Application for FCC Certificate
On Behalf of
NFTZ Hangpack Int'l Trading Co., Ltd.

Electronic Game Caller

Model No.: GS2

FCC ID : 2ABWD-GS2R-CALLER

Prepared For : NFTZ Hangpack Int'l Trading Co., Ltd.
722-1 Honghai Shangmao Mansion, Ningbo, China

Prepared By : Audix Technology (Shanghai) Co., Ltd.
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Report No. : ACI-F16078
Date of Test : Mar. 30, 2016
Date of Report : Mar. 31, 2016

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TEST REPORT FOR FCC CERTIFICATION

Applicant	:	NFTZ Hangpack Int'l Trading Co., Ltd.
Manufacturer	:	Hangzhou Xiaoshan Jinwei Suliao Chang
EUT Description	:	Electronic Game Caller
		(A) Model No. : GS2
		(B) Power Supply : DC 3V (AAA Battery*2)

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2015 AND ANSI C63.10:2013

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: GS2), which was tested in 3m anechoic chamber on Mar. 30, 2016 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 : Mar. 30, 2016 Date of Report : Mar. 31, 2016

Producer : Alan He
ALAN HE / Assistant

Review : Wenyi Fang for
SAMMY CHEN / Manager

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 2015 AND ANSI C63.10:2013	15.207	N/A
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2015 AND ANSI C63.10:2013	15.209	Pass
Fundamental and Harmonics Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2015 AND ANSI C63.10:2013	15.249	Pass
Band-Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2015 AND ANSI C63.10:2013	15.249	Pass
Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2015 AND ANSI C63.10:2013	15.215 (c)	Pass
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description	:	Electronic Game Caller
Type of EUT	:	☑ Production ☐ Pre-product ☐ Pro-type
Model No.	:	GS2
Applicant	:	NFTZ Hangpack Int'l Trading Co., Ltd. 722-1 Honghai Shangmao Mansion, Ningbo, China
Manufacturer	:	Hangzhou Xiaoshan Jinwei Suliao Chang 267 Chaoyang Shequ Shushan Jiedao, Xiaoshan, Hangzhou, China
Modulation	:	GFSK 250kbps
Operation Frequency	:	2440 MHz
Frequency Channel	:	Total 1 Channel
Antenna Type	:	metal antenna

2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber)	:	Sept. 17, 1998 file on 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 = 4.6 dB (Horizontal)

U = 4.3 dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):

U = 4.5 dB (Horizontal)

U = 5.4 dB (Vertical)

3 RADIATED EMISSION TEST

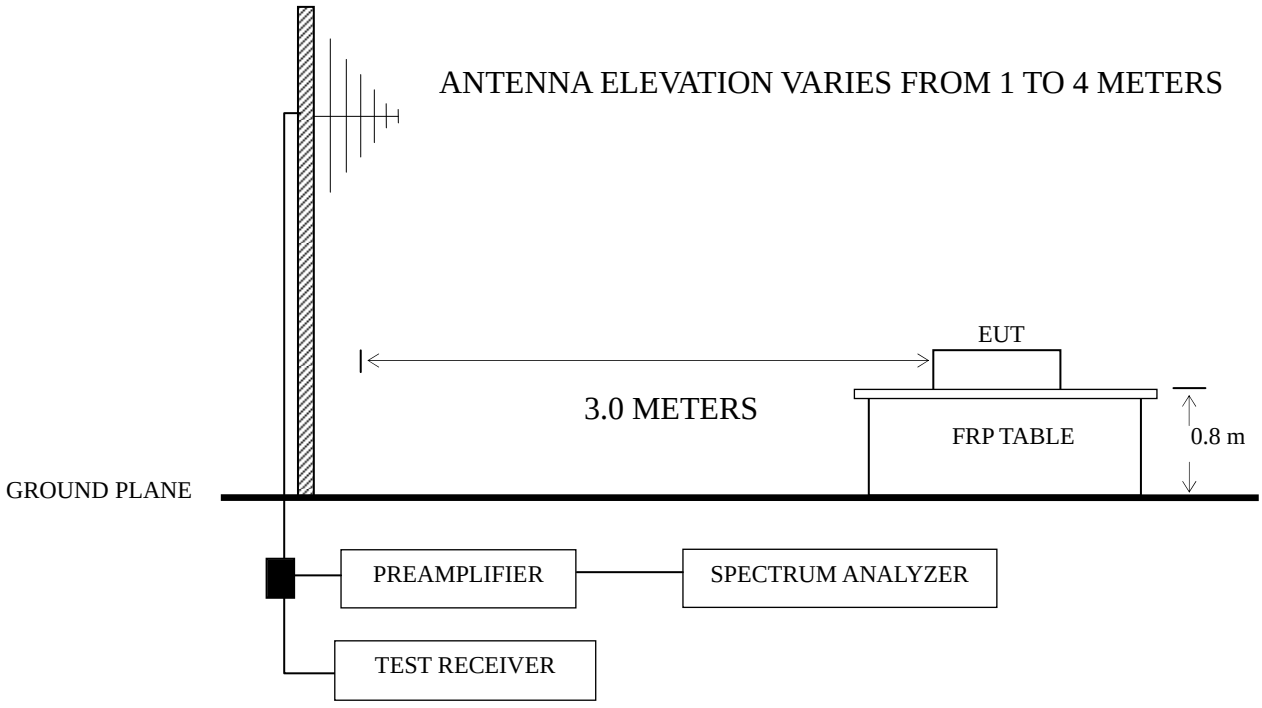
3.1 Test Equipment

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.	Pre-Amplifier	Agilent	8447D	2944A10548	Mar 18, 2016	Sep 17, 2016
2.	Pre-Amplifier	Agilent	8449B	3008A00864	Mar 20, 2016	Mar 19, 2017
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 12, 2015	Jun 11, 2016
4.	Test Receiver	R&S	ESCI	101302	Apr 27, 2015	Apr 26, 2016
5.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 15, 2015	May 14, 2016
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 03, 2015	Jun 02, 2016
7.	Horn Antenna	EMCO	3116	00062643	Sep 08, 2015	Sep 08, 2017
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2016	Sep 17, 2016
9.	Software	Audix	E3	SET00200 9912M295-2	--	--

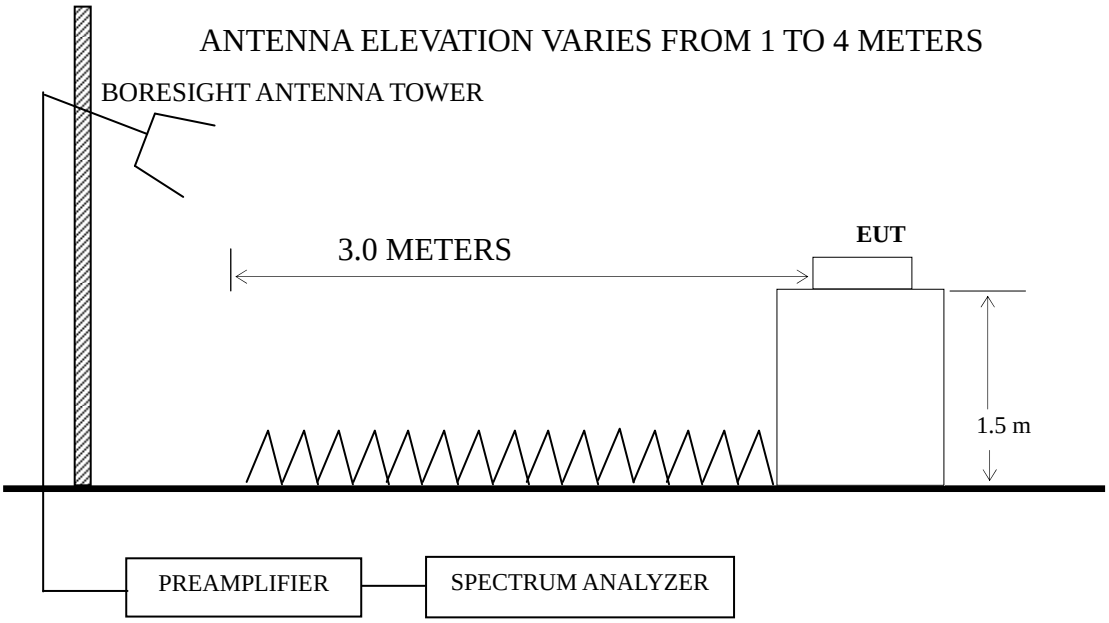
3.2 Block Diagram of Test Setup

3.2.1 Below 1GHz



■ : 50 ohm Coaxial Switch

3.2.2 Above 1GHz



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

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB (μV/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 (μV/m) = 20 lg Emission Level (μV/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.

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) and then test.

3.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. 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. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. 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 C63.10: 2013 requirements during radiated emission test. The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The frequency range from 30 MHz to 25 GHz (Up to 10^{th} harmonics from fundamental frequency) was checked.

All the test results are listed in 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 – The emission levels which not reported are too low against the official limit.

NOTE 5 – The emission levels recorded below is data of EUT configured in **Standing** direction, for Lying direction was the maximum emission direction during the test. The data of Side & Lying direction are too low against the official limit to be reported.

NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz and Peak 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.

EUT	:	Electronic Game Caller	Temperature :		22℃
Model No.	:	GS2	Humidity	:	40%RH
Test Mode	:	Transmitting 2440 MHz	Date of Test	:	Mar. 30, 2016

Polarization	Frequency (MHz)	Read Level dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	34.16	2.62	16.30	0.68	--	19.60	40.00	20.40	QP
	111.74	2.79	12.64	1.41	--	16.84	43.50	26.66	
	140.34	8.35	12.50	1.57	--	22.42	43.50	21.08	
	195.82	**23.25**	**10.03**	**1.94**	**--**	**35.22**	**43.50**	**8.28**	
	239.15	15.67	11.72	2.11	--	29.50	46.00	16.50	
	386.63	10.35	16.50	2.70	--	29.55	46.00	16.45	
	1223.488	54.97	24.55	3.56	36.09	46.99	74.00	27.01	PK
	1982.059	48.59	27.44	4.43	35.12	45.34	74.00	28.66	
	3690.970	48.36	32.03	6.02	34.56	51.85	74.00	22.15	
	4121.016	47.92	33.00	6.07	34.25	52.74	74.00	21.26	
Vertical	32.52	3.14	17.21	0.66	--	21.01	40.00	18.99	QP
	96.44	3.13	11.88	1.29	--	16.30	43.50	27.20	
	146.37	3.09	11.95	1.61	--	16.65	43.50	26.85	
	181.92	12.19	10.50	1.85	--	24.54	43.50	18.96	
	306.75	3.71	14.03	2.60	--	20.34	46.00	25.66	
	499.43	2.94	17.90	2.94	--	23.78	46.00	22.22	
	1288.775	50.02	24.82	3.63	35.99	42.48	74.00	31.52	PK
	1889.494	48.61	27.12	4.31	35.22	44.82	74.00	29.18	
	3453.358	48.28	31.42	6.14	34.76	51.08	74.00	22.92	
	4497.116	47.02	33.60	6.79	34.09	53.32	74.00	20.68	

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.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 12, 2015	Jun 11, 2016
2.	Horn Antenna	EMCO	3115	9607-4878	Jun 03, 2015	Jun 02, 2016
3.	Preamplifier	Agilent	8449B	3008A00864	Mar 20, 2016	Mar 19, 2017
4.	Horn Antenna	EMCO	3116	00062643	Sep 08, 2015	Sep 08, 2017
5.	Software	Audix	E3	SET00200 9912M295-2	--	--

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 (μV/m)	(microvolts/meter)	dB (μV/m)
2400 ~ 2483.5	3	50	94	500	54

NOTE 1 - Emission Level dB (μV/m) = 20 lg Emission Level (μV/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.

4.4 Test Configuration

The EUT was installed as show on Sec. 3.2 in fundamental and spurious emission test to meet ANSI C63.10:2013 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

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. The table height is 1.5 m. 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. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Horn antenna was used as receiving antenna. 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 C63.10: 2013 requirements during radiated emission test.

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

The test mode (Transmitting) 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 – The harmonics emission levels which not reported are too low against the official limit.
NOTE 2 – PK Level = Read Level + Factor
AV Level = PK Level – Correction Factor.
NOTE 3 – Factor = Antenna Factor + Cable Loss - Preamp Factor
NOTE 4 – Correction factor is measured as follows:

Duty Cycle x = Tx on / 100 ms = 0.344*11 / 100 = 0.038
Correction Factor = |20log(Duty Cycle)| = 28.44 dB

NOTE 5 – The emission levels recorded below is data of EUT configured in **Standing** direction, for Lying direction was the maximum emission direction during the test. The data of Side & Lying direction are too low against the official limit to be reported.
NOTE 6 – The duty cycle was calculated according to the plot in Appendix I

EUT	:	Electronic Game Caller	Temperature :	22℃
Model No.	:	GS2	Humidity :	40% RH
Test Mode		Transmitting 2440 MHz	Date of Test :	Mar. 30, 2016

Polarization	Frequency (MHz)	Read Level dB (μV)	Factor (dB/m)	Correction factor (dB)	Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	2440.00	99.28	-2.03	--	97.25	114.00	16.75	PK
	4880.00	50.94	6.30	--	57.24	74.00	16.76	
	7320.00	61.44	11.49	--	72.93	74.00	1.07	
	2440.00	--	--	28.44	68.81	94.00	25.19	AV
	4880.00	--	--	28.44	28.80	54.00	25.20	
	7320.00	--	--	**28.44**	**48.49**	**54.00**	**5.51**	
Vertical	2440.00	88.01	-2.03	--	85.98	114.00	28.02	PK
	4880.00	51.44	6.30	--	57.74	74.00	16.26	
	7320.00	59.49	11.49	--	70.98	74.00	3.02	
	2440.00	--	--	28.44	57.54	94.00	36.46	AV
	4880.00	--	--	28.44	29.30	54.00	24.70	
	7320.00	--	--	**28.44**	**42.54**	**54.00**	**11.46**	

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	N9010A	MY52221182	Jun 12, 2015	Jun 11, 2016
2.	Horn Antenna	EMCO	3115	9607-4878	Jun 03, 2015	Jun 02, 2016
3.	Preamplifier	Agilent	8449B	3008A00864	Mar 20, 2016	Mar 19, 2017
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 N9010A was set at 1MHz .

5.3 Test Results

<PASS>

Radiated Band Edge measurement:

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Factor (dB/m)	Correction Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	2390.00	56.77	-2.12	--	54.65	74.00	19.35	PK
	2483.50	54.58	-1.91	--	52.67	74.00	21.33	
	2390.00	--	--	28.44	26.21	54.00	27.79	AV
	2483.50	--	--	28.44	24.23	54.00	29.77	
Vertical	2390.00	55.35	-2.12	--	53.23	74.00	19.77	PK
	2483.50	53.96	-1.91	--	52.05	74.00	21.95	
	2390.00	--	--	28.44	24.79	54.00	29.21	AV
	2483.50	--	--	28.44	23.61	54.00	30.39	

TEST ENGINEER: BILL WU

6 BANDWIDTH MEASUREMENT

6.1 Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 12, 2015	Jun 11, 2016

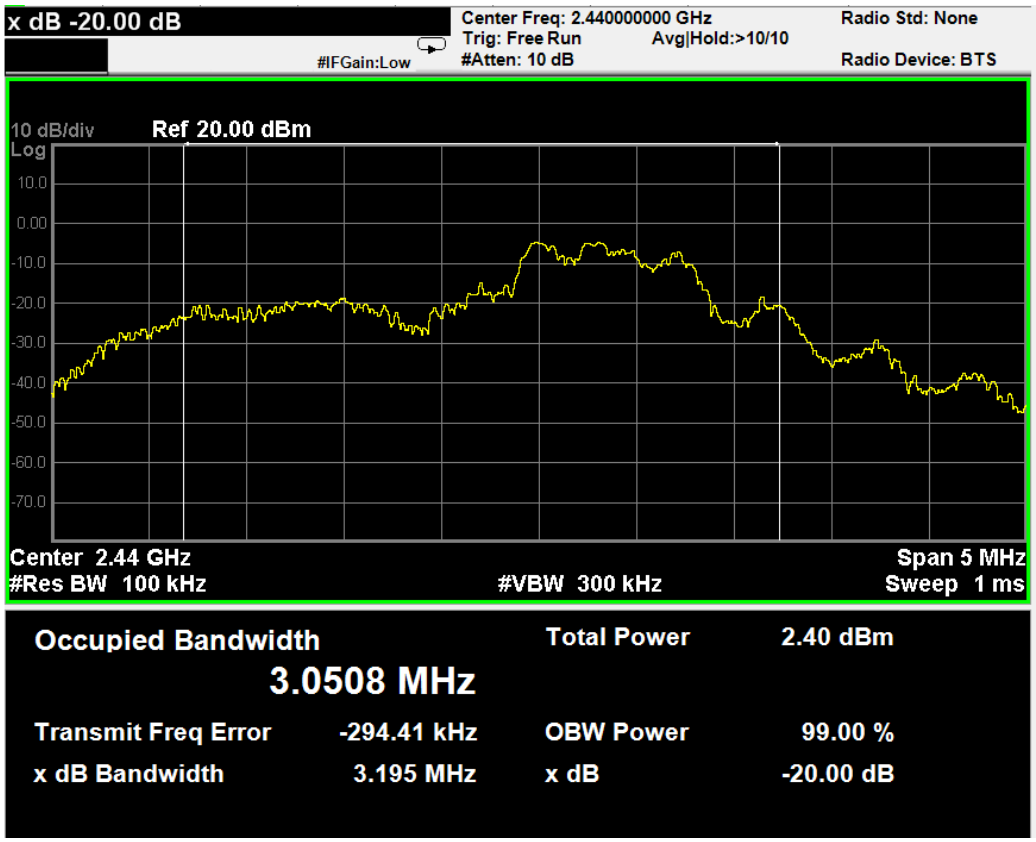
6.2 Bandwidth Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.3 Test Results

<PASS>

The 20dB bandwidth of the Fundament is **3.195 MHz**

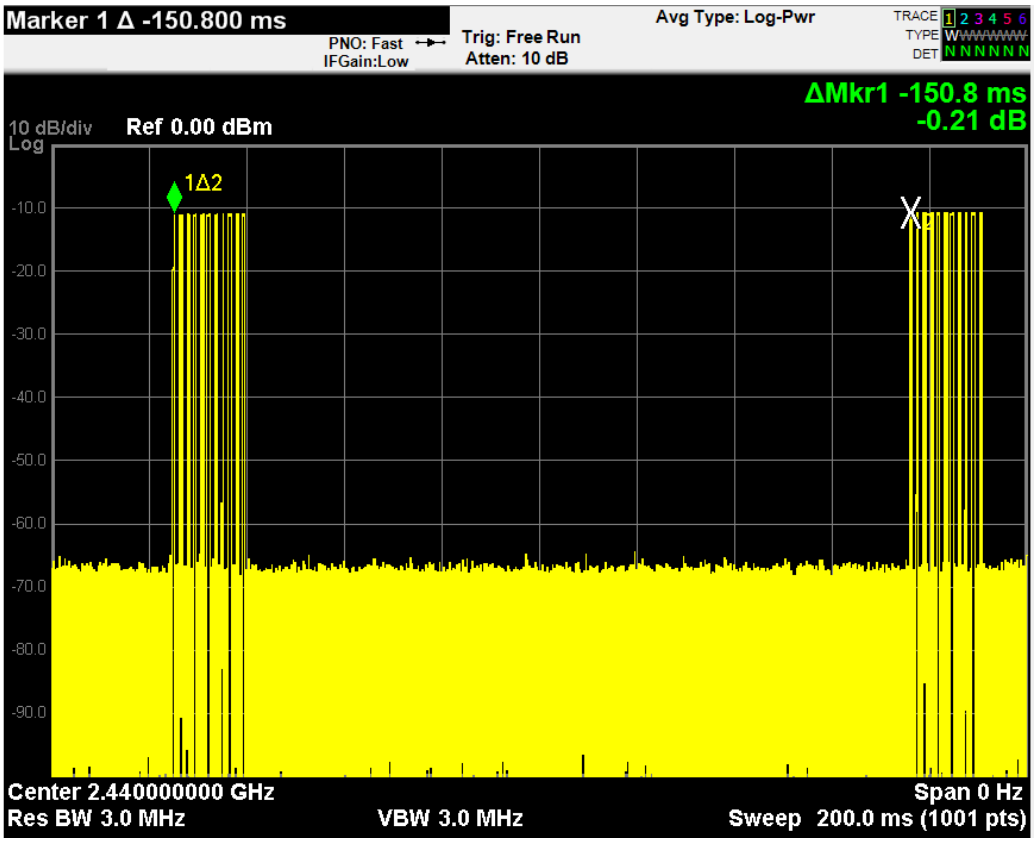


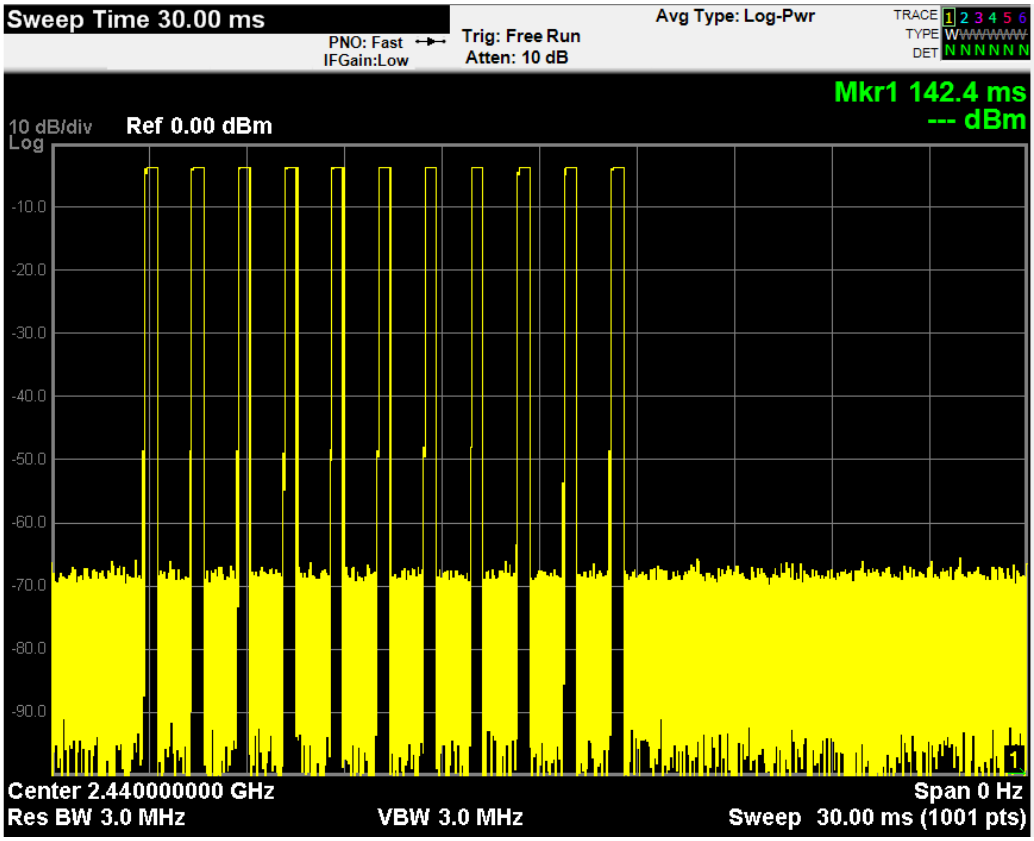
7 DEVIATION TO TEST SPECIFICATIONS

None.

APPENDIX I

PLOT OF DUTY CYCLE

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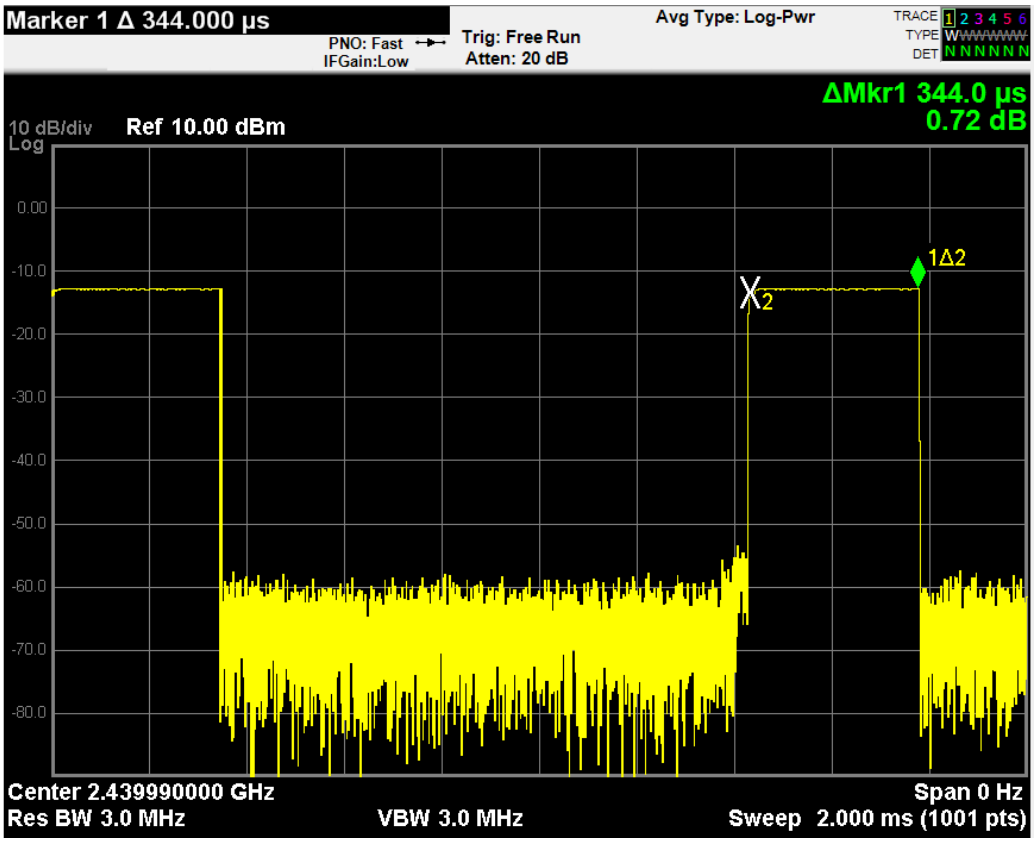
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
Mkr1 142.4 ms
--- dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Center 2.440000000 GHz
Res BW 3.0 MHz
VBW 3.0 MHz
Span 0 Hz
Sweep 30.00 ms (1001 pts)


Marker 1 Δ 344.000 µs
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
ΔMkr1 344.0 µs
0.72 dB
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
1Δ2
X2
Center 2.439990000 GHz
Res BW 3.0 MHz
VBW 3.0 MHz
Span 0 Hz
Sweep 2.000 ms (1001 pts)

DUTY CYCLE