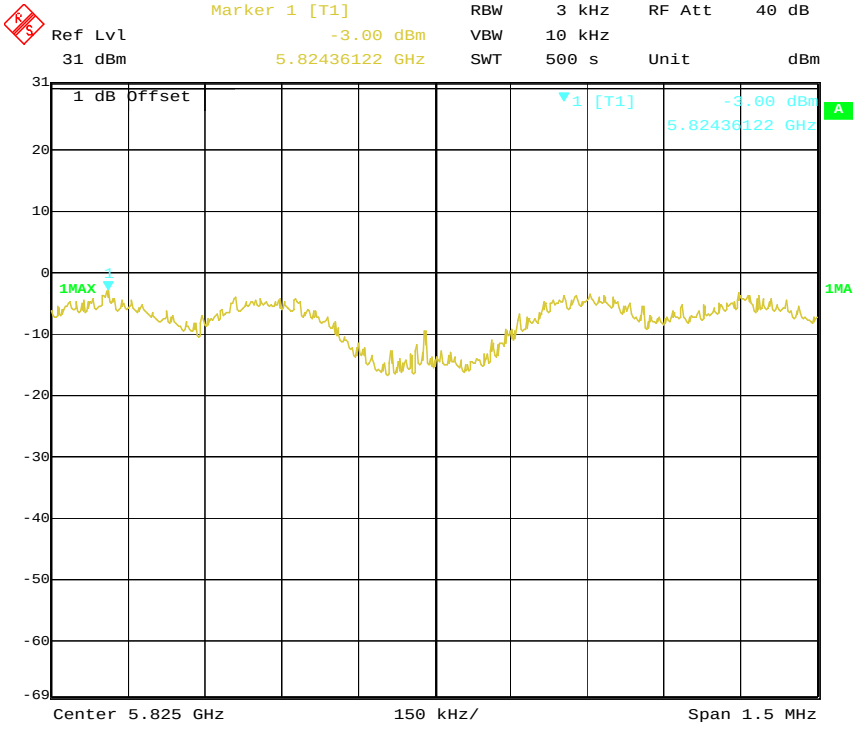
Power Spectral Density, 802.11n-HT20 Low Channel, TX1



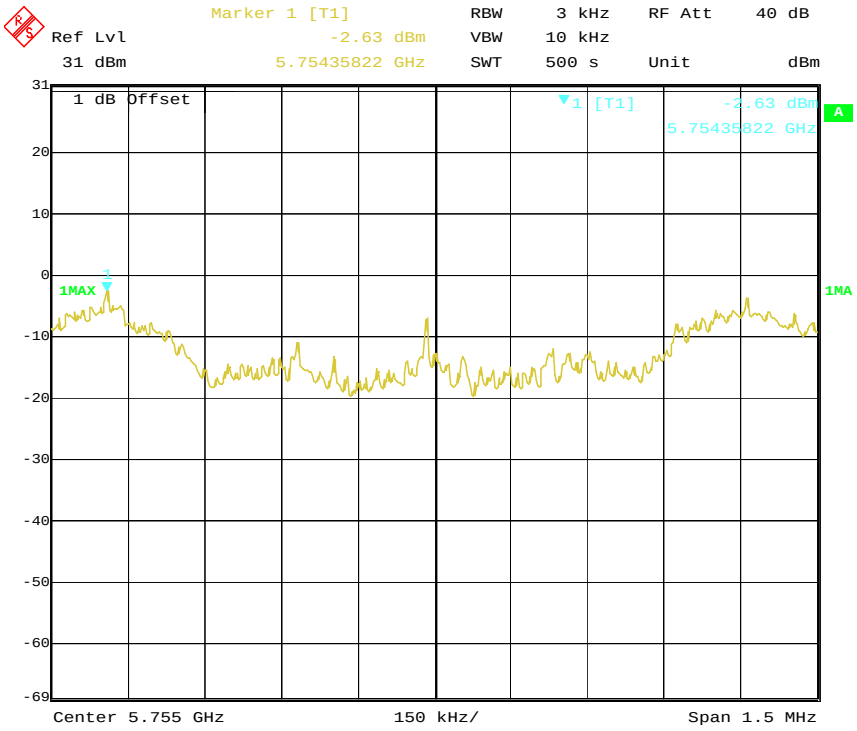
Power Spectral Density, 802.11n-HT20 Middle Channel, TX1



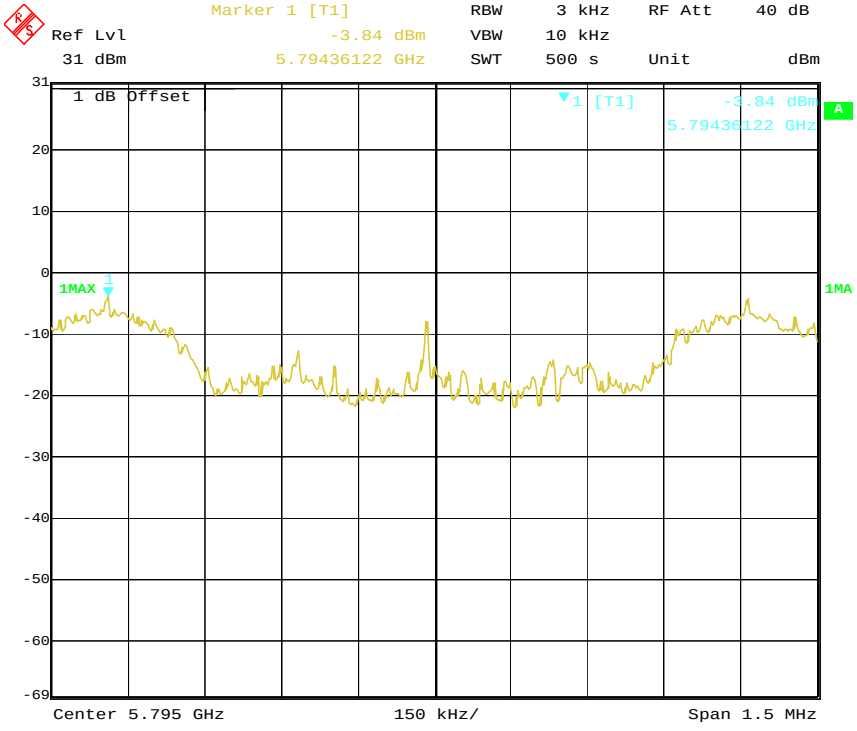
Power Spectral Density, 802.11n-HT20 High Channel, TX1



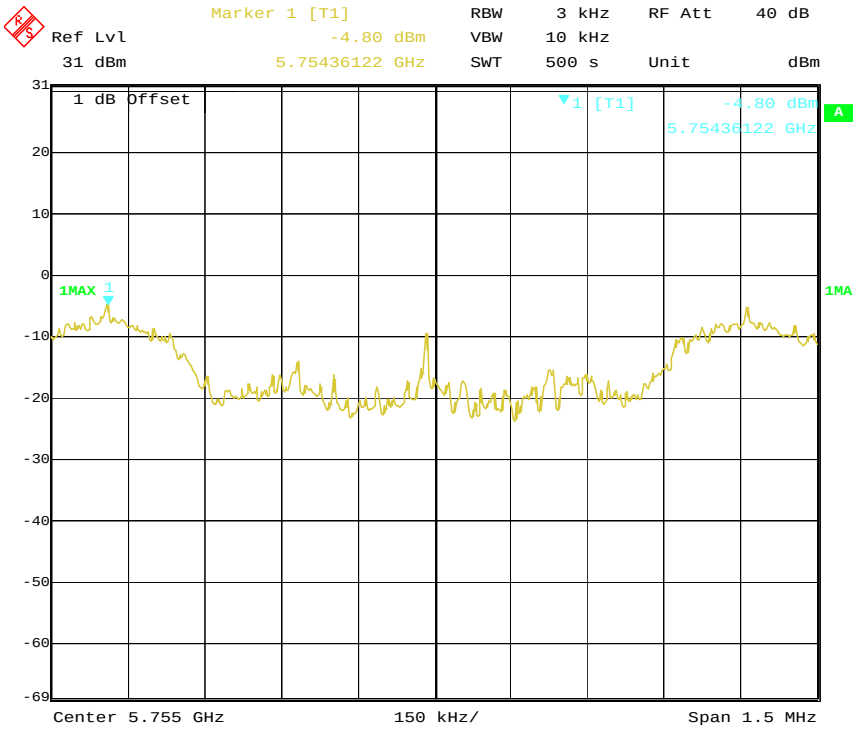
Power Spectral Density, 802.11n-HT40 Channel 151, TX0



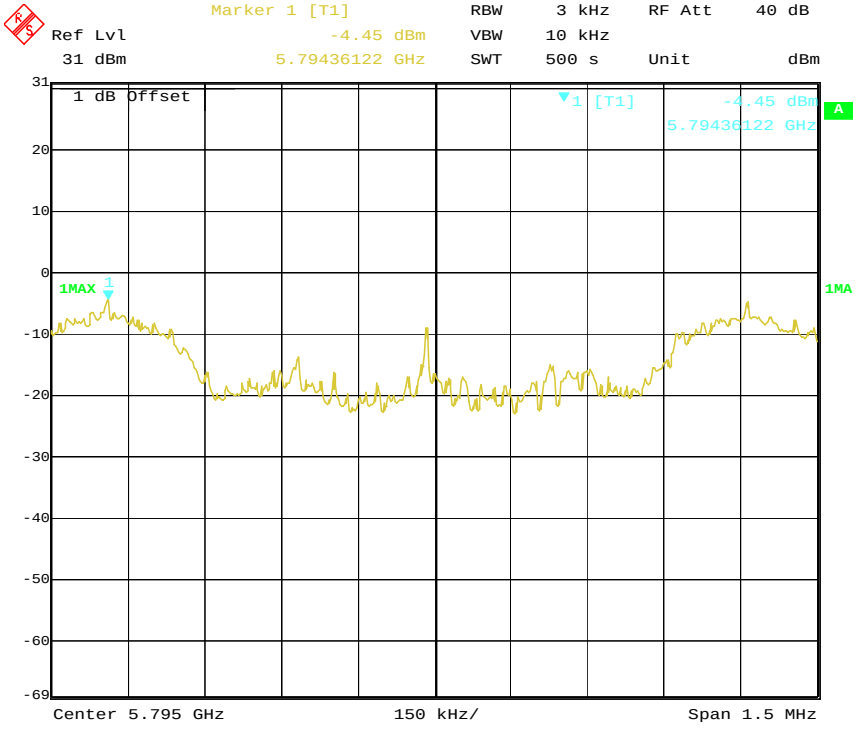
Power Spectral Density, 802.11n-HT40 Channel 159, TX0



Power Spectral Density, 802.11n-HT40 Channel 151, TX1



Power Spectral Density, 802.11n-HT40 Channel 159, TX1



******* END OF REPORT *******