

FCC TEST REPORT  
for  
Think Automatic

Think Automatic Luminode  
Model No.: Luminode V1

Prepared for : Think Automatic  
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Date of Test : Oct. 22~31, 2012  
Date of Report : Oct. 31, 2012

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APPENDIX I (External Photos) (2 Pages)

APPENDIX II (Internal Photos) (3 Pages)

## TEST REPORT

Applicant : Think Automatic  
 Manufacturer : Smartmanu, Inc.  
 EUT : Think Automatic Luminode  
 Model No. : Luminode V1  
 Serial No. : N/A  
 Rating : Input Rating: 120V AC, 60HZ, 600W Max  
               Output Rating: 120V AC, 60HZ, 600W Max

Trade Mark : N/A

## Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.249 & 15.209

The device described above is tested by Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotek Compliance Laboratory Limited

Date of Test :

Oct. 22~31, 2012



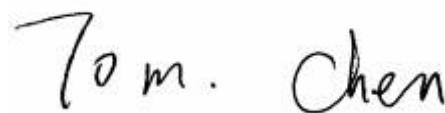
Prepared by :

(Tested Engineer / Rock Zeng)



Reviewer :

(Project Manager / Andy Chen )



Approved & Authorized Signer :

(Manager / Tom Chen)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT : Think Automatic Luminode

Model Number : Luminode V1

Test Power Supply : 120V AC, 60HZ

Frequency : 2405~2480MHz

Antenna : Printed Antenna:0dBi

Specification

Application : Think Automatic

Address : 935 14th Ave. Seattle, WA 98122

Manufacturer : Smartmanu, Inc.

Address : Suite 2310, Jinhui Bldg., Nanhui Blvd., Shenzhen, P.O.518054, China

Date of receiver : Oct. 22, 2012

Date of Test : Oct. 22~31, 2012

## 1.2. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### **CNAS - LAB Code: L3503**

Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

### **FCC-Registration No.: 752021**

Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, August 20, 2010.

### **IC-Registration No.: 8058A-1**

Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, August 30, 2010.

### **Test Location**

All Emissions tests were performed at

Anbotek Compliance Laboratory Limited. at 1/F, 1 /Building, SEC Industrial Park, No. 4 Qianhai Road, Nanshan District, Shenzhen, 518054, China

## 1.3. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB

Conduction Uncertainty : Uc = 3.4dB

## 2. Test Procedure

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2009 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

**Example:**

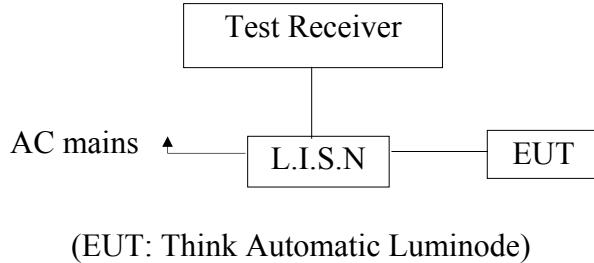
Freq (MHz) METER READING + ACF = FS  
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

**ANSI STANDARD C63.4-2009 10.1.7 MEASUREMENT PROCEDURES:** The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

### 3. Conducted Limits

#### 3.1. Block Diagram of Test Setup

##### 3.1.1. Block diagram of connection between the EUT and simulators



#### 3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies.

#### 3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : Think Automatic Luminode  
 Model Number : Luminode V1  
 Applicant : Think Automatic

#### 3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (ON) and measure it.

Test Equipment						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Nov. 12, 2012	1 Year
2.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2012	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2012	1 Year
4.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A

Conduction Uncertainty :  $U_c = 3.4\text{dB}$

### 3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

### 3.6. Power Line Conducted Emission Measurement Results

**PASS.**

The frequency range from 150KHz to 30 MHz is investigated.

Please refer the following pages.

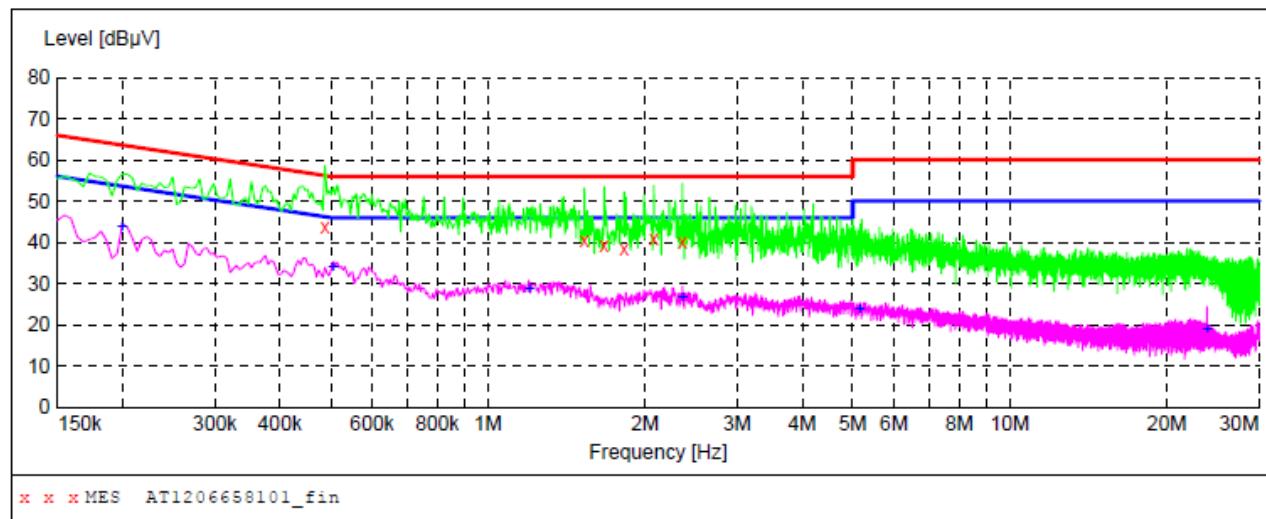
FCC ID: QC2LUMINODEV1

**CONDUCTED EMISSION TEST DATA**

EUT: Think Automatic Luminode M/N: Luminode V1  
 Operating Condition: ON  
 Test Site: 1# Shielded Room  
 Operator: Andy Chen  
 Test Specification: AC 120V/60HZ  
 Comment: Live Line  
 Tem:25°C Hum:50%

**SCAN TABLE: "Voltage (150K~30M) FIN"**

Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1206658101\_fin"**

10/22/2012 4:22PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.487500	43.90	20.1	56	12.3	QP	L1	GND
1.531000	40.70	20.3	56	15.3	QP	L1	GND
1.670500	39.20	20.3	56	16.8	QP	L1	GND
1.823500	38.50	20.3	56	17.5	QP	L1	GND
2.080000	41.10	20.3	56	14.9	QP	L1	GND
2.359000	40.00	20.3	56	16.0	QP	L1	GND

**MEASUREMENT RESULT: "AT1206658101\_fin2"**

10/22/2012 4:22PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.199500	43.60	20.1	54	10.0	AV	L1	GND
0.505500	33.90	20.1	46	12.1	AV	L1	GND
1.198000	28.80	20.2	46	17.2	AV	L1	GND
2.359000	26.70	20.3	46	19.3	AV	L1	GND
5.158000	23.60	20.5	50	26.4	AV	L1	GND
23.842000	19.00	20.8	50	31.0	AV	L1	GND

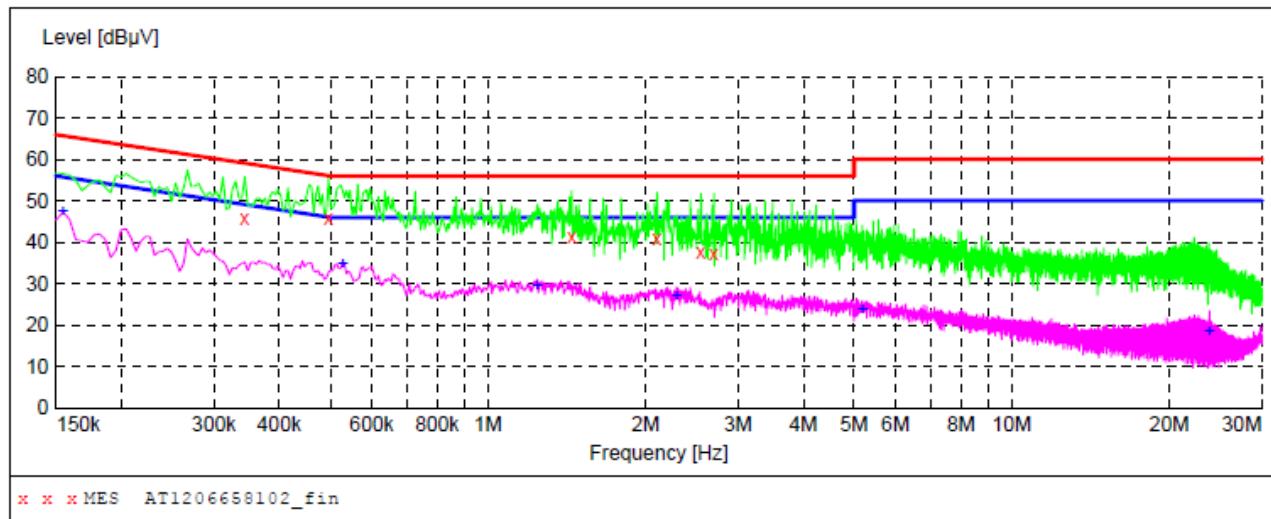
FCC ID: QC2LUMINODEV1

## CONDUCTED EMISSION TEST DATA

EUT: Think Automatic Luminode M/N: Luminode V1  
 Operating Condition: ON  
 Test Site: 1# Shielded Room  
 Operator: Andy Chen  
 Test Specification: AC 120V/60HZ  
 Comment: Neutral Line  
 Tem:25°C Hum:50%

**SCAN TABLE: "Voltage (150K~30M) FIN"**

Short Description: 150K-30M Disturbance Voltages

**MEASUREMENT RESULT: "AT1206658102\_fin"**

10/22/2012 4:25PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.343500	46.00	20.1	59	13.1	QP	N	GND
0.496500	46.00	20.1	56	10.1	QP	N	GND
1.445500	41.40	20.3	56	14.6	QP	N	GND
2.102500	41.00	20.3	56	15.0	QP	N	GND
2.552500	37.60	20.4	56	18.4	QP	N	GND
2.701000	37.30	20.4	56	18.7	QP	N	GND

**MEASUREMENT RESULT: "AT1206658102\_fin2"**

10/22/2012 4:25PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.154500	47.40	20.1	56	8.4	AV	N	GND
0.528000	34.70	20.1	46	11.3	AV	N	GND
1.243000	29.30	20.2	46	16.7	AV	N	GND
2.291500	27.10	20.3	46	18.9	AV	N	GND
5.180500	23.90	20.5	50	26.1	AV	N	GND
23.819500	18.40	20.8	50	31.6	AV	N	GND

## 4. Radiation Interference

### 4.1. Requirements (15.249, 15.209):

FIELD STRENGTH of Fundamental: 902-928 MHZ 2.4-2.4835 GHz 94 dB $\mu$ V/m @3m	FIELD STRENGTH of Harmonics 54 dB $\mu$ V/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dB $\mu$ V/m @3M 43.5 46 54dB $\mu$ V/m
---	---	--	---

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

### 4.2 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9\*6\*6 Chamber.

The test results are listed in Section 5.3.

### 4.3 Test Results

PASS.

Please refer the following pages.

**Data:**Horizontal  
CH Low(2405MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
239.98	1.58	13.50	38.90	57.46	33.66	46.00	-12.34	QP
2405.00	2.17	31.21	35.30	86.55	94.63	114.0	-19.37	Peak
2405.00	2.17	31.21	35.30	84.71	86.79	94.0	-8.21	AV
4810.10	2.56	34.01	34.71	41.15	43.01	74.0	-30.99	Peak
4810.10	2.56	34.01	34.71	38.26	40.12	54.0	-13.88	AV
7214.98	2.98	36.16	35.15	38.33	42.32	74.0	-31.68	Peak
7214.98	2.98	36.16	35.15	35.55	39.54	54.0	-14.46	AV
9620.00	---	---	---	---	---	---	---	---
12025.00	---	---	---	---	---	---	---	---
14430.00	---	---	---	---	---	---	---	---
16835.00	---	---	---	---	---	---	---	---
19240.00	---	---	---	---	---	---	---	---
21645.00	---	---	---	---	---	---	---	---
24050.00	---	---	---	---	---	---	---	---

## CH Middle(2440MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
312.18	1.60	13.52	38.82	56.41	32.71	46.00	-13.29	QP
2440.00	2.19	31.22	34.60	85.36	93.25	114.0	-20.75	Peak
2440.00	2.19	31.22	34.60	83.55	87.32	94.0	-6.68	AV
4880.08	2.57	35.00	34.58	39.62	42.61	74.0	-31.39	Peak
4880.08	2.57	35.00	34.58	37.47	40.46	54.0	-13.54	AV
7320.05	3.00	36.17	35.14	38.80	42.83	74.0	-31.17	Peak
7320.05	3.00	36.17	35.14	36.08	40.11	54.0	-13.89	AV
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24400.00	---	---	---	---	---	---	---	---

FCC ID: QC2LUMINODEV1

## CH High(2480MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
312.18	1.60	13.52	38.82	53.21	29.51	46.00	-16.49	QP
2480.00	2.20	31.65	36.00	92.77	90.62	114.0	-23.38	Peak
2480.00	2.20	31.65	36.00	89.51	87.36	94.0	-6.64	AV
4960.05	2.58	35.06	34.79	41.76	44.61	74.0	-29.39	Peak
4960.05	2.58	35.06	34.79	39.28	42.13	54.0	-11.87	AV
7439.97	3.02	36.19	34.90	39.53	43.84	74.0	-30.16	Peak
7439.97	3.02	36.20	35.20	37.40	41.42	54.0	-12.58	AV
9920.00	---	---	---	---	---	---	---	---
12400.00	---	---	---	---	---	---	---	---
14880.00	---	---	---	---	---	---	---	---
17360.00	---	---	---	---	---	---	---	---
19840.00	---	---	---	---	---	---	---	---
22320.00	---	---	---	---	---	---	---	---
24800.00	---	---	---	---	---	---	---	---

## 2356.8MHz (next section)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
235.80	1.58	13.50	38.90	29.22	33.62	46.00	-12.38	QP
2356.80	2.17	31.21	35.30	39.54	40.63	114.0	-19.37	Peak
2356.80	2.17	31.21	35.30	38.71	39.79	94.0	-54.21	AV
4713.60	2.56	34.01	34.71	29.15	31.01	74.0	-42.99	Peak
4713.60	2.56	34.01	34.71	28.26	30.12	54.0	-23.88	AV
7070.40	2.98	36.16	35.15	30.33	32.32	74.0	-41.68	Peak
7070.40	2.98	36.16	35.15	30.55	32.54	54.0	-21.46	AV
9620.00	---	---	---	---	---	---	---	---
12025.00	---	---	---	---	---	---	---	---
14430.00	---	---	---	---	---	---	---	---
16835.00	---	---	---	---	---	---	---	---
19240.00	---	---	---	---	---	---	---	---
21645.00	---	---	---	---	---	---	---	---
24050.00	---	---	---	---	---	---	---	---

FCC ID: QC2LUMINODEV1

Vertical  
CH Low(2405MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
30.42	1.43	12.13	38.45	53.51	28.62	40.00	-11.38	QP
2405.00	2.17	31.21	35.30	84.23	90.34	114.0	-23.66	Peak
2405.00	2.17	31.21	35.30	81.85	86.93	94.0	-7.07	AV
4810.10	2.56	34.01	34.71	41.05	42.91	74.0	-31.09	Peak
4810.10	2.56	34.01	34.71	38.61	40.47	54.0	-13.53	AV
7207.93	2.98	36.16	35.15	37.46	41.45	74.0	-32.55	Peak
7207.93	2.98	36.16	35.15	34.50	38.49	54.0	-15.51	AV
9620.00	---	---	---	---	---	---	---	---
12025.00	---	---	---	---	---	---	---	---
14430.00	---	---	---	---	---	---	---	---
16835.00	---	---	---	---	---	---	---	---
19240.00	---	---	---	---	---	---	---	---
21645.00	---	---	---	---	---	---	---	---
24050.00	---	---	---	---	---	---	---	---

## CH Middle(2440MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
143.82	1.50	13.40	38.89	53.91	29.92	43.50	-13.58	QP
2440.01	2.19	31.22	34.60	82.35	91.16	114.0	-22.84	Peak
2440.01	2.19	31.22	34.60	81.01	86.82	94.0	-7.18	AV
4882.11	2.57	35.00	34.58	40.15	43.14	74.0	-30.86	Peak
4882.11	2.57	35.00	34.58	37.86	40.85	54.0	-13.15	AV
7320.05	3.00	36.17	35.14	38.70	42.73	74.0	-31.27	Peak
7320.05	3.00	36.17	35.14	36.01	40.04	54.0	-13.96	AV
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24400.00	---	---	---	---	---	---	---	---

FCC ID: QC2LUMINODEV1

## CH High(2480MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
408.80	1.62	13.54	38.45	51.17	27.82	46.00	-18.12	QP
2480.00	2.20	31.65	36.00	83.52	91.37	114.0	-22.63	Peak
2480.00	2.20	31.65	36.00	82.03	86.88	94.0	-7.12	AV
4960.10	2.58	35.06	34.79	40.08	42.93	74.0	-31.07	Peak
4960.10	2.58	35.06	34.79	38.10	40.95	54.0	-13.05	AV
7439.97	3.02	36.19	34.90	38.58	42.89	74.0	-31.11	Peak
7439.97	3.02	36.20	35.20	36.34	40.36	54.0	-13.64	AV
9920.00	---	---	---	---	---	---	---	---
12400.00	---	---	---	---	---	---	---	---
14880.00	---	---	---	---	---	---	---	---
17360.00	---	---	---	---	---	---	---	---
19840.00	---	---	---	---	---	---	---	---
22320.00	---	---	---	---	---	---	---	---
24800.00	---	---	---	---	---	---	---	---

## 2356.8MHz

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB $\mu$ V	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Remark
235.92	1.43	12.13	38.45	53.51	28.98	40.00	-11.02	QP
2356.80	2.17	31.21	35.30	35.23	40.34	114.0	-73.66	Peak
2356.80	2.17	31.21	35.30	29.85	34.93	94.0	-50.07	AV
4713.60	2.56	34.01	34.71	31.05	32.91	74.0	-42.09	Peak
4713.60	2.56	34.01	34.71	32.61	34.47	54.0	-19.53	AV
7070.40	2.98	36.16	35.15	30.46	31.45	74.0	-42.55	Peak
7070.40	2.98	36.16	35.15	32.50	33.49	54.0	-20.51	AV
9620.00	---	---	---	---	---	---	---	---
12025.00	---	---	---	---	---	---	---	---
14430.00	---	---	---	---	---	---	---	---
16835.00	---	---	---	---	---	---	---	---
19240.00	---	---	---	---	---	---	---	---
21645.00	---	---	---	---	---	---	---	---
24050.00	---	---	---	---	---	---	---	---

NOTE: “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## 5. Occupied Bandwidth

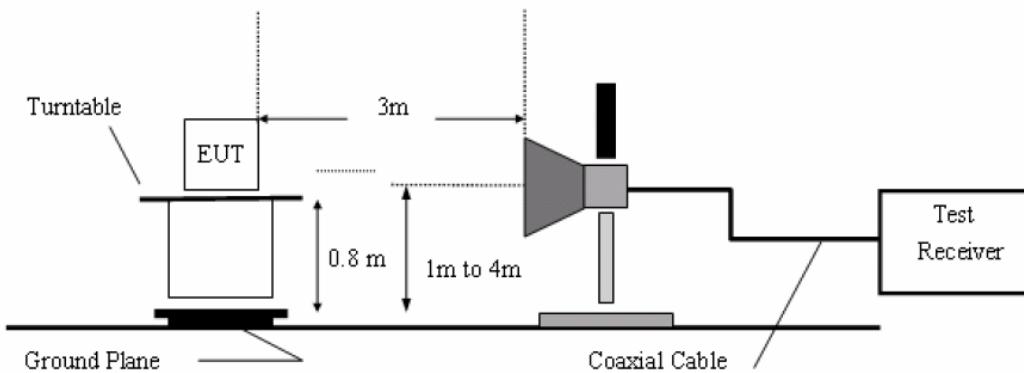
### 5.1. Requirements (15.249):

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

### 5.2. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

### 5.3. Test Configuration:



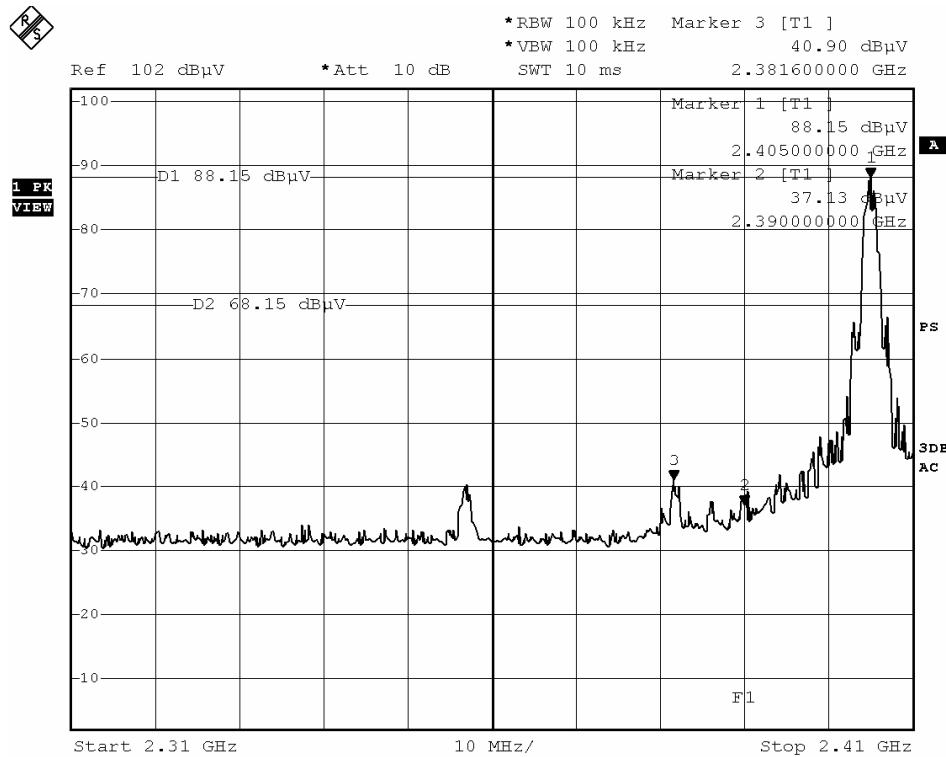
### 5.4. Test Results

Pass.

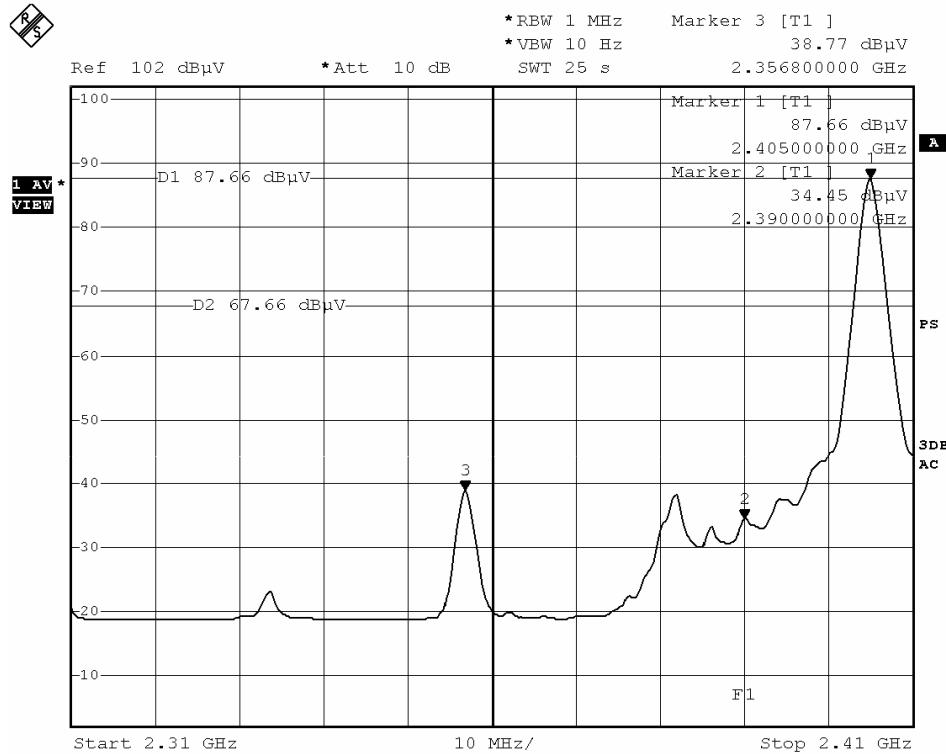
Please refer the following plot.

(Note: Marker 3 means the highest value in 2.39GHz~2.4GHz or 2.4835~2.5GHz)

FCC ID: QC2LUMINODEV1

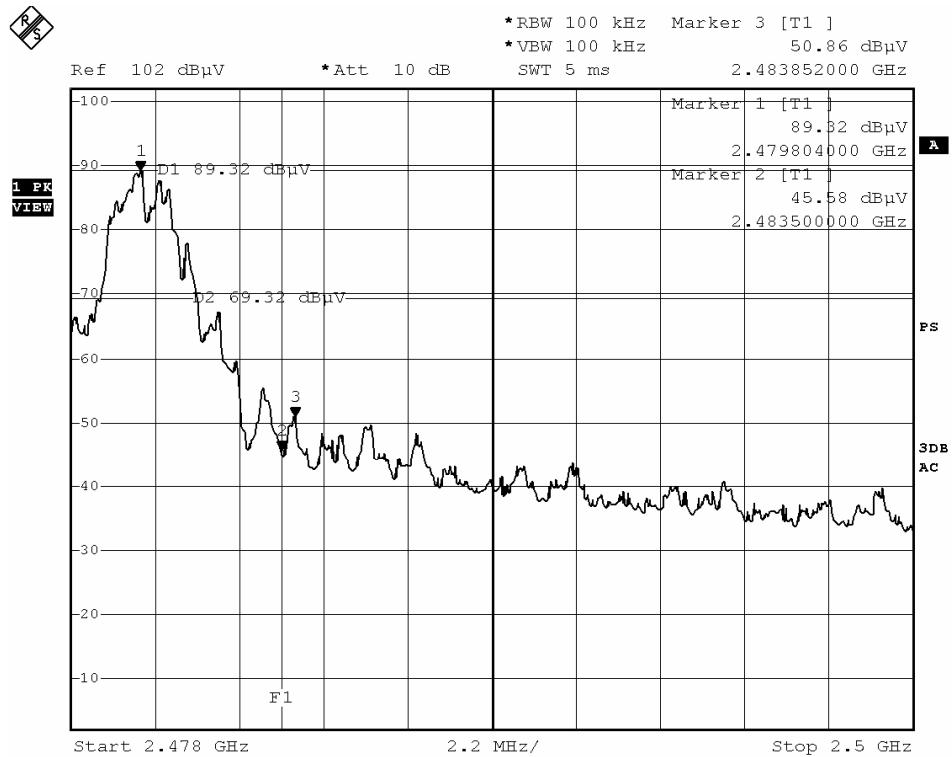


Date: 29.OCT.2012 16:19:30

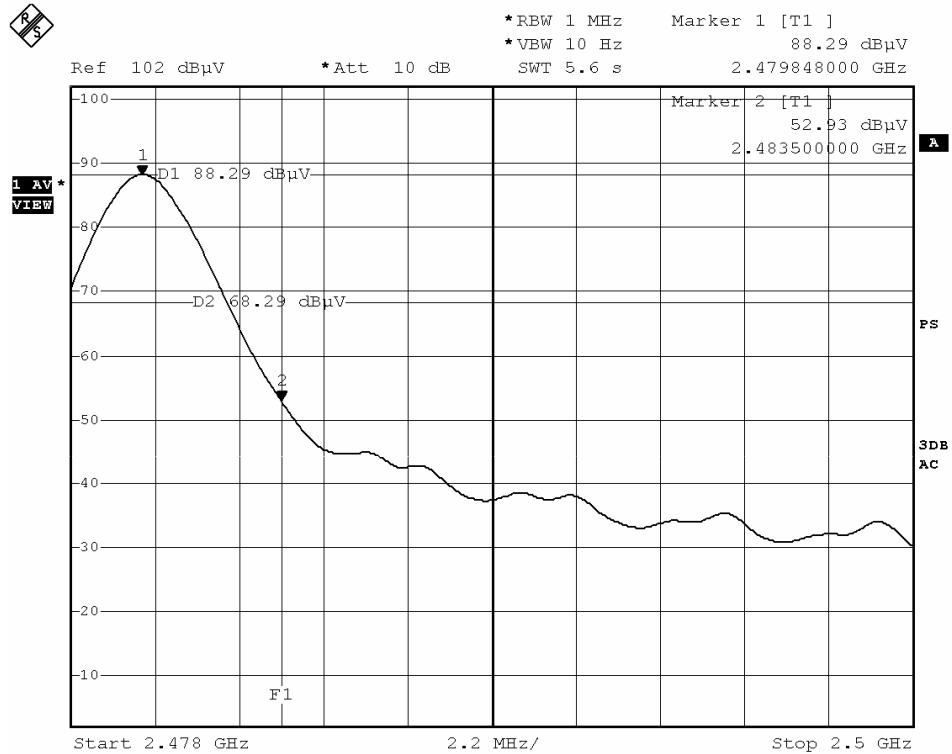


Date: 29.OCT.2012 16:22:50

FCC ID: QC2LUMINODEV1



Date: 29.OCT.2012 16:27:50



Date: 29.OCT.2012 16:24:45