FCC PART 15.247

TEST REPORT

For

Micron Electronics LLC.

1001 Yamato Road, Suite 400, Boca Raton, Florida, United States

FCC ID: ZKQ-BTM

Report Type:	Product Type:
Original Report	Bolt Mini

Test Engineer:	Edison Hu
Report Number:	RSHA170828003-00B
Report Date:	2017-10-10
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Micron Electronics LLC.
Tested Model	GT200
Product Type	Bolt Mini
Dimension	110 mm(L)×58 mm(W)×30 mm(H)
Power Supply	DC 3.6V from Lithium Non-rechargeable Battery

**All measurement and test data in this report was gathered from production sample serial number: 20170828003. (Assigned by BACL, Kunshan). The EUT was received on 2017-08-28.*

Objective

This report is prepared on behalf of Micron Electronics LLC. 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, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 22H24E27 PCB submissions with FCC ID: ZKQ-BTM.

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 KDB558074 D01 DTS Meas Guidance v04.

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
RF conducted test with spectrum		0.9dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	4.88dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
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.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

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.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

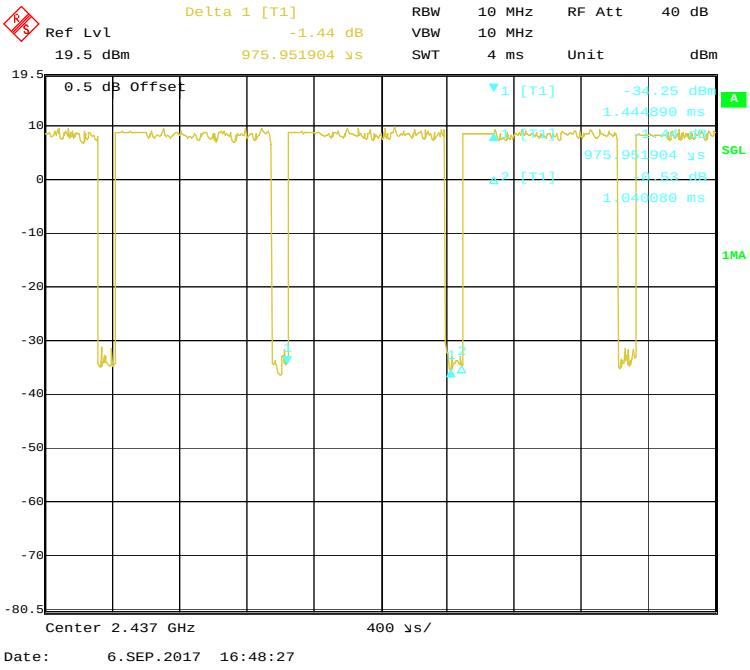
RF test tool : Wi-Fi tool.

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

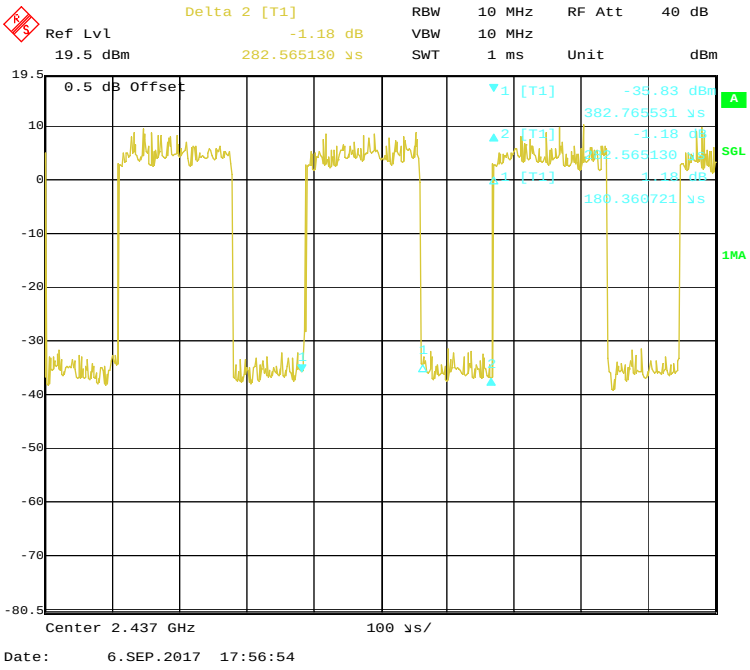
Mode	Data rate	Power level
802.11b	1 Mbps	32
802.11g	6 Mbps	38
802.11n-HT20	MCS0	38

Duty Cycle:

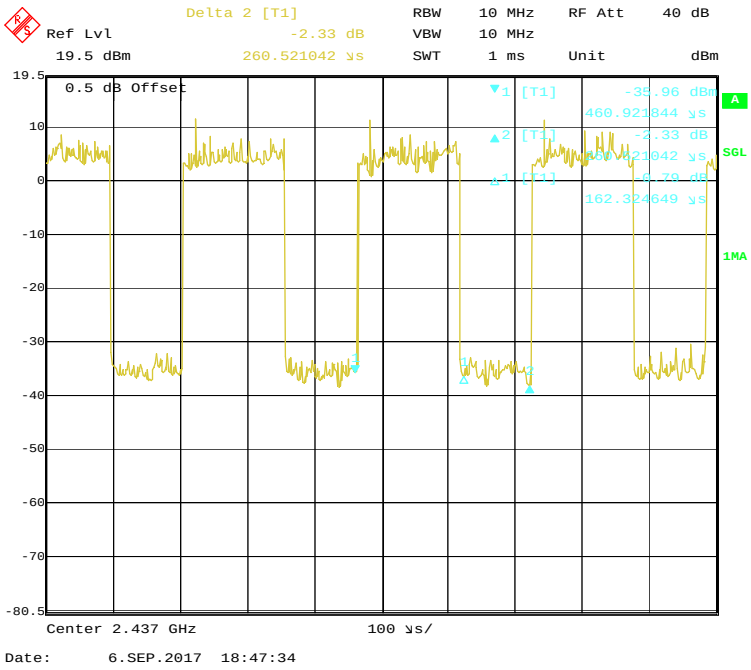
802.11b Mode Middle Channel



802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



Mode	Duty Cycle	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
802.11b	93.83%	0.976	1.025	3kHz	0.28
802.11g	63.83%	0.180	5.556	10kHz	1.95
802.11n-HT20	62.31%	0.162	6.173	10kHz	2.05

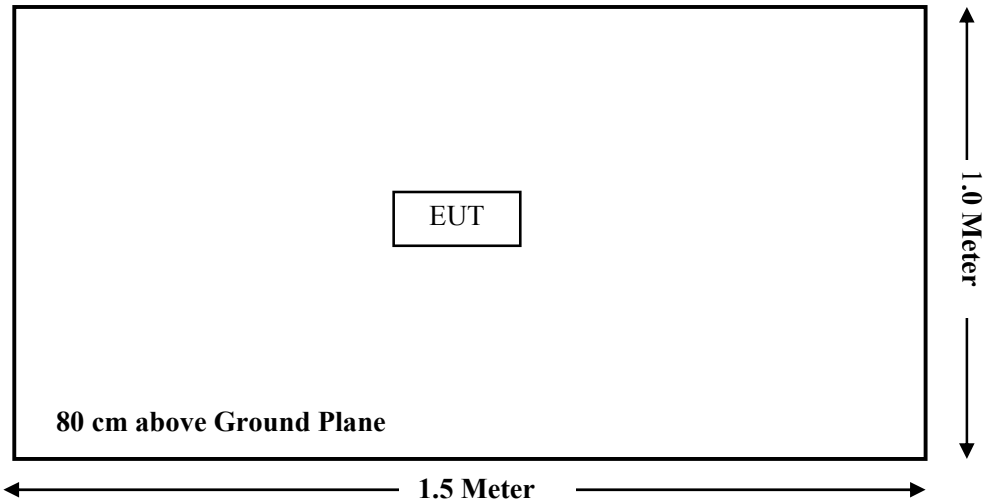
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

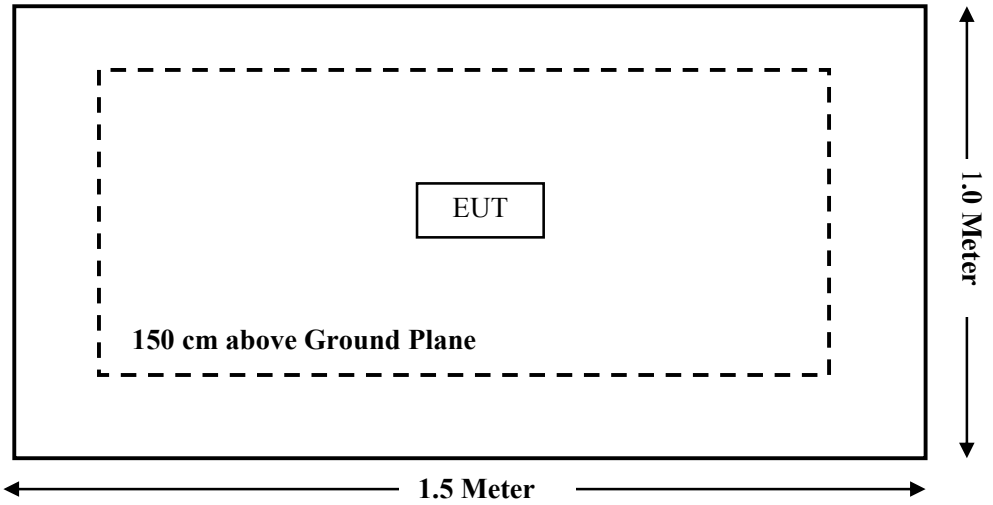
External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §1.1307 (b) (1) & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable
§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 Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

Not Applicable: The device is battery operated equipment.

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	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Micron	RF Cable	N/A	N/A	2017-09-06	2018-09-05
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
Rohde & Schwarz	LISN	ENV216	3560655016	2016-11-25	2017-11-24
BACL	BACL-EMC	V1.0	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2017-01-10	2018-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

*** 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 §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = 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, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Target Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412~2462	0.0	1.00	14.00	25.12	20	0.0050	1.00	0.0050
802.11g		0.0	1.00	12.50	17.78	20	0.0035	1.00	0.0035
802.11n-HT20		0.0	1.00	13.00	19.95	20	0.0040	1.00	0.0040
GPRS 850	824~849	0.5	1.12	26.50	446.68	20	0.0997	0.57	0.1749
EDGE 850	824~849	0.5	1.12	24.50	281.84	20	0.0629	0.57	0.1104
WCDMA Band V	824~849	0.5	1.12	22.50	177.83	20	0.0397	0.57	0.0696
GPRS 1900	1850~1910	1.0	1.26	22.50	177.83	20	0.0445	1.00	0.0445
EDGE 1900	1850~1910	1.0	1.26	23.00	199.53	20	0.0500	1.00	0.0500
WCDMA Band II	1850~1910	1.0	1.26	22.00	158.49	20	0.0397	1.00	0.0397
WCDMA Band IV	1710-1755	1.0	1.26	22.00	158.49	20	0.0397	1.00	0.0397

For GPRS mode, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.08
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note:

(1) The target output powers are all declared by the Manufacturer.

(2) Wi-Fi and GPRS or WCDMA mode support transmit simultaneously, the worst case (802.11b of Wi-Fi & GPRS 850) is as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0050/1.00+0.0997/0.57=0.0050+0.1749=0.1799 < 1.0$$

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 a monopole antenna arrangement for Wi-Fi, which the antenna gain is 0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

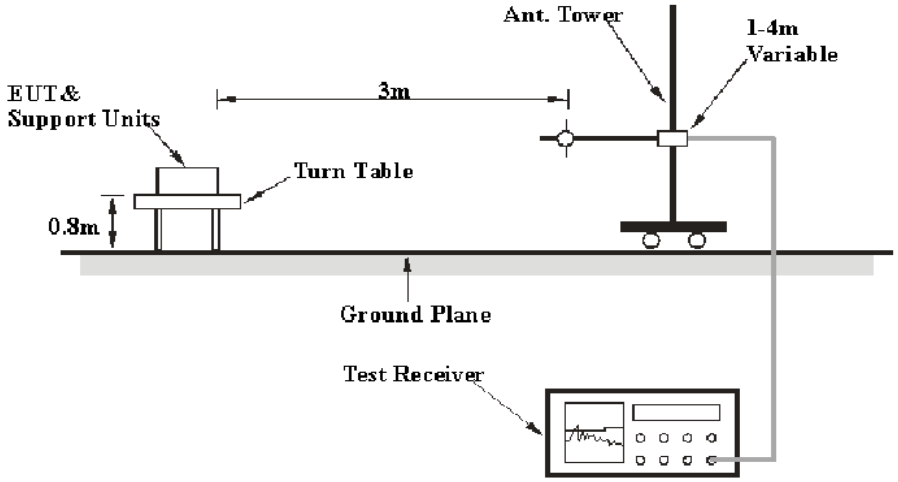
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

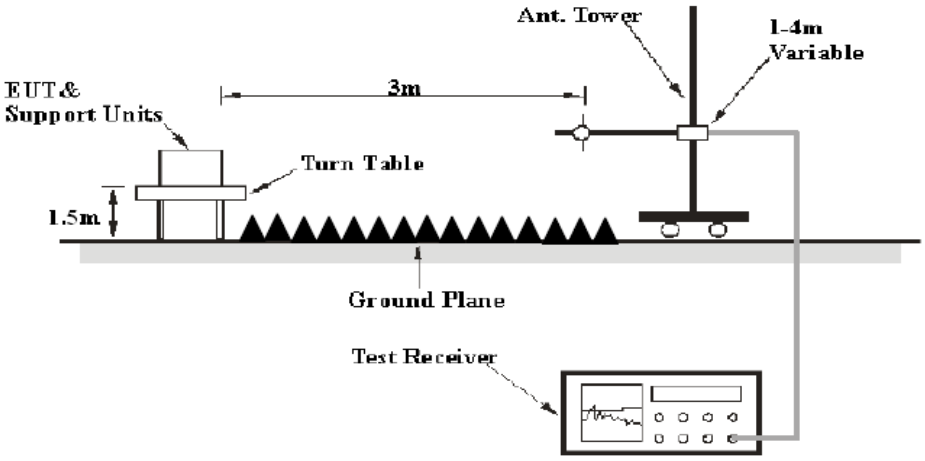
FCC §15.247 (d); §15.209; §15.205;

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 & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 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	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

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 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.

Test Data

Environmental Conditions

Temperature:	24.6℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Edison Hu on 2017-09-06.

EUT operation mode: Transmitting(Scan with X-Axis, Y-Axis and Z-Axis position, the worst case X-Axis was recorded)

30MHz-25GHz

802.11b Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
102.35	31.23	QP	145	137	V	0.33	31.56	43.50	11.94
2412.00	104.88	PK	267	114	V	-4.90	99.98	/	/
2412.00	99.15	Ave	267	114	V	-4.90	94.25	/	/
2412.00	100.35	PK	288	136	H	-4.90	95.45	/	/
2412.00	96.15	Ave	288	136	H	-4.90	91.25	/	/
2390.00	49.36	PK	232	192	V	-4.96	44.40	74.00	29.60
2390.00	38.49	Ave	232	192	V	-4.96	33.53	54.00	20.47
2311.00	48.36	PK	203	204	H	-5.18	43.18	74.00	30.82
2311.00	37.55	Ave	203	204	H	-5.18	32.37	54.00	21.63
3249.30	49.32	PK	57	132	V	-1.48	47.84	74.00	26.16
3249.30	38.15	Ave	57	132	V	-1.48	36.67	54.00	17.33
4824.00	50.11	PK	108	102	H	2.52	52.63	74.00	21.37
4824.00	39.25	Ave	108	102	H	2.52	41.77	54.00	12.23
7236.00	44.38	PK	270	140	H	9.83	54.21	74.00	19.79
7236.00	25.80	Ave	270	140	H	9.83	35.63	54.00	18.37

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
102.35	31.35	QP	11	124	V	0.33	31.68	43.50	11.82
2437.00	103.15	PK	335	140	V	-4.83	98.32	/	/
2437.00	97.94	Ave	335	140	V	-4.83	93.11	/	/
2437.00	100.11	PK	205	180	H	-4.83	95.28	/	/
2437.00	94.09	Ave	205	180	H	-4.83	89.26	/	/
1597.00	48.36	PK	166	189	V	-7.66	40.70	74.00	33.30
1597.00	37.71	Ave	166	189	V	-7.66	30.05	54.00	23.95
3249.30	45.32	PK	161	188	V	-1.48	43.84	74.00	30.16
3249.30	33.58	Ave	161	188	V	-1.48	32.10	54.00	21.90
4874.00	49.36	PK	254	231	H	2.63	51.99	74.00	22.01
4874.00	37.59	Ave	254	231	H	2.63	40.22	54.00	13.78
6563.06	45.36	PK	214	137	V	8.42	53.78	74.00	20.22
6563.06	32.58	Ave	214	137	V	8.42	41.00	54.00	13.00
7311.00	41.25	PK	106	116	H	9.95	51.20	74.00	22.80
7311.00	29.36	Ave	106	116	H	9.95	39.31	54.00	14.69
High Channel (2462 MHz)									
102.35	31.19	QP	201	147	V	0.33	31.52	43.50	11.98
2462.00	101.91	PK	260	148	V	-4.76	97.15	/	/
2462.00	96.94	Ave	260	148	V	-4.76	92.18	/	/
2462.00	98.38	PK	315	183	H	-4.76	93.62	/	/
2462.00	92.79	Ave	315	183	H	-4.76	88.03	/	/
2483.50	49.52	PK	312	187	V	-4.71	44.81	74.00	29.19
2483.50	38.33	Ave	312	187	V	-4.71	33.62	54.00	20.38
2547.72	46.36	PK	123	224	V	-4.41	41.95	74.00	32.05
2547.72	35.18	Ave	123	224	V	-4.41	30.77	54.00	23.23
4924.00	48.36	PK	120	114	H	2.74	51.10	74.00	22.90
4924.00	37.22	Ave	120	114	H	2.74	39.96	54.00	14.04
6563.06	45.36	PK	137	203	V	8.42	53.78	74.00	20.22
6563.06	32.58	Ave	137	203	V	8.42	41.00	54.00	13.00
7386.00	41.33	PK	191	123	H	10.06	51.39	74.00	22.61
7386.00	29.58	Ave	191	123	H	10.06	39.64	54.00	14.36

802.11g Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
102.35	31.20	QP	283	221	V	0.33	31.53	43.50	11.97
2412.00	102.01	PK	99	240	V	-4.90	97.11	/	/
2412.00	89.26	Ave	99	240	V	-4.90	84.36	/	/
2412.00	99.26	PK	180	141	H	-4.90	94.36	/	/
2412.00	86.48	Ave	180	141	H	-4.90	81.58	/	/
2390.00	48.36	PK	90	157	H	-4.96	43.40	74.00	30.60
2390.00	32.36	Ave	90	157	H	-4.96	27.40	54.00	26.60
2317.00	49.12	PK	185	126	V	-5.17	43.95	74.00	30.05
2317.00	34.58	Ave	185	126	V	-5.17	29.41	54.00	24.59
3249.30	46.39	PK	314	224	H	-1.48	44.91	74.00	29.09
3249.30	32.58	Ave	314	224	H	-1.48	31.10	54.00	22.90
4824.00	50.39	PK	163	223	V	2.52	52.91	74.00	21.09
4824.00	34.33	Ave	163	223	V	2.52	36.85	54.00	17.15
7236.00	44.11	PK	58	107	V	9.83	53.94	74.00	20.06
7236.00	29.36	Ave	58	107	V	9.83	39.19	54.00	14.81
Middle Channel (2437 MHz)									
102.35	31.26	QP	126	235	V	0.33	31.59	43.50	11.91
2437.00	100.52	PK	272	215	V	-4.83	95.69	/	/
2437.00	87.16	Ave	272	215	V	-4.83	82.33	/	/
2437.00	96.19	PK	160	163	H	-4.83	91.36	/	/
2437.00	83.52	Ave	160	163	H	-4.83	78.69	/	/
1594.40	48.33	PK	121	159	V	-7.67	40.66	74.00	33.34
1594.40	33.58	Ave	121	159	V	-7.67	25.91	54.00	28.09
3249.30	49.25	PK	25	199	H	-1.48	47.77	74.00	26.23
3249.30	35.48	Ave	25	199	H	-1.48	34.00	54.00	20.00
4874.00	49.36	PK	297	209	V	2.63	51.99	74.00	22.01
4874.00	34.20	Ave	297	209	V	2.63	36.83	54.00	17.17
6660.97	45.36	PK	168	239	V	8.66	54.02	74.00	19.98
6660.97	31.54	Ave	168	239	V	8.66	40.20	54.00	13.80
7311.00	42.36	PK	194	203	V	9.95	52.31	74.00	21.69
7311.00	28.33	Ave	194	203	V	9.95	38.28	54.00	15.72

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
102.35	31.11	QP	353	187	V	0.33	31.44	43.50	12.06
2462.00	99.12	PK	45	184	V	-4.76	94.36	/	/
2462.00	85.98	Ave	45	184	V	-4.76	81.22	/	/
2462.00	96.01	PK	22	100	H	-4.76	91.25	/	/
2462.00	84.14	Ave	22	100	H	-4.76	79.38	/	/
2483.50	49.12	PK	160	155	H	-4.71	44.41	74.00	29.59
2483.50	33.52	Ave	160	155	H	-4.71	28.81	54.00	25.19
2545.89	48.36	PK	24	219	H	-4.42	43.94	74.00	30.06
2545.89	35.11	Ave	24	219	H	-4.42	30.69	54.00	23.31
4924.00	50.25	PK	127	146	V	2.74	52.99	74.00	21.01
4924.00	32.58	Ave	127	146	V	2.74	35.32	54.00	18.68
6660.97	45.36	PK	7	177	V	8.66	54.02	74.00	19.98
6660.97	30.88	Ave	7	177	V	8.66	39.54	54.00	14.46
7386.00	42.31	PK	15	212	V	10.06	52.37	74.00	21.63
7386.00	28.18	Ave	15	212	V	10.06	38.24	54.00	15.76

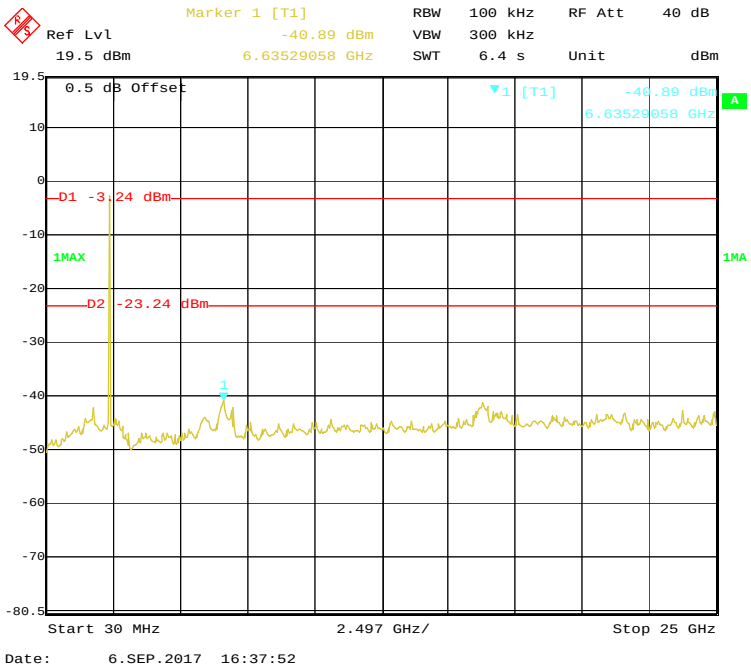
802.11n-HT20 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
102.35	31.08	QP	221	175	V	0.33	31.41	43.50	12.09
2412.00	100.22	PK	187	169	V	-4.90	95.32	/	/
2412.00	82.39	Ave	103	160	V	-4.90	77.49	/	/
2412.00	98.15	PK	165	104	H	-4.90	93.25	/	/
2412.00	79.59	Ave	165	104	H	-4.90	74.69	/	/
2390.00	48.32	PK	256	194	H	-4.96	43.36	74.00	30.64
2390.00	30.11	Ave	256	194	H	-4.96	25.15	54.00	28.85
2317.30	47.32	PK	158	136	H	-5.17	42.15	74.00	31.85
2317.30	29.58	Ave	158	136	H	-5.17	24.41	54.00	29.59
3249.30	46.32	PK	65	216	H	-1.48	44.84	74.00	29.16
3249.30	28.11	Ave	65	216	H	-1.48	26.63	54.00	27.37
4824.00	50.11	PK	127	106	V	2.52	52.63	74.00	21.37
4824.00	31.15	Ave	127	106	V	2.52	33.67	54.00	20.33
7236.00	41.21	PK	330	174	V	9.83	51.04	74.00	22.96
7236.00	24.32	Ave	330	174	V	9.83	34.15	54.00	19.85

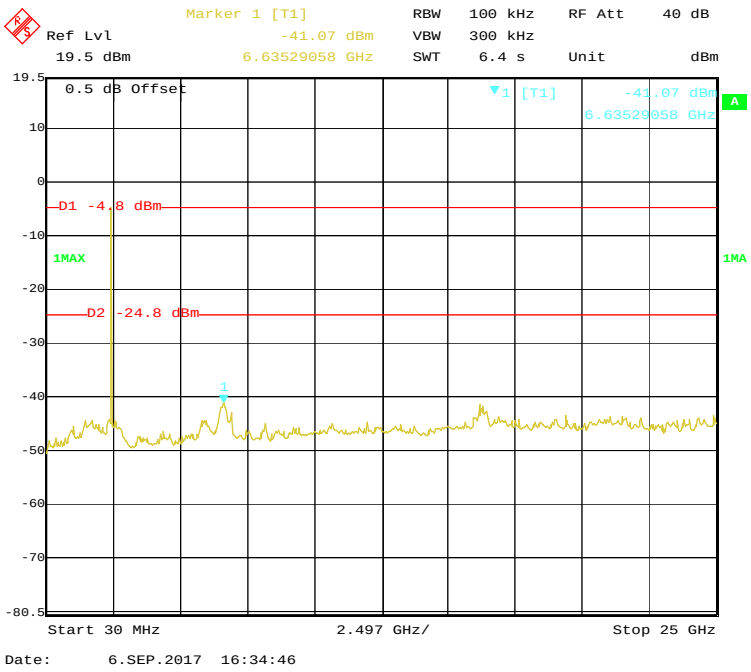
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
102.35	31.34	QP	76	146	V	0.33	31.67	43.50	11.83
2437.00	100.04	PK	300	187	V	-4.83	95.21	/	/
2437.00	82.02	Ave	300	187	V	-4.83	77.19	/	/
2437.00	96.95	PK	177	246	H	-4.83	92.12	/	/
2437.00	78.51	Ave	177	246	H	-4.83	73.68	/	/
1599.07	58.53	PK	5	198	H	-7.65	50.88	74.00	23.12
1599.07	37.58	Ave	5	198	H	-7.65	29.93	54.00	24.07
3249.30	46.08	PK	208	154	H	-1.48	44.60	74.00	29.40
3249.30	36.92	Ave	208	154	H	-1.48	35.44	54.00	18.56
4874.00	53.52	PK	300	165	V	2.63	56.15	74.00	17.85
4874.00	28.71	Ave	300	165	V	2.63	31.34	54.00	22.66
6655.83	42.52	PK	82	215	H	8.65	51.17	74.00	22.83
6655.83	29.16	Ave	82	215	H	8.65	37.81	54.00	16.19
7311.00	41.75	PK	32	220	V	9.95	51.70	74.00	22.30
7311.00	25.41	Ave	32	220	V	9.95	35.36	54.00	18.64
High Channel (2462 MHz)									
102.35	31.13	QP	173	131	V	0.33	31.46	43.50	12.04
2462.00	98.88	PK	133	125	V	-4.76	94.12	/	/
2462.00	81.08	Ave	133	125	V	-4.76	76.32	/	/
2462.00	96.05	PK	231	180	H	-4.76	91.29	/	/
2462.00	78.34	Ave	231	180	H	-4.76	73.58	/	/
2483.50	48.32	PK	277	207	H	-4.71	43.61	74.00	30.39
2483.50	29.11	Ave	277	207	H	-4.71	24.40	54.00	29.60
2536.95	47.32	PK	321	173	V	-4.47	42.85	74.00	31.15
2536.95	28.58	Ave	321	173	V	-4.47	24.11	54.00	29.89
4924.00	50.33	PK	283	236	V	2.74	53.07	74.00	20.93
4924.00	30.12	Ave	283	236	V	2.74	32.86	54.00	21.14
6655.83	47.62	PK	172	242	H	8.65	56.27	74.00	17.73
6655.83	28.11	Ave	172	242	H	8.65	36.76	54.00	17.24
7386.00	42.21	PK	137	144	V	10.06	52.27	74.00	21.73
7386.00	25.32	Ave	137	144	V	10.06	35.38	54.00	18.62

Conducted Spurious Emissions at Antenna Port

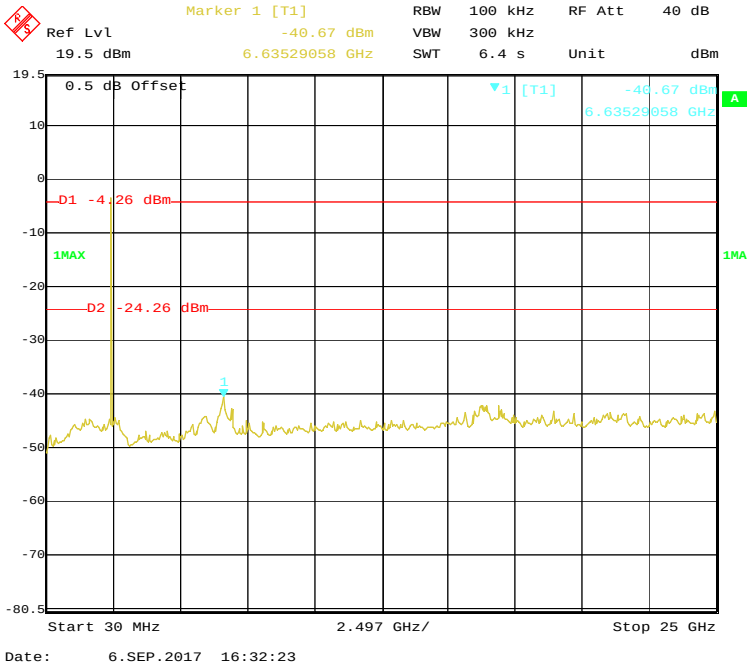
802.11b Low Channel



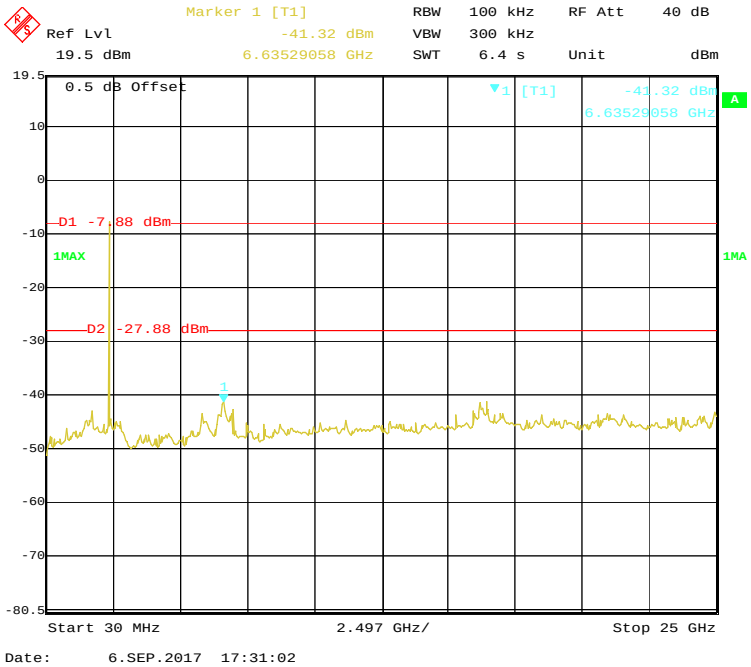
802.11b Middle Channel



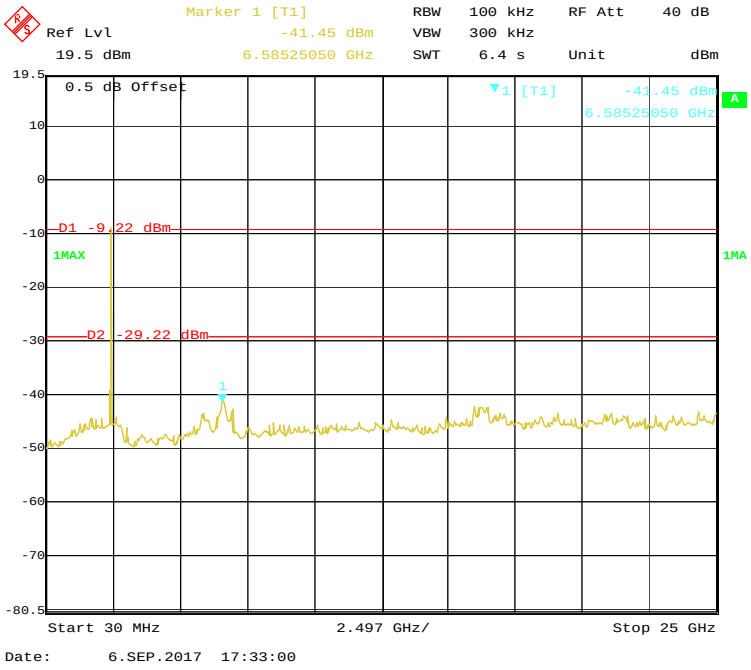
802.11b High Channel



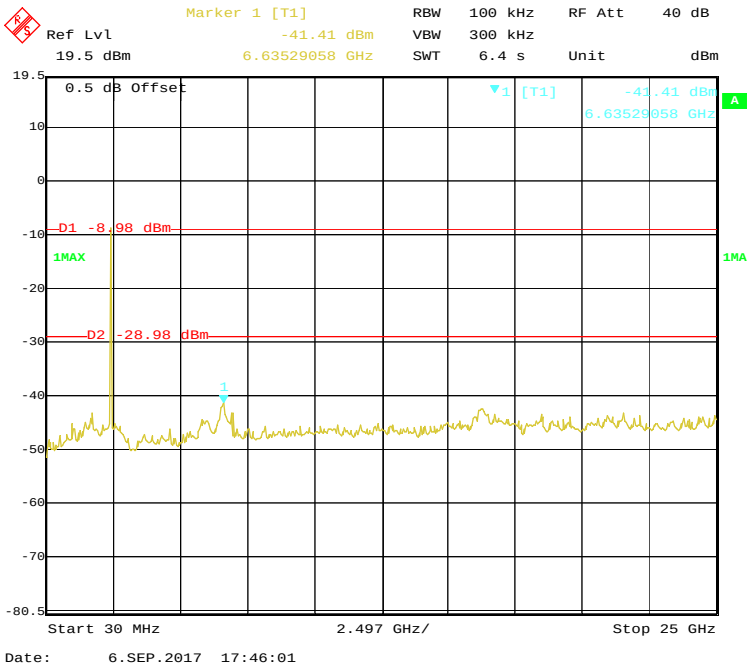
802.11g Low Channel



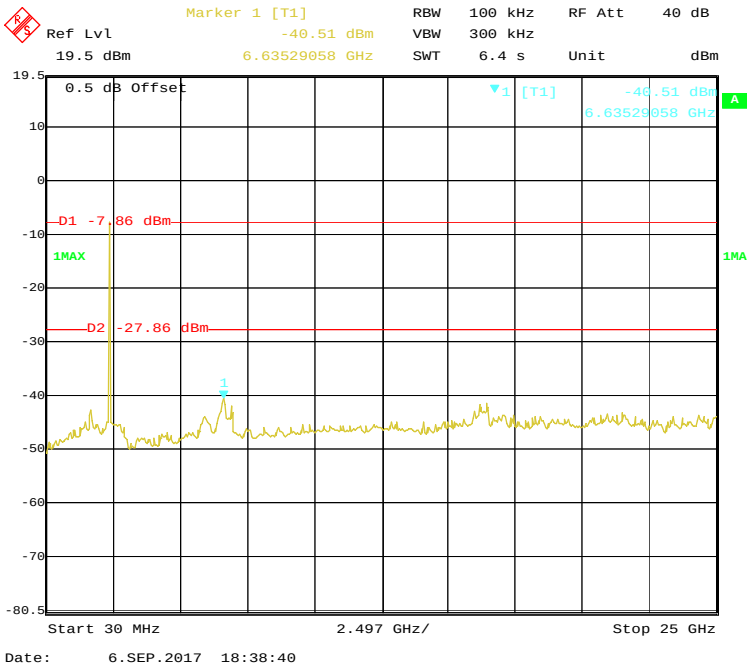
802.11g Middle Channel



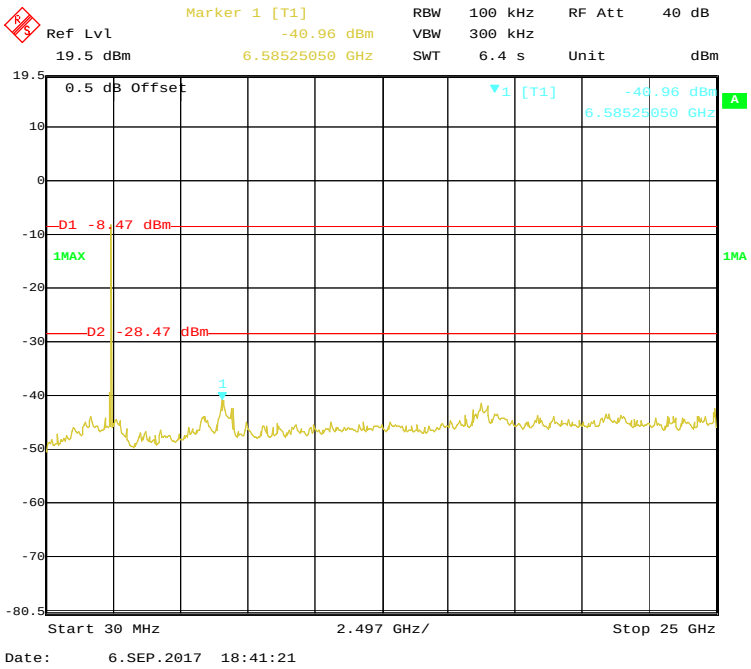
802.11g High Channel



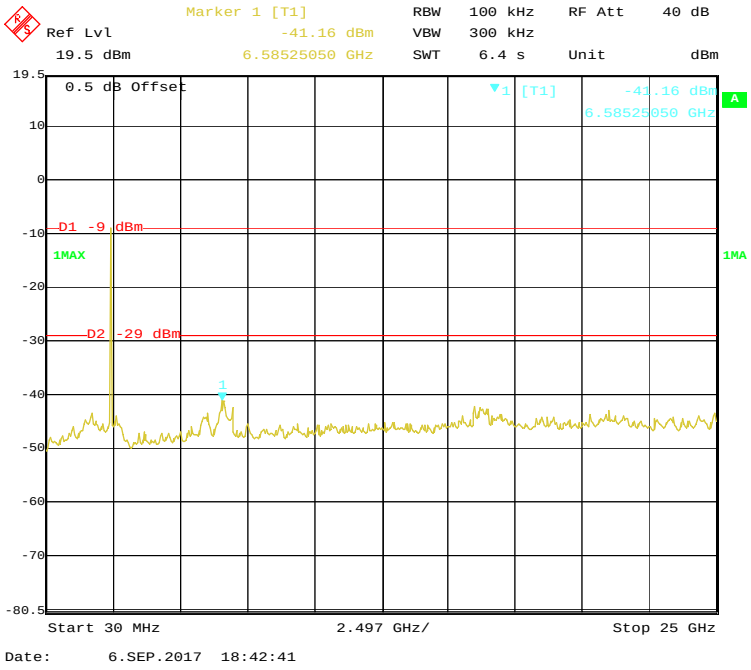
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



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

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x 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℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

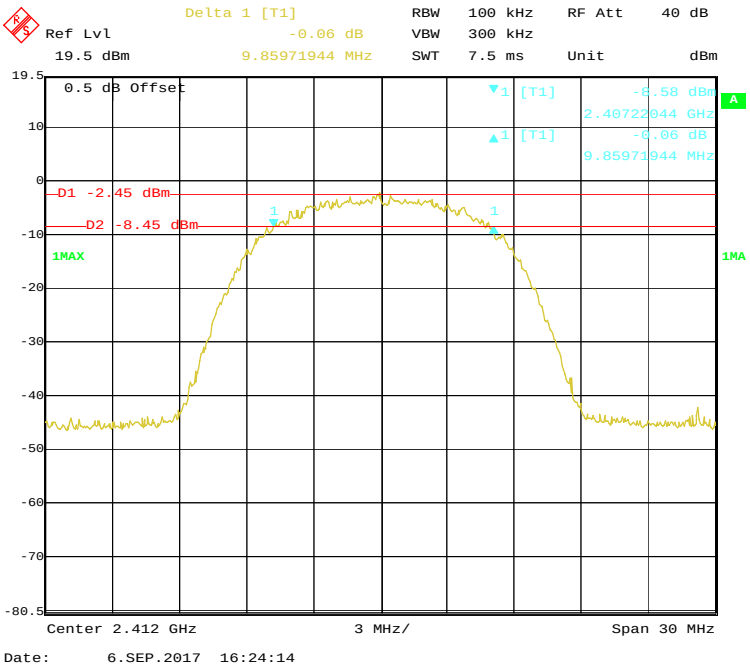
The testing was performed by Edison Hu on 2017-09-06.

Test Result: Pass.

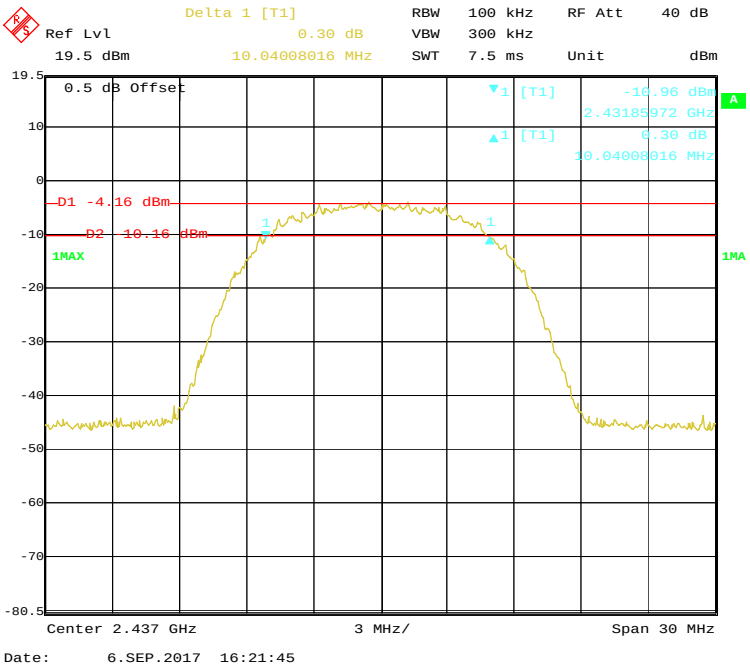
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	9.86	≥0.5
Middle	2437	10.04	≥0.5
High	2462	10.22	≥0.5
802.11g mode			
Low	2412	16.65	≥0.5
Middle	2437	16.65	≥0.5
High	2462	16.65	≥0.5
802.11n-HT20 mode			
Low	2412	17.92	≥0.5
Middle	2437	17.86	≥0.5
High	2462	17.86	≥0.5

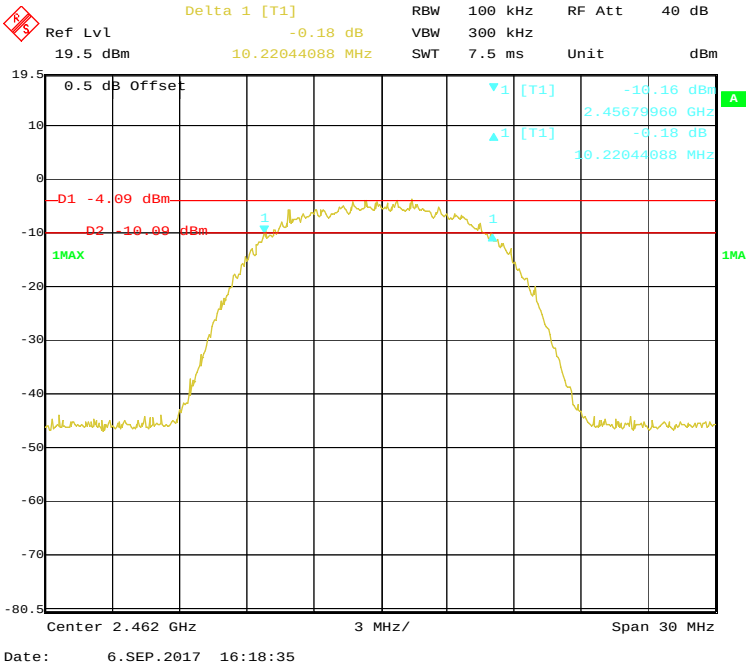
802.11b Low Channel



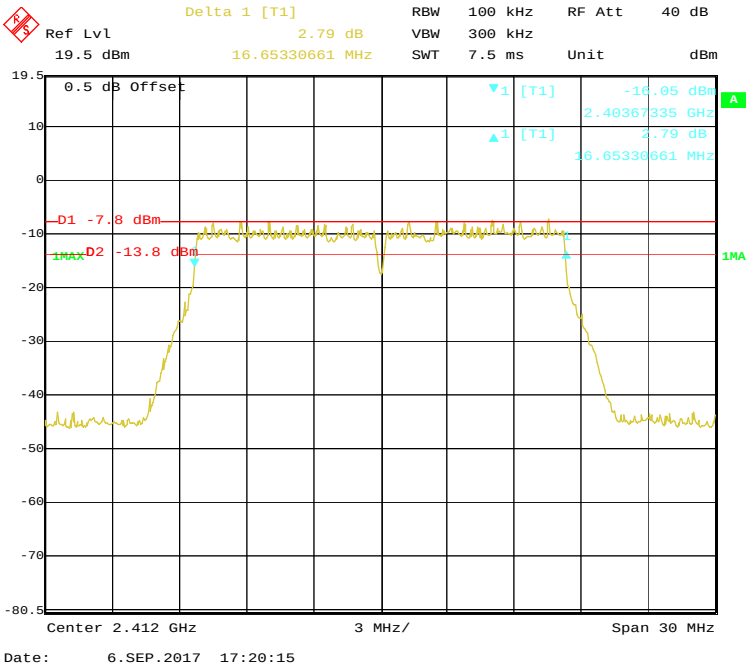
802.11b Middle Channel



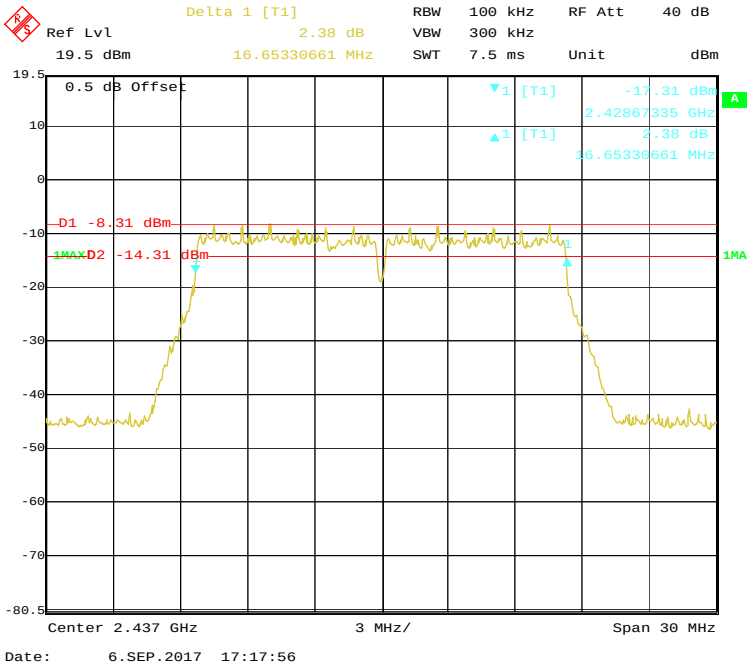
802.11b High Channel



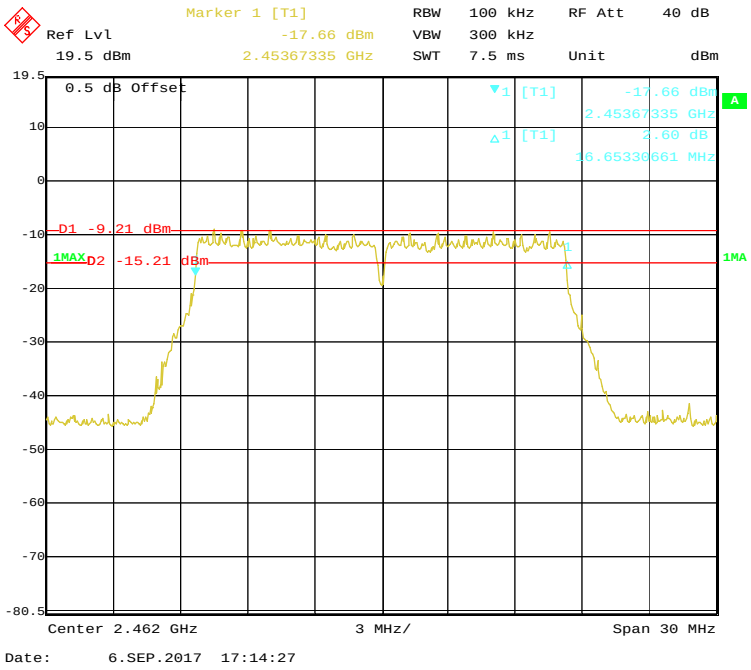
802.11g Low Channel



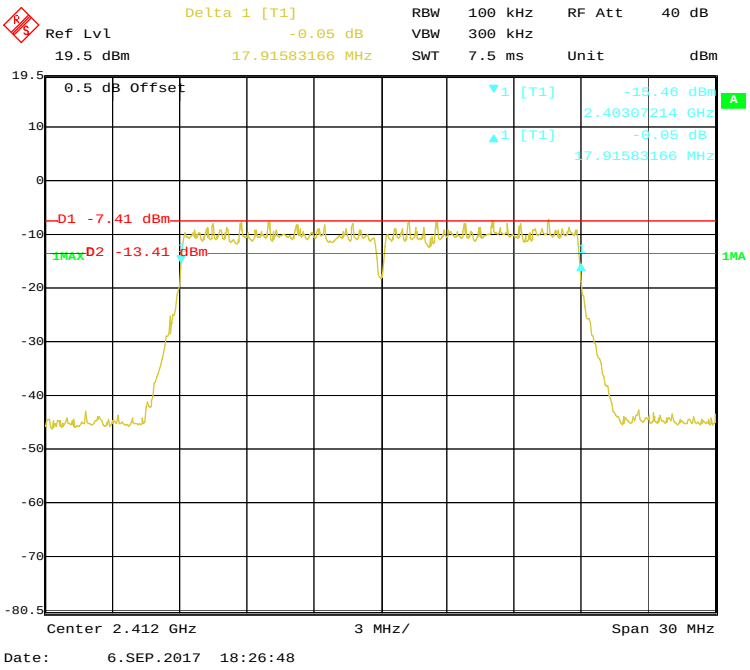
802.11g Middle Channel



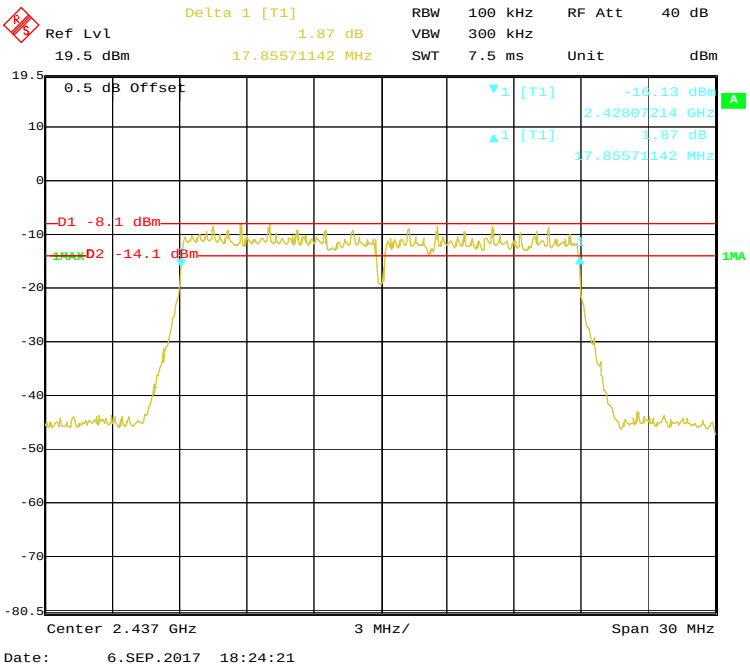
802.11g High Channel



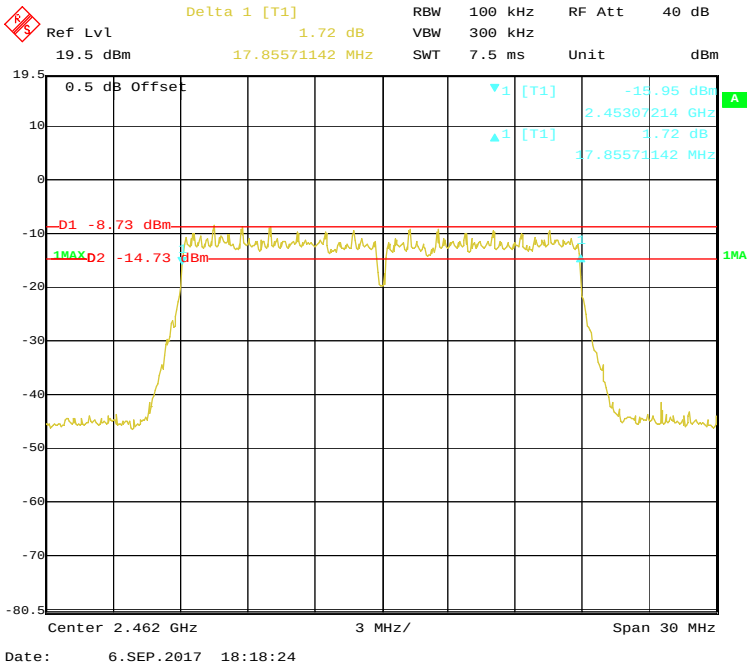
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



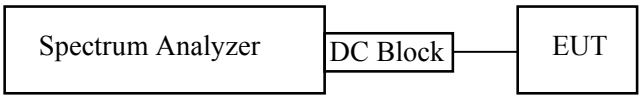
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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

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 one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	24.6℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Edison Hu on 2017-09-06.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
802.11b				
Low	2412	13.34	30	Pass
Middle	2437	12.90	30	Pass
High	2462	12.14	30	Pass
802.11g				
Low	2412	12.24	30	Pass
Middle	2437	12.11	30	Pass
High	2462	11.52	30	Pass
802.11n-HT20				
Low	2412	12.32	30	Pass
Middle	2437	12.04	30	Pass
High	2462	11.46	30	Pass

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 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 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

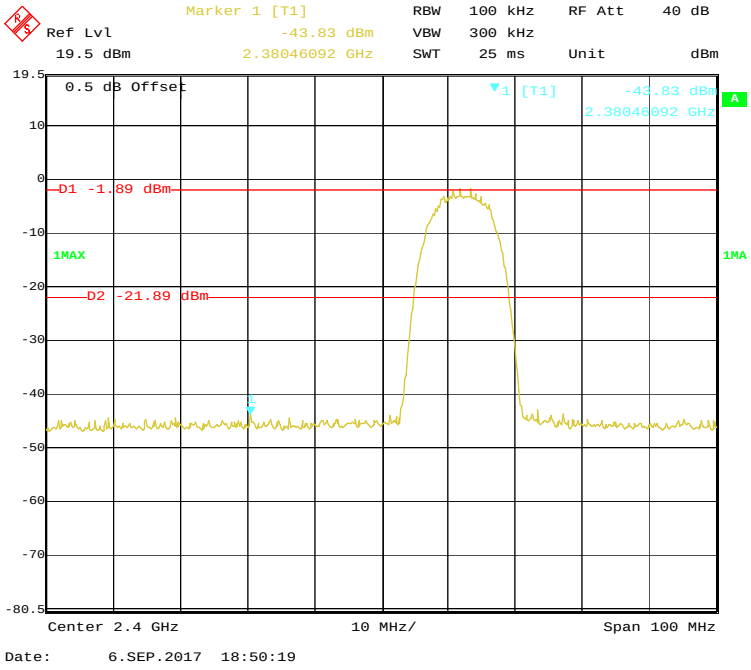
Temperature:	24.6℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Edison Hu on 2017-09-06.

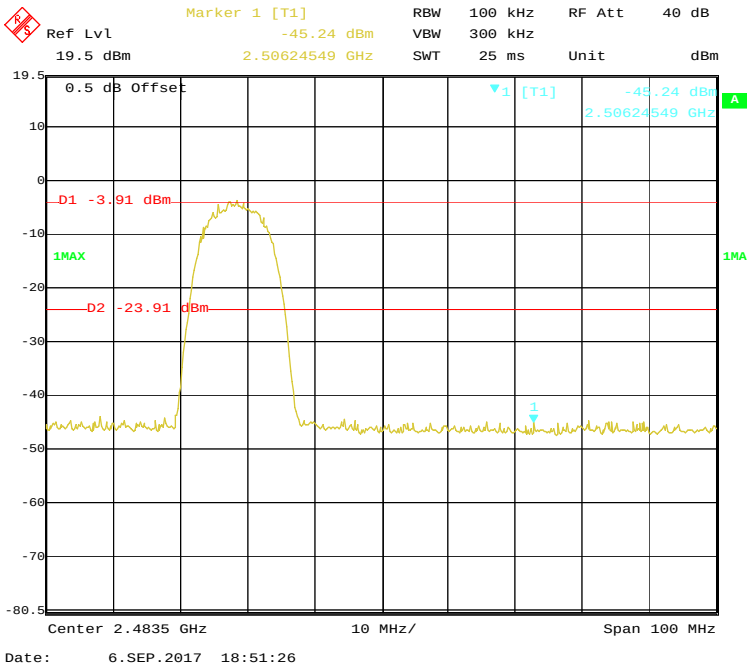
Test Result: *Compliance*

Band Edge

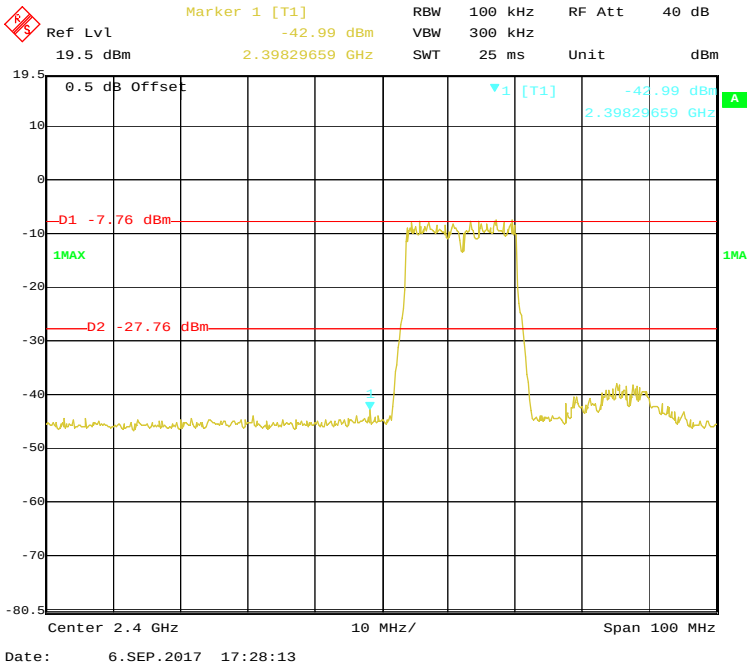
802.11b Mode Left Side



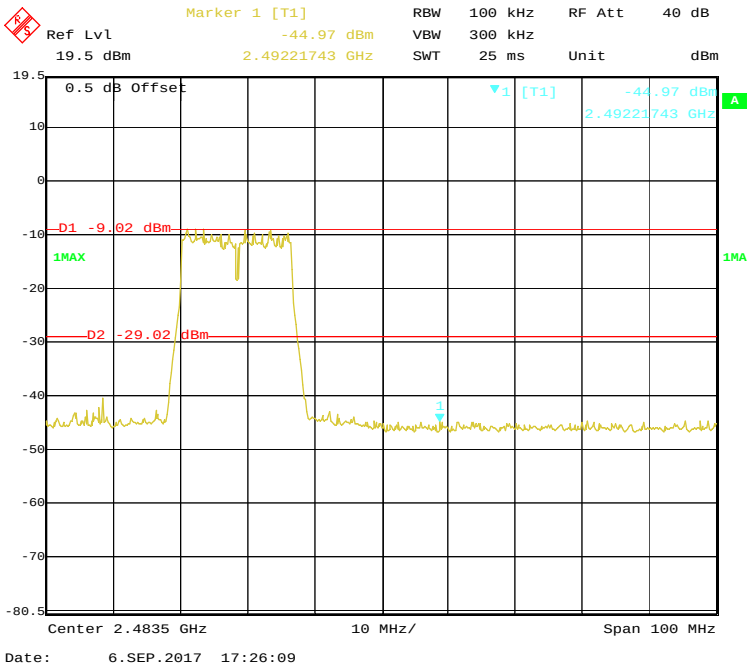
802.11b Mode Right Side



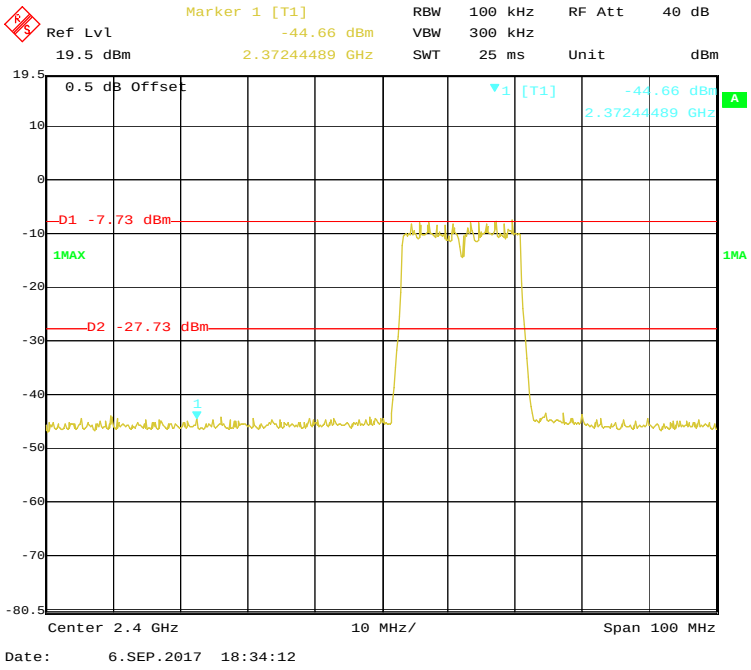
802.11g Mode Left Side



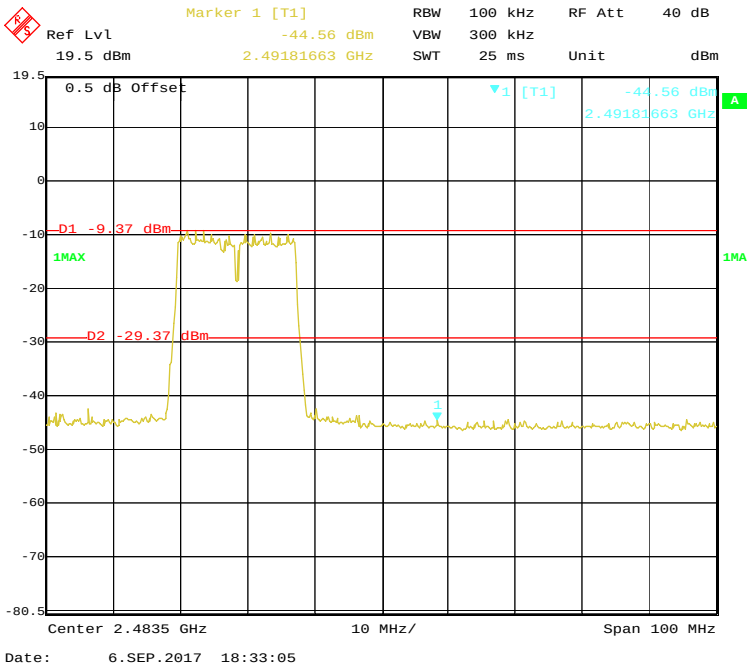
802.11g Mode Right Side



802.11n-HT20 Mode Left Side



802.11n-HT20 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 KDB558074 D01 DTS Meas Guidance v04 sub-clause 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: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×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℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

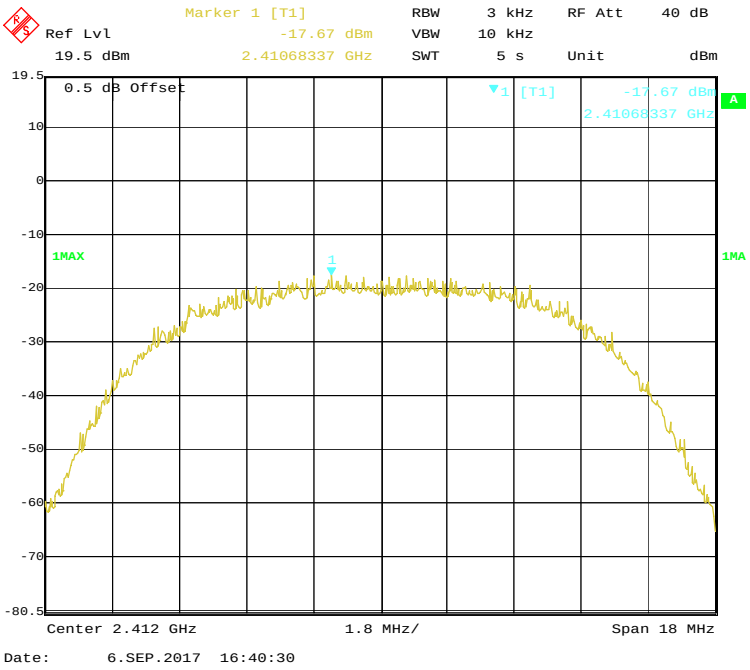
The testing was performed by Edison Hu on 2017-09-06.

EUT operation mode: Transmitting

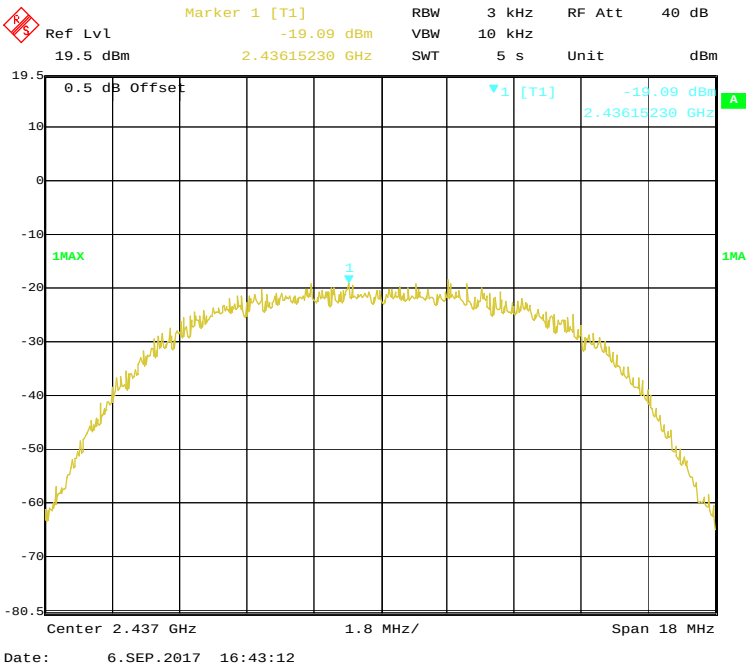
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-17.67	≤8
Middle	2437	-19.09	≤8
High	2462	-19.14	≤8
802.11g mode			
Low	2412	-22.99	≤8
Middle	2437	-22.88	≤8
High	2462	-23.11	≤8
802.11n-HT20 mode			
Low	2412	-23.86	≤8
Middle	2437	-24.35	≤8
High	2462	-24.82	≤8

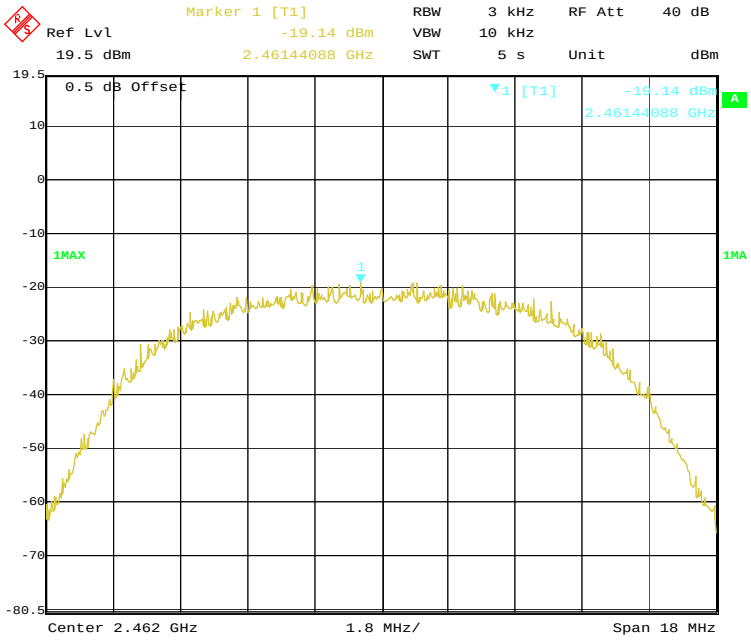
802.11b Low Channel



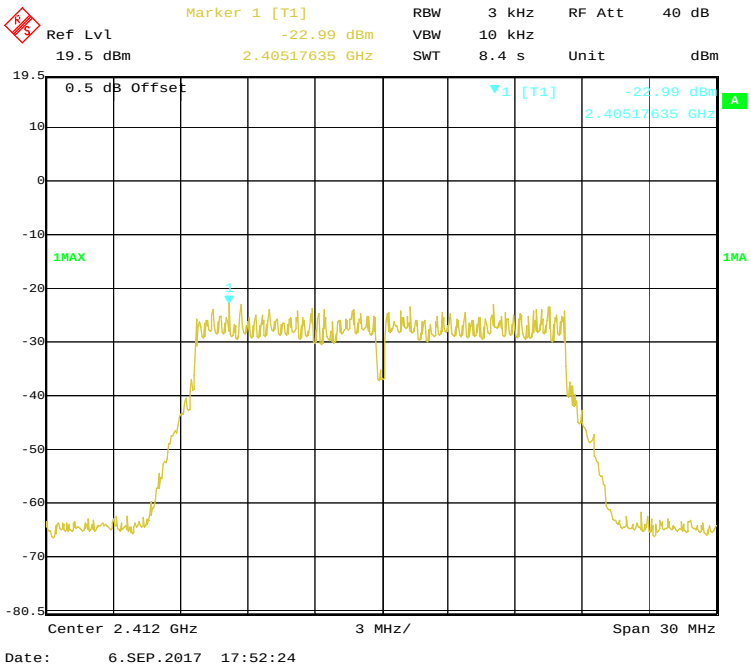
802.11b Middle Channel



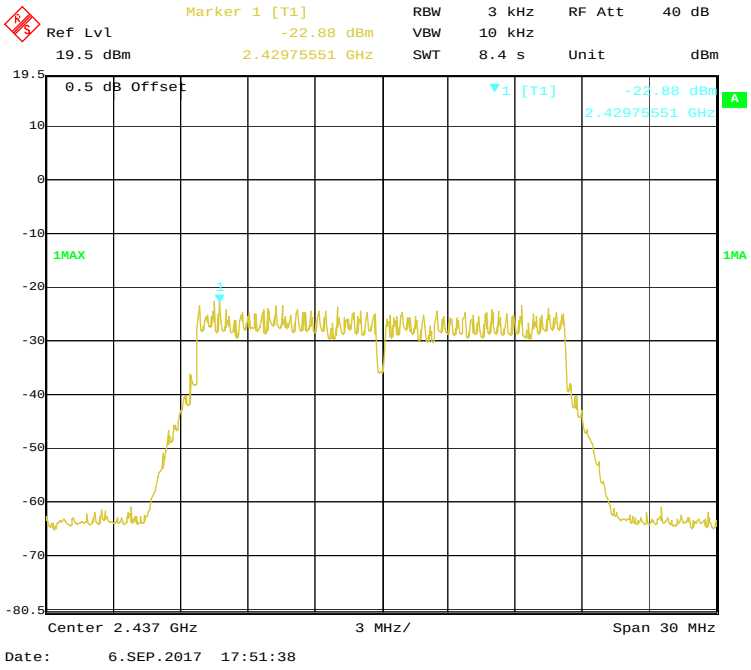
802.11b High Channel



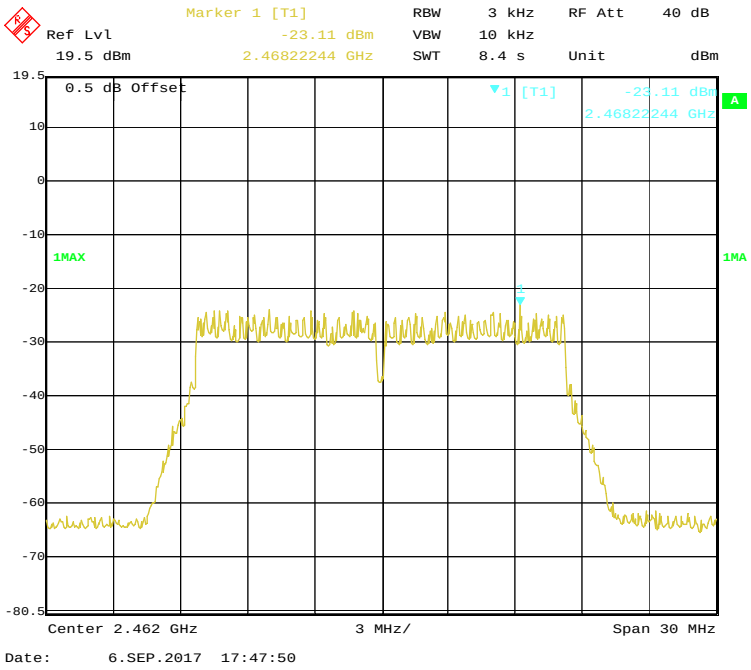
802.11g Low Channel



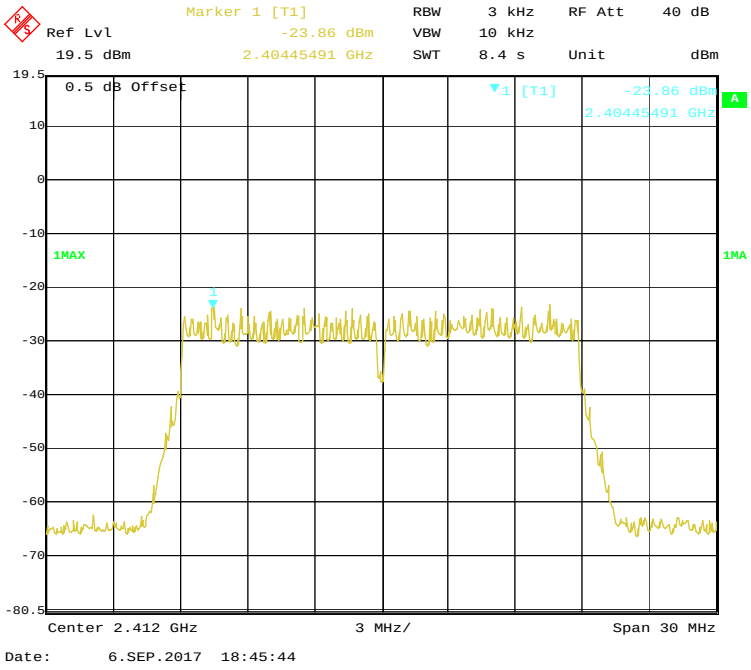
802.11g Middle Channel



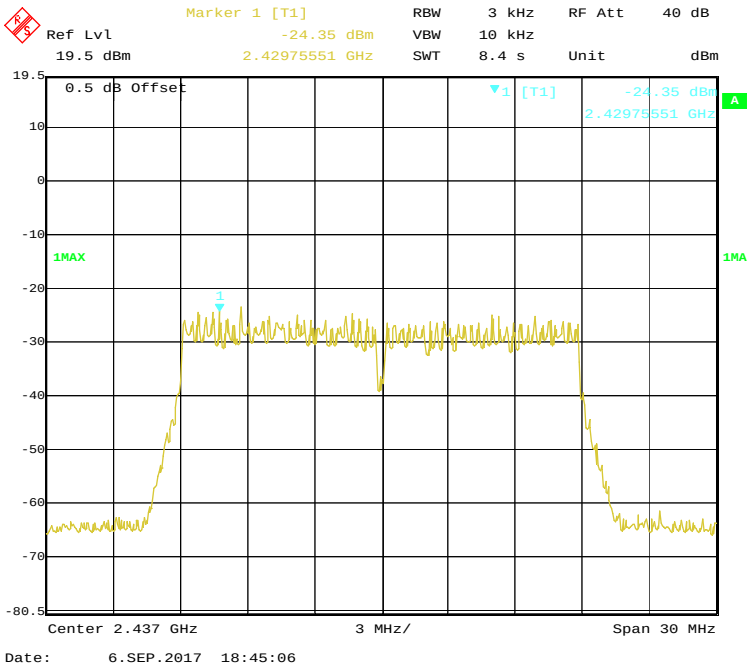
802.11g High Channel



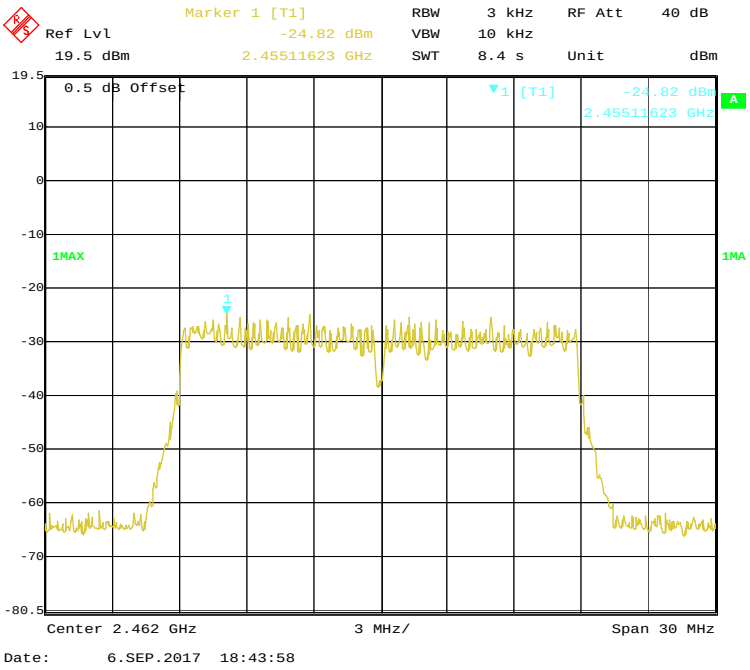
802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



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