



FCC PART 15.231

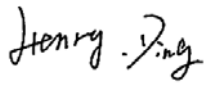
TEST REPORT

For

GEMMY INDUSTRIES (HK) LIMITED BVI

Unit No. 301 on 3rd Floor, East Ocean Centre, No.98 Granville Road,
Kowloon, Hong Kong

FCC ID: GPO1002013

Report Type: Original Report	Product Type: Wireless Remote Control
Test Engineer: <u>Henry Ding</u> 	
Report Number: <u>RSZ130327820-00</u>	
Report Date: <u>2013-04-27</u>	
Reviewed By: <u>RF Leader</u> 	
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	3
SYSTEM TEST CONFIGURATION.....	4
JUSTIFICATION	4
SPECIAL ACCESSORIES	4
EQUIPMENT MODIFICATIONS	4
BLOCK DIAGRAM OF TEST SETUP	4
SUMMARY OF TEST RESULTS	5
FCC §15.203 - ANTENNA REQUIREMENT.....	6
APPLICABLE STANDARD	6
ANTENNA CONNECTOR CONSTRUCTION	6
FCC §15.205, §15.209 & §15.231 (B) - RADIATED EMISSIONS.....	7
APPLICABLE STANDARD	7
MEASUREMENT UNCERTAINTY	7
EUT SETUP.....	8
EMI TEST RECEIVER SETUP.....	9
TEST PROCEDURE	9
TEST EQUIPMENT LIST AND DETAILS.....	9
CORRECTED AMPLITUDE & MARGIN CALCULATION	9
TEST RESULTS SUMMARY	10
TEST DATA	10
FCC §15.231(C) – 20 DB EMISSION BANDWIDTH.....	14
APPLICABLE STANDARD	14
TEST PROCEDURE	14
TEST EQUIPMENT LIST AND DETAILS.....	14
TEST DATA	14
FCC §15.231(A) (1) - DEACTIVATION TESTING.....	16
APPLICABLE STANDARD	16
TEST PROCEDURE	16
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST DATA	16
PRODUCT SIMILARITY DECLARATION LETTER.....	18

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *GEMMY INDUSTRIES (HK) LIMITED BVI*'s product, model number: 1002013 (FCC ID: GPO1002013) (the "EUT") in this report was a *Wireless Remote Control*, which was measured approximately: 9.0 cm (L) x 4.0 cm (W) x 1.5 cm (H), rated with input voltage: DC 12V.

Note: The series product, model 1002013 and 2002013 are electrically, they have the same PCB layout and schematic, the difference between them is just the model number, model 1002013 was selected for fully testing, the detailed information can be referred to the attached declaration letter that stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 1303271 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-03-27.*

Objective

This 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 C63.4-2009.

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

Related Submittal(s)/Grant(s)

No related submittal.

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 on 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 C63.4-2009.

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.

SYSTEM TEST CONFIGURATION

Justification

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

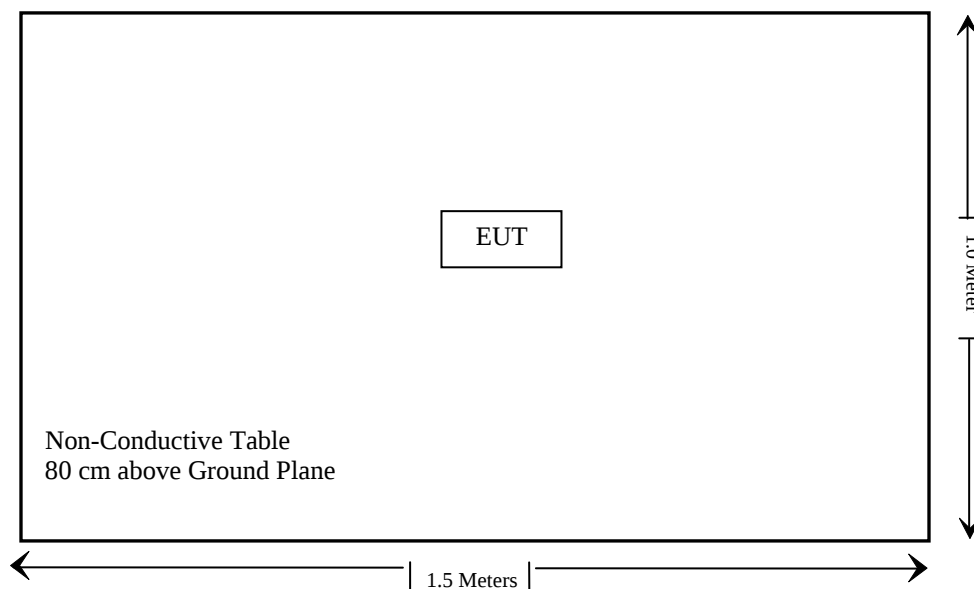
Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

N/A: Not applicable, the EUT is powered by battery only; the conducted emissions test is not required.

FCC §15.203 - ANTENNA REQUIREMENT

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.

Antenna Connector Construction

The EUT has an integrated PCB antenna arrangement, which was permanently attached; fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

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

Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

According to FCC §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	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

*Linear interpolations.

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

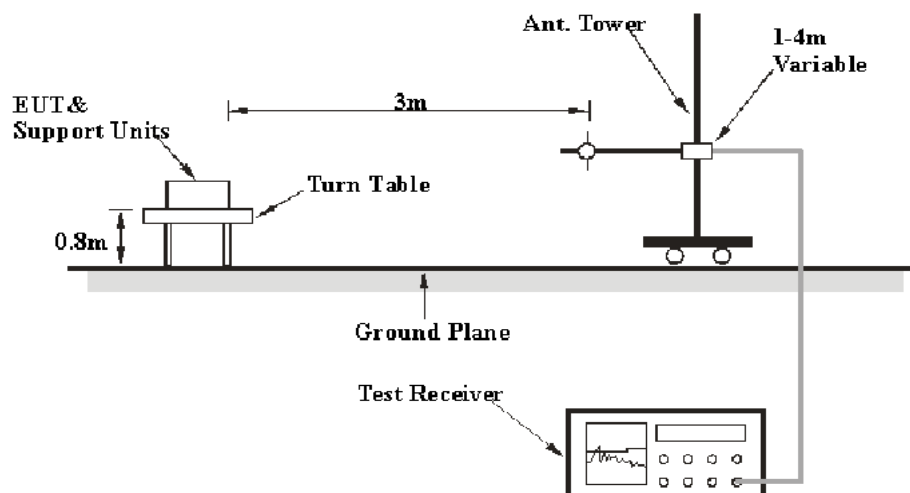
Measurement Uncertainty

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

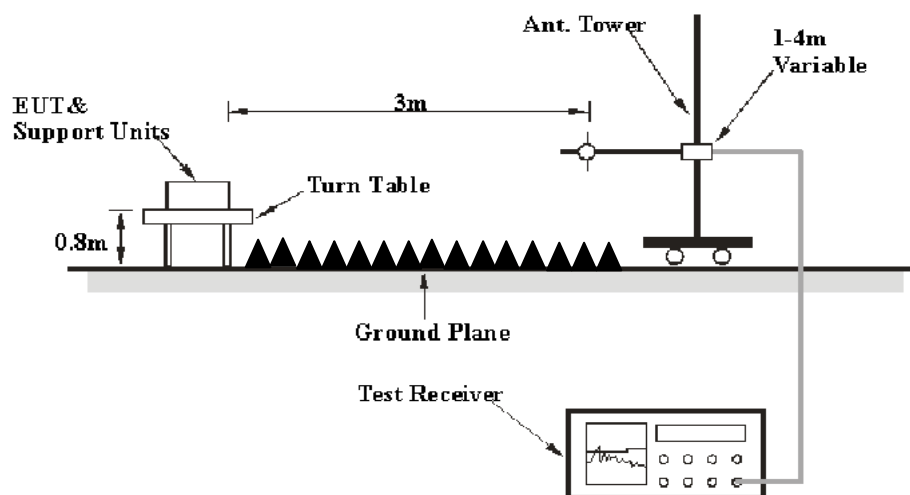
Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements and the best estimate of the uncertainty of radiation emission measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB, and the uncertainty will not be taken into consideration for the test data recorded in the report.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters 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:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2012-08-08	2013-08-07
HP	Amplifier	8447E	1937A01046	2012-11-24	2013-11-23
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
BIZI	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2013-11-23
Mini-Circuits	Amplifier	ZVA-213+	N/A	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30

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

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:

7.84 dB at 630 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by Henry Ding on 2013-04-01.

Test mode: Transmitting

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	Part 15.231/15.209		
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)	Comments
630	65.80	PK	178	1.0	V	-7.9	57.90	75.62	17.72	Harmonic
1575	51.40	PK	322	1.2	V	1.70	53.10	74.00	20.90	Harmonic
945	56.73	PK	98	1.1	V	-3.1	53.63	75.62	21.99	Harmonic
1260	51.86	PK	131	1.3	V	0.16	52.02	75.62	23.60	Harmonic
630	55.35	PK	245	1.2	H	-7.9	47.45	75.62	28.17	Harmonic
1575	43.63	PK	71	1.0	H	1.70	45.33	74.00	28.67	Harmonic
315	80.04	PK	123	1.2	V	-13.7	66.34	95.62	29.28	Fundamental
1260	45.44	PK	74	1.2	H	0.16	45.60	75.62	30.02	Harmonic
945	44.17	PK	302	1.0	H	-3.1	41.07	75.62	34.55	Harmonic
315	70.46	PK	23	1.1	H	-13.7	56.76	95.62	38.86	Fundamental

Field Strength of Average Emission							
Frequency (MHz)	Peak Measured @ 3m (dBμV/m)	Ant. Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Part 15.231/15.209 Limit (dBμV/m)	Margin (dB)	Comment
630	57.90	V	-10.12	47.78	55.62	7.84	Harmonic
1575	53.10	V	-10.12	42.98	54.00	11.02	Harmonic
945	53.63	V	-10.12	43.51	55.62	12.11	Harmonic
1260	52.02	V	-10.12	41.90	55.62	13.72	Harmonic
630	47.45	H	-10.12	37.33	55.62	18.29	Harmonic
1575	45.33	H	-10.12	35.21	54.00	18.79	Harmonic
315	66.34	V	-10.12	56.22	75.62	19.40	Fundamental
1260	45.60	H	-10.12	35.48	55.62	20.14	Harmonic
945	41.07	H	-10.12	30.95	55.62	24.67	Harmonic
315	56.76	H	-10.12	46.64	75.62	28.98	Fundamental

Note:

*Calculate Average value based on Duty Cycle correction factor:

$$\begin{aligned}
 T_{on} &= T_{on1}N_1 + T_{on2}N_2 + \dots + T_{onn}N_n \\
 &= (5.210\text{ms} + 0.902\text{ms} \times 17) \\
 &= 20.544\text{ms}
 \end{aligned}$$

$$T_p = 65.892\text{ms}$$

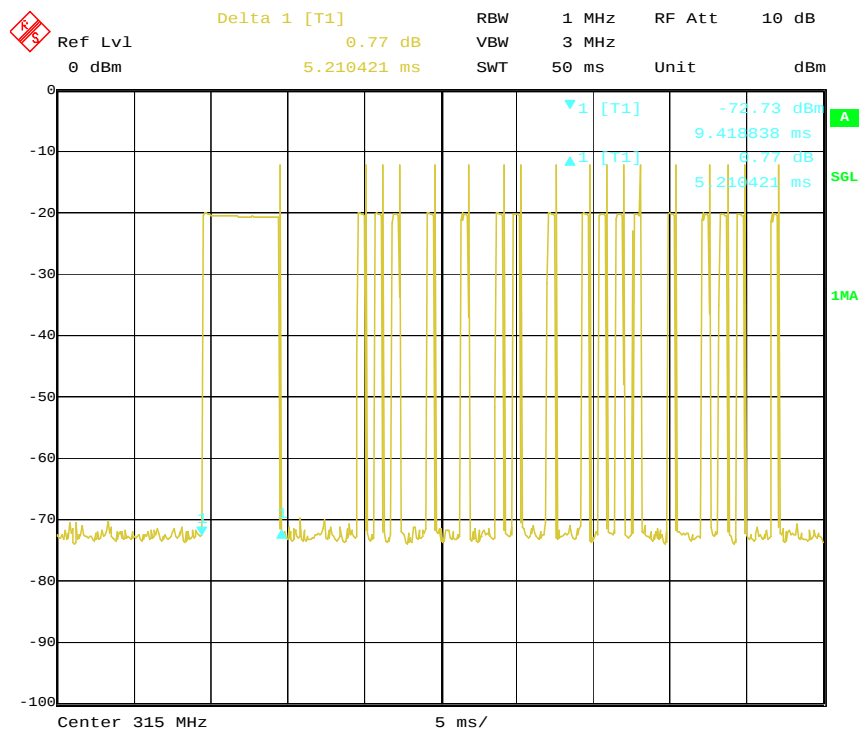
$$\begin{aligned}
 \text{Duty cycle} &= T_{on}/T_p \\
 &= 20.544/65.892 \\
 &= 0.3118
 \end{aligned}$$

$$\begin{aligned}
 \text{Duty Cycle Factor} &= 20\lg(\text{Duty Cycle}) \\
 &= 20\lg(0.3118) \\
 &= -10.12 \text{ dB}
 \end{aligned}$$

$$\text{Average} = \text{Peak} + \text{Duty Cycle Factor}$$

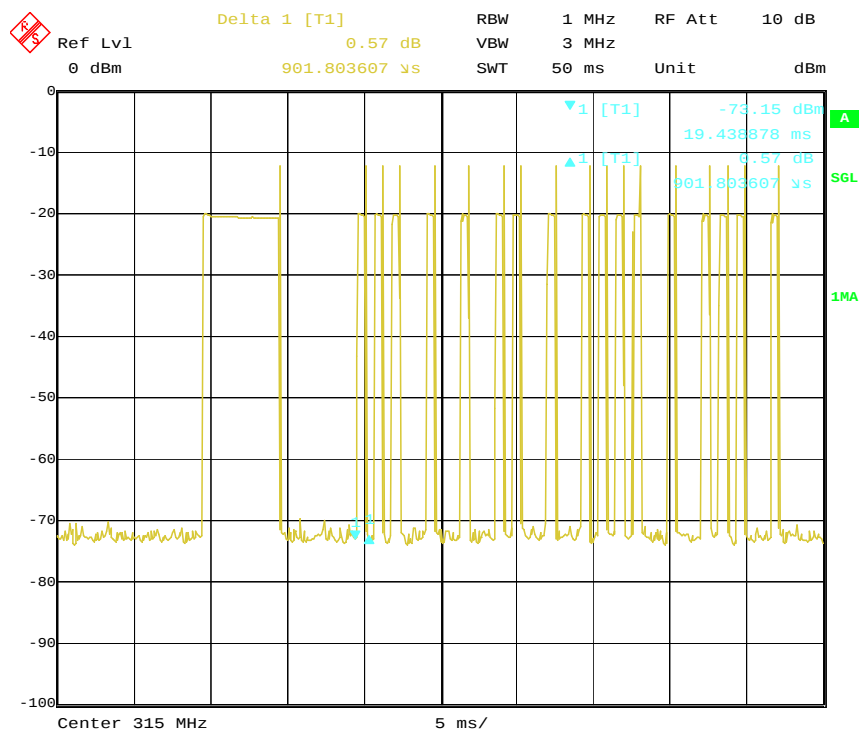
Please refer to the following plots.

T_{on1}

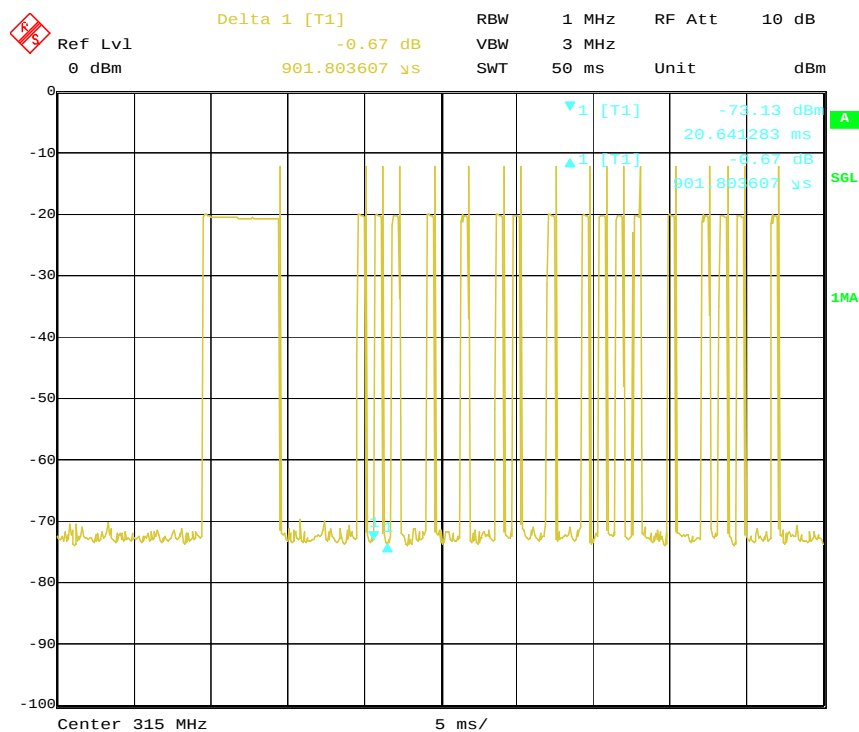
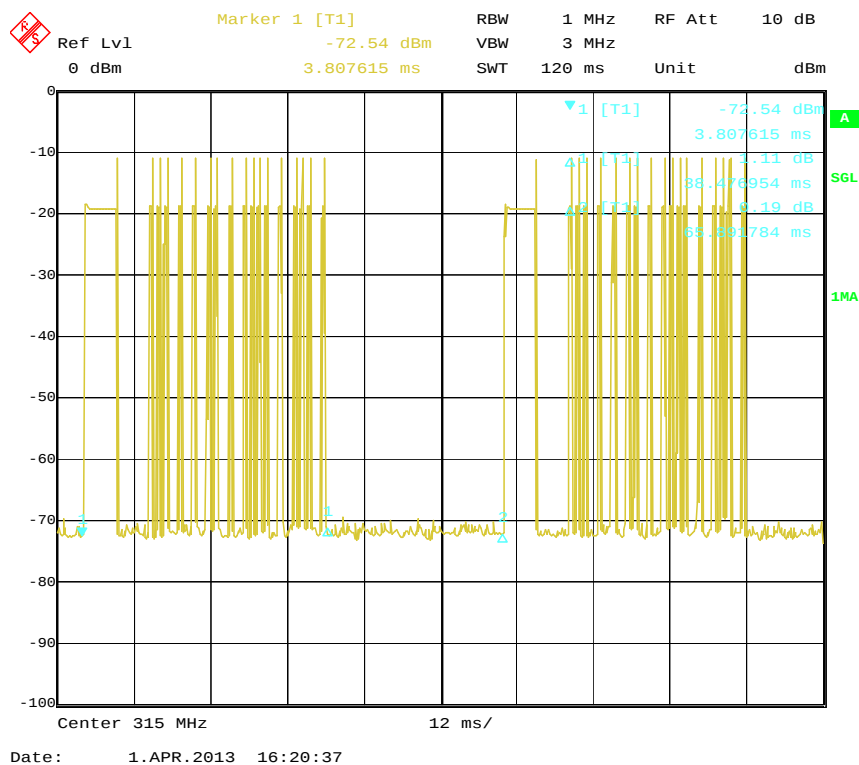


Date: 1.APR.2013 16:21:50

T_{on2}



Date: 1.APR.2013 16:22:20

T_{on3}  T_p 

FCC §15.231(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Per FCC §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 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 emission bandwidth.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BIZI	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2013-11-23

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

Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by Henry Ding on 2013-04-01.

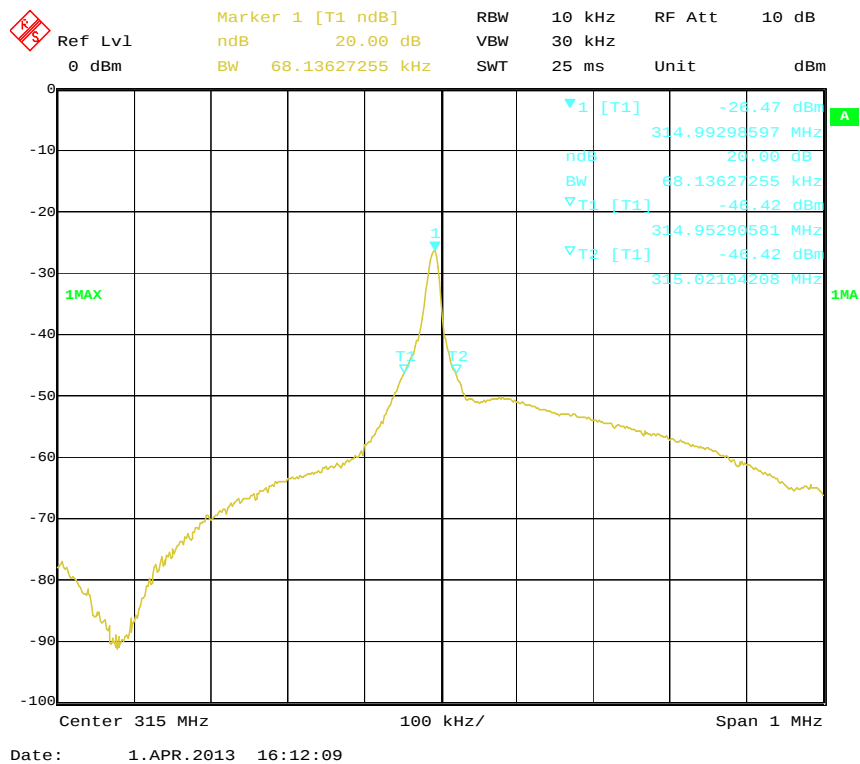
Test Mode: Transmitting

Test Result: Compliant, please refer to following table and plot.

Channel Frequency (MHz)	20 dB Emission Bandwidth (kHz)	Limit (kHz)	Result
315	68.1	787.5	Pass

Note: Limit = 0.25% * center frequency = 0.25% * 315 MHz = 787.5 kHz
20 dB Bandwidth = 68.1 kHz < 787.5 kHz

20 dB Emission Bandwidth



FCC §15.231(a) (1) - 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.

Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BIZI	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2013-11-23

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

Test Data

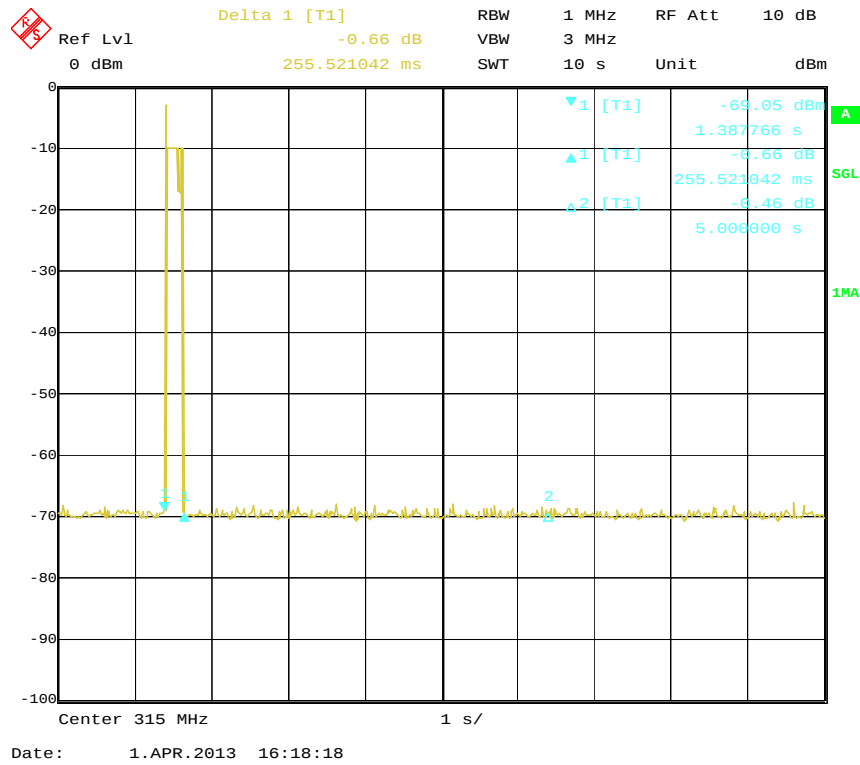
Environmental Conditions

Temperature:	25°C
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by Henry Ding on 2013-04-01.

Test Mode: Transmitting

Test Result: Compliant, please refer to following plot



PRODUCT SIMILARITY DECLARATION LETTER



GEMMY INDUSTRIES (HK)LIMITED BVI
Unit No.301 on 3rd floor ,East Ocean Centre, No.98
Granville Road, Kowloon, Hong Kong
Tel:(852) 23660631 Fax: (852) 23692595

DECLARATION OF SIMILARITY

April 27, 2013

To:
Bay Area Compliance Laboratories Corp.
6/F, the 3rd Phase of Wan Li Industrial Bldg., Shihua Rd.,
FuTian Free Trade Zone, Shenzhen, China
<http://www.baclcorp.com>

Dear Sir or Madam:

We GEMMY INDUSTRIES (HK)LIMITED BVI hereby declare that product: Wireless Remote Control model (s): 2002013 is electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: 1002013 tested by BACL
A description of the differences between the tested model and those that declared similar as follows:

Model No.

Please contact me if you have any questions.

Best Regards,

Signature:

Typed or Printed Name : Stan Zhang

Title: General Manager

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