





No.: AJT200716028E-1

Applicant Name : GUANGDONG HENGDI TECHNOLOGY CORP., LTD.

: THE WEST OF NINGCHUAN ROAD AND THE SOUTH OF HUANCUL **Applicant Address** 

ROAD, CHENGHAI ZONE, SHANTOU CITY, GUANGDONG, CHINA

: ROBOTIC TOYS Sample Description

Model No. : 1903

Additional Model : 1901, 1902, 1903, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913,

> 1914, 1915, 966, 955, 967, 20908, 20968, DB1-1, DB2-1, DB3-1, DB1-2, DB2-2, DB3-2, DB1-3, DB2-3, DB3-3, DB01, DB02, DB03, DB04, DB05, DB06, DB-1A, DB-1B, DB-2A, DB-2B, DB-3A, DB-3B, ODY-1208, MUK-1903

Client Specified Age Grade :/ Tested Age Grade :/

Sample Received Date : 16 July, 2020 **Testing Completed Date** : 27 October, 2020

Tests conducted: For compliance with application, refer to attached page(s) for details.

| Assess standard used:                                     | Conclusion |
|---|------------|
| FCC Part 15, Subpart C, Section 15.249 & ANSI C63,10-2013 | PASS       |

Reviewed by: Fly Livry Approved by Position:

Date

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Disagreement against this test report, if any, should be filed with to our company in writing within 15 days of receiving the report. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission.

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No.: AJT200716028E-1

### TABLE OF CONTENTS

| 1 Test Standards  | 3  |
|---|----|
| 2 Summary   | 3  |
| 2.1 General Remarks                                     | 3  |
| 2.2 Final Assessment                                    | 3  |
| 3 Equipment Under Test                                  | 3  |
| 3.1 Short description of the Equipment Under Test (EUT) | 3  |
| 3.2 EUT Configuration                                   | 4  |
| 3.3 Description of Test Modes                           |    |
| 4 Test Environment.                                     | 5  |
| 4.1 Address of the test Laboratory                      | 5  |
| 4.2 Test Facility                                       | 5  |
| 4.3 Environmental Conditions                            | 5  |
| 4.4 Statement of the Measurement Uncertainty            | 6  |
| 4.5 Test Types and Results                              | 6  |
| 5 Test Conditions and Results                           | 6  |
| 5.1 Radiated Emission                                   | 6  |
| 5.2 20dB Bandwidth                                      |    |
| 5.3 Antenna Requirements                                |    |
| 6 Test Equipment  | 27 |
| 7 Test Photographs                                      | 28 |
| 8 Photos of the EUT                                     | 28 |
| Q Manufacturer/ Approval Holder Declaration             | 20 |

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No.: AJT200716028E-1

#### 1 Test Standards

The tests were performed according to following standards:

FCC Part 15, Subpart C, Section 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz

ANSI C63,10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

### 2 Summary

#### 2.1 General Remarks

| Date of receipt of test sample | 16 July, 2020                  |
|--------------------------------|--------------------------------|
| Testing commenced on           | 16 July, 2020 27 October, 2020 |
| Testing concluded on           | 27 October, 2020               |

#### 2.2 Final Assessment

| Test content:  | Assessment                    |
|--|-------------------------------|
| The RF requirements pertaining to the technical standards and tested operation modes are | Fulfilled                     |
| The equipment under test   | Fulfilled the RF requirements |

### 3 Equipment Under Test

#### 3.1 Short description of the Equipment Under Test (EUT)

| EUT Name                 | ROBOTIC TOYS      |
|--------------------------|-------------------|
| Model No.                | 1903              |
| FCC ID                   | 2AWZK-1903        |
| Number of Tested Samples | 1 ( ) ( )         |
| Power Supply Voltage     | DC: 4.5V(AAA*3)   |
| Operating Mode           | TX Mode           |
| Operation Frequency      | 2409-2464MHz      |
| Number of Channel        | 56                |
| Modulation               | GFSK              |
| Antenna Type             | Dedicated Antenna |
| Antenna Gain             | 0dBi              |

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AJT TESTING SERVICES LIMITED







No.: AJT200716028E-1

#### 3.2 EUT Configuration

(The CDF filled by the applicant can be viewed at the test laboratory.)
The following peripheral devices and interface cables were connected during the measurement:
Not Applicable

EUT

#### 3.3 Description of Test Modes

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and packet type. The worst case was found when the EUT was positioned on Y axis for radiated emission. The EUT was tested under the following mode.

| TUT                | Applicable to |       |     | Description |                      |  |
|--------------------|---------------|-------|-----|-------------|----------------------|--|
| EUT configure mode | RE < 1G       | RE≥1G | PLC | BW          | DC 4 5V from bottom  |  |
| A                  | <b>√</b>      | V     | N/A | V           | DC 4.5V from battery |  |

Where RE<1G: Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz

BW: 20dB bandwidth

PLC: Power Line Conducted Emission

Following channel(s) was (were) selected for the test as listed below.

| Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel  | Frequency<br>(MHz) |
|---------|--------------------|---------|--------------------|---------|--------------------|----------|--------------------|
| 1       | 2409               | 18      | 2426               | 35      | 2443               | 52       | 2460               |
| 2       | 2410               | 19      | 2427               | 36      | 2444               | 53       | 2461               |
| 3       | 2411               | 20      | 2428               | 37      | 2445               | 54       | 2462               |
| 4       | 2412               | 21      | 2429               | 38      | 2446               | 55       | 2463               |
| 5       | 2413               | 22      | 2430               | 39      | 2447               | 56       | 2464               |
| 6       | 2414               | 23      | 2431               | 40      | 2448               |          |                    |
| 7       | 2415               | 24      | 2432               | 41      | 2449               |          |                    |
| 8       | 2416               | 25      | 2433               | 42      | 2450               | (-)      |                    |
| 9       | 2417               | 26      | 2434               | 43      | 2451               |          |                    |
| 10      | 2418               | 27      | 2435               | 44      | 2452               | <b>V</b> | -3                 |
| 11      | 2419               | 28      | 2436               | 45      | 2453               |          |                    |
| 12      | 2420               | 29      | 2437               | 46      | 2454               | -67      | 75-0               |
| 13      | 2421               | 30      | 2438               | 47      | 2455               |          | 1 1                |
| 14      | 2422               | 31      | 2439               | 48      | 2456               | 1 20     | 100                |
| 15      | 2423               | 32      | 2440               | 49      | 2457               | (0)      |                    |
| 16      | 2424               | 33      | 2441               | 50      | 2458               | 1        |                    |
| 17      | 2425               | 34      | 2442               | 51      | 2459               |          | 2                  |

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No.: AJT200716028E-1

**Channel List** 

| Channel             | Frequency (MHz) |
|---------------------|-----------------|
| The lowest channel  | 2409            |
| The middle channel  | 2440            |
| The highest channel | 2464            |

Note: The more detailed channel, please refer to the product specifications

### 4 Test Environment

### 4.1 Address of the test Laboratory

| Test Laboratory: | AJT Testing Services Limited                     |
|------------------|--|
| Test Site:       | 1F&2F YIFENG BUILDING, CHENGHUA INDUSTRIAL ZONE, |
| ( D)             | CHENGHAI DISTRICT, SHANTOU CITY                  |
| Tel:             | 86-754-85860999                                  |
| Fax:             | 86-754-86984098                                  |

### 4.2 Test Facility

| The test facility is recognized, certified, or acci | redited by the following organizations: |
|---|---|
| CNAS Accreditation NO.:                             | L4735                                   |
| A2LA Accreditation NO.:                             | 5443.01                                 |
| Designation Number:                                 | CN1263                                  |
| Test Firm Registration Number:                      | 127385                                  |
| Industry Canada Site Registration Number:           | 25345                                   |
| FCC Registration NO.:                               | 0028094555                              |

#### 4.3 Environmental Conditions

| During the measurement the environmental conditions were within the listed ranges: |  |  |  |
|--|--|--|--|
| Temperature 15~35°C  |  |  |  |
| Humidity 30~75%  |  |  |  |

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No.: AJT200716028E-1

### 4.4 Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. Furthermore, component and process variability of devices are similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

| Measurement Uncertainty (Standa | ard: ETSI TR 100 028) |
|---------------------------------|-----------------------|
| Conducted emissions             | ±2.14dB               |
| Radiated Emission below 1GHz    | ±4.44dB               |
| Radiated Emission above 1GHz    | ±5.26dB               |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

#### 4.5 Test Types and Results

| Stand                | lard: FCC PART 15, SUBPART C (SECTION 15.249) |        |
|----------------------|---|--------|
| Standard section     | Test Type                                     | Result |
| §15.209 & §15.249(a) | Radiated Emission                             | PASS   |
| §15.215(c)           | 20dB Bandwidth                                | PASS   |
| §15.207(a)           | Conducted Emission                            | N/A    |
| §15.203              | Antenna Requirement                           | PASS   |
| §15.205              | Restricted Band Around Fundamental Frequency  | PASS   |

#### 5 Test Conditions and Results

#### 5.1 Radiated Emission

For test instruments and accessories used see section 6

#### 5.1.1 Test Procedures

- (1) The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- (3) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- (4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- (5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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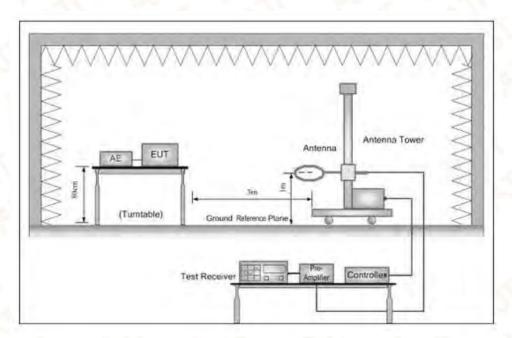
No.: AJT200716028E-1

- (6) For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- (7) If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet

#### Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz
- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3. All modes of operation were investigated and the worst-case emissions are reported
- 4. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

#### 5.1.2 Test Setup



Below 30MHz

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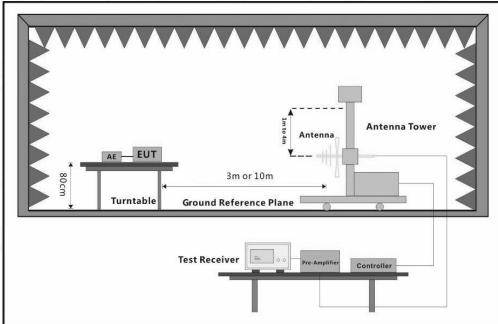
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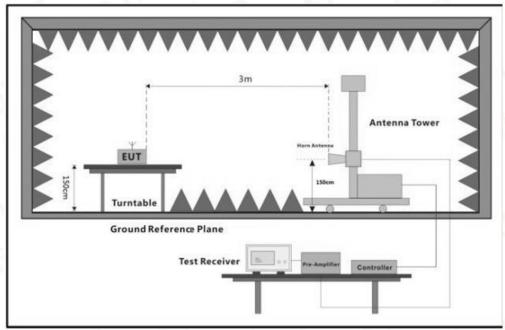




No.: AJT200716028E-1



30MHz-1000MHz



Above 1GHz

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No.: AJT200716028E-1

#### 5.1.3 Test Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490     | 2400/F(kHz)                       | 300                           |
| 0.490 ~ 1.705     | 24000/F(kHz)                      | 30                            |
| 1.705 ~ 30.0      | 30                                | 30                            |
| 30 ~ 88           | 100                               | 3                             |
| 88 ~ 216          | 150                               | 3                             |
| 216 ~ 960         | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Filed strength of fundamental(milli-volts/meter) | Field strength of harmonics<br>(micro-volts/meter) |  |  |
|-----------------------|--|--|--|--|
| 902 ~ 928 MHz         | 50   | 500  |  |  |
| 2400 ~ 2483.5 MHz     | 50   | 500  |  |  |
| 5725 ~5875 MHz        | 50   | 500  |  |  |
| 24.0 ~24.25 GHz       | 250  | 2500   |  |  |

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).
- 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
- 4. Emission from 9kHz to 30MHz is more than 20dB below the limit.

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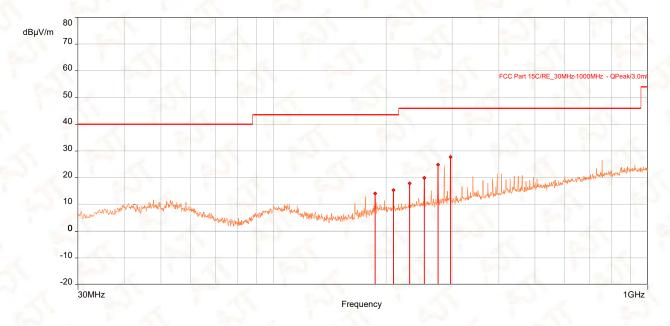
#### 5.1.4 Test Results

The disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

#### 5.1.4.1 Radiated Emissions Test (Below 1GHz)

| Test Point | Operation Mode                       | Result |
|------------|--------------------------------------|--------|
| Horizontal | TX mode (The worst channel: 2409MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency<br>(MHz) | Peak<br>(dBµV/m) | QP<br>(dBµV/m) | QP Lim.<br>(dBµV/m) | Margin<br>(dB) | Angle<br>(°) | Height (m) | Polarization |
|--------------------|------------------|----------------|---------------------|----------------|--------------|------------|--------------|
| 187.043            | 14.06            | 1              | 43.50               | -29.44         | 304.00       | 1.00       | Horizontal   |
| 209.062            | 15.38            | 1              | 43.50               | -28.12         | 288.00       | 1.00       | Horizontal   |
| 231.081            | 17.87            | 1              | 46.00               | -28.13         | 304.00       | 1.00       | Horizontal   |
| 253.197            | 19.97            | /              | 46.00               | -26.03         | 272.00       | 1.00       | Horizontal   |
| 275.119            | 24.87            | 1              | 46.00               | -21.13         | 131.00       | 1.00       | Horizontal   |
| 297.235            | 27.66            | 1              | 46.00               | -18.34         | 311.00       | 1.00       | Horizontal   |

#### Note:

- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level Limit Value
- 3. The emission levels of other frequencies were more than 20dB margin against the limit

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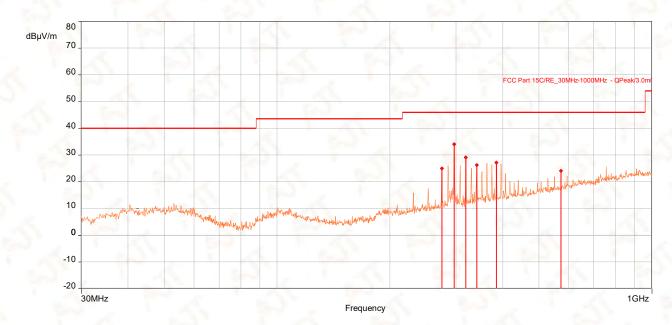




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| Test Point | Operation Mode                       | Result |
|------------|--------------------------------------|--------|
| Vertical   | TX mode (The worst channel: 2409MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency<br>(MHz) | Peak<br>(dBµV/m) | QP<br>(dBµV/m) | QP Lim.<br>(dBµV/m) | Margin<br>(dB) | Angle<br>(°) | Height (m) | Polarization |
|--------------------|------------------|----------------|---------------------|----------------|--------------|------------|--------------|
| 275.119            | 24.93            | 1              | 46.00               | -21.07         | 63.00        | 1.00       | Vertical     |
| 296.944            | 33.99            | 1              | 46.00               | -12.01         | 2.00         | 1.00       | Vertical     |
| 319.06             | 29.09            | 1              | 46.00               | -16.91         | 0.00         | 1.00       | Vertical     |
| 341.176            | 26.24            | 1              | 46.00               | -19.76         | 86.00        | 1.00       | Vertical     |
| 385.117            | 27.10            | /              | 46.00               | -18.90         | 310.00       | 1.00       | Vertical     |
| 572.23             | 23.99            | 1              | 46.00               | -22.01         | 63.00        | 1.00       | Vertical     |
|                    |                  |                |                     |                |              |            |              |

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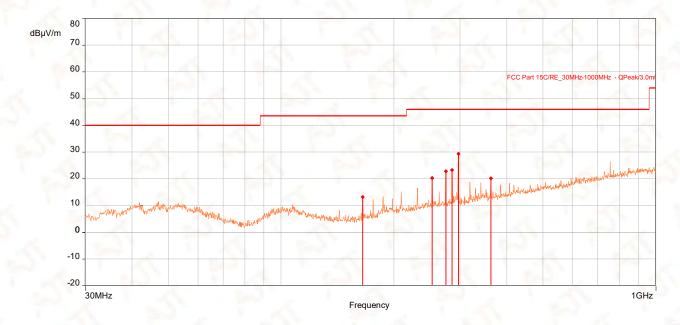




No.: AJT200716028E-1

| Test Point | Operation Mode                        | Result |
|------------|---------------------------------------|--------|
| Horizontal | TX mode (The middle channel: 2440MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency<br>(MHz) | Peak<br>(dBµV/m) | QP<br>(dBµV/m) | QP Lim.<br>(dBµV/m) | Margin<br>(dB) | Angle<br>(°) | Height (m) | Polarization |
|--------------------|------------------|----------------|---------------------|----------------|--------------|------------|--------------|
| 165.024            | 13.19            | 1              | 43.50               | -30.31         | 295.00       | 1.02       | Horizontal   |
| 253.003            | 20.31            | 1              | 46.00               | -25.69         | 134.00       | 1.02       | Horizontal   |
| 275.119            | 22.77            | 1              | 46.00               | -23.23         | 150.00       | 1.02       | Horizontal   |
| 285.983            | 23.24            | 1              | 46.00               | -22.76         | 279.00       | 1.02       | Horizontal   |
| 297.138            | 29.35            | 1              | 46.00               | -16.65         | 279.00       | 1.02       | Horizontal   |
| 363.195            | 20.14            | 1              | 46.00               | -25.86         | 124.00       | 1.02       | Horizontal   |

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- 2.Margin = Emission Level Limit Value
- 3. The emission levels of other frequencies were more than 20dB margin against the limit

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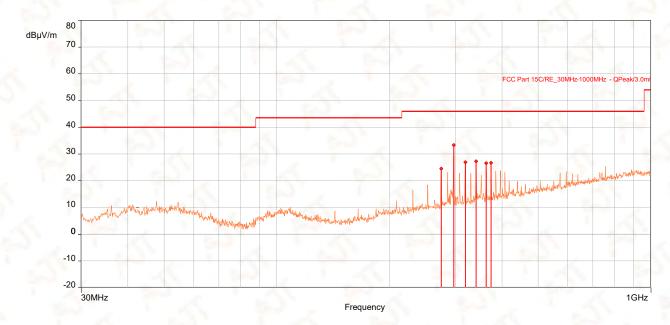




No.: AJT200716028E-1

| Test Point | Operation Mode                        | Result |
|------------|---------------------------------------|--------|
| Vertical   | TX mode (The middle channel: 2440MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency<br>(MHz) | Peak<br>(dBµV/m) | QP<br>(dBµV/m) | QP Lim.<br>(dBµV/m) | Margin<br>(dB) | Angle<br>(°) | Height (m) | Polarization |
|--------------------|------------------|----------------|---------------------|----------------|--------------|------------|--------------|
| 275.119            | 24.51            | 1              | 46.00               | -21.49         | 28.00        | 1.00       | Vertical     |
| 297.138            | 33.38            | /              | 46.00               | -12.62         | 9.00         | 1.00       | Vertical     |
| 319.157            | 26.90            | 1              | 46.00               | -19.10         | 357.00       | 1.00       | Vertical     |
| 341.176            | 27.22            | 1              | 46.00               | -18.78         | 65.00        | 1.00       | Vertical     |
| 363.195            | 26.56            | 1              | 46.00               | -19.44         | 280.00       | 1.00       | Vertical     |
| 374.253            | 26.67            | 1              | 46.00               | -19.33         | 280.00       | 1.00       | Vertical     |

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- 2.Margin = Emission Level Limit Value
- 3. The emission levels of other frequencies were more than 20dB margin against the limit

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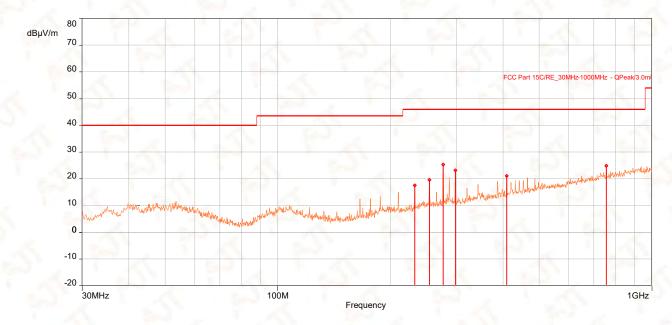




No.: AJT200716028E-1

| Test Point | Operation Mode                         | Result |
|------------|--|--------|
| Horizontal | TX mode (The highest channel: 2464MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency<br>(MHz) | Peak<br>(dBµV/m) | QP<br>(dBµV/m) | QP Lim.<br>(dBµV/m) | Margin<br>(dB) | Angle<br>(°) | Height (m) | Polarization              |
|--------------------|------------------|----------------|---------------------|----------------|--------------|------------|---------------------------|
| 232.439            | 17.48            | 1              | 46.00               | -28.52         | 330.00       | 1.00       | Horizontal                |
| 254.361            | 19.62            | 1              | 46.00               | -26.38         | 318.00       | 1.00       | Horizontal                |
| 276.671            | 25.35            | 1              | 46.00               | -20.65         | 110.00       | 1.00       | Horizontal                |
| 298.593            | 23.16            | 1              | 46.00               | -22.84         | 262.00       | 1.00       | Horizontal                |
| 409.464            | 21.02            | 1              | 46.00               | -24.98         | 38.00        | 1.00       | Horizontal                |
| 756.045            | 24.85            | 1              | 46.00               | -21.15         | 300.00       | 1.00       | Hori <mark>zo</mark> ntal |
|                    |                  |                |                     |                |              |            |                           |

#### Note:

- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level Limit Value
- 3. The emission levels of other frequencies were more than 20dB margin against the limit

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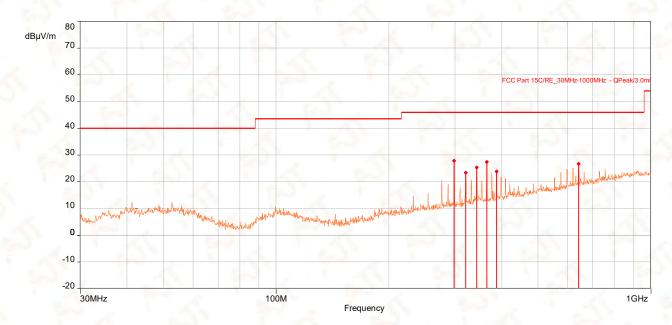




No.: AJT200716028E-1

| Test Point | Operation Mode                         | Result |
|------------|--|--------|
| Vertical   | TX mode (The highest channel: 2464MHz) | PASS   |

| EUT Name            | ROBOTIC TOYS                              |
|---------------------|---|
| Operating Condition | DC: 4.5V(AAA*3)                           |
| Test Condition      | Ambient Temperature: 26°C Humidity: 55%RH |



| Frequency        | Peak              | QP       | QP Lim.           | Margin         | Angle  | Height      | Polarization |
|------------------|-------------------|----------|-------------------|----------------|--------|-------------|--------------|
| (MHz)<br>298.787 | (dBµV/m)<br>27.88 | (dBµV/m) | (dBµV/m)<br>46.00 | (dB)<br>-18.12 | 320.00 | (m)<br>1.00 | Vertical     |
| 320.612          | 23.40             | 1        | 46.00             | -22.60         | 250.00 | 1.00        | Vertical     |
| 342.922          | 25.28             | 1        | 46.00             | -20.72         | 98.00  | 1.00        | Vertical     |
| 365.329          | 27.37             | 1        | 46.00             | -18.63         | 275.00 | 1.00        | Vertical     |
| 387.542          | 23.79             | 1        | 46.00             | -22.21         | 299.00 | 1.00        | Vertical     |
| 641.585          | 26.63             | 1        | 46.00             | -19.37         | 107.00 | 1.00        | Vertical     |

#### Note:

- 1.QP is abbreviation of Quasi-Peak
- 2.Margin = Emission Level Limit Value
- 3. The emission levels of other frequencies were more than 20dB margin against the limit

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#### 5.1.4.2 Radiated Emissions Test (Above 1GHz)

| EUT Name        | ROBOTIC TOYS                 |                   | ) I A 5                   |
|-----------------|------------------------------|-------------------|---------------------------|
| Channel         | The Lowest Channel (2409MHz) | Detector Function | Peak (PK)<br>Average (AV) |
| Frequency Range | Above 1GHz                   | Result            | PASS                      |

|                    | A                             | Antenna Pola      | arity & Te     | st Distand | ce: H <mark>oriz</mark> c | ontal At 3m  |                 |          |
|--------------------|-------------------------------|-------------------|----------------|------------|---------------------------|--------------|-----------------|----------|
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle<br>(°)              | Polarization | Correction (dB) | Detector |
| 2390.04            | 37.04                         | 54.00             | -16.96         | 1.52       | 112.00                    | Horizontal   | -3.93           | Average  |
| 2400               | 36.25                         | 54.00             | -17.75         | 1.52       | 136.00                    | Horizontal   | -3.93           | Average  |
| *2409              | 65.64                         | 94.00             | -28.36         | 1.52       | 157.00                    | Horizontal   | -3.93           | Average  |
| 4818.75            | 35.01                         | 54.00             | -18.99         | 1.99       | 270.00                    | Horizontal   | -3.93           | Average  |
| 7227.5             | 37.43                         | 54.00             | -16.57         | 1.01       | 28.00                     | Horizontal   | -3.93           | Average  |
| 2390.04            | 40.97                         | 74.00             | -33.03         | 1.52       | 112.00                    | Horizontal   | -2.58           | Peak     |
| 2400               | 40.18                         | 74.00             | -33.82         | 1.52       | 136.00                    | Horizontal   | -2.53           | Peak     |
| *2409              | 69.57                         | 114.00            | -44.43         | 1.52       | 157.00                    | Horizontal   | -2.44           | Peak     |
| 4818.75            | 38.94                         | 74.00             | -35.06         | 1.99       | 270.00                    | Horizontal   | 2.47            | Peak     |
| 7227.5             | 41.36                         | 74.00             | -32.64         | 1.01       | 28.00                     | Horizontal   | 8.04            | Peak     |
|                    | V 3                           | Antenna Po        | larity & T     | est Distai | nce: Verti                | cal At 3m    | 333             |          |
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle<br>(°)              | Polarization | Correction (dB) | Detector |
| 2380.44            | 41.94                         | 54.00             | -12.06         | 1.50       | 0.00                      | Vertical     | -3.93           | Average  |
| 2400               | 38.47                         | 54.00             | -15.53         | 1.50       | 30.00                     | Vertical     | -3.93           | Average  |
| *2409              | 69.32                         | 94.00             | -24.68         | 1.50       | 188.00                    | Vertical     | -3.93           | Average  |
| 4818.75            | 34.10                         | 54.00             | -19.90         | 1.99       | 328.00                    | Vertical     | -3.93           | Average  |
| 7227.5             | 37.86                         | 54.00             | -16.14         | 1.00       | 73.00                     | Vertical     | -3.93           | Average  |
| 2380.44            | 45.87                         | 74.00             | -28.13         | 1.50       | 0.00                      | Vertical     | -2.43           | Peak     |
| 2400               | 42.40                         | 74.00             | -31.60         | 1.50       | 30.00                     | Vertical     | -2.53           | Peak     |
| *2409              | 73.25                         | 114.00            | -40.75         | 1.50       | 188.00                    | Vertical     | -2.44           | Peak     |
| 4818.75            | 38.03                         | 74.00             | -35.97         | 1.99       | 328.00                    | Vertical     | 2.47            | Peak     |
| 7227.5             | 41.79                         | 74.00             | -32.21         | 1.00       | 73.00                     | Vertical     | 8.04            | Peak     |

#### Remarks:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The emission levels of other frequencies were more than 20dB margin against the limit.
- 4. Margin = Emission level Limit value
- 5. " \* ": Fundamental frequency.
- 6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (63.59%) = -3.93dB, please see 5.1.4.3.

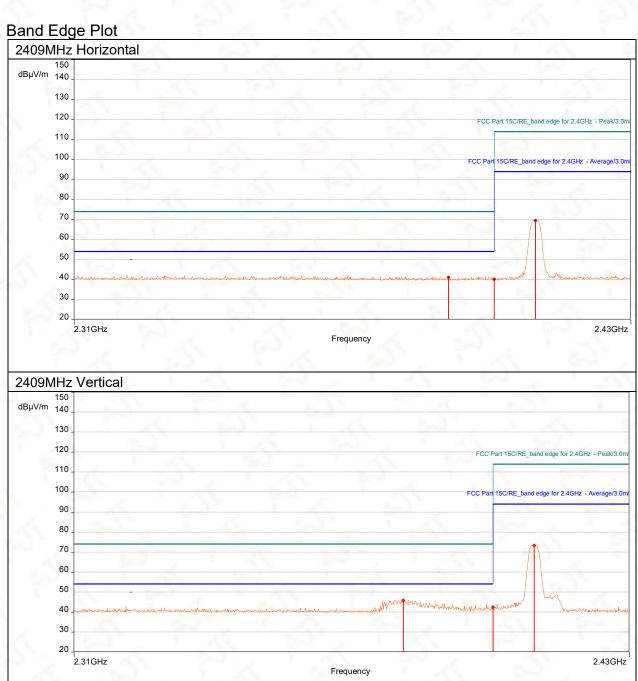
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| EUT Name        | ROBOTIC TOYS                 | 2 T 4             | / 60° /                   |
|-----------------|------------------------------|-------------------|---------------------------|
| Channel         | The Middle Channel (2440mhz) | Detector Function | Peak (PK)<br>Average (AV) |
| Frequency Range | Above 1GHz                   | Result            | PASS                      |

| 6)                 | -                             | Antenna Pola      | arity & Te     | st Distand | ce: Horizo   | ontal At 3m  | 2 , 1           | -4/      |
|--------------------|-------------------------------|-------------------|----------------|------------|--------------|--------------|-----------------|----------|
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle<br>(°) | Polarization | Correction (dB) | Detector |
| *2440.748          | 78.04                         | 94.00             | -15.96         | 1.51       | 40.00        | Horizontal   | -3.93           | Average  |
| 4881.025           | 41.10                         | 54.00             | -12.90         | 1.98       | 144.00       | Horizontal   | -3.93           | Average  |
| 7320.325           | 38.71                         | 54.00             | -15.29         | 1.98       | 64.00        | Horizontal   | -3.93           | Average  |
| *2440.748          | 81.97                         | 114.00            | -32.03         | 1.51       | 40.00        | Horizontal   | -2.63           | Peak     |
| 4881.025           | 45.03                         | 74.00             | -28.97         | 1.98       | 144.00       | Horizontal   | 1.88            | Peak     |
| 7320.325           | 42.64                         | 74.00             | -31.36         | 1.98       | 64.00        | Horizontal   | 8.19            | Peak     |
|                    | 6.0                           | Antenna Po        | larity & T     | est Distai | nce: Verti   | cal At 3m    |                 | . 1      |
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle (°)    | Polarization | Correction (dB) | Detector |
| *2440.748          | 77.61                         | 94.00             | -16.39         | 1.50       | 53.00        | Vertical     | -3.93           | Average  |
| 4881.025           | 40.81                         | 54.00             | -13.19         | 1.99       | 30.00        | Vertical     | -3.93           | Average  |
| 7320.325           | 37.65                         | 54.00             | -16.35         | 1.00       | 237.00       | Vertical     | -3.93           | Average  |
| *2440.748          | 81.54                         | 114.00            | -32.46         | 1.50       | 53.00        | Vertical     | -2.63           | Peak     |
| 4881.025           | 44.74                         | 74.00             | -29.26         | 1.99       | 30.00        | Vertical     | 1.88            | Peak     |
| 7320.325           | 41.58                         | 74.00             | -32.42         | 1.00       | 237.00       | Vertical     | 8.19            | Peak     |

#### Remarks:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The emission levels of other frequencies were more than 20dB margin against the limit.
- 4. Margin = Emission level Limit value
- 5. " \* ": Fundamental frequency.
- 6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (63.59%) = -3.93dB, please see 5.1.4.3.

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| EUT Name        | ROBOTIC TOYS                  | S) 1 4            | ( (2)                     |
|-----------------|-------------------------------|-------------------|---------------------------|
| Channel         | The Highest Channel (2464MHz) | Detector Function | Peak (PK)<br>Average (AV) |
| Frequency Range | Above 1GHz                    | Result            | PASS                      |

| (0.00)             |                               | Antenna Pola      | arity & Te     | st Distan  | ce: Horizo   | ontal At 3m  | 3 3             |          |
|--------------------|-------------------------------|-------------------|----------------|------------|--------------|--------------|-----------------|----------|
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle<br>(°) | Polarization | Correction (dB) | Detector |
| *2464              | 78.31                         | 94.00             | -15.69         | 1.52       | 48.00        | Horizontal   | -3.93           | Average  |
| 2483.5             | 36.14                         | 54.00             | -17.86         | 1.52       | 253.00       | Horizontal   | -3.93           | Average  |
| 4928.025           | 43.44                         | 54.00             | -10.56         | 2.00       | 167.00       | Horizontal   | -3.93           | Average  |
| 7392               | 39.22                         | 54.00             | -14.78         | 1.01       | 341.00       | Horizontal   | -3.93           | Average  |
| *2464              | 82.24                         | 114.00            | -31.76         | 1.52       | 48.00        | Horizontal   | -2.51           | Peak     |
| 2483.5             | 40.07                         | 74.00             | -33.93         | 1.52       | 253.00       | Horizontal   | -2.67           | Peak     |
| 4928.025           | 47.37                         | 74.00             | -26.63         | 2.00       | 167.00       | Horizontal   | 2.02            | Peak     |
| 7392               | 43.15                         | 74.00             | -30.85         | 1.01       | 341.00       | Horizontal   | 8.33            | Peak     |
|                    | 1 15                          | Antenna Po        | larity & T     | est Dista  | nce: Verti   | cal At 3m    | 1 1             |          |
| Frequency<br>(MHz) | Emission<br>Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Height (m) | Angle (°)    | Polarization | Correction (dB) | Detector |
| *2464              | 79.72                         | 94.00             | -14.28         | 1.50       | 142.00       | Vertical     | -3.93           | Average  |
| 2483.5             | 36.95                         | 54.00             | -17.05         | 1.50       | 99.00        | Vertical     | -3.93           | Average  |
| 4928.025           | 42.25                         | 54.00             | -11.75         | 1.99       | 20.00        | Vertical     | -3.93           | Average  |
| 7392               | 38.13                         | 54.00             | -15.87         | 1.00       | 32.00        | Vertical     | -3.93           | Average  |
| *2464              | 83.65                         | 114.00            | -30.35         | 1.50       | 142.00       | Vertical     | -2.51           | Peak     |
| 2483.5             | 40.88                         | 74.00             | -33.12         | 1.50       | 99.00        | Vertical     | -2.67           | Peak     |
| 4928.025           | 46.18                         | 74.00             | -27.82         | 1.99       | 20.00        | Vertical     | 2.02            | Peak     |
| 7392               | 42.06                         | 74.00             | -31.94         | 1.00       | 32.00        | Vertical     | 8.33            | Peak     |

#### Remarks:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The emission levels of other frequencies were more than 20dB margin against the limit.
- 4. Margin = Emission level Limit value
- 5. " \* ": Fundamental frequency.
- 6. The average value of fundamental frequency is: Average value = Peak value +AV factor, where the AV factor is calculated from following formula: AV factor=20 log (Duty cycle) = 20 log (63.59%) = -3.93dB, please see 5.1.4.3.

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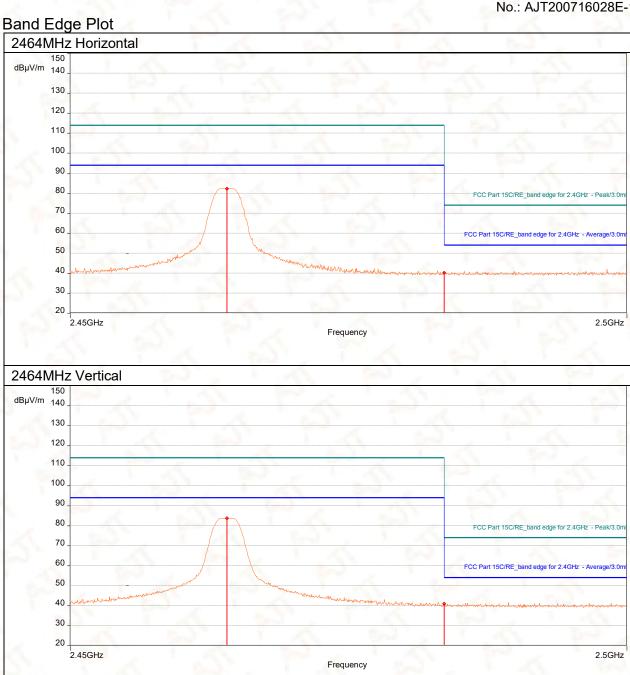
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No.: AJT200716028E-1

5.1.4.3 Calculation of Average Factor

Effective period of the cycle =0.407ms

The duration of one cycle =0.640ms

Duty Cycle = 0.407ms / 0.640ms =63.59%

Averaging factor in dB = 20 log (duty cycle) = 20 log (63.59%) = -3.93dB

#### 60ms Duty Cycle



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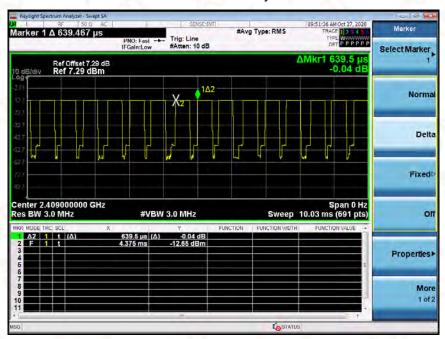




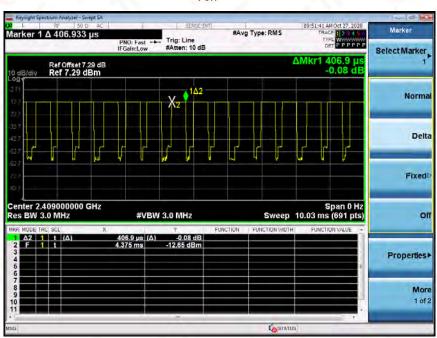


No.: AJT200716028E-1

#### The duration of one cycle



#### Ton



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#### 5.2 20dB Bandwidth

For test instruments and accessories used see section 6

#### 5.2.1 Test Procedures

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

#### 5.2.2 Test Setup

| Spectrum Analyzer | Attenuator |   | EUT and Assistant System | - | DC Power |
|-------------------|------------|---|--------------------------|---|----------|
|                   |            | ] |                          |   |          |

#### 5.2.3 Test Limits

According to FCC 15.215(c), must be designed to ensure that the 20dB 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.

#### 5.2.4 Test Results

| Channel             | frequency (MHz) | F <sub>L</sub> (MHz) | F <sub>H</sub> (MHz) | 20dB Bandwidth<br>(MHz) |  |
|---------------------|-----------------|----------------------|----------------------|-------------------------|--|
| The lowest channel  | 2409            | 2407.984             | 2409.980             | 1.996                   |  |
| The middle channel  | 2440            | 2439.968             | 2442.964             | 1.996                   |  |
| The highest channel | 2464            | 2462.972             | 2464.988             | 2.016                   |  |

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No.: AJT200716028E-1



2409MHz



2440MHz

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No.: AJT200716028E-1



2464MHz

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No.: AJT200716028E-1

#### 5.3 Antenna Requirements

Test Standard: FCC Part 15, Subpart C 15.203

#### Standard Requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user. but the use of a standard antenna jack or electrical connector is prohibited.

#### **EUT Antenna:**

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.Antenna location: Refer to Appendix (Internal photos).

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No.: AJT200716028E-1

### 6 Test Equipment

| Item | Test Equipment                             | Manufacturer                          | Model No.     | Se <mark>rial N</mark> o. | Last Cal.  | Next Cal.  |
|------|--|---------------------------------------|---------------|---------------------------|------------|------------|
| 1    | Spectrum Analyzer                          | Keysight                              | N9010A        | MY51120099                | 2020/06/22 | 2021/06/22 |
| 2    | JS0806-2 RF<br>Control Unit                | Tonscend                              | JS0806-2      | 188060124                 | 202012/18  | 2021/12/18 |
| 3    | Broadband<br>Preamplifier                  | SCHWARZBECK                           | BBV 9743B     | 00067                     | 2020/03/28 | 2021/03/28 |
| 4    | Broadband<br>Preamplifier                  | SCHWARZBECK                           | BBV 9718B     | 00062                     | 2020/03/28 | 2021/03/28 |
| 5    | EMI Test Receiver                          | ROHDE & SCHWARZ                       | ESR3          | 102452                    | 2020/06/22 | 2021/06/22 |
| 6    | Trilog Broadband<br>Antenna                | SCHWARZBECK                           | VULB 9163     | 9163-1127                 | 2020/06/12 | 2021/06/12 |
| 7    | Horn Antenna                               | SCHWARZBECK                           | BBHA<br>9120D | 01829                     | 2020/06/04 | 2021/06/04 |
| 8    | DC Power Supply                            | SIGLENT                               | SPD1168X      | SPD1XEAD3<br>R 0167       | 2020/06/02 | 2021/06/02 |
| 9    | Vector Signal<br>Generator                 | Keysight                              | N5172B-506    | MY53052255                | 2020/06/04 | 2021/06/04 |
| 10   | EXG Analog<br>Signal Generator             | Keysight                              | N5171B-506    | MY53051692                | 2020/06/22 | 2021/06/22 |
| 11   | Temperature<br>Humidity Chamber            | Yiheng                                | BPS-50CB      | 191005684                 | 2020/12/07 | 2021/12/07 |
| 12   | Temperature And Humidity Indicator         | JianDaRenKe                           | Cos-03        | 0612058                   | 2020/07/01 | 2021/07/01 |
| 13   | BAT-EMC Testing (Test Software)            | NEXIO                                 | BAT-EMC       | Version: 3.16.0.74        | N/A        | N/A        |
| 14   | JS1120-3<br>Test System<br>(Test Software) | Tonscend                              | JS1120-3      | Version: 2.5.77.0418      | N/A        | N/A        |
| 15   | Double Ridge<br>Guide Horn<br>Antennas     | A.H.Systems                           | SAS-574       | 588                       | 2020/07/02 | 2021/07/02 |
| 16   | Active Loop<br>Antenna                     | BeiJing DaZe<br>technology co.<br>LTD | ZN30900C      | 15015                     | 2020/03/31 | 2021/03/31 |
| 17   | Double Ridged<br>Horn Antenna              | A.H.Systems                           | SAS-574       | 588                       | 2020/07/09 | 2021/07/09 |

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Disagreement against this test report, if any, should be filed with to our company in writing within 15 days of receiving the report. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission.

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No.: AJT200716028E-1

### 7 Test Photographs

Referring to - "Test Setup Photos".

#### 8 Photos of the EUT

Referring to – "External Photos of ROBOTIC TOYS (1903)" and "Internal Photos of ROBOTIC TOYS (1903)".

### 9 Manufacturer/ Approval Holder Declaration

The following identical model(s):

1901, 1902, 1903, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 966, 955, 967, 20908, 20968, DB1-1, DB2-1, DB3-1, DB1-2, DB2-2, DB3-2, DB1-3, DB2-3, DB3-3, DB01, DB02, DB03, DB04, DB05, DB06, DB-1A, DB-1B, DB-2A, DB-2B, DB-3A, DB-3B, ODY-1208, MUK-1903

Belong to the tested device:

Product description: ROBOTIC TOYS Model No.: 1903

**END OF TEST REPORT** 

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