

## MEASUREMENT AND TEST REPORT

For

### 3H AND COMPANY LIMITED

Block A&B, 10F, Mai Wah Industrial Building, 1-7 Wah Sing Street,  
Kwaihing, N.T., Hong Kong, China

**FCC ID: ZFJ19620610161818**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Remote Controller
<b>Test Engineer:</b> <u>Alvin Huang</u> <i>Alvin Huang</i>	
<b>Report Number:</b> <u>RSZ11031651</u>	
<b>Report Date:</b> <u>2011-04-28</u>	
<b>Reviewed By:</b> <u>EMC Engineer</u> <i>Merry Zhao</i>	
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, or any agency of the Federal Government.

\* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The 3H AND COMPANY LIMITED's product, model: 3H-RC-01; H192124000000 (FCC ID: ZFJ19620610161818) or the "EUT" as referred to in this report is a *REMOTE CONTROLLER FOR SELECT-YOUR-COLOR LED LIGHT STRANDS*, which measures approximately: 11.7 cm (L) x 4.7 cm (W) x 2.0 cm (H), rated input voltage: DC 12V Battery.

*Note: the series product, model 3H-RC-01; H192124000000, we select 3H-RC-01 to test. These two models are electrically identical, they are just named differently, which was explained in the attached declaration letter.*

*\* All measurement and test data in this report was gathered from production sample serial number: 1103021 (Assigned by BACL, Shenzhen). The EUT was received on 2011-03-16.*

### Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4-2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

### Related Submittal(s)/Grant(s)

N/A

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 guide accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

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### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### Special Accessories

The special accessories were provided by Bay Area Compliance Laboratories Corp. (Shenzhen).

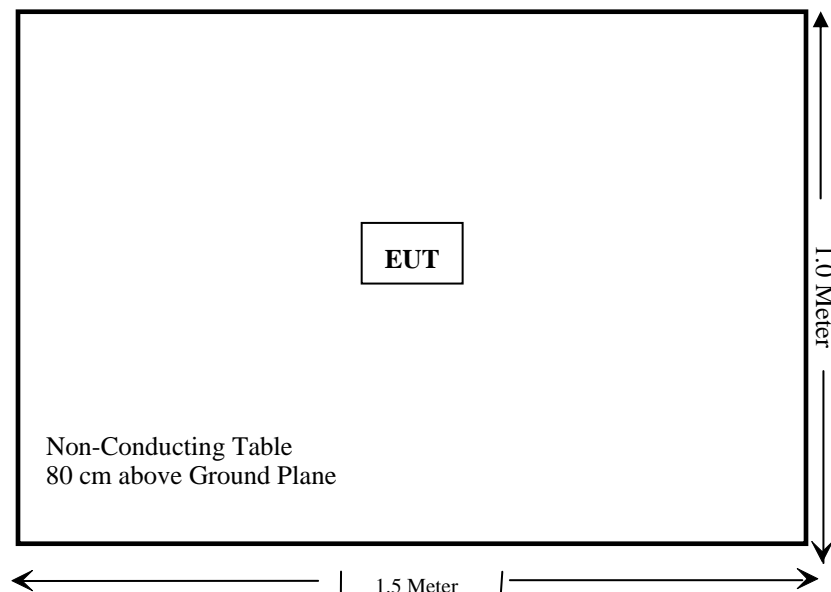
### Equipment Modifications

No modifications were made to the unit tested.

### Configuration of Test Setup



### Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	N/A*
§15.205, §15.209, §15.231 (b)	Radiated Emissions	Compliance**
§15.231 (c)	20 dB Band Width Testing	Compliance
§15.231 (a)(1)	Deactivation Testing	Compliance

Note: N/A\* The EUT is powered by battery only.

\*\* Within measurement uncertainty

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**FCC §15.203 - ANTENNA REQUIREMENT**

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**Applicable Standard**

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.

**Result:** Compliant.

The EUT has a printed antenna PCB; it is permanently attached to the PCB. Please refer to the EUT Internal photos.

## FCC §15.205, §15.209, §15.231 (b), - RADIATED EMISSIONS

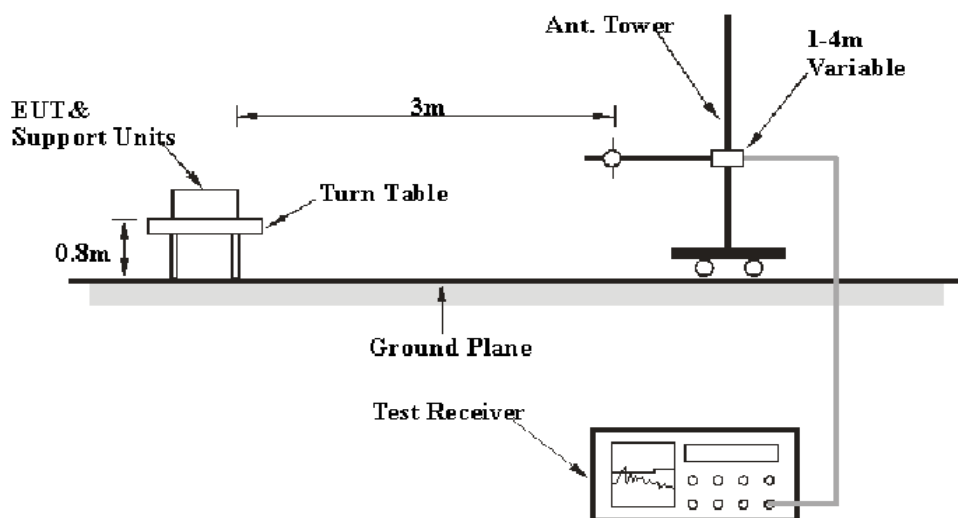
### Measurement Uncertainty

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

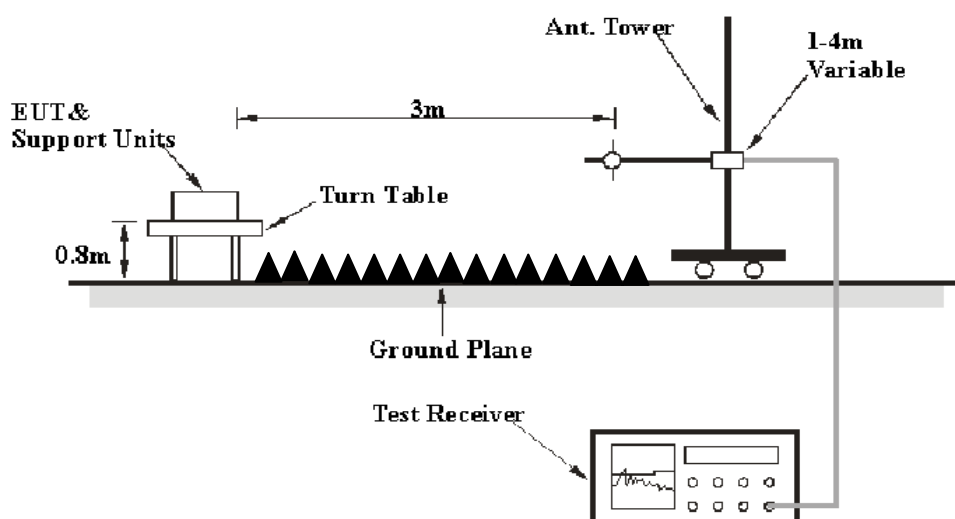
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emission measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is  $\pm 4.0$  dB.

### EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4 - 2009. The specification used was the FCC 15 § 15.209 ,15.205 and 15.231.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

<i><b>Frequency Range</b></i>	<i><b>RBW</b></i>	<i><b>Video B/W</b></i>	<i><b>Dectector</b></i>
30MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 5000 MHz	1 MHz	3 MHz	PK

### Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
HP	Amplifier	HP8447E	1937A01046	2010-08-02	2011-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-07-05	2011-07-04
HP	Spectrum Analyzer	8593A	2919A00242	2010-07-08	2011-07-07
Mini-circuits	Amplifier	ZVA-213+	T-E27H	2010-09-12	2011-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

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

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

## Applicable Standard

According to §15.231 (b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12, 500*	375 to 1,250*
Above 470	12,500	1,250

\*Linear interpolations.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

## Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b), with the worst margin reading of:

**27.53 dB at 433.92 MHz in the Horizontal polarization**

## Test Data

### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

*The testing was performed by Alvin Huang on 2011-04-07.*

Test mode: Transmitting

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/Ave.)	Direction (Degree)	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.231(b)/209/205		
				Height (m)	Polar (H / V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)	Remarks
30 MHz – 1000 MHz												
433.92	83.00	PK	68	1.5	H	14.5	1.73	25.96	73.27	100.8	27.53	Fund.
433.92	80.27	PK	94	1.0	V	14.5	1.73	25.96	70.54	100.8	30.26	Fund.
867.84	45.12	PK	0	2.0	H	19.9	3.86	25.64	43.24	80.8	37.56	Harmonic
867.84	42.67	PK	43	1.0	V	19.9	3.86	25.64	40.79	80.8	40.01	Harmonic
Above 1GHz												
1301.76	45.50	PK	147	1.1	H	26.5	2.09	26.49	47.6	74	26.4	Harmonic
1301.76	43.83	PK	142	1.5	V	26.0	2.09	26.49	45.43	74	28.57	Harmonic
2603.52	44.86	PK	273	1.7	V	30.6	3.10	26.88	51.68	80.8	29.12	Harmonic
2169.6	44.67	PK	226	1.4	V	29.8	2.85	26.83	50.49	80.8	30.31	Harmonic
1735.68	46.17	PK	104	1.2	H	26.5	2.50	26.83	48.34	80.8	32.46	Harmonic
2603.52	41.33	PK	0	2.2	H	30.6	3.10	26.88	48.15	80.8	32.65	Harmonic
2169.6	41.50	PK	197	1.5	H	29.7	2.85	26.83	47.22	80.8	33.58	Harmonic
1735.68	45.53	PK	311	1.6	V	26.0	2.50	26.83	47.2	80.8	33.6	Harmonic

## Field Strength (Average)

Frequency (MHz)	Peak Measurement @ 3m (dBμV/m)	Test Antenna Polar (H/V)	Duty Cycle Correction (dB)	Average Amp. (dBμV/m)	FCC 15.231(b)/209/205		Comment
					Limit (dBμV/m)	Margin (dB)	
30 MHz – 1000 MHz							
433.92	73.27	H	-2.38	70.89	80.8	9.91	Fund.
433.92	70.54	V	-2.38	68.16	80.8	12.64	Fund.
867.84	43.24	H	-2.38	40.86	60.8	19.94	Harmonic
867.84	40.79	V	-2.38	38.41	60.8	22.39	Harmonic
Above 1 GHz							
1301.76	45.50	H	-2.38	43.12	54	10.88	Harmonic
1301.76	43.83	V	-2.38	41.45	54	12.55	Harmonic
1735.68	46.17	H	-2.38	43.79	60.8	17.01	Harmonic
1735.68	45.53	V	-2.38	43.15	60.8	17.65	Harmonic
2603.52	44.86	V	-2.38	42.48	60.8	18.32	Harmonic
2169.6	44.67	V	-2.38	42.29	60.8	18.51	Harmonic
2169.6	41.50	H	-2.38	39.12	60.8	21.68	Harmonic
2603.52	41.33	H	-2.38	38.95	60.8	21.85	Harmonic

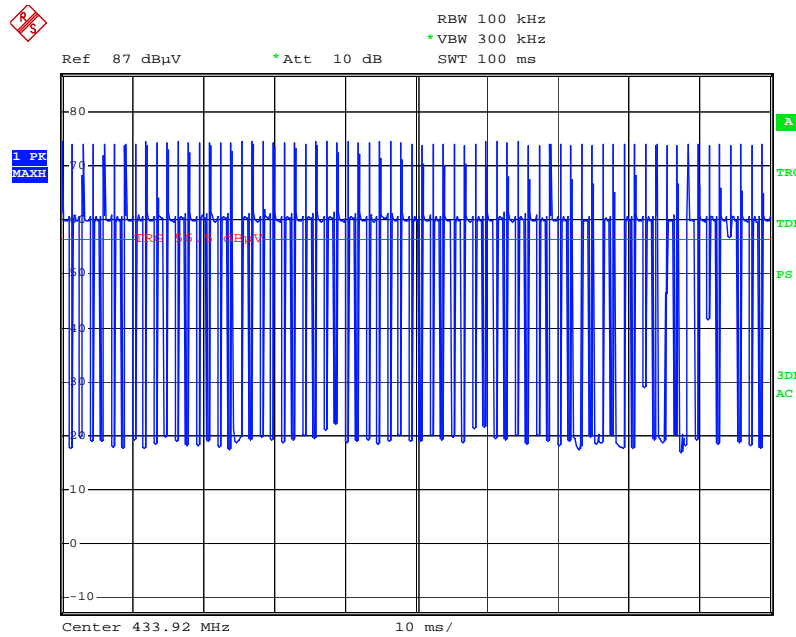
\*\*Note:

Duty Cycle=Ton/(Ton + Toff)=1.14/1.50=0.76

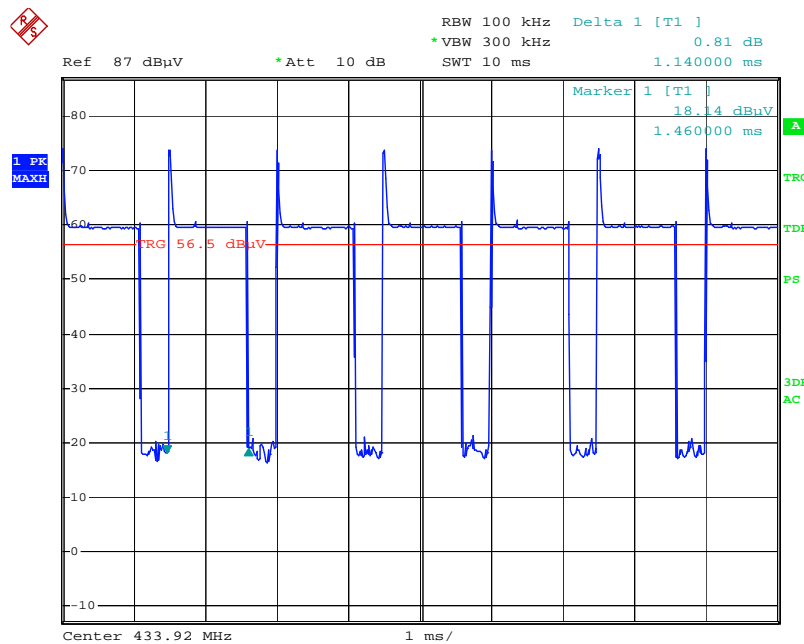
Factor=20lg (Duty Cycle) =20lg0.76= -2.38 dB

Average = Peak+ Factor

## Duty Cycle -100ms

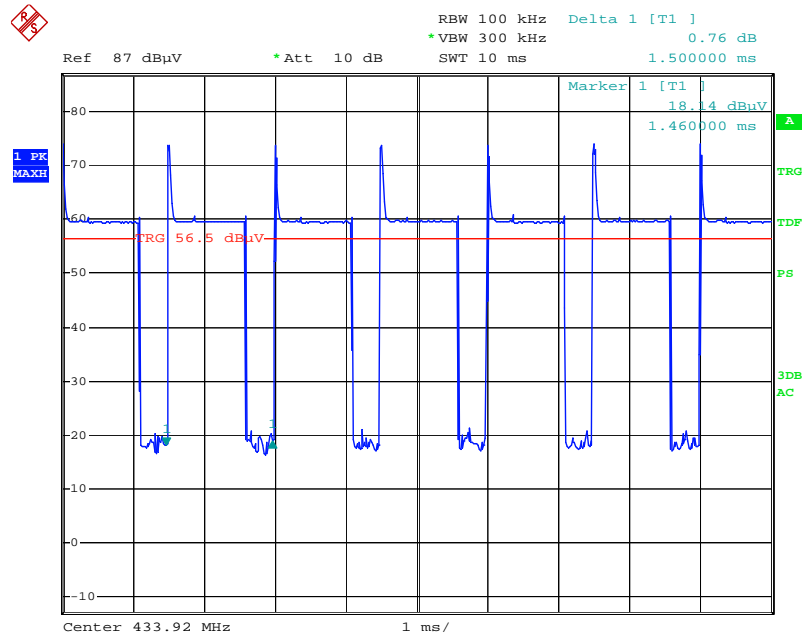


Date: 7.APR.2011 21:38:42

Duty Cycle-T<sub>on</sub>

Date: 7.APR.2011 21:39:29

## Duty Cycle-Tp



Date: 7.APR.2011 21:39:49

## FCC §15.231(c) – 20 dB BANDWIDTH TESTING

### Requirement

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10
HP	Amplifier	HP8447E	1937A01046	2010-08-02	2011-08-02
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2010-04-12	2011-04-12

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

### Test Data

#### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

*The testing was performed by Alvin Huang on 2011-04-07.*

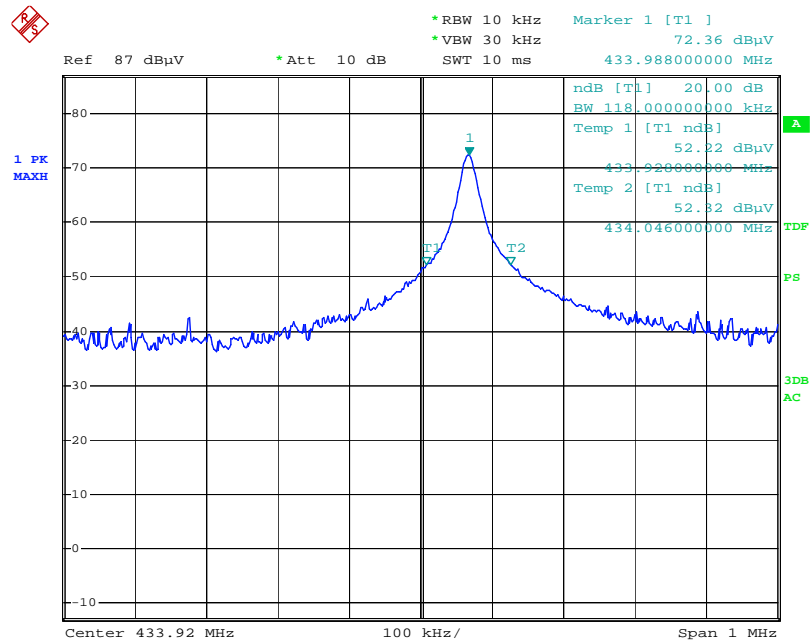
*Test Mode: Transmitting*

Please refer to following table and plot.

Channel Frequency (MHz )	20 dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	118	1084.8	Pass

**Note:** Limit = 0.25% \* center frequency = 0.25% \* 433.92MHz =1.0848 MHz  
20 dB Bandwidth = 118.0 kHz <1.0848 MHz

## 20 dB Emission Bandwidth



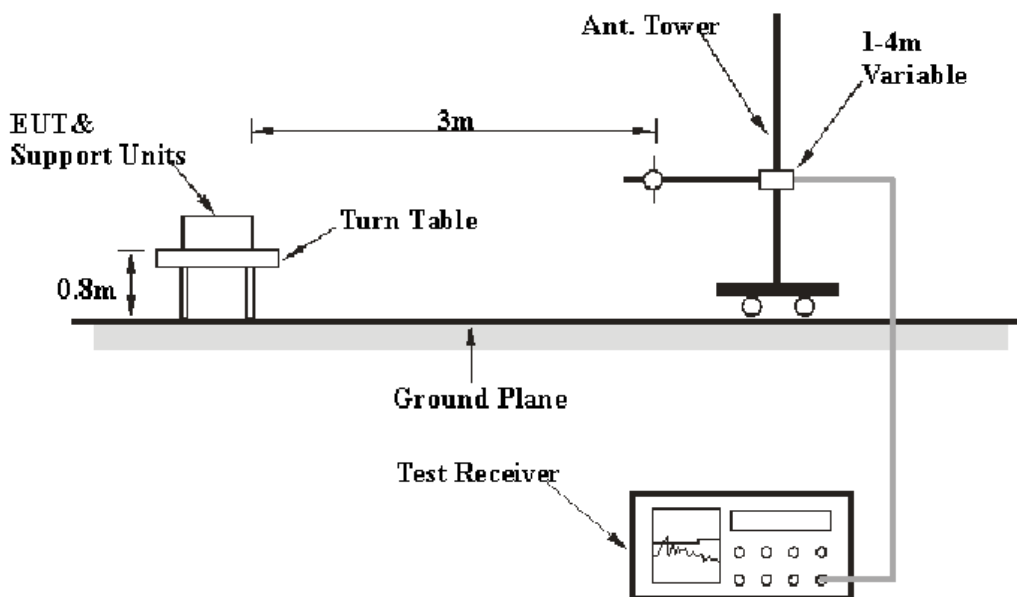
Date: 7.APR.2011 20:49:41

## FCC §15.231(a) - DEACTIVATION TESTING

### Applicable Standard

Per FCC §15.231(a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### EUT Setup



The deactivation test was performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(a) limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-07	2011-11-06
HP	Amplifier	8447E	1937A01046	2010-11-15	2011-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2010-04-12	2011-04-12

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

## Test Data

### Environmental Conditions

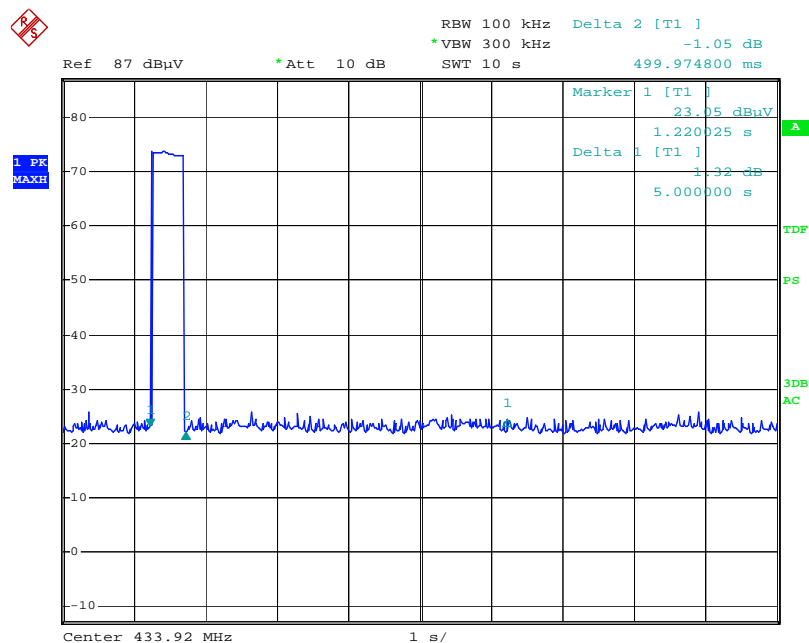
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101 kPa

The testing was performed by Alvin Huang on 2011-04-07.

Test Mode: Transmitting

**Test Result:** Compliance.

Please refer to following plot



Date: 7.APR.2011 21:02:42

**PRODUCT SIMILARITY DECLARATION LETTER**

**3H** 3H And Company Limited

BLOCK A&B, 10F, MAI WAH INDUSTRIAL BUILDING, 1-7 WAH SING ST., KWAIHING,  
N.T., HONGKONG  
Tel: 852-27663377  
Fax: 852-27745064

**Different Declaration**

We 3H AND COMPANY LIMITED, hereby declare that our REMOTE  
CONTROLLER FOR SELECT-YOUR-COLOR LED LIGHT  
STRANDS, the Model name: 3H-RC-01 was certified by BACL. The  
model H192124000000 have the same circuit and PCB board, only  
different in the model name.

Thank you!

Please contact me if you have any question.

2011-4-22

Sincerely,

Signature:

Company: 3H AND COMPANY LIMITED

Title: QA MANAGER

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