

FCC PART 15.247

TEST REPORT

For

Shanghai Baud Communication Co., Ltd.

No.123, Juli Road, Pudong Zhangjiang High-Tech Park, Shanghai 201203, P.R.China

FCC ID: 2ARMUGP17044FE

Report Type: Original Report	Product Type: ONU
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Report Number: RKSA181017003-00B	
Report Date: 2018-12-07	
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FINAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Baud Communication Co., Ltd.
Test Model	BDCOM GP1704-4F-E
Series Model	BDCOM P1704-4F-E
Product Type	ONU
Dimension	140 mm(L) × 105 mm(W) × 30mm(H)
Rate Voltage	DC 12V from adapter

Adapter Information:

Model: TS-A012-120010AY

Input: AC100-240 V 50/60Hz 0.4A

Output: 12.0V, 1A

Note: The difference between test model and series model was explained in the attached declaration letter.

*All measurement and test data in this report was gathered from production sample serial number: 20181017003 (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-10-17)

Objective

This report is prepared on behalf of *Shanghai Baud Communication Co., Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A 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)/Grant(s)

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 15.247 Meas Guidance v05.

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list for 802.11b, 802.11g and 802.11n-HT20 mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

EUT was tested with Channel 1, 6 and 11.

Channel list for 802.11n-HT40 mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	/	/
6	2437	/	/
7	2442	/	/

EUT was tested with Channel 3, 6 and 9.

For Conducted Test:

802.11b & 802.11g&802.11n: each transmit chains were tested

For Radiated Test:

802.11b & 802.11g, SISO for each transmit chain
For 802.11n: MIMO for two transmit chains

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

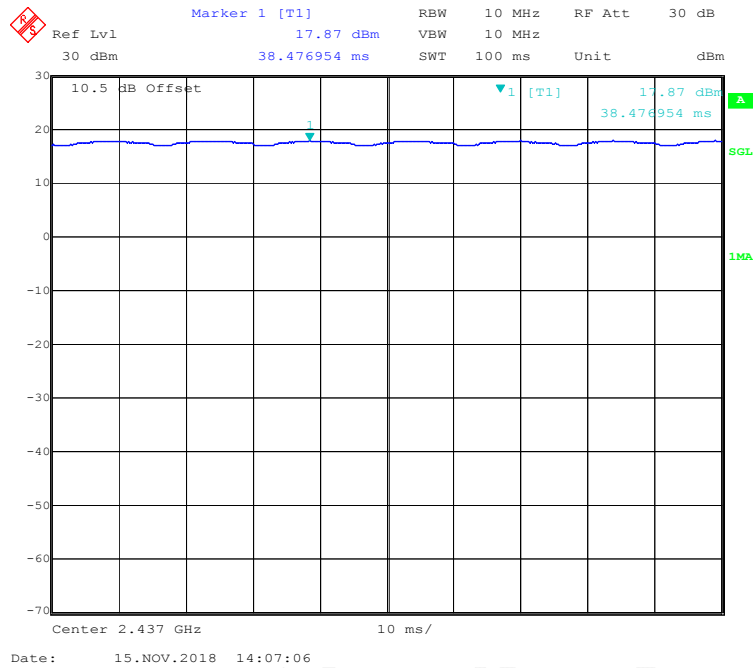
RF test tool: MP Tool

Pre-scan with all the data rates, and the worst case was performed as below:

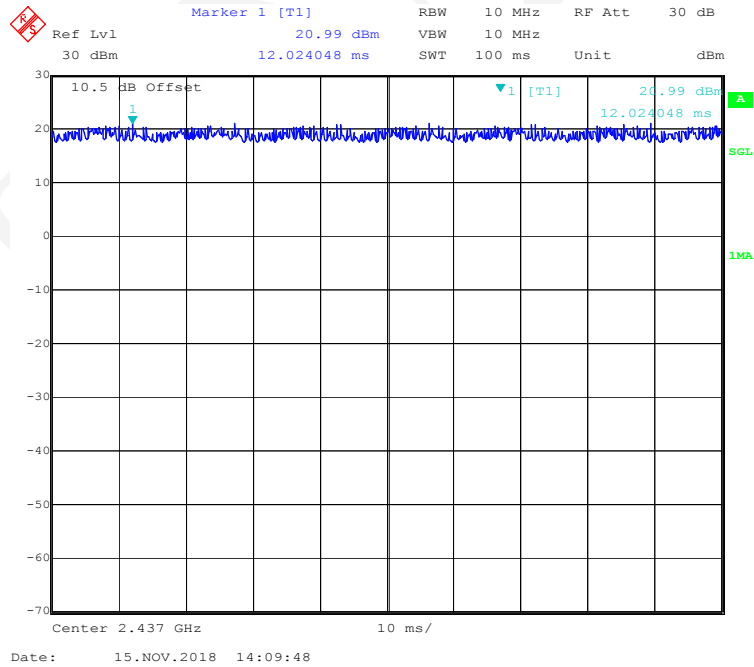
Mode	Data rate	Power level	
		Chain 0	Chain 1
802.11b	1 Mbps	34	32
802.11g	6 Mbps	36	36
802.11n-HT20	MCS0	36	36
802.11n-HT40	MCS0	36	36

Duty Cycle:

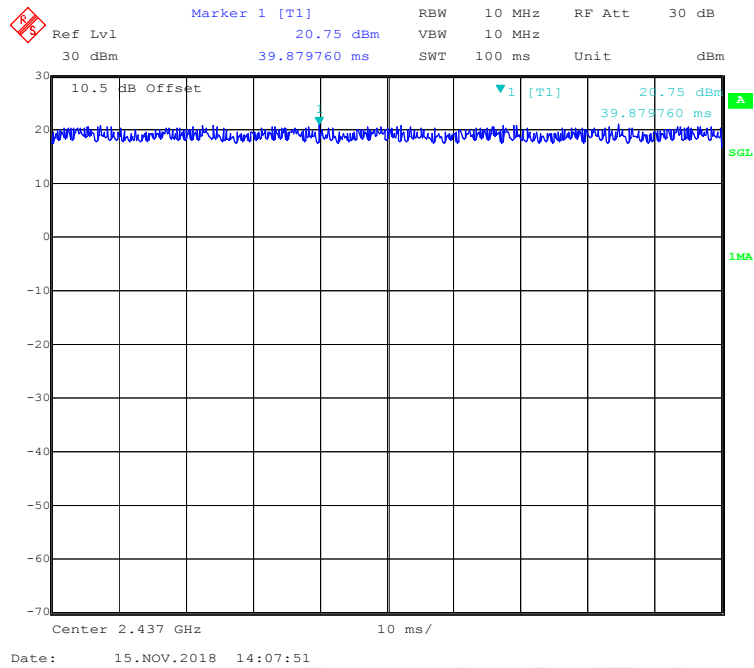
802.11b Mode Middle Channel



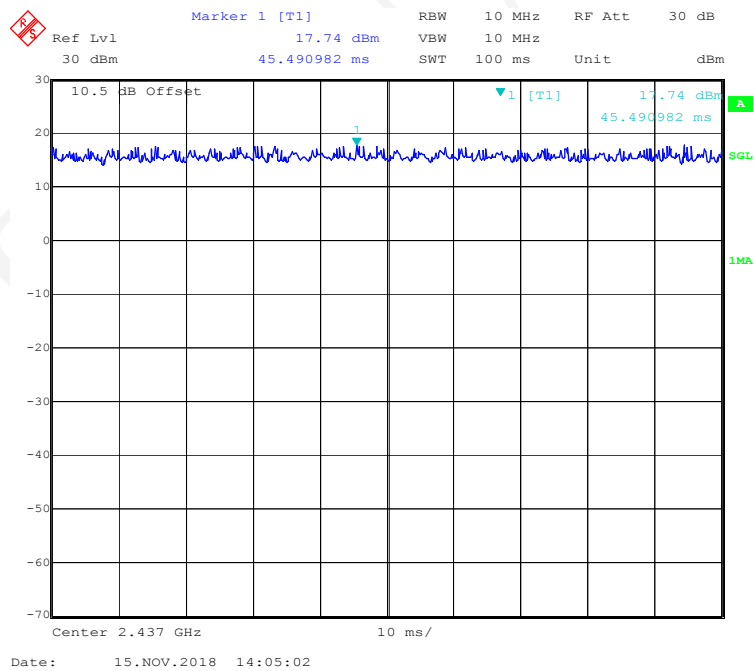
802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



Mode	Duty Cycle	T(ms)	1/T(kHz)	10log(1/x)
802.11b	100.00%	/	/	0.00
802.11g	100.00%	/	/	0.00
802.11n-HT20	100.00%	/	/	0.00
802.11n-HT40	100.00%	/	/	0.00

Note: “x” means the Duty Cycle.

Support Equipment List and Details

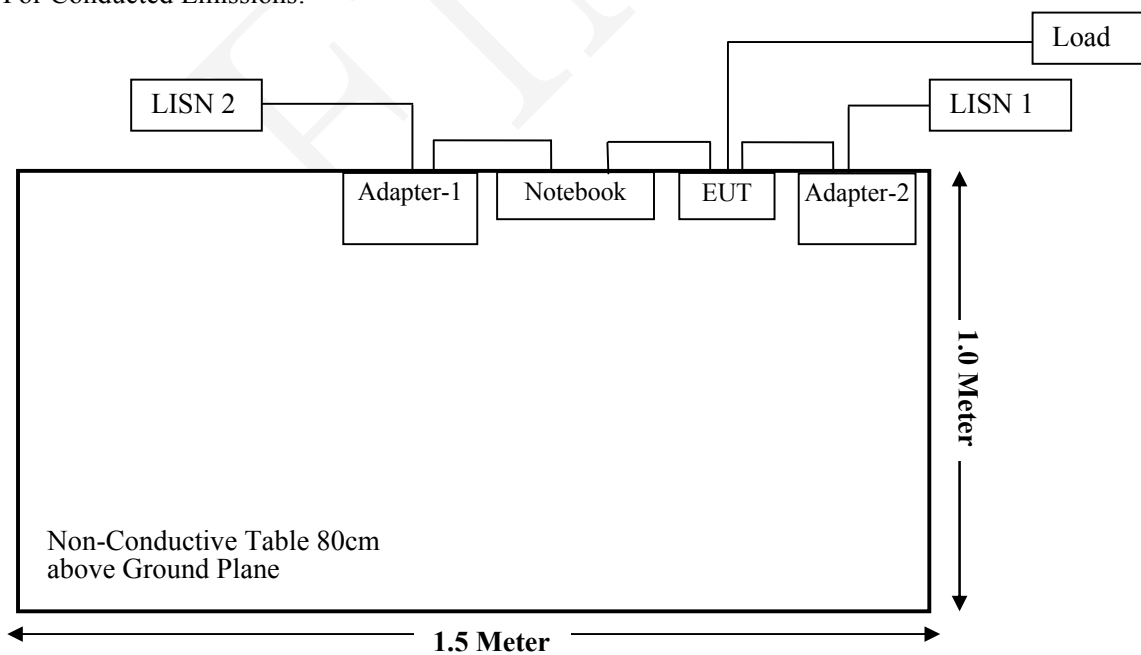
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
DELL	Adapter-1	LA65NS0-00	DF263
Un-known	Load	/	/

External I/O Cable

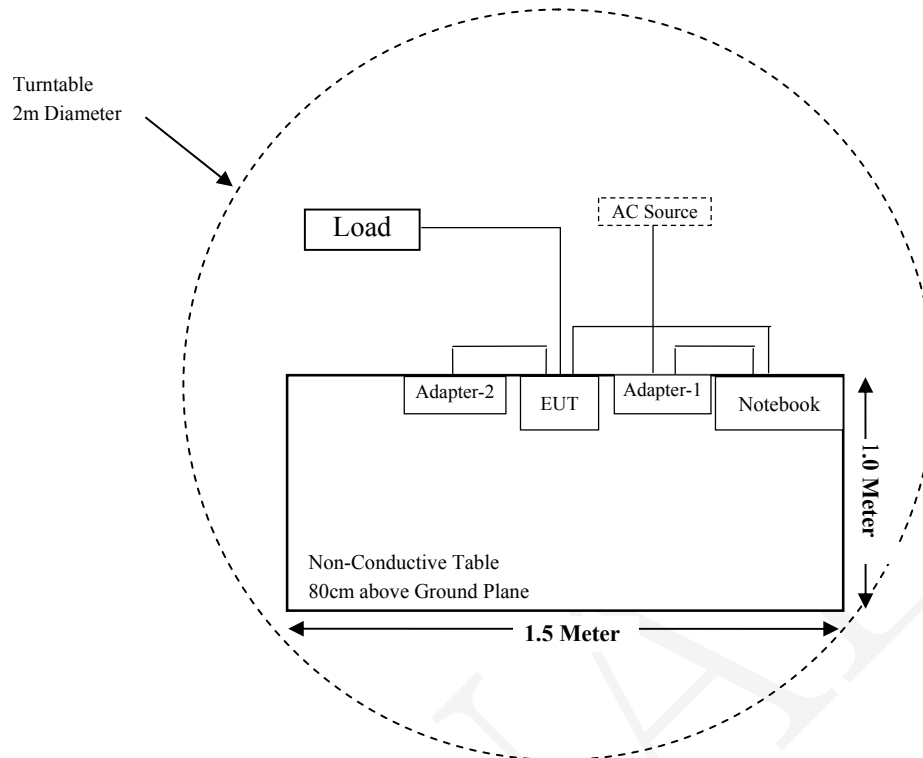
Cable Description	Length (m)	From Port	To
Power Cable-1	1.0	EUT	Adapter-2
Power Cable-2	1.2	Notebook	Adapter-1
RJ45 Cable	1.8	EUT	Notebook
RJ45 Cable*3	1.8	EUT	Load

Block Diagram of Test Setup

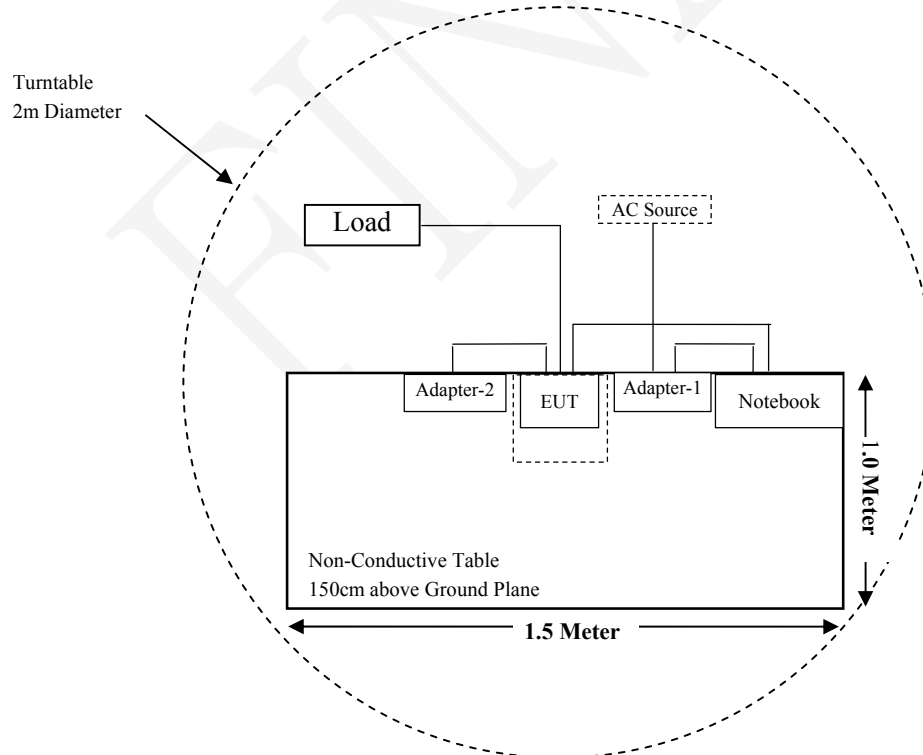
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2017-11-12	2018-11-11
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2018-11-12	2019-11-11
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrument	Pre-amplifier	310N	171205	2018-08-15	2019-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2018-08-27	2019-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
A.H.Systems, inc	Amplifier	2641-1	466	2018-09-11	2019-09-10
EM Electronics	Amplifier	EM18G40G	060726	2018-03-22	2019-03-21
MICRO-TRONICS	Notch filter	BRM50702	F02	2018-08-05	2019-08-04
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2018-11-12	2019-11-11
Narda	Attenuator	10dB	010	2017-12-12	2018-12-11
Agilent	Power Meter	N1912A	MY5000492	2017-11-18	2018-11-17
Agilent	Power Sensor	N1921A	MY54210024	2017-11-18	2018-11-17
Baud	RF Cable	Baud02	C02	Each Time	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2018-11-12	2019-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2018-11-12	2019-11-11
Rohde & Schwarz	LISN	ENV216	3560655016	2018-11-12	2019-11-11
BACL	Auto test Software	BACL-EMC	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2018-08-15	2019-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to §2.1091 and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

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/cm²)	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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:**For worst case:**

Mode	Frequency (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412-2462	4.84	3.05	18	63.10	20	0.0383	1.0
802.11g		4.84	3.05	20	100.00	20	0.0607	1.0
802.11n-HT20		4.84	3.05	23	199.53	20	0.1211	1.0
802.11n-HT40	2422-2452	4.84	3.05	21.5	141.25	20	0.0857	1.0

Result: The device meet FCC MPE at 20 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.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two Omnidirectional antennas; fulfill the requirement of this section. Please refer to the EUT photos.

Chain	Antenna Type	Max. Antenna Gain
0	Omnidirectional	4.84 dBi
1	Omnidirectional	4.84 dBi

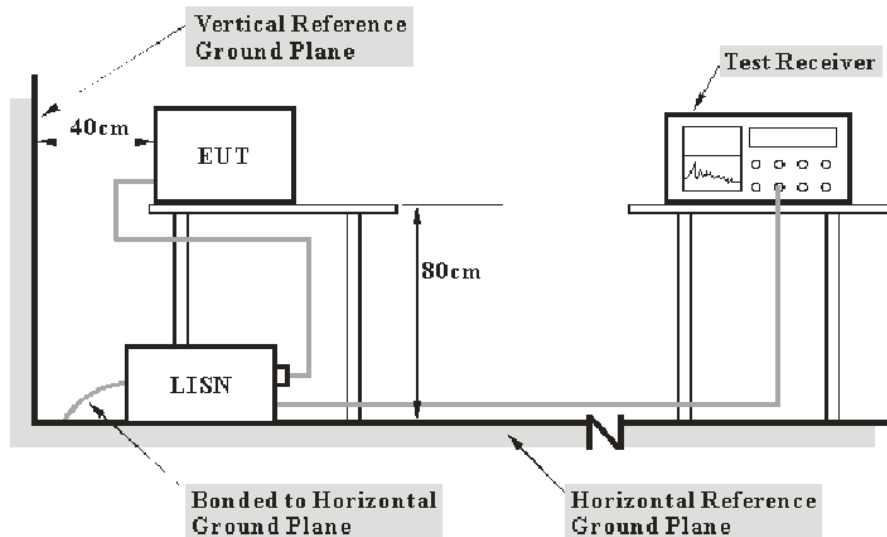
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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 C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

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 Procedure

During the conducted emission test, the adapter was connected to the outlet of 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.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Corrected Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Transient Limiter Attenuation (dB)}$$

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

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V)} - \text{Corrected Amplitude (dB}\mu\text{V)}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

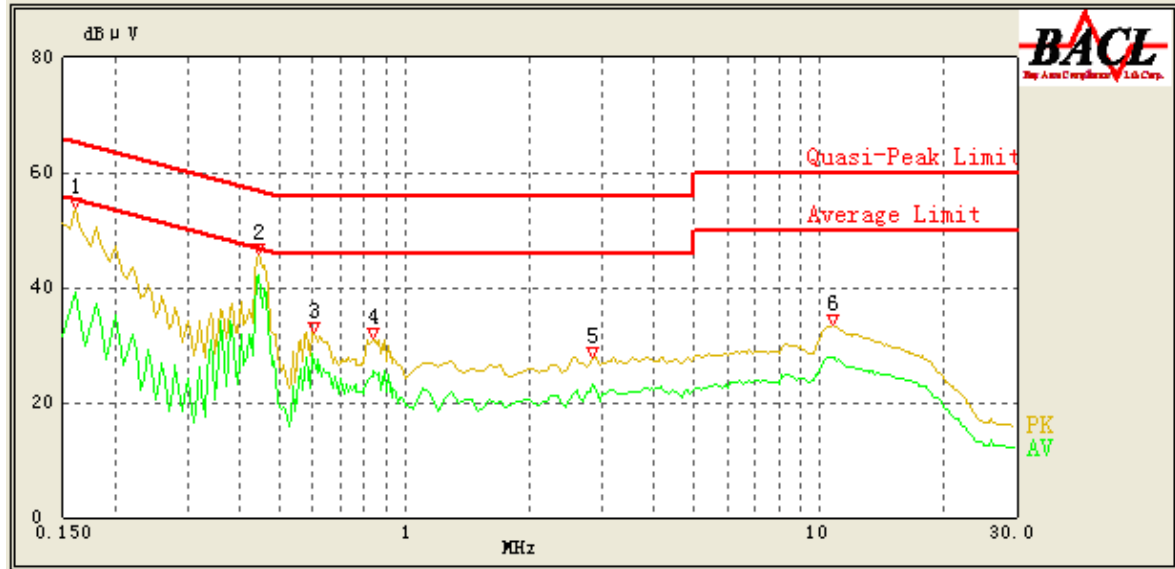
Environmental Conditions

Temperature:	20.2 °C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

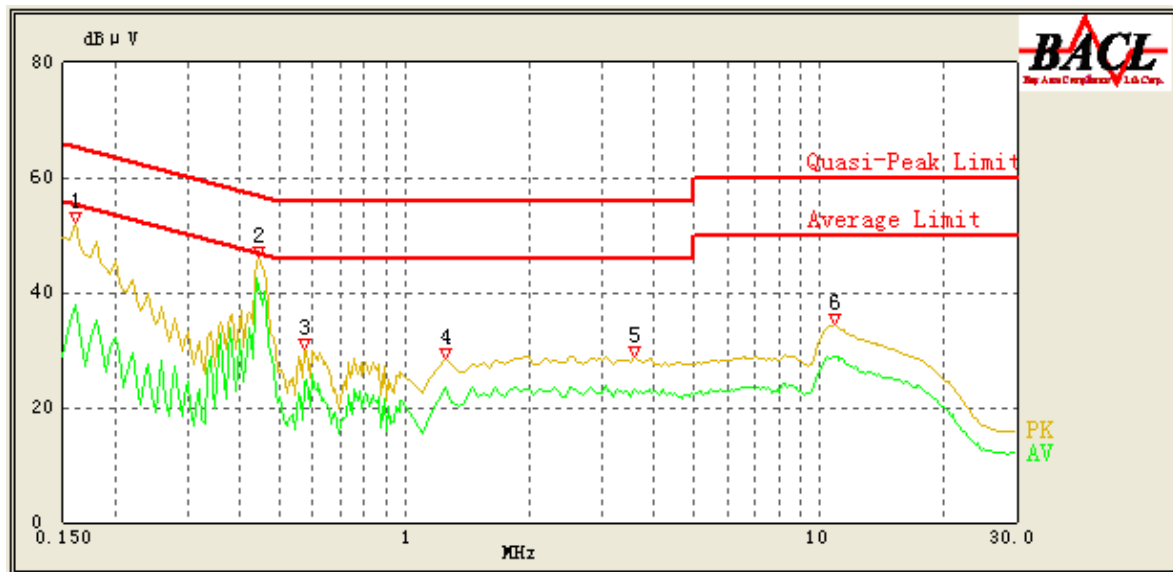
The testing was performed by Winnie Yang on 2018-11-23.

EUT operation mode: Transmitting in 802.11g mode low channel of Chain0 (Worst case)

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.160	53.76	QP	9.000	L1	16.05	65.71	11.95	Compliance
0.160	39.03	AV	9.000	L1	16.05	55.71	16.68	Compliance
0.445	45.97	QP	9.000	L1	16.07	57.57	11.60	Compliance
0.445	42.08	AV	9.000	L1	16.07	47.57	5.49	Compliance
0.605	32.30	QP	9.000	L1	16.01	56.00	23.70	Compliance
0.605	27.08	AV	9.000	L1	16.01	46.00	18.92	Compliance
0.840	31.33	QP	9.000	L1	15.92	56.00	24.67	Compliance
0.840	25.59	AV	9.000	L1	15.92	46.00	20.41	Compliance
2.850	27.81	QP	9.000	L1	15.85	56.00	28.19	Compliance
2.850	23.11	AV	9.000	L1	15.85	46.00	22.89	Compliance
10.750	33.37	QP	9.000	L1	16.08	60.00	26.63	Compliance
10.750	28.00	AV	9.000	L1	16.08	50.00	22.00	Compliance

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Comment
0.160	52.05	QP	9.000	N	16.06	65.71	13.66	Compliance
0.160	37.75	AV	9.000	N	16.06	55.71	17.96	Compliance
0.445	46.02	QP	9.000	N	16.10	57.57	11.55	Compliance
0.445	41.05	AV	9.000	N	16.10	47.57	6.52	Compliance
0.575	30.02	QP	9.000	N	16.07	56.00	25.98	Compliance
0.575	24.15	AV	9.000	N	16.07	46.00	21.85	Compliance
1.250	28.58	QP	9.000	N	15.93	56.00	27.42	Compliance
1.250	23.35	AV	9.000	N	15.93	46.00	22.65	Compliance
3.600	28.87	QP	9.000	N	15.89	56.00	27.13	Compliance
3.600	23.30	AV	9.000	N	15.89	46.00	22.70	Compliance
10.900	34.43	QP	9.000	N	15.99	60.00	25.57	Compliance
10.850	28.74	AV	9.000	N	15.99	50.00	21.26	Compliance

Note:

1) Corrected Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

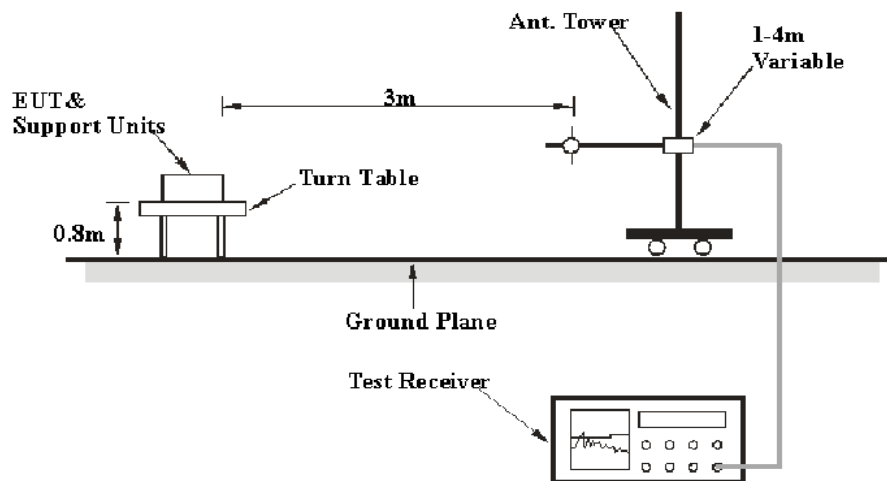
2) Margin (dB) = Limit (dBμV) – Corrected Amplitude (dBμV)

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

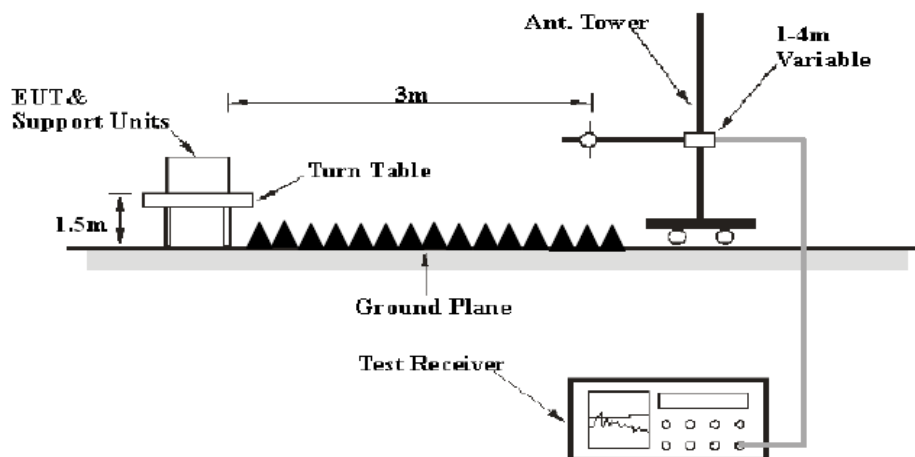
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz - 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave

Note: When duty cycle less than 98%, a correction factor shall be added to the average measurement results. Correction factor is $10 \cdot \log(1/x)$, where “x” is the duty cycle.

Test Procedure

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, peak and Average detection mode 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:

$$\text{Corrected Amplitude (dB}\mu\text{V /m)} = \text{Meter Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Amplifier Gain (dB)}$$

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:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Corrected Amplitude (dB}\mu\text{V /m)}$$

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.

Test Data**Environmental Conditions**

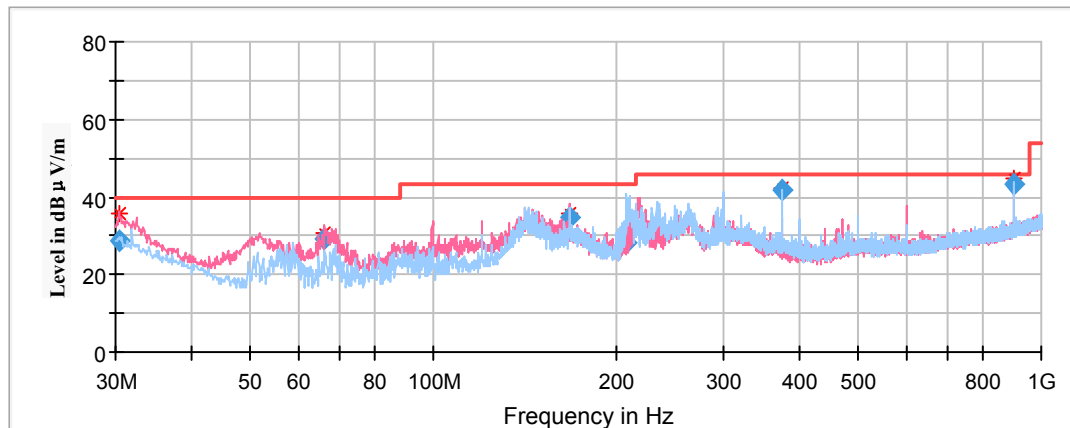
Temperature:	22.9-24.8℃
Relative Humidity:	48-51 %
ATM Pressure:	101.0-101.2 kPa

The testing was performed by Winnie Yang from 2018-11-15 to 2018-12-04.

Test Result: Compliant.

Spurious Emission Test:**30MHz-1GHz:**

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case 802.11g mode low channel of chain 1 in X-axis of orientation was recorded



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	QuasiPeak (dBμV/m)	Height (cm)	Polar (H/V)				
30.504309	28.84	101.0	V	97.0	-4.3	40.00	11.16
66.281950	29.30	101.0	V	313.0	-17.5	40.00	10.70
167.997200	34.57	101.0	V	0.0	-13.1	43.50	8.93
207.190300	28.35	101.0	H	113.0	-12.3	43.50	15.15
374.998250	41.77	101.0	H	154.0	-8.7	46.00	4.23
899.996100	43.38	101.0	H	196.0	0.0	46.00	2.62

1GHz-18GHz**802.11b Mode (Worst case: Chain 1):**

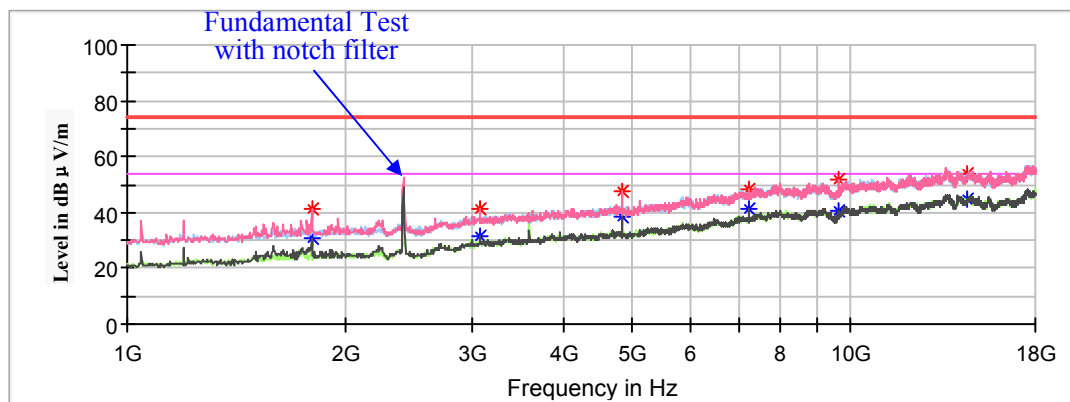
(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV)
 Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Low Channel: 2412MHz

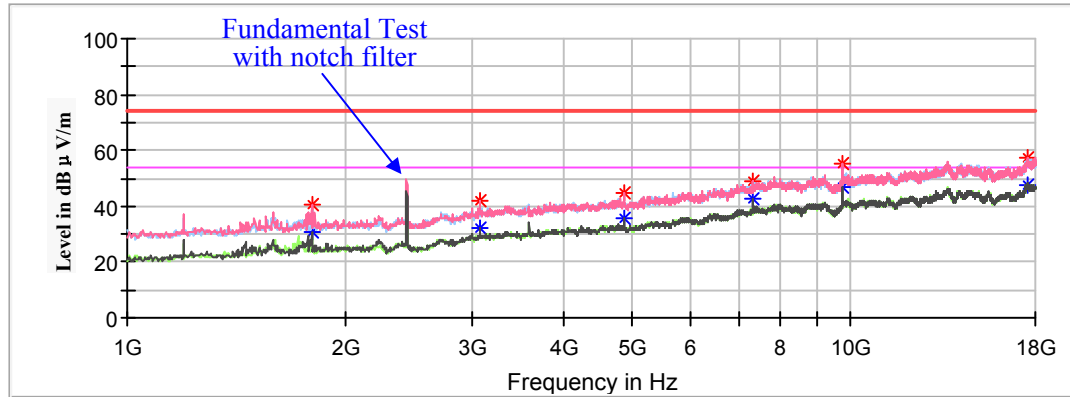
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1799.000000	---	31.04	100.0	V	335.0	-6.5	54.00	22.96
1799.000000	41.33	---	100.0	V	335.0	-6.5	74.00	32.67
3070.600000	---	31.62	200.0	V	74.0	-1.5	54.00	22.38
3070.600000	41.44	---	200.0	V	74.0	-1.5	74.00	32.56
4824.000000	---	38.46	100.0	V	325.0	1.9	54.00	15.54
4824.000000	47.48	---	100.0	V	325.0	1.9	74.00	26.52
7236.000000	---	41.26	100.0	V	165.0	9.0	54.00	12.74
7236.000000	48.34	---	100.0	V	165.0	9.0	74.00	25.66
9646.200000	51.99	---	200.0	V	154.0	11.7	74.00	22.01
9646.200000	---	40.68	200.0	V	154.0	11.7	54.00	13.32
14447.000000	---	44.62	200.0	V	53.0	14.7	54.00	9.38
14447.000000	53.81	---	200.0	V	53.0	14.7	74.00	20.19

Middle Channel: 2437MHz

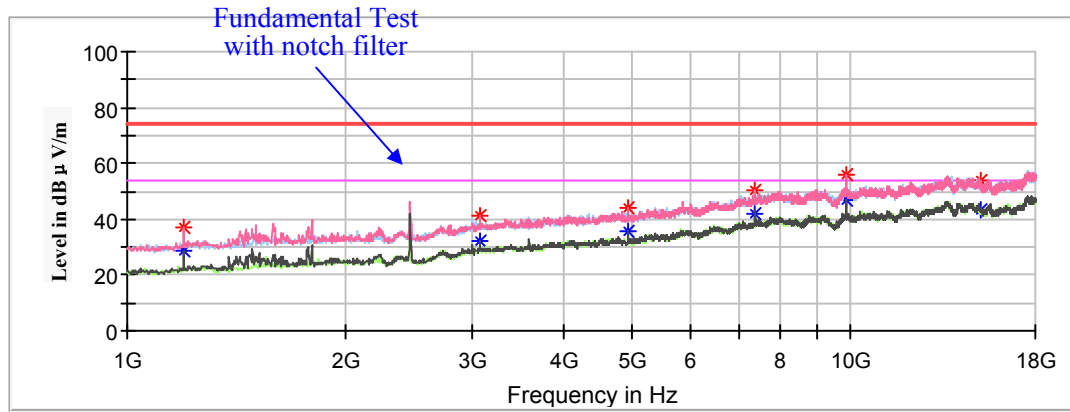
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1799.000000	---	30.63	100.0	V	2.0	-6.5	54.00	23.37
1799.000000	40.89	---	100.0	V	2.0	-6.5	74.00	33.11
3070.600000	---	32.34	200.0	V	85.0	-1.5	54.00	21.66
3070.600000	41.66	---	200.0	V	85.0	-1.5	74.00	32.34
4874.000000	---	35.72	150.0	V	320.0	1.9	54.00	18.28
4874.000000	44.78	---	150.0	V	320.0	1.9	74.00	29.22
7311.000000	---	42.39	100.0	V	162.0	9.2	54.00	11.61
7311.000000	48.92	---	100.0	V	162.0	9.2	74.00	25.08
9748.200000	---	47.15	150.0	V	135.0	12.0	54.00	6.85
9748.200000	55.28	---	150.0	V	135.0	12.0	74.00	18.72
17534.200000	---	47.23	200.0	V	254.0	17.2	54.00	6.77
17534.200000	57.56	---	200.0	V	254.0	17.2	74.00	16.44

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1197.200000	37.34	---	150.0	V	186.0	-9.3	74.00	36.66
1197.200000	---	28.68	150.0	V	186.0	-9.3	54.00	25.32
3070.600000	41.47	---	200.0	V	90.0	-1.5	74.00	32.53
3070.600000	---	32.41	200.0	V	90.0	-1.5	54.00	21.59
4924.000000	43.83	---	100.0	V	11.0	2.0	74.00	30.17
4924.000000	---	35.35	100.0	V	11.0	2.0	54.00	18.65
7386.000000	---	41.79	150.0	V	159.0	9.4	54.00	12.21
7386.000000	50.05	---	150.0	V	159.0	9.4	74.00	23.95
9846.800000	---	46.82	100.0	V	213.0	12.2	54.00	7.18
9846.800000	55.75	---	100.0	V	213.0	12.2	74.00	18.25
15147.400000	---	43.04	150.0	V	320.0	13.3	54.00	10.96
15147.400000	53.86	---	150.0	V	320.0	13.3	74.00	20.14

802.11g Mode(Worst case: Chain 0):

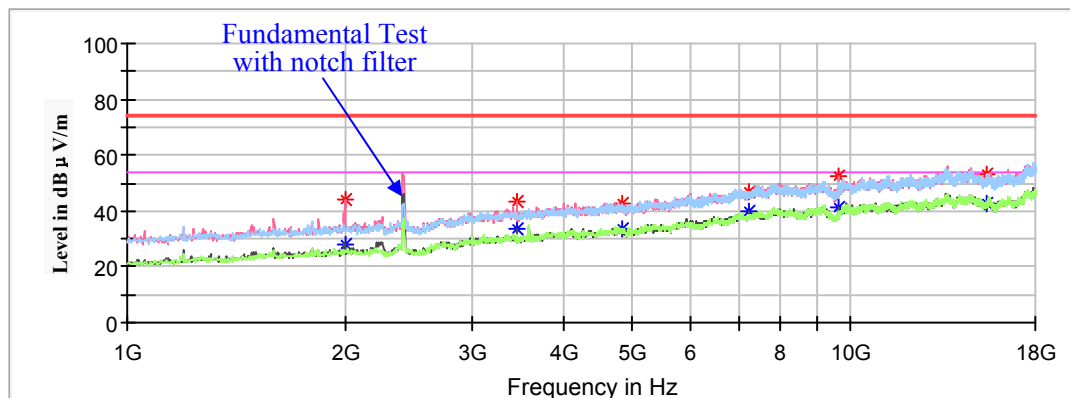
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dB μ V /m) = Corrected Factor (dB/m) + Reading (dB μ V)
 Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V /m)

Low Channel: 2412MHz

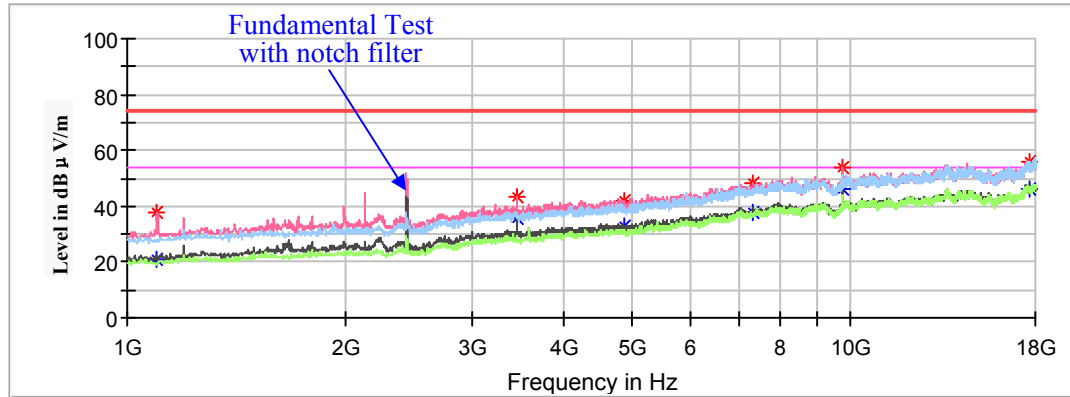
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1999.600000	---	27.98	150.0	V	191.0	-5.8	54.00	26.02
1999.600000	43.82	---	150.0	V	191.0	-5.8	74.00	30.18
3454.800000	---	33.50	200.0	V	244.0	-0.9	54.00	20.50
3454.800000	43.29	---	200.0	V	244.0	-0.9	74.00	30.71
4824.000000	---	33.50	150.0	V	354.0	1.9	54.00	20.50
4824.000000	42.80	---	150.0	V	354.0	1.9	74.00	31.20
7236.000000	47.05	---	150.0	V	116.0	9.0	74.00	26.95
7236.000000	---	39.63	150.0	V	116.0	9.0	54.00	14.37
9646.200000	---	41.17	250.0	V	325.0	11.7	54.00	12.83
9646.200000	52.35	---	250.0	V	325.0	11.7	74.00	21.65
15446.600000	---	42.50	150.0	H	359.0	12.6	54.00	11.50
15446.600000	53.32	---	150.0	H	359.0	12.6	74.00	20.68

Middle Channel: 2437MHz

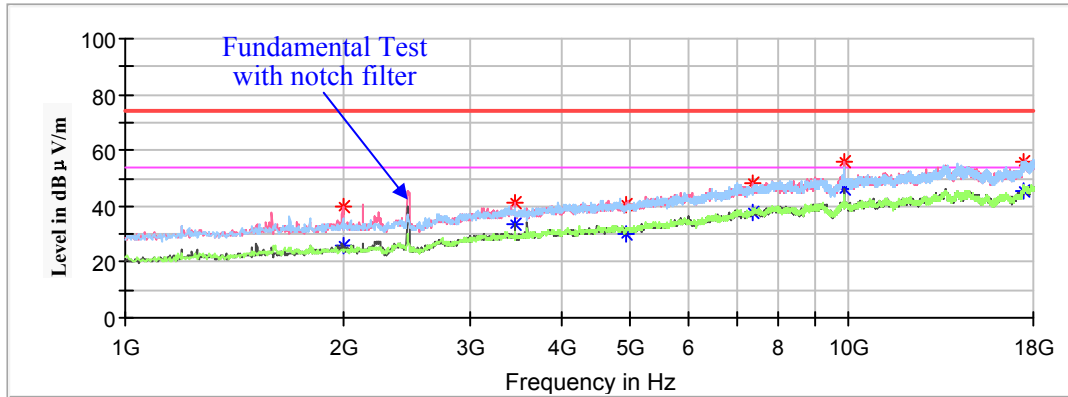
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1098.600000	38.10	---	150.0	V	61.0	-9.9	74.00	35.90
1098.600000	---	20.86	150.0	V	61.0	-9.9	54.00	33.14
3454.800000	43.65	---	150.0	V	248.0	-0.9	74.00	30.35
3454.800000	---	35.39	150.0	V	248.0	-0.9	54.00	18.61
4874.000000	41.67	---	250.0	V	152.0	1.9	74.00	32.33
4874.000000	---	33.13	250.0	V	152.0	1.9	54.00	20.87
7311.000000	48.05	---	150.0	V	163.0	9.2	74.00	25.95
7311.000000	---	38.01	150.0	V	163.0	9.2	54.00	15.99
9748.200000	53.69	---	150.0	V	291.0	12.0	74.00	20.31
9748.200000	---	45.86	150.0	V	291.0	12.0	54.00	8.14
17670.200000	---	45.86	200.0	H	309.0	17.4	54.00	8.14
17670.200000	55.93	---	200.0	H	309.0	17.4	74.00	18.07

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1999.600000	---	26.07	200.0	V	139.0	-5.8	54.00	27.93
1999.600000	39.80	---	200.0	V	139.0	-5.8	74.00	34.20
3454.800000	---	33.31	150.0	V	246.0	-0.9	54.00	20.69
3454.800000	41.44	---	150.0	V	246.0	-0.9	74.00	32.56
4924.000000	---	30.40	150.0	V	224.0	2.0	54.00	23.60
4924.000000	40.81	---	150.0	V	224.0	2.0	74.00	33.19
7386.000000	---	37.95	150.0	V	149.0	9.4	54.00	16.05
7386.000000	48.56	---	150.0	V	149.0	9.4	74.00	25.44
9846.800000	---	45.87	250.0	V	288.0	12.2	54.00	8.13
9846.800000	55.78	---	250.0	V	288.0	12.2	74.00	18.22
17462.800000	---	45.76	150.0	H	100.0	17.0	54.00	8.24
17462.800000	56.09	---	150.0	H	100.0	17.0	74.00	17.91

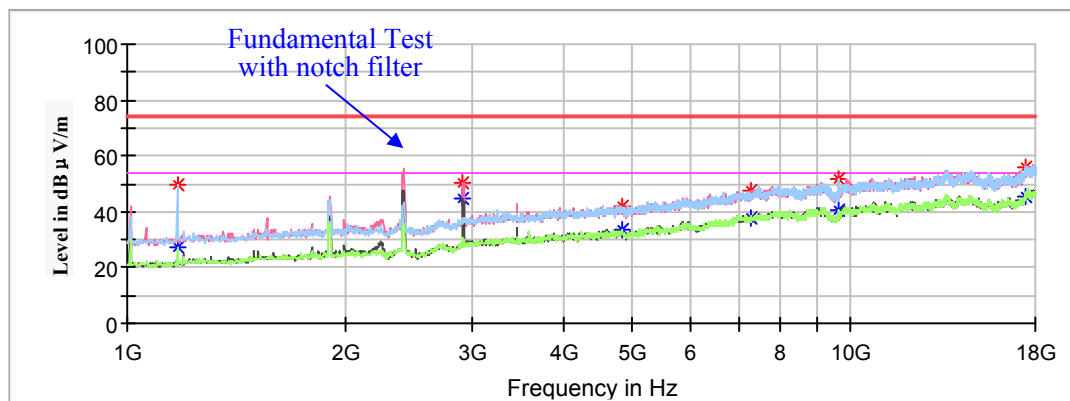
802.11n-HT20 Mode(Chain0+Chain1):

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dB μ V /m) = Corrected Factor (dB/m) + Reading (dB μ V)
 Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V /m)

Low Channel: 2412MHz

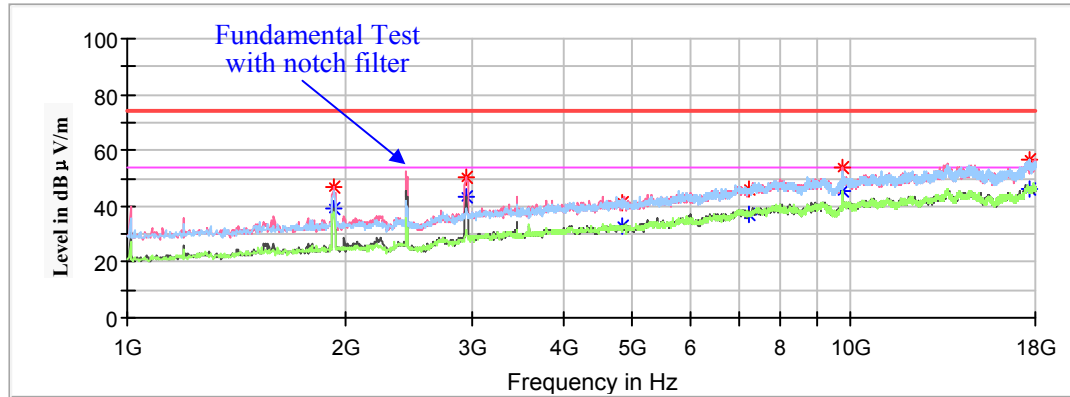
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1173.400000	49.52	---	250.0	H	121.0	-9.5	74.00	24.48
1173.400000	---	27.21	250.0	H	121.0	-9.5	54.00	26.79
2910.800000	50.36	---	150.0	V	212.0	-2.1	74.00	23.64
2910.800000	---	44.53	150.0	V	212.0	-2.1	54.00	9.47
4824.000000	41.92	---	200.0	V	244.0	1.9	74.00	32.08
4824.000000	---	33.25	200.0	V	244.0	1.9	54.00	20.75
7236.000000	47.76	---	150.0	V	11.0	9.0	74.00	26.24
7236.000000	---	37.47	150.0	V	11.0	9.0	54.00	16.53
9646.200000	---	40.91	150.0	V	228.0	11.7	54.00	13.09
9646.200000	51.99	---	150.0	V	228.0	11.7	74.00	22.01
17418.600000	---	45.40	150.0	H	25.0	16.8	54.00	8.60
17418.600000	56.06	---	150.0	H	25.0	16.8	74.00	17.94

Middle Channel: 2437MHz

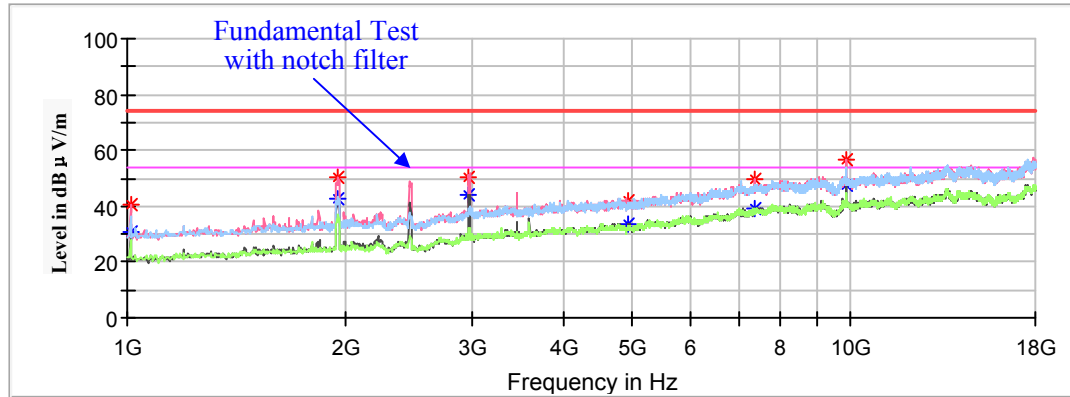
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1928.200000	---	39.31	200.0	V	103.0	-6.0	54.00	14.69
1928.200000	46.89	---	200.0	V	103.0	-6.0	74.00	27.11
2938.000000	---	43.34	150.0	V	114.0	-2.0	54.00	10.66
2938.000000	50.36	---	150.0	V	114.0	-2.0	74.00	23.64
4874.000000	---	32.65	250.0	V	92.0	1.9	54.00	21.35
4874.000000	41.44	---	250.0	V	92.0	1.9	74.00	32.56
7311.000000	---	36.77	150.0	V	82.0	9.0	54.00	17.23
7311.000000	46.27	---	150.0	V	82.0	9.0	74.00	27.73
9748.200000	---	45.71	150.0	V	236.0	12.0	54.00	8.29
9748.200000	53.92	---	150.0	V	236.0	12.0	74.00	20.08
17615.800000	---	46.16	200.0	H	297.0	17.3	54.00	7.84
17615.800000	56.61	---	200.0	H	297.0	17.3	74.00	17.39

High Channel: 2462MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1010.200000	40.27	---	200.0	V	104.0	-10.4	74.00	33.73
1010.200000	---	30.54	200.0	V	104.0	-10.4	54.00	23.46
1958.800000	50.38	---	150.0	V	1.0	-5.9	74.00	23.62
1958.800000	---	42.45	150.0	V	1.0	-5.9	54.00	11.55
2965.200000	---	43.81	150.0	V	168.0	-1.8	54.00	10.19
2965.200000	50.45	---	150.0	V	168.0	-1.8	74.00	23.55
4924.000000	---	33.74	150.0	V	348.0	2.0	54.00	20.26
4924.000000	42.11	---	150.0	V	348.0	2.0	74.00	31.89
7386.000000	---	39.16	250.0	V	136.0	9.4	54.00	14.84
7386.000000	49.30	---	250.0	V	136.0	9.4	74.00	24.70
9846.800000	56.93	---	150.0	V	243.0	12.2	74.00	17.07
9846.800000	---	47.33	150.0	V	243.0	12.2	54.00	6.67

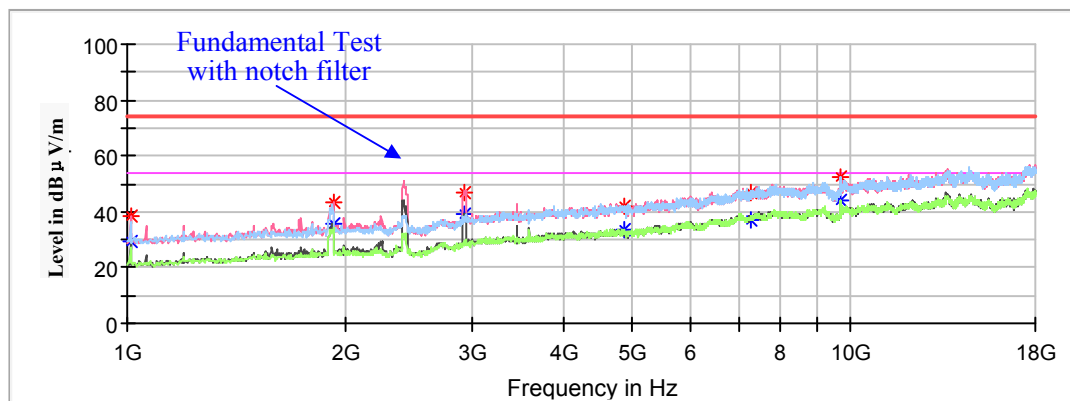
802.11n-HT40 Mode(Chain0+Chain1):

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)
 Corrected Amplitude (dB μ V /m) = Corrected Factor (dB/m) + Reading (dB μ V)
 Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V /m)

Low Channel: 2422MHz

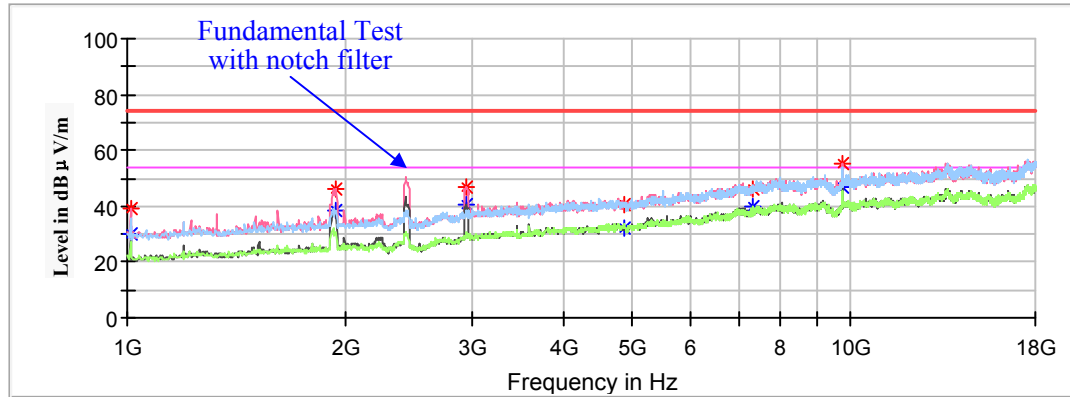
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)
	MaxPeak (dB μ V /m)	Average (dB μ V /m)	Height (cm)	Polar (H/V)				
1010.200000	---	29.16	250.0	V	105.0	-10.4	54.00	24.84
1010.200000	38.30	---	250.0	V	105.0	-10.4	74.00	35.70
1928.200000	---	35.81	150.0	V	94.0	-6.0	54.00	18.19
1928.200000	43.02	---	150.0	V	94.0	-6.0	74.00	30.98
2924.400000	---	39.27	150.0	V	74.0	-2.0	54.00	14.73
2924.400000	46.96	---	150.0	V	74.0	-2.0	74.00	27.04
4844.000000	---	33.33	250.0	V	266.0	1.9	54.00	20.67
4844.000000	41.90	---	250.0	V	266.0	1.9	74.00	32.10
7266.000000	---	37.22	150.0	V	166.0	9.0	54.00	16.78
7266.000000	46.62	---	150.0	V	166.0	9.0	74.00	27.38
9687.000000	---	44.18	150.0	H	234.0	11.8	54.00	9.82
9687.000000	52.78	---	150.0	H	234.0	11.8	74.00	21.22

Middle Channel: 2437MHz

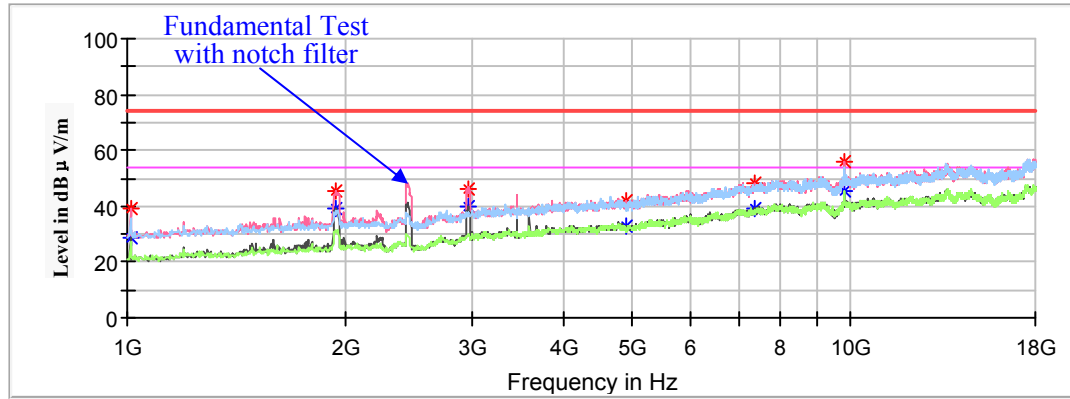
Full Spectrum



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1010.200000	---	30.37	150.0	V	74.0	-10.4	54.00	23.63
1010.200000	39.40	---	150.0	V	74.0	-10.4	74.00	34.60
1941.800000	---	38.47	200.0	V	5.0	-6.0	54.00	15.53
1941.800000	46.43	---	200.0	V	5.0	-6.0	74.00	27.57
2934.600000	---	40.35	150.0	V	138.0	-2.0	54.00	13.65
2934.600000	46.58	---	150.0	V	138.0	-2.0	74.00	27.42
4874.000000	---	32.45	150.0	V	0.0	1.9	54.00	21.55
4874.000000	40.71	---	150.0	V	0.0	1.9	74.00	33.29
7311.000000	46.01	---	250.0	V	359.0	9.2	74.00	27.99
7311.000000	---	39.73	250.0	V	359.0	9.2	54.00	14.27
9748.200000	---	46.64	150.0	V	149.0	12.0	54.00	7.36
9748.200000	55.08	---	150.0	V	149.0	12.0	74.00	18.92

High Channel: 2452MHz

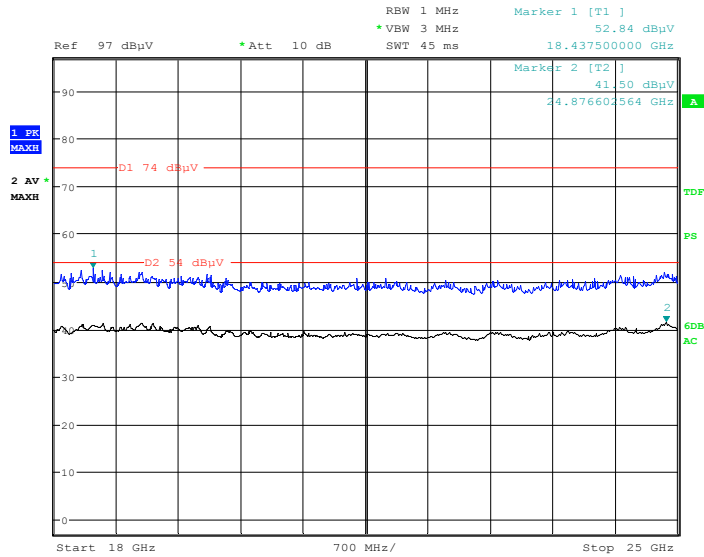
Full Spectrum



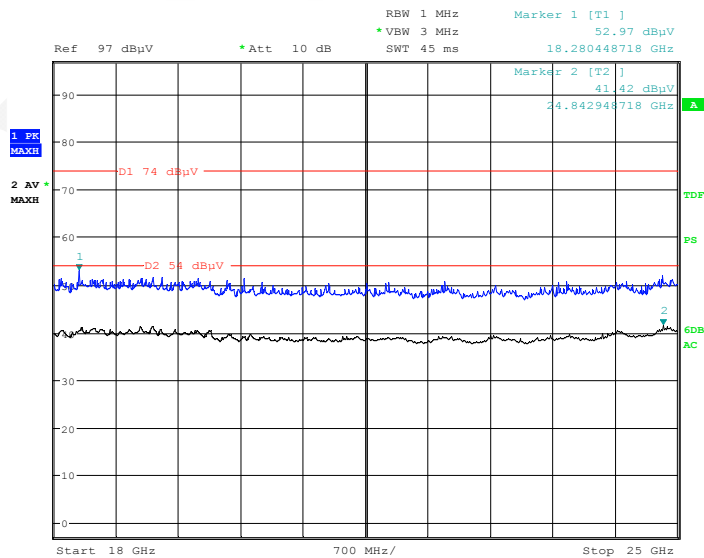
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
1010.200000	---	28.65	150.0	V	87.0	-10.4	54.00	25.35
1010.200000	39.14	---	150.0	V	87.0	-10.4	74.00	34.86
1941.800000	---	39.28	150.0	V	18.0	-6.0	54.00	14.72
1941.800000	45.35	---	150.0	V	18.0	-6.0	74.00	28.65
2955.000000	---	39.63	150.0	V	130.0	-1.9	54.00	14.37
2955.000000	45.87	---	150.0	V	130.0	-1.9	74.00	28.13
4904.000000	---	32.74	150.0	V	248.0	2.0	54.00	21.26
4904.000000	42.16	---	150.0	V	248.0	2.0	74.00	31.84
7356.000000	---	39.20	150.0	V	10.0	9.3	54.00	14.80
7356.000000	48.34	---	150.0	V	10.0	9.3	74.00	25.66
9809.400000	---	45.56	150.0	H	233.0	12.1	54.00	8.44
9809.400000	55.73	---	150.0	H	233.0	12.1	74.00	18.27

18GHz-25GHz

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case 802.11g mode low channel of chain 0 in X-axis of orientation was recorded

Horizontal

Date: 4.DEC.2018 17:37:31

Vertical

Date: 4.DEC.2018 17:48:04

Fundamental Test & Restricted Bands Emissions Test:

Note:

Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB) + Attenuator (dB)

Corrected Amplitude (dB μ V /m) = Corrected Factor (dB/m) + Reading (dB μ V)Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V /m)**802.11b Mode (Chain 1):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.00	111.13	---	200.0	V	302.0	6.1	/	/
2412.00	---	109.86	200.0	V	302.0	6.1	/	/
2412.00	108.72	---	150.0	H	269.0	6.1	/	/
2412.00	---	106.76	150.0	H	269.0	6.1	/	/
2390.00	51.07	---	150.0	V	357.0	6.0	74.00	22.93
2390.00	---	42.76	150.0	V	357.0	6.0	54.00	11.24
Middle Channel: 2437MHz								
2437.00	111.67	---	150.0	V	202.0	6.2	/	/
2437.00	---	109.60	150.0	V	202.0	6.2	/	/
2437.00	109.46	---	150.0	H	353.0	6.2	/	/
2437.00	---	107.35	150.0	H	353.0	6.2	/	/
High Channel: 2462MHz								
2462.00	111.41	---	150.0	V	57.0	6.2	/	/
2462.00	---	109.54	150.0	V	57.0	6.2	/	/
2462.00	108.95	---	250.0	H	168.0	6.2	/	/
2462.00	---	106.49	250.0	H	168.0	6.2	/	/
2483.50	---	43.40	150.0	V	104.0	6.3	54.00	10.60
2483.50	52.31	---	150.0	V	104.0	6.3	74.00	21.69

802.11g Mode (Chain 1): (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

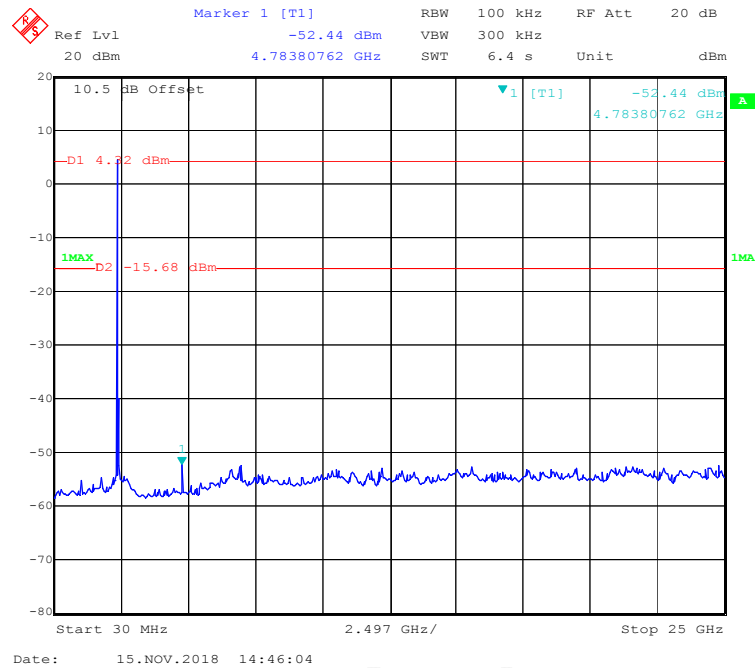
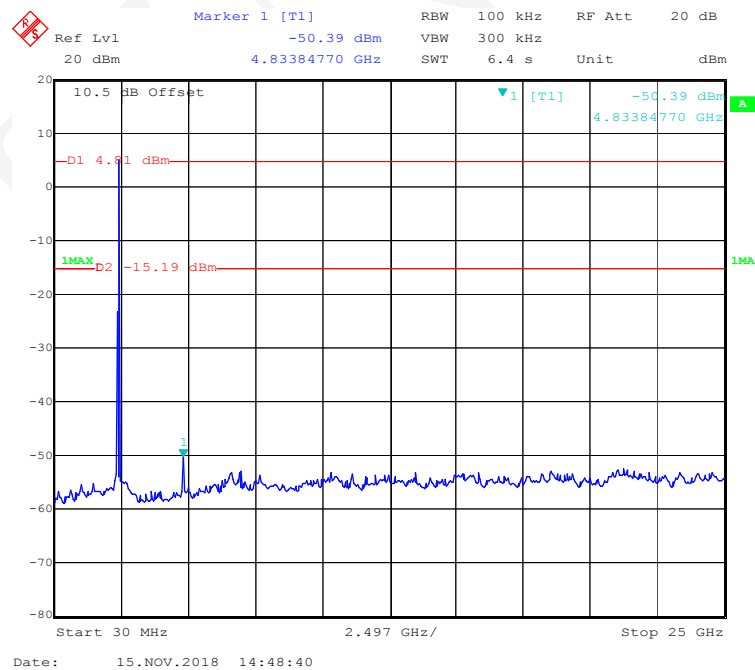
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.00	106.53	---	150.0	V	84.0	6.1	/	/
2412.00	---	99.67	150.0	V	84.0	6.1	/	/
2412.00	104.23	---	200.0	H	84.0	6.1	/	/
2412.00	---	97.22	200.0	H	84.0	6.1	/	/
2390.00	51.39	---	150.0	V	57.0	6.0	74.00	22.61
2390.00	---	42.36	150.0	V	57.0	6.0	54.00	11.64
Middle Channel: 2437MHz								
2437.00	107.36	---	200.0	V	270.0	6.2	/	/
2437.00	---	100.54	200.0	V	270.0	6.2	/	/
2437.00	103.00	---	100.0	H	21.0	6.2	/	/
2437.00	---	96.10	100.0	H	21.0	6.2	/	/
High Channel: 2462MHz								
2462.00	107.06	---	200.0	V	210.0	6.2	/	/
2462.00	---	99.95	200.0	V	210.0	6.2	/	/
2462.00	104.88	---	200.0	H	152.0	6.2	/	/
2462.00	---	97.53	200.0	H	152.0	6.2	/	/
2483.50	51.75	---	150.0	V	14.0	6.3	74.00	22.25
2483.50	---	42.86	150.0	V	14.0	6.3	54.00	11.14

802.11n-HT20 Mode (Chain0+Chain1): (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

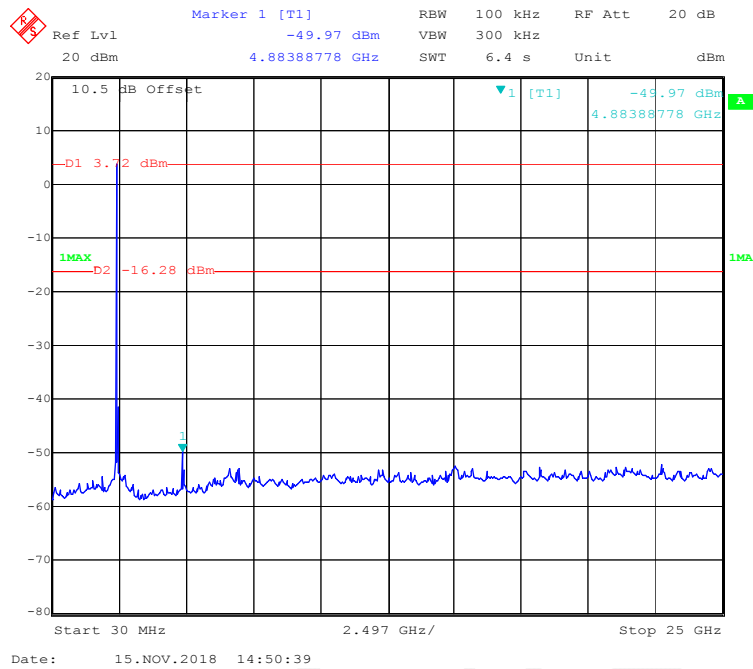
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2412MHz								
2412.00	106.15	---	100.0	V	63.0	6.1	/	/
2412.00	---	99.11	100.0	V	63.0	6.1	/	/
2412.00	104.08	---	150.0	H	323.0	6.1	/	/
2412.00	---	96.64	150.0	H	323.0	6.1	/	/
2390.00	60.31	---	100.0	V	71.0	6.0	74.00	13.69
2390.00	---	46.00	100.0	V	71.0	6.0	54.00	8.00
Middle Channel: 2437MHz								
2437.00	106.30	---	150.0	V	213.0	6.2	/	/
2437.00	---	99.47	150.0	V	213.0	6.2	/	/
2437.00	104.12	---	150.0	H	10.0	6.2	/	/
2437.00	---	97.33	150.0	H	10.0	6.2	/	/
High Channel: 2462MHz								
2462.00	107.77	---	100.0	V	64.0	6.2	/	/
2462.00	---	100.58	100.0	V	64.0	6.2	/	/
2462.00	105.40	---	100.0	H	13.0	6.2	/	/
2462.00	---	98.09	100.0	H	13.0	6.2	/	/
2483.50	---	43.34	200.0	V	20.0	6.3	54.00	10.66
2483.50	51.30	---	200.0	V	20.0	6.3	74.00	22.70

802.11n-HT40 Mode (Chain0+Chain1): (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

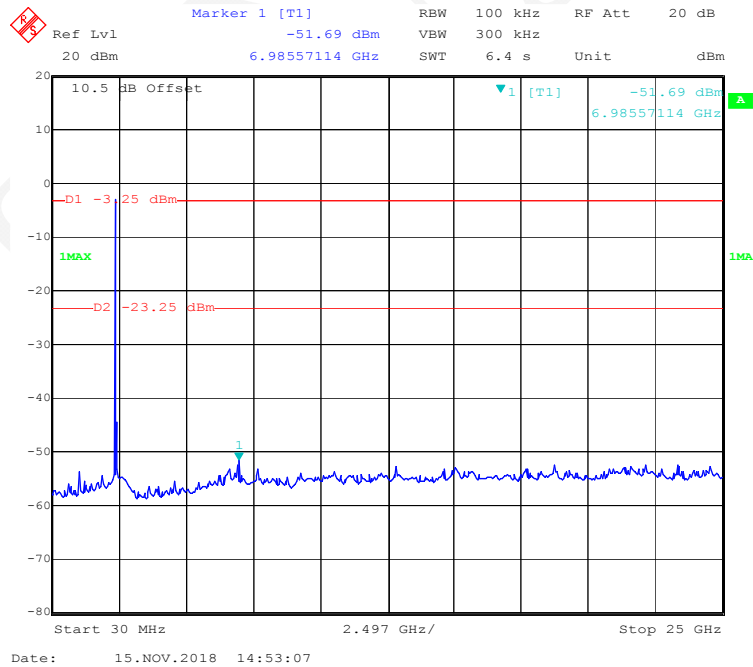
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
	MaxPeak (dBμV /m)	Average (dBμV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2422MHz								
2422.000000	106.03	---	250.0	V	229.0	6.1	/	/
2422.000000	---	98.78	250.0	V	229.0	6.1	/	/
2422.000000	103.76	---	250.0	H	50.0	6.1	/	/
2422.000000	---	96.65	250.0	H	50.0	6.1	/	/
2390.000000	63.36	---	150.0	V	165.0	6.0	74.00	10.64
2390.000000	---	51.04	150.0	V	165.0	6.0	54.00	2.96
Middle Channel: 2437MHz								
2437.000000	106.53	---	200.0	V	28.0	6.2	/	/
2437.000000	---	99.61	200.0	V	28.0	6.2	/	/
2437.000000	104.49	---	150.0	H	242.0	6.2	/	/
2437.000000	---	97.31	150.0	H	242.0	6.2	/	/
High Channel: 2452MHz								
2452.000000	106.52	---	200.0	V	304.0	6.2	/	/
2452.000000	---	99.71	200.0	V	304.0	6.2	/	/
2452.000000	104.43	---	100.0	H	258.0	6.2	/	/
2452.000000	---	97.40	100.0	H	258.0	6.2	/	/
2483.500000	---	44.58	200.0	V	300.0	6.3	54.00	9.42
2483.500000	52.84	---	200.0	V	300.0	6.3	74.00	21.16

Conducted Spurious Emissions at Antenna Port**Chain0: 802.11b Low Channel****Chain0: 802.11b Middle Channel**

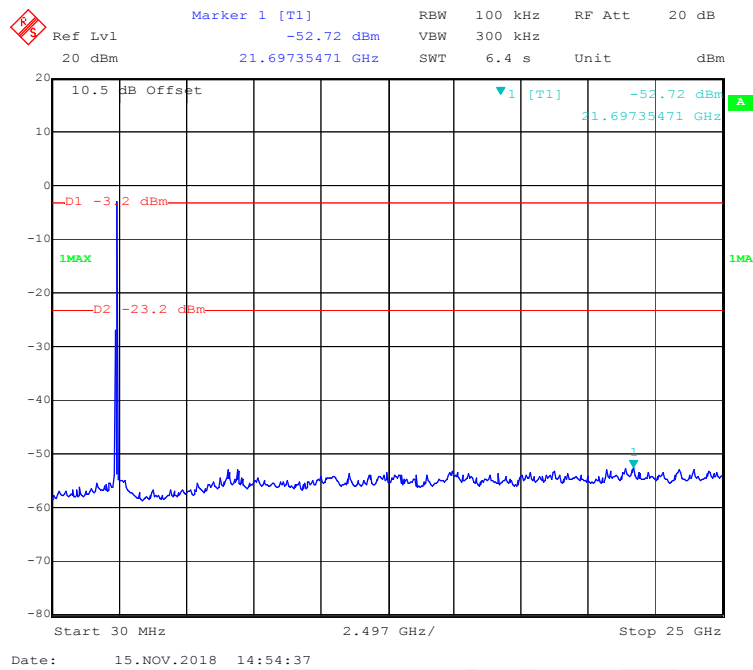
Chain0: 802.11b High Channel



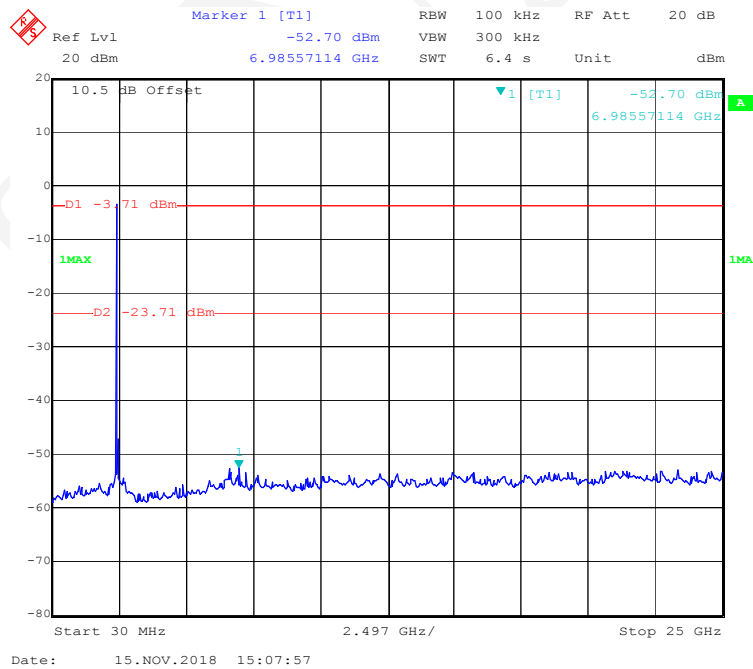
Chain0: 802.11g Low Channel



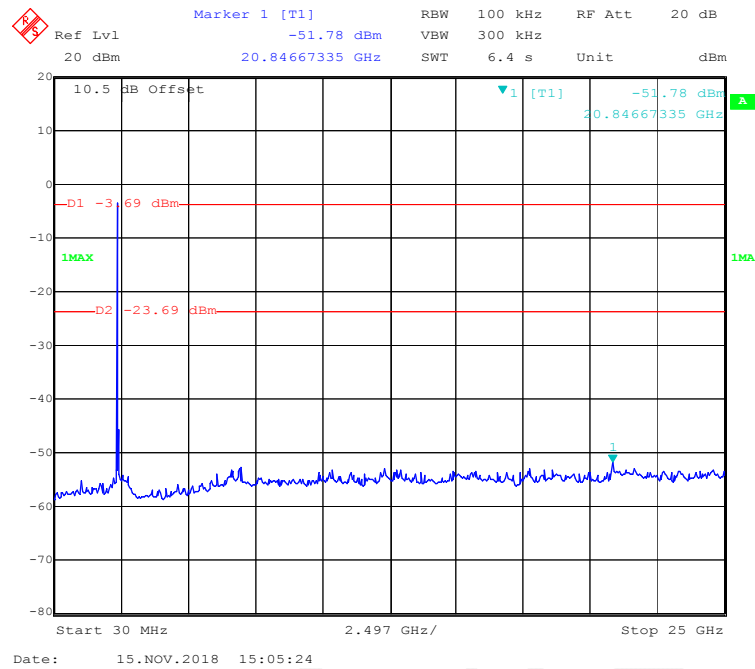
Chain0: 802.11g Middle Channel



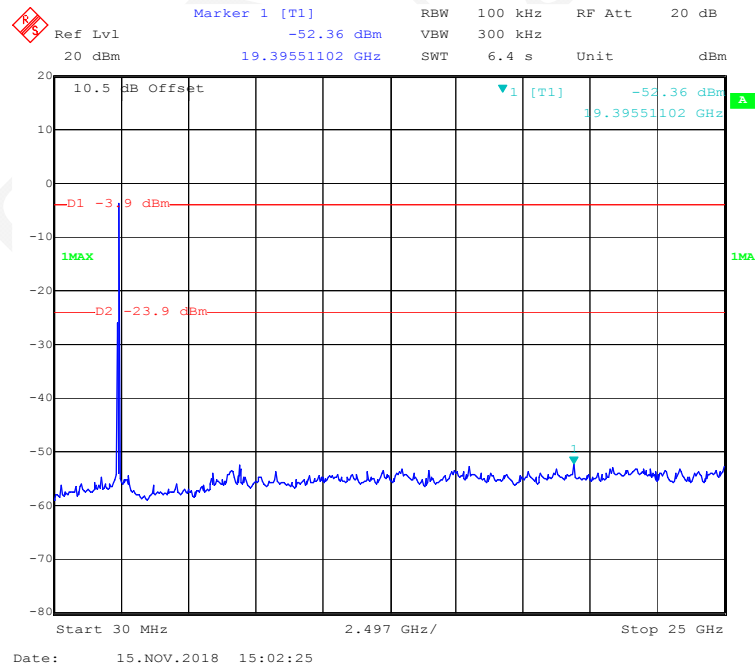
Chain0: 802.11g High Channel



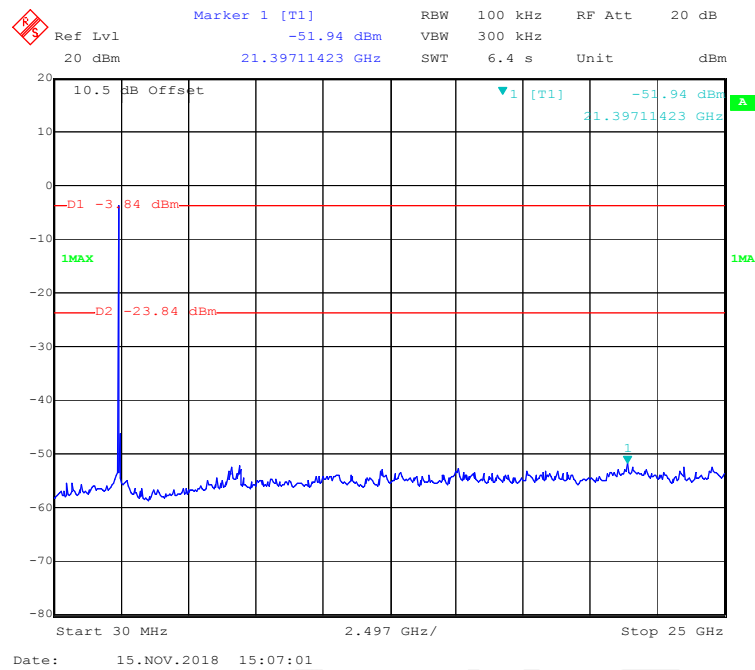
Chain0: 802.11n-HT20 Low Channel



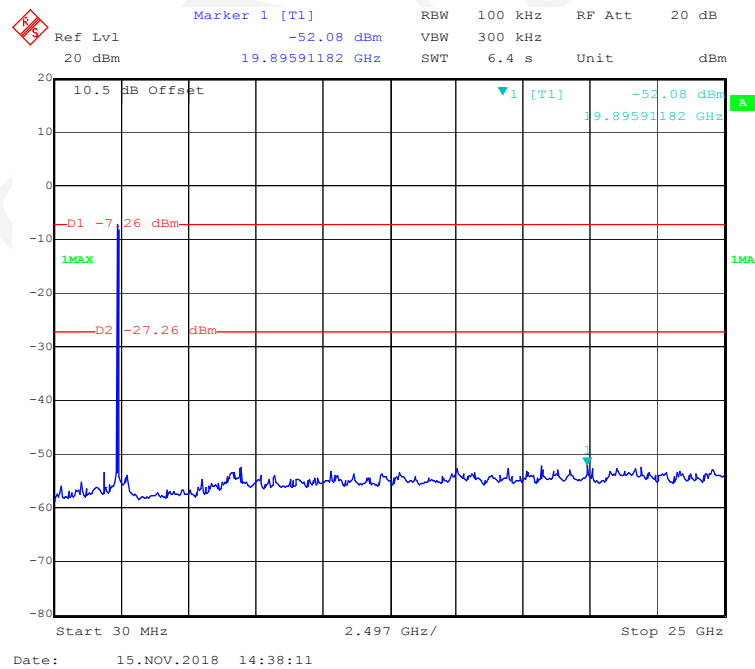
Chain0: 802.11n-HT20 Middle Channel



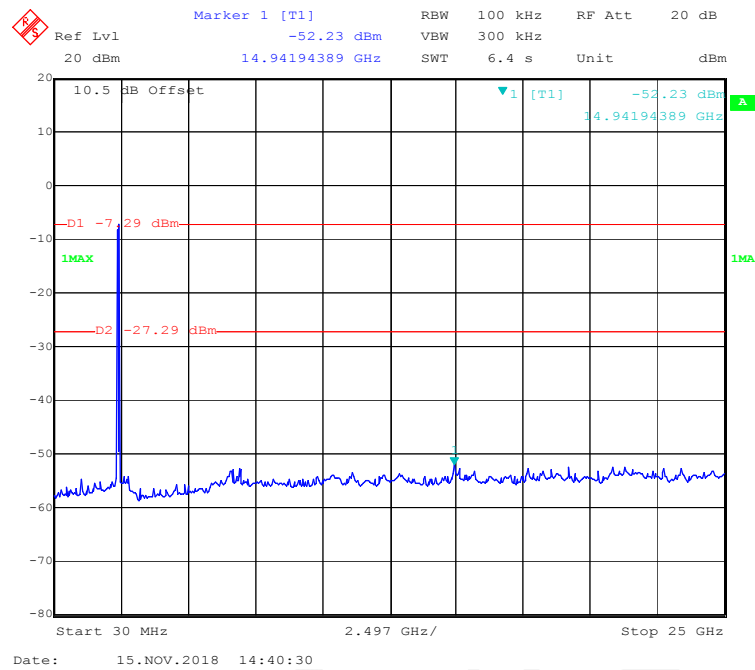
Chain0: 802.11n-HT20 High Channel



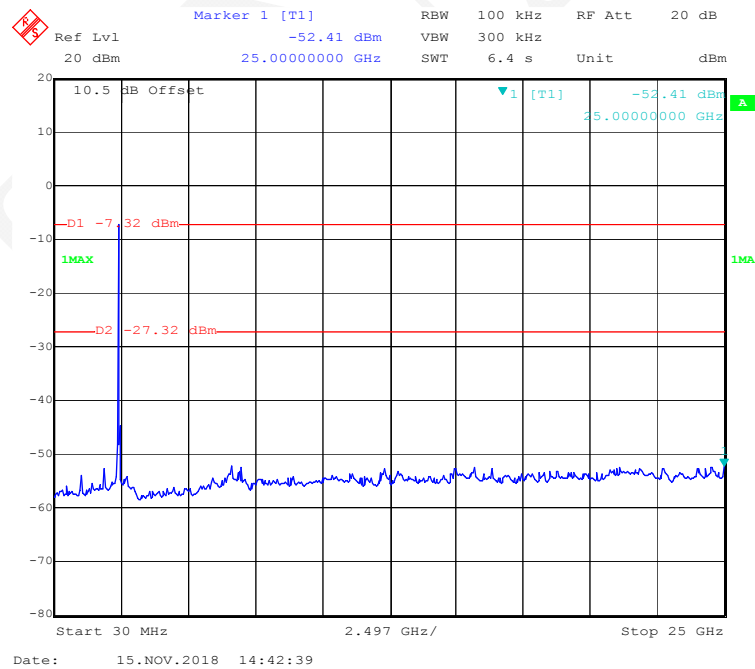
Chain0: 802.11n-HT40 Low Channel



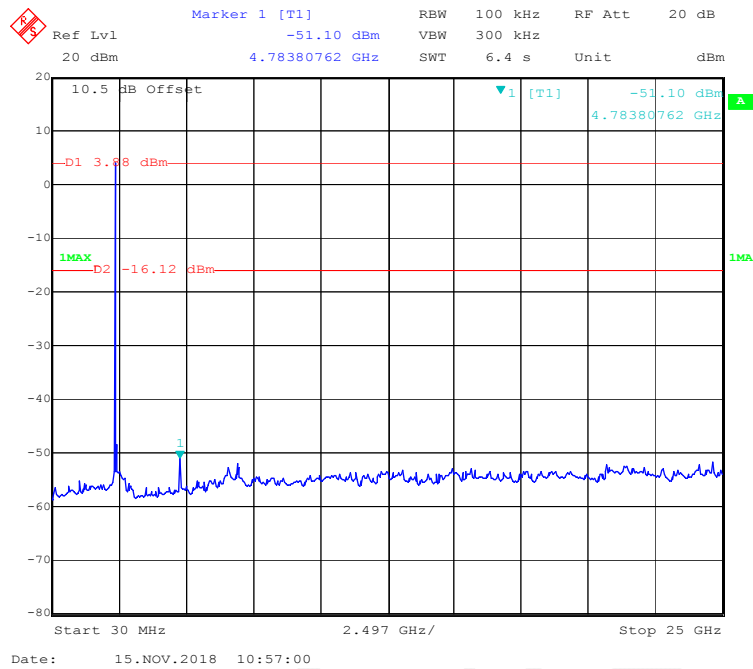
Chain0: 802.11n-HT40 Middle Channel



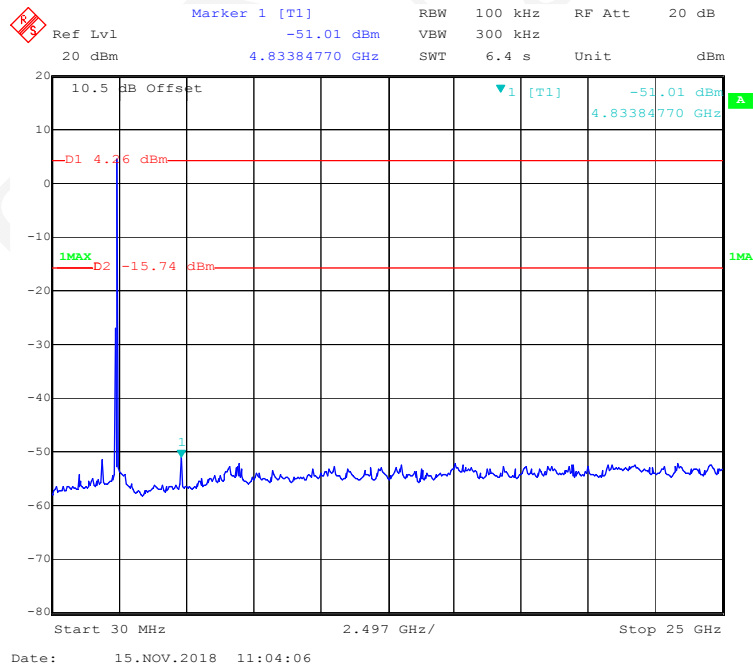
Chain0: 802.11n-HT40 High Channel



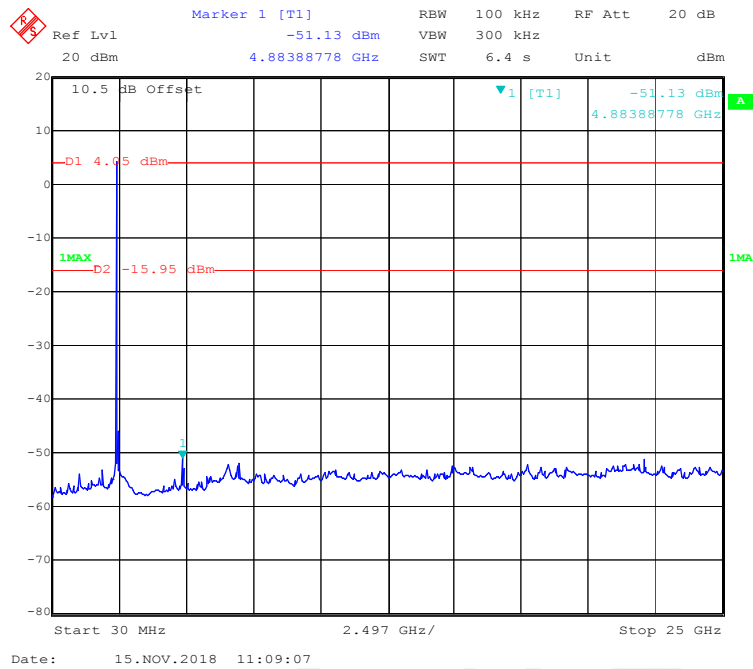
Chain1: 802.11b Low Channel



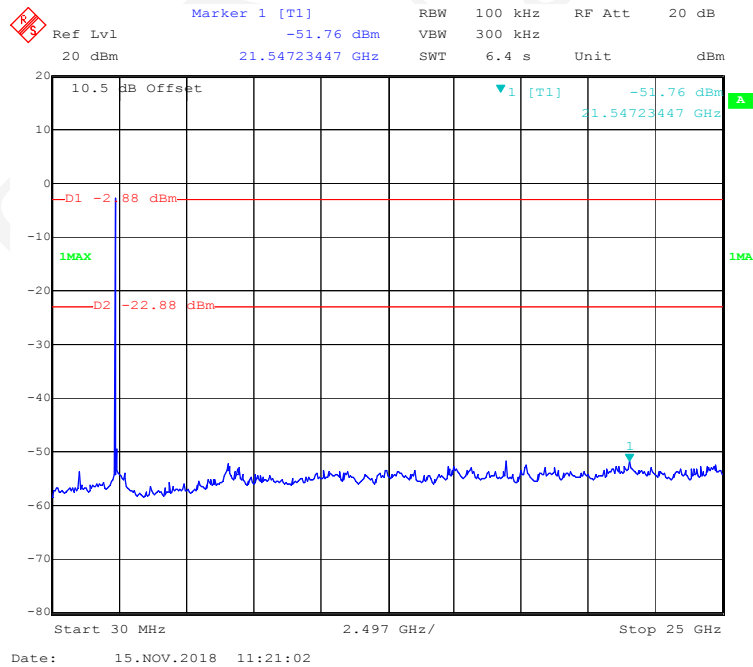
Chain1: 802.11b Middle Channel



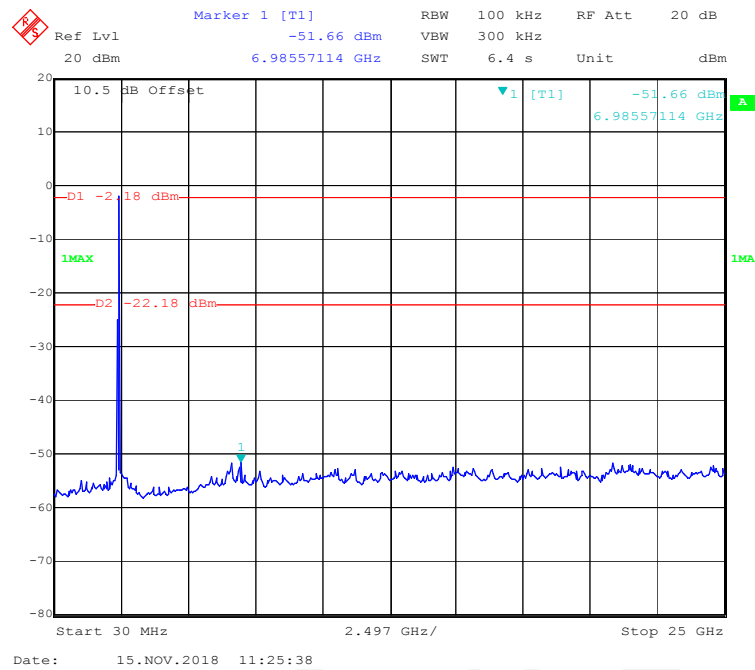
Chain1: 802.11b High Channel



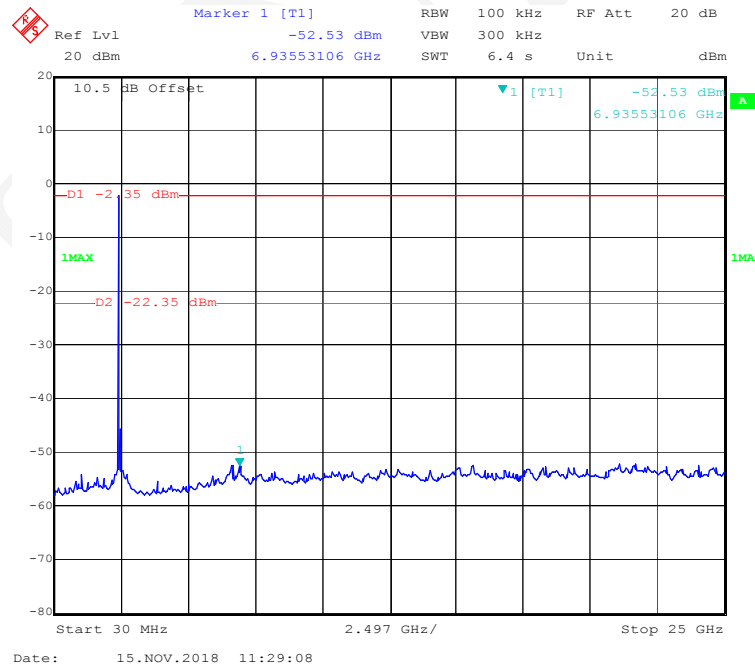
Chain1: 802.11g Low Channel



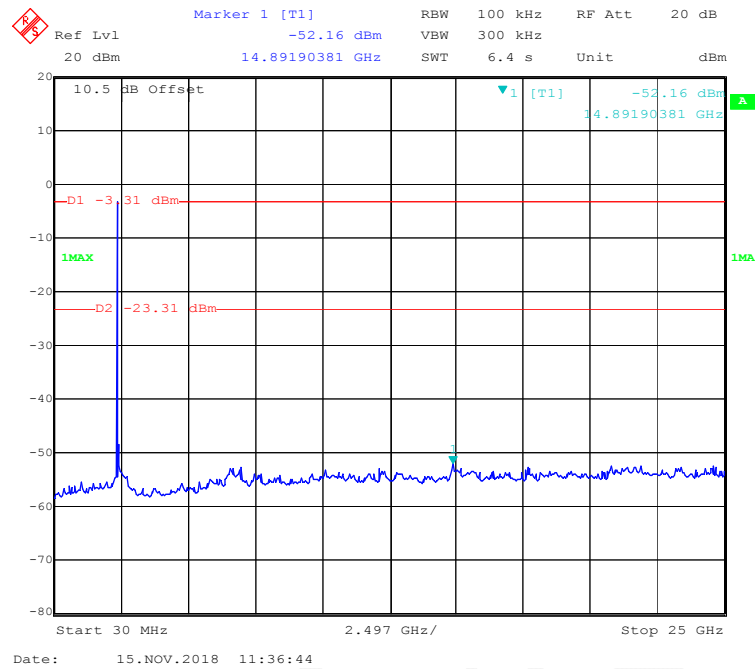
Chain1: 802.11g Middle Channel



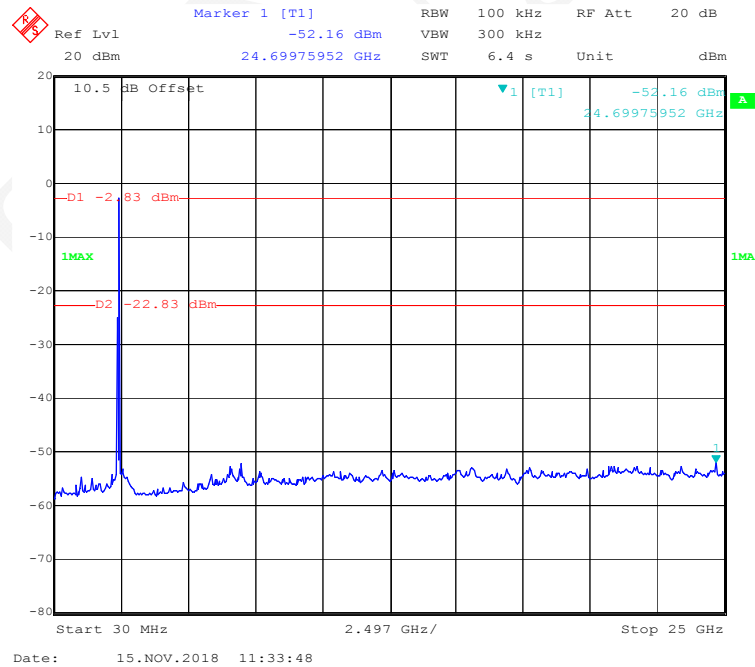
Chain1: 802.11g High Channel

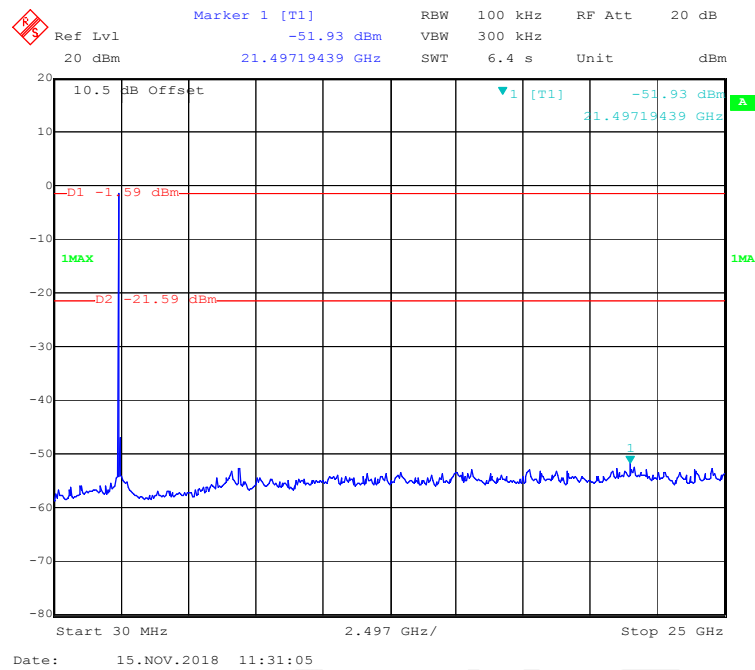
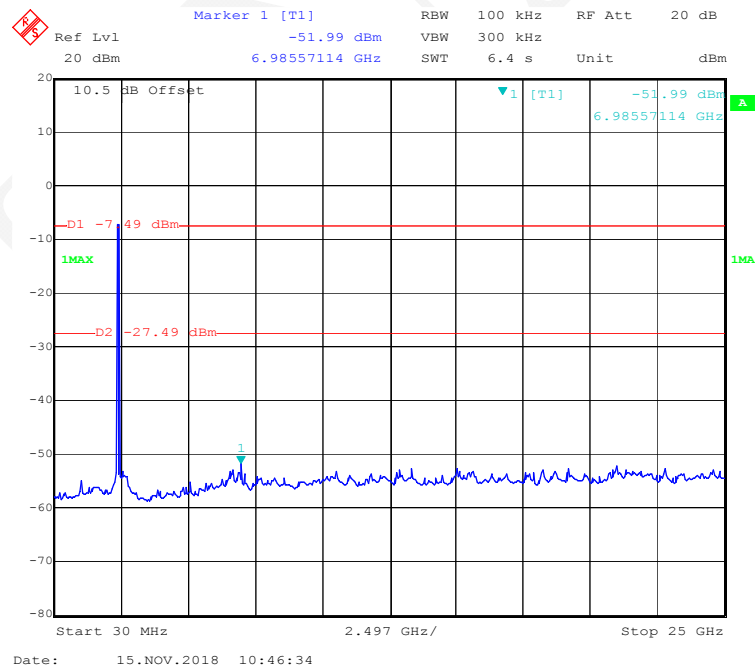


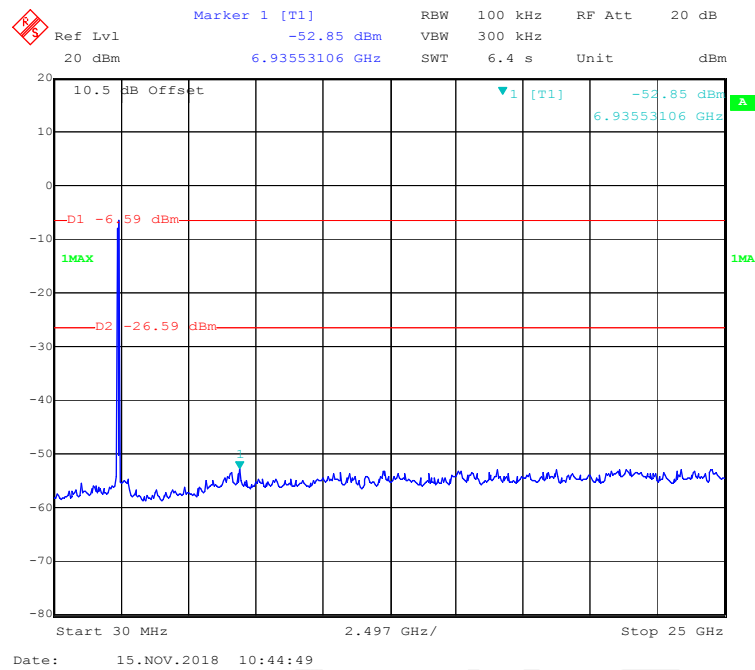
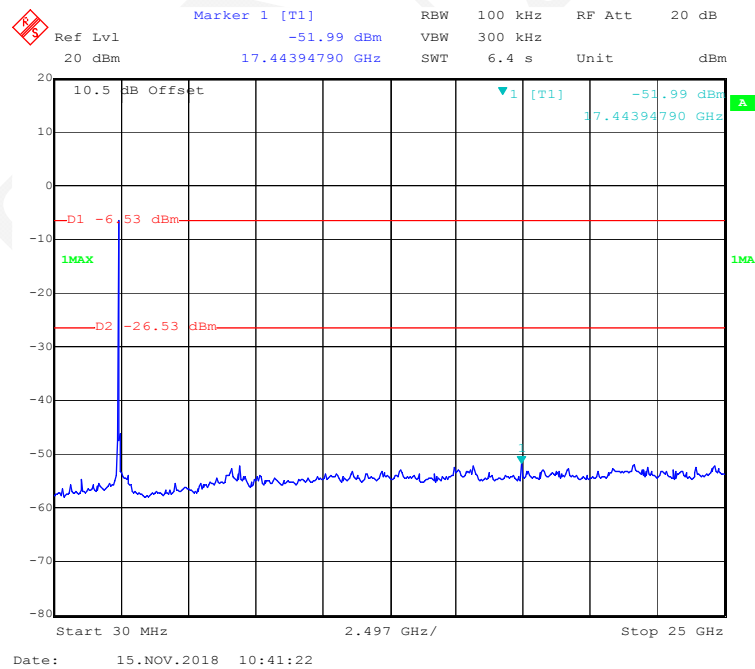
Chain1: 802.11n-HT20 Low Channel



Chain1: 802.11n-HT20 Middle Channel



Chain1: 802.11n-HT20 High Channel**Chain1: 802.11n-HT40 Low Channel**

Chain1: 802.11n-HT40 Middle Channel**Chain1: 802.11n-HT40 High Channel**

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

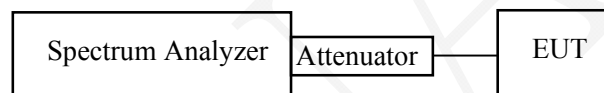
Applicable Standard

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 Procedure

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Winnie Yang on 2018-11-15.

Test Result: Compliant.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		Limit (kHz)
		Chain0	Chain1	
802.11b mode				
Low	2412	10.040	10.100	≥500
Middle	2437	10.040	10.100	≥500
High	2462	10.040	10.040	≥500
802.11g mode				
Low	2412	16.533	16.533	≥500
Middle	2437	16.533	16.593	≥500
High	2462	16.533	16.533	≥500
802.11n-HT20 mode				
Low	2412	17.796	17.796	≥500
Middle	2437	17.796	17.856	≥500
High	2462	17.856	17.916	≥500
802.11n-HT40 mode				
Low	2422	36.433	36.553	≥500
Middle	2437	36.433	36.553	≥500
High	2452	36.433	36.553	≥500

Delta 1 [T1] 0.17 dB
 RBW 100 kHz RF Att 20 dB
 Ref Lvl 20 dBm VBW 300 kHz
 10.04008016 MHz SWT 7.5 ms Unit dBm

10.5 dB Offset
 -D1 -5.03 dBm
 -D2 -0.97 dBm
 1MAX
 1 [T1] -0.67 dBm
 2.40697996 GHz
 0.17 dB
 10.04008016 MHz
 1 [T1]

Center 2.412 GHz 3 MHz/ Span 30 MHz

Date: 15.NOV.2018 15:13:10

Delta 1 [T1] 0.08 dB RBW 100 kHz RF Att 20 dB
 Ref Lvl 20 dBm Unit dBm BW 300 kHz SWT 7.5 ms

10.5 dB Offset

D1 4.73 dBm
 D2 -1.27 dBm

1MAX

1MA

Center 2.437 GHz 3 MHz/ Span 30 MHz

Date: 15.NOV.2018 15:17:14

Delta 1 [T1] -0.07 dB
 RBW 100 kHz RF Att 20 dB
 Ref Lvl 20 dBm 10.04008016 MHz
 VBW 300 kHz
 SWT 7.5 ms Unit dBm

10.5 dB Offset
 -D1 4.39 dBm
 -D2 -1.61 dBm
 1MAX
 1 [T1] -1.13 dBm
 2.45697996 GHz
 1 [T1] -0.07 dBm
 10.04008016 MHz
 1 [T1]
 1 [T1]

Center 2.462 GHz 3 MHz/
 Span 30 MHz

Date: 15.NOV.2018 15:21:00

Delta 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -0.27 dB VBW 300 kHz
 20 dBm 16.53306613 MHz SWT 7.5 ms Unit dBm

10.5 dB Offset

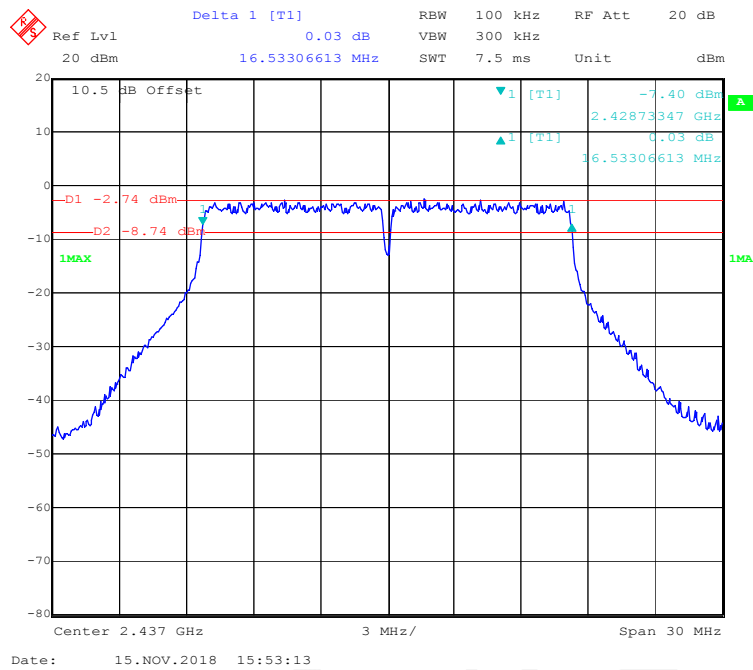
▼1 [T1] -7.40 dBm
 ▲1 [T1] -0.27 dB
 16.53306613 MHz

D1 -2.61 dBm
 D2 -8.61 dBm

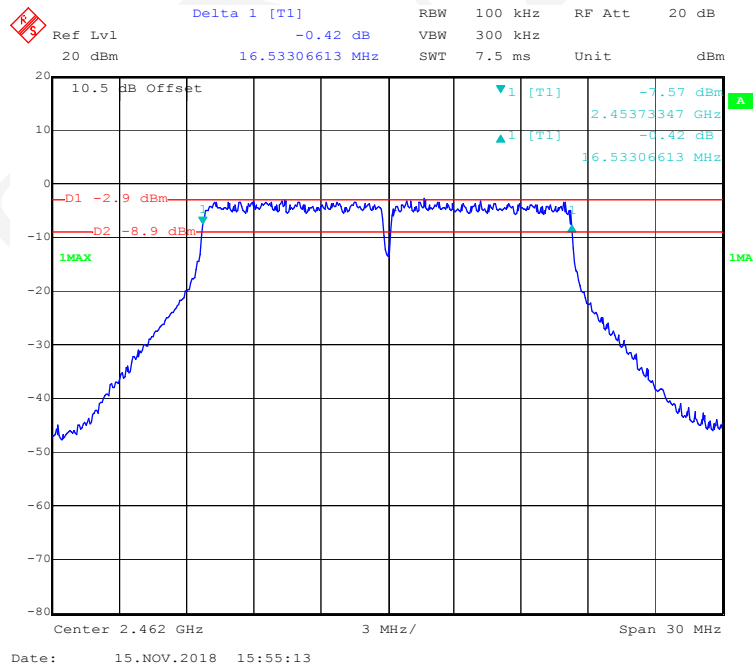
1MAX

Center 2.412 GHz 3 MHz/ Span 30 MHz

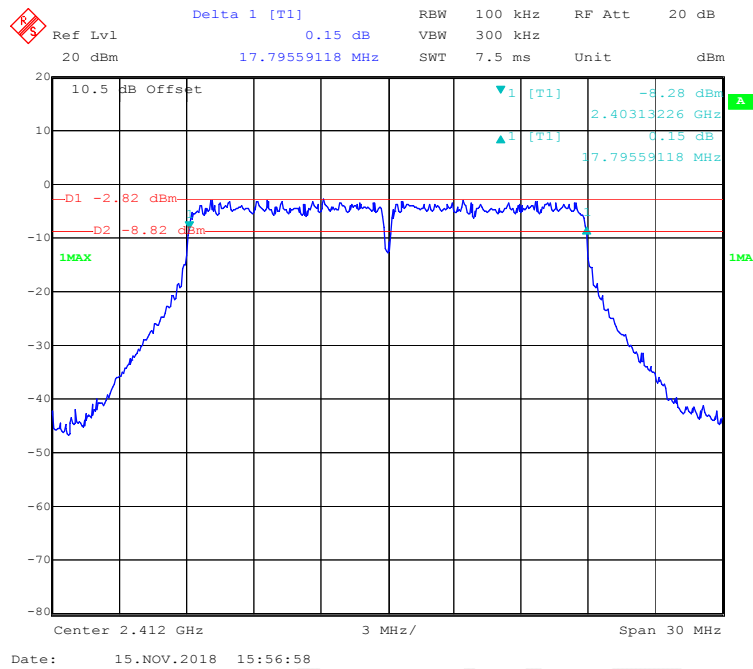
Chain0: 802.11g Middle Channel



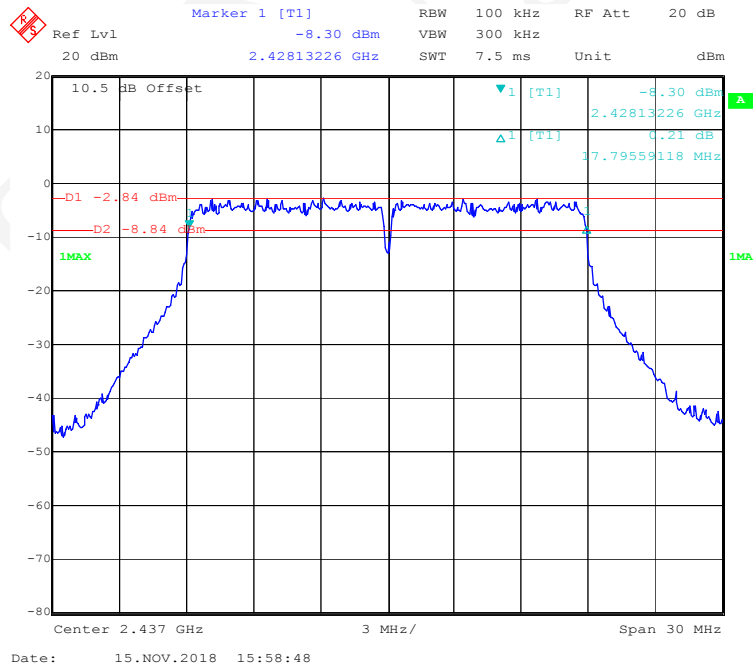
Chain0: 802.11g High Channel

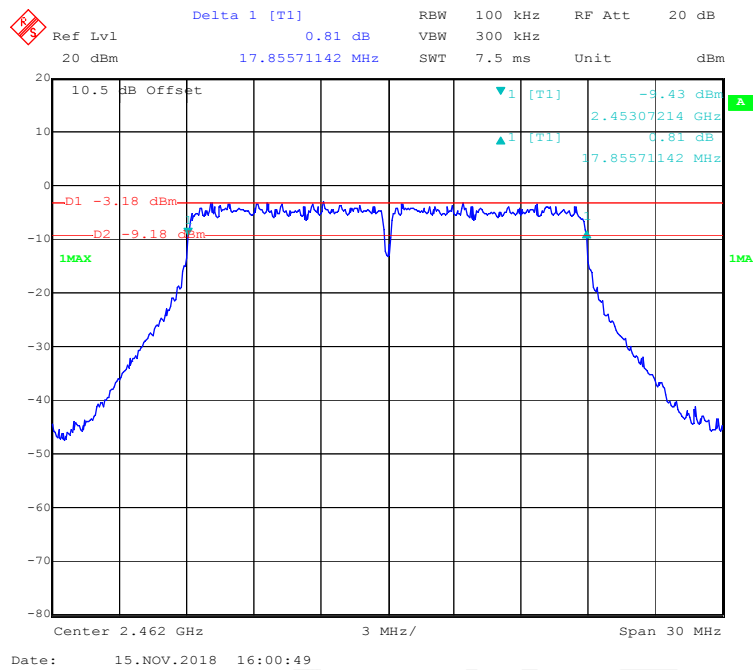
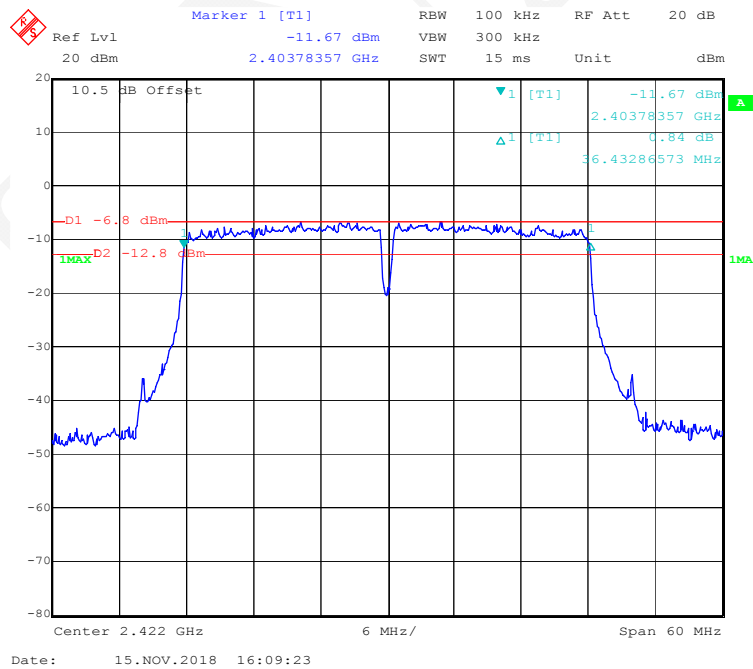


Chain0: 802.11n-HT20 Low Channel

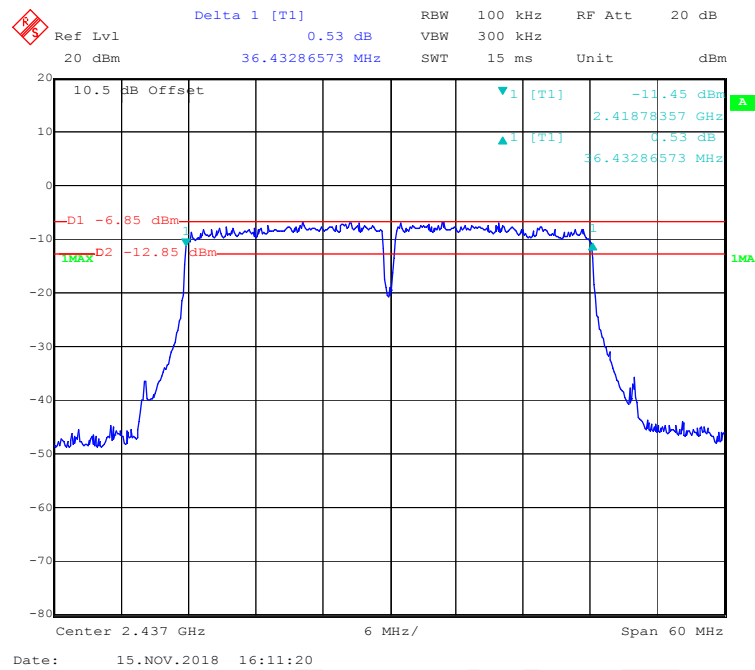


Chain0: 802.11n-HT20 Middle Channel

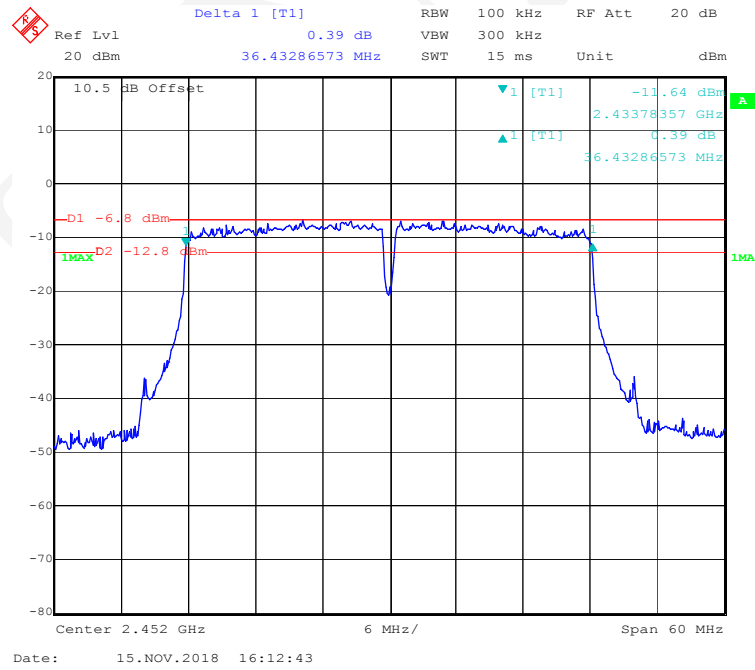


Chain0: 802.11n-HT20 High Channel**Chain0: 802.11n-HT40 Low Channel**

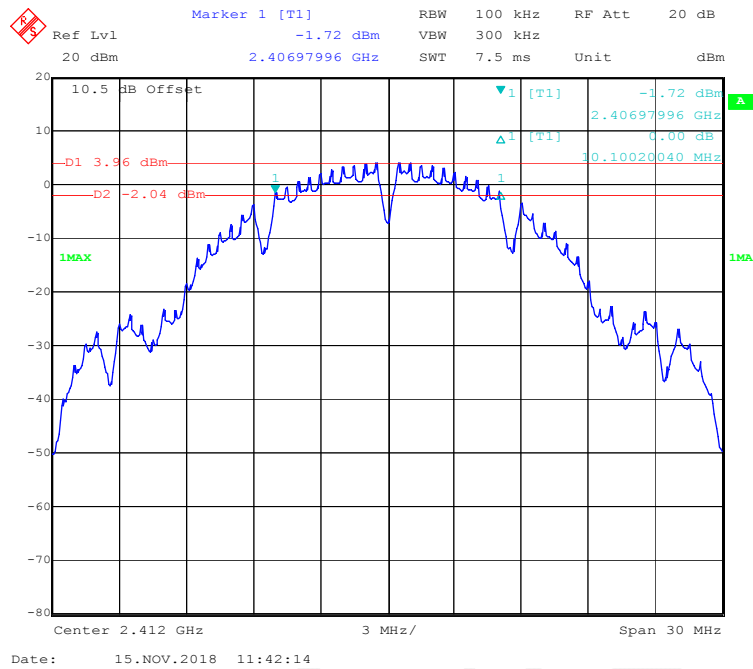
Chain0: 802.11n-HT40 Middle Channel



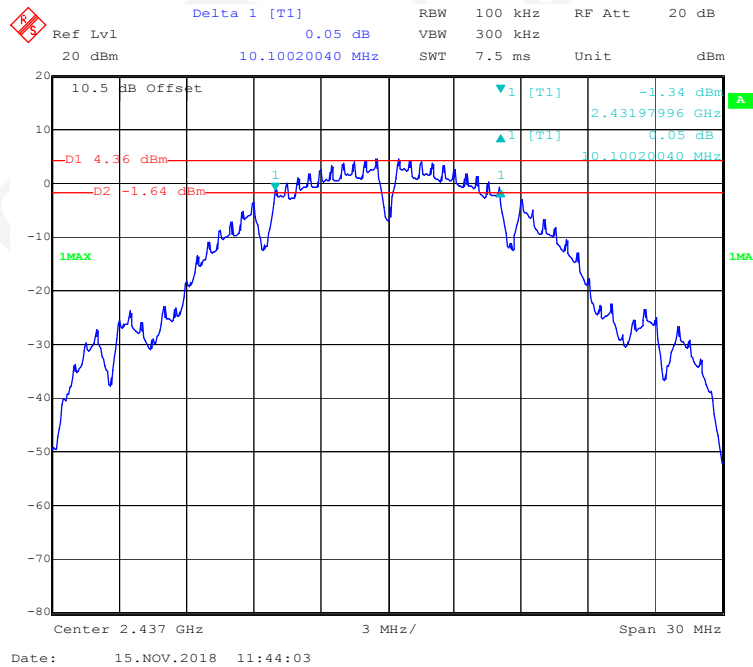
Chain0: 802.11n-HT40 High Channel

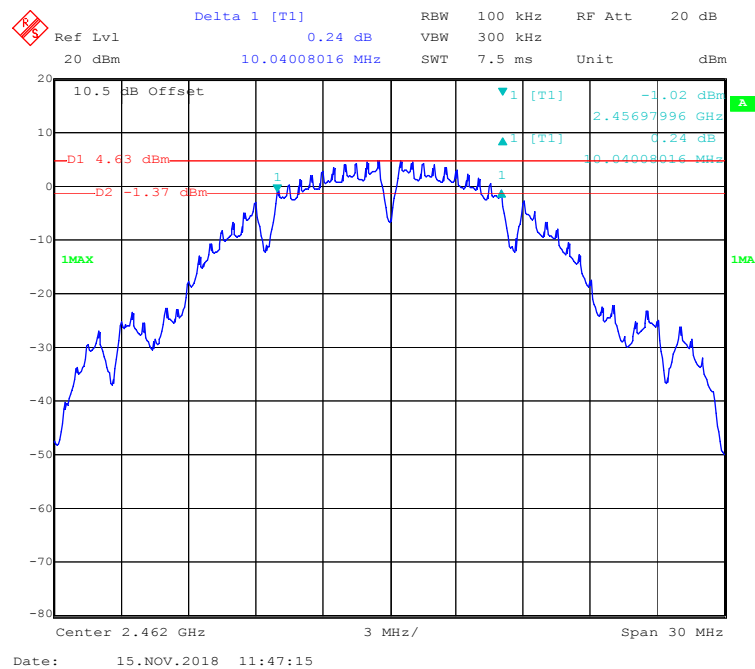


Chain1: 802.11b Low Channel

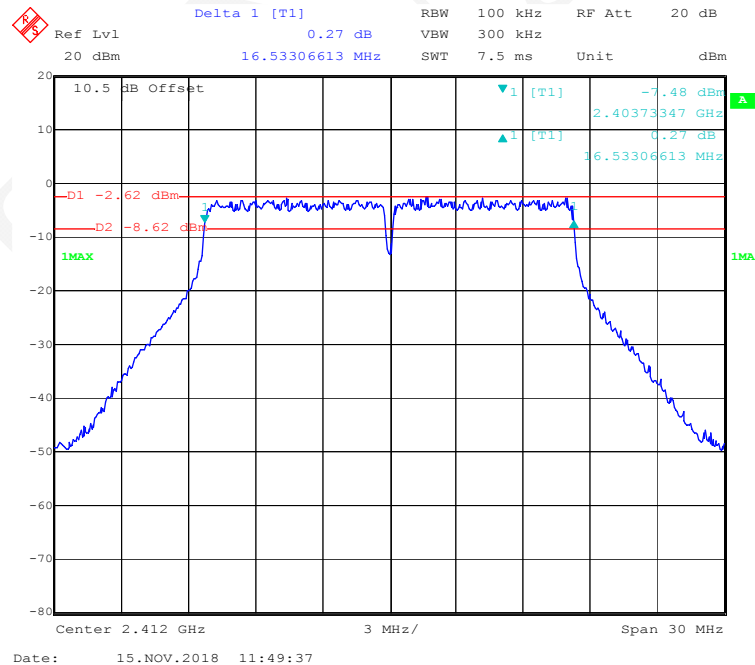


Chain1: 802.11b Middle Channel

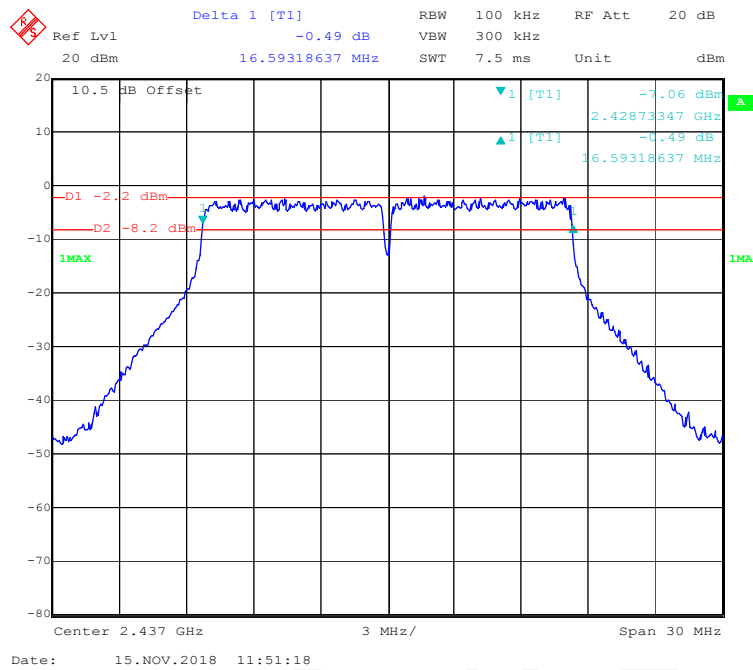


Chain1: 802.11b High Channel

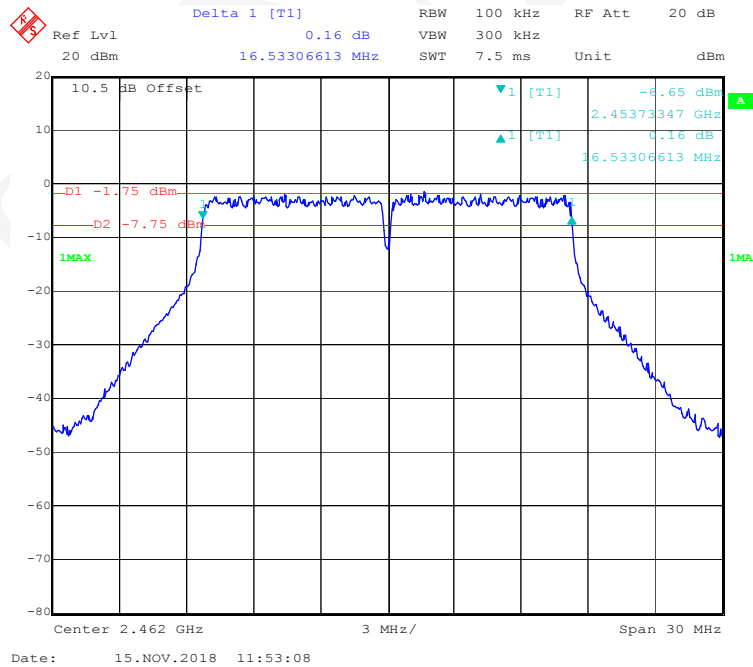
Chain1: 802.11g Low Channel



Chain1: 802.11g Middle Channel



Chain1: 802.11g High Channel



Delta 1 [T1] 0.47 dB
 Ref Lvl 20 dBm
 RBW 100 kHz RF Att 20 dB
 VBW 300 kHz
 SWT 7.5 ms Unit dBm
 17.79559118 MHz
 -8.22 dBm
 2.40313226 GHz
 -2.85 dBm
 -8.85 dBm
 1MAX
 Center 2.412 GHz 3 MHz/
 Span 30 MHz
 Date: 15.NOV.2018 11:55:01

Delta 1 [T1] -0.56 dB RBW 100 kHz RF Att 20 dB

Ref Lvl 20 dBm 17.85571142 MHz SWT 7.5 ms Unit dBm

10.5 dB Offset

▼1 [T1] -7.94 dBm

▲1 [T1] -0.56 dB

17.85571142 MHz

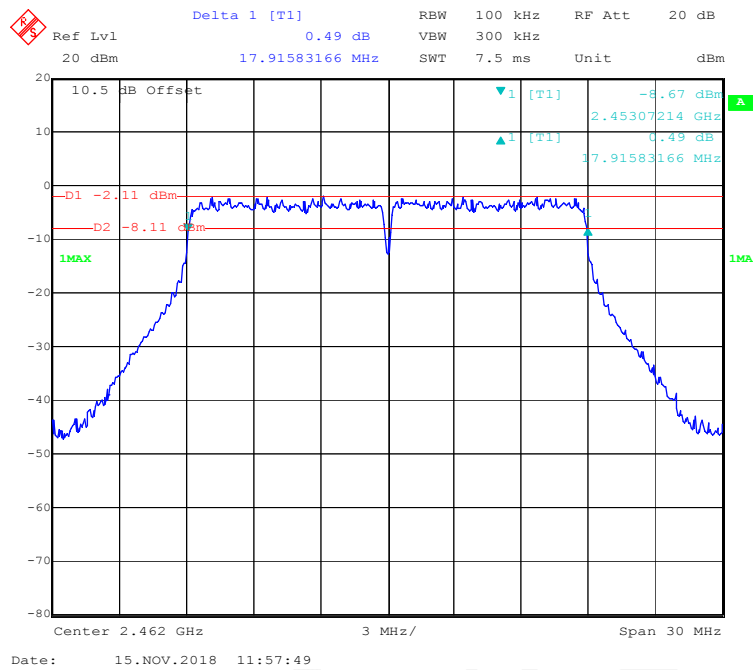
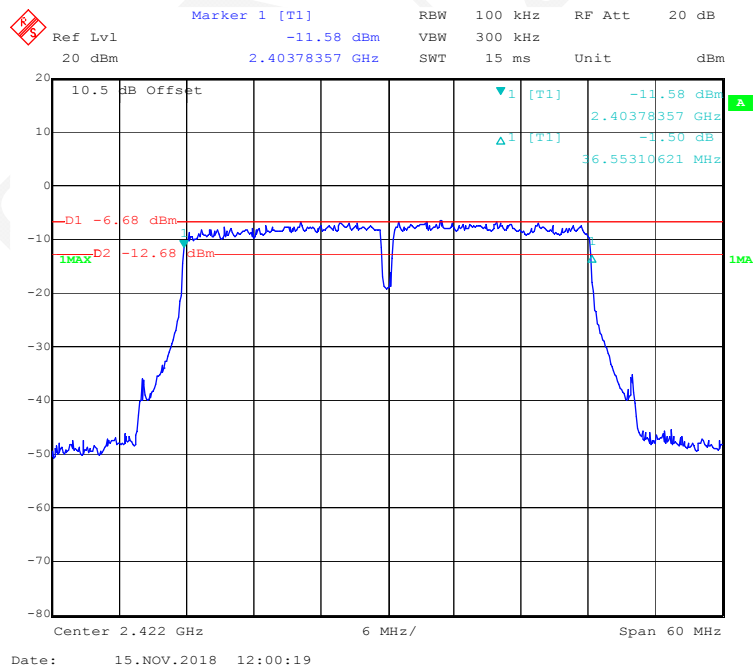
D1 -2.57 dBm

D2 -8.57 dBm

1MAX

Center 2.437 GHz 3 MHz/ Span 30 MHz

Date: 15.NOV.2018 11:56:30

Chain1: 802.11n-HT20 High Channel**Chain1: 802.11n-HT40 Low Channel**

Delta 1 [T1] -1.35 dB

RBW 100 kHz RF Att 20 dB

Ref Lvl 20 dBm Unit dBm

36.55310621 MHz

SWT 15 ms

10.5 dB Offset

▼1 [T1] -11.46 dBm

2.41878357 GHz

▲1 [T1] -1.35 dB

36.55310621 MHz

D1 -6.4 dBm

D2 -12.4 dBm

1MAX

Center 2.437 GHz

6 MHz/

Span 60 MHz

Date: 15.NOV.2018 12:05:22

Delta 1 [T1] -1.60 dB

Ref Lvl 20 dBm

RBW 100 kHz RF Att 20 dB

SWT 15 ms Unit dBm

10.5 dB Offset

▼1 [T1] -11.10 dBm

▲1 [T1] -1.60 dB

36.55310621 MHz

D1 -6.18 dBm

D2 -12.18 dBm

1MAX

Center 2.452 GHz

6 MHz/

Span 60 MHz

Date: 15.NOV.2018 12:07:18

FCC §15.247(b) (3) - MAXIMUM CONDUCTED 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 Procedure

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.



Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Winnie Yang on 2018-11-15.

Test Result: Compliant.

EUT operation mode: Transmitting

Test mode	Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)			Limit (dBm)	Result
			Chain0	Chain1	Total		
802.11b	Low	2412	17.91	17.10	/	30	Pass
	Middle	2437	17.85	17.53	/	30	Pass
	High	2462	17.53	17.83	/	30	Pass
802.11g	Low	2412	19.14	19.12	/	30	Pass
	Middle	2437	19.05	19.59	/	30	Pass
	High	2462	18.71	19.92	/	30	Pass
802.11n-HT20	Low	2412	19.37	19.50	22.45	30	Pass
	Middle	2437	19.24	19.84	22.56	30	Pass
	High	2462	18.99	20.15	22.62	30	Pass
802.11n-HT40	Low	2422	18.11	18.42	21.28	30	Pass
	Middle	2437	18.05	18.70	21.40	30	Pass
	High	2452	17.86	18.89	21.42	30	Pass

Note: The total output power= $10\log_{10}(10^{\text{Chain 0/10}} + 10^{\text{Chain 1/10}})$

The maximum antenna gain is 4.84 dBi, the device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

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

So:

Directional gain = $G_{ANT} + \text{Array Gain} = 4.84\text{dBi} < 6\text{dBi}$

FCC §15.247(d) – 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 Procedure

According to ANSI C63.10-2013 sub-clause 6.10.

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 100 kHz and VBW of spectrum analyzer to 300 kHz 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

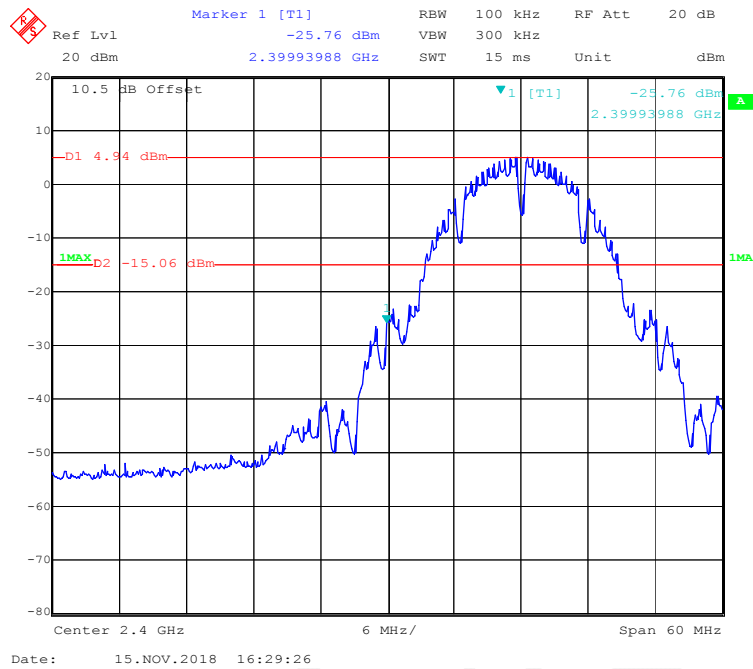
Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

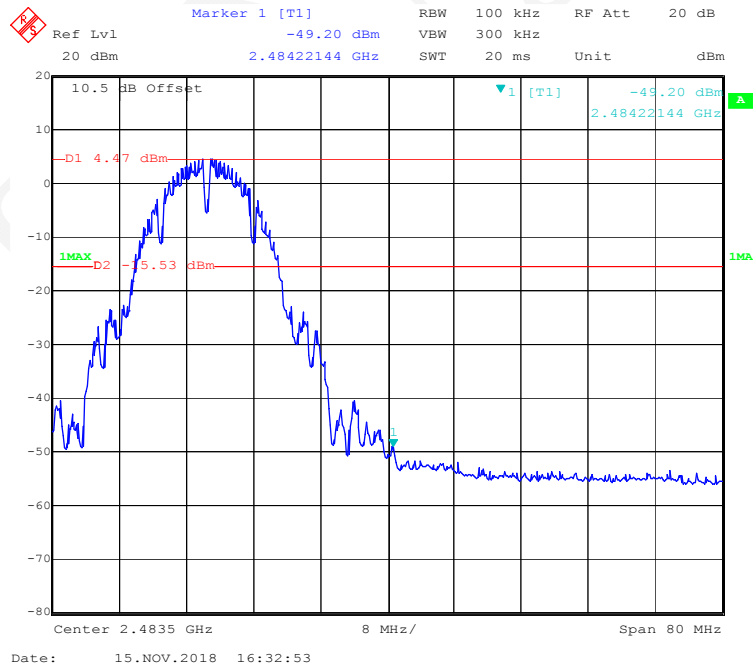
The testing was performed by Winnie Yang on 2018-11-15.

Test Result: *Compliant.*

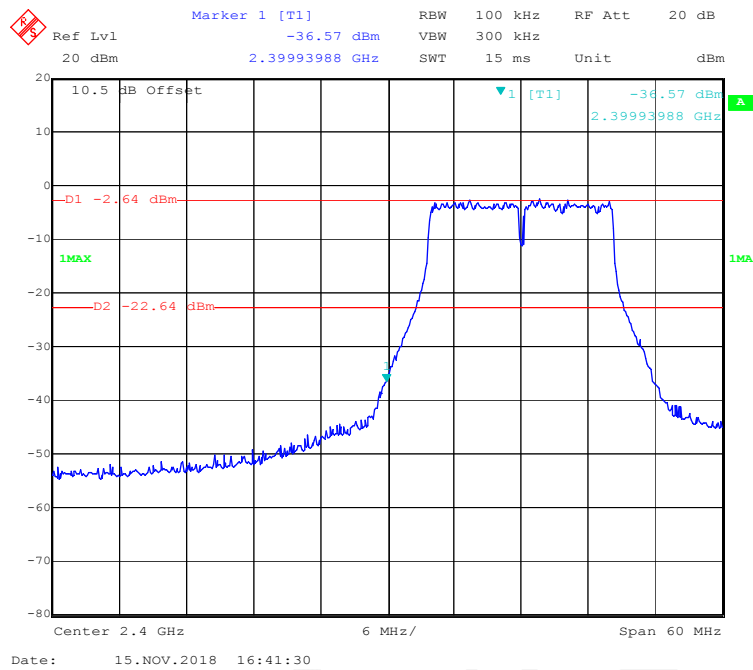
Chain0: 802.11b Mode Left Side



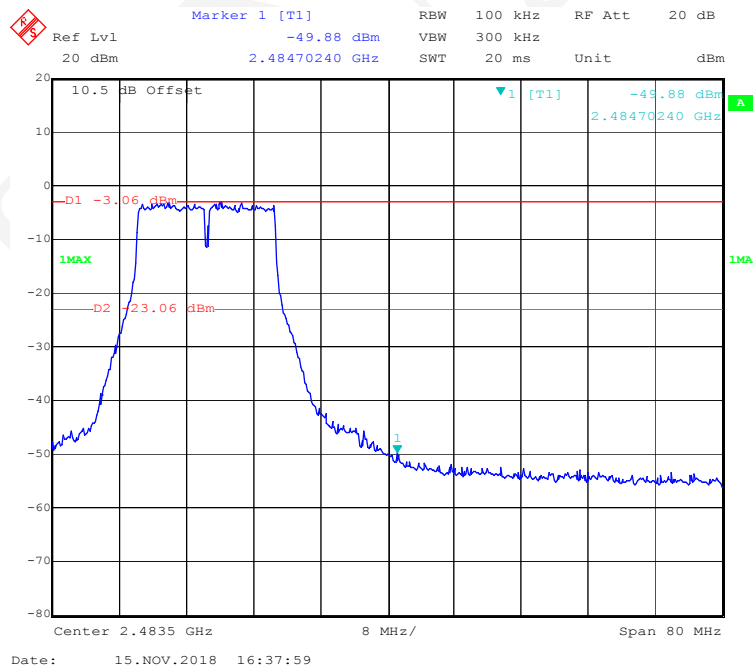
Chain0: 802.11b Mode Right Side



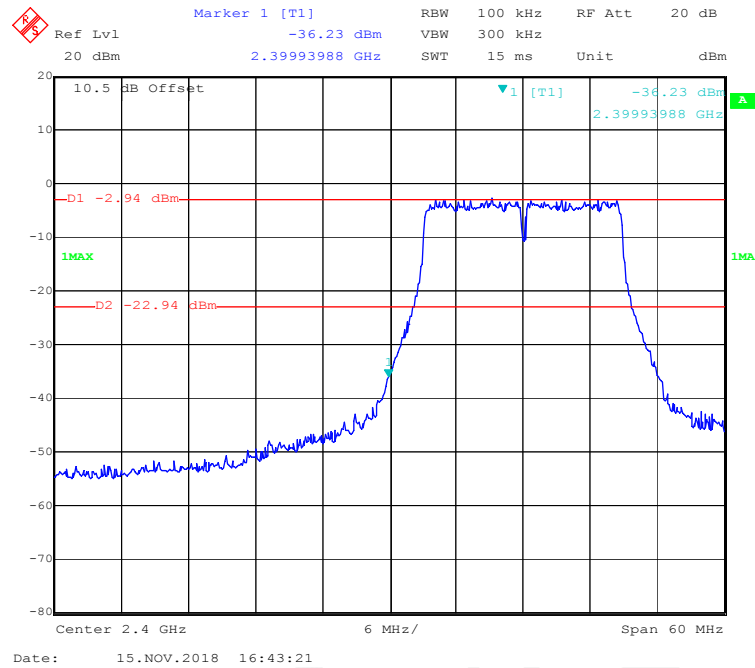
Chain0: 802.11g Mode Left Side



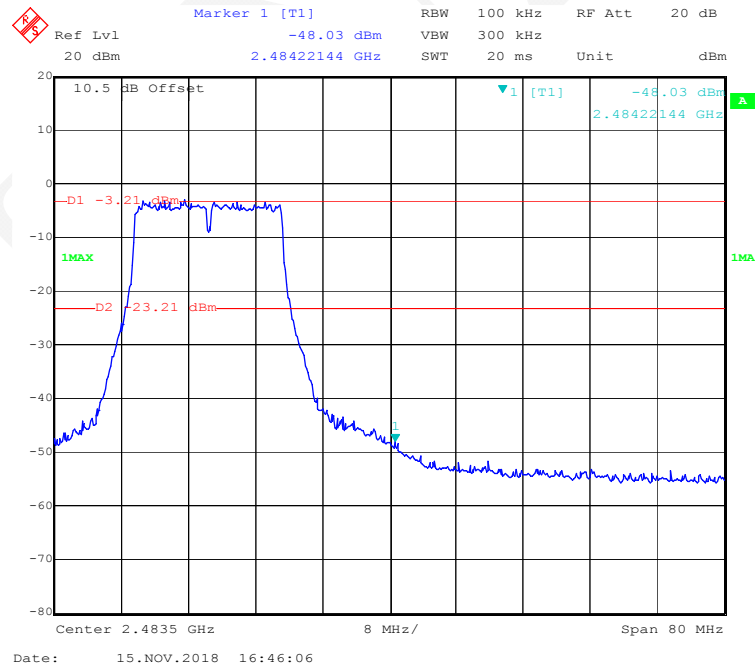
Chain0: 802.11g Mode Right Side



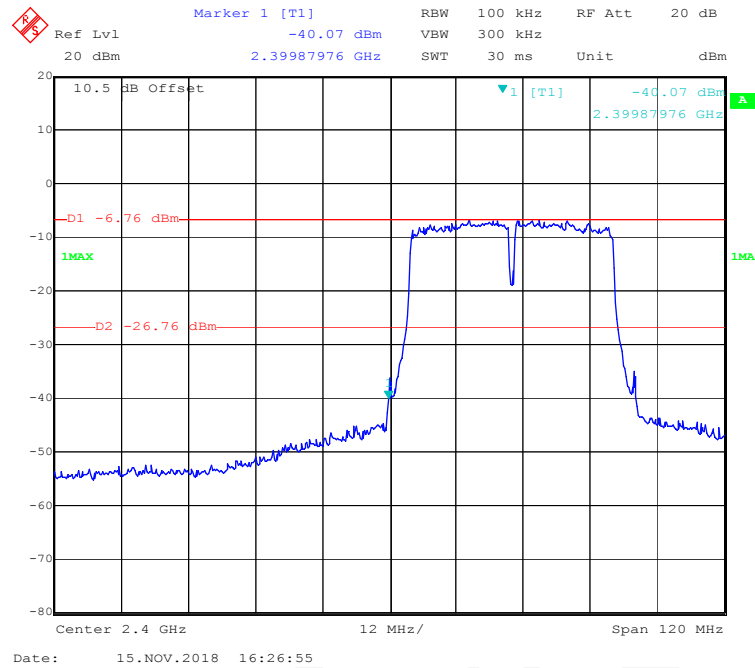
Chain0: 802.11n-HT20 Mode Left Side



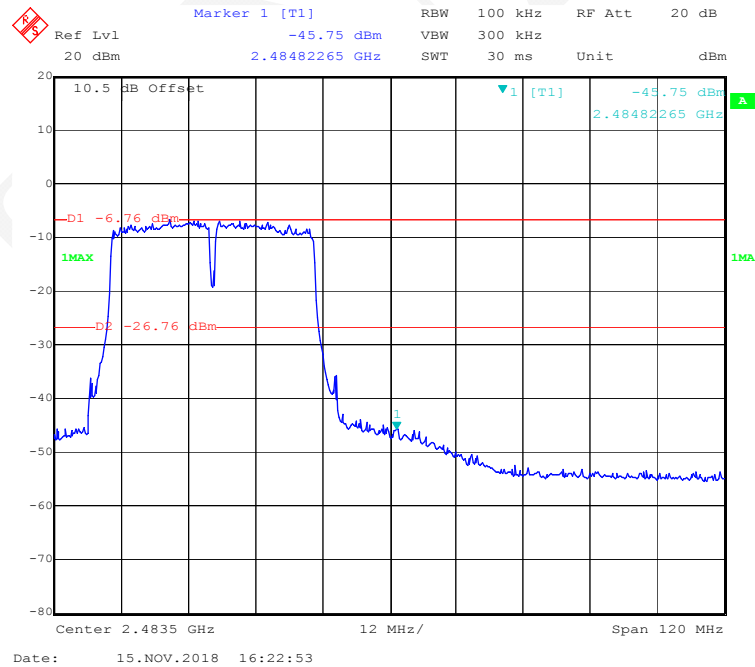
Chain0: 802.11n-HT20 Mode Right Side



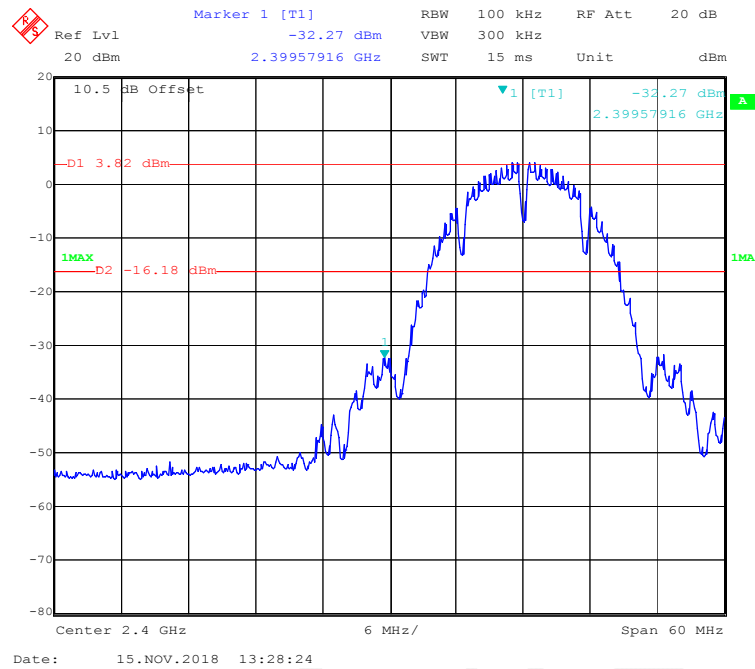
Chain0: 802.11n-HT40 Mode Left Side



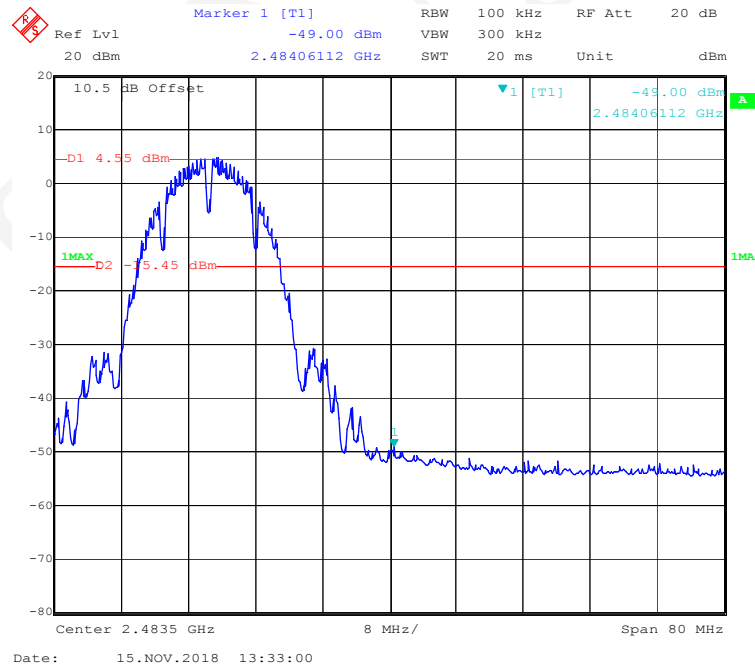
Chain0: 802.11n-HT40 Mode Right Side



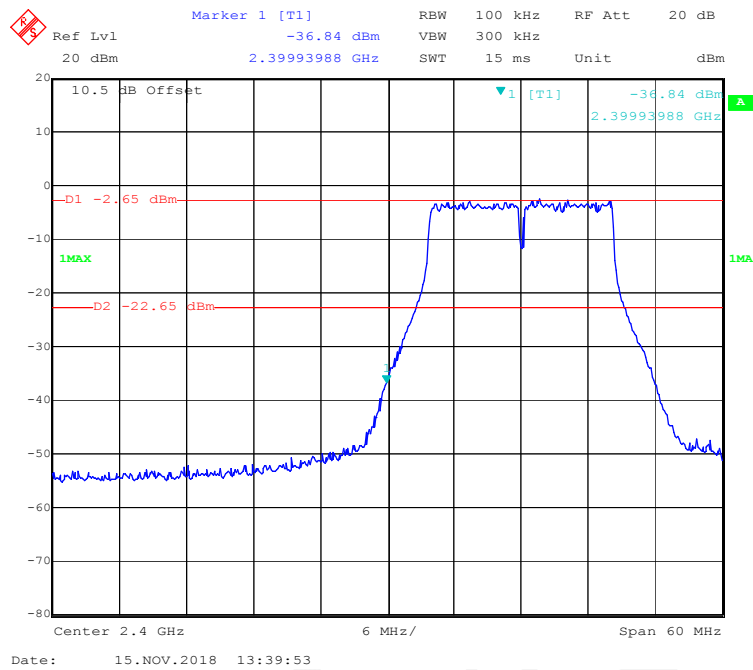
Chain1: 802.11b Mode Left Side



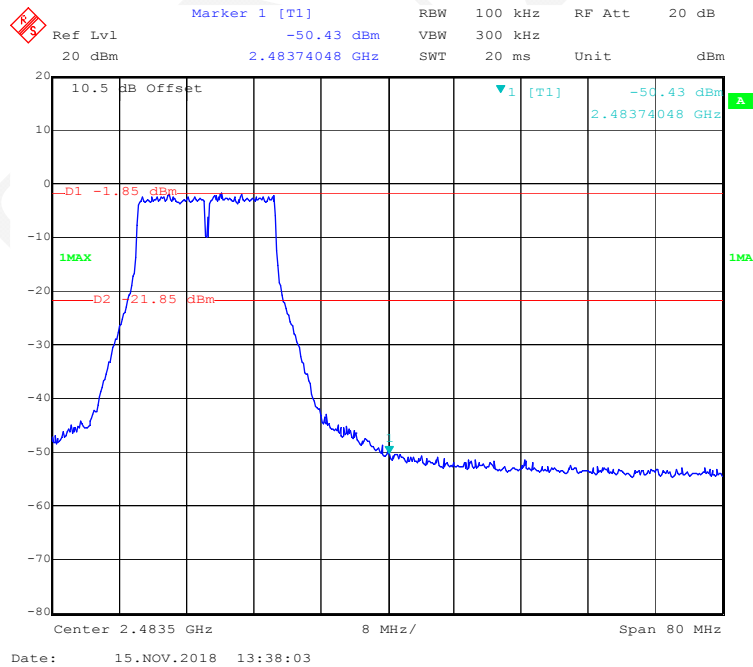
Chain1: 802.11b Mode Right Side



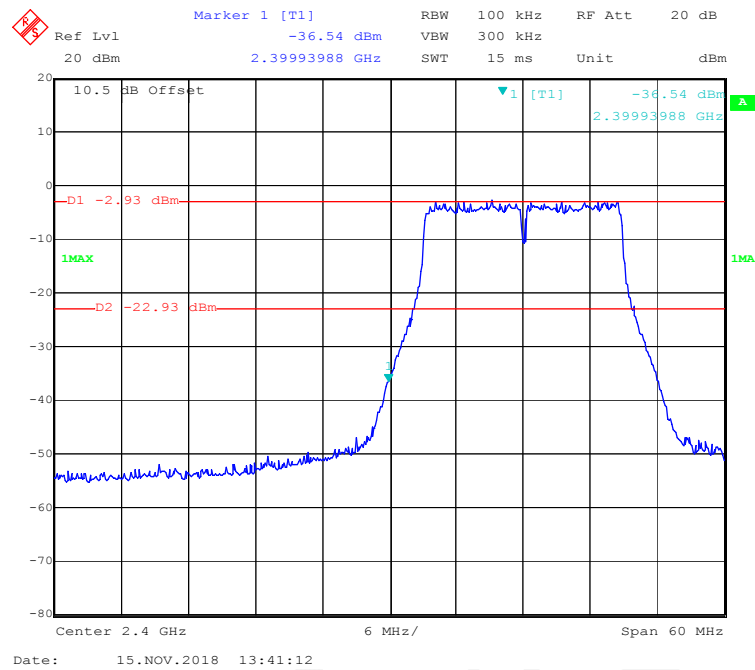
Chain1: 802.11g Mode Left Side



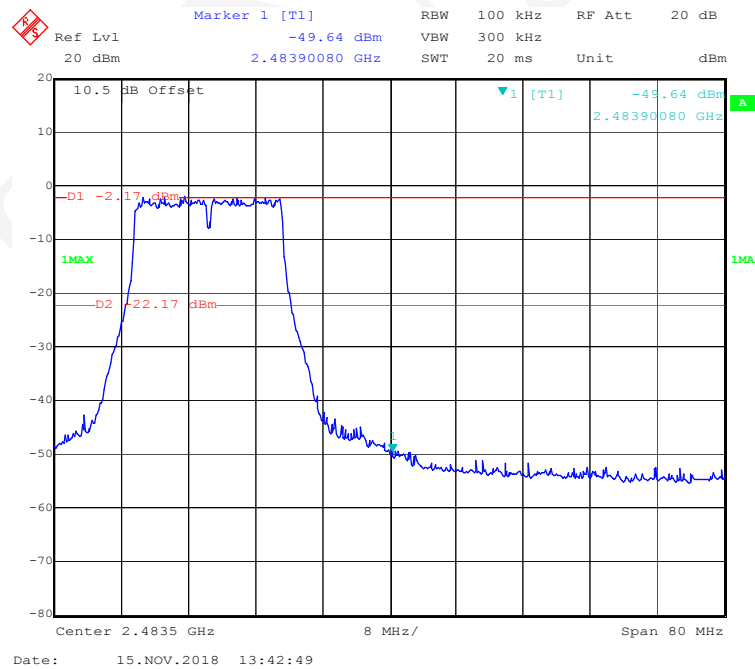
Chain1: 802.11g Mode Right Side



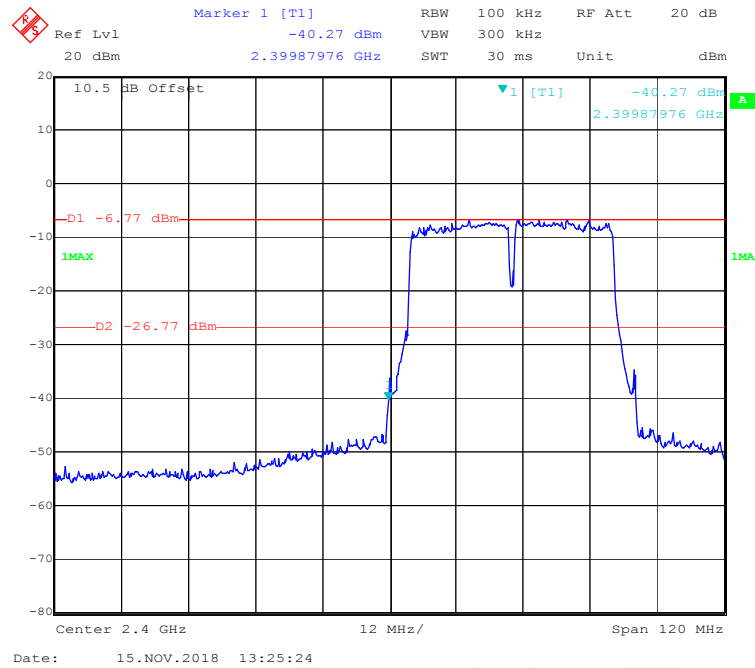
Chain1: 802.11n-HT20 Mode Left Side



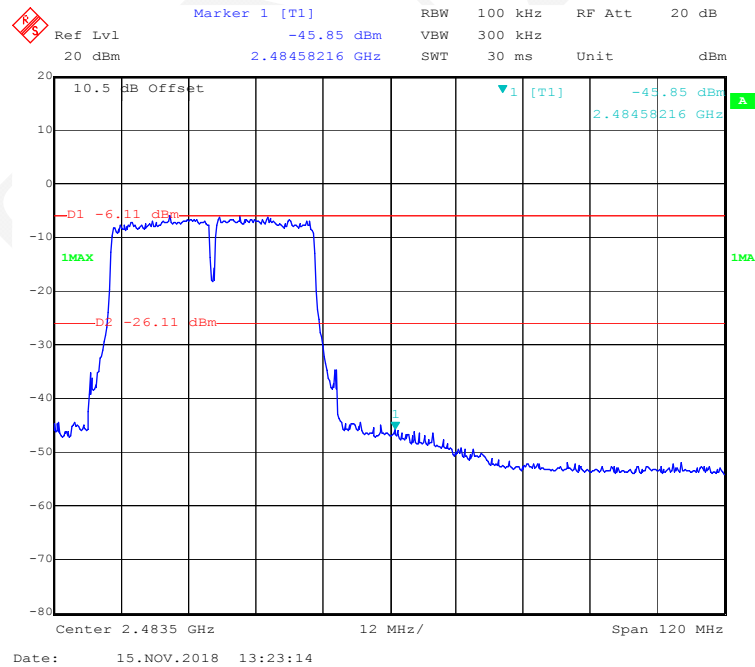
Chain1: 802.11n-HT20 Mode Right Side



Chain1: 802.11n-HT40 Mode Left Side



Chain1: 802.11n-HT40 Mode Right Side



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 Procedure

According to ANSI C63.10-2013 sub-clause 11.10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Winnie Yang on 2018-11-15.

Test Result: Compliant

EUT operation mode: Transmitting

Channel	Frequency (MHz)	PSD (dBm/3kHz)			Limit (dBm/3kHz)
		Chain0	Chain1	Total	
802.11b mode					
Low	2412	-14.81	-16.03	/	≤8
Middle	2437	-14.90	-15.65	/	≤8
High	2462	-15.31	-15.27	/	≤8
802.11g mode					
Low	2412	-17.73	-17.85	/	≤8
Middle	2437	-17.78	-17.65	/	≤8
High	2462	-18.05	-17.11	/	≤8
802.11n-HT20 mode					
Low	2412	-16.74	-17.85	-14.25	≤6.15
Middle	2437	-17.27	-16.91	-14.08	≤6.15
High	2462	-17.12	-16.52	-13.80	≤6.15
802.11n-HT40 mode					
Low	2422	-18.42	-18.65	-15.52	≤6.15
Middle	2437	-19.30	-18.56	-15.90	≤6.15
High	2452	-18.78	-20.47	-16.53	≤6.15

Note:

The total PSD = $10 \log_{10} (10^{\text{Chain 0/10}} + 10^{\text{Chain 1/10}})$

The maximum antenna gain is 4.84 dBi. The device employed Cyclic Delay Diversity (CDD) for 802.11MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

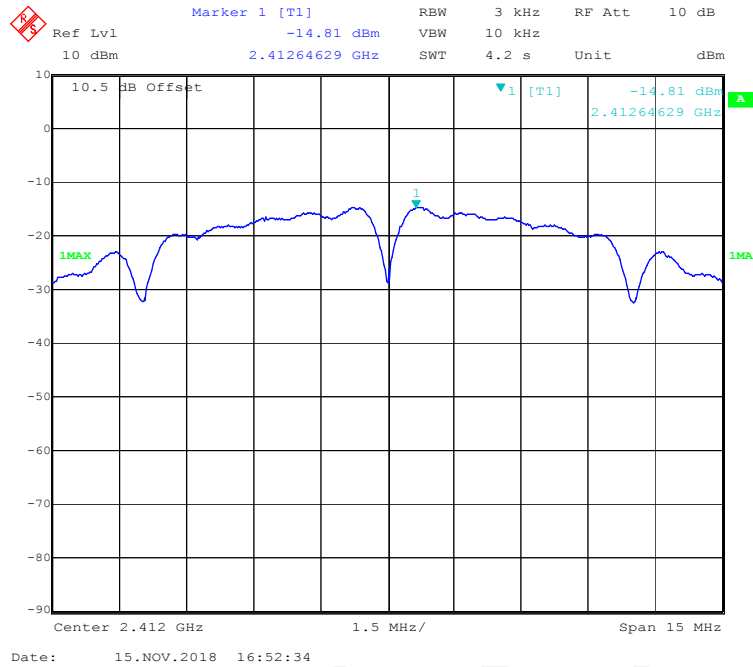
Array Gain = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB.

So:

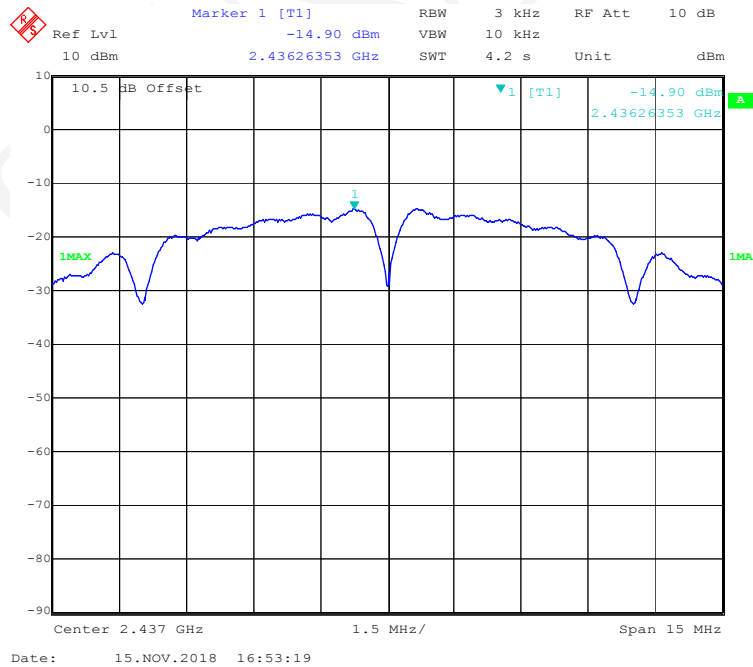
Directional gain = GANT + Array Gain = $4.84 + 10 \cdot \log(2/1) = 7.85$ dBi

Chain0:

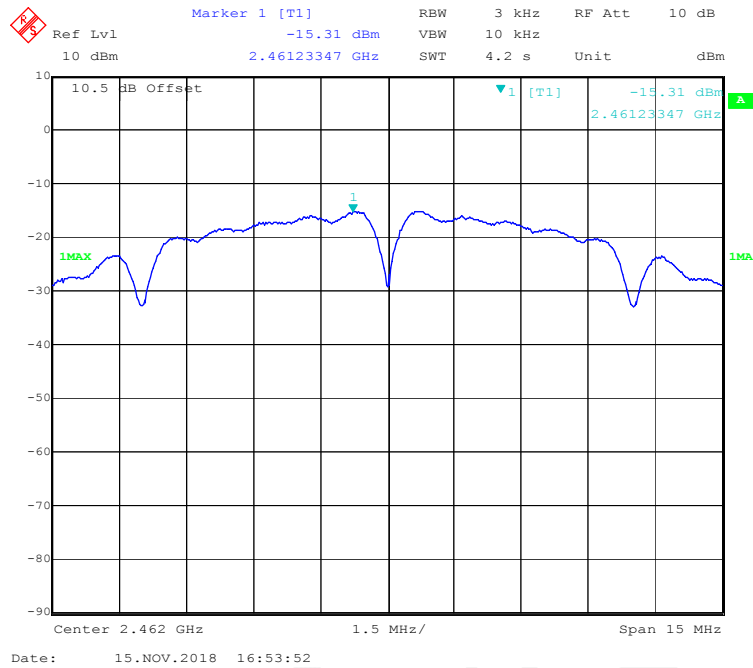
802.11b Low Channel



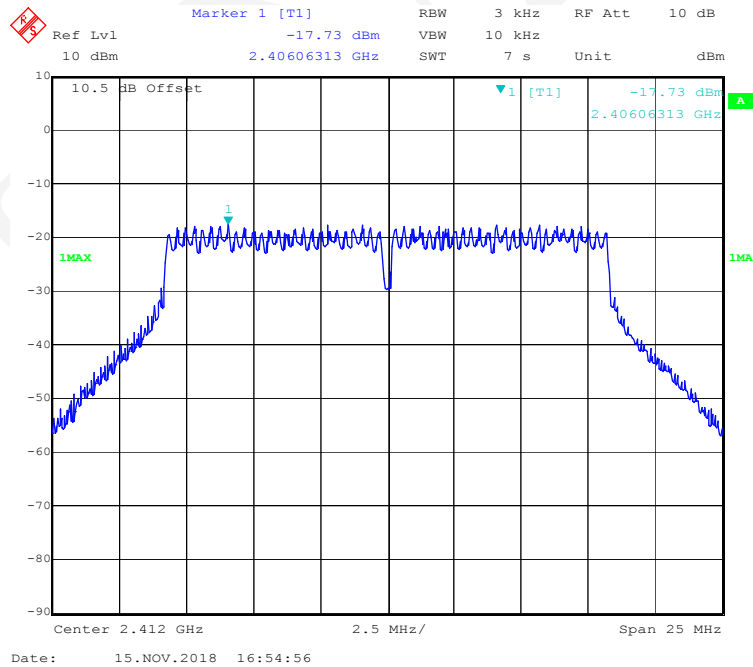
802.11b Middle Channel



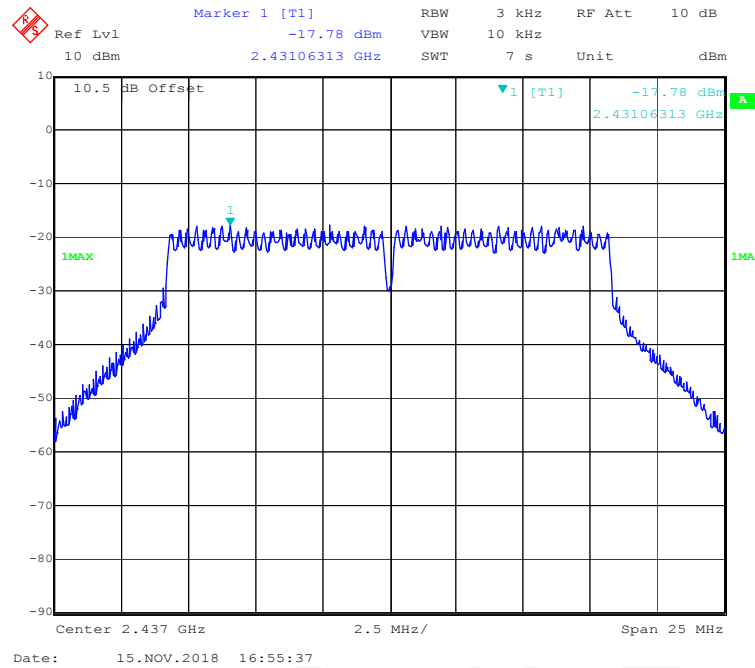
802.11b High Channel



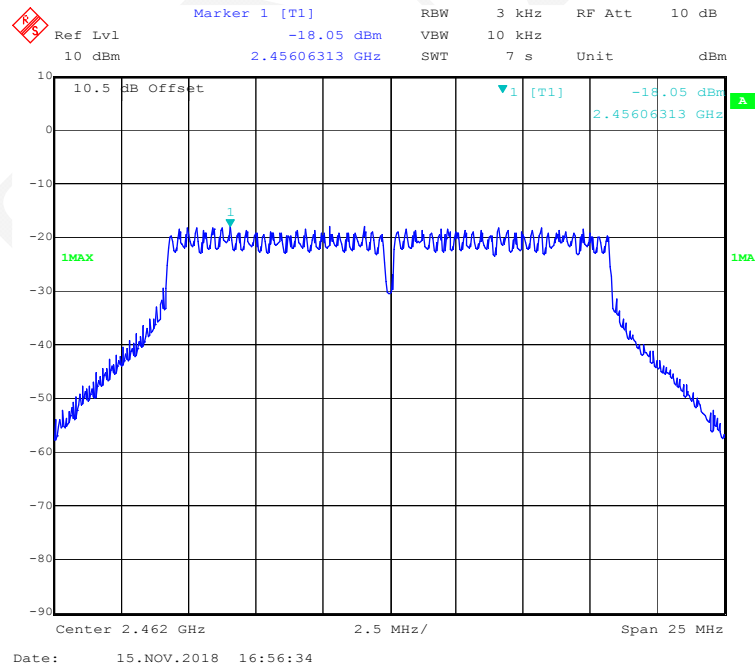
802.11g Low Channel



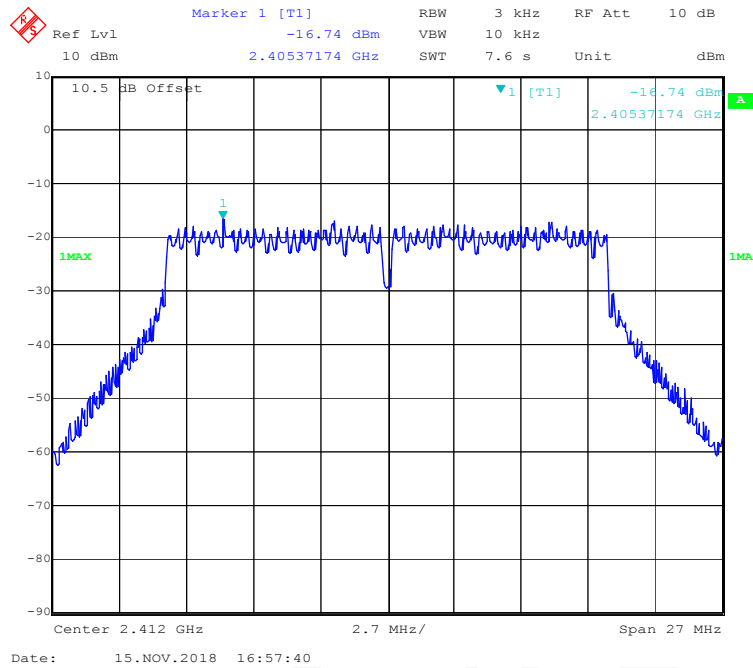
802.11g Middle Channel



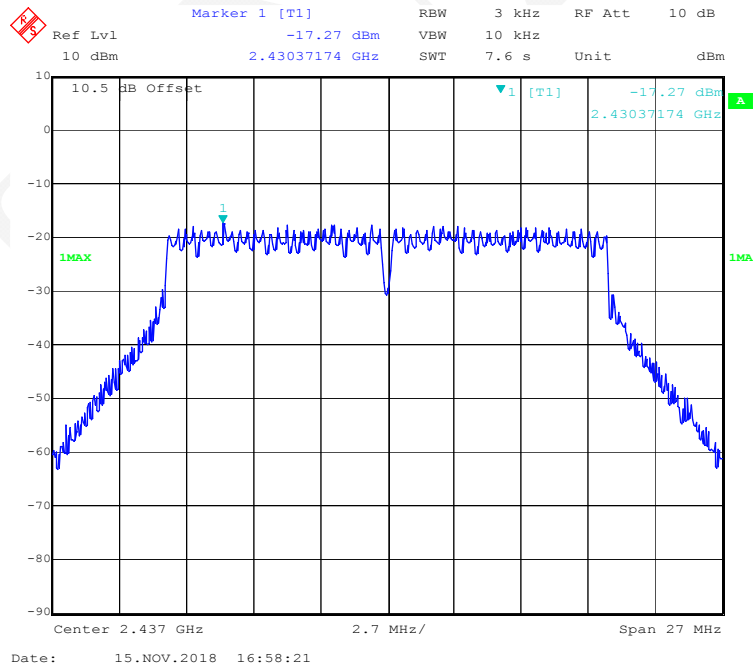
802.11g High Channel



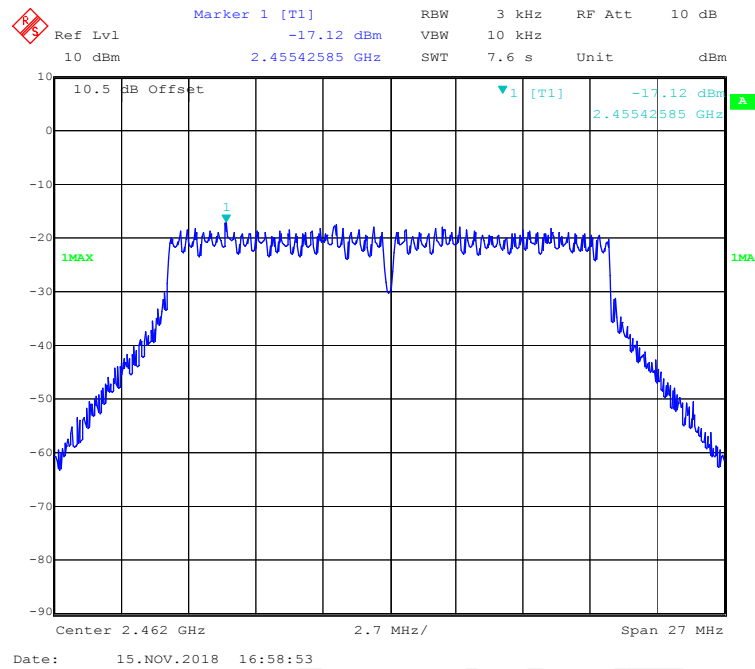
802.11n-HT20 Low Channel



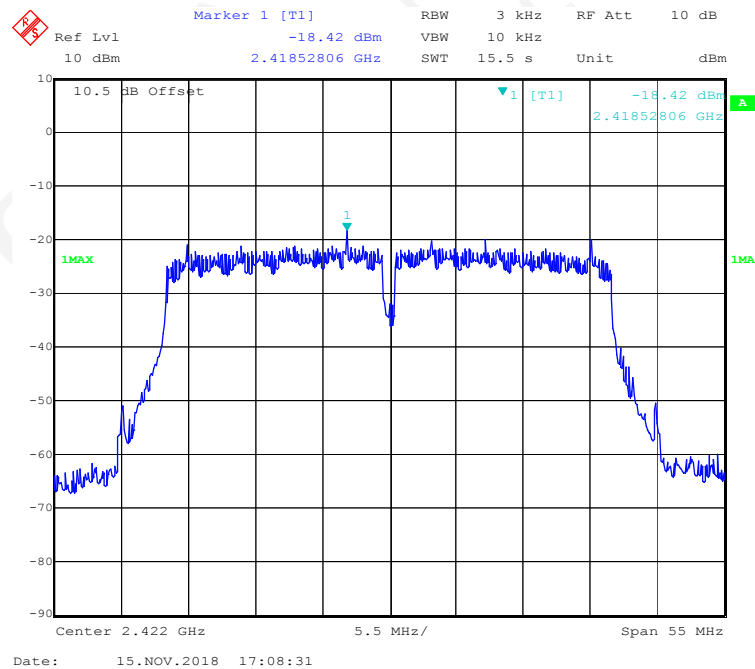
802.11n-HT20 Middle Channel



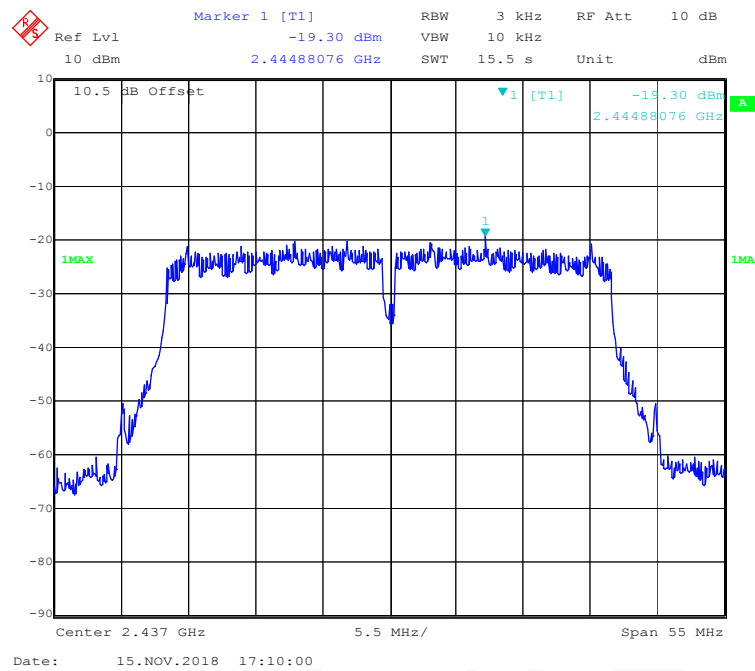
802.11n-HT20 High Channel



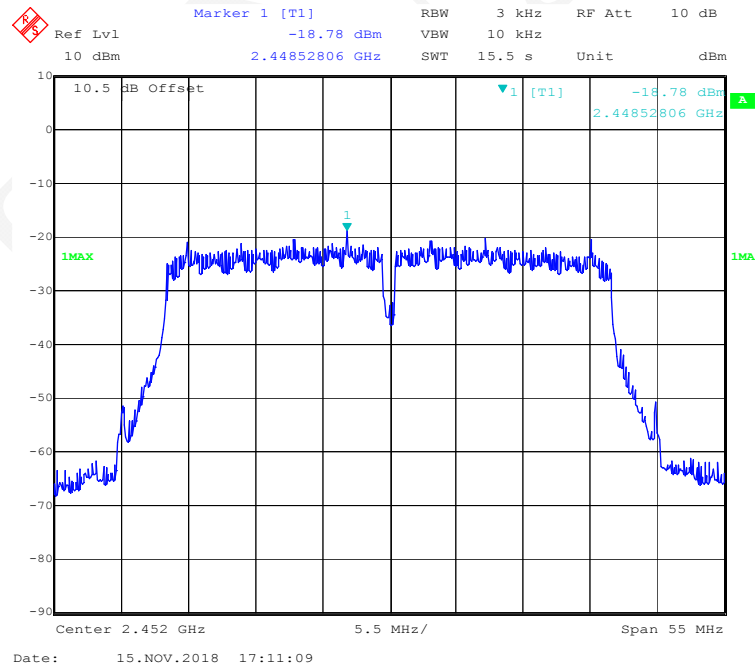
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel

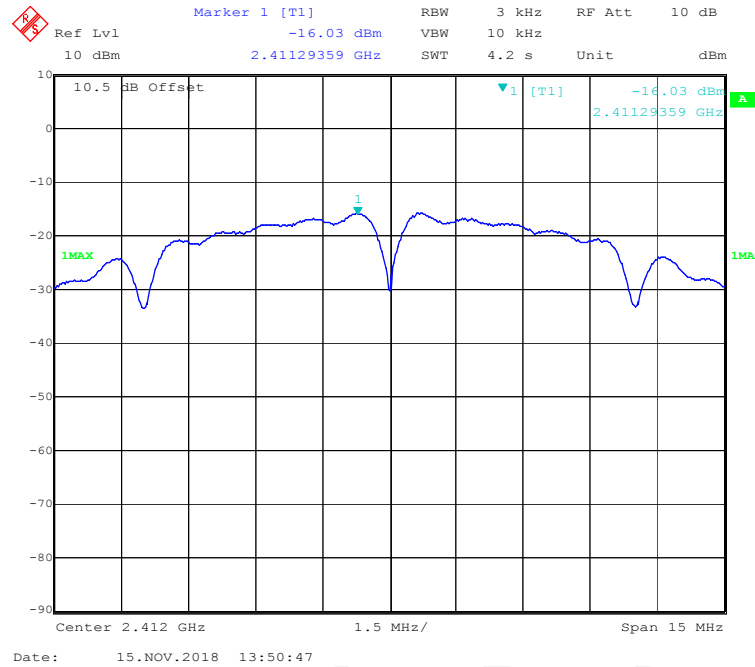


802.11n-HT40 High Channel

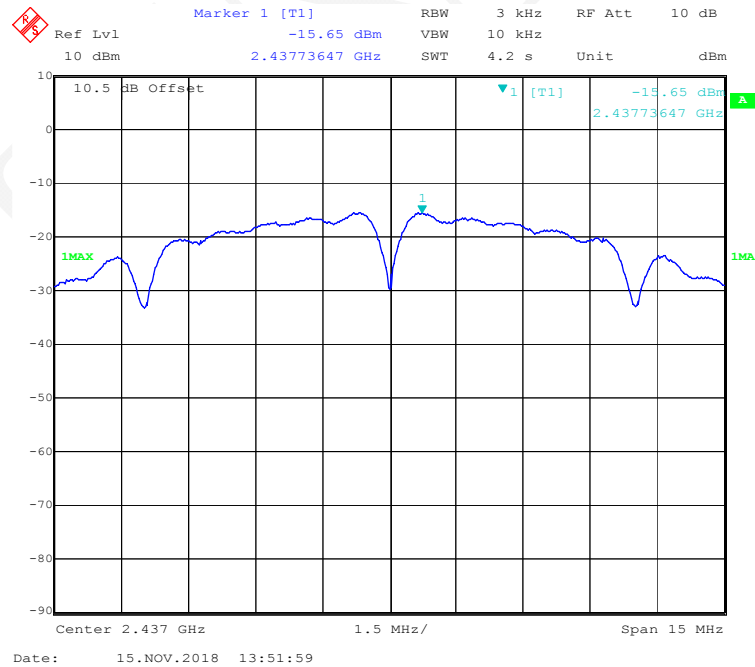


Chain1:

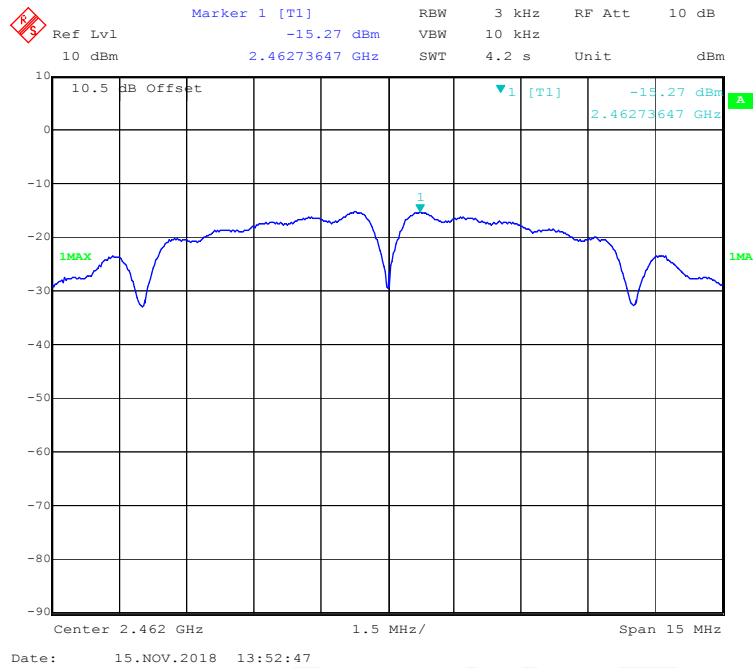
802.11b Low Channel



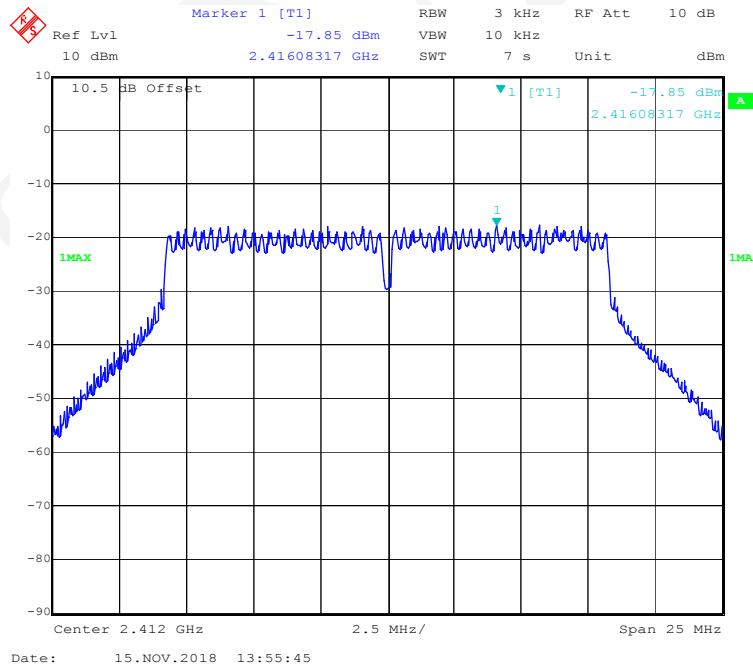
802.11b Middle Channel



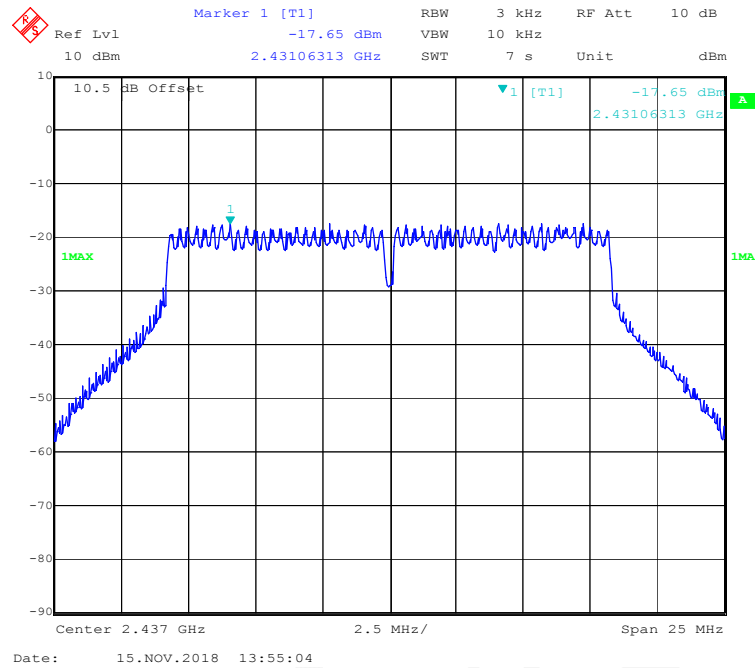
802.11b High Channel



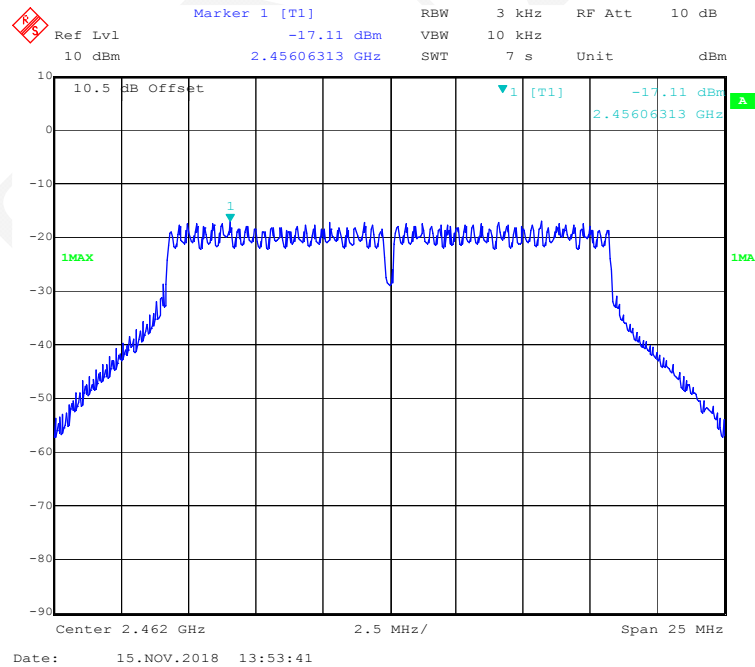
802.11g Low Channel



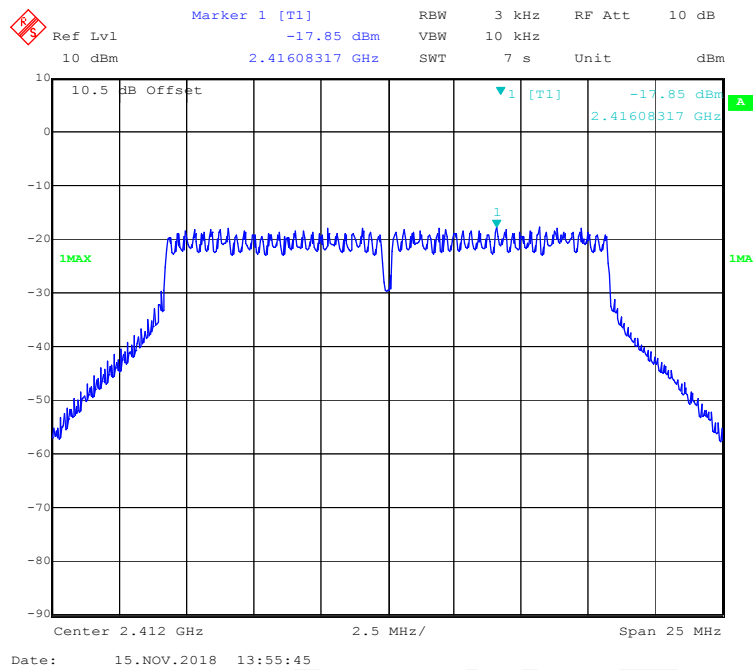
802.11g Middle Channel



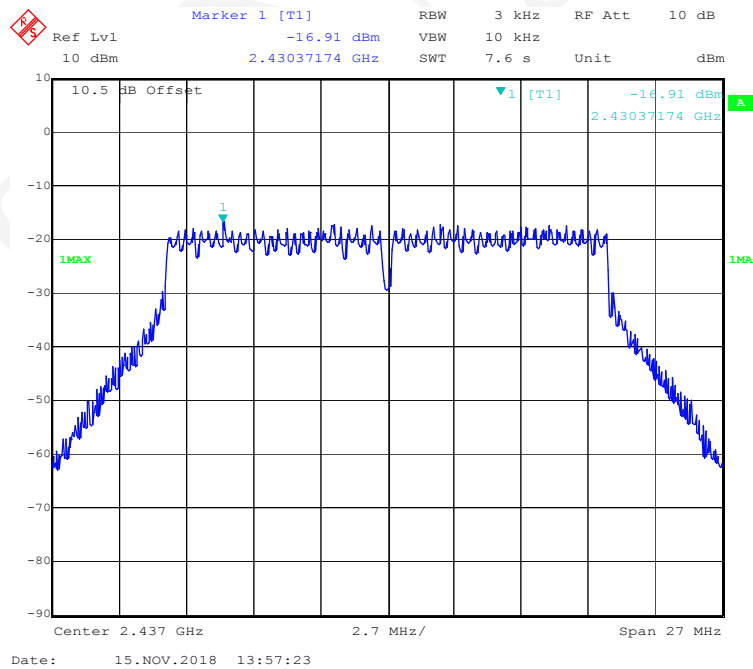
802.11g High Channel



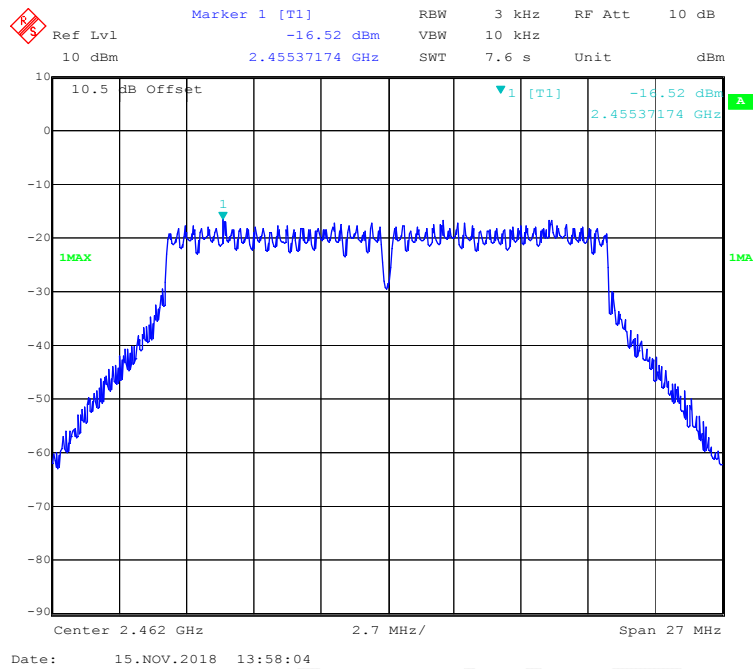
802.11n-HT20 Low Channel



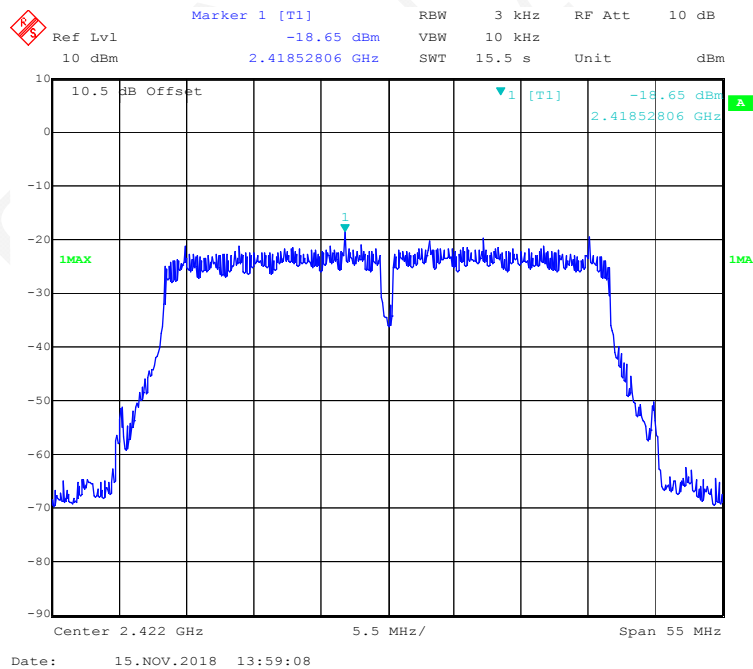
802.11n-HT20 Middle Channel



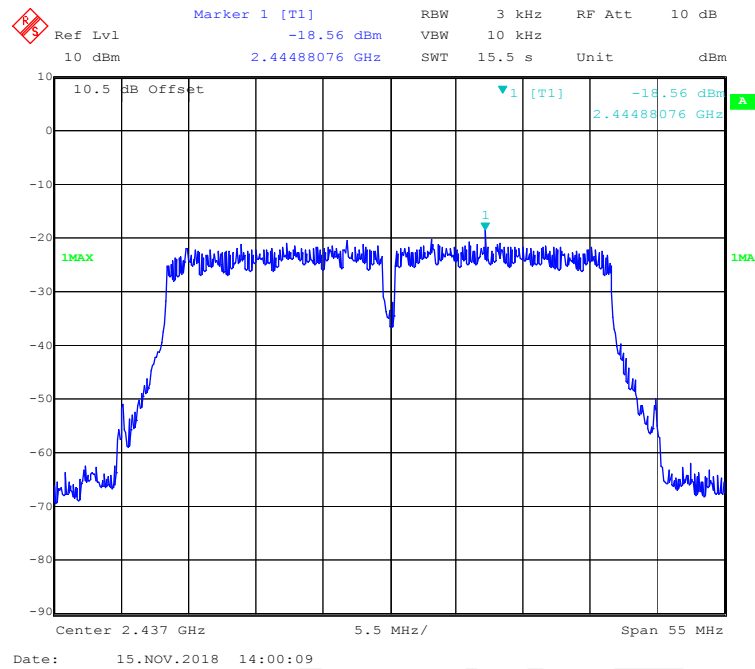
802.11n-HT20 High Channel



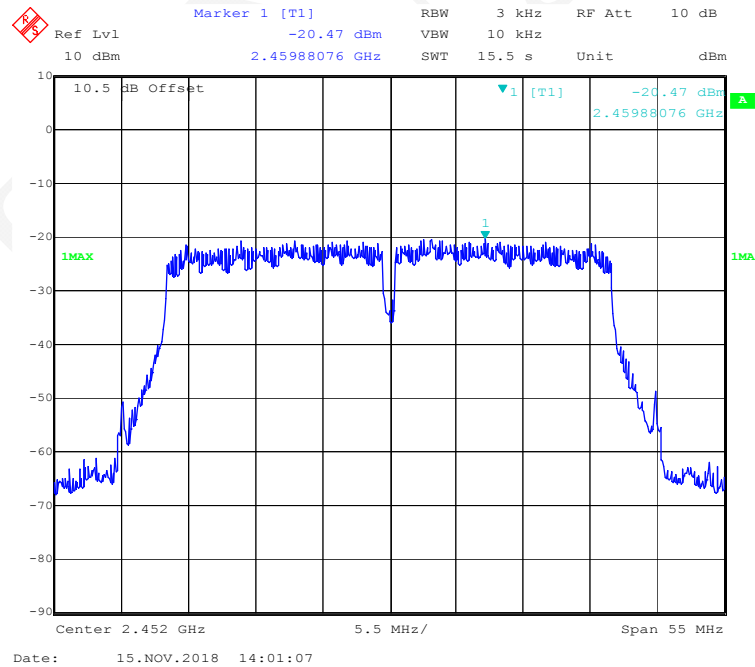
802.11n-HT40 Low Channel



802.11n-HT40 Middle Channel



802.11n-HT40 High Channel



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