FCC PART 15.247

TEST REPORT

For

Shanghai HowayGIS Co., Ltd

RM230, Fawkes Building, No.1985, Road Chunshen, Shanghai, China

FCC ID: 2AAZDT1XN2017

Report Type:	**Product Type:**
Original Report	Industrial Data Controller/Collector

Test Engineer:	Ada Yu
Report Number:	RKS170119001-00H
Report Date:	2017-02-17
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

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Manufacturer	Shanghai HowayGIS Co., Ltd
Tested Model	T17
Series Model	T17M, T17N, HC1
Product Type	Industrial Data Controller/Collector
Dimension	200 mm(L)×96 mm(W)×32 mm(H)
Power Supply	DC 3.7V from rechargeable battery or DC 5V supplied by adapter

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

Adapter Information:
Model: PSAC10R-050
Input: AC 100-240V, 50/60 Hz, 0.3A,23-32VA
Output: DC 5.0V, 2.0A

** All measurement and test data in this report was gathered from production sample serial number: 20161123001. (Assigned by BACL, Kunshan). The EUT was received on 2016-11-23.*

Objective

This report is prepared on behalf of Shanghai HowayGIS Co., Ltd in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commission's 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)

FCC Part 15B JBP, Part 15.247 DSS and Part 22H24E PCB submissions with FCC ID: 2AAZDT1XN2017.

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 v03r05.

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		3.26 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6 GHz ~18 GHz	4.92dB
	18 GHz~40 GHz	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.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. 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

For 802.11b and 802.11g mode, 11 channels are provided to test:

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

Lab_tool

The worst case was performed under:

802.11b: Data rate:1 Mbps, Power level: 7
802.11g: Data rate: 6 Mbps, Power level: 7

Support Equipment List and Details

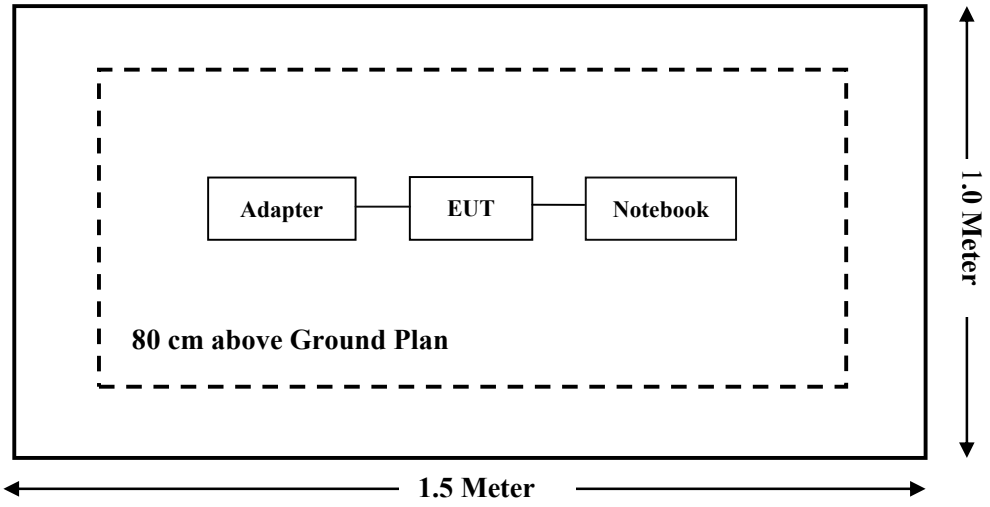
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
Howay	Adapter	PSM10R-050	N/A

External I/O Cable

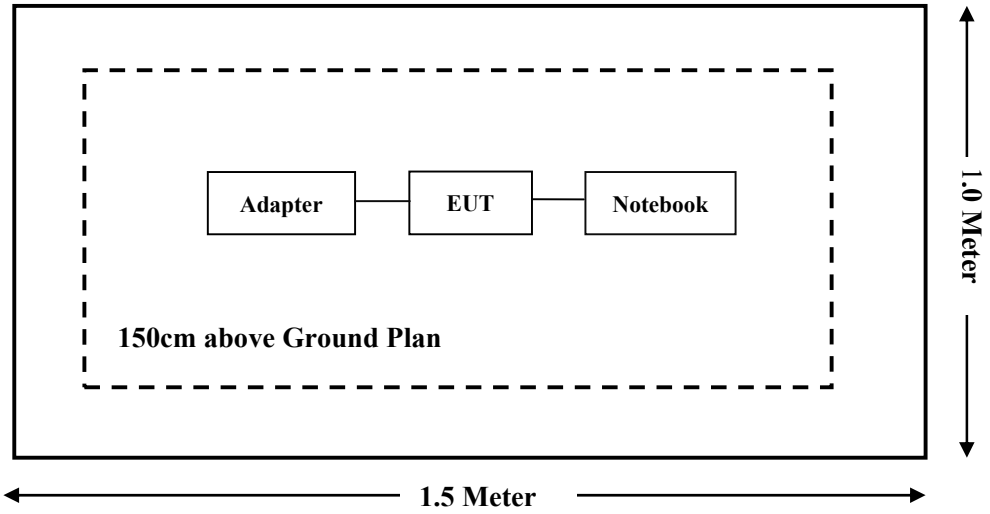
Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.8	EUT	Notebook

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1310 & §2.1093	RF Exposure	Compliance*
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB 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

Compliance*, please refer to the SAR report: RKS161122011-20A.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	1	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	2	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	3	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	4	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	5	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	OSP120 Base Unit	OSP120	101247	2016-07-04	2017-07-03
BACL	EMC32 Version	EMC 32	09106	/	/
Rohde & Schwarz	SMBV100A Vector Signal Generator	SMBV100A	261558	2016-07-04	2017-07-03
Rohde & Schwarz	SMB 100A Signal Generator	SMB100A	110390	2016-07-04	2017-07-03
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
HowayGIS	RF Cable	N/A	N/A	2017-01-12	2018-01-11
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	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
Rohde & Schwarz	CE Test software	EMC 32	100357	/	/
MICRO-COAX	Coaxial Cable	Cable-6	6	2016-09-08	2017-09-07

*** 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§15.247 (i), §1.1310& §2.1093 –RF EXPOSURE

Applicable Standard

According to§15.247(i) 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.

Test Result

Compliance, please refer to the SAR report: RKS161122011-20A.

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 PIFA antenna arrangement for Wi-Fi, which the antenna gain is 1.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

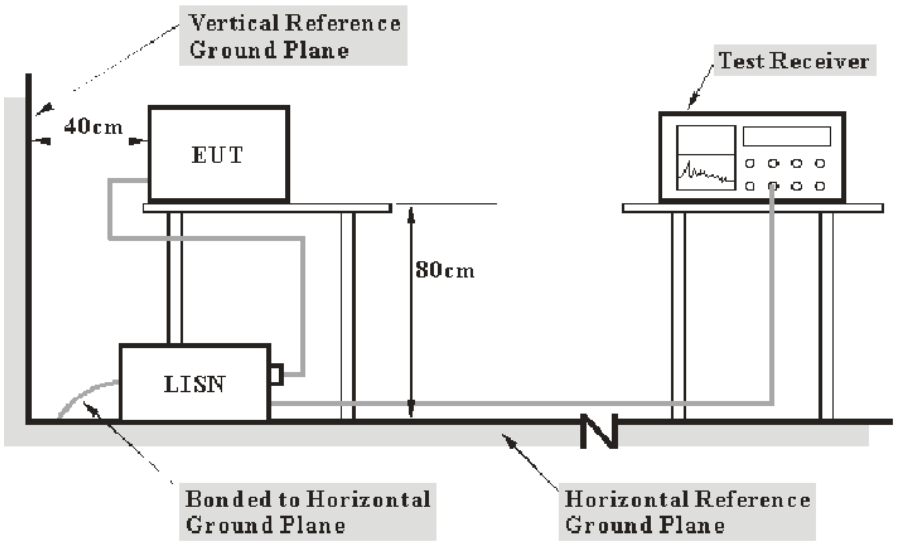
Result: Compliance.

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:

Correction Factor = LISN VDF + Cable Loss

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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

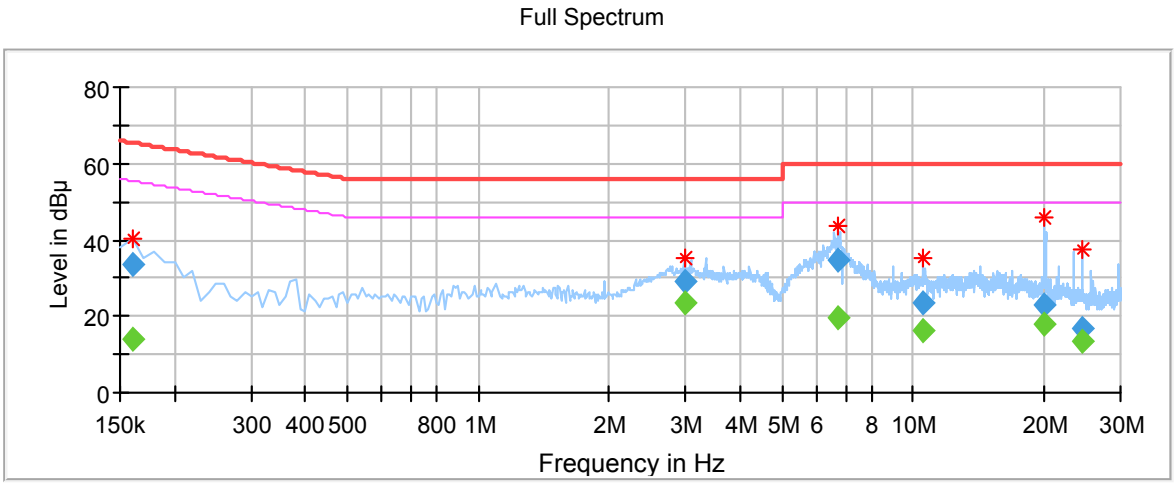
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	55 %
ATM Pressure:	101.1kPa

The testing was performed by Ada Yu on 2017-02-14.

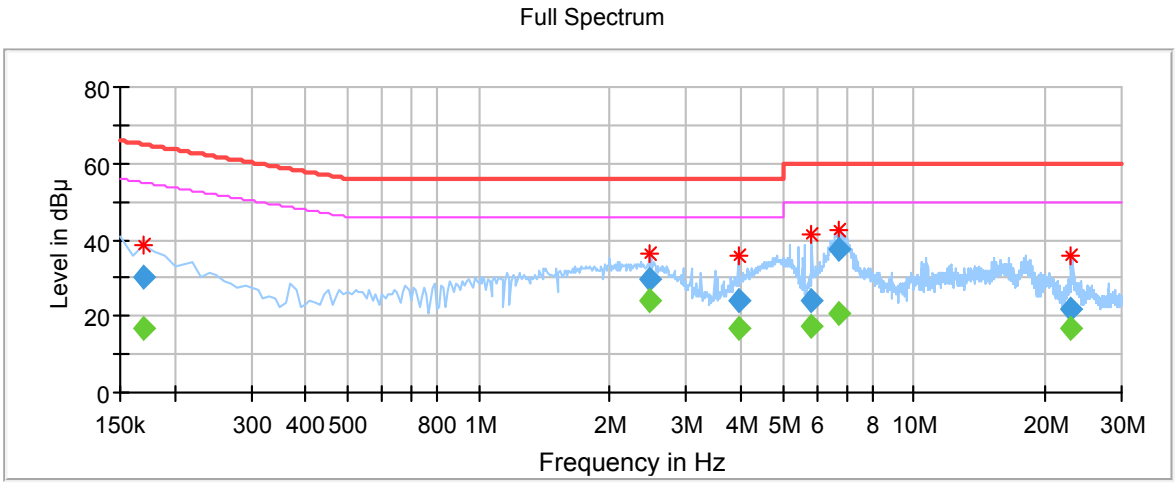
EUT operation mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.160000	---	13.83	9.000	L1	10.0	41.63	55.46	Compliance
0.160000	33.33	---	9.000	L1	10.0	32.13	65.46	Compliance
2.980000	---	23.24	9.000	L1	9.8	22.76	46.00	Compliance
2.980000	29.28	---	9.000	L1	9.8	26.72	56.00	Compliance
6.710000	---	19.59	9.000	L1	9.9	30.41	50.00	Compliance
6.710000	34.88	---	9.000	L1	9.9	25.12	60.00	Compliance
10.570000	---	16.24	9.000	L1	10.0	33.76	50.00	Compliance
10.570000	23.69	---	9.000	L1	10.0	36.31	60.00	Compliance
20.070000	---	17.70	9.000	L1	10.3	32.30	50.00	Compliance
20.070000	22.69	---	9.000	L1	10.3	37.31	60.00	Compliance
24.580000	---	13.37	9.000	L1	10.4	36.63	50.00	Compliance
24.580000	16.69	---	9.000	L1	10.4	43.31	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.170000	---	16.86	9.000	N	10.0	38.10	54.96	Compliance
0.170000	30.34	---	9.000	N	10.0	34.62	64.96	Compliance
2.470000	---	23.84	9.000	N	9.8	22.16	46.00	Compliance
2.470000	29.86	---	9.000	N	9.8	26.14	56.00	Compliance
3.940000	---	16.52	9.000	N	9.8	29.48	46.00	Compliance
3.940000	23.99	---	9.000	N	9.8	32.01	56.00	Compliance
5.830000	---	17.26	9.000	N	9.8	32.74	50.00	Compliance
5.830000	24.15	---	9.000	N	9.8	35.85	60.00	Compliance
6.750000	---	20.64	9.000	N	9.8	29.36	50.00	Compliance
6.750000	37.71	---	9.000	N	9.8	22.29	60.00	Compliance
22.940000	---	17.04	9.000	N	10.1	32.96	50.00	Compliance
22.940000	21.95	---	9.000	N	10.1	38.05	60.00	Compliance

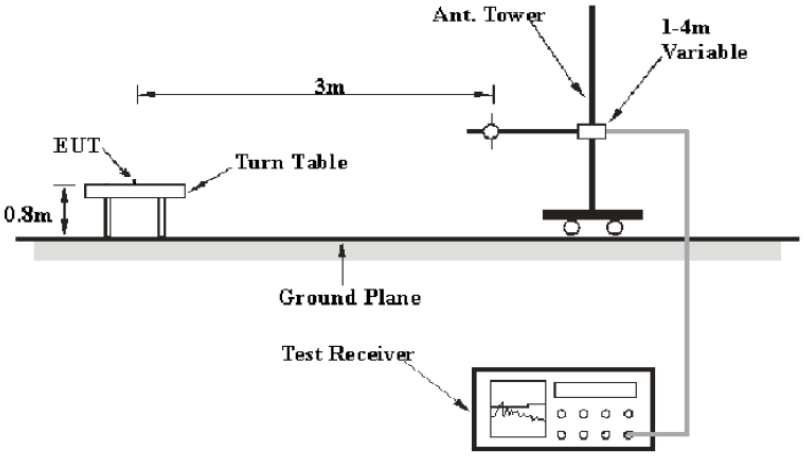
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

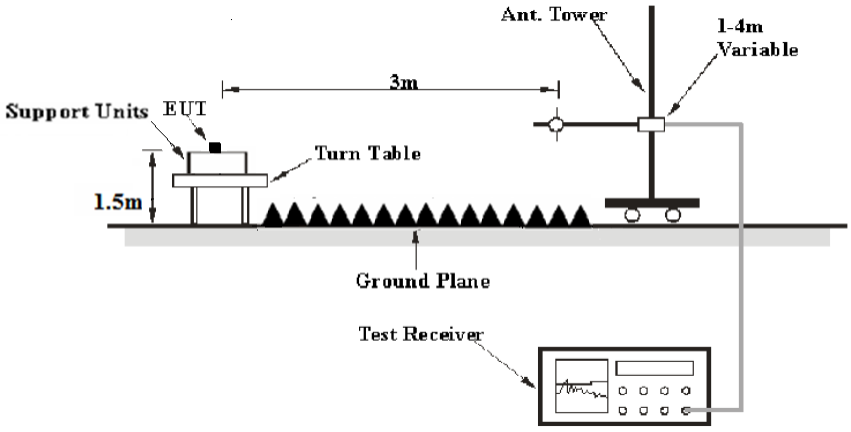
FCC §15.247 (d); §15.209; §15.205;

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.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2kPa

The testing was performed by Ada Yu on 2017-02-14 & 2017-02-15.

EUT operation mode: Transmitting

1GHz-25GHz

802.11b Mode:

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel (2412 MHz)									
44.11	35.16	QP	155	234	V	-7.46	27.70	40.00	12.30
81.26	36.37	QP	74	173	V	-11.14	25.23	40.00	14.77
816.37	31.26	QP	307	133	V	4.40	35.66	46.00	10.34
2412.00	108.26	PK	345	164	V	-6.17	102.09	/	/
2412.00	106.09	Ave	346	160	V	-6.17	99.92	/	/
2412.00	107.26	PK	60	135	H	-6.17	101.09	/	/
2412.00	105.09	Ave	303	240	H	-6.17	98.92	/	/
2390.00	45.22	PK	117	157	V	-6.22	39.00	74.00	35.00
2390.00	44.59	Ave	74	133	V	-6.22	38.37	54.00	15.63
2400.00	48.98	PK	196	115	V	-6.19	42.79	74.00	31.21
2400.00	46.13	Ave	180	198	V	-6.19	39.94	54.00	14.06
4824.00	42.13	PK	266	130	H	1.66	43.79	74.00	30.21
4824.00	42.66	Ave	324	137	H	1.66	44.32	54.00	9.68
7236.00	41.23	PK	174	212	H	7.58	48.81	74.00	25.19
7236.00	41.59	Ave	157	104	H	7.58	49.17	54.00	4.83
Middle Channel (2437 MHz)									
44.11	35.23	QP	323	177	V	-7.46	27.77	40.00	12.23
81.26	36.68	QP	179	153	V	-11.14	25.54	40.00	14.46
816.37	31.86	QP	209	109	V	4.40	36.26	46.00	9.74
2437.00	109.29	PK	195	149	V	-6.11	103.18	/	/
2437.00	107.03	Ave	105	160	V	-6.11	100.92	/	/
2437.00	108.37	PK	221	146	H	-6.11	102.26	/	/
2437.00	106.11	Ave	122	212	H	-6.11	100.00	/	/
4874.00	43.21	PK	130	201	V	1.77	44.98	74.00	29.02
4874.00	42.98	Ave	350	148	V	1.77	44.75	54.00	9.25
7311.00	41.26	PK	85	183	H	7.66	48.92	74.00	25.08
7311.00	42.11	Ave	351	195	H	7.66	49.77	54.00	4.23

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel (2462 MHz)									
44.11	35.56	QP	341	216	V	-7.46	28.10	40.00	11.90
81.26	36.87	QP	151	130	V	-11.14	25.73	40.00	14.27
816.37	31.23	QP\	34	216	V	4.40	35.63	46.00	10.37
2462.00	107.36	PK	189	191	V	-6.06	101.30	/	/
2462.00	105.21	Ave	34	121	V	-6.06	99.15	/	/
2462.00	106.52	PK	297	106	H	-6.06	100.46	/	/
2462.00	104.37	Ave	235	153	H	-6.06	98.31	/	/
2483.50	44.26	PK	116	116	V	-6.01	38.25	74.00	35.75
2483.50	45.13	Ave	43	151	V	-6.01	39.12	54.00	14.88
4924.00	42.35	PK	303	133	H	1.89	44.24	74.00	29.76
4924.00	42.67	Ave	225	196	H	1.89	44.56	54.00	9.44
7386.00	41.37	PK	247	227	H	7.73	49.10	74.00	24.90
7386.00	41.29	Ave	16	222	H	7.73	49.02	54.00	4.98

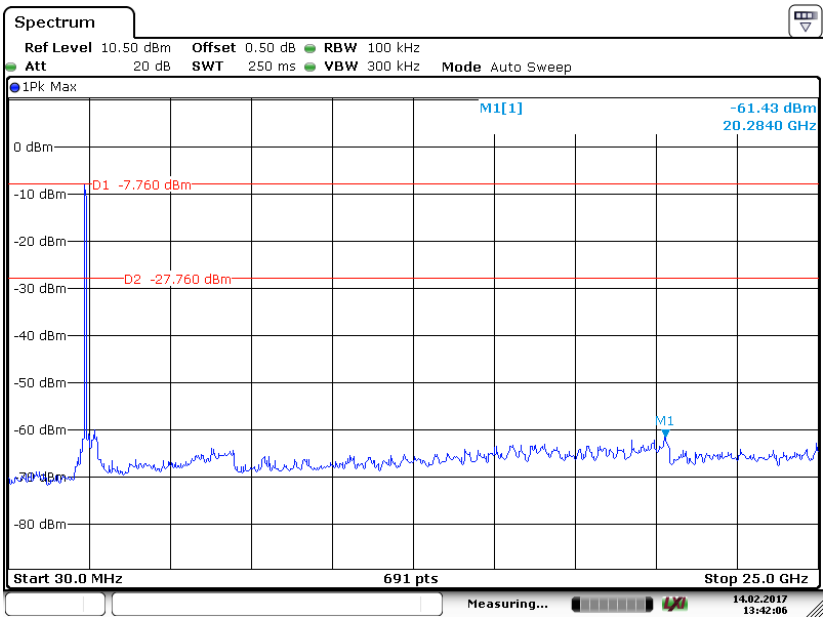
802.11g Mode:

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel (2412 MHz)									
43.19	36.28	QP	347	210	V	-6.89	29.39	40.00	10.61
82.69	36.75	QP	136	129	V	-11.17	25.58	40.00	14.42
829.37	31.24	QP	192	241	V	4.50	35.74	46.00	10.26
2412.00	108.42	PK	330	192	V	-6.17	102.25	/	/
2412.00	105.00	Ave	310	163	V	-6.17	98.83	/	/
2412.00	107.42	PK	202	144	H	-6.17	101.25	/	/
2412.00	104.00	Ave	293	249	H	-6.17	97.83	/	/
2390.00	50.26	PK	76	173	V	-6.22	44.04	74.00	29.96
2390.00	48.37	Ave	52	227	V	-6.22	42.15	54.00	11.85
2400.00	55.75	PK	137	196	V	-6.19	49.56	74.00	24.44
2400.00	52.79	Ave	184	160	V	-6.19	46.60	54.00	7.40
4824.00	43.16	PK	298	211	H	1.66	44.82	74.00	29.18
4824.00	42.57	Ave	326	199	H	1.66	44.23	54.00	9.77
7236.00	42.27	PK	169	236	H	7.58	49.85	74.00	24.15
7236.00	41.58	Ave	149	248	H	7.58	49.16	54.00	4.84

Frequency	Receiver		Turntable	Rx Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/205/209	
	Reading	Detector		Height	Polar			Limit	Margin
(MHz)	(dBµV)	(PK/QP/Ave.)	Degree	(cm)	(H/V)	(dB)	(dBµV/m)	(dB µ V/m)	(dB)
Middle Channel (2437 MHz)									
43.19	36.12	QP	22	199	V	-6.89	29.23	40.00	10.77
82.69	36.35	QP	100	171	V	-11.17	25.18	40.00	14.82
829.37	31.96	QP	192	170	V	4.50	36.46	46.00	9.54
2437.00	108.75	PK	254	115	V	-6.11	102.64	/	/
2437.00	105.01	Ave	217	177	V	-6.11	98.90	/	/
2437.00	107.83	PK	67	138	H	-6.11	101.72	/	/
2437.00	104.09	Ave	141	241	H	-6.11	97.98	/	/
4874.00	43.89	PK	320	203	V	1.77	45.66	74.00	28.34
4874.00	42.11	Ave	347	112	V	1.77	43.88	54.00	10.12
7311.00	42.31	PK	24	199	H	7.66	49.97	74.00	24.03
7311.00	41.12	Ave	224	126	H	7.66	48.78	54.00	5.22
High Channel (2462 MHz)									
43.19	36.85	QP	8	179	V	-6.89	29.96	40.00	10.04
82.69	36.96	QP	240	162	V	-11.17	25.79	40.00	14.21
829.37	31.68	QP	224	194	V	4.50	36.18	46.00	9.82
2462.00	108.82	PK	50	117	V	-6.06	102.76	/	/
2462.00	105.47	Ave	237	241	V	-6.06	99.41	/	/
2462.00	107.98	PK	24	172	H	-6.06	101.92	/	/
2462.00	104.63	Ave	156	192	H	-6.06	98.57	/	/
2483.50	42.11	PK	201	123	V	-6.01	36.10	74.00	37.90
2483.50	42.13	Ave	306	155	V	-6.01	36.12	54.00	17.88
4924.00	43.67	PK	280	144	H	1.89	45.56	74.00	28.44
4924.00	42.13	Ave	151	105	H	1.89	44.02	54.00	9.98
7386.00	42.39	PK	223	199	H	7.73	50.12	74.00	23.88
7386.00	42.12	Ave	350	179	H	7.73	49.85	54.00	4.15

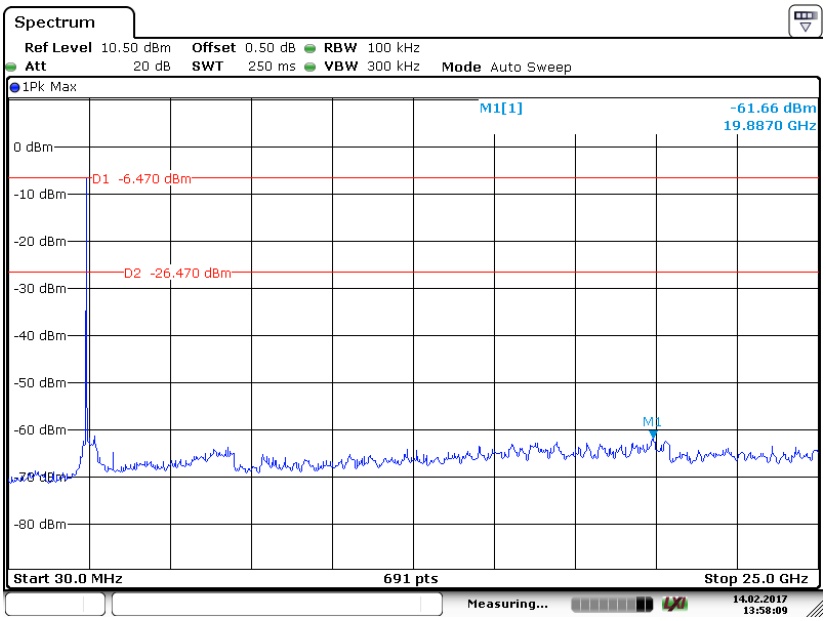
Conducted Spurious Emissions at Antenna Port

802.11b Low Channel



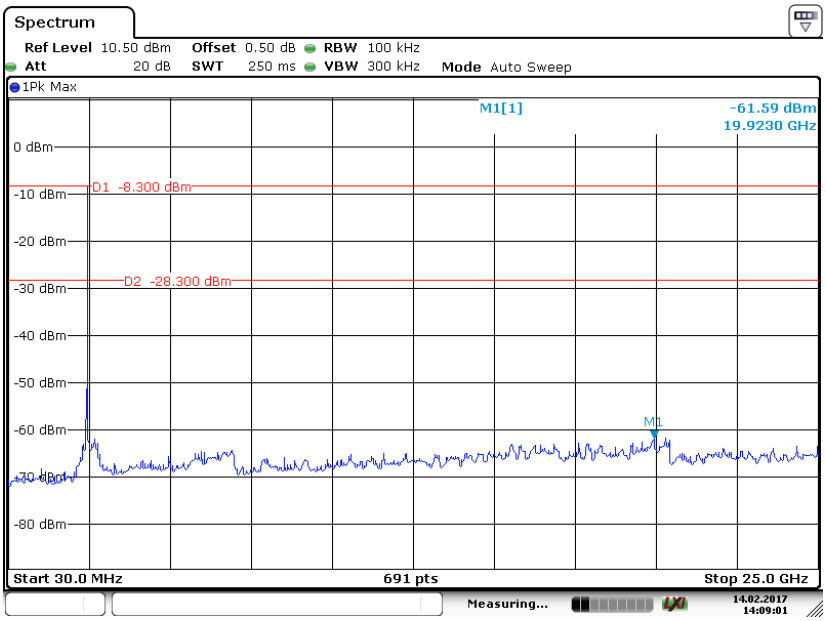
Date: 14.FEB.2017 13:42:07

802.11b Middle Channel



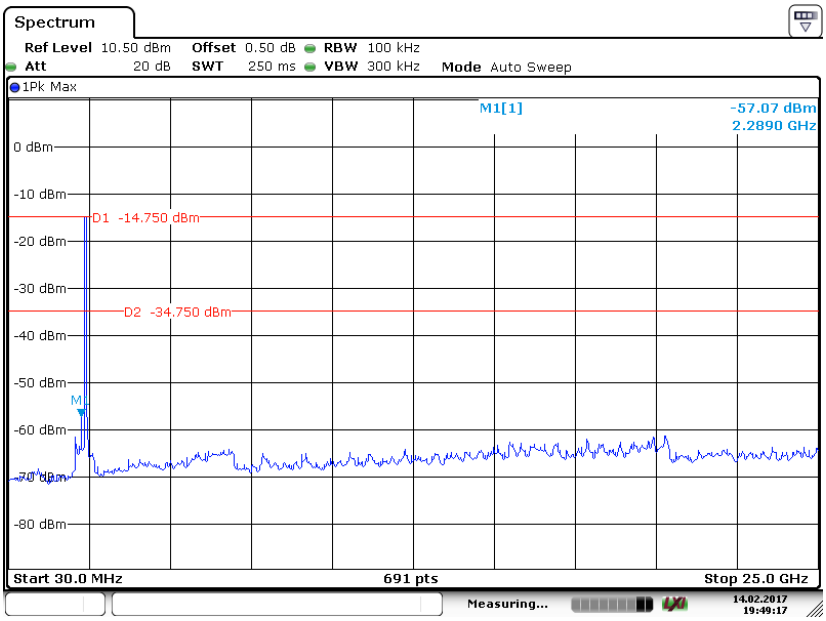
Date: 14.FEB.2017 13:58:09

802.11b High Channel



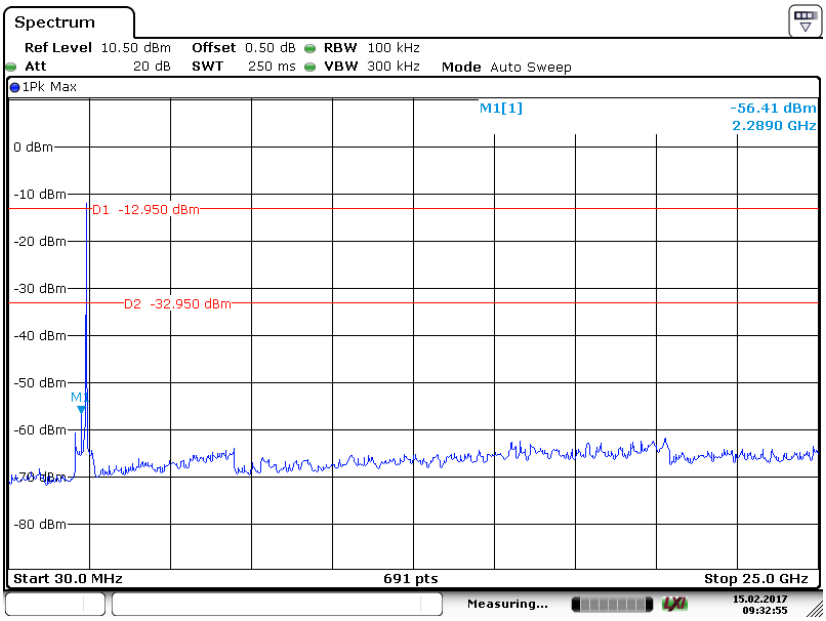
Date: 14.FEB.2017 14:09:01

802.11g Low Channel



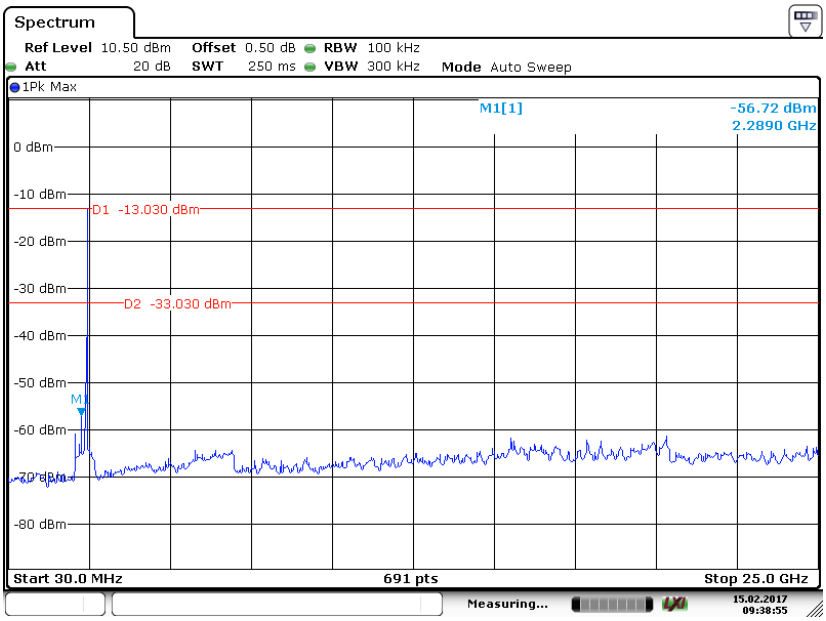
Date: 14.FEB.2017 19:49:17

802.11g Middle Channel



Date: 15.FEB.2017 09:32:55

802.11g High Channel



Date: 15.FEB.2017 09:38:55

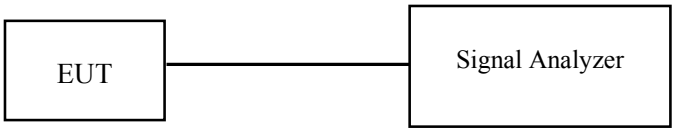
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2017-02-14 & 2017-02-15.

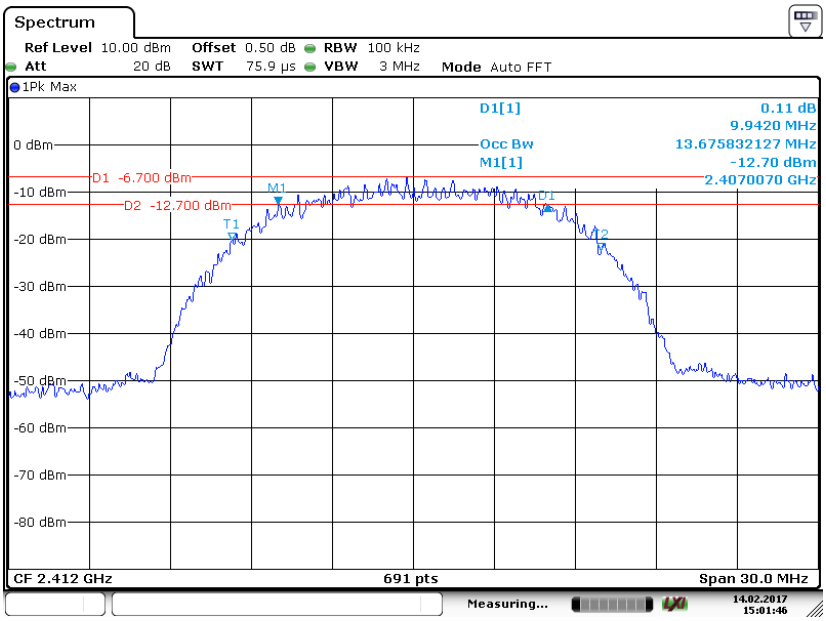
Test Result: Pass.

Please refer to the following tables and plots.

EUT operation mode: Transmitting

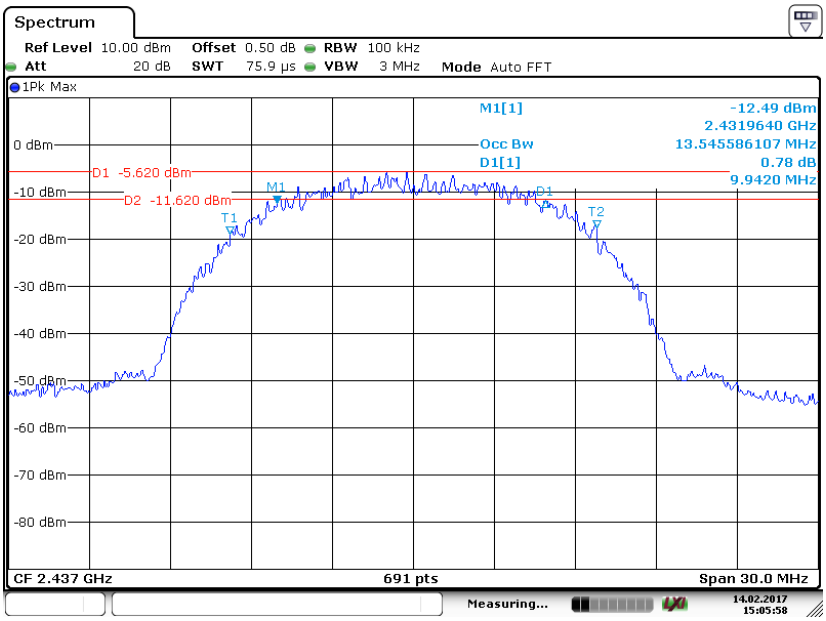
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b mode			
Low	2412	9.94	≥0.5
Middle	2437	9.94	≥0.5
High	2462	9.90	≥0.5
802.11g mode			
Low	2412	16.39	≥0.5
Middle	2437	16.41	≥0.5
High	2462	16.41	≥0.5

802.11b Low Channel



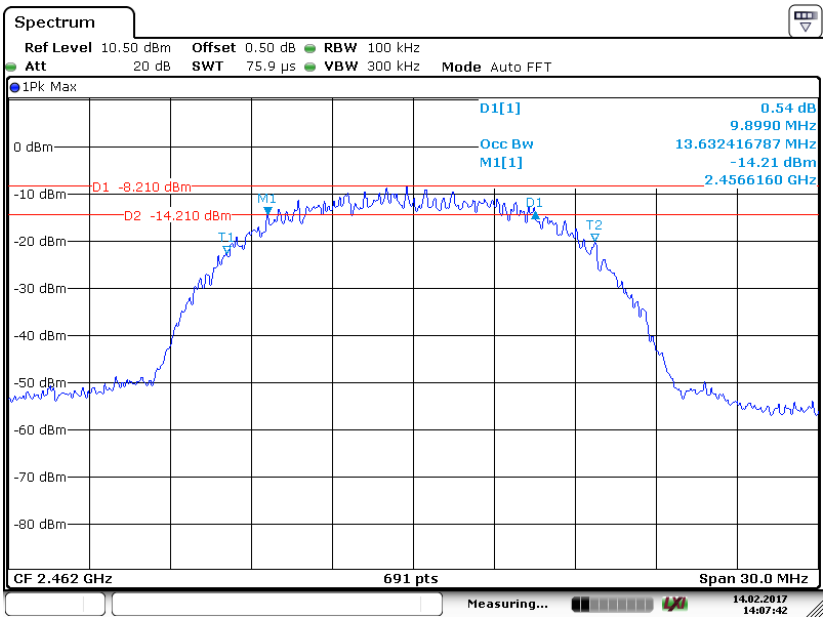
Date: 14.FEB.2017 15:01:47

802.11b Middle Channel



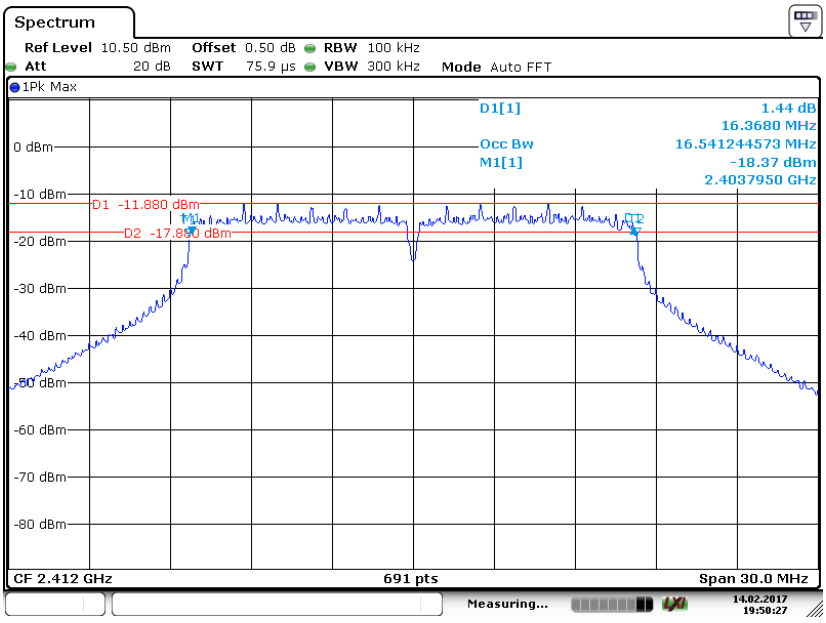
Date: 14.FEB.2017 15:05:58

802.11b High Channel



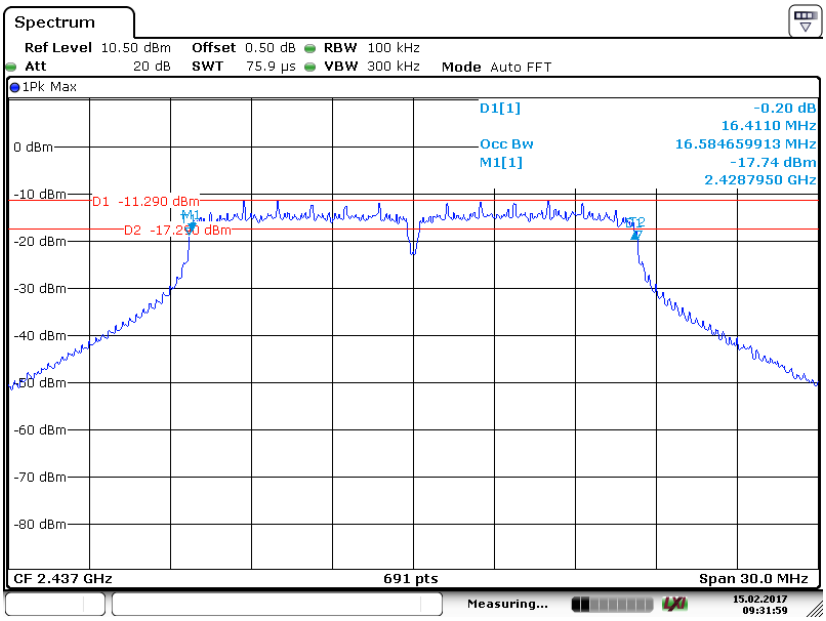
Date: 14.FEB.2017 14:07:42

802.11g Low Channel



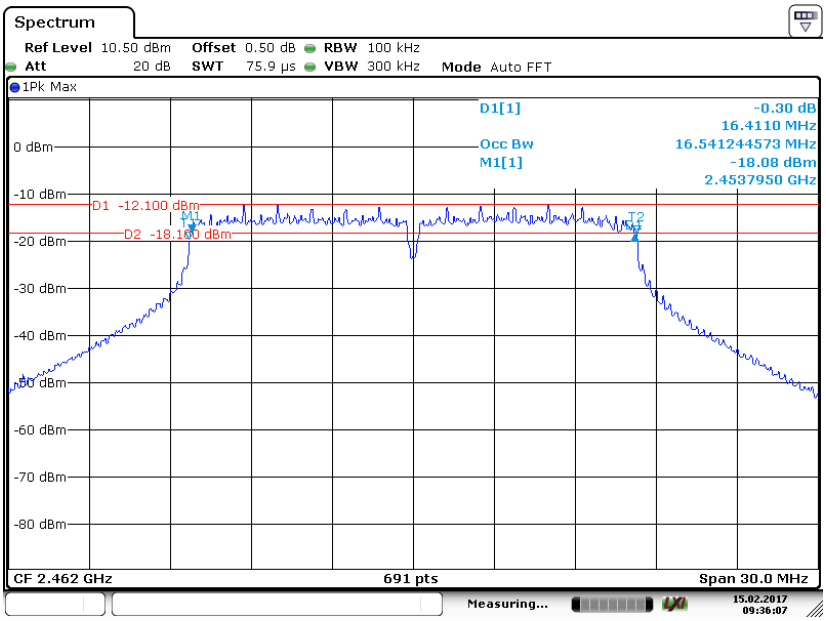
Date: 14.FEB.2017 19:50:27

802.11g Middle Channel



Date: 15.FEB.2017 09:31:59

802.11g High Channel



Date: 15.FEB.2017 09:36:07

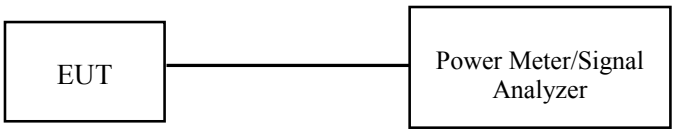
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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:	23.8℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

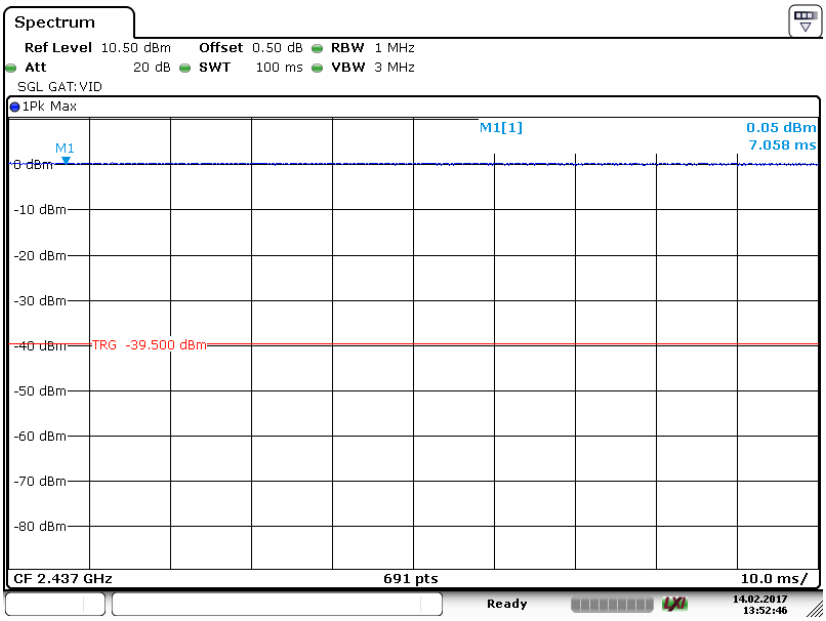
The testing was performed by Ada Yu on2017-02-14 & 2017-02-15.

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Conducted Average Output Power Reading (dBm)	Corrected Factor 10log(1/x) (dB)	Conducted Average Output Power (dBm)	Limit (dBm)	Result
802.11b							
Low	2412	8.34	6.17	0.00	6.17	30	Pass
Middle	2437	9.33	7.07	0.00	7.07	30	Pass
High	2462	7.37	5.22	0.00	5.22	30	Pass
802.11g							
Low	2412	8.50	5.08	0.00	5.08	30	Pass
Middle	2437	8.79	5.05	0.00	5.05	30	Pass
High	2462	8.83	5.48	0.00	5.48	30	Pass

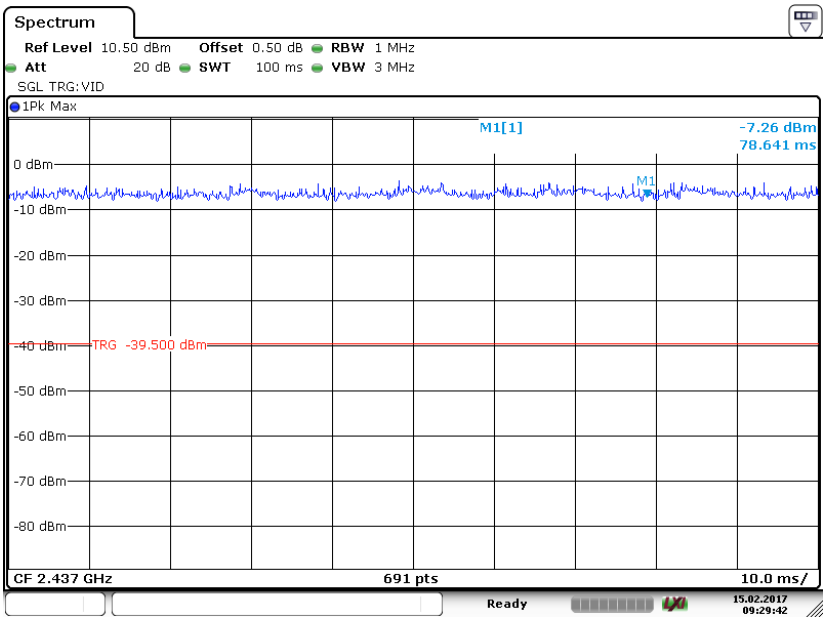
Note: x is the duty cycle. For 802.11b: x=1.0, 802.11g: x=1.0
Conducted Average Output Power= Reading+ Corrected Factor
The reading value is reading from the test software.

802.11b Mode Middle Channel duty cycle



Date: 14.FEB.2017 13:52:46

802.11g Mode Middle Channel duty cycle



Date: 15.FEB.2017 09:29:43

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

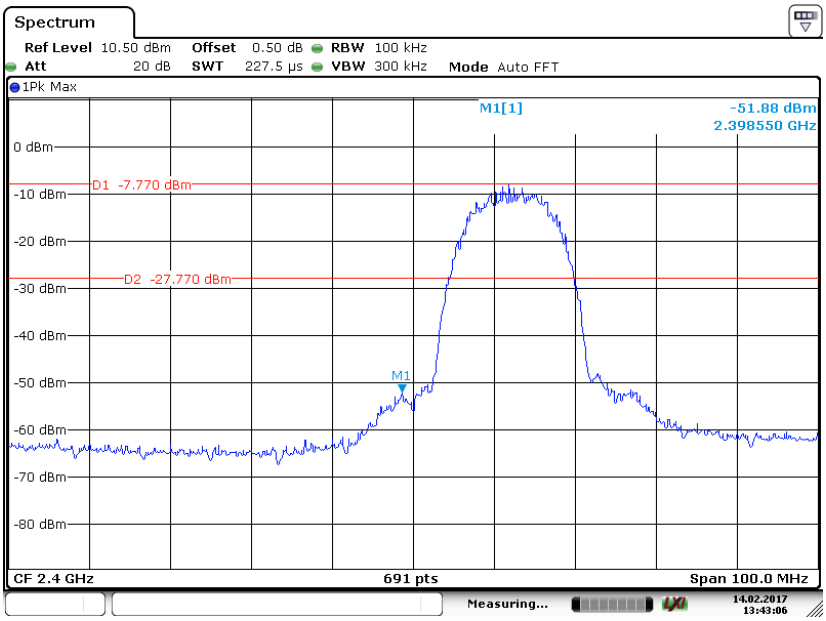
Temperature:	24.3 ℃
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

The testing was performed by Ada Yu on 2017-02-14 & 2017-02-15.

Test Result: *Compliance*

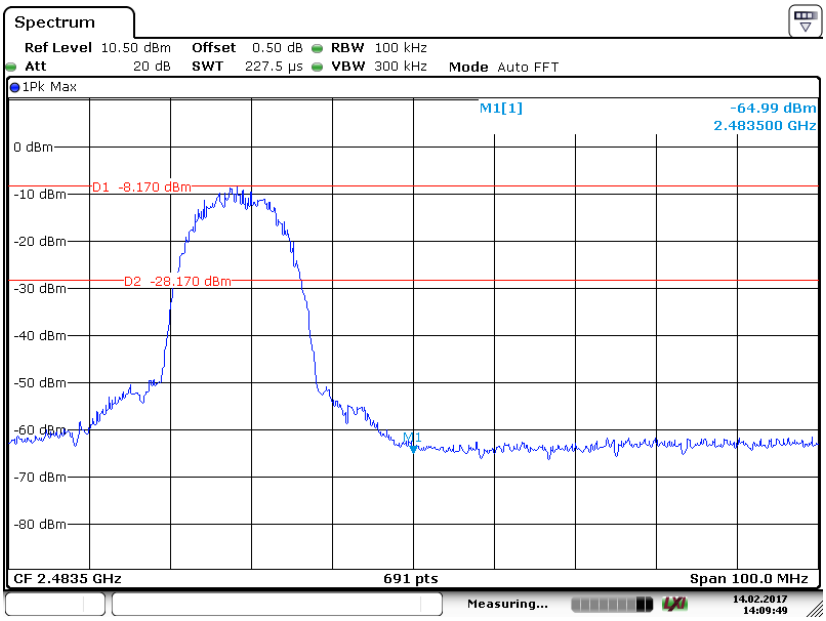
Please refer to the following table and plots.

802.11b: Band Edge, Left Side



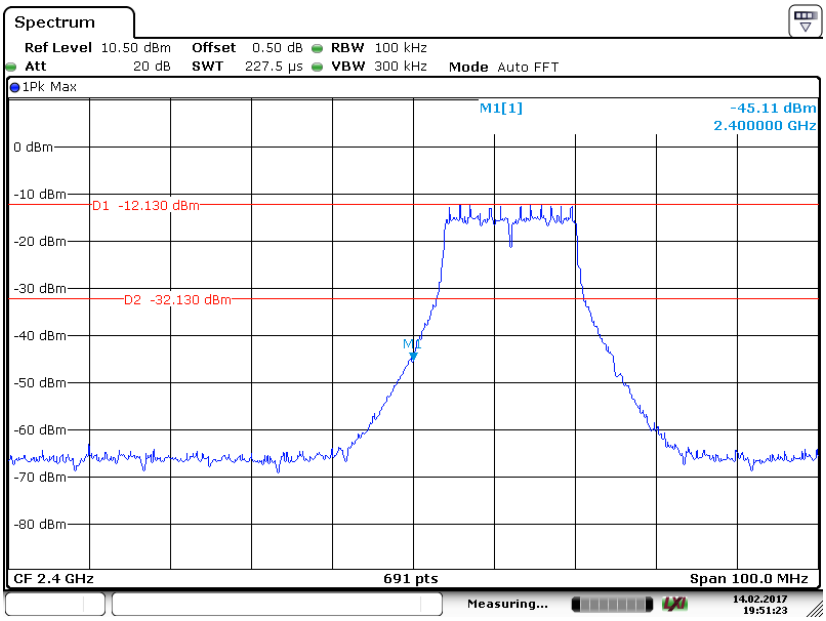
Date: 14.FEB.2017 13:43:06

802.11b: Band Edge, Right Side



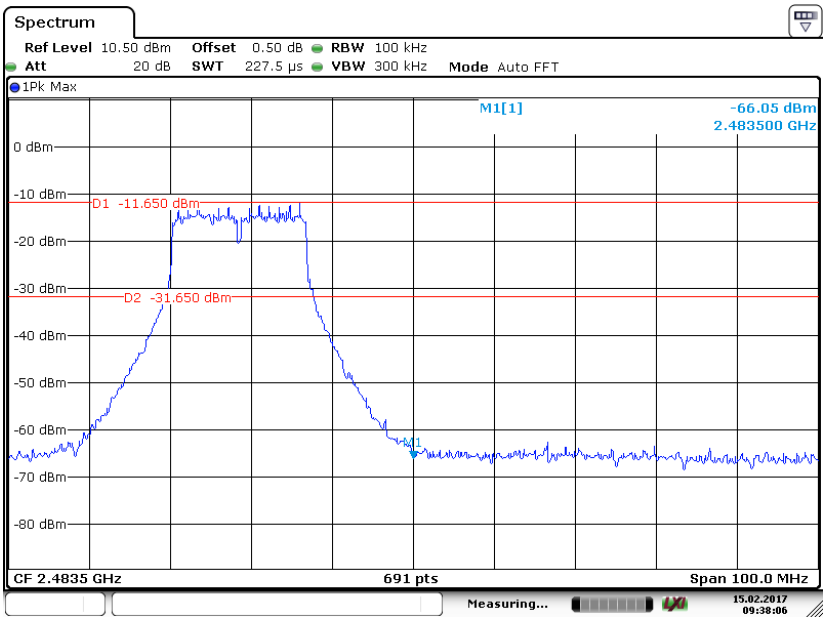
Date: 14.FEB.2017 14:09:49

802.11g: Band Edge, Left Side



Date: 14.FEB.2017 19:51:24

802.11g: Band Edge, Right Side



Date: 15.FEB.2017 09:38:07

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 v03r05.

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:	24.1 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

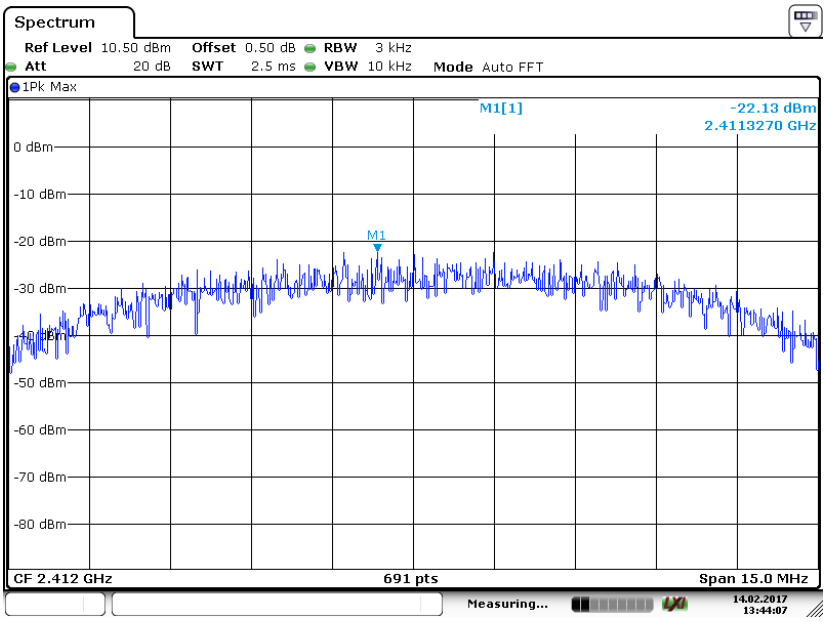
The testing was performed by Ada Yu on 2017-02-14 & 2017-02-15.

EUT operation mode: Transmitting

Test Result: Pass

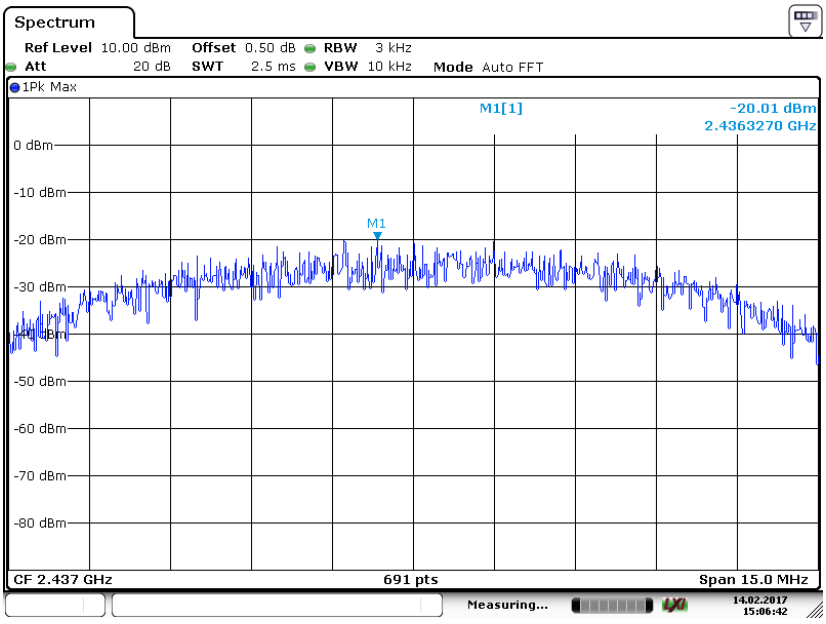
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-22.13	≤8
Middle	2437	-20.01	≤8
High	2462	-22.50	≤8
802.11g mode			
Low	2412	-25.23	≤8
Middle	2437	-24.03	≤8
High	2462	-24.46	≤8

Power Spectral Density , 802.11b Low Channel



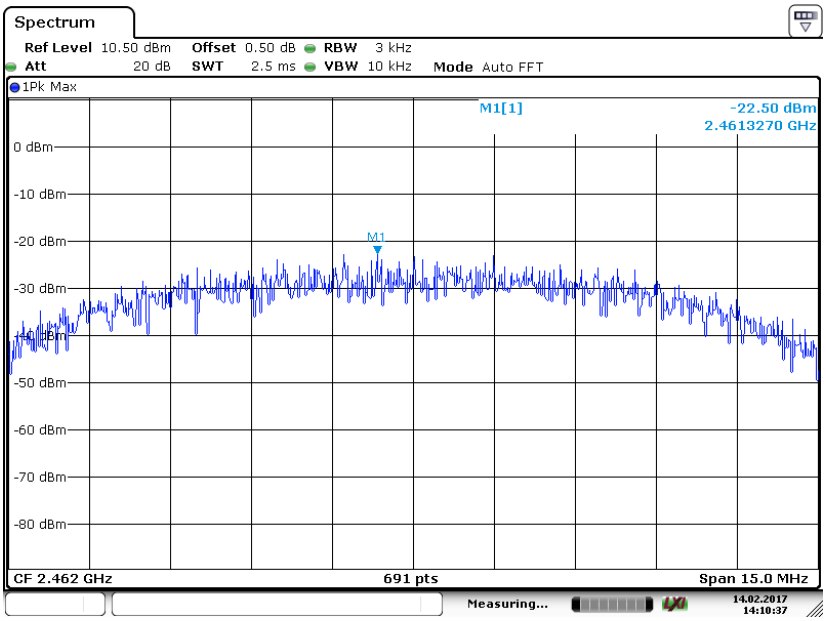
Date: 14.FEB.2017 13:44:08

Power Spectral Density , 802.11b Middle Channel



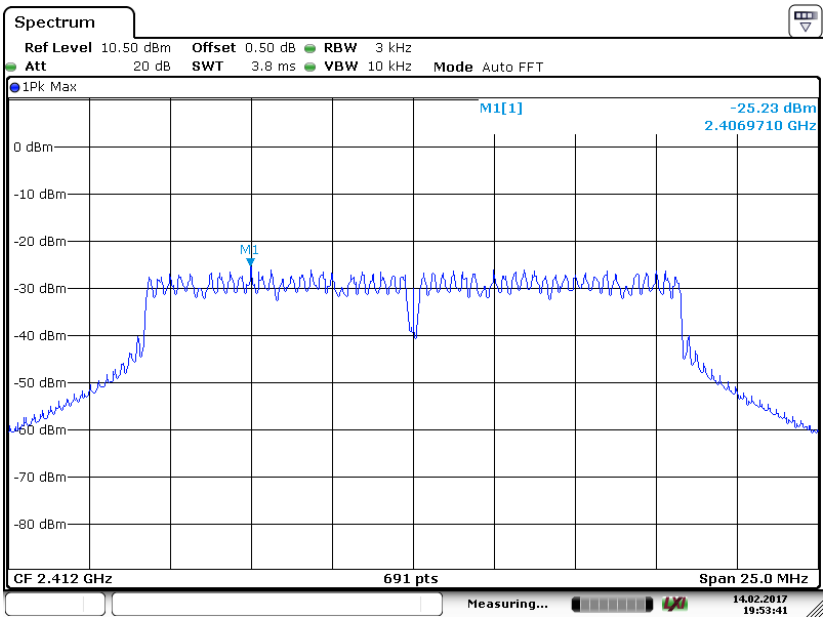
Date: 14.FEB.2017 15:06:41

Power Spectral Density , 802.11b High Channel



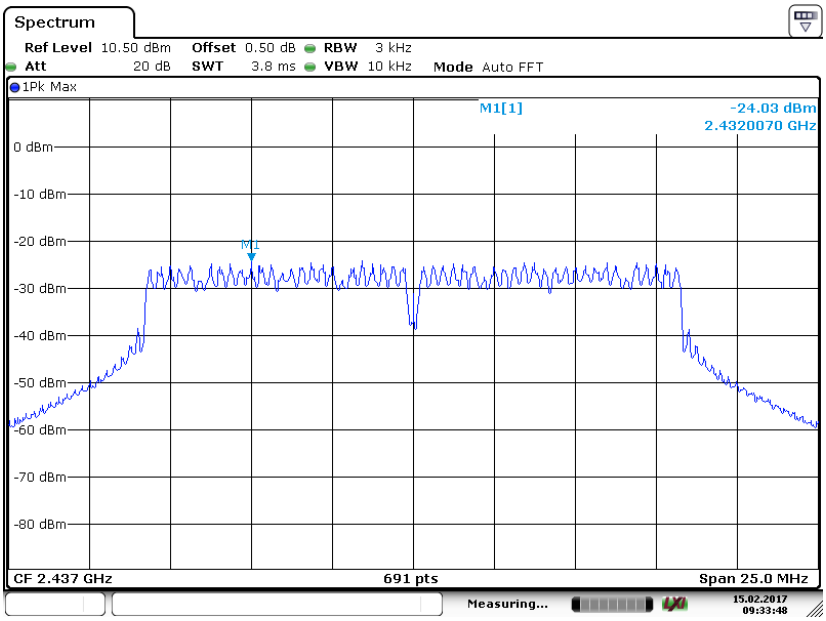
Date: 14.FEB.2017 14:10:37

Power Spectral Density , 802.11g Low Channel



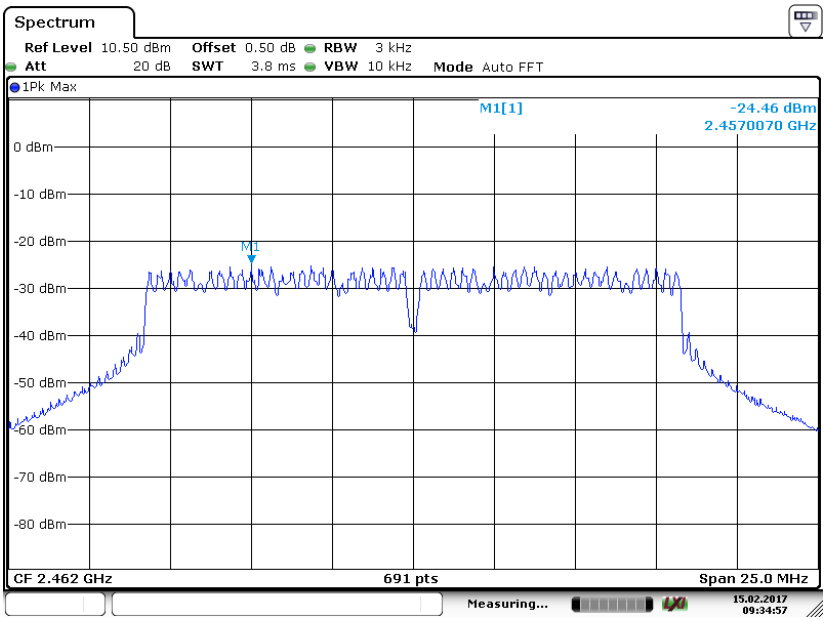
Date: 14.FEB.2017 19:53:41

Power Spectral Density , 802.11g Middle Channel



Date: 15.FEB.2017 09:33:48

Power Spectral Density , 802.11g High Channel



Date: 15.FEB.2017 09:34:57

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