FCC - TEST REPORT

Report Number	:	60.790.17.035.01	Date of Issue	:	June 8, 2018
Model	:	E2028			
Product Type	:	T REX PROJECTOR & ROOM GUARD			
Applicant	:	Brainstorm Limite			
Address	:	Unit 1A, Mill Lane, Gisburn, Lancashire BB7 4LN, United Kingdom			
Production Facility	:	NIL			
Address	:	NIL			
Test Result	:	■Positive ☐Negative			
Total pages including Appendices	:	21			

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1. Table of Contents

1. Table of Contents 2
2. Details about the Test Laboratory 3
3. Description of Equipment Under Test 3
4. Summary of Test Standards 3
5. Summary of Test Results 3
6. General Remarks 4
7. Test Setups 5
7.1. Below 1GHz 5
7.2. Above 1GHz 5
7.3. AC Power Line Conducted Emission test setups 5
8. Systems test configuration 6
9. Emission Test Results 7
9.1 Radiated Emission Test 30MHz – 1000MHz 7
10. Appendix A - Photographs of EUT 10
11. Appendix B - Setup Photographs of EUT 19
12. Test Equipment Site List 20
13. Measurement System Uncertainty 21

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2. Details about the Test Laboratory

Details about the Test Laboratory

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	514049
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3. Description of Equipment Under Test

Description of the Equipment Under Test

Product:	T REX PROJECTOR & ROOM GUARD
Model no.:	E2028
FCC ID:	2APXPE2Ø28
Rating:	1) 4.5VDC (3 x 1.5VDC “AA” batteries)

4. Summary of Test Standards

Test Standards
FCC Part 15 Subpart B 10-1-17 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart B — Unintentional Radiators

5. Summary of Test Results

Emission Tests				
FCC Part 15 Subpart B				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.109 Radiated Emission 30MHz-1000MHz	7-9	☒	☐	☐
FCC Title 47 Part 15.107 Conduct Emission 150kHz-30MHz	NIL	☐	☐	☒

6. General Remarks

Remarks

NIL

SUMMARY:

- All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: May 11, 2018

Testing Start Date: May 12, 2018

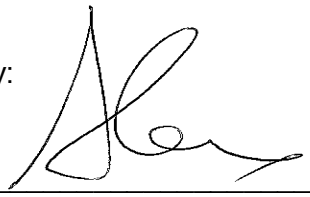
Testing End Date: May 25, 2018

- TÜV SÜD HONG KONG LTD. -

Reviewed by:

CHAN Kwong Ngai
EMC Test Engineer

Prepared by:



Alex CHAN
EMC Project Engineer

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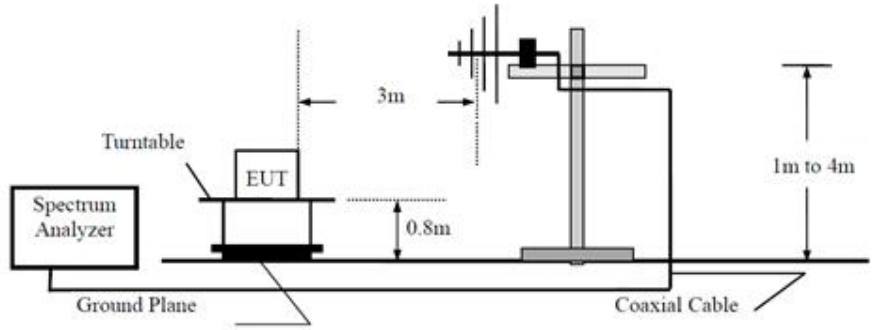
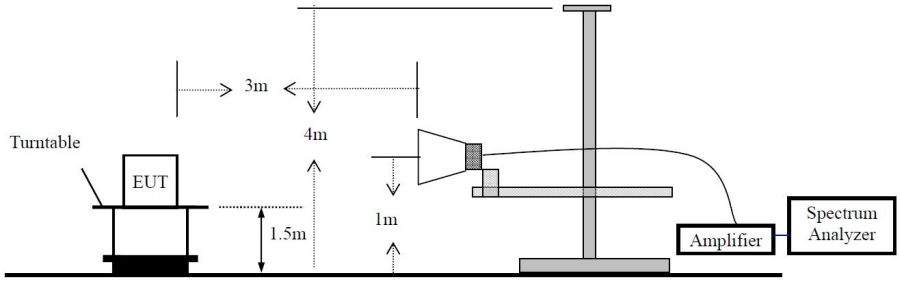
7. Test Setups

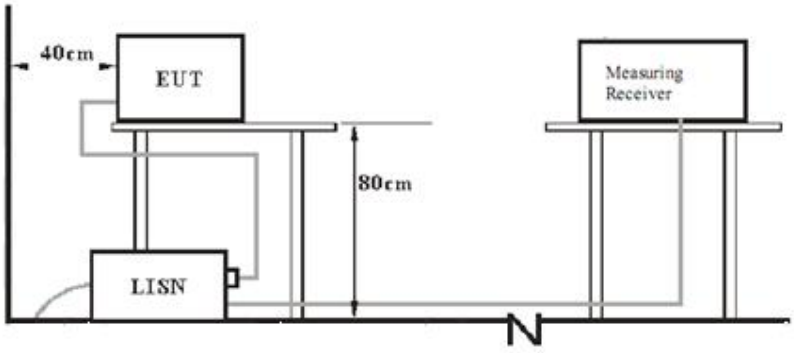
7.1. Below 1GHz



7.2. Above 1GHz



7.3. AC Power Line Conducted Emission test setups



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8. Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFAC-TURER	MODEL NO. (SHIELD)	S/N (LENGTH)	PARAMETERS
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9. Emission Test Results

9.1 Radiated Emission Test 30MHz – 1000MHz

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meters chamber room for test. 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 height of antenna 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: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement,
Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.

3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle).

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above1GHz

Limits

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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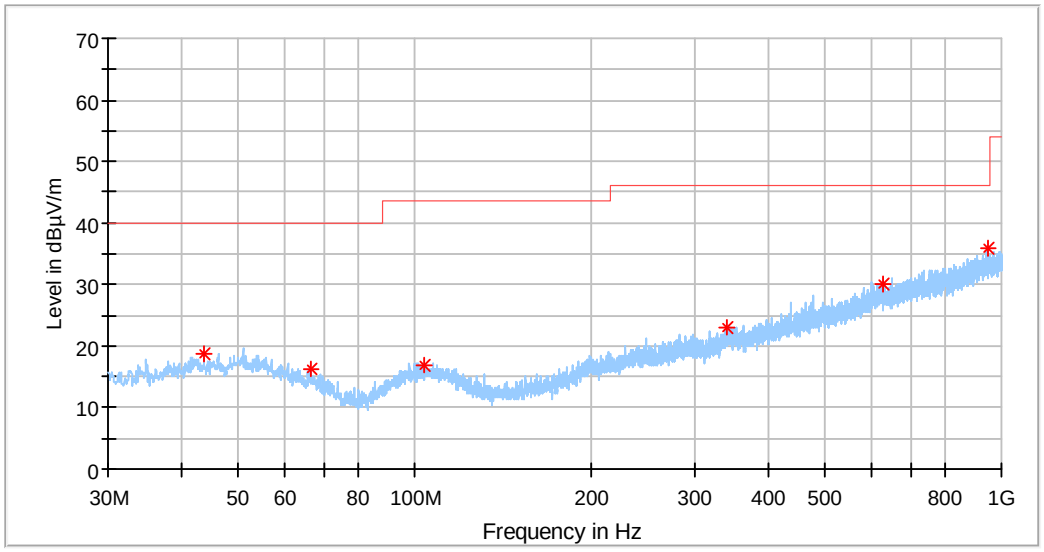
Radiated Emission

EUT: E2028
Op Condition: Normal Operating
Test Specification: Antenna: Horizontal
Comment: 4.5VDC

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
43.701250	18.86	40.00	-21.14
66.435625	16.38	40.00	-23.62
103.780625	16.88	43.50	-26.62
340.521250	23.02	46.00	-22.98
627.641250	30.04	46.00	-15.96
948.953750	35.86	46.00	-10.14

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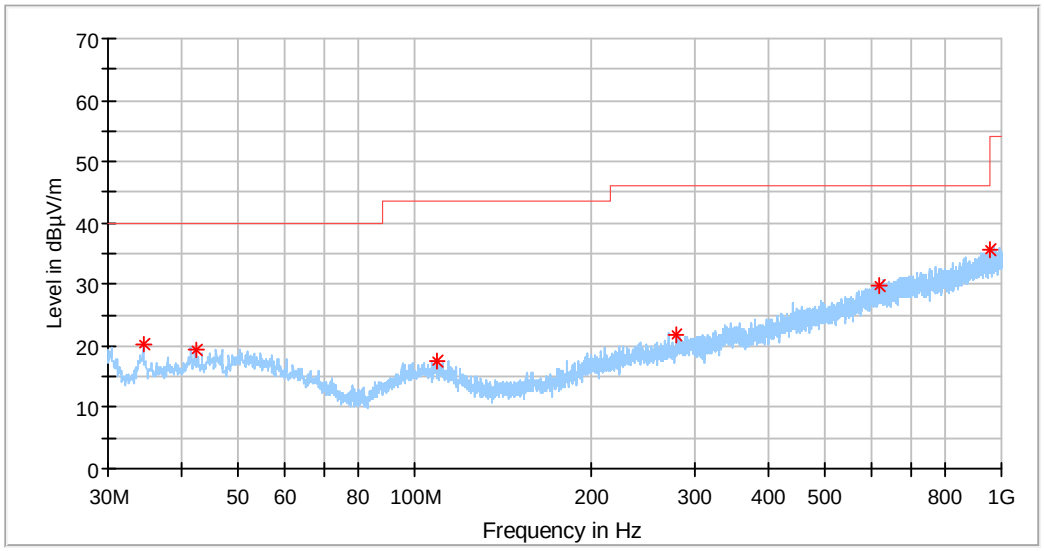
Radiated Emission

EUT: E2028
Op Condition: Normal Operating
Test Specification: Antenna: Vertical
Comment: 4.5VDC

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
34.486250	20.39	40.00	-19.61
42.306875	19.19	40.00	-20.81
108.873125	17.56	43.50	-25.94
278.016875	21.70	46.00	-24.30
617.395625	29.65	46.00	-16.35
955.319375	35.51	46.00	-10.49

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10. Appendix A - Photographs of EUT

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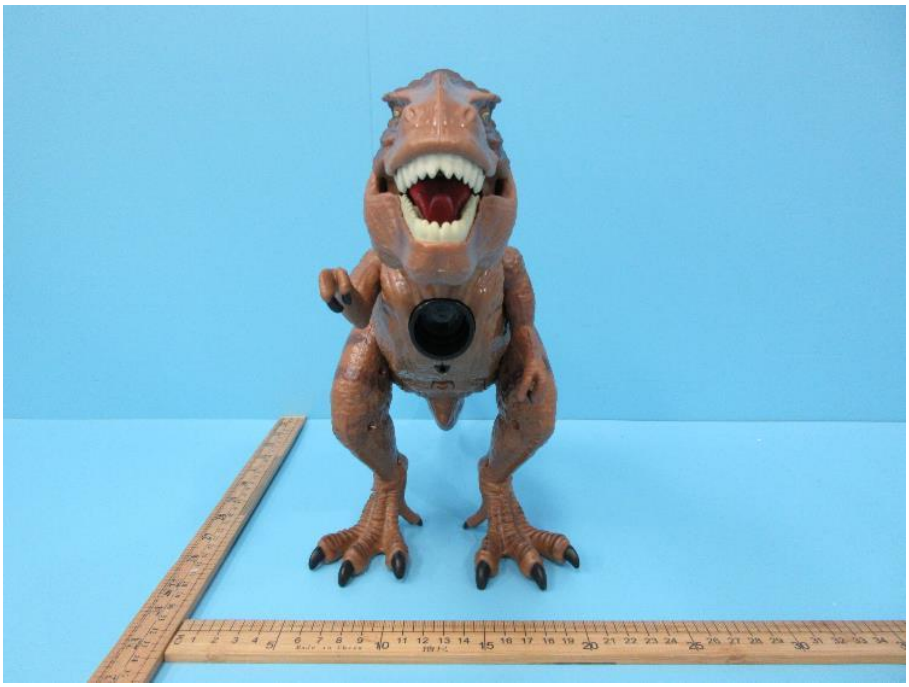

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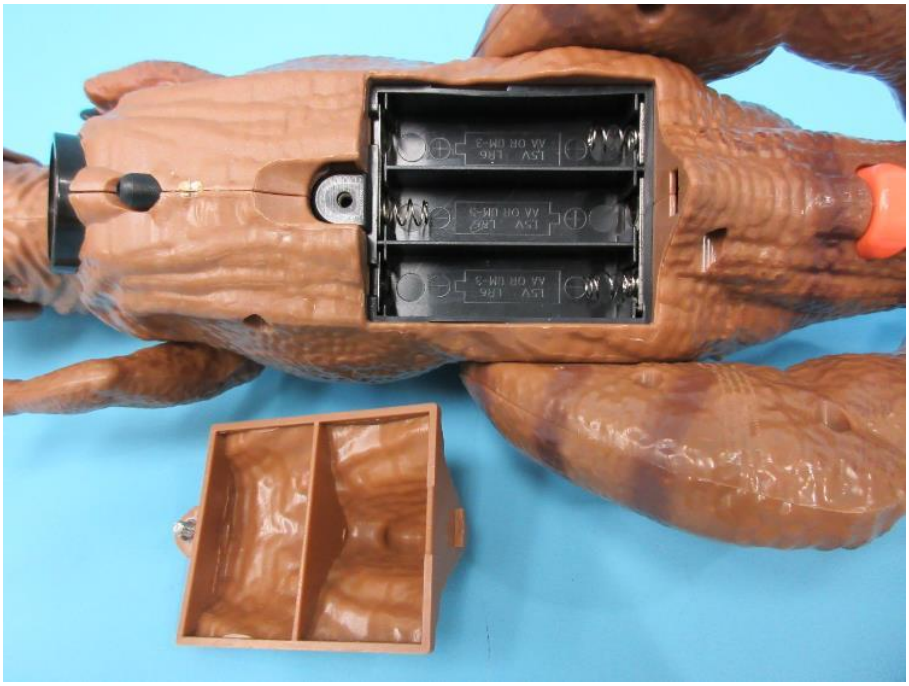

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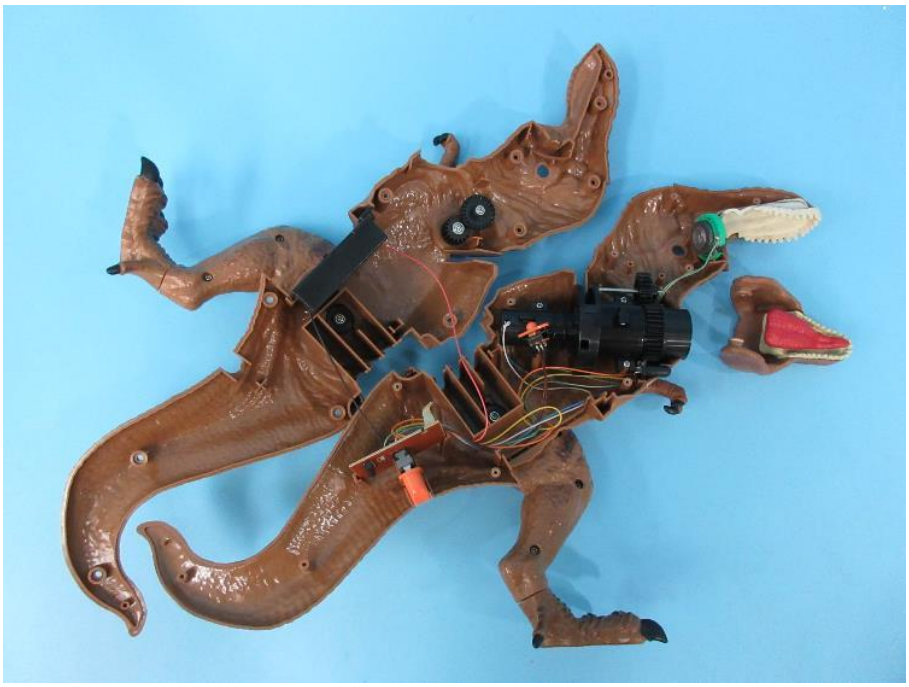

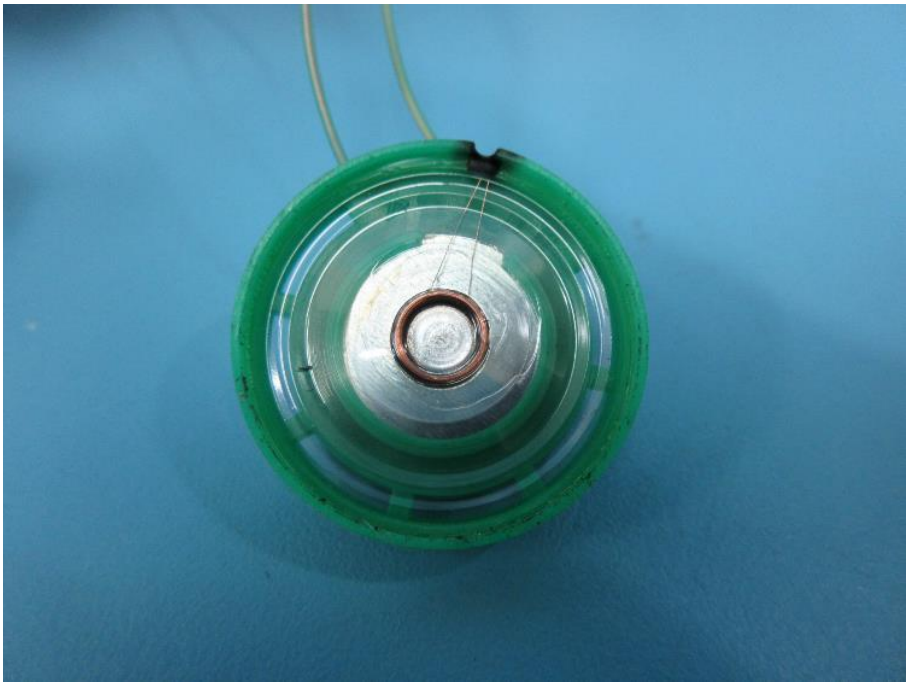

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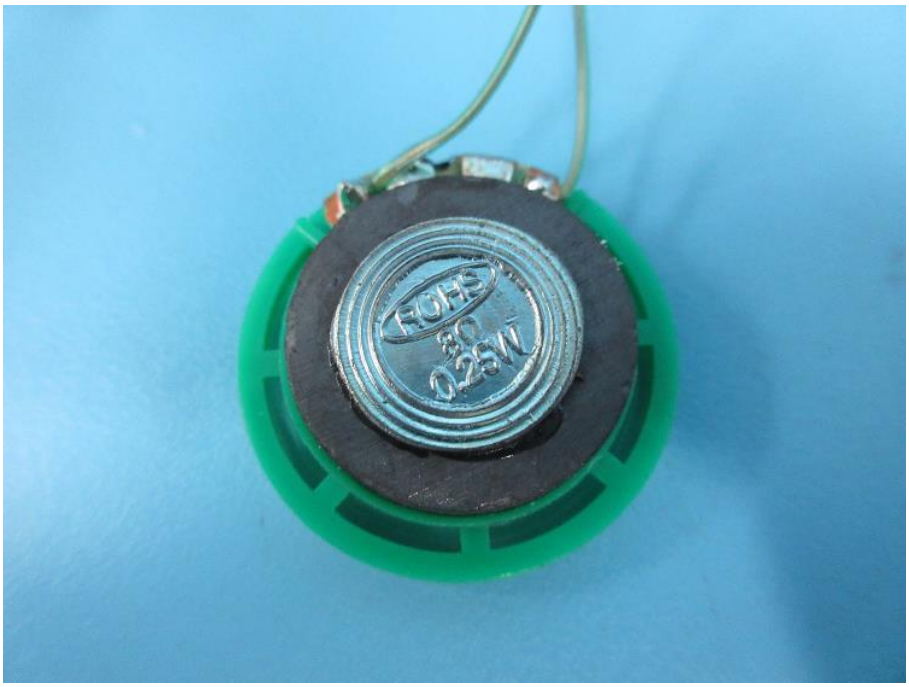

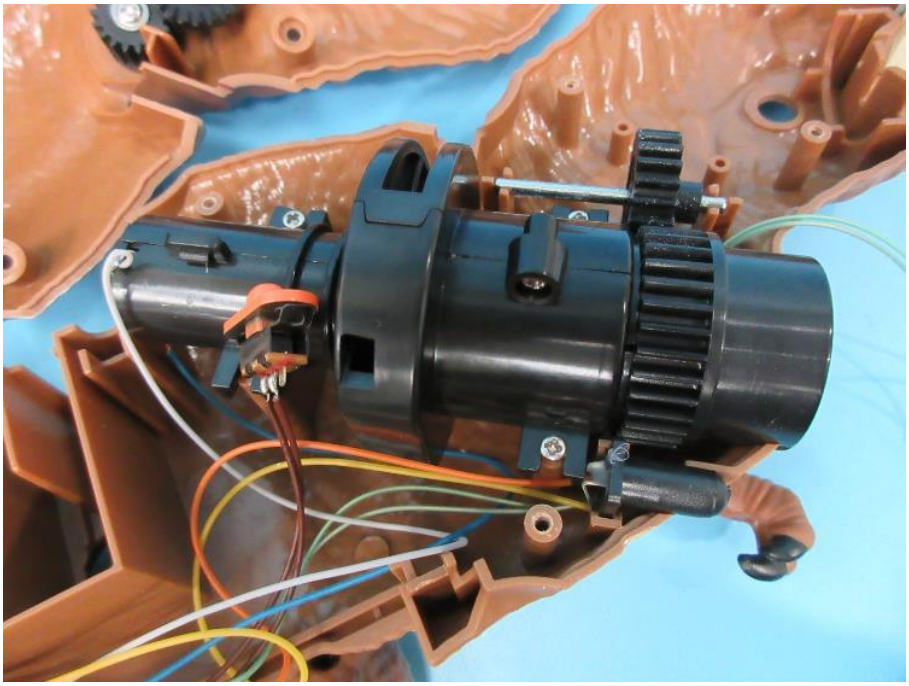

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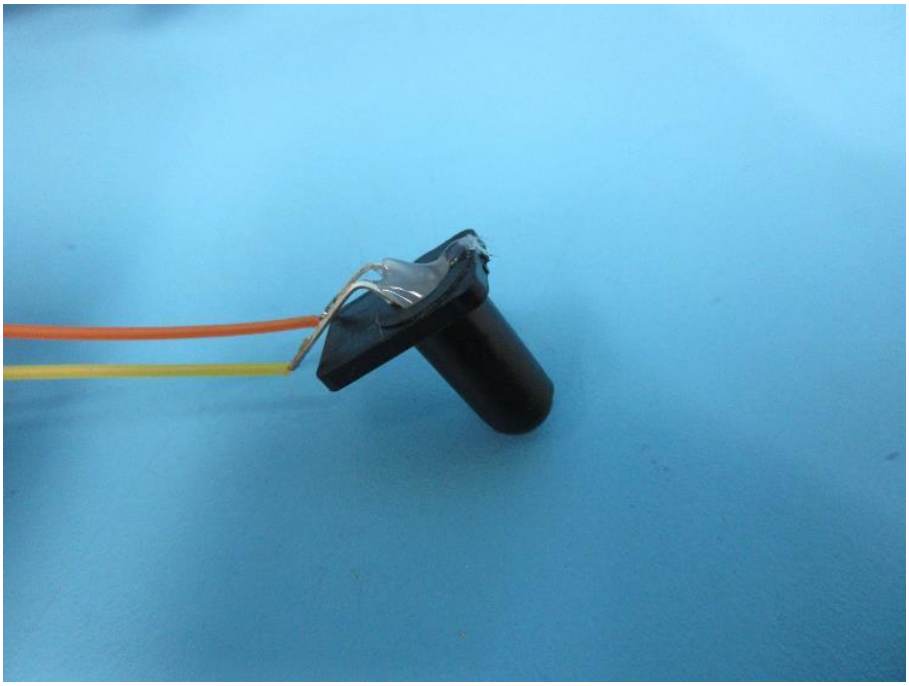

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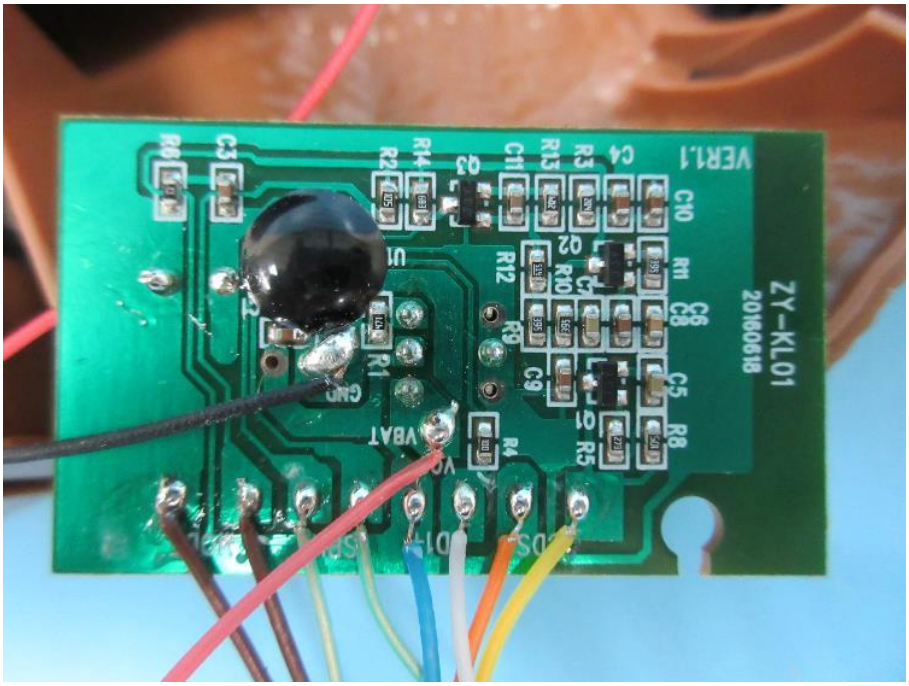

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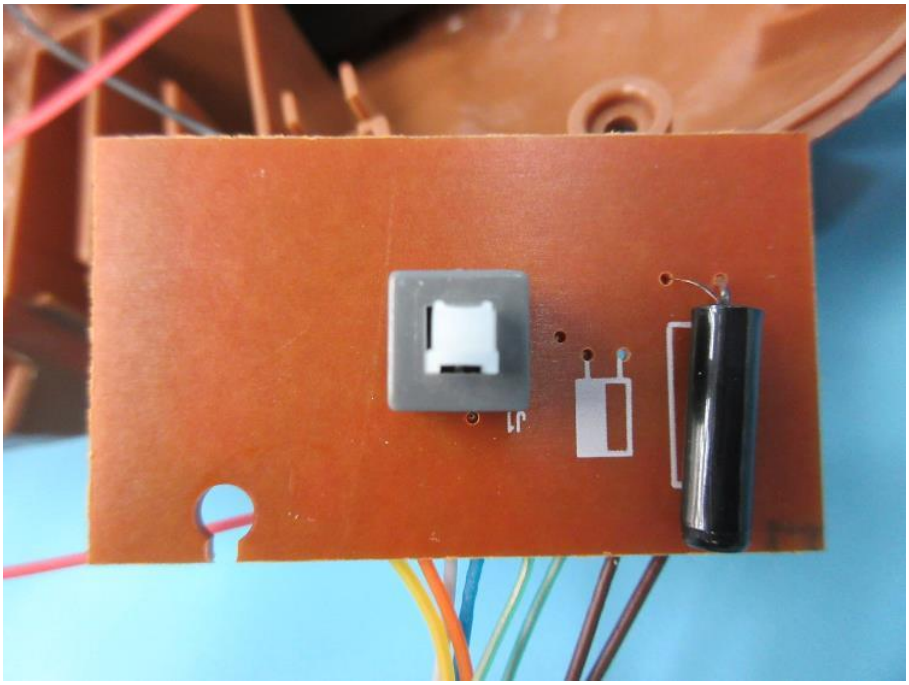

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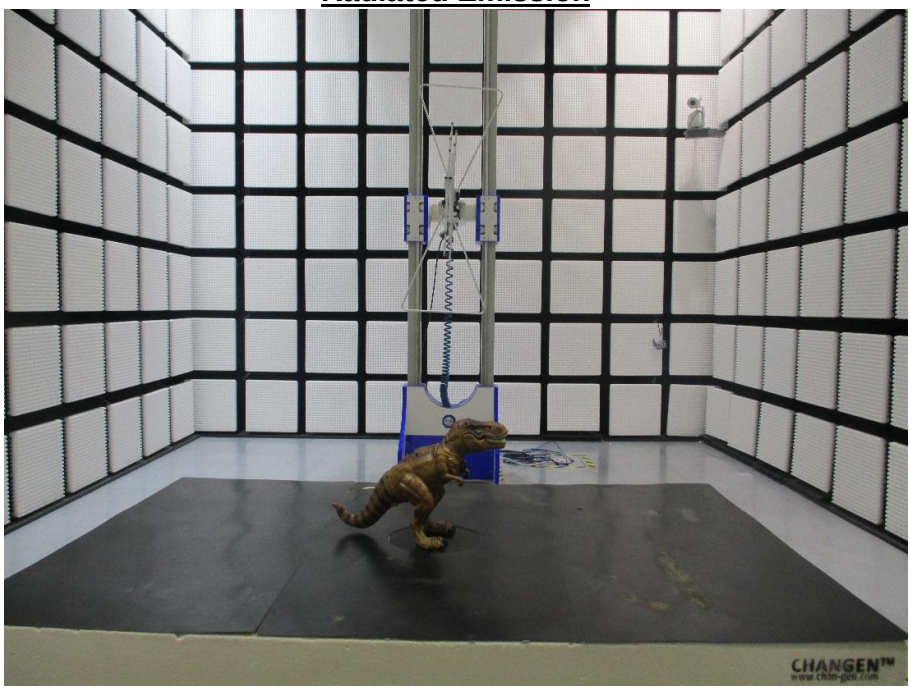
11. Appendix B - Setup Photographs of EUT

Radiated Emission



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12. Test Equipment Site List

Radiated emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2018-7-14
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2018-7-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2018-7-14
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2018-7-14
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2018-7-7
Attenuator	Agilent	8491A	MY39264334	2018-7-7
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

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13. Measurement System Uncertainty

Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	**Extended Uncertainty**
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.83dB; Vertical: 4.91dB;
Uncertainty for Conducted Emission 150kHz-30MHz	3.50dB

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