



FCC Part 15.247

TEST REPORT

For

WELLGO PEDAL'S CORP.

No.3, Gong 7th Road, Youth Ind. Park, Dajia Dist., Taichung City, Taiwan

FCC ID: 2ADSN531001002
Model: XRF12

Report Type: Original Report	Product Type: THRUST E
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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. (Taiwan)

REVISION HISTORY

Revision	Issue Date	Description
1.0	2017.01.11	Original

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1 General Information

1.1 Product Description for Equipment Under Test (EUT)

Applicant: WELLGO PEDAL'S CORP.
No.3, Gong 7th Road, Youth Ind. Park, Dajia Dist., Taichung City,
Taiwan

Manufacturer: Sheng Chia Optical Co., Ltd.
5 Hsin-Yi Road Sec. 5, Suite 3F20, Taipei 11011 Taiwan, ROC

Product: THRUST E

Model: XRF12

Trade Name: XPEDO

Frequency Range: 2402-2480 MHz

Transmit Power: BT BLE Mode: 3.34 dBm (0.0022W)

Modulation Technique: BT BLE Mode: GFSK

Transmit Data Rate: BT BLE Mode: 1 Mbps

Number of Channels: BT BLE Mode: 40 Channels

Antenna Specification: PCB Antenna/Gain: -3 dBi

Voltage Range: DC 1.5V from battery

Date of Test: Jan 04, 2017~Jan 11, 2017

**All measurement and test data in this report was gathered from production sample serial number: 161209001
(Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2016-12-23.*

1.2 Objective

This report is prepared on behalf of *WELLGO PEDAL'S CORP.* 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 the Bluetooth BLE mode of EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.249 DXX submission with FCC ID: 2ADSN531001002

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

EUT was tested with Channel 1, 20 and 40.

2.2 Equipment Modifications

No modification was made to the EUT

2.3 EUT Exercise Software

Used “fRFgo Studio V1.21.2.10” software.

Test Software Version		Engineering Mode		
Test Frequency		2402MHz	2440MHz	2480MHz
Power Level Setting	GFSK	0	0	0

2.4 Support Equipment List and Details

Description	Manufacturer	Model Number	BSMI	FCC ID	S/N
NB	DELL	E6410	N/A	N/A	10912240367

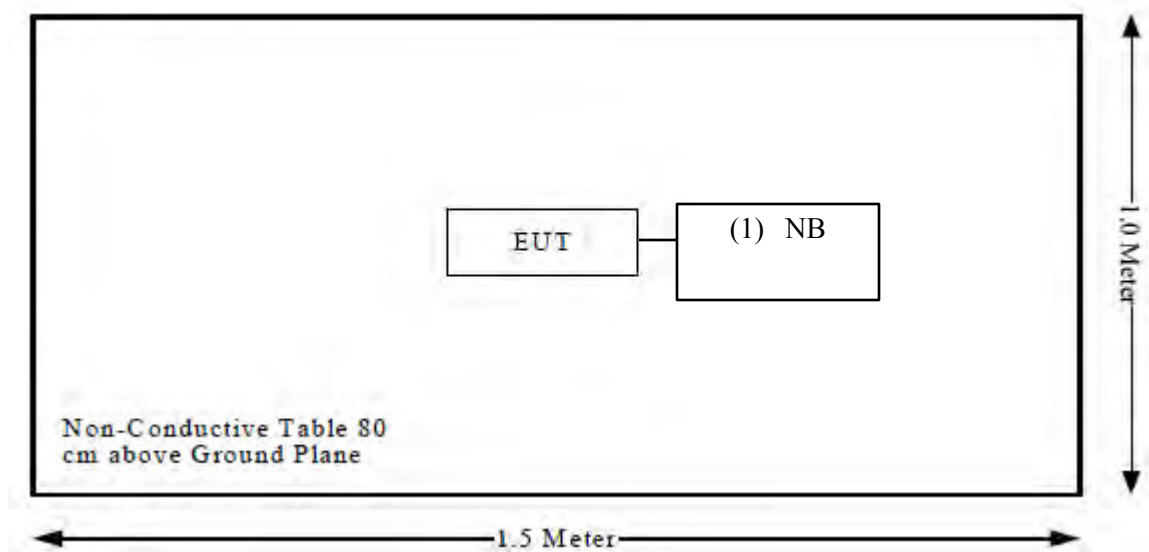
2.5 External Cable List and Details

Cable Description	Length (m)	From	To
Mini USB Cable	1.5	NB	EUT

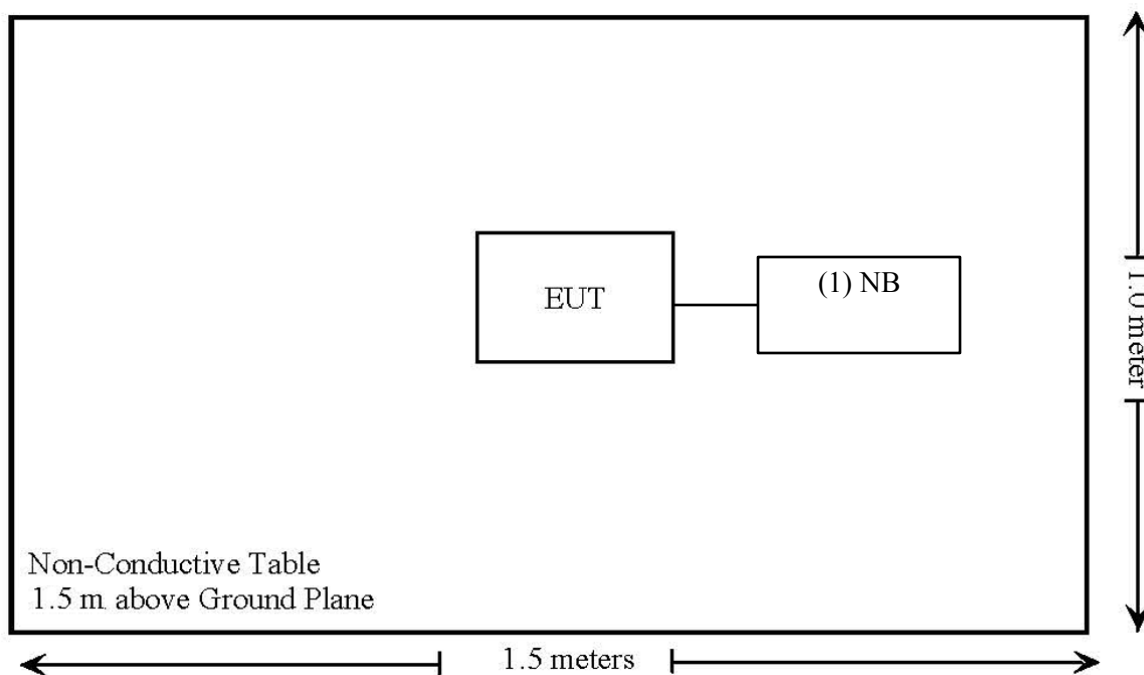
2.6 Block Diagram of Test Setup

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

Below 1GHz:

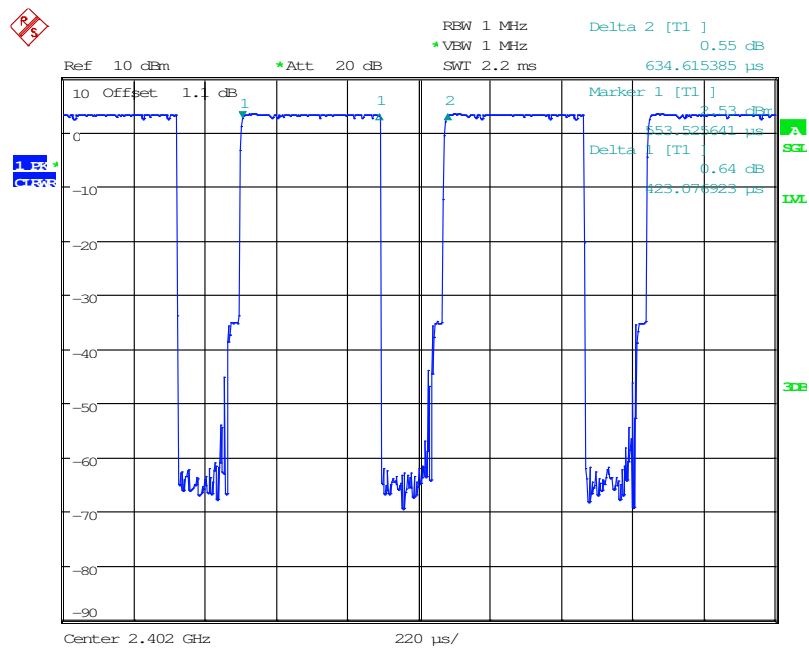


Above 1GHz:



2.7 Duty Cycle

Duty cycle of test signal is < 98%, duty factor shall be considered.
BLE: Duty cycle = 0.67, Duty factor = $10 * \log(1/0.67) = 1.74\text{dB}$: SA VBW setting 3kHz



Date: 4.JAN.2017 19:09:29

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

Note: It is battery operated equipment.

4 FCC §15.247(i) & 2.1093 - 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:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] \cdot \left[\sqrt{f(\text{GHz})} \right] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

1. $f(\text{GHz})$ 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 (1g SAR)
	(dBm)	(mW)			
2402	3.34	2.158	5	0.6868	3

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 6 dBi.

5.2 Antenna List and Details

Manufacturer	Model	Type	Antenna Gain	Result
Sheng Chia Optical Co., Ltd	BWP_ANT001	PCB Antenna	-3 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

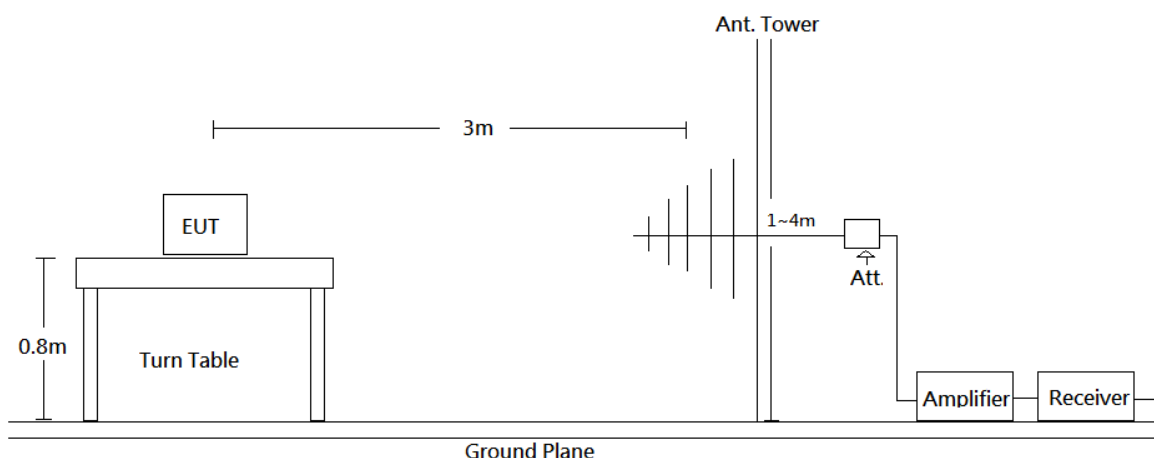
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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.

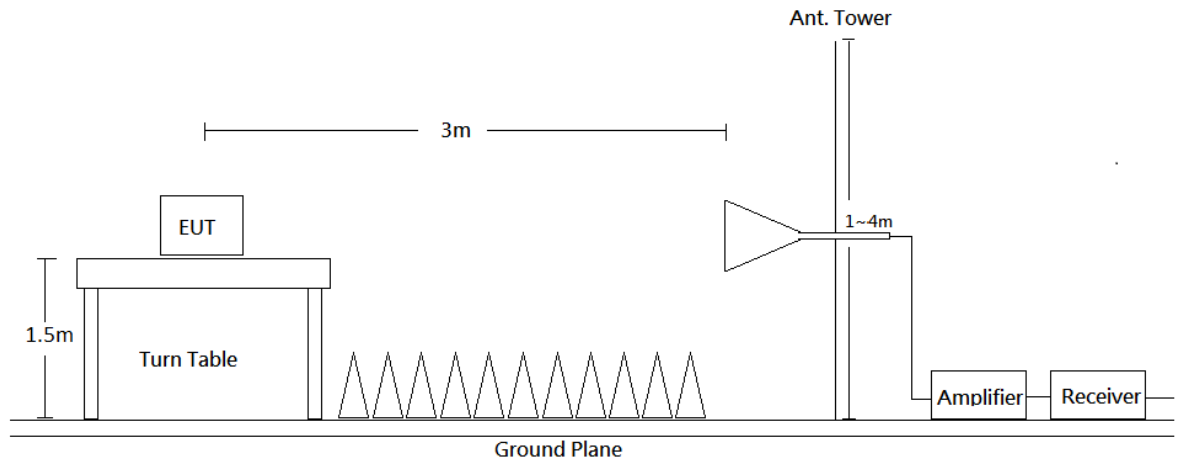
Frequency	Measurement uncertainty
30 MHz~200 MHz	4.21 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.41 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.51 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	4.88 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.30 dB (k=2, 95% level of confidence)
26 GHz~40 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. $VBW \geq 1/T$, 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	Duty cycle
30-1000 MHz	100 kHz	300 kHz	120 kHz	QP	
Above 1 GHz	1 MHz	3 MHz	/	PK	
	1 MHz	10 Hz	/	Ave	>98%
	1 MHz	1/T	/	Ave	<98%

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:

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Result} - \text{Limit}$$

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

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

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

6.8 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Broadband Antenna	Sunol Sciences	JB6	A050115	2016/11/16	2017/11/15
Amplifier	Sonoma	310N	130602	2016/7/15	2017/7/14
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2016/11/3	2017/11/2
Mircoflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2016/11/3	2017/11/2
Mircoflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2016/7/15	2017/7/14
Mircoflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2016/12/1	2017/11/30
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	Farad	EZ EMC	BACL-03A1	N.C.R	N.C.R
Horn Antenna	EMCO	3115	9311-4158	2016/5/10	2017/5/9
Horn Antenna	ETS-Lindgren	3116	00062638	2016/9/5	2017/9/4
Preamplifier	EMEC	EM01G18G	060657	2016/12/13	2017/12/12
Preamplifier	EMEC	EM18G40G	060656	2016/12/13	2017/12/12
Spectrum Analyzer	Rohde & Schwarz	FSEK30	825084/006	2016/12/15	2017/12/14
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
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A19 2S	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 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

The testing was performed by David Hsu on 2017-01-04.

6.10 Test Results

Mode: Test Mode

BLE Mode (Below 1 GHz)

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	47.4600	48.47	-15.06	33.41	40.00	-6.59	100	1	QP
2	95.9600	49.26	-15.57	33.69	43.50	-9.81	100	142	QP
3	120.2100	49.56	-10.80	38.76	43.50	-4.74	100	353	QP
4	143.4900	50.45	-11.05	39.40	43.50	-4.10	100	121	QP
5	335.5500	45.04	-9.08	35.96	46.00	-10.04	100	160	QP
6	431.5800	41.53	-6.98	34.55	46.00	-11.45	100	146	QP

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	31.9400	37.50	-4.93	32.57	40.00	-7.43	100	263	QP
2	34.8500	37.59	-6.93	30.66	40.00	-9.34	100	159	QP
3	47.4600	45.48	-15.06	30.42	40.00	-9.58	100	1	QP
4	71.7100	49.51	-16.84	32.67	40.00	-7.33	100	135	QP
5	119.2400	43.60	-10.89	32.71	43.50	-10.79	100	360	QP
6	891.3600	35.06	1.23	36.29	46.00	-9.71	100	360	QP

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

BLE Mode (Above 1 GHz)
2402MHz
Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2312.375	63.81	-5.06	58.75	74.00	-15.25	100	298	peak
2	2312.375	42.88	-5.06	37.82	54.00	-16.18	100	298	AVG
3	2368.045	63.45	-4.93	58.52	74.00	-15.48	100	298	peak
4	2368.045	42.75	-4.93	37.82	54.00	-16.18	100	298	AVG
5	2390.000	60.16	-4.89	55.27	74.00	-18.73	100	298	peak
6	2390.000	42.71	-4.89	37.82	54.00	-16.18	100	298	AVG
7	2402.000	100.38	-4.86	95.52	NA	NA	100	298	peak
8	2402.000	88.77	-4.86	83.91	NA	NA	100	298	AVG
9	4804.000	54.64	0.98	55.62	74.00	-18.38	100	271	peak
10	4804.000	51.88	0.98	52.86	54.00	-1.14	100	271	AVG
11	7206.000	48.33	6.56	54.89	74.00	-19.11	100	235	peak
12	7206.000	43.96	6.56	50.52	54.00	-3.48	100	235	AVG

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2312.375	60.73	-5.06	55.67	74.00	-18.33	100	58	peak
2	2312.375	41.29	-5.06	36.23	54.00	-17.77	100	58	AVG
3	2368.045	59.03	-4.93	54.10	74.00	-19.90	100	58	peak
4	2368.045	41.33	-4.93	36.40	54.00	-17.60	100	58	AVG
5	2390.000	57.05	-4.89	52.16	74.00	-21.84	100	58	peak
6	2390.000	41.08	-4.89	36.19	54.00	-17.81	100	58	AVG
7	2402.000	95.78	-4.86	90.92	NA	NA	100	58	peak
8	2402.000	95.02	-4.86	90.16	NA	NA	100	58	AVG
9	4804.000	52.87	0.98	53.85	74.00	-20.15	100	154	peak
10	4804.000	51.18	0.98	52.16	54.00	-1.84	100	154	AVG
11	7206.000	50.43	6.56	56.99	74.00	-17.01	100	104	peak
12	7206.000	46.04	6.56	52.60	54.00	-1.40	100	104	AVG

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

2440MHz**Horizontal**

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2440.000	99.60	-4.78	94.82	NA	NA	100	299	peak
2	2440.000	98.88	-4.78	94.10	NA	NA	100	299	AVG
3	2491.200	60.22	-4.66	55.56	74.00	-18.44	100	299	peak
4	2491.200	41.47	-4.66	36.81	54.00	-17.19	100	299	AVG
5	4880.000	51.08	1.24	52.32	74.00	-21.68	100	273	peak
6	4880.000	49.93	1.24	51.17	54.00	-2.83	100	273	AVG

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2440.000	93.69	-4.78	88.91	NA	NA	100	7	peak
2	2440.000	92.88	-4.78	88.10	NA	NA	100	7	AVG
3	4880.000	49.39	1.24	50.63	74.00	-23.37	100	160	peak
4	4880.000	47.45	1.24	48.69	54.00	-5.31	100	160	AVG
5	7320.000	46.67	7.01	53.68	74.00	-20.32	100	99	peak
6	7320.000	41.29	7.01	48.30	54.00	-5.70	100	99	AVG

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

2480 MHz**Horizontal**

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2480.000	90.76	-4.68	86.08	NA	NA	100	68	peak
2	2480.000	89.97	-4.68	85.29	NA	NA	100	68	AVG
3	2483.500	56.74	-4.69	52.05	74.00	-21.95	100	68	peak
4	2483.500	45.88	-4.69	41.19	54.00	-12.81	100	68	AVG
5	4960.000	47.52	1.51	49.03	74.00	-24.97	100	274	peak
6	4960.000	44.54	1.51	46.05	54.00	-7.95	100	274	AVG

Note: Result = Reading + Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2480.000	97.25	-4.68	92.57	NA	NA	100	300	peak
2	2480.000	96.52	-4.68	91.84	NA	NA	100	300	AVG
3	2483.500	59.21	-4.69	54.52	74.00	-19.48	100	300	peak
4	2483.500	42.18	-4.69	37.49	54.00	-16.51	100	300	AVG
5	2491.390	60.77	-4.66	56.11	74.00	-17.89	100	300	peak
6	2491.390	43.34	-4.66	38.68	54.00	-15.32	100	300	AVG
7	4960.000	47.73	1.51	49.24	74.00	-24.76	100	198	peak
8	4960.000	42.39	1.51	43.90	54.00	-10.10	100	198	AVG

Note: Result = Reading + Factor

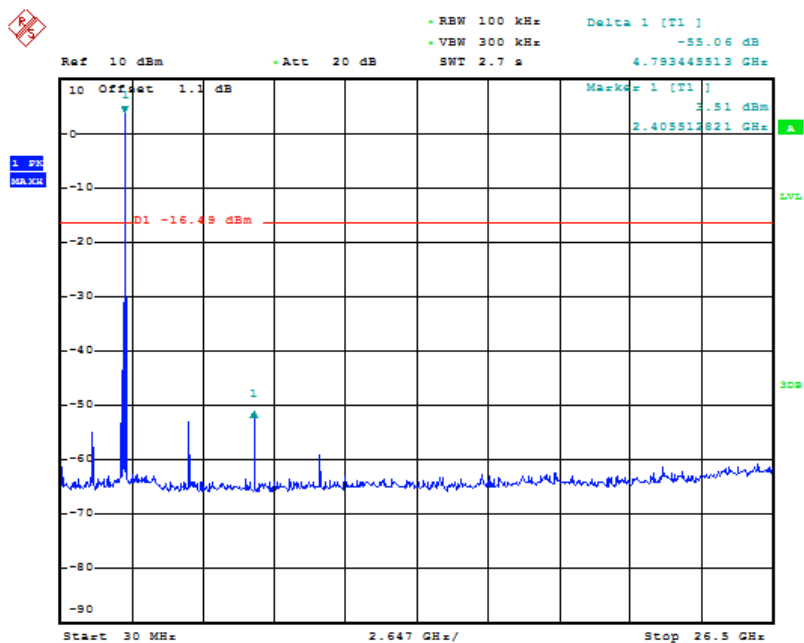
Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The other emission levels were very low against the limit.

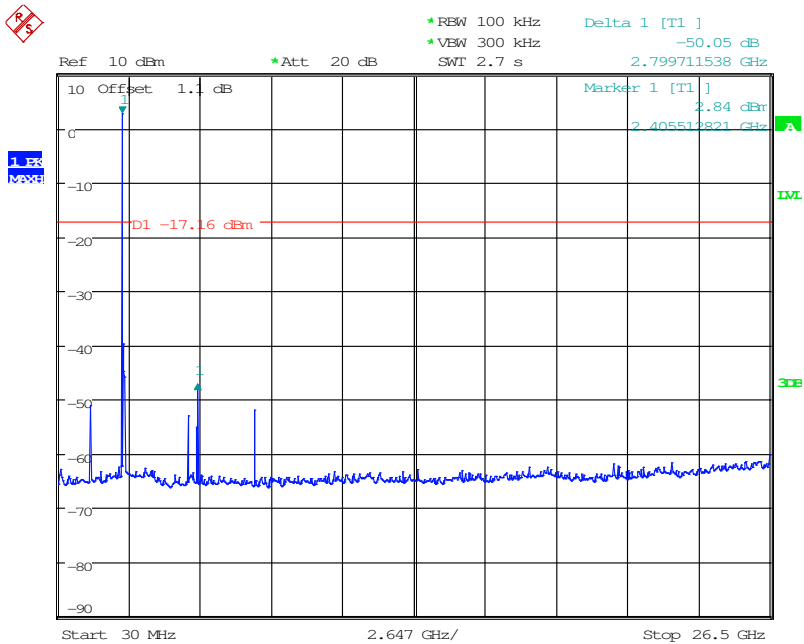
Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	RESULT
Low	2402	55.06	≥ 20	PASS
Mid	2440	50.05	≥ 20	PASS
High	2480	55.37	≥ 20	PASS

Low Channel

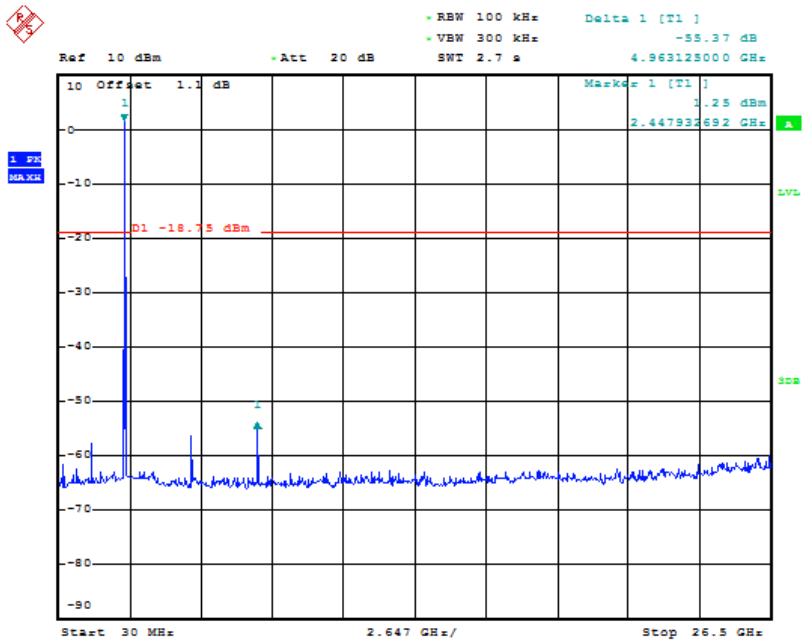
Date: 4.JAN.2017 18:51:38

Middle Channel



Date: 4.JAN.2017 18:47:49

High Channel



Date: 4.JAN.2017 18:49:33

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

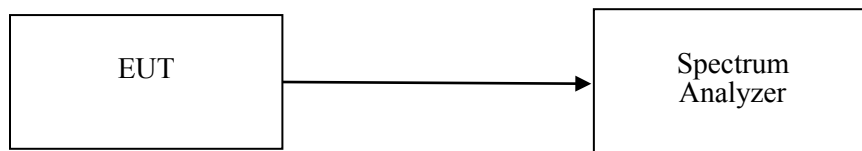
7.1 Applicable Standard

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	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	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).

7.4 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

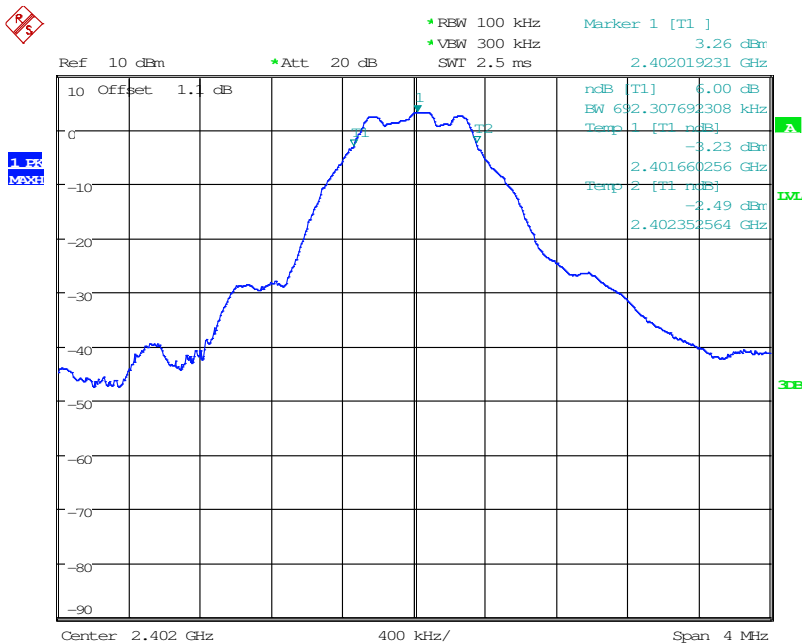
The testing was performed by David Hsu on 2017-01-04.

7.5 Test Results

Channel	Frequency (MHz)	6 dB OBW (MHz)	Limit (MHz)	Result
Low	2402	0.69	> 0.5	Compliance
Middle	2440	0.69	> 0.5	Compliance
High	2480	0.69	> 0.5	Compliance

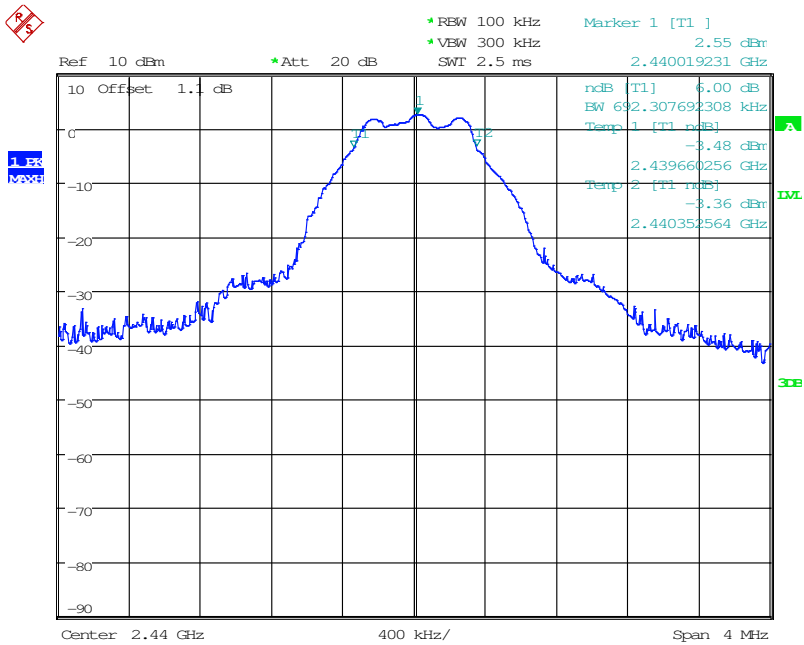
Please refer to the following plots

Low Channel



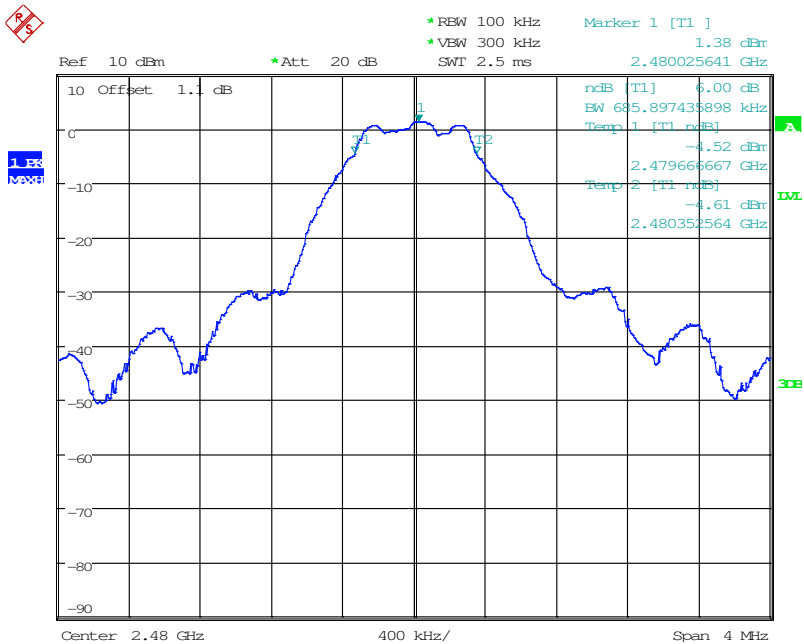
Date: 4.JAN.2017 17:19:15

Middle Channel



Date: 4.JAN.2017 17:29:01

High Channel



Date: 4.JAN.2017 17:27:18

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

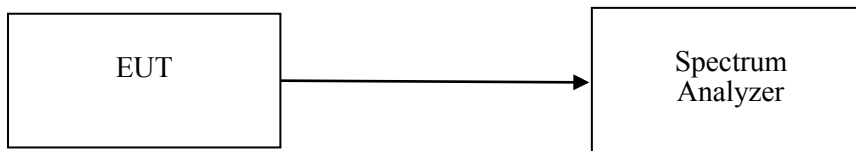
8.1 Applicable Standard

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	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	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).

8.4 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

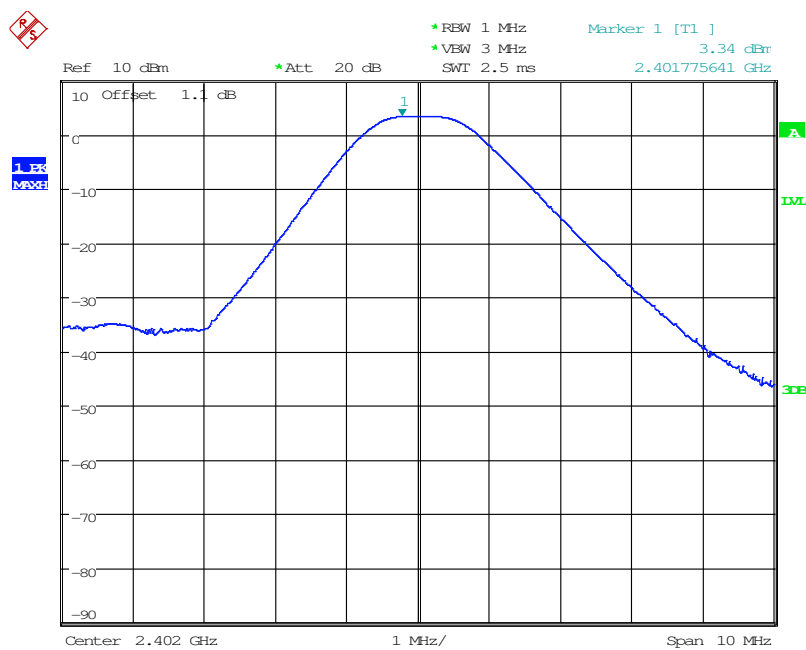
The testing was performed by David Hsu on 2017-01-04.

8.5 Test Results

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (W)	Limit (W)	Result
Low	2402	3.34	0.00216	1	Compliance
Middle	2440	2.77	0.00189	1	Compliance
High	2480	1.57	0.00144	1	Compliance

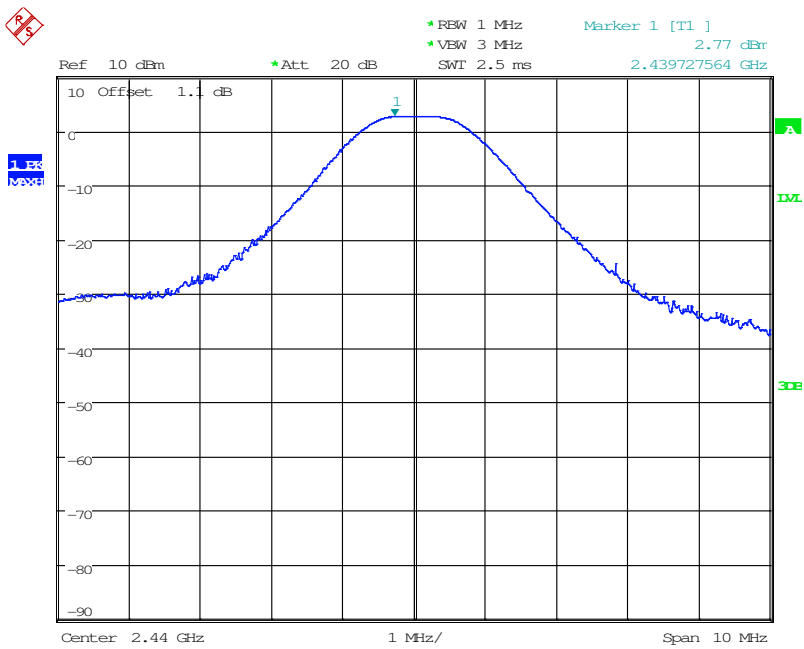
Please refer to the following plots

Low Channel



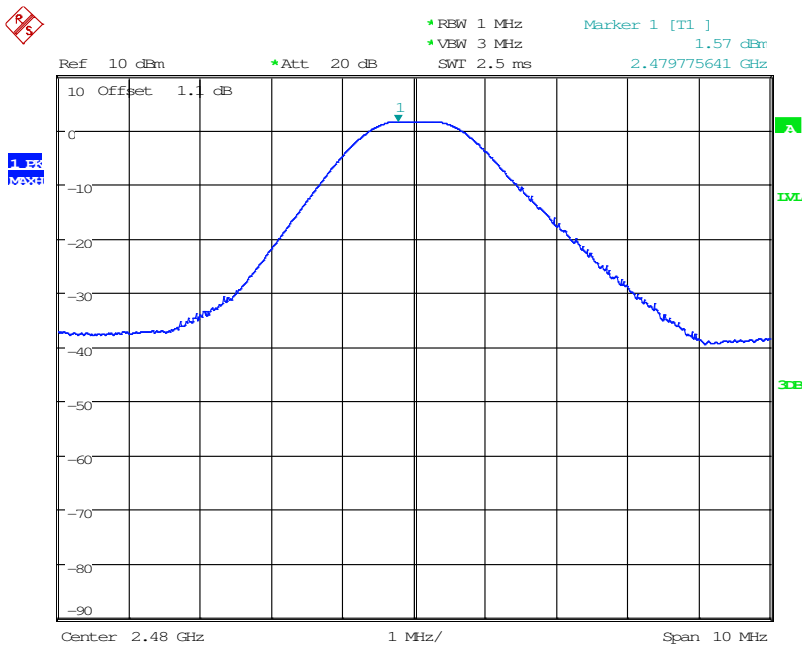
Date: 4.JAN.2017 18:20:34

Middle Channel



Date: 4.JAN.2017 18:23:10

High Channel



Date: 4.JAN.2017 18:25:16

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	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	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).

9.4 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

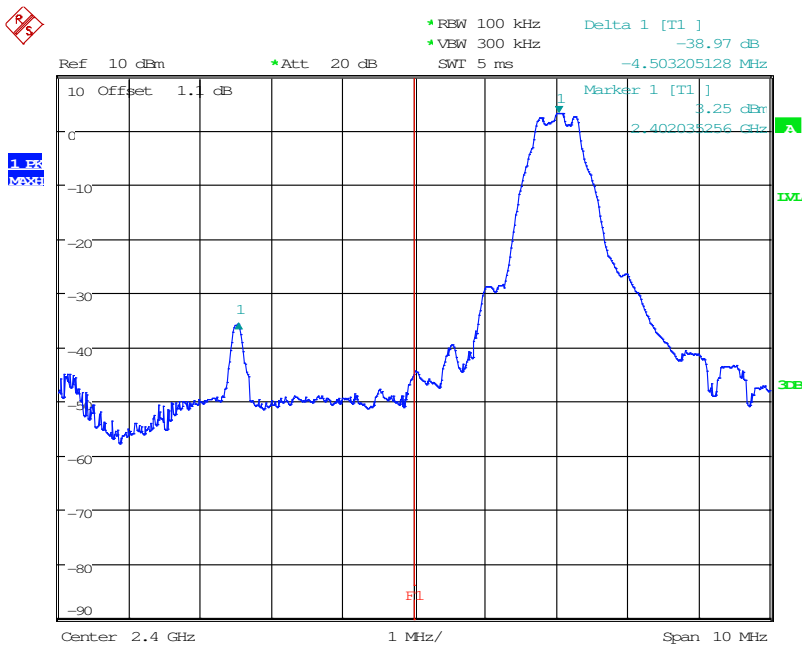
The testing was performed by David Hsu on 2017-01-04.

9.5 Test Results

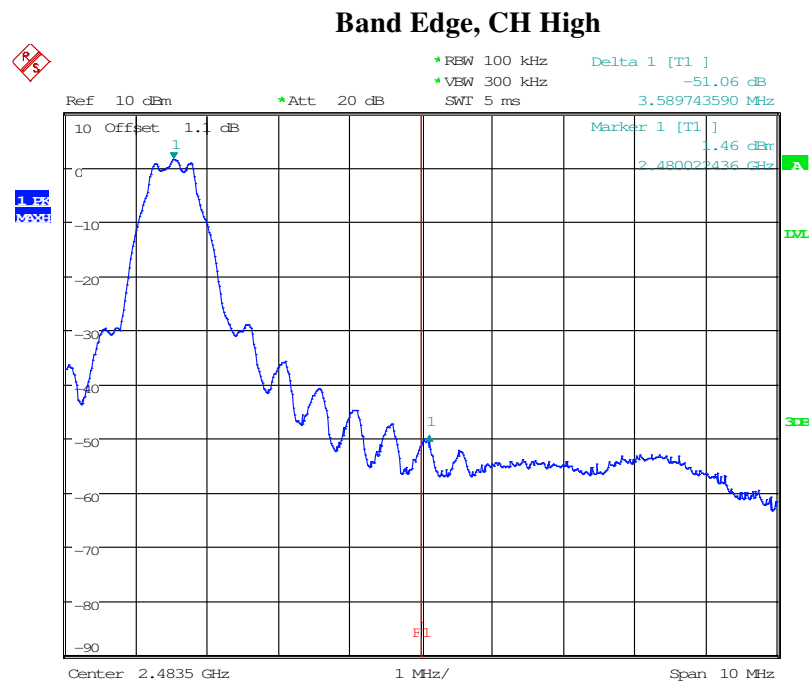
Please refer to the following plots

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	RESULT
Low	2402	38.97	≥ 20	PASS
High	2480	51.06	≥ 20	PASS

Band Edge, CH low



Date: 4.JAN.2017 18:58:32



Date: 4.JAN.2017 19:06:32

10 FCC §15.247(e) – Power Spectral Density

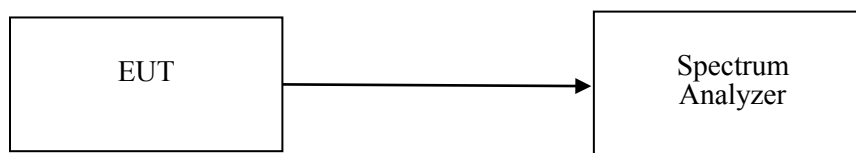
10.1 Applicable Standard

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	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	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).

10.3 Test Environmental Conditions

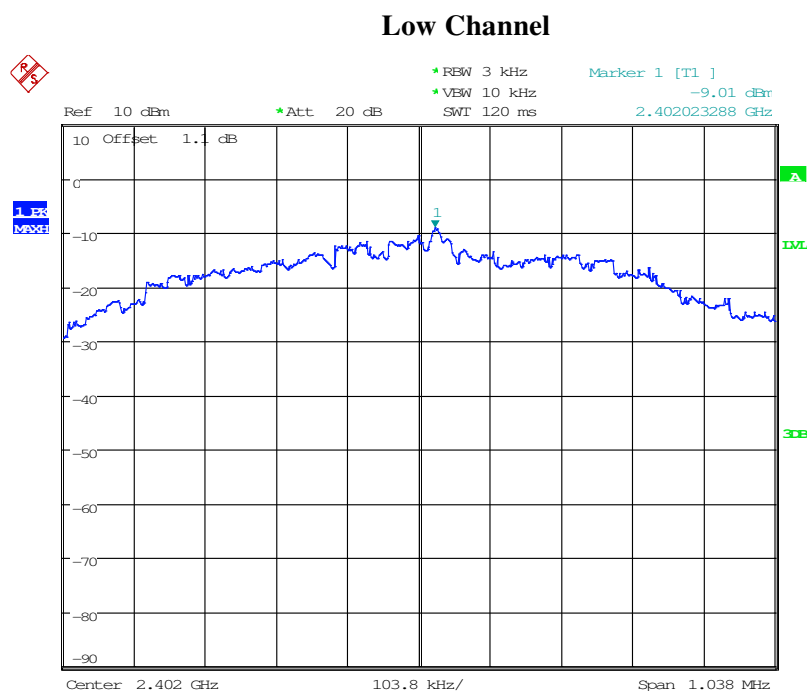
Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

The testing was performed by David Hsu on 2017-01-04.

10.4 Test Results

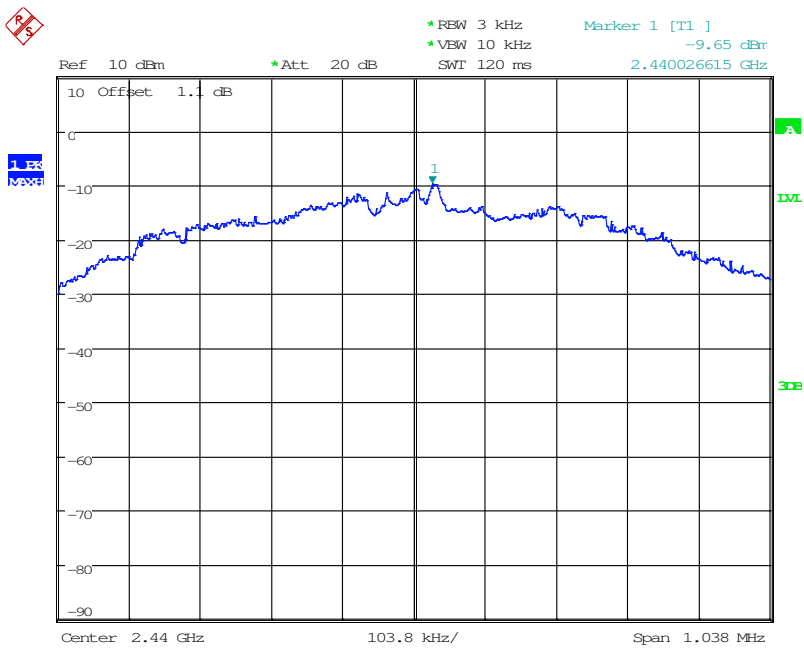
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
Low	2402	-9.01	8	Compliance
Middle	2440	-9.65	8	Compliance
High	2480	-11.23	8	Compliance

Please refer to the following plots



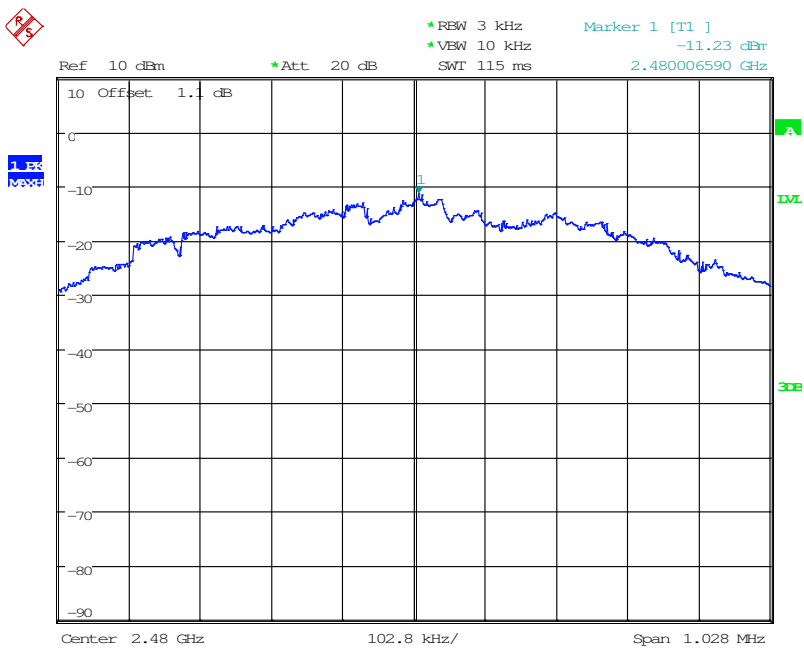
Date: 4.JAN.2017 17:50:52

Middle Channel



Date: 4.JAN.2017 17:52:44

High Channel



Date: 4.JAN.2017 17:57:23

----- END OF REPORT -----