FCC Part 15.247

TEST REPORT

For

Alatech Technology Limited

39F.,No.758,Jungming S. RD, Taichung, Taiwan, R.O.C.

Model: WBCP1NBNC
FCC ID: YQOWBCP1NBNC

Report Type:	**Product Type:**
Original Report	Compete

Test Engineer: David Hsu

Report Number: RTWA160704001-00A

Report Date: 2016-07-12

Reviewed By: Jerry Chang

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REVISION HISTORY

Revision	Issue Date	Description
1.0	2016.07.12	Original

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1 General Information

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Alatech Technology Limited 39F.,No.758,Jungming S. RD, Taichung, Taiwan, R.O.C.
Manufacturer:	Alatech Technology Limited 39F,No.758, JungMing S. Rd., South Dist., Taichung City 40255, Taiwan
Product:	Compete
Model:	WBCP1NBNC
Trade Name:	nabi
Frequency Range:	2402-2480 MHz
Transmit Power:	BT BLE Mode: -0.59 dBm
Modulation Technique:	BT BLE Mode: GFSK
Transmit Data Rate:	BT BLE Mode: 1 Mbps
Number of Channels:	BT BLE Mode: 40 Channels
Antenna Specification:	Chip Antenna/Gain: 5.05 dBi
Voltage Range:	3Vdc from Battery
Date of Test:	July 04, 2016~July 12, 2016

**All measurement and test data in this report was gathered from production sample serial number: 16070401 (Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2016-07-04 Designation Number: TW1101*

1.2 Objective

This report is prepared on behalf of *Alatech Technology Limited* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

N/A

1.4 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

1.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on the 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Test site at Bay Area Compliance Laboratories Corp. (Taiwan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 431084. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

2 System Test Configuration

2.1 Description of Test Configuration

For BT BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2442
2	2404	--	--
3	2406	--	--
4	2408	38	2476
--	--	39	2478
20	2440	40	2480

2.2 Equipment Modifications

No modification was made to the EUT

2.3 EUT Exercise Software

N/A

2.4 Support Equipment List and Details

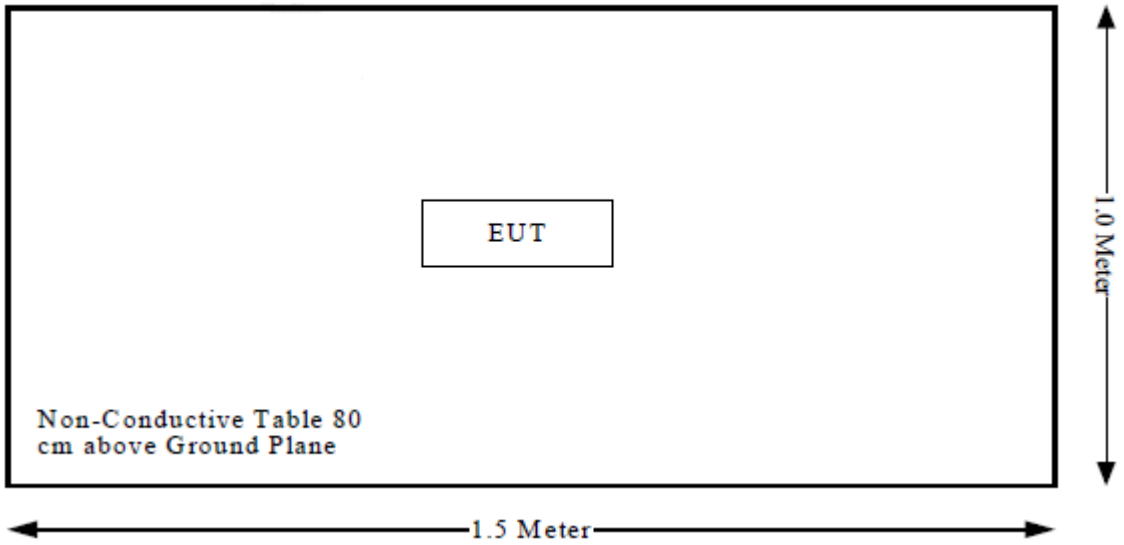
No.	Description	Manufacturer	Model N0.	Data Cable				Power Cable	
				Name	Length	Shielded	With Core	Length	Shielded
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.5 External Cable List and Details

Cable Description	Length (m)	From	To
N/A	N/A	N/A	N/A

2.6 Block Diagram of Test Setup

See test photographs attached in Exhibit A for the actual connections between EUT and support equipment.



3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Not Applicable
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 FCC §15.247(i) - RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i)

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.

According to KDB 447498 D01 General RF Exposure Guidance, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances
≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·
[√ f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

4.2 RF Exposure Evaluation Result

FCC
Worse case:

Frequency (MHz)	Tune-up Power		Evaluation Distance (mm)	SAR Exclusion Result	Extremity SAR Exclusion Limit (10g SAR)
	(dBm)	(mW)			
2480	0	1	5	0.31	7.5

Result: SAR test is exempted.

5 FCC §15.203 – Antenna Requirements

5.1 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.

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 does not exceed 5.05 dBi.

5.2 Antenna List and Details

Manufacturer	Model	Type	Antenna Gain	Result
YAGEO	ANT3216LL00R2400A	Chip Antenna	5.05 dBi	Compliance

The EUT has one integral antenna arrangement, which was permanently attached; fulfill the requirement of this section. Please refer to the internal photos.

6 FCC §15.209, §15.205 , §15.247(d) – Spurious Emissions

6.1 Applicable Standard

FCC§15.247 (d); §15.209; §15.205

6.2 Measurement Uncertainty

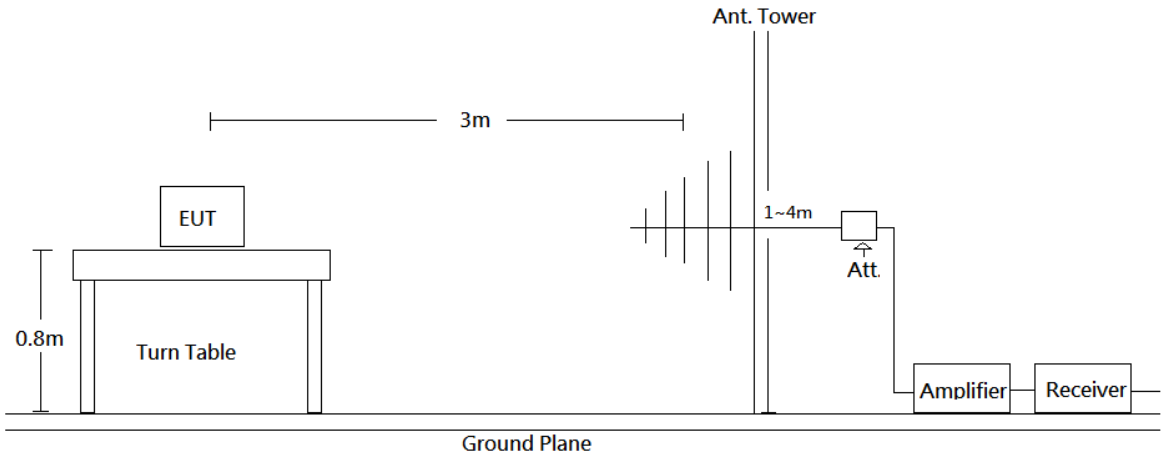
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency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

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Taiwan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report.

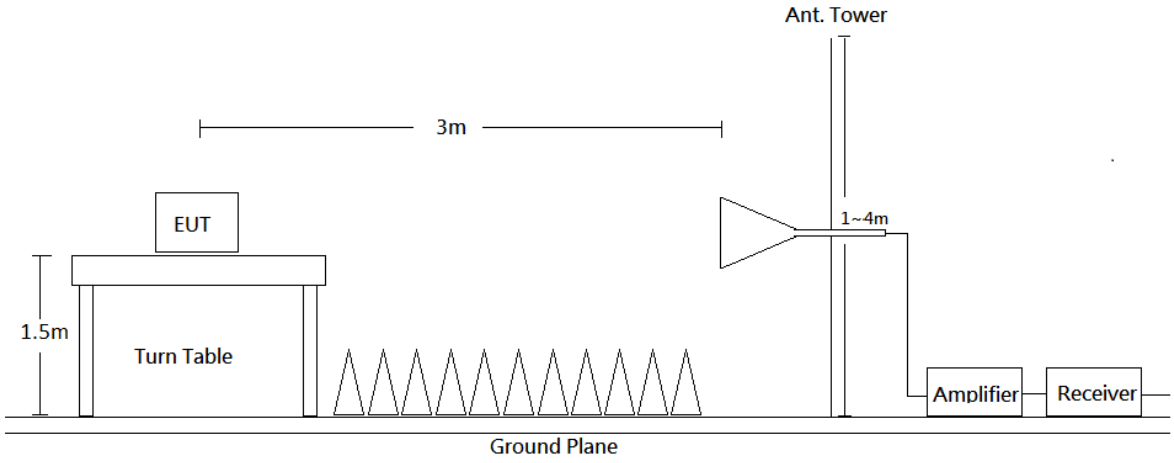
Frequency	Measurement uncertainty
30 MHz~200 MHz	4.21 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.41 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.51 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	4.88 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.30 dB (k=2, 95% level of confidence)
26 GHz~40 GHz	4.30 dB (k=2, 95% level of confidence)

6.3 EUT Setup

Blow 1 GHz:



Above 1 GHz:



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

6.4 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Set RBW = 1 MHz, VBW= 3MHz for f > 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Frequency Range	RBW	VBW	IF BW	Detector
30-1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave

6.5 Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

6.6 Corrected Factor & Margin Calculation

The Correct Factor 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:

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain + Attenuator

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 = Result –Limit

6.7 Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.209 Limit. Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$Lm + U(Lm) \leq Llim + Ucispr$

In BACL, U(Lm) is less than Ucispr, if Lm is less than Llim, it implies that the EUT complies with the limit.

6.8 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Interval
Broadband Antenna	Sunol Sciences	JB6	A050115	2015/12/8	2016/12/7
EMEC Attenuator	EMEC	UNAT-6+	15542	2015/12/8	2016/12/7
Pre Amplifier	Sonoma	310N	130601	2016/7/3	2017/7/2
Horn Antenna	EMCO	3115	9311-4158	2016/5/10	2017/5/9
Horn Antenna	ETS-Lindgren	3116	00062638	2015/9/7	2016/9/6
Preamplifier	EMEC	EM01G18G	060657	2015/12/21	2016/12/20
Preamplifier	EMEC	EM18G40G	060656	2015/12/21	2016/12/20
Active Loop Antenna	ETS-Lindgren	6502	00035796	2016/7/23	2017/7/22
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2015/11/4	2016/11/3
Mircoflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2015/11/4	2016/11/3
Mircoflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2016/7/3	2017/7/2
Mircoflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2015/12/2	2016/12/1
Spectrum Analyzer	Rohde & Schwarz	FSEK30	825084/006	2015/12/24	2016/12/23
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-80CM	160309-2	2016/3/24	2017/3/23
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-450CM	160309-1	2016/3/24	2017/3/23
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	060772	N.C.R	N.C.R
software	Rohde & Schwarz	EMC32	BACL-03A1	N.C.R	N.C.R

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

6.9 Test Environmental Conditions

Temperature:	25.2° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by David Hsu on 2016-07-11.

6.10 Test Results

Mode: Test Mode

Below 1 GHz, 2402 MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	30.69	26.63	-4.1	22.53	40	17.47	100	152	QP
2	127.69	29.01	-10.8	18.21	43.5	25.29	100	136	QP
3	199.75	27.21	-10.8	16.41	43.5	27.09	100	0	QP
4	285.66	27.91	-10.2	17.71	46	28.29	100	331	QP
5	626.55	27.92	-4	23.92	46	22.08	100	160	QP
6	922.40	27.7	1.7	29.4	46	16.6	100	87	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	30.00	29.13	-3.6	25.53	40	14.47	100	238	QP
2	34.85	30.01	-7.1	22.91	40	17.09	100	330	QP
3	39.01	33.93	-10.2	23.73	40	16.27	100	5	QP
4	200.44	27.62	-10.9	16.72	43.5	26.78	100	115	QP
5	454.03	29.45	-6.7	22.75	46	23.25	100	0	QP
6	690.99	29.28	-3.2	26.08	46	19.92	100	246	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

2442MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result	Limit	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
				(dBµV/m)					
1	30.69	26.05	-4.1	21.95	40	18.05	100	116	QP
2	133.24	28.33	-10.8	17.53	43.5	25.97	100	12	QP
3	201.83	27.54	-11.2	16.34	43.5	27.16	100	276	QP
4	318.23	27.82	-9.6	18.22	46	27.78	100	356	QP
5	688.91	28.76	-3.2	25.56	46	20.44	100	260	QP
6	957.74	26.29	2.6	28.89	46	17.11	100	168	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result	Limit	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
				(dBµV/m)					
1	31.39	27.6	-4.6	23	40	17	100	38	QP
2	34.85	28.56	-7.1	21.46	40	18.54	100	33	QP
3	39.01	33.97	-10.2	23.77	40	16.23	100	220	QP
4	169.96	29.11	-12.4	16.71	43.5	26.79	100	145	QP
5	270.42	28.41	-10.6	17.81	46	28.19	100	46	QP
6	530.24	28.97	-5.6	23.37	46	22.63	100	9	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

2480 MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	30.00	26.84	-3.6	23.24	40	16.76	100	9	QP
2	34.85	29.8	-7.1	22.7	40	17.3	100	180	QP
3	150.56	28.02	-11.4	16.62	43.5	26.88	100	18	QP
4	284.97	28.43	-10.3	18.13	46	27.87	100	9	QP
5	517.08	28.36	-5.7	22.66	46	23.34	100	13	QP
6	743.64	29.85	-2.3	27.55	46	18.45	100	139	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	30.69	26.91	-4.1	22.81	40	17.19	100	175	QP
2	36.24	29.4	-8.1	21.3	40	18.7	100	102	QP
3	39.01	33.98	-10.2	23.78	40	16.22	100	307	QP
4	201.83	27.64	-11.2	16.44	43.5	27.06	100	138	QP
5	454.03	29.72	-6.7	23.02	46	22.98	100	327	QP
6	729.09	28.98	-2.6	26.38	46	19.62	100	0	QP

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Above 1 GHz, 2402 MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2388.97	48.49	-5.3	43.19	74	30.81	100	261	PK
2	2388.97	38.42	-5.3	33.12	54	20.88	101	261	Ave.
3	2401.98	97.47	-5.2	92.27	NA	NA	100	273	PK
4	2401.98	94.28	-5.2	89.08	NA	NA	101	273	Ave.
5	4804.05	49.95	0.6	50.55	74	23.45	100	305	PK
6	4804.05	39.74	0.6	40.34	54	13.66	101	305	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2389.98	54.12	-5.3	48.82	74	25.18	100	52	PK
2	2389.98	48.79	-5.3	43.49	54	10.51	101	52	Ave.
3	2402.31	102.53	-5.2	97.33	NA	NA	100	58	PK
4	2402.31	98.73	-5.2	93.53	NA	NA	101	58	Ave.
5	4803.57	46.72	0.6	47.32	74	26.68	100	345	PK
6	4803.57	35.47	0.6	36.07	54	17.93	101	345	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

2442 MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2442.26	103.84	-5.1	98.74	NA	NA	100	231	PK
2	2442.26	98.31	-5.1	93.21	NA	NA	101	231	Ave.
3	4924.77	39.62	1.1	40.72	74	33.28	100	358	PK
4	4924.77	37.04	1.1	38.14	54	15.86	101	358	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2442.39	102.39	-5.1	97.29	NA	NA	100	125	PK
2	2442.39	97.56	-5.1	92.46	NA	NA	101	125	Ave.
3	4883.65	43.9	0.9	44.8	74	29.2	100	180	PK
4	4883.65	33.8	0.9	34.7	54	19.3	101	180	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

2480 MHz

Horizontal

NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2480.02	102.34	-5.1	97.33	NA	NA	100	128	PK
2	2480.02	99.72	-5.1	94.62	NA	NA	101	128	Ave.
3	2484.00	40.28	-5	35.28	74	38.72	100	234	PK
4	2484.00	33.63	-5	28.63	54	25.37	101	234	Ave.
3	4959.80	42.52	1.2	43.72	74	30.28	100	19	PK
4	4959.80	37.5	1.2	38.7	54	15.3	101	19	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Vertical

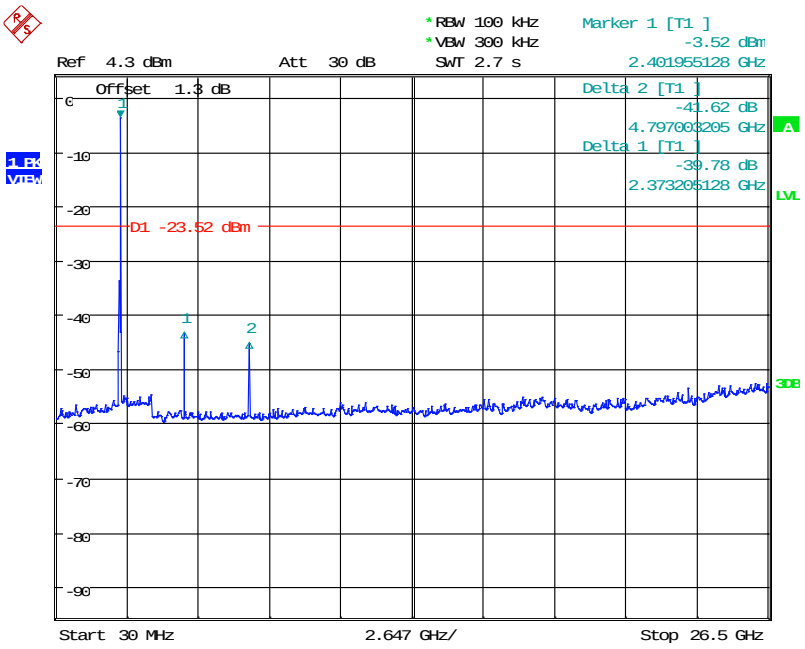
NO.	Frequency (MHz)	Reading (dBµV)	Cord. Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Ant. Height (cm)	Table Degree	Remark (PK/QP/Ave.)
1	2480.47	100.37	-5	95.37	NA	NA	100	236	PK
2	2480.47	97.15	-5	92.15	NA	NA	101	236	Ave.
3	2483.85	40.79	-5	35.79	74	38.21	100	288	PK
4	2483.85	32.66	-5	27.66	54	26.34	101	288	Ave.
5	4701.20	41.10	0.2	41.3	74	32.7	100	199	PK
6	4701.20	38.37	0.2	38.57	54	15.43	101	199	Ave.

Note: Result = Reading + Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

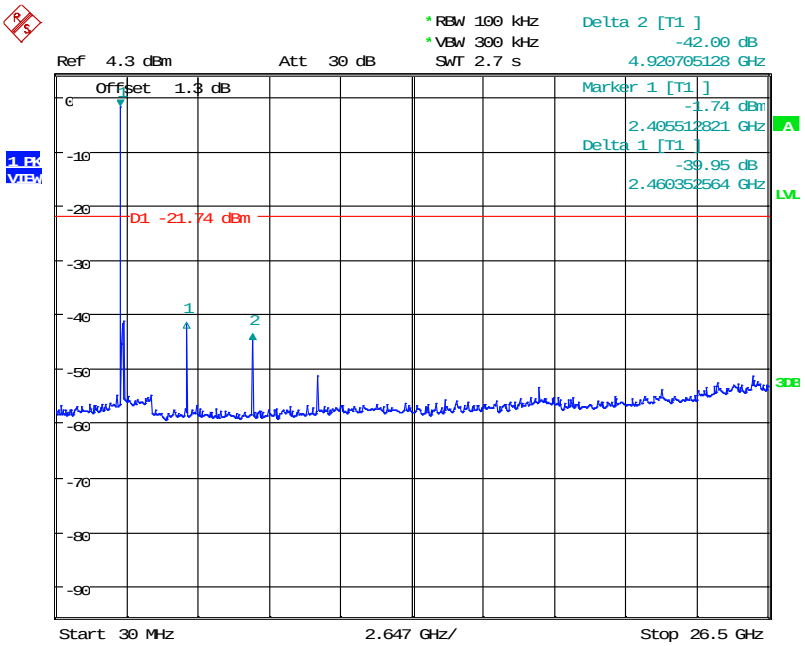
Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	RESULT
Low	2402	39.78	≥ 20	PASS
Mid	2442	39.95	≥ 20	PASS
High	2480	41.25	≥ 20	PASS

Low Channel



Middle Channel



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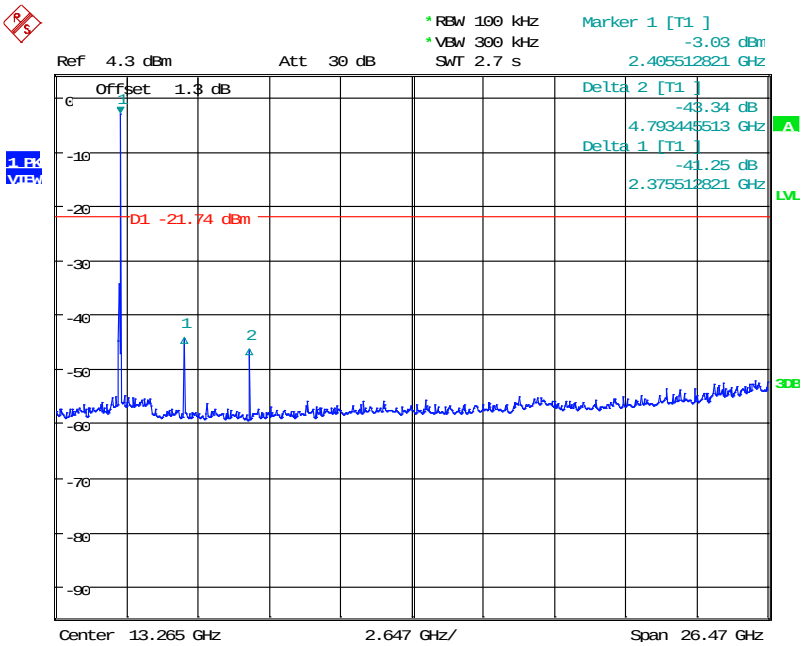
High Channel



Date: 7.JUL.2016 13:31:21

7 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

7.1 Applicable Standard

According to FCC §15.247(a) (2).

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.

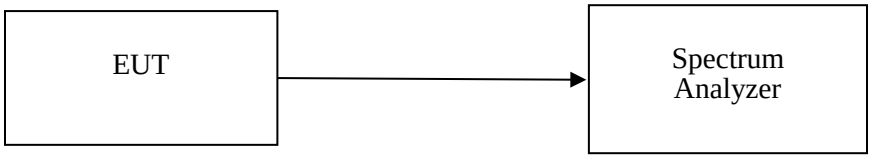
7.2 Test Procedure

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.



7.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	R & S	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	2015/12/18	2016/12/17

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

7.4 Test Environmental Conditions

Temperature:	26° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

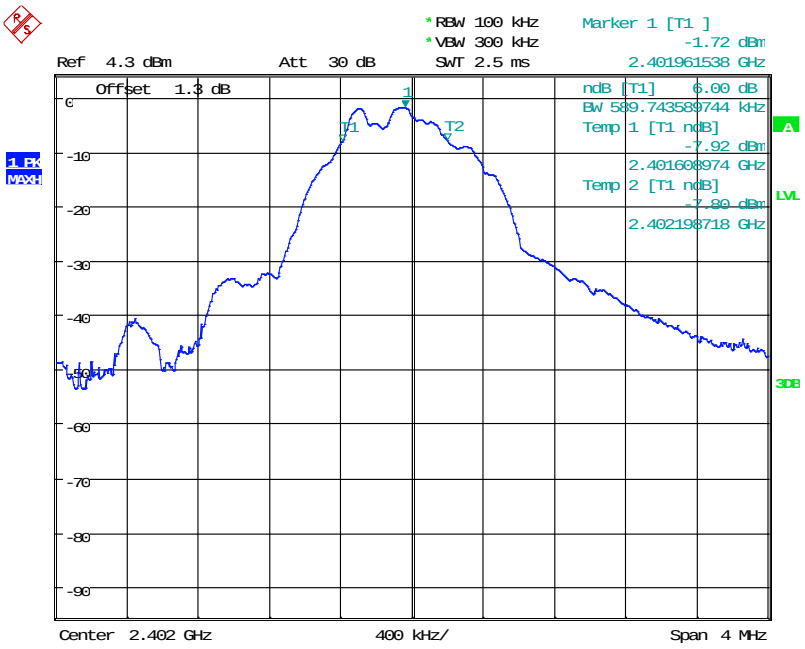
The testing was performed by David Hsu on 2016-07-07.

7.5 Test Results

Channel	Frequency (MHz)	6 dB OBW (MHz)	Limit (MHz)	Result
Low	2402	0.59	> 0.5	Compliance
Middle	2442	0.57	> 0.5	Compliance
High	2480	0.56	> 0.5	Compliance

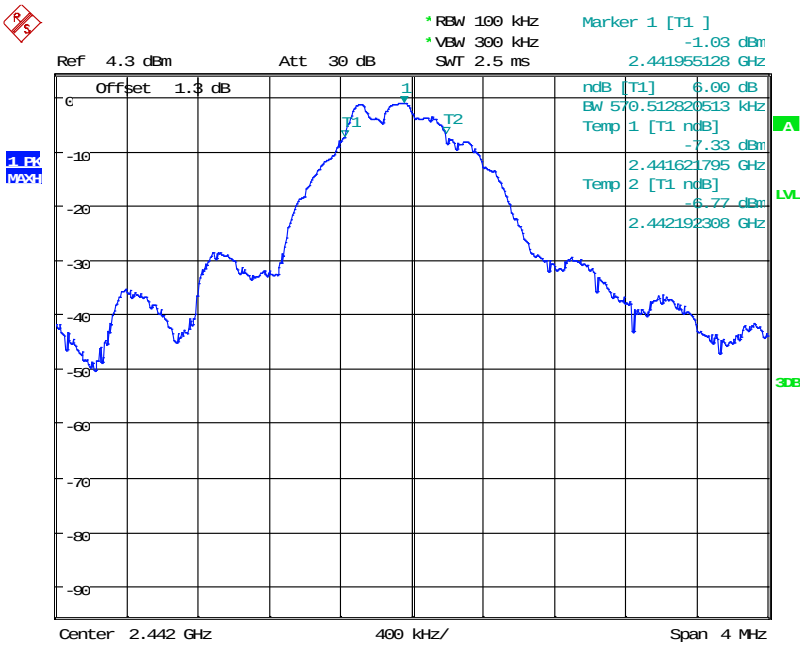
Please refer to the following plots

Low Channel



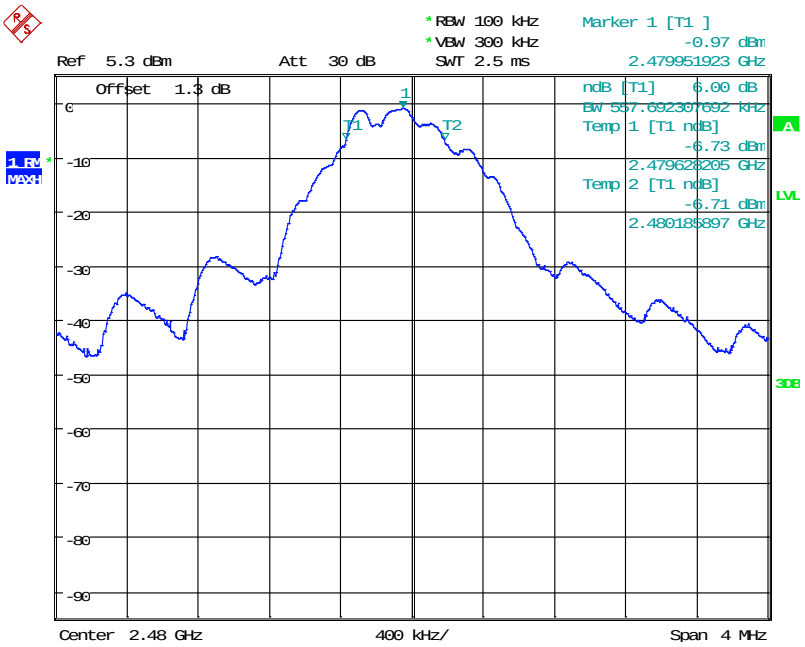
Date: 7.JUL.2016 11:10:57

Middle Channel



Date: 7.JUL.2016 11:45:46

High Channel



Date: 7.JUL.2016 13:20:31

8 FCC §15.247(b)(3) – Maximum Output Power

8.1 Applicable Standard

According to FCC §15.247(b) (3).

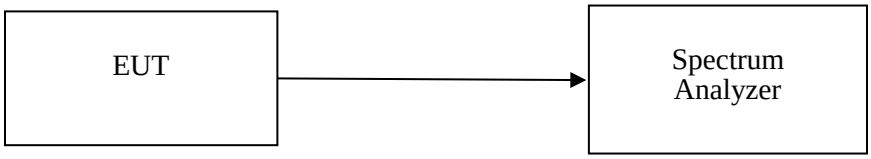
Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the 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.

8.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.

3. Add a correction factor to the display.



8.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	R & S	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	2015/12/18	2016/12/17

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

8.4 Test Environmental Conditions

Temperature:	26° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

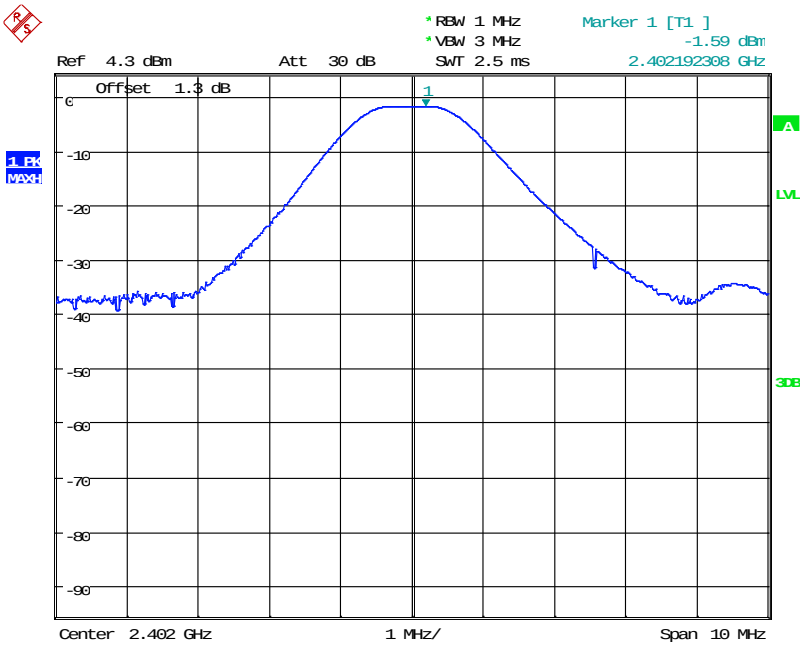
The testing was performed by David Hsu on 2016-07-07..

8.5 Test Results

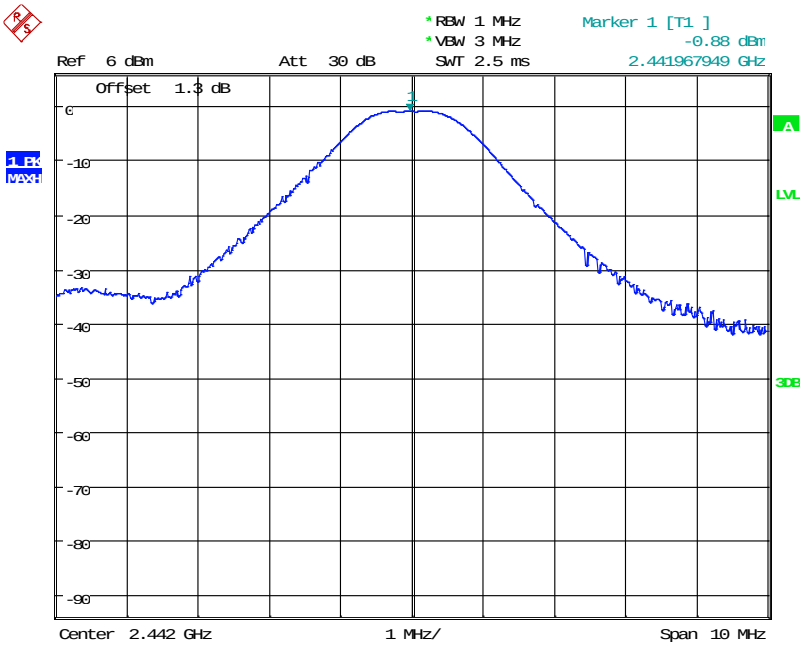
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
Low	2402	-1.59	30	Compliance
Middle	2442	-0.88	30	Compliance
High	2480	-0.89	30	Compliance

Please refer to the following plots

Low Channel

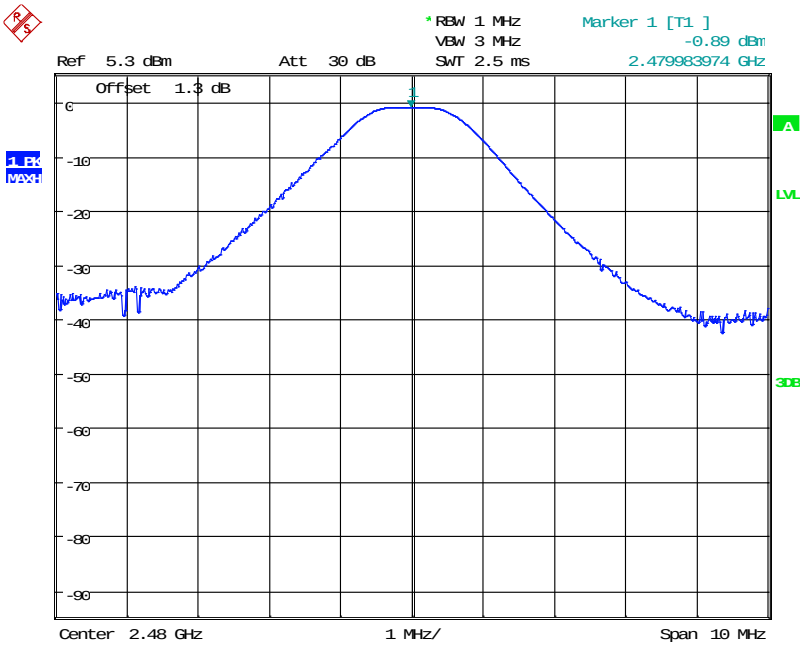


Middle Channel



Date: 7.JUL.2016 11:42:02

High Channel



Date: 7.JUL.2016 13:10:30

9 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

9.1 Applicable Standard

According to FCC §15.247(d).

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)).

9.2 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.

9.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	R & S	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	2015/12/18	2016/12/17

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

9.4 Test Environmental Conditions

Temperature:	25° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

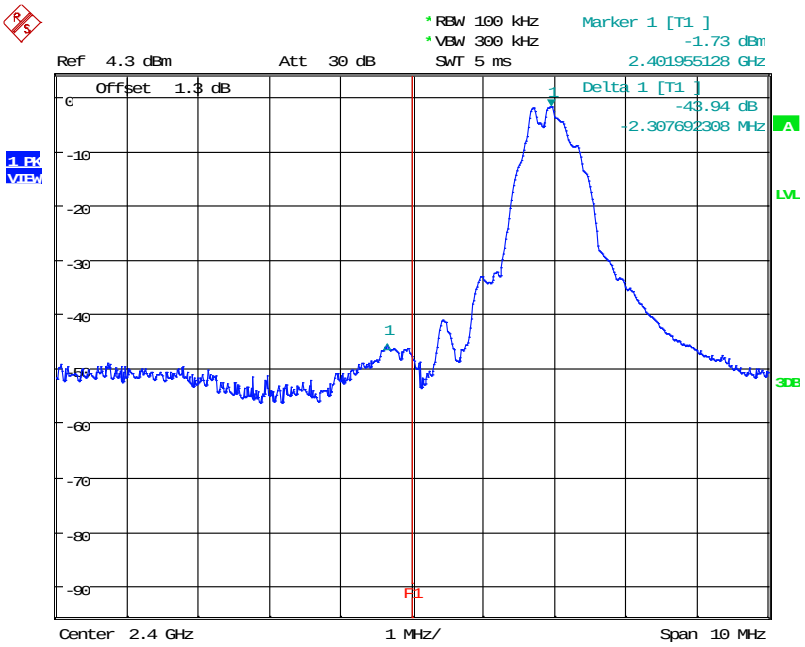
The testing was performed by David Hsu on 2016-07-07.

9.5 Test Results

Please refer to the following plots

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	RESULT
Low	2402	43.94	≥ 20	PASS
High	2480	52.04	≥ 20	PASS

Band Edge, Left Side



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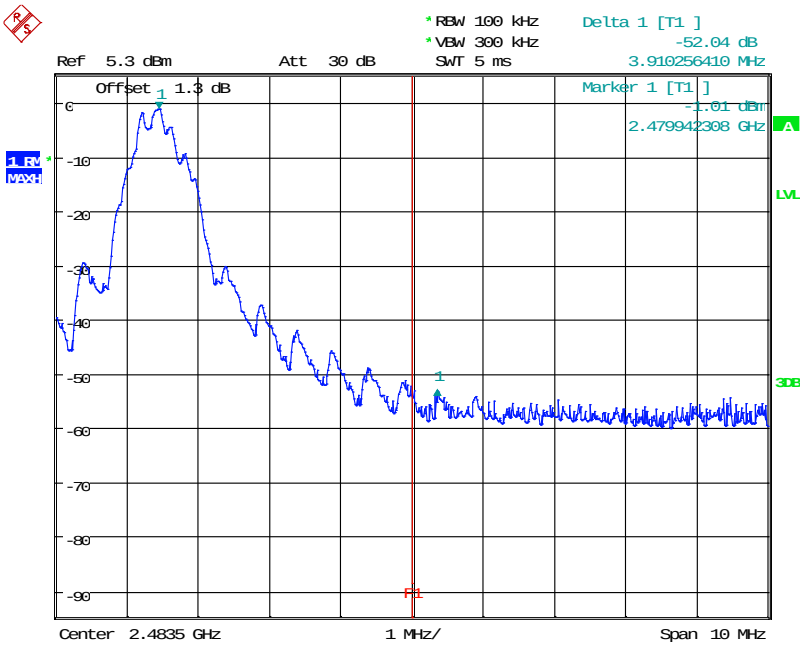
Band Edge, Right Side



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10 FCC §15.247(e) – Power Spectral Density

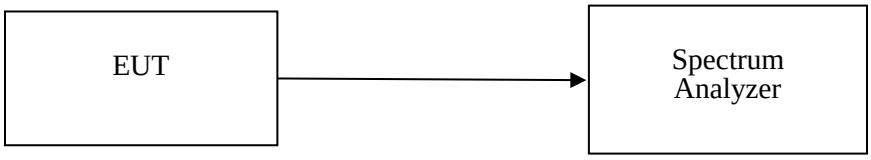
10.1 Applicable Standard

According to FCC §15.247(e).

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.

10.2 Test Procedure

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



Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	R & S	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	2015/12/18	2016/12/17

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

10.3 Test Environmental Conditions

Temperature:	26° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

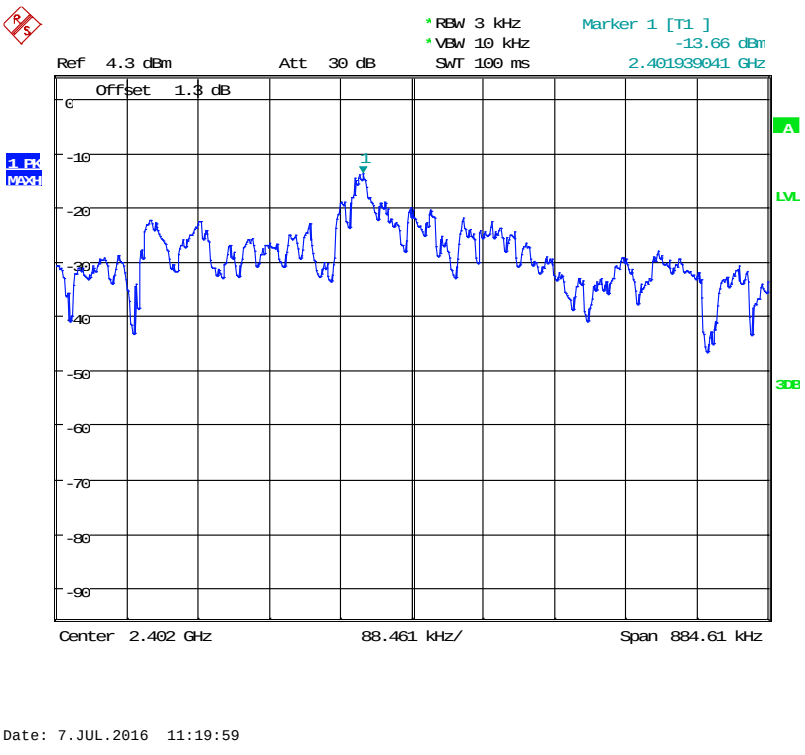
The testing was performed by David Hsu on 2016-07-07.

10.4 Test Results

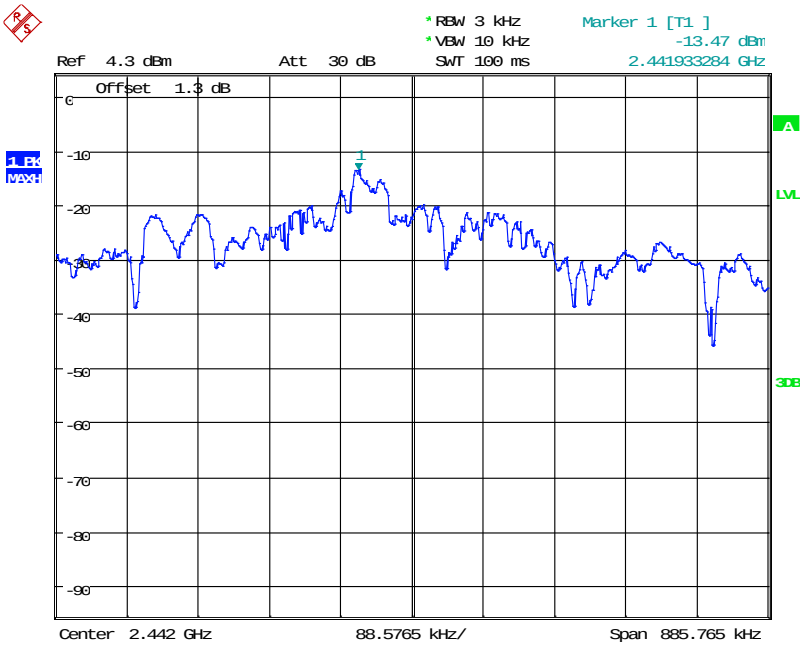
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
Low	2402	-13.66	8	Compliance
Middle	2442	-13.47	8	Compliance
High	2480	-14.16	8	Compliance

Please refer to the following plots

Low Channel



Middle Channel



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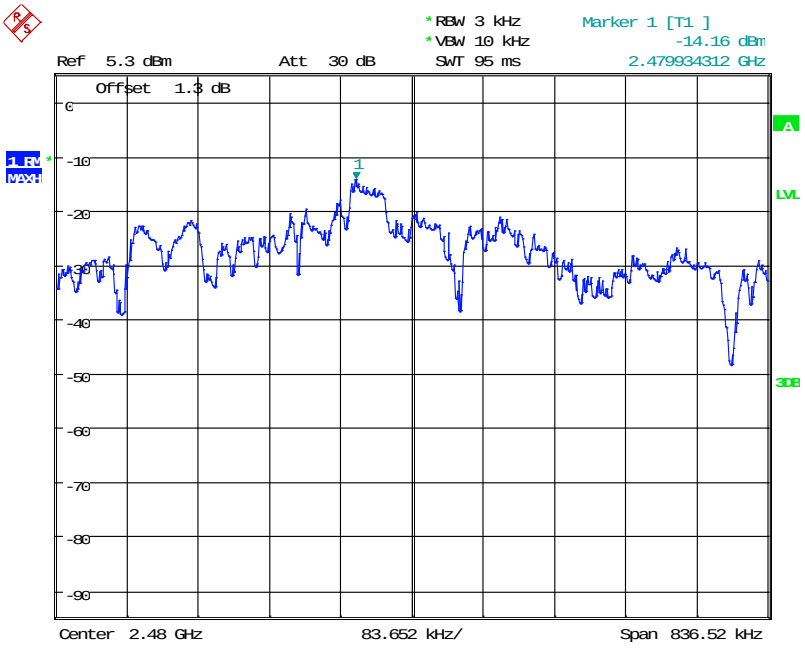
High Channel



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