

FCC Test Report

Product Name : Smart Lighting System

Trade Name : Noon

Model No. : N130

FCC ID. : 2ALVN-N100

Applicant : Locoroll, Inc.

Address : 20400 Stevens Creek Blvd Suite 370
Cupertino, CA 95014 United States

Date of Receipt : May 31, 2017

Issued Date : Sep. 22, 2017

Report No. : 1760047R-RFUSP01V00-A

Report Version : V1.0



The test results relate only to the samples tested.

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Test Report Certification

Issued Date : Sep. 22, 2017

Report No. : 1760047R-RFUSP01V00-A



Product Name : Smart Lighting System
Applicant : Locoroll, Inc.
Address : 20400 Stevens Creek Blvd Suite 370 Cupertino, CA 95014
United States
Manufacturer : Locoroll, Inc.
Model No. : N130
FCC ID. : 2ALVN-N100
EUT Voltage : DC 3.8V
Testing Voltage : DC 3.8V
Trade Name : Noon
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2015
Test Lab : Hsin Chu Laboratory
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Test Result : Complied

Documented By :



(Carol Tsai / Engineering Adm. Assistant)

Tested By :



(Elwin Lin / Assistant Engineer)

Approved By :



(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1760047R-RFUSP01V00	V1.0	Initial issue of report	Aug. 10, 2017
1760047R-RFUSP01V00-A	V1.0	1. Only BT4.0 function. 2. Update external photo (White).	Sep. 22, 2017

Laboratory Information

We, **DEKRA Testing and Certification Co., Ltd.**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	: TAF, Accreditation Number: 3024
USA	: FCC, Registration Number: TW3024
Canada	: IC, Submission No: 181665 / IC Registration Number: 22397-1 / 22397-2 / 22397-3

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site :

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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1. General Information

1.1. EUT Description

Product Name	Smart Lighting System
Trade Name	Noon
Model No.	N130
Frequency Range/ Channel Number	2402~2480MHz / 40 Channels
Type of Modulation	Bluetooth 4.0(GFSK)

Antenna Information	
Antenna Type	PIFA Antenna
Antenna Gain	3.42849 dBi

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00	2402 MHz	Channel 10	2422 MHz	Channel 20	2442 MHz	Channel 30	2462 MHz
Channel 01	2404 MHz	Channel 11	2424 MHz	Channel 21	2444 MHz	Channel 31	2464 MHz
Channel 02	2406 MHz	Channel 12	2426 MHz	Channel 22	2446 MHz	Channel 32	2466 MHz
Channel 03	2408 MHz	Channel 13	2428 MHz	Channel 23	2448 MHz	Channel 33	2468 MHz
Channel 04	2410 MHz	Channel 14	2430 MHz	Channel 24	2450 MHz	Channel 34	2470 MHz
Channel 05	2412 MHz	Channel 15	2432 MHz	Channel 25	2452 MHz	Channel 35	2472 MHz
Channel 06	2414 MHz	Channel 16	2434 MHz	Channel 26	2454 MHz	Channel 36	2474 MHz
Channel 07	2416MHz	Channel 17	2436 MHz	Channel 27	2456 MHz	Channel 37	2476 MHz
Channel 08	2418 MHz	Channel 18	2438 MHz	Channel 28	2458 MHz	Channel 38	2478 MHz
Channel 09	2420 MHz	Channel 19	2440 MHz	Channel 29	2460 MHz	Channel 39	2480 MHz

Note:

1. This device is Smart Lighting System including 2.4GHz b/g/n (1x1) and BT4.0 transmitting and receiving function.
2. Regards to the frequency band operation; the lowest、middle and highest frequency of channel were selected to perform the test, and then shown on this report.
3. This device is a composite device in accordance with Part 15 regulations.

1.2. Test Mode

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Test Mode	Mode 1: Transmit			
Test Items	Modulation	Channel	Antenna	Result

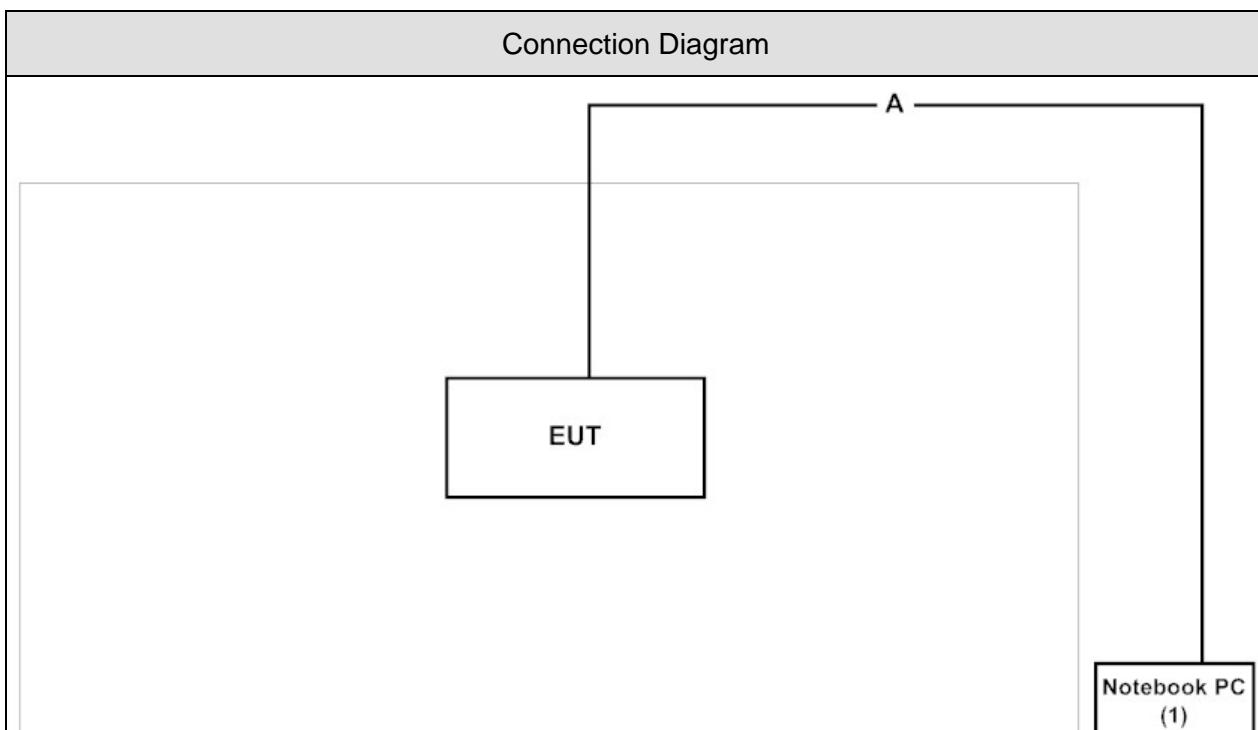
Conducted Emission	GFSK	19	0	NA
Peak Power Output	GFSK	00/19/39	0	Complies
Radiated Emission	GFSK	00/19/39	0	Complies
RF antenna conducted test	GFSK	00/19/39	0	Complies
Radiated Emission Band Edge	GFSK	00/39	0	Complies
DTS Bandwidth	GFSK	00/19/39	0	Complies
Power Density	GFSK	00/19/39	0	Complies

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Notebook PC	Lenovo	B590	WB1529782	DoC	Non-Shielded, 1.8m, one ferrite core bonded

1.4. Configuration of tested System

Connection Diagram	
	
Signal Cable Type	
A	USB CCD Cable
Signal cable Description	
	Shielded, 1.5m

1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Execute the Tera Term and select serial port. Set up band rate :115200.
3	Configure the test mode, the test channel, and the data rate.
4	Start the continuous Receiver.
5	Verify that the EUT works properly.

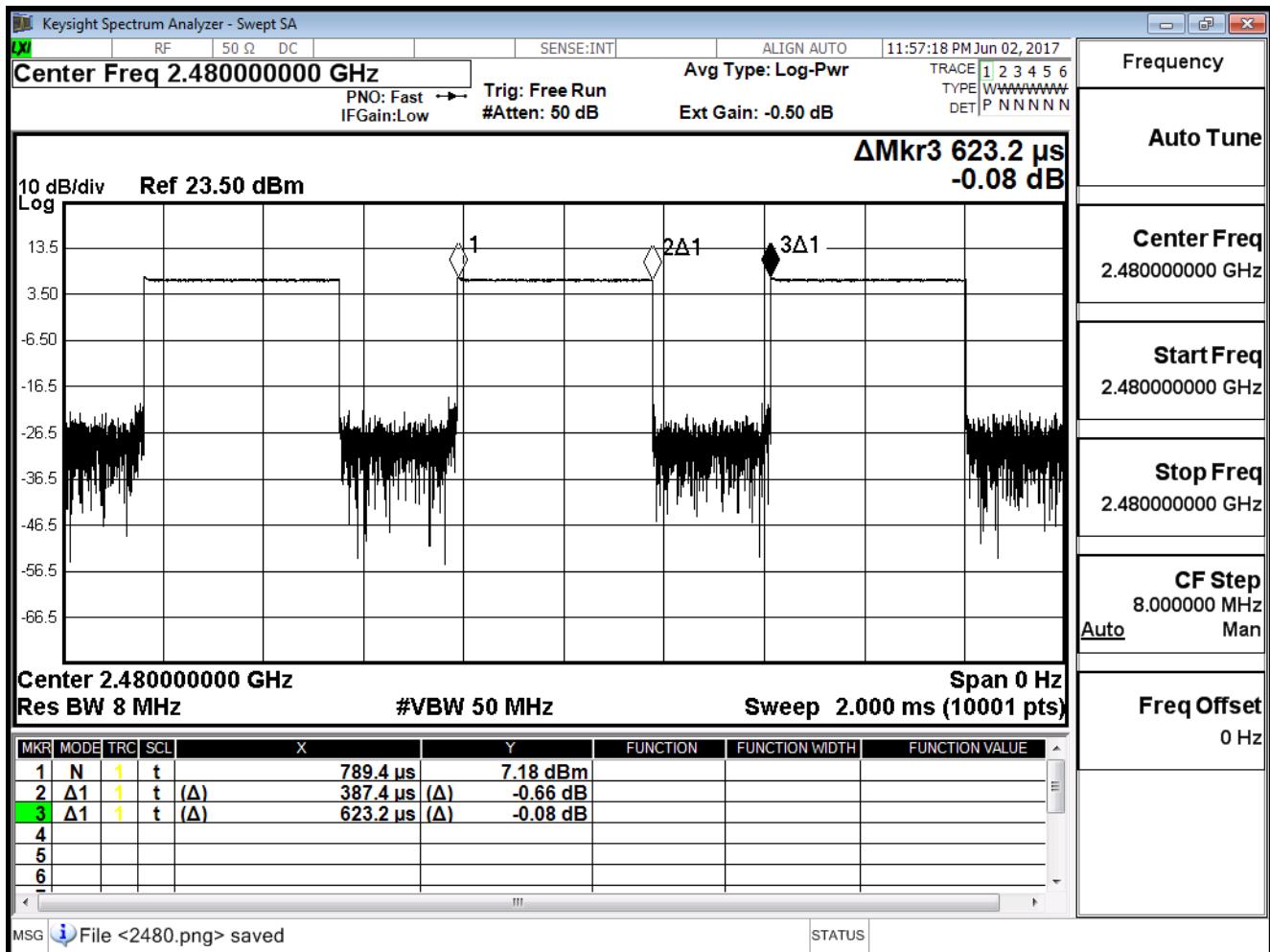
1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	24	--
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 Peak Power Output	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 Radiated Emission	15 - 35	25	2
Humidity (%RH)		25 - 75	54	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 RF antenna conducted test	15 - 35	25	3
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 Radiated Emission Band Edge	15 - 35	25	2
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 DTS Bandwidth & Occupied bandwidth	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.207 Power Density	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test Site information refers to Laboratory Information.

1.7. Duty cycle



Duty cycle	Radiated offset
≈ 62.1 %	-4.129

Note:

Offset = $20 \log(1/\text{duty cycle})$

According to KDB 789033

If power averaging (rms) mode was used in step (iv) above, the correction factor is $10 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB must be added to the measured emission levels.

If linear voltage averaging mode was used in step (iv) above, the correction factor is $20 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB must be added to the measured emission levels

2. Conducted Emission

2.1. Test Equipment

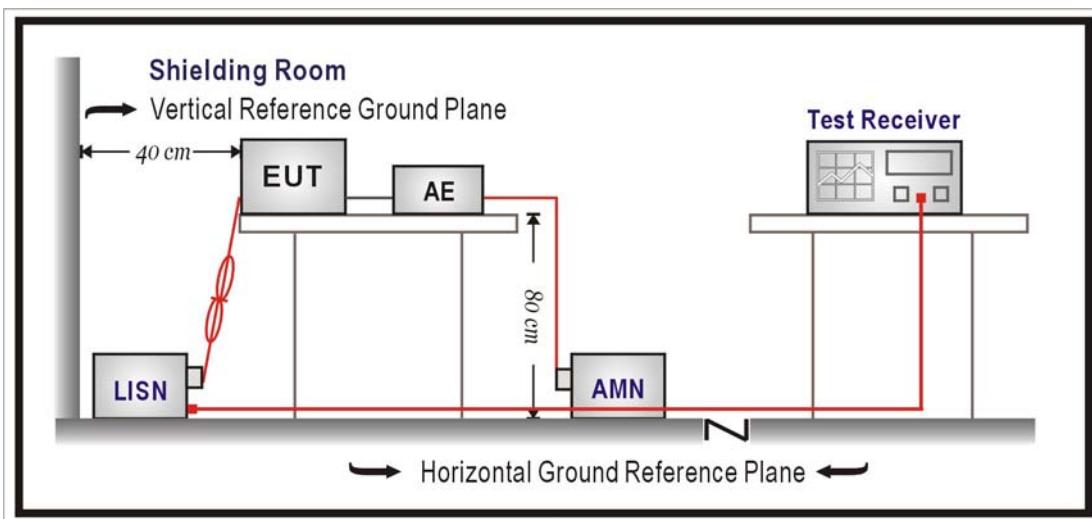
The following test equipments are used during the test:

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2018/02/05
LISN	R&S	ENV216	100092	2017/08/16
Test Receiver	R&S	ESCS 30	836858/022	2018/01/14

Note: All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2015

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

EUT using DC input voltage, so the project does not have to test for testing.

3. Peak Power Output

3.1. Test Equipment

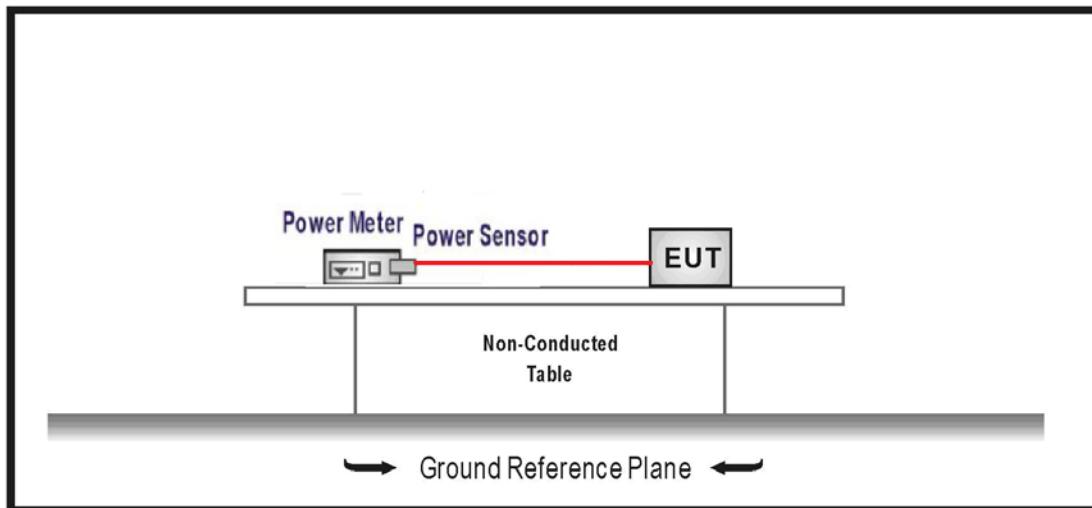
The following test equipment are used during the test:

Peak Power Output / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2018/01/19
Pulse Power Sensor	Anritsu	MA2411B	1531043	2018/01/19
Pulse Power Sensor	Anritsu	MA2411B	1531044	2018/01/19

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2. Test Setup



3.3. Test procedures

The EUT was setup according to ANSI C63.10:2013; tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

3.6. Test Result

Product	Smart Lighting System		
Test Item	Peak Power Output		
Test Mode	Mode 1: Transmit		
Date of Test	2017/06/02	Test Site	SR10-H

GFSK

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	7.230	≤30	Pass
19	2440	7.300	≤30	Pass
39	2480	7.080	≤30	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipment are used during the test:

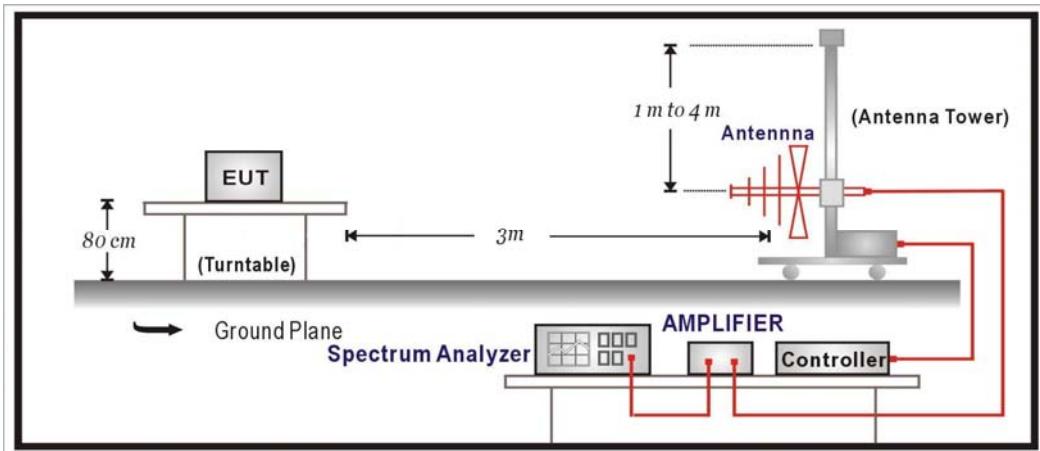
Radiated Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	Schaffner	CBL6112B	2891	2017/08/14
Horn Antenna	Schwarzbeck	BBHA 9120	D312	2017/10/25
Pre-Amplifier	EMCI	EMC0031835	980233	2018/02/02
Pre-Amplifier	Schwarzbeck	DBL-1840N506	013	2017/09/29
Pre-Amplifier	Miteq	JS41-00104000 0-58-5P	1573954	2017/10/04
Horn Antenna	Schwarzbeck	BBHA 9170	203	2017/08/28
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/22
Spectrum Analyzer	Agilent	E4440A	MY46187335	2017/12/21

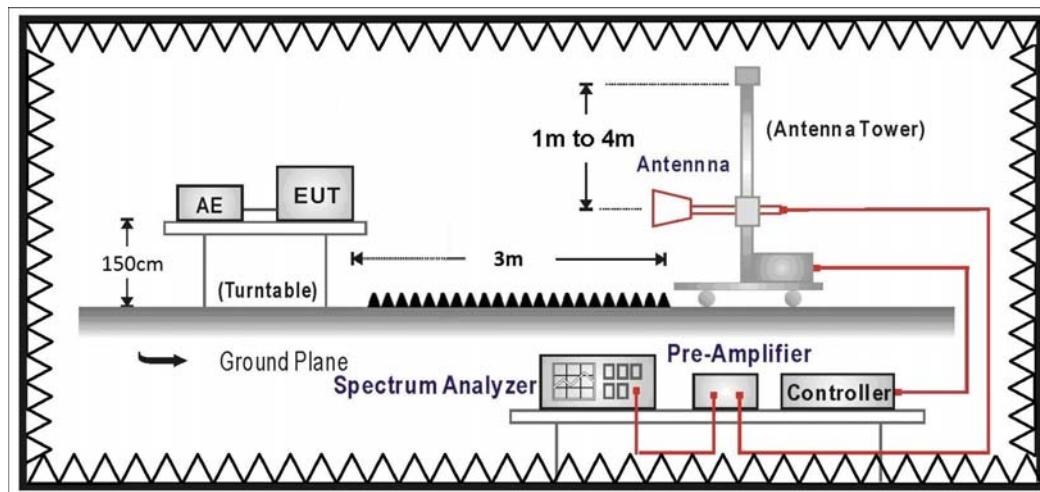
Note: All equipment that need to calibrate are with calibration period of 1 year.

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = $20 \log \frac{RF\ Voltage\ (uV)}{100}$

2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

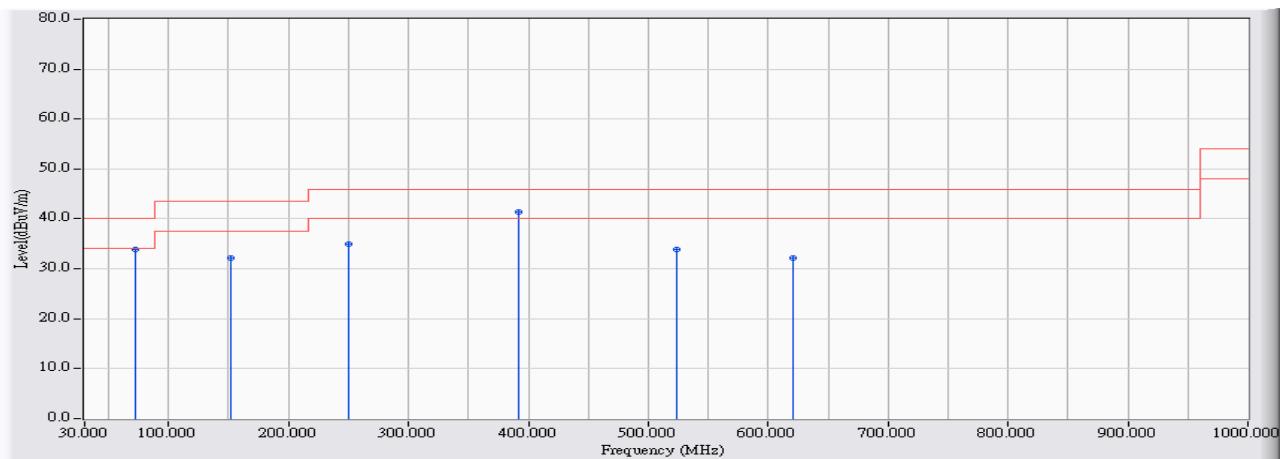
4.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

4.6. Test Result

30MHz-1GHz Spurious

Site : CB2-H	Time : 2017/06/19
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB2-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

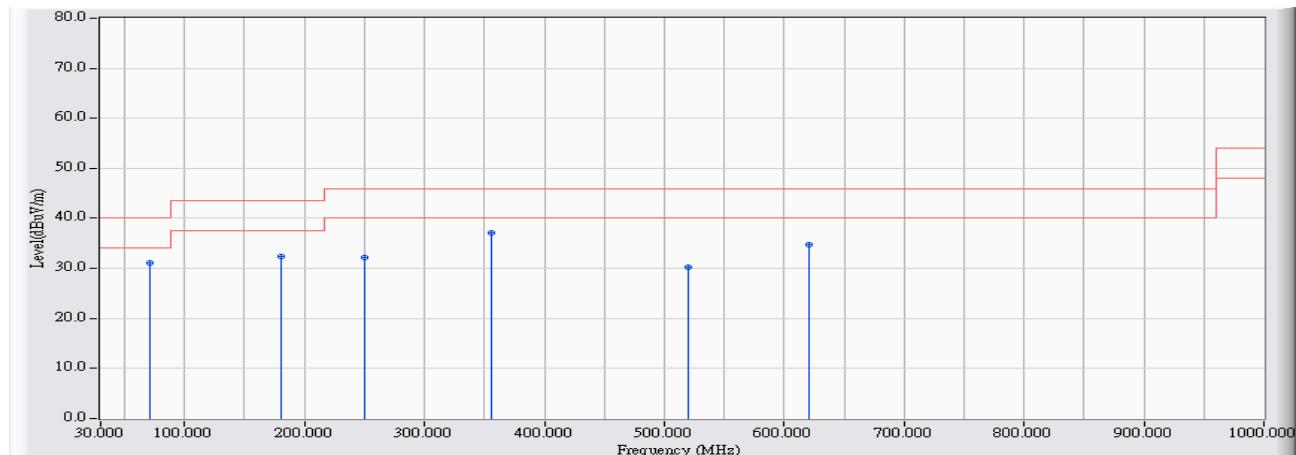


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	72.195	-27.657	61.538	33.881	-6.119	40.000	QUASIPEAK
2	152.220	-22.399	54.662	32.262	-11.238	43.500	QUASIPEAK
3	249.705	-20.314	55.322	35.008	-10.992	46.000	QUASIPEAK
4	* 391.810	-16.487	57.798	41.311	-4.689	46.000	QUASIPEAK
5	524.215	-14.110	47.939	33.829	-12.171	46.000	QUASIPEAK
6	620.730	-12.329	44.404	32.076	-13.924	46.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB2-H	Time : 2017/06/19
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB2-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz



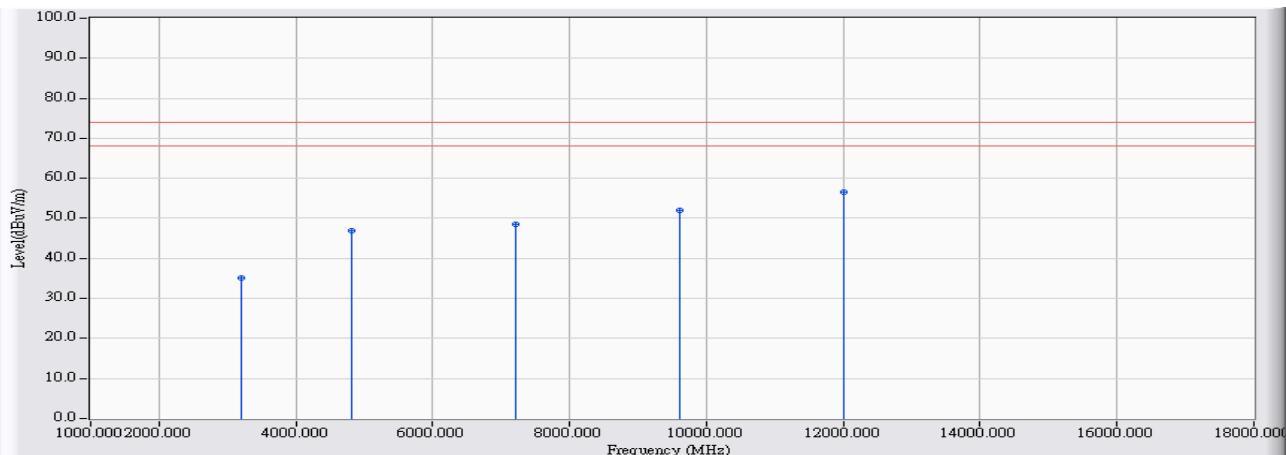
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	70.740	-27.788	58.881	31.093	-8.907	40.000	QUASIPEAK
2		180.350	-24.182	56.498	32.315	-11.185	43.500	QUASIPEAK
3		250.190	-20.286	52.358	32.072	-13.928	46.000	QUASIPEAK
4		356.405	-17.501	54.587	37.086	-8.914	46.000	QUASIPEAK
5		519.365	-13.956	44.095	30.139	-15.861	46.000	QUASIPEAK
6		620.730	-12.329	47.072	34.744	-11.256	46.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Above 1GHz Spurious

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

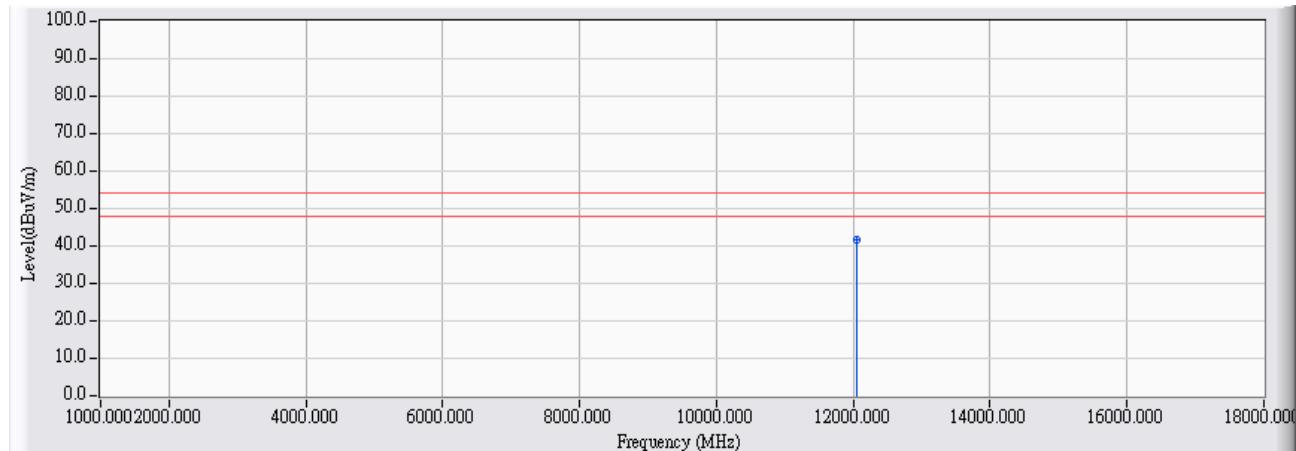


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3202.667	2.155	33.087	35.241	-38.759	74.000	PEAK
2		4803.430	7.383	39.620	47.003	-26.997	74.000	PEAK
3		7207.280	15.918	32.560	48.477	-25.523	74.000	PEAK
4		9607.530	21.730	30.240	51.970	-22.030	74.000	PEAK
5	*	12016.180	26.121	30.550	56.671	-17.329	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

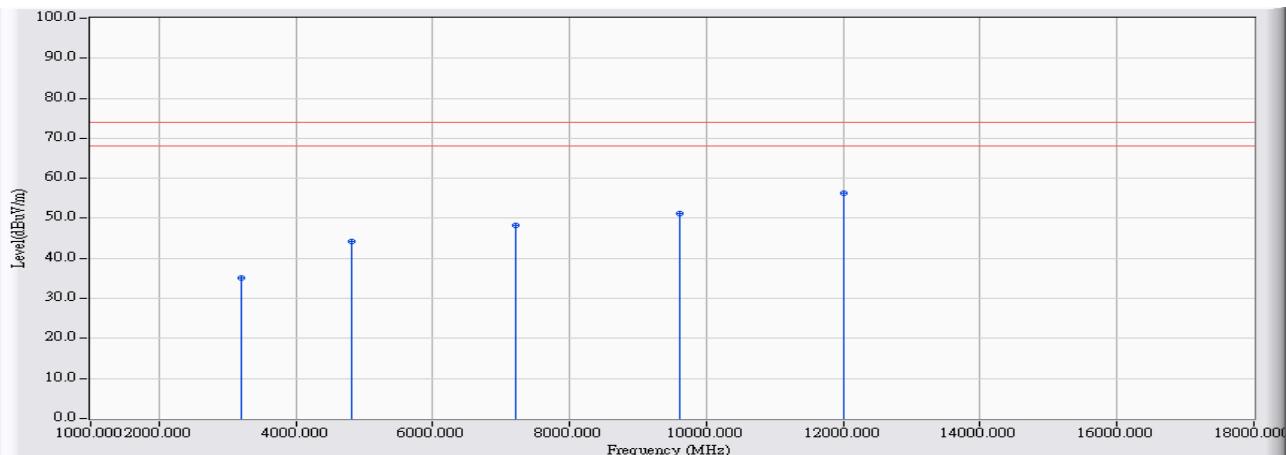


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12046.350	26.064	15.710	41.774	-12.226	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

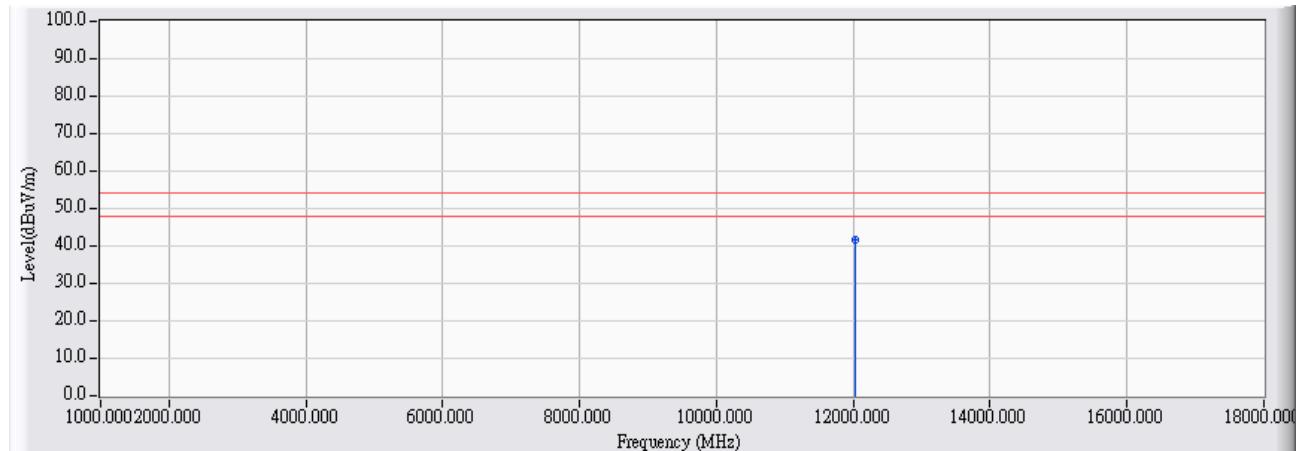


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3202.074	2.153	33.088	35.241	-38.759	74.000	PEAK
2		4803.380	7.383	36.770	44.153	-29.847	74.000	PEAK
3		7205.740	15.910	32.339	48.249	-25.751	74.000	PEAK
4		9608.920	21.734	29.590	51.324	-22.676	74.000	PEAK
5	*	12008.070	26.136	30.120	56.256	-17.744	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

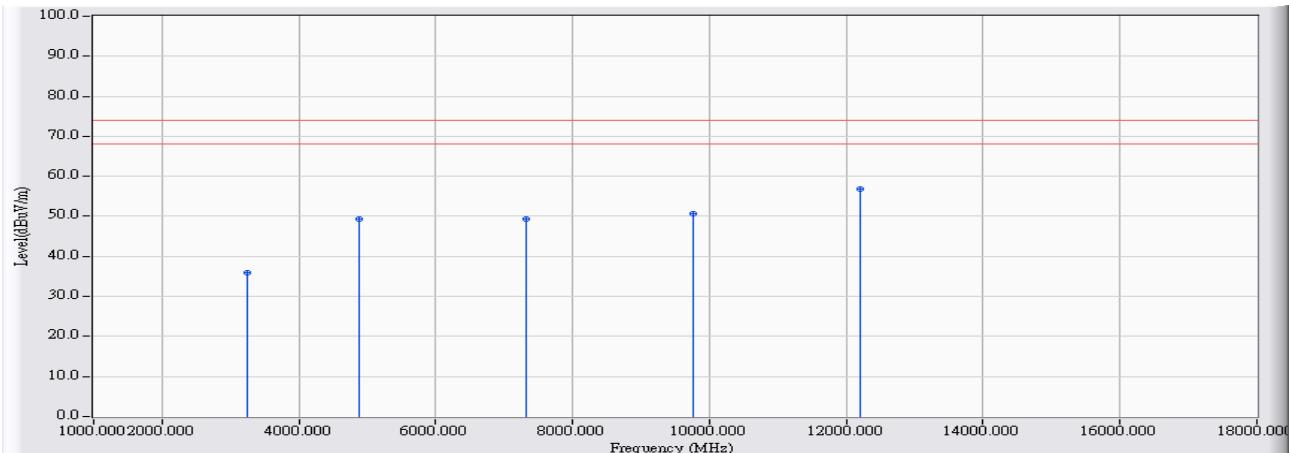


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12019.730	26.115	15.420	41.534	-12.466	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

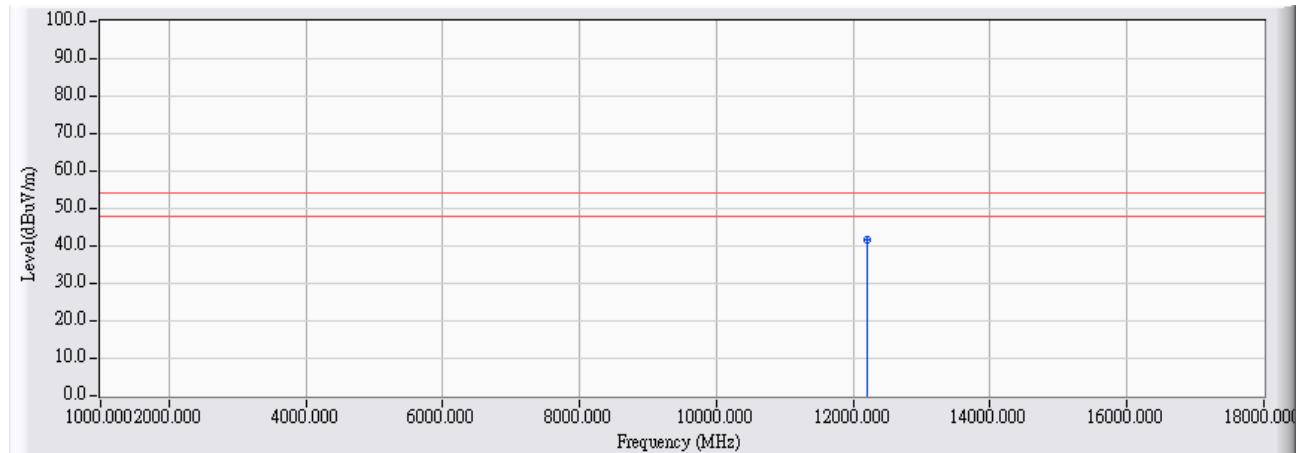


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3254.212	2.233	33.779	36.012	-37.988	74.000	PEAK
2		4880.495	7.574	41.860	49.434	-24.566	74.000	PEAK
3		7318.505	16.420	33.040	49.460	-24.540	74.000	PEAK
4		9759.675	22.159	28.540	50.698	-23.302	74.000	PEAK
5	*	12204.485	25.766	31.020	56.787	-17.213	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

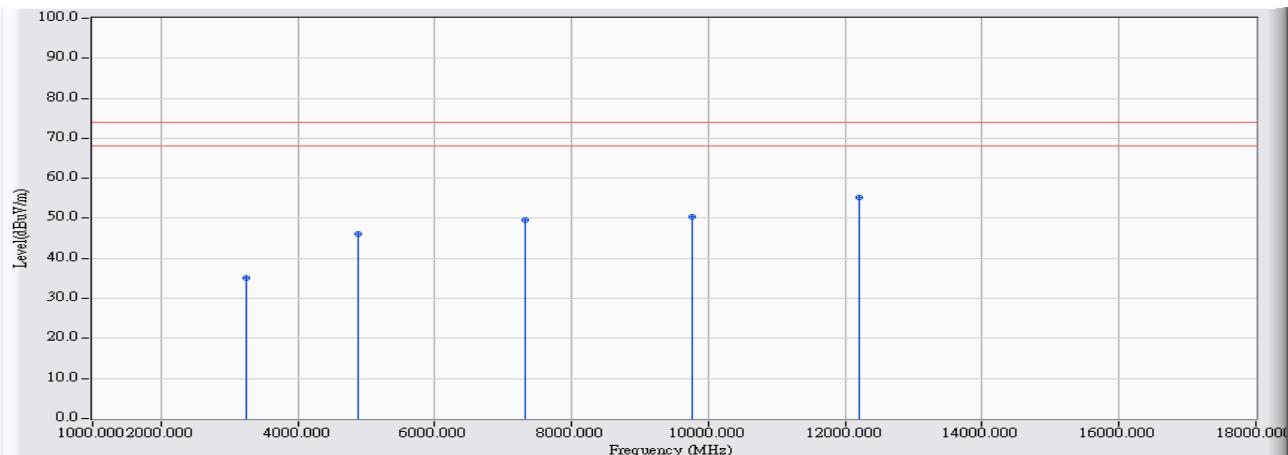


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12197.215	25.781	15.870	41.650	-12.350	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

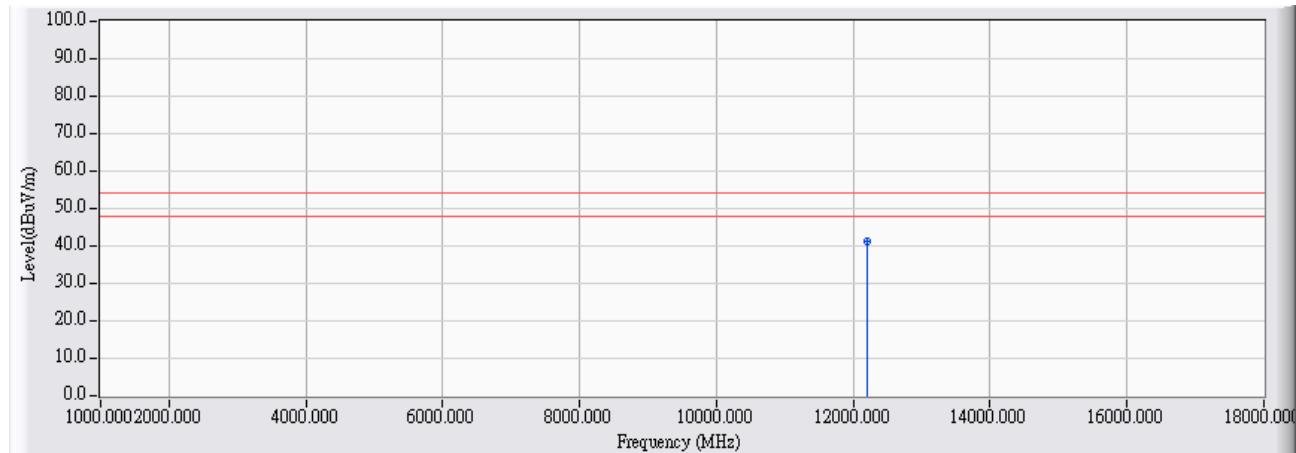


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3254.241	2.233	33.009	35.242	-38.758	74.000	PEAK
2		4879.895	7.573	38.610	46.182	-27.818	74.000	PEAK
3		7320.550	16.429	33.190	49.619	-24.381	74.000	PEAK
4		9760.300	22.159	28.150	50.310	-23.690	74.000	PEAK
5	*	12199.625	25.776	29.570	55.346	-18.654	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

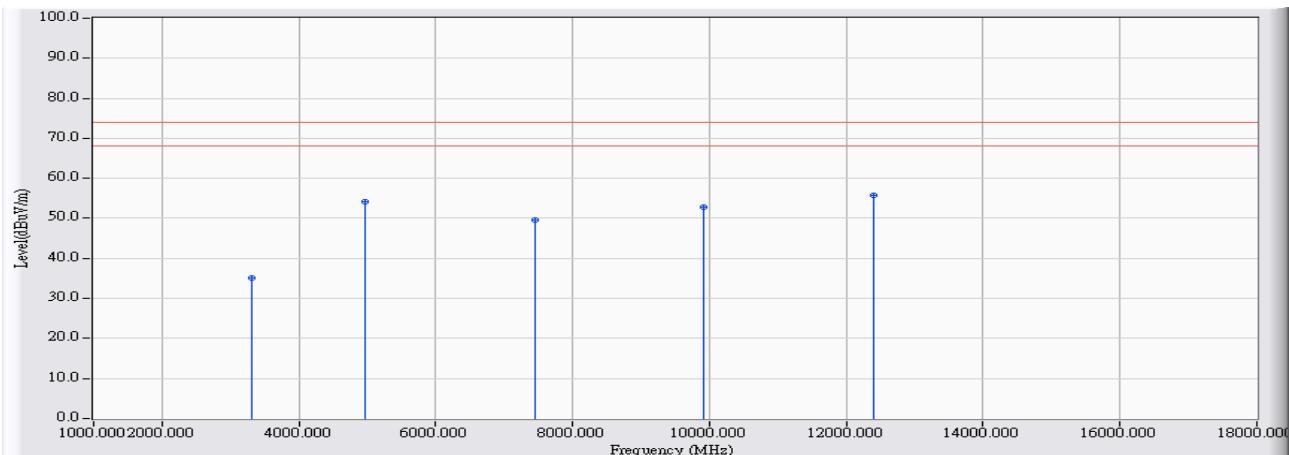


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12201.475	25.772	15.670	41.442	-12.558	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz

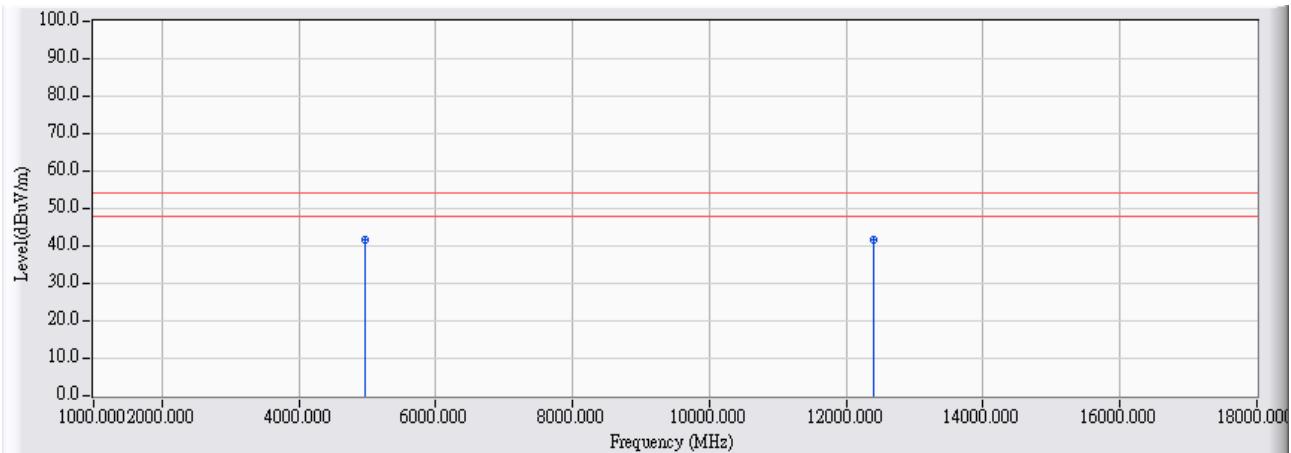


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3305.985	2.301	32.938	35.239	-38.761	74.000	PEAK
2		4959.955	7.770	46.260	54.030	-19.970	74.000	PEAK
3		7440.395	16.949	32.620	49.570	-24.430	74.000	PEAK
4		9920.075	22.512	30.200	52.712	-21.288	74.000	PEAK
5 [*]		12399.115	25.409	30.230	55.639	-18.361	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz

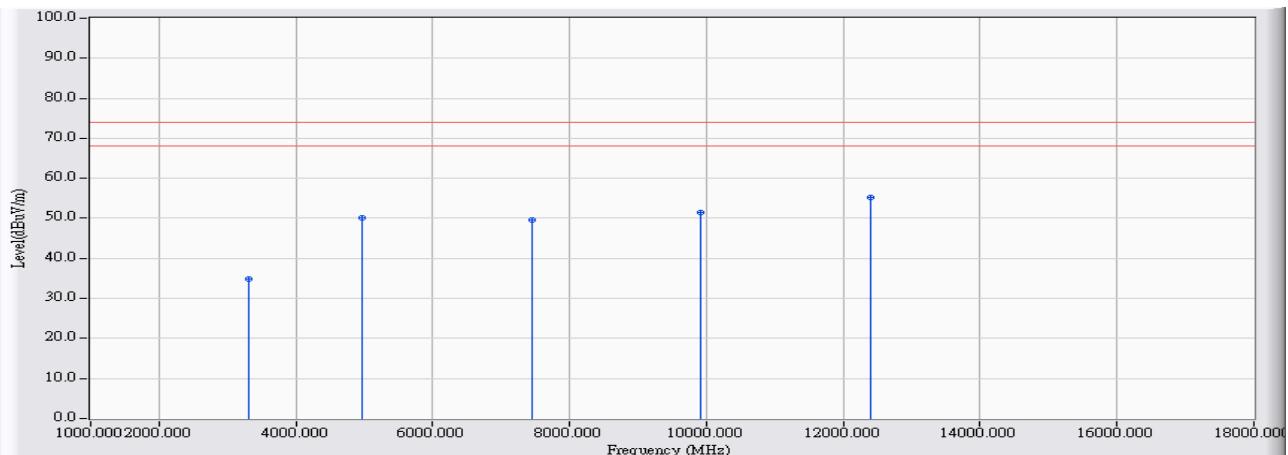


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4960.075	7.771	33.910	41.681	-12.319	54.000	AVERAGE
2	*	12397.230	25.413	16.420	41.833	-12.167	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		3306.351	2.301	32.684	34.986	-39.014	74.000	PEAK
2		4960.340	7.771	42.350	50.121	-23.879	74.000	PEAK
3		7440.410	16.949	32.520	49.470	-24.530	74.000	PEAK
4		9920.810	22.515	28.850	51.364	-22.636	74.000	PEAK
5	*	12399.250	25.409	29.760	55.169	-18.831	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/06/24
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power :DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12404.745	25.399	16.040	41.439	-12.561	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

5. RF antenna conducted test

5.1. Test Equipment

The following test equipment is used during the test:

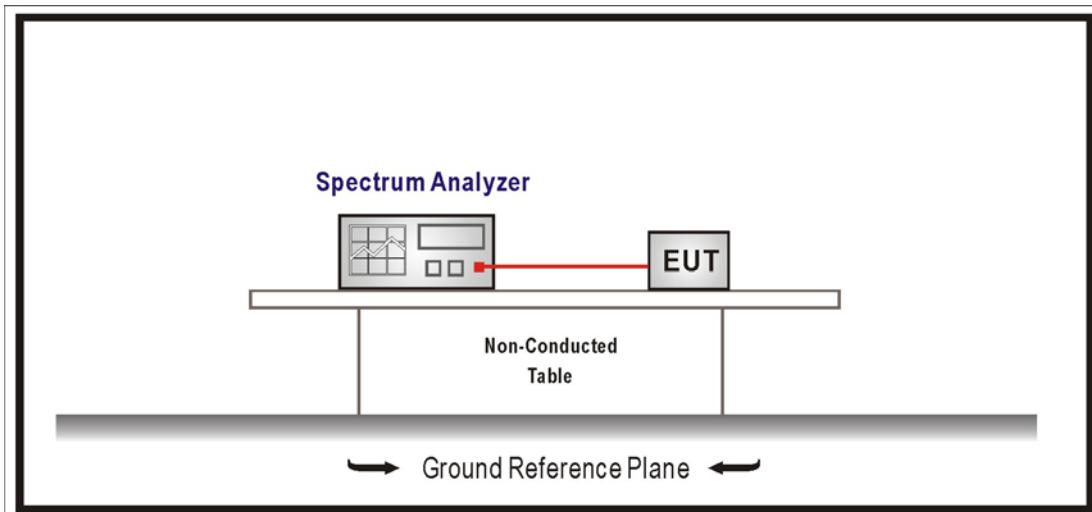
RF antenna conducted test / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

5.2. Test Setup

RF Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 an RF conducted or radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

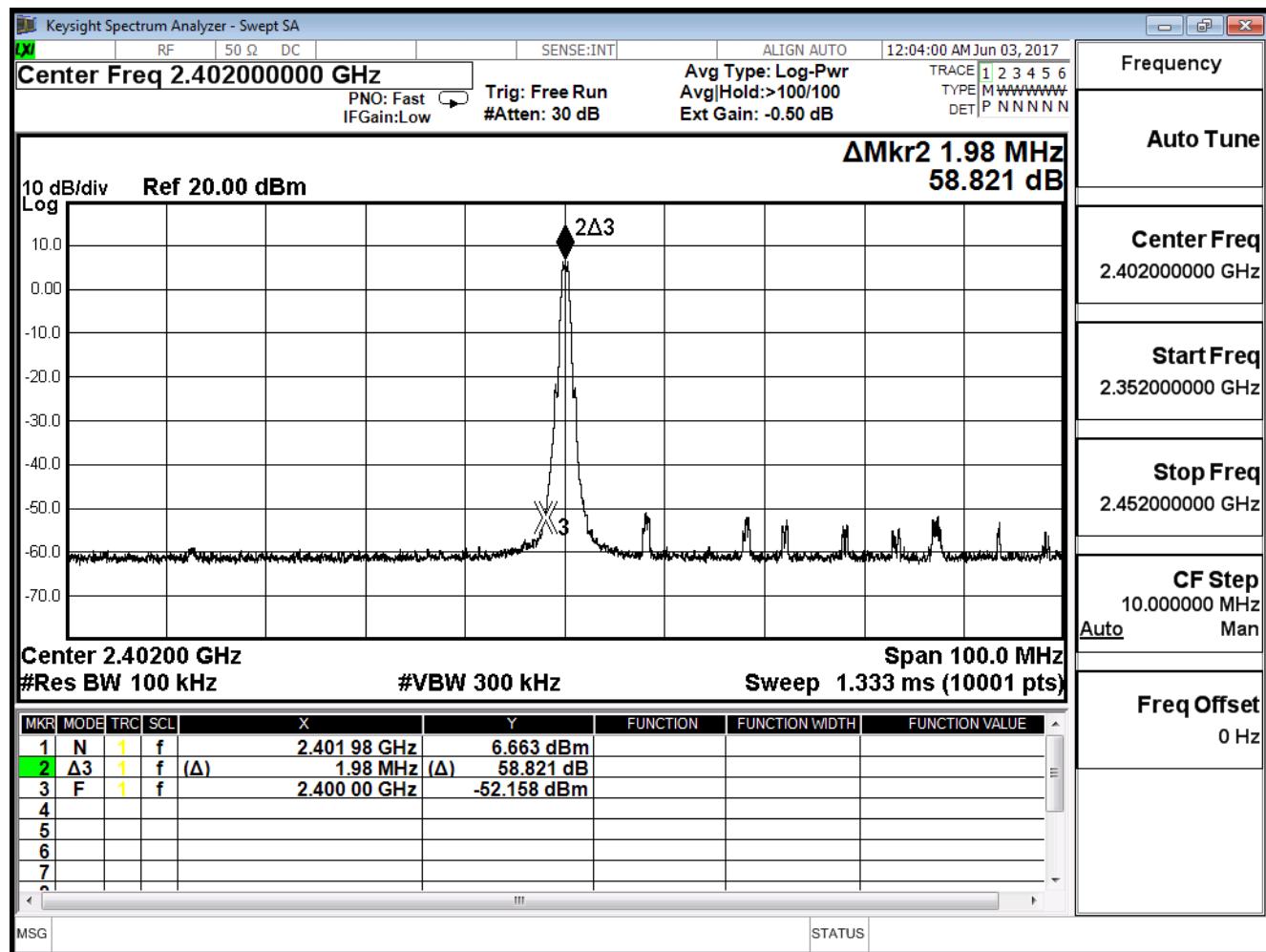
5.6. Test Result

Product	Smart Lighting System		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2017/06/03	Test Site	SR10-H

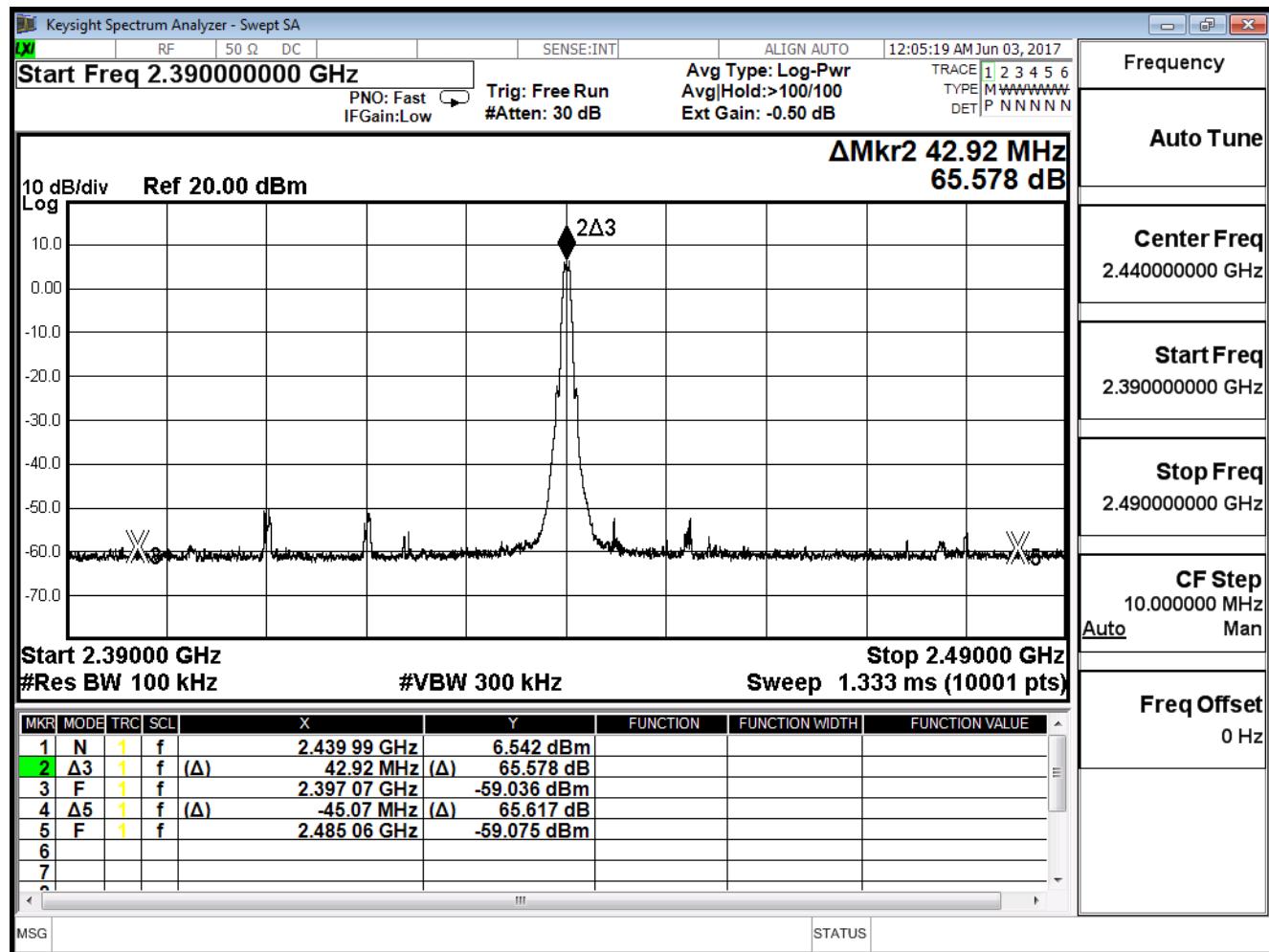
GFSK

Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
00	2402	58.821	≥20	Pass
19	2440	65.578	≥20	Pass
39	2480	63.513	≥20	Pass

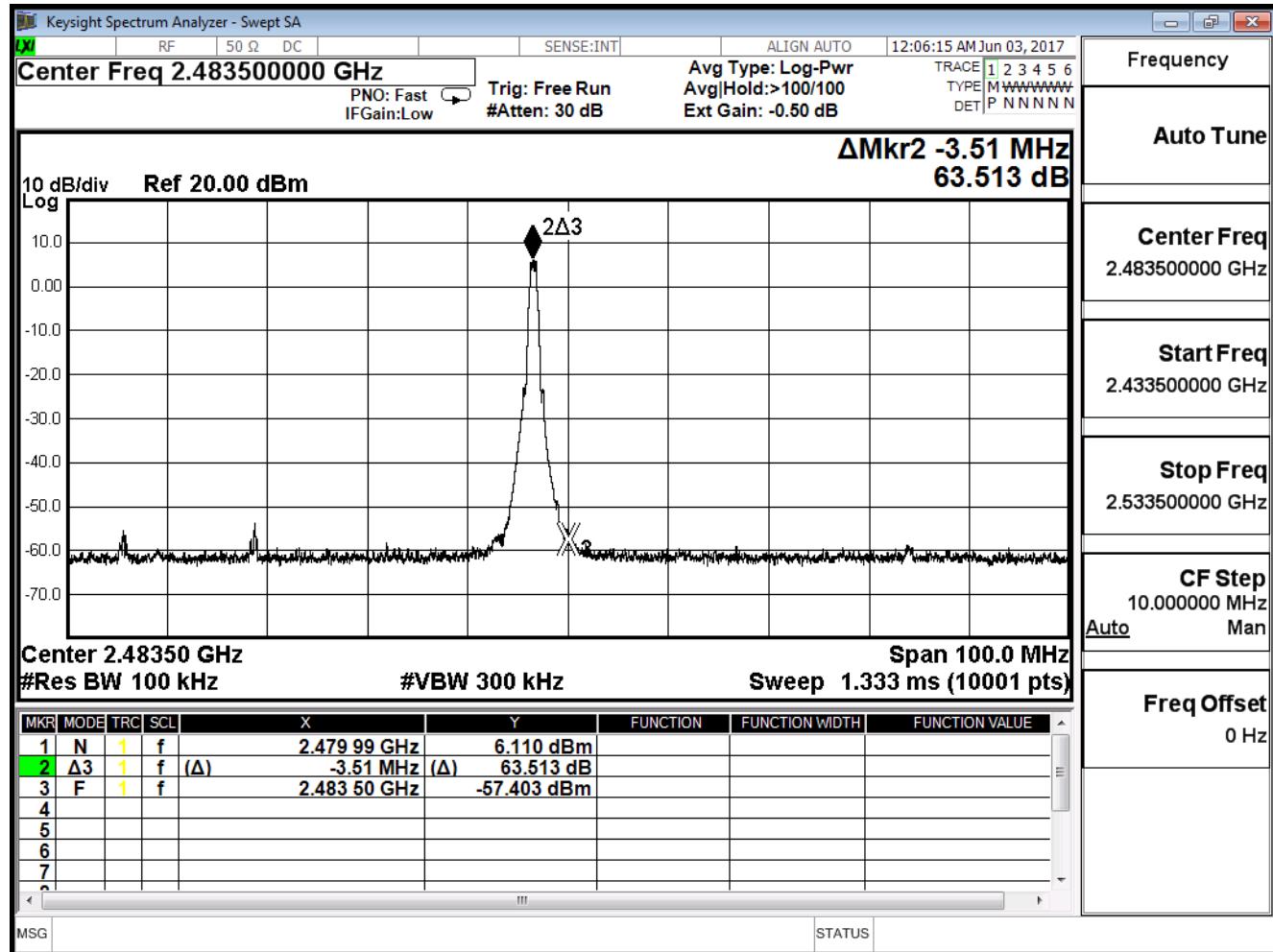
Channel 00



Channel 19

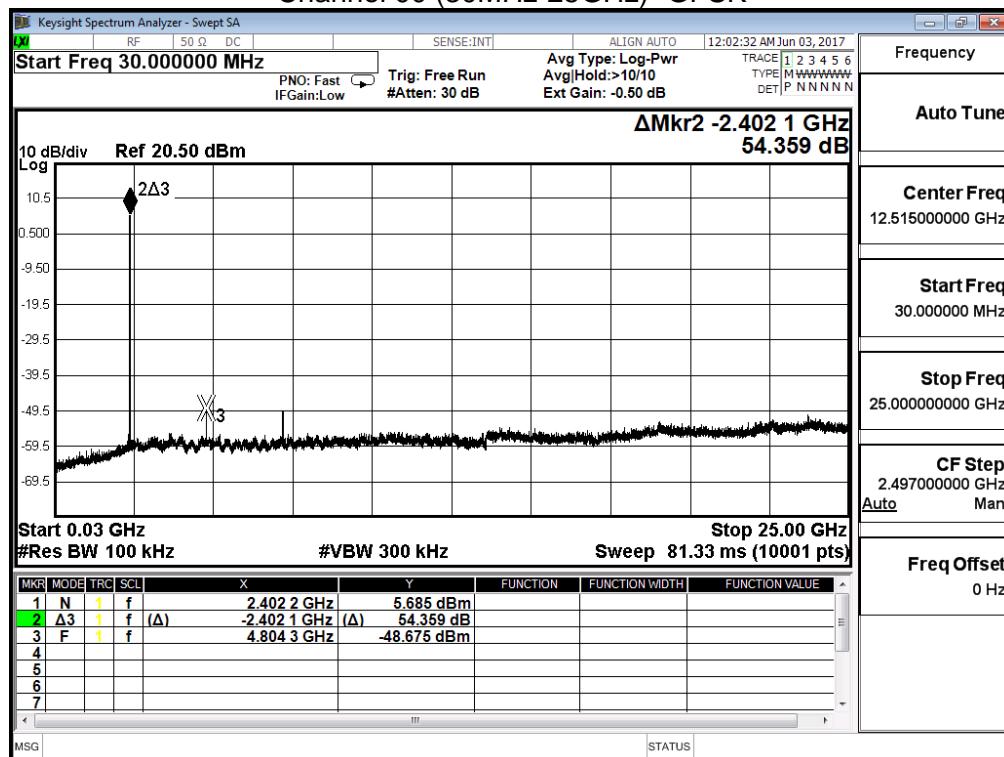


Channel 39

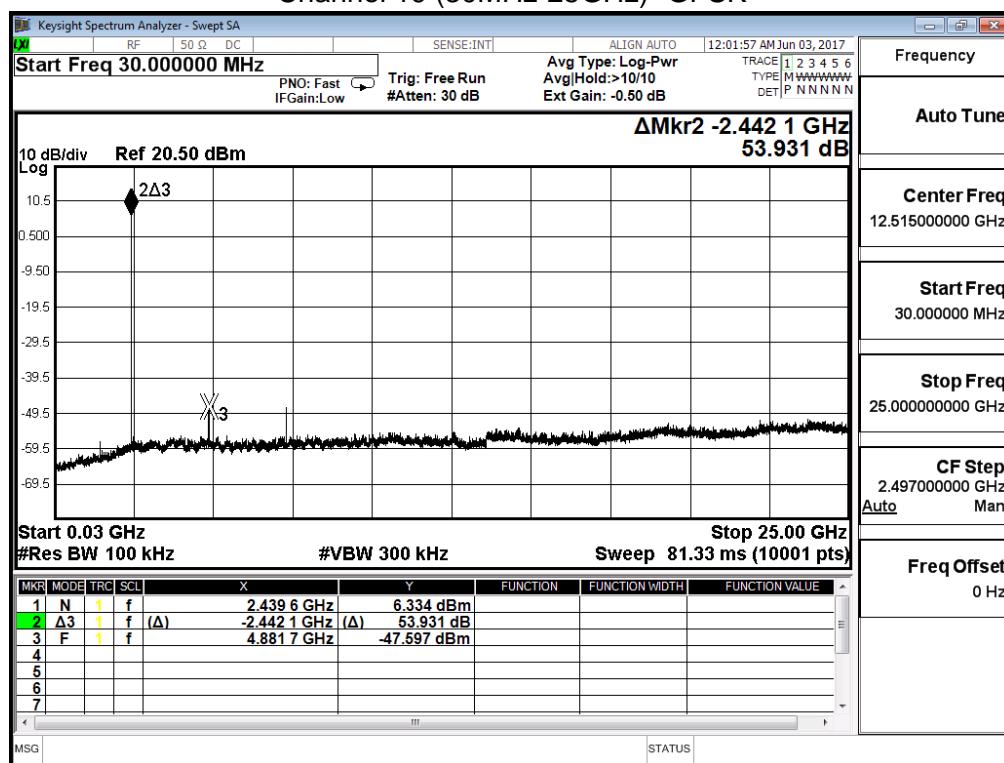


Product	Smart Lighting System		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2017/06/03	Test Site	SR10-H

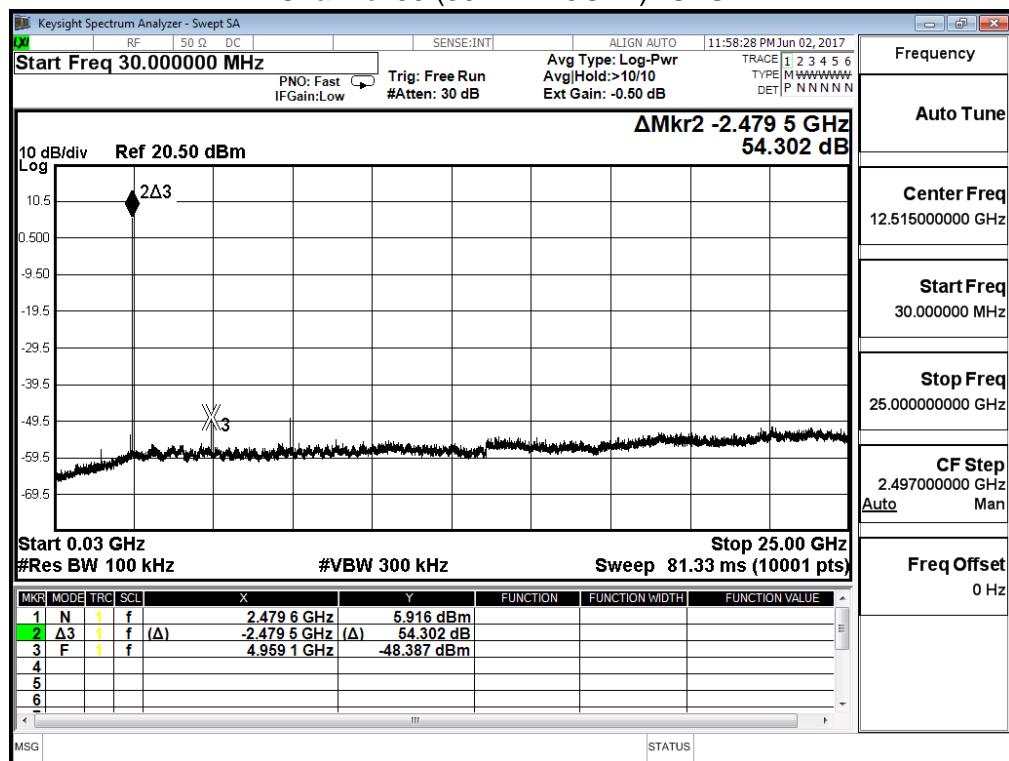
Channel 00 (30MHz-25GHz)- GFSK



Channel 19 (30MHz-25GHz)- GFSK



Channel 39 (30MHz-25GHz)- GFSK



6. Band Edge

6.1. Test Equipment

The following test equipment are used during the test:

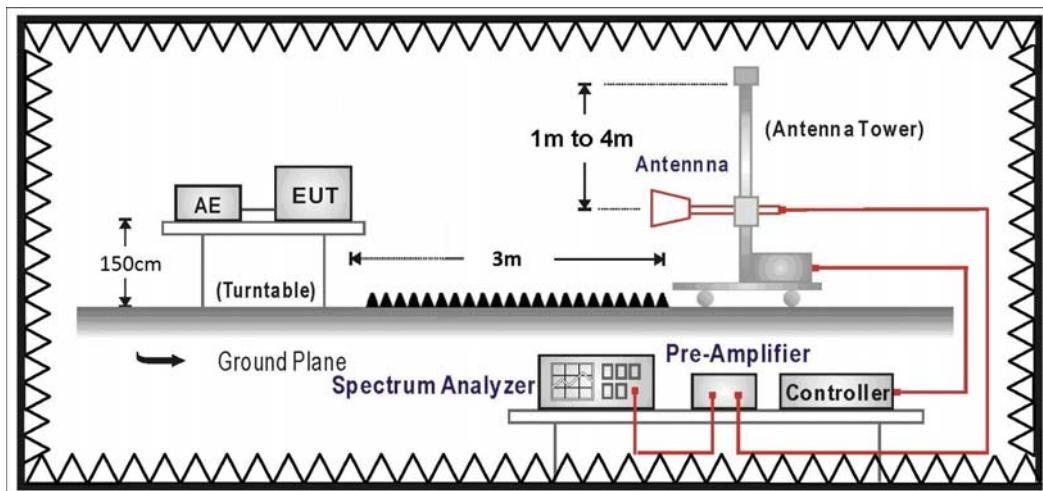
Band Edge / CB4-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Horn Antenna	Schwarzbeck	BBHA 9120	D312	2017/10/25
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/22
Pre-Amplifier	EMCI	EMC01820I	980364	2018/03/28
Spectrum Analyzer	Agilent	E4440A	MY46187335	2017/12/21

Note: All equipment that need to calibrate are with calibration period of 1 year.

6.2. Test Setup

RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

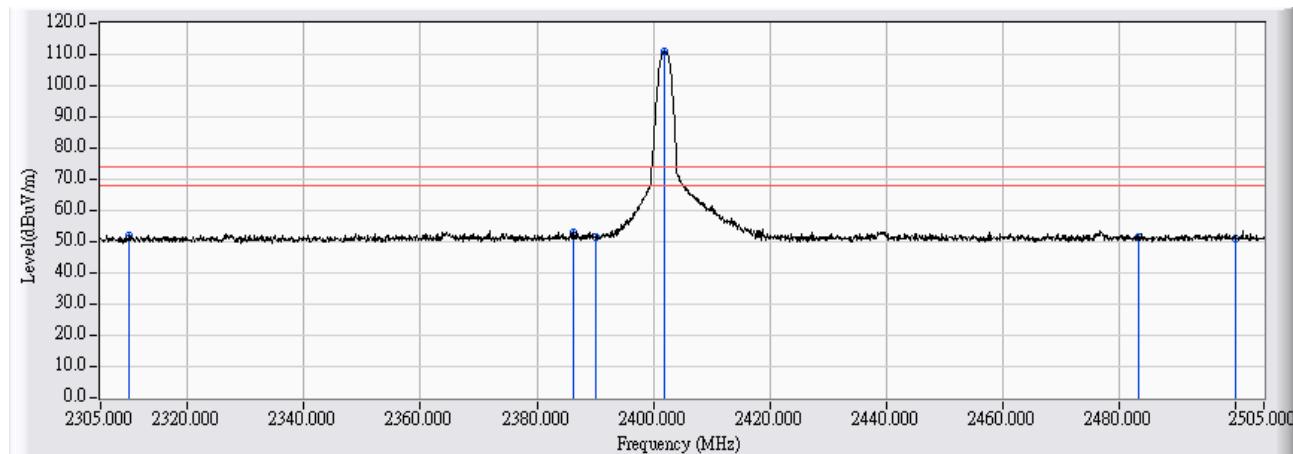
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

6.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

6.6. Test Result

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

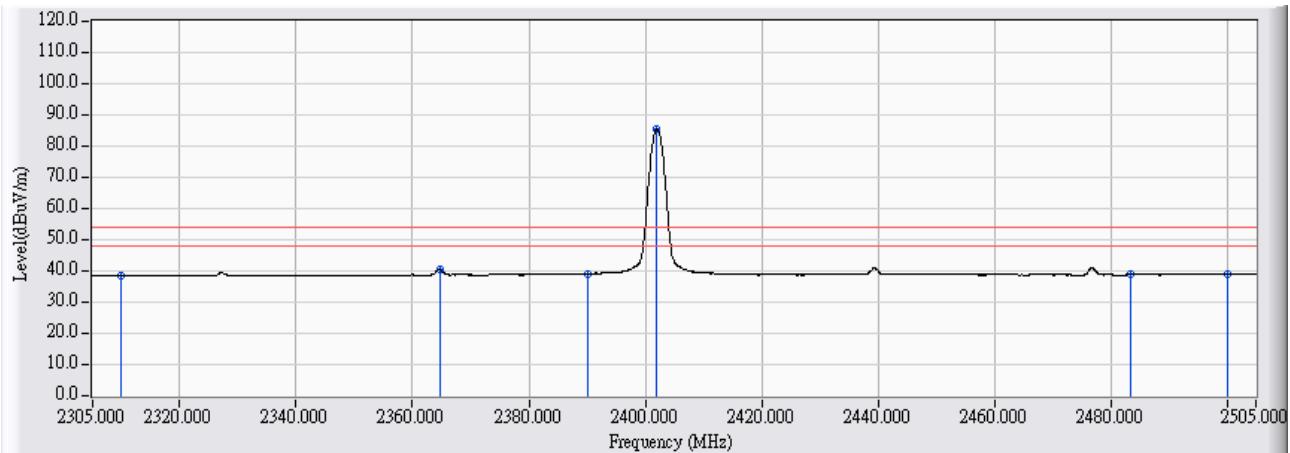


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	-0.502	52.565	52.063	-21.937	74.000	PEAK
2	2386.200	-0.207	53.346	53.138	-20.862	74.000	PEAK
3	2390.000	-0.193	51.472	51.279	-22.721	74.000	PEAK
4 *	2402.000	-0.146	110.926	110.780	36.780	74.000	PEAK
5	2483.500	0.168	51.281	51.449	-22.551	74.000	PEAK
6	2500.000	0.230	50.826	51.057	-22.943	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

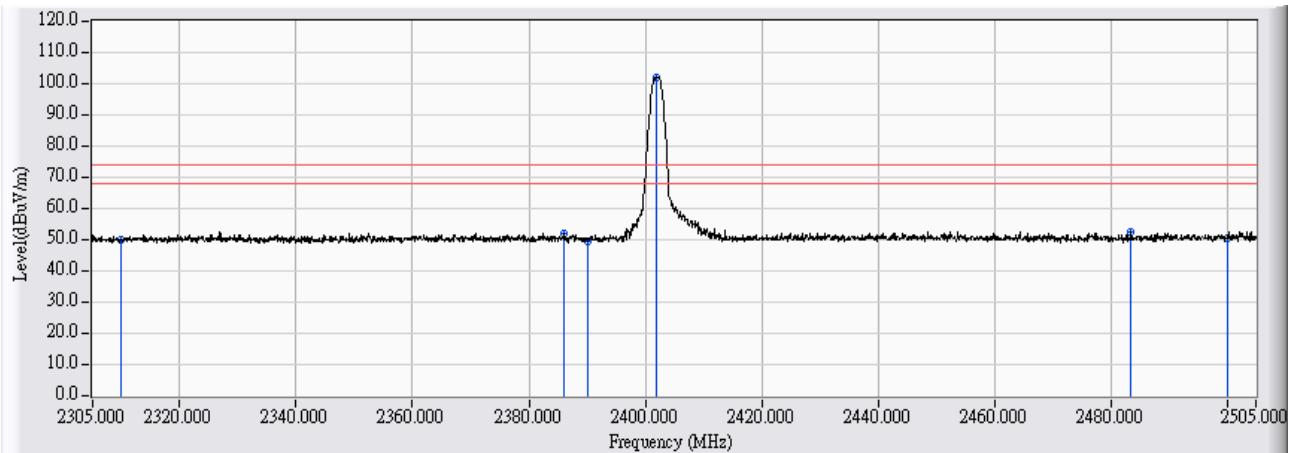


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.928	38.426	-15.574	54.000	AVERAGE
2		2364.700	-0.291	40.632	40.341	-13.659	54.000	AVERAGE
3		2390.000	-0.193	39.254	39.061	-14.939	54.000	AVERAGE
4	*	2402.000	-0.146	85.615	85.469	31.469	54.000	AVERAGE
5		2483.500	0.168	38.624	38.792	-15.208	54.000	AVERAGE
6		2500.000	0.230	38.768	38.999	-15.001	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

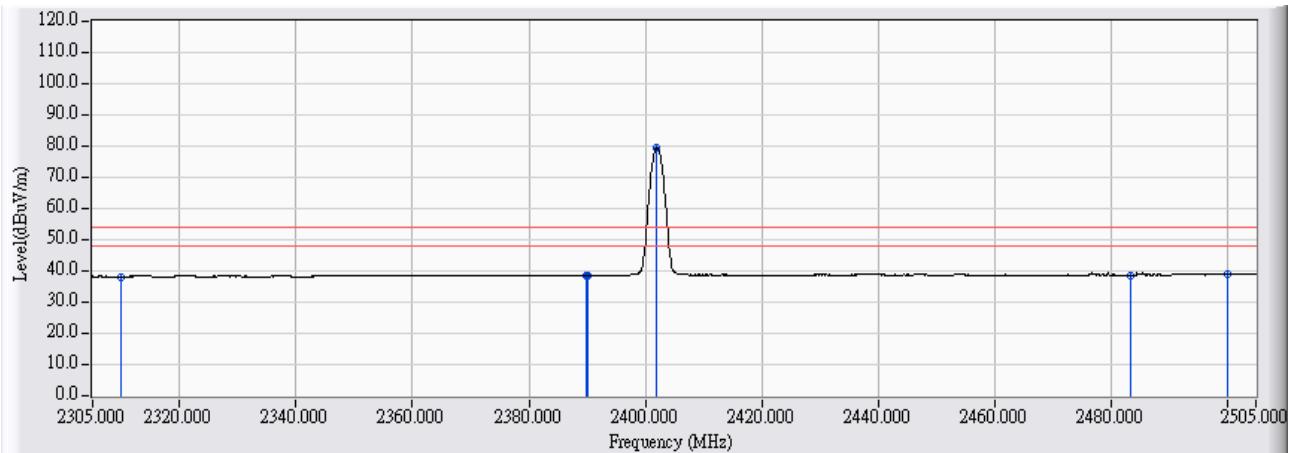


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	50.477	49.975	-24.025	74.000	PEAK
2		2386.100	-0.208	52.210	52.002	-21.998	74.000	PEAK
3		2390.000	-0.193	49.859	49.666	-24.334	74.000	PEAK
4	*	2402.000	-0.146	102.083	101.937	27.937	74.000	PEAK
5		2483.500	0.168	52.368	52.536	-21.464	74.000	PEAK
6		2500.000	0.230	50.436	50.667	-23.333	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2402MHz

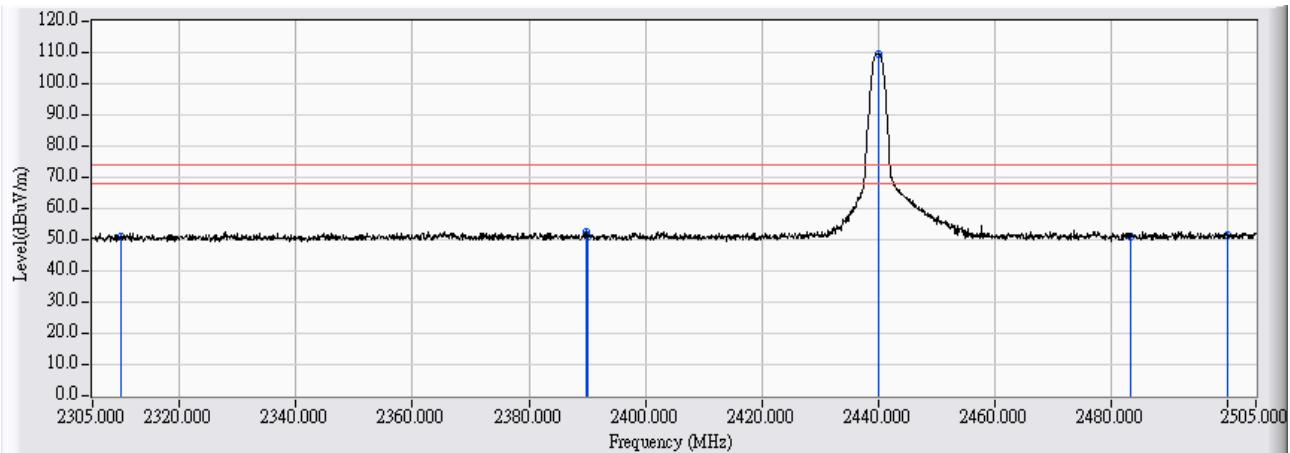


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.720	38.218	-15.782	54.000	AVERAGE
2		2389.800	-0.193	38.661	38.467	-15.533	54.000	AVERAGE
3		2390.000	-0.193	38.698	38.505	-15.495	54.000	AVERAGE
4	*	2402.000	-0.146	79.635	79.489	25.489	54.000	AVERAGE
5		2483.500	0.168	38.460	38.628	-15.372	54.000	AVERAGE
6		2500.000	0.230	38.655	38.886	-15.114	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

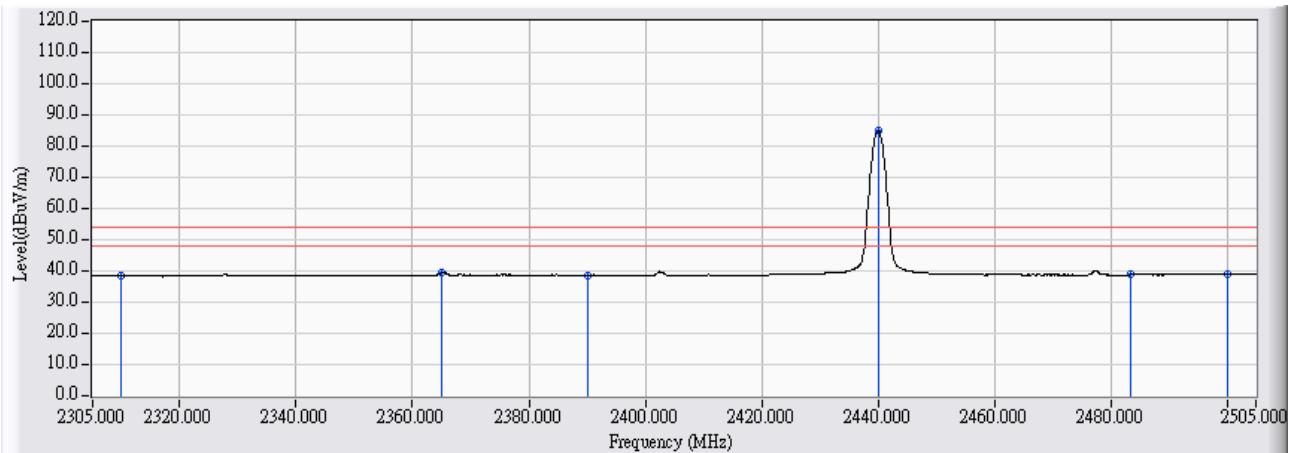


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	51.258	50.756	-23.244	74.000	PEAK
2		2389.800	-0.193	52.717	52.523	-21.477	74.000	PEAK
3		2390.000	-0.193	51.189	50.996	-23.004	74.000	PEAK
4	*	2440.000	0.000	109.672	109.672	35.672	74.000	PEAK
5		2483.500	0.168	50.914	51.082	-22.918	74.000	PEAK
6		2500.000	0.230	51.135	51.366	-22.634	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

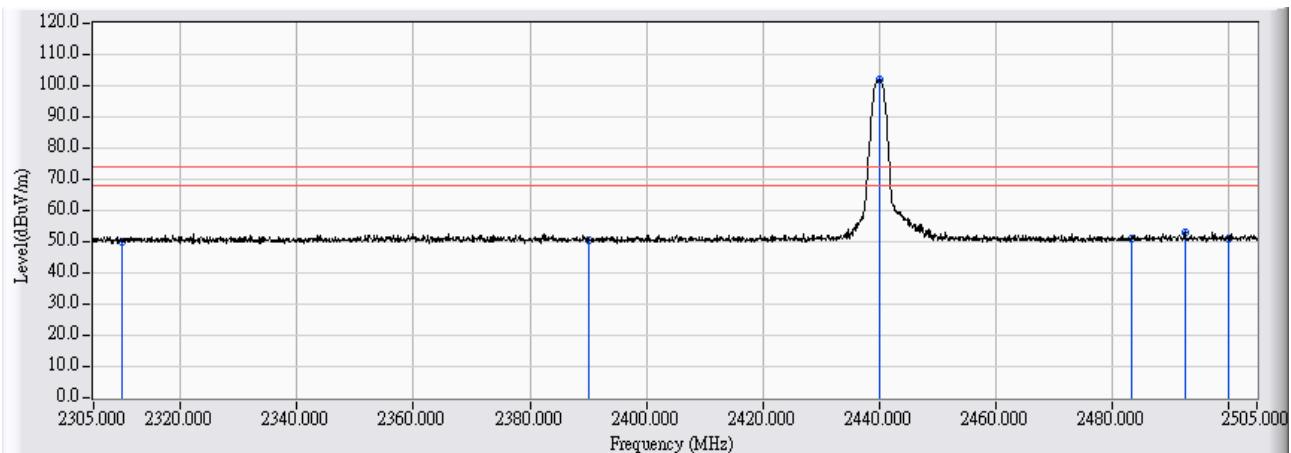


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.842	38.340	-15.660	54.000	AVERAGE
2		2364.900	-0.290	39.626	39.336	-14.664	54.000	AVERAGE
3		2390.000	-0.193	38.838	38.645	-15.355	54.000	AVERAGE
4	*	2440.000	0.000	84.759	84.759	30.759	54.000	AVERAGE
5		2483.500	0.168	38.631	38.799	-15.201	54.000	AVERAGE
6		2500.000	0.230	38.767	38.998	-15.002	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

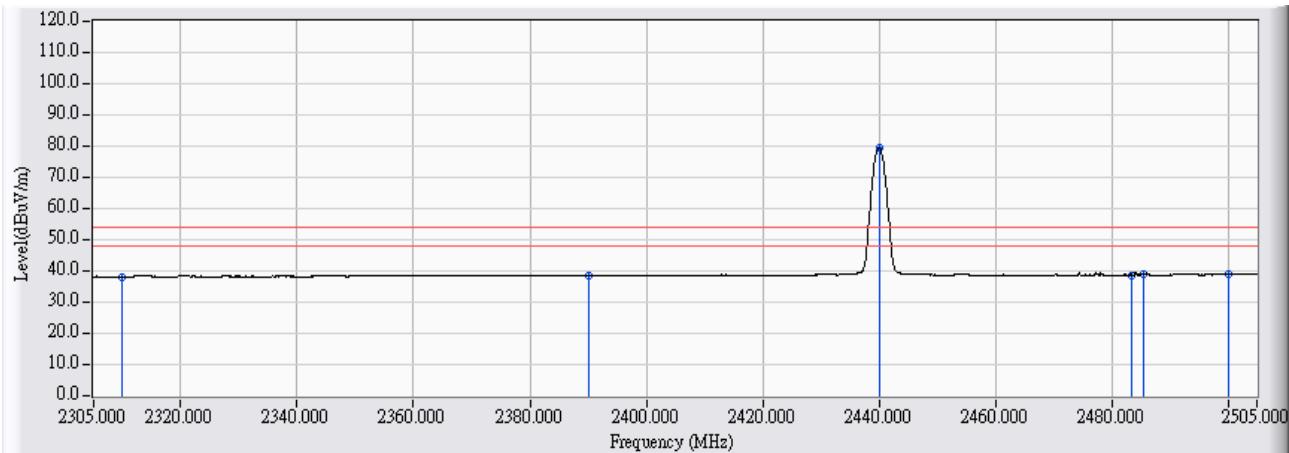


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	50.436	49.934	-24.066	74.000	PEAK
2		2390.000	-0.193	50.689	50.496	-23.504	74.000	PEAK
3	*	2440.000	0.000	101.772	101.772	27.772	74.000	PEAK
4		2483.500	0.168	50.723	50.891	-23.109	74.000	PEAK
5		2492.600	0.203	52.557	52.761	-21.239	74.000	PEAK
6		2500.000	0.230	50.872	51.103	-22.897	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2440MHz

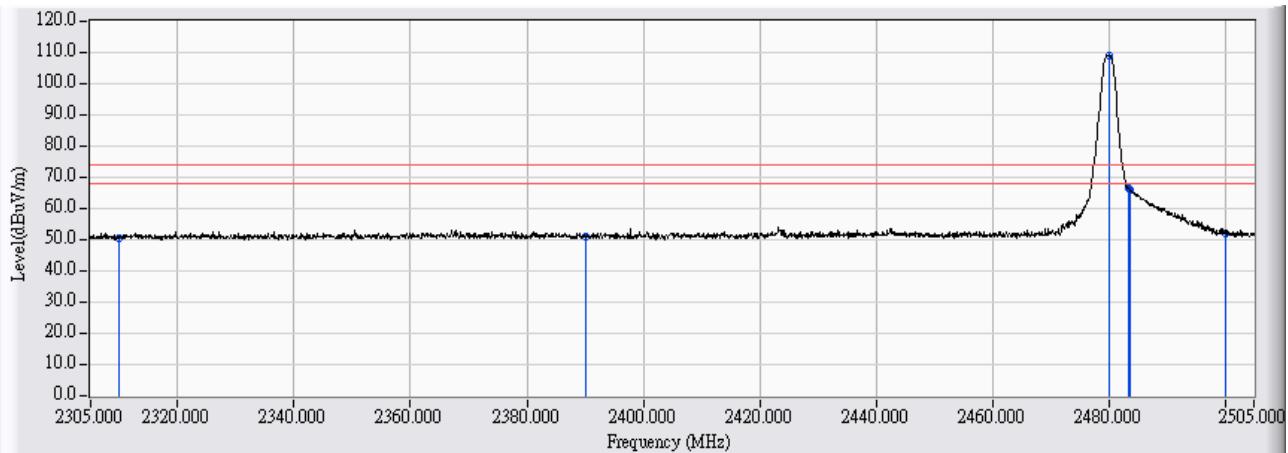


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.684	38.182	-15.818	54.000	AVERAGE
2		2390.000	-0.193	38.621	38.428	-15.572	54.000	AVERAGE
3	*	2440.100	0.001	79.411	79.412	25.412	54.000	AVERAGE
4		2483.500	0.168	38.550	38.718	-15.282	54.000	AVERAGE
5		2485.400	0.176	38.709	38.885	-15.115	54.000	AVERAGE
6		2500.000	0.230	38.592	38.823	-15.177	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz

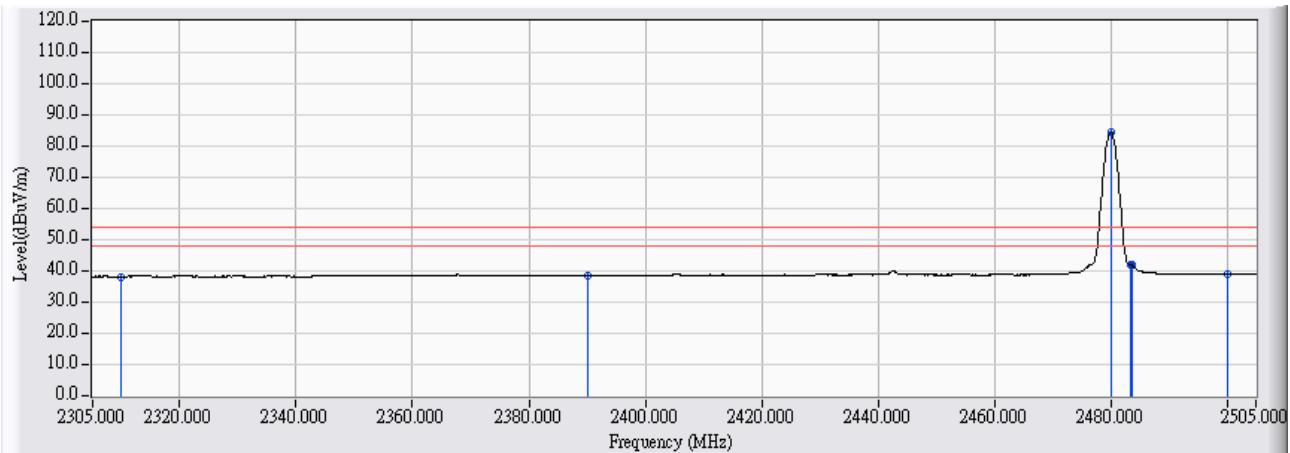


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	50.823	50.321	-23.679	74.000	PEAK
2		2390.000	-0.193	51.361	51.168	-22.832	74.000	PEAK
3	*	2480.000	0.155	109.066	109.221	35.221	74.000	PEAK
4		2483.500	0.168	66.083	66.251	-7.749	74.000	PEAK
5		2483.600	0.169	65.820	65.989	-8.011	74.000	PEAK
6		2500.000	0.230	51.669	51.900	-22.100	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz

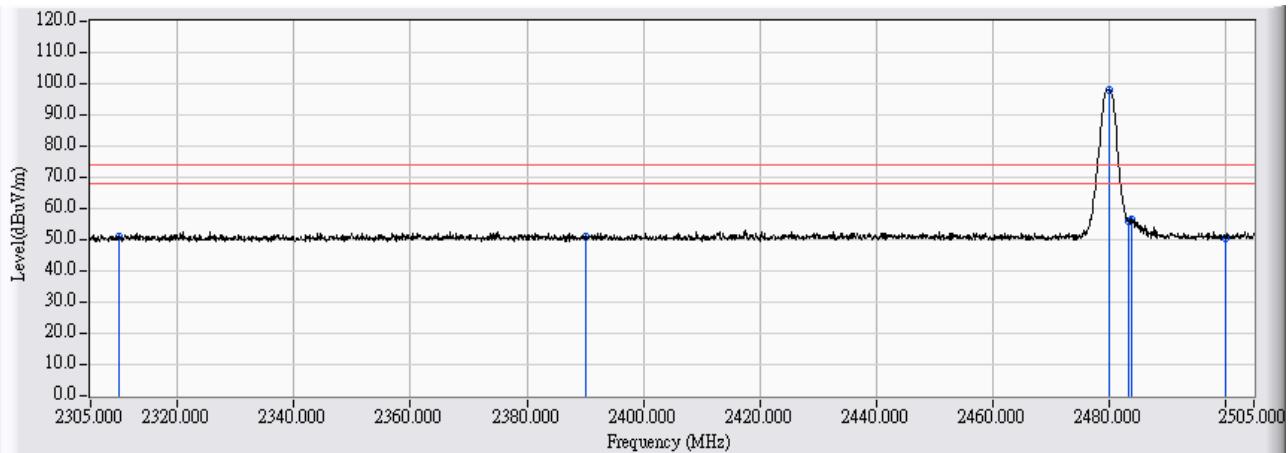


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.662	38.160	-15.840	54.000	AVERAGE
2		2390.000	-0.193	38.780	38.587	-15.413	54.000	AVERAGE
3	*	2480.100	0.155	84.200	84.355	30.355	54.000	AVERAGE
4		2483.500	0.168	41.694	41.862	-12.138	54.000	AVERAGE
5		2483.600	0.169	41.671	41.840	-12.160	54.000	AVERAGE
6		2500.000	0.230	38.686	38.917	-15.083	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz

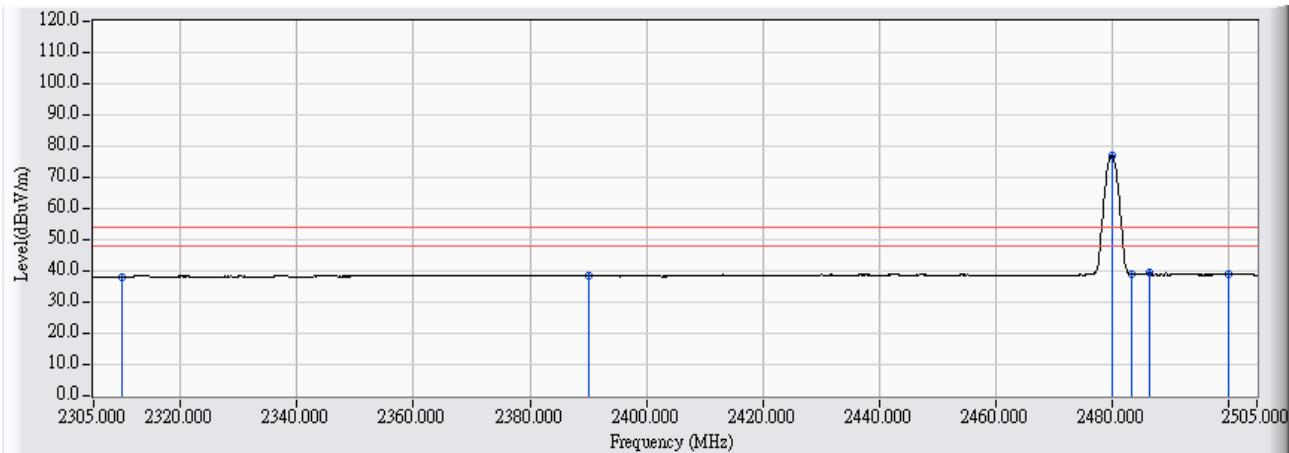


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	51.692	51.190	-22.810	74.000	PEAK
2		2390.000	-0.193	51.278	51.085	-22.915	74.000	PEAK
3	*	2480.000	0.155	97.960	98.115	24.115	74.000	PEAK
4		2483.500	0.168	56.058	56.226	-17.774	74.000	PEAK
5		2484.100	0.171	56.468	56.639	-17.361	74.000	PEAK
6		2500.000	0.230	50.193	50.424	-23.576	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/06/23
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3.8V
EUT : Smart Lighting System	Note : 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	-0.502	38.614	38.112	-15.888	54.000	AVERAGE
2		2390.000	-0.193	38.590	38.397	-15.603	54.000	AVERAGE
3	*	2480.000	0.155	76.727	76.882	22.882	54.000	AVERAGE
4		2483.500	0.168	38.906	39.074	-14.926	54.000	AVERAGE
5		2486.500	0.180	39.412	39.592	-14.408	54.000	AVERAGE
6		2500.000	0.230	38.622	38.853	-15.147	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

7. DTS Bandwidth

7.1. Test Equipment

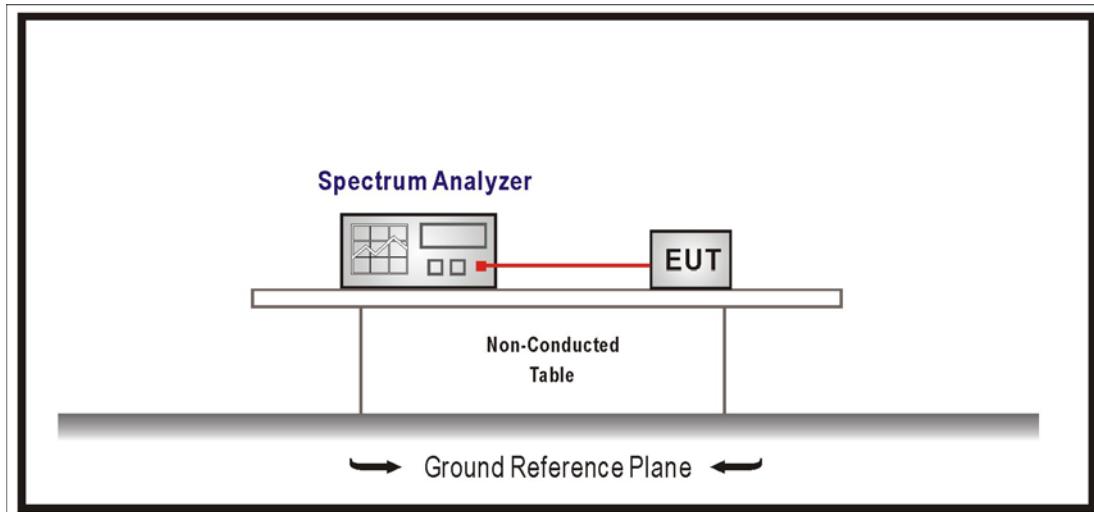
The following test equipment is used during the test:

DTS Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013; tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1% of EBW, Span greater than RBW.

7.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

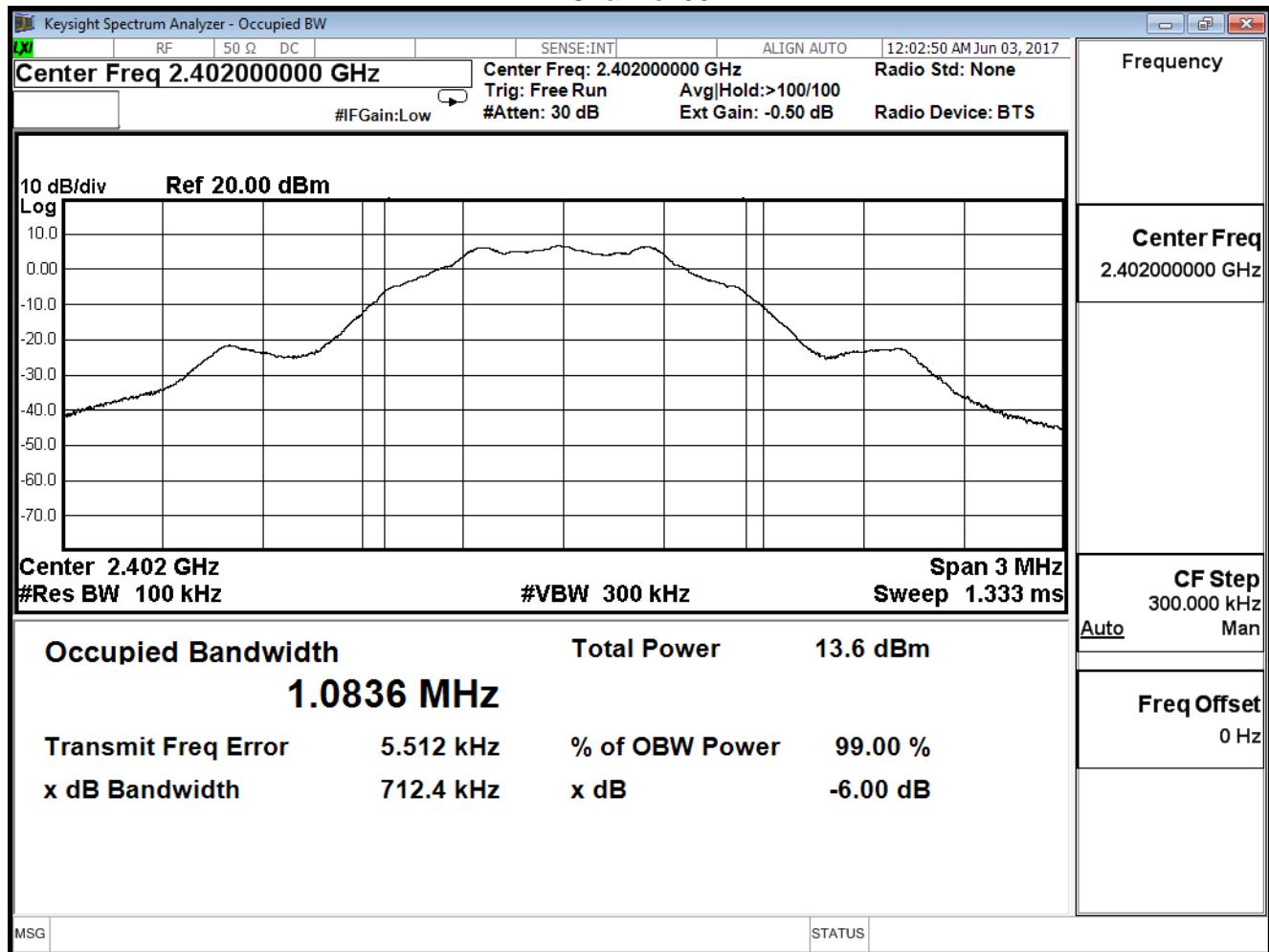
7.6. Test Result

Product	Smart Lighting System		
Test Item	DTS Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2017/06/03	Test Site	SR10-H

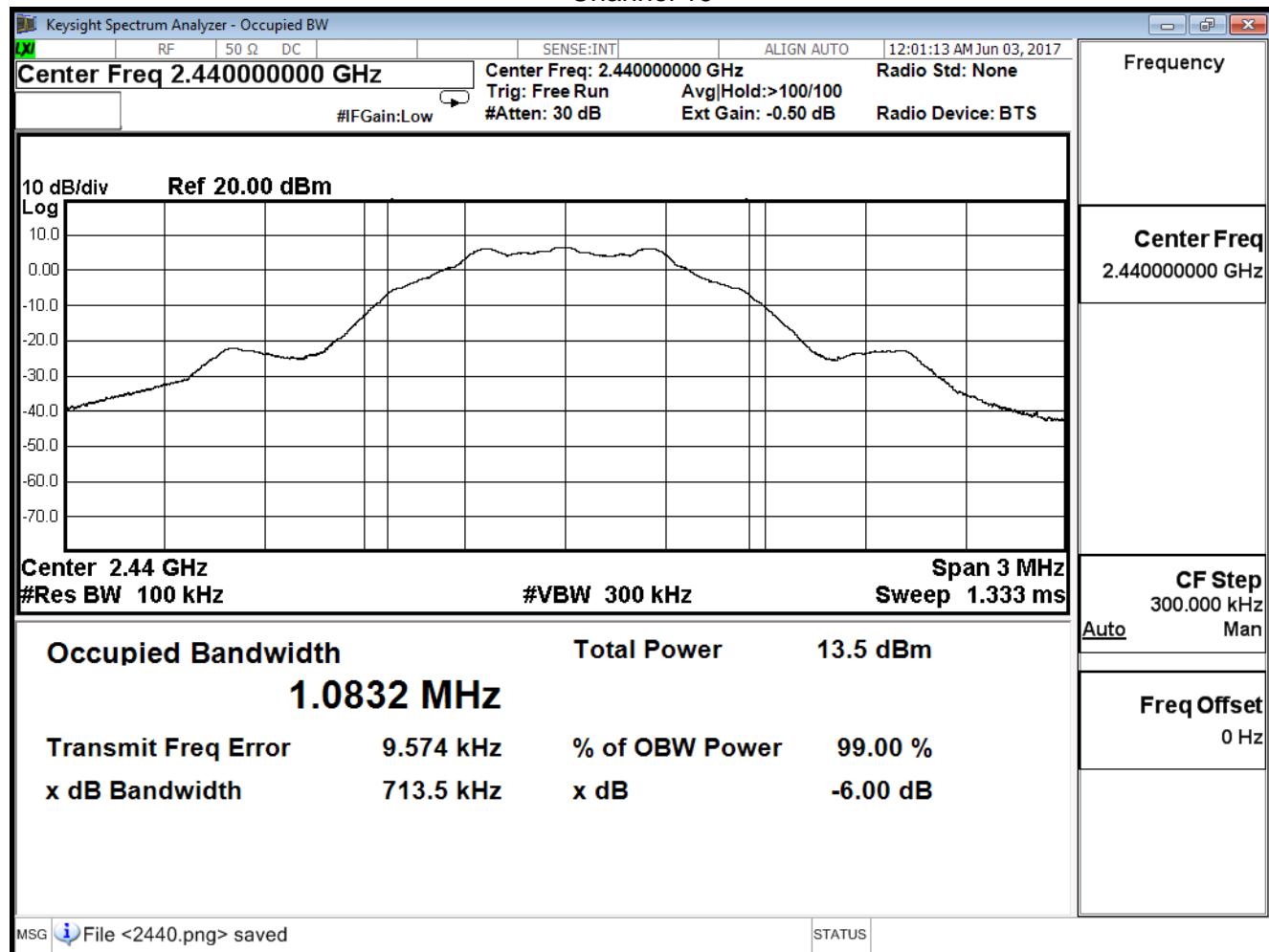
GFSK

Channel No.	Frequency (MHz)	Measure Level (KHz)	Limit (MHz)	Result
00	2402	712.400	≥ 0.5	Pass
19	2440	713.500	≥ 0.5	Pass
39	2480	710.600	≥ 0.5	Pass

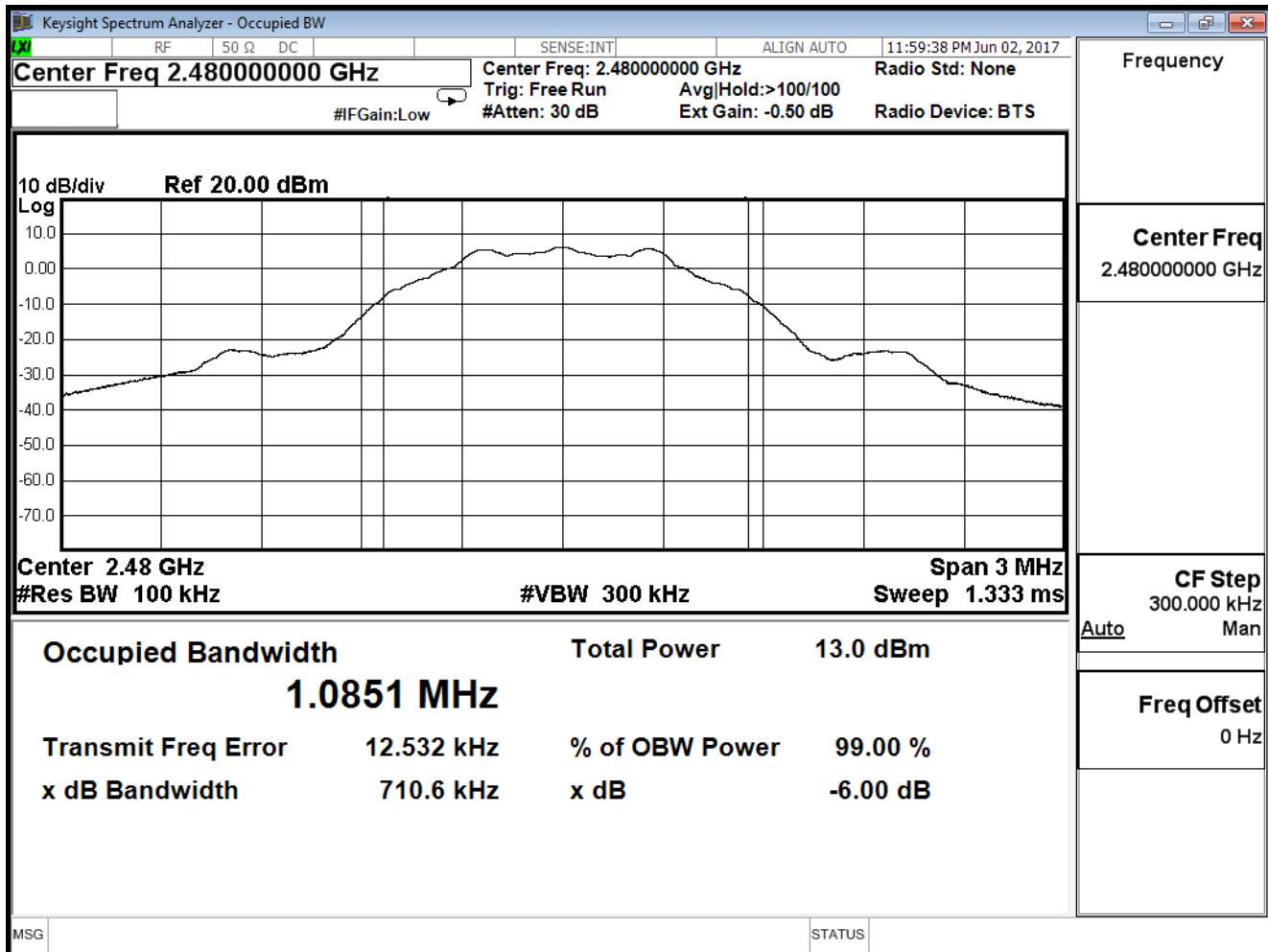
Channel 00



Channel 19



Channel 39



8. Power Density

8.1. Test Equipment

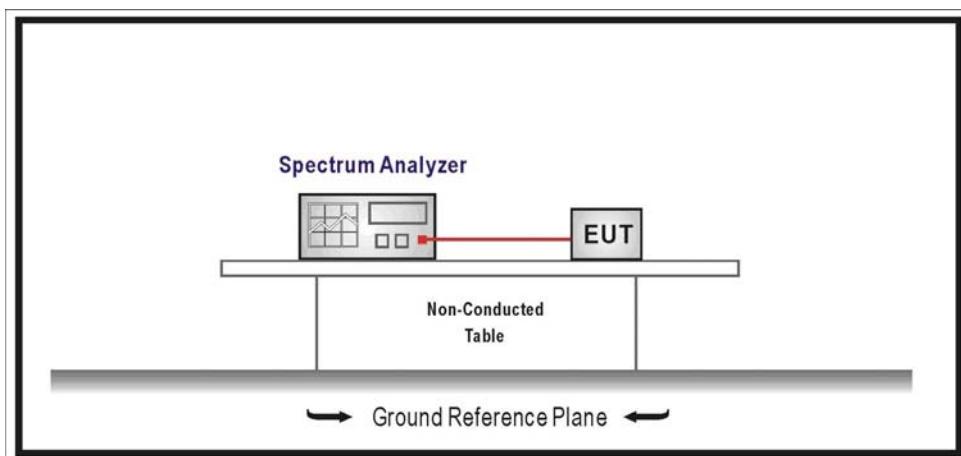
The following test equipment is used during the test:

Power Density / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

8.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013; tested according to DTS test procedure of KDB558074 V04 for compliance to FCC 47CFR 15.247 requirements.

8.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

8.6. Uncertainty

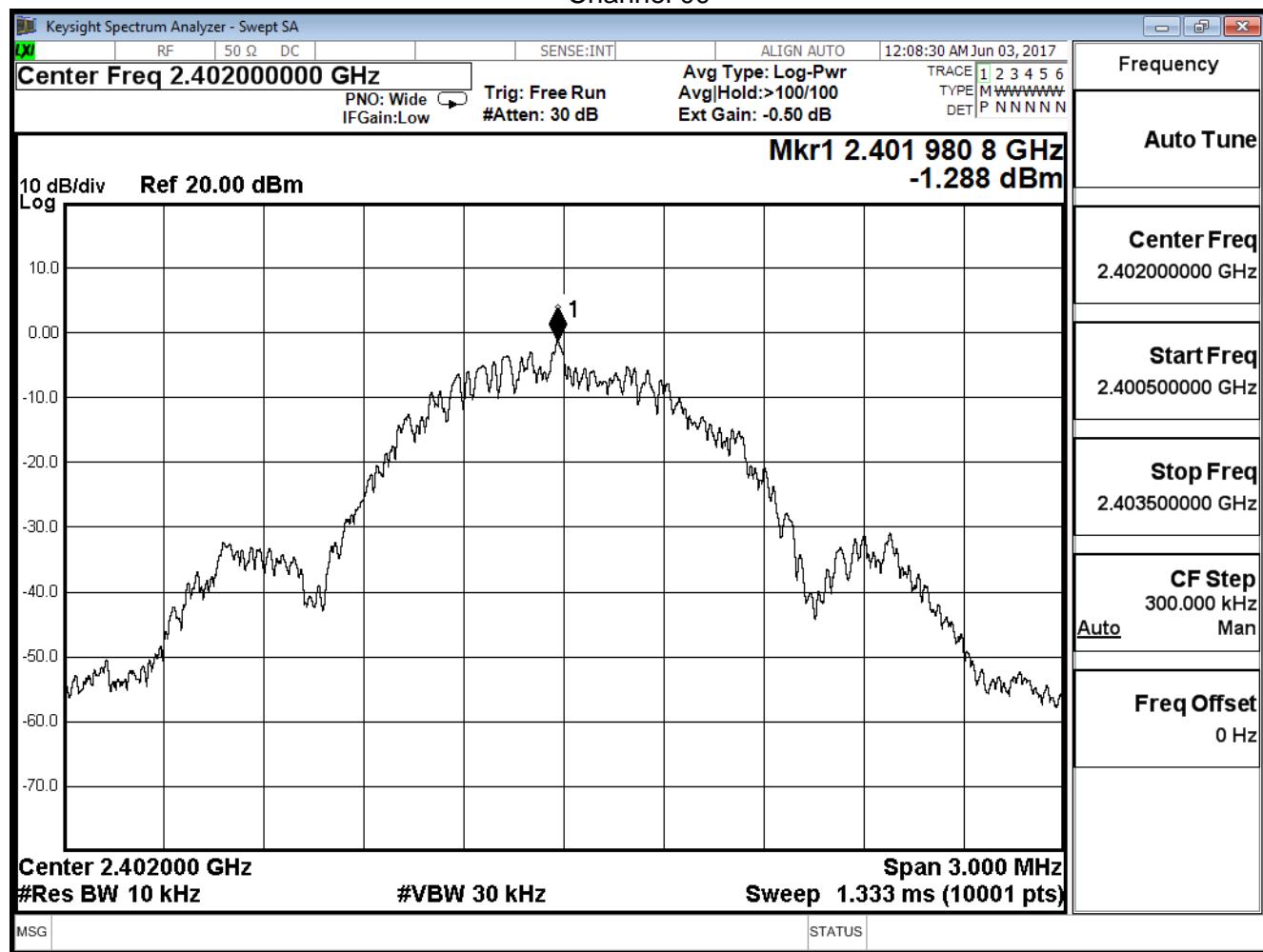
The measurement uncertainty is defined as $\pm 1.27\text{dB}$.

8.7. Test Result

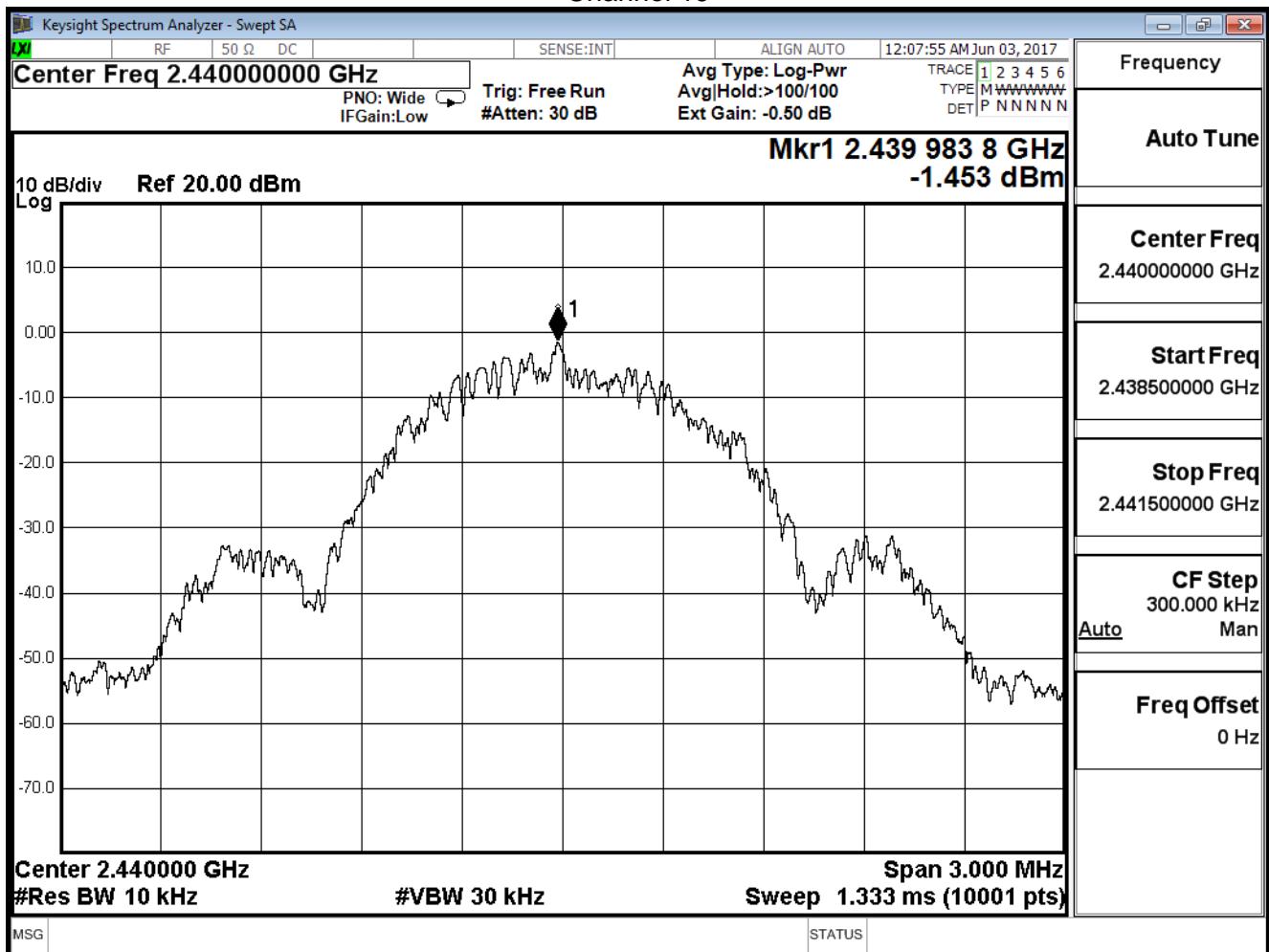
Product	Smart Lighting System		
Test Item	Power Density		
Test Mode	Mode 1: Transmit		
Date of Test	2017/06/03	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Result
00	2402	-1.288	≤8	Pass
19	2440	-1.453	≤8	Pass
39	2480	-1.840	≤8	Pass

Channel 00



Channel 19



Channel 39

