FCC PART 15.247

TEST REPORT

For

Slightech, Inc.

C602, 530 Building, Tai Lake T-Park, No. 18 Qingyuan Road, Xin District, Wuxi, China

FCC ID: 2AEIWMYNT02S

Report Type:	Product Type:
Original Report	MYNT ES

Test Engineer: Chris Wang

Report Number: RSHA171012007-00A

Report Date: 2017-10-24

Reviewed By: Oscar Ye, RF Leader

Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan)
No.248 Chenghu Road,Kunshan,Jiangsu province,China
Tel: +86-0512-86175000
Fax: +86-0512-88934268
www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Slightech, Inc.
Tested Model	MYNT02S
Product Type	MYNT ES
Dimension	52.0 mm(L)×28.0 mm(W)×4.7 mm(H)
Power Supply	DC 3.0V from CR2032 battery

**All measurement and test data in this report was gathered from production sample serial number: 20171012007 (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-10-12)*

Objective

This report is prepared on behalf of Slightech, Inc. in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB558074 D01 DTS Meas Guidance v04.

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~25GHz	4.88 dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

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

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list for BLE mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

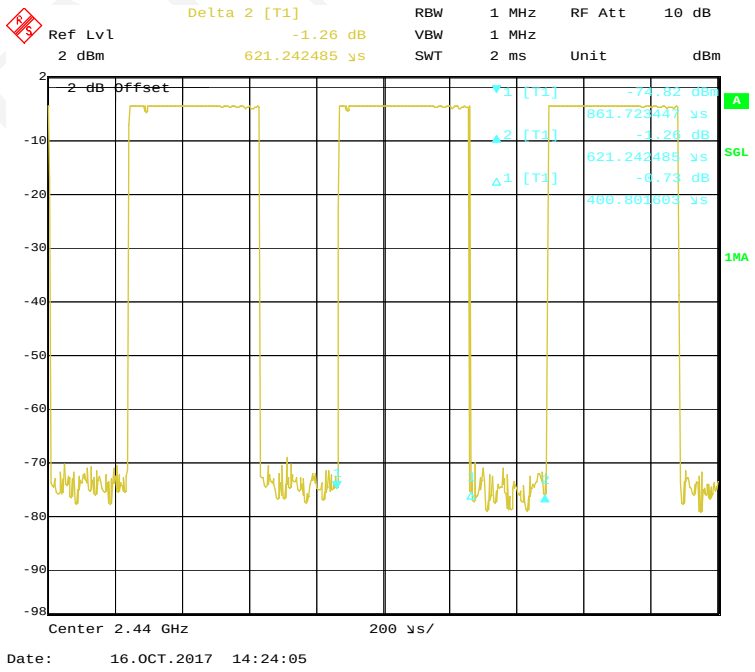
RF test tool: Secure CRT

The worst case was performed under:

The device was tested with 64.52% duty cycle and the worst case was performed as below:
BLE : Power level: 0

Duty Cycle:

Middle Channel



Band	Duty Cycle	T(ms)	1/T(kHz)	VBW Setting	10log(1/x)
BLE	64.52%	0.401	2.494	3kHz	1.90

Support Equipment List and Details

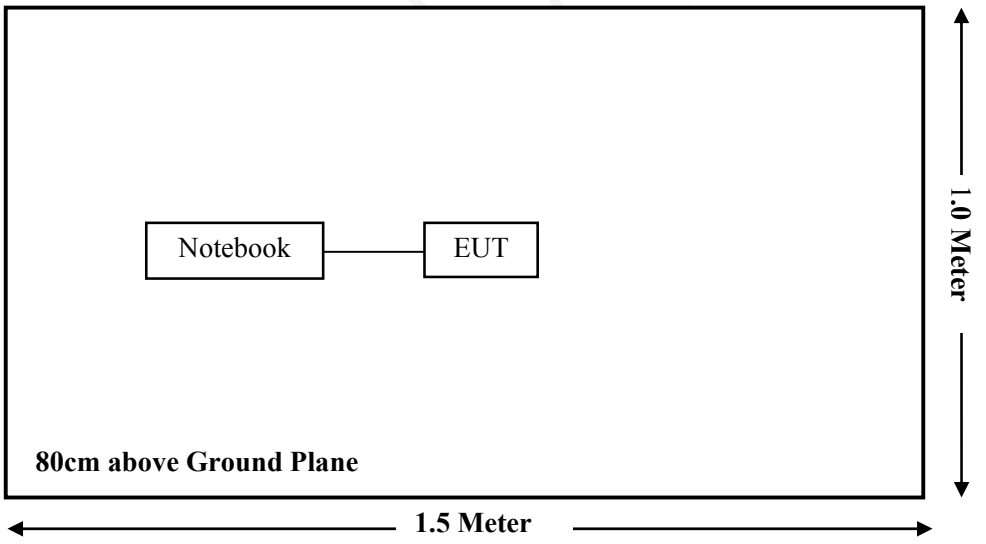
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152

External I/O Cable

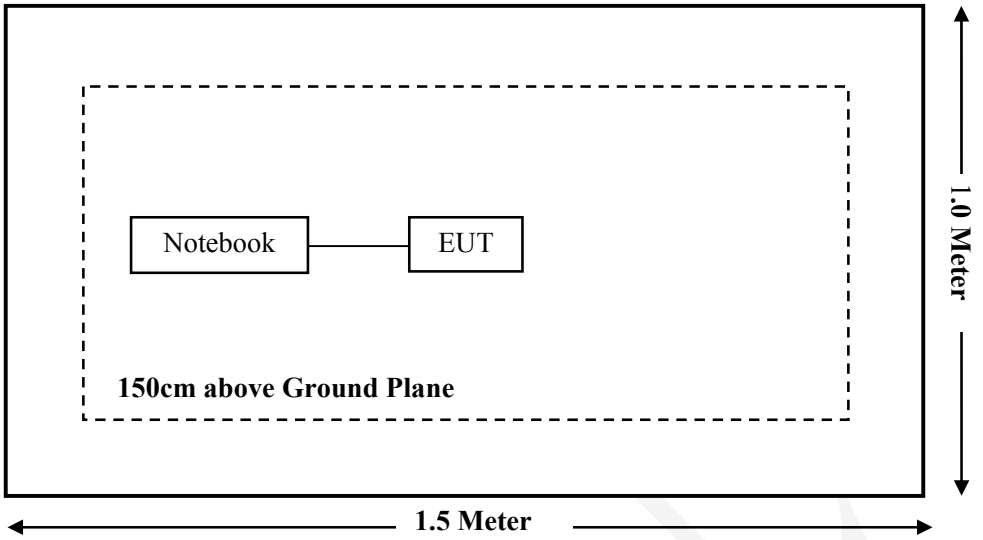
Cable Description	Length (m)	From Port	To
Serial Cable	0.2	EUT	Notebook

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
§1.1310 &§2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable (See Note 1)
§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

Note 1: The EUT is powered by battery only.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Picosecond	DC Block	5500A-110	131047	2017-09-23	2018-09-22
Slightech	RF Cable	/	/	2017-10-16	2018-10-15

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

FCC§1.1310 &§2.1093 –RF EXPOSURE

Applicable Standard

According to§2.1093and §1.1307(b)(1), 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 KDB447498 D01 General RF Exposure Guidance v06:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
[(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

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

Measurement Result

Function	Frequency Range (MHz)	Conducted Output Power		Minimum test separation distance required for the exposure conditions (mm)
		(dBm)	(mW)	
BLE	2402-2480	-2.00	0.63	5.00

Note: For the above target output power are all declared by the manufacturer.

Result:

BLE: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√f(GHz)]=0.63/5*√2.48= **0.2 <3**.

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 PCB antenna arrangement for BLE, which the antenna gain is 0.61 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

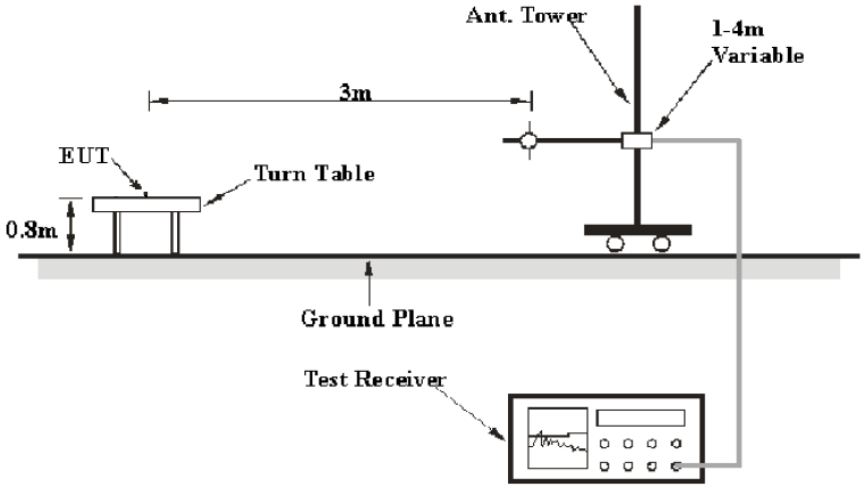
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

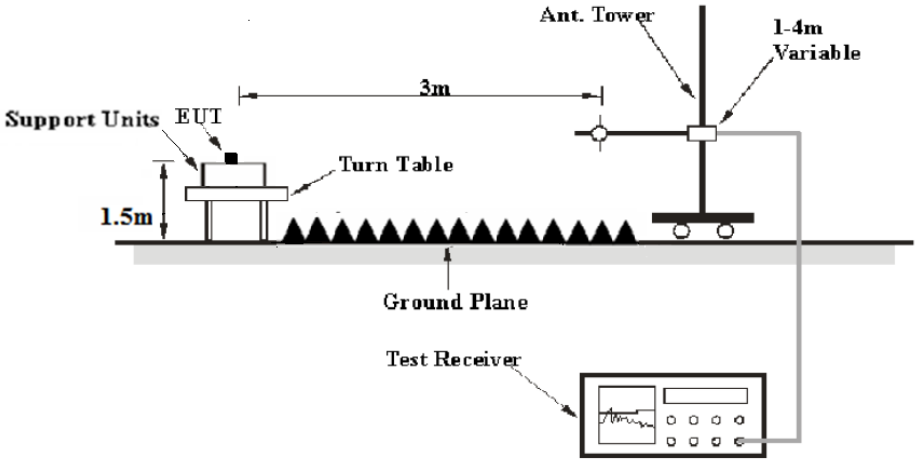
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



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

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz and no any emissions were found from 18GHz to 25GHz ,so the radiation emissions from 18GHz to 25GHz were not record.

During the radiated emission test, the EMI test receiver 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	Detector
1GHz – 25GHz	1MHz	3 MHz	PK
	1MHz	3 MHz	AV

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 detection mode for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data

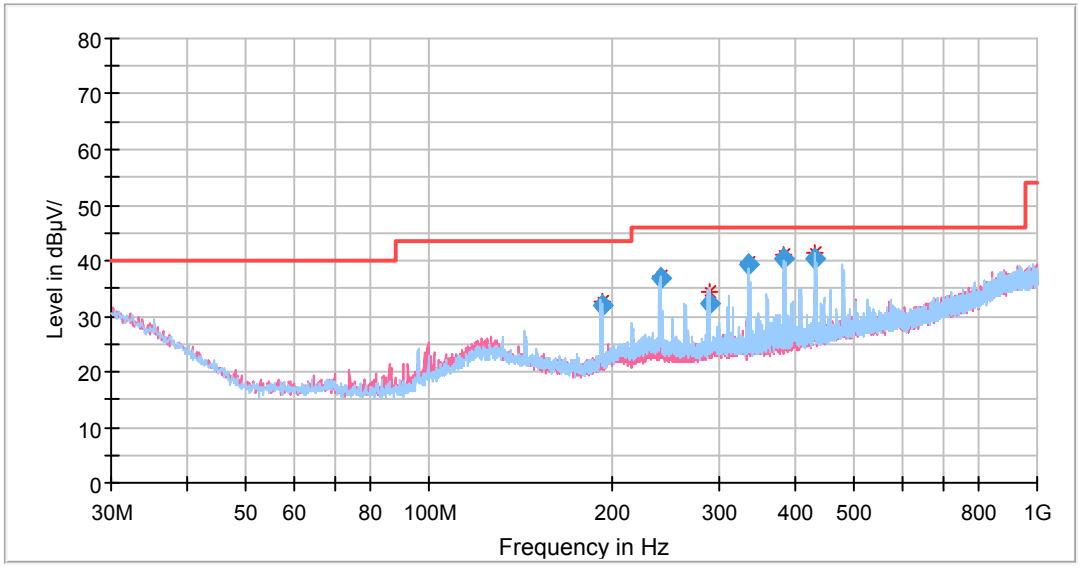
Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2017-10-16.

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

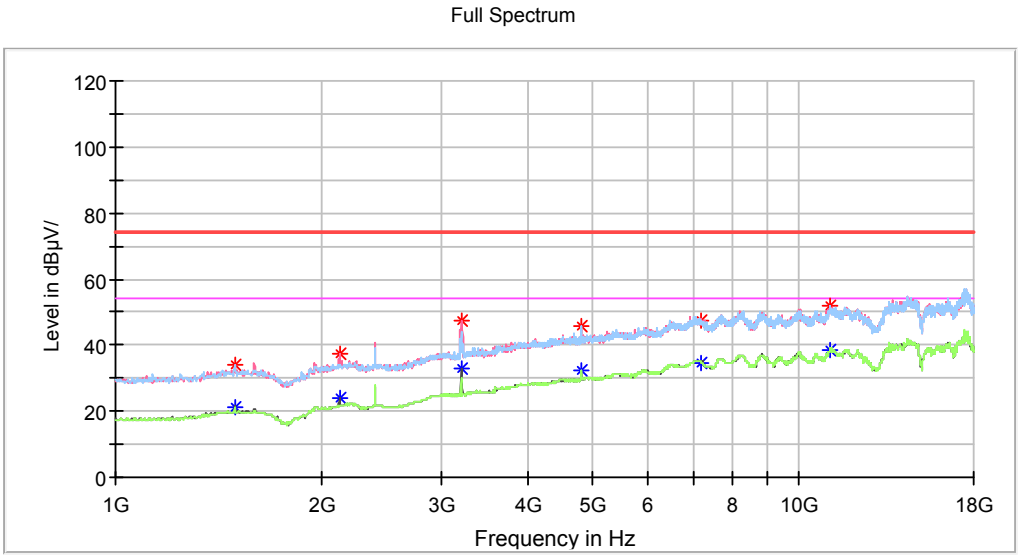
30MHz-1G



Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV)	Margin (dB)
	QuasiPeak (dB µ V/m)	Height (cm)	Polar (H/V)				
192.153450	31.97	101.0	H	180.0	-13.3	43.50	11.53
239.703700	36.90	101.0	H	170.0	-12.6	46.00	9.10
288.958200	32.40	101.0	H	180.0	-11.4	46.00	13.60
335.681800	39.38	101.0	H	150.0	-10.2	46.00	6.62
383.502300	40.50	101.0	H	150.0	-9.0	46.00	5.50
431.452550	40.22	101.0	H	13.0	-7.8	46.00	5.78

1G-25G

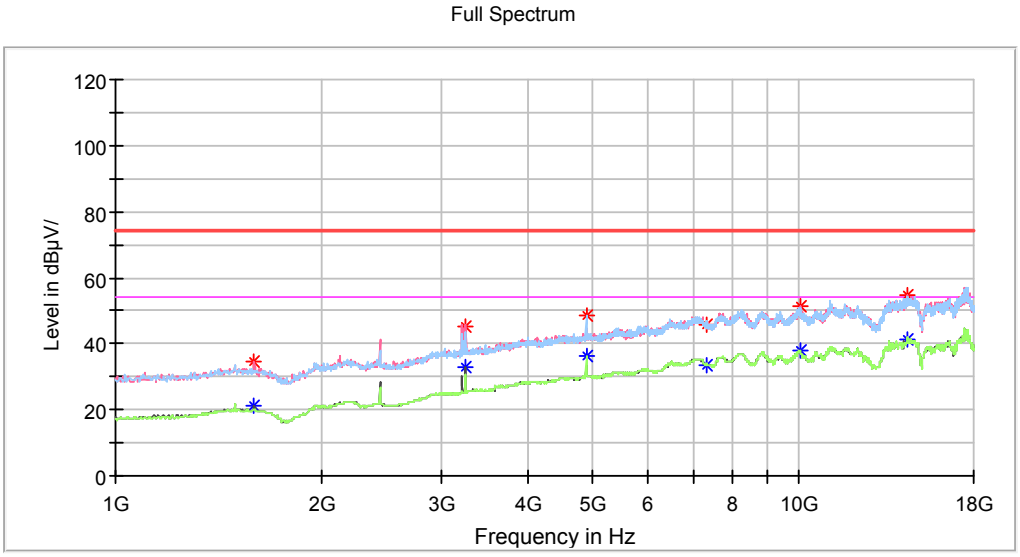
Low Channel: 2402MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1493.000000	---	21.15	250.0	H	185.0	-10.3	54.00	32.85
1493.000000	34.31	---	250.0	H	185.0	-10.3	74.00	39.69
2128.800000	37.13	---	150.0	V	176.0	-8.0	74.00	36.87
2128.800000	---	23.86	200.0	V	176.0	-8.0	54.00	30.14
3199.800000	47.57	---	150.0	V	184.0	-4.4	74.00	26.43
3199.800000	---	32.99	150.0	V	184.0	-4.4	54.00	21.01
4804.000000	45.78	---	150.0	H	175.0	-0.6	74.00	28.22
4804.000000	---	32.33	150.0	H	175.0	-0.6	54.00	21.67
7206.000000	---	34.81	250.0	V	7.0	6.3	54.00	19.19
7206.000000	47.43	---	250.0	V	7.0	6.3	74.00	26.57
11084.400000	---	38.47	150.0	H	185.0	11.8	54.00	15.53
11084.400000	51.71	---	250.0	H	185.0	11.8	74.00	22.29

Note: This test is performed with the 2.4-2.4835GHz band-filter.

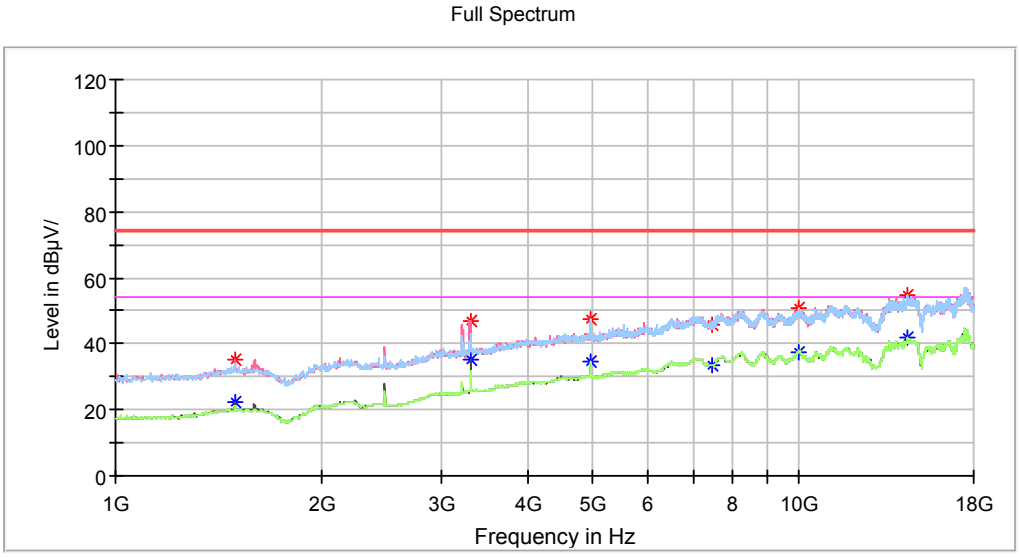
Middle Channel: 2440MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1595.000000	34.71	---	150.0	H	128.0	-9.8	74.00	39.29
1595.000000	---	21.01	150.0	H	128.0	-9.8	54.00	32.99
3250.800000	45.27	---	200.0	V	111.0	-4.3	74.00	28.73
3250.800000	---	32.97	250.0	V	111.0	-4.3	54.00	21.03
4880.000000	48.58	---	250.0	V	232.0	-0.4	74.00	25.42
4880.000000	---	36.35	250.0	V	232.0	-0.4	54.00	17.65
7320.000000	---	33.63	150.0	H	128.0	6.6	54.00	20.37
7320.000000	45.66	---	200.0	H	128.0	6.6	74.00	28.34
10023.600000	---	37.75	200.0	V	7.0	9.2	54.00	16.25
10023.600000	51.44	---	200.0	V	7.0	9.2	74.00	22.56
14436.800000	---	41.38	150.0	H	249.0	16.7	54.00	12.62
14436.800000	54.71	---	150.0	H	249.0	16.7	74.00	19.29

Note: This test is performed with the 2.4-2.4835GHz band-filter.

High Channel: 2480MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1496.400000	---	22.14	150.0	V	250.0	-10.3	54.00	31.86
1496.400000	35.33	---	150.0	V	250.0	-10.3	74.00	38.67
3305.200000	---	34.98	150.0	V	250.0	-4.2	54.00	19.02
3305.200000	46.92	---	250.0	V	250.0	-4.2	74.00	27.08
4960.000000	---	34.34	200.0	H	128.0	-0.3	54.00	19.66
4960.000000	47.69	---	200.0	H	128.0	-0.3	74.00	26.31
7440.000000	45.53	---	250.0	V	353.0	7.0	74.00	28.47
7440.000000	---	33.38	200.0	V	353.0	7.0	54.00	20.62
10010.000000	---	37.51	150.0	V	250.0	9.1	54.00	16.49
10010.000000	50.87	---	150.0	V	250.0	9.1	74.00	23.13
14409.600000	---	41.66	150.0	H	111.0	16.7	54.00	12.34
14409.600000	54.73	---	250.0	H	111.0	16.7	74.00	19.27

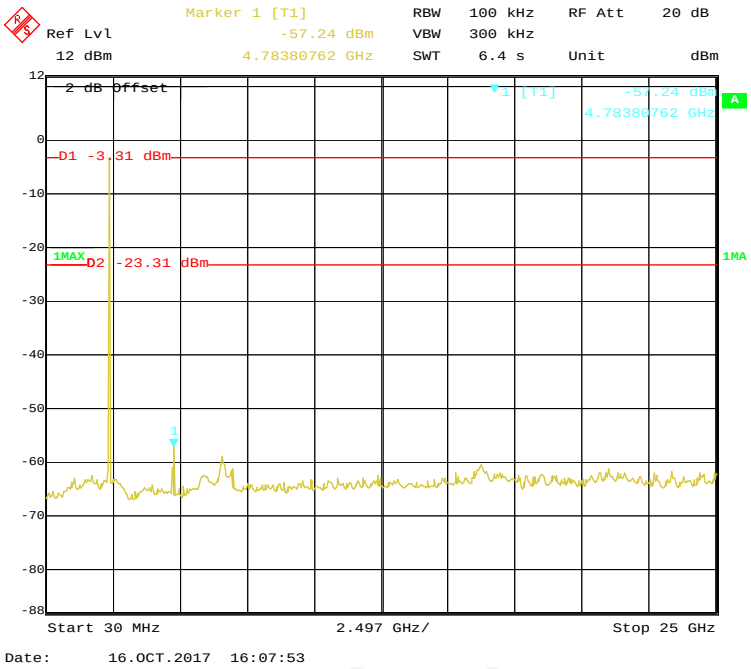
Note: This test is performed with the 2.4-2.4835GHz band-filter.

Radiation spurious Band edge

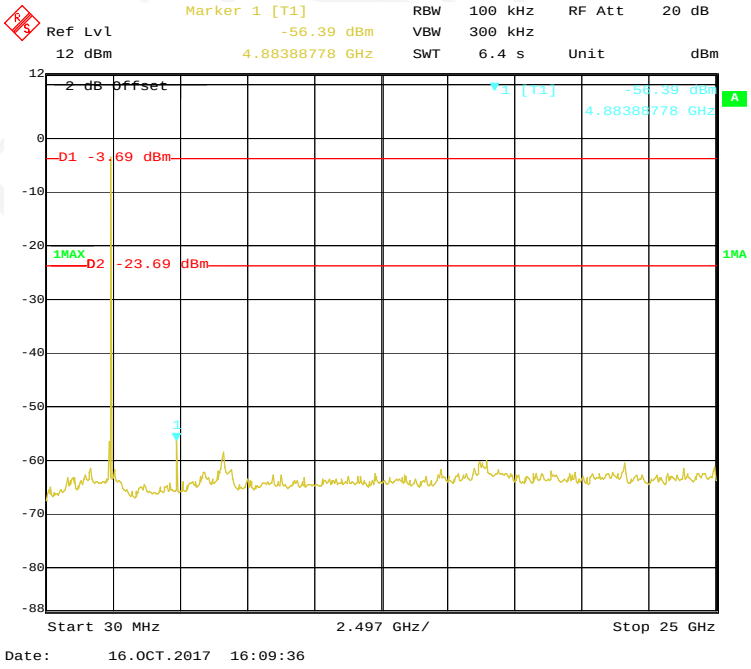
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
2390.00	---	45.62	142	V	205	-4.96	54.00	8.38
2390.00	56.37	---	142	V	205	-4.96	74.00	17.63
2483.50	---	46.24	242	V	166	-4.20	54.00	7.76
2483.50	60.73	---	242	V	166	-4.20	74.00	13.27

Conducted Spurious Emissions at Antenna Port

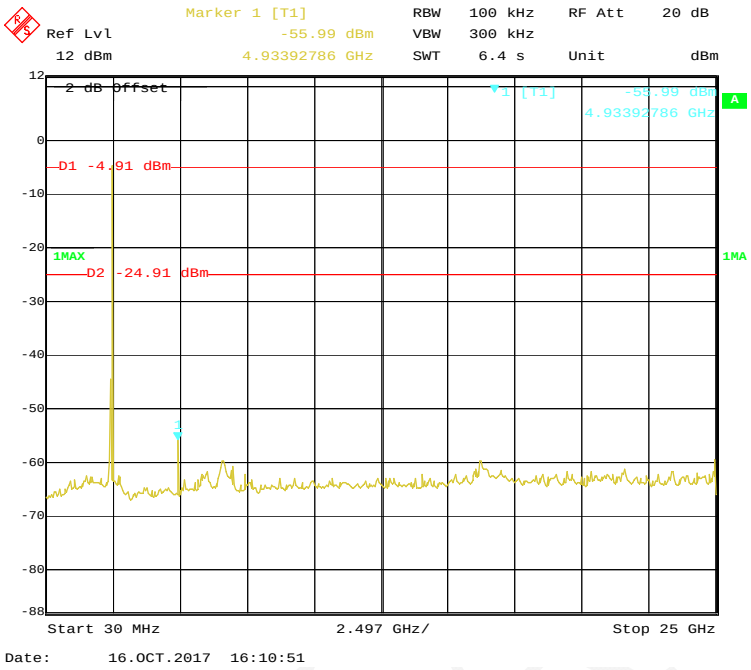
Low Channel



Middle Channel



High Channel



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

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	24 ˚C
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

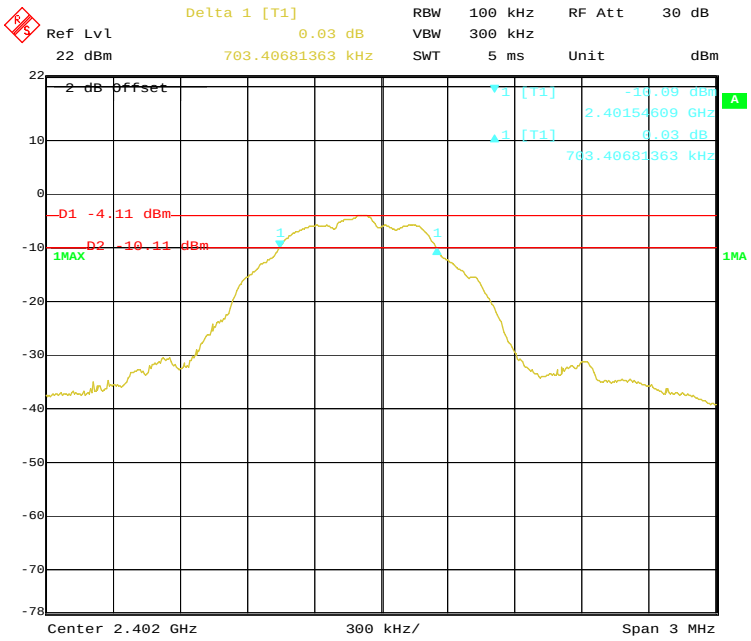
The testing was performed by Chris Wang on 2017-10-16.

Test Result: Pass.

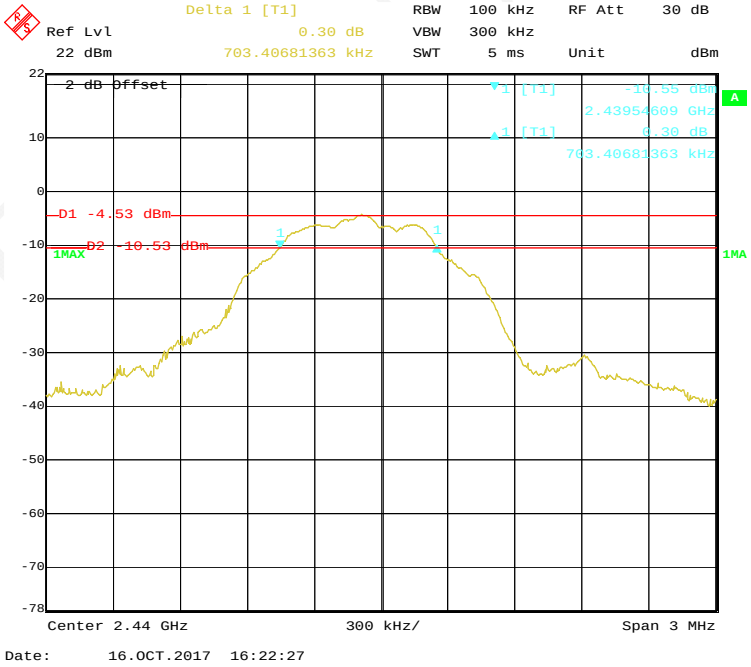
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Low	2402	0.703	≥0.5
Middle	2440	0.703	≥0.5
High	2480	0.703	≥0.5

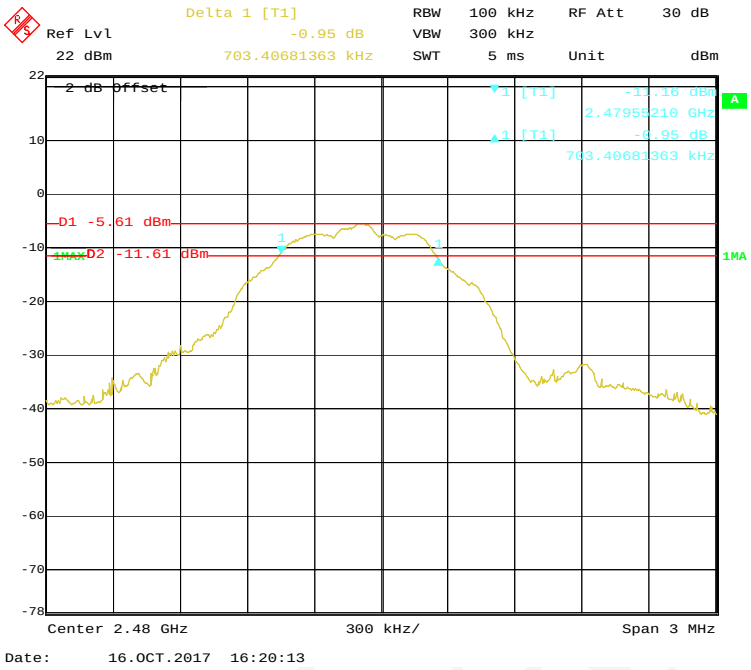
Low Channel



Middle Channel



High Channel



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

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Set the RBW ≥ *DTS bandwidth.*
2. Set VBW ≥ 3 x RBW.
3. Set span ≥ 3 x RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

Test Data

Environmental Conditions

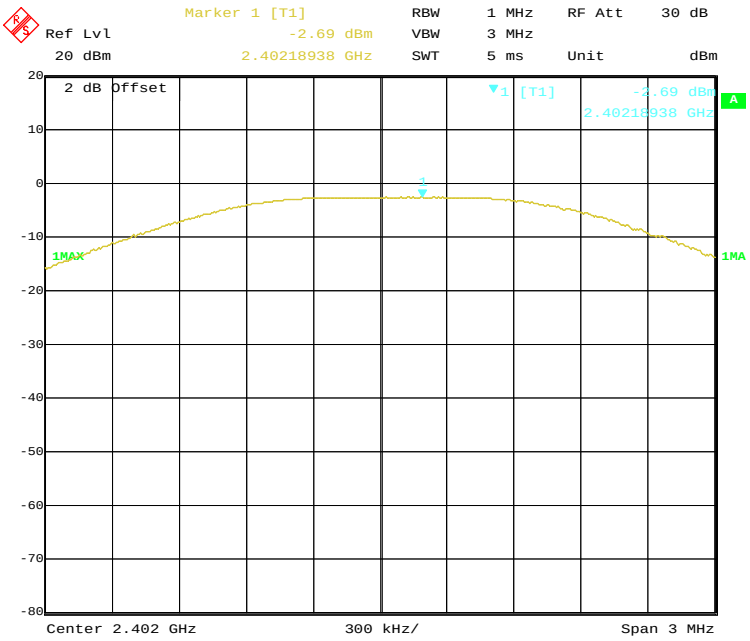
Temperature:	23.8˚C
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-10-16 to 2017-10-18.

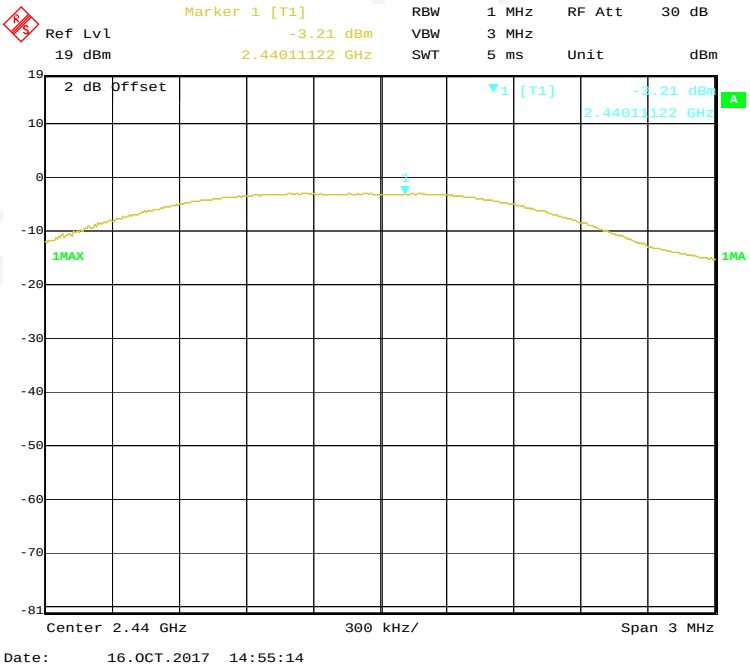
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low	2402	-2.69	30	Pass
Middle	2440	-3.21	30	Pass
High	2480	-4.52	30	Pass

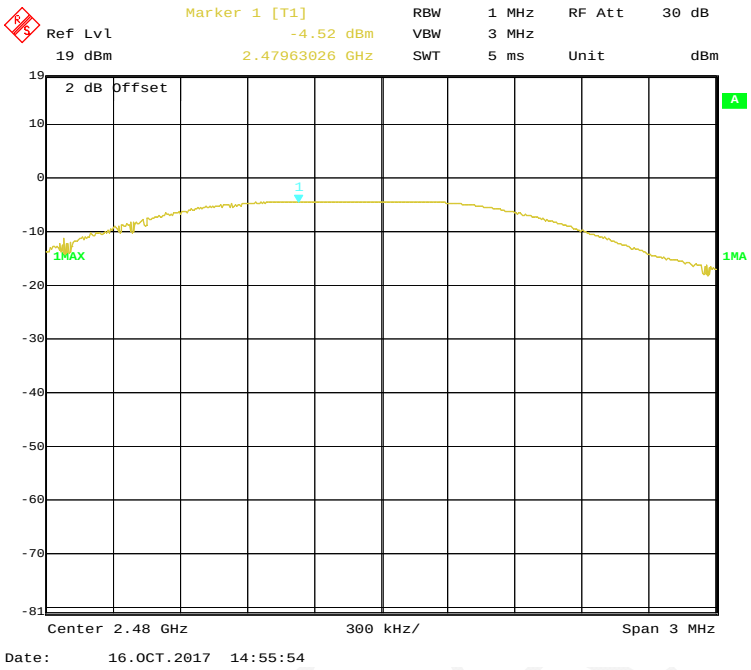
Low Channel



Middle Channel



High Channel



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

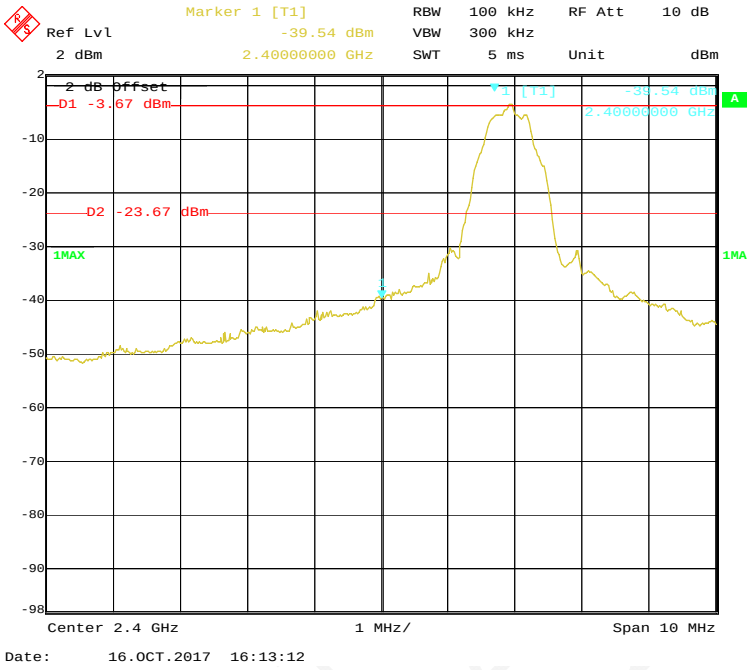
Temperature:	24.3 ˚C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Chris Wang on 2017-10-16.

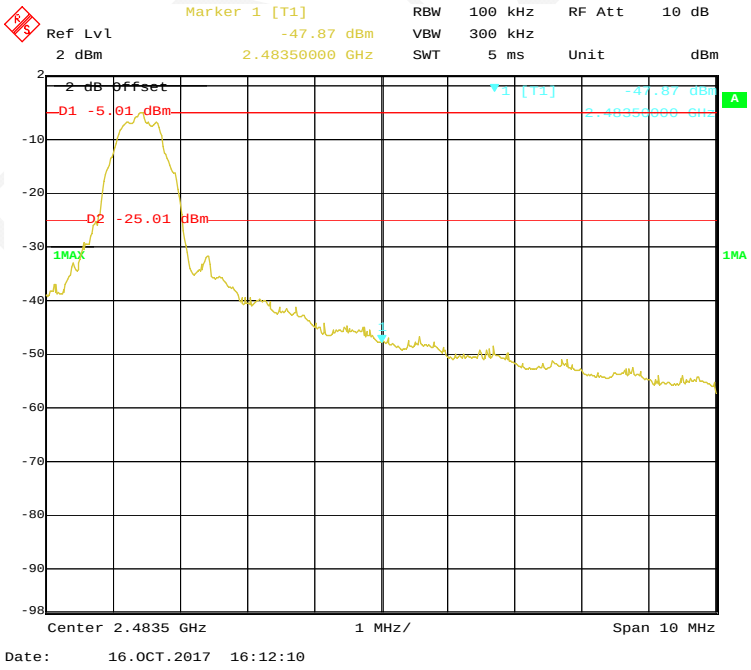
Test Result: *Compliance*

Band Edge

Left Side



Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04.

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 ˚C
Relative Humidity:	50%
ATM Pressure:	101.3 kPa

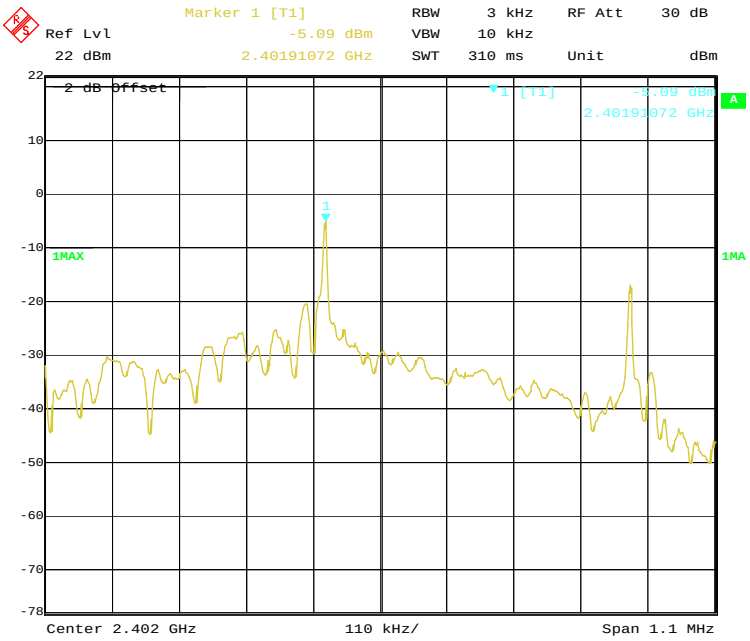
The testing was performed by Chris Wang on 2017-10-16.

EUT operation mode: Transmitting

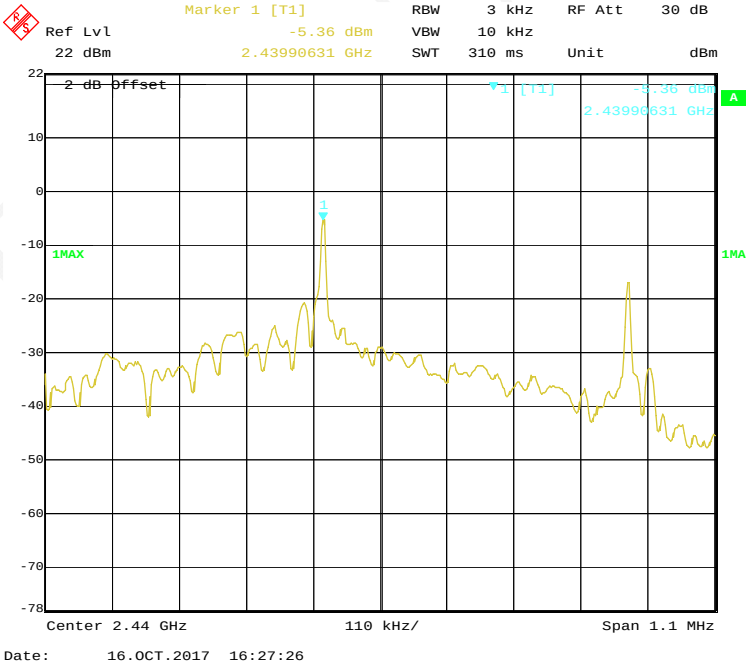
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	2402	-5.09	≤8
Middle	2440	-5.36	≤8
High	2480	-6.49	≤8

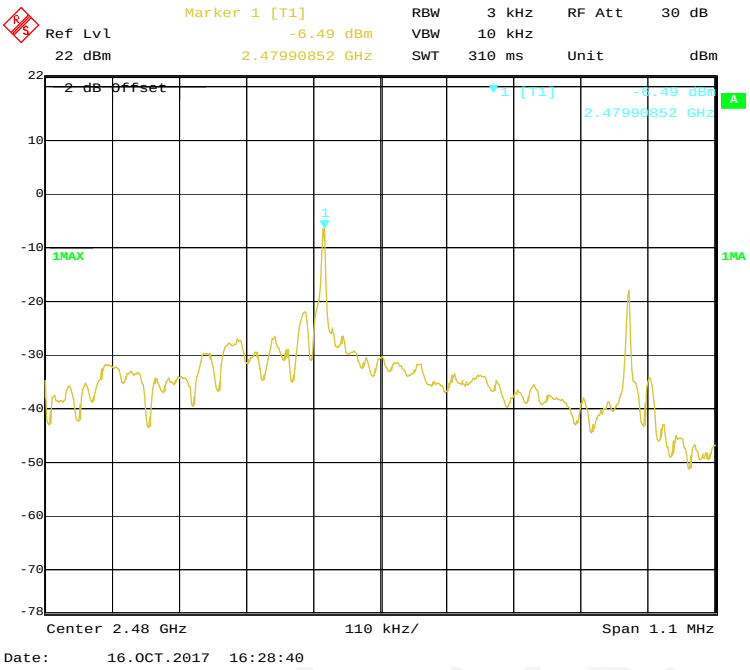
Low Channel



Middle Channel



High Channel



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