

FCC CERTIFICATION
On Behalf of
Xiamen Elecdart Sport Equipment Co., Ltd.

Wireless Electronic Bristle Dartboard
Model No.: TBL01-BXS

FCC ID: UQVTBLBXS RF

Prepared for : Xiamen Elecdart Sport Equipment Co., Ltd.
Address : R3-3, 3/F., No.466 Nanshan Rd., Huli, Xiamen, Fujian,
China

Prepared by : ACCURATE TECHNOLOGY CO. LTD
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Report Number : ATE20062317
Date of Test : November 07, 2006
Date of Report : November 13, 2006

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Test Report Certification

Applicant : Xiamen Elecdart Sport Equipment Co., Ltd.
 Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.
 EUT Description : Wireless Electronic Bristle Dartboard
 (A) MODEL NO.: TBL01-BXS
 (B) SERIAL NO.: N/A
 (C) POWER SUPPLY: 6.0V DC ("AA" battery Type×4)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231: 2006

The device described above is tested by ACCURATE TECHNOLOGY 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 Section 15.231 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : November 07, 2006

Prepared by : 
 (Engineer)

Reviewer : 
 (Quality Manager)

Approved & Authorized Signer : 
 (Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Wireless Electronic Bristle Dartboard

Model Number : TBL01-BXS

Power Supply : 6.0V DC ("AA" battery Type×4)

Applicant : Xiamen Elecdart Sport Equipment Co., Ltd.
Address : R3-3, 3/F., No.466 Nanshan Rd., Huli, Xiamen, Fujian, China

Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.
Address : R3-3, 3/F., No.466 Nanshan Rd., Huli, Xiamen, Fujian, China

Date of sample received : October 26, 2006
Date of Test : November 07, 2006

1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen, May 10, 2004
Accredited by FCC, May 10, 2004
The Certificate Registration Number is 253065

Accredited by Industry Canada, May 18, 2004
The Certificate Registration Number is IC 5077

Name of Firm : ACCURATE TECHNOLOGY CO. LTD
Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.3. Measurement Uncertainty

Conducted emission expanded uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 4.12dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	03.31.2007
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	01.02.2007
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	03.31.2007
Bilog Antenna	Chase	CBL6112B	2591	03.31.2007
Horn Antenna	Rohde&Schwarz	HF906	100013	01.02.2007
Spectrum Analyzer	Anritsu	MS2651B	6200238856	03.31.2007
Pre-Amplifier	Agilent	8447D	2944A10619	03.31.2007

3. THE FIELD STRENGTH OF RADIATION EMISSION

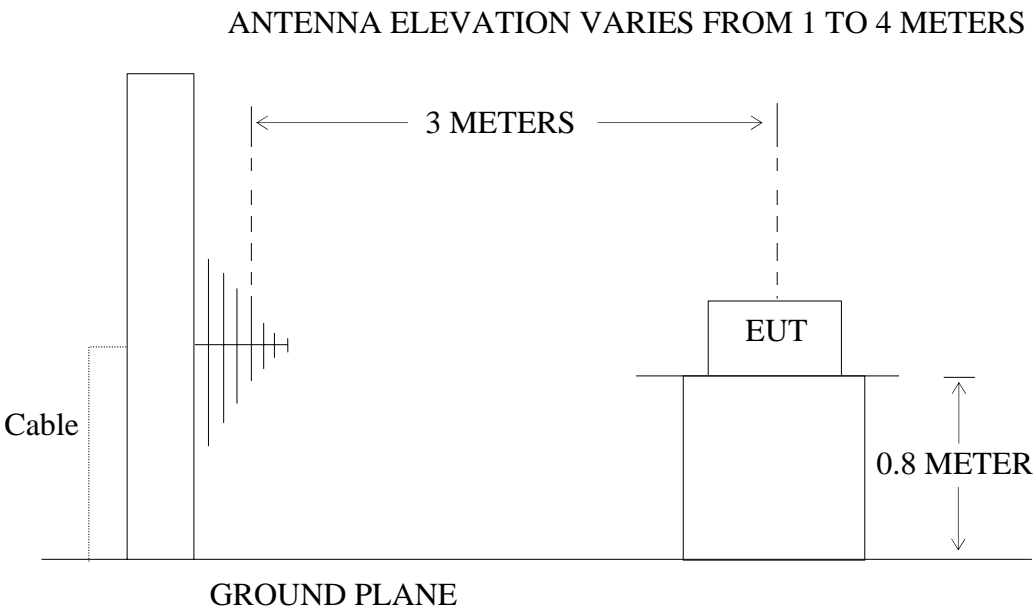
3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Electronic Bristle Dartboard)

3.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Electronic Bristle Dartboard)

3.2. The Field Strength of Radiation Emission Measurement Limits

3.2.1 Radiation Emission Measurement Limits According to Section 15.231(b)

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [$\mu\text{V/m}$]	Field Strength of Spurious Emission [Average] [$\mu\text{V/m}$]
40.66-40.70	2250	225
70-130	1250	125
130-174	1250-3750	125-375
174-260	3750	375
260-470	3750-12500	375-1250
Above 470	12500	1250

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental

field strengths are as follows: for the band 130-174MHz, $\mu\text{V/m}$ at 3 meters=56.81818(F)-6136.3636; For the band 260-470MHz, $\mu\text{V/m}$ at 3 meters=41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

3.2.2 Restricted Band Radiation Emission Measurement Limits According to Section 15.205 and Section 15.209

3.3. Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.3.1. Wireless Electronic Bristle Dartboard (EUT)

Model Number : TBL01-BXS
 Serial Number : N/A
 Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.

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 measuring modes (TX) measure it.

3.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI 63.4 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120KHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 30MHz to 3200MHz is checked.

3.6.The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 3200MHz is investigated.

Date of Test:	<u>November 07, 2006</u>	Temperature:	<u>27°C</u>
EUT:	<u>Wireless Electronic Bristle Dartboard</u>	Humidity:	<u>55%</u>
Model No.:	<u>TBL01-BXS</u>	Power Supply:	<u>6.0V DC ("AA" battery Type×4)</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Andy</u>

Frequency (MHz)	Reading (dBμV/m)	Factor Corr.	Average Factor	Result(dBμV/m)		Limit(dBμV/m)		Margin(dBμV/m)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
200.012	58.1	-23.2	-4.2	30.7	34.9	55.6	75.6	24.9	40.7	Horizontal
315.010	91.9	-18.8	-4.2	68.9	73.1	75.6	95.6	6.7	22.5	
630.020	55.7	-13.9	-4.2	37.6	41.8	55.6	75.6	18.0	33.8	
945.030	55.2	-11.6	-4.2	39.4	43.6	55.6	75.6	16.2	32.0	
1260.040	50.2	-7.3	-4.2	38.7	42.9	55.6	75.6	16.9	32.7	
*1575.050	51.0	-6.2	-4.2	40.6	44.8	54.0	74.0	13.4	29.2	
1890.060	45.9	-5.3	-4.2	36.4	40.6	55.6	75.6	19.2	35.0	
*2205.070	43.0	-4.3	-4.2	34.5	38.7	54.0	74.0	19.5	35.3	
2520.080	38.5	-3.2	-4.2	31.1	35.3	55.6	75.6	24.5	40.3	
*2835.090	35.8	-2.3	-4.2	29.3	33.5	54.0	74.0	24.7	40.5	
3150.100	34.1	-1.4	-4.2	28.5	32.7	55.6	75.6	27.1	42.9	
315.010	91.6	-18.8	-4.2	68.6	72.8	75.6	95.6	7.0	22.8	Vertical
630.020	54.5	-13.9	-4.2	36.4	40.6	55.6	75.6	19.2	35.0	
945.030	53.6	-11.6	-4.2	37.8	42.0	55.6	75.6	17.8	33.6	
1260.040	47.1	-7.3	-4.2	35.6	39.8	55.6	75.6	20.0	35.8	
*1575.050	49.0	-6.2	-4.2	38.6	42.8	54.0	74.0	15.4	31.2	
1890.060	43.6	-5.3	-4.2	34.1	38.3	55.6	75.6	21.5	37.3	
*2205.070	43.0	-4.3	-4.2	34.5	38.7	54.0	74.0	19.5	35.3	
2520.080	41.0	-3.2	-4.2	33.6	37.8	55.6	75.6	22.0	37.8	
*2835.090	38.1	-2.3	-4.2	31.6	35.8	54.0	74.0	22.4	38.2	
3150.100	35.9	-1.4	-4.2	30.3	34.5	55.6	75.6	25.3	41.1	

Note:

1. *: Denotes restricted band of operation.

Measurements were made using a peak detector and average detector. Any emission Above

1000MHz and falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

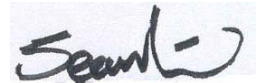
Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

3. FCC Limit for Average Measurement = $41.6667(315)-7083.3333 = 6041.6772\mu\text{V/m}$
 $=75.6\text{dB}\mu\text{V/m}$

4. The spectral diagrams in appendix I display the measurement of peak values.

Reviewer :



4. 20DB OCCUPIED BANDWIDTH

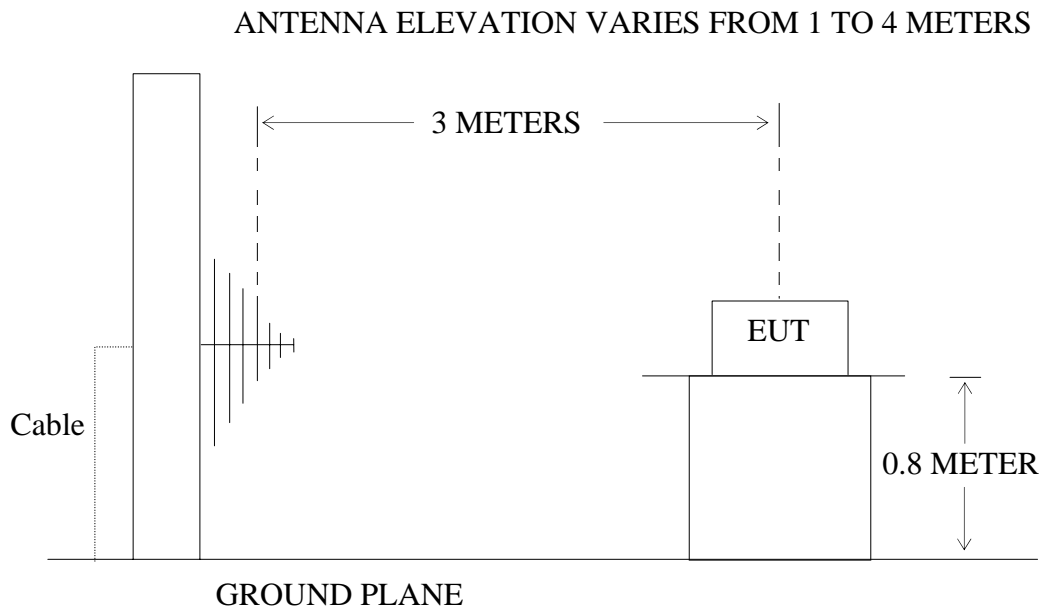
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Electronic Bristle Dartboard)

4.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Electronic Bristle Dartboard)

4.2. The Bandwidth of Emission Limit According To Section 15.231(c)

The bandwidth of emission shall be no wider than 0.25% of the center frequency. Therefore, the bandwidth of the emission limit is $315\text{MHz} \times 0.25\% = 787.5\text{KHz}$. Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

4.3.EUT Configuration on Measurement

The following equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.3.1.Wireless Electronic Bristle Dartboard (EUT)

Model Number : TBL01-BXS
Serial Number : N/A
Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.

4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

4.4.3.Let the EUT work in measuring mode (TX) measure it.

4.5.Test Procedure

4.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100kHz, VBW = 100kHz, Span = 1MHz.

4.5.2. Set SPA Max hold. Mark peak, -20dB

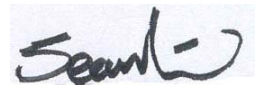
4.6. Measurement Result

The EUT does meet the FCC requirement.

-20dB bandwidth = 259.6KHz < 787.5KHz.

The spectral diagrams in appendix I.

Reviewer :

A handwritten signature in black ink, appearing to read "Sean", is written over a light blue rectangular background. The signature is stylized with a large, sweeping "S" and a checkmark-like flourish at the end.

5. RELEASE TIME MEASUREMENT

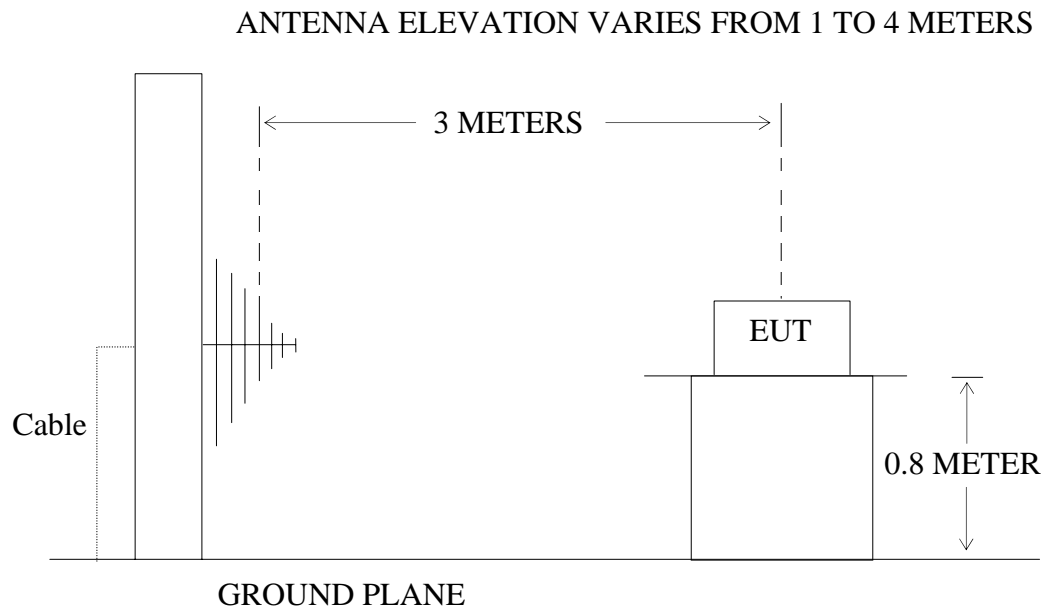
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Electronic Bristle Dartboard)

5.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Electronic Bristle Dartboard)

5.2. Release Time Measurement According To Section 15.231(a)

Section 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.

5.3.EUT Configuration on Measurement

The following equipment are installed on Release Time Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.3.1.Wireless Electronic Bristle Dartboard (EUT)

Model Number : TBL01-BXS
Serial Number : N/A
Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in measuring mode (TX) measure it.

5.5.Test Procedure

5.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100kHz, VBW = 100kHz, Span = 0Hz. Sweep time = 100ms.

5.5.2. Set EUT as normal operation and press Transmitter button.

5.5.3. Set SPA View. Delta Mark time.

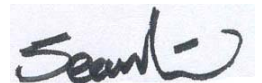
5.6. Measurement Result

The release time less than 5 seconds.

Release Time= 4.84 ms

The spectral diagrams in appendix I.

Reviewer :

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6. AVERAGE FACTOR MEASUREMENT

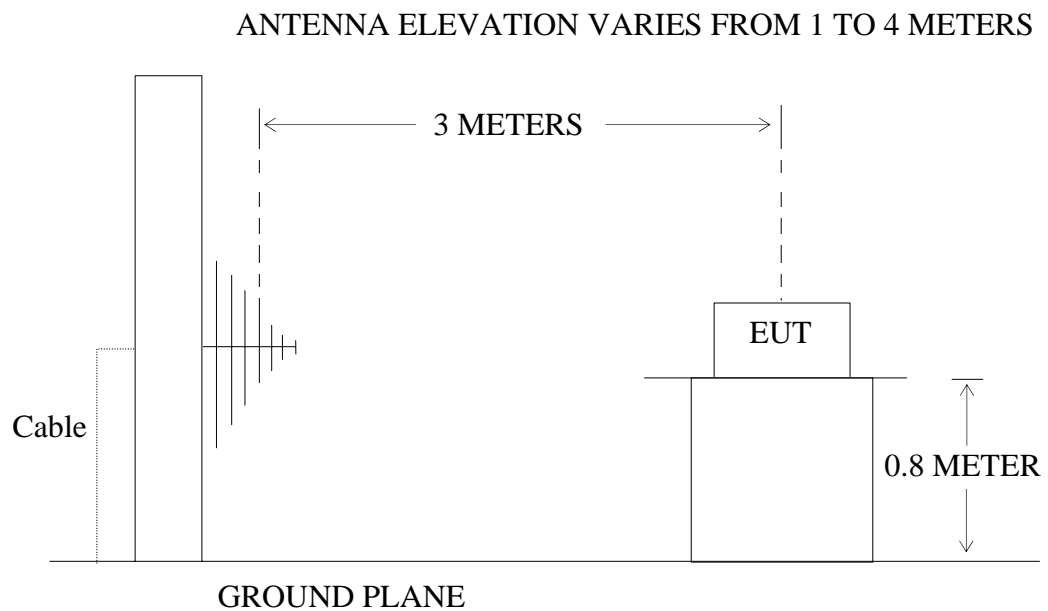
6.1. Block Diagram of Test Setup

6.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Electronic Bristle Dartboard)

6.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Electronic Bristle Dartboard)

6.2. Average factor Measurement

Average factor in dB = $20 \log (\text{duty cycle})$

6.2.1. The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

6.3.EUT Configuration on Measurement

The following equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3.1. Wireless Electronic Bristle Dartboard (EUT)

Model Number : TBL01-BXS
Serial Number : N/A
Manufacturer : Xiamen Elecdart Sport Equipment Co., Ltd.

6.4.Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 5.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in measuring mode (TX) measure it.

6.5.Test Procedure

6.5.1. The time period over which the duty cycle is measured is 10 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation.

6.5.2. Set EUT as normal operation.

6.5.3. Set SPA View. Delta Mark time.

6.6. Measurement Result

The duty cycle is simply the on time divided by the period:

The duration of one cycle = 4.4ms

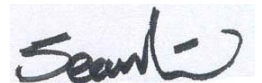
Effective period of the cycle = $(2 \times 0.92) + (2 \times 0.44)$ ms = 2.72ms

DC = $2.72\text{ms} / 4.4\text{ms} = 0.62$

Therefore, the average factor is found by $20\log 0.62 = -4.2\text{dB}$

The spectral diagrams in appendix I.

Reviewer :

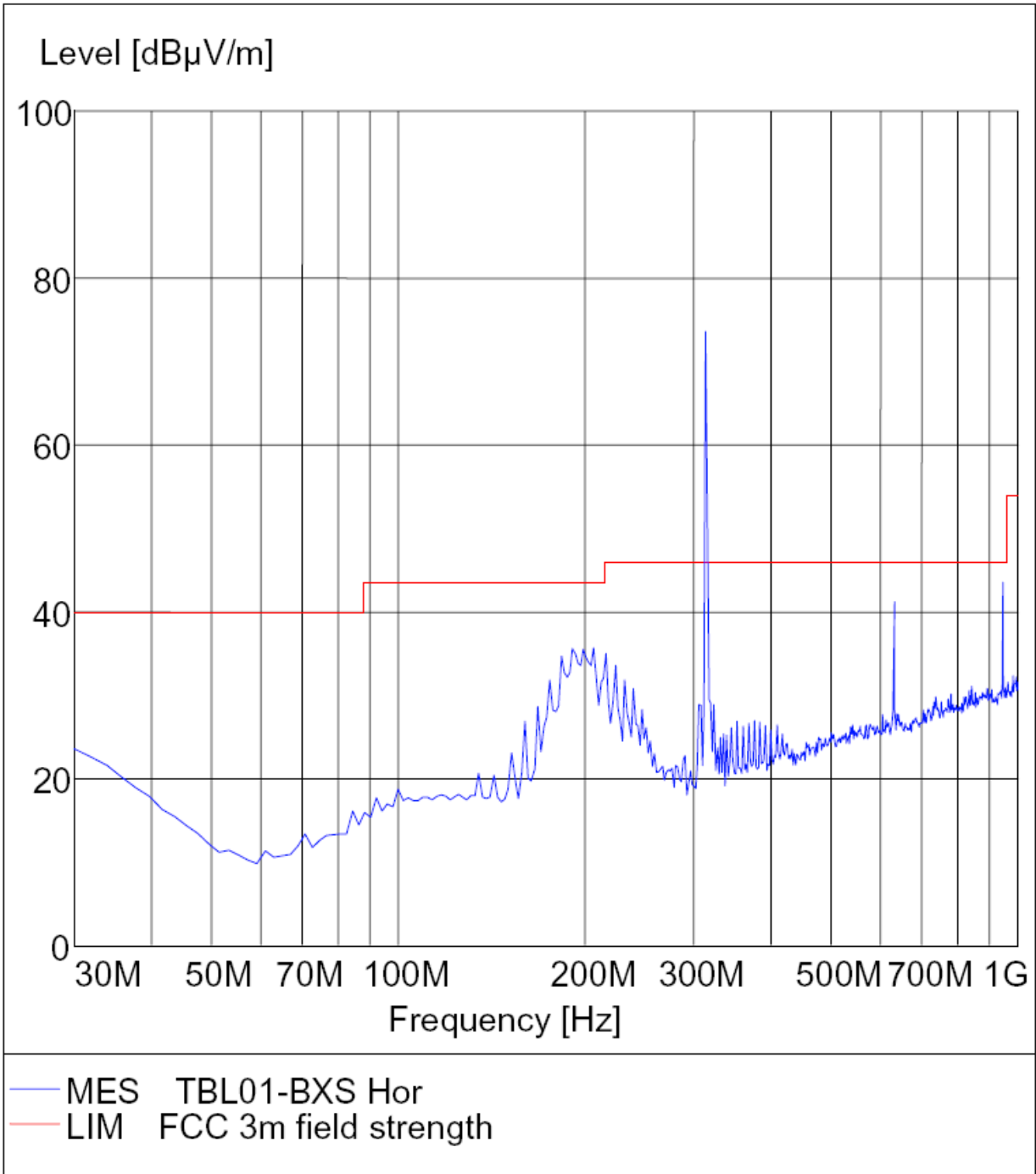


APPENDIX I (Test Curves)

Radiated Disturbance

FCC Part 15

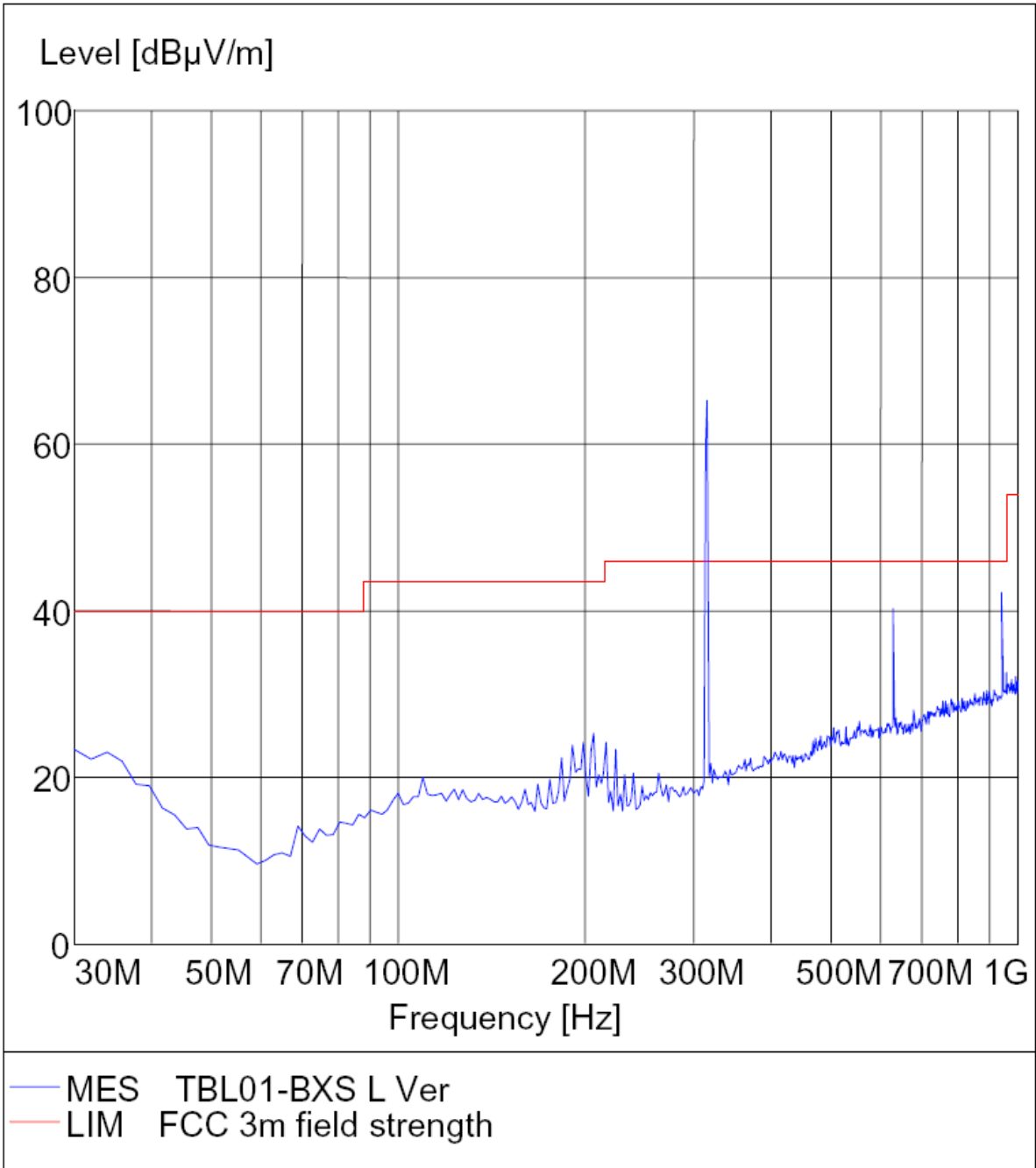
EUT: Wireless Electronic Bristle Dartboard
 Manufacturer: Xiamen Elecdart Sport Equipment Co., Ltd.
 Operating Condition: Tx
 Test Site: ATC EMC Lab. SAC
 Operator: Andy
 Test Specification: Horizontal
 Comment: DC 6.0V



Radiated Disturbance

FCC Part 15

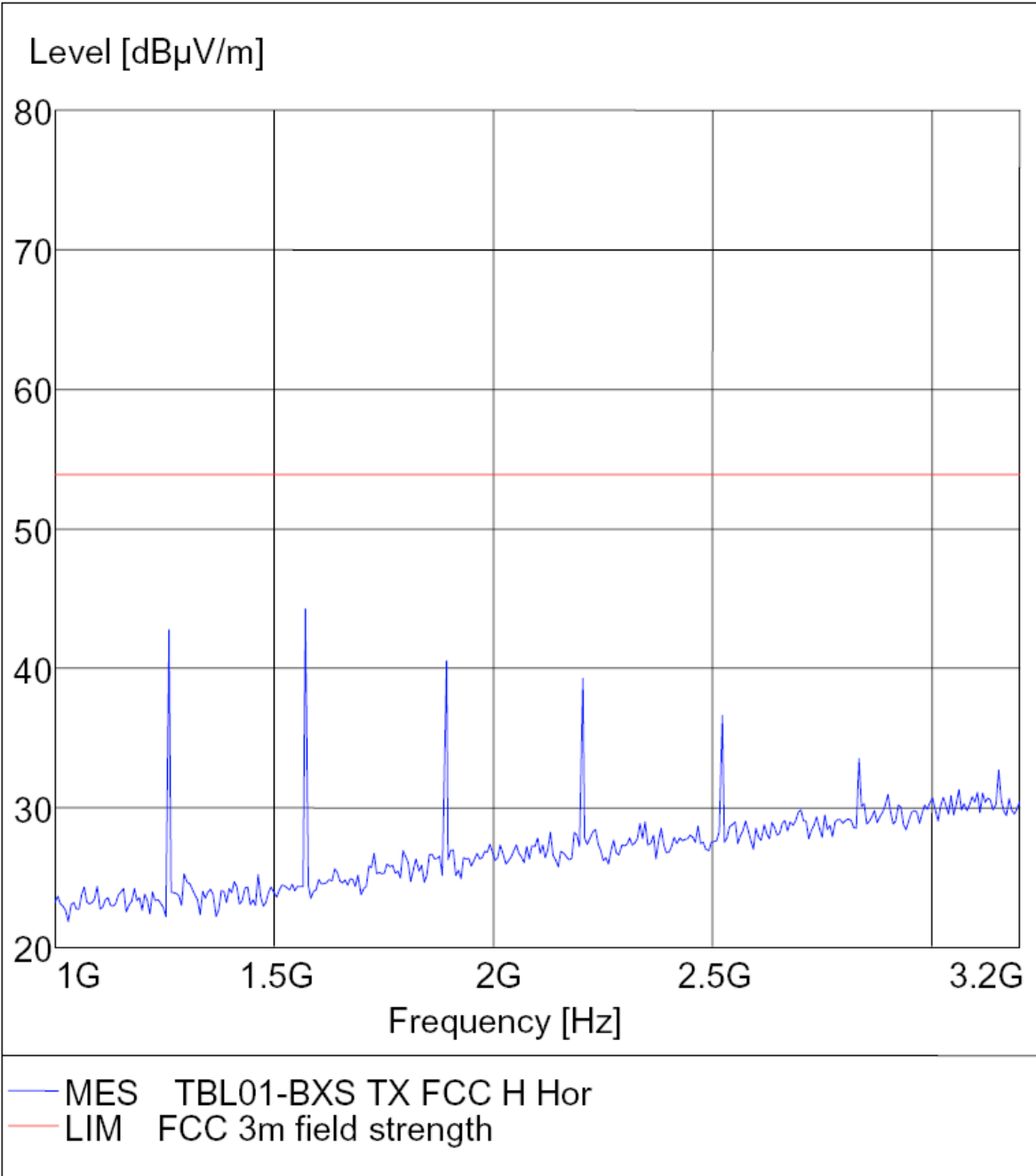
EUT: Wireless Electronic Bristle Dartboard M/N: TBL01-BXS
Manufacturer: Xiamen Elecdart Sport Equipment Co., Ltd.
Operating Condition: Tx
Test Site: ATC EMC Lab. SAC
Operator: Andy
Test Specification: Vertical
Comment: DC 6.0V



Radiated Disturbance

FCC Part 15

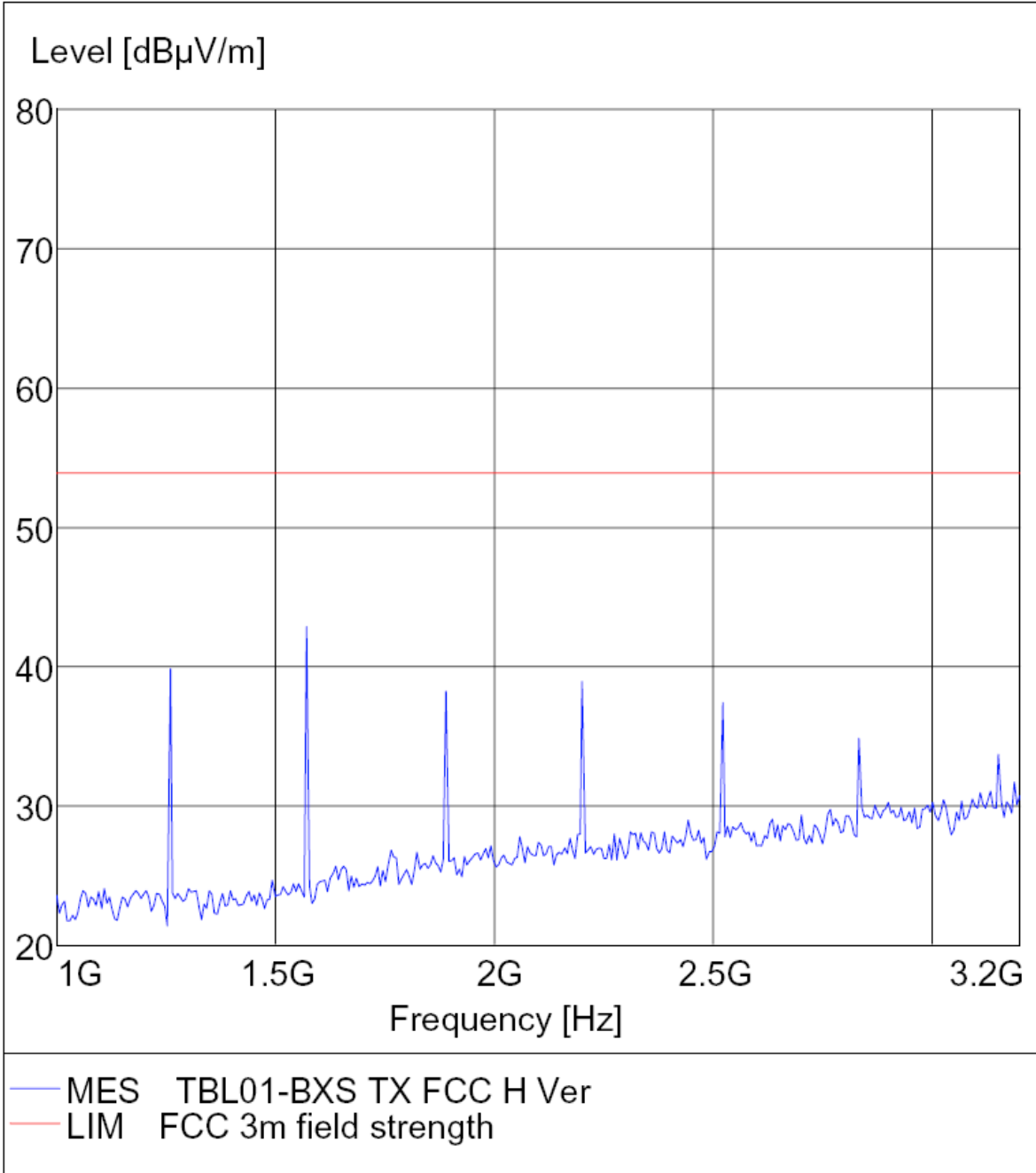
EUT: Wireless Electronic Bristle Dartboard M/N: TBL01-BXS
Manufacturer: Xiamen Elecdart Sport Equipment Co., Ltd.
Operating Condition: Tx
Test Site: ATC EMC Lab. SAC
Operator: Andy
Test Specification: Horizontal
Comment: DC 6.0V

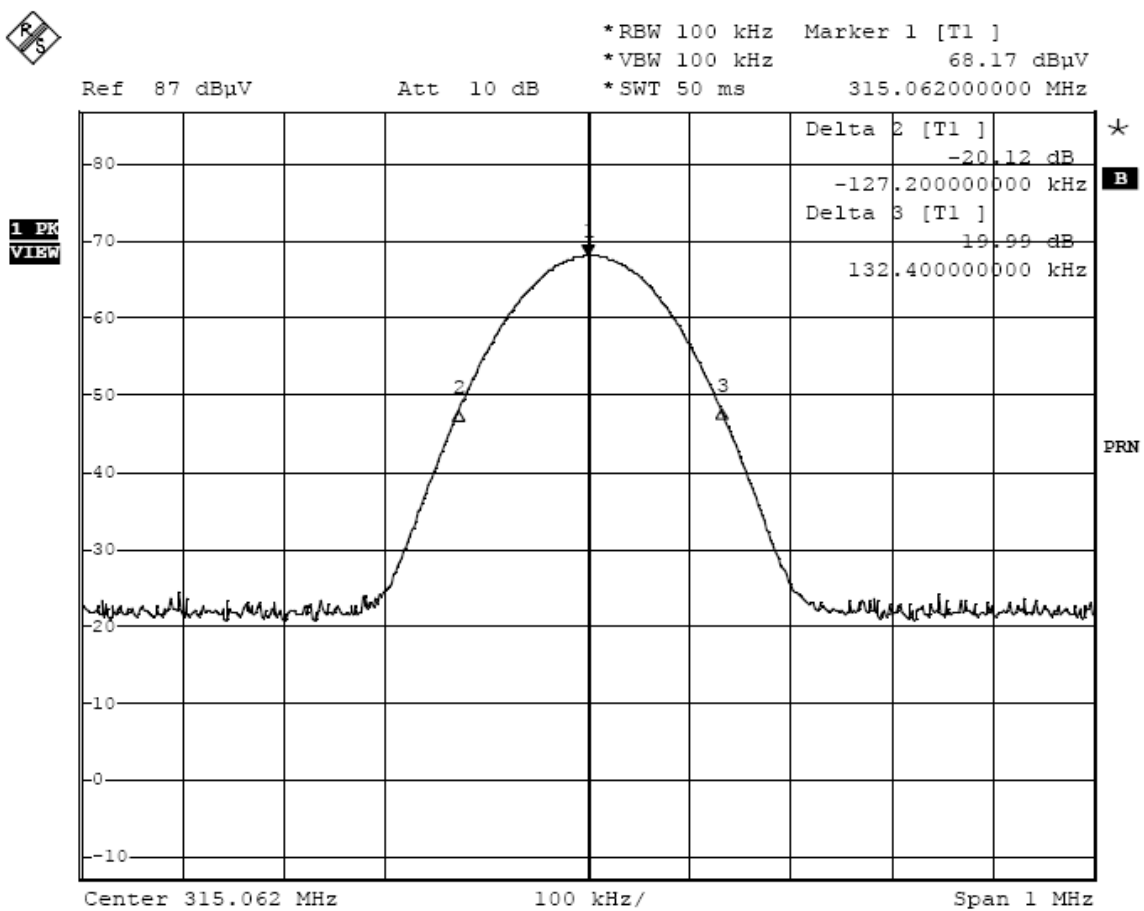


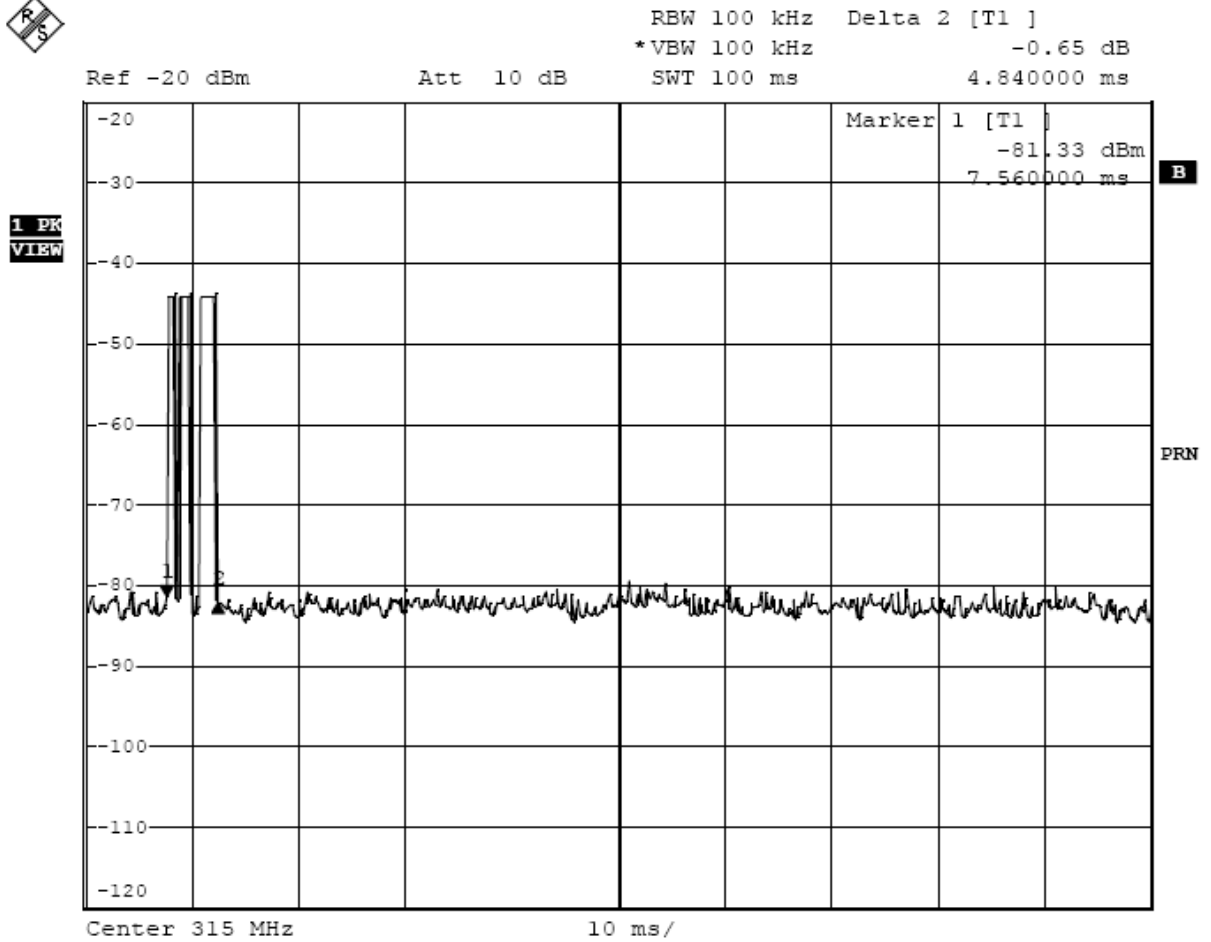
Radiated Disturbance

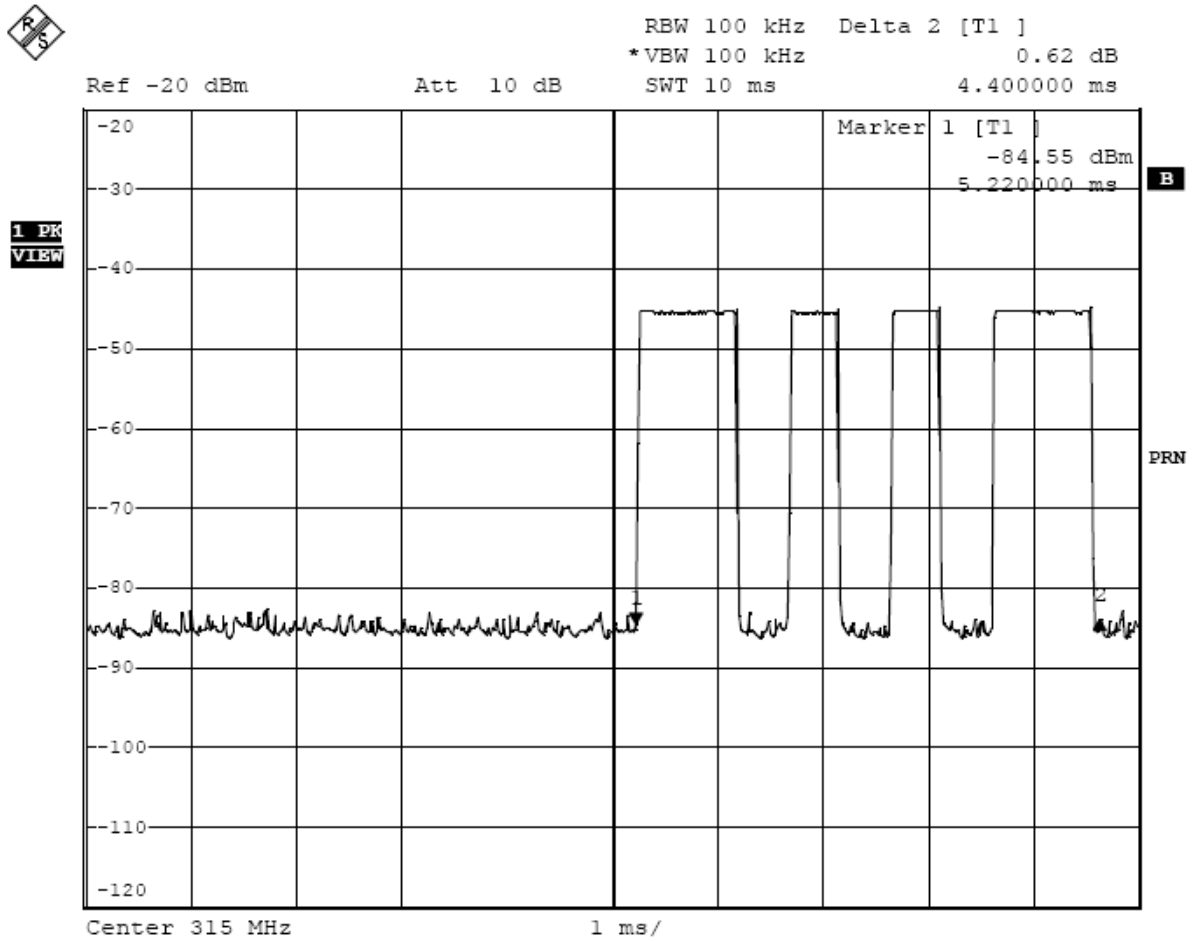
FCC Part 15

EUT: Wireless Electronic Bristle Dartboard M/N: TBL01-BXS
Manufacturer: Xiamen Elecdart Sport Equipment Co., Ltd.
Operating Condition: Tx
Test Site: ATC EMC Lab. SAC
Operator: Andy
Test Specification: Vertical
Comment: DC 6.0V

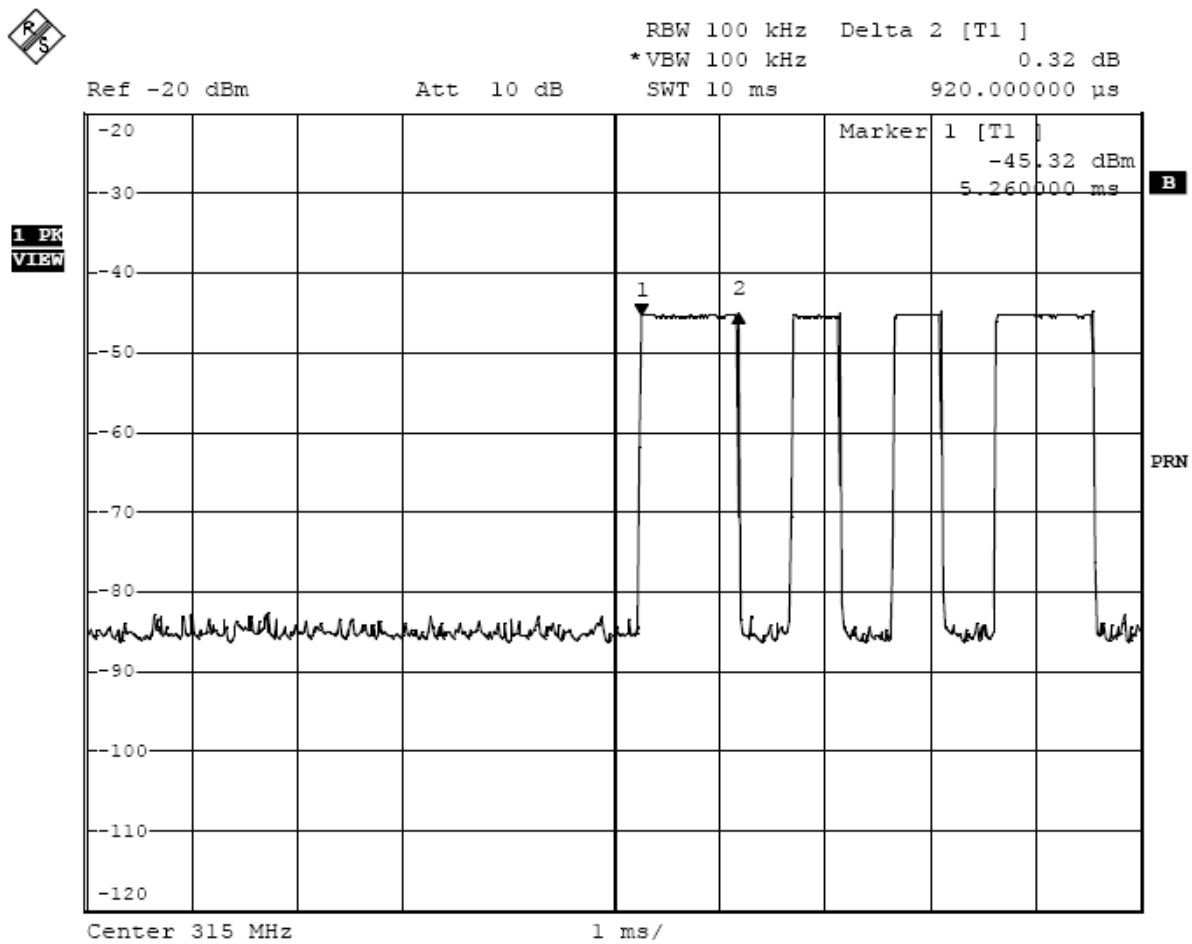




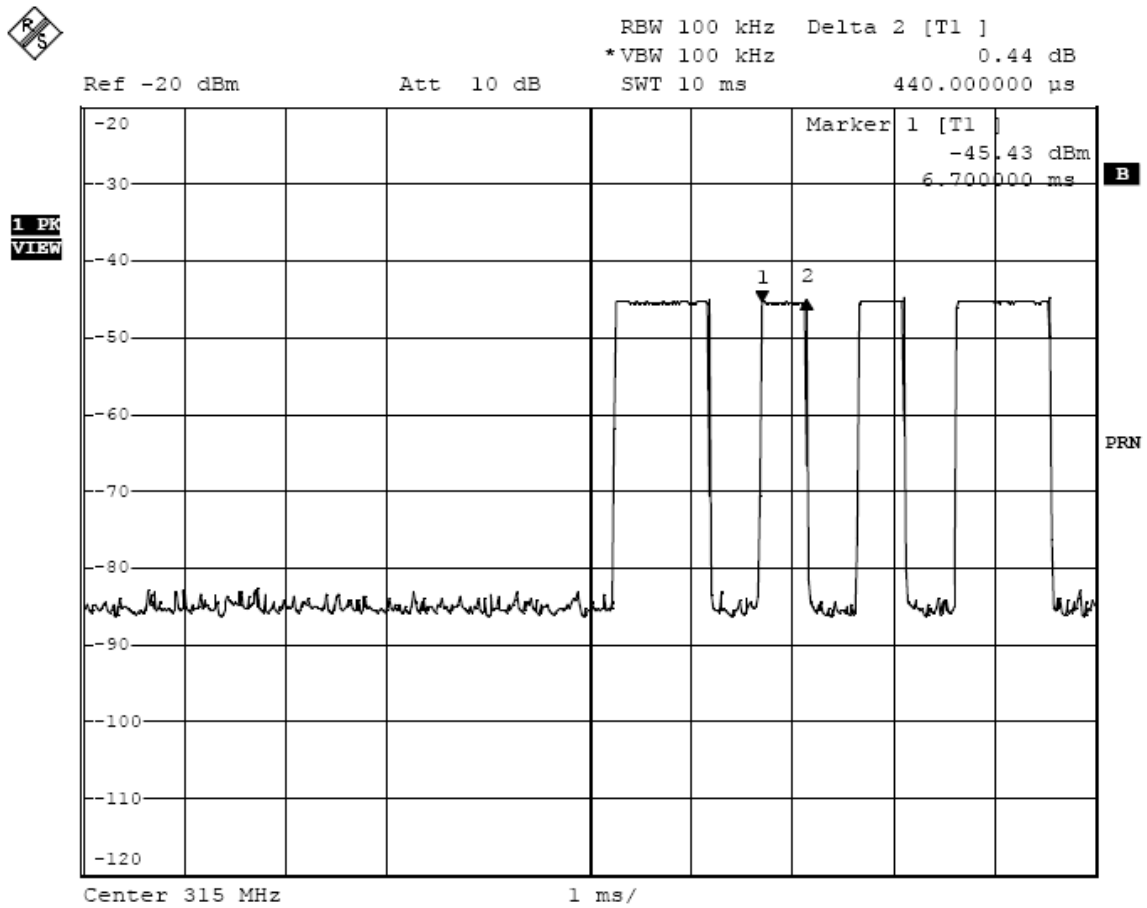




The graph shows the pattern of coding during the signal transmission.
The time interval of one coding period starts from marker 1 to marker 2,
Hence the total time of one period is 4.4ms.
It sums of 2 long 'on' signals and 2 short 'on' signals.



The graph show the duration of long 'on' signal. From marker 1 to marker 2, duration is 0.92ms.



The graph show the duration of short ‘on’ signal. From marker 1 to marker 2, duration is 0.44ms.