Prüfbericht-Nr.: *Test Report No.*:	**50297111 001**	**Auftrags-Nr.:** *Order No.*:	**158118229**	**Seite 1 von 14** *Page 1 of 14*
Kunden-Referenz-Nr.: *Client Reference No.*:	**N/A**	**Auftragsdatum:** *Order date*:	**25.09.2019**	

Auftraggeber: *Client*:	**Bulk Unlimited Corp** **199 Lee Ave. Suite 464 BROOKLYN, NY**
Prüfgegenstand: *Test item*:	**Short Range Device - Toy Sword (2.4GHz)**
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**AG-2912**
Auftrags-Inhalt: *Order content*:	**FCC Certification**
Prüfgrundlage: *Test specification*:	**FCC Part 15 Subpart C** **ANSI C63.10-2013**
Wareneingangsdatum: *Date of receipt*:	**04.10.2019**
Prüfmuster-Nr.: *Test sample No.*:	**A001001506-001**
Prüfzeitraum: *Testing period*:	**10.10.2019 - 29.10.2019**
Ort der Prüfung: *Place of testing*:	**Hong Kong**
Prüflaboratorium: *Testing laboratory*:	**TÜV Rheinland Hong Kong Ltd.**
Prüfergebnis*: *Test result**:	**Pass**

geprüft von / *tested by*:

kontrolliert von / *reviewed by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
07.11.2019	Benny Lau / Senior Project Manager		07.11.2019	Sharon Li / Unit Senior Manager	

Sonstiges / *Other*: **FCC ID: 2AE67-2912**

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2410 - 2475MHz
Type of modulation	GFSK
Number of channels	66
Type of antenna	Integral PCB Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	4.5 VDC

Product function and intended use

This device is a toy sword for game play. The score of each player is synchronized by the 2.4GHz RF linked. It is powered by 4.5VDC (3 x 1.5V AAA batteries)

FCC ID: 2AE67-2912

Models	Product description
AG-2912	Short Range Device - Toy Sword (2.4GHz)

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.-

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- Test mode samples with maximum RF output power and duty cycle and capable to transmit continuously at the lowest, middle and highest frequency channels is provided by the applicant for the testing.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

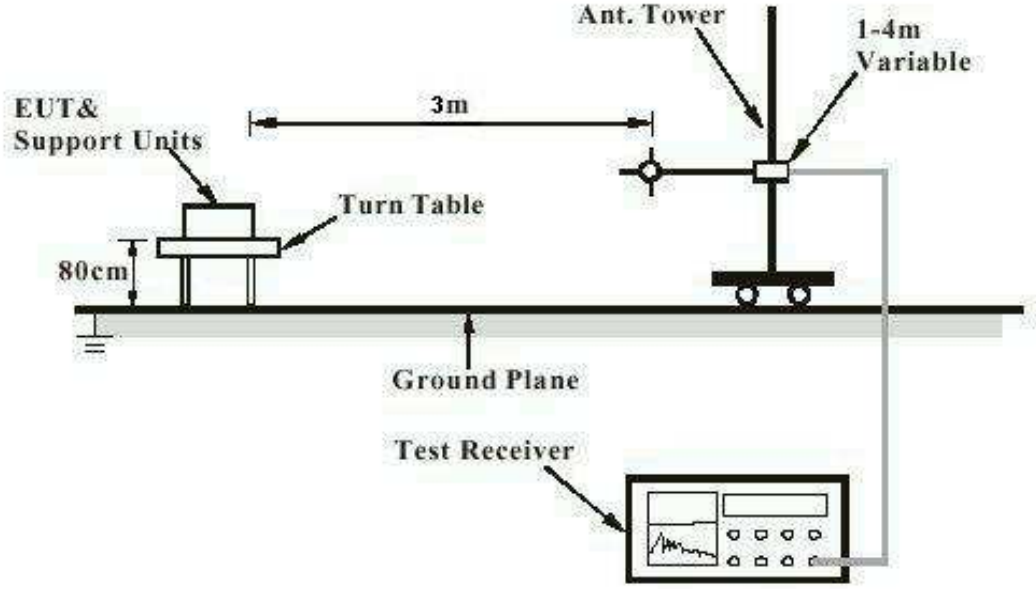
FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

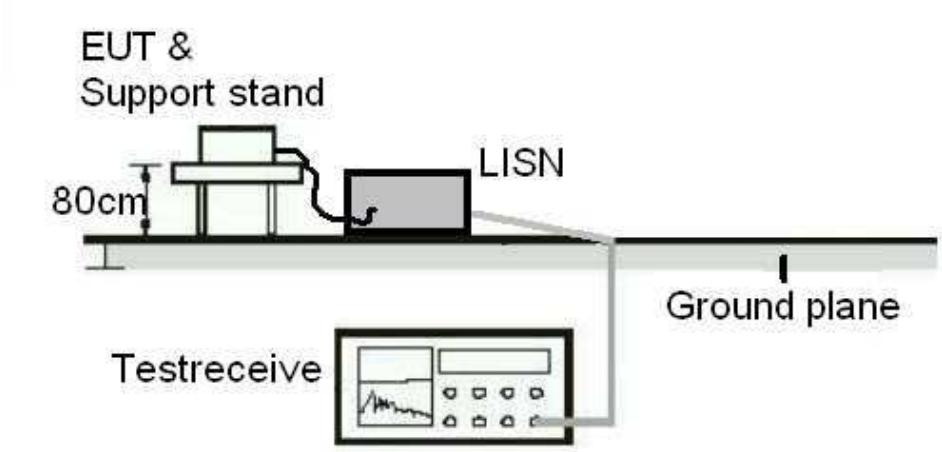
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong·
Tel.: +852 2192 1000
Fax: +852 2192 1001
Email service-gc@tuv.com
Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Type	: Accredited Test Firm
Designation Number	: HK0013
Test Firm Registration Number	: 371735
Scope	: Intentional Radiators

List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	23 Apr 2019	23 Apr 2020
Test Receiver	R & S	ESU26	11 Jun 2019	11 Jun 2020
Bi-conical Antenna	R & S	HK116	21 Mar 2018	21 Mar 2020
Log Periodic Antenna	R & S	HL223	22 Mar 2018	22 Mar 2020
Cable with I-Joint Conector	Huber+Suhner	CNM-NMCMILX800-473	04 Oct 2018	04 Oct 2020
Active Loop Antenna	EMCO	6502	25 Oct 2018	25 Oct 2019
Double-Ridged Waveguide Horn	EMCO	3116	05 Oct 2018	05 Oct 2019
Double-Ridged Waveguide Horn	EMCO	3117	30 Aug 2018	30 Aug 2020
Cable with I-Joint Conector	Huber+Suhner	CNM-NMCMILX800-473	04 Oct 2018	04 Oct 2020
Microwave Preamplifier	COM-POWER Corporation	PAM-118A	25 Jun 2019	25 Jun 2020
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	30 Jan 2019	30 Jan 2020
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30 Oct 2017	30 Oct 2019
High Frequency Cable	Pasternack	PE3VNA4001-3M	29 Jan 2019	29 Jan 2020
Horn Antenna	EMCO	3115	28 Mar 2018	28 Mar 2020

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	26-Jun-2019	26-Jun-2020

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±2.42dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±4.81dB (9kHz to 30MHz) and ±4.62dB (30MHz to 200MHz) and ±5.67dB (200MHz to 1000MHz) and is ±5.07dB (1GHz to 8.2GHz) and ±4.58dB (8.2GHz to 12.4GHz) and ±4.78dB (12.4GHz to 18GHz)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type:	Fixed Integral wire antenna
	b) Manufacturer and model no:	N/A
	c) Peak Gain:	0 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only one integral antenna can be used.
Verdict:	N/A

FCC 15.207 – Conducted Emission on AC Mains	**N/A**
There is no AC power input or output ports on the EUT.	

Subclause 15.215 (c) – 20 dB Bandwidth	**Pass**
Test Specification : ANSI C63.10 – 2013 Test date : 29.10.2019 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 4.5 VDC Temperature : 25ºC Humidity : 52%	
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.

Frequency (MHz)	**20 dB left (MHz)**	**Limit (MHz)**	**20 dB right (MHz)**	**Limit (MHz)**
2410	2409.472	> 2400	2410.534	< 2483.5
2443	2442.466	> 2400	2443.552	< 2483.5
2475	2474.466	> 2400	2475.552	< 2483.5

Subclause 15.249(a) – Field Strength of Fundamental and Harmonics **Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 23.10.2019
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 4.5 VDC
Temperature : 24ºC
Humidity : 51%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: PASS.

Fundamental Frequency 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2410.006	69.3	114.0 / PK
2410.006	46.8	94.0 / AV

Fundamental Frequency 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2409.755	68.2	114.0 / PK
2409.755	43.9	94.0 / AV

Harmonics 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4820.012	44.7	74.0 / PK
4820.012	28.8	54.0 / AV

Harmonics 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4820.011	43.9	74.0 / PK
4820.011	27.8	54.0 / AV

Fundamental Frequency 2443MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2443.14	70.9	114.0 / PK
2443.14	48.3	94.0 / AV

Fundamental Frequency 2443MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2443.006	70.4	114.0 / PK
2443.006	47.4	94.0 / AV

Harmonics 2443MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4886.011	44.7	74.0 / PK

4886.011	28.6	54.0 / AV
Harmonics 2443MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4886.725	44.9	74.0 / PK
4886.725	28.5	54.0 / AV
Fundamental Frequency 2475MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2475.003	71.2	114.0 / PK
2475.003	48.5	94.0 / AV
Fundamental Frequency 2475MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2475.003	73.1	114.0 / PK
2475.003	50.2	94.0 / AV
Harmonics 2475MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4950.076	45.0	74.0 / PK
4950.076	28.6	54.0 / AV
Harmonics 2475MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4950.006	45.0	74.0 / PK
4950.006	28.7	54.0 / AV

Subclause 15.249(d),15.205 – Out Of Band Radiated Emission **Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 23.10.2019
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 4.5 VDC
Temperature : 24ºC
Humidity : 51%

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

Results: All three transmit frequency modes comply with the field strength limit of section 15.209. There is no spurious found below 30MHz.

Tx frequency 2410MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	43.2	74.0 / PK
2400.000	22.0	54.0 / AV

Tx frequency 2410MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	40.3	74.0 / PK
2400.000	21.9	54.0 / AV

Tx frequency 2443MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Tx frequency 2443MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Tx frequency 2475MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	36.4	74.0 / PK
2483.500	22.6	54.0 / AV

Tx frequency 2475MHz Horizontal Polarization

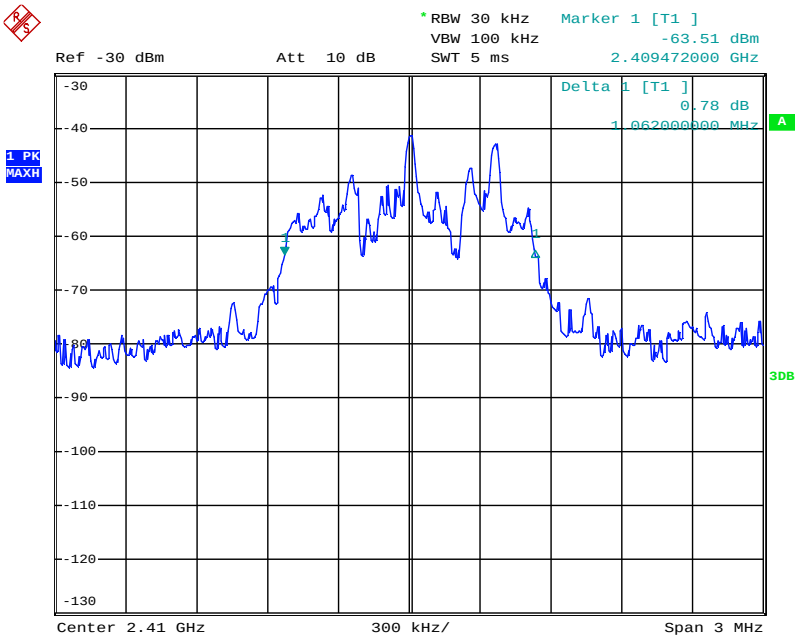
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	38.5	74.0 / PK
2483.500	22.4	54.0 / AV

Appendix 1

Test Results

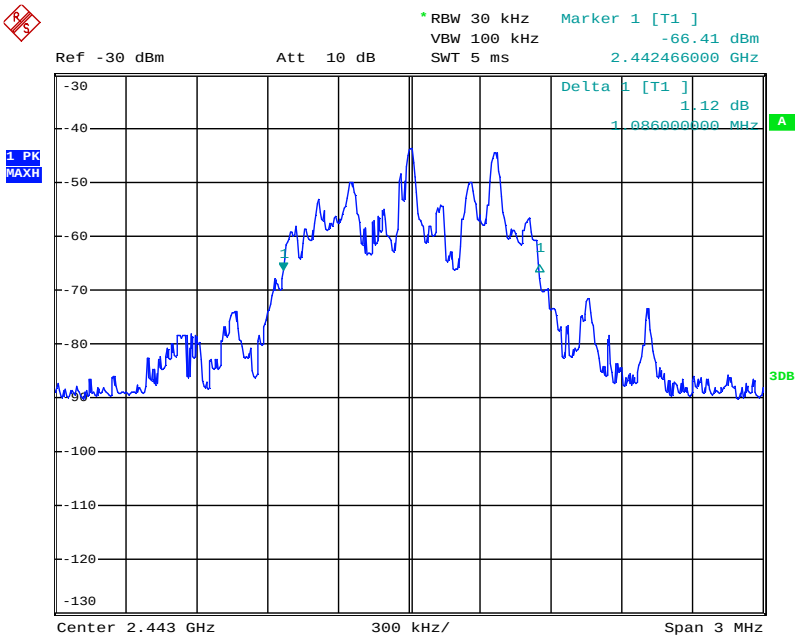
20dB Bandwidth

Tx frequency: 2410MHz



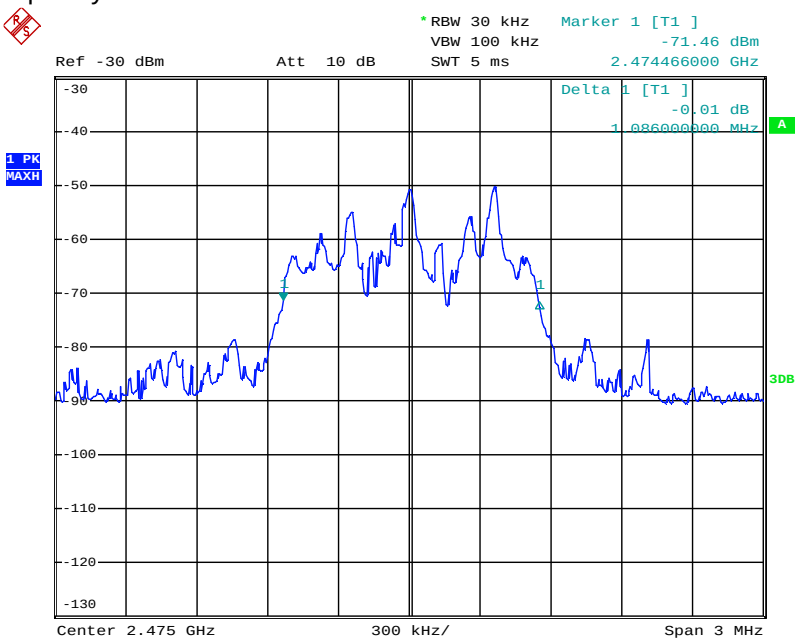
Date: 29.OCT.2019 11:21:37

Tx frequency: 2443MHz



Date: 29.OCT.2019 11:22:23

Tx frequency: 2475MHz



Date: 29.OCT.2019 11:24:57

Appendix 2

Test Setup Photos

Set-up for Radiated Emission

Appendix 3

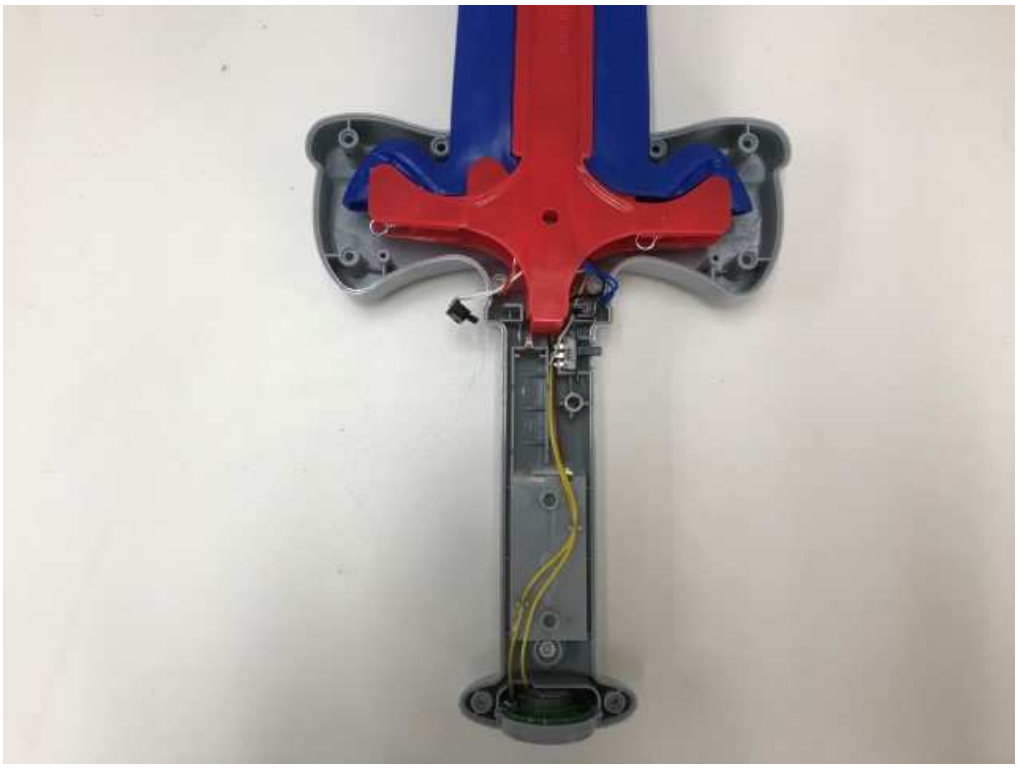
EUT External Photos

External View

External View

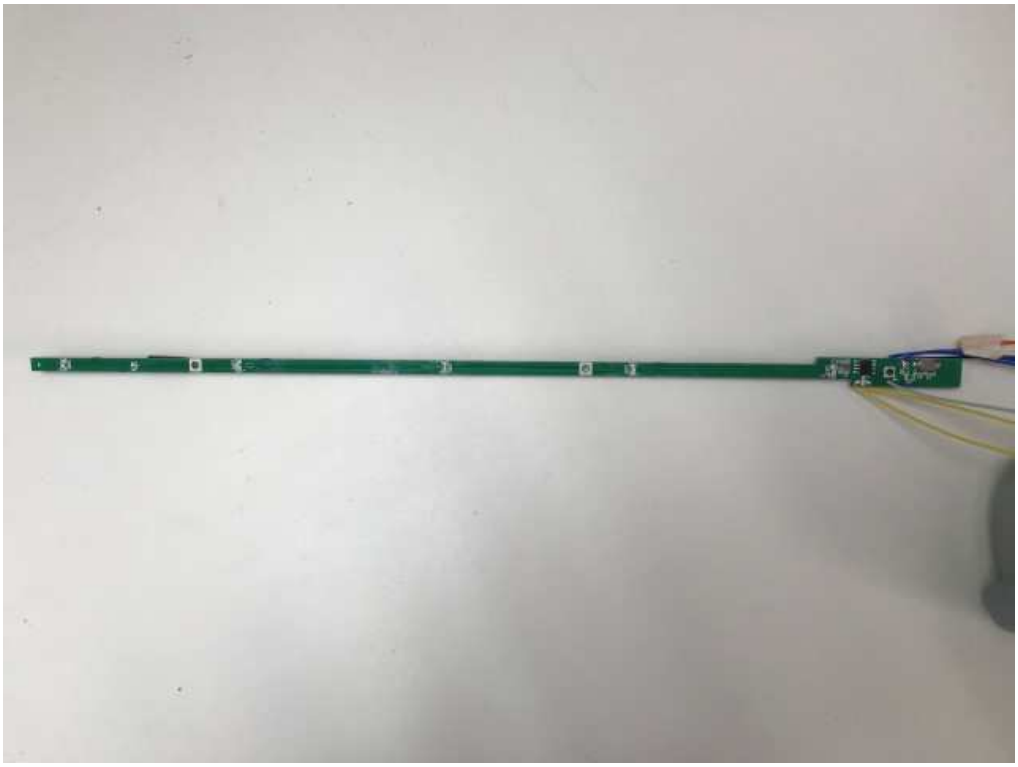
Appendix 4

EUT Internal Photos

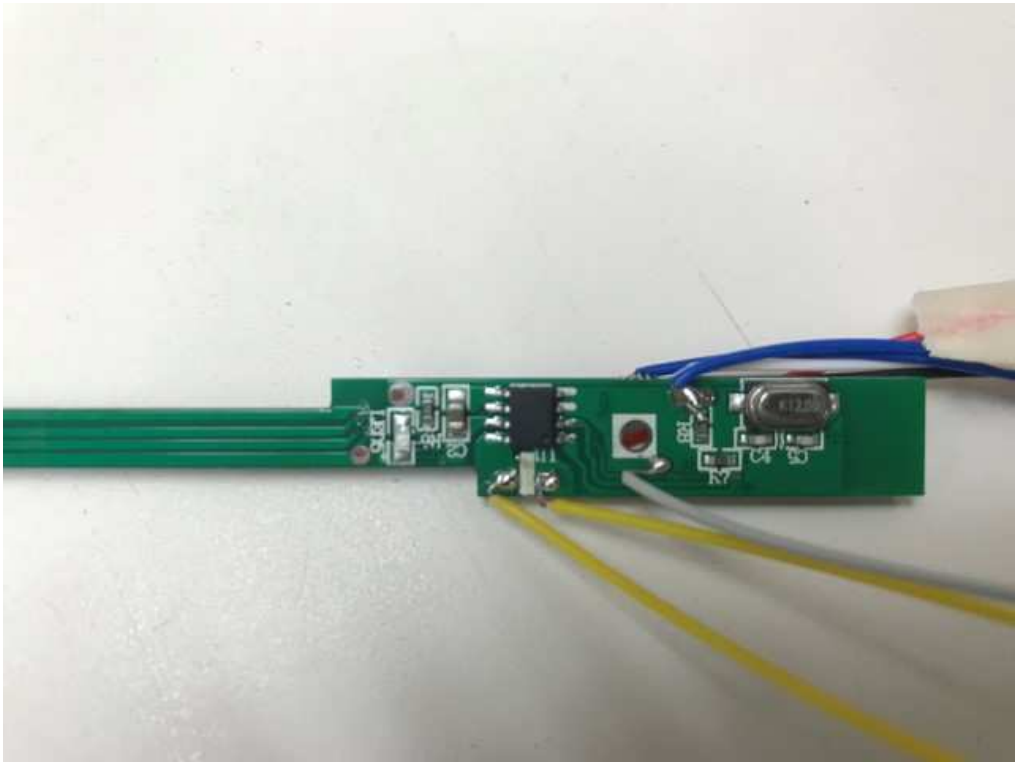


Internal View

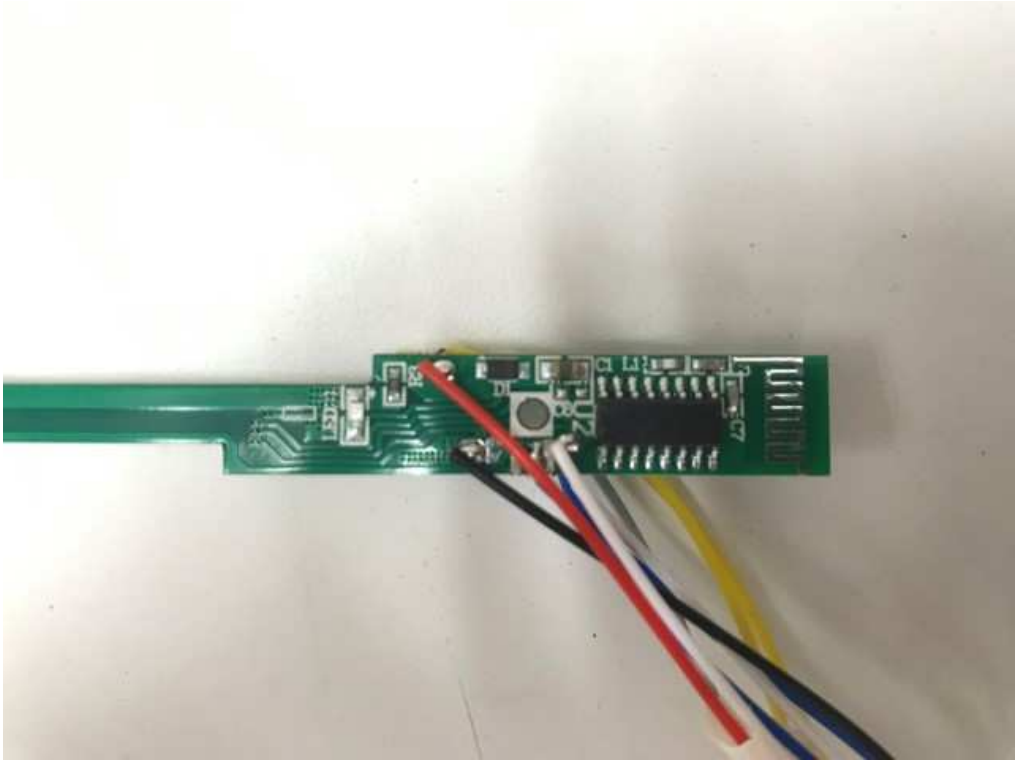
Internal View



Internal View



Internal View



Internal View

Appendix 5

RF Exposure Information

Maximum transmitter power:

Frequency (MHz)	Maximum peak output power (dBm)	Output power (mW)
2410	-25.9	0.003
2443	-24.3	0.004
2475	-24.3	0.006

For FCC

According to KDB 447498 D01:
The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤50 mm are determined by:
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where
• f(GHz) is the RF channel transmit frequency in GHz
• Power and distance are rounded to the nearest mW and mm before calculation
• The result is rounded to one decimal place for comparison
• 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

Result:

(0.003/5)*√2.410 = 0.0009 <3.0

(0.004/5)*√2.443 = 0.0012 <3.0

(0.006/5)*√2.475 = 0.0019 <3.0

Conclusion:
No SAR is required.