

Application for FCC Certificate  
On Behalf of  
Jiaxing AUTOP Electronic Co. Ltd.

Remote Controller

Model No.: SK007-1

FCC ID : 2AFITAUTOPRM001

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Report No. : ACI-F15142  
Date of Test : Jul. 27, 2015  
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## TEST REPORT FOR FCC CERTIFICATION

Applicant : Jiaxing AUTOP Electronic Co. Ltd.  
Manufacturer : Jiaxing AUTOP Electronic Co. Ltd.  
Factory : Jiaxing AUTOP Electronic Co. Ltd.

EUT Description : Remote Controller  
(A) Model No. : SK007-1  
(B) Power Supply : DC 4.5V (AAA Battery \*3)

## Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2014  
AND ANSI C63.4:2003*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits radiated emission.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report shows that the EUT (M/N: SK007-1) to be technically compliant with the FCC official limits also.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report contains data that are not covered by the NVLAP accreditation.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government by the client.

Date of Test : Jul. 27, 2015 Date of Report : Jul 28, 2015

Producer : Alan He  
ALAN HE / Assistant

Review : Sammy Chen  
SAMMY CHEN / Manager

**AUDIX**® For and on behalf of  
Audix Technology (Shanghai) Co., Ltd.

Signatory :



Authorized Signature EMC BYRON KWO/Assistant General Manager

# 1 SUMMARY OF STANDARDS AND RESULTS

## 1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Meets Limit	Results
Conducted Emission at the Mains Terminal	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.207	N/A
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.209	Pass
Fundamental and Harmonics Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.249 (a)	Pass
Band-Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.249 (d)	Pass
N/A is an abbreviation for Not Applicable.			

## 2 GENERAL INFORMATION

### 2.1 Description of Equipment Under Test

Description : Remote Controller

Type of EUT :  Production  Pre-product  Pro-type

Model No. : SK007-1

Applicant : Jiaxing AUTOP Electronic Co. Ltd.  
No.1522 City-north Road, Jiaxing, Zhejiang, China

Manufacturer : same as Applicant

Factory : same as Applicant

Modulation : MSK 500kbps

Working Frequency : 2433MHz

20dB Bandwidth : 867kHz

Antenna Location : Top of the RF module  
Please see Figure 7 in APPENDIX III  
“Photographs of EUT”.

Antenna Type : Internal permanently attached antenna

## 2.2 Description of Test Facility

Site Description : Sept. 17, 1998 file on  
(Semi-Anechoic Chamber) Jan 15, 2015 Renewed  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd.,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China

FCC registration Number : 91789

Accredited by NVLAP, Lab Code : 200371-0

## 2.3 Measurement Uncertainty

Radiated Emission Expanded Uncertainty (30-200MHz):  $U = 4.4 \text{ dB}$  (Horizontal)  
 $U = 4.4 \text{ dB}$  (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):  $U = 4.4 \text{ dB}$  (Horizontal)  
 $U = 5.5 \text{ dB}$  (Vertical)

Radiated Emission Expanded Uncertainty (Above 1GHz):  $U = 5.1 \text{ dB}$

### 3 RADIATED EMISSION TEST

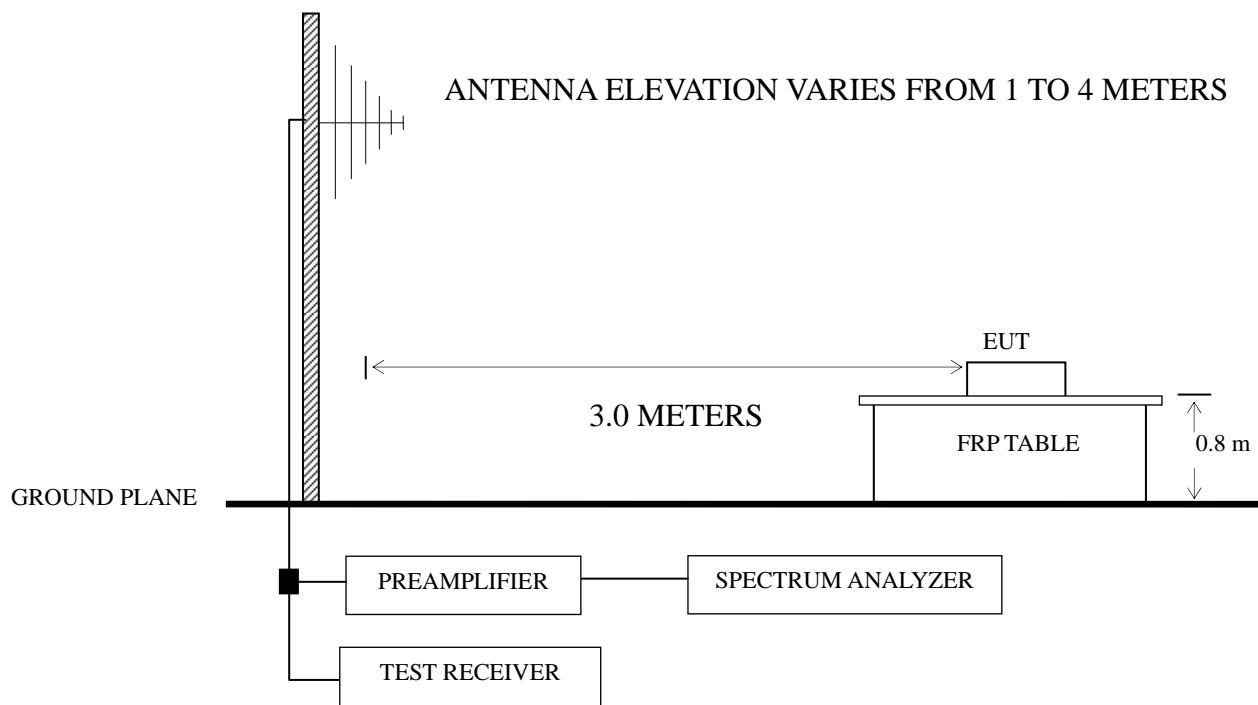
#### 3.1 Test Equipment

The following test equipments are used during the radiated emission test in a semi-anechoic chamber:

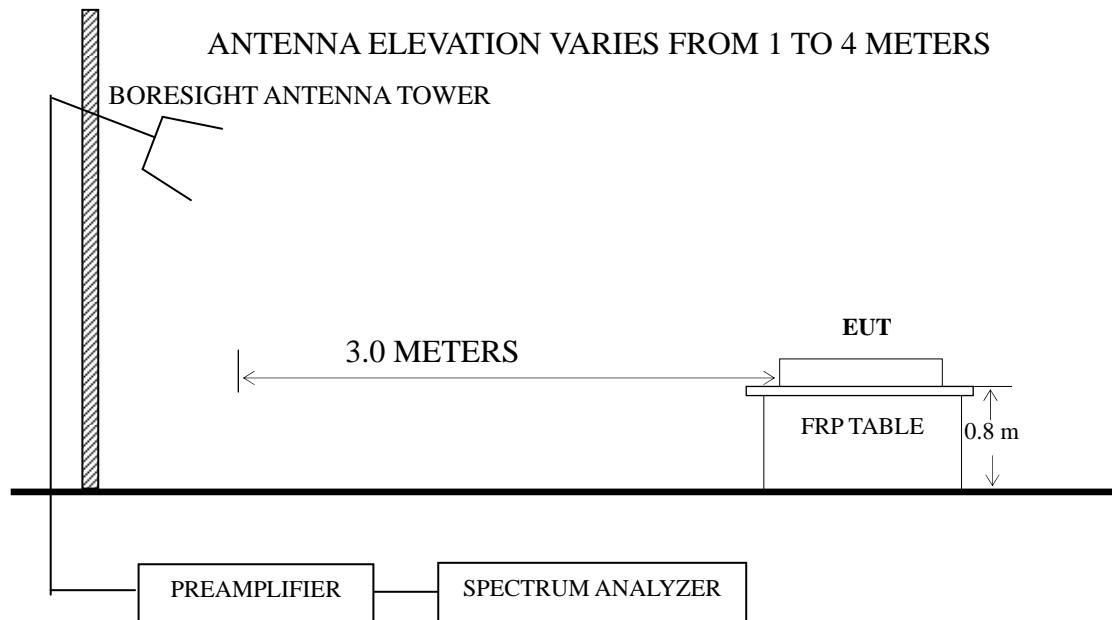
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Apr. 27, 2015	Apr. 26, 2016
2.	Bi-log Antenna	TESEQ	CBL6112D	23193	May. 15, 2015	May. 14, 2016
3.	Horn Antenna	EMCO	3115	9607-4878	Jun. 03, 2015	Jun. 02, 2016
4.	Horn Antenna	EMCO	3116	00062643	Jul. 04, 2015	Jul. 03, 2016
5.	Test Receiver	R&S	ESCI	101302	Apr. 27, 2015	Apr. 26, 2016
6.	Preamplifier	HP	8447D	2944A10548	Mar. 18, 2015	Sep. 17, 2015
7.	Preamplifier	HP	8449B	3008A00864	Mar. 20, 2015	Mar. 19, 2016
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar. 18, 2015	Sep. 17, 2015
9.	Software	Audix	E3	6.2007-9-10	--	--

#### 3.2 Block Diagram of Test Setup

##### 3.2.1 Below 1GHz



### 3.2.2 Above 1GHz



### 3.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]

Frequency (MHz)	Distance (m)	Field strength limits ( $\mu$ V/m)	
		( $\mu$ V/m)	dB ( $\mu$ V/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB ( $\mu$ V/m) = 20 lg Emission Level ( $\mu$ V/m)

NOTE 2 - The tighter limit applies at the band edges.

NOTE 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.

NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.

NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

### 3.4 Test Configuration

The EUT was installed as show on Sec. 3.2 in radiated emission test to meet FCC requirement and operating in a manner, which tend to maximize emission level in a normal application.

### 3.5 Operating Condition of EUT

- 3.5.1 Setup the EUT as shown in Sec. 3.2.
- 3.5.2 Turn on the power of all equipment.
- 3.5.3 Set the EUT on the test mode (Transmitting(FLAT key)) and then test.

### 3.6 Test Procedures

The EUT was placed on a FRP turntable that is 0.8 meter above ground. The FRP turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Broadband antenna (Calibrated Bilog Antenna) and horn antenna was used as receiving antenna. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.4:2003 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz for frequency range from 30MHz to 1000MHz.

The bandwidth of the VBW was set at 1MHz and RBW was set at 1MHz for peak emission measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emission above 1GHz for Spectrum Agilent E7405A.

The frequency range from 30 MHz to 25 GHz (Up to 10<sup>th</sup> harmonics from fundamental frequency) was checked.

The test mode (Transmitting(FLAT key)) was done on radiated emission test.

Please refer to Sec.3.7.

### 3.7 Test Results

**<PASS>**

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss (<1GHz)

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss

- Preamp Factor (>1GHz)

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – EUT configured in Lying, Side & Stand direction were all evaluated.

The emission levels recorded below is data of EUT configured in **Lying** direction, for Lying direction was the maximum emission direction during the test.

NOTE 5 – The emission levels which not reported are too low against the official limit.

NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz and Peak values and Average values above 1GHz. For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

## Radiated Emission below 1GHz

EUT : Remote Controller Temperature : 23°C  
 Model No. : SK007-1 Humidity : 47% RH  
 Test Mode : Transmitting(FLAT key) Date of Test : Jul. 27, 2015

Polarization	Frequency (MHz)	Read Level dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)	Remark
Horizontal	70.740	2.56	7.45	0.95	--	10.96	40.00	29.04	QP
	119.240	5.04	12.79	1.45	--	19.28	43.50	24.22	
	235.640	6.46	11.48	2.10	--	20.04	46.00	25.96	
	374.350	1.70	16.39	2.69	--	20.78	46.00	25.22	
	699.790	-1.70	19.80	3.54	--	21.64	46.00	24.36	
	<b>815.720</b>	<b>2.55</b>	<b>20.63</b>	<b>3.88</b>	--	<b>27.06</b>	<b>46.00</b>	<b>18.94</b>	
	1135.661	46.96	24.16	3.86	36.24	38.74	74.00	35.26	
	2650.417	45.51	29.07	5.18	35.17	44.59	74.00	29.41	
Vertical	5340.371	41.53	34.66	7.10	33.97	49.32	74.00	24.68	PK
	<b>30.970</b>	<b>6.95</b>	<b>18.15</b>	<b>0.64</b>	--	<b>25.74</b>	<b>40.00</b>	<b>14.26</b>	
	119.240	8.22	12.79	1.45	--	22.46	43.50	21.04	
	194.900	7.75	10.10	1.94	--	19.79	43.50	23.71	
	260.860	1.88	13.12	2.25	--	17.25	46.00	28.75	
	698.740	1.35	19.80	3.54	--	24.69	46.00	21.31	
	813.800	5.23	20.63	3.88	--	29.74	46.00	16.26	
	1622.187	46.20	26.11	4.03	35.52	40.82	74.00	33.18	
	3665.723	43.63	31.94	6.06	34.58	47.05	74.00	26.95	
	5655.516	43.14	34.96	7.90	34.04	51.96	74.00	22.04	

TEST ENGINEER: BILL WU

## 4 FUNDAMENTAL AND HARMONICS EMISSIONS TEST

### 4.1 Test Equipment

The following test equipments are used during the fundamental and spurious emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	HP	8449B	3008A00864	Mar. 20, 2015	Mar. 19, 2016
2.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Apr. 27, 2015	Apr. 26, 2016
3.	Horn Antenna	EMCO	3115	9607-4878	Jun. 03, 2015	Jun. 02, 2016
4.	Horn Antenna	EMCO	3116	00062643	Jul. 04, 2015	Jul. 03, 2016

### 4.2 Block Diagram of Test Setup

Same as Sec 3.2

### 4.3 Fundamental and Harmonics Emission Limit [FCC Part 15 Subpart C 15.249(a)]

Fundamental Frequency (MHz)	Distance (m)	Field Strength of Fundamental		Field Strength of Harmonics	
		(millivolts/meter)	dB ( $\mu$ V/m)	(microvolts/meter)	dB ( $\mu$ V/m)
2400 ~ 2483.5	3	50	94	500	54

NOTE 1 - Emission Level dB ( $\mu$ V/m) = 20 lg Emission Level ( $\mu$ V/m)

NOTE 2 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

NOTE 3 - The limits shown are based on Average value detector.

NOTE 4 - The limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

### 4.4 Test Configuration

The EUT was installed as show on Sec. 3.2 in fundamental and spurious emission test to meet ANSI C63.4:2003 requirements and operating in a manner that tend to maximize emission level in a normal application.

## 4.5 Operating Condition of EUT

- 4.5.1 Setup the EUT as shown in Sec. 3.2.
- 4.5.2 Turn on the power of all equipment.
- 4.5.3 Set the EUT on the test mode (Transmitting) and then test.

## 4.6 Test Procedures

The EUT was placed on a FRP turntable that is 0.8 meter above ground. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to FCC PART 15 Subpart C and ANSI C63.4:2003 requirements during fundamental and harmonics emission test.

The bandwidth of the VBW was set at 3MHz and RBW was set at 1MHz for peak emission measurement above 1GHz for Spectrum Agilent E7405A.

The frequency range from 2.4 GHz to 25 GHz (Up to 10<sup>th</sup> harmonics from fundamental frequency) was checked.

The test mode (Transmitting(FLAT key)) was done on Fundamental and Harmonics Emission test.

## 4.7 Test Results

**<PASS>**

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

NOTE 1 - All readings are Peak values.

NOTE 2 - The harmonics emission levels which not reported are too low against the official limit.

NOTE 3 – EUT configured in Lying, Side & Stand direction were all evaluated.

The emission levels recorded below is data of EUT configured in **Lying** direction, for Lying direction was the maximum emission direction during the test.

NOTE 4 - PK Level = Read Level + Factor

AV Level = Read Level + Factor – Correction Factor.

NOTE 5 - Factor = Antenna Factor + Cable Loss - Preamp Factor

NOTE 6 - Correction factor is measured as follows:

Duty Cycle x = Tx on / (Tx on + Tx off) = 0.7 / 49.65 = 0.014
Correction Factor =  20log(Duty Cycle)  = 37.01 dB

NOTE 7 - The duty cycle of each key are the same. The duty cycle of Flat key was calculated according to the plot in Appendix I

EUT : Remote Controller Temperature : 23°C

Model No. : SK007-1 Humidity : 47% RH

Test Mode : Transmitting(FLAT key) Date of Test : Jul. 27, 2015

Polarization	Frequency (MHz)	Read Level (dB $\mu$ V)	Factor (dB/m)	Correction factor (dB)	Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Remark
Horizontal	2433.05	60.48	-2.09	-	58.39	114	55.61	PK
	4866.10	49.94	6.25	-	56.19	74	17.81	
	2433.05	60.48	-2.09	37.01	21.38	94	72.62	AV
	4866.10	49.94	6.25	37.01	19.18	54	34.82	
Vertical	2433.05	58.23	-2.49	-	55.74	114	58.26	PK
	4866.10	47.92	6.25	-	54.17	74	19.83	
	2433.05	58.23	-2.49	37.01	18.73	94	75.27	AV
	4866.10	47.92	6.25	37.01	17.16	54	36.84	

TEST ENGINEER: BILL WU

## 5 BAND-EDGE MEASUREMENT

### 5.1 Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Apr. 27, 2015	Apr. 26, 2016
2.	Horn Antenna	EMCO	3115	9607-4878	Jun. 03, 2015	Jun. 02, 2016
3.	Preamplifier	HP	8449B	3008A00864	Mar. 20, 2015	Mar. 19, 2016
4.	Software	Audix	E3	SET00200 9912M295-2	--	--

### 5.2 Band-Edge Limit [FCC Part 15 Subpart C 15.249(d)]

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

For peak value, The RBW of Spectrum Analyzer Agilent E7405A was set at 1MHz and the VBW was set at 3MHz.

### 5.3 Test Results

<PASS>

EUT	:	<u>Remote Controller</u>	Temperature :	<u>23°C</u>
Model No.	:	<u>SK007-1</u>	Humidity	<u>47% RH</u>
Test Mode	:	<u>Transmitting(FLAT key)</u>	Date of Test :	<u>Jul. 27, 2015</u>

Peak limit = 74.00 dBuV/m

Average limit = 54.00 dBuV/m

#### **HORIZONTAL**

**Peak value @ 2400MHz** = 42.32 dBuV/m

**Average value @ 2400MHz** = Peak value - Correction Factor

= 42.32 dBuV/m - 37.01 dB

= 5.31 dBuV/m

**Peak value @ 2483.5MHz** = 43.56 dBuV/m

**Average value @ 2483.5MHz** = Peak value - Correction Factor

= 43.56 dBuV/m - 37.01 dB

= 6.55 dBuV/m

#### **VERTICAL**

**Peak value @ 2400MHz** = 41.90 dBuV/m

**Average value @ 2400MHz** = Peak value - Correction Factor

= 41.90 dBuV/m - 37.01 dB

= 4.89 dBuV/m

**Peak value @ 2483.5MHz** = 42.18 dBuV/m

**Average value @ 2483.5MHz** = Peak value - Correction Factor

= 42.18 dBuV/m - 37.01 dB

= 5.17 dBuV/m

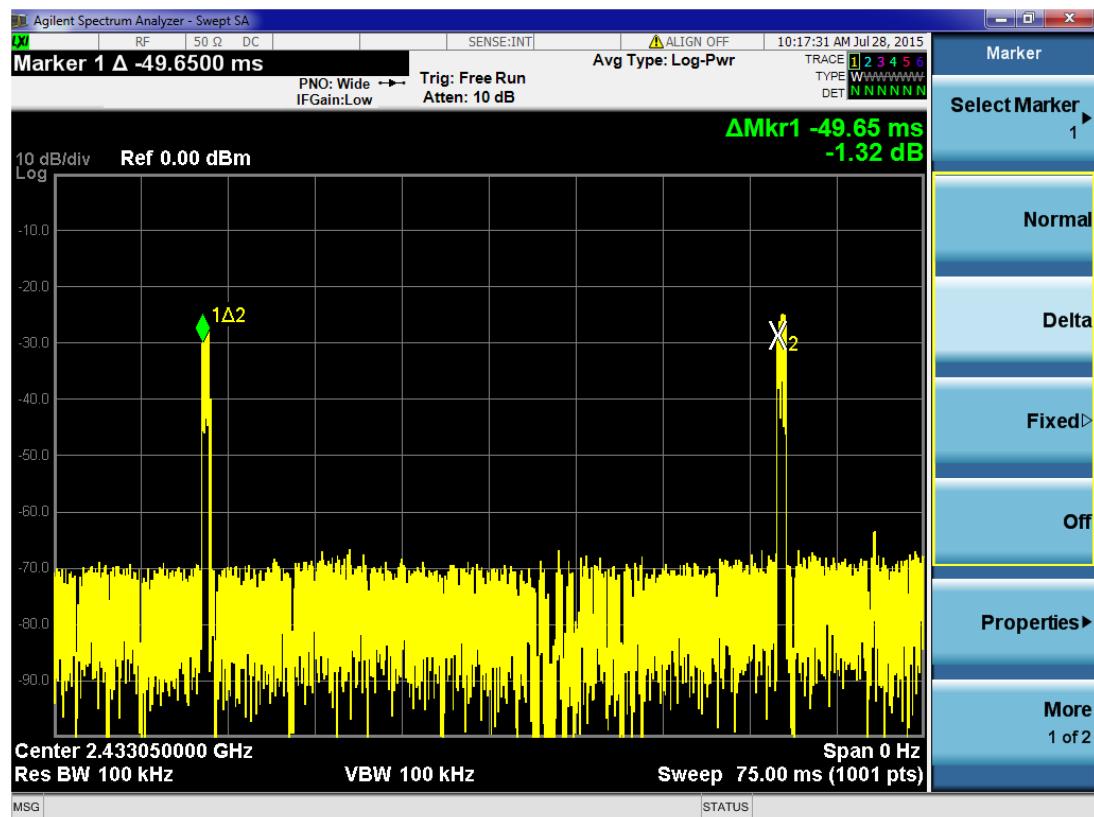
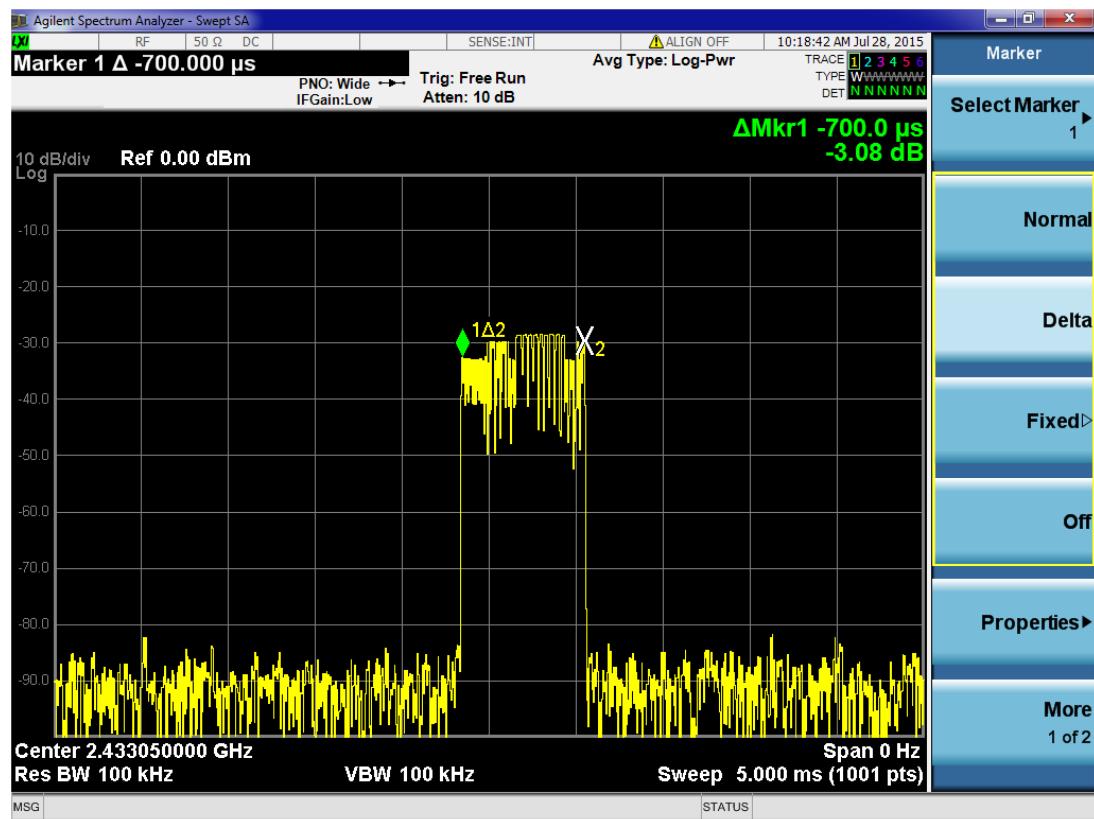
TEST ENGINEER: BILL WU

## 6 DEVIATION TO TEST SPECIFICATIONS

None.

# APPENDIX I

## PLOT OF DUTY CYCLE



DUTY CYCLE

## APPENDIX II

### PLOT OF 20DB BANDWIDTH

